Highway 101 Twinning Three Mile Plains to Falmouth

Environmental Assessment Update

Final Report

CBCL

211244.00 • April 2022

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Maritime Centre, 1505 Barrington Street, Suite 901
Box 606, Halifax, NS B3J 2R7
902-421-7241 | CBCL.ca | info@CBCL.ca

April 25, 2022

Renata Mageste da Silva
Environmental Assessment Officer
Department of Environment and Climate Change
1903 Barrington Street, Suite 2085
PO Box 442
Halifax, NS B3J 2P8

Dear Ms. Mageste da Silva:

RE: Highway 101 Twinning Three Mile Plains to Falmouth Environmental Assessment Update

CBCL Limited on behalf of Nova Scotia Department of Public Works (NSDPW) is pleased to provide Nova Scotia Environment and Climate Change (NSECC) this update to their Class 1 Environmental Assessment (EA) for the twinning of Highway 101 between Three Mile Plains and Falmouth (The Project).

This document is intended 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.

If you have any questions, please do not hesitate to reach out to Bob Pett (NSDPW) or myself.

Sincerely,

CBCL Limited

Melissa Rutherford

Melissa Rutherford, B.Sc., P.Biol., R.P. Bio
Environmental Scientist
Direct: (902) 717-8487
E-Mail: mrutherford@cbcl.ca

Attached: Environmental Assessment Update

Project No: 211244.00

Contents

Figures

Tables

Appendices

List of Acronyms

BOD	biological oxygen demand
CCME	Canadian Council of Ministers of the Environment
CFU	colony forming units
CLC	Community Liaison Committee
cm	centimetre
CPUE	catch per unit effort
CGVD2013	Canadian Geodetic Vertical Datum of 2013
CWS	Canadian Wildlife Service
DEM	digital elevation model
DFO	Fisheries and Oceans Canada
DO	dissolved oxygen
EA	environmental assessment
ECCC	Environment and Climate Change Canada
EPP	Environmental Protection Plan
GCDWQ	Guidelines for Canadian Drinking Water Quality
GIS	geographic information system
ha	hectare
h	horizontal
GCDWQ	Guidelines for Canadian Drinking Water Quality
km	kilometers
KMKNO	Kwilmu'kw Maw-klusuaqn Negotiation Office
l	litre
l/min	litres per minute
µS/cm	microSiemens per centimetre
m	metres
ml	millilitre
mm	millimetre
m/s	metres per second
mg	milligram
mg/L	milligram per litre
MCG	Mi’kmaq Conservation Group
MEKs	Mi’kmaq Ecological Knowledge study
N/A	not applicable
NovaWET	Nova Scotia Wetland Evaluation Technique
NSDA	Nova Scotia Department of Agriculture
NSE	Nova Scotia Environment

NSECC	Nova Scotia Environment and Climate Change
NS ESA	Nova Scotia *Endangered Species Act*
NSLF	Nova Scotia Department of Lands and Forestry
NSOAA	Nova Scotia Office of Aboriginal Affairs
NSP	Nova Scotia Power
NSDPW	Nova Scotia Department of Public Works
OHWM	ordinary high-water mark
PID	Property Identification Number
PDA	Project Development Area
PPT	parts per thousand
PSU	practical salinity units
SAR	Species at Risk
SARA	*Species at Risk Act*
SCADA	supervisory control and data acquisition
SoCI	Species of Conservation Interest
TDS	total dissolved solids
TSS	total suspended solids
UV	ultraviolet
v	vertical
VC	Valued Component
WESP-AC	Wetland Ecosystem Services Protocol for Atlantic Canada
WSS	Wetlands of Special Significance

Chapter 1 Introduction

1.1 Overview of Project Update

Nova Scotia Department of Public Works (NSDPW), formerly Nova Scotia Transportation and Infrastructure Renewal, is in the process of constructing the Highway 101 Twinning Three Mile Plains to Falmouth Project (the Project). The Project received approval (with conditions) pursuant to Section 40 of the Nova Scotia *Environment Act*, S.N.S. 1994-95 and subsection 13(1)(b) of the *Environmental Assessment Regulations*, N.S. Reg. 348/2008 on June 27, 2017 (EA Approval). The approved Project includes the construction, operation, and maintenance of approximately 9.5 km of highway to twin the existing Highway 101 from Trunk 14 (Exit 5) at Three Mile Plains to an area 2.5 km west of the Falmouth Connector (Exit 7) including the aboiteau upgrade at the Avon River in Hants County, Nova Scotia (Figure 1.1).

While NSDPW is the lead department on this Project, the aboiteau and associated flood protection component is in partnership with the Nova Scotia Department of Agriculture (NSDA) who own and operate the provincial dykelands system. Due to the proximity and relationship between Highway 101 and the flood protection system, it was determined that these critical pieces of infrastructure must be designed and upgraded in a coordinated manner. This Project is also being coordinated with NSDA's effort to raise the elevation of existing dykes that are outside the Project vicinity, as mandated under the *Agricultural Marshland Conservation Act*. This coordination also provided opportunities for added value to the Province by leveraging efficiencies associated with treating these individual components together as a system approach.

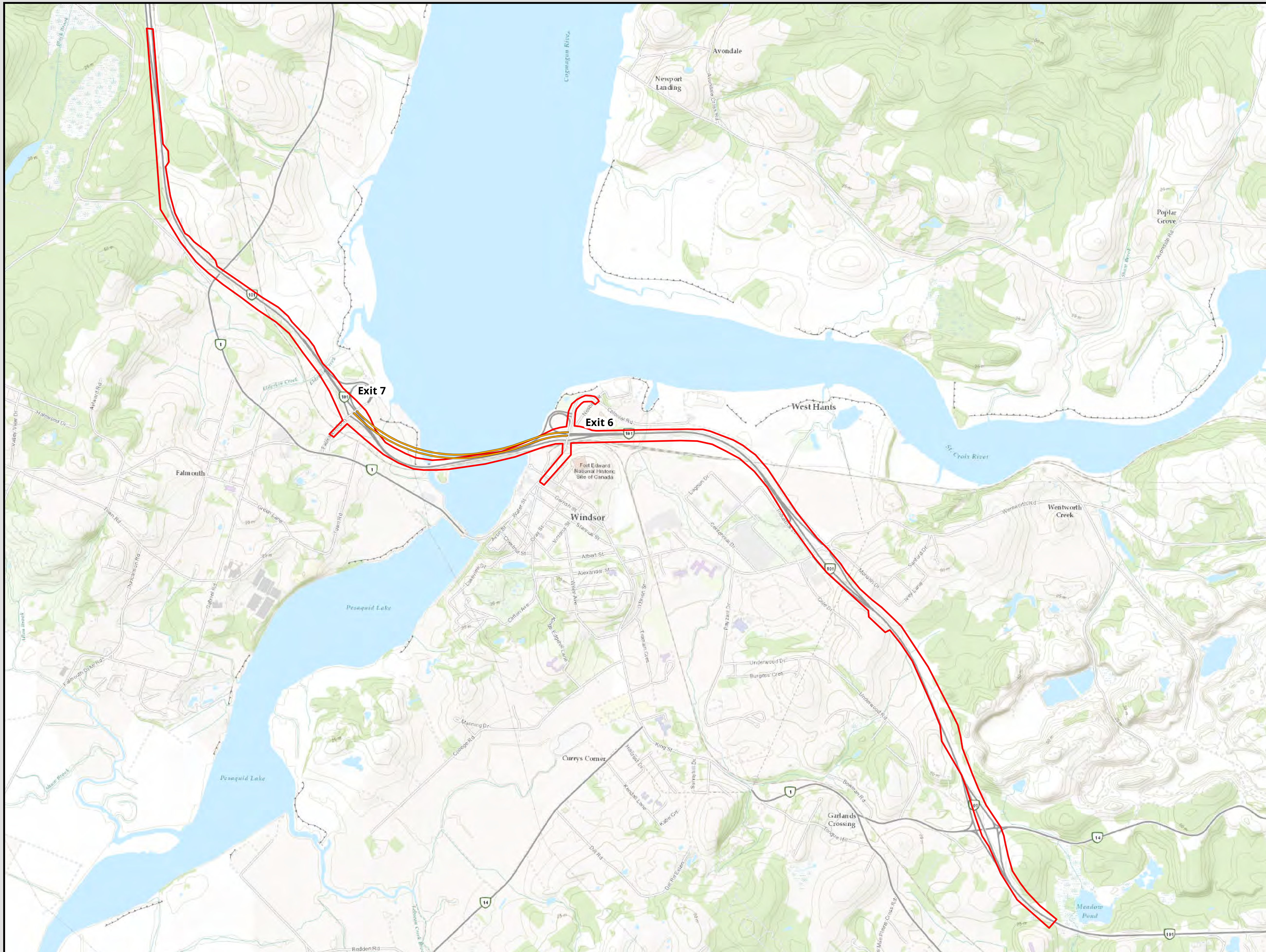
Since the submission of the Class 1 Environmental Assessment (EA) in May 2017, further design refinement has led to the conclusion that upgrading the existing Avon River Aboiteau requires a full structure replacement in a new location, two highway bridges on a new alignment, and new dykes to provide the required flood system protection and complete the highway twinning project (CBCL, 2019).

The seaward side of the existing aboiteau is in poor condition as it has been subject to several decades of exposure to a harsh climate. Conditions associated with climate change, such as sea-level rise and higher storm intensities, increase the risk that water will overtop the existing causeway over time. Additionally, to bring the highway up to current standards, a new alignment was designed with higher radius curves. To avoid moving the locations of the existing interchanges, which would result in an undesirable cascading effect on adjacent infrastructure, a new causeway and aboiteau is required to provide a roadbed for the new highway alignment across the Avon River and to prevent flooding upstream.

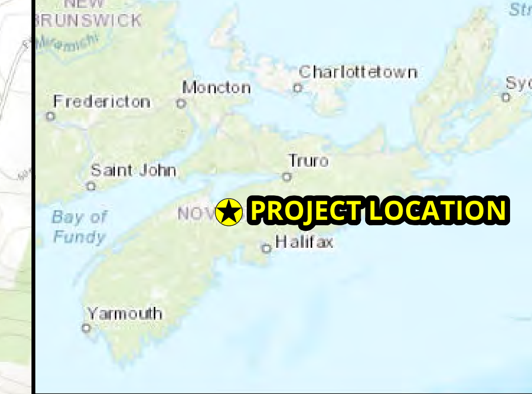
Since March 20, 2021, DFO Ministerial Orders have directed NSDA to operate the tidal gates in a manner that improves fish passage. Specifically, the DFO Ministerial Orders direct that the gates must be fully opened during outgoing tides and again during incoming tides to allow a minimum of 10 minutes of salt water from the Bay of Fundy to enter the lake upstream of the gate (Pesaquid Lake on Figure 1.1). The Orders also direct that no water is to be impounded above the causeway; therefore, Pesaquid Lake no longer exists as a freshwater lake. Currently, tidal waters inundate a portion of the Avon River upstream of the existing causeway. Although not a change in the Project, the resulting change in upstream habitat conditions from those described in the original EA is also considered as part of this update report.

This EA update has been prepared to provide details of the changes to the Project to Nova Scotia Environment and Climate Change (NSECC). This EA update describes the changes to the Avon River Aboiteau and Dyke System, and provides the final design and operational regime, and the associated environmental effects that were not evaluated in the 2017 EA. Specifically, NSECC requested the update to include modifications to the Avon River Aboiteau and Dyke System that may result in changes to the Project and EA that are not authorized or in the process of being authorized under another regulatory approval. In response to NSECC's request, the EA update includes the following items related to the new Aboiteau and Dyke System:

- Maps and drawings clearly identifying the original footprint of the approved Project and the proposed new one, if changed
- Proposed construction and operation schedules, if changed
- Potential adverse effects to surface water (including wetlands), groundwater, and social valued environmental components
- Additional proposed mitigation measures
- Any other information or factors relevant to the assessment of the effects of the new aboiteau location and operation on the environment



KEY MAP



LEGEND

- Original Approved Highway Alignment (2017)
- Proposed Highway Alignment (2022)

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FIGURE 1.1: Project Location

Drawn: NH	Date: 2022-03-15
Checked: MR	CBCL Project Number: 211244
Approved: MR	Scale @ 11"x17" 1:26,000

NOTES:

0 260 520 1,040 m

Coordinate System: NAD 1983 UTM Zone 20N
Units: Meter

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1.2 Identification of the Proponent / Proponent Representatives

This EA update was prepared by CBCL Limited (CBCL) on behalf of NSDPW and Nova Scotia Department of Agriculture (NSDA). Table 1.1 provides the contact information for this update.

Table 1.1 Proponent and Consultant Contact Information

Proponent:	Nova Scotia Department of Public Works (NSDPW) P.O Box 186 Johnston Building, 1672 Granville Street Halifax, NS B3J 2N2
	Nova Scotia Department of Agriculture (NSDA) 6th floor (Suite 605), 1800 Argyle Street Halifax, NS B3J 3N8 Mailing Address: PO Box 2223 Halifax, NS B3J 3C4
Proponent Contact:	Bob Pett, Ph.D. Senior Environmental Scientist NSDPW Telephone: (902) 424-4082 Cell: (902) 497-6212 Email: Bob.Pett@novascotia.ca
Consultant:	CBCL Limited 1505 Barrington Street, Suite 901 PO Box 606 Halifax, NS B3J 2R7
Consultant Contact:	Melissa Rutherford, B.Sc. R.P.Bio, P. Biol. Environmental Scientist CBCL Limited Telephone: (902) 421-7241, ext. 2574 Email: mrutherford@cbcl.ca

1.3 Regulatory Context

Following the 2017 EA Approval, the proponent obtained permits and approvals from relevant regulatory agencies for construction of the Project, which commenced in 2018. Permits, approvals, and authorizations for the Avon River Aboiteau and causeway expansion have been acquired separately from the other approvals as the design for the aboiteau structure, roadways, and new dykes has developed from 2017 through 2021. The Avon River Aboiteau portion is being permitted in two phases in an effort to advance time-sensitive components, such as the widened causeway embankment, which requires several years to consolidate before it can adequately support the new twinned highway.

Phase 1 includes the causeway expansion. Construction started in 2020, including the following:

- Roadbed subgrade construction, which involved infilling of the Windsor Marsh wetland for the purpose of the future highway including initial embankment and toe berms.
- Dyke base construction, which involved infilling of the wetland for the purpose of the permanent dyke and construction of the permanent dyke and toe berms.
- Completion of a geotechnical program in conjunction with subgrade construction to determine underlying soil characteristics and embankment stability.

Phase 2 includes the Avon River Aboiteau and Dyke System. The permitting and approvals process is underway including the following items, as illustrated in Figure 2.4.

- Construction of the new aboiteau within a new channel west of the existing alignment of the Avon River downstream of the existing aboiteau.
- Construction of new dykes extending from Exit 7 into the Elderkin Marsh to the new aboiteau structure, and from the new aboiteau structure across the existing river channel, then following the east side of the existing river channel to a new section of causeway north of the existing causeway.
- Partial demolition of the existing aboiteau including removal of the gates.

DFO Ministerial Orders directing NSDA's operation of the tidal gates in a manner that improves fish passage have been issued approximately biweekly since March 20, 2021. The DFO Ministerial Orders include conditions such that:

i. No water is being impounded above the causeway
ii. Both gates are fully open throughout each of the outgoing tides
iii. Both gates are fully opened during incoming tides to allow a minimum of 10 minutes of saltwater entry upstream of the gates.

Since that time, the water levels upstream of the existing causeway are held at an elevation where Pesaquid Lake no longer exists.

Table 1.2 provides a list of the applications for permits, approvals, and authorizations for the Avon River Aboiteau that have been submitted or acquired and the status of each.

Table 1.2 Avon River Aboiteau - Permits, Approval and Authorizations

Permit, Approval, or Authorization / No:	Applicable Legislation	Issuing Body	Status	Aspect of Project Included
Fisheries Act Authorization 19-HMAR-00216	*Fisheries Act*	Fisheries and Oceans Canada (DFO)	Authorization Received	Causeway Embankment including alteration of 10.7 ha (1.8 ha – tidal side channel and 8.9 ha - Windsor Marsh wetland*[1])
Water Approval – Wetland Alteration 2019-2567954-00	*Environment Act*	NSECC	Approval Received	Causeway Embankment (1.8 ha - tidal side channel and 8.9 ha - Windsor Marsh wetland*[1])
Fisheries Act Authorization 20-HMAR-00391	*Fisheries Act*	Fisheries and Oceans Canada (DFO)	Under Review	Aboiteau and New Dyke including the alteration of approximately 5.5 ha of wetlands, 6.1 ha of mudflats, banks and tidal channels, and 1.25 ha of the Avon River.
Water Approval – Wetland Alteration 2020-2767667-0*	*Environment Act*	NSECC	Under Review	Aboiteau and New Dyke including approximately 5.0 ha of the Elderkin Marsh and 0.5 ha of the Windsor Marsh
Approval 2020-203455*[2]	*Canadian Navigable Waters Act*	Transport Canada	Under Review	Aboiteau and New Dyke

*[1] Note: Further design led to a reduced impact on the Windsor Marsh compared to the original prediction. Post-construction monitoring will quantify the actual loss and required habitat offsetting/compensation.
*[2] Note: Updates to the Phase 2 applications submitted in December 2020 or associated approvals, such as the NSECC Wetland Alteration and Transport Canada application for the alteration of the Aboiteau PDA may be required following further DFO review and completion of final design later this year.

The *Agricultural Marshland Conservation Act* is administered by the NSDA and governs the protection of dyked marshlands in Nova Scotia for agricultural purposes. As prescribed under Section 4, the Minister of Agriculture has the power to reconstruct, repair, operate and maintain any works for the protection, drainage, and improvement of marshland for agricultural purposes. In doing so, the Minister has the power to designate the boundaries of the marshland in which the aforementioned activities occur and may include any adjacent lands that the Minister deems necessary for the construction or maintenance of said works. Works may include, but are not limited to, dykes, aboiteaux, breakwaters, roads, and any other structure necessary for the protection of agricultural marshlands.

Section 5D of the Activities Designation Regulations established under Section 66 of the *Environment Act*, identifies maintenance of "lands and structures by marsh bodies incorporated under the *Agricultural Marshland Conservation Act*" to be exempt from requiring an Approval or Notification. A Water Approval – Wetland Alteration has been submitted for the construction of the causeway and the aboiteau structure; however, discussions with NSECC confirmed that the proposed operations of the structure do not require an Approval so long as the work is for the maintenance of lands and structures under the *Agricultural Marshland Conservation Act*. NSDPW is currently conducting Year 1 post-construction monitoring at the Windsor Marsh as part of a minimum 5-year program at this site (and terms and conditions of DFO and NSECC approvals).

1.4 Structure of the EA Update

The structure and layout of the EA update follows the structure and layout of the original EA document prepared by Stantec (2017) that was approved by NSECC for the Highway 101 Twinning Three Mile Plains to Falmouth Project. The EA update document describes the changes, modifications, and updates for the Project in the following sections:

- Chapter 2: Updated Project Description
    - Changes to the design of the Project, including a description for the new aboiteau structure which was not provided in the 2017 EA document
- Chapter 3: Stakeholder Consultation and Indigenous Engagement
    - Summary to date of the ongoing consultation and engagement process since the submission of the 2017 EA document
- Chapter 4: Changes in Environmental Effects
    - Description of the changes in Environmental Effects to VCs due to the updated design of the Project, including the new aboiteau structure and the operational plan
- Chapter 5: Summary
    - Summary of the EA update

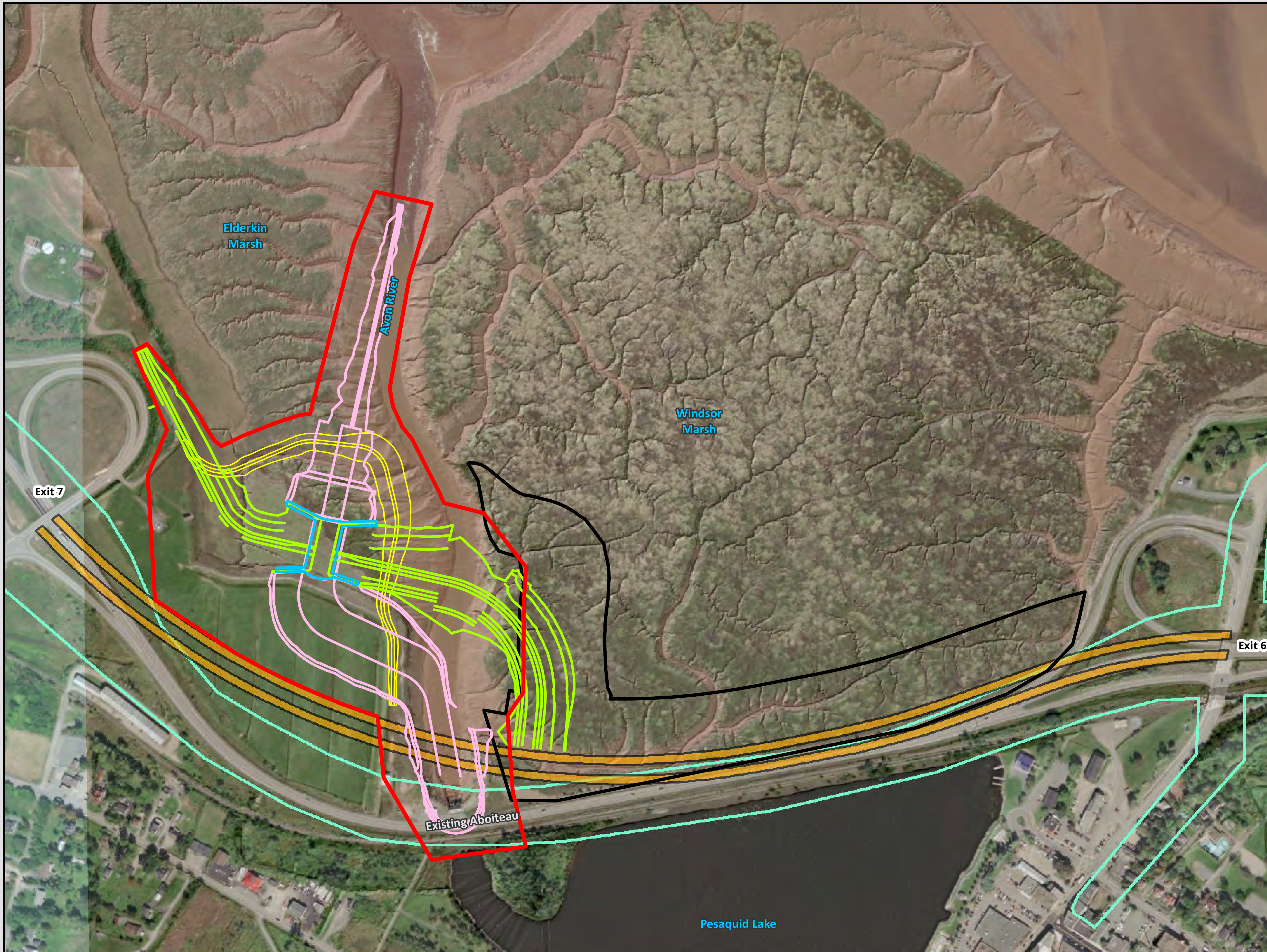
Chapter 2 Updated Project Description

This section provides an update to the Project components as a result of revisions to the Project design. Project Activities associated with the construction, operation, and maintenance of the Updated Project Components are described to facilitate identification and evaluation of any potential changes to environmental effects.

2.1 Location of Updated Project Components

The Avon River Aboiteau and causeway is located between Exit 6 and Exit 7 of Highway 101. The new Avon River Aboiteau and Dyke System will be located approximately 400 metres (m) downstream of the existing aboiteau structure, on the west side of the existing Avon River channel. The new highway bridges will be constructed over the existing Avon River channel on the downstream side of the existing causeway. The dyke system will run from the upland area at Exit 7, to the new aboiteau, then across the Avon River to the new causeway (Figure 2.1). Design drawings are provided in Appendix A.

Since the original EA submission, the Project Development Area (PDA) has been further refined with the design of the aboiteau and dyke system including a buffer area around the Proponent components, aboiteau, permanent dykes, and highway bridges. The updated development area includes the addition of approximately 19.7 ha and includes the area of alteration as described in the Phase 2 applications packages provided to NSECC and DFO (Section 1.3). For the purposes of this EA update, a focused development area (the Aboiteau PDA) has been defined including the aboiteau, permanent dykes, and highway Bridges, and the areas of construction activities that have not been previously approved by other regulatory approvals or already completed.



KEY MAP

LEGEND

- Aboiteau Project Development Area
- Aboiteau Structure
- Permanent Dyke
- Realigned Channel
- Temporary Dyke
- Avon River Causeway Phase 1 Development Area (As submitted in NSE and DFO Applicaitons)
- Proposed Highway Concept (2022)
- Original Approved Highway Alignment (2017)

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FIGURE 2.1: Project Layout and Aboiteau Project Development Area

Drawn: NH	**Date: 2022-03-15**
Checked: MR	**CBCL Project Number: 211244**
Approved: MR	**Scale @ 11"x17"**

NOTES:

0 45 90 180 m

Coordinate System: NAD 1983 UTM Zone 20N
Units: Meter

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The geographic coordinates that define the boundaries for the Aboiteau PDA are presented in Table 2.1.

Table 2.1 Approximate Extent of the Aboiteau PDA (NAD 83 UTM Zone 20 N)

ID	Location Markers	
	Easting	Northing
A	409445	4983963
B	409374	4983979
C	409291	4983695
D	409177	4983654
E	409083	4983784
F	409065	4983775
G	409108	4983675
H	409083	4983616
I	409092	4983458
J	409377	4983308
K	409384	4983231
L	409446	4983126
M	409566	4983143
N	409543	4983310
O	409563	4983339
P	409566	4983499
Q	409512	4983568
R	409461	4983581
S	409392	4983727

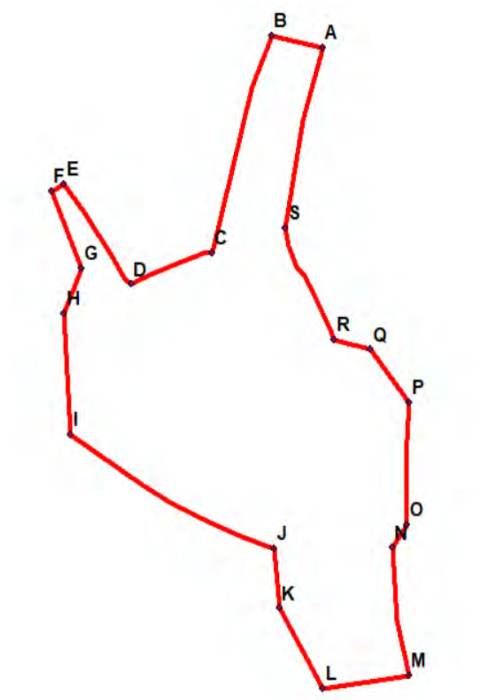

Figure 2.2 Locations of the Aboiteau PDA Geographic Coordinates.

2.1.1 Property Ownership

The updated Avon River highway crossing and dyke system are located entirely on Crown land under the administration and control of NSDPW and NSDA. The property identification number (PID) for this parcel of Highway 101 and adjacent land is 45328028. In August of 2019, ±22.45 ha of crown lands located within the Aboiteau PDA were granted to NSDPW by Nova Scotia Department of Lands and Forestry (NSLF), as indicated in Registry Survey Plan provided in Appendix B. Land ownership, PIDs and land use within the Aboiteau PDA are provided Table 2.2. PIDs proximate to the Aboiteau PDA are shown in Figure 2.3.

Table 2.2 Property Ownership and PID Numbers Adjacent to the Aboiteau PDA

PID	Owner	Land Use / Future Land Use
N/A ±22.45 ha Crownlands	To be NSDPW	Aboiteau, Dyke System, and Highway Alignment
45328028	NSDPW Her Majesty The Queen In Right Of The Province Of Nova Scotia	Aboiteau, Dyke System, and Highway Alignment
45321775	N/A	Highway Alignment
45410032	NSDPW Her Majesty The Queen In Right Of The Province Of Nova Scotia	Aboiteau, Dyke System, and Highway Alignment
45418837	NSDPW Her Majesty The Queen In Right Of The Province Of Nova Scotia	Aboiteau, Dyke System, and Highway Alignment
45026887	Phillip I Burgess Philip Burgess Patricia Burgess	Residential, Commercial, Resource Farm, Resource

KEY MAP

LEGEND

- Parcel A NSLF
- Aboiteau Project Development Area
- Original Project Development Area - EA 2017
- Adjacent Property Boundaries

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FIGURE 2.3:
Property Ownership in Proximity to the Aboiteau Project Development Area

Drawn: SF	Date: 2022-03-15
Checked: MR	CBCL Project Number: 211244
Approved:MR	Scale @ 11"x17" 1:5,000

NOTES:

0 50 100 200 m

Coordinate System: NAD 1983 UTM Zone 20N
Units: Meter

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2.2 Updated Project Components

The Avon River Aboiteau and associated infrastructure includes the following components, described in further detail in the following sections (Figure 2.4 and Figure 2.5):

- Avon River Aboiteau
  - New Aboiteau Structure
  - Channel Realignment
  - Existing Aboiteau
- Permanent Dykes / Highway Causeway
  - Permanent Dyke
- Highway Bridges
  - Eastbound Bridge
  - Westbound Bridge

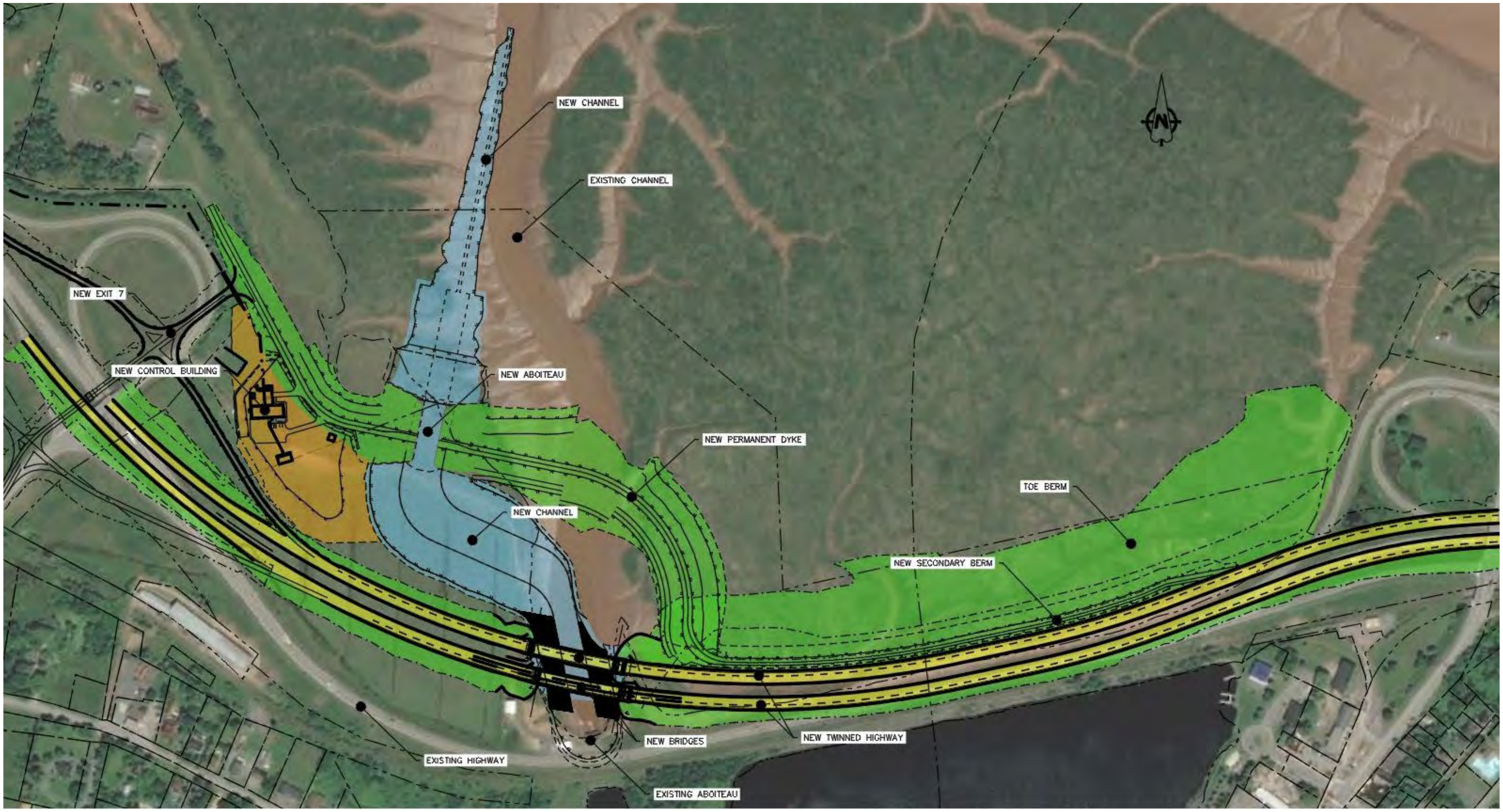


Figure 2.4 Proposed General Arrangement of the Avon River Aboiteau and Dyke System, and Highway Alignment.

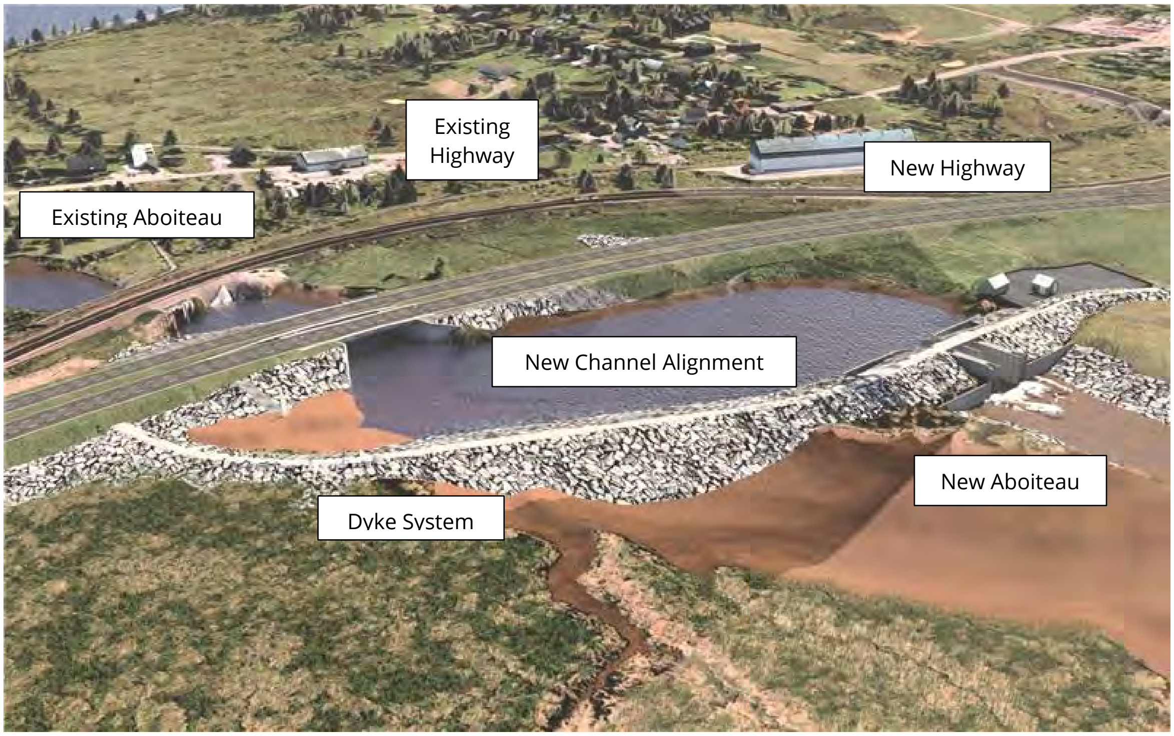


Figure 2.5 Preliminary Conceptual Rendering of the Proposed Upgrades to the Avon River Aboiteau And Causeway.

2.2.1 New Aboiteau Structure

The new aboiteau structure includes an open design with barrier walls and differs from a conventional culvert structure typically found in aboiteaux in this region. The structure has been designed, in consultation with DFO, to satisfy condition 4.2 of the EA Approval to provide improved fish passage compared to the existing aboiteau. On the openings of the barrier walls, gates will be mounted to allow the river to flow downstream at low tide and to either stop or restrict flow upstream at high tide, depending on the water management scenario and mode of operation. The proposed design is open and exposed to daylight, providing natural lighting conditions for fish navigating the structure, while also enhancing opportunities for direct observation within the structure, and providing easier access for operations and maintenance personnel. The proposed structure has straight main channels and will be approximately 69 m long and 25 m wide, not including wing walls (Figure 2.6 and Appendix A).

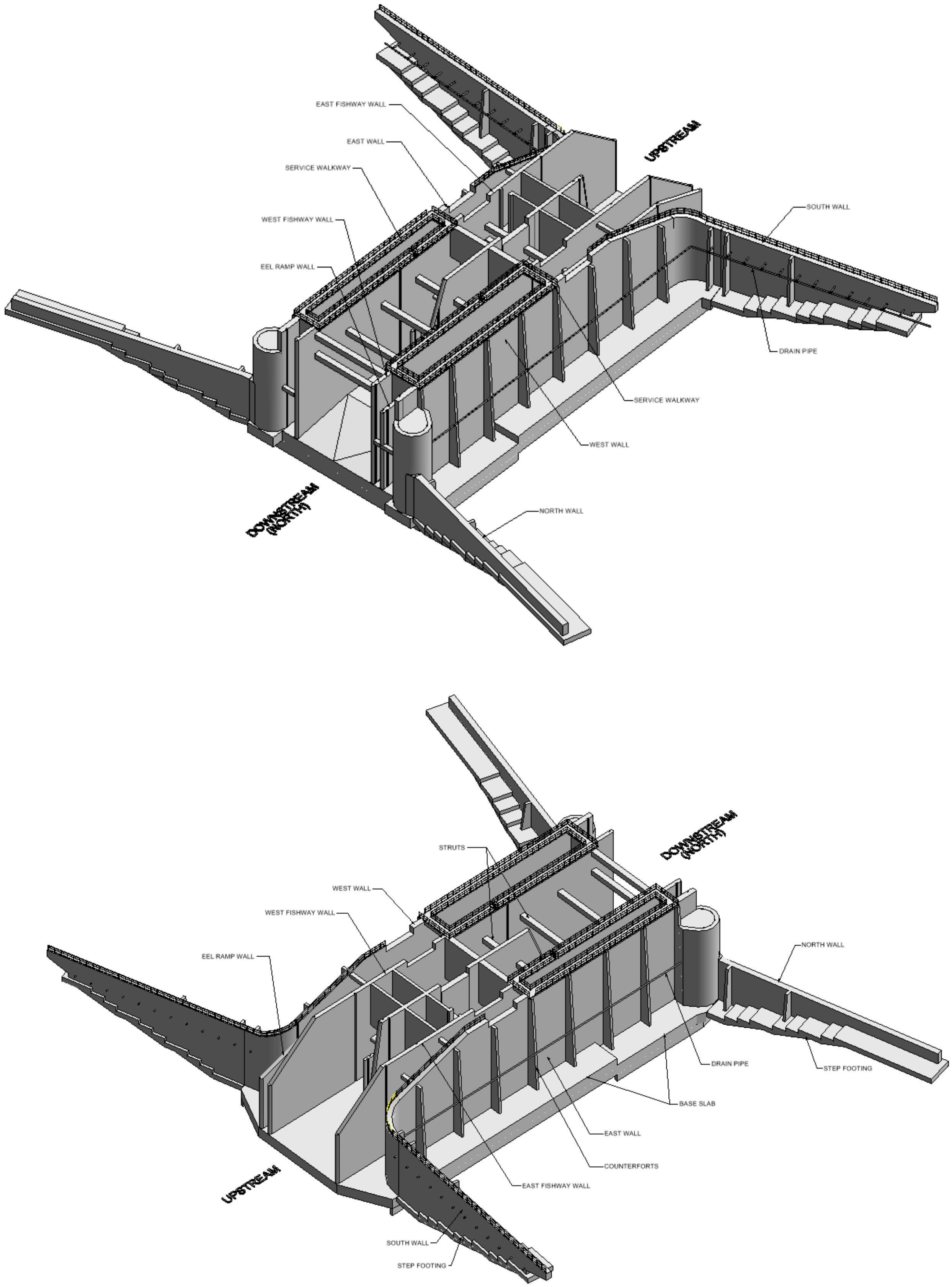


Figure 2.6 Conceptual Rendering of the New Aboiteau Structure.

The new aboiteau will have two main channels, each with active gates. Two baffled Denil (Alaska steeppass type) fishways are incorporated in the design of the new aboiteau; each fishway runs parallel to the main channels, with one fishway on each side of each main channels (Figure 2.6). One eel ramp will also be installed on the west side of the proposed structure, between the fishway and the west main channel. The new aboiteau structure comprises the following structural components:

- Narrow channels (2.36 m wide) on each side of the structure designed to be opened to provide natural light and facilitate the installation, inspection, and maintenance of the baffle components for the fishways. Partitions, also known as demising walls, separate the fishway channels from the main channels.
- East and west retaining walls to retain soil from the permanent dyke that divides the Bay of Fundy and the Avon River.
- Upstream and downstream wing walls support the dyke fill.
- Main channels each 7.2 m wide between the fishway channels.
- An eel ramp (1.2 m wide) between the west fishway and the west main channel.
- The structure is supported by a raft slab approximately 2,000 mm thick.
- Transverse barrier walls between the east and west retaining walls will support both an active gate (roller gate) system and a separate set of passive (flap) gates.

The main components of the structure that are used for the passage of water and fish include the following:

- Two main aboiteau channels.
- Three main gates covering the main aboiteau channels with active roller gates (one 6.6 m wide, one 4.5 m wide and one 1.5 m wide). The barrier wall openings for the wider gates are and 6.6 m high, and the opening for the 1.5 m wide gate is approximately 10 m.
- Two overflow passive flap gates (6.6 m wide x 2.5 m high) with inverts set 300 mm above normal water level of 2.1 m Canadian Geodetic Vertical datum of 2013 (CGVD2013) (i.e., set at 2.4 m CGVD2013).
- Two baffled Denil (Alaskan steeppass type) Fishways (2.36 m wide) with active roller gates at the downstream end.
- One eel ramp (1.2 m wide).

Figure 2.7 depicts a conceptual rendering of the new aboiteau initial configuration, including open channel dimensions. Design drawings are provided in Appendix A. The aboiteau will include two main channels (approximately 7.2 m wide each) complete with barrier walls housing tide gates. The fishways will be 2.36 m wide and 19 m tall with approximately 1.475 m of open space between the baffles.

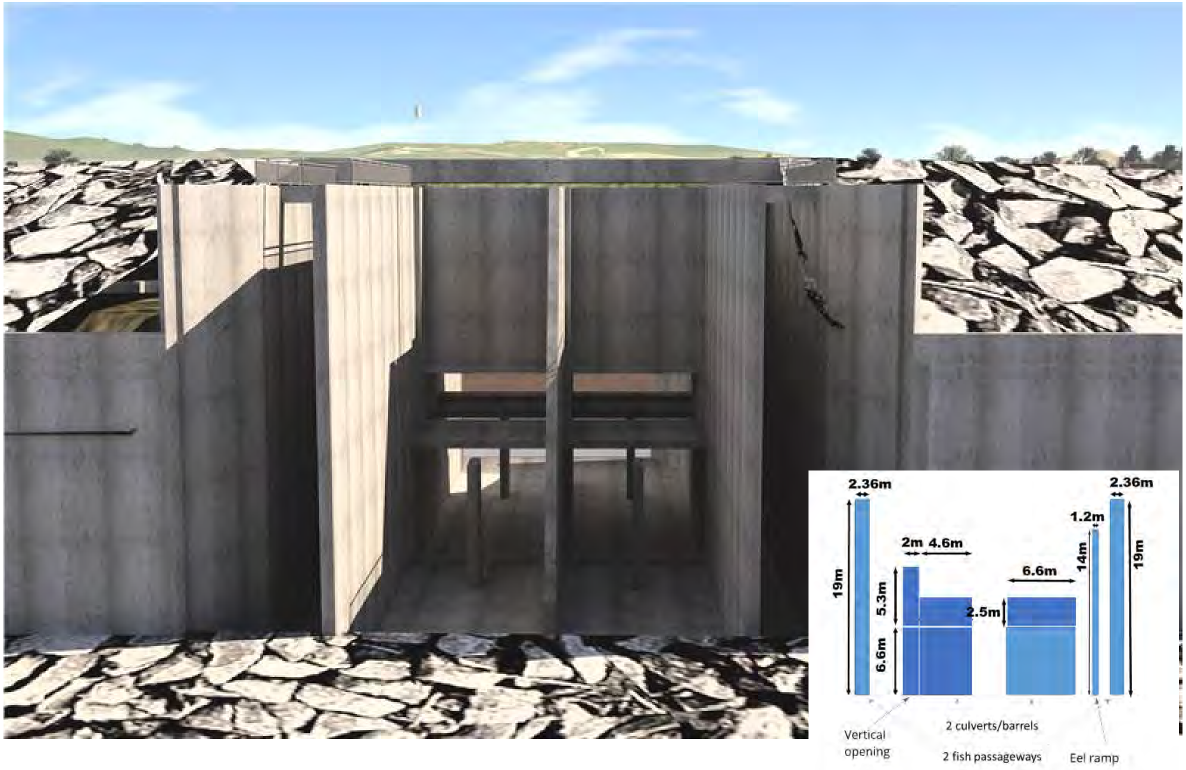


Figure 2.7 Conceptual Rendering (looking upstream) and Simplified Elevation View Schematic of the New Aboiteau Structure.

Two types of gates are proposed with the design: active roller gates and flap gates. The active roller gates are raised and lowered in a fixed frame similar to a vertical sliding window. Electric motors are used to move the gates up and down, and movements are controlled remotely or from the operations building. The movement can also be automated via an electric control system. Flap gates operate passively and can open and close automatically as water levels vary on each side of the gate; flap gates close when the tide level exceeds the upstream water level, and open when the tide level falls below the upstream water level. This type of gate is employed on all aboiteau structures in Nova Scotia except the current Avon River aboiteau structure, which also has active roller gates.

The new dykes constructed to the east and west will be directly connected to the new aboiteau structure and will serve to protect infrastructure and environments upstream of the Avon River estuary; once constructed, the new dyke system will be incorporated into the overall dyke system under the administration of the NSDA. The positions of the new dykes relative to the new aboiteau structure are displayed in Figure 2.1.

A new control building will be required to house a control room, backup power generator, automatic transfer switch, panel board, and supervisory control and data acquisition (SCADA) control mechanisms, which provide the ability to operate the active roller gates, as required. The control building will also include an office, a washroom, a maintenance garage, and storage space. Electrical and water services will be sourced from existing infrastructure along the Falmouth Connector at Exit 7. An on-site septic field will be provided for the sanitary disposal of wastewater.

2.2.1.1 Avon River Channel Realignment

The construction of the new Avon River Aboiteau and Dyke System requires the realignment of the Avon River channel for a length of approximately 620 m downstream of the existing structure. The new channel will be located on the west side of the existing river channel to allow for construction in the dry, adjacent to the watercourse. Beginning at the downstream side of the existing aboiteau structure, the river channel will be realigned to the northwest between the Avon River and the new highway causeway, and then realigned to the north to connect to the existing channel in the Avon River estuary (Figure 2.8).

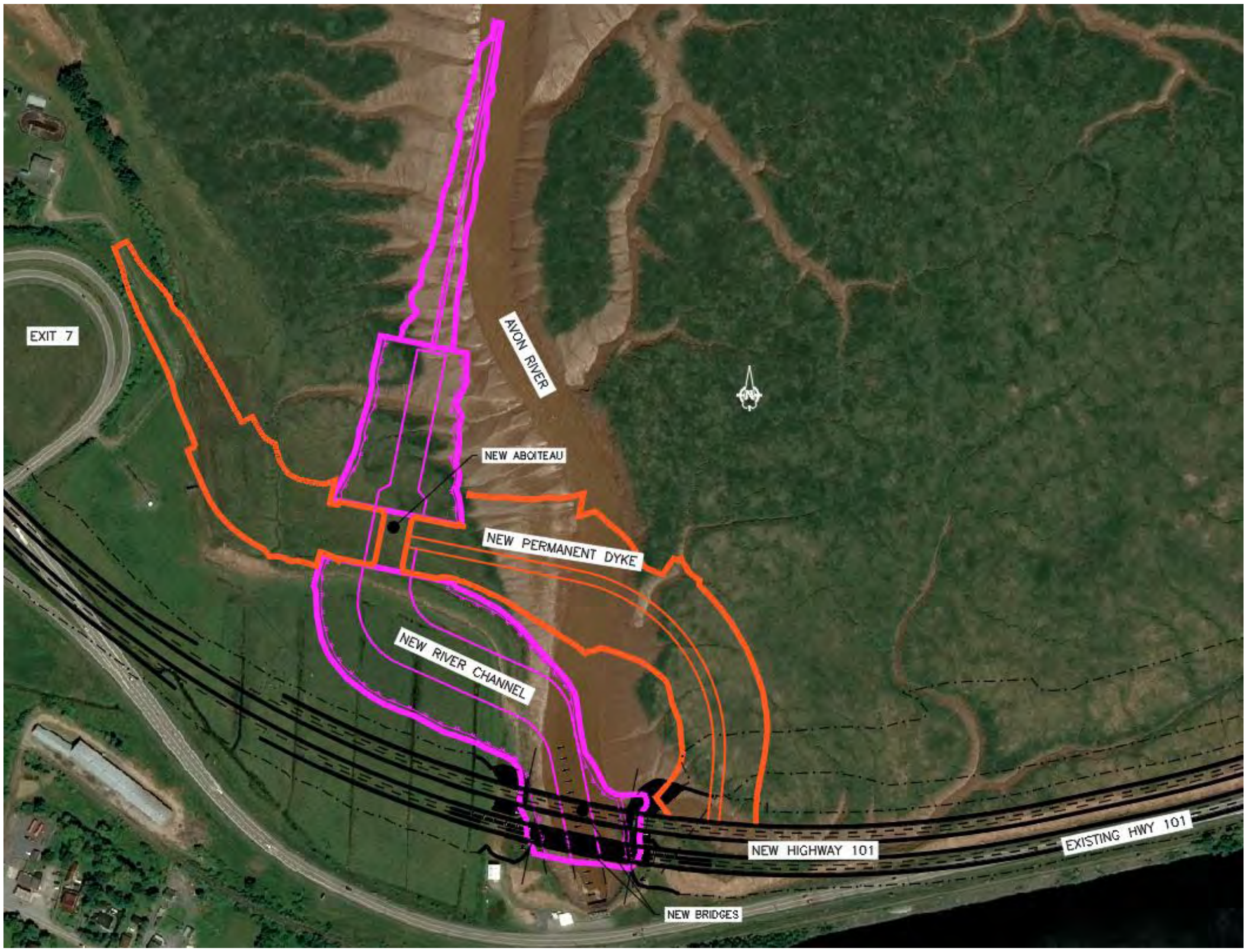


Figure 2.8 Concept Realignment of the Avon River Channel in the Avon River Estuary.

The placement of the new aboiteau structure in the smaller Elderkin Marsh to the west allows (a) the construction of the proposed structure to occur in the dry while isolated from the Avon River estuary, and (b) continued operation of the existing aboiteau structure for community flood protection during construction. When the new aboiteau structure is completed and ready for operation, the new river channel will be excavated at both ends of the new aboiteau structure to connect back to the existing channel. This minimizes flooding risks in the area since the existing river channel will remain in operation for the duration of the new aboiteau construction work.

The new river channel is designed with a minimum bottom width of 25 m and side slopes that vary between 2 horizontal (h):1 vertical (v) at the Highway 101 bridges and 3(h):1(v) from the highway bridges to the new aboiteau (Figure 2.9). The river channel will be widened at the upstream end of the new aboiteau to a bottom width of up to about 42 m to reduce the water flow velocities in the new channel and assist with fish passage through the fishways and new aboiteau structure.

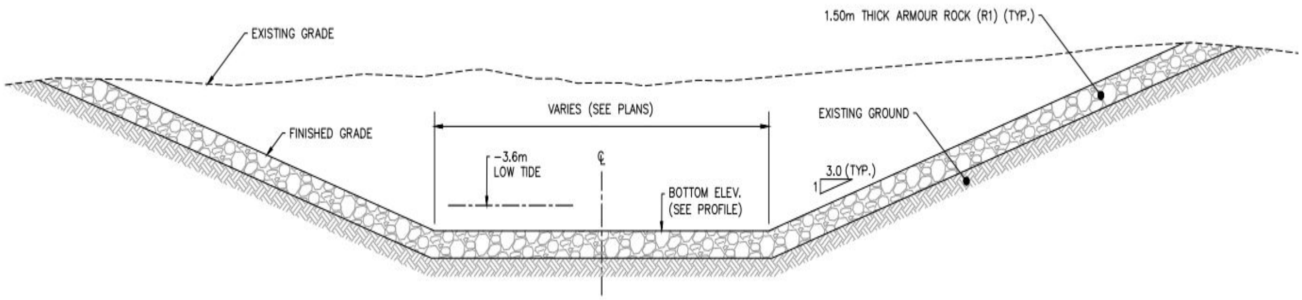


Figure 2.9 Typical River Channel Cross Section.

The existing river channel has a typical bottom elevation of approximately -5 m (CGVD2013) near the location of the new aboiteau structure. The river channel is essentially flat from the existing aboiteau to the confluence with the St. Croix River. The new river channel was designed with a bottom slope similar to the natural slope in the existing Avon River Channel (Figure 2.10).

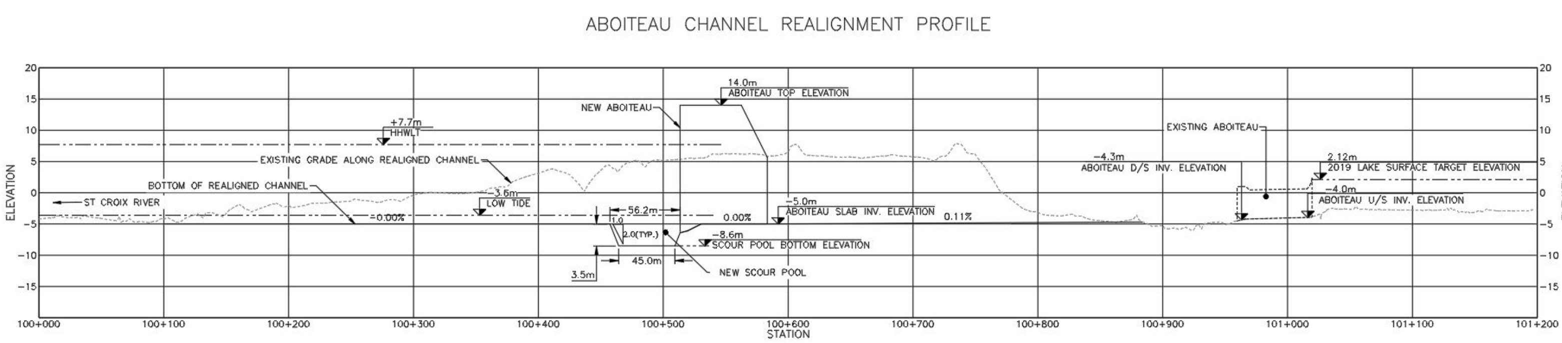


Figure 2.10 Profile of Conceptual New Avon River Channel (Note: The horizontal and vertical scales differ by a factor of 10 which exaggerates slopes and structures).

Since the river systems are dynamic in nature, the river can change course and have bottom elevations that vary seasonally, so that there is always some backwatering of the fishways. An energy dissipation pool will be located immediately downstream of the aboiteau structure, and the outlet is designed to keep the fishways backwatered at low tide (Appendix A).

Directly downstream of the new aboiteau at the energy dissipation pool, the new channel is proposed to be lined with a stone armour system along the bottom and up the sides. After the commissioning of the new aboiteau structure, a monitoring program will be implemented to evaluation the performance of the new structure. When the new aboiteau has operated for a period and is operating as expected, the existing aboiteau structure will be decommissioned. The decommissioning will be developed with DFO guidance.

2.2.2 Permanent Dykes / Highway Causeway System

To form the complete flood protection system, a separate permanent dyke forms a barrier between the flow of tidal water from the Bay of Fundy and the aquatic environments upstream of the existing causeway (former Pesaquid Lake). The new dyke will be designed to provide the desired flood protection while minimizing impacts to salt marsh habitats and reducing the volume of imported fill materials required during construction. The new permanent dyke will begin at the existing Elderkin dyke on the west side of the river near the Falmouth Connector at Exit 7 and run to the west side of the new aboiteau structure. From the east side of the structure, a new dyke/causeway will diagonally cross the existing river channel and connect with the new Highway 101 causeway (westbound lanes, Figure 2.11).

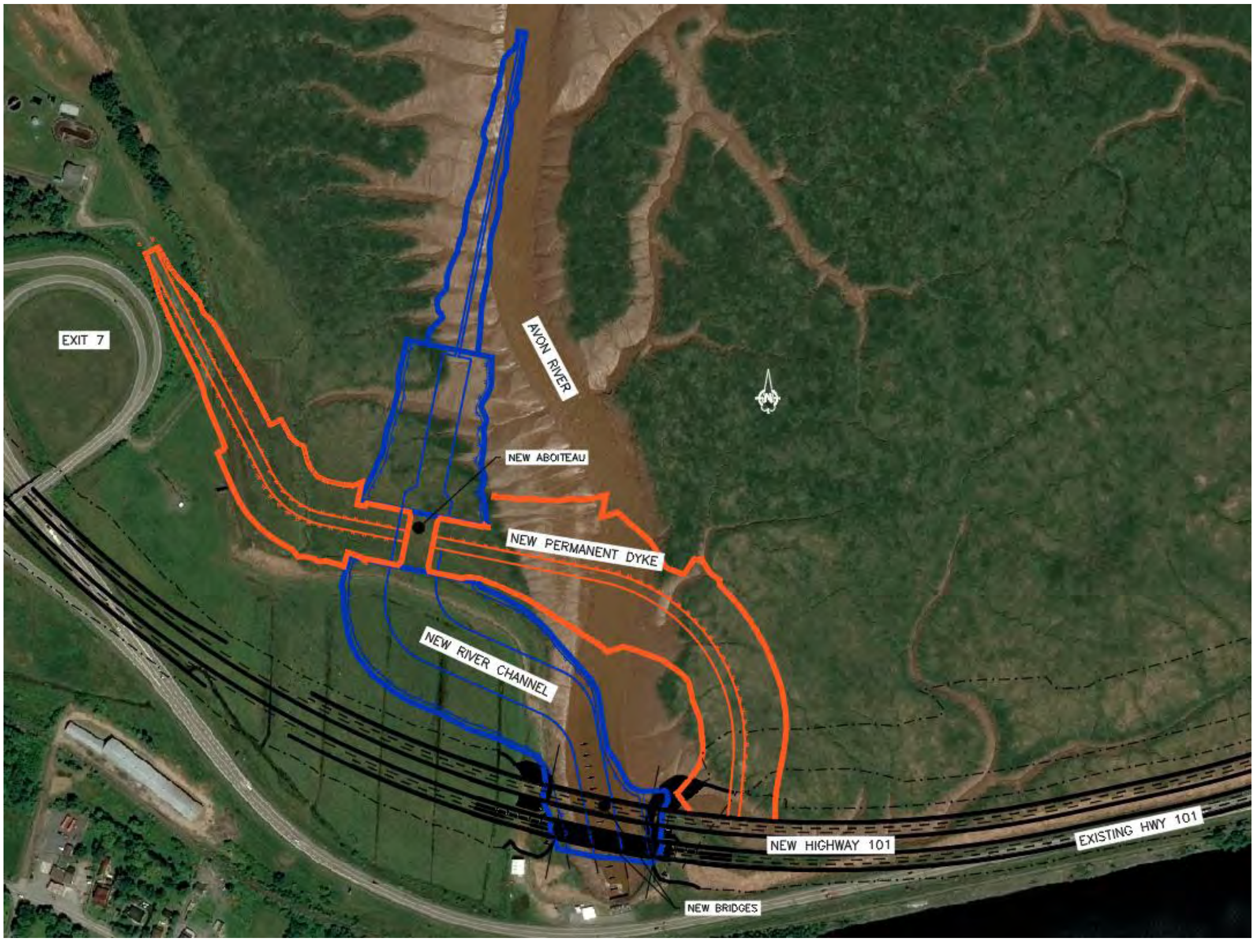


Figure 2.11 Conceptual Location of the New Permanent Dyke.

The design of the dyke system follows guidance from NSDA, who administer and maintain the Bay of Fundy dyke systems on behalf of the Province. The vertical alignment of the permanent dyke is generally designed to be at an elevation of 12.5 m (CGVD2013), with it rising to 14.0 m (CGVD2013) (Figure 2.12) at the new aboiteau structure. The elevation of the new aboiteau will be set at 14 m (CGVD2013) to allow for the dykes to be raised an additional 1.5 m, which is projected to be required in the future as a result of climate change and sea level rise. The dyke design includes a top width of 9.4 m including a 5 m wide maintenance road with both upstream and downstream side slopes of 3(h):1(v).

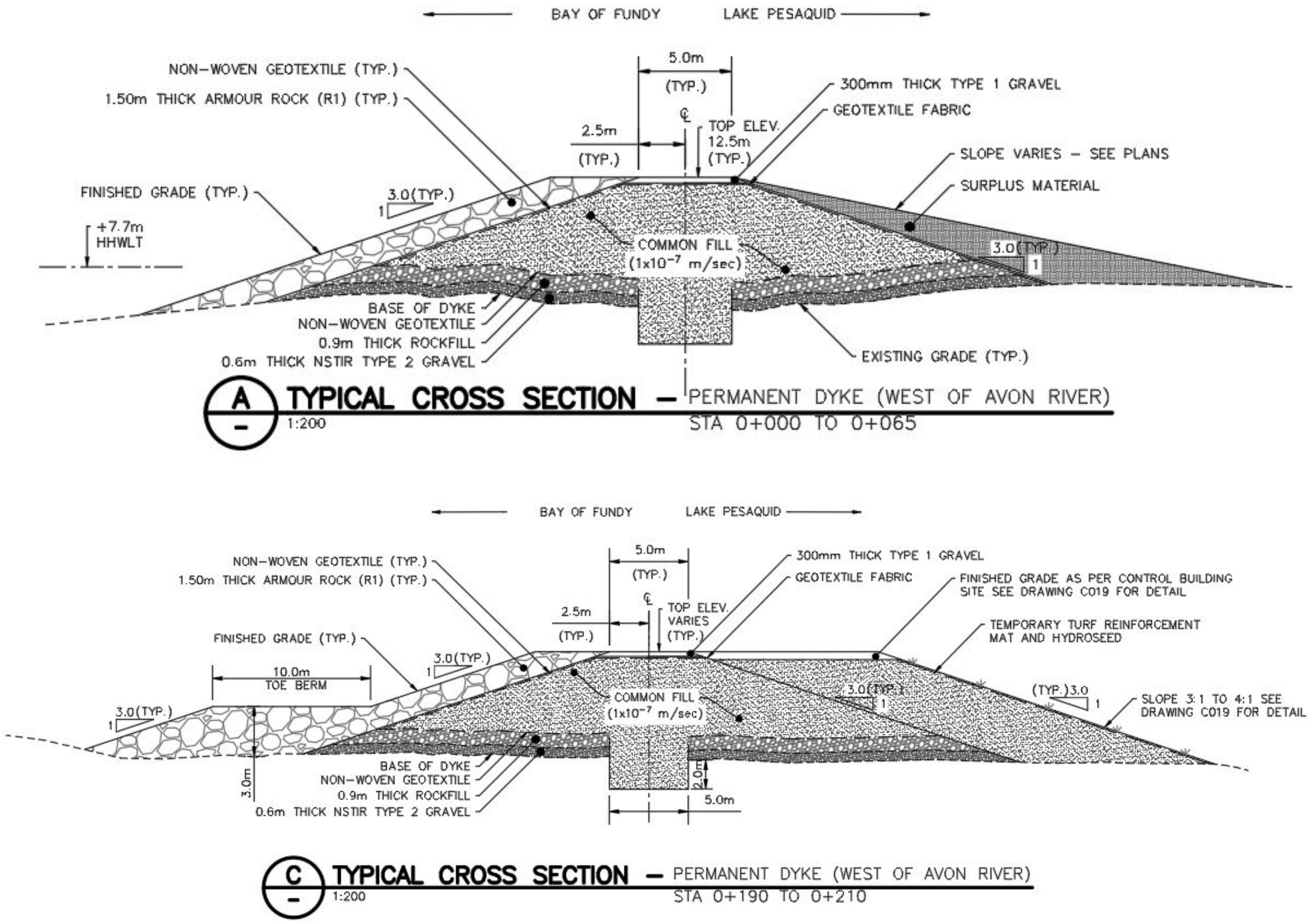


Figure 2.12 Conceptual Designs of the New Permanent Dyke West of the new Aboiteau Structure.

2.2.3 Highway Bridges

Two highway bridges will be constructed over the existing Avon River channel at the causeway. The bridges will consist of a westbound structure (HAN 259) and an eastbound structure (HAN 260). The bridges will span approximately 90 m each. Each structure will consist of three lanes and two paved shoulders with barriers on each side. The total width, from barrier to barrier, will be 16.2 m for each structure. Each bridge is designed with three travel lanes which will feature two 3.7 m wide travel lanes and a 3.5 m wide auxiliary lane. Each bridge will have a 2.5 m wide outside shoulder and a 2 m wide median shoulder. The bridge abutments will be constructed adjacent to the existing riverbank, with no in-river piers. Further design details for the new bridges are provided in the preliminary general arrangement included in Appendix A.

2.3 Updated Project Activities

The new aboiteau structure will be constructed in the dry, within an excavation in Elderkin Marsh on the west side of the existing river channel in the Avon River estuary. A new river channel will be excavated, and a new dyke will be constructed across the existing river channel to direct the new channel to the new structure. The construction, operation, and maintenance activities specific to the Avon River Aboiteau and associated components are outlined in the following subsections.

2.3.1 Construction

There are various construction activities required to build the new infrastructure, including the aboiteau, dykes and highway bridges. It is ultimately up to the selected Contractor to decide the staging and specific methods of construction. The Contractor will prepare necessary plans prior to construction including plans to conduct works in the dry, divert water, maintain fish passage, and prevent erosion and sedimentation during construction. The following sections outline the proposed works for the aboiteau, dykes, and bridges.

2.3.1.1 Aboiteau Construction

Construction activities to build the new aboiteau structure are expected to include the following:

- Install access roads and lay down areas for supplies and equipment.
- Install environmental controls measures around the construction site, including silt fencing, turbidity curtains, and booms, if deemed necessary as required.
- Install temporary cofferdam for the new aboiteau construction (Section 2.3.3). The cofferdam is proposed to be constructed to a minimum elevation of 8.8 m (CGVD2013), which is approximately 1 m higher than present spring tide levels. Sufficient space has been provided for an earthen dam structure with top width of 4 m and 2(h):1(v) side slopes in most areas around the new aboiteau site. The type of cofferdam will be determined by the selected Contractor and may include sheet pile and earthen dam.
- Excavate the area surrounding the location of the proposed aboiteau with 3(h):1(v) side slopes.
- Dispose excavated materials off-site and on adjacent field as necessary to build up existing elevation in the footprint of the west side permanent dyke.
- Dewater the area of the structure from seepage and rainwater, as required.
- Construct the new aboiteau structure including the formwork, reinforcement, and placement of concrete. Construction of the new structure includes the construction of the fishways and eel ramp.
- Infill areas adjacent to the aboiteau for formation of the new permanent dyke system.

- Install active main gates and passive flap gates on the new aboiteau structure, and active gates on the fishways.
- Place armour-rock scour protection around downstream side of the new aboiteau structure.
- Excavate the proposed river channel realignment. Undertake environmental protection measures, such as fish salvage as required for the realignment of the channel.
- Line the new river channel between the new aboiteau and existing aboiteau with an armour stone system along the bottom and up the sides.
- Cover bank and slope above the normal water levels with a turf reinforcement mat and vegetate as required.

The specific equipment to be utilized has not yet been determined; however, it is expected that some or all the following equipment may be used during construction:

- Excavators
- Dragline excavator
- Bulldozers
- Compactors
- Haul / dump trucks
- Concrete trucks

2.3.1.2 Permanent Dyke Construction

Construction activities undertaken to complete the system of permanent dyke and the highway causeway are expected to include the following:

- Install environmental controls measures around the construction site, including silt fencing, turbidity curtains, and booms, if deemed necessary.
- Construct the permanent dyke and place armour-rock scour protection on the downstream side of the dyke, which will extend below the ordinary high-water mark (OHWM).
- Construct an access road along the top of the permanent dyke.
- Remove environmental control measures after the landscaping is determined to be appropriately established, unless otherwise directed by regulators and the Engineer.

The specific construction equipment used to complete the construction of the dykes and highway causeway has not been determined; however, it is expected that the following equipment may be used:

- Excavators
- Bulldozers
- Compactors
- Haul / dump trucks
- Graders

2.3.1.3 Highway Bridges

The general construction sequence for the highway bridges will entail the following major tasks:

- Install environmental controls measures around the construction site, including cofferdams, sandbags, silt fencing, and turbidity curtains, as required.
- Excavate soft materials at the abutment locations and replace with imported engineered fill.
- Install piles and construct abutments on top of piles.
- Backfill the abutments with granular materials and place armour-rock scour protection around the abutments and along the sides of slopes, which will extend below the OHWM. Only pre-washed, clean fill and riprap should be placed in the watercourse.
- Construct bridge superstructure – erect bridge girders, place concrete bridge deck and complete backfilling behind the abutments.
- Construct concrete approach slabs and install barrier systems.
- Apply bridge deck waterproofing, place gravels and asphalt.
- Connect the approach roads.
- Remove environmental control measures once the landscaping is determined to be appropriately established, unless otherwise approved by regulators and the Engineer.

The specific equipment for bridge construction has not been determined; however, it is expected that the following equipment may be used:

- Crane
- Pile driving equipment
- Excavators
- Concrete trucks
- Bulldozers
- Compactors
- Graders
- Deck screed machines
- Haul / dump trucks

2.3.2 Operation and Maintenance

There will be ongoing operation and maintenance requirements for the Updated Project Components. The following activities are further described in the following sections:

- Aboiteau Operation and Maintenance
- Dyke System Maintenance
- Bridge Operation and Maintenance

2.3.2.1 Aboiteau Operation and Maintenance

The new aboiteau structure design can allow for adaptable water management scenarios. For comparison, three different water management scenarios are defined; however, adjustments can be made to allow more or less water to flow through the structure.

Further information on the adaptability is provided in Section 2.3.2.1.4. For assessment, the three proposed operational scenarios are as follows:

1. **Freshwater Lake** – A mostly freshwater lake (Pesaquid Lake) is maintained at 2.1 m CGVD2013 and would fluctuate between 1.8 m and 2.4 m for lake level management, similar to conditions prior to 2021. However, flow through the fishways during low tide cycles is allowed (i.e., tide elevation is lower than the lake elevation) when sufficient river flow is available. This scenario is not a substantial change from the original EA.
2. **Brackish Lake** – A lake with a 2.1 m CGVD2013 water level is maintained by allowing tidal flow through the fishways at high tide to compensate for fishway flow during low tides when upstream river flows are insufficient to maintain the lake level.
3. **Dampened Tidal Estuary** – Active and passive partial tidal gates are used to maintain tidal flow upstream of the aboiteau and dykes at high tides, and outflow during low tides (i.e., meeting the goal of the current DFO Ministerial Order for the existing aboiteau). The water levels will fluctuate between target elevations of - 0.5 m and +1.5 m CGVD2013. The actual intertidal variation on a per-cycle basis will usually be in the order of 0.8 m to 1.2 m, although it will vary and will be ultimately controlled by how the gates are operated on a tide-by-tide basis to accommodate the ever-changing tides and freshwater flows resulting from precipitation, runoff, and releases from Nova Scotia Power (NSP) dam operations. The operation of the gates for this operating scenario can be controlled to modulate the tidal range to limit affects to agricultural lands adjacent to the Avon River. The fishways always remain open, except in the event of a major storm or storm surge.

For scenarios 1 and 2, the new structure would be capable of passing flow from the Avon River as follows:

1. Two Alaska Steeppass Fishways
2. Three active main gates
3. Two overflow gates (Passive Flap Gates)

For scenario 3, the new structure would be capable of passing flow from the Avon River and incoming tides as follows:

1. Two Alaska Steeppass Fishways
2. Three active main gates normally kept in partial open position, and the 1.5 m wide gate kept fully open
3. Two overflow gates (Passive Flap Gates)
4. Two main flap gates along with a 2.0 m wide section left open that would allow a portion of the tidal inflow into the lake at high tide. The two flap gates would open as necessary to allow outflow of tidal/river water at low tide.

To better facilitate passage of American Eel (*Anguilla rostrata*), a single eel ramp has been added to the design of the structure. It will not provide a significant flow path for the Avon River or provide a significant flow path for tidal water upstream during high tide as it is designed to operate with a minimal amount of flow. The eel ramp would be operational

24/7 regardless of operating scenario, except for short periods during each tide cycle to allow sediment to be flushed away.

Several operating procedures have been developed based on climate conditions. This includes six conditions based on current river flows (the Nova Scotia Power-licensed flow regime will be subject to renewal in 2022/2023):

1. Normal river flow – Upstream water level at Normal Operating Level
2. High river flow – Upstream water level above Normal Operating Level
3. Low river flow – Upstream water level slightly below Normal Operating Level
4. Low river flow – (Extended dry weather)
5. Significant rainfall following extended dry weather
6. Extreme conditions – high flows from a large storm and high sea levels

The procedures are summarized in the following sections, and the detailed operation plan in provided in Appendix C.

2.3.2.1.1 Scenario 1: Freshwater Lake

Flow from the lake can only take place whenever the tide level is below the upstream water level, which would occur during low tide and the early part of high tide (approximately 7.5 hours per 12.5 hours tidal cycle). In order to maintain the lake as freshwater, all gates would be closed when the tide level on the downstream side of the structure is above the lake level on the upstream side of the structure for all six of the climate conditions listed above. This means the fishways would only operate in one flow direction: the Avon River flowing towards the Bay of Fundy when the tide level is lower than the lake water level. The following provides a summary of the operations that would take place once the receding tide has dropped below the lake level. A detailed description of the operational plan is provided in Appendix C.

Condition 1 – Normal River Flow (Lake at or less than 300 mm above normal operating level)

When the tide is lower than the lake level, both fishway gates would open and the supply pumps for the eel ramp would start. Flow would occur through both fishways throughout the entire low tide cycle and for a portion of the high tide cycle. If the lake level continues to rise during the low tide cycle, the main gates can be partially opened as needed to maintain the desired lake level. Once the high tide cycle begins, and the incoming tide returns to the same level as the lake, the fishway and main gates would be closed to prevent the ingress of tidal water, and the eel ramp pumps would stop. The eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake.

Condition 2 – High River Flow (Lake more than 300 mm above normal operating level)

When the tide is lower than the lake level, both fishway gates would open and the main gates would only open as required. The supply pumps for the eel ramp would start. The main gates can be either partially or fully opened depending on lake level and river flow at the time of opening. Flow would occur through both fishways, both main gates and both overflow gates throughout the entire low tide cycle, and a portion of the high tide cycle as described below. The amount of time that the main gates would need to be open would depend on the lake level that is monitored constantly. Once the high tide cycle begins and the incoming tide returns to the same level as the lake, the fishway and main gates would be closed to prevent the ingress of tidal water, and the eel ramp pumps would stop. The eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake. The rising tide would automatically close the overflow gates.

Condition 3 – Low River Flow (Lake slightly below normal operating level)

When the tide is lower than the lake level, one fishway gate would open, and the supply pumps for the eel ramp would start. If the lake level rises, the second fishway gate would open. Flow would occur through one or both fishways throughout the entire low tide cycle and a portion of the high tide cycle unless the lake level begins to drop. If the lake level drops, one fishway would be closed. If drop continues, the second fishway gate would be closed. In all circumstances, once the high tide cycle begins and the incoming tide returns to the same level as the lake, the fishway and main gates would be closed to prevent the ingress of tidal water, and the eel ramp pumps would stop. The eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake.

Condition 4 – Low River Flow (Extended Dry Weather – Lake below normal operating level)

If the lake level is more than 300 mm below normal operating level, all gates would remain closed. The supply pumps for the eel ramp would start to allow eel passage. If during the low tide cycle the lake level rises to within 300 mm of the normal operating level, one fishway gate would be opened. If the lake level continues to rise, the second fishway gate would be opened. If the lake level drops, one fishway would be closed. If the drop continues, the second fishway gate would be closed. In all circumstances, once the high tide cycle begins and the incoming tide returns to the same level as the lake, the fishway gates would be closed to prevent the ingress of tidal water, and the eel ramp pumps would stop. The eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake.

Condition 5 – Significant Rainfall following Extended Dry Weather (Lake below normal operating level)

Depending on prior lake level and the anticipated amount of precipitation, the lake level could be lowered further to provide storage for the storm event. During low tides, the gates and eel ramp would be operated as described in operating conditions 1, 2, or 3 depending on the nature of the storm event. Once the high tide cycle begins and the incoming tide returns to the same level as the lake, all gates would be closed to prevent the ingress of tidal water, and the eel ramp pumps would stop. The eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake. The rising tide would automatically close the overflow gates.

Condition 6 – Extreme Storm Conditions

The lake level would be lowered before the arrival of the storm, then operated by fully opening all gates throughout the entire low tide cycle. The supply pumps for the eel ramp would start. Once the high tide cycle begins and the incoming tide rises to the same level as the lake, all gates would be closed to prevent the ingress of tidal water, and the Eel ramp pumps would stop. The eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake. The rising tide would automatically close the overflow gates.

2.3.2.1.2 Scenario 2: Brackish Lake

In this scenario, the fishway gates would be kept open, allowing flow in two directions. Lake water would flow towards the Bay of Fundy at low tide, and Bay of Fundy water would flow through the fishways into the lake at high tide. This would prevent the lake from draining through the fishways and allow year-round maintenance of the target operating level of the lake (+2.1 m CGVD2013). It is expected that the lake would become brackish due to the inflow of some tidal waters on every high tide, and the salinity would be expected to vary depending on the amount of precipitation being received within the Avon River watershed. The salinity, however, would decrease with distance in the upstream direction of the aboiteau structure. During summer dry weather, it is expected that salinity would typically increase in comparison to the rest of the year. The following are summaries of the operational conditions; a detailed description is provided in Appendix C.

Condition 1 – Normal River Flow (Lake at or less than 300 mm above normal operating level)

Both fishway gates would remain open throughout all tidal cycles. The supply pumps for the eel ramp would start when the tide level would fall below the peak of the ramp. When the tide level is lower than the lake level, the main gates would open as necessary to control the level of the lake. The main gates would close when the desired lake level is reached, or when the rising tide reaches the lake level (whichever occurs first). When the rising tide reaches the peak of the eel ramp, the supply pumps would stop. Like the fishways, the eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake.

Condition 2 – High River Flow (Lake more than 300 mm above normal operating level)

Both fishway gates would remain open throughout all tidal cycles. The supply pumps for the eel ramp would start when the tide level would fall below the peak of the ramp. When the tide level is lower than the lake level, the overflow flap gates would automatically open. The main gates would also be opened. Fish would be able to move downstream through the fishways during low tide as well as through the main gates. The main gates would close when the rising tide reaches the lake level. When the rising tide reaches the peak of the eel ramp, the supply pumps would stop. Like the fishways, the eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake. The rising tide would automatically close the overflow gates.

Condition 3 – Low River Flow (Lake slightly below normal operating level)

One fishway gate could close, leaving one open to reduce tidal flow into the lake to minimize salinity and siltation impacts. At least one fishway would operate throughout all tidal cycles. The supply pumps for the eel ramp would start when the tide level falls below the peak of the ramp. When the tide level is lower than the lake level, the main gates would typically remain closed, however they could also be operated as necessary for short periods on outgoing tides to allow fish to leave the lake for the tidal waters. When the rising tide reaches the peak of the eel ramp, the supply pumps would stop. Like the fishways, the eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake.

Condition 4 – Low River Flow (Extended Dry Weather – Lake below normal operating level)

One fishway gate could close, leaving one open to reduce tidal flow into the lake to minimize salinity and siltation impacts. At least one fishway would operate throughout all tidal cycles. The supply pumps for the eel ramp would start when the tide level would fall below the peak of the ramp. When the tide level is lower than the lake level, the main gates would typically remain closed. Gates could also be operated as necessary for short periods on outgoing tides to allow fish to leave the lake for the tidal waters. When the rising tide reaches the peak of the eel ramp, the supply pumps would stop. Like the fishways, the eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake.

Condition 5 – Significant Rainfall following Extended Dry Weather (Lake below normal operating level)

Depending on prior lake level and the anticipated amount of precipitation, the lake level could be lowered below the typical target range to provide storage for the storm event. The gates would be operated as described in operating conditions 1, 2, or 3 depending on the nature of the storm event.

Condition 6 – Extreme Storm Conditions

The lake level could be lowered before the arrival of the storm, then operated by fully opening all gates throughout the entire low tide cycle. Once the high tide cycle begins and the incoming tide returns to the same level as the lake, all gates would be closed. The rising tide would automatically close the overflow gates. Operation would return to normal once the storm has passed, and the lake reaches near normal operating levels.

2.3.2.1.3 Scenario 3: Dampened Tidal Estuary

The main roller gates would be kept in a partially open position and operated as required to help control water levels if need be during high or low runoff seasons. On outgoing tides, the flap gates would be pushed open to varying amounts depending on precipitation within the watershed and resulting temporary increases in water level.

Main flap gates would be installed on the downstream side of the main roller gates. Two flap gates would be installed, and a narrow opening 2.0 m wide would be left open to allow tidal inflow. The flap gates would be hung on chains. When the tide level exceeds that of the upstream environment, tidal water would flow upstream through the aboiteau. The reduced area of the openings would prevent the full tidal prism from going upstream, thus controlling the water level upstream of the aboiteau and causeway.
As described above, active gates (Roller Gates) would be used to control upstream water levels. The two larger gates would be left partially open and the 1.5 m wide gate would be left fully open; these could be modulated to control upstream levels as required.
The structure would operate passively as much as possible for operating conditions 1 through 4. For operating conditions 5 and 6, the main roller gates could be operated in advance of a storm. They could be closed on the incoming tide to keep the upstream water levels at a low tide level, then opened and closed during and following the event to control the water level. For operating condition 6, the same could also be applied to the fishway gates, although this is not expected to be necessary given the small volume of water exchanged through the fishways.

The fishway gates would be kept open for all tide levels under operating conditions 1 through 4. They could be closed for operating conditions 5 and 6 if considered necessary. The supply pumps for the eel ramp would start when the tide level falls below the peak of the ramp. When the rising tide reaches the peak of the eel ramp, the supply pumps would stop. Like the fishways, the eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake.

Unlike the Freshwater Lake and Brackish Lake scenarios, a target constant water level is not required. However, a dampened tidal range upstream (dampened to a fraction of the tidal levels downstream of the aboiteau) at levels lower than in the other two scenarios will be established, such that tidal waters are not able to enter the drainage ditches in the agricultural fields.

2.3.2.1.4 Adaptive Management

The structure is designed to be adaptable to all three water management scenarios. In addition, it can be adjusted to any in-between setting, or higher tidal exchange for example, to allow more or less tidal water in and out of the lake area, to potentially improve fish passage if needed.

For example, in the Brackish Lake scenario, if it is found that the gate opening is affecting fish passage quality, an option would be to use only one fishway. This would reduce inflows into the lake at high tide and reduce the need to open the main gates when the tide lowers again. Another option is to open the main gates with a smaller opening, but for a longer time, to reduce the velocities in the upstream channel, to see if this could better support fish passage.

In the Freshwater Lake scenario, more flexibility can be given to the lake water levels such that a higher percentage of the rainfall can be kept in the lake. For example, water can be drained out through only one fishway instead of two when the water level is at the target, which would conserve more water for use in a fishway and keep it open for a longer time.

In the Dampened Tidal Estuary scenario, there are many possible adjustments that can be made with the roller (active) gates. The amount of tidal exchange is also adjustable. The currently planned operation of the roller gates is to set them to a fixed opening, which allows a dampening of the tide while draining freshwater flows. When large rainfall events occur, however, the main roller gates will rise (when the tide is lower) to drain the excess freshwater. When the water level is too low for the fishways to operate effectively, the gates can close (during low tide) to allow water levels upstream to rise again. The setting of the gates is selected with the goal of allowing a minimized amount of operation of the gates, so that the system is as passive as possible. But this can be adjusted as needed if it is found that a modification is required for fish passage. This approach is still under evaluation through the *Fisheries Act* application.

Finally, the fishway itself is designed such that it is bolted inside a concrete channel. If an adjustment to the fishway configuration is needed, any part of the fishway can be unbolted, modified, and replaced. For example, a switch from the Dampened Tidal Estuary scenario to the Brackish Lake scenario is possible by removing a 10 m section of the fishway and moving the ramp 10 m downstream. If it was found that a narrower fishway would be advantageous, this could be adjusted as well, although it would be a major change requiring several months of work to accomplish.

The need for adaptive management of the structure will be developed with monitoring and on-going discussion with DFO.

2.3.2.2 Aboiteau Operation and Maintenance

In addition to the operation of the structure, the structure will require periodic maintenance, such as inspections of the structures and gates, repairs to gates, motors, and gate fixtures (chains and guides). Regular maintenance of the aboiteau will follow NSDA standard maintenance procedures and approval protocols.

2.3.2.3 Dyke System Maintenance

The dykes constructed will require ongoing inspections and periodic reestablishment of slopes. Regular maintenance of the dykes will follow NSDA standard maintenance procedures and approval protocols. The long-term ongoing maintenance of the dykes are not included within this assessment but will follow NSDA standard maintenance procedures and approval protocols.

2.3.2.4 Bridge Operation and Maintenance

Over its lifespan (+/- 100 years) it is anticipated that the replacement bridge will be used by residential, commercial, and industrial traffic. Maintenance activities will include surface patching as required as well as snow removal and de-icing, as is carried out by NSDPW for all roadways. The long-term ongoing maintenance of the bridges and roads are not included within this assessment.

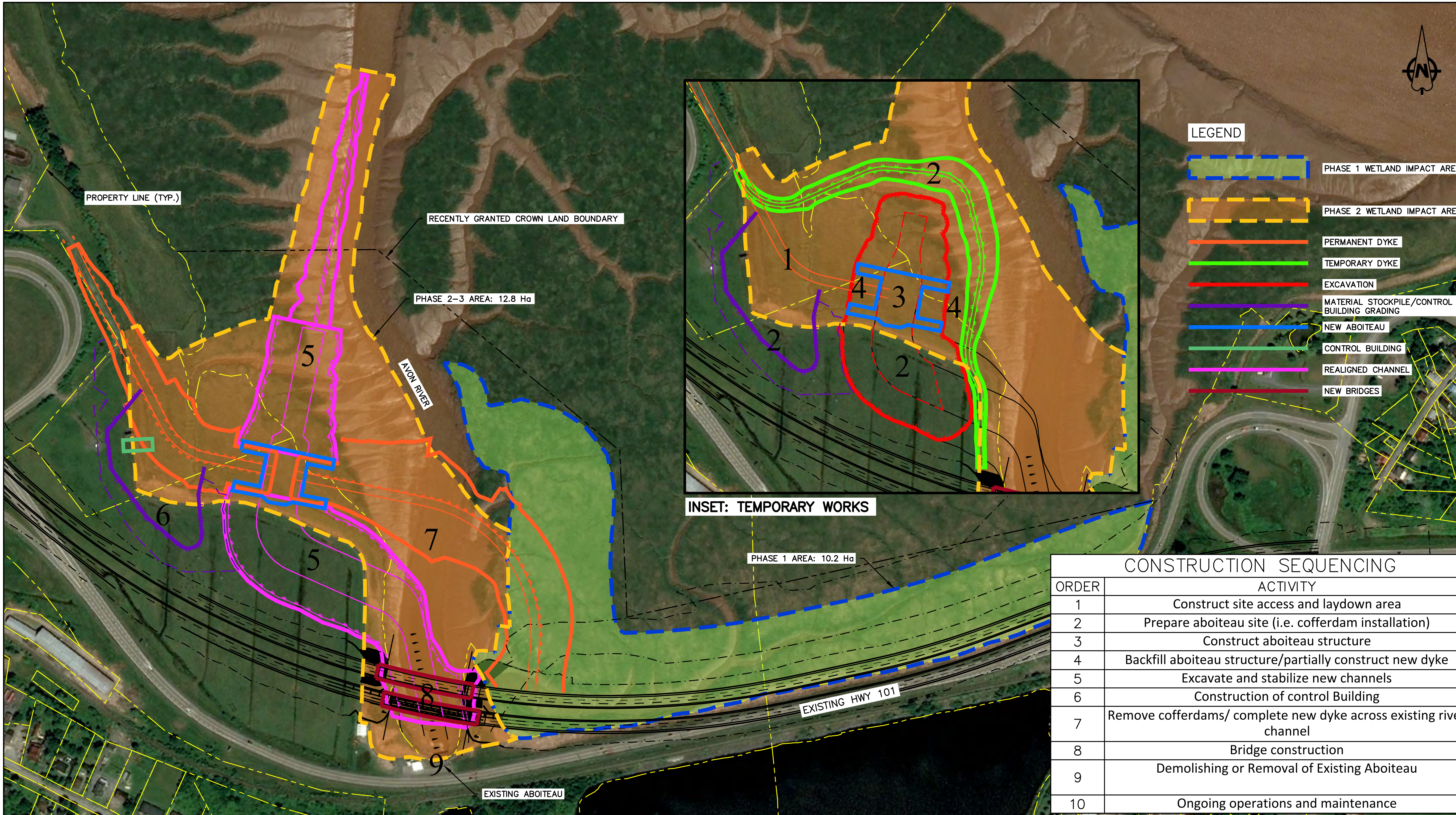
2.3.3 Updated Project Schedule and Sequencing

The schedule is dependent on the receipt of regulatory approvals and completion of the detailed design and tendering. The work is proposed to start in the 2022 and take approximately two to three years to complete. The sequencing of the construction is expected to follow the order in Table 2.3; however, the approach and length of construction phases will be determined by the selected contractor (Figure 2.13). The description of staging is provided in the following sections.

Table 2.3 Tentative Aboiteau Development Sequencing

Proposed Sequence	Activities	Location	Approximate Duration (Months)
1	Construct site access and laydown area	Adjacent to the Avon River, out of the watercourse	1
2	Prepare aboiteau site (i.e., temporary cofferdam installation)	Within wetland, out of the watercourse	3-4
3	Construct aboiteau structure & new Elderkin Dyke	Construction within the cofferdams in the dry. Out of the watercourse.	20
4	Backfill aboiteau structure/partially construct new dyke	Within wetland, out of the watercourse	2-3
5	Excavate and stabilize new channels	Upstream of new Aboiteau: Partially within wetland, mostly within current agricultural field, adjacent to the Avon River, and formation of new channel of the Avon River Downstream of new Aboiteau: Adjacent to the Avon River	3-4
6	Construction of Control Building	Adjacent to the Avon River, out of watercourse	3-6
7	Remove cofferdams/ complete new dyke across existing river channel	Adjacent to the Avon River, within wetland, new dyke in watercourse	2-4

Proposed Sequence	Activities	Location	Approximate Duration (Months)
8	Bridge construction	Adjacent to the Avon River, out of watercourse	3-5
9	Partial Demolition or Potential Removal of existing aboiteau structure	Demolition in watercourse	The requirements for demolition or removal will be developed in consultation with DFO.
10	Ongoing operations and maintenance	Management of Avon River Aboiteau operation	On-going for life of Project



CONSTRUCTION SEQUENCING

ORDER	ACTIVITY
1	Construct site access and laydown area
2	Prepare aboiteau site (i.e. cofferdam installation)
3	Construct aboiteau structure
4	Backfill aboiteau structure/partially construct new dyke
5	Excavate and stabilize new channels
6	Construction of control Building
7	Remove cofferdams/ complete new dyke across existing river channel
8	Bridge construction
9	Demolishing or Removal of Existing Aboiteau
10	Ongoing operations and maintenance

NOTE:
The Provincial mapping data shown is a graphical representation of property boundaries which approximate the size, configuration and location of parcels. Care has been taken to ensure the best possible quality, however, this map is not a land survey and is not intended to be used for legal descriptions or area. The Provincial mapping is not conclusive as to the location, boundaries or extent of a parcel [Land Registration Act subsection 21(2)]

No.	Description
1	ISSUED FOR INFORMATION

Date	Scale	Designed	Drawn	Checked	Approved	CBCL No.	Contract
16 NOV 2020	1:4000	C.M.	C.M.	R.G.		171046.00	

CBCL

HIGHWAY 101 TWINNING THREE MILE PLAINS TO FALMOUTH ENVIRONMENTAL ASSESSMENT UPDATE

AVON RIVER ABOITEAU CONSTRUCTION SEQUENCE

Drawing

FIG. 2.13

DRAWING NAME: Y:\HALIFAX\HEAVYDATA\171046.01 - AVON RIVER ABOITEAU ENVIRO\CAD\171046.01 APPROXIMATE WETLAND IMPACT AREA.DWG LAYOUT NAME: FIG. 2.13 PLOT DATE: February 1, 2022 10:32:02 AM CAD OPERATOR: MZHOU

2.3.3.1 Access & Laydown Area

Access and lay down area preparation will include general earthworks, such as grading and infilling in areas adjacent to the waterbodies. The primary access to the site will be from the Falmouth Connector at Exit 7; however, other access routes may be used near the existing control building and along the toe berm from Exit 6. The existing agricultural field will be used as the laydown area. Most of the existing agricultural field west of the river and north of Highway 101 will eventually be taken up by the excavation of the new channel, however it is expected that it can serve as laydown area until construction of the aboiteau structure is complete. Other laydown areas outside the Project area may be used based on the selected contractor.

2.3.3.2 Aboiteau Site Preparation

Site preparation will include excavation and cofferdam construction to provide a dry area in which to build the new aboiteau. A temporary cofferdam will be constructed north of the existing dyke. The design and construction of temporary cofferdams will be the responsibility of the contractor. It is expected that the cofferdam system will consist of imported fill or sheet piling or a combination of the two. The subgrade elevation will be below the adjacent river bottom such that the finished floor of the new aboiteau will be approximately the same as the existing river bottom, which is -5.0 m CGVD2013. Some embankment construction will likely be necessary to raise a section of the existing dyke to match the temporary cofferdam to provide a comfortable amount of freeboard against Spring Tides during construction.

2.3.3.3 Aboiteau Structure

After the site preparation is complete, construction of the aboiteau structure will begin outside of the river channel in the dry and will include the following main tasks:

- Foundation preparation
- Superstructure construction
- Fishways
- Gates

2.3.3.4 Backfill Aboiteau/Partial Dyke Construction

With the concrete work complete on the new aboiteau, the retaining walls will be backfilled and portions of the new dyke will be constructed that would not encroach on the existing river channel. The seaward side of the dyke will be dressed with armour stone from bottom to top to protect from storm generated waves. The upstream side will be dressed with armour stone near the bottom, and possibly vegetated above the armour stone, reinforced by turf reinforcement mat. A roadway approximately 5 m wide will be built on top of the dyke to provide access for maintenance vehicles.

2.3.3.5 Excavate/Stabilize New Channel

Once construction of the new aboiteau structure and partial new dykes are complete, a new river channel will be excavated upstream of the new structure. Initially, it will not connect to the existing river channel downstream of the existing aboiteau. Material from the excavation will be either reused onsite or disposed of offsite—perhaps stockpiled in areas where it can be used to raise the existing dyke system adjacent to the site. The channel will vary in width with a minimum bottom width of 25 m and side slopes of 3(h):1(v). It will be lined with armour stone designed to stay in place.

The new channel downstream of the new aboiteau will start from the downstream end of the new aboiteau to the temporary cofferdam. The channel will vary in width with a minimum bottom width of 25 m and side slopes of 3(h):1(v). It will be lined with armour stone designed to stay in place.

Excavation of the existing material on the seaward side of the cofferdam will proceed northward to connect to the existing river channel. It is anticipated that a narrow channel will need to be excavated using long reach excavation equipment such as a dragline, or perhaps excavators working from barges. The narrow channel is intended to create a flow path from the new aboiteau to the existing river channel. Material from the excavation will be disposed in a manner that may allow it to be used to raise the adjacent dykes in the future. This section of the channel will not be lined, and it is expected that the river will erode material away naturally as it is intended to become part of the natural river bottom and will be allowed to move to its natural position.

2.3.3.6 Control Building

Concurrent with the construction of the aboiteau structure, the control building will be constructed along with the installation of a water service and septic disposal system.

2.3.3.7 Remove Cofferdams/Complete New Dykes

With the new aboiteau completed and channels excavated both upstream and downstream, the cofferdams will be removed, and the remaining new dyke will be constructed across the existing river channel. The remaining material between the existing river channel and the new channel upstream of the new aboiteau will be removed. This will force the river to flow through the new aboiteau. This phase of the work will require careful timing with respect to tide levels and river flow and would likely be best completed during neap tides and dry weather.

The seaward side of the dyke will be dressed with armour stone from bottom to top to protect from storm generated waves. The upstream side will be dressed with armour stone near the bottom, and vegetated above the armour stone reinforced by turf reinforcement mat. A roadway approximately 5 m wide will be built on top of the dyke to provide access for maintenance vehicles.

2.3.3.8 Bridge Construction

The abutments will be constructed first and are proposed to be constructed outside of the Avon River Channel. Construction of these abutments will entail preparation of pile cap base, driving of piles, testing of piles, construction of pile cap, wingwalls, and beam seats.

The abutments will be back filled to at least the beam seat level prior to superstructure placement.

Each bridge superstructure will consist of three steel box girders composite with a glass fiber reinforced polymer reinforced concrete deck. The box girders will be comprised of five sections, two of which will be spliced in the fabrication shop. It is also anticipated that the girders will be coated in the shop to avoid painting over the river. Each girder will be transported to site in three sections that will be spliced on site with high strength bolts and splice plates. It is anticipated that the girders will be placed on the beam seats by launching the girders from one side with a nosing assembly that will be picked up by a crane on the other side. Detailed design of the launching will be completed by the contractor.

Following girder placement, the deck will be formed, and reinforcement will be placed prior to pouring the deck concrete. Following the deck pour, the abutments will be backfilled, and the approach slabs will be formed and cast, along with the barriers. Prior to opening the bridge to traffic a waterproofing membrane will be applied to the bridge deck, followed by an asphalt wearing surface.

2.3.3.9 Decommissioning of the Existing Aboiteau Structure

With the new aboiteau constructed and operational, and once the new aboiteau has been proven to be functioning as intended, the existing aboiteau will be removed from operation.

As the existing aboiteau supports infrastructure such as a private railway corridor, utilities, and active trail it will remain in place until a longer-term solution and associated design, funding, and approvals are obtained. The decommissioning of the structure, other than making it non-operational (such as removal of the gates), is outside of the scope of the current Project and is not included as part of this assessment.

Chapter 3 Aboriginal Consultation and Stakeholder Engagement

Highway 101 Three Mile Plains to Falmouth Twinning Project consultation and engagement activities were initiated in 2001[1]. Activities included a series of public meetings, Mi'kmaq consultation, establishment of a Community Liaison Committee (CLC), and stakeholder group specific meetings.

While there is broad support for the Project, concerns remain about impacts to habitat, and fish passage. NSDPW and NSDA recognize these concerns and proactively began planning for habitat compensation in 2004 prior to initiation of Mi'kmaq consultation and the 2009 NS Wetland Conservation Policy. The EA document (2017) notes commitments for both improved fish passage and habitat compensation and introduces the proposed Truro-Onslow Salt Marsh Restoration Project as a key means of offsetting the unavoidable damage to the salt marsh.

Both NSDPW and NSDA are fully committed to continued consultation and engagement. Summaries of consultation and engagement activities that have occurred since the EA are presented in the following sections.

3.1 Mi'kmaq Consultation

NSDPW leads consultation for the Highway 101 Twinning Project and officially initiated consultation with the Mi'kmaq of Nova Scotia on April 30, 2008. Consultation with the Mi'kmaq of Nova Scotia has continued since it was initiated. Much of the past discussion and concerns have focused primarily on the Project design, operational management of the new aboiteau, impacts to fish and fish habitat, fish passage design, baseline monitoring, post construction monitoring, archaeological impacts, and specific discussion about habitat compensation, the Truro-Onslow Salt Marsh Restoration Project (and Habitat Bank) (Appendix D).

[1] See *Highway 101 Twinning Three Mile Plains to Falmouth Environmental Assessment*, Section 3 (https://novascotia.ca/nse/ea/highway-101-twinning-three-mile-plains-to-falmouth.asp).

NSDPW and NSDA have made a number of commitments, accommodations and/or engagement efforts throughout the Project development in response to concerns expressed by the Mi'kmaq. A summary of these include:

- A robust aboiteau design with two dedicated fishways, an eel pass, and significantly greater operational flexibility to allow for improved fish passage for species that pass through the aboiteau for foraging or to complete their lifecycles. The new aboiteau design also allows for it to be adjusted and adaptively managed in the future if fish passage is not performing as well as expected.
- Mi'kmaq participation (MCG) in the baseline fish monitoring program spanning three years, including over $700,000 in funding to support this program between April 2017 and January 2020.
- Invitation for Mi'kmaq involvement in the post-construction monitoring program.
- Wetland Habitat Compensation for loss of the Windsor Marsh at a compensation ratio of 5:1 (increased from 2:1 as requested by DFO and the Mi'kmaq of Nova Scotia).
- Incorporating several recommendations made by the Mi'kmaq of Nova Scotia into the Archaeological work plan, including subsurface testing and on-site archaeological monitoring during geotechnical investigations.
- Commitment to begin exploring future removal of the existing aboiteau structure in effort to further improve fish passage.
- Continued consultation and sharing of information with the Mi'kmaq of Nova Scotia.

The ongoing consultation and sharing of information includes the following which are further described in the following subsections:

- Sharing of Project information
- Input to habitat off-setting plans
- Pre- and post-construction monitoring programs

3.1.1 Sharing of Project Information

The most recent consultation meeting on February 14, 2022, focused on providing an update on the status of the aboiteau/causeway portion of the Hwy 101 twinning project such as status of the *Fisheries Act* Authorization application, a high-level summary of the operational scenarios, aboiteau/fishway design, post construction monitoring plan updates, Mi'kmaq concerns, and to discuss concerns and potential impacts to Treaty and Aboriginal rights resulting from the Project. Since Aboriginal consultation was initiated on this project, NSDPW has requested (in correspondence and at meetings) specific information from The Assembly of Nova Scotia Mi'kmaw Chiefs, Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO), and Sipekne'katik First Nation on the practice of Mi'kmaw Aboriginal and treaty rights within the project area.

To date, no specific information on traditional or current uses has been shared by the Mi'kmaq. Generalized assertions of impacts to fish, fish passage, and fish habitat have been reiterated without any specificity as to location or the rights being practiced.

3.1.2 Input to Habitat Offsetting Plans

Habitat offsetting requirements have been discussed with ongoing dialogue. A letter received from KMKNO on June 20, 2018, made a recommendation for a habitat compensation ratio of at least 5:1. NSDPW initially committed to a 4:1 ratio to offset the loss of salt marsh and fish habitat during consultation meetings held on January 21, 2019, with KMKNO and on March 6, 2019, with Sipekne'katik First Nation. During the first phase of the upgraded Avon River dyke system, including the infilling along the existing causeway, an additional compensation to a 5:1 ratio was applied in the NSECC wetland alteration and DFO *Fisheries Act* Authorization applications. The selected compensation ratio for the first phase reflected the incomplete status of the habitat compensation/offsetting project, the Truro-Onslow Salt Marsh Restoration Project, and established habitat bank. This was shared in the update letter to KMKNO and the Assembly of NS Mi'kmaq Chiefs on December 9, 2020. Phase 2 DFO and NSECC applications included compensation to a 4:1 ratio for alteration to the Elderkin Marsh and Windsor Marsh and up to 3:1 for the loss or alteration of mudflats, banks, and tidal channels; these lower compensation ratios reflect the completion of the final restoration activities at the Truro-Onslow Project in October 2021. The Offsetting plans are still undergoing DFO and NSECC review.

3.1.3 Pre- and Post-Construction Monitoring Programs

NSDPW and NSDA have provided information to DFO on the approach to Construction Monitoring. During the July 2021 consultation meeting, NSDPW / NSDA noted an independent consultant will be engaged to manage the overall pre- and post-construction monitoring program. Commitments have made to include MCG participation in specific aspects of the proposed 7-year monitoring plan, to facilitate the contribution of Indigenous knowledge to the Project. Efforts are underway to finalize how MCG can support the monitoring program, such as carrying out catch per unit effort (CPUE) monitoring and fish handling and tagging experience. The proposed monitoring program in still undergoing review with DFO.

3.2 Public Engagement

NSDPW and NSDA have conducted engagement throughout the Project, which has identified public concerns related to fish passage, freshwater impacts, environmental considerations, and societal and socio-economic impacts, particularly if the operation of the aboiteau changes from previous / existing conditions. The following subsections provide a summary of these activities.

3.2.1 CLC Meetings

A Community Liaison Committee (CLC) was initiated in the fall of 2016 to provide a forum for engagement and information exchange for the Highway 101 Three Mile Plains to Falmouth Twinning project, including the Avon River Aboiteau and Causeway upgrading component. NSDPW and NSDA periodically convene CLC meetings as key milestones arise, or via requests from CLC members, including the Town of Windsor and Municipality of the District of West Hants, now the Regional Municipality of West Hants.

The CLC is chaired by Ken Donnelly, Beyond Attitude Consulting, and generally meets approximately twice a year since January 30, 2017. The CLC membership, including 13+ people representing a wide range of local government, business, recreation, and other stakeholder groups, have voiced environmental, economic, and social concerns.

Due to the COVID-19 virus, starting in 2020, meetings have taken place virtually. The most recent meeting was held on April 6, 2022, and provided an update on the overall Highway 101 construction progress, Avon River Aboiteau and Causeway upgrade including aboiteau design overview, fishway design, operational scenarios, post-construction monitoring, and updated timelines. A summary of the meeting will be provided for review on the Project website (https://hwy101windsor.ca/meetings).

The next CLC meeting is being planned for summer / fall 2022, once further updates on the regulatory process and details are available following DFO's review of information and updates to the design.

3.2.2 Public Open House

An Open House was held on October 10, 2018, at the Windsor Legion for the Highway 101 Twinning Three Mile Plains to Falmouth project. The purpose of the Open House was to inform the public about the recently concluded study on the replacement options for the new aboiteau, and to gain feedback from the community on the study findings. Over 300 people attended the event and 184 people provided completed feedback forms.

The most frequent comment made was support for the Hybrid Aboiteau Design (Option D), quite often as a step to save the lake for business, community, tourism, and recreational purposes, including the canoe club. However, there were many people who saw Option D as a way to satisfy a variety of interests in the community, with a desire to simultaneously see adequate fish passage while also protecting the lake, providing protection for agriculture, preserving the waterfront, and providing flood protection.

On the other hand, and to a lesser extent, other options were mentioned, primarily by people who wanted to see tidal flow (full or partial) and/or prioritize fish passage above all else. A small number of people wrote they want the causeway removed and/or a bridge built to return the river to full tidal flow.

Beyond the feedback on the presented options, Table 3.1 identifies concerns that people raised.

Table 3.1 Summary of Concerns from Open House

Theme	Concerns
Freshwater Supply	• Keeping saltwater out of the lake • Protection of potable water source
General Water Use	• Fire protection
Business Tourism/Recreation	• Protecting recreation • Protecting businesses and tourism opportunities in the vicinity of the lake
Flooding Protection	• Floodwater protection • Protecting agriculture

3.2.3 Stakeholder Meetings

Several meetings have also taken place since 2018 with individual stakeholders, including:

- West Hants Regional Municipality (formerly the Town of Windsor and the Municipality of the District of West Hants)
- Agricultural Farmers
- Ski Martock
- Pisiquid Canoe Club

Stakeholders have various interests and concern. Table 3.2 identified some of the interests and concerns associated with the Project.

Table 3.2 Summary of Stakeholder Interests and Concerns

Stakeholder	Interest	Concerns
West Hants Regional Municipality	Flood protection Recreational use of lake and water course Balanced solution	Flooding risk increase to the community Loss of lake and decrease of watercourse for recreation Balanced solution that avoids or minimizes negative impacts to all groups
Agricultural Farmers	Protection of Crops and Livestock	Saltwater intrusion Salt damage to crop Risk to livestock
Ski Martock	Freshwater Water sources	Saltwater intrusion into water source
Pisiquid Canoe Club	Recreational use of lake and water course	Loss of lake and decrease of watercourse for recreation

3.3 Regulatory Consultation

NSDPW and NSDA have had regular communication with Regulatory Agencies during the Highway 101 Twinning Project, including informal periodic updates and as part of the Mi'kmaq of Nova Scotia consultation activities. Regulatory consultation on the Updated Project Components and activities included updates of the ongoing design, discussion of interim findings and results and the development of the post-construction monitoring plan required for Authorization under the *Fisheries Act*. A summary of the regulatory consultation activities is provided in the following table.

Table 3.3 Summary of Regulatory Consultation from April 2020

Nature of Discussion	Date	Groups Involved	Discussion
Post Construction Monitoring	April 16, 2020	DFO, NSDPW, NSDA, MCG, Acadia University, Consultant	The focus of this meeting was to discuss the monitoring for fish passage effectiveness of the new structure as part of the plan development. DFO indicated that the plan must include multi-species considerations for passage and a robust monitoring plan to confirm passage. Potential approaches to monitoring were discussed, such as pit tagging and species that been previously successful monitored with this method. DFO indicated the post-construction monitoring plan should include: objectives of the study, define the approach to monitoring, and identify monitoring points, definitions of 'effective' and 'efficient', and monitoring methods. The monitoring locations may also be informed during the Consultation process. DFO also noted that another aspect that should be included is adaptive management and a description of how the monitoring data will help inform those decisions.
Regulatory Workshop and Q&A Session	May 6 and 7, 2020	NSDPW, NSDA, DFO, Nova Scotia Department of Lands and Forestry (NSLF), NSE, Nova Scotia Office of Aboriginal Affairs	CBCL facilitated the workshop which included a summary of design and technical considerations (i.e., hydrotechnical, construction, and fish passage), regulatory requirements, steps forward, discussion and identification of requirements for on-going Mi'kmaq of Nova Scotia consultation. A summary of the presentation, and question and responses were provided to all attendees.

Nature of Discussion	Date	Groups Involved	Discussion
		(NSOAA), Consultant	
DFO Phase 2 Submission Update	July 20, 2020	DFO, NSDPW, NSDA, Consultant	Provide an update on the aboiteau design, proposed approach for the operation of the aboiteau, post-construction monitoring plan, and potential compensation/offsetting projects. DFO confirmed that the application submission must include the post-construction monitoring plan. In addition to the requirements identified in the April 16, 2020 meeting DFO recommended including how offsetting can be used if monitoring results do not meet the objectives as identified in the plan.
20-HMAR-00391 Application Submission	November 5, 2020	NSDPW, NSDA, DFO, Consultant	Submission of Project Phase 2 Application to DFO, regarding preferred design and Freshwater Lake operating scenario.
Water Approval – Wetland Alteration 2020-2767667-0 Application Submission	December 10, 2020	NSDPW, NSDA, NSECC, Consultant	Submission of Project Phase 2 Application to NSECC, regarding preferred design and alteration of Windsor Marsh and Elderkin Marsh.
2020-203455 *Canadian Navigable Waters Act* Application	December 10, 2020	NSDPW, NSDA, Transport Canada, Consultant	Submission of Project Phase 2 Application to NSECC, regarding preferred design.
20-HMAR-00391 Summary of Prelim Comments DFO	March 25 and 26, 2021	NSDPW, NSDA, DFO, Consultant	Allow NSDPW, NSDA, DFO and CBCL team members to review / discuss some of the DFO comments in more detail and to come to a clearer understanding of the expectations / critical items to focus on to ensure best chance of future application approval.
20-HMAR-00391 Response to Prelim Comments Update	June 2, 2021	NSDPW, NSDA, DFO, Consultant	The intent of the workshop was to provide updates to the operational scenarios, discuss Fish Behaviour Assessment highlights and limitations, provide an overview of design criteria for fish passage and the incorporation of fish behaviours, and discuss next steps and items under development.
20-HMAR-00391 Supplementary Document Submission	August 25, 2021.	NSDPW, NSDA, DFO, Consultant	Submission of supplemental materials for the Dampened Tidal and Brackish Lake scenarios.

Nature of Discussion	Date	Groups Involved	Discussion
20-HMAR-00391 Post Submission Discussion	September 22, 2021	NSDPW, NSDA, DFO, Consultant	Highlight changes to design and scenarios, present highlights from fish passage downstream to upstream, and discuss next steps and items under development.
20-HMAR-00391 Post Submission Discussion	October 14, 2021	NSDPW, NSDA, DFO, Consultant	Clarification of questions to the updated submission and Workshop 2 including sediment modelling validation, elevation of upstream ditches, capacity of proposed bridges, discuss new gate configuration and the velocity through the main structure with the new configuration, discuss maximum openings for new gates, and discuss next steps and items under development.
20-HMAR-00391 Post Submission Discussion	November 10, 2021	DFO, NSDPW, NSDA, Consultant	Technical discussion on fish passage around velocities, attraction flow, confirm requirements of any further modelling efforts, open discussion, and outline of next steps.
Post Construction Monitoring	November 19, 2021	DFO, NSDPW, NSDA, Consultant	To provide DFO with a summary of the Post - construction Monitoring Plan and discuss modifications.
Post Construction Monitoring	December 10, 2021	DFO, NSDPW, NSDA, Consultant	To discuss modifications to the Post - construction Monitoring Plan following the meeting on November 19, 2021.

Chapter 4 Changes in Environmental Effects

The EA update provides an assessment of the environmental effects related to changes in the Project, considering the new location and potential change in the operational scenarios of the aboiteau structure.

Summaries of supplementary studies undertaken since the original EA are included to support the updated assessment, including a summary of the changes to the aquatic environment since the DFO Ministerial Orders were issued starting March 2021.

Specifically, the assessment is focussed on effects that have changed from what was considered in the original EA and that are not authorized or in the process of being authorized under another regulatory approval. In consultation with NSECC, the scope of this EA update focuses on changes to five Valued Components (VCs) that were included in the original EA for which potential environmental effects may change as a result of the operational (water management) scenarios of the new aboiteau structure:

- Aquatic Environment
- Groundwater Resources
- Wetlands
- Wildlife and Wildlife Habitat
- Land Use

The following VCs were assessed in the original EA and are not included in this EA update, as the effects are not anticipated to change as a result of the operational scenarios or have been assessed under a VC (such as effects to wetland vegetation considered with wetlands):

- Atmospheric Environment
- Vegetation
- Archaeological and Heritage Resources

For each of the VCs assessed in this EA update, the assessment boundaries have been re-evaluated considering the new Aboiteau PDA and the two new water management scenarios: Brackish Lake and Dampened Tidal Estuary.

4.1 Aquatic Environment

Since the submission of the EA document, further assessment has been undertaken within the Avon River estuary, Windsor Marsh and Elderkin Marsh, the upstream freshwater reservoir (e.g., Pesaquid Lake) and the Avon River to support the design of the structure. The aquatic environment was selected as a VC under the original submission due to the importance of the aquatic environment and aquatic organisms to local stakeholders (Stantec, 2017). The updated EA includes additional assessment of the aquatic environment associated with operation and maintenance of the new Avon River Aboiteau and Dyke System.

4.1.1 Update to Existing Conditions

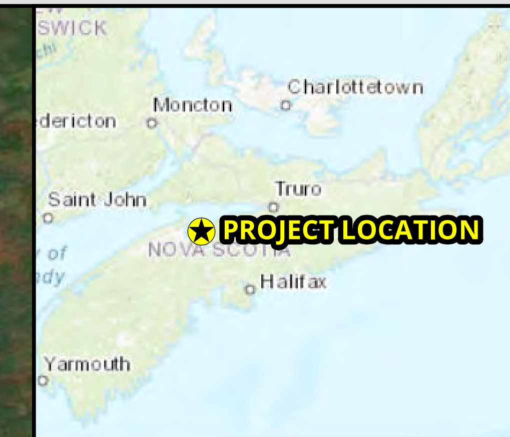
Since 1970, the upstream aquatic environment was predominantly held as a freshwater lake after the construction of the Windsor Causeway and existing aboiteau structure. These conditions remained until 2021, where environmental conditions changed following the DFO Ministerial Orders directing NSDA's operation of the tidal gates in a manner that improves fish passage. The following section describes information on the existing environment collected since the original EA.

4.1.1.1 Prior to 2021 Conditions

Baseline water quality measurements were collected from 30 locations in the Avon River Estuary and Avon River upstream of the causeway in 2019 (Figure 4.1). The water quality monitoring program included the seasonal collection of in-situ water quality data and samples submitted for laboratory analysis (Appendix E).

Generally, trends in the spatial distribution of estuarine and fresh waters downstream and upstream of the Windsor Causeway, respectively, were clearly defined. There were elevated concentrations of total suspended solids (TSS), measurements of salinity, and certain biological characteristics in the estuarine environment compared to the freshwater environment.

TSS showed clear trends and was considerably higher in the estuarine environment downstream from the aboiteau relative to the freshwater environment upstream. During low tide events TSS measurements were notably higher than levels measured at higher tide events. Similarly, it was noted that TSS measurements were consistently lower in the summer months, a trend particularly clear in the downstream environment. High TSS values in estuarine and brackish riverine environments can occur due to the re-suspension of fine bottom sediments by wind, waves, and ebbing tidal currents, in addition turbid inputs from terrestrial environments during periods of increased rainfall and runoff. These trends were also noted in total dissolved solids (TDS) and turbidity measurements, where measurements tended to be higher toward the bottom of the water column.



LEGEND

- Water Sampling Locations

CBCL

NOVA SCOTIA Public Works

Highway 101 Twinning Three Mile Plains to Falmouth Environmental Assessment Update

FIGURE 4.1: Water Quality Sampling Locations

Drawn: NH	Date: 2022-03-15
Checked: MR	CBCL Project Number: 211244
Approved: MR	Scale @ 11"x17"

NOTES:
The Water Sampling program was conducted throughout the Avon River Estuary (AVE), The Avon River (AR), and two background sampling locations (BKG)

0 800 1,600 3,200 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter

K:\Projects\211244.00 NSTAT EA-Hwy 101 TMP to Falmouth\44 CAD\08 GIS\MXD\211244_HWY101EA_Figure4.1_WQSamplingLocations.mxd 2022-03-15 9:11:22 AM

Salinity was highest in locations directly within the Avon River estuary or immediately upstream of the aboiteau. Farther from the aboiteau in the Avon River, salinity was much lower and exhibited characteristics of a freshwater environment. Similar trends were noted in conductivity, where levels were much higher in the estuarine environment compared to the freshwater environment.

Depth-stratified sampling indicated that salinity and conductivity were both slightly higher towards the bottom of the water columns compared to the surface, particularly in areas of the estuary with large freshwater inputs, such as the Kennetcook and St. Croix rivers. These sorts of depth-stratified results are typically observed in areas with denser, more saline waters near bottom and less dense freshwater nearer the surface. This trend was also observed near the aboiteau. Similar trends were noted in TDS and turbidity measurements, where measurements tended to be higher toward the bottom of the water column.

The water temperatures in the freshwater and estuarine environments showed increases and decreases consistent with changing seasons. Differences of 2 to 3°C were noted when transitioning from the upstream freshwater environment to the downstream estuarine environment. Water temperatures were typically cooler in the estuary compared to the freshwater environment. These results are to be expected due to the effects of tides and greater depths in the estuary, compared to the shallow depths and lesser flows in the freshwater environment.

During sampling, Pesaquid Lake was held at approximately 2.1 m CGVD2013 following operational protocols in place in 2019. Depth-stratified sampling showed little variation between the surface and bottom water temperature in the Avon River estuary, whereas temperatures in the freshwater environment were about 1°C warmer on surface compared to bottom. These consistent temperatures are likely associated to the extensive mixing of the water column associated with the large volume of tidal water fluctuating daily in the estuary, the relatively shallow waters in Pesaquid Lake and the Avon River, and the influx of estuarine waters into Pesaquid Lake through the aboiteau gates. Overall, the warmest temperatures were recorded in shallow surface waters in the Avon River near Sangster Bridge Road during the summer sampling event.

Measurements of pH generally fit within the expectations of a NS river environment according to Brown and Davis (1996). The majority of measurements collected were within Canadian Council of Ministers of the Environment (CCME) guidelines for freshwater and/or estuarine/marine environments, with some exceptions, particularly in the estuarine environment.

Other parameters, such as dissolved oxygen (DO) and TDS, generally did not show any clear spatial or temporal trends. DO appeared slightly lower at sampling locations in the freshwater environment during the summer sampling event, and where tributaries in the upstream Avon River appeared to flow through agricultural lands. Abundant aquatic vegetation and filamentous algae were also noted near the mouths of tributaries to the

Avon River along agricultural fields, suggesting possible increases in available nutrients at these sampling locations. However, concentrations of phosphorous, an important component of fertilizer and limiting factor for plant growth in aqueous environments, did not show clear trends in the freshwater environment, or consistently higher concentrations at these sampling locations. Phosphorous concentrations were generally much higher in the marine environment, although there did not appear to be clear trends in the spatial or temporal distribution of phosphorous in the estuarine environment.

Biological characteristics of water quality showed trends in the counts of fecal coliform units in the freshwater environment versus the estuarine environment. Counts were consistently higher in the freshwater environment, indicating a potential source of fecal coliforms in the area. This may be attributed to agricultural land practices, as cows were regularly observed near to and occasionally on the banks of the upstream Avon River. Counts in the freshwater environment were generally higher during the fall compared to the summer, therefore increased rainfall and runoff may contribute to the higher counts. Fecal coliform counts in the estuary were primarily non-detect (i.e., no observed colony forming unit (CFUs)/ 100 mL) through the year.

Trends in the total coliform counts were reversed; higher counts of total coliforms were observed in the estuary compared to the freshwater environment. Sediments can act as a reservoir for coliform bacteria; therefore, the inverse relationship may be explained by the higher levels of TSS in estuarine waters. There were no trends in the spatial distributions of total coliforms in the either the estuarine or freshwater environments. Similar to fecal coliforms, increased counts were observed in the fall compared to the summer, therefore the increase in counts may be associated with increased runoff.

BOD and chlorophyll *a* concentrations were generally higher in the estuarine environment compared to the freshwater environment. There were no clear trends in spatial distribution or association with the tidal cycle; however, both BOD and chlorophyll *a* concentrations were generally higher during the summer sampling events. Higher concentrations are common during the summer months when water temperatures and light levels are elevated relative to the spring, fall, and winter.

4.1.1.2 Conditions following the DFO Ministerial Orders

Since the issue of the DFO Ministerial Orders directing NSDA's operation of the tidal gates in a manner that improves fish passage, the impoundment of water is restricted upstream of the causeway and aboiteau. The aboiteau gates open on the ebb tide when the upstream levels and tide levels are the same, resulting in water being released downstream through the structure.

The water level upstream of the existing aboiteau varies depending on the conditions in the watershed. The thalweg of the Avon River through the previous location of Pesaquid Lake remains, allowing flow from the upper reaches of the Avon River to drain toward the Avon River Estuary downstream of the existing aboiteau and causeway.

Directly upstream of the causeway, a portion of the Avon River is inundated with tidal waters which enter the upstream environment during the period of gate openings, particularly on flooding tides. The salinity of the upstream environment depends on the amount the aboiteau gates are open and the freshwater input conditions. Background in-situ water quality data was collected by NSDA from April 2021 to July 2021 at select locations upstream of the existing aboiteau and dyke system. Through this period, salinity varied from negligible (less than 0.5 parts per thousand (ppt)) to greater than 20 ppt within the location of former Pesaquid Lake. Increases in salinity were recorded during drier conditions of June and July. Within the Avon River, upstream of the Lebreau Creek Brook and Allen Brook confluences, the salinity ranged from less than 0.5 ppt to approximately 11.5 ppt, with higher salinity at depths greater than 1 m below the surface water level during the dry June conditions. Moving farther upstream, toward the fork of the Avon River and the West Branch, salinity was less than 0.5 ppt.

Other watercourses sampled included Lebreau Creek Brook and Allen Brook. Greater levels of salinity were noted at Lebreau Creek Brook at its confluence with the Avon River and extending slightly upstream during drier conditions of June 2021. Higher salinities were recorded at depths greater than 0.75 m, than were recorded at the surface. Salinity decreased moving upstream, with negligible salinity (less than 0.5 ppt) noted approximately 375 m upstream of the confluence with the Avon River. Salinity in Allen Brook was less than 0.5 ppt, even when measured during dry conditions in June and July of 2021.

Vegetation is establishing on the exposed substrates along the riverbeds, and along the mudded slopes of the Avon River, which were covered with water when Pesaquid Lake was held at approximately 2.1 m CGVD2013. Where exposed substrates along the riverbeds, and slopes of the Avon River remain unvegetated, increase dust has been reported by the community.

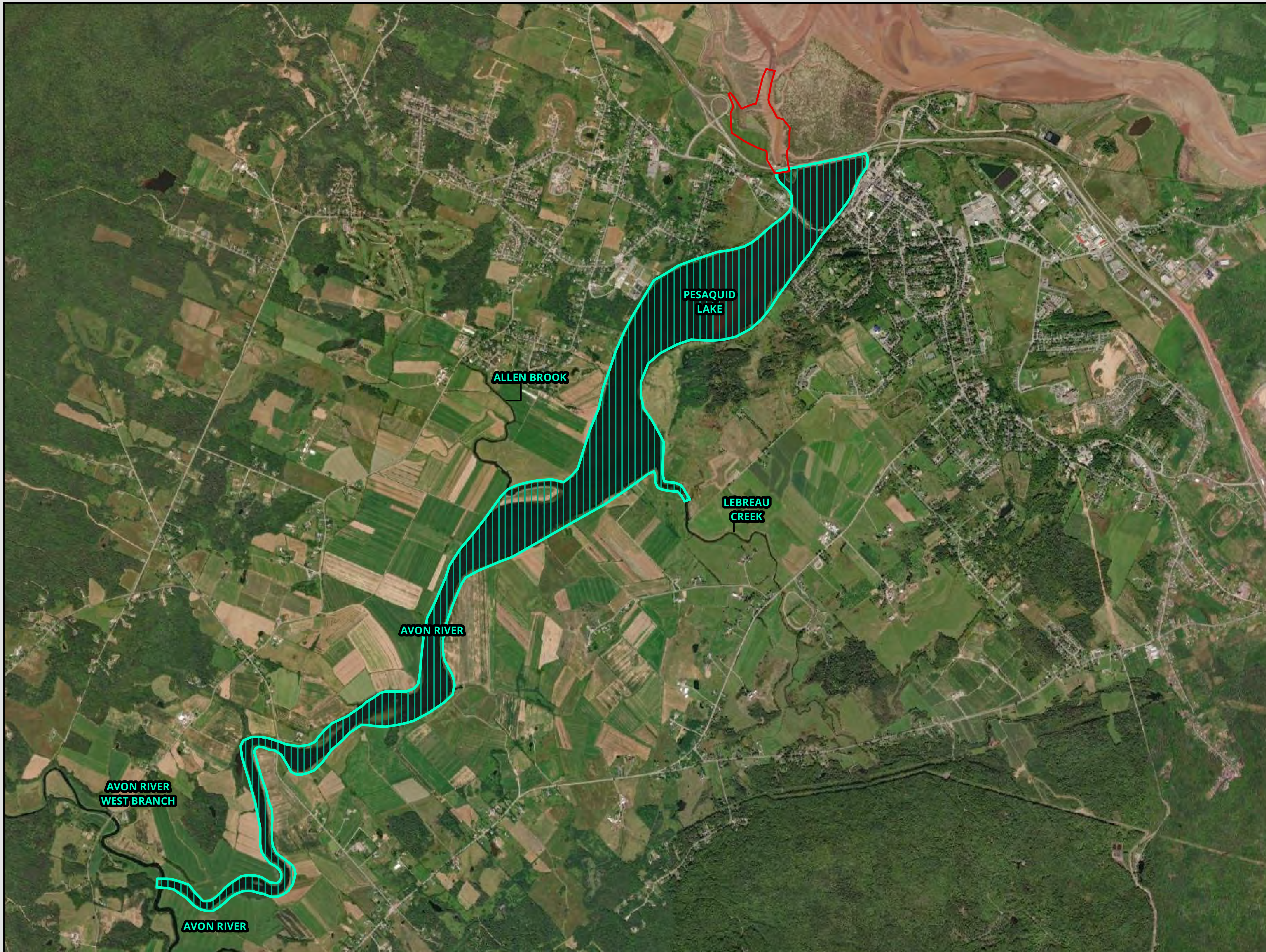
4.1.2 Boundaries

The updated assessment of potential effects to the aquatic environment was completed within the updated Aquatic Environment Assessment Area (Figure 4.2).

The Aboiteau PDA marks the physical footprint area of the updated Project and includes new areas downstream in the Avon River estuary and Avon River upstream of the existing causeway. The Aquatic Environment Assessment Area extends upstream in Pesaquid Lake to the fork of the Avon River at the West Branch as noted in Figure 4.2. The new Project Area downstream is associated with the location of the new aboiteau structure, the realignment of the channel immediately downstream of the existing aboiteau structure, and the construction of new dykes in the Avon River estuary, Windsor Marsh, and Elderkin Marsh. Applications for *Fisheries Act* Authorizations for the alteration of this area have been submitted to DFO for approval (Section 1.3). Therefore, assessment of effects associated with the direct and indirect effects on fish and fish habitat have not been included in this assessment.

The extent of the Aquatic Environment Assessment Area depends on the water management operational scenario. Assessment of effects anticipated in the upstream area under the Freshwater Lake scenario were included in the original EA as the lake and river are maintained as predominantly freshwater environments. Under the Brackish Lake scenario, environmental effects are anticipated to occur in the lake and river environments; modelling indicates that the upstream extent depends on freshwater river inputs, with effects occurring further upstream during seasonal dry conditions. Overall, the Dampened Tidal Estuary scenario is similar to the Brackish Lake scenario, with higher salinity and suspended sediment concentrations due to the larger volume of tidal waters flowing upstream. Therefore, the upstream boundary of the Aquatic Environment Assessment Area was set upstream of the Martock water intake at the fork in the river located at the confluence of the West Branch and the Avon River. Tidal waters are not anticipated to flow upstream of the fork into the West Branch and Avon River, and environmental effects associated with the Project can be expected between the new aboiteau and the fork at the West Branch and Avon River.

The temporal boundaries of the updated environmental effects assessment include the operations and maintenance phases of the Project.



LEGEND

- Aboiteau Project Development Area
- Aquatic Environment Assessment Area

Nova Scotia Public Works

Highway 101 Twinning Three Mile Plains to Falmouth Environmental Assessment Update

FIGURE 4.2: Aquatic Environment Assessment Boundaries

Drawn: SF	Date: 2022-03-21
Checked: MR	CBCL Project Number: 211244
Approved: MR	Scale @ 11"x17"

NOTES:

0 295 590 1,180 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter

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4.1.3 Potential Environmental Effects and Project-Related Interactions

Project-related activities have the potential to result in changes to the Aquatic Environment VC in the Aquatic Environment Assessment Area. In the original Highway 101 Twinning Three Mile Plains to Falmouth EA document (Stantec, 2017), the only effects to the Aquatic Environment that were identified and evaluated were related to fish and fish habitat use in the Assessment Area, and the use of fish habitat by species at risk (SAR) and species of conservation interest (SoCI). The Project-related effects of the Project on fish, fish habitat, SAR and SoCI, including the changes to the Project and the water management operational scenarios, are under evaluation by DFO through an application for Authorization under the *Fisheries Act*. Therefore, these effects are not included in the EA update.

In the EA update, the predicted changes in surface water quality and quantity are evaluated for the Brackish Lake and Dampened Tidal Estuary water management scenarios. The 2017 EA document included no changes to the upstream freshwater environment and are not re-evaluated as part of this EA update. The changes to the Aquatic Environment result in associated effects for other VCs in the Aquatic Environment Assessment Area, including Wetlands, Wildlife and Wildlife Habitat, and Land Use. The effects associated with changes in surface water quality and quantity to these VCs are described in Sections 4.3, 4.4, and 4.5, respectively.

Under the Brackish Lake and the Dampened Tidal Estuary scenarios, tidal waters are expected to transform the predominantly freshwater environment maintained in the lake and river (prior to 2021) to a brackish or tidal environment, respectively. Consequently, the aquatic environment will change depending on the selected water management scenario. Potential effects may include changes in the following:

- Change in Sediment Dynamics
- Change in Water Levels
- Change in Water Quality
    - Salinity
    - Sediment

Two sets of seasonal conditions were modelled for each water management operational scenario for year-round operation of the Project, since freshwater runoff into the lake and river impact the salinity and sediment concentrations in the Assessment Area. The seasonal conditions modelled include:

- **Wet Season Conditions**: Winter and spring seasons with higher average volumes of freshwater runoff into Pesaquid Lake and the Avon River
- **Dry Season Conditions**: Summer and fall seasons with lower average volumes of freshwater runoff into Pesaquid Lake and the Avon River

4.1.3.1 Change in Sediment Dynamics

Changes in flow patterns, suspended sediment, sediment mobility, and sediment deposition from the influx of tidal water into the lake and river has the potential to result in the formation of estuarine habitats in the lake and river, including development of salt marsh habitats as observed in the downstream estuary.

Hydraulic modelling was used to analyze simulated erosion and deposition as the reintroduction of tidal water exchange in the lake and river areas has the potential to result in sediment deposition (Appendix F). Erosion and deposition may result in changes to watercourse bed elevations, surface cover and overall capacity within the Aquatic Environment Assessment Area. However, the long-term changes to the lake and river areas following long-term operation of the selected operational scenario are not fully understood due to the complexity of the hydrology and suspended sediment. It is expected that the changes will be similar to the original effects associated with the construction of the causeway with deposition in slower flowing areas outside of the main thalweg. The intrusion of salt water and potential effects of sedimentation in the lake and river may result in an alteration of the aquatic habitats and aquatic vegetation communities in the affected areas.

Under the Brackish Lake scenario, tidal waters typically extend into the lake and river just upstream of the Highway/Trunk 1 bridge. Models indicate that sediment deposition is likely to occur along the Windsor waterfront due to the sediment plume entering the lake and settling in the low flow velocities in this area. Over time, this deposition may result in the formation of marsh and mudflats in the lake area. Deposition may also occur in the channel bends between the new and existing aboiteau; however, the rates of deposition are expected to be minimal, and the thalweg of the channel should remain free of deposited sediment. Other areas, such as the main channel downstream of the new aboiteau, may also experience some slight rates of sediment deposition during dry seasons. These deposited sediments are anticipated to erode from these same areas during wet seasons.

Under the Dampened Tidal Estuary scenario, tidal waters extend further upstream into the Avon River. Modelling indicates that sediments are likely to deposit along the waterfront in Windsor, similar to deposition under the Brackish Lake scenario. Sediment deposition also extends further upstream in the Avon River due to the greater volume of tidal water exchange under the Dampened Tidal Estuary scenario. However, the sedimentation rates are expected to be lower in the channel between the new and old aboiteau structures, compared to the Brackish Lake scenario, due to the constant flow of tidal waters in and out of the channel. This is expected to result in a channel thalweg that is free of deposited sediment. The constant flows and high velocities downstream of the new aboiteau structure are also expected to result in a deepening of the main channel immediately downstream of the dissipation pool.

4.1.3.2 Change in Water Levels

Surface water quantity was assessed through the identification of potential effects on the aquatic environment associated with the intrusion of tidal water from the Avon River estuary into the habitats upstream of the causeway to the fork at the West Branch and the Avon River. The potential effects are anticipated to occur as a result of tidal fluctuation in both the Brackish Lake and Dampened Tidal Estuary scenarios.

Brackish Lake Scenario

Under the Brackish Lake scenario, the water level is maintained at approximately 2.1 m CGVD2013 and allows the level to fluctuate by +/- 0.4 m (Figure 4.3). The target elevation of 2.1 m CGVD2013 under this scenario is similar to the approximately 2.1 m elevation historically maintained in the freshwater lake, and the tidal fluctuation of +/- 0.4 m is comparable to the +/- 0.6 m fluctuation in the freshwater water level used in the Pesaquid Lake area prior to 2021 (Table 4.1).

Table 4.1 Target Water Level Elevation and Corresponding Surface Water Area for the Brackish Lake Scenario (CBCL, 2021b)

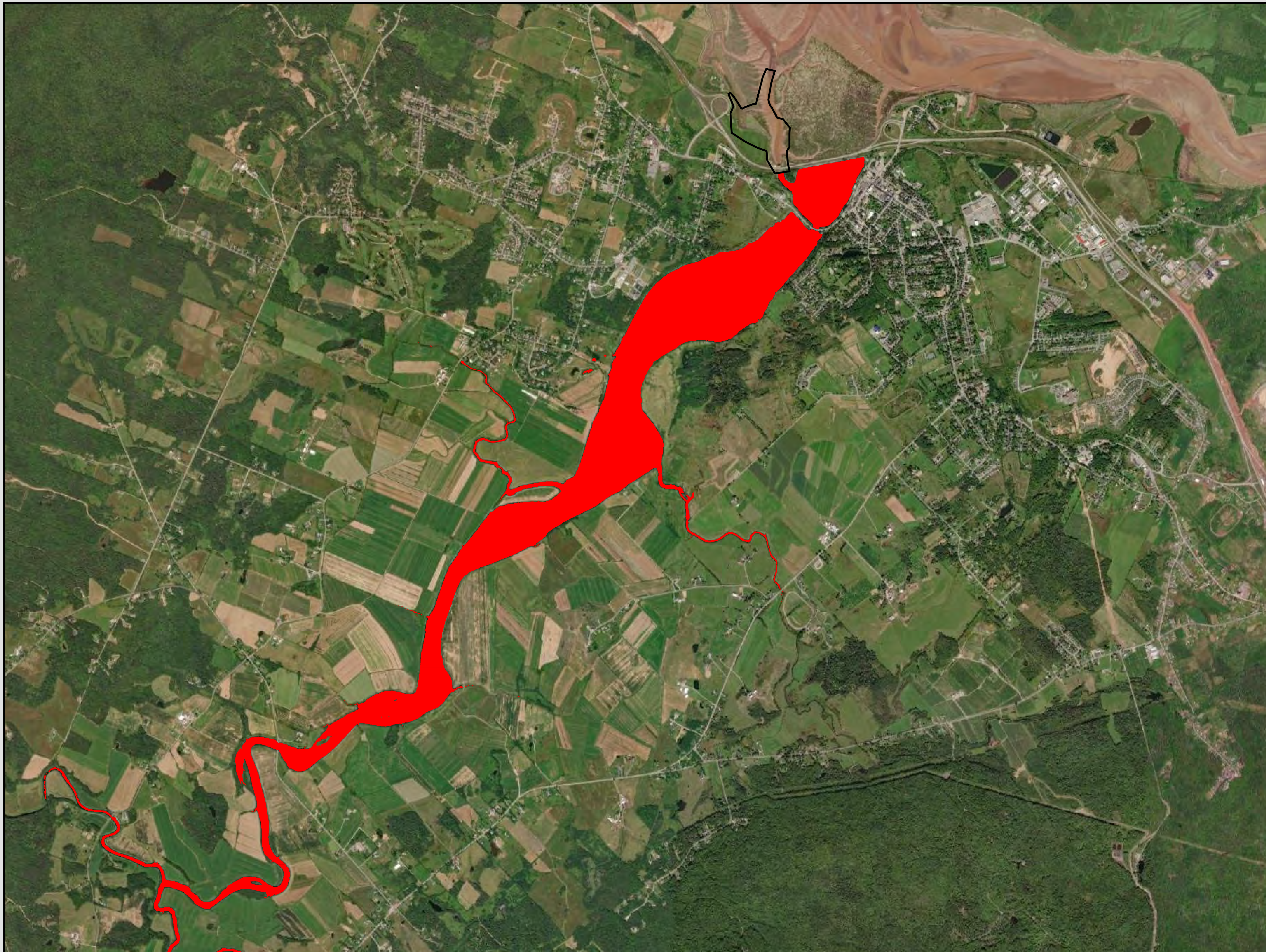
Target Water Level Elevation (CGVD2013)	Approx. Surface Water Area (m^2)
1.5 m	2,507,400
2.1 m	2,768,700
2.5 m	2,864,300

Tidal water is allowed to flow upstream through the fishways when the tide is above the upstream water elevation, and the gates on the main channel will typically open between 0.5 to 2.5 hours per tidal cycle when the tide falls below the water level to maintain the water level in Pesaquid Lake and reduce flooding concerns along the lake and the Avon River. The opening of the gates results in a large movement of water downstream through the channel. The amount of time the gates are open varies depending on downstream tidal and upstream freshwater conditions. During an average year, the gates are open more often during the wet conditions in winter and spring (i.e., higher freshwater inputs), with the highest percentage in December, to reduce water levels in the freshwater system.

In this scenario, the water levels are proposed to be maintained similar to pre-2021 water levels, therefore, this scenario is not expected to negatively affect water levels.

Dampened Tidal Estuary Scenario

The Dampened Tidal Estuary scenario alters the freshwater environment in Pesaquid Lake, which had been maintained prior to 2021, to a brackish estuarine environment. Water levels are expected to fluctuate between -0.5 m and +1.5 m CGVD2013 (Figure 4.4 and Figure 4.5), with an average intertidal variation in the order of 0.8 m to 1.2 m (Table 4.2).



LEGEND

- Brackish Lake Scenario (2.1 m)
- Aboiteau Project Development Area

CBCL

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FIGURE 4.3: Water Levels Upstream of the Causeway at 2.1 m CGVD2013

Drawn: SF	Date: 2022-03-15
Checked: MR	CBCL Project Number: 211244
Approved: MR	Scale @ 11"x17"

NOTES:

0 295 590 1,180 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter

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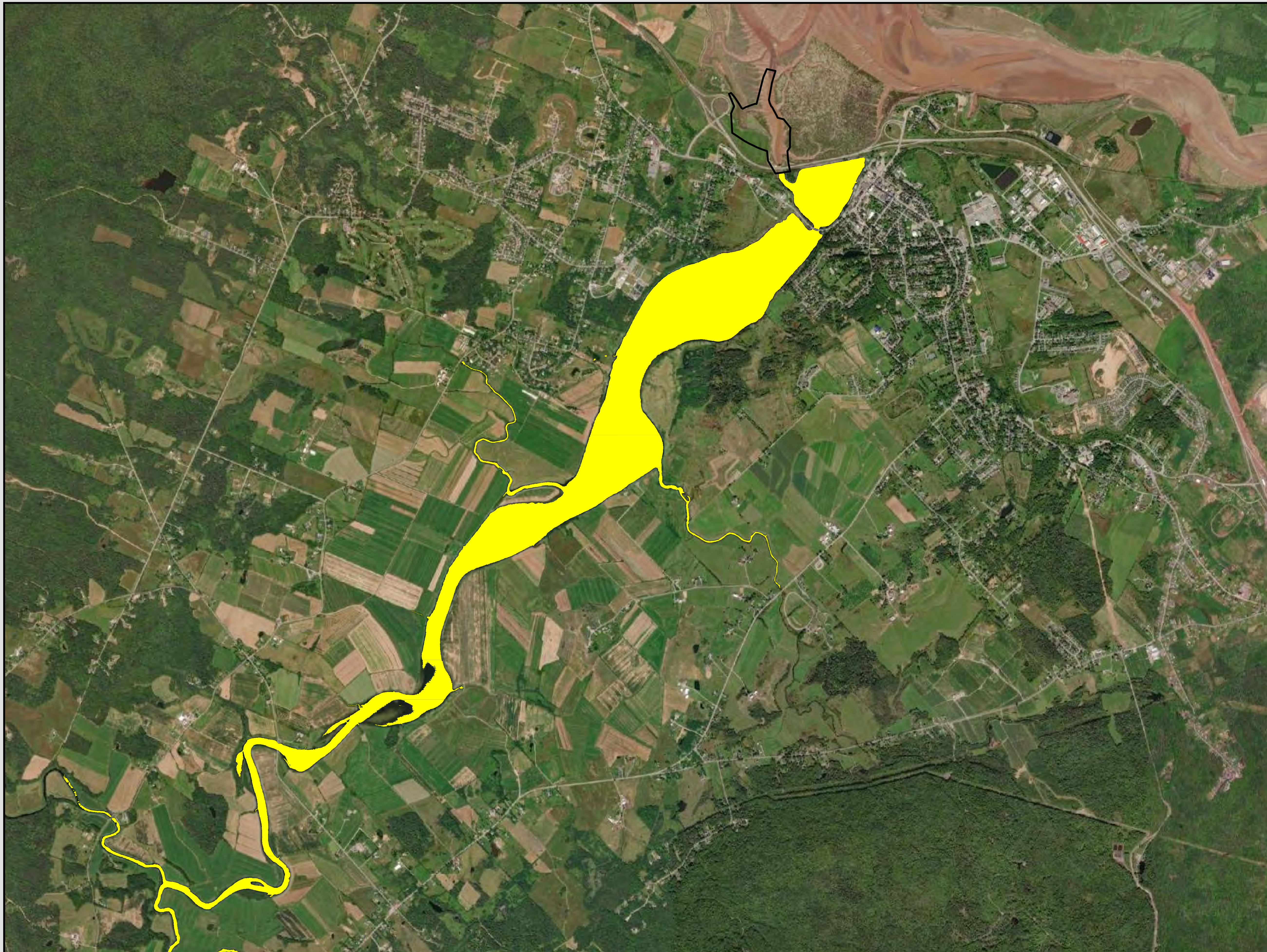

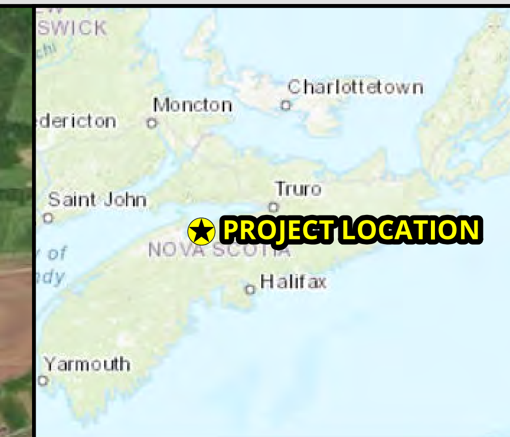

LEGEND

Dampened Tidal Scenario (1.5 m)

Aboiteau Project Development Area

CBCL

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Highway 101 Twinning Three Mile Plains to Falmouth Environmental Assessment Update

FIGURE 4.4: Water Levels Upstream of the Causeway at 1.5 m CGVD2013

Drawn: SF	Date: 2022-03-15
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Approved: MR	Scale @ 11"x17"

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Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter

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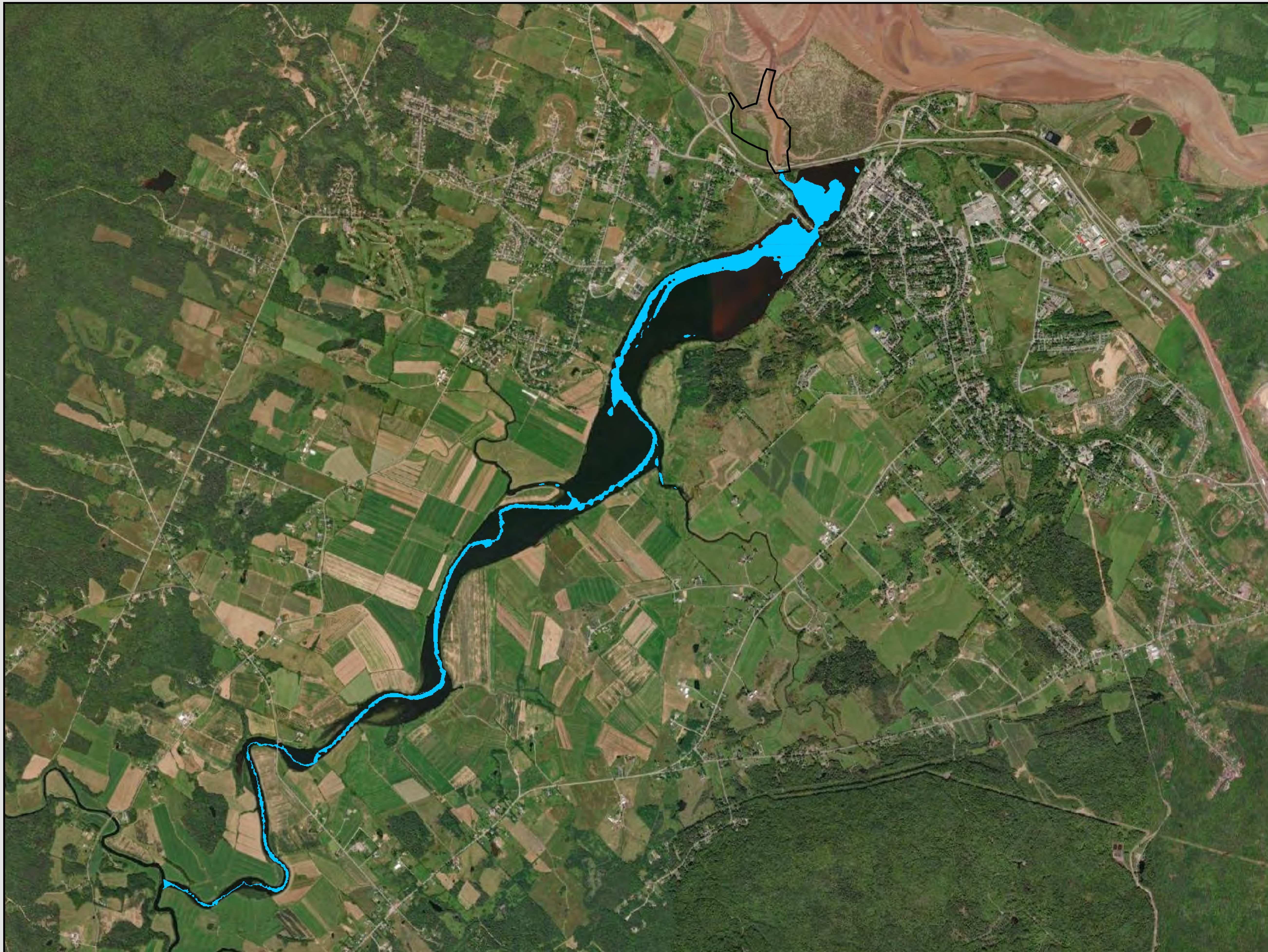

LEGEND

- Dampened Tidal Scenario (-0.5 m)
- Aboiteau Project Development Area

CBCL

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Public Works

Highway 101 Twinning Three Mile Plains to Falmouth Environmental Assessment Update

FIGURE 4.5: Water Levels Upstream of the Causeway at -0.5 m CGVD2013

Drawn: SF	Date: 2022-03-15
Checked: MR	CBCL Project Number: 211244
Approved: MR	Scale @ 11"x17"

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Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter

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Table 4.2 Target Water Level Elevations and Corresponding Surface Water Area for the Dampened Tidal Estuary Scenario (CBCL, 2021b)

Target Water Level Elevation (CGVD2013)	Approx. Surface Water Area (m^2)
Low Tide -0.5 m	608,312
High Tide 1.5 m	2,507,400

The actual tidal variation is expected to vary on a per-cycle basis, to accommodate the changing tides and freshwater flows resulting from precipitation and runoff, and will ultimately be controlled by the gates on the aboiteau structure. A greater volume of tidal water moves between the estuary and the lake under this scenario compared to the Brackish Lake scenario. The surface water area at low tide will be smaller in the overall system compared to the high tide levels. High tide levels correspond to the water levels maintained in the lake and river areas between 1970 and 2021.

4.1.3.3 Change in Water Quality

Surface water quality (i.e., salinity and suspended sediment levels) is expected to change as a result of increased intrusion of tidal water from the downstream Avon River estuary into the areas upstream of the Avon River Aboiteau and Dyke System. The potential effects to surface water quality in the upstream habitats are expected to occur during the operation and maintenance phases of the new aboiteau structure.

Under the Brackish Lake and Dampened Tidal Estuary scenarios, tidal waters from the estuary flow upstream through the new aboiteau structure into the former Pesaquid Lake. This environment has been predominantly freshwater since the construction of the causeway and the existing aboiteau as described in Section 4.1.1. The intrusion of tidal waters increases the salinity and suspended sediment concentration in the affected portions of the lake and river. The magnitude of the change in surface water quality is expected to be greater under the Dampened Tidal Estuary scenario due to the larger volume of tidal waters allowed to flow upstream.

Hydraulic modelling was used to estimate the extent of potential effects. Description of the model used, model calibration, and analysis is provided Appendix F. The changes in salinity and suspended sediment are summarized in the following subsections.

Changes in Salinity

Brackish Lake Scenario

The Brackish Lake scenario allows the intrusion of tidal water from the Avon River estuary into the previously freshwater environments of former Pesaquid Lake and upstream reaches of the Avon River (CBCL, 2021a, Appendix F). Modelling the wet season (winter and spring) and dry season (summer and fall) conditions indicates this scenario will result in the development of brackish conditions upstream of the proposed structure:

Dry Seasons (Low Runoff)

- 15 practical salinity units (PSU) or 15 ppt (1 PSU = 1 ppt) north of the Highway / Trunk 1 bridge
- 7 PSU / ppt downstream of Martock

Wet Seasons (High Runoff)

- 6 PSU / ppt north of Highway / Trunk 1 bridge
- 1 PSU / ppt at Martock and during a large precipitation event, saline water is expected to be flushed from this area

Figures 4.6 and 4.7 show a salinity gradient between the north and south ends of Pesaquid Lake, with higher salinities occurring in the north. During the wet season, this gradient decreases due to increased freshwater river inputs, frequent flushing through the main roller gates to manage lake levels, and the influx of saline water through the fishways (Figure 4.6).

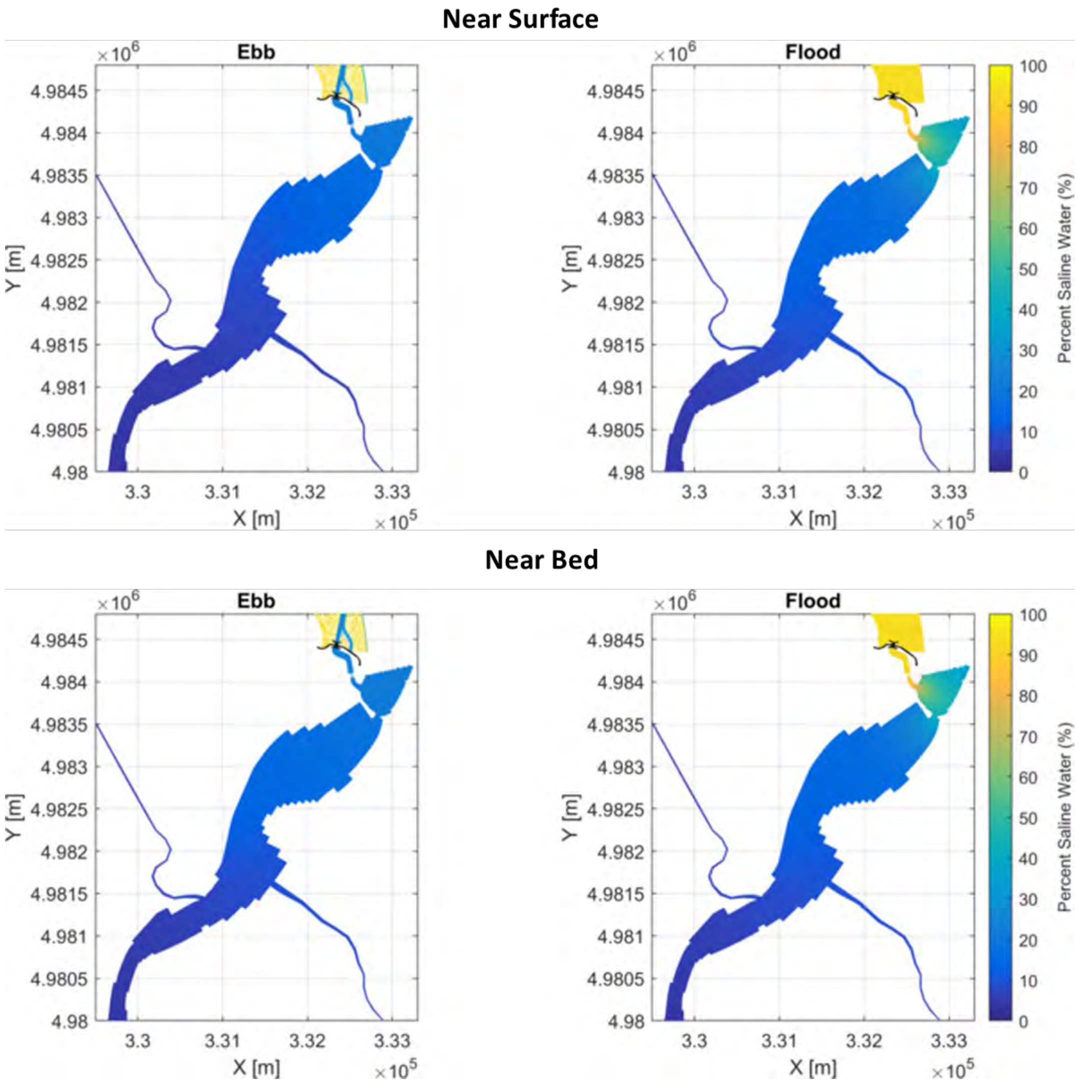


Figure 4.6 Delft3D Model Map of Freshwater and Saline Percentage of Water for the Brackish Lake Scenario (Wet Seasons; CBCL, 2021a).

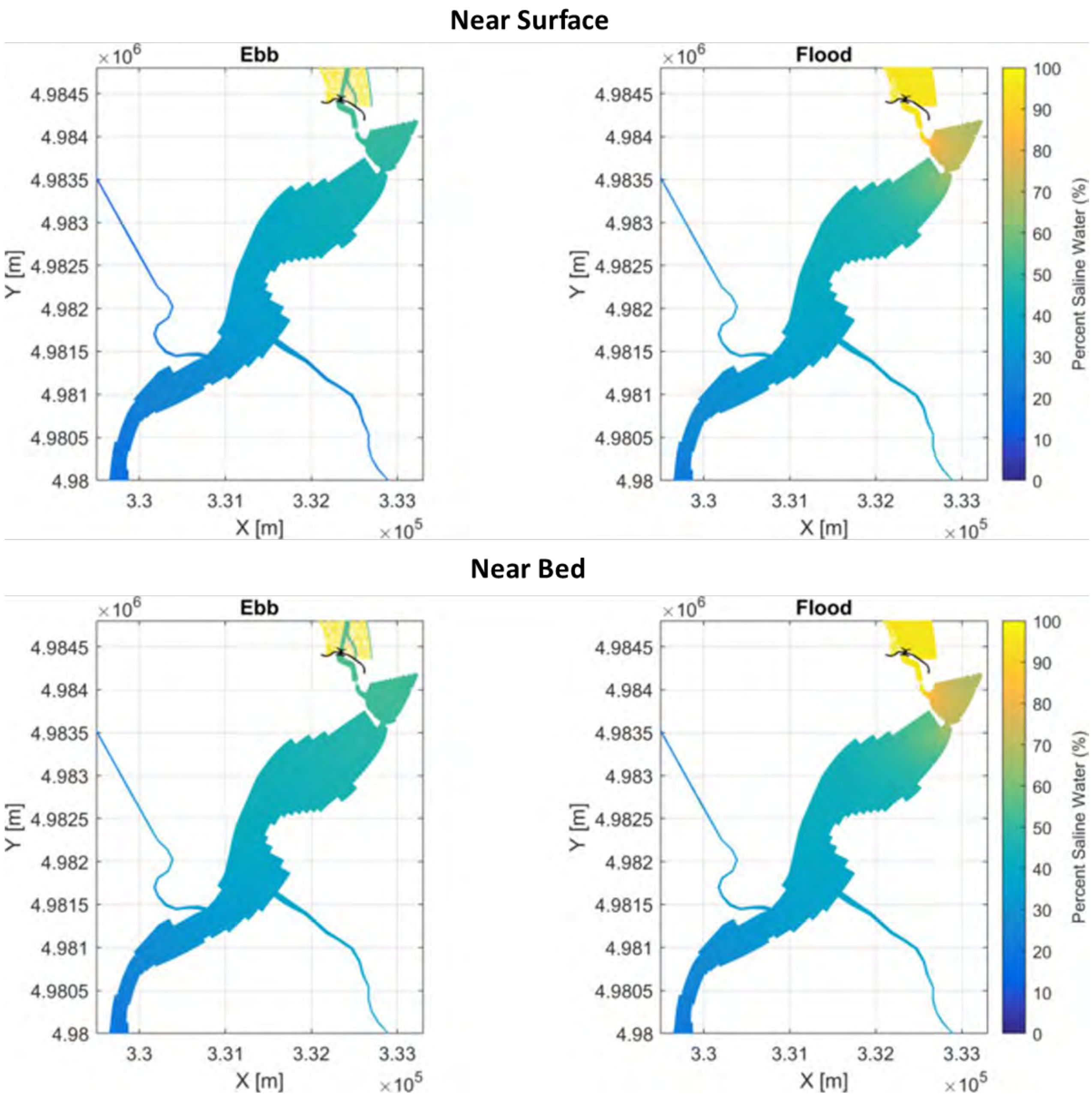


Figure 4.7 Delft3D Model Map of Freshwater and Saline Percentage of Water for the Brackish Lake Scenario (Dry Seasons; CBCL, 2021a).

Very little stratification takes place in the lake (CBCL, 2021a). Some stratification occurs just upstream of the aboiteau, but further upstream, this stratification is reduced. This is similar to pre-2021 conditions, with the exception of the area closer to the existing aboiteau in Pesaquid Lake, where higher salinity values were exhibited near the bottom of the water column.

Dampened Tidal Estuary Scenario

The Dampened Tidal Estuary scenario allows for more intrusion of brackish water from the Avon River estuary, resulting, on average, in a higher concentration of salinity relative to the Brackish Lake scenario (CBCL, 2021a, Appendix F). Modelling the wet season (winter and spring) and dry season (summer and fall) conditions indicates the Dampened Tidal Estuary scenario will result in the development of brackish conditions upstream of the proposed structure:

Dry Seasons (Low Runoff)

- 25 PSU / PPT north of the Highway / Trunk 1 bridge
- 8 PSU / PPT downstream of Martock

Wet Seasons (High Runoff)

- 18 PSU / PPT north of Highway / Trunk 1 bridge
- Fresh water at Martock is continuously observed during a period of high runoff

Figure 4.8 and Figure 4.9 show a gradient of salinities between the north portion at the Aboiteau and south portions of the Aquatic Environment Assessment Area, with higher salinities occurring in the north. Salinity shows a gradual decrease between the proposed aboiteau structure and the upstream extent of tidal water intrusion; increased salinity is expected to occur in the vicinity of former Pesaquid Lake and decreasing salinity is expected with increasing distance upstream in the Avon River. During the wet season, the salinity gradient is pronounced due to increased freshwater river inputs, frequent flushing through the main roller gates to manage lake levels and the entrance of saline water through the fishways. Modelling also indicates that saline waters reach furthest upstream in the river during flood tides in the dry season when freshwater inputs are at a minimum. The model indicated that salinity could reach up to 25 PSU at the causeway and 8 PSU near the Martock water intake.

Little stratification takes place in the environment upstream of the new aboiteau. This was reported to be even less than what was indicated by model results of the Brackish Lake scenario (Figure 4.8 and Figure 4.9, CBCL, 2021a). This is likely due to the higher velocities under the Dampened Tidal Estuary scenario increasing mixing upstream of the existing structure. The results indicate that the salinity is largely controlled by the freshwater river inputs, with high rainfall events resulting in lower salinities in the wet seasons (CBCL, 2021a).

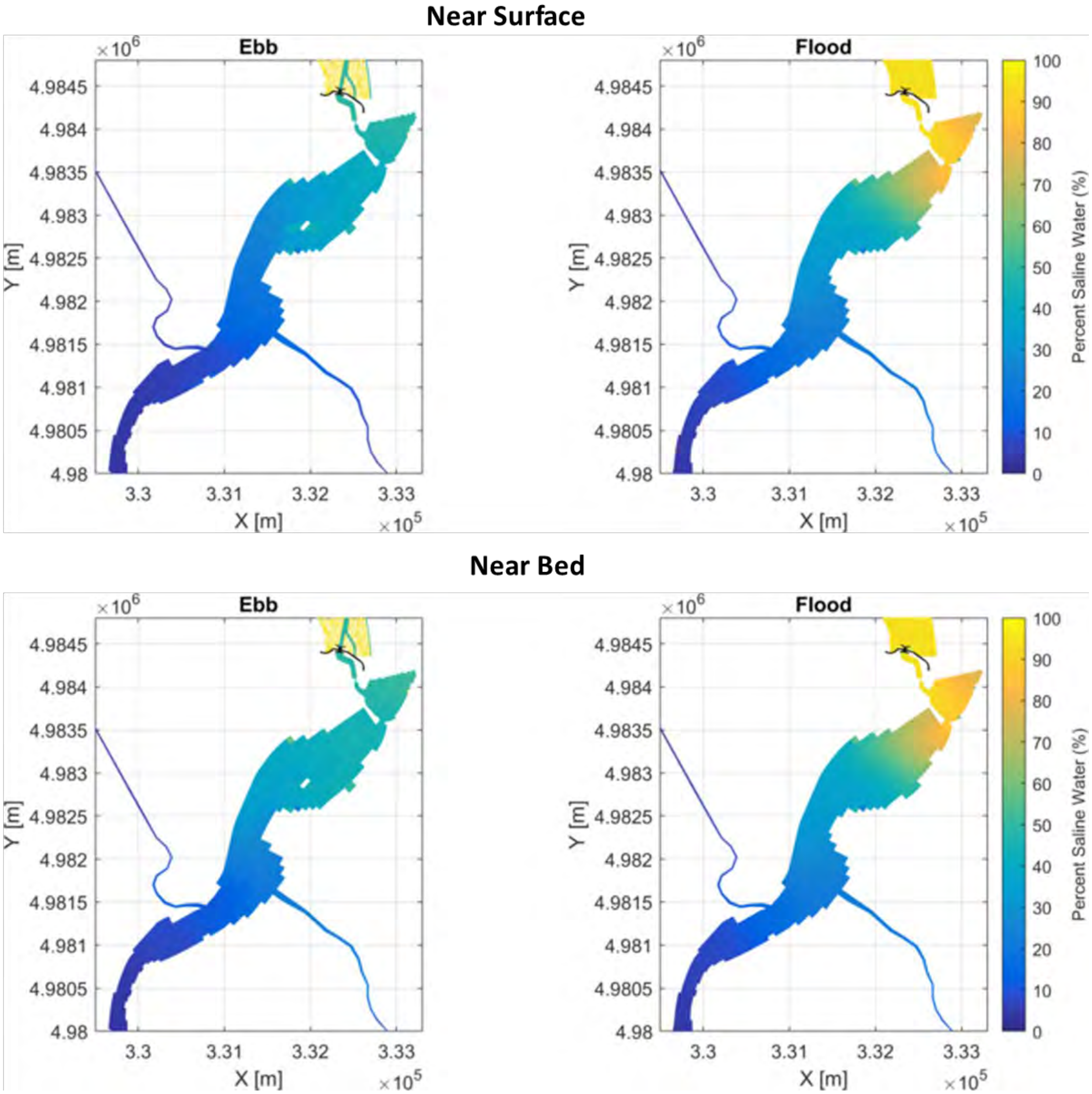


Figure 4.8 Delft3D Model Map of Freshwater and Saline Percentage of Water for the Dampened Tidal Estuary Scenario (Wet Seasons; CBCL, 2021a).

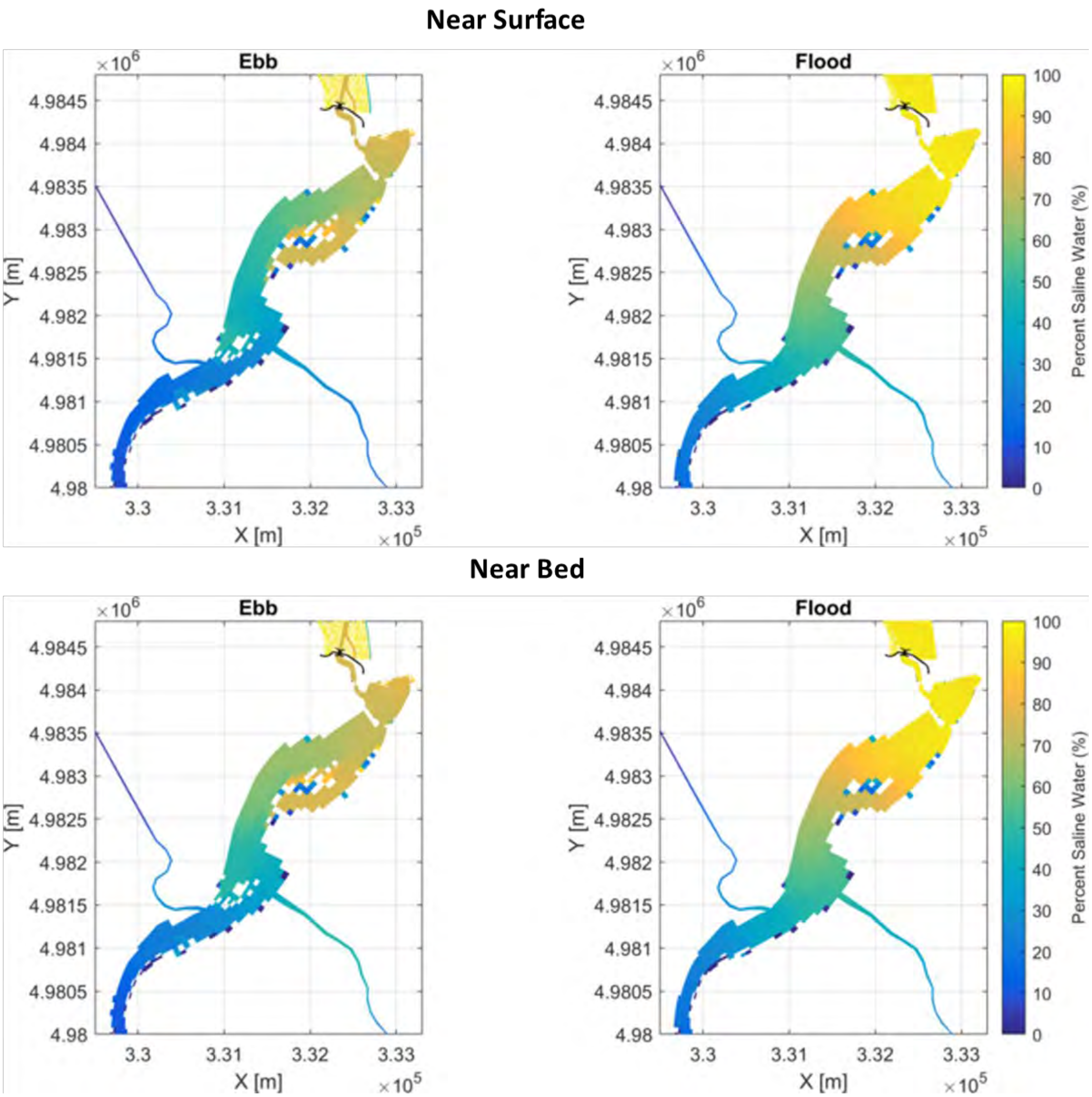


Figure 4.9 Delft3D Model Map of Freshwater and Saline Percentage of Water for the Dampened Tidal Estuary Scenario (Dry Seasons; CBCL, 2021a).

Changes in Suspended Sediment Levels

Tidal waters in the Avon River estuary are naturally high in sediment loads and suspended sediments (van Proosdij and Baker, 2006; Appendix E). The operation of the proposed aboiteau is expected to affect the aquatic environment by increasing the concentrations of solid-phase materials suspended in the water column above pre-2021 background levels in the Aquatic Environment Assessment Area.

The modelled suspended sediment extents and accretion and erosion potential differed seasonally and on tidal condition (flood and ebb tide), a summary of the model analysis is provided Appendix F and described in the following subsections.

Brackish Lake Scenario
Concentrations of suspended sediments are expected to increase in the former Pesaquid Lake area due to the high concentrations of fine suspended sediment in estuarine waters flowing into the system under the Brackish Lake scenario (Appendix F). Highest concentrations are expected to occur in the vicinity of the existing aboiteau structure, where estuarine waters pass into the former lake area, during flooding tides. The upstream extent of increased concentrations occurs at the Highway / Trunk 1 bridge. When the tide turns (i.e., ebb tide), the sediment plume is flushed back downstream through the aboiteau into the estuary, and suspended sediment concentrations return to the low concentrations observed under the Freshwater Operational scenario maintained in the lake between 1970 and 2021 (i.e., background concentrations).

Fine sediment is expected to settle in some areas of the former lake; the velocities at the upstream extent of intrusion are so low that some sediment accumulation is likely to occur on bottom (CBCL, 2021a, Appendix F). Overall, sediment accumulation is expected to be minimal in the former lake area; however, there will be changes to the lake bottom and bank morphology over time.

Dampened Tidal Estuary Scenario
Under the Dampened Tidal Estuary scenario, concentrations of suspended sediment are expected to increase upstream of the causeway due to the influx of turbid waters from the downstream estuary during flooding tides. Suspended sediment concentrations are highest at the existing aboiteau structure, and may reach upstream as far as 2 km beyond the Highway / Trunk 1 bridge during high tides (Appendix F). However, on ebb tide the plume recedes downstream through the aboiteau to the estuary, and suspended sediment concentrations return to levels near the low concentrations observed in the former lake area between 1970 and 2021.

Sediment accumulation is expected to occur on bottom and along the banks of the Windsor waterfront and further upstream into former Pesaquid Lake in areas with low velocities (CBCL, 2021a). Over time, the settlement of fine sediment may result in changes to the bottom and bank morphology in the former lake and river areas. The areas of deposition are likely to evolve as the system equilibrates with freshwater and tidal flows, storms, and other natural process such as ice formation and breakup.

4.1.4 Mitigation

The original EA document identified mitigation measures to be undertaken during the construction and operation phases of the Project, including (Stantec, 2017):

- Effects to fish and fish habitat will be reduced with the implementation of erosion and sediment control measures and adherence to applicable guidelines outlined in a site-specific environmental protection plan (EPP).
- New structures will be appropriately sited, sized, and installed to meet applicable regulatory guidelines and requirements for fish passage and flood protection.

- Construction will be completed in the dry and in-water works will be minimized to prevent effects to fish and fish habitat until the new structures are ready for operation, where possible.
- Servicing and maintenance of vehicles and equipment will be completed using secondary containment in the vicinity of the aquatic environment.
- Petroleum products and hazardous waste and materials will be stored a minimum 30 m distance from a waterbody or identified sensitive environmental area.
- In-water construction will be scheduled to occur outside of sensitive timing windows, where possible.
- Fish salvages will be carried out during de-watering activities for structures completed in the dry, as required.

No additional mitigation measures were identified that reduce or eliminate possible Project-related effects to the aquatic environment during the operation and maintenance phases of the Project. As described in Section 2.3.2.1, the structure is designed to be adaptable to multiple management scenarios and allow more or less tidal water in and out of upstream areas, which can mitigate the effects on the aquatic environment, if needed.

4.1.5 Residual Environmental Effects and Significance Determination

The assessment of the significance of residual environmental effects to the Aquatic Environment VC in the original EA Document (Stantec, 2017) related to the predicted effects of Project-related activities on fish and fish habitat and aquatic SAR and SoCI occurring in the Assessment Area. It was predicted that the residual environmental effects of the Project were not considered significant after the implementation of Project-specific mitigation and offsetting measures. The significance definitions for Aquatic Environment in the original EA document are not relevant as they are solely related to effects on fish and fish habitat.

The proposed water management operational scenarios are anticipated to result in changes to sediment dynamics, water quality, and water levels in the Assessment Area. These changes may result in effects to other VCs under assessment in the EA update, including Wetlands, Wildlife and Wildlife Habitat, and Land Use. These VCs are described in Sections 4.3, 4.4, and 4.5, respectively.

4.1.6 Monitoring and Follow-up

Monitoring and follow-up measures for the Aquatic Environment VC were described in the original EA Document (Stantec, 2017). A Post-Construction Monitoring Plan is being prepared as part of an application for Authorization under the *Fisheries Act*. This plan includes water quality monitoring in the Assessment Area during the pre-construction, construction, and operation phases of the Project. Additional monitoring and follow-up measures related to the predicted changes in wetland habitat, sediment dynamics and biota are further described in Section 4.3.6. This includes additional baseline measurements upstream and downstream of the dyke-aboiteau system to be collected in 2022 and 2023.

4.2 Groundwater Resources

Groundwater resources has been selected to be updated as the changes to the Aboiteau operational scenarios have the potential effects on groundwater that could be used for potable purposes. The following section provides a summary of additional studies completed, updated to the assessment boundaries for the Aboiteau PDA and assessment areas, identification of new potential effects, identification of new mitigations measures and which mitigation previously proposed that will be maintained and monitoring and follow-up measures. This assessment does not address the conditions of the original Approval (water well surveys, contingency planning etc.).

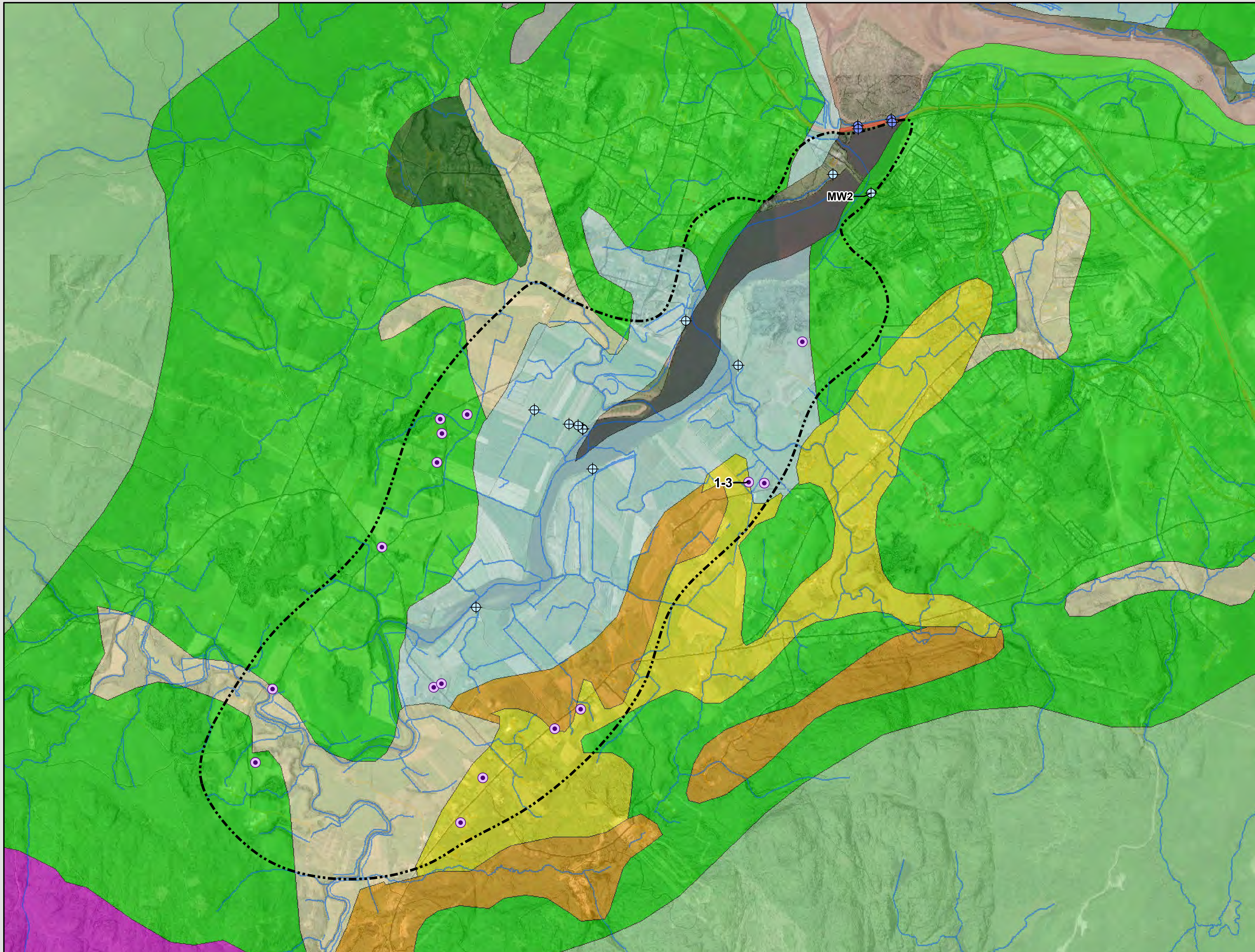
4.2.1 Update to Existing Conditions

The following sections provide a summary of monitoring work completed since the submission of the original EA, in the context of potential changes arising from operation of the Avon River Aboiteau structure. Detailed reporting on supplementary groundwater investigations is provided in Appendix G, including the study methodology, summary tables, borehole logs, water level and water quality monitoring figures, and further discussion of the results at each individual location.

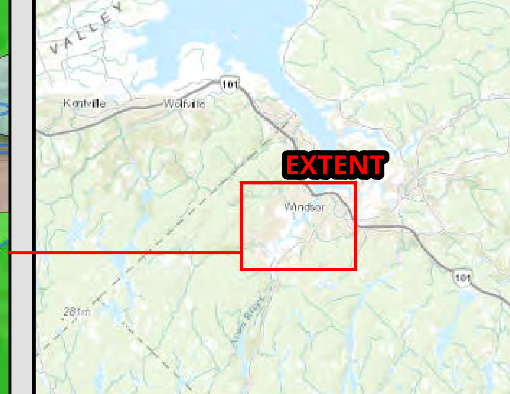
4.2.1.1 Surficial Geology

The area underlying and directly adjacent to the Aboiteau PDA is mapped as marine deposits, which can include stratified beds of fine-grained material (silt and clay) and granular material (sand and gravel) (Figure 4.10). The area mapped as marine sediment coincides with the Avon River floodplain, a flat, low-lying feature that has been farmed for over 300 years. Provincial records indicate that private water wells are generally not installed in the marine deposits, discussed further in Sections 4.2.1.5 and 4.2.1.7.

Mapping shows glaciofluvial features to the southeast of the floodplain, including outwash fans (shown in yellow on Figure 4.10) and kame-esker complexes (shown in orange on Figure 4.10). These features are composed of predominantly granular material and form elongated, discontinuous chains along the flanks of glacial meltwater channels. Silty till plains and stony till plains dominate in the upland areas and are expected to vary in texture and composition depending on the underlying bedrock type. Till is composed of poorly sorted, predominantly fine-grained material with generally low permeabilities. Alluvial deposits represent recent deposition and occur locally on the floodplains of modern streams.



KEY MAP



LEGEND

- Groundwater Assessment Area
- Sampled Private Water Well
- Causeway Monitoring Well
- Riverbank Monitoring Well
- Organic
- Alluvial
- Marine
- Glaciofluvial Outwash Fans
- Glaciofluvial Kames and Eskers
- Stony Till Plain (Ground Moraine)
- Silty Till Plain (Ground Moraine)
- Silty Drumlin
- Bedrock

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FIGURE 4.10: Surficial Geology Mapping

Drawn: CW	Date: 2022-03-15
Checked:	CBCL Project Number: 211244.00
Approved:	Scale @ 11"x17" : 1:35,000

NOTES:

0 300 600 900 1,200 m

Coordinate System: NAD 1983 UTM Zone 20N
Units: Meter

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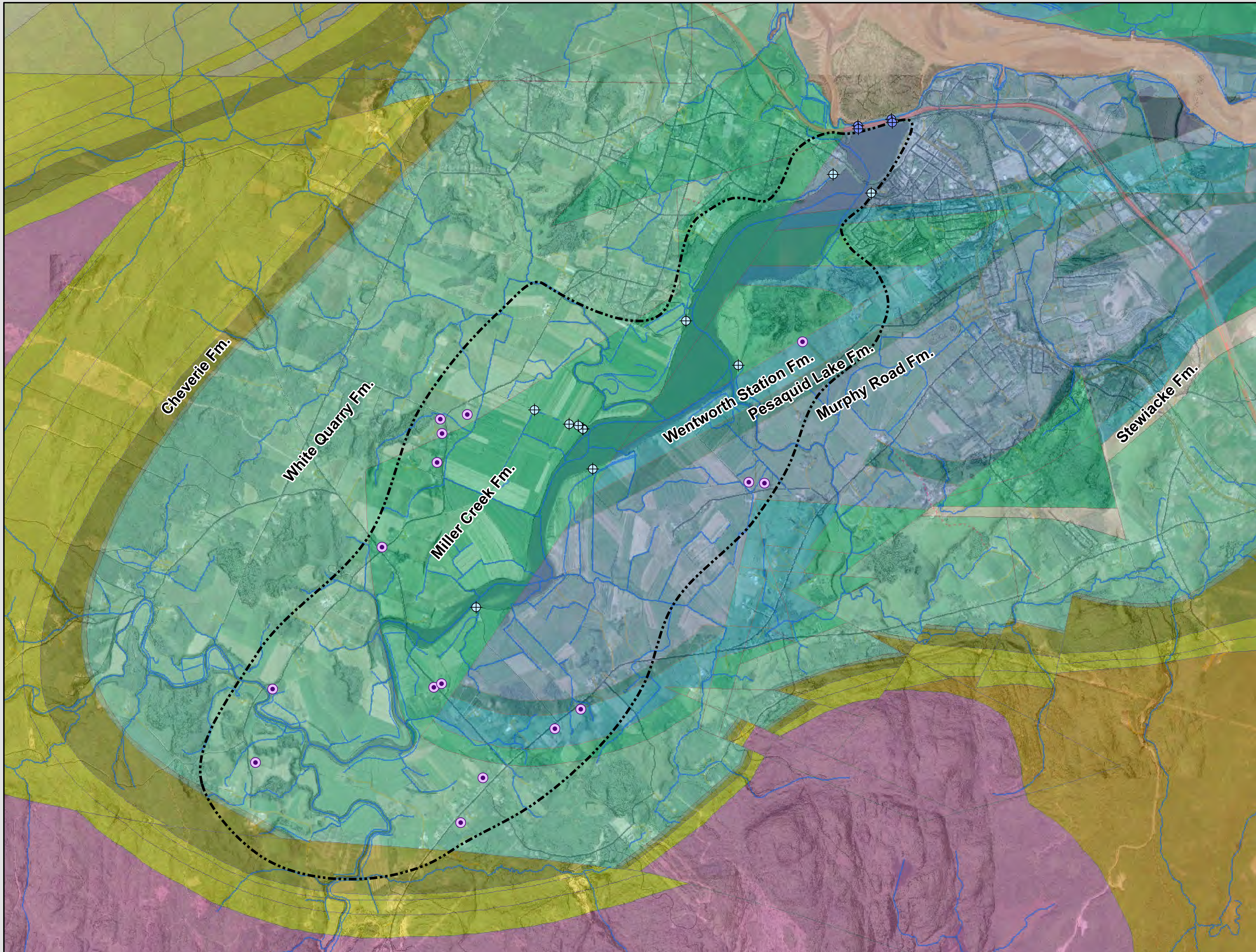
In 2019, Golder Associates Ltd. (Golder) completed a geotechnical investigation within the Windsor Marsh and Elderkin Marsh. The primary subsurface conditions of Windsor Marsh, consisted of cohesive sediment (Golder, 2020). Secondary subsurface conditions consisted of upper clay and silt (Unit 2a) ranging from the ground surface to approximately 7.5 m in depth (including the topsoil layer). Some sand was occasionally encountered, and organics were commonly observed (Golder, 2020). Sandy low plasticity silt to sandy intermediate plasticity silty clay (Unit 2c) occurred at two different layers; subsurface thickness for Unit 2c ranged from 2.1 m to 6.7 m. Non-cohesive sediments (Unit 3), consisting of silt and sand to poorly graded sand (Unit 3b) as well as gravelly silt and sand to sandy silty gravel (Unit 3c), were also found in these boreholes. Unit 3b ranged in thickness from 1.1 m to 7.5 m, and Unit 3c ranged from 2.4 m to 3.1 m in thickness. Depth to the top of bedrock ranged from 24.6 m to 25.5 m (Golder, 2020).

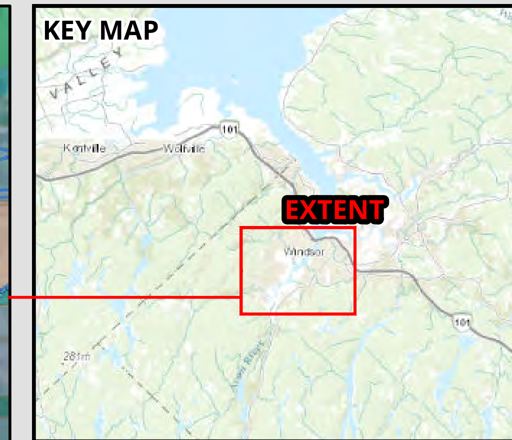
Adjacent to the Elderkin Marsh, geotechnical investigations identified a layer of upper clay and silt 7.4 m thick, as well as a layer of sandy low plasticity silt to sandy intermediate plasticity silty clay that was 3.1 m thick (Golder, 2020). Non-cohesive sediment identified included a 5.1 m layer of silt and sand to poorly graded sand, as well as a 7.2 m layer of gravelly silt and sand to sandy silty gravel. A 0.9 m layer of residual soil consisting of low plasticity silty clay to sandy low plasticity silt, was found at the interface between soil and bedrock (Golder, 2020). The depth to bedrock was 23.7 m (Golder, 2020).

Upstream of the causeway, twelve boreholes were drilled in the marine unit adjacent to the Avon River, to depths ranging from 7.2 m to 21 m. Split-spoon samples showed material consistent with regional mapping. The shallowest material consisted of clay and silty clay of thicknesses from 3 m to 17 m, overlying beds of sand, silty sand, and gravel of varying thicknesses. The water table was generally encountered 1.5 m to 4.5 m below grade. The bedrock surface was not encountered in any of the boreholes.

4.2.1.2 Bedrock Geology

The Groundwater Assessment Area is underlain by Early Carboniferous (Mississippian) rocks of the Windsor Group, shown in blue (Keppie, 2000) (Figure 4.11). Windsor Group rocks consist of marine evaporites (gypsum, anhydrite) and carbonates (limestone, dolostone) with minor shale and sandstone. Provincial mapping indicates that gypsum predominates in the White Quarry, Miller Creek, and Wentworth Station Formations, with more frequent sequences of siltstone and sandstone in the Pesaquid Lake and Murphy Road Formations. Water drawn from Windsor Group rock typically exhibits elevated concentrations of dissolved solids, including chloride, sulphate, bicarbonate, iron, and manganese.





LEGEND

- Groundwater Assessment
- Sampled Private Water Well
- Causeway Monitoring Well
- Riverbank Monitoring Well
- Windsor Group Evaporites
- Horton Group Sedimentary Rock
- Meguma Group Metamorphic Rock
- Plutonic Rock (primarily granite)

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FIGURE 4.11: Bedrock Geology Mapping

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Approved:	Scale @ 11"x17" : 1:800,000

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Coordinate System: NAD 1983 UTM Zone 20N
Units: Meter

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The Windsor Group conformably overlies the Horton Group of Late Devonian to Early Carboniferous age. Horton Group rocks directly underlie the surficial deposits in the northwest and southwest parts of the study area, shown in yellow and bronze on Figure 4.11. To the southwest, Horton group rocks contact metamorphic rock of the Goldenville Formation and igneous rock of South Mountain Batholith (shown as pink on Figure 4.11).

4.2.1.3 Hydrogeologic Setting

The regional setting indicates that the Avon River acts as a regional groundwater discharge zone. Groundwater flow is inferred to recharge in upland areas with regional flow toward the Avon River. Flow systems discharging to the river may travel through sandy horizons of the overburden, and through the underlying evaporite rock. Flow systems originating in the evaporite would tend to contribute elevated concentrations of dissolved solids to the river and coastal estuary.

At local scales groundwater flow directions tend to be influenced by the local topography, stratigraphy, and seasonal changes. The high permeability of glaciofluvial features in the Avon River basin may lead to local flow systems oriented from southwest to northeast, with discharge to smaller streams and wetlands. Shallow groundwater systems will tend to be younger and derived from recent recharge, resulting in relatively low concentrations of dissolved solids.

Field investigations showed that the marine material of the valley plain constitutes an approximately 10 m-thick clay aquitard underlain by a sandy unit at least 15 m-thick, consisting of interbedded horizons of fine sand, medium sandy, siltier material, and clay. The hydraulic conductivity of the confined marine sands is estimated to vary from 3×10^{-4} metres per second (m/s) to 3×10^{-6} m/s. The groundwater flow direction in this unit has not been mapped; a transect of monitoring wells perpendicular to the river indicated a neutral horizontal gradient. Water levels in the confined aquifer showed a hydraulic response to changes in the river level (tidal, seasonal, and operational fluctuations); this direct hydraulic connection suggests that the flow system(s) of the confined aquifer could interact with the Avon River.

Many water supply wells in the study area are shallow dug wells, located outside of the marine unit closest to the Avon River. These wells draw water from sandy lenses in the till units, or from granular material of the kame/esker complexes. Dug wells in the area showed low concentrations of chloride, characteristic of relatively young, shallow, freshwater flow systems, which is generally expected for dug wells. Several wells exhibited elevated concentrations of sulphate, which is likely to be related to the underlying gypsum rock, derived either from deeper flow systems or from till that was scoured from the gypsum bedrock.

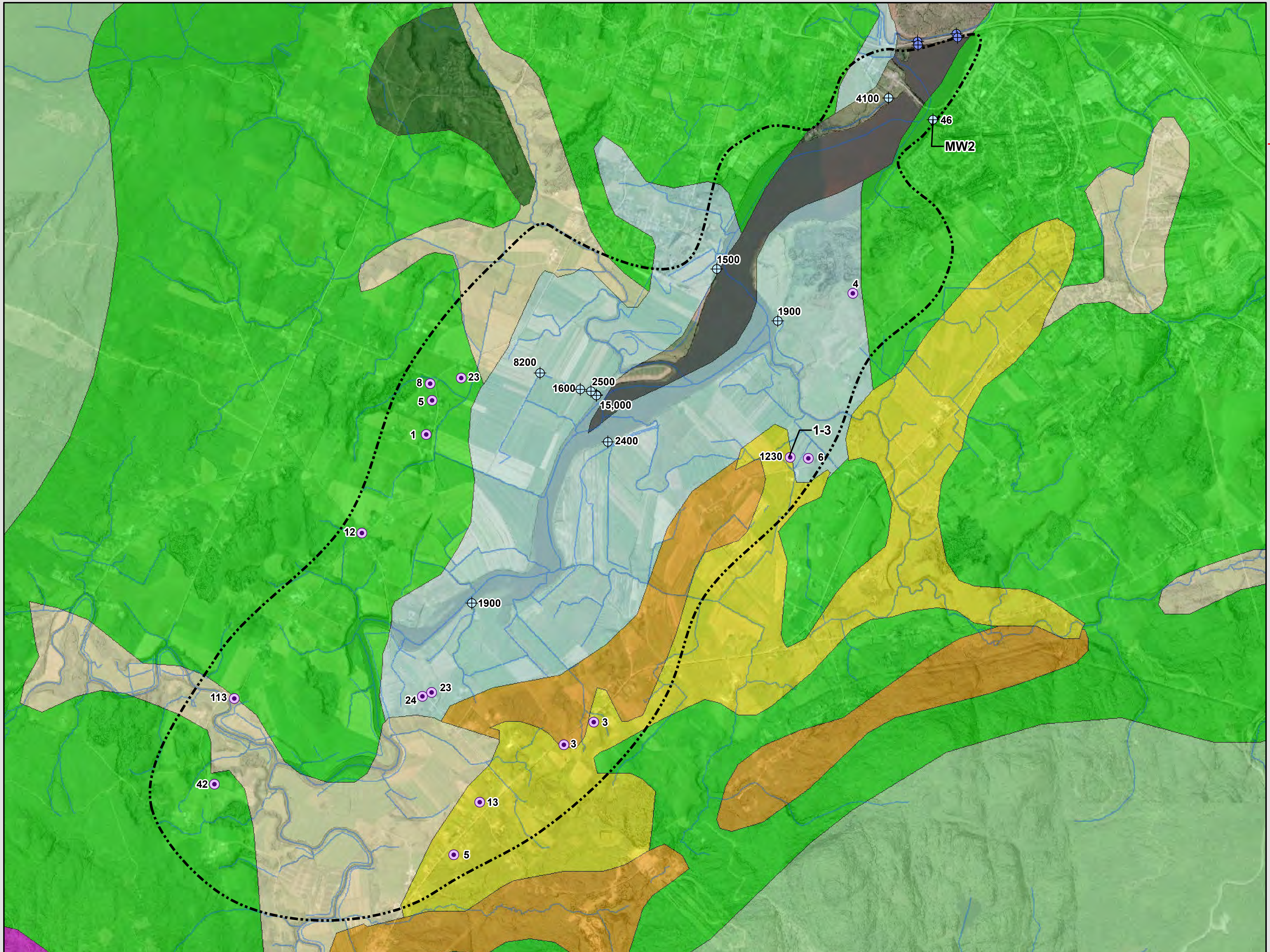
Groundwater data were collected primarily to establish baseline data; however, the data have helped to inform and develop conceptual understanding of groundwater flow systems. Geological mapping, borehole data, well head elevations, and water quality data indicate the floodplain flow system is separate and distinct from the freshwater aquifers that supply dug wells. The chemical composition of water drawn from dug wells, and the location of these wells above and distinct from the flow systems on the valley plain marine unit. This suggests that the freshwater flow systems that feed these wells are not directly connected to the Avon River.

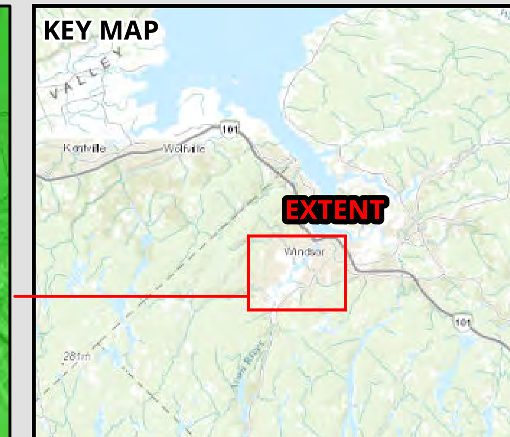
Water drawn from the riverbank monitoring wells exhibited elevated concentrations of chloride and other dissolved solids (Figure 4.12). A transect of wells in this unit did not show decreasing chloride concentrations with distance from the river. Chloride concentrations and the setting of the floodplain aquifer suggest that brackish conditions may have been established by periodic flooding of the plain prior to construction of dykes in the early 1700s. This brackish flow system appears to be distinct from the freshwater systems outside of and topographically above the marine unit. The setting of the marine unit suggests that it could interact with and receive flow from the underlying evaporite bedrock.

The Windsor causeway and aboiteau have established generally higher water levels and freshwater conditions in the river for approximately fifty years (relative to baseline, pre-construction conditions). These changes may have resulted in groundwater discharge rates and flow patterns that were different from historical conditions. In general, a higher water table at the river would tend to emphasize more localized flow systems and discharge zones. A return to tidal conditions is expected to re-establish groundwater flow patterns as they existed prior to completion of the Windsor Causeway in 1970.

4.2.1.4 NSECC Well Logs

The NSECC Well Log Database shows records of 89 wells located within the study area. Drilled well records indicate that the bedrock depth varies between 2.4 m and 61 m, with a median value of 12.6 m. Drilled wells in the area show a median depth of 36.5 m, and a median yield of 22.7 litres per minutes (L/min).





LEGEND

- Sampled Private Water Well
- Causeway Monitoring Well
- Riverbank Monitoring Well
- Groundwater Assessment Area
- Alluvial
- Marine
- Glaciofluvial Outwash Fans
- Glaciofluvial Kames and Eskers
- Stony Till Plain (Ground Moraine)
- Silty Till Plain (Ground Moraine)
- Silty Drumlin
- Bedrock

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FIGURE 4.13: Chloride Concentrations (mg/L)

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0 300 600 900 1,200 m

Coordinate System: NAD 1983 UTM Zone 20N
Units: Meter

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4.2.1.5 Surveyed Water Wells

A water well survey provided information on the existing quality and quantity of water available to non-serviced homes in the study area. The water well survey was initiated with a homeowner questionnaire, providing owner-supplied impressions of groundwater quality and quantity. The survey was distributed to non-serviced homes located within approximately 1,500 m of the Avon River, between Sangster Bridge Road and the causeway. The survey provided each homeowner in the area with the opportunity to participate in the water sampling program. Surveys were distributed within the Additional Groundwater Assessment Area shown on Figure 4.12 using a template based on NSE-recommended protocols and NSDPW guidance documents.

Many well owners reported elevated TDS, salinity, and hardness. These parameters may be related to natural sources (e.g., dissolution of gypsum) or external sources such as road salt. Some respondents indicated that their well experienced occasional shortages during summer dry periods. Most of the wells from the survey were equipped with a water treatment system, such as a softener and/or ultraviolet (UV) light for disinfection.

Sixteen private dug well supplies were accessible and could be sampled for raw water prior to any treatment infrastructure. As the groundwater investigation was focussed on shallow flow systems, dug wells were targeted preferentially for sampling. A complete description of the water well survey and sampling methodology is provided in Appendix G.

The sampled wells were at distances varying from 40 m to 1,230 m from the river. Complete results of water quality sampling are summarised in Appendix G. Dug wells are commonly susceptible to inputs at the ground surface. Consequently, the raw water of most sampled wells showed the presence of total coliforms. Six of the wells showed the presence of *E. coli*. Exceedances of health-based guidelines were observed for the following parameters:

- Arsenic at one location
- Lead at four locations
- Manganese at three locations

The exceedance of an aesthetic guideline (which may include iron, manganese, sodium, chloride, colour, sulphate, and TDS) was observed in multiple samples. Sample location 1-3 showed elevated concentrations of chloride and sodium, which could indicate the effect of road salt, or the well may intersect the brackish marine unit. No correlation was observed between TDS concentrations and distance to the river.

4.2.1.6 Water Level Monitoring Data

Data loggers recorded hourly water levels in the riverbank monitoring wells. Monitoring well and water level hydrographs are presented in Appendix G. Water level variations in the monitoring wells closely resembled longer and short-term variations in surface water. In addition to longer-term changes, groundwater levels fluctuated with a period of 12.4 hours, showing tidal influences. The amplitude of the tide signal in the confined sandy unit was considerably damped, varying between wells from 0.02 to 0.05 m.

Rates and directions of flow between the confined unit and the river have not been mapped or measured. The hydrogeologic setting suggests that discharge to the river should predominate, subject to varying gradients associated with tidal fluctuations. Under typical flow scenarios for this setting, the rate and amount of exchange of tidal water with near-shore areas is expected to be relatively limited.

Water level responses at MW2 were distinct from those of other wells. The tidal signal was weak and longer-term changes were subdued with respect to other wells. The elevation and nature of the granular material screened at MW2 suggests that it is not directly connected to Pesaquid Lake but is representative of other freshwater flow systems in the study area, generally located at greater distances from the river and at an elevation higher than the flood plain.

Groundwater levels increased after precipitation events, showing larger and more frequent changes in the rainy season. Variation between wells also increased during the rainy season, and when the lake water level was lowered in March-April 2021. This variation reflects a more direct connection of some wells to the river and/or the recharge zones that supply the shallow aquifer systems.

4.2.1.7 Water Quality Monitoring Data

Most of the wells exhibited a conductivity of 5,000 microSiemens per centimeter (µS/cm) or greater, reflecting elevated total dissolved solids concentrations in the confined flow system adjacent to the river. Several locations showed a conductivity on the order of 15,000 µS/cm, and another showed a conductivity of 40,000 µS/cm.

Water with a conductivity of less than 1,000 µS/cm is generally regarded as fresh, and sea water has a conductivity of 55,000 µS/cm. Data from the study area generally indicates that background conditions are brackish (water of mixed composition). Brackish water is observed in deep flow systems with long residence times, and in mixing zones influenced by tidal waters. As the flow systems intersected by the monitoring wells are relatively shallow, the observed groundwater quality appears to be consistent with a tidal mixing and/or flooding zone, most likely reflecting conditions as they existed prior to the construction of Acadian dykes (approximately early 1700s).

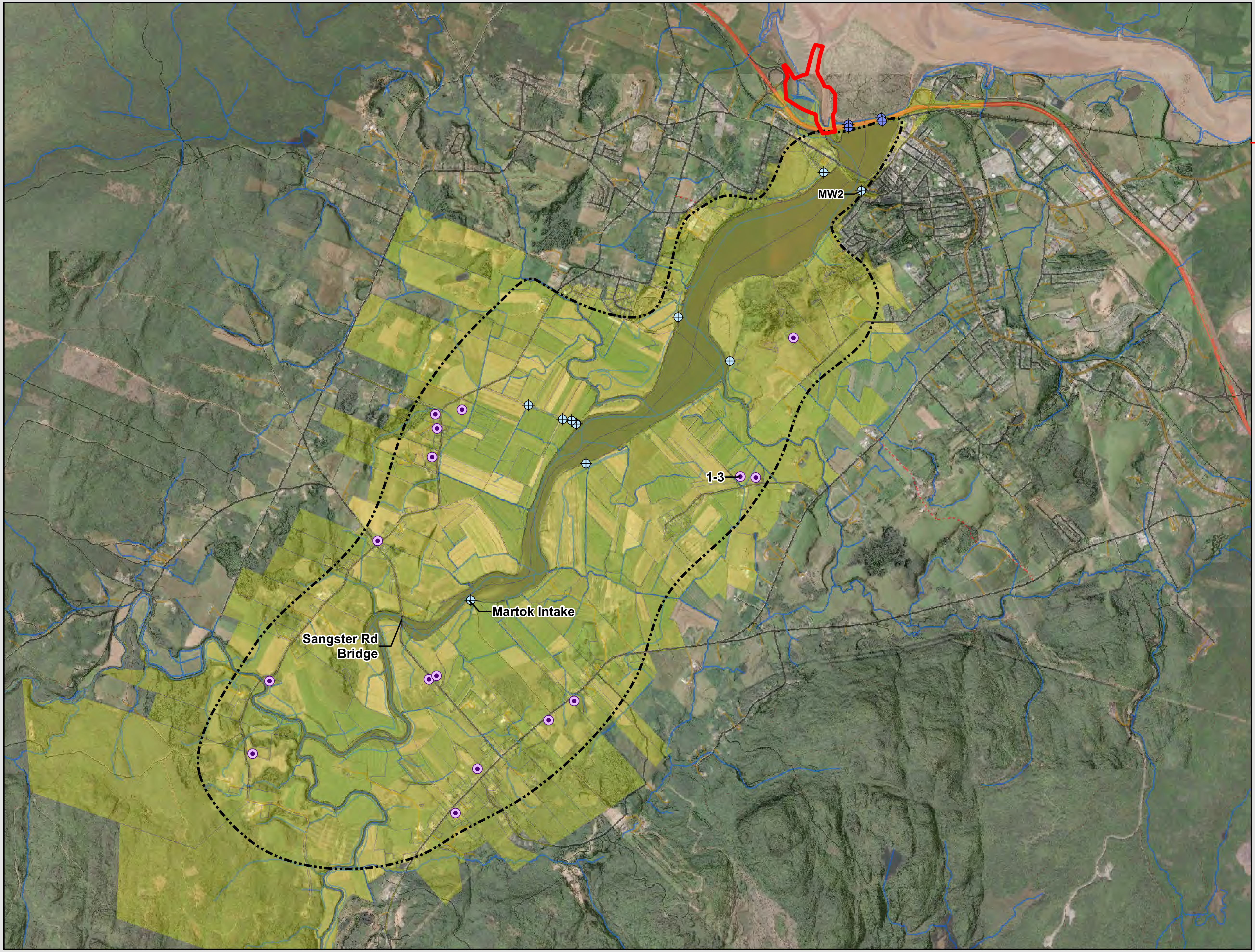
4.2.2 Boundaries

Since the EA Document submission, the location of the aboiteau, dykes, and roads have been updated and the potential operations scenarios are anticipated to allow for inundation of brackish water upstream of the causeway. The assessment of effects associated with the direct and indirect effects to Groundwater Resources during construction have not changed from the original EA assessment, and therefore are not included in this assessment. Assessment of effects will be focused on changes within the Assessment Area during operation and maintenance that have not been included in other regulatory applications.

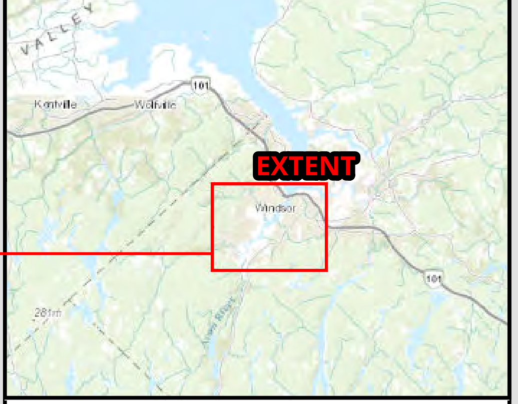
The Aboiteau PDA has been updated to include new areas downstream in the Avon River estuary associated with the location of the new aboiteau structure, the realignment of the channel immediately downstream of the existing aboiteau structure, and the construction of new dykes in the Avon River estuary, Windsor Marsh, and Elderkin Marsh.

Future scenarios (Brackish Lake and Dampened Tidal Estuary) include the possibility that the Avon River upstream of the proposed structure could be returned to tidal conditions, which existed prior to completion of the original Highway 101 causeway in 1970. Under Brackish Lake and Dampened Tidal Estuary conditions, water in the river may be periodically brackish depending on the reach of the river, tide cycles, and season. The extent of the Assessment Area for this EA update was derived to include the potential effects of the new operational scenarios. The Groundwater Assessment Area targets areas of potential shallow groundwater flow systems with the greatest potential to interact with the Avon River. The Groundwater Assessment Area has been expanded from the original EA to include areas upstream of the former location of Pesaquid Lake (Figure 4.13). The area extends approximately 1.5 km from the centreline of the Avon River and 1.5 km southwest of Sangster Bridge Road. This area encapsulates the private water wells that are closest to the Avon River. Tidal waters are not anticipated to flow upstream of the confluence of the West Branch and the Avon River, and environmental effects associated with the Project can be expected to occur between the aboiteau and river fork.

The temporal boundaries of the updated environmental effects assessment are considered in a long-term context, and include the operations and maintenance phases of the Project.



KEY MAP



LEGEND

- Groundwater Assessment Area
- Property Mapping in Assessment Area
- Sampled Private Water Well
- Aboiteau Project Development Area
- Causeway Monitoring Well
- Riverbank Monitoring Well

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Figure 4.13: Groundwater Resources Assessment Boundaries

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0 300 600 900 1,200 m

Coordinate System: NAD 1983 UTM Zone 20N
Units: Meter

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4.2.3 Potential Environmental Effects and Project-Related Interactions

The aboiteau operational scenarios have the potential to affect Groundwater Resources that could be used for potable purposes. The following section provides a summary of potential effects from Operations and Maintenance.

4.2.3.1 Operation and Maintenance

An assessment of potential effects is summarized in the following sections and includes assessment of changes in with two areas:

- Floodplain
- Freshwater Aquifers

4.2.3.1.1 Change in Groundwater Quality and Quantity within the Floodplain

Changes to operation of the aboiteau will affect the Avon River. The river elevation will on average be lower than it was from 1970 to 2021 during the Dampened Tidal Estuary scenario and for both the Dampened Tidal Estuary and Brackish Lake scenarios will be affected by tides in the Bay of Fundy. A detailed study of the effects that tide cycles will have on the river is presented in Appendix F. Investigations focussed on the reach of the river between the Highway 101 causeway and Sangster Bridge Road.

Interaction with the tides will introduce tidal water to the river and cause daily high and low water levels. Freshwater from the upstream reaches of the river will mix with water from the estuary, leading to water of mixed composition. Salinity will be highest near the causeway and increasingly fresh in the upstream reaches (Section 4.1.3.3). Computer modelling indicates that salt concentrations will be greatest on the flood tide, during the driest parts of the year when freshwater inputs (precipitation and snow melt) are at a minimum. During the Dampened Tidal Estuary scenario, salinity in the river could reach up to 25 PSU at the causeway, and 8 PSU near the Martock water intake (Figure 4.4). The salinity of seawater is on the order of 35 PSU.

Baseline water quality data from the Marine unit indicate that the shallowest flow system adjacent to the river is a brackish flow system. The sandy unit underlies a historical saltwater estuary floodplain and overlies Windsor Formation bedrock. One or both of these influences appears to have generated brackish conditions, established over time scales of centuries or greater. Consequently, the return of the Avon River to brackish conditions is not expected to have a significant effect on the brackish groundwater flow system, and there are no anticipated negative ecological effects or changes to fresh groundwater resources. The effect of tide cycles on brackish groundwater discharge rates is likewise not expected to represent a significant change.

From 1970 to 2021 the brackish groundwater flow system may have contributed brackish baseflow to the freshwater river and Pesaquid Lake. Higher water levels in the river would have generated higher hydraulic head in the confined sandy unit, with little or no tidal variation. Over time (up to 50 years) this increase in head may have established a higher water table in the clay confining unit, potentially emphasizing more localized flow systems. A return to lower water levels in the river could over time lead to a generally lower water table in the confining unit. If there are existing wells that draw brackish water from the marine flow system (e.g., Sample location 1-3), these wells could exhibit lowered water levels in the future, but this does not represent a change to drinking water supplies.

4.2.3.1.2 Change in Groundwater Quality and Quantity within Freshwater Aquifers

Available data indicate that the wells supplying water to homes in the Assessment Area are installed in flow systems that are not directly connected to the river or the brackish marine flow system. Changes in the Avon River are not expected to affect existing well water supplies.

4.2.4 Mitigation

This assessment does not change mitigation measures identified for construction or the operation or maintenance of the highway identified in the original EA, or as identified in terms and conditions of the EA Approval, such as the following:

- Pre-construction well surveys
- Pre-blast surveys, as required
- Use of non blasting construction methods near residential areas, where practical
- Implementation of Erosion and sediment control measures
- Minimization of extent of clearing
- Use of remedial action to restore damaged wells and provide temporary potable water, as necessary
- Adherence to Generic EPP and site-specific Spill Contingency Plan
- Limitation of herbicide use for vegetation management
- Adherence to NSDPW Salt Management Plan

There are no anticipated effects to potable water supplies in the Assessment Area. The water well survey and private well sampling program provided well owners with the opportunity to establish conditions in their wells prior to changes in operation of the Aboiteau, which began with the DFO Ministerial Order on March 20, 2021. Baseline data for participating well owners is provided in Appendix G.

If a change in water quality or quantity that is considered a significant environmental effect and is confirmed and attributed to the Project (i.e., operation of the Aboiteau), mitigation measures will be implemented. Operation of the aboiteau to allow tidal conditions in the upstream environment is being considered as a requirement of the DFO Ministerial Orders, the DFO Authorization, and in response to concerns expressed by Indigenous people, environmental organizations, and the public. Consequently, the options to mitigate or manage the potential significant environmental effects should be a shared responsibility, similar to established principles for managing cumulative environmental effects[2]. Bottled drinking water will be supplied to the well owner until a longer-term solution can be implemented. Longer-term solutions will be determined on a case-by-case basis, examples of mitigation approaches may include:

- Provision of water treatment.
- Modification to / improvement of the well.
- Re-drilling or digging of the well.
- If no other option is available, long-term provision of potable water using a storage tank and trucked water.

4.2.5 Residual Environmental Effects and Significance Determination

Long-term changes to the Avon River may include lower average surface water levels, tidal fluctuations, and increased salinity. This could result in generally lowered water levels in wells installed in the brackish marine unit adjacent to the river. Potable or agricultural uses depending on this brackish flow system could experience more frequent or permanent interruptions to supply due to reductions in hydraulic head. Work to date identified at most one well that may draw water from the brackish unit (Well 1-3). As the water drawn from this unit is non-potable (many parameters exceed the Guidelines for Canadian Drinking Water Quality (GCDWQ)), and this unit does not appear to have contributed fresh baseflow to the river, pre- or post-construction of the original causeway, a significant adverse environmental effect is not anticipated.

4.2.6 Monitoring and Follow-up

Monitoring and follow-up work could include the re-sampling of domestic wells in the Assessment Area if groundwater quality issues are reported during operation of the Project. A typical approach for re-sampling may include the following:

- The well condition is inspected and compared to baseline data, if available.
- A water quality sample is collected and compared to baseline data, if available.
- Environmental conditions prior to the complaint are reviewed (e.g., possible influences on the property, drought, intense rainfall/flooding, winter conditions, damage to the well, activities on adjacent properties, etc.).

In addition to sampling of domestic wells, sensors have been installed in riverbank monitoring wells, collecting hourly water level data at twelve locations and electrical conductivity data at six locations in the Assessment Area. The monitoring program is proposed to continue to June 2022. Water level responses from the second year of

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[2] Refer to the following publications for discussion of cumulative effects management principles:
1) CCME. 2021. *Key Elements to Guide Governance for Cumulative Effects Assessment, Monitoring and Management*, and 2) International Finance Corporation. 2013. *Good Practice Handbook. Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets*.

monitoring will be compared to data collected prior to March 2021, allowing monitoring of ongoing conditions in the Aquatic Environment Assessment Area.

4.3 Wetlands

Two salt marshes are located within the Aboiteau PDA: Windsor Marsh, and Elderkin Marsh. The wetland boundaries were mapped using Geographic Information System (GIS) data generated by CBWES (2018) and Stantec (2017) and are depicted in Figure 4.14.

Both the Windsor Marsh and Elderkin Marsh are considered wetlands of special significance (WSS) under the Nova Scotia Wetland Conservation Policy (NSE, 2019) since they are:

- Salt marshes
- Part of the Southern Bight-Minas Basin Ramsar Site
- Within the Bay of Fundy Hemispheric Shorebird Reserve

4.3.1 Update to Existing Conditions

Information on existing wetlands located within the proposed Phase 2 Project footprint have spanned twenty years. Information on wetland habitat present within the Aboiteau PDA was obtained from a review of studies conducted in the area since 2002, including the Highway 101 Twinning Three Mile Plains to Falmouth EA document (Stantec, 2017).

Wetland determination and delineation was completed as a requirement for the NSECC applications. Field surveys were conducted by Stantec (2017) and wetlands were classified in accordance with the Canadian Wetland Classification System. More recent delineations of wetland boundaries within and adjacent to the Aboiteau PDA were completed by CBWES (2017, 2018) using aerial and satellite imagery. CBCL mapped the boundaries of wetlands within and adjacent to the Aboiteau PDA based on data provided in Stantec (2017) and CBWES (2017, 2018).

Functional assessments were completed and provided to NSECC as part of the wetland alteration application process. Functional assessments for Windsor Marsh were completed by Stantec (2017) using the Nova Scotia Wetland Evaluation Technique (NovaWET) method. As part of the Phase 1 permitting in 2019, CBCL supplemented the previous assessment with data obtained from additional studies conducted on the salt marshes and the surrounding area in order to provide additional context behind the NovaWET and Wetland Ecosystem Services Protocol for Atlantic Canada (WESP-AC) outputs. A functional assessment for Elderkin Marsh completed by CBWES in 2020 using the tidal WESP-AC.

KEY MAP

LEGEND

- Wetland Boundaries (Stantec 2016)
- Wetland Boundaries (CBWES 2017)
- Aboiteau Project Development Area

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FIGURE 4.14: Wetland Boundaries Adjacent to the Aboiteau Project Development Area

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Checked: MR	**CBCL Project Number: 211244**
Approved: MR	**Scale @ 11"x17"** 1:8,000

NOTES:

0 80 160 320 m

Coordinate System: NAD 1983 UTM Zone 20N
Units: Meter

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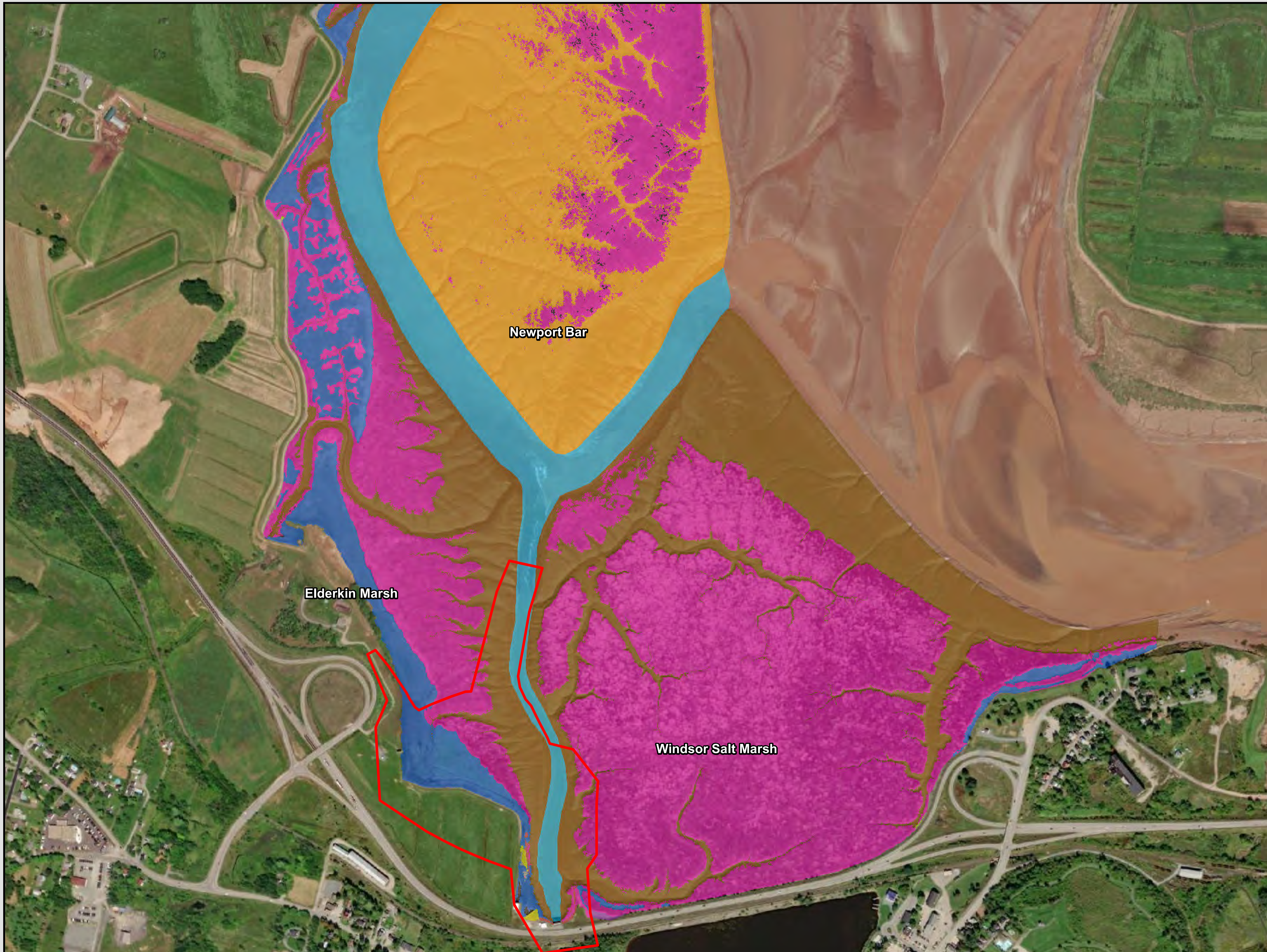
4.3.1.1 Windsor Marsh

The Windsor Marsh, located immediately downstream (north) of the highway causeway and on the east side of the Avon River channel (Figure 4.14), is the largest of the two salt marshes located adjacent to the Avon River Aboiteau and Causeway. Stantec (2017) reported an area of approximately 55 ha in size for the Windsor Marsh, which has been updated to approximately 63 ha identified using GIS data provided by CBWES including the northern portion of the Windsor Marsh as illustrated in Figure 4.14.

An aerial oblique photograph of the Windsor Marsh adjacent to the highway causeway is provided in Figure 4.15. The salt marsh is characterized by a low diversity of low marsh vegetation that is dominated by smooth cordgrass (*Sporobolus alterniflorus* [formerly *Spartina alterniflora*], Figure 4.16) (Stantec, 2017; CBWES, 2018; CBWES, 2020a). Measurements of smooth cordgrass height and biomass in the salt marsh have been found to greatly exceed values reported for other low salt marshes along the Bay of Fundy. This may be attributed to its higher elevation and availability of nutrients.

Figure 4.15 Overview of the Windsor Marsh looking southeast. Source: CBWES, 2018.

In addition to smooth cordgrass, glabrous orache (*Atriplex glabrisucula*), blackgrass rush (*Juncus gerardii)*, and saltmeadow cordgrass (*S. pumilus* [formerly *S. patens*]) are also known to occur within the Windsor Marsh (CBWES, 2018). Seaside goldenrod (*Solidago sempervirens*), seaside plantain (*Plantago maritima*), and two SoCI, Frankton's saltbush (*Atriplex franktonii*; S3S4) and Roland's sea-blite (*Suaeda rolandii*; S1) have also been reported in the salt marsh along the edge of the causeway (Stantec, 2017), and white sea-blite (*S. maritima* ssp. *maritima*), was observed along the highway edge and sparsely scattered within the saltmarsh (CBWES, 2018). No vascular or non-vascular vegetation that is federally or provincially listed under *Species at Risk Act* (SARA) or Nova Scotia *Endangered Species Act* (NS ESA), respectively, has been reported within the Windsor Marsh.



LEGEND

Aboiteau Project Development Area

Avon Habitat Mapping

Vegetation Type

- Avon River
- Bank
- Bare
- Debris
- High Marsh
- Juncus gerardii
- Mudflat
- Rock
- Spartina alterniflora
- Suaeda maritima
- Spartina patens

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FIGURE 4.16: Wetland Habitat Composition and Dominant Vegetation

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Approved: MR	**Scale @ 11"x17"** 1:8,000

NOTES:

0 80 160 320 m

Coordinate System: NAD 1983 UTM Zone 20N
Units: Meter

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The Windsor Marsh is situated in a large estuary approximately 17 km south of the Bay of Fundy. The hydrology of the salt marsh is primarily tidal; although, variable amounts of freshwater originating from Pesaquid Lake and the upstream reaches of the Avon River are released into the salt marsh through the existing aboiteau structure (Stantec, 2017). Subsequently, the saltmarsh is regularly flooded and contains a multitude of hydrology indicators (e.g., inundation, soil saturation, and standing water). Channel networks and drainage basins influence how the wetland floods and have, therefore, been delineated by CBWES (2019). The total channel length and average channel length in the Windsor Marsh is 19,405 m and 60.5 m, respectively. Relative to the Elderkin Marsh, the Windsor Marsh has fewer drainage basins (i.e., 19) but a much larger drainage area (855,609 m^2), the shortest channel segments, and the largest number of channel segments (i.e., 321) as a result of the complex dendritic network at the site (CBWES, 2019). Approximately 45% and 90% of the wetland is flooded during minimum high tide (5.58 m) and mean observed high tide (6.58 m), respectively (CBWES, 2019). Owing to its higher elevation, the portion of the saltmarsh bordering the causeway is the only area that does not flood at high tide. All channels within the salt marsh are reportedly dry at low water levels (-1.23 m) and become filled at a minimum observed tide level of 5.58 m (CBWES, 2019).

4.3.1.2 Elderkin Marsh

The Elderkin Marsh is situated downstream (north) of the Avon River Aboiteau and Causeway and on the west of the Avon River channel (Figure 4.14 and Figure 4.16). Stantec (2017) had reported the Elderkin Marsh as two separate wetlands that were identified as Wetland 26 and Wetland 29 and reported to cover an area of 0.12 ha and 10.64 ha, respectively. More recent GIS data provided by CBWES indicates that these wetlands are connected via a narrow fringe of fore marsh along the western bank of the Avon River (Figure 4.16). Boundaries produced by CBWES indicate that the Elderkin Marsh covers approximately 32 ha in total area.

An aerial oblique photograph of the Elderkin Marsh adjacent to the highway causeway is provided in Figure 4.17. The Elderkin Marsh has clear low and high marsh zonation and has a higher species richness (relative to the Windsor Marsh) in both zones. The low marsh is dominated by smooth cordgrass (Figure 4.16) with no forbs observed in the subcanopy at the time of the site visit on September 21, 2020 (CBWES, 2020a). The high marsh is largely dominated by saltmeadow cordgrass (Figure 4.14) and, to a lesser extent, salt grass (*Distichlis spicata*). A variety of forb and sedge species, such as saltbush (*Atriplex* sp.), blackgrass rush, and seaside goldenrod were found along the upland edge where no dykes are located and sporadically in the subcanopy (CBWES, 2020a). Where dykes form the upland boundary, species diversity is limited as the dykes are heavily armored (CBWES, 2020a). No vascular species of conservation concern have been reported to occur within Elderkin Marsh by Stantec (2017) or CBWES (2019, 2020a).

Figure 4.17 View of the Elderkin Marsh looking south towards the Avon River Aboiteau (Source: CBWES, 2020a).

Hydrology of the Elderkin Marsh is primarily tidal. The marsh is, therefore, regularly flooded, and is characterized by inundation, soil saturation and standing water. Channel networks and drainage basins influence how the wetland floods and were, therefore, delineated by CBWES (2019). Elderkin Marsh has a similar number of drainage basins (i.e., 20) to that reported for the Windsor Marsh but a smaller drainage area (433,699 m^2). Differences in tidal channel morphology are evident. The Elderkin Marsh has a shorter total channel length (9,783 m) and less than half the number of channel segments (i.e., 132) compared to that reported for the Windsor Marsh; however, the average channel length (74.1 m) is larger for the Elderkin Marsh compared to that reported for the Windsor Marsh (CBWES, 2019). The Elderkin Marsh fringes the channel of the Avon River Estuary, which has widened over time, resulting in erosion of the foreshore of Elderkin Marsh (CBWES, 2019). Over time, the loss of foreshore marsh could compromise the integrity of the Elderkin dyke system on the backshore of the salt marsh (CBWES, 2019).

4.3.1.3 Upstream Habitats

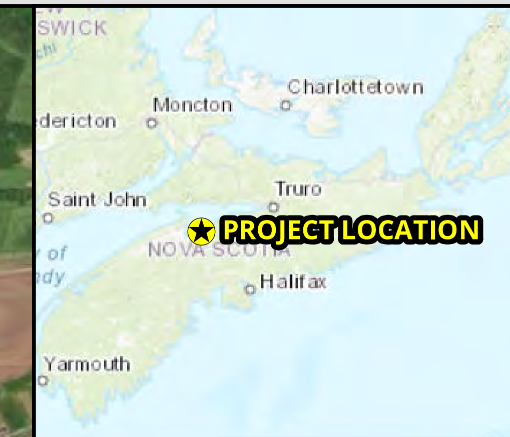
Habitats upstream of the Causeway are in areas under the management of the *Agricultural Marshland Conservation Act.* Wetland assessments have not been previously completed upstream of the causeway. Prior to the DFO Ministerial Orders, freshwater wetlands were observed along the edges of the Pesaquid Lake and the Avon River.

In July 2019, riparian vegetation community data was collected upstream of the causeway along Pesaquid Lake and the Avon River in order to better understand the current riparian conditions in upstream of the causeway. The riparian vegetation program assessed the existing vegetation at ten locations established along the Avon River (Figure 4.18).

Sampling involved the use of ±10 m long by 1 m wide belt transects, oriented perpendicular to shore to assess the abundance and distribution of vascular plant species at the selected locations (Appendix H). In most locations, two transects were conducted. In sites with very broad vegetated fringes, a single long transect was conducted. A single transect was also conducted at AR-11, due to its proximity to AR-10 and AR-09. The vegetation forms present within each 1x1 m quadrat were documented (as defined in Table 4.3), presence (and % cover) of detected species and list of species present within each quadrat were recorded (Appendix H).

Table 4.3 Definitions of Vegetative Forms, with Example Taxa

Vegetation Form	Definition	Example Taxa
Tree	Deciduous or Coniferous species	*Acer, Populus, Pinus*
Tall Shrub	Woody shrubs from 1 to 6 m tall, including coniferous or deciduous tree saplings	*Ilex, Alnus*
Low Shrub	Woody shrubs less than 1 m tall, including seedlings of coniferous or deciduous trees	*Ledum, Kalmia, Vaccinium*
Herbs	Non-woody species growing in moist soil or occasionally shallow water, and not belonging to the other categories described below	*Impatiens, Lythrum, Polygonum*, ferns, etc.
Mosses	Moss species growing on the ground, or on dead wood	
Robust emergents	Robust monocots, typically > 1.5 m height, which may be temporarily or permanently flooded at the base, but exposed at the tops	*Typha*, *Schoenoplectus*
Narrow leaved emergents	Erect, rooted monocots including horsetails, typically less than 1.5 m height, which may be temporarily or permanently flooded at the base, but exposed at the tops	*Carex, Juncus, Scirpus,* grasses, etc.
Broad leaved emergents	Broad leaved, non woody herbaceous plants, typically <1.5 m height, which may be temporarily or permanently flooded at the base, but exposed at the tops	*Pontederia, Alisma*
Floating plants	Rooted hydrophytes with leaves floating horizontally on or just above the water's surface	*Nuphar*, *Nymphaea*
Free-floating plants	Non-rooted hydrophytes floating on or just below the water surface	*Lemna*
Submerged plants	Rooted hydrophytes with leaves entirely below the water surface in most normal situations	*Myriophyllum*, *Potamogeton*, *Utricularia*
Unvegetated	Unvegetated open water, or bare soil, rock, etc.	N/A



LEGEND

- Riparian Survey Location
- Aboiteau Project Development Area

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FIGURE 4.18: Riparian Survey Locations Upstream of the Aboiteau Project Development Area

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Approved: MR	**Scale @ 11"x17"**

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0 295 590 1,180 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter

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In general, low diversity of plant species and families was identified at the 10 sites. In total, 82 species of vascular plants were identified, representing 32 families (Appendix H). A description of each of the sites, and number of species and families of vascular plants detected at each assessment area Table 4.4. Three vascular SoCI plant species were identified during the field program:

- Hop Sedge (*Carex lupulina*, AC CDC S3)
- Halberd-leaved Tearthumb (*Polygonum arifolium*, AC CDC S2)
- Blue Vervain (*Verbena hastata*, AC CDC S3)

Table 4.4 Summary of Upstream Habitat Conditions

Location	Description of Assessment Location	Total Species and Families in the surrounding area (Appendix H).
Avon River (AR)-02	The riparian zone at AR-02 consisted of a narrow strip of tall shrubs and low vegetation situated between the walking trail and the shoreline, which was dominated by small gravel. The vegetation within the two transects were dominated by narrow-leaved emergent species such as Prairie Cordgrass, (*Spartina pectinata*), Jointed Rush (*Juncus articulatus*), Reed Canary Grass (*Phalaris arundinacea*) and herbs such as Field Horsetail (*Equisetum arvense*), with small amounts of tall shrubs, mosses, and broad-leaved emergent species.	47 species 25 families 0 SoCI
AR-03	Located within a freshwater marsh, the sampled transect extended from open water (depth 35 cm) across a large stand of Narrow-Leaved Cattail (*Typha angustifolia*) to the riverbank, with smaller amounts of Softstem Bulrush (*Schoenoplectus tabernaemontani*). One submerged species, Claspingleaf Pondweed (*Potamogeton perfoliatum)* was abundant in the deeper water. The substrate consisted of organics and fines, and floating/ submerged vegetation such as False Waterpepper (*Polygonum hydropiperoides*) was abundant around the edges of the cattail marsh.	40 species 20 families 0 SoCI
AR-04	Located on the western shore, the sampling location was oriented on a peninsula which extends out into main river channel of the Avon River. The centre of this peninsula is agricultural field, and it is surrounded by robust emergent marsh. The single long transect was dominated by Narrow-Leaved Cattail and herbs such as False Waterpepper and Spotted Touch-me-not (*Impatiens capensis*).	26 species 19 families 0 SoCI
AR-05	Oriented on the eastern side of the Avon River, adjacent to agricultural fields; The riparian zone consists of a thin strip of shrubs and herbaceous vegetation grading into riparian wetland. The two short belt transects were dominated by narrow-leaved emergents and herbs such as Marsh Hedge-Nettle (*Stachys palustris),* Northern Beaked Sedge (*Carex utriculate*), Reed Canary Grass, and Softstem Bulrush.	74 species 30 families 0 SoCI
AR-06	AR-06 is located on the western side of the Avon River, adjacent to agricultural fields. The riparian zone in this location consists of a band of emergent vegetation grading upward into agricultural field. The	21 species 16 families 0 SoCI

Location	Description of Assessment Location	Total Species and Families in the surrounding area (Appendix H).
	single long transect at this location was dominated by Woolgrass (*Scirpus cyperinus*) and Reed Canary Grass, with Common Spikerush (*Eleocharis palustris*) becoming dominant in deeper water.	
AR-07	Located on the western side of the Avon River, the riparian zone in this location consists of a considerable band of tall emergent vegetation grading into agricultural field. The two short transects were dominated by robust and narrow-leaved emergent species such as Narrow-leaved Cattail and Reed Canary Grass.	31 species 17 families 0 SoCI
AR-08	At AR-08, the riparian zone on the western side of the Avon River consists of a relatively narrow band of tall emergent vegetation at the base of a steep slope which grades upwards into tall shrubs and agricultural field. The two short transects were dominated by Softstem Bulrush, Reed Canary Grass, and Woolgrass.	47 species 21 families 0 SoCI
AR-09	The riparian zone along the eastern bank of the Avon River consists of a relatively narrow band of tall emergent vegetation at the base of a steep slope grading upwards into tall shrubs and agricultural field. The two transects were dominated by robust and narrow-leaved emergent, such as Narrow-leaved Cattail, Reed Canary Grass, and Softstem Bulrush. Two SoCI were identified: • Halberd-leaved Tearthumb (*Polygonum arifolium*, AC CDC S2) • Hop Sedge (*Carex lupulina*, AC CDC S3)	48 species 28 families 2 SoCI
AR-10	Located on a small island in the Avon River, the riparian zone includes a relatively narrow band of tall emergent vegetation surrounding more upland vegetation in the centre. The two short transects were dominated by narrow-leaved emergent such as Reed Canary Grass, Northern Beaked Sedge, and Common Spikerush. Herbs included Spotted Touch-me-Not. One SoCI was identified: • Blue Vervain (*Verbena hastata*, AC CDC S3)	43 species 23 families 1 SoCI
AR-11	Oriented on the western bank of the Avon River, the riparian zone consists of a relatively narrow band of tall emergent vegetation surrounding more upland vegetation in the centre. The transect was dominated by narrow-leaved emergent such as Reed Canary Grass and Woolgrass, while herb species include Small Forget-me-not (*Myosotis laxa*) and False Waterpepper. One SoCI was identified: • Hop Sedge (AC CDC S3)	43 species 23 families 1 SoCI

4.3.2 Boundaries

Since the EA Document submission, the location of the aboiteau, dykes, and roads have been updated. The Aboiteau PDA, has been updated to include new areas downstream in the Avon River estuary associated with the location of the new aboiteau structure, the realignment of the channel immediately downstream of the existing aboiteau structure, and the construction of new dykes in the Avon River estuary, Windsor Marsh, and Elderkin Marsh.

The Assessment Area extends upstream into the former location of Pesaquid Lake and the Avon River. The extent of the Assessment Area is dependant on the water management operational scenario. Under the Brackish Lake scenario, environmental effects are anticipated to occur in the area upstream of the causeway and river environments; modelling indicates that the upstream extent depends on freshwater river inputs, with effects occurring further upstream during seasonal dry conditions. Overall, the Dampened Tidal Estuary scenario is similar to the Brackish Lake scenario, with intrusion of higher salinity and suspended sediment concentrations due to the larger volume of tidal waters flowing upstream. Therefore, the upstream boundary of the Assessment Area was set upstream of the Martock water intake at the confluence of the West Branch and the Avon River. Tidal waters are not anticipated to flow upstream into the branches of the river, and environmental effects associated with the Project can be expected to occur within Aquatic Environment Assessment Area as defined in Figure 4.2.

The NSECC Wetland Alteration application for the alteration of the Aboiteau PDA was submitted to NSECC for approval in December 2020 (Section 1.3); amendment to the application or approval may be required following further DFO review and completion of final design later this year. Therefore, assessment of effects associated with the direct and indirect effects within the Aboiteau PDA have not been included in this assessment. Assessment of effects will be focused on changes within the Assessment Area that have not been included in other regulatory applications. Note that wetlands located upstream of the causeway and located within lands associated with Avon River marsh bodies are exempt from NSECC approvals under the *Agricultural Marshland Conservation Act*.

The temporal boundaries of the updated environmental effects assessment include the operations and maintenance phases of the Project. Project-related effects occur during the operation and maintenance phase within the upstream environment, depending on the water management scenarios upstream of the structure.

4.3.3 Potential Environmental Effects and Project-Related Interactions

The EA Document (2017) included the assessment during construction and routine operation activities; therefore, the EA update does not include reassessment of these effects. Effects previously assessed during construction included direct effects and indirect effects from road, dyke, and aboiteau site preparation activities, such as removal of wetland vegetation and soils, and change in wetland area or function within the wetlands downstream of the causeway. Effects assessed during operations and maintenance activities included regular maintenance of the Project infrastructure, winter maintenance activities, and vegetation management.

The proposed operational scenarios, Brackish Lake and Dampened Tidal Estuary, have the potential to affect existing wetlands or create new wetland areas upstream of the existing causeway, outside of the Aboiteau PDA. These include changes to wetland area and wetland function upstream of the causeway.

4.3.3.1 Operation and Maintenance

Under the Brackish Lake and the Dampened Tidal Estuary scenarios, tidal waters are expected to transform habitats upstream of the existing causeway, through the movement of tidal waters upstream. The extent that the environment will change depends on the selected water management scenario. Potential effects may include changes in the following:

- Change in Wetland Area
- Change in Wetland Function

These potential effects are described in the following sections.

4.3.3.1.1 Changes in Wetland Area

As described in Sections 4.1.3.1 and 4.1.3.2, the proposed operational scenarios control water levels and result in potential deposition of sediment. Directly, this could result in the development of new wetland areas upstream of the causeway within the former Pesaquid Lake area or modification of existing habitats through deposition. The extent of the effects will vary depending on the operational scenario. The potential for development of new wetland or intertidal habitats will depend upon the selected operational scenario, hydrology, sediment supply, vegetation colonists, and existing physical condition (i.e., elevation/bathymetry; substrate composition) of the system.

Brackish Lake

Under the Brackish Lake scenario, water level upstream will be operated at a target elevation of 2.1 m CGVD2013 (Figure 4.3), maintaining areas of riparian habitat similar to pre-2021 levels. However, sediment accretion would modify existing habitats; where deposition occurs water levels would be shallower than under the Freshwater Lake scenario and this would facilitate colonization with marsh vegetation. Sediment accretion along the Windsor waterfront may result in the formation of mudflats in the former Pesaquid Lake area, which may be colonized by halophytic or salt marsh vegetation.

Dampened Tidal Estuary Scenario
The Dampened Tidal Estuary scenario facilitates more variable water levels (-0.5 m to 1.5 m CGVD2013, Figure 4.4 and Figure 4.5), ultimately creating additional available intertidal and tidal habitat. This will result in in the exposure of a larger area of intertidal habitat compared to the water levels maintained between 1970 and 2021. The typically wetted freshwater habitats will be exposed for a portion of the tidal cycle, resulting in a transition from a submerged, shallow freshwater environment to exposed mudflat which could be colonized by salt marsh vegetation tolerant of fluctuating tidal conditions. Modelling indicates that sediment is likely to deposit along the waterfront in Windsor, similar to the Brackish Lake scenario, and also extends further upstream into the Avon River. If new wetlands or salt marshes areas are established, this would create potential positive effect of more wetlands, and potential increase of WSS, within the Assessment Area.

4.3.3.1.2 Changes to Wetland Function
The inundation of estuary waters upstream of the causeway and aboiteau will change the salinity of the water and soils (Section 4.1.3), affecting wetland types and functions. Overall, the salinity is influenced by the volume of water entering from the estuary and other available freshwater sources entering the Avon River. The Dampened Tidal Estuary scenario results in the greatest concentration of salt water upstream of the causeway; however, this varies seasonally (wet versus dry). Highest concentrations occur during the dry season when there are fewer freshwater runoff influences. The seasonal and freshwater input variables also similarly influence salinity for the Brackish Lake scenario. Established wetlands upstream of the causeway within the area of increased salinity could demonstrate a change in function, transitioning from freshwater wetlands to tidal fresh and estuarine wetlands, similar to salt marsh observed downstream of the aboiteau. Nova Scotia Wetland Conservation Policy (NSE, 2019) considers salt marshes as WSS. Therefore, establishment of additional salt marshes, is a potential positive effect of the Project but the extent to which this could occur has not been quantified.

Changes in the soils or water salinity, could also result in stress, or mortality of existing vegetation species within the wetlands and upstream environment. The degree to which species can tolerate salinity depends on numerous factors such as plant health, and species-specific salinity tolerance levels. Species with more robust salinity tolerance (medium through high) are likely to be least affected by the increases in salinity. Salinity within the upstream environments is influenced by the volume of water entering from the estuary during the operational scenario (Brackish Lake or Dampened Tidal Estuary) and the available freshwater inputs from upstream in the Avon River (such as precipitation event and runoff). This results in varying salinity in the system, throughout the day, and between the season or between years (wet versus dry years). Due to this variability, determining the degree of effects of stress or mortality is difficult to quantify.

4.3.4 Mitigation

The EA Document identified mitigation measures to be undertaken during the construction and operation phases of the Project, including (Stantec, 2017):

- Avoid or minimize direct disturbance to wetlands and reduce work in and near wetlands
- Adherence to Generic EPP and site-specific spill Contingency Plan
- Implementation of Erosion and sediment control measures
- Avoid or minimize operation of vehicles within wetland boundaries, and clean construction machinery prior to entering wetlands
- Use progressive installation of materials to reduce potential for overfilling or over excavation
- Clean, pH neutral, non-leaching coarse fill will be used in wetlands
- Implement monitoring of the salt marshes, before, during and after construction according to recommended protocols
- Adherence to NSE Water Approval conditions, including compensation for loss of wetland area following provincial requirements
- Implement Employee environmental awareness training
- Adherence to NSDPW Salt Management Plan
- Limitation of herbicide use for vegetation management
- Adherence to NSDPW's Integrated Roadside Vegetation Maintenance program

No additional mitigation measures were identified that reduce or eliminate possible Project-related effects to wetlands during the operation and maintenance phases of the Project. As described in Section 2.3.2.1, the structure is designed to be adaptable to multiple management scenarios and allow more or less tidal water in and out of upstream areas, which can mitigate the effects on wetlands, if needed.

4.3.5 Residual Environmental Effects and Significance Determination

Following the implementation of mitigation measures, an assessment of residual effects was undertaken. Following the 2017 EA document a significant adverse effect was defined if it met the following criteria (Stantec, 2017):

- results in an unauthorized permanent net loss of wetland area, or
- results in a loss of WSS.

Generally, the design of the new Aboiteau, dykes, and highways have followed the standard mitigation sequence, as identified in the EA, which prioritized the following hierarchy (Stantec, 2017):

- Avoidance of impacts
- Minimize unavoidable impacts
- Develop compensation or offsetting for residual impacts that cannot be avoided or minimized

The following table identifies the approaches considered as part of the overall Project:

Table 4.5 Mitigation Sequence and Approaches

Mitigation Sequence	Approaches
Avoidance of impacts	Aboiteau location was selected to be away from Windsor Marsh to avoid alteration of a larger area (permanent and temporary). The construction within a new channel alignment will reduce effects to the Windsor Marsh.
Minimize unavoidable impacts	The aboiteau will be oriented towards to the west aligning with the main channel further downstream. Construction in the dry with use of temporary cofferdams will leave portions of Windsor Marsh unaffected during construction of the aboiteau.
Develop compensation or offsetting for residual impacts that cannot be avoided or minimized	NSDPW and NSDA are proposing to compensate for direct loss in area of the Windsor Marsh and Elderkin Marsh via the habitat offsetting plan (HOP). Further description is provided in Section 5.1.

The direct and indirect effects as a result of construction were not reassessed as part of this EA update. Wetland Alteration Applications have been submitted to NSECC for direct alteration in the Aboiteau PDA and other subsequent construction through out the project, such as the causeway.

The ongoing operation and maintenance of the aboiteau is expected to affect wetland area and wetland function upstream of the causeway. The habitats upstream of the proposed aboiteau and causeway are managed under the *Agricultural Marshland Conservation Act*. The Avon River Aboiteau and Causeway protect approximately 2,100 ha of land from tidal flooding and, subsequently, yielding an additional 140 ha of farmland (CBCL, 2018). Under Section 5D of the Activities Designation Regulations established under Section 66 of the *Environment Act*, maintenance of "lands and structures by marsh bodies incorporated under the *Agricultural Marshland Conservation Act*" to be exempt from requiring an Approval or Notification. The Brackish Lake and Dampened Tidal Estuary scenarios may result in an increase in WSS; therefore, a significant adverse effect is not anticipated.

4.3.6 Monitoring and Follow-up

Habitat monitoring pre- and post-construction will be undertaken to quantify the environmental impact predictions of the EA document and other regulatory approvals and to support efforts to adequately offset any unavoidable negative impacts to salt marsh. Habitat monitoring includes the Elderkin Marsh, Windsor Marsh, and habitat upstream of the Causeway. To monitor and quantify the environmental impact predictions of the EA document and other regulatory approvals, a habitat monitoring has been developed includes the Elderkin Marsh, Windsor Marsh, and habitat upstream of the Causeway. The following sections provide a description of the proposed programs.

4.3.6.1 Monitoring within the Aboiteau PDA and Adjacent Habitats

In preparation for this Project, NSDPW has initiated a comprehensive monitoring program that includes both pre- and post-construction monitoring of wetlands adjacent to the Avon River Crossing (CBWES, 2017, 2018, 2019, 2020b, 2022 in prep.). The downstream monitoring program was developed in order to allow for the documentation of habitat conditions before and after causeway expansion, in order to determine change to the Avon River salt marsh, mudflat and associated tidal channel system as a result of the construction project. Implemented in 2018, it builds upon the previous research and monitoring activities conducted by Saint Mary's University between 2002 and 2007 (van Proosdij, 2005; van Proosdij et al., 2006; van Proosdij and Baker, 2007).

The Program will analyse the ecomorphodynamics[3] of the river, tidal channels and assess the potential implications of Highway twinning and an updated dyke and aboiteau system. Habitat monitoring post construction will be undertaken to quantify the environmental impact predictions of the EA document and other regulatory approvals and to support efforts to adequately offset any unavoidable negative impacts to salt marsh and fish habitat. The main objectives of the monitoring program are:

1. Measure changes in surface elevation.
2. Measure changes in the location, stability and capacity of tidal channel networks.
3. Measure changes in the amount of vegetated marsh and mudflat habitat conditions (habitat mapping).
4. Measure changes in vegetation community structure.
5. Measure changes to fish and fish habitat.

Post-construction monitoring at the Elderkin Marsh and Windsor Marsh will continue for at least five years to verify the actual impacts and lost habitat. Annual reports will be provided to NSECC, DFO, and the Mi'kmaq of Nova Scotia. Reports will be available for public review via the CLC (https://hwy101windsor.ca/). A summary of monitoring programs, parameters and frequency sampled, and the corresponding monitoring years are provided in Table 4.6.

[3] Ecomorphodynamics is the study of the interaction and adjustment of topography, vegetation, fluid and hydrodynamic processes, morphologies and sequence of change dynamics involving the movement of sediment.

Table 4.6 Summary of Avon River Estuary Monitoring Program (CBWES, 2019)

Category	Parameters	Sampling Frequency	Monitoring Year						
			Pre Construction	Construction	Post-restoration (Year)				
			2017 - 2019	2019 - 2022	1	2	3	4	5
Hydrology	Tidal signal, Hydroperiod, Tidal flow patterns	Minimum 29-day period; Minimum 1 spring and neap tide event	✓		✓	✓	✓	✓	✓
Geomorphology	Marsh surface elevation	Once per required sampling year	✓		✓	✓	✓	✓	✓
	Tidal creek network	Once per sampling year	✓	✓	✓	✓	✓	✓	✓
	Sediment dynamics	Once per sampling year	✓	✓	✓	✓	✓	✓	✓
	Bathymetry	Once per required sampling year			✓				✓
	Georeferenced low-altitude aerial photography	Twice per sampling year (spring, mid-late summer)	✓		✓	✓	✓	✓	✓
Vegetation	Composition, Abundance, Height, Habitat mapping	Once per sampling year (August)	✓		✓		✓		✓
Fish & Fish Habitat	Composition, Abundance, Habitat	N/A	✓	✓	✓		✓		✓
Visual Assessment of Habitat Responses	Habitat conditions, Geomorphic change, Wildlife usage, etc.	Once per sampling year (August)	✓	✓	✓	✓	✓	✓	✓
Winter Conditions	Visual assessment of ice/snow, Habitat conditions	Minimum once per sampling year (January - March)	✓		✓	✓	✓	✓	✓

4.3.6.2 Monitoring of Habitats Upstream of the Aboiteau PDA

As the aquatic system upstream of the Avon River causeway and aboiteau has not been well studied, a monitoring program in 2022 and 2023 has been proposed to characterize the upstream conditions, document the response of the system to the current gate management approach and to predict the potential restoration opportunities. The downstream monitoring program as described in Section 4.3.6.1 will be adapted to include the portion of the upstream system that has the potential to be tidally influenced, including potential tidal wetland areas upstream of the causeway and assess the potential implications of Highway twinning and a new water/flood management system associated with the DFO Ministerial Orders and proposed operational scenario. A key aspect of this study will be the examination of suspended sediment concentrations throughout the system in order to determine the potential for fluid mud.

Proposed activities will be focused on the collection of the data necessary to understand key physical, chemical and biological characteristics of the upper estuarine system (Figure 4.19), including key habitat types (i.e., aquatic, channels, mudflats, and wetlands). A contemporary bathymetric and digital elevation model (DEM), tidal channel network map, and delineation of habitats will be produced through the integration of high resolution geo-referenced low-altitude aerial photography and derived surface elevation models, with on the ground elevation and bathymetry surveys. The proposed project will also include a historical analysis of habitat conditions using existing data sources (i.e., provincial air photographs; bathymetric surveys) and considering two time periods: pre-causeway (pre-1968) and post-causeway (1970-2021).

Figure 4.19 Proposed study area extending upstream from the causeway to the at the fork in the river located at the confluence of the West Branch and the Avon River (image source-Google Earth).

4.4 Wildlife and Wildlife Habitat

Wildlife and wildlife habitat was included as a VC in the original EA due to possible interactions of the Project with wildlife species including SAR and SoCI, migratory birds, mammals, and herptiles (Stantec, 2017). The updated EA provides additional assessment of effects to wildlife and wildlife habitat during construction within the new Aboiteau PDA and with operation and maintenance of the new aboiteau structure and dyke.

4.4.1 Update to Existing Conditions

Terrestrial biological field surveys included in the original EA were undertaken to assess existing wildlife and wildlife habitat conditions. The terrestrial field surveys were conducted between 2007 and 2016 and consisted of bird (breeding bird, fall migration shorebird, nightjar), mammal, and herptile surveys (Stantec, 2017).

The updated assessment does not include additional terrestrial field surveys specific to wildlife and wildlife habitat as most of the previously gathered data is still relevant. Since the original EA document (Stantec, 2017), three species have updated SARA status; no changes of status under NS ESA were identified. Table 4.7 summarizes these changes.

Table 4.7 Changes in SoCI SARA Statuses Since the Original EA Submission

Common Name	Scientific Name	Previous Status	Updated Status
Eastern Painted Turtle	*Chrysemys picta picta*	No status	Special Concern
Bobolink	*Dolichonyx oryzivorus*	No status	Threatened
Eastern Wood-pewee	*Contopus virens*	No status	Special Concern

4.4.2 Boundaries

Since the EA Document submission, the location of the aboiteau, dykes and roads have been updated, and the operational scenario has changed to include two scenarios that will allow tidal water to enter the habitats upstream of the causeway. This updated EA includes assessment within updated spatial and temporal boundaries.

The updated assessment of potential effects to wildlife and wildlife habitat was conducted within two spatial boundaries: the Aboiteau PDA and the Assessment Area.

The Aboiteau PDA is defined in Section 2.1 and marks the footprint of physical disturbance which has changed from the original EA. The Aboiteau PDA, has been updated to include new areas downstream in the Avon River estuary associated with the location of the new aboiteau structure, the realignment of the channel immediately downstream of the existing aboiteau structure, and the construction of new dykes in the Avon River estuary, Windsor Marsh, and Elderkin Marsh.

The original Assessment Area included a 1 km wide study corridor (500 m on either side of the PDA). The updated Assessment Area for wildlife and wildlife habitat on the downstream side includes the same boundaries as the original assessment which includes the Aboiteau PDA. The Assessment Area extends to include the area of the potential saltwater influence upstream in the Avon River (Figure 4.2), which is described in Sections 4.1, 4.2, and 4.3.

The updated Assessment Area consists of agricultural lands (hay fields and pasture) on either side of the Avon River; urban areas comprising commercial, industrial, and residential buildings within the Town of Windsor; and brackish marshland (wetlands) on the downstream side of the existing aboiteau (Stantec, 2017). There is also a small portion of forested lands on the south side of the original approved highway alignment and east of the existing aboiteau. The terrestrial environment of the Aboiteau PDA is almost exclusively situated in wetland habitat.

The temporal boundaries of the updated assessment on the wildlife and wildlife habitat VC include the construction, and operation and maintenance phases of the Project. Temporal boundaries consider the sensitivity of wildlife during specific times of year, i.e., over-wintering, breeding, migration but also recognize that project interactions with wildlife could occur year-round.

4.4.3 Potential Environmental Effects and Project-Related Interactions

The EA Document (2017) included the assessment during construction and routine operation activities.

Effects previously assessed during construction included direct effects and indirect effects from road, dyke, and aboiteau site preparation activities within the PDA, and include change in habitat quantity, quality, or use; and change in risk of mortality or physical injury. This EA update includes the assessment of effects that may occur as result of the new Aboiteau PDA and the new operating scenarios.

Effects assessed during operations and maintenance activities included regular maintenance of the Project infrastructure, winter maintenance activities, and vegetation management. The EA Document (2017) included the assessment during routine operation activities; therefore, the EA update does not include reassessment of these activities.

The original EA did not identify any mammal SAR or SoCI within the vicinity of the Aboiteau PDA and assessed effects to SoCI mammalian species—such Northern Myotis (*Myotis septentrionalis*), Little Brown Myotis (*Myotis lucifugus*), and Tricoloured Bat (*Perimyotis subflavus*)—during construction. The evaluation of residual environmental effects on mammalian SAR undertaken in the original EA is not anticipated to change; therefore, assessment of effects on mammalian SAR is not included as part of this EA update.

The updated assessment focusses on effects to avian and herptile wildlife and wildlife habitat.

4.4.3.1 Construction

Potential environmental effects on wildlife and wildlife habitat include effects resulting in change in habitat quantity, quality, or use; and change in risk of mortality or physical injury. Although there is a small change in the PDA, effects are expected to be similar to the effects described in Section 5.6 of the original EA (Stantec, 2017).

The Aboiteau PDA extends into the location of the Windsor Marsh and Elderkin Marsh. As indicated in the original EA, the wetlands and mudflats of the Avon River estuary are in the southern portion of the Southern Bight Important Bird Area (IBA). The IBA supports large numbers and diversity of shorebirds during fall migration (Stantec, 2017).

The area also attracts high numbers of waterfowl that forage and stage in wetland areas adjacent to the Avon River causeway. The wetlands and mudflats also offer suitable habitat for SoCI and some federally and/or provincially protected SAR.

The updated Aboiteau PDA results in additional habitat loss within the Project footprint. The activities associated with the construction of new infrastructure including the aboiteau, dyke system and highway bridges are anticipated to result in direct changes to the quality and quantity of wildlife habitat within the Aboiteau PDA. Clearing, grubbing, and excavation during site preparation will remove wetland habitat and areas used by wildlife.

Similarly, as detailed in the original EA submission, sensory disturbance may occur during construction along with general avoidance of the area due to human presence. Disruptions to shorebird feeding or roosting caused by avoidance and displacement could result temporarily (Stantec, 2017). Physical injury to wildlife, such as avian species and herptiles within the marshlands, can also occur. The occurrence of shorebirds, waterfowl and other wildlife species including mammals and herptiles is expected to resume after construction activities are complete as the area will be allowed to naturally regenerate.

4.4.3.2 Operations and Maintenance

Effects of the operations and maintenance phase to wildlife and wildlife habitat will depend on the aboiteau operational system that is ultimately selected. The Brackish Lake and Dampened Tidal Estuary scenario will allow manipulation of water levels and the inundation of tidal water changing salinity and sediment dynamics within the upstream habitats. Therefore, the operational scenarios are likely to result in a change in habitat quantity, quality, and/or use. These changes are likely to affect wildlife groups differently.

While changes to the Avon River sediment and salinity levels are not expected to result in loss of habitat used by avian wildlife, water level fluctuations and tidal waters within the Brackish Lake and Dampened Tidal Estuary scenarios are expected to create additional saltwater marshland on the upstream side of the highway (Section 4.3.3). This could result in the expansion of available salt marsh habitats for species that use this area as part of their migratory corridor.

The Brackish Lake and Dampened Tidal Estuary operational scenarios would allow an influx of tidal water that may result in changes to food sources, such as freshwater invertebrate communities or freshwater fish, that may be present upstream of the causeway. The operational scenario is anticipated to result in the development of invertebrate and fish communities tolerant of fluctuating tidal conditions within this area. In addition to a change in the prey availability, an increase in TSS and turbidity upstream of the aboiteau could reduce prey capture success for birds, such as Belted Kingfisher, and other wildlife that feed on fish and invertebrates.

The operational changes may also affect freshwater herptile species, such as Common Snapping Turtle (*Chelydra serpentine*) and Eastern Painted Turtle (*Chrysemys picta picta*), that may use the areas upstream of the causeway that will be exposed to tidal waters. Changes in salinity or TSS may result in the loss of habitats used by freshwater species. The original EA identified that snapping turtles were reported in the general vicinity of the old Assessment Area, and that painted turtles were encountered during the completion of the biological field surveys; however, the precise locations of these observations were not specified in the original EA submission (Stantec 2017). The original EA also identified that suitable habitat for snapping turtle existed in Pesaquid Lake. Generally, Eastern Painted Turtles occupy slow moving freshwater environments with emergent vegetation, such as lakes, rivers, creeks, and streams and vegetated wetlands (COSEWIC, 2018). There are areas upstream of the causeway that could provide suitable habitat for Eastern Painted Turtles, which are now considered SoCI.

As stated in Section 4.3.6.2, post-construction monitoring upstream of the causeway will continue for at least five years to verify the actual impacts and lost/restored habitat, and to assess whether wetland conditions develop as expected.

4.4.4 Mitigation

Mitigation measures for identified effects will include those as originally identified in the 2017 environmental assessment. The mitigation measures that will be undertaken during the construction and operations and maintenance phases of the Project include:

- Following the site-specific EPP.
- Completing construction outside of the breeding bird season (April 1 to August 15) as much as feasible. Where this is not practical, developing a Mitigation Plan in consultation with Environment and Climate Change Canada (ECCC), Canadian Wildlife Service (CWS) and provincial regulators.
- Compensating for loss of wetland habitat and function in accordance with NSECC requirements.
- Reducing the frequency of off-road activity and using only designated roadways to minimize ground disturbance.
- Contractor environmental awareness training.
- During maintenance, following NSDPW’s Salt Management Plan.

- During maintenance, inspect bridges prior to proceeding with maintenance work to check for occupied nests or the presence of species of conservation interest. If nests are observed, disruptive activities in the vicinity of nests should cease until nesting is complete.

No additional mitigation measures were identified that reduce or eliminate possible Project-related effects to wildlife and wildlife habitat during the operation and maintenance phases of the Project. As described in Section 2.3.2.1, the structure is designed to be adaptable to multiple management scenarios and allow more or less tidal water in and out of upstream areas, which can mitigate the effects on wildlife and wildlife habitat, if needed.

4.4.5 Residual Environmental Effects and Significance Determination

The residual effects assessment considers the effects on wildlife and wildlife habitat following the implementation of the mitigation measures described in Section 4.4.4. A significant adverse effect was identified following the criteria as identified in the original EA (Stantec, 2017).

4.4.5.1 Construction

The change in the Aboiteau PDA will increase the loss of habitat for some wildlife species, such as foraging habitat for shorebirds and waterfowl. Despite the increase in the Aboiteau PDA, following the implementation of mitigation measures, the residual effect is not anticipated to threaten the long-term sustainability of non-SoCI or recovery plans for SoCI wildlife species within the Assessment Area. Habitat suitable for nesting was not identified for Barn Swallow, Bobolink, or Eastern Wood-Pewee within the Aboiteau PDA.

There is no anticipated change in risk of mortality or physical injury from the previous assessment that would result in a significant residual environmental effect. Temporary displacement and general avoidance of the Project Area by wildlife, in particular waterfowl and shorebirds, could be expected. However, after construction activities are complete and the Project Area is able to naturally regenerate, wildlife activity should resume to typical pre-construction levels.

In consideration of the potential environmental effects to wildlife and wildlife habitat, use, quantity, and quality as a result of construction activities and the proposed mitigation measures to be implemented, residual effects to wildlife and wildlife habitat are not expected to be significant.

4.4.5.2 Operations and Maintenance

A change in the operational scenario from the original EA will change the upstream habitat from the tidal water flows, changing the salinity and TSS upstream of the causeway. This will result in the creation of additional brackish and tidal habitats. This would result in a positive effect for species that depend on estuarine habitats. However, this would result in the loss of freshwater habitat areas and displacement of species that depend on freshwater habitat. In Dampened Tidal Estuary scenario, new salt marsh and other wetlands that develop on the upstream side of the causeway could offer suitable habitat for some species, including SAR. In the Brackish Lake operational scenario, this would also occur within reduced areas compared to that of the Dampened Tidal Estuary scenario.

There are no effects anticipated for either operational scenario that will threaten the long-term sustainability of a wildlife species within the Assessment Area.

The change in the operation could result in the loss of habitat for freshwater herptile SAR (Common Snapping Turtle and Eastern Painted Turtle) if they use the freshwater habitat upstream of the causeway within the area of tidal influence. The presence of these species within the area of tidal influence was not specified in the original EA (Stantec, 2017). The residual effects were determined to the non-significant following the significance criteria.

In consideration of the environmental effects that are likely due to operations and maintenance of all proposed infrastructure as well as the proposed mitigation measures, residual effects to wildlife and wildlife habitat are predicted to be not significant.

4.4.6 Monitoring and Follow-up

As stated in Section 4.3.6, post-construction monitoring at the Elderkin Marsh, Windsor Marsh, and habitats upstream of the causeway will continue for at least five years to verify the actual impacts and lost habitat, and to assess whether saltwater marshland conditions develop as expected.

4.5 Land Use

Land use was selected as a VC in the original EA and existing and anticipated land use within the immediate vicinity of the Highway 101 Twinning Project and the surrounding communities were assessed. The assessment of land use also included use of the land and its resources by the Mi'kmaq of Nova Scotia as well as traditional land use (Stantec, 2017). An updated assessment of potential interactions of the proposed Project related activities on land use was undertaken to expand on the assessment of this VC in the original submission.

4.5.1 Update to Existing Conditions

Existing and anticipated land use within the immediate vicinity of the Highway 101 Twinning Project and the surrounding communities were assessed in 2017. The assessment of land use also included use of the land and its resources by the Mi'kmaq of Nova Scotia as well as traditional land use (Stantec, 2017).

There have been a number of development permits issued for development projects within the Municipality of West Hants since 2017, most of which are residential and commercial. The most notable development is the West Hants Sports Complex worth $17.5 million, which opened in late 2020. The Sports Complex is located on the east side of Windsor, about 200 m southwest of Highway 101. The number of development permits issued in 2020 appeared to be less than previous years, likely due to disruptions caused by the COVID-19 pandemic.

Land use along the Pesaquid Lake and Avon River is similar to the 2017 assessment and is characterized by a combination of residential, commercial, agricultural, industrial use as well as vacant lots.

As mentioned in Section 2.1.1, the existing aboiteau including the portion of the Avon River Causeway within the footprint of the aboiteau, and the land immediately west of the causeway are owned by NSDPW and the Province of Nova Scotia.

4.5.1.1 Residential, Industrial, and Commercial Use

While residential development continues to be on the rise within the communities of Falmouth and Windsor, there were no residential development projects identified to be underway between Exit 6 and Exit 7 at the time of the EA update and associated assessment. Since the original EA, the Municipality of West Hants had issued between approximately 320 to 360 permits annually. Currently, there are two applications for residential rezoning and/or minor construction projects within Windsor and Falmouth that are undergoing review with the Municipality of West Hants (West Hants Regional Municipality, 2022). The location of the former Nova Scotia Textile Mill on the north side of Exit 6 off Highway 101 is undergoing redevelopment and the existing Nova Scotia Textile Mill structure will be partially decommissioned and used as part of a new-multi use development (CBC News, 2022).

There was one minor commercial project undergoing consideration by the Municipality of West Hants in Windsor in October 2021; the project is located just under 2 km east of Exit 6 in Windsor, NS.

4.5.1.2 Recreational and Resource Use

Most of the recreational facilities and areas previously described in the 2017 EA still exist in 2022, including the Pisiquid Canoe Club (canoe club) building that is located on the northeast side of Pesaquid Lake, 100 m south of the existing Highway 101. Approximately 52 m south of Highway 101, are three floating docks that belong to the canoe club. The Windsor and Hantsport Railway-owned walking path and basketball court south of the canoe club also still appear to be in use. Martock Ski Hill continued to intake freshwater from the Avon River to create snow for skiing during the winter months (approximately mid-December to end of March) until March 2021, when water levels became too low following the release of the DFO Ministerial Orders. The West Hants Regional Municipality received $1,105,000 of federal funding in December 2021 to install new freshwater supply infrastructure and facilitate continued operation of Ski Martock (ACOA, 2021).

Similarly, prior to the DFO Ministerial Orders, the Avon Valley Golf & Country Club (the golf course) occasionally withdraws freshwater for use in its operations (G. Matheson, Nova Scotia Department of Agriculture, *pers comm.*, October 28, 2021). The withdrawal location is adjacent to the western bank of the Pesaquid Lake, approximately 1.7 km upstream of the existing aboiteau. The diverted water is used for irrigation of the turf grass.

Farms adjacent to the Avon River have been known to withdraw water from the river's tributaries to irrigate crops and to provide a drinking water source for pastured livestock (G. Matheson, Nova Scotia Department of Agriculture, *pers comm.*, October 28, 2021). However, there are no known water withdrawal approvals issued by NSECC for these purposes in the area (i.e., their water withdrawal requirements do not meet the 23,000 L per year threshold).

4.5.1.3 Current Use of Lands for Traditional Purposes by Aboriginal Persons

Land use for traditional purposes by the Mi'kmaq of Nova Scotia has likely not changed from the original assessment. There is a larger gathering area in Falmouth that extends west from Pesaquid Lake to Gabriel Road and south approximately 850 m from the existing Highway 101, near Exit 7. The area is used by Mi'kmaq communities within the region, including the Annapolis Valley First Nation and the Glooscap First Nation, to gather berries, wild fruit, specialty wood, and decoration plants.

4.5.2 Boundaries

The environmental effects of Project Activities on current and future land use were assessed within two spatial boundaries: the PDA and the Assessment Area. The PDA, which has been previously defined in Section 2.1, marks the footprint of physical disturbance. The Assessment Area encompasses the Project Area and the adjacent communities of Windsor and Falmouth, agricultural lands on either side of the Avon River, and upstream of the Martock water intake to the confluence of the West Branch and the Avon River, approximately 7 to 8 km upstream of the proposed aboiteau.

The temporal boundaries of the effects assessment on land use include the operations and maintenance phases of the Project. The temporal boundaries of the updated environmental effects assessment include the operations and maintenance phases of the Project. As specified in Section 4.1.3, two sets of seasonal conditions (wet and dry) were modelled for each water management operational scenario, considering year-round operation of the Project. Differences in salinity and suspended sediments/sedimentation are expected in the Avon River and Pesaquid Lake depending on the season based on the modelling results, which could see different impacts to land users throughout the year. Additionally, land use of the Assessment Area by neighbouring communities also varies according to season, such as recreational activities. Therefore, interactions between land use and project activities may differ depending on the timing of the project activity.

4.5.3 Potential Environmental Effects and Project-Related Interactions

Project activities, including construction and operation/maintenance of the aboiteau, dyke system and fishways could lead to changes to land use. Furthermore, the changes to land use may differ according to which aboiteau design option is selected. During operation and maintenance of the aboiteau, environmental effects to land use were assessed for the three scenarios that could result from each design option.

The boundaries of Mi'kmaq land and resource use areas identified in the Mi'kmaq Ecological Knowledge study (MEKs) do not coincide with the proposed aboiteau location or the Pesaquid Lake. As such, the component is not further evaluated.

4.5.3.1 Construction

The construction of the new aboiteau and dyke system will occur north of the existing aboiteau, which already prevents passage of recreational boats between the tide side channel of Avon River and former Pesaquid Lake. The use of the existing highway will be permitted during construction, though some level of disruption to traffic on the highway and the community due to the mobilization of equipment is expected, but not substantial. Effects of noise, dust, odours, and air emissions are also likely to be experienced by the community during construction.

Other direct effects to recreational, agricultural, and resource land users as a result of construction are not anticipated.

The existing aboiteau will remain operational during construction, and for a period of time to ensure the new structure is functional. As water is redirected to the new Avon River Aboiteau through the new channel and the old channel is decommissioned, the two structures will be operational. The water exchange may be temporarily restricted during this period to minimize flooding. Depending on the upstream water levels, water levels upstream of the causeway may be reduced (drawn down) for the commissioning of the new structure to prevent a surge of water on the upstream side as operation of the new structure commences.

4.5.3.2 Operations and Maintenance

Anticipated adverse effects to land use caused by the operation of the new aboiteau-dyke system will largely depend on the operating scenario and the resulting water levels, flow velocity, salinity, and sediment movement.

Salinity and flow velocity will vary according to seasonal conditions (dry and wet) in addition to the tidal exchange setting of the aboiteau. As previously mentioned, dry conditions will be experienced in summer/fall while wet conditions will occur in winter/spring. Effects of required maintenance to the aboiteau will likely be similar to the effects generated by construction.

4.5.3.2.1 Effects of Water Level Changes

The Brackish Lake scenario will allow the current water level to be mostly maintained at 2.1 m CGVD2013 regardless of the tidal environment, which is similar to the Freshwater Lake scenario assessed in the original EA submission. The predicted water level fluctuations (0.4 m) are not substantial enough to have an impact on the canoe club and other land users in the Assessment Area. The threshold of 2.1 m CGVD2013 was strategically selected to minimize impacts to agricultural production in the watershed and other land user within and adjacent to the Avon River, following modelling of various scenarios with differing water levels (CBCL, 2022).

The Dampened Tidal Estuary scenario could result in water level fluctuations of 2 m during high and low tide (-0.5 m to 1.5 m CGVD2013). Under high tide conditions, flooding upstream of the causeway will extend to the reaches of the canoe club floating docks. Under low tide conditions, particularly during dry conditions in summer/fall, the floating docks may no longer be functional. This could not only create an inconvenience to the canoe club and its members, but also cause an economic impact that could make the canoe club non-viable. The docks would need to be relocated or extended to be functional when the water level is low. Low water levels will partially expose the riverbed and tributaries, creating a mudflat or salt marsh environment at low tide. Salt marshes have the potential to give off malodours resulting from microbial activities and the recycling of carbon, nitrogen, and sulfur, if they are poorly drained (Mossman, 2004). Well-drained minerogenic marshes such as the Windsor Salt Marsh, however, do not typically emit overpowering odours and odours are not expected to reach levels that are considered a nuisance.

4.5.3.2.2 Effects of Salinity Changes

Under normal operating conditions salinity, described in the context of the two scenarios, is more likely to have implications to Ski Martock, the golf course, and agricultural land users than the livelihood of the town communities since the three receptors have been identified to use water withdrawn from the Avon River to support their operations. The portion of land use effects assessment dedicated to salinity changes will, therefore, focus on the three receptors: Ski Martock, the golf course and agricultural land users. Under extreme storm conditions which result in water levels increasing beyond 2.1 m CGVD2013, there is potential for large levels of saltwater intrusion in agricultural ditches that border the Avon River within the Assessment Area.

Brackish Lake Scenario

Ingress of salinity will be the highest during the dry season in both scenarios. In the Brackish Lake scenario, salinities north of the Highway / Trunk 1 bridge are expected to reach 15 PSU, with salinities reduced by nearly half (7 PSU) by the time the tidal water reaches the Martock intake (CBCL, 2021a). A level of 7 PSU is approximately 150 to 200 times the salinity of the water quality monitoring program results from summer/fall 2019 at the Martock intake (CBCL, 2019). Following the DFO Ministerial Orders, approximately 11 ppt was recorded at a 1 m depth approximately 1.9 km downstream from the intake, and dissipated to less than 0.6 ppt within approximately 1,000 m downstream of the intake. Low salinity (less than 0.5 ppt) has been consistently observed at the confluence of the Avon River and West Branch several kilometers further upstream from the Martock intake.

Since water intake is not expected to occur until the wet season (winter/spring) when water is needed for snowmaking, salinity effects to Ski Martock during the dry season are not expected.

Usual freshwater volume withdrawals for use at the golf course was unknown at the time of this assessment, however withdrawal likely occurs from spring until fall in alignment with a typical golf course season in Nova Scotia. Salinity at the Golf Course withdrawal location is expected to be between 7 to 15 PSU. Crops, including turfgrasses, can be particularly sensitive to salinity. Higher salinities can present long-term negative effects to turfgrasses, particularly during drier months when precipitation is low as less salts will be flushed (leached) through the soil and there is a higher evapotranspirational demand (Marcum, 1999).

The dry season coincides with crop growing seasons. The CCME Canadian Environmental Quality Guidelines for the Protection of Agricultural Water Use include guidelines for permissible chloride levels for the irrigation of various crops, with the highest crop tolerance threshold (900 mg/L for grapevines) substantially less than 7 PSU (assuming a conversion of 1 PSU = 1 ppt = 1,000 mg/L). For other fruit, grain, and vegetable crops including alfalfa, barley, corn, sorghum, stone fruits and berries, the permissible chloride levels are much lower (between 100 to 710 mg/L). Negative long-term effects to agricultural lands containing soils with suboptimal drainage can occur, especially during drier months for similar reasons as described above for turfgrasses (Marcum, 1999). For agricultural land users who withdraw water to irrigate crops, using saline water for this purpose can lead to reduced quality and yield especially for crops with low-moderate tolerance to salinity such as wheat, alfalfa, and corn and many fruit and vegetable crops (Steppuhn, 2013). The consumption of saline water by livestock can also be lethal unless it is treated first.

Alternatively, during the wet season, saline water concentrations will be much lower north of the Highway / Trunk 1 bridge and at the Martock intake for the Brackish Lake scenario with around 1 PSU of salinity observed at Martock (CBCL, 2021a) due to higher freshwater inputs and seasonal runoff. While the salinity of water withdrawn during the wet season will be substantially less than the dry season, 1 PSU is still greater than the CCME Canadian Environmental Quality Guidelines for the Protection of Agricultural Water Use for chloride levels. Martock is expected to pump water from the Avon River into holding tanks during the wet season for use in snow generation. Applying snow made from unfiltered saline water could lead to runoff (i.e., snow melt) into neighbouring agricultural lands when warmer temperatures occur. During the dry season when farming resumes, crop damage could potentially occur, similar to using untreated saline water for irrigation.

Dampened Tidal Estuary Scenario

Salinity will be higher by comparison for the Dampened Tidal Estuary scenario due to the greater influx of tidal water. Salinities north of the Highway / Trunk 1 bridge could reach up to 25 PSU during the dry season, while salinities downstream of the Martock intake could reach 8 PSU (CBCL, 2021a). Since the Martock intake is not expected to be operating during the dry season, no changes are anticipated.

Salinity at the golf course intake location is expected to be somewhere between 8 PSU and 25 PSU, which is much higher than the Brackish Lake scenario. The CCME Canadian Environmental Quality Guidelines do not include guidelines for the irrigation of golf courses, though it can be inferred that water with such high salinities would not be suitable for use. As is the case with the Brackish Lake scenario, if highly concentrated saline water is applied to turfgrasses without being treated/filtered first, there could be long-term negative effects felt to turfgrasses. These effects may be pronounced during drier months when precipitation is low as less salts will be flushed (leached) through the soil and there is a higher evapotranspirational demand (Marcum, 1999).

Water withdrawn from the Avon River downstream of the Martock intake during the dry season would not be suitable to use for irrigation purposes for agriculture, as the chloride concentrations would substantially exceed the CCME Canadian Environmental Quality Guidelines for the Protection of Agricultural Water Use, regardless of the crop. Water may need to be sourced from other means for irrigation purposes, such as trucking in freshwater exploring other freshwater bodies in the area or pumping water from further upstream during the wet season when salinities are much lower and storing for future use.

In the wet season when the ski hill is operating, higher salinities would be confined to the area north of Highway / Trunk 1 (CBCL, 2021a). There would be sufficient freshwater runoff and high enough velocities of flow occurring to keep the water composition at the Martock intake fresh. The results of the model therefore indicate that the influx of saline water in the Dampened Tidal Estuary scenario will not have an impact on water quality at the Martock intake and as a result, there should be no impact to ski hill operations.

During the wet season, salinity effects to crops are also less likely as the growing season will either be finished (winter) or is just beginning (spring). Most of the accumulated salts should be leached from the soils by the time seeding occurs.

4.5.3.2.3 Effects of Suspended Sediment Changes

High levels of suspended sediments in the river have the potential to hinder the ability of agricultural drainage systems to function effectively and minimize sedimentation risks (NSDA, 2022). A ground truthing exercise involving the measurement of five culvert invert elevations in critical agricultural ditches along the Avon River occurred in 2021. The culverts ranged in height between 1.8 m and 3.3 m CGDV2013. It is likely that the culvert at the lowest elevation (1.8 m) will be susceptible to sedimentation issues for both scenarios during extreme storm events (NSDA, 2022). Extreme storm events that cause water levels to rise beyond 2.1 m CGVD2013, and upwards of 3 m CGVD2013 for either scenario, will see an inundation of suspended sediment into culverts in drainage ditches that sit at 1.8 m or less, which could potentially lead to adverse impacts to agricultural land users. A similar or perhaps even amplified effect could occur under extreme storm events if the existing aboiteau were to continue operating as is.

High accumulation of suspended sediments can also plug intake pipes (such intakes for Ski Martock, and for use in irrigation of agricultural lands and the golf course) for water withdrawal, reducing pumping efficiency and causing possible equipment damage.

Brackish Lake Scenario

In the Brackish Lake scenario under normal operating conditions, suspended sediment brought in from the Minas Basin is likely to be contained to the area just upstream of the Highway / Trunk 1 bridge and background concentrations will return under ebb tide conditions. Some accumulation of settled sediment on the bed is possible during flood conditions as described above, though the concentration of sediment dissipates with distances upstream.

No change to land use is expected from the inflow and outflow of sediment from the Minas Basin in this scenario under normal operating conditions. Under extreme storm events, if water levels were to rise beyond 3 m, the drainage ditches could become inundated with sediment.

Dampened Tidal Estuary Scenario

In the Dampened Tidal Estuary scenario under normal operating conditions, high suspended sediment concentrations can reach up to 2 km upstream of the Highway / Trunk 1 bridge during high tide, but close to background concentrations will resume during ebb tide. As the Martock intake is three to four times the distances of the outer reaches of the plume, the influx of sediments from the Minas Basin will not reach the Ski Martock intake.

The golf course and agricultural land user water withdrawal locations are also greater than 2 km upstream of the Highway / Trunk 1 bridge.

4.5.3.2.4 Effects of Water Velocity Changes

Flow velocity fluctuations caused by water flowing in and out of the proposed aboiteau and the existing aboiteau, vary depending on the opening of the gates and water levels (Appendix F).

Brackish Lake Scenario

Water velocities in the Assessment Area vary under the Brackish Lake scenario depending on the time of year and freshwater inputs, and the phase of the tidal cycle. The main gates on the new structure will be closed for most of the tidal cycle under the Brackish Lake scenario, resulting in generally low flowing water velocities in the vicinity of the new and existing aboiteau structures (CBCL, 2021c). There is a sudden increase in velocity when the tidal gates of the proposed structure open and the water flows downstream, which is due to a large movement of water through the channel. These releases are necessary to control the water level elevation upstream of the causeway at approximately 2.1 m CGVD2013, and to lower water levels upstream of the causeway during periods of higher freshwater inputs into the Avon River watershed (i.e., wet seasons). This increase in velocity occurs for approximately 0.5 to 2.5 hours depending on the amount of freshwater inputs and tidal conditions. There are also increased velocities through the existing aboiteau the upstream direction, which occur at high tide due to the flow entering through fishways (CBCL, 2021c).

The increases in water velocity are limited to the area immediately downstream of the new aboiteau structure, immediately upstream of the existing aboiteau structure, and in the new river channel between these structures (CBCL, 2021c). Water velocities in the Assessment Area are not affected within a few hundred metres upstream of the existing structure. The canoe club is more than 600 m away from the existing aboiteau. The area in front of the existing structure is presently restricted with a safety boom and the new area between the two structures will be restricted from the public; therefore, there is no anticipated effect to personal watercraft or paddle board users.

Dampened Tidal Estuary Scenario

Water velocities in the Assessment Area are more dynamic under the Dampened Tidal Estuary scenario. This water management scenario creates conditions similar to a natural tidal estuary environment, with tidal water allowed to flow in both the upstream and downstream directions. Increased velocities upstream occur when the upstream water level is less than the tidal level and large volumes of water entering into the upstream environment from the proposed aboiteau operation. Flows in the upstream direction occur for approximately 5.5 to 6 hours and in the downstream direction for 6.5 to 7 hours, depending on seasonal conditions (CBCL, 2021c).

Water flows in the upstream direction are expected to be higher under the Dampened Tidal Estuary scenario when compared to the Brackish Lake scenario, since comparatively large volumes of tidal water are allowed to flow upstream into the former Pesaquid Lake and river areas. When tidal flows exit the former lake area during ebb tide (i.e., through the aboiteau), higher velocities are expected until the water level is similar to the tidal water level (CBCL, 2021c).

The increases in water velocity were identified immediately upstream of the existing aboiteau structure, and in the new river channel between these structures. The area between the two structures will be restricted from the public.

4.5.4 Mitigation

As originally identified in the 2017 EA Document, the following mitigation measures will be undertaken during the construction phase of the Project:

- Noise, dust, and air emissions will be mitigated by following the site-specific EPP.
- Dust will be controlled by using dust suppression methods such as water application whenever necessary.
- Water level reductions that will occur as a result of the channel realignment will be communicated with local stakeholders.
- Standard traffic control procedures will be put in place, including mobilizing equipment during periods that are likely to interact with the least amount of traffic on Highway 101.

In addition to the mitigation measures that will still apply to the construction of the aboiteau, new mitigation measures that will minimize possible Project-related effects to land use during the construction and operation and maintenance phases of the project are outlined in Table 4.8.

Table 4.8 New Mitigation Measures for Effects to Land Use

Project Phase	Effect	Mitigation Measure
Operations and Maintenance	Water level fluctuations (Dampened Tidal Estuary scenario)	• As described in section 2.3.2.1, the structure is designed to be adaptable to multiple management scenarios and allow more or less tidal water in and out of upstream areas, which can mitigate the effects on land use, if needed. • A floating safety barrier placed across the channel approaching the existing aboiteau structure to limit access within higher velocity areas. • Access to the waterbody between the new structure and existing structure will be limited to authorized person.
	Salinity effects on irrigation and livestock drinking water supply	• As described in section 2.3.2.1, the structure is designed to be adaptable to multiple management scenarios and allow more or less tidal water in and out of upstream areas, which can mitigate the effects on land use, if needed.

4.5.5 Residual Environmental Effects and Significance Determination

The residual effects assessment considers the effects on land use following the implementation of the mitigation measures described in Section 4.5.4.

4.5.5.1 Construction

Effects to land users created by the generation of noise, dust, and air emissions due to construction will be minimized through the application of the mitigation measures. Minor residual effects are likely to occur, but existing conditions will resume following construction. Increased traffic on the Highway caused by the upgrades and the mobilization of equipment will still occur despite the mitigation measures, but the effects will resolve after construction is complete.

For the Brackish Lake scenario, the level of dust and malodours that are being experienced by the community due to the DFO Ministerial Orders are expected to subside after construction, as the water level upstream of the causeway be restored to a higher water level. For the Dampened Tidal Estuary scenario, dust and malodours upstream of the causeway may still be apparent as the water level subsides, though will likely be less persistent than the conditions created after the DFO Ministerial Orders was brought into effect.

On the downstream side, north of the new Highway 101 bridges, the change in flow conditions that may arise from channel-realignment activities will be temporary. Water levels will be allowed to resume subsequent to the completion of these activities.

Effects of construction on land use will be local, reversible, short in duration, and overall, not significant.

4.5.5.2 Operations and Maintenance

The degree of impacts to land users under normal conditions, including the communities of Falmouth and Windsor, and those classified as agricultural and recreational, throughout the operations phase of the proposed aboiteau will be dependant on the scenario ultimately selected.

Residual effects were identified for users that withdraw freshwater surface within the assessment area. The Brackish Lake scenario will result in fewer adverse effects compared to the Dampened Tidal Estuary scenario though salinity is still a possible concern for the golf course and agricultural land users. Post construction monitoring of water quality at various locations along the river on a frequent basis will allow landowners, golf course employees, and farmers the opportunity to determine whether the water withdrawn from the Avon River is suitable for use. If the water is determined not to be suitable for use, possible solutions can be filtering or treating withdrawn water, withdrawing water during the wet season when salinity will be lower for storage and use during the summer months, trucking in freshwater, or exploring other local freshwater bodies to offset the quantity of water that is no longer suitable for use from the Avon River due to high salinity.

Operation of the aboiteau to allow tidal conditions in the upstream environment has the potential to result in significant environmental effects. Monitoring will help support the determination of whether water can be used for the withdrawal purposes. However, unless reasonable mitigations are agreed to by land users and supported/implemented by the proponent or other responsible party to offset losses, potential effects to land users including local farmers, Ski Martock and the golf courses are expected to be significant. The selection of the operational scenario is being considered as a requirement of the DFO Authorization and in response to concerns expressed by Indigenous people, environmental organizations, and the public. Consequently, the options to mitigate or manage the potential significant environmental effects should be a shared responsibility among the decision-making authorities, similar to established principles for managing cumulative environmental effects[4].

The fluctuations of the water levels were also identified as a residual effect. For the Dampened Tidal Estuary scenario, water level fluctuations created by tidal conditions will limit access to the existing canoe club. If commitments are made to work with recreational users, including the canoe club to adapt to the differences in water levels, residual effects will still occur, but may be able to be managed. For the Brackish Lake scenario under extreme storm conditions that see water levels rise beyond 2.1 m CGVD2013 as a result of increased influx of tidal water, there may be saltwater intrusion and sedimentation implications to adjacent critical agricultural drainage ditches due to the surge in water levels upstream of the causeway. Maintaining the water levels at the levels specified for each scenario will minimize adverse effects to agricultural drainage ditches under these conditions, as the water levels for each scenario were strategically selected with this intention following the completion of modelling (CBCL, 2022; NSDA, 2022). Storm surges should not be an issue under a Dampened Tidal Estuary scenario.

Residual effects were also identified during the Dampened Tidal Estuary scenario from potential malodours. While there may be malodours that arise due to the creation of mudflats and marsh, the effect was not determined to be significant, as area where marsh may form is small in comparison to the overall estuary, the upstream area will have frequent water movement, and malodours are not anticipated to be as strong during the winter months. Therefore, odours are not expected to exceed pre-construction levels. As the upstream environments stabilize, such as biological growth and sediment stabilization, the emission reduction will also occur with time.

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[4] Refer to the following publications for discussion of cumulative effects management principles:
1) CCME. 2021. *Key Elements to Guide Governance for Cumulative Effects Assessment, Monitoring and Management*, and
2) International Finance Corporation. 2013. *Good Practice Handbook. Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets*.

Chapter 5 Summary

Since the submission of the Class 1 Environmental Assessment (EA), the design of the new Avon River Aboiteau and Dyke System, and Highway Alignment between Exit 6 and 7 have been further refined. The new aboiteau and dyke system will replace the aging existing structure and address conditions associated with climate change, such as sea-level rise and higher storm intensities that increase the risk that water will overtop the existing causeway over time. The changes to the highway alignment radius curves will bring the highway up to current standards, increasing highway safety and avoiding major changes to the locations of the existing interchanges and associated adjacent infrastructure. The new aboiteau design improves fish passage for diadromous fish. The aboiteau design provides for operational flexibility to allowing for adaptable tidal exchange, which has the potential to partially restore estuarine habitat in the upstream environment.

A *Fisheries Act* Authorization application and NSE Wetland Alteration application are currently under evaluation by DFO and NSECC, respectively. Therefore, the Project-related effects associated with wetland alteration in the Aboiteau PDA; and effects on fish, fish habitat, aquatic SAR and SoCI, including the changes to the Project and the water management operational scenarios, were not included in the EA update. The EA update focussed on effects that have changed from what was considered in the original EA and that are not authorized or in the process of being authorized under another regulatory approval. The EA update focuses on changes to five VCs:

- Aquatic Environment
- Groundwater Resources
- Wetlands
- Wildlife and Wildlife Habitat
- Land Use

Changes to five VCs included direct and indirect effects within the new Aboiteau PDA or as a result of effects from the potential operational scenario upstream of the new aboiteau structure.

Generally, the mitigation measures as identified in the original EA will remain, as identified in Chapter 4.0. New mitigation measures were identified to address the change in effects. A summary of the change in effects for these five VCs and the associated mitigation measures is provided in Table 5.1. The structure is designed to be adaptable to multiple management scenarios and allow more or less tidal water in and out of upstream areas, which can mitigate the effects on each of the VCs, if needed.

Following the implementation of mitigation measures, effects to Groundwater, Aquatic Resources, Wetlands, and Wildlife and Wildlife Habitat are predicted to be not significant.

Adverse effects identified to Land Use during construction are anticipated to be not significant, localized within the Aboiteau PDA, and short in duration. However, during the operation and maintenance there is potential for significant residual effects to Land Use during either the Brackish Lake and Dampened Tidal Scenarios as a result of the inundation of tidal waters and during the Dampened Tidal Scenario as a result of change in water levels.

The Brackish Lake and Dampened Tidal Estuary scenarios may reduce the availability of freshwater suitable for current commercial and agricultural use. The Brackish Lake scenario will result in fewer adverse effects compared to the Dampened Tidal Estuary scenario; however, the salinity could change the use of the waterbody to a point where activities that developed based on the former freshwater lake cannot continue and cannot be mitigated, which would be considered a significant adverse environmental effect. Post construction monitoring of water quality at various locations along the river will allow a determination of whether the water withdrawn from the Avon River is suitable for use.

The Dampened Tidal Estuary scenario is likely to result in water level fluctuations created by tidal conditions. The fluctuating water levels could change the use of the waterbody to a point where recreational activities that developed based on the former freshwater lake cannot continue and cannot be mitigated, which would be considered a significant adverse environmental effect.

Table 5.1 Summary of Update Effects Assessment

VC	Change in Effects	Project Phase	New Mitigation Measures Identified
Aquatic Environment	• Change in Sediment Dynamics • Change in Water Levels • Change to Water Quality, including Salinity and Sediment	Operation and Maintenance (Operational Scenario)	• No additional mitigation measures were identified that reduce or eliminate possible Project-related effects to the aquatic environment during the operation and maintenance phases of the Project. The structure is designed to be adaptable to multiple management scenarios and allow more or less tidal water in and out of upstream areas, which can mitigate the effects on the aquatic environment, if needed.

Groundwater	• Change in groundwater quality and quantity	Operation and Maintenance (Operational Scenario)	• Short Term - if a change in water quality or quantity is confirmed and attributed to the Project (i.e., operation of the Aboiteau), provide bottled drinking water to user until a longer-term solution can be implemented.
			• Development of Longer-term solutions on a case-by-case basis, as required:
			  • Provision of water treatment.
			  • Modification to / improvement of the well.
			  • Re-drilling or digging of the well.
			• If no other option is available, long-term provision of potable water using a storage tank and trucked water.

Wetland	• Change to Wetland Area • Change to Wetland Function	Operation and Maintenance (Operational Scenario)	• No additional mitigation measures were identified that reduce or eliminate possible Project-related effects to the wetlands during the operation and maintenance phases of the Project. The structure is designed to be adaptable to multiple management scenarios and allow more or less tidal water in and out of upstream areas, which can mitigate the effects on wetlands, if needed.
Wildlife and Wildlife Habitat	• Change in habitat quantity, quality or use • Change in risk of mortality or physical injury	Construction	• No additional mitigation measures were identified that reduce or eliminate possible Project-related effects to the Wildlife and Wildlife Habitat during the operation and maintenance phases of the Project.
		Operation and Maintenance	• No additional mitigation measures were identified that reduce or eliminate possible Project-related effects to the Wildlife and Wildlife Habitat during the operation and maintenance phases of the Project.

VC	Change in Effects	Project Phase	New Mitigation Measures Identified
		(Operational Scenario)	The structure is designed to be adaptable to multiple management scenarios and allow more or less tidal water in and out of upstream areas, which can mitigate the effects on wildlife and wildlife habitat, if needed.
Land Use	• Change in Land Use due to Construction • Change in Land Use due to the operational Scenario changing water levels, water quality, or velocity	Construction	• No additional mitigation measures were identified that reduce or eliminate possible Project-related effects to the Land Use during the construction phases of the Project.
		Operation and Maintenance (Operational Scenario)	• The structure is designed to be adaptable to multiple management scenarios and allow more or less tidal water in and out of upstream areas, which can mitigate the effects on land use, if needed. • A floating safety barrier will be placed across the channel approaching the existing aboiteau structure to limit access within higher velocity areas. • Access to the waterbody between the new structure and existing structure will be limited to authorized person.

Chapter 6 References

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APPENDIX A

Design Drawings

- Highway 101 Aboiteau & Causeway Upgrade Avon River Aboiteau & Dyke Replacement – Civil Drawings (C001-C023)
- Highway 101 Aboiteau & Causeway Upgrade Avon River Aboiteau & Dyke Replacement – Structural Drawings (S002, S101, S102, S106, S151, S410, S411)
- Avon River Causeway Bridge, (HAN 260) Highway 101 Eastbound Hants County File # B-20-06 – Structural Drawings (S201-S203)
- Avon River Causeway Bridge, (HAN 259) Highway 101 Westbound Hants County File # B-20-05 – Structural Drawings (S101-S103)

C001

EXISTING CONDITIONS AND REMOVALS SITE PLAN

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

KEY PLAN

KEY PLAN SCALE 1 : 300 000

LEGEND

- CONTROL MONUMENT
- N.S. ACT. CONTROL STN.
- CALCULATED COORDINATE
- IRON BAR
- IRON PIPE
- SURVEY MARKER
- CUT CROSS
- ROCK POST
- WOODEN POST
- PL,FD — PLACED, FOUND
- CD,A,R — CHORD, ARC, RADIUS
- CENTRELINE
- GUIDE POLE
- UTILITY POLE
- CATCH BASIN
- FIRE HYDRANT
- FLAG POLE
- FIBRE OPTIC MARKER
- GUIDE POST
- GAS TANK
- TELEPHONE JUNCTION BOX
- GUY WIRE
- MAIL BOX
- UTILITY MANHOLE
- SIGN
- DESIGN POINT
- DIRECTION OF FLOW
- SEWER MANHOLE
- WELL
- WOODEN GUARD POST
- WATER VALVE
- GAS METER
- GAS VALVE
- RAILROAD SWITCH BOX
- RAILROAD SIGNAL POLE
- SOFTWOOD TREE
- HARDWOOD TREE
- BUSH
- CULVERT
- BUILDING
- OHWM — ORDINARY HIGH WATER MARK
- TRAFFIC SIGNAL – NEW
- TRAFFIC SIGNAL – EXISTING
- TRAFFIC SIGNAL HIGHWAY LIGHT COMBINATION – NEW
- TRAFFIC SIGNAL HIGHWAY LIGHT COMBINATION – EXISTING
- HIGHWAY LIGHT – NEW
- HIGHWAY LIGHT – EXISTING
- JUNCTION BOX
- ELECTRICAL SERVICE POST
- TRAFFIC SIGNAL CONTROL PAD
- VEHICLE DETECTOR LOOP
- UNDERGROUND CONDUIT
- LAND DEALT WITH/ PROPOSED RIGHT OF WAY
- SURPLUS HIGHWAY RIGHT OF WAY
- HIGHWAY RIGHT OF WAY (EXISTING)
- PROPERTY LINE (EXISTING)
- ALIGNMENT CENTERLINE (PROPOSED)
- ROAD CENTERLINE (EXISTING)
- DIVISION BETWEEN LAND USE TYPES
- FENCE (EXISTING)
- RAILROAD (EXISTING)
- GUARDRAIL (EXISTING)
- GUARDRAIL (PROPOSED)
- TOP OF SLOPE (PROPOSED)
- TOE OF SLOPE (PROPOSED)
- O/H — OVERHEAD UTILITY SERVICE (EXISTING)
- MAJOR CONTOUR (EXISTING)
- MINOR CONTOUR (EXISTING)

U/S – UPSTREAM | D/S – DOWNSTREAM
RC – REVERSE CROWN | LC – LEVEL CROWN
NC – NORMAL CROWN | FS – FULL SUPERELEVATION
BC – BEGINNING OF CURVE | EC – END OF CURVE
EOP – EDGE OF PAVEMENT | ETL – EDGE OF TRAVEL LANE
ESH – EDGE OF SHOULDER | PRC – POINT OF REVERSE CURVATURE
PCC – POINT OF COMPOUND CURVATURE

TO BE REMOVED | NATIVE SOIL
ARMOUR ROCK (R1) | ARMOUR ROCK (R2)
ROCK FILL | COMMON FILL
TOPSOIL

NOTES:

1. THE TOPOGRAPHIC DATA IS FROM LIDAR REFERENCED TO CANADIAN GEODETIC VERTICAL DATUM OF 2013 (CGVD13). THE COORDINATE SYSTEM USED IS NOVA SCOTIA NAD83 (CSRS) (2010) MODIFIED TRANSVERSE MERCATOR ZONE 5.
2. CONTOUR INTERVAL IS 1 METRE.
3. BOREHOLE LOCATIONS PROVIDED BY GOLDER ASSOCIATES.
4. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
5. TYPICAL TIDAL RANGE ELEVATIONS ARE AS FOLLOWS: LOW TIDE: −3.0m TO −3.6m, HIGH TIDE: 4.8m TO 7.7m. TIDE LEVELS ARE DEPENDENT ON ASTRONOMIC CYCLES AND WEATHER SYSTEMS. THE CONTRACTOR IS URGED TO MONITOR TIDE LEVELS AND PREDICTIONS ON AN ONGOING BASIS THROUGHOUT THE DURATION OF CONSTRUCTION.
6. ALL RIGHT OF WAY LINES DISPLAYED ON THIS PLAN ARE REPRESENTATIVE ONLY.

CBCL

PROJECT: 171046

Designed by: C. FISHER
Surveyed by:
Drawn by: M. ZHOU
Checked by: R. GIFFIN
Approved by:

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW
A	OCT 11/19	ISSUED FOR REVIEW

NOVA SCOTIA Public Works

Scale: (H) 1:2000
Date: OCTOBER 2019
File No.: C001
Sheet No.: 01 of 31

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

HIGHWAY 101 HANTS COUNTY

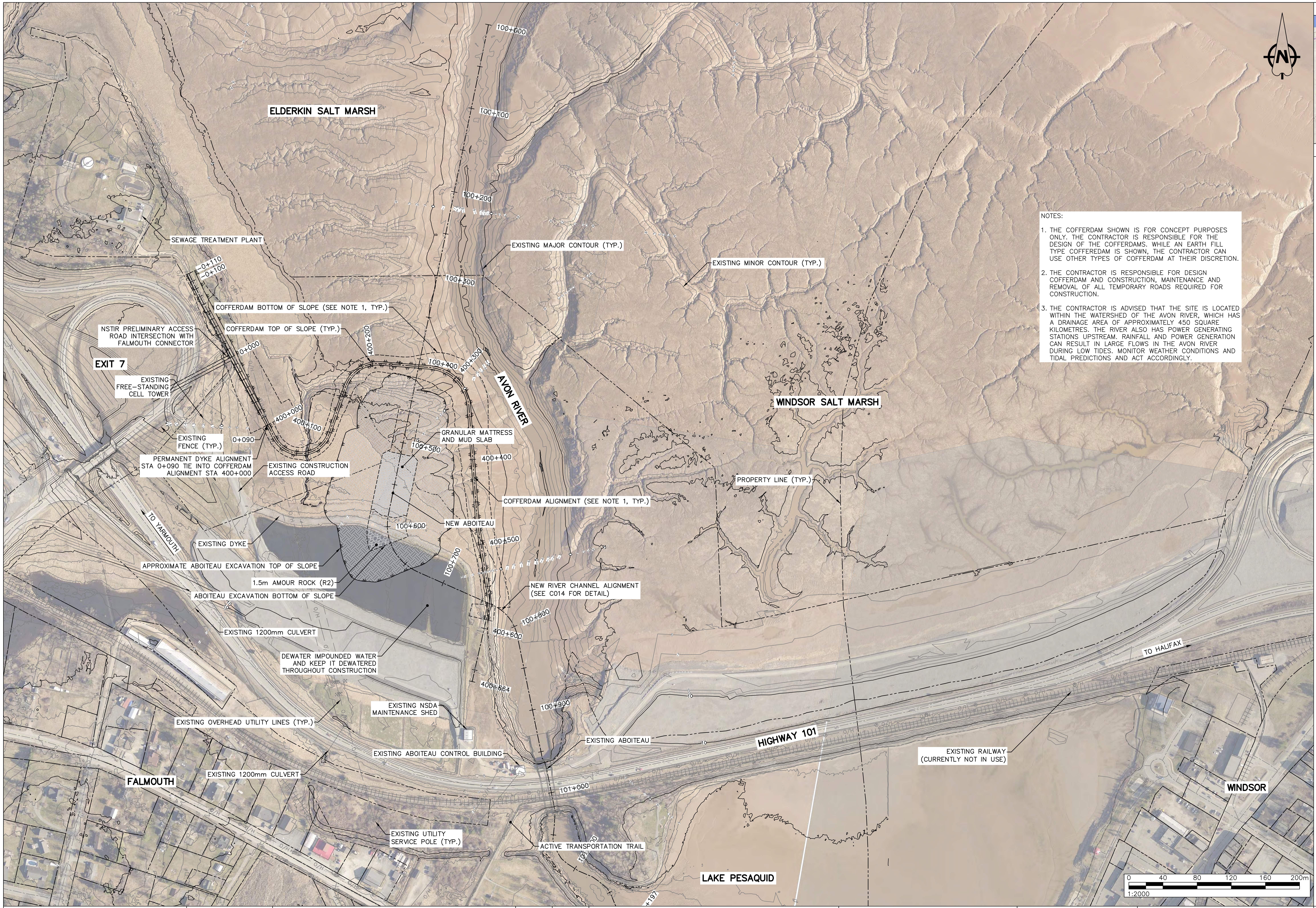
EXISTING CONDITIONS & REMOVALS SITE PLAN

DRAWING NAME: Y:\HALIFAX\DATA\PROJECTS\171046.00 AVON RIVER ABOITEAU\20 CAD\01 CIVIL\04 DRAWING SHEETS\171046.00 – C001 – EXISTING CONDITIONS & REMOVALS SITE PLAN.DWG LAYOUT NAME: C001 PLOT DATE: April 11, 2022 9:38:19 AM CAD OPERATOR: MZHOU

C002

TEMPORARY CONDITIONS SITE PLAN

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE



NOTES:

1. THE COFFERDAM SHOWN IS FOR CONCEPT PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF THE COFFERDAMS. WHILE AN EARTH FILL TYPE COFFERDAM IS SHOWN, THE CONTRACTOR CAN USE OTHER TYPES OF COFFERDAM AT THEIR DISCRETION.
2. THE CONTRACTOR IS RESPONSIBLE FOR DESIGN COFFERDAM AND CONSTRUCTION, MAINTENANCE AND REMOVAL OF ALL TEMPORARY ROADS REQUIRED FOR CONSTRUCTION.
3. THE CONTRACTOR IS ADVISED THAT THE SITE IS LOCATED WITHIN THE WATERSHED OF THE AVON RIVER, WHICH HAS A DRAINAGE AREA OF APPROXIMATELY 450 SQUARE KILOMETRES. THE RIVER ALSO HAS POWER GENERATING STATIONS UPSTREAM. RAINFALL AND POWER GENERATION CAN RESULT IN LARGE FLOWS IN THE AVON RIVER DURING LOW TIDES. MONITOR WEATHER CONDITIONS AND TIDAL PREDICTIONS AND ACT ACCORDINGLY.

KEY PLAN

KEY PLAN SCALE 1 : 300 000

LEGEND

CONTROL MONUMENT
N.S. ACT. CONTROL STN.
CALCULATED COORDINATE
IB IRON BAR
IP IRON PIPE
SM SURVEY MARKER
CUT CROSS
RP ROCK POST
WP WOODEN POST
PL,FD PLACED, FOUND
CD,A,R CHORD, ARC, RADIUS
CENTRELINE
GUIDE POLE
UTILITY POLE
CATCH BASIN
FIRE HYDRANT
FLAG POLE
FIBRE OPTIC MARKER
GUIDE POST
GAS TANK
TELEPHONE JUNCTION BOX
GUY WIRE
MAIL BOX
UTILITY MANHOLE
SIGN
DESIGN POINT
DIRECTION OF FLOW
SEWER MANHOLE
WELL
WOODEN GUARD POST
WV WATER VALVE
GM GAS METER
GV GAS VALVE
RAILROAD SWITCH BOX
RAILROAD SIGNAL POLE
SOFTWOOD TREE
HARDWOOD TREE
BUSH
CULVERT
BUILDING
OHWM ORDINARY HIGH WATER MARK
TS# TRAFFIC SIGNAL – NEW
TS# TRAFFIC SIGNAL – EXISTING
TRAFFIC SIGNAL HIGHWAY LIGHT COMBINATION – NEW
TRAFFIC SIGNAL HIGHWAY LIGHT COMBINATION – EXISTING
HIGHWAY LIGHT – NEW
HIGHWAY LIGHT – EXISTING
JB# JUNCTION BOX
ES ELECTRICAL SERVICE POST
CP TRAFFIC SIGNAL CONTROL PAD
VEHICLE DETECTOR LOOP
UNDERGROUND CONDUIT
LAND DEALT WITH/ PROPOSED RIGHT OF WAY
SURPLUS HIGHWAY RIGHT OF WAY
HIGHWAY RIGHT OF WAY (EXISTING)
PROPERTY LINE (EXISTING)
ALIGNMENT CENTERLINE (PROPOSED)
ROAD CENTERLINE (EXISTING)
DIVISION BETWEEN LAND USE TYPES
FENCE (EXISTING)
RAILROAD (EXISTING)
GUARDRAIL (EXISTING)
GUARDRAIL (PROPOSED)
TOP OF SLOPE (PROPOSED)
TOE OF SLOPE (PROPOSED)
O/H OVERHEAD UTILITY SERVICE (EXISTING)
0 MAJOR CONTOUR (EXISTING)
4 MINOR CONTOUR (EXISTING)

U/S – EXIT 6
D/S – DOWNSTREAM
RC – REVERSE CROWN
LC – LEVEL CROWN
NC – NORMAL CROWN
FS – FULL SUPERELEVATION
BC – BEGINNING OF CURVE
EC – END OF CURVE
EOP – EDGE OF PAVEMENT
ETL – EDGE OF TRAVEL LANE
ESH – EDGE OF SHOULDER
PRC – POINT OF REVERSE CURVATURE
PCC – POINT OF COMPOUND CURVATURE

TO BE REMOVED
NATIVE SOIL
ARMOUR ROCK (R1)
ARMOUR ROCK (R2)
ROCK FILL
COMMON FILL
TOPSOIL

CBCL

PROJECT: 171046

Designed by:	C. FISHER
Surveyed by:	
Drawn by:	M. ZHOU
Checked by:	R. GIFFIN
Approved by:	

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW
A	OCT 11/19	ISSUED FOR REVIEW

NOVA SCOTIA
Public Works

Scale: (H) 1:2000
Date: OCTOBER 2019
File No.: C002
Sheet No.: 02 of 31

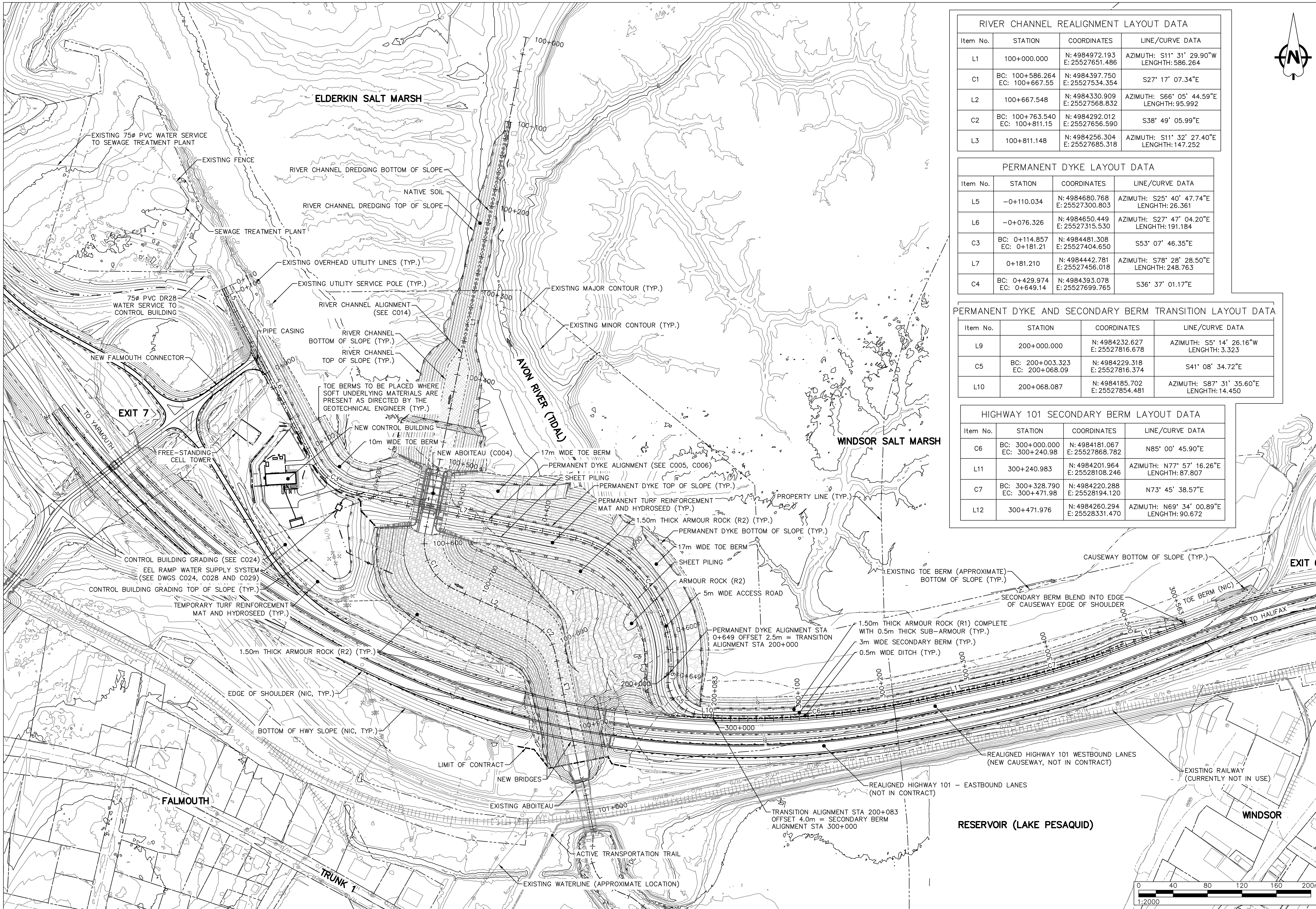
AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

HIGHWAY 101 HANTS COUNTY

TEMPORARY CONDITIONS SITE PLAN

DRAWING NAME: Y:\HALIFAX\DATA\PROJECTS\171046.00 AVON RIVER ABOITEAU\20 CAD\01 CIVIL\04 DRAWING SHEETS\171046.00 – C002 – TEMPORARY CONDITIONS SITE PLAN.DWG LAYOUT NAME: C002 PLOT DATE: April 11, 2022 9:43:33 AM CAD OPERATOR: MZHOU

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE — FINAL CONDITIONS SITE PLAN



RIVER CHANNEL REALIGNMENT LAYOUT DATA

Item No.	STATION	COORDINATES	LINE/CURVE DATA
L1	100+000.000	N: 4984972.193 E: 25527651.486	AZIMUTH: S11° 31' 29.90"W LENGHTH: 586.264
C1	BC: 100+586.264 EC: 100+667.55	N: 4984397.750 E: 25527534.354	S27° 17' 07.34"E
L2	100+667.548	N: 4984330.909 E: 25527568.832	AZIMUTH: S66° 05' 44.59"E LENGHTH: 95.992
C2	BC: 100+763.540 EC: 100+811.15	N: 4984292.012 E: 25527656.590	S38° 49' 05.99"E
L3	100+811.148	N: 4984256.304 E: 25527685.318	AZIMUTH: S11° 32' 27.40"E LENGHTH: 147.252

PERMANENT DYKE LAYOUT DATA

Item No.	STATION	COORDINATES	LINE/CURVE DATA
L5	−0+110.034	N: 4984680.768 E: 25527300.803	AZIMUTH: S25° 40' 47.74"E LENGHTH: 26.361
L6	−0+076.326	N: 4984650.449 E: 25527315.530	AZIMUTH: S27° 47' 04.20"E LENGHTH: 191.184
C3	BC: 0+114.857 EC: 0+181.21	N: 4984481.308 E: 25527404.650	S53° 07' 46.35"E
L7	0+181.210	N: 4984442.781 E: 25527456.018	AZIMUTH: S78° 28' 28.50"E LENGHTH: 248.763
C4	BC: 0+429.974 EC: 0+649.14	N: 4984393.078 E: 25527699.765	S36° 37' 01.17"E

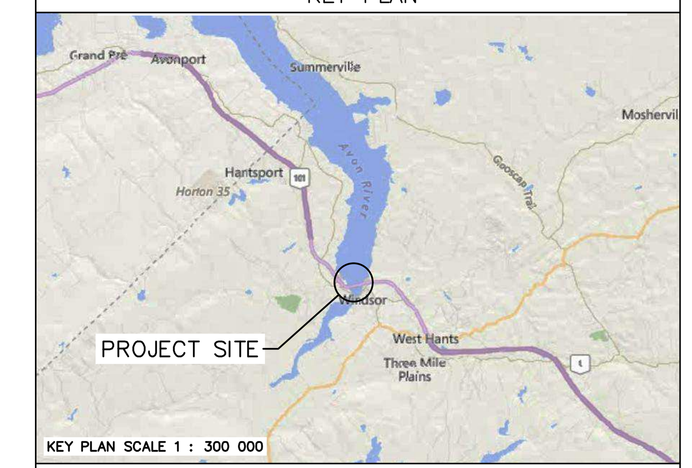
PERMANENT DYKE AND SECONDARY BERM TRANSITION LAYOUT DATA

Item No.	STATION	COORDINATES	LINE/CURVE DATA
L9	200+000.000	N: 4984232.627 E: 25527816.678	AZIMUTH: S5° 14' 26.16"W LENGHTH: 3.323
C5	BC: 200+003.323 EC: 200+068.09	N: 4984229.318 E: 25527816.374	S41° 08' 34.72"E
L10	200+068.087	N: 4984185.702 E: 25527854.481	AZIMUTH: S87° 31' 35.60"E LENGHTH: 14.450

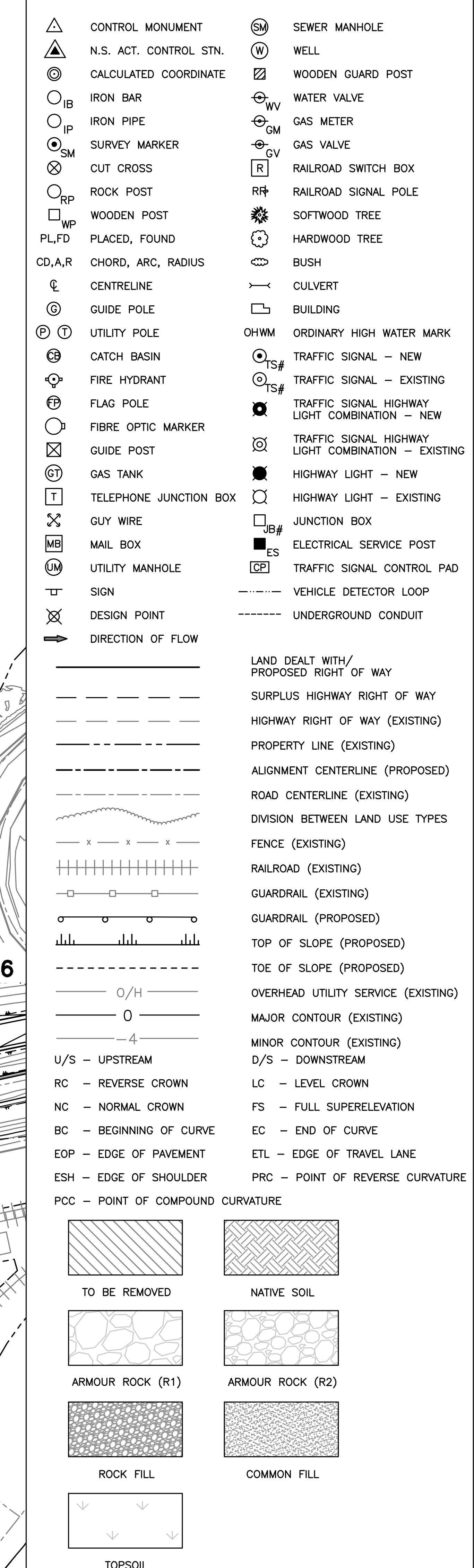
HIGHWAY 101 SECONDARY BERM LAYOUT DATA

Item No.	STATION	COORDINATES	LINE/CURVE DATA
C6	BC: 300+000.000 EC: 300+240.98	N: 4984181.067 E: 25527868.782	N85° 00' 45.90"E
L11	300+240.983	N: 4984201.964 E: 25528108.246	AZIMUTH: N77° 57' 16.26"E LENGHTH: 87.807
C7	BC: 300+328.790 EC: 300+471.98	N: 4984220.288 E: 25528194.120	N73° 45' 38.57"E
L12	300+471.976	N: 4984260.294 E: 25528331.470	AZIMUTH: N69° 34' 00.89"E LENGHTH: 90.672

KEY PLAN



LEGEND



CBCL

PROJECT: 171046

Designed by:	C. FISHER
Surveyed by:	
Drawn by:	M. ZHOU
Checked by:	R. GIFFIN
Approved by:	

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW
A	MAR 24/20	ISSUED FOR INFORMATION

NOVA SCOTIA Public Works

Scale: (H) 1:2000
Date: OCTOBER 2019
File No.: C003
Sheet No.: 03 of 31

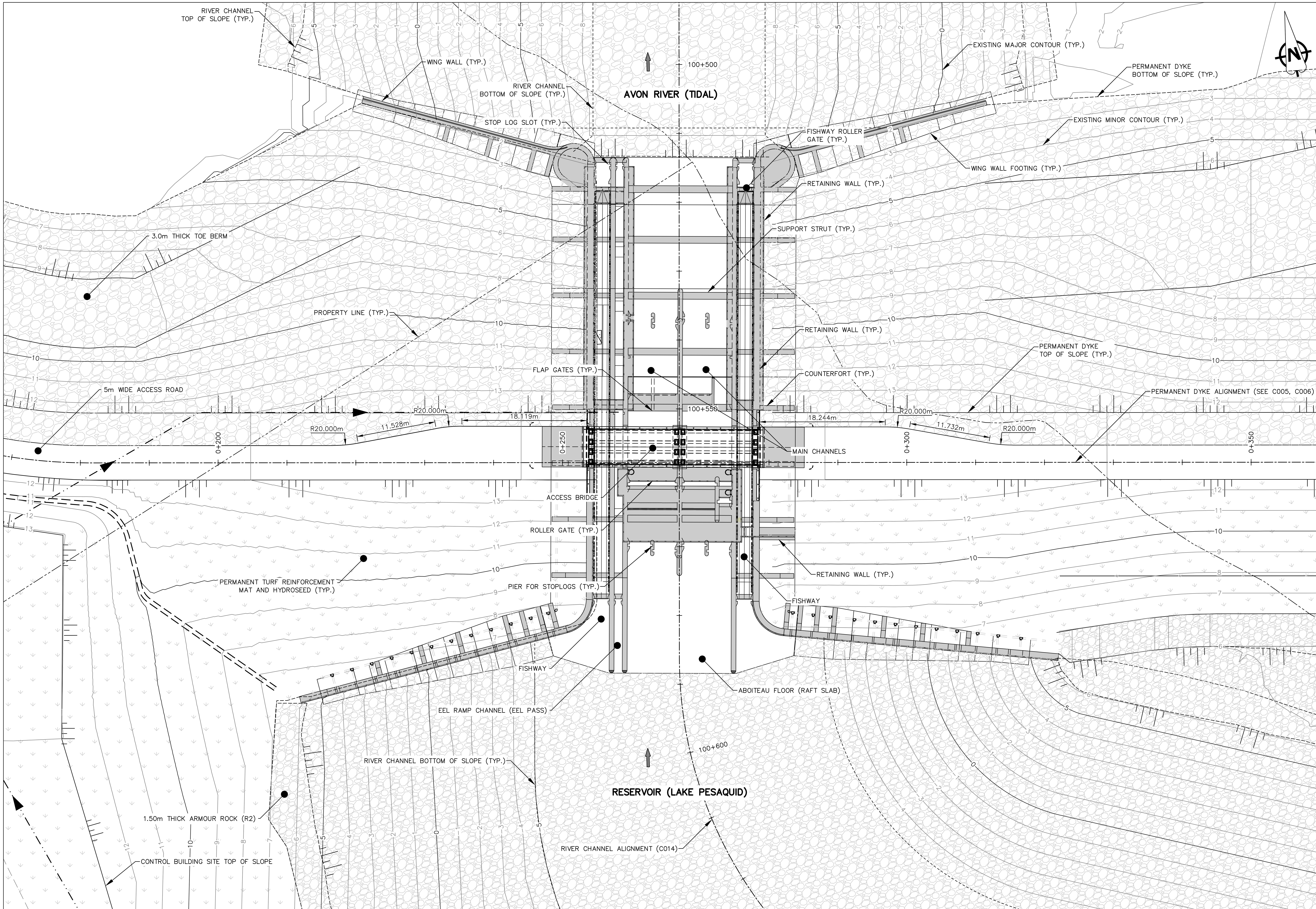
AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE
HIGHWAY 101 HANTS COUNTY

FINAL CONDITIONS SITE PLAN

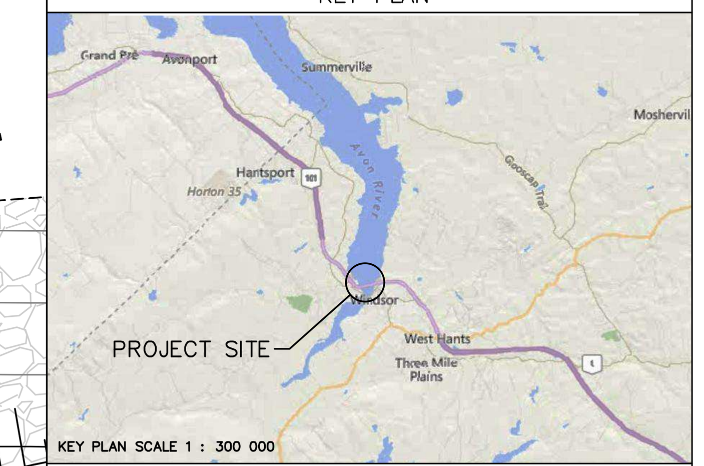
C004

ABOITEAU GENERAL ARRANGEMENT SITE PLAN

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE



KEY PLAN



LEGEND

- CONTROL MONUMENT
- N.S. ACT. CONTROL STN.
- CALCULATED COORDINATE
- IRON BAR
- IRON PIPE
- SURVEY MARKER
- CUT CROSS
- ROCK POST
- WOODEN POST
- PL,FD — PLACED, FOUND
- CD,A,R — CHORD, ARC, RADIUS
- CENTRELINE
- GUIDE POLE
- UTILITY POLE
- CATCH BASIN
- FIRE HYDRANT
- FLAG POLE
- FIBRE OPTIC MARKER
- GUIDE POST
- GAS TANK
- TELEPHONE JUNCTION BOX
- GUY WIRE
- MAIL BOX
- UTILITY MANHOLE
- SIGN
- DESIGN POINT
- DIRECTION OF FLOW
- SEWER MANHOLE
- WELL
- WOODEN GUARD POST
- WATER VALVE
- GAS METER
- GAS VALVE
- RAILROAD SWITCH BOX
- RAILROAD SIGNAL POLE
- SOFTWOOD TREE
- HARDWOOD TREE
- BUSH
- CULVERT
- BUILDING
- OHWM — ORDINARY HIGH WATER MARK
- TRAFFIC SIGNAL – NEW
- TRAFFIC SIGNAL – EXISTING
- TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – NEW
- TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – EXISTING
- HIGHWAY LIGHT – NEW
- HIGHWAY LIGHT – EXISTING
- JUNCTION BOX
- ELECTRICAL SERVICE POST
- TRAFFIC SIGNAL CONTROL PAD
- VEHICLE DETECTOR LOOP
- UNDERGROUND CONDUIT
- LAND DEALT WITH/ PROPOSED RIGHT OF WAY
- SURPLUS HIGHWAY RIGHT OF WAY
- HIGHWAY RIGHT OF WAY (EXISTING)
- PROPERTY LINE (EXISTING)
- ALIGNMENT CENTERLINE (PROPOSED)
- ROAD CENTERLINE (EXISTING)
- DIVISION BETWEEN LAND USE TYPES
- FENCE (EXISTING)
- RAILROAD (EXISTING)
- GUARDRAIL (EXISTING)
- GUARDRAIL (PROPOSED)
- TOP OF SLOPE (PROPOSED)
- TOE OF SLOPE (PROPOSED)
- O/H — OVERHEAD UTILITY SERVICE (EXISTING)
- 0 — MAJOR CONTOUR (EXISTING)
- 4 — MINOR CONTOUR (EXISTING)

U/S – UPSTREAM
D/S – DOWNSTREAM
RC – REVERSE CROWN
LC – LEVEL CROWN
NC – NORMAL CROWN
FS – FULL SUPERELEVATION
BC – BEGINNING OF CURVE
EC – END OF CURVE
EOP – EDGE OF PAVEMENT
ETL – EDGE OF TRAVEL LANE
ESH – EDGE OF SHOULDER
PRC – POINT OF REVERSE CURVATURE
PCC – POINT OF COMPOUND CURVATURE

- TO BE REMOVED
- NATIVE SOIL
- ARMOUR ROCK (R1)
- ARMOUR ROCK (R2)
- ROCK FILL
- COMMON FILL
- TOPSOIL

CBCL

PROJECT: 171046

Designed by:	C. FISHER
Surveyed by:	
Drawn by:	M. ZHOU
Checked by:	R. GIFFIN
Approved by:	

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW
A	OCT 24/20	ISSUED FOR REVIEW

NOVA SCOTIA
Public Works

Scale: (H) 1:500
Date: OCTOBER 2019
File No.: C004
Sheet No.: 04 of 31

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE
HIGHWAY 101 HANTS COUNTY

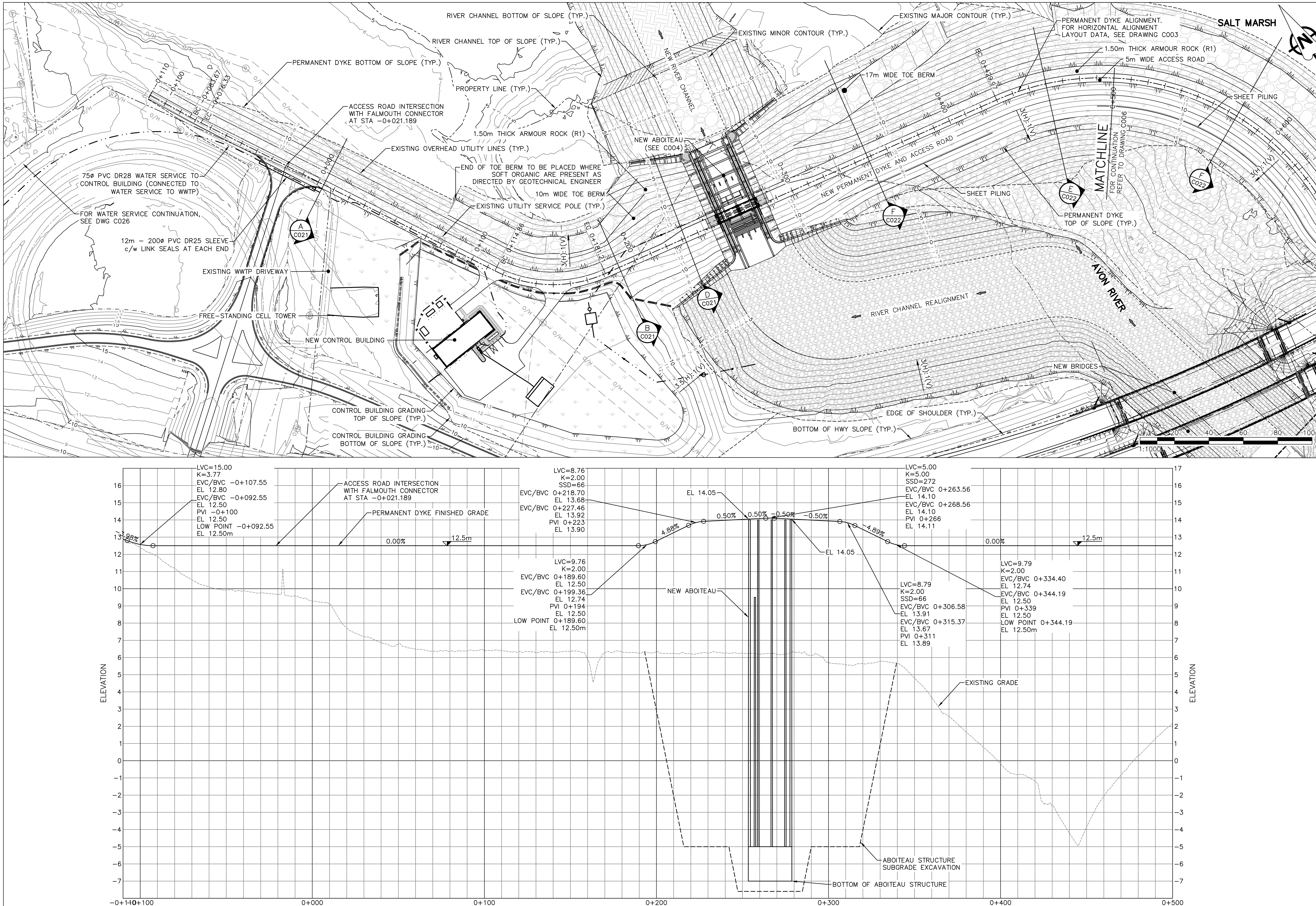
ABOITEAU GENERAL ARRANGEMENT SITE PLAN

DRAWING NAME: Y:\HALIFAX\DATA\PROJECTS\171046.00 AVON RIVER ABOITEAU\20 CAD\01 CIVIL\04 DRAWING SHEETS\171046.00 – C004 – ABOITEAU GENERAL ARRANGEMENT SITE PLAN.DWG LAYOUT NAME: C004 PLOT DATE: March 24, 2022 2:29:02 PM CAD OPERATOR: MZHOU

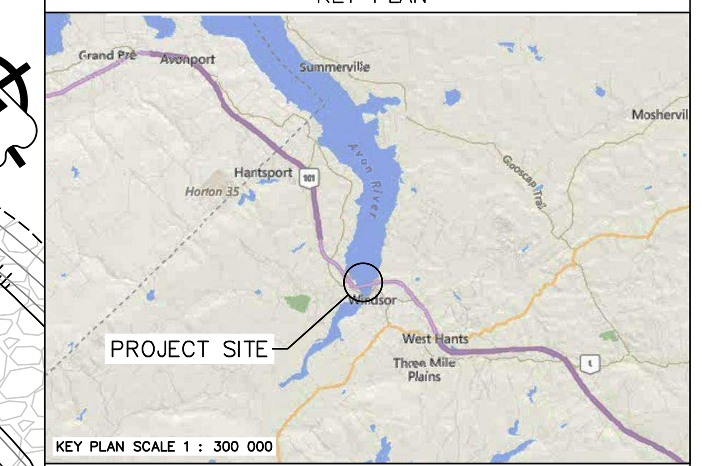
C005

PERMANENT DYKE PLAN AND PROFILE - SHEET 1

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE



KEY PLAN



LEGEND

CONTROL MONUMENT; N.S. ACT. CONTROL STN.; CALCULATED COORDINATE; IRON BAR; IRON PIPE; SURVEY MARKER; CUT CROSS; ROCK POST; WOODEN POST; PLACED, FOUND; CHORD, ARC, RADIUS; CENTRELINE; GUIDE POLE; UTILITY POLE; CATCH BASIN; FIRE HYDRANT; FLAG POLE; FIBRE OPTIC MARKER; GUIDE POST; GAS TANK; TELEPHONE JUNCTION BOX; GUY WIRE; MAIL BOX; UTILITY MANHOLE; SIGN; DESIGN POINT; DIRECTION OF FLOW

SEWER MANHOLE; WELL; WOODEN GUARD POST; WATER VALVE; GAS METER; GAS VALVE; RAILROAD SWITCH BOX; RAILROAD SIGNAL POLE; SOFTWOOD TREE; HARDWOOD TREE; BUSH; CULVERT; BUILDING; ORDINARY HIGH WATER MARK; TRAFFIC SIGNAL - NEW; TRAFFIC SIGNAL - EXISTING; TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION - NEW; TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION - EXISTING; HIGHWAY LIGHT - NEW; HIGHWAY LIGHT - EXISTING; JUNCTION BOX; ELECTRICAL SERVICE POST; TRAFFIC SIGNAL CONTROL PAD; VEHICLE DETECTOR LOOP; UNDERGROUND CONDUIT

LAND DEALT WITH/PROPOSED RIGHT OF WAY; SURPLUS HIGHWAY RIGHT OF WAY; HIGHWAY RIGHT OF WAY (EXISTING); PROPERTY LINE (EXISTING); ALIGNMENT CENTERLINE (PROPOSED); ROAD CENTERLINE (EXISTING); DIVISION BETWEEN LAND USE TYPES; FENCE (EXISTING); RAILROAD (EXISTING); GUARDRAIL (EXISTING); GUARDRAIL (PROPOSED); TOP OF SLOPE (PROPOSED); TOE OF SLOPE (PROPOSED); OVERHEAD UTILITY SERVICE (EXISTING); MAJOR CONTOUR (EXISTING); MINOR CONTOUR (EXISTING)

U/S - UPSTREAM; D/S - DOWNSTREAM; RC - REVERSE CROWN; LC - LEVEL CROWN; NC - NORMAL CROWN; FS - FULL SUPERELEVATION; BC - BEGINNING OF CURVE; EC - END OF CURVE; EOP - EDGE OF PAVEMENT; ETL - EDGE OF TRAVEL LANE; ESH - EDGE OF SHOULDER; PRC - POINT OF REVERSE CURVATURE; PCC - POINT OF COMPOUND CURVATURE

TO BE REMOVED; NATIVE SOIL; ARMOUR ROCK (R1); ARMOUR ROCK (R2); ROCK FILL; COMMON FILL; TOPSOIL

CBCL

PROJECT: 171046

Designed by:	C. FISHER
Surveyed by:	
Drawn by:	M. ZHOU
Checked by:	R. GIFFIN
Approved by:	

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW
A	OCT 11/19	ISSUED FOR REVIEW

NOVA SCOTIA Public Works

Scale: (H) 1:1000 (V) 1:100
Date: OCTOBER 2019
File No.: C005
Sheet No.: 05 of 31

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

HIGHWAY 101 HANTS COUNTY

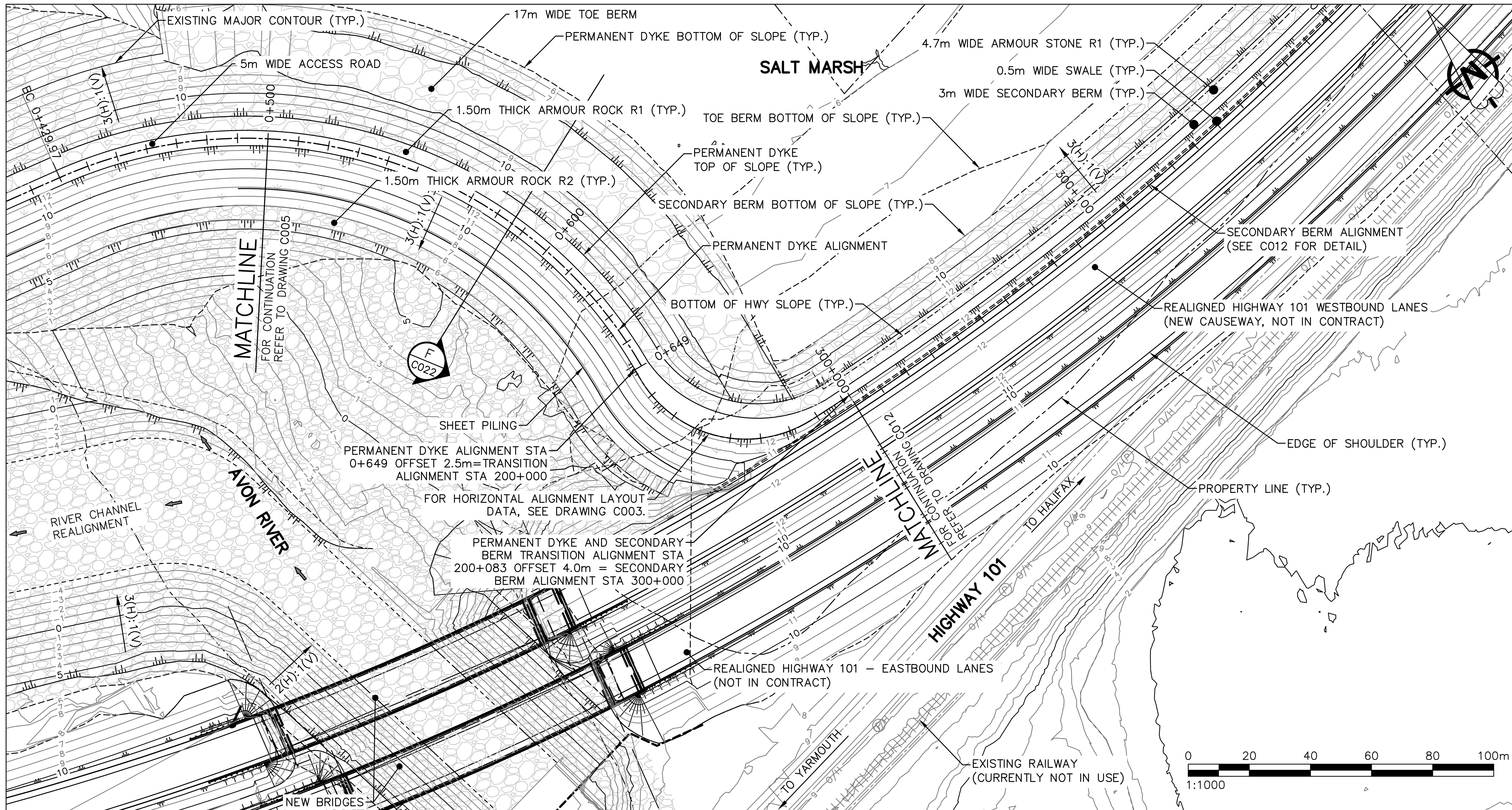
PERMANENT DYKE & ACCESS ROAD PLAN AND PROFILE STA -0+110 TO 0+500 - SHEET 1

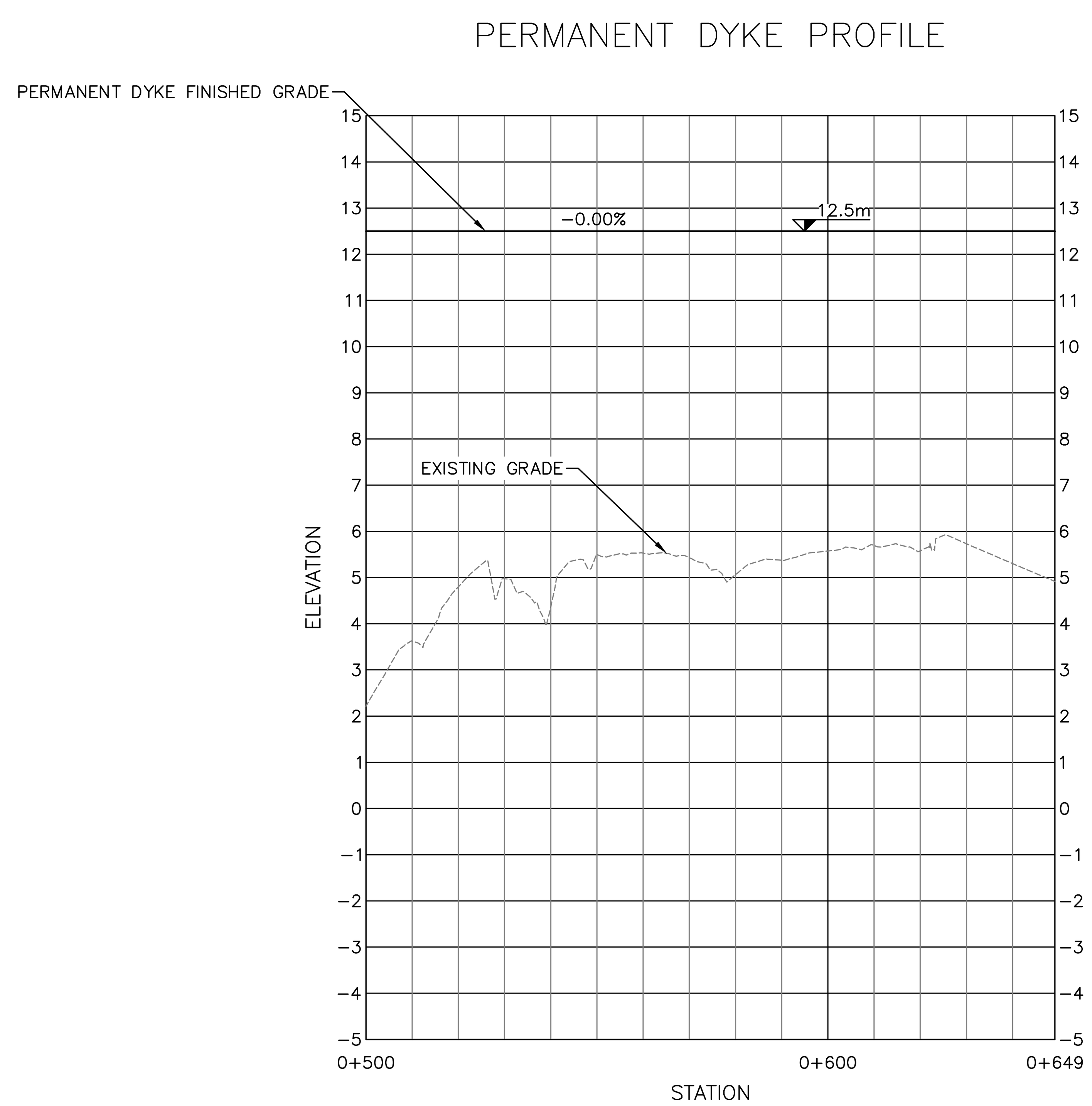
DRAWING NAME: Y:\HALIFAX\DATA\PROJECTS\171046.00 AVON RIVER ABOITEAU\20 CAD\01 CIVIL\04 DRAWING SHEETS\171046.00 - C005 - PERMANENT DYKE & ACCESS ROAD PLAN AND PROFILE.DWG LAYOUT NAME: C005 PLOT DATE: March 24, 2022 2:45:14 PM CAD OPERATOR: MZHOU

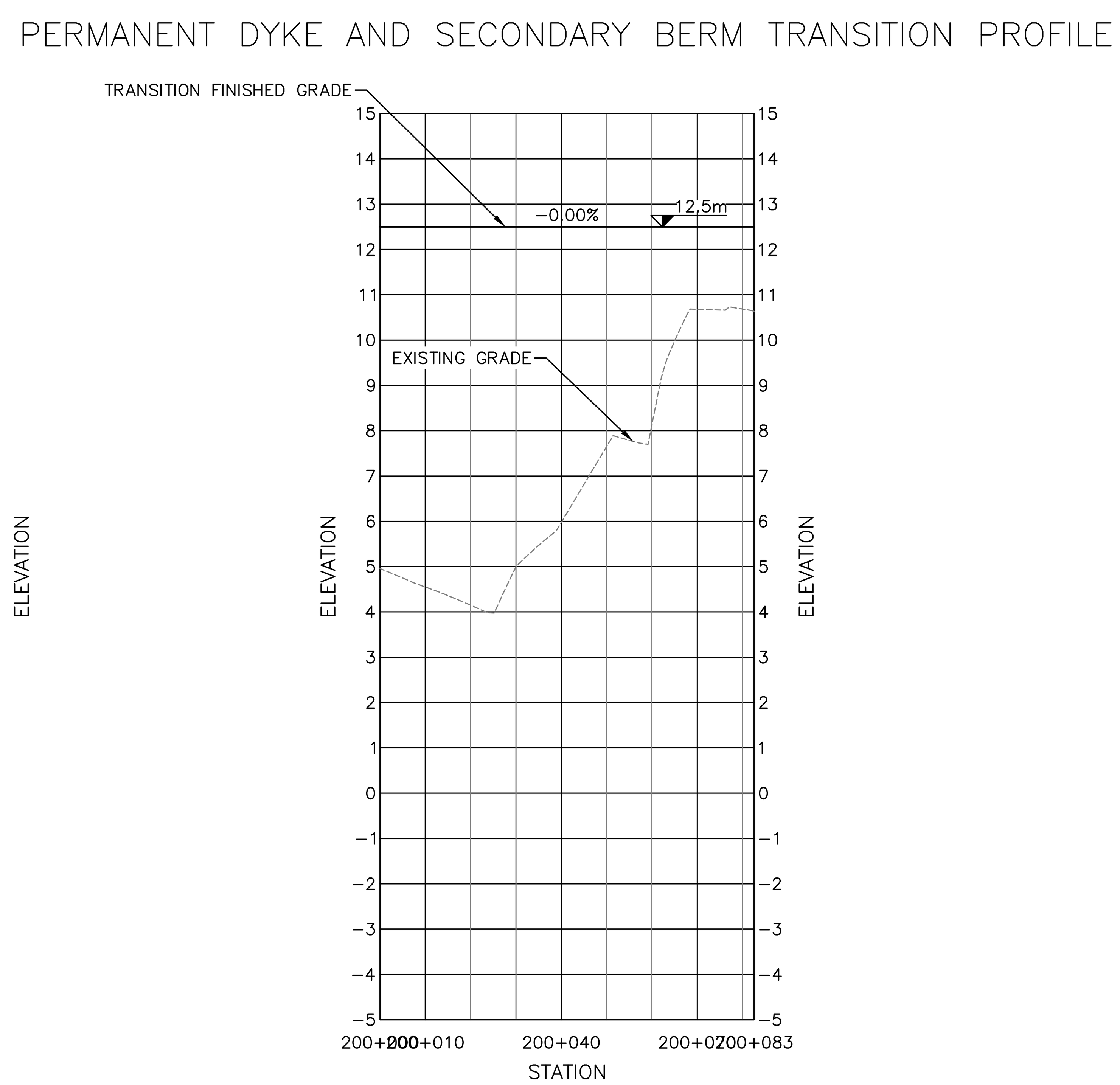
AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

PERMANENT DYKE PLAN AND PROFILE - SHEET 2

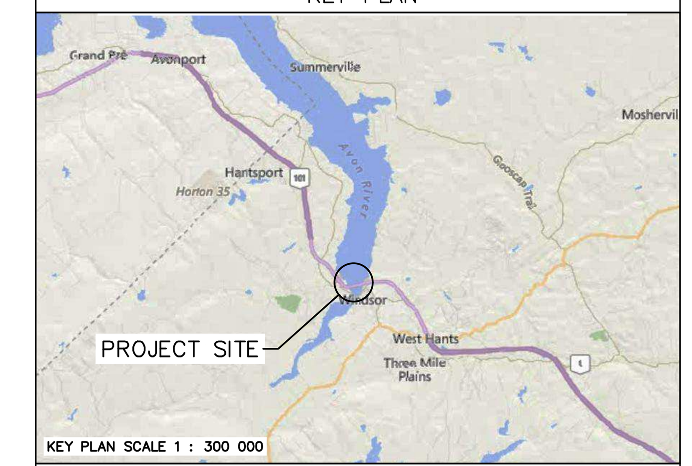
C006







KEY PLAN



LEGEND

- CONTROL MONUMENT
- N.S. ACT. CONTROL STN.
- CALCULATED COORDINATE
- IRON BAR
- IRON PIPE
- SURVEY MARKER
- CUT CROSS
- ROCK POST
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- DIVISION BETWEEN LAND USE TYPES
- FENCE (EXISTING)
- RAILROAD (EXISTING)
- GUARDRAIL (EXISTING)
- GUARDRAIL (PROPOSED)
- TOP OF SLOPE (PROPOSED)
- TOE OF SLOPE (PROPOSED)
- OVERHEAD UTILITY SERVICE (EXISTING)
- MAJOR CONTOUR (EXISTING)
- MINOR CONTOUR (EXISTING)

U/S – UPSTREAM
D/S – DOWNSTREAM
RC – REVERSE CROWN
LC – LEVEL CROWN
NC – NORMAL CROWN
FS – FULL SUPERELEVATION
BC – BEGINNING OF CURVE
EC – END OF CURVE
EOP – EDGE OF PAVEMENT
ETL – EDGE OF TRAVEL LANE
ESH – EDGE OF SHOULDER
PRC – POINT OF REVERSE CURVATURE
PCC – POINT OF COMPOUND CURVATURE

TO BE REMOVED
NATIVE SOIL
ARMOUR ROCK (R1)
ARMOUR ROCK (R2)
ROCK FILL
COMMON FILL
TOPSOIL

CBCL

PROJECT: 171046

Designed by:	C. FISHER
Surveyed by:	
Drawn by:	M. ZHOU
Checked by:	R. GIFFIN
Approved by:	

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
C	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW
A	OCT 11/19	ISSUED FOR REVIEW

NOVA SCOTIA Public Works

Scale: (H) 1:1000 (V) 1:100

Date: OCTOBER 2019

File No. : C006

Sheet No. : 06 of 31

AVON RIVER ABOITEAU & CAUSEWAY UPGRADE UPGRADE

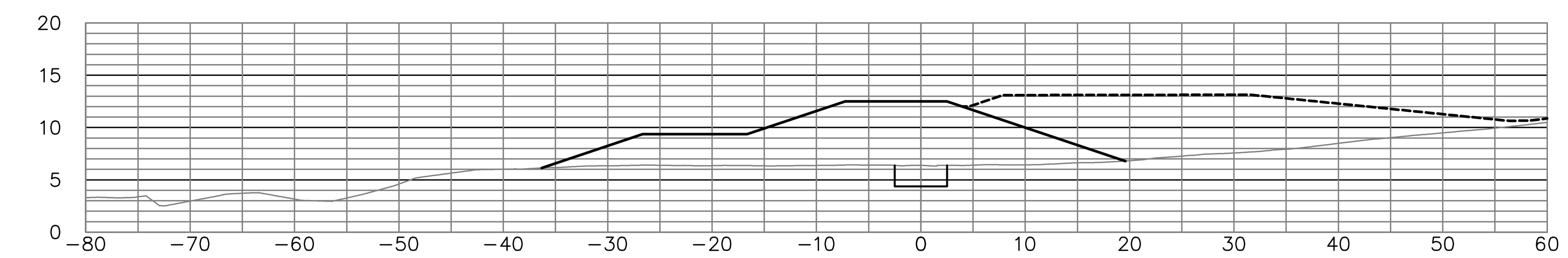
HIGHWAY 101 HANTS COUNTY

PERMANENT DYKE & ACCESS ROAD PLAN AND PROFILE - SHEET 2 STA 0+500 TO 0+649

DRAWING NAME: Y:\HALIFAX\DATA\PROJECTS\171046.00 AVON RIVER ABOITEAU\20 CAD\01 CIVIL\04 DRAWING SHEETS\171046.00 – C006 – PERMANENT DYKE & ACCESS ROAD PLAN AND PROFILE.DWG LAYOUT NAME: C006 PLOT DATE: March 24, 2022 3:22:22 PM CAD OPERATOR: MZHOU

PERMANENT DYKE CROSS SECTIONS - SHEET 1

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE



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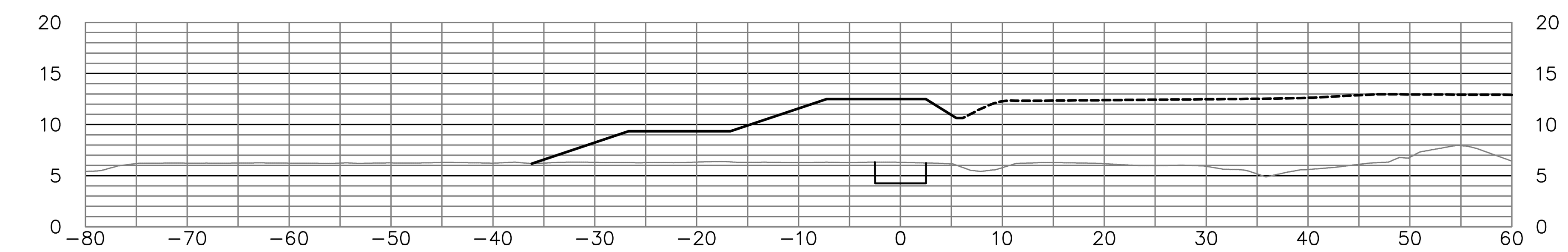

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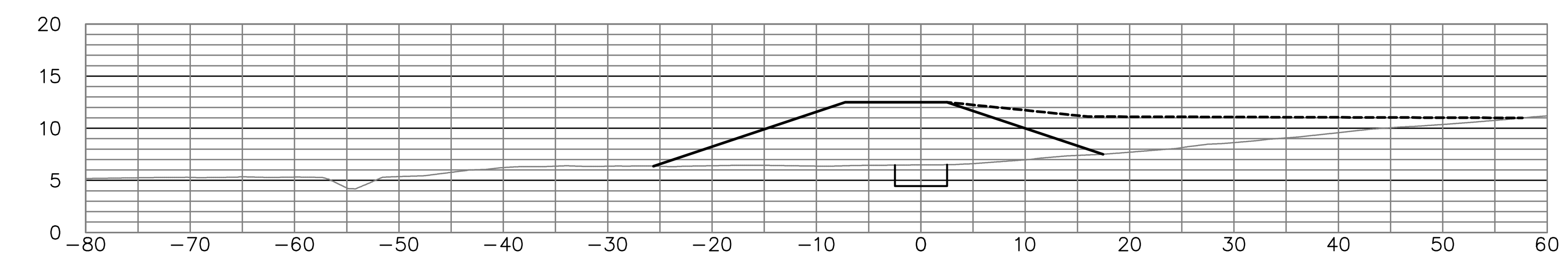

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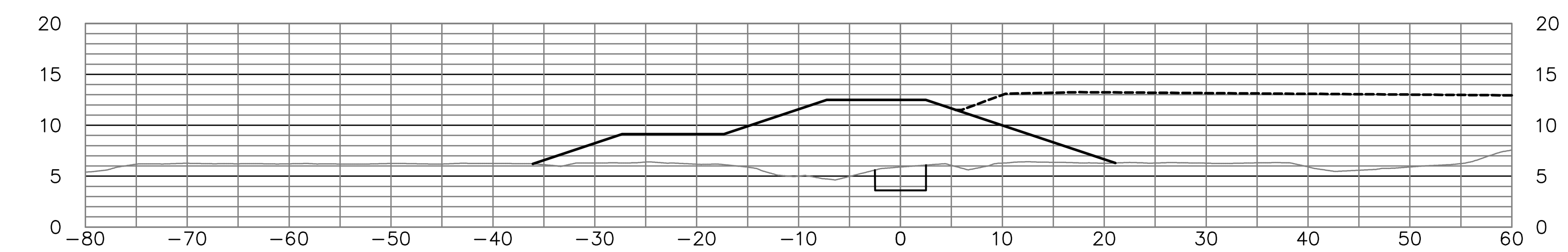

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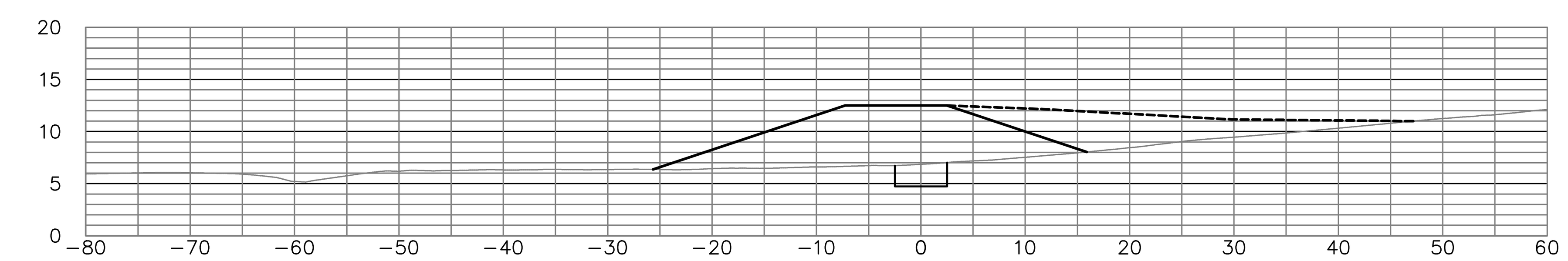

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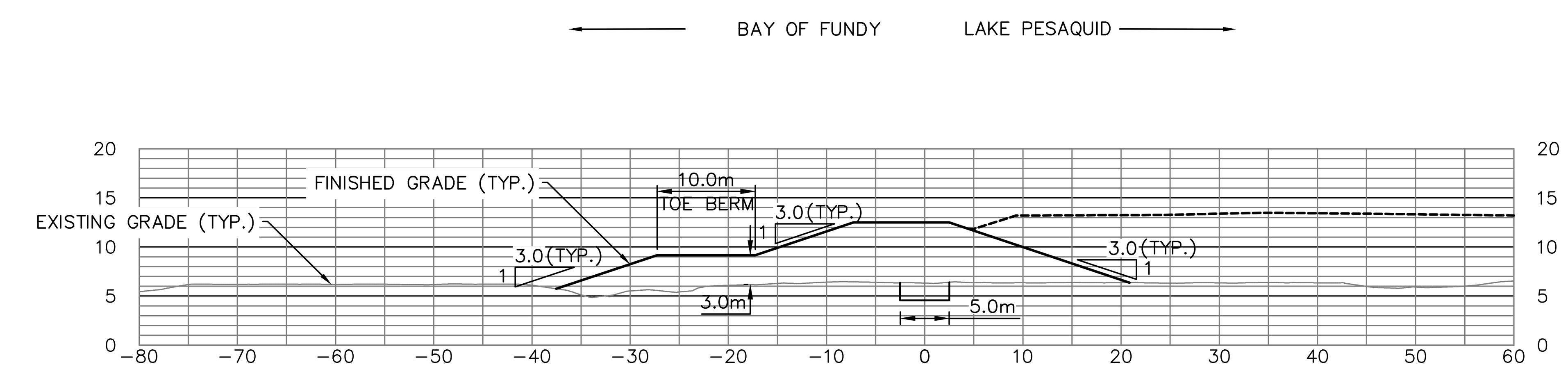
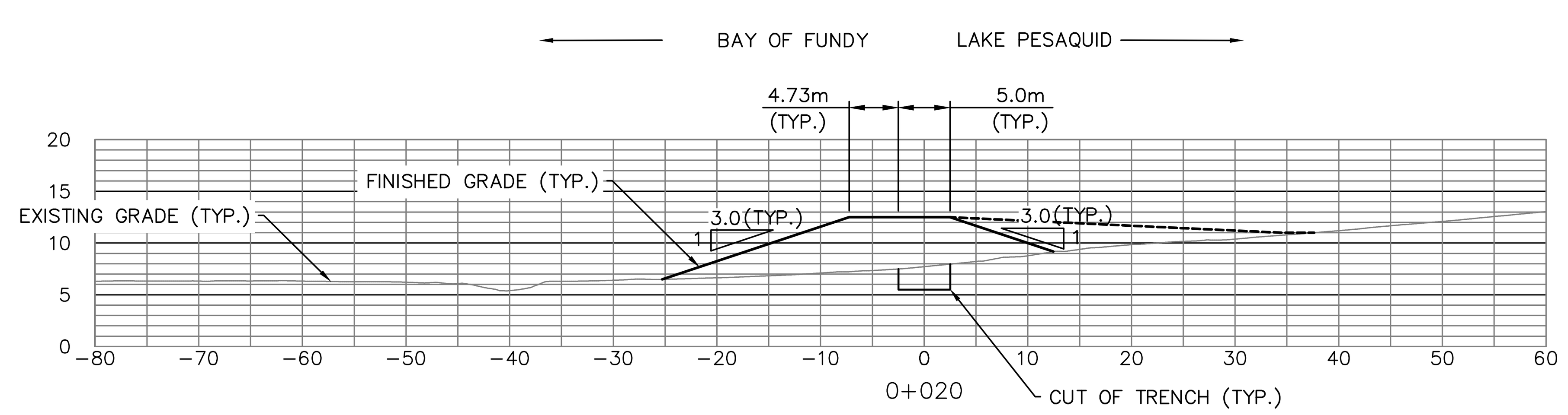


0+140

NOTES:

1. FOR CROSS SECTION DETAILS, SEE TYPICAL SECTIONS DRAWING NO. C021 AND C022.



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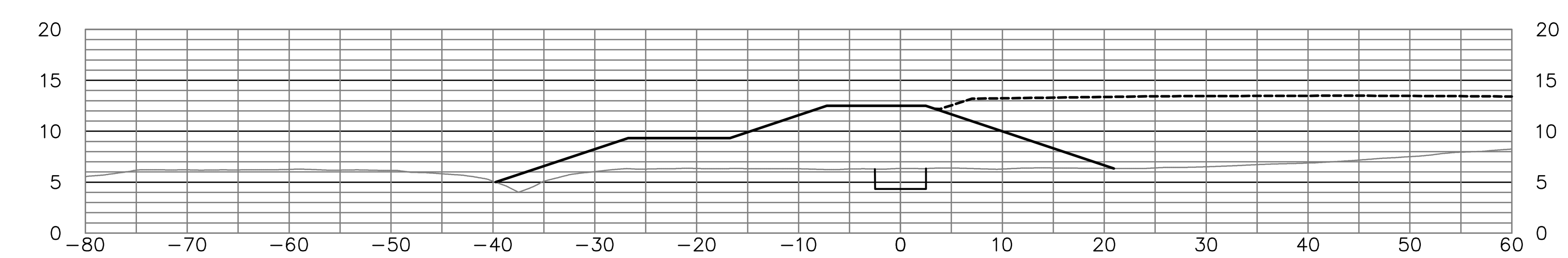

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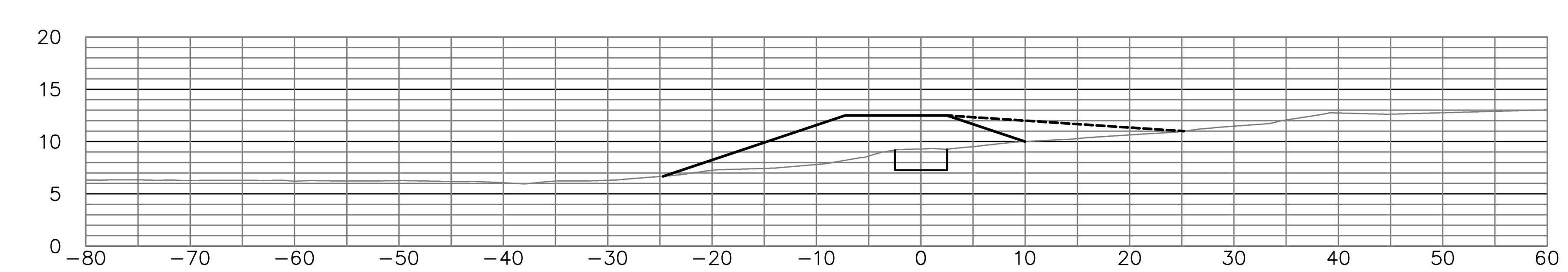
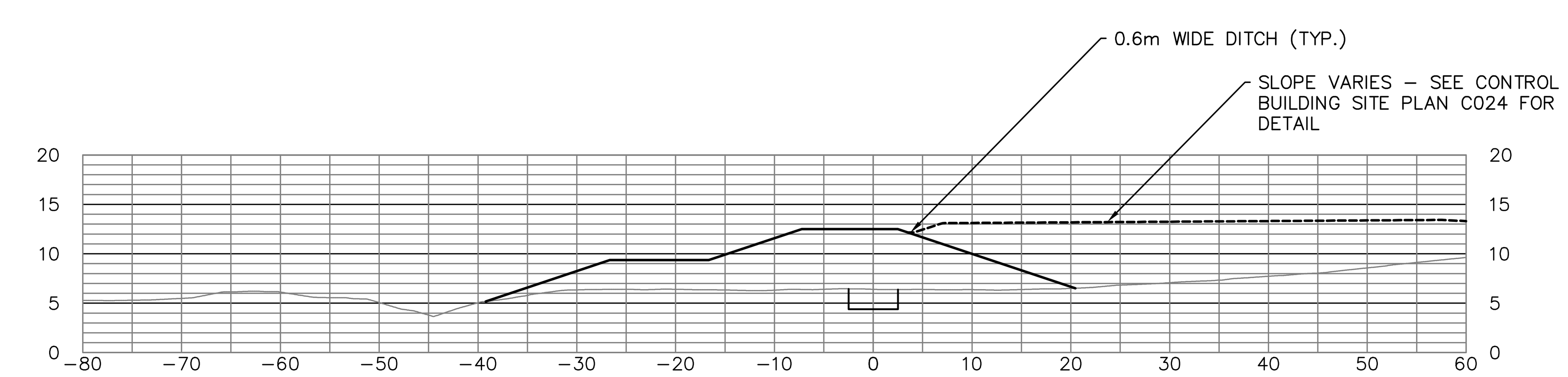
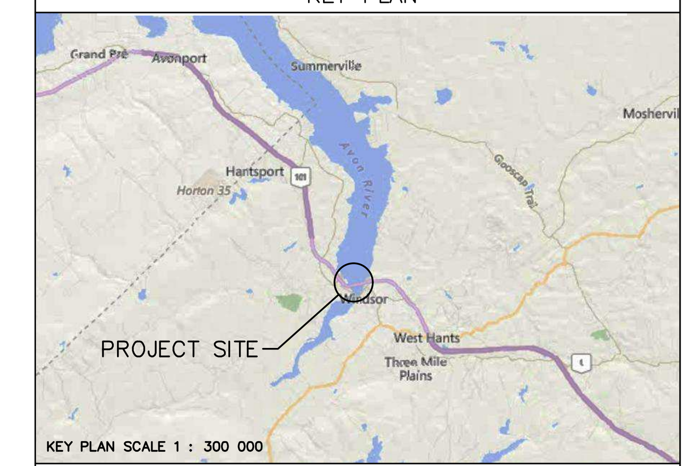


0+000



0+100

KEY PLAN



LEGEND

- CONTROL MONUMENT
- N.S. ACT. CONTROL STN.
- CALCULATED COORDINATE
- IRON BAR
- IRON PIPE
- SURVEY MARKER
- CUT CROSS
- ROCK POST
- WOODEN POST
- PL,FD — PLACED, FOUND
- CD,A,R — CHORD, ARC, RADIUS
- CENTRELINE
- GUIDE POLE
- UTILITY POLE
- CATCH BASIN
- FIRE HYDRANT
- FLAG POLE
- FIBRE OPTIC MARKER
- GUIDE POST
- GAS TANK
- TELEPHONE JUNCTION BOX
- GUY WIRE
- MAIL BOX
- UTILITY MANHOLE
- SIGN
- DESIGN POINT
- DIRECTION OF FLOW
- SEWER MANHOLE
- WELL
- WOODEN GUARD POST
- WATER VALVE
- GAS METER
- GAS VALVE
- RAILROAD SWITCH BOX
- RAILROAD SIGNAL POLE
- SOFTWOOD TREE
- HARDWOOD TREE
- BUSH
- CULVERT
- BUILDING
- OHWM — ORDINARY HIGH WATER MARK
- TRAFFIC SIGNAL – NEW
- TRAFFIC SIGNAL – EXISTING
- TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – NEW
- TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – EXISTING
- HIGHWAY LIGHT – NEW
- HIGHWAY LIGHT – EXISTING
- JUNCTION BOX
- ELECTRICAL SERVICE POST
- TRAFFIC SIGNAL CONTROL PAD
- VEHICLE DETECTOR LOOP
- UNDERGROUND CONDUIT
- EXISTING GRADE
- FINISHED GRADE
- SUBGRADE
- EXCAVATION

U/S – UPSTREAM
D/S – DOWNSTREAM
RC – REVERSE CROWN
LC – LEVEL CROWN
NC – NORMAL CROWN
FS – FULL SUPERELEVATION
BC – BEGINNING OF CURVE
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EOP – EDGE OF PAVEMENT
ETL – EDGE OF TRAVEL LANE
ESH – EDGE OF SHOULDER
PRC – POINT OF REVERSE CURVATURE
PCC – POINT OF COMPOUND CURVATURE

0 10.0 20.0 30.0 40.0 50.0m
1:500

PROJECT: 171046

Designed by: C. FISHER		
Surveyed by:		
Drawn by: M. ZHOU		
Checked by: R. GIFFIN		
Approved by:		

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW

NOVA SCOTIA Public Works

Scale: (H) 1:500 (V) 1:500
Date: OCTOBER 2019
File No. : C007
Sheet No. : 07 of 31

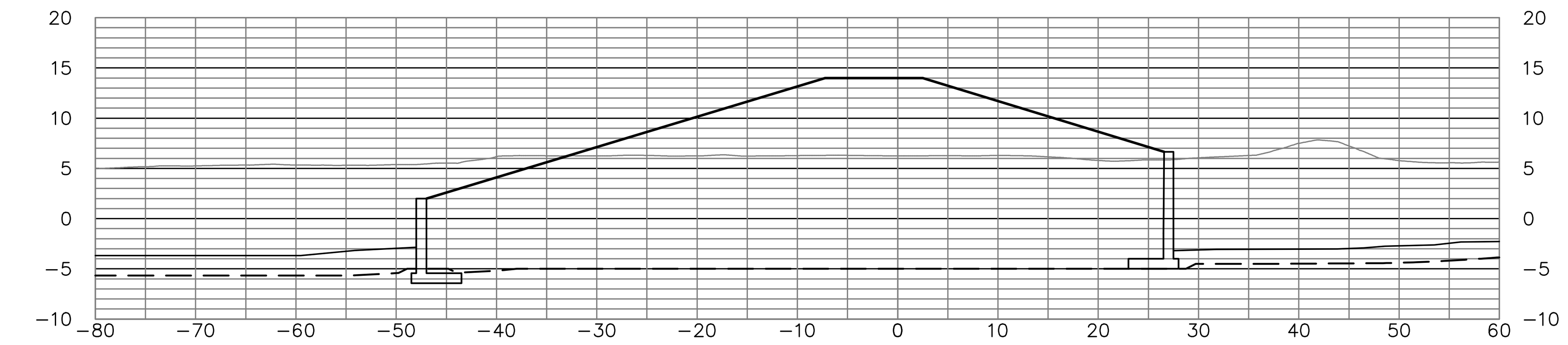
AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

HIGHWAY 101 HANTS COUNTY

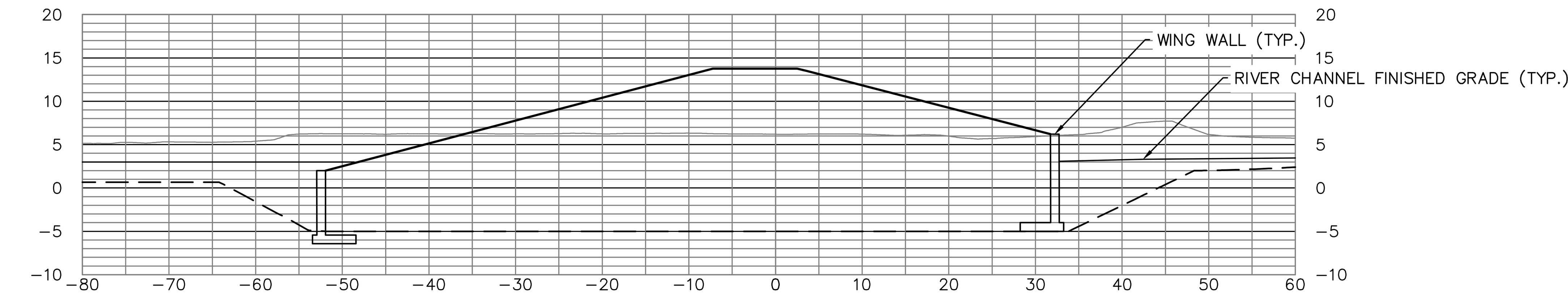
PERMANENT DYKE & ACCESS ROAD CROSS SECTIONS STA 0+000 TO 0+180 - SHEET 1

PERMANENT DYKE TYPICAL CROSS SECTIONS - SHEET 2

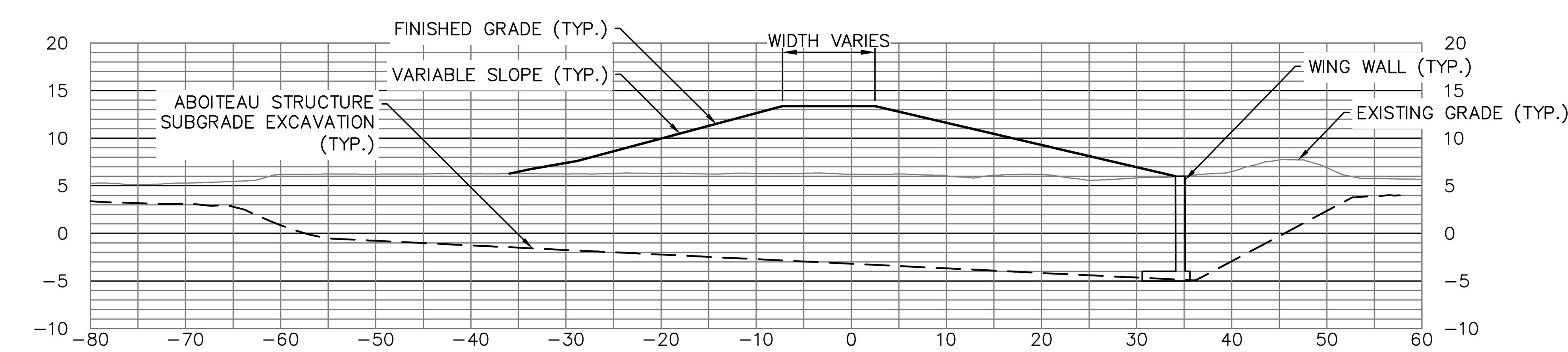
AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE



0+240

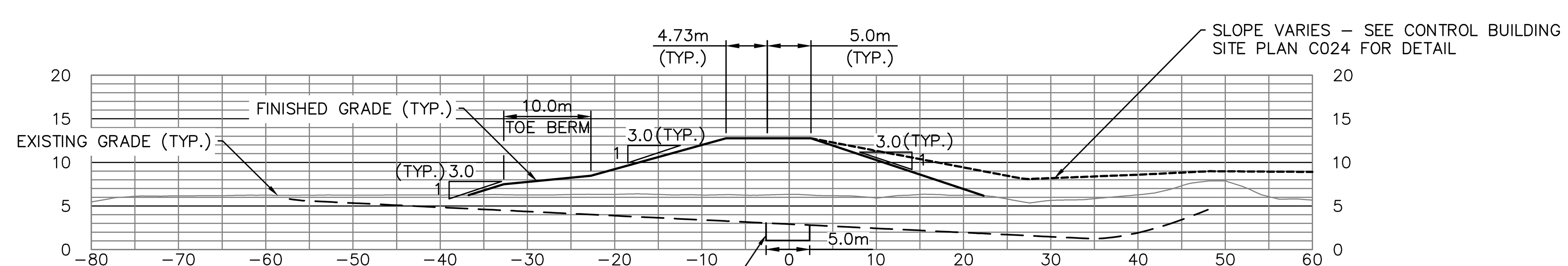


0+221



0+212

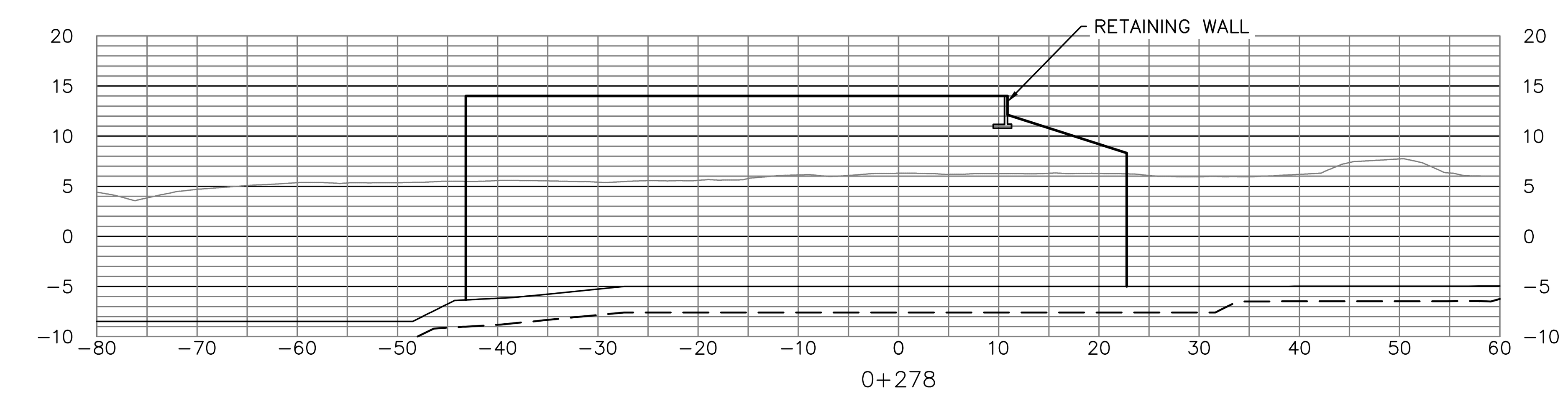
← BAY OF FUNDY LAKE PESAQUID →



0+200

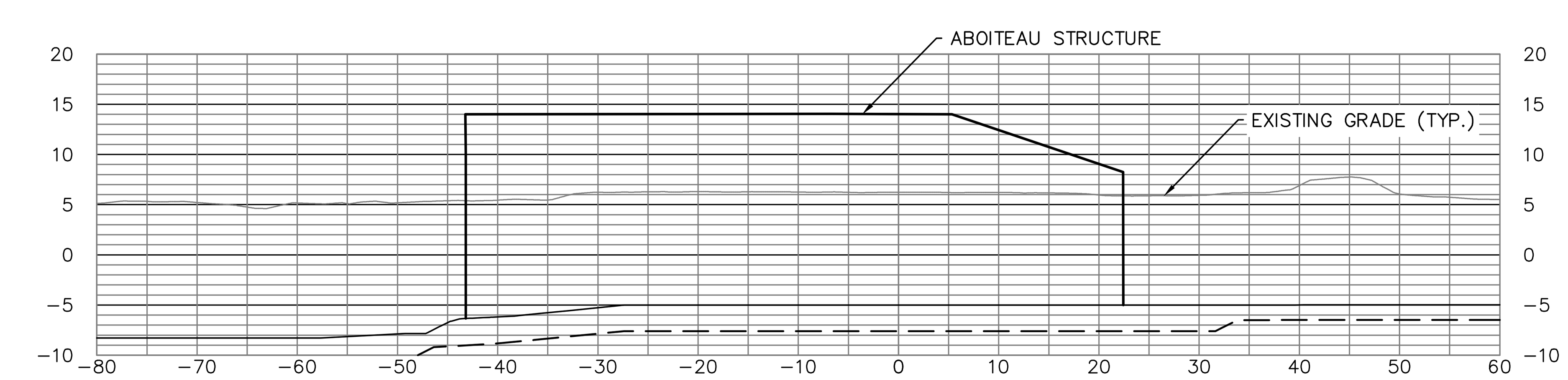
NOTES:

1. FOR CROSS SECTION DETAILS, SEE TYPICAL SECTIONS DRAWING NO. C021 AND C022.



0+278

← BAY OF FUNDY LAKE PESAQUID →



0+254

KEY PLAN

LEGEND

CONTROL MONUMENT
N.S. ACT. CONTROL STN.
CALCULATED COORDINATE
IRON BAR
IRON PIPE
SURVEY MARKER
CUT CROSS
ROCK POST
WOODEN POST
PL,FD PLACED, FOUND
CD,A,R CHORD, ARC, RADIUS
CENTRELINE
GUIDE POLE
UTILITY POLE
CATCH BASIN
FIRE HYDRANT
FLAG POLE
FIBRE OPTIC MARKER
GUIDE POST
GAS TANK
TELEPHONE JUNCTION BOX
GUY WIRE
MAIL BOX
UTILITY MANHOLE
SIGN
DESIGN POINT
DIRECTION OF FLOW
SEWER MANHOLE
WELL
WOODEN GUARD POST
WATER VALVE
GAS METER
GAS VALVE
RAILROAD SWITCH BOX
RAILROAD SIGNAL POLE
SOFTWOOD TREE
HARDWOOD TREE
BUSH
CULVERT
BUILDING
OHWM ORDINARY HIGH WATER MARK
TRAFFIC SIGNAL – NEW
TRAFFIC SIGNAL – EXISTING
TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – NEW
TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – EXISTING
HIGHWAY LIGHT – NEW
HIGHWAY LIGHT – EXISTING
JUNCTION BOX
ELECTRICAL SERVICE POST
TRAFFIC SIGNAL CONTROL PAD
VEHICLE DETECTOR LOOP
UNDERGROUND CONDUIT

EXISTING GRADE
FINISHED GRADE
SUBGRADE
EXCAVATION

U/S – UPSTREAM
RC – REVERSE CROWN
NC – NORMAL CROWN
BC – BEGINNING OF CURVE
EOP – EDGE OF PAVEMENT
ESH – EDGE OF SHOULDER
PCC – POINT OF COMPOUND CURVATURE
D/S – DOWNSTREAM
LC – LEVEL CROWN
FS – FULL SUPERELEVATION
EC – END OF CURVE
ETL – EDGE OF TRAVEL LANE
PRC – POINT OF REVERSE CURVATURE

0 10.0 20.0 30.0 40.0 50.0m
1:500

CBCL

PROJECT: 171046

Designed by:	C. FISHER
Surveyed by:	
Drawn by:	M. ZHOU
Checked by:	R. GIFFIN
Approved by:	

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW

NOVA SCOTIA Public Works

Scale: (H) 1:500 (V) 1:500
Date: OCTOBER 2019
File No. : C008
Sheet No. : 08 of 31

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

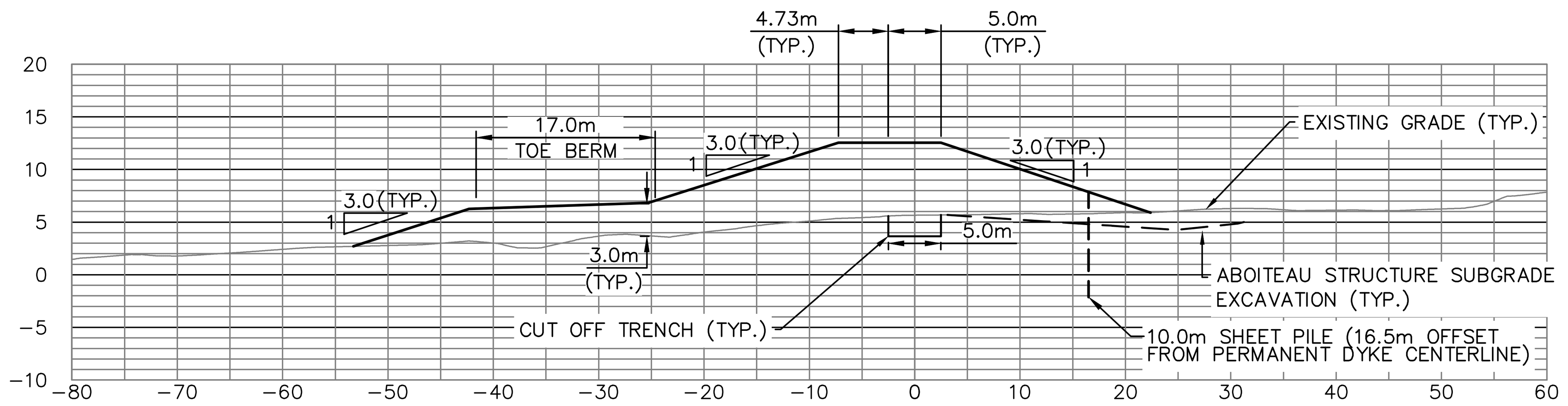
HIGHWAY 101 HANTS COUNTY

PERMANENT DYKE & ACCESS ROAD CROSS SECTIONS STA 0+200 TO 0+280 - SHEET 2

C009

PERMANENT DYKE TYPICAL CROSS SECTIONS - SHEET 3

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE



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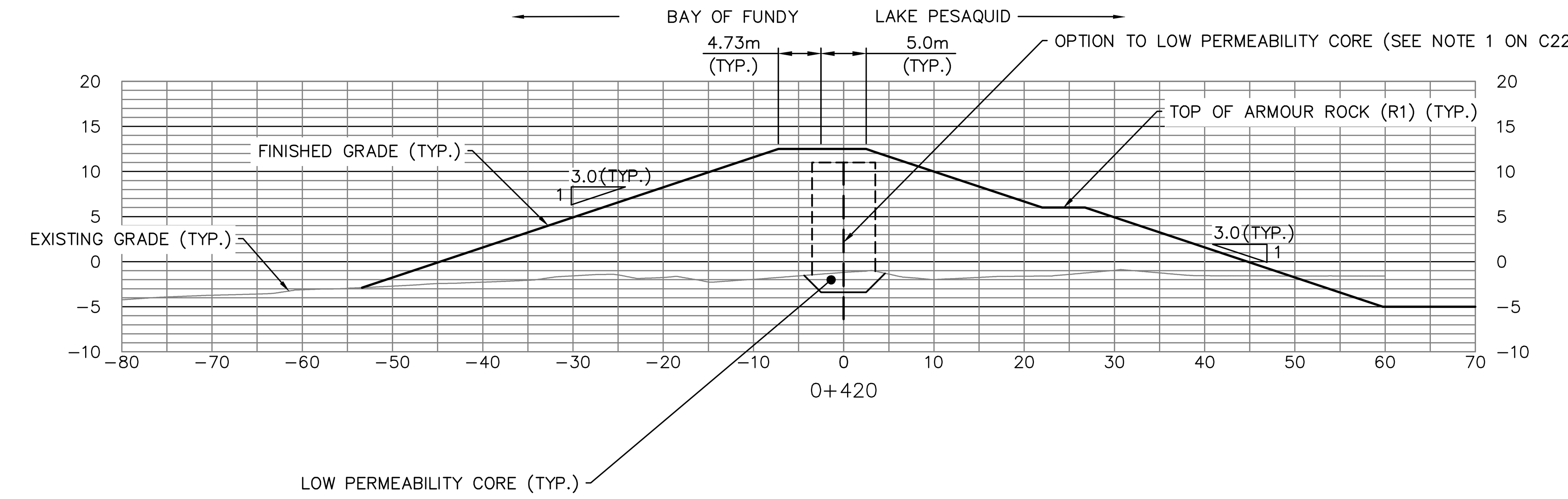

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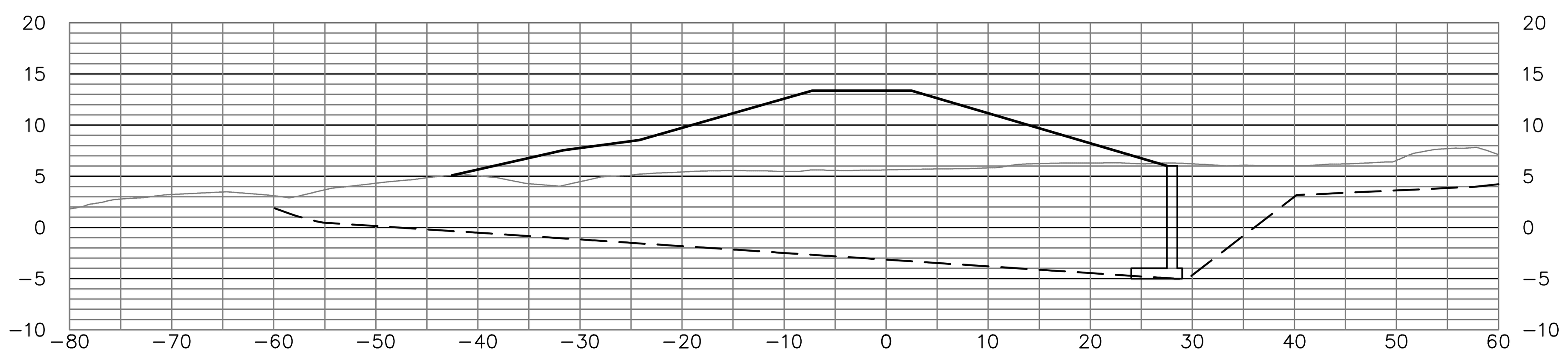

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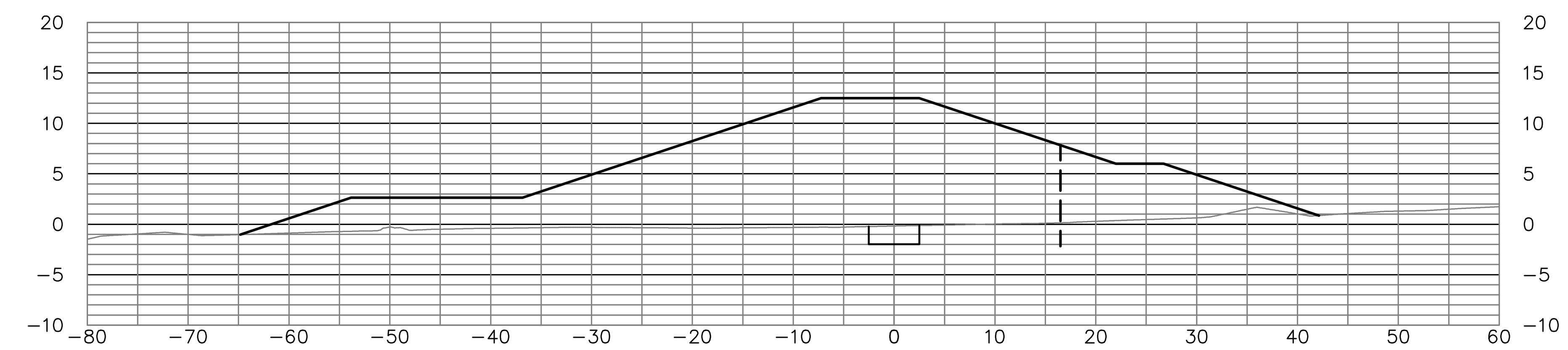
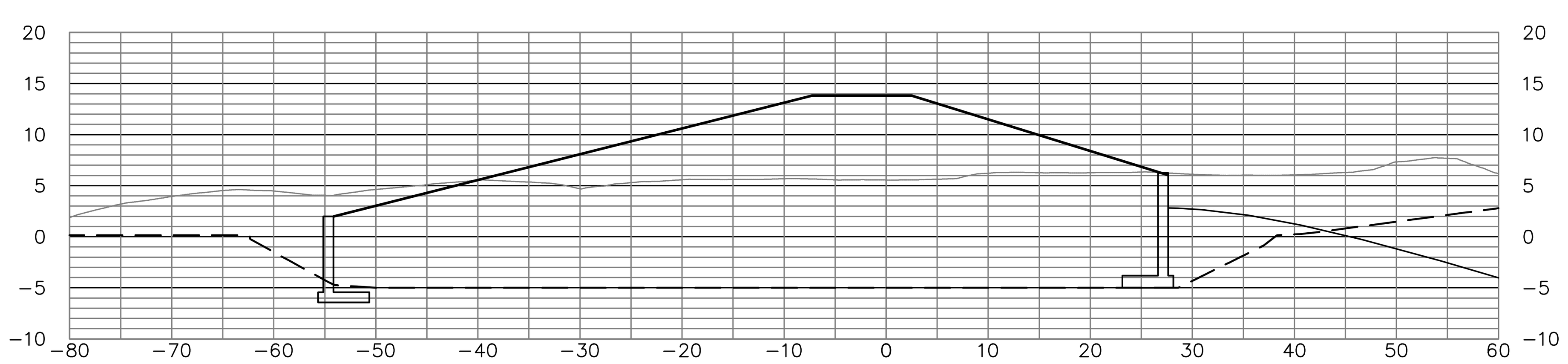


0+400

NOTES:

1. FOR CROSS SECTION DETAILS, SEE TYPICAL SECTIONS DRAWING NO. C021 AND C022.



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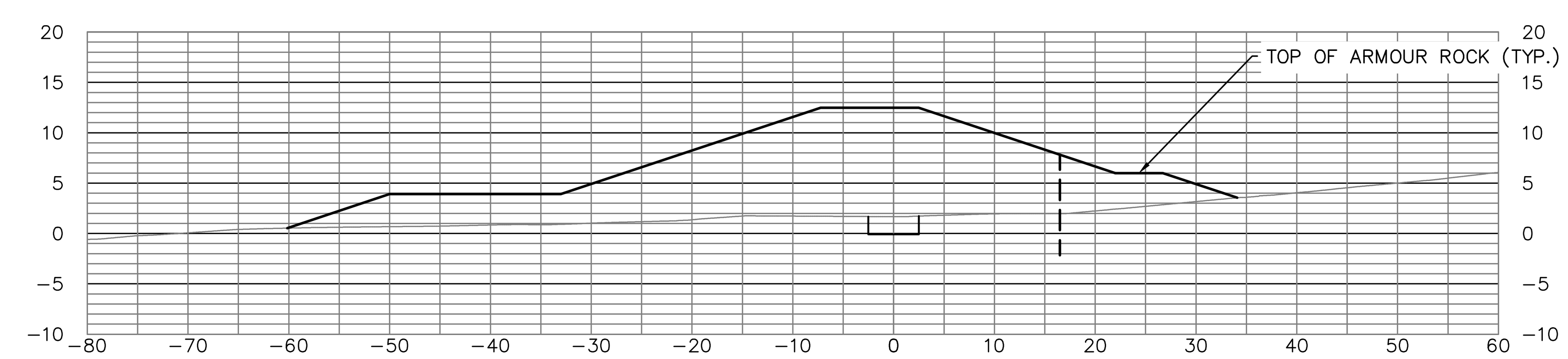

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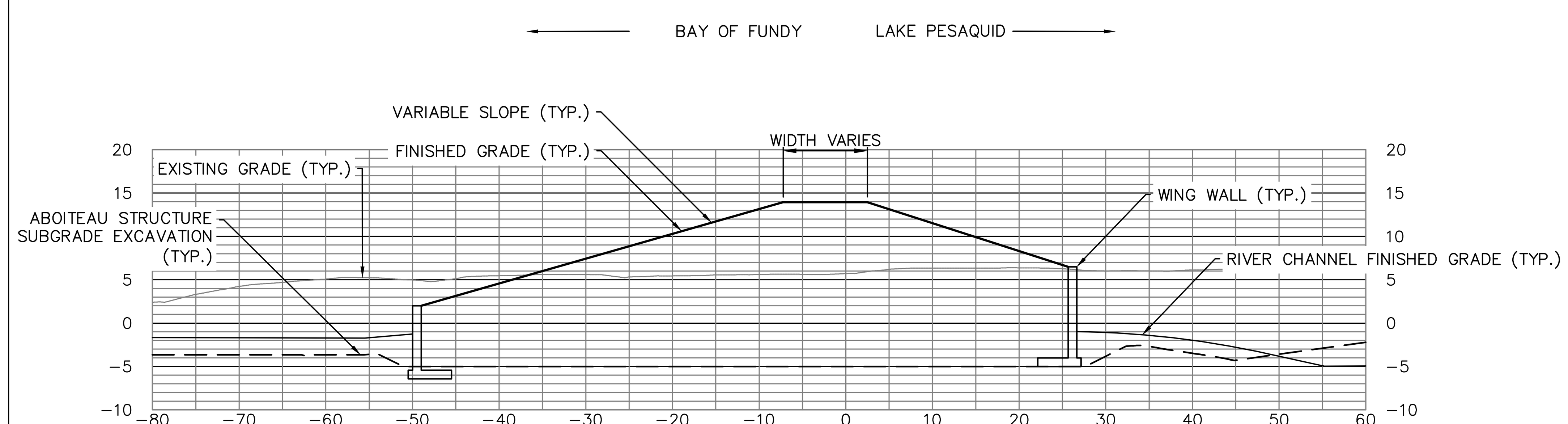

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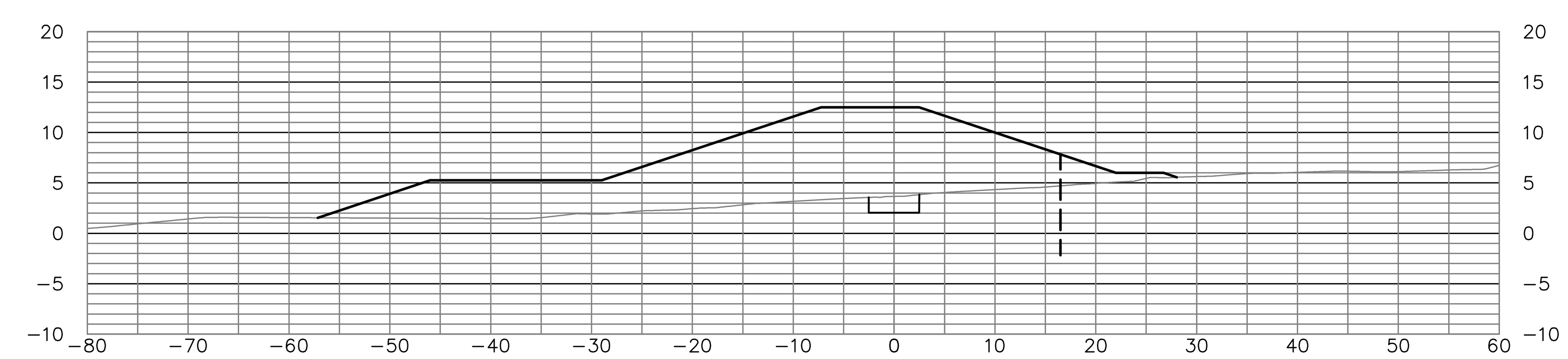
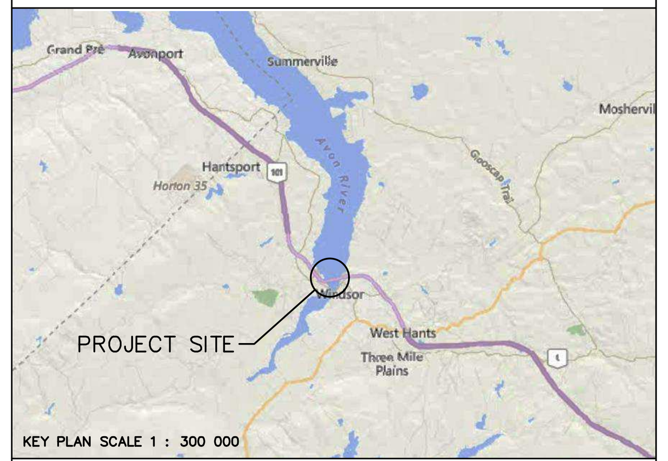


0+360

KEY PLAN



LEGEND

- CONTROL MONUMENT
- N.S. ACT. CONTROL STN.
- CALCULATED COORDINATE
- IRON BAR
- IRON PIPE
- SURVEY MARKER
- CUT CROSS
- ROCK POST
- WOODEN POST
- PL,FD — PLACED, FOUND
- CD,A,R — CHORD, ARC, RADIUS
- CENTRELINE
- GUIDE POLE
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- CATCH BASIN
- FIRE HYDRANT
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- FIBRE OPTIC MARKER
- GUIDE POST
- GAS TANK
- TELEPHONE JUNCTION BOX
- GUY WIRE
- MAIL BOX
- UTILITY MANHOLE
- SIGN
- DESIGN POINT
- DIRECTION OF FLOW
- SEWER MANHOLE
- WELL
- WOODEN GUARD POST
- WATER VALVE
- GAS METER
- GAS VALVE
- RAILROAD SWITCH BOX
- RAILROAD SIGNAL POLE
- SOFTWOOD TREE
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- BUSH
- CULVERT
- BUILDING
- OHWM — ORDINARY HIGH WATER MARK
- TRAFFIC SIGNAL – NEW
- TRAFFIC SIGNAL – EXISTING
- TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – NEW
- TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – EXISTING
- HIGHWAY LIGHT – NEW
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- JUNCTION BOX
- ELECTRICAL SERVICE POST
- TRAFFIC SIGNAL CONTROL PAD
- VEHICLE DETECTOR LOOP
- UNDERGROUND CONDUIT

- EXISTING GRADE
- FINISHED GRADE
- SUBGRADE
- EXCAVATION

U/S – UPSTREAM	D/S – DOWNSTREAM
RC – REVERSE CROWN	LC – LEVEL CROWN
NC – NORMAL CROWN	FS – FULL SUPERELEVATION
BC – BEGINNING OF CURVE	EC – END OF CURVE
EOP – EDGE OF PAVEMENT	ETL – EDGE OF TRAVEL LANE
ESH – EDGE OF SHOULDER	PRC – POINT OF REVERSE CURVATURE
PCC – POINT OF COMPOUND CURVATURE	

0 10.0 20.0 30.0 40.0 50.0m
1:500

CBCL

PROJECT: 171046

Designed by: C. FISHER
Surveyed by:
Drawn by: M. ZHOU
Checked by: R. GIFFIN
Approved by:

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW

NOVA SCOTIA Public Works

Scale: (H) 1:500 (V) 1:500
Date: OCTOBER 2019
File No. : C009
Sheet No. : 09 of 31

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

HIGHWAY 101 HANTS COUNTY

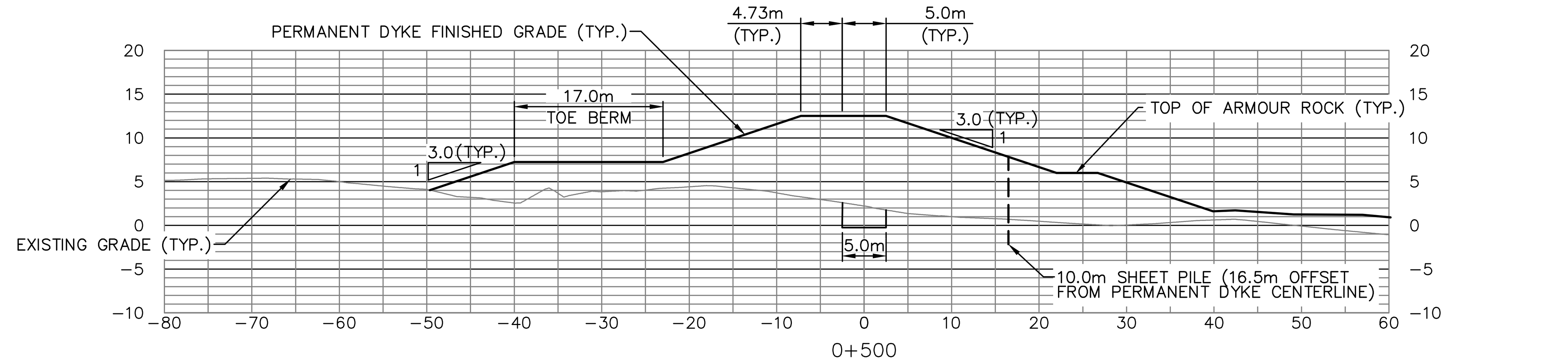
PERMANENT DYKE & ACCESS ROAD CROSS SECTIONS STA 0+300 TO 0+420 - SHEET 3

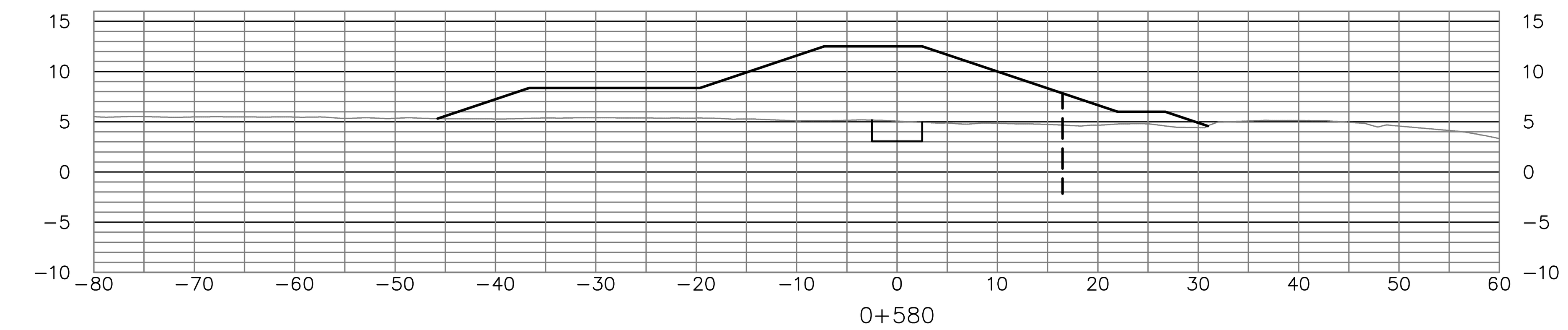
DRAWING NAME: Y:\HALIFAX\DATA\PROJECTS\171046.00 AVON RIVER ABOITEAU\20 CAD\01 CIVIL\04 DRAWING SHEETS\171046.00 – C007 – C011 – PERMANENT DYKE & ACCESS ROAD CROSS-SECTIONS.DWG LAYOUT NAME: C009 PLOT DATE: March 25, 2022 9:14:51 AM CAD OPERATOR: MZHOU

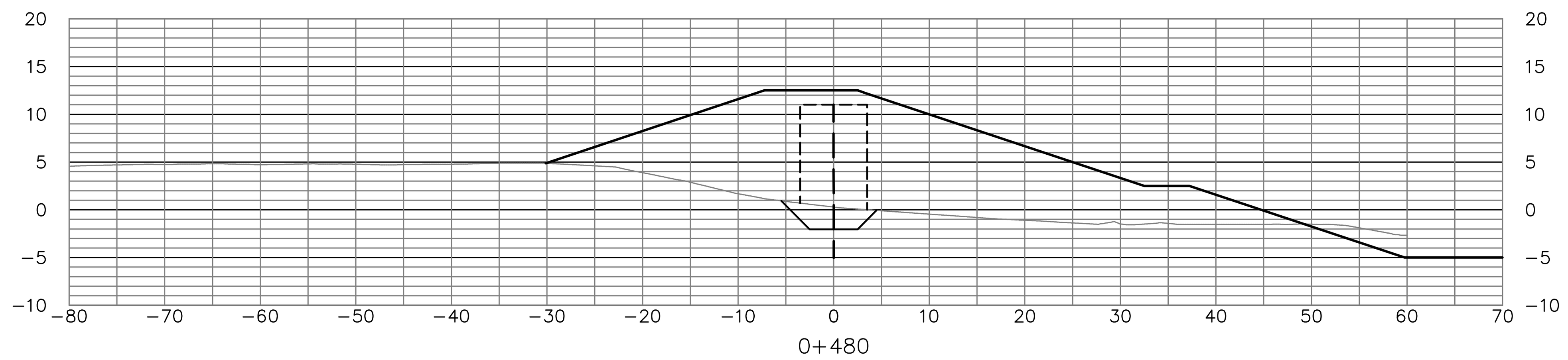
AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

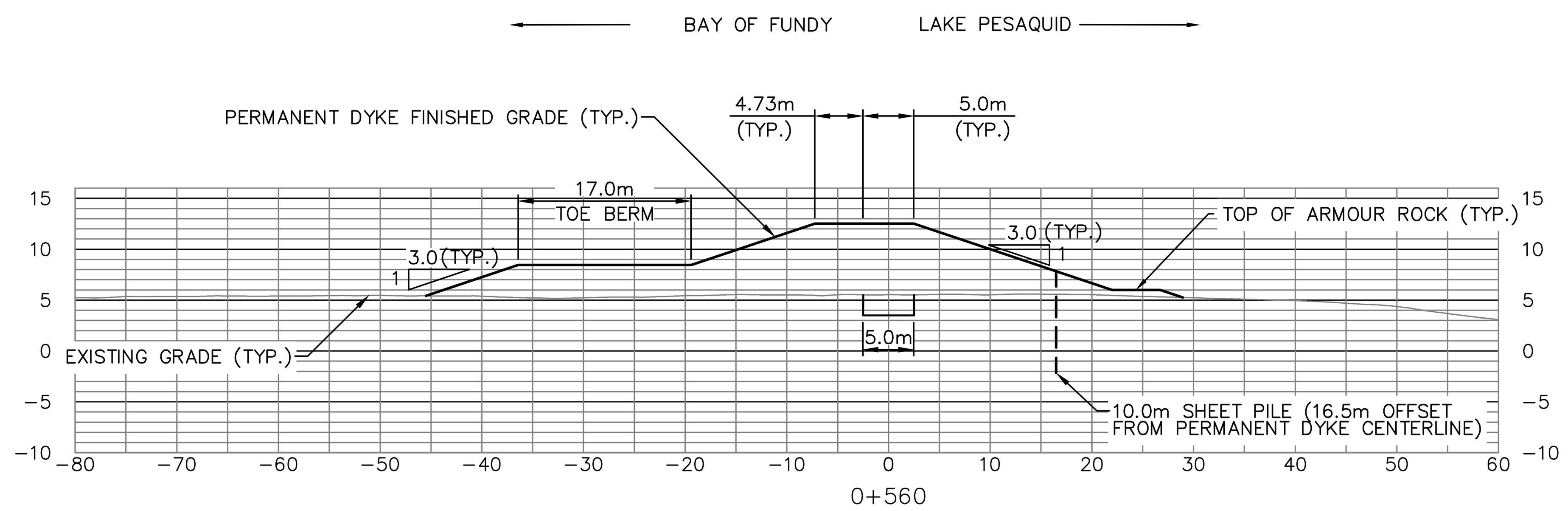
PERMANENT DYKE TYPICAL CROSS SECTIONS - SHEET 4

C010



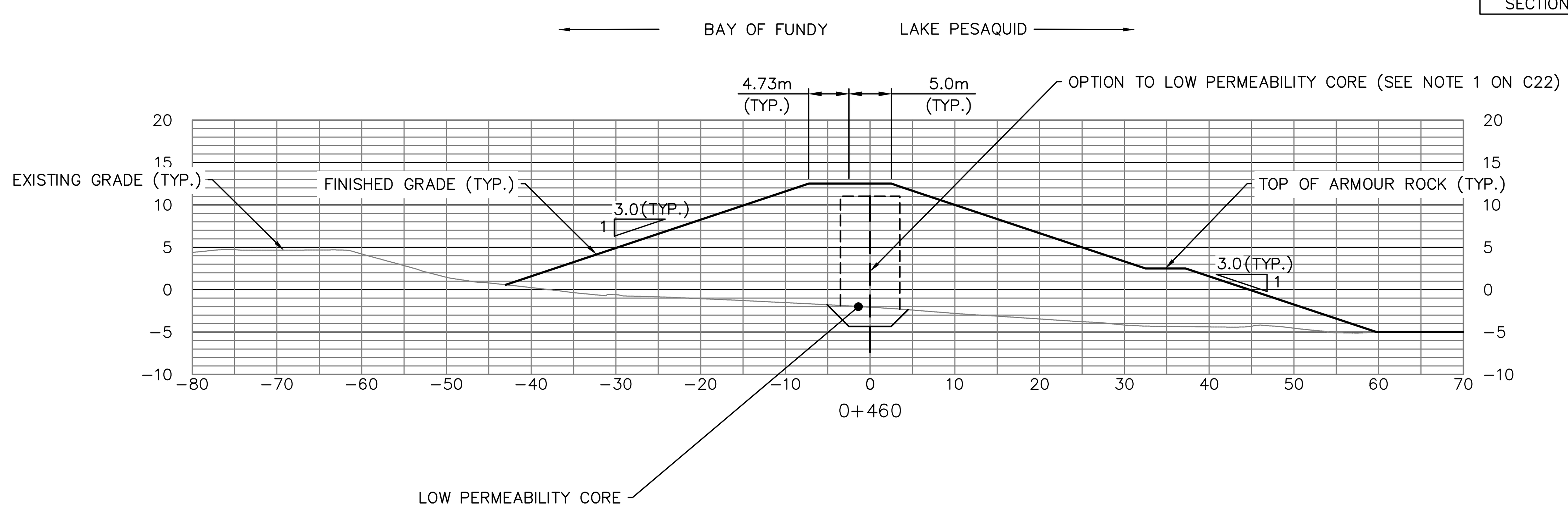


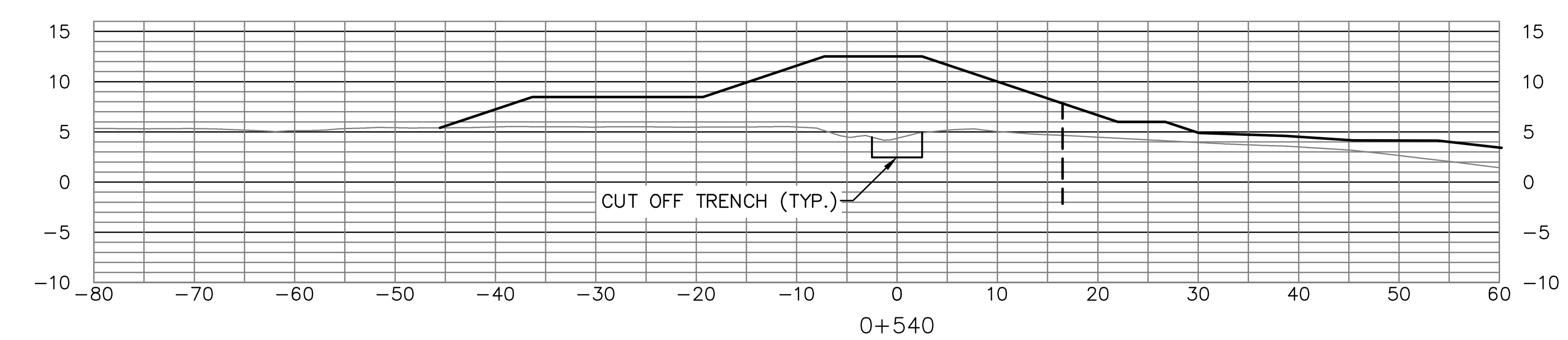


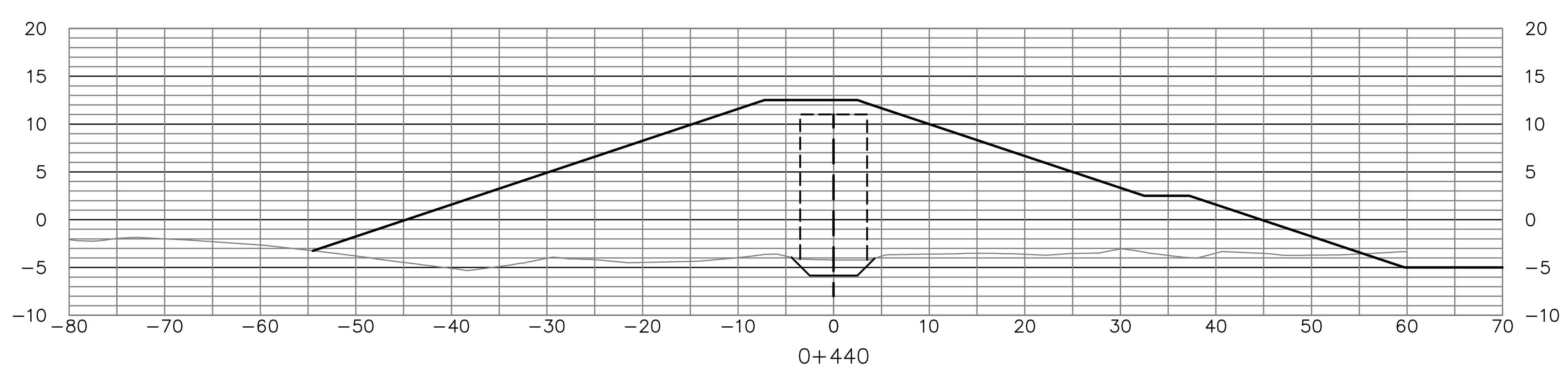


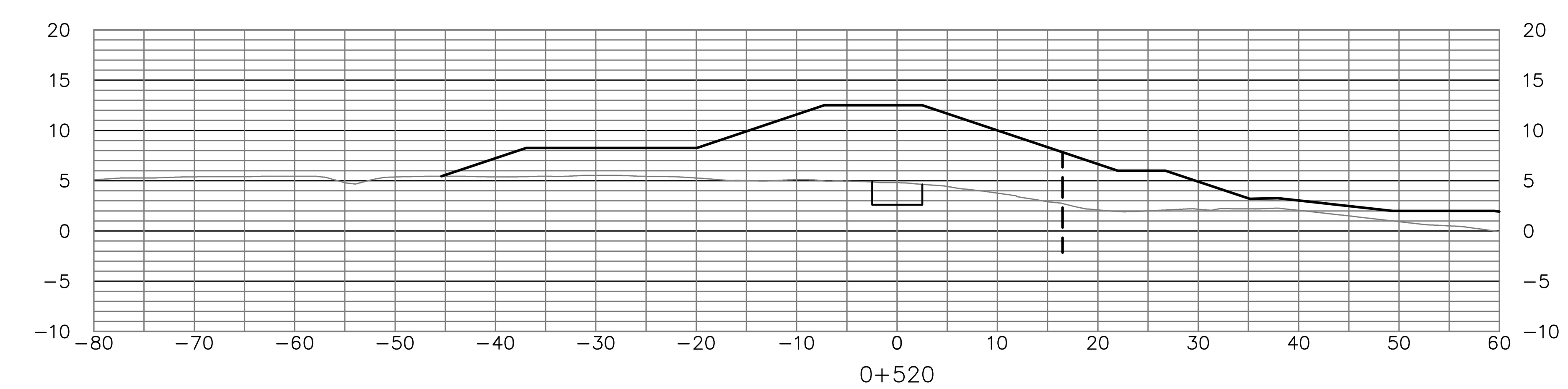
NOTES:

1. FOR CROSS SECTION DETAILS, SEE TYPICAL SECTIONS DRAWING NO. C021 AND C022.

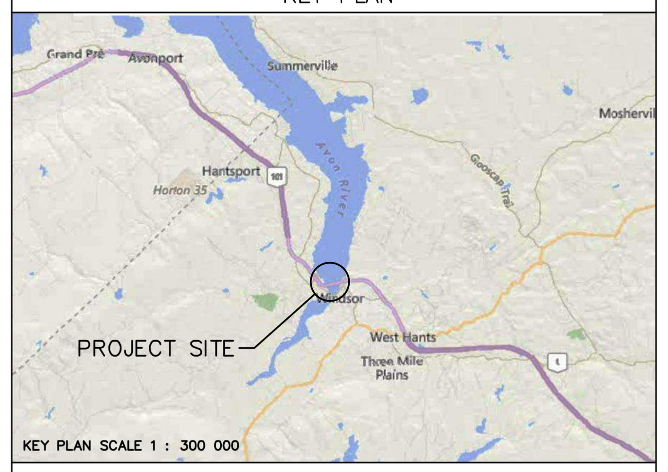








KEY PLAN



LEGEND

- CONTROL MONUMENT
- N.S. ACT. CONTROL STN.
- CALCULATED COORDINATE
- IRON BAR
- IRON PIPE
- SURVEY MARKER
- CUT CROSS
- ROCK POST
- WOODEN POST
- PL,FD PLACED, FOUND
- CD,A,R CHORD, ARC, RADIUS
- CENTRELINE
- GUIDE POLE
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- CULVERT
- BUILDING
- OHWM ORDINARY HIGH WATER MARK
- TRAFFIC SIGNAL – NEW
- TRAFFIC SIGNAL – EXISTING
- TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – NEW
- TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – EXISTING
- HIGHWAY LIGHT – NEW
- HIGHWAY LIGHT – EXISTING
- JUNCTION BOX
- ELECTRICAL SERVICE POST
- TRAFFIC SIGNAL CONTROL PAD
- VEHICLE DETECTOR LOOP
- UNDERGROUND CONDUIT

- EXISTING GRADE
- FINISHED GRADE
- SUBGRADE
- EXCAVATION

- U/S – UPSTREAM
- RC – REVERSE CROWN
- NC – NORMAL CROWN
- BC – BEGINNING OF CURVE
- EOP – EDGE OF PAVEMENT
- ESH – EDGE OF SHOULDER
- PCC – POINT OF COMPOUND CURVATURE
- D/S – DOWNSTREAM
- LC – LEVEL CROWN
- FS – FULL SUPERELEVATION
- EC – END OF CURVE
- ETL – EDGE OF TRAVEL LANE
- PRC – POINT OF REVERSE CURVATURE

0 10.0 20.0 30.0 40.0 50.0m

1:500

CBCL

PROJECT: 171046

Designed by: C. FISHER
Surveyed by:
Drawn by: M. ZHOU
Checked by: R. GIFFIN
Approved by:

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW

NOVA SCOTIA Public Works

Scale: (H) 1:500 (V) 1:500
Date: OCTOBER 2019
File No.: C010
Sheet No.: 10 of 31

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

HIGHWAY 101 HANTS COUNTY

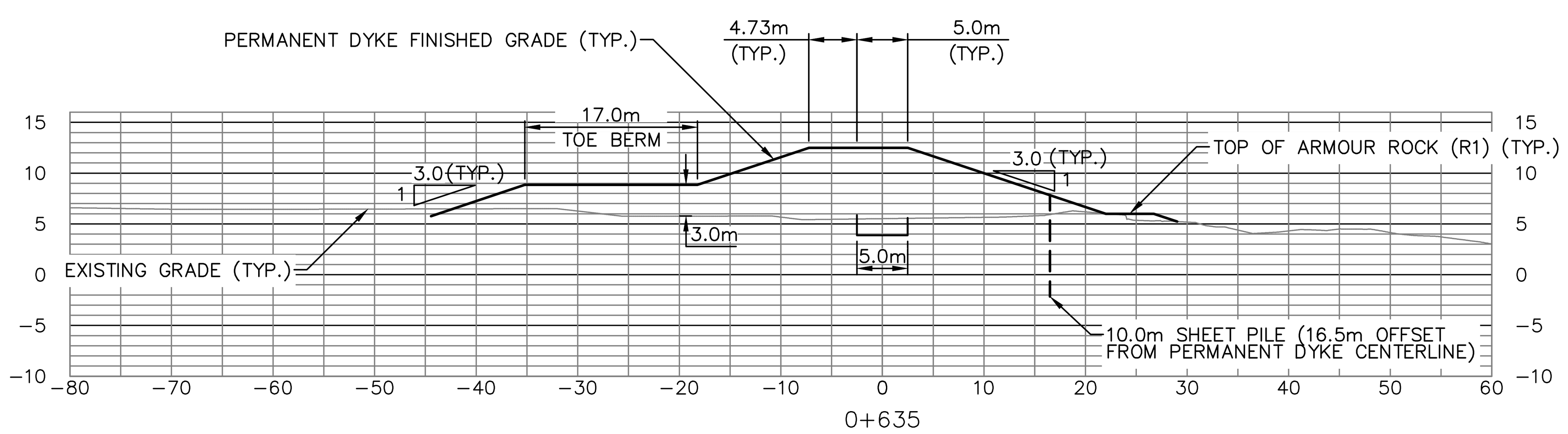
PERMANENT DYKE & ACCESS ROAD CROSS SECTIONS STA 0+440 TO 0+580 - SHEET 4

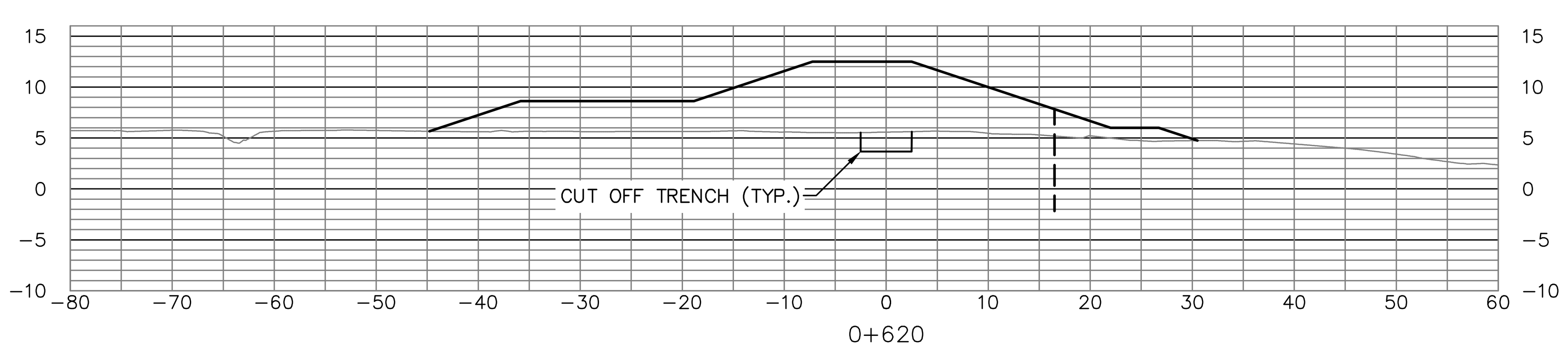
DRAWING NAME: Y:\HALIFAX\DATA\PROJECTS\171046.00 AVON RIVER ABOITEAU\20 CAD\01 CIVIL\04 DRAWING SHEETS\171046.00 - C007 - C011 - PERMANENT DYKE & ACCESS ROAD CROSS-SECTIONS.DWG LAYOUT NAME: C010 PLOT DATE: March 25, 2022 9:15:42 AM CAD OPERATOR: MZHOU

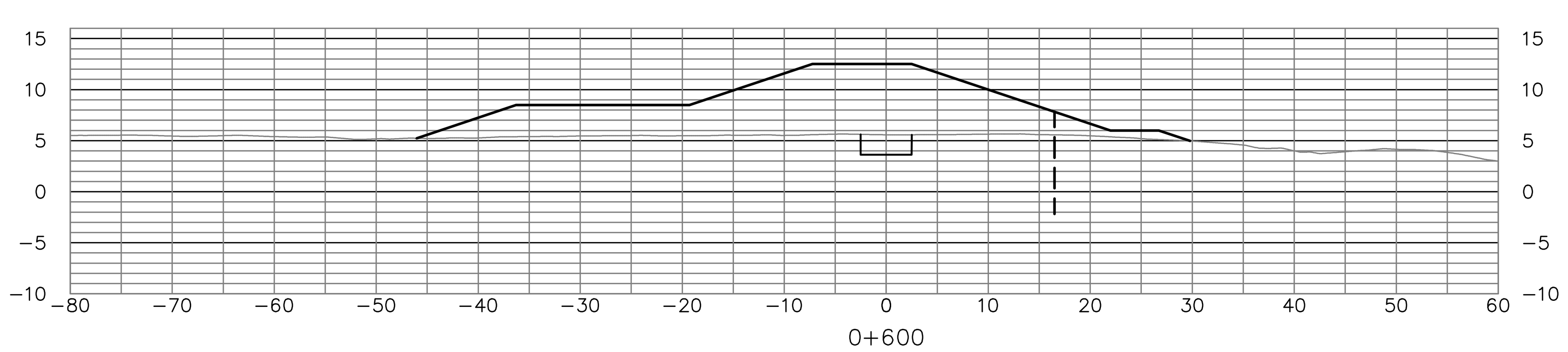
C011

PERMANENT DYKE TYPICAL CROSS SECTIONS - SHEET 5

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE



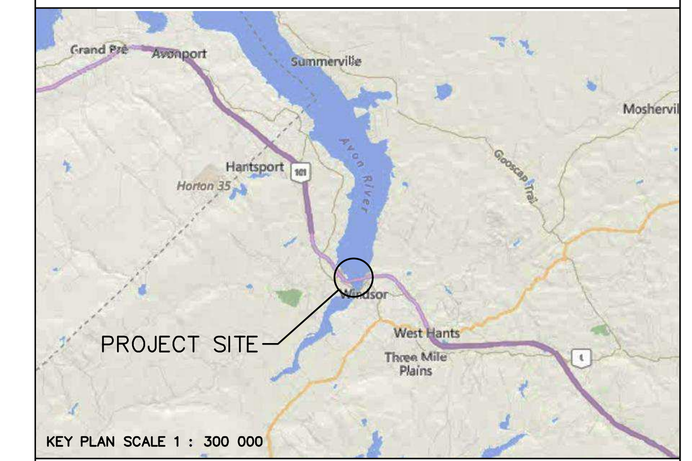




NOTES:

1. FOR CROSS SECTION DETAILS, SEE TYPICAL SECTIONS DRAWING NO. C021 AND C022.

KEY PLAN



LEGEND

CONTROL MONUMENT	SEWER MANHOLE
N.S. ACT. CONTROL STN.	WELL
CALCULATED COORDINATE	WOODEN GUARD POST
IB IRON BAR	WV WATER VALVE
IP IRON PIPE	GM GAS METER
SM SURVEY MARKER	GV GAS VALVE
CUT CROSS	RAILROAD SWITCH BOX
RP ROCK POST	RAILROAD SIGNAL POLE
WP WOODEN POST	SOFTWOOD TREE
PL,FD PLACED, FOUND	HARDWOOD TREE
CD,A,R CHORD, ARC, RADIUS	BUSH
CENTRELINE	CULVERT
GUIDE POLE	BUILDING
UTILITY POLE	OHWM ORDINARY HIGH WATER MARK
CATCH BASIN	TS# TRAFFIC SIGNAL – NEW
FIRE HYDRANT	TS# TRAFFIC SIGNAL – EXISTING
FLAG POLE	TRAFFIC SIGNAL HIGHWAY LIGHT COMBINATION – NEW
FIBRE OPTIC MARKER	TRAFFIC SIGNAL HIGHWAY LIGHT COMBINATION – EXISTING
GUIDE POST	HIGHWAY LIGHT – NEW
GAS TANK	HIGHWAY LIGHT – EXISTING
TELEPHONE JUNCTION BOX	JB# JUNCTION BOX
GUY WIRE	ES ELECTRICAL SERVICE POST
MAIL BOX	TRAFFIC SIGNAL CONTROL PAD
UTILITY MANHOLE	VEHICLE DETECTOR LOOP
SIGN	UNDERGROUND CONDUIT
DESIGN POINT	
DIRECTION OF FLOW	

EXISTING GRADE
FINISHED GRADE
SUBGRADE
EXCAVATION

U/S – UPSTREAM	D/S – DOWNSTREAM
RC – REVERSE CROWN	LC – LEVEL CROWN
NC – NORMAL CROWN	FS – FULL SUPERELEVATION
BC – BEGINNING OF CURVE	EC – END OF CURVE
EOP – EDGE OF PAVEMENT	ETL – EDGE OF TRAVEL LANE
ESH – EDGE OF SHOULDER	PRC – POINT OF REVERSE CURVATURE
PCC – POINT OF COMPOUND CURVATURE	

0 10.0 20.0 30.0 40.0 50.0m
1:500

CBCL

PROJECT: 171046

Designed by:	C. FISHER
Surveyed by:	
Drawn by:	M. ZHOU
Checked by:	R. GIFFIN
Approved by:	

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW

NOVA SCOTIA Public Works

Scale: (H) 1:500 (V) 1:500
Date: OCTOBER 2019
File No. : C011
Sheet No. : 11 of 31

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

HIGHWAY 101 HANTS COUNTY

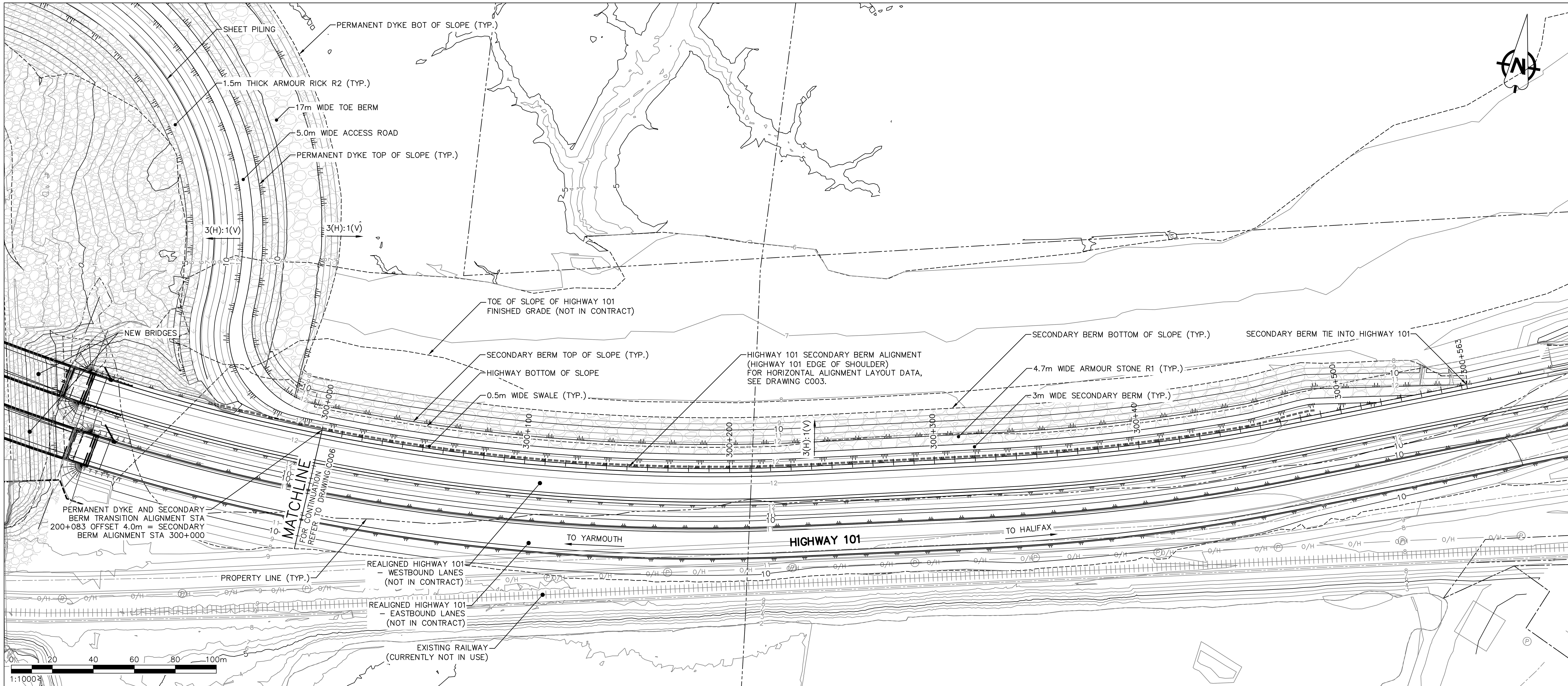
PERMANENT DYKE & ACCESS ROAD CROSS SECTIONS STA 0+600 TO 0+635 - SHEET 5

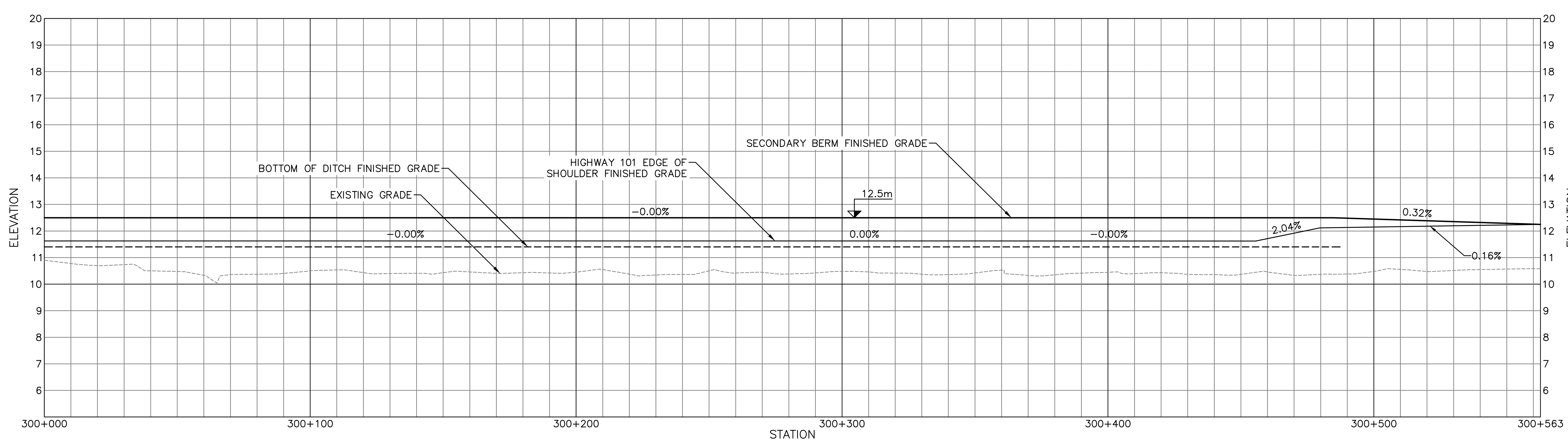
DRAWING NAME: Y:\HALIFAX\DATA\PROJECTS\171046.00 AVON RIVER ABOITEAU\20 CAD\01 CIVIL\04 DRAWING SHEETS\171046.00 – C007 – C011 – PERMANENT DYKE & ACCESS ROAD CROSS-SECTIONS.DWG LAYOUT NAME: C011 PLOT DATE: March 25, 2022 9:16:26 AM CAD OPERATOR: MZHOU

C012

HIGHWAY 101 SECONDARY BERM PLAN AND PROFILE

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE





KEY PLAN

LEGEND

CONTROL MONUMENT
N.S. ACT. CONTROL STN.
CALCULATED COORDINATE
IRON BAR
IRON PIPE
SURVEY MARKER
CUT CROSS
ROCK POST
WOODEN POST
PLACED, FOUND
CHORD, ARC, RADIUS
CENTRELINE
GUIDE POLE
UTILITY POLE
CATCH BASIN
FIRE HYDRANT
FLAG POLE
FIBRE OPTIC MARKER
GUIDE POST
GAS TANK
TELEPHONE JUNCTION BOX
GUY WIRE
MAIL BOX
UTILITY MANHOLE
SIGN
DESIGN POINT
DIRECTION OF FLOW
SEWER MANHOLE
WELL
WOODEN GUARD POST
WATER VALVE
GAS METER
GAS VALVE
RAILROAD SWITCH BOX
RAILROAD SIGNAL POLE
SOFTWOOD TREE
HARDWOOD TREE
BUSH
CULVERT
BUILDING
ORDINARY HIGH WATER MARK
TRAFFIC SIGNAL – NEW
TRAFFIC SIGNAL – EXISTING
TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – NEW
TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – EXISTING
HIGHWAY LIGHT – NEW
HIGHWAY LIGHT – EXISTING
JUNCTION BOX
ELECTRICAL SERVICE POST
TRAFFIC SIGNAL CONTROL PAD
VEHICLE DETECTOR LOOP
UNDERGROUND CONDUIT

LAND DEALT WITH/ PROPOSED RIGHT OF WAY
SURPLUS HIGHWAY RIGHT OF WAY
HIGHWAY RIGHT OF WAY (EXISTING)
PROPERTY LINE (EXISTING)
ALIGNMENT CENTERLINE (PROPOSED)
ROAD CENTERLINE (EXISTING)
DIVISION BETWEEN LAND USE TYPES
FENCE (EXISTING)
RAILROAD (EXISTING)
GUARDRAIL (EXISTING)
GUARDRAIL (PROPOSED)
TOP OF SLOPE (PROPOSED)
TOE OF SLOPE (PROPOSED)
OVERHEAD UTILITY SERVICE (EXISTING)
MAJOR CONTOUR (EXISTING)
MINOR CONTOUR (EXISTING)

U/S – UPSTREAM
D/S – DOWNSTREAM
RC – REVERSE CROWN
LC – LEVEL CROWN
NC – NORMAL CROWN
FS – FULL SUPERELEVATION
BC – BEGINNING OF CURVE
EC – END OF CURVE
EOP – EDGE OF PAVEMENT
ETL – EDGE OF TRAVEL LANE
ESH – EDGE OF SHOULDER
PRC – POINT OF REVERSE CURVATURE
PCC – POINT OF COMPOUND CURVATURE

TO BE REMOVED
NATIVE SOIL
ARMOUR ROCK (R1)
ARMOUR ROCK (R2)
ROCK FILL
COMMON FILL
TOPSOIL

CBCL

PROJECT: 171046

Designed by:	C. FISHER
Surveyed by:	
Drawn by:	M. ZHOU
Checked by:	R. GIFFIN
Approved by:	

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
A	MAR 25/22	ISSUED FOR 95% REVIEW

NOVA SCOTIA Public Works

Scale: (H) 1:2000 (V) 1:400
Date: OCTOBER 2019
File No. : C012
Sheet No. : 12 of 31

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE
HIGHWAY 101 HANTS COUNTY

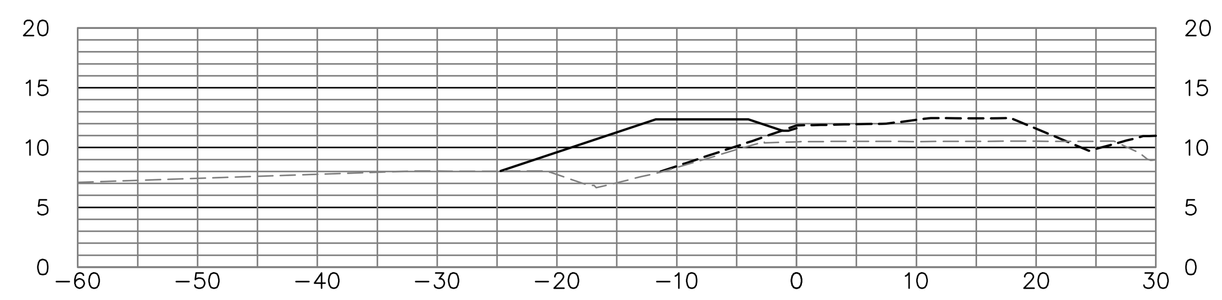
HIGHWAY 101 SECONDARY BERM PLAN AND PROFILE STA 23+961 TO 24+524

DRAWING NAME: Y:\HALIFAX\DATA\PROJECTS\171046.00 AVON RIVER ABOITEAU\20 CAD\01 CIVIL\04 DRAWING SHEETS\171046.00 – C012 – HIGHWAY 101 SECONDARY BERM PLAN AND PROFILE.DWG LAYOUT NAME: C012 PLOT DATE: March 25, 2022 9:19:50 AM CAD OPERATOR: MZHOU

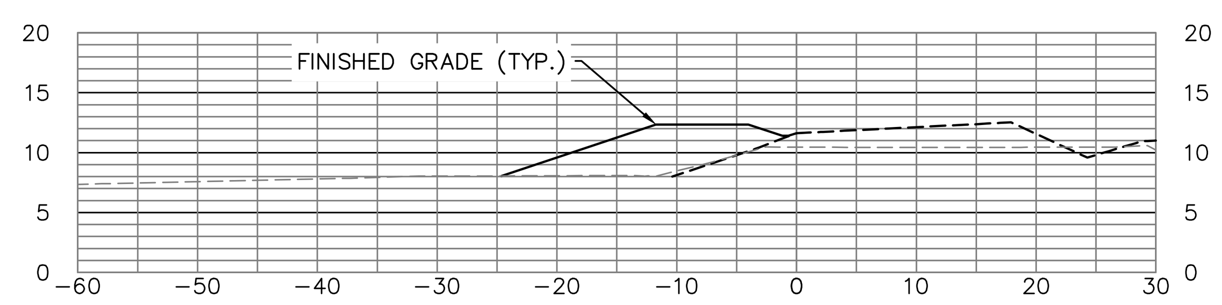
C013

HIGHWAY 101 SECONDARY BERM CROSS SECTIONS

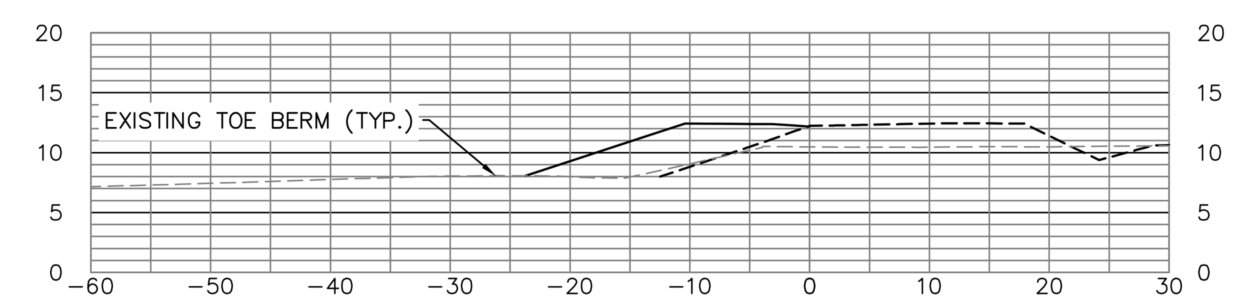
AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE



300+300



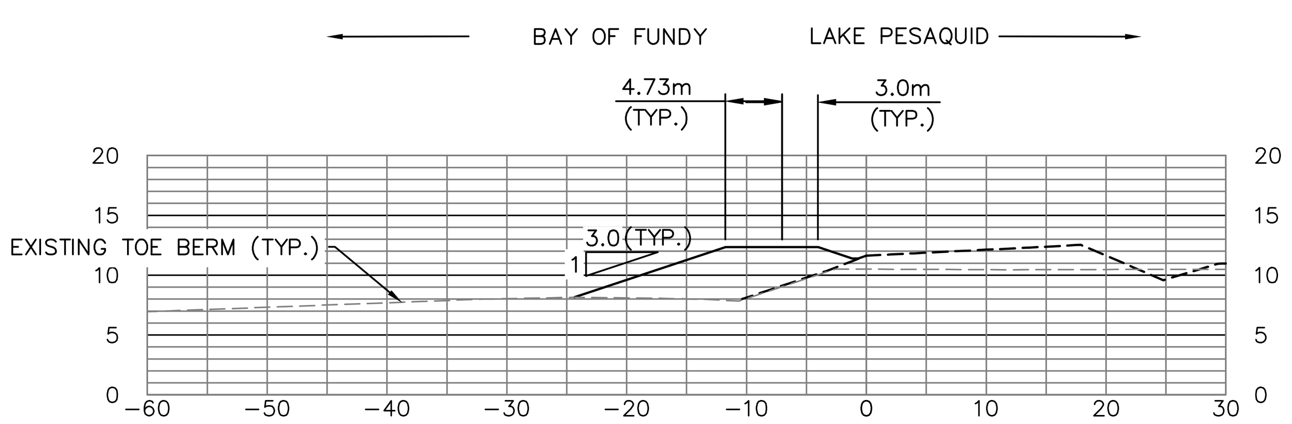
300+200



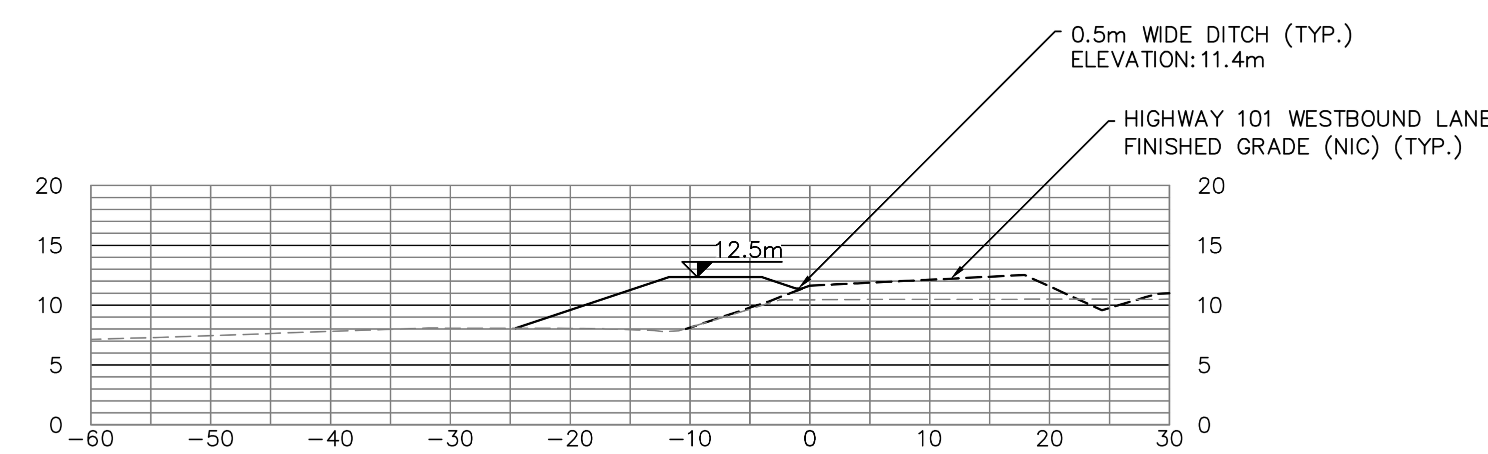
300+500

NOTES:

1. FOR CROSS SECTION DETAILS, SEE TYPICAL SECTIONS DRAWING NO. C022.

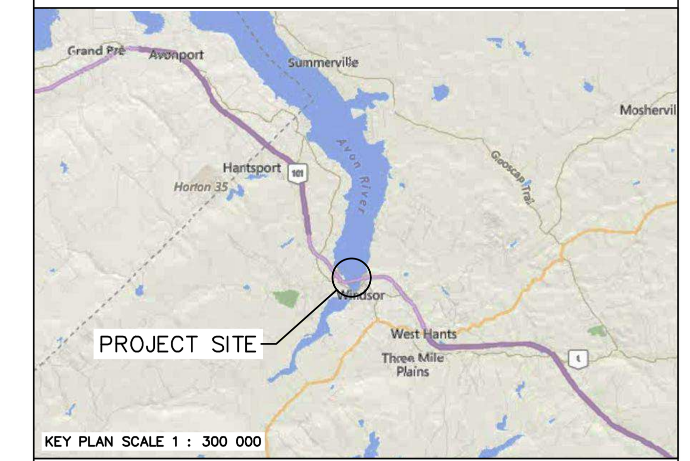


300+100



300+400

KEY PLAN



LEGEND

- CONTROL MONUMENT
- N.S. ACT. CONTROL STN.
- CALCULATED COORDINATE
- IRON BAR
- IRON PIPE
- SURVEY MARKER
- CUT CROSS
- ROCK POST
- WOODEN POST
- PLACED, FOUND
- CHORD, ARC, RADIUS
- CENTRELINE
- GUIDE POLE
- UTILITY POLE
- CATCH BASIN
- FIRE HYDRANT
- FLAG POLE
- FIBRE OPTIC MARKER
- GUIDE POST
- GAS TANK
- TELEPHONE JUNCTION BOX
- GUY WIRE
- MAIL BOX
- UTILITY MANHOLE
- SIGN
- DESIGN POINT
- DIRECTION OF FLOW
- SEWER MANHOLE
- WELL
- WOODEN GUARD POST
- WATER VALVE
- GAS METER
- GAS VALVE
- RAILROAD SWITCH BOX
- RAILROAD SIGNAL POLE
- SOFTWOOD TREE
- HARDWOOD TREE
- BUSH
- CULVERT
- BUILDING
- ORDINARY HIGH WATER MARK
- TRAFFIC SIGNAL – NEW
- TRAFFIC SIGNAL – EXISTING
- TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – NEW
- TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – EXISTING
- HIGHWAY LIGHT – NEW
- HIGHWAY LIGHT – EXISTING
- JUNCTION BOX
- ELECTRICAL SERVICE POST
- TRAFFIC SIGNAL CONTROL PAD
- VEHICLE DETECTOR LOOP
- UNDERGROUND CONDUIT
- LAND DEALT WITH/ PROPOSED RIGHT OF WAY
- SURPLUS HIGHWAY RIGHT OF WAY
- HIGHWAY RIGHT OF WAY (EXISTING)
- PROPERTY LINE (EXISTING)
- ALIGNMENT CENTERLINE (PROPOSED)
- ROAD CENTERLINE (EXISTING)
- DIVISION BETWEEN LAND USE TYPES
- FENCE (EXISTING)
- RAILROAD (EXISTING)
- GUARDRAIL (EXISTING)
- GUARDRAIL (PROPOSED)
- TOP OF SLOPE (PROPOSED)
- TOE OF SLOPE (PROPOSED)
- OVERHEAD UTILITY SERVICE (EXISTING)
- MAJOR CONTOUR (EXISTING)
- MINOR CONTOUR (EXISTING)

U/S – UPSTREAM
D/S – DOWNSTREAM
RC – REVERSE CROWN
LC – LEVEL CROWN
NC – NORMAL CROWN
FS – FULL SUPERELEVATION
BC – BEGINNING OF CURVE
EC – END OF CURVE
EOP – EDGE OF PAVEMENT
ETL – EDGE OF TRAVEL LANE
ESH – EDGE OF SHOULDER
PRC – POINT OF REVERSE CURVATURE
PCC – POINT OF COMPOUND CURVATURE

CBCL

PROJECT: 171046

Designed by:	C. FISHER
Surveyed by:	
Drawn by:	M. ZHOU
Checked by:	R. GIFFIN
Approved by:	

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
A	MAR 25/22	ISSUED FOR 95% REVIEW

NOVA SCOTIA Public Works

Scale: (H) 1:500 (V) 1:500

Date: OCTOBER 2019

File No. : C013

Sheet No. : 13 of 31

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

HIGHWAY 101 HANTS COUNTY

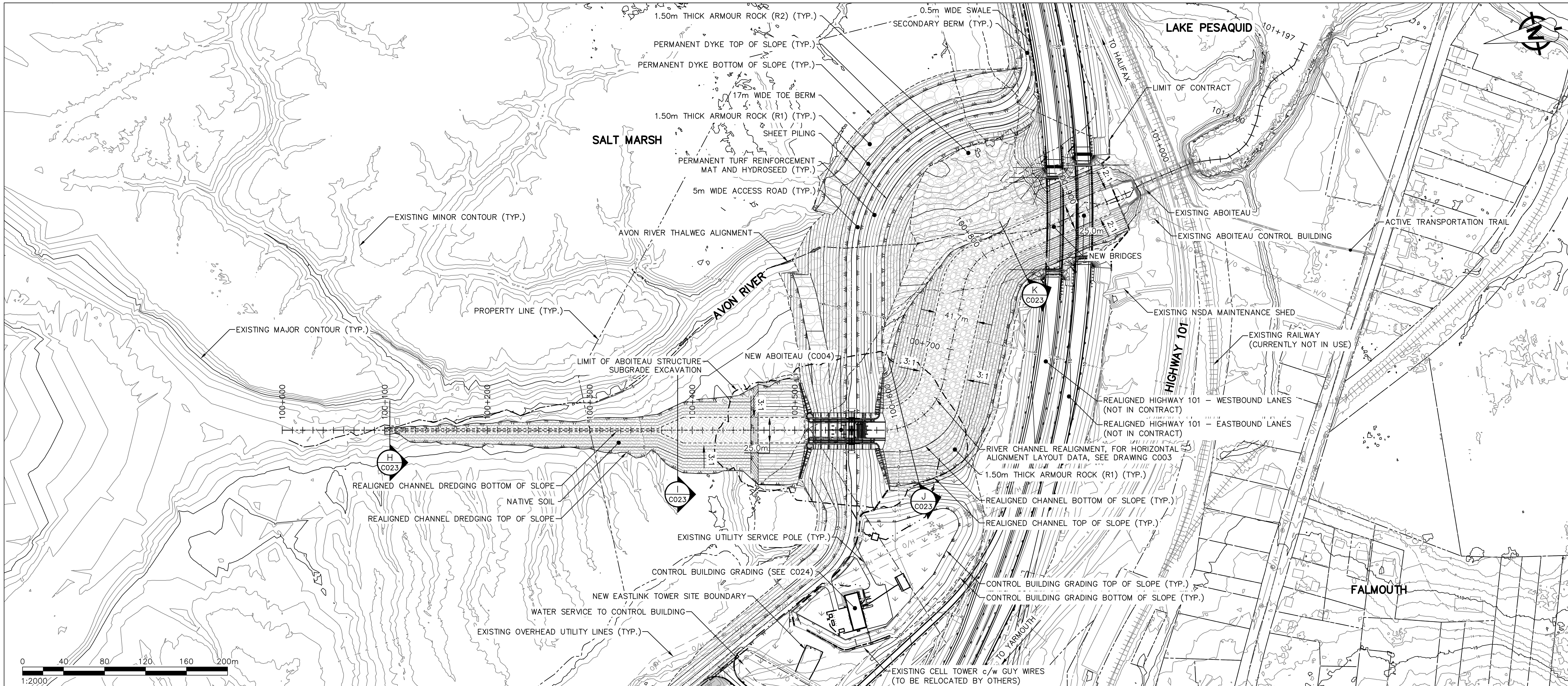
HIGHWAY 101 SECONDARY BERM CROSS SECTIONS

DRAWING NAME: Y:\HALIFAX\DATA\PROJECTS\171046.00 AVON RIVER ABOITEAU\20 CAD\01 CIVIL\04 DRAWING SHEETS\171046.00 – C013 – HIGHWAY 101 SECONDARY BERM CROSS SECTIONS.DWG LAYOUT NAME: C013 PLOT DATE: March 25, 2022 9:22:56 AM CAD OPERATOR: MZHOU

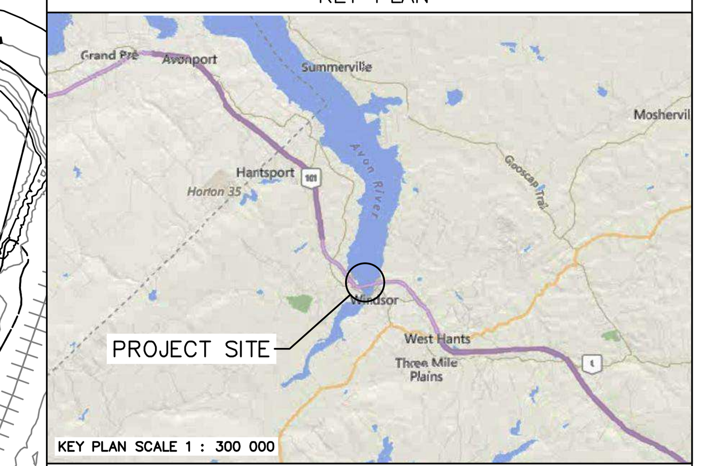
C014

RIVER CHANNEL REALIGNMENT PLAN AND PROFILE

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE



KEY PLAN



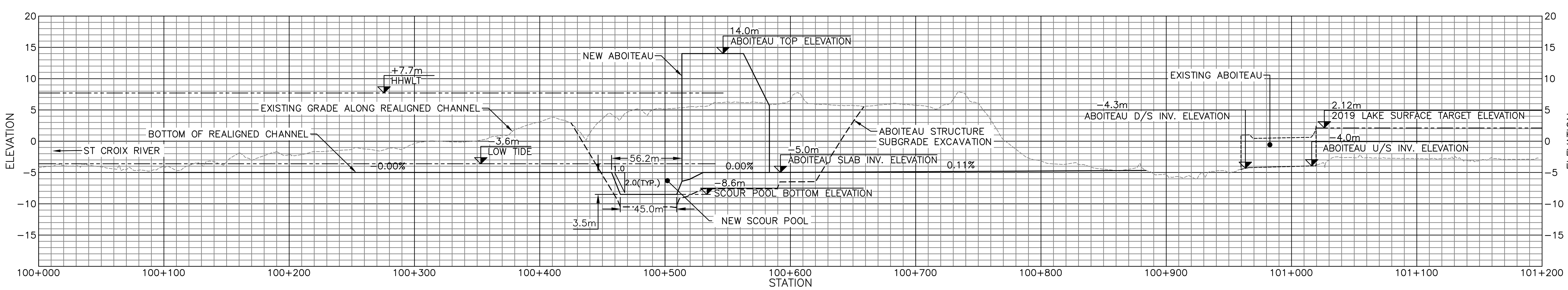
LEGEND

CONTROL MONUMENT
N.S. ACT. CONTROL STN.
CALCULATED COORDINATE
IRON BAR
IRON PIPE
SURVEY MARKER
CUT CROSS
ROCK POST
WOODEN POST
PL,FD PLACED, FOUND
CD,A,R CHORD, ARC, RADIUS
CENTRELINE
GUIDE POLE
UTILITY POLE
CATCH BASIN
FIRE HYDRANT
FLAG POLE
FIBRE OPTIC MARKER
GUIDE POST
GAS TANK
TELEPHONE JUNCTION BOX
GUY WIRE
MAIL BOX
UTILITY MANHOLE
SIGN
DESIGN POINT
DIRECTION OF FLOW
SEWER MANHOLE
WELL
WOODEN GUARD POST
WATER VALVE
GAS METER
GAS VALVE
RAILROAD SWITCH BOX
RAILROAD SIGNAL POLE
SOFTWOOD TREE
HARDWOOD TREE
BUSH
CULVERT
BUILDING
OHWM ORDINARY HIGH WATER MARK
TRAFFIC SIGNAL – NEW
TRAFFIC SIGNAL – EXISTING
TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – NEW
TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – EXISTING
HIGHWAY LIGHT – NEW
HIGHWAY LIGHT – EXISTING
JUNCTION BOX
ELECTRICAL SERVICE POST
TRAFFIC SIGNAL CONTROL PAD
VEHICLE DETECTOR LOOP
UNDERGROUND CONDUIT
LAND DEALT WITH/ PROPOSED RIGHT OF WAY
SURPLUS HIGHWAY RIGHT OF WAY
HIGHWAY RIGHT OF WAY (EXISTING)
PROPERTY LINE (EXISTING)
ALIGNMENT CENTERLINE (PROPOSED)
ROAD CENTERLINE (EXISTING)
DIVISION BETWEEN LAND USE TYPES
FENCE (EXISTING)
RAILROAD (EXISTING)
GUARDRAIL (EXISTING)
GUARDRAIL (PROPOSED)
TOP OF SLOPE (PROPOSED)
TOE OF SLOPE (PROPOSED)
OVERHEAD UTILITY SERVICE (EXISTING)
MAJOR CONTOUR (EXISTING)
MINOR CONTOUR (EXISTING)

U/S – UPSTREAM
D/S – DOWNSTREAM
RC – REVERSE CROWN
LC – LEVEL CROWN
NC – NORMAL CROWN
FS – FULL SUPERELEVATION
BC – BEGINNING OF CURVE
EC – END OF CURVE
EOP – EDGE OF PAVEMENT
ETL – EDGE OF TRAVEL LANE
ESH – EDGE OF SHOULDER
PRC – POINT OF REVERSE CURVATURE
PCC – POINT OF COMPOUND CURVATURE

TO BE REMOVED
NATIVE SOIL
ARMOUR ROCK (R1)
ARMOUR ROCK (R2)
ROCK FILL
COMMON FILL
TOPSOIL

RIVER CHANNEL REALIGNMENT PROFILE



CBCL

PROJECT: 171046

Designed by:	C. FISHER
Surveyed by:	
Drawn by:	M. ZHOU
Checked by:	R. GIFFIN
Approved by:	

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW

NOVA SCOTIA Public Works

Scale: (H) 1:2000 (V) 1:400

Date: OCTOBER 2019

File No.: C014

Sheet No.: 14 of 31

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

HIGHWAY 101 HANTS COUNTY

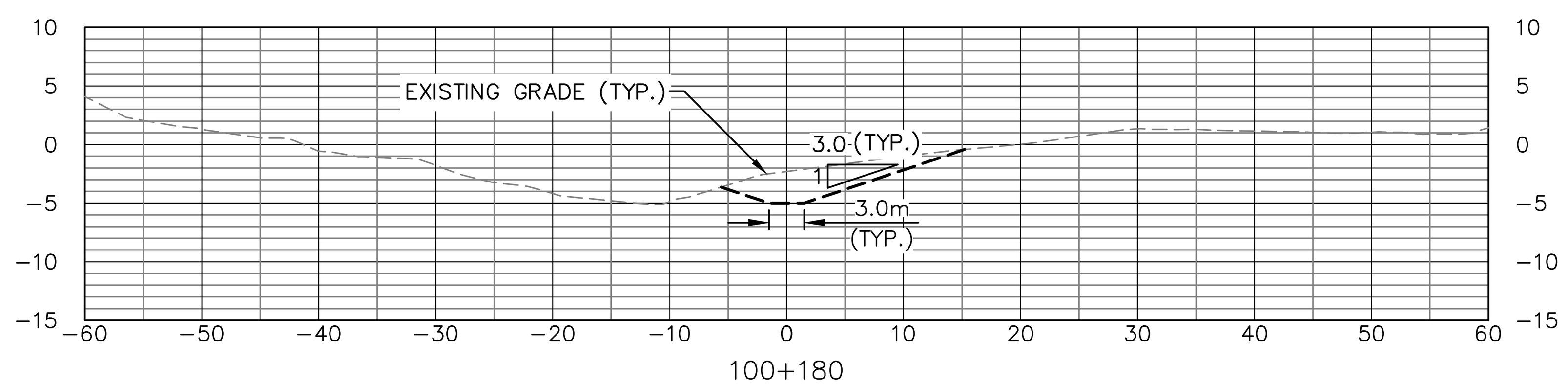
RIVER CHANNEL REALIGNMENT PLAN AND PROFILE STA 100+000 TO 101+200

DRAWING NAME: Y:\HALIFAX\DATA\PROJECTS\171046.00 AVON RIVER ABOITEAU\20 CAD\01 CIVIL\04 DRAWING SHEETS\171046.00 – C014 – ABOITEAU CHANNEL REALIGNMENT PLAN AND PROFILE.DWG LAYOUT NAME: C014 PLOT DATE: March 25, 2022 9:29:59 AM CAD OPERATOR: MZHOU

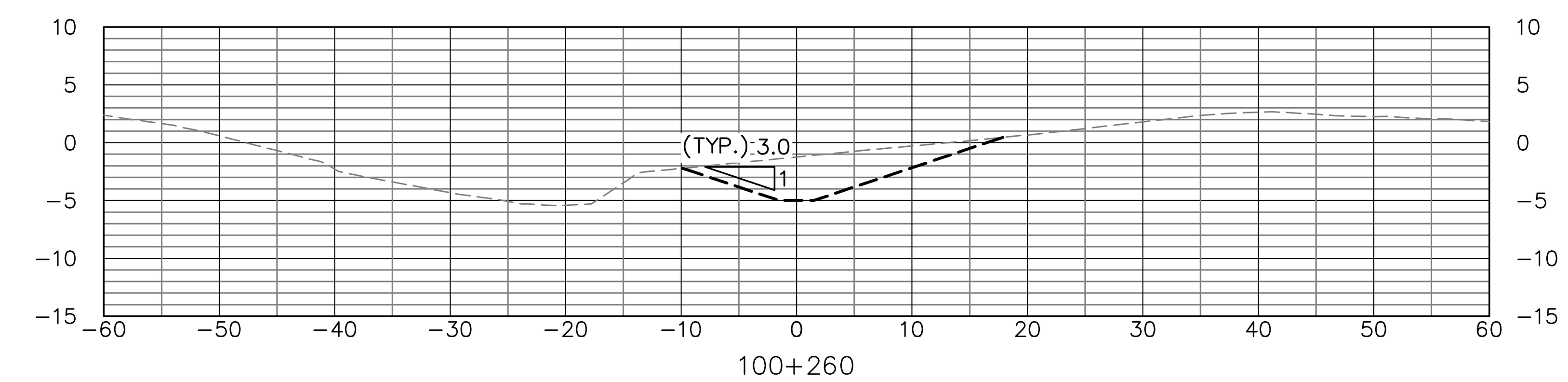
AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

RIVER CHANNEL REALIGNMENT CROSS SECTIONS - SHEET 1

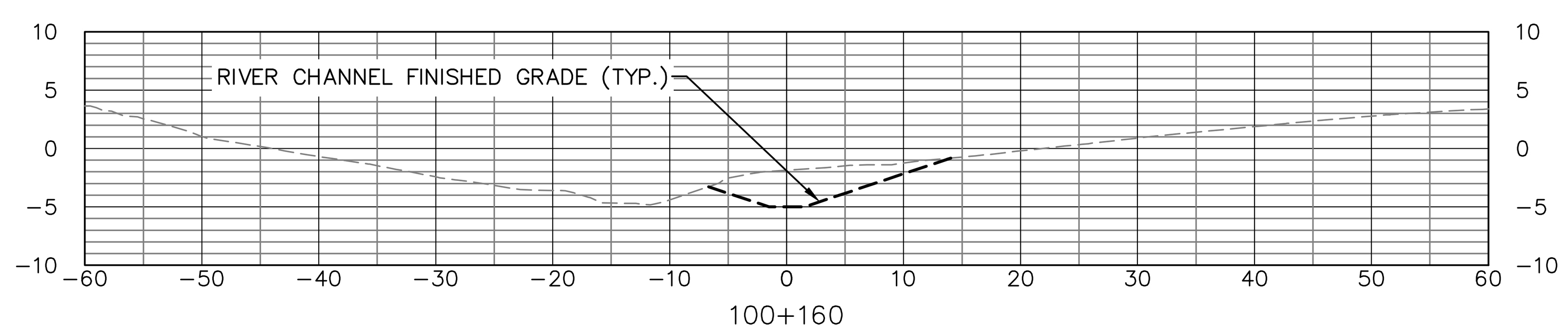
C015



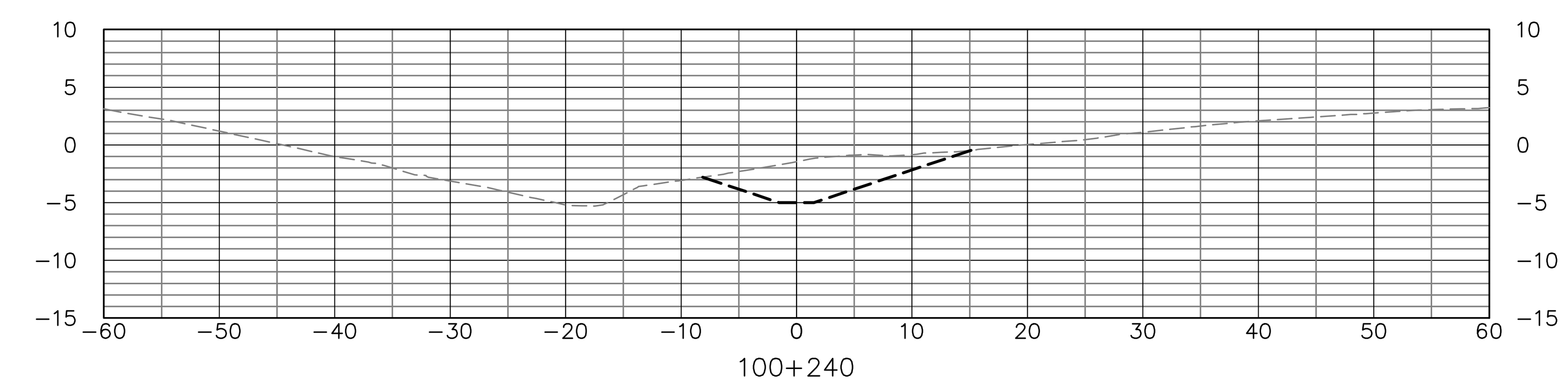
100+180



100+260



100+160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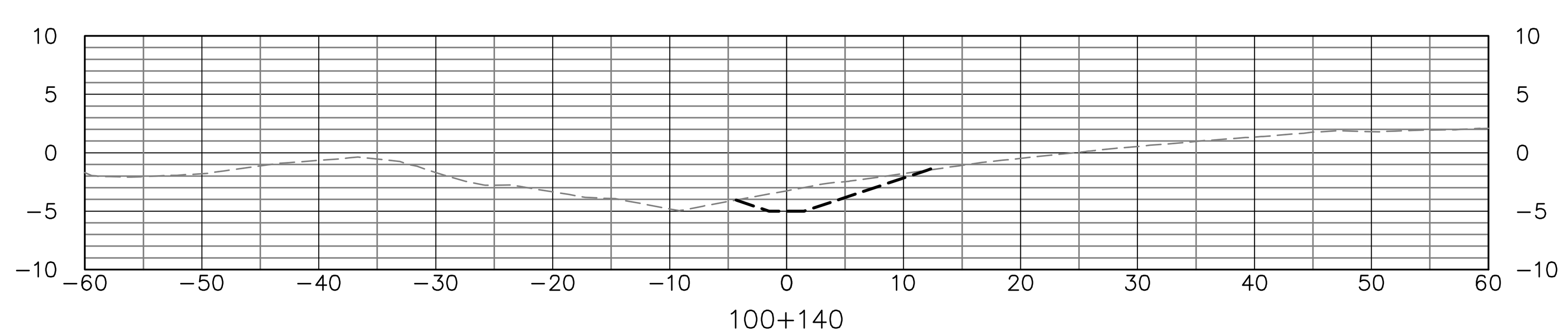
NOTES:
1. FOR CROSS SECTION DETAILS, SEE TYPICAL SECTIONS DRAWING NO. C023.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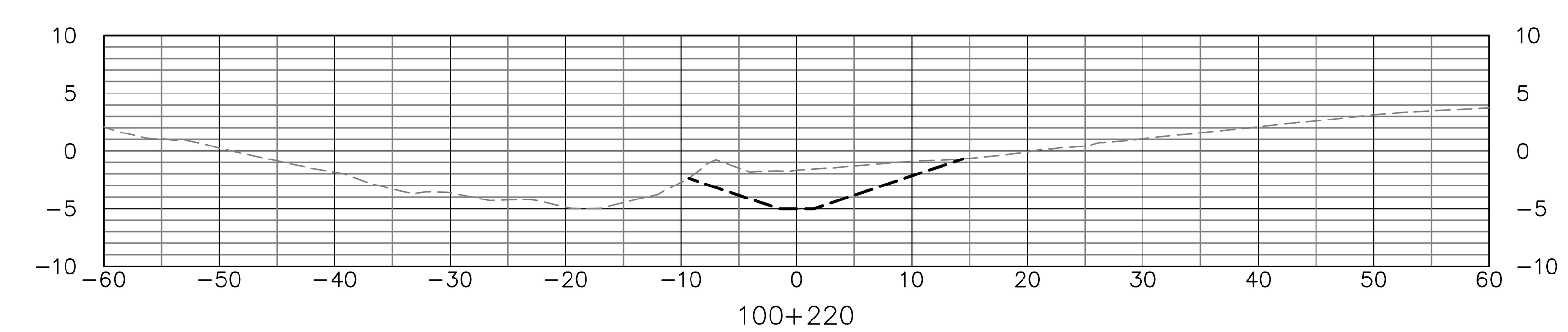
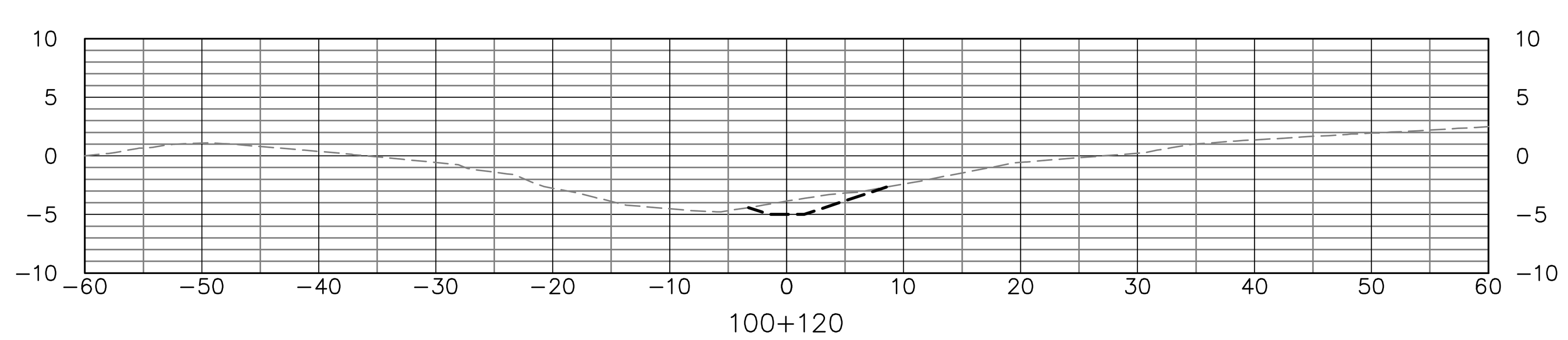
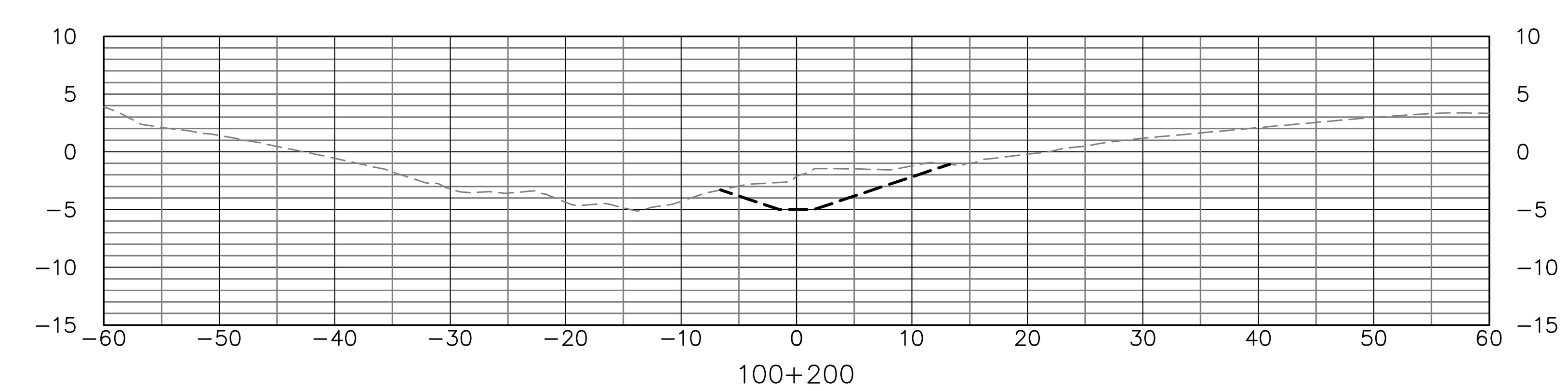
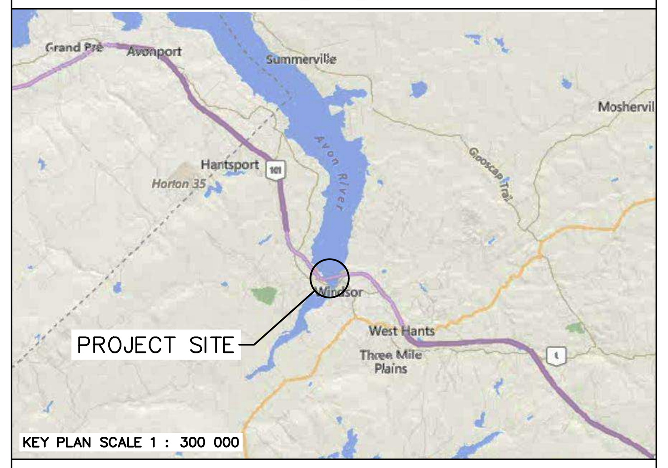

100+220


100+120


100+200

KEY PLAN



LEGEND

CONTROL MONUMENT	SEWER MANHOLE
N.S. ACT. CONTROL STN.	WELL
CALCULATED COORDINATE	WOODEN GUARD POST
IRON BAR	WATER VALVE
IRON PIPE	GAS METER
SURVEY MARKER	GAS VALVE
CUT CROSS	RAILROAD SWITCH BOX
ROCK POST	RAILROAD SIGNAL POLE
WOODEN POST	SOFTWOOD TREE
PL,FD PLACED, FOUND	HARDWOOD TREE
CD,A,R CHORD, ARC, RADIUS	BUSH
CENTRELINE	CULVERT
GUIDE POLE	BUILDING
UTILITY POLE	OHWM ORDINARY HIGH WATER MARK
CATCH BASIN	TRAFFIC SIGNAL – NEW
FIRE HYDRANT	TRAFFIC SIGNAL – EXISTING
FLAG POLE	TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – NEW
FIBRE OPTIC MARKER	TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – EXISTING
GUIDE POST	HIGHWAY LIGHT – NEW
GAS TANK	HIGHWAY LIGHT – EXISTING
TELEPHONE JUNCTION BOX	JUNCTION BOX
GUY WIRE	ELECTRICAL SERVICE POST
MAIL BOX	TRAFFIC SIGNAL CONTROL PAD
UTILITY MANHOLE	VEHICLE DETECTOR LOOP
SIGN	UNDERGROUND CONDUIT
DESIGN POINT	
DIRECTION OF FLOW	

EXISTING GRADE
FINISHED GRADE
SUBGRADE
EXCAVATION

U/S – UPSTREAM	D/S – DOWNSTREAM
RC – REVERSE CROWN	LC – LEVEL CROWN
NC – NORMAL CROWN	FS – FULL SUPERELEVATION
BC – BEGINNING OF CURVE	EC – END OF CURVE
EOP – EDGE OF PAVEMENT	ETL – EDGE OF TRAVEL LANE
ESH – EDGE OF SHOULDER	PRC – POINT OF REVERSE CURVATURE
PCC – POINT OF COMPOUND CURVATURE	

0 10.0 20.0 30.0 40.0 50.0m
1:500

CBCL

PROJECT: 171046

Designed by:	C. FISHER
Surveyed by:	
Drawn by:	M. ZHOU
Checked by:	R. GIFFIN
Approved by:	

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW

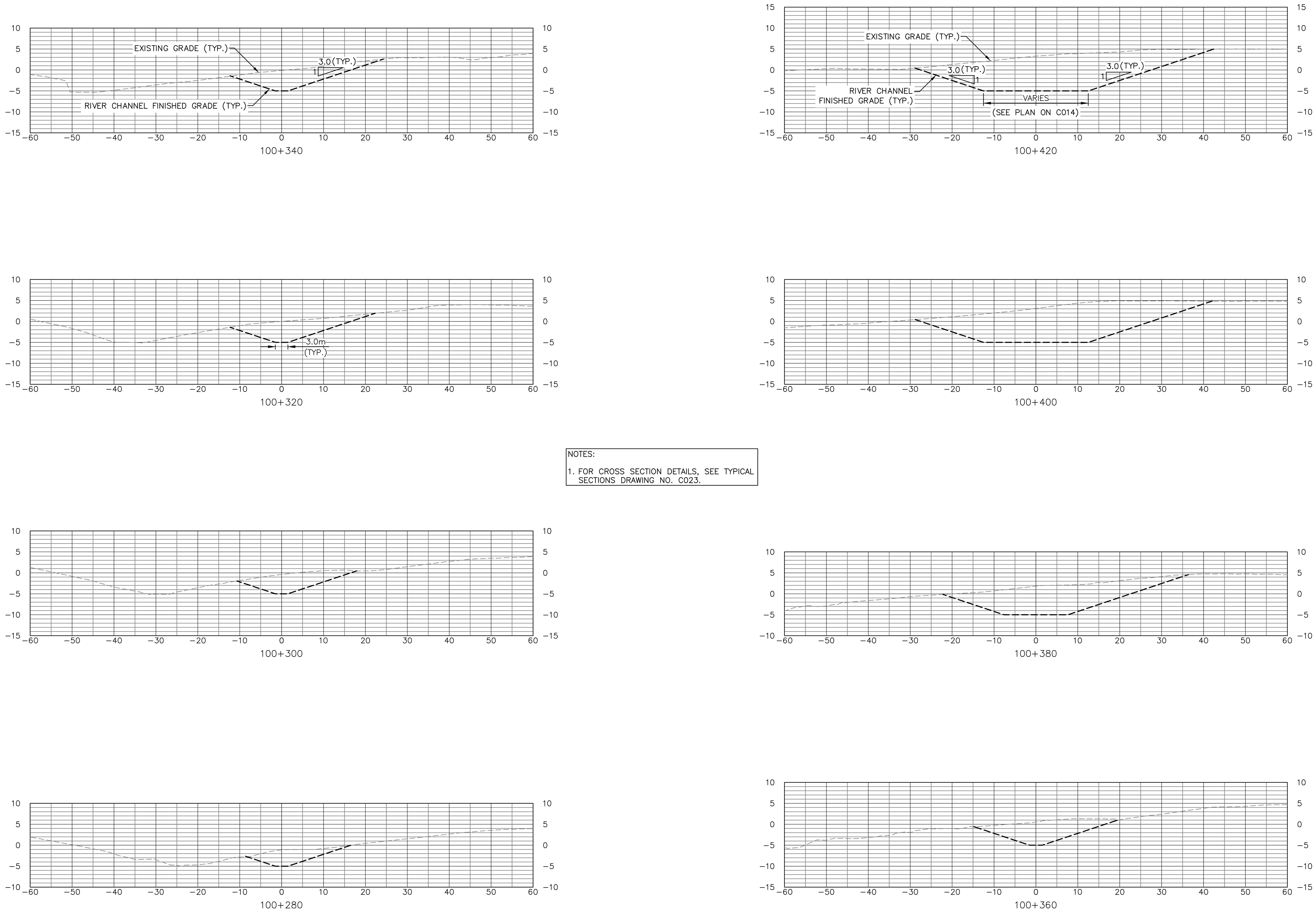
NOVA SCOTIA Public Works

Scale: (H) 1:500 (V) 1:500
Date: OCTOBER 2019
File No. : C015
Sheet No. : 15 of 31

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE
HIGHWAY 101 HANTS COUNTY

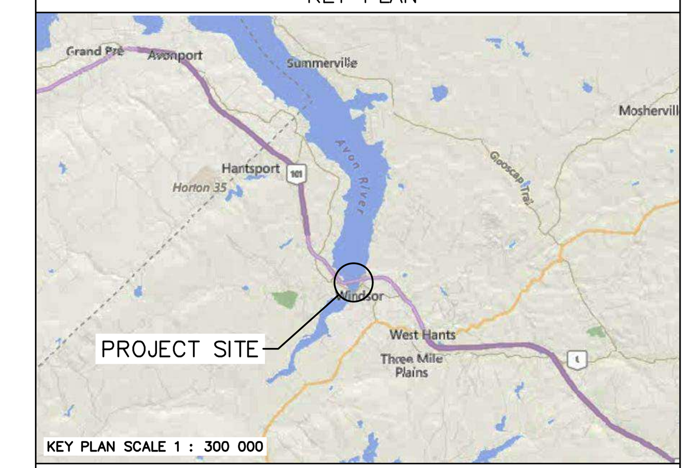
RIVER CHANNEL REALIGNMENT CROSS SECTIONS STA 100+120 TO 100+260 - SHEET 1

DRAWING NAME: Y:\HALIFAX\DATA\PROJECTS\171046.00 AVON RIVER ABOITEAU\20 CAD\01 CIVIL\04 DRAWING SHEETS\171046.00 – C015 – C020 – ABOITEAU CHANNEL REALIGNMENT CROSS SECTIONS.DWG LAYOUT NAME: C015 PLOT DATE: March 25, 2022 9:34:52 AM CAD OPERATOR: MZHOU



NOTES:
1. FOR CROSS SECTION DETAILS, SEE TYPICAL SECTIONS DRAWING NO. C023.

KEY PLAN



LEGEND

	CONTROL MONUMENT		SEWER MANHOLE
	N.S. ACT. CONTROL STN.		WELL
	CALCULATED COORDINATE		WOODEN GUARD POST
	IRON BAR		WATER VALVE
	IRON PIPE		GAS METER
	SURVEY MARKER		GAS VALVE
	CUT CROSS		RAILROAD SWITCH BOX
	ROCK POST		RAILROAD SIGNAL POLE
	WOODEN POST		SOFTWOOD TREE
PL,FD	PLACED, FOUND		HARDWOOD TREE
CD,A,R	CHORD, ARC, RADIUS		BUSH
	CENTRELINE		CULVERT
	GUIDE POLE		BUILDING
	UTILITY POLE	OHWM	ORDINARY HIGH WATER MARK
	CATCH BASIN		TRAFFIC SIGNAL – NEW
	FIRE HYDRANT		TRAFFIC SIGNAL – EXISTING
	FLAG POLE		TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – NEW
	FIBRE OPTIC MARKER		TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – EXISTING
	GUIDE POST		HIGHWAY LIGHT – NEW
	GAS TANK		HIGHWAY LIGHT – EXISTING
	TELEPHONE JUNCTION BOX		JUNCTION BOX
	GUY WIRE		ELECTRICAL SERVICE POST
	MAIL BOX		TRAFFIC SIGNAL CONTROL PAD
	UTILITY MANHOLE		VEHICLE DETECTOR LOOP
	SIGN		UNDERGROUND CONDUIT
	DESIGN POINT		
	DIRECTION OF FLOW		

EXISTING GRADE
FINISHED GRADE
SUBGRADE
EXCAVATION

U/S – UPSTREAM	D/S – DOWNSTREAM
RC – REVERSE CROWN	LC – LEVEL CROWN
NC – NORMAL CROWN	FS – FULL SUPERELEVATION
BC – BEGINNING OF CURVE	EC – END OF CURVE
EOP – EDGE OF PAVEMENT	ETL – EDGE OF TRAVEL LANE
ESH – EDGE OF SHOULDER	PRC – POINT OF REVERSE CURVATURE
PCC – POINT OF COMPOUND CURVATURE	

0 10.0 20.0 30.0 40.0 50.0m
1:500

CBCL

PROJECT: 171046

Designed by:	C. FISHER
Surveyed by:	
Drawn by:	M. ZHOU
Checked by:	R. GIFFIN
Approved by:	

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
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NOVA SCOTIA
Public Works

Scale: (H) 1:500 (V) 1:500
Date: OCTOBER 2019
File No.: C016
Sheet No.: 16 of 31

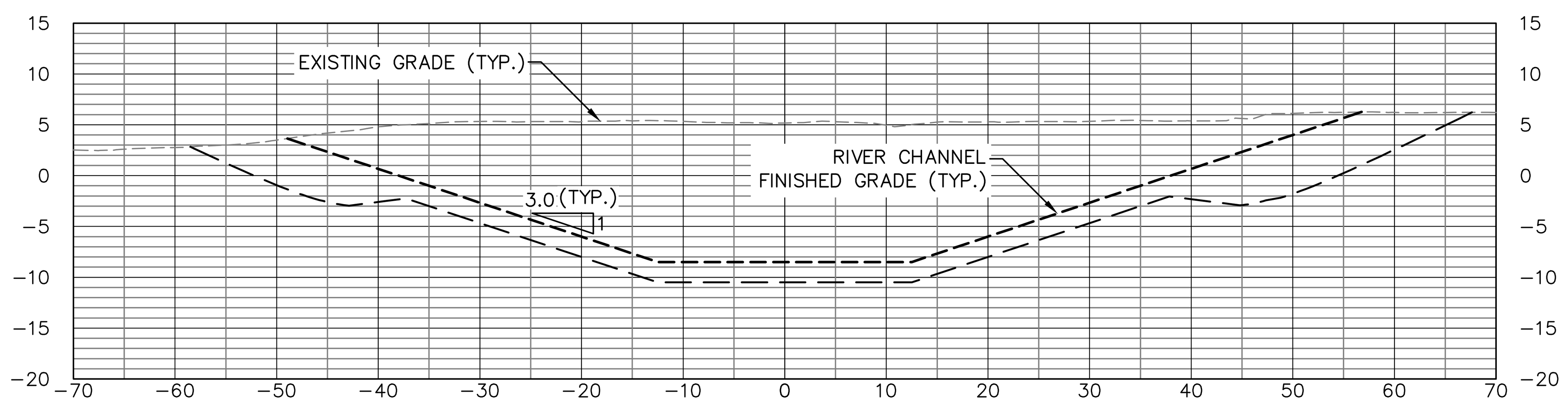
AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE
HIGHWAY 101 HANTS COUNTY

ABOITEAU CHANNEL REALIGNMENT CROSS SECTIONS STA 100+280 TO 100+420 - SHEET 2

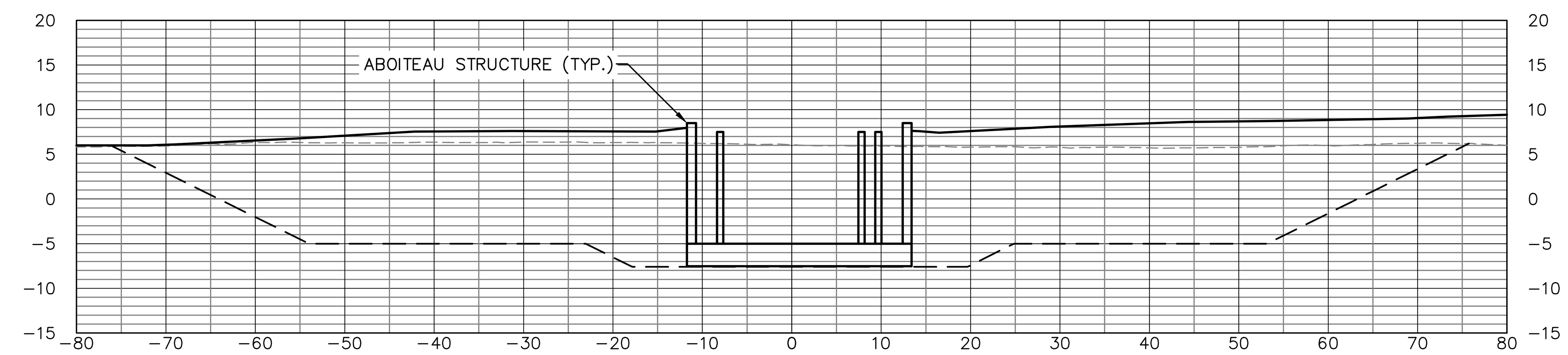
C017

RIVER CHANNEL REALIGNMENT CROSS SECTIONS - SHEET 3

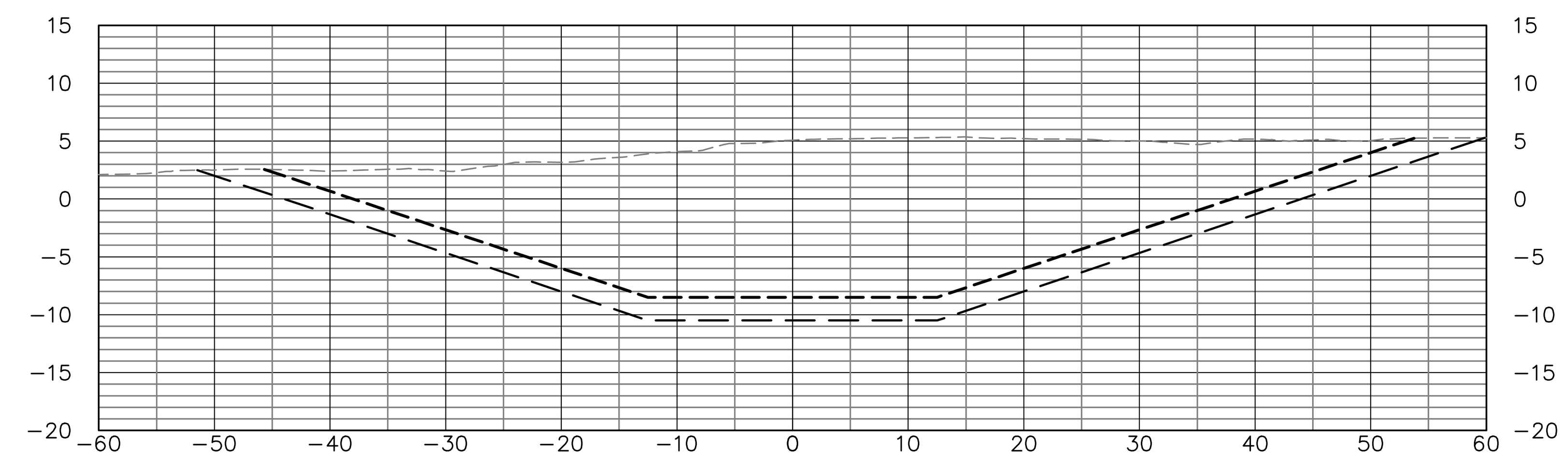
AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE



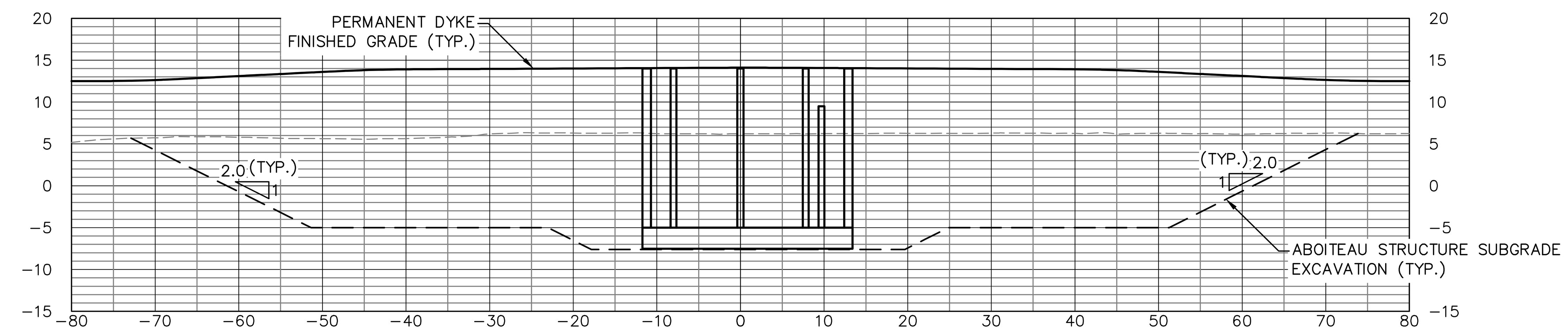
100+500



100+580



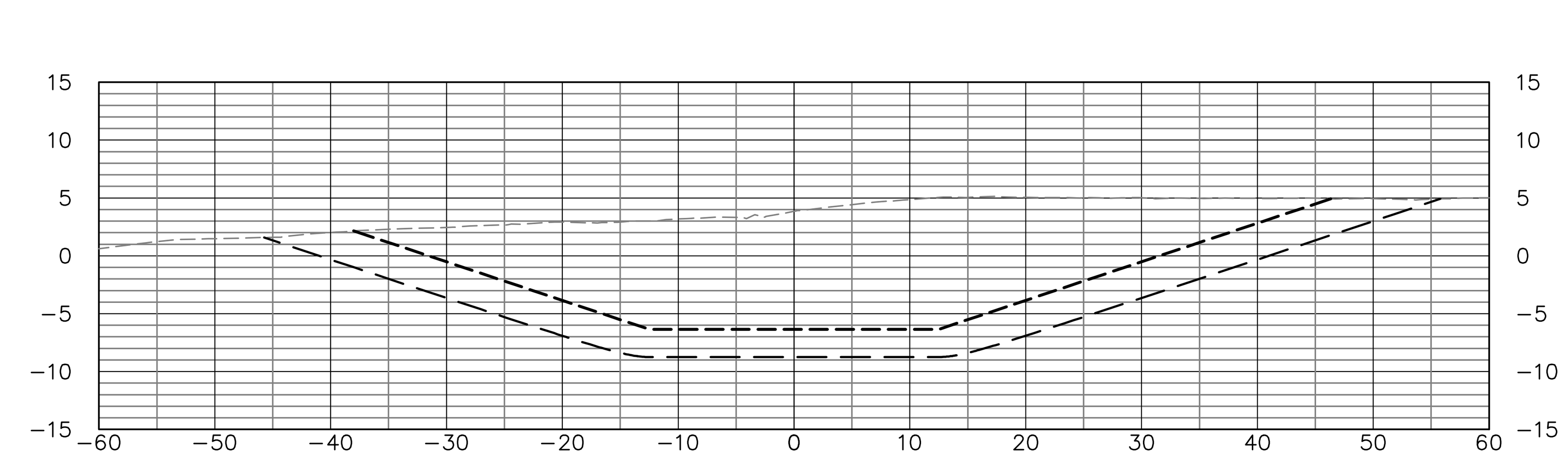
100+480



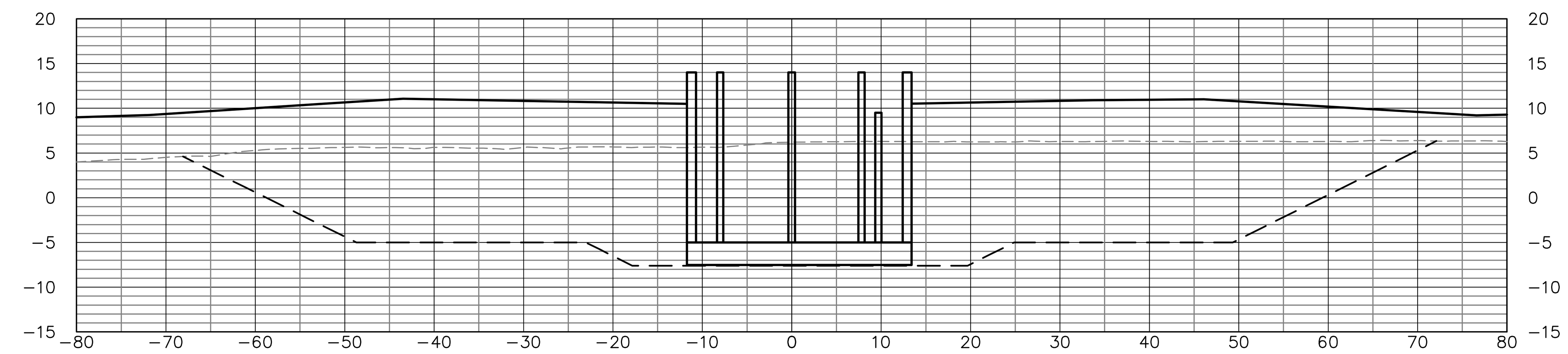
100+560

NOTES:

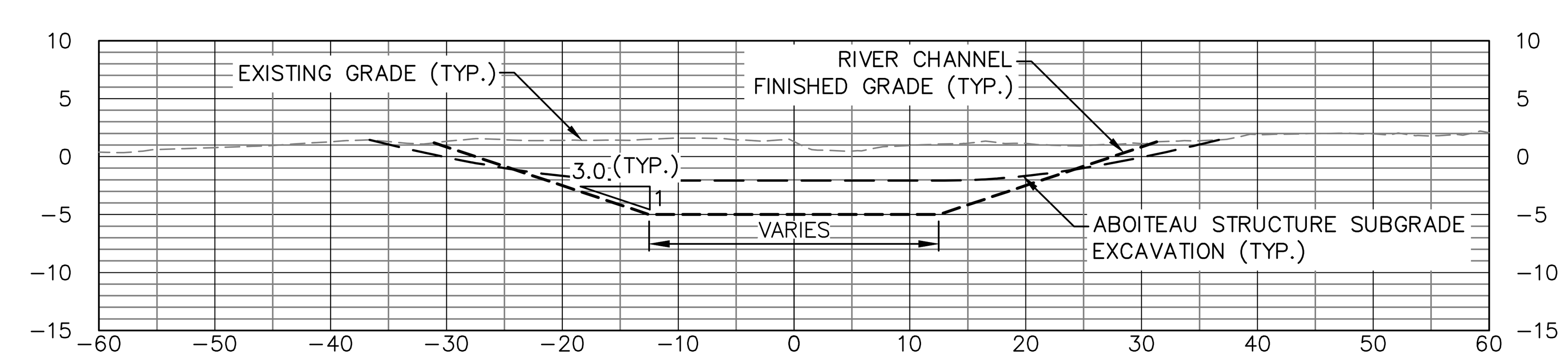
1. FOR CROSS SECTION DETAILS, SEE TYPICAL SECTIONS DRAWING NO. C023.



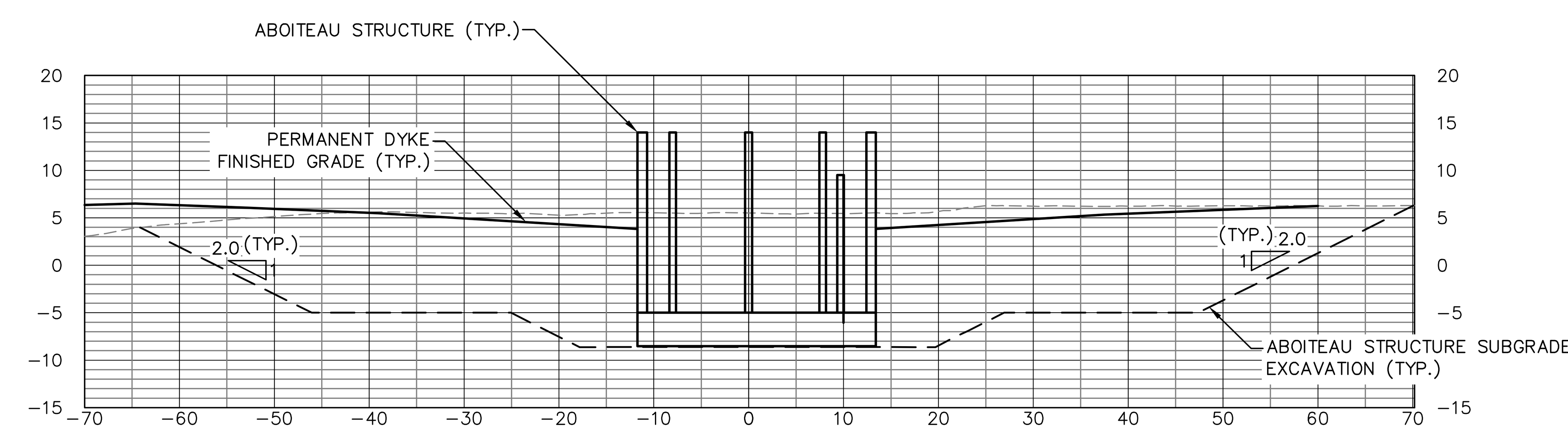
100+460



100+540

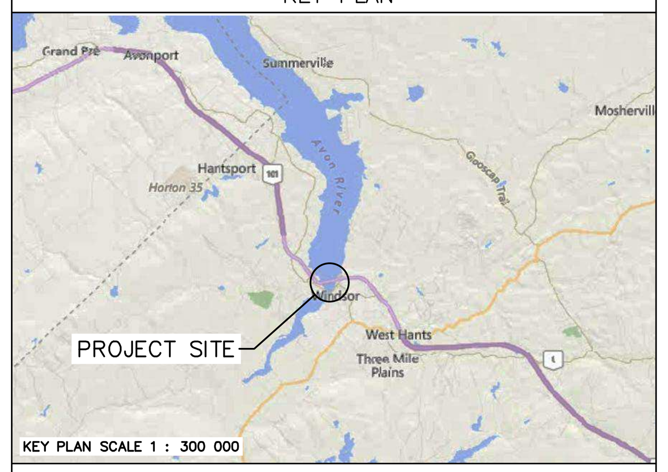


100+440



100+520

KEY PLAN



LEGEND

CONTROL MONUMENT
N.S. ACT. CONTROL STN.
CALCULATED COORDINATE
IRON BAR
IRON PIPE
SURVEY MARKER
CUT CROSS
ROCK POST
WOODEN POST
PL,FD PLACED, FOUND
CD,A,R CHORD, ARC, RADIUS
CENTRELINE
GUIDE POLE
UTILITY POLE
CATCH BASIN
FIRE HYDRANT
FLAG POLE
FIBRE OPTIC MARKER
GUIDE POST
GAS TANK
TELEPHONE JUNCTION BOX
GUY WIRE
MAIL BOX
UTILITY MANHOLE
SIGN
DESIGN POINT
DIRECTION OF FLOW
SEWER MANHOLE
WELL
WOODEN GUARD POST
WATER VALVE
GAS METER
GAS VALVE
RAILROAD SWITCH BOX
RAILROAD SIGNAL POLE
SOFTWOOD TREE
HARDWOOD TREE
BUSH
CULVERT
BUILDING
OHWM ORDINARY HIGH WATER MARK
TRAFFIC SIGNAL – NEW
TRAFFIC SIGNAL – EXISTING
TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – NEW
TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – EXISTING
HIGHWAY LIGHT – NEW
HIGHWAY LIGHT – EXISTING
JUNCTION BOX
ELECTRICAL SERVICE POST
TRAFFIC SIGNAL CONTROL PAD
VEHICLE DETECTOR LOOP
UNDERGROUND CONDUIT

EXISTING GRADE
FINISHED GRADE
SUBGRADE
EXCAVATION

U/S – UPSTREAM
RC – REVERSE CROWN
NC – NORMAL CROWN
BC – BEGINNING OF CURVE
EOP – EDGE OF PAVEMENT
ESH – EDGE OF SHOULDER
PCC – POINT OF COMPOUND CURVATURE
D/S – DOWNSTREAM
LC – LEVEL CROWN
FS – FULL SUPERELEVATION
EC – END OF CURVE
ETL – EDGE OF TRAVEL LANE
PRC – POINT OF REVERSE CURVATURE

0 10.0 20.0 30.0 40.0 50.0m
1:500

CBCL

PROJECT: 171046

Designed by:	C. FISHER
Surveyed by:	
Drawn by:	M. ZHOU
Checked by:	R. GIFFIN
Approved by:	

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW

NOVA SCOTIA Public Works

Scale: (H) 1:500 (V) 1:500
Date: OCTOBER 2019
File No. : C017
Sheet No. : 17 of 31

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

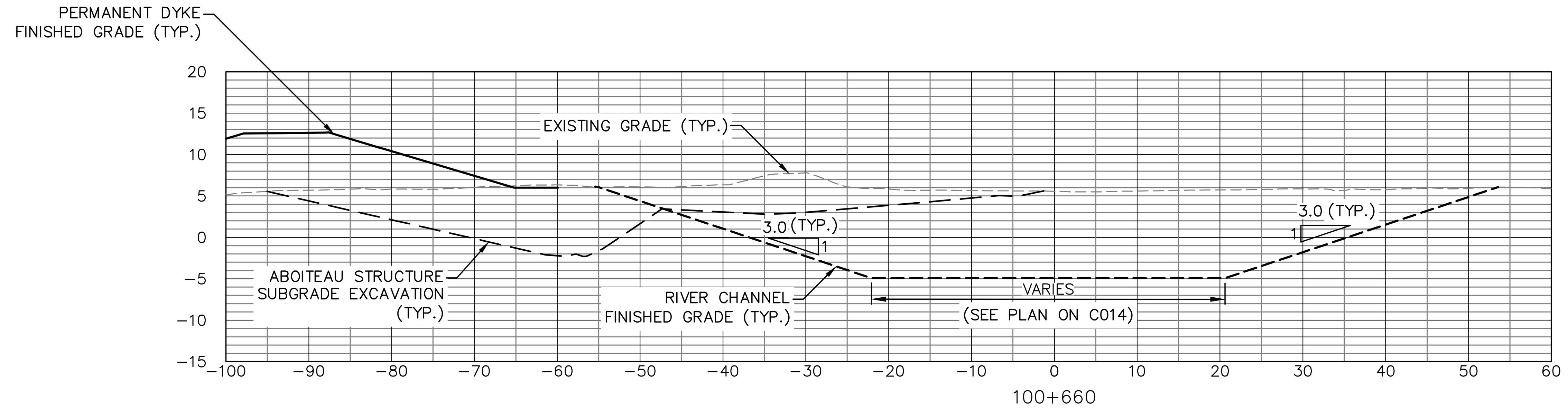
HIGHWAY 101 HANTS COUNTY

ABOITEAU CHANNEL REALIGNMENT CROSS SECTIONS STA 100+440 TO 100+580 - SHEET 3

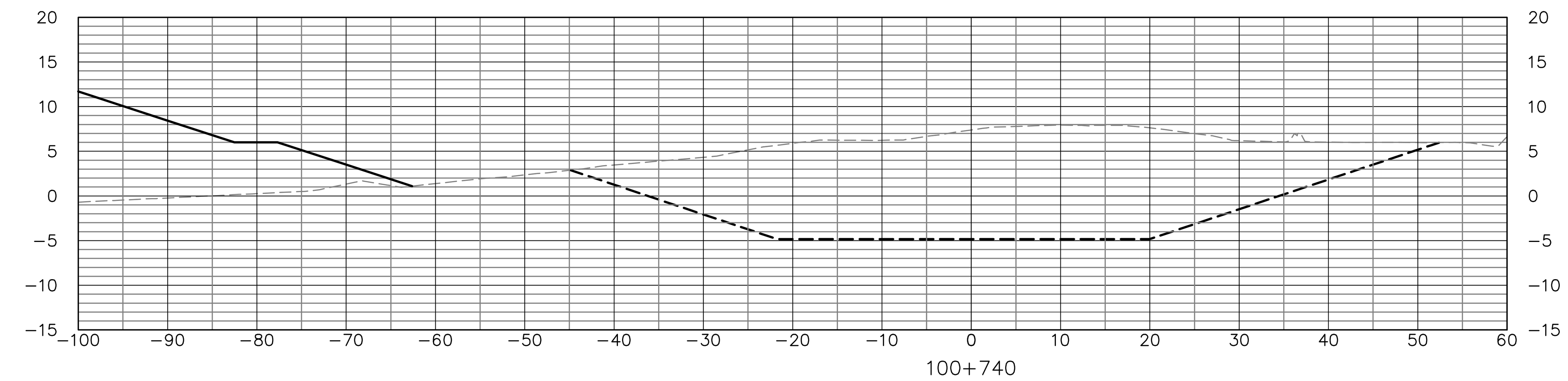
C018

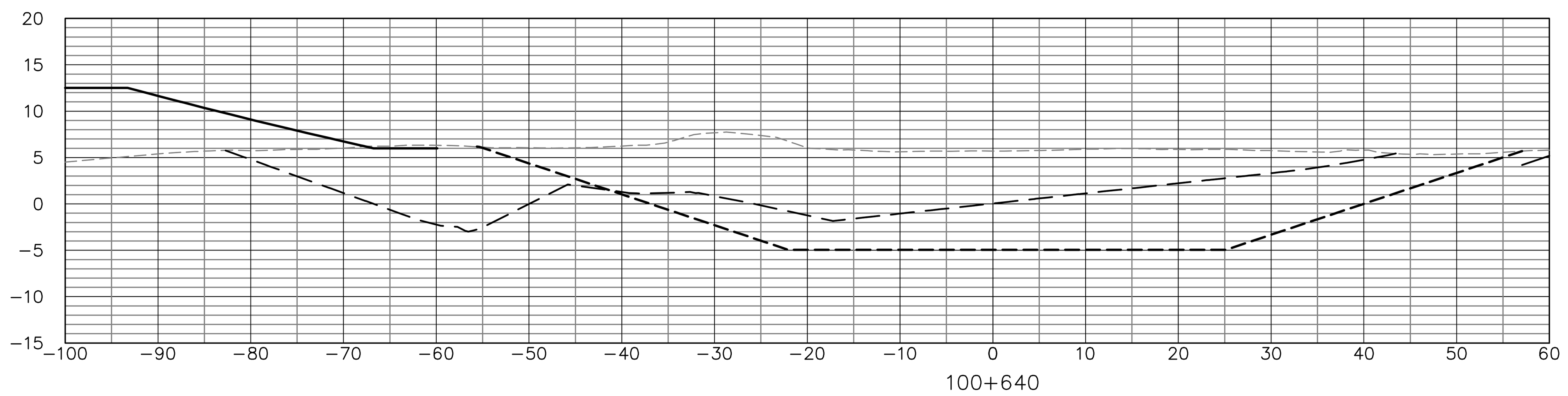
RIVER CHANNEL REALIGNMENT CROSS SECTIONS - SHEET 4

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE



100+660


100+740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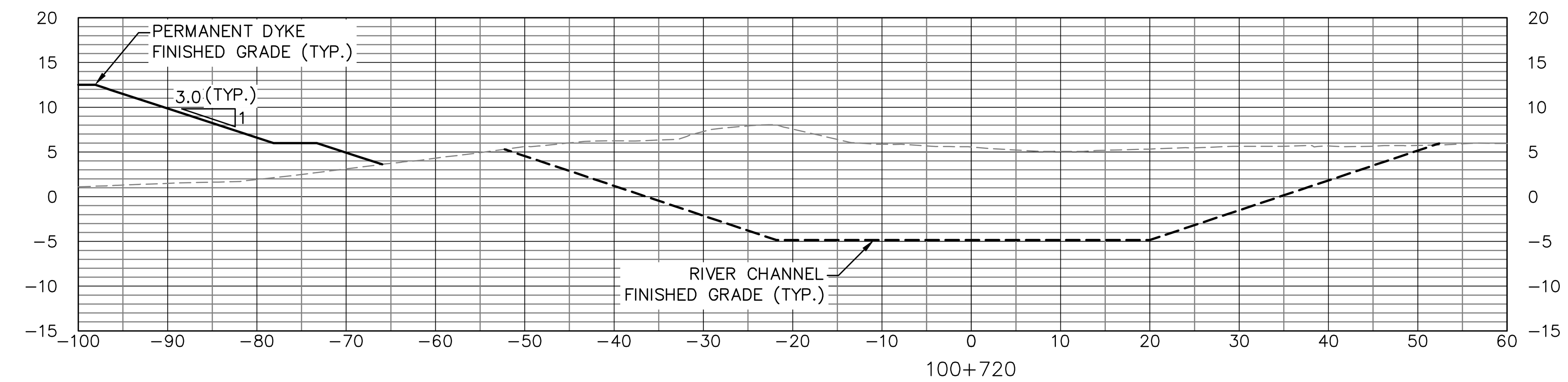
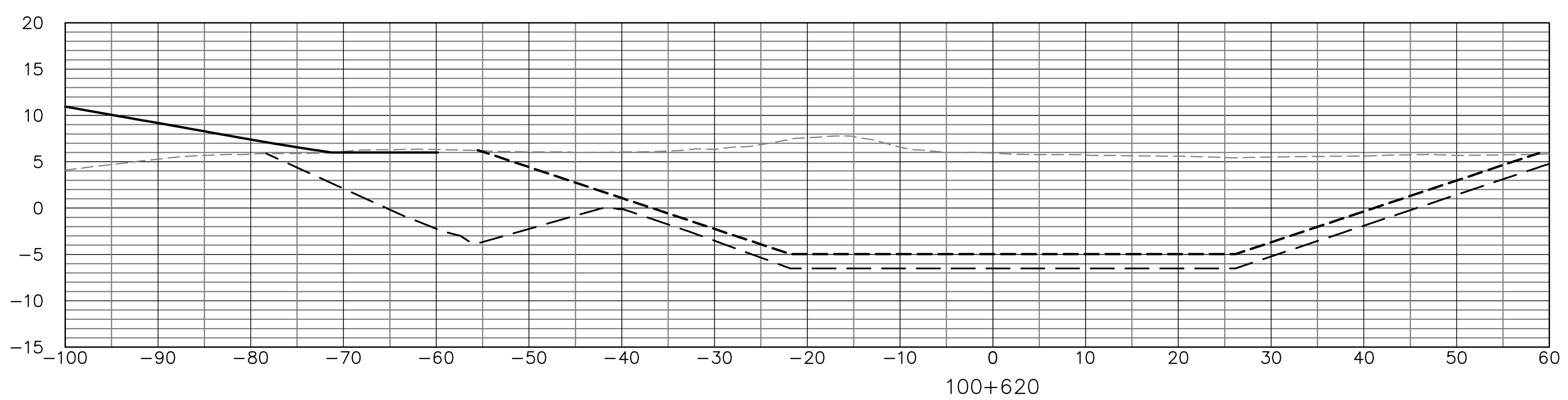
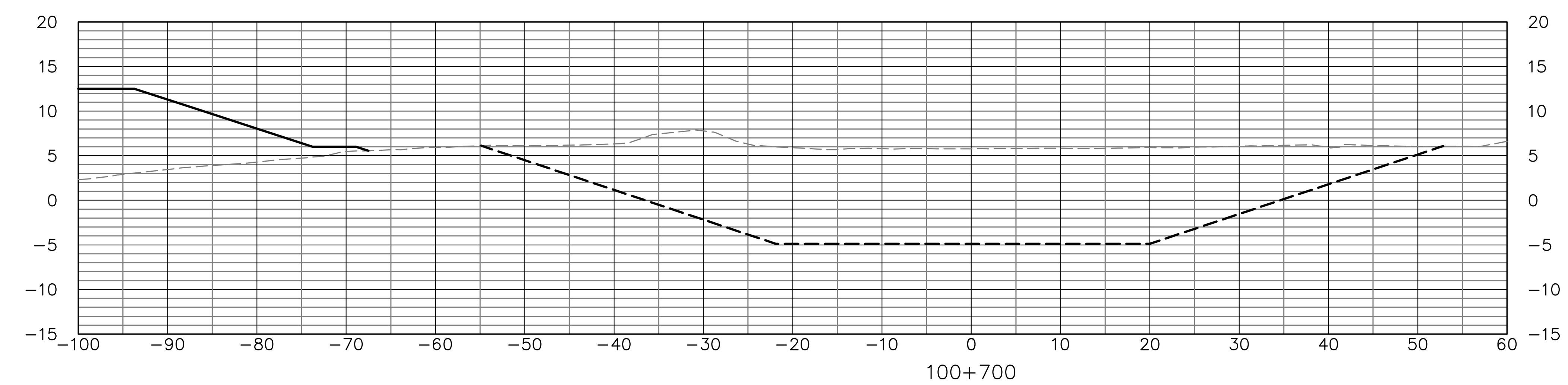
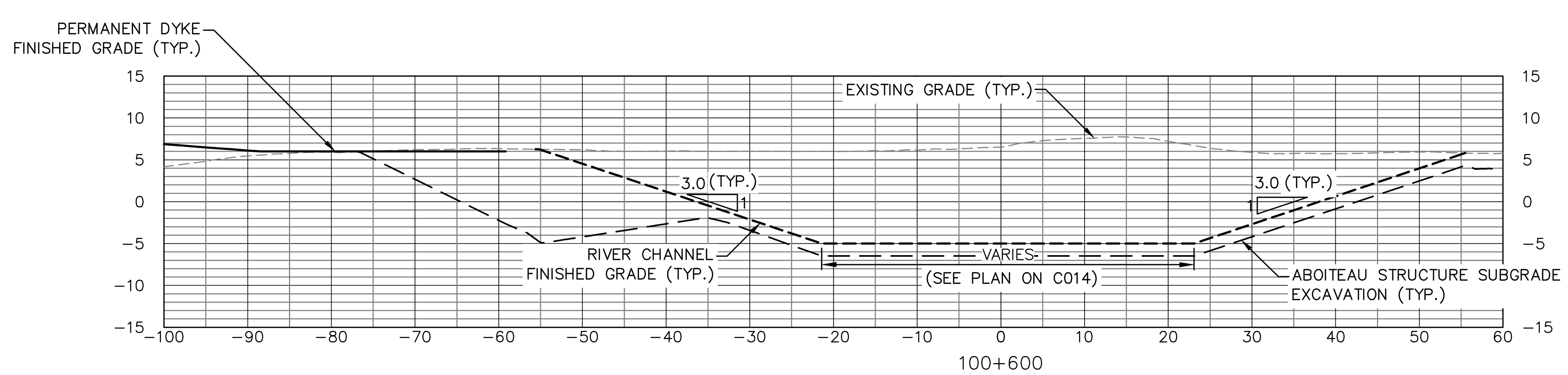


100+720

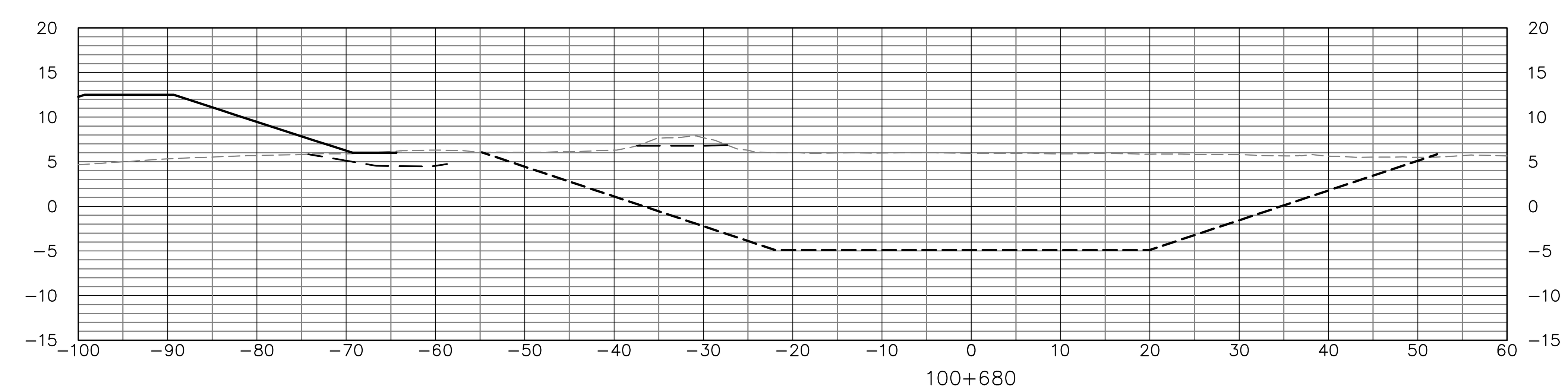
NOTES:
1. FOR CROSS SECTION DETAILS, SEE TYPICAL SECTIONS DRAWING NO. C023.


100+620

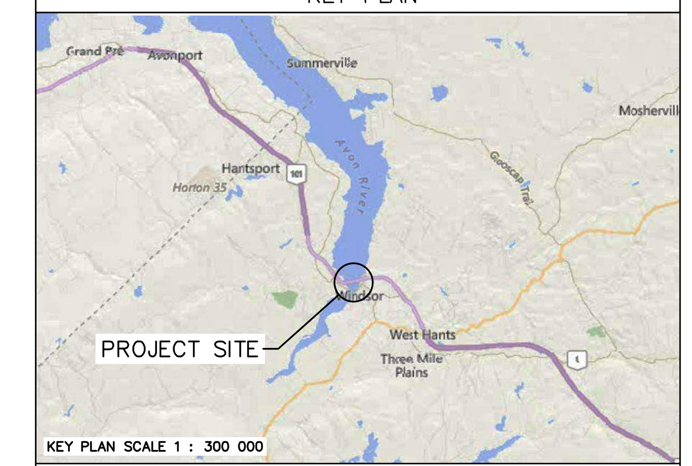

100+700



100+600


100+680

KEY PLAN



LEGEND

CONTROL MONUMENT; N.S. ACT. CONTROL STN.; CALCULATED COORDINATE; IRON BAR; IRON PIPE; SURVEY MARKER; CUT CROSS; ROCK POST; WOODEN POST; PLACED, FOUND; CHORD, ARC, RADIUS; CENTRELINE; GUIDE POLE; UTILITY POLE; CATCH BASIN; FIRE HYDRANT; FLAG POLE; FIBRE OPTIC MARKER; GUIDE POST; GAS TANK; TELEPHONE JUNCTION BOX; GUY WIRE; MAIL BOX; UTILITY MANHOLE; SIGN; DESIGN POINT; DIRECTION OF FLOW

SEWER MANHOLE; WELL; WOODEN GUARD POST; WATER VALVE; GAS METER; GAS VALVE; RAILROAD SWITCH BOX; RAILROAD SIGNAL POLE; SOFTWOOD TREE; HARDWOOD TREE; BUSH; CULVERT; BUILDING; OHWM ORDINARY HIGH WATER MARK; TRAFFIC SIGNAL – NEW; TRAFFIC SIGNAL – EXISTING; TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – NEW; TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – EXISTING; HIGHWAY LIGHT – NEW; HIGHWAY LIGHT – EXISTING; JUNCTION BOX; ELECTRICAL SERVICE POST; TRAFFIC SIGNAL CONTROL PAD; VEHICLE DETECTOR LOOP; UNDERGROUND CONDUIT

EXISTING GRADE; FINISHED GRADE; SUBGRADE; EXCAVATION

U/S – UPSTREAM
RC – REVERSE CROWN
NC – NORMAL CROWN
BC – BEGINNING OF CURVE
EOP – EDGE OF PAVEMENT
ESH – EDGE OF SHOULDER
PCC – POINT OF COMPOUND CURVATURE
D/S – DOWNSTREAM
LC – LEVEL CROWN
FS – FULL SUPERELEVATION
EC – END OF CURVE
ETL – EDGE OF TRAVEL LANE
PRC – POINT OF REVERSE CURVATURE

0 10.0 20.0 30.0 40.0 50.0m
1:500

CBCL

PROJECT: 171046

Designed by: C. FISHER
Surveyed by:
Drawn by: M. ZHOU
Checked by: R. GIFFIN
Approved by:

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW

NOVA SCOTIA Public Works

Scale: (H) 1:500 (V) 1:500
Date: OCTOBER 2019
File No. : C018
Sheet No. : 18 of 31

AVON RIVER ABOITEAU & DYKE REPLACEMENT UPGRADE
HIGHWAY 101 HANTS COUNTY

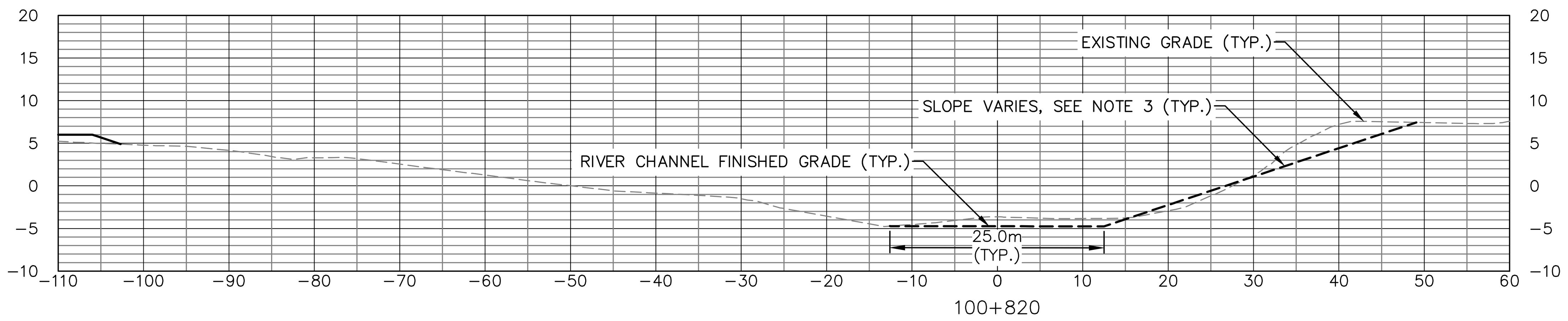
ABOITEAU CHANNEL REALIGNMENT CROSS SECTIONS STA 100+600 TO 100+740 - SHEET 4

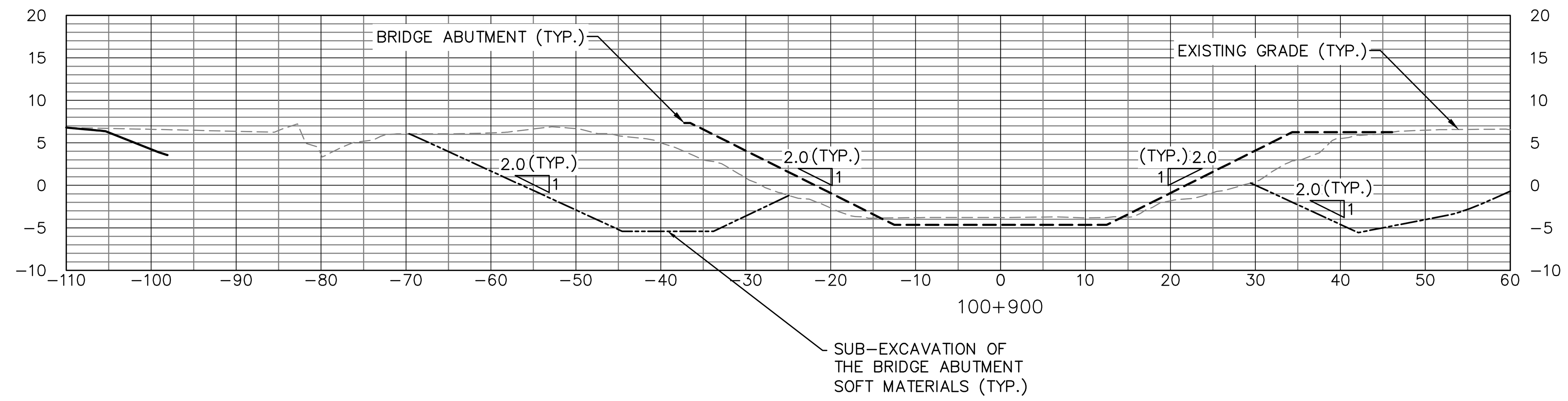
DRAWING NAME: Y:\HALIFAX\DATA\PROJECTS\171046.00 AVON RIVER ABOITEAU\20 CAD\01 CIVIL\04 DRAWING SHEETS\171046.00 – C015 – C020 – ABOITEAU CHANNEL REALIGNMENT CROSS SECTIONS.DWG LAYOUT NAME: C018 PLOT DATE: March 25, 2022 9:37:58 AM CAD OPERATOR: MZHOU

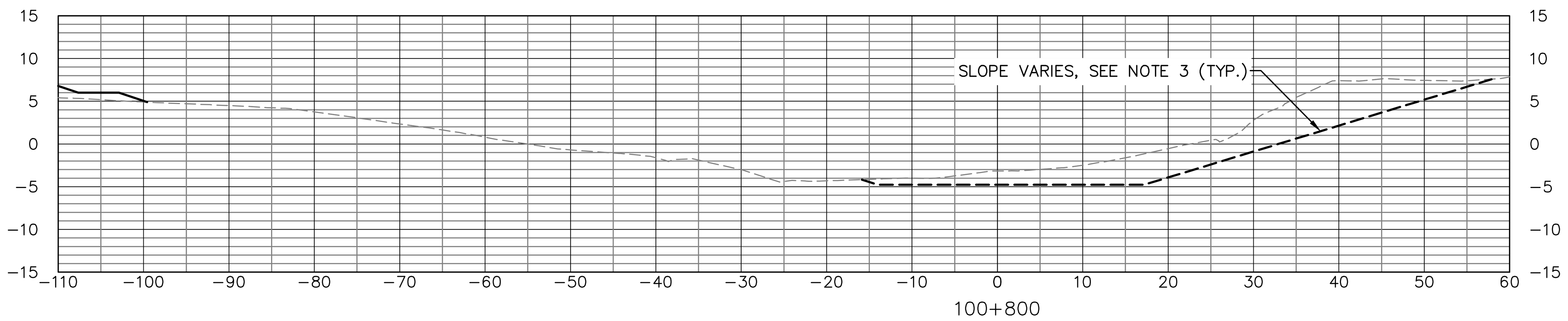
C019

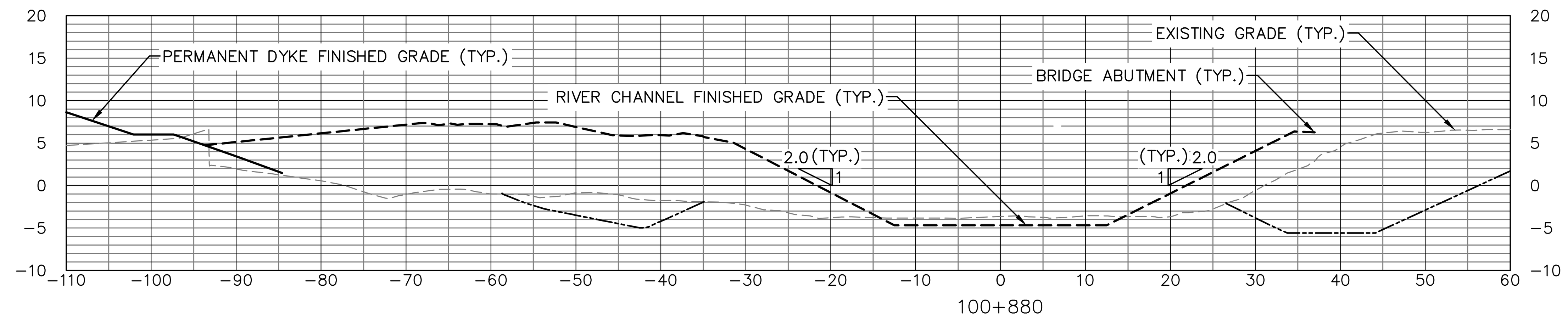
RIVER CHANNEL REALIGNMENT CROSS SECTIONS - SHEET 5

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE



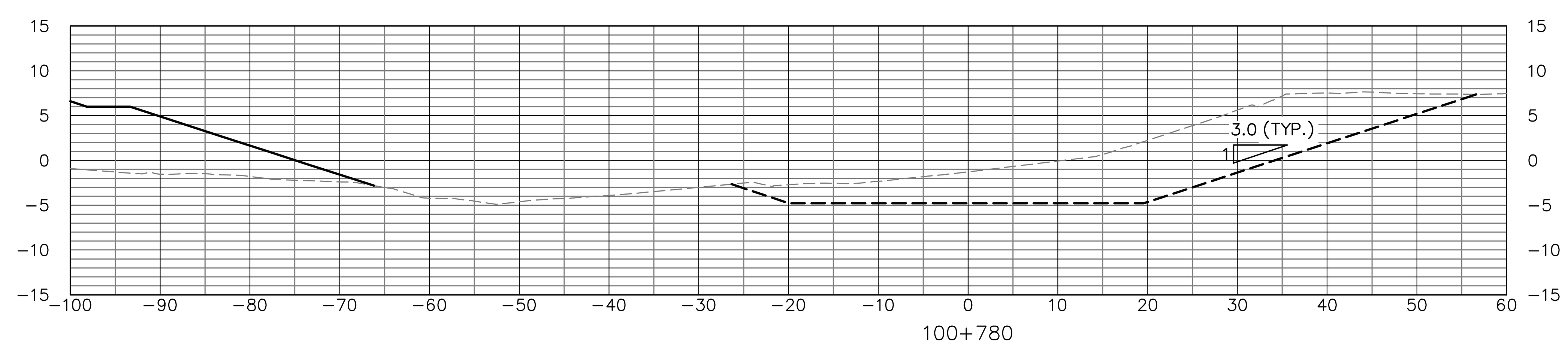


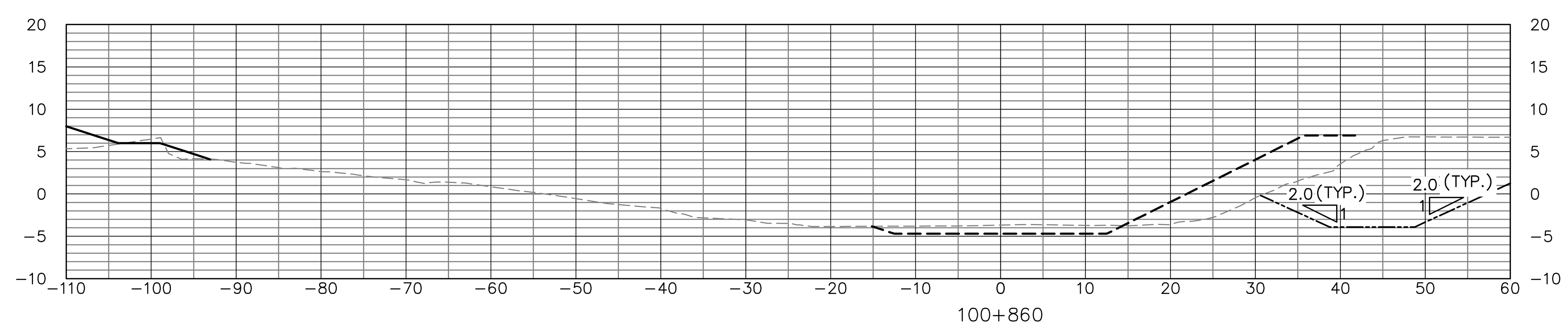


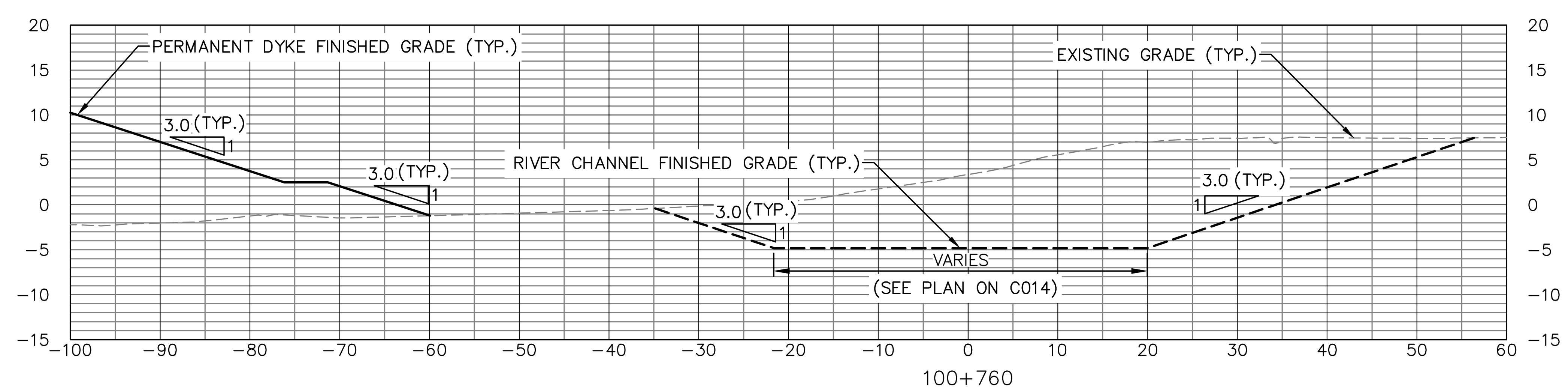


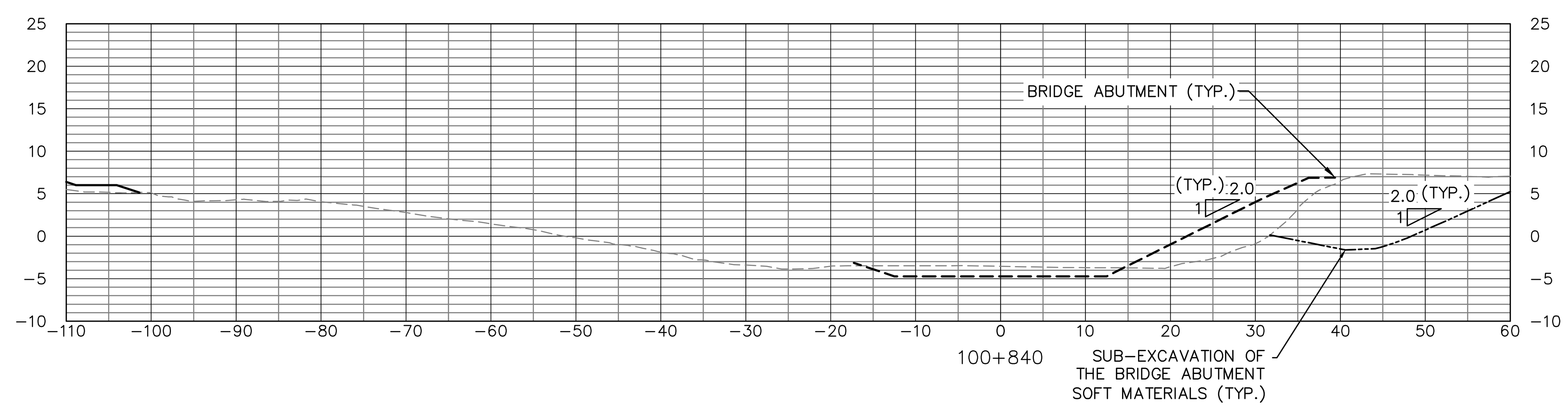
NOTES:

1. FOR CROSS SECTION DETAILS, SEE TYPICAL SECTIONS DRAWING NO. C023.
2. HIGHWAY 101 FINISHED GRADE IS NOT SHOWN.
3. SLOPE TRANSITIONS FROM 3:1 TO 2:1 BETWEEN STA 0+780 TO STA 0+840

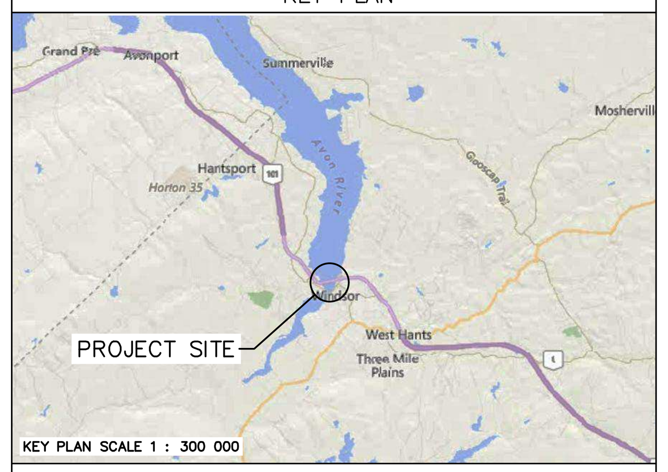








KEY PLAN



LEGEND

CONTROL MONUMENT; N.S. ACT. CONTROL STN.; CALCULATED COORDINATE; IRON BAR; IRON PIPE; SURVEY MARKER; CUT CROSS; ROCK POST; WOODEN POST; PL,FD PLACED, FOUND; CD,A,R CHORD, ARC, RADIUS; CENTRELINE; GUIDE POLE; UTILITY POLE; CATCH BASIN; FIRE HYDRANT; FLAG POLE; FIBRE OPTIC MARKER; GUIDE POST; GAS TANK; TELEPHONE JUNCTION BOX; GUY WIRE; MAIL BOX; UTILITY MANHOLE; SIGN; DESIGN POINT; DIRECTION OF FLOW; SEWER MANHOLE; WELL; WOODEN GUARD POST; WATER VALVE; GAS METER; GAS VALVE; RAILROAD SWITCH BOX; RAILROAD SIGNAL POLE; SOFTWOOD TREE; HARDWOOD TREE; BUSH; CULVERT; BUILDING; OHWM ORDINARY HIGH WATER MARK; TRAFFIC SIGNAL – NEW; TRAFFIC SIGNAL – EXISTING; TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – NEW; TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – EXISTING; HIGHWAY LIGHT – NEW; HIGHWAY LIGHT – EXISTING; JUNCTION BOX; ELECTRICAL SERVICE POST; TRAFFIC SIGNAL CONTROL PAD; VEHICLE DETECTOR LOOP; UNDERGROUND CONDUIT

EXISTING GRADE; FINISHED GRADE; SUBGRADE; EXCAVATION

U/S – UPSTREAM; D/S – DOWNSTREAM; RC – REVERSE CROWN; LC – LEVEL CROWN; NC – NORMAL CROWN; FS – FULL SUPERELEVATION; BC – BEGINNING OF CURVE; EC – END OF CURVE; EOP – EDGE OF PAVEMENT; ETL – EDGE OF TRAVEL LANE; ESH – EDGE OF SHOULDER; PRC – POINT OF REVERSE CURVATURE; PCC – POINT OF COMPOUND CURVATURE

0 10.0 20.0 30.0 40.0 50.0m
1:500

CBCL

PROJECT: 171046

Designed by:	C. FISHER
Surveyed by:	
Drawn by:	M. ZHOU
Checked by:	R. GIFFIN
Approved by:	

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW

NOVA SCOTIA Public Works

Scale: (H) 1:500 (V) 1:500
Date: OCTOBER 2019
File No. : C019
Sheet No. : 19 of 31

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

HIGHWAY 101 HANTS COUNTY

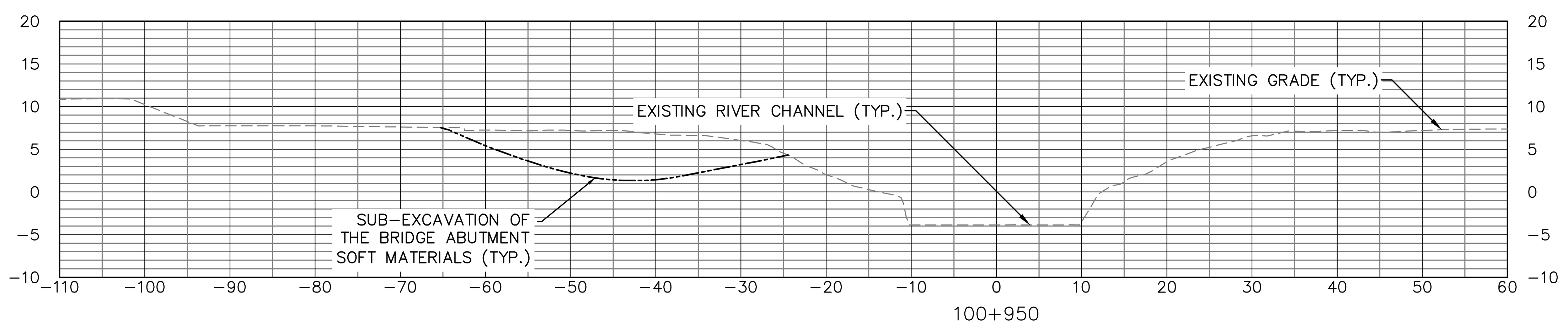
ABOITEAU CHANNEL REALIGNMENT CROSS SECTIONS STA 100+760 TO 100+900 - SHEET 5

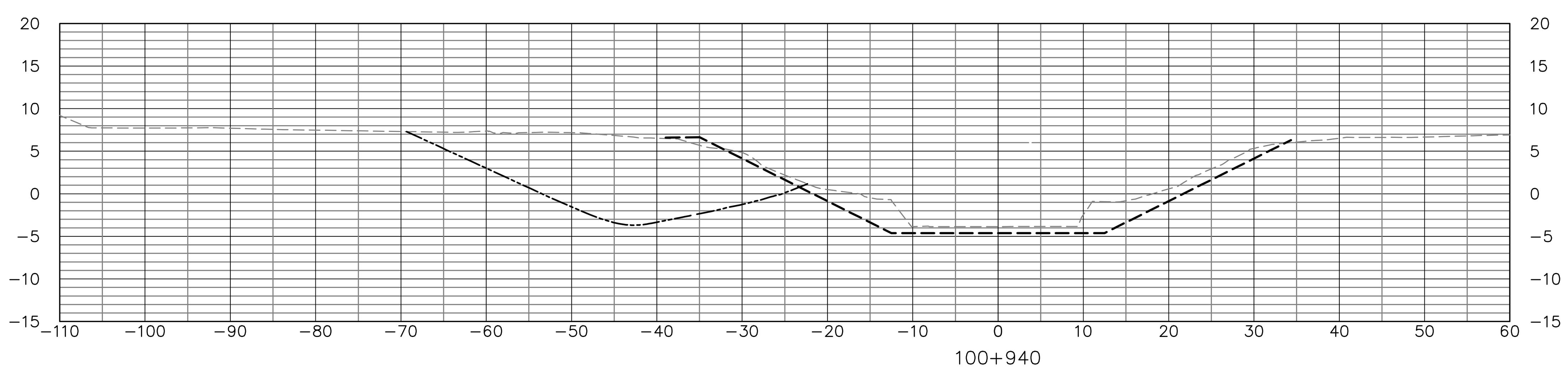
DRAWING NAME: Y:\HALIFAX\DATA\PROJECTS\171046.00 AVON RIVER ABOITEAU\20 CAD\01 CIVIL\04 DRAWING SHEETS\171046.00 - C015 - C020 - ABOITEAU CHANNEL REALIGNMENT CROSS SECTIONS.DWG LAYOUT NAME: C019 PLOT DATE: March 25, 2022 9:39:37 AM CAD OPERATOR: MZHOU

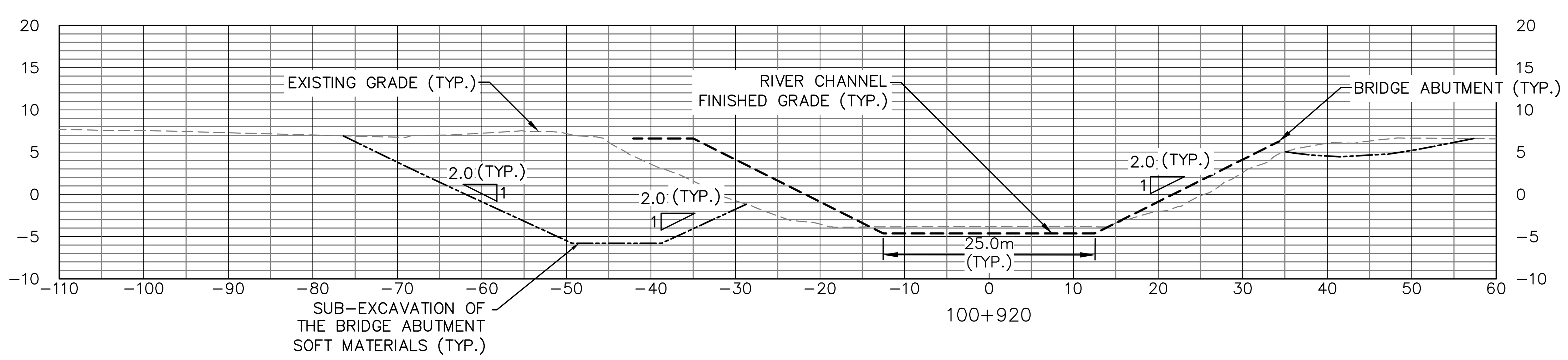
AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

RIVER CHANNEL REALIGNMENT CROSS SECTIONS - SHEET 6

C020



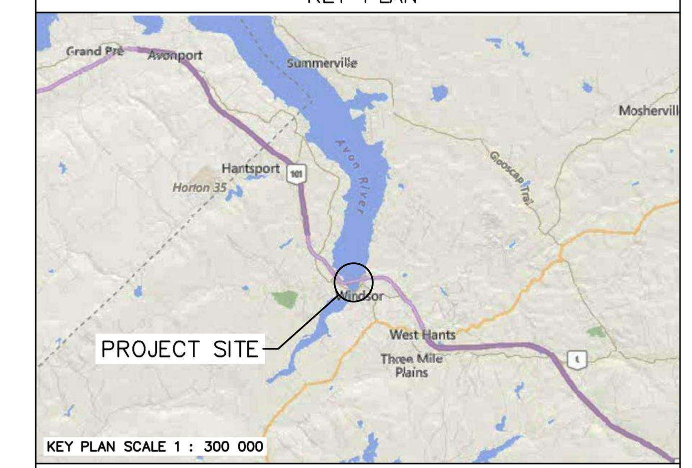




NOTES:

1. FOR CROSS SECTION DETAILS, SEE TYPICAL SECTIONS DRAWING NO. C023.
2. HIGHWAY 101 FINISHED GRADE IS NOT SHOWN.

KEY PLAN



LEGEND

CONTROL MONUMENT; N.S. ACT. CONTROL STN.; CALCULATED COORDINATE; IRON BAR; IRON PIPE; SURVEY MARKER; CUT CROSS; ROCK POST; WOODEN POST; PL,FD PLACED, FOUND; CD,A,R CHORD, ARC, RADIUS; CENTRELINE; GUIDE POLE; UTILITY POLE; CATCH BASIN; FIRE HYDRANT; FLAG POLE; FIBRE OPTIC MARKER; GUIDE POST; GAS TANK; TELEPHONE JUNCTION BOX; GUY WIRE; MAIL BOX; UTILITY MANHOLE; SIGN; DESIGN POINT; DIRECTION OF FLOW

SEWER MANHOLE; WELL; WOODEN GUARD POST; WATER VALVE; GAS METER; GAS VALVE; RAILROAD SWITCH BOX; RAILROAD SIGNAL POLE; SOFTWOOD TREE; HARDWOOD TREE; BUSH; CULVERT; BUILDING; OHWM ORDINARY HIGH WATER MARK; TRAFFIC SIGNAL - NEW; TRAFFIC SIGNAL - EXISTING; TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION - NEW; TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION - EXISTING; HIGHWAY LIGHT - NEW; HIGHWAY LIGHT - EXISTING; JUNCTION BOX; ELECTRICAL SERVICE POST; TRAFFIC SIGNAL CONTROL PAD; VEHICLE DETECTOR LOOP; UNDERGROUND CONDUIT

EXISTING GRADE
FINISHED GRADE
SUBGRADE
EXCAVATION

U/S - UPSTREAM | D/S - DOWNSTREAM
RC - REVERSE CROWN | LC - LEVEL CROWN
NC - NORMAL CROWN | FS - FULL SUPERELEVATION
BC - BEGINNING OF CURVE | EC - END OF CURVE
EOP - EDGE OF PAVEMENT | ETL - EDGE OF TRAVEL LANE
ESH - EDGE OF SHOULDER | PRC - POINT OF REVERSE CURVATURE
PCC - POINT OF COMPOUND CURVATURE

0 10.0 20.0 30.0 40.0 50.0m
1:500

CBCL

PROJECT: 171046

Designed by:	C. FISHER
Surveyed by:	
Drawn by:	M. ZHOU
Checked by:	R. GIFFIN
Approved by:	

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW

NOVA SCOTIA Public Works

Scale: (H) 1:500 (V) 1:500
Date: OCTOBER 2019
File No.: C020
Sheet No.: 20 of 31

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

HIGHWAY 101 HANTS COUNTY

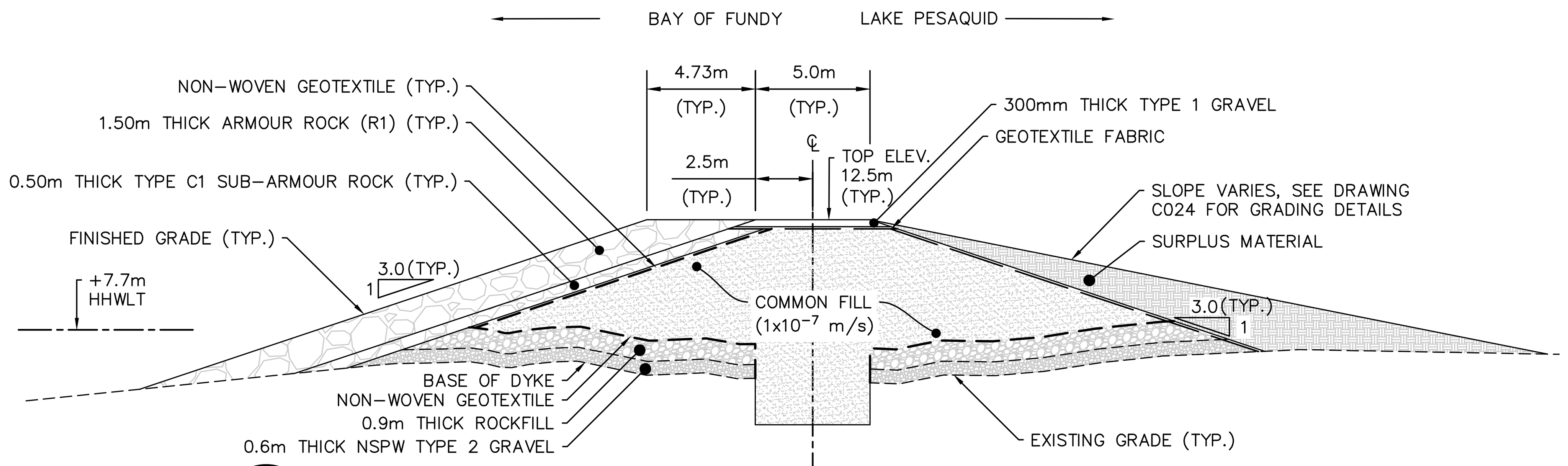
ABOITEAU CHANNEL REALIGNMENT CROSS SECTIONS STA 100+920 TO 100+961 - SHEET 6

DRAWING NAME: Y:\HALIFAX\DATA\PROJECTS\171046.00 AVON RIVER ABOITEAU\20 CAD\01 CIVIL\04 DRAWING SHEETS\171046.00 - C015 - C020 - ABOITEAU CHANNEL REALIGNMENT CROSS SECTIONS.DWG LAYOUT NAME: C020 PLOT DATE: March 25, 2022 9:40:32 AM CAD OPERATOR: MZHOU

C021

PERMANENT DYKE TYPICAL CROSS SECTIONS

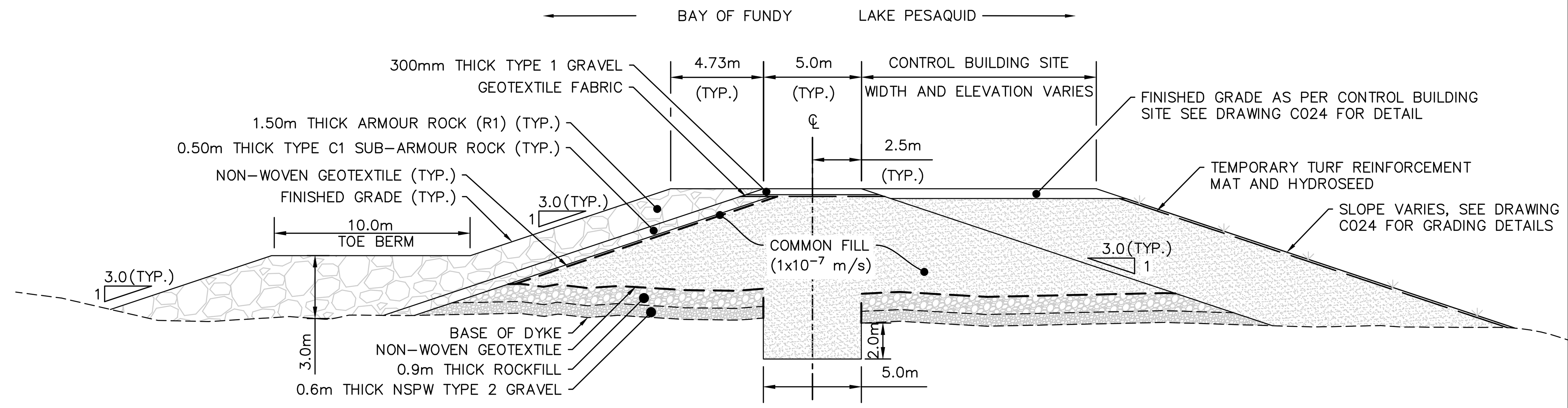
AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE



A TYPICAL CROSS SECTION – PERMANENT DYKE (WEST OF AVON RIVER)

1:200

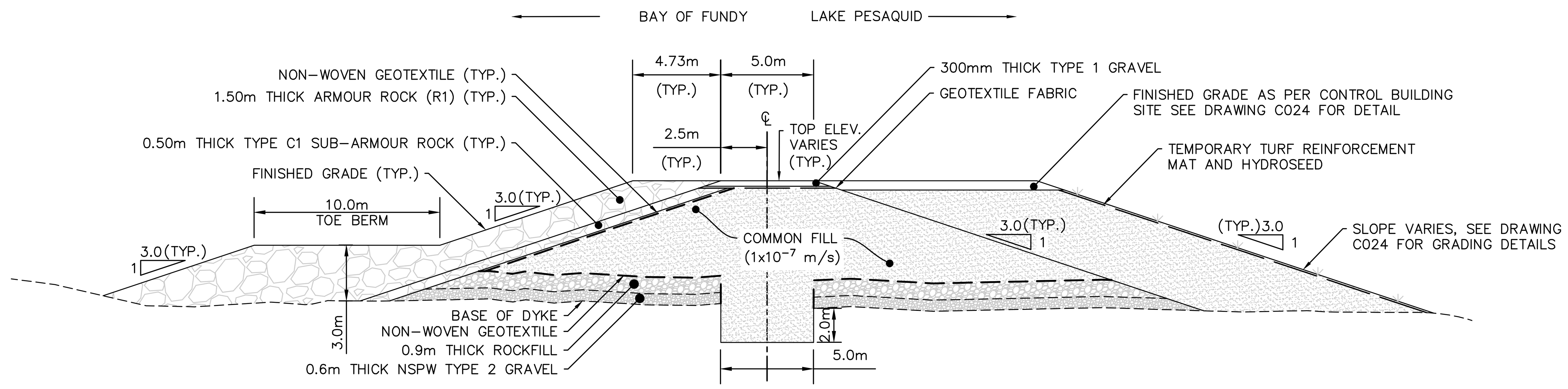
STA 0+000 TO 0+065



B TYPICAL CROSS SECTION – PERMANENT DYKE AND CONTROL BUILDING SITE

1:200

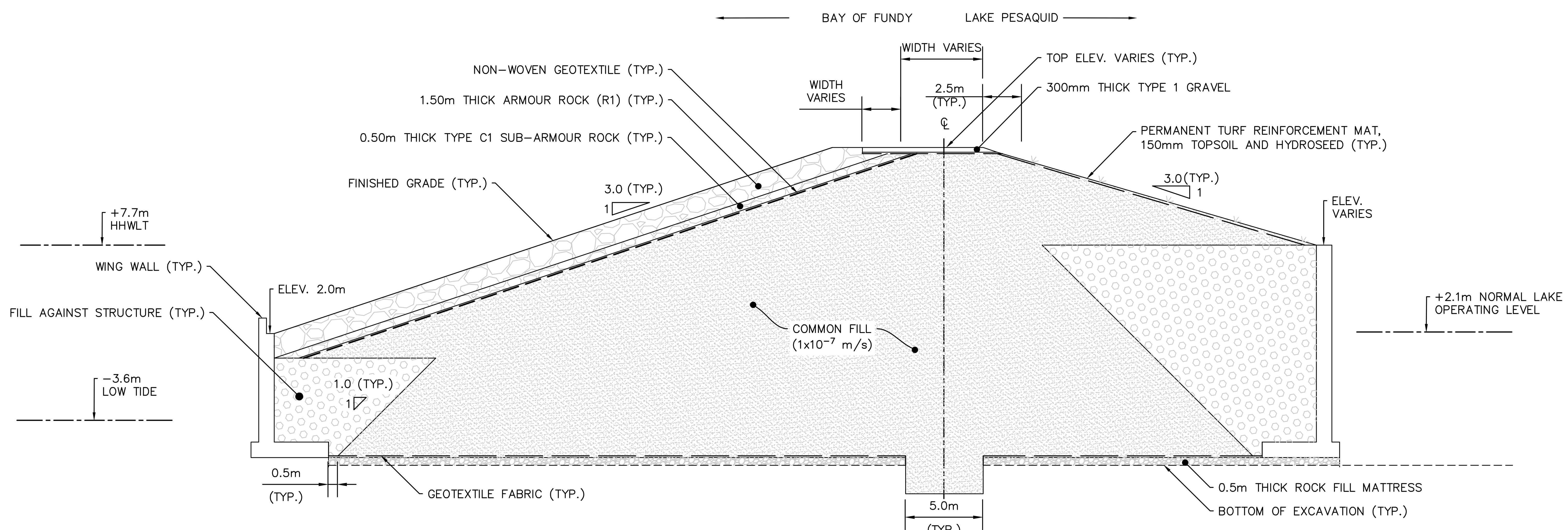
STA 0+065 TO 0+190



C TYPICAL CROSS SECTION – PERMANENT DYKE (WEST OF AVON RIVER)

1:200

STA 0+190 TO 0+210

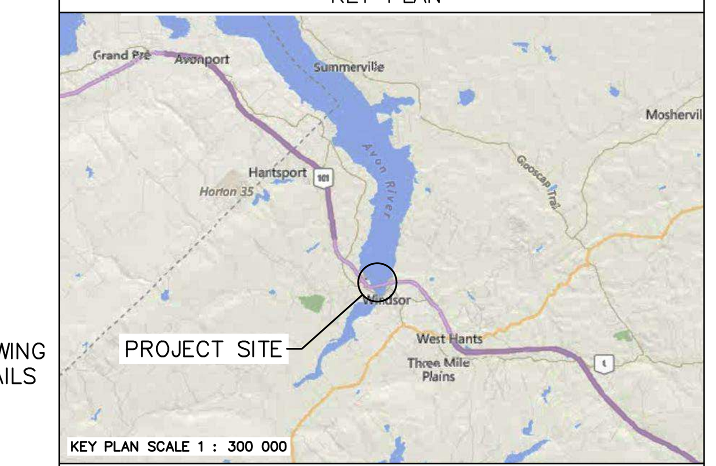


D TYPICAL CROSS SECTION – PERMANENT DYKE (AT NEW ABOITEAU)

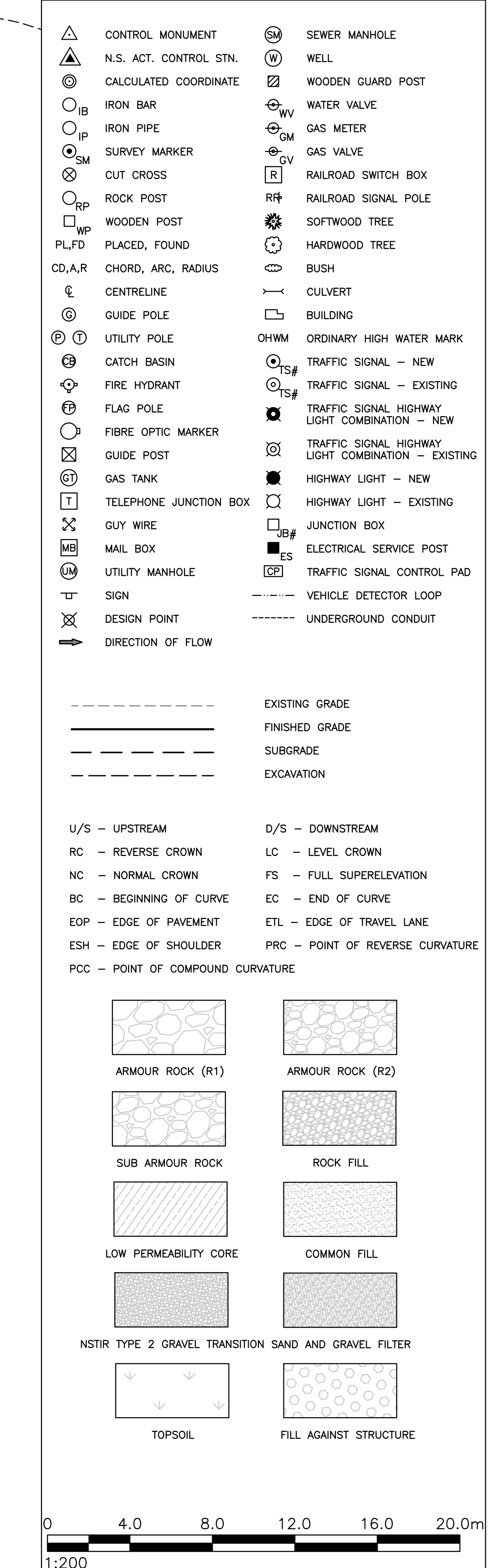
1:200

STA 0+210 TO 0+325

KEY PLAN



LEGEND



CBCL

PROJECT: 171046

Designed by:	C. FISHER		
Surveyed by:			
Drawn by:	M. ZHOU		
Checked by:	R. GIFFIN		
Approved by:			

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW

NOVA SCOTIA Public Works

Scale: AS NOTED

Date: OCTOBER 2019

File No.: C021

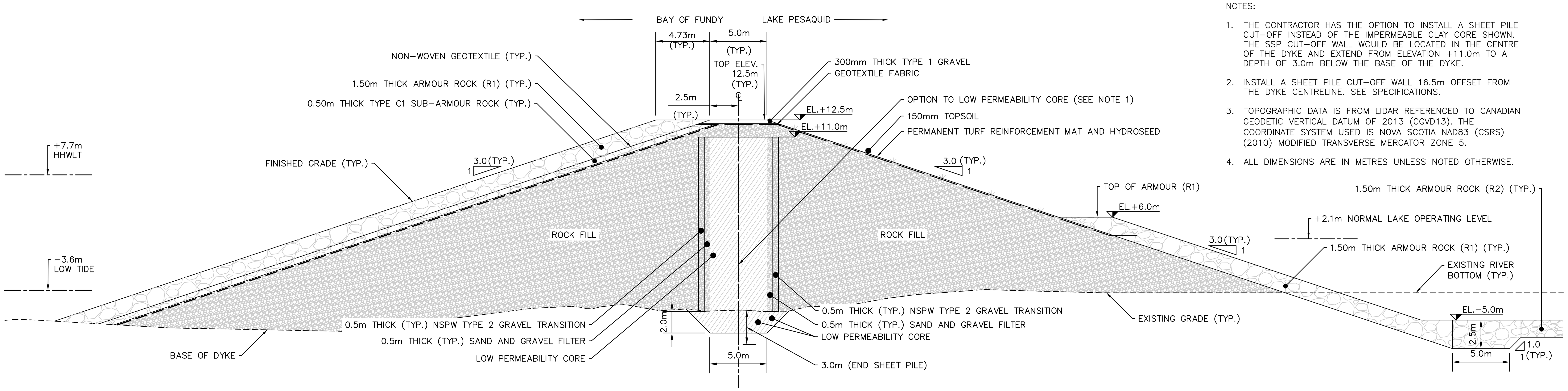
Sheet No.: 21 of 31

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

HIGHWAY 101 HANTS COUNTY

PERMANENT DYKE TYPICAL CROSS SECTIONS

DRAWING NAME: Y:\HALIFAX\DATA\PROJECTS\171046.00 AVON RIVER ABOITEAU\20 CAD\01 CIVIL\04 DRAWING SHEETS\171046.00 – C021 – C023 – TYPICAL CROSS SECTIONS.DWG LAYOUT NAME: C021 PLOT DATE: March 25, 2022 9:46:22 AM CAD OPERATOR: MZHOU

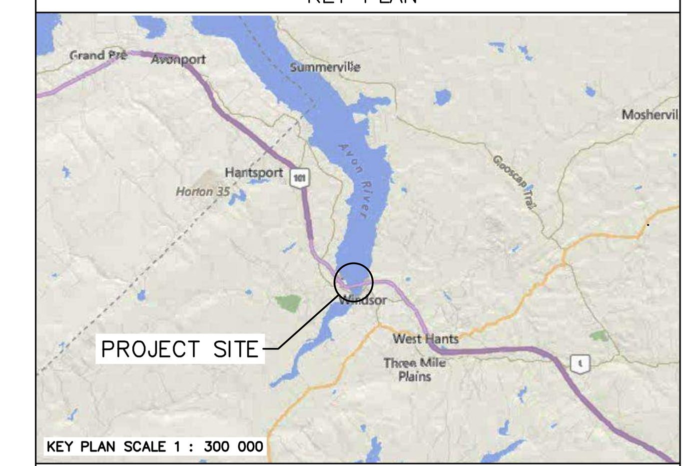


E — TYPICAL CROSS SECTION — PERMANENT DYKE (ACROSS AVON RIVER)
1:200
STA 0+420 TO 0+490

NOTES:

1. THE CONTRACTOR HAS THE OPTION TO INSTALL A SHEET PILE CUT-OFF INSTEAD OF THE IMPERMEABLE CLAY CORE SHOWN. THE SSP CUT-OFF WALL WOULD BE LOCATED IN THE CENTRE OF THE DYKE AND EXTEND FROM ELEVATION +11.0m TO A DEPTH OF 3.0m BELOW THE BASE OF THE DYKE.
2. INSTALL A SHEET PILE CUT-OFF WALL 16.5m OFFSET FROM THE DYKE CENTRELINE. SEE SPECIFICATIONS.
3. TOPOGRAPHIC DATA IS FROM LIDAR REFERENCED TO CANADIAN GEODETIC VERTICAL DATUM OF 2013 (CGVD13). THE COORDINATE SYSTEM USED IS NOVA SCOTIA NAD83 (CSRS) (2010) MODIFIED TRANSVERSE MERCATOR ZONE 5.
4. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

KEY PLAN



LEGEND

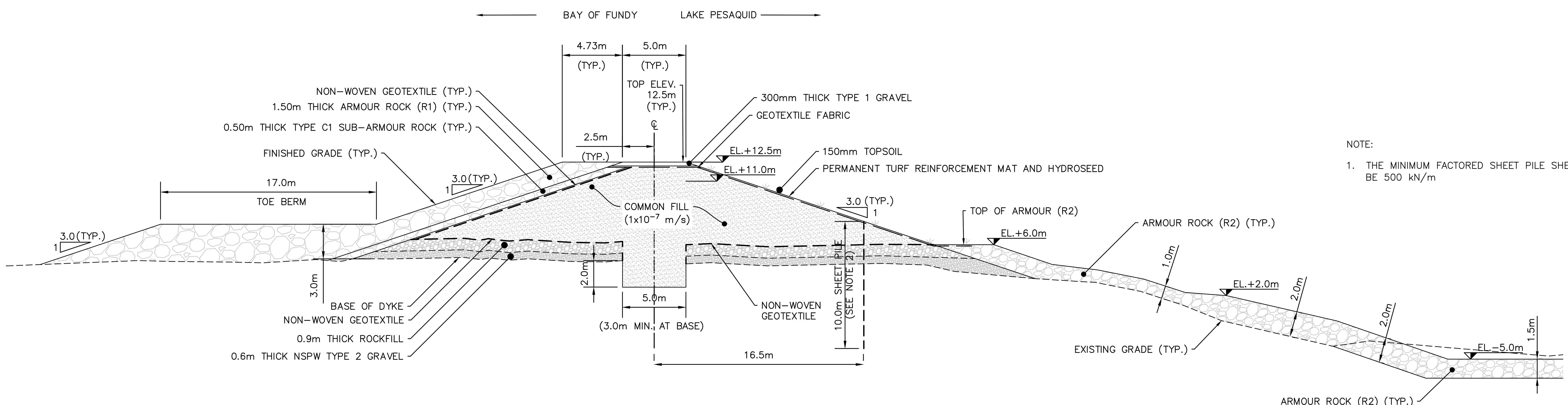
CONTROL MONUMENT; N.S. ACT. CONTROL STN.; CALCULATED COORDINATE; IRON BAR; IRON PIPE; SURVEY MARKER; CUT CROSS; ROCK POST; WOODEN POST; PLACED, FOUND; CHORD, ARC, RADIUS; CENTRELINE; GUIDE POLE; UTILITY POLE; CATCH BASIN; FIRE HYDRANT; FLAG POLE; FIBRE OPTIC MARKER; GUIDE POST; GAS TANK; TELEPHONE JUNCTION BOX; GUY WIRE; MAIL BOX; UTILITY MANHOLE; SIGN; DESIGN POINT; DIRECTION OF FLOW

SEWER MANHOLE; WELL; WOODEN GUARD POST; WATER VALVE; GAS METER; GAS VALVE; RAILROAD SWITCH BOX; RAILROAD SIGNAL POLE; SOFTWOOD TREE; HARDWOOD TREE; BUSH; CULVERT; BUILDING; ORDINARY HIGH WATER MARK; TRAFFIC SIGNAL – NEW; TRAFFIC SIGNAL – EXISTING; TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – NEW; TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – EXISTING; HIGHWAY LIGHT – NEW; HIGHWAY LIGHT – EXISTING; JUNCTION BOX; ELECTRICAL SERVICE POST; TRAFFIC SIGNAL CONTROL PAD; VEHICLE DETECTOR LOOP; UNDERGROUND CONDUIT

EXISTING GRADE; FINISHED GRADE; SUBGRADE; EXCAVATION

U/S – UPSTREAM; D/S – DOWNSTREAM; RC – REVERSE CROWN; LC – LEVEL CROWN; NC – NORMAL CROWN; FS – FULL SUPERELEVATION; BC – BEGINNING OF CURVE; EC – END OF CURVE; EOP – EDGE OF PAVEMENT; ETL – EDGE OF TRAVEL LANE; ESH – EDGE OF SHOULDER; PRC – POINT OF REVERSE CURVATURE; PCC – POINT OF COMPOUND CURVATURE

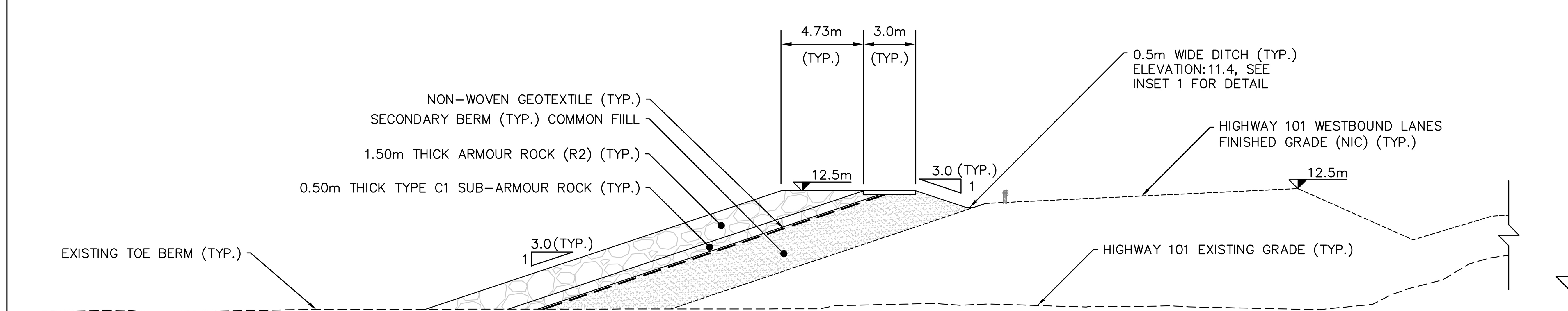
ARMOUR ROCK (R1); ARMOUR ROCK (R2); SUB ARMOUR ROCK; ROCK FILL; LOW PERMEABILITY CORE; COMMON FILL; NSTIR TYPE 2 GRAVEL TRANSITION; SAND AND GRAVEL FILTER; TOPSOIL; FILL AGAINST STRUCTURE



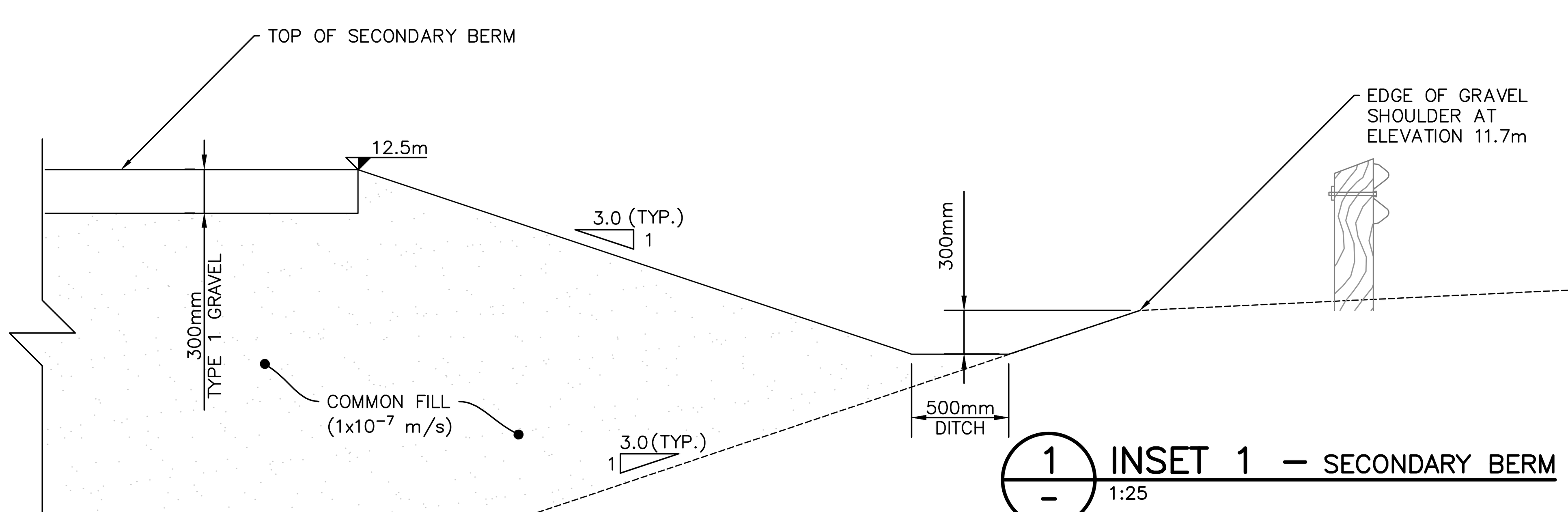
NOTE:

1. THE MINIMUM FACTORED SHEET PILE SHEAR CAPACITY SHALL BE 500 kN/m

F — TYPICAL CROSS SECTION — PERMANENT DYKE (WING WALL EAST)
1:200
STA 0+325 TO 0+420 AND STA 0+0490 TO THE WESTBOUND HIGHWAY EMBANKMENT (APPROX. 0+640)



G — TYPICAL CROSS SECTION — SECONDARY BERM
1:200



1 — INSET 1 — SECONDARY BERM
1:25

0 4.0 8.0 12.0 16.0 20.0m
1:200

CBCL
PROJECT: 171046

Designed by:	C. FISHER	
Surveyed by:		
Drawn by:	M. ZHOU	
Checked by:	R. GIFFIN	
Approved by:		

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW

NOVA SCOTIA Public Works

Scale: AS NOTED
Date: OCTOBER 2019
File No.: C022
Sheet No.: 22 of 31

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE
HIGHWAY 101 HANTS COUNTY

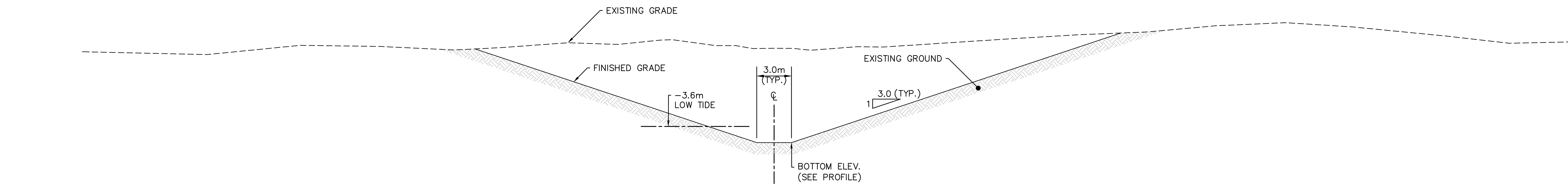
PERMANENT DYKE TYPICAL CROSS SECTIONS

C022
PERMANENT DYKE TYPICAL CROSS SECTIONS
AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

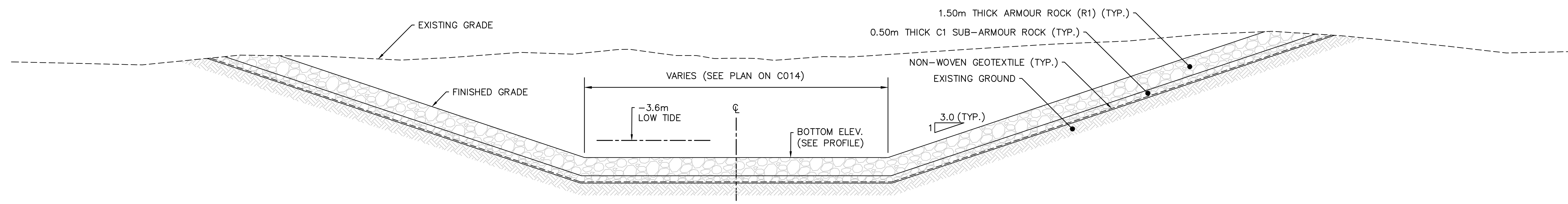
DRAWING NAME: Y:\HALIFAX\DATA\PROJECTS\171046.00 AVON RIVER ABOITEAU\20 CAD\01 CIVIL\04 DRAWING SHEETS\171046.00 – C021 – C023 – TYPICAL CROSS SECTIONS.DWG LAYOUT NAME: C022 PLOT DATE: March 25, 2022 9:44:50 AM CAD OPERATOR: MZHOU

RIVER CHANNEL TYPICAL CROSS SECTIONS

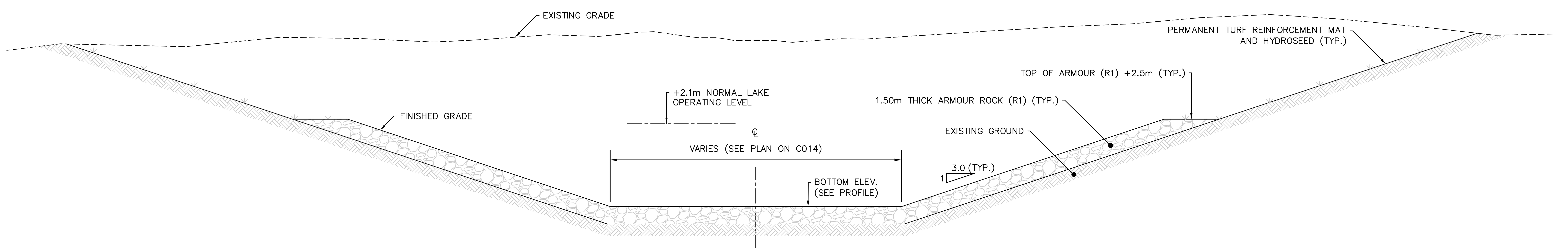
AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE



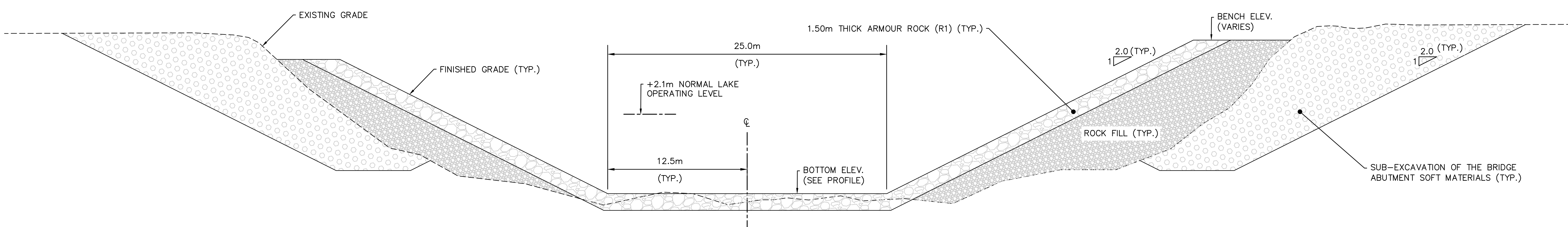
H – TYPICAL CROSS SECTION – RIVER CHANNEL EXCAVATION/DREDGING DOWNSTREAM OF ABOITEAU COFFERDAM
1:200



I – TYPICAL CROSS SECTION – RIVER CHANNEL DOWNSTREAM OF NEW ABOITEAU
1:200

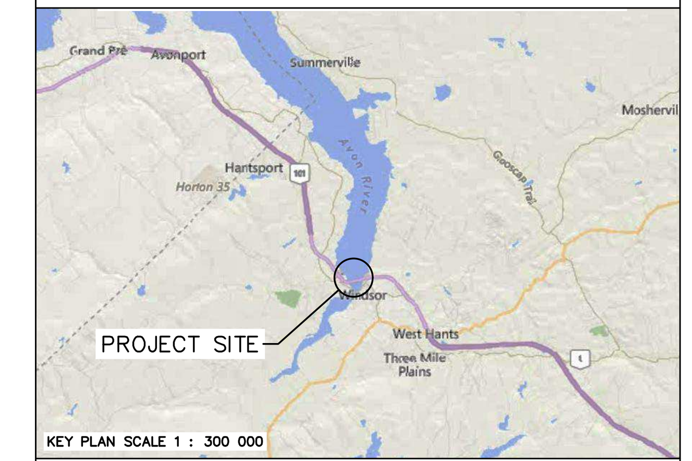


J – TYPICAL CROSS SECTION – RIVER CHANNEL UPSTREAM OF NEW ABOITEAU
1:200



K – TYPICAL CROSS SECTION – RIVER CHANNEL UNDER HIGHWAY 101 BRIDGES
1:200

KEY PLAN



LEGEND

CONTROL MONUMENT
N.S. ACT. CONTROL STN.
CALCULATED COORDINATE
IRON BAR
IRON PIPE
SURVEY MARKER
CUT CROSS
ROCK POST
WOODEN POST
PL,FD – PLACED, FOUND
CD,A,R – CHORD, ARC, RADIUS
CENTRELINE
GUIDE POLE
UTILITY POLE
CATCH BASIN
FIRE HYDRANT
FLAG POLE
FIBRE OPTIC MARKER
GUIDE POST
GAS TANK
TELEPHONE JUNCTION BOX
GUY WIRE
MAIL BOX
UTILITY MANHOLE
SIGN
DESIGN POINT
DIRECTION OF FLOW
SEWER MANHOLE
WELL
WOODEN GUARD POST
WATER VALVE
GAS METER
GAS VALVE
RAILROAD SWITCH BOX
RAILROAD SIGNAL POLE
SOFTWOOD TREE
HARDWOOD TREE
BUSH
CULVERT
BUILDING
OHWM – ORDINARY HIGH WATER MARK
TRAFFIC SIGNAL – NEW
TRAFFIC SIGNAL – EXISTING
TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – NEW
TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – EXISTING
HIGHWAY LIGHT – NEW
HIGHWAY LIGHT – EXISTING
JUNCTION BOX
ELECTRICAL SERVICE POST
TRAFFIC SIGNAL CONTROL PAD
VEHICLE DETECTOR LOOP
UNDERGROUND CONDUIT

EXISTING GRADE
FINISHED GRADE
SUBGRADE
EXCAVATION

U/S – UPSTREAM
RC – REVERSE CROWN
NC – NORMAL CROWN
BC – BEGINNING OF CURVE
EOP – EDGE OF PAVEMENT
ESH – EDGE OF SHOULDER
PCC – POINT OF COMPOUND CURVATURE
D/S – DOWNSTREAM
LC – LEVEL CROWN
FS – FULL SUPERELEVATION
EC – END OF CURVE
ETL – EDGE OF TRAVEL LANE
PRC – POINT OF REVERSE CURVATURE

ARMOUR ROCK (R1)
ARMOUR ROCK (R2)
SUB ARMOUR ROCK
ROCK FILL
LOW PERMEABILITY CORE
COMMON FILL
NSTIR TYPE 2 GRAVEL
TRANSITION SAND AND GRAVEL FILTER
TOPSOIL
FILL AGAINST STRUCTURE

0 4.0 8.0 12.0 16.0 20.0m
1:200

CBCL

PROJECT: 171046

Designed by:	C. FISHER
Surveyed by:	
Drawn by:	M. ZHOU
Checked by:	R. GIFFIN
Approved by:	

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
D	MAR 25/22	ISSUED FOR 95% REVIEW
C	NOV 26/21	ISSUED FOR 66% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW

NOVA SCOTIA
Public Works

Scale: AS NOTED
Date: OCTOBER 2019
File No.: C023
Sheet No.: 23 of 31

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE
HIGHWAY 101 HANTS COUNTY

RIVER CHANNEL TYPICAL CROSS SECTIONS

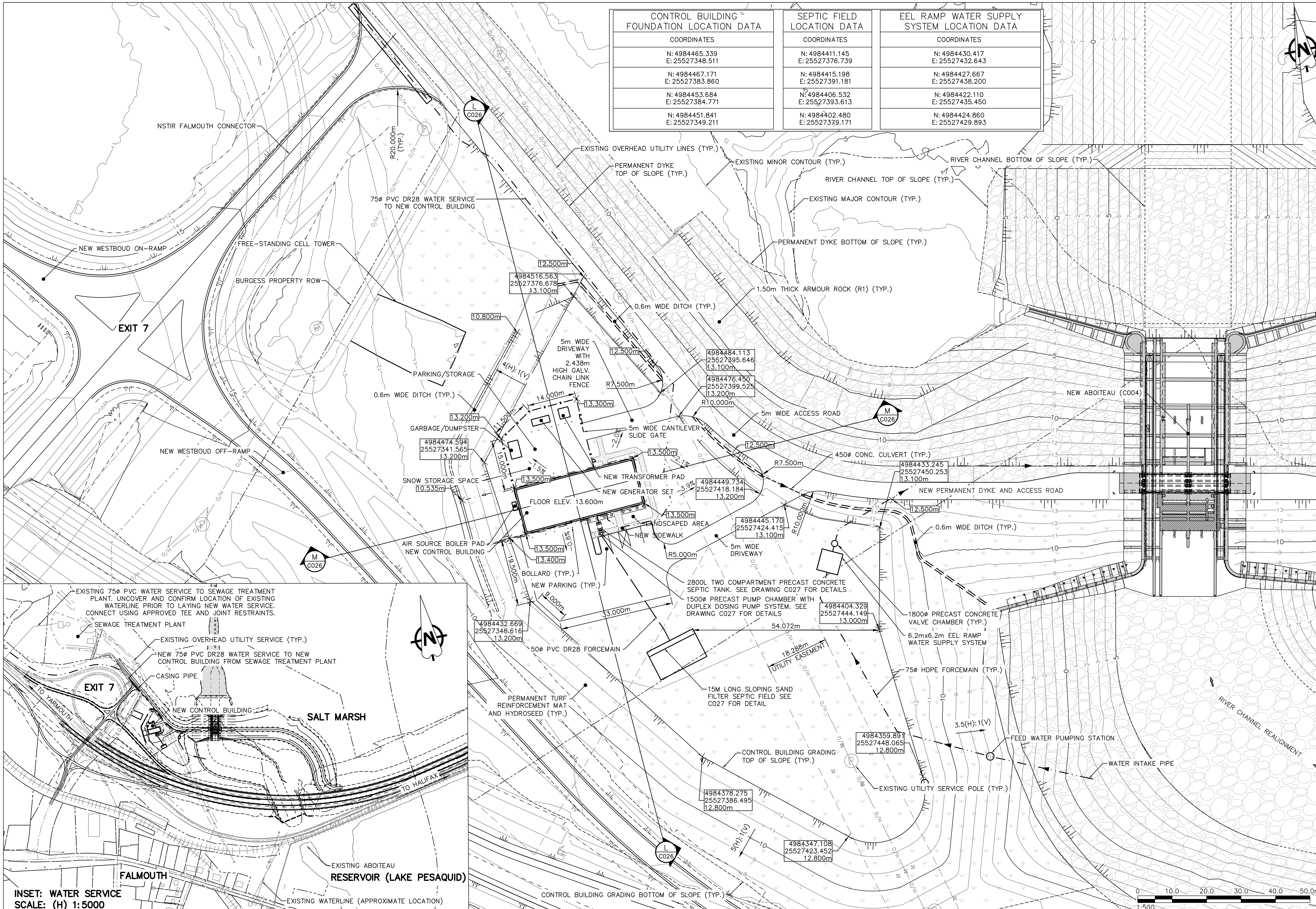
CONTROL BUILDING GRADING AND SERVICING PLAN

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

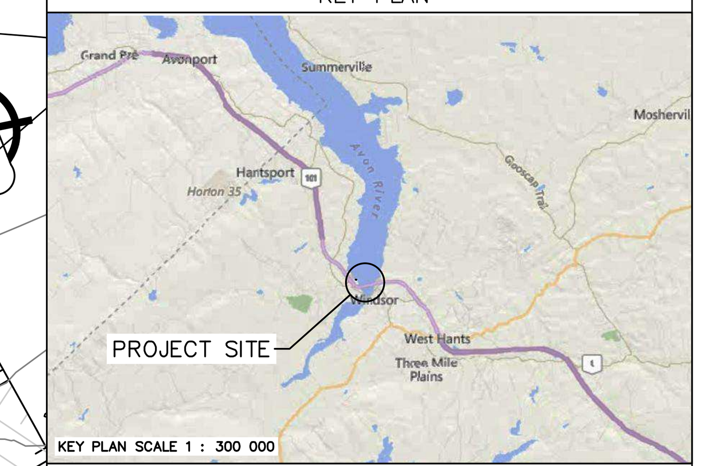
CONTROL BUILDING FOUNDATION LOCATION DATA
COORDINATES
N: 4984465.339 E: 25527348.511
N: 4984467.171 E: 25527383.860
N: 4984453.684 E: 25527384.771
N: 4984451.841 E: 25527349.211

SEPTIC FIELD LOCATION DATA
COORDINATES
N: 4984411.145 E: 25527376.739
N: 4984415.198 E: 25527391.181
N: 4984406.532 E: 25527393.613
N: 4984402.480 E: 25527379.171

EEL RAMP WATER SUPPLY SYSTEM LOCATION DATA
COORDINATES
N: 4984430.417 E: 25527432.643
N: 4984427.667 E: 25527438.200
N: 4984422.110 E: 25527435.450
N: 4984424.860 E: 25527429.893



KEY PLAN



LEGEND

- CONTROL MONUMENT
- N.S. ACT. CONTROL STN.
- CALCULATED COORDINATE
- IRON BAR
- IRON PIPE
- SURVEY MARKER
- CUT CROSS
- ROCK POST
- WOODEN POST
- PL,FD — PLACED, FOUND
- CD,A,R — CHORD, ARC, RADIUS
- CENTRELINE
- GUIDE POLE
- UTILITY POLE
- CATCH BASIN
- FIRE HYDRANT
- FLAG POLE
- FIBRE OPTIC MARKER
- GUIDE POST
- GAS TANK
- TELEPHONE JUNCTION BOX
- GUY WIRE
- MAIL BOX
- UTILITY MANHOLE
- SIGN
- DESIGN POINT
- DIRECTION OF FLOW
- SEWER MANHOLE
- WELL
- WOODEN GUARD POST
- WATER VALVE
- GAS METER
- GAS VALVE
- RAILROAD SWITCH BOX
- RAILROAD SIGNAL POLE
- SOFTWOOD TREE
- HARDWOOD TREE
- BUSH
- CULVERT
- BUILDING
- OHWM — ORDINARY HIGH WATER MARK
- TRAFFIC SIGNAL – NEW
- TRAFFIC SIGNAL – EXISTING
- TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – NEW
- TRAFFIC SIGNAL, HIGHWAY LIGHT COMBINATION – EXISTING
- HIGHWAY LIGHT – NEW
- HIGHWAY LIGHT – EXISTING
- JUNCTION BOX
- ELECTRICAL SERVICE POST
- TRAFFIC SIGNAL CONTROL PAD
- VEHICLE DETECTOR LOOP
- UNDERGROUND CONDUIT
- LAND DEALT WITH/ PROPOSED RIGHT OF WAY
- SURPLUS HIGHWAY RIGHT OF WAY
- HIGHWAY RIGHT OF WAY (EXISTING)
- PROPERTY LINE (EXISTING)
- ALIGNMENT CENTERLINE (PROPOSED)
- ROAD CENTERLINE (EXISTING)
- DIVISION BETWEEN LAND USE TYPES
- FENCE (EXISTING)
- RAILROAD (EXISTING)
- GUARDRAIL (EXISTING)
- GUARDRAIL (PROPOSED)
- TOP OF SLOPE (PROPOSED)
- TOE OF SLOPE (PROPOSED)
- OVERHEAD UTILITY SERVICE (EXISTING)
- MAJOR CONTOUR (EXISTING)
- MINOR CONTOUR (EXISTING)
- U/S – UPSTREAM
- D/S – DOWNSTREAM
- RC – REVERSE CROWN
- LC – LEVEL CROWN
- NC – NORMAL CROWN
- FS – FULL SUPERELEVATION
- BC – BEGINNING OF CURVE
- EC – END OF CURVE
- EOP – EDGE OF PAVEMENT
- ETL – EDGE OF TRAVEL LANE
- ESH – EDGE OF SHOULDER
- PRC – POINT OF REVERSE CURVATURE
- PCC – POINT OF COMPOUND CURVATURE
- TO BE REMOVED
- NATIVE SOIL
- ARMOUR ROCK (R1)
- ARMOUR ROCK (R2)
- ROCK FILL
- COMMON FILL
- TOPSOIL

CBCL

PROJECT: 171046

Designed by:	C. FISHER
Surveyed by:	
Drawn by:	M. ZHOU
Checked by:	R. GIFFIN
Approved by:	

NOT FOR CONSTRUCTION

MK.	DATE	REVISION
E	MAR 25/22	ISSUED FOR 95% REVIEW
D	NOV 26/21	ISSUED FOR 66% REVIEW
C	APR 20/21	RE-ISSUED FOR 33% REVIEW
B	SEP 08/20	ISSUED FOR 33% REVIEW

NOVA SCOTIA Public Works

Scale: (H) 1:500
Date: OCTOBER 2019
File No. : C024
Sheet No. : 24 of 31

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

HIGHWAY 101 HANTS COUNTY

CONTROL BUILDING GRADING AND SERVICING PLAN

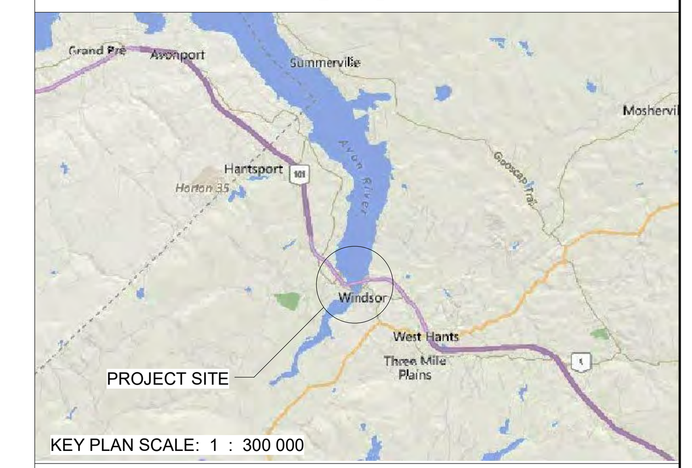
DRAWING NAME: Y:\HALIFAX\DATA\PROJECTS\171046.00 AVON RIVER ABOITEAU\20 CAD\01 CIVIL\04 DRAWING SHEETS\171046.00 – C024 – C025– CONTROL BUILDING GRADING & SERVICING PLAN.DWG LAYOUT NAME: C024 PLOT DATE: March 25, 2022 1:41:06 PM CAD OPERATOR: MZHOU

S002

ISOMETRIC VIEWS

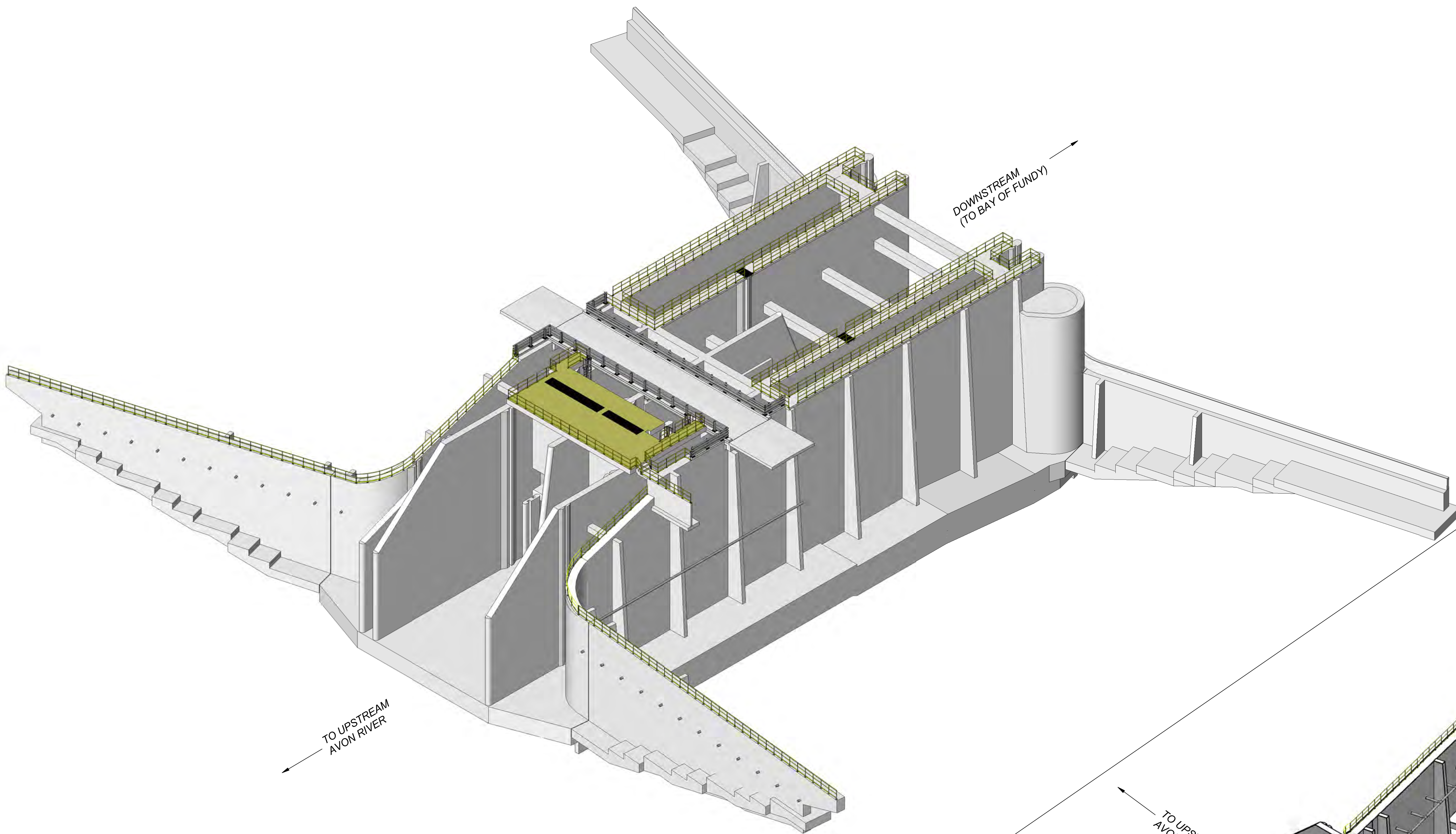
AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

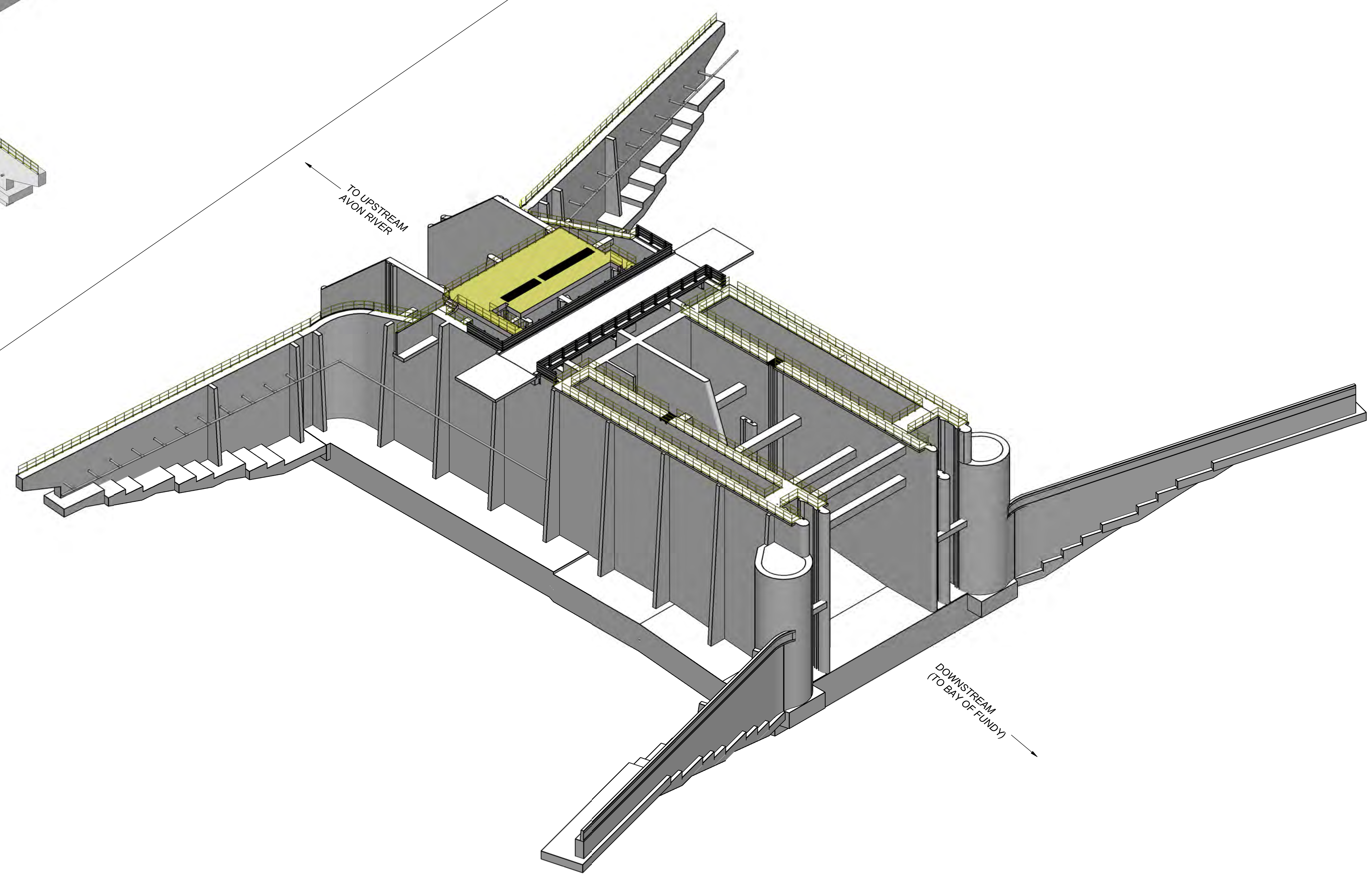
KEY PLAN



LEGEND

NOTE:
3-DIMENSIONAL (3D) VIEWS ARE VISUAL REPRESENTATION OF THE PROJECT. 3D VIEWS ARE FOR GENERAL REFERENCE ONLY. 2-DIMENSIONAL (2D) CONTRACT DOCUMENTS AND SPECIFICATIONS SHALL GOVERN.





NOT FOR CONSTRUCTION

CBCL

PROJECT: 171046

Designed by: X.CHEN			
Surveyed by:			
Drawn by: E.MALIOUGINA	C	JAN 18/22	ISSUED FOR 90% REVIEW
Checked by: T.BARKHOUSE	B	NOV 02/21	ISSUED FOR 60% REVIEW
Approved by: C.JIM	A	SEPT 3/20	ISSUED FOR 30% REVIEW
	MK.	DATE	REVISION

NOVA SCOTIA
Public Works

Scale:	N.T.S.
Date:	OCT. 2019
File No. :	S002
Sheet No. :	2 of 52

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

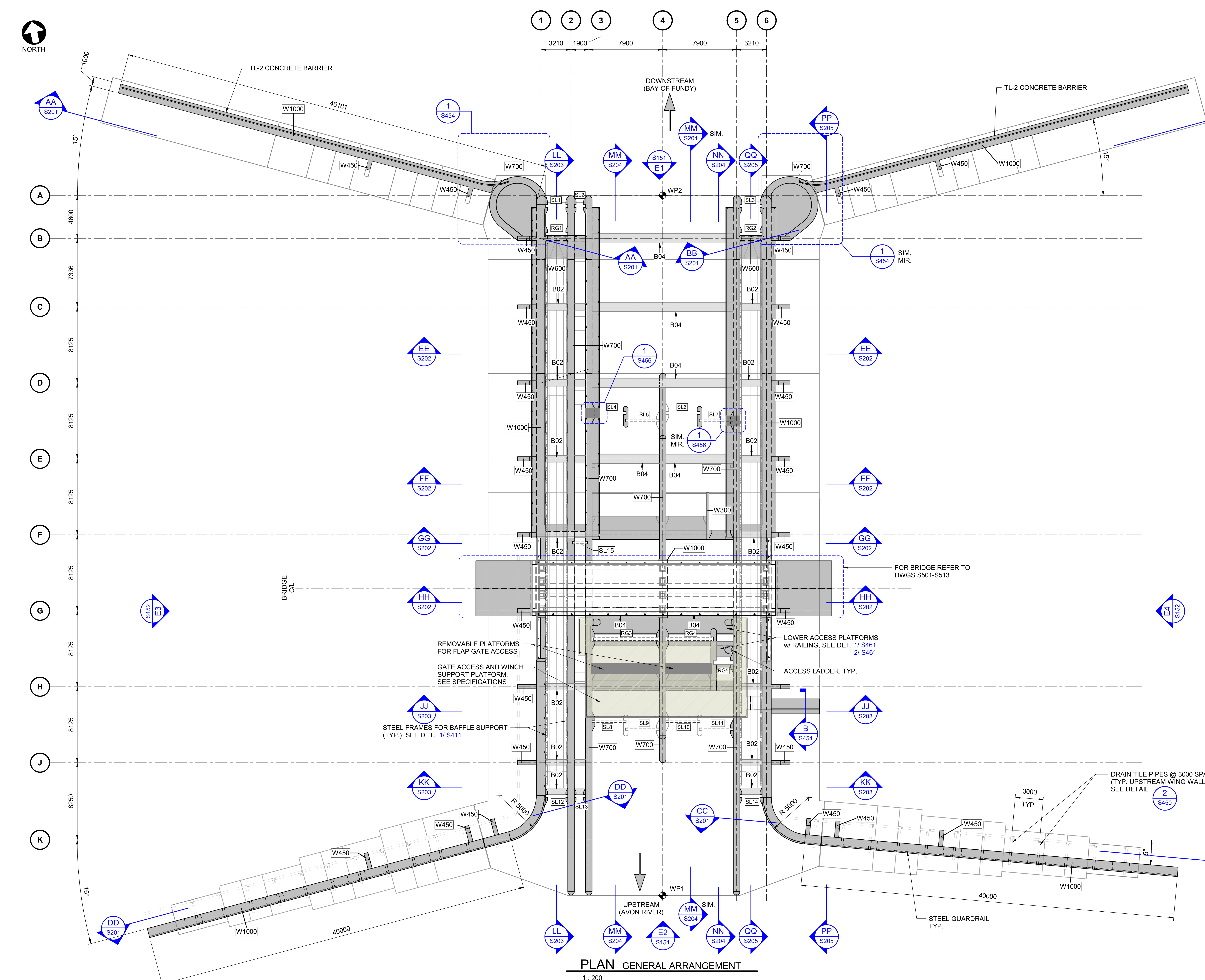
HIGHWAY 101 HANTS COUNTY

ISOMETRIC VIEWS

S101

GENERAL ARRANGEMENT - PLAN VIEW

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE



PLAN GENERAL ARRANGEMENT

1 : 200

WORKING POINT SCHEDULE

WP#	NORTHING	EASTING	ELEVATION
WP1	4,984,395.668	25,527,533.884	-5.000m
WP2	4,984,468.998	25,527,549.072	-6.420m

WALL SCHEDULE

TYPE	WIDTH
W300	300.0
W450	450.0
W600	600.0
W700	700.0
W1000	1000.0

STOPLOGS SCHEDULE

STOPLOG NUMBER	WIDTH	HEIGHT MAX.
SL1		
SL2		
SL3		
SL4		
SL5		
SL6		
SL7		
SL8		
SL9		
SL10		
SL11		
SL12		
SL13		
SL14		
SL15		

ROLLER GATES SCHEDULE

ROLLER GATE NUMBER	WIDTH	HEIGHT MAX.
RG1		
RG2		
RG3		
RG4		
RG5		

KEY PLAN

LEGEND

CBCL

PROJECT: 171046

Designed by:	X.CHEN
Surveyed by:	
Drawn by:	E.MALIOUGINA
Checked by:	T.BARKHOUSE
Approved by:	C.JIM

MK.	DATE	REVISION
C	JAN 18/22	ISSUED FOR 90% REVIEW
B	NOV 02/21	ISSUED FOR 60% REVIEW
A	SEPT 3/20	ISSUED FOR 30% REVIEW

NOVA SCOTIA Public Works

Scale: 1 : 200
Date: OCT. 2019
File No. : S101
Sheet No. : 3 of 52

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

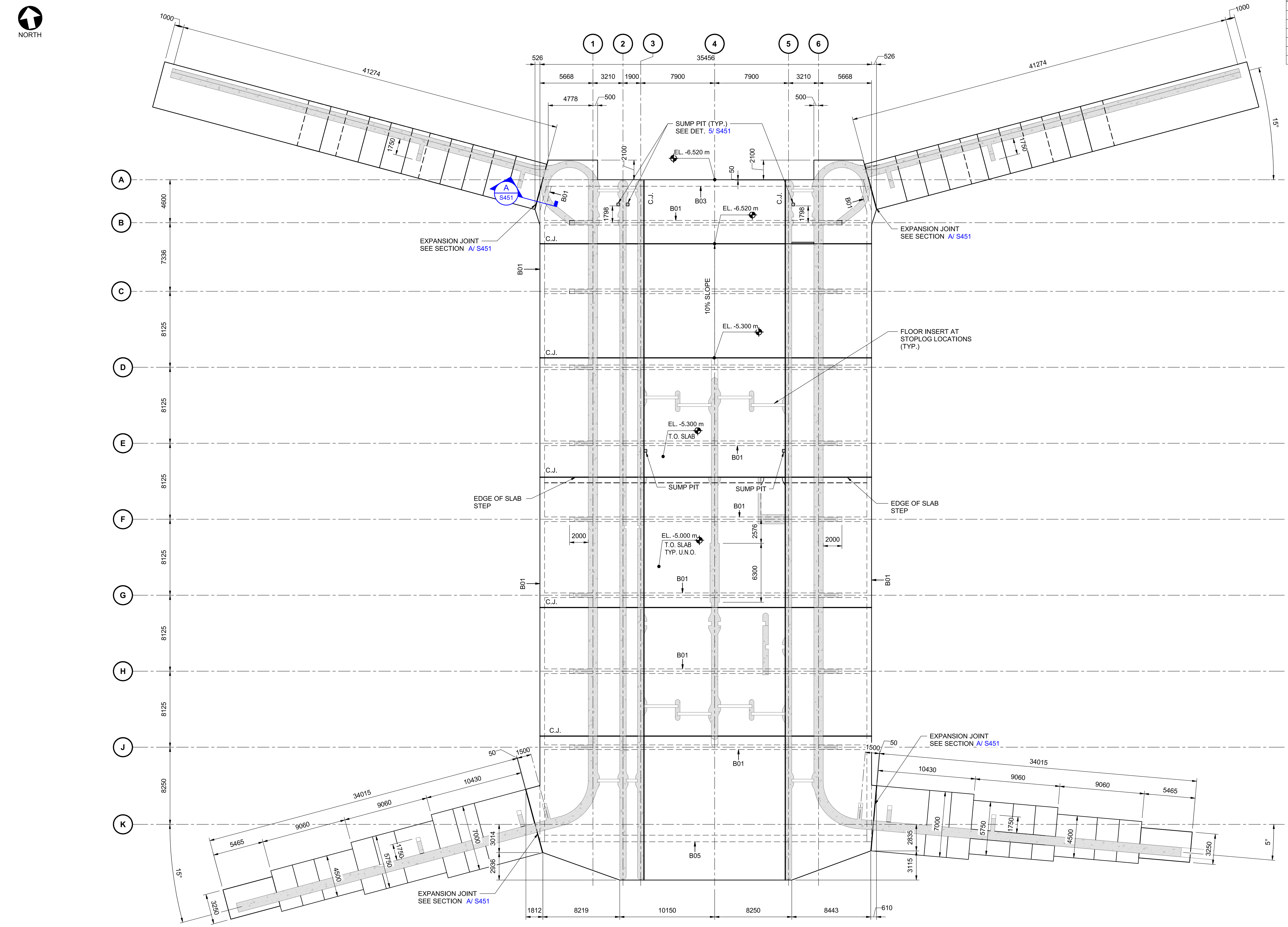
HIGHWAY 101 HANTS COUNTY

GENERAL ARRANGEMENT - PLAN VIEW

S102

FOUNDATION PLAN

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE



PLAN FOUNDATION

1 : 200

BEAM SCHEDULE

TYPE	SIZE	REINFORCING
B01	500 x 1500	
B02	700 X 700	
B03	700 X 2000	
B04	1000 x 1000	
B05	700 x 700_BASE	
NEXT 28F	28F NEXT BEAM	

KEY PLAN

LEGEND

NOT FOR CONSTRUCTION

CBCL

PROJECT: 171046

Designed by:	X.CHEN		
Surveyed by:			
Drawn by:	E.MALIOUGINA		
Checked by:	T.BARKHOUSE		
Approved by:	C.JIM		

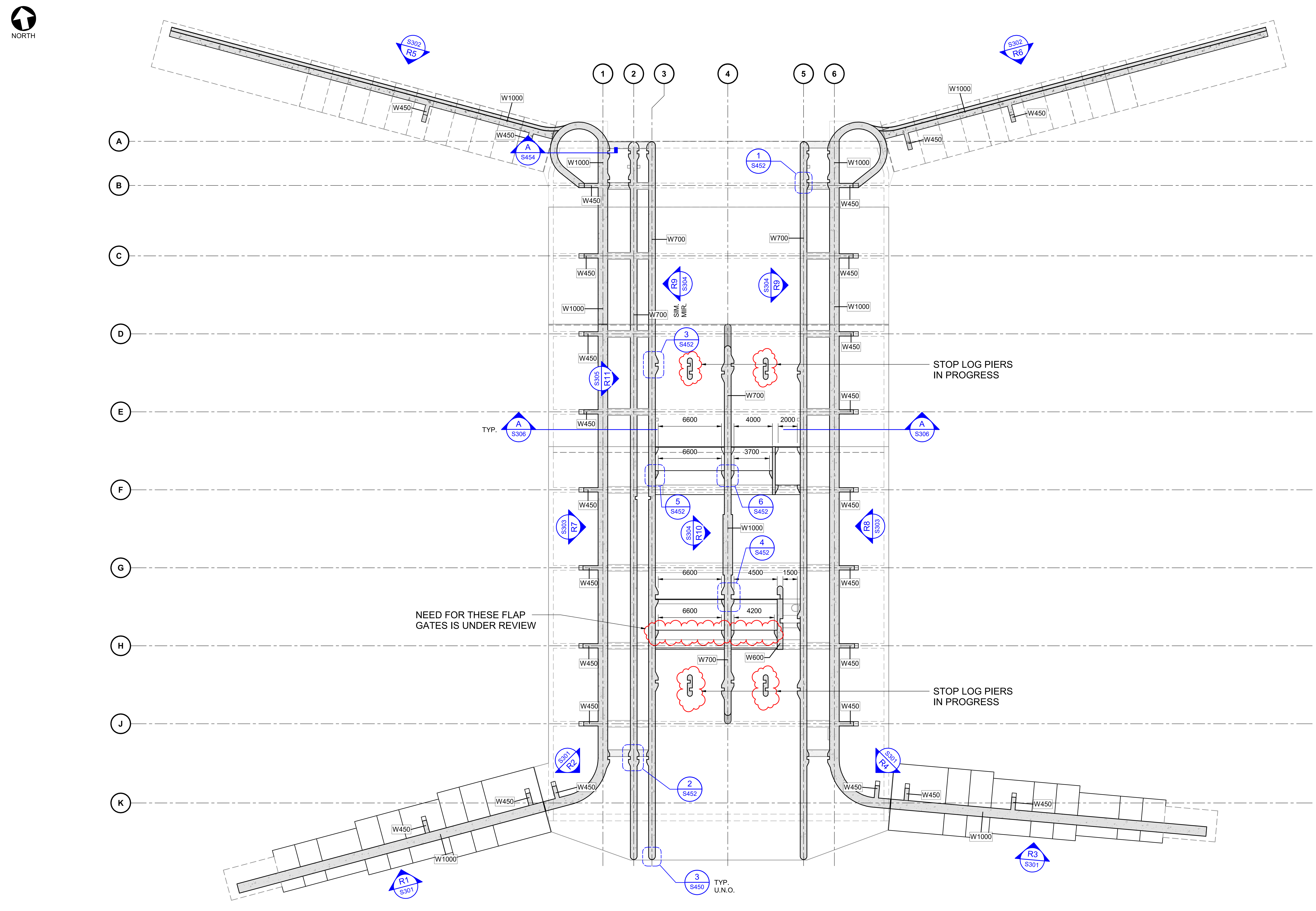
MK.	DATE	REVISION
C	JAN 18/22	ISSUED FOR 90% REVIEW
B	NOV 02/21	ISSUED FOR 60% REVIEW
A	SEPT 3/20	ISSUED FOR 30% REVIEW

NOVA SCOTIA Public Works

Scale: 1 : 200
Date: OCT. 2019
File No. : S102
Sheet No. : 4 of 52

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE
HIGHWAY 101 HANTS COUNTY

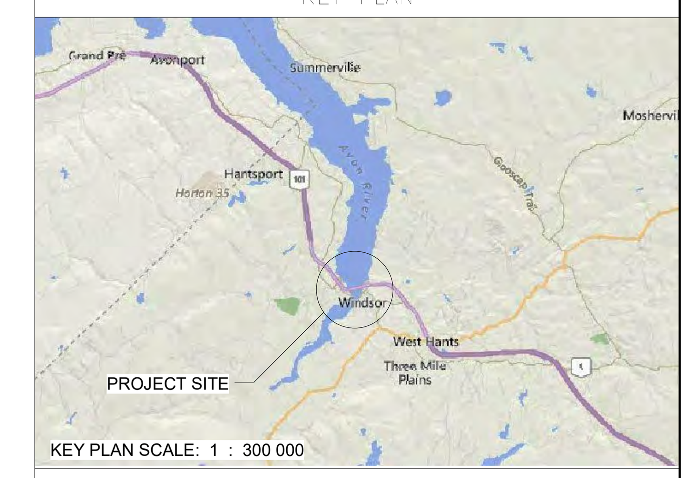
FOUNDATION PLAN



PLAN GENERAL REINFORCING PLAN - WALLS

1 : 200

KEY PLAN



LEGEND

NOT FOR CONSTRUCTION

CBCL

PROJECT: 171046

Designed by:	X.CHEN
Surveyed by:	
Drawn by:	E.MALIOUGINA
Checked by:	T.BARKHOUSE
Approved by:	C.JIM

MK.	DATE	REVISION
A	JAN 18/22	ISSUED FOR 90% REVIEW

NOVA SCOTIA
Public Works

Scale:	1 : 200
Date:	OCT. 2019
File No. :	S106
Sheet No. :	8 of 52

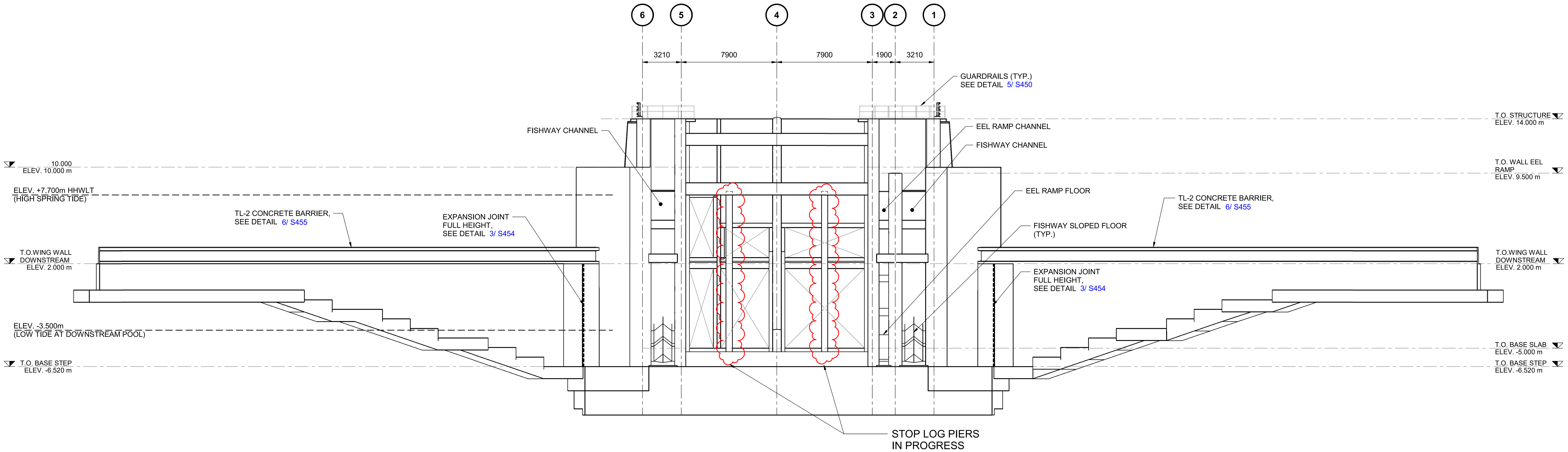
AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

HIGHWAY 101 HANTS COUNTY

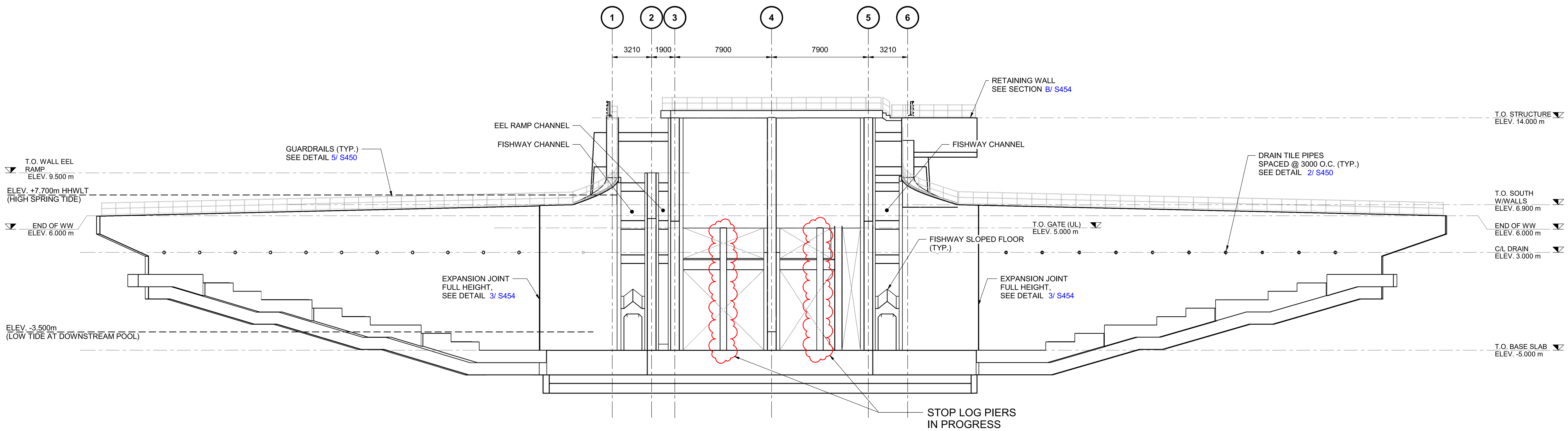
GENERAL REINFORCING PLAN - WALLS

ELEVATIONS AT NORTH AND SOUTH WALLS

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

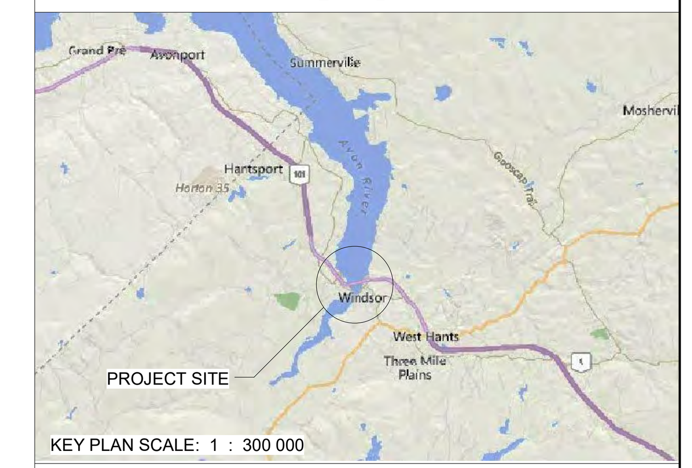


E1
S101
ELEVATION NORTH END OF STRUCTURE (LOOKING SOUTH)
1 : 175



E2
S101
ELEVATION SOUTH END OF STRUCTURE (LOOKING NORTH)
1 : 175

KEY PLAN



LEGEND

NOT FOR CONSTRUCTION

CBCL

PROJECT: 171046

Designed by:	X.CHEN
Surveyed by:	
Drawn by:	E.MALIOUGINA
Checked by:	T.BARKHOUSE
Approved by:	C.JIM

MK.	DATE	REVISION
C	JAN 18/22	ISSUED FOR 90% REVIEW
B	NOV 02/21	ISSUED FOR 60% REVIEW
A	SEPT 3/20	ISSUED FOR 30% REVIEW

NOVA SCOTIA
Public Works

Scale:	1 : 175
Date:	OCT. 2019
File No. :	S151
Sheet No. :	9 of 52

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

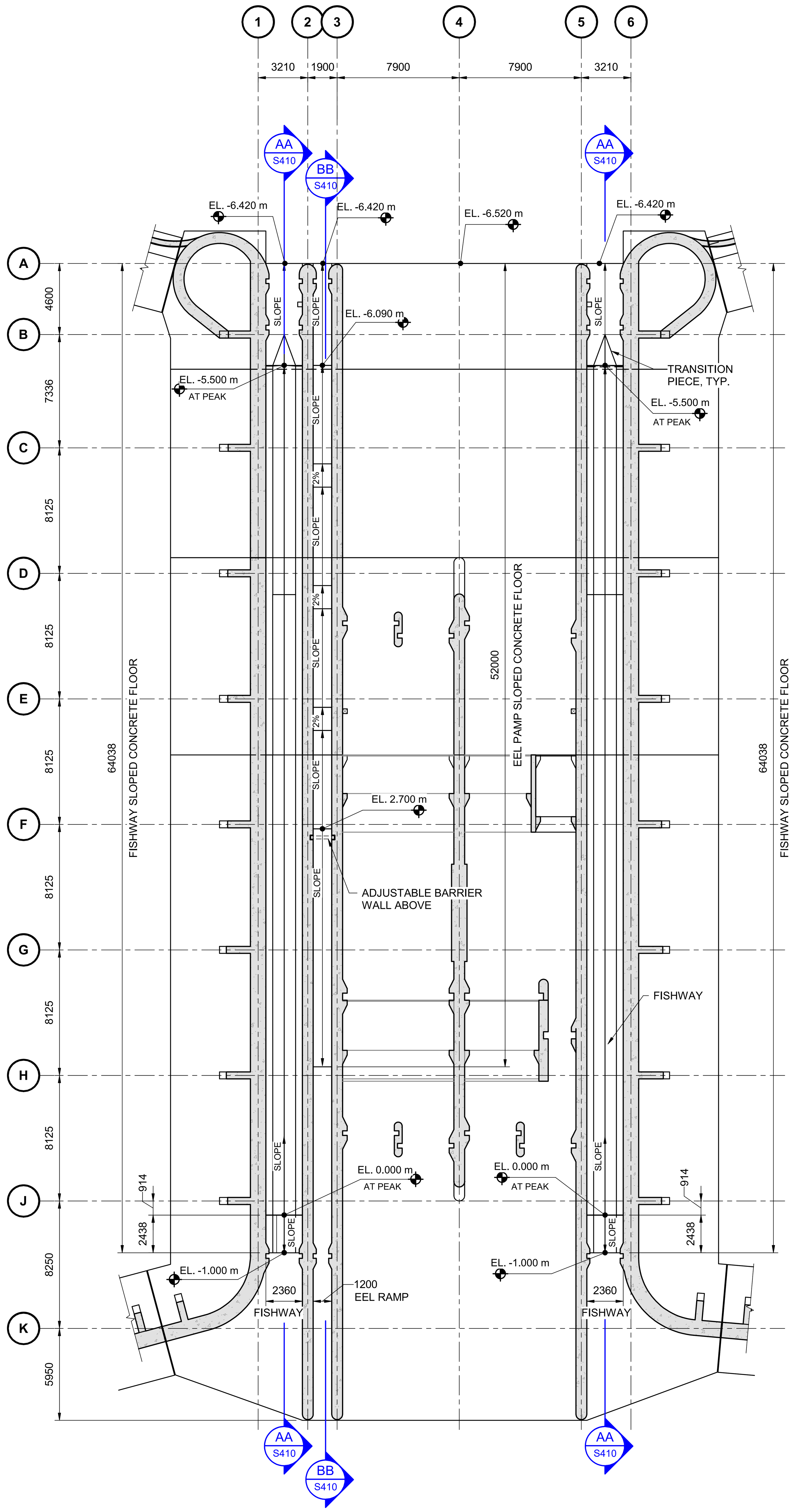
HIGHWAY 101 HANTS COUNTY

ELEVATIONS AT NORTH AND SOUTH WALLS

S410

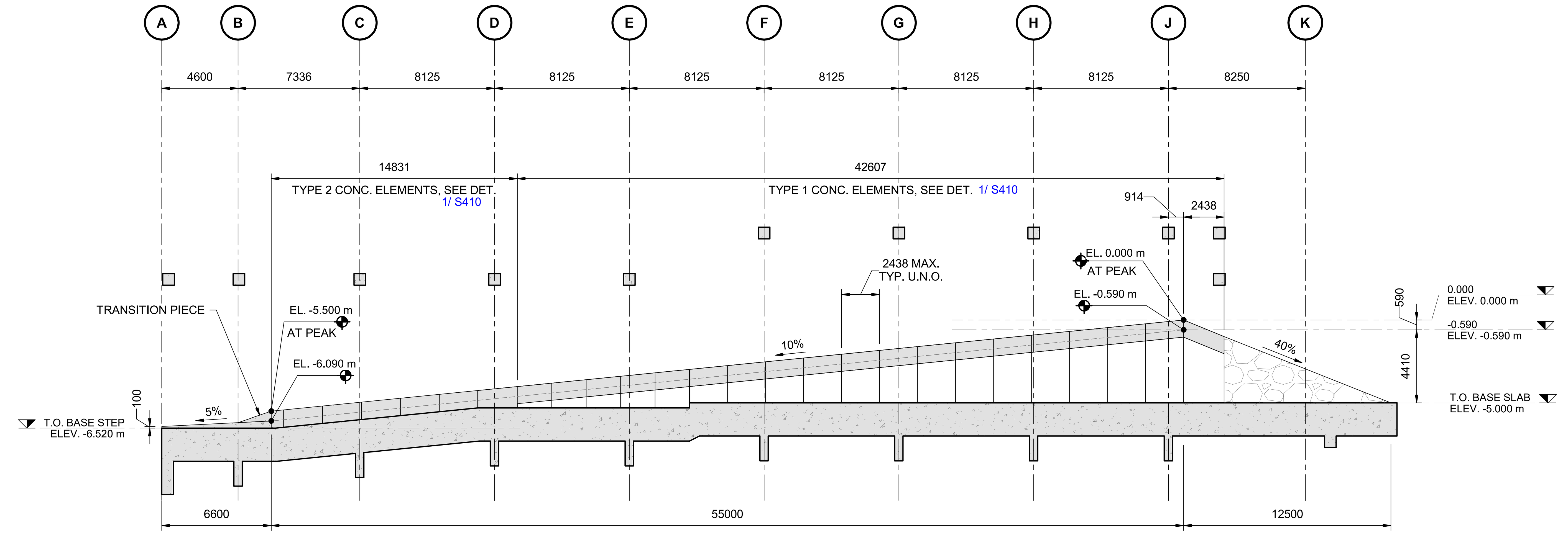
FISHWAY AND EEL RAMP FLOOR PLAN, SECTIONS AND DETAILS

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE



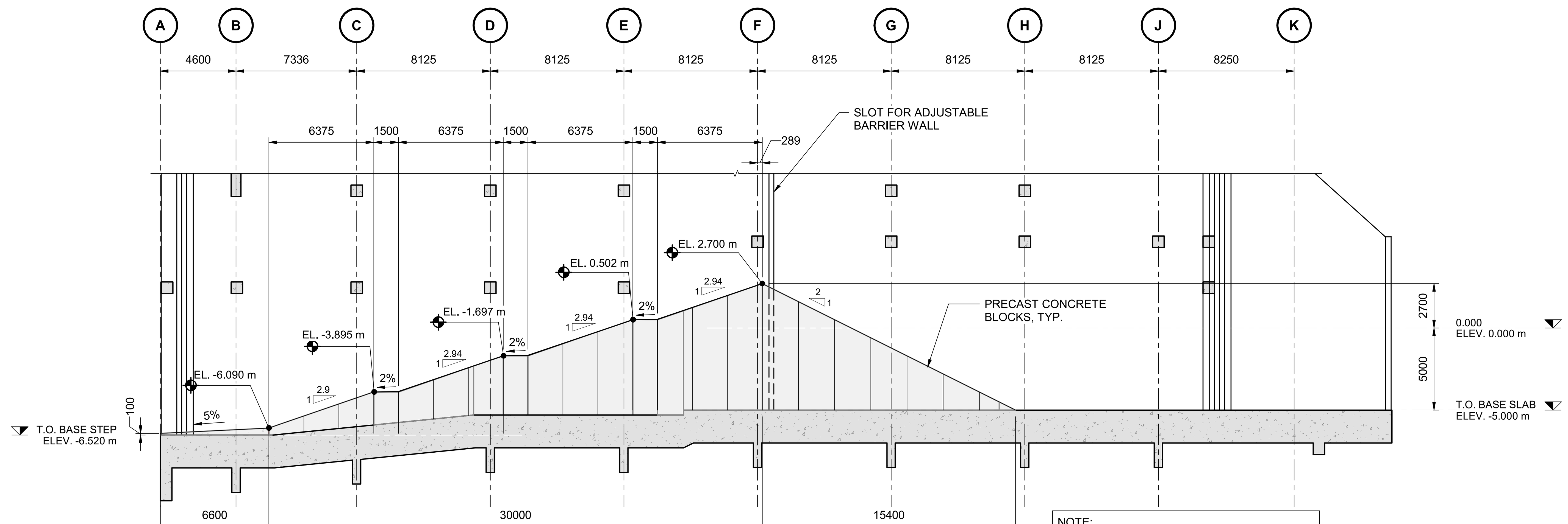
PLAN FISHWAY AND EEL RAMP CONCRETE FLOOR

1 : 200



AA SECTION FISHWAY FLOOR

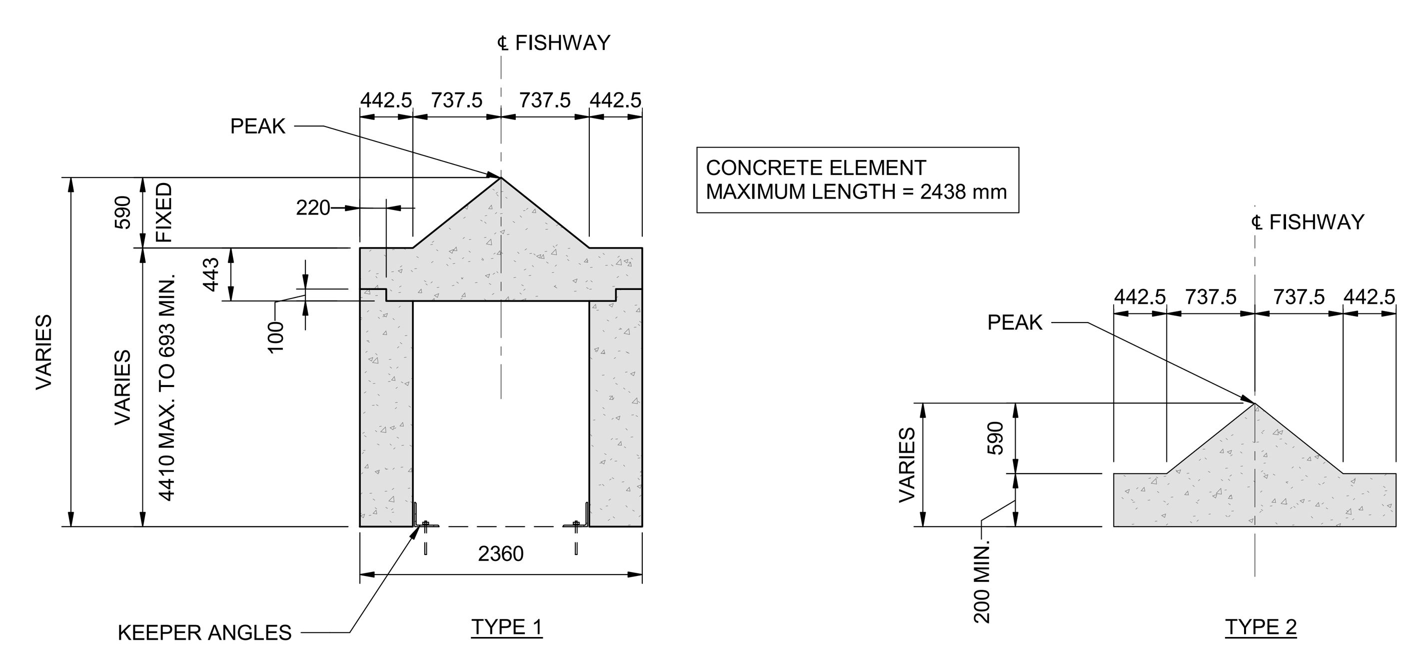
1 : 200



NOTE:
EEL RAMP TO BE SURFACED WITH CLIMBING STRATA. SEE DETAILS DRAWING XXX.

BB SECTION EEL RAMP FLOOR

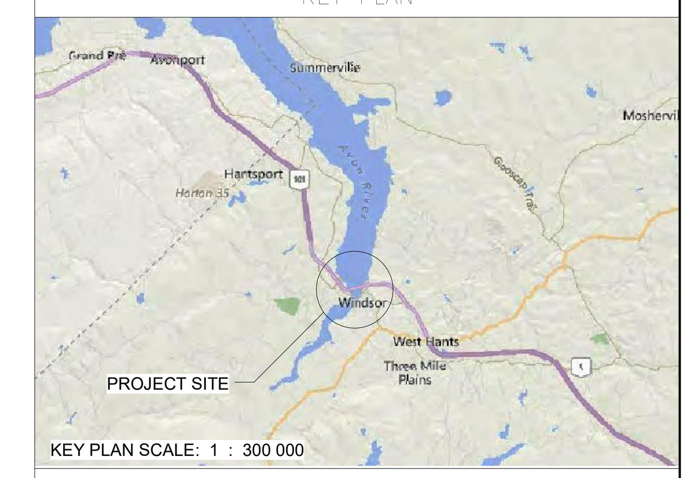
1 : 200



1 DETAIL PRECAST CONCRETE ELEMENTS

N.T.S.

KEY PLAN



LEGEND

NOT FOR CONSTRUCTION

CBCL

PROJECT: 171046

Designed by:	X.CHEN
Surveyed by:	
Drawn by:	E.MALIOUGINA
Checked by:	T.BARKHOUSE
Approved by:	C.JIM

MK.	DATE	REVISION
B	JAN 18/22	ISSUED FOR 90% REVIEW
A	NOV 02/21	ISSUED FOR 60% REVIEW

NOVA SCOTIA
Public Works

Scale:	As indicated
Date:	OCT. 2019
File No. :	S410
Sheet No. :	22 of 52

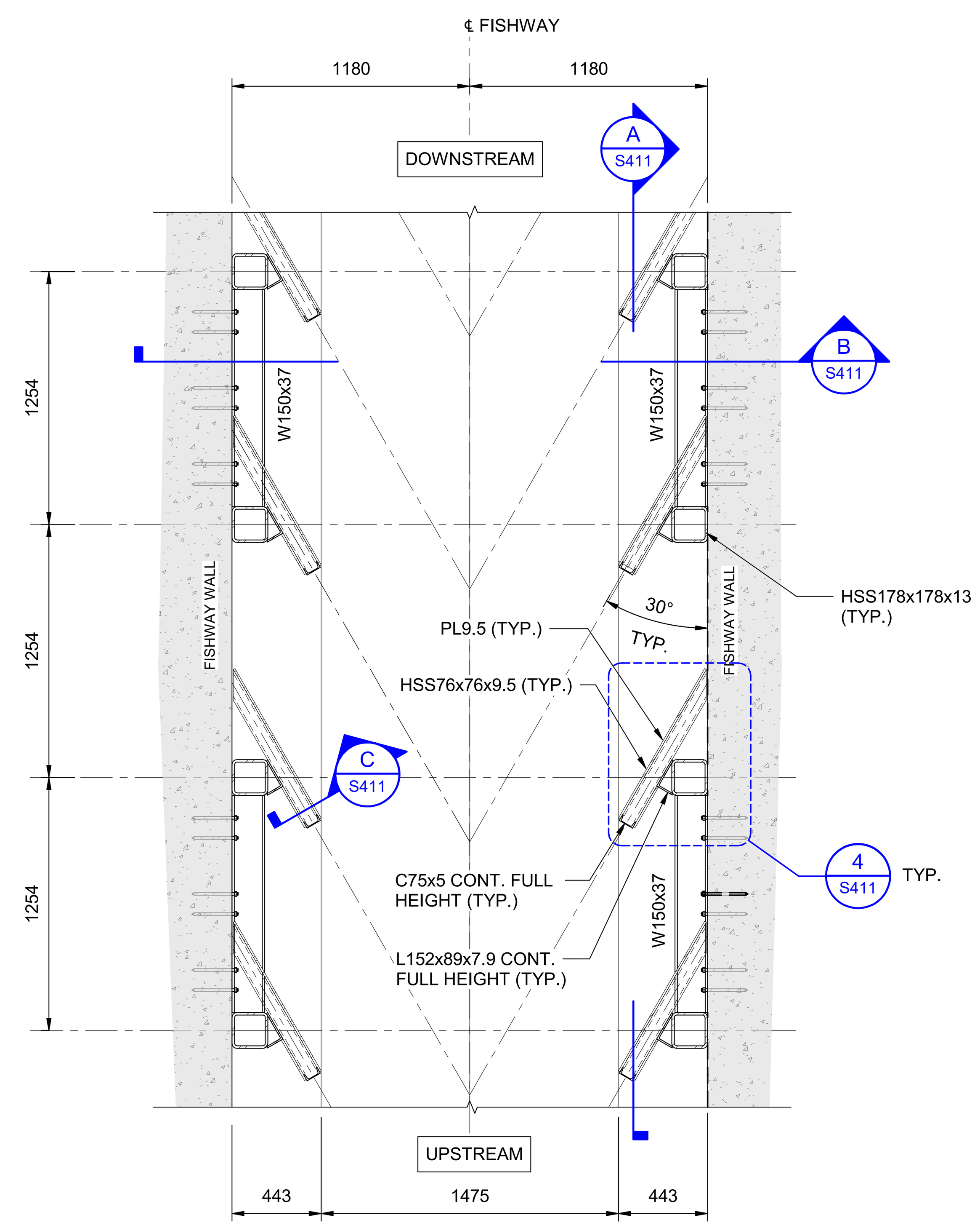
AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

HIGHWAY 101 HANTS COUNTY

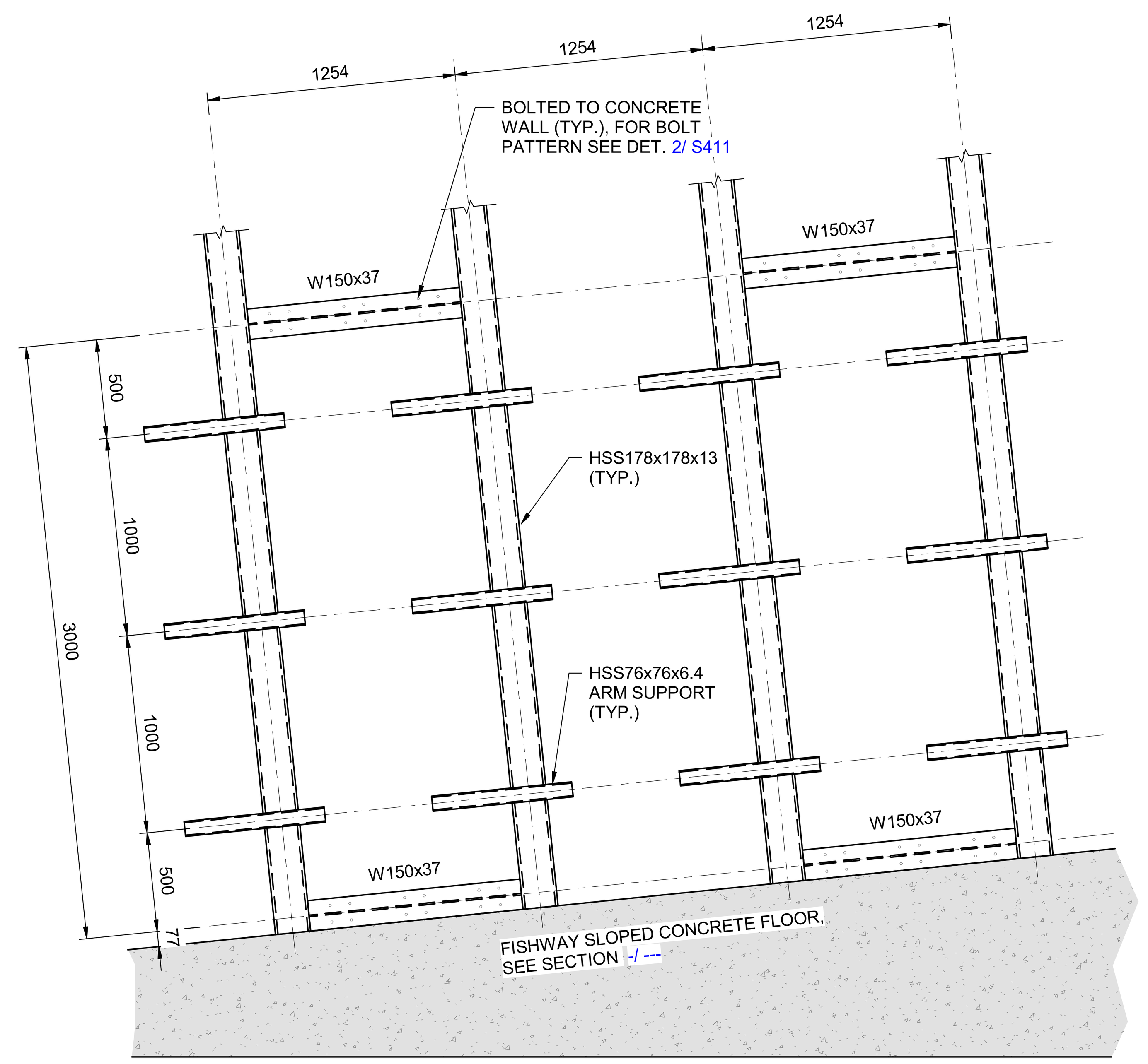
FISHWAY AND EEL RAMP FLOOR PLAN, SECTIONS AND DETAILS

FISHWAY BAFFLES PARTIAL PLAN, SECTIONS AND DETAILS

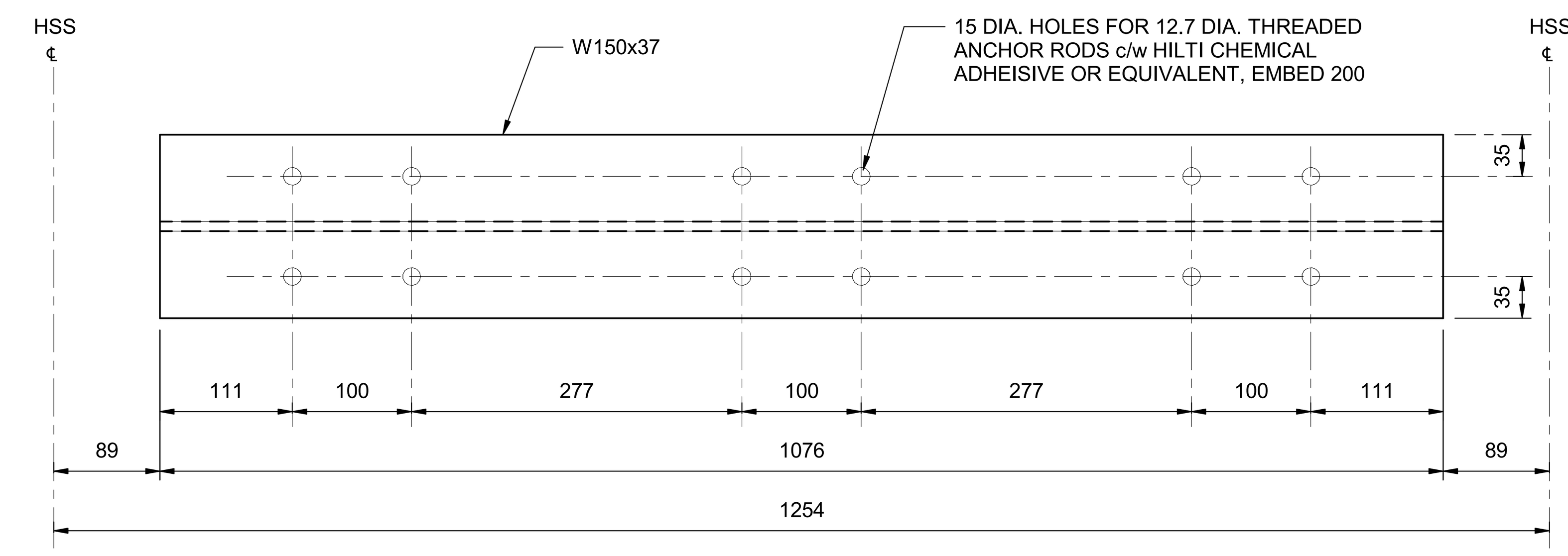
AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE



1 PLAN DETAIL BAFFLE LAYOUT
1 : 25

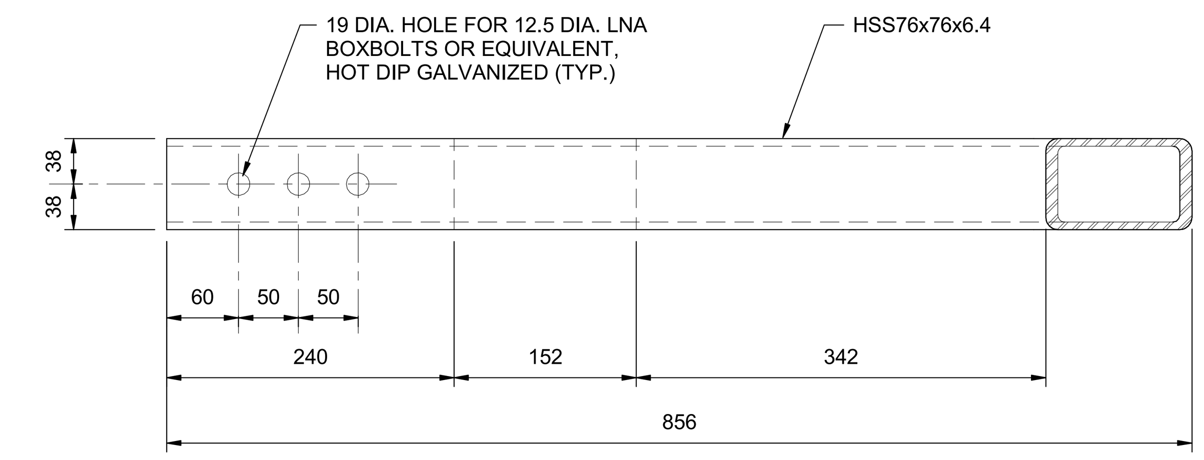


A SECTION BAFFLE SUPPORT FRAME
1 : 25



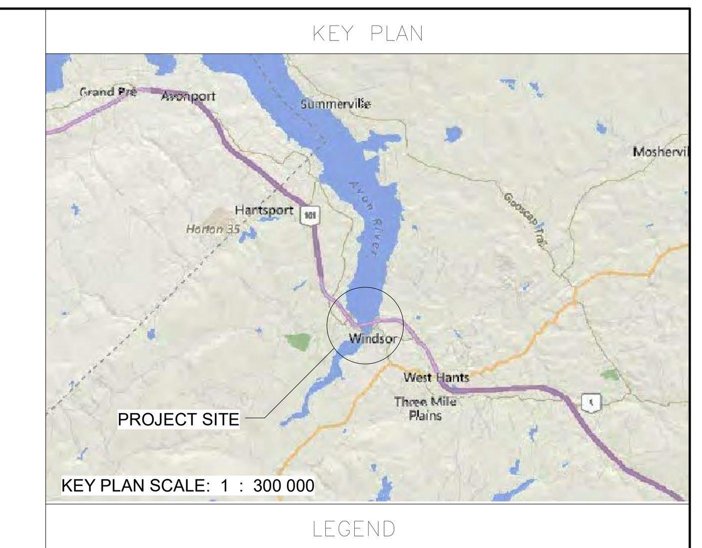
NOTE: CONFIRM DIMENSIONS PRIOR TO FABRICATIONS.

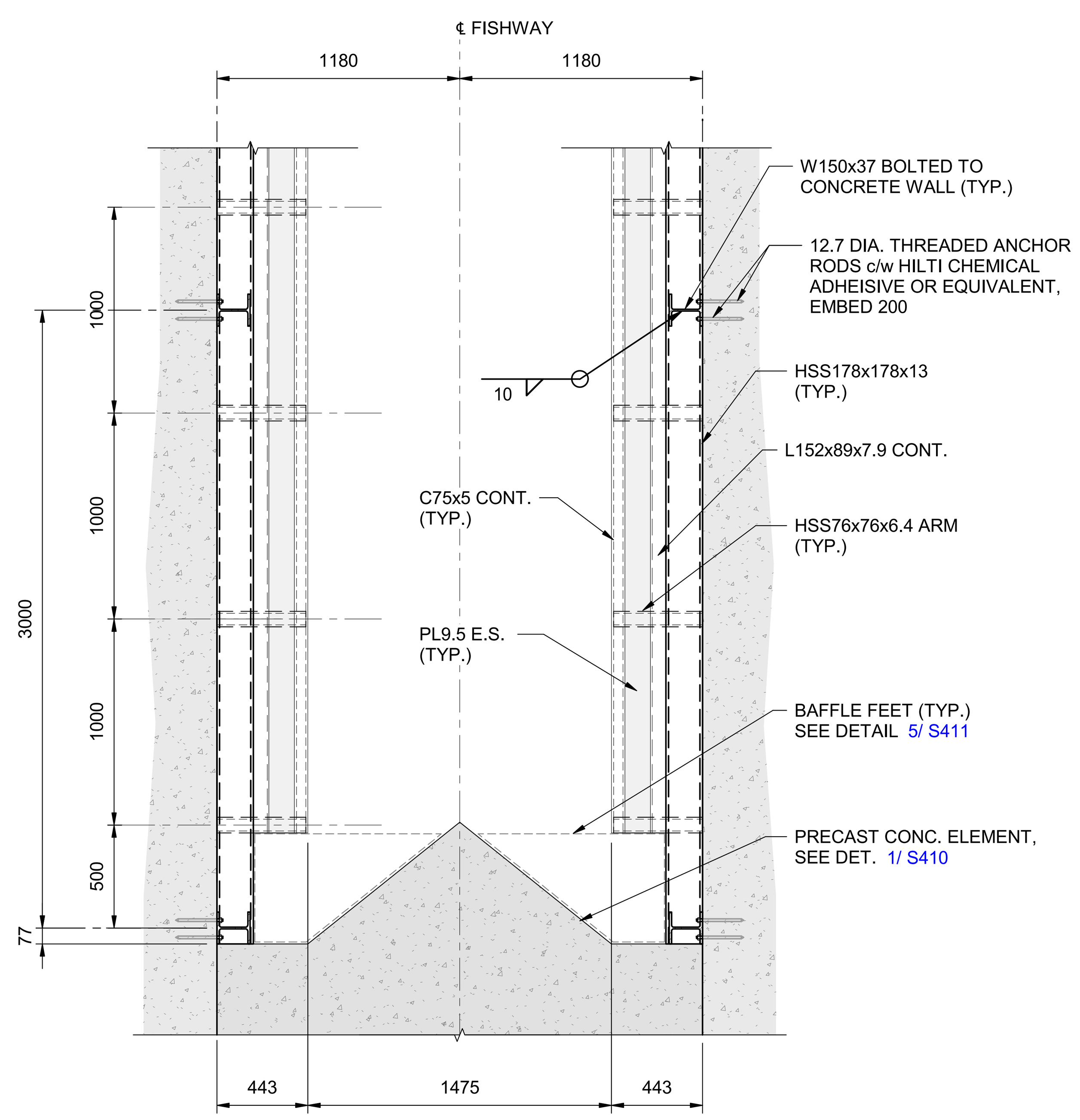
2 DETAIL W BEAM BOLT PATTERN
1 : 5



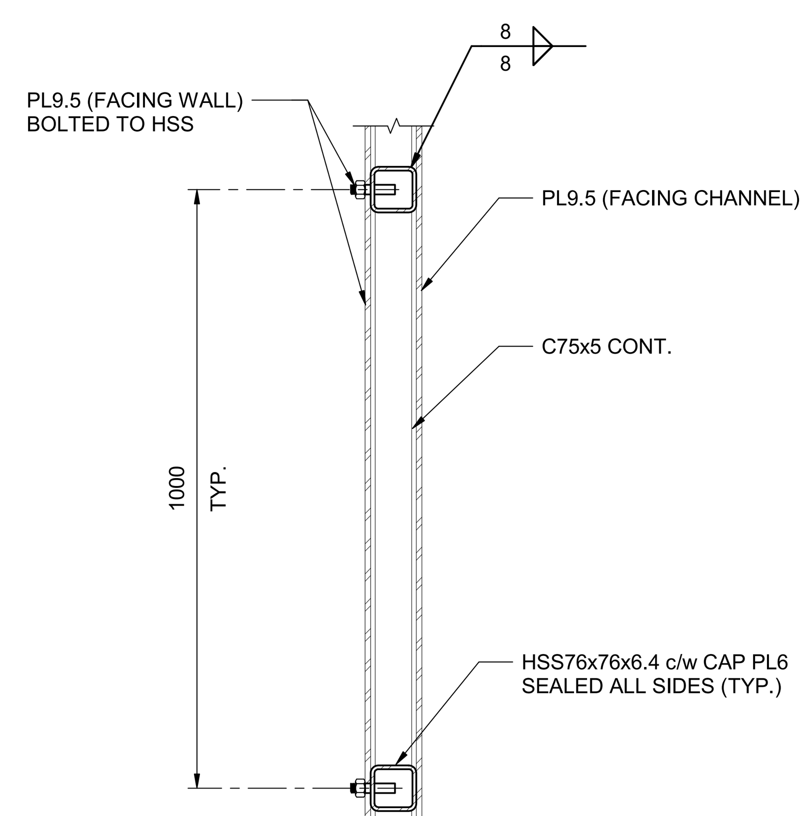
NOTE: CONFIRM DIMENSIONS PRIOR TO FABRICATIONS.

3 DETAIL BAFFLE ARM BOLT PATTERN
1 : 5

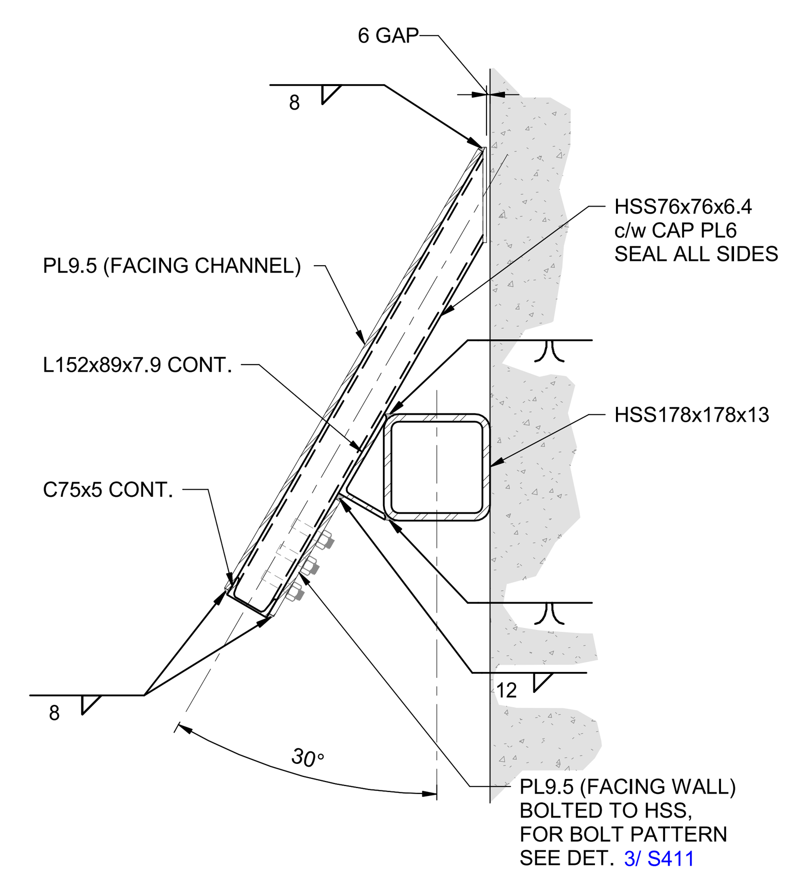




B SECTION BAFFLES
1 : 25



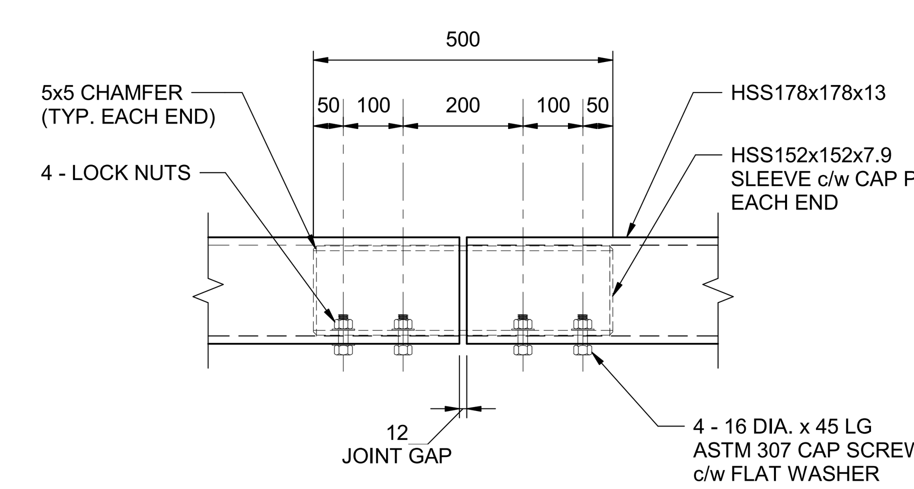
C SECTION BAFFLE ARM
S411
1 : 10



4 DETAIL BAFFLE ARM CONNECTION
1 : 10

IN PROGRESS

5 DETAIL BAFFLE FEET
N.T.S.



6 DETAIL STANDARD BAFFLE SPLICE
N.T.S.

NOT FOR CONSTRUCTION

CBCL

PROJECT: 171046

Designed by:	X.CHEN
Surveyed by:	
Drawn by:	E.MALIOUGINA
Checked by:	T.BARKHOUSE
Approved by:	C.JIM

MK.	DATE	REVISION
B	JAN 18/22	ISSUED FOR 90% REVIEW
A	NOV 02/21	ISSUED FOR 60% REVIEW

NOVA SCOTIA Public Works

Scale:	As indicated
Date:	OCT. 2019
File No. :	S411
Sheet No. :	23 of 52

AVON RIVER ABOITEAU AND CAUSEWAY UPGRADE

HIGHWAY 101 HANTS COUNTY

FISHWAY BAFFLES PARTIAL PLAN, SECTIONS AND DETAILS

WORKING POINT	NORTHING	EASTING	STATION	ELEVATION
W.P.3	4,984,178.062	25,527,661.365	STA. 1+674.054	+10.638m
W.P.4	4,984,160.398	25,527,749.614	STA. 1+764.085	+10.968m

BRIDGE PLAN
1:200

EL1 ELEVATION– EASTBOUND TRAFFIC (HAN 260)
S201 1:200

NOTE:
FOR GENERAL NOTES SEE S202

Designed by :	M.WARREN
Surveyed by :	N.S.P.W.
Drawn by :	J.DIXON
Checked by :	T.BARKHOUSE
Approved by :	C.JIM

NOT FOR CONSTRUCTION

Manager Structural Engineering — Date:

MK.	DATE	REVISION
B	2021-12-23	ISSUED FOR 95% REVIEW
A	2021-10-18	ISSUED FOR 50% REVIEW

NOVA SCOTIA
Public Works

Scale : AS NOTED
Date : FEB 2021
File No. : B-20-06
Sheet No. : S201 of S225

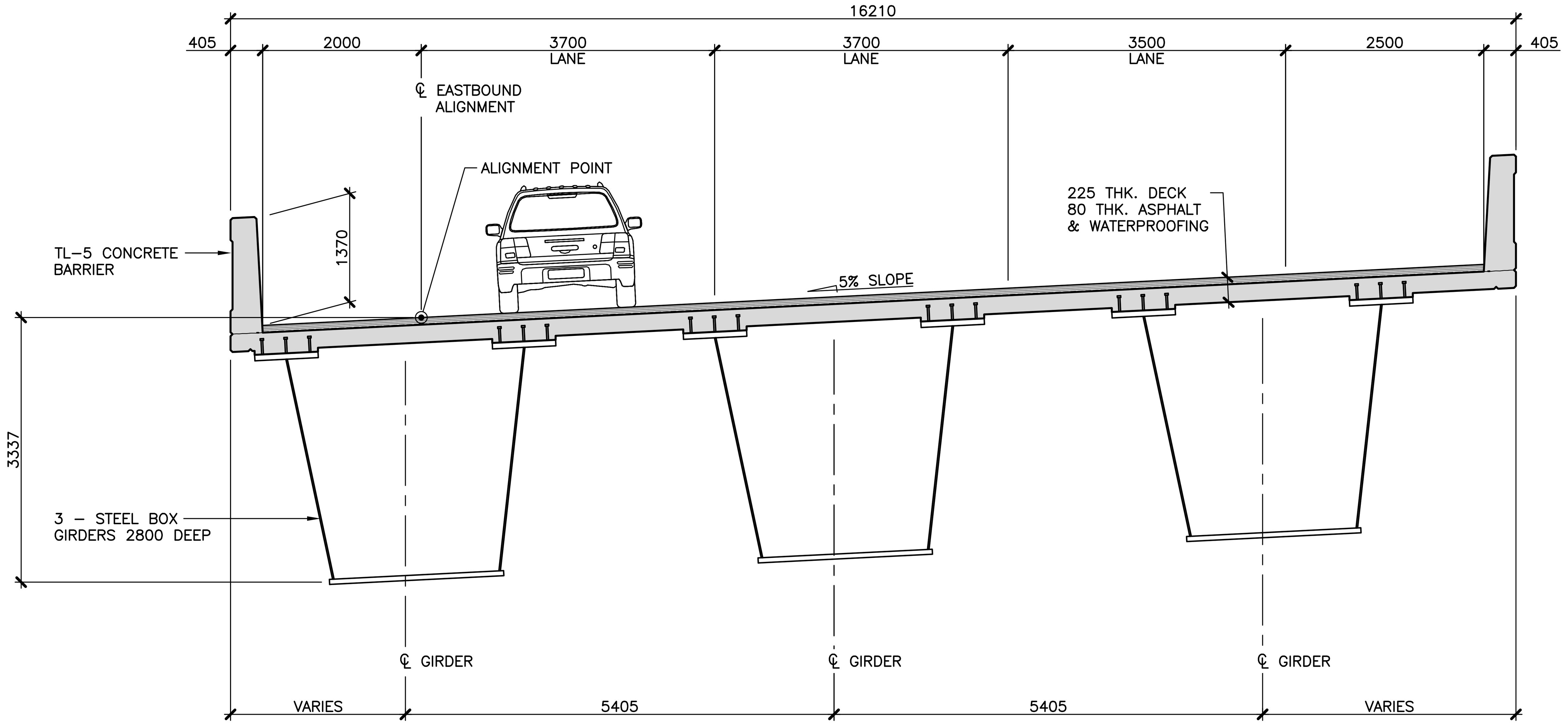
Avon River Causeway Bridge, Highway 101 Eastbound (HAN 260)
Highway 101 — Hants County

GENERAL ARRANGEMENT

B-20-06

CROSS SECTION AND FILL AGAINST STRUCTURE

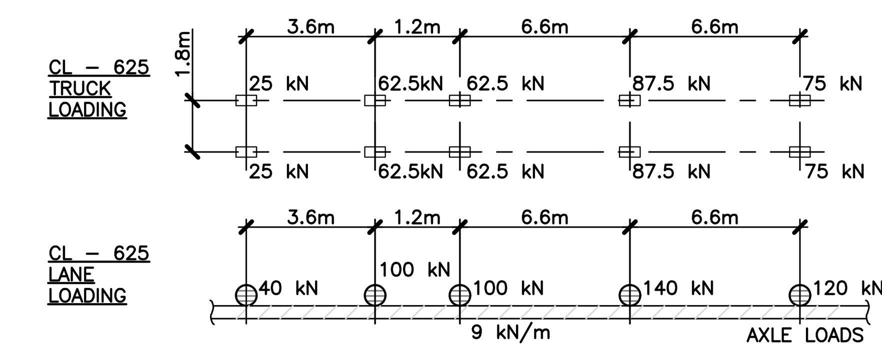
Avon River Causeway Bridge, Highway 101 Eastbound (HAN 260)



A CROSS SECTION–EASTBOUND STRUCTURE
S201 1:50

GENERAL NOTES:

1. GENERAL REQUIREMENTS GOVERNING DESIGN, MATERIALS, AND CONSTRUCTION ARE AS FOLLOWS:
   a. LOADING, CONSTRUCTION AND GENERAL DESIGN TO CAN/CSA – S6 – 19, WITH LATEST REVISIONS.
   b. NOVA SCOTIA PUBLIC WORKS (NSPW), STANDARD SPECIFICATION.
   c. DECK, BARRIERS, CRASH BLOCKS AND APPROACH SLABS TO BE REINFORCED WITH GFRP.
2. REFERENCE DRAWING S203 FOR CONCRETE AND PILE NOTES.
3. REFERENCE DRAWING S209 FOR STEEL GIRDER NOTES.
4. ALL DIMENSIONS SHOWN IN MILLIMETRES.
5. ALL ELEVATIONS SHOWN IN METRES.
6. ALL SPECIFICATION NOTES TO REFLECT THE "LATEST EDITION".
7. LIVE LOADS CL–625.



8. FOUNDATION DESIGN BASED ON INFORMATION PROVIDED IN GEOTECHNICAL REPORT PREPARED BY GOLDER ASSOCIATES LTD., PROJECT NUMBER 1783861–019–R–Rev0, DATED AUGUST 17, 2021.
9. LAYOUT INFORMATION IS BASED ON INFORMATION PROVIDED BY NSPW. COORDINATES ARE BASED ON THE NOVA SCOTIA COORDINATE SYSTEM AND ELEVATIONS ARE TO CANADIAN GEODATIC DATUM.
10. CONCRETE COVERS AS INDICATED ON DRAWINGS.
11. ANY DISCREPANCIES BETWEEN DRAWINGS AND FIELD CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO PROCEEDING WITH CONSTRUCTION.
12. ALIGNMENT PROVIDED BY NSPW REFERENCE: DATED APRIL 8, 2020.

DETAIL TO BE COORDINATED WITH AVON RIVER CHANNEL CONSTRUCTION DRAWINGS ONCE FURTHER DEVELOPED

DETAIL–FILL AGAINST STRUCTURE WEST ABUTMENT
1:150

DETAIL–FILL AGAINST STRUCTURE EAST ABUTMENT
1:150

Designed by :	M.WARREN
Surveyed by :	N.S.P.W.
Drawn by :	J.DIXON
Checked by :	T.BARKHOUSE
Approved by :	C.JIM

NOT FOR CONSTRUCTION

Manager Structural Engineering Date:

MK.	DATE	REVISION
B	2021-12-23	ISSUED FOR 95% REVIEW
A	2021-10-18	ISSUED FOR 50% REVIEW

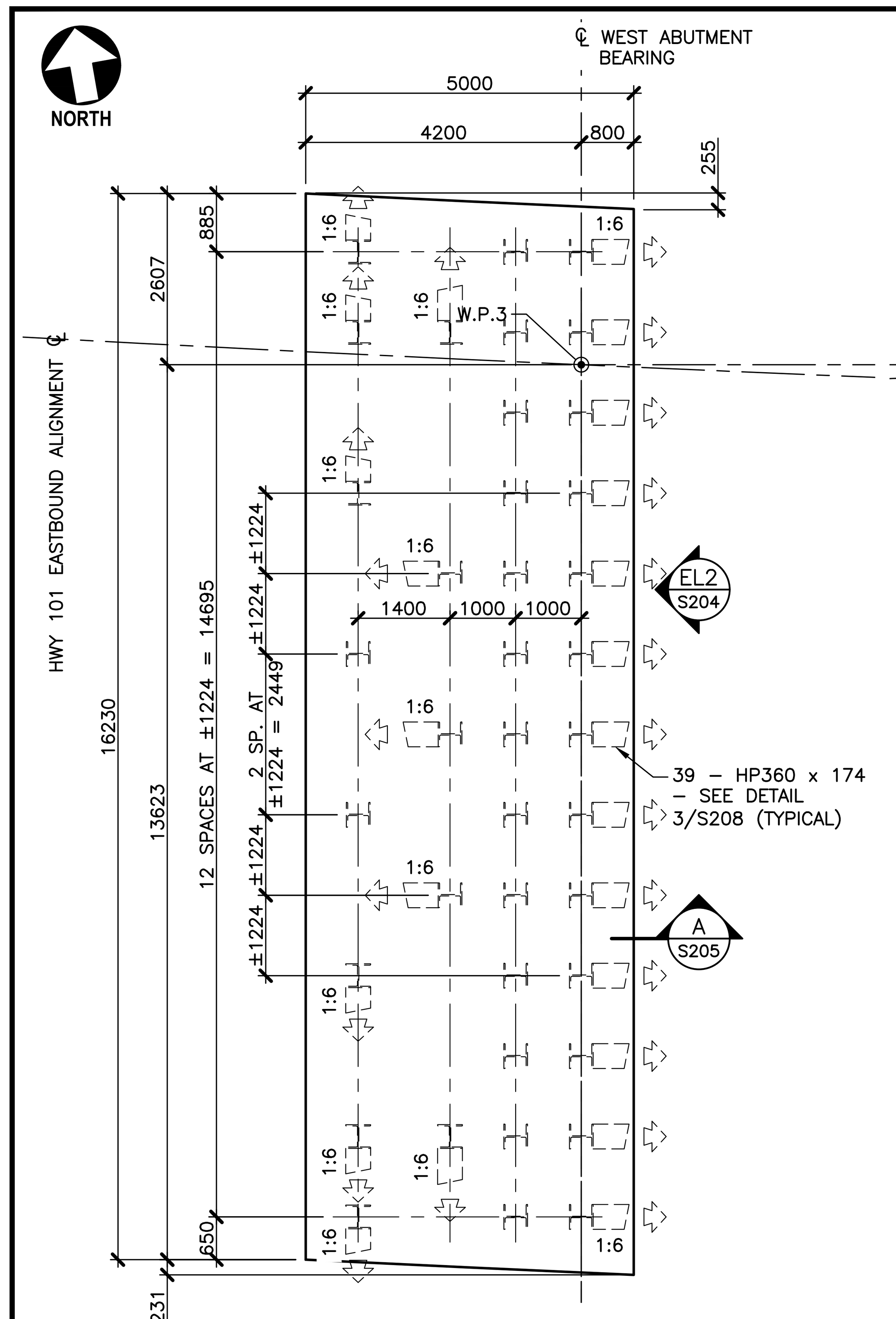
NOVA SCOTIA Public Works

Scale : AS NOTED
Date : FEB 2021
File No. : B-20-06
Sheet No. : S202 of S225

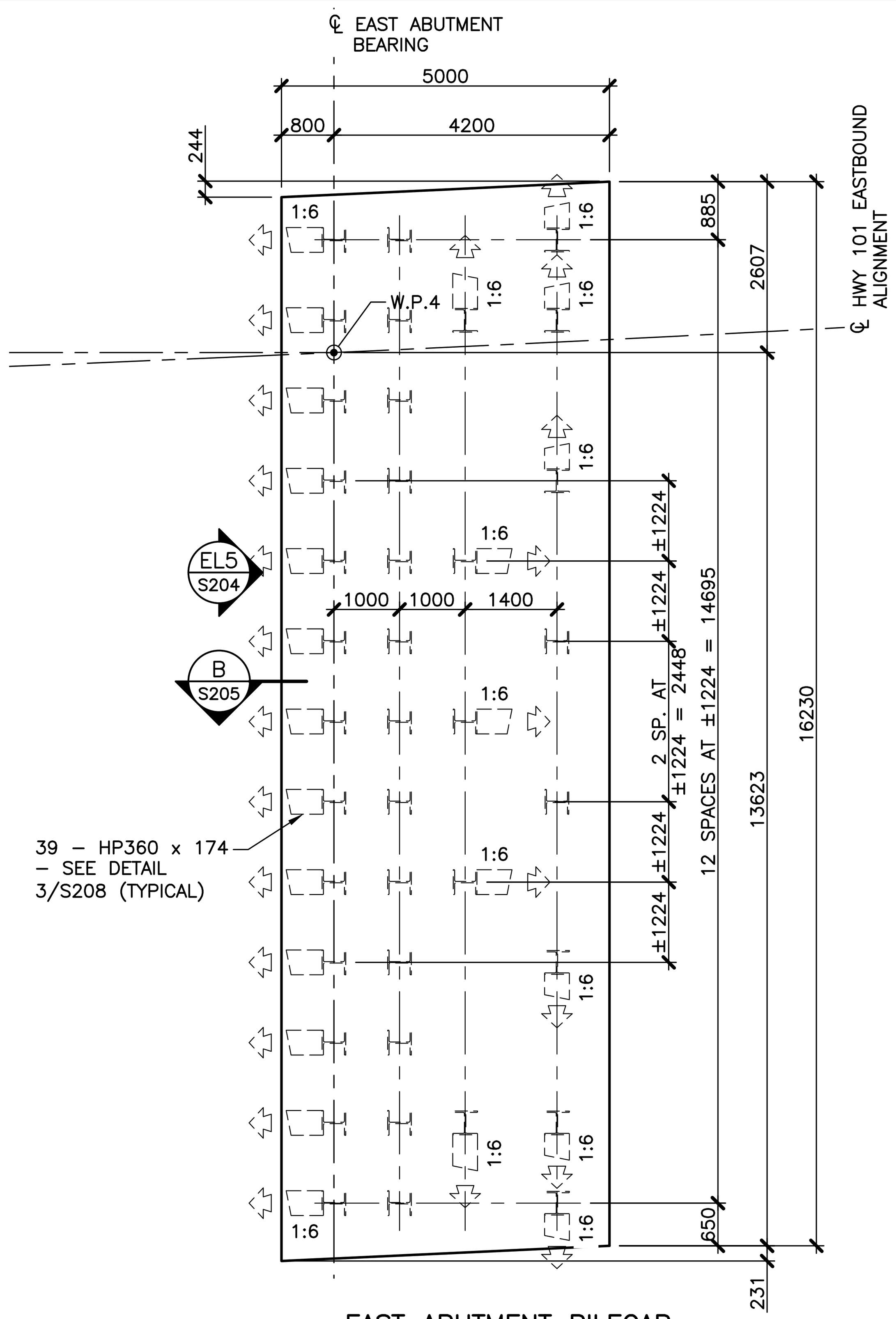
Avon River Causeway Bridge, Highway 101 Eastbound (HAN 260)

Highway 101 Hants County

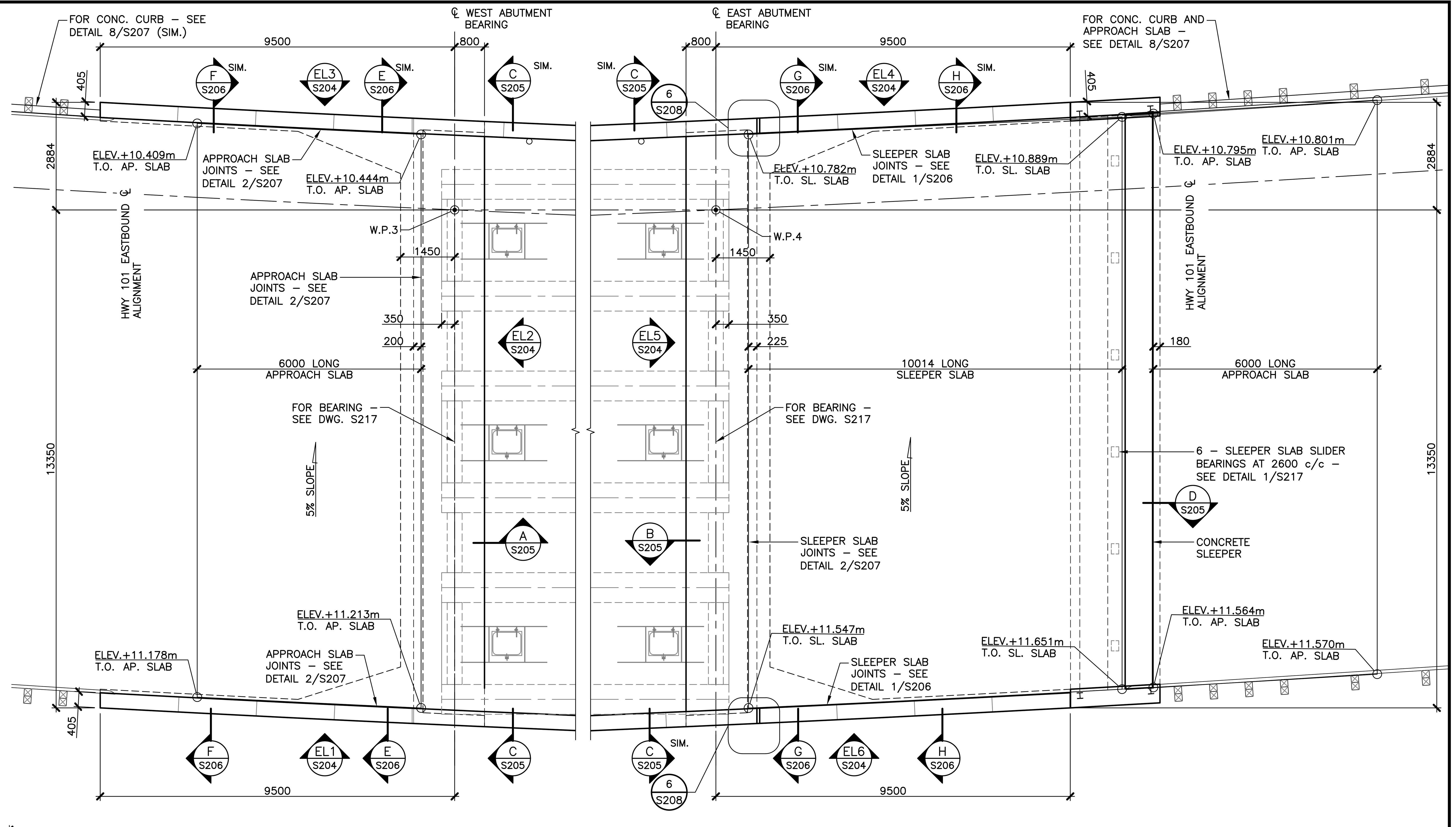
CROSS SECTION AND FILL AGAINST STRUCTURE



PLAN– WEST ABUTMENT PILECAP AND PILE LAYOUT
1:75

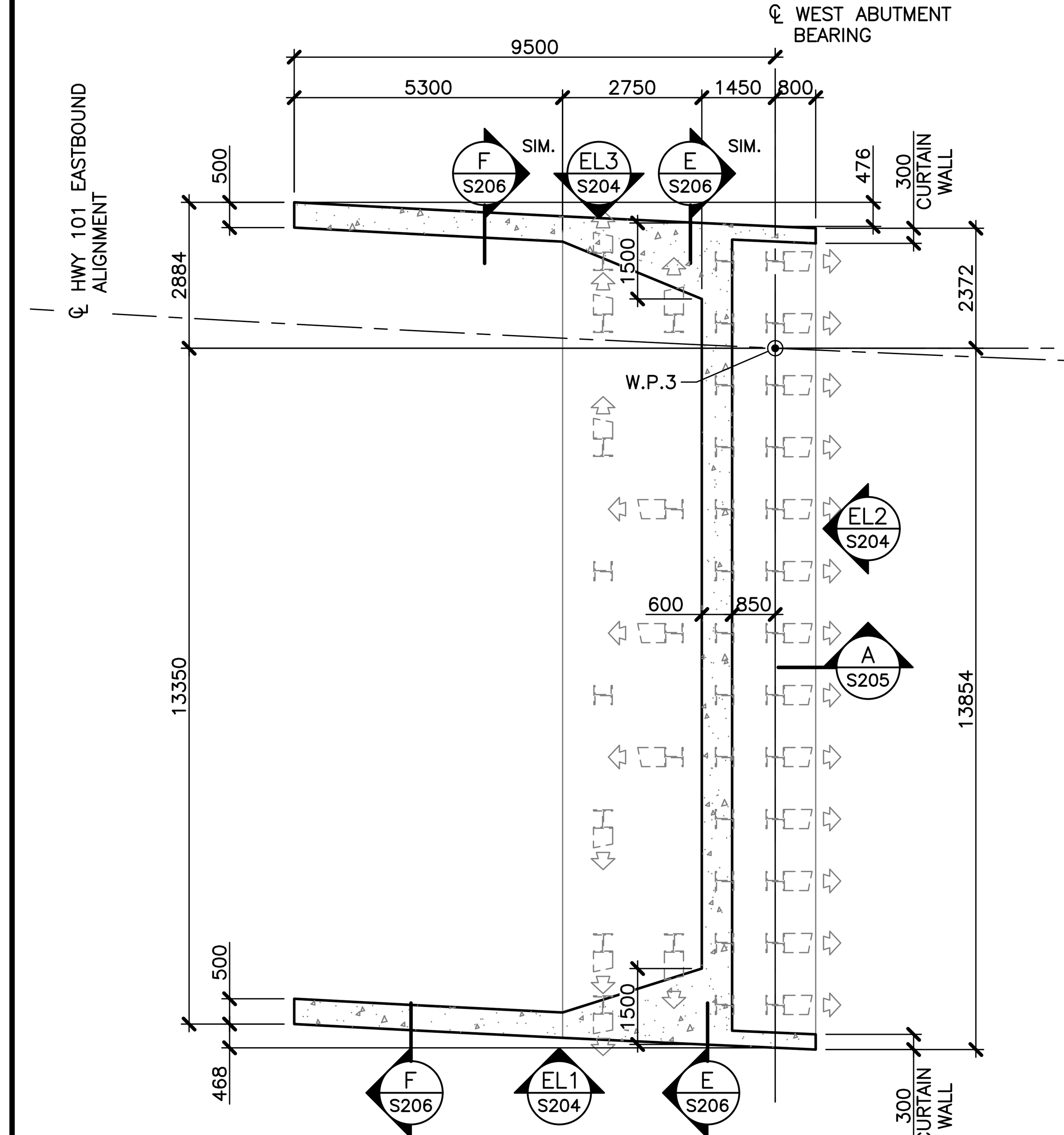


PLAN– EAST ABUTMENT PILECAP AND PILE LAYOUT
1:75

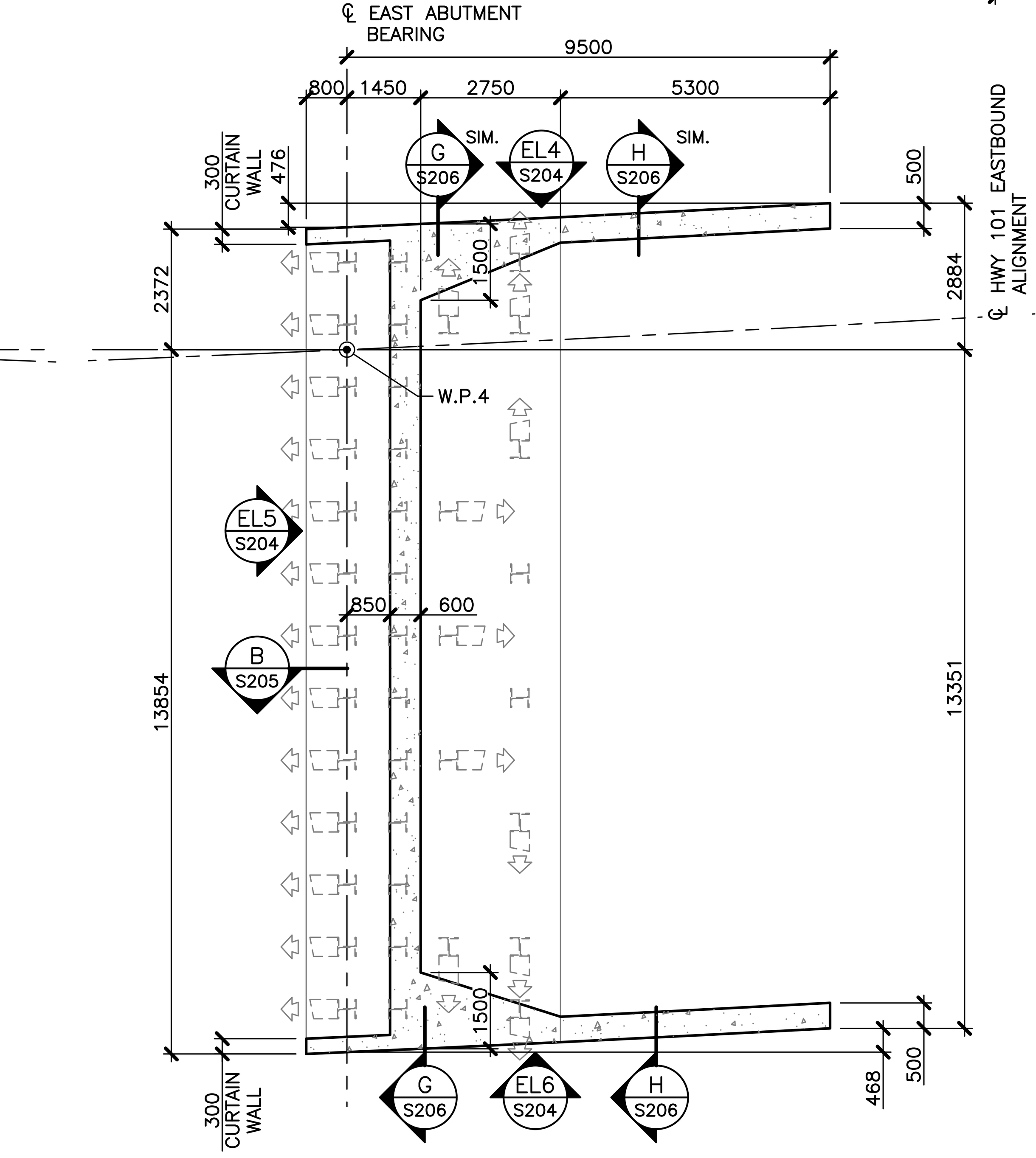


PLAN– WEST ABUTMENT BEARING
1:75

PLAN– EAST ABUTMENT BEARING
1:75



PLAN– WEST ABUTMENT WINGWALLS
1:100



PLAN– EAST ABUTMENT WINGWALLS
1:100

CONCRETE NOTES:

1. CONCRETE NOTES TO BE READ IN CONJUNCTION WITH GENERAL NOTES ON DRAWINGS S202
2. ALL EXPOSED CORNERS OF CONCRETE TO HAVE 25mm CHAMFERS.
3. LOCATION OF CONSTRUCTION JOINTS AND SEQUENCE OF CONCRETE PLACEMENT TO BE APPROVED BY THE ENGINEER.
4. ALL REINFORCEMENT TO BE INSPECTED BY THE ENGINEER PRIOR TO CLOSING FORMWORK OR PLACING CONCRETE.
5. BACKFILL IMMEDIATELY BEHIND ABUTMENTS TO BE "FILL AGAINST STRUCTURES" MATERIAL AS PER NSPW SPECIFICATIONS.
6. TYPICAL BENT REINFORCING TO FOLLOW DIMENSIONS PUBLISHED IN R.S.I.C. (REINFORCING STEEL MANUAL OF STANDARD PRACTICES), AND NSPW STANDARD SPECIFICATION.
7. EACH PHASE OF WORK TO BE INSPECTED BY THE ENGINEER PRIOR TO PROCEEDING TO THE NEXT PHASE OF WORK.
8. IF DEWATERING BEHIND COFFERDAMS/ENVIRONMENTAL CONTROLS IS NOT ACHIEVABLE, ALL CONCRETING UNDERWATER SHALL BE COMPLETED BY TREMIE METHOD (TYPICAL ABUTMENTS AND WINGWALLS).

PILE NOTES:

1. PILE MATERIAL:
   a. STEEL H PILES: 360 x 174 TO CSA/CSA G40.21–350W.
   b. STEEL PLATES AND BAR STOCK TO G40.21 – LATEST EDITION, GRADE 350W.
   c. WELDING MATERIAL TO CSA G40.1 – LATEST EDITION.
   d. WELDING TO BE IN ACCORDANCE WITH CSA W59 – LATEST EDITION.
   e. PILES ARE TO BE FITTED WITH DRIVING SHOES.
2. PILE "SET CRITERIA":
   REFERENCE GOLDER ASSOCIATES LTD. GEOTECHNICAL REPORT, REFERENCE NO. 1783861–019–R–Rev0, DATED AUGUST 17, 2021.
   a. RATED ENERGY OF THE HAMMER SHOULD BE LIMITED TO 600 J/cm sq. OF CROSS SECTIONAL AREA OF THE PILE.
   b. PILES SHALL BE DRIVEN TO REFUSAL. REFUSAL SHALL BE CONSIDERED AS 12 – 15 BLOWS FOR THE LAST 25mm OF PILE PENETRATION FOR TWO CONSECUTIVE SETS.
   c. 2 PILES AT EACH ABUTMENT SHOULD BE RESTRUCK A MINIMUM OF 24 HOURS AFTER INITIAL DRIVING REFUSAL IS OBTAINED. IF RELAXATION OCCURS, ALL PILES SHOULD BE REDRIVEN TO THE REFUSAL CRITERIA AND THE CYCLE REPEATED UNTIL THE REFUSAL CRITERIA IS MAINTAINED DURING RE–STRIKE.
   d. DRIVE SHOES SHALL BE USED TO PROTECT PILES DURING DRIVING.
   e. REFERENCE GEOTECHNICAL REPORT AND NSPW STANDARD SPECIFICATION FOR PDA TESTING REQUIREMENTS.
   f. CONTRACTOR SHALL PROVIDE TO THE ENGINEER FULL DETAILS ON THE METHOD OF INSTALLATION AND EQUIPMENT PRIOR TO COMMENCING THE WORK.
   g. REQUIRED MINIMUM HP360 x 174 PILE CAPACITIES AT ULTIMATE LIMIT STATES:
      – WEST ABUTMENT: 1613 kN COMPRESSION AND 694 kN TENSION.
      – EAST ABUTMENT: 1465 kN COMPRESSION AND 705 kN TENSION.

Designed by :	M. WARREN
Surveyed by :	N.S.P.W.
Drawn by :	J.DIXON
Checked by :	T.BARKHOUSE
Approved by :	C.JIM

NOT FOR CONSTRUCTION

Manager Structural Engineering   Date:

MK.	DATE	REVISION
B	2021-12-23	ISSUED FOR 95% REVIEW
A	2021-10-18	ISSUED FOR 50% REVIEW

NOVA SCOTIA Public Works

Scale :	AS NOTED
Date :	FEB 2021
File No. :	B-20-05
Sheet No. :	S203 of S225

Avon River Causeway Bridge, Highway 101 Eastbound (HAN 260)

Highway 101   Hants County

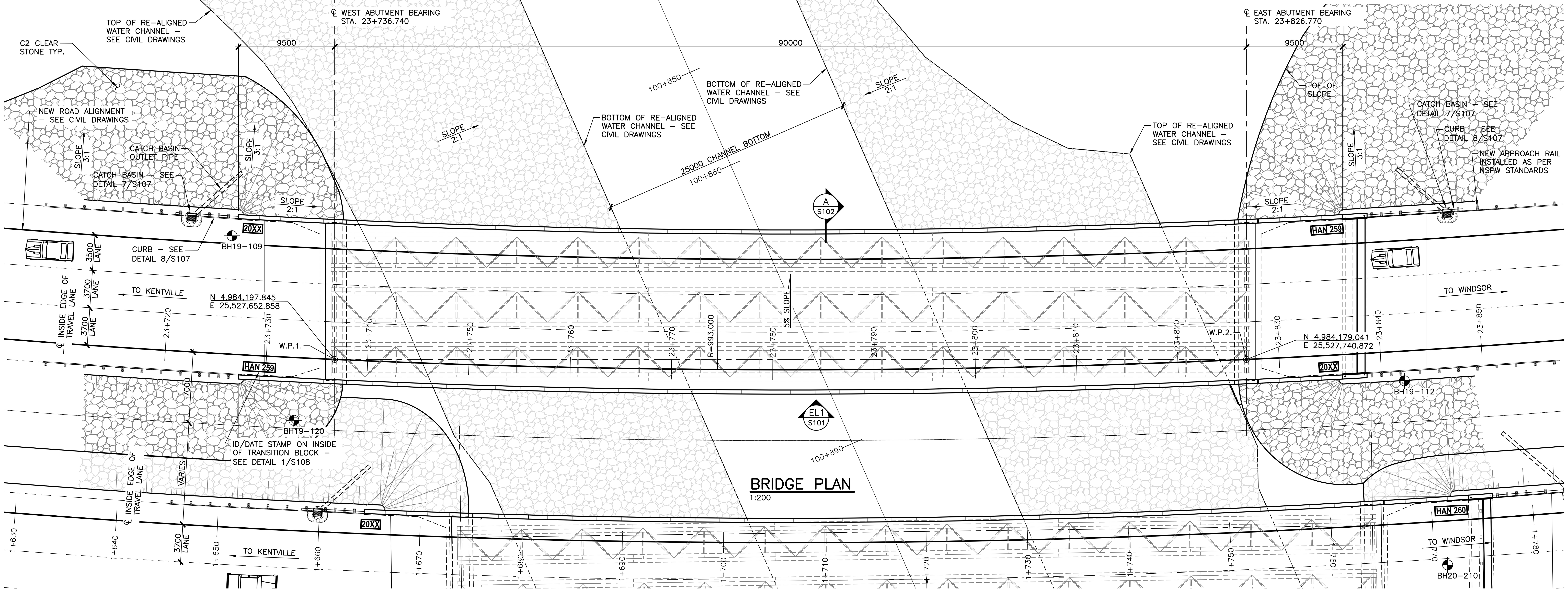
ABUTMENT PLANS

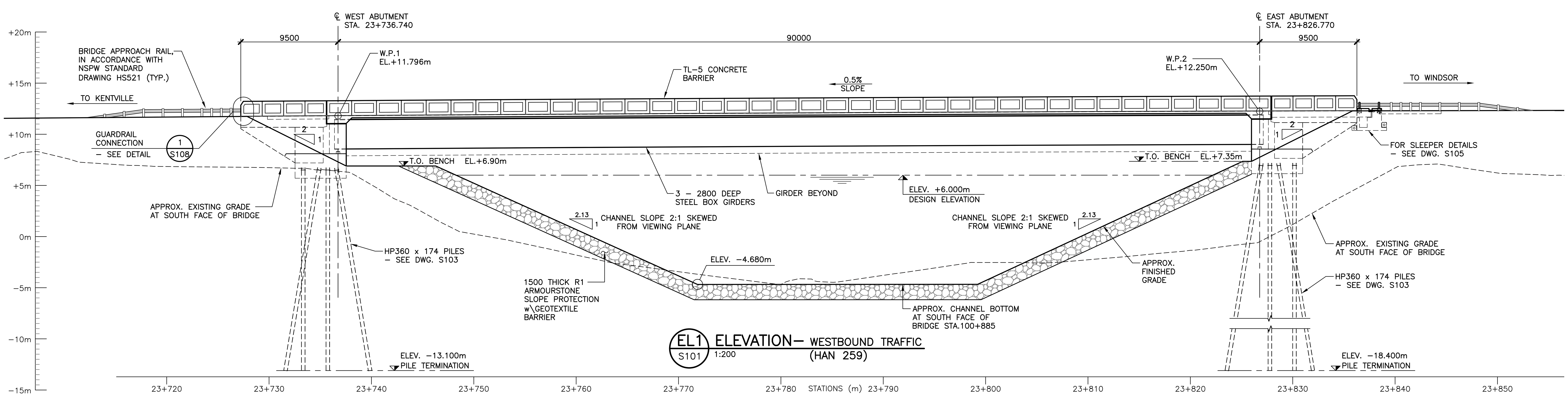
B-20-05

GENERAL ARRANGEMENT

Avon River Causeway Bridge, Highway 101 Westbound (HAN 259)

WORKING POINT	NORTHING	EASTING	STATION	ELEVATION
W.P.1.	4,984,197.845	25,527,652.858	STA. 23+736.740	+11.796m
W.P.2.	4,984,179.041	25,527,740.872	STA. 23+826.770	+12.250m





NOTE:
FOR GENERAL NOTES SEE S102

Designed by : M.WARREN	NOT FOR CONSTRUCTION	Manager Structural Engineering	Date:	
Surveyed by : N.S.P.W.				
Drawn by : J.DIXON				
Checked by : T.BARKHOUSE				
Approved by : C.JIM				

MK.	DATE	REVISION
B	2021-12-23	ISSUED FOR 95% REVIEW
A	2021-10-18	ISSUED FOR 50% REVIEW

NOVA SCOTIA
Public Works

Scale : AS NOTED
Date : JULY 2020
File No. : B-20-05
Sheet No. : S101 of S125

Avon River Causeway Bridge, Highway 101 Westbound (HAN 259)

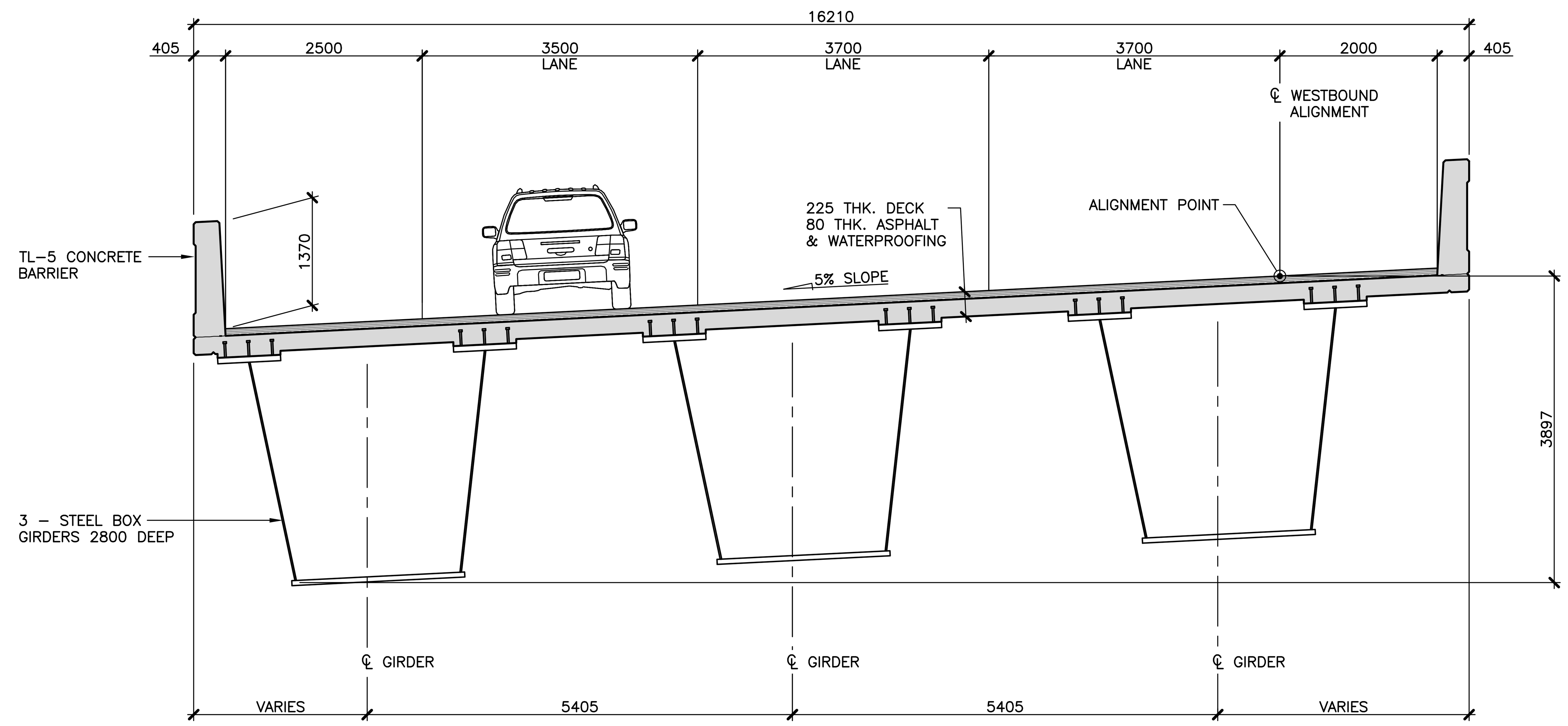
Highway 101 Hants County

GENERAL ARRANGEMENT

B-20-05

CROSS SECTION AND FILL AGAINST STRUCTURE

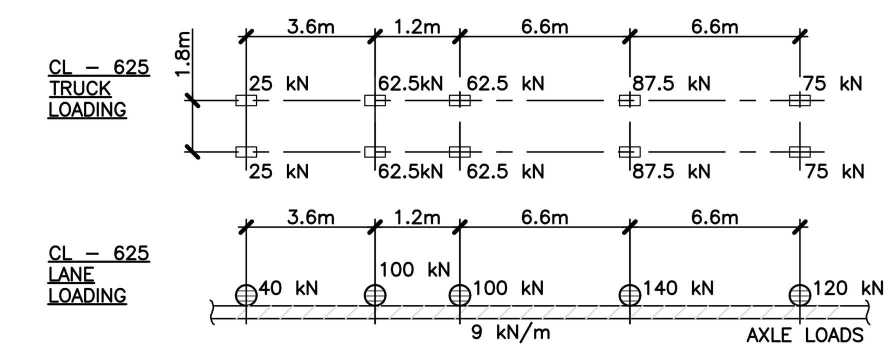
Avon River Causeway Bridge, Highway 101 Westbound (HAN 259)



A S101 **CROSS SECTION– WESTBOUND STRUCTURE**
1:50

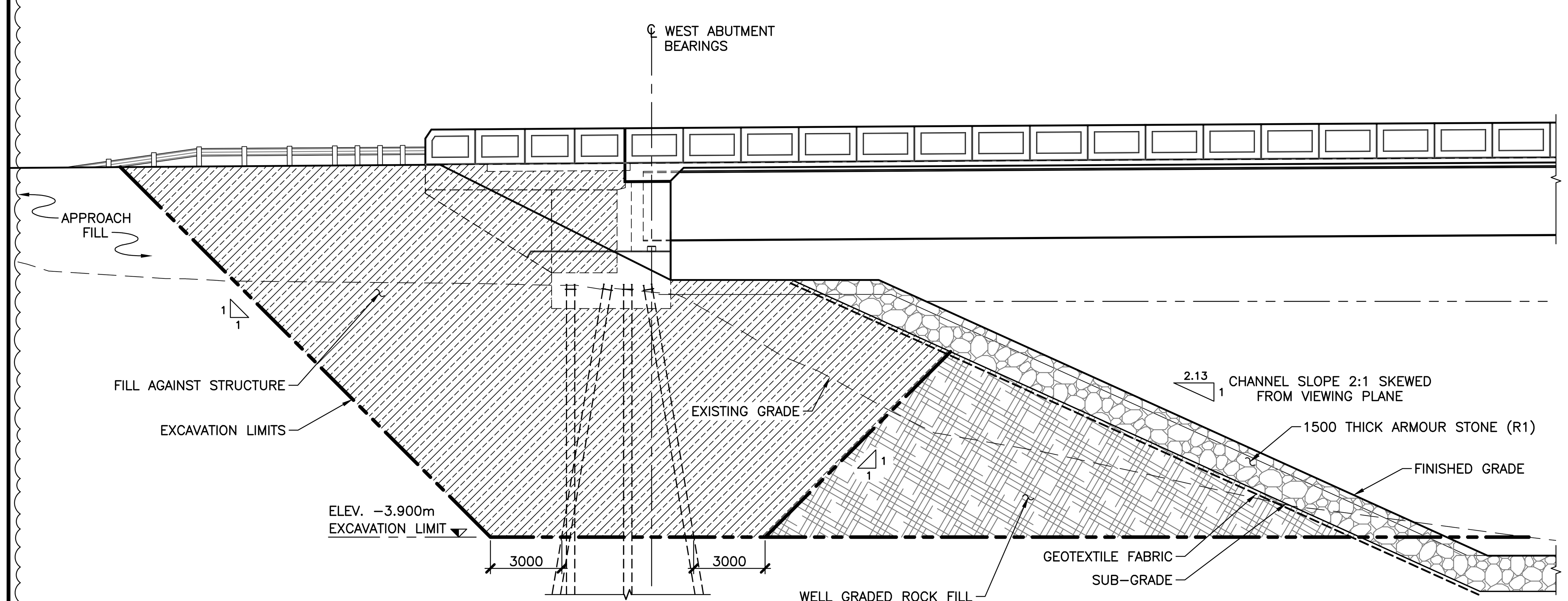
GENERAL NOTES:

1. GENERAL REQUIREMENTS GOVERNING DESIGN, MATERIALS, AND CONSTRUCTION ARE AS FOLLOWS:
   a. LOADING, CONSTRUCTION AND GENERAL DESIGN TO CAN/CSA – S6 – 19, WITH LATEST REVISIONS.
   b. NOVA SCOTIA PUBLIC WORKS (NSPW), STANDARD SPECIFICATION.
   c. DECK, BARRIERS, CRASH BLOCKS AND APPROACH SLABS TO BE REINFORCED WITH GFRP.
2. REFERENCE DRAWING S103 FOR CONCRETE AND PILE NOTES.
3. REFERENCE DRAWING S109 FOR STEEL GIRDER NOTES.
4. ALL DIMENSIONS SHOWN IN MILLIMETRES.
5. ALL ELEVATIONS SHOWN IN METRES.
6. ALL SPECIFICATION NOTES TO REFLECT THE "LATEST EDITION".
7. LIVE LOADS CL–625.

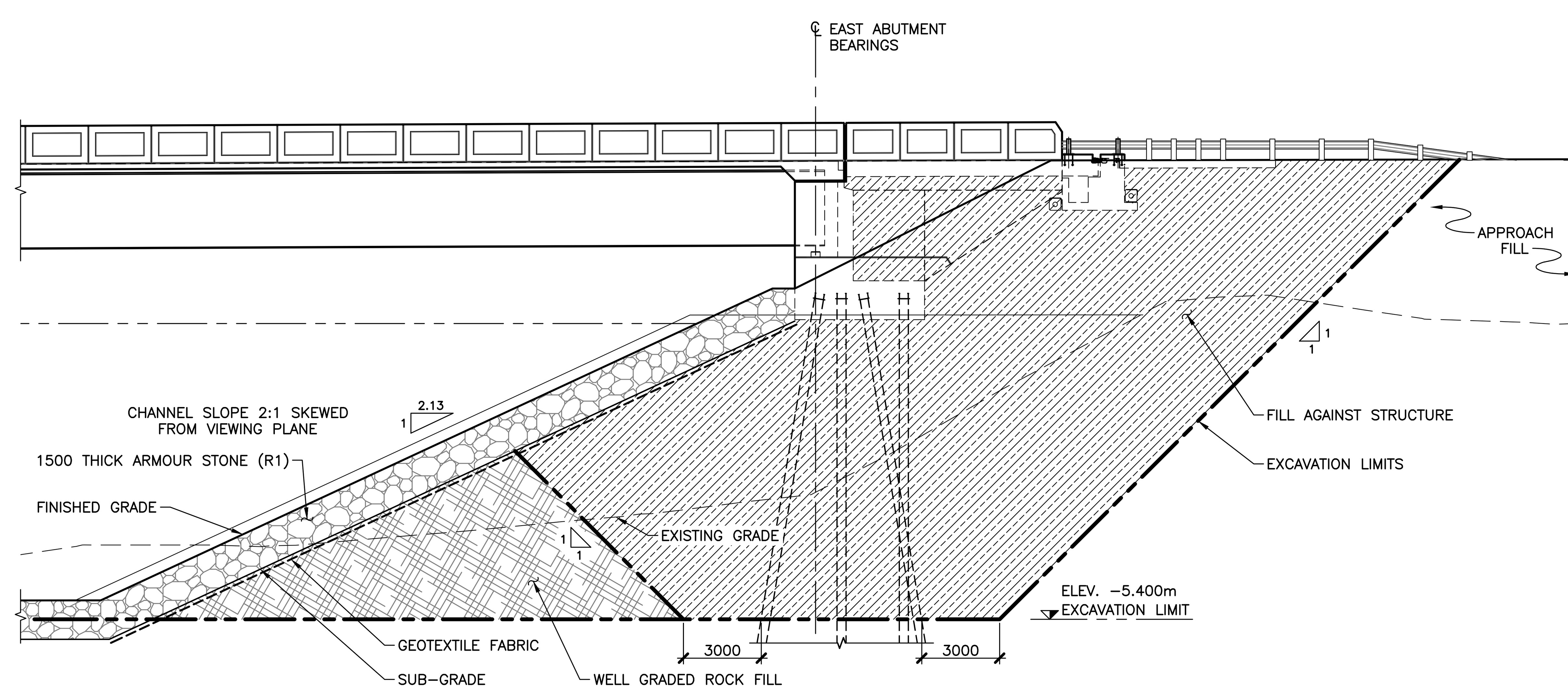


8. FOUNDATION DESIGN BASED ON INFORMATION PROVIDED IN GEOTECHNICAL REPORT PREPARED BY GOLDER ASSOCIATES LTD., PROJECT NUMBER 1783861–019–R–Rev0, DATED AUGUST 17, 2021.
9. LAYOUT INFORMATION IS BASED ON INFORMATION PROVIDED BY NSPW. COORDINATES ARE BASED ON THE NOVA SCOTIA COORDINATE SYSTEM AND ELEVATIONS ARE TO CANADIAN GEODATIC DATUM.
10. CONCRETE COVERS AS INDICATED ON DRAWINGS.
11. ANY DISCREPANCIES BETWEEN DRAWINGS AND FIELD CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO PROCEEDING WITH CONSTRUCTION.
12. ALIGNMENT PROVIDED BY NSPW REFERENCE: DATED APRIL 8, 2020.

DETAIL TO BE COORDINATED WITH AVON RIVER CHANNEL CONSTRUCTION DRAWINGS ONCE FURTHER DEVELOPED



DETAIL– FILL AGAINST STRUCTURE WEST ABUTMENT
1:150



DETAIL– FILL AGAINST STRUCTURE EAST ABUTMENT
1:150

Designed by :	M.WARREN
Surveyed by :	N.S.P.W.
Drawn by :	J.DIXON
Checked by :	T.BARKHOUSE
Approved by :	C.JIM

NOT FOR CONSTRUCTION

Manager Structural Engineering — Date:

MK.	DATE	REVISION
B	2021-12-23	ISSUED FOR 95% REVIEW
A	2021-10-18	ISSUED FOR 50% REVIEW

NOVA SCOTIA Public Works

Scale :	AS NOTED
Date :	FEB 2021
File No. :	B-20-05
Sheet No. :	S102 of S125

Avon River Causeway Bridge, Highway 101 Westbound (HAN 259)

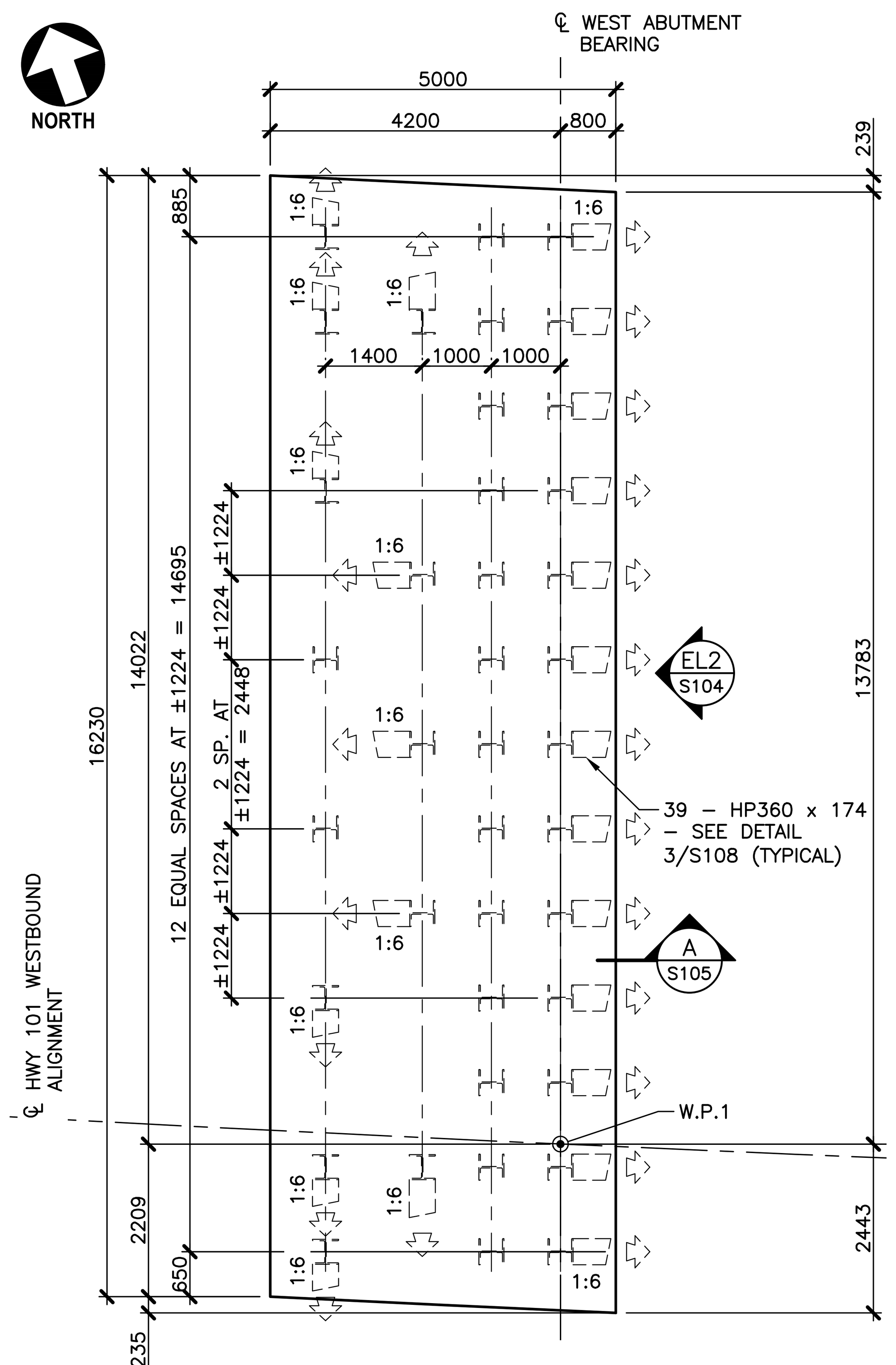
Highway 101 — Hants County

CROSS SECTION AND FILL AGAINST STRUCTURE

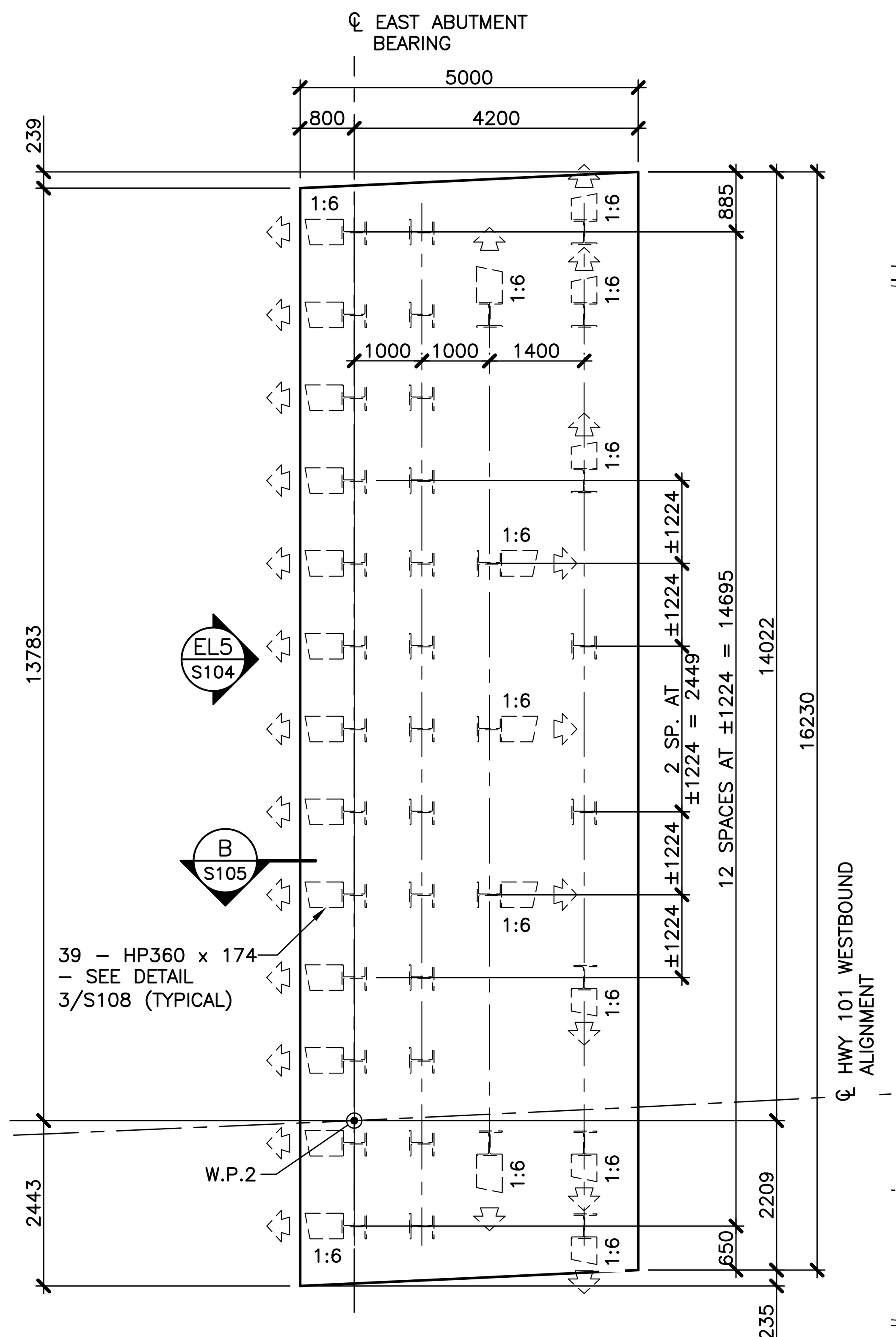
B-20-05

ABUTMENT PLANS

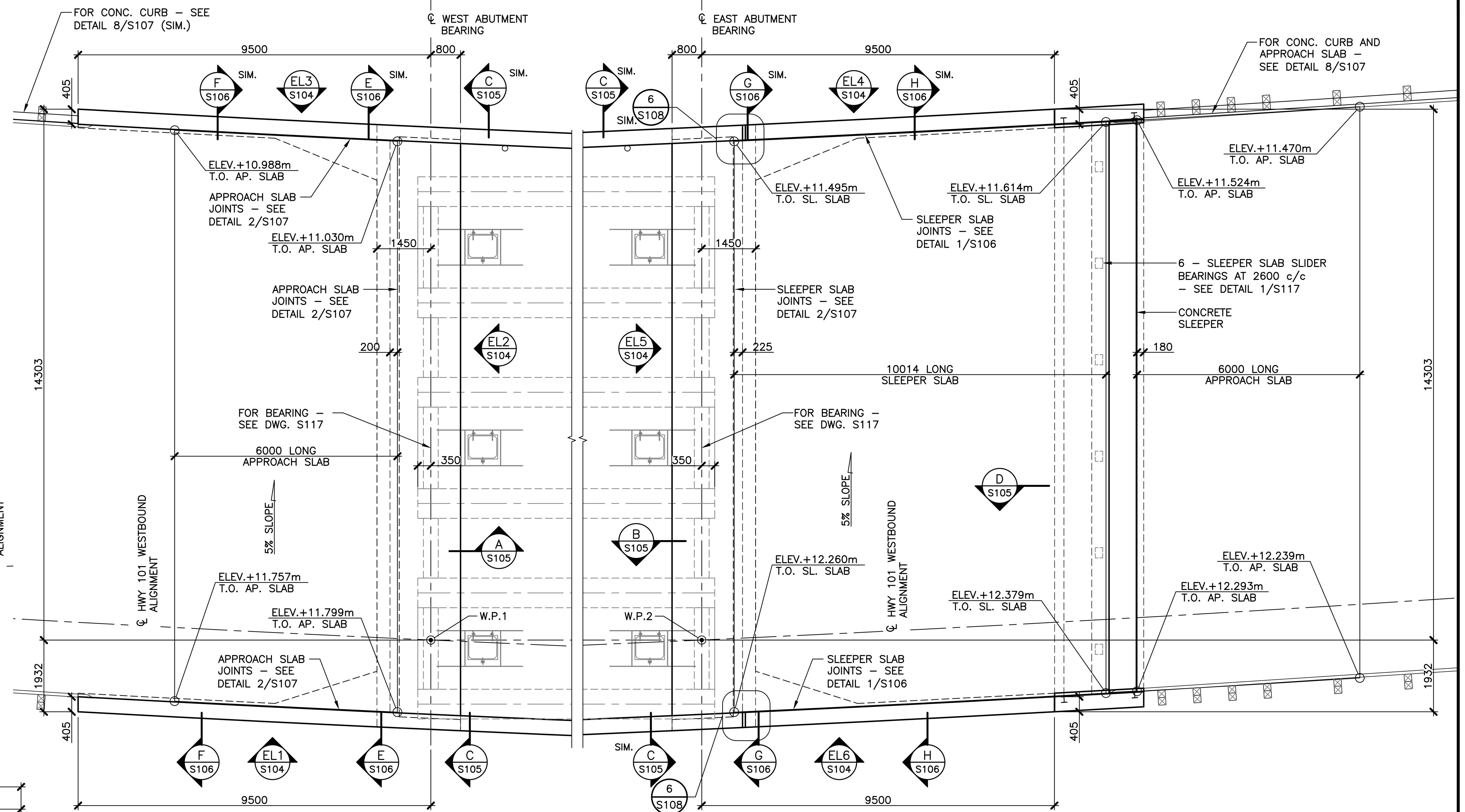
Avon River Causeway Bridge, Highway 101 Westbound (HAN 259)



PLAN– WEST ABUTMENT PILECAP AND PILE LAYOUT
1:75

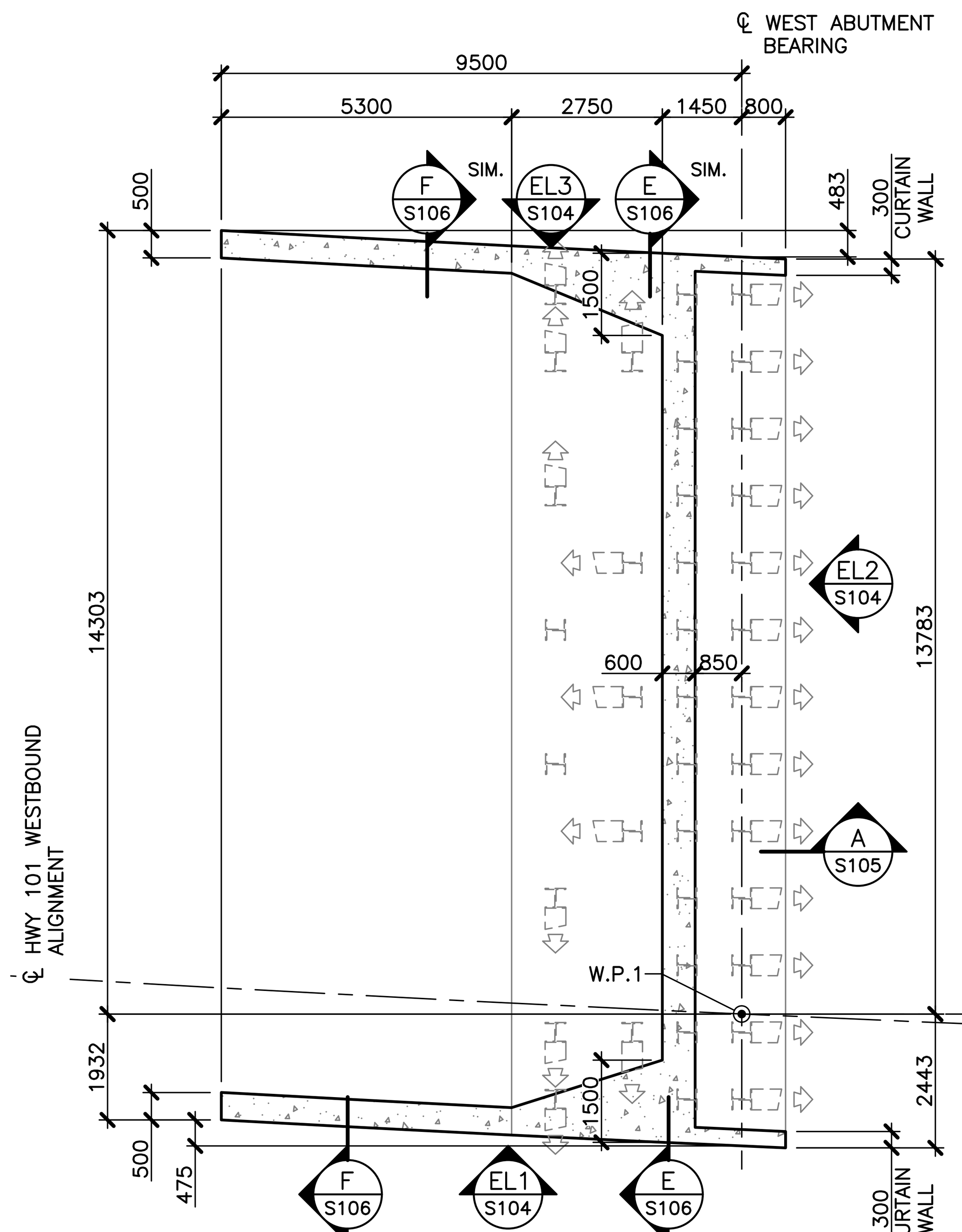


PLAN– EAST ABUTMENT PILECAP AND PILE LAYOUT
1:75

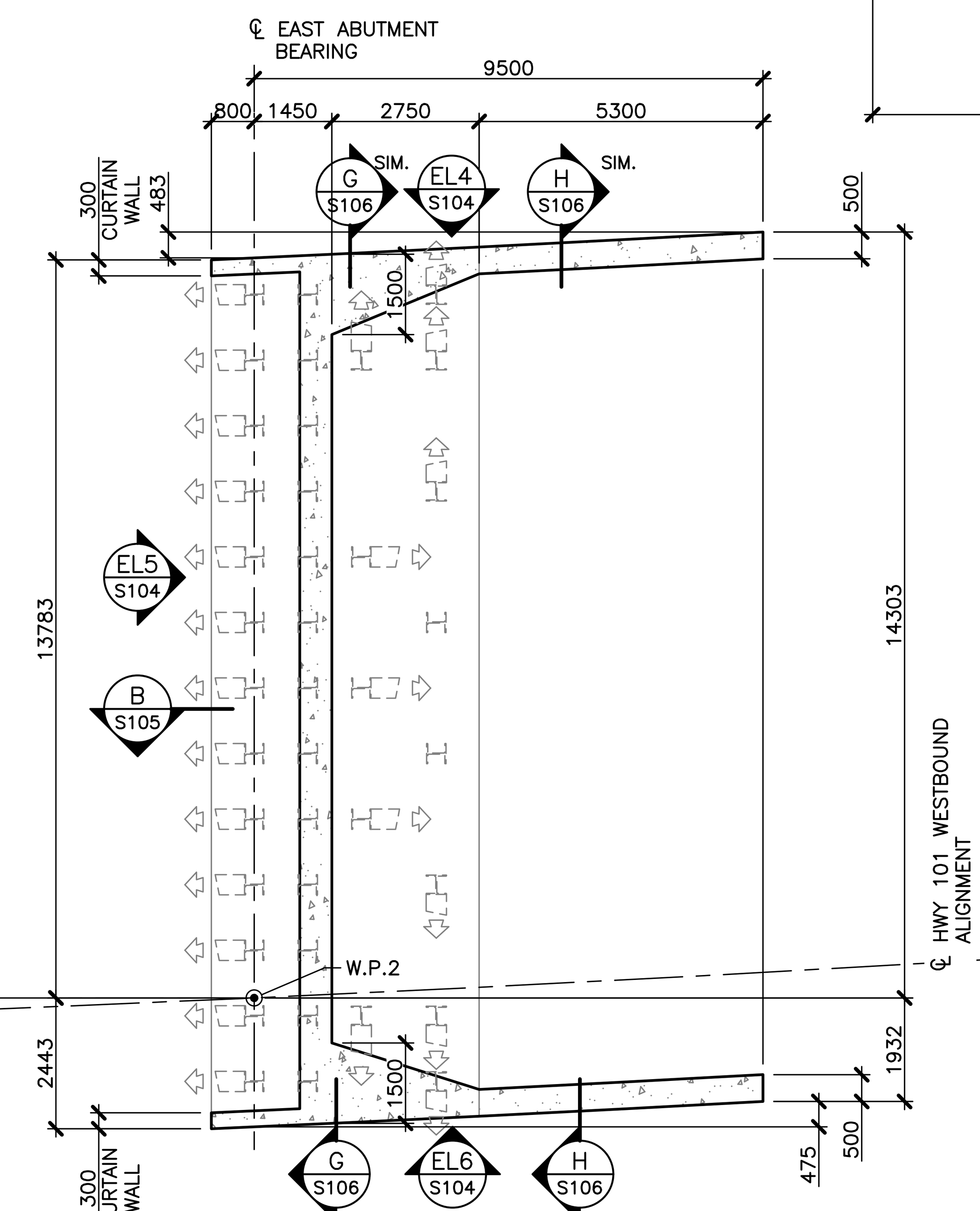


PLAN– WEST ABUTMENT BEARING
1:75

PLAN– EAST ABUTMENT BEARING
1:75



PLAN– WEST ABUTMENT WINGWALLS
1:100



PLAN– EAST ABUTMENT WINGWALLS
1:100

CONCRETE NOTES:

1. CONCRETE NOTES TO BE READ IN CONJUNCTION WITH GENERAL NOTES ON DRAWINGS S102
2. ALL EXPOSED CORNERS OF CONCRETE TO HAVE 25mm CHAMFERS.
3. LOCATION OF CONSTRUCTION JOINTS AND SEQUENCE OF CONCRETE PLACEMENT TO BE APPROVED BY THE ENGINEER.
4. ALL REINFORCEMENT TO BE INSPECTED BY THE ENGINEER PRIOR TO CLOSING FORMWORK OR PLACING CONCRETE.
5. BACKFILL IMMEDIATELY BEHIND ABUTMENTS TO BE "FILL AGAINST STRUCTURES" MATERIAL AS PER NSPW SPECIFICATIONS.
6. TYPICAL BENT REINFORCING TO FOLLOW DIMENSIONS PUBLISHED IN R.S.I.C. (REINFORCING STEEL MANUAL OF STANDARD PRACTICES), AND NSPW STANDARD SPECIFICATION.
7. EACH PHASE OF WORK TO BE INSPECTED BY THE ENGINEER PRIOR TO PROCEEDING TO THE NEXT PHASE OF WORK.
8. IF DEWATERING BEHIND COFFERDAMS/ENVIRONMENTAL CONTROLS IS NOT ACHIEVABLE, ALL CONCRETING UNDERWATER SHALL BE COMPLETED BY TREMIE METHOD (TYPICAL ABUTMENTS AND WINGWALLS).

PILE NOTES:

1. PILE MATERIAL:
   a. STEEL H PILES: HP360 x 174 TO CSA/CSA G40.21–350W.
   b. STEEL PLATES AND BAR STOCK TO G40.21 – LATEST EDITION, GRADE 350W.
   c. WELDING MATERIAL TO CSA G40.1 – LATEST EDITION.
   d. WELDING TO BE IN ACCORDANCE WITH CSA W59 – LATEST EDITION.
   e. PILES ARE TO BE FITTED WITH DRIVING SHOES.
2. PILE "SET CRITERIA":
   REFERENCE GOLDER ASSOCIATES LTD. GEOTECHNICAL REPORT, REFERENCE NO. 1783861–019–R–Rev0, DATED AUGUST 17, 2021.
   a. RATED ENERGY OF THE HAMMER SHOULD BE LIMITED TO 600 J/cm sq. OF CROSS SECTIONAL AREA OF THE PILE.
   b. PILES SHALL BE DRIVEN TO REFUSAL. REFUSAL SHALL BE CONSIDERED AS 12 – 15 BLOWS FOR THE LAST 25mm OF PILE PENETRATION FOR TWO CONSECUTIVE SETS.
   c. 2 PILES AT EACH ABUTMENT SHOULD BE RESTRUCK A MINIMUM OF 24 HOURS AFTER INITIAL DRIVING REFUSAL IS OBTAINED. IF RELAXATION OCCURS, ALL PILES SHOULD BE REDRIVEN TO THE REFUSAL CRITERIA AND THE CYCLE REPEATED UNTIL THE REFUSAL CRITERIA IS MAINTAINED DURING RE–STRIKE.
   d. DRIVE SHOES SHALL BE USED TO PROTECT PILES DURING DRIVING.
   e. REFERENCE GEOTECHNICAL REPORT AND NSPW STANDARD SPECIFICATION FOR PDA TESTING REQUIREMENTS.
   f. CONTRACTOR SHALL PROVIDE TO THE ENGINEER FULL DETAILS ON THE METHOD OF INSTALLATION AND EQUIPMENT PRIOR TO COMMENCING THE WORK.
   g. REQUIRED MINIMUM HP360 x 174 PILE CAPACITIES AT ULTIMATE LIMIT STATES:
      – WEST ABUTMENT: 1634 kN COMPRESSION AND 708 kN TENSION.
      – EAST ABUTMENT: 2127 kN COMPRESSION AND 1030 kN TENSION.

Designed by :	M. WARREN
Surveyed by :	N.S.P.W.
Drawn by :	J.DIXON
Checked by :	T.BARKHOUSE
Approved by :	C.JIM

NOT FOR CONSTRUCTION

Manager Structural Engineering ____ Date: ____

MK.	DATE	REVISION
B	2021-12-23	ISSUED FOR 95% REVIEW
A	2021-10-18	ISSUED FOR 50% REVIEW

NOVA SCOTIA
Public Works

Scale : AS NOTED
Date : FEB 2021
File No. : B-20-05
Sheet No. : S103 of S125

Avon River Causeway Bridge, Highway 101 Westbound (HAN 259)

Highway 101 Hants County

ABUTMENT PLANS

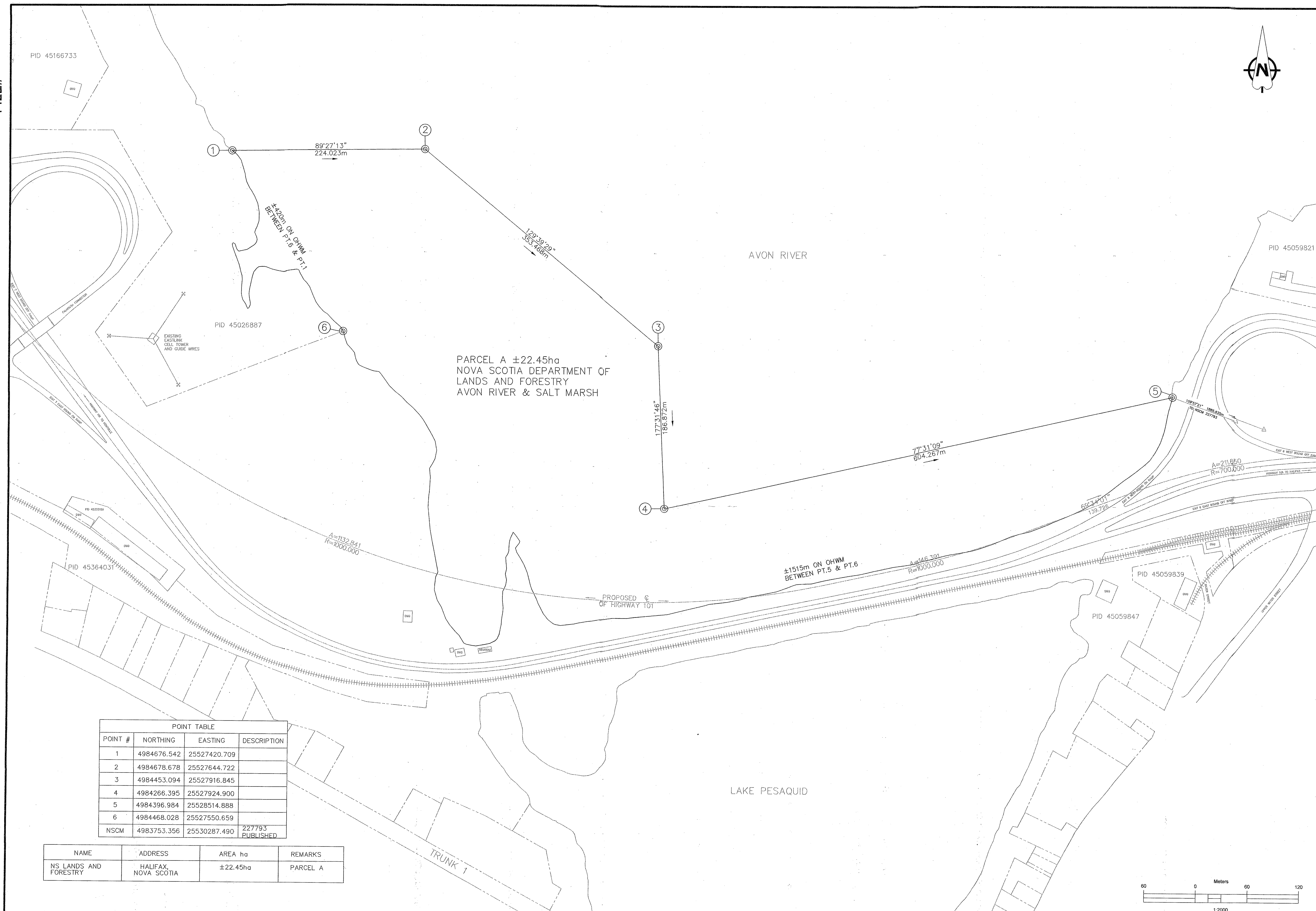
APPENDIX B

Property Information

FILE#

RIGHT OF WAY PLAN

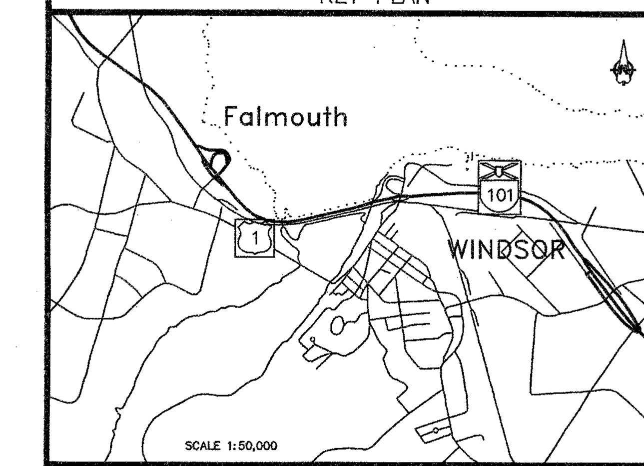
HIGHWAY 101 AVON RIVER SALT MARSH



POINT TABLE			
POINT #	NORTHING	EASTING	DESCRIPTION
1	4984676.542	25527420.709	
2	4984678.678	25527644.722	
3	4984453.094	25527916.845	
4	4984266.395	25527924.900	
5	4984396.984	25528514.888	
6	4984468.028	25527550.659	
NSCM	4983753.356	25530287.490	227793 PUBLISHED

NAME	ADDRESS	AREA ha	REMARKS
NS LANDS AND FORESTRY	HALIFAX, NOVA SCOTIA	±22.45ha	PARCEL A

KEY PLAN



LEGEND

△	CONTROL MONUMENT	SM	SEWER MANHOLE
▲	N.S. ACT. CONTROL STN.	W	WELL
◎	CALCULATED COORDINATE	▨	WOODEN GUARD POST
○IB	IRON BAR	WV	WATER VALVE
○IP	IRON PIPE	GM	GAS METER
⊙SM	SURVEY MARKER	GV	GAS VALVE
⊗	CUT CROSS	R	RAILROAD SWITCH BOX
○RP	ROCK POST		RAILROAD SIGNAL POLE
□WP	WOODEN POST		SOFTWOOD TREE
PL,FD	PLACED, FOUND		HARDWOOD TREE
CD,A,R	CHORD, ARC, RADIUS		BUSH
℄	CENTRELINE		CULVERT
	GUIDE POLE		BUILDING
	UTILITY POLE	OHWM	ORDINARY HIGH WATER MARK
	CATCH BASIN	TS#	TRAFFIC SIGNAL – NEW
	FIRE HYDRANT	TS#	TRAFFIC SIGNAL – EXISTING
	FLAG POLE		TRAFFIC SIGNAL HIGHWAY LIGHT COMBINATION – NEW
	FIBRE OPTIC MARKER		TRAFFIC SIGNAL HIGHWAY LIGHT COMBINATION – EXISTING
	GUIDE POST		HIGHWAY LIGHT – NEW
GT	GAS TANK		HIGHWAY LIGHT – EXISTING
T	TELEPHONE JUNCTION BOX	JB#	JUNCTION BOX
	GUY WIRE	ES	ELECTRICAL SERVICE POST
MB	MAIL BOX		TRAFFIC SIGNAL CONTROL PAD
UM	UTILITY MANHOLE		VEHICLE DETECTOR LOOP
	SIGN		UNDERGROUND CONDUIT
	DESIGN POINT		
	DIRECTION OF FLOW		

- LAND DEALT WITH/ PROPOSED RIGHT OF WAY
- SURPLUS HIGHWAY RIGHT OF WAY
- EXISTING HIGHWAY RIGHT OF WAY
- PROPERTY LINE
- ROAD CENTERLINE (PROPOSED)
- ROAD CENTERLINE (EXISTING)
- DIVISION BETWEEN LAND USE TYPES
- FENCE
- RAILROAD
- GUARDRAIL (EXISTING)
- GUARDRAIL (PROPOSED)
- TOP OF SLOPE
- TOE OF SLOPE

U/S – UPSTREAM		D/S – DOWNSTREAM	
RC – REVERSE CROWN		LC – LEVEL CROWN	
NC – NORMAL CROWN		FS – FULL SUPERELEVATION	
BC – BEGINNING OF CURVE		EC – END OF CURVE	
EOP – EDGE OF PAVEMENT		ETL – EDGE OF TRAVEL LANE	
ESH – EDGE OF SHOULDER		PRC – POINT OF REVERSE CURVATURE	
PCC – POINT OF COMPOUND CURVATURE			

PROPOSED CONSTRUCTION — TO BE REMOVED

NOTES:

1. ALL DISTANCES AND AZIMUTHS SHOWN ARE BASED ON THE NOVA SCOTIA COORDINATE SYSTEM. ZONE 5 CENTRAL MERIDIAN 64°30' WEST NAD83CSRS EPOCH2010 CGVD2013.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
3. OHWM IS BASED ON FIELD OBSERVATIONS AND CURRENT GIS DATA.

Meters 60 0 60 120 1:2000

REGISTRATION STAMP

HANTS COUNTY LAND REGISTRATION OFFICE
I certify that this plan was registered or recorded as shown here.
Penny Goodwin, Registrar

115886138 Plan # LRO RODE

FEB 10 2020 MM DD YYYY 11:28 Time

Designed by:		Checked — Project Engineer	August 11 2019 Date
Surveyed by:	P.COGAN	Approved — Construction Manager	AUGUST 14 2019 Date
Drawn by:	P.COGAN	Approved — District Director	August 15 2019 Date
Checked by:	M.MINICK	Approved for Conformance to Standard Plan Requirements	August 30 2019 Date
Approved by:			

MK.	DATE	REVISION

NOVA SCOTIA
Transportation and Infrastructure Renewal

Scale: 1:2000
Date: AUGUST 2, 2019
File No. :
Sheet No. : 1 of 1

HIGHWAY 101 TWINNING
THREE MILE PLAINS
TO FALMOUTH

HIGHWAY 101 HANTS

AVON RIVER
SALT MARSH
RIGHT OF WAY PLAN

Form 44
Request to the Registrar of Deeds to Register a Document

FEB 1 1 2020

Registration district: Hants County
Submitter's name: Samantha Hines, Department of Lands and Forestry

Take notice that the attached document relates to a parcel that is not registered under the *Land Registration Act*, and the document may be accepted for registration under the *Registry Act* because it is (*select one only*)

9 not a transfer for valuable consideration
9 not a mortgage or security interest as defined in the *Land Registration Administration Regulations.*
9 a transfer of a parcel between persons married to one another
9 a transfer of a parcel between persons formerly married to one another, if the transfer is for the purpose of division of matrimonial assets.
9 transfer of a parcel between persons who are parties to a registered domestic partnership agreement.
9 a transfer of a parcel acquired by Her Majesty in right of the Province or a municipality for the purpose of road widening, alignment or movement.
9 a deed to a predecessor in title being registered in order to feed the estoppel or clarify title.
9 a transfer of an unregistered piece of land that is being created as a parcel under the subdivision provisions of Part IX of the *Municipal Government Act* solely for purposes of consolidation with an abutting unregistered parcel.
9 a transfer of a parcel from the Nova Scotia Farm Loan Board to a borrower under the *Agriculture and Rural Credit Act.*
ξ any other instrument not mentioned above that is not required to be registered or recorded under the *Land Registration Act*

I hereby request that this document be registered under the *Registry Act.*

Dated at HALIFAX, in the County of HALIFAX, Province of Nova Scotia, February 6, 2020.

Signature of submitter

Name Samantha Hines
Address PO BOX 698 HALIFAX B3J 2T9
Phone 902-424-8097
Email: Samantha.hines@novascotia.ca
Fax: 902-424-3173

HANTS COUNTY LAND REGISTRATION OFFICE
I certify that this plan was registered or recorded as shown here.
Penny Goodwin, Registrar
115886138 LRO ☐ ROD ☑
Plan #
FEB 1 0 2020 11:28
MM DD YYYY Time DP

Effective April 3, 2007

APPENDIX C

Operational Plan

Operating Plan

Proposed Avon River Aboiteau Facility

Draft 3

CBCL

171046.01 • August 2021

Solutions today | Tomorrow IN mind
Maritime Centre, 1505 Barrington Street, Suite 901
Box 606, Halifax, NS B3J 2R7
902-421-7241 | CBCL.ca | info@CBCL.ca

August 13, 2021

Justin Tanner, P.Eng., PMP
Manager, Highway Planning and Design
Transportation and Active Transit
4th Floor, 1672 Granville Street
Halifax, NS B3J 2N2

Dear Mr. Tanner:

RE: Avon Aboiteau Operating Plan - Update

Please find attached an updated operating plan describing how Nova Scotia Transportation and Active Transit (NSTAT) and Department of Agriculture (NSDA) can operate the new aboiteau structure proposed for the Avon River when it is put into operation.

This plan provides a detailed description of how the major components of the facility can be operated to achieve the primary objectives of flood control and fish passage, for which we are currently finalizing the design. The aboiteau structure will be capable of a wide range of operating scenarios, including: (1) Freshwater Lake; (2) Slightly Brackish Lake, and; (3) Dampened Tidal Estuary. This plan explains how the aboiteau will achieve flood protection and fish passage while considering the full range of stormwater and tidal conditions.

This plan has been written in order to be presented to DFO in conjunction with the permit application. However, as the project develops, it can be expanded/supplemented to function as an operating manual for NSTAT and NSDA.

Sincerely,

CBCL Limited

DRAFT

Prepared by:
Rick Giffin, P.Eng., LEED™ AP
Principal, Sr. Project Manager
Direct: 902-492-6756
E-Mail: rickg@cbcl.ca

DRAFT

Reviewed by:
Colin Fisher, P.Eng.
Sr. Project Manager & Civil Engineer

CC: Kevin Bekkers, P.Eng. - Director Resource Sustainability, NSDA
Project No: 171046.00

Contents

Chapter 1 Introduction

This report is meant to provide a draft plan of the operational procedure for the new aboiteau structure proposed for the Avon River. The plan is intended to be used by the Nova Scotia Department of Agriculture when the structure is put into operation.

The new structure is currently proposed to be located approximately 400 metres downstream of the existing structure. It is to be constructed within an excavation of the existing ground, on the west side of the existing river location. A new channel would be excavated and a new dyke would be constructed across the existing river to direct it to the new structure. Once the new aboiteau is commissioned, and has operated for a period of time to ensure it is performing as expected, the existing aboiteau structure would be partially demolished, including removal of the gates.

The new aboiteau structure would not be a conventional culvert structure typically found in aboiteaux in this region. It would be an open design with barrier walls with orifices on which gates would be mounted to allow the river to flow at low tide and to either stop or reduce the tidal prism flowing upstream at high tide depending on the mode of operation. This design would be open to the daylight, providing more natural light conditions for fish, while allowing more ability for observation and easier access for maintenance for operations and maintenance personnel.

The currently proposed new aboiteau will be capable of being operated to allow for three different water management scenarios for the reservoir (Lake Pesaquid) on the upstream side of the structure. The three scenarios are as follows:

1 **Freshwater Lake** – The existing (mostly freshwater) lake is retained as it has typically been over the past 50 years, however, flow through the fishways during low tide cycles is allowed (i.e., tide elevation is lower than the lake elevation) when sufficient river flow is available.
2 **Slightly Brackish Lake** – The existing lake is retained at its current target level by allowing tidal flow through the fishways at high tide to compensate for fishway flow during low tides when river flows are insufficient to maintain the lake level.
3 **Dampened Tidal Estuary** – The Active and Passive partial tidal gates are used to allow tidal flow into the lake at high tides, and outflow during low tides resulting in levels that

fluctuate by approximately 1.5 metres between high and low tide. The operation of the gates for this operating scenario can be controlled to modulate the tidal range within the lake to ensure agricultural lands adjacent to the river are not affected by the tide. The fishways remain open at all times, except in the event of a major storm which may include storm surge.

For scenarios 1 and 2, the new structure would be capable of passing flow from the Avon River as follows:

1. Two Alaska Steeppass Fishways (2.36 m wide) complete with roller gates.
2. Two main gates with active roller gates 6.6 m wide by 6.6 m high.
3. Two overflow gates (Passive Flap Gates 6.6 mw x 2.5 m h) with inverts set 300 mm above normal lake level of 2.1 m CVGD2013 (i.e., set at 2.4 m CGVD2013).

For scenario 3, the new structure would be capable of passing flow from the Avon River and incoming tides as follows:

1. Two Alaska Steeppass Fishways (2.36 m wide) complete with roller gates.
2. Two main gates with active roller gates 6.6m wide by 6.6 m high (normally kept in open position).
3. Two overflow gates (Passive Flap Gates 6.6 mw x 2.5 m h) with inverts set 300 mm above normal lake level of 2.1 m CVGD2013 (i.e., set at 2.4 m CGVD2013).
4. Two main flap gates that are raised above the bottom of the aboiteau (6.6 m wide by approximately 5.1 m high) that would allow a portion of the tidal inflow into the lake at high tide and would open as necessary to allow outflow of tidal/river water at low tide.

To better facilitate passage of American Eel, a single Eel ramp has been added to the design of the structure. It will not provide a significant flow path for the Avon River, or a significant flow path for tidal water upstream during high tide as it is designed to operate with a minimal amount of flow. The Eel ramp would be operational 24/7 regardless of operating scenario, except for short periods during each tide cycle to allow sediment to be flushed away.

A number of operating procedures based on climate conditions are defined as follows:

1. Normal river flow – Lake at Normal Operating Level
2. High river flow – Lake above Normal Operating Level
3. Low river flow – Lake slightly below Normal Operating Level
4. Low River Flow (Extended dry weather)
5. Significant rainfall following extended dry weather
6. Extreme conditions – high flows from a large storm and high sea levels

Chapter 2 Scenario 1: Freshwater Lake

The following operating plan outlines how the new structure would operate to maintain the lake in its current state while improving fish passage.

Flow from the lake can only take place whenever the tide level is below the lake level, which would occur during low tide and the early part of high tide. In order to maintain the lake as freshwater, all gates would be closed when the tide level on the downstream side of the structure is above the lake level on the upstream side of the structure for all six of the climate conditions listed above. This means the fishways would only operate in one direction: the Avon River flowing towards the Bay of Fundy when the tide level is lower than the lake water level. Fish, on the other hand, would be able to travel upstream and downstream when the fishways are flowing as they would in any natural stream. The Eel ramp would operate 24/7, regardless of tide level except during short maintenance flushing periods.

The following are descriptions of operations that would take place once the receding tide has dropped below the lake level. The operation of the gates would control how the lake level is maintained. There are two types of gates on the structure – active (roller gates) and passive (flap gates). The main gates and fishway gates are roller gates, and the passive gates are supplementary. To clarify the difference between roller gates and flap gates, roller gates are raised and lowered in a frame similar to a vertical sliding window. Electric motors would move the gates, and can be manually controlled from the operations building or remotely via internet connection. They would also be set up to be able to be automatically controlled via computer, based on lake water level measurements. Flap gates operate passively and open and close automatically as water levels vary on each side. They close when the tide level exceeds the lake level, and open when the tide level falls below the lake level. This type of gate is employed on all aboiteau structures in Nova Scotia except the current Avon structure, which also has roller gates.

It should be noted that for all operating conditions under the Freshwater Lake scenario that the first priority, after flood protection, is to have flow in the fishways at all times when the tide levels and water availability in the lake and river permit.

Condition 1 – Normal River Flow (Lake at or less than 300 mm above normal operating level)

When the tide is lower than the lake level, both fishway gates would open, and the supply pumps for the Eel ramp would start. Flow would occur through both fishways throughout the entire low tide cycle, and for a portion of the high tide cycle as described below. If the lake level continues to rise during the low tide cycle, the main gates can be partially opened as needed to maintain the desired lake level. Fish would be able to move upstream through the fishways as velocities allow during the tide cycle. Fish moving downstream can use the fishways and the main gates if they are open. Once the high tide cycle begins, and the incoming tide returns to the same level as the lake, the fishway and main gates would be closed to prevent the ingress of tidal water, and the Eel ramp pumps would stop. The Eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake.

Condition 2 – High River Flow (Lake more than 300 mm above normal operating level)

When the tide is lower than the lake level, both fishway gates would open, and the main gates would only open as required. The supply pumps for the Eel ramp would start . The main gates can be either partially or fully opened depending on lake level and river flow at the time of opening. Flow would occur through both fishways, both main gates and both overflow gates throughout the entire low tide cycle, and a portion of the high tide cycle as described below. The amount of time that the main gates would need to be open would depend on the lake level that is monitored constantly. Fish would be able to move upstream through the fishways as velocities allow during the tide cycle. Fish moving downstream can use either the fishways or the main gates. Once the high tide cycle begins, and the incoming tide returns to the same level as the lake, the fishway and main gates would be closed to prevent the ingress of tidal water, and the Eel ramp pumps would stop. The Eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake.
The rising tide would automatically close the overflow gates.

Condition 3 – Low River Flow (Lake slightly below normal operating level)

When the tide is lower than the lake level, one fishway gate would open, and the supply pumps for the Eel ramp would start. If the lake level rises, the second fishway gate would open. Fish would be able to move upstream through the fishways as velocities allow during the tide cycle. Fish moving downstream can use the fishways. Flow would occur through one or both fishways throughout the entire low tide cycle and a portion of the high tide cycle, unless the lake level begins to drop. If the lake level drops, one fishway would be closed. If drop continues, the second fishway gate would be closed. In all circumstances, once the high tide cycle begins and the incoming tide returns to the same level as the lake, the fishway and main gates would be closed to prevent the ingress of tidal water, and the Eel ramp pumps would stop. The Eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake.

Condition 4 – Low River Flow (Extended Dry Weather – Lake below normal operating level)

If the lake level is more than 300mm below normal operating level, all gates would remain closed. The supply pumps for the Eel ramp would start to allow Eel passage. If during the low tide cycle the lake level rises to within 300mm of the normal operating level, one fishway gate would be opened. If the lake level continues to rise, the second fishway gate would be opened. Fish would be able to move upstream through the fishways as velocities allow during the low tide cycle. Fish moving downstream would use the fishways. If the lake level drops, one fishway would be closed. If the drop continues, the second fishway gate would be closed. In all circumstances, once the high tide cycle begins and the incoming tide returns to the same level as the lake, the fishway gates would be closed to prevent the ingress of tidal water, and the Eel ramp pumps would stop. The Eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake.

Condition 5 – Significant Rainfall following Extended Dry Weather (Lake below normal operating level)

Depending on prior lake level and the anticipated amount of precipitation, the lake level could be lowered further to provide storage for the storm event. During low tides, the gates and eel ramp would be operated as described in operating conditions 1, 2, or 3 depending on the nature of the storm event. Once the high tide cycle begins and the incoming tide returns to the same level as the lake, all gates would be closed to prevent the ingress of tidal water, and the Eel ramp pumps would stop. The Eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake. The rising tide would automatically close the overflow gates.

Condition 6 – Extreme Storm Conditions

The lake level would be significantly lowered before the arrival of the storm, then operated by fully opening all gates throughout the entire low tide cycle. The supply pumps for the Eel ramp would start. Once the high tide cycle begins and the incoming tide rises to the same level as the lake, all gates would be closed to prevent the ingress of tidal water, and the Eel ramp pumps would stop. The Eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake. The rising tide would automatically close the overflow gates.

Estimated Percentage of Time During Which the Fishways Would be Active

This was estimated by running a SWMM model with "average year" conditions (year 2008 corresponded to the climate normal in terms of precipitation). The model was adjusted to represent the operating procedures described above, and results were extracted for each month of the year to show potential annual variations. Since snow accumulation and snowmelt was not included in the model, it is assumed that the snow that falls is able to melt within the month. Results are shown for both fishways being operated as noted in Conditions 1 through 4, and also show the percentage during which the fishways are open, compared to all available hours during the month (24 hours a day), and compared to the hours during which the tide is lower than the lake level (approximately 16 hours a day on average). Results are shown below in Figures 2.1a and 2.1b. The percentage of time the Eel pass is open is also shown on the Figures.

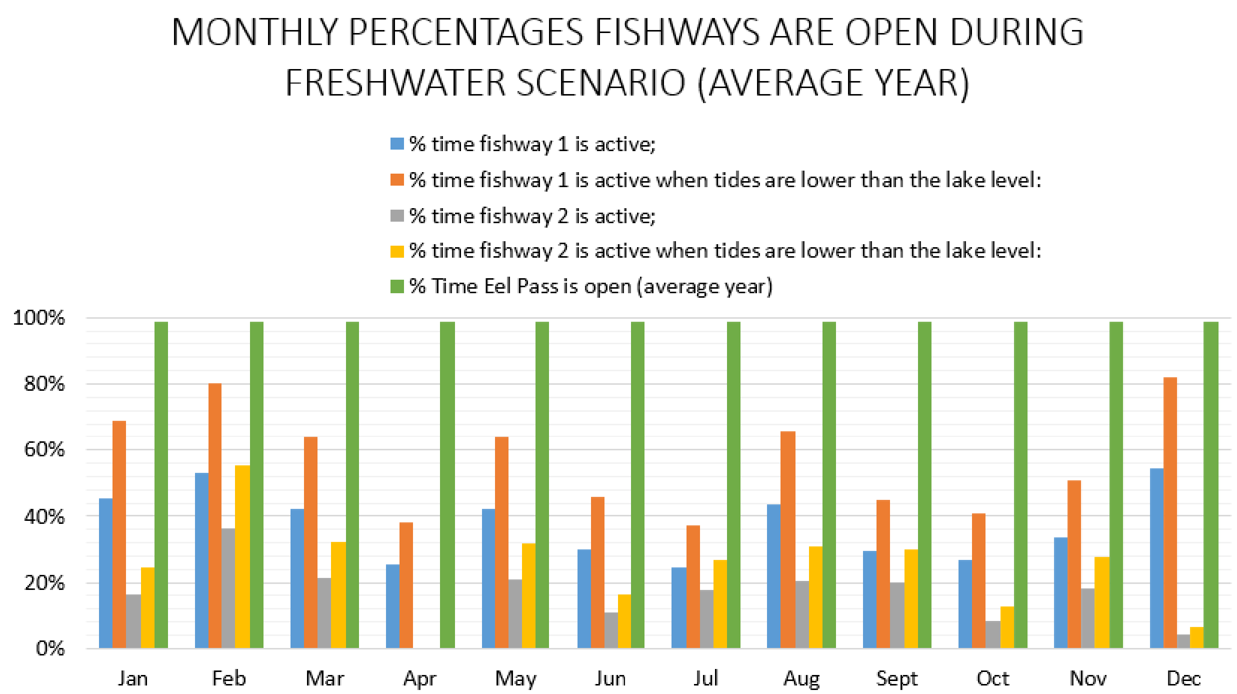


Figure 2.1a: Freshwater Scenario: Percentage of Time each Fishway is Active During Full Tidal Cycle and During Low Tides

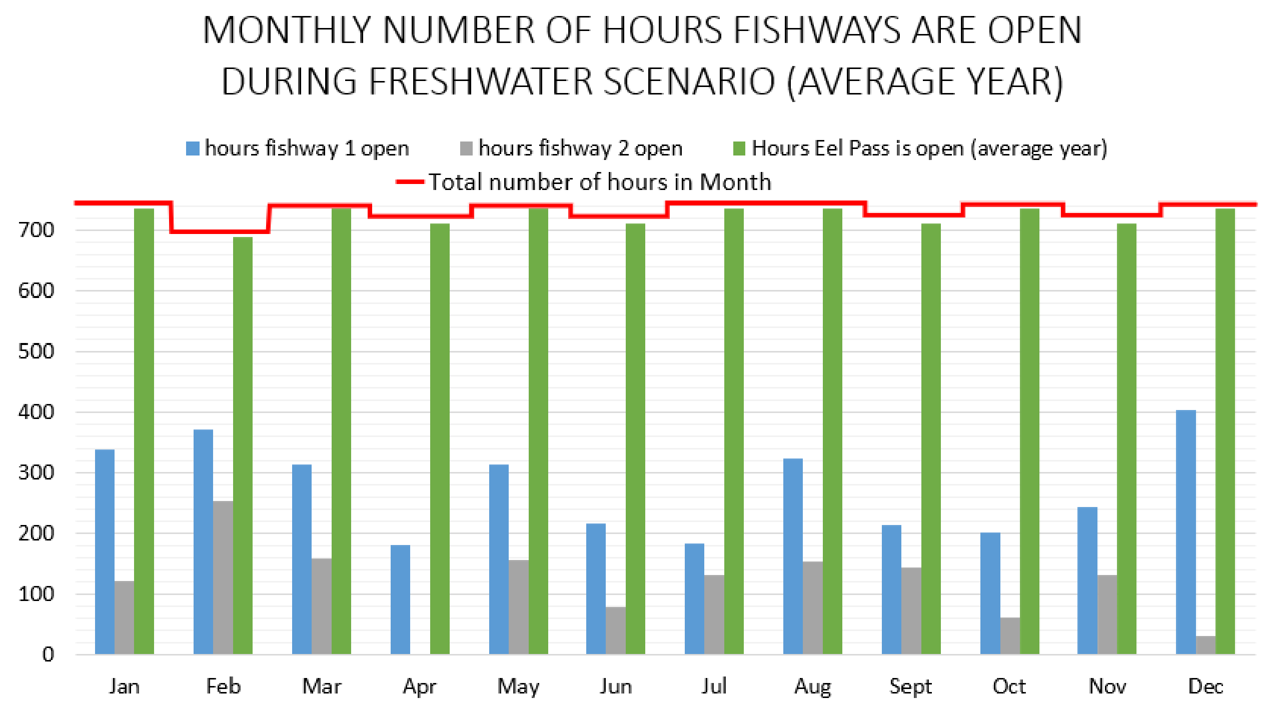


Figure 2.1b: Freshwater Scenario: Monthly Number of Hours each Fishway is Active During Full Tidal Cycle and During Low Tides

Chapter 3 Scenario 2: Slightly Brackish Lake

In this scenario, the fishway gates would be kept open, allowing flow in two directions. Lake water would flow towards the Bay of Fundy at low tide, and Bay of Fundy water would flow through the fishways into the lake at high tide. This would prevent the lake from draining through the fishways and allow year-round maintenance of the target operating level of the lake (2.1 m CVGD2013). It is expected that the lake would become slightly brackish due to the inflow of some tidal waters on every high tide, and the salinity would be expected to vary depending on the amount of precipitation being received within the Avon River watershed. The salinity, however, would decrease with distance in the upstream direction from the aboiteau structure. Therefore, during summer dry weather, it is expected that salinity would typically increase in comparison to the rest of the year.

Condition 1 – Normal River Flow (Lake at or less than 300 mm above normal operating level)

Both fishway gates would remain open throughout all tidal cycles. The supply pumps for the Eel ramp would start when the tide level would fall below the peak of the ramp. Fish would be able to move upstream through the fishway during low tide, as well as during high tide. Fish would be able to move downstream through the fishways during low tide as well as the through the main gates if they are open. When the tide level is lower than the lake level, the main gates would open as necessary to control the level of the lake. The main gates would close when the desired lake level is reached, or when the rising tide reaches the lake level (whichever occurs first). When the rising tide reaches the peak of the Eel ramp, the supply pumps would stop. Like the fishways, the Eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake.

Condition 2 – High River Flow (Lake more than 300 mm above normal operating level)

Both fishway gates would remain open throughout all tidal cycles. The supply pumps for the Eel ramp would start when the tide level would fall below the peak of the ramp. Fish would be able to move upstream through the fishway during low tide, as well as during high tide. When the tide level is lower than the lake level, the overflow flap gates would automatically open. The main gates would also be opened. Fish would be able to move downstream through the fishways during low tide as well as the through the main gates. The main gates would close when the rising tide reaches the lake level. When the rising tide reaches the peak of the Eel ramp, the supply pumps would stop. Like the fishways, the Eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake. The rising tide would automatically close the overflow gates.

Condition 3 – Low River Flow (Lake slightly below normal operating level)

One fishway gate could close, leaving one open to reduce tidal flow into the lake to minimize salinity and siltation impacts. At least one fishway would operate throughout all tidal cycles. The supply pumps for the Eel ramp would start when the tide level falls below the peak of the ramp. Fish would be able to move upstream through the fishway during low tide, as well as during high tide. Fish would be able to move downstream through the fishway during low tide. When the tide level is lower than the lake level, the main gates would typically remain closed, however they could also be operated as necessary for short periods on outgoing tides to allow fish to leave the lake for the tidal waters. When the rising tide reaches the peak of the Eel ramp, the supply pumps would stop. Like the fishways, the Eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake.

Condition 4 – Low River Flow (Extended Dry Weather – Lake below normal operating level)

One fishway gate could close, leaving one open to reduce tidal flow into the lake to minimize salinity and siltation impacts. At least one fishway would operate throughout all tidal cycles. The supply pumps for the Eel ramp would start when the tide level would fall below the peak of the ramp. Fish would be able to move upstream when velocities allow during low tide, as well as during high tide. Fish would be able to move downstream through the fishway during low tide. When the tide level is lower than the lake level, the main gates would typically remain closed. Gates could also be operated as necessary for short periods on outgoing tides to allow fish to leave the lake for the tidal waters. When the rising tide reaches the peak of the Eel ramp, the supply pumps would stop. Like the fishways, the Eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake.

Condition 5 - Significant Rainfall following Extended Dry Weather (Lake below normal operating level)

Depending on prior lake level and the anticipated amount of precipitation, the lake level could be lowered below the typical target range to provide storage for the storm event. The gates would be operated as described in operating conditions 1, 2, or 3 depending on the nature of the storm event.

Condition 6 – Extreme Storm Conditions

The lake level could be significantly lowered before the arrival of the storm, then operated by fully opening all gates throughout the entire low tide cycle. Once the high tide cycle begins and the incoming tide returns to the same level as the lake, all gates would be closed. The rising tide would automatically close the overflow gates. Operation would return to normal once the storm has passed, and the lake reaches near normal operating levels.

Estimated Percentage of Time During Which the Fishways Would be Active

In this scenario, at least one fishway would remain open all the time, except during extreme flood risk conditions at high tide. In normal river flow conditions, with sufficient runoff to flush out the incoming salt and sediments, both fishways would be open.

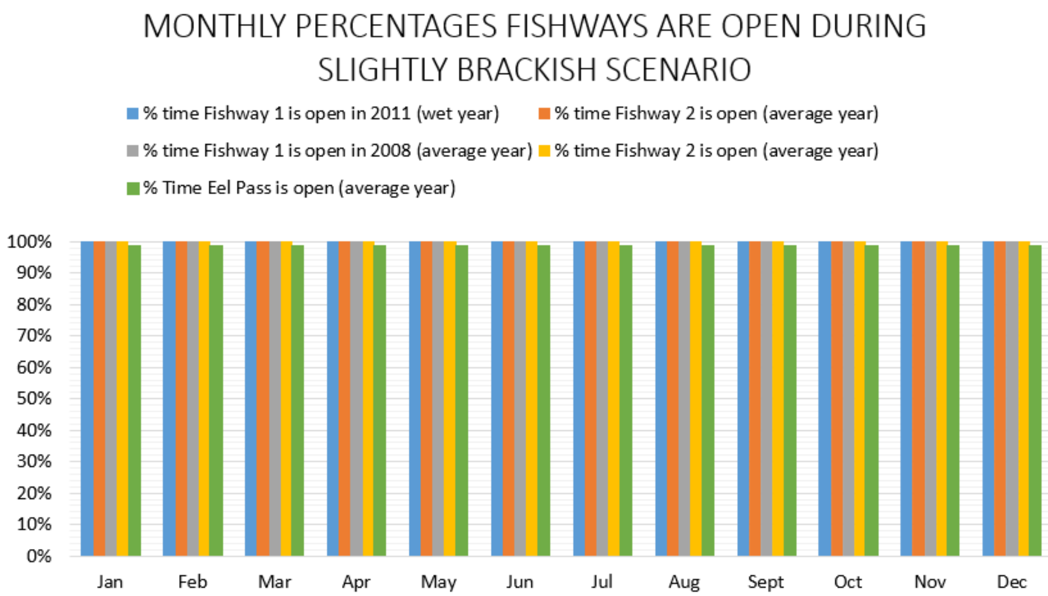


Figure 3.1a: Slightly Brackish Scenario: Percentage of Time each Fishway is Active During Full Tidal Cycle and During Low Tides

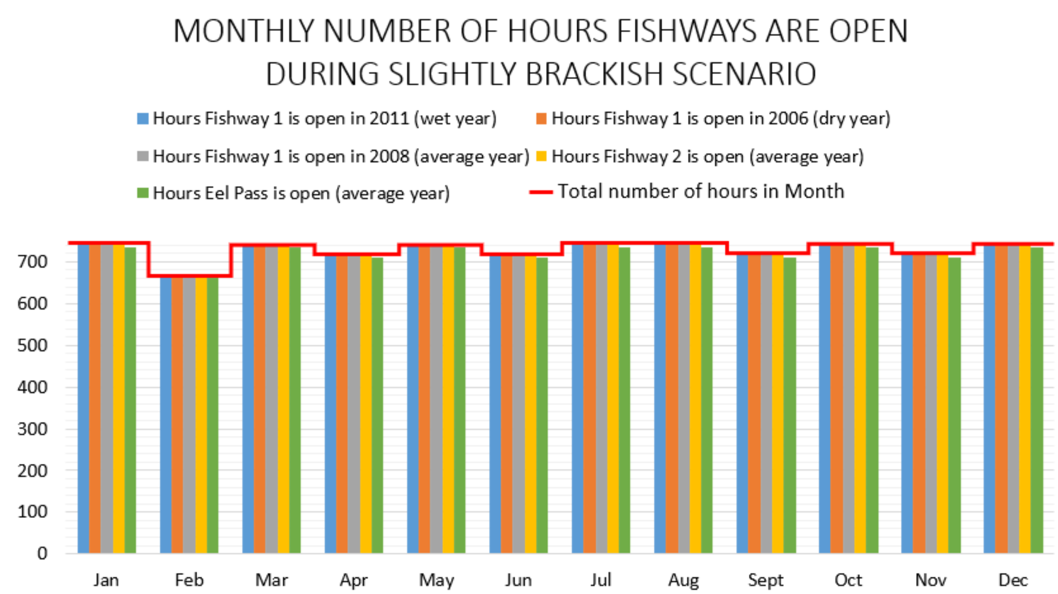


Figure 3.1b: Slightly Brackish Scenario: Percentage of Time each Fishway is Active During Full Tidal Cycle and During Low Tides

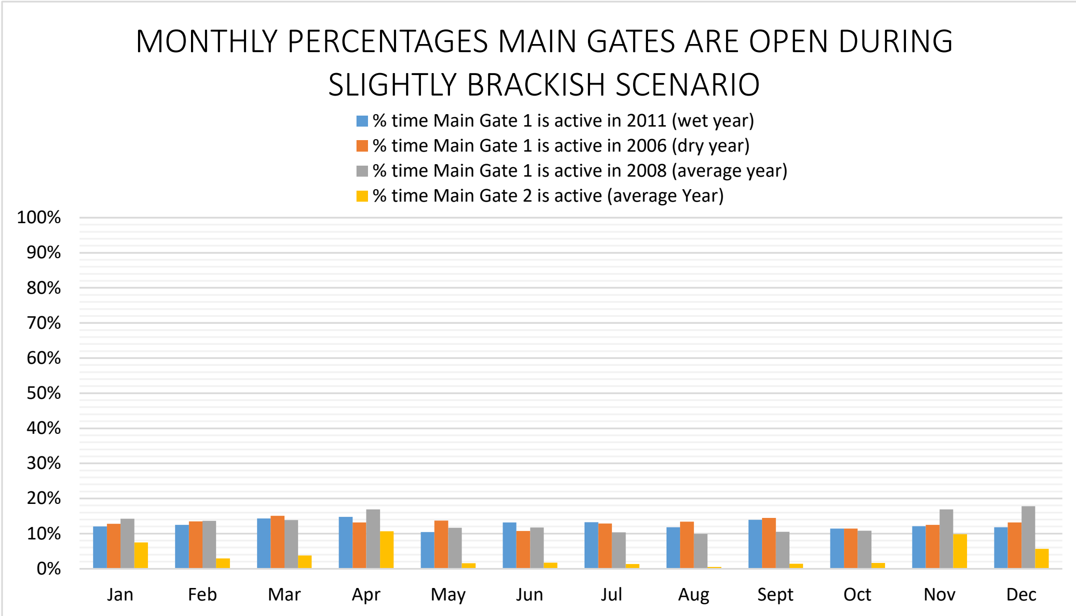


Figure 3.2a: Slightly Brackish Scenario: Percentage of Time Main Gates are Open During Full Tidal Cycle and During Low Tides

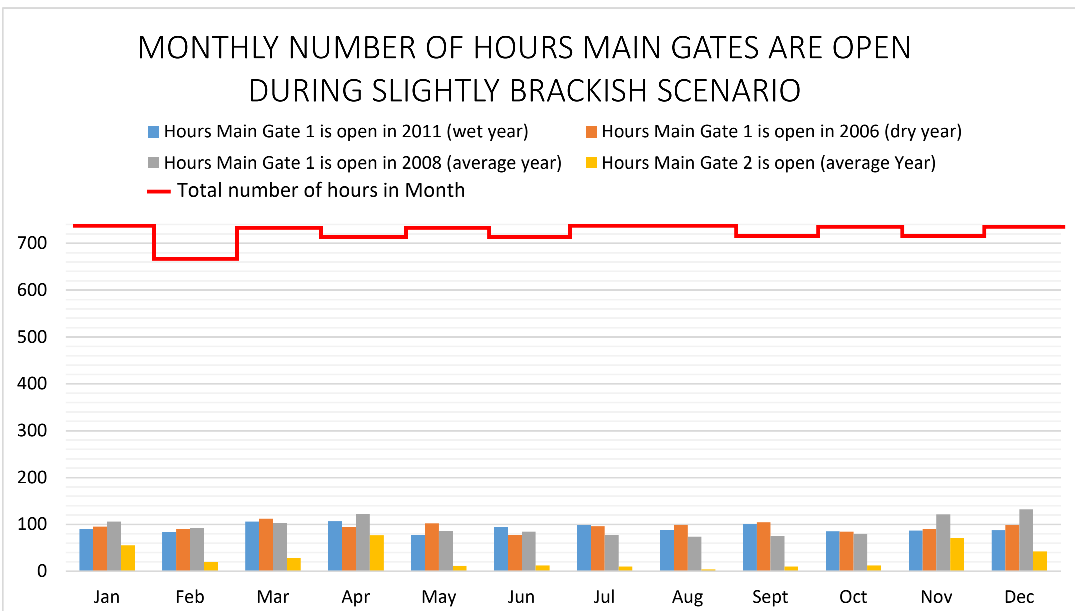


Figure 3.2b: Slightly Brackish Scenario: Percentage of Time Main Gates are Open During Full Tidal Cycle and During Low Tides

Chapter 4 Scenario 3: Dampened Tidal Estuary

Main flap gates would be installed on the downstream side of the main roller gates. The flap gates would be hung on chains such that the bottom of the gates would not extend fully to the floor of the aboiteau. When the tide level would exceed that of the lake, tidal water would flow upstream into the lake. The reduced area of the openings beneath the flap gates would prevent the full tidal prism from going upstream, thus controlling the level of the high tide in the lake. The opening below the flap gates can be manually adjusted from time to time by adjusting the chain hangers in order to adjust the desired tidal range upstream. Another option would be to have the partial gate opening at the side of the gate instead of at the bottom. This would require a narrower gate that would extend fully to the bottom. This arrangement could have positive impacts on fish passage; however, it does not have the same adjustability of the full width gate with the opening at the bottom.

The main roller gates and fishway roller gates would be kept in a partially open position, and operated as required to help control lake levels if need be during high or low runoff seasons. On outgoing tides, the flap gates would be pushed open by the lake, to varying amounts depending on precipitation within the watershed and resulting temporary increases in lake level.

The structure would operate passively as much as possible for operating conditions 1 through 4. For operating conditions 5 and 6, the main roller gates could be operated in advance of a storm. They could be closed on the incoming tide to keep the lake at a low tide level, then opened and closed during and following the event to control the lake level. For operating condition 6, the same could also be applied to the fishway gates, although this is not expected to be necessary given the small volume of water exchanged through the fishways.

The fishway gates would be kept open for all tide levels under operating conditions 1 through 4. They could be closed for operating conditions 5 and 6 if considered necessary. The supply pumps for the Eel ramp would start when the tide level falls below the peak of the ramp. When the rising tide reaches the peak of the Eel ramp, the supply pumps would stop. Like the fishways, the Eel ramp would continue to operate during high tide by allowing a small amount of tidal flow to move upstream over the peak of the ramp and into the lake.

Unlike the freshwater and partially brackish scenarios, a target constant lake level is not required. However, a dampened tidal range in the lake (dampened to a fraction of the tidal levels downstream of the aboiteau) at levels lower than in the other two scenarios will be established, such that tidal waters are not able to enter the drainage ditches in the agricultural fields.

Estimated Percentage of Time During Which the Fishways Would be Active

In this scenario, both fishways would remain open all the time, and the Eel ramp would operate 24/7, like the other two scenarios. There would be additional fish passage through the permanent opening in the main gates, except during extreme flood risk conditions at high tide, during which all gates will be closed to minimize the flood risks.

It should be noted that because a large volume of tidal water would be let into the river during high tides, and then allowed to flow out during low tides this large movement of water four times per day would result in high velocities on the upstream side of the aboiteau for much longer periods each day than what would occur for the freshwater and partially brackish operating scenarios. This would present narrower time windows for fish travel upstream of the aboiteau structure during low tide than the other two operating scenarios.

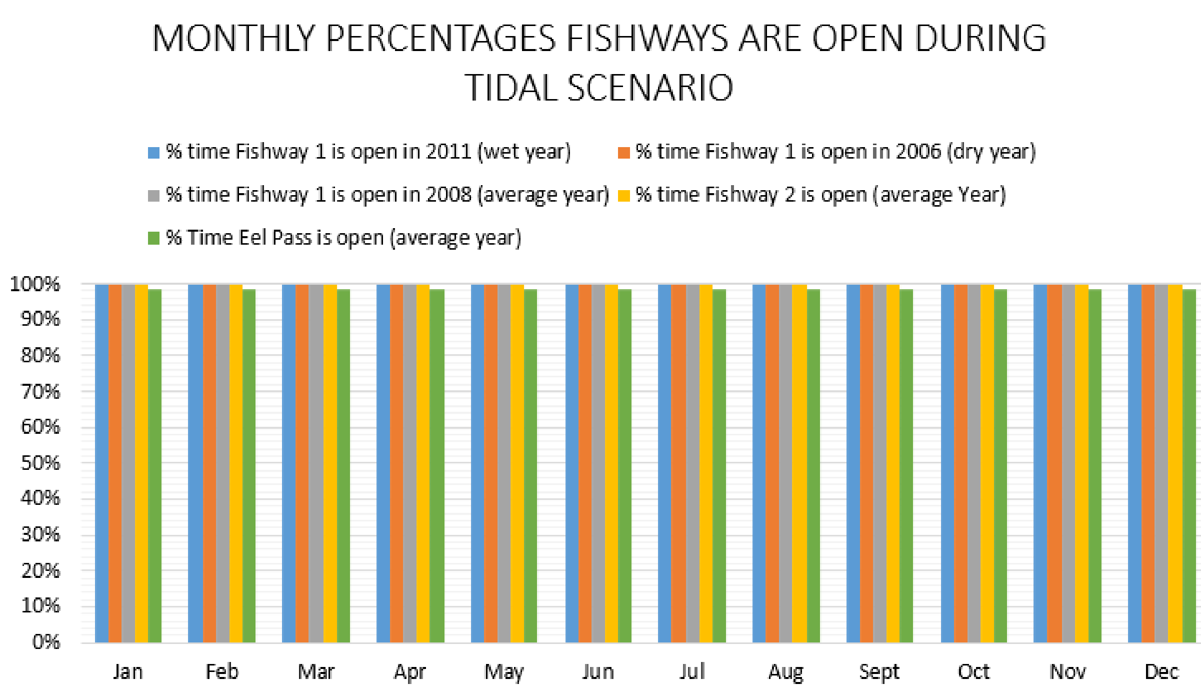


Figure 4.2a: Dampened Tidal Scenario: Percentage of Time Fishways are Open During Full Tidal Cycle and During Low Tides

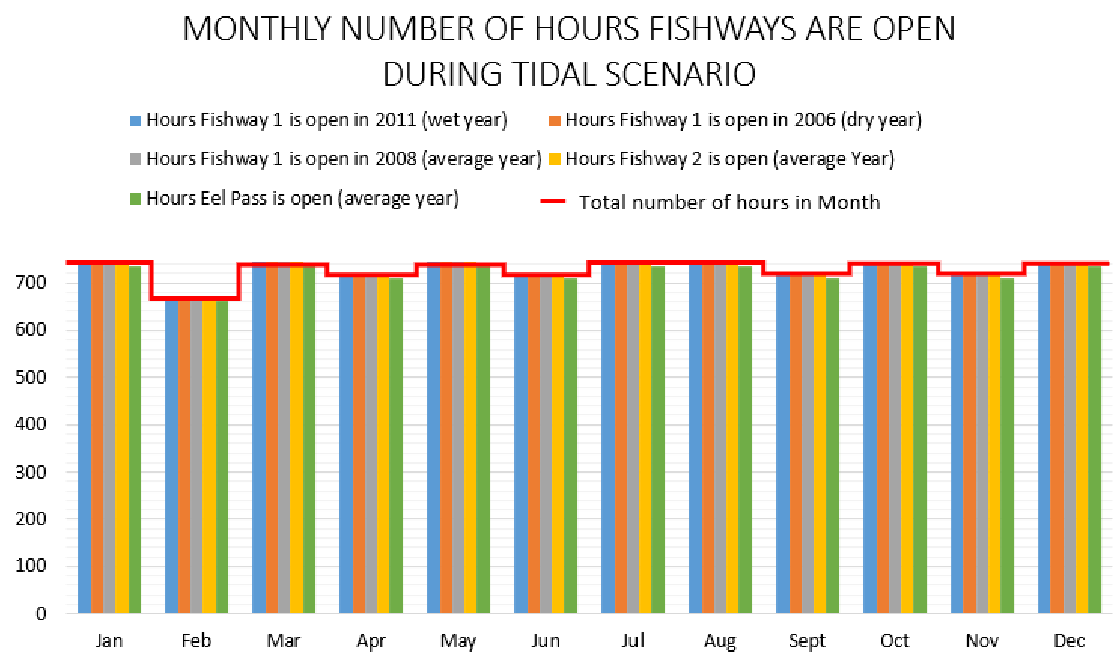


Figure 4.2b: Dampened Tidal Scenario: Monthly Number of Hours Fishways are Open During Full Tidal Cycle and During Low Tides

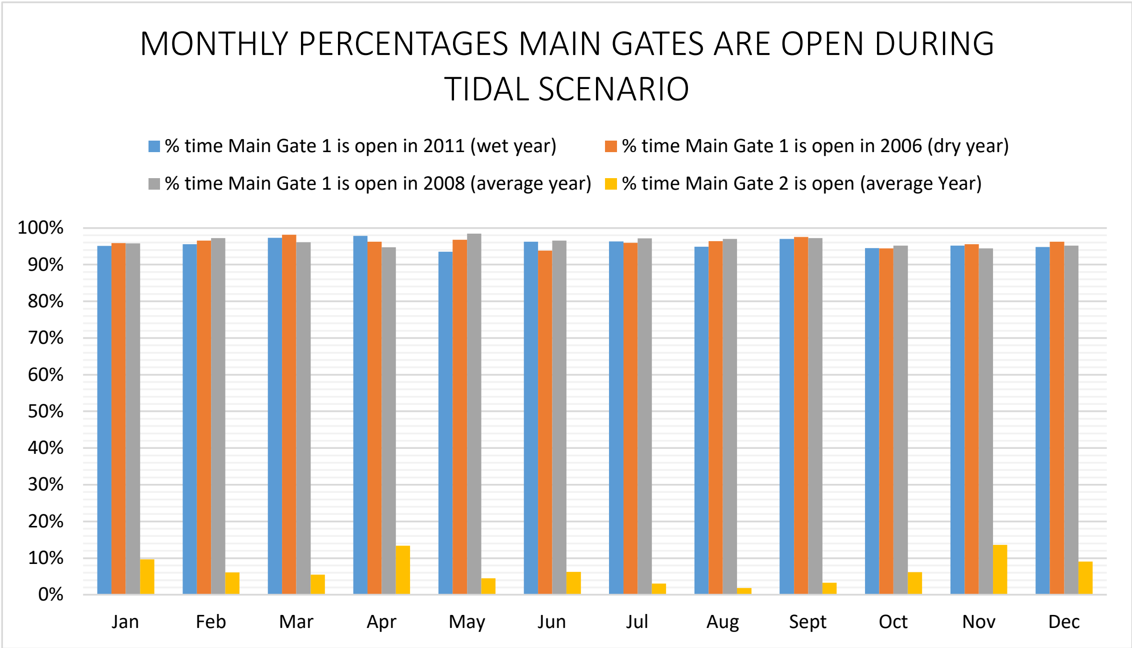


Figure 4.3a: Dampened Tidal Scenario: Percentage of Time Main Gates are Open During Full Tidal Cycle and During Low Tides

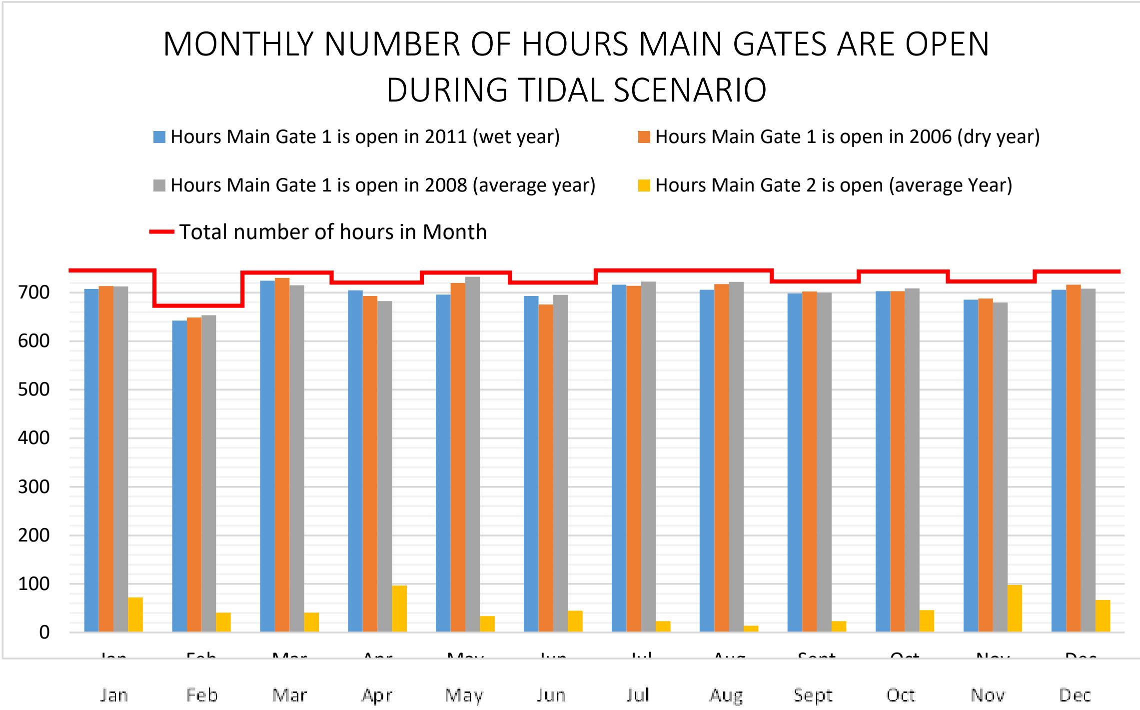


Figure 4.3b: Dampened Tidal Scenario: Monthly Number of Hours Main Gates are Open During Full Tidal Cycle and During Low Tides

Prepared by:
Rick Giffin, P.Eng., LEED™ AP
Principal, Sr. Project Manager

Reviewed by:
Alex Wilson, M.Eng., P.Eng.
Practice Lead – Water Resources

Colin Fisher, P.Eng.
Sr. Project Manager & Civil Engineer

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APPENDIX D

Consultation Log

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
2016-07-25	NSTIR	KMKNO/Assembly of NS Mi'kmaq Chiefs, Sipekne'katik and Millbrook FNs	Continuing Consultation Letter re: fourth phase of Highway 101 Twinning project (Three Mile Plains to Falmouth)		
2016-08-08	Sipekne'katik FN	NSTIR	Response to July 25th letter indicating that Sipekne'katik expects EA terms & conditions to be met to protect fish & fish habitat. Also requested to be notified in writing in case that archaeological or human remains found.	EA terms and conditions as they relate to fish and fish habitat; archaeological findings	See September 6th response below
2016-09-06	NSTIR	Sipekne'katik FN	Response to August 8th letter – Agrees to apply for all regulatory permits and comply with EA terms/conditions – NSTIR will notify if human remains/cultural resources unearthed.		Agreed to apply for and comply with all regulatory permits and EA terms and conditions; Also agrees to notify if human remains/cultural resources unearthed.
2017-03-07	NSTIR	KMKNO/Assembly of NS Mi'kmaq Chiefs, Sipekne'katik and Millbrook FNs	Continuing Consultation Letter – Advises the completion and registration of Environmental Assessment (EA) with NSE in near future, formation of a	EA including recognition of salt marsh loss and compensation, Continuing Consultation, MEKS and Information Sharing	Formation of Community Liaison Committee, MEKS shared, and proactive development of salt marsh compensation projects since 2004

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
			Community Liaison Committee (CLC) and dedicated Project website Hwy101windsor.ca for information sharing. Mi'kmaq Ecological Knowledge Study (MEKS) also shared.		including new project design for the Truro-Onslow Bank.
2017-04-20	Sipekne'katik FN	NSTIR	Letter from SFN to NSTIR acknowledging receipt of MEKS - request to be notified in writing in case that archeological or human remains found.	MEKS, Archaeological Resources	
2017-05-01	NSE	KMKNO/Assembly of NS Mi'kmaq Chiefs, Sipekne'katik and Millbrook FNs	Continuing Consultation Letter – Notification that EA will be registered May 8, 2017 – decision 50 days following – NSE leading this phase of consultation – requesting concerns specifically related to asserted Mi'kmaq rights that could be adversely impacted by June 7, 2017	EA and Mi'kmaq Rights	
2017-05-08	NSTIR, NSE	Public via EA website and advertisements in	Advises that the EA is available online and solicits comment on all aspects of	EA	

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
		provincial newspapers	the Highway 101 Twinning Project.		
2017-05-23	NSTIR	KMKNO/Assembly of NS Mi'kmaq Chiefs, Sipekne'katik and Millbrook FNs	Advises that the EA is registered, available online and solicits comment on all aspects of the Project. Also requests response about any concerns including details on any asserted Rights that could be adversely affected by the Project.	EA and Mi'kmaq Rights	
2017-06-07	KMKNO, Chief Carol Potter	NSTIR	Response to May 23rd letter - Advises significant/grave concerns regarding fish and fish habitat and requests continuing Mi'kmaq consultation on future approvals, authorizations, permits, and participation in monitoring.	EA, Project Design, Fish and Fish Habitat, Permitting, Wetland Compensation, Baseline and Post-Construction Monitoring	See August 14th response below.
2017-06-26	Sipekne'katik FN	NSTIR	Response to May 23rd letter - Advises comments sent to NSE during EA process. Protection of fish and fish habitat is key to protection of member's rights.	Fish and Fish Habitat, Archaeology Resources, Missing previous consultation documents	Past project communications for 2008 to 2013 to be provided (see July 19, 2017 response)

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
2017-07-11	NSE	Public	Minister of Environment approval of proposed project, conditional on terms and conditions, following consideration of all comments received	EA	
2017-07-11	NSE	KMKNO/Assembly of NS Mi’kmaq Chiefs	Letter noting approval of project EA and terms/conditions, citing specific concerns raised in June 7 letter: NSTIR to communicate to Mi’kmaq and public why the causeway was selected over other options, sufficient baseline info for fish to be communicated, detailed design to enable fish passage to be provided to DFO, and preparation of a Mi’kmaq comms plan; NSTIR to continue consultation through permitting process	EA Terms and Conditions; Design Options; Baseline Monitoring; Fish Passage Design; Mi’kmaq Comms Plan, Continued Consultation	
2017-07-11	NSE	Sipekne’katik FN	Letter noting approval of project EA and terms/conditions, citing specific concerns raised in June 7 letter: NSTIR to	EA Terms and Conditions; Design Options; Baseline Monitoring; Fish Passage Design; Mi’kmaq Comms	

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
			communicate to Mi'kmaq and public why the causeway was selected over other options, sufficient baseline info for fish to be communicated, detailed design to enable fish passage to be provided to DFO, and preparation of a Mi'kmaq comms plan; NSTIR to continue consultation through permitting process and Mi'kmaq to be contacted if human remains or archaeological resources are unearthed during the works	Plan, Continued Consultation; Archaeological Resources	
2017-07-18	Millbrook FN	NSTIR	Response to May 23rd letter - Advises no identified issues with the Project and does not require any further engagement.	No Concerns	NSTIR to provide Project updates.
2017-07-19	NSTIR	Sipekne'katik FN	Letter providing requested consultation files from period up to March 2013 and noting process if archaeological resources / remains found – Requests	Consultation Records; Archaeological Resources, Mi'kmaq Rights	Provided consultation files requested in June 26, 2017 letter

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
			any concerns including details of asserted Mi'kmaq rights that could be impacted by project		
2017-08-14	NSTIR	KMKNO, Chief Carol Potter	NSTIR to Assembly in response to letter dated June 7, 2017 discussing consultation with Mi'kmaq of Nova Scotia, referencing language of federal Fisheries legislation (serious harm) which they are bound by, will continue consultation with Mi'kmaq and discussion with DFO re: protection of Aboriginal and Treaty rights. Encourages discussion of items related to environmental protection and monitoring at Technical Committee. Notes baseline study partnership between local fishers, academia, MCG and SFN representatives. Commits NSTIR to ongoing consultation on permits and authorizations throughout life of project. Also includes lengthy description of wetland compensation: NSTIR proactively began planning for compensation requirements associated	Baseline Study Partnership w/ MCG, SFN, Local Fishers, Academia Ongoing consultation on permits and authorizations Continuing development of Truro-Onslow Habitat Bank	

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
			with this project (and others) in 2004 prior to initiation of Mi'kmaq consultation and the 2009 Wetland Conservation Policy. Three large salt marsh projects were developed that collectively restored more than 70 ha of fish and fish habitat and yielded banks of 'habitat credits' to meet future regulatory requirements (Cheverie 2005, Walton 2005, and St. Croix 2009). Given delays in planning for the Avon River crossing, NSTIR has developed another large salt marsh restoration project on the Salmon and North Rivers near Truro that will restore ~92 ha of salt marsh and fish passage to ~48 km of McCurdy Brook, including at-risk species and other keystone species within the Minas Basin (e.g., Atlantic salmon, American eel,		

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
			striped bass, Atlantic tomcod, and Gaspereau).		
2017-09-20	NSTIR	NSE	Letter to NSE providing Mi'kmaq Communications Plan	Mi'kmaq Communications Plan	Submission of Mi'kmaq Communications Plan
2017-10-30	NSTIR	KMKNO/Assembly of NS Mi'kmaq Chiefs	Mi'kmaq-NSTIR Consultation Roundtable Meeting – Sharing of Mi'kmaq Communications Plan, CLC Representation	Mi'kmaq Communications Plan, CLC Representation	
2017-11-10	NSTIR	KMKNO/Assembly of NS Mi'kmaq Chiefs, Sipekne'katik and Millbrook FNs, Native Council	Letter providing copy of Mi'kmaq Communications Plan	Mi'kmaq Communications Plan	Sharing of Mi'kmaq Communications Plan
2017-12-06	NSTIR	KMKNO/Assembly of NS Mi'kmaq Chiefs, Sipekne'katik and Millbrook FNs, Native Council, NSE	Letter enclosing document further explaining rationale behind maintaining causeway/aboiteau structure	Project Design	Sharing of Document explaining rationale behind maintaining causeway/aboiteau structure

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
2017-12-12	Sipekne'katik FN	NSTIR	Letter clarifying role as CLC representative and requesting meeting to discuss design of the structure that will significantly enhance fish passage and accommodate climate change projections	CLC Representation, Project Design	
2017-12-14	NSTIR	KMKNO/Assembly of NS Mi'kmaq Chiefs, Sipekne'katik and Millbrook FNs	Sharing copy of Archaeological Contingency Plan	Archaeological Resources	Sharing of Archaeological Contingency Plan
December 2016 to June 2018	Cultural Resource Management Group (CRM; NSTIR's Archaeology Consultant)	KMKNO Archaeology Research Division, Sipekne'katik and Millbrook FNs	Liaison to support Heritage Research Permits A2016NS102, A2017NS099, A2018NS004 and A2018NS064 (Archaeologists John Shears and Sarah Ingram) from NS Communities, Culture and History (NSCCH)	Archaeological Assessment at the Truro-Onslow Salt Marsh Restoration and Dyke Realignment Site	Reports to be submitted following NSCCH review and acceptance of HRP Permit Reports – see May 9, 2019, entry below
2018-01-11	Sipekne'katik FN	NSTIR	Letter responding to the document outlining the rationale for maintaining the causeway/aboiteau, noting the Avon River as habitat for Inner Bay of	Project design, Fish and Fish Habitat, Continued Consultation	

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
			Fundy Atlantic Salmon population and noting concerns for fish protection and fish and fish habitat. Agreed to consultation meeting on Feb. 15, 2018.		
2018-01-12	NSTIR	Sipekne'katik FN	Letter confirming role of representative on CLC Committee, confirming consultation meeting on February 15, 2018.	CLC Representation/Role, Consultation Meeting	Confirmation of Consultation Meeting on Feb. 15, 2018
2018-01-17	Sipekne'katik FN	NSTIR	Letter thanking NSTIR for clarification of role of representative on CLC Committee	CLC Representation/Role	
2018-02-15	NSTIR	Sipekne'katik FN	Consultation Meeting between SFN, NSTIR, NSDA, OAA and CBCL Consultants		
2018-03-29	Sipekne'katik FN	NSTIR	Letter requesting information on CRA fish baseline data collection and habitat assessment work	Baseline Monitoring, Habitat Assessment	See June 14, 2018 response
2018-05-07	KMKNO, Annapolis Valley, Glooscap and Bear River FN's, NSTIR, NSDA,	Consultation Meeting			

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
	OAA, CBCL Ltd, MCG				
2018-05-23	KMKNO	NSTIR	Letter following-up on May 7th consultation meeting citing list of concerns	Protection of all species, impacts to fish and fish habitat, fish passage, environmental monitoring, emergency management and safety, impacts of sea level rise and storm surge, environmental impacts and rerouting waterways, impacts to terrestrial habitat, impacts to Mi'kmaq archaeological resources; Requests participation in environmental monitoring and updated Mi'kmaq communications plan	
2018-05-28	NSDA, NSTIR, KMKNO, BRFN, AVFN, GFN, CBCL, DFO		Site Visit to existing Avon River Aboiteau including NSDA description of operational and technical details of structure; Group discussion of up/downstream impacts of changes to structure; Mi'kmaq concerns and expectations for improved	Project Design/Operations, Fish Passage, Continued Consultation	Commitments to continued coordination of consultation process and consultation

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
			passage for all species of fish; Mi'kmaq concerns also about accommodating other stakeholders (municipality, private land-owners) in light of historic displacement of their People. OAA, NSTIR, NSDA and DFO commitments to continued coordination of consultation process. KMKNO commitment to reaching out to NSPI for opportunities to coordinate on improving fish habitat and passage in Avon watershed area. Consultation meeting to be held in September when design options ready.		meeting in September 2018
2018-06-08 & 2018-06-18	OAA	KMKNO (M. Nevin and T. Gaudet)	OAA provided notes from May 28th aboiteau site visit to KMKNO		
2018-06-14	NSTIR	Sipekne'katik FN	NSTIR response to SFN's March 29th letter describing CRA data collection and habitat assessment		Shared copy of CRA Research Proposal and excerpt of changes planned in Year 2 of the study
2018-06-20	KMKNO/Assembly of NS Mi'kmaq Chiefs	Premier McNeil, NSTIR Minister Hines, NSDA Minister Colwell, DFO Regional Director Rhea King	Follow-up to May 23rd letter and May 28th site visit – Cites preference for removal of causeway, impacts to rights due to effects on ecosystem. Second preferred option involves constant unimpeded fish passage by way of culvert, restoring sufficient tidal flow	Project Design/Operation, Mi'kmaq Rights, Fish Passage, Archaeological Resources, Salt Marsh Compensation	See July 12, 2018 response to KMKNO and January 21, 2019 entry for NSTIR commitment of 4:1 compensation

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
			and eliminating need for human operation and manipulation on fish passage. Careful consideration of archaeological resources, and requests that DFO authorization for loss of salt marsh should require at least 5:1 compensation rather than current status quo ratio of 2:1 which will not suffice in this situation.		
2018-07-12	NSTIR	KMKNO	Letter responding to KMKNO June 20th letter noting consideration of 9 concerns listed		Commitment to working w/ OAA & DFO re: Fisheries Authorizations, clarifying Mi'kmaq involvement in CRA fisheries study, proposing establishment of joint Mi'kmaq-NS-DFO working group on environmental monitoring, noting earlier dissemination of Mi'kmaq Communications Plan for project, and the

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
					communique describing the rationale for maintaining the Avon River Aboiteau and Causeway
2018-09-26	SFN, NSTIR, NSDA, CBCL		Consultation Meeting - Consisted of a technical update by CBCL followed by a consultation conversation between SFN and the Crown. CBCL presented 3 scenarios/options (A through C). Option C – partial tidal exchange - was considered most viable option. However, significant community concerns with Option C (lake level variability and changes) and led to consideration of a new Option D that would balance concerns – still in development – goal is to maintain the freshwater lake while also improving fish passage. SFN asked questions about funding, stated preference for Option C with enhanced habitat protections. Suggested SFN participation in monitoring at aboiteau/Lake Pisiquid.	Project Design/Operations, Baseline Monitoring	
2018-10-09	KMKNO, AVFN, GFN, BRFN, NSTIR, NSDA, MCG, CBCL Ltd.		Consultation Meeting - Project update provided by CBCL with discussion of new Option D. Mi'kmaq asked questions about funding, design, operation of structure, and voiced concerns over fish passage and decision-making. Mi'kmaq expressed preference for Option C. Suggested collaborative management of tidal control structure going forward.	Project Design/Operation, Fish Passage	

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
2018-10-17	OAA	Sipekne'katik FN	OAA provided SFN with CBCL presentation materials from September 26 meeting, a high-level summary of materials for senior leadership and list of 24 fish species present in vicinity of aboiteau.		Provided presentation materials from Sept. 26th meeting and list of 24 fish species present in near aboiteau
2018-10-17	OAA	KMKNO	OAA provided KMKNO with CBCL presentation materials from October 9 meeting.		Provided presentation materials from Oct. 9th meeting
2018-10-17	KMKNO	OAA, DFO, NSTIR, NSDA	Letter from KMKNO stating preference for Option C & citing inadequate information on Option D fish passage. Also noted the importance of consulting w/ Mi'kmaq before final decision & that any impacts on fish/fish habitat are impacts on Mi'kmaq Rights, Concerns around lack of archaeological considerations in design options.	Project Design/Operation, Continued Consultation, Impacts to Fish/Fish Habitat, Mi'kmaq Rights, Archaeological Resources	
2018-11-26	Sipekne'katik FN	NSTIR, NSE, OAA	Letter from SFN stating it's become their knowledge that final decision on	Project Design/Operation, Fish Passage, Capacity Issues	

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
			design has been made; Lack of support for any design that does not allow 24 hr/day, 365 day/yr access for all fish species at all life stages; Support for bridge structure with removal of aboiteau/causeway; Notes SFN capacity issues		
2018-11-28	NSTIR, Minister Hines	KMKNO, Chief Carol Potter	Response to June 20th letter – describing public safety and land protection as key project objectives, rationale for choosing causeway/aboiteau over free-tidal flow with bridge; acknowledging concern for increased compensation for impact on existing salt marsh.		Commitment to enhanced fish passage and continued consultation Continuing development of Truro-Onslow Habitat Bank
2018-12-18	NSTIR	KMKNO/Assembly of NS Mi'kmaq Chiefs	Response to Oct. 17th letter – described complexity of flood protection system and importance of project for public safety (twinning, flood protection). Highlights incorporation of improved fish passage in design		

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
			process, description of Option D (Hybrid) with increased flexibility, cited importance of monitoring once system in place, and described archaeological work undertaken to date. Requests input on specific concerns.		
2018-12-19	NSTIR	Sipekne'katik FN	Response to Nov. 26th letter – describes project status and rationale for aboiteau and causeway decision. Highlights incorporation of improved fish passage in design process, description of Option D (Hybrid) with increased flexibility, cited importance of monitoring once system in place. Notes NS capacity funding to SFN and stresses importance of continuing consultation		
2019-01-21	NSTIR	KMKNO Consultation Meeting on the Highway 101 Project	Project Update and Discussion – primarily on aboiteau design options but notes commitment to 4:1 compensation including	Salt Marsh Compensation, Archaeological Resources, Project Design, Continued Consultation	4:1 salt marsh compensation Truro-Onslow Habitat Bank

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
			restoration of former salt marshes in similar systems.		
2019-02-05	KMKNO	NSTIR	KMKNO follow-up letter to Jan. 21st Consultation meeting – Desire for co-management of strategy for aboiteau, Mi'kmaq participation in monitoring, cumulative impacts and request for additional archaeological work	Project Design/Operations, Co-Management, Monitoring, Cumulative Impacts, Archaeological Resources	
2019-02-22	NSTIR	KMKNO, Twila Gaudet	Response to February 5th letter following January 21st Consultation Meeting – Seeking details on Mi'kmaq definition of co-management, invitation to Mi'kmaq in post-construction monitoring, Cumulative Effects investigations already undertaken– Residual adverse affects not anticipated to substantially contribute to effects from other past, present or future undertakings, assuming conduct of mitigation measures,	Salt Marsh and Fish Habitat Compensation	Invitation for Mi'kmaq participation in Post-Construction Monitoring, Truro-Onslow Habitat Bank and Commitments for Post-Construction Monitoring at both Avon River and Salmon-North River sites. Commitment to archaeologist onsite for monitoring purposes.

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
			monitoring and habitat compensation to offset unavoidable damage or loss of wetland and fish habitat. Seeking additional details on requested archaeological scope		
2019-03-06	NSTIR	Sipekne'katik FN Consultation Meeting on the Highway 101 Project	Project Update and Discussion – primarily on aboiteau design options but notes commitment to 4:1 compensation including restoration of former salt marshes in similar systems. SFN voiced concerns about 24/7, 365 fish passage, concerns with Option D, requested clarity on design of aboiteau fishways, archaeological monitoring.	Fish Passage, Salt Marsh Compensation, Project Design, Fish Passage, Archaeological Resources	4:1 salt marsh compensation Truro-Onslow Habitat Bank
2019-04-26	NSTIR	KMKNO Consultation Meeting	Consultation Meeting focused on the planned / requested archaeological work; Mi'kmaq expressed concerns about archaeological methods used in earlier investigations	Archaeological Resources/Investigations	See May 2nd response below

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
2019-05-02	NSTIR	KMKNO	Follow-up Letter to April 26th Consultation Meeting on Archaeological work – Status update on work provided, seeking feedback from KMKNO ARD on proposed investigations. NSTIR acknowledges concerns about primary and secondary impacts.	Archaeological Resources/Investigations	Commitment to Archaeological monitoring of geotechnical investigations
2019-05-09	NSTIR	KMKNO/Assembly of NS Mi'kmaq Chiefs, Sipekne'katik and Millbrook FNs	Description and early findings of archaeological resource impact assessment (ARIA) for the Truro-Onslow Salt Marsh Restoration Project and Habitat Bank (2 reports)	Salt Marsh and Fish Habitat Compensation – Archaeology Concerns	Shovel-test reports to be submitted once NSCCH has approved
2019-05-09	NSTIR	Meeting w/ KMKNO ARD	Meeting between KMKNO-ARD, David McIntyre (Archaeologist), NSTIR, OAA and NSDA regarding Archaeological Investigations associated w/ Truro-Onslow Salt Marsh Restoration Project and Habitat Bank		

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
2019-06-10	KMKNO	NSTIR	KMKNO response to May 9th letter regarding Archaeology associated with Truro-Onslow Salt Marsh Restoration / Habitat Bank – requests clarification	Requested clarification on lack of rationale for changes to recommendations as set out in 2016 ARIA vs 2017 report; Requests copy of 2018 report and requests work stoppage until KMKNO-ARD review	
2019-06-10 2019-06-28	NSTIR	KMKNO/Assembly of NS Mi'kmaq Chiefs	Shovel test reports (2) and NSCCH-acceptance letters for the Truro-Onslow Salt Marsh Restoration Project and Habitat Bank	Salt Marsh and Fish Habitat Compensation – Archaeology Concerns	Final reports and NSCCH-acceptance letters sent
2019-07-19	KMKNO	NSTIR	Letter from KMKNO citing insufficient fish passage at Avon River aboiteau under current operation, notes potential violation of Fisheries Act; Reiterates desire to be involved in operational plan for new aboiteau design, recommends involving NSPI in ongoing discussions around operations	Fish Passage, Project Design/Operations	

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
2019-10-02	NSTIR	Joint-Consultation Meeting w/ KMKNO, OAA, NSDA, DFO	Joint Consultation Meeting with KMKNO, OAA, NSDA and DFO to provide project updates and discussion about archaeological work, regulatory requirements, consultants’ work, reports, fish monitoring, information sharing, and Mi’kmaq engagement in development of gate operations.	Mi’kmaq Rights and Title	Draft Meeting Record 19Nov2019
2019-11-15	NSTIR	KMKNO/Assembly of NS Mi’kmaq Chiefs	Letter providing Project update – archaeology investigations near the Avon River crossing	Archaeology evidence on Falmouth side	Final reports and NSCCH-acceptance letters sent
2019-12-09	NSTIR	KMKNO/Assembly of NS Mi’kmaq Chiefs	Project update Letter – Consultation Meeting summary provided, Data sharing, application process for HADD authorization and marsh compensation/offset	NSDA-DFO meeting in July	Sharing of support documents and commitment to 5:1 offset for loss at Windsor Marsh
2019-12-10	Sipekne’katik FN	NSTIR	Acknowledges 9May2019 letter about archaeology investigations associated with the Truro-Onslow Salt Marsh Restoration Project and Habitat Bank	Limited capacity to participate in consultation	Continue providing information updates

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
2020-03-18	KMKNO	NSTIR	Acknowledges 9Dec2019 letter about continued consultation and request for meetings	NSDA communications plan for current aboiteau operations, co-monitoring of watershed by MCG, and training of Mi'kmaq to operate new aboiteau	
2020-04-20	NSTIR	KMKNO, Twila Gaudet	Acknowledges concerns and requests noted in the March 18, 2020 letter		NSTIR to reach out and schedule another consultation meeting
2020-05-21	Confederacy of Mainland Mi'kmaq (CMM)	DFO Minister of Fisheries, Bernadette Jordan	Federal commitment to working with the Mi'kmaq on their concerns about the Avon River Causeway	Mi'kmaq Rights and Title, Species-at-Risk, and Co-Management	
2020-06-30	NSTIR	KMKNO, Twila Gaudet	Response to 18Mar2020 letter including project updates, regulatory requirements and continuing consultation	Willingness to continue discussions and partnership with MCG	Planning for consultation meeting as soon as possible
2020-07-23	NSTIR	KMKNO/Assembly of NS Mi'kmaq Chiefs	Consultation Meeting – Project and Design Update provided by NSTIR/CBCL, including recap on history of dyke system, rationale for current approach, and update on operational scenarios and initial operating approach	Cumulative impacts, Mi'kmaq rights, Request for Bridge	

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
2020-08-31	KMKNO	NSTIR	Response to June 30th letter and acknowledgement of receiving July 23 presentation slides; Request for bridge option to be considered and presented to DFO, request for additional monitoring funding for MCG, request for update on ARIA studies, request for further technical discussions	Request for Bridge Option, Funding for Fish Monitoring, Update on ARIA studies	
2020-09-30	Confederacy of Mainland Mi'kmaq (CMM)	NSTIR	Letter on behalf of CMM and Chiefs stressing importance of considerations for species at risk such as Inner Bay of Fundy (iBoF) Atlantic Salmon, request for alternatives to Armour Rock protection, unrestricted fish passage, inclusion in decision making process, bridge designs that are adequate to withstand tides, bridge option be considered, and proper ecosystem monitoring be considered.	Species at Risk, Armour Rock Alternatives, Request for Bridge Option, Ecosystem Monitoring	

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
2020-10-01	Confederacy of Mainland Mi'kmaq (CMM)	NSTIR	Letter providing results of recent independent survey around the Windsor Causeway/aboiteau	Fish Passage, Indigenous Rights	
2020-10-06	NSTIR	KMKNO/Assembly of NS Mi'kmaq Chiefs	Consultation Meeting	Project Design (Bridge option), Technical Resource Limitations for Mi'kmaq, Armour Rock protection alternatives	TIR to explore reducing the amount of Armour Rock or alternatives w/ consultant (CBCL)
2020-10-08	Sipekne'katik FN	NSTIR (Minister)	Letter to NSTIR Minister claiming that Sipekne'katik FN has not been consulted concerning the current design and no response to Aug. 16th letter to NSTIR Minister	Consultation	
2020-10-23	NSTIR	KMKNO/Assembly of NS Mi'kmaq Chiefs			
2020-11-03	NSTIR	Confederacy of Mainland Mi'kmaq (CMM)	Response to CMM regrading several concerns raised in their Sept. 30, 2020 letter and independent survey results shared on Oct. 1, 2020.	Species at Risk (iBoF) Atlantic Salmon, Coastal Protection and Alternatives to Armour Rock Barriers, Cooperation and Collaboration on Design Options, and a Survey concerning Fish Passage	

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
				and the Windsor Causeway.	
2020-11-12	NSTIR (Minister Hines)	Sipekne'katik FN	Response from TIR (Minister Hines) to Aug. 16, 2020 and Oct. 8, 2020 letters from Chief Sack (Sipekne'katik) clarifying that TIR has been engaged in consultation with Sipekne'katik since early 2017 and has continued to share information and has been soliciting feedback throughout the design development.	Consultation, Accommodations, Capacity concerns	TIR provided a summary of the key accommodated concerns to date.
2020-11-17	KMKNO	NSTIR	Follow-up letter to Oct. 6, 2020 consultation meeting noting several concerns about the project.	Current gated structure, free tidal flow/bridges, Independent Engineering Assessment & Feasibility study, Species at Risk (iBoF Atlantic Salmon)	
2020-11-25	KMKNO	NSTIR	Response to Oct. 23, 2020 Letter from TIR and reiteration of points from letter sent Nov. 17, 2020.	Fish Passage and Bridge Design, Post-Construction Monitoring Program, Regulatory Requirements.	

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
2021-02-12	NSTIR	KMKNO	Response to Nov. 17, 2020 and Nov. 25, 2020 letters and general project update regarding: Hwy 101 Twinning progress, Updates on Regulatory Requirements (DFO Fisheries Act Authorization, NSE Wetland Alteration Application, and Transport Canada Navigable Waters Application). Also responded to several items/concerns raised in previous letters.	Fish Passage, Project Design, Species at Risk, Post Construction Monitoring Program	
2021-02-12	NSTIR	Sipekne'katik	Continued consultation letter and general update on project regarding: Hwy 101 Twinning progress, Updates on Regulatory Requirements, and consultation.		
2021-03-25	KMKNO	NSTIR	Response to NSTAT's Feb. 12, 2021 letter requesting response extension to March 31, 2021	Response extension request	

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
2021-04-09	KMKNO	NSTAT	Response to NSTAT's Feb. 12, 2021 letter with questions about existing structure repairs, NSDA Ministerial Order, Fish Passage, Project Design and Post-Construction Monitoring Plan.	Existing aboiteau condition/repairs, DFO Ministerial Order, Fish Passage and Project Design, Post Construction Monitoring Plan	
2021-06-21	NSTAT	KMKNO	Response to KMKNO's Apr. 9, 2021 letter and general project update regarding: Hwy 101 Twinning progress, updates on Regulatory Requirements (DFO Fisheries Act Authorization, NSE Wetland Alteration Application, and Transport Canada Navigable Waters Application). Also responded to several items raised in April 9th letter related to: Existing Aboiteau Structure Concerns, Fish Passage and Project Design and the Post Construction Monitoring Program (including MCG		

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
			involvement). An update was also provided regarding the recent incident involving stranded fish during high tides between May 27-28th.		
2021-06-21	NSTAT	Sipekne'katik	Continued consultation letter and general update on project regarding: Hwy 101 Twinning progress, updates on Regulatory Requirements (DFO Fisheries Act Authorization, NSE Wetland Alteration Application, and Transport Canada Navigable Waters Application). An update was also provided regarding the recent incident involving stranded fish during high tides between May 27-28th.		
2021-07-23	NSTAT	KMKNO	Consultation meeting focused on providing an update on the status of the aboiteau/causeway portion of the Hwy 101 twinning project, progress on the aboiteau design and issues raised by the Mi'kmaq, and	MCG involvement in Post-Construction Monitoring Program, Project Design, Fish Passage, etc.	

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
			to discuss concerns and potential impacts to Treaty and Aboriginal rights resulting from the project		
2021-08-19	NSTAT	KMKNO	Letter indicating that as discussed during the consultation meeting, NSTAT intends to engage an independent consultant to manage the overall post construction monitoring program and has agreed to Mi'kmaq participation (through MCG) in the proposed 7-year monitoring plan. It should also be noted that while a proposed monitoring plan has been submitted with our DFO application, it is still open for DFO and Mi'kmaq		Agreed to Mi'kmaq participation (through MCG) in the proposed 7-year monitoring program.
2021-08-25	NSTAT	KMKNO	E-mail providing update that Supplemental Application to DFO has been submitted and copy has been provided via electronic file transfer.		Provided copy of Supplemental Information as part of DFO Fisheries Act Authorization Application

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
2021-12-08	KMKNO	NSPW	Letter reiterating the preference for tidal bridge and dyke system, requesting a meeting with NSPW & DFO to discuss concerns, request for commitment in multi-year funding to MCG for post construction monitoring, and first phase of independent engineering assessment is complete.	Project design/operations, Post Construction Monitoring (and MCG involvement), Fish Passage	Commitment to significantly improve fish passage through project design Commitment to begin exploring removal of existing aboiteau after construction complete Reiterated commitment to Mi'kmaq participation in 7-year Pre/Post Construction Monitoring Program Sharing of Information (NSDA Engineering Assessment of Existing Aboiteau) Commitment to convene a consultation meeting soon
2022-02-14	NSPW	KMKNO	Consultation meeting focused on Project Update and Status of DFO Application (NSPW), and	Continued expectations for tidal bridge option (not the current project)	

Date (Y-M-D)	From	To	Communication Description	Nature of Concerns	NSPW Actions and Accommodation
			Update on Regulatory Approach (DFO)		

APPENDIX E

Surface Water Monitoring Report

Avon River Aboiteau Replacement

Water Quality Monitoring

Final Report

CBCL

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Contents

Appendices

List of Tables

Chapter 1 Introduction

CBCL Limited (CBCL) was engaged by the Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) to provide engineering and environmental services for the planned replacement of the Avon River Aboiteau and Causeway. These services included baseline monitoring to establish background water quality conditions in the Study Area. The baseline monitoring program provides the data required to assess water quality conditions and inform decisions regarding the current and future use of the aquatic environment in the Avon River estuary, Lake Pesaquid, and the upstream Avon River and its tributaries (the Study Area).

CBCL collected baseline water quality measurements during several monitoring events in the estuarine and freshwater environments in the Study Area. Water quality measurements included physical properties (e.g., temperature and salinity), chemical characteristics (e.g., pH and dissolved oxygen), and biological characteristics (e.g., coliform bacteria and chlorophyll). Measurements were collected in the brackish / estuarine waters of the Avon River estuary, and in the freshwater environments upstream of the Avon River Aboiteau in Lake Pesaquid and the Avon River. Water quality was measured at each sample location through in-situ analysis using a handheld field meter, and water quality samples were collected and submitted for laboratory analysis. Depth-stratified in-situ measurements were also recorded at a subset of sampling locations in the Study Area to record potential variations in the vertical profile of the water column from surface to the bottom.

A secondary function of the baseline monitoring program was to determine the extent of saltwater seepage through the existing causeway and aboiteau into Lake Pesaquid and the Avon River. Salinity measurements were collected in the field during monitoring events and were used to assist in determining the temporal and spatial salinity variation in the Study Area. Salinity measurements occurred concurrently with the water quality measurements at each sample location.

The water quality results were used in the calibration of predictive computer models for the Study Area, and will be utilized if a future Ecological Risk Assessment is conducted for the Project. The baseline data will also be used to inform decisions regarding the limits of acceptable change in the freshwater environment predicted to occur as a result of the construction and operation of the new Avon River Aboiteau structure.

1.1 Scope of Work

The following scope of work was conducted for the water quality monitoring program for the Avon River Causeway and Aboiteau replacement Project:

- Design of the water quality monitoring program, including the selection of sampling locations and the parameters targeted for each location, including water temperature, salinity concentrations, total suspended solids (TSS), general chemistry (RCAp-MS), low level phosphorous, total and fecal coliforms, biological oxygen demand (BOD), and chlorophyll A
- Three rounds of water sampling were conducted at each sampling location, with one event occurring in each of the spring, summer, and fall seasons
- One round of in-situ water sampling conducted in July at sites easily accessible on foot
- One round of water sampling conducted at the freshwater intake for Martock Ski Resort, and other sites easily accessible on foot during the early winter
- Completion and submission of a technical summary of findings

1.2 Study Area

The downstream portion of the Study Area encompasses the Avon River estuary from Avonport Beach to the Windsor Causeway, including the Kennetcook River to the Glooscap Trail Bridge on Highway 215, and the St. Croix River to Avondale Bridge on Avondale Road. The upstream portion of the Study Area includes Lake Pesaquid and the upstream Avon River, including its tributaries, and the northern branch of the river to the Castle Frederick Road highway bridge. An overview of the Study Area, including all sampling locations, is provided in Appendix A, Figures 1 to 3. Selected images of the individual sampling locations are provided in Appendix B.

Chapter 2 Methodology

The Canadian Council of Ministers of the Environment (CCME) has developed guidance manuals that establish best practices and methods for water quality monitoring in Canada (CCME, 2011; CCME, 2015). These manuals allow practitioners to design comprehensive water quality monitoring programs and collect samples in a consistent manner with the appropriate equipment and tools. The following sections outline the sampling program that was developed according to the CCME guidelines, and the methodology used in conducting the program.

2.1 Sampling Program

The water quality monitoring program consisted of 30 water quality monitoring locations established in the Avon River estuary, Lake Pesaquid, and the Avon River, including several tributaries to the Avon River. The sampling locations targeted potential areas of interest in the Study Area, including:

- The Avon River estuary from Avonport Beach to the Windsor Causeway
- The upstream side of the Avon River aboiteau, where saline waters are predicted to flow into Lake Pesaquid
- Locations of freshwater flows around Lake Pesaquid and upstream in the Avon River
- Sampling locations in freshwater tributaries flowing from agricultural lands into the Avon River

2.1.1 Sample Locations

The preliminary water quality sampling locations were selected during a desktop exercise, which identified potential areas of interest in the Study Area. Preliminary site reconnaissance was conducted prior to the first sampling event in order to allow field personnel the opportunity to visit each of the proposed sampling locations and assess the logistics of sampling at each location, including the most practical means of access (e.g., watercraft, on foot), alternate means of access (e.g., on foot at low tide), and potential constraints (e.g., high bridges, electrical lines).

A watercraft was used for sampling locations that could be effectively accessed by water while operating in high tide conditions. Low tide conditions, particularly in the Avon River estuary, make sampling from a watercraft challenging. A lack of practical access points in the estuary occasionally resulted in the repositioning of sampling locations.

2.1.1.1 In-situ Sample Locations

In-situ water quality parameters were measured at 30 sampling locations using a calibrated Horiba or YSI handheld water quality meter. Measurements were taken at the surface of the water column at each sample location, if possible. Additionally, depth-stratified sampling occurred at 13 sampling locations in the Study Area to assess water quality variations within the water column.

The type of sampling completed at each sampling location is presented in Table 2.1 to Table 2.3.

Table 2.1: In-situ water quality sampling locations in the Avon River estuary

Sample ID	Surface Water Quality	Depth-Stratified Water Quality
AVE-1	X	
AVE-2	X	
AVE-3		X
AVE-4	X	
AVE-5		X
AVE-6		X
AVE-7	X	
AVE-8	X	
AVE-9	X	

Table 2.2: In-situ water quality sampling locations in Lake Pesaquid and Avon River upstream of the existing Avon River Causeway and Aboiteau

Sample ID	Surface Water Quality	Depth-Stratified Water Quality
AR-1	X	
AR-2	X	
AR-3	X	
AR-4		X
AR-4B		X
AR-5/AR-5B		X
AR-6		X
AR-7		X
AR-8		X
AR-9		X
AR-10		X
AR-11	X	
AR-12		X
AR-13	X	
AR-14	X	

Sample ID	Surface Water Quality	Depth-Stratified Water Quality
AR-15		X
AR-16	X	
AR-17	X	
AR-18		X

Table 2.3: In-situ water quality sampling locations in freshwater tributaries near agricultural lands upstream of the Avon River Causeway and Aboiteau

Sample ID	Surface Water Quality	Depth-Stratified Water Quality
BKG-1	X	
BKG-2	X	

2.1.1.2 Laboratory Analytical Sampling Locations

Water quality samples for salinity and TSS were collected and submitted for laboratory analysis for each of the 30 sampling locations. Water samples were also collected for additional parameters including general chemistry (RCAp-MS), low level phosphorous, total and fecal coliforms, BOD, and chlorophyll A at 10 sample locations in the Study Area. The laboratory based analytical parameters for each sample location are provided in Table 2.4 through Table 2.6.

Table 2.4: Water quality sampling locations and laboratory analytical testing for the Avon River estuary

Sample ID	Surface Water Salinity	Surface Water TSS	Surface Water Additional Parameters
AVE-1	X	X	X
AVE-2	X	X	
AVE-3	X	X	
AVE-4	X	X	X
AVE-5	X	X	
AVE-6	X	X	
AVE-7	X	X	
AVE-8	X	X	
AVE-9	X	X	X

Table 2.5: Water quality sampling locations and laboratory analytical testing in Lake Pesaquid and the Avon River upstream of the existing Avon River Causeway and Aboiteau

Sample ID	Surface Water Salinity	Surface Water TSS	Surface Water Additional Parameters
AR-1	X	X	X
AR-2	X	X	
AR-3	X	X	X
AR-4	X	X	
AR-4B	X	X	
AR-5/AR-5B	X	X	
AR-6	X	X	X
AR-7	X	X	
AR-8	X	X	
AR-9	X	X	X
AR-10	X	X	
AR-11	X	X	
AR-12	X	X	X
AR-13	X	X	
AR-14	X	X	
AR-15	X	X	
AR-16	X	X	X
AR-17	X	X	
AR-18	X	X	

Table 2.6: Water quality sampling locations and laboratory analytical testing in freshwater tributaries near agricultural lands upstream of the Avon River Causeway and Aboiteau

Sample ID	Surface Water Salinity	Surface Water TSS	Surface Water Additional Parameters
BKG-1	X	X	
BKG-2	X	X	X

2.1.2 Sample Collection Periods

In-situ water quality and laboratory samples were collected over three main sampling events in 2019. The sampling events coincided with three major seasonal windows:

- Spring freshet – May 2019
- Summer dry season – August 2019
- Fall rainy season – October 2019

The first sampling event took place in May 2019 during which water levels were lowered (drawn-down) in Lake Pesaquid. The second sampling event took place in August 2019, and coincided with the dry season during which freshwater inputs in the aquatic environment were minimal. The third sampling event coincided with the fall rainy season. This sampling event took place in October 2019, after the onset of moderate to heavy rainfall events (>25 mm) over a period of consecutive days, during which freshwater inputs into the aquatic environment were high.

Additional water quality sampling was completed in July and December, 2019, but was limited to sampling locations that were easily accessible on foot. The primary focus of the December sampling event was to collect a water sample at the freshwater intake for Martock Ski Resort during high tide in the Avon River estuary, in order to assess the potential for upstream saltwater intrusion in this part of the Avon River.

Where possible, sampling events were scheduled such that at least one sampling event occurred at high tide and at least one sampling event occurred at low tide. Due to constraints associated with sampling the estuary at low tide, such as lack of sufficient depths for the operation of a watercraft, or steep and unsafe river banks, it was not always possible to collect a sample at each location. These locations are noted in Appendix C.

2.2 Sampling Methods

Based on a desktop analysis of the Study Area and site reconnaissance, several different sampling methods for the collection of in-situ water quality parameters and laboratory samples were implemented depending on the sample location, as well as physical constraints including site access and substrate type. For instance, a sampling location with silty substrate was not always suitable for sampling on foot due to the risk of sinking or becoming trapped. The proposed sampling methods included some combination of the following:

- Sampling from the shoreline with an extendable rod
- Sampling by wading, where substrate and footing is suitable (e.g. rock, coarse sand)
- Sampling from a bridge
- Sampling from a boat

The CCME (2011) guidance manual containing water quality sampling protocols was adhered to for each of the applicable sampling methods. Safety protocols for each method are also provided in the guidance manual, were implemented into CBCL's Project Health and Safety Plan, and strictly adhered to during the water quality monitoring program.

2.2.1 In-situ Parameters and Laboratory Analysis

Water quality parameters were measured in two ways during the sampling events:

- In-situ water quality parameters measured with a portable water quality meter
- Water quality samples collected and submitted for laboratory analysis

In-situ parameters are discussed in Section 82.2.1.1. Water quality samples collected and submitted for laboratory analysis are discussed in Section 2.2.1.2.

2.2.1.1 In-situ Water Quality Parameters

In-situ water quality parameters were measured using a handheld multi-parameter water quality meter and probe capable of measuring the physicochemical parameters specified in Table 2.7.

Table 2.7: In-situ water quality parameters

Water Quality Parameter	Unit of Measurement
Temperature	Degrees Celsius (°C)
Dissolved Oxygen	Milligrams per litre (mg/L)
Dissolved Oxygen	Percent (%)
pH	N/A
Salinity	Parts per thousand (ppt)
Conductivity	Microsiemens per centimetre (µS/cm)
Turbidity	Nephelometric Turbidity Units (NTU)
Total Dissolved Solids (TDS)	mg/L

In-situ surface water quality parameters were measured at each of the 30 sample locations, within the upper 0.1 m of the water column (CCME, 2011). Measuring surface water at each sampling location allows for cross comparison among all of the sampling locations within the Study Area.

Depth-stratified in-situ water quality parameters were measured at a subset of sampling locations to further understand the subsurface and limnologic processes and conditions in the Study Area (Table 2.1 through Table 2.3). In-situ parameters were measured at discrete intervals in the water column, based on CCME protocols (CCME, 2011). These protocols recommend that sample locations with less than 2 m depth be measured at surface and near bottom, with one measurement recorded within 0.1 m of the surface and one measurement recorded within 0.5 m of the bottom. Sample locations with more than 2 m of water depth were measured at the surface, and at discrete 1 m intervals down to approximately 0.5 m above the bottom. For example, if the water column was 4 m deep when samplers arrive on site, in-situ water quality measurements were recorded within 0.1 m of the surface, at 1 m below surface water, 2 m below surface water, 3 m below surface water, and approximately 3.5 m below surface water, or bottom (CCME, 2011). It should be noted that the handheld water quality meters had a maximum cable length of 10 metres, therefore sample locations in the estuary deeper than this could not be sampled to bottom.

The conditions on site at the time of assessment were recorded for each sampling event and sample location, including the time of day the sample was recorded, a geospatial waypoint location, and site photos, as well as water depth, period of the tidal cycle, wind and wave conditions, and approximate cloud cover. In addition, the vertical transparency of the water column was estimated using a Secchi disk, where water depths and conditions on site suited the use of this instrument. Additional notes recorded at the sample locations included observations of flora or fauna in the area, potential sources of contamination (e.g., petroleum products, garbage, debris), or other notable features.

2.2.1.2 Laboratory Analysis

Water quality samples collected within 0.1 m of the surface underwent laboratory analysis for salinity and TSS (mg/L). Laboratory salinity was measured as Practical Salinity Units (PSU), which are equivalent to ppt.

Water quality samples collected at 10 predetermined sample locations also underwent laboratory analysis for the Atlantic Canada Rapid Chemical Analysis program (RCAp-MS), low level phosphorous, total and fecal coliforms, BOD, and chlorophyll A (Table 2.4 to Table 2.6). These supplement the in-situ water quality measurements and laboratory analysis of salinity and TSS, and provide further information on the baseline conditions present in the Study Area. The Atlantic Canada RCAp-MS analytical package was designed to characterize a standardized suite of physicochemical water quality parameters for Atlantic Canada, which are provided in Table 2.8. Low-level phosphorous, total and fecal coliforms, BOD, and chlorophyll A were selected to supplement the biological water quality characteristics in the Study Area. These parameters are provided in Table 2.9.

Table 2.8: Water quality parameters included in the RCAp-MS analytical package

Atlantic Canada RCAp-MS Water Quality Parameters							
Inorganics	**Units**	**Metals**	**Units**	**Metals**	**Units**	**Calculated Parameters**	**Units**
Total Alkalinity (Total as CaCO3)	mg/L	Aluminum (Al)	µg/L	Manganese (Mn)	µg/L	Anion Sum	me/L
Dissolved Chloride (Cl-)	mg/L	Antimony (Sb)	µg/L	Molybdenum (Mo)	µg/L	Bicarb. Alkalinity (calc. as CaCO3)	mg/L
Colour	TCU	Arsenic (As)	µg/L	Nickel (Ni)	µg/L	Calculated TDS	mg/L
Nitrate + Nitrite (N)	mg/L	Barium (Ba)	µg/L	Phosphorus (P)	µg/L	Carb. Alkalinity (calc. as CaCO3)	mg/L
Nitrite (N)	mg/L	Total Beryllium (Be)	µg/L	Total Potassium (K)	µg/L	Cation Sum	me/L
Nitrogen (Ammonia Nitrogen)	mg/L	Bismuth (Bi)	µg/L	Selenium (Se)	µg/L	Hardness (CaCO3)	mg/L
Total Organic Carbon (C)	mg/L	Boron (B)	µg/L	Silver (Ag)	µg/L	Ion Balance (% Difference)	%
Orthophosphate (P)	mg/L	Cadmium (Cd)	µg/L	Sodium (Na)	µg/L	Langelier Index (@ 20C)	N/A
pH	N/A	Calcium (Ca)	µg/L	Strontium (Sr)	µg/L	Langelier Index (@ 4C)	N/A
Reactive Silica (SiO2)	mg/L	Chromium (Cr)	µg/L	Thallium (Tl)	µg/L	Nitrate (N)	mg/L
Dissolved Sulphate (SO4)	mg/L	Cobalt (Co)	µg/L	Tin (Sn)	µg/L	Saturation pH (@ 20C)	N/A

Atlantic Canada RCAp-MS Water Quality Parameters							
Inorganics	**Units**	**Metals**	**Units**	**Metals**	**Units**	**Calculated Parameters**	**Units**
Turbidity	NTU	Copper (Cu)	µg/L	Titanium (Ti)	µg/L	Saturation pH (@ 4C)	N/A
Conductivity	µS/cm	Iron (Fe)	µg/L	Uranium (U)	µg/L		
		Lead (Pb)	µg/L	Vanadium (V)	µg/L		
		Magnesium (Mg)	µg/L	Zinc (Zn)	µg/L		

Table 2.9: Biological water quality characteristics

Biological Characteristics	Unit of Measurement
Low-level Phosphorous	mg/L
Total Coliforms	Colony forming units per 100 millilitres (CFU/100 mL)
Fecal Coliforms	CFU/100 mL
Biological Oxygen Demand (BOD)	mg/L
Chlorophyll A	Micrograms per litre (µg/L)

2.2.2 Sampling Equipment

The water quality monitoring program was conducted using standard scientific equipment and instrumentation, which included the following:

- Handheld multi-parameter water quality meter and probe
- Handheld GPS unit
- Secchi disk
- Van Dorn water sampler
- Telescopic sample collection rod or wand
- Laboratory supplied sampling bottles

2.2.3 Field QA/QC

Industry standard sampling protocols and the most recent version of the CCME protocol manual (CCME, 2011) were followed to allow accuracy and precision of results. This included decontamination procedures, the collection of QA/QC samples, labelling, preserving, completed Chain of Custody forms, and internal QA/QC procedures in the laboratory.

To minimize cross-contamination during sampling, a field QA program was followed that included the following measures:

- Disposable nitrile gloves were used to collect each sample and discarded following collection of each sample
- Sampling instruments and equipment were thoroughly cleaned prior to and between sampling locations
- Laboratory-supplied jars and bottles were used to store surface water samples

- Water samples were stored in coolers on ice and transported to the laboratory with the appropriate Chain of Custody documentation for tracking purposes

2.2.4 Laboratory Sample Preservation

Water quality samples collected in the field were preserved following guidance provided by Bureau Veritas Laboratories (BV Labs), in accordance with CCME water quality sampling documents (CCME 2015; CCME 2011). All sample containers were filled to the rim with no head space, except where head space was recommended by the analytical laboratory. Water samples were stored and transported in closed containers with ice or gel packs at or below 4°C. During winter months, care was taken to prevent water samples from freezing.

2.2.5 Laboratory Sample Hold Times

Samples collected for laboratory analysis have specific hold times that facilitate the generation of accurate results during sample analysis. It was determined through consultation with staff at BV Labs (MacKay, K., Team Leader, Site Assessment and Remediation, *pers. comm.*, May 17, 2019) that hold-times for most of the requested analytical parameters was seven days following the collection event. Total and fecal coliforms, however, have a hold time of approximately 24 hours. Samples collected during the monitoring program were delivered to the lab within 24 hours of collection, therefore no samples exceeded the recommended hold time.

Chapter 3 Results Summary

3.1 In-Situ Sampling Results

Results of the in-situ water quality sampling are presented in Table C.1 (Avon River and Lake Pesaquid) and Table C.2 (Avon River Estuary) in Appendix C. Additionally, Figure 4 to Figure 24 in Appendix A provide a visual representation of the in-situ and laboratory sampling completed at each sample location. The sampling results provided in Appendix C include additional information pertaining to each sample, including sample date, time of day, tidal phase, water depth, and sample depth. Depth-stratified sampling occurred at 13 sampling locations to assess variations in water quality through the water column. Figures showing the variability of each parameter with depth at each of the locations are presented in Figure 1 to Figure 15 in Appendix D.

Measured pH values were compared against the CCME *Water Quality Guidelines* (WQGs) for the protection of Freshwater Aquatic Life (FWAL) and Marine Aquatic Life (MAL) (CCME, long term effects, current to 2018). All exceedances are outlined in Section 3.2.3, as well as presented in the analytical tables in Appendix C. No such guidelines exist for comparison of other physical, chemical, and biological parameters, such as salinity, TDS, conductivity, turbidity, dissolved oxygen, phosphorous, BOD, or chlorophyll A, therefore the results of these parameters are discussed in terms of spatial and temporal (seasonal) variability, as well as with respect to changing tides.

The following sections provide an overview of the results for the parameters analyzed in-situ.

3.1.1 Water Temperature

Water temperature was recorded at each sampling location during every sampling event, where possible. Water temperature was not recorded if the sampling location was not accessible at the time of sampling. Temperatures were relatively consistent through both the freshwater and estuarine sampling areas. Estuarine water samples generally only varied by 1 to 2°C between each sample location during a sampling event in all seasons. A very similar trend was observed in the freshwater sample locations, where water temperatures in Lake Pesaquid and the Avon River were generally consistent and varied by 1 to 2°C in the sampled areas of the lake and river. Water temperatures in estuarine and freshwater environments were also similar during sampling events;

temperatures in the estuary were typically 1 to 2°C cooler than water temperatures in the lake and river.

Where depth-stratified sampling was conducted, results showed some minor fluctuations in the water column, with the highest temperatures recorded towards the surface, and the lower temperatures recorded towards the bottom. In general, fluctuations between the top and bottom of the water column were no more than 1°C. These results suggest the water column is well mixed with little stratification through the year in the sampling areas, including the deeper waters in the estuary downstream of the Windsor Causeway, and the shallower freshwater environments in Lake Pesaquid and the Avon River.

3.1.2 Salinity

3.1.2.1 Avon River and Lake Pesaquid

Upstream from the aboiteau in the Avon River, salinity values measured ranged from 0 ppt to 10.73 ppt at the sample locations. In general, those samples farther from the aboiteau structure in Avon River (AR-7 to AR-18) exhibited lower salinity values near zero on surface and bottom, while those closer the aboiteau (AR-01 to AR-06) in Lake Pesaquid exhibited higher salinity values near the bottom of the water column relative to the surface, particularly samples AR-04, AR-04B, and AR-05. These sample locations were positioned in the river thalwag leading to the aboiteau, therefore the salinity measured near bottom likely represents estuarine waters (ie. the salt wedge) moving upstream through the aboiteau gates.

In terms of tidal variation, higher salinity levels were generally seen during middle to low tide, however changes were very slight, and the distribution of high or low salinity values measured at each site shifted between different seasons and showed no clear trends. These results are likely associated with the variation and differential rates of estuarine water passing through the opened or closed aboiteau gates over tidal cycles, as well as seasonal freshwater inputs into the Avon River.

3.1.2.2 Avon River Estuary

In the Avon River Estuary, salinity values in the estuary averaged 20 ppt and ranged from 0.11 ppt to 28.9 ppt. The measurements show no clear trends in terms of spatial distribution, with the exception of samples AVE-04 and AVE-08 which were located approximately 10 kilometres up the Kennetcook and St. Croix Rivers, respectively, in upstream segments of the estuary. As expected, these two samples showed lower salinity values than other sampling locations in the estuary.

There were no clear trends in salinity with respect to tidal or seasonal variations. Depth-stratified sampling to 10 metres was completed at three sample locations in the estuary, while at most other sampling locations sample readings were taken at both the surface and bottom of the water column (no intermediate intervals). In general, it was noted that the levels recorded lower in the water column tended to have higher salinity levels.

3.1.3 pH

3.1.3.1 Avon River and Lake Pesaquid

In the freshwater environment, the measured pH values ranged from a low of 4.97 to a high of 9.13, with an average pH of approximately 6.77. According to a 1996 study completed by Brown and Davis, low pH is a known and common occurrence for many small streams in the Province, with an average pH in Nova Scotia being around 6.2 (Brown and Davis, 1996); therefore, the pH sampling results from the freshwater environment align with this study.

Measurements do not show any trends in spatial variability in the sampling area. Additionally, no clear trends resulting from tidal effects are evident in the area.

Seasonally, pH values measured during the winter sampling event appear to be significantly lower than those measured during spring, summer, and falls months, which do not show any clear trends. However, only four sampling locations were completed during the winter sampling event, therefore it should be noted that these results may not be representative of the entire freshwater area.

In locations where depth-stratified sampling was completed, values did tend to vary from the top of the water column to the bottom, however again there are no clear trends that show higher or lower values at any particular interval.

The freshwater environment pH measurements were compared against the CCME *Water Quality Guidelines* (WQGs) for the protection of Freshwater Aquatic Life (FWAL) (long term effects) (CCME, current to 2018). Several exceedances were noted at various locations and depths in the freshwater environment, as summarised in Table 3.1.

Table 3.1: In-situ pH results exceeding CCME FWAL Guidelines

Sample ID	Field Program	Date Sampled	Sample Depth (m)	Parameters Exceeded	Criteria
AR-01	In-situ Water Quality	04-Jul-19	0.38	pH – 6.21	**CCME FWAL** pH – 6.5 – 9.0
AR-01	Fall Sampling	24-Oct-19	Surface	pH – 6.44	**CCME FWAL** pH – 6.5 – 9.0
AR-01	Fall Sampling	24-Oct-19	2.0	pH – 6.43	**CCME FWAL** pH – 6.5 – 9.0
AR-01	Winter Sampling	13-Dec-19	Surface	pH – 5.87	**CCME FWAL** pH – 6.5 – 9.0
AR-02	In-Situ Water Quality	04-Jul-19	0.41	pH – 6.46	**CCME FWAL** pH – 6.5 – 9.0

Sample ID	Field Program	Date Sampled	Sample Depth (m)	Parameters Exceeded	Criteria
AR-02	Fall Sampling	24-Oct-19	Surface	pH – 6.37	**CCME FWAL** pH – 6.5 – 9.0
AR-02	Fall Sampling	24-Oct-19	1.76	pH – 6.28	**CCME FWAL** pH – 6.5 – 9.0
AR-03	In-Situ Water Quality	04-Jul-19	0.36	pH – 6.19	**CCME FWAL** pH – 6.5 – 9.0
AR-03	Winter Sampling	13-Dec-19	Surface	pH – 5.89	**CCME FWAL** pH – 6.5 – 9.0
AR-04	In-Situ Water Quality	04-Jul-19	3.66	pH – 6.29	**CCME FWAL** pH – 6.5 – 9.0
AR-04	In-Situ Water Quality	04-Jul-19	Surface	pH – 6.31	**CCME FWAL** pH – 6.5 – 9.0
AR-04	In-Situ Water Quality	04-Jul-19	0.46	pH – 6.11	**CCME FWAL** pH – 6.5 – 9.0
AR-04	Winter Sampling	13-Dec-19	Surface	pH – 5.93	**CCME FWAL** pH – 6.5 – 9.0
AR-04B	Winter Sampling	13-Dec-19	Surface	pH – 5.75	**CCME FWAL** pH – 6.5 – 9.0
AR-04B	Winter Sampling	13-Dec-19	3.0	pH – 4.97	**CCME FWAL** pH – 6.5 – 9.0
AR-05	Fall Sampling	24-Oct-19	3.0	pH – 6.17	**CCME FWAL** pH – 6.5 – 9.0
AR-06	In-Situ Water Quality	04-Jul-19	Surface	pH – 6.35	**CCME FWAL** pH – 6.5 – 9.0
AR-06	In-Situ Water Quality	04-Jul-19	4.57	pH – 6.16	**CCME FWAL** pH – 6.5 – 9.0
AR-06	In-Situ Water Quality	04-Jul-19	0.76	pH – 5.99	**CCME FWAL** pH – 6.5 – 9.0
AR-06	In-Situ Water Quality	04-Jul-19	Surface	pH – 5.93	**CCME FWAL** pH – 6.5 – 9.0
AR-06	Fall Sampling	24-Oct-19	Surface	pH – 5.93	**CCME FWAL** pH – 6.5 – 9.0
AR-06	Fall Sampling	24-Oct-19	3.75	pH – 5.93	**CCME FWAL** pH – 6.5 – 9.0

Sample ID	Field Program	Date Sampled	Sample Depth (m)	Parameters Exceeded	Criteria
AR-06	Fall Sampling	24-Oct-19	7.5	pH – 5.93	**CCME FWAL** pH – 6.5 – 9.0
AR-06	Winter Sampling	13-Dec-19	Surface	pH – 5.93	**CCME FWAL** pH – 6.5 – 9.0
AR-07	Fall Sampling	24-Oct-19	4.20	pH – 6.19	**CCME FWAL** pH – 6.5 – 9.0
AR-08	Fall Sampling	24-Oct-19	3.80	pH – 6.44	**CCME FWAL** pH – 6.5 – 9.0
AR-12	In-Situ Water Quality	04-Jul-19	0.76	pH – 5.73	**CCME FWAL** pH – 6.5 – 9.0
AR-12	In-Situ Water Quality	04-Jul-19	Surface	pH – 5.45	**CCME FWAL** pH – 6.5 – 9.0
AR-12	Summer Sampling	29-Aug-19	2.20	pH – 6.37	**CCME FWAL** pH – 6.5 – 9.0
AR-13	Summer Sampling	29-Aug-19	Surface	pH – 6.36	**CCME FWAL** pH – 6.5 – 9.0
AR-13	Summer Sampling	29-Aug-19	3.60	pH – 6.22	**CCME FWAL** pH – 6.5 – 9.0
AR-14	In-Situ Water Quality	04-Jul-19	0.51	pH – 6.38	**CCME FWAL** pH – 6.5 – 9.0
AR-14	In-Situ Water Quality	04-Jul-19	Surface	pH – 5.75	**CCME FWAL** pH – 6.5 – 9.0
AR-14	Summer Sampling	27-Aug-19	Surface	pH – 9.13	**CCME FWAL** pH – 6.5 – 9.0
AR-14	Summer Sampling	29-Aug-19	Surface	pH – 6.23	**CCME FWAL** pH – 6.5 – 9.0
AR-14	Summer Sampling	29-Aug-19	2.60	pH – 6.23	**CCME FWAL** pH – 6.5 – 9.0
AR-15	In-Situ Water Quality	04-Jul-19	1.07	pH – 6.05	**CCME FWAL** pH – 6.5 – 9.0
AR-15	In-Situ Water Quality	04-Jul-19	Surface	pH – 6.22	**CCME FWAL** pH – 6.5 – 9.0
AR-15	Summer Sampling	29-Aug-19	Surface	pH – 6.13	**CCME FWAL** pH – 6.5 – 9.0

Sample ID	Field Program	Date Sampled	Sample Depth (m)	Parameters Exceeded	Criteria
AR-15	Summer Sampling	29-Aug-19	3.60	pH – 6.08	**CCME FWAL** pH – 6.5 – 9.0
AR-15	Winter Sampling	13-Dec-19	0.20	pH – 5.29	**CCME FWAL** pH – 6.5 – 9.0
AR-16	In-Situ Water Quality	04-Jul-19	1.02	pH – 5.52	**CCME FWAL** pH – 6.5 – 9.0
AR-16	In-Situ Water Quality	04-Jul-19	Surface	pH – 5.36	**CCME FWAL** pH – 6.5 – 9.0
AR-16	Summer Sampling	29-Aug-19	Surface	pH – 5.91	**CCME FWAL** pH – 6.5 – 9.0
AR-16	Summer Sampling	29-Aug-19	2.62	pH – 5.84	**CCME FWAL** pH – 6.5 – 9.0
AR-17	Summer Sampling	29-Aug-19	Surface	pH – 6.44	**CCME FWAL** pH – 6.5 – 9.0
AR-17	Summer Sampling	29-Aug-19	3.05	pH – 6.28	**CCME FWAL** pH – 6.5 – 9.0
AR-18	In-Situ Water Quality	04-Jul-19	5.35	pH – 5.36	**CCME FWAL** pH – 6.5 – 9.0
AR-18	In-Situ Water Quality	04-Jul-19	5.26	pH – 6.26	**CCME FWAL** pH – 6.5 – 9.0
BKG-01	In-Situ Water Quality	04-Jul-19	0.25	pH – 5.95	**CCME FWAL** pH – 6.5 – 9.0

3.1.3.2 Avon River Estuary

In the estuary, the pH values measured range from 5.08 to 9.17. Measurements do not show clear trends in spatial variation, seasonal variation, or with respect to tidal influences.

Where depth-stratified sampling was complete, it was noted that pH values remained relatively constant in the water column.

The pH measurements in the estuary were compared against the CCME *Water Quality Guidelines* (WQGs) for the protection of Marine Aquatic Life (MAL) (long term effects) (CCME, current to 2018). Several exceedances were noted at various locations and depths in the estuary, as summarised in Table 3.2.

Table 3.2: In-situ pH results exceeding CCME MAL Guidelines

Sample ID	Field Program	Date Sampled	Sample Depth (m)	Parameters Exceeded	Criteria
AVE-01	Fall Sampling	23-Oct-19	Surface	pH – 8.78	**CCME MAL** pH – 7.0 – 8.7
AVE-02	Reconnaissance	28-May-19	0.10	pH – 6.95	**CCME MAL** pH – 7.0 – 8.7
AVE-02	Fall Sampling	23-Oct-19	Surface	pH – 8.82	**CCME MAL** pH – 7.0 – 8.7
AVE-04	Fall Sampling	23-Oct-19	Surface	pH – 8.91	**CCME MAL** pH – 7.0 – 8.7
AVE-05	Fall Sampling	25-Oct-19	Surface	pH – 6.97	**CCME MAL** pH – 7.0 – 8.7
AVE-05	Fall Sampling	25-Oct-19	6.10	pH – 6.92	**CCME MAL** pH – 7.0 – 8.7
AVE-06	Fall Sampling	25-Oct-19	Surface	pH – 6.96	**CCME MAL** pH – 7.0 – 8.7
AVE-06	Fall Sampling	25-Oct-19	7.60	pH – 6.88	**CCME MAL** pH – 7.0 – 8.7
AVE-07	Fall Sampling	25-Oct-19	Surface	pH – 6.98	**CCME MAL** pH – 7.0 – 8.7
AVE-07	Fall Sampling	25-Oct-19	8.80	pH – 6.90	**CCME MAL** pH – 7.0 – 8.7
AVE-08	Summer Sampling	27-Aug-19	Surface	pH – 9.17	**CCME MAL** pH – 7.0 – 8.7
AVE-08	Fall Sampling	25-Oct-19	Surface	pH – 6.91	**CCME MAL** pH – 7.0 – 8.7
AVE-08	Fall Sampling	25-Oct-19	4.70	pH – 6.88	**CCME MAL** pH – 7.0 – 8.7
AVE-09	Summer Sampling	27-Aug-19	Surface	pH – 6.80	**CCME MAL** pH – 7.0 – 8.7
AVE-09	Winter Sampling	13-Dec-19	Surface	pH – 5.08	**CCME MAL** pH – 7.0 – 8.7

3.1.4 Total Dissolved Solids (TDS)

3.1.4.1 Avon River and Lake Pesaquid

In the freshwater environment, the TDS values measured range from 0.024 g/L to 10.7 g/L. There were no trends in spatial variation in TDS in the sample area; however, similar to other parameters, TDS values measured at greater depths in the water column during depth-stratified sampling were much greater than those measured at surface.

Closer to the aboiteau, TDS values tended to be higher at low tide, however the changes were very slight. Trends in TDS values becomes less clear in those samples farther away from the aboiteau.

Seasonally, TDS values appeared to be slightly higher during the summer sampling events compared to fall sampling events, although changes are very minor. TDS was not measured during the spring and winter sampling events.

3.1.4.2 Avon River Estuary

TDS values in the estuarine environment averaged 20.5 g/L with a measured range from 6.45 to 25.8 g/L. TDS measurements do not show clear trends in spatial variability, with the exception of AVE-04 in the Kennetcook River and AVE-08 in the St. Croix River. These sampling locations show a substantially lower TDS than downstream samples in the estuary.

In general, relatively higher TDS levels are measured in the estuarine sampling area in comparison to the freshwater area. Slightly increased TDS values are noted with depth in the water column in the estuarine sampling locations, however the variation between the surface and bottom of the water column are much less than those noted in the freshwater sampling locations.

TDS measurements collected at low tide showed a lower concentration than those collected at high tide in the estuarine sampling area.

Similar to freshwater conditions, TDS measurements appear to be higher during the summer sampling events when compared to fall sampling events. Again, no TDS measurements were taken in the spring or winter sampling events.

3.1.5 Turbidity

3.1.5.1 Avon River and Lake Pesaquid

In the freshwater environment, turbidity levels ranged from 0 to 370 NTU, with an average measurement of approximately 19 NTU. There were no clear trends in the spatial variability of turbidity in the freshwater sampling area. However, where depth-stratified sampling occurred, it was noted that water clarity was high towards the surface (<15 NTU) and become more turbid towards the bottom at most sampling locations.

There were no consistent trends with respect to seasonal variability or tidal influence.

Turbidity was measured during the summer and fall sampling events at all sample locations in the freshwater environment, with the exception of AR-01 where no measurements were collected during the summer sampling event. Turbidity measurements were not collected during the spring or winter sampling events.

3.1.5.2 Avon River Estuary

Turbidity was measured during at least one sampling event at five out of the nine sample locations in the estuary area. In general, turbidity measurements were higher in the estuarine environment when compared with the freshwater environment, ranging from 92.2 NTU to 965 NTU. The highest values were recorded at AVE-08 which is located approximately 12 kilometres east of the aboiteau in the St. Croix River.

Similar to the downstream area, there were no clear trends in spatial variability, but where depth-stratified sampling was carried out it was generally noted that the higher turbidity values were measured near the bottom of the water column.

There were no trends noted with respect to seasonal or tidal changes.

3.1.6 Dissolved Oxygen

3.1.6.1 Avon River and Lake Pesaquid

DO measurements were collected in the freshwater environment during the summer, fall, and winter sampling events. DO measurements ranged from 1.6 mg/L to 12.3 mg/L. The highest DO levels were found in sample BKG-02 during the spring sampling events, while the lowest levels were found in sample BKG-01. These results were consistent with the sampling locations, as BKG-02 was located in a swift flowing permanent tributary to the Avon River, while BKG-01 was located in slow flowing stagnant waters near an agricultural site.

Overall, there were no clear trends in spatial variability in the freshwater sampling area, however where depth-stratified sampling was conducted, results indicate that DO levels decreased with increasing depth. The lowest level, 1.6 mg/L, was recorded at 0.25 m depth in sample BKG-01 in an agricultural drainage channel during the summer dry season.

Clear trends were noted between seasonal variations and DO levels. DO measurements tended to be higher in fall and winter, where measurements generally ranged from 7.5 mg/L to 10.9 mg/L. During the summer months, measurements recorded were lower, generally from 3.6 mg/L to 6.3 mg/L. Measurements taken during spring sampling events tend to be higher than those recorded in summer, but generally not as high as those recorded in fall and winter.

There does not appear to be any correlation between DO levels and tidal influence.

3.1.6.2 Avon River Estuary

DO measurements in the estuarine environment ranged from 4.3 mg/L to 10.4 mg/L. Similar to the freshwater environment, measurements tend to be higher in the fall and winter seasons, and lowest in the summer. Where depth-stratified sampling was conducted, levels became lower with depth, with the lowest level of 4.3 mg/L recorded at AVE-03 at a depth of 0.33 m. Again, there do not appear to be any trends in spatial variability in the sample area, or with respect to tidal influences.

3.1.7 Conductivity

3.1.7.1 Avon River and Lake Pesaquid

Conductivity measurements were highly variable in the freshwater environment, ranging from 23.9 to 17,200 µS/cm. Higher levels were recorded closer to the aboiteau in the Lake Pesaquid area, while sample locations further upstream tended to have lower levels. One exception is the background samples (BKG-01 and BKG-02) which showed notably higher levels than any other sample locations on the upstream side of the aboiteau. These locations are near roadways and agricultural lands, and may be influenced by winter road salting or other human activities.

Where depth-stratified sampling occurred, large variations were noted in the water column, with levels being substantially higher towards the bottom when compared to the surface, particularly in samples AR-04, AR-04B, and AR-05 in Lake Pesaquid near the aboiteau.

Additionally, it was generally noted that conductivity levels were higher during the summer months when compared with other seasons, as well as higher during lower tide.

3.1.7.2 Avon River Estuary

Conductivity levels in the estuarine environment were significantly higher than those recorded in the freshwater environment. No clear trends were noted with respect to spatial variability, with the exception of sample location AR-08 in the St. Croix River, where conductivity levels were much lower. Where depth-stratified sampling occurred, it was again noted that conductivity levels were generally higher towards the bottom of the water column.

No clear trends were observed with respect to seasonal or tidal variability.

3.2 Laboratory Analytical Results

Water quality samples collected at each of the 30 sampling locations underwent laboratory analysis for salinity and TSS. Additionally, RCAp-MS, low level phosphorous, total and fecal coliforms, BOD, and chlorophyll A analyses were requested for water samples collected at 10 predetermined sample locations; seven locations were upstream of the aboiteau in Lake Pesaquid and the Avon River, and three locations downstream from the aboiteau in the Avon River Estuary. These sample locations are indicated in Table 2.4 and Table 2.5.

Laboratory analytical results are presented in Table C.3 (Avon River and Lake Pesaquid) and Table C.4 (Avon River Estuary) in Appendix C. Laboratory certificates for the analysis completed are provided in Appendix E. The following sections provide an overview of the results for the parameters analyzed, and outline any discrepancies noted between the in-situ sample results and the laboratory analytical results.

Where available, parameters were compared against the relevant guidelines to identify any exceedances within the sampling area. All exceedances for relevant guidelines are outlined in the sections below.

3.2.1 Salinity

3.2.1.1 Avon River and Lake Pesaquid

Laboratory salinity results in the freshwater environment were recorded as less than the reportable detection limit (RDL) of 2.0 ppt, which is consistent with the results seen from the in-situ measurements. One exception is seen in the laboratory analysis for AR-04B, where results show salinity measurements up to 12 PSU, which is again consistent with the in-situ results.

3.2.1.2 Avon River Estuary

In the estuarine environment, laboratory results are again consistent with the in-situ results, with at most a 5 PSU discrepancy. Similar to the in-situ results, the lowest recorded salinity values were reported from AVE-04 and AVE-08, the two sites located in the Kennetcook and St. Croix Rivers, respectively.

3.2.2 pH

3.2.2.1 Avon River and Lake Pesaquid

In the freshwater environment, the pH results from the laboratory analysis were generally consistent with the findings of the in-situ results, with some minor discrepancies. There was a discrepancy of 0.1 to 0.3 between most laboratory and in-situ results, however three samples showed greater discrepancies from 0.5 to 0.8.

Where pH was measured both in-situ and in the laboratory analysis, the exceedances recorded in-situ were not always consistent with the laboratory results, and vice versa. At locations AR-01 and AR-06, surface water samples taken during the fall sampling event were noted to be outside the acceptable pH range according to CCME FWAL guidelines (Table 3.1). However, the laboratory results for the same samples showed that these samples were in fact within the acceptable range. These discrepancies are likely attributed to variation in pH levels at the surface, or minor variation associated with changes in pH between the time the water was sampled and the time it was analyzed in the lab.

Similarly, the laboratory analysis showed that only one sample was outside the acceptable pH criteria, as shown in Table 3.3, below. However, this sample was measured as within the acceptable criteria according to the in-situ results.

Table 3.3: Laboratory pH results exceeding CCME FWAL Guidelines

Sample ID	Field Program	Date Sampled	Sample Depth (m)	Parameters Exceeded	Criteria
AR-16	Fall Sampling	24-Oct-19	Surface	pH – 6.27	**CCME FWAL** pH – 6.5 – 9.0

3.2.2.2 AVON RIVER ESTUARY

In the estuarine environment, results were not as consistent between in-situ and laboratory results. Five out of the nine samples that were analyzed both in-situ and in the lab showed discrepancies from 0.1 to 0.3, however four of the samples showed larger discrepancies, with an increase in pH of up to 1.34 between the laboratory results and the in-situ result. Similar to the freshwater environment, those samples that were noted to be outside CCME MAL guidelines according to in-situ measurements did not exceed guidelines according to the laboratory results. According to the laboratory results, none of the samples submitted exceeded CCME MAL guidelines. Again, these discrepancies are likely attributed to variation in pH levels at the surface, or the time between in-situ measurement, and sample collection and laboratory analysis.

3.2.3 Total Suspended Solids (TSS)

3.2.3.1 AVON RIVER AND LAKE PESAQUID

TSS was analyzed at each sampling location during at least one of the sampling events. Measurements showed that TSS was consistently much higher during low tide when compared to measurements taken at high tide. Additionally, TSS was consistently lower during summer sampling events compared to spring and fall, with the exception of samples taken at low tide during the summer sampling events, which tended to be higher than spring or fall events taken at middle or high tide. There were no clear trends in spatial variation in the freshwater Study Area.

3.2.3.2 AVON RIVER ESTUARY

In the estuarine environment, TSS measurements were noted to be significantly higher than those recorded in the freshwater environment upstream of the aboiteau. With respect to tidal influence, the same trends were noted in both the estuarine and freshwater environment; TSS measurements were much higher at low tide compared to high tide. No trends were observed in terms of seasonal or spatial variation.

3.2.4 General Chemistry

RCAp-MS was conducted on several surface water samples collected from the freshwater and estuarine environments, as outlined in Table 2.4 and Table 2.5.

Results were evaluated against the CCME WQGs for the protection of FWAL and MAL (long term effects) (CCME, current to 2018), as well as the Nova Scotia Environment (NSE), Tier 1 Environmental Quality Standards (EQS) for Surface Water for Freshwater Aquatic Life (SWFAL) and Surface Water for Marine Aquatic Life (SWMAL). Results of the analysis are outlined below.

3.2.4.1 Avon River and Lake Pesaquid

As noted in Section 3.3.2, pH was outside the CCME FWAL acceptable criteria at one sample location in the freshwater environment. Additionally, concentrations of aluminum, cadmium, and iron exceeded either the CCME FWAL guidelines or NSE EQG SWFAL in multiple samples collected.

Table 3.4 summarizes the samples which exceed guidelines for one of more parameters in the RCAp-MS analysis.

Table 3.4: Samples with RCAp-MS concentrations exceeding CCME and/or NSE FWAL Guidelines

Sample ID	Date Sampled	Parameters Exceeded	Criteria
AR-01	August	Al – 140 µg/L (100 µg/L) Fe – 370 µg/L	**CCME FWAL** pH – 6.5 – 9.0 Al – pH dependant (guideline in parenthesis) Fe – 300 µg/L **NSE SWFAL** Al – 5 µg/L Cd – 0.01 µg/L Fe – 300 µg/L
	October	Al – 340 µg/L (100 µg/L) Cd – 0.025 µg/L Fe – 500 µg/L	
AR-03	August	Al – 180 µg/L (100 µg/L) Fe – 430 µg/L	
	October	Al – 340 µg/L (100 µg/L) Cd – 0.023 µg/L Fe – 530 µg/L	
AR-06	May	Al – 480 µg/L (100 µg/L) Cd – 0.024 µg/L Fe – 810 µg/L	
	August	Al – 200 µg/L (100 µg/L) Cd – 0.013 µg/L Fe – 480 µg/L	
	October	Al – 330 µg/L (100 µg/L) Cd – 0.020 µg/L Fe – 550 µg/L	
AR-09	May	Al – 220 µg/L (100 µg/L) Cd – 0.016 µg/L Fe – 720 µg/L	
	August	Al – 150 µg/L (100 µg/L) Fe – 360 µg/L	
	October	Al – 350 µg/L (100 µg/L) Cd – 0.024 µg/L	

Sample ID	Date Sampled	Parameters Exceeded	Criteria
		Fe – 580 µg/L	
AR-12	May	Al – 230 µg/L (100 µg/L) Cd – 0.016 µg/L Fe – 320 µg/L	
	August	Al – 180 µg/L (100 µg/L) Fe – 370 µg/L	
	October	Al – 490 µg/L (100 µg/L) Cd – 0.028 µg/L Fe – 640 µg/L	
AR-16	May	Al – 220 µg/L (100 µg/L) Cd – 0.016 µg/L	
	August	Al – 270 µg/L (100 µg/L) Cd – 0.018 µg/L Fe – 470 µg/L	
	October	pH – 6.27 Al – 290 µg/L (5 µg/L) Cd – 0.030 µg/L Fe – 360 µg/L	
BKG-2	May	Al – 170 µg/L (100 µg/L) Fe – 390 µg/L	
	August	Al – 120 µg/L (100 µg/L) Fe – 310 µg/L	
	October	Al – 340 µg/L (100 µg/L) Fe – 500 µg/L	

3.2.4.2 Avon River Estuary

In the estuarine environment, concentrations of arsenic, cadmium, and chromium exceeded CCME MAL guidelines in several samples. Additionally, concentrations of arsenic, cadmium, chromium, copper, lead, nickel, selenium, vanadium, and zinc exceeded NSE EQG SWMAL guidelines in multiple samples.

Table 3.5 summarizes the samples which exceed guidelines for one of more parameters in the RCAp-MS analysis.

Table 3.5: Samples with RCAp-MS concentrations exceeding CCME and/or NSE MAL Guidelines

Sample ID	Date Sampled	Parameters Exceeded	Criteria
AVE-01	August	Cu – 9.9 µg/L Pb – 10 µg/L	**CCME MAL** As – 12.5 µg/L Cd – 0.12 µg/L **NSE SWMAL** As – 12.5 µg/L Cd – 0.12 µg/L Cu – 2 µg/L Pb – 2 µg/L Ni – 8.3 µg/L Se – 2 µg/L Va – 50 µg/L Zn – 10 µg/L
	October	Cu – 18 µg/L Pb – 16 µg/L Ni – 29 µg/L Zn – 73 µg/L	
AVE-04	May	Cu – 14 µg/L Pb – 14 µg/L Ni – 21 µg/L Zn - 63 µg/L	
	August	As – 19 µg/L Cd – 0.13 µg/L Cu – 34 µg/L Pb – 37 µg/L Ni – 52 µg/L Va – 85 µg/L Zn – 150 µg/L	
	October	Cu – 20 µg/L Pb – 22 µg/L Ni – 35 µg/L Va – 60 µg/L Zn – 94 µg/L	
AVE-09	August	Cu – 5.1 µg/L Pb – 7.1 µg/L	
	October	Cu – 13 µg/L Pb – 12 µg/L	

3.2.5 Low-Level Phosphorous

3.2.5.1 Avon River and Lake Pesaquid

Total phosphorous (low level) was analyzed at six sampling locations in the freshwater environment, and one background location. Analytics measurements indicated that concentrations ranged from 0.015 to 0.037 mg/L, with an average concentration of 0.029 mg/L. There do not appear to be any trends in spatial variability in the sampling area, or with respect to tidal influences in the estuary. However, it was generally noted that levels were slightly higher during the summer months compared to the spring and fall seasons. This may be associated with increased freshwater inputs in the spring and fall, in addition to the possible use of phosphorous-rich fertilizers on agricultural land during the summer months.

3.2.5.2 Avon River Estuary

Low-level phosphorous was analyzed at three sampling locations in the estuarine environment downstream of the Windsor Causeway. Laboratory analysis indicated that concentrations of phosphorous were ranged from 0.3 to 1.5 mg/L, and were generally a at least an order of magnitude greater than concentrations observed upstream in the freshwater environment. There did not appear to be temporal or spatial trends in concentrations; however, the concentration doubled from summer to fall near the aboiteau gates at AVE-9 (0.29 to 0.6 mg/L). No clear trends were observed with respect to seasonal or tidal variability.

3.2.6 Total and Fecal Coliforms

3.2.6.1 Avon River and Lake Pesaquid

Fecal coliform units were detected in the freshwater samples from Lake Pesaquid and the Avon River. Counts ranged from 10 to 900 CFU/100 mL, with an average of approximately 200 CFU/100 mL. There were no obvious trends in the spatial or temporal variation of fecal coliform counts, nor were there patterns correlated to the downstream tidal cycle. Generally, counts were higher during the fall compared to the summer; this elevation may be associated with increased runoff from upstream agricultural lands.

Total coliforms unit counts were also completed in the freshwater samples. Counts averaged approximately 750 CFU/100 mL with a range from 140 to 2,500 CFU/100 mL. Similar to fecal coliforms, total coliforms showed no obvious trends related to the downstream tidal cycle. The higher counts appeared to correlate with sampling locations further upstream in the Avon River during the fall sampling event. Again, this may be related to increased runoff from agricultural lands in this part of the freshwater environment.

3.2.6.2 Avon River Estuary

Low counts of fecal coliform units were detected in the estuarine samples from downstream of the Windsor Causeway. The counts ranged from 1 to 4 CFU/100 mL during the fall sampling event; all other samples collected were non-detections. There were no spatial trends due to the low numbers of detections, nor were there correlations with the tidal cycle. The only counts coincided with the fall sampling event, and were much lower than counts upstream of the causeway in Lake Pesaquid and the Avon River.

Total coliforms units in the estuarine environment ranged from 400 to 3,500 CFU/100 mL, with an average count of approximately 1,700 CFU/100 mL. There appeared to be a temporal trend associated with the fall sampling event; the highest counts occurred during the fall sampling event, similar to the fecal coliform counts as well as the coliform counts in the freshwater environment. Again, this may be associated with the increased water flows and associated terrestrial runoff from agricultural lands into the estuary.

3.2.7 Biological Oxygen Demand

3.2.7.1 Avon River and Lake Pesaquid

BOD was largely below the detection limit in the freshwater environment of Lake Pesaquid and the Avon River. Where detected, the BOD ranged from 3.3 to at least 4.3 mg/L, but all samples were less than 10 mg/L. There were no obvious trends in spatial distribution, nor was there a tidal correlation. It did appear that detections were associated with the summer sampling event. This may be seasonal trend may be associated with elevated water temperatures and the associated increases in biological activities of bacterial and other micro-organisms in the aquatic environment. Further, there did not appear be any substantial decreases in the available dissolved oxygen levels at sample locations where BOD concentrations were above the laboratory detection limits.

3.2.7.2 Avon River Estuary

Similar to the freshwater environment, most sample locations in the estuarine environment were below the laboratory detection limit of 5 mg/L. However, BOD was measurable in two of the estuarine samples collected, at 5 mg/L and 16 mg/L. While there were no obvious spatial trends, both samples were collected during the summer sampling event. There was no obvious tidal correlation, nor was there an obvious reduction in available dissolved oxygen at the sampling locations where BOD was above the laboratory detection limits.

3.2.8 Chlorophyll A

3.2.8.1 Avon River and Lake Pesaquid

Two laboratory methods were used to determine chlorophyll A concentrations in the freshwater environment samples. Chlorophyll A concentrations by acidification method averaged approximately 2.0 μg/L with a range of 0.39 to 3.75 μg/L in Lake Pesaquid and the Avon River. Estimated concentrations by non-acidification method averaged 2.3 μg/L with a range of 0.55 to 4.06 μg/L. Generally, the results of the two methods agreed at each sampling location, with variations around 0.1 to 0.3 μg/L.

There were no clear correlations associated with the spatial distribution of the sampling locations, or the downstream tidal cycle. However, the chlorophyll A concentrations were highest across all sampling during the summer sampling event. The associate with the summer correlates with the increased light availability during summer, and the associated increase in photosynthetic potential in the aquatic environment. There was also a tendency for the relative difference in chlorophyll A concentrations to increase between the summer and fall sampling seasons further upstream in the Avon River. However, this trend was not observed at all sampling locations.

3.2.8.2 Avon River Estuary

Concentrations of chlorophyll A were also determined using two methods for samples collected in the estuarine environment. Chlorophyll A concentrations by acidification method ranged from 5.1 to 78.0 µg/L, with an average concentration of approximately 28.5 µg/L. Estimated concentrations by the non-acidification method were generally higher; they ranged from 9.2 to 86.9 µg/L with an average of 35 µg/L. These differences are likely due to chlorophyll B, and chlorophyll degradation products in the estuarine environment; the estimated non-acidification method corrects for the contributions of chlorophyll B and any degradation products.

There were no clear trends associated with spatial distribution of sampling locations or the tidal cycle. However, there was a strong trend for increased chlorophyll concentrations during the summer sampling event. Similar to the freshwater environment, there is likely an increase in chlorophyll concentrations in the water column in summer associated with the increase in available light and warmer water temperatures promoting photosynthesis.

3.3 Quality Assurance/Quality Control

3.3.1 Field QA/QC

Field QA/QC was conducted through comparison of the in-situ sampling results with the laboratory analysis results in sample locations where both analyses were completed.

In-situ results were generally consistent with lab results, with most differences between sample results being less than 5%. There were a few exceptions in salinity, pH, and turbidity results where differences were up to 16%. Additionally, there was one instance where a salinity measurement recorded in-situ at AVE-04 was nearly 20% lower than the laboratory analytical result for the same sample.

Larger discrepancies were seen in conductivity results, where laboratory results and in-situ results differed by up to 25 to 35% in some cases, and up to 165% in one sample from the freshwater environment. This may be associated with water temperature, as conductivity changes with changes in water temperature, and water samples were stored on ice between collection and transportation to the laboratory for analysis. The decrease in water temperature may have affected conductivity measurements. Other factors, including inflows of freshwater and estuarine water, rising and falling tides, and stratification in the water column may have affected conductivity.

3.3.2 Laboratory QA/QC

BV Labs has a QA program in place to ensure that reliable results are consistently obtained. Specific laboratory QA measures are provided in Appendix E, and include the following:

- Chain of Custody sample and document control, and sample integrity inspection.
- Trained personnel prepare and analyze samples according to Standard Operating Procedures.

- All analytical methods are based on accepted (e.g., MOE, US EPA, ASTM) procedures and are fully validated prior to use.
- Precision is monitored by performing replicated analysis of samples within each batch
- Instrument calibration integrity is ensured by analyzing calibration check standards within each run sequence.
- Matrix effects in organic analysis are assessed with surrogate fortification of each sample.
- Extensive use is made of blank spikes, matrix spikes and certified reference material for routine procedure evaluation.
- Predefined analytical sequences ensure all results are traceable to calibrate QC data.
- Hard copy reports displaying all of the required data are generated for each instrument.
- On-going method and instrumentation performance records are maintained for all analysis.
- BV is accredited to ISO 17025 standards by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific tests at specific locations.
- BV employs continuous improvement procedures including internal audits, external audits and Management review meetings.

Chapter 4 Conclusions

CBCL collected baseline water quality measurements from 30 locations in the Study Area to understand the current aquatic environmental conditions upstream and downstream of the existing Windsor Causeway and Avon River aboiteau structure. The water quality monitoring program included the seasonal collection of in-situ water quality data and samples for submission to analytical laboratories. Additional in-situ water quality data was collected in the summer and winter, where samples could be safely collected on foot.

Water temperature measurements were consistent with anticipated seasonal increases during the spring and summer, and decreases in the fall and winter. This trend was observed in both the upstream freshwater and downstream estuarine environments. The temperature in the freshwater and estuarine environments were generally similar; differences of 2 to 3°C were noted when transitioning from the freshwater to the estuarine environment. Water temperatures were typically cooler in the estuary compared to the freshwater environment. These results are to be expected due to the affects of tides and greater depths in the estuary, compared to the shallow depths and lesser flows in the freshwater environment. Depth-stratified sampling also showed little variation between the surface and bottom water temperature in the estuary, whereas temperature in the freshwater environment were about 1°C warmer on surface compared to bottom. These consistent temperatures are likely associated to the extensive mixing of the water column associated with the large volume of tidal water fluctuating daily in the estuary, the relatively shallow waters in Lake Pesaquid and the Avon River, and the influx of estuarine waters into Lake Pesaquid through the aboiteau gates. Overall, the warmest temperatures were recorded in the upstream portion of the Avon River in shallow surface waters during the summer sampling event.

Salinity measurements collected in the field and analyzed in the laboratory were useful in determining the temporal and spatial salinity variation in the Study Area. As expected, salinity measurements were highest in locations directly within the Avon River estuary or immediately upstream of the aboiteau in Lake Pesaquid. Farther from the aboiteau in the Avon River, salinity measurements were much lower and exhibited characteristics of a freshwater environment. Similar trends were noted in conductivity, where levels were much higher in the estuarine environment compared to the freshwater environment.

Additionally, depth-stratified sampling indicated that salinity and conductivity were both slightly higher towards the bottom of the water columns compared to the surface, particularly in areas of the estuary with large freshwater inputs, such as the Kennetcook and St. Croix Rivers. These sorts of depth-stratified results are typically observed in areas with denser, more saline waters near bottom and less dense freshwater nearer the surface. This trend was also observed near the aboiteau in Lake Pesaquid. Similar trends were noted in TDS and turbidity measurements, where measurements tended to be higher toward the bottom of the water column.

pH measurements in the Study Area generally fit within the expectations of a NS river environment according to Brown and Davis (1996). The majority of measurements collected were within CCME guidelines for freshwater and/or estuarine/marine environments, with some exceptions, particularly in the estuarine environment. However, it was observed that in several cases where in-situ sampling results recorded a measurement outside CCME guidelines, laboratory results did not always align and in several cases did not report an exceedance in the same locations. This variation can likely be attributed to fluctuations in pH levels at the surface, or changes in pH between the time the water was sampled and the time it was analyzed in the lab.

TSS showed clear trends, particularly with respect to tidal influence. During low tide events TSS measurements were notably higher than levels measured at higher tide events. Similarly, it was noted that TSS measurements were consistently lower in the summer months, a trend particularly clear in the downstream environment. Additionally, it was noted that TSS measurements were considerably higher in the estuarine environment downstream from the aboiteau relative to the freshwater environment upstream. High TSS values in estuarine and brackish riverine environments can occur due to the re-suspension of fine bottom sediments by wind, waves, and ebbing tidal currents, in addition turbid inputs from terrestrial environments during periods of increased rainfall and runoff. These trends were also noted in TDS and turbidity measurements, where measurements tended to be higher toward the bottom of the water column.

Other parameters, such as DO and TDS, generally did not show any clear spatial or temporal trends in the Study Area. DO appeared slightly lower at sampling locations in the freshwater environment during the summer sampling event, and where tributaries in the upstream Avon River appeared to flow through agricultural lands. Abundant aquatic vegetation and filamentous algae were also noted near the mouths of tributaries to the Avon River along agricultural fields, suggesting possible increases in available nutrients at these sampling locations. However, concentrations of phosphorous, an important component of fertilizer and limiting factor for plant growth in aqueous environments, did not show clear trends in the freshwater environment, or consistently higher concentrations at these sampling locations. Phosphorous concentrations were generally much higher in the marine environment, although there did not appear to be clear trends in the spatial or temporal distribution of phosphorous in the estuarine environment.

Biological characteristics of water quality showed trends in the counts of fecal coliform units in the freshwater environment versus the estuarine environment. Counts were consistently higher in the freshwater environment, indicating a potential source of fecal coliforms in the area. This may be attributed to agricultural land practices, as cows were regularly observed near to and occasionally on the banks of the upstream Avon River. Counts in the freshwater environment were generally higher during the fall compared to the summer, therefore increased rainfall and runoff may contribute to the higher counts. Fecal coliform counts in the estuary were primarily non-detect (i.e., no observed CFUs/ 100 mL) through the year.

Trends in the total coliform counts were reversed; higher counts of total coliforms were observed in the estuary compared to the freshwater environment. There were no trends in the spatial distributions of total coliforms in the either the estuarine or freshwater environments. Similar to fecal coliforms, increased counts were observed in the fall compared to the summer, therefore the increase in counts may be associated with increased runoff.

BOD and chlorophyll A concentrations were generally higher in the estuarine environment compared to the freshwater environment. There were no clear trends in spatial distribution or association with the tidal cycle; however, both BOD and chlorophyll A concentrations were generally higher during the summer sampling events. Higher concentrations are common during the summer months when water temperatures and light levels are elevated relative to the spring, fall, and winter.

Overall, the water quality monitoring program provides a better understanding of the current aquatic environmental conditions in the Avon River estuary downstream of the Windsor Causeway and Avon River aboiteau structure, and the upstream freshwater environment in Lake Pesaquid and the Avon River, and its tributaries. There are clear trends in the spatial distribution of estuarine and freshwater waters downstream and upstream of the Windsor Causeway, respectively, and the area immediately upstream of the aboiteau structure where estuarine waters mix with freshwater in Lake Pesaquid. There were also clearly elevated concentrations of TSS and certain biological characteristics in the estuarine environment compared to the freshwater environment. Other physical, chemical, and biological characteristics showed little variation between the estuarine and freshwater environments.

Chapter 5 Closure

This report provides a summary of the baseline physical, chemical, and biological parameters measured in Lake Pesaquid, the Avon River, and the Avon River estuary between May and December 2019. Conclusions presented represent the best judgement of the assessors based on current environmental standards and on the observed site conditions. Due to the nature of the investigation and the limited data available, the assessor cannot warrant against undiscovered environmental liabilities. Conclusions are based on results from the assessed Study Area, and can only be extrapolated to an undefined and limited spatial area and temporal scale around the sampling locations.

Respectively submitted,

CBCL Limited

Prepared by:
Colin McVarish, B.Sc.H
Environmental Scientist

Reviewed by:
Loretta Hardwick, M.Sc.
Senior Environmental Scientist

Prepared by:
Lindsay Allen, P.Eng.
Civil Engineer

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APPENDIX A

Figures

LEGEND

Water Sampling Locations

CBCL

Avon River Aboiteau and Causeway Upgrade

Figure 1: Avon River Water Quality Study Location

Drawn: NH	**Date: 2021-06-11**
Checked:	**Project: 171046.01**
Approved:	**Scale @ 11"x17"** 1:81,000
-	

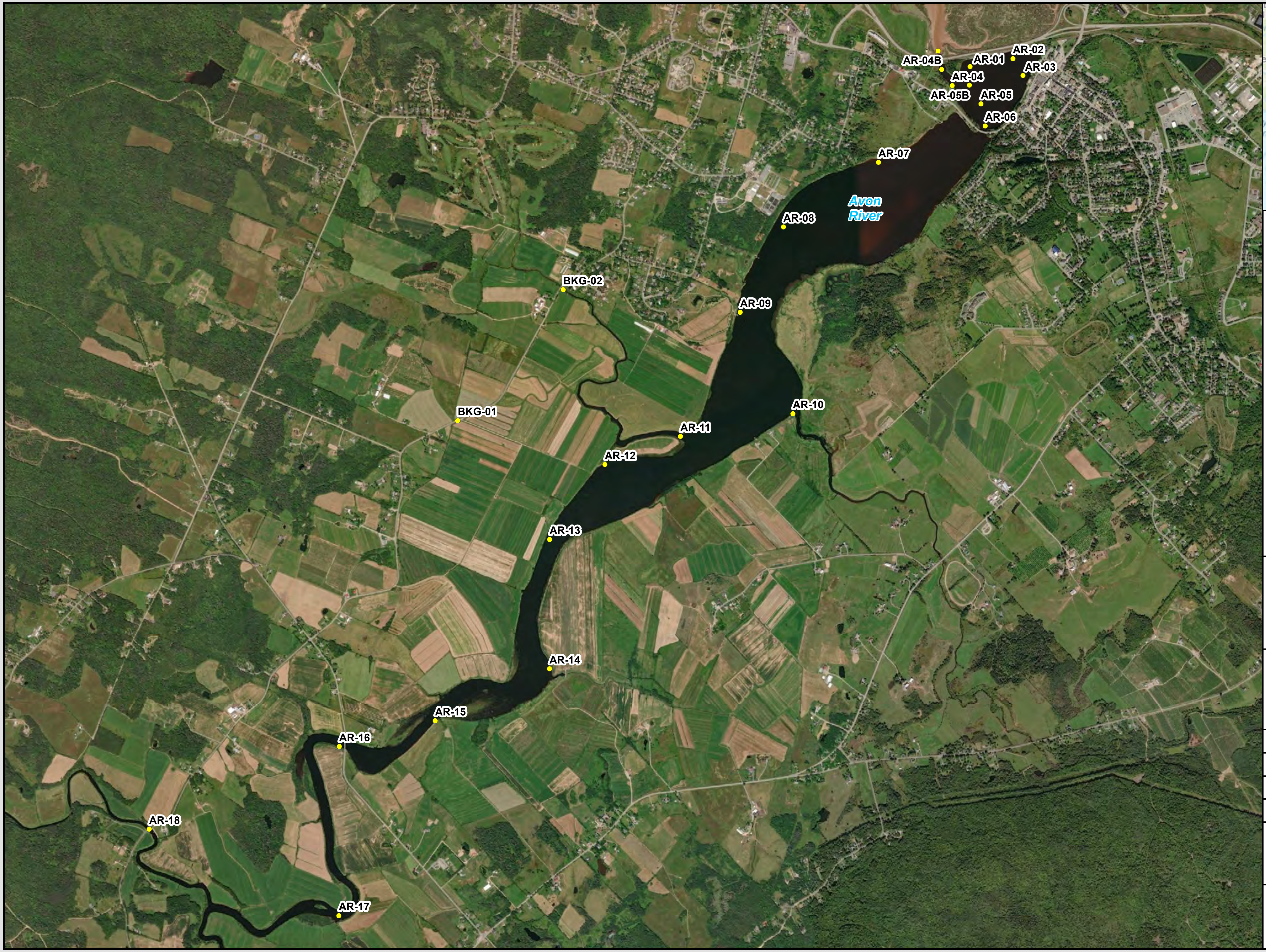
Notes:

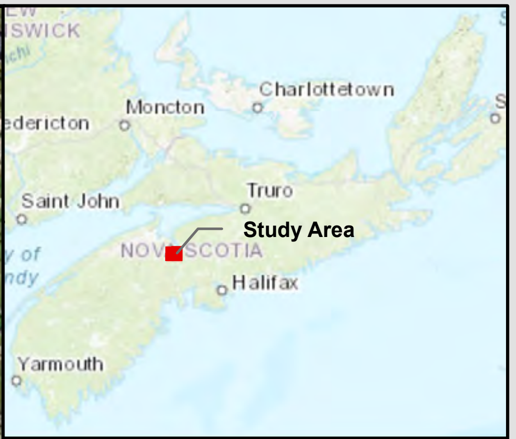
The Water Sampling program was conducted throughout the Avon River Estuary (AVE), The Avon River (AR), and two background sampling locations (BKG)

0 800 1,600 3,200 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter

Z:\171046.01 - AVON RIVER ABOITEAU ENVIRO\GIS\WATER QUALITY MONITORING 2019\171046.01 -FIG1- AVON RIVER WATER QUALITY - SUMMARY.mxd 2021-06-11 12:13:01 PM





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Water Sampling Locations

CBCL

Avon River Aboiteau and Causeway Upgrade

Figure 2: Avon River Fresh Water Sampling Point

Drawn: NH	Date: 2021-06-11
Checked:	Project: 171046.01
Approved:	Scale @ 11"x17" 1:25,000

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Notes:

Fresh Water Quality Sampling Points along the Avon River (AR)

0 245 490 980 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter

LEGEND

- Water Sampling Locations

CBCL

Avon River Aboiteau and Causeway Upgrade

Figure 3: Avon River Estuary Marine Water Sampling Point Locations

Drawn: NH	**Date:** 2021-06-11
Checked:	**Project:** 171046.01
Approved:	**Scale @ 11"x17"** 1:60,000

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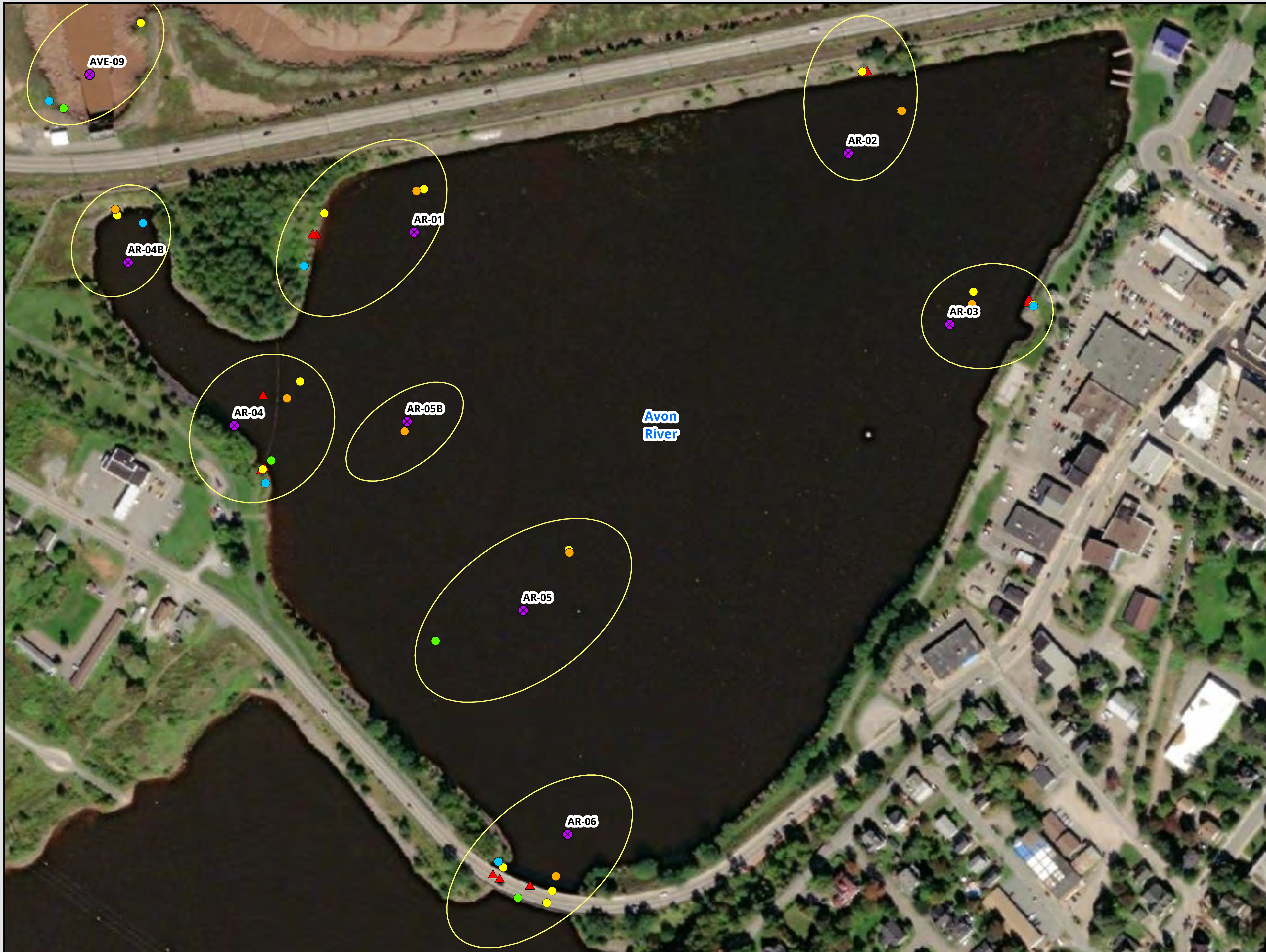
Notes:

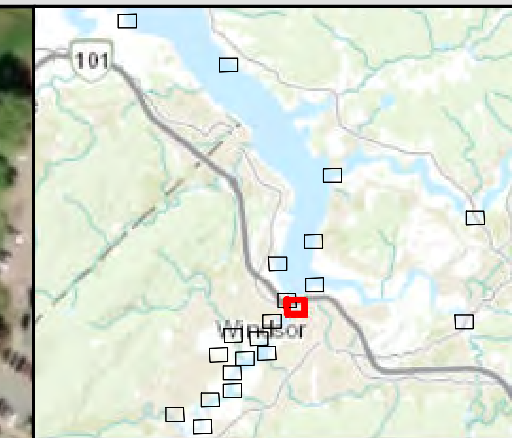
Marine Water Quality Sampling Points along the Avon River Estuary (AVE)

0 550 1,100 2,200 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter

Z:\171046.01 - AVON RIVER ABOITEAU ENVIRO\GIS\WATER QUALITY MONITORING 2019\171046.01 -FIG3- AVON RIVER WATER QUALITY - AVE SUMMARY.mxd 2021-05-06 11:18:30 AM





Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

Water Sample Locations by Season

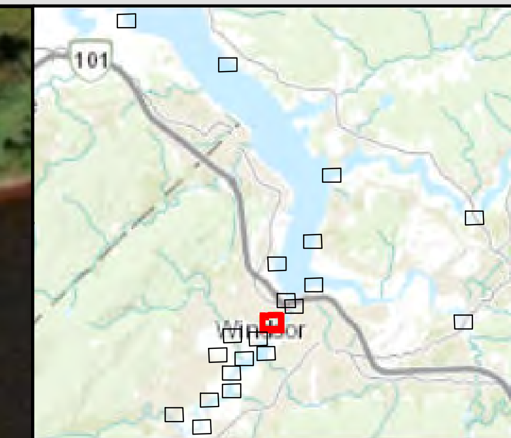
Sample Locations: AR-01-06	
Drawn: NH	Figure: 4
Checked:	Date: 2021-05-11
Approved:	Project: 171046.01

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500

Z:\171046.01 - AVON RIVER ABOITEAU ENVIRO\GIS\WATER QUALITY MONITORING 2019\171046.01-FIG4-24-AVON RIVER WATER QUALITY- SAMPLE LOCATIONS BY SEASON.mxd 2021-05-11 1:41:26 PM



Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

Avon River Aboiteau and Causeway Upgrade

Water Sample Locations by Season

Sample Locations: AR-07-08

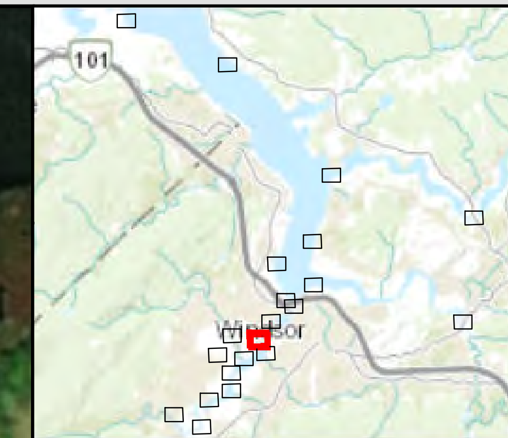
Drawn: NH	**Figure:** 5
Checked:	**Date:** 2021-05-11
Approved:	**Project:** 171046.01

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500

Z:\171046.01 - AVON RIVER ABOITEAU ENVIRO\GIS\WATER QUALITY MONITORING 2019\171046.01-FIG4-24-AVON RIVER WATER QUALITY- SAMPLE LOCATIONS BY SEASON.mxd 2021-05-11 1:41:26 PM



Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

Water Sample Locations by Season

Sample Locations: AR-09	
Drawn: NH	Figure: 6
Checked:	Date: 2021-05-11
Approved:	Project: 171046.01

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500

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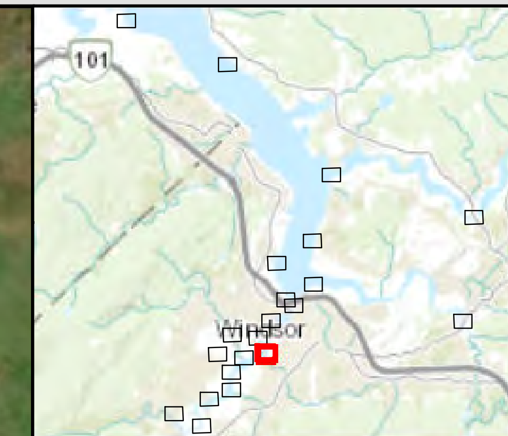

Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

Water Sample Locations by Season

Sample Locations: AR-10

Drawn: NH	Figure: 7
Checked:	Date: 2021-05-11
Approved:	Project: 171046.01

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500

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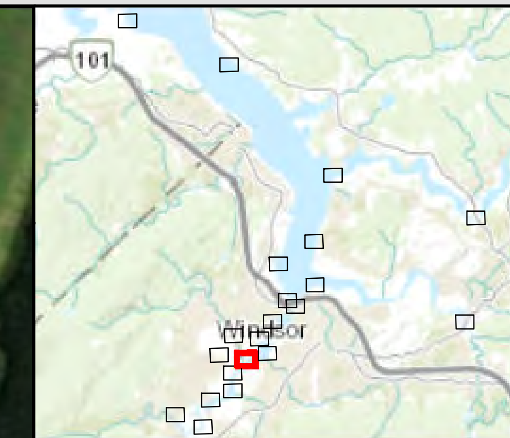


Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

Water Sample Locations by Season

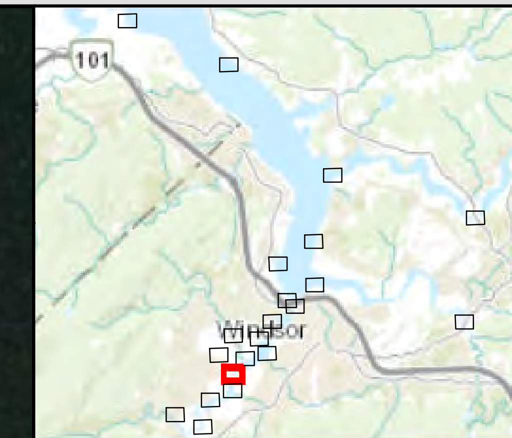
Sample Locations: AR-11-12

Drawn: NH	**Figure: 8**
Checked:	**Date: 2021-05-11**
Approved:	**Project: 171046.01**

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500



Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

Water Sample Locations by Season

Sample Locations: AR-13	
Drawn: NH	Figure: 9
Checked:	Date: 2021-05-11
Approved:	Project: 171046.01

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500

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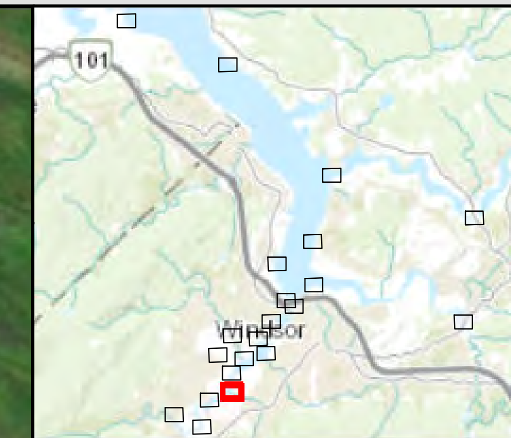


Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

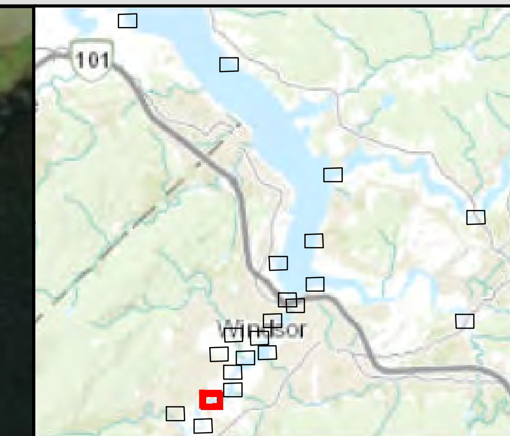
Water Sample Locations by Season

Sample Locations: AR-14	
Drawn: NH	Figure: 10
Checked:	Date: 2021-05-11
Approved:	Project: 171046.01

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500



Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

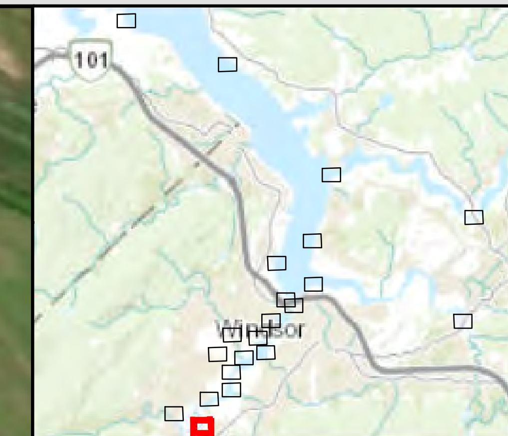
Water Sample Locations by Season

Sample Locations: AR15-16	
Drawn: NH	Figure: 11
Checked:	Date: 2021-05-11
Approved:	Project: 171046.01

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500



Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

Water Sample Locations by Season

Sample Locations: AR-17	
Drawn: NH	Figure: 12
Checked:	Date: 2021-05-11
Approved:	Project: 171046.01

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500

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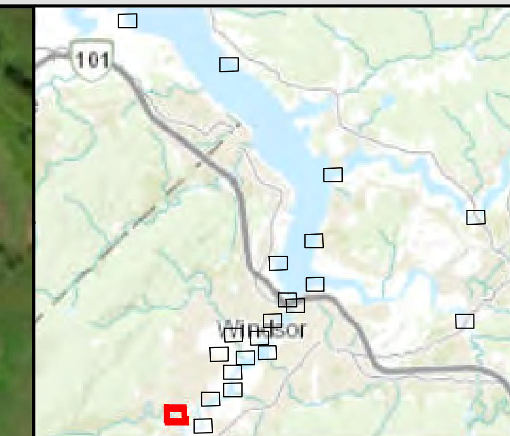


Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

Water Sample Locations by Season

Sample Locations: AR-18

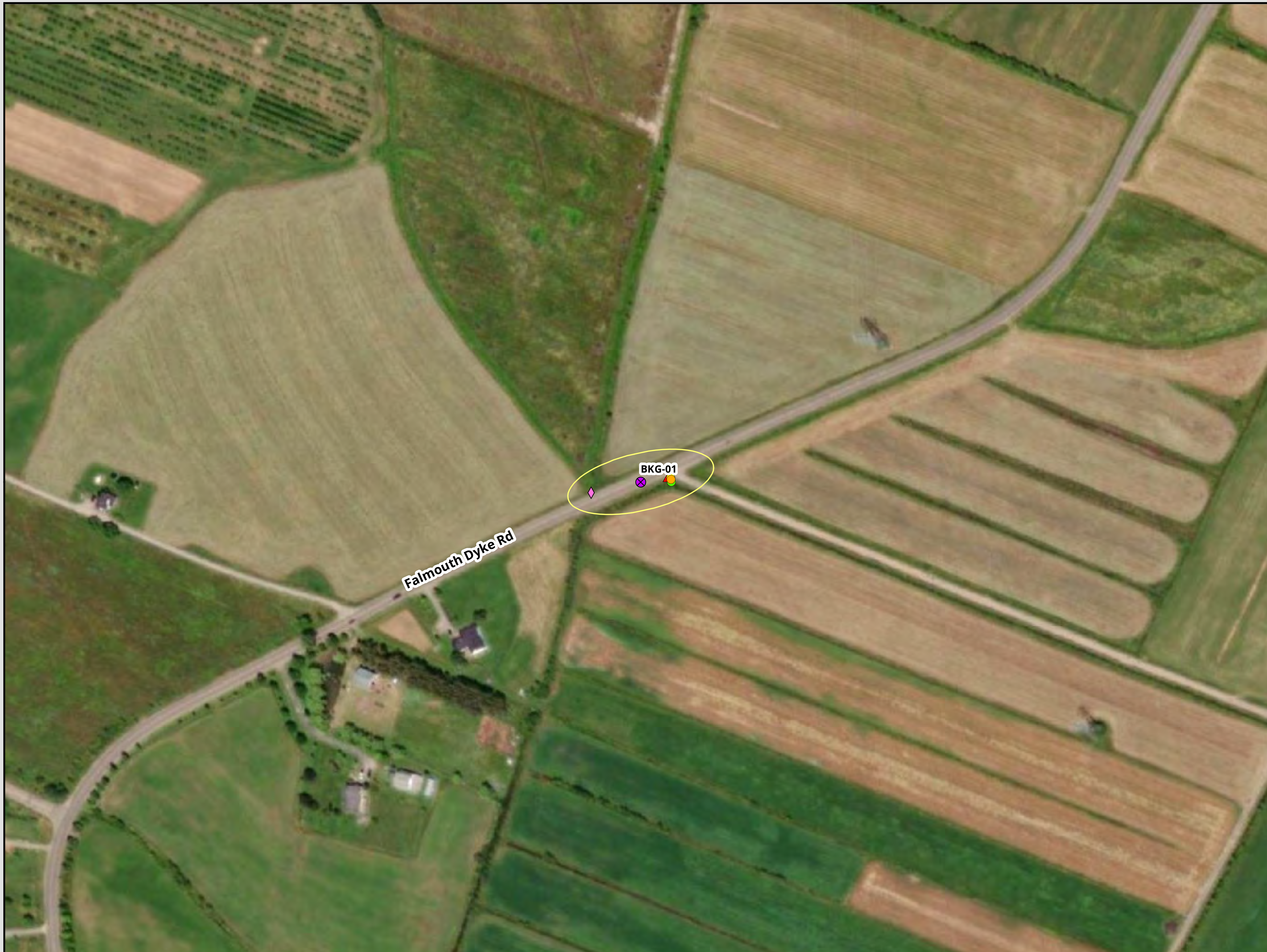
Drawn: NH	**Figure: 13**
Checked:	**Date: 2021-05-11**
Approved:	**Project: 171046.01**

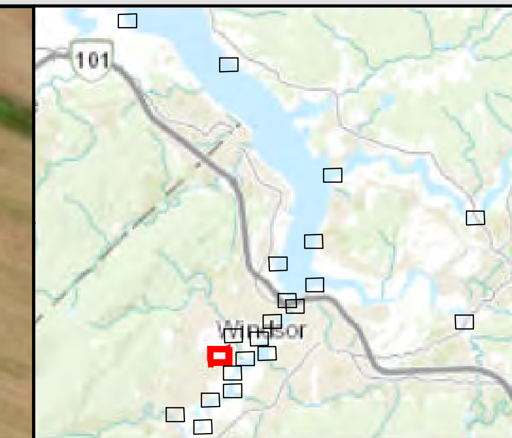
Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500

Z:\171046.01 - AVON RIVER ABOITEAU ENVIRO\GIS\WATER QUALITY MONITORING 2019\171046.01-FIG4-24-AVON RIVER WATER QUALITY- SAMPLE LOCATIONS BY SEASON.mxd 2021-05-11 1:41:26 PM





Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

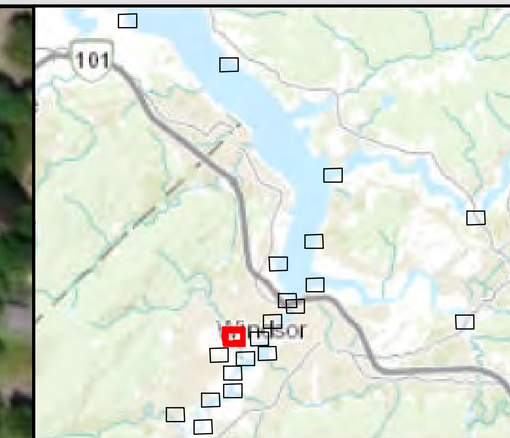
Water Sample Locations by Season

Sample Locations: BKG-01	
Drawn: NH	Figure: 14
Checked:	Date: 2021-05-11
Approved:	Project: 171046.01

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500



Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

Water Sample Locations by Season

Sample Locations: BKG-02	
Drawn: NH	Figure: 15
Checked:	Date: 2021-05-11
Approved:	Project: 171046.01

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500

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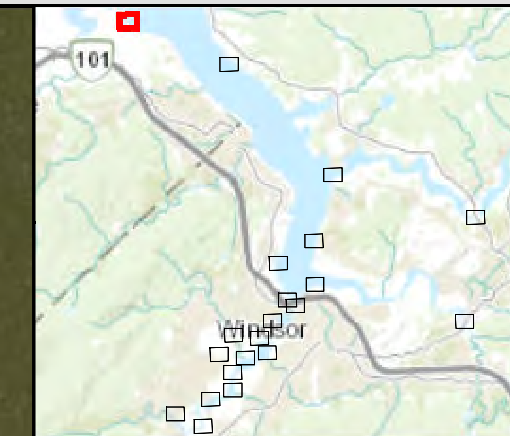

Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

Water Sample Locations by Season

Sample Locations: AVE-01	
Drawn: NH	Figure: 16
Checked:	Date: 2021-05-11
Approved:	Project: 171046.01

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500

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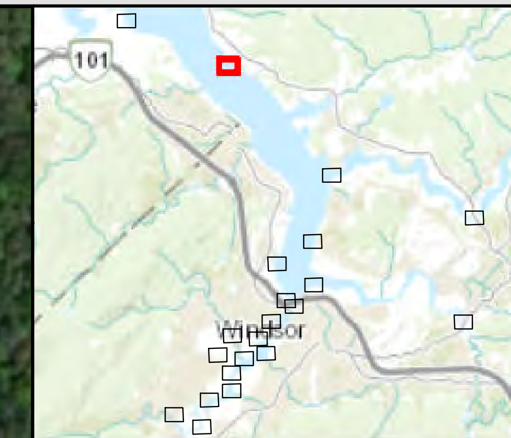


Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

Water Sample Locations by Season

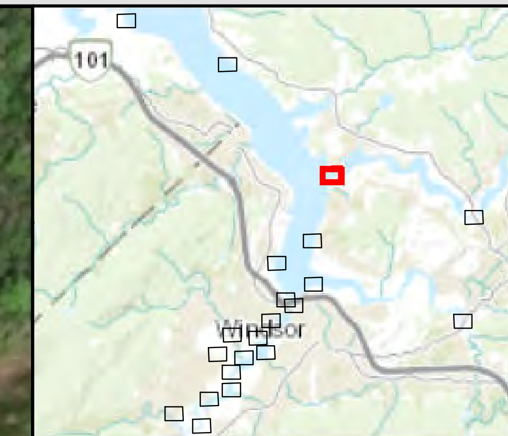
Sample Locations: AVE-02	
Drawn: NH	Figure: 17
Checked:	Date: 2021-05-11
Approved:	Project: 171046.01

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter

Scale @ 11"x17" 1:2,500



Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

Water Sample Locations by Season

Sample Locations: AVE-03	
Drawn: NH	Figure: 18
Checked:	Date: 2021-05-11
Approved:	Project: 171046.01

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500

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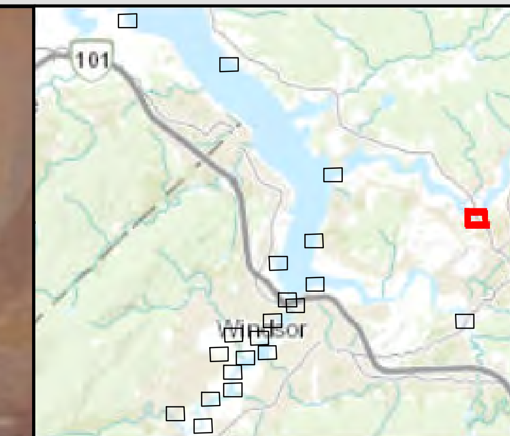

Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

Water Sample Locations by Season

Sample Locations: AVE-04	
Drawn: NH	Figure: 19
Checked:	Date: 2021-05-11
Approved:	Project: 171046.01

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500

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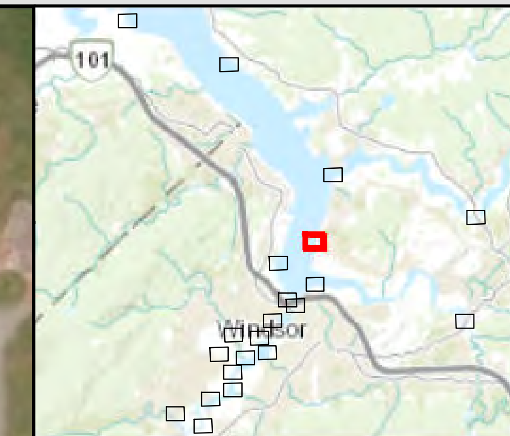

Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

Water Sample Locations by Season

Sample Locations: AVE-05	
Drawn: NH	Figure: 20
Checked:	Date: 2021-05-11
Approved:	Project: 171046.01

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500

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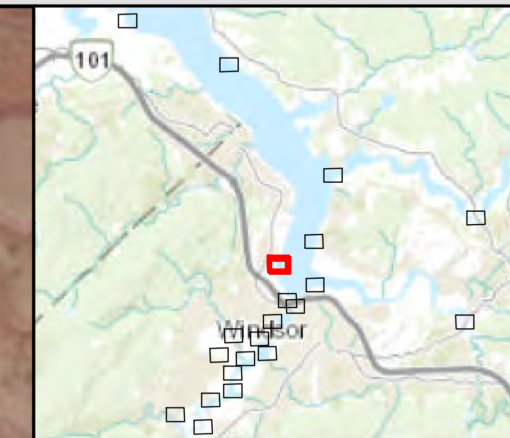


Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

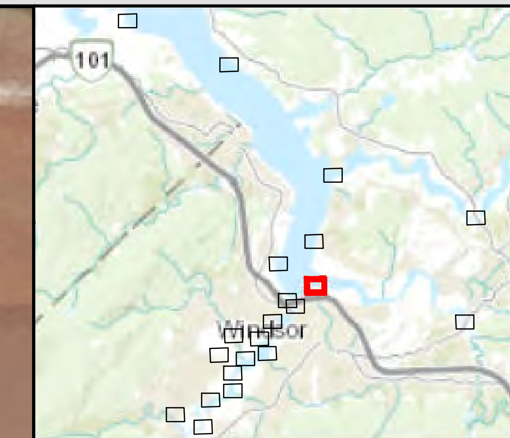
Water Sample Locations by Season

Sample Locations: AVE-06	
Drawn: NH	Figure: 21
Checked:	Date: 2021-05-11
Approved:	Project: 171046.01

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500



Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

Water Sample Locations by Season

Sample Locations: AVE-07	
Drawn: NH	Figure: 22
Checked:	Date: 2021-05-11
Approved:	Project: 171046.01

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500

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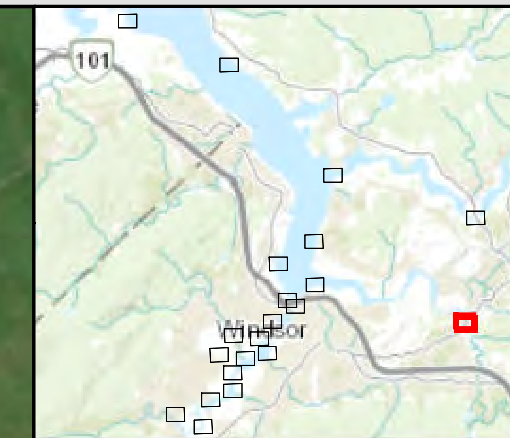


Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

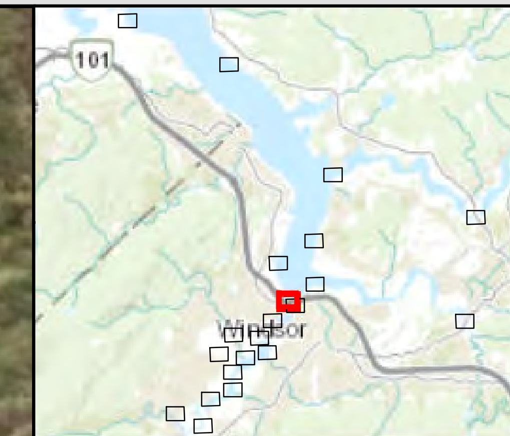
Water Sample Locations by Season

Sample Locations: AVE-08	
Drawn: NH	**Figure: 23**
Checked:	**Date: 2021-05-11**
Approved:	**Project: 171046.01**

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500



Sample Program Symbology

- PROPOSED WATER QUALITY SAMPLE LOCATIONS
- Reconnaissance
- In-Situ Water Quality
- Spring Sampling
- Summer Sampling
- Fall Sampling
- Winter Sampling

CBCL

Avon River Aboiteau and Causeway Upgrade

Water Sample Locations by Season

Sample Locations: AVE-09	
Drawn: NH	Figure: 24
Checked:	Date: 2021-05-11
Approved:	Project: 171046.01

Notes:

0 25 50 100 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter
Scale @ 11"x17" 1:2,500

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APPENDIX B

Site Photographs

Appendix B – Photo Log

Figure 1: Sample location AVE-1 at Avon Port beach near low tide during the summer sampling event on August 27, 2019.

Figure 2: Sample location AVE-2 near Summerville at mid-tide during the in-situ sampling event on July 5, 2019.

Appendix B – Photo Log

Figure 3: Sample location AVE-3 at the mouth of Kennetcook River at mid-tide during the in-situ sampling event on July 5, 2019.

Figure 4: Sample location AVE-4 at the highway bridge over the Kennetcook River at high tide during the spring sampling event on May 31, 2019.

Appendix B – Photo Log

Figure 5: Sample location AVE-5 at Newport Landing at mid-tide during the spring sampling event on May 31, 2019.

Figure 6: Sample location AVE-6 in the Avon River estuary at high tide during the summer sampling event on August 30, 2019.

Appendix B – Photo Log

Figure 7: Sample location AVE-7 at the mouth of the St. Croix River at high tide during the fall sampling event on October 25, 2019.

Figure 8: Sample location AVE-8 from the highway bridge over the St. Croix River at mid-tide during the summer sampling event on August 27, 2019.

Appendix B – Photo Log

Figure 9: Sample location AVE-9 downstream of the Avon River aboiteau on the Windsor Causeway at mid-tide during the summer sampling event on August 27, 2019.

Figure 10: Sample location AR-1 in Lake Pesaquid during the in-situ sampling event on July 4, 2019.

Appendix B – Photo Log

Figure 11: Sample location AR-2 in Lake Pesaquid during the fall sampling event on October 24, 2019.

Figure 12: Sample location AR-3 in Lake Pesaquid during the fall sampling event on October 24, 2019.

Appendix B – Photo Log

Figure 13: Sample location AR-4 in Lake Pesaquid upstream of the Avon River aboiteau during the summer sampling event on August 29, 2019.

Figure 14: Sample location AR-4B in Lake Pesaquid immediately upstream of the Avon River aboiteau during the summer sampling event on August 27, 2019.

Appendix B – Photo Log

Figure 15: Sample location AR-5 near the centre of Lake Pesaquid during the fall sampling event on October 24, 2019.

Figure 16: Sample location AR-6 at the Highway 1 bridge during the fall sampling event on October 24, 2019.

Appendix B – Photo Log

Figure 17: Sample location AR-7 in the Avon River during the fall sampling event on October 24, 2019.

Figure 18: Sample location AR-8 in the Avon River during the fall sampling event on October 24, 2019.

Appendix B – Photo Log

Figure 19: Sample location AR-9 in the Avon River during the fall sampling event on October 24, 2019.

Figure 20: Sample location AR-10 in the Avon River during the fall sampling event on October 24, 2019.

Appendix B – Photo Log

Figure 21: Sample location AR-11 in the Avon River during the summer sampling event on August 29, 2019.

Figure 22: Sample location AR-12 in the Avon River during the summer sampling event on August 29, 2019.

Figure 23: Sample location AR-13 in the Avon River during the summer sampling event on August 29, 2019.

Figure 24: Sample location AR-14 in the Avon River during the fall sampling event on October 24, 2019.

Appendix B – Photo Log

Figure 25: Sample location AR-15 in the Avon River at the Ski Martock water intake during the summer sampling event on October 24, 2019.

Figure 26: Sample location AR-16 at Sangsters bridge during the summer sampling event on October 24, 2019.

Appendix B – Photo Log

Figure 27: Sample location AR-17 during the summer sampling event on October 24, 2019.

Figure 28: Sample location AR-18 at the Castle Frederick road bridge during the summer sampling event on October 24, 2019.

Appendix B – Photo Log

Figure 29: Sample location BKG-01 in an agricultural ditch off Falmouth Dyke road during the summer sampling event on October 24, 2019.

Figure 30: Sample location BKG-02 in a tributary to the Avon River off Falmouth Dyke road upstream of sample location AR-11 during the in-situ sampling event on July 4, 2019.

APPENDIX C

Analytical Results

Appendix C1

IN-SITU AND LABORATORY WATER QUALITY RESULTS - AVON RIVER
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID	CCME (a) FWAL Long Term	AR-01										
Field Program		Reconnaissance	May Sampling	May Sampling	July Sampling	July Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling	December Sampling
Sample Date		28-May-19	30-May-19	31-May-19	04-Jul-19	04-Jul-19	27-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19	13-Dec-19
Sample Time		N/A	N/A	N/A	9:43	11:59	20:39	10:00	10:00	11:01	11:01	14:14
Tide (HP #282)		L	L	H	LR	MR	MR	MR	MR	HF	HF	H
Water Depth (cm)		N/A	N/A	N/A	N/A	N/A	N/A	200	200	210	210	20
Sample Depth in Water Column (cm)		N/A	N/A	N/A	46	38	Surface	Surface	Bottom (10 cm above bottom)	Surface	Bottom (10 cm above bottom)	Surface
In-situ Water Quality Results												
Secchi Depth (m)	NGA	-	-	-	-	-	-	1.5	1.5	0.9	0.9	-
Temp (°C)	NGA	-	-	-	19	19.7	21	20.23	20	11.77	11.52	1.5
DO (%)	NGA	-	-	-	80.5	77.9	44.6	-	-	-	-	88.6
DO (mg/L)	NGA	-	-	-	7.47	7.12	4.01	7.65	7.19	11.92	12.01	12.42
Cond (uS/cm)	NGA	-	-	-	96.6	86.5	136.8	146	142	740	750	44
Salinity (PSU / PPT)	NGA	-	-	-	0.05	0.04	0.07	0.1	0.1	0.03	0.03	0.04
pH	6.5 - 9	-	-	-	6.83	6.21	7.35	6.75	6.67	6.44	6.43	5.87
TDS (g/L)	NGA	-	-	-	-	-	-	-	-	0.048	0.049	-
NTU	NGA	-	-	-	-	-	-	-	-	4.2	6.5	-
Laboratory Water Quality Results												
pH	6.5 - 9	-	-	-	-	-	-	-	-	6.61	-	-
Turbidity (NTU)	NGA	-	-	-	-	-	-	-	-	5.6	-	-
Cond (uS/cm)	NGA	-	-	-	-	-	-	-	-	70	-	-
Salinity (PSU)	NGA	-	-	-	-	-	<2.0	-	-	<2.0	-	-
TSS (mg/L)	NGA	-	-	-	-	-	<2.1	-	-	5.8	-	-
Comments		No water to sample; unsafe	No water to sample; unsafe	No water to sample at high tide	Sampled from shore. Moved AR-1 further west due to steep unstable bankslope			Sediment sample collected was composed of clayey fines	Sediment sample collected was composed of clayey fines			Sampled from shore

Notes:

'-' = not analyzed   <RDL in grey text   na = not applicable

NR = Guideline is Not Required, as an applicable guideline is available from another more appropriate jurisdiction.

NGA = No guideline available

(a) CCME Water Quality Guidelines (WQGs) for the Protection of Aquatic Life, (Updated to 2017), Freshwater Aquatic Life (FWAL), Long Term effects.

Exceedance Identification:

Shaded = exceedance of CCME guideline for Freshwater Aquatic Life

IN-SITU AND LABORATORY WATER QUALITY RESULTS - AVON RIVER
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID	CCME (a) FWAL Long Term	AR-02									
Field Program		Reconnaissance	May Sampling	May Sampling	July Sampling	July Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling
Sample Date		28-May-19	30-May-19	31-May-19	04-Jul-19	04-Jul-19	27-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19
Sample Time		N/A	N/A	N/A	9:27	11:42	20:30	10:07	10:07	11:11	11:11
Tide (HP #282)		L	L	H	LR	MR	MR	MR	MR	HF	HF
Water Depth (cm)		N/A	N/A	N/A	N/A	N/A	N/A	210	210	186	186
Sample Depth in Water Column (cm)		N/A	N/A	N/A	56	41	Surface	Surface	Bottom (10 cm above bottom)	Surface	Bottom (10 cm above bottom)
In-situ Water Quality Results											
Secchi Depth (m)	NGA	-	-	-	-	-	-	1.3	1.3	0.9	0.9
Temp (°C)	NGA	-	-	-	18.5	19.4	20.8	20.24	19.98	11.57	11.52
DO (%)	NGA	-	-	-	69.1	78.8	45.3	-	-	-	-
DO (mg/L)	NGA	-	-	-	6.47	7.28	4.05	7.8	7	11.79	11.85
Cond (uS/cm)	NGA	-	-	-	110.4	148.1	137.1	156	174	88	95
Salinity (PSU / PPT)	NGA	-	-	-	0.06	0.08	0.07	0.1	0.1	0.04	0.04
pH	6.5 - 9	-	-	-	6.87	6.46	7.34	6.76	6.63	6.37	6.28
TDS (g/L)	NGA	-	-	-	-	-	-	0.101	0.114	0.058	0.059
NTU	NGA	-	-	-	-	-	-	4.8	9.8	4.9	5
Laboratory Water Quality Results											
pH	6.5 - 9	-	-	-	-	-	-	-	-	-	-
Turbidity (NTU)	NGA	-	-	-	-	-	-	-	-	-	-
Cond (uS/cm)	NGA	-	-	-	-	-	-	-	-	-	-
Salinity (PSU)	NGA	-	-	-	-		<2.0	-	-	<2.0	-
TSS (mg/L)	NGA	-	-	-	-		4	-	-	6.2	-
Comments		No water to sample; unsafe	No water to sample; unsafe	No water to sample at high tide	Sampled from shore			Sediment sample collected was composed of clayey fines	Sediment sample collected was composed of clayey fines		

Notes:

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Exceedance Identification:

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IN-SITU AND LABORATORY WATER QUALITY RESULTS - AVON RIVER
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID	CCME (a) FWAL Long Term	AR-03										
Field Program		Reconnaissance	May Sampling	May Sampling	July Sampling	July Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling	December Sampling
Sample Date		28-May-19	30-May-19	31-May-19	04-Jul-19	04-Jul-19	27-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19	13-Dec-19
Sample Time		N/A	N/A	N/A	9:07	11:22	20:08	10:15	10:15	12:44	12:44	14:31
Tide (HP #282)		L	L	H	LR	MR	MR	MR	MR	MF	MF	H
Water Depth (cm)		N/A	N/A	N/A	N/A	N/A	N/A	220	220	230	230	20
Sample Depth in Water Column (cm)		N/A	N/A	N/A	41	36	Surface	Surface	Bottom (10 cm above bottom)	Surface	Bottom	Surface
In-situ Water Quality Results												
Secchi Depth (m)	NGA	-	-	-	-	-	-	1.6	1.6	0.9	0.9	-
Temp (°C)	NGA	-	-	-	18.2	18.7	20.8	20.3	19.89	11.74	11.74	1.5
DO (%)	NGA	-	-	-	70	67.9	63.7		-	-	-	86.3
DO (mg/L)	NGA	-	-	-	6.56	6.33	5.78	8.16	7.04	12.18	12.05	12.12
Cond (uS/cm)	NGA	-	-	-	92.9	99.1	132.9	141	158	82	83	36.7
Salinity (PSU / PPT)	NGA	-	-	-	0.05	0.05	0.07	0.1	0.1	0.04	0.04	0.03
pH	6.5 - 9	-	-	-	7.65	6.19	7.35	6.83	6.75	6.74	6.65	5.89
TDS (g/L)	NGA	-	-	-	-	-	-	0.091	0.101	0.053	0.054	-
NTU	NGA	-	-	-	-	-	-	4.7	13.4	5.1	27.5	-
Laboratory Water Quality Results												
pH	6.5 - 9	-	-	-	-	-	-	-	-	6.6	-	-
Turbidity (NTU)	NGA	-	-	-	-	-	-	-	-	6.9	-	-
Cond (uS/cm)	NGA	-	-	-	-	-	-	-	-	78	-	-
Salinity (PSU)	NGA	-	-	-	-	-	<2.0	-	-	<2.0	-	-
TSS (mg/L)	NGA	-	-	-	-	-	4.7	-	-	5.8	-	-
Comments		No water to sample; unsafe	No water to sample; unsafe	No water to sample at high tide	Sampled from shore			Sediment sample collected was composed of clayey fines	Sediment sample collected was composed of clayey fines			Sampled from shore. Frozen over, broke through ice

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IN-SITU AND LABORATORY WATER QUALITY RESULTS - AVON RIVER
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID	CCME (a) FWAL Long Term	AR-04															
Field Program		Reconnaissance	May Sampling	July Sampling	July Sampling	July Sampling	July Sampling	August Sampling	August Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling	October Sampling	October Sampling	December Sampling
Sample Date		28-May-19	30-May-19	04-Jul-19	04-Jul-19	04-Jul-19	04-Jul-19	27-Aug-19	29-Aug-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19	24-Oct-19	24-Oct-19	13-Dec-19
Sample Time		N/A	15:20	10:05	10:36	10:40	12:28	11:25	9:31	9:31	9:31	9:31	9:34	9:34	9:34	9:34	13:46
Tide (HP #282)		N/A	LF	LR	LR	LR	MR	HF	MR	MR	MR	MR	H	H	H	H	H
Water Depth (cm)		N/A	20	N/A	N/A	N/A	N/A	100	450	450	450	450	381	381	381	381	20
Sample Depth in Water Column (cm)		N/A	10	51	366	Surface	46	Surface	Surface	10 cm above bottom	150 cm above bottom	350 cm above bottom	Surface	200 cm below surface	300 cm below surface	Bottom	Surface
In-situ Water Quality Results																	
Secchi Depth (m)	NGA	-	-	-	-	-	-	1	1.35	1.35	1.35	1.35	0.95	0.95	0.95	0.95	-
Temp (°C)	NGA	-	12.7	19.5	16.4	18.8	20	21.2	20.25	19.53	19.63	20.15	11.52	11.48	11.56	11.59	1.6
DO (%)	NGA	-	94	82.4	75.3	74.9	75.8	50.8	-	-	-	-	-	-	-	-	89.9
DO (mg/L)	NGA	-	9.92	7.53	7.36	6.98	6.89	4.55	7.84	7.72	7.16	7.7	12.46	12.24	12.13	12.43	12.58
Cond (uS/cm)	NGA	-	262.4	91.6	316.9	96	85.5	135.7	139	146	139	139	720	115	11200	10700	44.1
Salinity (PSU / PPT)	NGA	-		0.05	0.18	0.05	0.04	0.07	0.1	0.1	0.1	0.1	0.03	0.05	6.43	5.87	0.04
pH	6.5 - 9	-	7.1	6.78	6.29	6.31	6.11	7.04	6.75	6.69	7.25	7.33	7.39	7.19	7.03	7.62	5.93
TDS (g/L)	NGA	-	-	-	-	-	-	-	0.09	0.095	0.091	0.09	0.046	0.075	7.03	6.63	-
NTU	NGA	-	-	-	-	-	-	-	5	15.2	6.6	4.9	5.1	6.7	172	-	-
Laboratory Water Quality Results																	
pH	6.5 - 9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity (NTU)	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cond (uS/cm)	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Salinity (PSU)	NGA	-	<2.0	-	-	-	-	<2.0	-	-	-	-	<2.0	-	-	-	-
TSS (mg/L)	NGA	-	24	-	-	-	-	3	-	-	-	-	7.2	-	-	-	-
Comments			Sampled within ~1 m of shore; very turbid, high current	Sampled from shore	Sampled from Boat. Sample collected approximately 30 cm above bottom	Sampled from Boat. Sample collected approximately 30 cm above bottom	Sampled from Boat	Sampled from shoreline in 1 m of water. Rocky/gravelly shoreline.	Sampled from boat. Sediment sample collected using ponar grab (clayey fines).	Sampled from boat. Sediment sample collected using ponar grab (clayey fines).	Sampled from boat. Sediment sample collected using ponar grab (clayey fines).	Sampled from boat. Sediment sample collected using ponar grab (clayey fines).					Sampled from shoreline

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IN-SITU AND LABORATORY WATER QUALITY RESULTS - AVON RIVER
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID	CCME (a) FWAL Long Term	AR-04B										
Field Program		August Sampling	August Sampling	October Sampling	October Sampling	October Sampling	October Sampling	October Sampling	October Sampling	October Sampling	December Sampling	December Sampling
Sample Date		27-Aug-19	27-Aug-19	23-Oct-19	23-Oct-19	24-Oct-19	24-Oct-19	24-Oct-19	24-Oct-19	24-Oct-19	13-Dec-19	13-Dec-19
Sample Time		19:38	19:38	9:40	9:40	10:14	10:14	10:14	10:14	10:14	13:32	13:32
Tide (HP #282)		LR	LR	H	H	H	H	H	H	H	H	H
Water Depth (cm)		~500-600	~500-600	~500-600	~500-600	~500-600	~500-600	~500-600	~500-600	~500-600	~500-600	~500-600
Sample Depth in Water Column (cm)		Surface	Bottom	Surface	Bottom	Surface	300 cm below surface	400 cm below surface	500 cm below surface	Bottom	Surface	300 cm below surface
In-situ Water Quality Results												
Secchi Depth (m)	NGA	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	0.9	0.9
Temp (°C)	NGA	21	20.9	11.25	11.39	11.7	11.48	11.5	11.65	11.75	1.5	1.7
DO (%)	NGA	71.6	76.1	-	-	-	-	-	-	-	98.1	99.6
DO (mg/L)	NGA	6.37	6.8	13.75	12.36	11.23	11.67	12.1	12.1	12.47	13.86	13.55
Cond (uS/cm)	NGA	135.3	290.6	124	9400	81	119	135	11800	17200	46.1	3958
Salinity (PSU / PPT)	NGA	0.07	0.15	0	4	0.04	0.06	0.07	6.63	10.73	0.04	3.81
pH	6.5 - 9	7.22	7.16	8.75	8.58	6.64	6.52	6.75	6.98	6.88	5.75	4.97
TDS (g/L)	NGA	-	-	0.075	5.9	0.053	0.075	0.086	7.31	10.7	-	-
NTU	NGA	-	-	-	-	4.6	5.4	6.5	169	370	-	-
Laboratory Water Quality Results												
pH	6.5 - 9	-	-	-	-	-	-	-	-	-	-	-
Turbidity (NTU)	NGA	-	-	-	-	-	-	-	-	-	-	-
Cond (uS/cm)	NGA	-	-	-	-	-	-	-	-	-	-	-
Salinity (PSU)	NGA	-	<2.0	-	9	-	-	-	-	12	-	-
TSS (mg/L)	NGA	-	310	-	260	-	-	-	-	340	-	-
Comments		AR-4B collected immediately upstream of the aboiteau barrels (lakeside).	AR-4B collected immediately upstream of the aboiteau barrels (lakeside).	AR-4B collected immediately upstream of the aboiteau barrels (lakeside).	AR-4B collected immediately upstream of the aboiteau barrels (lakeside).							

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IN-SITU AND LABORATORY WATER QUALITY RESULTS - AVON RIVER
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID	CCME (a) FWAL Long Term	AR-05										
Field Program		Reconnaissance	May Sampling	Summer Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling	October Sampling	October Sampling	October Sampling
Sample Date		28-May-19	30-May-19	29-Aug-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19	24-Oct-19	24-Oct-19	24-Oct-19
Sample Time		N/A	15:32	9:13	9:13	9:13	9:13	11:17	11:17	11:17	11:17	11:17
Tide (HP #282)		N/A	LF	M	M	M	M	HF	HF	HF	HF	HF
Water Depth (cm)		N/A	500+	450	450	450	450	450	450	450	450	450
Sample Depth in Water Column (cm)		N/A	10	Surface	Bottom	150 cm above bottom	350 cm above bottom	Surface	150 cm below surface	300 cm below surface	400 cm below surface	Bottom
In-situ Water Quality Results												
Secchi Depth (m)	NGA	-	-	1.5	1.5	1.5	1.5	0.85	0.85	0.85	0.85	0.85
Temp (°C)	NGA	-	13	20.32	19.5	19.7	20.27	11.59	11.53	11.51	11.58	11.62
DO (%)	NGA	-	93	-	-	-	-	-	-	-	-	-
DO (mg/L)	NGA	-	9.74	8.24	7.41	6.65	7.67	11.82	11.58	12.27	12.23	12.2
Cond (uS/cm)	NGA	-	300.1	143	142	142	145	76	92	231	8950	10700
Salinity (PSU / PPT)	NGA	-	-	0.1	0.1	0.1	0.1	0.03	0.05	0.08	4.75	6.01
pH	6.5 - 9	-	7.21	6.74	6.76	7.2	7.31	6.51	6.52	6.17	6.67	6.66
TDS (g/L)	NGA	-	-	0.093	0.093	0.092	0.094	0.049	0.058	0.197	5.9	6.71
NTU	NGA	-	-	6.3	13.1	5.7	5.6	4.6	5.6	8	160	127
Laboratory Water Quality Results												
pH	6.5 - 9	-	-	-	-	-	-	-	-	-	-	-
Turbidity (NTU)	NGA	-	-	-	-	-	-	-	-	-	-	-
Cond (uS/cm)	NGA	-	-	-	-	-	-	-	-	-	-	-
Salinity (PSU)	NGA	-	<2.0	<2.0	-	-	-	<2.0	-	-	-	-
TSS (mg/L)	NGA	-	19	3.2	-	-	-	7.1	-	-	-	-
Comments		Did not scope out location during reconn; site at easily accessible area (at high tide) near wharf.	As close to AR-5 as possible	Sediment collected	Sediment sample collected composed of muddy fines	Sediment sample collected composed of muddy fines	Sediment sample collected composed of muddy fines					

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Exceedance Identification:

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Appendix C1

IN-SITU AND LABORATORY WATER QUALITY RESULTS - AVON RIVER
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID	CCME (a) FWAL Long Term	AR-06																		
Field Program		Reconnaissance	May Sampling	July Sampling	July Sampling	July Sampling	July Sampling	July Sampling	August Sampling	August Sampling	August Sampling	August Sampling	August Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling	October Sampling	December Sampling
Sample Date		28-May-19	30-May-19	04-Jul-19	04-Jul-19	04-Jul-19	04-Jul-19	04-Jul-19	27-Aug-19	27-Aug-19	27-Aug-19	29-Aug-19	29-Aug-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19	24-Oct-19	13-Dec-19
Sample Time		N/A	15:00	10:18	10:35	10:40	12:35	12:35	12:05	12:05	12:17	8:40	8:40	8:40	8:40	8:40	12:16	12:16	12:16	13:56
Tide (HP #282)		N/A	LF	LR	LR	LR	MR	MR	HF	HF	HF	LR	LR	LR	LR	LR	MF	MF	MF	H
Water Depth (cm)		N/A	40	N/A	N/A	N/A	N/A	N/A		200	750	750	750	750	750	750	750	750	750	30
Sample Depth in Water Column (cm)		N/A	10	66	Surface	457	76	Surface	Surface	Bottom	400	Surface	10 cm above bottom	200 cm above Bottom	400 cm above Bottom	500 cm above Bottom	Surface	375 cm below surface	Bottom	Surface
In-situ Water Quality Results																				
Secchi Depth (m)	NGA	-	-	-	-	-	-	-	1.5	1.5	-	1.65	1.65	1.65	1.65	1.65	1	1	1	-
Temp (°C)	NGA	14.6	12.9	18.6	19.3	15.9	17.8	18.6	20.9	21	20.7	20.2	19.39	19.38	19.45	20.02	11.73	11.56	11.53	1.5
DO (%)	NGA	105.2	98.1	73.1	87.6	79.8	63.3	62.5	51.7	41.7	42.6	-	-	-	-	-	-	-	-	85.1
DO (mg/L)	NGA	10.63	10.3	6.82	8.05	7.76	5.99	5.84	4.62	3.68	3.81	8.57	7.38	7.33	6.88	7.51	11.18	11.94	13.37	11.93
Cond (uS/cm)	NGA	187.9	267.1	75.5	70.1	130.4	82.7	76.6	128.4	127.6	126	153	144	148	153	147	65	64	65	36.1
Salinity (PSU / PPT)	NGA	-	-	0.04	0.04	0.08	0.04	0.04	0.07	0.06	0.06	0.1	0.1	0.1	0.1	0.1	0.03	0.03	0.03	0.03
pH	6.5 - 9	8.67	7.05	6.62	6.35	6.16	5.99	5.93	6.99	7.00	7.03	6.65	7.16	7.16	7.18	6.65	6.49	5.94	5.93	5.84
TDS (g/L)	NGA	-	-	-	-	-	-	-	-	-	-	0.097	0.093	0.095	0.099	0.094	0.042	0.042	0.043	-
NTU	NGA	-	-	-	-	-	-	-	-	-	-	6.1	10.2	7.5	7.8	5	6.8	5.3	7.3	-
Laboratory Water Quality Results																				
pH	6.5 - 9	-	7.34	-	-	-	-	-	-	-	-	-	-	-	-	-	6.75	-	-	-
Turbidity (NTU)	NGA	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	6.5	-	-	-
Cond (uS/cm)	NGA	-	340	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-
Salinity (PSU)	NGA	-	<2.0	-	-	-	-	-	<2.0	-	-	-	-	-	-	-	<2.0	-	-	-
TSS (mg/L)	NGA	-	27	-	-	-	-	-	2.9	-	-	-	-	-	-	-	5.9	-	-	-
Comments			Under bridge ~1.5m from shore; very turbid, high current; abundant debris (leaves, twigs, grass) in water	Sampled from shore	Sampled from boat (DP) in channel under bridge. DP indicated this is the deepest point in Lake Pisiquid / Avon River.	Sampled from boat (DP) in channel under bridge. DP indicated this is the deepest point in Lake Pisiquid / Avon River.			Water sample collected from shore under the bridge. The shoreline consisted of a rip rap slope (cobble/boulder).	Water sample collected from shore under the bridge. The shoreline consisted of a rip rap slope (cobble/boulder).	Water sample collected in the thalwag between bridge piers from the bridge deck.	Mostly rock on bottom; some gravel and fines collected with ponar grab	Mostly rock on bottom; some gravel and fines collected with ponar grab	Mostly rock on bottom; some gravel and fines collected with ponar grab	Mostly rock on bottom; some gravel and fines collected with ponar grab	Mostly rock on bottom; some gravel and fines collected with ponar grab	Aboiteau gates opened few minutes before sample was collected. Generated a very strong current			Sampled from shore

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Exceedance Identification:

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IN-SITU AND LABORATORY WATER QUALITY RESULTS - AVON RIVER
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID	CCME (a) FWAL Long Term	AR-07							AR-08						
Field Program		Reconnaissance	May Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling	Reconnaissance	May Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling
Sample Date		28-May-19	30-May-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19	28-May-19	30-May-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19
Sample Time		N/A	16:51	10:29	10:29	10:29	12:53	12:53	N/A	N/A	10:47	10:47	10:47	13:10	13:10
Tide (HP #282)		N/A	L	MR	MR	MR	MF	MF	N/A	N/A	HR	HR	HR	MF	MF
Water Depth (cm)		N/A	20	450	450	450	420	420	N/A	N/A	400	400	400	380	380
Sample Depth in Water Column (cm)		N/A	15	Surface	Bottom (10 cm above bottom)	200 cm above Bottom	Surface	Bottom	N/A	N/A	Surface	Bottom (10 cm above bottom)	250 cm above Bottom	Surface	Bottom
In-situ Water Quality Results															
Secchi Depth (m)	NGA	-	-	1.6	1.6	1.6	1	1	-	-	1.7	1.7	1.7	0.9	0.9
Temp (°C)	NGA	-	12.5	20.48	19.32	19.59	11.7	11.36	-	-	20.98	19.43	20.87	11.94	11.58
DO (%)	NGA	-	106.8	-	-	-	-	-	-	-	-	-	-	-	-
DO (mg/L)	NGA	-	11.3	8.21	7.53	6.98	11.53	12.89	-	-	8.08	7.57	7.34	11.56	12.59
Cond (uS/cm)	NGA	-	179.4	135	134	133	66	61	-	-	125	137	125	71	88
Salinity (PSU / PPT)	NGA	-	-	0.1	0.1	0.1	0.03	0.03	-	-	0.1	0.1	0.1	0.03	0.04
pH	6.5 - 9	-	7.58	6.82	6.78	6.74	6.83	6.19	-	-	7.02	6.79	7.34	6.92	6.44
TDS (g/L)	NGA	-	-	0.088	0.087	0.087	0.043	0.04	-	-	0.081	0.089	0.081	0.045	0.057
NTU	NGA	-	-	4.2	6.8	6.7	6.9	7	-	-	3.6	11.3	3.7	7.9	64.7
Laboratory Water Quality Results															
pH	6.5 - 9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity (NTU)	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cond (uS/cm)	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Salinity (PSU)	NGA	-	<2.0	<2.0	-	-	<2.0	-	-	-	<2.0	-	-	<2.0	-
TSS (mg/L)	NGA	-	16	2.8	-	-	6.8	-	-	-	2.6	-	-	7.6	-
Comments			Sampled ~1m from shore	Sediment sample composed of sand and clayey fines	Sediment sample composed of sand and clayey fines	Sediment sample composed of sand and clayey fines				Couldn't access by foot	Fines	Fines	Fines		

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IN-SITU AND LABORATORY WATER QUALITY RESULTS - AVON RIVER
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID	CCME (a) FWAL Long Term	AR-09							AR-10						
Field Program		Reconnaissance	May Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling	Reconnaissance	May Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling
Sample Date		28-May-19	30-May-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19	28-May-19	30-May-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19
Sample Time		N/A	13:30	11:02	11:02	11:02	13:20	13:20	N/A	N/A	11:19	11:19	11:19	13:28	13:28
Tide (HP #282)		LR	M	HR	HR	HR	MF	MF	N/A	N/A	HR	HR	HR	MF	MF
Water Depth (cm)		N/A	30	430	430	430	380	380	N/A	N/A	330	330	330	140	140
Sample Depth in Water Column (cm)		N/A	10	Surface	Bottom (10 cm above bottom)	250 cm above Bottom	Surface	Bottom	N/A	N/A	Surface	Bottom (10 cm above bottom)	250 cm above Bottom	Surface	Bottom
In-situ Water Quality Results															
Secchi Depth (m)	NGA	-	-	1.55	1.55	1.55	0.9	0.9	-	-	2	2	-	0.7	0.7
Temp (°C)	NGA	-	13.4	21.25	19.06	19.99	11.68	11.36	-	-	20.78	19.92	20.49	11.91	11.36
DO (%)	NGA	-	103	-	-	-	-	-	-	-	-	-	-	-	-
DO (mg/L)	NGA	-	10.83	8.1	6.95	6.84	11.7	11.9	-	-	8	7.48	7.53	11.35	11.9
Cond (uS/cm)	NGA	-	270.7	122	206	112	95	241	-	-	95	345	122	72	241
Salinity (PSU / PPT)	NGA	-	-	0.1	0.1	0.1	0.04	0.11	-	-	0	0.2	0.1	0.03	0.11
pH	6.5 - 9	-	7.1	6.95	6.78	7.21	6.99	6.99	-	-	6.68	7.02	7.53	6.99	6.99
TDS (g/L)	NGA	-	-	0.08	0.134	0.072	0.06	0.156	-	-	0.062	0.236	0.075	0.047	0.156
NTU	NGA	-	-	3.4	5.6	4.1	6.6	17.5	-	-	1.4	8.7	1.2	12.5	17.5
Laboratory Water Quality Results															
pH	6.5 - 9	-	7.3	-	-	-	6.85	-	-	-		-	-		-
Turbidity (NTU)	NGA	-	4.2	-	-	-	6.3	-	-	-		-	-		-
Cond (uS/cm)	NGA	-	390	-	-	-	98	-	-	-		-	-		-
Salinity (PSU)	NGA	-	<2.0	<2.0	-	-	<2.0	-	-	-	<2.0	-	-	<2.0	-
TSS (mg/L)	NGA	-	6.1	<2.2	-	-	7.7	-	-	-	1.8	-	-	8.8	-
Comments		Closest point to river on foot was at edge of cemetery; need boat to sample AR-9	Sampled ~1m from shore; private access road	Fines with sand	Fines with sand	Fines with sand			No foot access	Couldn't access by foot	sand and gravel	sand and gravel	sand and gravel		

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IN-SITU AND LABORATORY WATER QUALITY RESULTS - AVON RIVER
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID	CCME (a) FWAL Long Term	AR-11				AR-12								
Field Program		Reconnaissance	May Sampling	August Sampling	October Sampling	Reconnaissance	May Sampling	July Sampling	July Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling
Sample Date		28-May-19	30-May-19	29-Aug-19	24-Oct-19	28-May-19	30-May-19	04-Jul-19	04-Jul-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19
Sample Time		N/A	N/A	11:37	13:51	N/A	12:32	15:21	15:21	11:49	11:49	11:49	13:43	13:43
Tide (HP #282)		N/A	N/A	HR	MF	N/A	HF	H	H	HR	HR	HR	LF	LF
Water Depth (cm)		N/A	N/A	50	60	N/A	30	N/A	N/A	420	420	420	370	370
Sample Depth in Water Column (cm)		N/A	N/A	Surface	Surface	N/A	10	76	Surface	Surface	Bottom	Middle (200 cm above bottom)	Surface	Bottom
In-situ Water Quality Results														
Secchi Depth (m)	NGA	-	-	0.5	0.3	-	-	-	-	1.65	1.65	1.65	0.7	0.7
Temp (°C)	NGA	-	-	21.01	11.17	-	12.6	17.7	18.6	20.65	19.71	20.16	11.81	11.75
DO (%)	NGA	-	-	-	-	-	104.9	68.1	60.6	-	-	-	-	-
DO (mg/L)	NGA	-	-	8.32	11.7	-	11.09	6.35	5.55	8.63	7.17	7.36	11.11	12.29
Cond (uS/cm)	NGA	-	-	98	288	-	146.6	55.5	56.9	91	98	91	65	65
Salinity (PSU / PPT)	NGA	-	-	0	0.14	-	-	0.03	0.03	0	0	0	0.03	0.03
pH	6.5 - 9	-	-	6.84	7.21	-	6.84	5.73	5.45	6.52	6.5	6.37	7.01	6.51
TDS (g/L)	NGA	-	-	0.064	0.187	-	-	-	-	0.047	0.063	0.058	0.042	0.042
NTU	NGA	-	-	9.8	46.3	-	-	-	-	20	20.1	5.9	12.8	10.9
Laboratory Water Quality Results														
pH	6.5 - 9	-	-	-	-	-	6.98	-	-	-	-	-	6.62	-
Turbidity (NTU)	NGA	-	-	-	-	-	2.1	-	-	-	-	-	11	-
Cond (uS/cm)	NGA	-	-	-	-	-	190	-	-	-	-	-	63	-
Salinity (PSU)	NGA	-	-	<2.0	<2.0	-	<2.0	-	-	<2.0	-	-	<2.0	-
TSS (mg/L)	NGA	-	-	5.6	26	-	4.8	-	-	3.2	-	-	6.4	-
Comments		Not accessible by foot/car	Couldn't access by foot	silty, clayey fines		Not accessible by foot/car	Sampled ~ 2m from shore			Sand	Sand	Sand		

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IN-SITU AND LABORATORY WATER QUALITY RESULTS - AVON RIVER
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID		AR-13						AR-14								
Field Program	**CCME (a) FWAL Long Term**	Reconnaissance	May Sampling	August Sampling	August Sampling	October Sampling	October Sampling	Reconnaissance	May Sampling	July Sampling	July Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling
Sample Date		28-May-19	30-May-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19	28-May-19	30-May-19	04-Jul-19	04-Jul-19	27-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19
Sample Time		N/A	N/A	12:03	12:03	14:00	14:00	N/A	10:42	13:55	13:55	18:05	12:14	12:14	14:09	14:09
Tide (HP #282)		N/A	N/A	HR	HR	LF	LF	LR	H	HR	HR	LR	H	H	LF	LF
Water Depth (cm)		N/A	N/A	360	360	250	250	N/A	15	N/A	N/A	200	260	260	230	230
Sample Depth in Water Column (cm)		N/A	N/A	Surface	Bottom	Surface	Bottom	N/A	10	51	Surface	Surface	Surface	Bottom	Surface	Bottom
In-situ Water Quality Results																
Secchi Depth (m)	NGA	-	-	1.75	1.75	0.7	0.7	-	-	-	-	-	2.6	2.6	1	1
Temp (°C)	NGA	-	-	21.07	19.61	11.62	11.6	-	10.3	21.1	21.8	20	21.1	21.1	11.66	11.67
DO (%)	NGA	-	-	N/A	-	-	-	-	103.2	60.8	71.1	65	N/A	N/A	-	-
DO (mg/L)	NGA	-	-	8.17	6.54	11.32	11.74	-	11.58	5.38	6.24	5.08	6.23	6.23	11.15	11.39
Cond (uS/cm)	NGA	-	-	56	102	59	60	-	181.3	47.1	44	148.3	53	53	53	64
Salinity (PSU / PPT)	NGA	-	-	0	0	0.03	0.03	-	N/A	0.02	0.02	0.08	0	0	0.02	0.03
pH	6.5 - 9	-	-	6.36	6.22	7.14	6.61	-	7.4	6.38	5.75	9.13	6.23	6.23	7.12	7.08
TDS (g/L)	NGA	-	-	0.063	0.067	0.038	0.039	-	-	-	-	-	0.035	0.035	0.033	0.076
NTU	NGA	-	-	1.3	19.2	5.4	6.7	-	-	-	-	-	1.6	1.6	4	6.5
Laboratory Water Quality Results																
pH	6.5 - 9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity (NTU)	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cond (uS/cm)	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Salinity (PSU)	NGA	-	-	<2.0	-	<2.0	-	-	<2.0	-	-	<2.0	-	-	<2.0	-
TSS (mg/L)	NGA	-	-	2	-	5.4	-	-	78	-	-	120	-	-	5.6	-
Comments		No foot access	Not accessible by foot/car	Sand and clay	Sand and clay			Able to access by foot; fish observed (~6" long)	Sample collected ~30 m downstream of outflow and ~1 m from shore			Hard bottom, boulders/amourstone along banks of channel	Muddy with sand	Muddy with sand		

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IN-SITU AND LABORATORY WATER QUALITY RESULTS - AVON RIVER
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID	CCME (a) FWAL Long Term	AR-15											
Field Program		Reconnaissance	Spring Sampling	July Sampling	July Sampling	August Sampling	August Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling	December Sampling
Sample Date		28-May-19	30-May-19	04-Jul-19	04-Jul-19	27-Aug-19	27-Aug-19	27-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19	13-Dec-19
Sample Time		N/A	10:16	14:20	14:20	18:29	18:29	18:29	12:24	12:24	14:19	14:19	11:57
Tide (HP #282)		N/A	H	HR	HR	LR	LR	LR	H	H	LF	LF	MR
Water Depth (cm)		N/A	20	N/A	N/A	200 to 250	200 to 250	200 to 250	360	360	170	170	100-200(?)
Sample Depth in Water Column (cm)		N/A	15	107	Surface	Surface	Middle (100)	Bottom (200 to 250)	Surface	Bottom	Surface	Bottom	20
In-situ Water Quality Results													
Secchi Depth (m)	NGA	-	-	-	-	-	-	-	1.7	1.7	0.7	0.7	-
Temp (°C)	NGA	-	11.6	18.1	23.7	20.9	20.5	20.7	21.33	19.83	12	11.62	0.9
DO (%)	NGA	-	99.9	50.5	69.7	54.4	43.4	40.1	-	-	-	-	96.8
DO (mg/L)	NGA	-	10.91	4.77	5.9	4.65	3.88	3.59	5.69	7.23	11	11.59	13.8
Cond (uS/cm)	NGA	-	100.4	53.5	40.1	46.4	48.2	60.4	46	81	65	239	23.9
Salinity (PSU / PPT)	NGA	-	N/A	0.03	0.02	0.02	0.02	0.02	0	0	0.03	0.08	0.02
pH	6.5 - 9	-	8.61	6.05	6.22	8.55	8.29	7.96	6.13	6.08	7.14	6.94	5.29
TDS (g/L)	NGA	-	-	-	-	-	-	-	0.03	0.053	0.043	0.114	-
NTU	NGA	-	-	-	-	-	-	-	1.8	4.2	14.6	53.3	-
Laboratory Water Quality Results													
pH	6.5 - 9	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity (NTU)	NGA	-	-	-	-	-	-	-	-	-	-	-	-
Cond (uS/cm)	NGA	-	-	-	-	-	-	-	-	-	-	-	-
Salinity (PSU)	NGA	-	<2.0	-	-	<2.0	-	-	-	-	<2.0	-	-
TSS (mg/L)	NGA	-	4	-	-	18	-	-	-	-	13	-	-
Comments		Locked gate at access point	Sample taken about 5 m downstream of intake pipe and ~2m from shore	In front of Ski Martock water intake	In front of Ski Martock water intake	Rocky hard bottom	Rocky hard bottom	Rocky hard bottom	Sandy mud	Sandy mud			Sample location frozen. Broke through ice to collect sample. Total water depth unknown (estimate 1-2 m at water

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IN-SITU AND LABORATORY WATER QUALITY RESULTS - AVON RIVER
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID	CCME (a) FWAL Long Term	AR-16										
Field Program		Reconnaissance	Spring Sampling	July Sampling	July Sampling	August Sampling	August Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling
Sample Date		28-May-19	30-May-19	04-Jul-19	04-Jul-19	27-Aug-19	27-Aug-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19
Sample Time		N/A	11:13	14:41	14:41	19:03	19:03	15:26	15:26	15:26	14:30	14:30
Tide (HP #282)		LR	H	HR	HR	LR	LR	HF	HF	HF	LF	LF
Water Depth (cm)		N/A	15-20	N/A	N/A	200	200	262	262	262	290	290
Sample Depth in Water Column (cm)		N/A	10	102	Surface	Surface	Bottom	Surface	Bottom	Middle	Surface	Bottom
In-situ Water Quality Results												
Secchi Depth (m)	NGA	-	-	-	-	-	-	2	2	2	1	1
Temp (°C)	NGA	-	12.2	17.7	18.1	20.8	20.8	21.14	20.98	21.11	11.38	11.37
DO (%)	NGA	-	109.9	73.6	54.8	59.3	53.9	-	-	-	-	-
DO (mg/L)	NGA	-	11.81	7	5.19	5.31	4.85	8.69	7.49	7.23	11.3	12.13
Cond (uS/cm)	NGA	-	72.5	35.1	35.2	40.6	41.6	47	47	47	41	41
Salinity (PSU / PPT)	NGA	-		0.02	0.02	0.02	0.02	0	0	0	0.02	0.02
pH	6.5 - 9	-	7.58	5.52	5.36	7.67	7.37	5.91	5.84	8.84	7.09	6.71
TDS (g/L)	NGA	-	-	-	-	-	-	0.031	0.031	0.03	0.026	0.027
NTU	NGA	-	-	-	-	-	-	0.1	0.2	0.3	0	0
Laboratory Water Quality Results												
pH	6.5 - 9	-	7.05	-	-	-	-	-	-	-	6.27	-
Turbidity (NTU)	NGA	-	2.1	-	-	-	-	-	-	-	2.7	-
Cond (uS/cm)	NGA	-	90	-	-	-	-	-	-	-	40	-
Salinity (PSU)	NGA	-	<2.0	-	-	<2.0	-	-	-	-	<2.0	-
TSS (mg/L)	NGA	-	5.4	-	-	4.3	-	-	-	-	<2.3	-
Comments		Bridge; accessible by shore during draw down	Sampled ~2 m from shore	Sample collected from shoreline beneath bridge	Sample collected from shoreline beneath bridge	Rocky bottom along shoreline	Rocky bottom along shoreline	Hard bottom; ponar grabbed cobble, gravels and algae	Hard bottom; ponar grabbed cobble, gravels and algae	Hard bottom; ponar grabbed cobble, gravels and algae		

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IN-SITU AND LABORATORY WATER QUALITY RESULTS - AVON RIVER
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID	CCME (a) FWAL Long Term	AR-17						
Field Program		Reconnaissance	May Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling
Sample Date		28-May-19	30-May-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19
Sample Time		N/A	N/A	15:07	15:07	15:07	14:41	14:41
Tide (HP #282)		N/A	N/A	HF	HF	HF	LF	LF
Water Depth (cm)		N/A	N/A	305	305	305	300	300
Sample Depth in Water Column (cm)		N/A	N/A	Surface	Bottom	Middle	Surface	Bottom
In-situ Water Quality Results								
Secchi Depth (m)	NGA	-	-	1.9	1.9	1.9	0.9	0.9
Temp (°C)	NGA	-	-	20.93	20.6	20.78	11.4	11.35
DO (%)	NGA	-	-	-	-	-	-	-
DO (mg/L)	NGA	-	-	8.35	7.7	7.09	11.35	11.93
Cond (uS/cm)	NGA	-	-	67	68	67	37	37
Salinity (PSU / PPT)	NGA	-	-	0	0	0	0.02	0.02
pH	6.5 - 9	-	-	6.44	6.28	6.68	7.16	6.54
TDS (g/L)	NGA	-	-	0.044	0.044	0.043	0.024	0.024
NTU	NGA	-	-	0.6	1.8	1.1	0	0
Laboratory Water Quality Results								
pH	6.5 - 9	-	-	-	-	-	-	-
Turbidity (NTU)	NGA	-	-	-	-	-	-	-
Cond (uS/cm)	NGA	-	-	-	-	-	-	-
Salinity (PSU)	NGA	-	-	<2.0	-	-	<2.0	-
TSS (mg/L)	NGA	-	-	2.3	-	-	2.2	-
Comments		Only accessible by boat	Not accessible by foot/car	mixed fines, gravel and rock	mixed fines, gravel and rock	mixed fines, gravel and rock		

Sample ID	CCME (a) FWAL Long Term	AR-18									
Field Program		Reconnaissance	May Sampling	July Sampling	July Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling
Sample Date		28-May-19	30-May-19	04-Jul-19	04-Jul-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19
Sample Time		N/A	11:45	14:59	14:59	14:40	14:40	14:40	15:01	15:01
Tide (HP #282)		LR	HF	H	H	HF	HF	HF	LF	LF
Water Depth (cm)		N/A	100	N/A	N/A	338	338	338	130	130
Sample Depth in Water Column (cm)		N/A	10	150	Surface	Surface	Bottom	Middle (183 cm above bottom)	Surface	Bottom
In-situ Water Quality Results										
Secchi Depth (m)	NGA	-	-	-	-	1.6	1.6	1.6	1.2	1.2
Temp (°C)	NGA	-	11.1	19	19	21.49	19.16	19.05	10.69	10.69
DO (%)	NGA	-	104.5	102.6	102.3	-	-	-	-	-
DO (mg/L)	NGA	-	11.42	9.53	9.5	8.34	6.87	6.75	11.64	11.4
Cond (uS/cm)	NGA	-	29.2	35	34.9	263	351	318	36	37
Salinity (PSU / PPT)	NGA	-		0.02	0.02	0.1	0.2	0.2	0.02	0.02
pH	6.5 - 9	-	7.54	5.35	5.26	7.03	6.78	7.06	7.19	7.22
TDS (g/L)	NGA	-	-	-	-	0.176	0.224	0.207	0.024	0.024
NTU	NGA	-	-	-	-	4.3	4.5	3.1	0	0
Laboratory Water Quality Results										
pH	6.5 - 9	-	-	-	-	-	-	-	-	-
Turbidity (NTU)	NGA	-	-	-	-	-	-	-	-	-
Cond (uS/cm)	NGA	-	-	-	-	-	-	-	-	-
Salinity (PSU)	NGA	-	<2.0	-	-	<2.0	-	-	<2.0	-
TSS (mg/L)	NGA	-	1.2	-	-	3.6	-	-	2	-
Comments		Bridge at Castle Frederick Rd.; Accessible via shore	Used van dorn from bridge to collect lab samples; took in-situ measurements from shore	Beneath bridge	Beneath bridge	Sandy bottom	Sandy bottom	Sandy bottom		

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IN-SITU AND LABORATORY WATER QUALITY RESULTS - AVON RIVER
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID	CCME (a) FWAL Long Term	BKG-01					BKG-02				
Field Program		Reconnaissance	May Sampling	July Sampling	August Sampling	October Sampling	Reconnaissance	May Sampling	July Sampling	August Sampling	October Sampling
Sample Date		28-May-19	30-May-19	04-Jul-19	29-Aug-19	25-Oct-19	28-May-19	30-May-19	04-Jul-19	29-Aug-19	25-Oct-19
Sample Time		N/A	12:13	15:34	18:24	8:46	N/A	13:00	15:44	18:05	8:31
Tide (HP #282)		LR	HF	N/A	LF	MR	LR	HF	N/A	LF	MR
Water Depth (cm)		-	40	-	-	-	-	60	-	20	20
Sample Depth in Water Column (cm)		N/A	10	25	Surface	Surface	-	10	66	Surface	Surface
In-situ Water Quality Results											
Secchi Depth (m)	NGA	-	-	-	0	0	-	-	-	0.2 (bottom)	0.2 (bottom)
Temp (°C)	NGA	N/A	12.6	19.6	20.45	8.86	N/A	11.2	18.8	18.75	8.88
DO (%)	NGA	-	28.7, 21.3	18.3	N/A	-	-	112	77.9	N/A	-
DO (mg/L)	NGA	-	2.32	1.64	2.14	12.55	-	12.28	7.25	8.15	12.72
Cond (uS/cm)	NGA	-	800	720	1670	676	-	179.8	228.3	1030	227
Salinity (PSU / PPT)	NGA	-	N/A	0.4	0.8	0.32	-	-	0.12	0.5	0.11
pH	6.5 - 9	-	6.62	5.95	6.85	7.38	-	7.3	6.33	7.78	7.14
TDS (g/L)	NGA	-	-	-	1.07	0.433	-	-	-	0.661	0.147
NTU	NGA	-	-	-	N/A	14	-	-	-	11.1	7.6
Laboratory Water Quality Results											
pH	6.5 - 9	-	-	-	7.54	-	-	7.49	-	-	7.18
Turbidity (NTU)	NGA	-	-	-	500	-	-	3.2	-	-	8.6
Cond (uS/cm)	NGA	-	-	-	24000	-	-	350	-	-	210
Salinity (PSU)	NGA	-	<2.0	-	<2.0	<2.0		<2.0	-	<2.0	<2.0
TSS (mg/L)	NGA	-	22	-	170	34		3.8	-	6.1	5.7
Comments		Sludge on north side of road; sample would be better taken on south side	Sampled in marshy ditch draining to roadway and agricultural land; abundant filamentous algae and terrestrial veg	Drainage ditch along field	Drainage ditch along field	Drainage ditch along field	BKG-2 & BKG-3 were inaccessible (private property), changed location	Sampled ~ 1m from shore	Sampled up stream of bridge	Sampled up stream of bridge	Sampled up stream of bridge

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IN-SITU AND LABORATORY WATER QUALITY RESULTS - AVON RIVER ESTUARY
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID	CCME (a) MAL Long Term	AVE-01								AVE-02						
Field Program		Reconnaissance	May Sampling	July Sampling	July Sampling	July Sampling	July Sampling	August Sampling	October Sampling	Reconnaissance	May Sampling	July Sampling	July Sampling	August Sampling	August Sampling	October Sampling
Sample Date		28-May-19	31-May-19	04-Jul-19	04-Jul-19	05-Jul-19	05-Jul-19	27-Aug-19	23-Oct-19	28-May-19	31-May-19	05-Jul-19	05-Jul-19	27-Aug-19	30-Aug-19	23-Oct-19
Sample Time		13:46	12:35	16:12	16:12	13:57	14:08	13:45	11:25	N/A	9:15	8:45	11:46	17:05	10:28	12:50
Tide (HP #282)		LF	HF	HF	HF	MR	MR	HF	MF	HF	HR	LF	LR	L	MR	LF
Water Depth (cm)		-	15	-	-	-	-	30	30	20	20	-	-	30	30	30
Sample Depth in Water Column (cm)		-	10	30	Surface	25	25	Surface	Surface	10	10	15	28	Surface	Surface	Surface
In-Situ Water Quality Results																
Secchi Depth (m)	NGA	-	-	-	-	-	-	-	0	-	-	-	-	-	N/A	0
Temp (°C)	NGA	-	8.5	14.7	15.1	22.1	19.5	18.7	11.43	9.3	9	15.9	20.3	19.7	29.86	12.05
DO (%)	NGA	-	110	108.9	108.5	63.3	56.1	133	-	107.5	100.3	65.5	77	64.5	-	-
DO (mg/L)	NGA	-	10.89	9.45	9.33	4.9	4.47	10.42	14.06	10.58	9.94	5.72	6.4	4.99	7.44	14.42
Cond (uS/cm)	NGA	-	27923	31165	32335	31582	29406	39316	41200	26617	24720	27498	24620	39127	36200	42300
Salinity (PSU / PPT)	NGA	-	N/A	24.68	25.44	21.01	20.49	28.9	24.7	-	-	20.88	16.65	28.11	22.8	25.6
pH	7.0 - 8.7	-	7.75	7.09	7.27	7.69	7.69	7.48	8.78	6.95	7.87	7.6	7.26	7.65	8.24	8.82
TDS (g/L)	NGA	-	-	-	-	-	-	-	25.1	-	-	-	-	-	22.1	25.8
Turbidity (NTU)	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	N/A	-
Laboratory Water Quality Results																
pH	7.0 - 8.7	-	7.74	-	-	-	-	7.79	7.61	-	-	-	-	-	-	-
Turbidity (NTU)	NGA	-	170	-	-	-	-	280	670	-	-	-	-	-	-	-
Cond (uS/cm)	NGA	-	40000	-	-	-	-	43000	40000	-	-	-	-	-	-	-
Salinity (PSU)	NGA	-	24	-	-	-	-	27	26	-	21	-	-	-	27	26
TSS (mg/L)	NGA	-	92	-	-	-	-	310	820	-	340	-	-	-	710	11000
Comments			Sampled ~50 m from high water line	Avonport Beach	Avonport Beach			Sediment is sand and silt mix (Avonport Beach).	Sediment is sand and silt mix (Avonport Beach). Sample collected on windy, stormy day.	Boat launch (no wharf); would want to launch at high tide.	Sampled ~10m from shore		Quickly rising tide prevented access to 1st sample site	Sediment sample collected from intertidal beach composed of fines with gravel and cobbles	Very turbid waters. Water sample collected after heavy rains the previous day.	Sediment sample collected from intertidal beach composed of fines with gravel and cobbles. Sample collected on windy, stormy day.

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IN-SITU AND LABORATORY WATER QUALITY RESULTS - AVON RIVER ESTUARY
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID	CCME (a) MAL Long Term	AVE-03									AVE-04			
Field Program		Reconnaissance	May Sampling	July Sampling	July Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling	Reconnaissance	May Sampling	August Sampling	October Sampling
Sample Date		28-May-19	31-May-19	05-Jul-19	05-Jul-19	30-Aug-19	30-Aug-19	30-Aug-19	25-Oct-19	25-Oct-19	28-May-19	31-May-19	27-Aug-19	23-Oct-19
Sample Time		11:33	10:00	9:17	12:14	12:08	12:08	12:08	9:45	9:45	12:10	10:30	16:08	13:10
Tide (HP #282)		HF	HR	LF	LR	HR	HR	HR	HR	HR	MF	HR	LF	LF
Water Depth (cm)		20	40	-	-	1311	1311	1311	1310	1310	-	10	-	30
Sample Depth in Water Column (cm)		10	10	33	33	Surface	Bottom (914)	Mid (457)	Surface	Mid-column (610)	10	10	Surface	Surface
In-Situ Water Quality Results														
Secchi Depth (m)	NGA	-	-	-	-	0	0	0	0.3	0.3	-	-	-	-
Temp (°C)	NGA	9.9	9.5	18	19.1	20.16	19.22	19.23	12.11	12.3	11.7	10.2	19.1	10.63
DO (%)	NGA	103.8	99.6	47.9	68.3	-	-	-	-	-	94.3	92.9	85.1	-
DO (mg/L)	NGA	10.42	9.93	4.25	5.9	7.02	8.3	8.32	9.95	12.3	9.87	9.52	6.83	14.07
Cond (uS/cm)	NGA	21827	23123	15780	16668	36500	38500	38400	35800	38900	8675	18671	29341	10400
Salinity (PSU / PPT)	NGA	-	-	10.78	11.2	23.1	24.3	24.3	21.88	24.36	-	-	20.75	4.6
pH	7.0 - 8.7	7.68	7.8	7.58	7.5	8.28	8.3	8.32	7.62	7.05	8.06	7.86	7.28	8.91
TDS (g/L)	NGA	-	-	-	-	22.4	23.5	23.5	21.7	23.8	-	-	-	6.45
Turbidity (NTU)	NGA	-	-	-	-	92.7	111	111	108	134	-	-	-	-
Laboratory Water Quality Results														
pH	7.0 - 8.7	-	-	-	-	-	-	-	-	-	-	7.58	7.52	7.57
Turbidity (NTU)	NGA	-	-	-	-	-	-	-	-	-	-	660	>1000	>1000
Cond (uS/cm)	NGA	-	-	-	-	-	-	-	-	-	-	25000	33000	11000
Salinity (PSU)	NGA	-	19	-	-	28	-	-	23	-	-	15	21	6.2
TSS (mg/L)	NGA	-	320	-	-	56	-	-	100	-	-	780	3000	1000
Comments		Access at end of Card Beach Road by House (Bruce); took sample at	Sampled ~50m from shore			Ponar grab couldn't collect sample; current too strong and bottom too hard.					Bridge site	Used van Dorn to collect sample from NE side of bridge; took in-situ water measurement with YSI from river bank at ~ 10 m from shore.	Facing upstream into St. Croix River, sediment sample taken from exposed shoreline;	Sample collected with van dorn sampler from NE side of bridge; took in-situ water measurement with Horiba from river bank

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NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID	CCME (a) MAL Long Term	AVE-05							AVE-06						
Field Program		May Sampling	July Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling	Reconnaissance	May Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling
Sample Date		31-May-19	05-Jul-19	30-Aug-19	30-Aug-19	30-Aug-19	25-Oct-19	25-Oct-19	28-May-19	30-May-19	30-Aug-19	30-Aug-19	30-Aug-19	25-Oct-19	25-Oct-19
Sample Time		14:45	12:49	11:42	11:42	11:42	10:01	10:01	N/A	N/A	12:33	12:33	12:33	10:12	10:13
Tide (HP #282)		MF	MR	MR	MR	MR	HR	HR	LF	L	HR	HR	HR	HR	HR
Water Depth (cm)		30	-	802	802	802	950	950	-	-	1128	1128	1128	1210	1210
Sample Depth in Water Column (cm)		10	Surface	Surface	Bottom (802)	Middle	Surface	Mid-column (610)	-	-	Surface	Bottom (914)	Middle	Surface	Mid-column (760)
In-situ Water Quality Results															
Secchi Depth (m)	NGA	-	-	-	-	-	0.2	0.2	-	-	0	0	0	0.35	0.35
Temp (°C)	NGA	10.3	19.2	19.95	19.49	19.5	12.05	12.2	-	-	19.84	19.93	19.39	12.15	12.18
DO (%)	NGA	98.4	59.8	-	-	-	-	-	-	-	-	-	-	-	-
DO (mg/L)	NGA	9.9	5.18	6.67	6.96	6.87	9.74	11.02	-	-	7.41	7.32	6.93	9.61	12.47
Cond (uS/cm)	NGA	19522	16735	36000	37200	37000	33800	36300	-	-	35900	35900	37200	35400	35700
Salinity (PSU / PPT)	NGA	-	11.29	22.6	23.5	23.4	21.01	22.6	-	-	22.6	22.6	23.5	22.12	22.1
pH	7.0 - 8.7	7.91	7.59	8.25	8.26	8.26	6.97	6.92	-	-	8.27	8.26	8.33	6.98	6.88
TDS (g/L)	NGA	-	-	22	22.7	22.6	20.7	22.7	-	-	21.9	21.9	22.7	21.7	21.8
Turbidity (NTU)	NGA	-	-	170	437	336	142	175	-	-	99	92.2	112	116	104
Laboratory Water Quality Results															
pH	7.0 - 8.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity (NTU)	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cond (uS/cm)	NGA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Salinity (PSU)	NGA	16		27	-	-	21	-	-	-	27	-		21	-
TSS (mg/L)	NGA	1200		140	-	-	120	-	-	-	76	-		81	-
Comments		Sample collected from beach on south side of wharf	Arrived at 10:04 no access returned at 12:45 at mid tide and sampled at old jetty	Ponar grab couldn't collect sample; current too strong and bottom too hard.					Did not sample because of limited foot access and low tide	Did not sample because of limited foot access and low tide		Bottom sample represents length of the cable on the water meter. Cable length too short to sample on bottom.			

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NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

Sample ID	CCME (a) MAL Long Term	AVE-07				AVE-08						AVE-09				
Field Program		May Sampling	August Sampling	October Sampling	October Sampling	Reconnaissance	May Sampling	July Sampling	August Sampling	October Sampling	October Sampling	May Sampling	May Sampling	August Sampling	October Sampling	December Sampling
Sample Date		31-May-19	27-Aug-19	25-Oct-19	25-Oct-19	28-May-19	31-May-19	05-Jul-19	27-Aug-19	25-Oct-19	25-Oct-19	30-May-19	31-May-19	27-Aug-19	23-Oct-19	13-Dec-19
Sample Time		13:25	14:35	10:24	10:24	13:46	14:00	10:47	15:10	10:43	10:43	N/A	11:20	13:05	10:35	14:40
Tide (HP #282)		M	M	HR	HR	LF	M	LF	MF	HR	HR	L	H	HF	HF	H
Water Depth (cm)		15	30	880	880	-	-	-	-	470	470	-	20	-	20	50
Sample Depth in Water Column (cm)		10	Surface	Surface	Bottom	-	-	Surface	Surface	Surface	Bottom	-	10	Surface	Surface	Surface
In-situ Water Quality Results																
Secchi Depth (m)	NGA	-	-	0.2	0.2	-	-	-	-	0.1	0.1	-	-	0	0	0
Temp (°C)	NGA	10.1	19.2	12.05	12.16	-	-	20	21.6	11.1	11.14	N/A	10	19.2	11.5	2.1
DO (%)	NGA	95.7	50.5	-	-	-	-	80	66	-	-	-	95.1	68.1	-	92.9
DO (mg/L)	NGA	9.59	4.09	9.7	11.22	-	-	7.18	5.82	11.09	11.82	-	9.59	5.68	12.02	11.78
Cond (uS/cm)	NGA	20791	31155	32800	35700	-	-	214.4	333.9	13700	15050	-	20438	25516	28500	12165
Salinity (PSU / PPT)	NGA	N/A	22.09	20.19	22.15	-	-	0.11	0.17	7.91	8.79	-	N/A	17.75	19.8	12.67
pH	7.0 - 8.7	7.96	7.6	**6.98**	**6.9**	-	-	8.42	**9.17**	**6.91**	**6.88**	-	7.81	**6.8**	8.37	**5.08**
TDS (g/L)	NGA	-	-	20	21.8	-	-	-	-	8.63	9.48	-	-	N/A	17.7	-
Turbidity (NTU)	NGA	-	-	105	106	-	-	-	-	395	965	-	-	N/A	-	-
Laboratory Water Quality Results																
pH	7.0 - 8.7	-	-	-	-	-	-	-	-	-	-	-	7.6	7.55	7.54	-
Turbidity (NTU)	NGA	-	-	-	-	-	-	-	-	-	-	-	130	360	500	-
Cond (uS/cm)	NGA	-	-	-	-	-	-	-	-	-	-	-	28000	29000	24000	-
Salinity (PSU)	NGA	18	24	20	-	-	<2.0	-	<2.0	8.4	-	-	17	17	15	-
TSS (mg/L)	NGA	130	360	96	-	-	1200	-	690	290	-	-	130	300	730	-
Comments		Sampled ~ 10 m from high water line	Sample collected on exposed bank composed of rock and boulder in places, with fine sediment, gravel, and cobble over top				Collected water sample from middle of bridge on west side. Couldn't collect in-situ water quality because banks too steep/not safe	Sampled from bridge. Water collected in Van Dorn sampler and parameters were measured from within the sampler	Water sample collected from bridge deck using Van Dorn. No foot access due to muddy/slippery banks.			Downsteam at aboiteau cannot be safely sampled at low tide due to hazardous conditions along banks of the outfall	Collected sample on west shore of aboiteau ~5 m from high water line.	anoxic silty clay	Sample collected on east shore of aboiteau on a high falling tide.	Sample collected on west shore of aboiteau on a high tide.

Notes:

'-' = not analyzed ; <RDL in grey text

NR = Guideline is Not Required, as an applicable guideline is available from another more appropriate jurisdiction.

NGA = No guideline available

(a) CCME Water Quality Guidelines (WQGs) for the Protection of Aquatic Life, (Updated to 2017), Marine Aquatic Life (MAL), Long Term effects.

Exceedance Identification:

Shaded = exceedance of CCME guidelines for Marine Aquatic Life (shaded values shown in bold)

GENERAL CHEMISTRY IN SURFACE WATER - AVON RIVER
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

ATLANTIC RCAP-MS IN WATER (WATER)	UNITS	CCME [(a)] FWAL Long Term	Tier 1 NSE EQS (b) Surface Water Freshwater	August 2019	October 2019	August 2019	October 2019	May 2019	August 2019	October 2019	May 2019	August 2019	October 2019	May 2019	August 2019	October 2019	May 2019	August 2019	October 2019	May 2019	August 2019	October 2019
PARAMETER / SAMPLE ID				**AR-1**	**AR-1**	**AR-3**	**AR-3**	**AR-6**	**AR-6**	**AR-6**	**AR-9**	**AR-9**	**AR-9**	**AR-12**	**AR-12**	**AR-12**	**AR-16**	**AR-16**	**AR-16**	**BKG-2**	**BKG-2**	**BKG-2**
Anion Sum	me/L	NGA	NGA	1.27	0.710	1.31	0.760	3.25	1.25	0.640	3.84	1.09	1.14	1.77	0.650	0.650	0.870	0.400	0.370	2.41	10.9	2.08
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	NGA	NGA	14	7.3	14	7.5	27	14	6.3	33	13	8.3	15	8.1	6.8	8.9	5.4	<1.0	26	110	23
Calculated TDS	mg/L	NGA	NGA	78	46	80	49	190	76	42	230	67	66	100	39	42	56	27	27	160	710	140
Carb. Alkalinity (calc. as CaCO3)	mg/L	NGA	NGA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cation Sum	me/L	NGA	NGA	1.26	0.660	1.26	0.720	3.14	1.17	0.600	3.87	1.06	0.800	1.57	0.600	0.570	0.850	0.450	0.380	2.39	11.3	2.02
Hardness (CaCO3)	mg/L	NGA	NGA	37	19	36	20	79	35	18	88	32	26	37	14	17	27	9.8	10	110	530	88
Ion Balance (% Difference)	%	NGA	NGA	0.400	3.65	1.95	2.70	1.72	3.31	3.23	0.390	1.40	17.5	5.99	4.00	6.56	1.16	5.88	1.33	0.420	1.53	1.46
Langelier Index (@ 20C)	N/A	NGA	NGA	-1.75	-3.03	-1.95	-3.03	-1.24	-1.84	-2.98	-1.17	-2.29	-2.61	-2.13	-2.84	-3.14	-2.36	-3.33	NC	-0.873	0.637	-1.32
Langelier Index (@ 4C)	N/A	NGA	NGA	-2.01	-3.28	-2.20	-3.28	-1.49	-2.09	-3.24	-1.42	-2.54	-2.86	-2.39	-3.09	-3.39	-2.61	-3.58	NC	-1.12	0.390	-1.57
Nitrate (N)	mg/L	13	NGA	0.058	<0.050	0.054	<0.050	0.058	0.066	<0.050	<0.050	<0.060	<0.050	<0.050	<0.060	<0.050	<0.050	<0.055	<0.050	0.067	0.23	0.065
Saturation pH (@ 20C)	N/A	NGA	NGA	9.09	9.65	9.10	9.64	8.58	9.11	9.74	8.48	9.20	9.46	9.11	9.75	9.76	9.41	10.1	NC	8.36	7.17	8.50
Saturation pH (@ 4C)	N/A	NGA	NGA	9.34	9.90	9.36	9.89	8.83	9.36	9.99	8.73	9.45	9.71	9.37	10.0	10.0	9.66	10.3	NC	8.61	7.41	8.75
Inorganics																						
Carbonaceaous BOD	mg/L	NGA	NGA	3.3	<5.0	3.3	<5.0	-	4.3	<5.0	-	<5.0	<5.0	-	<5.0	<5.0	-	4.10	<5.0	-	<5.0	<10
Total Phosphorus (low level)	mg/L	NGA	NGA	0.025	0.024	0.033	0.025	-	0.034	0.024	-	0.032	0.022	-	0.031	0.037	-	0.03	0.015	-	0.028	0.025
Total Alkalinity (Total as CaCO3)	mg/L	NGA	NGA	14	7.4	14	7.5	27	14	6.3	33	13	8.3	15	8.1	6.8	8.9	5.4	<5.0	26	110	23
Dissolved Chloride (Cl-)	mg/L	120	NGA	17	9.2	18	10	56	16	8.0	70	14	17	30	11	7.8	9.4	6.0	8.2	6.4	20	8.7
Colour	TCU	NGA	NGA	52	90	63	79	78	55	92	75	61	78	95	69	95	98	75	86	22	12	39
Nitrate + Nitrite (N)	mg/L	NGA	NGA	0.058	<0.050	0.054	<0.050	0.058	0.066	<0.050	<0.050	<0.060	<0.050	<0.050	<0.060	<0.050	<0.050	<0.055	<0.050	0.067	0.23	0.065
Nitrite (N)	mg/L	0.06	NGA	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrogen (Ammonia Nitrogen)	mg/L	note (c)	NGA	0.059 (3.96)	<0.050 (26.6)	<0.050 (3.96)	0.061 (26.6)	0.097 (8.47)	<0.050 (3.96)	<0.050 (26.6)	0.13 (8.47)	<0.050 (12.5)	<0.050 (26.6)	0.064 (26.6)	<0.050 (12.5)	<0.050 (26.6)	<0.050 (8.47)	0.052 (12.5)	<0.050 (83.9)	<0.050 (8.47)	<0.050 (1.83)	<0.050 (12.5)
Total Organic Carbon (C)	mg/L	NGA	NGA	6.8	10	7.0	10	7.2	6.7	10	8.1	6.8	9.8	8.3	7.0	11	8.5	6.7	11	3.5	2.9	6.1
Orthophosphate (P)	mg/L	NGA	NGA	<0.010	<0.010	<0.010	<0.010	0.014	<0.010	0.014	0.017	<0.010	<0.010	0.013	0.011	<0.010	<0.010	0.020	<0.010	<0.010	<0.010	<0.010
pH	pH	6.5 - 9	NGA	7.34	6.61	7.16	6.60	7.34	7.27	6.75	7.30	6.91	6.85	6.98	6.91	6.62	7.05	6.75	6.27	7.49	7.80	7.18
Reactive Silica (SiO2)	mg/L	NGA	NGA	1.7	3.6	1.7	3.5	2.0	1.8	3.2	3.1	1.5	3.4	2.8	1.7	3.8	2.6	1.8	3.8	4.2	6.2	6.5
Dissolved Sulphate (SO4)	mg/L	NGA	NGA	25	15	25	15	54	25	14	57	22	23	30	9.3	14	21	6.0	6.4	83	390	66
Turbidity	NTU	NGA	NGA	3.3	5.6	4.1	6.9	13	6.3	6.5	4.2	3.0	6.3	2.1	2.5	11	2.1	4.2	2.7	3.0	3.8	8.6
Conductivity	uS/cm	NGA	NGA	140	70	140	78	340	140	100	390	120	98	190	68	63	90	46	40	250	1000	210
Microbiological																						
Fecal Coliform	CFU/100mL	NGA	NGA	10	70	<10	90	-	30	50	-	10	120	-	<10	890	-	30	100	-	900	70
Total Coliforms	CFU/100mL	NGA	NGA	2000	610	480	850	-	370	560	-	180	1100	-	140	>2500	-	150	1500	-	>2500	1100
Chlorophyll A																						
Chl A (acidification)	µg / L	NGA	NGA	1.720	1.990	3.420	1.500	-	2.160	1.530	-	3.750	1.340	-	3.930	0.805	-	2.150	0.648	-	2.550	0.390
Chl A (non-acidification)	µg / L	NGA	NGA	2.020	2.580	3.660	2.140	-	2.630	2.050	-	4.040	1.810	-	4.060	1.200	-	2.170	0.849	-	2.780	0.545

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(a) CCME Water Quality Guidelines (WQGs) for the Protection of Aquatic Life, (Updated to 2017), Freshwater Aquatic Life (FWAL), Long Term effects.

(b) Nova Scotia Environment (NSE), Tier 1 Environmental Quality Standards (EQS) for Surface Water for Freshwater Aquatic Life (FWAL), Table 3.

Exceedance Identification:

Shaded = exceedance of CCME FWAL

Bold and Underline - exceeds CCME FWAL

Appendix C3

GENERAL CHEMISTRY IN SURFACE WATER - AVON RIVER
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)	UNITS	CCME [(a)] FWAL Long Term	Tier 1 NSE EQS (b) Surface Water Freshwater	August 2019	October 2019	August 2019	October 2019	May 2019	August 2019	October 2019	May 2019	August 2019	October 2019	May 2019	August 2019	October 2019	May 2019	August 2019	October 2019	May 2019	August 2019	October 2019
PARAMETER / SAMPLE ID				AR-1	AR-1	AR-3	AR-3	AR-6	AR-6	AR-6	AR-9	AR-9	AR-9	AR-12	AR-12	AR-12	AR-16	AR-16	AR-16	BKG-2	BKG-2	BKG-2
Metals																						
Total Aluminum (Al)	ug/L	5 or 100 [(d)]	5	**140**	**340**	**180**	**340**	**480**	**200**	**330**	**220**	**150**	**350**	**230**	**180**	**490**	**220**	**270**	**290**	**170**	**120**	**340**
Total Antimony (Sb)	ug/L	NGA	20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Arsenic (As)	ug/L	5	5	1.4	<1.0	1.4	<1.0	<1.0	1.5	<1.0	1.3	1.3	<1.0	<1.0	1.3	<1.0	<1.0	1.3	<1.0	<1.0	<1.0	<1.0
Total Barium (Ba)	ug/L	NGA	1000	11	15	12	16	25	12	15	28	11	17	14	7.6	17	15	7.8	17	71	96	70
Total Beryllium (Be)	ug/L	NGA	5.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Bismuth (Bi)	ug/L	NGA	NGA	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Total Boron (B)	ug/L	1500	1200	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	150	<50
Total Cadmium (Cd)	ug/L	Calculated [(e)]	0.01	<0.010 (0.76)	**0.025 (0.39)**	<0.010 (0.74)	**0.023 (0.41)**	**0.024 (1.7)**	**0.013 (0.11)**	**0.020 (0.37)**	**0.016 (1.8)**	<0.010 (0.66)	**0.024 (0.53)**	**0.016 (0.76)**	<0.010 (0.28)	**0.028 (0.35)**	**0.016 (0.55)**	**0.018 (0.20)**	**0.030 (0.20)**	<0.010 (2.3)	<0.010 (7.7)	0.010 (1.8)
Total Calcium (Ca)	ug/L	NGA	NGA	12000	6200	12000	6300	24000	12000	5800	25000	11000	8800	11000	4400	5200	9100	3000	3100	40000	200000	32000
Total Chromium (Cr)	ug/L	NGA	NGA	1.1	<1.0	1.3	<1.0	1.6	1.1	<1.0	1.4	1.1	<1.0	1.0	1.1	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	<1.0
Total Cobalt (Co)	ug/L	NGA	10	<0.40	<0.40	<0.40	<0.40	0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Total Copper (Cu)	ug/L	Calculated [(f)]	2	2.0 (2.0)	0.73 (2.0)	0.98 (2.0)	0.73 (2.0)	0.79 (2.0)	0.69 (2.0)	0.80 (2.0)	0.73 (2.12)	0.57 (2.0)	0.85 (2.0)	<0.50 (2.0)	0.61 (2.0)	0.92 (2.0)	<0.50 (2.0)	1.0 (2.0)	0.71 (2.0)	0.65 (2.57)	<0.50 (4)	0.87 (2.12)
Total Iron (Fe)	ug/L	300	300	**370**	**500**	**430**	**530**	**810**	**480**	**550**	**720**	**360**	**580**	**320**	**370**	**640**	230	**470**	**360**	**390**	**310**	**500**
Total Lead (Pb)	ug/L	Calculated [(g)]	1	<0.50 (1.0)	<0.50 (1.0)	<0.50 (1.0)	<0.50 (1.0)	<0.50 (2.36)	<0.50 (1.0)	<0.50 (1.0)	<0.50 (2.70)	<0.50 (1)	<0.50 (1.0)	<0.50 (1.0)	<0.50 (1.0)	<0.50 (1.0)	<0.50 (1.0)	<0.50 (1.0)	<0.50 (1.0)	<0.50 (3.59)	<0.50 (7.0)	<0.50 (2.70)
Total Magnesium (Mg)	ug/L	NGA	NGA	1600	920	1600	1000	4800	1400	820	6100	1200	1000	2300	760	900	950	560	600	2000	6100	2200
Total Manganese (Mn)	ug/L	NGA	820	32	61	42	61	170	87	64	470	33	69	89	27	55	49	44	38	140	360	110
Total Molybdenum (Mo)	ug/L	73	73	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Total Nickel (Ni)	ug/L	Calculated [(h)]	25	<2.0 (25.0)	<2.0 (25.0)	<2.0 (25.0)	<2.0 (25.0)	<2.0 (79.9)	<2.0 (25.0)	<2.0 (25.0)	<2.0 (86.73)	<2.0 (25.0)	<2.0 (25.0)	<2.0 (25.0)	<2.0 (25.0)	<2.0 (25.0)	<2.0 (25.0)	<2.0 (25.0)	<2.0 (25.0)	<2.0 (102.76)	<2.0 (150)	<2.0 (86.73)
Total Phosphorus (P)	ug/L	NGA	NGA	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Total Potassium (K)	ug/L	NGA	NGA	840	700	830	760	1500	740	670	1700	680	740	830	520	920	520	500	560	780	2100	1300
Total Selenium (Se)	ug/L	1	1	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<0.50	<0.50
Total Silver (Ag)	ug/L	0.25	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Total Sodium (Na)	ug/L	NGA	NGA	11000	5600	11000	6500	34000	9900	4800	47000	9100	5600	18000	6600	4500	6800	5000	3500	4900	12000	5100
Total Strontium (Sr)	ug/L	NGA	21000	86	40	85	41	160	82	38	180	78	58	75	31	32	57	21	17	280	1600	220
Total Thallium (Tl)	ug/L	0.8	0.8	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Total Tin (Sn)	ug/L	NGA	NGA	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Total Titanium (Ti)	ug/L	NGA	NGA	3.1	5.8	3.7	6.3	11	4.3	6.7	6.2	2.2	7.6	3.8	2.8	9.5	3.0	4.2	4.7	3.5	3.5	8.3
Total Uranium (U)	ug/L	15	300	0.20	0.25	0.23	0.23	0.23	0.24	0.25	0.28	0.23	0.29	0.19	0.21	0.22	0.20	0.27	0.23	<0.10	0.46	<0.10
Total Vanadium (V)	ug/L	NGA	6	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Total Zinc (Zn)	ug/L	30	30	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.3	<5.0	6.6	<5.0	<5.0	<5.0	<5.0

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(a) CCME Water Quality Guidelines (WQGs) for the Protection of Aquatic Life, (Updated to 2017), Freshwater Aquatic Life (FWAL), Long Term effects.

(b) Nova Scotia Environment (NSE), Tier 1 Environmental Quality Standards (EQS) for Surface Water for Freshwater Aquatic Life (FWAL), Table 3.

(c) The CCME Ammonia guideline was calculated using the CCME look-up table (CCME Online, 2013), using the field temperature and pH for each sample. The calculated Ammonia guideline is presented in brackets with analytical results. For example: 1 (2), where 1 represents the analytical result and 2 represents the calculated guideline from CCME Online.

(d) Aluminum guideline dependent on pH: 5 µg/L if pH < 6.5 & 100 µg/L if pH ≥ 6.5. (CCME FWAL Guidelines)

(e) Cadmium guideline - calculated by using the CCME online calculator

(f) Copper guideline - calculated by using the CCME online calculator

(g) Lead guideline - calculated by using the CCME online calculator

(h) Nickel guideline - calculated by using the CCME online calculator

(i) Aluminum, cadmium, copper, lead and nickel calculated guidelines are presented in brackets with analytical results. For example: 1 (2), where 1 represents the analytical result and 2 represents the calculated guideline from CCME Online.

Exceedance Identification:

Shaded = exceedance of CCME FWAL

Bold and Underline - exceeds CCME FWAL

GENERAL CHEMISTRY IN SURFACE WATER - AVON RIVER ESTUARY
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)	UNITS	CCME (a) MAL Long Term	Tier 1 NSE EQS (b) Surface Water Marine	May 2019 (Spring)	August 2019 (Summer)	October 2019 (Fall)	May 2019	August 2019	October 2019	May 2019	August 2019	October 2019
PARAMETER / SAMPLE ID				AVE-1	AVE-1	AVE-1	AVE-4	AVE-4	AVE-4	AVE-9	AVE-9	AVE-9
Anion Sum	me/L	NGA	NGA	454	482	403	240	267	91.1	242	219	170
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	NGA	NGA	87	97	89	68	91	51	71	73	64
Calculated TDS	mg/L	NGA	NGA	26000	28000	24000	15000	18000	5700	16000	15000	12000
Carb. Alkalinity (calc. as CaCO3)	mg/L	NGA	NGA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cation Sum	me/L	NGA	NGA	444	508	458	280	371	112	314	303	258
Hardness (CaCO3)	mg/L	NGA	NGA	4600	5500	5000	3000	4100	1300	3300	3200	2800
Ion Balance (% Difference)	%	NGA	NGA	1.14	2.60	6.38	7.78	16.3	10.4	12.8	16.2	20.8
Langelier Index (@ 20C)	N/A	NGA	NGA	0.296	0.499	0.189	-0.186	0.0400	-0.531	-0.0990	-0.151	-0.273
Langelier Index (@ 4C)	N/A	NGA	NGA	0.0580	0.260	-0.0480	-0.423	-0.197	-0.770	-0.336	-0.388	-0.510
Nitrate (N)	mg/L	NGA	NGA	<0.050	<0.050	0.14	0.11	0.12	<0.050	0.080	<0.060	0.070
Saturation pH (@ 20C)	N/A	NGA	NGA	7.44	7.30	7.42	7.77	7.48	8.10	7.70	7.71	7.82
Saturation pH (@ 4C)	N/A	NGA	NGA	7.68	7.53	7.66	8.00	7.72	8.34	7.94	7.94	8.05
Inorganics												
Carbonaceaous BOD	mg/L	NGA	NGA	-	<5.0	<5.0	-	16	<5.0	-	5	<5.0
Total Phosphorus (low level)	mg/L	NGA	NGA	-	0.7	0.7	-	1.5	1.5	-	0.29	0.6
Total Alkalinity (Total as CaCO3)	mg/L	NGA	NGA	87	97	89	68	92	51	71	73	64
Dissolved Chloride (Cl-)	mg/L	NGA	NGA	15000	16000	13000	7600	8300	2900	7500	6800	5200
Colour	TCU	NGA	NGA	6.4	9.4	8.7	25	25	72	21	24	34
Nitrate + Nitrite (N)	mg/L	NGA	NGA	<0.050	<0.050	0.16	0.11	0.12	<0.050	0.080	<0.060	0.070
Nitrite (N)	mg/L	NGA	NGA	<0.010	<0.010	0.018	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrogen (Ammonia Nitrogen)	mg/L	NGA	NGA	<0.050	<0.050	0.070	0.057	0.15	0.12	<0.050	0.16	0.092
Total Organic Carbon (C)	mg/L	NGA	NGA	<5.0	<5.0	8.6	8.1	13	<50	<5.0	5.5	12
Orthophosphate (P)	mg/L	NGA	NGA	<0.010	<0.010	<0.010	0.015	<0.010	<0.010	0.014	<0.010	<0.010
pH	pH	7.0 - 8.7	NGA	7.74	7.79	7.61	7.58	7.52	7.57	7.60	7.55	7.54
Reactive Silica (SiO2)	mg/L	NGA	NGA	<0.50	1.0	1.3	1.3	2.4	3.3	1.1	1.9	2.5
Dissolved Sulphate (SO4)	mg/L	NGA	NGA	1900	2000	1700	1200	1600	440	1400	1200	980
Turbidity	NTU	NGA	NGA	170	280	670	660	>1000	>1000	130	360	500
Conductivity	uS/cm	NGA	NGA	40000	43000	40000	25000	33000	11000	28000	29000	24000
Microbiological												
Fecal Coliform	CFU/100mL	NGA	NGA	-	<100	<1.0	-	<100	4.0	-	<100	1.0
Total Coliforms	CFU/100mL	NGA	NGA	-	<100	1600	-	400	3500	-	800	2300
Chlorophyll A												
Chl A (acidification)	µg / L	NGA	NGA	-	46.500	19.800	-	78.000	6.010	-	15.300	5.140
Chl A (non-acidification)	µg / L	NGA	NGA	-	56.600	30.800	-	86.900	11.800	-	15.700	9.200

Notes:

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(a) CCME Water Quality Guidelines (WQGs) for the Protection of Aquatic Life, (Updated to 2017), Marine Aquatic Life (MAL), Long Term effects.

(b) Nova Scotia Environment (NSE), Tier 1 Environmental Quality Standards (EQS) for Surface Water for Marine Aquatic Life (SWMAL), Table 3.

Exceedance Identification:

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Bold and Underline - exceeds CCME MAL

GENERAL CHEMISTRY IN SURFACE WATER - AVON RIVER ESTUARY
NSTIR and NSDA
Avon River Aboiteau
Project No. 171046.01

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)	UNITS	CCME (a) MAL Long Term	Tier 1 NSE EQS (b) Surface Water Marine	May 2019 (Spring)	August 2019 (Summer)	October 2019 (Fall)	May 2019	August 2019	October 2019	May 2019	August 2019	October 2019
PARAMETER / SAMPLE ID				AVE-1	AVE-1	AVE-1	AVE-4	AVE-4	AVE-4	AVE-9	AVE-9	AVE-9
Metals												
Total Aluminum (Al)	ug/L	NGA	NGA	1700	9400	20000	13000	31000	29000	2800	11000	16000
Total Antimony (Sb)	ug/L	NGA	500	<10	<10	<10	<10	<10	<10	<10	<10	<10
Total Arsenic (As)	ug/L	12.5	12.5	<10	<10	12	<10	**19**	12	<10	<10	<10
Total Barium (Ba)	ug/L	NGA	500	15	59	92	58	110	140	21	54	77
Total Beryllium (Be)	ug/L	NGA	100	<10	<10	<10	<10	<10	<10	<10	<10	<10
Total Bismuth (Bi)	ug/L	NGA	NGA	<20	<20	<20	<20	<20	<20	<20	<20	<20
Total Boron (B)	ug/L	NGA	1200	3400	4200	3600	2100	3100	940	2400	2300	2000
Total Cadmium (Cd)	ug/L	0.12	0.12	<0.10	0.10	<0.10	<0.10	**0.13**	<0.10	<0.10	<0.10	<0.10
Total Calcium (Ca)	ug/L	NGA	NGA	300000	360000	320000	200000	290000	100000	220000	220000	190000
Total Chromium (Cr)	ug/L	NGA	NGA	<10	14	27	19	48	37	<10	14	21
Total Cobalt (Co)	ug/L	NGA	NGA	<4.0	7.9	12	11	27	16	<4.0	4.5	9.9
Total Copper (Cu)	ug/L	NGA	2	<5.0	**9.9**	**18**	**14**	**34**	**20**	<5.0	**5.1**	**13**
Total Iron (Fe)	ug/L	NGA	NGA	2200	15000	25000	19000	49000	32000	3700	9900	19000
Total Lead (Pb)	ug/L	NGA	2	<5.0	**10**	**16**	**14**	**37**	**22**	<5.0	**7.1**	**12**
Total Magnesium (Mg)	ug/L	NGA	NGA	940000	1100000	1000000	600000	810000	250000	660000	660000	570000
Total Manganese (Mn)	ug/L	NGA	NGA	100	750	1000	820	2700	1600	150	500	940
Total Molybdenum (Mo)	ug/L	NGA	NGA	<20	<20	<20	<20	<20	<20	<20	<20	<20
Total Nickel (Ni)	ug/L	NGA	8.3	<20	<20	**29**	**21**	**52**	**35**	<20	<20	<20
Total Phosphorus (P)	ug/L	NGA	NGA	<1000	<1000	1200	<1000	1500	1300	<1000	<1000	1200
Total Potassium (K)	ug/L	NGA	NGA	280000	330000	300000	180000	250000	77000	200000	200000	170000
Total Selenium (Se)	ug/L	NGA	2	<10	<5.0	<5.0	<10	<5.0	<5.0	<10	<5.0	<5.0
Total Silver (Ag)	ug/L	NGA	1.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Sodium (Na)	ug/L	NGA	NGA	7900000	9000000	8100000	5000000	6500000	1900000	5600000	5400000	4500000
Total Strontium (Sr)	ug/L	NGA	NGA	5600	6500	5800	3600	5000	1600	4000	3900	3300
Total Thallium (Tl)	ug/L	NGA	21.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Tin (Sn)	ug/L	NGA	NGA	<20	<20	<20	<20	<20	<20	<20	<20	<20
Total Titanium (Ti)	ug/L	NGA	NGA	42	210	590	280	450	310	67	250	400
Total Uranium (U)	ug/L	NGA	100	2.4	3.1	3.0	2.1	3.3	1.6	1.8	2.0	2.1
Total Vanadium (V)	ug/L	NGA	50	<20	31	49	33	**85**	**60**	<20	22	38
Total Zinc (Zn)	ug/L	NGA	10	<50	<50	**73**	**63**	**150**	**94**	<50	<50	<50

Notes:

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(b) Nova Scotia Environment (NSE), Tier 1 Environmental Quality Standards (EQS) for Surface Water for Marine Aquatic Life (SWMAL), Table 3.

Exceedance Identification:

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Bold and Underline - exceeds CCME MAL

APPENDIX D

Depth-Stratified Sampling Results

Appendix D: Depth stratified in-situ sampling at sampling location AVE-3

Sample ID	AVE-03								
Field Program	Reconnaissance	May Sampling	July Sampling	July Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling
Sample Date	28-May-19	31-May-19	05-Jul-19	05-Jul-19	30-Aug-19	30-Aug-19	30-Aug-19	25-Oct-19	25-Oct-19
Sample Time	11:33	10:00	9:17	12:14	12:08	12:08	12:08	9:45	9:45
Tide (HP #282)	HF	HR	LF	LR	HR	HR	HR	HR	HR
Water Depth (cm)	20	40	-	-	1311	1311	1311	1310	1310
Sample Depth in Water Column (cm)	10	10	33	33	Surface	Bottom (914)	Mid (457)	Surface	Mid-column (610)
In-Situ Water Quality Results									
Secchi Depth (m)	-	-	-	-	0	0	0	0.3	0.3
Temp (°C)	9.9	9.5	18	19.1	20.16	19.22	19.23	12.11	12.3
DO (%)	103.8	99.6	47.9	68.3	-	-	-	-	-
DO (mg/L)	10.42	9.93	4.25	5.9	7.02	8.3	8.32	9.95	12.3
Cond (uS/cm)	21827	23123	15780	16668	36500	38500	38400	35800	38900
Salinity (PSU / PPT)	-	-	10.78	11.2	23.1	24.3	24.3	21.88	24.36
pH	7.68	7.8	7.58	7.5	8.28	8.3	8.32	7.62	7.05
TDS (g/L)	-	-	-	-	22.4	23.5	23.5	21.7	23.8
Turbidity (NTU)	-	-	-	-	92.7	111	111	108	134
Laboratory Water Quality Results									
pH	-	-	-	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-	-	-	-
Cond (uS/cm)	-	-	-	-	-	-	-	-	-
Salinity (PSU)	-	19	-	-	28	-	-	23	-
TSS (mg/L)	-	320	-	-	56	-	-	100	-

Summer								
Depth	**Temp (°C)**	**DO (%)**	**DO (mg/L)**	**Cond (uS/cm)**	**Salinity (PSU / PPT)**	**pH**	**TDS (g/L)**	**NTU**
0	20.16	-	7.02	36500	23.1	8.28	22.4	92.7
457	19.23	-	8.32	38400	24.3	8.32	23.5	111
914	19.22	-	8.3	38500	24.3	8.3	23.5	111

Appendix D: Depth stratified in-situ sampling at sampling location AVE-5

Sample ID	AVE-05						
Field Program	May Sampling	July Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling
Sample Date	31-May-19	05-Jul-19	30-Aug-19	30-Aug-19	30-Aug-19	25-Oct-19	25-Oct-19
Sample Time	14:45	12:49	11:42	11:42	11:42	10:01	10:01
Tide (HP #282)	MF	MR	MR	MR	MR	HR	HR
Water Depth (cm)	30	-	802	802	802	950	950
Sample Depth in Water Column (cm)	10	Surface	Surface	Bottom (802)	Middle	Surface	Mid-column (610)
In-Situ Water Quality Results							
Secchi Depth (m)	-	-	-	-	-	0.2	0.2
Temp (°C)	10.3	19.2	19.95	19.49	19.5	12.05	12.2
DO (%)	98.4	59.8	-	-	-	-	-
DO (mg/L)	9.9	5.18	6.67	6.96	6.87	9.74	11.02
Cond (uS/cm)	19522	16735	36000	37200	37000	33800	36300
Salinity (PSU / PPT)	-	11.29	22.6	23.5	23.4	21.01	22.6
pH	7.91	7.59	8.25	8.26	8.26	6.97	6.92
TDS (g/L)	-	-	22	22.7	22.6	20.7	22.7
Turbidity (NTU)	-	-	170	437	336	142	175
Laboratory Water Quality Results							
pH	-	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-	-
Cond (uS/cm)	-	-	-	-	-	-	-
Salinity (PSU)	16		27	-	-	21	-
TSS (mg/L)	1200		140	-	-	120	-

Summer								
Depth	Temp (°C)	DO (%)	DO (mg/L)	Cond (uS/cm)	Salinity (PSU / PPT)	pH	TDS (g/L)	NTU
0	19.95	-	6.67	36000	22.6	8.25	22	170
401	19.5	-	6.87	37000	23.4	8.26	22.6	336
802	19.49	-	6.96	37200	23.5	8.26	22.7	437

Appendix D: Depth stratified in-situ sampling at sampling location AVE-6

Sample ID	AVE-06						
Field Program	Reconnaissance	May Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling
Sample Date	28-May-19	30-May-19	30-Aug-19	30-Aug-19	30-Aug-19	25-Oct-19	25-Oct-19
Sample Time	N/A	N/A	12:33	12:33	12:33	10:12	10:13
Tide (HP #282)	LF	L	HR	HR	HR	HR	HR
Water Depth (cm)	-	-	1128	1128	1128	1210	1210
Sample Depth in Water Column (cm)	-	-	Surface	Bottom (914)	Middle	Surface	Mid-column (760)
In-Situ Water Quality Results							
Secchi Depth (m)	-	-	0	0	0	0.35	0.35
Temp (°C)	-	-	19.84	19.93	19.39	12.15	12.18
DO (%)	-	-	-	-	-	-	-
DO (mg/L)	-	-	7.41	7.32	6.93	9.61	12.47
Cond (uS/cm)	-	-	35900	35900	37200	35400	35700
Salinity (PSU / PPT)	-	-	22.6	22.6	23.5	22.12	22.1
pH	-	-	8.27	8.26	8.33	6.98	6.88
TDS (g/L)	-	-	21.9	21.9	22.7	21.7	21.8
Turbidity (NTU)	-	-	99	92.2	112	116	104
Laboratory Water Quality Results							
pH	-	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-	-
Cond (uS/cm)	-	-	-	-	-	-	-
Salinity (PSU)	-	-	27	-		21	-
TSS (mg/L)	-	-	76	-		81	-

Summer								
Depth	Temp (°C)	DO (%)	DO (mg/L)	Cond (uS/cm)	Salinity (PSU / PPT)	pH	TDS (g/L)	NTU
0	19.84	-	7.41	35900	22.6	8.27	21.9	99
457	19.39	-	6.93	37200	23.5	8.33	22.7	112
914	19.93	-	7.32	35900	22.6	8.26	21.9	92.2

Appendix D: Depth stratified in-situ sampling at sampling location AR-4

Sample ID	AR-04														
Field Program	Reconnaissance	Spring Sampling	In-Situ Water Quality	In-Situ Water Quality	In-Situ Water Quality	In-Situ Water Quality	Summer Sampling	Summer Sampling	Summer Sampling	Summer Sampling	Summer Sampling	Fall Sampling	Fall Sampling	Fall Sampling	Fall Sampling	Winter Sampling
Sample Date	28-May-19	30-May-19	04-Jul-19	04-Jul-19	04-Jul-19	04-Jul-19	27-Aug-19	29-Aug-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19	24-Oct-19	24-Oct-19	13-Dec-19
Sample Time	N/A	15:20	10:05	10:36	10:40	12:28	11:25	9:31	9:31	9:31	9:31	9:34	9:34	9:34	9:34	13:46
Tide (HP #282)	N/A	LF	LR	LR	LR	MR	HF	MR	MR	MR	MR	H	H	H	H	H
Water Depth (cm)	N/A	20	N/A	N/A	N/A	N/A	100	450	450	450	450	381	381	381	381	20
Sample Depth in Water Column (cm)	N/A	10	51	366	Surface	46	Surface	Surface	10 cm above bottom	150 cm above bottom	350 cm above bottom	Surface	200 cm below surface	300 cm below surface	Bottom	Surface
In-Situ Water Quality Results																
Secchi Depth (m)	-	-	-	-	-	-	1	1.35	1.35	1.35	1.35	0.95	0.95	0.95	0.95	-
Temp (°C)	-	12.7	19.5	16.4	18.8	20	21.2	20.25	19.53	19.63	20.15	11.52	11.48	11.56	11.59	1.6
DO (%)	-	94	82.4	75.3	74.9	75.8	50.8	-	-	-	-	-	-	-	-	89.9
DO (mg/L)	-	9.92	7.53	7.36	6.98	6.89	4.55	7.84	7.72	7.16	7.7	12.46	12.24	12.13	12.43	12.58
Cond (uS/cm)	-	262.4	91.6	316.9	96	85.5	135.7	139	146	139	139	720	115	11200	10700	44.1
Salinity (PSU / PPT)	-		0.05	0.18	0.05	0.04	0.07	0.1	0.1	0.1	0.1	0.03	0.05	6.43	5.87	0.04
pH	-	7.1	6.78	6.29	6.31	6.11	7.04	6.75	6.69	7.25	7.33	7.39	7.19	7.03	7.62	5.93
TDS (g/L)	-	-	-	-	-	-	-	0.09	0.095	0.091	0.09	0.046	0.075	7.03	6.63	-
NTU	-	-	-	-	-	-	-	5	15.2	6.6	4.9	5.1	6.7	172	-	-
Laboratory Water Quality Results																
pH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cond (uS/cm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Salinity (PSU)	-	<2.0	-	-	-	-	<2.0	-	-	-	-	<2.0	-	-	-	-
TSS (mg/L)	-	24	-	-	-	-	3	-	-	-	-	7.2	-	-	-	-

Summer									Fall								
Depth	Temp (°C)	DO (%)	DO (mg/L)	Cond (uS/cm)	Salinity (PSU / PPT)	pH	TDS (g/L)	NTU	Depth	Temp (°C)	DO (%)	DO (mg/L)	Cond (uS/cm)	Salinity (PSU / PPT)	pH	TDS (g/L)	NTU
0	20.25	-	7.84	139	0.1	6.75	0.09	5	0	11.52	-	12.46	720	0.03	7.39	0.046	5.1
100	20.15	-	7.7	139	0.1	7.33	0.09	4.9	200	11.48	-	12.24	115	0.05	7.19	0.075	6.7
300	19.63	-	7.16	139	0.1	7.25	0.091	6.6	300	11.56	-	12.13	11200	6.43	7.03	7.03	172
440	19.53	-	7.72	146	0.1	6.69	0.095	15.2	381	11.59	-	12.43	10700	5.87	7.62	6.63	-

Appendix D: Depth stratified in-situ sampling at sampling location AR-4B

Sample ID	AR-04B										
Field Program	Summer Sampling	Summer Sampling	Fall Sampling	Fall Sampling	Fall Sampling	Fall Sampling	Fall Sampling	Fall Sampling	Fall Sampling	Winter Sampling	Winter Sampling
Sample Date	27-Aug-19	27-Aug-19	23-Oct-19	23-Oct-19	24-Oct-19	24-Oct-19	24-Oct-19	24-Oct-19	24-Oct-19	13-Dec-19	13-Dec-19
Sample Time	19:38	19:38	9:40	9:40	10:14	10:14	10:14	10:14	10:14	13:32	13:32
Tide (HP #282)	LR	LR	H	H	H	H	H	H	H	H	H
Water Depth (cm)	~500-600	~500-600	~500-600	~500-600	~500-600	~500-600	~500-600	~500-600	~500-600	~500-600	~500-600
Sample Depth in Water Column (cm)	Surface	Bottom	Surface	Bottom	Surface	300 cm below surface	400 cm below surface	500 cm below surface	Bottom	Surface	300 cm below surface
In-Situ Water Quality Results											
Secchi Depth (m)	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	0.9	0.9
Temp (°C)	21	20.9	11.25	11.39	11.7	11.48	11.5	11.65	11.75	1.5	1.7
DO (%)	71.6	76.1	-	-	-	-	-	-	-	98.1	99.6
DO (mg/L)	6.37	6.8	13.75	12.36	11.23	11.67	12.1	12.1	12.47	13.86	13.55
Cond (uS/cm)	135.3	290.6	124	9400	81	119	135	11800	17200	46.1	3958
Salinity (PSU / PPT)	0.07	0.15	0	4	0.04	0.06	0.07	6.63	10.73	0.04	3.81
pH	7.22	7.16	8.75	8.58	6.64	6.52	6.75	6.98	6.88	5.75	4.97
TDS (g/L)	-	-	0.075	5.9	0.053	0.075	0.086	7.31	10.7	-	-
NTU	-	-	-	-	4.6	5.4	6.5	169	370	-	-
Laboratory Water Quality Results											
pH	-	-	-	-	-	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-	-	-	-	-	-
Cond (uS/cm)	-	-	-	-	-	-	-	-	-	-	-
Salinity (PSU)	-	<2.0	-	9	-	-	-	-	12	-	-
TSS (mg/L)	-	310	-	260	-	-	-	-	340	-	-

Fall								
Depth	**Temp (°C)**	**DO (%)**	**DO (mg/L)**	**Cond (uS/cm)**	**Salinity (PSU / PPT)**	**pH**	**TDS (g/L)**	**NTU**
0	11.7	-	11.23	81	0.04	6.64	0.053	4.6
300	11.48	-	11.67	119	0.06	6.52	0.075	5.4
400	11.5	-	12.1	135	0.07	6.75	0.086	6.5
500	11.65	-	12.1	11800	6.63	6.98	7.31	169

Appendix D: Depth stratified in-situ sampling at sampling location AR-5

Sample ID		AR-05										
Field Program	CCME (a) FWAL Long Term	Reconnaissance	Spring Sampling	Summer Sampling	Summer Sampling	Summer Sampling	Summer Sampling	Fall Sampling	Fall Sampling	Fall Sampling	Fall Sampling	Fall Sampling
Sample Date		28-May-19	30-May-19	29-Aug-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19	24-Oct-19	24-Oct-19	24-Oct-19
Sample Time		N/A	15:32	9:13	9:13	9:13	9:13	11:17	11:17	11:17	11:17	11:17
Tide (HP #282)		N/A	LF	M	M	M	M	HF	HF	HF	HF	HF
Water Depth (cm)		N/A	500+	450	450	450	450	450	450	450	450	450
Sample Depth in Water Column (cm)		N/A	10	Surface	Bottom	150 cm above bottom	350 cm above bottom	Surface	150 cm below surface	300 cm below surface	400 cm below surface	Bottom
In-Situ Water Quality Results												
Secchi Depth (m)	NGA	-	-	1.5	1.5	1.5	1.5	0.85	0.85	0.85	0.85	0.85
Temp (°C)	NGA	-	13	20.32	19.5	19.7	20.27	11.59	11.53	11.51	11.58	11.62
DO (%)	NGA	-	93	-	-	-	-	-	-	-	-	-
DO (mg/L)	NGA	-	9.74	8.24	7.41	6.65	7.67	11.82	11.58	12.27	12.23	12.2
Cond (uS/cm)	NGA	-	300.1	143	142	142	145	76	92	231	8950	10700
Salinity (PSU / PPT)	NGA	-	-	0.1	0.1	0.1	0.1	0.03	0.05	0.08	4.75	6.01
pH	6.5 - 9	-	7.21	6.74	6.76	7.2	7.31	6.51	6.52	6.17	6.67	6.66
TDS (g/L)	NGA	-	-	0.093	0.093	0.092	0.094	0.049	0.058	0.197	5.9	6.71
NTU	NGA	-	-	6.3	13.1	5.7	5.6	4.6	5.6	8	160	127
Laboratory Water Quality Results												
pH	6.5 - 9	-	-	-	-	-	-	-	-	-	-	-
Turbidity (NTU)	NGA	-	-	-	-	-	-	-	-	-	-	-
Cond (uS/cm)	NGA	-	-	-	-	-	-	-	-	-	-	-
Salinity (PSU)	NGA	-	<2.0	<2.0	-	-	-	<2.0	-	-	-	-
TSS (mg/L)	NGA	-	19	3.2	-	-	-	7.1	-	-	-	-

Summer								
Depth	Temp (°C)	DO (%)	DO (mg/L)	Cond (uS/cm)	Salinity (PSU / PPT)	pH	TDS (g/L)	NTU
0	20.32	-	8.24	143	0.1	6.74	0.093	6.3
100	20.27	-	7.67	145	0.1	7.31	0.094	5.6
300	19.7	-	6.65	142	0.1	7.2	0.092	5.7
450	19.5	-	7.41	142	0.1	6.76	0.093	13.1

Fall								
Depth	Temp (°C)	DO (%)	DO (mg/L)	Cond (uS/cm)	Salinity (PSU / PPT)	pH	TDS (g/L)	NTU
0	11.59	-	11.82	76	0.03	6.51	0.049	4.6
150	11.53	-	11.58	92	0.05	6.52	0.058	5.6
300	11.51	-	12.27	231	0.08	6.17	0.197	8
400	11.58	-	12.23	8950	4.75	6.67	5.9	160
450	11.62	-	12.2	10700	6.01	6.66	6.71	127

Appendix D: Depth stratified in-situ sampling at sampling location AR-6

Sample ID	AR-06																		
Field Program	Reconnaissance	May Sampling	July Sampling	July Sampling	July Sampling	July Sampling	July Sampling	August Sampling	August Sampling	August Sampling	August Sampling	August Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling	October Sampling	December Sampling
Sample Date	28-May-19	30-May-19	04-Jul-19	04-Jul-19	04-Jul-19	04-Jul-19	04-Jul-19	27-Aug-19	27-Aug-19	27-Aug-19	29-Aug-19	29-Aug-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19	24-Oct-19	13-Dec-19
Sample Time	N/A	15:00	10:18	10:35	10:40	12:35	12:35	12:05	12:05	12:17	8:40	8:40	8:40	8:40	8:40	12:16	12:16	12:16	13:56
Tide (HP #282)	N/A	LF	LR	LR	LR	MR	MR	HF	HF	HF	LR	LR	LR	LR	LR	MF	MF	MF	H
Water Depth (cm)	N/A	40	N/A	N/A	N/A	N/A	N/A		200	750	750	750	750	750	750	750	750	750	30
Sample Depth in Water Column (cm)	N/A	10	66	Surface	457	76	Surface	Surface	Bottom	400	Surface	10 cm above bottom	200 cm above Bottom	400 cm above Bottom	500 cm above Bottom	Surface	375 cm below surface	Bottom	Surface
In-Situ Water Quality Results																			
Secchi Depth (m)	-	-	-	-	-	-	-	1.5	1.5	-	1.65	1.65	1.65	1.65	1.65	1	1	1	-
Temp (°C)	14.6	12.9	18.6	19.3	15.9	17.8	18.6	20.9	21	20.7	20.2	19.39	19.38	19.45	20.02	11.73	11.56	11.53	1.5
DO (%)	105.2	98.1	73.1	87.6	79.8	63.3	62.5	51.7	41.7	42.6	-	-	-	-	-	-	-	-	85.1
DO (mg/L)	10.63	10.3	6.82	8.05	7.76	5.99	5.84	4.62	3.68	3.81	8.57	7.38	7.33	6.88	7.51	11.18	11.94	13.37	11.93
Cond (uS/cm)	187.9	267.1	75.5	70.1	130.4	82.7	76.6	128.4	127.6	126	153	144	148	153	147	65	64	65	36.1
Salinity (PSU / PPT)	-	-	0.04	0.04	0.08	0.04	0.04	0.07	0.06	0.06	0.1	0.1	0.1	0.1	0.1	0.03	0.03	0.03	0.03
pH	8.67	7.05	6.62	6.35	6.16	5.99	5.93	6.99	7.00	7.03	6.65	7.16	7.16	7.18	6.65	6.49	5.94	5.93	5.84
TDS (g/L)	-	-	-	-	-	-	-	-	-	-	0.097	0.093	0.095	0.099	0.094	0.042	0.042	0.043	-
NTU	-	-	-	-	-	-	-	-	-	-	6.1	10.2	7.5	7.8	5	6.8	5.3	7.3	-
Laboratory Water Quality Results																			
pH	-	7.34	-	-	-	-	-	-	-	-	-	-	-	-	-	6.75	-	-	-
Turbidity (NTU)	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	6.5	-	-	-
Cond (uS/cm)	-	340	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-
Salinity (PSU)	-	<2.0	-	-	-	-	-	<2.0	-	-	-	-	-	-	-	<2.0	-	-	-
TSS (mg/L)	-	27	-	-	-	-	-	2.9	-	-	-	-	-	-	-	5.9	-	-	-

Summer									Fall								
Depth	Temp (°C)	DO (%)	DO (mg/L)	Cond (uS/cm)	Salinity (PSU / PPT)	pH	TDS (g/L)	NTU	Depth	Temp (°C)	DO (%)	DO (mg/L)	Cond (uS/cm)	Salinity (PSU / PPT)	pH	TDS (g/L)	NTU
0	20.2	-	8.57	153	0.1	6.65	0.097	6.1	0	11.73	-	11.18	65	0.03	6.49	0.042	6.8
250	20.02	-	7.51	147	0.1	6.65	0.094	5	375	11.56	-	11.94	64	0.03	5.94	0.042	5.3
350	19.45	-	6.88	153	0.1	7.18	0.099	7.8	750	11.53	-	13.37	65	0.03	5.93	0.043	7.3
550	19.38	-	7.33	148	0.1	7.16	0.095	7.5									
740	19.39	-	7.38	144	0.1	7.16	0.093	10.2									

Appendix D: Depth stratified in-situ sampling at sampling location AR-7

Sample ID	AR-07						
Field Program	Reconnaissance	Spring Sampling	Summer Sampling	Summer Sampling	Summer Sampling	Fall Sampling	Fall Sampling
Sample Date	28-May-19	30-May-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19
Sample Time	N/A	16:51	10:29	10:29	10:29	12:53	12:53
Tide (HP #282)	N/A	L	MR	MR	MR	MF	MF
Water Depth (cm)	N/A	20	450	450	450	420	420
Sample Depth in Water Column (cm)	N/A	15	Surface	Bottom (10 cm above bottom)	200 cm above Bottom	Surface	Bottom
In-Situ Water Quality Results							
Secchi Depth (m)	-	-	1.6	1.6	1.6	1	1
Temp (°C)	-	12.5	20.48	19.32	19.59	11.7	11.36
DO (%)	-	106.8	-	-	-	-	-
DO (mg/L)	-	11.3	8.21	7.53	6.98	11.53	12.89
Cond (uS/cm)	-	179.4	135	134	133	66	61
Salinity (PSU / PPT)	-	-	0.1	0.1	0.1	0.03	0.03
pH	-	7.58	6.82	6.78	6.74	6.83	6.19
TDS (g/L)	-	-	0.088	0.087	0.087	0.043	0.04
NTU	-	-	4.2	6.8	6.7	6.9	7
Laboratory Water Quality Results							
pH	-	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-	-
Cond (uS/cm)	-	-	-	-	-	-	-
Salinity (PSU)	-	<2.0	<2.0	-	-	<2.0	-
TSS (mg/L)	-	16	2.8	-	-	6.8	-

Summer								
Depth	Temp (°C)	DO (%)	DO (mg/L)	Cond (uS/cm)	Salinity (PSU / PPT)	pH	TDS (g/L)	NTU
0	20.48	-	8.21	135	0.1	6.82	0.088	4.2
250	19.59	-	6.98	133	0.1	6.74	0.087	6.7
440	19.32	-	7.53	134	0.1	6.78	0.087	6.8

Appendix D: Depth stratified in-situ sampling at sampling location AR-8

Sample ID	AR-08						
Field Program	Reconnaissance	Spring Sampling	Summer Sampling	Summer Sampling	Summer Sampling	Fall Sampling	Fall Sampling
Sample Date	28-May-19	30-May-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19
Sample Time	N/A	N/A	10:47	10:47	10:47	13:10	13:10
Tide (HP #282)	N/A	N/A	HR	HR	HR	MF	MF
Water Depth (cm)	N/A	N/A	400	400	400	380	380
Sample Depth in Water Column (cm)	N/A	N/A	Surface	Bottom (10 cm above bottom)	250 cm above Bottom	Surface	Bottom
In-Situ Water Quality Results							
Secchi Depth (m)	-	-	1.7	1.7	1.7	0.9	0.9
Temp (°C)	-	-	20.98	19.43	20.87	11.94	11.58
DO (%)	-	-	-	-	-	-	-
DO (mg/L)	-	-	8.08	7.57	7.34	11.56	12.59
Cond (uS/cm)	-	-	125	137	125	71	88
Salinity (PSU / PPT)	-	-	0.1	0.1	0.1	0.03	0.04
pH	-	-	7.02	6.79	7.34	6.92	6.44
TDS (g/L)	-	-	0.081	0.089	0.081	0.045	0.057
NTU	-	-	3.6	11.3	3.7	7.9	64.7
Laboratory Water Quality Results							
pH	-	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-	-
Cond (uS/cm)	-	-	-	-	-	-	-
Salinity (PSU)	-	-	<2.0	-	-	<2.0	-
TSS (mg/L)	-	-	2.6	-	-	7.6	-

Summer								
Depth	**Temp (°C)**	**DO (%)**	**DO (mg/L)**	**Cond (uS/cm)**	**Salinity (PSU / PPT)**	**pH**	**TDS (g/L)**	**NTU**
0	20.98	-	8.08	125	0.1	7.02	0.081	3.6
150	20.87	-	7.34	125	0.1	7.34	0.081	3.7
390	19.43	-	7.57	137	0.1	6.79	0.089	11.3

Appendix D: Depth stratified in-situ sampling at sampling location AR-9

Sample ID	AR-09						
Field Program	Reconnaissance	Spring Sampling	Summer Sampling	Summer Sampling	Summer Sampling	Fall Sampling	Fall Sampling
Sample Date	28-May-19	30-May-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19
Sample Time	N/A	13:30	11:02	11:02	11:02	13:20	13:20
Tide (HP #282)	LR	M	HR	HR	HR	MF	MF
Water Depth (cm)	N/A	30	430	430	430	380	380
Sample Depth in Water Column (cm)	N/A	10	Surface	Bottom (10 cm above bottom)	250 cm above Bottom	Surface	Bottom
In-Situ Water Quality Results							
Secchi Depth (m)	-	-	1.55	1.55	1.55	0.9	0.9
Temp (°C)	-	13.4	21.25	19.06	19.99	11.68	11.36
DO (%)	-	103	-	-	-	-	-
DO (mg/L)	-	10.83	8.1	6.95	6.84	11.7	11.9
Cond (uS/cm)	-	270.7	122	206	112	95	241
Salinity (PSU / PPT)	-	-	0.1	0.1	0.1	0.04	0.11
pH	-	7.1	6.95	6.78	7.21	6.99	6.99
TDS (g/L)	-	-	0.08	0.134	0.072	0.06	0.156
NTU	-	-	3.4	5.6	4.1	6.6	17.5
Laboratory Water Quality Results							
pH	-	7.3	-	-	-	6.85	-
Turbidity (NTU)	-	4.2	-	-	-	6.3	-
Cond (uS/cm)	-	390	-	-	-	98	-
Salinity (PSU)	-	<2.0	<2.0	-	-	<2.0	-
TSS (mg/L)	-	6.1	<2.2	-	-	7.7	-

Summer								
Depth	**Temp (°C)**	**DO (%)**	**DO (mg/L)**	**Cond (uS/cm)**	**Salinity (PSU / PPT)**	**pH**	**TDS (g/L)**	**NTU**
0	21.25	-	8.1	122	0.1	6.95	0.08	3.4
180	19.99	-	6.84	112	0.1	7.21	0.072	4.1
420	19.06	-	6.95	206	0.1	6.78	0.134	5.6

Appendix D: Depth stratified in-situ sampling at sampling location AR-10

Sample ID	AR-10						
Field Program	Reconnaissance	May Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling
Sample Date	28-May-19	30-May-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19
Sample Time	N/A	N/A	11:19	11:19	11:19	13:28	13:28
Tide (HP #282)	N/A	N/A	HR	HR	HR	MF	MF
Water Depth (cm)	N/A	N/A	330	330	330	140	140
Sample Depth in Water Column (cm)	N/A	N/A	Surface	Bottom (10 cm above bottom)	250 cm above Bottom	Surface	Bottom
In-Situ Water Quality Results							
Secchi Depth (m)	-	-	2	2	-	0.7	0.7
Temp (°C)	-	-	20.78	19.92	20.49	11.91	11.36
DO (%)	-	-	-	-	-	-	-
DO (mg/L)	-	-	8	7.48	7.53	11.35	11.9
Cond (uS/cm)	-	-	95	345	122	72	241
Salinity (PSU / PPT)	-	-	0	0.2	0.1	0.03	0.11
pH	-	-	6.68	7.02	7.53	6.99	6.99
TDS (g/L)	-	-	0.062	0.236	0.075	0.047	0.156
NTU	-	-	1.4	8.7	1.2	12.5	17.5
Laboratory Water Quality Results							
pH	-	-		-	-		-
Turbidity (NTU)	-	-		-	-		-
Cond (uS/cm)	-	-		-	-		-
Salinity (PSU)	-	-	<2.0	-	-	<2.0	-
TSS (mg/L)	-	-	1.8	-	-	8.8	-

Summer								
Depth	**Temp (°C)**	**DO (%)**	**DO (mg/L)**	**Cond (uS/cm)**	**Salinity (PSU / PPT)**	**pH**	**TDS (g/L)**	**NTU**
0	20.78	-	8	95	0	6.68	0.062	1.4
70	20.49	-	7.53	122	0.1	7.53	0.075	1.2
320	19.92	-	7.48	345	0.2	7.02	0.236	8.7

Appendix D: Depth stratified in-situ sampling at sampling location AR-12

Sample ID	CCME (a) FWAL Long Term	AR-12								
Field Program		Reconnaissance	Spring Sampling	In-Situ Water Quality	In-Situ Water Quality	Summer Sampling	Summer Sampling	Summer Sampling	Fall Sampling	Fall Sampling
Sample Date		28-May-19	30-May-19	04-Jul-19	04-Jul-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19
Sample Time		N/A	12:32	15:21	15:21	11:49	11:49	11:49	13:43	13:43
Tide (HP #282)		N/A	HF	H	H	HR	HR	HR	LF	LF
Water Depth (cm)		N/A	30	N/A	N/A	420	420	420	370	370
Sample Depth in Water Column (cm)		N/A	10	76	Surface	Surface	Bottom	Middle (200 cm above bottom)	Surface	Bottom
In-Situ Water Quality Results										
Secchi Depth (m)	NGA	-	-	-	-	1.65	1.65	1.65	0.7	0.7
Temp (°C)	NGA	-	12.6	17.7	18.6	20.65	19.71	20.16	11.81	11.75
DO (%)	NGA	-	104.9	68.1	60.6	-	-	-	-	-
DO (mg/L)	NGA	-	11.09	6.35	5.55	8.63	7.17	7.36	11.11	12.29
Cond (uS/cm)	NGA	-	146.6	55.5	56.9	91	98	91	65	65
Salinity (PSU / PPT)	NGA	-	-	0.03	0.03	0	0	0	0.03	0.03
pH	6.5 - 9	-	6.84	5.73	5.45	6.52	6.5	6.37	7.01	6.51
TDS (g/L)	NGA	-	-	-	-	0.047	0.063	0.058	0.042	0.042
NTU	NGA	-	-	-	-	20	20.1	5.9	12.8	10.9
Laboratory Water Quality Results										
pH	6.5 - 9	-	6.98	-	-	-	-	-	6.62	-
Turbidity (NTU)	NGA	-	2.1	-	-	-	-	-	11	-
Cond (uS/cm)	NGA	-	190	-	-	-	-	-	63	-
Salinity (PSU)	NGA	-	<2.0	-	-	<2.0	-	-	<2.0	-
TSS (mg/L)	NGA	-	4.8	-	-	3.2	-	-	6.4	-

Summer								
Depth	Temp (°C)	DO (%)	DO (mg/L)	Cond (uS/cm)	Salinity (PSU / PPT)	pH	TDS (g/L)	NTU
0	20.65	-	8.63	91	0	6.52	0.047	20
220	20.16	-	7.36	91	0	6.37	0.058	5.9
420	19.71	-	7.17	98	0	6.5	0.063	20.1

Appendix D: Depth stratified in-situ sampling at sampling location AR-15

Sample ID	AR-15											
Field Program	Reconnaissance	Spring Sampling	July Sampling	July Sampling	August Sampling	August Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling	December Sampling
Sample Date	28-May-19	30-May-19	04-Jul-19	04-Jul-19	27-Aug-19	27-Aug-19	27-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19	13-Dec-19
Sample Time	N/A	10:16	14:20	14:20	18:29	18:29	18:29	12:24	12:24	14:19	14:19	11:57
Tide (HP #282)	N/A	H	HR	HR	LR	LR	LR	H	H	LF	LF	MR
Water Depth (cm)	N/A	20	N/A	N/A	200 to 250	200 to 250	200 to 250	360	360	170	170	100-200(?)
Sample Depth in Water Column (cm)	N/A	15	107	Surface	Surface	Middle (100)	Bottom (200 to 250)	Surface	Bottom	Surface	Bottom	20
In-Situ Water Quality Results												
Secchi Depth (m)	-	-	-	-	-	-	-	1.7	1.7	0.7	0.7	-
Temp (°C)	-	11.6	18.1	23.7	20.9	20.5	20.7	21.33	19.83	12	11.62	0.9
DO (%)	-	99.9	50.5	69.7	54.4	43.4	40.1	-	-	-	-	96.8
DO (mg/L)	-	10.91	4.77	5.9	4.65	3.88	3.59	5.69	7.23	11	11.59	13.8
Cond (uS/cm)	-	100.4	53.5	40.1	46.4	48.2	60.4	46	81	65	239	23.9
Salinity (PSU / PPT)	-	N/A	0.03	0.02	0.02	0.02	0.02	0	0	0.03	0.08	0.02
pH	-	8.61	6.05	6.22	8.55	8.29	7.96	6.13	6.08	7.14	6.94	5.29
TDS (g/L)	-	-	-	-	-	-	-	0.03	0.053	0.043	0.114	-
NTU	-	-	-	-	-	-	-	1.8	4.2	14.6	53.3	-
Laboratory Water Quality Results												
pH	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-	-	-	-	-	-	-
Cond (uS/cm)	-	-	-	-	-	-	-	-	-	-	-	-
Salinity (PSU)	-	<2.0	-	-	<2.0	-	-	-	-	<2.0	-	-
TSS (mg/L)	-	4	-	-	18	-	-	-	-	13	-	-

Summer								
Depth	Temp (°C)	DO (%)	DO (mg/L)	Cond (uS/cm)	Salinity (PSU / PPT)	pH	TDS (g/L)	NTU
0	20.9	54.4	4.65	46.4	0.02	8.55	-	-
100	20.5	43.4	3.88	48.2	0.02	8.29	-	-
200	20.7	40.1	3.59	60.4	0.02	7.96	-	-

Appendix D: Depth stratified in-situ sampling at sampling location AR-16

Sample ID	AR-16										
Field Program	Reconnaissance	Spring Sampling	In-Situ Water Quality	In-Situ Water Quality	Summer Sampling	Summer Sampling	Summer Sampling	Summer Sampling	Summer Sampling	Fall Sampling	Fall Sampling
Sample Date	28-May-19	30-May-19	04-Jul-19	04-Jul-19	27-Aug-19	27-Aug-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19
Sample Time	N/A	11:13	14:41	14:41	19:03	19:03	15:26	15:26	15:26	14:30	14:30
Tide (HP #282)	LR	H	HR	HR	LR	LR	HF	HF	HF	LF	LF
Water Depth (cm)	N/A	15-20	N/A	N/A	200	200	262	262	262	290	290
Sample Depth in Water Column (cm)	N/A	10	102	Surface	Surface	Bottom	Surface	Bottom	Middle	Surface	Bottom
In-Situ Water Quality Results											
Secchi Depth (m)	-	-	-	-	-	-	2	2	2	1	1
Temp (°C)	-	12.2	17.7	18.1	20.8	20.8	21.14	20.98	21.11	11.38	11.37
DO (%)	-	109.9	73.6	54.8	59.3	53.9	-	-	-	-	-
DO (mg/L)	-	11.81	7	5.19	5.31	4.85	8.69	7.49	7.23	11.3	12.13
Cond (uS/cm)	-	72.5	35.1	35.2	40.6	41.6	47	47	47	41	41
Salinity (PSU / PPT)	-		0.02	0.02	0.02	0.02	0	0	0	0.02	0.02
pH	-	7.58	5.52	5.36	7.67	7.37	5.91	5.84	8.84	7.09	6.71
TDS (g/L)	-	-	-	-	-	-	0.031	0.031	0.03	0.026	0.027
NTU	-	-	-	-	-	-	0.1	0.2	0.3	0	0
Laboratory Water Quality Results											
pH	-	7.05	-	-	-	-	-	-	-	6.27	-
Turbidity (NTU)	-	2.1	-	-	-	-	-	-	-	2.7	-
Cond (uS/cm)	-	90	-	-	-	-	-	-	-	40	-
Salinity (PSU)	-	<2.0	-	-	<2.0	-	-	-	-	<2.0	-
TSS (mg/L)	-	5.4	-	-	4.3	-	-	-	-	<2.3	-

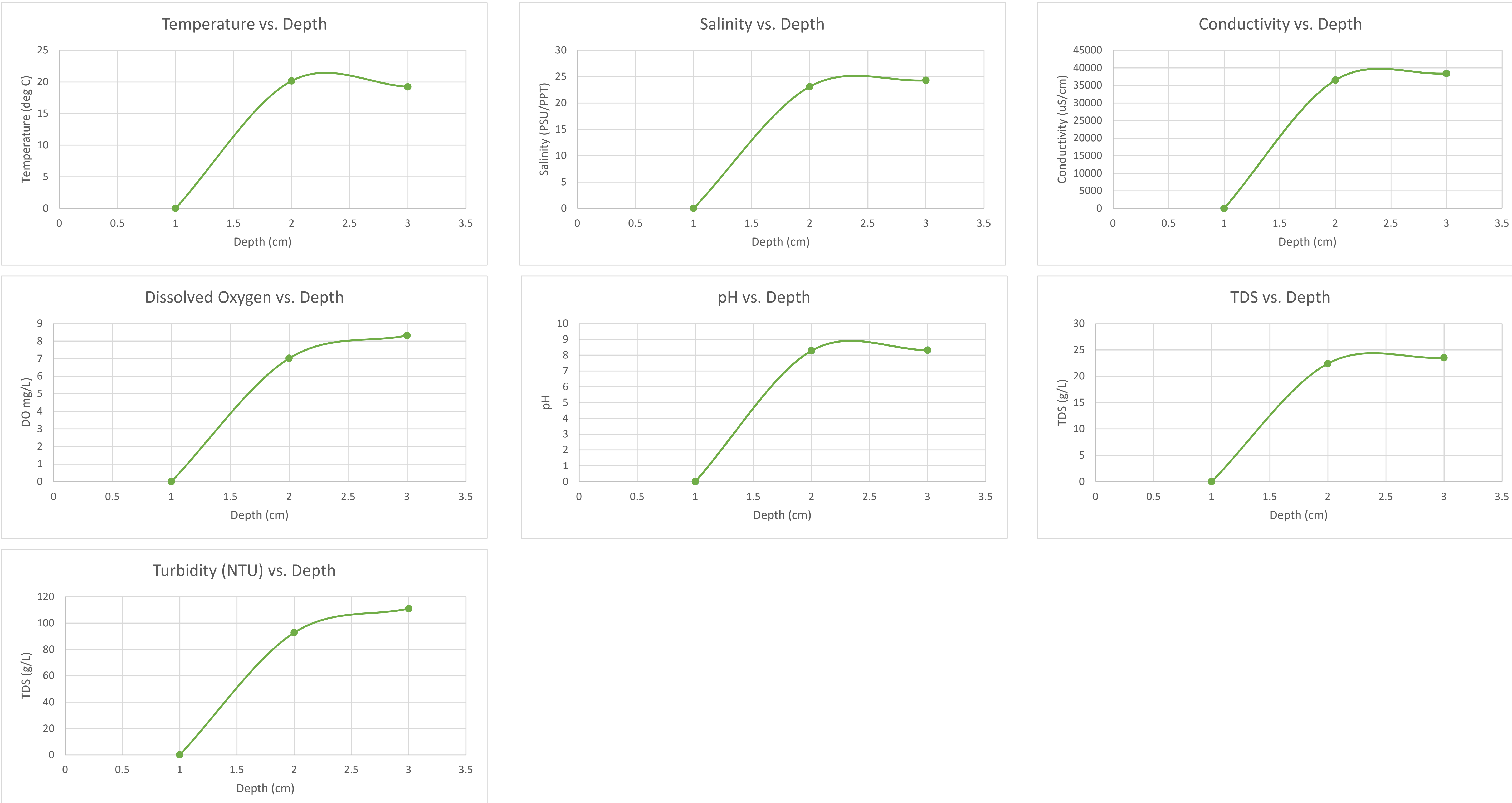
Summer								
Depth	**Temp (°C)**	**DO (%)**	**DO (mg/L)**	**Cond (uS/cm)**	**Salinity (PSU / PPT)**	**pH**	**TDS (g/L)**	**NTU**
0	21.14	-	8.69	47	0	5.91	0.031	0.1
131	21.11	-	7.23	47	0	8.84	0.03	0.3
262	20.98	-	7.49	47	0	5.84	0.031	0.2

Appendix D: Depth stratified in-situ sampling at sampling location AR-18

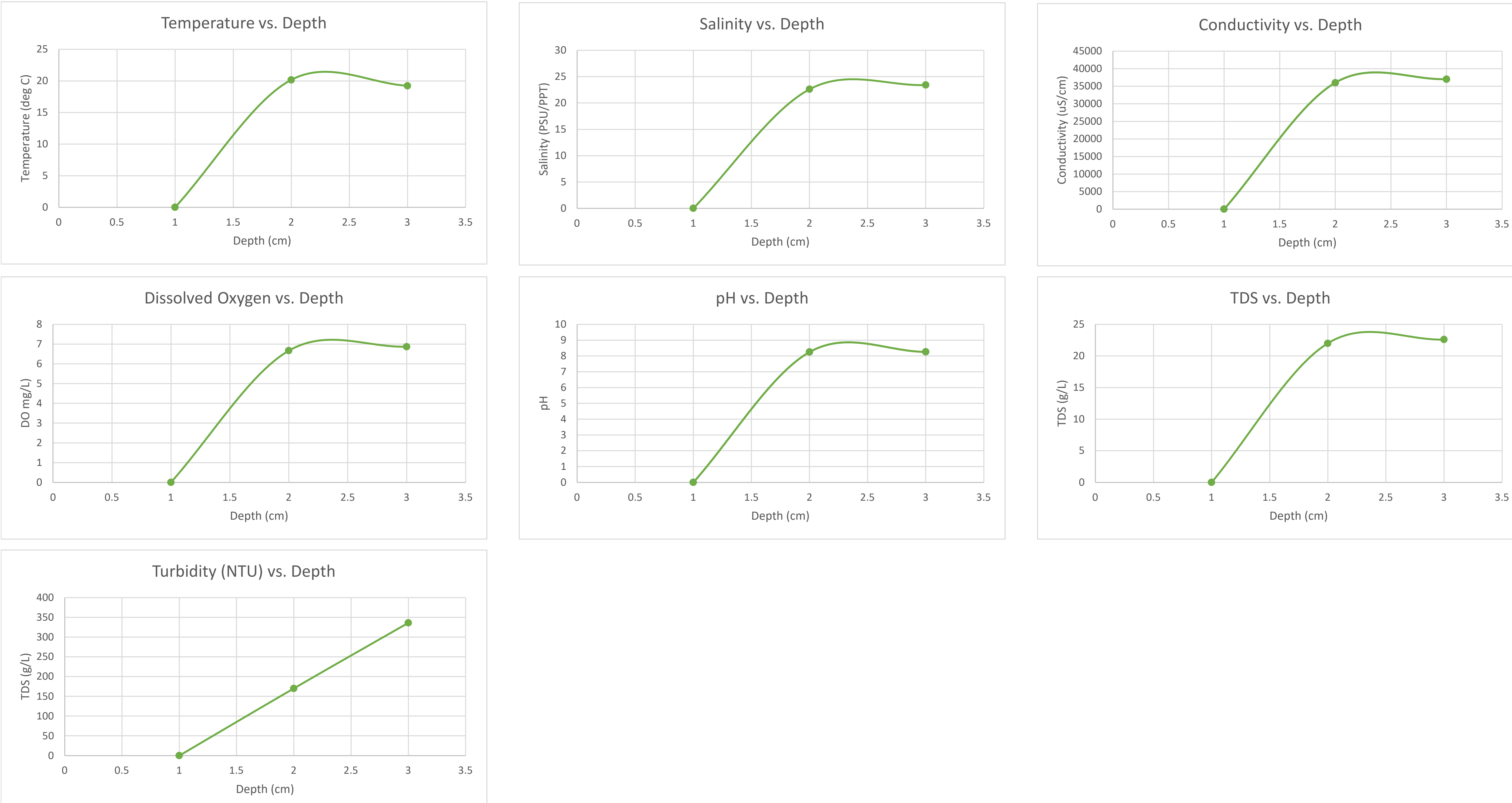
Sample ID	AR-18								
Field Program	Reconnaissance	May Sampling	July Sampling	July Sampling	August Sampling	August Sampling	August Sampling	October Sampling	October Sampling
Sample Date	28-May-19	30-May-19	04-Jul-19	04-Jul-19	29-Aug-19	29-Aug-19	29-Aug-19	24-Oct-19	24-Oct-19
Sample Time	N/A	11:45	14:59	14:59	14:40	14:40	14:40	15:01	15:01
Tide (HP #282)	LR	HF	H	H	HF	HF	HF	LF	LF
Water Depth (cm)	N/A	100	N/A	N/A	338	338	338	130	130
Sample Depth in Water Column (cm)	N/A	10	150	Surface	Surface	Bottom	Middle (183 cm above bottom)	Surface	Bottom
In-Situ Water Quality Results									
Secchi Depth (m)	-	-	-	-	1.6	1.6	1.6	1.2	1.2
Temp (°C)	-	11.1	19	19	21.49	19.16	19.05	10.69	10.69
DO (%)	-	104.5	102.6	102.3	-	-	-	-	-
DO (mg/L)	-	11.42	9.53	9.5	8.34	6.87	6.75	11.64	11.4
Cond (uS/cm)	-	29.2	35	34.9	263	351	318	36	37
Salinity (PSU / PPT)	-		0.02	0.02	0.1	0.2	0.2	0.02	0.02
pH	-	7.54	5.35	5.26	7.03	6.78	7.06	7.19	7.22
TDS (g/L)	-	-	-	-	0.176	0.224	0.207	0.024	0.024
NTU	-	-	-	-	4.3	4.5	3.1	0	0
Laboratory Water Quality Results									
pH	-	-	-	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-	-	-	-
Cond (uS/cm)	-	-	-	-	-	-	-	-	-
Salinity (PSU)	-	<2.0	-	-	<2.0	-	-	<2.0	-
TSS (mg/L)	-	1.2	-	-	3.6	-	-	2	-

Summer								
Depth	Temp (°C)	DO (%)	DO (mg/L)	Cond (uS/cm)	Salinity (PSU / PPT)	pH	TDS (g/L)	NTU
0	21.49	-	8.34	263	0.1	7.03	0.176	4.3
155	19.05	-	6.75	318	0.2	7.06	0.207	3.1
338	19.16	-	6.87	351	0.2	6.78	0.224	4.5

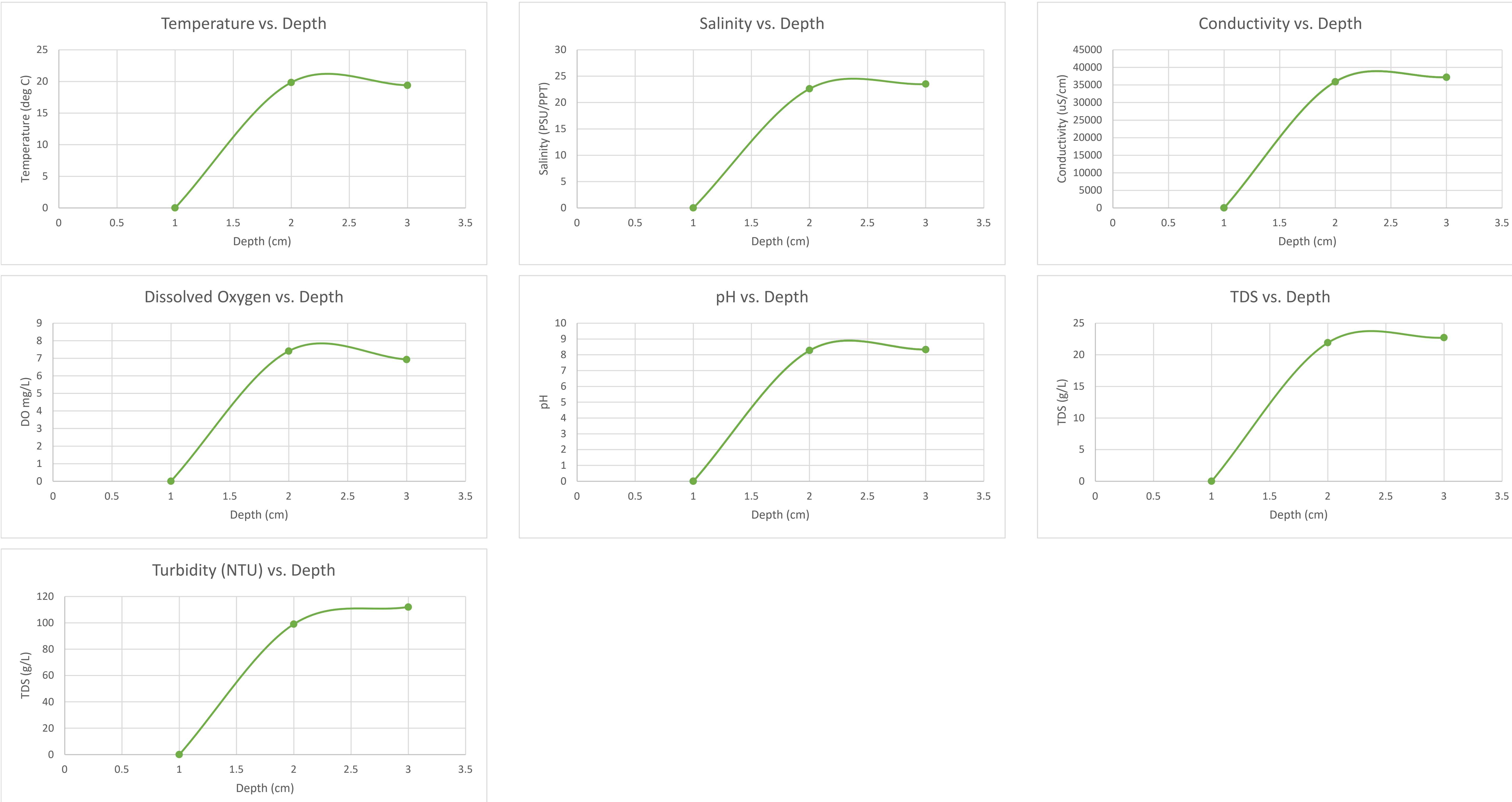
Appendix D: Figure 1 - Depth stratified in-situ sampling at sampling location AVE-3



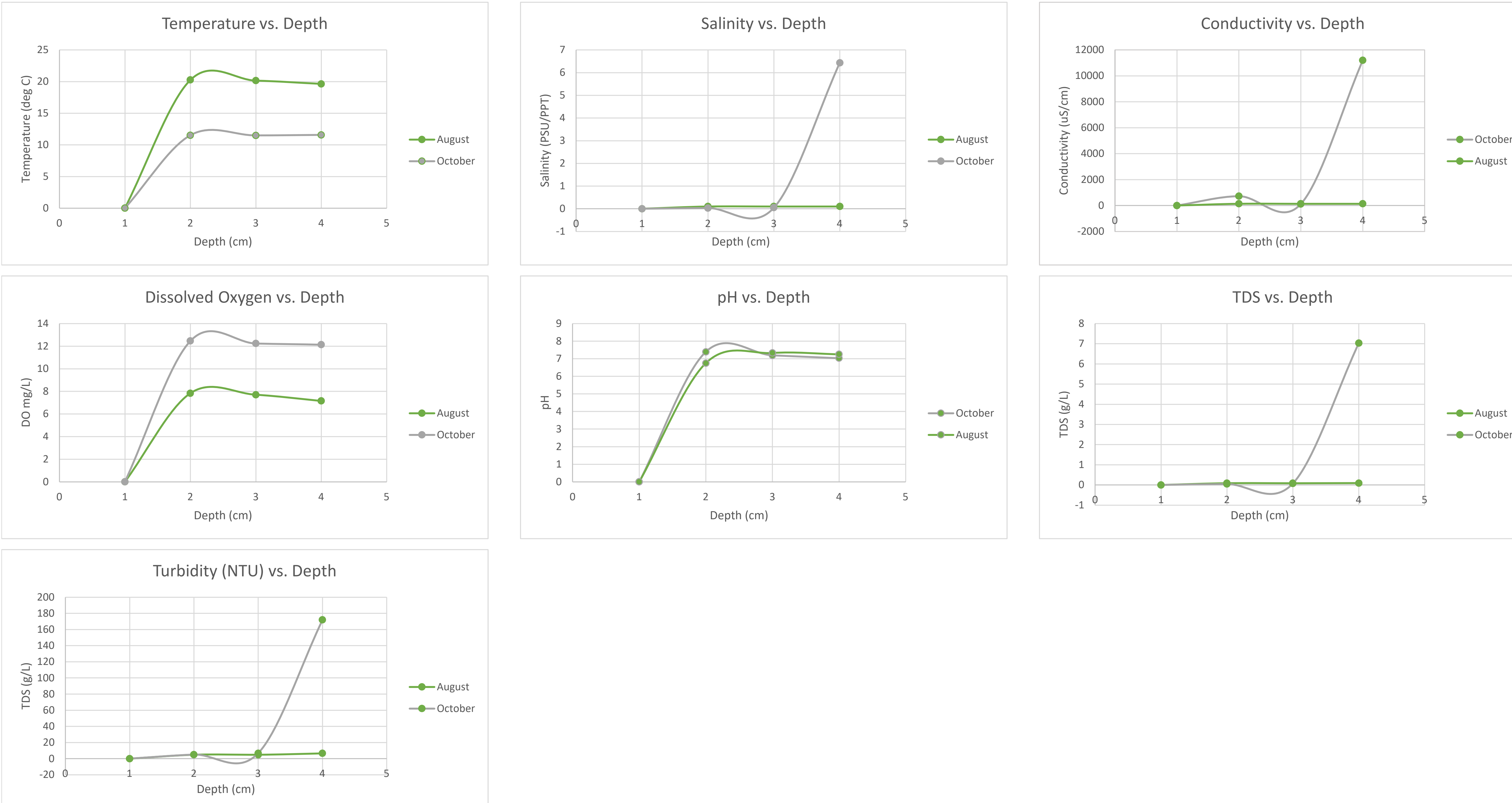
Appendix D: Figure 2 - Depth stratified in-situ sampling at sampling location AVE-5



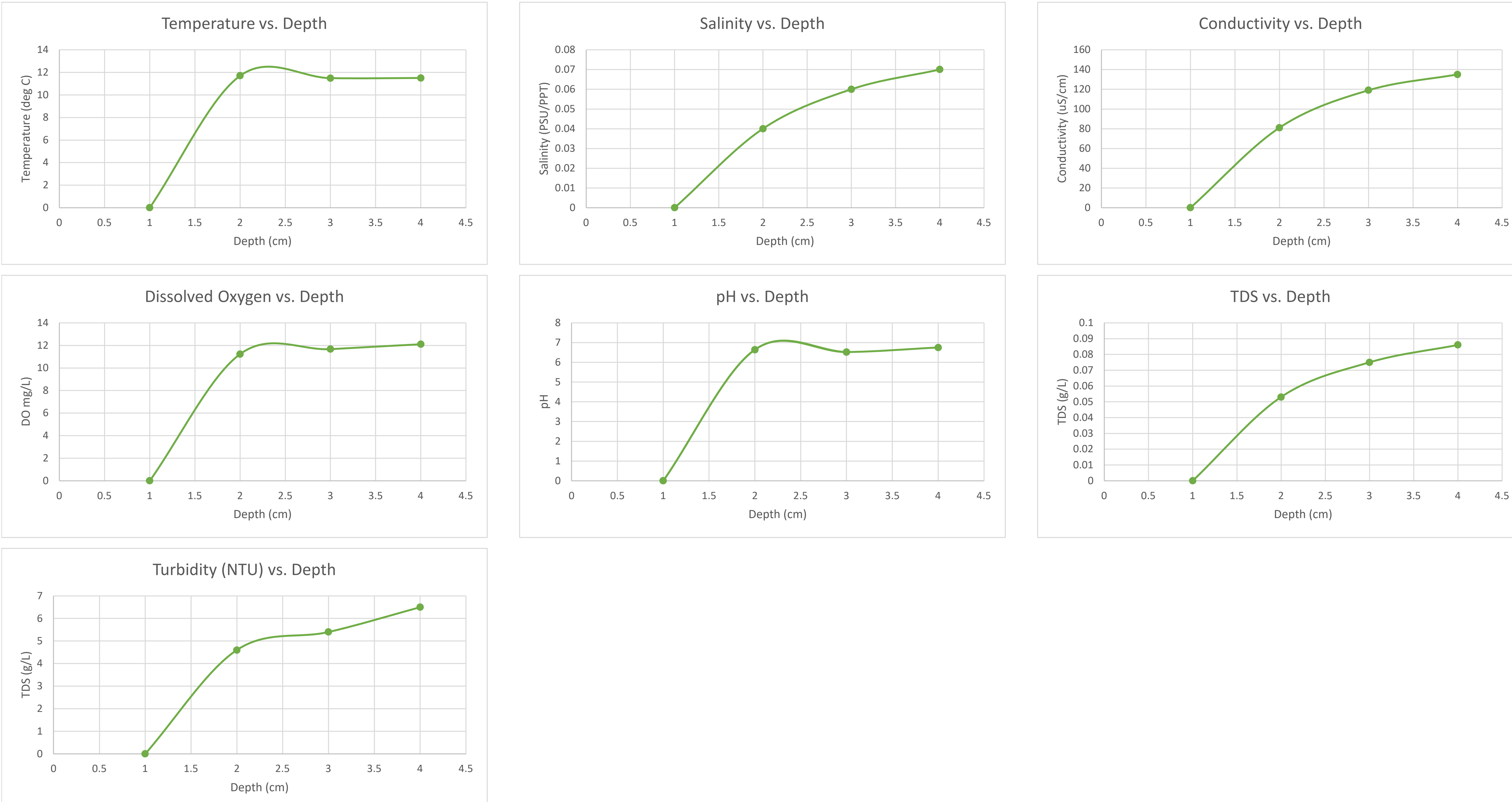
Appendix D: Figure 3 - Depth stratified in-situ sampling at sampling location AVE-6



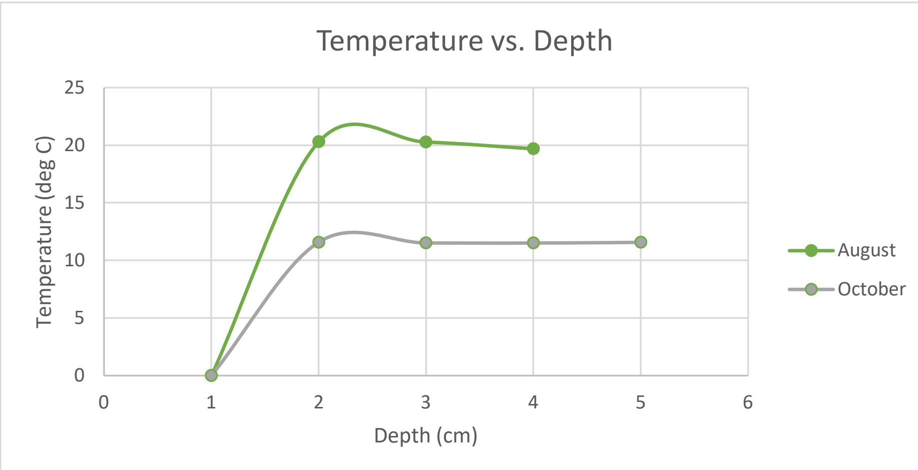
Appendix D: Figure 4 - Depth stratified in-situ sampling at sampling location AR-4

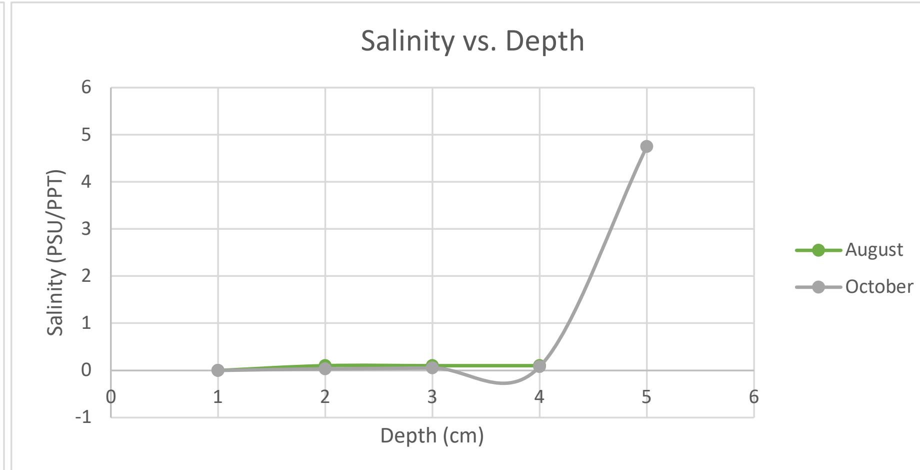


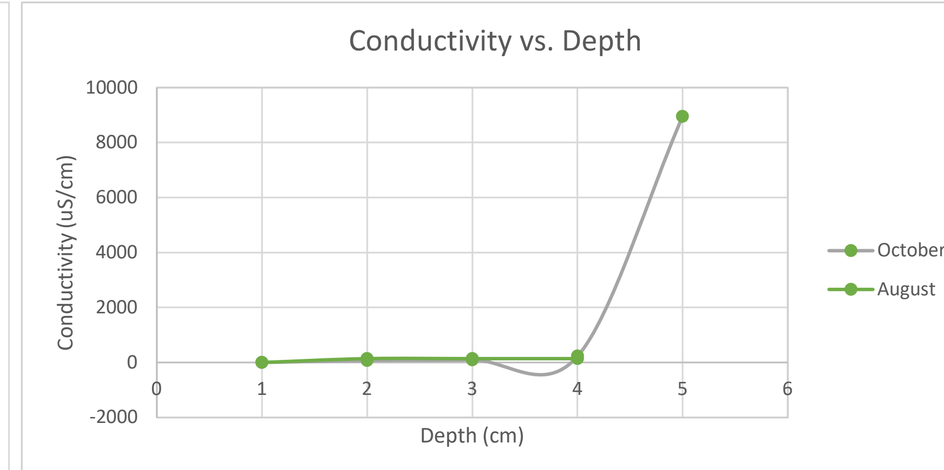
Appendix D: Figure 5 - Depth stratified in-situ sampling at sampling location AR-4B

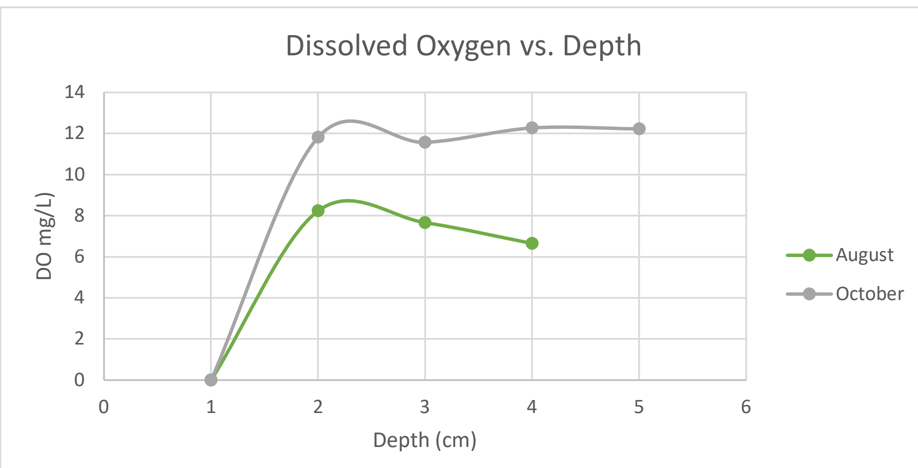


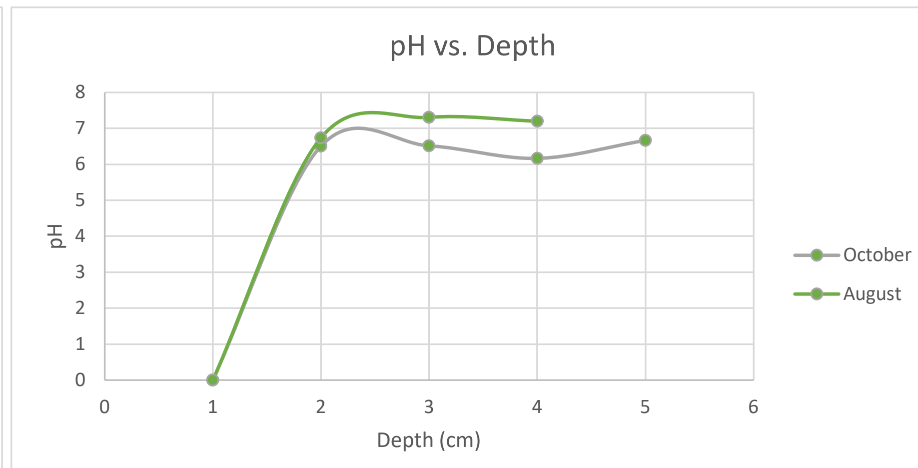
Appendix D: Figure 6 - Depth stratified in-situ sampling at sampling location AR-5

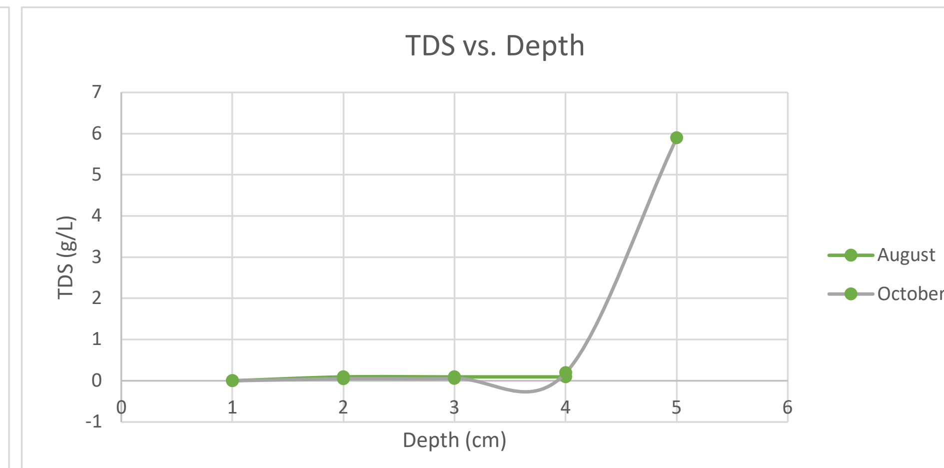


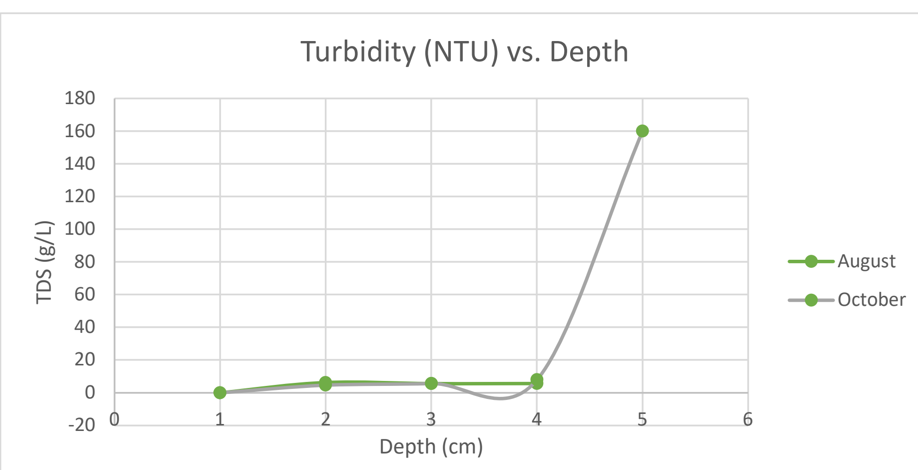




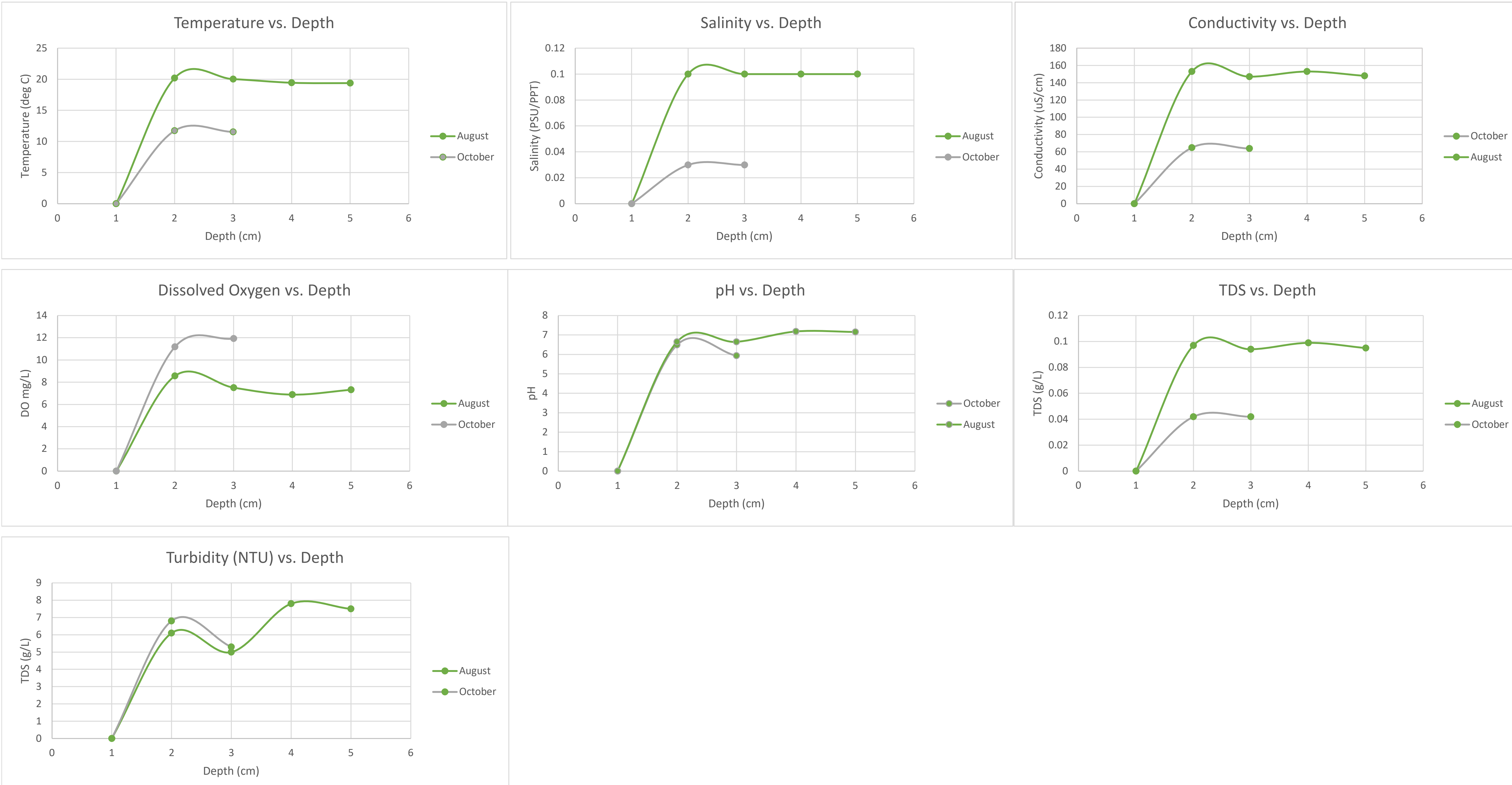




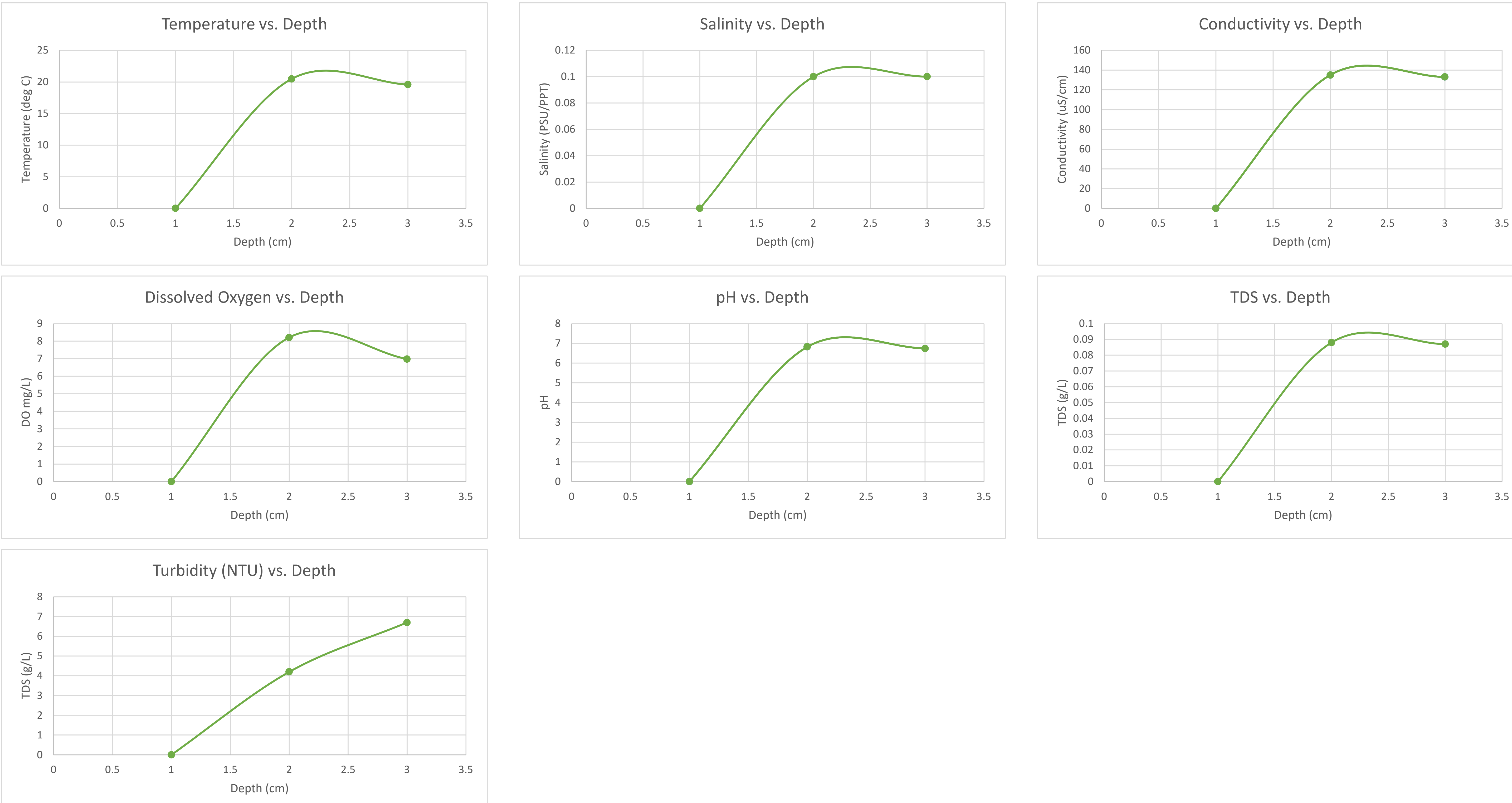




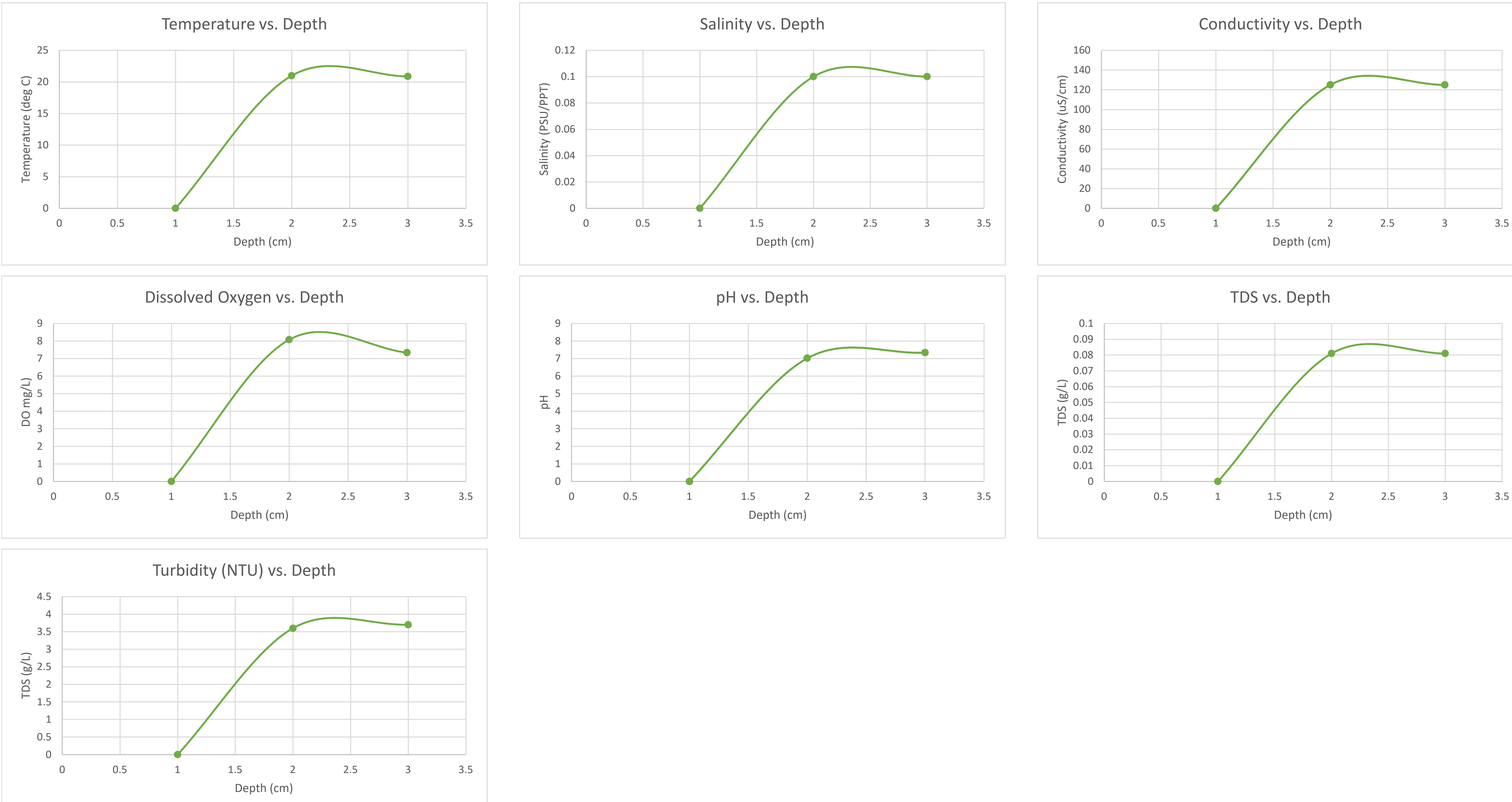
Appendix D: Figure 7 - Depth stratified in-situ sampling at sampling location AR-6



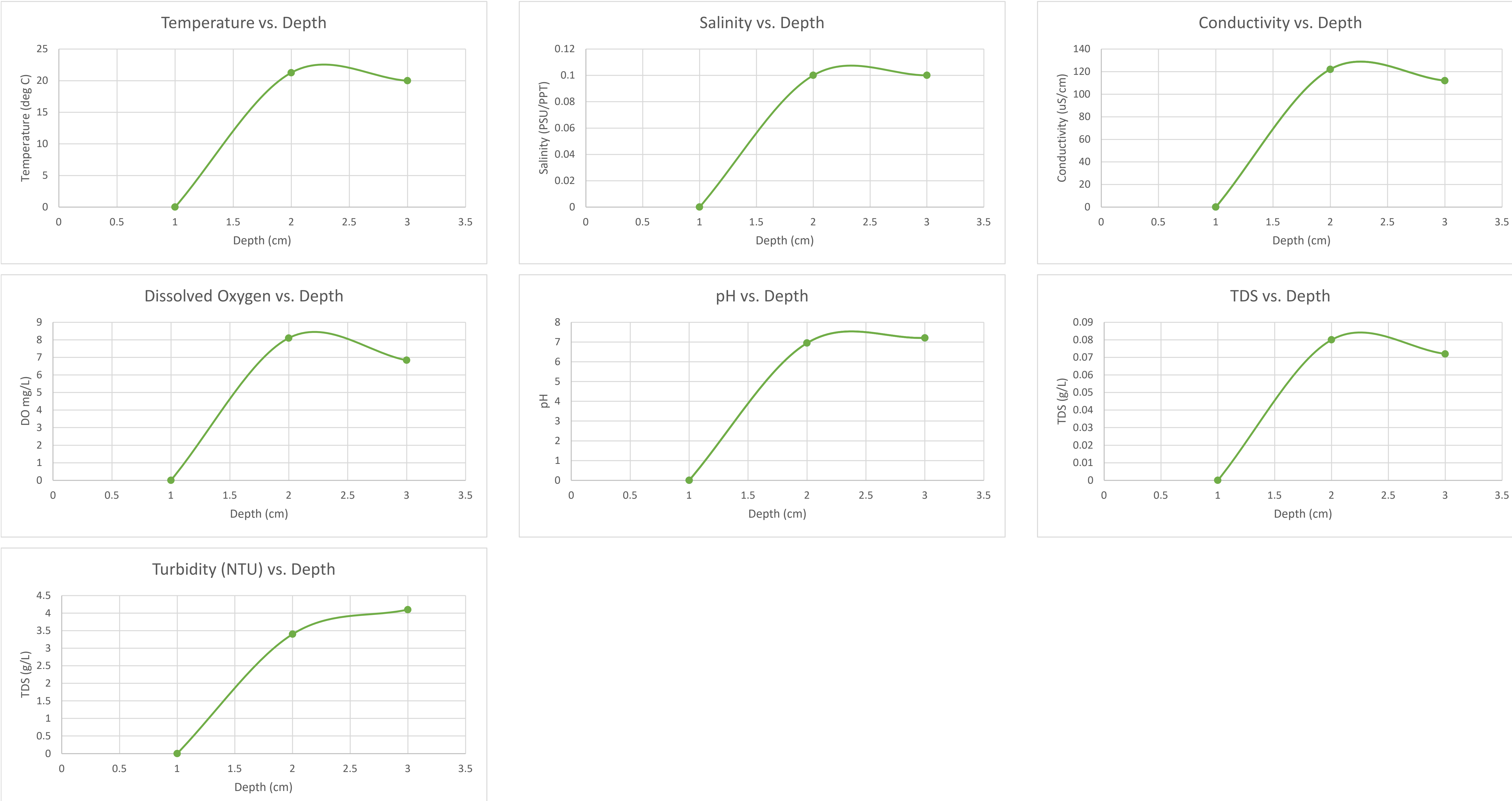
Appendix D: Figure 8 - Depth stratified in-situ sampling at sampling location AR-7



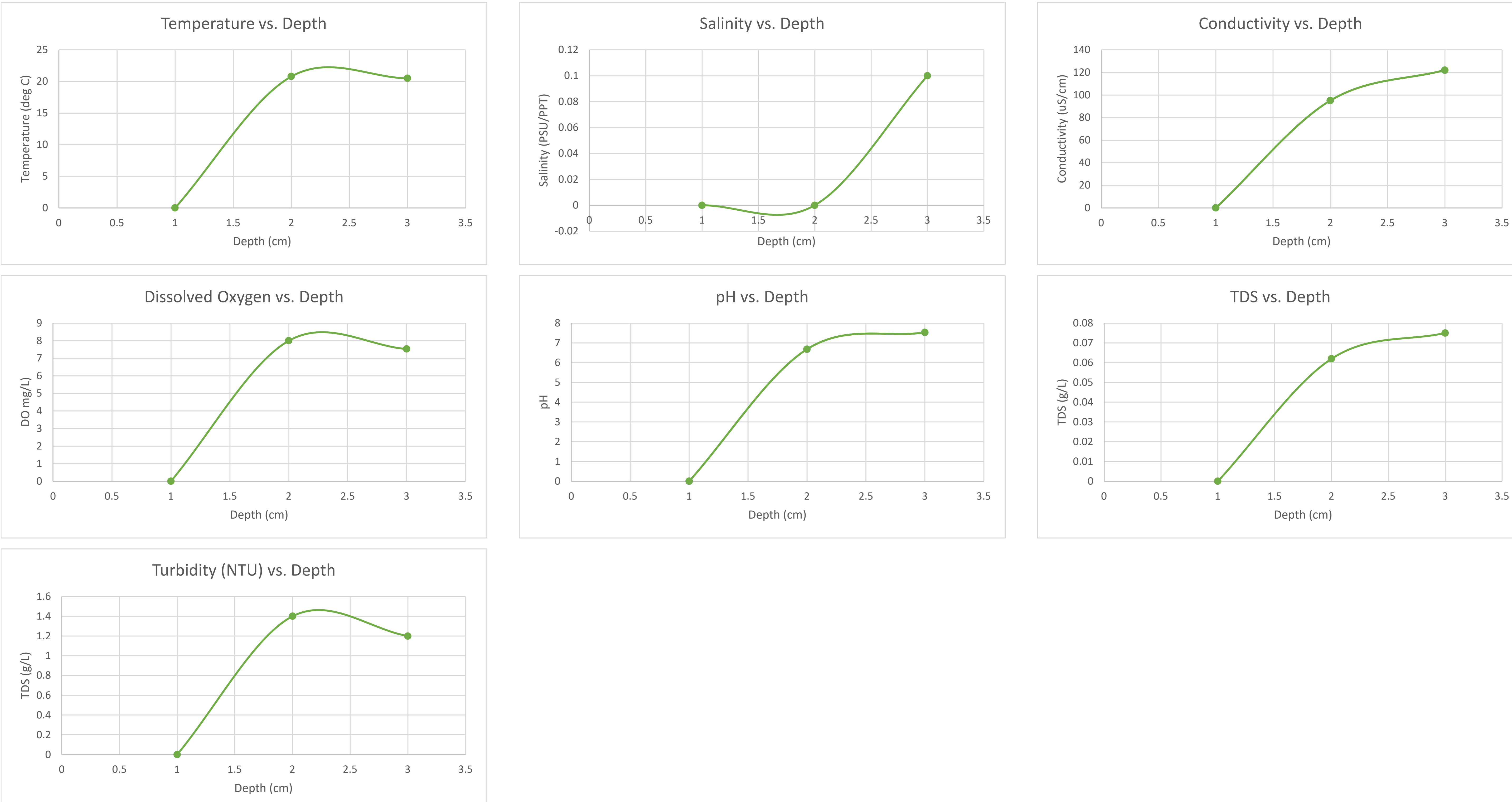
Appendix D: Figure 9 - Depth stratified in-situ sampling at sampling location AR-8



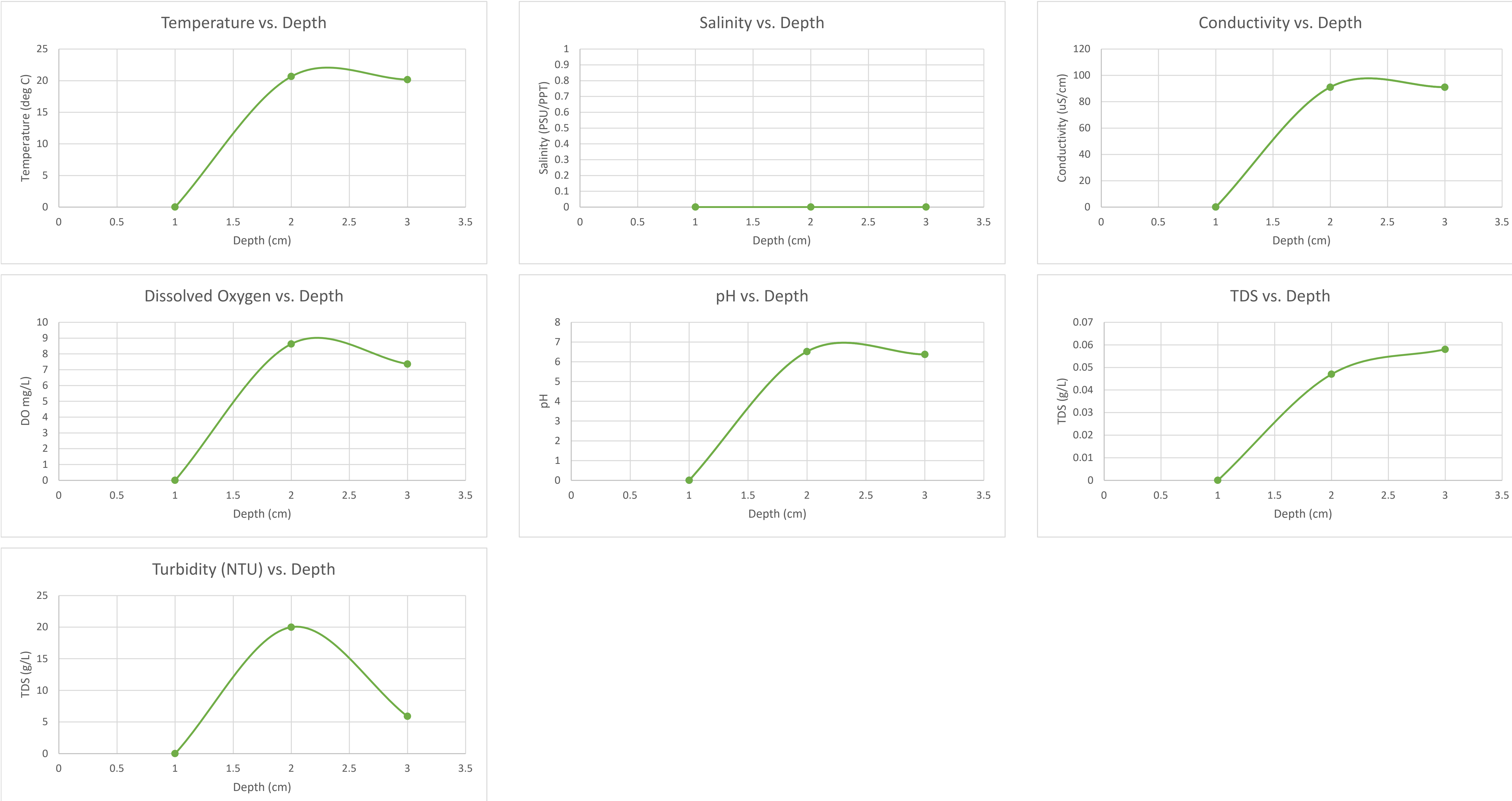
Appendix D: Figure 10 - Depth stratified in-situ sampling at sampling location AR-9



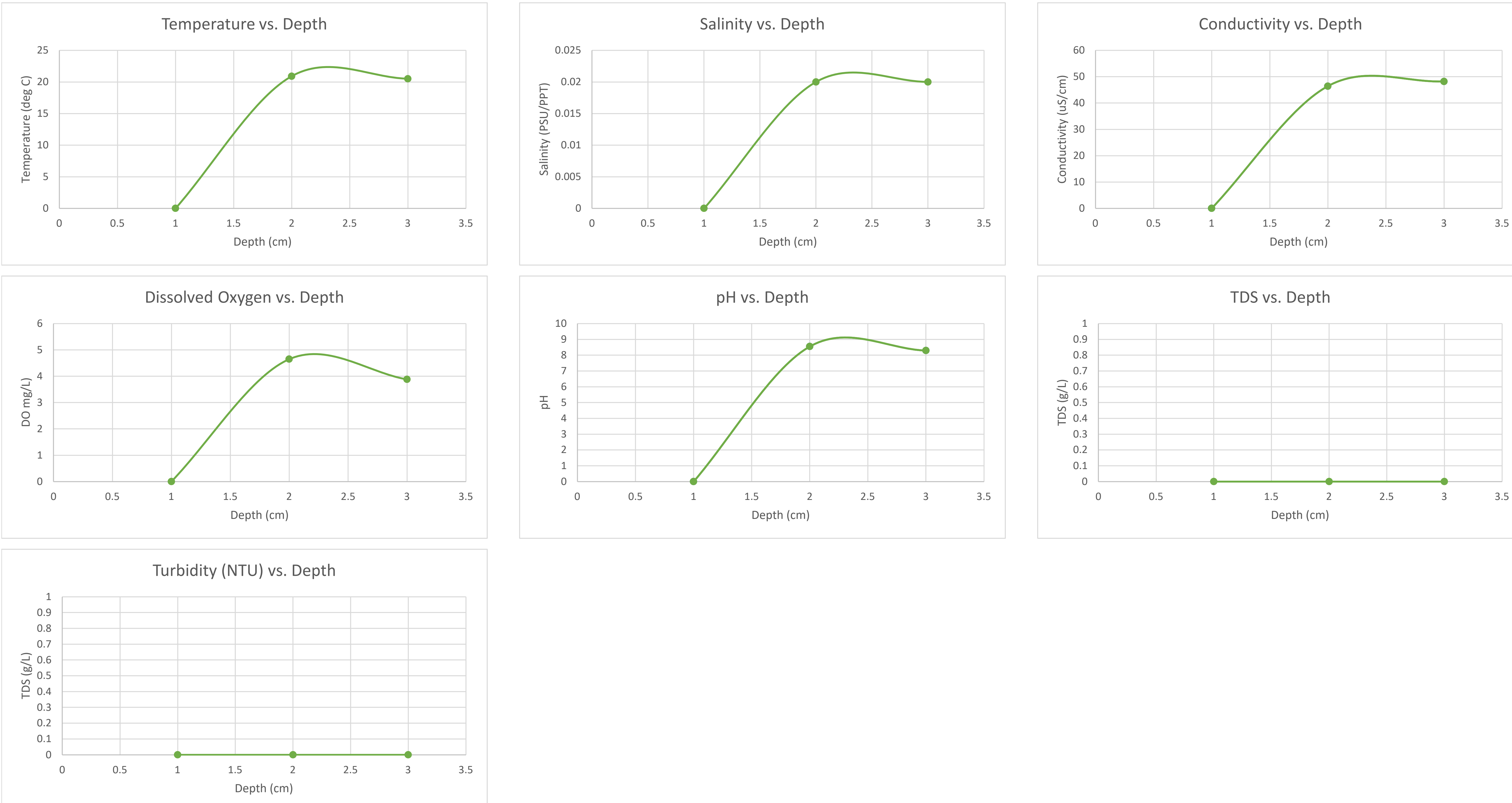
Appendix D: Figure 11 - Depth stratified in-situ sampling at sampling location AR-10



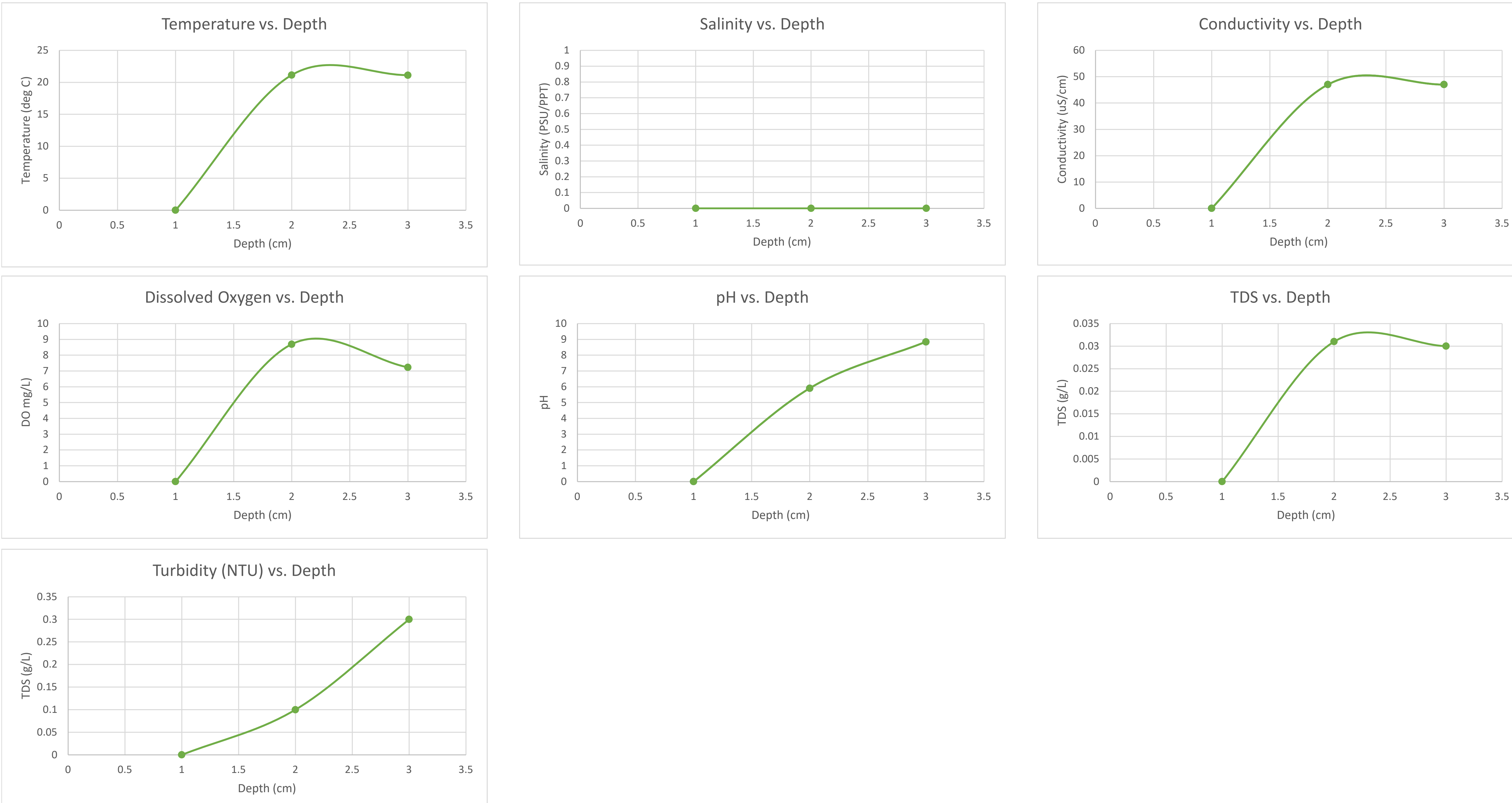
Appendix D: Figure 12 - Depth stratified in-situ sampling at sampling location AR-12



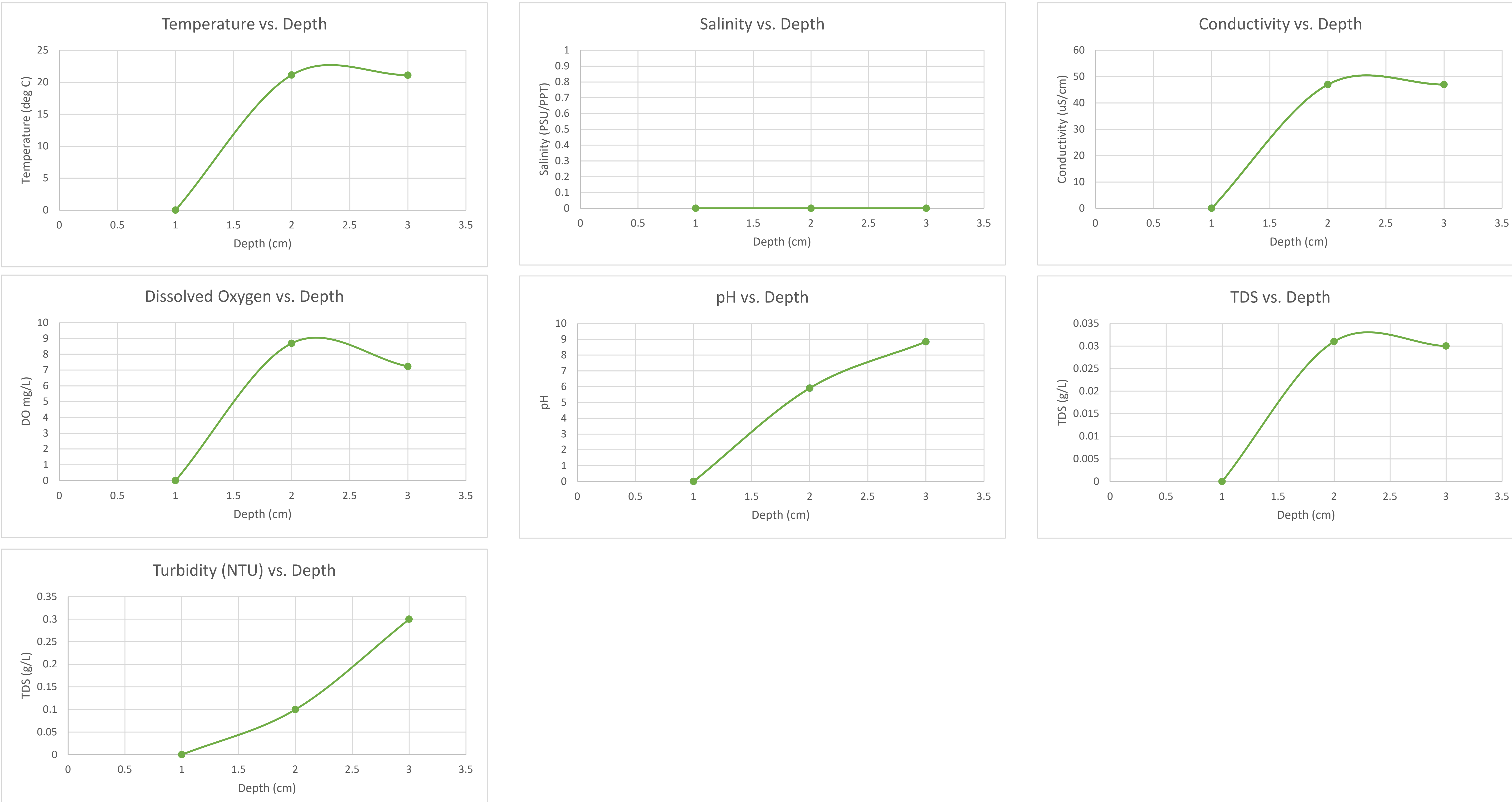
Appendix D: Figure 13 - Depth stratified in-situ sampling at sampling location AR-15



Appendix D: Figure 14 - Depth stratified in-situ sampling at sampling location AR-16



Appendix D: Figure 15 - Depth stratified in-situ sampling at sampling location AR-18



APPENDIX E

Laboratory Certificates

Confirmation of Sample Receipt

Invoice Information	Report Information	Project Information
Attn: ACCOUNTS PAYABLE	Attn: Colin McVarish	**Quote #:** B91310
CBCL Limited	CBCL Limited	**PO/AFE#:**
1505 Barrington Street	1505 Barrington Street	**Project #:** 171046.01
Suite 901 / PO Box 606	Suite 901 / PO Box 606	**Site Location:** WINDSOR
Halifax, NS, B3J 3Y6	Halifax, NS, B3J 3Y6	**Sampled By:**
Email to:	Email to:	
acct@cbcl.ca	cmcvarish@cbcl.ca lisamacdonald@cbcl.ca	

Analytical Summary

A: Due On 2019/06/10 18:00

Lab ID	Client Sample ID	Sampling Date/Time	Matrix	Atlantic RCAp-MS Total Metals in Water	Salinity	Total Suspended Solids	Set Number
COC# D40796							
JWM417	AVE-1	2019/05/31 12:35	SW	A	A	A	1
COC# d40796							
JWM418	AVE-2	2019/05/31 09:15	SW		A	A	2
JWM419	AVE-3	2019/05/31 10:00	SW		A	A	2
JWM420	AVE-4	2019/05/31 10:30	SW	A	A	A	1
JWM421	AVE-5	2019/05/31 14:45	SW		A	A	2
JWM422	AVE-7	2019/05/31 13:25	SW		A	A	2
JWM423	AVE-8	2019/05/31 14:00	SW		A	A	2
JWM424	AVE-9	2019/05/31 11:20	SW	A	A	A	1
JWM425	AR-4	2019/05/31 15:20	SW		A	A	2
JWM426	AR-5	2019/05/31 15:32	SW		A	A	2
COC# D40795							
JWM428	AR-6	2019/05/30 15:00	SW	A	A	A	1
COC# d40795							
JWM429	AR-7	2019/05/30 16:51	SW		A	A	2
JWM430	AR-9	2019/05/30 13:30	SW	A	A	A	1
JWM431	AR-12	2019/05/30 12:32	SW	A	A	A	1
JWM432	AR-14	2019/05/30 10:42	SW		A	A	2
JWM433	AR-15	2019/05/30 10:16	SW		A	A	2
JWM434	AR-16	2019/05/30 11:13	SW	A	A	A	1
JWM435	AR-18	2019/05/30 11:45	SW		A	A	2
JWM436	BKG-1	2019/05/30 12:13	SW		A	A	2
JWM437	BKG-2	2019/05/30 13:00	SW	A	A	A	1

Include Criteria on CofA: No

Confirmation of Sample Receipt

Sample Inspection Observations & Comments

# of Samples Received: 20

Details:
9) Bottles in shipment, but bottles not listed on C of C
11) Labelling issue (label missing and /or incorrect)

Average Temperature:
Package 1: 5.3 °C
Package 2: 0.7 °C

Additional Notes

- Unless special storage arrangements are made, all samples will be disposed 30 days after receipt. Additional fees may be applied for extended storage.
- Additional fees may be applied for the disposal of hazardous samples.

The contents of this report are subject to change. For up to date information, please refer to the Customer Portal.

BV Labs PM: Keri Mackay (Keri.MACKAY@bvlabs.com or 902-420-0203 Ext: 294)

Confirmation of Sample Receipt

Sample Set Listing

Set 1 (8 Samples)	Set 2 (12 Samples)
AVE-1	AVE-2
AVE-4	AVE-3
AVE-9	AVE-5
AR-6	AVE-7
AR-9	AVE-8
AR-12	AR-4
AR-16	AR-5
BKG-2	AR-7
	AR-14
	AR-15
	AR-18
	BKG-1

Parameter Summary

Package/Test	Parameter	RDL	Unit	Set 1	Set 2
Atlantic RCAp-MS Total Metals in Water	Total Alkalinity (Total as CaCO3)	5	mg/L	X	
	Anion Sum	N/A	me/L	X	
	Cation Sum	N/A	me/L	X	
	Bicarb. Alkalinity (calc. as CaCO3)	1	mg/L	X	
	Carb. Alkalinity (calc. as CaCO3)	1	mg/L	X	
	Dissolved Chloride (Cl-)	1	mg/L	X	
	Colour	5	TCU	X	
	Conductivity	1	uS/cm	X	
	Hardness (CaCO3)	1	mg/L	X	
	Ion Balance (% Difference)	N/A	%	X	
	Total Aluminum (Al)	5	ug/L	X	
	Total Antimony (Sb)	1	ug/L	X	
	Total Arsenic (As)	1	ug/L	X	
	Total Barium (Ba)	1	ug/L	X	
	Total Beryllium (Be)	1	ug/L	X	
	Total Bismuth (Bi)	2	ug/L	X	
	Total Boron (B)	50	ug/L	X	
	Total Cadmium (Cd)	0.01	ug/L	X	
	Total Calcium (Ca)	100	ug/L	X	
	Total Chromium (Cr)	1	ug/L	X	
	Total Cobalt (Co)	0.4	ug/L	X	
	Total Copper (Cu)	0.5	ug/L	X	
	Total Iron (Fe)	50	ug/L	X	
	Total Lead (Pb)	0.5	ug/L	X	
	Total Magnesium (Mg)	100	ug/L	X	
	Total Manganese (Mn)	2	ug/L	X	
	Total Molybdenum (Mo)	2	ug/L	X	
	Total Nickel (Ni)	2	ug/L	X	

BV Labs PM: Keri Mackay (Keri.MACKAY@bvlabs.com or 902-420-0203 Ext: 294)

Parameter Summary

Package/Test	Parameter	RDL	Unit	Set 1	Set 2
	Total Phosphorus (P)	100	ug/L	X	
	Total Potassium (K)	100	ug/L	X	
	Total Selenium (Se)	1	ug/L	X	
	Total Silver (Ag)	0.1	ug/L	X	
	Total Sodium (Na)	100	ug/L	X	
	Total Strontium (Sr)	2	ug/L	X	
	Total Thallium (Tl)	0.1	ug/L	X	
	Total Tin (Sn)	2	ug/L	X	
	Total Titanium (Ti)	2	ug/L	X	
	Total Uranium (U)	0.1	ug/L	X	
	Total Vanadium (V)	2	ug/L	X	
	Total Zinc (Zn)	5	ug/L	X	
	Nitrate (N)	0.05	mg/L	X	
Atlantic RCAp-MS Total Metals in Water	Nitrate + Nitrite (N)	0.05	mg/L	X	
	Nitrite (N)	0.01	mg/L	X	
	Nitrogen (Ammonia Nitrogen)	0.05	mg/L	X	
	Total Organic Carbon (C)	0.5	mg/L	X	
	pH	N/A	pH	X	
	Orthophosphate (P)	0.01	mg/L	X	
	Reactive Silica (SiO2)	0.5	mg/L	X	
	Langelier Index (@ 20C)	N/A	N/A	X	
	Saturation pH (@ 20C)	N/A	N/A	X	
	Langelier Index (@ 4C)	N/A	N/A	X	
	Saturation pH (@ 4C)	N/A	N/A	X	
	Dissolved Sulphate (SO4)	2	mg/L	X	
	Calculated TDS	1	mg/L	X	
	Turbidity	0.1	NTU	X	
Salinity	Salinity	2	N/A	X	X
Total Suspended Solids	Total Suspended Solids	0.5	mg/L	X	X

**RDLs are subject to change based on interferences present at the time of analysis.*

Confirmation of Sample Receipt

Cost Estimate

#	Description	Matrix	Quote #	Rate	Test Total
8	Atlantic RCAp-MS Total Metals in Water	SW	B91310	$ 152.50	$ 1,220.00
4	Additional Container - Archive	SW		$ 0.00	$ 0.00
20	Non hazardous disposal/container supply	SW	B91310	$ 5.00	$ 100.00
20	Salinity	SW		$ 22.00	$ 440.00
20	Total Suspended Solids	SW	B91310	$ 13.50	$ 270.00
				Total (excluding applicable taxes):	**$ 2,030.00**

BV Labs PM: Keri Mackay (Keri.MACKAY@bvlabs.com or 902-420-0203 Ext: 294)

Maxxam
A Bureau Veritas Group Company

200 Bluewater Road, Suite 105, Bedford, Nova Scotia B4B 1G9 Tel: 902-420-0203 Fax: 902-420-8612 Toll Free: 1-800-565-7227
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465 George Street, Unit G, Sydney, NS B1P 1K5 Tel: 902-567-1255 Fax: 902-539-6504 Toll Free: 1-888-535-7770
www.maxxam.ca E-mail: Customerservicebedford@maxxam.ca

ATL FCD 00149 / 23

CHAIN OF CUSTODY RECORD

COC #: D40796 Page ____ of ____

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required
Company Name:	CBCL Limited	Company Name:		Quotation #:		☑ Regular TAT (5 business days) Most analyses
Contact Name:	Colin McVarish	Contact Name:		Purchase Order #:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	~~1489 Ho~~ 1505 Barrington St Suite 901 PO Box 606 Halifax PC: B3J 2R7	Address:	PC:	Project #:	171046.01	IF RUSH please specify date (Surcharges will be applied)
				Site Location:	Windsor	
Phone:	902-421-7241 Ext 2315	Phone:		Site Province:	NS.	DATE REQUIRED:
Email:	cmcvarish@cbcl.ca	Email:		Site #:		
Report Copies:	lisamacdonald@cbcl.ca	Report Copies:		Sampled By:	Colin McVarish/Lisa MacDonald	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		4, 4, 4	
		2, 0, 0	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

#	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well (Surface water)	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs - Select One: Default or CCME Sediment	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)	Salinity	TSS		HOLD- DO NOT ANALYZE	COMMENTS
1	AVE-1	2019/05/31	12:35	SW				X															X	X			
2	AVE-2	2019/05/31	9:15am	SW																			X	X			
3	AVE-3	2019/05/31	10:00am	SW																			X	X			
4	AVE-4	2019/05/31	10:30am	SW				X															X	X			
5	AVE-5	2019/05/31	2:25pm	SW																			X	X			
6	AVE-7	2019/05/31	1:25pm	SW																			X	X			
7	AVE-8	2019/05/31	2:00pm	SW																			X	X			2019-MAY-31 5:18
8	AVE-9	2019/05/31	11:20am	SW				X															X	X			
9	AR-4	2019/05/30	15:20	SW																			X	X			
10	AR-5	2019/05/30	15:32	SW																			X	X			

Regulatory Requirements (Specify)

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Lisa MacDonald (signature) / Lisa MacDonald			GBWYK			B9E8112

White: Maxxam Pink: Client

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ATL FCD 00149 / 23

CHAIN OF CUSTODY RECORD

COC #: D40795 Page ____ of ____

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required
Company Name:	CBCL Limited	Company Name:	CBCL Limited	Quotation #:		☑ Regular TAT (5 business days) Most analyses
Contact Name:	Colin McVanish	Contact Name:	Colin McVanish	Purchase Order #:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	1505 Barrington St PO Box 606 Halifax PC: B3J2R7	Address:	PC:	Project #:	171046.01	IF RUSH please specify date (Surcharges will be applied)
Phone:	902-421-7241 Ext 2315	Phone:		Site Location:	Windsor	DATE REQUIRED:
Email:	colinmcvanish@cbcl.ca	Email:		Site Province:	N.S.	
Report Copies:	lisamacdonald@cbcl.ca	Report Copies:		Site #:		
				Sampled By:	Colin McVanish / Lisa MacDonald	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		4, 6, 6	
		2, 0, 0	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

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1	AR-6	2019/05/30	15:00	SW				X															X	X			
2	AR-7	2019/05/30	16:51	SW																			X	X			
3	AR-9	2019/05/30	13:30	SW				X															X	X			
4	AR-12	2019/05/30	12:32	SW				X															X	X			
5	AR-14	2019/05/30	10:42	SW																			X	X			
6	AR-15	2019/05/30	10:16	SW																			X	X			
7	AR-16	2019/05/30	11:13	SW				X															X	X			
8	AR-18	2019/05/30	11:45	SW																			X	X			
9	~~[illegible]~~ BKG-1	2019/05/30	12:13	SW																			X	X			
10	~~[illegible]~~ BKG-2	2019/05/30	13:00	SW				X															X	X			

Regulatory Requirements (Specify)

2019 MAY 31 15:18

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Lisa MacDonald (signature)			GBurke			B9E8112
Lisa MacDonald						

White: Maxxam Pink: Client

Confirmation of Sample Receipt

BV Labs Job Number: B9E8112
Job Received: 2019/05/31 16:18
Final Report Due: 2019/06/10 18:00

Invoice Information

Attn: ACCOUNTS PAYABLE
CBCL Limited
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS, B3J 3Y6
Email to:
acct@cbcl.ca

Report Information

Attn: Colin McVarish
CBCL Limited
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS, B3J 3Y6
Email to:
cmcvarish@cbcl.ca
lisamacdonald@cbcl.ca

Project Information

Quote #: B91310
PO/AFE#:
Project #: 171046.01
Site Location: WINDSOR
Sampled By:

Analytical Summary

A: Due On 2019/06/10 18:00

Lab ID	Client Sample ID	Sampling Date/Time	Matrix	Atlantic RCAp-MS Total Metals in Water	Salinity	Total Suspended Solids	Set Number
COC# D40796							
JWM417	AVE-1	2019/05/31 12:35	SW	A	A	A	1
COC# d40796							
JWM418	AVE-2	2019/05/31 09:15	SW		A	A	2
JWM419	AVE-3	2019/05/31 10:00	SW		A	A	2
JWM420	AVE-4	2019/05/31 10:30	SW	A	A	A	1
JWM421	AVE-5	2019/05/31 14:45	SW		A	A	2
JWM422	AVE-7	2019/05/31 13:25	SW		A	A	2
JWM423	AVE-8	2019/05/31 14:00	SW		A	A	2
JWM424	AVE-9	2019/05/31 11:20	SW	A	A	A	1
JWM425	AR-4	2019/05/31 15:20	SW		A	A	2
JWM426	AR-5	2019/05/31 15:32	SW		A	A	2
COC# D40795							
JWM428	AR-6	2019/05/30 15:00	SW	A	A	A	1
COC# d40795							
JWM429	AR-7	2019/05/30 16:51	SW		A	A	2
JWM430	AR-9	2019/05/30 13:30	SW	A	A	A	1
JWM431	AR-12	2019/05/30 12:32	SW	A	A	A	1
JWM432	AR-14	2019/05/30 10:42	SW		A	A	2
JWM433	AR-15	2019/05/30 10:16	SW		A	A	2
JWM434	AR-16	2019/05/30 11:13	SW	A	A	A	1
JWM435	AR-18	2019/05/30 11:45	SW		A	A	2
JWM436	BKG-1	2019/05/30 12:13	SW		A	A	2
JWM437	BKG-2	2019/05/30 13:00	SW	A	A	A	1

Include Criteria on CofA: No

Confirmation of Sample Receipt

Sample Inspection Observations & Comments

# of Samples Received: 20

Details:
9) Bottles in shipment, but bottles not listed on C of C
11) Labelling issue (label missing and /or incorrect)

Average Temperature:
Package 1: 5.3 °C
Package 2: 0.7 °C

Additional Notes

- Unless special storage arrangements are made, all samples will be disposed 30 days after receipt. Additional fees may be applied for extended storage.
- Additional fees may be applied for the disposal of hazardous samples.

The contents of this report are subject to change. For up to date information, please refer to the Customer Portal.

Confirmation of Sample Receipt

Sample Set Listing

Set 1 (8 Samples)	Set 2 (12 Samples)
AVE-1	AVE-2
AVE-4	AVE-3
AVE-9	AVE-5
AR-6	AVE-7
AR-9	AVE-8
AR-12	AR-4
AR-16	AR-5
BKG-2	AR-7
	AR-14
	AR-15
	AR-18
	BKG-1

Parameter Summary

Package/Test	Parameter	RDL	Unit	Set 1	Set 2
Atlantic RCAp-MS Total Metals in Water	Total Alkalinity (Total as CaCO3)	5	mg/L	X	
	Anion Sum	N/A	me/L	X	
	Cation Sum	N/A	me/L	X	
	Bicarb. Alkalinity (calc. as CaCO3)	1	mg/L	X	
	Carb. Alkalinity (calc. as CaCO3)	1	mg/L	X	
	Dissolved Chloride (Cl-)	1	mg/L	X	
	Colour	5	TCU	X	
	Conductivity	1	uS/cm	X	
	Hardness (CaCO3)	1	mg/L	X	
	Ion Balance (% Difference)	N/A	%	X	
	Total Aluminum (Al)	5	ug/L	X	
	Total Antimony (Sb)	1	ug/L	X	
	Total Arsenic (As)	1	ug/L	X	
	Total Barium (Ba)	1	ug/L	X	
	Total Beryllium (Be)	1	ug/L	X	
	Total Bismuth (Bi)	2	ug/L	X	
	Total Boron (B)	50	ug/L	X	
	Total Cadmium (Cd)	0.01	ug/L	X	
	Total Calcium (Ca)	100	ug/L	X	
	Total Chromium (Cr)	1	ug/L	X	
	Total Cobalt (Co)	0.4	ug/L	X	
	Total Copper (Cu)	0.5	ug/L	X	
	Total Iron (Fe)	50	ug/L	X	
	Total Lead (Pb)	0.5	ug/L	X	
	Total Magnesium (Mg)	100	ug/L	X	
	Total Manganese (Mn)	2	ug/L	X	
	Total Molybdenum (Mo)	2	ug/L	X	
	Total Nickel (Ni)	2	ug/L	X	

BV Labs PM: Keri Mackay (Keri.MACKAY@bvlabs.com or 902-420-0203 Ext: 294)

Parameter Summary

Package/Test	Parameter	RDL	Unit	Set 1	Set 2
Atlantic RCAp-MS Total Metals in Water	Total Phosphorus (P)	100	ug/L	X	
	Total Potassium (K)	100	ug/L	X	
	Total Selenium (Se)	1	ug/L	X	
	Total Silver (Ag)	0.1	ug/L	X	
	Total Sodium (Na)	100	ug/L	X	
	Total Strontium (Sr)	2	ug/L	X	
	Total Thallium (Tl)	0.1	ug/L	X	
	Total Tin (Sn)	2	ug/L	X	
	Total Titanium (Ti)	2	ug/L	X	
	Total Uranium (U)	0.1	ug/L	X	
	Total Vanadium (V)	2	ug/L	X	
	Total Zinc (Zn)	5	ug/L	X	
	Nitrate (N)	0.05	mg/L	X	
	Nitrate + Nitrite (N)	0.05	mg/L	X	
	Nitrite (N)	0.01	mg/L	X	
	Nitrogen (Ammonia Nitrogen)	0.05	mg/L	X	
	Total Organic Carbon (C)	0.5	mg/L	X	
	pH	N/A	pH	X	
	Orthophosphate (P)	0.01	mg/L	X	
	Reactive Silica (SiO2)	0.5	mg/L	X	
	Langelier Index (@ 20C)	N/A	N/A	X	
	Saturation pH (@ 20C)	N/A	N/A	X	
	Langelier Index (@ 4C)	N/A	N/A	X	
	Saturation pH (@ 4C)	N/A	N/A	X	
	Dissolved Sulphate (SO4)	2	mg/L	X	
	Calculated TDS	1	mg/L	X	
	Turbidity	0.1	NTU	X	
Salinity	Salinity	2	N/A	X	X
Total Suspended Solids	Total Suspended Solids	0.5	mg/L	X	X

**RDLs are subject to change based on interferences present at the time of analysis.*

Cost Estimate

#	Description	Matrix	Quote #	Rate	Test Total
8	Atlantic RCAp-MS Total Metals in Water	SW	B91310	$ 152.50	$ 1,220.00
4	Additional Container - Archive	SW		$ 0.00	$ 0.00
20	Non hazardous disposal/container supply	SW	B91310	$ 5.00	$ 100.00
20	Salinity	SW		$ 22.00	$ 440.00
20	Total Suspended Solids	SW	B91310	$ 13.50	$ 270.00
				Total (excluding applicable taxes):	**$ 2,030.00**

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CHAIN OF CUSTODY RECORD

COC #: D40796 Page ____ of ____

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: CBCL Limited	Company Name:	Quotation #:	☑ Regular TAT (5 business days) Most analyses
Contact Name: Colin McVarish	Contact Name:	Purchase Order #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: ~~1489 Ho~~ 1505 Barrington St Suite 901 PO Box 606 Halifax PC: B3J 2R7	Address: PC:	Project #: 171046.01	IF RUSH please specify date (Surcharges will be applied)
Phone: 902-421-7241 Ext 2315	Phone:	Site Location: Windsor	DATE REQUIRED:
Email: cmcvarish@cbcl.ca	Email:	Site Province: NS.	
Report Copies: lisamacdonald@cbcl.ca	Report Copies:	Site #:	
		Sampled By: Colin McVarish/Lisa MacDonald	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		4, 6, 6	
		2, 0, 0	

COOLING MEDIA PRESENT Y / N

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Analysis Requested

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Regulatory Requirements (Specify)

2019 MAY 31 15:18

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Lisa MacDonald (signature)			[signature]			B9E8112
Lisa MacDonald						

White: Maxxam Pink: Client

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CHAIN OF CUSTODY RECORD

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Phone: 902-421-7241 Ext 2315	Phone:	Site Location: Windsor	**DATE REQUIRED:**
Email: cmcvarish@cbcl.ca	Email:	Site Province: N.S.	
Report Copies: lisamacdonald@cbcl.ca	Report Copies:	Site #:	
		Sampled By: Colin McVarish / Lisa MacDonald	

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9	~~[illegible]~~ BKG-1	2019/05/30	12:13	SW																			X	X			
10	~~[illegible]~~ BKG-2	2019/05/30	13:00	SW				X															X	X			

2019 MAY 31 15:18

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Lisa MacDonald (signature)			GBurke			B9E8112
Lisa MacDonald						

White: Maxxam Pink: Client

Maxxam
A Bureau Veritas Group Company

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ATL FCD 00149 / 23

CHAIN OF CUSTODY RECORD

COC #: D40796 Page ____ of ____

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Company Name:	CBCL Limited	Company Name:		Quotation #:		☑ Regular TAT (5 business days) Most analyses
Contact Name:	Colin McVarish	Contact Name:		Purchase Order #:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	~~1489 Ho~~ 1505 Barrington St Suite 901 PO Box 606 Halifax PC: B3J 2R7	Address: PC:		Project #:	171046.01	IF RUSH please specify date (Surcharges will be applied)
Phone:	902-421-7241 Ext 2315	Phone:		Site Location:	Windsor	DATE REQUIRED:
Email:	cmcvarish@cbcl.ca	Email:		Site Province:	NS.	
Report Copies:	lisamacdonald@cbcl.ca	Report Copies:		Site #:		
				Sampled By:	Colin McVarish/Lisa MacDonald	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		4, 6, 6	
		2, 0, 0	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well (Surface water)	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs - Select One: Default or CCME Sediment	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)	Salinity	TSS		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	AVE-1	2019/05/31	12:35	SW				X															X	X			
2	AVE-2	2019/05/31	9:15am	SW																			X	X			
3	AVE-3	2019/05/31	10:00am	SW																			X	X			
4	AVE-4	2019/05/31	10:30am	SW				X															X	X			
5	AVE-5	2019/05/31	2:25pm	SW																			X	X			
6	AVE-7	2019/05/31	1:25pm	SW																			X	X			
7	AVE-8	2019/05/31	2:00pm	SW																			X	X			
8	AVE-9	2019/05/31	11:20am	SW				X															X	X			
9	AR-4	2019/05/30	15:20	SW																			X	X			
10	AR-5	2019/05/30	15:32	SW																			X	X			

2019 MAY 31 16:18

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Lisa MacDonald			9BW7K			B9E8112
Lisa MacDonald						

White: Maxxam Pink: Client

Maxxam
A Bureau Veritas Group Company

200 Bluewater Road, Suite 105, Bedford, Nova Scotia B4B 1G9 Tel: 902-420-0203 Fax: 902-420-8612 Toll Free: 1-800-565-7227
49-55 Elizabeth Avenue, St John's, NL A1A 1W9 Tel: 709-754-0203 Fax: 709-754-8612 Toll Free: 1-888-492-7227
465 George Street,Unit G,Sydney, NS B1P 1K5 Tel: 902-567-1255 Fax: 902-539-6504 Toll Free: 1-888-535-7770
www.maxxam.ca E-mail: Customerservicebedford@maxxam.ca

ATL FCD 00149 / 23

CHAIN OF CUSTODY RECORD

COC #: D40795 Page ___ of ___

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required
Company Name:	CBCL Limited	Company Name:	CBCL Limited	Quotation #:		☑ Regular TAT (5 business days) Most analyses
Contact Name:	Colin McVarish	Contact Name:	Colin McVarish	Purchase Order #:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	1505 Barrington St, PO Box 606 Halifax PC: B3J2R7	Address:	PC:	Project #:	171046.01	IF RUSH please specify date (Surcharges will be applied)
Phone:	902-421-7241 Ext 2315	Phone:		Site Location:	Windsor	DATE REQUIRED:
Email:	~~colin~~ cmcvarish@cbcl.ca	Email:		Site Province:	N.S.	
Report Copies:	lisamacdonald@cbcl.ca	Report Copies:		Site #:		
				Sampled By:	Colin McVarish / Lisa MacDonald	

Laboratory Use Only

CUSTODY SEAL Present	Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		4, 6, 6	
		2, 0, 0	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs - Select One: Default or CCME Sediment	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.coli (Count)	Salinity	TSS		HOLD- DO NOT ANALYZE	COMMENTS
1	AR-6	2019/05/30	15:00	SW				X															X	X			
2	AR-7	2019/05/30	16:51	SW																			X	X			
3	AR-9	2019/05/30	13:30	SW				X															X	X			
4	AR-12	2019/05/30	12:32	SW				X															X	X			
5	AR-14	2019/05/30	10:42	SW																			X	X			
6	AR-15	2019/05/30	10:16	SW																			X	X			
7	AR-16	2019/05/30	11:13	SW				X															X	X			
8	AR-18	2019/05/30	11:45	SW																			X	X			
9	~~[illegible]~~ BKG-1	2019/05/30	12:13	SW																			X	X			
10	~~[illegible]~~ BKG-2	2019/05/30	13:00	SW				X															X	X			

Regulatory Requirements (Specify):

2019 MAY 31 15:18

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Lisa MacDonald (signature)			G Burke			B9E8112
Lisa MacDonald						

White: Maxxam Pink: Client

BV Labs Job Number: B9E8112
Report Date: 2019/06/10

CBCL Limited
Client Project #: 171046.01
Site Location: WINDSOR

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		JWM417			JWM420		JWM424			JWM428			JWM428			JWM430		JWM431			JWM431			JWM434			JWM437		
Sampling Date		2019-05-31 12:35			2019-05-31 10:30		2019-05-31 11:20			2019-05-30 15:00			2019-05-30 15:00			2019-05-30 13:30		2019-05-30 12:32			2019-05-30 12:32			2019-05-30 11:13			2019-05-30 13:00		
COC Number		D40796			d40796		d40796			D40795			D40795			d40795		d40795			d40795			d40795			d40795		
	UNITS	**AVE-1**	**RDL**	**QC Batch**	**AVE-4**	**QC Batch**	**AVE-9**	**RDL**	**QC Batch**	**AR-6**	**RDL**	**QC Batch**	**AR-6 Lab-Dup**	**RDL**	**QC Batch**	**AR-9**	**QC Batch**	**AR-12**	**RDL**	**QC Batch**	**AR-12 Lab-Dup**	**RDL**	**QC Batch**	**AR-16**	**RDL**	**QC Batch**	**BKG-2**	**RDL**	**QC Batch**
Calculated Parameters																													
Anion Sum	me/L	454	N/A	6153424	240	6153424	242	N/A	6153424	3.25	N/A	6153424				3.84	6153424	1.77	N/A	6153424				0.870	N/A	6153424	2.41	N/A	6153424
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	87	1.0	6153419	68	6153419	71	1.0	6153419	27	1.0	6153419				33	6153419	15	1.0	6153419				8.9	1.0	6153419	26	1.0	6153419
Calculated TDS	mg/L	26000	1.0	6153430	15000	6153430	16000	1.0	6153430	190	1.0	6153430				230	6153430	100	1.0	6153430				56	1.0	6153430	160	1.0	6153430
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	6153419	<1.0	6153419	<1.0	1.0	6153419	<1.0	1.0	6153419				<1.0	6153419	<1.0	1.0	6153419				<1.0	1.0	6153419	<1.0	1.0	6153419
Cation Sum	me/L	444	N/A	6153424	280	6153424	314	N/A	6153424	3.14	N/A	6153424				3.87	6153424	1.57	N/A	6153424				0.850	N/A	6153424	2.39	N/A	6153424
Hardness (CaCO3)	mg/L	4600	1.0	6153420	3000	6153420	3300	1.0	6153420	79	1.0	6153420				88	6153420	37	1.0	6153420				27	1.0	6153420	110	1.0	6153420
Ion Balance (% Difference)	%	1.14	N/A	6153422	7.78	6153422	12.8	N/A	6153422	1.72	N/A	6153422				0.390	6153422	5.99	N/A	6153422				1.16	N/A	6153422	0.420	N/A	6153422
Langelier Index (@ 20C)	N/A	0.296		6153427	-0.186	6153427	-0.0990		6153427	-1.24		6153427				-1.17	6153427	-2.13		6153427				-2.36		6153427	-0.873		6153427
Langelier Index (@ 4C)	N/A	0.0580		6153428	-0.423	6153428	-0.336		6153428	-1.49		6153428				-1.42	6153428	-2.39		6153428				-2.61		6153428	-1.12		6153428
Nitrate (N)	mg/L	<0.050	0.050	6153426	0.11	6153426	0.080	0.050	6153426	0.058	0.050	6153426				<0.050	6153426	<0.050	0.050	6153426				<0.050	0.050	6153426	0.067	0.050	6153426
Saturation pH (@ 20C)	N/A	7.44		6153427	7.77	6153427	7.70		6153427	8.58		6153427				8.48	6153427	9.11		6153427				9.41		6153427	8.36		6153427
Saturation pH (@ 4C)	N/A	7.68		6153428	8.00	6153428	7.94		6153428	8.83		6153428				8.73	6153428	9.37		6153428				9.66		6153428	8.61		6153428
Inorganics																													
Total Alkalinity (Total as CaCO3)	mg/L	87	5.0	6161210	68	6161210	71	5.0	6161210	27	5.0	6161210				33	6161210	15	5.0	6161217	15	5.0	6161217	8.9	5.0	6161210	26	5.0	6161210
Dissolved Chloride (Cl-)	mg/L	15000	500	6161211	7600	6161211	7500	100	6161211	56	1.0	6161211				70	6161211	30	1.0	6161218	30	1.0	6161218	9.4	1.0	6161211	6.4	1.0	6161211
Colour	TCU	6.4	5.0	6156662	25	6156662	21	5.0	6156662	78	25	6156662				75	6156662	95	25	6156662				98	25	6156662	22	5.0	6157018
Nitrate + Nitrite (N)	mg/L	<0.050	0.050	6161215	0.11	6161215	0.080	0.050	6161215	0.058	0.050	6161215				<0.050	6161215	<0.050	0.050	6161222	<0.050	0.050	6161222	<0.050	0.050	6161215	0.067	0.050	6161215
Nitrite (N)	mg/L	<0.010	0.010	6161216	<0.010	6161216	<0.010	0.010	6161216	<0.010	0.010	6161216				<0.010	6161216	<0.010	0.010	6161223	<0.010	0.010	6161223	<0.010	0.010	6161216	<0.010	0.010	6161216
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	0.050	6159693	0.057	6159693	<0.050	0.050	6159693	0.097	0.050	6159693				0.13	6159693	0.064	0.050	6159693				<0.050	0.050	6159693	<0.050	0.050	6159693
Total Organic Carbon (C)	mg/L	<5.0 (1)	5.0	6158934	8.1 (1)	6158937	<5.0 (1)	5.0	6158937	7.2	0.50	6158934	7.3	0.50	6158934	8.1	6158934	8.3	0.50	6158934				8.5	0.50	6158934	3.5	0.50	6158934
Orthophosphate (P)	mg/L	<0.010	0.010	6161214	0.015	6161214	0.014	0.010	6161214	0.014	0.010	6161214				0.017	6161214	0.013	0.010	6161221	0.013	0.010	6161221	<0.010	0.010	6161214	<0.010	0.010	6161214
pH	pH	7.74	N/A	6161620	7.58	6161620	7.60	N/A	6161620	7.34	N/A	6161620				7.30	6161620	6.98	N/A	6161633	7.03	N/A	6161633	7.05	N/A	6161620	7.49	N/A	6161620
Reactive Silica (SiO2)	mg/L	<0.50	0.50	6161213	1.3	6161213	1.1	0.50	6161213	2.0	0.50	6161213				3.1	6161213	2.8	0.50	6161220	2.5	0.50	6161220	2.6	0.50	6161213	4.2	0.50	6161213
Dissolved Sulphate (SO4)	mg/L	1900	40	6161212	1200	6161212	1400	40	6161212	54	2.0	6161212				57	6161212	30	2.0	6161219	30	2.0	6161219	21	2.0	6161212	83	2.0	6161212
Turbidity	NTU	170	1.0	6161380	660	6161380	130	1.0	6161295	13	0.10	6161295				4.2	6161380	2.1	0.10	6161380				2.1	0.10	6161380	3.0	0.10	6161380
Conductivity	uS/cm	40000	1.0	6161624	25000	6161624	28000	1.0	6161624	340	1.0	6161624				390	6161624	190	1.0	6161639	190	1.0	6161639	90	1.0	6161624	250	1.0	6161624
Metals																													
Total Aluminum (Al)	ug/L	1700	50	6159159	13000	6159159	2800	50	6159124	480	5.0	6159124				220	6159159	230	5.0	6159159				220	5.0	6159159	170	5.0	6159159
Total Antimony (Sb)	ug/L	<10	10	6159159	<10	6159159	<10	10	6159124	<1.0	1.0	6159124				<1.0	6159159	<1.0	1.0	6159159				<1.0	1.0	6159159	<1.0	1.0	6159159
Total Arsenic (As)	ug/L	<10	10	6159159	<10	6159159	<10	10	6159124	<1.0	1.0	6159124				1.3	6159159	<1.0	1.0	6159159				<1.0	1.0	6159159	<1.0	1.0	6159159
Total Barium (Ba)	ug/L	15	10	6159159	58	6159159	21	10	6159124	25	1.0	6159124				28	6159159	14	1.0	6159159				15	1.0	6159159	71	1.0	6159159
Total Beryllium (Be)	ug/L	<10	10	6159159	<10	6159159	<10	10	6159124	<1.0	1.0	6159124				<1.0	6159159	<1.0	1.0	6159159				<1.0	1.0	6159159	<1.0	1.0	6159159
Total Bismuth (Bi)	ug/L	<20	20	6159159	<20	6159159	<20	20	6159124	<2.0	2.0	6159124				<2.0	6159159	<2.0	2.0	6159159				<2.0	2.0	6159159	<2.0	2.0	6159159
Total Boron (B)	ug/L	3400	500	6159159	2100	6159159	2400	500	6159124	<50	50	6159124				<50	6159159	<50	50	6159159				<50	50	6159159	<50	50	6159159
Total Cadmium (Cd)	ug/L	<0.10	0.10	6159159	<0.10	6159159	<0.10	0.10	6159124	0.024	0.010	6159124				0.016	6159159	0.016	0.010	6159159				0.016	0.010	6159159	<0.010	0.010	6159159
Total Calcium (Ca)	ug/L	300000	1000	6159159	200000	6159159	220000	1000	6159124	24000	100	6159124				25000	6159159	11000	100	6159159				9100	100	6159159	40000	100	6159159
Total Chromium (Cr)	ug/L	<10	10	6159159	19	6159159	<10	10	6159124	1.6	1.0	6159124				1.4	6159159	1.0	1.0	6159159				<1.0	1.0	6159159	1.2	1.0	6159159
Total Cobalt (Co)	ug/L	<4.0	4.0	6159159	11	6159159	<4.0	4.0	6159124	0.40	0.40	6159124				<0.40	6159159	<0.40	0.40	6159159				<0.40	0.40	6159159	<0.40	0.40	6159159
Total Copper (Cu)	ug/L	<5.0	5.0	6159159	14	6159159	<5.0	5.0	6159124	0.79	0.50	6159124				0.73	6159159	<0.50	0.50	6159159				<0.50	0.50	6159159	0.65	0.50	6159159
Total Iron (Fe)	ug/L	2200	500	6159159	19000	6159159	3700	500	6159124	810	50	6159124				720	6159159	320	50	6159159				230	50	6159159	390	50	6159159
Total Lead (Pb)	ug/L	<5.0	5.0	6159159	14	6159159	<5.0	5.0	6159124	<0.50	0.50	6159124				<0.50	6159159	<0.50	0.50	6159159				<0.50	0.50	6159159	<0.50	0.50	6159159
Total Magnesium (Mg)	ug/L	940000	1000	6159159	600000	6159159	660000	1000	6159124	4800	100	6159124				6100	6159159	2300	100	6159159				950	100	6159159	2000	100	6159159
Total Manganese (Mn)	ug/L	100	20	6159159	820	6159159	150	20	6159124	170	2.0	6159124				470	6159159	89	2.0	6159159				49	2.0	6159159	140	2.0	6159159
Total Molybdenum (Mo)	ug/L	<20	20	6159159	<20	6159159	<20	20	6159124	<2.0	2.0	6159124				<2.0	6159159	<2.0	2.0	6159159				<2.0	2.0	6159159	<2.0	2.0	6159159
Total Nickel (Ni)	ug/L	<20	20	6159159	21	6159159	<20	20	6159124	<2.0	2.0	6159124				<2.0	6159159	<2.0	2.0	6159159				<2.0	2.0	6159159	<2.0	2.0	6159159
Total Phosphorus (P)	ug/L	<1000	1000	6159159	<1000	6159159	<1000	1000	6159124	<100	100	6159124				<100	6159159	<100	100	6159159				<100	100	6159159	<100	100	6159159
Total Potassium (K)	ug/L	280000	1000	6159159	180000	6159159	200000	1000	6159124	1500	100	6159124				1700	6159159	830	100	6159159				520	100	6159159	780	100	6159159
Total Selenium (Se)	ug/L	<10	10	6159159	<10	6159159	<10	10	6159124	<1.0	1.0	6159124				<1.0	6159159	<1.0	1.0	6159159				<1.0	1.0	6159159	<1.0	1.0	6159159
Total Silver (Ag)	ug/L	<1.0	1.0	6159159	<1.0	6159159	<1.0	1.0	6159124	<0.10	0.10	6159124				<0.10	6159159	<0.10	0.10	6159159				<0.10	0.10	6159159	<0.10	0.10	6159159
Total Sodium (Na)	ug/L	7900000	1000	6159159	5000000	6159159	5600000	1000	6159124	34000	100	6159124				47000	6159159	18000	100	6159159				6800	100	6159159	4900	100	6159159
Total Strontium (Sr)	ug/L	5600	20	6159159	3600	6159159	4000	20	6159124	160	2.0	6159124				180	6159159	75	2.0	6159159				57	2.0	6159159	280	2.0	6159159
Total Thallium (Tl)	ug/L	<1.0	1.0	6159159	<1.0	6159159	<1.0	1.0	6159124	<0.10	0.10	6159124				<0.10	6159159	<0.10	0.10	6159159				<0.10	0.10	6159159	<0.10	0.10	6159159
Total Tin (Sn)	ug/L	<20	20	6159159	<20	6159159	<20	20	6159124	<2.0	2.0	6159124				<2.0	6159159	<2.0	2.0	6159159				<2.0	2.0	6159159	<2.0	2.0	6159159
Total Titanium (Ti)	ug/L	42	20	6159159	280	6159159	67	20	6159124	11	2.0	6159124				6.2	6159159	3.8	2.0	6159159				3.0	2.0	6159159	3.5	2.0	6159159
Total Uranium (U)	ug/L	2.4	1.0	6159159	2.1	6159159	1.8	1.0	6159124	0.23	0.10	6159124				0.28	6159159	0.19	0.10	6159159				0.20	0.10	6159159	<0.10	0.10	6159159
Total Vanadium (V)	ug/L	<20	20	6159159	33	6159159	<20	20	6159124	<2.0	2.0	6159124				<2.0	6159159	<2.0	2.0	6159159				<2.0	2.0	6159159	<2.0	2.0	6159159
Total Zinc (Zn)	ug/L	<50	50	6159159	63	6159159	<50	50	6159124	<5.0	5.0	6159124				<5.0	6159159	<5.0	5.0	6159159				<5.0	5.0	6159159	<5.0	5.0	6159159

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

Results relate only to the items tested.

CBCL Limited
Client Project #: 171046.01
Site Location: WINDSOR

BV Labs Job Number: B9E8112
Report Date: 2019/06/10

RESULTS OF ANALYSES OF WATER

BV Labs ID		JWM417			JWM417			JWM418	JWM419		JWM420	JWM421		JWM422		JWM423		JWM424			JWM425	JWM426	JWM428		JWM429	
Sampling Date		2019-05-31 12:35			2019-05-31 12:35			2019-05-31 09:15	2019-05-31 10:00		2019-05-31 10:30	2019-05-31 14:25		2019-05-31 13:25		2019-05-31 14:00		2019-05-31 11:20			2019-05-30 15:20	2019-05-30 15:32	2019-05-30 15:00		2019-05-30 16:51	
COC Number		D40796			D40796			d40796	d40796		d40796	d40796		d40796		d40796		d40796			d40796	d40796	D40795		d40795	
	UNITS	**AVE-1**	**RDL**	**QC Batch**	**AVE-1 Lab-Dup**	**RDL**	**QC Batch**	**AVE-2**	**AVE-3**	**RDL**	**AVE-4**	**AVE-5**	**RDL**	**AVE-7**	**RDL**	**AVE-8**	**RDL**	**AVE-9**	**RDL**	**QC Batch**	**AR-4**	**AR-5**	**AR-6**	**QC Batch**	**AR-7**	**RDL**
Inorganics																										
Salinity	N/A	24	2.0	6156521	24	2.0	6156521	21	19	2.0	15	16	2.0	18	2.0	<2.0	2.0	17	2.0	6156521	<2.0	<2.0	<2.0	6156521	<2.0	2.0
Total Suspended Solids	mg/L	92	5.0	6158988				340	320	10	780	1200	17	130	10	1200	17	130	5.0	6158988	24	19	27	6159456	16	2.0

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Results relate only to the items tested.

	JWM429			JWM430	JWM431		JWM432		JWM433	JWM434	JWM435		JWM436			JWM436			JWM437		
	2019-05-30 16:51			2019-05-30 13:30	2019-05-30 12:32		2019-05-30 10:42		2019-05-30 10:16	2019-05-30 11:13	2019-05-30 11:45		2019-05-30 12:13			2019-05-30 12:13			2019-05-30 13:00		
	d40795			d40795	d40795		d40795		d40795	d40795	d40795		d40795			d40795			d40795		
QC Batch	**AR-7 Lab-Dup**	**RDL**	**QC Batch**	**AR-9**	**AR-12**	**RDL**	**AR-14**	**RDL**	**AR-15**	**AR-16**	**AR-18**	**RDL**	**BKG-1**	**RDL**	**QC Batch**	**BKG-1 Lab-Dup**	**RDL**	**QC Batch**	**BKG-2**	**RDL**	**QC Batch**
6161198	<2.0	2.0	6161198	<2.0	<2.0	2.0	<2.0	2.0	<2.0	<2.0	<2.0	2.0	<2.0	2.0	6161198				<2.0	2.0	6161198
6159456				6.1	4.8	1.0	78	2.0	4.0	5.4	1.2	1.0	22	5.0	6159456	18	5.0	6159456	3.8	1.0	6159456

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Each tempera	Each tempera	Each tempera	Each temperature is the average of up to three cooler temperatures taken at receipt
Package 1	5.3°C	#N/A	#N/A
Package 2	0.7°C	#N/A	#N/A

Sample JWM417 [AVE-1] : Elevated reporting limits for trace metals due to sample matrix.

Sample JWM420 [AVE-4] : Elevated reporting limits for trace metals due to sample matrix.

Poor RCAp Ion Balance due to sample matrix. Excess cations due to presence of turbidity.

Sample JWM424 [AVE-9] : Elevated reporting limits for trace metals due to sample matrix.

Poor RCAp Ion Balance due to sample matrix. Excess cations due to presence of turbidity.

Sample JWM431 [AR-12] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Results relate only to the items tested.

Report Date: 2019/06/10

CBCL Limited
Attention: Colin McVarish
Client Project #: 171046.01

Site Location: WINDSOR

Quality Assurance Report
BV Labs Job Number: B9E8112

QA/QC Bat Init		QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6156521	BBD	QC Standard	Salinity	2019-06-04		100	%	80 - 120
6156521	BBD	Method Blank	Salinity	2019-06-04	<2.0		N/A	
6156521	BBD	RPD [JWM417-02]	Salinity	2019-06-04	0		%	25
6156662	NRG	Spiked Blank	Colour	2019-06-05		103	%	80 - 120
6156662	NRG	Method Blank	Colour	2019-06-05	<5.0		TCU	
6156662	NRG	RPD	Colour	2019-06-05	8.1		%	20
6157018	NRG	Spiked Blank	Colour	2019-06-05		101	%	80 - 120
6157018	NRG	Method Blank	Colour	2019-06-05	<5.0		TCU	
6157018	NRG	RPD	Colour	2019-06-05	NC		%	20
6158934	SSI	Matrix Spike [JWM428-05]	Total Organic Carbon (C)	2019-06-05		93	%	85 - 115
6158934	SSI	Spiked Blank	Total Organic Carbon (C)	2019-06-05		98	%	80 - 120
6158934	SSI	Method Blank	Total Organic Carbon (C)	2019-06-05	<0.50		mg/L	
6158934	SSI	RPD [JWM428-05]	Total Organic Carbon (C)	2019-06-05	2.5		%	15
6158937	SSI	Matrix Spike	Total Organic Carbon (C)	2019-06-05		NC	%	85 - 115
6158937	SSI	Spiked Blank	Total Organic Carbon (C)	2019-06-05		100	%	80 - 120
6158937	SSI	Method Blank	Total Organic Carbon (C)	2019-06-05	<0.50		mg/L	
6158937	SSI	RPD	Total Organic Carbon (C)	2019-06-05	1.6 (1)		%	15
6158988	AM6	QC Standard	Total Suspended Solids	2019-06-06		101	%	80 - 120
6158988	AM6	Method Blank	Total Suspended Solids	2019-06-06	<1.0		mg/L	
6158988	AM6	RPD	Total Suspended Solids	2019-06-06	3.1		%	20
6159124	AFM	Matrix Spike	Total Aluminum (Al)	2019-06-06		106	%	80 - 120
			Total Antimony (Sb)	2019-06-06		103	%	80 - 120
			Total Arsenic (As)	2019-06-06		101	%	80 - 120
			Total Barium (Ba)	2019-06-06		99	%	80 - 120
			Total Beryllium (Be)	2019-06-06		99	%	80 - 120
			Total Bismuth (Bi)	2019-06-06		102	%	80 - 120
			Total Boron (B)	2019-06-06		102	%	80 - 120
			Total Cadmium (Cd)	2019-06-06		99	%	80 - 120
			Total Calcium (Ca)	2019-06-06		106	%	80 - 120
			Total Chromium (Cr)	2019-06-06		101	%	80 - 120
			Total Cobalt (Co)	2019-06-06		103	%	80 - 120
			Total Copper (Cu)	2019-06-06		103	%	80 - 120
			Total Iron (Fe)	2019-06-06		107	%	80 - 120
			Total Lead (Pb)	2019-06-06		NC	%	80 - 120
			Total Magnesium (Mg)	2019-06-06		111	%	80 - 120
			Total Manganese (Mn)	2019-06-06		102	%	80 - 120
			Total Molybdenum (Mo)	2019-06-06		105	%	80 - 120
			Total Nickel (Ni)	2019-06-06		104	%	80 - 120
			Total Phosphorus (P)	2019-06-06		109	%	80 - 120
			Total Potassium (K)	2019-06-06		107	%	80 - 120
			Total Selenium (Se)	2019-06-06		103	%	80 - 120
			Total Silver (Ag)	2019-06-06		100	%	80 - 120
			Total Sodium (Na)	2019-06-06		107	%	80 - 120
			Total Strontium (Sr)	2019-06-06		102	%	80 - 120
			Total Thallium (Tl)	2019-06-06		105	%	80 - 120
			Total Tin (Sn)	2019-06-06		101	%	80 - 120
			Total Titanium (Ti)	2019-06-06		107	%	80 - 120
			Total Uranium (U)	2019-06-06		107	%	80 - 120
			Total Vanadium (V)	2019-06-06		104	%	80 - 120
			Total Zinc (Zn)	2019-06-06		104	%	80 - 120
6159124	AFM	Spiked Blank	Total Aluminum (Al)	2019-06-06		106	%	80 - 120
			Total Antimony (Sb)	2019-06-06		102	%	80 - 120

			Total Arsenic (As)	2019-06-06	101	%	80 - 120
			Total Barium (Ba)	2019-06-06	99	%	80 - 120
			Total Beryllium (Be)	2019-06-06	101	%	80 - 120
			Total Bismuth (Bi)	2019-06-06	101	%	80 - 120
			Total Boron (B)	2019-06-06	102	%	80 - 120
			Total Cadmium (Cd)	2019-06-06	100	%	80 - 120
			Total Calcium (Ca)	2019-06-06	108	%	80 - 120
			Total Chromium (Cr)	2019-06-06	101	%	80 - 120
			Total Cobalt (Co)	2019-06-06	103	%	80 - 120
			Total Copper (Cu)	2019-06-06	103	%	80 - 120
			Total Iron (Fe)	2019-06-06	107	%	80 - 120
			Total Lead (Pb)	2019-06-06	101	%	80 - 120
			Total Magnesium (Mg)	2019-06-06	110	%	80 - 120
			Total Manganese (Mn)	2019-06-06	103	%	80 - 120
			Total Molybdenum (Mo)	2019-06-06	105	%	80 - 120
			Total Nickel (Ni)	2019-06-06	104	%	80 - 120
			Total Phosphorus (P)	2019-06-06	107	%	80 - 120
			Total Potassium (K)	2019-06-06	106	%	80 - 120
			Total Selenium (Se)	2019-06-06	100	%	80 - 120
			Total Silver (Ag)	2019-06-06	100	%	80 - 120
			Total Sodium (Na)	2019-06-06	107	%	80 - 120
			Total Strontium (Sr)	2019-06-06	103	%	80 - 120
			Total Thallium (Tl)	2019-06-06	104	%	80 - 120
			Total Tin (Sn)	2019-06-06	103	%	80 - 120
			Total Titanium (Ti)	2019-06-06	107	%	80 - 120
			Total Uranium (U)	2019-06-06	106	%	80 - 120
			Total Vanadium (V)	2019-06-06	103	%	80 - 120
			Total Zinc (Zn)	2019-06-06	102	%	80 - 120
6159124	AFM	Method Blank	Total Aluminum (Al)	2019-06-06 <5.0		ug/L	
			Total Antimony (Sb)	2019-06-06 <1.0		ug/L	
			Total Arsenic (As)	2019-06-06 <1.0		ug/L	
			Total Barium (Ba)	2019-06-06 <1.0		ug/L	
			Total Beryllium (Be)	2019-06-06 <1.0		ug/L	
			Total Bismuth (Bi)	2019-06-06 <2.0		ug/L	
			Total Boron (B)	2019-06-06 <50		ug/L	
			Total Cadmium (Cd)	2019-06-06 <0.010		ug/L	
			Total Calcium (Ca)	2019-06-06 <100		ug/L	
			Total Chromium (Cr)	2019-06-06 <1.0		ug/L	
			Total Cobalt (Co)	2019-06-06 <0.40		ug/L	
			Total Copper (Cu)	2019-06-06 <0.50		ug/L	
			Total Iron (Fe)	2019-06-06 <50		ug/L	
			Total Lead (Pb)	2019-06-06 <0.50		ug/L	
			Total Magnesium (Mg)	2019-06-06 <100		ug/L	
			Total Manganese (Mn)	2019-06-06 <2.0		ug/L	
			Total Molybdenum (Mo)	2019-06-06 <2.0		ug/L	
			Total Nickel (Ni)	2019-06-06 <2.0		ug/L	
			Total Phosphorus (P)	2019-06-06 <100		ug/L	
			Total Potassium (K)	2019-06-06 <100		ug/L	
			Total Selenium (Se)	2019-06-06 <1.0		ug/L	
			Total Silver (Ag)	2019-06-06 <0.10		ug/L	
			Total Sodium (Na)	2019-06-06 <100		ug/L	
			Total Strontium (Sr)	2019-06-06 <2.0		ug/L	
			Total Thallium (Tl)	2019-06-06 <0.10		ug/L	
			Total Tin (Sn)	2019-06-06 <2.0		ug/L	
			Total Titanium (Ti)	2019-06-06 <2.0		ug/L	
			Total Uranium (U)	2019-06-06 <0.10		ug/L	
			Total Vanadium (V)	2019-06-06 <2.0		ug/L	
			Total Zinc (Zn)	2019-06-06 <5.0		ug/L	
6159124	AFM	RPD	Total Aluminum (Al)	2019-06-06 4.2		%	20
			Total Iron (Fe)	2019-06-06 NC		%	20
			Total Lead (Pb)	2019-06-06 3.7		%	20
			Total Manganese (Mn)	2019-06-06 3.3		%	20
			Total Zinc (Zn)	2019-06-06 5.3		%	20
6159159	AFM	Matrix Spike	Total Aluminum (Al)	2019-06-06	104	%	80 - 120
			Total Antimony (Sb)	2019-06-06	103	%	80 - 120

			Total Arsenic (As)	2019-06-06	99	%	80 - 120
			Total Barium (Ba)	2019-06-06	98	%	80 - 120
			Total Beryllium (Be)	2019-06-06	99	%	80 - 120
			Total Bismuth (Bi)	2019-06-06	99	%	80 - 120
			Total Boron (B)	2019-06-06	103	%	80 - 120
			Total Cadmium (Cd)	2019-06-06	99	%	80 - 120
			Total Calcium (Ca)	2019-06-06	102	%	80 - 120
			Total Chromium (Cr)	2019-06-06	98	%	80 - 120
			Total Cobalt (Co)	2019-06-06	100	%	80 - 120
			Total Copper (Cu)	2019-06-06	100	%	80 - 120
			Total Iron (Fe)	2019-06-06	105	%	80 - 120
			Total Lead (Pb)	2019-06-06	99	%	80 - 120
			Total Magnesium (Mg)	2019-06-06	107	%	80 - 120
			Total Manganese (Mn)	2019-06-06	102	%	80 - 120
			Total Molybdenum (Mo)	2019-06-06	104	%	80 - 120
			Total Nickel (Ni)	2019-06-06	102	%	80 - 120
			Total Phosphorus (P)	2019-06-06	105	%	80 - 120
			Total Potassium (K)	2019-06-06	103	%	80 - 120
			Total Selenium (Se)	2019-06-06	101	%	80 - 120
			Total Silver (Ag)	2019-06-06	98	%	80 - 120
			Total Sodium (Na)	2019-06-06	104	%	80 - 120
			Total Strontium (Sr)	2019-06-06	102	%	80 - 120
			Total Thallium (Tl)	2019-06-06	102	%	80 - 120
			Total Tin (Sn)	2019-06-06	100	%	80 - 120
			Total Titanium (Ti)	2019-06-06	103	%	80 - 120
			Total Uranium (U)	2019-06-06	105	%	80 - 120
			Total Vanadium (V)	2019-06-06	103	%	80 - 120
			Total Zinc (Zn)	2019-06-06	100	%	80 - 120
6159159	AFM	Spiked Blank	Total Aluminum (Al)	2019-06-06	105	%	80 - 120
			Total Antimony (Sb)	2019-06-06	101	%	80 - 120
			Total Arsenic (As)	2019-06-06	98	%	80 - 120
			Total Barium (Ba)	2019-06-06	97	%	80 - 120
			Total Beryllium (Be)	2019-06-06	99	%	80 - 120
			Total Bismuth (Bi)	2019-06-06	99	%	80 - 120
			Total Boron (B)	2019-06-06	99	%	80 - 120
			Total Cadmium (Cd)	2019-06-06	98	%	80 - 120
			Total Calcium (Ca)	2019-06-06	100	%	80 - 120
			Total Chromium (Cr)	2019-06-06	98	%	80 - 120
			Total Cobalt (Co)	2019-06-06	101	%	80 - 120
			Total Copper (Cu)	2019-06-06	101	%	80 - 120
			Total Iron (Fe)	2019-06-06	108	%	80 - 120
			Total Lead (Pb)	2019-06-06	99	%	80 - 120
			Total Magnesium (Mg)	2019-06-06	108	%	80 - 120
			Total Manganese (Mn)	2019-06-06	102	%	80 - 120
			Total Molybdenum (Mo)	2019-06-06	103	%	80 - 120
			Total Nickel (Ni)	2019-06-06	102	%	80 - 120
			Total Phosphorus (P)	2019-06-06	105	%	80 - 120
			Total Potassium (K)	2019-06-06	105	%	80 - 120
			Total Selenium (Se)	2019-06-06	98	%	80 - 120
			Total Silver (Ag)	2019-06-06	96	%	80 - 120
			Total Sodium (Na)	2019-06-06	105	%	80 - 120
			Total Strontium (Sr)	2019-06-06	99	%	80 - 120
			Total Thallium (Tl)	2019-06-06	102	%	80 - 120
			Total Tin (Sn)	2019-06-06	101	%	80 - 120
			Total Titanium (Ti)	2019-06-06	102	%	80 - 120
			Total Uranium (U)	2019-06-06	103	%	80 - 120
			Total Vanadium (V)	2019-06-06	101	%	80 - 120
			Total Zinc (Zn)	2019-06-06	99	%	80 - 120
6159159	AFM	Method Blank	Total Aluminum (Al)	2019-06-06 <5.0		ug/L	
			Total Antimony (Sb)	2019-06-06 <1.0		ug/L	
			Total Arsenic (As)	2019-06-06 <1.0		ug/L	
			Total Barium (Ba)	2019-06-06 <1.0		ug/L	
			Total Beryllium (Be)	2019-06-06 <1.0		ug/L	
			Total Bismuth (Bi)	2019-06-06 <2.0		ug/L	
			Total Boron (B)	2019-06-06 <50		ug/L	

			Total Cadmium (Cd)	2019-06-06	<0.010		ug/L	
			Total Calcium (Ca)	2019-06-06	<100		ug/L	
			Total Chromium (Cr)	2019-06-06	<1.0		ug/L	
			Total Cobalt (Co)	2019-06-06	<0.40		ug/L	
			Total Copper (Cu)	2019-06-06	<0.50		ug/L	
			Total Iron (Fe)	2019-06-06	<50		ug/L	
			Total Lead (Pb)	2019-06-06	<0.50		ug/L	
			Total Magnesium (Mg)	2019-06-06	<100		ug/L	
			Total Manganese (Mn)	2019-06-06	<2.0		ug/L	
			Total Molybdenum (Mo)	2019-06-06	<2.0		ug/L	
			Total Nickel (Ni)	2019-06-06	<2.0		ug/L	
			Total Phosphorus (P)	2019-06-06	<100		ug/L	
			Total Potassium (K)	2019-06-06	<100		ug/L	
			Total Selenium (Se)	2019-06-06	<1.0		ug/L	
			Total Silver (Ag)	2019-06-06	<0.10		ug/L	
			Total Sodium (Na)	2019-06-06	<100		ug/L	
			Total Strontium (Sr)	2019-06-06	<2.0		ug/L	
			Total Thallium (Tl)	2019-06-06	<0.10		ug/L	
			Total Tin (Sn)	2019-06-06	<2.0		ug/L	
			Total Titanium (Ti)	2019-06-06	<2.0		ug/L	
			Total Uranium (U)	2019-06-06	<0.10		ug/L	
			Total Vanadium (V)	2019-06-06	<2.0		ug/L	
			Total Zinc (Zn)	2019-06-06	<5.0		ug/L	
6159159	AFM	RPD	Total Aluminum (Al)	2019-06-06	2.2		%	20
			Total Antimony (Sb)	2019-06-06	NC		%	20
			Total Arsenic (As)	2019-06-06	NC		%	20
			Total Barium (Ba)	2019-06-06	4.3		%	20
			Total Beryllium (Be)	2019-06-06	NC		%	20
			Total Bismuth (Bi)	2019-06-06	NC		%	20
			Total Boron (B)	2019-06-06	NC		%	20
			Total Cadmium (Cd)	2019-06-06	8.1		%	20
			Total Calcium (Ca)	2019-06-06	2.5		%	20
			Total Chromium (Cr)	2019-06-06	1.1		%	20
			Total Cobalt (Co)	2019-06-06	NC		%	20
			Total Copper (Cu)	2019-06-06	2.6		%	20
			Total Iron (Fe)	2019-06-06	0.41		%	20
			Total Lead (Pb)	2019-06-06	NC		%	20
			Total Magnesium (Mg)	2019-06-06	2.0		%	20
			Total Manganese (Mn)	2019-06-06	4.3		%	20
			Total Molybdenum (Mo)	2019-06-06	NC		%	20
			Total Nickel (Ni)	2019-06-06	NC		%	20
			Total Phosphorus (P)	2019-06-06	2.9		%	20
			Total Potassium (K)	2019-06-06	0.98		%	20
			Total Selenium (Se)	2019-06-06	NC		%	20
			Total Silver (Ag)	2019-06-06	NC		%	20
			Total Sodium (Na)	2019-06-06	2.5		%	20
			Total Strontium (Sr)	2019-06-06	8.7		%	20
			Total Thallium (Tl)	2019-06-06	NC		%	20
			Total Tin (Sn)	2019-06-06	NC		%	20
			Total Titanium (Ti)	2019-06-06	NC		%	20
			Total Uranium (U)	2019-06-06	NC		%	20
			Total Vanadium (V)	2019-06-06	NC		%	20
			Total Zinc (Zn)	2019-06-06	2.6		%	20
6159456	MLW	QC Standard	Total Suspended Solids	2019-06-10		99	%	80 - 120
6159456	MLW	Method Blank	Total Suspended Solids	2019-06-10	<1.0		mg/L	
6159456	MLW	RPD [JWM436-01]	Total Suspended Solids	2019-06-10	20		%	20
6159693	NRG	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2019-06-06		102	%	80 - 120
6159693	NRG	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2019-06-06		109	%	80 - 120
6159693	NRG	Method Blank	Nitrogen (Ammonia Nitrogen)	2019-06-06	<0.050		mg/L	
6159693	NRG	RPD	Nitrogen (Ammonia Nitrogen)	2019-06-06	NC		%	20
6161198	BBD	QC Standard	Salinity	2019-06-06		101	%	80 - 120
6161198	BBD	Method Blank	Salinity	2019-06-06	<2.0		N/A	
6161198	BBD	RPD [JWM429-02]	Salinity	2019-06-06	NC		%	25
6161210	SRM	Matrix Spike	Total Alkalinity (Total as CaCO3)	2019-06-06		NC	%	80 - 120
6161210	SRM	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019-06-06		105	%	80 - 120

6161210	SRM	Method Blank	Total Alkalinity (Total as CaCO3)	2019-06-06	<5.0		mg/L	
6161210	SRM	RPD	Total Alkalinity (Total as CaCO3)	2019-06-06	0.87		%	25
6161211	SRM	Matrix Spike	Dissolved Chloride (Cl-)	2019-06-06		NC	%	80 - 120
6161211	SRM	Spiked Blank	Dissolved Chloride (Cl-)	2019-06-06		98	%	80 - 120
6161211	SRM	Method Blank	Dissolved Chloride (Cl-)	2019-06-06	<1.0		mg/L	
6161211	SRM	RPD	Dissolved Chloride (Cl-)	2019-06-06	1.3		%	25
6161212	SRM	Matrix Spike	Dissolved Sulphate (SO4)	2019-06-06		NC	%	80 - 120
6161212	SRM	Spiked Blank	Dissolved Sulphate (SO4)	2019-06-06		98	%	80 - 120
6161212	SRM	Method Blank	Dissolved Sulphate (SO4)	2019-06-06	<2.0		mg/L	
6161212	SRM	RPD	Dissolved Sulphate (SO4)	2019-06-06	0.69		%	25
6161213	SRM	Matrix Spike	Reactive Silica (SiO2)	2019-06-07		102	%	80 - 120
6161213	SRM	Spiked Blank	Reactive Silica (SiO2)	2019-06-07		91	%	80 - 120
6161213	SRM	Method Blank	Reactive Silica (SiO2)	2019-06-07	<0.50		mg/L	
6161213	SRM	RPD	Reactive Silica (SiO2)	2019-06-07	8.2		%	25
6161214	SRM	Matrix Spike	Orthophosphate (P)	2019-06-06		NC	%	80 - 120
6161214	SRM	Spiked Blank	Orthophosphate (P)	2019-06-06		92	%	80 - 120
6161214	SRM	Method Blank	Orthophosphate (P)	2019-06-06	<0.010		mg/L	
6161214	SRM	RPD	Orthophosphate (P)	2019-06-06	0.82		%	25
6161215	SRM	Matrix Spike	Nitrate + Nitrite (N)	2019-06-06		91	%	80 - 120
6161215	SRM	Spiked Blank	Nitrate + Nitrite (N)	2019-06-06		97	%	80 - 120
6161215	SRM	Method Blank	Nitrate + Nitrite (N)	2019-06-06	<0.050		mg/L	
6161215	SRM	RPD	Nitrate + Nitrite (N)	2019-06-06	NC		%	25
6161216	SRM	Matrix Spike	Nitrite (N)	2019-06-06		82	%	80 - 120
6161216	SRM	Spiked Blank	Nitrite (N)	2019-06-06		99	%	80 - 120
6161216	SRM	Method Blank	Nitrite (N)	2019-06-06	<0.010		mg/L	
6161216	SRM	RPD	Nitrite (N)	2019-06-06	NC		%	20
6161217	SRM	Matrix Spike [JWM431-03]	Total Alkalinity (Total as CaCO3)	2019-06-06		100	%	80 - 120
6161217	SRM	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019-06-06		97	%	80 - 120
6161217	SRM	Method Blank	Total Alkalinity (Total as CaCO3)	2019-06-06	<5.0		mg/L	
6161217	SRM	RPD [JWM431-03]	Total Alkalinity (Total as CaCO3)	2019-06-06	4.8		%	25
6161218	SRM	Matrix Spike [JWM431-03]	Dissolved Chloride (Cl-)	2019-06-06		95	%	80 - 120
6161218	SRM	Spiked Blank	Dissolved Chloride (Cl-)	2019-06-06		98	%	80 - 120
6161218	SRM	Method Blank	Dissolved Chloride (Cl-)	2019-06-06	<1.0		mg/L	
6161218	SRM	RPD [JWM431-03]	Dissolved Chloride (Cl-)	2019-06-06	0.14		%	25
6161219	SRM	Matrix Spike [JWM431-03]	Dissolved Sulphate (SO4)	2019-06-06		99	%	80 - 120
6161219	SRM	Spiked Blank	Dissolved Sulphate (SO4)	2019-06-06		98	%	80 - 120
6161219	SRM	Method Blank	Dissolved Sulphate (SO4)	2019-06-06	<2.0		mg/L	
6161219	SRM	RPD [JWM431-03]	Dissolved Sulphate (SO4)	2019-06-06	0.30		%	25
6161220	SRM	Matrix Spike [JWM431-03]	Reactive Silica (SiO2)	2019-06-07		94	%	80 - 120
6161220	SRM	Spiked Blank	Reactive Silica (SiO2)	2019-06-07		95	%	80 - 120
6161220	SRM	Method Blank	Reactive Silica (SiO2)	2019-06-07	<0.50		mg/L	
6161220	SRM	RPD [JWM431-03]	Reactive Silica (SiO2)	2019-06-07	15		%	25
6161221	SRM	Matrix Spike [JWM431-03]	Orthophosphate (P)	2019-06-06		92	%	80 - 120
6161221	SRM	Spiked Blank	Orthophosphate (P)	2019-06-06		92	%	80 - 120
6161221	SRM	Method Blank	Orthophosphate (P)	2019-06-06	<0.010		mg/L	
6161221	SRM	RPD [JWM431-03]	Orthophosphate (P)	2019-06-06	0.79		%	25
6161222	SRM	Matrix Spike [JWM431-03]	Nitrate + Nitrite (N)	2019-06-06		96	%	80 - 120
6161222	SRM	Spiked Blank	Nitrate + Nitrite (N)	2019-06-06		97	%	80 - 120
6161222	SRM	Method Blank	Nitrate + Nitrite (N)	2019-06-06	<0.050		mg/L	
6161222	SRM	RPD [JWM431-03]	Nitrate + Nitrite (N)	2019-06-06	NC		%	25
6161223	SRM	Matrix Spike [JWM431-03]	Nitrite (N)	2019-06-06		90	%	80 - 120
6161223	SRM	Spiked Blank	Nitrite (N)	2019-06-06		100	%	80 - 120
6161223	SRM	Method Blank	Nitrite (N)	2019-06-06	<0.010		mg/L	
6161223	SRM	RPD [JWM431-03]	Nitrite (N)	2019-06-06	NC		%	20
6161295	EMT	QC Standard	Turbidity	2019-06-06		104	%	80 - 120
6161295	EMT	Spiked Blank	Turbidity	2019-06-06		97	%	80 - 120
6161295	EMT	Method Blank	Turbidity	2019-06-06	<0.10		NTU	
6161295	EMT	RPD	Turbidity	2019-06-06	3.0		%	20
6161380	EMT	QC Standard	Turbidity	2019-06-06		106	%	80 - 120
6161380	EMT	Spiked Blank	Turbidity	2019-06-06		97	%	80 - 120

6161380	EMT	Method Blank	Turbidity	2019-06-06	<0.10		NTU	
6161380	EMT	RPD	Turbidity	2019-06-06	18		%	20
6161620	EMT	QC Standard	pH	2019-06-07		101	%	97 - 103
6161620	EMT	RPD	pH	2019-06-07	0.75		%	N/A
6161624	EMT	Spiked Blank	Conductivity	2019-06-07		100	%	80 - 120
6161624	EMT	Method Blank	Conductivity	2019-06-07	<1.0		uS/cm	
6161624	EMT	RPD	Conductivity	2019-06-07	0.85		%	10
6161633	EMT	QC Standard	pH	2019-06-07		101	%	97 - 103
6161633	EMT	RPD [JWM431-03]	pH	2019-06-07	0.71		%	N/A
6161639	EMT	Spiked Blank	Conductivity	2019-06-07		99	%	80 - 120
6161639	EMT	Method Blank	Conductivity	2019-06-07	<1.0		uS/cm	
6161639	EMT	RPD [JWM431-03]	Conductivity	2019-06-07	0.49		%	10

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Elevated reporting limit due to sample matrix.

CLIENT: CBCL Limited
PROJECT #: 171046.01, BV LABS JOB: B9E8112
INORGANIC PARAMETERS
MATRIX: WATER
Note: Window zoom values other than 75% may cause unstable perfor

Select Guideline Values from the Dropdown List Below. Exceedences (& "ND") will turn BOLD with Yellow Background.
1. CDWQ - Health-based, Coarse Grained
Bold with Blue Background indicates non-detected but DL > Guideline (due to dilution etc)
** Guideline flagging is correct only when result units correspond with guideline units on spreadsheet. Every effort has been made to ensure report and guideline units are aligned.
***Programmers' Note: Do not insert or delete Parameter rows unless Guidelines, DropDownConstants & BaseTables are also adjusted.

Sample ID Laboratory ID BV Labs Job # Sampling Date	Guideline 1. CDWQ Health-based Coarse Grained	Detection Limit	Units	AVE-1 JWM417 B9E8112 31-May-2019	AVE-4 JWM420 B9E8112 31-May-2019	AVE-9 JWM424 B9E8112 31-May-2019	AR-6 JWM428 B9E8112 30-May-2019	AR-9 JWM430 B9E8112 30-May-2019	AR-12 JWM431 B9E8112 30-May-2019	AR-16 JWM434 B9E8112 30-May-2019	BKG-2 JWM437 B9E8112 30-May-2019
Aluminium (mg/L)[3,4]	NV	-	-								
Aluminium (ug/L)[3,4]	NV	5.0	ug/L	1700	13000	2800	480	220	230	220	170
Ammonia (total)[5]	NV	0.050	mg/L	<0.050	0.057	<0.050	0.097	0.13	0.064	<0.050	<0.050
Ammonia (un-ionized)	NV	-	-								
Antimony	6	1.0	ug/L	**<10**	**<10**	**<10**	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic	10	1.0	ug/L	<10	<10	<10	<1.0	1.3	<1.0	<1.0	<1.0
Barium	1000	1.0	ug/L	15	58	21	25	28	14	15	71
Boron[20]	5000	50	ug/L	3400	2100	2400	<50	<50	<50	<50	<50
Bromate	10	-	-								
Cadmium[21]	5	0.010	ug/L	<0.10	<0.10	<0.10	0.024	0.016	0.016	0.016	<0.010
Chloramines (total)	3000	-	-								
Chlorate	1	-	-								
Chloride[6]	NV	1.0	mg/L	15000	7600	7500	56	70	30	9.4	6.4
Chlorite	1	-	-								
Chromium (mg/L)	0.05	-	-								
Chromium (ug/L)	50	1.0	ug/L	<10	19	<10	1.6	1.4	1	<1.0	1.2
Hexavalent chromium (Cr(VI))	NV	-	-								
Trivalent chromium (Cr(III))	NV	-	-								
Colour	NV	5.0	TCU	6.4	25	21	78	75	95	98	22
Copper (mg/L)[7]	NV	-	-								
Copper (ug/L)[7]	NV	0.50	ug/L	<5.0	14	<5.0	0.79	0.73	<0.50	<0.50	0.65
Cyanide (total)	NV	-	-								
Cyanide (as free CN)	0.2	-	-								
Dissolved oxygen[8,9]	NV	-	-								
Fluoride	1.5	-	-								
Iron (mg/L)	NV	-	-								
Iron (ug/L)	NV	50	ug/L	2200	19000	3700	810	720	320	230	390
Lead (mg/L)[10]	0.01	-	-								
Lead (ug/L)[10]	10	0.50	ug/L	<5.0	**14**	<5.0	<0.50	<0.50	<0.50	<0.50	<0.50
Manganese (mg/L)	NV	-	-								
Manganese (ug/L)	NV	2.0	ug/L	100	820	150	170	470	89	49	140
Mercury	1	-	-								
Methylmercury	NV	-	-								
Molybdenum	NV	2.0	ug/L	<20	<20	<20	<2.0	<2.0	<2.0	<2.0	<2.0
Nickel[11]	NV	2.0	ug/L	<20	21	<20	<2.0	<2.0	<2.0	<2.0	<2.0
Nitrate (as N)[12]	10	0.050	mg/L	<0.050	0.11	0.08	0.058	<0.050	<0.050	<0.050	0.067
Nitrilotriacetic acid (NTA)	400	-	-								
Nitrite (as N)	1	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Odour[13]	NV	-	-								
pH[14,15]	NV	N/A	pH	7.74	7.58	7.6	7.34	7.3	6.98	7.05	7.49
Phosphorus (total)	NV	-	-								
Reactive chlorine species (hypochlorou	NV	-	-								
Salinity[16]	NV	-	-								
Selenium	50	1.0	ug/L	<10	<10	<10	<1.0	<1.0	<1.0	<1.0	<1.0
Silver	NV	0.10	ug/L	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium (mg/L)	NV	-	-								
Sodium (ug/L)	NV	100	ug/L	7900000	5000000	5600000	34000	47000	18000	6800	4900
Sulphate	NV	2.0	mg/L	1900	1200	1400	54	57	30	21	83
Sulphide (as H2S)	NV	-	-								
Taste[17]	NV	-	-								
Temperature[18]	NV	-	-								
Thallium	NV	0.10	ug/L	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10
Total dissolved solids (TDS-Measured)	NV	-	-								
Total dissolved solids (TDS-Calculated)	NV	1.0	mg/L	26000	15000	16000	190	230	100	56	160
Tributyltin	NV	-	-								
Triphenyltin	NV	-	-								
Turbidity[22]	0.3	0.10	NTU	**170**	**660**	**130**	**13**	**4.2**	**2.1**	**2.1**	**3**
Uranium[23]	20	0.10	ug/L	2.4	2.1	1.8	0.23	0.28	0.19	0.2	<0.10
Zinc (mg/L)	NV	-	-								
Zinc (ug/L)	NV	5.0	ug/L	<50	63	<50	<5.0	<5.0	<5.0	<5.0	<5.0
Beryllium	NV	1.0	ug/L	<10	<10	<10	<1.0	<1.0	<1.0	<1.0	<1.0
Cobalt	NV	0.40	ug/L	<4.0	11	<4.0	0.4	<0.40	<0.40	<0.40	<0.40
Strontium	NV	2.0	ug/L	5600	3600	4000	160	180	75	57	280
Tin	NV	2.0	ug/L	<20	<20	<20	<2.0	<2.0	<2.0	<2.0	<2.0
Vanadium	NV	2.0	ug/L	<20	33	<20	<2.0	<2.0	<2.0	<2.0	<2.0

NOTES:
NV = no value
CDWQ: Oct 2014, CWQG Aquatic Life Update 7.1: Dec 2007 (B 2009, Cl 2011, U 2011, NO3 2012, Cd 2014), NS Contaminated Sites (NSCS): July 2013
Coarse/Fine designation only applies to Atl. RBCA (PIRI) Water and NS Contam. Sites GW Guidelines. For all other this may be ignore‹
1. This table represents a summary of the data presented in the Laboratory Certificate of Analysis for convenience purposes on
2. This summary is to be used in conjunction with, not as a replacement of the Laboratory Certificate of Analysis which contains all QA/QC informatic
3. Aluminum Aesthetic Objective (CDWQ - AO): Conventional Treatment Plants = 0.1 mg/L (100 ug/L), Other Treatment Systems = 0.2 mg/L (200 ug/L
4. Aluminum Guideline (CWQG Aquatic Life - Freshwater) is pH dependent: please see applicable guideline
5. Ammonia (CWQG Aquatic Life - Freshwater) - guidelines vary with pH and temperature. See fact sheet for detai
6. Chloride Aquatic Life Guidelines are for Long term exposure. For Short term please see applicable guideline
7. Copper Guideline (CWQG Aquatic Life - Freshwater) is CaCO3 (Hardness) dependent: Please see applicable guideline for more informatior
8. Dissolved Oxygen Guideline (CWQG Aquatic Life - Freshwater): For warm-water biota (WWB) specific life stages values please see applicable guideline
9. Dissolved Oxygen Guideline (CWQG Aquatic Life - Marinewater): > 8000 ug/L
10. Lead Guideline (CWQG Aquatic Life - Freshwater) is CaCO3 (Hardness) dependent: Please see applicable guideline for more informatior
11. Nickel Guideline (CWQG Aquatic Life - Freshwater) is CaCO3 (Hardness) dependent: Please see applicable guideline for more informatior
12. Nitrate (CWQG) for Aquatic Life "Long Term Exposure" guideline used. Short Term exposure values: Freshwater=124 and Marine=33
13. Odour Aesthetic Objective (CDWQ): "Inoffensive'
14. pH Objective (CDWQ): 6.5 - 8.5
15. pH Guideline (CWQG Aquatic Life): Freshwater 6.5 - 9, Marine 7.0 - 8.7
16. Salinity Guideline (CWQG Aquatic Life - Marinewater): < 10% fluctuation
17. Taste Aesthetic Objective (CDWQ): "Inoffensive'
18. Temperature Aesthetic Objective (CDWQ): <= 15°C
19. Calculated result only includes measured parameters. Actual TDS may be higher
20. Boron Aquatic Life Guidelines are for Long term exposure. For Short term please see applicable guideline
21. Cadmium Aquatic Life Guidelines are for Long term exposure. For Short term please see Guideline. Note: Both are CaCO3 dependent for Freshwate
22. Turbidity CDWQ guideline value based on conventional treatment system. For slow sand or diatomaceous earth filtration 1.0 NTU and for membrane filtration 0.1 NTU
23. Uranium Aquatic Life Guidelines are for Long term exposure. For Short term: Please see applicable guideline

Analyte_ID	Parameter	Sample_ID	Method	Results	Units	EQL	Lab_ID	Matrix	Lab_Duplicate_Of	Field_Duplicate_Of	Date_Sampled	CSite #	DFRP #	DCC_Project_ID	Report Name	TableName
	Nitrate (as N)	AVE-1	ASTM D3867-16	<0.050	mg/L	0.050	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Hardness (as CaCO3)	AVE-1	Auto Calc	4600	mg/L	1.0	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Anion Sum	AVE-1	Auto Calc.	454	me/L	N/A	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Total Dissolved Solids	AVE-1	Auto Calc.	26000	mg/L	1.0	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Cation Sum	AVE-1	Auto Calc.	444	me/L	N/A	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Ion Balance (% Difference)	AVE-1	Auto Calc.	1.14	%	N/A	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Langelier Index (@ 20C)	AVE-1	Auto Calc.	0.296	N/A		JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Langelier Index (@ 4C)	AVE-1	Auto Calc.	0.0580	N/A		JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Saturation pH (@ 20C)	AVE-1	Auto Calc.	7.44	N/A		JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Saturation pH (@ 4C)	AVE-1	Auto Calc.	7.68	N/A		JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Bicarbonate (as CaCO3)	AVE-1	SM 23 4500-CO2 D	87	mg/L	1.0	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Carbonate (as CaCO3)	AVE-1	SM 23 4500-CO2 D	<1.0	mg/L	1.0	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Sulphate	AVE-1	ASTM D516-16 m	1900	mg/L	40	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Turbidity	AVE-1	EPA 180.1 R2 m	170	NTU	1.0	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Alkalinity (as CaCO3)	AVE-1	EPA 310.2 R1974 m	87	mg/L	5.0	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Ammonia	AVE-1	EPA 350.1 R2 m	<0.050	mg/L	0.050	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Reactive Silica (as SiO2)	AVE-1	EPA 366.0 m	<0.50	mg/L	0.50	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Salinity	AVE-1	SM 22 2520B	24	N/A	2.0	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Colour	AVE-1	SM 23 2120C m	6.4	TCU	5.0	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Conductivity	AVE-1	SM 23 2510B m	40000	uS/cm	1.0	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	TSS	AVE-1	SM 23 2540D m	92	mg/L	5.0	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Chloride	AVE-1	SM 23 4500-Cl- E m	15000	mg/L	500	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	pH	AVE-1	SM 23 4500-H+ B m	7.74	pH	N/A	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Nitrite	AVE-1	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Ortho Phosphate (as P)	AVE-1	SM 23 4500-P E m	<0.010	mg/L	0.010	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	TOC	AVE-1	SM 23 5310B m	<5.0	mg/L	5.0	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Nitrate + Nitrite (as N)	AVE-1	USGS I-2547-11m	<0.050	mg/L	0.050	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Aluminum	AVE-1	EPA 6020B R2 m	1700	ug/L	50	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Antimony	AVE-1	EPA 6020B R2 m	<10	ug/L	10	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Arsenic	AVE-1	EPA 6020B R2 m	<10	ug/L	10	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Barium	AVE-1	EPA 6020B R2 m	15	ug/L	10	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Beryllium	AVE-1	EPA 6020B R2 m	<10	ug/L	10	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Bismuth	AVE-1	EPA 6020B R2 m	<20	ug/L	20	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Boron	AVE-1	EPA 6020B R2 m	3400	ug/L	500	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Cadmium	AVE-1	EPA 6020B R2 m	<0.10	ug/L	0.10	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Calcium	AVE-1	EPA 6020B R2 m	300000	ug/L	1000	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Chromium	AVE-1	EPA 6020B R2 m	<10	ug/L	10	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Cobalt	AVE-1	EPA 6020B R2 m	<4.0	ug/L	4.0	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Copper	AVE-1	EPA 6020B R2 m	<5.0	ug/L	5.0	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Iron	AVE-1	EPA 6020B R2 m	2200	ug/L	500	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Lead	AVE-1	EPA 6020B R2 m	<5.0	ug/L	5.0	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Magnesium	AVE-1	EPA 6020B R2 m	940000	ug/L	1000	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Manganese	AVE-1	EPA 6020B R2 m	100	ug/L	20	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Molybdenum	AVE-1	EPA 6020B R2 m	<20	ug/L	20	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Nickel	AVE-1	EPA 6020B R2 m	<20	ug/L	20	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Phosphorus (P)	AVE-1	EPA 6020B R2 m	<1000	ug/L	1000	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Potassium	AVE-1	EPA 6020B R2 m	280000	ug/L	1000	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Selenium	AVE-1	EPA 6020B R2 m	<10	ug/L	10	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Silver	AVE-1	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Sodium	AVE-1	EPA 6020B R2 m	7900000	ug/L	1000	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Strontium	AVE-1	EPA 6020B R2 m	5600	ug/L	20	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Thallium	AVE-1	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Tin	AVE-1	EPA 6020B R2 m	<20	ug/L	20	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Titanium	AVE-1	EPA 6020B R2 m	42	ug/L	20	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Uranium	AVE-1	EPA 6020B R2 m	2.4	ug/L	1.0	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Vanadium	AVE-1	EPA 6020B R2 m	<20	ug/L	20	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Zinc	AVE-1	EPA 6020B R2 m	<50	ug/L	50	JWM417	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Salinity	AVE-1	SM 22 2520B	24	N/A	2.0	JWM417D1	Water	JWM417		2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Salinity	AVE-2	SM 22 2520B	21	N/A	2.0	JWM418	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	TSS	AVE-2	SM 23 2540D m	340	mg/L	10	JWM418	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Salinity	AVE-3	SM 22 2520B	19	N/A	2.0	JWM419	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	TSS	AVE-3	SM 23 2540D m	320	mg/L	10	JWM419	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Nitrate (as N)	AVE-4	ASTM D3867-16	0.11	mg/L	0.050	JWM420	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Hardness (as CaCO3)	AVE-4	Auto Calc	3000	mg/L	1.0	JWM420	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Anion Sum	AVE-4	Auto Calc.	240	me/L	N/A	JWM420	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Total Dissolved Solids	AVE-4	Auto Calc.	15000	mg/L	1.0	JWM420	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Cation Sum	AVE-4	Auto Calc.	280	me/L	N/A	JWM420	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Ion Balance (% Difference)	AVE-4	Auto Calc.	7.78	%	N/A	JWM420	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
	Langelier Index (@ 20C)	AVE-4	Auto Calc.	-0.186	N/A		JWM420	Water			2019/05/31	WINDSOR			B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls

Langelier Index (@ 4C)	AVE-4	Auto Calc.	-0.423	N/A		JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Saturation pH (@ 20C)	AVE-4	Auto Calc.	7.77	N/A		JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Saturation pH (@ 4C)	AVE-4	Auto Calc.	8.00	N/A		JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Bicarbonate (as CaCO3)	AVE-4	SM 23 4500-CO2 D	68	mg/L	1.0	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Carbonate (as CaCO3)	AVE-4	SM 23 4500-CO2 D	<1.0	mg/L	1.0	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Sulphate	AVE-4	ASTM D516-16 m	1200	mg/L	40	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Turbidity	AVE-4	EPA 180.1 R2 m	660	NTU	1.0	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Alkalinity (as CaCO3)	AVE-4	EPA 310.2 R1974 m	68	mg/L	5.0	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ammonia	AVE-4	EPA 350.1 R2 m	0.057	mg/L	0.050	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Reactive Silica (as SiO2)	AVE-4	EPA 366.0 m	1.3	mg/L	0.50	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Salinity	AVE-4	SM 22 2520B	15	N/A	2.0	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Colour	AVE-4	SM 23 2120C m	25	TCU	5.0	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Conductivity	AVE-4	SM 23 2510B m	25000	uS/cm	1.0	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TSS	AVE-4	SM 23 2540D m	780	mg/L	17	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Chloride	AVE-4	SM 23 4500-Cl- E m	7600	mg/L	100	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
pH	AVE-4	SM 23 4500-H+ B m	7.58	pH	N/A	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrite	AVE-4	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ortho Phosphate (as P)	AVE-4	SM 23 4500-P E m	0.015	mg/L	0.010	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TOC	AVE-4	SM 23 5310B m	8.1	mg/L	5.0	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrate + Nitrite (as N)	AVE-4	USGS I-2547-11m	0.11	mg/L	0.050	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Aluminum	AVE-4	EPA 6020B R2 m	13000	ug/L	50	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Antimony	AVE-4	EPA 6020B R2 m	<10	ug/L	10	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Arsenic	AVE-4	EPA 6020B R2 m	<10	ug/L	10	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Barium	AVE-4	EPA 6020B R2 m	58	ug/L	10	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Beryllium	AVE-4	EPA 6020B R2 m	<10	ug/L	10	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Bismuth	AVE-4	EPA 6020B R2 m	<20	ug/L	20	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Boron	AVE-4	EPA 6020B R2 m	2100	ug/L	500	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cadmium	AVE-4	EPA 6020B R2 m	<0.10	ug/L	0.10	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Calcium	AVE-4	EPA 6020B R2 m	200000	ug/L	1000	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Chromium	AVE-4	EPA 6020B R2 m	19	ug/L	10	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cobalt	AVE-4	EPA 6020B R2 m	11	ug/L	4.0	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Copper	AVE-4	EPA 6020B R2 m	14	ug/L	5.0	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Iron	AVE-4	EPA 6020B R2 m	19000	ug/L	500	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Lead	AVE-4	EPA 6020B R2 m	14	ug/L	5.0	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Magnesium	AVE-4	EPA 6020B R2 m	600000	ug/L	1000	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Manganese	AVE-4	EPA 6020B R2 m	820	ug/L	20	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Molybdenum	AVE-4	EPA 6020B R2 m	<20	ug/L	20	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nickel	AVE-4	EPA 6020B R2 m	21	ug/L	20	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Phosphorus (P)	AVE-4	EPA 6020B R2 m	<1000	ug/L	1000	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Potassium	AVE-4	EPA 6020B R2 m	180000	ug/L	1000	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Selenium	AVE-4	EPA 6020B R2 m	<10	ug/L	10	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Silver	AVE-4	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Sodium	AVE-4	EPA 6020B R2 m	5000000	ug/L	1000	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Strontium	AVE-4	EPA 6020B R2 m	3600	ug/L	20	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Thallium	AVE-4	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Tin	AVE-4	EPA 6020B R2 m	<20	ug/L	20	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Titanium	AVE-4	EPA 6020B R2 m	280	ug/L	20	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Uranium	AVE-4	EPA 6020B R2 m	2.1	ug/L	1.0	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Vanadium	AVE-4	EPA 6020B R2 m	33	ug/L	20	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Zinc	AVE-4	EPA 6020B R2 m	63	ug/L	50	JWM420	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Salinity	AVE-5	SM 22 2520B	16	N/A	2.0	JWM421	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TSS	AVE-5	SM 23 2540D m	1200	mg/L	17	JWM421	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Salinity	AVE-7	SM 22 2520B	18	N/A	2.0	JWM422	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TSS	AVE-7	SM 23 2540D m	130	mg/L	10	JWM422	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Salinity	AVE-8	SM 22 2520B	<2.0	N/A	2.0	JWM423	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TSS	AVE-8	SM 23 2540D m	1200	mg/L	17	JWM423	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrate (as N)	AVE-9	ASTM D3867-16	0.080	mg/L	0.050	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Hardness (as CaCO3)	AVE-9	Auto Calc	3300	mg/L	1.0	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Anion Sum	AVE-9	Auto Calc.	242	me/L	N/A	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Total Dissolved Solids	AVE-9	Auto Calc.	16000	mg/L	1.0	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cation Sum	AVE-9	Auto Calc.	314	me/L	N/A	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ion Balance (% Difference)	AVE-9	Auto Calc.	12.8	%	N/A	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Langelier Index (@ 20C)	AVE-9	Auto Calc.	-0.0990	N/A		JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Langelier Index (@ 4C)	AVE-9	Auto Calc.	-0.336	N/A		JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Saturation pH (@ 20C)	AVE-9	Auto Calc.	7.70	N/A		JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Saturation pH (@ 4C)	AVE-9	Auto Calc.	7.94	N/A		JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Bicarbonate (as CaCO3)	AVE-9	SM 23 4500-CO2 D	71	mg/L	1.0	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Carbonate (as CaCO3)	AVE-9	SM 23 4500-CO2 D	<1.0	mg/L	1.0	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Sulphate	AVE-9	ASTM D516-16 m	1400	mg/L	40	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Turbidity	AVE-9	EPA 180.1 R2 m	130	NTU	1.0	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls

Alkalinity (as CaCO3)	AVE-9	EPA 310.2 R1974 m	71	mg/L	5.0	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ammonia	AVE-9	EPA 350.1 R2 m	<0.050	mg/L	0.050	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Reactive Silica (as SiO2)	AVE-9	EPA 366.0 m	1.1	mg/L	0.50	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Salinity	AVE-9	SM 22 2520B	17	N/A	2.0	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Colour	AVE-9	SM 23 2120C m	21	TCU	5.0	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Conductivity	AVE-9	SM 23 2510B m	28000	uS/cm	1.0	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TSS	AVE-9	SM 23 2540D m	130	mg/L	5.0	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Chloride	AVE-9	SM 23 4500-Cl- E m	7500	mg/L	100	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
pH	AVE-9	SM 23 4500-H+ B m	7.60	pH	N/A	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrite	AVE-9	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ortho Phosphate (as P)	AVE-9	SM 23 4500-P E m	0.014	mg/L	0.010	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TOC	AVE-9	SM 23 5310B m	<5.0	mg/L	5.0	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrate + Nitrite (as N)	AVE-9	USGS I-2547-11m	0.080	mg/L	0.050	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Aluminum	AVE-9	EPA 6020B R2 m	2800	ug/L	50	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Antimony	AVE-9	EPA 6020B R2 m	<10	ug/L	10	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Arsenic	AVE-9	EPA 6020B R2 m	<10	ug/L	10	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Barium	AVE-9	EPA 6020B R2 m	21	ug/L	10	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Beryllium	AVE-9	EPA 6020B R2 m	<10	ug/L	10	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Bismuth	AVE-9	EPA 6020B R2 m	<20	ug/L	20	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Boron	AVE-9	EPA 6020B R2 m	2400	ug/L	500	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cadmium	AVE-9	EPA 6020B R2 m	<0.10	ug/L	0.10	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Calcium	AVE-9	EPA 6020B R2 m	220000	ug/L	1000	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Chromium	AVE-9	EPA 6020B R2 m	<10	ug/L	10	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cobalt	AVE-9	EPA 6020B R2 m	<4.0	ug/L	4.0	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Copper	AVE-9	EPA 6020B R2 m	<5.0	ug/L	5.0	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Iron	AVE-9	EPA 6020B R2 m	3700	ug/L	500	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Lead	AVE-9	EPA 6020B R2 m	<5.0	ug/L	5.0	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Magnesium	AVE-9	EPA 6020B R2 m	660000	ug/L	1000	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Manganese	AVE-9	EPA 6020B R2 m	150	ug/L	20	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Molybdenum	AVE-9	EPA 6020B R2 m	<20	ug/L	20	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nickel	AVE-9	EPA 6020B R2 m	<20	ug/L	20	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Phosphorus (P)	AVE-9	EPA 6020B R2 m	<1000	ug/L	1000	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Potassium	AVE-9	EPA 6020B R2 m	200000	ug/L	1000	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Selenium	AVE-9	EPA 6020B R2 m	<10	ug/L	10	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Silver	AVE-9	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Sodium	AVE-9	EPA 6020B R2 m	5600000	ug/L	1000	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Strontium	AVE-9	EPA 6020B R2 m	4000	ug/L	20	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Thallium	AVE-9	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Tin	AVE-9	EPA 6020B R2 m	<20	ug/L	20	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Titanium	AVE-9	EPA 6020B R2 m	67	ug/L	20	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Uranium	AVE-9	EPA 6020B R2 m	1.8	ug/L	1.0	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Vanadium	AVE-9	EPA 6020B R2 m	<20	ug/L	20	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Zinc	AVE-9	EPA 6020B R2 m	<50	ug/L	50	JWM424	Water	2019/05/31	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Salinity	AR-4	SM 22 2520B	<2.0	N/A	2.0	JWM425	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TSS	AR-4	SM 23 2540D m	24	mg/L	2.0	JWM425	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Salinity	AR-5	SM 22 2520B	<2.0	N/A	2.0	JWM426	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TSS	AR-5	SM 23 2540D m	19	mg/L	2.0	JWM426	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrate (as N)	AR-6	ASTM D3867-16	0.058	mg/L	0.050	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Hardness (as CaCO3)	AR-6	Auto Calc	79	mg/L	1.0	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Anion Sum	AR-6	Auto Calc.	3.25	me/L	N/A	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Total Dissolved Solids	AR-6	Auto Calc.	190	mg/L	1.0	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cation Sum	AR-6	Auto Calc.	3.14	me/L	N/A	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ion Balance (% Difference)	AR-6	Auto Calc.	1.72	%	N/A	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Langelier Index (@ 20C)	AR-6	Auto Calc.	-1.24	N/A		JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Langelier Index (@ 4C)	AR-6	Auto Calc.	-1.49	N/A		JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Saturation pH (@ 20C)	AR-6	Auto Calc.	8.58	N/A		JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Saturation pH (@ 4C)	AR-6	Auto Calc.	8.83	N/A		JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Bicarbonate (as CaCO3)	AR-6	SM 23 4500-CO2 D	27	mg/L	1.0	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Carbonate (as CaCO3)	AR-6	SM 23 4500-CO2 D	<1.0	mg/L	1.0	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Sulphate	AR-6	ASTM D516-16 m	54	mg/L	2.0	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Turbidity	AR-6	EPA 180.1 R2 m	13	NTU	0.10	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Alkalinity (as CaCO3)	AR-6	EPA 310.2 R1974 m	27	mg/L	5.0	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ammonia	AR-6	EPA 350.1 R2 m	0.097	mg/L	0.050	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Reactive Silica (as SiO2)	AR-6	EPA 366.0 m	2.0	mg/L	0.50	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Salinity	AR-6	SM 22 2520B	<2.0	N/A	2.0	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Colour	AR-6	SM 23 2120C m	78	TCU	25	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Conductivity	AR-6	SM 23 2510B m	340	uS/cm	1.0	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TSS	AR-6	SM 23 2540D m	27	mg/L	2.0	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Chloride	AR-6	SM 23 4500-Cl- E m	56	mg/L	1.0	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
pH	AR-6	SM 23 4500-H+ B m	7.34	pH	N/A	JWM428	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls

Nitrite	AR-6	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ortho Phosphate (as P)	AR-6	SM 23 4500-P E m	0.014	mg/L	0.010	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TOC	AR-6	SM 23 5310B m	7.2	mg/L	0.50	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrate + Nitrite (as N)	AR-6	USGS I-2547-11m	0.058	mg/L	0.050	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Aluminum	AR-6	EPA 6020B R2 m	480	ug/L	5.0	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Antimony	AR-6	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Arsenic	AR-6	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Barium	AR-6	EPA 6020B R2 m	25	ug/L	1.0	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Beryllium	AR-6	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Bismuth	AR-6	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Boron	AR-6	EPA 6020B R2 m	<50	ug/L	50	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cadmium	AR-6	EPA 6020B R2 m	0.024	ug/L	0.010	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Calcium	AR-6	EPA 6020B R2 m	24000	ug/L	100	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Chromium	AR-6	EPA 6020B R2 m	1.6	ug/L	1.0	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cobalt	AR-6	EPA 6020B R2 m	0.40	ug/L	0.40	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Copper	AR-6	EPA 6020B R2 m	0.79	ug/L	0.50	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Iron	AR-6	EPA 6020B R2 m	810	ug/L	50	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Lead	AR-6	EPA 6020B R2 m	<0.50	ug/L	0.50	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Magnesium	AR-6	EPA 6020B R2 m	4800	ug/L	100	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Manganese	AR-6	EPA 6020B R2 m	170	ug/L	2.0	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Molybdenum	AR-6	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nickel	AR-6	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Phosphorus (P)	AR-6	EPA 6020B R2 m	<100	ug/L	100	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Potassium	AR-6	EPA 6020B R2 m	1500	ug/L	100	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Selenium	AR-6	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Silver	AR-6	EPA 6020B R2 m	<0.10	ug/L	0.10	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Sodium	AR-6	EPA 6020B R2 m	34000	ug/L	100	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Strontium	AR-6	EPA 6020B R2 m	160	ug/L	2.0	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Thallium	AR-6	EPA 6020B R2 m	<0.10	ug/L	0.10	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Tin	AR-6	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Titanium	AR-6	EPA 6020B R2 m	11	ug/L	2.0	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Uranium	AR-6	EPA 6020B R2 m	0.23	ug/L	0.10	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Vanadium	AR-6	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Zinc	AR-6	EPA 6020B R2 m	<5.0	ug/L	5.0	JWM428	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TOC	AR-6	SM 23 5310B m	7.3	mg/L	0.50	JWM428D1	Water	JWM428	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Salinity	AR-7	SM 22 2520B	<2.0	N/A	2.0	JWM429	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TSS	AR-7	SM 23 2540D m	16	mg/L	2.0	JWM429	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Salinity	AR-7	SM 22 2520B	<2.0	N/A	2.0	JWM429D1	Water	JWM429	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrate (as N)	AR-9	ASTM D3867-16	<0.050	mg/L	0.050	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Hardness (as CaCO3)	AR-9	Auto Calc	88	mg/L	1.0	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Anion Sum	AR-9	Auto Calc.	3.84	me/L	N/A	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Total Dissolved Solids	AR-9	Auto Calc.	230	mg/L	1.0	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cation Sum	AR-9	Auto Calc.	3.87	me/L	N/A	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ion Balance (% Difference)	AR-9	Auto Calc.	0.390	%	N/A	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Langelier Index (@ 20C)	AR-9	Auto Calc.	-1.17	N/A		JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Langelier Index (@ 4C)	AR-9	Auto Calc.	-1.42	N/A		JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Saturation pH (@ 20C)	AR-9	Auto Calc.	8.48	N/A		JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Saturation pH (@ 4C)	AR-9	Auto Calc.	8.73	N/A		JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Bicarbonate (as CaCO3)	AR-9	SM 23 4500-CO2 D	33	mg/L	1.0	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Carbonate (as CaCO3)	AR-9	SM 23 4500-CO2 D	<1.0	mg/L	1.0	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Sulphate	AR-9	ASTM D516-16 m	57	mg/L	2.0	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Turbidity	AR-9	EPA 180.1 R2 m	4.2	NTU	0.10	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Alkalinity (as CaCO3)	AR-9	EPA 310.2 R1974 m	33	mg/L	5.0	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ammonia	AR-9	EPA 350.1 R2 m	0.13	mg/L	0.050	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Reactive Silica (as SiO2)	AR-9	EPA 366.0 m	3.1	mg/L	0.50	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Salinity	AR-9	SM 22 2520B	<2.0	N/A	2.0	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Colour	AR-9	SM 23 2120C m	75	TCU	25	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Conductivity	AR-9	SM 23 2510B m	390	uS/cm	1.0	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TSS	AR-9	SM 23 2540D m	6.1	mg/L	1.0	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Chloride	AR-9	SM 23 4500-Cl- E m	70	mg/L	1.0	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
pH	AR-9	SM 23 4500-H+ B m	7.30	pH	N/A	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrite	AR-9	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ortho Phosphate (as P)	AR-9	SM 23 4500-P E m	0.017	mg/L	0.010	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TOC	AR-9	SM 23 5310B m	8.1	mg/L	0.50	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrate + Nitrite (as N)	AR-9	USGS I-2547-11m	<0.050	mg/L	0.050	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Aluminum	AR-9	EPA 6020B R2 m	220	ug/L	5.0	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Antimony	AR-9	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Arsenic	AR-9	EPA 6020B R2 m	1.3	ug/L	1.0	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Barium	AR-9	EPA 6020B R2 m	28	ug/L	1.0	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Beryllium	AR-9	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM430	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls

Bismuth	AR-9	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Boron	AR-9	EPA 6020B R2 m	<50	ug/L	50	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cadmium	AR-9	EPA 6020B R2 m	0.016	ug/L	0.010	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Calcium	AR-9	EPA 6020B R2 m	25000	ug/L	100	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Chromium	AR-9	EPA 6020B R2 m	1.4	ug/L	1.0	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cobalt	AR-9	EPA 6020B R2 m	<0.40	ug/L	0.40	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Copper	AR-9	EPA 6020B R2 m	0.73	ug/L	0.50	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Iron	AR-9	EPA 6020B R2 m	720	ug/L	50	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Lead	AR-9	EPA 6020B R2 m	<0.50	ug/L	0.50	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Magnesium	AR-9	EPA 6020B R2 m	6100	ug/L	100	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Manganese	AR-9	EPA 6020B R2 m	470	ug/L	2.0	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Molybdenum	AR-9	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nickel	AR-9	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Phosphorus (P)	AR-9	EPA 6020B R2 m	<100	ug/L	100	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Potassium	AR-9	EPA 6020B R2 m	1700	ug/L	100	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Selenium	AR-9	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Silver	AR-9	EPA 6020B R2 m	<0.10	ug/L	0.10	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Sodium	AR-9	EPA 6020B R2 m	47000	ug/L	100	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Strontium	AR-9	EPA 6020B R2 m	180	ug/L	2.0	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Thallium	AR-9	EPA 6020B R2 m	<0.10	ug/L	0.10	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Tin	AR-9	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Titanium	AR-9	EPA 6020B R2 m	6.2	ug/L	2.0	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Uranium	AR-9	EPA 6020B R2 m	0.28	ug/L	0.10	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Vanadium	AR-9	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Zinc	AR-9	EPA 6020B R2 m	<5.0	ug/L	5.0	JWM430	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrate (as N)	AR-12	ASTM D3867-16	<0.050	mg/L	0.050	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Hardness (as CaCO3)	AR-12	Auto Calc	37	mg/L	1.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Anion Sum	AR-12	Auto Calc.	1.77	me/L	N/A	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Total Dissolved Solids	AR-12	Auto Calc.	100	mg/L	1.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cation Sum	AR-12	Auto Calc.	1.57	me/L	N/A	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ion Balance (% Difference)	AR-12	Auto Calc.	5.99	%	N/A	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Langelier Index (@ 20C)	AR-12	Auto Calc.	-2.13	N/A		JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Langelier Index (@ 4C)	AR-12	Auto Calc.	-2.39	N/A		JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Saturation pH (@ 20C)	AR-12	Auto Calc.	9.11	N/A		JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Saturation pH (@ 4C)	AR-12	Auto Calc.	9.37	N/A		JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Bicarbonate (as CaCO3)	AR-12	SM 23 4500-CO2 D	15	mg/L	1.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Carbonate (as CaCO3)	AR-12	SM 23 4500-CO2 D	<1.0	mg/L	1.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Sulphate	AR-12	ASTM D516-16 m	30	mg/L	2.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Turbidity	AR-12	EPA 180.1 R2 m	2.1	NTU	0.10	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Alkalinity (as CaCO3)	AR-12	EPA 310.2 R1974 m	15	mg/L	5.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ammonia	AR-12	EPA 350.1 R2 m	0.064	mg/L	0.050	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Reactive Silica (as SiO2)	AR-12	EPA 366.0 m	2.8	mg/L	0.50	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Salinity	AR-12	SM 22 2520B	<2.0	N/A	2.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Colour	AR-12	SM 23 2120C m	95	TCU	25	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Conductivity	AR-12	SM 23 2510B m	190	uS/cm	1.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TSS	AR-12	SM 23 2540D m	4.8	mg/L	1.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Chloride	AR-12	SM 23 4500-Cl- E m	30	mg/L	1.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
pH	AR-12	SM 23 4500-H+ B m	6.98	pH	N/A	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrite	AR-12	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ortho Phosphate (as P)	AR-12	SM 23 4500-P E m	0.013	mg/L	0.010	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TOC	AR-12	SM 23 5310B m	8.3	mg/L	0.50	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrate + Nitrite (as N)	AR-12	USGS I-2547-11m	<0.050	mg/L	0.050	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Aluminum	AR-12	EPA 6020B R2 m	230	ug/L	5.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Antimony	AR-12	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Arsenic	AR-12	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Barium	AR-12	EPA 6020B R2 m	14	ug/L	1.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Beryllium	AR-12	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Bismuth	AR-12	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Boron	AR-12	EPA 6020B R2 m	<50	ug/L	50	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cadmium	AR-12	EPA 6020B R2 m	0.016	ug/L	0.010	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Calcium	AR-12	EPA 6020B R2 m	11000	ug/L	100	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Chromium	AR-12	EPA 6020B R2 m	1.0	ug/L	1.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cobalt	AR-12	EPA 6020B R2 m	<0.40	ug/L	0.40	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Copper	AR-12	EPA 6020B R2 m	<0.50	ug/L	0.50	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Iron	AR-12	EPA 6020B R2 m	320	ug/L	50	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Lead	AR-12	EPA 6020B R2 m	<0.50	ug/L	0.50	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Magnesium	AR-12	EPA 6020B R2 m	2300	ug/L	100	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Manganese	AR-12	EPA 6020B R2 m	89	ug/L	2.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Molybdenum	AR-12	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nickel	AR-12	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM431	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls

Phosphorus (P)	AR-12	EPA 6020B R2 m	<100	ug/L	100	JWM431	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Potassium	AR-12	EPA 6020B R2 m	830	ug/L	100	JWM431	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Selenium	AR-12	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM431	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Silver	AR-12	EPA 6020B R2 m	<0.10	ug/L	0.10	JWM431	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Sodium	AR-12	EPA 6020B R2 m	18000	ug/L	100	JWM431	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Strontium	AR-12	EPA 6020B R2 m	75	ug/L	2.0	JWM431	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Thallium	AR-12	EPA 6020B R2 m	<0.10	ug/L	0.10	JWM431	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Tin	AR-12	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM431	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Titanium	AR-12	EPA 6020B R2 m	3.8	ug/L	2.0	JWM431	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Uranium	AR-12	EPA 6020B R2 m	0.19	ug/L	0.10	JWM431	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Vanadium	AR-12	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM431	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Zinc	AR-12	EPA 6020B R2 m	<5.0	ug/L	5.0	JWM431	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Sulphate	AR-12	ASTM D516-16 m	30	mg/L	2.0	JWM431D1	Water	JWM431	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Alkalinity (as CaCO3)	AR-12	EPA 310.2 R1974 m	15	mg/L	5.0	JWM431D1	Water	JWM431	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Reactive Silica (as SiO2)	AR-12	EPA 366.0 m	2.5	mg/L	0.50	JWM431D1	Water	JWM431	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Conductivity	AR-12	SM 23 2510B m	190	uS/cm	1.0	JWM431D1	Water	JWM431	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Chloride	AR-12	SM 23 4500-Cl- E m	30	mg/L	1.0	JWM431D1	Water	JWM431	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
pH	AR-12	SM 23 4500-H+ B m	7.03	pH	N/A	JWM431D1	Water	JWM431	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrite	AR-12	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	JWM431D1	Water	JWM431	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ortho Phosphate (as P)	AR-12	SM 23 4500-P E m	0.013	mg/L	0.010	JWM431D1	Water	JWM431	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrate + Nitrite (as N)	AR-12	USGS I-2547-11m	<0.050	mg/L	0.050	JWM431D1	Water	JWM431	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Salinity	AR-14	SM 22 2520B	<2.0	N/A	2.0	JWM432	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TSS	AR-14	SM 23 2540D m	78	mg/L	2.0	JWM432	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Salinity	AR-15	SM 22 2520B	<2.0	N/A	2.0	JWM433	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TSS	AR-15	SM 23 2540D m	4.0	mg/L	1.0	JWM433	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrate (as N)	AR-16	ASTM D3867-16	<0.050	mg/L	0.050	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Hardness (as CaCO3)	AR-16	Auto Calc	27	mg/L	1.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Anion Sum	AR-16	Auto Calc.	0.870	me/L	N/A	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Total Dissolved Solids	AR-16	Auto Calc.	56	mg/L	1.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cation Sum	AR-16	Auto Calc.	0.850	me/L	N/A	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ion Balance (% Difference)	AR-16	Auto Calc.	1.16	%	N/A	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Langelier Index (@ 20C)	AR-16	Auto Calc.	-2.36	N/A		JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Langelier Index (@ 4C)	AR-16	Auto Calc.	-2.61	N/A		JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Saturation pH (@ 20C)	AR-16	Auto Calc.	9.41	N/A		JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Saturation pH (@ 4C)	AR-16	Auto Calc.	9.66	N/A		JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Bicarbonate (as CaCO3)	AR-16	SM 23 4500-CO2 D	8.9	mg/L	1.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Carbonate (as CaCO3)	AR-16	SM 23 4500-CO2 D	<1.0	mg/L	1.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Sulphate	AR-16	ASTM D516-16 m	21	mg/L	2.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Turbidity	AR-16	EPA 180.1 R2 m	2.1	NTU	0.10	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Alkalinity (as CaCO3)	AR-16	EPA 310.2 R1974 m	8.9	mg/L	5.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ammonia	AR-16	EPA 350.1 R2 m	<0.050	mg/L	0.050	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Reactive Silica (as SiO2)	AR-16	EPA 366.0 m	2.6	mg/L	0.50	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Salinity	AR-16	SM 22 2520B	<2.0	N/A	2.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Colour	AR-16	SM 23 2120C m	98	TCU	25	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Conductivity	AR-16	SM 23 2510B m	90	uS/cm	1.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TSS	AR-16	SM 23 2540D m	5.4	mg/L	1.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Chloride	AR-16	SM 23 4500-Cl- E m	9.4	mg/L	1.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
pH	AR-16	SM 23 4500-H+ B m	7.05	pH	N/A	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrite	AR-16	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ortho Phosphate (as P)	AR-16	SM 23 4500-P E m	<0.010	mg/L	0.010	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TOC	AR-16	SM 23 5310B m	8.5	mg/L	0.50	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrate + Nitrite (as N)	AR-16	USGS I-2547-11m	<0.050	mg/L	0.050	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Aluminum	AR-16	EPA 6020B R2 m	220	ug/L	5.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Antimony	AR-16	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Arsenic	AR-16	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Barium	AR-16	EPA 6020B R2 m	15	ug/L	1.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Beryllium	AR-16	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Bismuth	AR-16	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Boron	AR-16	EPA 6020B R2 m	<50	ug/L	50	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cadmium	AR-16	EPA 6020B R2 m	0.016	ug/L	0.010	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Calcium	AR-16	EPA 6020B R2 m	9100	ug/L	100	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Chromium	AR-16	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cobalt	AR-16	EPA 6020B R2 m	<0.40	ug/L	0.40	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Copper	AR-16	EPA 6020B R2 m	<0.50	ug/L	0.50	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Iron	AR-16	EPA 6020B R2 m	230	ug/L	50	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Lead	AR-16	EPA 6020B R2 m	<0.50	ug/L	0.50	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Magnesium	AR-16	EPA 6020B R2 m	950	ug/L	100	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Manganese	AR-16	EPA 6020B R2 m	49	ug/L	2.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Molybdenum	AR-16	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nickel	AR-16	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls

Phosphorus (P)	AR-16	EPA 6020B R2 m	<100	ug/L	100	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Potassium	AR-16	EPA 6020B R2 m	520	ug/L	100	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Selenium	AR-16	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Silver	AR-16	EPA 6020B R2 m	<0.10	ug/L	0.10	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Sodium	AR-16	EPA 6020B R2 m	6800	ug/L	100	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Strontium	AR-16	EPA 6020B R2 m	57	ug/L	2.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Thallium	AR-16	EPA 6020B R2 m	<0.10	ug/L	0.10	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Tin	AR-16	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Titanium	AR-16	EPA 6020B R2 m	3.0	ug/L	2.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Uranium	AR-16	EPA 6020B R2 m	0.20	ug/L	0.10	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Vanadium	AR-16	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Zinc	AR-16	EPA 6020B R2 m	<5.0	ug/L	5.0	JWM434	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Salinity	AR-18	SM 22 2520B	<2.0	N/A	2.0	JWM435	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TSS	AR-18	SM 23 2540D m	1.2	mg/L	1.0	JWM435	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Salinity	BKG-1	SM 22 2520B	<2.0	N/A	2.0	JWM436	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TSS	BKG-1	SM 23 2540D m	22	mg/L	5.0	JWM436	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TSS	BKG-1	SM 23 2540D m	18	mg/L	5.0	JWM436D1	Water	JWM436	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrate (as N)	BKG-2	ASTM D3867-16	0.067	mg/L	0.050	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Hardness (as CaCO3)	BKG-2	Auto Calc	110	mg/L	1.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Anion Sum	BKG-2	Auto Calc.	2.41	me/L	N/A	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Total Dissolved Solids	BKG-2	Auto Calc.	160	mg/L	1.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cation Sum	BKG-2	Auto Calc.	2.39	me/L	N/A	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ion Balance (% Difference)	BKG-2	Auto Calc.	0.420	%	N/A	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Langelier Index (@ 20C)	BKG-2	Auto Calc.	-0.873	N/A		JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Langelier Index (@ 4C)	BKG-2	Auto Calc.	-1.12	N/A		JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Saturation pH (@ 20C)	BKG-2	Auto Calc.	8.36	N/A		JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Saturation pH (@ 4C)	BKG-2	Auto Calc.	8.61	N/A		JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Bicarbonate (as CaCO3)	BKG-2	SM 23 4500-CO2 D	26	mg/L	1.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Carbonate (as CaCO3)	BKG-2	SM 23 4500-CO2 D	<1.0	mg/L	1.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Sulphate	BKG-2	ASTM D516-16 m	83	mg/L	2.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Turbidity	BKG-2	EPA 180.1 R2 m	3.0	NTU	0.10	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Alkalinity (as CaCO3)	BKG-2	EPA 310.2 R1974 m	26	mg/L	5.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ammonia	BKG-2	EPA 350.1 R2 m	<0.050	mg/L	0.050	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Reactive Silica (as SiO2)	BKG-2	EPA 366.0 m	4.2	mg/L	0.50	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Salinity	BKG-2	SM 22 2520B	<2.0	N/A	2.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Colour	BKG-2	SM 23 2120C m	22	TCU	5.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Conductivity	BKG-2	SM 23 2510B m	250	uS/cm	1.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TSS	BKG-2	SM 23 2540D m	3.8	mg/L	1.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Chloride	BKG-2	SM 23 4500-Cl- E m	6.4	mg/L	1.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
pH	BKG-2	SM 23 4500-H+ B m	7.49	pH	N/A	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrite	BKG-2	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Ortho Phosphate (as P)	BKG-2	SM 23 4500-P E m	<0.010	mg/L	0.010	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
TOC	BKG-2	SM 23 5310B m	3.5	mg/L	0.50	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nitrate + Nitrite (as N)	BKG-2	USGS I-2547-11m	0.067	mg/L	0.050	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Aluminum	BKG-2	EPA 6020B R2 m	170	ug/L	5.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Antimony	BKG-2	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Arsenic	BKG-2	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Barium	BKG-2	EPA 6020B R2 m	71	ug/L	1.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Beryllium	BKG-2	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Bismuth	BKG-2	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Boron	BKG-2	EPA 6020B R2 m	<50	ug/L	50	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cadmium	BKG-2	EPA 6020B R2 m	<0.010	ug/L	0.010	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Calcium	BKG-2	EPA 6020B R2 m	40000	ug/L	100	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Chromium	BKG-2	EPA 6020B R2 m	1.2	ug/L	1.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Cobalt	BKG-2	EPA 6020B R2 m	<0.40	ug/L	0.40	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Copper	BKG-2	EPA 6020B R2 m	0.65	ug/L	0.50	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Iron	BKG-2	EPA 6020B R2 m	390	ug/L	50	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Lead	BKG-2	EPA 6020B R2 m	<0.50	ug/L	0.50	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Magnesium	BKG-2	EPA 6020B R2 m	2000	ug/L	100	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Manganese	BKG-2	EPA 6020B R2 m	140	ug/L	2.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Molybdenum	BKG-2	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Nickel	BKG-2	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Phosphorus (P)	BKG-2	EPA 6020B R2 m	<100	ug/L	100	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Potassium	BKG-2	EPA 6020B R2 m	780	ug/L	100	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Selenium	BKG-2	EPA 6020B R2 m	<1.0	ug/L	1.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Silver	BKG-2	EPA 6020B R2 m	<0.10	ug/L	0.10	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Sodium	BKG-2	EPA 6020B R2 m	4900	ug/L	100	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Strontium	BKG-2	EPA 6020B R2 m	280	ug/L	2.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Thallium	BKG-2	EPA 6020B R2 m	<0.10	ug/L	0.10	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Tin	BKG-2	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM437	Water		2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls

Titanium	BKG-2	EPA 6020B R2 m	3.5	ug/L	2.0	JWM437	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Uranium	BKG-2	EPA 6020B R2 m	<0.10	ug/L	0.10	JWM437	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Vanadium	BKG-2	EPA 6020B R2 m	<2.0	ug/L	2.0	JWM437	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls
Zinc	BKG-2	EPA 6020B R2 m	<5.0	ug/L	5.0	JWM437	Water	2019/05/30	WINDSOR	B9E8112V1-R2019-06-10_16-58-21_N020.pdf	B9E8112V1-R2019-06-10_16-58-21_N020.xls

Your Project #: 171046.01
Your C.O.C. #: D37371

Attention: Melissa Rutherford

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/09/10
Report #: R5873862
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9O4069
Received: 2019/08/30, 16:11

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Salinity (1)	4	N/A	2019/09/10		SM 22 2520B
Total Suspended Solids	4	2019/09/06	2019/09/10	ATL SOP 00007	SM 23 2540D m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Non-accredited test method

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

Your Project #: 171046.01
Your C.O.C. #: D37371

Attention: Melissa Rutherford

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/09/10
Report #: R5873862
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9O4069
Received: 2019/08/30, 16:11

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
10 Sep 2019 16:04:18

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Keri Mackay, Customer Experience Team Lead
Email: Keri.MACKAY@bvlabs.com
Phone# (902)420-0203 Ext:294
==
This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: B9O4069
Report Date: 2019/09/10

CBCL Limited
Client Project #: 171046.01

RESULTS OF ANALYSES OF WATER

BV Labs ID		KRD356		KRD357		KRD358			KRD358		
Sampling Date		2019/08/30 10:30		2019/08/30 12:10		2019/08/30 11:45			2019/08/30 11:45		
COC Number		D37371		D37371		D37371			D37371		
	UNITS	**AVE-2**	**RDL**	**AVE-3**	**RDL**	**AVE-5**	**RDL**	**QC Batch**	**AVE-5 Lab-Dup**	**RDL**	**QC Batch**
Inorganics											
Salinity	N/A	27	2.0	28	2.0	27	2.0	6323353			
Total Suspended Solids	mg/L	710	17	56	2.5	140	5.0	6318345	140	5.0	6318345

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

BV Labs ID		KRD359		
Sampling Date		2019/08/30 12:30		
COC Number		D37371		
	UNITS	**AVE-6**	**RDL**	**QC Batch**
Inorganics				
Salinity	N/A	27	2.0	6323353
Total Suspended Solids	mg/L	76	2.5	6318345

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	6.7°C

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6318345	AM6	QC Standard	Total Suspended Solids	2019/09/10		96	%	80 - 120
6318345	AM6	Method Blank	Total Suspended Solids	2019/09/10	<1.0		mg/L	
6318345	AM6	RPD [KRD358-01]	Total Suspended Solids	2019/09/10	1.5		%	20
6323353	BBD	QC Standard	Salinity	2019/09/10		101	%	80 - 120
6323353	BBD	Method Blank	Salinity	2019/09/10	<2.0		N/A	
6323353	BBD	RPD	Salinity	2019/09/10	0		%	25

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Mike MacGillivray, Scientific Specialist (Inorganics)

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam
A Bureau Veritas Group Company

200 Bluewater Road, Suite 105, Bedford, Nova Scotia B4B 1G9 Tel: 902-420-0203 Fax: 902-420-8612 Toll Free: 1-800-565-7227
49-55 Elizabeth Avenue, St John's, NL A1A 1W9 Tel: 709-754-0203 Fax: 709-754-8612 Toll Free: 1-888-492-7227
465 George Street, Unit G, Sydney, NS B1P 1K5 Tel: 902-567-1255 Fax: 902-539-6504 Toll Free: 1-888-535-7770
www.maxxam.ca E-mail: Customerservicebedford@maxxam.ca

ATL FCD 00149 / 22

CHAIN OF CUSTODY RECORD

COC #: D 37371 Page ___ of ___

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)	
Company Name:	CBCL	Company Name:		Quotation #:	
Contact Name:	Accounts Payable	Contact Name:		P.O. #:	
Address:	1505 Barrington St. Suite 901	Address:		Project #:	171046.01
	PO Box 606 Postal Code:	Postal Code:		Site Location:	
Phone:	902-421-7241 Fax:	Phone:	Fax:	Site #:	
Email:	cmcvarish@cbcl.ca	Email:	mrutherford@cbcl.ca	Sampled By:	

Turnaround Time (TAT) Required

☑ Regular TAT (5 business days) Most analyses

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

IF RUSH please specify date (Surcharges will be applied)

DATE REQUIRED:

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		3, 8, 9	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

#	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX
1	AVE-2	2019/08/30	10:30	Water
2	AVE-3	"	12:10	"
3	AVE-5	"	11:45	"
4	AVE-6	"	12:30	"
5				
6				
7				
8				
9				
10				

Analysis Requested

#	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest - for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	~~Total Coliform/Fecal Coliform~~ TSS	Salinity	HOLD- DO NOT ANALYZE
1																						X	X	
2																						X	X	
3																						X	X	
4																						X	X	
5																								
6																								
7																								
8																								
9																								
10																								

Regulatory Requirements (Specify)

COMMENTS

~~TSS~~ ~~Salinity~~

2019 AUG 30 16:11

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Colin McVarish	2019/08/30	16:11	E Burke			B904069
[signature]						

White: Maxxam Pink: Client

BV Labs Job Number: B9O4069
Report Date: 2019/09/10

CBCL Limited
Client Project #: 171046.01

RESULTS OF ANALYSES OF WATER

BV Labs ID		KRD356		KRD357		KRD358			KRD358			KRD359		
Sampling Date		2019-08-30 10:30		2019-08-30 12:10		2019-08-30 11:45			2019-08-30 11:45			2019-08-30 12:30		
COC Number		D37371		D37371		D37371			D37371			D37371		
	UNITS	**AVE-2**	**RDL**	**AVE-3**	**RDL**	**AVE-5**	**RDL**	**QC Batch**	**AVE-5 Lab-Dup**	**RDL**	**QC Batch**	**AVE-6**	**RDL**	**QC Batch**
Inorganics														
Salinity	N/A	27	2.0	28	2.0	27	2.0	6323353				27	2.0	6323353
Total Suspended Solids	mg/L	710	17	56	2.5	140	5.0	6318345	140	5.0	6318345	76	2.5	6318345

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Results relate only to the items tested.

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Results relate only to the items tested.

Each tempera	Each tempera	Each tempera	Each temperature is the average of up to three cooler temperatures taken at receipt
Package 1	6.7°C	#N/A	#N/A

Report Date: 2019/09/10

CBCL Limited
Attention: Melissa Rutherford
Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9O4069

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6318345	AM6	QC Standard	Total Suspended Solids	2019-09-10		96	%	80 - 120
6318345	AM6	Method Blank	Total Suspended Solids	2019-09-10	<1.0		mg/L	
6318345	AM6	RPD [KRD358-01]	Total Suspended Solids	2019-09-10	1.5		%	20
6323353	BBD	QC Standard	Salinity	2019-09-10		101	%	80 - 120
6323353	BBD	Method Blank	Salinity	2019-09-10	<2.0		N/A	
6323353	BBD	RPD	Salinity	2019-09-10	0		%	25

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Analyte_ID	Parameter	Sample_ID	Method	Results	Units	EQL	Lab_ID	Matrix	Lab_Duplicate_Of	Field_Duplicate_Of	Date_Sampled	CSite #	DFRP #	DCC_Project_ID	Report Name	TableName
	Salinity	AVE-2	SM 22 2520B	27	N/A	2.0	KRD356	Water			2019/08/30				B9O4069V1-R2019-09-10_16-04-14_N020.pdf	B9O4069V1-R2019-09-10_16-04-14_N020.xls
	TSS	AVE-2	SM 23 2540D m	710	mg/L	17	KRD356	Water			2019/08/30				B9O4069V1-R2019-09-10_16-04-14_N020.pdf	B9O4069V1-R2019-09-10_16-04-14_N020.xls
	Salinity	AVE-3	SM 22 2520B	28	N/A	2.0	KRD357	Water			2019/08/30				B9O4069V1-R2019-09-10_16-04-14_N020.pdf	B9O4069V1-R2019-09-10_16-04-14_N020.xls
	TSS	AVE-3	SM 23 2540D m	56	mg/L	2.5	KRD357	Water			2019/08/30				B9O4069V1-R2019-09-10_16-04-14_N020.pdf	B9O4069V1-R2019-09-10_16-04-14_N020.xls
	Salinity	AVE-5	SM 22 2520B	27	N/A	2.0	KRD358	Water			2019/08/30				B9O4069V1-R2019-09-10_16-04-14_N020.pdf	B9O4069V1-R2019-09-10_16-04-14_N020.xls
	TSS	AVE-5	SM 23 2540D m	140	mg/L	5.0	KRD358	Water			2019/08/30				B9O4069V1-R2019-09-10_16-04-14_N020.pdf	B9O4069V1-R2019-09-10_16-04-14_N020.xls
	TSS	AVE-5	SM 23 2540D m	140	mg/L	5.0	KRD358D1	Water	KRD358		2019/08/30				B9O4069V1-R2019-09-10_16-04-14_N020.pdf	B9O4069V1-R2019-09-10_16-04-14_N020.xls
	Salinity	AVE-6	SM 22 2520B	27	N/A	2.0	KRD359	Water			2019/08/30				B9O4069V1-R2019-09-10_16-04-14_N020.pdf	B9O4069V1-R2019-09-10_16-04-14_N020.xls
	TSS	AVE-6	SM 23 2540D m	76	mg/L	2.5	KRD359	Water			2019/08/30				B9O4069V1-R2019-09-10_16-04-14_N020.pdf	B9O4069V1-R2019-09-10_16-04-14_N020.xls

Your Project #: 171046.01
Your C.O.C. #: 733248-01-01

Attention: Melissa Rutherford

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/09/11
Report #: R5875356
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9N9256
Received: 2019/08/28, 09:06

Sample Matrix: Water
Samples Received: 13

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Carbonate, Bicarbonate and Hydroxide	4	N/A	2019/08/29	N/A	SM 23 4500-CO2 D
Carbonate, Bicarbonate and Hydroxide	2	N/A	2019/09/03	N/A	SM 23 4500-CO2 D
Alkalinity	1	N/A	2019/09/04	ATL SOP 00013	EPA 310.2 R1974 m
Alkalinity	3	N/A	2019/09/05	ATL SOP 00013	EPA 310.2 R1974 m
Alkalinity	2	N/A	2019/09/09	ATL SOP 00013	EPA 310.2 R1974 m
Carbonaceous BOD	6	2019/08/29	2019/09/03	ATL SOP 00041	SM 23 5210B m
Chloride	4	N/A	2019/09/05	ATL SOP 00014	SM 23 4500-Cl- E m
Chloride	2	N/A	2019/09/10	ATL SOP 00014	SM 23 4500-Cl- E m
Total coliform (CFU/100mL) in water	6	N/A	2019/08/28	ATL SOP 00097	MOE E3371 R2 (2018)
Colour	1	N/A	2019/09/04	ATL SOP 00020	SM 23 2120C m
Colour	3	N/A	2019/09/05	ATL SOP 00020	SM 23 2120C m
Colour	2	N/A	2019/09/09	ATL SOP 00020	SM 23 2120C m
Conductance - water	4	N/A	2019/08/29	ATL SOP 00004	SM 23 2510B m
Conductance - water	2	N/A	2019/09/03	ATL SOP 00004	SM 23 2510B m
Fecal coliform in water (CFU/100 mL)	6	N/A	2019/08/28	ATL SOP 00071	SM 23 9222D
Hardness (calculated as CaCO3)	5	N/A	2019/09/03	ATL SOP 00048	Auto Calc
Hardness (calculated as CaCO3)	1	N/A	2019/09/10	ATL SOP 00048	Auto Calc
Metals Water Total MS	5	2019/08/29	2019/08/30	ATL SOP 00058	EPA 6020B R2 m
Metals Water Total MS	1	2019/09/09	2019/09/09	ATL SOP 00058	EPA 6020B R2 m
Ion Balance (% Difference)	3	N/A	2019/09/06	N/A	Auto Calc.
Ion Balance (% Difference)	3	N/A	2019/09/10	N/A	Auto Calc.
Anion and Cation Sum	3	N/A	2019/09/06	N/A	Auto Calc.
Anion and Cation Sum	3	N/A	2019/09/10	N/A	Auto Calc.
Nitrogen Ammonia - water	4	N/A	2019/09/06	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen Ammonia - water	2	N/A	2019/09/09	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	1	N/A	2019/09/04	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrate + Nitrite	3	N/A	2019/09/05	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrate + Nitrite	2	N/A	2019/09/09	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	1	N/A	2019/09/04	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrite	3	N/A	2019/09/05	ATL SOP 00017	SM 23 4500-NO2- B m

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Your Project #: 171046.01
Your C.O.C. #: 733248-01-01

Attention: Melissa Rutherford

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/09/11
Report #: R5875356
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9N9256
Received: 2019/08/28, 09:06

Sample Matrix: Water
Samples Received: 13

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Nitrogen - Nitrite	2	N/A	2019/09/09	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	1	N/A	2019/09/05	ATL SOP 00018	ASTM D3867-16
Nitrogen - Nitrate (as N)	3	N/A	2019/09/06	ATL SOP 00018	ASTM D3867-16
Nitrogen - Nitrate (as N)	2	N/A	2019/09/10	ATL SOP 00018	ASTM D3867-16
pH (3)	4	N/A	2019/08/29	ATL SOP 00003	SM 23 4500-H+ B m
pH (3)	2	N/A	2019/09/03	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	1	N/A	2019/09/04	ATL SOP 00021	SM 23 4500-P E m
Phosphorus - ortho	3	N/A	2019/09/06	ATL SOP 00021	SM 23 4500-P E m
Phosphorus - ortho	2	N/A	2019/09/09	ATL SOP 00021	SM 23 4500-P E m
Salinity (4)	4	N/A	2019/09/04		SM 22 2520B
Salinity (4)	8	N/A	2019/09/10		SM 22 2520B
Salinity (4)	1	N/A	2019/09/11		SM 22 2520B
Sat. pH and Langelier Index (@ 20C)	3	N/A	2019/09/06	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 20C)	3	N/A	2019/09/10	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	3	N/A	2019/09/06	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	3	N/A	2019/09/10	ATL SOP 00049	Auto Calc.
Reactive Silica	1	N/A	2019/09/04	ATL SOP 00022	EPA 366.0 m
Reactive Silica	3	N/A	2019/09/05	ATL SOP 00022	EPA 366.0 m
Reactive Silica	2	N/A	2019/09/09	ATL SOP 00022	EPA 366.0 m
Sulphate	1	N/A	2019/09/04	ATL SOP 00023	ASTM D516-16 m
Sulphate	3	N/A	2019/09/05	ATL SOP 00023	ASTM D516-16 m
Sulphate	2	N/A	2019/09/10	ATL SOP 00023	ASTM D516-16 m
Chlorophyll A (Sub from Bedford) (1)	6	2019/08/30	2019/08/30		
Total Dissolved Solids (TDS calc)	3	N/A	2019/09/06	N/A	Auto Calc.
Total Dissolved Solids (TDS calc)	3	N/A	2019/09/10	N/A	Auto Calc.
Organic carbon - Total (TOC) (5)	2	N/A	2019/09/04	ATL SOP 00203	SM 23 5310B m
Organic carbon - Total (TOC) (5)	2	N/A	2019/09/05	ATL SOP 00203	SM 23 5310B m
Organic carbon - Total (TOC) (5)	2	N/A	2019/09/10	ATL SOP 00203	SM 23 5310B m
Total Phosphorus (Colourimetric) (2)	1	2019/08/29	2019/08/30	CAM SOP-00407	SM 23 4500 P B H m
Total Phosphorus (Colourimetric) (2)	3	2019/09/03	2019/09/04	CAM SOP-00407	SM 23 4500 P B H m

Your Project #: 171046.01
Your C.O.C. #: 733248-01-01

Attention: Melissa Rutherford

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/09/11
Report #: R5875356
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9N9256
Received: 2019/08/28, 09:06

Sample Matrix: Water
Samples Received: 13

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Total Phosphorus (Colourimetric) (2)	2	2019/09/04	2019/09/05	CAM SOP-00407	SM 23 4500 P B H m
Total Suspended Solids	8	2019/09/03	2019/09/06	ATL SOP 00007	SM 23 2540D m
Total Suspended Solids	5	2019/09/03	2019/09/09	ATL SOP 00007	SM 23 2540D m
Turbidity	4	N/A	2019/08/29	ATL SOP 00011	EPA 180.1 R2 m
Turbidity	2	N/A	2019/08/30	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Dalhousie Dept of Oceanography
(2) This test was performed by Bureau Veritas Laboratories Mississauga
(3) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(4) Non-accredited test method
(5) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

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Your Project #: 171046.01
Your C.O.C. #: 733248-01-01

Attention: Melissa Rutherford

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/09/11
Report #: R5875356
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9N9256
Received: 2019/08/28, 09:06

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
11 Sep 2019 14:44:25

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Keri Mackay, Customer Experience Team Lead
Email: Keri.MACKAY@bvlabs.com
Phone# (902)420-0203 Ext:294
==
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BV Labs Job #: B9N9256
Report Date: 2019/09/11

CBCL Limited
Client Project #: 171046.01

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		KQB840			KQB840			KQB841		
Sampling Date		2019/08/27 12:05			2019/08/27 12:05			2019/08/27 13:05		
COC Number		733248-01-01			733248-01-01			733248-01-01		
	UNITS	AR-6	RDL	QC Batch	AR-6 Lab-Dup	RDL	QC Batch	AVE-9	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	1.25	N/A	6303630				219	N/A	6303630
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	14	1.0	6303626				73	1.0	6303626
Calculated TDS	mg/L	76	1.0	6303640				15000	1.0	6303640
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	6303626				<1.0	1.0	6303626
Cation Sum	me/L	1.17	N/A	6303630				303	N/A	6303630
Hardness (CaCO3)	mg/L	35	1.0	6303628				3200	1.0	6303628
Ion Balance (% Difference)	%	3.31	N/A	6303629				16.2	N/A	6303629
Langelier Index (@ 20C)	N/A	-1.84		6303636				-0.151		6303636
Langelier Index (@ 4C)	N/A	-2.09		6303638				-0.388		6303638
Nitrate (N)	mg/L	0.066	0.055	6303632				<0.060	0.060	6303632
Saturation pH (@ 20C)	N/A	9.11		6303636				7.71		6303636
Saturation pH (@ 4C)	N/A	9.36		6303638				7.94		6303638
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	14	5.0	6314232				73	5.0	6312388
Dissolved Chloride (Cl-)	mg/L	16	1.0	6314235				6800	100	6312387
Colour	TCU	55	25	6314251				24	5.0	6312350
Nitrate + Nitrite (N)	mg/L	0.066 (1)	0.055	6314269				<0.060 (2)	0.060	6312336
Nitrite (N)	mg/L	<0.010	0.010	6314273				<0.010	0.010	6312341
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	0.050	6315942				0.16	0.050	6315942
Total Organic Carbon (C)	mg/L	6.7	0.50	6313841				5.5 (3)	5.0	6313837
Orthophosphate (P)	mg/L	<0.010	0.010	6314253				<0.010	0.010	6312343
pH	pH	7.27	N/A	6306091				7.55	N/A	6306091
Reactive Silica (SiO2)	mg/L	1.8	0.50	6314244				1.9 (2)	0.67	6312383
Dissolved Sulphate (SO4)	mg/L	25	2.0	6314240				1200	40	6312385
Turbidity	NTU	6.3	0.10	6306179	6.2	0.10	6306179	360	1.0	6306179
Conductivity	uS/cm	140	1.0	6306095				29000	1.0	6306095
Metals										
Total Aluminum (Al)	ug/L	200	5.0	6305955				11000	50	6321245
Total Antimony (Sb)	ug/L	<1.0	1.0	6305955				<10	10	6321245
Total Arsenic (As)	ug/L	1.5	1.0	6305955				<10	10	6321245
Total Barium (Ba)	ug/L	12	1.0	6305955				54	10	6321245

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated reporting limit due to method blank performance.
(2) Elevated reporting limit due to blank performance.
(3) Elevated reporting limit due to turbidity.

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		KQB840			KQB840			KQB841		
Sampling Date		2019/08/27 12:05			2019/08/27 12:05			2019/08/27 13:05		
COC Number		733248-01-01			733248-01-01			733248-01-01		
	UNITS	**AR-6**	**RDL**	**QC Batch**	**AR-6 Lab-Dup**	**RDL**	**QC Batch**	**AVE-9**	**RDL**	**QC Batch**
Total Beryllium (Be)	ug/L	<1.0	1.0	6305955				<10	10	6321245
Total Bismuth (Bi)	ug/L	<2.0	2.0	6305955				<20	20	6321245
Total Boron (B)	ug/L	<50	50	6305955				2300	500	6321245
Total Cadmium (Cd)	ug/L	0.013	0.010	6305955				<0.10	0.10	6321245
Total Calcium (Ca)	ug/L	12000	100	6305955				220000	1000	6321245
Total Chromium (Cr)	ug/L	1.1	1.0	6305955				14	10	6321245
Total Cobalt (Co)	ug/L	<0.40	0.40	6305955				4.5	4.0	6321245
Total Copper (Cu)	ug/L	0.69	0.50	6305955				5.1	5.0	6321245
Total Iron (Fe)	ug/L	480	50	6305955				9900	500	6321245
Total Lead (Pb)	ug/L	<0.50	0.50	6305955				7.1	5.0	6321245
Total Magnesium (Mg)	ug/L	1400	100	6305955				660000	1000	6321245
Total Manganese (Mn)	ug/L	87	2.0	6305955				500	20	6321245
Total Molybdenum (Mo)	ug/L	<2.0	2.0	6305955				<20	20	6321245
Total Nickel (Ni)	ug/L	<2.0	2.0	6305955				<20	20	6321245
Total Phosphorus (P)	ug/L	<100	100	6305955				<1000	1000	6321245
Total Potassium (K)	ug/L	740	100	6305955				200000	1000	6321245
Total Selenium (Se)	ug/L	<0.50	0.50	6305955				<5.0	5.0	6321245
Total Silver (Ag)	ug/L	<0.10	0.10	6305955				<1.0	1.0	6321245
Total Sodium (Na)	ug/L	9900	100	6305955				5400000	1000	6321245
Total Strontium (Sr)	ug/L	82	2.0	6305955				3900	20	6321245
Total Thallium (Tl)	ug/L	<0.10	0.10	6305955				<1.0	1.0	6321245
Total Tin (Sn)	ug/L	<2.0	2.0	6305955				<20	20	6321245
Total Titanium (Ti)	ug/L	4.3	2.0	6305955				250	20	6321245
Total Uranium (U)	ug/L	0.24	0.10	6305955				2.0	1.0	6321245
Total Vanadium (V)	ug/L	<2.0	2.0	6305955				22	20	6321245
Total Zinc (Zn)	ug/L	<5.0	5.0	6305955				<50	50	6321245

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B9N9256
Report Date: 2019/09/11

CBCL Limited
Client Project #: 171046.01

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		KQB841			KQB842			KQB842		
Sampling Date		2019/08/27 13:05			2019/08/27 13:45			2019/08/27 13:45		
COC Number		733248-01-01			733248-01-01			733248-01-01		
	UNITS	AVE-9 Lab-Dup	RDL	QC Batch	AVE-1	RDL	QC Batch	AVE-1 Lab-Dup	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L				482	N/A	6303630			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L				97	1.0	6303626			
Calculated TDS	mg/L				28000	1.0	6303640			
Carb. Alkalinity (calc. as CaCO3)	mg/L				<1.0	1.0	6303626			
Cation Sum	me/L				508	N/A	6303630			
Hardness (CaCO3)	mg/L				5500	1.0	6303628			
Ion Balance (% Difference)	%				2.60	N/A	6303629			
Langelier Index (@ 20C)	N/A				0.499		6303636			
Langelier Index (@ 4C)	N/A				0.260		6303638			
Nitrate (N)	mg/L				<0.050	0.050	6304669			
Saturation pH (@ 20C)	N/A				7.30		6303636			
Saturation pH (@ 4C)	N/A				7.53		6303638			
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	74	5.0	6312388	97	5.0	6318254	94	5.0	6318254
Dissolved Chloride (Cl-)	mg/L	7200	100	6312387	16000	500	6318255	16000	500	6318255
Colour	TCU	21	5.0	6312350	9.4	5.0	6318271	9.9	5.0	6318271
Nitrate + Nitrite (N)	mg/L	0.065 (1)	0.060	6312336	<0.050	0.050	6318278	0.055	0.050	6318278
Nitrite (N)	mg/L	<0.010	0.010	6312341	<0.010	0.010	6318281	<0.010	0.010	6318281
Nitrogen (Ammonia Nitrogen)	mg/L				<0.050	0.050	6318378			
Total Organic Carbon (C)	mg/L				<5.0 (2)	5.0	6321609			
Orthophosphate (P)	mg/L	<0.010	0.010	6312343	<0.010	0.010	6318276	<0.010	0.010	6318276
pH	pH				7.79	N/A	6311558			
Reactive Silica (SiO2)	mg/L	2.0 (1)	0.67	6312383	1.0	0.50	6318259	0.91	0.50	6318259
Dissolved Sulphate (SO4)	mg/L	1200	40	6312385	2000	40	6318257	2000	40	6318257
Turbidity	NTU				280	1.0	6308546	280	1.0	6308546
Conductivity	uS/cm				43000	1.0	6311560			
Metals										
Total Aluminum (Al)	ug/L				9400	50	6305955			
Total Antimony (Sb)	ug/L				<10	10	6305955			
Total Arsenic (As)	ug/L				<10	10	6305955			
Total Barium (Ba)	ug/L				59	10	6305955			
Total Beryllium (Be)	ug/L				<10	10	6305955			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated reporting limit due to blank performance.
(2) Elevated reporting limit due to turbidity.

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ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		KQB841			KQB842			KQB842		
Sampling Date		2019/08/27 13:05			2019/08/27 13:45			2019/08/27 13:45		
COC Number		733248-01-01			733248-01-01			733248-01-01		
	UNITS	**AVE-9 Lab-Dup**	**RDL**	**QC Batch**	**AVE-1**	**RDL**	**QC Batch**	**AVE-1 Lab-Dup**	**RDL**	**QC Batch**
Total Bismuth (Bi)	ug/L				<20	20	6305955			
Total Boron (B)	ug/L				4200	500	6305955			
Total Cadmium (Cd)	ug/L				0.10	0.10	6305955			
Total Calcium (Ca)	ug/L				360000	1000	6305955			
Total Chromium (Cr)	ug/L				14	10	6305955			
Total Cobalt (Co)	ug/L				7.9	4.0	6305955			
Total Copper (Cu)	ug/L				9.9	5.0	6305955			
Total Iron (Fe)	ug/L				15000	500	6305955			
Total Lead (Pb)	ug/L				10	5.0	6305955			
Total Magnesium (Mg)	ug/L				1100000	1000	6305955			
Total Manganese (Mn)	ug/L				750	20	6305955			
Total Molybdenum (Mo)	ug/L				<20	20	6305955			
Total Nickel (Ni)	ug/L				<20	20	6305955			
Total Phosphorus (P)	ug/L				<1000	1000	6305955			
Total Potassium (K)	ug/L				330000	1000	6305955			
Total Selenium (Se)	ug/L				<5.0	5.0	6305955			
Total Silver (Ag)	ug/L				<1.0	1.0	6305955			
Total Sodium (Na)	ug/L				9000000	1000	6305955			
Total Strontium (Sr)	ug/L				6500	20	6305955			
Total Thallium (Tl)	ug/L				<1.0	1.0	6305955			
Total Tin (Sn)	ug/L				<20	20	6305955			
Total Titanium (Ti)	ug/L				210	20	6305955			
Total Uranium (U)	ug/L				3.1	1.0	6305955			
Total Vanadium (V)	ug/L				31	20	6305955			
Total Zinc (Zn)	ug/L				<50	50	6305955			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		KQB845			KQB848			KQB848		
Sampling Date		2019/08/27 16:08			2019/08/27 19:03			2019/08/27 19:03		
COC Number		733248-01-01			733248-01-01			733248-01-01		
	UNITS	AVE-4	RDL	QC Batch	AR-16	RDL	QC Batch	AR-16 Lab-Dup	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	267	N/A	6303630	0.400	N/A	6303630			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	91	1.0	6303626	5.4	1.0	6303626			
Calculated TDS	mg/L	18000	1.0	6303640	27	1.0	6303640			
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	6303626	<1.0	1.0	6303626			
Cation Sum	me/L	371	N/A	6303630	0.450	N/A	6303630			
Hardness (CaCO3)	mg/L	4100	1.0	6303628	9.8	1.0	6303628			
Ion Balance (% Difference)	%	16.3	N/A	6303629	5.88	N/A	6303629			
Langelier Index (@ 20C)	N/A	0.0400		6303636	-3.33		6303636			
Langelier Index (@ 4C)	N/A	-0.197		6303638	-3.58		6303638			
Nitrate (N)	mg/L	0.12	0.050	6304669	<0.055	0.055	6303632			
Saturation pH (@ 20C)	N/A	7.48		6303636	10.1		6303636			
Saturation pH (@ 4C)	N/A	7.72		6303638	10.3		6303638			
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	92	5.0	6318311	5.4	5.0	6314232			
Dissolved Chloride (Cl-)	mg/L	8300	100	6318314	6.0	1.0	6314235			
Colour	TCU	25	5.0	6318321	75	25	6314251			
Nitrate + Nitrite (N)	mg/L	0.12	0.050	6318328	<0.055 (1)	0.055	6314269			
Nitrite (N)	mg/L	<0.010	0.010	6318329	<0.010	0.010	6314273			
Nitrogen (Ammonia Nitrogen)	mg/L	0.15	0.050	6318378	0.052	0.050	6315942			
Total Organic Carbon (C)	mg/L	13 (2)	5.0	6321609	6.7	0.50	6313841	6.7	0.50	6313841
Orthophosphate (P)	mg/L	<0.010	0.010	6318323	0.020	0.010	6314253			
pH	pH	7.52	N/A	6311558	6.75	N/A	6306091			
Reactive Silica (SiO2)	mg/L	2.4	0.50	6318320	1.8	0.50	6314244			
Dissolved Sulphate (SO4)	mg/L	1600	40	6318315	6.0	2.0	6314240			
Turbidity	NTU	>1000	1.0	6308546	4.2	0.10	6306179			
Conductivity	uS/cm	33000	1.0	6311560	46	1.0	6306095			
Metals										
Total Aluminum (Al)	ug/L	31000	50	6305955	270	5.0	6305955			
Total Antimony (Sb)	ug/L	<10	10	6305955	<1.0	1.0	6305955			
Total Arsenic (As)	ug/L	19	10	6305955	1.3	1.0	6305955			
Total Barium (Ba)	ug/L	110	10	6305955	7.8	1.0	6305955			
Total Beryllium (Be)	ug/L	<10	10	6305955	<1.0	1.0	6305955			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated reporting limit due to method blank performance.
(2) Elevated reporting limit due to turbidity.

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		KQB845			KQB848			KQB848		
Sampling Date		2019/08/27 16:08			2019/08/27 19:03			2019/08/27 19:03		
COC Number		733248-01-01			733248-01-01			733248-01-01		
	UNITS	AVE-4	RDL	QC Batch	AR-16	RDL	QC Batch	AR-16 Lab-Dup	RDL	QC Batch
Total Bismuth (Bi)	ug/L	<20	20	6305955	<2.0	2.0	6305955			
Total Boron (B)	ug/L	3100	500	6305955	<50	50	6305955			
Total Cadmium (Cd)	ug/L	0.13	0.10	6305955	0.018	0.010	6305955			
Total Calcium (Ca)	ug/L	290000	1000	6305955	3000	100	6305955			
Total Chromium (Cr)	ug/L	48	10	6305955	<1.0	1.0	6305955			
Total Cobalt (Co)	ug/L	27	4.0	6305955	<0.40	0.40	6305955			
Total Copper (Cu)	ug/L	34	5.0	6305955	1.0	0.50	6305955			
Total Iron (Fe)	ug/L	49000	500	6305955	470	50	6305955			
Total Lead (Pb)	ug/L	37	5.0	6305955	<0.50	0.50	6305955			
Total Magnesium (Mg)	ug/L	810000	1000	6305955	560	100	6305955			
Total Manganese (Mn)	ug/L	2700	20	6305955	44	2.0	6305955			
Total Molybdenum (Mo)	ug/L	<20	20	6305955	<2.0	2.0	6305955			
Total Nickel (Ni)	ug/L	52	20	6305955	<2.0	2.0	6305955			
Total Phosphorus (P)	ug/L	1500	1000	6305955	<100	100	6305955			
Total Potassium (K)	ug/L	250000	1000	6305955	500	100	6305955			
Total Selenium (Se)	ug/L	<5.0	5.0	6305955	<0.50	0.50	6305955			
Total Silver (Ag)	ug/L	<1.0	1.0	6305955	<0.10	0.10	6305955			
Total Sodium (Na)	ug/L	6500000	1000	6305955	5000	100	6305955			
Total Strontium (Sr)	ug/L	5000	20	6305955	21	2.0	6305955			
Total Thallium (Tl)	ug/L	<1.0	1.0	6305955	<0.10	0.10	6305955			
Total Tin (Sn)	ug/L	<20	20	6305955	<2.0	2.0	6305955			
Total Titanium (Ti)	ug/L	450	20	6305955	4.2	2.0	6305955			
Total Uranium (U)	ug/L	3.3	1.0	6305955	0.27	0.10	6305955			
Total Vanadium (V)	ug/L	85	20	6305955	<2.0	2.0	6305955			
Total Zinc (Zn)	ug/L	150	50	6305955	6.6	5.0	6305955			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		KQB851		
Sampling Date		2019/08/27 20:40		
COC Number		733248-01-01		
	UNITS	**AR-1**	**RDL**	**QC Batch**
Calculated Parameters				
Anion Sum	me/L	1.27	N/A	6303630
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	14	1.0	6303626
Calculated TDS	mg/L	78	1.0	6303640
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	6303626
Cation Sum	me/L	1.26	N/A	6303630
Hardness (CaCO3)	mg/L	37	1.0	6303628
Ion Balance (% Difference)	%	0.400	N/A	6303629
Langelier Index (@ 20C)	N/A	-1.75		6303636
Langelier Index (@ 4C)	N/A	-2.01		6303638
Nitrate (N)	mg/L	0.058	0.055	6303632
Saturation pH (@ 20C)	N/A	9.09		6303636
Saturation pH (@ 4C)	N/A	9.34		6303638
Inorganics				
Total Alkalinity (Total as CaCO3)	mg/L	14	5.0	6314232
Dissolved Chloride (Cl-)	mg/L	17	1.0	6314235
Colour	TCU	52	25	6314251
Nitrate + Nitrite (N)	mg/L	0.058 (1)	0.055	6314269
Nitrite (N)	mg/L	<0.010	0.010	6314273
Nitrogen (Ammonia Nitrogen)	mg/L	0.059	0.050	6315942
Total Organic Carbon (C)	mg/L	6.8	0.50	6313841
Orthophosphate (P)	mg/L	<0.010	0.010	6314253
pH	pH	7.34	N/A	6306091
Reactive Silica (SiO2)	mg/L	1.7	0.50	6314244
Dissolved Sulphate (SO4)	mg/L	25	2.0	6314240
Turbidity	NTU	3.3	0.10	6306186
Conductivity	uS/cm	140	1.0	6306095
Metals				
Total Aluminum (Al)	ug/L	140	5.0	6305955
Total Antimony (Sb)	ug/L	<1.0	1.0	6305955
Total Arsenic (As)	ug/L	1.4	1.0	6305955
Total Barium (Ba)	ug/L	11	1.0	6305955
Total Beryllium (Be)	ug/L	<1.0	1.0	6305955
Total Bismuth (Bi)	ug/L	<2.0	2.0	6305955
Total Boron (B)	ug/L	<50	50	6305955

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to method blank performance.

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ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		KQB851		
Sampling Date		2019/08/27 20:40		
COC Number		733248-01-01		
	UNITS	AR-1	RDL	QC Batch
Total Cadmium (Cd)	ug/L	<0.010	0.010	6305955
Total Calcium (Ca)	ug/L	12000	100	6305955
Total Chromium (Cr)	ug/L	1.1	1.0	6305955
Total Cobalt (Co)	ug/L	<0.40	0.40	6305955
Total Copper (Cu)	ug/L	2.0	0.50	6305955
Total Iron (Fe)	ug/L	370	50	6305955
Total Lead (Pb)	ug/L	<0.50	0.50	6305955
Total Magnesium (Mg)	ug/L	1600	100	6305955
Total Manganese (Mn)	ug/L	32	2.0	6305955
Total Molybdenum (Mo)	ug/L	<2.0	2.0	6305955
Total Nickel (Ni)	ug/L	<2.0	2.0	6305955
Total Phosphorus (P)	ug/L	<100	100	6305955
Total Potassium (K)	ug/L	840	100	6305955
Total Selenium (Se)	ug/L	<0.50	0.50	6305955
Total Silver (Ag)	ug/L	<0.10	0.10	6305955
Total Sodium (Na)	ug/L	11000	100	6305955
Total Strontium (Sr)	ug/L	86	2.0	6305955
Total Thallium (Tl)	ug/L	<0.10	0.10	6305955
Total Tin (Sn)	ug/L	<2.0	2.0	6305955
Total Titanium (Ti)	ug/L	3.1	2.0	6305955
Total Uranium (U)	ug/L	0.20	0.10	6305955
Total Vanadium (V)	ug/L	<2.0	2.0	6305955
Total Zinc (Zn)	ug/L	<5.0	5.0	6305955

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs Job #: B9N9256
Report Date: 2019/09/11

CBCL Limited
Client Project #: 171046.01

RESULTS OF ANALYSES OF WATER

BV Labs ID		KQB839			KQB840			KQB840		
Sampling Date		2019/08/27 11:25			2019/08/27 12:05			2019/08/27 12:05		
COC Number		733248-01-01			733248-01-01			733248-01-01		
	UNITS	AR-4	RDL	QC Batch	AR-6	RDL	QC Batch	AR-6 Lab-Dup	RDL	QC Batch
Inorganics										
Carbonaceous BOD	mg/L				4.3	3.1	6304039			
Total Phosphorus	mg/L				0.034	0.004	6307899	0.035	0.004	6307899
Salinity	N/A	<2.0	2.0	6313681	<2.0	2.0	6313681			
Total Suspended Solids	mg/L	3.0	1.0	6312107	2.9	2.1	6312107			
Subcontracted Analysis										
Subcontract Parameter	N/A				ATTACHED	N/A	6308857			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

BV Labs ID		KQB841			KQB842			KQB842		
Sampling Date		2019/08/27 13:05			2019/08/27 13:45			2019/08/27 13:45		
COC Number		733248-01-01			733248-01-01			733248-01-01		
	UNITS	AVE-9	RDL	QC Batch	AVE-1	RDL	QC Batch	AVE-1 Lab-Dup	RDL	QC Batch
Inorganics										
Carbonaceous BOD	mg/L	5.0	3.1	6304039	<5.0	5.0	6306476			
Total Phosphorus	mg/L	0.29	0.02	6312886	0.7	0.1	6313967			
Salinity	N/A	17	2.0	6313681	27	2.0	6313681			
Total Suspended Solids	mg/L	300	5.0	6312107	310	10	6312107	310	10	6312107
Subcontracted Analysis										
Subcontract Parameter	N/A	ATTACHED	N/A	6308857	ATTACHED	N/A	6308857			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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BV Labs Job #: B9N9256
Report Date: 2019/09/11

CBCL Limited
Client Project #: 171046.01

RESULTS OF ANALYSES OF WATER

BV Labs ID		KQB843			KQB843			KQB844		
Sampling Date		2019/08/27 14:35			2019/08/27 14:35			2019/08/27 15:10		
COC Number		733248-01-01			733248-01-01			733248-01-01		
	UNITS	AVE-7	RDL	QC Batch	AVE-7 Lab-Dup	RDL	QC Batch	AVE-8	RDL	QC Batch
Inorganics										
Salinity	N/A	24	2.0	6323353	24	2.0	6323353	<2.0	2.0	6323353
Total Suspended Solids	mg/L	360	10	6312107				690	10	6312406

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

BV Labs ID		KQB845			KQB845			KQB846	KQB847		
Sampling Date		2019/08/27 16:08			2019/08/27 16:08			2019/08/27 18:05	2019/08/27 18:29		
COC Number		733248-01-01			733248-01-01			733248-01-01	733248-01-01		
	UNITS	AVE-4	RDL	QC Batch	AVE-4 Lab-Dup	RDL	QC Batch	AR-14	AR-15	RDL	QC Batch
Inorganics											
Carbonaceous BOD	mg/L	16	3.1	6306476							
Total Phosphorus	mg/L	1.5	0.1	6313967							
Salinity	N/A	21	2.0	6325628	21	2.0	6325628	<2.0	<2.0	2.0	6323353
Total Suspended Solids	mg/L	3000	10	6312406				120	18	5.0	6312406
Subcontracted Analysis											
Subcontract Parameter	N/A	ATTACHED	N/A	6308857							

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

BV Labs ID		KQB848			KQB849		KQB850		
Sampling Date		2019/08/27 19:03			2019/08/27 19:40		2019/08/27 20:30		
COC Number		733248-01-01			733248-01-01		733248-01-01		
	UNITS	AR-16	RDL	QC Batch	AR-4B	RDL	AR-2	RDL	QC Batch
Inorganics									
Carbonaceous BOD	mg/L	4.1	3.1	6304039					
Total Phosphorus	mg/L	0.027	0.004	6312886					
Salinity	N/A	<2.0	2.0	6323353	<2.0	2.0	<2.0	2.0	6323353
Total Suspended Solids	mg/L	4.3	2.1	6312406	310	10	4.0	2.0	6312406
Subcontracted Analysis									
Subcontract Parameter	N/A	ATTACHED	N/A	6308857					

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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RESULTS OF ANALYSES OF WATER

BV Labs ID		KQB851		
Sampling Date		2019/08/27 20:40		
COC Number		733248-01-01		
	UNITS	AR-1	RDL	QC Batch
Inorganics				
Carbonaceous BOD	mg/L	3.3	3.1	6304039
Total Phosphorus	mg/L	0.025	0.004	6312886
Salinity	N/A	<2.0	2.0	6323353
Total Suspended Solids	mg/L	<2.1	2.1	6312406
Subcontracted Analysis				
Subcontract Parameter	N/A	ATTACHED	N/A	6308857

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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MICROBIOLOGY (WATER)

BV Labs ID		KQB840		KQB841		KQB842	KQB845		
Sampling Date		2019/08/27 12:05		2019/08/27 13:05		2019/08/27 13:45	2019/08/27 16:08		
COC Number		733248-01-01		733248-01-01		733248-01-01	733248-01-01		
	UNITS	AR-6	RDL	AVE-9	QC Batch	AVE-1	AVE-4	RDL	QC Batch
Microbiological									
Fecal coliform	CFU/100mL	30	10	<100	6303862	<100	<100	100	6304779
Total Coliforms	CFU/100mL	370	10	800	6303864	<100	400	100	6304768

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs ID		KQB848	KQB851		
Sampling Date		2019/08/27 19:03	2019/08/27 20:40		
COC Number		733248-01-01	733248-01-01		
	UNITS	AR-16	AR-1	RDL	QC Batch
Microbiological					
Fecal coliform	CFU/100mL	30	10	10	6303862
Total Coliforms	CFU/100mL	150	2000	10	6303864

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	2.0°C
Package 2	-0.3°C

Samples AVE-1 and AVE-4 were analyzed past hold time for Coliform and Fecal Coliform testing.

Sample KQB841 [AVE-9] : Elevated reporting limits for trace metals due to sample matrix.
Poor RCAp Ion Balance due to sample matrix. Excess cations due to presence of turbidity.

Sample KQB842 [AVE-1] : Elevated reporting limits for trace metals due to sample matrix.

Sample KQB845 [AVE-4] : Elevated reporting limits for trace metals due to sample matrix.
Poor RCAp Ion Balance due to sample matrix. Excess cations due to presence of turbidity.

Sample KQB848 [AR-16] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample KQB851 [AR-1] : TSS:Used all of the sample provided, DL raised.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6303862	KBO	Method Blank	Fecal coliform	2019/08/28	<1.0		CFU/100mL	
6303864	KBO	Method Blank	Total Coliforms	2019/08/28	<1.0		CFU/100mL	
6304039	EBR	QC Standard	Carbonaceous BOD	2019/09/03		130 (1)	%	80 - 120
6304039	EBR	Spiked Blank	Carbonaceous BOD	2019/09/03		127 (2)	%	80 - 120
6304039	EBR	Method Blank	Carbonaceous BOD	2019/09/03	<2.0		mg/L	
6304039	EBR	RPD	Carbonaceous BOD	2019/09/03	NC		%	25
6304768	SDN	Method Blank	Total Coliforms	2019/08/28	<1.0		CFU/100mL	
6304779	SDN	Method Blank	Fecal coliform	2019/08/28	<1.0		CFU/100mL	
6305955	BAN	Matrix Spike	Total Aluminum (Al)	2019/08/30		98	%	80 - 120
			Total Antimony (Sb)	2019/08/30		103	%	80 - 120
			Total Arsenic (As)	2019/08/30		99	%	80 - 120
			Total Barium (Ba)	2019/08/30		100	%	80 - 120
			Total Beryllium (Be)	2019/08/30		103	%	80 - 120
			Total Bismuth (Bi)	2019/08/30		101	%	80 - 120
			Total Boron (B)	2019/08/30		104	%	80 - 120
			Total Cadmium (Cd)	2019/08/30		97	%	80 - 120
			Total Calcium (Ca)	2019/08/30		102	%	80 - 120
			Total Chromium (Cr)	2019/08/30		97	%	80 - 120
			Total Cobalt (Co)	2019/08/30		97	%	80 - 120
			Total Copper (Cu)	2019/08/30		97	%	80 - 120
			Total Iron (Fe)	2019/08/30		99	%	80 - 120
			Total Lead (Pb)	2019/08/30		99	%	80 - 120
			Total Magnesium (Mg)	2019/08/30		103	%	80 - 120
			Total Manganese (Mn)	2019/08/30		98	%	80 - 120
			Total Molybdenum (Mo)	2019/08/30		102	%	80 - 120
			Total Nickel (Ni)	2019/08/30		98	%	80 - 120
			Total Phosphorus (P)	2019/08/30		101	%	80 - 120
			Total Potassium (K)	2019/08/30		101	%	80 - 120
			Total Selenium (Se)	2019/08/30		97	%	80 - 120
			Total Silver (Ag)	2019/08/30		98	%	80 - 120
			Total Sodium (Na)	2019/08/30		NC	%	80 - 120
			Total Strontium (Sr)	2019/08/30		99	%	80 - 120
			Total Thallium (Tl)	2019/08/30		102	%	80 - 120
			Total Tin (Sn)	2019/08/30		105	%	80 - 120
			Total Titanium (Ti)	2019/08/30		100	%	80 - 120
			Total Uranium (U)	2019/08/30		104	%	80 - 120
			Total Vanadium (V)	2019/08/30		102	%	80 - 120
			Total Zinc (Zn)	2019/08/30		97	%	80 - 120
6305955	BAN	Spiked Blank	Total Aluminum (Al)	2019/08/30		98	%	80 - 120
			Total Antimony (Sb)	2019/08/30		100	%	80 - 120
			Total Arsenic (As)	2019/08/30		97	%	80 - 120
			Total Barium (Ba)	2019/08/30		99	%	80 - 120
			Total Beryllium (Be)	2019/08/30		102	%	80 - 120
			Total Bismuth (Bi)	2019/08/30		101	%	80 - 120
			Total Boron (B)	2019/08/30		103	%	80 - 120
			Total Cadmium (Cd)	2019/08/30		96	%	80 - 120
			Total Calcium (Ca)	2019/08/30		101	%	80 - 120
			Total Chromium (Cr)	2019/08/30		97	%	80 - 120
			Total Cobalt (Co)	2019/08/30		98	%	80 - 120
			Total Copper (Cu)	2019/08/30		98	%	80 - 120
			Total Iron (Fe)	2019/08/30		98	%	80 - 120
			Total Lead (Pb)	2019/08/30		99	%	80 - 120
			Total Magnesium (Mg)	2019/08/30		102	%	80 - 120
			Total Manganese (Mn)	2019/08/30		100	%	80 - 120
			Total Molybdenum (Mo)	2019/08/30		101	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Nickel (Ni)	2019/08/30		101	%	80 - 120
			Total Phosphorus (P)	2019/08/30		100	%	80 - 120
			Total Potassium (K)	2019/08/30		99	%	80 - 120
			Total Selenium (Se)	2019/08/30		97	%	80 - 120
			Total Silver (Ag)	2019/08/30		96	%	80 - 120
			Total Sodium (Na)	2019/08/30		95	%	80 - 120
			Total Strontium (Sr)	2019/08/30		100	%	80 - 120
			Total Thallium (Tl)	2019/08/30		101	%	80 - 120
			Total Tin (Sn)	2019/08/30		101	%	80 - 120
			Total Titanium (Ti)	2019/08/30		104	%	80 - 120
			Total Uranium (U)	2019/08/30		103	%	80 - 120
			Total Vanadium (V)	2019/08/30		100	%	80 - 120
			Total Zinc (Zn)	2019/08/30		96	%	80 - 120
6305955	BAN	Method Blank	Total Aluminum (Al)	2019/08/30	<5.0		ug/L	
			Total Antimony (Sb)	2019/08/30	<1.0		ug/L	
			Total Arsenic (As)	2019/08/30	<1.0		ug/L	
			Total Barium (Ba)	2019/08/30	<1.0		ug/L	
			Total Beryllium (Be)	2019/08/30	<1.0		ug/L	
			Total Bismuth (Bi)	2019/08/30	<2.0		ug/L	
			Total Boron (B)	2019/08/30	<50		ug/L	
			Total Cadmium (Cd)	2019/08/30	<0.010		ug/L	
			Total Calcium (Ca)	2019/08/30	<100		ug/L	
			Total Chromium (Cr)	2019/08/30	<1.0		ug/L	
			Total Cobalt (Co)	2019/08/30	<0.40		ug/L	
			Total Copper (Cu)	2019/08/30	<0.50		ug/L	
			Total Iron (Fe)	2019/08/30	<50		ug/L	
			Total Lead (Pb)	2019/08/30	<0.50		ug/L	
			Total Magnesium (Mg)	2019/08/30	<100		ug/L	
			Total Manganese (Mn)	2019/08/30	<2.0		ug/L	
			Total Molybdenum (Mo)	2019/08/30	<2.0		ug/L	
			Total Nickel (Ni)	2019/08/30	<2.0		ug/L	
			Total Phosphorus (P)	2019/08/30	<100		ug/L	
			Total Potassium (K)	2019/08/30	<100		ug/L	
			Total Selenium (Se)	2019/08/30	<0.50		ug/L	
			Total Silver (Ag)	2019/08/30	<0.10		ug/L	
			Total Sodium (Na)	2019/08/30	<100		ug/L	
			Total Strontium (Sr)	2019/08/30	<2.0		ug/L	
			Total Thallium (Tl)	2019/08/30	<0.10		ug/L	
			Total Tin (Sn)	2019/08/30	<2.0		ug/L	
			Total Titanium (Ti)	2019/08/30	<2.0		ug/L	
			Total Uranium (U)	2019/08/30	<0.10		ug/L	
			Total Vanadium (V)	2019/08/30	<2.0		ug/L	
			Total Zinc (Zn)	2019/08/30	<5.0		ug/L	
6305955	BAN	RPD	Total Aluminum (Al)	2019/08/30	NC		%	20
			Total Antimony (Sb)	2019/08/30	NC		%	20
			Total Arsenic (As)	2019/08/30	NC		%	20
			Total Barium (Ba)	2019/08/30	NC		%	20
			Total Beryllium (Be)	2019/08/30	NC		%	20
			Total Bismuth (Bi)	2019/08/30	NC		%	20
			Total Boron (B)	2019/08/30	NC		%	20
			Total Cadmium (Cd)	2019/08/30	NC		%	20
			Total Calcium (Ca)	2019/08/30	NC		%	20
			Total Chromium (Cr)	2019/08/30	NC		%	20
			Total Cobalt (Co)	2019/08/30	NC		%	20
			Total Iron (Fe)	2019/08/30	NC		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Lead (Pb)	2019/08/30	NC		%	20
			Total Magnesium (Mg)	2019/08/30	NC		%	20
			Total Manganese (Mn)	2019/08/30	NC		%	20
			Total Molybdenum (Mo)	2019/08/30	2.0		%	20
			Total Nickel (Ni)	2019/08/30	NC		%	20
			Total Phosphorus (P)	2019/08/30	NC		%	20
			Total Potassium (K)	2019/08/30	NC		%	20
			Total Selenium (Se)	2019/08/30	NC		%	20
			Total Silver (Ag)	2019/08/30	NC		%	20
			Total Sodium (Na)	2019/08/30	2.7		%	20
			Total Strontium (Sr)	2019/08/30	NC		%	20
			Total Thallium (Tl)	2019/08/30	NC		%	20
			Total Tin (Sn)	2019/08/30	NC		%	20
			Total Titanium (Ti)	2019/08/30	NC		%	20
			Total Uranium (U)	2019/08/30	2.0		%	20
			Total Vanadium (V)	2019/08/30	NC		%	20
			Total Zinc (Zn)	2019/08/30	NC		%	20
6306091	JMV	QC Standard	pH	2019/08/29		100	%	97 - 103
6306091	JMV	RPD	pH	2019/08/29	1.1		%	N/A
6306095	JMV	Spiked Blank	Conductivity	2019/08/29		104	%	80 - 120
6306095	JMV	Method Blank	Conductivity	2019/08/29	1.1, RDL=1.0		uS/cm	
6306095	JMV	RPD	Conductivity	2019/08/29	0.47		%	10
6306179	JMV	QC Standard	Turbidity	2019/08/29		107	%	80 - 120
6306179	JMV	Spiked Blank	Turbidity	2019/08/29		99	%	80 - 120
6306179	JMV	Method Blank	Turbidity	2019/08/29	<0.10		NTU	
6306179	JMV	RPD [KQB840-02]	Turbidity	2019/08/29	1.9		%	20
6306186	JMV	QC Standard	Turbidity	2019/08/29		107	%	80 - 120
6306186	JMV	Spiked Blank	Turbidity	2019/08/29		100	%	80 - 120
6306186	JMV	Method Blank	Turbidity	2019/08/29	<0.10		NTU	
6306186	JMV	RPD	Turbidity	2019/08/29	NC		%	20
6306476	EBR	QC Standard	Carbonaceous BOD	2019/09/03		120	%	80 - 120
6306476	EBR	Spiked Blank	Carbonaceous BOD	2019/09/03		133 (3)	%	80 - 120
6306476	EBR	Method Blank	Carbonaceous BOD	2019/09/03	<2.0		mg/L	
6306476	EBR	RPD	Carbonaceous BOD	2019/09/03	4.8		%	25
6307899	SSV	Matrix Spike [KQB840-07]	Total Phosphorus	2019/08/30		93	%	80 - 120
6307899	SSV	QC Standard	Total Phosphorus	2019/08/30		84	%	80 - 120
6307899	SSV	Spiked Blank	Total Phosphorus	2019/08/30		95	%	80 - 120
6307899	SSV	Method Blank	Total Phosphorus	2019/08/30	<0.004		mg/L	
6307899	SSV	RPD [KQB840-07]	Total Phosphorus	2019/08/30	2.3		%	20
6308546	JMV	QC Standard	Turbidity	2019/08/30		106	%	80 - 120
6308546	JMV	Spiked Blank	Turbidity	2019/08/30		101	%	80 - 120
6308546	JMV	Method Blank	Turbidity	2019/08/30	<0.10		NTU	
6308546	JMV	RPD [KQB842-02]	Turbidity	2019/08/30	2.7		%	20
6311558	JMV	QC Standard	pH	2019/09/03		101	%	97 - 103
6311558	JMV	RPD	pH	2019/09/03	1.7		%	N/A
6311560	JMV	Spiked Blank	Conductivity	2019/09/03		101	%	80 - 120
6311560	JMV	Method Blank	Conductivity	2019/09/03	<1.0		uS/cm	
6311560	JMV	RPD	Conductivity	2019/09/03	0.0024		%	10
6312107	AM6	QC Standard	Total Suspended Solids	2019/09/09		98	%	80 - 120
6312107	AM6	Method Blank	Total Suspended Solids	2019/09/09	<1.0		mg/L	
6312107	AM6	RPD [KQB842-01]	Total Suspended Solids	2019/09/09	0.65		%	20
6312336	SRM	Matrix Spike [KQB841-02]	Nitrate + Nitrite (N)	2019/09/04		94	%	80 - 120
6312336	SRM	Spiked Blank	Nitrate + Nitrite (N)	2019/09/04		97	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6312336	SRM	Method Blank	Nitrate + Nitrite (N)	2019/09/04	0.057, RDL=0.050 (4)		mg/L	
6312336	SRM	RPD [KQB841-02]	Nitrate + Nitrite (N)	2019/09/04	8.1 (5)		%	25
6312341	SRM	Matrix Spike [KQB841-02]	Nitrite (N)	2019/09/04		96	%	80 - 120
6312341	SRM	Spiked Blank	Nitrite (N)	2019/09/04		101	%	80 - 120
6312341	SRM	Method Blank	Nitrite (N)	2019/09/04	<0.010		mg/L	
6312341	SRM	RPD [KQB841-02]	Nitrite (N)	2019/09/04	NC		%	20
6312343	SRM	Matrix Spike [KQB841-02]	Orthophosphate (P)	2019/09/04		94	%	80 - 120
6312343	SRM	Spiked Blank	Orthophosphate (P)	2019/09/04		96	%	80 - 120
6312343	SRM	Method Blank	Orthophosphate (P)	2019/09/04	<0.010		mg/L	
6312343	SRM	RPD [KQB841-02]	Orthophosphate (P)	2019/09/04	NC		%	25
6312350	SRM	Spiked Blank	Colour	2019/09/04		95	%	80 - 120
6312350	SRM	Method Blank	Colour	2019/09/04	<5.0		TCU	
6312350	SRM	RPD [KQB841-02]	Colour	2019/09/04	16		%	20
6312383	SRM	Matrix Spike [KQB841-02]	Reactive Silica (SiO2)	2019/09/04		96	%	80 - 120
6312383	SRM	Spiked Blank	Reactive Silica (SiO2)	2019/09/04		100	%	80 - 120
6312383	SRM	Method Blank	Reactive Silica (SiO2)	2019/09/04	0.66, RDL=0.50 (6)		mg/L	
6312383	SRM	RPD [KQB841-02]	Reactive Silica (SiO2)	2019/09/04	4.4 (5)		%	25
6312385	SRM	Matrix Spike [KQB841-02]	Dissolved Sulphate (SO4)	2019/09/04		NC	%	80 - 120
6312385	SRM	Spiked Blank	Dissolved Sulphate (SO4)	2019/09/04		105	%	80 - 120
6312385	SRM	Method Blank	Dissolved Sulphate (SO4)	2019/09/04	2.2, RDL=2.0 (5)		mg/L	
6312385	SRM	RPD [KQB841-02]	Dissolved Sulphate (SO4)	2019/09/04	2.5		%	25
6312387	SRM	Matrix Spike [KQB841-02]	Dissolved Chloride (Cl-)	2019/09/05		NC	%	80 - 120
6312387	SRM	Spiked Blank	Dissolved Chloride (Cl-)	2019/09/04		102	%	80 - 120
6312387	SRM	Method Blank	Dissolved Chloride (Cl-)	2019/09/04	<1.0		mg/L	
6312387	SRM	RPD [KQB841-02]	Dissolved Chloride (Cl-)	2019/09/05	6.0		%	25
6312388	SRM	Matrix Spike [KQB841-02]	Total Alkalinity (Total as CaCO3)	2019/09/04		NC	%	80 - 120
6312388	SRM	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019/09/04		102	%	80 - 120
6312388	SRM	Method Blank	Total Alkalinity (Total as CaCO3)	2019/09/04	<5.0		mg/L	
6312388	SRM	RPD [KQB841-02]	Total Alkalinity (Total as CaCO3)	2019/09/04	0.98		%	25
6312406	AM6	QC Standard	Total Suspended Solids	2019/09/06		100	%	80 - 120
6312406	AM6	Method Blank	Total Suspended Solids	2019/09/06	<1.0		mg/L	
6312406	AM6	RPD	Total Suspended Solids	2019/09/06	5.1		%	20
6312886	SSV	Matrix Spike	Total Phosphorus	2019/09/04		94	%	80 - 120
6312886	SSV	QC Standard	Total Phosphorus	2019/09/04		88	%	80 - 120
6312886	SSV	Spiked Blank	Total Phosphorus	2019/09/04		95	%	80 - 120
6312886	SSV	Method Blank	Total Phosphorus	2019/09/04	<0.004		mg/L	
6312886	SSV	RPD	Total Phosphorus	2019/09/04	4.6		%	20
6313681	BBD	QC Standard	Salinity	2019/09/04		100	%	80 - 120
6313681	BBD	Method Blank	Salinity	2019/09/04	<2.0		N/A	
6313681	BBD	RPD	Salinity	2019/09/04	0		%	25
6313837	EMT	Matrix Spike	Total Organic Carbon (C)	2019/09/04		94	%	85 - 115
6313837	EMT	Spiked Blank	Total Organic Carbon (C)	2019/09/04		94	%	80 - 120
6313837	EMT	Method Blank	Total Organic Carbon (C)	2019/09/04	<0.50		mg/L	
6313837	EMT	RPD	Total Organic Carbon (C)	2019/09/04	1.0		%	15
6313841	EMT	Matrix Spike [KQB848-06]	Total Organic Carbon (C)	2019/09/04		91	%	85 - 115
6313841	EMT	Spiked Blank	Total Organic Carbon (C)	2019/09/04		94	%	80 - 120
6313841	EMT	Method Blank	Total Organic Carbon (C)	2019/09/04	<0.50		mg/L	
6313841	EMT	RPD [KQB848-06]	Total Organic Carbon (C)	2019/09/04	0.33		%	15
6313967	SSV	Matrix Spike	Total Phosphorus	2019/09/05		94	%	80 - 120
6313967	SSV	QC Standard	Total Phosphorus	2019/09/05		88	%	80 - 120
6313967	SSV	Spiked Blank	Total Phosphorus	2019/09/05		98	%	80 - 120
6313967	SSV	Method Blank	Total Phosphorus	2019/09/05	<0.004		mg/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6313967	SSV	RPD	Total Phosphorus	2019/09/05	1.0		%	20
6314232	SRM	Matrix Spike	Total Alkalinity (Total as CaCO3)	2019/09/06		62 (7)	%	80 - 120
6314232	SRM	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019/09/05		106	%	80 - 120
6314232	SRM	Method Blank	Total Alkalinity (Total as CaCO3)	2019/09/05	<5.0		mg/L	
6314232	SRM	RPD	Total Alkalinity (Total as CaCO3)	2019/09/05	NC		%	25
6314235	SRM	Matrix Spike	Dissolved Chloride (Cl-)	2019/09/05		NC	%	80 - 120
6314235	SRM	Spiked Blank	Dissolved Chloride (Cl-)	2019/09/05		98	%	80 - 120
6314235	SRM	Method Blank	Dissolved Chloride (Cl-)	2019/09/05	<1.0		mg/L	
6314235	SRM	RPD	Dissolved Chloride (Cl-)	2019/09/05	0.55		%	25
6314240	SRM	Matrix Spike	Dissolved Sulphate (SO4)	2019/09/05		NC	%	80 - 120
6314240	SRM	Spiked Blank	Dissolved Sulphate (SO4)	2019/09/05		104	%	80 - 120
6314240	SRM	Method Blank	Dissolved Sulphate (SO4)	2019/09/05	<2.0		mg/L	
6314240	SRM	RPD	Dissolved Sulphate (SO4)	2019/09/05	1.4		%	25
6314244	SRM	Matrix Spike	Reactive Silica (SiO2)	2019/09/05		NC	%	80 - 120
6314244	SRM	Spiked Blank	Reactive Silica (SiO2)	2019/09/05		98	%	80 - 120
6314244	SRM	Method Blank	Reactive Silica (SiO2)	2019/09/05	<0.50		mg/L	
6314244	SRM	RPD	Reactive Silica (SiO2)	2019/09/05	3.1		%	25
6314251	SRM	Spiked Blank	Colour	2019/09/05		103	%	80 - 120
6314251	SRM	Method Blank	Colour	2019/09/05	<5.0		TCU	
6314251	SRM	RPD	Colour	2019/09/05	NC		%	20
6314253	SRM	Matrix Spike	Orthophosphate (P)	2019/09/06		3.6 (7)	%	80 - 120
6314253	SRM	Spiked Blank	Orthophosphate (P)	2019/09/06		95	%	80 - 120
6314253	SRM	Method Blank	Orthophosphate (P)	2019/09/06	<0.010		mg/L	
6314253	SRM	RPD	Orthophosphate (P)	2019/09/06	NC		%	25
6314269	SRM	Matrix Spike	Nitrate + Nitrite (N)	2019/09/05		NC (7)	%	80 - 120
6314269	SRM	Spiked Blank	Nitrate + Nitrite (N)	2019/09/05		86	%	80 - 120
6314269	SRM	Method Blank	Nitrate + Nitrite (N)	2019/09/05	0.050, RDL=0.050		mg/L	
6314269	SRM	RPD	Nitrate + Nitrite (N)	2019/09/05	1.7 (8)		%	25
6314273	SRM	Matrix Spike	Nitrite (N)	2019/09/05		100	%	80 - 120
6314273	SRM	Spiked Blank	Nitrite (N)	2019/09/05		100	%	80 - 120
6314273	SRM	Method Blank	Nitrite (N)	2019/09/05	<0.010		mg/L	
6314273	SRM	RPD	Nitrite (N)	2019/09/05	NC		%	20
6315942	SRM	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2019/09/06		100	%	80 - 120
6315942	SRM	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2019/09/06		97	%	80 - 120
6315942	SRM	Method Blank	Nitrogen (Ammonia Nitrogen)	2019/09/06	<0.050		mg/L	
6315942	SRM	RPD	Nitrogen (Ammonia Nitrogen)	2019/09/06	NC		%	20
6318254	SRM	Matrix Spike [KQB842-02]	Total Alkalinity (Total as CaCO3)	2019/09/09		NC	%	80 - 120
6318254	SRM	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019/09/09		108	%	80 - 120
6318254	SRM	Method Blank	Total Alkalinity (Total as CaCO3)	2019/09/09	<5.0		mg/L	
6318254	SRM	RPD [KQB842-02]	Total Alkalinity (Total as CaCO3)	2019/09/09	4.1		%	25
6318255	SRM	Matrix Spike [KQB842-02]	Dissolved Chloride (Cl-)	2019/09/10		NC	%	80 - 120
6318255	SRM	Spiked Blank	Dissolved Chloride (Cl-)	2019/09/09		101	%	80 - 120
6318255	SRM	Method Blank	Dissolved Chloride (Cl-)	2019/09/09	<1.0		mg/L	
6318255	SRM	RPD [KQB842-02]	Dissolved Chloride (Cl-)	2019/09/10	0.30		%	25
6318257	SRM	Matrix Spike [KQB842-02]	Dissolved Sulphate (SO4)	2019/09/10		NC	%	80 - 120
6318257	SRM	Spiked Blank	Dissolved Sulphate (SO4)	2019/09/09		108	%	80 - 120
6318257	SRM	Method Blank	Dissolved Sulphate (SO4)	2019/09/09	<2.0		mg/L	
6318257	SRM	RPD [KQB842-02]	Dissolved Sulphate (SO4)	2019/09/10	1.2		%	25
6318259	SRM	Matrix Spike [KQB842-02]	Reactive Silica (SiO2)	2019/09/09		88	%	80 - 120
6318259	SRM	Spiked Blank	Reactive Silica (SiO2)	2019/09/09		99	%	80 - 120
6318259	SRM	Method Blank	Reactive Silica (SiO2)	2019/09/09	<0.50		mg/L	
6318259	SRM	RPD [KQB842-02]	Reactive Silica (SiO2)	2019/09/09	11		%	25
6318271	SRM	Spiked Blank	Colour	2019/09/09		104	%	80 - 120
6318271	SRM	Method Blank	Colour	2019/09/09	<5.0		TCU	

BV Labs Job #: B9N9256
Report Date: 2019/09/11

CBCL Limited
Client Project #: 171046.01

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6318271	SRM	RPD [KQB842-02]	Colour	2019/09/09	5.0		%	20
6318276	SRM	Matrix Spike [KQB842-02]	Orthophosphate (P)	2019/09/09		92	%	80 - 120
6318276	SRM	Spiked Blank	Orthophosphate (P)	2019/09/09		97	%	80 - 120
6318276	SRM	Method Blank	Orthophosphate (P)	2019/09/09	<0.010		mg/L	
6318276	SRM	RPD [KQB842-02]	Orthophosphate (P)	2019/09/09	NC		%	25
6318278	SRM	Matrix Spike [KQB842-02]	Nitrate + Nitrite (N)	2019/09/09		81	%	80 - 120
6318278	SRM	Spiked Blank	Nitrate + Nitrite (N)	2019/09/09		83	%	80 - 120
6318278	SRM	Method Blank	Nitrate + Nitrite (N)	2019/09/09	<0.050		mg/L	
6318278	SRM	RPD [KQB842-02]	Nitrate + Nitrite (N)	2019/09/09	8.7		%	25
6318281	SRM	Matrix Spike [KQB842-02]	Nitrite (N)	2019/09/09		97	%	80 - 120
6318281	SRM	Spiked Blank	Nitrite (N)	2019/09/09		100	%	80 - 120
6318281	SRM	Method Blank	Nitrite (N)	2019/09/09	<0.010		mg/L	
6318281	SRM	RPD [KQB842-02]	Nitrite (N)	2019/09/09	NC		%	20
6318311	SRM	Matrix Spike	Total Alkalinity (Total as CaCO3)	2019/09/09		NC	%	80 - 120
6318311	SRM	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019/09/09		109	%	80 - 120
6318311	SRM	Method Blank	Total Alkalinity (Total as CaCO3)	2019/09/09	<5.0		mg/L	
6318311	SRM	RPD	Total Alkalinity (Total as CaCO3)	2019/09/09	2.5		%	25
6318314	SRM	Matrix Spike	Dissolved Chloride (Cl-)	2019/09/09		NC	%	80 - 120
6318314	SRM	Spiked Blank	Dissolved Chloride (Cl-)	2019/09/09		103	%	80 - 120
6318314	SRM	Method Blank	Dissolved Chloride (Cl-)	2019/09/09	<1.0		mg/L	
6318314	SRM	RPD	Dissolved Chloride (Cl-)	2019/09/09	4.6		%	25
6318315	SRM	Matrix Spike	Dissolved Sulphate (SO4)	2019/09/09		102	%	80 - 120
6318315	SRM	Spiked Blank	Dissolved Sulphate (SO4)	2019/09/09		107	%	80 - 120
6318315	SRM	Method Blank	Dissolved Sulphate (SO4)	2019/09/09	<2.0		mg/L	
6318315	SRM	RPD	Dissolved Sulphate (SO4)	2019/09/09	1.1		%	25
6318320	SRM	Matrix Spike	Reactive Silica (SiO2)	2019/09/09		101	%	80 - 120
6318320	SRM	Spiked Blank	Reactive Silica (SiO2)	2019/09/09		102	%	80 - 120
6318320	SRM	Method Blank	Reactive Silica (SiO2)	2019/09/09	<0.50		mg/L	
6318320	SRM	RPD	Reactive Silica (SiO2)	2019/09/09	3.2		%	25
6318321	SRM	Spiked Blank	Colour	2019/09/09		107	%	80 - 120
6318321	SRM	Method Blank	Colour	2019/09/09	<5.0		TCU	
6318321	SRM	RPD	Colour	2019/09/09	8.2		%	20
6318323	SRM	Matrix Spike	Orthophosphate (P)	2019/09/09		NC	%	80 - 120
6318323	SRM	Spiked Blank	Orthophosphate (P)	2019/09/09		97	%	80 - 120
6318323	SRM	Method Blank	Orthophosphate (P)	2019/09/09	<0.010		mg/L	
6318323	SRM	RPD	Orthophosphate (P)	2019/09/09	1.0		%	25
6318328	SRM	Matrix Spike	Nitrate + Nitrite (N)	2019/09/09		83	%	80 - 120
6318328	SRM	Spiked Blank	Nitrate + Nitrite (N)	2019/09/09		89	%	80 - 120
6318328	SRM	Method Blank	Nitrate + Nitrite (N)	2019/09/09	<0.050		mg/L	
6318328	SRM	RPD	Nitrate + Nitrite (N)	2019/09/09	5.9		%	25
6318329	SRM	Matrix Spike	Nitrite (N)	2019/09/09		94	%	80 - 120
6318329	SRM	Spiked Blank	Nitrite (N)	2019/09/09		100	%	80 - 120
6318329	SRM	Method Blank	Nitrite (N)	2019/09/09	<0.010		mg/L	
6318329	SRM	RPD	Nitrite (N)	2019/09/09	0.53		%	20
6318378	SRM	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2019/09/10		94	%	80 - 120
6318378	SRM	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2019/09/09		104	%	80 - 120
6318378	SRM	Method Blank	Nitrogen (Ammonia Nitrogen)	2019/09/09	<0.050		mg/L	
6318378	SRM	RPD	Nitrogen (Ammonia Nitrogen)	2019/09/10	NC		%	20
6321245	BAN	Matrix Spike	Total Aluminum (Al)	2019/09/09		106	%	80 - 120
			Total Antimony (Sb)	2019/09/09		104	%	80 - 120
			Total Arsenic (As)	2019/09/09		101	%	80 - 120
			Total Barium (Ba)	2019/09/09		102	%	80 - 120
			Total Beryllium (Be)	2019/09/09		101	%	80 - 120
			Total Bismuth (Bi)	2019/09/09		102	%	80 - 120
			Total Boron (B)	2019/09/09		105	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Cadmium (Cd)	2019/09/09		100	%	80 - 120
			Total Calcium (Ca)	2019/09/09		NC	%	80 - 120
			Total Chromium (Cr)	2019/09/09		99	%	80 - 120
			Total Cobalt (Co)	2019/09/09		101	%	80 - 120
			Total Copper (Cu)	2019/09/09		97	%	80 - 120
			Total Iron (Fe)	2019/09/09		104	%	80 - 120
			Total Lead (Pb)	2019/09/09		102	%	80 - 120
			Total Magnesium (Mg)	2019/09/09		109	%	80 - 120
			Total Manganese (Mn)	2019/09/09		101	%	80 - 120
			Total Molybdenum (Mo)	2019/09/09		107	%	80 - 120
			Total Nickel (Ni)	2019/09/09		100	%	80 - 120
			Total Phosphorus (P)	2019/09/09		107	%	80 - 120
			Total Potassium (K)	2019/09/09		105	%	80 - 120
			Total Selenium (Se)	2019/09/09		99	%	80 - 120
			Total Silver (Ag)	2019/09/09		100	%	80 - 120
			Total Sodium (Na)	2019/09/09		103	%	80 - 120
			Total Strontium (Sr)	2019/09/09		102	%	80 - 120
			Total Thallium (Tl)	2019/09/09		103	%	80 - 120
			Total Tin (Sn)	2019/09/09		104	%	80 - 120
			Total Titanium (Ti)	2019/09/09		105	%	80 - 120
			Total Uranium (U)	2019/09/09		106	%	80 - 120
			Total Vanadium (V)	2019/09/09		99	%	80 - 120
			Total Zinc (Zn)	2019/09/09		99	%	80 - 120
6321245	BAN	Spiked Blank	Total Aluminum (Al)	2019/09/09		110	%	80 - 120
			Total Antimony (Sb)	2019/09/09		106	%	80 - 120
			Total Arsenic (As)	2019/09/09		101	%	80 - 120
			Total Barium (Ba)	2019/09/09		104	%	80 - 120
			Total Beryllium (Be)	2019/09/09		102	%	80 - 120
			Total Bismuth (Bi)	2019/09/09		107	%	80 - 120
			Total Boron (B)	2019/09/09		105	%	80 - 120
			Total Cadmium (Cd)	2019/09/09		101	%	80 - 120
			Total Calcium (Ca)	2019/09/09		109	%	80 - 120
			Total Chromium (Cr)	2019/09/09		102	%	80 - 120
			Total Cobalt (Co)	2019/09/09		104	%	80 - 120
			Total Copper (Cu)	2019/09/09		102	%	80 - 120
			Total Iron (Fe)	2019/09/09		108	%	80 - 120
			Total Lead (Pb)	2019/09/09		107	%	80 - 120
			Total Magnesium (Mg)	2019/09/09		113	%	80 - 120
			Total Manganese (Mn)	2019/09/09		106	%	80 - 120
			Total Molybdenum (Mo)	2019/09/09		106	%	80 - 120
			Total Nickel (Ni)	2019/09/09		104	%	80 - 120
			Total Phosphorus (P)	2019/09/09		111	%	80 - 120
			Total Potassium (K)	2019/09/09		110	%	80 - 120
			Total Selenium (Se)	2019/09/09		100	%	80 - 120
			Total Silver (Ag)	2019/09/09		102	%	80 - 120
			Total Sodium (Na)	2019/09/09		107	%	80 - 120
			Total Strontium (Sr)	2019/09/09		105	%	80 - 120
			Total Thallium (Tl)	2019/09/09		107	%	80 - 120
			Total Tin (Sn)	2019/09/09		106	%	80 - 120
			Total Titanium (Ti)	2019/09/09		105	%	80 - 120
			Total Uranium (U)	2019/09/09		109	%	80 - 120
			Total Vanadium (V)	2019/09/09		103	%	80 - 120
			Total Zinc (Zn)	2019/09/09		103	%	80 - 120
6321245	BAN	Method Blank	Total Aluminum (Al)	2019/09/09	<5.0		ug/L	
			Total Antimony (Sb)	2019/09/09	<1.0		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Arsenic (As)	2019/09/09	<1.0		ug/L	
			Total Barium (Ba)	2019/09/09	<1.0		ug/L	
			Total Beryllium (Be)	2019/09/09	<1.0		ug/L	
			Total Bismuth (Bi)	2019/09/09	<2.0		ug/L	
			Total Boron (B)	2019/09/09	<50		ug/L	
			Total Cadmium (Cd)	2019/09/09	<0.010		ug/L	
			Total Calcium (Ca)	2019/09/09	<100		ug/L	
			Total Chromium (Cr)	2019/09/09	<1.0		ug/L	
			Total Cobalt (Co)	2019/09/09	<0.40		ug/L	
			Total Copper (Cu)	2019/09/09	<0.50		ug/L	
			Total Iron (Fe)	2019/09/09	<50		ug/L	
			Total Lead (Pb)	2019/09/09	<0.50		ug/L	
			Total Magnesium (Mg)	2019/09/09	<100		ug/L	
			Total Manganese (Mn)	2019/09/09	<2.0		ug/L	
			Total Molybdenum (Mo)	2019/09/09	<2.0		ug/L	
			Total Nickel (Ni)	2019/09/09	<2.0		ug/L	
			Total Phosphorus (P)	2019/09/09	<100		ug/L	
			Total Potassium (K)	2019/09/09	<100		ug/L	
			Total Selenium (Se)	2019/09/09	<0.50		ug/L	
			Total Silver (Ag)	2019/09/09	<0.10		ug/L	
			Total Sodium (Na)	2019/09/09	<100		ug/L	
			Total Strontium (Sr)	2019/09/09	<2.0		ug/L	
			Total Thallium (Tl)	2019/09/09	<0.10		ug/L	
			Total Tin (Sn)	2019/09/09	<2.0		ug/L	
			Total Titanium (Ti)	2019/09/09	<2.0		ug/L	
			Total Uranium (U)	2019/09/09	<0.10		ug/L	
			Total Vanadium (V)	2019/09/09	<2.0		ug/L	
			Total Zinc (Zn)	2019/09/09	<5.0		ug/L	
6321245	BAN	RPD	Total Aluminum (Al)	2019/09/09	NC		%	20
			Total Antimony (Sb)	2019/09/09	NC		%	20
			Total Arsenic (As)	2019/09/09	NC		%	20
			Total Barium (Ba)	2019/09/09	3.1		%	20
			Total Beryllium (Be)	2019/09/09	NC		%	20
			Total Bismuth (Bi)	2019/09/09	NC		%	20
			Total Boron (B)	2019/09/09	NC		%	20
			Total Cadmium (Cd)	2019/09/09	NC		%	20
			Total Calcium (Ca)	2019/09/09	3.3		%	20
			Total Chromium (Cr)	2019/09/09	6.0		%	20
			Total Cobalt (Co)	2019/09/09	NC		%	20
			Total Copper (Cu)	2019/09/09	0.60		%	20
			Total Iron (Fe)	2019/09/09	NC		%	20
			Total Lead (Pb)	2019/09/09	2.9		%	20
			Total Magnesium (Mg)	2019/09/09	2.6		%	20
			Total Manganese (Mn)	2019/09/09	NC		%	20
			Total Molybdenum (Mo)	2019/09/09	NC		%	20
			Total Nickel (Ni)	2019/09/09	NC		%	20
			Total Phosphorus (P)	2019/09/09	NC		%	20
			Total Potassium (K)	2019/09/09	2.6		%	20
			Total Selenium (Se)	2019/09/09	NC		%	20
			Total Silver (Ag)	2019/09/09	NC		%	20
			Total Sodium (Na)	2019/09/09	1.9		%	20
			Total Strontium (Sr)	2019/09/09	1.1		%	20
			Total Thallium (Tl)	2019/09/09	NC		%	20
			Total Tin (Sn)	2019/09/09	NC		%	20
			Total Titanium (Ti)	2019/09/09	NC		%	20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Uranium (U)	2019/09/09	5.9		%	20
			Total Vanadium (V)	2019/09/09	NC		%	20
			Total Zinc (Zn)	2019/09/09	0.58		%	20
6321609	EMT	Matrix Spike	Total Organic Carbon (C)	2019/09/10		95	%	85 - 115
6321609	EMT	Spiked Blank	Total Organic Carbon (C)	2019/09/09		93	%	80 - 120
6321609	EMT	Method Blank	Total Organic Carbon (C)	2019/09/09	<0.50		mg/L	
6321609	EMT	RPD	Total Organic Carbon (C)	2019/09/10	0.96		%	15
6323353	BBD	QC Standard	Salinity	2019/09/10		101	%	80 - 120
6323353	BBD	Method Blank	Salinity	2019/09/10	<2.0		N/A	
6323353	BBD	RPD [KQB843-02]	Salinity	2019/09/10	0		%	25
6325628	BBD	QC Standard	Salinity	2019/09/11		100	%	80 - 120
6325628	BBD	Method Blank	Salinity	2019/09/11	<2.0		N/A	
6325628	BBD	RPD [KQB845-02]	Salinity	2019/09/11	0		%	25

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) CBOD Analysis: Reference material and second source recovery high.

(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(3) CBOD Analysis: second source recovery high.

(4) Elevated blank results due to low level contamination.

(5) Elevated reporting limit due to blank performance.

(6) Elevated blank result due to low level contamination.

(7) Poor spike recovery due to sample matrix.

(8) Elevated reporting limit due to method blank performance.

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Anastassia Hamanov, Scientific Specialist

Eric Dearman, Scientific Specialist

Mike MacGillivray, Scientific Specialist (Inorganics)

Robyn Edwards, Bedford Micro Supervisor

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

Department of Oceanography
1355 Oxford St
Halifax, NS
B3H 4R2

Determination of chlorophyll a by fluorescence

Client: Bureau Veritas Laboratories, 200 Bluewater Road, Bedford, NS, B4B 1G9

Attention: Keri Mackay **Received:** 2019-08-28 & 29

Project #: B9N9256 **Completed:** 2019-08-30

Hugh MacIntyre, Ph.D.

Chl *a* (chlorophyll *a*; µg L-1) determined by the acidification method (Holm-Hansen et al., 1965). Estimates made with the non-acidification method (Welschmeyer, 1994) are shown for comparison. The non-acidification method is considered more reliable than the acidification method in correcting for bias due to the contributions of chlorophyll *b* and chlorophyll degradation products.

Holm-Hansen O, Lorenzen CJ, Holmes RW, Strickland JDH (1965) Fluorometric determination of chlorophyll. J Conseil 30:3-15

Welschmeyer NA (1994) Fluorometric analysis of chlorophyll *a* in the presence of chlorophyll *b* and phaeopigments. Limnol Oceanogr 39:1985-1992

Contractor ID	Client ID	Chl *a* (acidification)	Chl *a* (non-acidification)
KQB840-03R	AR-6	2.16	2.63
KQB841-03R	AVE-9	15.3	15.7
KQB842-03R	AVE-1	46.5	56.6
KQB845-03R	AVE-4	78	86.9
KQB848-03R	AR-16	2.15	2.17
KQB851-03R	AR-1	1.72	2.02

Bureau Veritas Laboratories
200 Bluewater Road, Bedford, Nova Scotia Canada B4B 1G9 Tel:(902) 420-0203 Toll-free:800-563-6266 Fax:(902) 420-8612 www.bvlabs.com

Chain Of Custody Record

INVOICE TO:		Report Information		Project Information	
Company Name	#41018 CBCL Limited	Company Name		Quotation #	B91310
Contact Name	ACCOUNTS PAYABLE	Contact Name	Melissa Rutherford	P.O. #	
Address	1505 Barrington Street Suite 901 / PO Box 606	Address		Project #	171046.01
	Halifax NS B3J 3Y6			Project Name	
Phone	(902) 421-7241 Fax: (902) 423-3938	Phone	Fax:	Site #	
Email	acct@cbcl.ca	Email	mrutherford@cbcl.ca, cmcvarish@cbcl.ca	Sampled By	

Laboratory Use Only

BV Labs Job #	Bottle Order #:
B9N9256	733248
Chain Of Custody Record	Project Manager
C#733248-01-01	Keri Mackay

Regulatory Criteria:

Special Instructions

** Specify Matrix: Surface/Ground/Tapwater/Sewage/Effluent/Seawater Potable/Nonpotable/Tissue/Soil/Sludge/Metal

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: ☑
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: Time Required: ☐

SAMPLES MUST BE KEPT COOL (< 10ºC) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered & Preserved	Lab Filtration Required	Atlantic RCAp-MS Total Metals in Water	Low Level Total Phosphrous	Total coliform (CFU/100mL) in water	Fecal coliform in water (CFU/100 mL)	Carbonaceous BOD	Chlorophyll A (Sub from Bedford)	TSS	Salinity			# of Bottles	Comments / Hazards / Other Required Analysis
1	AR-4	.	27 Aug 19	11:25	Water			~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	✓	✓			2	No RCAp-MS, phosphorus, coliforms or BOD for this sample. Only TSS & Salinity
2	AR-6	.	"	12:05	"			x	x	x	x	x	x	✓	✓			8	Hold BOD until Thurs Aug 29 for analysis
3	AVE-9	.	"	13:05	"			x	x	x	x	x	x	✓	✓			8	Hold BOD " " " " "
4	AVE-1	.	"	13:45	"			~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	✓	✓			2	Only TSS & Salinity
5	AVE-7	.	"	14:35	"			~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	✓	✓			2	Only TSS & Salinity
6	AVE-8	.	"	15:10	"			~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	✓	✓			2	Only TSS & Salinity
7	AVE-4	.	"	16:08	"			~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	✓	✓			2	Only TSS & Salinity
8	AVE-2	.	"	17:05	"			~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	✓	✓			2	Only TSS & Salinity
9	AR-14	.	"	18:05	"			~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	✓	✓			2	Only TSS & Salinity
10	AR-15	.	"	18:29	"			~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	✓	✓			2	Only TSS & Salinity

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Colin McVarish	19/08/27	22:14	[signature]			
[signature]						

Lab Use Only 2019 AUG 28 9:06

Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
☐	0,1,5/-1,0,8	☐ Yes ☐ No

White: BV Labs Yellow: Client

Bureau Veritas Laboratories
200 Bluewater Road, Bedford, Nova Scotia Canada B4B 1G9 Tel:(902) 420-0203 Toll-free:800-563-6266 Fax:(902) 420-8612 www.bvlabs.com

Chain Of Custody Record

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#41018 CBCL Limited	Company Name		Quotation #	B91310	BV Labs Job #	Bottle Order #:
Contact Name	ACCOUNTS PAYABLE	Contact Name	Melissa Rutherford	P.O. #		B9N9256	733248
Address	1505 Barrington Street Suite 901 / PO Box 606	Address		Project #	171046.01	Chain Of Custody Record	Project Manager
	Halifax NS B3J 3Y6			Project Name		C#733248-02-01	Keri Mackay
Phone	(902) 421-7241 Fax: (902) 423-3938	Phone	Fax:	Site #			
Email	acct@cbcl.ca	Email	mrutherford@cbcl.ca, cmcvarish@cbcl.ca	Sampled By			

Regulatory Criteria:

** Specify Matrix: Surface/Ground/Tapwater/Sewage/Effluent/Seawater Potable/Nonpotable/Tissue/Soil/Sludge/Metal

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: ☑
(will be applied if Rush TAT is not specified):
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Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: Time Required: ☐

#	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered & Preserved	Lab Filtration Required	Atlantic RCAp-MS Total Metals in Water	Low Level Total Phosphrous	Total coliform (CFU/100mL) in water	Fecal coliform in water (CFU/100 mL)	Carbonaceous BOD	Chlorophyll A (Sub from Bedford)	TSS	Salinity			# of Bottles	Comments / Hazards / Other Required Analysis
1	AR-16		27Aug'19	19:03	Water			X	X	X	X	X	X	✓	✓			8	Hold BOD until Thurs Aug 29 for analysis
2	AR-4B		"	19:40	"									✓	✓			2	
3	AR-3		"	20:08	"			✓	✓	✓	✓	✓	✓	✓	✓			8	Hold BOD " " " " " " "
4	AR-2		"	20:30	"									✓	✓			2	Only TSS & Salinity
5	AR-1		"	20:40	"			✓	✓	✓	✓	✓	✓	✓	✓			8	Hold BOD " " " " " " "
6																			
7																			
8																			
9																			2019 AUG 28 9:0
10																			

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
Colin McVarish [signature]	19/08/27	22:14	[signature]				☐	0,1,3/-1,0,0	☐ Yes ☐ No

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: BV Labs Yellow: Client

BV Labs Job Number: B9N9256
Report Date: 2019/09/11

CBCL Limited
Client Project #: 171046.01

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		KQB840			KQB840			KQB841			KQB841			KQB842			KQB842			KQB845			KQB848			KQB848			KQB851		
Sampling Date		2019-08-27 12:05			2019-08-27 12:05			2019-08-27 13:05			2019-08-27 13:05			2019-08-27 13:45			2019-08-27 13:45			2019-08-27 16:08			2019-08-27 19:03			2019-08-27 19:03			2019-08-27 20:40		
COC Number		733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01		
	UNITS	**AR-6**	**RDL**	**QC Batch**	**AR-6 Lab-Dup**	**RDL**	**QC Batch**	**AVE-9**	**RDL**	**QC Batch**	**AVE-9 Lab-Dup**	**RDL**	**QC Batch**	**AVE-1**	**RDL**	**QC Batch**	**AVE-1 Lab-Dup**	**RDL**	**QC Batch**	**AVE-4**	**RDL**	**QC Batch**	**AR-16**	**RDL**	**QC Batch**	**AR-16 Lab-Dup**	**RDL**	**QC Batch**	**AR-1**	**RDL**	**QC Batch**
Calculated Parameters																															
Anion Sum	me/L	1.25	N/A	6303630				219	N/A	6303630				482	N/A	6303630				267	N/A	6303630	0.400	N/A	6303630				1.27	N/A	6303630
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	14	1.0	6303626				73	1.0	6303626				97	1.0	6303626				91	1.0	6303626	5.4	1.0	6303626				14	1.0	6303626
Calculated TDS	mg/L	76	1.0	6303640				15000	1.0	6303640				28000	1.0	6303640				18000	1.0	6303640	27	1.0	6303640				78	1.0	6303640
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	6303626				<1.0	1.0	6303626				<1.0	1.0	6303626				<1.0	1.0	6303626	<1.0	1.0	6303626				<1.0	1.0	6303626
Cation Sum	me/L	1.17	N/A	6303630				303	N/A	6303630				508	N/A	6303630				371	N/A	6303630	0.450	N/A	6303630				1.26	N/A	6303630
Hardness (CaCO3)	mg/L	35	1.0	6303628				3200	1.0	6303628				5500	1.0	6303628				4100	1.0	6303628	9.8	1.0	6303628				37	1.0	6303628
Ion Balance (% Difference)	%	3.31	N/A	6303629				16.2	N/A	6303629				2.60	N/A	6303629				16.3	N/A	6303629	5.88	N/A	6303629				0.400	N/A	6303629
Langelier Index (@ 20C)	N/A	-1.84		6303636				-0.151		6303636				0.499		6303636				0.0400		6303636	-3.33		6303636				-1.75		6303636
Langelier Index (@ 4C)	N/A	-2.09		6303638				-0.388		6303638				0.260		6303638				-0.197		6303638	-3.58		6303638				-2.01		6303638
Nitrate (N)	mg/L	0.066	0.055	6303632				<0.060	0.060	6303632				<0.050	0.050	6304669				0.12	0.050	6304669	<0.055	0.055	6303632				0.058	0.055	6303632
Saturation pH (@ 20C)	N/A	9.11		6303636				7.71		6303636				7.30		6303636				7.48		6303636	10.1		6303636				9.09		6303636
Saturation pH (@ 4C)	N/A	9.36		6303638				7.94		6303638				7.53		6303638				7.72		6303638	10.3		6303638				9.34		6303638
Inorganics																															
Total Alkalinity (Total as CaCO3)	mg/L	14	5.0	6314232				73	5.0	6312388	74	5.0	6312388	97	5.0	6318254	94	5.0	6318254	92	5.0	6318311	5.4	5.0	6314232				14	5.0	6314232
Dissolved Chloride (Cl-)	mg/L	16	1.0	6314235				6800	100	6312387	7200	100	6312387	16000	500	6318255	16000	500	6318255	8300	100	6318314	6.0	1.0	6314235				17	1.0	6314235
Colour	TCU	55	25	6314251				24	5.0	6312350	21	5.0	6312350	9.4	5.0	6318271	9.9	5.0	6318271	25	5.0	6318321	75	25	6314251				52	25	6314251
Nitrate + Nitrite (N)	mg/L	0.066 (1)	0.055	6314269				<0.060 (2)	0.060	6312336	0.065 (2)	0.060	6312336	<0.050	0.050	6318278	0.055	0.050	6318278	0.12	0.050	6318328	<0.055 (1)	0.055	6314269				0.058 (1)	0.055	6314269
Nitrite (N)	mg/L	<0.010	0.010	6314273				<0.010	0.010	6312341	<0.010	0.010	6312341	<0.010	0.010	6318281	<0.010	0.010	6318281	<0.010	0.010	6318329	<0.010	0.010	6314273				<0.010	0.010	6314273
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	0.050	6315942				0.16	0.050	6315942				<0.050	0.050	6318378				0.15	0.050	6318378	0.052	0.050	6315942				0.059	0.050	6315942
Total Organic Carbon (C)	mg/L	6.7	0.50	6313841				5.5 (3)	5.0	6313837				<5.0 (3)	5.0	6321609				13 (3)	5.0	6321609	6.7	0.50	6313841	6.7	0.50	6313841	6.8	0.50	6313841
Orthophosphate (P)	mg/L	<0.010	0.010	6314253				<0.010	0.010	6312343	<0.010	0.010	6312343	<0.010	0.010	6318276	<0.010	0.010	6318276	<0.010	0.010	6318323	0.020	0.010	6314253				<0.010	0.010	6314253
pH	pH	7.27	N/A	6306091				7.55	N/A	6306091				7.79	N/A	6311558				7.52	N/A	6311558	6.75	N/A	6306091				7.34	N/A	6306091
Reactive Silica (SiO2)	mg/L	1.8	0.50	6314244				1.9 (2)	0.67	6312383	2.0 (2)	0.67	6312383	1.0	0.50	6318259	0.91	0.50	6318259	2.4	0.50	6318320	1.8	0.50	6314244				1.7	0.50	6314244
Dissolved Sulphate (SO4)	mg/L	25	2.0	6314240				1200	40	6312385	1200	40	6312385	2000	40	6318257	2000	40	6318257	1600	40	6318315	6.0	2.0	6314240				25	2.0	6314240
Turbidity	NTU	6.3	0.10	6306179	6.2	0.10	6306179	360	1.0	6306179				280	1.0	6308546	280	1.0	6308546	>1000	1.0	6308546	4.2	0.10	6306179				3.3	0.10	6306186
Conductivity	uS/cm	140	1.0	6306095				29000	1.0	6306095				43000	1.0	6311560				33000	1.0	6311560	46	1.0	6306095				140	1.0	6306095
Metals																															
Total Aluminum (Al)	ug/L	200	5.0	6305955				11000	50	6321245				9400	50	6305955				31000	50	6305955	270	5.0	6305955				140	5.0	6305955
Total Antimony (Sb)	ug/L	<1.0	1.0	6305955				<10	10	6321245				<10	10	6305955				<10	10	6305955	<1.0	1.0	6305955				<1.0	1.0	6305955
Total Arsenic (As)	ug/L	1.5	1.0	6305955				<10	10	6321245				<10	10	6305955				19	10	6305955	1.3	1.0	6305955				1.4	1.0	6305955
Total Barium (Ba)	ug/L	12	1.0	6305955				54	10	6321245				59	10	6305955				110	10	6305955	7.8	1.0	6305955				11	1.0	6305955
Total Beryllium (Be)	ug/L	<1.0	1.0	6305955				<10	10	6321245				<10	10	6305955				<10	10	6305955	<1.0	1.0	6305955				<1.0	1.0	6305955
Total Bismuth (Bi)	ug/L	<2.0	2.0	6305955				<20	20	6321245				<20	20	6305955				<20	20	6305955	<2.0	2.0	6305955				<2.0	2.0	6305955
Total Boron (B)	ug/L	<50	50	6305955				2300	500	6321245				4200	500	6305955				3100	500	6305955	<50	50	6305955				<50	50	6305955
Total Cadmium (Cd)	ug/L	0.013	0.010	6305955				<0.10	0.10	6321245				0.10	0.10	6305955				0.13	0.10	6305955	0.018	0.010	6305955				<0.010	0.010	6305955
Total Calcium (Ca)	ug/L	12000	100	6305955				220000	1000	6321245				360000	1000	6305955				290000	1000	6305955	3000	100	6305955				12000	100	6305955
Total Chromium (Cr)	ug/L	1.1	1.0	6305955				14	10	6321245				14	10	6305955				48	10	6305955	<1.0	1.0	6305955				1.1	1.0	6305955
Total Cobalt (Co)	ug/L	<0.40	0.40	6305955				4.5	4.0	6321245				7.9	4.0	6305955				27	4.0	6305955	<0.40	0.40	6305955				<0.40	0.40	6305955
Total Copper (Cu)	ug/L	0.69	0.50	6305955				5.1	5.0	6321245				9.9	5.0	6305955				34	5.0	6305955	1.0	0.50	6305955				2.0	0.50	6305955
Total Iron (Fe)	ug/L	480	50	6305955				9900	500	6321245				15000	500	6305955				49000	500	6305955	470	50	6305955				370	50	6305955
Total Lead (Pb)	ug/L	<0.50	0.50	6305955				7.1	5.0	6321245				10	5.0	6305955				37	5.0	6305955	<0.50	0.50	6305955				<0.50	0.50	6305955
Total Magnesium (Mg)	ug/L	1400	100	6305955				660000	1000	6321245				1100000	1000	6305955				810000	1000	6305955	560	100	6305955				1600	100	6305955
Total Manganese (Mn)	ug/L	87	2.0	6305955				500	20	6321245				750	20	6305955				2700	20	6305955	44	2.0	6305955				32	2.0	6305955
Total Molybdenum (Mo)	ug/L	<2.0	2.0	6305955				<20	20	6321245				<20	20	6305955				<20	20	6305955	<2.0	2.0	6305955				<2.0	2.0	6305955
Total Nickel (Ni)	ug/L	<2.0	2.0	6305955				<20	20	6321245				<20	20	6305955				52	20	6305955	<2.0	2.0	6305955				<2.0	2.0	6305955
Total Phosphorus (P)	ug/L	<100	100	6305955				<1000	1000	6321245				<1000	1000	6305955				1500	1000	6305955	<100	100	6305955				<100	100	6305955
Total Potassium (K)	ug/L	740	100	6305955				200000	1000	6321245				330000	1000	6305955				250000	1000	6305955	500	100	6305955				840	100	6305955
Total Selenium (Se)	ug/L	<0.50	0.50	6305955				<5.0	5.0	6321245				<5.0	5.0	6305955				<5.0	5.0	6305955	<0.50	0.50	6305955				<0.50	0.50	6305955
Total Silver (Ag)	ug/L	<0.10	0.10	6305955				<1.0	1.0	6321245				<1.0	1.0	6305955				<1.0	1.0	6305955	<0.10	0.10	6305955				<0.10	0.10	6305955
Total Sodium (Na)	ug/L	9900	100	6305955				5400000	1000	6321245				9000000	1000	6305955				6500000	1000	6305955	5000	100	6305955				11000	100	6305955
Total Strontium (Sr)	ug/L	82	2.0	6305955				3900	20	6321245				6500	20	6305955				5000	20	6305955	21	2.0	6305955				86	2.0	6305955
Total Thallium (Tl)	ug/L	<0.10	0.10	6305955				<1.0	1.0	6321245				<1.0	1.0	6305955				<1.0	1.0	6305955	<0.10	0.10	6305955				<0.10	0.10	6305955
Total Tin (Sn)	ug/L	<2.0	2.0	6305955				<20	20	6321245				<20	20	6305955				<20	20	6305955	<2.0	2.0	6305955				<2.0	2.0	6305955
Total Titanium (Ti)	ug/L	4.3	2.0	6305955				250	20	6321245				210	20	6305955				450	20	6305955	4.2	2.0	6305955				3.1	2.0	6305955
Total Uranium (U)	ug/L	0.24	0.10	6305955				2.0	1.0	6321245				3.1	1.0	6305955				3.3	1.0	6305955	0.27	0.10	6305955				0.20	0.10	6305955
Total Vanadium (V)	ug/L	<2.0	2.0	6305955				22	20	6321245				31	20	6305955				85	20	6305955	<2.0	2.0	6305955				<2.0	2.0	6305955
Total Zinc (Zn)	ug/L	<5.0	5.0	6305955				<50	50	6321245				<50	50	6305955				150	50	6305955	6.6	5.0	6305955				<5.0	5.0	6305955

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated reporting limit due to method blank performance.
(2) Elevated reporting limit due to blank performance.
(3) Elevated reporting limit due to turbidity.

Results relate only to the items tested.

CBCL Limited
Client Project #: 171046.01

BV Labs Job Number: B9N9256
Report Date: 2019/09/11

RESULTS OF ANALYSES OF WATER

BV Labs ID		KQB839			KQB840			KQB840			KQB841			KQB842			KQB842			KQB843			KQB843			KQB844	
Sampling Date		2019-08-27 11:25			2019-08-27 12:05			2019-08-27 12:05			2019-08-27 13:05			2019-08-27 13:45			2019-08-27 13:45			2019-08-27 14:35			2019-08-27 14:35			2019-08-27 15:10	
COC Number		733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01	
	UNITS	**AR-4**	**RDL**	**QC Batch**	**AR-6**	**RDL**	**QC Batch**	**AR-6 Lab-Dup**	**RDL**	**QC Batch**	**AVE-9**	**RDL**	**QC Batch**	**AVE-1**	**RDL**	**QC Batch**	**AVE-1 Lab-Dup**	**RDL**	**QC Batch**	**AVE-7**	**RDL**	**QC Batch**	**AVE-7 Lab-Dup**	**RDL**	**QC Batch**	**AVE-8**	**RDL**
Inorganics																											
Carbonaceous BOD	mg/L				4.3	3.1	6304039				5.0	3.1	6304039	<5.0	5.0	6306476											
Total Phosphorus	mg/L				0.034	0.004	6307899	0.035	0.004	6307899	0.29	0.02	6312886	0.7	0.1	6313967											
Salinity	N/A	<2.0	2.0	6313681	<2.0	2.0	6313681				17	2.0	6313681	27	2.0	6313681				24	2.0	6323353	24	2.0	6323353	<2.0	2.0
Total Suspended Solids	mg/L	3.0	1.0	6312107	2.9	2.1	6312107				300	5.0	6312107	310	10	6312107	310	10	6312107	360	10	6312107				690	10
Subcontracted Analysis																											
Subcontract Parameter	N/A				ATTACHED	N/A	6308857				ATTACHED	N/A	6308857	ATTACHED	N/A	6308857											

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Results relate only to the items tested.

CBCL Limited
Client Project #: 171046.01

BV Labs Job Number: B9N9256
Report Date: 2019/09/11

RESULTS OF ANALYSES OF WATER

BV Labs ID		KQB839				KQB845			KQB845			KQB846	KQB847			KQB848			KQB849		KQB850			KQB851		
Sampling Date		2019-08-27 11:25				2019-08-27 16:08			2019-08-27 16:08			2019-08-27 18:05	2019-08-27 18:29			2019-08-27 19:03			2019-08-27 19:40		2019-08-27 20:30			2019-08-27 20:40		
COC Number		733248-01-01				733248-01-01			733248-01-01			733248-01-01	733248-01-01			733248-01-01			733248-01-01		733248-01-01			733248-01-01		
	UNITS	**AR-4**	**RDL**	**QC Batch**	**QC Batch**	**AVE-4**	**RDL**	**QC Batch**	**AVE-4 Lab-Dup**	**RDL**	**QC Batch**	**AR-14**	**AR-15**	**RDL**	**QC Batch**	**AR-16**	**RDL**	**QC Batch**	**AR-4B**	**RDL**	**AR-2**	**RDL**	**QC Batch**	**AR-1**	**RDL**	**QC Batch**
Inorganics																										
Carbonaceous BOD	mg/L					16	3.1	6306476								4.1	3.1	6304039						3.3	3.1	6304039
Total Phosphorus	mg/L					1.5	0.1	6313967								0.027	0.004	6312886						0.025	0.004	6312886
Salinity	N/A	<2.0	2.0	6313681	6323353	21	2.0	6325628	21	2.0	6325628	<2.0	<2.0	2.0	6323353	<2.0	2.0	6323353	<2.0	2.0	<2.0	2.0	6323353	<2.0	2.0	6323353
Total Suspended Solids	mg/L	3.0	1.0	6312107	6312406	3000	10	6312406				120	18	5.0	6312406	4.3	2.1	6312406	310	10	4.0	2.0	6312406	<2.1	2.1	6312406
Subcontracted Analysis																										
Subcontract Parameter	N/A					ATTACHED	N/A	6308857								ATTACHED	N/A	6308857						ATTACHED	N/A	6308857

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Results relate only to the items tested.

BV Labs Job Number: B9N9256
Report Date: 2019/09/11

CBCL Limited
Client Project #: 171046.01

MICROBIOLOGY (WATER)

BV Labs ID		KQB840		KQB841		KQB842	KQB845			KQB848	KQB851		
Sampling Date		2019-08-27 12:05		2019-08-27 13:05		2019-08-27 13:45	2019-08-27 16:08			2019-08-27 19:03	2019-08-27 20:40		
COC Number		733248-01-01		733248-01-01		733248-01-01	733248-01-01			733248-01-01	733248-01-01		
	UNITS	**AR-6**	**RDL**	**AVE-9**	**QC Batch**	**AVE-1**	**AVE-4**	**RDL**	**QC Batch**	**AR-16**	**AR-1**	**RDL**	**QC Batch**
Microbiological													
Fecal coliform	CFU/100mL	30	10	<100	6303862	<100	<100	100	6304779	30	10	10	6303862
Total Coliforms	CFU/100mL	370	10	800	6303864	<100	400	100	6304768	150	2000	10	6303864

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Results relate only to the items tested.

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Each tempera	Each tempera	Each tempera	Each temperature is the average of up to three cooler temperatures taken at receipt
Package 1	2.0°C	#N/A	#N/A
Package 2	-0.3°C	#N/A	#N/A

Samples AVE-1 and AVE-4 were analyzed past hold time for Coliform and Fecal Coliform testing.

Sample KQB841 [AVE-9] : Elevated reporting limits for trace metals due to sample matrix.

Poor RCAp Ion Balance due to sample matrix. Excess cations due to presence of turbidity.

Sample KQB842 [AVE-1] : Elevated reporting limits for trace metals due to sample matrix.

Sample KQB845 [AVE-4] : Elevated reporting limits for trace metals due to sample matrix.

Poor RCAp Ion Balance due to sample matrix. Excess cations due to presence of turbidity.

Sample KQB848 [AR-16] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample KQB851 [AR-1] : TSS:Used all of the sample provided, DL raised.

Results relate only to the items tested.

CBCL Limited
Attention: Melissa Rutherford
Client Project #: 171046.01

Report Date: 2019/09/11

Quality Assurance Report
BV Labs Job Number: B9N9256

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6303862	KBO	Method Blank	Fecal coliform	2019-08-28	<1.0		CFU/100mL	
6303864	KBO	Method Blank	Total Coliforms	2019-08-28	<1.0		CFU/100mL	
6304039	EBR	QC Standard	Carbonaceous BOD	2019-09-03		130 (1)	%	80 - 120
6304039	EBR	Spiked Blank	Carbonaceous BOD	2019-09-03		127 (2)	%	80 - 120
6304039	EBR	Method Blank	Carbonaceous BOD	2019-09-03	<2.0		mg/L	
6304039	EBR	RPD	Carbonaceous BOD	2019-09-03	NC		%	25
6304768	SDN	Method Blank	Total Coliforms	2019-08-28	<1.0		CFU/100mL	
6304779	SDN	Method Blank	Fecal coliform	2019-08-28	<1.0		CFU/100mL	
6305955	BAN	Matrix Spike	Total Aluminum (Al)	2019-08-30		98	%	80 - 120
			Total Antimony (Sb)	2019-08-30		103	%	80 - 120
			Total Arsenic (As)	2019-08-30		99	%	80 - 120
			Total Barium (Ba)	2019-08-30		100	%	80 - 120
			Total Beryllium (Be)	2019-08-30		103	%	80 - 120
			Total Bismuth (Bi)	2019-08-30		101	%	80 - 120
			Total Boron (B)	2019-08-30		104	%	80 - 120
			Total Cadmium (Cd)	2019-08-30		97	%	80 - 120
			Total Calcium (Ca)	2019-08-30		102	%	80 - 120
			Total Chromium (Cr)	2019-08-30		97	%	80 - 120
			Total Cobalt (Co)	2019-08-30		97	%	80 - 120
			Total Copper (Cu)	2019-08-30		97	%	80 - 120
			Total Iron (Fe)	2019-08-30		99	%	80 - 120
			Total Lead (Pb)	2019-08-30		99	%	80 - 120
			Total Magnesium (Mg)	2019-08-30		103	%	80 - 120
			Total Manganese (Mn)	2019-08-30		98	%	80 - 120
			Total Molybdenum (Mo)	2019-08-30		102	%	80 - 120
			Total Nickel (Ni)	2019-08-30		98	%	80 - 120
			Total Phosphorus (P)	2019-08-30		101	%	80 - 120
			Total Potassium (K)	2019-08-30		101	%	80 - 120
			Total Selenium (Se)	2019-08-30		97	%	80 - 120
			Total Silver (Ag)	2019-08-30		98	%	80 - 120
			Total Sodium (Na)	2019-08-30		NC	%	80 - 120
			Total Strontium (Sr)	2019-08-30		99	%	80 - 120
			Total Thallium (Tl)	2019-08-30		102	%	80 - 120
			Total Tin (Sn)	2019-08-30		105	%	80 - 120
			Total Titanium (Ti)	2019-08-30		100	%	80 - 120
			Total Uranium (U)	2019-08-30		104	%	80 - 120
			Total Vanadium (V)	2019-08-30		102	%	80 - 120
			Total Zinc (Zn)	2019-08-30		97	%	80 - 120
6305955	BAN	Spiked Blank	Total Aluminum (Al)	2019-08-30		98	%	80 - 120
			Total Antimony (Sb)	2019-08-30		100	%	80 - 120
			Total Arsenic (As)	2019-08-30		97	%	80 - 120
			Total Barium (Ba)	2019-08-30		99	%	80 - 120
			Total Beryllium (Be)	2019-08-30		102	%	80 - 120
			Total Bismuth (Bi)	2019-08-30		101	%	80 - 120
			Total Boron (B)	2019-08-30		103	%	80 - 120
			Total Cadmium (Cd)	2019-08-30		96	%	80 - 120
			Total Calcium (Ca)	2019-08-30		101	%	80 - 120
			Total Chromium (Cr)	2019-08-30		97	%	80 - 120
			Total Cobalt (Co)	2019-08-30		98	%	80 - 120
			Total Copper (Cu)	2019-08-30		98	%	80 - 120
			Total Iron (Fe)	2019-08-30		98	%	80 - 120
			Total Lead (Pb)	2019-08-30		99	%	80 - 120
			Total Magnesium (Mg)	2019-08-30		102	%	80 - 120
			Total Manganese (Mn)	2019-08-30		100	%	80 - 120
			Total Molybdenum (Mo)	2019-08-30		101	%	80 - 120
			Total Nickel (Ni)	2019-08-30		101	%	80 - 120
			Total Phosphorus (P)	2019-08-30		100	%	80 - 120
			Total Potassium (K)	2019-08-30		99	%	80 - 120
			Total Selenium (Se)	2019-08-30		97	%	80 - 120
			Total Silver (Ag)	2019-08-30		96	%	80 - 120

Report Date: 2019/09/11

CBCL Limited
Attention: Melissa Rutherford
Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9N9256

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Sodium (Na)	2019-08-30		95	%	80 - 120
			Total Strontium (Sr)	2019-08-30		100	%	80 - 120
			Total Thallium (Tl)	2019-08-30		101	%	80 - 120
			Total Tin (Sn)	2019-08-30		101	%	80 - 120
			Total Titanium (Ti)	2019-08-30		104	%	80 - 120
			Total Uranium (U)	2019-08-30		103	%	80 - 120
			Total Vanadium (V)	2019-08-30		100	%	80 - 120
			Total Zinc (Zn)	2019-08-30		96	%	80 - 120
6305955	BAN	Method Blank	Total Aluminum (Al)	2019-08-30	<5.0		ug/L	
			Total Antimony (Sb)	2019-08-30	<1.0		ug/L	
			Total Arsenic (As)	2019-08-30	<1.0		ug/L	
			Total Barium (Ba)	2019-08-30	<1.0		ug/L	
			Total Beryllium (Be)	2019-08-30	<1.0		ug/L	
			Total Bismuth (Bi)	2019-08-30	<2.0		ug/L	
			Total Boron (B)	2019-08-30	<50		ug/L	
			Total Cadmium (Cd)	2019-08-30	<0.010		ug/L	
			Total Calcium (Ca)	2019-08-30	<100		ug/L	
			Total Chromium (Cr)	2019-08-30	<1.0		ug/L	
			Total Cobalt (Co)	2019-08-30	<0.40		ug/L	
			Total Copper (Cu)	2019-08-30	<0.50		ug/L	
			Total Iron (Fe)	2019-08-30	<50		ug/L	
			Total Lead (Pb)	2019-08-30	<0.50		ug/L	
			Total Magnesium (Mg)	2019-08-30	<100		ug/L	
			Total Manganese (Mn)	2019-08-30	<2.0		ug/L	
			Total Molybdenum (Mo)	2019-08-30	<2.0		ug/L	
			Total Nickel (Ni)	2019-08-30	<2.0		ug/L	
			Total Phosphorus (P)	2019-08-30	<100		ug/L	
			Total Potassium (K)	2019-08-30	<100		ug/L	
			Total Selenium (Se)	2019-08-30	<0.50		ug/L	
			Total Silver (Ag)	2019-08-30	<0.10		ug/L	
			Total Sodium (Na)	2019-08-30	<100		ug/L	
			Total Strontium (Sr)	2019-08-30	<2.0		ug/L	
			Total Thallium (Tl)	2019-08-30	<0.10		ug/L	
			Total Tin (Sn)	2019-08-30	<2.0		ug/L	
			Total Titanium (Ti)	2019-08-30	<2.0		ug/L	
			Total Uranium (U)	2019-08-30	<0.10		ug/L	
			Total Vanadium (V)	2019-08-30	<2.0		ug/L	
			Total Zinc (Zn)	2019-08-30	<5.0		ug/L	
6305955	BAN	RPD	Total Aluminum (Al)	2019-08-30	NC		%	20
			Total Antimony (Sb)	2019-08-30	NC		%	20
			Total Arsenic (As)	2019-08-30	NC		%	20
			Total Barium (Ba)	2019-08-30	NC		%	20
			Total Beryllium (Be)	2019-08-30	NC		%	20
			Total Bismuth (Bi)	2019-08-30	NC		%	20
			Total Boron (B)	2019-08-30	NC		%	20
			Total Cadmium (Cd)	2019-08-30	NC		%	20
			Total Calcium (Ca)	2019-08-30	NC		%	20
			Total Chromium (Cr)	2019-08-30	NC		%	20
			Total Cobalt (Co)	2019-08-30	NC		%	20
			Total Iron (Fe)	2019-08-30	NC		%	20
			Total Lead (Pb)	2019-08-30	NC		%	20
			Total Magnesium (Mg)	2019-08-30	NC		%	20
			Total Manganese (Mn)	2019-08-30	NC		%	20
			Total Molybdenum (Mo)	2019-08-30	2.0		%	20
			Total Nickel (Ni)	2019-08-30	NC		%	20
			Total Phosphorus (P)	2019-08-30	NC		%	20
			Total Potassium (K)	2019-08-30	NC		%	20
			Total Selenium (Se)	2019-08-30	NC		%	20
			Total Silver (Ag)	2019-08-30	NC		%	20
			Total Sodium (Na)	2019-08-30	2.7		%	20
			Total Strontium (Sr)	2019-08-30	NC		%	20

CBCL Limited
Attention: Melissa Rutherford
Report Date: 2019/09/11 Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9N9256

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Thallium (Tl)	2019-08-30	NC		%	20
			Total Tin (Sn)	2019-08-30	NC		%	20
			Total Titanium (Ti)	2019-08-30	NC		%	20
			Total Uranium (U)	2019-08-30	2.0		%	20
			Total Vanadium (V)	2019-08-30	NC		%	20
			Total Zinc (Zn)	2019-08-30	NC		%	20
6306091	JMV	QC Standard	pH	2019-08-29		100	%	97 - 103
6306091	JMV	RPD	pH	2019-08-29	1.1		%	N/A
6306095	JMV	Spiked Blank	Conductivity	2019-08-29		104	%	80 - 120
6306095	JMV	Method Blank	Conductivity	2019-08-29	1.1, RDL=1.0		uS/cm	
6306095	JMV	RPD	Conductivity	2019-08-29	0.47		%	10
6306179	JMV	QC Standard	Turbidity	2019-08-29		107	%	80 - 120
6306179	JMV	Spiked Blank	Turbidity	2019-08-29		99	%	80 - 120
6306179	JMV	Method Blank	Turbidity	2019-08-29	<0.10		NTU	
6306179	JMV	RPD [KQB840-02]	Turbidity	2019-08-29	1.9		%	20
6306186	JMV	QC Standard	Turbidity	2019-08-29		107	%	80 - 120
6306186	JMV	Spiked Blank	Turbidity	2019-08-29		100	%	80 - 120
6306186	JMV	Method Blank	Turbidity	2019-08-29	<0.10		NTU	
6306186	JMV	RPD	Turbidity	2019-08-29	NC		%	20
6306476	EBR	QC Standard	Carbonaceous BOD	2019-09-03		120	%	80 - 120
6306476	EBR	Spiked Blank	Carbonaceous BOD	2019-09-03		133 (3)	%	80 - 120
6306476	EBR	Method Blank	Carbonaceous BOD	2019-09-03	<2.0		mg/L	
6306476	EBR	RPD	Carbonaceous BOD	2019-09-03	4.8		%	25
6307899	SSV	Matrix Spike [KQB840-07]	Total Phosphorus	2019-08-30		93	%	80 - 120
6307899	SSV	QC Standard	Total Phosphorus	2019-08-30		84	%	80 - 120
6307899	SSV	Spiked Blank	Total Phosphorus	2019-08-30		95	%	80 - 120
6307899	SSV	Method Blank	Total Phosphorus	2019-08-30	<0.004		mg/L	
6307899	SSV	RPD [KQB840-07]	Total Phosphorus	2019-08-30	2.3		%	20
6308546	JMV	QC Standard	Turbidity	2019-08-30		106	%	80 - 120
6308546	JMV	Spiked Blank	Turbidity	2019-08-30		101	%	80 - 120
6308546	JMV	Method Blank	Turbidity	2019-08-30	<0.10		NTU	
6308546	JMV	RPD [KQB842-02]	Turbidity	2019-08-30	2.7		%	20
6311558	JMV	QC Standard	pH	2019-09-03		101	%	97 - 103
6311558	JMV	RPD	pH	2019-09-03	1.7		%	N/A
6311560	JMV	Spiked Blank	Conductivity	2019-09-03		101	%	80 - 120
6311560	JMV	Method Blank	Conductivity	2019-09-03	<1.0		uS/cm	
6311560	JMV	RPD	Conductivity	2019-09-03	0.0024		%	10
6312107	AM6	QC Standard	Total Suspended Solids	2019-09-09		98	%	80 - 120
6312107	AM6	Method Blank	Total Suspended Solids	2019-09-09	<1.0		mg/L	
6312107	AM6	RPD [KQB842-01]	Total Suspended Solids	2019-09-09	0.65		%	20
6312336	SRM	Matrix Spike [KQB841-02]	Nitrate + Nitrite (N)	2019-09-04		94	%	80 - 120
6312336	SRM	Spiked Blank	Nitrate + Nitrite (N)	2019-09-04		97	%	80 - 120
6312336	SRM	Method Blank	Nitrate + Nitrite (N)	2019-09-04	0.057, RDL=0.050 (4)		mg/L	
6312336	SRM	RPD [KQB841-02]	Nitrate + Nitrite (N)	2019-09-04	8.1 (5)		%	25
6312341	SRM	Matrix Spike [KQB841-02]	Nitrite (N)	2019-09-04		96	%	80 - 120
6312341	SRM	Spiked Blank	Nitrite (N)	2019-09-04		101	%	80 - 120
6312341	SRM	Method Blank	Nitrite (N)	2019-09-04	<0.010		mg/L	
6312341	SRM	RPD [KQB841-02]	Nitrite (N)	2019-09-04	NC		%	20
6312343	SRM	Matrix Spike [KQB841-02]	Orthophosphate (P)	2019-09-04		94	%	80 - 120
6312343	SRM	Spiked Blank	Orthophosphate (P)	2019-09-04		96	%	80 - 120
6312343	SRM	Method Blank	Orthophosphate (P)	2019-09-04	<0.010		mg/L	
6312343	SRM	RPD [KQB841-02]	Orthophosphate (P)	2019-09-04	NC		%	25
6312350	SRM	Spiked Blank	Colour	2019-09-04		95	%	80 - 120
6312350	SRM	Method Blank	Colour	2019-09-04	<5.0		TCU	
6312350	SRM	RPD [KQB841-02]	Colour	2019-09-04	16		%	20
6312383	SRM	Matrix Spike [KQB841-02]	Reactive Silica (SiO2)	2019-09-04		96	%	80 - 120
6312383	SRM	Spiked Blank	Reactive Silica (SiO2)	2019-09-04		100	%	80 - 120

CBCL Limited
Attention: Melissa Rutherford
Client Project #: 171046.01

Report Date: 2019/09/11

Quality Assurance Report
BV Labs Job Number: B9N9256

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6312383	SRM	Method Blank	Reactive Silica (SiO2)	2019-09-04	0.66, RDL=0.50 (6)		mg/L	
6312383	SRM	RPD [KQB841-02]	Reactive Silica (SiO2)	2019-09-04	4.4 (5)		%	25
6312385	SRM	Matrix Spike [KQB841-02]	Dissolved Sulphate (SO4)	2019-09-04		NC	%	80 - 120
6312385	SRM	Spiked Blank	Dissolved Sulphate (SO4)	2019-09-04		105	%	80 - 120
6312385	SRM	Method Blank	Dissolved Sulphate (SO4)	2019-09-04	2.2, RDL=2.0 (5)		mg/L	
6312385	SRM	RPD [KQB841-02]	Dissolved Sulphate (SO4)	2019-09-04	2.5		%	25
6312387	SRM	Matrix Spike [KQB841-02]	Dissolved Chloride (Cl-)	2019-09-05		NC	%	80 - 120
6312387	SRM	Spiked Blank	Dissolved Chloride (Cl-)	2019-09-04		102	%	80 - 120
6312387	SRM	Method Blank	Dissolved Chloride (Cl-)	2019-09-04	<1.0		mg/L	
6312387	SRM	RPD [KQB841-02]	Dissolved Chloride (Cl-)	2019-09-05	6.0		%	25
6312388	SRM	Matrix Spike [KQB841-02]	Total Alkalinity (Total as CaCO3)	2019-09-04		NC	%	80 - 120
6312388	SRM	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019-09-04		102	%	80 - 120
6312388	SRM	Method Blank	Total Alkalinity (Total as CaCO3)	2019-09-04	<5.0		mg/L	
6312388	SRM	RPD [KQB841-02]	Total Alkalinity (Total as CaCO3)	2019-09-04	0.98		%	25
6312406	AM6	QC Standard	Total Suspended Solids	2019-09-06		100	%	80 - 120
6312406	AM6	Method Blank	Total Suspended Solids	2019-09-06	<1.0		mg/L	
6312406	AM6	RPD	Total Suspended Solids	2019-09-06	5.1		%	20
6312886	SSV	Matrix Spike	Total Phosphorus	2019-09-04		94	%	80 - 120
6312886	SSV	QC Standard	Total Phosphorus	2019-09-04		88	%	80 - 120
6312886	SSV	Spiked Blank	Total Phosphorus	2019-09-04		95	%	80 - 120
6312886	SSV	Method Blank	Total Phosphorus	2019-09-04	<0.004		mg/L	
6312886	SSV	RPD	Total Phosphorus	2019-09-04	4.6		%	20
6313681	BBD	QC Standard	Salinity	2019-09-04		100	%	80 - 120
6313681	BBD	Method Blank	Salinity	2019-09-04	<2.0		N/A	
6313681	BBD	RPD	Salinity	2019-09-04	0		%	25
6313837	EMT	Matrix Spike	Total Organic Carbon (C)	2019-09-04		94	%	85 - 115
6313837	EMT	Spiked Blank	Total Organic Carbon (C)	2019-09-04		94	%	80 - 120
6313837	EMT	Method Blank	Total Organic Carbon (C)	2019-09-04	<0.50		mg/L	
6313837	EMT	RPD	Total Organic Carbon (C)	2019-09-04	1.0		%	15
6313841	EMT	Matrix Spike [KQB848-06]	Total Organic Carbon (C)	2019-09-04		91	%	85 - 115
6313841	EMT	Spiked Blank	Total Organic Carbon (C)	2019-09-04		94	%	80 - 120
6313841	EMT	Method Blank	Total Organic Carbon (C)	2019-09-04	<0.50		mg/L	
6313841	EMT	RPD [KQB848-06]	Total Organic Carbon (C)	2019-09-04	0.33		%	15
6313967	SSV	Matrix Spike	Total Phosphorus	2019-09-05		94	%	80 - 120
6313967	SSV	QC Standard	Total Phosphorus	2019-09-05		88	%	80 - 120
6313967	SSV	Spiked Blank	Total Phosphorus	2019-09-05		98	%	80 - 120
6313967	SSV	Method Blank	Total Phosphorus	2019-09-05	<0.004		mg/L	
6313967	SSV	RPD	Total Phosphorus	2019-09-05	1.0		%	20
6314232	SRM	Matrix Spike	Total Alkalinity (Total as CaCO3)	2019-09-06		62 (7)	%	80 - 120
6314232	SRM	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019-09-05		106	%	80 - 120
6314232	SRM	Method Blank	Total Alkalinity (Total as CaCO3)	2019-09-05	<5.0		mg/L	
6314232	SRM	RPD	Total Alkalinity (Total as CaCO3)	2019-09-05	NC		%	25
6314235	SRM	Matrix Spike	Dissolved Chloride (Cl-)	2019-09-05		NC	%	80 - 120
6314235	SRM	Spiked Blank	Dissolved Chloride (Cl-)	2019-09-05		98	%	80 - 120
6314235	SRM	Method Blank	Dissolved Chloride (Cl-)	2019-09-05	<1.0		mg/L	
6314235	SRM	RPD	Dissolved Chloride (Cl-)	2019-09-05	0.55		%	25
6314240	SRM	Matrix Spike	Dissolved Sulphate (SO4)	2019-09-05		NC	%	80 - 120
6314240	SRM	Spiked Blank	Dissolved Sulphate (SO4)	2019-09-05		104	%	80 - 120
6314240	SRM	Method Blank	Dissolved Sulphate (SO4)	2019-09-05	<2.0		mg/L	
6314240	SRM	RPD	Dissolved Sulphate (SO4)	2019-09-05	1.4		%	25
6314244	SRM	Matrix Spike	Reactive Silica (SiO2)	2019-09-05		NC	%	80 - 120
6314244	SRM	Spiked Blank	Reactive Silica (SiO2)	2019-09-05		98	%	80 - 120
6314244	SRM	Method Blank	Reactive Silica (SiO2)	2019-09-05	<0.50		mg/L	
6314244	SRM	RPD	Reactive Silica (SiO2)	2019-09-05	3.1		%	25
6314251	SRM	Spiked Blank	Colour	2019-09-05		103	%	80 - 120
6314251	SRM	Method Blank	Colour	2019-09-05	<5.0		TCU	
6314251	SRM	RPD	Colour	2019-09-05	NC		%	20
6314253	SRM	Matrix Spike	Orthophosphate (P)	2019-09-06		3.6 (7)	%	80 - 120

Report Date: 2019/09/11

CBCL Limited
Attention: Melissa Rutherford
Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9N9256

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6314253	SRM	Spiked Blank	Orthophosphate (P)	2019-09-06		95	%	80 - 120
6314253	SRM	Method Blank	Orthophosphate (P)	2019-09-06	<0.010		mg/L	
6314253	SRM	RPD	Orthophosphate (P)	2019-09-06	NC		%	25
6314269	SRM	Matrix Spike	Nitrate + Nitrite (N)	2019-09-05		NC (7)	%	80 - 120
6314269	SRM	Spiked Blank	Nitrate + Nitrite (N)	2019-09-05		86	%	80 - 120
6314269	SRM	Method Blank	Nitrate + Nitrite (N)	2019-09-05	0.050, RDL=0.050		mg/L	
6314269	SRM	RPD	Nitrate + Nitrite (N)	2019-09-05	1.7 (8)		%	25
6314273	SRM	Matrix Spike	Nitrite (N)	2019-09-05		100	%	80 - 120
6314273	SRM	Spiked Blank	Nitrite (N)	2019-09-05		100	%	80 - 120
6314273	SRM	Method Blank	Nitrite (N)	2019-09-05	<0.010		mg/L	
6314273	SRM	RPD	Nitrite (N)	2019-09-05	NC		%	20
6315942	SRM	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2019-09-06		100	%	80 - 120
6315942	SRM	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2019-09-06		97	%	80 - 120
6315942	SRM	Method Blank	Nitrogen (Ammonia Nitrogen)	2019-09-06	<0.050		mg/L	
6315942	SRM	RPD	Nitrogen (Ammonia Nitrogen)	2019-09-06	NC		%	20
6318254	SRM	Matrix Spike [KQB842-02]	Total Alkalinity (Total as CaCO3)	2019-09-09		NC	%	80 - 120
6318254	SRM	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019-09-09		108	%	80 - 120
6318254	SRM	Method Blank	Total Alkalinity (Total as CaCO3)	2019-09-09	<5.0		mg/L	
6318254	SRM	RPD [KQB842-02]	Total Alkalinity (Total as CaCO3)	2019-09-09	4.1		%	25
6318255	SRM	Matrix Spike [KQB842-02]	Dissolved Chloride (Cl-)	2019-09-10		NC	%	80 - 120
6318255	SRM	Spiked Blank	Dissolved Chloride (Cl-)	2019-09-09		101	%	80 - 120
6318255	SRM	Method Blank	Dissolved Chloride (Cl-)	2019-09-09	<1.0		mg/L	
6318255	SRM	RPD [KQB842-02]	Dissolved Chloride (Cl-)	2019-09-10	0.30		%	25
6318257	SRM	Matrix Spike [KQB842-02]	Dissolved Sulphate (SO4)	2019-09-10		NC	%	80 - 120
6318257	SRM	Spiked Blank	Dissolved Sulphate (SO4)	2019-09-09		108	%	80 - 120
6318257	SRM	Method Blank	Dissolved Sulphate (SO4)	2019-09-09	<2.0		mg/L	
6318257	SRM	RPD [KQB842-02]	Dissolved Sulphate (SO4)	2019-09-10	1.2		%	25
6318259	SRM	Matrix Spike [KQB842-02]	Reactive Silica (SiO2)	2019-09-09		88	%	80 - 120
6318259	SRM	Spiked Blank	Reactive Silica (SiO2)	2019-09-09		99	%	80 - 120
6318259	SRM	Method Blank	Reactive Silica (SiO2)	2019-09-09	<0.50		mg/L	
6318259	SRM	RPD [KQB842-02]	Reactive Silica (SiO2)	2019-09-09	11		%	25
6318271	SRM	Spiked Blank	Colour	2019-09-09		104	%	80 - 120
6318271	SRM	Method Blank	Colour	2019-09-09	<5.0		TCU	
6318271	SRM	RPD [KQB842-02]	Colour	2019-09-09	5.0		%	20
6318276	SRM	Matrix Spike [KQB842-02]	Orthophosphate (P)	2019-09-09		92	%	80 - 120
6318276	SRM	Spiked Blank	Orthophosphate (P)	2019-09-09		97	%	80 - 120
6318276	SRM	Method Blank	Orthophosphate (P)	2019-09-09	<0.010		mg/L	
6318276	SRM	RPD [KQB842-02]	Orthophosphate (P)	2019-09-09	NC		%	25
6318278	SRM	Matrix Spike [KQB842-02]	Nitrate + Nitrite (N)	2019-09-09		81	%	80 - 120
6318278	SRM	Spiked Blank	Nitrate + Nitrite (N)	2019-09-09		83	%	80 - 120
6318278	SRM	Method Blank	Nitrate + Nitrite (N)	2019-09-09	<0.050		mg/L	
6318278	SRM	RPD [KQB842-02]	Nitrate + Nitrite (N)	2019-09-09	8.7		%	25
6318281	SRM	Matrix Spike [KQB842-02]	Nitrite (N)	2019-09-09		97	%	80 - 120
6318281	SRM	Spiked Blank	Nitrite (N)	2019-09-09		100	%	80 - 120
6318281	SRM	Method Blank	Nitrite (N)	2019-09-09	<0.010		mg/L	
6318281	SRM	RPD [KQB842-02]	Nitrite (N)	2019-09-09	NC		%	20
6318311	SRM	Matrix Spike	Total Alkalinity (Total as CaCO3)	2019-09-09		NC	%	80 - 120
6318311	SRM	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019-09-09		109	%	80 - 120
6318311	SRM	Method Blank	Total Alkalinity (Total as CaCO3)	2019-09-09	<5.0		mg/L	
6318311	SRM	RPD	Total Alkalinity (Total as CaCO3)	2019-09-09	2.5		%	25
6318314	SRM	Matrix Spike	Dissolved Chloride (Cl-)	2019-09-09		NC	%	80 - 120
6318314	SRM	Spiked Blank	Dissolved Chloride (Cl-)	2019-09-09		103	%	80 - 120
6318314	SRM	Method Blank	Dissolved Chloride (Cl-)	2019-09-09	<1.0		mg/L	
6318314	SRM	RPD	Dissolved Chloride (Cl-)	2019-09-09	4.6		%	25
6318315	SRM	Matrix Spike	Dissolved Sulphate (SO4)	2019-09-09		102	%	80 - 120
6318315	SRM	Spiked Blank	Dissolved Sulphate (SO4)	2019-09-09		107	%	80 - 120
6318315	SRM	Method Blank	Dissolved Sulphate (SO4)	2019-09-09	<2.0		mg/L	
6318315	SRM	RPD	Dissolved Sulphate (SO4)	2019-09-09	1.1		%	25
6318320	SRM	Matrix Spike	Reactive Silica (SiO2)	2019-09-09		101	%	80 - 120
6318320	SRM	Spiked Blank	Reactive Silica (SiO2)	2019-09-09		102	%	80 - 120

CBCL Limited
Attention: Melissa Rutherford
Report Date: 2019/09/11
Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9N9256

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6318320	SRM	Method Blank	Reactive Silica (SiO2)	2019-09-09	<0.50		mg/L	
6318320	SRM	RPD	Reactive Silica (SiO2)	2019-09-09	3.2		%	25
6318321	SRM	Spiked Blank	Colour	2019-09-09		107	%	80 - 120
6318321	SRM	Method Blank	Colour	2019-09-09	<5.0		TCU	
6318321	SRM	RPD	Colour	2019-09-09	8.2		%	20
6318323	SRM	Matrix Spike	Orthophosphate (P)	2019-09-09		NC	%	80 - 120
6318323	SRM	Spiked Blank	Orthophosphate (P)	2019-09-09		97	%	80 - 120
6318323	SRM	Method Blank	Orthophosphate (P)	2019-09-09	<0.010		mg/L	
6318323	SRM	RPD	Orthophosphate (P)	2019-09-09	1.0		%	25
6318328	SRM	Matrix Spike	Nitrate + Nitrite (N)	2019-09-09		83	%	80 - 120
6318328	SRM	Spiked Blank	Nitrate + Nitrite (N)	2019-09-09		89	%	80 - 120
6318328	SRM	Method Blank	Nitrate + Nitrite (N)	2019-09-09	<0.050		mg/L	
6318328	SRM	RPD	Nitrate + Nitrite (N)	2019-09-09	5.9		%	25
6318329	SRM	Matrix Spike	Nitrite (N)	2019-09-09		94	%	80 - 120
6318329	SRM	Spiked Blank	Nitrite (N)	2019-09-09		100	%	80 - 120
6318329	SRM	Method Blank	Nitrite (N)	2019-09-09	<0.010		mg/L	
6318329	SRM	RPD	Nitrite (N)	2019-09-09	0.53		%	20
6318378	SRM	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2019-09-10		94	%	80 - 120
6318378	SRM	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2019-09-09		104	%	80 - 120
6318378	SRM	Method Blank	Nitrogen (Ammonia Nitrogen)	2019-09-09	<0.050		mg/L	
6318378	SRM	RPD	Nitrogen (Ammonia Nitrogen)	2019-09-10	NC		%	20
6321245	BAN	Matrix Spike	Total Aluminum (Al)	2019-09-09		106	%	80 - 120
			Total Antimony (Sb)	2019-09-09		104	%	80 - 120
			Total Arsenic (As)	2019-09-09		101	%	80 - 120
			Total Barium (Ba)	2019-09-09		102	%	80 - 120
			Total Beryllium (Be)	2019-09-09		101	%	80 - 120
			Total Bismuth (Bi)	2019-09-09		102	%	80 - 120
			Total Boron (B)	2019-09-09		105	%	80 - 120
			Total Cadmium (Cd)	2019-09-09		100	%	80 - 120
			Total Calcium (Ca)	2019-09-09		NC	%	80 - 120
			Total Chromium (Cr)	2019-09-09		99	%	80 - 120
			Total Cobalt (Co)	2019-09-09		101	%	80 - 120
			Total Copper (Cu)	2019-09-09		97	%	80 - 120
			Total Iron (Fe)	2019-09-09		104	%	80 - 120
			Total Lead (Pb)	2019-09-09		102	%	80 - 120
			Total Magnesium (Mg)	2019-09-09		109	%	80 - 120
			Total Manganese (Mn)	2019-09-09		101	%	80 - 120
			Total Molybdenum (Mo)	2019-09-09		107	%	80 - 120
			Total Nickel (Ni)	2019-09-09		100	%	80 - 120
			Total Phosphorus (P)	2019-09-09		107	%	80 - 120
			Total Potassium (K)	2019-09-09		105	%	80 - 120
			Total Selenium (Se)	2019-09-09		99	%	80 - 120
			Total Silver (Ag)	2019-09-09		100	%	80 - 120
			Total Sodium (Na)	2019-09-09		103	%	80 - 120
			Total Strontium (Sr)	2019-09-09		102	%	80 - 120
			Total Thallium (Tl)	2019-09-09		103	%	80 - 120
			Total Tin (Sn)	2019-09-09		104	%	80 - 120
			Total Titanium (Ti)	2019-09-09		105	%	80 - 120
			Total Uranium (U)	2019-09-09		106	%	80 - 120
			Total Vanadium (V)	2019-09-09		99	%	80 - 120
			Total Zinc (Zn)	2019-09-09		99	%	80 - 120
6321245	BAN	Spiked Blank	Total Aluminum (Al)	2019-09-09		110	%	80 - 120
			Total Antimony (Sb)	2019-09-09		106	%	80 - 120
			Total Arsenic (As)	2019-09-09		101	%	80 - 120
			Total Barium (Ba)	2019-09-09		104	%	80 - 120
			Total Beryllium (Be)	2019-09-09		102	%	80 - 120
			Total Bismuth (Bi)	2019-09-09		107	%	80 - 120
			Total Boron (B)	2019-09-09		105	%	80 - 120
			Total Cadmium (Cd)	2019-09-09		101	%	80 - 120
			Total Calcium (Ca)	2019-09-09		109	%	80 - 120
			Total Chromium (Cr)	2019-09-09		102	%	80 - 120

CBCL Limited
Attention: Melissa Rutherford
Report Date: 2019/09/11
Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9N9256

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Cobalt (Co)	2019-09-09		104	%	80 - 120
			Total Copper (Cu)	2019-09-09		102	%	80 - 120
			Total Iron (Fe)	2019-09-09		108	%	80 - 120
			Total Lead (Pb)	2019-09-09		107	%	80 - 120
			Total Magnesium (Mg)	2019-09-09		113	%	80 - 120
			Total Manganese (Mn)	2019-09-09		106	%	80 - 120
			Total Molybdenum (Mo)	2019-09-09		106	%	80 - 120
			Total Nickel (Ni)	2019-09-09		104	%	80 - 120
			Total Phosphorus (P)	2019-09-09		111	%	80 - 120
			Total Potassium (K)	2019-09-09		110	%	80 - 120
			Total Selenium (Se)	2019-09-09		100	%	80 - 120
			Total Silver (Ag)	2019-09-09		102	%	80 - 120
			Total Sodium (Na)	2019-09-09		107	%	80 - 120
			Total Strontium (Sr)	2019-09-09		105	%	80 - 120
			Total Thallium (Tl)	2019-09-09		107	%	80 - 120
			Total Tin (Sn)	2019-09-09		106	%	80 - 120
			Total Titanium (Ti)	2019-09-09		105	%	80 - 120
			Total Uranium (U)	2019-09-09		109	%	80 - 120
			Total Vanadium (V)	2019-09-09		103	%	80 - 120
			Total Zinc (Zn)	2019-09-09		103	%	80 - 120
6321245	BAN	Method Blank	Total Aluminum (Al)	2019-09-09	<5.0		ug/L	
			Total Antimony (Sb)	2019-09-09	<1.0		ug/L	
			Total Arsenic (As)	2019-09-09	<1.0		ug/L	
			Total Barium (Ba)	2019-09-09	<1.0		ug/L	
			Total Beryllium (Be)	2019-09-09	<1.0		ug/L	
			Total Bismuth (Bi)	2019-09-09	<2.0		ug/L	
			Total Boron (B)	2019-09-09	<50		ug/L	
			Total Cadmium (Cd)	2019-09-09	<0.010		ug/L	
			Total Calcium (Ca)	2019-09-09	<100		ug/L	
			Total Chromium (Cr)	2019-09-09	<1.0		ug/L	
			Total Cobalt (Co)	2019-09-09	<0.40		ug/L	
			Total Copper (Cu)	2019-09-09	<0.50		ug/L	
			Total Iron (Fe)	2019-09-09	<50		ug/L	
			Total Lead (Pb)	2019-09-09	<0.50		ug/L	
			Total Magnesium (Mg)	2019-09-09	<100		ug/L	
			Total Manganese (Mn)	2019-09-09	<2.0		ug/L	
			Total Molybdenum (Mo)	2019-09-09	<2.0		ug/L	
			Total Nickel (Ni)	2019-09-09	<2.0		ug/L	
			Total Phosphorus (P)	2019-09-09	<100		ug/L	
			Total Potassium (K)	2019-09-09	<100		ug/L	
			Total Selenium (Se)	2019-09-09	<0.50		ug/L	
			Total Silver (Ag)	2019-09-09	<0.10		ug/L	
			Total Sodium (Na)	2019-09-09	<100		ug/L	
			Total Strontium (Sr)	2019-09-09	<2.0		ug/L	
			Total Thallium (Tl)	2019-09-09	<0.10		ug/L	
			Total Tin (Sn)	2019-09-09	<2.0		ug/L	
			Total Titanium (Ti)	2019-09-09	<2.0		ug/L	
			Total Uranium (U)	2019-09-09	<0.10		ug/L	
			Total Vanadium (V)	2019-09-09	<2.0		ug/L	
			Total Zinc (Zn)	2019-09-09	<5.0		ug/L	
6321245	BAN	RPD	Total Aluminum (Al)	2019-09-09	NC		%	20
			Total Antimony (Sb)	2019-09-09	NC		%	20
			Total Arsenic (As)	2019-09-09	NC		%	20
			Total Barium (Ba)	2019-09-09	3.1		%	20
			Total Beryllium (Be)	2019-09-09	NC		%	20
			Total Bismuth (Bi)	2019-09-09	NC		%	20
			Total Boron (B)	2019-09-09	NC		%	20
			Total Cadmium (Cd)	2019-09-09	NC		%	20
			Total Calcium (Ca)	2019-09-09	3.3		%	20
			Total Chromium (Cr)	2019-09-09	6.0		%	20
			Total Cobalt (Co)	2019-09-09	NC		%	20

CBCL Limited
Attention: Melissa Rutherford
Report Date: 2019/09/11
Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9N9256

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Copper (Cu)	2019-09-09	0.60		%	20
			Total Iron (Fe)	2019-09-09	NC		%	20
			Total Lead (Pb)	2019-09-09	2.9		%	20
			Total Magnesium (Mg)	2019-09-09	2.6		%	20
			Total Manganese (Mn)	2019-09-09	NC		%	20
			Total Molybdenum (Mo)	2019-09-09	NC		%	20
			Total Nickel (Ni)	2019-09-09	NC		%	20
			Total Phosphorus (P)	2019-09-09	NC		%	20
			Total Potassium (K)	2019-09-09	2.6		%	20
			Total Selenium (Se)	2019-09-09	NC		%	20
			Total Silver (Ag)	2019-09-09	NC		%	20
			Total Sodium (Na)	2019-09-09	1.9		%	20
			Total Strontium (Sr)	2019-09-09	1.1		%	20
			Total Thallium (Tl)	2019-09-09	NC		%	20
			Total Tin (Sn)	2019-09-09	NC		%	20
			Total Titanium (Ti)	2019-09-09	NC		%	20
			Total Uranium (U)	2019-09-09	5.9		%	20
			Total Vanadium (V)	2019-09-09	NC		%	20
			Total Zinc (Zn)	2019-09-09	0.58		%	20
6321609	EMT	Matrix Spike	Total Organic Carbon (C)	2019-09-10		95	%	85 - 115
6321609	EMT	Spiked Blank	Total Organic Carbon (C)	2019-09-09		93	%	80 - 120
6321609	EMT	Method Blank	Total Organic Carbon (C)	2019-09-09	<0.50		mg/L	
6321609	EMT	RPD	Total Organic Carbon (C)	2019-09-10	0.96		%	15
6323353	BBD	QC Standard	Salinity	2019-09-10		101	%	80 - 120
6323353	BBD	Method Blank	Salinity	2019-09-10	<2.0		N/A	
6323353	BBD	RPD [KQB843-02]	Salinity	2019-09-10	0		%	25
6325628	BBD	QC Standard	Salinity	2019-09-11		100	%	80 - 120
6325628	BBD	Method Blank	Salinity	2019-09-11	<2.0		N/A	
6325628	BBD	RPD [KQB845-02]	Salinity	2019-09-11	0		%	25

N/A = Not Applicable
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).
(1) CBOD Analysis: Reference material and second source recovery high.
(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.
(3) CBOD Analysis: second source recovery high.
(4) Elevated blank results due to low level contamination.
(5) Elevated reporting limit due to blank performance.
(6) Elevated blank result due to low level contamination.
(7) Poor spike recovery due to sample matrix.
(8) Elevated reporting limit due to method blank performance.

Analyte_ID	Parameter	Sample_ID	Method	Results	Units	EQL	Lab_ID	Matrix	Lab_Duplicate_Of	Field_Duplicate_Of	Date_Sampled	CSite #	DFRP #	DCC_Project_ID	Report Name	TableName
	Salinity	AR-4	SM 22 2520B	<2.0	N/A	2.0	KQB839	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	TSS	AR-4	SM 23 2540D m	3.0	mg/L	1.0	KQB839	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Nitrate (as N)	AR-6	ASTM D3867-16	0.066	mg/L	0.055	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Hardness (as CaCO3)	AR-6	Auto Calc	35	mg/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Anion Sum	AR-6	Auto Calc.	1.25	me/L	N/A	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Total Dissolved Solids	AR-6	Auto Calc.	76	mg/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Cation Sum	AR-6	Auto Calc.	1.17	me/L	N/A	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Ion Balance (% Difference)	AR-6	Auto Calc.	3.31	%	N/A	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Langelier Index (@ 20C)	AR-6	Auto Calc.	-1.84	N/A		KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Langelier Index (@ 4C)	AR-6	Auto Calc.	-2.09	N/A		KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Saturation pH (@ 20C)	AR-6	Auto Calc.	9.11	N/A		KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Saturation pH (@ 4C)	AR-6	Auto Calc.	9.36	N/A		KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Bicarbonate (as CaCO3)	AR-6	SM 23 4500-CO2 D	14	mg/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Carbonate (as CaCO3)	AR-6	SM 23 4500-CO2 D	<1.0	mg/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Sulphate	AR-6	ASTM D516-16 m	25	mg/L	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Turbidity	AR-6	EPA 180.1 R2 m	6.3	NTU	0.10	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Alkalinity (as CaCO3)	AR-6	EPA 310.2 R1974 m	14	mg/L	5.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Ammonia	AR-6	EPA 350.1 R2 m	<0.050	mg/L	0.050	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Reactive Silica (as SiO2)	AR-6	EPA 366.0 m	1.8	mg/L	0.50	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Salinity	AR-6	SM 22 2520B	<2.0	N/A	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Colour	AR-6	SM 23 2120C m	55	TCU	25	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Conductivity	AR-6	SM 23 2510B m	140	uS/cm	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	TSS	AR-6	SM 23 2540D m	2.9	mg/L	2.1	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Phosphorus	AR-6	SM 23 4500 P B H m	0.034	mg/L	0.004	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Chloride	AR-6	SM 23 4500-Cl- E m	16	mg/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	pH	AR-6	SM 23 4500-H+ B m	7.27	pH	N/A	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Nitrite	AR-6	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Ortho Phosphate (as P)	AR-6	SM 23 4500-P E m	<0.010	mg/L	0.010	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Carbonaceous BOD	AR-6	SM 23 5210B m	4.3	mg/L	3.1	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	TOC	AR-6	SM 23 5310B m	6.7	mg/L	0.50	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Nitrate + Nitrite (as N)	AR-6	USGS I-2547-11m	0.066	mg/L	0.055	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Aluminum	AR-6	EPA 6020B R2 m	200	ug/L	5.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Antimony	AR-6	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Arsenic	AR-6	EPA 6020B R2 m	1.5	ug/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Barium	AR-6	EPA 6020B R2 m	12	ug/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Beryllium	AR-6	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Bismuth	AR-6	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Boron	AR-6	EPA 6020B R2 m	<50	ug/L	50	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Cadmium	AR-6	EPA 6020B R2 m	0.013	ug/L	0.010	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Calcium	AR-6	EPA 6020B R2 m	12000	ug/L	100	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Chromium	AR-6	EPA 6020B R2 m	1.1	ug/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Cobalt	AR-6	EPA 6020B R2 m	<0.40	ug/L	0.40	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Copper	AR-6	EPA 6020B R2 m	0.69	ug/L	0.50	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Iron	AR-6	EPA 6020B R2 m	480	ug/L	50	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Lead	AR-6	EPA 6020B R2 m	<0.50	ug/L	0.50	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Magnesium	AR-6	EPA 6020B R2 m	1400	ug/L	100	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Manganese	AR-6	EPA 6020B R2 m	87	ug/L	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Molybdenum	AR-6	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Nickel	AR-6	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Phosphorus (P)	AR-6	EPA 6020B R2 m	<100	ug/L	100	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Potassium	AR-6	EPA 6020B R2 m	740	ug/L	100	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Selenium	AR-6	EPA 6020B R2 m	<0.50	ug/L	0.50	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Silver	AR-6	EPA 6020B R2 m	<0.10	ug/L	0.10	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Sodium	AR-6	EPA 6020B R2 m	9900	ug/L	100	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Strontium	AR-6	EPA 6020B R2 m	82	ug/L	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Thallium	AR-6	EPA 6020B R2 m	<0.10	ug/L	0.10	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Tin	AR-6	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Titanium	AR-6	EPA 6020B R2 m	4.3	ug/L	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Uranium	AR-6	EPA 6020B R2 m	0.24	ug/L	0.10	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Vanadium	AR-6	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Zinc	AR-6	EPA 6020B R2 m	<5.0	ug/L	5.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Total Coliforms	AR-6	MOE E3371 R2 (2018)	370	CFU/100mL	10	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Fecal coliform	AR-6	SM 23 9222D	30	CFU/100mL	10	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls

Subcontract Parameter	AR-6		ATTACHED	N/A	N/A	KQB840	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Turbidity	AR-6	EPA 180.1 R2 m	6.2	NTU	0.10	KQB840D1	Water	KQB840	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus	AR-6	SM 23 4500 P B H m	0.035	mg/L	0.004	KQB840D1	Water	KQB840	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate (as N)	AVE-9	ASTM D3867-16	<0.060	mg/L	0.060	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Hardness (as CaCO3)	AVE-9	Auto Calc	3200	mg/L	1.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Anion Sum	AVE-9	Auto Calc.	219	me/L	N/A	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Dissolved Solids	AVE-9	Auto Calc.	15000	mg/L	1.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cation Sum	AVE-9	Auto Calc.	303	me/L	N/A	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ion Balance (% Difference)	AVE-9	Auto Calc.	16.2	%	N/A	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 20C)	AVE-9	Auto Calc.	-0.151	N/A		KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 4C)	AVE-9	Auto Calc.	-0.388	N/A		KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 20C)	AVE-9	Auto Calc.	7.71	N/A		KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 4C)	AVE-9	Auto Calc.	7.94	N/A		KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bicarbonate (as CaCO3)	AVE-9	SM 23 4500-CO2 D	73	mg/L	1.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonate (as CaCO3)	AVE-9	SM 23 4500-CO2 D	<1.0	mg/L	1.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sulphate	AVE-9	ASTM D516-16 m	1200	mg/L	40	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Turbidity	AVE-9	EPA 180.1 R2 m	360	NTU	1.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Alkalinity (as CaCO3)	AVE-9	EPA 310.2 R1974 m	73	mg/L	5.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ammonia	AVE-9	EPA 350.1 R2 m	0.16	mg/L	0.050	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Reactive Silica (as SiO2)	AVE-9	EPA 366.0 m	1.9	mg/L	0.67	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AVE-9	SM 22 2520B	17	N/A	2.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Colour	AVE-9	SM 23 2120C m	24	TCU	5.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Conductivity	AVE-9	SM 23 2510B m	29000	uS/cm	1.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AVE-9	SM 23 2540D m	300	mg/L	5.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus	AVE-9	SM 23 4500 P B H m	0.29	mg/L	0.02	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chloride	AVE-9	SM 23 4500-Cl- E m	6800	mg/L	100	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
pH	AVE-9	SM 23 4500-H+ B m	7.55	pH	N/A	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrite	AVE-9	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ortho Phosphate (as P)	AVE-9	SM 23 4500-P E m	<0.010	mg/L	0.010	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonaceous BOD	AVE-9	SM 23 5210B m	5.0	mg/L	3.1	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TOC	AVE-9	SM 23 5310B m	5.5	mg/L	5.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate + Nitrite (as N)	AVE-9	USGS I-2547-11m	<0.060	mg/L	0.060	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Aluminum	AVE-9	EPA 6020B R2 m	11000	ug/L	50	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Antimony	AVE-9	EPA 6020B R2 m	<10	ug/L	10	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Arsenic	AVE-9	EPA 6020B R2 m	<10	ug/L	10	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Barium	AVE-9	EPA 6020B R2 m	54	ug/L	10	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Beryllium	AVE-9	EPA 6020B R2 m	<10	ug/L	10	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bismuth	AVE-9	EPA 6020B R2 m	<20	ug/L	20	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Boron	AVE-9	EPA 6020B R2 m	2300	ug/L	500	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cadmium	AVE-9	EPA 6020B R2 m	<0.10	ug/L	0.10	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Calcium	AVE-9	EPA 6020B R2 m	220000	ug/L	1000	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chromium	AVE-9	EPA 6020B R2 m	14	ug/L	10	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cobalt	AVE-9	EPA 6020B R2 m	4.5	ug/L	4.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Copper	AVE-9	EPA 6020B R2 m	5.1	ug/L	5.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Iron	AVE-9	EPA 6020B R2 m	9900	ug/L	500	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Lead	AVE-9	EPA 6020B R2 m	7.1	ug/L	5.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Magnesium	AVE-9	EPA 6020B R2 m	660000	ug/L	1000	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Manganese	AVE-9	EPA 6020B R2 m	500	ug/L	20	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Molybdenum	AVE-9	EPA 6020B R2 m	<20	ug/L	20	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nickel	AVE-9	EPA 6020B R2 m	<20	ug/L	20	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus (P)	AVE-9	EPA 6020B R2 m	<1000	ug/L	1000	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Potassium	AVE-9	EPA 6020B R2 m	200000	ug/L	1000	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Selenium	AVE-9	EPA 6020B R2 m	<5.0	ug/L	5.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Silver	AVE-9	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sodium	AVE-9	EPA 6020B R2 m	5400000	ug/L	1000	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Strontium	AVE-9	EPA 6020B R2 m	3900	ug/L	20	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Thallium	AVE-9	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Tin	AVE-9	EPA 6020B R2 m	<20	ug/L	20	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Titanium	AVE-9	EPA 6020B R2 m	250	ug/L	20	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Uranium	AVE-9	EPA 6020B R2 m	2.0	ug/L	1.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Vanadium	AVE-9	EPA 6020B R2 m	22	ug/L	20	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Zinc	AVE-9	EPA 6020B R2 m	<50	ug/L	50	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Coliforms	AVE-9	MOE E3371 R2 (2018)	800	CFU/100mL	100	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Fecal coliform	AVE-9	SM 23 9222D	<100	CFU/100mL	100	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls

Subcontract Parameter	AVE-9		ATTACHED	N/A	N/A	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sulphate	AVE-9	ASTM D516-16 m	1200	mg/L	40	KQB841D1	Water	KQB841	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Alkalinity (as CaCO3)	AVE-9	EPA 310.2 R1974 m	74	mg/L	5.0	KQB841D1	Water	KQB841	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Reactive Silica (as SiO2)	AVE-9	EPA 366.0 m	2.0	mg/L	0.67	KQB841D1	Water	KQB841	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Colour	AVE-9	SM 23 2120C m	21	TCU	5.0	KQB841D1	Water	KQB841	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chloride	AVE-9	SM 23 4500-Cl- E m	7200	mg/L	100	KQB841D1	Water	KQB841	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrite	AVE-9	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQB841D1	Water	KQB841	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ortho Phosphate (as P)	AVE-9	SM 23 4500-P E m	<0.010	mg/L	0.010	KQB841D1	Water	KQB841	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate + Nitrite (as N)	AVE-9	USGS I-2547-11m	0.065	mg/L	0.060	KQB841D1	Water	KQB841	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate (as N)	AVE-1	ASTM D3867-16	<0.050	mg/L	0.050	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Hardness (as CaCO3)	AVE-1	Auto Calc	5500	mg/L	1.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Anion Sum	AVE-1	Auto Calc.	482	me/L	N/A	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Dissolved Solids	AVE-1	Auto Calc.	28000	mg/L	1.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cation Sum	AVE-1	Auto Calc.	508	me/L	N/A	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ion Balance (% Difference)	AVE-1	Auto Calc.	2.60	%	N/A	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 20C)	AVE-1	Auto Calc.	0.499	N/A		KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 4C)	AVE-1	Auto Calc.	0.260	N/A		KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 20C)	AVE-1	Auto Calc.	7.30	N/A		KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 4C)	AVE-1	Auto Calc.	7.53	N/A		KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bicarbonate (as CaCO3)	AVE-1	SM 23 4500-CO2 D	97	mg/L	1.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonate (as CaCO3)	AVE-1	SM 23 4500-CO2 D	<1.0	mg/L	1.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sulphate	AVE-1	ASTM D516-16 m	2000	mg/L	40	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Turbidity	AVE-1	EPA 180.1 R2 m	280	NTU	1.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Alkalinity (as CaCO3)	AVE-1	EPA 310.2 R1974 m	97	mg/L	5.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ammonia	AVE-1	EPA 350.1 R2 m	<0.050	mg/L	0.050	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Reactive Silica (as SiO2)	AVE-1	EPA 366.0 m	1.0	mg/L	0.50	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AVE-1	SM 22 2520B	27	N/A	2.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Colour	AVE-1	SM 23 2120C m	9.4	TCU	5.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Conductivity	AVE-1	SM 23 2510B m	43000	uS/cm	1.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AVE-1	SM 23 2540D m	310	mg/L	10	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus	AVE-1	SM 23 4500 P B H m	0.7	mg/L	0.1	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chloride	AVE-1	SM 23 4500-Cl- E m	16000	mg/L	500	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
pH	AVE-1	SM 23 4500-H+ B m	7.79	pH	N/A	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrite	AVE-1	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ortho Phosphate (as P)	AVE-1	SM 23 4500-P E m	<0.010	mg/L	0.010	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonaceous BOD	AVE-1	SM 23 5210B m	<5.0	mg/L	5.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TOC	AVE-1	SM 23 5310B m	<5.0	mg/L	5.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate + Nitrite (as N)	AVE-1	USGS I-2547-11m	<0.050	mg/L	0.050	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Aluminum	AVE-1	EPA 6020B R2 m	9400	ug/L	50	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Antimony	AVE-1	EPA 6020B R2 m	<10	ug/L	10	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Arsenic	AVE-1	EPA 6020B R2 m	<10	ug/L	10	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Barium	AVE-1	EPA 6020B R2 m	59	ug/L	10	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Beryllium	AVE-1	EPA 6020B R2 m	<10	ug/L	10	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bismuth	AVE-1	EPA 6020B R2 m	<20	ug/L	20	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Boron	AVE-1	EPA 6020B R2 m	4200	ug/L	500	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cadmium	AVE-1	EPA 6020B R2 m	0.10	ug/L	0.10	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Calcium	AVE-1	EPA 6020B R2 m	360000	ug/L	1000	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chromium	AVE-1	EPA 6020B R2 m	14	ug/L	10	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cobalt	AVE-1	EPA 6020B R2 m	7.9	ug/L	4.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Copper	AVE-1	EPA 6020B R2 m	9.9	ug/L	5.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Iron	AVE-1	EPA 6020B R2 m	15000	ug/L	500	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Lead	AVE-1	EPA 6020B R2 m	10	ug/L	5.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Magnesium	AVE-1	EPA 6020B R2 m	1100000	ug/L	1000	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Manganese	AVE-1	EPA 6020B R2 m	750	ug/L	20	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Molybdenum	AVE-1	EPA 6020B R2 m	<20	ug/L	20	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nickel	AVE-1	EPA 6020B R2 m	<20	ug/L	20	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus (P)	AVE-1	EPA 6020B R2 m	<1000	ug/L	1000	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Potassium	AVE-1	EPA 6020B R2 m	330000	ug/L	1000	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Selenium	AVE-1	EPA 6020B R2 m	<5.0	ug/L	5.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Silver	AVE-1	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sodium	AVE-1	EPA 6020B R2 m	9000000	ug/L	1000	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Strontium	AVE-1	EPA 6020B R2 m	6500	ug/L	20	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Thallium	AVE-1	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Tin	AVE-1	EPA 6020B R2 m	<20	ug/L	20	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls

Titanium	AVE-1	EPA 6020B R2 m	210	ug/L	20	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Uranium	AVE-1	EPA 6020B R2 m	3.1	ug/L	1.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Vanadium	AVE-1	EPA 6020B R2 m	31	ug/L	20	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Zinc	AVE-1	EPA 6020B R2 m	<50	ug/L	50	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Coliforms	AVE-1	MOE E3371 R2 (2018)	<100	CFU/100mL	100	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Fecal coliform	AVE-1	SM 23 9222D	<100	CFU/100mL	100	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Subcontract Parameter	AVE-1		ATTACHED	N/A	N/A	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sulphate	AVE-1	ASTM D516-16 m	2000	mg/L	40	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Turbidity	AVE-1	EPA 180.1 R2 m	280	NTU	1.0	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Alkalinity (as CaCO3)	AVE-1	EPA 310.2 R1974 m	94	mg/L	5.0	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Reactive Silica (as SiO2)	AVE-1	EPA 366.0 m	0.91	mg/L	0.50	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Colour	AVE-1	SM 23 2120C m	9.9	TCU	5.0	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AVE-1	SM 23 2540D m	310	mg/L	10	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chloride	AVE-1	SM 23 4500-Cl- E m	16000	mg/L	500	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrite	AVE-1	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ortho Phosphate (as P)	AVE-1	SM 23 4500-P E m	<0.010	mg/L	0.010	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate + Nitrite (as N)	AVE-1	USGS I-2547-11m	0.055	mg/L	0.050	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AVE-7	SM 22 2520B	24	N/A	2.0	KQB843	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AVE-7	SM 23 2540D m	360	mg/L	10	KQB843	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AVE-7	SM 22 2520B	24	N/A	2.0	KQB843D1	Water	KQB843	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AVE-8	SM 22 2520B	<2.0	N/A	2.0	KQB844	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AVE-8	SM 23 2540D m	690	mg/L	10	KQB844	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate (as N)	AVE-4	ASTM D3867-16	0.12	mg/L	0.050	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Hardness (as CaCO3)	AVE-4	Auto Calc	4100	mg/L	1.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Anion Sum	AVE-4	Auto Calc.	267	me/L	N/A	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Dissolved Solids	AVE-4	Auto Calc.	18000	mg/L	1.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cation Sum	AVE-4	Auto Calc.	371	me/L	N/A	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ion Balance (% Difference)	AVE-4	Auto Calc.	16.3	%	N/A	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 20C)	AVE-4	Auto Calc.	0.0400	N/A		KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 4C)	AVE-4	Auto Calc.	-0.197	N/A		KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 20C)	AVE-4	Auto Calc.	7.48	N/A		KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 4C)	AVE-4	Auto Calc.	7.72	N/A		KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bicarbonate (as CaCO3)	AVE-4	SM 23 4500-CO2 D	91	mg/L	1.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonate (as CaCO3)	AVE-4	SM 23 4500-CO2 D	<1.0	mg/L	1.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sulphate	AVE-4	ASTM D516-16 m	1600	mg/L	40	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Turbidity	AVE-4	EPA 180.1 R2 m	>1000	NTU	1.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Alkalinity (as CaCO3)	AVE-4	EPA 310.2 R1974 m	92	mg/L	5.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ammonia	AVE-4	EPA 350.1 R2 m	0.15	mg/L	0.050	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Reactive Silica (as SiO2)	AVE-4	EPA 366.0 m	2.4	mg/L	0.50	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AVE-4	SM 22 2520B	21	N/A	2.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Colour	AVE-4	SM 23 2120C m	25	TCU	5.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Conductivity	AVE-4	SM 23 2510B m	33000	uS/cm	1.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AVE-4	SM 23 2540D m	3000	mg/L	10	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus	AVE-4	SM 23 4500 P B H m	1.5	mg/L	0.1	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chloride	AVE-4	SM 23 4500-Cl- E m	8300	mg/L	100	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
pH	AVE-4	SM 23 4500-H+ B m	7.52	pH	N/A	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrite	AVE-4	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ortho Phosphate (as P)	AVE-4	SM 23 4500-P E m	<0.010	mg/L	0.010	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonaceous BOD	AVE-4	SM 23 5210B m	16	mg/L	3.1	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TOC	AVE-4	SM 23 5310B m	13	mg/L	5.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate + Nitrite (as N)	AVE-4	USGS I-2547-11m	0.12	mg/L	0.050	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Aluminum	AVE-4	EPA 6020B R2 m	31000	ug/L	50	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Antimony	AVE-4	EPA 6020B R2 m	<10	ug/L	10	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Arsenic	AVE-4	EPA 6020B R2 m	19	ug/L	10	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Barium	AVE-4	EPA 6020B R2 m	110	ug/L	10	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Beryllium	AVE-4	EPA 6020B R2 m	<10	ug/L	10	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bismuth	AVE-4	EPA 6020B R2 m	<20	ug/L	20	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Boron	AVE-4	EPA 6020B R2 m	3100	ug/L	500	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cadmium	AVE-4	EPA 6020B R2 m	0.13	ug/L	0.10	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Calcium	AVE-4	EPA 6020B R2 m	290000	ug/L	1000	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chromium	AVE-4	EPA 6020B R2 m	48	ug/L	10	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cobalt	AVE-4	EPA 6020B R2 m	27	ug/L	4.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Copper	AVE-4	EPA 6020B R2 m	34	ug/L	5.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Iron	AVE-4	EPA 6020B R2 m	49000	ug/L	500	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls

Lead	AVE-4	EPA 6020B R2 m	37	ug/L	5.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Magnesium	AVE-4	EPA 6020B R2 m	810000	ug/L	1000	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Manganese	AVE-4	EPA 6020B R2 m	2700	ug/L	20	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Molybdenum	AVE-4	EPA 6020B R2 m	<20	ug/L	20	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nickel	AVE-4	EPA 6020B R2 m	52	ug/L	20	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus (P)	AVE-4	EPA 6020B R2 m	1500	ug/L	1000	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Potassium	AVE-4	EPA 6020B R2 m	250000	ug/L	1000	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Selenium	AVE-4	EPA 6020B R2 m	<5.0	ug/L	5.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Silver	AVE-4	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sodium	AVE-4	EPA 6020B R2 m	6500000	ug/L	1000	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Strontium	AVE-4	EPA 6020B R2 m	5000	ug/L	20	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Thallium	AVE-4	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Tin	AVE-4	EPA 6020B R2 m	<20	ug/L	20	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Titanium	AVE-4	EPA 6020B R2 m	450	ug/L	20	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Uranium	AVE-4	EPA 6020B R2 m	3.3	ug/L	1.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Vanadium	AVE-4	EPA 6020B R2 m	85	ug/L	20	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Zinc	AVE-4	EPA 6020B R2 m	150	ug/L	50	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Coliforms	AVE-4	MOE E3371 R2 (2018)	400	CFU/100mL	100	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Fecal coliform	AVE-4	SM 23 9222D	<100	CFU/100mL	100	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Subcontract Parameter	AVE-4		ATTACHED	N/A	N/A	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AVE-4	SM 22 2520B	21	N/A	2.0	KQB845D1	Water	KQB845	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AR-14	SM 22 2520B	<2.0	N/A	2.0	KQB846	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AR-14	SM 23 2540D m	120	mg/L	5.0	KQB846	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AR-15	SM 22 2520B	<2.0	N/A	2.0	KQB847	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AR-15	SM 23 2540D m	18	mg/L	5.0	KQB847	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate (as N)	AR-16	ASTM D3867-16	<0.055	mg/L	0.055	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Hardness (as CaCO3)	AR-16	Auto Calc	9.8	mg/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Anion Sum	AR-16	Auto Calc.	0.400	me/L	N/A	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Dissolved Solids	AR-16	Auto Calc.	27	mg/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cation Sum	AR-16	Auto Calc.	0.450	me/L	N/A	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ion Balance (% Difference)	AR-16	Auto Calc.	5.88	%	N/A	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 20C)	AR-16	Auto Calc.	-3.33	N/A		KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 4C)	AR-16	Auto Calc.	-3.58	N/A		KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 20C)	AR-16	Auto Calc.	10.1	N/A		KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 4C)	AR-16	Auto Calc.	10.3	N/A		KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bicarbonate (as CaCO3)	AR-16	SM 23 4500-CO2 D	5.4	mg/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonate (as CaCO3)	AR-16	SM 23 4500-CO2 D	<1.0	mg/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sulphate	AR-16	ASTM D516-16 m	6.0	mg/L	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Turbidity	AR-16	EPA 180.1 R2 m	4.2	NTU	0.10	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Alkalinity (as CaCO3)	AR-16	EPA 310.2 R1974 m	5.4	mg/L	5.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ammonia	AR-16	EPA 350.1 R2 m	0.052	mg/L	0.050	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Reactive Silica (as SiO2)	AR-16	EPA 366.0 m	1.8	mg/L	0.50	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AR-16	SM 22 2520B	<2.0	N/A	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Colour	AR-16	SM 23 2120C m	75	TCU	25	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Conductivity	AR-16	SM 23 2510B m	46	uS/cm	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AR-16	SM 23 2540D m	4.3	mg/L	2.1	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus	AR-16	SM 23 4500 P B H m	0.027	mg/L	0.004	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chloride	AR-16	SM 23 4500-Cl- E m	6.0	mg/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
pH	AR-16	SM 23 4500-H+ B m	6.75	pH	N/A	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrite	AR-16	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ortho Phosphate (as P)	AR-16	SM 23 4500-P E m	0.020	mg/L	0.010	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonaceous BOD	AR-16	SM 23 5210B m	4.1	mg/L	3.1	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TOC	AR-16	SM 23 5310B m	6.7	mg/L	0.50	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate + Nitrite (as N)	AR-16	USGS I-2547-11m	<0.055	mg/L	0.055	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Aluminum	AR-16	EPA 6020B R2 m	270	ug/L	5.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Antimony	AR-16	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Arsenic	AR-16	EPA 6020B R2 m	1.3	ug/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Barium	AR-16	EPA 6020B R2 m	7.8	ug/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Beryllium	AR-16	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bismuth	AR-16	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Boron	AR-16	EPA 6020B R2 m	<50	ug/L	50	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cadmium	AR-16	EPA 6020B R2 m	0.018	ug/L	0.010	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Calcium	AR-16	EPA 6020B R2 m	3000	ug/L	100	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chromium	AR-16	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls

Cobalt	AR-16	EPA 6020B R2 m	<0.40	ug/L	0.40	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Copper	AR-16	EPA 6020B R2 m	1.0	ug/L	0.50	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Iron	AR-16	EPA 6020B R2 m	470	ug/L	50	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Lead	AR-16	EPA 6020B R2 m	<0.50	ug/L	0.50	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Magnesium	AR-16	EPA 6020B R2 m	560	ug/L	100	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Manganese	AR-16	EPA 6020B R2 m	44	ug/L	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Molybdenum	AR-16	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nickel	AR-16	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus (P)	AR-16	EPA 6020B R2 m	<100	ug/L	100	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Potassium	AR-16	EPA 6020B R2 m	500	ug/L	100	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Selenium	AR-16	EPA 6020B R2 m	<0.50	ug/L	0.50	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Silver	AR-16	EPA 6020B R2 m	<0.10	ug/L	0.10	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sodium	AR-16	EPA 6020B R2 m	5000	ug/L	100	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Strontium	AR-16	EPA 6020B R2 m	21	ug/L	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Thallium	AR-16	EPA 6020B R2 m	<0.10	ug/L	0.10	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Tin	AR-16	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Titanium	AR-16	EPA 6020B R2 m	4.2	ug/L	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Uranium	AR-16	EPA 6020B R2 m	0.27	ug/L	0.10	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Vanadium	AR-16	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Zinc	AR-16	EPA 6020B R2 m	6.6	ug/L	5.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Coliforms	AR-16	MOE E3371 R2 (2018)	150	CFU/100mL	10	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Fecal coliform	AR-16	SM 23 9222D	30	CFU/100mL	10	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Subcontract Parameter	AR-16		ATTACHED	N/A	N/A	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TOC	AR-16	SM 23 5310B m	6.7	mg/L	0.50	KQB848D1	Water	KQB848	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AR-4B	SM 22 2520B	<2.0	N/A	2.0	KQB849	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AR-4B	SM 23 2540D m	310	mg/L	10	KQB849	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AR-2	SM 22 2520B	<2.0	N/A	2.0	KQB850	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AR-2	SM 23 2540D m	4.0	mg/L	2.0	KQB850	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate (as N)	AR-1	ASTM D3867-16	0.058	mg/L	0.055	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Hardness (as CaCO3)	AR-1	Auto Calc	37	mg/L	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Anion Sum	AR-1	Auto Calc.	1.27	me/L	N/A	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Dissolved Solids	AR-1	Auto Calc.	78	mg/L	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cation Sum	AR-1	Auto Calc.	1.26	me/L	N/A	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ion Balance (% Difference)	AR-1	Auto Calc.	0.400	%	N/A	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 20C)	AR-1	Auto Calc.	-1.75	N/A		KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 4C)	AR-1	Auto Calc.	-2.01	N/A		KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 20C)	AR-1	Auto Calc.	9.09	N/A		KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 4C)	AR-1	Auto Calc.	9.34	N/A		KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bicarbonate (as CaCO3)	AR-1	SM 23 4500-CO2 D	14	mg/L	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonate (as CaCO3)	AR-1	SM 23 4500-CO2 D	<1.0	mg/L	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sulphate	AR-1	ASTM D516-16 m	25	mg/L	2.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Turbidity	AR-1	EPA 180.1 R2 m	3.3	NTU	0.10	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Alkalinity (as CaCO3)	AR-1	EPA 310.2 R1974 m	14	mg/L	5.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ammonia	AR-1	EPA 350.1 R2 m	0.059	mg/L	0.050	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Reactive Silica (as SiO2)	AR-1	EPA 366.0 m	1.7	mg/L	0.50	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AR-1	SM 22 2520B	<2.0	N/A	2.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Colour	AR-1	SM 23 2120C m	52	TCU	25	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Conductivity	AR-1	SM 23 2510B m	140	uS/cm	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AR-1	SM 23 2540D m	<2.1	mg/L	2.1	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus	AR-1	SM 23 4500 P B H m	0.025	mg/L	0.004	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chloride	AR-1	SM 23 4500-Cl- E m	17	mg/L	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
pH	AR-1	SM 23 4500-H+ B m	7.34	pH	N/A	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrite	AR-1	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ortho Phosphate (as P)	AR-1	SM 23 4500-P E m	<0.010	mg/L	0.010	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonaceous BOD	AR-1	SM 23 5210B m	3.3	mg/L	3.1	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TOC	AR-1	SM 23 5310B m	6.8	mg/L	0.50	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate + Nitrite (as N)	AR-1	USGS I-2547-11m	0.058	mg/L	0.055	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Aluminum	AR-1	EPA 6020B R2 m	140	ug/L	5.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Antimony	AR-1	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Arsenic	AR-1	EPA 6020B R2 m	1.4	ug/L	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Barium	AR-1	EPA 6020B R2 m	11	ug/L	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Beryllium	AR-1	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bismuth	AR-1	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Boron	AR-1	EPA 6020B R2 m	<50	ug/L	50	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls

Cadmium	AR-1	EPA 6020B R2 m	<0.010	ug/L	0.010	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Calcium	AR-1	EPA 6020B R2 m	12000	ug/L	100	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chromium	AR-1	EPA 6020B R2 m	1.1	ug/L	1.0	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cobalt	AR-1	EPA 6020B R2 m	<0.40	ug/L	0.40	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Copper	AR-1	EPA 6020B R2 m	2.0	ug/L	0.50	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Iron	AR-1	EPA 6020B R2 m	370	ug/L	50	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Lead	AR-1	EPA 6020B R2 m	<0.50	ug/L	0.50	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Magnesium	AR-1	EPA 6020B R2 m	1600	ug/L	100	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Manganese	AR-1	EPA 6020B R2 m	32	ug/L	2.0	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Molybdenum	AR-1	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nickel	AR-1	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus (P)	AR-1	EPA 6020B R2 m	<100	ug/L	100	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Potassium	AR-1	EPA 6020B R2 m	840	ug/L	100	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Selenium	AR-1	EPA 6020B R2 m	<0.50	ug/L	0.50	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Silver	AR-1	EPA 6020B R2 m	<0.10	ug/L	0.10	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sodium	AR-1	EPA 6020B R2 m	11000	ug/L	100	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Strontium	AR-1	EPA 6020B R2 m	86	ug/L	2.0	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Thallium	AR-1	EPA 6020B R2 m	<0.10	ug/L	0.10	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Tin	AR-1	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Titanium	AR-1	EPA 6020B R2 m	3.1	ug/L	2.0	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Uranium	AR-1	EPA 6020B R2 m	0.20	ug/L	0.10	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Vanadium	AR-1	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Zinc	AR-1	EPA 6020B R2 m	<5.0	ug/L	5.0	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Coliforms	AR-1	MOE E3371 R2 (2018)	2000	CFU/100mL	10	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Fecal coliform	AR-1	SM 23 9222D	10	CFU/100mL	10	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Subcontract Parameter	AR-1		ATTACHED	N/A	N/A	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls

Your Project #: 171046.01
Your C.O.C. #: D 42534

Attention: Melissa Rutherford

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/09/11
Report #: R5875484
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9N9903
Received: 2019/08/28, 16:01

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Carbonate, Bicarbonate and Hydroxide	1	N/A	2019/08/30	N/A	SM 23 4500-CO2 D
Alkalinity	1	N/A	2019/09/10	ATL SOP 00013	EPA 310.2 R1974 m
Carbonaceous BOD	1	2019/08/29	2019/09/03	ATL SOP 00041	SM 23 5210B m
Chloride	1	N/A	2019/09/10	ATL SOP 00014	SM 23 4500-Cl- E m
Total coliform (CFU/100mL) in water	1	N/A	2019/08/28	ATL SOP 00097	MOE E3371 R2 (2018)
Colour	1	N/A	2019/09/10	ATL SOP 00020	SM 23 2120C m
Conductance - water	1	N/A	2019/08/29	ATL SOP 00004	SM 23 2510B m
Fecal coliform in water (CFU/100 mL)	1	N/A	2019/08/28	ATL SOP 00071	SM 23 9222D
Hardness (calculated as CaCO3)	1	N/A	2019/09/03	ATL SOP 00048	Auto Calc
Metals Water Total MS	1	2019/08/29	2019/08/30	ATL SOP 00058	EPA 6020B R2 m
Ion Balance (% Difference)	1	N/A	2019/09/11	N/A	Auto Calc.
Anion and Cation Sum	1	N/A	2019/09/10	N/A	Auto Calc.
Nitrogen Ammonia - water	1	N/A	2019/09/10	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	1	N/A	2019/09/10	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	1	N/A	2019/09/10	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	1	N/A	2019/09/11	ATL SOP 00018	ASTM D3867-16
pH (3)	1	N/A	2019/08/29	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	1	N/A	2019/09/10	ATL SOP 00021	SM 23 4500-P E m
Salinity (4)	1	N/A	2019/09/11		SM 22 2520B
Sat. pH and Langelier Index (@ 20C)	1	N/A	2019/09/11	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	1	N/A	2019/09/11	ATL SOP 00049	Auto Calc.
Reactive Silica	1	N/A	2019/09/10	ATL SOP 00022	EPA 366.0 m
Sulphate	1	N/A	2019/09/10	ATL SOP 00023	ASTM D516-16 m
Chlorophyll A (Sub from Bedford) (1)	1	2019/09/03	2019/08/30		
Total Dissolved Solids (TDS calc)	1	N/A	2019/09/11	N/A	Auto Calc.
Organic carbon - Total (TOC) (5)	1	N/A	2019/09/11	ATL SOP 00203	SM 23 5310B m
Total Phosphorus (Colourimetric) (2)	1	2019/09/04	2019/09/05	CAM SOP-00407	SM 23 4500 P B H m
Total Suspended Solids	1	2019/09/03	2019/09/06	ATL SOP 00007	SM 23 2540D m
Turbidity	1	N/A	2019/08/30	ATL SOP 00011	EPA 180.1 R2 m

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Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Dalhousie Dept of Oceanography
(2) This test was performed by Bureau Veritas Laboratories Mississauga
(3) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(4) Non-accredited test method
(5) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

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Your C.O.C. #: D 42534

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CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9N9903
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AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
11 Sep 2019 16:03:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Keri Mackay, Customer Experience Team Lead
Email: Keri.MACKAY@bvlabs.com
Phone# (902)420-0203 Ext:294
==
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ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		KQF926		
Sampling Date		2019/08/27 20:08		
COC Number		D 42534		
	UNITS	AR-3	RDL	QC Batch
Calculated Parameters				
Anion Sum	me/L	1.31	N/A	6303630
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	14	1.0	6303626
Calculated TDS	mg/L	80	1.0	6303640
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	6303626
Cation Sum	me/L	1.26	N/A	6303630
Hardness (CaCO3)	mg/L	36	1.0	6303628
Ion Balance (% Difference)	%	1.95	N/A	6303629
Langelier Index (@ 20C)	N/A	-1.95		6303636
Langelier Index (@ 4C)	N/A	-2.20		6303638
Nitrate (N)	mg/L	0.054	0.050	6304669
Saturation pH (@ 20C)	N/A	9.10		6303636
Saturation pH (@ 4C)	N/A	9.36		6303638
Inorganics				
Total Alkalinity (Total as CaCO3)	mg/L	14	5.0	6321908
Dissolved Chloride (Cl-)	mg/L	18	1.0	6321917
Colour	TCU	63	25	6321923
Nitrate + Nitrite (N)	mg/L	0.054	0.050	6321929
Nitrite (N)	mg/L	<0.010	0.010	6321931
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	0.050	6318401
Total Organic Carbon (C)	mg/L	7.0	0.50	6323881
Orthophosphate (P)	mg/L	<0.010	0.010	6321927
pH	pH	7.16	N/A	6306853
Reactive Silica (SiO2)	mg/L	1.7	0.50	6321921
Dissolved Sulphate (SO4)	mg/L	25	2.0	6321920
Turbidity	NTU	4.1	0.10	6308546
Conductivity	uS/cm	140	1.0	6306863
Metals				
Total Aluminum (Al)	ug/L	180	5.0	6305955
Total Antimony (Sb)	ug/L	<1.0	1.0	6305955
Total Arsenic (As)	ug/L	1.4	1.0	6305955
Total Barium (Ba)	ug/L	12	1.0	6305955
Total Beryllium (Be)	ug/L	<1.0	1.0	6305955
Total Bismuth (Bi)	ug/L	<2.0	2.0	6305955
Total Boron (B)	ug/L	<50	50	6305955

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		KQF926		
Sampling Date		2019/08/27 20:08		
COC Number		D 42534		
	UNITS	**AR-3**	**RDL**	**QC Batch**
Total Cadmium (Cd)	ug/L	<0.010	0.010	6305955
Total Calcium (Ca)	ug/L	12000	100	6305955
Total Chromium (Cr)	ug/L	1.3	1.0	6305955
Total Cobalt (Co)	ug/L	<0.40	0.40	6305955
Total Copper (Cu)	ug/L	0.98	0.50	6305955
Total Iron (Fe)	ug/L	430	50	6305955
Total Lead (Pb)	ug/L	<0.50	0.50	6305955
Total Magnesium (Mg)	ug/L	1600	100	6305955
Total Manganese (Mn)	ug/L	42	2.0	6305955
Total Molybdenum (Mo)	ug/L	<2.0	2.0	6305955
Total Nickel (Ni)	ug/L	<2.0	2.0	6305955
Total Phosphorus (P)	ug/L	<100	100	6305955
Total Potassium (K)	ug/L	830	100	6305955
Total Selenium (Se)	ug/L	<0.50	0.50	6305955
Total Silver (Ag)	ug/L	<0.10	0.10	6305955
Total Sodium (Na)	ug/L	11000	100	6305955
Total Strontium (Sr)	ug/L	85	2.0	6305955
Total Thallium (Tl)	ug/L	<0.10	0.10	6305955
Total Tin (Sn)	ug/L	<2.0	2.0	6305955
Total Titanium (Ti)	ug/L	3.7	2.0	6305955
Total Uranium (U)	ug/L	0.23	0.10	6305955
Total Vanadium (V)	ug/L	<2.0	2.0	6305955
Total Zinc (Zn)	ug/L	<5.0	5.0	6305955

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

RESULTS OF ANALYSES OF WATER

BV Labs ID		KQF926		
Sampling Date		2019/08/27 20:08		
COC Number		D 42534		
	UNITS	**AR-3**	**RDL**	**QC Batch**
Inorganics				
Carbonaceous BOD	mg/L	3.3	3.1	6306476
Total Phosphorus	mg/L	0.033	0.004	6313967
Salinity	N/A	<2.0	2.0	6325628
Total Suspended Solids	mg/L	4.7	2.1	6312406
Subcontracted Analysis				
Subcontract Parameter	N/A	ATTACHED	N/A	6311708

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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MICROBIOLOGY (WATER)

BV Labs ID		KQF926		
Sampling Date		2019/08/27 20:08		
COC Number		D 42534		
	UNITS	AR-3	RDL	QC Batch
Microbiological				
Fecal coliform	CFU/100mL	<10	10	6304695
Total Coliforms	CFU/100mL	480	10	6304698

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	7.0°C

Results relate only to the items tested.

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BV Labs Job #: B9N9903
Report Date: 2019/09/11

CBCL Limited
Client Project #: 171046.01

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6304695	KBO	Method Blank	Fecal coliform	2019/08/28	<1.0		CFU/100mL	
6304698	KBO	Method Blank	Total Coliforms	2019/08/28	<1.0		CFU/100mL	
6305955	BAN	Matrix Spike	Total Aluminum (Al)	2019/08/30		98	%	80 - 120
			Total Antimony (Sb)	2019/08/30		103	%	80 - 120
			Total Arsenic (As)	2019/08/30		99	%	80 - 120
			Total Barium (Ba)	2019/08/30		100	%	80 - 120
			Total Beryllium (Be)	2019/08/30		103	%	80 - 120
			Total Bismuth (Bi)	2019/08/30		101	%	80 - 120
			Total Boron (B)	2019/08/30		104	%	80 - 120
			Total Cadmium (Cd)	2019/08/30		97	%	80 - 120
			Total Calcium (Ca)	2019/08/30		102	%	80 - 120
			Total Chromium (Cr)	2019/08/30		97	%	80 - 120
			Total Cobalt (Co)	2019/08/30		97	%	80 - 120
			Total Copper (Cu)	2019/08/30		97	%	80 - 120
			Total Iron (Fe)	2019/08/30		99	%	80 - 120
			Total Lead (Pb)	2019/08/30		99	%	80 - 120
			Total Magnesium (Mg)	2019/08/30		103	%	80 - 120
			Total Manganese (Mn)	2019/08/30		98	%	80 - 120
			Total Molybdenum (Mo)	2019/08/30		102	%	80 - 120
			Total Nickel (Ni)	2019/08/30		98	%	80 - 120
			Total Phosphorus (P)	2019/08/30		101	%	80 - 120
			Total Potassium (K)	2019/08/30		101	%	80 - 120
			Total Selenium (Se)	2019/08/30		97	%	80 - 120
			Total Silver (Ag)	2019/08/30		98	%	80 - 120
			Total Sodium (Na)	2019/08/30		NC	%	80 - 120
			Total Strontium (Sr)	2019/08/30		99	%	80 - 120
			Total Thallium (Tl)	2019/08/30		102	%	80 - 120
			Total Tin (Sn)	2019/08/30		105	%	80 - 120
			Total Titanium (Ti)	2019/08/30		100	%	80 - 120
			Total Uranium (U)	2019/08/30		104	%	80 - 120
			Total Vanadium (V)	2019/08/30		102	%	80 - 120
			Total Zinc (Zn)	2019/08/30		97	%	80 - 120
6305955	BAN	Spiked Blank	Total Aluminum (Al)	2019/08/30		98	%	80 - 120
			Total Antimony (Sb)	2019/08/30		100	%	80 - 120
			Total Arsenic (As)	2019/08/30		97	%	80 - 120
			Total Barium (Ba)	2019/08/30		99	%	80 - 120
			Total Beryllium (Be)	2019/08/30		102	%	80 - 120
			Total Bismuth (Bi)	2019/08/30		101	%	80 - 120
			Total Boron (B)	2019/08/30		103	%	80 - 120
			Total Cadmium (Cd)	2019/08/30		96	%	80 - 120
			Total Calcium (Ca)	2019/08/30		101	%	80 - 120
			Total Chromium (Cr)	2019/08/30		97	%	80 - 120
			Total Cobalt (Co)	2019/08/30		98	%	80 - 120
			Total Copper (Cu)	2019/08/30		98	%	80 - 120
			Total Iron (Fe)	2019/08/30		98	%	80 - 120
			Total Lead (Pb)	2019/08/30		99	%	80 - 120
			Total Magnesium (Mg)	2019/08/30		102	%	80 - 120
			Total Manganese (Mn)	2019/08/30		100	%	80 - 120
			Total Molybdenum (Mo)	2019/08/30		101	%	80 - 120
			Total Nickel (Ni)	2019/08/30		101	%	80 - 120
			Total Phosphorus (P)	2019/08/30		100	%	80 - 120
			Total Potassium (K)	2019/08/30		99	%	80 - 120
			Total Selenium (Se)	2019/08/30		97	%	80 - 120
			Total Silver (Ag)	2019/08/30		96	%	80 - 120
			Total Sodium (Na)	2019/08/30		95	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Strontium (Sr)	2019/08/30		100	%	80 - 120
			Total Thallium (Tl)	2019/08/30		101	%	80 - 120
			Total Tin (Sn)	2019/08/30		101	%	80 - 120
			Total Titanium (Ti)	2019/08/30		104	%	80 - 120
			Total Uranium (U)	2019/08/30		103	%	80 - 120
			Total Vanadium (V)	2019/08/30		100	%	80 - 120
			Total Zinc (Zn)	2019/08/30		96	%	80 - 120
6305955	BAN	Method Blank	Total Aluminum (Al)	2019/08/30	<5.0		ug/L	
			Total Antimony (Sb)	2019/08/30	<1.0		ug/L	
			Total Arsenic (As)	2019/08/30	<1.0		ug/L	
			Total Barium (Ba)	2019/08/30	<1.0		ug/L	
			Total Beryllium (Be)	2019/08/30	<1.0		ug/L	
			Total Bismuth (Bi)	2019/08/30	<2.0		ug/L	
			Total Boron (B)	2019/08/30	<50		ug/L	
			Total Cadmium (Cd)	2019/08/30	<0.010		ug/L	
			Total Calcium (Ca)	2019/08/30	<100		ug/L	
			Total Chromium (Cr)	2019/08/30	<1.0		ug/L	
			Total Cobalt (Co)	2019/08/30	<0.40		ug/L	
			Total Copper (Cu)	2019/08/30	<0.50		ug/L	
			Total Iron (Fe)	2019/08/30	<50		ug/L	
			Total Lead (Pb)	2019/08/30	<0.50		ug/L	
			Total Magnesium (Mg)	2019/08/30	<100		ug/L	
			Total Manganese (Mn)	2019/08/30	<2.0		ug/L	
			Total Molybdenum (Mo)	2019/08/30	<2.0		ug/L	
			Total Nickel (Ni)	2019/08/30	<2.0		ug/L	
			Total Phosphorus (P)	2019/08/30	<100		ug/L	
			Total Potassium (K)	2019/08/30	<100		ug/L	
			Total Selenium (Se)	2019/08/30	<0.50		ug/L	
			Total Silver (Ag)	2019/08/30	<0.10		ug/L	
			Total Sodium (Na)	2019/08/30	<100		ug/L	
			Total Strontium (Sr)	2019/08/30	<2.0		ug/L	
			Total Thallium (Tl)	2019/08/30	<0.10		ug/L	
			Total Tin (Sn)	2019/08/30	<2.0		ug/L	
			Total Titanium (Ti)	2019/08/30	<2.0		ug/L	
			Total Uranium (U)	2019/08/30	<0.10		ug/L	
			Total Vanadium (V)	2019/08/30	<2.0		ug/L	
			Total Zinc (Zn)	2019/08/30	<5.0		ug/L	
6305955	BAN	RPD	Total Aluminum (Al)	2019/08/30	NC		%	20
			Total Antimony (Sb)	2019/08/30	NC		%	20
			Total Arsenic (As)	2019/08/30	NC		%	20
			Total Barium (Ba)	2019/08/30	NC		%	20
			Total Beryllium (Be)	2019/08/30	NC		%	20
			Total Bismuth (Bi)	2019/08/30	NC		%	20
			Total Boron (B)	2019/08/30	NC		%	20
			Total Cadmium (Cd)	2019/08/30	NC		%	20
			Total Calcium (Ca)	2019/08/30	NC		%	20
			Total Chromium (Cr)	2019/08/30	NC		%	20
			Total Cobalt (Co)	2019/08/30	NC		%	20
			Total Iron (Fe)	2019/08/30	NC		%	20
			Total Lead (Pb)	2019/08/30	NC		%	20
			Total Magnesium (Mg)	2019/08/30	NC		%	20
			Total Manganese (Mn)	2019/08/30	NC		%	20
			Total Molybdenum (Mo)	2019/08/30	2.0		%	20
			Total Nickel (Ni)	2019/08/30	NC		%	20
			Total Phosphorus (P)	2019/08/30	NC		%	20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Potassium (K)	2019/08/30	NC		%	20
			Total Selenium (Se)	2019/08/30	NC		%	20
			Total Silver (Ag)	2019/08/30	NC		%	20
			Total Sodium (Na)	2019/08/30	2.7		%	20
			Total Strontium (Sr)	2019/08/30	NC		%	20
			Total Thallium (Tl)	2019/08/30	NC		%	20
			Total Tin (Sn)	2019/08/30	NC		%	20
			Total Titanium (Ti)	2019/08/30	NC		%	20
			Total Uranium (U)	2019/08/30	2.0		%	20
			Total Vanadium (V)	2019/08/30	NC		%	20
			Total Zinc (Zn)	2019/08/30	NC		%	20
6306476	EBR	QC Standard	Carbonaceous BOD	2019/09/03		120	%	80 - 120
6306476	EBR	Spiked Blank	Carbonaceous BOD	2019/09/03		133 (1)	%	80 - 120
6306476	EBR	Method Blank	Carbonaceous BOD	2019/09/03	<2.0		mg/L	
6306476	EBR	RPD	Carbonaceous BOD	2019/09/03	4.8		%	25
6306853	JMV	QC Standard	pH	2019/08/29		101	%	97 - 103
6306853	JMV	RPD	pH	2019/08/29	1.2		%	N/A
6306863	JMV	Spiked Blank	Conductivity	2019/08/29		100	%	80 - 120
6306863	JMV	Method Blank	Conductivity	2019/08/29	1.0, RDL=1.0		uS/cm	
6306863	JMV	RPD	Conductivity	2019/08/29	2.1		%	10
6308546	JMV	QC Standard	Turbidity	2019/08/30		106	%	80 - 120
6308546	JMV	Spiked Blank	Turbidity	2019/08/30		101	%	80 - 120
6308546	JMV	Method Blank	Turbidity	2019/08/30	<0.10		NTU	
6308546	JMV	RPD	Turbidity	2019/08/30	2.7		%	20
6312406	AM6	QC Standard	Total Suspended Solids	2019/09/06		100	%	80 - 120
6312406	AM6	Method Blank	Total Suspended Solids	2019/09/06	<1.0		mg/L	
6312406	AM6	RPD	Total Suspended Solids	2019/09/06	5.1		%	20
6313967	SSV	Matrix Spike	Total Phosphorus	2019/09/05		94	%	80 - 120
6313967	SSV	QC Standard	Total Phosphorus	2019/09/05		88	%	80 - 120
6313967	SSV	Spiked Blank	Total Phosphorus	2019/09/05		98	%	80 - 120
6313967	SSV	Method Blank	Total Phosphorus	2019/09/05	<0.004		mg/L	
6313967	SSV	RPD	Total Phosphorus	2019/09/05	1.0		%	20
6318401	SRM	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2019/09/10		NC	%	80 - 120
6318401	SRM	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2019/09/10		103	%	80 - 120
6318401	SRM	Method Blank	Nitrogen (Ammonia Nitrogen)	2019/09/10	<0.050		mg/L	
6318401	SRM	RPD	Nitrogen (Ammonia Nitrogen)	2019/09/10	1.0		%	20
6321908	SRM	Matrix Spike	Total Alkalinity (Total as CaCO3)	2019/09/10		NC	%	80 - 120
6321908	SRM	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019/09/10		103	%	80 - 120
6321908	SRM	Method Blank	Total Alkalinity (Total as CaCO3)	2019/09/10	<5.0		mg/L	
6321908	SRM	RPD	Total Alkalinity (Total as CaCO3)	2019/09/10	2.2		%	25
6321917	SRM	Matrix Spike	Dissolved Chloride (Cl-)	2019/09/10		NC	%	80 - 120
6321917	SRM	Spiked Blank	Dissolved Chloride (Cl-)	2019/09/10		101	%	80 - 120
6321917	SRM	Method Blank	Dissolved Chloride (Cl-)	2019/09/10	<1.0		mg/L	
6321917	SRM	RPD	Dissolved Chloride (Cl-)	2019/09/10	0.28		%	25
6321920	SRM	Matrix Spike	Dissolved Sulphate (SO4)	2019/09/10		103	%	80 - 120
6321920	SRM	Spiked Blank	Dissolved Sulphate (SO4)	2019/09/10		104	%	80 - 120
6321920	SRM	Method Blank	Dissolved Sulphate (SO4)	2019/09/10	<2.0		mg/L	
6321920	SRM	RPD	Dissolved Sulphate (SO4)	2019/09/10	0.93		%	25
6321921	SRM	Matrix Spike	Reactive Silica (SiO2)	2019/09/10		NC	%	80 - 120
6321921	SRM	Spiked Blank	Reactive Silica (SiO2)	2019/09/10		96	%	80 - 120
6321921	SRM	Method Blank	Reactive Silica (SiO2)	2019/09/10	<0.50		mg/L	
6321921	SRM	RPD	Reactive Silica (SiO2)	2019/09/10	1.5		%	25
6321923	SRM	Spiked Blank	Colour	2019/09/10		112	%	80 - 120
6321923	SRM	Method Blank	Colour	2019/09/10	<5.0		TCU	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6321923	SRM	RPD	Colour	2019/09/10	15		%	20
6321927	SRM	Matrix Spike	Orthophosphate (P)	2019/09/10		83	%	80 - 120
6321927	SRM	Spiked Blank	Orthophosphate (P)	2019/09/10		95	%	80 - 120
6321927	SRM	Method Blank	Orthophosphate (P)	2019/09/10	<0.010		mg/L	
6321927	SRM	RPD	Orthophosphate (P)	2019/09/10	61 (2)		%	25
6321929	SRM	Matrix Spike	Nitrate + Nitrite (N)	2019/09/10		76 (3)	%	80 - 120
6321929	SRM	Spiked Blank	Nitrate + Nitrite (N)	2019/09/10		85	%	80 - 120
6321929	SRM	Method Blank	Nitrate + Nitrite (N)	2019/09/10	<0.050		mg/L	
6321929	SRM	RPD	Nitrate + Nitrite (N)	2019/09/10	2.2		%	25
6321931	SRM	Matrix Spike	Nitrite (N)	2019/09/10		97	%	80 - 120
6321931	SRM	Spiked Blank	Nitrite (N)	2019/09/10		99	%	80 - 120
6321931	SRM	Method Blank	Nitrite (N)	2019/09/10	<0.010		mg/L	
6321931	SRM	RPD	Nitrite (N)	2019/09/10	NC		%	20
6323881	EMT	Matrix Spike	Total Organic Carbon (C)	2019/09/11		99	%	85 - 115
6323881	EMT	Spiked Blank	Total Organic Carbon (C)	2019/09/11		100	%	80 - 120
6323881	EMT	Method Blank	Total Organic Carbon (C)	2019/09/11	<0.50		mg/L	
6323881	EMT	RPD	Total Organic Carbon (C)	2019/09/11	0.95		%	15
6325628	BBD	QC Standard	Salinity	2019/09/11		100	%	80 - 120
6325628	BBD	Method Blank	Salinity	2019/09/11	<2.0		N/A	
6325628	BBD	RPD	Salinity	2019/09/11	0		%	25

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) CBOD Analysis: second source recovery high.

(2) Duplicate results exceeded RPD acceptance criteria. This may be due to sample heterogeneity.

(3) Poor spike recovery due to sample matrix.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Anastassia Hamanov, Scientific Specialist

Eric Dearman, Scientific Specialist

Mike MacGillivray, Scientific Specialist (Inorganics)

Robyn Edwards, Bedford Micro Supervisor

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Department of Oceanography
1355 Oxford St
Halifax, NS
B3H 4R2

Determination of chlorophyll a by fluorescence

Client: Bureau Veritas Laboratories, 200 Bluewater Road, Bedford, NS, B4B 1G9

Attention: Keri Mackay **Received:** 2019-08-28 & 29

Project #: B9N9256 **Completed:** 2019-08-30

Hugh MacIntyre, Ph.D.

Chl *a* (chlorophyll *a*; µg L-1) determined by the acidification method (Holm-Hansen et al., 1965). Estimates made with the non-acidification method (Welschmeyer, 1994) are shown for comparison. The non-acidification method is considered more reliable than the acidification method in correcting for bias due to the contributions of chlorophyll *b* and chlorophyll degradation products.

Holm-Hansen O, Lorenzen CJ, Holmes RW, Strickland JDH (1965) Fluorometric determination of chlorophyll. J Conseil 30:3-15

Welschmeyer NA (1994) Fluorometric analysis of chlorophyll *a* in the presence of chlorophyll *b* and phaeopigments. Limnol Oceanogr 39:1985-1992

Contractor ID	Client ID	Chl *a* (acidification)	Chl *a* (non-acidification)
KQB840-03R	AR-6	2.16	2.63
KQB841-03R	AVE-9	15.3	15.7
KQB842-03R	AVE-1	46.5	56.6
KQB845-03R	AVE-4	78	86.9
KQB848-03R	AR-16	2.15	2.17
KQB851-03R	AR-1	1.72	2.02

Bureau Veritas Laboratories
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Chain Of Custody Record

INVOICE TO:		Report Information		Project Information	
Company Name	#41018 CBCL Limited	Company Name		Quotation #	B91310
Contact Name	ACCOUNTS PAYABLE	Contact Name	Melissa Rutherford	P.O. #	
Address	1505 Barrington Street Suite 901 / PO Box 606	Address		Project #	171046.01
	Halifax NS B3J 3Y6			Project Name	
Phone	(902) 421-7241 Fax: (902) 423-3938	Phone	Fax:	Site #	
Email	acct@cbcl.ca	Email	mrutherford@cbcl.ca, cmcvarish@cbcl.ca	Sampled By	

Laboratory Use Only

BV Labs Job #	Bottle Order #:
B9N9256	733248
Chain Of Custody Record	Project Manager
C#733248-01-01	Keri Mackay

Regulatory Criteria:

Special Instructions

** Specify Matrix: Surface/Ground/Tapwater/Sewage/Effluent/Seawater Potable/Nonpotable/Tissue/Soil/Sludge/Metal

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: ☑
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: Time Required: ☐

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered & Preserved	Lab Filtration Required	Atlantic RCAp-MS Total Metals in Water	Low Level Total Phosphrous	Total coliform (CFU/100mL) in water	Fecal coliform in water (CFU/100 mL)	Carbonaceous BOD	Chlorophyll A (Sub from Bedford)	TSS	Salinity			# of Bottles	Comments / Hazards / Other Required Analysis
1	AR-4		27Aug19	11:25	Water			~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	✓	✓			2	No RCAp-MS, phosphorus, coliforms or BOD for this sample. Only TSS & Salinity
2	AR-6		"	12:05	"			X	X	X	X	X	X	✓	✓			8	Hold BOD until Thurs Aug 29 for analysis
3	AVE-9		"	13:05	"			X	X	X	X	X	X	✓	✓			8	Hold BOD " " " " "
4	AVE-1		"	13:45	"			~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	✓	✓			2	Only TSS & Salinity
5	AVE-7		"	14:35	"			~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	✓	✓			2	Only TSS & Salinity
6	AVE-8		"	15:10	"			~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	✓	✓			2	Only TSS & Salinity
7	AVE-4		"	16:08	"			~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	✓	✓			2	Only TSS & Salinity
8	AVE-2		"	17:05	"			~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	✓	✓			2	Only TSS & Salinity
9	AR-14		"	18:05	"			~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	✓	✓			2	Only TSS & Salinity
10	AR-15		"	18:29	"			~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	✓	✓			2	Only TSS & Salinity

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
Colin McVarish	19/08/27	22:14	[signature]	2019 AUG 28	9:06		☐	0, 1, 5/1, 0, 0	☐ Yes ☐ No

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: BV Labs Yellow: Client

Bureau Veritas Laboratories
200 Bluewater Road, Bedford, Nova Scotia Canada B4B 1G9 Tel:(902) 420-0203 Toll-free:800-563-6266 Fax:(902) 420-8612 www.bvlabs.com

Chain Of Custody Record

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#41018 CBCL Limited	Company Name		Quotation #	B91310	BV Labs Job #	Bottle Order #:
Contact Name	ACCOUNTS PAYABLE	Contact Name	Melissa Rutherford	P.O. #		B9N9256	733248
Address	1505 Barrington Street Suite 901 / PO Box 606	Address		Project #	171046.01	Chain Of Custody Record	Project Manager
	Halifax NS B3J 3Y6			Project Name		C#733248-02-01	Keri Mackay
Phone	(902) 421-7241 Fax: (902) 423-3938	Phone	Fax:	Site #			
Email	acct@cbcl.ca	Email	mrutherford@cbcl.ca, cmcvarish@cbcl.ca	Sampled By			

Regulatory Criteria:

** Specify Matrix: Surface/Ground/Tapwater/Sewage/Effluent/Seawater Potable/Nonpotable/Tissue/Soil/Sludge/Metal

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered & Preserved	Lab Filtration Required	Atlantic RCAp-MS Total Metals in Water	Low Level Total Phosphrous	Total coliform (CFU/100mL) in water	Fecal coliform in water (CFU/100 mL)	Carbonaceous BOD	Chlorophyll A (Sub from Bedford)	TSS	Salinity			# of Bottles	Comments / Hazards / Other Required Analysis
1	AR-16		27Aug'19	19:03	Water			X	X	X	X	X	X	✓	✓			8	Hold BOD until Thurs Aug 29 for analysis
2	AR-4B		"	19:40	"									✓	✓			2	
3	AR-3		"	20:08	"			✓	✓	✓	✓	✓	✓	✓	✓			8	Hold BOD " " " " " "
4	AR-2		"	20:30	"									✓	✓			2	Only TSS & Salinity
5	AR-1		"	20:40	"			✓	✓	✓	✓	✓	✓	✓	✓			8	Hold BOD " " " " " "
6																			
7																			
8																			
9																			
10																			

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: ☑

(will be applied if Rush TAT is not specified):

Standard TAT = 5-7 Working days for most tests.

Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)

Date Required: Time Required: ☐

2019 AUG 28 9:0[illegible]

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
Colin McVarish [signature]	19/08/27	22:14	[signature]				☐	0,1,3/-1,0,0	☐ Yes ☐ No

Lab Use Only

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: BV Labs Yellow: Client

CBCL Limited
BV Labs Job Number: B9N9256 Client Project #: 171046.01
Report Date: 2019/09/11

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		KQB840			KQB840			KQB841			KQB841			KQB842			KQB842			KQB845			KQB848			KQB848			KQB851		
Sampling Date		2019-08-27 12:05			2019-08-27 12:05			2019-08-27 13:05			2019-08-27 13:05			2019-08-27 13:45			2019-08-27 13:45			2019-08-27 16:08			2019-08-27 19:03			2019-08-27 19:03			2019-08-27 20:40		
COC Number		733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01		
	UNITS	**AR-6**	**RDL**	**QC Batch**	**AR-6 Lab-Dup**	**RDL**	**QC Batch**	**AVE-9**	**RDL**	**QC Batch**	**AVE-9 Lab-Dup**	**RDL**	**QC Batch**	**AVE-1**	**RDL**	**QC Batch**	**AVE-1 Lab-Dup**	**RDL**	**QC Batch**	**AVE-4**	**RDL**	**QC Batch**	**AR-16**	**RDL**	**QC Batch**	**AR-16 Lab-Dup**	**RDL**	**QC Batch**	**AR-1**	**RDL**	**QC Batch**
Calculated Parameters																															
Anion Sum	me/L	1.25	N/A	6303630				219	N/A	6303630				482	N/A	6303630				267	N/A	6303630	0.400	N/A	6303630				1.27	N/A	6303630
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	14	1.0	6303626				73	1.0	6303626				97	1.0	6303626				91	1.0	6303626	5.4	1.0	6303626				14	1.0	6303626
Calculated TDS	mg/L	76	1.0	6303640				15000	1.0	6303640				28000	1.0	6303640				18000	1.0	6303640	27	1.0	6303640				78	1.0	6303640
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	6303626				<1.0	1.0	6303626				<1.0	1.0	6303626				<1.0	1.0	6303626	<1.0	1.0	6303626				<1.0	1.0	6303626
Cation Sum	me/L	1.17	N/A	6303630				303	N/A	6303630				508	N/A	6303630				371	N/A	6303630	0.450	N/A	6303630				1.26	N/A	6303630
Hardness (CaCO3)	mg/L	35	1.0	6303628				3200	1.0	6303628				5500	1.0	6303628				4100	1.0	6303628	9.8	1.0	6303628				37	1.0	6303628
Ion Balance (% Difference)	%	3.31	N/A	6303629				16.2	N/A	6303629				2.60	N/A	6303629				16.3	N/A	6303629	5.88	N/A	6303629				0.400	N/A	6303629
Langelier Index (@ 20C)	N/A	-1.84		6303636				-0.151		6303636				0.499		6303636				0.0400		6303636	-3.33		6303636				-1.75		6303636
Langelier Index (@ 4C)	N/A	-2.09		6303638				-0.388		6303638				0.260		6303638				-0.197		6303638	-3.58		6303638				-2.01		6303638
Nitrate (N)	mg/L	0.066	0.055	6303632				<0.060	0.060	6303632				<0.050	0.050	6304669				0.12	0.050	6304669	<0.055	0.055	6303632				0.058	0.055	6303632
Saturation pH (@ 20C)	N/A	9.11		6303636				7.71		6303636				7.30		6303636				7.48		6303636	10.1		6303636				9.09		6303636
Saturation pH (@ 4C)	N/A	9.36		6303638				7.94		6303638				7.53		6303638				7.72		6303638	10.3		6303638				9.34		6303638
Inorganics																															
Total Alkalinity (Total as CaCO3)	mg/L	14	5.0	6314232				73	5.0	6312388	74	5.0	6312388	97	5.0	6318254	94	5.0	6318254	92	5.0	6318311	5.4	5.0	6314232				14	5.0	6314232
Dissolved Chloride (Cl-)	mg/L	16	1.0	6314235				6800	100	6312387	7200	100	6312387	16000	500	6318255	16000	500	6318255	8300	100	6318314	6.0	1.0	6314235				17	1.0	6314235
Colour	TCU	55	25	6314251				24	5.0	6312350	21	5.0	6312350	9.4	5.0	6318271	9.9	5.0	6318271	25	5.0	6318321	75	25	6314251				52	25	6314251
Nitrate + Nitrite (N)	mg/L	0.066 (1)	0.055	6314269				<0.060 (2)	0.060	6312336	0.065 (2)	0.060	6312336	<0.050	0.050	6318278	0.055	0.050	6318278	0.12	0.050	6318328	<0.055 (1)	0.055	6314269				0.058 (1)	0.055	6314269
Nitrite (N)	mg/L	<0.010	0.010	6314273				<0.010	0.010	6312341	<0.010	0.010	6312341	<0.010	0.010	6318281	<0.010	0.010	6318281	<0.010	0.010	6318329	<0.010	0.010	6314273				<0.010	0.010	6314273
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	0.050	6315942				0.16	0.050	6315942				<0.050	0.050	6318378				0.15	0.050	6318378	0.052	0.050	6315942				0.059	0.050	6315942
Total Organic Carbon (C)	mg/L	6.7	0.50	6313841				5.5 (3)	5.0	6313837				<5.0 (3)	5.0	6321609				13 (3)	5.0	6321609	6.7	0.50	6313841	6.7	0.50	6313841	6.8	0.50	6313841
Orthophosphate (P)	mg/L	<0.010	0.010	6314253				<0.010	0.010	6312343	<0.010	0.010	6312343	<0.010	0.010	6318276	<0.010	0.010	6318276	<0.010	0.010	6318323	0.020	0.010	6314253				<0.010	0.010	6314253
pH	pH	7.27	N/A	6306091				7.55	N/A	6306091				7.79	N/A	6311558				7.52	N/A	6311558	6.75	N/A	6306091				7.34	N/A	6306091
Reactive Silica (SiO2)	mg/L	1.8	0.50	6314244				1.9 (2)	0.67	6312383	2.0 (2)	0.67	6312383	1.0	0.50	6318259	0.91	0.50	6318259	2.4	0.50	6318320	1.8	0.50	6314244				1.7	0.50	6314244
Dissolved Sulphate (SO4)	mg/L	25	2.0	6314240				1200	40	6312385	1200	40	6312385	2000	40	6318257	2000	40	6318257	1600	40	6318315	6.0	2.0	6314240				25	2.0	6314240
Turbidity	NTU	6.3	0.10	6306179	6.2	0.10	6306179	360	1.0	6306179				280	1.0	6308546	280	1.0	6308546	>1000	1.0	6308546	4.2	0.10	6306179				3.3	0.10	6306186
Conductivity	uS/cm	140	1.0	6306095				29000	1.0	6306095				43000	1.0	6311560				33000	1.0	6311560	46	1.0	6306095				140	1.0	6306095
Metals																															
Total Aluminum (Al)	ug/L	200	5.0	6305955				11000	50	6321245				9400	50	6305955				31000	50	6305955	270	5.0	6305955				140	5.0	6305955
Total Antimony (Sb)	ug/L	<1.0	1.0	6305955				<10	10	6321245				<10	10	6305955				<10	10	6305955	<1.0	1.0	6305955				<1.0	1.0	6305955
Total Arsenic (As)	ug/L	1.5	1.0	6305955				<10	10	6321245				<10	10	6305955				19	10	6305955	1.3	1.0	6305955				1.4	1.0	6305955
Total Barium (Ba)	ug/L	12	1.0	6305955				54	10	6321245				59	10	6305955				110	10	6305955	7.8	1.0	6305955				11	1.0	6305955
Total Beryllium (Be)	ug/L	<1.0	1.0	6305955				<10	10	6321245				<10	10	6305955				<10	10	6305955	<1.0	1.0	6305955				<1.0	1.0	6305955
Total Bismuth (Bi)	ug/L	<2.0	2.0	6305955				<20	20	6321245				<20	20	6305955				<20	20	6305955	<2.0	2.0	6305955				<2.0	2.0	6305955
Total Boron (B)	ug/L	<50	50	6305955				2300	500	6321245				4200	500	6305955				3100	500	6305955	<50	50	6305955				<50	50	6305955
Total Cadmium (Cd)	ug/L	0.013	0.010	6305955				<0.10	0.10	6321245				0.10	0.10	6305955				0.13	0.10	6305955	0.018	0.010	6305955				<0.010	0.010	6305955
Total Calcium (Ca)	ug/L	12000	100	6305955				220000	1000	6321245				360000	1000	6305955				290000	1000	6305955	3000	100	6305955				12000	100	6305955
Total Chromium (Cr)	ug/L	1.1	1.0	6305955				14	10	6321245				14	10	6305955				48	10	6305955	<1.0	1.0	6305955				1.1	1.0	6305955
Total Cobalt (Co)	ug/L	<0.40	0.40	6305955				4.5	4.0	6321245				7.9	4.0	6305955				27	4.0	6305955	<0.40	0.40	6305955				<0.40	0.40	6305955
Total Copper (Cu)	ug/L	0.69	0.50	6305955				5.1	5.0	6321245				9.9	5.0	6305955				34	5.0	6305955	1.0	0.50	6305955				2.0	0.50	6305955
Total Iron (Fe)	ug/L	480	50	6305955				9900	500	6321245				15000	500	6305955				49000	500	6305955	470	50	6305955				370	50	6305955
Total Lead (Pb)	ug/L	<0.50	0.50	6305955				7.1	5.0	6321245				10	5.0	6305955				37	5.0	6305955	<0.50	0.50	6305955				<0.50	0.50	6305955
Total Magnesium (Mg)	ug/L	1400	100	6305955				660000	1000	6321245				1100000	1000	6305955				810000	1000	6305955	560	100	6305955				1600	100	6305955
Total Manganese (Mn)	ug/L	87	2.0	6305955				500	20	6321245				750	20	6305955				2700	20	6305955	44	2.0	6305955				32	2.0	6305955
Total Molybdenum (Mo)	ug/L	<2.0	2.0	6305955				<20	20	6321245				<20	20	6305955				<20	20	6305955	<2.0	2.0	6305955				<2.0	2.0	6305955
Total Nickel (Ni)	ug/L	<2.0	2.0	6305955				<20	20	6321245				<20	20	6305955				52	20	6305955	<2.0	2.0	6305955				<2.0	2.0	6305955
Total Phosphorus (P)	ug/L	<100	100	6305955				<1000	1000	6321245				<1000	1000	6305955				1500	1000	6305955	<100	100	6305955				<100	100	6305955
Total Potassium (K)	ug/L	740	100	6305955				200000	1000	6321245				330000	1000	6305955				250000	1000	6305955	500	100	6305955				840	100	6305955
Total Selenium (Se)	ug/L	<0.50	0.50	6305955				<5.0	5.0	6321245				<5.0	5.0	6305955				<5.0	5.0	6305955	<0.50	0.50	6305955				<0.50	0.50	6305955
Total Silver (Ag)	ug/L	<0.10	0.10	6305955				<1.0	1.0	6321245				<1.0	1.0	6305955				<1.0	1.0	6305955	<0.10	0.10	6305955				<0.10	0.10	6305955
Total Sodium (Na)	ug/L	9900	100	6305955				5400000	1000	6321245				9000000	1000	6305955				6500000	1000	6305955	5000	100	6305955				11000	100	6305955
Total Strontium (Sr)	ug/L	82	2.0	6305955				3900	20	6321245				6500	20	6305955				5000	20	6305955	21	2.0	6305955				86	2.0	6305955
Total Thallium (Tl)	ug/L	<0.10	0.10	6305955				<1.0	1.0	6321245				<1.0	1.0	6305955				<1.0	1.0	6305955	<0.10	0.10	6305955				<0.10	0.10	6305955
Total Tin (Sn)	ug/L	<2.0	2.0	6305955				<20	20	6321245				<20	20	6305955				<20	20	6305955	<2.0	2.0	6305955				<2.0	2.0	6305955
Total Titanium (Ti)	ug/L	4.3	2.0	6305955				250	20	6321245				210	20	6305955				450	20	6305955	4.2	2.0	6305955				3.1	2.0	6305955
Total Uranium (U)	ug/L	0.24	0.10	6305955				2.0	1.0	6321245				3.1	1.0	6305955				3.3	1.0	6305955	0.27	0.10	6305955				0.20	0.10	6305955
Total Vanadium (V)	ug/L	<2.0	2.0	6305955				22	20	6321245				31	20	6305955				85	20	6305955	<2.0	2.0	6305955				<2.0	2.0	6305955
Total Zinc (Zn)	ug/L	<5.0	5.0	6305955				<50	50	6321245				<50	50	6305955				150	50	6305955	6.6	5.0	6305955				<5.0	5.0	6305955

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated reporting limit due to method blank performance.
(2) Elevated reporting limit due to blank performance.
(3) Elevated reporting limit due to turbidity.

Results relate only to the items tested.

CBCL Limited
Client Project #: 171046.01

BV Labs Job Number: B9N9256
Report Date: 2019/09/11

RESULTS OF ANALYSES OF WATER

BV Labs ID		KQB839			KQB840			KQB840			KQB841			KQB842			KQB842			KQB843			KQB843			KQB844	
Sampling Date		2019-08-27 11:25			2019-08-27 12:05			2019-08-27 12:05			2019-08-27 13:05			2019-08-27 13:45			2019-08-27 13:45			2019-08-27 14:35			2019-08-27 14:35			2019-08-27 15:10	
COC Number		733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01			733248-01-01	
	UNITS	**AR-4**	**RDL**	**QC Batch**	**AR-6**	**RDL**	**QC Batch**	**AR-6 Lab-Dup**	**RDL**	**QC Batch**	**AVE-9**	**RDL**	**QC Batch**	**AVE-1**	**RDL**	**QC Batch**	**AVE-1 Lab-Dup**	**RDL**	**QC Batch**	**AVE-7**	**RDL**	**QC Batch**	**AVE-7 Lab-Dup**	**RDL**	**QC Batch**	**AVE-8**	**RDL**
Inorganics																											
Carbonaceous BOD	mg/L				4.3	3.1	6304039				5.0	3.1	6304039	<5.0	5.0	6306476											
Total Phosphorus	mg/L				0.034	0.004	6307899	0.035	0.004	6307899	0.29	0.02	6312886	0.7	0.1	6313967											
Salinity	N/A	<2.0	2.0	6313681	<2.0	2.0	6313681				17	2.0	6313681	27	2.0	6313681				24	2.0	6323353	24	2.0	6323353	<2.0	2.0
Total Suspended Solids	mg/L	3.0	1.0	6312107	2.9	2.1	6312107				300	5.0	6312107	310	10	6312107	310	10	6312107	360	10	6312107				690	10
Subcontracted Analysis																											
Subcontract Parameter	N/A				ATTACHED	N/A	6308857				ATTACHED	N/A	6308857	ATTACHED	N/A	6308857											

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Results relate only to the items tested.

CBCL Limited
Client Project #: 171046.01

BV Labs Job Number: B9N9256
Report Date: 2019/09/11

RESULTS OF ANALYSES OF WATER

BV Labs ID		KQB839				KQB845			KQB845			KQB846	KQB847			KQB848			KQB849		KQB850			KQB851		
Sampling Date		2019-08-27 11:25				2019-08-27 16:08			2019-08-27 16:08			2019-08-27 18:05	2019-08-27 18:29			2019-08-27 19:03			2019-08-27 19:40		2019-08-27 20:30			2019-08-27 20:40		
COC Number		733248-01-01				733248-01-01			733248-01-01			733248-01-01	733248-01-01			733248-01-01			733248-01-01		733248-01-01			733248-01-01		
	UNITS	**AR-4**	**RDL**	**QC Batch**	**QC Batch**	**AVE-4**	**RDL**	**QC Batch**	**AVE-4 Lab-Dup**	**RDL**	**QC Batch**	**AR-14**	**AR-15**	**RDL**	**QC Batch**	**AR-16**	**RDL**	**QC Batch**	**AR-4B**	**RDL**	**AR-2**	**RDL**	**QC Batch**	**AR-1**	**RDL**	**QC Batch**
Inorganics																										
Carbonaceous BOD	mg/L					16	3.1	6306476								4.1	3.1	6304039						3.3	3.1	6304039
Total Phosphorus	mg/L					1.5	0.1	6313967								0.027	0.004	6312886						0.025	0.004	6312886
Salinity	N/A	<2.0	2.0	6313681	6323353	21	2.0	6325628	21	2.0	6325628	<2.0	<2.0	2.0	6323353	<2.0	2.0	6323353	<2.0	2.0	<2.0	2.0	6323353	<2.0	2.0	6323353
Total Suspended Solids	mg/L	3.0	1.0	6312107	6312406	3000	10	6312406				120	18	5.0	6312406	4.3	2.1	6312406	310	10	4.0	2.0	6312406	<2.1	2.1	6312406
Subcontracted Analysis																										
Subcontract Parameter	N/A					ATTACHED	N/A	6308857								ATTACHED	N/A	6308857						ATTACHED	N/A	6308857

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Results relate only to the items tested.

BV Labs Job Number: B9N9256
Report Date: 2019/09/11

CBCL Limited
Client Project #: 171046.01

MICROBIOLOGY (WATER)

BV Labs ID		KQB840		KQB841		KQB842	KQB845			KQB848	KQB851		
Sampling Date		2019-08-27 12:05		2019-08-27 13:05		2019-08-27 13:45	2019-08-27 16:08			2019-08-27 19:03	2019-08-27 20:40		
COC Number		733248-01-01		733248-01-01		733248-01-01	733248-01-01			733248-01-01	733248-01-01		
	UNITS	**AR-6**	**RDL**	**AVE-9**	**QC Batch**	**AVE-1**	**AVE-4**	**RDL**	**QC Batch**	**AR-16**	**AR-1**	**RDL**	**QC Batch**
Microbiological													
Fecal coliform	CFU/100mL	30	10	<100	6303862	<100	<100	100	6304779	30	10	10	6303862
Total Coliforms	CFU/100mL	370	10	800	6303864	<100	400	100	6304768	150	2000	10	6303864

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Results relate only to the items tested.

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Each tempera	Each tempera	Each tempera	Each temperature is the average of up to three cooler temperatures taken at receipt
Package 1	2.0°C	#N/A	#N/A
Package 2	-0.3°C	#N/A	#N/A

Samples AVE-1 and AVE-4 were analyzed past hold time for Coliform and Fecal Coliform testing.

Sample KQB841 [AVE-9] : Elevated reporting limits for trace metals due to sample matrix.

Poor RCAp Ion Balance due to sample matrix. Excess cations due to presence of turbidity.

Sample KQB842 [AVE-1] : Elevated reporting limits for trace metals due to sample matrix.

Sample KQB845 [AVE-4] : Elevated reporting limits for trace metals due to sample matrix.

Poor RCAp Ion Balance due to sample matrix. Excess cations due to presence of turbidity.

Sample KQB848 [AR-16] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample KQB851 [AR-1] : TSS:Used all of the sample provided, DL raised.

Results relate only to the items tested.

CBCL Limited
Attention: Melissa Rutherford
Report Date: 2019/09/11 Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9N9256

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6303862	KBO	Method Blank	Fecal coliform	2019-08-28	<1.0		CFU/100mL	
6303864	KBO	Method Blank	Total Coliforms	2019-08-28	<1.0		CFU/100mL	
6304039	EBR	QC Standard	Carbonaceous BOD	2019-09-03		130 (1)	%	80 - 120
6304039	EBR	Spiked Blank	Carbonaceous BOD	2019-09-03		127 (2)	%	80 - 120
6304039	EBR	Method Blank	Carbonaceous BOD	2019-09-03	<2.0		mg/L	
6304039	EBR	RPD	Carbonaceous BOD	2019-09-03	NC		%	25
6304768	SDN	Method Blank	Total Coliforms	2019-08-28	<1.0		CFU/100mL	
6304779	SDN	Method Blank	Fecal coliform	2019-08-28	<1.0		CFU/100mL	
6305955	BAN	Matrix Spike	Total Aluminum (Al)	2019-08-30		98	%	80 - 120
			Total Antimony (Sb)	2019-08-30		103	%	80 - 120
			Total Arsenic (As)	2019-08-30		99	%	80 - 120
			Total Barium (Ba)	2019-08-30		100	%	80 - 120
			Total Beryllium (Be)	2019-08-30		103	%	80 - 120
			Total Bismuth (Bi)	2019-08-30		101	%	80 - 120
			Total Boron (B)	2019-08-30		104	%	80 - 120
			Total Cadmium (Cd)	2019-08-30		97	%	80 - 120
			Total Calcium (Ca)	2019-08-30		102	%	80 - 120
			Total Chromium (Cr)	2019-08-30		97	%	80 - 120
			Total Cobalt (Co)	2019-08-30		97	%	80 - 120
			Total Copper (Cu)	2019-08-30		97	%	80 - 120
			Total Iron (Fe)	2019-08-30		99	%	80 - 120
			Total Lead (Pb)	2019-08-30		99	%	80 - 120
			Total Magnesium (Mg)	2019-08-30		103	%	80 - 120
			Total Manganese (Mn)	2019-08-30		98	%	80 - 120
			Total Molybdenum (Mo)	2019-08-30		102	%	80 - 120
			Total Nickel (Ni)	2019-08-30		98	%	80 - 120
			Total Phosphorus (P)	2019-08-30		101	%	80 - 120
			Total Potassium (K)	2019-08-30		101	%	80 - 120
			Total Selenium (Se)	2019-08-30		97	%	80 - 120
			Total Silver (Ag)	2019-08-30		98	%	80 - 120
			Total Sodium (Na)	2019-08-30		NC	%	80 - 120
			Total Strontium (Sr)	2019-08-30		99	%	80 - 120
			Total Thallium (Tl)	2019-08-30		102	%	80 - 120
			Total Tin (Sn)	2019-08-30		105	%	80 - 120
			Total Titanium (Ti)	2019-08-30		100	%	80 - 120
			Total Uranium (U)	2019-08-30		104	%	80 - 120
			Total Vanadium (V)	2019-08-30		102	%	80 - 120
			Total Zinc (Zn)	2019-08-30		97	%	80 - 120
6305955	BAN	Spiked Blank	Total Aluminum (Al)	2019-08-30		98	%	80 - 120
			Total Antimony (Sb)	2019-08-30		100	%	80 - 120
			Total Arsenic (As)	2019-08-30		97	%	80 - 120
			Total Barium (Ba)	2019-08-30		99	%	80 - 120
			Total Beryllium (Be)	2019-08-30		102	%	80 - 120
			Total Bismuth (Bi)	2019-08-30		101	%	80 - 120
			Total Boron (B)	2019-08-30		103	%	80 - 120
			Total Cadmium (Cd)	2019-08-30		96	%	80 - 120
			Total Calcium (Ca)	2019-08-30		101	%	80 - 120
			Total Chromium (Cr)	2019-08-30		97	%	80 - 120
			Total Cobalt (Co)	2019-08-30		98	%	80 - 120
			Total Copper (Cu)	2019-08-30		98	%	80 - 120
			Total Iron (Fe)	2019-08-30		98	%	80 - 120
			Total Lead (Pb)	2019-08-30		99	%	80 - 120
			Total Magnesium (Mg)	2019-08-30		102	%	80 - 120
			Total Manganese (Mn)	2019-08-30		100	%	80 - 120
			Total Molybdenum (Mo)	2019-08-30		101	%	80 - 120
			Total Nickel (Ni)	2019-08-30		101	%	80 - 120
			Total Phosphorus (P)	2019-08-30		100	%	80 - 120
			Total Potassium (K)	2019-08-30		99	%	80 - 120
			Total Selenium (Se)	2019-08-30		97	%	80 - 120
			Total Silver (Ag)	2019-08-30		96	%	80 - 120

CBCL Limited
Attention: Melissa Rutherford
Report Date: 2019/09/11 Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9N9256

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Sodium (Na)	2019-08-30		95	%	80 - 120
			Total Strontium (Sr)	2019-08-30		100	%	80 - 120
			Total Thallium (Tl)	2019-08-30		101	%	80 - 120
			Total Tin (Sn)	2019-08-30		101	%	80 - 120
			Total Titanium (Ti)	2019-08-30		104	%	80 - 120
			Total Uranium (U)	2019-08-30		103	%	80 - 120
			Total Vanadium (V)	2019-08-30		100	%	80 - 120
			Total Zinc (Zn)	2019-08-30		96	%	80 - 120
6305955	BAN	Method Blank	Total Aluminum (Al)	2019-08-30	<5.0		ug/L	
			Total Antimony (Sb)	2019-08-30	<1.0		ug/L	
			Total Arsenic (As)	2019-08-30	<1.0		ug/L	
			Total Barium (Ba)	2019-08-30	<1.0		ug/L	
			Total Beryllium (Be)	2019-08-30	<1.0		ug/L	
			Total Bismuth (Bi)	2019-08-30	<2.0		ug/L	
			Total Boron (B)	2019-08-30	<50		ug/L	
			Total Cadmium (Cd)	2019-08-30	<0.010		ug/L	
			Total Calcium (Ca)	2019-08-30	<100		ug/L	
			Total Chromium (Cr)	2019-08-30	<1.0		ug/L	
			Total Cobalt (Co)	2019-08-30	<0.40		ug/L	
			Total Copper (Cu)	2019-08-30	<0.50		ug/L	
			Total Iron (Fe)	2019-08-30	<50		ug/L	
			Total Lead (Pb)	2019-08-30	<0.50		ug/L	
			Total Magnesium (Mg)	2019-08-30	<100		ug/L	
			Total Manganese (Mn)	2019-08-30	<2.0		ug/L	
			Total Molybdenum (Mo)	2019-08-30	<2.0		ug/L	
			Total Nickel (Ni)	2019-08-30	<2.0		ug/L	
			Total Phosphorus (P)	2019-08-30	<100		ug/L	
			Total Potassium (K)	2019-08-30	<100		ug/L	
			Total Selenium (Se)	2019-08-30	<0.50		ug/L	
			Total Silver (Ag)	2019-08-30	<0.10		ug/L	
			Total Sodium (Na)	2019-08-30	<100		ug/L	
			Total Strontium (Sr)	2019-08-30	<2.0		ug/L	
			Total Thallium (Tl)	2019-08-30	<0.10		ug/L	
			Total Tin (Sn)	2019-08-30	<2.0		ug/L	
			Total Titanium (Ti)	2019-08-30	<2.0		ug/L	
			Total Uranium (U)	2019-08-30	<0.10		ug/L	
			Total Vanadium (V)	2019-08-30	<2.0		ug/L	
			Total Zinc (Zn)	2019-08-30	<5.0		ug/L	
6305955	BAN	RPD	Total Aluminum (Al)	2019-08-30	NC		%	20
			Total Antimony (Sb)	2019-08-30	NC		%	20
			Total Arsenic (As)	2019-08-30	NC		%	20
			Total Barium (Ba)	2019-08-30	NC		%	20
			Total Beryllium (Be)	2019-08-30	NC		%	20
			Total Bismuth (Bi)	2019-08-30	NC		%	20
			Total Boron (B)	2019-08-30	NC		%	20
			Total Cadmium (Cd)	2019-08-30	NC		%	20
			Total Calcium (Ca)	2019-08-30	NC		%	20
			Total Chromium (Cr)	2019-08-30	NC		%	20
			Total Cobalt (Co)	2019-08-30	NC		%	20
			Total Iron (Fe)	2019-08-30	NC		%	20
			Total Lead (Pb)	2019-08-30	NC		%	20
			Total Magnesium (Mg)	2019-08-30	NC		%	20
			Total Manganese (Mn)	2019-08-30	NC		%	20
			Total Molybdenum (Mo)	2019-08-30	2.0		%	20
			Total Nickel (Ni)	2019-08-30	NC		%	20
			Total Phosphorus (P)	2019-08-30	NC		%	20
			Total Potassium (K)	2019-08-30	NC		%	20
			Total Selenium (Se)	2019-08-30	NC		%	20
			Total Silver (Ag)	2019-08-30	NC		%	20
			Total Sodium (Na)	2019-08-30	2.7		%	20
			Total Strontium (Sr)	2019-08-30	NC		%	20

CBCL Limited
Attention: Melissa Rutherford
Client Project #: 171046.01

Report Date: 2019/09/11

Quality Assurance Report
BV Labs Job Number: B9N9256

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Thallium (Tl)	2019-08-30	NC		%	20
			Total Tin (Sn)	2019-08-30	NC		%	20
			Total Titanium (Ti)	2019-08-30	NC		%	20
			Total Uranium (U)	2019-08-30	2.0		%	20
			Total Vanadium (V)	2019-08-30	NC		%	20
			Total Zinc (Zn)	2019-08-30	NC		%	20
6306091	JMV	QC Standard	pH	2019-08-29		100	%	97 - 103
6306091	JMV	RPD	pH	2019-08-29	1.1		%	N/A
6306095	JMV	Spiked Blank	Conductivity	2019-08-29		104	%	80 - 120
6306095	JMV	Method Blank	Conductivity	2019-08-29	1.1, RDL=1.0		uS/cm	
6306095	JMV	RPD	Conductivity	2019-08-29	0.47		%	10
6306179	JMV	QC Standard	Turbidity	2019-08-29		107	%	80 - 120
6306179	JMV	Spiked Blank	Turbidity	2019-08-29		99	%	80 - 120
6306179	JMV	Method Blank	Turbidity	2019-08-29	<0.10		NTU	
6306179	JMV	RPD [KQB840-02]	Turbidity	2019-08-29	1.9		%	20
6306186	JMV	QC Standard	Turbidity	2019-08-29		107	%	80 - 120
6306186	JMV	Spiked Blank	Turbidity	2019-08-29		100	%	80 - 120
6306186	JMV	Method Blank	Turbidity	2019-08-29	<0.10		NTU	
6306186	JMV	RPD	Turbidity	2019-08-29	NC		%	20
6306476	EBR	QC Standard	Carbonaceous BOD	2019-09-03		120	%	80 - 120
6306476	EBR	Spiked Blank	Carbonaceous BOD	2019-09-03		133 (3)	%	80 - 120
6306476	EBR	Method Blank	Carbonaceous BOD	2019-09-03	<2.0		mg/L	
6306476	EBR	RPD	Carbonaceous BOD	2019-09-03	4.8		%	25
6307899	SSV	Matrix Spike [KQB840-07]	Total Phosphorus	2019-08-30		93	%	80 - 120
6307899	SSV	QC Standard	Total Phosphorus	2019-08-30		84	%	80 - 120
6307899	SSV	Spiked Blank	Total Phosphorus	2019-08-30		95	%	80 - 120
6307899	SSV	Method Blank	Total Phosphorus	2019-08-30	<0.004		mg/L	
6307899	SSV	RPD [KQB840-07]	Total Phosphorus	2019-08-30	2.3		%	20
6308546	JMV	QC Standard	Turbidity	2019-08-30		106	%	80 - 120
6308546	JMV	Spiked Blank	Turbidity	2019-08-30		101	%	80 - 120
6308546	JMV	Method Blank	Turbidity	2019-08-30	<0.10		NTU	
6308546	JMV	RPD [KQB842-02]	Turbidity	2019-08-30	2.7		%	20
6311558	JMV	QC Standard	pH	2019-09-03		101	%	97 - 103
6311558	JMV	RPD	pH	2019-09-03	1.7		%	N/A
6311560	JMV	Spiked Blank	Conductivity	2019-09-03		101	%	80 - 120
6311560	JMV	Method Blank	Conductivity	2019-09-03	<1.0		uS/cm	
6311560	JMV	RPD	Conductivity	2019-09-03	0.0024		%	10
6312107	AM6	QC Standard	Total Suspended Solids	2019-09-09		98	%	80 - 120
6312107	AM6	Method Blank	Total Suspended Solids	2019-09-09	<1.0		mg/L	
6312107	AM6	RPD [KQB842-01]	Total Suspended Solids	2019-09-09	0.65		%	20
6312336	SRM	Matrix Spike [KQB841-02]	Nitrate + Nitrite (N)	2019-09-04		94	%	80 - 120
6312336	SRM	Spiked Blank	Nitrate + Nitrite (N)	2019-09-04		97	%	80 - 120
6312336	SRM	Method Blank	Nitrate + Nitrite (N)	2019-09-04	0.057, RDL=0.050 (4)		mg/L	
6312336	SRM	RPD [KQB841-02]	Nitrate + Nitrite (N)	2019-09-04	8.1 (5)		%	25
6312341	SRM	Matrix Spike [KQB841-02]	Nitrite (N)	2019-09-04		96	%	80 - 120
6312341	SRM	Spiked Blank	Nitrite (N)	2019-09-04		101	%	80 - 120
6312341	SRM	Method Blank	Nitrite (N)	2019-09-04	<0.010		mg/L	
6312341	SRM	RPD [KQB841-02]	Nitrite (N)	2019-09-04	NC		%	20
6312343	SRM	Matrix Spike [KQB841-02]	Orthophosphate (P)	2019-09-04		94	%	80 - 120
6312343	SRM	Spiked Blank	Orthophosphate (P)	2019-09-04		96	%	80 - 120
6312343	SRM	Method Blank	Orthophosphate (P)	2019-09-04	<0.010		mg/L	
6312343	SRM	RPD [KQB841-02]	Orthophosphate (P)	2019-09-04	NC		%	25
6312350	SRM	Spiked Blank	Colour	2019-09-04		95	%	80 - 120
6312350	SRM	Method Blank	Colour	2019-09-04	<5.0		TCU	
6312350	SRM	RPD [KQB841-02]	Colour	2019-09-04	16		%	20
6312383	SRM	Matrix Spike [KQB841-02]	Reactive Silica (SiO2)	2019-09-04		96	%	80 - 120
6312383	SRM	Spiked Blank	Reactive Silica (SiO2)	2019-09-04		100	%	80 - 120

CBCL Limited
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Report Date: 2019/09/11 Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9N9256

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6312383	SRM	Method Blank	Reactive Silica (SiO2)	2019-09-04	0.66, RDL=0.50 (6)		mg/L	
6312383	SRM	RPD [KQB841-02]	Reactive Silica (SiO2)	2019-09-04	4.4 (5)		%	25
6312385	SRM	Matrix Spike [KQB841-02]	Dissolved Sulphate (SO4)	2019-09-04		NC	%	80 - 120
6312385	SRM	Spiked Blank	Dissolved Sulphate (SO4)	2019-09-04		105	%	80 - 120
6312385	SRM	Method Blank	Dissolved Sulphate (SO4)	2019-09-04	2.2, RDL=2.0 (5)		mg/L	
6312385	SRM	RPD [KQB841-02]	Dissolved Sulphate (SO4)	2019-09-04	2.5		%	25
6312387	SRM	Matrix Spike [KQB841-02]	Dissolved Chloride (Cl-)	2019-09-05		NC	%	80 - 120
6312387	SRM	Spiked Blank	Dissolved Chloride (Cl-)	2019-09-04		102	%	80 - 120
6312387	SRM	Method Blank	Dissolved Chloride (Cl-)	2019-09-04	<1.0		mg/L	
6312387	SRM	RPD [KQB841-02]	Dissolved Chloride (Cl-)	2019-09-05	6.0		%	25
6312388	SRM	Matrix Spike [KQB841-02]	Total Alkalinity (Total as CaCO3)	2019-09-04		NC	%	80 - 120
6312388	SRM	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019-09-04		102	%	80 - 120
6312388	SRM	Method Blank	Total Alkalinity (Total as CaCO3)	2019-09-04	<5.0		mg/L	
6312388	SRM	RPD [KQB841-02]	Total Alkalinity (Total as CaCO3)	2019-09-04	0.98		%	25
6312406	AM6	QC Standard	Total Suspended Solids	2019-09-06		100	%	80 - 120
6312406	AM6	Method Blank	Total Suspended Solids	2019-09-06	<1.0		mg/L	
6312406	AM6	RPD	Total Suspended Solids	2019-09-06	5.1		%	20
6312886	SSV	Matrix Spike	Total Phosphorus	2019-09-04		94	%	80 - 120
6312886	SSV	QC Standard	Total Phosphorus	2019-09-04		88	%	80 - 120
6312886	SSV	Spiked Blank	Total Phosphorus	2019-09-04		95	%	80 - 120
6312886	SSV	Method Blank	Total Phosphorus	2019-09-04	<0.004		mg/L	
6312886	SSV	RPD	Total Phosphorus	2019-09-04	4.6		%	20
6313681	BBD	QC Standard	Salinity	2019-09-04		100	%	80 - 120
6313681	BBD	Method Blank	Salinity	2019-09-04	<2.0		N/A	
6313681	BBD	RPD	Salinity	2019-09-04	0		%	25
6313837	EMT	Matrix Spike	Total Organic Carbon (C)	2019-09-04		94	%	85 - 115
6313837	EMT	Spiked Blank	Total Organic Carbon (C)	2019-09-04		94	%	80 - 120
6313837	EMT	Method Blank	Total Organic Carbon (C)	2019-09-04	<0.50		mg/L	
6313837	EMT	RPD	Total Organic Carbon (C)	2019-09-04	1.0		%	15
6313841	EMT	Matrix Spike [KQB848-06]	Total Organic Carbon (C)	2019-09-04		91	%	85 - 115
6313841	EMT	Spiked Blank	Total Organic Carbon (C)	2019-09-04		94	%	80 - 120
6313841	EMT	Method Blank	Total Organic Carbon (C)	2019-09-04	<0.50		mg/L	
6313841	EMT	RPD [KQB848-06]	Total Organic Carbon (C)	2019-09-04	0.33		%	15
6313967	SSV	Matrix Spike	Total Phosphorus	2019-09-05		94	%	80 - 120
6313967	SSV	QC Standard	Total Phosphorus	2019-09-05		88	%	80 - 120
6313967	SSV	Spiked Blank	Total Phosphorus	2019-09-05		98	%	80 - 120
6313967	SSV	Method Blank	Total Phosphorus	2019-09-05	<0.004		mg/L	
6313967	SSV	RPD	Total Phosphorus	2019-09-05	1.0		%	20
6314232	SRM	Matrix Spike	Total Alkalinity (Total as CaCO3)	2019-09-06		62 (7)	%	80 - 120
6314232	SRM	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019-09-05		106	%	80 - 120
6314232	SRM	Method Blank	Total Alkalinity (Total as CaCO3)	2019-09-05	<5.0		mg/L	
6314232	SRM	RPD	Total Alkalinity (Total as CaCO3)	2019-09-05	NC		%	25
6314235	SRM	Matrix Spike	Dissolved Chloride (Cl-)	2019-09-05		NC	%	80 - 120
6314235	SRM	Spiked Blank	Dissolved Chloride (Cl-)	2019-09-05		98	%	80 - 120
6314235	SRM	Method Blank	Dissolved Chloride (Cl-)	2019-09-05	<1.0		mg/L	
6314235	SRM	RPD	Dissolved Chloride (Cl-)	2019-09-05	0.55		%	25
6314240	SRM	Matrix Spike	Dissolved Sulphate (SO4)	2019-09-05		NC	%	80 - 120
6314240	SRM	Spiked Blank	Dissolved Sulphate (SO4)	2019-09-05		104	%	80 - 120
6314240	SRM	Method Blank	Dissolved Sulphate (SO4)	2019-09-05	<2.0		mg/L	
6314240	SRM	RPD	Dissolved Sulphate (SO4)	2019-09-05	1.4		%	25
6314244	SRM	Matrix Spike	Reactive Silica (SiO2)	2019-09-05		NC	%	80 - 120
6314244	SRM	Spiked Blank	Reactive Silica (SiO2)	2019-09-05		98	%	80 - 120
6314244	SRM	Method Blank	Reactive Silica (SiO2)	2019-09-05	<0.50		mg/L	
6314244	SRM	RPD	Reactive Silica (SiO2)	2019-09-05	3.1		%	25
6314251	SRM	Spiked Blank	Colour	2019-09-05		103	%	80 - 120
6314251	SRM	Method Blank	Colour	2019-09-05	<5.0		TCU	
6314251	SRM	RPD	Colour	2019-09-05	NC		%	20
6314253	SRM	Matrix Spike	Orthophosphate (P)	2019-09-06		3.6 (7)	%	80 - 120

CBCL Limited
Attention: Melissa Rutherford
Client Project #: 171046.01

Report Date: 2019/09/11

Quality Assurance Report
BV Labs Job Number: B9N9256

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6314253	SRM	Spiked Blank	Orthophosphate (P)	2019-09-06		95	%	80 - 120
6314253	SRM	Method Blank	Orthophosphate (P)	2019-09-06	<0.010		mg/L	
6314253	SRM	RPD	Orthophosphate (P)	2019-09-06	NC		%	25
6314269	SRM	Matrix Spike	Nitrate + Nitrite (N)	2019-09-05		NC (7)	%	80 - 120
6314269	SRM	Spiked Blank	Nitrate + Nitrite (N)	2019-09-05		86	%	80 - 120
6314269	SRM	Method Blank	Nitrate + Nitrite (N)	2019-09-05	0.050, RDL=0.050		mg/L	
6314269	SRM	RPD	Nitrate + Nitrite (N)	2019-09-05	1.7 (8)		%	25
6314273	SRM	Matrix Spike	Nitrite (N)	2019-09-05		100	%	80 - 120
6314273	SRM	Spiked Blank	Nitrite (N)	2019-09-05		100	%	80 - 120
6314273	SRM	Method Blank	Nitrite (N)	2019-09-05	<0.010		mg/L	
6314273	SRM	RPD	Nitrite (N)	2019-09-05	NC		%	20
6315942	SRM	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2019-09-06		100	%	80 - 120
6315942	SRM	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2019-09-06		97	%	80 - 120
6315942	SRM	Method Blank	Nitrogen (Ammonia Nitrogen)	2019-09-06	<0.050		mg/L	
6315942	SRM	RPD	Nitrogen (Ammonia Nitrogen)	2019-09-06	NC		%	20
6318254	SRM	Matrix Spike [KQB842-02]	Total Alkalinity (Total as CaCO3)	2019-09-09		NC	%	80 - 120
6318254	SRM	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019-09-09		108	%	80 - 120
6318254	SRM	Method Blank	Total Alkalinity (Total as CaCO3)	2019-09-09	<5.0		mg/L	
6318254	SRM	RPD [KQB842-02]	Total Alkalinity (Total as CaCO3)	2019-09-09	4.1		%	25
6318255	SRM	Matrix Spike [KQB842-02]	Dissolved Chloride (Cl-)	2019-09-10		NC	%	80 - 120
6318255	SRM	Spiked Blank	Dissolved Chloride (Cl-)	2019-09-09		101	%	80 - 120
6318255	SRM	Method Blank	Dissolved Chloride (Cl-)	2019-09-09	<1.0		mg/L	
6318255	SRM	RPD [KQB842-02]	Dissolved Chloride (Cl-)	2019-09-10	0.30		%	25
6318257	SRM	Matrix Spike [KQB842-02]	Dissolved Sulphate (SO4)	2019-09-10		NC	%	80 - 120
6318257	SRM	Spiked Blank	Dissolved Sulphate (SO4)	2019-09-09		108	%	80 - 120
6318257	SRM	Method Blank	Dissolved Sulphate (SO4)	2019-09-09	<2.0		mg/L	
6318257	SRM	RPD [KQB842-02]	Dissolved Sulphate (SO4)	2019-09-10	1.2		%	25
6318259	SRM	Matrix Spike [KQB842-02]	Reactive Silica (SiO2)	2019-09-09		88	%	80 - 120
6318259	SRM	Spiked Blank	Reactive Silica (SiO2)	2019-09-09		99	%	80 - 120
6318259	SRM	Method Blank	Reactive Silica (SiO2)	2019-09-09	<0.50		mg/L	
6318259	SRM	RPD [KQB842-02]	Reactive Silica (SiO2)	2019-09-09	11		%	25
6318271	SRM	Spiked Blank	Colour	2019-09-09		104	%	80 - 120
6318271	SRM	Method Blank	Colour	2019-09-09	<5.0		TCU	
6318271	SRM	RPD [KQB842-02]	Colour	2019-09-09	5.0		%	20
6318276	SRM	Matrix Spike [KQB842-02]	Orthophosphate (P)	2019-09-09		92	%	80 - 120
6318276	SRM	Spiked Blank	Orthophosphate (P)	2019-09-09		97	%	80 - 120
6318276	SRM	Method Blank	Orthophosphate (P)	2019-09-09	<0.010		mg/L	
6318276	SRM	RPD [KQB842-02]	Orthophosphate (P)	2019-09-09	NC		%	25
6318278	SRM	Matrix Spike [KQB842-02]	Nitrate + Nitrite (N)	2019-09-09		81	%	80 - 120
6318278	SRM	Spiked Blank	Nitrate + Nitrite (N)	2019-09-09		83	%	80 - 120
6318278	SRM	Method Blank	Nitrate + Nitrite (N)	2019-09-09	<0.050		mg/L	
6318278	SRM	RPD [KQB842-02]	Nitrate + Nitrite (N)	2019-09-09	8.7		%	25
6318281	SRM	Matrix Spike [KQB842-02]	Nitrite (N)	2019-09-09		97	%	80 - 120
6318281	SRM	Spiked Blank	Nitrite (N)	2019-09-09		100	%	80 - 120
6318281	SRM	Method Blank	Nitrite (N)	2019-09-09	<0.010		mg/L	
6318281	SRM	RPD [KQB842-02]	Nitrite (N)	2019-09-09	NC		%	20
6318311	SRM	Matrix Spike	Total Alkalinity (Total as CaCO3)	2019-09-09		NC	%	80 - 120
6318311	SRM	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019-09-09		109	%	80 - 120
6318311	SRM	Method Blank	Total Alkalinity (Total as CaCO3)	2019-09-09	<5.0		mg/L	
6318311	SRM	RPD	Total Alkalinity (Total as CaCO3)	2019-09-09	2.5		%	25
6318314	SRM	Matrix Spike	Dissolved Chloride (Cl-)	2019-09-09		NC	%	80 - 120
6318314	SRM	Spiked Blank	Dissolved Chloride (Cl-)	2019-09-09		103	%	80 - 120
6318314	SRM	Method Blank	Dissolved Chloride (Cl-)	2019-09-09	<1.0		mg/L	
6318314	SRM	RPD	Dissolved Chloride (Cl-)	2019-09-09	4.6		%	25
6318315	SRM	Matrix Spike	Dissolved Sulphate (SO4)	2019-09-09		102	%	80 - 120
6318315	SRM	Spiked Blank	Dissolved Sulphate (SO4)	2019-09-09		107	%	80 - 120
6318315	SRM	Method Blank	Dissolved Sulphate (SO4)	2019-09-09	<2.0		mg/L	
6318315	SRM	RPD	Dissolved Sulphate (SO4)	2019-09-09	1.1		%	25
6318320	SRM	Matrix Spike	Reactive Silica (SiO2)	2019-09-09		101	%	80 - 120
6318320	SRM	Spiked Blank	Reactive Silica (SiO2)	2019-09-09		102	%	80 - 120

Report Date: 2019/09/11

CBCL Limited
Attention: Melissa Rutherford
Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9N9256

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6318320	SRM	Method Blank	Reactive Silica (SiO2)	2019-09-09	<0.50		mg/L	
6318320	SRM	RPD	Reactive Silica (SiO2)	2019-09-09	3.2		%	25
6318321	SRM	Spiked Blank	Colour	2019-09-09		107	%	80 - 120
6318321	SRM	Method Blank	Colour	2019-09-09	<5.0		TCU	
6318321	SRM	RPD	Colour	2019-09-09	8.2		%	20
6318323	SRM	Matrix Spike	Orthophosphate (P)	2019-09-09		NC	%	80 - 120
6318323	SRM	Spiked Blank	Orthophosphate (P)	2019-09-09		97	%	80 - 120
6318323	SRM	Method Blank	Orthophosphate (P)	2019-09-09	<0.010		mg/L	
6318323	SRM	RPD	Orthophosphate (P)	2019-09-09	1.0		%	25
6318328	SRM	Matrix Spike	Nitrate + Nitrite (N)	2019-09-09		83	%	80 - 120
6318328	SRM	Spiked Blank	Nitrate + Nitrite (N)	2019-09-09		89	%	80 - 120
6318328	SRM	Method Blank	Nitrate + Nitrite (N)	2019-09-09	<0.050		mg/L	
6318328	SRM	RPD	Nitrate + Nitrite (N)	2019-09-09	5.9		%	25
6318329	SRM	Matrix Spike	Nitrite (N)	2019-09-09		94	%	80 - 120
6318329	SRM	Spiked Blank	Nitrite (N)	2019-09-09		100	%	80 - 120
6318329	SRM	Method Blank	Nitrite (N)	2019-09-09	<0.010		mg/L	
6318329	SRM	RPD	Nitrite (N)	2019-09-09	0.53		%	20
6318378	SRM	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2019-09-10		94	%	80 - 120
6318378	SRM	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2019-09-09		104	%	80 - 120
6318378	SRM	Method Blank	Nitrogen (Ammonia Nitrogen)	2019-09-09	<0.050		mg/L	
6318378	SRM	RPD	Nitrogen (Ammonia Nitrogen)	2019-09-10	NC		%	20
6321245	BAN	Matrix Spike	Total Aluminum (Al)	2019-09-09		106	%	80 - 120
			Total Antimony (Sb)	2019-09-09		104	%	80 - 120
			Total Arsenic (As)	2019-09-09		101	%	80 - 120
			Total Barium (Ba)	2019-09-09		102	%	80 - 120
			Total Beryllium (Be)	2019-09-09		101	%	80 - 120
			Total Bismuth (Bi)	2019-09-09		102	%	80 - 120
			Total Boron (B)	2019-09-09		105	%	80 - 120
			Total Cadmium (Cd)	2019-09-09		100	%	80 - 120
			Total Calcium (Ca)	2019-09-09		NC	%	80 - 120
			Total Chromium (Cr)	2019-09-09		99	%	80 - 120
			Total Cobalt (Co)	2019-09-09		101	%	80 - 120
			Total Copper (Cu)	2019-09-09		97	%	80 - 120
			Total Iron (Fe)	2019-09-09		104	%	80 - 120
			Total Lead (Pb)	2019-09-09		102	%	80 - 120
			Total Magnesium (Mg)	2019-09-09		109	%	80 - 120
			Total Manganese (Mn)	2019-09-09		101	%	80 - 120
			Total Molybdenum (Mo)	2019-09-09		107	%	80 - 120
			Total Nickel (Ni)	2019-09-09		100	%	80 - 120
			Total Phosphorus (P)	2019-09-09		107	%	80 - 120
			Total Potassium (K)	2019-09-09		105	%	80 - 120
			Total Selenium (Se)	2019-09-09		99	%	80 - 120
			Total Silver (Ag)	2019-09-09		100	%	80 - 120
			Total Sodium (Na)	2019-09-09		103	%	80 - 120
			Total Strontium (Sr)	2019-09-09		102	%	80 - 120
			Total Thallium (Tl)	2019-09-09		103	%	80 - 120
			Total Tin (Sn)	2019-09-09		104	%	80 - 120
			Total Titanium (Ti)	2019-09-09		105	%	80 - 120
			Total Uranium (U)	2019-09-09		106	%	80 - 120
			Total Vanadium (V)	2019-09-09		99	%	80 - 120
			Total Zinc (Zn)	2019-09-09		99	%	80 - 120
6321245	BAN	Spiked Blank	Total Aluminum (Al)	2019-09-09		110	%	80 - 120
			Total Antimony (Sb)	2019-09-09		106	%	80 - 120
			Total Arsenic (As)	2019-09-09		101	%	80 - 120
			Total Barium (Ba)	2019-09-09		104	%	80 - 120
			Total Beryllium (Be)	2019-09-09		102	%	80 - 120
			Total Bismuth (Bi)	2019-09-09		107	%	80 - 120
			Total Boron (B)	2019-09-09		105	%	80 - 120
			Total Cadmium (Cd)	2019-09-09		101	%	80 - 120
			Total Calcium (Ca)	2019-09-09		109	%	80 - 120
			Total Chromium (Cr)	2019-09-09		102	%	80 - 120

CBCL Limited
Attention: Melissa Rutherford
Report Date: 2019/09/11 Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9N9256

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Cobalt (Co)	2019-09-09		104	%	80 - 120
			Total Copper (Cu)	2019-09-09		102	%	80 - 120
			Total Iron (Fe)	2019-09-09		108	%	80 - 120
			Total Lead (Pb)	2019-09-09		107	%	80 - 120
			Total Magnesium (Mg)	2019-09-09		113	%	80 - 120
			Total Manganese (Mn)	2019-09-09		106	%	80 - 120
			Total Molybdenum (Mo)	2019-09-09		106	%	80 - 120
			Total Nickel (Ni)	2019-09-09		104	%	80 - 120
			Total Phosphorus (P)	2019-09-09		111	%	80 - 120
			Total Potassium (K)	2019-09-09		110	%	80 - 120
			Total Selenium (Se)	2019-09-09		100	%	80 - 120
			Total Silver (Ag)	2019-09-09		102	%	80 - 120
			Total Sodium (Na)	2019-09-09		107	%	80 - 120
			Total Strontium (Sr)	2019-09-09		105	%	80 - 120
			Total Thallium (Tl)	2019-09-09		107	%	80 - 120
			Total Tin (Sn)	2019-09-09		106	%	80 - 120
			Total Titanium (Ti)	2019-09-09		105	%	80 - 120
			Total Uranium (U)	2019-09-09		109	%	80 - 120
			Total Vanadium (V)	2019-09-09		103	%	80 - 120
			Total Zinc (Zn)	2019-09-09		103	%	80 - 120
6321245	BAN	Method Blank	Total Aluminum (Al)	2019-09-09	<5.0		ug/L	
			Total Antimony (Sb)	2019-09-09	<1.0		ug/L	
			Total Arsenic (As)	2019-09-09	<1.0		ug/L	
			Total Barium (Ba)	2019-09-09	<1.0		ug/L	
			Total Beryllium (Be)	2019-09-09	<1.0		ug/L	
			Total Bismuth (Bi)	2019-09-09	<2.0		ug/L	
			Total Boron (B)	2019-09-09	<50		ug/L	
			Total Cadmium (Cd)	2019-09-09	<0.010		ug/L	
			Total Calcium (Ca)	2019-09-09	<100		ug/L	
			Total Chromium (Cr)	2019-09-09	<1.0		ug/L	
			Total Cobalt (Co)	2019-09-09	<0.40		ug/L	
			Total Copper (Cu)	2019-09-09	<0.50		ug/L	
			Total Iron (Fe)	2019-09-09	<50		ug/L	
			Total Lead (Pb)	2019-09-09	<0.50		ug/L	
			Total Magnesium (Mg)	2019-09-09	<100		ug/L	
			Total Manganese (Mn)	2019-09-09	<2.0		ug/L	
			Total Molybdenum (Mo)	2019-09-09	<2.0		ug/L	
			Total Nickel (Ni)	2019-09-09	<2.0		ug/L	
			Total Phosphorus (P)	2019-09-09	<100		ug/L	
			Total Potassium (K)	2019-09-09	<100		ug/L	
			Total Selenium (Se)	2019-09-09	<0.50		ug/L	
			Total Silver (Ag)	2019-09-09	<0.10		ug/L	
			Total Sodium (Na)	2019-09-09	<100		ug/L	
			Total Strontium (Sr)	2019-09-09	<2.0		ug/L	
			Total Thallium (Tl)	2019-09-09	<0.10		ug/L	
			Total Tin (Sn)	2019-09-09	<2.0		ug/L	
			Total Titanium (Ti)	2019-09-09	<2.0		ug/L	
			Total Uranium (U)	2019-09-09	<0.10		ug/L	
			Total Vanadium (V)	2019-09-09	<2.0		ug/L	
			Total Zinc (Zn)	2019-09-09	<5.0		ug/L	
6321245	BAN	RPD	Total Aluminum (Al)	2019-09-09	NC		%	20
			Total Antimony (Sb)	2019-09-09	NC		%	20
			Total Arsenic (As)	2019-09-09	NC		%	20
			Total Barium (Ba)	2019-09-09	3.1		%	20
			Total Beryllium (Be)	2019-09-09	NC		%	20
			Total Bismuth (Bi)	2019-09-09	NC		%	20
			Total Boron (B)	2019-09-09	NC		%	20
			Total Cadmium (Cd)	2019-09-09	NC		%	20
			Total Calcium (Ca)	2019-09-09	3.3		%	20
			Total Chromium (Cr)	2019-09-09	6.0		%	20
			Total Cobalt (Co)	2019-09-09	NC		%	20

CBCL Limited
Attention: Melissa Rutherford
Client Project #: 171046.01

Report Date: 2019/09/11

Quality Assurance Report
BV Labs Job Number: B9N9256

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Copper (Cu)	2019-09-09	0.60		%	20
			Total Iron (Fe)	2019-09-09	NC		%	20
			Total Lead (Pb)	2019-09-09	2.9		%	20
			Total Magnesium (Mg)	2019-09-09	2.6		%	20
			Total Manganese (Mn)	2019-09-09	NC		%	20
			Total Molybdenum (Mo)	2019-09-09	NC		%	20
			Total Nickel (Ni)	2019-09-09	NC		%	20
			Total Phosphorus (P)	2019-09-09	NC		%	20
			Total Potassium (K)	2019-09-09	2.6		%	20
			Total Selenium (Se)	2019-09-09	NC		%	20
			Total Silver (Ag)	2019-09-09	NC		%	20
			Total Sodium (Na)	2019-09-09	1.9		%	20
			Total Strontium (Sr)	2019-09-09	1.1		%	20
			Total Thallium (Tl)	2019-09-09	NC		%	20
			Total Tin (Sn)	2019-09-09	NC		%	20
			Total Titanium (Ti)	2019-09-09	NC		%	20
			Total Uranium (U)	2019-09-09	5.9		%	20
			Total Vanadium (V)	2019-09-09	NC		%	20
			Total Zinc (Zn)	2019-09-09	0.58		%	20
6321609	EMT	Matrix Spike	Total Organic Carbon (C)	2019-09-10		95	%	85 - 115
6321609	EMT	Spiked Blank	Total Organic Carbon (C)	2019-09-09		93	%	80 - 120
6321609	EMT	Method Blank	Total Organic Carbon (C)	2019-09-09	<0.50		mg/L	
6321609	EMT	RPD	Total Organic Carbon (C)	2019-09-10	0.96		%	15
6323353	BBD	QC Standard	Salinity	2019-09-10		101	%	80 - 120
6323353	BBD	Method Blank	Salinity	2019-09-10	<2.0		N/A	
6323353	BBD	RPD [KQB843-02]	Salinity	2019-09-10	0		%	25
6325628	BBD	QC Standard	Salinity	2019-09-11		100	%	80 - 120
6325628	BBD	Method Blank	Salinity	2019-09-11	<2.0		N/A	
6325628	BBD	RPD [KQB845-02]	Salinity	2019-09-11	0		%	25

N/A = Not Applicable
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).
(1) CBOD Analysis: Reference material and second source recovery high.
(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.
(3) CBOD Analysis: second source recovery high.
(4) Elevated blank results due to low level contamination.
(5) Elevated reporting limit due to blank performance.
(6) Elevated blank result due to low level contamination.
(7) Poor spike recovery due to sample matrix.
(8) Elevated reporting limit due to method blank performance.

Analyte_ID	Parameter	Sample_ID	Method	Results	Units	EQL	Lab_ID	Matrix	Lab_Duplicate_Of	Field_Duplicate_Of	Date_Sampled	CSite #	DFRP #	DCC_Project_ID	Report Name	TableName
	Salinity	AR-4	SM 22 2520B	<2.0	N/A	2.0	KQB839	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	TSS	AR-4	SM 23 2540D m	3.0	mg/L	1.0	KQB839	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Nitrate (as N)	AR-6	ASTM D3867-16	0.066	mg/L	0.055	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Hardness (as CaCO3)	AR-6	Auto Calc	35	mg/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Anion Sum	AR-6	Auto Calc.	1.25	me/L	N/A	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Total Dissolved Solids	AR-6	Auto Calc.	76	mg/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Cation Sum	AR-6	Auto Calc.	1.17	me/L	N/A	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Ion Balance (% Difference)	AR-6	Auto Calc.	3.31	%	N/A	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Langelier Index (@ 20C)	AR-6	Auto Calc.	-1.84	N/A		KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Langelier Index (@ 4C)	AR-6	Auto Calc.	-2.09	N/A		KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Saturation pH (@ 20C)	AR-6	Auto Calc.	9.11	N/A		KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Saturation pH (@ 4C)	AR-6	Auto Calc.	9.36	N/A		KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Bicarbonate (as CaCO3)	AR-6	SM 23 4500-CO2 D	14	mg/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Carbonate (as CaCO3)	AR-6	SM 23 4500-CO2 D	<1.0	mg/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Sulphate	AR-6	ASTM D516-16 m	25	mg/L	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Turbidity	AR-6	EPA 180.1 R2 m	6.3	NTU	0.10	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Alkalinity (as CaCO3)	AR-6	EPA 310.2 R1974 m	14	mg/L	5.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Ammonia	AR-6	EPA 350.1 R2 m	<0.050	mg/L	0.050	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Reactive Silica (as SiO2)	AR-6	EPA 366.0 m	1.8	mg/L	0.50	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Salinity	AR-6	SM 22 2520B	<2.0	N/A	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Colour	AR-6	SM 23 2120C m	55	TCU	25	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Conductivity	AR-6	SM 23 2510B m	140	uS/cm	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	TSS	AR-6	SM 23 2540D m	2.9	mg/L	2.1	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Phosphorus	AR-6	SM 23 4500 P B H m	0.034	mg/L	0.004	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Chloride	AR-6	SM 23 4500-Cl- E m	16	mg/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	pH	AR-6	SM 23 4500-H+ B m	7.27	pH	N/A	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Nitrite	AR-6	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Ortho Phosphate (as P)	AR-6	SM 23 4500-P E m	<0.010	mg/L	0.010	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Carbonaceous BOD	AR-6	SM 23 5210B m	4.3	mg/L	3.1	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	TOC	AR-6	SM 23 5310B m	6.7	mg/L	0.50	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Nitrate + Nitrite (as N)	AR-6	USGS I-2547-11m	0.066	mg/L	0.055	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Aluminum	AR-6	EPA 6020B R2 m	200	ug/L	5.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Antimony	AR-6	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Arsenic	AR-6	EPA 6020B R2 m	1.5	ug/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Barium	AR-6	EPA 6020B R2 m	12	ug/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Beryllium	AR-6	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Bismuth	AR-6	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Boron	AR-6	EPA 6020B R2 m	<50	ug/L	50	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Cadmium	AR-6	EPA 6020B R2 m	0.013	ug/L	0.010	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Calcium	AR-6	EPA 6020B R2 m	12000	ug/L	100	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Chromium	AR-6	EPA 6020B R2 m	1.1	ug/L	1.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Cobalt	AR-6	EPA 6020B R2 m	<0.40	ug/L	0.40	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Copper	AR-6	EPA 6020B R2 m	0.69	ug/L	0.50	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Iron	AR-6	EPA 6020B R2 m	480	ug/L	50	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Lead	AR-6	EPA 6020B R2 m	<0.50	ug/L	0.50	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Magnesium	AR-6	EPA 6020B R2 m	1400	ug/L	100	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Manganese	AR-6	EPA 6020B R2 m	87	ug/L	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Molybdenum	AR-6	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Nickel	AR-6	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Phosphorus (P)	AR-6	EPA 6020B R2 m	<100	ug/L	100	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Potassium	AR-6	EPA 6020B R2 m	740	ug/L	100	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Selenium	AR-6	EPA 6020B R2 m	<0.50	ug/L	0.50	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Silver	AR-6	EPA 6020B R2 m	<0.10	ug/L	0.10	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Sodium	AR-6	EPA 6020B R2 m	9900	ug/L	100	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Strontium	AR-6	EPA 6020B R2 m	82	ug/L	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Thallium	AR-6	EPA 6020B R2 m	<0.10	ug/L	0.10	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Tin	AR-6	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Titanium	AR-6	EPA 6020B R2 m	4.3	ug/L	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Uranium	AR-6	EPA 6020B R2 m	0.24	ug/L	0.10	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Vanadium	AR-6	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Zinc	AR-6	EPA 6020B R2 m	<5.0	ug/L	5.0	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Total Coliforms	AR-6	MOE E3371 R2 (2018)	370	CFU/100mL	10	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
	Fecal coliform	AR-6	SM 23 9222D	30	CFU/100mL	10	KQB840	Water			2019/08/27				B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls

Subcontract Parameter	AR-6		ATTACHED	N/A	N/A	KQB840	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Turbidity	AR-6	EPA 180.1 R2 m	6.2	NTU	0.10	KQB840D1	Water	KQB840	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus	AR-6	SM 23 4500 P B H m	0.035	mg/L	0.004	KQB840D1	Water	KQB840	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate (as N)	AVE-9	ASTM D3867-16	<0.060	mg/L	0.060	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Hardness (as CaCO3)	AVE-9	Auto Calc	3200	mg/L	1.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Anion Sum	AVE-9	Auto Calc.	219	me/L	N/A	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Dissolved Solids	AVE-9	Auto Calc.	15000	mg/L	1.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cation Sum	AVE-9	Auto Calc.	303	me/L	N/A	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ion Balance (% Difference)	AVE-9	Auto Calc.	16.2	%	N/A	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 20C)	AVE-9	Auto Calc.	-0.151	N/A		KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 4C)	AVE-9	Auto Calc.	-0.388	N/A		KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 20C)	AVE-9	Auto Calc.	7.71	N/A		KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 4C)	AVE-9	Auto Calc.	7.94	N/A		KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bicarbonate (as CaCO3)	AVE-9	SM 23 4500-CO2 D	73	mg/L	1.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonate (as CaCO3)	AVE-9	SM 23 4500-CO2 D	<1.0	mg/L	1.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sulphate	AVE-9	ASTM D516-16 m	1200	mg/L	40	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Turbidity	AVE-9	EPA 180.1 R2 m	360	NTU	1.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Alkalinity (as CaCO3)	AVE-9	EPA 310.2 R1974 m	73	mg/L	5.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ammonia	AVE-9	EPA 350.1 R2 m	0.16	mg/L	0.050	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Reactive Silica (as SiO2)	AVE-9	EPA 366.0 m	1.9	mg/L	0.67	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AVE-9	SM 22 2520B	17	N/A	2.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Colour	AVE-9	SM 23 2120C m	24	TCU	5.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Conductivity	AVE-9	SM 23 2510B m	29000	uS/cm	1.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AVE-9	SM 23 2540D m	300	mg/L	5.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus	AVE-9	SM 23 4500 P B H m	0.29	mg/L	0.02	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chloride	AVE-9	SM 23 4500-Cl- E m	6800	mg/L	100	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
pH	AVE-9	SM 23 4500-H+ B m	7.55	pH	N/A	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrite	AVE-9	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ortho Phosphate (as P)	AVE-9	SM 23 4500-P E m	<0.010	mg/L	0.010	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonaceous BOD	AVE-9	SM 23 5210B m	5.0	mg/L	3.1	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TOC	AVE-9	SM 23 5310B m	5.5	mg/L	5.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate + Nitrite (as N)	AVE-9	USGS I-2547-11m	<0.060	mg/L	0.060	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Aluminum	AVE-9	EPA 6020B R2 m	11000	ug/L	50	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Antimony	AVE-9	EPA 6020B R2 m	<10	ug/L	10	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Arsenic	AVE-9	EPA 6020B R2 m	<10	ug/L	10	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Barium	AVE-9	EPA 6020B R2 m	54	ug/L	10	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Beryllium	AVE-9	EPA 6020B R2 m	<10	ug/L	10	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bismuth	AVE-9	EPA 6020B R2 m	<20	ug/L	20	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Boron	AVE-9	EPA 6020B R2 m	2300	ug/L	500	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cadmium	AVE-9	EPA 6020B R2 m	<0.10	ug/L	0.10	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Calcium	AVE-9	EPA 6020B R2 m	220000	ug/L	1000	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chromium	AVE-9	EPA 6020B R2 m	14	ug/L	10	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cobalt	AVE-9	EPA 6020B R2 m	4.5	ug/L	4.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Copper	AVE-9	EPA 6020B R2 m	5.1	ug/L	5.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Iron	AVE-9	EPA 6020B R2 m	9900	ug/L	500	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Lead	AVE-9	EPA 6020B R2 m	7.1	ug/L	5.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Magnesium	AVE-9	EPA 6020B R2 m	660000	ug/L	1000	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Manganese	AVE-9	EPA 6020B R2 m	500	ug/L	20	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Molybdenum	AVE-9	EPA 6020B R2 m	<20	ug/L	20	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nickel	AVE-9	EPA 6020B R2 m	<20	ug/L	20	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus (P)	AVE-9	EPA 6020B R2 m	<1000	ug/L	1000	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Potassium	AVE-9	EPA 6020B R2 m	200000	ug/L	1000	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Selenium	AVE-9	EPA 6020B R2 m	<5.0	ug/L	5.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Silver	AVE-9	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sodium	AVE-9	EPA 6020B R2 m	5400000	ug/L	1000	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Strontium	AVE-9	EPA 6020B R2 m	3900	ug/L	20	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Thallium	AVE-9	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Tin	AVE-9	EPA 6020B R2 m	<20	ug/L	20	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Titanium	AVE-9	EPA 6020B R2 m	250	ug/L	20	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Uranium	AVE-9	EPA 6020B R2 m	2.0	ug/L	1.0	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Vanadium	AVE-9	EPA 6020B R2 m	22	ug/L	20	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Zinc	AVE-9	EPA 6020B R2 m	<50	ug/L	50	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Coliforms	AVE-9	MOE E3371 R2 (2018)	800	CFU/100mL	100	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Fecal coliform	AVE-9	SM 23 9222D	<100	CFU/100mL	100	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls

Subcontract Parameter	AVE-9		ATTACHED	N/A	N/A	KQB841	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sulphate	AVE-9	ASTM D516-16 m	1200	mg/L	40	KQB841D1	Water	KQB841	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Alkalinity (as CaCO3)	AVE-9	EPA 310.2 R1974 m	74	mg/L	5.0	KQB841D1	Water	KQB841	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Reactive Silica (as SiO2)	AVE-9	EPA 366.0 m	2.0	mg/L	0.67	KQB841D1	Water	KQB841	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Colour	AVE-9	SM 23 2120C m	21	TCU	5.0	KQB841D1	Water	KQB841	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chloride	AVE-9	SM 23 4500-Cl- E m	7200	mg/L	100	KQB841D1	Water	KQB841	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrite	AVE-9	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQB841D1	Water	KQB841	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ortho Phosphate (as P)	AVE-9	SM 23 4500-P E m	<0.010	mg/L	0.010	KQB841D1	Water	KQB841	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate + Nitrite (as N)	AVE-9	USGS I-2547-11m	0.065	mg/L	0.060	KQB841D1	Water	KQB841	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate (as N)	AVE-1	ASTM D3867-16	<0.050	mg/L	0.050	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Hardness (as CaCO3)	AVE-1	Auto Calc	5500	mg/L	1.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Anion Sum	AVE-1	Auto Calc.	482	me/L	N/A	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Dissolved Solids	AVE-1	Auto Calc.	28000	mg/L	1.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cation Sum	AVE-1	Auto Calc.	508	me/L	N/A	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ion Balance (% Difference)	AVE-1	Auto Calc.	2.60	%	N/A	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 20C)	AVE-1	Auto Calc.	0.499	N/A		KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 4C)	AVE-1	Auto Calc.	0.260	N/A		KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 20C)	AVE-1	Auto Calc.	7.30	N/A		KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 4C)	AVE-1	Auto Calc.	7.53	N/A		KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bicarbonate (as CaCO3)	AVE-1	SM 23 4500-CO2 D	97	mg/L	1.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonate (as CaCO3)	AVE-1	SM 23 4500-CO2 D	<1.0	mg/L	1.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sulphate	AVE-1	ASTM D516-16 m	2000	mg/L	40	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Turbidity	AVE-1	EPA 180.1 R2 m	280	NTU	1.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Alkalinity (as CaCO3)	AVE-1	EPA 310.2 R1974 m	97	mg/L	5.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ammonia	AVE-1	EPA 350.1 R2 m	<0.050	mg/L	0.050	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Reactive Silica (as SiO2)	AVE-1	EPA 366.0 m	1.0	mg/L	0.50	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AVE-1	SM 22 2520B	27	N/A	2.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Colour	AVE-1	SM 23 2120C m	9.4	TCU	5.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Conductivity	AVE-1	SM 23 2510B m	43000	uS/cm	1.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AVE-1	SM 23 2540D m	310	mg/L	10	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus	AVE-1	SM 23 4500 P B H m	0.7	mg/L	0.1	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chloride	AVE-1	SM 23 4500-Cl- E m	16000	mg/L	500	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
pH	AVE-1	SM 23 4500-H+ B m	7.79	pH	N/A	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrite	AVE-1	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ortho Phosphate (as P)	AVE-1	SM 23 4500-P E m	<0.010	mg/L	0.010	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonaceous BOD	AVE-1	SM 23 5210B m	<5.0	mg/L	5.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TOC	AVE-1	SM 23 5310B m	<5.0	mg/L	5.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate + Nitrite (as N)	AVE-1	USGS I-2547-11m	<0.050	mg/L	0.050	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Aluminum	AVE-1	EPA 6020B R2 m	9400	ug/L	50	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Antimony	AVE-1	EPA 6020B R2 m	<10	ug/L	10	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Arsenic	AVE-1	EPA 6020B R2 m	<10	ug/L	10	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Barium	AVE-1	EPA 6020B R2 m	59	ug/L	10	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Beryllium	AVE-1	EPA 6020B R2 m	<10	ug/L	10	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bismuth	AVE-1	EPA 6020B R2 m	<20	ug/L	20	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Boron	AVE-1	EPA 6020B R2 m	4200	ug/L	500	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cadmium	AVE-1	EPA 6020B R2 m	0.10	ug/L	0.10	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Calcium	AVE-1	EPA 6020B R2 m	360000	ug/L	1000	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chromium	AVE-1	EPA 6020B R2 m	14	ug/L	10	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cobalt	AVE-1	EPA 6020B R2 m	7.9	ug/L	4.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Copper	AVE-1	EPA 6020B R2 m	9.9	ug/L	5.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Iron	AVE-1	EPA 6020B R2 m	15000	ug/L	500	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Lead	AVE-1	EPA 6020B R2 m	10	ug/L	5.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Magnesium	AVE-1	EPA 6020B R2 m	1100000	ug/L	1000	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Manganese	AVE-1	EPA 6020B R2 m	750	ug/L	20	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Molybdenum	AVE-1	EPA 6020B R2 m	<20	ug/L	20	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nickel	AVE-1	EPA 6020B R2 m	<20	ug/L	20	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus (P)	AVE-1	EPA 6020B R2 m	<1000	ug/L	1000	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Potassium	AVE-1	EPA 6020B R2 m	330000	ug/L	1000	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Selenium	AVE-1	EPA 6020B R2 m	<5.0	ug/L	5.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Silver	AVE-1	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sodium	AVE-1	EPA 6020B R2 m	9000000	ug/L	1000	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Strontium	AVE-1	EPA 6020B R2 m	6500	ug/L	20	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Thallium	AVE-1	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Tin	AVE-1	EPA 6020B R2 m	<20	ug/L	20	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls

Titanium	AVE-1	EPA 6020B R2 m	210	ug/L	20	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Uranium	AVE-1	EPA 6020B R2 m	3.1	ug/L	1.0	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Vanadium	AVE-1	EPA 6020B R2 m	31	ug/L	20	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Zinc	AVE-1	EPA 6020B R2 m	<50	ug/L	50	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Coliforms	AVE-1	MOE E3371 R2 (2018)	<100	CFU/100mL	100	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Fecal coliform	AVE-1	SM 23 9222D	<100	CFU/100mL	100	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Subcontract Parameter	AVE-1		ATTACHED	N/A	N/A	KQB842	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sulphate	AVE-1	ASTM D516-16 m	2000	mg/L	40	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Turbidity	AVE-1	EPA 180.1 R2 m	280	NTU	1.0	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Alkalinity (as CaCO3)	AVE-1	EPA 310.2 R1974 m	94	mg/L	5.0	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Reactive Silica (as SiO2)	AVE-1	EPA 366.0 m	0.91	mg/L	0.50	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Colour	AVE-1	SM 23 2120C m	9.9	TCU	5.0	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AVE-1	SM 23 2540D m	310	mg/L	10	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chloride	AVE-1	SM 23 4500-Cl- E m	16000	mg/L	500	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrite	AVE-1	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ortho Phosphate (as P)	AVE-1	SM 23 4500-P E m	<0.010	mg/L	0.010	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate + Nitrite (as N)	AVE-1	USGS I-2547-11m	0.055	mg/L	0.050	KQB842D1	Water	KQB842	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AVE-7	SM 22 2520B	24	N/A	2.0	KQB843	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AVE-7	SM 23 2540D m	360	mg/L	10	KQB843	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AVE-7	SM 22 2520B	24	N/A	2.0	KQB843D1	Water	KQB843	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AVE-8	SM 22 2520B	<2.0	N/A	2.0	KQB844	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AVE-8	SM 23 2540D m	690	mg/L	10	KQB844	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate (as N)	AVE-4	ASTM D3867-16	0.12	mg/L	0.050	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Hardness (as CaCO3)	AVE-4	Auto Calc	4100	mg/L	1.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Anion Sum	AVE-4	Auto Calc.	267	me/L	N/A	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Dissolved Solids	AVE-4	Auto Calc.	18000	mg/L	1.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cation Sum	AVE-4	Auto Calc.	371	me/L	N/A	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ion Balance (% Difference)	AVE-4	Auto Calc.	16.3	%	N/A	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 20C)	AVE-4	Auto Calc.	0.0400	N/A		KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 4C)	AVE-4	Auto Calc.	-0.197	N/A		KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 20C)	AVE-4	Auto Calc.	7.48	N/A		KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 4C)	AVE-4	Auto Calc.	7.72	N/A		KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bicarbonate (as CaCO3)	AVE-4	SM 23 4500-CO2 D	91	mg/L	1.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonate (as CaCO3)	AVE-4	SM 23 4500-CO2 D	<1.0	mg/L	1.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sulphate	AVE-4	ASTM D516-16 m	1600	mg/L	40	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Turbidity	AVE-4	EPA 180.1 R2 m	>1000	NTU	1.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Alkalinity (as CaCO3)	AVE-4	EPA 310.2 R1974 m	92	mg/L	5.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ammonia	AVE-4	EPA 350.1 R2 m	0.15	mg/L	0.050	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Reactive Silica (as SiO2)	AVE-4	EPA 366.0 m	2.4	mg/L	0.50	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AVE-4	SM 22 2520B	21	N/A	2.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Colour	AVE-4	SM 23 2120C m	25	TCU	5.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Conductivity	AVE-4	SM 23 2510B m	33000	uS/cm	1.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AVE-4	SM 23 2540D m	3000	mg/L	10	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus	AVE-4	SM 23 4500 P B H m	1.5	mg/L	0.1	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chloride	AVE-4	SM 23 4500-Cl- E m	8300	mg/L	100	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
pH	AVE-4	SM 23 4500-H+ B m	7.52	pH	N/A	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrite	AVE-4	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ortho Phosphate (as P)	AVE-4	SM 23 4500-P E m	<0.010	mg/L	0.010	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonaceous BOD	AVE-4	SM 23 5210B m	16	mg/L	3.1	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TOC	AVE-4	SM 23 5310B m	13	mg/L	5.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate + Nitrite (as N)	AVE-4	USGS I-2547-11m	0.12	mg/L	0.050	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Aluminum	AVE-4	EPA 6020B R2 m	31000	ug/L	50	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Antimony	AVE-4	EPA 6020B R2 m	<10	ug/L	10	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Arsenic	AVE-4	EPA 6020B R2 m	19	ug/L	10	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Barium	AVE-4	EPA 6020B R2 m	110	ug/L	10	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Beryllium	AVE-4	EPA 6020B R2 m	<10	ug/L	10	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bismuth	AVE-4	EPA 6020B R2 m	<20	ug/L	20	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Boron	AVE-4	EPA 6020B R2 m	3100	ug/L	500	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cadmium	AVE-4	EPA 6020B R2 m	0.13	ug/L	0.10	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Calcium	AVE-4	EPA 6020B R2 m	290000	ug/L	1000	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chromium	AVE-4	EPA 6020B R2 m	48	ug/L	10	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cobalt	AVE-4	EPA 6020B R2 m	27	ug/L	4.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Copper	AVE-4	EPA 6020B R2 m	34	ug/L	5.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Iron	AVE-4	EPA 6020B R2 m	49000	ug/L	500	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls

Lead	AVE-4	EPA 6020B R2 m	37	ug/L	5.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Magnesium	AVE-4	EPA 6020B R2 m	810000	ug/L	1000	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Manganese	AVE-4	EPA 6020B R2 m	2700	ug/L	20	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Molybdenum	AVE-4	EPA 6020B R2 m	<20	ug/L	20	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nickel	AVE-4	EPA 6020B R2 m	52	ug/L	20	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus (P)	AVE-4	EPA 6020B R2 m	1500	ug/L	1000	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Potassium	AVE-4	EPA 6020B R2 m	250000	ug/L	1000	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Selenium	AVE-4	EPA 6020B R2 m	<5.0	ug/L	5.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Silver	AVE-4	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sodium	AVE-4	EPA 6020B R2 m	6500000	ug/L	1000	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Strontium	AVE-4	EPA 6020B R2 m	5000	ug/L	20	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Thallium	AVE-4	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Tin	AVE-4	EPA 6020B R2 m	<20	ug/L	20	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Titanium	AVE-4	EPA 6020B R2 m	450	ug/L	20	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Uranium	AVE-4	EPA 6020B R2 m	3.3	ug/L	1.0	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Vanadium	AVE-4	EPA 6020B R2 m	85	ug/L	20	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Zinc	AVE-4	EPA 6020B R2 m	150	ug/L	50	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Coliforms	AVE-4	MOE E3371 R2 (2018)	400	CFU/100mL	100	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Fecal coliform	AVE-4	SM 23 9222D	<100	CFU/100mL	100	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Subcontract Parameter	AVE-4		ATTACHED	N/A	N/A	KQB845	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AVE-4	SM 22 2520B	21	N/A	2.0	KQB845D1	Water	KQB845	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AR-14	SM 22 2520B	<2.0	N/A	2.0	KQB846	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AR-14	SM 23 2540D m	120	mg/L	5.0	KQB846	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AR-15	SM 22 2520B	<2.0	N/A	2.0	KQB847	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AR-15	SM 23 2540D m	18	mg/L	5.0	KQB847	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate (as N)	AR-16	ASTM D3867-16	<0.055	mg/L	0.055	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Hardness (as CaCO3)	AR-16	Auto Calc	9.8	mg/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Anion Sum	AR-16	Auto Calc.	0.400	me/L	N/A	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Dissolved Solids	AR-16	Auto Calc.	27	mg/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cation Sum	AR-16	Auto Calc.	0.450	me/L	N/A	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ion Balance (% Difference)	AR-16	Auto Calc.	5.88	%	N/A	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 20C)	AR-16	Auto Calc.	-3.33	N/A		KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 4C)	AR-16	Auto Calc.	-3.58	N/A		KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 20C)	AR-16	Auto Calc.	10.1	N/A		KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 4C)	AR-16	Auto Calc.	10.3	N/A		KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bicarbonate (as CaCO3)	AR-16	SM 23 4500-CO2 D	5.4	mg/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonate (as CaCO3)	AR-16	SM 23 4500-CO2 D	<1.0	mg/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sulphate	AR-16	ASTM D516-16 m	6.0	mg/L	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Turbidity	AR-16	EPA 180.1 R2 m	4.2	NTU	0.10	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Alkalinity (as CaCO3)	AR-16	EPA 310.2 R1974 m	5.4	mg/L	5.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ammonia	AR-16	EPA 350.1 R2 m	0.052	mg/L	0.050	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Reactive Silica (as SiO2)	AR-16	EPA 366.0 m	1.8	mg/L	0.50	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AR-16	SM 22 2520B	<2.0	N/A	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Colour	AR-16	SM 23 2120C m	75	TCU	25	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Conductivity	AR-16	SM 23 2510B m	46	uS/cm	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AR-16	SM 23 2540D m	4.3	mg/L	2.1	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus	AR-16	SM 23 4500 P B H m	0.027	mg/L	0.004	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chloride	AR-16	SM 23 4500-Cl- E m	6.0	mg/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
pH	AR-16	SM 23 4500-H+ B m	6.75	pH	N/A	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrite	AR-16	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ortho Phosphate (as P)	AR-16	SM 23 4500-P E m	0.020	mg/L	0.010	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonaceous BOD	AR-16	SM 23 5210B m	4.1	mg/L	3.1	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TOC	AR-16	SM 23 5310B m	6.7	mg/L	0.50	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate + Nitrite (as N)	AR-16	USGS I-2547-11m	<0.055	mg/L	0.055	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Aluminum	AR-16	EPA 6020B R2 m	270	ug/L	5.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Antimony	AR-16	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Arsenic	AR-16	EPA 6020B R2 m	1.3	ug/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Barium	AR-16	EPA 6020B R2 m	7.8	ug/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Beryllium	AR-16	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bismuth	AR-16	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Boron	AR-16	EPA 6020B R2 m	<50	ug/L	50	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cadmium	AR-16	EPA 6020B R2 m	0.018	ug/L	0.010	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Calcium	AR-16	EPA 6020B R2 m	3000	ug/L	100	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chromium	AR-16	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls

Cobalt	AR-16	EPA 6020B R2 m	<0.40	ug/L	0.40	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Copper	AR-16	EPA 6020B R2 m	1.0	ug/L	0.50	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Iron	AR-16	EPA 6020B R2 m	470	ug/L	50	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Lead	AR-16	EPA 6020B R2 m	<0.50	ug/L	0.50	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Magnesium	AR-16	EPA 6020B R2 m	560	ug/L	100	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Manganese	AR-16	EPA 6020B R2 m	44	ug/L	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Molybdenum	AR-16	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nickel	AR-16	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus (P)	AR-16	EPA 6020B R2 m	<100	ug/L	100	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Potassium	AR-16	EPA 6020B R2 m	500	ug/L	100	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Selenium	AR-16	EPA 6020B R2 m	<0.50	ug/L	0.50	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Silver	AR-16	EPA 6020B R2 m	<0.10	ug/L	0.10	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sodium	AR-16	EPA 6020B R2 m	5000	ug/L	100	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Strontium	AR-16	EPA 6020B R2 m	21	ug/L	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Thallium	AR-16	EPA 6020B R2 m	<0.10	ug/L	0.10	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Tin	AR-16	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Titanium	AR-16	EPA 6020B R2 m	4.2	ug/L	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Uranium	AR-16	EPA 6020B R2 m	0.27	ug/L	0.10	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Vanadium	AR-16	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Zinc	AR-16	EPA 6020B R2 m	6.6	ug/L	5.0	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Coliforms	AR-16	MOE E3371 R2 (2018)	150	CFU/100mL	10	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Fecal coliform	AR-16	SM 23 9222D	30	CFU/100mL	10	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Subcontract Parameter	AR-16		ATTACHED	N/A	N/A	KQB848	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TOC	AR-16	SM 23 5310B m	6.7	mg/L	0.50	KQB848D1	Water	KQB848	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AR-4B	SM 22 2520B	<2.0	N/A	2.0	KQB849	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AR-4B	SM 23 2540D m	310	mg/L	10	KQB849	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AR-2	SM 22 2520B	<2.0	N/A	2.0	KQB850	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AR-2	SM 23 2540D m	4.0	mg/L	2.0	KQB850	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate (as N)	AR-1	ASTM D3867-16	0.058	mg/L	0.055	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Hardness (as CaCO3)	AR-1	Auto Calc	37	mg/L	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Anion Sum	AR-1	Auto Calc.	1.27	me/L	N/A	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Dissolved Solids	AR-1	Auto Calc.	78	mg/L	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cation Sum	AR-1	Auto Calc.	1.26	me/L	N/A	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ion Balance (% Difference)	AR-1	Auto Calc.	0.400	%	N/A	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 20C)	AR-1	Auto Calc.	-1.75	N/A		KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Langelier Index (@ 4C)	AR-1	Auto Calc.	-2.01	N/A		KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 20C)	AR-1	Auto Calc.	9.09	N/A		KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Saturation pH (@ 4C)	AR-1	Auto Calc.	9.34	N/A		KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bicarbonate (as CaCO3)	AR-1	SM 23 4500-CO2 D	14	mg/L	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonate (as CaCO3)	AR-1	SM 23 4500-CO2 D	<1.0	mg/L	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sulphate	AR-1	ASTM D516-16 m	25	mg/L	2.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Turbidity	AR-1	EPA 180.1 R2 m	3.3	NTU	0.10	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Alkalinity (as CaCO3)	AR-1	EPA 310.2 R1974 m	14	mg/L	5.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ammonia	AR-1	EPA 350.1 R2 m	0.059	mg/L	0.050	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Reactive Silica (as SiO2)	AR-1	EPA 366.0 m	1.7	mg/L	0.50	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Salinity	AR-1	SM 22 2520B	<2.0	N/A	2.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Colour	AR-1	SM 23 2120C m	52	TCU	25	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Conductivity	AR-1	SM 23 2510B m	140	uS/cm	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TSS	AR-1	SM 23 2540D m	<2.1	mg/L	2.1	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus	AR-1	SM 23 4500 P B H m	0.025	mg/L	0.004	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chloride	AR-1	SM 23 4500-Cl- E m	17	mg/L	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
pH	AR-1	SM 23 4500-H+ B m	7.34	pH	N/A	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrite	AR-1	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Ortho Phosphate (as P)	AR-1	SM 23 4500-P E m	<0.010	mg/L	0.010	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Carbonaceous BOD	AR-1	SM 23 5210B m	3.3	mg/L	3.1	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
TOC	AR-1	SM 23 5310B m	6.8	mg/L	0.50	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nitrate + Nitrite (as N)	AR-1	USGS I-2547-11m	0.058	mg/L	0.055	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Aluminum	AR-1	EPA 6020B R2 m	140	ug/L	5.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Antimony	AR-1	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Arsenic	AR-1	EPA 6020B R2 m	1.4	ug/L	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Barium	AR-1	EPA 6020B R2 m	11	ug/L	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Beryllium	AR-1	EPA 6020B R2 m	<1.0	ug/L	1.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Bismuth	AR-1	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Boron	AR-1	EPA 6020B R2 m	<50	ug/L	50	KQB851	Water		2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls

Cadmium	AR-1	EPA 6020B R2 m	<0.010	ug/L	0.010	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Calcium	AR-1	EPA 6020B R2 m	12000	ug/L	100	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Chromium	AR-1	EPA 6020B R2 m	1.1	ug/L	1.0	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Cobalt	AR-1	EPA 6020B R2 m	<0.40	ug/L	0.40	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Copper	AR-1	EPA 6020B R2 m	2.0	ug/L	0.50	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Iron	AR-1	EPA 6020B R2 m	370	ug/L	50	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Lead	AR-1	EPA 6020B R2 m	<0.50	ug/L	0.50	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Magnesium	AR-1	EPA 6020B R2 m	1600	ug/L	100	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Manganese	AR-1	EPA 6020B R2 m	32	ug/L	2.0	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Molybdenum	AR-1	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Nickel	AR-1	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Phosphorus (P)	AR-1	EPA 6020B R2 m	<100	ug/L	100	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Potassium	AR-1	EPA 6020B R2 m	840	ug/L	100	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Selenium	AR-1	EPA 6020B R2 m	<0.50	ug/L	0.50	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Silver	AR-1	EPA 6020B R2 m	<0.10	ug/L	0.10	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Sodium	AR-1	EPA 6020B R2 m	11000	ug/L	100	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Strontium	AR-1	EPA 6020B R2 m	86	ug/L	2.0	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Thallium	AR-1	EPA 6020B R2 m	<0.10	ug/L	0.10	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Tin	AR-1	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Titanium	AR-1	EPA 6020B R2 m	3.1	ug/L	2.0	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Uranium	AR-1	EPA 6020B R2 m	0.20	ug/L	0.10	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Vanadium	AR-1	EPA 6020B R2 m	<2.0	ug/L	2.0	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Zinc	AR-1	EPA 6020B R2 m	<5.0	ug/L	5.0	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Total Coliforms	AR-1	MOE E3371 R2 (2018)	2000	CFU/100mL	10	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Fecal coliform	AR-1	SM 23 9222D	10	CFU/100mL	10	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls
Subcontract Parameter	AR-1		ATTACHED	N/A	N/A	KQB851	Water	2019/08/27	B9N9256V1-R2019-09-11_14-44-22_N020.pdf	B9N9256V1-R2019-09-11_14-44-22_N020.xls

Your C.O.C. #: D 40667

Attention: Melissa Rutherford

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/09/13
Report #: R5878484
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9O2216
Received: 2019/08/30, 09:31

Sample Matrix: Water
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Carbonate, Bicarbonate and Hydroxide	3	N/A	2019/09/03	N/A	SM 23 4500-CO2 D
Alkalinity	3	N/A	2019/09/11	ATL SOP 00013	EPA 310.2 R1974 m
Carbonaceous BOD	3	2019/08/30	2019/09/04	ATL SOP 00041	SM 23 5210B m
Chloride	3	N/A	2019/09/11	ATL SOP 00014	SM 23 4500-Cl- E m
Total coliform (CFU/100mL) in water	3	N/A	2019/08/30	ATL SOP 00097	MOE E3371 R2 (2018)
Colour	3	N/A	2019/09/11	ATL SOP 00020	SM 23 2120C m
Conductance - water	3	N/A	2019/09/03	ATL SOP 00004	SM 23 2510B m
Fecal coliform in water (CFU/100 mL)	3	N/A	2019/08/30	ATL SOP 00071	SM 23 9222D
Hardness (calculated as CaCO3)	3	N/A	2019/09/06	ATL SOP 00048	Auto Calc
Metals Water Total MS	1	2019/09/04	2019/09/05	ATL SOP 00058	EPA 6020B R2 m
Metals Water Total MS	1	2019/09/04	2019/09/06	ATL SOP 00058	EPA 6020B R2 m
Metals Water Total MS	1	2019/09/05	2019/09/05	ATL SOP 00058	EPA 6020B R2 m
Ion Balance (% Difference)	3	N/A	2019/09/12	N/A	Auto Calc.
Anion and Cation Sum	3	N/A	2019/09/12	N/A	Auto Calc.
Nitrogen Ammonia - water	3	N/A	2019/09/11	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	3	N/A	2019/09/12	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	3	N/A	2019/09/11	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	3	N/A	2019/09/13	ATL SOP 00018	ASTM D3867-16
pH (3)	3	N/A	2019/09/03	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	3	N/A	2019/09/11	ATL SOP 00021	SM 23 4500-P E m
Salinity (4)	12	N/A	2019/09/11		SM 22 2520B
Sat. pH and Langelier Index (@ 20C)	3	N/A	2019/09/12	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	3	N/A	2019/09/12	ATL SOP 00049	Auto Calc.
Reactive Silica	3	N/A	2019/09/11	ATL SOP 00022	EPA 366.0 m
Sulphate	3	N/A	2019/09/11	ATL SOP 00023	ASTM D516-16 m
Chlorophyll A (Sub from Bedford) (1)	3	2019/09/03	2019/09/03		
Total Dissolved Solids (TDS calc)	3	N/A	2019/09/12	N/A	Auto Calc.
Organic carbon - Total (TOC) (5)	3	N/A	2019/09/12	ATL SOP 00203	SM 23 5310B m
Total Phosphorus (Colourimetric) (2)	3	2019/09/04	2019/09/05	CAM SOP-00407	SM 23 4500 P B H m
Total Suspended Solids	12	2019/09/05	2019/09/06	ATL SOP 00007	SM 23 2540D m

Your C.O.C. #: D 40667

Attention: Melissa Rutherford

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/09/13
Report #: R5878484
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9O2216
Received: 2019/08/30, 09:31

Sample Matrix: Water
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Turbidity	3	N/A	2019/09/03	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Dalhousie Dept of Oceanography
(2) This test was performed by Bureau Veritas Laboratories Mississauga
(3) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(4) Non-accredited test method
(5) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

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Your C.O.C. #: D 40667

Attention: Melissa Rutherford

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Report Date: 2019/09/13
Report #: R5878484
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9O2216
Received: 2019/08/30, 09:31

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
13 Sep 2019 11:12:57

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Keri Mackay, Customer Experience Team Lead
Email: Keri.MACKAY@bvlabs.com
Phone# (902)420-0203 Ext:294
==
This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		KQS901		KQS904			KQS908		
Sampling Date		2019/08/29 11:05		2019/08/29 11:50			2019/08/29 18:10		
COC Number		D 40667		D 40667			D 40667		
	UNITS	AR-9	QC Batch	AR-12	RDL	QC Batch	BKG-2	RDL	QC Batch
Calculated Parameters									
Anion Sum	me/L	1.09	6308515	0.650	N/A	6308515	10.9	N/A	6308515
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	13	6308509	8.1	1.0	6308509	110	1.0	6308509
Calculated TDS	mg/L	67	6308526	39	1.0	6308526	710	1.0	6308526
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	6308509	<1.0	1.0	6308509	<1.0	1.0	6308509
Cation Sum	me/L	1.06	6308515	0.600	N/A	6308515	11.3	N/A	6308515
Hardness (CaCO3)	mg/L	32	6308511	14	1.0	6308511	530	1.0	6308511
Ion Balance (% Difference)	%	1.40	6308513	4.00	N/A	6308513	1.53	N/A	6308513
Langelier Index (@ 20C)	N/A	-2.29	6308522	-2.84		6308522	0.637		6308522
Langelier Index (@ 4C)	N/A	-2.54	6308524	-3.09		6308524	0.390		6308524
Nitrate (N)	mg/L	<0.060	6308517	<0.060	0.060	6308517	0.23	0.060	6308517
Saturation pH (@ 20C)	N/A	9.20	6308522	9.75		6308522	7.17		6308522
Saturation pH (@ 4C)	N/A	9.45	6308524	10.0		6308524	7.41		6308524
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	13	6324081	8.1	5.0	6324081	110	25	6324081
Dissolved Chloride (Cl-)	mg/L	14	6324082	11	1.0	6324082	20	1.0	6324082
Colour	TCU	61	6324087	69	25	6324087	12	5.0	6324087
Nitrate + Nitrite (N)	mg/L	<0.060 (1)	6324093	<0.060 (1)	0.060	6324093	0.23 (1)	0.060	6324093
Nitrite (N)	mg/L	<0.010	6324094	<0.010	0.010	6324094	<0.010	0.010	6324094
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	6325852	<0.050	0.050	6325852	<0.050	0.050	6325852
Total Organic Carbon (C)	mg/L	6.8	6327925	7.0	0.50	6327925	2.9	0.50	6327925
Orthophosphate (P)	mg/L	<0.010	6324089	0.011	0.010	6324089	<0.010	0.010	6324089
pH	pH	6.91	6311565	6.91	N/A	6311558	7.80	N/A	6311558
Reactive Silica (SiO2)	mg/L	1.5	6324085	1.7	0.50	6324085	6.2	0.50	6324085
Dissolved Sulphate (SO4)	mg/L	22	6324084	9.3	2.0	6324084	390	10	6324084
Turbidity	NTU	3.0	6311605	2.5	0.10	6311605	3.8	0.10	6311605
Conductivity	uS/cm	120	6311570	68	1.0	6311560	1000	1.0	6311560
Metals									
Total Aluminum (Al)	ug/L	150	6313453	180	5.0	6313655	120	5.0	6315790
Total Antimony (Sb)	ug/L	<1.0	6313453	<1.0	1.0	6313655	<1.0	1.0	6315790
Total Arsenic (As)	ug/L	1.3	6313453	1.3	1.0	6313655	<1.0	1.0	6315790
Total Barium (Ba)	ug/L	11	6313453	7.6	1.0	6313655	96	1.0	6315790
Total Beryllium (Be)	ug/L	<1.0	6313453	<1.0	1.0	6313655	<1.0	1.0	6315790
Total Bismuth (Bi)	ug/L	<2.0	6313453	<2.0	2.0	6313655	<2.0	2.0	6315790
Total Boron (B)	ug/L	<50	6313453	<50	50	6313655	150	50	6315790

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to blank performance.

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ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		KQS901		KQS904			KQS908		
Sampling Date		2019/08/29 11:05		2019/08/29 11:50			2019/08/29 18:10		
COC Number		D 40667		D 40667			D 40667		
	UNITS	AR-9	QC Batch	AR-12	RDL	QC Batch	BKG-2	RDL	QC Batch
Total Cadmium (Cd)	ug/L	<0.010	6313453	<0.010	0.010	6313655	<0.010	0.010	6315790
Total Calcium (Ca)	ug/L	11000	6313453	4400	100	6313655	200000	100	6315790
Total Chromium (Cr)	ug/L	1.1	6313453	1.1	1.0	6313655	<1.0	1.0	6315790
Total Cobalt (Co)	ug/L	<0.40	6313453	<0.40	0.40	6313655	<0.40	0.40	6315790
Total Copper (Cu)	ug/L	0.57	6313453	0.61	0.50	6313655	<0.50	0.50	6315790
Total Iron (Fe)	ug/L	360	6313453	370	50	6313655	310	50	6315790
Total Lead (Pb)	ug/L	<0.50	6313453	<0.50	0.50	6313655	<0.50	0.50	6315790
Total Magnesium (Mg)	ug/L	1200	6313453	760	100	6313655	6100	100	6315790
Total Manganese (Mn)	ug/L	33	6313453	27	2.0	6313655	360	2.0	6315790
Total Molybdenum (Mo)	ug/L	<2.0	6313453	<2.0	2.0	6313655	<2.0	2.0	6315790
Total Nickel (Ni)	ug/L	<2.0	6313453	<2.0	2.0	6313655	<2.0	2.0	6315790
Total Phosphorus (P)	ug/L	<100	6313453	<100	100	6313655	<100	100	6315790
Total Potassium (K)	ug/L	680	6313453	520	100	6313655	2100	100	6315790
Total Selenium (Se)	ug/L	<0.50	6313453	<0.50	0.50	6313655	<0.50	0.50	6315790
Total Silver (Ag)	ug/L	<0.10	6313453	<0.10	0.10	6313655	<0.10	0.10	6315790
Total Sodium (Na)	ug/L	9100	6313453	6600	100	6313655	12000	100	6315790
Total Strontium (Sr)	ug/L	78	6313453	31	2.0	6313655	1600	2.0	6315790
Total Thallium (Tl)	ug/L	<0.10	6313453	<0.10	0.10	6313655	<0.10	0.10	6315790
Total Tin (Sn)	ug/L	<2.0	6313453	<2.0	2.0	6313655	<2.0	2.0	6315790
Total Titanium (Ti)	ug/L	2.2	6313453	2.8	2.0	6313655	3.5	2.0	6315790
Total Uranium (U)	ug/L	0.23	6313453	0.21	0.10	6313655	0.46	0.10	6315790
Total Vanadium (V)	ug/L	<2.0	6313453	<2.0	2.0	6313655	<2.0	2.0	6315790
Total Zinc (Zn)	ug/L	<5.0	6313453	<5.0	5.0	6313655	<5.0	5.0	6315790

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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RESULTS OF ANALYSES OF WATER

BV Labs ID		KQS898		KQS899	KQS900			KQS901		
Sampling Date		2019/08/29 09:10		2019/08/29 10:32	2019/08/29 10:49			2019/08/29 11:05		
COC Number		D 40667		D 40667	D 40667			D 40667		
	UNITS	**AR-5**	**RDL**	**AR-7**	**AR-8**	**RDL**	**QC Batch**	**AR-9**	**RDL**	**QC Batch**
Inorganics										
Carbonaceous BOD	mg/L							<5.0	5.0	6308403
Total Phosphorus	mg/L							0.032	0.004	6313967
Salinity	N/A	<2.0	2.0	<2.0	<2.0	2.0	6325628	<2.0	2.0	6325628
Total Suspended Solids	mg/L	3.2	2.0	2.8	2.6	1.0	6316421	<2.2	2.2	6316421
Subcontracted Analysis										
Subcontract Parameter	N/A							ATTACHED	N/A	6311715

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

BV Labs ID		KQS902	KQS903			KQS904			KQS905		
Sampling Date		2019/08/29 11:20	2019/08/29 11:37			2019/08/29 11:50			2019/08/29 12:05		
COC Number		D 40667	D 40667			D 40667			D 40667		
	UNITS	**AR-10**	**AR-11**	**RDL**	**QC Batch**	**AR-12**	**RDL**	**QC Batch**	**AR-13**	**RDL**	**QC Batch**
Inorganics											
Carbonaceous BOD	mg/L					<5.0	5.0	6308403			
Total Phosphorus	mg/L					0.031	0.004	6313967			
Salinity	N/A	<2.0	<2.0	2.0	6325628	<2.0	2.0	6325628	<2.0	2.0	6325628
Total Suspended Solids	mg/L	1.8	5.6	1.0	6316421	3.2	2.3	6316421	2.0	1.0	6316421
Subcontracted Analysis											
Subcontract Parameter	N/A					ATTACHED	N/A	6311715			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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RESULTS OF ANALYSES OF WATER

BV Labs ID		KQS906	KQS907			KQS908			KQS909		
Sampling Date		2019/08/29 14:33	2019/08/29 15:00			2019/08/29 18:10			2019/08/29 18:20		
COC Number		D 40667	D 40667			D 40667			D 40667		
	UNITS	**AR-18**	**AR-17**	**RDL**	**QC Batch**	**BKG-2**	**RDL**	**QC Batch**	**BKG-1**	**RDL**	**QC Batch**
Inorganics											
Carbonaceous BOD	mg/L					<5.0	5.0	6308403			
Total Phosphorus	mg/L					0.028	0.004	6313967			
Salinity	N/A	<2.0	<2.0	2.0	6325628	<2.0	2.0	6325628	<2.0	2.0	6325628
Total Suspended Solids	mg/L	3.6	2.3	1.0	6316421	6.1	2.2	6316421	170	5.0	6316421
Subcontracted Analysis											
Subcontract Parameter	N/A					ATTACHED	N/A	6311715			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

MICROBIOLOGY (WATER)

BV Labs ID		KQS901	KQS904	KQS908		
Sampling Date		2019/08/29 11:05	2019/08/29 11:50	2019/08/29 18:10		
COC Number		D 40667	D 40667	D 40667		
	UNITS	**AR-9**	**AR-12**	**BKG-2**	**RDL**	**QC Batch**
Microbiological						
Fecal coliform	CFU/100mL	10	<10	900	10	6308630
Total Coliforms	CFU/100mL	180	140	>2500	10	6308632

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	2.3°C

Sample KQS901 [AR-9] : TSS:Used all of the sample provided, DL raised.

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6308403	MLW	QC Standard	Carbonaceous BOD	2019/09/04		133 (1)	%	80 - 120
6308403	MLW	Spiked Blank	Carbonaceous BOD	2019/09/04		133 (2)	%	80 - 120
6308403	MLW	Method Blank	Carbonaceous BOD	2019/09/04	<2.0		mg/L	
6308403	MLW	RPD	Carbonaceous BOD	2019/09/04	NC		%	25
6308630	KBO	Method Blank	Fecal coliform	2019/08/30	<1.0		CFU/100mL	
6308632	KBO	Method Blank	Total Coliforms	2019/08/30	<1.0		CFU/100mL	
6311558	JMV	QC Standard	pH	2019/09/03		101	%	97 - 103
6311558	JMV	RPD	pH	2019/09/03	1.7		%	N/A
6311560	JMV	Spiked Blank	Conductivity	2019/09/03		101	%	80 - 120
6311560	JMV	Method Blank	Conductivity	2019/09/03	<1.0		uS/cm	
6311560	JMV	RPD	Conductivity	2019/09/03	0.0024		%	10
6311565	JMV	QC Standard	pH	2019/09/03		100	%	97 - 103
6311565	JMV	RPD	pH	2019/09/03	0.014		%	N/A
6311570	JMV	Spiked Blank	Conductivity	2019/09/03		101	%	80 - 120
6311570	JMV	Method Blank	Conductivity	2019/09/03	<1.0		uS/cm	
6311570	JMV	RPD	Conductivity	2019/09/03	0.81		%	10
6311605	JMV	QC Standard	Turbidity	2019/09/03		106	%	80 - 120
6311605	JMV	Spiked Blank	Turbidity	2019/09/03		100	%	80 - 120
6311605	JMV	Method Blank	Turbidity	2019/09/03	<0.10		NTU	
6311605	JMV	RPD	Turbidity	2019/09/03	11		%	20
6313453	BAN	Matrix Spike	Total Aluminum (Al)	2019/09/06		101	%	80 - 120
			Total Antimony (Sb)	2019/09/06		106	%	80 - 120
			Total Arsenic (As)	2019/09/06		98	%	80 - 120
			Total Barium (Ba)	2019/09/06		106	%	80 - 120
			Total Beryllium (Be)	2019/09/06		103	%	80 - 120
			Total Bismuth (Bi)	2019/09/06		103	%	80 - 120
			Total Boron (B)	2019/09/06		100	%	80 - 120
			Total Cadmium (Cd)	2019/09/06		101	%	80 - 120
			Total Calcium (Ca)	2019/09/06		107	%	80 - 120
			Total Chromium (Cr)	2019/09/06		98	%	80 - 120
			Total Cobalt (Co)	2019/09/06		99	%	80 - 120
			Total Copper (Cu)	2019/09/06		98	%	80 - 120
			Total Iron (Fe)	2019/09/06		102	%	80 - 120
			Total Lead (Pb)	2019/09/06		106	%	80 - 120
			Total Magnesium (Mg)	2019/09/06		105	%	80 - 120
			Total Manganese (Mn)	2019/09/06		101	%	80 - 120
			Total Molybdenum (Mo)	2019/09/06		106	%	80 - 120
			Total Nickel (Ni)	2019/09/06		100	%	80 - 120
			Total Phosphorus (P)	2019/09/06		105	%	80 - 120
			Total Potassium (K)	2019/09/06		109	%	80 - 120
			Total Selenium (Se)	2019/09/06		99	%	80 - 120
			Total Silver (Ag)	2019/09/06		102	%	80 - 120
			Total Sodium (Na)	2019/09/06		100	%	80 - 120
			Total Strontium (Sr)	2019/09/06		103	%	80 - 120
			Total Thallium (Tl)	2019/09/06		104	%	80 - 120
			Total Tin (Sn)	2019/09/06		109	%	80 - 120
			Total Titanium (Ti)	2019/09/06		103	%	80 - 120
			Total Uranium (U)	2019/09/06		111	%	80 - 120
			Total Vanadium (V)	2019/09/06		98	%	80 - 120
			Total Zinc (Zn)	2019/09/06		100	%	80 - 120
6313453	BAN	Spiked Blank	Total Aluminum (Al)	2019/09/06		104	%	80 - 120
			Total Antimony (Sb)	2019/09/06		108	%	80 - 120
			Total Arsenic (As)	2019/09/06		100	%	80 - 120
			Total Barium (Ba)	2019/09/06		103	%	80 - 120
			Total Beryllium (Be)	2019/09/06		103	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Bismuth (Bi)	2019/09/06		104	%	80 - 120
			Total Boron (B)	2019/09/06		100	%	80 - 120
			Total Cadmium (Cd)	2019/09/06		102	%	80 - 120
			Total Calcium (Ca)	2019/09/06		108	%	80 - 120
			Total Chromium (Cr)	2019/09/06		100	%	80 - 120
			Total Cobalt (Co)	2019/09/06		102	%	80 - 120
			Total Copper (Cu)	2019/09/06		100	%	80 - 120
			Total Iron (Fe)	2019/09/06		105	%	80 - 120
			Total Lead (Pb)	2019/09/06		107	%	80 - 120
			Total Magnesium (Mg)	2019/09/06		108	%	80 - 120
			Total Manganese (Mn)	2019/09/06		103	%	80 - 120
			Total Molybdenum (Mo)	2019/09/06		106	%	80 - 120
			Total Nickel (Ni)	2019/09/06		102	%	80 - 120
			Total Phosphorus (P)	2019/09/06		107	%	80 - 120
			Total Potassium (K)	2019/09/06		109	%	80 - 120
			Total Selenium (Se)	2019/09/06		99	%	80 - 120
			Total Silver (Ag)	2019/09/06		104	%	80 - 120
			Total Sodium (Na)	2019/09/06		101	%	80 - 120
			Total Strontium (Sr)	2019/09/06		106	%	80 - 120
			Total Thallium (Tl)	2019/09/06		105	%	80 - 120
			Total Tin (Sn)	2019/09/06		104	%	80 - 120
			Total Titanium (Ti)	2019/09/06		104	%	80 - 120
			Total Uranium (U)	2019/09/06		111	%	80 - 120
			Total Vanadium (V)	2019/09/06		100	%	80 - 120
			Total Zinc (Zn)	2019/09/06		100	%	80 - 120
6313453	BAN	Method Blank	Total Aluminum (Al)	2019/09/06	<5.0		ug/L	
			Total Antimony (Sb)	2019/09/06	<1.0		ug/L	
			Total Arsenic (As)	2019/09/06	<1.0		ug/L	
			Total Barium (Ba)	2019/09/06	<1.0		ug/L	
			Total Beryllium (Be)	2019/09/06	<1.0		ug/L	
			Total Bismuth (Bi)	2019/09/06	<2.0		ug/L	
			Total Boron (B)	2019/09/06	<50		ug/L	
			Total Cadmium (Cd)	2019/09/06	<0.010		ug/L	
			Total Calcium (Ca)	2019/09/06	<100		ug/L	
			Total Chromium (Cr)	2019/09/06	<1.0		ug/L	
			Total Cobalt (Co)	2019/09/06	<0.40		ug/L	
			Total Copper (Cu)	2019/09/06	<0.50		ug/L	
			Total Iron (Fe)	2019/09/06	<50		ug/L	
			Total Lead (Pb)	2019/09/06	<0.50		ug/L	
			Total Magnesium (Mg)	2019/09/06	<100		ug/L	
			Total Manganese (Mn)	2019/09/06	<2.0		ug/L	
			Total Molybdenum (Mo)	2019/09/06	<2.0		ug/L	
			Total Nickel (Ni)	2019/09/06	<2.0		ug/L	
			Total Phosphorus (P)	2019/09/06	<100		ug/L	
			Total Potassium (K)	2019/09/06	<100		ug/L	
			Total Selenium (Se)	2019/09/06	<0.50		ug/L	
			Total Silver (Ag)	2019/09/06	<0.10		ug/L	
			Total Sodium (Na)	2019/09/06	<100		ug/L	
			Total Strontium (Sr)	2019/09/06	<2.0		ug/L	
			Total Thallium (Tl)	2019/09/06	<0.10		ug/L	
			Total Tin (Sn)	2019/09/06	<2.0		ug/L	
			Total Titanium (Ti)	2019/09/06	<2.0		ug/L	
			Total Uranium (U)	2019/09/06	<0.10		ug/L	
			Total Vanadium (V)	2019/09/06	<2.0		ug/L	
			Total Zinc (Zn)	2019/09/06	<5.0		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6313453	BAN	RPD	Total Lead (Pb)	2019/09/06	6.2		%	20
6313655	BAN	Matrix Spike	Total Aluminum (Al)	2019/09/05		101	%	80 - 120
			Total Antimony (Sb)	2019/09/05		106	%	80 - 120
			Total Arsenic (As)	2019/09/05		97	%	80 - 120
			Total Barium (Ba)	2019/09/05		NC	%	80 - 120
			Total Beryllium (Be)	2019/09/05		101	%	80 - 120
			Total Bismuth (Bi)	2019/09/05		96	%	80 - 120
			Total Boron (B)	2019/09/05		100	%	80 - 120
			Total Cadmium (Cd)	2019/09/05		98	%	80 - 120
			Total Calcium (Ca)	2019/09/05		NC	%	80 - 120
			Total Chromium (Cr)	2019/09/05		96	%	80 - 120
			Total Cobalt (Co)	2019/09/05		94	%	80 - 120
			Total Copper (Cu)	2019/09/05		91	%	80 - 120
			Total Iron (Fe)	2019/09/05		NC	%	80 - 120
			Total Lead (Pb)	2019/09/05		97	%	80 - 120
			Total Magnesium (Mg)	2019/09/05		NC	%	80 - 120
			Total Manganese (Mn)	2019/09/05		NC	%	80 - 120
			Total Molybdenum (Mo)	2019/09/05		107	%	80 - 120
			Total Nickel (Ni)	2019/09/05		94	%	80 - 120
			Total Phosphorus (P)	2019/09/05		105	%	80 - 120
			Total Potassium (K)	2019/09/05		NC	%	80 - 120
			Total Selenium (Se)	2019/09/05		98	%	80 - 120
			Total Silver (Ag)	2019/09/05		99	%	80 - 120
			Total Sodium (Na)	2019/09/05		NC	%	80 - 120
			Total Strontium (Sr)	2019/09/05		NC	%	80 - 120
			Total Thallium (Tl)	2019/09/05		101	%	80 - 120
			Total Tin (Sn)	2019/09/05		104	%	80 - 120
			Total Titanium (Ti)	2019/09/05		100	%	80 - 120
			Total Uranium (U)	2019/09/05		104	%	80 - 120
			Total Vanadium (V)	2019/09/05		98	%	80 - 120
			Total Zinc (Zn)	2019/09/05		90	%	80 - 120
6313655	BAN	Spiked Blank	Total Aluminum (Al)	2019/09/05		106	%	80 - 120
			Total Antimony (Sb)	2019/09/05		108	%	80 - 120
			Total Arsenic (As)	2019/09/05		99	%	80 - 120
			Total Barium (Ba)	2019/09/05		102	%	80 - 120
			Total Beryllium (Be)	2019/09/05		104	%	80 - 120
			Total Bismuth (Bi)	2019/09/05		105	%	80 - 120
			Total Boron (B)	2019/09/05		103	%	80 - 120
			Total Cadmium (Cd)	2019/09/05		100	%	80 - 120
			Total Calcium (Ca)	2019/09/05		109	%	80 - 120
			Total Chromium (Cr)	2019/09/05		99	%	80 - 120
			Total Cobalt (Co)	2019/09/05		100	%	80 - 120
			Total Copper (Cu)	2019/09/05		98	%	80 - 120
			Total Iron (Fe)	2019/09/05		104	%	80 - 120
			Total Lead (Pb)	2019/09/05		105	%	80 - 120
			Total Magnesium (Mg)	2019/09/05		109	%	80 - 120
			Total Manganese (Mn)	2019/09/05		101	%	80 - 120
			Total Molybdenum (Mo)	2019/09/05		106	%	80 - 120
			Total Nickel (Ni)	2019/09/05		100	%	80 - 120
			Total Phosphorus (P)	2019/09/05		108	%	80 - 120
			Total Potassium (K)	2019/09/05		109	%	80 - 120
			Total Selenium (Se)	2019/09/05		100	%	80 - 120
			Total Silver (Ag)	2019/09/05		101	%	80 - 120
			Total Sodium (Na)	2019/09/05		102	%	80 - 120
			Total Strontium (Sr)	2019/09/05		102	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Thallium (Tl)	2019/09/05		107	%	80 - 120
			Total Tin (Sn)	2019/09/05		108	%	80 - 120
			Total Titanium (Ti)	2019/09/05		103	%	80 - 120
			Total Uranium (U)	2019/09/05		108	%	80 - 120
			Total Vanadium (V)	2019/09/05		100	%	80 - 120
			Total Zinc (Zn)	2019/09/05		100	%	80 - 120
6313655	BAN	Method Blank	Total Aluminum (Al)	2019/09/05	<5.0		ug/L	
			Total Antimony (Sb)	2019/09/05	<1.0		ug/L	
			Total Arsenic (As)	2019/09/05	<1.0		ug/L	
			Total Barium (Ba)	2019/09/05	<1.0		ug/L	
			Total Beryllium (Be)	2019/09/05	<1.0		ug/L	
			Total Bismuth (Bi)	2019/09/05	<2.0		ug/L	
			Total Boron (B)	2019/09/05	<50		ug/L	
			Total Cadmium (Cd)	2019/09/05	<0.010		ug/L	
			Total Calcium (Ca)	2019/09/05	<100		ug/L	
			Total Chromium (Cr)	2019/09/05	<1.0		ug/L	
			Total Cobalt (Co)	2019/09/05	<0.40		ug/L	
			Total Copper (Cu)	2019/09/05	<0.50		ug/L	
			Total Iron (Fe)	2019/09/05	<50		ug/L	
			Total Lead (Pb)	2019/09/05	<0.50		ug/L	
			Total Magnesium (Mg)	2019/09/05	<100		ug/L	
			Total Manganese (Mn)	2019/09/05	<2.0		ug/L	
			Total Molybdenum (Mo)	2019/09/05	<2.0		ug/L	
			Total Nickel (Ni)	2019/09/05	<2.0		ug/L	
			Total Phosphorus (P)	2019/09/05	<100		ug/L	
			Total Potassium (K)	2019/09/05	<100		ug/L	
			Total Selenium (Se)	2019/09/05	<0.50		ug/L	
			Total Silver (Ag)	2019/09/05	<0.10		ug/L	
			Total Sodium (Na)	2019/09/05	<100		ug/L	
			Total Strontium (Sr)	2019/09/05	<2.0		ug/L	
			Total Thallium (Tl)	2019/09/05	<0.10		ug/L	
			Total Tin (Sn)	2019/09/05	<2.0		ug/L	
			Total Titanium (Ti)	2019/09/05	<2.0		ug/L	
			Total Uranium (U)	2019/09/05	<0.10		ug/L	
			Total Vanadium (V)	2019/09/05	<2.0		ug/L	
			Total Zinc (Zn)	2019/09/05	<5.0		ug/L	
6313655	BAN	RPD	Total Aluminum (Al)	2019/09/05	15		%	20
			Total Antimony (Sb)	2019/09/05	NC		%	20
			Total Arsenic (As)	2019/09/05	NC		%	20
			Total Barium (Ba)	2019/09/05	5.4		%	20
			Total Beryllium (Be)	2019/09/05	NC		%	20
			Total Bismuth (Bi)	2019/09/05	NC		%	20
			Total Boron (B)	2019/09/05	5.0		%	20
			Total Cadmium (Cd)	2019/09/05	NC		%	20
			Total Calcium (Ca)	2019/09/05	4.3		%	20
			Total Chromium (Cr)	2019/09/05	NC		%	20
			Total Cobalt (Co)	2019/09/05	NC		%	20
			Total Copper (Cu)	2019/09/05	0.87		%	20
			Total Iron (Fe)	2019/09/05	5.2		%	20
			Total Lead (Pb)	2019/09/05	5.8		%	20
			Total Magnesium (Mg)	2019/09/05	5.9		%	20
			Total Manganese (Mn)	2019/09/05	5.5		%	20
			Total Molybdenum (Mo)	2019/09/05	NC		%	20
			Total Nickel (Ni)	2019/09/05	NC		%	20
			Total Phosphorus (P)	2019/09/05	NC		%	20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Potassium (K)	2019/09/05	5.6		%	20
			Total Selenium (Se)	2019/09/05	NC		%	20
			Total Silver (Ag)	2019/09/05	NC		%	20
			Total Sodium (Na)	2019/09/05	5.7		%	20
			Total Strontium (Sr)	2019/09/05	5.8		%	20
			Total Thallium (Tl)	2019/09/05	NC		%	20
			Total Tin (Sn)	2019/09/05	NC		%	20
			Total Titanium (Ti)	2019/09/05	NC		%	20
			Total Uranium (U)	2019/09/05	NC		%	20
			Total Vanadium (V)	2019/09/05	NC		%	20
			Total Zinc (Zn)	2019/09/05	4.2		%	20
6313967	SSV	Matrix Spike	Total Phosphorus	2019/09/05		94	%	80 - 120
6313967	SSV	QC Standard	Total Phosphorus	2019/09/05		88	%	80 - 120
6313967	SSV	Spiked Blank	Total Phosphorus	2019/09/05		98	%	80 - 120
6313967	SSV	Method Blank	Total Phosphorus	2019/09/05	<0.004		mg/L	
6313967	SSV	RPD	Total Phosphorus	2019/09/05	1.0		%	20
6315790	BAN	Matrix Spike	Total Aluminum (Al)	2019/09/05		103	%	80 - 120
			Total Antimony (Sb)	2019/09/05		108	%	80 - 120
			Total Arsenic (As)	2019/09/05		102	%	80 - 120
			Total Barium (Ba)	2019/09/05		100	%	80 - 120
			Total Beryllium (Be)	2019/09/05		104	%	80 - 120
			Total Bismuth (Bi)	2019/09/05		102	%	80 - 120
			Total Boron (B)	2019/09/05		102	%	80 - 120
			Total Cadmium (Cd)	2019/09/05		102	%	80 - 120
			Total Calcium (Ca)	2019/09/05		NC	%	80 - 120
			Total Chromium (Cr)	2019/09/05		99	%	80 - 120
			Total Cobalt (Co)	2019/09/05		100	%	80 - 120
			Total Copper (Cu)	2019/09/05		98	%	80 - 120
			Total Iron (Fe)	2019/09/05		101	%	80 - 120
			Total Lead (Pb)	2019/09/05		104	%	80 - 120
			Total Magnesium (Mg)	2019/09/05		106	%	80 - 120
			Total Manganese (Mn)	2019/09/05		102	%	80 - 120
			Total Molybdenum (Mo)	2019/09/05		106	%	80 - 120
			Total Nickel (Ni)	2019/09/05		100	%	80 - 120
			Total Phosphorus (P)	2019/09/05		107	%	80 - 120
			Total Potassium (K)	2019/09/05		108	%	80 - 120
			Total Selenium (Se)	2019/09/05		101	%	80 - 120
			Total Silver (Ag)	2019/09/05		101	%	80 - 120
			Total Sodium (Na)	2019/09/05		98	%	80 - 120
			Total Strontium (Sr)	2019/09/05		NC	%	80 - 120
			Total Thallium (Tl)	2019/09/05		105	%	80 - 120
			Total Tin (Sn)	2019/09/05		107	%	80 - 120
			Total Titanium (Ti)	2019/09/05		102	%	80 - 120
			Total Uranium (U)	2019/09/05		108	%	80 - 120
			Total Vanadium (V)	2019/09/05		100	%	80 - 120
			Total Zinc (Zn)	2019/09/05		99	%	80 - 120
6315790	BAN	Spiked Blank	Total Aluminum (Al)	2019/09/05		107	%	80 - 120
			Total Antimony (Sb)	2019/09/05		107	%	80 - 120
			Total Arsenic (As)	2019/09/05		98	%	80 - 120
			Total Barium (Ba)	2019/09/05		100	%	80 - 120
			Total Beryllium (Be)	2019/09/05		102	%	80 - 120
			Total Bismuth (Bi)	2019/09/05		105	%	80 - 120
			Total Boron (B)	2019/09/05		101	%	80 - 120
			Total Cadmium (Cd)	2019/09/05		100	%	80 - 120
			Total Calcium (Ca)	2019/09/05		108	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Chromium (Cr)	2019/09/05		99	%	80 - 120
			Total Cobalt (Co)	2019/09/05		98	%	80 - 120
			Total Copper (Cu)	2019/09/05		98	%	80 - 120
			Total Iron (Fe)	2019/09/05		103	%	80 - 120
			Total Lead (Pb)	2019/09/05		105	%	80 - 120
			Total Magnesium (Mg)	2019/09/05		108	%	80 - 120
			Total Manganese (Mn)	2019/09/05		101	%	80 - 120
			Total Molybdenum (Mo)	2019/09/05		105	%	80 - 120
			Total Nickel (Ni)	2019/09/05		100	%	80 - 120
			Total Phosphorus (P)	2019/09/05		108	%	80 - 120
			Total Potassium (K)	2019/09/05		108	%	80 - 120
			Total Selenium (Se)	2019/09/05		100	%	80 - 120
			Total Silver (Ag)	2019/09/05		100	%	80 - 120
			Total Sodium (Na)	2019/09/05		102	%	80 - 120
			Total Strontium (Sr)	2019/09/05		102	%	80 - 120
			Total Thallium (Tl)	2019/09/05		106	%	80 - 120
			Total Tin (Sn)	2019/09/05		107	%	80 - 120
			Total Titanium (Ti)	2019/09/05		106	%	80 - 120
			Total Uranium (U)	2019/09/05		106	%	80 - 120
			Total Vanadium (V)	2019/09/05		99	%	80 - 120
			Total Zinc (Zn)	2019/09/05		100	%	80 - 120
6315790	BAN	Method Blank	Total Aluminum (Al)	2019/09/05	<5.0		ug/L	
			Total Antimony (Sb)	2019/09/05	<1.0		ug/L	
			Total Arsenic (As)	2019/09/05	<1.0		ug/L	
			Total Barium (Ba)	2019/09/05	<1.0		ug/L	
			Total Beryllium (Be)	2019/09/05	<1.0		ug/L	
			Total Bismuth (Bi)	2019/09/05	<2.0		ug/L	
			Total Boron (B)	2019/09/05	<50		ug/L	
			Total Cadmium (Cd)	2019/09/05	<0.010		ug/L	
			Total Calcium (Ca)	2019/09/05	<100		ug/L	
			Total Chromium (Cr)	2019/09/05	<1.0		ug/L	
			Total Cobalt (Co)	2019/09/05	<0.40		ug/L	
			Total Copper (Cu)	2019/09/05	<0.50		ug/L	
			Total Iron (Fe)	2019/09/05	<50		ug/L	
			Total Lead (Pb)	2019/09/05	<0.50		ug/L	
			Total Magnesium (Mg)	2019/09/05	<100		ug/L	
			Total Manganese (Mn)	2019/09/05	<2.0		ug/L	
			Total Molybdenum (Mo)	2019/09/05	<2.0		ug/L	
			Total Nickel (Ni)	2019/09/05	<2.0		ug/L	
			Total Phosphorus (P)	2019/09/05	<100		ug/L	
			Total Potassium (K)	2019/09/05	<100		ug/L	
			Total Selenium (Se)	2019/09/05	<0.50		ug/L	
			Total Silver (Ag)	2019/09/05	<0.10		ug/L	
			Total Sodium (Na)	2019/09/05	<100		ug/L	
			Total Strontium (Sr)	2019/09/05	<2.0		ug/L	
			Total Thallium (Tl)	2019/09/05	<0.10		ug/L	
			Total Tin (Sn)	2019/09/05	<2.0		ug/L	
			Total Titanium (Ti)	2019/09/05	<2.0		ug/L	
			Total Uranium (U)	2019/09/05	<0.10		ug/L	
			Total Vanadium (V)	2019/09/05	<2.0		ug/L	
			Total Zinc (Zn)	2019/09/05	<5.0		ug/L	
6315790	BAN	RPD	Total Aluminum (Al)	2019/09/05	11		%	20
			Total Antimony (Sb)	2019/09/05	NC		%	20
			Total Arsenic (As)	2019/09/05	NC		%	20
			Total Barium (Ba)	2019/09/05	1.8		%	20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Beryllium (Be)	2019/09/05	NC		%	20
			Total Bismuth (Bi)	2019/09/05	NC		%	20
			Total Boron (B)	2019/09/05	NC		%	20
			Total Cadmium (Cd)	2019/09/05	NC		%	20
			Total Calcium (Ca)	2019/09/05	0.53		%	20
			Total Chromium (Cr)	2019/09/05	NC		%	20
			Total Cobalt (Co)	2019/09/05	NC		%	20
			Total Copper (Cu)	2019/09/05	2.7		%	20
			Total Iron (Fe)	2019/09/05	0.56		%	20
			Total Lead (Pb)	2019/09/05	1.6		%	20
			Total Magnesium (Mg)	2019/09/05	0.74		%	20
			Total Manganese (Mn)	2019/09/05	1.2		%	20
			Total Molybdenum (Mo)	2019/09/05	NC		%	20
			Total Nickel (Ni)	2019/09/05	NC		%	20
			Total Phosphorus (P)	2019/09/05	NC		%	20
			Total Potassium (K)	2019/09/05	1.4		%	20
			Total Selenium (Se)	2019/09/05	NC		%	20
			Total Silver (Ag)	2019/09/05	NC		%	20
			Total Sodium (Na)	2019/09/05	0.12		%	20
			Total Strontium (Sr)	2019/09/05	0.41		%	20
			Total Thallium (Tl)	2019/09/05	NC		%	20
			Total Tin (Sn)	2019/09/05	NC		%	20
			Total Titanium (Ti)	2019/09/05	NC		%	20
			Total Uranium (U)	2019/09/05	0.42		%	20
			Total Vanadium (V)	2019/09/05	NC		%	20
			Total Zinc (Zn)	2019/09/05	NC		%	20
6316421	AM6	QC Standard	Total Suspended Solids	2019/09/06		98	%	80 - 120
6316421	AM6	Method Blank	Total Suspended Solids	2019/09/06	<1.0		mg/L	
6316421	AM6	RPD	Total Suspended Solids	2019/09/06	20		%	20
6324081	SRM	Matrix Spike	Total Alkalinity (Total as CaCO3)	2019/09/12		NC	%	80 - 120
6324081	SRM	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019/09/11		103	%	80 - 120
6324081	SRM	Method Blank	Total Alkalinity (Total as CaCO3)	2019/09/11	<5.0		mg/L	
6324081	SRM	RPD	Total Alkalinity (Total as CaCO3)	2019/09/12	1.6		%	25
6324082	SRM	Matrix Spike	Dissolved Chloride (Cl-)	2019/09/11		91	%	80 - 120
6324082	SRM	Spiked Blank	Dissolved Chloride (Cl-)	2019/09/11		101	%	80 - 120
6324082	SRM	Method Blank	Dissolved Chloride (Cl-)	2019/09/11	<1.0		mg/L	
6324082	SRM	RPD	Dissolved Chloride (Cl-)	2019/09/11	0.17		%	25
6324084	SRM	Matrix Spike	Dissolved Sulphate (SO4)	2019/09/11		105	%	80 - 120
6324084	SRM	Spiked Blank	Dissolved Sulphate (SO4)	2019/09/11		103	%	80 - 120
6324084	SRM	Method Blank	Dissolved Sulphate (SO4)	2019/09/11	<2.0		mg/L	
6324084	SRM	RPD	Dissolved Sulphate (SO4)	2019/09/11	NC		%	25
6324085	SRM	Matrix Spike	Reactive Silica (SiO2)	2019/09/11		99	%	80 - 120
6324085	SRM	Spiked Blank	Reactive Silica (SiO2)	2019/09/11		97	%	80 - 120
6324085	SRM	Method Blank	Reactive Silica (SiO2)	2019/09/11	<0.50		mg/L	
6324085	SRM	RPD	Reactive Silica (SiO2)	2019/09/11	2.7		%	25
6324087	SRM	Spiked Blank	Colour	2019/09/11		98	%	80 - 120
6324087	SRM	Method Blank	Colour	2019/09/11	<5.0		TCU	
6324087	SRM	RPD	Colour	2019/09/11	5.0		%	20
6324089	SRM	Matrix Spike	Orthophosphate (P)	2019/09/11		NC	%	80 - 120
6324089	SRM	Spiked Blank	Orthophosphate (P)	2019/09/11		97	%	80 - 120
6324089	SRM	Method Blank	Orthophosphate (P)	2019/09/11	<0.010		mg/L	
6324089	SRM	RPD	Orthophosphate (P)	2019/09/11	2.0		%	25
6324093	SRM	Matrix Spike	Nitrate + Nitrite (N)	2019/09/12		86	%	80 - 120
6324093	SRM	Spiked Blank	Nitrate + Nitrite (N)	2019/09/12		95	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6324093	SRM	Method Blank	Nitrate + Nitrite (N)	2019/09/12	0.058, RDL=0.050		mg/L	
6324093	SRM	RPD	Nitrate + Nitrite (N)	2019/09/12	NC (3)		%	25
6324094	SRM	Matrix Spike	Nitrite (N)	2019/09/11		92	%	80 - 120
6324094	SRM	Spiked Blank	Nitrite (N)	2019/09/11		104	%	80 - 120
6324094	SRM	Method Blank	Nitrite (N)	2019/09/11	<0.010		mg/L	
6324094	SRM	RPD	Nitrite (N)	2019/09/11	NC		%	20
6325628	BBD	QC Standard	Salinity	2019/09/11		100	%	80 - 120
6325628	BBD	Method Blank	Salinity	2019/09/11	<2.0		N/A	
6325628	BBD	RPD	Salinity	2019/09/11	0		%	25
6325852	SRM	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2019/09/11		102	%	80 - 120
6325852	SRM	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2019/09/11		100	%	80 - 120
6325852	SRM	Method Blank	Nitrogen (Ammonia Nitrogen)	2019/09/12	<0.050		mg/L	
6325852	SRM	RPD	Nitrogen (Ammonia Nitrogen)	2019/09/11	NC		%	20
6327925	EMT	Matrix Spike	Total Organic Carbon (C)	2019/09/12		95	%	85 - 115
6327925	EMT	Spiked Blank	Total Organic Carbon (C)	2019/09/12		96	%	80 - 120
6327925	EMT	Method Blank	Total Organic Carbon (C)	2019/09/12	<0.50		mg/L	
6327925	EMT	RPD	Total Organic Carbon (C)	2019/09/12	1.5		%	15

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) CBOD Analysis: Reference Material and second source recovery were high.

(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(3) Elevated reporting limit due to blank performance.

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Anastassia Hamanov, Scientific Specialist

Eric Dearman, Scientific Specialist

Robyn Edwards, Bedford Micro Supervisor

DALHOUSIE UNIVERSITY
Inspiring Minds

Department of Oceanography
1355 Oxford St
Halifax, NS
B3H 4R2

Determination of chlorophyll a by fluorescence

Client: Bureau Veritas Laboratories, 200 Bluewater Road, Bedford, NS, B4B 1G9

Attention: Keri Mackay **Received:** 2019-08-30

Project #: B9O2216 **Completed:** 2019-09-03

Hugh MacIntyre, Ph.D.

Chl *a* (chlorophyll *a*; µg L-1) determined by the acidification method (Holm-Hansen et al., 1965). Estimates made with the non-acidification method (Welschmeyer, 1994) are shown for comparison.
The non-acidification method is considered more reliable than the acidification method in correcting for bias due to the contributions of chlorophyll *b* and chlorophyll degradation products.

Holm-Hansen O, Lorenzen CJ, Holmes RW, Strickland JDH (1965) Fluorometric determination of chlorophyll. J Conseil 30:3-15

Welschmeyer NA (1994) Fluorometric analysis of chlorophyll *a* in the presence of chlorophyll *b* and phaeopigments. Limnol Oceanogr 39:1985-1992

Contractor ID	Client ID	Chl *a* (acidification)	Chl *a* (non-acidification)
KQS901	AR-9	3.75	4.04
KQS904	AR-12	3.93	4.06
KQS908	BKG-2	2.55	2.78

Maxxam
A Bureau Veritas Group Company

200 Bluewater Road, Suite 105, Bedford, Nova Scotia B4B 1G9 Tel: 902-420-0203 Fax: 902-420-8612 Toll Free: 1-800-565-7227
49-55 Elizabeth Avenue, St John's, NL A1A 1W9 Tel: 709-754-0203 Fax: 709-754-8612 Toll Free: 1-888-492-7227
465 George Street, Unit G, Sydney, NS B1P 1K5 Tel: 902-567-1255 Fax: 902-539-6504 Toll Free: 1-888-535-7770
www.maxxam.ca E-mail: Customerservicebedford@maxxam.ca

ATL FCD 00149 / 23

CHAIN OF CUSTODY RECORD

COC #: D40667 Page ____ of ____

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required
Company Name:	CBCL	Company Name:		Quotation #:		☑ Regular TAT (5 business days) Most analyses
Contact Name:	Accounts Payable	Contact Name:		Purchase Order #:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	1505 Barrington Street Suite 901 PO Box 606 PC:	Address: PC:		Project #:		IF RUSH please specify date (Surcharges will be applied)
Phone:	902-421-7241	Phone:		Site Location:		DATE REQUIRED:
Email:	acct@cbcl.ca	Email:		Site Province:		
Report Copies:	cmcvarish@cbcl.ca	Report Copies:	mrutherford@cbcl.ca	Site #:		
				Sampled By:		

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		4, 0, 3	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

#	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Mercury (CIRCLE) TOTAL / DISSOLVED
1	AR-5	2019/08/29	9:10	Water								
2	AR-7	〃	10:32	〃								
3	AR-8	〃	10:49	〃								
4	AR-9	〃	11:05	〃				X				
5	AR-10	〃	11:20	〃								
6	AR-11	〃	11:37	〃								
7	AR-12	〃	11:50	〃				X				
8	AR-13	〃	12:05	〃								
9	AR-18	〃	14:33	〃								
10	AR-17	〃	15:00	〃								

#	SAMPLE IDENTIFICATION	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	~~PAHs (Default for water/soil)~~ Chlorophyll A (Sub from Bedford)	~~PAHs (PWQ/CCME Sediment)~~ BOD	PCBs - Select One: Default or CCME Sediment	~~VOC~~ low level phosphorus	~~Total Coliform/E.coli (Presence/Absence)~~ Fecal Coliform (Count)	Total Coliform/E.Coli (Count)	TSS	Salinity		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	AR-5											X	X			
2	AR-7											X	X			
3	AR-8											X	X			
4	AR-9					X	X		X	X	X	X	X			
5	AR-10											X	X			
6	AR-11											X	X			
7	AR-12					X	X		X	X	X	X	X			
8	AR-13											X	X			2019 AUG 30 9:31
9	AR-18											X	X			
10	AR-17											X	X			

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Colin McVarish [signature]	2019/08/29	20:30	[signature]			B902216

White: Maxxam Pink: Client

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ATL FCD 00149 / 23

CHAIN OF CUSTODY RECORD

COC #: D40668 Page ____ of ____

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required
Company Name:	CBCL	Company Name:		Quotation #:		✓ Regular TAT (5 business days) Most analyses
Contact Name:	Accounts Payable	Contact Name:		Purchase Order #:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	1505 Barrington St Suite 1401 PO Box 606 PC:	Address:	PC:	Project #:		IF RUSH please specify date (Surcharges will be applied)
				Site Location:		DATE REQUIRED:
Phone:	902-421-7241	Phone:		Site Province:		
Email:	acct@cbcl.ca	Email:		Site #:		
Report Copies:	CMcVarish@cbcl.ca	Report Copies:	mrutherford@cbcl.ca	Sampled By:		

Laboratory Use Only

CUSTODY SEAL Present	Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		4, 8, 3	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	~~PAHs (Default for water/soil)~~ Chlorophyll A (Sub from Bedford)	~~PAHs (PWAL/CCME Sediment)~~ BOD	PCBs - Select One: Default or CCME Sediment	~~VOCs~~ low level phosphorous	~~Total Coliform/E.coli (Presence/Absence)~~ Fecal Coliform (Count)	Total Coliform/E.Coli (Count)	TSS	Salinity		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	BKG-2	2019/08/29	18:10	Water				X									X	X		X	X	X	X	X			
2	BKG-1	"	18:20	"																			X	X			
3																											
4																											
5																											
6																											2019 AUG 30 9:31
7																											
8																											
9																											
10																											

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Colin McVarish	2019/08/29	20:30	[signature]			B902216
[signature]						

White: Maxxam Pink: Client

CBCL Limited

BV Labs Job Number: B9O2216
Report Date: 2019/09/13

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		KQS901		KQS904			KQS908		
Sampling Date		2019-08-29 11:05		2019-08-29 11:50			2019-08-29 18:10		
COC Number		D 40667		D 40667			D 40667		
	UNITS	**AR-9**	**QC Batch**	**AR-12**	**RDL**	**QC Batch**	**BKG-2**	**RDL**	**QC Batch**
Calculated Parameters									
Anion Sum	me/L	1.09	6308515	0.650	N/A	6308515	10.9	N/A	6308515
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	13	6308509	8.1	1.0	6308509	110	1.0	6308509
Calculated TDS	mg/L	67	6308526	39	1.0	6308526	710	1.0	6308526
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	6308509	<1.0	1.0	6308509	<1.0	1.0	6308509
Cation Sum	me/L	1.06	6308515	0.600	N/A	6308515	11.3	N/A	6308515
Hardness (CaCO3)	mg/L	32	6308511	14	1.0	6308511	530	1.0	6308511
Ion Balance (% Difference)	%	1.40	6308513	4.00	N/A	6308513	1.53	N/A	6308513
Langelier Index (@ 20C)	N/A	-2.29	6308522	-2.84		6308522	0.637		6308522
Langelier Index (@ 4C)	N/A	-2.54	6308524	-3.09		6308524	0.390		6308524
Nitrate (N)	mg/L	<0.060	6308517	<0.060	0.060	6308517	0.23	0.060	6308517
Saturation pH (@ 20C)	N/A	9.20	6308522	9.75		6308522	7.17		6308522
Saturation pH (@ 4C)	N/A	9.45	6308524	10.0		6308524	7.41		6308524
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	13	6324081	8.1	5.0	6324081	110	25	6324081
Dissolved Chloride (Cl-)	mg/L	14	6324082	11	1.0	6324082	20	1.0	6324082
Colour	TCU	61	6324087	69	25	6324087	12	5.0	6324087
Nitrate + Nitrite (N)	mg/L	<0.060 (1)	6324093	<0.060 (1)	0.060	6324093	0.23 (1)	0.060	6324093
Nitrite (N)	mg/L	<0.010	6324094	<0.010	0.010	6324094	<0.010	0.010	6324094
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	6325852	<0.050	0.050	6325852	<0.050	0.050	6325852
Total Organic Carbon (C)	mg/L	6.8	6327925	7.0	0.50	6327925	2.9	0.50	6327925
Orthophosphate (P)	mg/L	<0.010	6324089	0.011	0.010	6324089	<0.010	0.010	6324089
pH	pH	6.91	6311565	6.91	N/A	6311558	7.80	N/A	6311558
Reactive Silica (SiO2)	mg/L	1.5	6324085	1.7	0.50	6324085	6.2	0.50	6324085
Dissolved Sulphate (SO4)	mg/L	22	6324084	9.3	2.0	6324084	390	10	6324084
Turbidity	NTU	3.0	6311605	2.5	0.10	6311605	3.8	0.10	6311605
Conductivity	uS/cm	120	6311570	68	1.0	6311560	1000	1.0	6311560
Metals									
Total Aluminum (Al)	ug/L	150	6313453	180	5.0	6313655	120	5.0	6315790
Total Antimony (Sb)	ug/L	<1.0	6313453	<1.0	1.0	6313655	<1.0	1.0	6315790
Total Arsenic (As)	ug/L	1.3	6313453	1.3	1.0	6313655	<1.0	1.0	6315790
Total Barium (Ba)	ug/L	11	6313453	7.6	1.0	6313655	96	1.0	6315790
Total Beryllium (Be)	ug/L	<1.0	6313453	<1.0	1.0	6313655	<1.0	1.0	6315790
Total Bismuth (Bi)	ug/L	<2.0	6313453	<2.0	2.0	6313655	<2.0	2.0	6315790
Total Boron (B)	ug/L	<50	6313453	<50	50	6313655	150	50	6315790
Total Cadmium (Cd)	ug/L	<0.010	6313453	<0.010	0.010	6313655	<0.010	0.010	6315790
Total Calcium (Ca)	ug/L	11000	6313453	4400	100	6313655	200000	100	6315790
Total Chromium (Cr)	ug/L	1.1	6313453	1.1	1.0	6313655	<1.0	1.0	6315790
Total Cobalt (Co)	ug/L	<0.40	6313453	<0.40	0.40	6313655	<0.40	0.40	6315790
Total Copper (Cu)	ug/L	0.57	6313453	0.61	0.50	6313655	<0.50	0.50	6315790
Total Iron (Fe)	ug/L	360	6313453	370	50	6313655	310	50	6315790
Total Lead (Pb)	ug/L	<0.50	6313453	<0.50	0.50	6313655	<0.50	0.50	6315790
Total Magnesium (Mg)	ug/L	1200	6313453	760	100	6313655	6100	100	6315790
Total Manganese (Mn)	ug/L	33	6313453	27	2.0	6313655	360	2.0	6315790

CBCL Limited

BV Labs Job Number: B9O2216
Report Date: 2019/09/13

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		KQS901		KQS904			KQS908		
Sampling Date		2019-08-29 11:05		2019-08-29 11:50			2019-08-29 18:10		
COC Number		D 40667		D 40667			D 40667		
	UNITS	**AR-9**	**QC Batch**	**AR-12**	**RDL**	**QC Batch**	**BKG-2**	**RDL**	**QC Batch**
Calculated Parameters									
Total Molybdenum (Mo)	ug/L	<2.0	6313453	<2.0	2.0	6313655	<2.0	2.0	6315790
Total Nickel (Ni)	ug/L	<2.0	6313453	<2.0	2.0	6313655	<2.0	2.0	6315790
Total Phosphorus (P)	ug/L	<100	6313453	<100	100	6313655	<100	100	6315790
Total Potassium (K)	ug/L	680	6313453	520	100	6313655	2100	100	6315790
Total Selenium (Se)	ug/L	<0.50	6313453	<0.50	0.50	6313655	<0.50	0.50	6315790
Total Silver (Ag)	ug/L	<0.10	6313453	<0.10	0.10	6313655	<0.10	0.10	6315790
Total Sodium (Na)	ug/L	9100	6313453	6600	100	6313655	12000	100	6315790
Total Strontium (Sr)	ug/L	78	6313453	31	2.0	6313655	1600	2.0	6315790
Total Thallium (Tl)	ug/L	<0.10	6313453	<0.10	0.10	6313655	<0.10	0.10	6315790
Total Tin (Sn)	ug/L	<2.0	6313453	<2.0	2.0	6313655	<2.0	2.0	6315790
Total Titanium (Ti)	ug/L	2.2	6313453	2.8	2.0	6313655	3.5	2.0	6315790
Total Uranium (U)	ug/L	0.23	6313453	0.21	0.10	6313655	0.46	0.10	6315790
Total Vanadium (V)	ug/L	<2.0	6313453	<2.0	2.0	6313655	<2.0	2.0	6315790
Total Zinc (Zn)	ug/L	<5.0	6313453	<5.0	5.0	6313655	<5.0	5.0	6315790

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to blank performance.

Results relate only to the items tested.

CBCL Limited

BV Labs Job Number: B9O2216
Report Date: 2019/09/13

RESULTS OF ANALYSES OF WATER

BV Labs ID		KQS898		KQS899	KQS900			KQS901			KQS902	KQS903			KQS904			KQS905	KQS906	KQS907			KQS908			KQS909		
Sampling Date		2019-08-29 09:10		2019-08-29 10:32	2019-08-29 10:49			2019-08-29 11:05			2019-08-29 11:20	2019-08-29 11:37			2019-08-29 11:50			2019-08-29 12:05	2019-08-29 14:33	2019-08-29 15:00			2019-08-29 18:10			2019-08-29 18:20		
COC Number		D 40667		D 40667	D 40667			D 40667			D 40667	D 40667			D 40667			D 40667	D 40667	D 40667			D 40667			D 40667		
	UNITS	**AR-5**	**RDL**	**AR-7**	**AR-8**	**RDL**	**QC Batch**	**AR-9**	**RDL**	**QC Batch**	**AR-10**	**AR-11**	**RDL**	**QC Batch**	**AR-12**	**RDL**	**QC Batch**	**AR-13**	**AR-18**	**AR-17**	**RDL**	**QC Batch**	**BKG-2**	**RDL**	**QC Batch**	**BKG-1**	**RDL**	**QC Batch**
Inorganics																												
Carbonaceous BOD	mg/L							<5.0	5.0	6308403					<5.0	5.0	6308403						<5.0	5.0	6308403			
Total Phosphorus	mg/L							0.032	0.004	6313967					0.031	0.004	6313967						0.028	0.004	6313967			
Salinity	N/A	<2.0	2.0	<2.0	<2.0	2.0	6325628	<2.0	2.0	6325628	<2.0	<2.0	2.0	6325628	<2.0	2.0	6325628	<2.0	<2.0	<2.0	2.0	6325628	<2.0	2.0	6325628	<2.0	2.0	6325628
Total Suspended Solids	mg/L	3.2	2.0	2.8	2.6	1.0	6316421	<2.2	2.2	6316421	1.8	5.6	1.0	6316421	3.2	2.3	6316421	2.0	3.6	2.3	1.0	6316421	6.1	2.2	6316421	170	5.0	6316421
Subcontracted Analysis																												
Subcontract Parameter	N/A							ATTACHED	N/A	6311715					ATTACHED	N/A	6311715						ATTACHED	N/A	6311715			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Results relate only to the items tested.

CBCL Limited

BV Labs Job Number: B9O2216
Report Date: 2019/09/13

MICROBIOLOGY (WATER)

BV Labs ID		KQS901	KQS904	KQS908		
Sampling Date		2019-08-29 11:05	2019-08-29 11:50	2019-08-29 18:10		
COC Number		D 40667	D 40667	D 40667		
	UNITS	**AR-9**	**AR-12**	**BKG-2**	**RDL**	**QC Batch**
Microbiological						
Fecal coliform	CFU/100mL	10	<10	900	10	6308630
Total Coliforms	CFU/100mL	180	140	>2500	10	6308632

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Results relate only to the items tested.

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Each tempera	Each tempera	Each tempera	Each temperature is the average of up to three cooler temperatures taken at receipt
Package 1	2.3°C	#N/A	#N/A

Sample KQS901 [AR-9] : TSS:Used all of the sample provided, DL raised.

Results relate only to the items tested.

CBCL Limited
Attention: Melissa Rutherford

Report Date: 2019/09/13

Quality Assurance Report
BV Labs Job Number: B9O2216

QA/QC Ba	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6308403	MLW	QC Standard	Carbonaceous BOD	2019-09-04		133 (1)	%	80 - 120
6308403	MLW	Spiked Blank	Carbonaceous BOD	2019-09-04		133 (2)	%	80 - 120
6308403	MLW	Method Blank	Carbonaceous BOD	2019-09-04	<2.0		mg/L	
6308403	MLW	RPD	Carbonaceous BOD	2019-09-04	NC		%	25
6308630	KBO	Method Blank	Fecal coliform	2019-08-30	<1.0		CFU/100mL	
6308632	KBO	Method Blank	Total Coliforms	2019-08-30	<1.0		CFU/100mL	
6311558	JMV	QC Standard	pH	2019-09-03		101	%	97 - 103
6311558	JMV	RPD	pH	2019-09-03	1.7		%	N/A
6311560	JMV	Spiked Blank	Conductivity	2019-09-03		101	%	80 - 120
6311560	JMV	Method Blank	Conductivity	2019-09-03	<1.0		uS/cm	
6311560	JMV	RPD	Conductivity	2019-09-03	0.0024		%	10
6311565	JMV	QC Standard	pH	2019-09-03		100	%	97 - 103
6311565	JMV	RPD	pH	2019-09-03	0.014		%	N/A
6311570	JMV	Spiked Blank	Conductivity	2019-09-03		101	%	80 - 120
6311570	JMV	Method Blank	Conductivity	2019-09-03	<1.0		uS/cm	
6311570	JMV	RPD	Conductivity	2019-09-03	0.81		%	10
6311605	JMV	QC Standard	Turbidity	2019-09-03		106	%	80 - 120
6311605	JMV	Spiked Blank	Turbidity	2019-09-03		100	%	80 - 120
6311605	JMV	Method Blank	Turbidity	2019-09-03	<0.10		NTU	
6311605	JMV	RPD	Turbidity	2019-09-03	11		%	20
6313453	BAN	Matrix Spike	Total Aluminum (Al)	2019-09-06		101	%	80 - 120
			Total Antimony (Sb)	2019-09-06		106	%	80 - 120
			Total Arsenic (As)	2019-09-06		98	%	80 - 120
			Total Barium (Ba)	2019-09-06		106	%	80 - 120
			Total Beryllium (Be)	2019-09-06		103	%	80 - 120
			Total Bismuth (Bi)	2019-09-06		103	%	80 - 120
			Total Boron (B)	2019-09-06		100	%	80 - 120
			Total Cadmium (Cd)	2019-09-06		101	%	80 - 120
			Total Calcium (Ca)	2019-09-06		107	%	80 - 120
			Total Chromium (Cr)	2019-09-06		98	%	80 - 120
			Total Cobalt (Co)	2019-09-06		99	%	80 - 120
			Total Copper (Cu)	2019-09-06		98	%	80 - 120
			Total Iron (Fe)	2019-09-06		102	%	80 - 120
			Total Lead (Pb)	2019-09-06		106	%	80 - 120
			Total Magnesium (Mg)	2019-09-06		105	%	80 - 120
			Total Manganese (Mn)	2019-09-06		101	%	80 - 120
			Total Molybdenum (Mo)	2019-09-06		106	%	80 - 120
			Total Nickel (Ni)	2019-09-06		100	%	80 - 120
			Total Phosphorus (P)	2019-09-06		105	%	80 - 120
			Total Potassium (K)	2019-09-06		109	%	80 - 120
			Total Selenium (Se)	2019-09-06		99	%	80 - 120
			Total Silver (Ag)	2019-09-06		102	%	80 - 120
			Total Sodium (Na)	2019-09-06		100	%	80 - 120
			Total Strontium (Sr)	2019-09-06		103	%	80 - 120
			Total Thallium (Tl)	2019-09-06		104	%	80 - 120
			Total Tin (Sn)	2019-09-06		109	%	80 - 120
			Total Titanium (Ti)	2019-09-06		103	%	80 - 120
			Total Uranium (U)	2019-09-06		111	%	80 - 120
			Total Vanadium (V)	2019-09-06		98	%	80 - 120
			Total Zinc (Zn)	2019-09-06		100	%	80 - 120
6313453	BAN	Spiked Blank	Total Aluminum (Al)	2019-09-06		104	%	80 - 120
			Total Antimony (Sb)	2019-09-06		108	%	80 - 120
			Total Arsenic (As)	2019-09-06		100	%	80 - 120

CBCL Limited
Attention: Melissa Rutherford

Report Date: 2019/09/13

Quality Assurance Report
BV Labs Job Number: B9O2216

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Barium (Ba)	2019-09-06		103	%	80 - 120
			Total Beryllium (Be)	2019-09-06		103	%	80 - 120
			Total Bismuth (Bi)	2019-09-06		104	%	80 - 120
			Total Boron (B)	2019-09-06		100	%	80 - 120
			Total Cadmium (Cd)	2019-09-06		102	%	80 - 120
			Total Calcium (Ca)	2019-09-06		108	%	80 - 120
			Total Chromium (Cr)	2019-09-06		100	%	80 - 120
			Total Cobalt (Co)	2019-09-06		102	%	80 - 120
			Total Copper (Cu)	2019-09-06		100	%	80 - 120
			Total Iron (Fe)	2019-09-06		105	%	80 - 120
			Total Lead (Pb)	2019-09-06		107	%	80 - 120
			Total Magnesium (Mg)	2019-09-06		108	%	80 - 120
			Total Manganese (Mn)	2019-09-06		103	%	80 - 120
			Total Molybdenum (Mo)	2019-09-06		106	%	80 - 120
			Total Nickel (Ni)	2019-09-06		102	%	80 - 120
			Total Phosphorus (P)	2019-09-06		107	%	80 - 120
			Total Potassium (K)	2019-09-06		109	%	80 - 120
			Total Selenium (Se)	2019-09-06		99	%	80 - 120
			Total Silver (Ag)	2019-09-06		104	%	80 - 120
			Total Sodium (Na)	2019-09-06		101	%	80 - 120
			Total Strontium (Sr)	2019-09-06		106	%	80 - 120
			Total Thallium (Tl)	2019-09-06		105	%	80 - 120
			Total Tin (Sn)	2019-09-06		104	%	80 - 120
			Total Titanium (Ti)	2019-09-06		104	%	80 - 120
			Total Uranium (U)	2019-09-06		111	%	80 - 120
			Total Vanadium (V)	2019-09-06		100	%	80 - 120
			Total Zinc (Zn)	2019-09-06		100	%	80 - 120
6313453	BAN	Method Blank	Total Aluminum (Al)	2019-09-06	<5.0		ug/L	
			Total Antimony (Sb)	2019-09-06	<1.0		ug/L	
			Total Arsenic (As)	2019-09-06	<1.0		ug/L	
			Total Barium (Ba)	2019-09-06	<1.0		ug/L	
			Total Beryllium (Be)	2019-09-06	<1.0		ug/L	
			Total Bismuth (Bi)	2019-09-06	<2.0		ug/L	
			Total Boron (B)	2019-09-06	<50		ug/L	
			Total Cadmium (Cd)	2019-09-06	<0.010		ug/L	
			Total Calcium (Ca)	2019-09-06	<100		ug/L	
			Total Chromium (Cr)	2019-09-06	<1.0		ug/L	
			Total Cobalt (Co)	2019-09-06	<0.40		ug/L	
			Total Copper (Cu)	2019-09-06	<0.50		ug/L	
			Total Iron (Fe)	2019-09-06	<50		ug/L	
			Total Lead (Pb)	2019-09-06	<0.50		ug/L	
			Total Magnesium (Mg)	2019-09-06	<100		ug/L	
			Total Manganese (Mn)	2019-09-06	<2.0		ug/L	
			Total Molybdenum (Mo)	2019-09-06	<2.0		ug/L	
			Total Nickel (Ni)	2019-09-06	<2.0		ug/L	
			Total Phosphorus (P)	2019-09-06	<100		ug/L	
			Total Potassium (K)	2019-09-06	<100		ug/L	
			Total Selenium (Se)	2019-09-06	<0.50		ug/L	
			Total Silver (Ag)	2019-09-06	<0.10		ug/L	
			Total Sodium (Na)	2019-09-06	<100		ug/L	
			Total Strontium (Sr)	2019-09-06	<2.0		ug/L	
			Total Thallium (Tl)	2019-09-06	<0.10		ug/L	
			Total Tin (Sn)	2019-09-06	<2.0		ug/L	
			Total Titanium (Ti)	2019-09-06	<2.0		ug/L	

CBCL Limited
Attention: Melissa Rutherford

Report Date: 2019/09/13

Quality Assurance Report
BV Labs Job Number: B9O2216

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Uranium (U)	2019-09-06	<0.10		ug/L	
			Total Vanadium (V)	2019-09-06	<2.0		ug/L	
			Total Zinc (Zn)	2019-09-06	<5.0		ug/L	
6313453	BAN	RPD	Total Lead (Pb)	2019-09-06	6.2		%	20
6313655	BAN	Matrix Spike	Total Aluminum (Al)	2019-09-05		101	%	80 - 120
			Total Antimony (Sb)	2019-09-05		106	%	80 - 120
			Total Arsenic (As)	2019-09-05		97	%	80 - 120
			Total Barium (Ba)	2019-09-05		NC	%	80 - 120
			Total Beryllium (Be)	2019-09-05		101	%	80 - 120
			Total Bismuth (Bi)	2019-09-05		96	%	80 - 120
			Total Boron (B)	2019-09-05		100	%	80 - 120
			Total Cadmium (Cd)	2019-09-05		98	%	80 - 120
			Total Calcium (Ca)	2019-09-05		NC	%	80 - 120
			Total Chromium (Cr)	2019-09-05		96	%	80 - 120
			Total Cobalt (Co)	2019-09-05		94	%	80 - 120
			Total Copper (Cu)	2019-09-05		91	%	80 - 120
			Total Iron (Fe)	2019-09-05		NC	%	80 - 120
			Total Lead (Pb)	2019-09-05		97	%	80 - 120
			Total Magnesium (Mg)	2019-09-05		NC	%	80 - 120
			Total Manganese (Mn)	2019-09-05		NC	%	80 - 120
			Total Molybdenum (Mo)	2019-09-05		107	%	80 - 120
			Total Nickel (Ni)	2019-09-05		94	%	80 - 120
			Total Phosphorus (P)	2019-09-05		105	%	80 - 120
			Total Potassium (K)	2019-09-05		NC	%	80 - 120
			Total Selenium (Se)	2019-09-05		98	%	80 - 120
			Total Silver (Ag)	2019-09-05		99	%	80 - 120
			Total Sodium (Na)	2019-09-05		NC	%	80 - 120
			Total Strontium (Sr)	2019-09-05		NC	%	80 - 120
			Total Thallium (Tl)	2019-09-05		101	%	80 - 120
			Total Tin (Sn)	2019-09-05		104	%	80 - 120
			Total Titanium (Ti)	2019-09-05		100	%	80 - 120
			Total Uranium (U)	2019-09-05		104	%	80 - 120
			Total Vanadium (V)	2019-09-05		98	%	80 - 120
			Total Zinc (Zn)	2019-09-05		90	%	80 - 120
6313655	BAN	Spiked Blank	Total Aluminum (Al)	2019-09-05		106	%	80 - 120
			Total Antimony (Sb)	2019-09-05		108	%	80 - 120
			Total Arsenic (As)	2019-09-05		99	%	80 - 120
			Total Barium (Ba)	2019-09-05		102	%	80 - 120
			Total Beryllium (Be)	2019-09-05		104	%	80 - 120
			Total Bismuth (Bi)	2019-09-05		105	%	80 - 120
			Total Boron (B)	2019-09-05		103	%	80 - 120
			Total Cadmium (Cd)	2019-09-05		100	%	80 - 120
			Total Calcium (Ca)	2019-09-05		109	%	80 - 120
			Total Chromium (Cr)	2019-09-05		99	%	80 - 120
			Total Cobalt (Co)	2019-09-05		100	%	80 - 120
			Total Copper (Cu)	2019-09-05		98	%	80 - 120
			Total Iron (Fe)	2019-09-05		104	%	80 - 120
			Total Lead (Pb)	2019-09-05		105	%	80 - 120
			Total Magnesium (Mg)	2019-09-05		109	%	80 - 120
			Total Manganese (Mn)	2019-09-05		101	%	80 - 120
			Total Molybdenum (Mo)	2019-09-05		106	%	80 - 120
			Total Nickel (Ni)	2019-09-05		100	%	80 - 120
			Total Phosphorus (P)	2019-09-05		108	%	80 - 120
			Total Potassium (K)	2019-09-05		109	%	80 - 120

CBCL Limited
Attention: Melissa Rutherford

Report Date: 2019/09/13

Quality Assurance Report
BV Labs Job Number: B9O2216

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Selenium (Se)	2019-09-05		100	%	80 - 120
			Total Silver (Ag)	2019-09-05		101	%	80 - 120
			Total Sodium (Na)	2019-09-05		102	%	80 - 120
			Total Strontium (Sr)	2019-09-05		102	%	80 - 120
			Total Thallium (Tl)	2019-09-05		107	%	80 - 120
			Total Tin (Sn)	2019-09-05		108	%	80 - 120
			Total Titanium (Ti)	2019-09-05		103	%	80 - 120
			Total Uranium (U)	2019-09-05		108	%	80 - 120
			Total Vanadium (V)	2019-09-05		100	%	80 - 120
			Total Zinc (Zn)	2019-09-05		100	%	80 - 120
6313655	BAN	Method Blank	Total Aluminum (Al)	2019-09-05	<5.0		ug/L	
			Total Antimony (Sb)	2019-09-05	<1.0		ug/L	
			Total Arsenic (As)	2019-09-05	<1.0		ug/L	
			Total Barium (Ba)	2019-09-05	<1.0		ug/L	
			Total Beryllium (Be)	2019-09-05	<1.0		ug/L	
			Total Bismuth (Bi)	2019-09-05	<2.0		ug/L	
			Total Boron (B)	2019-09-05	<50		ug/L	
			Total Cadmium (Cd)	2019-09-05	<0.010		ug/L	
			Total Calcium (Ca)	2019-09-05	<100		ug/L	
			Total Chromium (Cr)	2019-09-05	<1.0		ug/L	
			Total Cobalt (Co)	2019-09-05	<0.40		ug/L	
			Total Copper (Cu)	2019-09-05	<0.50		ug/L	
			Total Iron (Fe)	2019-09-05	<50		ug/L	
			Total Lead (Pb)	2019-09-05	<0.50		ug/L	
			Total Magnesium (Mg)	2019-09-05	<100		ug/L	
			Total Manganese (Mn)	2019-09-05	<2.0		ug/L	
			Total Molybdenum (Mo)	2019-09-05	<2.0		ug/L	
			Total Nickel (Ni)	2019-09-05	<2.0		ug/L	
			Total Phosphorus (P)	2019-09-05	<100		ug/L	
			Total Potassium (K)	2019-09-05	<100		ug/L	
			Total Selenium (Se)	2019-09-05	<0.50		ug/L	
			Total Silver (Ag)	2019-09-05	<0.10		ug/L	
			Total Sodium (Na)	2019-09-05	<100		ug/L	
			Total Strontium (Sr)	2019-09-05	<2.0		ug/L	
			Total Thallium (Tl)	2019-09-05	<0.10		ug/L	
			Total Tin (Sn)	2019-09-05	<2.0		ug/L	
			Total Titanium (Ti)	2019-09-05	<2.0		ug/L	
			Total Uranium (U)	2019-09-05	<0.10		ug/L	
			Total Vanadium (V)	2019-09-05	<2.0		ug/L	
			Total Zinc (Zn)	2019-09-05	<5.0		ug/L	
6313655	BAN	RPD	Total Aluminum (Al)	2019-09-05	15		%	20
			Total Antimony (Sb)	2019-09-05	NC		%	20
			Total Arsenic (As)	2019-09-05	NC		%	20
			Total Barium (Ba)	2019-09-05	5.4		%	20
			Total Beryllium (Be)	2019-09-05	NC		%	20
			Total Bismuth (Bi)	2019-09-05	NC		%	20
			Total Boron (B)	2019-09-05	5.0		%	20
			Total Cadmium (Cd)	2019-09-05	NC		%	20
			Total Calcium (Ca)	2019-09-05	4.3		%	20
			Total Chromium (Cr)	2019-09-05	NC		%	20
			Total Cobalt (Co)	2019-09-05	NC		%	20
			Total Copper (Cu)	2019-09-05	0.87		%	20
			Total Iron (Fe)	2019-09-05	5.2		%	20
			Total Lead (Pb)	2019-09-05	5.8		%	20

CBCL Limited
Attention: Melissa Rutherford

Report Date: 2019/09/13

Quality Assurance Report
BV Labs Job Number: B9O2216

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Magnesium (Mg)	2019-09-05	5.9		%	20
			Total Manganese (Mn)	2019-09-05	5.5		%	20
			Total Molybdenum (Mo)	2019-09-05	NC		%	20
			Total Nickel (Ni)	2019-09-05	NC		%	20
			Total Phosphorus (P)	2019-09-05	NC		%	20
			Total Potassium (K)	2019-09-05	5.6		%	20
			Total Selenium (Se)	2019-09-05	NC		%	20
			Total Silver (Ag)	2019-09-05	NC		%	20
			Total Sodium (Na)	2019-09-05	5.7		%	20
			Total Strontium (Sr)	2019-09-05	5.8		%	20
			Total Thallium (Tl)	2019-09-05	NC		%	20
			Total Tin (Sn)	2019-09-05	NC		%	20
			Total Titanium (Ti)	2019-09-05	NC		%	20
			Total Uranium (U)	2019-09-05	NC		%	20
			Total Vanadium (V)	2019-09-05	NC		%	20
			Total Zinc (Zn)	2019-09-05	4.2		%	20
6313967	SSV	Matrix Spike	Total Phosphorus	2019-09-05		94	%	80 - 120
6313967	SSV	QC Standard	Total Phosphorus	2019-09-05		88	%	80 - 120
6313967	SSV	Spiked Blank	Total Phosphorus	2019-09-05		98	%	80 - 120
6313967	SSV	Method Blank	Total Phosphorus	2019-09-05	<0.004		mg/L	
6313967	SSV	RPD	Total Phosphorus	2019-09-05	1.0		%	20
6315790	BAN	Matrix Spike	Total Aluminum (Al)	2019-09-05		103	%	80 - 120
			Total Antimony (Sb)	2019-09-05		108	%	80 - 120
			Total Arsenic (As)	2019-09-05		102	%	80 - 120
			Total Barium (Ba)	2019-09-05		100	%	80 - 120
			Total Beryllium (Be)	2019-09-05		104	%	80 - 120
			Total Bismuth (Bi)	2019-09-05		102	%	80 - 120
			Total Boron (B)	2019-09-05		102	%	80 - 120
			Total Cadmium (Cd)	2019-09-05		102	%	80 - 120
			Total Calcium (Ca)	2019-09-05		NC	%	80 - 120
			Total Chromium (Cr)	2019-09-05		99	%	80 - 120
			Total Cobalt (Co)	2019-09-05		100	%	80 - 120
			Total Copper (Cu)	2019-09-05		98	%	80 - 120
			Total Iron (Fe)	2019-09-05		101	%	80 - 120
			Total Lead (Pb)	2019-09-05		104	%	80 - 120
			Total Magnesium (Mg)	2019-09-05		106	%	80 - 120
			Total Manganese (Mn)	2019-09-05		102	%	80 - 120
			Total Molybdenum (Mo)	2019-09-05		106	%	80 - 120
			Total Nickel (Ni)	2019-09-05		100	%	80 - 120
			Total Phosphorus (P)	2019-09-05		107	%	80 - 120
			Total Potassium (K)	2019-09-05		108	%	80 - 120
			Total Selenium (Se)	2019-09-05		101	%	80 - 120
			Total Silver (Ag)	2019-09-05		101	%	80 - 120
			Total Sodium (Na)	2019-09-05		98	%	80 - 120
			Total Strontium (Sr)	2019-09-05		NC	%	80 - 120
			Total Thallium (Tl)	2019-09-05		105	%	80 - 120
			Total Tin (Sn)	2019-09-05		107	%	80 - 120
			Total Titanium (Ti)	2019-09-05		102	%	80 - 120
			Total Uranium (U)	2019-09-05		108	%	80 - 120
			Total Vanadium (V)	2019-09-05		100	%	80 - 120
			Total Zinc (Zn)	2019-09-05		99	%	80 - 120
6315790	BAN	Spiked Blank	Total Aluminum (Al)	2019-09-05		107	%	80 - 120
			Total Antimony (Sb)	2019-09-05		107	%	80 - 120
			Total Arsenic (As)	2019-09-05		98	%	80 - 120

CBCL Limited
Attention: Melissa Rutherford

Report Date: 2019/09/13

Quality Assurance Report
BV Labs Job Number: B9O2216

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Barium (Ba)	2019-09-05		100	%	80 - 120
			Total Beryllium (Be)	2019-09-05		102	%	80 - 120
			Total Bismuth (Bi)	2019-09-05		105	%	80 - 120
			Total Boron (B)	2019-09-05		101	%	80 - 120
			Total Cadmium (Cd)	2019-09-05		100	%	80 - 120
			Total Calcium (Ca)	2019-09-05		108	%	80 - 120
			Total Chromium (Cr)	2019-09-05		99	%	80 - 120
			Total Cobalt (Co)	2019-09-05		98	%	80 - 120
			Total Copper (Cu)	2019-09-05		98	%	80 - 120
			Total Iron (Fe)	2019-09-05		103	%	80 - 120
			Total Lead (Pb)	2019-09-05		105	%	80 - 120
			Total Magnesium (Mg)	2019-09-05		108	%	80 - 120
			Total Manganese (Mn)	2019-09-05		101	%	80 - 120
			Total Molybdenum (Mo)	2019-09-05		105	%	80 - 120
			Total Nickel (Ni)	2019-09-05		100	%	80 - 120
			Total Phosphorus (P)	2019-09-05		108	%	80 - 120
			Total Potassium (K)	2019-09-05		108	%	80 - 120
			Total Selenium (Se)	2019-09-05		100	%	80 - 120
			Total Silver (Ag)	2019-09-05		100	%	80 - 120
			Total Sodium (Na)	2019-09-05		102	%	80 - 120
			Total Strontium (Sr)	2019-09-05		102	%	80 - 120
			Total Thallium (Tl)	2019-09-05		106	%	80 - 120
			Total Tin (Sn)	2019-09-05		107	%	80 - 120
			Total Titanium (Ti)	2019-09-05		106	%	80 - 120
			Total Uranium (U)	2019-09-05		106	%	80 - 120
			Total Vanadium (V)	2019-09-05		99	%	80 - 120
			Total Zinc (Zn)	2019-09-05		100	%	80 - 120
6315790	BAN	Method Blank	Total Aluminum (Al)	2019-09-05	<5.0		ug/L	
			Total Antimony (Sb)	2019-09-05	<1.0		ug/L	
			Total Arsenic (As)	2019-09-05	<1.0		ug/L	
			Total Barium (Ba)	2019-09-05	<1.0		ug/L	
			Total Beryllium (Be)	2019-09-05	<1.0		ug/L	
			Total Bismuth (Bi)	2019-09-05	<2.0		ug/L	
			Total Boron (B)	2019-09-05	<50		ug/L	
			Total Cadmium (Cd)	2019-09-05	<0.010		ug/L	
			Total Calcium (Ca)	2019-09-05	<100		ug/L	
			Total Chromium (Cr)	2019-09-05	<1.0		ug/L	
			Total Cobalt (Co)	2019-09-05	<0.40		ug/L	
			Total Copper (Cu)	2019-09-05	<0.50		ug/L	
			Total Iron (Fe)	2019-09-05	<50		ug/L	
			Total Lead (Pb)	2019-09-05	<0.50		ug/L	
			Total Magnesium (Mg)	2019-09-05	<100		ug/L	
			Total Manganese (Mn)	2019-09-05	<2.0		ug/L	
			Total Molybdenum (Mo)	2019-09-05	<2.0		ug/L	
			Total Nickel (Ni)	2019-09-05	<2.0		ug/L	
			Total Phosphorus (P)	2019-09-05	<100		ug/L	
			Total Potassium (K)	2019-09-05	<100		ug/L	
			Total Selenium (Se)	2019-09-05	<0.50		ug/L	
			Total Silver (Ag)	2019-09-05	<0.10		ug/L	
			Total Sodium (Na)	2019-09-05	<100		ug/L	
			Total Strontium (Sr)	2019-09-05	<2.0		ug/L	
			Total Thallium (Tl)	2019-09-05	<0.10		ug/L	
			Total Tin (Sn)	2019-09-05	<2.0		ug/L	
			Total Titanium (Ti)	2019-09-05	<2.0		ug/L	

CBCL Limited
Attention: Melissa Rutherford

Report Date: 2019/09/13

Quality Assurance Report
BV Labs Job Number: B9O2216

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Uranium (U)	2019-09-05	<0.10		ug/L	
			Total Vanadium (V)	2019-09-05	<2.0		ug/L	
			Total Zinc (Zn)	2019-09-05	<5.0		ug/L	
6315790	BAN	RPD	Total Aluminum (Al)	2019-09-05	11		%	20
			Total Antimony (Sb)	2019-09-05	NC		%	20
			Total Arsenic (As)	2019-09-05	NC		%	20
			Total Barium (Ba)	2019-09-05	1.8		%	20
			Total Beryllium (Be)	2019-09-05	NC		%	20
			Total Bismuth (Bi)	2019-09-05	NC		%	20
			Total Boron (B)	2019-09-05	NC		%	20
			Total Cadmium (Cd)	2019-09-05	NC		%	20
			Total Calcium (Ca)	2019-09-05	0.53		%	20
			Total Chromium (Cr)	2019-09-05	NC		%	20
			Total Cobalt (Co)	2019-09-05	NC		%	20
			Total Copper (Cu)	2019-09-05	2.7		%	20
			Total Iron (Fe)	2019-09-05	0.56		%	20
			Total Lead (Pb)	2019-09-05	1.6		%	20
			Total Magnesium (Mg)	2019-09-05	0.74		%	20
			Total Manganese (Mn)	2019-09-05	1.2		%	20
			Total Molybdenum (Mo)	2019-09-05	NC		%	20
			Total Nickel (Ni)	2019-09-05	NC		%	20
			Total Phosphorus (P)	2019-09-05	NC		%	20
			Total Potassium (K)	2019-09-05	1.4		%	20
			Total Selenium (Se)	2019-09-05	NC		%	20
			Total Silver (Ag)	2019-09-05	NC		%	20
			Total Sodium (Na)	2019-09-05	0.12		%	20
			Total Strontium (Sr)	2019-09-05	0.41		%	20
			Total Thallium (Tl)	2019-09-05	NC		%	20
			Total Tin (Sn)	2019-09-05	NC		%	20
			Total Titanium (Ti)	2019-09-05	NC		%	20
			Total Uranium (U)	2019-09-05	0.42		%	20
			Total Vanadium (V)	2019-09-05	NC		%	20
			Total Zinc (Zn)	2019-09-05	NC		%	20
6316421	AM6	QC Standard	Total Suspended Solids	2019-09-06		98	%	80 - 120
6316421	AM6	Method Blank	Total Suspended Solids	2019-09-06	<1.0		mg/L	
6316421	AM6	RPD	Total Suspended Solids	2019-09-06	20		%	20
6324081	SRM	Matrix Spike	Total Alkalinity (Total as CaCO3)	2019-09-12		NC	%	80 - 120
6324081	SRM	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019-09-11		103	%	80 - 120
6324081	SRM	Method Blank	Total Alkalinity (Total as CaCO3)	2019-09-11	<5.0		mg/L	
6324081	SRM	RPD	Total Alkalinity (Total as CaCO3)	2019-09-12	1.6		%	25
6324082	SRM	Matrix Spike	Dissolved Chloride (Cl-)	2019-09-11		91	%	80 - 120
6324082	SRM	Spiked Blank	Dissolved Chloride (Cl-)	2019-09-11		101	%	80 - 120
6324082	SRM	Method Blank	Dissolved Chloride (Cl-)	2019-09-11	<1.0		mg/L	
6324082	SRM	RPD	Dissolved Chloride (Cl-)	2019-09-11	0.17		%	25
6324084	SRM	Matrix Spike	Dissolved Sulphate (SO4)	2019-09-11		105	%	80 - 120
6324084	SRM	Spiked Blank	Dissolved Sulphate (SO4)	2019-09-11		103	%	80 - 120
6324084	SRM	Method Blank	Dissolved Sulphate (SO4)	2019-09-11	<2.0		mg/L	
6324084	SRM	RPD	Dissolved Sulphate (SO4)	2019-09-11	NC		%	25
6324085	SRM	Matrix Spike	Reactive Silica (SiO2)	2019-09-11		99	%	80 - 120
6324085	SRM	Spiked Blank	Reactive Silica (SiO2)	2019-09-11		97	%	80 - 120
6324085	SRM	Method Blank	Reactive Silica (SiO2)	2019-09-11	<0.50		mg/L	
6324085	SRM	RPD	Reactive Silica (SiO2)	2019-09-11	2.7		%	25
6324087	SRM	Spiked Blank	Colour	2019-09-11		98	%	80 - 120
6324087	SRM	Method Blank	Colour	2019-09-11	<5.0		TCU	

CBCL Limited
Attention: Melissa Rutherford

Report Date: 2019/09/13

Quality Assurance Report
BV Labs Job Number: B9O2216

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6324087	SRM	RPD	Colour	2019-09-11	5.0		%	20
6324089	SRM	Matrix Spike	Orthophosphate (P)	2019-09-11		NC	%	80 - 120
6324089	SRM	Spiked Blank	Orthophosphate (P)	2019-09-11		97	%	80 - 120
6324089	SRM	Method Blank	Orthophosphate (P)	2019-09-11	<0.010		mg/L	
6324089	SRM	RPD	Orthophosphate (P)	2019-09-11	2.0		%	25
6324093	SRM	Matrix Spike	Nitrate + Nitrite (N)	2019-09-12		86	%	80 - 120
6324093	SRM	Spiked Blank	Nitrate + Nitrite (N)	2019-09-12		95	%	80 - 120
6324093	SRM	Method Blank	Nitrate + Nitrite (N)	2019-09-12	0.058, RDL=0.050		mg/L	
6324093	SRM	RPD	Nitrate + Nitrite (N)	2019-09-12	NC (3)		%	25
6324094	SRM	Matrix Spike	Nitrite (N)	2019-09-11		92	%	80 - 120
6324094	SRM	Spiked Blank	Nitrite (N)	2019-09-11		104	%	80 - 120
6324094	SRM	Method Blank	Nitrite (N)	2019-09-11	<0.010		mg/L	
6324094	SRM	RPD	Nitrite (N)	2019-09-11	NC		%	20
6325628	BBD	QC Standard	Salinity	2019-09-11		100	%	80 - 120
6325628	BBD	Method Blank	Salinity	2019-09-11	<2.0		N/A	
6325628	BBD	RPD	Salinity	2019-09-11	0		%	25
6325852	SRM	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2019-09-11		102	%	80 - 120
6325852	SRM	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2019-09-11		100	%	80 - 120
6325852	SRM	Method Blank	Nitrogen (Ammonia Nitrogen)	2019-09-12	<0.050		mg/L	
6325852	SRM	RPD	Nitrogen (Ammonia Nitrogen)	2019-09-11	NC		%	20
6327925	EMT	Matrix Spike	Total Organic Carbon (C)	2019-09-12		95	%	85 - 115
6327925	EMT	Spiked Blank	Total Organic Carbon (C)	2019-09-12		96	%	80 - 120
6327925	EMT	Method Blank	Total Organic Carbon (C)	2019-09-12	<0.50		mg/L	
6327925	EMT	RPD	Total Organic Carbon (C)	2019-09-12	1.5		%	15

N/A = Not Applicable
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).
(1) CBOD Analysis: Reference Material and second source recovery were high.
(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.
(3) Elevated reporting limit due to blank performance.

Analyte_ID	Parameter	Sample_ID	Method	Results	Units	EQL	Lab_ID	Matrix	Lab_Duplicate_Of	Field_Duplicate_Of	Date_Sampled	CSite #	DFRP #	DCC_Project_ID	Report Name	TableName
	Salinity	AR-5	SM 22 2520B	<2.0	N/A	2.0	KQS898	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	TSS	AR-5	SM 23 2540D m	3.2	mg/L	2.0	KQS898	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Salinity	AR-7	SM 22 2520B	<2.0	N/A	2.0	KQS899	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	TSS	AR-7	SM 23 2540D m	2.8	mg/L	1.0	KQS899	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Salinity	AR-8	SM 22 2520B	<2.0	N/A	2.0	KQS900	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	TSS	AR-8	SM 23 2540D m	2.6	mg/L	1.0	KQS900	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Nitrate (as N)	AR-9	ASTM D3867-16	<0.060	mg/L	0.060	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Hardness (as CaCO3)	AR-9	Auto Calc	32	mg/L	1.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Anion Sum	AR-9	Auto Calc.	1.09	me/L	N/A	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Total Dissolved Solids	AR-9	Auto Calc.	67	mg/L	1.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Cation Sum	AR-9	Auto Calc.	1.06	me/L	N/A	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Ion Balance (% Difference)	AR-9	Auto Calc.	1.40	%	N/A	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Langelier Index (@ 20C)	AR-9	Auto Calc.	-2.29	N/A		KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Langelier Index (@ 4C)	AR-9	Auto Calc.	-2.54	N/A		KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Saturation pH (@ 20C)	AR-9	Auto Calc.	9.20	N/A		KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Saturation pH (@ 4C)	AR-9	Auto Calc.	9.45	N/A		KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Bicarbonate (as CaCO3)	AR-9	SM 23 4500-CO2 D	13	mg/L	1.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Carbonate (as CaCO3)	AR-9	SM 23 4500-CO2 D	<1.0	mg/L	1.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Sulphate	AR-9	ASTM D516-16 m	22	mg/L	2.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Turbidity	AR-9	EPA 180.1 R2 m	3.0	NTU	0.10	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Alkalinity (as CaCO3)	AR-9	EPA 310.2 R1974 m	13	mg/L	5.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Ammonia	AR-9	EPA 350.1 R2 m	<0.050	mg/L	0.050	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Reactive Silica (as SiO2)	AR-9	EPA 366.0 m	1.5	mg/L	0.50	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Salinity	AR-9	SM 22 2520B	<2.0	N/A	2.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Colour	AR-9	SM 23 2120C m	61	TCU	25	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Conductivity	AR-9	SM 23 2510B m	120	uS/cm	1.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	TSS	AR-9	SM 23 2540D m	<2.2	mg/L	2.2	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Phosphorus	AR-9	SM 23 4500 P B H m	0.032	mg/L	0.004	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Chloride	AR-9	SM 23 4500-Cl- E m	14	mg/L	1.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	pH	AR-9	SM 23 4500-H+ B m	6.91	pH	N/A	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Nitrite	AR-9	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Ortho Phosphate (as P)	AR-9	SM 23 4500-P E m	<0.010	mg/L	0.010	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Carbonaceous BOD	AR-9	SM 23 5210B m	<5.0	mg/L	5.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	TOC	AR-9	SM 23 5310B m	6.8	mg/L	0.50	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Nitrate + Nitrite (as N)	AR-9	USGS I-2547-11m	<0.060	mg/L	0.060	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Aluminum	AR-9	EPA 6020B R2 m	150	ug/L	5.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Antimony	AR-9	EPA 6020B R2 m	<1.0	ug/L	1.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Arsenic	AR-9	EPA 6020B R2 m	1.3	ug/L	1.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Barium	AR-9	EPA 6020B R2 m	11	ug/L	1.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Beryllium	AR-9	EPA 6020B R2 m	<1.0	ug/L	1.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Bismuth	AR-9	EPA 6020B R2 m	<2.0	ug/L	2.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Boron	AR-9	EPA 6020B R2 m	<50	ug/L	50	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Cadmium	AR-9	EPA 6020B R2 m	<0.010	ug/L	0.010	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Calcium	AR-9	EPA 6020B R2 m	11000	ug/L	100	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Chromium	AR-9	EPA 6020B R2 m	1.1	ug/L	1.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Cobalt	AR-9	EPA 6020B R2 m	<0.40	ug/L	0.40	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Copper	AR-9	EPA 6020B R2 m	0.57	ug/L	0.50	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Iron	AR-9	EPA 6020B R2 m	360	ug/L	50	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Lead	AR-9	EPA 6020B R2 m	<0.50	ug/L	0.50	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Magnesium	AR-9	EPA 6020B R2 m	1200	ug/L	100	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Manganese	AR-9	EPA 6020B R2 m	33	ug/L	2.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Molybdenum	AR-9	EPA 6020B R2 m	<2.0	ug/L	2.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Nickel	AR-9	EPA 6020B R2 m	<2.0	ug/L	2.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Phosphorus (P)	AR-9	EPA 6020B R2 m	<100	ug/L	100	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Potassium	AR-9	EPA 6020B R2 m	680	ug/L	100	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Selenium	AR-9	EPA 6020B R2 m	<0.50	ug/L	0.50	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Silver	AR-9	EPA 6020B R2 m	<0.10	ug/L	0.10	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Sodium	AR-9	EPA 6020B R2 m	9100	ug/L	100	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Strontium	AR-9	EPA 6020B R2 m	78	ug/L	2.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Thallium	AR-9	EPA 6020B R2 m	<0.10	ug/L	0.10	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Tin	AR-9	EPA 6020B R2 m	<2.0	ug/L	2.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Titanium	AR-9	EPA 6020B R2 m	2.2	ug/L	2.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Uranium	AR-9	EPA 6020B R2 m	0.23	ug/L	0.10	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Vanadium	AR-9	EPA 6020B R2 m	<2.0	ug/L	2.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Zinc	AR-9	EPA 6020B R2 m	<5.0	ug/L	5.0	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Total Coliforms	AR-9	MOE E3371 R2 (2018)	180	CFU/100mL	10	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Fecal coliform	AR-9	SM 23 9222D	10	CFU/100mL	10	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Subcontract Parameter	AR-9		ATTACHED	N/A	N/A	KQS901	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	Salinity	AR-10	SM 22 2520B	<2.0	N/A	2.0	KQS902	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
	TSS	AR-10	SM 23 2540D m	1.8	mg/L	1.0	KQS902	Water			2019/08/29				B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls

Salinity	AR-11	SM 22 2520B	<2.0	N/A	2.0	KQS903	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
TSS	AR-11	SM 23 2540D m	5.6	mg/L	1.0	KQS903	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Nitrate (as N)	AR-12	ASTM D3867-16	<0.060	mg/L	0.060	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Hardness (as CaCO3)	AR-12	Auto Calc	14	mg/L	1.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Anion Sum	AR-12	Auto Calc.	0.650	me/L	N/A	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Total Dissolved Solids	AR-12	Auto Calc.	39	mg/L	1.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Cation Sum	AR-12	Auto Calc.	0.600	me/L	N/A	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Ion Balance (% Difference)	AR-12	Auto Calc.	4.00	%	N/A	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Langelier Index (@ 20C)	AR-12	Auto Calc.	-2.84	N/A		KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Langelier Index (@ 4C)	AR-12	Auto Calc.	-3.09	N/A		KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Saturation pH (@ 20C)	AR-12	Auto Calc.	9.75	N/A		KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Saturation pH (@ 4C)	AR-12	Auto Calc.	10.0	N/A		KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Bicarbonate (as CaCO3)	AR-12	SM 23 4500-CO2 D	8.1	mg/L	1.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Carbonate (as CaCO3)	AR-12	SM 23 4500-CO2 D	<1.0	mg/L	1.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Sulphate	AR-12	ASTM D516-16 m	9.3	mg/L	2.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Turbidity	AR-12	EPA 180.1 R2 m	2.5	NTU	0.10	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Alkalinity (as CaCO3)	AR-12	EPA 310.2 R1974 m	8.1	mg/L	5.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Ammonia	AR-12	EPA 350.1 R2 m	<0.050	mg/L	0.050	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Reactive Silica (as SiO2)	AR-12	EPA 366.0 m	1.7	mg/L	0.50	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Salinity	AR-12	SM 22 2520B	<2.0	N/A	2.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Colour	AR-12	SM 23 2120C m	69	TCU	25	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Conductivity	AR-12	SM 23 2510B m	68	uS/cm	1.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
TSS	AR-12	SM 23 2540D m	3.2	mg/L	2.3	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Phosphorus	AR-12	SM 23 4500 P B H m	0.031	mg/L	0.004	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Chloride	AR-12	SM 23 4500-Cl- E m	11	mg/L	1.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
pH	AR-12	SM 23 4500-H+ B m	6.91	pH	N/A	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Nitrite	AR-12	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Ortho Phosphate (as P)	AR-12	SM 23 4500-P E m	0.011	mg/L	0.010	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Carbonaceous BOD	AR-12	SM 23 5210B m	<5.0	mg/L	5.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
TOC	AR-12	SM 23 5310B m	7.0	mg/L	0.50	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Nitrate + Nitrite (as N)	AR-12	USGS I-2547-11m	<0.060	mg/L	0.060	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Aluminum	AR-12	EPA 6020B R2 m	180	ug/L	5.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Antimony	AR-12	EPA 6020B R2 m	<1.0	ug/L	1.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Arsenic	AR-12	EPA 6020B R2 m	1.3	ug/L	1.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Barium	AR-12	EPA 6020B R2 m	7.6	ug/L	1.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Beryllium	AR-12	EPA 6020B R2 m	<1.0	ug/L	1.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Bismuth	AR-12	EPA 6020B R2 m	<2.0	ug/L	2.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Boron	AR-12	EPA 6020B R2 m	<50	ug/L	50	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Cadmium	AR-12	EPA 6020B R2 m	<0.010	ug/L	0.010	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Calcium	AR-12	EPA 6020B R2 m	4400	ug/L	100	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Chromium	AR-12	EPA 6020B R2 m	1.1	ug/L	1.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Cobalt	AR-12	EPA 6020B R2 m	<0.40	ug/L	0.40	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Copper	AR-12	EPA 6020B R2 m	0.61	ug/L	0.50	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Iron	AR-12	EPA 6020B R2 m	370	ug/L	50	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Lead	AR-12	EPA 6020B R2 m	<0.50	ug/L	0.50	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Magnesium	AR-12	EPA 6020B R2 m	760	ug/L	100	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Manganese	AR-12	EPA 6020B R2 m	27	ug/L	2.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Molybdenum	AR-12	EPA 6020B R2 m	<2.0	ug/L	2.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Nickel	AR-12	EPA 6020B R2 m	<2.0	ug/L	2.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Phosphorus (P)	AR-12	EPA 6020B R2 m	<100	ug/L	100	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Potassium	AR-12	EPA 6020B R2 m	520	ug/L	100	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Selenium	AR-12	EPA 6020B R2 m	<0.50	ug/L	0.50	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Silver	AR-12	EPA 6020B R2 m	<0.10	ug/L	0.10	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Sodium	AR-12	EPA 6020B R2 m	6600	ug/L	100	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Strontium	AR-12	EPA 6020B R2 m	31	ug/L	2.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Thallium	AR-12	EPA 6020B R2 m	<0.10	ug/L	0.10	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Tin	AR-12	EPA 6020B R2 m	<2.0	ug/L	2.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Titanium	AR-12	EPA 6020B R2 m	2.8	ug/L	2.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Uranium	AR-12	EPA 6020B R2 m	0.21	ug/L	0.10	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Vanadium	AR-12	EPA 6020B R2 m	<2.0	ug/L	2.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Zinc	AR-12	EPA 6020B R2 m	<5.0	ug/L	5.0	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Total Coliforms	AR-12	MOE E3371 R2 (2018)	140	CFU/100mL	10	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Fecal coliform	AR-12	SM 23 9222D	<10	CFU/100mL	10	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Subcontract Parameter	AR-12		ATTACHED	N/A	N/A	KQS904	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Salinity	AR-13	SM 22 2520B	<2.0	N/A	2.0	KQS905	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
TSS	AR-13	SM 23 2540D m	2.0	mg/L	1.0	KQS905	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Salinity	AR-18	SM 22 2520B	<2.0	N/A	2.0	KQS906	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
TSS	AR-18	SM 23 2540D m	3.6	mg/L	1.0	KQS906	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Salinity	AR-17	SM 22 2520B	<2.0	N/A	2.0	KQS907	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
TSS	AR-17	SM 23 2540D m	2.3	mg/L	1.0	KQS907	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Nitrate (as N)	BKG-2	ASTM D3867-16	0.23	mg/L	0.060	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls

Hardness (as CaCO3)	BKG-2	Auto Calc	530	mg/L	1.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Anion Sum	BKG-2	Auto Calc.	10.9	me/L	N/A	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Total Dissolved Solids	BKG-2	Auto Calc.	710	mg/L	1.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Cation Sum	BKG-2	Auto Calc.	11.3	me/L	N/A	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Ion Balance (% Difference)	BKG-2	Auto Calc.	1.53	%	N/A	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Langelier Index (@ 20C)	BKG-2	Auto Calc.	0.637	N/A		KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Langelier Index (@ 4C)	BKG-2	Auto Calc.	0.390	N/A		KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Saturation pH (@ 20C)	BKG-2	Auto Calc.	7.17	N/A		KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Saturation pH (@ 4C)	BKG-2	Auto Calc.	7.41	N/A		KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Bicarbonate (as CaCO3)	BKG-2	SM 23 4500-CO2 D	110	mg/L	1.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Carbonate (as CaCO3)	BKG-2	SM 23 4500-CO2 D	<1.0	mg/L	1.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Sulphate	BKG-2	ASTM D516-16 m	390	mg/L	10	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Turbidity	BKG-2	EPA 180.1 R2 m	3.8	NTU	0.10	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Alkalinity (as CaCO3)	BKG-2	EPA 310.2 R1974 m	110	mg/L	25	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Ammonia	BKG-2	EPA 350.1 R2 m	<0.050	mg/L	0.050	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Reactive Silica (as SiO2)	BKG-2	EPA 366.0 m	6.2	mg/L	0.50	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Salinity	BKG-2	SM 22 2520B	<2.0	N/A	2.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Colour	BKG-2	SM 23 2120C m	12	TCU	5.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Conductivity	BKG-2	SM 23 2510B m	1000	uS/cm	1.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
TSS	BKG-2	SM 23 2540D m	6.1	mg/L	2.2	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Phosphorus	BKG-2	SM 23 4500 P B H m	0.028	mg/L	0.004	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Chloride	BKG-2	SM 23 4500-Cl- E m	20	mg/L	1.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
pH	BKG-2	SM 23 4500-H+ B m	7.80	pH	N/A	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Nitrite	BKG-2	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Ortho Phosphate (as P)	BKG-2	SM 23 4500-P E m	<0.010	mg/L	0.010	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Carbonaceous BOD	BKG-2	SM 23 5210B m	<5.0	mg/L	5.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
TOC	BKG-2	SM 23 5310B m	2.9	mg/L	0.50	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Nitrate + Nitrite (as N)	BKG-2	USGS I-2547-11m	0.23	mg/L	0.060	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Aluminum	BKG-2	EPA 6020B R2 m	120	ug/L	5.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Antimony	BKG-2	EPA 6020B R2 m	<1.0	ug/L	1.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Arsenic	BKG-2	EPA 6020B R2 m	<1.0	ug/L	1.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Barium	BKG-2	EPA 6020B R2 m	96	ug/L	1.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Beryllium	BKG-2	EPA 6020B R2 m	<1.0	ug/L	1.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Bismuth	BKG-2	EPA 6020B R2 m	<2.0	ug/L	2.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Boron	BKG-2	EPA 6020B R2 m	150	ug/L	50	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Cadmium	BKG-2	EPA 6020B R2 m	<0.010	ug/L	0.010	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Calcium	BKG-2	EPA 6020B R2 m	200000	ug/L	100	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Chromium	BKG-2	EPA 6020B R2 m	<1.0	ug/L	1.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Cobalt	BKG-2	EPA 6020B R2 m	<0.40	ug/L	0.40	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Copper	BKG-2	EPA 6020B R2 m	<0.50	ug/L	0.50	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Iron	BKG-2	EPA 6020B R2 m	310	ug/L	50	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Lead	BKG-2	EPA 6020B R2 m	<0.50	ug/L	0.50	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Magnesium	BKG-2	EPA 6020B R2 m	6100	ug/L	100	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Manganese	BKG-2	EPA 6020B R2 m	360	ug/L	2.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Molybdenum	BKG-2	EPA 6020B R2 m	<2.0	ug/L	2.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Nickel	BKG-2	EPA 6020B R2 m	<2.0	ug/L	2.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Phosphorus (P)	BKG-2	EPA 6020B R2 m	<100	ug/L	100	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Potassium	BKG-2	EPA 6020B R2 m	2100	ug/L	100	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Selenium	BKG-2	EPA 6020B R2 m	<0.50	ug/L	0.50	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Silver	BKG-2	EPA 6020B R2 m	<0.10	ug/L	0.10	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Sodium	BKG-2	EPA 6020B R2 m	12000	ug/L	100	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Strontium	BKG-2	EPA 6020B R2 m	1600	ug/L	2.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Thallium	BKG-2	EPA 6020B R2 m	<0.10	ug/L	0.10	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Tin	BKG-2	EPA 6020B R2 m	<2.0	ug/L	2.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Titanium	BKG-2	EPA 6020B R2 m	3.5	ug/L	2.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Uranium	BKG-2	EPA 6020B R2 m	0.46	ug/L	0.10	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Vanadium	BKG-2	EPA 6020B R2 m	<2.0	ug/L	2.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Zinc	BKG-2	EPA 6020B R2 m	<5.0	ug/L	5.0	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Total Coliforms	BKG-2	MOE E3371 R2 (2018)	>2500	CFU/100mL	10	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Fecal coliform	BKG-2	SM 23 9222D	900	CFU/100mL	10	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Subcontract Parameter	BKG-2		ATTACHED	N/A	N/A	KQS908	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
Salinity	BKG-1	SM 22 2520B	<2.0	N/A	2.0	KQS909	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls
TSS	BKG-1	SM 23 2540D m	170	mg/L	5.0	KQS909	Water	2019/08/29	B9O2216V1-R2019-09-13_11-12-52_N020.pdf	B9O2216V1-R2019-09-13_11-12-52_N020.xls

Your Project #: 171046.01
Your C.O.C. #: D43335

Attention: Melissa Rutherford

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/11/07
Report #: R5955612
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9T7878
Received: 2019/10/23, 15:44

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Carbonate, Bicarbonate and Hydroxide	3	N/A	2019/10/29	N/A	SM 23 4500-CO2 D
Alkalinity	3	N/A	2019/11/06	ATL SOP 00013	EPA 310.2 R1974 m
Carbonaceous BOD	3	2019/10/24	2019/10/29	ATL SOP 00041	SM 23 5210B m
Chloride	3	N/A	2019/11/06	ATL SOP 00014	SM 23 4500-Cl- E m
Total coliform (CFU/100mL) in water	3	N/A	2019/10/23	ATL SOP 00097	MOE E3371 R2 (2018)
E.coli in water (CFU/100mL)	2	N/A	2019/10/23	ATL SOP 00097	MOE E3371 R2 (2018)
E.coli in water (CFU/100mL)	1	N/A	2019/10/24	ATL SOP 00097	MOE E3371 R2 (2018)
Colour	3	N/A	2019/11/07	ATL SOP 00020	SM 23 2120C m
Conductance - water	3	N/A	2019/10/29	ATL SOP 00004	SM 23 2510B m
Fecal Coliform by mem. filt. CFU/1mL	3	N/A	2019/10/23	ATL SOP 00071	SM 23 9222D
Hardness (calculated as CaCO3)	2	N/A	2019/11/06	ATL SOP 00048	Auto Calc
Hardness (calculated as CaCO3)	1	N/A	2019/11/07	ATL SOP 00048	Auto Calc
Metals Water Total MS	2	2019/11/05	2019/11/05	ATL SOP 00058	EPA 6020B R2 m
Metals Water Total MS	1	2019/11/05	2019/11/06	ATL SOP 00058	EPA 6020B R2 m
Ion Balance (% Difference)	3	N/A	2019/11/07	N/A	Auto Calc.
Anion and Cation Sum	2	N/A	2019/11/06	N/A	Auto Calc.
Anion and Cation Sum	1	N/A	2019/11/07	N/A	Auto Calc.
Nitrogen Ammonia - water	3	N/A	2019/11/05	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	3	N/A	2019/11/06	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	3	N/A	2019/11/06	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	3	N/A	2019/11/07	ATL SOP 00018	ASTM D3867-16
pH (3)	3	N/A	2019/10/29	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	3	N/A	2019/11/06	ATL SOP 00021	SM 23 4500-P E m
Salinity (4)	5	N/A	2019/11/07		SM 22 2520B
Sat. pH and Langelier Index (@ 20C)	3	N/A	2019/11/07	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	3	N/A	2019/11/07	ATL SOP 00049	Auto Calc.
Reactive Silica	3	N/A	2019/11/06	ATL SOP 00022	EPA 366.0 m
Sulphate	3	N/A	2019/11/06	ATL SOP 00023	ASTM D516-16 m
Chlorophyll A (Sub from Bedford) (1)	3	2019/10/24	2019/10/25		
Total Dissolved Solids (TDS calc)	3	N/A	2019/11/07	N/A	Auto Calc.

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Your Project #: 171046.01
Your C.O.C. #: D43335

Attention: Melissa Rutherford

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/11/07
Report #: R5955612
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9T7878
Received: 2019/10/23, 15:44

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Organic carbon - Total (TOC) (5)	1	N/A	2019/11/05	ATL SOP 00203	SM 23 5310B m
Organic carbon - Total (TOC) (5)	2	N/A	2019/11/06	ATL SOP 00203	SM 23 5310B m
Total Phosphorus (Colourimetric) (2)	3	2019/11/05	2019/11/05	CAM SOP-00407	SM 23 4500 P B H m
Total Suspended Solids	5	2019/10/30	2019/11/04	ATL SOP 00007	SM 23 2540D m
Turbidity	1	N/A	2019/10/31	ATL SOP 00011	EPA 180.1 R2 m
Turbidity	2	N/A	2019/11/01	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Dalhousie Dept of Oceanography
(2) This test was performed by Bureau Veritas Laboratories Mississauga
(3) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(4) Non-accredited test method
(5) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Your Project #: 171046.01
Your C.O.C. #: D43335

Attention: Melissa Rutherford

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
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Report Date: 2019/11/07
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CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9T7878
Received: 2019/10/23, 15:44

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
07 Nov 2019 15:34:11

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Keri Mackay, Customer Experience Team Lead
Email: Keri.MACKAY@bvlabs.com
Phone# (902)420-0203 Ext:294

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This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		LCO798			LCO800			LCO801		
Sampling Date		2019/10/23 13:10			2019/10/23 11:25			2019/10/23 10:35		
COC Number		D43335			D43335			D43335		
	UNITS	AVE-4	RDL	QC Batch	AVE-1	RDL	QC Batch	AVE-9	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	91.1	N/A	6401204	403	N/A	6401204	170	N/A	6401204
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	51	1.0	6401201	89	1.0	6401201	64	1.0	6401201
Calculated TDS	mg/L	5700	1.0	6401209	24000	1.0	6401209	12000	1.0	6401209
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	6401201	<1.0	1.0	6401201	<1.0	1.0	6401201
Cation Sum	me/L	112	N/A	6401204	458	N/A	6401204	258	N/A	6401204
Hardness (CaCO3)	mg/L	1300	1.0	6401202	5000	1.0	6401202	2800	1.0	6401202
Ion Balance (% Difference)	%	10.4	N/A	6401203	6.38	N/A	6401203	20.8	N/A	6401203
Langelier Index (@ 20C)	N/A	-0.531		6401207	0.189		6401207	-0.273		6401207
Langelier Index (@ 4C)	N/A	-0.770		6401208	-0.0480		6401208	-0.510		6401208
Nitrate (N)	mg/L	<0.050	0.050	6401205	0.14	0.050	6401205	0.070	0.050	6401205
Saturation pH (@ 20C)	N/A	8.10		6401207	7.42		6401207	7.82		6401207
Saturation pH (@ 4C)	N/A	8.34		6401208	7.66		6401208	8.05		6401208
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	51	5.0	6427106	89	5.0	6427106	64	5.0	6427106
Dissolved Chloride (Cl-)	mg/L	2900	50	6427114	13000	500	6427114	5200	100	6427114
Colour	TCU	72	25	6427125	8.7	5.0	6427125	34	5.0	6427125
Nitrate + Nitrite (N)	mg/L	<0.050	0.050	6427131	0.16	0.050	6427131	0.070	0.050	6427131
Nitrite (N)	mg/L	<0.010	0.010	6427134	0.018	0.010	6427134	<0.010	0.010	6427134
Nitrogen (Ammonia Nitrogen)	mg/L	0.12	0.050	6424813	0.070	0.050	6424813	0.092	0.050	6424813
Total Organic Carbon (C)	mg/L	<50 (1)	50	6424781	8.6 (1)	5.0	6425124	12 (1)	5.0	6425124
Orthophosphate (P)	mg/L	<0.010	0.010	6427128	<0.010	0.010	6427128	<0.010	0.010	6427128
pH	pH	7.57	N/A	6411783	7.61	N/A	6411783	7.54	N/A	6411783
Reactive Silica (SiO2)	mg/L	3.3	0.50	6427120	1.3	0.50	6427120	2.5	0.50	6427120
Dissolved Sulphate (SO4)	mg/L	440	10	6427117	1700	40	6427117	980	20	6427117
Turbidity	NTU	>1000	1.0	6417157	670	1.0	6419319	500	1.0	6419312
Conductivity	uS/cm	11000	1.0	6411787	40000	1.0	6411787	24000	1.0	6411787
Metals										
Total Aluminum (Al)	ug/L	29000	50	6424517	20000	50	6424517	16000	50	6424517
Total Antimony (Sb)	ug/L	<10	10	6424517	<10	10	6424517	<10	10	6424517
Total Arsenic (As)	ug/L	12	10	6424517	12	10	6424517	<10	10	6424517
Total Barium (Ba)	ug/L	140	10	6424517	92	10	6424517	77	10	6424517
Total Beryllium (Be)	ug/L	<10	10	6424517	<10	10	6424517	<10	10	6424517
Total Bismuth (Bi)	ug/L	<20	20	6424517	<20	20	6424517	<20	20	6424517
Total Boron (B)	ug/L	940	500	6424517	3600	500	6424517	2000	500	6424517

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

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ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		LCO798			LCO800			LCO801		
Sampling Date		2019/10/23 13:10			2019/10/23 11:25			2019/10/23 10:35		
COC Number		D43335			D43335			D43335		
	UNITS	**AVE-4**	**RDL**	**QC Batch**	**AVE-1**	**RDL**	**QC Batch**	**AVE-9**	**RDL**	**QC Batch**
Total Cadmium (Cd)	ug/L	<0.10	0.10	6424517	<0.10	0.10	6424517	<0.10	0.10	6424517
Total Calcium (Ca)	ug/L	100000	1000	6424517	320000	1000	6424517	190000	1000	6424517
Total Chromium (Cr)	ug/L	37	10	6424517	27	10	6424517	21	10	6424517
Total Cobalt (Co)	ug/L	16	4.0	6424517	12	4.0	6424517	9.9	4.0	6424517
Total Copper (Cu)	ug/L	20	5.0	6424517	18	5.0	6424517	13	5.0	6424517
Total Iron (Fe)	ug/L	32000	500	6424517	25000	500	6424517	19000	500	6424517
Total Lead (Pb)	ug/L	22	5.0	6424517	16	5.0	6424517	12	5.0	6424517
Total Magnesium (Mg)	ug/L	250000	1000	6424517	1000000	1000	6424517	570000	1000	6424517
Total Manganese (Mn)	ug/L	1600	20	6424517	1000	20	6424517	940	20	6424517
Total Molybdenum (Mo)	ug/L	<20	20	6424517	<20	20	6424517	<20	20	6424517
Total Nickel (Ni)	ug/L	35	20	6424517	29	20	6424517	<20	20	6424517
Total Phosphorus (P)	ug/L	1300	1000	6424517	1200	1000	6424517	1200	1000	6424517
Total Potassium (K)	ug/L	77000	1000	6424517	300000	1000	6424517	170000	1000	6424517
Total Selenium (Se)	ug/L	<5.0	5.0	6424517	<5.0	5.0	6424517	<5.0	5.0	6424517
Total Silver (Ag)	ug/L	<1.0	1.0	6424517	<1.0	1.0	6424517	<1.0	1.0	6424517
Total Sodium (Na)	ug/L	1900000	1000	6424517	8100000	1000	6424517	4500000	1000	6424517
Total Strontium (Sr)	ug/L	1600	20	6424517	5800	20	6424517	3300	20	6424517
Total Thallium (Tl)	ug/L	<1.0	1.0	6424517	<1.0	1.0	6424517	<1.0	1.0	6424517
Total Tin (Sn)	ug/L	<20	20	6424517	<20	20	6424517	<20	20	6424517
Total Titanium (Ti)	ug/L	310	20	6424517	590	20	6424517	400	20	6424517
Total Uranium (U)	ug/L	1.6	1.0	6424517	3.0	1.0	6424517	2.1	1.0	6424517
Total Vanadium (V)	ug/L	60	20	6424517	49	20	6424517	38	20	6424517
Total Zinc (Zn)	ug/L	94	50	6424517	73	50	6424517	<50	50	6424517

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9T7878
Report Date: 2019/11/07

CBCL Limited
Client Project #: 171046.01

RESULTS OF ANALYSES OF WATER

BV Labs ID		LCO798			LCO798			LCO799		
Sampling Date		2019/10/23 13:10			2019/10/23 13:10			2019/10/23 12:50		
COC Number		D43335			D43335			D43335		
	UNITS	**AVE-4**	**RDL**	**QC Batch**	**AVE-4 Lab-Dup**	**RDL**	**QC Batch**	**AVE-2**	**RDL**	**QC Batch**
Inorganics										
Carbonaceous BOD	mg/L	<5.0	5.0	6403741						
Total Phosphorus	mg/L	1.5	0.1	6424853						
Salinity	N/A	6.2	2.0	6429749	6.2	2.0	6429749	26	2.0	6429749
Total Suspended Solids	mg/L	1000	17	6414638				11000	100	6414638
Subcontracted Analysis										
Subcontract Parameter	N/A	ATTACHED	N/A	6404012						

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

BV Labs ID		LCO800	LCO801			LCO802			LCO802		
Sampling Date		2019/10/23 11:25	2019/10/23 10:35			2019/10/23 09:40			2019/10/23 09:40		
COC Number		D43335	D43335			D43335			D43335		
	UNITS	**AVE-1**	**AVE-9**	**RDL**	**QC Batch**	**AR-4B**	**RDL**	**QC Batch**	**AR-4B Lab-Dup**	**RDL**	**QC Batch**
Inorganics											
Carbonaceous BOD	mg/L	<5.0	<5.0	5.0	6403741						
Total Phosphorus	mg/L	0.7	0.6	0.1	6424853						
Salinity	N/A	26	15	2.0	6429749	9.0	2.0	6429749			
Total Suspended Solids	mg/L	820	730	17	6414638	260	10	6414638	260	10	6414638
Subcontracted Analysis											
Subcontract Parameter	N/A	ATTACHED	ATTACHED	N/A	6404012						

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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MICROBIOLOGY (WATER)

BV Labs ID		LCO798	LCO800	LCO801		
Sampling Date		2019/10/23 13:10	2019/10/23 11:25	2019/10/23 10:35		
COC Number		D43335	D43335	D43335		
	UNITS	**AVE-4**	**AVE-1**	**AVE-9**	**RDL**	**QC Batch**
Microbiological						
Escherichia coli	CFU/100mL	400	100	<100	100	6403716
Fecal coliform	CFU/1mL	4.0	<1.0	1.0	1.0	6403738
Total Coliforms	CFU/100mL	3500	1600	2300	100	6403725

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	6.3°C

Sample LCO798 [AVE-4] : Elevated reporting limits for trace metals due to sample matrix.

Poor RCAp Ion Balance due to sample matrix. Excess cations due to presence of turbidity.

Sample LCO799 [AVE-2] : TSS: The sample contained materials that can settle rapidly and may give results with an elevated bias.

Sample LCO800 [AVE-1] : Elevated reporting limits for trace metals due to sample matrix.
Poor RCAp Ion Balance due to sample matrix. Excess cations due to presence of turbidity.

Sample LCO801 [AVE-9] : Elevated reporting limits for trace metals due to sample matrix.
Poor RCAp Ion Balance due to sample matrix. Excess cations due to presence of turbidity.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6403716	SDN	Method Blank	Escherichia coli	2019/10/23	<1.0		CFU/100mL	
6403725	SDN	Method Blank	Total Coliforms	2019/10/23	<1.0		CFU/100mL	
6403738	SDN	Method Blank	Fecal coliform	2019/10/23	<1.0		CFU/1mL	
6403741	DME	QC Standard	Carbonaceous BOD	2019/10/29		117	%	80 - 120
6403741	DME	Spiked Blank	Carbonaceous BOD	2019/10/29		113	%	80 - 120
6403741	DME	Method Blank	Carbonaceous BOD	2019/10/29	<2.0		mg/L	
6403741	DME	RPD	Carbonaceous BOD	2019/10/29	NC		%	25
6411783	SHW	QC Standard	pH	2019/10/29		101	%	97 - 103
6411787	SHW	Spiked Blank	Conductivity	2019/10/29		102	%	80 - 120
6411787	SHW	Method Blank	Conductivity	2019/10/29	<1.0		uS/cm	
6414638	GTH	QC Standard	Total Suspended Solids	2019/11/04		97	%	80 - 120
6414638	GTH	Method Blank	Total Suspended Solids	2019/11/04	<1.0		mg/L	
6414638	GTH	RPD [LCO802-01]	Total Suspended Solids	2019/11/04	2.3		%	20
6417157	SHW	QC Standard	Turbidity	2019/10/31		100	%	80 - 120
6417157	SHW	Spiked Blank	Turbidity	2019/10/31		100	%	80 - 120
6417157	SHW	Method Blank	Turbidity	2019/10/31	<0.10		NTU	
6417157	SHW	RPD	Turbidity	2019/10/31	1.1		%	20
6419312	SHW	QC Standard	Turbidity	2019/11/01		103	%	80 - 120
6419312	SHW	Spiked Blank	Turbidity	2019/11/01		102	%	80 - 120
6419312	SHW	Method Blank	Turbidity	2019/11/01	<0.10		NTU	
6419312	SHW	RPD	Turbidity	2019/11/01	7.5		%	20
6419319	SHW	QC Standard	Turbidity	2019/11/01		108	%	80 - 120
6419319	SHW	Spiked Blank	Turbidity	2019/11/01		102	%	80 - 120
6419319	SHW	Method Blank	Turbidity	2019/11/01	<0.10		NTU	
6419319	SHW	RPD	Turbidity	2019/11/01	0.98		%	20
6424517	MLB	Matrix Spike	Total Aluminum (Al)	2019/11/05		96	%	80 - 120
			Total Antimony (Sb)	2019/11/05		98	%	80 - 120
			Total Arsenic (As)	2019/11/05		98	%	80 - 120
			Total Barium (Ba)	2019/11/05		93	%	80 - 120
			Total Beryllium (Be)	2019/11/05		100	%	80 - 120
			Total Bismuth (Bi)	2019/11/05		98	%	80 - 120
			Total Boron (B)	2019/11/05		103	%	80 - 120
			Total Cadmium (Cd)	2019/11/05		93	%	80 - 120
			Total Calcium (Ca)	2019/11/05		97	%	80 - 120
			Total Chromium (Cr)	2019/11/05		97	%	80 - 120
			Total Cobalt (Co)	2019/11/05		96	%	80 - 120
			Total Copper (Cu)	2019/11/05		97	%	80 - 120
			Total Iron (Fe)	2019/11/05		100	%	80 - 120
			Total Lead (Pb)	2019/11/05		97	%	80 - 120
			Total Magnesium (Mg)	2019/11/05		102	%	80 - 120
			Total Manganese (Mn)	2019/11/05		99	%	80 - 120
			Total Molybdenum (Mo)	2019/11/05		102	%	80 - 120
			Total Nickel (Ni)	2019/11/05		99	%	80 - 120
			Total Phosphorus (P)	2019/11/05		100	%	80 - 120
			Total Potassium (K)	2019/11/05		97	%	80 - 120
			Total Selenium (Se)	2019/11/05		97	%	80 - 120
			Total Silver (Ag)	2019/11/05		96	%	80 - 120
			Total Sodium (Na)	2019/11/05		94	%	80 - 120
			Total Strontium (Sr)	2019/11/05		NC	%	80 - 120
			Total Thallium (Tl)	2019/11/05		100	%	80 - 120
			Total Tin (Sn)	2019/11/05		101	%	80 - 120
			Total Titanium (Ti)	2019/11/05		101	%	80 - 120
			Total Uranium (U)	2019/11/05		106	%	80 - 120
			Total Vanadium (V)	2019/11/05		101	%	80 - 120
			Total Zinc (Zn)	2019/11/05		96	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6424517	MLB	Spiked Blank	Total Aluminum (Al)	2019/11/05		102	%	80 - 120
			Total Antimony (Sb)	2019/11/05		101	%	80 - 120
			Total Arsenic (As)	2019/11/05		101	%	80 - 120
			Total Barium (Ba)	2019/11/05		100	%	80 - 120
			Total Beryllium (Be)	2019/11/05		104	%	80 - 120
			Total Bismuth (Bi)	2019/11/05		101	%	80 - 120
			Total Boron (B)	2019/11/05		104	%	80 - 120
			Total Cadmium (Cd)	2019/11/05		95	%	80 - 120
			Total Calcium (Ca)	2019/11/05		105	%	80 - 120
			Total Chromium (Cr)	2019/11/05		100	%	80 - 120
			Total Cobalt (Co)	2019/11/05		101	%	80 - 120
			Total Copper (Cu)	2019/11/05		101	%	80 - 120
			Total Iron (Fe)	2019/11/05		108	%	80 - 120
			Total Lead (Pb)	2019/11/05		101	%	80 - 120
			Total Magnesium (Mg)	2019/11/05		109	%	80 - 120
			Total Manganese (Mn)	2019/11/05		103	%	80 - 120
			Total Molybdenum (Mo)	2019/11/05		105	%	80 - 120
			Total Nickel (Ni)	2019/11/05		103	%	80 - 120
			Total Phosphorus (P)	2019/11/05		107	%	80 - 120
			Total Potassium (K)	2019/11/05		105	%	80 - 120
			Total Selenium (Se)	2019/11/05		101	%	80 - 120
			Total Silver (Ag)	2019/11/05		101	%	80 - 120
			Total Sodium (Na)	2019/11/05		102	%	80 - 120
			Total Strontium (Sr)	2019/11/05		102	%	80 - 120
			Total Thallium (Tl)	2019/11/05		103	%	80 - 120
			Total Tin (Sn)	2019/11/05		102	%	80 - 120
			Total Titanium (Ti)	2019/11/05		106	%	80 - 120
			Total Uranium (U)	2019/11/05		109	%	80 - 120
			Total Vanadium (V)	2019/11/05		105	%	80 - 120
			Total Zinc (Zn)	2019/11/05		100	%	80 - 120
6424517	MLB	Method Blank	Total Aluminum (Al)	2019/11/05	<5.0		ug/L	
			Total Antimony (Sb)	2019/11/05	<1.0		ug/L	
			Total Arsenic (As)	2019/11/05	<1.0		ug/L	
			Total Barium (Ba)	2019/11/05	<1.0		ug/L	
			Total Beryllium (Be)	2019/11/05	<1.0		ug/L	
			Total Bismuth (Bi)	2019/11/05	<2.0		ug/L	
			Total Boron (B)	2019/11/05	<50		ug/L	
			Total Cadmium (Cd)	2019/11/05	<0.010		ug/L	
			Total Calcium (Ca)	2019/11/05	<100		ug/L	
			Total Chromium (Cr)	2019/11/05	<1.0		ug/L	
			Total Cobalt (Co)	2019/11/05	<0.40		ug/L	
			Total Copper (Cu)	2019/11/05	<0.50		ug/L	
			Total Iron (Fe)	2019/11/05	<50		ug/L	
			Total Lead (Pb)	2019/11/05	<0.50		ug/L	
			Total Magnesium (Mg)	2019/11/05	<100		ug/L	
			Total Manganese (Mn)	2019/11/05	<2.0		ug/L	
			Total Molybdenum (Mo)	2019/11/05	<2.0		ug/L	
			Total Nickel (Ni)	2019/11/05	<2.0		ug/L	
			Total Phosphorus (P)	2019/11/05	<100		ug/L	
			Total Potassium (K)	2019/11/05	<100		ug/L	
			Total Selenium (Se)	2019/11/05	<0.50		ug/L	
			Total Silver (Ag)	2019/11/05	<0.10		ug/L	
			Total Sodium (Na)	2019/11/05	<100		ug/L	
			Total Strontium (Sr)	2019/11/05	<2.0		ug/L	
			Total Thallium (Tl)	2019/11/05	<0.10		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Tin (Sn)	2019/11/05	<2.0		ug/L	
			Total Titanium (Ti)	2019/11/05	<2.0		ug/L	
			Total Uranium (U)	2019/11/05	<0.10		ug/L	
			Total Vanadium (V)	2019/11/05	<2.0		ug/L	
			Total Zinc (Zn)	2019/11/05	<5.0		ug/L	
6424517	MLB	RPD	Total Aluminum (Al)	2019/11/05	4.6		%	20
			Total Antimony (Sb)	2019/11/05	NC		%	20
			Total Arsenic (As)	2019/11/05	NC		%	20
			Total Barium (Ba)	2019/11/05	1.2		%	20
			Total Beryllium (Be)	2019/11/05	NC		%	20
			Total Bismuth (Bi)	2019/11/05	NC		%	20
			Total Boron (B)	2019/11/05	0.86		%	20
			Total Cadmium (Cd)	2019/11/05	NC		%	20
			Total Calcium (Ca)	2019/11/05	2.0		%	20
			Total Chromium (Cr)	2019/11/05	NC		%	20
			Total Cobalt (Co)	2019/11/05	NC		%	20
			Total Copper (Cu)	2019/11/05	0.42		%	20
			Total Iron (Fe)	2019/11/05	2.1		%	20
			Total Lead (Pb)	2019/11/05	NC		%	20
			Total Magnesium (Mg)	2019/11/05	2.6		%	20
			Total Manganese (Mn)	2019/11/05	NC		%	20
			Total Molybdenum (Mo)	2019/11/05	NC		%	20
			Total Nickel (Ni)	2019/11/05	NC		%	20
			Total Phosphorus (P)	2019/11/05	NC		%	20
			Total Potassium (K)	2019/11/05	1.5		%	20
			Total Selenium (Se)	2019/11/05	NC		%	20
			Total Silver (Ag)	2019/11/05	NC		%	20
			Total Sodium (Na)	2019/11/05	1.6		%	20
			Total Strontium (Sr)	2019/11/05	0.30		%	20
			Total Thallium (Tl)	2019/11/05	NC		%	20
			Total Tin (Sn)	2019/11/05	NC		%	20
			Total Titanium (Ti)	2019/11/05	NC		%	20
			Total Uranium (U)	2019/11/05	3.2		%	20
			Total Vanadium (V)	2019/11/05	NC		%	20
			Total Zinc (Zn)	2019/11/05	NC		%	20
6424781	MGN	Matrix Spike	Total Organic Carbon (C)	2019/11/05		98	%	85 - 115
6424781	MGN	Spiked Blank	Total Organic Carbon (C)	2019/11/05		100	%	80 - 120
6424781	MGN	Method Blank	Total Organic Carbon (C)	2019/11/05	<0.50		mg/L	
6424781	MGN	RPD	Total Organic Carbon (C)	2019/11/05	3.1		%	15
6424813	MCN	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2019/11/05		95	%	80 - 120
6424813	MCN	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2019/11/05		103	%	80 - 120
6424813	MCN	Method Blank	Nitrogen (Ammonia Nitrogen)	2019/11/05	<0.050		mg/L	
6424813	MCN	RPD	Nitrogen (Ammonia Nitrogen)	2019/11/05	2.0		%	20
6424853	SSV	Matrix Spike	Total Phosphorus	2019/11/05		97	%	80 - 120
6424853	SSV	QC Standard	Total Phosphorus	2019/11/05		91	%	80 - 120
6424853	SSV	Spiked Blank	Total Phosphorus	2019/11/05		103	%	80 - 120
6424853	SSV	Method Blank	Total Phosphorus	2019/11/05	<0.004		mg/L	
6424853	SSV	RPD	Total Phosphorus	2019/11/05	2.2		%	20
6425124	MGN	Matrix Spike	Total Organic Carbon (C)	2019/11/06		99	%	85 - 115
6425124	MGN	Spiked Blank	Total Organic Carbon (C)	2019/11/06		98	%	80 - 120
6425124	MGN	Method Blank	Total Organic Carbon (C)	2019/11/06	<0.50		mg/L	
6425124	MGN	RPD	Total Organic Carbon (C)	2019/11/06	2.8		%	15
6427106	MCN	Matrix Spike	Total Alkalinity (Total as CaCO3)	2019/11/06		NC	%	80 - 120
6427106	MCN	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019/11/06		110	%	80 - 120
6427106	MCN	Method Blank	Total Alkalinity (Total as CaCO3)	2019/11/06	<5.0		mg/L	

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6427106	MCN	RPD	Total Alkalinity (Total as CaCO3)	2019/11/06	7.5		%	25
6427114	MCN	Matrix Spike	Dissolved Chloride (Cl-)	2019/11/06		NC	%	80 - 120
6427114	MCN	Spiked Blank	Dissolved Chloride (Cl-)	2019/11/06		103	%	80 - 120
6427114	MCN	Method Blank	Dissolved Chloride (Cl-)	2019/11/06	<1.0		mg/L	
6427114	MCN	RPD	Dissolved Chloride (Cl-)	2019/11/06	0.21		%	25
6427117	MCN	Matrix Spike	Dissolved Sulphate (SO4)	2019/11/06		92	%	80 - 120
6427117	MCN	Spiked Blank	Dissolved Sulphate (SO4)	2019/11/06		105	%	80 - 120
6427117	MCN	Method Blank	Dissolved Sulphate (SO4)	2019/11/06	<2.0		mg/L	
6427117	MCN	RPD	Dissolved Sulphate (SO4)	2019/11/06	0.47		%	25
6427120	MCN	Matrix Spike	Reactive Silica (SiO2)	2019/11/06		NC	%	80 - 120
6427120	MCN	Spiked Blank	Reactive Silica (SiO2)	2019/11/06		94	%	80 - 120
6427120	MCN	Method Blank	Reactive Silica (SiO2)	2019/11/06	<0.50		mg/L	
6427120	MCN	RPD	Reactive Silica (SiO2)	2019/11/06	0.70		%	25
6427125	MCN	Spiked Blank	Colour	2019/11/07		102	%	80 - 120
6427125	MCN	Method Blank	Colour	2019/11/07	<5.0		TCU	
6427125	MCN	RPD	Colour	2019/11/07	NC		%	20
6427128	MCN	Matrix Spike	Orthophosphate (P)	2019/11/06		91	%	80 - 120
6427128	MCN	Spiked Blank	Orthophosphate (P)	2019/11/06		108	%	80 - 120
6427128	MCN	Method Blank	Orthophosphate (P)	2019/11/06	<0.010		mg/L	
6427128	MCN	RPD	Orthophosphate (P)	2019/11/06	NC		%	25
6427131	MCN	Matrix Spike	Nitrate + Nitrite (N)	2019/11/06		97	%	80 - 120
6427131	MCN	Spiked Blank	Nitrate + Nitrite (N)	2019/11/06		96	%	80 - 120
6427131	MCN	Method Blank	Nitrate + Nitrite (N)	2019/11/06	<0.050		mg/L	
6427131	MCN	RPD	Nitrate + Nitrite (N)	2019/11/06	0.59		%	25
6427134	MCN	Matrix Spike	Nitrite (N)	2019/11/06		104	%	80 - 120
6427134	MCN	Spiked Blank	Nitrite (N)	2019/11/06		103	%	80 - 120
6427134	MCN	Method Blank	Nitrite (N)	2019/11/06	<0.010		mg/L	
6427134	MCN	RPD	Nitrite (N)	2019/11/06	NC		%	20
6429749	BBD	QC Standard	Salinity	2019/11/07		101	%	80 - 120
6429749	BBD	Method Blank	Salinity	2019/11/07	<2.0		N/A	
6429749	BBD	RPD [LCO798-01]	Salinity	2019/11/07	0		%	25

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Eric Dearman, Scientific Specialist

CHARTERED
Eva Pranjic
CHEMIST

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Lynne Kempton, Senior Analyst

Mike MacGillivray, Scientific Specialist (Inorganics)

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Department of Oceanography
1355 Oxford St
Halifax, NS
B3H 4R2

Determination of chlorophyll a by fluorescence

Client: Bureau Veritas Laboratories, 200 Bluewater Road, Bedford, NS, B4B 1G9

Attention: Keri Mackay **Received:** 2019-10-24

Project #: B9T7878 **Completed:** 2019-10-25

Hugh MacIntyre, Ph.D.

Chl *a* (chlorophyll *a* ; µg L-1) determined by the acidification method (Holm-Hansen et al., 1965). Estimates made with the non-acidification method (Welschmeyer, 1994) are shown for comparison. The non-acidification method is considered more reliable than the acidification method in correcting for bias due to the contributions of chlorophyll *b* and chlorophyll degradation products.

Holm-Hansen O, Lorenzen CJ, Holmes RW, Strickland JDH (1965) Fluorometric determination of chlorophyll. J Conseil 30:3-15

Welschmeyer NA (1994) Fluorometric analysis of chlorophyll *a* in the presence of chlorophyll *b* and phaeopigments. Limnol Oceanogr 39:1985-1992

Contractor ID	Client ID	Chl *a* (acidification)	Chl *a* (non-acidification)
LCO798-06R	AVE-4	6.01	11.8
LCO800-06R	AVE-1	19.8	30.8
LCO801-06R	AVE-9	5.14	9.2

Maxxam
A Bureau Veritas Group Company

200 Bluewater Road, Suite 105, Bedford, Nova Scotia B4B 1G9 Tel: 902-420-0203 Fax: 902-420-8612 Toll Free: 1-800-565-7227
49-55 Elizabeth Avenue, St John's, NL A1A 1W9 Tel: 709-754-0203 Fax: 709-754-8612 Toll Free: 1-888-492-7227
465 George Street,Unit G,Sydney, NS B1P 1K5 Tel: 902-567-1255 Fax: 902-539-6504 Toll Free: 1-888-535-7770
www.maxxam.ca E-mail: Customerservicebedford@maxxam.ca

ATL FCD 00149 / 23

CHAIN OF CUSTODY RECORD

COC #: D 43335 Page ___ of ___

(Sub from Bedford)

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required
Company Name:	CBCL Ltd	~~Company Name:~~ Project #	171046.01	Quotation #:		☑ Regular TAT (5 business days) Most analyses
Contact Name:	Accounts Payable	Contact Name:		Purchase Order #:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	1505 Barrington St. Suite 901 PO BOX 606 PC:	Address: PC:		Project #:		IF RUSH please specify date (Surcharges will be applied)
Phone:	902-421-7241	Phone:		Site Location:		DATE REQUIRED:
Email:	acct@cbcl.ca	Email:		Site Province:		
Report Copies:	cmcvarish@cbcl.ca	Report Copies:	mrutherford@cbcl.ca	Site #: / Sampled By:		

Laboratory Use Only

CUSTODY SEAL Present	Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		9, 7, 3	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	BOD	Chlorophyll A	PCBs - Select One: Default or CCME Sediment	low level phosphorous	Fecal coliform (count)	Total Coliform/E.Coli (Count)	TSS	Salinity		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	AVE-4	2019/10/23	13:10	Water	8			X									X	X		X	X	X	X	X			
2	AVE-2	11	12:50	11	2																		X	X			
3	AVE-1	11	11:25	11	8			X									X	X		X	X	X	X	X			
4	AVE-9	11	10:35	11	8			X									X	X		X	X	X	X	X			
5	AR-4B	11	9:40	11	2																		X	X			
6																											
7																											
8																											
9																											
10																											

2019 OCT 23 15:44

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Colin McVarish	2019/10/23	15:43	[signature]			B9T7878
[signature]						

White: Maxxam Pink: Client

CBCL Limited
BV Labs Job Number: B9T7878 Client Project #: 171046.01
Report Date: 2019/11/07

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		LCO798			LCO800			LCO801		
Sampling Date		2019-10-23 13:10			2019-10-23 11:25			2019-10-23 10:35		
COC Number		D43335			D43335			D43335		
	UNITS	**AVE-4**	**RDL**	**QC Batch**	**AVE-1**	**RDL**	**QC Batch**	**AVE-9**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L	91.1	N/A	6401204	403	N/A	6401204	170	N/A	6401204
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	51	1.0	6401201	89	1.0	6401201	64	1.0	6401201
Calculated TDS	mg/L	5700	1.0	6401209	24000	1.0	6401209	12000	1.0	6401209
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	6401201	<1.0	1.0	6401201	<1.0	1.0	6401201
Cation Sum	me/L	112	N/A	6401204	458	N/A	6401204	258	N/A	6401204
Hardness (CaCO3)	mg/L	1300	1.0	6401202	5000	1.0	6401202	2800	1.0	6401202
Ion Balance (% Difference)	%	10.4	N/A	6401203	6.38	N/A	6401203	20.8	N/A	6401203
Langelier Index (@ 20C)	N/A	-0.531		6401207	0.189		6401207	-0.273		6401207
Langelier Index (@ 4C)	N/A	-0.770		6401208	-0.0480		6401208	-0.510		6401208
Nitrate (N)	mg/L	<0.050	0.050	6401205	0.14	0.050	6401205	0.070	0.050	6401205
Saturation pH (@ 20C)	N/A	8.10		6401207	7.42		6401207	7.82		6401207
Saturation pH (@ 4C)	N/A	8.34		6401208	7.66		6401208	8.05		6401208
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	51	5.0	6427106	89	5.0	6427106	64	5.0	6427106
Dissolved Chloride (Cl-)	mg/L	2900	50	6427114	13000	500	6427114	5200	100	6427114
Colour	TCU	72	25	6427125	8.7	5.0	6427125	34	5.0	6427125
Nitrate + Nitrite (N)	mg/L	<0.050	0.050	6427131	0.16	0.050	6427131	0.070	0.050	6427131
Nitrite (N)	mg/L	<0.010	0.010	6427134	0.018	0.010	6427134	<0.010	0.010	6427134
Nitrogen (Ammonia Nitrogen)	mg/L	0.12	0.050	6424813	0.070	0.050	6424813	0.092	0.050	6424813
Total Organic Carbon (C)	mg/L	<50 (1)	50	6424781	8.6 (1)	5.0	6425124	12 (1)	5.0	6425124
Orthophosphate (P)	mg/L	<0.010	0.010	6427128	<0.010	0.010	6427128	<0.010	0.010	6427128
pH	pH	7.57	N/A	6411783	7.61	N/A	6411783	7.54	N/A	6411783
Reactive Silica (SiO2)	mg/L	3.3	0.50	6427120	1.3	0.50	6427120	2.5	0.50	6427120
Dissolved Sulphate (SO4)	mg/L	440	10	6427117	1700	40	6427117	980	20	6427117
Turbidity	NTU	>1000	1.0	6417157	670	1.0	6419319	500	1.0	6419312
Conductivity	uS/cm	11000	1.0	6411787	40000	1.0	6411787	24000	1.0	6411787
Metals										
Total Aluminum (Al)	ug/L	29000	50	6424517	20000	50	6424517	16000	50	6424517
Total Antimony (Sb)	ug/L	<10	10	6424517	<10	10	6424517	<10	10	6424517
Total Arsenic (As)	ug/L	12	10	6424517	12	10	6424517	<10	10	6424517
Total Barium (Ba)	ug/L	140	10	6424517	92	10	6424517	77	10	6424517
Total Beryllium (Be)	ug/L	<10	10	6424517	<10	10	6424517	<10	10	6424517
Total Bismuth (Bi)	ug/L	<20	20	6424517	<20	20	6424517	<20	20	6424517
Total Boron (B)	ug/L	940	500	6424517	3600	500	6424517	2000	500	6424517
Total Cadmium (Cd)	ug/L	<0.10	0.10	6424517	<0.10	0.10	6424517	<0.10	0.10	6424517
Total Calcium (Ca)	ug/L	100000	1000	6424517	320000	1000	6424517	190000	1000	6424517
Total Chromium (Cr)	ug/L	37	10	6424517	27	10	6424517	21	10	6424517
Total Cobalt (Co)	ug/L	16	4.0	6424517	12	4.0	6424517	9.9	4.0	6424517
Total Copper (Cu)	ug/L	20	5.0	6424517	18	5.0	6424517	13	5.0	6424517
Total Iron (Fe)	ug/L	32000	500	6424517	25000	500	6424517	19000	500	6424517
Total Lead (Pb)	ug/L	22	5.0	6424517	16	5.0	6424517	12	5.0	6424517
Total Magnesium (Mg)	ug/L	250000	1000	6424517	1000000	1000	6424517	570000	1000	6424517
Total Manganese (Mn)	ug/L	1600	20	6424517	1000	20	6424517	940	20	6424517
Total Molybdenum (Mo)	ug/L	<20	20	6424517	<20	20	6424517	<20	20	6424517
Total Nickel (Ni)	ug/L	35	20	6424517	29	20	6424517	<20	20	6424517
Total Phosphorus (P)	ug/L	1300	1000	6424517	1200	1000	6424517	1200	1000	6424517

BV Labs Job Number: B9T7878
Report Date: 2019/11/07

CBCL Limited
Client Project #: 171046.01

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		LCO798			LCO800			LCO801		
Sampling Date		2019-10-23 13:10			2019-10-23 11:25			2019-10-23 10:35		
COC Number		D43335			D43335			D43335		
	UNITS	**AVE-4**	**RDL**	**QC Batch**	**AVE-1**	**RDL**	**QC Batch**	**AVE-9**	**RDL**	**QC Batch**
Total Potassium (K)	ug/L	77000	1000	6424517	300000	1000	6424517	170000	1000	6424517
Total Selenium (Se)	ug/L	<5.0	5.0	6424517	<5.0	5.0	6424517	<5.0	5.0	6424517
Total Silver (Ag)	ug/L	<1.0	1.0	6424517	<1.0	1.0	6424517	<1.0	1.0	6424517
Total Sodium (Na)	ug/L	1900000	1000	6424517	8100000	1000	6424517	4500000	1000	6424517
Total Strontium (Sr)	ug/L	1600	20	6424517	5800	20	6424517	3300	20	6424517
Total Thallium (Tl)	ug/L	<1.0	1.0	6424517	<1.0	1.0	6424517	<1.0	1.0	6424517
Total Tin (Sn)	ug/L	<20	20	6424517	<20	20	6424517	<20	20	6424517
Total Titanium (Ti)	ug/L	310	20	6424517	590	20	6424517	400	20	6424517
Total Uranium (U)	ug/L	1.6	1.0	6424517	3.0	1.0	6424517	2.1	1.0	6424517
Total Vanadium (V)	ug/L	60	20	6424517	49	20	6424517	38	20	6424517
Total Zinc (Zn)	ug/L	94	50	6424517	73	50	6424517	<50	50	6424517

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

Results relate only to the items tested.

CBCL Limited
BV Labs Job Number: B9T7878 Client Project #: 171046.01
Report Date: 2019/11/07

RESULTS OF ANALYSES OF WATER

BV Labs ID		LCO798			LCO798			LCO799			LCO800	LCO801			LCO802			LCO802		
Sampling Date		2019-10-23 13:10			2019-10-23 13:10			2019-10-23 12:50			2019-10-23 11:25	2019-10-23 10:35			2019-10-23 09:40			2019-10-23 09:40		
COC Number		D43335			D43335			D43335			D43335	D43335			D43335			D43335		
	UNITS	**AVE-4**	**RDL**	**QC Batch**	**AVE-4 Lab-Dup**	**RDL**	**QC Batch**	**AVE-2**	**RDL**	**QC Batch**	**AVE-1**	**AVE-9**	**RDL**	**QC Batch**	**AR-4B**	**RDL**	**QC Batch**	**AR-4B Lab-Dup**	**RDL**	**QC Batch**
Inorganics																				
Carbonaceous BOD	mg/L	<5.0	5.0	6403741							<5.0	<5.0	5.0	6403741						
Total Phosphorus	mg/L	1.5	0.1	6424853							0.7	0.6	0.1	6424853						
Salinity	N/A	6.2	2.0	6429749	6.2	2.0	6429749	26	2.0	6429749	26	15	2.0	6429749	9.0	2.0	6429749			
Total Suspended Solids	mg/L	1000	17	6414638				11000	100	6414638	820	730	17	6414638	260	10	6414638	260	10	6414638
Subcontracted Analysis																				
Subcontract Parameter	N/A	ATTACHED	N/A	6404012							ATTACHED	ATTACHED	N/A	6404012						

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Results relate only to the items tested.

CBCL Limited

BV Labs Job Number: B9T7878
Client Project #: 171046.01

Report Date: 2019/11/07

MICROBIOLOGY (WATER)

BV Labs ID		LCO798	LCO800	LCO801		
Sampling Date		2019-10-23 13:10	2019-10-23 11:25	2019-10-23 10:35		
COC Number		D43335	D43335	D43335		
	UNITS	**AVE-4**	**AVE-1**	**AVE-9**	**RDL**	**QC Batch**
Microbiological						
Escherichia coli	CFU/100mL	400	100	<100	100	6403716
Fecal coliform	CFU/1mL	4.0	<1.0	1.0	1.0	6403738
Total Coliforms	CFU/100mL	3500	1600	2300	100	6403725

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Results relate only to the items tested.

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Each tempera	Each tempera	Each tempera	Each temperature is the average of up to three cooler temperatures taken at receipt
Package 1	6.3°C	#N/A	#N/A

Sample LCO798 [AVE-4] : Elevated reporting limits for trace metals due to sample matrix.
Poor RCAp Ion Balance due to sample matrix. Excess cations due to presence of turbidity.
Sample LCO799 [AVE-2] : TSS: The sample contained materials that can settle rapidly and may give results with an elevated bias.
Sample LCO800 [AVE-1] : Elevated reporting limits for trace metals due to sample matrix.
Poor RCAp Ion Balance due to sample matrix. Excess cations due to presence of turbidity.
Sample LCO801 [AVE-9] : Elevated reporting limits for trace metals due to sample matrix.
Poor RCAp Ion Balance due to sample matrix. Excess cations due to presence of turbidity.
Results relate only to the items tested.

CBCL Limited
Attention: Melissa Rutherford
Report Date: 2019/11/07
Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9T7878

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6403716	SDN	Method Blank	Escherichia coli	2019-10-23	<1.0		CFU/100mL	
6403725	SDN	Method Blank	Total Coliforms	2019-10-23	<1.0		CFU/100mL	
6403738	SDN	Method Blank	Fecal coliform	2019-10-23	<1.0		CFU/1mL	
6403741	DME	QC Standard	Carbonaceous BOD	2019-10-29		117	%	80 - 120
6403741	DME	Spiked Blank	Carbonaceous BOD	2019-10-29		113	%	80 - 120
6403741	DME	Method Blank	Carbonaceous BOD	2019-10-29	<2.0		mg/L	
6403741	DME	RPD	Carbonaceous BOD	2019-10-29	NC		%	25
6411783	SHW	QC Standard	pH	2019-10-29		101	%	97 - 103
6411787	SHW	Spiked Blank	Conductivity	2019-10-29		102	%	80 - 120
6411787	SHW	Method Blank	Conductivity	2019-10-29	<1.0		uS/cm	
6414638	GTH	QC Standard	Total Suspended Solids	2019-11-04		97	%	80 - 120
6414638	GTH	Method Blank	Total Suspended Solids	2019-11-04	<1.0		mg/L	
6414638	GTH	RPD [LCO802-01]	Total Suspended Solids	2019-11-04	2.3		%	20
6417157	SHW	QC Standard	Turbidity	2019-10-31		100	%	80 - 120
6417157	SHW	Spiked Blank	Turbidity	2019-10-31		100	%	80 - 120
6417157	SHW	Method Blank	Turbidity	2019-10-31	<0.10		NTU	
6417157	SHW	RPD	Turbidity	2019-10-31	1.1		%	20
6419312	SHW	QC Standard	Turbidity	2019-11-01		103	%	80 - 120
6419312	SHW	Spiked Blank	Turbidity	2019-11-01		102	%	80 - 120
6419312	SHW	Method Blank	Turbidity	2019-11-01	<0.10		NTU	
6419312	SHW	RPD	Turbidity	2019-11-01	7.5		%	20
6419319	SHW	QC Standard	Turbidity	2019-11-01		108	%	80 - 120
6419319	SHW	Spiked Blank	Turbidity	2019-11-01		102	%	80 - 120
6419319	SHW	Method Blank	Turbidity	2019-11-01	<0.10		NTU	
6419319	SHW	RPD	Turbidity	2019-11-01	0.98		%	20
6424517	MLB	Matrix Spike	Total Aluminum (Al)	2019-11-05		96	%	80 - 120
			Total Antimony (Sb)	2019-11-05		98	%	80 - 120
			Total Arsenic (As)	2019-11-05		98	%	80 - 120
			Total Barium (Ba)	2019-11-05		93	%	80 - 120
			Total Beryllium (Be)	2019-11-05		100	%	80 - 120
			Total Bismuth (Bi)	2019-11-05		98	%	80 - 120
			Total Boron (B)	2019-11-05		103	%	80 - 120
			Total Cadmium (Cd)	2019-11-05		93	%	80 - 120
			Total Calcium (Ca)	2019-11-05		97	%	80 - 120
			Total Chromium (Cr)	2019-11-05		97	%	80 - 120
			Total Cobalt (Co)	2019-11-05		96	%	80 - 120
			Total Copper (Cu)	2019-11-05		97	%	80 - 120
			Total Iron (Fe)	2019-11-05		100	%	80 - 120
			Total Lead (Pb)	2019-11-05		97	%	80 - 120
			Total Magnesium (Mg)	2019-11-05		102	%	80 - 120
			Total Manganese (Mn)	2019-11-05		99	%	80 - 120
			Total Molybdenum (Mo)	2019-11-05		102	%	80 - 120
			Total Nickel (Ni)	2019-11-05		99	%	80 - 120
			Total Phosphorus (P)	2019-11-05		100	%	80 - 120
			Total Potassium (K)	2019-11-05		97	%	80 - 120
			Total Selenium (Se)	2019-11-05		97	%	80 - 120
			Total Silver (Ag)	2019-11-05		96	%	80 - 120
			Total Sodium (Na)	2019-11-05		94	%	80 - 120
			Total Strontium (Sr)	2019-11-05		NC	%	80 - 120
			Total Thallium (Tl)	2019-11-05		100	%	80 - 120
			Total Tin (Sn)	2019-11-05		101	%	80 - 120
			Total Titanium (Ti)	2019-11-05		101	%	80 - 120
			Total Uranium (U)	2019-11-05		106	%	80 - 120
			Total Vanadium (V)	2019-11-05		101	%	80 - 120
			Total Zinc (Zn)	2019-11-05		96	%	80 - 120
6424517	MLB	Spiked Blank	Total Aluminum (Al)	2019-11-05		102	%	80 - 120
			Total Antimony (Sb)	2019-11-05		101	%	80 - 120
			Total Arsenic (As)	2019-11-05		101	%	80 - 120
			Total Barium (Ba)	2019-11-05		100	%	80 - 120
			Total Beryllium (Be)	2019-11-05		104	%	80 - 120

CBCL Limited
Attention: Melissa Rutherford
Report Date: 2019/11/07 Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9T7878

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Bismuth (Bi)	2019-11-05		101	%	80 - 120
			Total Boron (B)	2019-11-05		104	%	80 - 120
			Total Cadmium (Cd)	2019-11-05		95	%	80 - 120
			Total Calcium (Ca)	2019-11-05		105	%	80 - 120
			Total Chromium (Cr)	2019-11-05		100	%	80 - 120
			Total Cobalt (Co)	2019-11-05		101	%	80 - 120
			Total Copper (Cu)	2019-11-05		101	%	80 - 120
			Total Iron (Fe)	2019-11-05		108	%	80 - 120
			Total Lead (Pb)	2019-11-05		101	%	80 - 120
			Total Magnesium (Mg)	2019-11-05		109	%	80 - 120
			Total Manganese (Mn)	2019-11-05		103	%	80 - 120
			Total Molybdenum (Mo)	2019-11-05		105	%	80 - 120
			Total Nickel (Ni)	2019-11-05		103	%	80 - 120
			Total Phosphorus (P)	2019-11-05		107	%	80 - 120
			Total Potassium (K)	2019-11-05		105	%	80 - 120
			Total Selenium (Se)	2019-11-05		101	%	80 - 120
			Total Silver (Ag)	2019-11-05		101	%	80 - 120
			Total Sodium (Na)	2019-11-05		102	%	80 - 120
			Total Strontium (Sr)	2019-11-05		102	%	80 - 120
			Total Thallium (Tl)	2019-11-05		103	%	80 - 120
			Total Tin (Sn)	2019-11-05		102	%	80 - 120
			Total Titanium (Ti)	2019-11-05		106	%	80 - 120
			Total Uranium (U)	2019-11-05		109	%	80 - 120
			Total Vanadium (V)	2019-11-05		105	%	80 - 120
			Total Zinc (Zn)	2019-11-05		100	%	80 - 120
6424517	MLB	Method Blank	Total Aluminum (Al)	2019-11-05	<5.0		ug/L	
			Total Antimony (Sb)	2019-11-05	<1.0		ug/L	
			Total Arsenic (As)	2019-11-05	<1.0		ug/L	
			Total Barium (Ba)	2019-11-05	<1.0		ug/L	
			Total Beryllium (Be)	2019-11-05	<1.0		ug/L	
			Total Bismuth (Bi)	2019-11-05	<2.0		ug/L	
			Total Boron (B)	2019-11-05	<50		ug/L	
			Total Cadmium (Cd)	2019-11-05	<0.010		ug/L	
			Total Calcium (Ca)	2019-11-05	<100		ug/L	
			Total Chromium (Cr)	2019-11-05	<1.0		ug/L	
			Total Cobalt (Co)	2019-11-05	<0.40		ug/L	
			Total Copper (Cu)	2019-11-05	<0.50		ug/L	
			Total Iron (Fe)	2019-11-05	<50		ug/L	
			Total Lead (Pb)	2019-11-05	<0.50		ug/L	
			Total Magnesium (Mg)	2019-11-05	<100		ug/L	
			Total Manganese (Mn)	2019-11-05	<2.0		ug/L	
			Total Molybdenum (Mo)	2019-11-05	<2.0		ug/L	
			Total Nickel (Ni)	2019-11-05	<2.0		ug/L	
			Total Phosphorus (P)	2019-11-05	<100		ug/L	
			Total Potassium (K)	2019-11-05	<100		ug/L	
			Total Selenium (Se)	2019-11-05	<0.50		ug/L	
			Total Silver (Ag)	2019-11-05	<0.10		ug/L	
			Total Sodium (Na)	2019-11-05	<100		ug/L	
			Total Strontium (Sr)	2019-11-05	<2.0		ug/L	
			Total Thallium (Tl)	2019-11-05	<0.10		ug/L	
			Total Tin (Sn)	2019-11-05	<2.0		ug/L	
			Total Titanium (Ti)	2019-11-05	<2.0		ug/L	
			Total Uranium (U)	2019-11-05	<0.10		ug/L	
			Total Vanadium (V)	2019-11-05	<2.0		ug/L	
			Total Zinc (Zn)	2019-11-05	<5.0		ug/L	
6424517	MLB	RPD	Total Aluminum (Al)	2019-11-05	4.6		%	20
			Total Antimony (Sb)	2019-11-05	NC		%	20
			Total Arsenic (As)	2019-11-05	NC		%	20
			Total Barium (Ba)	2019-11-05	1.2		%	20
			Total Beryllium (Be)	2019-11-05	NC		%	20
			Total Bismuth (Bi)	2019-11-05	NC		%	20

Report Date: 2019/11/07

CBCL Limited
Attention: Melissa Rutherford
Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9T7878

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Boron (B)	2019-11-05	0.86		%	20
			Total Cadmium (Cd)	2019-11-05	NC		%	20
			Total Calcium (Ca)	2019-11-05	2.0		%	20
			Total Chromium (Cr)	2019-11-05	NC		%	20
			Total Cobalt (Co)	2019-11-05	NC		%	20
			Total Copper (Cu)	2019-11-05	0.42		%	20
			Total Iron (Fe)	2019-11-05	2.1		%	20
			Total Lead (Pb)	2019-11-05	NC		%	20
			Total Magnesium (Mg)	2019-11-05	2.6		%	20
			Total Manganese (Mn)	2019-11-05	NC		%	20
			Total Molybdenum (Mo)	2019-11-05	NC		%	20
			Total Nickel (Ni)	2019-11-05	NC		%	20
			Total Phosphorus (P)	2019-11-05	NC		%	20
			Total Potassium (K)	2019-11-05	1.5		%	20
			Total Selenium (Se)	2019-11-05	NC		%	20
			Total Silver (Ag)	2019-11-05	NC		%	20
			Total Sodium (Na)	2019-11-05	1.6		%	20
			Total Strontium (Sr)	2019-11-05	0.30		%	20
			Total Thallium (Tl)	2019-11-05	NC		%	20
			Total Tin (Sn)	2019-11-05	NC		%	20
			Total Titanium (Ti)	2019-11-05	NC		%	20
			Total Uranium (U)	2019-11-05	3.2		%	20
			Total Vanadium (V)	2019-11-05	NC		%	20
			Total Zinc (Zn)	2019-11-05	NC		%	20
6424781	MGN	Matrix Spike	Total Organic Carbon (C)	2019-11-05		98	%	85 - 115
6424781	MGN	Spiked Blank	Total Organic Carbon (C)	2019-11-05		100	%	80 - 120
6424781	MGN	Method Blank	Total Organic Carbon (C)	2019-11-05	<0.50		mg/L	
6424781	MGN	RPD	Total Organic Carbon (C)	2019-11-05	3.1		%	15
6424813	MCN	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2019-11-05		95	%	80 - 120
6424813	MCN	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2019-11-05		103	%	80 - 120
6424813	MCN	Method Blank	Nitrogen (Ammonia Nitrogen)	2019-11-05	<0.050		mg/L	
6424813	MCN	RPD	Nitrogen (Ammonia Nitrogen)	2019-11-05	2.0		%	20
6424853	SSV	Matrix Spike	Total Phosphorus	2019-11-05		97	%	80 - 120
6424853	SSV	QC Standard	Total Phosphorus	2019-11-05		91	%	80 - 120
6424853	SSV	Spiked Blank	Total Phosphorus	2019-11-05		103	%	80 - 120
6424853	SSV	Method Blank	Total Phosphorus	2019-11-05	<0.004		mg/L	
6424853	SSV	RPD	Total Phosphorus	2019-11-05	2.2		%	20
6425124	MGN	Matrix Spike	Total Organic Carbon (C)	2019-11-06		99	%	85 - 115
6425124	MGN	Spiked Blank	Total Organic Carbon (C)	2019-11-06		98	%	80 - 120
6425124	MGN	Method Blank	Total Organic Carbon (C)	2019-11-06	<0.50		mg/L	
6425124	MGN	RPD	Total Organic Carbon (C)	2019-11-06	2.8		%	15
6427106	MCN	Matrix Spike	Total Alkalinity (Total as CaCO3)	2019-11-06		NC	%	80 - 120
6427106	MCN	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019-11-06		110	%	80 - 120
6427106	MCN	Method Blank	Total Alkalinity (Total as CaCO3)	2019-11-06	<5.0		mg/L	
6427106	MCN	RPD	Total Alkalinity (Total as CaCO3)	2019-11-06	7.5		%	25
6427114	MCN	Matrix Spike	Dissolved Chloride (Cl-)	2019-11-06		NC	%	80 - 120
6427114	MCN	Spiked Blank	Dissolved Chloride (Cl-)	2019-11-06		103	%	80 - 120
6427114	MCN	Method Blank	Dissolved Chloride (Cl-)	2019-11-06	<1.0		mg/L	
6427114	MCN	RPD	Dissolved Chloride (Cl-)	2019-11-06	0.21		%	25
6427117	MCN	Matrix Spike	Dissolved Sulphate (SO4)	2019-11-06		92	%	80 - 120
6427117	MCN	Spiked Blank	Dissolved Sulphate (SO4)	2019-11-06		105	%	80 - 120
6427117	MCN	Method Blank	Dissolved Sulphate (SO4)	2019-11-06	<2.0		mg/L	
6427117	MCN	RPD	Dissolved Sulphate (SO4)	2019-11-06	0.47		%	25
6427120	MCN	Matrix Spike	Reactive Silica (SiO2)	2019-11-06		NC	%	80 - 120
6427120	MCN	Spiked Blank	Reactive Silica (SiO2)	2019-11-06		94	%	80 - 120
6427120	MCN	Method Blank	Reactive Silica (SiO2)	2019-11-06	<0.50		mg/L	
6427120	MCN	RPD	Reactive Silica (SiO2)	2019-11-06	0.70		%	25
6427125	MCN	Spiked Blank	Colour	2019-11-07		102	%	80 - 120
6427125	MCN	Method Blank	Colour	2019-11-07	<5.0		TCU	
6427125	MCN	RPD	Colour	2019-11-07	NC		%	20
6427128	MCN	Matrix Spike	Orthophosphate (P)	2019-11-06		91	%	80 - 120

CBCL Limited
Attention: Melissa Rutherford
Client Project #: 171046.01

Report Date: 2019/11/07

Quality Assurance Report
BV Labs Job Number: B9T7878

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6427128	MCN	Spiked Blank	Orthophosphate (P)	2019-11-06		108	%	80 - 120
6427128	MCN	Method Blank	Orthophosphate (P)	2019-11-06	<0.010		mg/L	
6427128	MCN	RPD	Orthophosphate (P)	2019-11-06	NC		%	25
6427131	MCN	Matrix Spike	Nitrate + Nitrite (N)	2019-11-06		97	%	80 - 120
6427131	MCN	Spiked Blank	Nitrate + Nitrite (N)	2019-11-06		96	%	80 - 120
6427131	MCN	Method Blank	Nitrate + Nitrite (N)	2019-11-06	<0.050		mg/L	
6427131	MCN	RPD	Nitrate + Nitrite (N)	2019-11-06	0.59		%	25
6427134	MCN	Matrix Spike	Nitrite (N)	2019-11-06		104	%	80 - 120
6427134	MCN	Spiked Blank	Nitrite (N)	2019-11-06		103	%	80 - 120
6427134	MCN	Method Blank	Nitrite (N)	2019-11-06	<0.010		mg/L	
6427134	MCN	RPD	Nitrite (N)	2019-11-06	NC		%	20
6429749	BBD	QC Standard	Salinity	2019-11-07		101	%	80 - 120
6429749	BBD	Method Blank	Salinity	2019-11-07	<2.0		N/A	
6429749	BBD	RPD [LCO798-01]	Salinity	2019-11-07	0		%	25

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

Analyte_ID	Parameter	Sample_ID	Method	Results	Units	EQL	Lab_ID	Matrix	Lab_Duplicate_Of	Field_Duplicate_Of	Date_Sampled	CSite #	DFRP #	DCC_Project_ID	Report Name	TableName
	Nitrate (as N)	AVE-4	ASTM D3867-16	<0.050	mg/L	0.050	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Hardness (as CaCO3)	AVE-4	Auto Calc	1300	mg/L	1.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Anion Sum	AVE-4	Auto Calc.	91.1	me/L	N/A	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Total Dissolved Solids	AVE-4	Auto Calc.	5700	mg/L	1.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Cation Sum	AVE-4	Auto Calc.	112	me/L	N/A	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Ion Balance (% Difference)	AVE-4	Auto Calc.	10.4	%	N/A	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Langelier Index (@ 20C)	AVE-4	Auto Calc.	-0.531	N/A		LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Langelier Index (@ 4C)	AVE-4	Auto Calc.	-0.770	N/A		LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Saturation pH (@ 20C)	AVE-4	Auto Calc.	8.10	N/A		LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Saturation pH (@ 4C)	AVE-4	Auto Calc.	8.34	N/A		LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Bicarbonate (as CaCO3)	AVE-4	SM 23 4500-CO2 D	51	mg/L	1.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Carbonate (as CaCO3)	AVE-4	SM 23 4500-CO2 D	<1.0	mg/L	1.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Sulphate	AVE-4	ASTM D516-16 m	440	mg/L	10	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Turbidity	AVE-4	EPA 180.1 R2 m	>1000	NTU	1.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Alkalinity (as CaCO3)	AVE-4	EPA 310.2 R1974 m	51	mg/L	5.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Ammonia	AVE-4	EPA 350.1 R2 m	0.12	mg/L	0.050	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Reactive Silica (as SiO2)	AVE-4	EPA 366.0 m	3.3	mg/L	0.50	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Salinity	AVE-4	SM 22 2520B	6.2	N/A	2.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Colour	AVE-4	SM 23 2120C m	72	TCU	25	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Conductivity	AVE-4	SM 23 2510B m	11000	uS/cm	1.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	TSS	AVE-4	SM 23 2540D m	1000	mg/L	17	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Phosphorus	AVE-4	SM 23 4500 P B H m	1.5	mg/L	0.1	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Chloride	AVE-4	SM 23 4500-Cl- E m	2900	mg/L	50	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	pH	AVE-4	SM 23 4500-H+ B m	7.57	pH	N/A	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Nitrite	AVE-4	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Ortho Phosphate (as P)	AVE-4	SM 23 4500-P E m	<0.010	mg/L	0.010	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Carbonaceous BOD	AVE-4	SM 23 5210B m	<5.0	mg/L	5.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	TOC	AVE-4	SM 23 5310B m	<50	mg/L	50	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Nitrate + Nitrite (as N)	AVE-4	USGS I-2547-11m	<0.050	mg/L	0.050	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Aluminum	AVE-4	EPA 6020B R2 m	29000	ug/L	50	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Antimony	AVE-4	EPA 6020B R2 m	<10	ug/L	10	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Arsenic	AVE-4	EPA 6020B R2 m	12	ug/L	10	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Barium	AVE-4	EPA 6020B R2 m	140	ug/L	10	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Beryllium	AVE-4	EPA 6020B R2 m	<10	ug/L	10	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Bismuth	AVE-4	EPA 6020B R2 m	<20	ug/L	20	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Boron	AVE-4	EPA 6020B R2 m	940	ug/L	500	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Cadmium	AVE-4	EPA 6020B R2 m	<0.10	ug/L	0.10	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Calcium	AVE-4	EPA 6020B R2 m	100000	ug/L	1000	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Chromium	AVE-4	EPA 6020B R2 m	37	ug/L	10	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Cobalt	AVE-4	EPA 6020B R2 m	16	ug/L	4.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Copper	AVE-4	EPA 6020B R2 m	20	ug/L	5.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Iron	AVE-4	EPA 6020B R2 m	32000	ug/L	500	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Lead	AVE-4	EPA 6020B R2 m	22	ug/L	5.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Magnesium	AVE-4	EPA 6020B R2 m	250000	ug/L	1000	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Manganese	AVE-4	EPA 6020B R2 m	1600	ug/L	20	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Molybdenum	AVE-4	EPA 6020B R2 m	<20	ug/L	20	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Nickel	AVE-4	EPA 6020B R2 m	35	ug/L	20	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Phosphorus (P)	AVE-4	EPA 6020B R2 m	1300	ug/L	1000	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Potassium	AVE-4	EPA 6020B R2 m	77000	ug/L	1000	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Selenium	AVE-4	EPA 6020B R2 m	<5.0	ug/L	5.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Silver	AVE-4	EPA 6020B R2 m	<1.0	ug/L	1.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Sodium	AVE-4	EPA 6020B R2 m	1900000	ug/L	1000	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Strontium	AVE-4	EPA 6020B R2 m	1600	ug/L	20	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Thallium	AVE-4	EPA 6020B R2 m	<1.0	ug/L	1.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Tin	AVE-4	EPA 6020B R2 m	<20	ug/L	20	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Titanium	AVE-4	EPA 6020B R2 m	310	ug/L	20	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Uranium	AVE-4	EPA 6020B R2 m	1.6	ug/L	1.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Vanadium	AVE-4	EPA 6020B R2 m	60	ug/L	20	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Zinc	AVE-4	EPA 6020B R2 m	94	ug/L	50	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Escherichia coli	AVE-4	MOE E3371 R2 (2018)	400	CFU/100mL	100	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Total Coliforms	AVE-4	MOE E3371 R2 (2018)	3500	CFU/100mL	100	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls

Fecal coliform	AVE-4	SM 23 9222D	4.0	CFU/1mL	1.0	LCO798	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Subcontract Parameter	AVE-4		ATTACHED	N/A	N/A	LCO798	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Salinity	AVE-4	SM 22 2520B	6.2	N/A	2.0	LCO798D1	Water	LCO798	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Salinity	AVE-2	SM 22 2520B	26	N/A	2.0	LCO799	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
TSS	AVE-2	SM 23 2540D m	11000	mg/L	100	LCO799	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Nitrate (as N)	AVE-1	ASTM D3867-16	0.14	mg/L	0.050	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Hardness (as CaCO3)	AVE-1	Auto Calc	5000	mg/L	1.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Anion Sum	AVE-1	Auto Calc.	403	me/L	N/A	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Total Dissolved Solids	AVE-1	Auto Calc.	24000	mg/L	1.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Cation Sum	AVE-1	Auto Calc.	458	me/L	N/A	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Ion Balance (% Difference)	AVE-1	Auto Calc.	6.38	%	N/A	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Langelier Index (@ 20C)	AVE-1	Auto Calc.	0.189	N/A		LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Langelier Index (@ 4C)	AVE-1	Auto Calc.	-0.0480	N/A		LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Saturation pH (@ 20C)	AVE-1	Auto Calc.	7.42	N/A		LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Saturation pH (@ 4C)	AVE-1	Auto Calc.	7.66	N/A		LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Bicarbonate (as CaCO3)	AVE-1	SM 23 4500-CO2 D	89	mg/L	1.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Carbonate (as CaCO3)	AVE-1	SM 23 4500-CO2 D	<1.0	mg/L	1.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Sulphate	AVE-1	ASTM D516-16 m	1700	mg/L	40	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Turbidity	AVE-1	EPA 180.1 R2 m	670	NTU	1.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Alkalinity (as CaCO3)	AVE-1	EPA 310.2 R1974 m	89	mg/L	5.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Ammonia	AVE-1	EPA 350.1 R2 m	0.070	mg/L	0.050	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Reactive Silica (as SiO2)	AVE-1	EPA 366.0 m	1.3	mg/L	0.50	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Salinity	AVE-1	SM 22 2520B	26	N/A	2.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Colour	AVE-1	SM 23 2120C m	8.7	TCU	5.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Conductivity	AVE-1	SM 23 2510B m	40000	uS/cm	1.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
TSS	AVE-1	SM 23 2540D m	820	mg/L	17	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Phosphorus	AVE-1	SM 23 4500 P B H m	0.7	mg/L	0.1	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Chloride	AVE-1	SM 23 4500-Cl- E m	13000	mg/L	500	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
pH	AVE-1	SM 23 4500-H+ B m	7.61	pH	N/A	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Nitrite	AVE-1	SM 23 4500-NO2- B m	0.018	mg/L	0.010	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Ortho Phosphate (as P)	AVE-1	SM 23 4500-P E m	<0.010	mg/L	0.010	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Carbonaceous BOD	AVE-1	SM 23 5210B m	<5.0	mg/L	5.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
TOC	AVE-1	SM 23 5310B m	8.6	mg/L	5.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Nitrate + Nitrite (as N)	AVE-1	USGS I-2547-11m	0.16	mg/L	0.050	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Aluminum	AVE-1	EPA 6020B R2 m	20000	ug/L	50	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Antimony	AVE-1	EPA 6020B R2 m	<10	ug/L	10	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Arsenic	AVE-1	EPA 6020B R2 m	12	ug/L	10	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Barium	AVE-1	EPA 6020B R2 m	92	ug/L	10	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Beryllium	AVE-1	EPA 6020B R2 m	<10	ug/L	10	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Bismuth	AVE-1	EPA 6020B R2 m	<20	ug/L	20	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Boron	AVE-1	EPA 6020B R2 m	3600	ug/L	500	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Cadmium	AVE-1	EPA 6020B R2 m	<0.10	ug/L	0.10	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Calcium	AVE-1	EPA 6020B R2 m	320000	ug/L	1000	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Chromium	AVE-1	EPA 6020B R2 m	27	ug/L	10	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Cobalt	AVE-1	EPA 6020B R2 m	12	ug/L	4.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Copper	AVE-1	EPA 6020B R2 m	18	ug/L	5.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Iron	AVE-1	EPA 6020B R2 m	25000	ug/L	500	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Lead	AVE-1	EPA 6020B R2 m	16	ug/L	5.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Magnesium	AVE-1	EPA 6020B R2 m	1000000	ug/L	1000	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Manganese	AVE-1	EPA 6020B R2 m	1000	ug/L	20	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Molybdenum	AVE-1	EPA 6020B R2 m	<20	ug/L	20	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Nickel	AVE-1	EPA 6020B R2 m	29	ug/L	20	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Phosphorus (P)	AVE-1	EPA 6020B R2 m	1200	ug/L	1000	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Potassium	AVE-1	EPA 6020B R2 m	300000	ug/L	1000	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Selenium	AVE-1	EPA 6020B R2 m	<5.0	ug/L	5.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Silver	AVE-1	EPA 6020B R2 m	<1.0	ug/L	1.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Sodium	AVE-1	EPA 6020B R2 m	8100000	ug/L	1000	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Strontium	AVE-1	EPA 6020B R2 m	5800	ug/L	20	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Thallium	AVE-1	EPA 6020B R2 m	<1.0	ug/L	1.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Tin	AVE-1	EPA 6020B R2 m	<20	ug/L	20	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Titanium	AVE-1	EPA 6020B R2 m	590	ug/L	20	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Uranium	AVE-1	EPA 6020B R2 m	3.0	ug/L	1.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls

Vanadium	AVE-1	EPA 6020B R2 m	49	ug/L	20	LCO800	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Zinc	AVE-1	EPA 6020B R2 m	73	ug/L	50	LCO800	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Escherichia coli	AVE-1	MOE E3371 R2 (2018)	100	CFU/100mL	100	LCO800	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Total Coliforms	AVE-1	MOE E3371 R2 (2018)	1600	CFU/100mL	100	LCO800	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Fecal coliform	AVE-1	SM 23 9222D	<1.0	CFU/1mL	1.0	LCO800	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Subcontract Parameter	AVE-1		ATTACHED	N/A	N/A	LCO800	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Nitrate (as N)	AVE-9	ASTM D3867-16	0.070	mg/L	0.050	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Hardness (as CaCO3)	AVE-9	Auto Calc	2800	mg/L	1.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Anion Sum	AVE-9	Auto Calc.	170	me/L	N/A	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Total Dissolved Solids	AVE-9	Auto Calc.	12000	mg/L	1.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Cation Sum	AVE-9	Auto Calc.	258	me/L	N/A	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Ion Balance (% Difference)	AVE-9	Auto Calc.	20.8	%	N/A	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Langelier Index (@ 20C)	AVE-9	Auto Calc.	-0.273	N/A		LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Langelier Index (@ 4C)	AVE-9	Auto Calc.	-0.510	N/A		LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Saturation pH (@ 20C)	AVE-9	Auto Calc.	7.82	N/A		LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Saturation pH (@ 4C)	AVE-9	Auto Calc.	8.05	N/A		LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Bicarbonate (as CaCO3)	AVE-9	SM 23 4500-CO2 D	64	mg/L	1.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Carbonate (as CaCO3)	AVE-9	SM 23 4500-CO2 D	<1.0	mg/L	1.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Sulphate	AVE-9	ASTM D516-16 m	980	mg/L	20	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Turbidity	AVE-9	EPA 180.1 R2 m	500	NTU	1.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Alkalinity (as CaCO3)	AVE-9	EPA 310.2 R1974 m	64	mg/L	5.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Ammonia	AVE-9	EPA 350.1 R2 m	0.092	mg/L	0.050	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Reactive Silica (as SiO2)	AVE-9	EPA 366.0 m	2.5	mg/L	0.50	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Salinity	AVE-9	SM 22 2520B	15	N/A	2.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Colour	AVE-9	SM 23 2120C m	34	TCU	5.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Conductivity	AVE-9	SM 23 2510B m	24000	uS/cm	1.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
TSS	AVE-9	SM 23 2540D m	730	mg/L	17	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Phosphorus	AVE-9	SM 23 4500 P B H m	0.6	mg/L	0.1	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Chloride	AVE-9	SM 23 4500-Cl- E m	5200	mg/L	100	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
pH	AVE-9	SM 23 4500-H+ B m	7.54	pH	N/A	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Nitrite	AVE-9	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Ortho Phosphate (as P)	AVE-9	SM 23 4500-P E m	<0.010	mg/L	0.010	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Carbonaceous BOD	AVE-9	SM 23 5210B m	<5.0	mg/L	5.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
TOC	AVE-9	SM 23 5310B m	12	mg/L	5.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Nitrate + Nitrite (as N)	AVE-9	USGS I-2547-11m	0.070	mg/L	0.050	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Aluminum	AVE-9	EPA 6020B R2 m	16000	ug/L	50	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Antimony	AVE-9	EPA 6020B R2 m	<10	ug/L	10	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Arsenic	AVE-9	EPA 6020B R2 m	<10	ug/L	10	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Barium	AVE-9	EPA 6020B R2 m	77	ug/L	10	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Beryllium	AVE-9	EPA 6020B R2 m	<10	ug/L	10	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Bismuth	AVE-9	EPA 6020B R2 m	<20	ug/L	20	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Boron	AVE-9	EPA 6020B R2 m	2000	ug/L	500	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Cadmium	AVE-9	EPA 6020B R2 m	<0.10	ug/L	0.10	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Calcium	AVE-9	EPA 6020B R2 m	190000	ug/L	1000	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Chromium	AVE-9	EPA 6020B R2 m	21	ug/L	10	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Cobalt	AVE-9	EPA 6020B R2 m	9.9	ug/L	4.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Copper	AVE-9	EPA 6020B R2 m	13	ug/L	5.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Iron	AVE-9	EPA 6020B R2 m	19000	ug/L	500	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Lead	AVE-9	EPA 6020B R2 m	12	ug/L	5.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Magnesium	AVE-9	EPA 6020B R2 m	570000	ug/L	1000	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Manganese	AVE-9	EPA 6020B R2 m	940	ug/L	20	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Molybdenum	AVE-9	EPA 6020B R2 m	<20	ug/L	20	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Nickel	AVE-9	EPA 6020B R2 m	<20	ug/L	20	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Phosphorus (P)	AVE-9	EPA 6020B R2 m	1200	ug/L	1000	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Potassium	AVE-9	EPA 6020B R2 m	170000	ug/L	1000	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Selenium	AVE-9	EPA 6020B R2 m	<5.0	ug/L	5.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Silver	AVE-9	EPA 6020B R2 m	<1.0	ug/L	1.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Sodium	AVE-9	EPA 6020B R2 m	4500000	ug/L	1000	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Strontium	AVE-9	EPA 6020B R2 m	3300	ug/L	20	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Thallium	AVE-9	EPA 6020B R2 m	<1.0	ug/L	1.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Tin	AVE-9	EPA 6020B R2 m	<20	ug/L	20	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Titanium	AVE-9	EPA 6020B R2 m	400	ug/L	20	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls

Uranium	AVE-9	EPA 6020B R2 m	2.1	ug/L	1.0	LCO801	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Vanadium	AVE-9	EPA 6020B R2 m	38	ug/L	20	LCO801	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Zinc	AVE-9	EPA 6020B R2 m	<50	ug/L	50	LCO801	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Escherichia coli	AVE-9	MOE E3371 R2 (2018)	<100	CFU/100mL	100	LCO801	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Total Coliforms	AVE-9	MOE E3371 R2 (2018)	2300	CFU/100mL	100	LCO801	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Fecal coliform	AVE-9	SM 23 9222D	1.0	CFU/1mL	1.0	LCO801	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Subcontract Parameter	AVE-9		ATTACHED	N/A	N/A	LCO801	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Salinity	AR-4B	SM 22 2520B	9.0	N/A	2.0	LCO802	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
TSS	AR-4B	SM 23 2540D m	260	mg/L	10	LCO802	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
TSS	AR-4B	SM 23 2540D m	260	mg/L	10	LCO802D1	Water	LCO802	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls

Your Project #: 171046.01
Your C.O.C. #: 743612-02-01, 743612-01-01

Attention: Colin McVarish

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/11/07
Report #: R5955863
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9U0136
Received: 2019/10/25, 09:22

Sample Matrix: Water
Samples Received: 19

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Carbonate, Bicarbonate and Hydroxide	5	N/A	2019/10/29	N/A	SM 23 4500-CO2 D
Carbonate, Bicarbonate and Hydroxide	1	N/A	2019/11/04	N/A	SM 23 4500-CO2 D
Alkalinity	6	N/A	2019/11/06	ATL SOP 00013	EPA 310.2 R1974 m
Biochemical Oxygen Demand	6	2019/10/25	2019/10/30	ATL SOP 00041	SM 23 5210B m
Chloride	6	N/A	2019/11/06	ATL SOP 00014	SM 23 4500-Cl- E m
Total coliform (CFU/100mL) in water	6	N/A	2019/10/25	ATL SOP 00097	MOE E3371 R2 (2018)
Colour	6	N/A	2019/11/07	ATL SOP 00020	SM 23 2120C m
Conductance - water	5	N/A	2019/10/29	ATL SOP 00004	SM 23 2510B m
Conductance - water	1	N/A	2019/11/04	ATL SOP 00004	SM 23 2510B m
Fecal coliform in water (CFU/100 mL)	6	N/A	2019/10/25	ATL SOP 00071	SM 23 9222D
Hardness (calculated as CaCO3)	6	N/A	2019/11/06	ATL SOP 00048	Auto Calc
Metals Water Total MS	6	2019/11/05	2019/11/05	ATL SOP 00058	EPA 6020B R2 m
Ion Balance (% Difference)	6	N/A	2019/11/07	N/A	Auto Calc.
Anion and Cation Sum	6	N/A	2019/11/06	N/A	Auto Calc.
Nitrogen Ammonia - water	6	N/A	2019/11/05	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	6	N/A	2019/11/06	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	6	N/A	2019/11/06	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	6	N/A	2019/11/07	ATL SOP 00018	ASTM D3867-16
pH (3)	5	N/A	2019/10/29	ATL SOP 00003	SM 23 4500-H+ B m
pH (3)	1	N/A	2019/11/04	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	6	N/A	2019/11/06	ATL SOP 00021	SM 23 4500-P E m
Salinity (4)	4	N/A	2019/11/04		SM 22 2520B
Salinity (4)	15	N/A	2019/11/07		SM 22 2520B
Sat. pH and Langelier Index (@ 20C)	6	N/A	2019/11/07	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	6	N/A	2019/11/07	ATL SOP 00049	Auto Calc.
Reactive Silica	6	N/A	2019/11/06	ATL SOP 00022	EPA 366.0 m
Sulphate	6	N/A	2019/11/06	ATL SOP 00023	ASTM D516-16 m
Chlorophyll A (Sub from Bedford) (1)	6	2019/10/25	2019/10/29		
Total Dissolved Solids (TDS calc)	6	N/A	2019/11/07	N/A	Auto Calc.
Organic carbon - Total (TOC) (5)	1	N/A	2019/11/05	ATL SOP 00203	SM 23 5310B m

Your Project #: 171046.01
Your C.O.C. #: 743612-02-01, 743612-01-01

Attention: Colin McVarish

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/11/07
Report #: R5955863
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9U0136
Received: 2019/10/25, 09:22

Sample Matrix: Water
Samples Received: 19

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Organic carbon - Total (TOC) (5)	5	N/A	2019/11/06	ATL SOP 00203	SM 23 5310B m
Total Phosphorus (Colourimetric) (2)	6	2019/11/05	2019/11/05	CAM SOP-00407	SM 23 4500 P B H m
Total Suspended Solids	5	2019/10/31	2019/11/01	ATL SOP 00007	SM 23 2540D m
Total Suspended Solids	14	2019/10/31	2019/11/05	ATL SOP 00007	SM 23 2540D m
Turbidity	5	N/A	2019/10/31	ATL SOP 00011	EPA 180.1 R2 m
Turbidity	1	N/A	2019/11/01	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Dalhousie Dept of Oceanography
(2) This test was performed by Bureau Veritas Laboratories Mississauga
(3) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(4) Non-accredited test method
(5) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

Your Project #: 171046.01
Your C.O.C. #: 743612-02-01, 743612-01-01

Attention: Colin McVarish

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/11/07
Report #: R5955863
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9U0136
Received: 2019/10/25, 09:22

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
07 Nov 2019 16:37:58

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Keri Mackay, Customer Experience Team Lead
Email: Keri.MACKAY@bvlabs.com
Phone# (902)420-0203 Ext:294
==
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		LDA982		LDA983			LDA983		
Sampling Date		2019/10/24 13:20		2019/10/24 14:30			2019/10/24 14:30		
COC Number		743612-01-01		743612-01-01			743612-01-01		
	UNITS	AR-9	QC Batch	AR-16	RDL	QC Batch	AR-16 Lab-Dup	RDL	QC Batch
Calculated Parameters									
Anion Sum	me/L	1.14	6406278	0.370	N/A	6406278			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	8.3	6406275	<1.0	1.0	6406275			
Calculated TDS	mg/L	66	6406286	27	1.0	6406286			
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	6406275	<1.0	1.0	6406275			
Cation Sum	me/L	0.800	6406278	0.380	N/A	6406278			
Hardness (CaCO3)	mg/L	26	6406276	10	1.0	6406276			
Ion Balance (% Difference)	%	17.5	6406277	1.33	N/A	6406277			
Langelier Index (@ 20C)	N/A	-2.61	6406283	NC		6406283			
Langelier Index (@ 4C)	N/A	-2.86	6406284	NC		6406284			
Nitrate (N)	mg/L	<0.050	6406279	<0.050	0.050	6406279			
Saturation pH (@ 20C)	N/A	9.46	6406283	NC		6406283			
Saturation pH (@ 4C)	N/A	9.71	6406284	NC		6406284			
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	8.3	6427106	<5.0	5.0	6427106			
Dissolved Chloride (Cl-)	mg/L	17	6427114	8.2	1.0	6427114			
Colour	TCU	78	6427125	86	25	6427125			
Nitrate + Nitrite (N)	mg/L	<0.050	6427131	<0.050	0.050	6427131			
Nitrite (N)	mg/L	<0.010	6427134	<0.010	0.010	6427134			
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	6424813	<0.050	0.050	6424813			
Total Organic Carbon (C)	mg/L	9.8	6424781	11	0.50	6427429			
Orthophosphate (P)	mg/L	<0.010	6427128	<0.010	0.010	6427128			
pH	pH	6.85	6411783	6.27	N/A	6411783			
Reactive Silica (SiO2)	mg/L	3.4	6427120	3.8	0.50	6427120			
Dissolved Sulphate (SO4)	mg/L	23	6427117	6.4	2.0	6427117			
Turbidity	NTU	6.3	6417157	2.7	0.10	6414537	2.7	0.10	6414537
Conductivity	uS/cm	98	6411787	40	1.0	6411787			
Metals									
Total Aluminum (Al)	ug/L	350	6424517	290	5.0	6424517			
Total Antimony (Sb)	ug/L	<1.0	6424517	<1.0	1.0	6424517			
Total Arsenic (As)	ug/L	<1.0	6424517	<1.0	1.0	6424517			
Total Barium (Ba)	ug/L	17	6424517	17	1.0	6424517			
Total Beryllium (Be)	ug/L	<1.0	6424517	<1.0	1.0	6424517			
Total Bismuth (Bi)	ug/L	<2.0	6424517	<2.0	2.0	6424517			
Total Boron (B)	ug/L	<50	6424517	<50	50	6424517			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		LDA982		LDA983			LDA983		
Sampling Date		2019/10/24 13:20		2019/10/24 14:30			2019/10/24 14:30		
COC Number		743612-01-01		743612-01-01			743612-01-01		
	UNITS	**AR-9**	**QC Batch**	**AR-16**	**RDL**	**QC Batch**	**AR-16 Lab-Dup**	**RDL**	**QC Batch**
Total Cadmium (Cd)	ug/L	0.024	6424517	0.030	0.010	6424517			
Total Calcium (Ca)	ug/L	8800	6424517	3100	100	6424517			
Total Chromium (Cr)	ug/L	<1.0	6424517	<1.0	1.0	6424517			
Total Cobalt (Co)	ug/L	<0.40	6424517	<0.40	0.40	6424517			
Total Copper (Cu)	ug/L	0.85	6424517	0.71	0.50	6424517			
Total Iron (Fe)	ug/L	580	6424517	360	50	6424517			
Total Lead (Pb)	ug/L	<0.50	6424517	<0.50	0.50	6424517			
Total Magnesium (Mg)	ug/L	1000	6424517	600	100	6424517			
Total Manganese (Mn)	ug/L	69	6424517	38	2.0	6424517			
Total Molybdenum (Mo)	ug/L	<2.0	6424517	<2.0	2.0	6424517			
Total Nickel (Ni)	ug/L	<2.0	6424517	<2.0	2.0	6424517			
Total Phosphorus (P)	ug/L	<100	6424517	<100	100	6424517			
Total Potassium (K)	ug/L	740	6424517	560	100	6424517			
Total Selenium (Se)	ug/L	<0.50	6424517	<0.50	0.50	6424517			
Total Silver (Ag)	ug/L	<0.10	6424517	<0.10	0.10	6424517			
Total Sodium (Na)	ug/L	5600	6424517	3500	100	6424517			
Total Strontium (Sr)	ug/L	58	6424517	17	2.0	6424517			
Total Thallium (Tl)	ug/L	<0.10	6424517	<0.10	0.10	6424517			
Total Tin (Sn)	ug/L	<2.0	6424517	<2.0	2.0	6424517			
Total Titanium (Ti)	ug/L	7.6	6424517	4.7	2.0	6424517			
Total Uranium (U)	ug/L	0.29	6424517	0.23	0.10	6424517			
Total Vanadium (V)	ug/L	<2.0	6424517	<2.0	2.0	6424517			
Total Zinc (Zn)	ug/L	<5.0	6424517	<5.0	5.0	6424517			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		LDA984		LDA985		LDA986		
Sampling Date		2019/10/24 13:45		2019/10/24 11:00		2019/10/24 12:15		
COC Number		743612-01-01		743612-01-01		743612-01-01		
	UNITS	AR-12	QC Batch	AR-1	QC Batch	AR-6	RDL	QC Batch
Calculated Parameters								
Anion Sum	me/L	0.650	6406278	0.710	6406278	0.640	N/A	6406278
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	6.8	6406275	7.3	6406275	6.3	1.0	6406275
Calculated TDS	mg/L	42	6406286	46	6406286	42	1.0	6406286
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	6406275	<1.0	6406275	<1.0	1.0	6406275
Cation Sum	me/L	0.570	6406278	0.660	6406278	0.600	N/A	6406278
Hardness (CaCO3)	mg/L	17	6406276	19	6406276	18	1.0	6406276
Ion Balance (% Difference)	%	6.56	6406277	3.65	6406277	3.23	N/A	6406277
Langelier Index (@ 20C)	N/A	-3.14	6406283	-3.03	6406283	-2.98		6406283
Langelier Index (@ 4C)	N/A	-3.39	6406284	-3.28	6406284	-3.24		6406284
Nitrate (N)	mg/L	<0.050	6406279	<0.050	6406279	<0.050	0.050	6406279
Saturation pH (@ 20C)	N/A	9.76	6406283	9.65	6406283	9.74		6406283
Saturation pH (@ 4C)	N/A	10.0	6406284	9.90	6406284	9.99		6406284
Inorganics								
Total Alkalinity (Total as CaCO3)	mg/L	6.8	6427106	7.4	6427106	6.3	5.0	6427106
Dissolved Chloride (Cl-)	mg/L	7.8	6427114	9.2	6427114	8.0	1.0	6427114
Colour	TCU	95	6427125	90	6427125	92	25	6427125
Nitrate + Nitrite (N)	mg/L	<0.050	6427131	<0.050	6427131	<0.050	0.050	6427131
Nitrite (N)	mg/L	<0.010	6427134	<0.010	6427134	<0.010	0.010	6427134
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	6424813	<0.050	6424813	<0.050	0.050	6424813
Total Organic Carbon (C)	mg/L	11	6425124	10	6424781	10	0.50	6425124
Orthophosphate (P)	mg/L	<0.010	6427128	<0.010	6427128	0.014	0.010	6427128
pH	pH	6.62	6411783	6.61	6411783	6.75	N/A	6422873
Reactive Silica (SiO2)	mg/L	3.8	6427120	3.6	6427120	3.2	0.50	6427120
Dissolved Sulphate (SO4)	mg/L	14	6427117	15	6427117	14	2.0	6427117
Turbidity	NTU	11	6417153	5.6	6417157	6.5	0.10	6417157
Conductivity	uS/cm	63	6411787	70	6411787	100	1.0	6422880
Metals								
Total Aluminum (Al)	ug/L	490	6424517	340	6424517	330	5.0	6424517
Total Antimony (Sb)	ug/L	<1.0	6424517	<1.0	6424517	<1.0	1.0	6424517
Total Arsenic (As)	ug/L	<1.0	6424517	<1.0	6424517	<1.0	1.0	6424517
Total Barium (Ba)	ug/L	17	6424517	15	6424517	15	1.0	6424517
Total Beryllium (Be)	ug/L	<1.0	6424517	<1.0	6424517	<1.0	1.0	6424517
Total Bismuth (Bi)	ug/L	<2.0	6424517	<2.0	6424517	<2.0	2.0	6424517
Total Boron (B)	ug/L	<50	6424517	<50	6424517	<50	50	6424517

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		LDA984		LDA985		LDA986		
Sampling Date		2019/10/24 13:45		2019/10/24 11:00		2019/10/24 12:15		
COC Number		743612-01-01		743612-01-01		743612-01-01		
	UNITS	**AR-12**	**QC Batch**	**AR-1**	**QC Batch**	**AR-6**	**RDL**	**QC Batch**
Total Cadmium (Cd)	ug/L	0.028	6424517	0.025	6424517	0.020	0.010	6424517
Total Calcium (Ca)	ug/L	5200	6424517	6200	6424517	5800	100	6424517
Total Chromium (Cr)	ug/L	<1.0	6424517	<1.0	6424517	<1.0	1.0	6424517
Total Cobalt (Co)	ug/L	<0.40	6424517	<0.40	6424517	<0.40	0.40	6424517
Total Copper (Cu)	ug/L	0.92	6424517	0.73	6424517	0.80	0.50	6424517
Total Iron (Fe)	ug/L	640	6424517	500	6424517	550	50	6424517
Total Lead (Pb)	ug/L	<0.50	6424517	<0.50	6424517	<0.50	0.50	6424517
Total Magnesium (Mg)	ug/L	900	6424517	920	6424517	820	100	6424517
Total Manganese (Mn)	ug/L	55	6424517	61	6424517	64	2.0	6424517
Total Molybdenum (Mo)	ug/L	<2.0	6424517	<2.0	6424517	<2.0	2.0	6424517
Total Nickel (Ni)	ug/L	<2.0	6424517	<2.0	6424517	<2.0	2.0	6424517
Total Phosphorus (P)	ug/L	<100	6424517	<100	6424517	<100	100	6424517
Total Potassium (K)	ug/L	920	6424517	700	6424517	670	100	6424517
Total Selenium (Se)	ug/L	<0.50	6424517	<0.50	6424517	<0.50	0.50	6424517
Total Silver (Ag)	ug/L	<0.10	6424517	<0.10	6424517	<0.10	0.10	6424517
Total Sodium (Na)	ug/L	4500	6424517	5600	6424517	4800	100	6424517
Total Strontium (Sr)	ug/L	32	6424517	40	6424517	38	2.0	6424517
Total Thallium (Tl)	ug/L	<0.10	6424517	<0.10	6424517	<0.10	0.10	6424517
Total Tin (Sn)	ug/L	<2.0	6424517	<2.0	6424517	<2.0	2.0	6424517
Total Titanium (Ti)	ug/L	9.5	6424517	5.8	6424517	6.7	2.0	6424517
Total Uranium (U)	ug/L	0.22	6424517	0.25	6424517	0.25	0.10	6424517
Total Vanadium (V)	ug/L	<2.0	6424517	<2.0	6424517	<2.0	2.0	6424517
Total Zinc (Zn)	ug/L	5.3	6424517	<5.0	6424517	<5.0	5.0	6424517

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		LDA987		
Sampling Date		2019/10/24 12:43		
COC Number		743612-01-01		
	UNITS	**AR-3**	**RDL**	**QC Batch**
Calculated Parameters				
Anion Sum	me/L	0.760	N/A	6406278
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	7.5	1.0	6406275
Calculated TDS	mg/L	49	1.0	6406286
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	6406275
Cation Sum	me/L	0.720	N/A	6406278
Hardness (CaCO3)	mg/L	20	1.0	6406276
Ion Balance (% Difference)	%	2.70	N/A	6406277
Langelier Index (@ 20C)	N/A	-3.03		6406283
Langelier Index (@ 4C)	N/A	-3.28		6406284
Nitrate (N)	mg/L	<0.050	0.050	6406279
Saturation pH (@ 20C)	N/A	9.64		6406283
Saturation pH (@ 4C)	N/A	9.89		6406284
Inorganics				
Total Alkalinity (Total as CaCO3)	mg/L	7.5	5.0	6427106
Dissolved Chloride (Cl-)	mg/L	10	1.0	6427114
Colour	TCU	79	25	6427125
Nitrate + Nitrite (N)	mg/L	<0.050	0.050	6427131
Nitrite (N)	mg/L	<0.010	0.010	6427134
Nitrogen (Ammonia Nitrogen)	mg/L	0.061	0.050	6424813
Total Organic Carbon (C)	mg/L	10	0.50	6425124
Orthophosphate (P)	mg/L	<0.010	0.010	6427128
pH	pH	6.60	N/A	6411783
Reactive Silica (SiO2)	mg/L	3.5	0.50	6427120
Dissolved Sulphate (SO4)	mg/L	15	2.0	6427117
Turbidity	NTU	6.9	0.10	6419312
Conductivity	uS/cm	78	1.0	6411787
Metals				
Total Aluminum (Al)	ug/L	340	5.0	6424517
Total Antimony (Sb)	ug/L	<1.0	1.0	6424517
Total Arsenic (As)	ug/L	<1.0	1.0	6424517
Total Barium (Ba)	ug/L	16	1.0	6424517
Total Beryllium (Be)	ug/L	<1.0	1.0	6424517
Total Bismuth (Bi)	ug/L	<2.0	2.0	6424517
Total Boron (B)	ug/L	<50	50	6424517

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		LDA987		
Sampling Date		2019/10/24 12:43		
COC Number		743612-01-01		
	UNITS	**AR-3**	**RDL**	**QC Batch**
Total Cadmium (Cd)	ug/L	0.023	0.010	6424517
Total Calcium (Ca)	ug/L	6300	100	6424517
Total Chromium (Cr)	ug/L	<1.0	1.0	6424517
Total Cobalt (Co)	ug/L	<0.40	0.40	6424517
Total Copper (Cu)	ug/L	0.73	0.50	6424517
Total Iron (Fe)	ug/L	530	50	6424517
Total Lead (Pb)	ug/L	<0.50	0.50	6424517
Total Magnesium (Mg)	ug/L	1000	100	6424517
Total Manganese (Mn)	ug/L	61	2.0	6424517
Total Molybdenum (Mo)	ug/L	<2.0	2.0	6424517
Total Nickel (Ni)	ug/L	<2.0	2.0	6424517
Total Phosphorus (P)	ug/L	<100	100	6424517
Total Potassium (K)	ug/L	760	100	6424517
Total Selenium (Se)	ug/L	<0.50	0.50	6424517
Total Silver (Ag)	ug/L	<0.10	0.10	6424517
Total Sodium (Na)	ug/L	6500	100	6424517
Total Strontium (Sr)	ug/L	41	2.0	6424517
Total Thallium (Tl)	ug/L	<0.10	0.10	6424517
Total Tin (Sn)	ug/L	<2.0	2.0	6424517
Total Titanium (Ti)	ug/L	6.3	2.0	6424517
Total Uranium (U)	ug/L	0.23	0.10	6424517
Total Vanadium (V)	ug/L	<2.0	2.0	6424517
Total Zinc (Zn)	ug/L	<5.0	5.0	6424517

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9U0136
Report Date: 2019/11/07

CBCL Limited
Client Project #: 171046.01

RESULTS OF ANALYSES OF WATER

BV Labs ID		LDA979	LDA980	LDA981			LDA982	LDA983		
Sampling Date		2019/10/24 11:10	2019/10/24 14:40	2019/10/24 14:10			2019/10/24 13:20	2019/10/24 14:30		
COC Number		743612-01-01	743612-01-01	743612-01-01			743612-01-01	743612-01-01		
	UNITS	**AR-2**	**AR-17**	**AR-14**	**RDL**	**QC Batch**	**AR-9**	**AR-16**	**RDL**	**QC Batch**
Inorganics										
Biochemical Oxygen Demand	mg/L						<5.0	<5.0	5.0	6406479
Total Phosphorus	mg/L						0.022	0.015	0.004	6424853
Salinity	N/A	<2.0	<2.0	<2.0	2.0	6429749	<2.0	<2.0	2.0	6429749
Total Suspended Solids	mg/L	6.2	2.2	5.6	1.0	6417073	7.7	<2.3	2.3	6417073
Subcontracted Analysis										
Subcontract Parameter	N/A						ATTACHED	ATTACHED	N/A	6412010

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

BV Labs ID		LDA984		LDA985		LDA986		LDA987		
Sampling Date		2019/10/24 13:45		2019/10/24 11:00		2019/10/24 12:15		2019/10/24 12:43		
COC Number		743612-01-01		743612-01-01		743612-01-01		743612-01-01		
	UNITS	**AR-12**	**RDL**	**AR-1**	**RDL**	**AR-6**	**RDL**	**AR-3**	**RDL**	**QC Batch**
Inorganics										
Biochemical Oxygen Demand	mg/L	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	6406479
Total Phosphorus	mg/L	0.037	0.004	0.024	0.004	0.024	0.004	0.025	0.004	6424853
Salinity	N/A	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	6429749
Total Suspended Solids	mg/L	6.4	2.3	5.8	2.2	5.9	2.3	5.8	2.2	6417073
Subcontracted Analysis										
Subcontract Parameter	N/A	ATTACHED	N/A	ATTACHED	N/A	ATTACHED	N/A	ATTACHED	N/A	6412010

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

BV Labs ID		LDA988		LDA989		LDA990	LDA991	LDA992		
Sampling Date		2019/10/24 09:34		2019/10/24 10:10		2019/10/24 14:19	2019/10/24 12:53	2019/10/24 14:00		
COC Number		743612-02-01		743612-02-01		743612-02-01	743612-02-01	743612-02-01		
	UNITS	**AR-4**	**RDL**	**AR-4B**	**RDL**	**AR-15**	**AR-7**	**AR-13**	**RDL**	**QC Batch**
Inorganics										
Salinity	N/A	<2.0	2.0	12	2.0	<2.0	<2.0	<2.0	2.0	6429749
Total Suspended Solids	mg/L	7.2	1.0	340	17	13	6.8	5.4	1.0	6417073

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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RESULTS OF ANALYSES OF WATER

BV Labs ID		LDA993		LDA994			LDA994		
Sampling Date		2019/10/24 13:53		2019/10/24 14:57			2019/10/24 14:57		
COC Number		743612-02-01		743612-02-01			743612-02-01		
	UNITS	**AR-11**	**QC Batch**	**AR-18**	**RDL**	**QC Batch**	**AR-18 Lab-Dup**	**RDL**	**QC Batch**
Inorganics									
Salinity	N/A	<2.0	6429749	<2.0	2.0	6422734	<2.0	2.0	6422734
Total Suspended Solids	mg/L	26	6417446	2.0	2.0	6417446			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

BV Labs ID		LDA995	LDA996	LDA997		
Sampling Date		2019/10/24 13:09	2019/10/24 13:27	2019/10/24 11:20		
COC Number		743612-02-01	743612-02-01	743612-02-01		
	UNITS	**AR-08**	**AR-10**	**AR-5**	**RDL**	**QC Batch**
Inorganics						
Salinity	N/A	<2.0	<2.0	<2.0	2.0	6422734
Total Suspended Solids	mg/L	7.6	8.8	7.1	1.0	6417446

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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MICROBIOLOGY (WATER)

BV Labs ID		LDA982	LDA983	LDA984	LDA985	LDA986	LDA987		
Sampling Date		2019/10/24 13:20	2019/10/24 14:30	2019/10/24 13:45	2019/10/24 11:00	2019/10/24 12:15	2019/10/24 12:43		
COC Number		743612-01-01	743612-01-01	743612-01-01	743612-01-01	743612-01-01	743612-01-01		
	UNITS	**AR-9**	**AR-16**	**AR-12**	**AR-1**	**AR-6**	**AR-3**	**RDL**	**QC Batch**
Microbiological									
Fecal coliform	CFU/100mL	120	100	890	70	50	90	10	6406502
Total Coliforms	CFU/100mL	1100	1500	>2500	610	560	850	10	6406508

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	1.3°C
Package 2	4.7°C

Sample LDA982 [AR-9] : Poor RCAp Ion Balance due to sample matrix.

Sample LDA984 [AR-12] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Results relate only to the items tested.

BV Labs Job #: B9U0136
Report Date: 2019/11/07

CBCL Limited
Client Project #: 171046.01

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6406479	DME	QC Standard	Biochemical Oxygen Demand	2019/10/30		103	%	80 - 120
6406479	DME	Spiked Blank	Biochemical Oxygen Demand	2019/10/30		90	%	80 - 120
6406479	DME	Method Blank	Biochemical Oxygen Demand	2019/10/30	<2.0		mg/L	
6406479	DME	RPD	Biochemical Oxygen Demand	2019/10/30	10		%	25
6406502	LKE	Method Blank	Fecal coliform	2019/10/25	<1.0		CFU/100mL	
6406508	LKE	Method Blank	Total Coliforms	2019/10/25	<1.0		CFU/100mL	
6411783	SHW	QC Standard	pH	2019/10/29		101	%	97 - 103
6411787	SHW	Spiked Blank	Conductivity	2019/10/29		102	%	80 - 120
6411787	SHW	Method Blank	Conductivity	2019/10/29	<1.0		uS/cm	
6414537	SHW	QC Standard	Turbidity	2019/10/31		100	%	80 - 120
6414537	SHW	Spiked Blank	Turbidity	2019/10/31		103	%	80 - 120
6414537	SHW	Method Blank	Turbidity	2019/10/31	<0.10		NTU	
6414537	SHW	RPD [LDA983-02]	Turbidity	2019/10/31	1.1		%	20
6417073	AM6	QC Standard	Total Suspended Solids	2019/11/05		95	%	80 - 120
6417073	AM6	Method Blank	Total Suspended Solids	2019/11/05	<1.0		mg/L	
6417073	AM6	RPD	Total Suspended Solids	2019/11/05	14		%	20
6417153	SHW	QC Standard	Turbidity	2019/10/31		100	%	80 - 120
6417153	SHW	Spiked Blank	Turbidity	2019/10/31		99	%	80 - 120
6417153	SHW	Method Blank	Turbidity	2019/10/31	<0.10		NTU	
6417153	SHW	RPD	Turbidity	2019/10/31	6.2		%	20
6417157	SHW	QC Standard	Turbidity	2019/10/31		100	%	80 - 120
6417157	SHW	Spiked Blank	Turbidity	2019/10/31		100	%	80 - 120
6417157	SHW	Method Blank	Turbidity	2019/10/31	<0.10		NTU	
6417157	SHW	RPD	Turbidity	2019/10/31	1.1		%	20
6417446	GTH	QC Standard	Total Suspended Solids	2019/11/01		99	%	80 - 120
6417446	GTH	Method Blank	Total Suspended Solids	2019/11/01	<1.0		mg/L	
6417446	GTH	RPD	Total Suspended Solids	2019/11/01	8.7		%	20
6419312	SHW	QC Standard	Turbidity	2019/11/01		103	%	80 - 120
6419312	SHW	Spiked Blank	Turbidity	2019/11/01		102	%	80 - 120
6419312	SHW	Method Blank	Turbidity	2019/11/01	<0.10		NTU	
6419312	SHW	RPD	Turbidity	2019/11/01	7.5		%	20
6422734	BBD	QC Standard	Salinity	2019/11/04		101	%	80 - 120
6422734	BBD	Method Blank	Salinity	2019/11/04	<2.0		N/A	
6422734	BBD	RPD [LDA994-02]	Salinity	2019/11/04	NC		%	25
6422873	SHW	QC Standard	pH	2019/11/04		101	%	97 - 103
6422873	SHW	RPD	pH	2019/11/04	0.42		%	N/A
6422880	SHW	Spiked Blank	Conductivity	2019/11/04		101	%	80 - 120
6422880	SHW	Method Blank	Conductivity	2019/11/04	<1.0		uS/cm	
6422880	SHW	RPD	Conductivity	2019/11/04	1.0		%	10
6424517	MLB	Matrix Spike	Total Aluminum (Al)	2019/11/05		96	%	80 - 120
			Total Antimony (Sb)	2019/11/05		98	%	80 - 120
			Total Arsenic (As)	2019/11/05		98	%	80 - 120
			Total Barium (Ba)	2019/11/05		93	%	80 - 120
			Total Beryllium (Be)	2019/11/05		100	%	80 - 120
			Total Bismuth (Bi)	2019/11/05		98	%	80 - 120
			Total Boron (B)	2019/11/05		103	%	80 - 120
			Total Cadmium (Cd)	2019/11/05		93	%	80 - 120
			Total Calcium (Ca)	2019/11/05		97	%	80 - 120
			Total Chromium (Cr)	2019/11/05		97	%	80 - 120
			Total Cobalt (Co)	2019/11/05		96	%	80 - 120
			Total Copper (Cu)	2019/11/05		97	%	80 - 120
			Total Iron (Fe)	2019/11/05		100	%	80 - 120
			Total Lead (Pb)	2019/11/05		97	%	80 - 120
			Total Magnesium (Mg)	2019/11/05		102	%	80 - 120
			Total Manganese (Mn)	2019/11/05		99	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Molybdenum (Mo)	2019/11/05		102	%	80 - 120
			Total Nickel (Ni)	2019/11/05		99	%	80 - 120
			Total Phosphorus (P)	2019/11/05		100	%	80 - 120
			Total Potassium (K)	2019/11/05		97	%	80 - 120
			Total Selenium (Se)	2019/11/05		97	%	80 - 120
			Total Silver (Ag)	2019/11/05		96	%	80 - 120
			Total Sodium (Na)	2019/11/05		94	%	80 - 120
			Total Strontium (Sr)	2019/11/05		NC	%	80 - 120
			Total Thallium (Tl)	2019/11/05		100	%	80 - 120
			Total Tin (Sn)	2019/11/05		101	%	80 - 120
			Total Titanium (Ti)	2019/11/05		101	%	80 - 120
			Total Uranium (U)	2019/11/05		106	%	80 - 120
			Total Vanadium (V)	2019/11/05		101	%	80 - 120
			Total Zinc (Zn)	2019/11/05		96	%	80 - 120
6424517	MLB	Spiked Blank	Total Aluminum (Al)	2019/11/05		102	%	80 - 120
			Total Antimony (Sb)	2019/11/05		101	%	80 - 120
			Total Arsenic (As)	2019/11/05		101	%	80 - 120
			Total Barium (Ba)	2019/11/05		100	%	80 - 120
			Total Beryllium (Be)	2019/11/05		104	%	80 - 120
			Total Bismuth (Bi)	2019/11/05		101	%	80 - 120
			Total Boron (B)	2019/11/05		104	%	80 - 120
			Total Cadmium (Cd)	2019/11/05		95	%	80 - 120
			Total Calcium (Ca)	2019/11/05		105	%	80 - 120
			Total Chromium (Cr)	2019/11/05		100	%	80 - 120
			Total Cobalt (Co)	2019/11/05		101	%	80 - 120
			Total Copper (Cu)	2019/11/05		101	%	80 - 120
			Total Iron (Fe)	2019/11/05		108	%	80 - 120
			Total Lead (Pb)	2019/11/05		101	%	80 - 120
			Total Magnesium (Mg)	2019/11/05		109	%	80 - 120
			Total Manganese (Mn)	2019/11/05		103	%	80 - 120
			Total Molybdenum (Mo)	2019/11/05		105	%	80 - 120
			Total Nickel (Ni)	2019/11/05		103	%	80 - 120
			Total Phosphorus (P)	2019/11/05		107	%	80 - 120
			Total Potassium (K)	2019/11/05		105	%	80 - 120
			Total Selenium (Se)	2019/11/05		101	%	80 - 120
			Total Silver (Ag)	2019/11/05		101	%	80 - 120
			Total Sodium (Na)	2019/11/05		102	%	80 - 120
			Total Strontium (Sr)	2019/11/05		102	%	80 - 120
			Total Thallium (Tl)	2019/11/05		103	%	80 - 120
			Total Tin (Sn)	2019/11/05		102	%	80 - 120
			Total Titanium (Ti)	2019/11/05		106	%	80 - 120
			Total Uranium (U)	2019/11/05		109	%	80 - 120
			Total Vanadium (V)	2019/11/05		105	%	80 - 120
			Total Zinc (Zn)	2019/11/05		100	%	80 - 120
6424517	MLB	Method Blank	Total Aluminum (Al)	2019/11/05	<5.0		ug/L	
			Total Antimony (Sb)	2019/11/05	<1.0		ug/L	
			Total Arsenic (As)	2019/11/05	<1.0		ug/L	
			Total Barium (Ba)	2019/11/05	<1.0		ug/L	
			Total Beryllium (Be)	2019/11/05	<1.0		ug/L	
			Total Bismuth (Bi)	2019/11/05	<2.0		ug/L	
			Total Boron (B)	2019/11/05	<50		ug/L	
			Total Cadmium (Cd)	2019/11/05	<0.010		ug/L	
			Total Calcium (Ca)	2019/11/05	<100		ug/L	
			Total Chromium (Cr)	2019/11/05	<1.0		ug/L	
			Total Cobalt (Co)	2019/11/05	<0.40		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Copper (Cu)	2019/11/05	<0.50		ug/L	
			Total Iron (Fe)	2019/11/05	<50		ug/L	
			Total Lead (Pb)	2019/11/05	<0.50		ug/L	
			Total Magnesium (Mg)	2019/11/05	<100		ug/L	
			Total Manganese (Mn)	2019/11/05	<2.0		ug/L	
			Total Molybdenum (Mo)	2019/11/05	<2.0		ug/L	
			Total Nickel (Ni)	2019/11/05	<2.0		ug/L	
			Total Phosphorus (P)	2019/11/05	<100		ug/L	
			Total Potassium (K)	2019/11/05	<100		ug/L	
			Total Selenium (Se)	2019/11/05	<0.50		ug/L	
			Total Silver (Ag)	2019/11/05	<0.10		ug/L	
			Total Sodium (Na)	2019/11/05	<100		ug/L	
			Total Strontium (Sr)	2019/11/05	<2.0		ug/L	
			Total Thallium (Tl)	2019/11/05	<0.10		ug/L	
			Total Tin (Sn)	2019/11/05	<2.0		ug/L	
			Total Titanium (Ti)	2019/11/05	<2.0		ug/L	
			Total Uranium (U)	2019/11/05	<0.10		ug/L	
			Total Vanadium (V)	2019/11/05	<2.0		ug/L	
			Total Zinc (Zn)	2019/11/05	<5.0		ug/L	
6424517	MLB	RPD	Total Aluminum (Al)	2019/11/05	4.6		%	20
			Total Antimony (Sb)	2019/11/05	NC		%	20
			Total Arsenic (As)	2019/11/05	NC		%	20
			Total Barium (Ba)	2019/11/05	1.2		%	20
			Total Beryllium (Be)	2019/11/05	NC		%	20
			Total Bismuth (Bi)	2019/11/05	NC		%	20
			Total Boron (B)	2019/11/05	0.86		%	20
			Total Cadmium (Cd)	2019/11/05	NC		%	20
			Total Calcium (Ca)	2019/11/05	2.0		%	20
			Total Chromium (Cr)	2019/11/05	NC		%	20
			Total Cobalt (Co)	2019/11/05	NC		%	20
			Total Copper (Cu)	2019/11/05	0.42		%	20
			Total Iron (Fe)	2019/11/05	2.1		%	20
			Total Lead (Pb)	2019/11/05	NC		%	20
			Total Magnesium (Mg)	2019/11/05	2.6		%	20
			Total Manganese (Mn)	2019/11/05	NC		%	20
			Total Molybdenum (Mo)	2019/11/05	NC		%	20
			Total Nickel (Ni)	2019/11/05	NC		%	20
			Total Phosphorus (P)	2019/11/05	NC		%	20
			Total Potassium (K)	2019/11/05	1.5		%	20
			Total Selenium (Se)	2019/11/05	NC		%	20
			Total Silver (Ag)	2019/11/05	NC		%	20
			Total Sodium (Na)	2019/11/05	1.6		%	20
			Total Strontium (Sr)	2019/11/05	0.30		%	20
			Total Thallium (Tl)	2019/11/05	NC		%	20
			Total Tin (Sn)	2019/11/05	NC		%	20
			Total Titanium (Ti)	2019/11/05	NC		%	20
			Total Uranium (U)	2019/11/05	3.2		%	20
			Total Vanadium (V)	2019/11/05	NC		%	20
			Total Zinc (Zn)	2019/11/05	NC		%	20
6424781	MGN	Matrix Spike	Total Organic Carbon (C)	2019/11/05		98	%	85 - 115
6424781	MGN	Spiked Blank	Total Organic Carbon (C)	2019/11/05		100	%	80 - 120
6424781	MGN	Method Blank	Total Organic Carbon (C)	2019/11/05	<0.50		mg/L	
6424781	MGN	RPD	Total Organic Carbon (C)	2019/11/05	3.1		%	15
6424813	MCN	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2019/11/05		95	%	80 - 120
6424813	MCN	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2019/11/05		103	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6424813	MCN	Method Blank	Nitrogen (Ammonia Nitrogen)	2019/11/05	<0.050		mg/L	
6424813	MCN	RPD	Nitrogen (Ammonia Nitrogen)	2019/11/05	2.0		%	20
6424853	SSV	Matrix Spike	Total Phosphorus	2019/11/05		97	%	80 - 120
6424853	SSV	QC Standard	Total Phosphorus	2019/11/05		91	%	80 - 120
6424853	SSV	Spiked Blank	Total Phosphorus	2019/11/05		103	%	80 - 120
6424853	SSV	Method Blank	Total Phosphorus	2019/11/05	<0.004		mg/L	
6424853	SSV	RPD	Total Phosphorus	2019/11/05	2.2		%	20
6425124	MGN	Matrix Spike	Total Organic Carbon (C)	2019/11/06		99	%	85 - 115
6425124	MGN	Spiked Blank	Total Organic Carbon (C)	2019/11/06		98	%	80 - 120
6425124	MGN	Method Blank	Total Organic Carbon (C)	2019/11/06	<0.50		mg/L	
6425124	MGN	RPD	Total Organic Carbon (C)	2019/11/06	2.8		%	15
6427106	MCN	Matrix Spike	Total Alkalinity (Total as CaCO3)	2019/11/06		NC	%	80 - 120
6427106	MCN	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019/11/06		110	%	80 - 120
6427106	MCN	Method Blank	Total Alkalinity (Total as CaCO3)	2019/11/06	<5.0		mg/L	
6427106	MCN	RPD	Total Alkalinity (Total as CaCO3)	2019/11/06	7.5		%	25
6427114	MCN	Matrix Spike	Dissolved Chloride (Cl-)	2019/11/06		NC	%	80 - 120
6427114	MCN	Spiked Blank	Dissolved Chloride (Cl-)	2019/11/06		103	%	80 - 120
6427114	MCN	Method Blank	Dissolved Chloride (Cl-)	2019/11/06	<1.0		mg/L	
6427114	MCN	RPD	Dissolved Chloride (Cl-)	2019/11/06	0.21		%	25
6427117	MCN	Matrix Spike	Dissolved Sulphate (SO4)	2019/11/06		92	%	80 - 120
6427117	MCN	Spiked Blank	Dissolved Sulphate (SO4)	2019/11/06		105	%	80 - 120
6427117	MCN	Method Blank	Dissolved Sulphate (SO4)	2019/11/06	<2.0		mg/L	
6427117	MCN	RPD	Dissolved Sulphate (SO4)	2019/11/06	0.47		%	25
6427120	MCN	Matrix Spike	Reactive Silica (SiO2)	2019/11/06		NC	%	80 - 120
6427120	MCN	Spiked Blank	Reactive Silica (SiO2)	2019/11/06		94	%	80 - 120
6427120	MCN	Method Blank	Reactive Silica (SiO2)	2019/11/06	<0.50		mg/L	
6427120	MCN	RPD	Reactive Silica (SiO2)	2019/11/06	0.70		%	25
6427125	MCN	Spiked Blank	Colour	2019/11/07		102	%	80 - 120
6427125	MCN	Method Blank	Colour	2019/11/07	<5.0		TCU	
6427125	MCN	RPD	Colour	2019/11/07	NC		%	20
6427128	MCN	Matrix Spike	Orthophosphate (P)	2019/11/06		91	%	80 - 120
6427128	MCN	Spiked Blank	Orthophosphate (P)	2019/11/06		108	%	80 - 120
6427128	MCN	Method Blank	Orthophosphate (P)	2019/11/06	<0.010		mg/L	
6427128	MCN	RPD	Orthophosphate (P)	2019/11/06	NC		%	25
6427131	MCN	Matrix Spike	Nitrate + Nitrite (N)	2019/11/06		97	%	80 - 120
6427131	MCN	Spiked Blank	Nitrate + Nitrite (N)	2019/11/06		96	%	80 - 120
6427131	MCN	Method Blank	Nitrate + Nitrite (N)	2019/11/06	<0.050		mg/L	
6427131	MCN	RPD	Nitrate + Nitrite (N)	2019/11/06	0.59		%	25
6427134	MCN	Matrix Spike	Nitrite (N)	2019/11/06		104	%	80 - 120
6427134	MCN	Spiked Blank	Nitrite (N)	2019/11/06		103	%	80 - 120
6427134	MCN	Method Blank	Nitrite (N)	2019/11/06	<0.010		mg/L	
6427134	MCN	RPD	Nitrite (N)	2019/11/06	NC		%	20
6427429	MGN	Matrix Spike	Total Organic Carbon (C)	2019/11/06		98	%	85 - 115
6427429	MGN	Spiked Blank	Total Organic Carbon (C)	2019/11/06		100	%	80 - 120
6427429	MGN	Method Blank	Total Organic Carbon (C)	2019/11/06	<0.50		mg/L	
6427429	MGN	RPD	Total Organic Carbon (C)	2019/11/06	0.039		%	15
6429749	BBD	QC Standard	Salinity	2019/11/07		101	%	80 - 120
6429749	BBD	Method Blank	Salinity	2019/11/07	<2.0		N/A	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6429749	BBD	RPD	Salinity	2019/11/07	0		%	25

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Eric Dearman, Scientific Specialist

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Mike MacGillivray, Scientific Specialist (Inorganics)

Robyn Edwards, Bedford Micro Supervisor

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Department of Oceanography
1355 Oxford St
Halifax, NS
B3H 4R2

Determination of chlorophyll a by fluorescence

Client: Bureau Veritas Laboratories, 200 Bluewater Road, Bedford, NS, B4B 1G9

Attention: Keri Mackay **Received:** 2019-10-24

Project #: B9T7878 **Completed:** 2019-10-25

Hugh MacIntyre, Ph.D.

Chl *a* (chlorophyll *a* ; µg L-1) determined by the acidification method (Holm-Hansen et al., 1965). Estimates made with the non-acidification method (Welschmeyer, 1994) are shown for comparison. The non-acidification method is considered more reliable than the acidification method in correcting for bias due to the contributions of chlorophyll *b* and chlorophyll degradation products.

Holm-Hansen O, Lorenzen CJ, Holmes RW, Strickland JDH (1965) Fluorometric determination of chlorophyll. J Conseil 30:3-15

Welschmeyer NA (1994) Fluorometric analysis of chlorophyll *a* in the presence of chlorophyll *b* and phaeopigments. Limnol Oceanogr 39:1985-1992

Contractor ID	Client ID	Chl *a* (acidification)	Chl *a* (non-acidification)
LCO798-06R	AVE-4	6.01	11.8
LCO800-06R	AVE-1	19.8	30.8
LCO801-06R	AVE-9	5.14	9.2

Maxxam A Bureau Veritas Group Company

200 Bluewater Road, Suite 105, Bedford, Nova Scotia B4B 1G9 Tel: 902-420-0203 Fax: 902-420-8612 Toll Free: 1-800-565-7227
49-55 Elizabeth Avenue, St John's, NL A1A 1W9 Tel: 709-754-0203 Fax: 709-754-8612 Toll Free: 1-888-492-7227
465 George Street Unit G,Sydney, NS B1P 1K5 Tel: 902-567-1255 Fax: 902-539-6504 Toll Free: 1-888-535-7770
www.maxxam.ca E-mail: Customerservicebedford@maxxam.ca

ATL FCD 00149 / 23

CHAIN OF CUSTODY RECORD

COC #: D 43335 Page ____ of ____

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required
Company Name:	CBCL Ltd	~~Company Name:~~ Project #:	171046.01	Quotation #:		☑ Regular TAT (5 business days) Most analyses
Contact Name:	Accounts Payable	Contact Name:		Purchase Order #:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	1505 Barrington St. Suite 901 PO BOX 606 PC:	Address: PC:		Project #:		IF RUSH please specify date (Surcharges will be applied)
				Site Location:		DATE REQUIRED:
Phone:	902-421-7241	Phone:		Site Province:		
Email:	acct@cbcl.ca	Email:		Site #:		
Report Copies:	cmcvarish@cbcl.ca	Report Copies:	mrutherford@cbcl.ca	Sampled By:		

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		9, 7, 3	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

#	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	BOD	Chlorophyll A (Sub from Bedford)	PCBs - Select One: Default or CCME Sediment	low level phosphorous	Fecal Coliform (count)	Total Coliform/E.Coli (Count)	TSS	Salinity		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	AVE-4	2019/10/23	13:10	Water	8			X									X	X		X	X	X	X	X			
2	AVE-2	〃	12:50	〃	2																		X	X			
3	AVE-1	〃	11:25	〃	8			X									X	X		X	X	X	X	X			
4	AVE-9	〃	10:35	〃	8			X									X	X		X	X	X	X	X			
5	AR-4B	〃	9:40	〃	2																		X	X			
6																											
7																											
8																											
9																											
10																											

2019 OCT 23 15:44

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Colin McVarish	2019/10/23	15:43	[signature]			B9T7878
[signature]						

White: Maxxam Pink: Client

CBCL Limited
BV Labs Job Number: B9T7878 Client Project #: 171046.01
Report Date: 2019/11/07

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		LCO798			LCO800			LCO801		
Sampling Date		2019-10-23 13:10			2019-10-23 11:25			2019-10-23 10:35		
COC Number		D43335			D43335			D43335		
	UNITS	**AVE-4**	**RDL**	**QC Batch**	**AVE-1**	**RDL**	**QC Batch**	**AVE-9**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L	91.1	N/A	6401204	403	N/A	6401204	170	N/A	6401204
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	51	1.0	6401201	89	1.0	6401201	64	1.0	6401201
Calculated TDS	mg/L	5700	1.0	6401209	24000	1.0	6401209	12000	1.0	6401209
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	6401201	<1.0	1.0	6401201	<1.0	1.0	6401201
Cation Sum	me/L	112	N/A	6401204	458	N/A	6401204	258	N/A	6401204
Hardness (CaCO3)	mg/L	1300	1.0	6401202	5000	1.0	6401202	2800	1.0	6401202
Ion Balance (% Difference)	%	10.4	N/A	6401203	6.38	N/A	6401203	20.8	N/A	6401203
Langelier Index (@ 20C)	N/A	-0.531		6401207	0.189		6401207	-0.273		6401207
Langelier Index (@ 4C)	N/A	-0.770		6401208	-0.0480		6401208	-0.510		6401208
Nitrate (N)	mg/L	<0.050	0.050	6401205	0.14	0.050	6401205	0.070	0.050	6401205
Saturation pH (@ 20C)	N/A	8.10		6401207	7.42		6401207	7.82		6401207
Saturation pH (@ 4C)	N/A	8.34		6401208	7.66		6401208	8.05		6401208
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	51	5.0	6427106	89	5.0	6427106	64	5.0	6427106
Dissolved Chloride (Cl-)	mg/L	2900	50	6427114	13000	500	6427114	5200	100	6427114
Colour	TCU	72	25	6427125	8.7	5.0	6427125	34	5.0	6427125
Nitrate + Nitrite (N)	mg/L	<0.050	0.050	6427131	0.16	0.050	6427131	0.070	0.050	6427131
Nitrite (N)	mg/L	<0.010	0.010	6427134	0.018	0.010	6427134	<0.010	0.010	6427134
Nitrogen (Ammonia Nitrogen)	mg/L	0.12	0.050	6424813	0.070	0.050	6424813	0.092	0.050	6424813
Total Organic Carbon (C)	mg/L	<50 (1)	50	6424781	8.6 (1)	5.0	6425124	12 (1)	5.0	6425124
Orthophosphate (P)	mg/L	<0.010	0.010	6427128	<0.010	0.010	6427128	<0.010	0.010	6427128
pH	pH	7.57	N/A	6411783	7.61	N/A	6411783	7.54	N/A	6411783
Reactive Silica (SiO2)	mg/L	3.3	0.50	6427120	1.3	0.50	6427120	2.5	0.50	6427120
Dissolved Sulphate (SO4)	mg/L	440	10	6427117	1700	40	6427117	980	20	6427117
Turbidity	NTU	>1000	1.0	6417157	670	1.0	6419319	500	1.0	6419312
Conductivity	uS/cm	11000	1.0	6411787	40000	1.0	6411787	24000	1.0	6411787
Metals										
Total Aluminum (Al)	ug/L	29000	50	6424517	20000	50	6424517	16000	50	6424517
Total Antimony (Sb)	ug/L	<10	10	6424517	<10	10	6424517	<10	10	6424517
Total Arsenic (As)	ug/L	12	10	6424517	12	10	6424517	<10	10	6424517
Total Barium (Ba)	ug/L	140	10	6424517	92	10	6424517	77	10	6424517
Total Beryllium (Be)	ug/L	<10	10	6424517	<10	10	6424517	<10	10	6424517
Total Bismuth (Bi)	ug/L	<20	20	6424517	<20	20	6424517	<20	20	6424517
Total Boron (B)	ug/L	940	500	6424517	3600	500	6424517	2000	500	6424517
Total Cadmium (Cd)	ug/L	<0.10	0.10	6424517	<0.10	0.10	6424517	<0.10	0.10	6424517
Total Calcium (Ca)	ug/L	100000	1000	6424517	320000	1000	6424517	190000	1000	6424517
Total Chromium (Cr)	ug/L	37	10	6424517	27	10	6424517	21	10	6424517
Total Cobalt (Co)	ug/L	16	4.0	6424517	12	4.0	6424517	9.9	4.0	6424517
Total Copper (Cu)	ug/L	20	5.0	6424517	18	5.0	6424517	13	5.0	6424517
Total Iron (Fe)	ug/L	32000	500	6424517	25000	500	6424517	19000	500	6424517
Total Lead (Pb)	ug/L	22	5.0	6424517	16	5.0	6424517	12	5.0	6424517
Total Magnesium (Mg)	ug/L	250000	1000	6424517	1000000	1000	6424517	570000	1000	6424517
Total Manganese (Mn)	ug/L	1600	20	6424517	1000	20	6424517	940	20	6424517
Total Molybdenum (Mo)	ug/L	<20	20	6424517	<20	20	6424517	<20	20	6424517
Total Nickel (Ni)	ug/L	35	20	6424517	29	20	6424517	<20	20	6424517
Total Phosphorus (P)	ug/L	1300	1000	6424517	1200	1000	6424517	1200	1000	6424517

BV Labs Job Number: B9T7878
Report Date: 2019/11/07

CBCL Limited
Client Project #: 171046.01

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		LCO798			LCO800			LCO801		
Sampling Date		2019-10-23 13:10			2019-10-23 11:25			2019-10-23 10:35		
COC Number		D43335			D43335			D43335		
	UNITS	**AVE-4**	**RDL**	**QC Batch**	**AVE-1**	**RDL**	**QC Batch**	**AVE-9**	**RDL**	**QC Batch**
Total Potassium (K)	ug/L	77000	1000	6424517	300000	1000	6424517	170000	1000	6424517
Total Selenium (Se)	ug/L	<5.0	5.0	6424517	<5.0	5.0	6424517	<5.0	5.0	6424517
Total Silver (Ag)	ug/L	<1.0	1.0	6424517	<1.0	1.0	6424517	<1.0	1.0	6424517
Total Sodium (Na)	ug/L	1900000	1000	6424517	8100000	1000	6424517	4500000	1000	6424517
Total Strontium (Sr)	ug/L	1600	20	6424517	5800	20	6424517	3300	20	6424517
Total Thallium (Tl)	ug/L	<1.0	1.0	6424517	<1.0	1.0	6424517	<1.0	1.0	6424517
Total Tin (Sn)	ug/L	<20	20	6424517	<20	20	6424517	<20	20	6424517
Total Titanium (Ti)	ug/L	310	20	6424517	590	20	6424517	400	20	6424517
Total Uranium (U)	ug/L	1.6	1.0	6424517	3.0	1.0	6424517	2.1	1.0	6424517
Total Vanadium (V)	ug/L	60	20	6424517	49	20	6424517	38	20	6424517
Total Zinc (Zn)	ug/L	94	50	6424517	73	50	6424517	<50	50	6424517

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

Results relate only to the items tested.

CBCL Limited
BV Labs Job Number: B9T7878 Client Project #: 171046.01
Report Date: 2019/11/07

RESULTS OF ANALYSES OF WATER

BV Labs ID		LCO798			LCO798			LCO799			LCO800	LCO801			LCO802			LCO802		
Sampling Date		2019-10-23 13:10			2019-10-23 13:10			2019-10-23 12:50			2019-10-23 11:25	2019-10-23 10:35			2019-10-23 09:40			2019-10-23 09:40		
COC Number		D43335			D43335			D43335			D43335	D43335			D43335			D43335		
	UNITS	**AVE-4**	**RDL**	**QC Batch**	**AVE-4 Lab-Dup**	**RDL**	**QC Batch**	**AVE-2**	**RDL**	**QC Batch**	**AVE-1**	**AVE-9**	**RDL**	**QC Batch**	**AR-4B**	**RDL**	**QC Batch**	**AR-4B Lab-Dup**	**RDL**	**QC Batch**
Inorganics																				
Carbonaceous BOD	mg/L	<5.0	5.0	6403741							<5.0	<5.0	5.0	6403741						
Total Phosphorus	mg/L	1.5	0.1	6424853							0.7	0.6	0.1	6424853						
Salinity	N/A	6.2	2.0	6429749	6.2	2.0	6429749	26	2.0	6429749	26	15	2.0	6429749	9.0	2.0	6429749			
Total Suspended Solids	mg/L	1000	17	6414638				11000	100	6414638	820	730	17	6414638	260	10	6414638	260	10	6414638
Subcontracted Analysis																				
Subcontract Parameter	N/A	ATTACHED	N/A	6404012							ATTACHED	ATTACHED	N/A	6404012						

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Results relate only to the items tested.

CBCL Limited

BV Labs Job Number: B9T7878

Client Project #: 171046.01

Report Date: 2019/11/07

MICROBIOLOGY (WATER)

BV Labs ID		LCO798	LCO800	LCO801		
Sampling Date		2019-10-23 13:10	2019-10-23 11:25	2019-10-23 10:35		
COC Number		D43335	D43335	D43335		
	UNITS	**AVE-4**	**AVE-1**	**AVE-9**	**RDL**	**QC Batch**
Microbiological						
Escherichia coli	CFU/100mL	400	100	<100	100	6403716
Fecal coliform	CFU/1mL	4.0	<1.0	1.0	1.0	6403738
Total Coliforms	CFU/100mL	3500	1600	2300	100	6403725

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Results relate only to the items tested.

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Each tempera	Each tempera	Each tempera	Each temperature is the average of up to three cooler temperatures taken at receipt
Package 1	6.3°C	#N/A	#N/A

Sample LCO798 [AVE-4] : Elevated reporting limits for trace metals due to sample matrix.
Poor RCAp Ion Balance due to sample matrix. Excess cations due to presence of turbidity.
Sample LCO799 [AVE-2] : TSS: The sample contained materials that can settle rapidly and may give results with an elevated bias.
Sample LCO800 [AVE-1] : Elevated reporting limits for trace metals due to sample matrix.
Poor RCAp Ion Balance due to sample matrix. Excess cations due to presence of turbidity.
Sample LCO801 [AVE-9] : Elevated reporting limits for trace metals due to sample matrix.
Poor RCAp Ion Balance due to sample matrix. Excess cations due to presence of turbidity.
Results relate only to the items tested.

CBCL Limited
Attention: Melissa Rutherford
Report Date: 2019/11/07
Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9T7878

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6403716	SDN	Method Blank	Escherichia coli	2019-10-23	<1.0		CFU/100mL	
6403725	SDN	Method Blank	Total Coliforms	2019-10-23	<1.0		CFU/100mL	
6403738	SDN	Method Blank	Fecal coliform	2019-10-23	<1.0		CFU/1mL	
6403741	DME	QC Standard	Carbonaceous BOD	2019-10-29		117	%	80 - 120
6403741	DME	Spiked Blank	Carbonaceous BOD	2019-10-29		113	%	80 - 120
6403741	DME	Method Blank	Carbonaceous BOD	2019-10-29	<2.0		mg/L	
6403741	DME	RPD	Carbonaceous BOD	2019-10-29	NC		%	25
6411783	SHW	QC Standard	pH	2019-10-29		101	%	97 - 103
6411787	SHW	Spiked Blank	Conductivity	2019-10-29		102	%	80 - 120
6411787	SHW	Method Blank	Conductivity	2019-10-29	<1.0		uS/cm	
6414638	GTH	QC Standard	Total Suspended Solids	2019-11-04		97	%	80 - 120
6414638	GTH	Method Blank	Total Suspended Solids	2019-11-04	<1.0		mg/L	
6414638	GTH	RPD [LCO802-01]	Total Suspended Solids	2019-11-04	2.3		%	20
6417157	SHW	QC Standard	Turbidity	2019-10-31		100	%	80 - 120
6417157	SHW	Spiked Blank	Turbidity	2019-10-31		100	%	80 - 120
6417157	SHW	Method Blank	Turbidity	2019-10-31	<0.10		NTU	
6417157	SHW	RPD	Turbidity	2019-10-31	1.1		%	20
6419312	SHW	QC Standard	Turbidity	2019-11-01		103	%	80 - 120
6419312	SHW	Spiked Blank	Turbidity	2019-11-01		102	%	80 - 120
6419312	SHW	Method Blank	Turbidity	2019-11-01	<0.10		NTU	
6419312	SHW	RPD	Turbidity	2019-11-01	7.5		%	20
6419319	SHW	QC Standard	Turbidity	2019-11-01		108	%	80 - 120
6419319	SHW	Spiked Blank	Turbidity	2019-11-01		102	%	80 - 120
6419319	SHW	Method Blank	Turbidity	2019-11-01	<0.10		NTU	
6419319	SHW	RPD	Turbidity	2019-11-01	0.98		%	20
6424517	MLB	Matrix Spike	Total Aluminum (Al)	2019-11-05		96	%	80 - 120
			Total Antimony (Sb)	2019-11-05		98	%	80 - 120
			Total Arsenic (As)	2019-11-05		98	%	80 - 120
			Total Barium (Ba)	2019-11-05		93	%	80 - 120
			Total Beryllium (Be)	2019-11-05		100	%	80 - 120
			Total Bismuth (Bi)	2019-11-05		98	%	80 - 120
			Total Boron (B)	2019-11-05		103	%	80 - 120
			Total Cadmium (Cd)	2019-11-05		93	%	80 - 120
			Total Calcium (Ca)	2019-11-05		97	%	80 - 120
			Total Chromium (Cr)	2019-11-05		97	%	80 - 120
			Total Cobalt (Co)	2019-11-05		96	%	80 - 120
			Total Copper (Cu)	2019-11-05		97	%	80 - 120
			Total Iron (Fe)	2019-11-05		100	%	80 - 120
			Total Lead (Pb)	2019-11-05		97	%	80 - 120
			Total Magnesium (Mg)	2019-11-05		102	%	80 - 120
			Total Manganese (Mn)	2019-11-05		99	%	80 - 120
			Total Molybdenum (Mo)	2019-11-05		102	%	80 - 120
			Total Nickel (Ni)	2019-11-05		99	%	80 - 120
			Total Phosphorus (P)	2019-11-05		100	%	80 - 120
			Total Potassium (K)	2019-11-05		97	%	80 - 120
			Total Selenium (Se)	2019-11-05		97	%	80 - 120
			Total Silver (Ag)	2019-11-05		96	%	80 - 120
			Total Sodium (Na)	2019-11-05		94	%	80 - 120
			Total Strontium (Sr)	2019-11-05		NC	%	80 - 120
			Total Thallium (Tl)	2019-11-05		100	%	80 - 120
			Total Tin (Sn)	2019-11-05		101	%	80 - 120
			Total Titanium (Ti)	2019-11-05		101	%	80 - 120
			Total Uranium (U)	2019-11-05		106	%	80 - 120
			Total Vanadium (V)	2019-11-05		101	%	80 - 120
			Total Zinc (Zn)	2019-11-05		96	%	80 - 120
6424517	MLB	Spiked Blank	Total Aluminum (Al)	2019-11-05		102	%	80 - 120
			Total Antimony (Sb)	2019-11-05		101	%	80 - 120
			Total Arsenic (As)	2019-11-05		101	%	80 - 120
			Total Barium (Ba)	2019-11-05		100	%	80 - 120
			Total Beryllium (Be)	2019-11-05		104	%	80 - 120

Report Date: 2019/11/07

CBCL Limited
Attention: Melissa Rutherford
Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9T7878

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Bismuth (Bi)	2019-11-05		101	%	80 - 120
			Total Boron (B)	2019-11-05		104	%	80 - 120
			Total Cadmium (Cd)	2019-11-05		95	%	80 - 120
			Total Calcium (Ca)	2019-11-05		105	%	80 - 120
			Total Chromium (Cr)	2019-11-05		100	%	80 - 120
			Total Cobalt (Co)	2019-11-05		101	%	80 - 120
			Total Copper (Cu)	2019-11-05		101	%	80 - 120
			Total Iron (Fe)	2019-11-05		108	%	80 - 120
			Total Lead (Pb)	2019-11-05		101	%	80 - 120
			Total Magnesium (Mg)	2019-11-05		109	%	80 - 120
			Total Manganese (Mn)	2019-11-05		103	%	80 - 120
			Total Molybdenum (Mo)	2019-11-05		105	%	80 - 120
			Total Nickel (Ni)	2019-11-05		103	%	80 - 120
			Total Phosphorus (P)	2019-11-05		107	%	80 - 120
			Total Potassium (K)	2019-11-05		105	%	80 - 120
			Total Selenium (Se)	2019-11-05		101	%	80 - 120
			Total Silver (Ag)	2019-11-05		101	%	80 - 120
			Total Sodium (Na)	2019-11-05		102	%	80 - 120
			Total Strontium (Sr)	2019-11-05		102	%	80 - 120
			Total Thallium (Tl)	2019-11-05		103	%	80 - 120
			Total Tin (Sn)	2019-11-05		102	%	80 - 120
			Total Titanium (Ti)	2019-11-05		106	%	80 - 120
			Total Uranium (U)	2019-11-05		109	%	80 - 120
			Total Vanadium (V)	2019-11-05		105	%	80 - 120
			Total Zinc (Zn)	2019-11-05		100	%	80 - 120
6424517	MLB	Method Blank	Total Aluminum (Al)	2019-11-05	<5.0		ug/L	
			Total Antimony (Sb)	2019-11-05	<1.0		ug/L	
			Total Arsenic (As)	2019-11-05	<1.0		ug/L	
			Total Barium (Ba)	2019-11-05	<1.0		ug/L	
			Total Beryllium (Be)	2019-11-05	<1.0		ug/L	
			Total Bismuth (Bi)	2019-11-05	<2.0		ug/L	
			Total Boron (B)	2019-11-05	<50		ug/L	
			Total Cadmium (Cd)	2019-11-05	<0.010		ug/L	
			Total Calcium (Ca)	2019-11-05	<100		ug/L	
			Total Chromium (Cr)	2019-11-05	<1.0		ug/L	
			Total Cobalt (Co)	2019-11-05	<0.40		ug/L	
			Total Copper (Cu)	2019-11-05	<0.50		ug/L	
			Total Iron (Fe)	2019-11-05	<50		ug/L	
			Total Lead (Pb)	2019-11-05	<0.50		ug/L	
			Total Magnesium (Mg)	2019-11-05	<100		ug/L	
			Total Manganese (Mn)	2019-11-05	<2.0		ug/L	
			Total Molybdenum (Mo)	2019-11-05	<2.0		ug/L	
			Total Nickel (Ni)	2019-11-05	<2.0		ug/L	
			Total Phosphorus (P)	2019-11-05	<100		ug/L	
			Total Potassium (K)	2019-11-05	<100		ug/L	
			Total Selenium (Se)	2019-11-05	<0.50		ug/L	
			Total Silver (Ag)	2019-11-05	<0.10		ug/L	
			Total Sodium (Na)	2019-11-05	<100		ug/L	
			Total Strontium (Sr)	2019-11-05	<2.0		ug/L	
			Total Thallium (Tl)	2019-11-05	<0.10		ug/L	
			Total Tin (Sn)	2019-11-05	<2.0		ug/L	
			Total Titanium (Ti)	2019-11-05	<2.0		ug/L	
			Total Uranium (U)	2019-11-05	<0.10		ug/L	
			Total Vanadium (V)	2019-11-05	<2.0		ug/L	
			Total Zinc (Zn)	2019-11-05	<5.0		ug/L	
6424517	MLB	RPD	Total Aluminum (Al)	2019-11-05	4.6		%	20
			Total Antimony (Sb)	2019-11-05	NC		%	20
			Total Arsenic (As)	2019-11-05	NC		%	20
			Total Barium (Ba)	2019-11-05	1.2		%	20
			Total Beryllium (Be)	2019-11-05	NC		%	20
			Total Bismuth (Bi)	2019-11-05	NC		%	20

Report Date: 2019/11/07

CBCL Limited
Attention: Melissa Rutherford
Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9T7878

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Boron (B)	2019-11-05	0.86		%	20
			Total Cadmium (Cd)	2019-11-05	NC		%	20
			Total Calcium (Ca)	2019-11-05	2.0		%	20
			Total Chromium (Cr)	2019-11-05	NC		%	20
			Total Cobalt (Co)	2019-11-05	NC		%	20
			Total Copper (Cu)	2019-11-05	0.42		%	20
			Total Iron (Fe)	2019-11-05	2.1		%	20
			Total Lead (Pb)	2019-11-05	NC		%	20
			Total Magnesium (Mg)	2019-11-05	2.6		%	20
			Total Manganese (Mn)	2019-11-05	NC		%	20
			Total Molybdenum (Mo)	2019-11-05	NC		%	20
			Total Nickel (Ni)	2019-11-05	NC		%	20
			Total Phosphorus (P)	2019-11-05	NC		%	20
			Total Potassium (K)	2019-11-05	1.5		%	20
			Total Selenium (Se)	2019-11-05	NC		%	20
			Total Silver (Ag)	2019-11-05	NC		%	20
			Total Sodium (Na)	2019-11-05	1.6		%	20
			Total Strontium (Sr)	2019-11-05	0.30		%	20
			Total Thallium (Tl)	2019-11-05	NC		%	20
			Total Tin (Sn)	2019-11-05	NC		%	20
			Total Titanium (Ti)	2019-11-05	NC		%	20
			Total Uranium (U)	2019-11-05	3.2		%	20
			Total Vanadium (V)	2019-11-05	NC		%	20
			Total Zinc (Zn)	2019-11-05	NC		%	20
6424781	MGN	Matrix Spike	Total Organic Carbon (C)	2019-11-05		98	%	85 - 115
6424781	MGN	Spiked Blank	Total Organic Carbon (C)	2019-11-05		100	%	80 - 120
6424781	MGN	Method Blank	Total Organic Carbon (C)	2019-11-05	<0.50		mg/L	
6424781	MGN	RPD	Total Organic Carbon (C)	2019-11-05	3.1		%	15
6424813	MCN	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2019-11-05		95	%	80 - 120
6424813	MCN	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2019-11-05		103	%	80 - 120
6424813	MCN	Method Blank	Nitrogen (Ammonia Nitrogen)	2019-11-05	<0.050		mg/L	
6424813	MCN	RPD	Nitrogen (Ammonia Nitrogen)	2019-11-05	2.0		%	20
6424853	SSV	Matrix Spike	Total Phosphorus	2019-11-05		97	%	80 - 120
6424853	SSV	QC Standard	Total Phosphorus	2019-11-05		91	%	80 - 120
6424853	SSV	Spiked Blank	Total Phosphorus	2019-11-05		103	%	80 - 120
6424853	SSV	Method Blank	Total Phosphorus	2019-11-05	<0.004		mg/L	
6424853	SSV	RPD	Total Phosphorus	2019-11-05	2.2		%	20
6425124	MGN	Matrix Spike	Total Organic Carbon (C)	2019-11-06		99	%	85 - 115
6425124	MGN	Spiked Blank	Total Organic Carbon (C)	2019-11-06		98	%	80 - 120
6425124	MGN	Method Blank	Total Organic Carbon (C)	2019-11-06	<0.50		mg/L	
6425124	MGN	RPD	Total Organic Carbon (C)	2019-11-06	2.8		%	15
6427106	MCN	Matrix Spike	Total Alkalinity (Total as CaCO3)	2019-11-06		NC	%	80 - 120
6427106	MCN	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019-11-06		110	%	80 - 120
6427106	MCN	Method Blank	Total Alkalinity (Total as CaCO3)	2019-11-06	<5.0		mg/L	
6427106	MCN	RPD	Total Alkalinity (Total as CaCO3)	2019-11-06	7.5		%	25
6427114	MCN	Matrix Spike	Dissolved Chloride (Cl-)	2019-11-06		NC	%	80 - 120
6427114	MCN	Spiked Blank	Dissolved Chloride (Cl-)	2019-11-06		103	%	80 - 120
6427114	MCN	Method Blank	Dissolved Chloride (Cl-)	2019-11-06	<1.0		mg/L	
6427114	MCN	RPD	Dissolved Chloride (Cl-)	2019-11-06	0.21		%	25
6427117	MCN	Matrix Spike	Dissolved Sulphate (SO4)	2019-11-06		92	%	80 - 120
6427117	MCN	Spiked Blank	Dissolved Sulphate (SO4)	2019-11-06		105	%	80 - 120
6427117	MCN	Method Blank	Dissolved Sulphate (SO4)	2019-11-06	<2.0		mg/L	
6427117	MCN	RPD	Dissolved Sulphate (SO4)	2019-11-06	0.47		%	25
6427120	MCN	Matrix Spike	Reactive Silica (SiO2)	2019-11-06		NC	%	80 - 120
6427120	MCN	Spiked Blank	Reactive Silica (SiO2)	2019-11-06		94	%	80 - 120
6427120	MCN	Method Blank	Reactive Silica (SiO2)	2019-11-06	<0.50		mg/L	
6427120	MCN	RPD	Reactive Silica (SiO2)	2019-11-06	0.70		%	25
6427125	MCN	Spiked Blank	Colour	2019-11-07		102	%	80 - 120
6427125	MCN	Method Blank	Colour	2019-11-07	<5.0		TCU	
6427125	MCN	RPD	Colour	2019-11-07	NC		%	20
6427128	MCN	Matrix Spike	Orthophosphate (P)	2019-11-06		91	%	80 - 120

CBCL Limited
Attention: Melissa Rutherford
Report Date: 2019/11/07 Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9T7878

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6427128	MCN	Spiked Blank	Orthophosphate (P)	2019-11-06		108	%	80 - 120
6427128	MCN	Method Blank	Orthophosphate (P)	2019-11-06	<0.010		mg/L	
6427128	MCN	RPD	Orthophosphate (P)	2019-11-06	NC		%	25
6427131	MCN	Matrix Spike	Nitrate + Nitrite (N)	2019-11-06		97	%	80 - 120
6427131	MCN	Spiked Blank	Nitrate + Nitrite (N)	2019-11-06		96	%	80 - 120
6427131	MCN	Method Blank	Nitrate + Nitrite (N)	2019-11-06	<0.050		mg/L	
6427131	MCN	RPD	Nitrate + Nitrite (N)	2019-11-06	0.59		%	25
6427134	MCN	Matrix Spike	Nitrite (N)	2019-11-06		104	%	80 - 120
6427134	MCN	Spiked Blank	Nitrite (N)	2019-11-06		103	%	80 - 120
6427134	MCN	Method Blank	Nitrite (N)	2019-11-06	<0.010		mg/L	
6427134	MCN	RPD	Nitrite (N)	2019-11-06	NC		%	20
6429749	BBD	QC Standard	Salinity	2019-11-07		101	%	80 - 120
6429749	BBD	Method Blank	Salinity	2019-11-07	<2.0		N/A	
6429749	BBD	RPD [LCO798-01]	Salinity	2019-11-07	0		%	25

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

Analyte_ID	Parameter	Sample_ID	Method	Results	Units	EQL	Lab_ID	Matrix	Lab_Duplicate_Of	Field_Duplicate_Of	Date_Sampled	CSite #	DFRP #	DCC_Project_ID	Report Name	TableName
	Nitrate (as N)	AVE-4	ASTM D3867-16	<0.050	mg/L	0.050	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Hardness (as CaCO3)	AVE-4	Auto Calc	1300	mg/L	1.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Anion Sum	AVE-4	Auto Calc.	91.1	me/L	N/A	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Total Dissolved Solids	AVE-4	Auto Calc.	5700	mg/L	1.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Cation Sum	AVE-4	Auto Calc.	112	me/L	N/A	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Ion Balance (% Difference)	AVE-4	Auto Calc.	10.4	%	N/A	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Langelier Index (@ 20C)	AVE-4	Auto Calc.	-0.531	N/A		LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Langelier Index (@ 4C)	AVE-4	Auto Calc.	-0.770	N/A		LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Saturation pH (@ 20C)	AVE-4	Auto Calc.	8.10	N/A		LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Saturation pH (@ 4C)	AVE-4	Auto Calc.	8.34	N/A		LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Bicarbonate (as CaCO3)	AVE-4	SM 23 4500-CO2 D	51	mg/L	1.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Carbonate (as CaCO3)	AVE-4	SM 23 4500-CO2 D	<1.0	mg/L	1.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Sulphate	AVE-4	ASTM D516-16 m	440	mg/L	10	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Turbidity	AVE-4	EPA 180.1 R2 m	>1000	NTU	1.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Alkalinity (as CaCO3)	AVE-4	EPA 310.2 R1974 m	51	mg/L	5.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Ammonia	AVE-4	EPA 350.1 R2 m	0.12	mg/L	0.050	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Reactive Silica (as SiO2)	AVE-4	EPA 366.0 m	3.3	mg/L	0.50	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Salinity	AVE-4	SM 22 2520B	6.2	N/A	2.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Colour	AVE-4	SM 23 2120C m	72	TCU	25	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Conductivity	AVE-4	SM 23 2510B m	11000	uS/cm	1.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	TSS	AVE-4	SM 23 2540D m	1000	mg/L	17	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Phosphorus	AVE-4	SM 23 4500 P B H m	1.5	mg/L	0.1	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Chloride	AVE-4	SM 23 4500-Cl- E m	2900	mg/L	50	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	pH	AVE-4	SM 23 4500-H+ B m	7.57	pH	N/A	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Nitrite	AVE-4	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Ortho Phosphate (as P)	AVE-4	SM 23 4500-P E m	<0.010	mg/L	0.010	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Carbonaceous BOD	AVE-4	SM 23 5210B m	<5.0	mg/L	5.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	TOC	AVE-4	SM 23 5310B m	<50	mg/L	50	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Nitrate + Nitrite (as N)	AVE-4	USGS I-2547-11m	<0.050	mg/L	0.050	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Aluminum	AVE-4	EPA 6020B R2 m	29000	ug/L	50	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Antimony	AVE-4	EPA 6020B R2 m	<10	ug/L	10	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Arsenic	AVE-4	EPA 6020B R2 m	12	ug/L	10	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Barium	AVE-4	EPA 6020B R2 m	140	ug/L	10	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Beryllium	AVE-4	EPA 6020B R2 m	<10	ug/L	10	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Bismuth	AVE-4	EPA 6020B R2 m	<20	ug/L	20	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Boron	AVE-4	EPA 6020B R2 m	940	ug/L	500	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Cadmium	AVE-4	EPA 6020B R2 m	<0.10	ug/L	0.10	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Calcium	AVE-4	EPA 6020B R2 m	100000	ug/L	1000	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Chromium	AVE-4	EPA 6020B R2 m	37	ug/L	10	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Cobalt	AVE-4	EPA 6020B R2 m	16	ug/L	4.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Copper	AVE-4	EPA 6020B R2 m	20	ug/L	5.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Iron	AVE-4	EPA 6020B R2 m	32000	ug/L	500	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Lead	AVE-4	EPA 6020B R2 m	22	ug/L	5.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Magnesium	AVE-4	EPA 6020B R2 m	250000	ug/L	1000	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Manganese	AVE-4	EPA 6020B R2 m	1600	ug/L	20	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Molybdenum	AVE-4	EPA 6020B R2 m	<20	ug/L	20	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Nickel	AVE-4	EPA 6020B R2 m	35	ug/L	20	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Phosphorus (P)	AVE-4	EPA 6020B R2 m	1300	ug/L	1000	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Potassium	AVE-4	EPA 6020B R2 m	77000	ug/L	1000	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Selenium	AVE-4	EPA 6020B R2 m	<5.0	ug/L	5.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Silver	AVE-4	EPA 6020B R2 m	<1.0	ug/L	1.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Sodium	AVE-4	EPA 6020B R2 m	1900000	ug/L	1000	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Strontium	AVE-4	EPA 6020B R2 m	1600	ug/L	20	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Thallium	AVE-4	EPA 6020B R2 m	<1.0	ug/L	1.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Tin	AVE-4	EPA 6020B R2 m	<20	ug/L	20	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Titanium	AVE-4	EPA 6020B R2 m	310	ug/L	20	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Uranium	AVE-4	EPA 6020B R2 m	1.6	ug/L	1.0	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Vanadium	AVE-4	EPA 6020B R2 m	60	ug/L	20	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Zinc	AVE-4	EPA 6020B R2 m	94	ug/L	50	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Escherichia coli	AVE-4	MOE E3371 R2 (2018)	400	CFU/100mL	100	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
	Total Coliforms	AVE-4	MOE E3371 R2 (2018)	3500	CFU/100mL	100	LCO798	Water			2019/10/23				B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls

Fecal coliform	AVE-4	SM 23 9222D	4.0	CFU/1mL	1.0	LCO798	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Subcontract Parameter	AVE-4		ATTACHED	N/A	N/A	LCO798	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Salinity	AVE-4	SM 22 2520B	6.2	N/A	2.0	LCO798D1	Water	LCO798	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Salinity	AVE-2	SM 22 2520B	26	N/A	2.0	LCO799	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
TSS	AVE-2	SM 23 2540D m	11000	mg/L	100	LCO799	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Nitrate (as N)	AVE-1	ASTM D3867-16	0.14	mg/L	0.050	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Hardness (as CaCO3)	AVE-1	Auto Calc	5000	mg/L	1.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Anion Sum	AVE-1	Auto Calc.	403	me/L	N/A	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Total Dissolved Solids	AVE-1	Auto Calc.	24000	mg/L	1.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Cation Sum	AVE-1	Auto Calc.	458	me/L	N/A	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Ion Balance (% Difference)	AVE-1	Auto Calc.	6.38	%	N/A	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Langelier Index (@ 20C)	AVE-1	Auto Calc.	0.189	N/A		LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Langelier Index (@ 4C)	AVE-1	Auto Calc.	-0.0480	N/A		LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Saturation pH (@ 20C)	AVE-1	Auto Calc.	7.42	N/A		LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Saturation pH (@ 4C)	AVE-1	Auto Calc.	7.66	N/A		LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Bicarbonate (as CaCO3)	AVE-1	SM 23 4500-CO2 D	89	mg/L	1.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Carbonate (as CaCO3)	AVE-1	SM 23 4500-CO2 D	<1.0	mg/L	1.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Sulphate	AVE-1	ASTM D516-16 m	1700	mg/L	40	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Turbidity	AVE-1	EPA 180.1 R2 m	670	NTU	1.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Alkalinity (as CaCO3)	AVE-1	EPA 310.2 R1974 m	89	mg/L	5.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Ammonia	AVE-1	EPA 350.1 R2 m	0.070	mg/L	0.050	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Reactive Silica (as SiO2)	AVE-1	EPA 366.0 m	1.3	mg/L	0.50	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Salinity	AVE-1	SM 22 2520B	26	N/A	2.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Colour	AVE-1	SM 23 2120C m	8.7	TCU	5.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Conductivity	AVE-1	SM 23 2510B m	40000	uS/cm	1.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
TSS	AVE-1	SM 23 2540D m	820	mg/L	17	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Phosphorus	AVE-1	SM 23 4500 P B H m	0.7	mg/L	0.1	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Chloride	AVE-1	SM 23 4500-Cl- E m	13000	mg/L	500	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
pH	AVE-1	SM 23 4500-H+ B m	7.61	pH	N/A	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Nitrite	AVE-1	SM 23 4500-NO2- B m	0.018	mg/L	0.010	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Ortho Phosphate (as P)	AVE-1	SM 23 4500-P E m	<0.010	mg/L	0.010	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Carbonaceous BOD	AVE-1	SM 23 5210B m	<5.0	mg/L	5.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
TOC	AVE-1	SM 23 5310B m	8.6	mg/L	5.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Nitrate + Nitrite (as N)	AVE-1	USGS I-2547-11m	0.16	mg/L	0.050	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Aluminum	AVE-1	EPA 6020B R2 m	20000	ug/L	50	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Antimony	AVE-1	EPA 6020B R2 m	<10	ug/L	10	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Arsenic	AVE-1	EPA 6020B R2 m	12	ug/L	10	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Barium	AVE-1	EPA 6020B R2 m	92	ug/L	10	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Beryllium	AVE-1	EPA 6020B R2 m	<10	ug/L	10	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Bismuth	AVE-1	EPA 6020B R2 m	<20	ug/L	20	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Boron	AVE-1	EPA 6020B R2 m	3600	ug/L	500	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Cadmium	AVE-1	EPA 6020B R2 m	<0.10	ug/L	0.10	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Calcium	AVE-1	EPA 6020B R2 m	320000	ug/L	1000	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Chromium	AVE-1	EPA 6020B R2 m	27	ug/L	10	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Cobalt	AVE-1	EPA 6020B R2 m	12	ug/L	4.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Copper	AVE-1	EPA 6020B R2 m	18	ug/L	5.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Iron	AVE-1	EPA 6020B R2 m	25000	ug/L	500	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Lead	AVE-1	EPA 6020B R2 m	16	ug/L	5.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Magnesium	AVE-1	EPA 6020B R2 m	1000000	ug/L	1000	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Manganese	AVE-1	EPA 6020B R2 m	1000	ug/L	20	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Molybdenum	AVE-1	EPA 6020B R2 m	<20	ug/L	20	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Nickel	AVE-1	EPA 6020B R2 m	29	ug/L	20	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Phosphorus (P)	AVE-1	EPA 6020B R2 m	1200	ug/L	1000	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Potassium	AVE-1	EPA 6020B R2 m	300000	ug/L	1000	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Selenium	AVE-1	EPA 6020B R2 m	<5.0	ug/L	5.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Silver	AVE-1	EPA 6020B R2 m	<1.0	ug/L	1.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Sodium	AVE-1	EPA 6020B R2 m	8100000	ug/L	1000	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Strontium	AVE-1	EPA 6020B R2 m	5800	ug/L	20	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Thallium	AVE-1	EPA 6020B R2 m	<1.0	ug/L	1.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Tin	AVE-1	EPA 6020B R2 m	<20	ug/L	20	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Titanium	AVE-1	EPA 6020B R2 m	590	ug/L	20	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Uranium	AVE-1	EPA 6020B R2 m	3.0	ug/L	1.0	LCO800	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls

Vanadium	AVE-1	EPA 6020B R2 m	49	ug/L	20	LCO800	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Zinc	AVE-1	EPA 6020B R2 m	73	ug/L	50	LCO800	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Escherichia coli	AVE-1	MOE E3371 R2 (2018)	100	CFU/100mL	100	LCO800	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Total Coliforms	AVE-1	MOE E3371 R2 (2018)	1600	CFU/100mL	100	LCO800	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Fecal coliform	AVE-1	SM 23 9222D	<1.0	CFU/1mL	1.0	LCO800	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Subcontract Parameter	AVE-1		ATTACHED	N/A	N/A	LCO800	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Nitrate (as N)	AVE-9	ASTM D3867-16	0.070	mg/L	0.050	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Hardness (as CaCO3)	AVE-9	Auto Calc	2800	mg/L	1.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Anion Sum	AVE-9	Auto Calc.	170	me/L	N/A	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Total Dissolved Solids	AVE-9	Auto Calc.	12000	mg/L	1.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Cation Sum	AVE-9	Auto Calc.	258	me/L	N/A	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Ion Balance (% Difference)	AVE-9	Auto Calc.	20.8	%	N/A	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Langelier Index (@ 20C)	AVE-9	Auto Calc.	-0.273	N/A		LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Langelier Index (@ 4C)	AVE-9	Auto Calc.	-0.510	N/A		LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Saturation pH (@ 20C)	AVE-9	Auto Calc.	7.82	N/A		LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Saturation pH (@ 4C)	AVE-9	Auto Calc.	8.05	N/A		LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Bicarbonate (as CaCO3)	AVE-9	SM 23 4500-CO2 D	64	mg/L	1.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Carbonate (as CaCO3)	AVE-9	SM 23 4500-CO2 D	<1.0	mg/L	1.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Sulphate	AVE-9	ASTM D516-16 m	980	mg/L	20	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Turbidity	AVE-9	EPA 180.1 R2 m	500	NTU	1.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Alkalinity (as CaCO3)	AVE-9	EPA 310.2 R1974 m	64	mg/L	5.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Ammonia	AVE-9	EPA 350.1 R2 m	0.092	mg/L	0.050	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Reactive Silica (as SiO2)	AVE-9	EPA 366.0 m	2.5	mg/L	0.50	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Salinity	AVE-9	SM 22 2520B	15	N/A	2.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Colour	AVE-9	SM 23 2120C m	34	TCU	5.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Conductivity	AVE-9	SM 23 2510B m	24000	uS/cm	1.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
TSS	AVE-9	SM 23 2540D m	730	mg/L	17	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Phosphorus	AVE-9	SM 23 4500 P B H m	0.6	mg/L	0.1	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Chloride	AVE-9	SM 23 4500-Cl- E m	5200	mg/L	100	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
pH	AVE-9	SM 23 4500-H+ B m	7.54	pH	N/A	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Nitrite	AVE-9	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Ortho Phosphate (as P)	AVE-9	SM 23 4500-P E m	<0.010	mg/L	0.010	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Carbonaceous BOD	AVE-9	SM 23 5210B m	<5.0	mg/L	5.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
TOC	AVE-9	SM 23 5310B m	12	mg/L	5.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Nitrate + Nitrite (as N)	AVE-9	USGS I-2547-11m	0.070	mg/L	0.050	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Aluminum	AVE-9	EPA 6020B R2 m	16000	ug/L	50	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Antimony	AVE-9	EPA 6020B R2 m	<10	ug/L	10	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Arsenic	AVE-9	EPA 6020B R2 m	<10	ug/L	10	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Barium	AVE-9	EPA 6020B R2 m	77	ug/L	10	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Beryllium	AVE-9	EPA 6020B R2 m	<10	ug/L	10	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Bismuth	AVE-9	EPA 6020B R2 m	<20	ug/L	20	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Boron	AVE-9	EPA 6020B R2 m	2000	ug/L	500	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Cadmium	AVE-9	EPA 6020B R2 m	<0.10	ug/L	0.10	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Calcium	AVE-9	EPA 6020B R2 m	190000	ug/L	1000	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Chromium	AVE-9	EPA 6020B R2 m	21	ug/L	10	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Cobalt	AVE-9	EPA 6020B R2 m	9.9	ug/L	4.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Copper	AVE-9	EPA 6020B R2 m	13	ug/L	5.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Iron	AVE-9	EPA 6020B R2 m	19000	ug/L	500	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Lead	AVE-9	EPA 6020B R2 m	12	ug/L	5.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Magnesium	AVE-9	EPA 6020B R2 m	570000	ug/L	1000	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Manganese	AVE-9	EPA 6020B R2 m	940	ug/L	20	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Molybdenum	AVE-9	EPA 6020B R2 m	<20	ug/L	20	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Nickel	AVE-9	EPA 6020B R2 m	<20	ug/L	20	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Phosphorus (P)	AVE-9	EPA 6020B R2 m	1200	ug/L	1000	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Potassium	AVE-9	EPA 6020B R2 m	170000	ug/L	1000	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Selenium	AVE-9	EPA 6020B R2 m	<5.0	ug/L	5.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Silver	AVE-9	EPA 6020B R2 m	<1.0	ug/L	1.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Sodium	AVE-9	EPA 6020B R2 m	4500000	ug/L	1000	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Strontium	AVE-9	EPA 6020B R2 m	3300	ug/L	20	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Thallium	AVE-9	EPA 6020B R2 m	<1.0	ug/L	1.0	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Tin	AVE-9	EPA 6020B R2 m	<20	ug/L	20	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Titanium	AVE-9	EPA 6020B R2 m	400	ug/L	20	LCO801	Water	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls

Uranium	AVE-9	EPA 6020B R2 m	2.1	ug/L	1.0	LCO801	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Vanadium	AVE-9	EPA 6020B R2 m	38	ug/L	20	LCO801	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Zinc	AVE-9	EPA 6020B R2 m	<50	ug/L	50	LCO801	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Escherichia coli	AVE-9	MOE E3371 R2 (2018)	<100	CFU/100mL	100	LCO801	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Total Coliforms	AVE-9	MOE E3371 R2 (2018)	2300	CFU/100mL	100	LCO801	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Fecal coliform	AVE-9	SM 23 9222D	1.0	CFU/1mL	1.0	LCO801	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Subcontract Parameter	AVE-9		ATTACHED	N/A	N/A	LCO801	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
Salinity	AR-4B	SM 22 2520B	9.0	N/A	2.0	LCO802	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
TSS	AR-4B	SM 23 2540D m	260	mg/L	10	LCO802	Water		2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls
TSS	AR-4B	SM 23 2540D m	260	mg/L	10	LCO802D1	Water	LCO802	2019/10/23	B9T7878V1-R2019-11-07_15-34-06_N020.pdf	B9T7878V1-R2019-11-07_15-34-06_N020.xls

Your Project #: 171046.01
Your C.O.C. #: 743612-03-01

Attention: Colin McVarish

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/11/08
Report #: R5957083
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9U0744
Received: 2019/10/25, 14:22

Sample Matrix: Water
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Carbonate, Bicarbonate and Hydroxide	1	N/A	2019/10/31	N/A	SM 23 4500-CO2 D
Alkalinity	1	N/A	2019/11/06	ATL SOP 00013	EPA 310.2 R1974 m
Carbonaceous BOD	1	2019/10/25	2019/10/30	ATL SOP 00041	SM 23 5210B m
Chloride	1	N/A	2019/11/06	ATL SOP 00014	SM 23 4500-Cl- E m
Total coliform (CFU/100mL) in water	1	N/A	2019/10/25	ATL SOP 00097	MOE E3371 R2 (2018)
Colour	1	N/A	2019/11/07	ATL SOP 00020	SM 23 2120C m
Conductance - water	1	N/A	2019/10/31	ATL SOP 00004	SM 23 2510B m
Fecal coliform in water (CFU/100 mL)	1	N/A	2019/10/25	ATL SOP 00071	SM 23 9222D
Hardness (calculated as CaCO3)	1	N/A	2019/11/06	ATL SOP 00048	Auto Calc
Metals Water Total MS	1	2019/11/05	2019/11/05	ATL SOP 00058	EPA 6020B R2 m
Ion Balance (% Difference)	1	N/A	2019/11/07	N/A	Auto Calc.
Anion and Cation Sum	1	N/A	2019/11/06	N/A	Auto Calc.
Nitrogen Ammonia - water	1	N/A	2019/11/05	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	1	N/A	2019/11/06	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	1	N/A	2019/11/06	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	1	N/A	2019/11/07	ATL SOP 00018	ASTM D3867-16
pH (3)	1	N/A	2019/10/31	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	1	N/A	2019/11/06	ATL SOP 00021	SM 23 4500-P E m
Salinity (4)	7	N/A	2019/11/04		SM 22 2520B
Sat. pH and Langelier Index (@ 20C)	1	N/A	2019/11/07	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	1	N/A	2019/11/07	ATL SOP 00049	Auto Calc.
Reactive Silica	1	N/A	2019/11/06	ATL SOP 00022	EPA 366.0 m
Sulphate	1	N/A	2019/11/06	ATL SOP 00023	ASTM D516-16 m
Chlorophyll A (Sub from Bedford) (1)	1	2019/10/28	2019/11/08		
Total Dissolved Solids (TDS calc)	1	N/A	2019/11/07	N/A	Auto Calc.
Organic carbon - Total (TOC) (5)	1	N/A	2019/11/06	ATL SOP 00203	SM 23 5310B m
Total Phosphorus (Colourimetric) (2)	1	2019/10/30	2019/10/30	CAM SOP-00407	SM 23 4500 P B H m
Total Suspended Solids	5	2019/10/31	2019/11/01	ATL SOP 00007	SM 23 2540D m
Total Suspended Solids	2	2019/11/01	2019/11/04	ATL SOP 00007	SM 23 2540D m
Turbidity	1	N/A	2019/10/31	ATL SOP 00011	EPA 180.1 R2 m

Your Project #: 171046.01
Your C.O.C. #: 743612-03-01

Attention: Colin McVarish

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/11/08
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CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9U0744
Received: 2019/10/25, 14:22

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Dalhousie Dept of Oceanography
(2) This test was performed by Bureau Veritas Laboratories Mississauga
(3) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(4) Non-accredited test method
(5) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Encryption Key — AUTHORIZED REPORT / RAPPORT AUTORISÉ

Bureau Veritas Laboratories
08 Nov 2019 13:43:07

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Keri Mackay, Customer Experience Team Lead
Email: Keri.MACKAY@bvlabs.com
Phone# (902)420-0203 Ext:294
==
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total Cover Pages : 2

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		LDE118		
Sampling Date		2019/10/25 08:30		
COC Number		743612-03-01		
	UNITS	**BKG-2**	**RDL**	**QC Batch**
Calculated Parameters				
Anion Sum	me/L	2.08	N/A	6407153
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	23	1.0	6407151
Calculated TDS	mg/L	140	1.0	6407157
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	6407151
Cation Sum	me/L	2.02	N/A	6407153
Hardness (CaCO3)	mg/L	88	1.0	6407101
Ion Balance (% Difference)	%	1.46	N/A	6407152
Langelier Index (@ 20C)	N/A	-1.32		6407155
Langelier Index (@ 4C)	N/A	-1.57		6407156
Nitrate (N)	mg/L	0.065	0.050	6407154
Saturation pH (@ 20C)	N/A	8.50		6407155
Saturation pH (@ 4C)	N/A	8.75		6407156
Inorganics				
Total Alkalinity (Total as CaCO3)	mg/L	23	5.0	6427106
Dissolved Chloride (Cl-)	mg/L	8.7	1.0	6427114
Colour	TCU	39	5.0	6427125
Nitrate + Nitrite (N)	mg/L	0.065	0.050	6427131
Nitrite (N)	mg/L	<0.010	0.010	6427134
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	0.050	6424814
Total Organic Carbon (C)	mg/L	6.1	0.50	6425124
Orthophosphate (P)	mg/L	<0.010	0.010	6427128
pH	pH	7.18	N/A	6416848
Reactive Silica (SiO2)	mg/L	6.5	0.50	6427120
Dissolved Sulphate (SO4)	mg/L	66	2.0	6427117
Turbidity	NTU	8.6	0.10	6417157
Conductivity	uS/cm	210	1.0	6416853
Metals				
Total Aluminum (Al)	ug/L	340	5.0	6424517
Total Antimony (Sb)	ug/L	<1.0	1.0	6424517
Total Arsenic (As)	ug/L	<1.0	1.0	6424517
Total Barium (Ba)	ug/L	70	1.0	6424517
Total Beryllium (Be)	ug/L	<1.0	1.0	6424517
Total Bismuth (Bi)	ug/L	<2.0	2.0	6424517
Total Boron (B)	ug/L	<50	50	6424517

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

BV Labs Job #: B9U0744
Report Date: 2019/11/08

CBCL Limited
Client Project #: 171046.01

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		LDE118		
Sampling Date		2019/10/25 08:30		
COC Number		743612-03-01		
	UNITS	BKG-2	RDL	QC Batch
Total Cadmium (Cd)	ug/L	0.010	0.010	6424517
Total Calcium (Ca)	ug/L	32000	100	6424517
Total Chromium (Cr)	ug/L	<1.0	1.0	6424517
Total Cobalt (Co)	ug/L	<0.40	0.40	6424517
Total Copper (Cu)	ug/L	0.87	0.50	6424517
Total Iron (Fe)	ug/L	500	50	6424517
Total Lead (Pb)	ug/L	<0.50	0.50	6424517
Total Magnesium (Mg)	ug/L	2200	100	6424517
Total Manganese (Mn)	ug/L	110	2.0	6424517
Total Molybdenum (Mo)	ug/L	<2.0	2.0	6424517
Total Nickel (Ni)	ug/L	<2.0	2.0	6424517
Total Phosphorus (P)	ug/L	<100	100	6424517
Total Potassium (K)	ug/L	1300	100	6424517
Total Selenium (Se)	ug/L	<0.50	0.50	6424517
Total Silver (Ag)	ug/L	<0.10	0.10	6424517
Total Sodium (Na)	ug/L	5100	100	6424517
Total Strontium (Sr)	ug/L	220	2.0	6424517
Total Thallium (Tl)	ug/L	<0.10	0.10	6424517
Total Tin (Sn)	ug/L	<2.0	2.0	6424517
Total Titanium (Ti)	ug/L	8.3	2.0	6424517
Total Uranium (U)	ug/L	<0.10	0.10	6424517
Total Vanadium (V)	ug/L	<2.0	2.0	6424517
Total Zinc (Zn)	ug/L	<5.0	5.0	6424517

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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RESULTS OF ANALYSES OF WATER

BV Labs ID		LDE118			LDE119	LDE120			LDE120		
Sampling Date		2019/10/25 08:30			2019/10/25 10:13	2019/10/25 10:25			2019/10/25 10:25		
COC Number		743612-03-01			743612-03-01	743612-03-01			743612-03-01		
	UNITS	**BKG-2**	**RDL**	**QC Batch**	**AVE-6**	**AVE-7**	**RDL**	**QC Batch**	**AVE-7 Lab-Dup**	**RDL**	**QC Batch**
Inorganics											
Carbonaceous BOD	mg/L	<10	10	6406692							
Total Phosphorus	mg/L	0.025	0.004	6415200							
Salinity	N/A	<2.0	2.0	6422734	21	20	2.0	6422734			
Total Suspended Solids	mg/L	5.7	2.0	6417446	81	96	5.0	6417446	88	5.0	6417446
Subcontracted Analysis											
Subcontract Parameter	N/A	ATTACHED	N/A	6412011							

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

BV Labs ID		LDE121		LDE122			LDE123		LDE124		
Sampling Date		2019/10/25 08:45		2019/10/25 09:47			2019/10/25 10:45		2019/10/25 10:03		
COC Number		743612-03-01		743612-03-01			743612-03-01		743612-03-01		
	UNITS	**BKG-1**	**RDL**	**AVE-3**	**RDL**	**QC Batch**	**AVE-8**	**RDL**	**AVE-5**	**RDL**	**QC Batch**
Inorganics											
Salinity	N/A	<2.0	2.0	23	2.0	6422734	8.4	2.0	21	2.0	6422734
Total Suspended Solids	mg/L	34	2.0	100	5.0	6417446	290	10	120	5.0	6419551

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs ID		LDE124		
Sampling Date		2019/10/25 10:03		
COC Number		743612-03-01		
	UNITS	**AVE-5 Lab-Dup**	**RDL**	**QC Batch**
Inorganics				
Total Suspended Solids	mg/L	120	5.0	6419551

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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MICROBIOLOGY (WATER)

BV Labs ID		LDE118		
Sampling Date		2019/10/25 08:30		
COC Number		743612-03-01		
	UNITS	BKG-2	RDL	QC Batch
Microbiological				
Fecal coliform	CFU/100mL	70	10	6407308
Total Coliforms	CFU/100mL	1100	10	6407307

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	6.3°C

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6406692	DME	QC Standard	Carbonaceous BOD	2019/10/30		133 (1)	%	80 - 120
6406692	DME	Spiked Blank	Carbonaceous BOD	2019/10/30		114	%	80 - 120
6406692	DME	Method Blank	Carbonaceous BOD	2019/10/30	<2.0		mg/L	
6406692	DME	RPD	Carbonaceous BOD	2019/10/30	NC		%	25
6407307	JWA	Method Blank	Total Coliforms	2019/10/25	<1.0		CFU/100mL	
6407308	JWA	Method Blank	Fecal coliform	2019/10/25	<1.0		CFU/100mL	
6415200	SSV	Matrix Spike	Total Phosphorus	2019/10/30		91	%	80 - 120
6415200	SSV	QC Standard	Total Phosphorus	2019/10/30		92	%	80 - 120
6415200	SSV	Spiked Blank	Total Phosphorus	2019/10/30		89	%	80 - 120
6415200	SSV	Method Blank	Total Phosphorus	2019/10/30	<0.004		mg/L	
6415200	SSV	RPD	Total Phosphorus	2019/10/30	5.3		%	20
6416848	SHW	QC Standard	pH	2019/10/31		101	%	97 - 103
6416848	SHW	RPD	pH	2019/10/31	0.24		%	N/A
6416853	SHW	Spiked Blank	Conductivity	2019/10/31		102	%	80 - 120
6416853	SHW	Method Blank	Conductivity	2019/10/31	1.3, RDL=1.0		uS/cm	
6416853	SHW	RPD	Conductivity	2019/10/31	0.46		%	10
6417157	SHW	QC Standard	Turbidity	2019/10/31		100	%	80 - 120
6417157	SHW	Spiked Blank	Turbidity	2019/10/31		100	%	80 - 120
6417157	SHW	Method Blank	Turbidity	2019/10/31	<0.10		NTU	
6417157	SHW	RPD	Turbidity	2019/10/31	1.1		%	20
6417446	GTH	QC Standard	Total Suspended Solids	2019/11/01		99	%	80 - 120
6417446	GTH	Method Blank	Total Suspended Solids	2019/11/01	<1.0		mg/L	
6417446	GTH	RPD [LDE120-01]	Total Suspended Solids	2019/11/01	8.7		%	20
6419551	MLW	QC Standard	Total Suspended Solids	2019/11/04		96	%	80 - 120
6419551	MLW	Method Blank	Total Suspended Solids	2019/11/04	<1.0		mg/L	
6419551	MLW	RPD [LDE124-01]	Total Suspended Solids	2019/11/04	0		%	20
6422734	BBD	QC Standard	Salinity	2019/11/04		101	%	80 - 120
6422734	BBD	Method Blank	Salinity	2019/11/04	<2.0		N/A	
6422734	BBD	RPD	Salinity	2019/11/04	NC		%	25
6424517	MLB	Matrix Spike	Total Aluminum (Al)	2019/11/05		96	%	80 - 120
			Total Antimony (Sb)	2019/11/05		98	%	80 - 120
			Total Arsenic (As)	2019/11/05		98	%	80 - 120
			Total Barium (Ba)	2019/11/05		93	%	80 - 120
			Total Beryllium (Be)	2019/11/05		100	%	80 - 120
			Total Bismuth (Bi)	2019/11/05		98	%	80 - 120
			Total Boron (B)	2019/11/05		103	%	80 - 120
			Total Cadmium (Cd)	2019/11/05		93	%	80 - 120
			Total Calcium (Ca)	2019/11/05		97	%	80 - 120
			Total Chromium (Cr)	2019/11/05		97	%	80 - 120
			Total Cobalt (Co)	2019/11/05		96	%	80 - 120
			Total Copper (Cu)	2019/11/05		97	%	80 - 120
			Total Iron (Fe)	2019/11/05		100	%	80 - 120
			Total Lead (Pb)	2019/11/05		97	%	80 - 120
			Total Magnesium (Mg)	2019/11/05		102	%	80 - 120
			Total Manganese (Mn)	2019/11/05		99	%	80 - 120
			Total Molybdenum (Mo)	2019/11/05		102	%	80 - 120
			Total Nickel (Ni)	2019/11/05		99	%	80 - 120
			Total Phosphorus (P)	2019/11/05		100	%	80 - 120
			Total Potassium (K)	2019/11/05		97	%	80 - 120
			Total Selenium (Se)	2019/11/05		97	%	80 - 120
			Total Silver (Ag)	2019/11/05		96	%	80 - 120
			Total Sodium (Na)	2019/11/05		94	%	80 - 120
			Total Strontium (Sr)	2019/11/05		NC	%	80 - 120
			Total Thallium (Tl)	2019/11/05		100	%	80 - 120

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Tin (Sn)	2019/11/05		101	%	80 - 120
			Total Titanium (Ti)	2019/11/05		101	%	80 - 120
			Total Uranium (U)	2019/11/05		106	%	80 - 120
			Total Vanadium (V)	2019/11/05		101	%	80 - 120
			Total Zinc (Zn)	2019/11/05		96	%	80 - 120
6424517	MLB	Spiked Blank	Total Aluminum (Al)	2019/11/05		102	%	80 - 120
			Total Antimony (Sb)	2019/11/05		101	%	80 - 120
			Total Arsenic (As)	2019/11/05		101	%	80 - 120
			Total Barium (Ba)	2019/11/05		100	%	80 - 120
			Total Beryllium (Be)	2019/11/05		104	%	80 - 120
			Total Bismuth (Bi)	2019/11/05		101	%	80 - 120
			Total Boron (B)	2019/11/05		104	%	80 - 120
			Total Cadmium (Cd)	2019/11/05		95	%	80 - 120
			Total Calcium (Ca)	2019/11/05		105	%	80 - 120
			Total Chromium (Cr)	2019/11/05		100	%	80 - 120
			Total Cobalt (Co)	2019/11/05		101	%	80 - 120
			Total Copper (Cu)	2019/11/05		101	%	80 - 120
			Total Iron (Fe)	2019/11/05		108	%	80 - 120
			Total Lead (Pb)	2019/11/05		101	%	80 - 120
			Total Magnesium (Mg)	2019/11/05		109	%	80 - 120
			Total Manganese (Mn)	2019/11/05		103	%	80 - 120
			Total Molybdenum (Mo)	2019/11/05		105	%	80 - 120
			Total Nickel (Ni)	2019/11/05		103	%	80 - 120
			Total Phosphorus (P)	2019/11/05		107	%	80 - 120
			Total Potassium (K)	2019/11/05		105	%	80 - 120
			Total Selenium (Se)	2019/11/05		101	%	80 - 120
			Total Silver (Ag)	2019/11/05		101	%	80 - 120
			Total Sodium (Na)	2019/11/05		102	%	80 - 120
			Total Strontium (Sr)	2019/11/05		102	%	80 - 120
			Total Thallium (Tl)	2019/11/05		103	%	80 - 120
			Total Tin (Sn)	2019/11/05		102	%	80 - 120
			Total Titanium (Ti)	2019/11/05		106	%	80 - 120
			Total Uranium (U)	2019/11/05		109	%	80 - 120
			Total Vanadium (V)	2019/11/05		105	%	80 - 120
			Total Zinc (Zn)	2019/11/05		100	%	80 - 120
6424517	MLB	Method Blank	Total Aluminum (Al)	2019/11/05	<5.0		ug/L	
			Total Antimony (Sb)	2019/11/05	<1.0		ug/L	
			Total Arsenic (As)	2019/11/05	<1.0		ug/L	
			Total Barium (Ba)	2019/11/05	<1.0		ug/L	
			Total Beryllium (Be)	2019/11/05	<1.0		ug/L	
			Total Bismuth (Bi)	2019/11/05	<2.0		ug/L	
			Total Boron (B)	2019/11/05	<50		ug/L	
			Total Cadmium (Cd)	2019/11/05	<0.010		ug/L	
			Total Calcium (Ca)	2019/11/05	<100		ug/L	
			Total Chromium (Cr)	2019/11/05	<1.0		ug/L	
			Total Cobalt (Co)	2019/11/05	<0.40		ug/L	
			Total Copper (Cu)	2019/11/05	<0.50		ug/L	
			Total Iron (Fe)	2019/11/05	<50		ug/L	
			Total Lead (Pb)	2019/11/05	<0.50		ug/L	
			Total Magnesium (Mg)	2019/11/05	<100		ug/L	
			Total Manganese (Mn)	2019/11/05	<2.0		ug/L	
			Total Molybdenum (Mo)	2019/11/05	<2.0		ug/L	
			Total Nickel (Ni)	2019/11/05	<2.0		ug/L	
			Total Phosphorus (P)	2019/11/05	<100		ug/L	
			Total Potassium (K)	2019/11/05	<100		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Selenium (Se)	2019/11/05	<0.50		ug/L	
			Total Silver (Ag)	2019/11/05	<0.10		ug/L	
			Total Sodium (Na)	2019/11/05	<100		ug/L	
			Total Strontium (Sr)	2019/11/05	<2.0		ug/L	
			Total Thallium (Tl)	2019/11/05	<0.10		ug/L	
			Total Tin (Sn)	2019/11/05	<2.0		ug/L	
			Total Titanium (Ti)	2019/11/05	<2.0		ug/L	
			Total Uranium (U)	2019/11/05	<0.10		ug/L	
			Total Vanadium (V)	2019/11/05	<2.0		ug/L	
			Total Zinc (Zn)	2019/11/05	<5.0		ug/L	
6424517	MLB	RPD	Total Aluminum (Al)	2019/11/05	4.6		%	20
			Total Antimony (Sb)	2019/11/05	NC		%	20
			Total Arsenic (As)	2019/11/05	NC		%	20
			Total Barium (Ba)	2019/11/05	1.2		%	20
			Total Beryllium (Be)	2019/11/05	NC		%	20
			Total Bismuth (Bi)	2019/11/05	NC		%	20
			Total Boron (B)	2019/11/05	0.86		%	20
			Total Cadmium (Cd)	2019/11/05	NC		%	20
			Total Calcium (Ca)	2019/11/05	2.0		%	20
			Total Chromium (Cr)	2019/11/05	NC		%	20
			Total Cobalt (Co)	2019/11/05	NC		%	20
			Total Copper (Cu)	2019/11/05	0.42		%	20
			Total Iron (Fe)	2019/11/05	2.1		%	20
			Total Lead (Pb)	2019/11/05	NC		%	20
			Total Magnesium (Mg)	2019/11/05	2.6		%	20
			Total Manganese (Mn)	2019/11/05	NC		%	20
			Total Molybdenum (Mo)	2019/11/05	NC		%	20
			Total Nickel (Ni)	2019/11/05	NC		%	20
			Total Phosphorus (P)	2019/11/05	NC		%	20
			Total Potassium (K)	2019/11/05	1.5		%	20
			Total Selenium (Se)	2019/11/05	NC		%	20
			Total Silver (Ag)	2019/11/05	NC		%	20
			Total Sodium (Na)	2019/11/05	1.6		%	20
			Total Strontium (Sr)	2019/11/05	0.30		%	20
			Total Thallium (Tl)	2019/11/05	NC		%	20
			Total Tin (Sn)	2019/11/05	NC		%	20
			Total Titanium (Ti)	2019/11/05	NC		%	20
			Total Uranium (U)	2019/11/05	3.2		%	20
			Total Vanadium (V)	2019/11/05	NC		%	20
			Total Zinc (Zn)	2019/11/05	NC		%	20
6424814	MCN	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2019/11/05		95	%	80 - 120
6424814	MCN	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2019/11/05		101	%	80 - 120
6424814	MCN	Method Blank	Nitrogen (Ammonia Nitrogen)	2019/11/05	<0.050		mg/L	
6424814	MCN	RPD	Nitrogen (Ammonia Nitrogen)	2019/11/05	6.4		%	20
6425124	MGN	Matrix Spike	Total Organic Carbon (C)	2019/11/06		99	%	85 - 115
6425124	MGN	Spiked Blank	Total Organic Carbon (C)	2019/11/06		98	%	80 - 120
6425124	MGN	Method Blank	Total Organic Carbon (C)	2019/11/06	<0.50		mg/L	
6425124	MGN	RPD	Total Organic Carbon (C)	2019/11/06	2.8		%	15
6427106	MCN	Matrix Spike	Total Alkalinity (Total as CaCO3)	2019/11/06		NC	%	80 - 120
6427106	MCN	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019/11/06		110	%	80 - 120
6427106	MCN	Method Blank	Total Alkalinity (Total as CaCO3)	2019/11/06	<5.0		mg/L	
6427106	MCN	RPD	Total Alkalinity (Total as CaCO3)	2019/11/06	7.5		%	25
6427114	MCN	Matrix Spike	Dissolved Chloride (Cl-)	2019/11/06		NC	%	80 - 120
6427114	MCN	Spiked Blank	Dissolved Chloride (Cl-)	2019/11/06		103	%	80 - 120
6427114	MCN	Method Blank	Dissolved Chloride (Cl-)	2019/11/06	<1.0		mg/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6427114	MCN	RPD	Dissolved Chloride (Cl-)	2019/11/06	0.21		%	25
6427117	MCN	Matrix Spike	Dissolved Sulphate (SO4)	2019/11/06		92	%	80 - 120
6427117	MCN	Spiked Blank	Dissolved Sulphate (SO4)	2019/11/06		105	%	80 - 120
6427117	MCN	Method Blank	Dissolved Sulphate (SO4)	2019/11/06	<2.0		mg/L	
6427117	MCN	RPD	Dissolved Sulphate (SO4)	2019/11/06	0.47		%	25
6427120	MCN	Matrix Spike	Reactive Silica (SiO2)	2019/11/06		NC	%	80 - 120
6427120	MCN	Spiked Blank	Reactive Silica (SiO2)	2019/11/06		94	%	80 - 120
6427120	MCN	Method Blank	Reactive Silica (SiO2)	2019/11/06	<0.50		mg/L	
6427120	MCN	RPD	Reactive Silica (SiO2)	2019/11/06	0.70		%	25
6427125	MCN	Spiked Blank	Colour	2019/11/07		102	%	80 - 120
6427125	MCN	Method Blank	Colour	2019/11/07	<5.0		TCU	
6427125	MCN	RPD	Colour	2019/11/07	NC		%	20
6427128	MCN	Matrix Spike	Orthophosphate (P)	2019/11/06		91	%	80 - 120
6427128	MCN	Spiked Blank	Orthophosphate (P)	2019/11/06		108	%	80 - 120
6427128	MCN	Method Blank	Orthophosphate (P)	2019/11/06	<0.010		mg/L	
6427128	MCN	RPD	Orthophosphate (P)	2019/11/06	NC		%	25
6427131	MCN	Matrix Spike	Nitrate + Nitrite (N)	2019/11/06		97	%	80 - 120
6427131	MCN	Spiked Blank	Nitrate + Nitrite (N)	2019/11/06		96	%	80 - 120
6427131	MCN	Method Blank	Nitrate + Nitrite (N)	2019/11/06	<0.050		mg/L	
6427131	MCN	RPD	Nitrate + Nitrite (N)	2019/11/06	0.59		%	25
6427134	MCN	Matrix Spike	Nitrite (N)	2019/11/06		104	%	80 - 120
6427134	MCN	Spiked Blank	Nitrite (N)	2019/11/06		103	%	80 - 120
6427134	MCN	Method Blank	Nitrite (N)	2019/11/06	<0.010		mg/L	
6427134	MCN	RPD	Nitrite (N)	2019/11/06	NC		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Reference Material recovery high. Second source QC recovery and all other QC acceptable.

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Eric Dearman, Scientific Specialist

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Mike MacGillivray, Scientific Specialist (Inorganics)

Robyn Edwards, Bedford Micro Supervisor

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

Department of Oceanography
1355 Oxford St
Halifax, NS
B3H 4R2

Determination of chlorophyll a by fluorescence

Client: Bureau Veritas Laboratories, 200 Bluewater Road, Bedford, NS, B4B 1G9

Attention: Keri Mackay **Received:** 2019-10-28

Project #: B9U0744 **Completed:** 2019-11-08

Hugh MacIntyre, Ph.D.

Chl *a* (chlorophyll *a* ; µg L-1) determined by the acidification method (Holm-Hansen et al., 1965). Estimates made with the non-acidification method (Welschmeyer, 1994) are shown for comparison. The non-acidification method is considered more reliable than the acidification method in correcting for bias due to the contributions of chlorophyll *b* and chlorophyll degradation products.

Holm-Hansen O, Lorenzen CJ, Holmes RW, Strickland JDH (1965) Fluorometric determination of chlorophyll. J Conseil 30:3-15

Welschmeyer NA (1994) Fluorometric analysis of chlorophyll *a* in the presence of chlorophyll *b* and phaeopigments. Limnol Oceanogr 39:1985-1992

Contractor ID	Client ID	Chl *a* (acidification)	Chl *a* (non-acidification)
LDE118-01R	BKG-2	0.39	0.545

Bureau Veritas Laboratories
200 Bluewater Road, Bedford, Nova Scotia Canada B4B 1G9 Tel:(902) 420-0203 Toll-free:800-563-6266 Fax:(902) 420-8612 www.bvlabs.com

Chain Of Custody Record

INVOICE TO:		Report Information		Project Information	
Company Name	#41018 CBCL Limited	Company Name		Quotation #	
Contact Name	ACCOUNTS PAYABLE	Contact Name	Colin McVarish	P.O. #	
Address	1505 Barrington Street Suite 901 / PO Box 606	Address		Project #	171046.01
	Halifax NS B3J 3Y6			Project Name	
Phone	(902) 421-7241 Fax: (902) 423-3938	Phone	Fax:	Site #	
Email	acct@cbcl.ca	Email	cmcvarish@cbcl.ca , mrutherford@cbcl.ca	Sampled By	

Laboratory Use Only

BV Labs Job #	Bottle Order #:
B9U0744	743612
Chain Of Custody Record	Project Manager
C#743612-03-01	Keri Mackay

Regulatory Criteria:

Special Instructions

** Specify Matrix: Surface/Ground/Tapwater/Sewage/Effluent/Seawater Potable/Nonpotable/Tissue/Soil/Sludge/Metal

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: ✓

(will be applied if Rush TAT is not specified):

Standard TAT = 5-7 Working days for most tests.

Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)

Date Required: Time Required: ☐

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered & Preserved	Lab Filtration Required	Total Suspended Solids	Salinity	Atlantic RCAp-MS Total Metals in Water	Low level Total Phosphorus (Colourimetric)	Fecal coliform in water (CFU/100 mL)	Total coliform (CFU/100mL) in water	Biochemical Oxygen Demand	Chlorophyll A (Sub from Bedford)			# of Bottles	Comments / Hazards / Other Required Analysis
1	BKG-2		2019/10/25	8:30	Water			X	X	X	X	X	X	X	X			8	
2	AVE-6		"	10:13	"			X	X									2	
3	AVE-7		"	10:25	"			X	X									2	
4	BKG-1		"	8:45	"			X	X									2	
5	AVE-3		"	9:47	"			X	X									2	
6	AVE-8		"	10:45	"			X	X									2	
7	AVE-5		"	10:03	"			X	X									2	
8								X	X										
9								X	X										
10								X	X										

2019 OCT 25 14:2

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only		
Colin McVarish	19/10/25	14:25	[signature]				Time Sensitive ☐	Temperature (°C) on Receipt: 5 5 9	Custody Seal Intact on Cooler? ☐ Yes ☐ No

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: BV Labs Yellow: Client

CBCL Limited
BV Labs Job Number: B9U0744 Client Project #: 171046.01
Report Date: 2019/11/08

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		LDE118		
Sampling Date		2019-10-25 08:30		
COC Number		743612-03-01		
	UNITS	**BKG-2**	**RDL**	**QC Batch**
Calculated Parameters				
Anion Sum	me/L	2.08	N/A	6407153
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	23	1.0	6407151
Calculated TDS	mg/L	140	1.0	6407157
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	6407151
Cation Sum	me/L	2.02	N/A	6407153
Hardness (CaCO3)	mg/L	88	1.0	6407101
Ion Balance (% Difference)	%	1.46	N/A	6407152
Langelier Index (@ 20C)	N/A	-1.32		6407155
Langelier Index (@ 4C)	N/A	-1.57		6407156
Nitrate (N)	mg/L	0.065	0.050	6407154
Saturation pH (@ 20C)	N/A	8.50		6407155
Saturation pH (@ 4C)	N/A	8.75		6407156
Inorganics				
Total Alkalinity (Total as CaCO3)	mg/L	23	5.0	6427106
Dissolved Chloride (Cl-)	mg/L	8.7	1.0	6427114
Colour	TCU	39	5.0	6427125
Nitrate + Nitrite (N)	mg/L	0.065	0.050	6427131
Nitrite (N)	mg/L	<0.010	0.010	6427134
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	0.050	6424814
Total Organic Carbon (C)	mg/L	6.1	0.50	6425124
Orthophosphate (P)	mg/L	<0.010	0.010	6427128
pH	pH	7.18	N/A	6416848
Reactive Silica (SiO2)	mg/L	6.5	0.50	6427120
Dissolved Sulphate (SO4)	mg/L	66	2.0	6427117
Turbidity	NTU	8.6	0.10	6417157
Conductivity	uS/cm	210	1.0	6416853
Metals				
Total Aluminum (Al)	ug/L	340	5.0	6424517
Total Antimony (Sb)	ug/L	<1.0	1.0	6424517
Total Arsenic (As)	ug/L	<1.0	1.0	6424517
Total Barium (Ba)	ug/L	70	1.0	6424517
Total Beryllium (Be)	ug/L	<1.0	1.0	6424517
Total Bismuth (Bi)	ug/L	<2.0	2.0	6424517
Total Boron (B)	ug/L	<50	50	6424517
Total Cadmium (Cd)	ug/L	0.010	0.010	6424517

BV Labs Job Number: B9U0744
Report Date: 2019/11/08

CBCL Limited
Client Project #: 171046.01

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

BV Labs ID		LDE118		
Sampling Date		2019-10-25 08:30		
COC Number		743612-03-01		
	UNITS	**BKG-2**	**RDL**	**QC Batch**
Total Calcium (Ca)	ug/L	32000	100	6424517
Total Chromium (Cr)	ug/L	<1.0	1.0	6424517
Total Cobalt (Co)	ug/L	<0.40	0.40	6424517
Total Copper (Cu)	ug/L	0.87	0.50	6424517
Total Iron (Fe)	ug/L	500	50	6424517
Total Lead (Pb)	ug/L	<0.50	0.50	6424517
Total Magnesium (Mg)	ug/L	2200	100	6424517
Total Manganese (Mn)	ug/L	110	2.0	6424517
Total Molybdenum (Mo)	ug/L	<2.0	2.0	6424517
Total Nickel (Ni)	ug/L	<2.0	2.0	6424517
Total Phosphorus (P)	ug/L	<100	100	6424517
Total Potassium (K)	ug/L	1300	100	6424517
Total Selenium (Se)	ug/L	<0.50	0.50	6424517
Total Silver (Ag)	ug/L	<0.10	0.10	6424517
Total Sodium (Na)	ug/L	5100	100	6424517
Total Strontium (Sr)	ug/L	220	2.0	6424517
Total Thallium (Tl)	ug/L	<0.10	0.10	6424517
Total Tin (Sn)	ug/L	<2.0	2.0	6424517
Total Titanium (Ti)	ug/L	8.3	2.0	6424517
Total Uranium (U)	ug/L	<0.10	0.10	6424517
Total Vanadium (V)	ug/L	<2.0	2.0	6424517
Total Zinc (Zn)	ug/L	<5.0	5.0	6424517

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Results relate only to the items tested.

CBCL Limited
BV Labs Job Number: B9U0744
Client Project #: 171046.01
Report Date: 2019/11/08

RESULTS OF ANALYSES OF WATER

BV Labs ID		LDE118			LDE119	LDE120			LDE120			LDE121		LDE122			LDE123		LDE124			LDE124		
Sampling Date		2019-10-25 08:30			2019-10-25 10:13	2019-10-25 10:25			2019-10-25 10:25			2019-10-25 08:45		2019-10-25 09:47			2019-10-25 10:45		2019-10-25 10:03			2019-10-25 10:03		
COC Number		743612-03-01			743612-03-01	743612-03-01			743612-03-01			743612-03-01		743612-03-01			743612-03-01		743612-03-01			743612-03-01		
	UNITS	**BKG-2**	**RDL**	**QC Batch**	**AVE-6**	**AVE-7**	**RDL**	**QC Batch**	**AVE-7 Lab-Dup**	**RDL**	**QC Batch**	**BKG-1**	**RDL**	**AVE-3**	**RDL**	**QC Batch**	**AVE-8**	**RDL**	**AVE-5**	**RDL**	**QC Batch**	**AVE-5 Lab-Dup**	**RDL**	**QC Batch**
Inorganics																								
Carbonaceous BOD	mg/L	<10	10	6406692																				
Total Phosphorus	mg/L	0.025	0.004	6415200																				
Salinity	N/A	<2.0	2.0	6422734	21	20	2.0	6422734				<2.0	2.0	23	2.0	6422734	8.4	2.0	21	2.0	6422734			
Total Suspended Solids	mg/L	5.7	2.0	6417446	81	96	5.0	6417446	88	5.0	6417446	34	2.0	100	5.0	6417446	290	10	120	5.0	6419551	120	5.0	6419551
Subcontracted Analysis																								
Subcontract Parameter	N/A	ATTACHED	N/A	6412011																				

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Results relate only to the items tested.

CBCL Limited

BV Labs Job Number: B9U0744
Client Project #: 171046.01

Report Date: 2019/11/08

MICROBIOLOGY (WATER)

BV Labs ID		LDE118		
Sampling Date		2019-10-25 08:30		
COC Number		743612-03-01		
	UNITS	**BKG-2**	**RDL**	**QC Batch**
Microbiological				
Fecal coliform	CFU/100mL	70	10	6407308
Total Coliforms	CFU/100mL	1100	10	6407307

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Results relate only to the items tested.

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Each tempera	Each tempera	Each tempera	Each temperature is the average of up to three cooler temperatures taken at receipt
Package 1	6.3°C	#N/A	#N/A

Results relate only to the items tested.

CBCL Limited
Attention: Colin McVarish
Report Date: 2019/11/08 Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9U0744

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6406692	DME	QC Standard	Carbonaceous BOD	2019-10-30		133 (1)	%	80 - 120
6406692	DME	Spiked Blank	Carbonaceous BOD	2019-10-30		114	%	80 - 120
6406692	DME	Method Blank	Carbonaceous BOD	2019-10-30	<2.0		mg/L	
6406692	DME	RPD	Carbonaceous BOD	2019-10-30	NC		%	25
6407307	JWA	Method Blank	Total Coliforms	2019-10-25	<1.0		CFU/100mL	
6407308	JWA	Method Blank	Fecal coliform	2019-10-25	<1.0		CFU/100mL	
6415200	SSV	Matrix Spike	Total Phosphorus	2019-10-30		91	%	80 - 120
6415200	SSV	QC Standard	Total Phosphorus	2019-10-30		92	%	80 - 120
6415200	SSV	Spiked Blank	Total Phosphorus	2019-10-30		89	%	80 - 120
6415200	SSV	Method Blank	Total Phosphorus	2019-10-30	<0.004		mg/L	
6415200	SSV	RPD	Total Phosphorus	2019-10-30	5.3		%	20
6416848	SHW	QC Standard	pH	2019-10-31		101	%	97 - 103
6416848	SHW	RPD	pH	2019-10-31	0.24		%	N/A
6416853	SHW	Spiked Blank	Conductivity	2019-10-31		102	%	80 - 120
6416853	SHW	Method Blank	Conductivity	2019-10-31	1.3, RDL=1.0		uS/cm	
6416853	SHW	RPD	Conductivity	2019-10-31	0.46		%	10
6417157	SHW	QC Standard	Turbidity	2019-10-31		100	%	80 - 120
6417157	SHW	Spiked Blank	Turbidity	2019-10-31		100	%	80 - 120
6417157	SHW	Method Blank	Turbidity	2019-10-31	<0.10		NTU	
6417157	SHW	RPD	Turbidity	2019-10-31	1.1		%	20
6417446	GTH	QC Standard	Total Suspended Solids	2019-11-01		99	%	80 - 120
6417446	GTH	Method Blank	Total Suspended Solids	2019-11-01	<1.0		mg/L	
6417446	GTH	RPD [LDE120-01]	Total Suspended Solids	2019-11-01	8.7		%	20
6419551	MLW	QC Standard	Total Suspended Solids	2019-11-04		96	%	80 - 120
6419551	MLW	Method Blank	Total Suspended Solids	2019-11-04	<1.0		mg/L	
6419551	MLW	RPD [LDE124-01]	Total Suspended Solids	2019-11-04	0		%	20
6422734	BBD	QC Standard	Salinity	2019-11-04		101	%	80 - 120
6422734	BBD	Method Blank	Salinity	2019-11-04	<2.0		N/A	
6422734	BBD	RPD	Salinity	2019-11-04	NC		%	25
6424517	MLB	Matrix Spike	Total Aluminum (Al)	2019-11-05		96	%	80 - 120
			Total Antimony (Sb)	2019-11-05		98	%	80 - 120
			Total Arsenic (As)	2019-11-05		98	%	80 - 120
			Total Barium (Ba)	2019-11-05		93	%	80 - 120
			Total Beryllium (Be)	2019-11-05		100	%	80 - 120
			Total Bismuth (Bi)	2019-11-05		98	%	80 - 120
			Total Boron (B)	2019-11-05		103	%	80 - 120
			Total Cadmium (Cd)	2019-11-05		93	%	80 - 120
			Total Calcium (Ca)	2019-11-05		97	%	80 - 120
			Total Chromium (Cr)	2019-11-05		97	%	80 - 120
			Total Cobalt (Co)	2019-11-05		96	%	80 - 120
			Total Copper (Cu)	2019-11-05		97	%	80 - 120
			Total Iron (Fe)	2019-11-05		100	%	80 - 120
			Total Lead (Pb)	2019-11-05		97	%	80 - 120
			Total Magnesium (Mg)	2019-11-05		102	%	80 - 120
			Total Manganese (Mn)	2019-11-05		99	%	80 - 120
			Total Molybdenum (Mo)	2019-11-05		102	%	80 - 120
			Total Nickel (Ni)	2019-11-05		99	%	80 - 120
			Total Phosphorus (P)	2019-11-05		100	%	80 - 120
			Total Potassium (K)	2019-11-05		97	%	80 - 120
			Total Selenium (Se)	2019-11-05		97	%	80 - 120
			Total Silver (Ag)	2019-11-05		96	%	80 - 120
			Total Sodium (Na)	2019-11-05		94	%	80 - 120
			Total Strontium (Sr)	2019-11-05		NC	%	80 - 120
			Total Thallium (Tl)	2019-11-05		100	%	80 - 120
			Total Tin (Sn)	2019-11-05		101	%	80 - 120
			Total Titanium (Ti)	2019-11-05		101	%	80 - 120
			Total Uranium (U)	2019-11-05		106	%	80 - 120
			Total Vanadium (V)	2019-11-05		101	%	80 - 120
			Total Zinc (Zn)	2019-11-05		96	%	80 - 120

CBCL Limited
Attention: Colin McVarish
Report Date: 2019/11/08
Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9U0744

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6424517	MLB	Spiked Blank	Total Aluminum (Al)	2019-11-05		102	%	80 - 120
			Total Antimony (Sb)	2019-11-05		101	%	80 - 120
			Total Arsenic (As)	2019-11-05		101	%	80 - 120
			Total Barium (Ba)	2019-11-05		100	%	80 - 120
			Total Beryllium (Be)	2019-11-05		104	%	80 - 120
			Total Bismuth (Bi)	2019-11-05		101	%	80 - 120
			Total Boron (B)	2019-11-05		104	%	80 - 120
			Total Cadmium (Cd)	2019-11-05		95	%	80 - 120
			Total Calcium (Ca)	2019-11-05		105	%	80 - 120
			Total Chromium (Cr)	2019-11-05		100	%	80 - 120
			Total Cobalt (Co)	2019-11-05		101	%	80 - 120
			Total Copper (Cu)	2019-11-05		101	%	80 - 120
			Total Iron (Fe)	2019-11-05		108	%	80 - 120
			Total Lead (Pb)	2019-11-05		101	%	80 - 120
			Total Magnesium (Mg)	2019-11-05		109	%	80 - 120
			Total Manganese (Mn)	2019-11-05		103	%	80 - 120
			Total Molybdenum (Mo)	2019-11-05		105	%	80 - 120
			Total Nickel (Ni)	2019-11-05		103	%	80 - 120
			Total Phosphorus (P)	2019-11-05		107	%	80 - 120
			Total Potassium (K)	2019-11-05		105	%	80 - 120
			Total Selenium (Se)	2019-11-05		101	%	80 - 120
			Total Silver (Ag)	2019-11-05		101	%	80 - 120
			Total Sodium (Na)	2019-11-05		102	%	80 - 120
			Total Strontium (Sr)	2019-11-05		102	%	80 - 120
			Total Thallium (Tl)	2019-11-05		103	%	80 - 120
			Total Tin (Sn)	2019-11-05		102	%	80 - 120
			Total Titanium (Ti)	2019-11-05		106	%	80 - 120
			Total Uranium (U)	2019-11-05		109	%	80 - 120
			Total Vanadium (V)	2019-11-05		105	%	80 - 120
			Total Zinc (Zn)	2019-11-05		100	%	80 - 120
6424517	MLB	Method Blank	Total Aluminum (Al)	2019-11-05	<5.0		ug/L	
			Total Antimony (Sb)	2019-11-05	<1.0		ug/L	
			Total Arsenic (As)	2019-11-05	<1.0		ug/L	
			Total Barium (Ba)	2019-11-05	<1.0		ug/L	
			Total Beryllium (Be)	2019-11-05	<1.0		ug/L	
			Total Bismuth (Bi)	2019-11-05	<2.0		ug/L	
			Total Boron (B)	2019-11-05	<50		ug/L	
			Total Cadmium (Cd)	2019-11-05	<0.010		ug/L	
			Total Calcium (Ca)	2019-11-05	<100		ug/L	
			Total Chromium (Cr)	2019-11-05	<1.0		ug/L	
			Total Cobalt (Co)	2019-11-05	<0.40		ug/L	
			Total Copper (Cu)	2019-11-05	<0.50		ug/L	
			Total Iron (Fe)	2019-11-05	<50		ug/L	
			Total Lead (Pb)	2019-11-05	<0.50		ug/L	
			Total Magnesium (Mg)	2019-11-05	<100		ug/L	
			Total Manganese (Mn)	2019-11-05	<2.0		ug/L	
			Total Molybdenum (Mo)	2019-11-05	<2.0		ug/L	
			Total Nickel (Ni)	2019-11-05	<2.0		ug/L	
			Total Phosphorus (P)	2019-11-05	<100		ug/L	
			Total Potassium (K)	2019-11-05	<100		ug/L	
			Total Selenium (Se)	2019-11-05	<0.50		ug/L	
			Total Silver (Ag)	2019-11-05	<0.10		ug/L	
			Total Sodium (Na)	2019-11-05	<100		ug/L	
			Total Strontium (Sr)	2019-11-05	<2.0		ug/L	
			Total Thallium (Tl)	2019-11-05	<0.10		ug/L	
			Total Tin (Sn)	2019-11-05	<2.0		ug/L	
			Total Titanium (Ti)	2019-11-05	<2.0		ug/L	
			Total Uranium (U)	2019-11-05	<0.10		ug/L	
			Total Vanadium (V)	2019-11-05	<2.0		ug/L	
			Total Zinc (Zn)	2019-11-05	<5.0		ug/L	
6424517	MLB	RPD	Total Aluminum (Al)	2019-11-05	4.6		%	20

CBCL Limited
Attention: Colin McVarish
Report Date: 2019/11/08 Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9U0744

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Antimony (Sb)	2019-11-05	NC		%	20
			Total Arsenic (As)	2019-11-05	NC		%	20
			Total Barium (Ba)	2019-11-05	1.2		%	20
			Total Beryllium (Be)	2019-11-05	NC		%	20
			Total Bismuth (Bi)	2019-11-05	NC		%	20
			Total Boron (B)	2019-11-05	0.86		%	20
			Total Cadmium (Cd)	2019-11-05	NC		%	20
			Total Calcium (Ca)	2019-11-05	2.0		%	20
			Total Chromium (Cr)	2019-11-05	NC		%	20
			Total Cobalt (Co)	2019-11-05	NC		%	20
			Total Copper (Cu)	2019-11-05	0.42		%	20
			Total Iron (Fe)	2019-11-05	2.1		%	20
			Total Lead (Pb)	2019-11-05	NC		%	20
			Total Magnesium (Mg)	2019-11-05	2.6		%	20
			Total Manganese (Mn)	2019-11-05	NC		%	20
			Total Molybdenum (Mo)	2019-11-05	NC		%	20
			Total Nickel (Ni)	2019-11-05	NC		%	20
			Total Phosphorus (P)	2019-11-05	NC		%	20
			Total Potassium (K)	2019-11-05	1.5		%	20
			Total Selenium (Se)	2019-11-05	NC		%	20
			Total Silver (Ag)	2019-11-05	NC		%	20
			Total Sodium (Na)	2019-11-05	1.6		%	20
			Total Strontium (Sr)	2019-11-05	0.30		%	20
			Total Thallium (Tl)	2019-11-05	NC		%	20
			Total Tin (Sn)	2019-11-05	NC		%	20
			Total Titanium (Ti)	2019-11-05	NC		%	20
			Total Uranium (U)	2019-11-05	3.2		%	20
			Total Vanadium (V)	2019-11-05	NC		%	20
			Total Zinc (Zn)	2019-11-05	NC		%	20
6424814	MCN	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2019-11-05		95	%	80 - 120
6424814	MCN	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2019-11-05		101	%	80 - 120
6424814	MCN	Method Blank	Nitrogen (Ammonia Nitrogen)	2019-11-05	<0.050		mg/L	
6424814	MCN	RPD	Nitrogen (Ammonia Nitrogen)	2019-11-05	6.4		%	20
6425124	MGN	Matrix Spike	Total Organic Carbon (C)	2019-11-06		99	%	85 - 115
6425124	MGN	Spiked Blank	Total Organic Carbon (C)	2019-11-06		98	%	80 - 120
6425124	MGN	Method Blank	Total Organic Carbon (C)	2019-11-06	<0.50		mg/L	
6425124	MGN	RPD	Total Organic Carbon (C)	2019-11-06	2.8		%	15
6427106	MCN	Matrix Spike	Total Alkalinity (Total as CaCO3)	2019-11-06		NC	%	80 - 120
6427106	MCN	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019-11-06		110	%	80 - 120
6427106	MCN	Method Blank	Total Alkalinity (Total as CaCO3)	2019-11-06	<5.0		mg/L	
6427106	MCN	RPD	Total Alkalinity (Total as CaCO3)	2019-11-06	7.5		%	25
6427114	MCN	Matrix Spike	Dissolved Chloride (Cl-)	2019-11-06		NC	%	80 - 120
6427114	MCN	Spiked Blank	Dissolved Chloride (Cl-)	2019-11-06		103	%	80 - 120
6427114	MCN	Method Blank	Dissolved Chloride (Cl-)	2019-11-06	<1.0		mg/L	
6427114	MCN	RPD	Dissolved Chloride (Cl-)	2019-11-06	0.21		%	25
6427117	MCN	Matrix Spike	Dissolved Sulphate (SO4)	2019-11-06		92	%	80 - 120
6427117	MCN	Spiked Blank	Dissolved Sulphate (SO4)	2019-11-06		105	%	80 - 120
6427117	MCN	Method Blank	Dissolved Sulphate (SO4)	2019-11-06	<2.0		mg/L	
6427117	MCN	RPD	Dissolved Sulphate (SO4)	2019-11-06	0.47		%	25
6427120	MCN	Matrix Spike	Reactive Silica (SiO2)	2019-11-06		NC	%	80 - 120
6427120	MCN	Spiked Blank	Reactive Silica (SiO2)	2019-11-06		94	%	80 - 120
6427120	MCN	Method Blank	Reactive Silica (SiO2)	2019-11-06	<0.50		mg/L	
6427120	MCN	RPD	Reactive Silica (SiO2)	2019-11-06	0.70		%	25
6427125	MCN	Spiked Blank	Colour	2019-11-07		102	%	80 - 120
6427125	MCN	Method Blank	Colour	2019-11-07	<5.0		TCU	
6427125	MCN	RPD	Colour	2019-11-07	NC		%	20
6427128	MCN	Matrix Spike	Orthophosphate (P)	2019-11-06		91	%	80 - 120
6427128	MCN	Spiked Blank	Orthophosphate (P)	2019-11-06		108	%	80 - 120
6427128	MCN	Method Blank	Orthophosphate (P)	2019-11-06	<0.010		mg/L	
6427128	MCN	RPD	Orthophosphate (P)	2019-11-06	NC		%	25
6427131	MCN	Matrix Spike	Nitrate + Nitrite (N)	2019-11-06		97	%	80 - 120

CBCL Limited
Attention: Colin McVarish
Report Date: 2019/11/08
Client Project #: 171046.01

Quality Assurance Report
BV Labs Job Number: B9U0744

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6427131	MCN	Spiked Blank	Nitrate + Nitrite (N)	2019-11-06		96	%	80 - 120
6427131	MCN	Method Blank	Nitrate + Nitrite (N)	2019-11-06	<0.050		mg/L	
6427131	MCN	RPD	Nitrate + Nitrite (N)	2019-11-06	0.59		%	25
6427134	MCN	Matrix Spike	Nitrite (N)	2019-11-06		104	%	80 - 120
6427134	MCN	Spiked Blank	Nitrite (N)	2019-11-06		103	%	80 - 120
6427134	MCN	Method Blank	Nitrite (N)	2019-11-06	<0.010		mg/L	
6427134	MCN	RPD	Nitrite (N)	2019-11-06	NC		%	20

N/A = Not Applicable
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount w
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute
(1) Reference Material recovery high. Second source QC recovery and all other QC acceptable.

Analyte_ID	Parameter	Sample_ID	Method	Results	Units	EQL	Lab_ID	Matrix	Lab_Duplicate_Of	Field_Duplicate_Of	Date_Sampled	CSite #	DFRP #	DCC_Project_ID	Report Name	TableName
	Nitrate (as N)	BKG-2	ASTM D3867-16	0.065	mg/L	0.050	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Hardness (as CaCO3)	BKG-2	Auto Calc	88	mg/L	1.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Anion Sum	BKG-2	Auto Calc.	2.08	me/L	N/A	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Total Dissolved Solids	BKG-2	Auto Calc.	140	mg/L	1.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Cation Sum	BKG-2	Auto Calc.	2.02	me/L	N/A	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Ion Balance (% Difference)	BKG-2	Auto Calc.	1.46	%	N/A	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Langelier Index (@ 20C)	BKG-2	Auto Calc.	-1.32	N/A		LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Langelier Index (@ 4C)	BKG-2	Auto Calc.	-1.57	N/A		LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Saturation pH (@ 20C)	BKG-2	Auto Calc.	8.50	N/A		LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Saturation pH (@ 4C)	BKG-2	Auto Calc.	8.75	N/A		LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Bicarbonate (as CaCO3)	BKG-2	SM 23 4500-CO2 D	23	mg/L	1.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Carbonate (as CaCO3)	BKG-2	SM 23 4500-CO2 D	<1.0	mg/L	1.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Sulphate	BKG-2	ASTM D516-16 m	66	mg/L	2.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Turbidity	BKG-2	EPA 180.1 R2 m	8.6	NTU	0.10	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Alkalinity (as CaCO3)	BKG-2	EPA 310.2 R1974 m	23	mg/L	5.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Ammonia	BKG-2	EPA 350.1 R2 m	<0.050	mg/L	0.050	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Reactive Silica (as SiO2)	BKG-2	EPA 366.0 m	6.5	mg/L	0.50	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Salinity	BKG-2	SM 22 2520B	<2.0	N/A	2.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Colour	BKG-2	SM 23 2120C m	39	TCU	5.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Conductivity	BKG-2	SM 23 2510B m	210	uS/cm	1.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	TSS	BKG-2	SM 23 2540D m	5.7	mg/L	2.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Phosphorus	BKG-2	SM 23 4500 P B H m	0.025	mg/L	0.004	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Chloride	BKG-2	SM 23 4500-Cl- E m	8.7	mg/L	1.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	pH	BKG-2	SM 23 4500-H+ B m	7.18	pH	N/A	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Nitrite	BKG-2	SM 23 4500-NO2- B m	<0.010	mg/L	0.010	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Ortho Phosphate (as P)	BKG-2	SM 23 4500-P E m	<0.010	mg/L	0.010	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Carbonaceous BOD	BKG-2	SM 23 5210B m	<10	mg/L	10	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	TOC	BKG-2	SM 23 5310B m	6.1	mg/L	0.50	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Nitrate + Nitrite (as N)	BKG-2	USGS I-2547-11m	0.065	mg/L	0.050	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Aluminum	BKG-2	EPA 6020B R2 m	340	ug/L	5.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Antimony	BKG-2	EPA 6020B R2 m	<1.0	ug/L	1.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Arsenic	BKG-2	EPA 6020B R2 m	<1.0	ug/L	1.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Barium	BKG-2	EPA 6020B R2 m	70	ug/L	1.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Beryllium	BKG-2	EPA 6020B R2 m	<1.0	ug/L	1.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Bismuth	BKG-2	EPA 6020B R2 m	<2.0	ug/L	2.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Boron	BKG-2	EPA 6020B R2 m	<50	ug/L	50	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Cadmium	BKG-2	EPA 6020B R2 m	0.010	ug/L	0.010	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Calcium	BKG-2	EPA 6020B R2 m	32000	ug/L	100	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Chromium	BKG-2	EPA 6020B R2 m	<1.0	ug/L	1.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Cobalt	BKG-2	EPA 6020B R2 m	<0.40	ug/L	0.40	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Copper	BKG-2	EPA 6020B R2 m	0.87	ug/L	0.50	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Iron	BKG-2	EPA 6020B R2 m	500	ug/L	50	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Lead	BKG-2	EPA 6020B R2 m	<0.50	ug/L	0.50	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Magnesium	BKG-2	EPA 6020B R2 m	2200	ug/L	100	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Manganese	BKG-2	EPA 6020B R2 m	110	ug/L	2.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Molybdenum	BKG-2	EPA 6020B R2 m	<2.0	ug/L	2.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Nickel	BKG-2	EPA 6020B R2 m	<2.0	ug/L	2.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Phosphorus (P)	BKG-2	EPA 6020B R2 m	<100	ug/L	100	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Potassium	BKG-2	EPA 6020B R2 m	1300	ug/L	100	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Selenium	BKG-2	EPA 6020B R2 m	<0.50	ug/L	0.50	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Silver	BKG-2	EPA 6020B R2 m	<0.10	ug/L	0.10	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Sodium	BKG-2	EPA 6020B R2 m	5100	ug/L	100	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Strontium	BKG-2	EPA 6020B R2 m	220	ug/L	2.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Thallium	BKG-2	EPA 6020B R2 m	<0.10	ug/L	0.10	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Tin	BKG-2	EPA 6020B R2 m	<2.0	ug/L	2.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Titanium	BKG-2	EPA 6020B R2 m	8.3	ug/L	2.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Uranium	BKG-2	EPA 6020B R2 m	<0.10	ug/L	0.10	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Vanadium	BKG-2	EPA 6020B R2 m	<2.0	ug/L	2.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Zinc	BKG-2	EPA 6020B R2 m	<5.0	ug/L	5.0	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Total Coliforms	BKG-2	MOE E3371 R2 (2018)	1100	CFU/100mL	10	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Fecal coliform	BKG-2	SM 23 9222D	70	CFU/100mL	10	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Subcontract Parameter	BKG-2		ATTACHED	N/A	N/A	LDE118	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Salinity	AVE-6	SM 22 2520B	21	N/A	2.0	LDE119	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	TSS	AVE-6	SM 23 2540D m	81	mg/L	5.0	LDE119	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Salinity	AVE-7	SM 22 2520B	20	N/A	2.0	LDE120	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	TSS	AVE-7	SM 23 2540D m	96	mg/L	5.0	LDE120	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	TSS	AVE-7	SM 23 2540D m	88	mg/L	5.0	LDE120D1	Water	LDE120		2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Salinity	BKG-1	SM 22 2520B	<2.0	N/A	2.0	LDE121	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	TSS	BKG-1	SM 23 2540D m	34	mg/L	2.0	LDE121	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	Salinity	AVE-3	SM 22 2520B	23	N/A	2.0	LDE122	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
	TSS	AVE-3	SM 23 2540D m	100	mg/L	5.0	LDE122	Water			2019/10/25				B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls

Salinity	AVE-8	SM 22 2520B	8.4	N/A	2.0	LDE123	Water		2019/10/25	B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
TSS	AVE-8	SM 23 2540D m	290	mg/L	10	LDE123	Water		2019/10/25	B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
Salinity	AVE-5	SM 22 2520B	21	N/A	2.0	LDE124	Water		2019/10/25	B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
TSS	AVE-5	SM 23 2540D m	120	mg/L	5.0	LDE124	Water		2019/10/25	B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls
TSS	AVE-5	SM 23 2540D m	120	mg/L	5.0	LDE124D1	Water	LDE124	2019/10/25	B9U0744V2-R2019-11-08_13-43-03_N020.pdf	B9U0744V2-R2019-11-08_13-43-03_N020.xls

Your Project #: 171046.01
Site Location: AVON RIVER
Your C.O.C. #: D44348

Attention: Melissa Rutherford

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/12/20
Report #: R6014942
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9Z3553
Received: 2019/12/13, 15:47

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Salinity (1)	1	N/A	2019/12/20		SM 22 2520B
Total Suspended Solids	1	2019/12/17	2019/12/18	ATL SOP 00007	SM 23 2540D m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
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Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Non-accredited test method

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

Your Project #: 171046.01
Site Location: AVON RIVER
Your C.O.C. #: D44348

Attention: Melissa Rutherford

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/12/20
Report #: R6014942
Version: 1 - Final

CERTIFICATE OF ANALYSIS

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20 Dec 2019 19:11:20

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Keri Mackay, Customer Experience Team Lead
Email: Keri.MACKAY@bvlabs.com
Phone# (902)420-0203 Ext:294
==
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BV Labs Job #: B9Z3553
Report Date: 2019/12/20

CBCL Limited
Client Project #: 171046.01
Site Location: AVON RIVER

RESULTS OF ANALYSES OF WATER

BV Labs ID		LOU666			LOU666		
Sampling Date		2019/12/13 12:00			2019/12/13 12:00		
COC Number		D44348			D44348		
	UNITS	AR-15	RDL	QC Batch	AR-15 Lab-Dup	RDL	QC Batch
Inorganics							
Salinity	N/A	<2.0	2.0	6508332	<2.0	2.0	6508332
Total Suspended Solids	mg/L	1.8	1.0	6501039			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	-1.3°C

Results relate only to the items tested.

BV Labs Job #: B9Z3553
Report Date: 2019/12/20

CBCL Limited
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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6501039	AM6	QC Standard	Total Suspended Solids	2019/12/18		98	%	80 - 120
6501039	AM6	Method Blank	Total Suspended Solids	2019/12/18	<1.0		mg/L	
6501039	AM6	RPD	Total Suspended Solids	2019/12/18	5.4		%	20
6508332	BBD	QC Standard	Salinity	2019/12/20		102	%	80 - 120
6508332	BBD	Method Blank	Salinity	2019/12/20	<2.0		N/A	
6508332	BBD	RPD [LOU666-02]	Salinity	2019/12/20	NC		%	25

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Colleen Acker, Scientific Service Specialist

Eric Dearman, Scientific Specialist

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CHAIN OF CUSTODY RECORD

COC #: D 44348 Page ____ of ____

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required
Company Name:	CBCL Ltd	Company Name:		Quotation #:		✓ Regular TAT (5 business days) Most analyses
Contact Name:		Contact Name:		Purchase Order #:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	PC:	Address:	PC:	Project #:	171046.01	IF RUSH please specify date (Surcharges will be applied)
				Site Location:	Avon River	DATE REQUIRED:
Phone:		Phone:		Site Province:	NS	
Email:	acct@cbcl.ca	Email:	mrutherford@cbcl.ca	Site #:		
Report Copies:	emcvarish@cbcl.ca	Report Copies:	emcvarish@cbcl.ca	Sampled By:		

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CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		-1, -1, -2	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

#	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default: Acid Extractable (Available) Digest	Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs - Select One: Default or CCME Sediment	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.coli (Count)	TSS	Salinity			HOLD- DO NOT ANALYZE	COMMENTS
1	AR-15	2019/12/13	12:00	Water																			X	X				
2																												
3																												
4																												
5																												
6																												
7																												
8																												
9																												
10																												

Regulatory Requirements (Specify)

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Colin McVarish	2019/12/13	15:47	[signature]			B9Z3553
[signature]						

White: Maxxam Pink: Client

CBCL Limited

BV Labs Job Number: B9Z3553
Report Date: 2019/12/20

Client Project #: 171046.01
Site Location: AVON RIVER

RESULTS OF ANALYSES OF WATER

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Inorganics							
Salinity	N/A	<2.0	2.0	6508332	<2.0	2.0	6508332
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RDL = Reportable Detection Limit
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Results relate only to the items tested.

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Results relate only to the items tested.

Each tempera	Each tempera	Each tempera	Each temperature is the average of up to three cooler temperatures taken at receipt
Package 1	-1.3°C	#N/A	#N/A

Report Date: 2019/12/20

CBCL Limited
Attention: Melissa Rutherford
Client Project #: 171046.01

Site Location: AVON RIVER

Quality Assurance Report
BV Labs Job Number: B9Z3553

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
6501039	AM6	QC Standard	Total Suspended Solids	2019-12-18		98	%	80 - 120
6501039	AM6	Method Blank	Total Suspended Solids	2019-12-18	<1.0		mg/L	
6501039	AM6	RPD	Total Suspended Solids	2019-12-18	5.4		%	20
6508332	BBD	QC Standard	Salinity	2019-12-20		102	%	80 - 120
6508332	BBD	Method Blank	Salinity	2019-12-20	<2.0		N/A	
6508332	BBD	RPD [LOU666-02]	Salinity	2019-12-20	NC		%	25

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

Analyte_ID	Parameter	Sample_ID	Method	Results	Units	EQL	Lab_ID	Matrix	Lab_Duplicate_Of	Field_Duplicate_Of	Date_Sampled	CSite #	DFRP #	DCC_Project_ID	Report Name	TableName
	Salinity	AR-15	SM 22 2520B	<2.0	N/A	2.0	LOU666	Water			2019/12/13	AVON RIVER			B9Z3553V1-R2019-12-20_19-11-15_N020.pdf	B9Z3553V1-R2019-12-20_19-11-15_N020.xls
	TSS	AR-15	SM 23 2540D m	1.8	mg/L	1.0	LOU666	Water			2019/12/13	AVON RIVER			B9Z3553V1-R2019-12-20_19-11-15_N020.pdf	B9Z3553V1-R2019-12-20_19-11-15_N020.xls
	Salinity	AR-15	SM 22 2520B	<2.0	N/A	2.0	LOU666D1	Water	LOU666		2019/12/13	AVON RIVER			B9Z3553V1-R2019-12-20_19-11-15_N020.pdf	B9Z3553V1-R2019-12-20_19-11-15_N020.xls

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APPENDIX F

Hydraulic Modelling Reports

- Memo 01 – Delft3D Model Setup and Validation
- Memo 02 – Delft3D Analysis – Salinity, Sediment, and Morphology
- Memo 03 – Delft3D Analysis – Flow Velocities

Memo

Date	29/10/2021
Memo to	Justin Tanner, P.Eng, NSPW
Project name	171046.01 - Avon River Aboiteau
Subject	Delft3D Model Setup and Validation - Updated
From	A. Kaji, G. Mauti
Reviewed by	A. Camarena, A. Wilson
Copy to	

1 Introduction

This memo provides an overview of the Delft3D model setup and validation. This memo complements the two other memos using the Delft3D model: Delft3D Analysis – Salinity, Sediment, and Morphology (16/07/2021) and Delft3D Analysis – Flow Velocities (21/07/2021). This memo includes:

- **Modelling objectives and limitations.** Includes the description of the general modelling approach, highlighting key decisions, assumptions, and limitations.
- **Delft3D model setup.** Describes the steps undertaken to develop the model, and the methods to incorporate the measured data into the model.
- **Comparison of modelled and measured conditions.** This section includes a comparison of the model results with the measured data and literature findings to corroborate the completed analysis.

Hydrodynamic and sediment transport models were created using the Delft3D numerical modelling software to complete an analysis of the lake and estuary portion of the study area. Specifically, these models were used to investigate the hydrodynamics of the area around the proposed aboiteau, the effects of the removal of the existing aboiteau, salinity and sediment intrusion into the Avon River, and potential morphological changes near the aboiteau and in the wider estuary and upstream lake. An overview of the study area and relevant features is presented in Figure 2. The model inputs for setup and validation include measurements from the field campaigns, literature, bathymetric surveys, the WebTide tidal prediction model (Bedford Institute of Oceanography), historical flow records in the St. Croix River, and results from other models previously developed for this study.

2. Modelling Goals and Limitations

The Delft3D model was developed to provide an overall understanding of the flow and transport patterns in the study area. This model is not intended to represent small-scale phenomena, such as turbulence and fully tridimensional flow, notably inside the structures.

The Delft3D software does not have the capabilities to model structures to a high level of detail and therefore the flow discharge through the structures was calibrated using the SWMM (Storm Water Management Model, Environmental Protection Agency) and OpenFOAM (OpenFOAM Foundation) software where relevant. The flow patterns near the outlet and inlet of the structures are affected mainly by a combination of the volume of water passing through the structures (structure capacity), upstream and downstream water levels, and the local bathymetry. Specific flow-structure interaction, such as the effect of the fishway baffles, is represented in the model by reducing the structure capacity (reducing the discharge volume). Velocity magnitudes across the main gates of the proposed aboiteau from the Delft3D model are in line with the velocities estimated using the SWMM model and are considered sufficiently accurate in the context of the scope and objectives of this analysis. As described above, velocities inside the fishway are not accurately represented by the Delft3D model. For the flow patterns inside the fishway and at the inlet/outlet, results from the OpenFOAM model should be used.

The project area is highly dynamic and complex. It has one of the largest tides in the world, and the bed composition consists of a combination of sand, gravel and mud. In addition, it is affected by different rivers, as well as the presence of the aboiteau itself. In the attempt to schematize the local conditions, the model assumes a single mud cohesive layer, with uniform sediment/bed characteristics. In reality cohesive sediment behaviour (i.e. flocculation, settling velocity and critical shear stress for erosion/sedimentation) is dependent not only on the sediment characteristics (i.e. grain size and water content) but also on the environment (i.e. turbulence and salinity). Therefore, the model capabilities to fully represent the varying mud behavior is limited.

Salt intrusion in the model is controlled by advective and diffusive processes. Advective processes are fairly well represented (and the dominant mode of transport in the Dampened Tidal and Brackish water management scenarios). On the other hand, diffusion is influenced by sub-grid phenomena (e.g. turbulence) and therefore parametrized in the model leading to some (limited) uncertainties.

All these factors, combined with the limited amount of measured data and uncertainties inherent to the modelling of cohesive sediments and salt diffusion processes inside the lake, make it a challenge to fully validate the model results. Therefore, results related to morphology/sediment transport and salt intrusion should be interpreted with caution. Results are more suitable for a relative assessment (e.g. comparison between the different water management scenarios and/or to understand the impact of the removal of the existing aboiteau, given a similar set of input conditions and assumptions) rather than for determining absolute salinity concentrations and sedimentation volumes within the lake. Subsequent monitoring campaigns during construction and post-construction are recommended to be able to evaluate rates of change and better understand the local hydrodynamic and morphological processes.

3. Delft3D Setup

Model Grid

Three sets of models were created for this analysis to obtain regional results while also completing a detailed analysis (Figure 1). The first model is referred to as Model A, which is the regional model and includes a larger model with a coarser grid (Figure 2, Figure 3). The existing structure was only modelled in the regional model so that it could be compared to field data and literature. The second and third models are referred to as the "local models" and differ in grid resolution and boundary conditions. These models include the proposed aboiteau and fishways, in addition to the existing structure. A summary of the approximate range of grid resolution is listed in Table 1.

The two local models were developed taking into consideration model accuracy (related to specific processes) and computational efficiency. The first being a medium-resolution grid and is referred to as Model B, which was used to analyze sediment and salinity concentrations (Figure 2, Figure 4). This model used a medium-resolution grid so that longer time periods could be simulated. The second model uses a fine-resolution grid and is referred to as Model C, which was used to assess velocities, specifically surrounding the structures (Figure 2, Figure 5). The grid with the finer resolution allows for more detailed velocities to be resolved and analyzed, in areas surrounding the structures.

In addition, for both the medium-resolution and fine-resolution local models, two grids were developed to determine the effects of the removal of the existing structure. The first assumes that the existing aboiteau remains in place, with the gate system removed. The second assumes that the existing aboiteau is removed. In its place is a 25 m wide trapezoidal channel with 2:1 side slopes and a bottom elevation of -5 m CGVD2013.

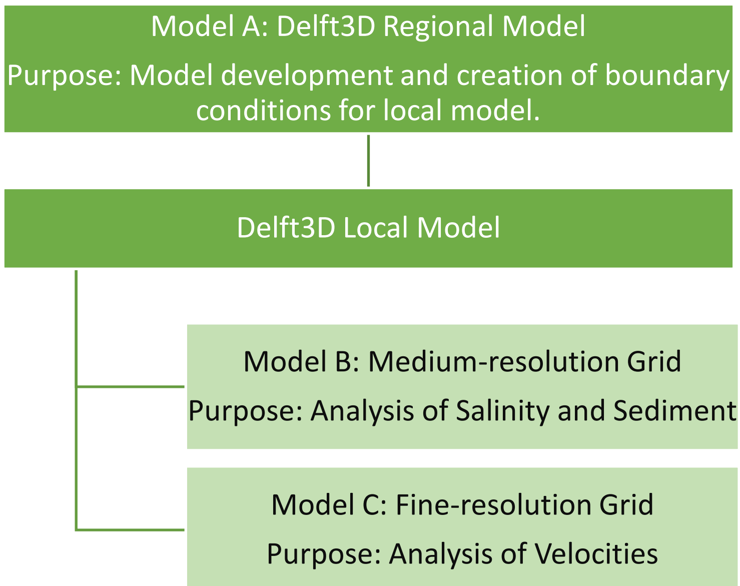

Figure 1: Summary of the various Delft3D models used and their purposes.

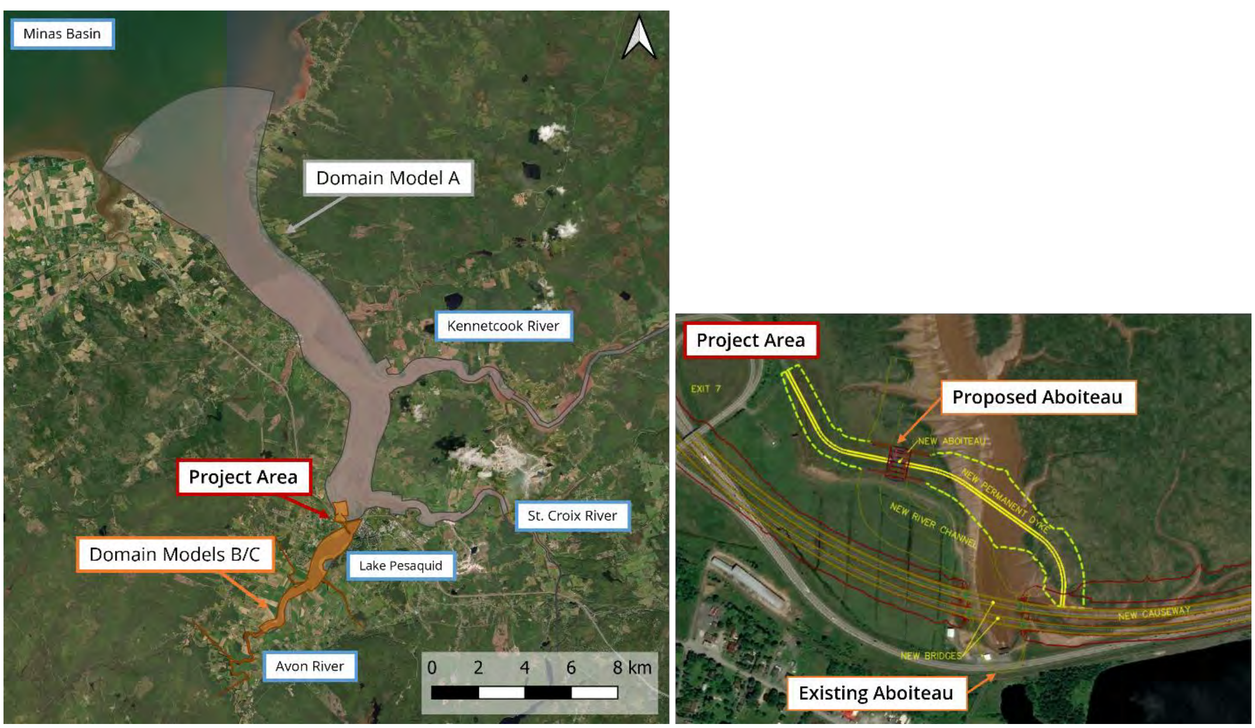

Figure 2: Project Area and Model Domains.

Table 1: Summary of the range of model resolution for the three various grids.

Location	Regional Model	Local Model: Medium-Resolution	Local Model: Fine-Resolution
Estuary	20 – 500 m	N/A	N/A
Near the structures	6 – 40 m	2 – 6 m	1 – 3 m
Lake	15 – 200 m	5 – 80 m	3 – 80 m

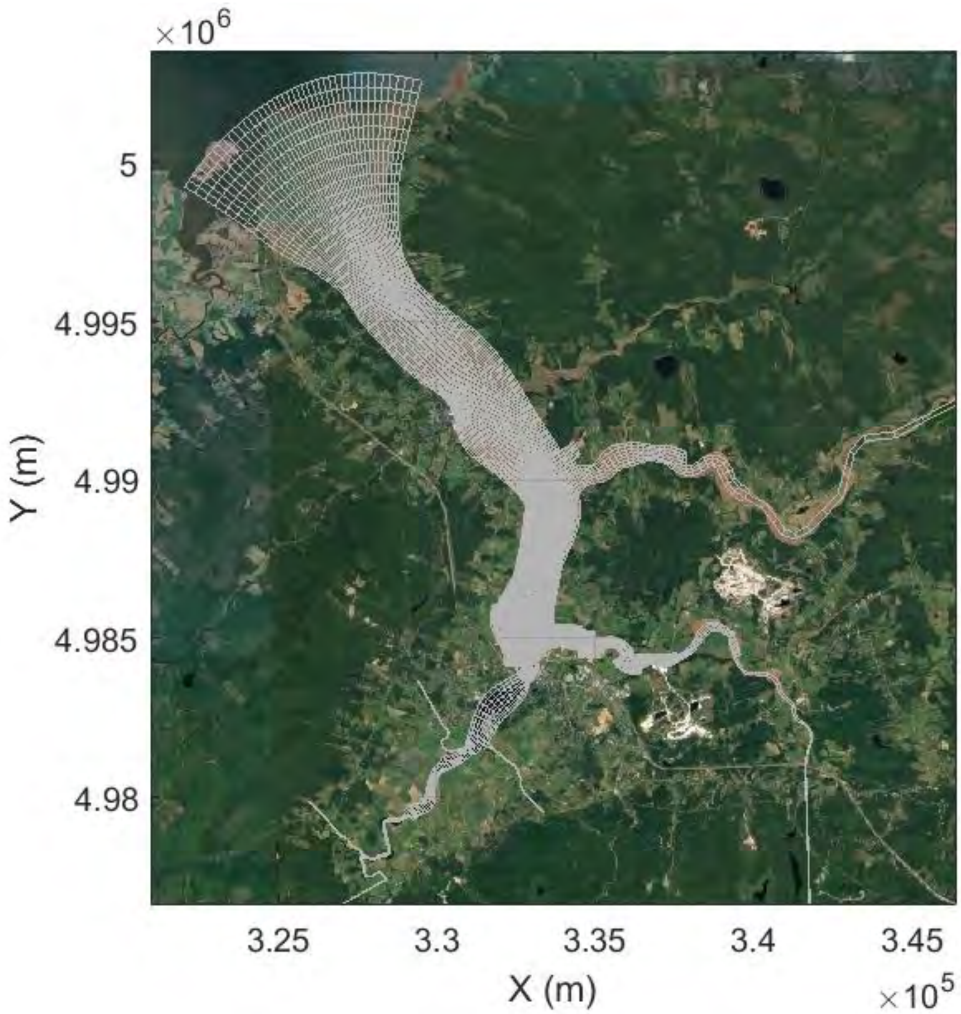

Figure 3: Regional Model Grid – Model A. Horizontal reference system: NAD83/MTM5 (EPSG 2947).

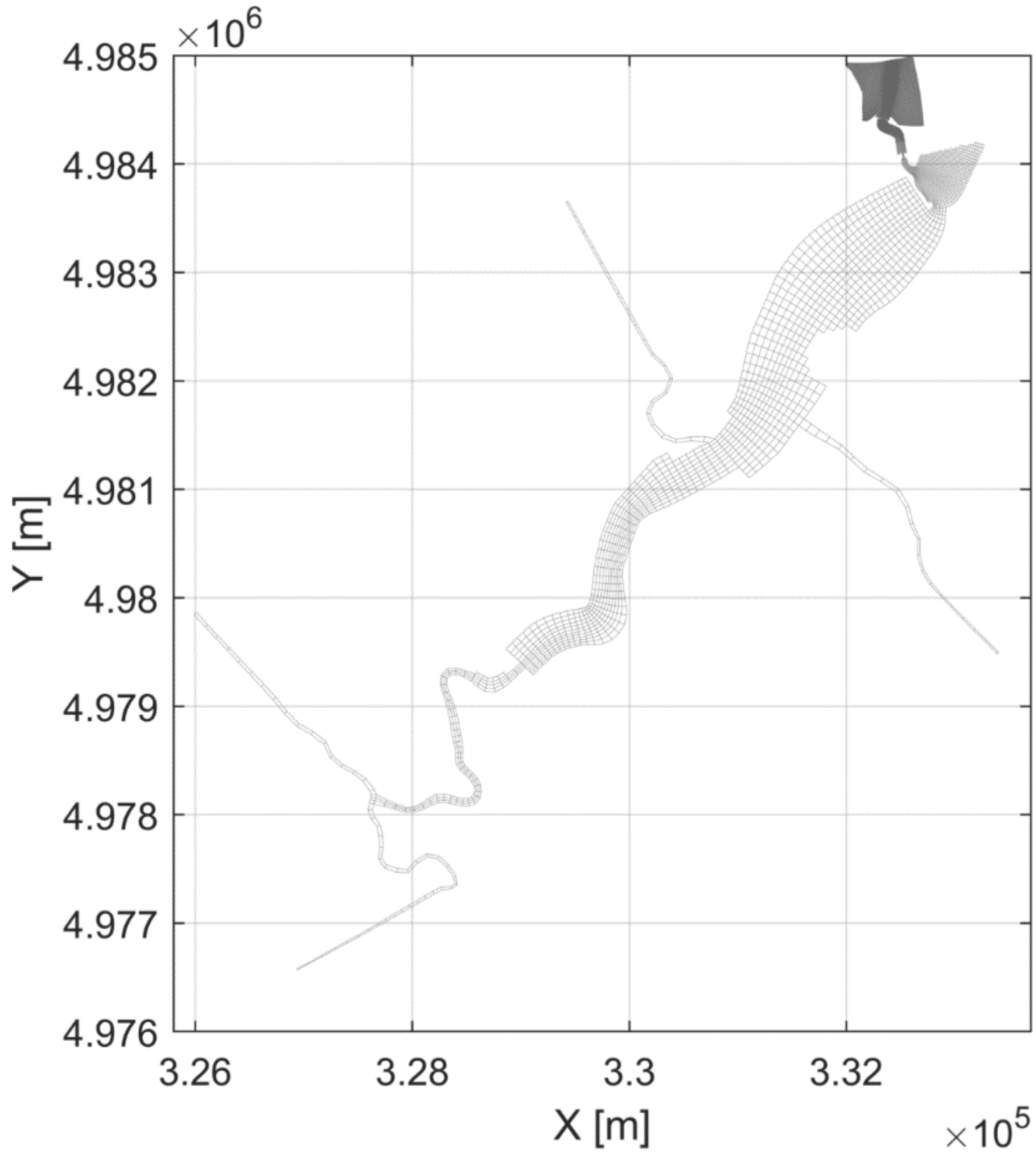

Figure 4: Grid of the Local Model with Medium-Resolution – Model B. Horizontal reference system: NAD83/MTM5 (EPSG 2947).

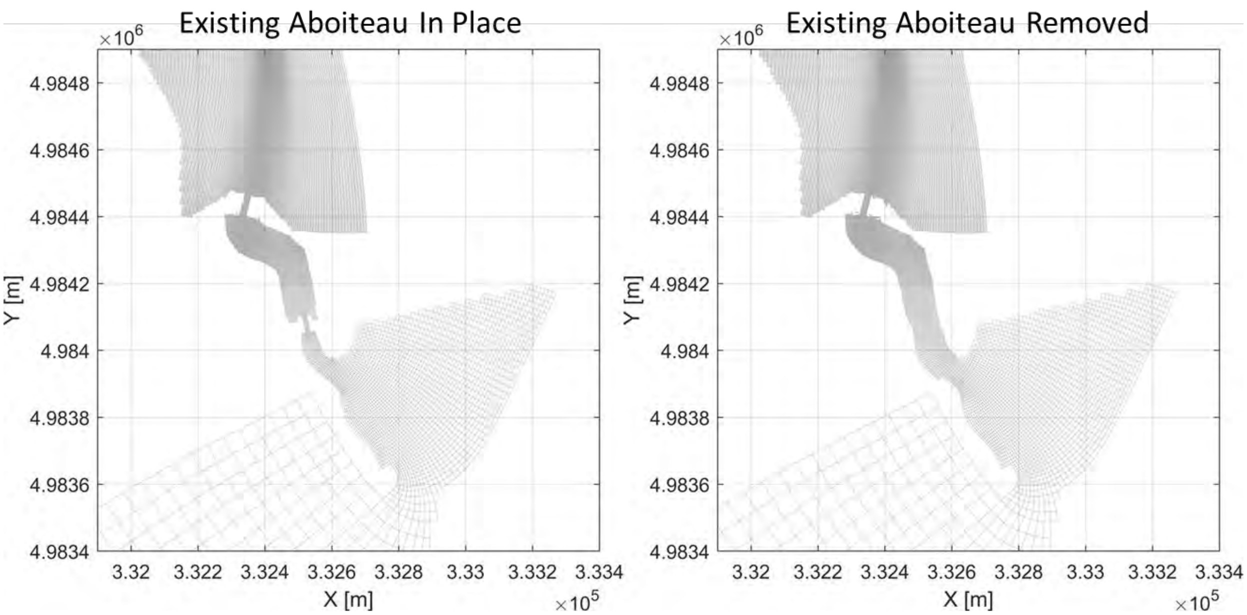

Figure 5: Grid of the local model with finer resolution – Model C with the existing aboiteau removed and in place. Horizontal reference system: NAD83/MTM5 (EPSG 2947).

Model Bathymetry

The bathymetry used in the model has been derived from a combination of the latest bathymetric surveys (from CBCL - 2017 and Saint Mary's University (SMU) - 2019), the available LiDAR surface data, the drawings of the new structure (including the permanent dyke, aboiteau and channel). Based on the flood levels and the elevation of the agricultural and developed areas behind the aboiteau it is expected that these areas would not flood under operational conditions. This is expected because the water levels of Lake Pesaquid are manually controlled by the flood gates, and as a result these areas were removed from the model domain. The domain and bathymetry of the local model are presented in Figure 6, with the existing aboiteau removed (bottom right subplot) and in place (bottom left subplot).

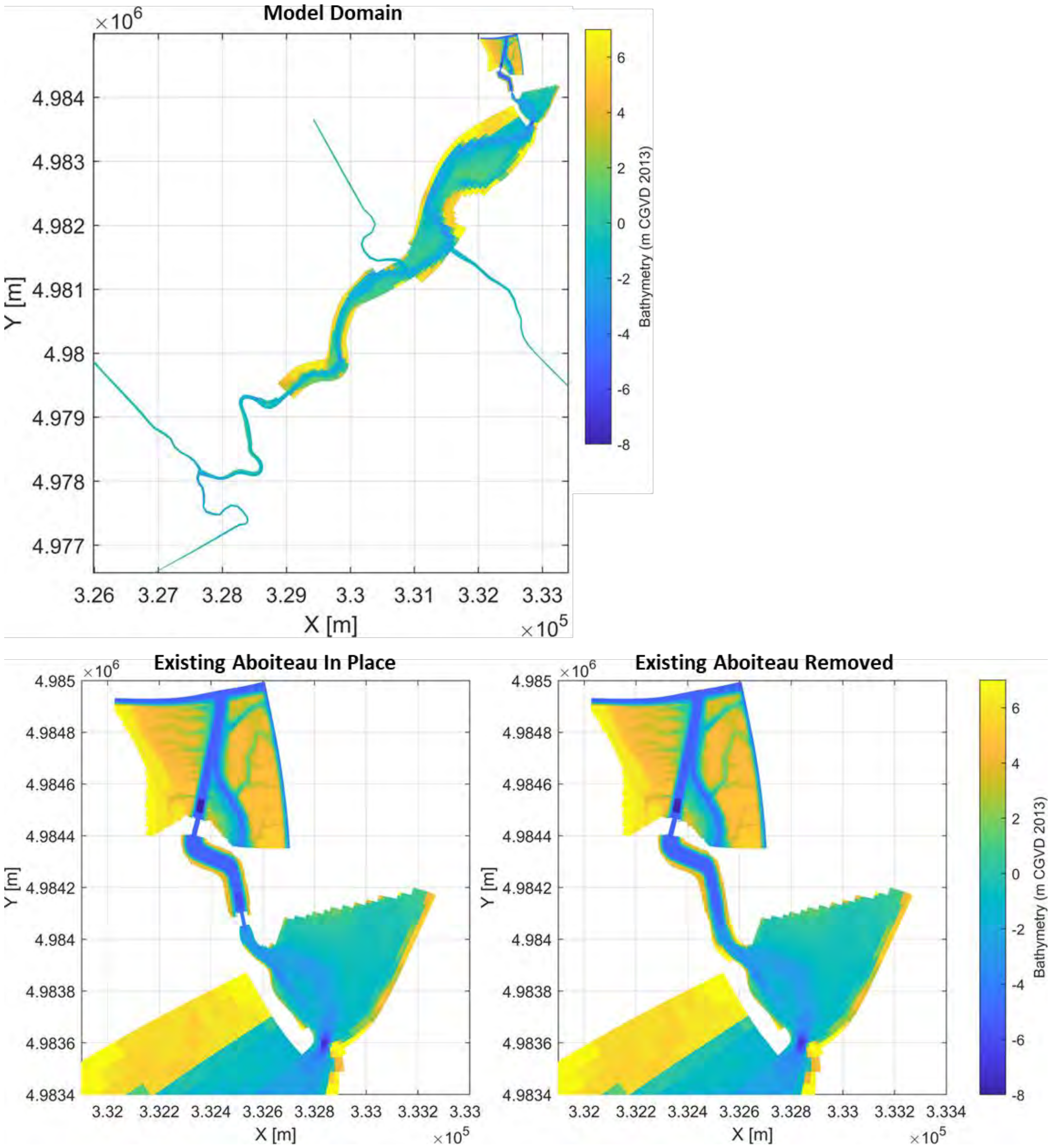

Figure 6: Model bathymetry with existing aboiteau in place and removed.

Hydrodynamic Boundary Conditions

The boundary conditions vary for each of the 3 main models and are chosen based on the model objectives. The regional model was forced with the WebTide tidal prediction model and with representative freshwater inputs based on historical flow records of the St. Croix River.

Model B (medium-resolution grid) is forced with a time series of freshwater runoff into the lake (derived from analysis of flow data from the St. Croix River and the river discharges were prorated based on calculations by the SWMM model) and astronomical tides (calculated by the regional Delft3D model) as illustrated in Figure 7. Two 2-month time periods of seasonal conditions were modelled – the first during January to March representing average winter/spring conditions with higher flows, which will be referred to as the "wet" season, and the second from July to September representing average summer conditions with lower flows, which will be referred to as the "dry" season. The variances in flow rates from the freshwater runoff provide information on how flow events will affect salinity and sediment concentrations.

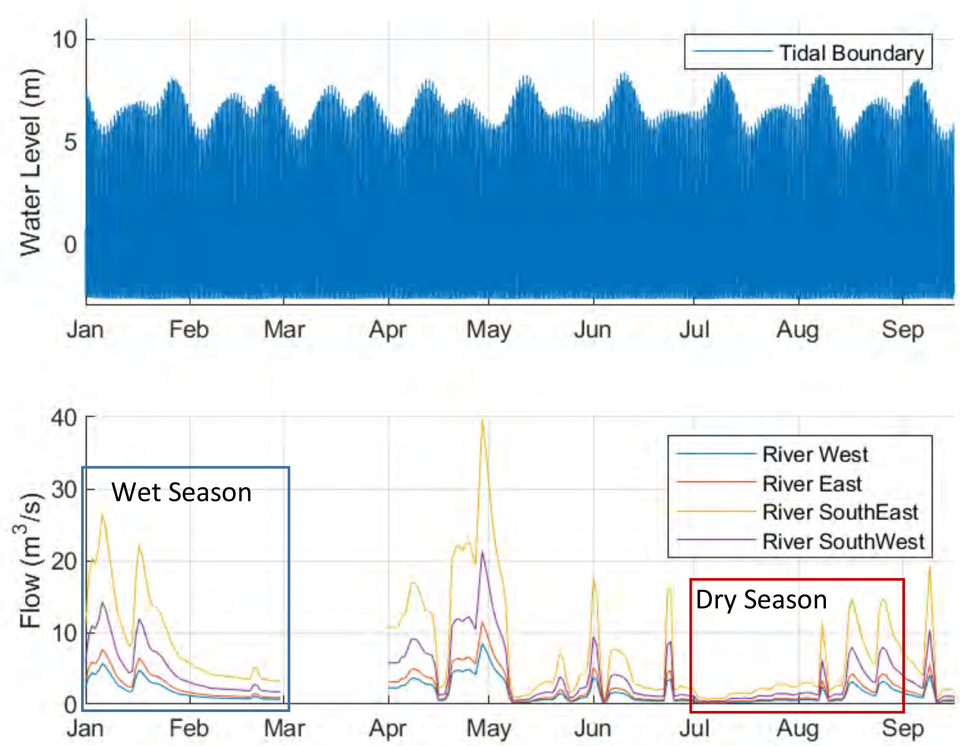

Figure 7: Hydrodynamic boundary conditions including the tidal water levels and the freshwater inputs into the lake (used for Model B and calculation of Model C).

Model C (fine-resolution grid) is forced with average freshwater runoff into the lake (calculated by the SWMM model) and astronomical tides (calculated by the regional Delft3D model). A constant flow was forced for the freshwater inputs which include two sets of seasonal conditions. These were calculated as the average flow rates over the months of

January and February representing average winter/spring conditions (wet season) and the second over the months of July and August representing average summer conditions (dry season). A summary of the sum of the flow rates for the freshwater inputs are listed in Table 2. In addition, the tidal forcing includes both neap and spring tides, which were also calculated using Model A.

Table 2: Sum of freshwater inputs from rivers into the lake for seasonal conditions (used for Model C).

Constant Total Flow – Wet Season	Constant Total Flow – Dry Season
29.1 m^3/s	3.5 m^3/s

Schematization of Structures

The structures in Delft3D were schematized as box structures with varying gate height, depending on the specific function of each structure. Those hydraulic structures are implemented to simulate the influence of obstacles in the flow which are not resolved on the horizontal grid (sub-grid effects).

The proposed aboiteau utilized the so-called "3D gates" with varying heights depending on the tide and lake levels to simulate the conditions of the specific water management scenarios. The fishways were also schematized by means of a 3D gate with varying height (which simulates the asymmetry in flow caused by the baffles). The existing aboiteau is schematized as a fixed gate.

The capacity of the structures was determined based on the SWMM and the OpenFOAM models (Avon River Aboiteau and Causeway Replacement - Preliminary Design Report, CBCL 2020) used in this study. This allows for consistency and accuracy in the representation of the structures across the different models. The fishways were specifically calibrated based on the flow calculated with the OpenFOAM model that was developed for the simulation of the fishways. The flow through the main gates were calibrated with the flow through the culverts calculated with SWMM. The equations for flow through structures in SWMM are empirical (based on experimental data) and therefore, considered more accurate than Delft3D for this specific purpose. Similarly, the OpenFOAM model can represent processes, including turbulent flow, in a scale of centimeters, therefore being appropriate to resolve the flow through the complex geometry of the fishway (Section 5.4, Avon River Aboiteau and Causeway Replacement - Preliminary Design Report, CBCL 2020).

Sediment and Salinity Parameters

The sediment and salinity input parameters used to assess sediment/ salinity intrusion and morphological changes in Model B (medium-resolution local model) were based on measurements from the field campaign, literature, and sensitivity analyses. Two types of sediment were included, which are a cohesive sediment, representing mud, and a non-cohesive sediment, representing sand. A summary of all the values used for the various sediment parameters is listed in Table 3. A summary of the morphological parameters used for the model is included in Table 4.

The characteristics of sediment parameters used in the morphological model were obtained from the field campaign conducted by SMU and Dalhousie University, from relevant literature sources, and from other projects completed in the Bay of Fundy. The field data obtained by SMU was used to define the initial conditions related to sediment transport parameters. Any gaps in data and comparisons to the field data were collected from literature sources pertaining to tidal mudflats and salt marshes, particularly in the region of the project. A summary of how the sediment and salinity parameters were determined is summarized below and the sources used are listed in Table 5:

- The settling velocity was defined based on relevant literature sources for cohesive flocculated material and the median grain size diameter that was measured in the SMU field campaign.
- The critical shear stresses for sedimentation and erosion were chosen based on the relevant literature, the type of sediment observed in the Avon River, and sensitivity analyses conducted.
- Specific and dry bed densities were chosen based on values that are typical for the types of sediment observed (cohesive and non-cohesive).
- The thickness of the mud layer was based on sensitivity analyses completed in Phase 1 of the project and literature sources. It was assumed that at the start of the simulations there is no sediment available for erosion in the area of the proposed structure, between the proposed and existing structures, and just upstream of the existing structure, due to the proposed rip-rap at this location (providing scour protection).
- It was assumed that non-cohesive sediment supply would be available to erode for the entirety of the model domain except for at the proposed structure, between the proposed and existing structures, and just upstream of the existing structure, due to the proposed rip-rap at this location.
- The median grain size chosen for the non-cohesive soil was based on a representative grain size analysis. To define the representative grain size, several median grain sizes were collected throughout the project, providing a wide range of sediment samples

and sizes. As a result of this analysis, a grain size was chosen based on a size that would provide a general representation of the non-cohesive sediment present in the study area.

- The boundary conditions for the cohesive sediment at the estuary boundary were based on a combination of the field data obtained from SMU, results of the regional model and an understanding of the physical system. The variation of the suspended sediment concentration (SSC) with time was based on concentrations obtained from the ISCO sampler. The maximum concentration of the suspended sediment was based on the regional model results, at the location of the boundary of the local model. The measured values from the ISCO sampler could not be directly used at the boundaries as they were measured in a small secondary channel that is not representative of the boundary location in the local model. The secondary channel has higher sediment concentration possibly due to difference in channel size, shallower depth, and different flow speeds. The sediment concentrations at the boundary are presented in Figure 8.
- The concentration of the non-cohesive sand at the tidal boundary was set to 0 as suspended sediment transport of sand is limited in the area (most of the sand transport occurs as bed load).
- No sediment was assumed to enter through the rivers that enter Lake Pesaquid. This was based on the CBCL water quality sampling survey and sensitivity analyses that showed very low turbidity (NTU < 1) in the upstream areas of the lake.
- The tidal boundary conditions for salinity in the local model were based on the results of the regional model. The tidal levels, freshwater inputs, and salinity concentrations from the regional model were compared to develop a time series of salinity concentrations for the local model (Figure 8).
- The rivers entering Lake Pesaquid were considered to be completely fresh based on measured salinity concentrations (lower than the 0.2 PSU). In the model freshwater input has PSU equal to 0.
- A morphological acceleration factor of 2 was used to speed up morphological changes. This approach reduces computational time without significantly impacting model results. It is based on the assumption that morphological changes occur in time scales that are larger than the time scale of hydrodynamic processes.

Table 3: Summary of sediment input parameters.

Sediment Type	Parameter	Value
Mud	Settling Velocity	1 - 1.5 mm/s (fresh to saline)
	Critical shear stress for sedimentation	0.1 N/m2
	Critical shear stress for erosion	0.2 N/m2
	Dry bed density	500 kg/m^3
	Initial thickness in tidal/ lake area	0.1 m
	Initial thickness in channel in between structures	0 m
	Dry Bed Density	1600 kg/m^3
	Median Grain Diameter (D_{50})	100 µm
	Initial thickness in tidal/ lake area	5 m
	Initial thickness in channel in between structures	0 m

Table 4: Summary of morphological parameters.

Parameter	Value
Morphological Scale Factor	2
Spin up time	360 min
Inclusion of effect of sediment on fluid density	Yes
Minimum depth for sediment calculation	0.3 m

Table 5: Summary of sediment characteristics from field data and literature.

Parameter	Value	Location	Source
Range of D_{50} Values	4 - 690 µm	Avon River	Saint Mary's 2019 Field Campaign
Suspended sediment concentration	0.2 to 28.8 kg/m^3 (time varying)	Avon River	Saint Mary's 2019 Field Campaign
Maximum suspended sediment concentration	4 kg/m^3	Avon River	van Proosdij and Baker (2007)
Suspended sediment concentration	0.1 to 1.7 kg/m^3	Avon River	Daborn et al. (2002)
Suspended sediment concentration	0 to 1 kg/m^3	Minas Basin	O'Laughlin and van Proosdij (2012)
Suspended sediment concentration storm event	3 kg/m^3	Minas Basin	O'Laughlin and van Proosdij (2012)
Critical shear stress for erosion	0.1 to 0.15 N/m^2	Mudflat in Yangtze Delta, China	Shi et al. (2012)
Critical shear stress for sedimentation	0.01 to 0.1 N/m^2	Mudflat in Yangtze Delta, China	Shi et al. (2012)
Settling Velocity	1-1.5 mm/s	Variety of Locations (dependent on floc size)	Winterwerp (2011)
Settling velocity	2.1 mm/s	Laboratory experiment using sediment from Windsor and Evangeline Beach	Amos and Mosher (1985)

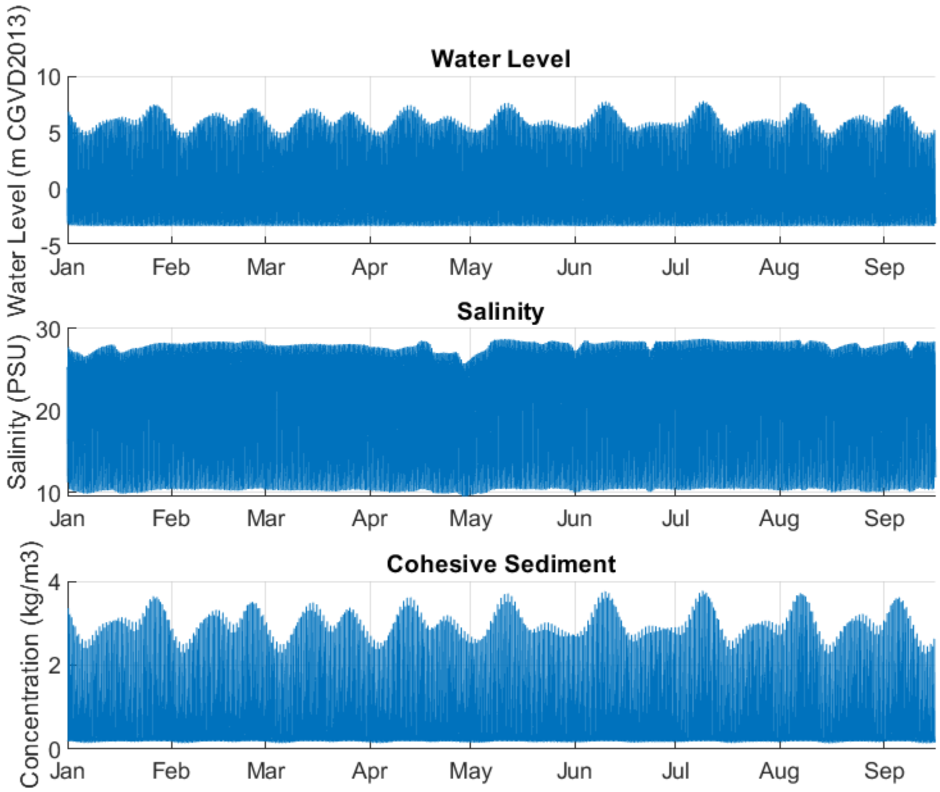

Figure 8: Model forcing at tidal boundary for salinity and sediment for Model B.

In addition to the analysis of field data and the literature review conducted, sensitivity analyses were performed on different sediment input parameters to assess how they would impact model results. Summarized conclusions from the sensitivity analyses are listed below:

- The model is sensitive to sediment parameters such as critical bed shear stress and settling velocity.
- Modelling in 3D rather than 2D results in a reduction of SSC but slightly greater accretion due to stratification in layers.
- The concentration of sediment at the tidal boundary has a significant impact on the model's sediment erosion and deposition results.
- Sediment inputs at river boundaries have very little impact on sediment in lake as sediment source is mostly from the estuary to the lake.
- Changing the concentration of suspended sediment at the boundary with time also has a large impact on sediment concentrations in the lake and in between the structures as higher measured concentrations occur when there is little flow entering through the structures and into the lake.

- There is very little difference between high and low freshwater flow events in terms of morphology and suspended sediment.

4. Comparison Against Measured Data

Model A (regional model) was validated mainly using relevant literature and field data, including several instruments that measured current velocities, water levels and salinities (obtained from a combination of SMU, Dalhousie, and CBCL measurements). Additionally, the local models were compared to the results obtained with the SWMM and the OpenFOAM models, which were specifically developed to represent the flow through the structures.

Available Data

Field data have been collected throughout the project to support the understanding of the area, provide information for model setup and validation, and to determine baseline environmental conditions. A summary of the different data sources used in this modelling exercise is provided in Table 6. The location of the various (main) instruments used in the validation is presented in Figure 9.

All field data collected during the project was very valuable to increase the understanding of the physical processes acting in this complex area. Nevertheless, it is important to note that measured data results are representative of very specific time periods and locations. Because of this, comparing model results directly with measurements would be not be representative and possibly lead to errors.

Table 6: Summary of (relevant) field data used for Delft3D model setup and validation.

Variable	Data Type (Instrument/ Method)	Collected By	Date	Purpose
Water Levels	Causeway Logs	Provided by the Client	Dec 2017	Model Validation
	Level Logger	CBCL	2018-2020	Model Validation
Currents	ADCP	Dalhousie University	Dec 2017	Model Validation
	ADCP	SMU	Dec 2017	Process Understanding/ Background Information
	ADCP	SMU	Fall 2019	Model Validation
	ADV	SMU	Fall 2019	Process Understanding
Median Grain Size	Sieve Analysis	SMU	Fall 2019	Model Setup (Sediment type, median grain size)

Bottom Sediment Classification	Drone Survey	SMU	Fall 2019	Model Setup (Spatial Sediment Distribution/Bed Roughness)
Suspended Sediment Concentration	ISCO Sampler	SMU	Sep 2019	Model Setup (Boundary conditions for model)
	ADV	SMU	Dec 2017	Model Validation
	ADCP Backscatter	SMU	Fall 2019	Model Validation
	ISCO Sampler	SMU	Dec 2017	Process Understanding/ Background Information
Salinity	Level Logger	CBCL	2018-2020	Model Validation
	RBR Gauge	SMU	Fall 2019	Model Validation
	Water Samples	CBCL	2019	Process Understanding/ Background Information
Topography/ Bathymetry	Drone Survey	SMU	Jul 2019	Model Setup (Bathymetry)
	Bathymetry Survey	CBCL	Dec 2017	Model Setup (Bathymetry)

Figure 9: Location of the various instruments (left). Details near the causeway (right).

Hydrodynamics

The current velocities calculated using the initial model setup were compared with December 2017 measurements from the ADCP installed by Dalhousie University near the existing aboiteau and with September 2019 measurements from the ADCP installed by SMU in the channel adjacent to the Newport Bar (Figure 10, Figure 11). During the model development period these were the only instruments that could be used for validation, since the other instruments were located in secondary channels not fully represented in the model (nor representative for the hydrodynamics and morphodynamics of the overall project area). Overall, the model was able to accurately represent the velocity patterns associated with the tidal propagation in both locations. Higher velocities are observed during flood tide, with low velocities during ebb tide.

Figure 10 and Figure 11 show the time series of horizontal velocities along the water column. The instrument was placed at the bottom (facing upwards). Time is presented in the x-axis while the distance from the bottom is presented in the y-axis. Some differences between total water depth measured by the ADCP and in the model are due to differences in local bathymetry. Gaps in the data are likely due to loss of backscatter signal strength.

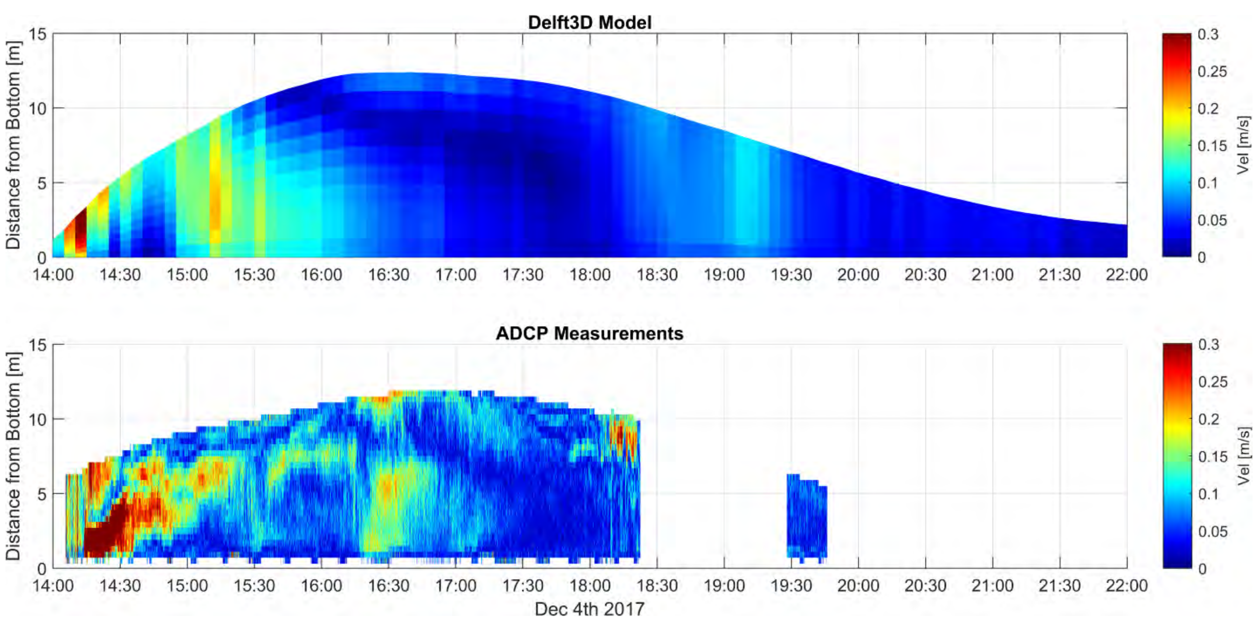

Figure 10: Comparison between Model A and measured velocities in the main channel near the existing aboiteau.

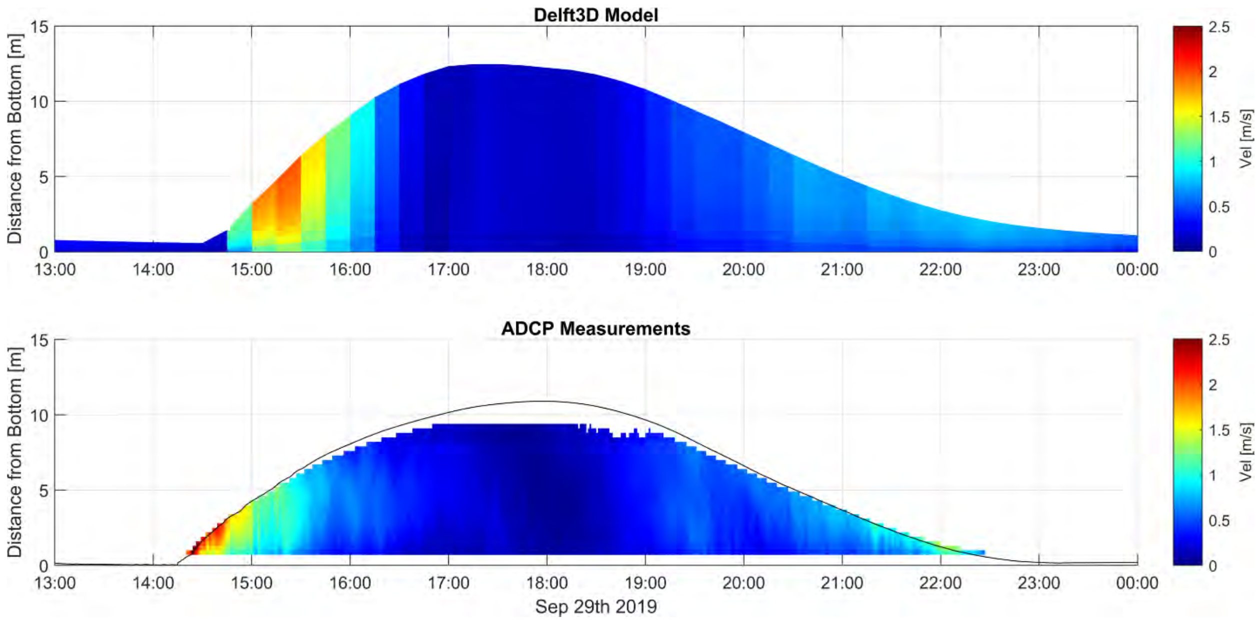

Figure 11: Comparison between Model A and measured velocities in the channel adjacent to the Newport Bar. Note that the bed level is different in the model and the measured location.

The water levels calculated by the model were compared with measurements at the causeway provided by the client. Overall, the model is able to reproduce the high water levels relatively well (Figure 14). Low water levels could not be compared because both sensors become dry during low tide.

The Root Mean Square Error (RMSE) indicates that the model can estimate the water levels near the causeway and at the St. Croix River with less than 0.2-0.3 m error. The error represents less than 5% of the tidal amplitude in the area. This low error demonstrates that the model reproduces observed water levels well.

Some time delay in the tidal propagation, generally of about 10-15 minutes (up to 30 minutes), is observed in the model (Figure 12 and Figure 13). This can be caused by differences in bed roughness, especially due to the varying bed composition between mud and sand, and/or model bathymetry schematization, including the meandering channels along the St. Croix River branch. This time lag does not affect the outcome of the model and has no influence on the design conditions.

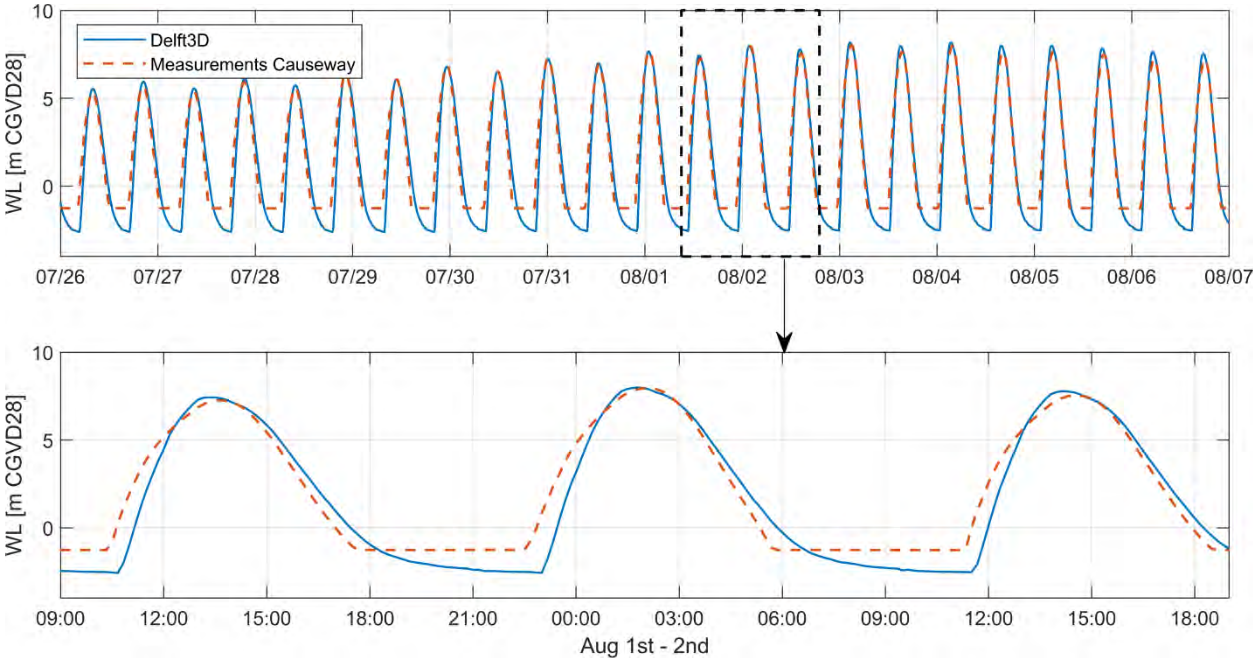

Figure 12: Time Series of Water Levels Modelled and Measured at the Causeway.

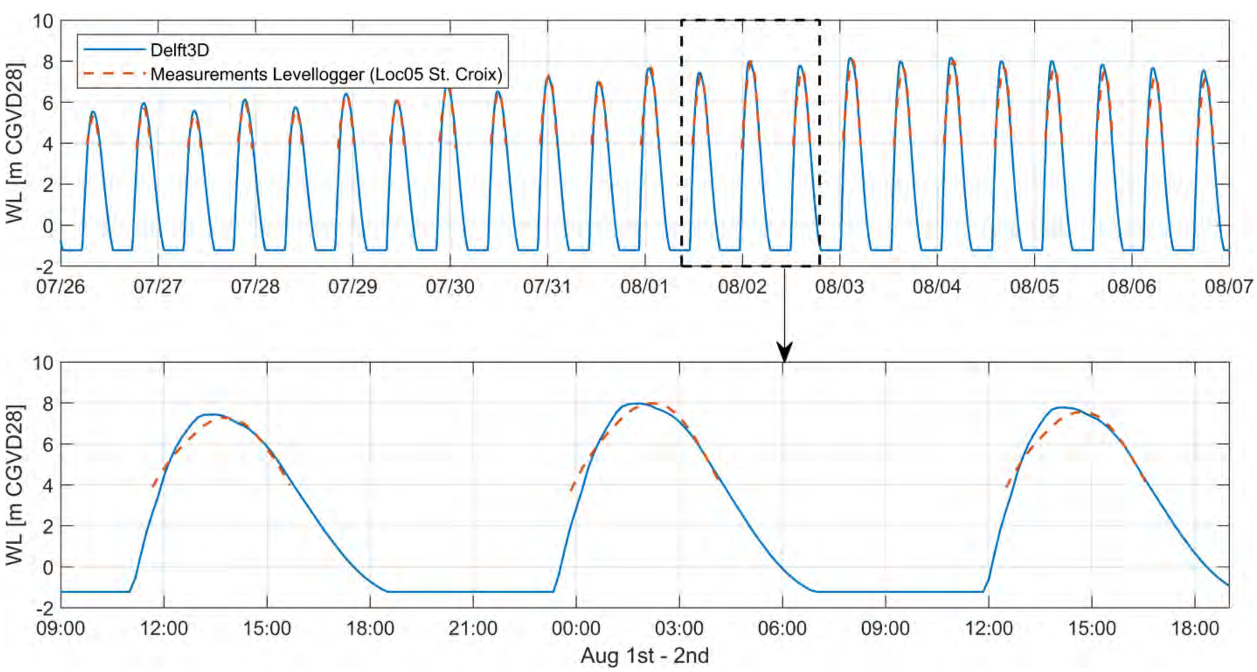

Figure 13: Time Series of Water Level Modelled and Measured at the St. Croix River (Loc 05).

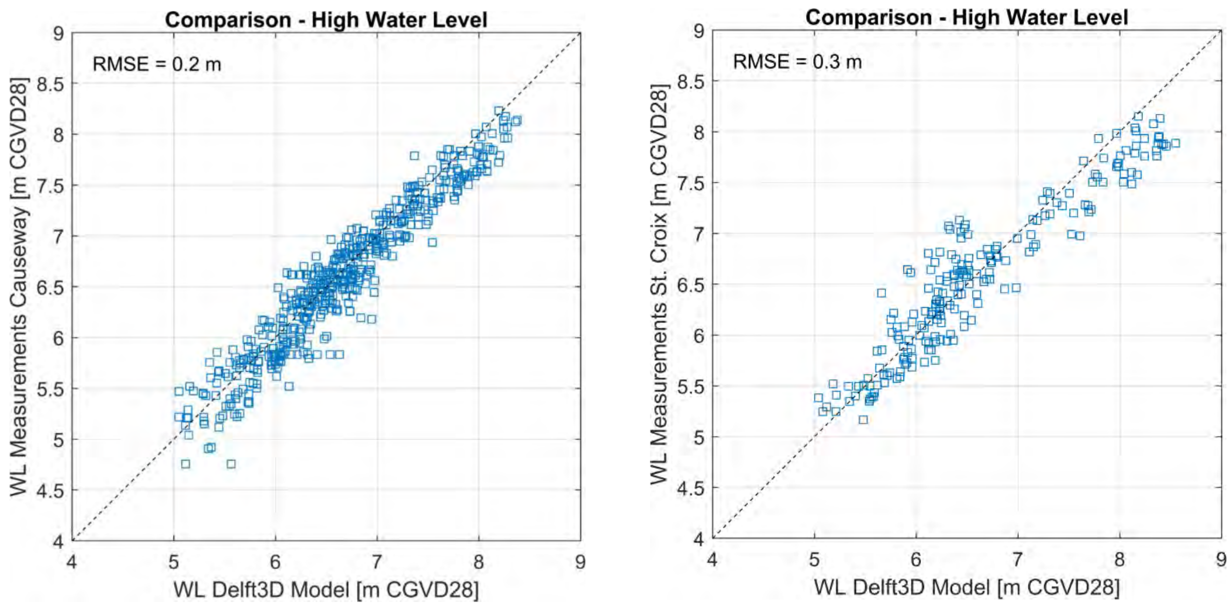

Figure 14: Comparison between the high water level calculated by the model and measured at the causeway and at the St. Croix River level logger (Loc05).

Salinity

Model results indicate that salinity concentrations vary significantly within a tidal cycle, with low salinity during low tide and high salinity during high tide. All (continuous) salinity measurements collected during the project are representative only of the high tide since the instruments were constantly dry during low tide. In this sense, only the peak salinity concentrations were compared with the measurements. In addition, salinity patterns calculated by the model were only qualitatively assessed due to inconsistency in the measurements, lack of data at low tide, and uncertainty in quantifying the river flows during the field campaign.

Laboratory analysis of water samples collected during the water quality monitoring were also analysed to provide information to the model. However, those samples were collected at varying moments of the tidal cycle and at varying locations, including some areas near small freshwater creeks, which locally affected the salinity concentrations. Consequently, it was not possible to directly compare model results with measured data. The data was used to inform the general understanding of the processes affecting salinity in the area and were taken into account when assessing model results.

Overall, the modelled results show that the (peak [1]) salinity concentrations in the estuary are highly dependent on the (freshwater) river discharge, tidal levels, and tidal cycle (Figure 15). This includes a decrease in salinity during higher river flows, low tide, and neap tide events.

Modelled (peak) salinity values were compared to salinity concentrations recorded by a level logger deployed by CBCL from July to October 2019. Peak salinity per tidal cycle was calculated because the instruments could not record salinity concentrations during low tide as the instruments would become dry. The peak measured salinity values, near the mouth of the St. Croix River[2], ranged from 7 PSU to 25 PSU (Figure 16). The peak modelled salinity values ranged from 10 PSU to 26 PSU at a nearby location of the level logger (Figure 15), which is a similar range of peaks salinities to the measured values.

An RBR gauge was deployed by SMU from September 29th to October 1st, 2019 near the deployed ADCP. The salinity concentrations recorded by the instrument are illustrated in Figure 17. The pressure recorded by the ADCP is also shown in this figure to demonstrate the tidal cycle (no measured water levels were available). Similar to the salinities recorded by the level logger, the instrument was dry during low tide, so the peak salinities per tide were calculated. The peak salinities ranged from 27 to 28 PSU and the gauge was deployed during spring tides. Since the instrument was only deployed for 3 days the peak salinities fall within a small range. The maximum modelled salinity at this location is 27 PSU, with a range of peak salinities from 14 to 27 PSU. The discharges are unknown during the period of recorded salinities and therefore, the measured salinities cannot be directly compared to the modelled salinities.

It is important to note that since the freshwater discharges were not measured during the period of the level logger measurements, it is difficult to compare measured salinities and model results. Model results and measurements seem to indicate that freshwater discharges have a significant impact on salinity concentrations and therefore, only the range of salinities can be compared between measured and modelled results. In addition, since the instruments became dry during low tide, the salinity concentrations during low tide cannot be compared and as a result, only peak salinity concentrations were compared between the modelled and measured results.

[1] There is significant variation in salinity concentrations within the tidal cycle. Peak salinity concentrations refer to the maximum salinity within one tidal cycle.
[2] See location of instrument in Figure 9

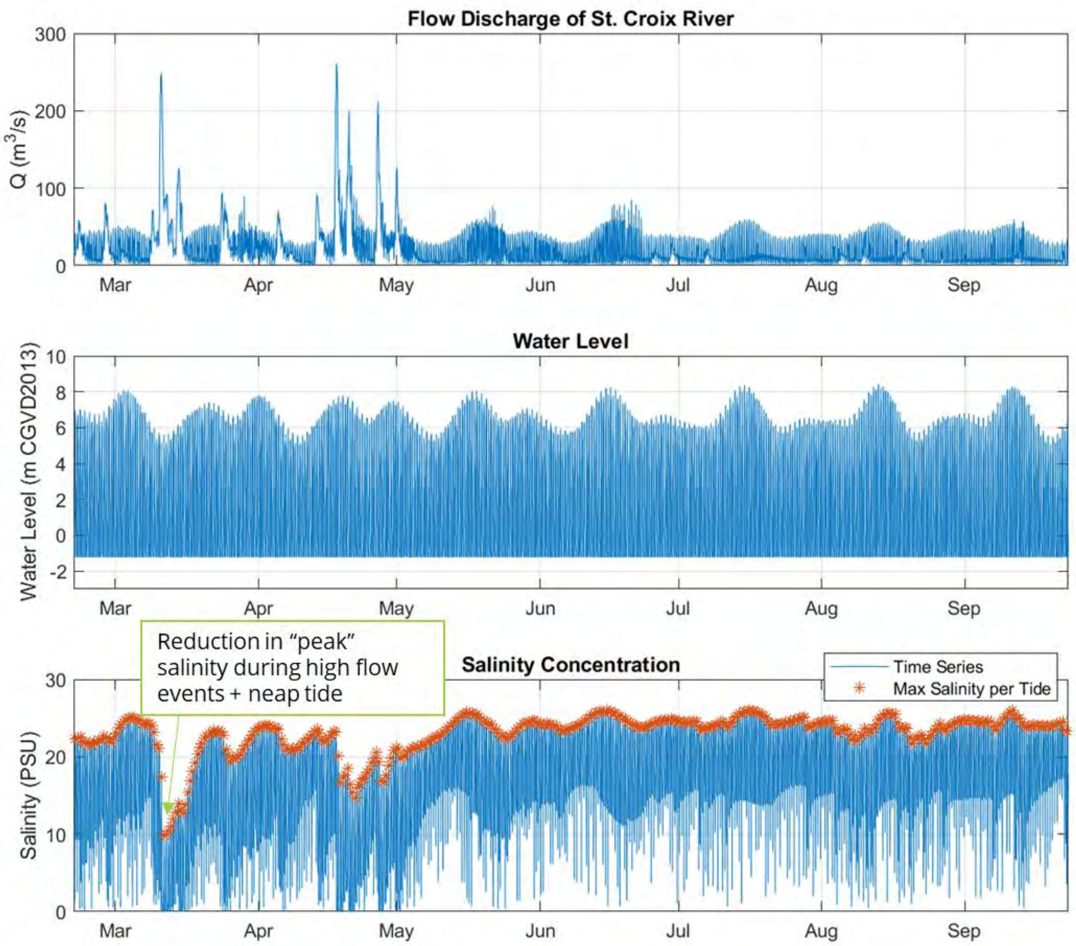

Figure 15: Modelled salinity concentrations at a similar location to the deployed level logger, with peak salinity highlighted by orange *.

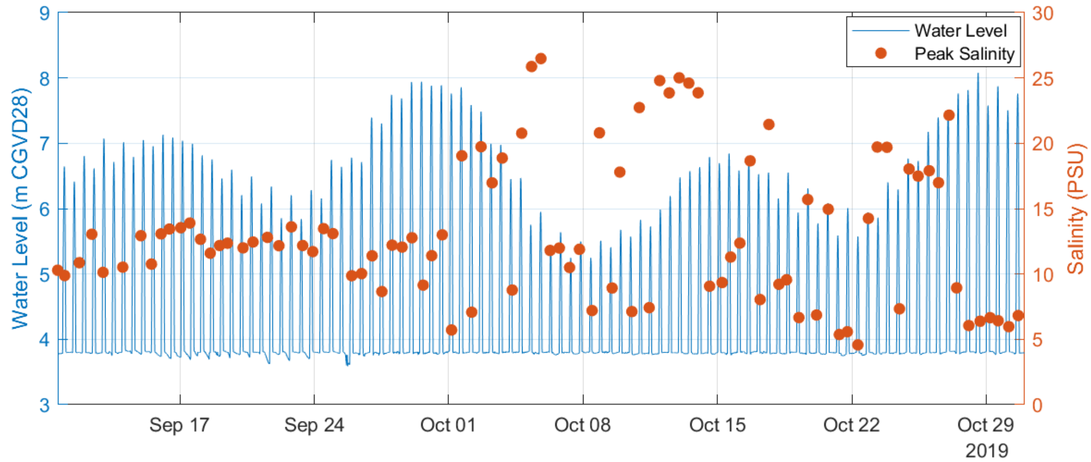

Figure 16: Peak salinity concentrations and water levels measured by a level logger deployed by CBCL. Note: Only peak salinity values (the maximum salinity per tidal cycle) are shown since the instruments were consistently dry during low tide.

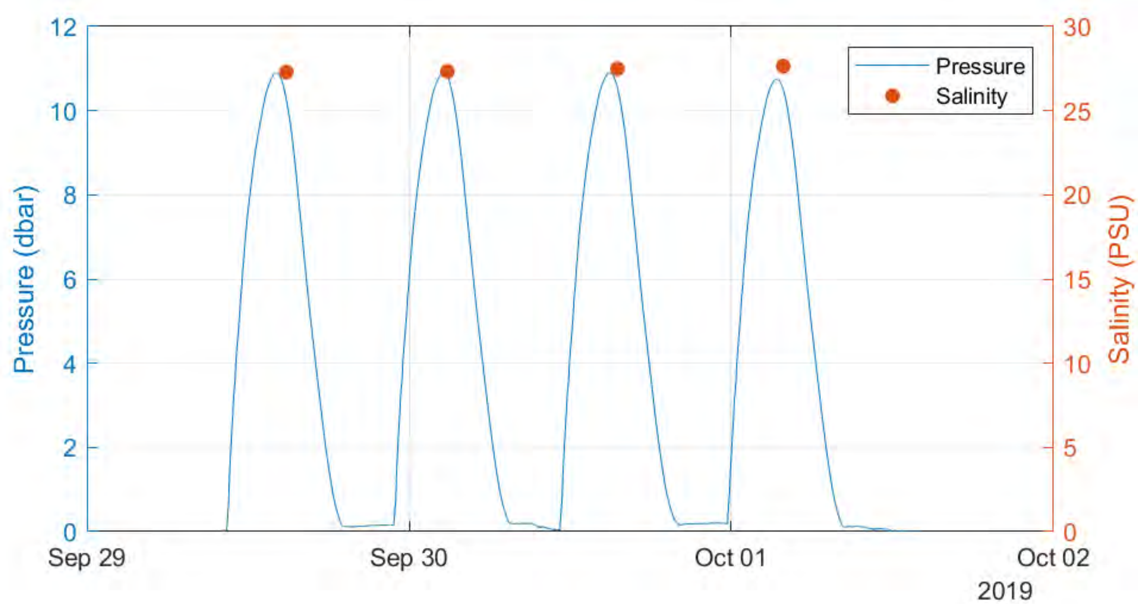

Figure 17: Peak salinity concentrations and pressure (to demonstrate the tidal cycle) measured by a RBR gauge deployed by SMU. Note: Only peak salinity values (the maximum salinity per tidal cycle) are shown since the instruments were consistently dry during low tide.

Suspended Sediment Concentrations

Actual measurements of suspended sediment concentration (SSC) only occurred over a few tidal cycles (2-3 days) during two field campaigns (December 2017, September 2019). The information provided by the ISCO measurements from 2019 (in a secondary channel) were used to inform the time-variability of the suspended sediment concentrations at the model boundaries. Since the ISCO measurements were conducted in a secondary channel, they could not be directly compared to the model results as the model did not resolve small channels of this size.

An ADCP deployed by SMU and the backscatter recorded by the instrument was used to qualitatively compare modelled SSC (location of instrument shown in Figure 9). As described by SMU, backscatter can be (somewhat) related to turbidity and therefore, suspended sediment concentrations (SSC). In order to quantitatively compare the backscatter levels to SSC a calibration procedure is required. SMU communicated to CBCL that the calibration performed on the ADCP backscatter data did not provide reasonable suspended sediment concentrations and therefore, CBCL can only qualitatively compare modelled results to the ADCP data gathered by SMU. It was stated that a reason for this could be due to type of sediment.

The signal strength (representing backscatter) recorded by the ADCP is shown in Figure 18. This data was compared to the modelled SSC at a similar location to the ADCP. The comparison of the results show that the model compares well to the pattern of backscatter data with the incoming tide. However, the model does not capture the increase in SSC during the ebb tide as recorded in the backscatter data. This could be due to complexities in the overall system such as local eddies impacting sediment resuspension or other sediment processes not taken into account in the model (See Section 2. Modelling Goals and Limitations). In addition, the sediment parameters chosen for the model were selected to best represent conditions in the lake and the effect of the structure in sediment intrusion; and therefore, some sediment parameters may not fully represent conditions in the estuary. In addition, discrepancies could be due to issues with measurement methods including instrument interference with the system and instrument noise. It is also important to note that while comparing ADCP backscatter to SSC can provide qualitative comparisons, since the data was not calibrated to the SSC a direct comparison of the modelled SSC to the backscatter data cannot be made.

Two optical backscattering sensors (OBS) were also deployed alongside the ADVs by SMU which was calibrated to provide SSC (location of ADV shown in Figure 9). The recorded SSC was compared to the modelled SSC from Model B (medium-resolution model), illustrated in Figure 19. The comparison shows that the range of SSC is similar in both the modelled and measured results. The measured SSC values range from approximately 0.5 to 3.5 g/L. At a similar location, the modelled SSC were in the range of 0 to 3.7 g/L, which is similar to the measured results.

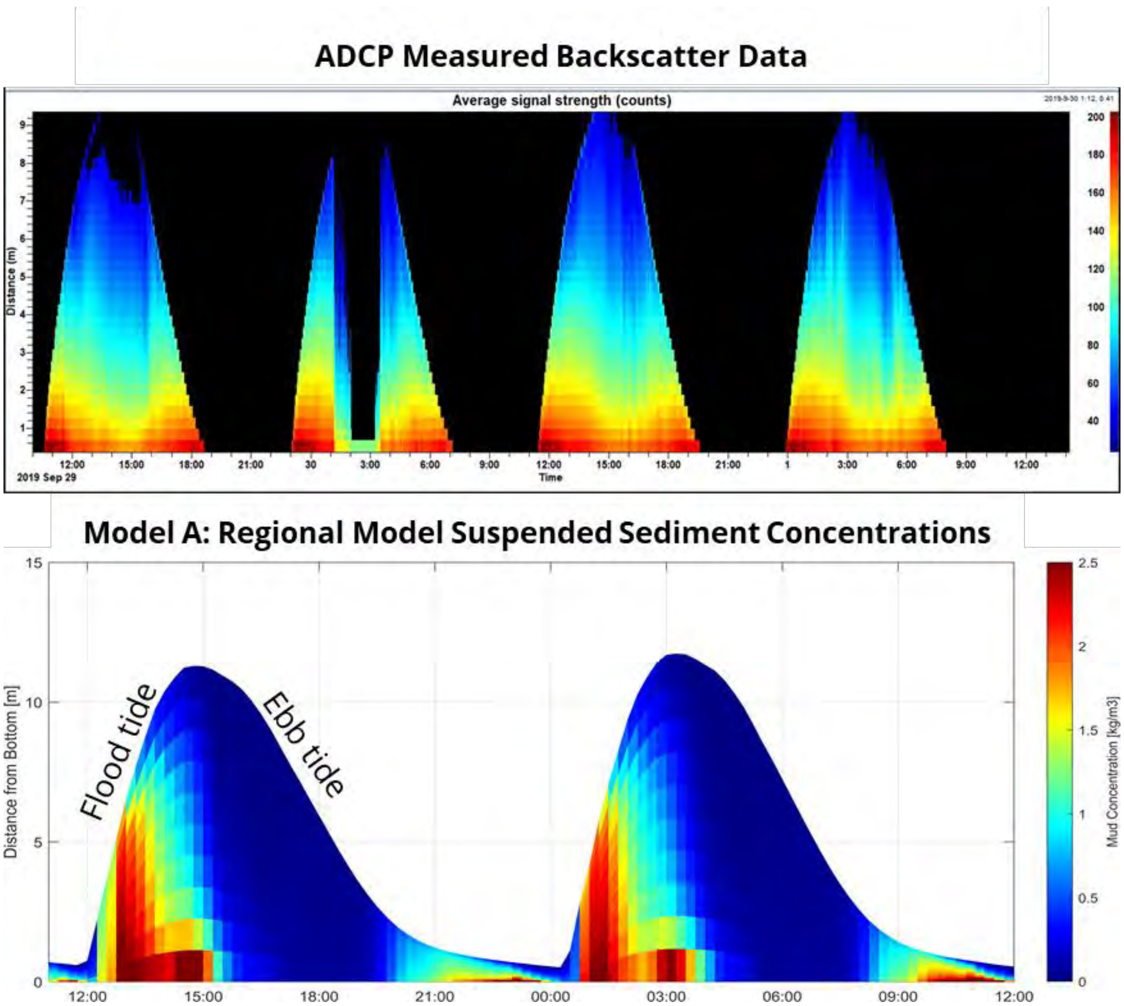

Figure 18: Backscatter recorded by ADCP deployed by SMU compared to the modelled suspended sediment concentrations from Model A (regional domain – 10 vertical layers).

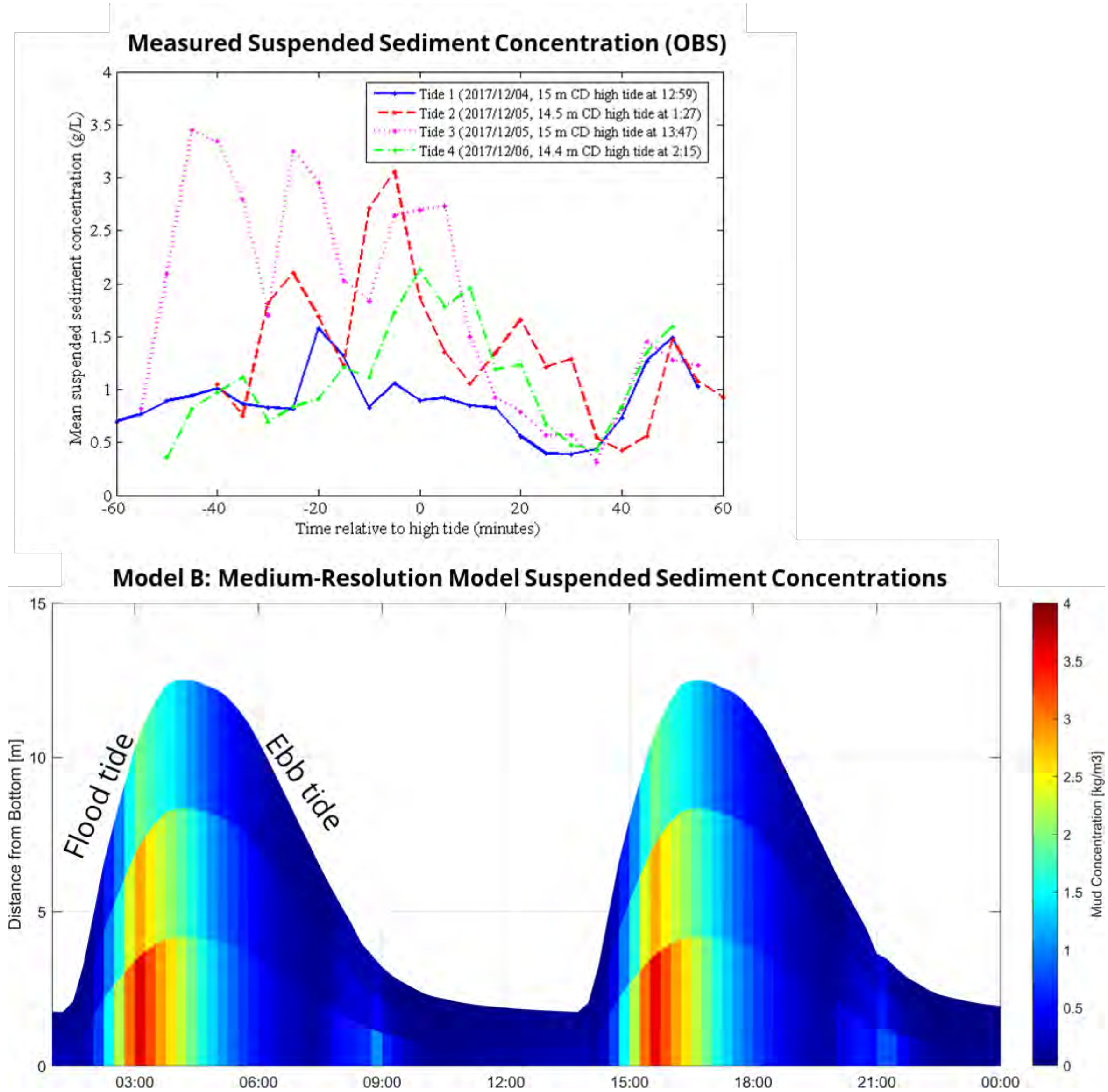

Figure 19: The suspended sediment concentration converted from the OBS deployed by SMU compared to the modelled suspended sediment concentrations from Model B (medium-resolution domain - 3 vertical layers).

5. Concluding Remarks

This memo outlines the model set up and validation for the Delft3D hydrodynamic and sediment transport modelling. Three main Delft3D models were developed to meet the objectives of the consultancy. Key steps in the development included comparison with measured data, literature review, and sensitivity analyses. The three models include the regional model (Model A), the medium-resolution local model (Model B), and the fine-resolution local model (Model C). A summary of the model setup is discussed including the various model grids, bathymetric data sources, schematization of the aboiteaux and fishways, and various model input parameters, as well as modelling limitations and baseline considerations. The derivation of these model inputs is explained here with sources including field data and relevant literature. In addition, a comparison of the model results and measured data is included to illustrate the validation of the model.

The regional model was compared against in-situ measurements of water levels and velocities. Overall, the model could represent sufficiently well the hydrodynamics of the area (including the main channel near the existing aboiteau, the channel adjacent to the Newport Bar and the downstream end of the St. Croix River). Due to scarcity and uncertainty on the measurements of salinity and suspended sediment concentrations, the model capabilities with respect to the transport of those constituents were assessed only qualitatively. Modelled salinity values at the St. Croix location are in line with the measurements. The salinity concentrations inside Lake Pesaquid could not be validated due to limited amount of data.

The Delft3D models developed in this study are considered suitable for the assessment of salt and sediment intrusion, and velocity patterns around the proposed and existing aboiteaux. Due to the very dynamic aspect of the area and the complex nature of cohesive sediment transport as well as uncertainties in salt diffusion processes inside the lake, results are better assessed in relative terms rather than for determining absolute values (e.g. comparison between the different water management scenarios and/or to understand the impact of the removal of the existing aboiteau, given a similar set of input conditions and assumptions). In addition, the boundary conditions for the local model were based on limited information (e.g. typical salinity for the Minas Basin and suspended sediment concentration from a single field campaign); making it challenging to fully validate the model results. Sensitivity analysis has shown that concentrations applied in the model boundaries could have a strong influence on the concentrations inside the lake.

As is typical for morphological models, CBCL recommends further monitoring and field campaigns during construction and post-construction so that a better understanding of the local hydrodynamic and morphological processes can be obtained.

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Memo

Date	16/07/2021
Memo to	C. Fisher, A. Wilson, R. Giffin
Project name	171046.01 - Avon River Aboiteau
Subject	Delft3D Analysis – Salinity, Sediment, and Morphology
From	A. Kaji, G. Mauti
Reviewed by	A. Wilson

1 Introduction

This memo outlines an analysis of salt intrusion and suspended sediment concentrations, in addition to morphological development of the area around the proposed aboiteau. The analysis is based on the results of the hydrodynamic model using the software Delft3D. The results included in this memo are for the Slightly Brackish and Dampened Tidal Estuary water management scenarios. The modelling done for this analysis utilizes a medium-resolution grid and was conducted both with the existing aboiteau in place and with the existing aboiteau removed. Two sets of seasonal conditions, including average winter/spring seasons (wet) and average summer/fall seasons (dry), were modelled as runoff into the lake can impact salinity and sediment concentration. A summary of all the models conducted with the various conditions are listed in Table 1.

Table 1: Summary of the Various Simulations Used in this Analysis in Terms of Seasonal Conditions, Scenario, and the Setup of the Existing Aboiteau

Simulation	Season	Scenario	Existing Aboiteau
1	Dry	Brackish	In place
2	Wet	Brackish	In place
3	Dry	Dampened Tidal	In place
4	Wet	Dampened Tidal	In place
5	Dry	Brackish	Removed
6	Wet	Brackish	Removed
7	Dry	Dampened Tidal	Removed
8	Wet	Dampened Tidal	Removed

2 Delft3D Setup

Bathymetry has been derived from a combination of the latest bathymetric surveys, the available LiDAR surface data, the drawings of the new structure (including the permanent dyke, aboiteau and channel) and some assumptions on the local bathymetry. The farmland and developed area outside of the lake, behind the aboiteau, is assumed not to flood in those conditions and was therefore removed from the model. The model used for the analysis of salinity and suspended sediment concentrations is 3D with 3 layers and the model used for assessing morphological changes was 2D (the more complex calculations involved meant that conducting this analysis in 3D was not feasible within the project timeline). The model domain and bathymetry are shown in Figure 1, with the existing aboiteau removed and in place.

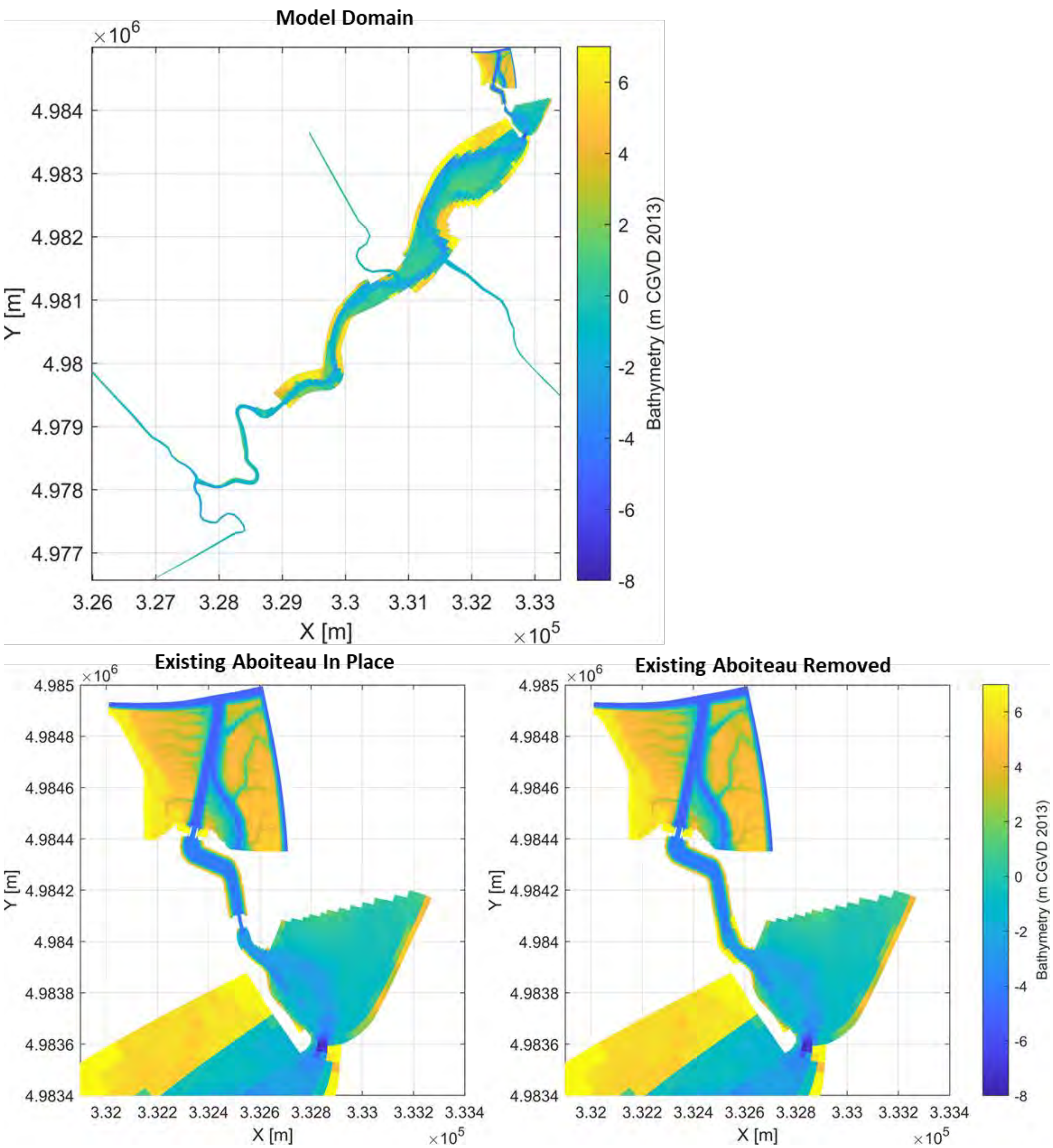


Figure 1: Model bathymetry with existing aboiteau in place and removed.

The model is forced with a time series of freshwater runoff into the lake (derived from analysis of flow data from the St. Croix River and calculated by the SWMM model) and astronomical tides (calculated by the regional Delft3D model). Two 1-month time periods of seasonal conditions were modelled – the first representing average winter/ spring conditions, which will be referred to as the “wet” seasons, and the second representing average summer conditions, which will be referred to as the “dry” seasons.

The model was compared against the SWMM and the OpenFOAM models used in this study for consistency and improved accuracy in the representation of the structure. The capacity of the fishways was specifically calibrated on the capacity calculated by the OpenFOAM model. The capacity through the main gates was calibrated on the capacity calculated by SWMM. The equations for flow through structures in SWMM are empirical based on measured data (they follow the FHWA “Hydraulic Design of Highway Culverts” manual) and therefore, considered more accurate than Delft3D for this specific purpose.

Two model grids were developed for this comparison. The first assumes that the existing aboiteau remains in place, with the gate system removed. This aboiteau is schematized as a fixed opening. The second model assumes that the existing aboiteau is removed. In its place is a 25 m wide trapezoidal channel with 2:1 side slopes, connecting the new channel downstream to the existing channel upstream of the existing structure. The grid with the existing aboiteau in place is shown in Figure 2. Three points are illustrated in this figure, which depict locations in the model where data was extracted and are referenced in this memo. The three locations chosen are locations through Lake Pesaquid.

The sediments simulated to assess sediment intrusion and morphological changes in the models include a cohesive sediment, representing clay, and a non-cohesive sediment, representing sand. It was assumed that sediment supply would be available to erode for the entirety of the model domain except for at the proposed structure, between the proposed and existing structures, and just upstream of the existing structure, due to the proposed rip-rap at these locations.

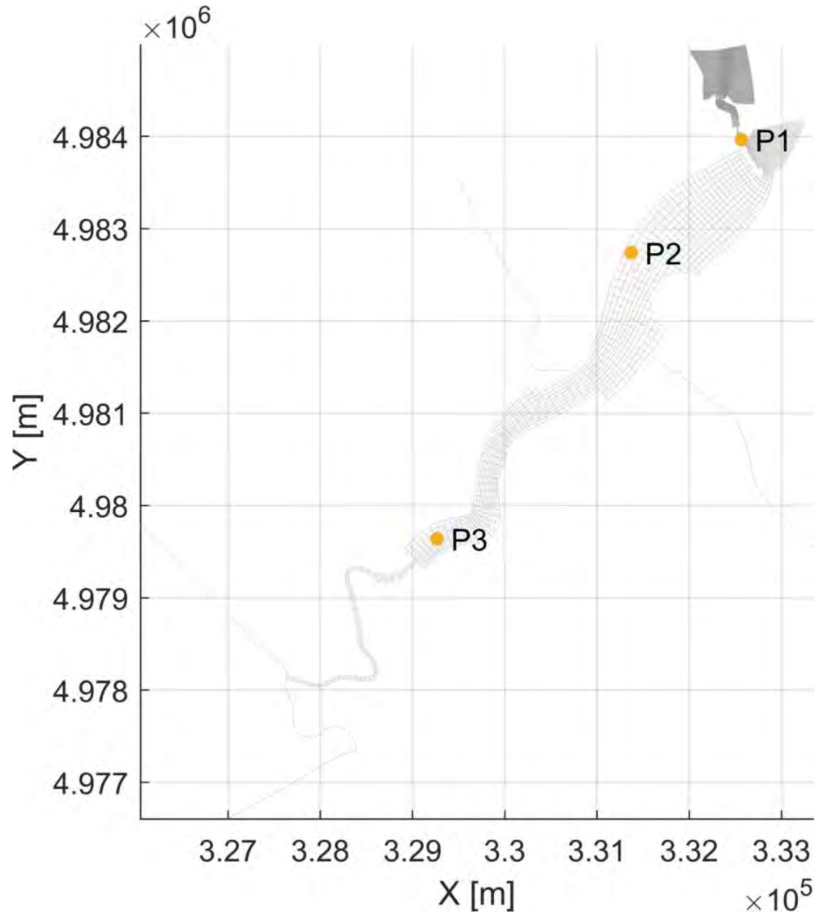


Figure 2: Model grid with points that indicate the location of the time series results that are discussed throughout the memo.

2.1 Water Management Scenarios

Two operational scenarios were modelled in this analysis to assess the sediment and salinity intrusion throughout the area of study. These scenarios were tested using the grid with the existing aboiteau remaining in place as well as with the existing aboiteau removed. The two water management scenarios include:

- Slightly Brackish Scenario.
- Dampened Tidal Estuary Scenario.

The **Slightly Brackish Scenario** includes the operation of two-way baffled fishways and active gates. The active gates open when needed to maintain the desired lake level, when the tidal level is less than the lake level. In the model results, the lake level is maintained at 2.1 m CGVD2013 and fluctuates by +/- 0.4 m. The **Dampened Tidal Estuary Scenario** has a lake level that fluctuates between -0.5 m and 1.5 m CGVD2013. This scenario utilizes a flap gate that has a permanently open section, with the remaining functioning as a normal flap gate, and two-way baffled fishways. The flap gate was schematized in Delft3D by adjusting the gate level based on the tide and lake levels, to match the capacity estimated by the SWMM model.

3.0 Results

This section of the memo discusses the results of the Slightly Brackish and Dampened Tidal Estuary Scenario models, with the existing aboiteau in place and removed. A summary of the results illustrated in this section include:

- Time series of the salinity and suspended sediment concentration in each layer at three locations in the lake, shown in Figure 2.
- Maps of the percentage of saline water and suspended sediment concentration near the surface and near the bed.
- Maps of the depth-averaged salinity and suspended sediment concentration.
- Maps of potential sedimentation and erosion for the study area and maps of just the area surrounding the structures.
- Cross-sections of potential sedimentation of the channel between the proposed and existing aboiteaux.
- Maps of the maximum bed shear stress between the existing and proposed aboiteaux.

3.1 Slightly Brackish Scenario

3.1.1 Salinity

Time series of the salinity concentrations along with the freshwater inputs and water levels are shown in Figure 3 and Figure 4 for the wet and dry season, respectively (locations of points are shown in Figure 2). Under the **dry (low runoff) seasons** (Figure 3), the Slightly Brackish Scenario would create brackish conditions in Lake Pesaquid:

- Salinities north of the Highway 1 bridge would reach 15 PSU.
- Salinities just downstream of Martock would reach 7 PSU.

In contrast, model results show much lower salinities during the **wet (high runoff) seasons** (Figure 4):

- Under the Slightly Brackish scenario, salinities greater than 6 PSU would be confined to the area north of Highway 1, however during a large rainfall event the saline water is essentially completely flushed from this area.
- Very little saline water was observed at Martock during an average wet season (a maximum of 1 PSU was indicated by the models).

The maps of the percent salinity near the bed and surface are shown in Figure 5 and Figure 6 for wet and dry seasons. These maps, in addition to the time series, show that very little stratification takes place in the lake. Some stratification occurs just downstream of the aboiteau (P1), but further upstream, this stratification is reduced. The maps of depth-averaged salinity are shown in Figure 7 and Figure 8 for the wet and dry seasons. The results indicate that that the salinity is largely controlled by the freshwater river inputs, with higher rainfall events resulting in lower salinities. In particular, the time series illustrate that salinity of the lake responds not only to seasonal runoff conditions (i.e., wet vs. dry seasons) but also to individual runoff events. The maps also illustrate that there is a gradient in salinities between the north and south of Lake Pesaquid, with higher salinities occurring in the north. This gradient is especially marked during the wet season due to the river inputs providing freshwater, while saline water enters through the fishways.

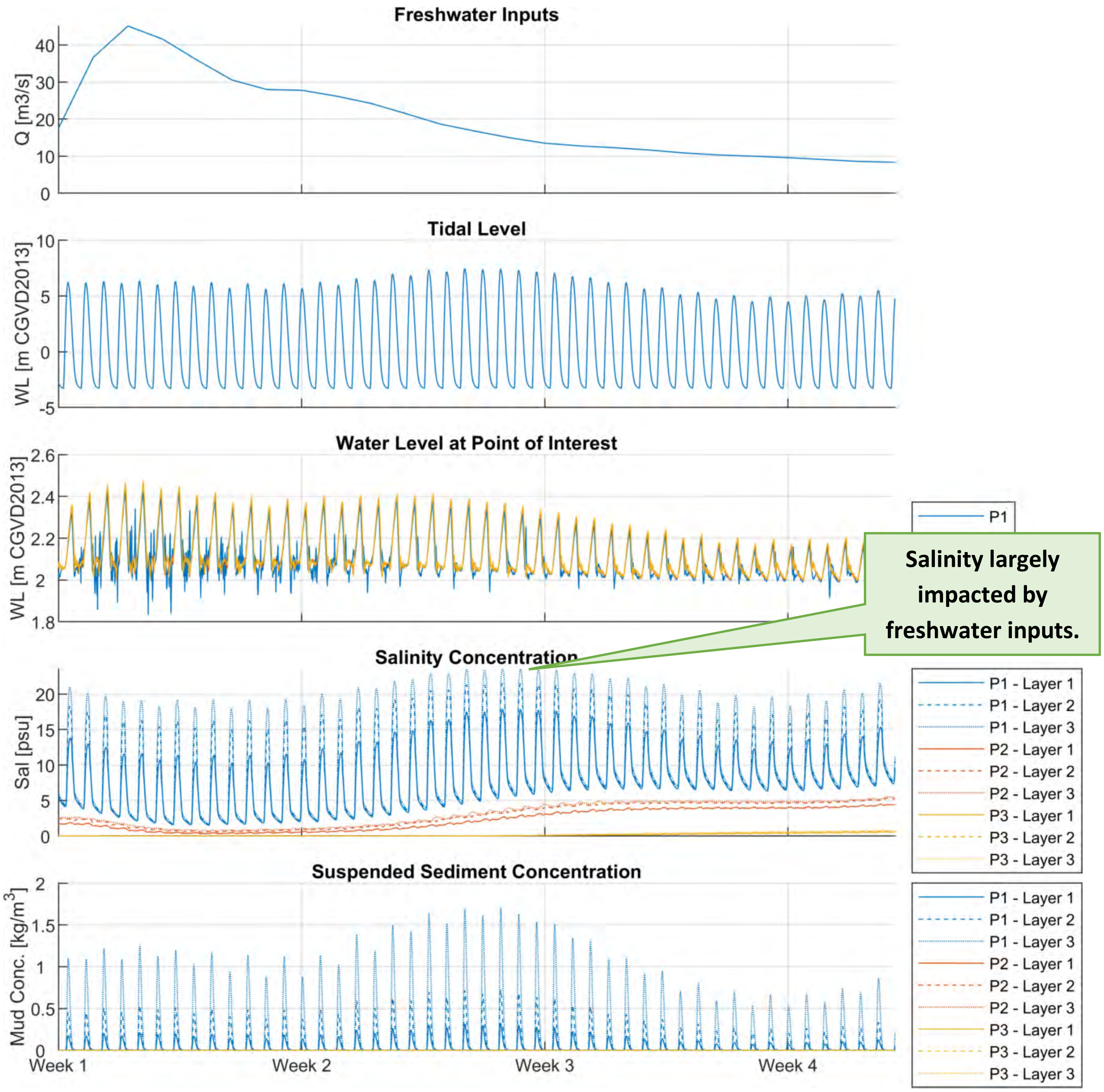


Figure 3: Time series of salinity and suspended sediment concentrations at each layer for the Slightly Brackish Scenario (wet season).

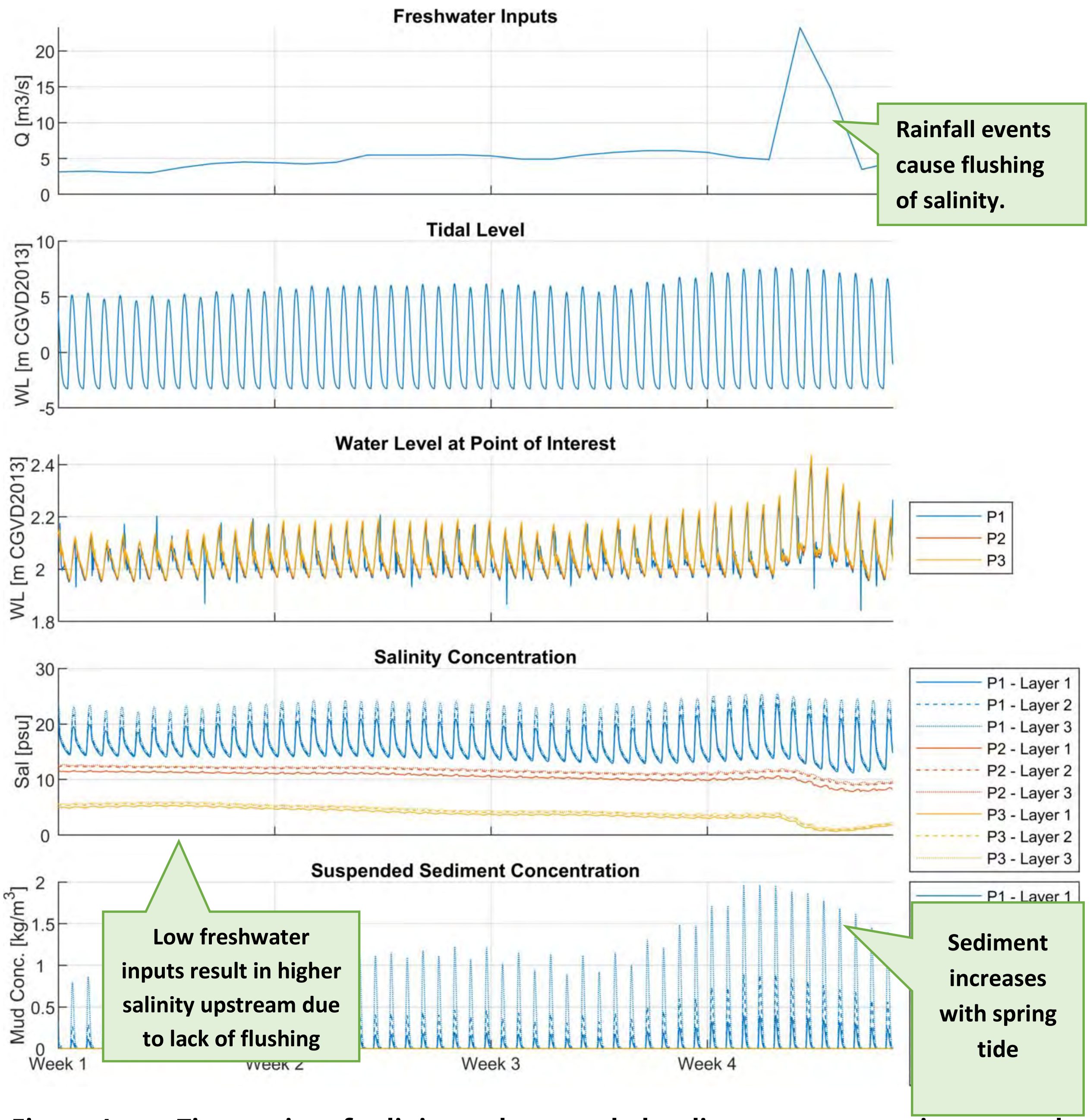


Figure 4: **Time series of salinity and suspended sediment concentrations at each layer for the Slightly Brackish Scenario (dry season).**

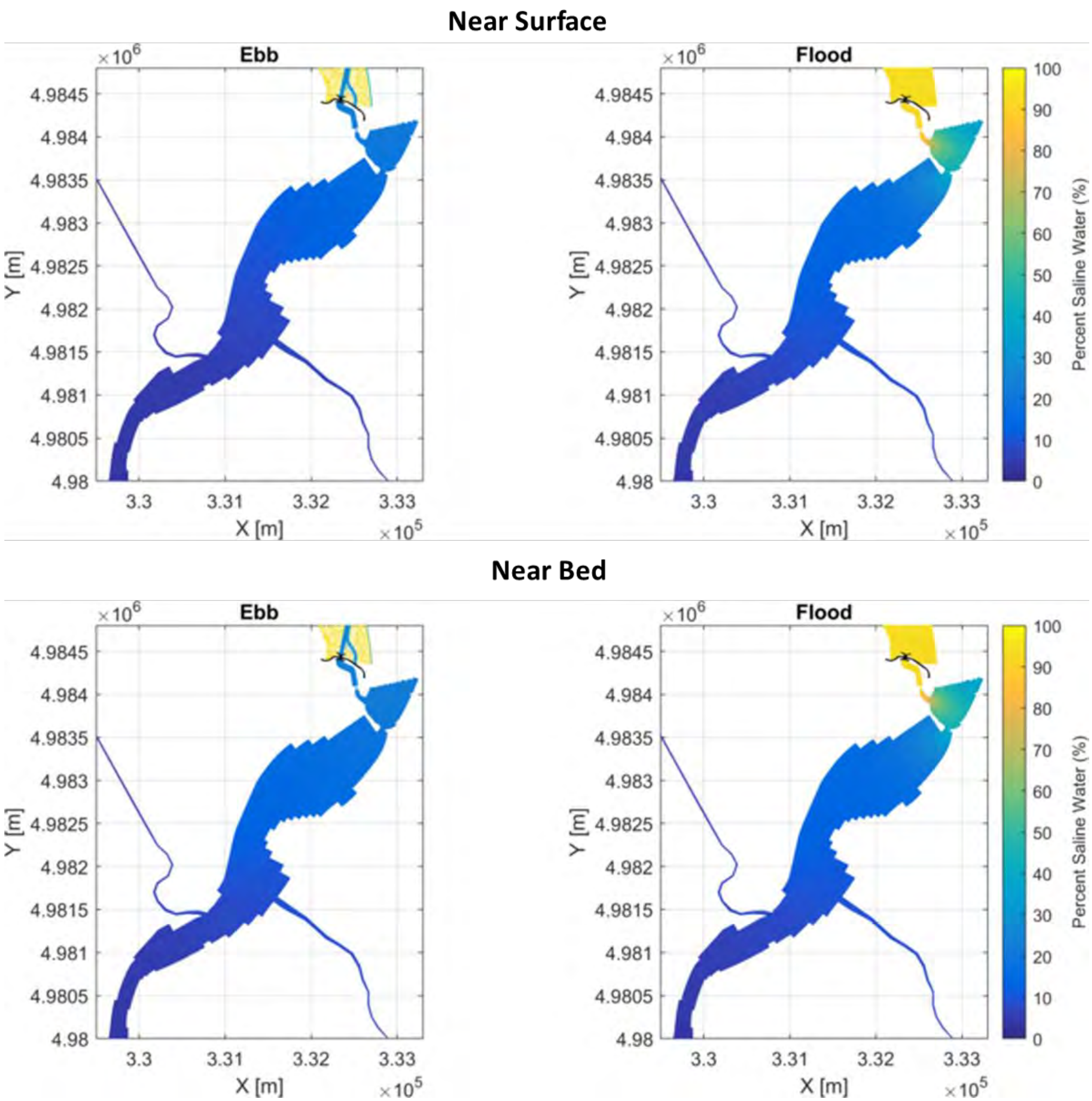


Figure 5: Map of freshwater and saline percentage of water for the Slightly Brackish Scenario (wet seasons).

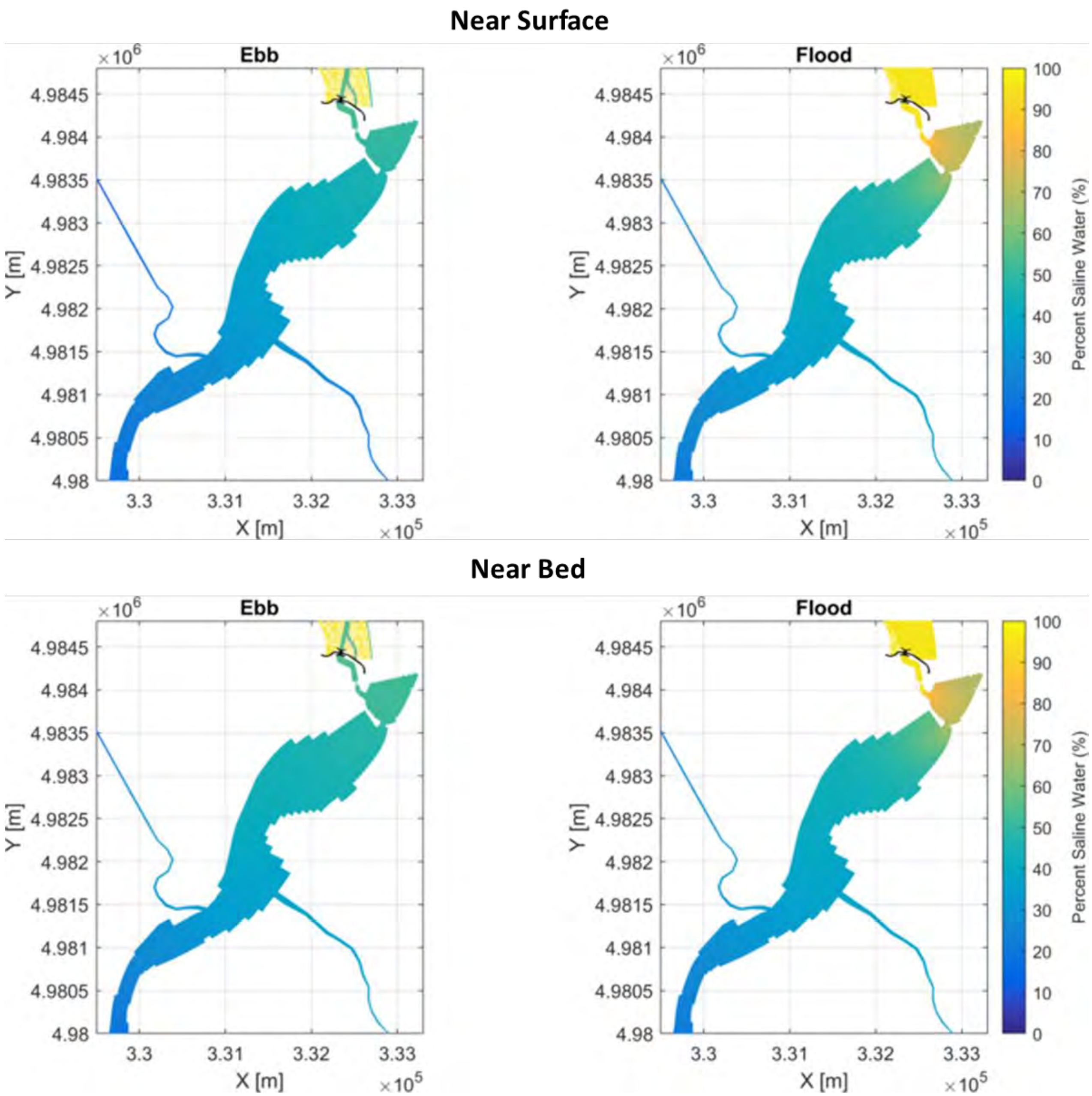


Figure 6: Map of freshwater and saline percentage of water for the Slightly Brackish Scenario (dry seasons).

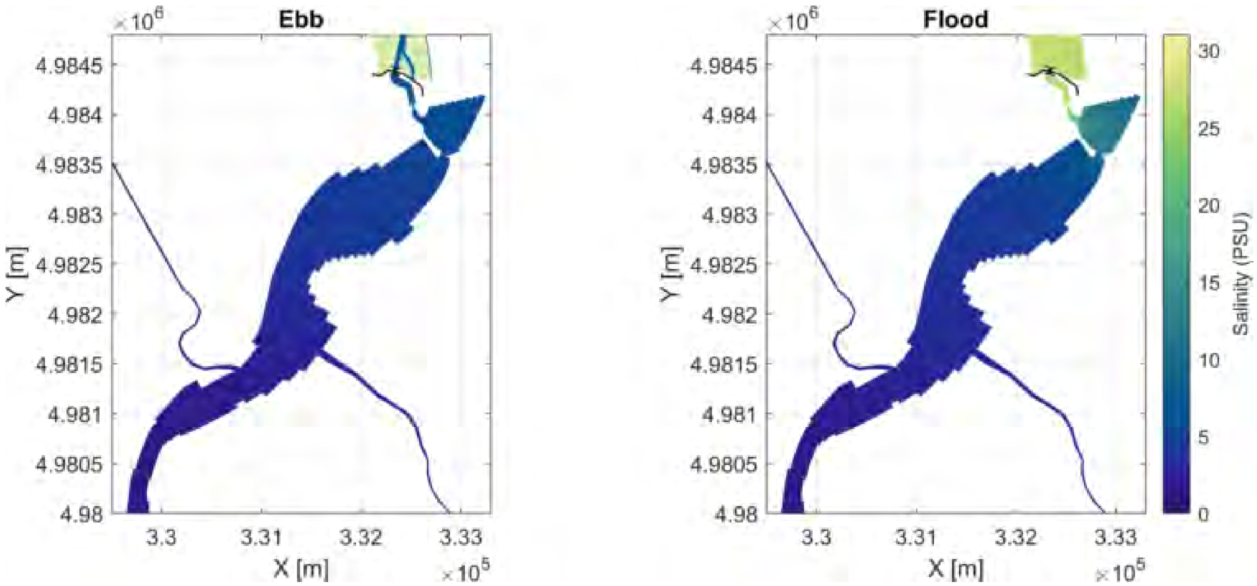


Figure 7: Depth-averaged salinity concentrations for the flood and ebb tide under the Slightly Brackish Scenario with the wet seasons).

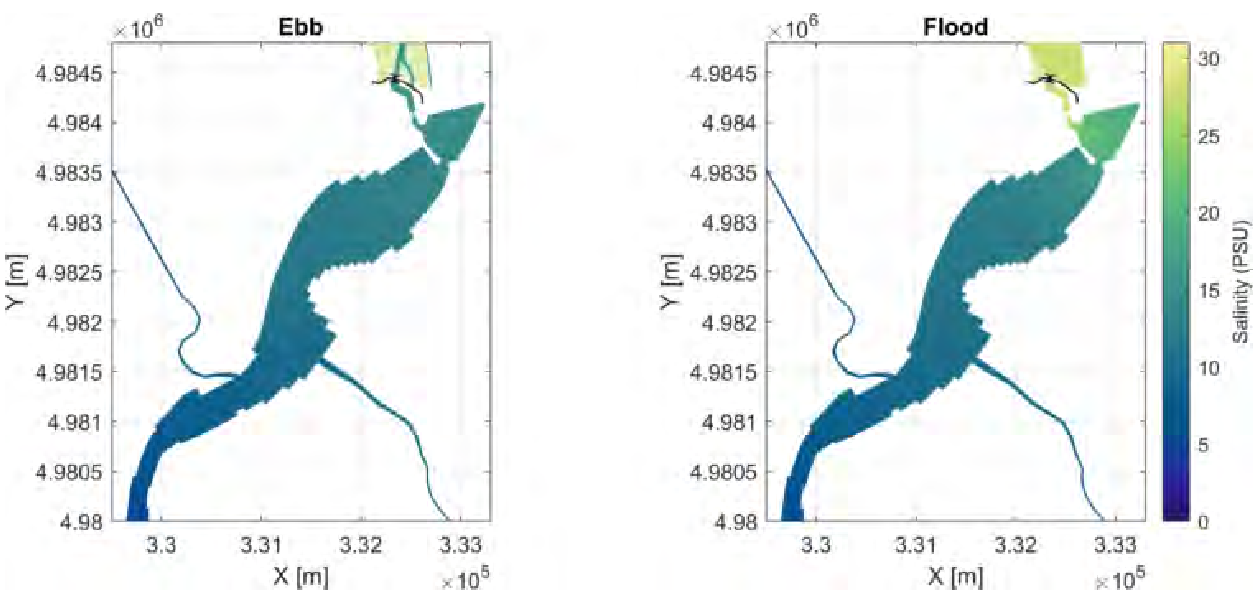


Figure 8: Depth-averaged salinity concentrations for the flood and ebb tide under the Slightly Brackish Scenario with the dry seasons.

3.1.2 Suspended Sediment

The depth-averaged suspended sediment concentration for the Brackish Water Scenario during flood and ebb tide is shown in Figure 9 and the near bed and surface concentration is shown in Figure 10. High suspended sediment concentrations are mainly restricted to the area just upstream of the HWY1 Bridge in the Slightly Brackish Scenario. During ebb tide the suspended sediment plume is pushed back out of the aboiteau, and the water returns to background concentrations.

The model indicates that the suspended sediment within the lake is mainly generated by the plume of fine sediment coming from the Minas Basin. Local resuspension of fine sediments within the lake area is very limited in the model; therefore, the contribution of sediment input from the upstream Avon River and tributaries is generally several orders of magnitude smaller than the Minas Basin plume intrusion. Additionally, model results indicate that the dynamics of the sediment plume is tidally-driven and that the river runoff has a limited effect on the extension of the plume in the lake. Time variations of the plume extensions are mostly determined by variations in tidal amplitude (spring/neap cycle) rather than variations in the river flow (wet/dry seasons), which is illustrated in Figure 3 and Figure 4. This is because the concentration of suspended sediments is controlled by the velocity of the water, rather than mixing. Beyond the extents of the sediment plume shown in the model, the velocities are so low that sediment will either settle or be pushed back to the estuary, through the aboiteau, with the lowering tide.

Overall, within the lake area, the suspended sediment concentration is greatest closer to the new aboiteau structure and reduces gradually upstream. The results also indicate that there is some stratification occurring, with greater concentrations of suspended sediment occurring near the bed (Figure 10). The suspended sediment also travels further upstream in the lake near the bed relative to near the surface, likely due to sediment settling towards the bed.

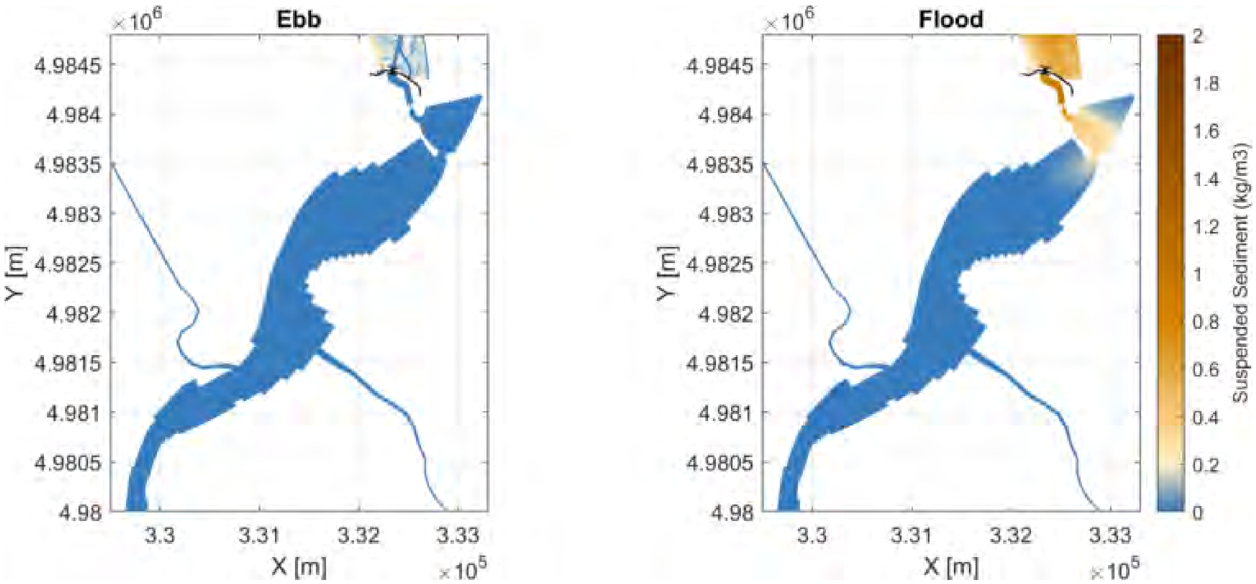


Figure 9: Depth-averaged suspended sediment concentrations for the flood and ebb tide for the Slightly Brackish Scenario.

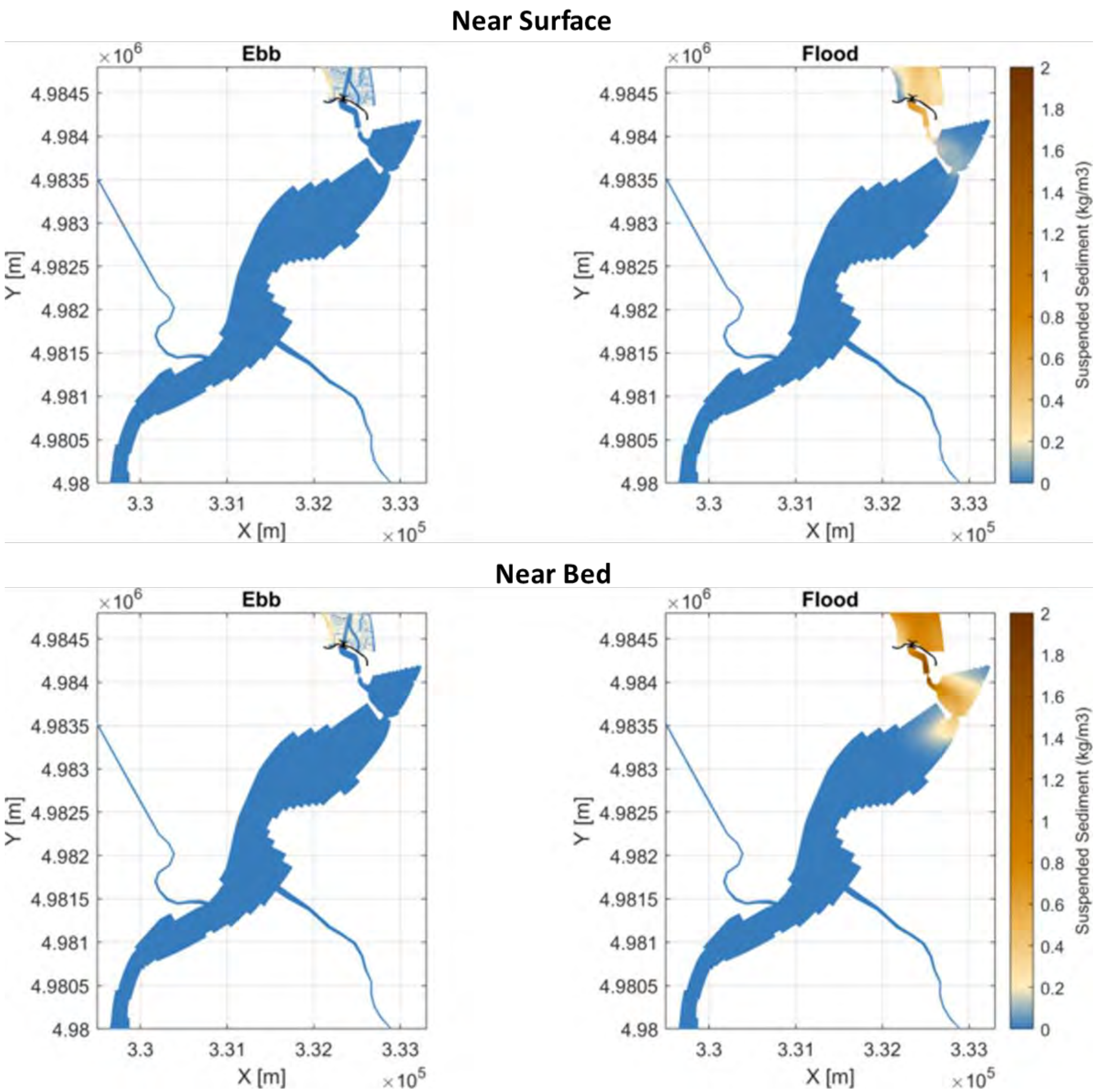


Figure 10: Near surface and near bed suspended sediment concentrations for the flood and ebb tide for the Slightly Brackish Scenario.

3.2 Dampened Tidal Estuary Scenario

3.2.1 Salinity

Time series of the salinity concentrations along with the freshwater inputs and water levels are shown in Figure 11 and Figure 12 for the wet and dry seasons, respectively (locations of points are shown in Figure 2). Under the **dry (low runoff) seasons**, the Dampened Tidal Estuary Scenario would create brackish conditions in Lake Pesquid:

- Salinities north of the Highway 1 bridge would reach up to 25 PSU.
- Salinities just downstream of the Martock intake would reach 8 PSU.

In contrast, model results show much lower salinities during the **wet (high runoff) seasons**:

- Salinities of up to 18 PSU would be confined to the area north of Highway 1.
- Fresh water at the Martock intake is continuously observed during a period of high runoff.

The maps of the percent salinity near the bed and surface are shown in Figure 13 and Figure 14 for the wet and dry seasons. These maps, in addition to the time series, show that very little stratification takes place in the lake, even less stratification that what was observed in the Brackish Scenario. This is likely due to the higher velocities under the Dampened Tidal Scenario increasing mixing in the lake. The maps of the depth-averaged salinity are shown in Figure 15 and Figure 16. The results indicate that the salinity is largely controlled by the freshwater river inputs, with high rainfall events resulting in lower salinities. In particular, the time series illustrate that salinity of the lake responds not only to seasonal runoff conditions but also to individual runoff events. The maps also illustrate that there is a gradient in salinities between the north and south of Lake Pesaquid, with higher salinities occurring in the north. This especially occurs during the wet seasons due to the river inputs providing freshwater while saline water enters through the fishways. Overall, the Dampened Tidal Estuary Scenario allows a greater volume of tidal water to enter the lake, resulting, on average, in a higher concentration of salinity relative to the Slightly Brackish Scenario.

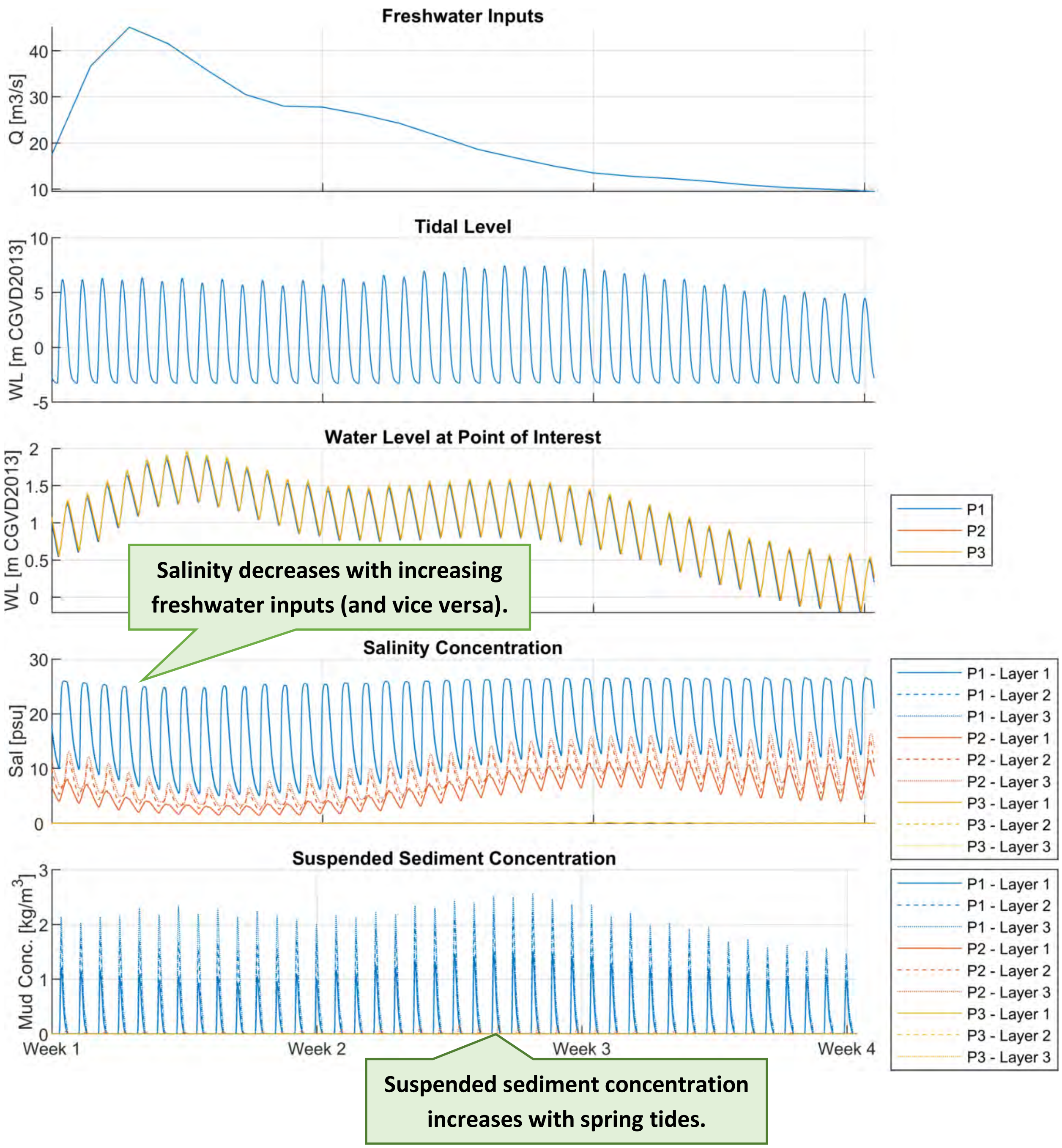


Figure 11: Time series of salinity and suspended sediment concentrations at each layer for the Dampened Tidal Scenario (wet season).

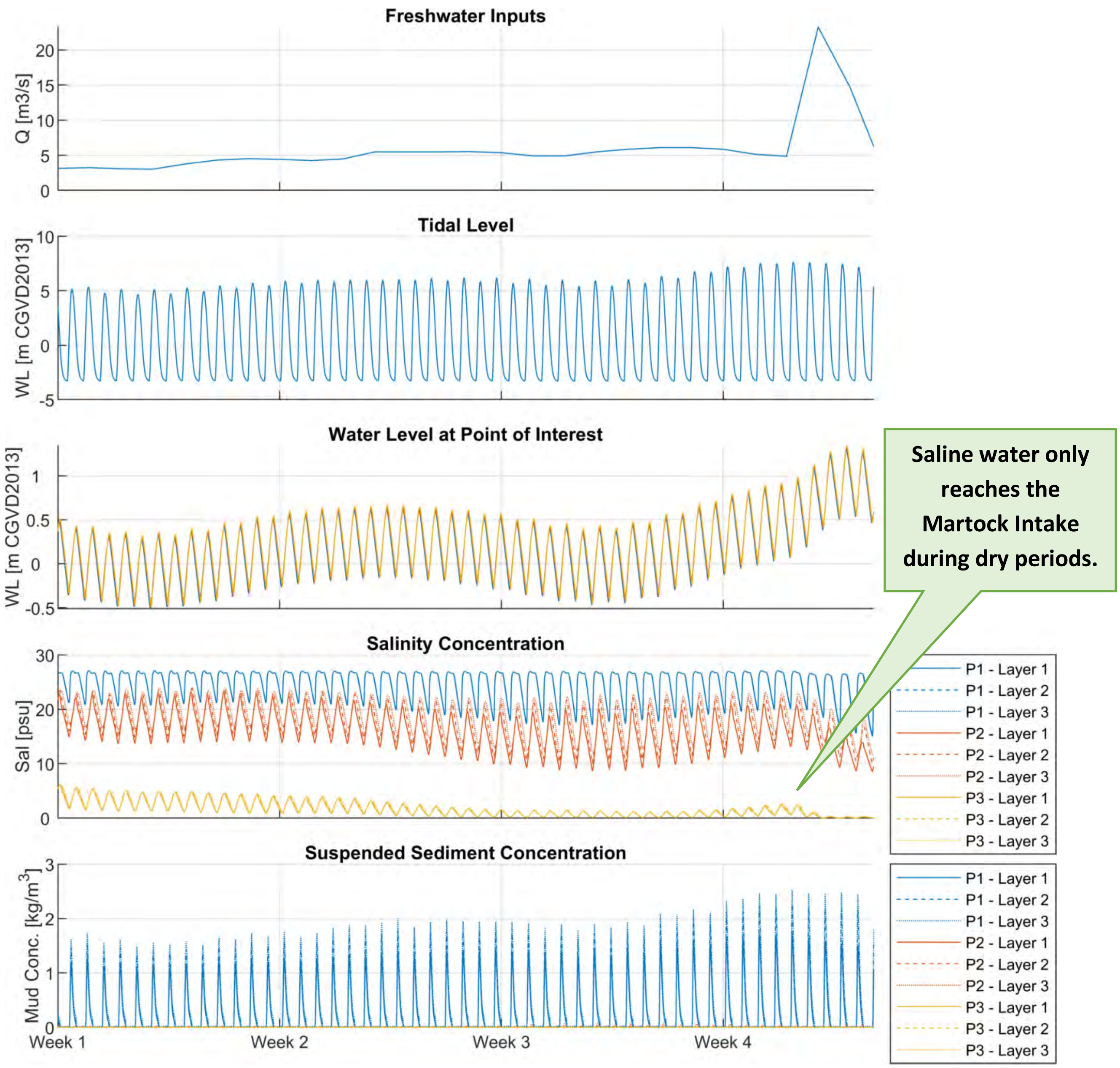


Figure 12: Time series of salinity and suspended sediment concentrations at each layer for the Dampened Tidal Scenario (dry seasons).

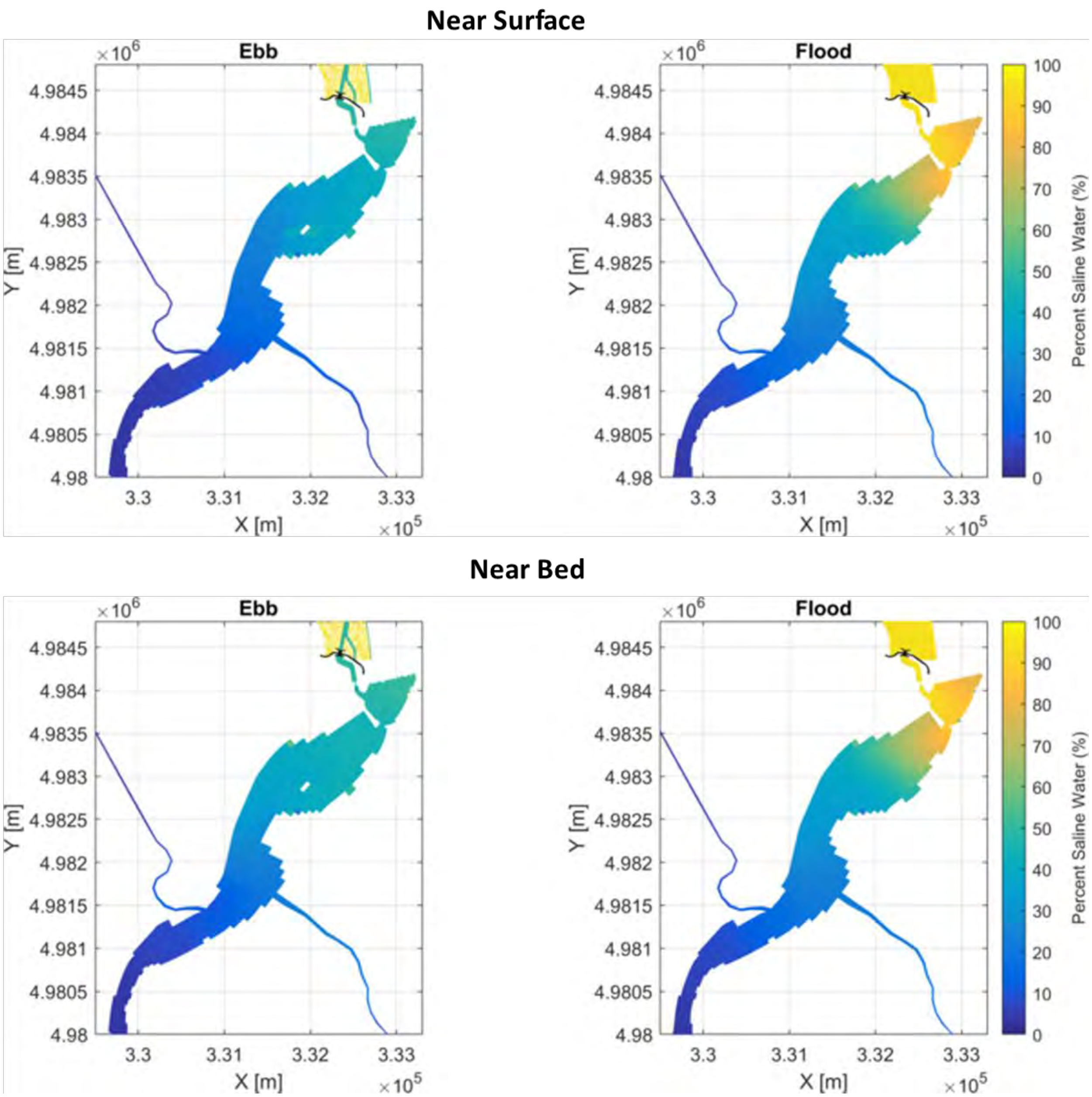


Figure 13: **Map of freshwater and saline percentage of water for the Dampened Tidal Estuary Scenario (wet seasons).**

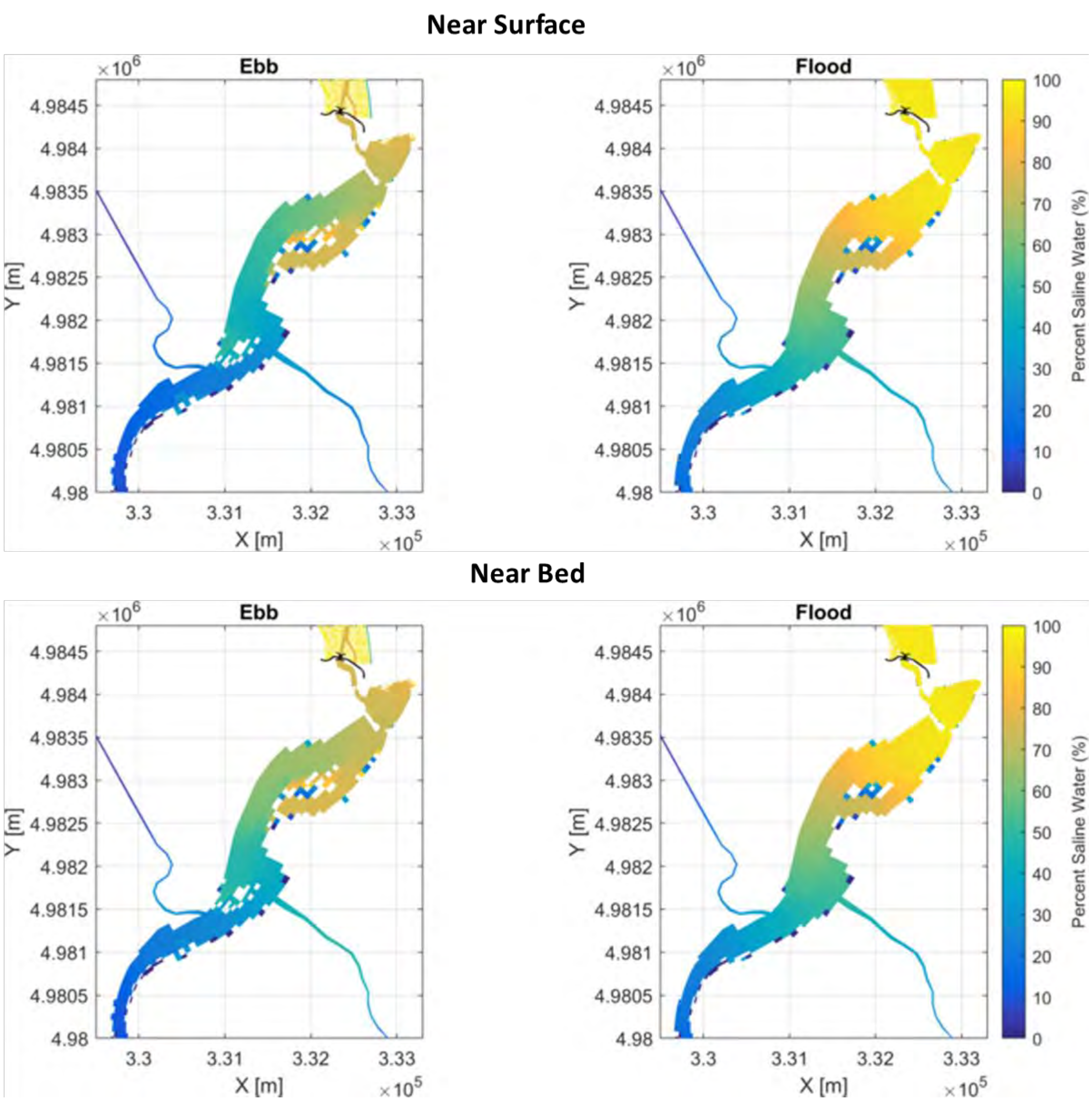


Figure 14: Map of freshwater and saline percentage of water for the Dampened Tidal Estuary Scenario (dry seasons).

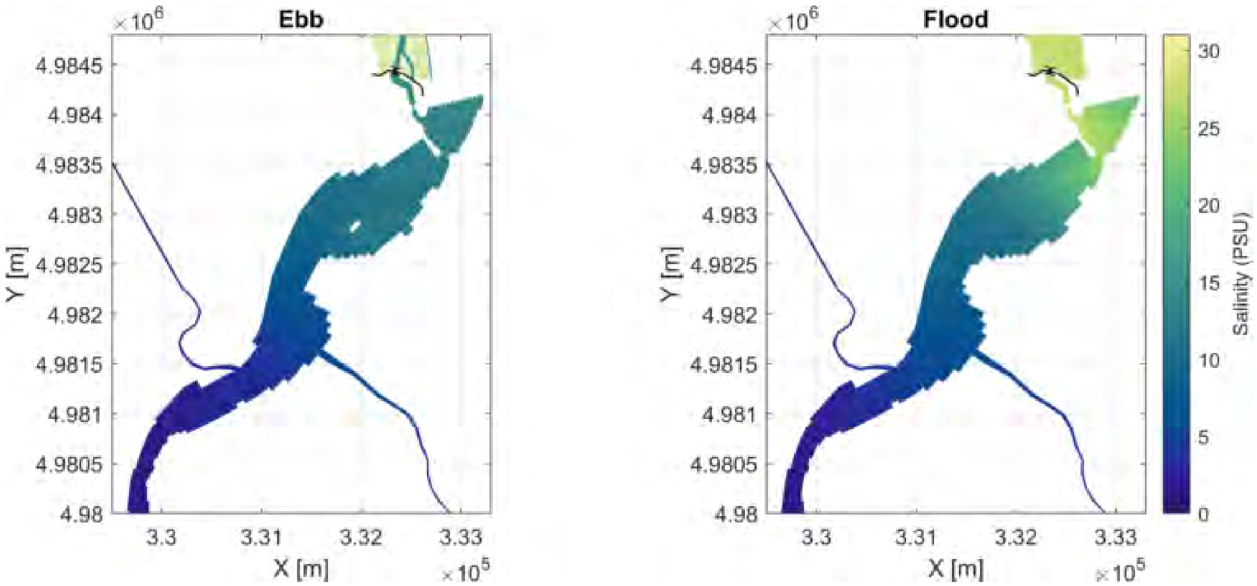


Figure 15: **Depth-averaged salinity concentrations for the flood and ebb tide under the Dampened Tidal Estuary scenario (wet seasons).**

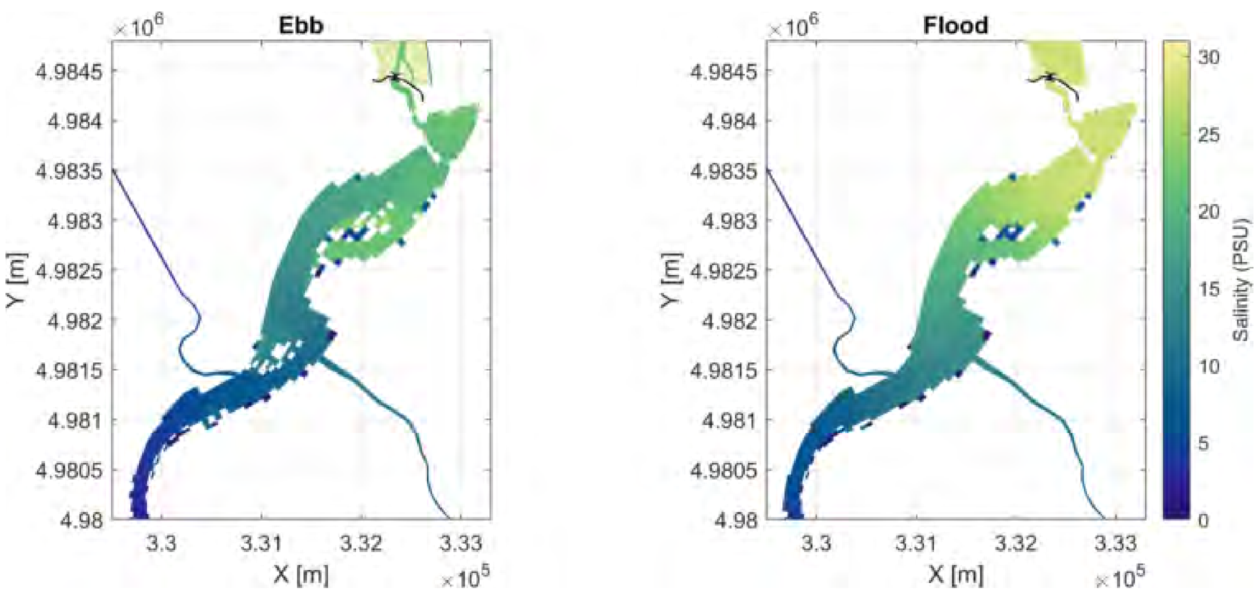


Figure 16: **Depth-averaged salinity concentrations for the flood and ebb tide under the Dampened Tidal Estuary scenario (dry seasons).**

3.2.2 Suspended Sediment

Under the Dampened Tidal Estuary Scenario, high suspended sediment concentrations can reach up to 2 km upstream of the HWY1 Bridge during high tide (Figure 17). Similar to the Slightly Brackish Water Scenario, the plume recedes during ebb tide.

The overall processes relating to suspended sediment are similar for the Dampened Tidal Estuary Scenario and the Slightly Brackish Scenario. The model indicates that the suspended sediment within the lake is mainly generated by the plume of fine sediment coming from the Minas Basin. The sediment plume is tidally-driven and river runoff has a limited effect on the extension of the plume in the lake. Time variations of the plume extensions are mainly determined by variations in tidal amplitude, as illustrated in Figure 11 and Figure 12. Beyond the extents of the sediment plume shown in the model, the low velocities will cause the sediment to either settle or be pushed back with the lowering tide.

Overall, within the lake area, the suspended sediment concentration is greatest closer to the new aboiteau structure and reduces gradually upstream. The results indicate that there is stratification occurring as shown in Figure 18 where greater sediment concentrations occur near the bed. The extent of suspended sediment is also further upstream near the bed relative to the surface, likely due to the settling of sediment towards the bed.

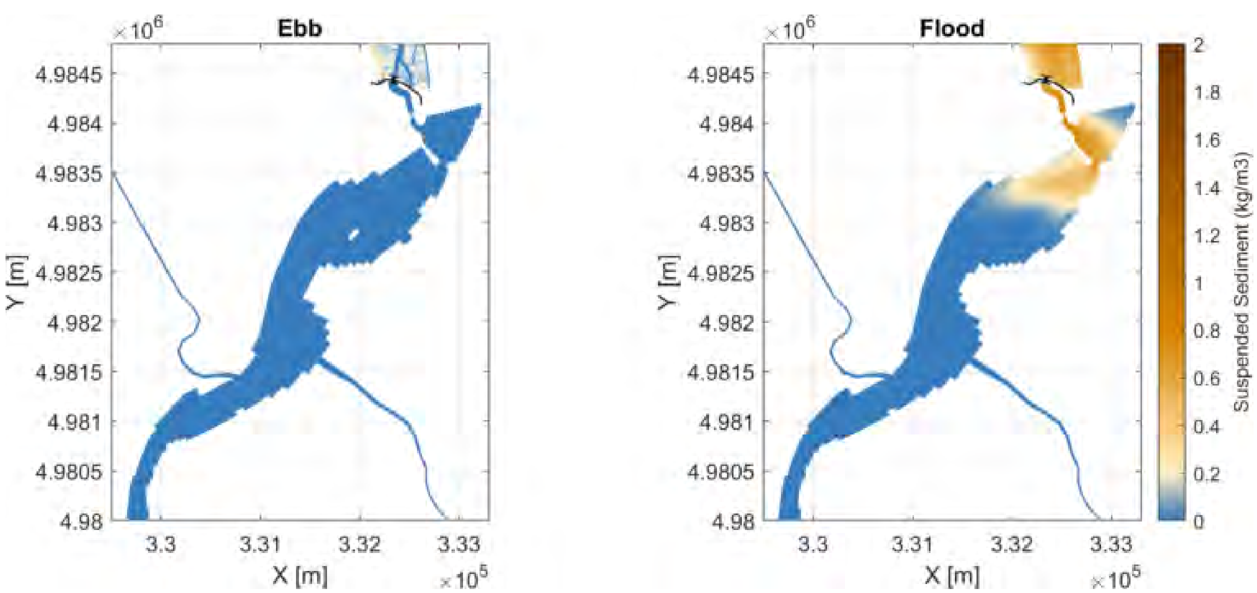


Figure 17: Depth-averaged suspended sediment concentrations for the flood and ebb tide for the Dampened Tidal Estuary Scenario.

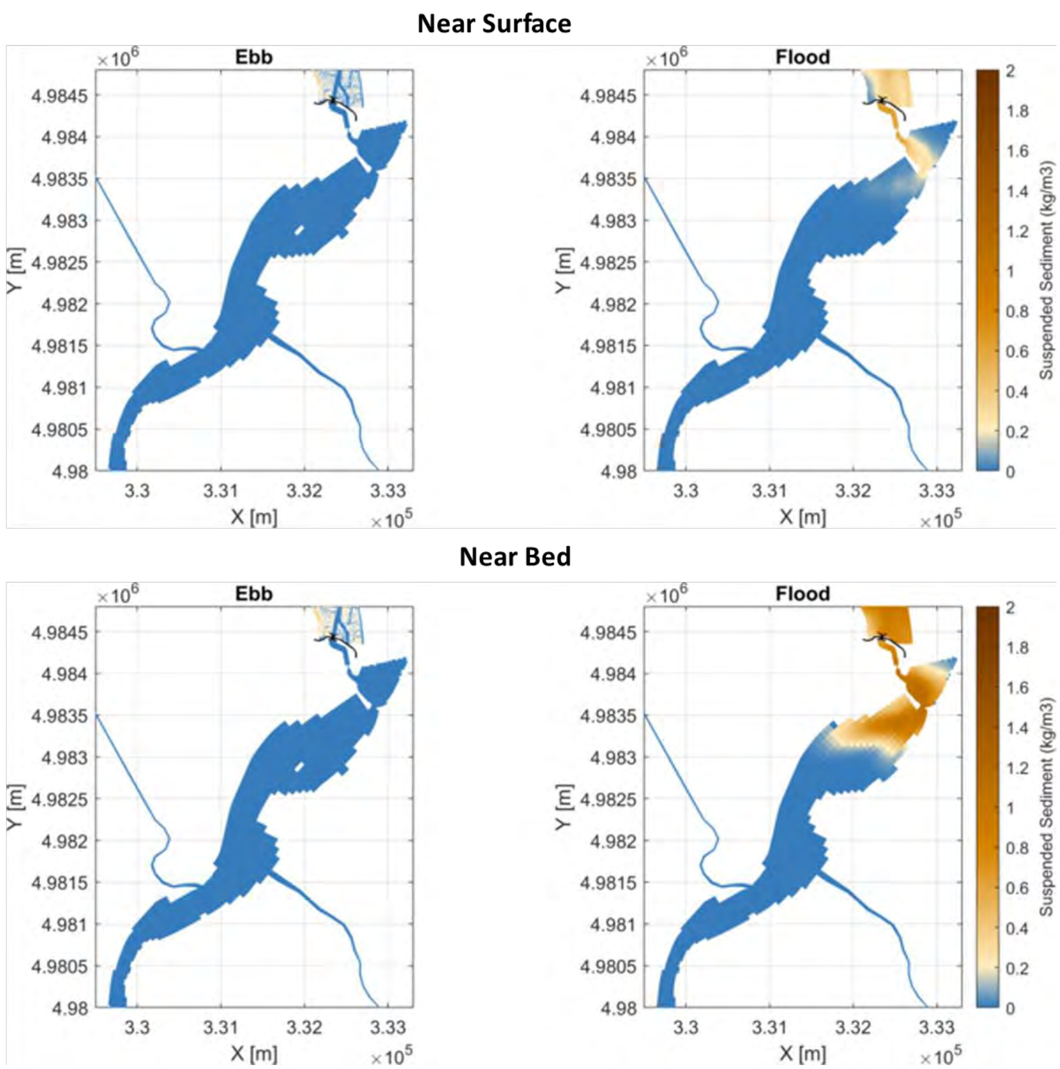


Figure 18: Near surface and near bed suspended sediment concentrations for the flood and ebb tide for the Dampened Tidal Estuary Scenario.

3.3 Removal of Existing Aboiteau

3.3.1 Brackish Scenario

Time series of the salinity concentrations along with the freshwater inputs and water levels are shown in Figure 3 and Figure 4 for the wet and dry seasons, respectively (locations of points are shown in Figure 2). The processes related to suspended sediment and salinity concentrations are similar to when the existing aboiteau is in place. Refer to Section 3.1 Slightly Brackish Scenario for further details on this.

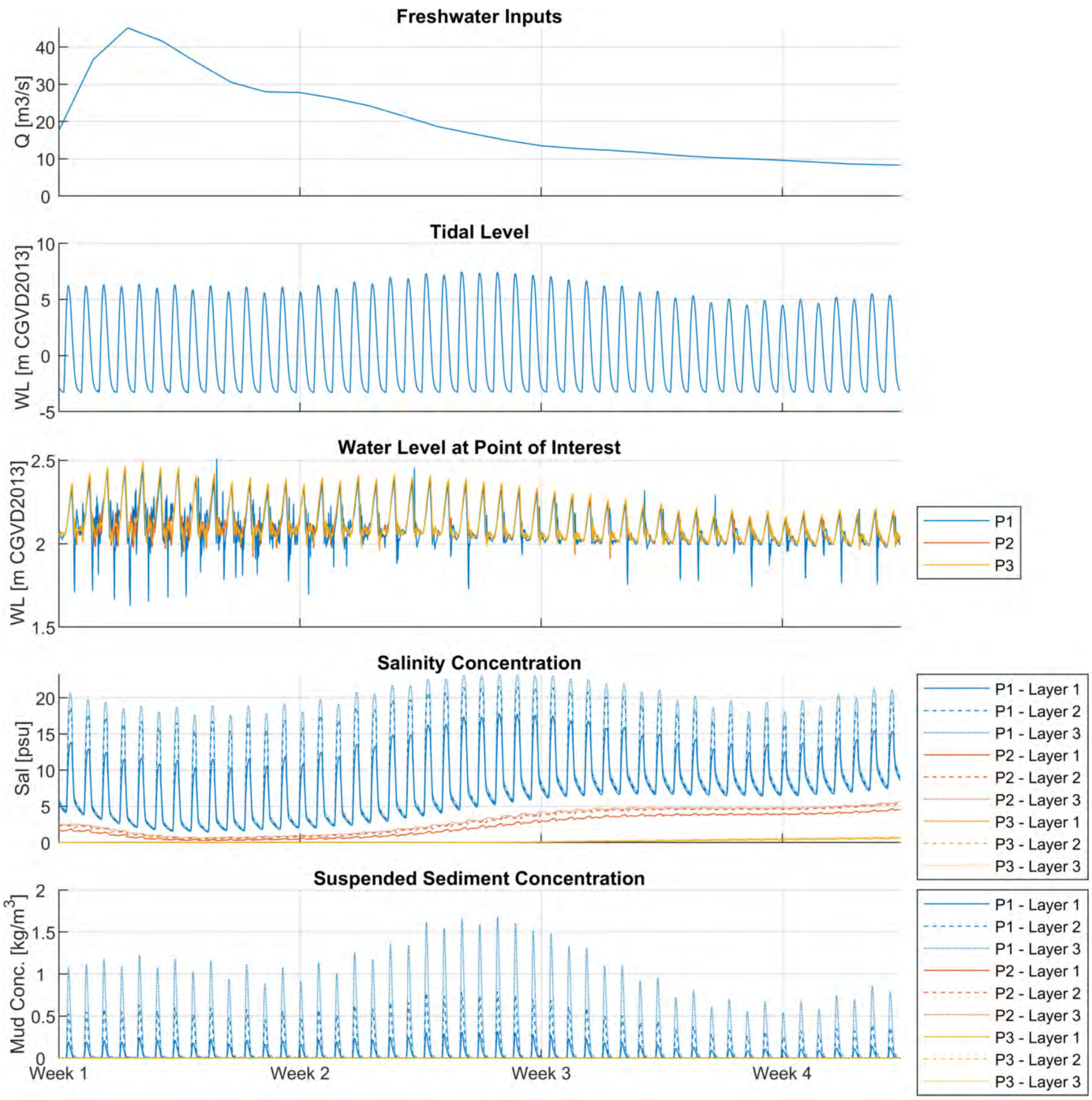


Figure 19: Time series of salinity and suspended sediment concentrations at each layer for the Slightly Brackish Scenario – Existing Aboiteau Removed (wet seasons).

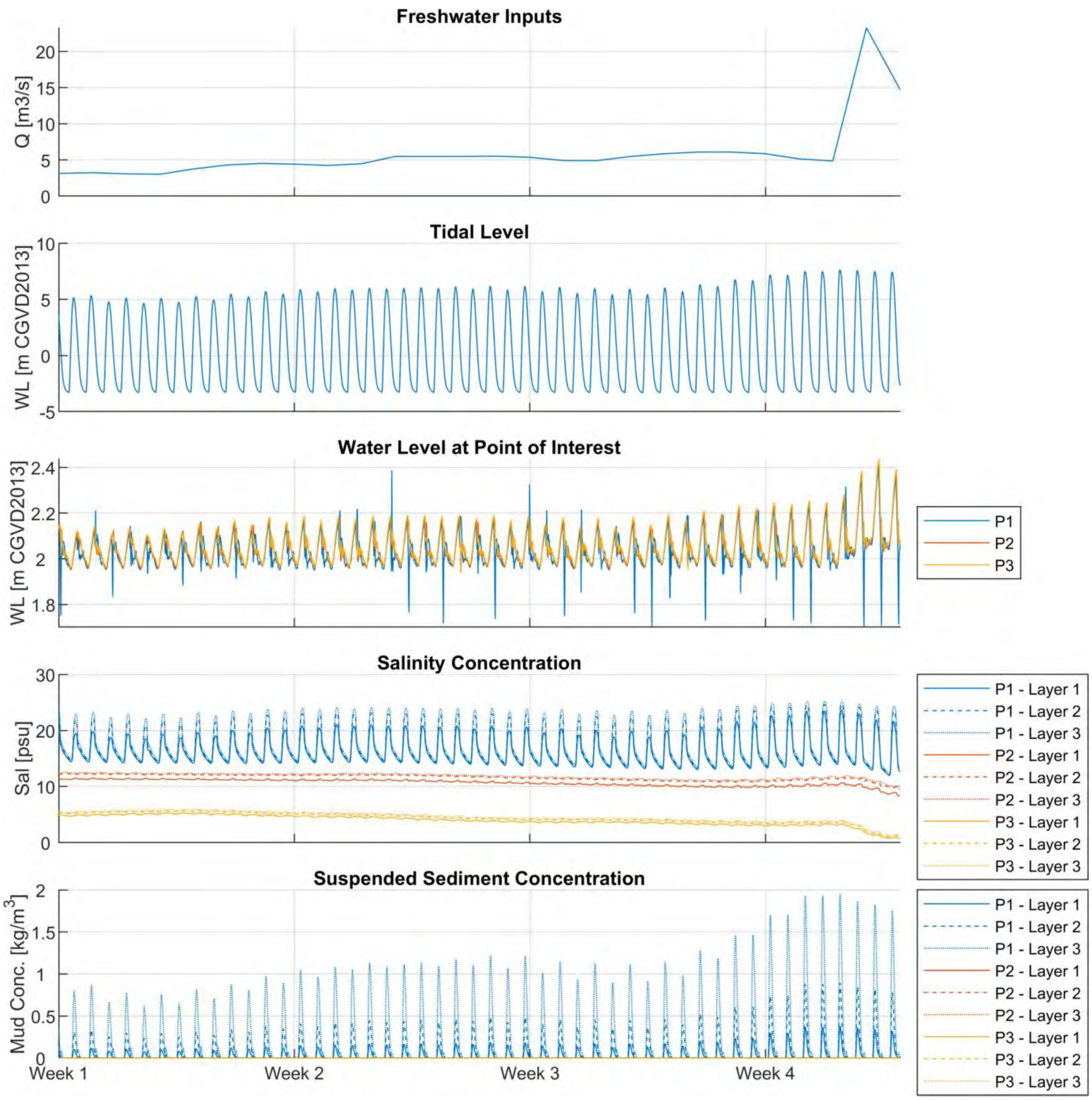


Figure 20: Time series of salinity and suspended sediment concentrations at each layer for the Slightly Brackish Scenario - Existing Aboiteau Removed (dry seasons).

3.3.2 Dampened Tidal Scenario

Time series of the salinity and suspended sediment concentrations along with the freshwater inputs and water levels are shown in Figure 21 and Figure 22 for the wet and dry seasons, respectively (locations of points are shown in Figure 2). The processes related to suspended sediment and salinity concentrations are similar to when the existing aboiteau is in place. Refer to Section 3.2 Dampened Tidal Estuary Scenario for further details on this for further details on this.

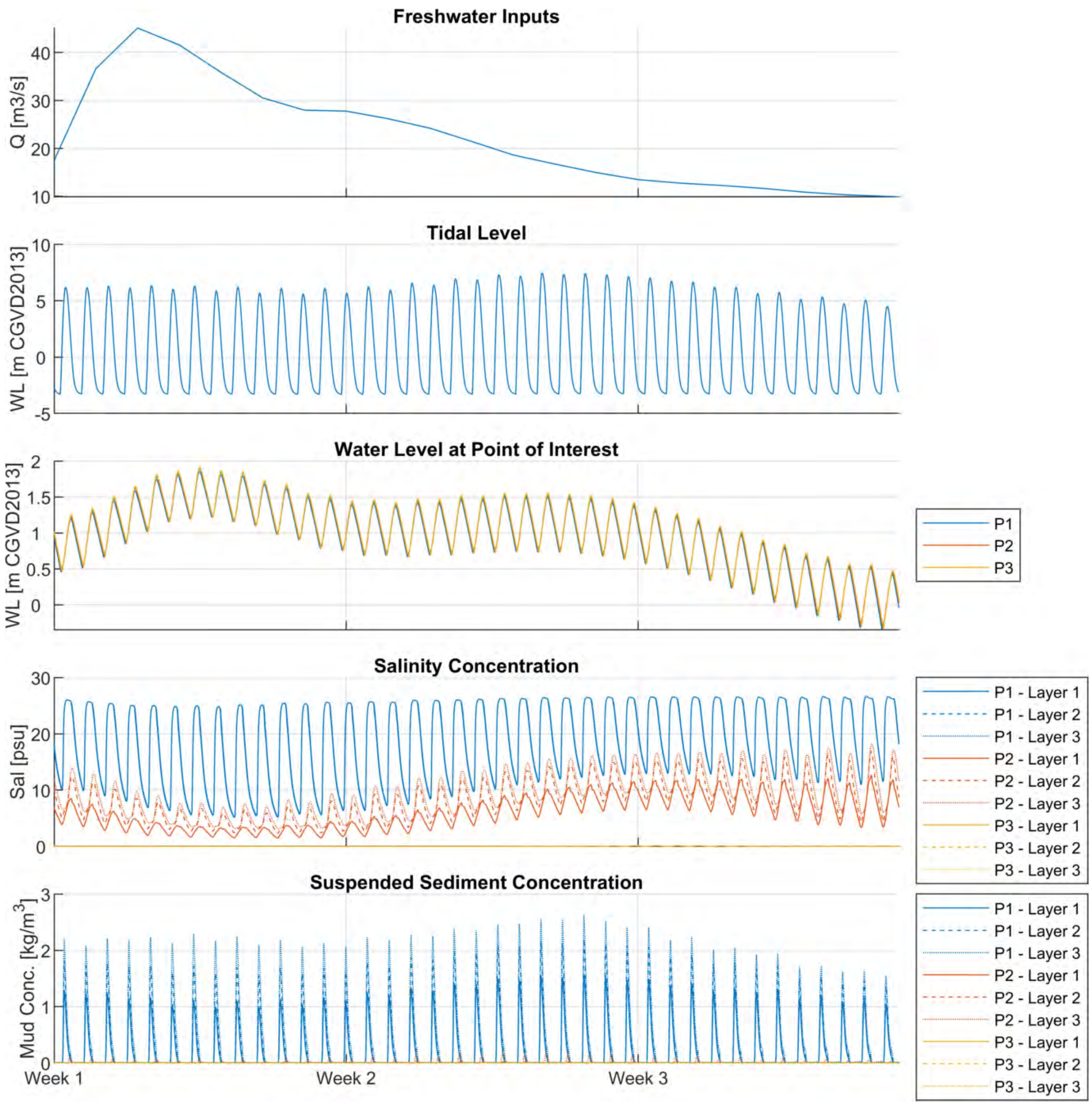


Figure 21: Time series of salinity and suspended sediment concentrations at each layer for the Dampened Tidal Estuary Scenario – Existing Aboiteau Removed (wet seasons).

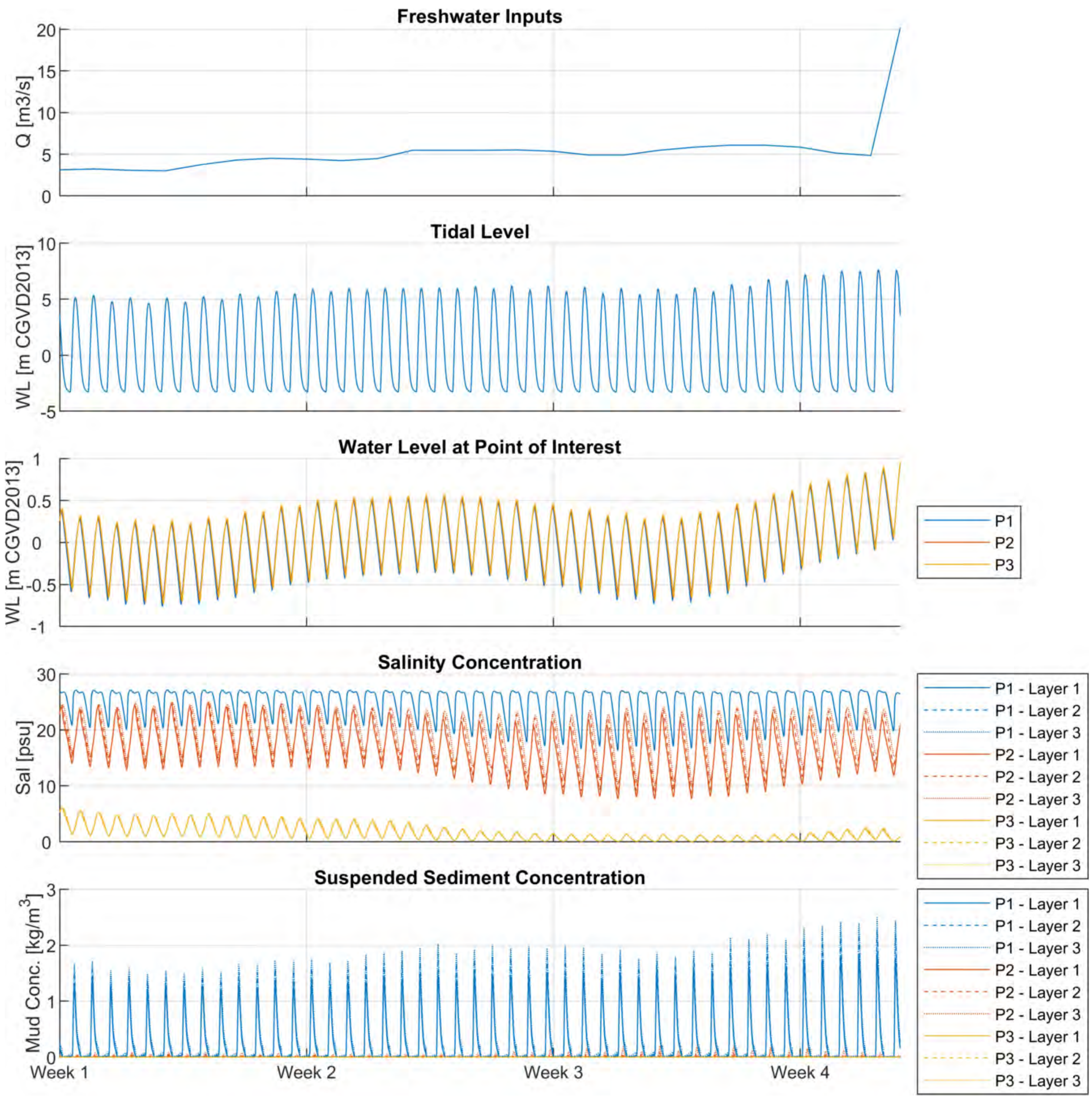


Figure 22: Time series of salinity and suspended sediment concentrations at each layer for the Dampened Tidal Estuary Scenario – Existing Aboiteau Removed (dry seasons).

3.3.3 Comparison of Existing Aboiteau Removal

A comparison of the salinity concentrations with the existing aboiteau in place and removed during flood tide is shown in Figure 23 and Figure 24 for the Slightly Brackish Scenario and Figure 25 and Figure 26 for the Dampened Tidal Estuary Scenario. These results, in addition to the time series, indicate that there is very little difference in terms of the salinity concentration with the existing aboiteau in place or removed. This is likely due to a similar volume exchange of tidal and freshwater with both the existing aboiteau in place or removed.

A comparison of the suspended sediment concentrations during flood tide is also shown in Figure 27 for the Slightly Brackish Scenario and Figure 28 for the Dampened Tidal Estuary Scenario. Similarly, there is very little difference is suspended sediment concentrations with the existing aboiteau removed for both scenarios. As mentioned above, this is likely due to a similar amount of tidal water entering the lake, resulting in similar volumes of sediment entering as well.

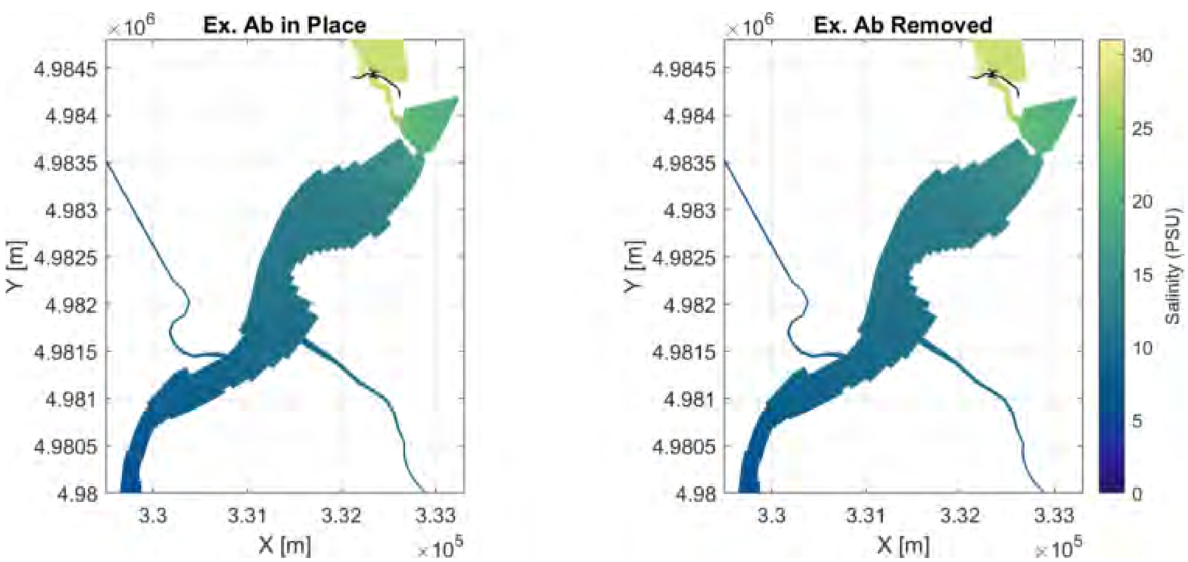


Figure 23: Depth-averaged salinity concentrations during flood tide comparing with and without the existing aboiteau (Slightly Brackish Scenario – dry seasons).

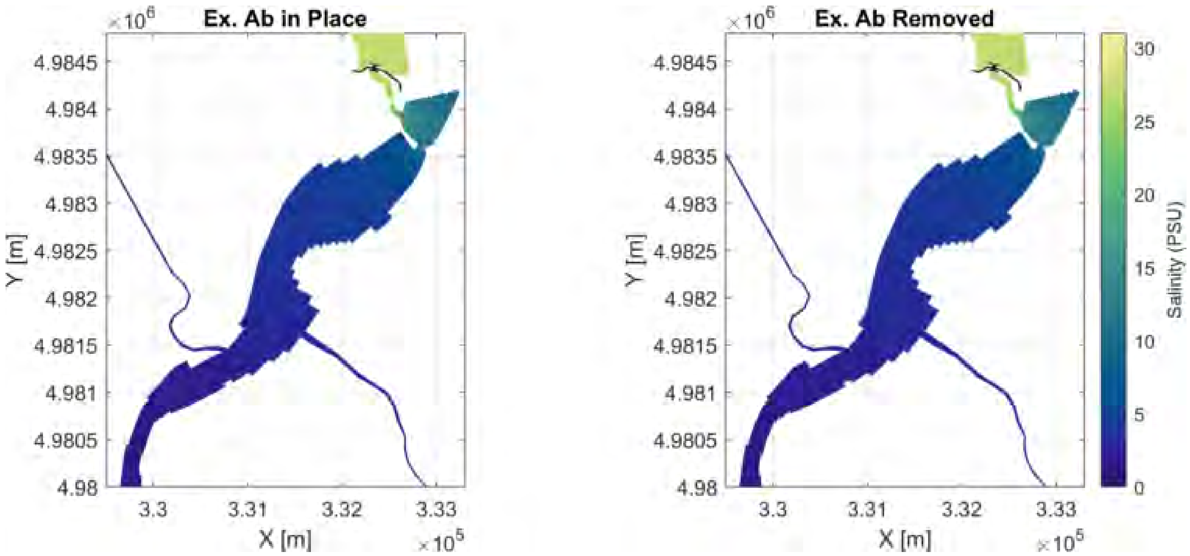


Figure 24: Depth-averaged salinity concentrations during flood tide comparing with and without the existing aboiteau (Slightly Brackish Scenario – wet seasons).

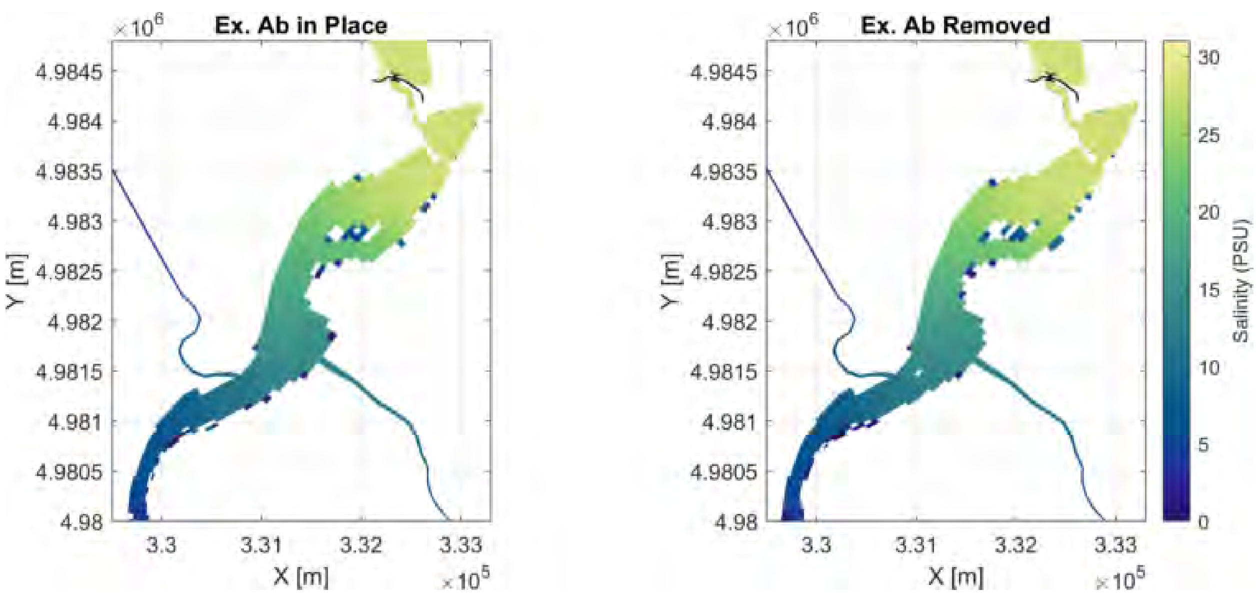


Figure 25: Depth-averaged salinity concentrations during flood tide comparing with and without the existing aboiteau (Dampened Tidal Estuary Scenario – dry seasons).

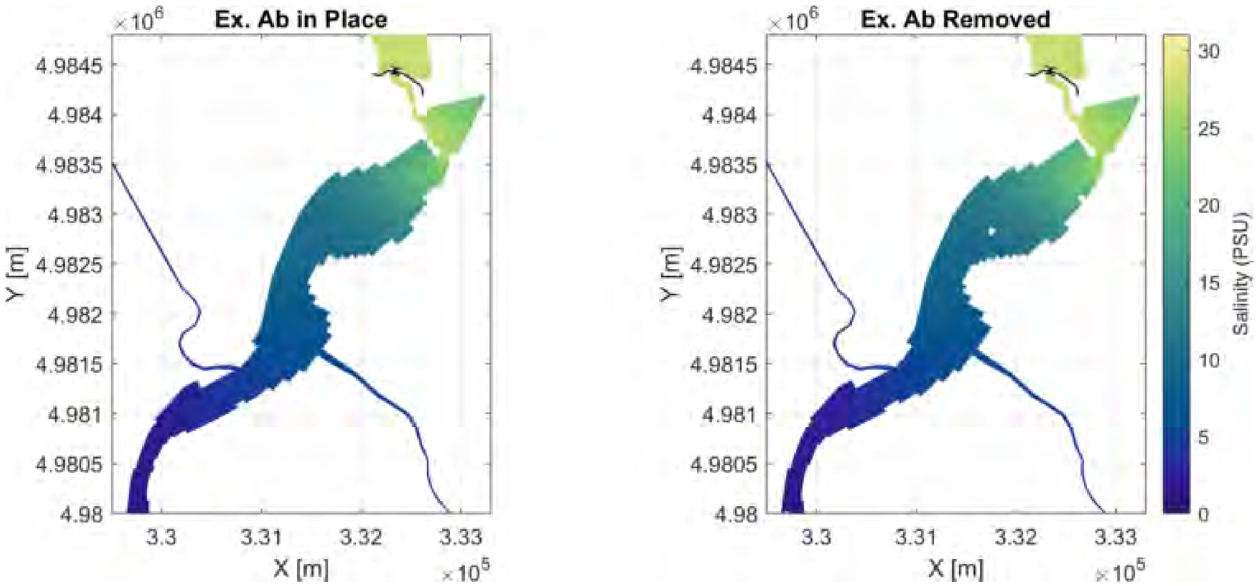


Figure 26: Depth-averaged salinity concentrations during flood tide comparing with and without the existing aboiteau (Dampened Tidal Estuary Scenario – dry seasons).

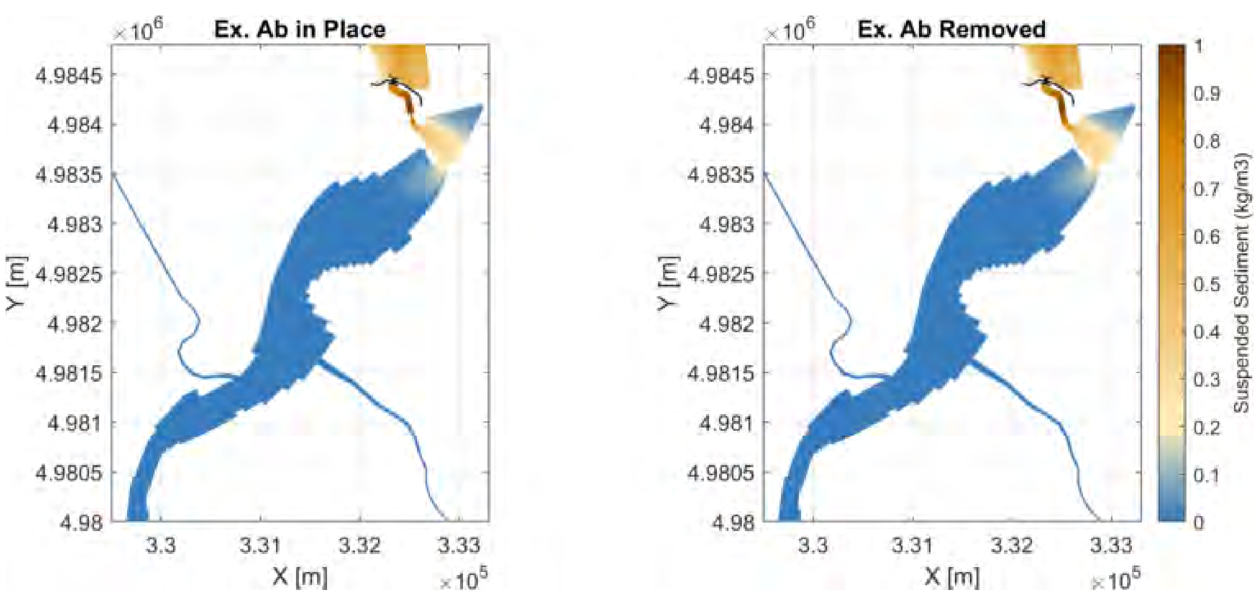


Figure 27: Depth-averaged suspended sediment concentrations during flood tide comparing with and without the existing aboiteau (Slightly Brackish Scenario).

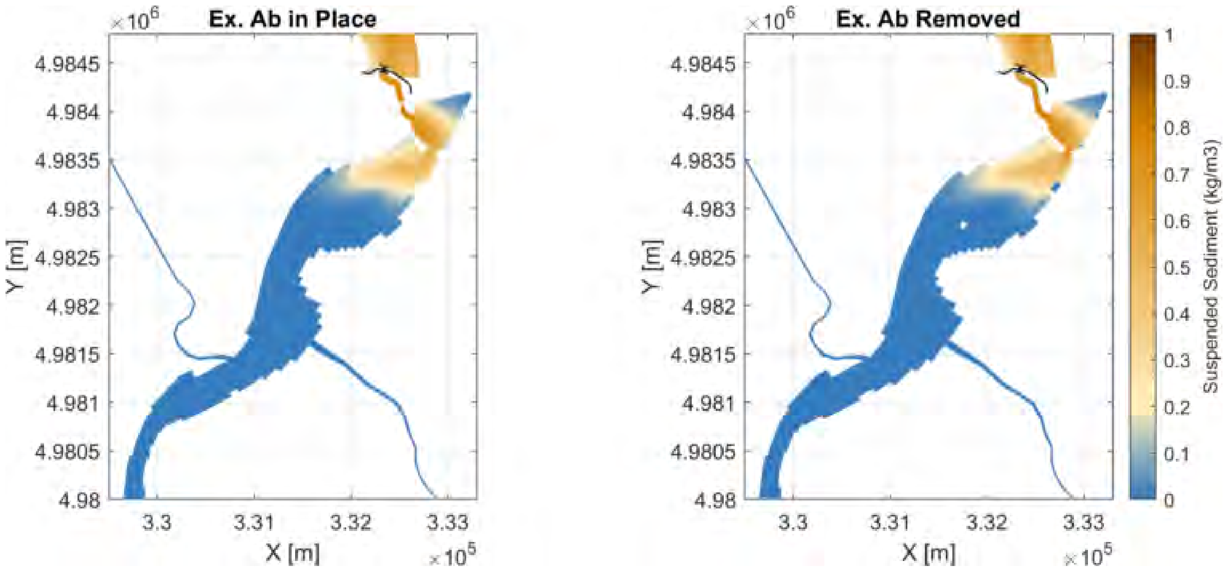


Figure 28: Depth-averaged suspended sediment concentrations during flood tide comparing the removal of the existing aboiteau (Dampened Tidal Scenario).

3.4 Sedimentation and Erosion

This section analyzes potential sedimentation and erosion for the study area. This analysis utilized 2D models as modelling morphology is significantly more computationally demanding and there was little difference between sediment transport loads of the 2D and 3D simulations under all conditions. The sedimentation and erosion model includes the proposed rip-rap to protect the channel between the two structures, but it does not include the partial rip-rap that exists upstream of the existing aboiteau structure. The model may therefore show erosion at this location, indicating a need to ensure the existing rip-rap protection is checked and supplemented if necessary.

3.4.1 Slightly Brackish Scenario

Maps of the potential deposition and erosion under the Slightly Brackish Scenario are shown in Figure 29 and Figure 30 in the dry seasons and Figure 32 and Figure 33 in the wet seasons after a two-month time period. Deposition is likely to occur along the Windsor waterfront due the sediment plume entering the lake, in addition to the low flow velocities in the lake area. Since the modelled sediment plume was mainly contained to north of the HWY1 Bridge, deposition is only expected to occur here. In the wet seasons, some erosion upstream of the rip rap placed south of the existing aboiteau is shown in the model, due to high velocities that occur there.

Some slight deposition is expected along the outside of the bends in the channel between the new and existing aboiteau structures; however, the thalweg of the channel should remain free of sediments (Figure 31 and Figure 34). In both the dry season and the wet seasons, the model results indicate that there is some erosion that is expected downstream of the existing structure. In the wet seasons, the main channel downstream of the new structure will tend to deepen due to the high current velocities exiting the main gates, while some deposition may occur in the channel during drier periods.

A map of the maximum bed shear stresses expected to occur for the Slightly Brackish Scenario is shown in Figure 35. This map can be used to indicate potential locations with high erosive forces. This can be particularly useful to analyze erosive forces at the structures and at the channel in-between them because the simulated rip-rap at these locations prevents erosion potential to be shown in the accretion/erosion maps. High bed shear stresses are expected at the existing and proposed aboiteau due to the high velocities that occur there during the opening of the active gates. In addition, high bed shear stresses are expected downstream of the proposed aboiteau. Increased shear stresses also occur downstream of the existing aboiteau.

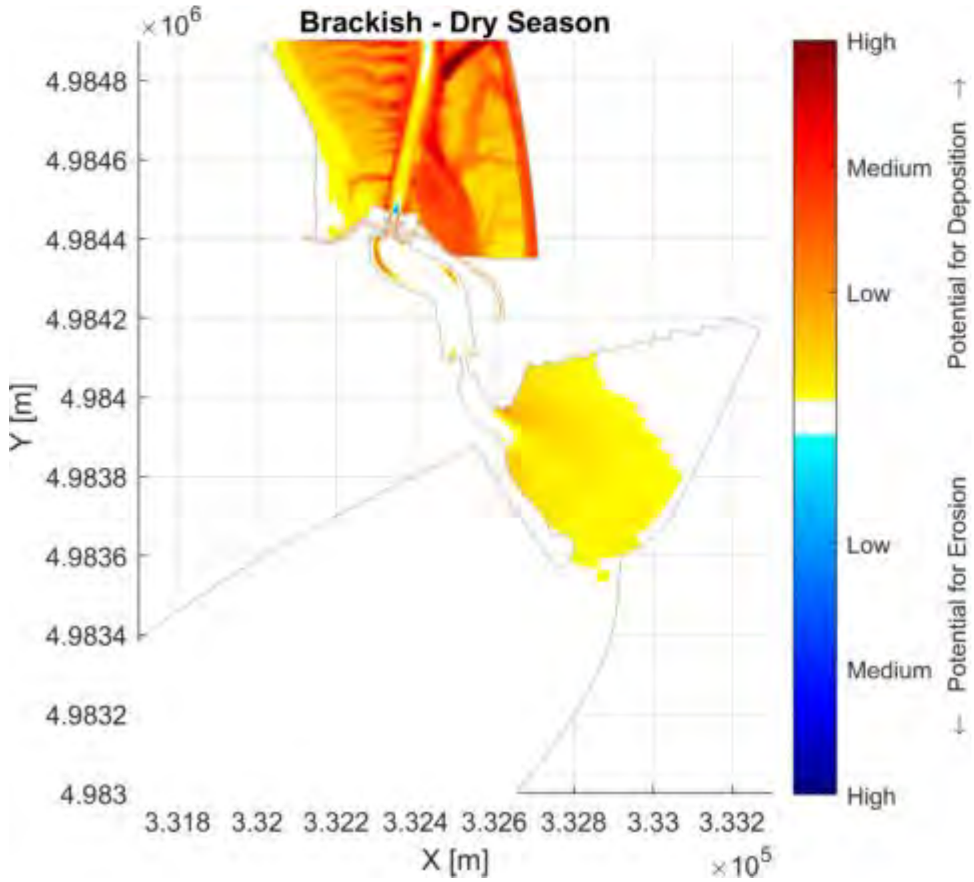


Figure 29: Map of potential accretion and erosion after two months for the Slightly Brackish Scenario (dry seasons).

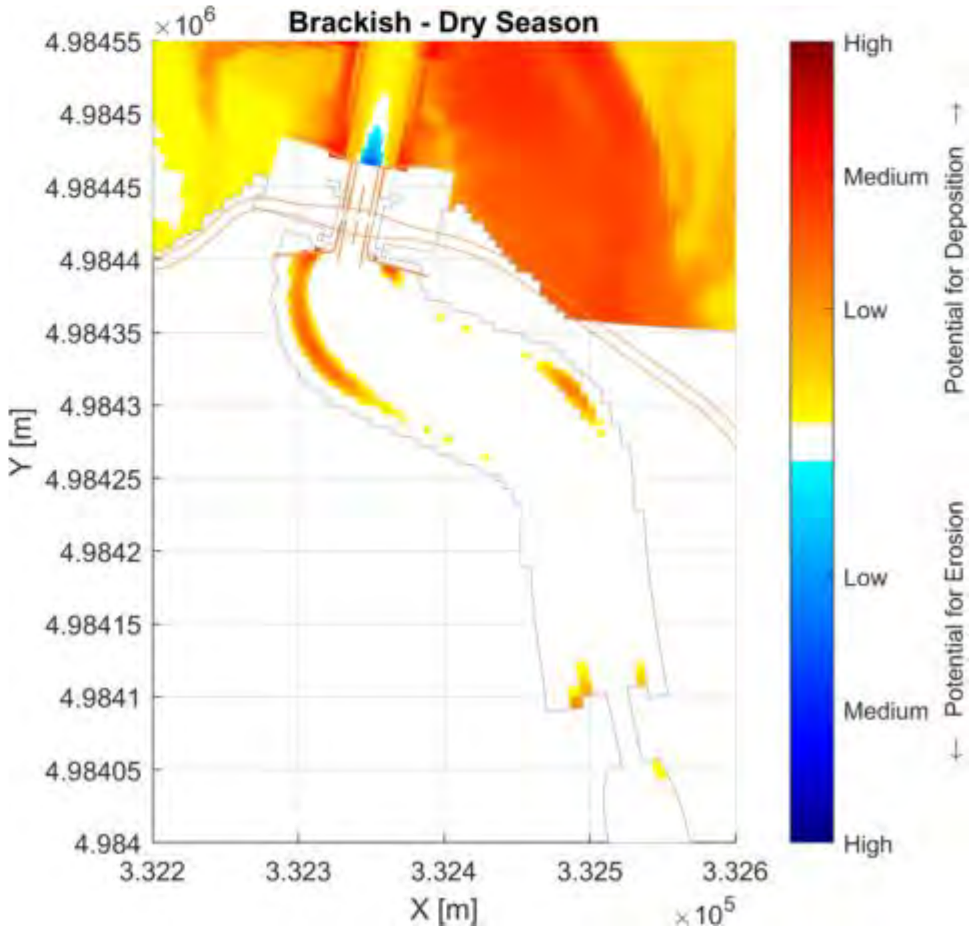


Figure 30: Map of potential accretion and erosion after two months at the structures for the Slightly Brackish Scenario (dry seasons).

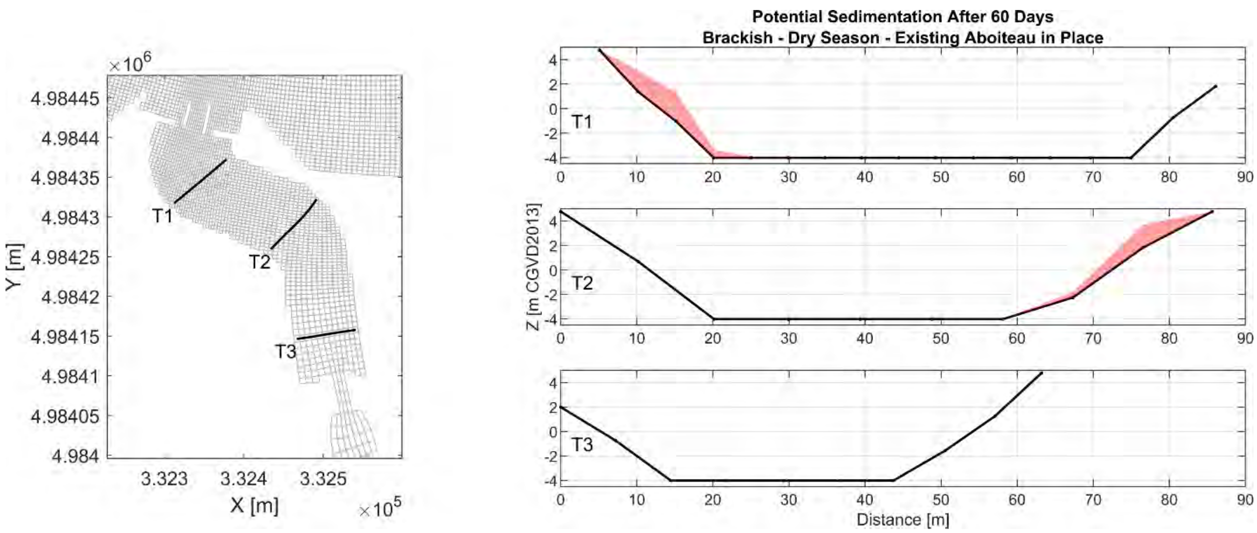


Figure 31: Cross-sections of potential deposition in channel between structures after two months for the Slightly Brackish Scenario (dry seasons).

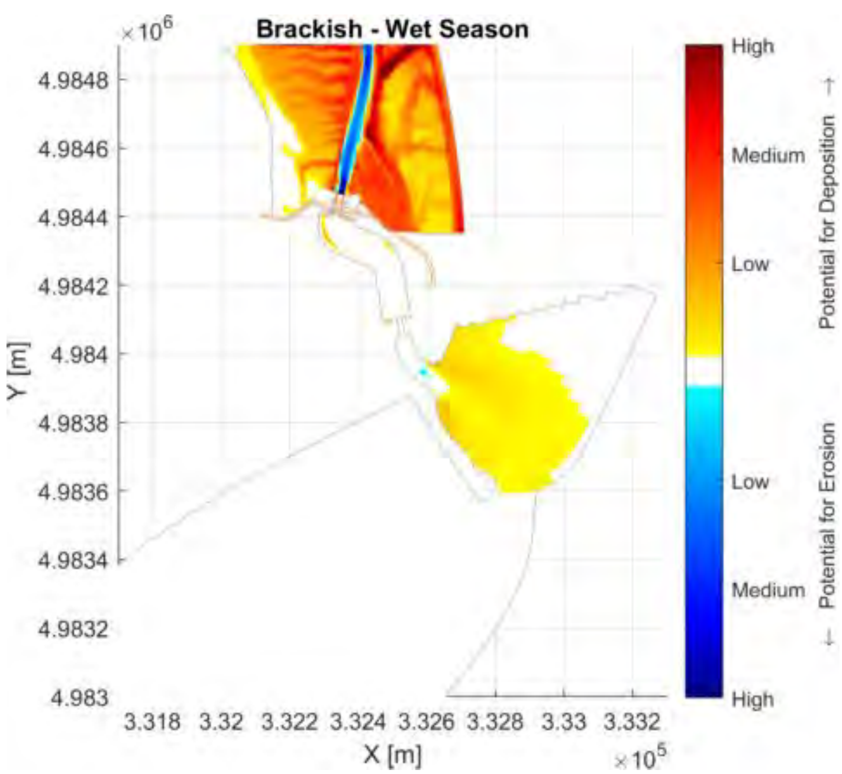


Figure 32: Map of potential accretion and erosion after two months for the Slightly Brackish Scenario (wet seasons).

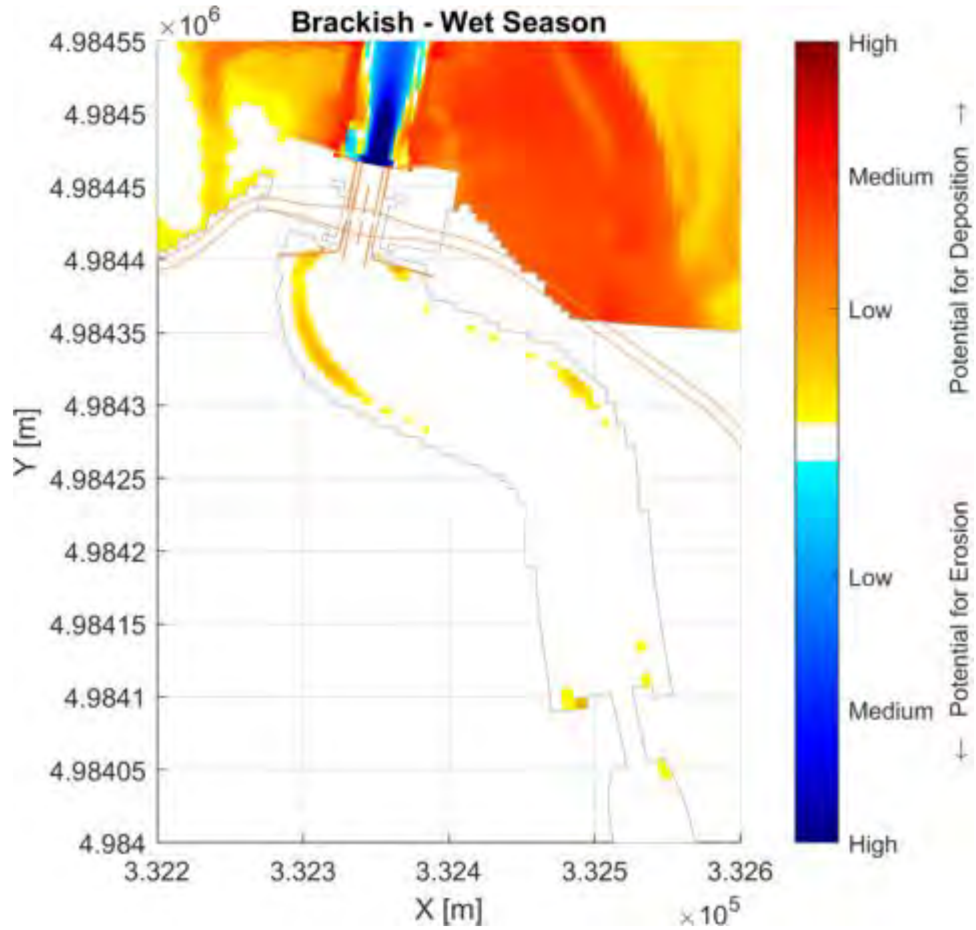


Figure 33: Map of potential accretion and erosion after two months at the structures for the Slightly Brackish Scenario (wet seasons).

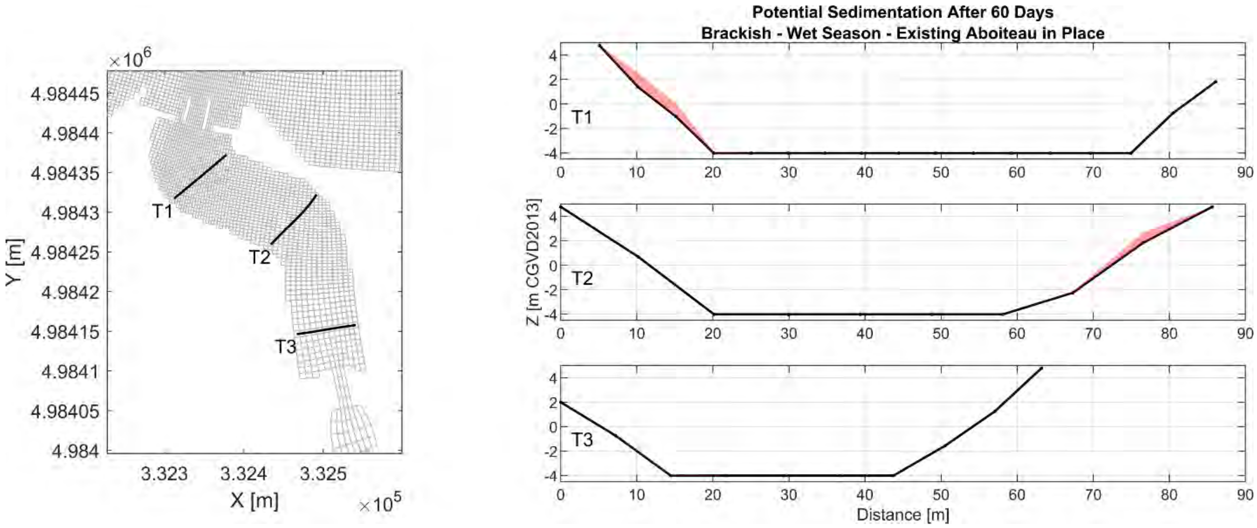


Figure 34: Cross-sections of potential deposition in channel between structures after two months for the Slightly Brackish Scenario (wet seasons).

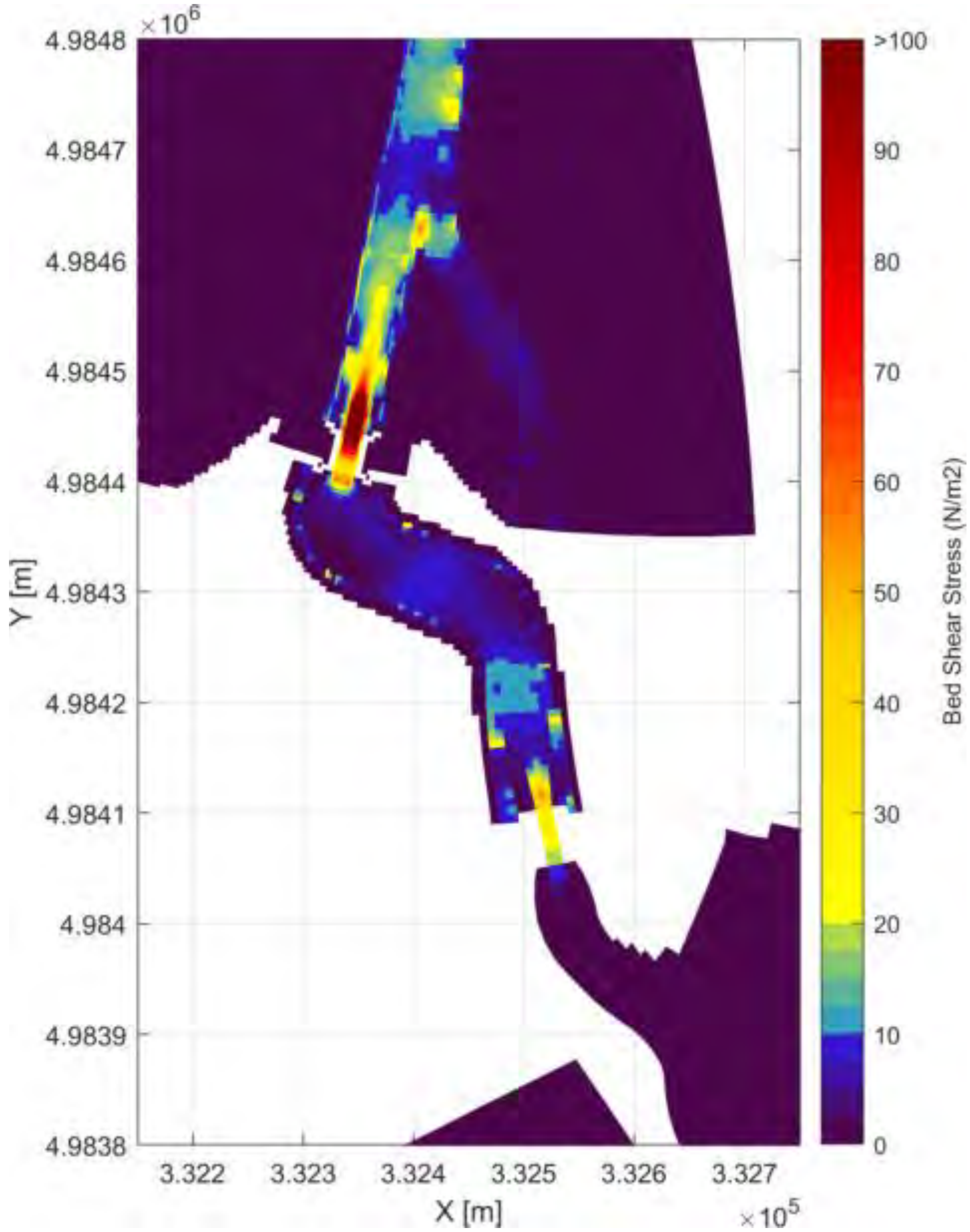


Figure 35: Maximum bed shear stress for the Slightly Brackish Scenario.

3.4.2 Dampened Tidal Estuary Scenario

Maps of the potential deposition and erosion under the Dampened Tidal Estuary Scenario are shown in Figure 36 and Figure 37 in the dry seasons and Figure 39 and Figure 40 in the wet seasons after a two-month time simulation period. The model results indicate that deposition is likely to occur along the Windsor waterfront and further upstream into Lake

Pesaquid due the sediment plume entering the lake and the low velocities in the lake area. Under the Dampened Tidal Estuary Scenario, it is expected that the plume will travel a greater extent (with the greater volume of water exchange), hence the model results indicate deposition occurring further upstream. Some erosive forces are also expected upstream of the rip rap placed south of the existing aboiteau and into the lake channel due to high flow velocities occurring during the incoming and outgoing flows.

Very little deposition is expected along the sides of the channel between the new and existing aboiteau structures due to constant flow in and out of the channel in the Dampened Tidal estuary Scenario (Figure 31 and Figure 34). The thalweg of the channel should also remain free of sediments. Erosive forces are expected downstream of the existing structure due to the high velocities that occur there. In addition, the main channel downstream of the new structure and dissipation pool will tend to deepen due to the high current velocities exiting the main gates.

A map of the maximum bed shear stresses expected to occur for the Dampened Tidal Scenario is shown in Figure 42. This map can be used to indicate potential locations with high erosive forces. This can be particularly useful to analyze erosive forces at the structures and at the channel in-between them because the simulated rip-rap at these locations prevents erosion potential to be shown in the accretion/erosion maps. High bed shear stresses are expected at the existing and proposed aboiteau due to high velocities through the structures, however these are lesser than in the Slightly Brackish Scenario. In addition, high bed shear stresses are expected to occur downstream of the proposed aboiteau.

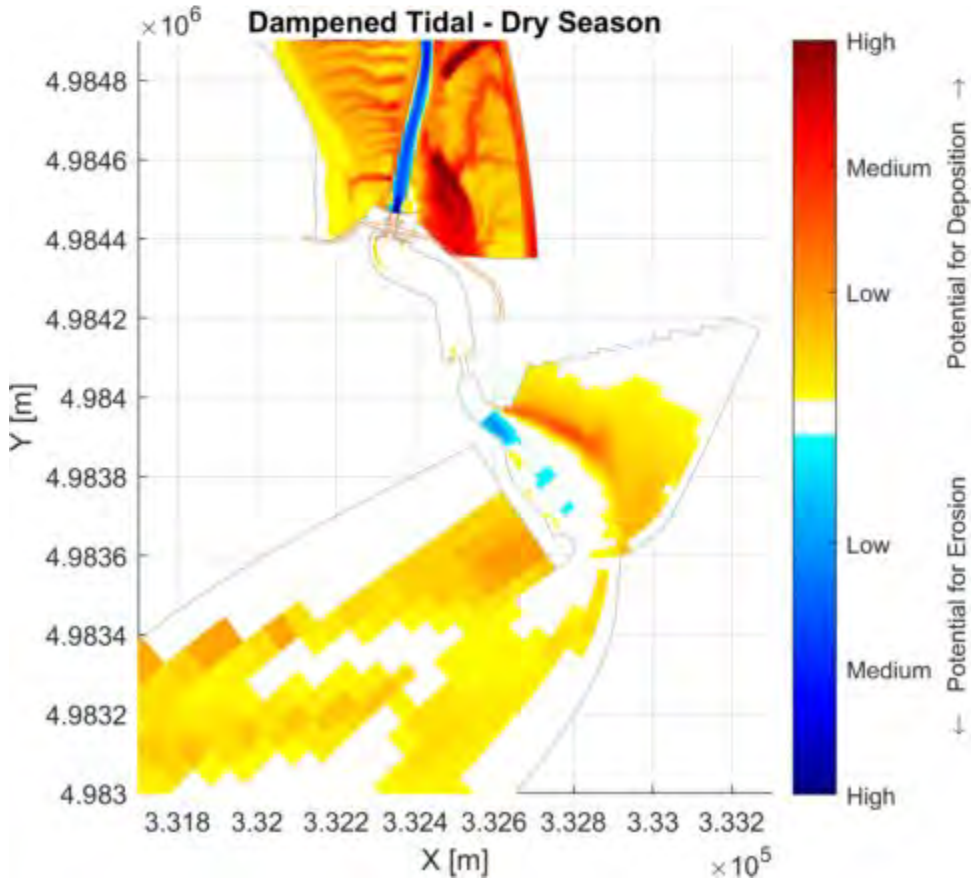


Figure 36: Map of potential accretion and erosion after two months for the Dampened Tidal Estuary Scenario (dry seasons).

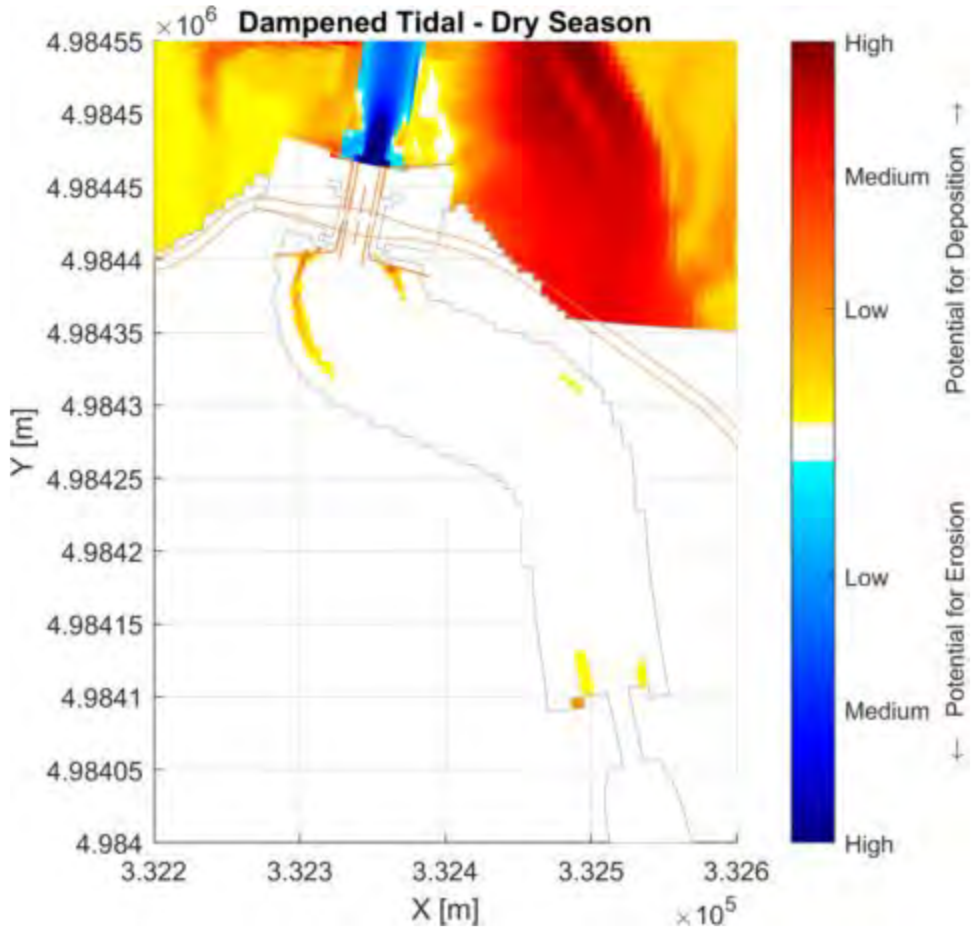


Figure 37: Map of potential accretion and erosion after two months at the structure for the Dampened Tidal Estuary Scenario (dry seasons).

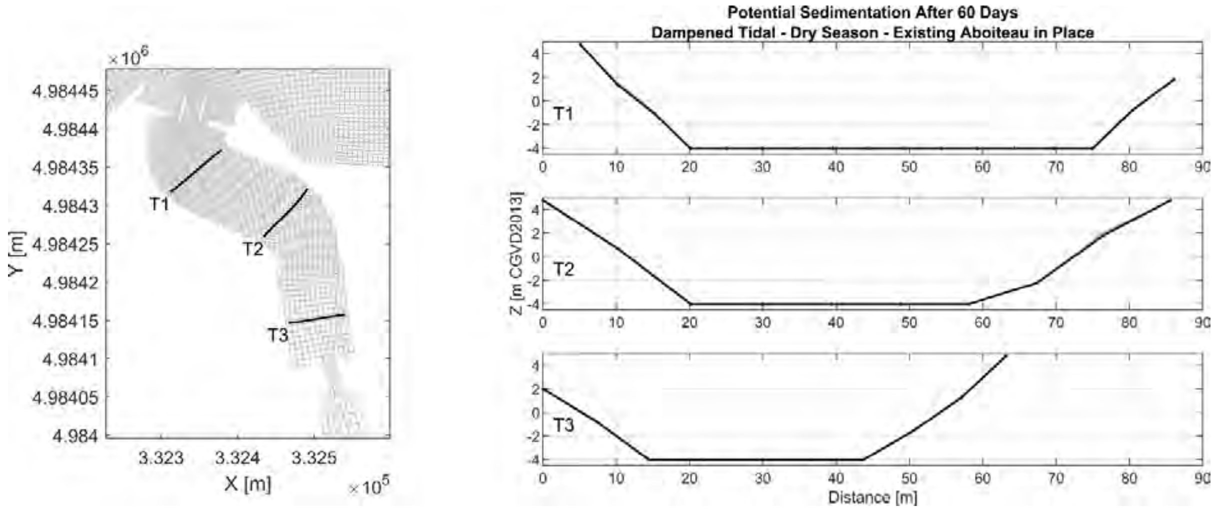


Figure 38: Cross-sections of potential deposition in channel between structures after two months for the Dampened Tidal Estuary Scenario (dry seasons).

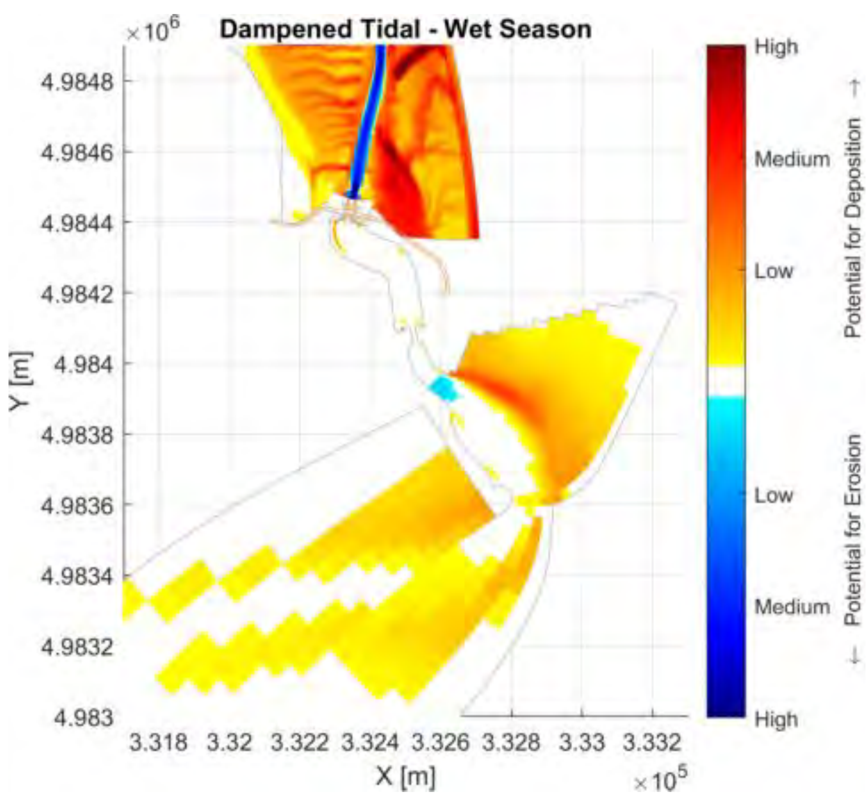


Figure 39: Map of potential accretion and erosion after two months for the Dampened Tidal Estuary Scenario (wet seasons).

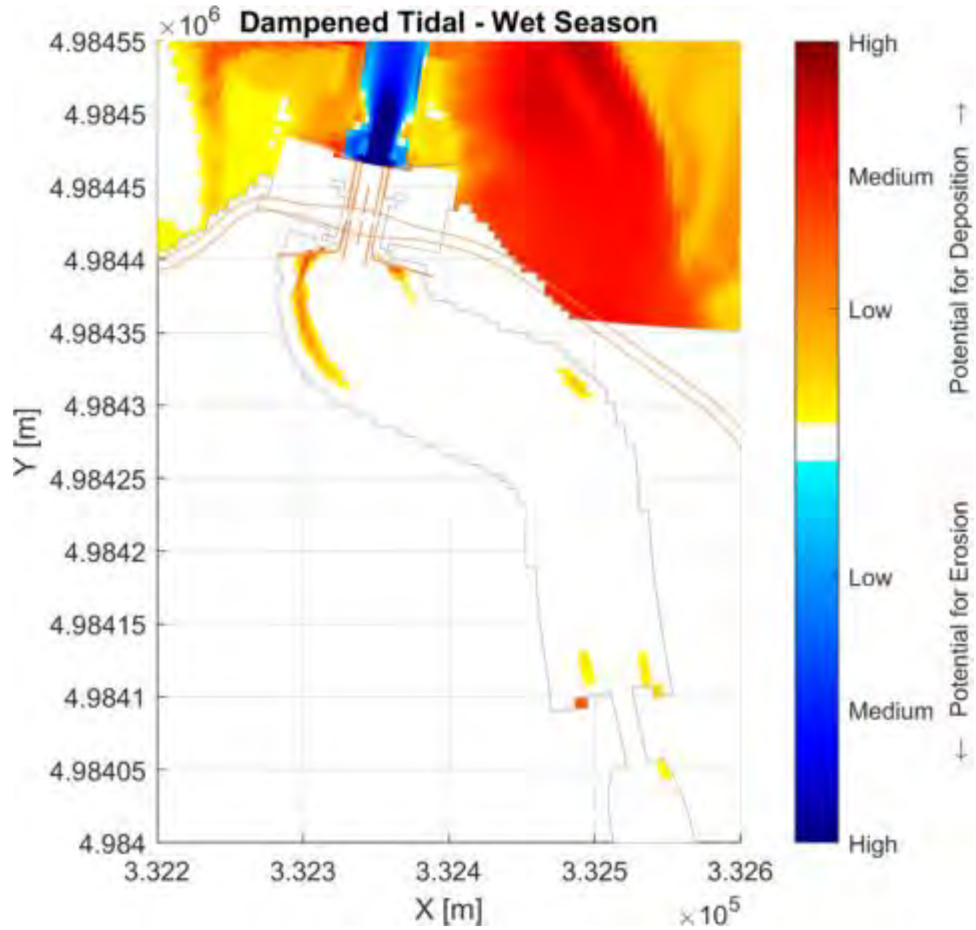


Figure 40: Map of potential accretion and erosion after two months at the structure for the Dampened Tidal Estuary Scenario (wet seasons).

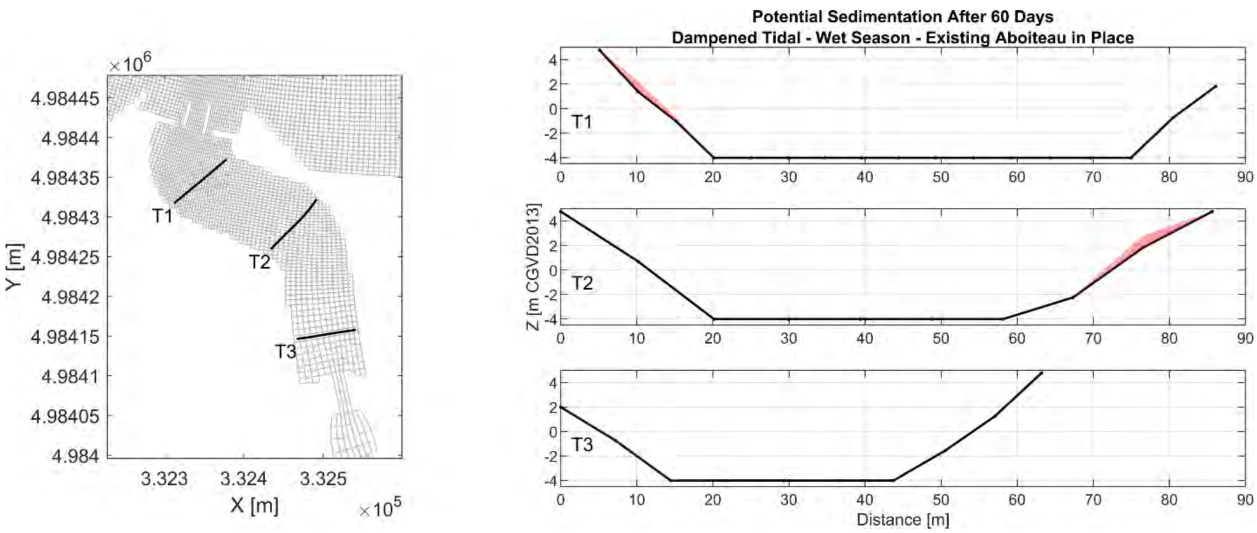


Figure 41: Cross-sections of potential deposition in channel between structures after two months for the Dampened Tidal Estuary Scenario (wet seasons).

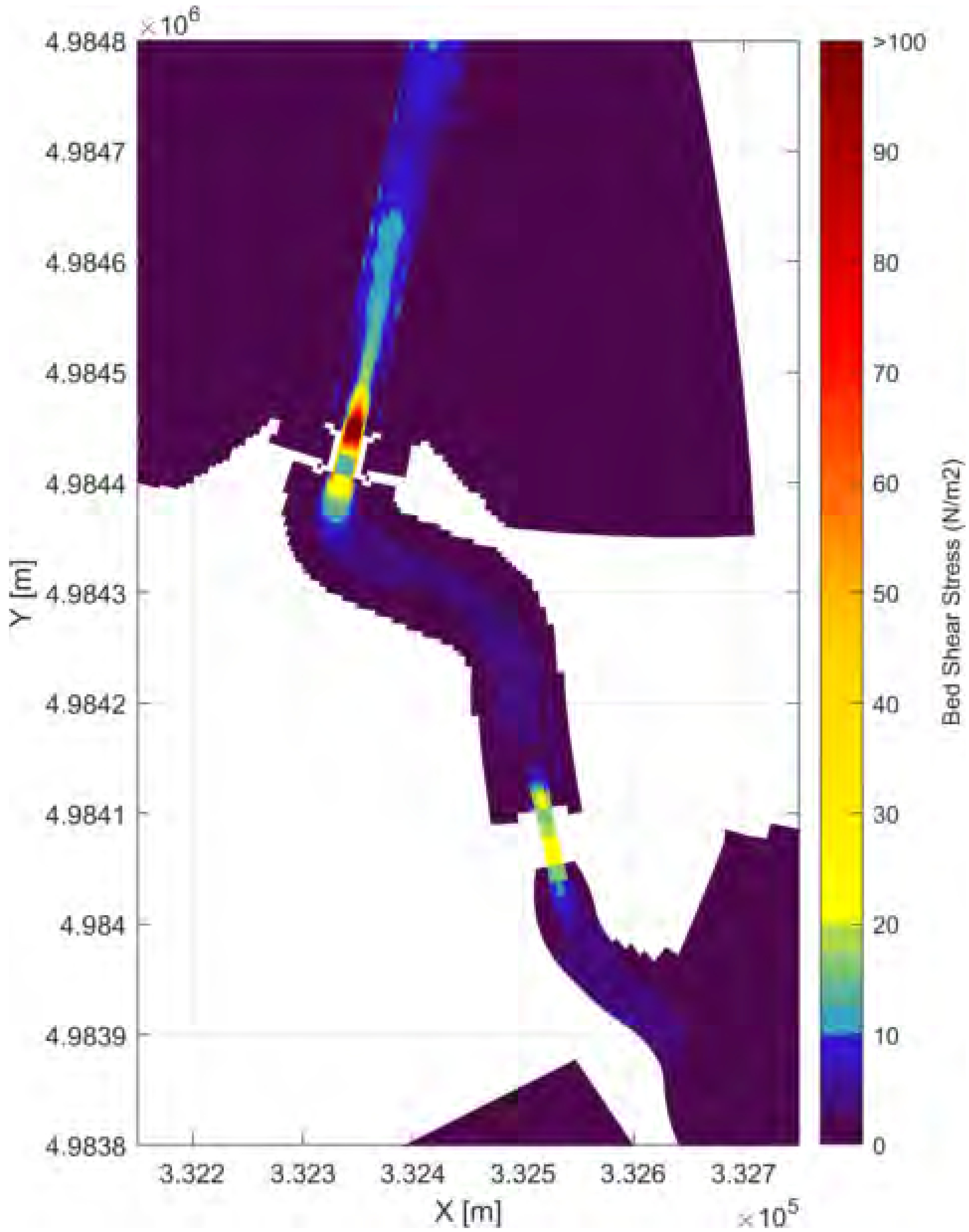


Figure 42: Maximum bed shear stress for the Dampened Tidal Scenario.

4.0 Limitations

The results presented in this report are indicative of the information that was made available to CBCL Limited at the time of the study. Should additional information become available, CBCL Limited requests that this information be brought to our attention so that we may re-assess the conclusions presented herein. While most of the information came from carefully documented and reliable sources (e.g. single beam and multi-beam bathymetric surveys and measured water levels), other types of available information were more anecdotal in nature (e.g., geomorphic characteristics, and seasonal bed level changes) which did not allow for a detailed quantification of model error range. Due to the very dynamic aspect of the area and the complex nature of morphological evolution (and the modelling of such processes), results should be interpreted with caution. Results should be taken in relative terms (e.g. comparison between alternatives, given a similar set of input conditions and assumptions) rather than for determining absolute quantitative results.

Additionally, climate change impacts in regional sea level rise have not been considered in this study and might have an impact on the future long-term morphological development of the area.

5.0 Concluding Remarks

This analysis provides a summary of the salinity and sediment concentrations through the structures and into Lake Pesaquid based on the Delft3D modelling. The modelling indicates that the Slightly Brackish and Dampened Tidal Estuary scenarios will result in Lake Pesaquid experiencing a range of brackish conditions:

- Freshwater runoff into the lake results in significant changes in salinities within Lake Pesaquid since it directly dilutes the salt concentration. Lake salinities would respond not only to seasonal runoff conditions (i.e. wet vs. dry testing periods) but also to individual runoff events.
- Higher salinity concentrations in the lake are expected in general (except at the Martock intake) for the Dampened Tidal Estuary Scenario relative to the Slightly Brackish Scenario due to greater volumes of saline water entering.
- Little stratification in salinity was observed in the model results for both scenarios.
- The removal of the existing aboiteau had very little impact on salinity concentrations.

The model results indicate that suspended sediment will enter the lake from the Minas Basin, and show that:

- The sediment plume is mainly tidally-driven, with the plume's maximum extent occurring during flood tides. It was also shown in the model that the plume recedes significantly during ebb tide.
- The sediment plume for the Slightly Brackish Scenario will mainly be contained to just upstream of the HWY1 Bridge.
- The sediment plume for the Dampened Tidal Estuary Scenario travels further upstream, reaching approximately 2 km upstream of the HWY1 Bridge.

- The suspended sediment was mainly controlled by the tidal variation (greater sediment entering during spring tides) and seasonal conditions (variation in the freshwater runoff) had little impact.
- The removal of the existing aboiteau had very little impact on sediment concentrations.

In addition to these analyses, potential deposition and erosion were assessed with the models. Deposition along Windsor waterfront is expected due to the sediment plume entering the lake. In the Slightly Brackish Scenario, deposition is only expected north of the HWY1 Bridge, while under the Dampened Tidal Estuary Scenario, deposition is expected further upstream. Very little deposition is expected in the channel between the two structures, with some accumulation on the sides of the channel. Erosion downstream of the proposed aboiteau and dissipation pool is expected, as high flow velocities were shown by the model to occur there.

Memo

Date	21/07/2021
Memo to	C. Fisher, A. Wilson, R. Giffin
Project name	171046.01 - Avon River Aboiteau
Subject	Delft3D Analysis – Flow Velocities
From	A. Kaji, G. Mauti
Copies to	C. Katopodis, B. Rutherford, M. Rutherford

1 Introduction

This memo outlines an analysis of flow velocities, within the study area starting from upstream of the existing aboiteau and ending downstream of the proposed aboiteau. The analysis is based on the results of the hydrodynamic model using the software, Delft3D. The results included in this memo are for the Slightly Brackish and Dampened Tidal Estuary water management scenarios. The modelling done for this analysis utilizes the finest resolution grid for this model to obtain more detailed velocity results and was upgraded into a 3D model. The analysis was conducted both with the existing aboiteau in place and with the existing aboiteau removed, to quantify the effects of this change on velocities in the study area.

2 Delft3D Setup

The bathymetry used in the model has been derived from a combination of the latest bathymetric surveys (from CBCL and SMU), the available Lidar surface data, the drawings of the new structure (including the permanent dyke, aboiteau and channel) and some assumptions on the local bathymetry. The agricultural and developed area behind the aboiteau is assumed not to flood in those conditions and it was therefore removed from the model. The model runs in quasi-3D mode with three equally spaced vertical layers. The thickness of each layer is relative to the water depth. The model domain and bathymetry are shown in Figure 1, with the existing aboiteau removed and in place.

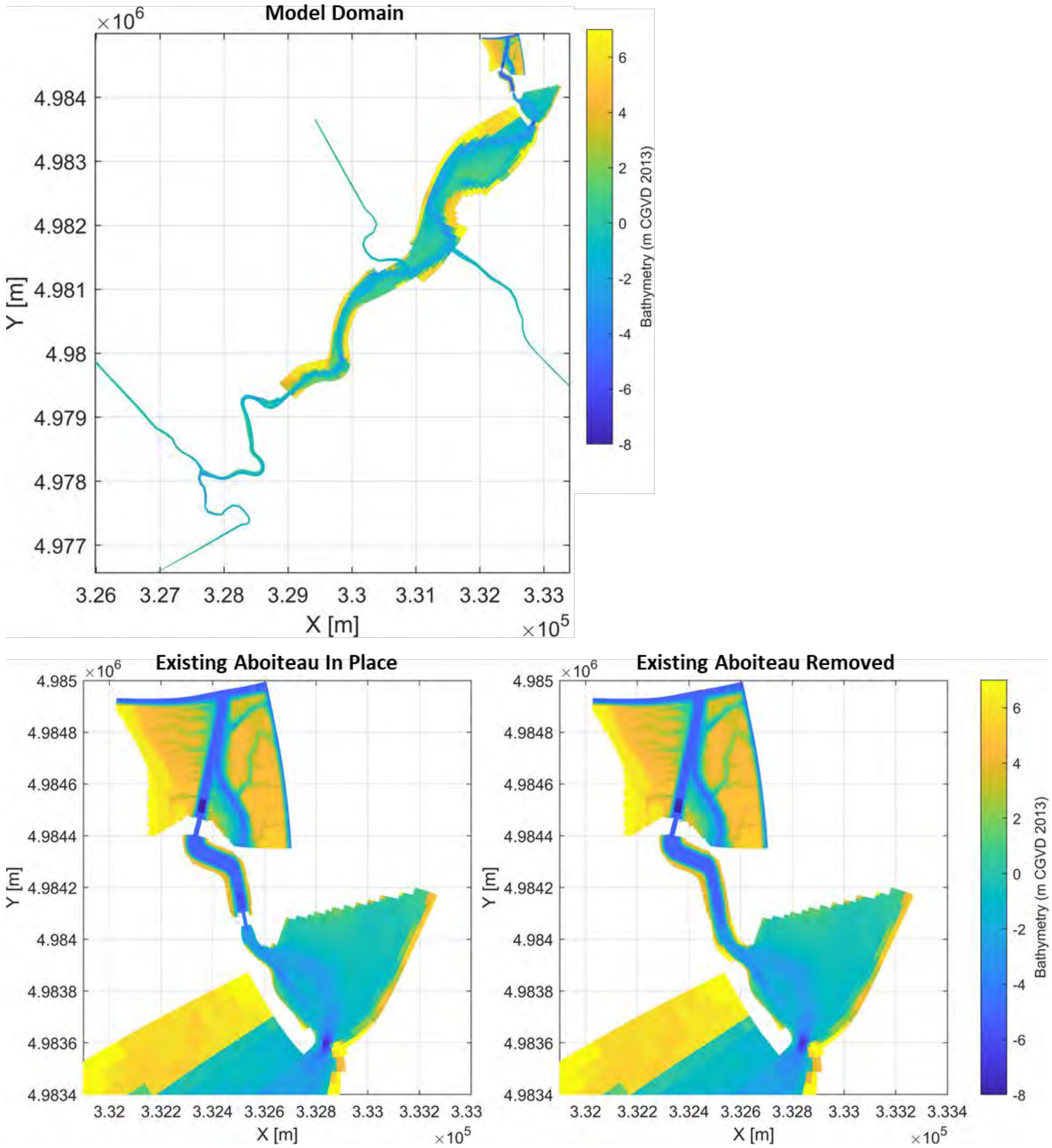


Figure 1: **Model bathymetry with existing aboiteau in place and removed.**

The model is forced with freshwater runoff into the lake (calculated by the SWMM model) and astronomical tides (calculated by the regional Delft3D model). Two sets of seasonal conditions were calculated – the first representing average winter/ spring conditions, which will be referred to as the "wet" season and the second representing average summer conditions, which will be referred to as the "dry" season (Table 1). In addition, the tidal forcings include both neap and spring tides.

Table 1: Total Freshwater Inputs from Rivers into the Lake for Seasonal Conditions

Constant Total Flow – Wet Season	Constant Total Flow – Dry Season
29.1 m^3/s	3.5 m^3/s

The capacity of the structure was determined based on the SWMM and the OpenFOAM models used in this study for consistency and accuracy in the representation of the structures. The fishways were specifically calibrated based on the flow calculated by OpenFOAM. The flow through the main gates were calibrated with the flow through the culverts calculated by SWMM. The equations for flow through structures in SWMM are empirical based on experimental data and therefore, considered more accurate than Delft3D for this specific purpose.

Two model grids were developed for this comparison. The first assumes that the existing aboiteau remains in place, with the gate system removed. This aboiteau is schematized as a fixed opening and is calibrated to reproduce the SWMM results for energy losses at the structure. The second model assumes that the existing aboiteau is removed and in its place is a continuation of the upstream channel, with a 25 m wide trapezoidal channel with 2:1 side slope and a bottom elevation of -5.0 m CGVD2013. The grid at the location of the structures for each model is illustrated in Figure 2. Three points are illustrated in this figure, which depict locations in the model where data was extracted and are referenced in this memo. The three locations were chosen based on relevance.

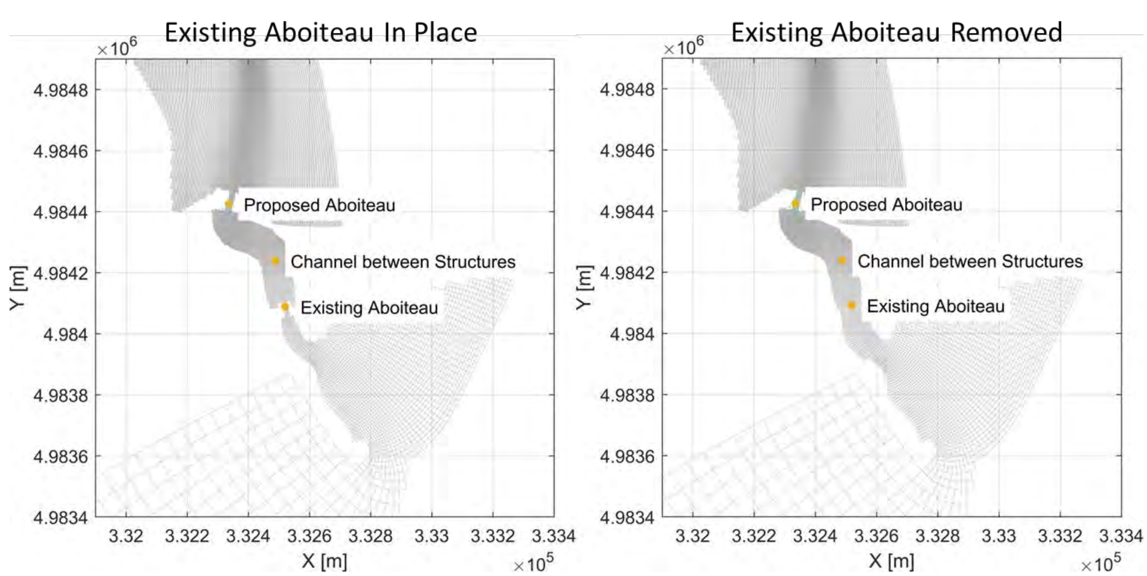


Figure 2: Model grid with and without the existing aboiteau. The dots indicate where the time-series results are discussed throughout the memo.

2.1 Water Management Scenarios

Two operational scenarios were modelled in this analysis to assess the velocities throughout the area of study. These scenarios were tested using the grid with the existing aboiteau remaining in place as well as with the existing aboiteau removed. The two water management scenarios include:

- Slightly Brackish Scenario.
- Dampened Tidal Estuary Scenario.

The **Slightly Brackish Scenario** includes the operation of two-way baffled fishways and active gates. The active gates open when the tidal level is less than the lake level to maintain the desired lake level. In the model results, the lake level is maintained at 2.1 m CGVD2013 and fluctuates by +/- 0.4 m. The **Dampened Tidal Estuary Scenario** has a lake level that fluctuates between -0.5 and 1.5 m CGVD2013. This scenario utilizes a flap gate that has a permanently open section, with the remaining functioning as a normal flap gate, and two-way baffled fishways. The flap gate was schematized in Delft3D by adjusting the gate level based on the tide and lake levels, to match the capacity estimated by the SWMM model.

A total of 16 simulations were performed to assess velocity patterns for the two water management scenarios under different seasons (varying freshwater input) and different instants in the tidal cycle (neap x spring tide). The different simulations are shown in Table 2.

Table 2: Summary of the Simulation Completed for the Analysis of Velocities

Simulation	Scenario	Seasonal Conditions	Existing Aboiteau In Place	Tidal Conditions
1	Brackish	Dry	Yes	Spring
2	Dampened Tidal	Dry	Yes	Spring
3	Brackish	Wet	Yes	Spring
4	Dampened Tidal	Wet	Yes	Spring
5	Brackish	Dry	No	Spring
6	Dampened Tidal	Dry	No	Spring
7	Brackish	Wet	No	Spring
8	Dampened Tidal	Wet	No	Spring
9	Brackish	Dry	Yes	Neap
10	Dampened Tidal	Dry	Yes	Neap
11	Brackish	Wet	Yes	Neap
12	Dampened Tidal	Wet	Yes	Neap
13	Brackish	Dry	No	Neap
14	Dampened Tidal	Dry	No	Neap
15	Brackish	Wet	No	Neap
16	Dampened Tidal	Wet	No	Neap

3 Modelling Goals and Limitations

The Delft3D model was developed to provide an overall picture of the flow patterns in the channel between the proposed and existing aboiteaux and surrounding areas in the scale of a few meters. This model is not intended to represent small-scale phenomena, such as turbulence and fully tridimensional flow, especially inside the structures.

It is important to note that Delft3D software does not have the capabilities to model structures in high levels of detail and therefore, the flow discharge through the structures were calibrated using the SWMM and OpenFOAM software where relevant. Therefore, the results presented in this memo may not accurately portray velocity patterns through the structures and near the inlets and outlets of these structures.

The flow patterns near the outlet and inlet of the structures are affected only by the combination of the volume of water passing through the structures (structure capacity), upstream and downstream water levels, and the local bathymetry. Specific flow-structure interaction, such as the effect of the fishway baffles, is only accounted for by reducing the structure capacity (reducing the discharge).

Velocity magnitudes across the main gates of the proposed aboiteau from the Delft3D model are in line with the velocities estimated using the SWMM model and are considered sufficiently accurate for this analysis. On the other hand, velocities inside the fishway are not accurately represented by the Delft3D model. For the flow patterns inside the fishway, results from the OpenFOAM should be used.

Results presented in this memo should be interpreted taking these limitations into account.

4 Results

4.1 Comparison Between Water Management Scenarios

This section of the memo discusses the results of the Slightly Brackish and Dampened Tidal Scenario models, with the existing aboiteau in place. A summary of the results illustrated in this section include:

- Time series of the velocities in each vertical layer at the location of the structures and channel in-between them. The locations of each point are shown in Figure 2.
- Maps of depth-averaged velocities for the general study area and at the inlets and outlets of the proposed and existing aboiteau with flow patterns being shown.
- Cross-sections of flow velocities at the structures and the channel in-between them.

Maps of the velocities in each layer are included in the Appendix. In addition, streamlines of the velocity gradients are included for flow in the upstream direction.

4.1.1 Brackish Scenario

The velocities in each vertical layer at the proposed aboiteau, existing aboiteau, and the centre of the channel in-between the structures are illustrated in Figure 3 for the dry season and Figure 4 for the wet season (a map of the point locations is shown in Figure 2). These figures demonstrate that there is a sudden increase in velocity when the tidal gates of the proposed structure open, which is due to a large movement of water through the channel. This increase in velocity occurs for approximately 0.5 to 2.5 hours depending on the type of freshwater and tidal conditions (Table 3). There are also increased velocities through the existing aboiteau the upstream direction, which occur at high tide due to the flow entering through fishways. Overall, all three layers have similar velocities, with small reduction towards the bottom (layer 3). It is important to note that there are some spikes in velocities after the initial gate opening for each tidal cycle as shown in Figure 4 due to the gates opening subsequently for a very short period of time. This is due to the initial gate opening causing a rapid change in water levels. This results in the model to cause another opening of the gate because the gate height is controlled through water levels; however, this would not happen in reality.

The depth-averaged velocity of the Slightly Brackish Scenario was plotted in planform at the locations of the existing and proposed aboiteaux. Three different time periods were plotted:

- The moment when the tide has dropped below the lake level, and the gates of the proposed aboiteau open, which generates maximum velocities in the downstream flow direction (Figure 5, Figure 8). This lasts for approximately 1.5 hours on average.
- The moment when the gates of the proposed aboiteau are closed and the tide level is greater than the lake level – upstream flow (Figure 6, Figure 9). This lasts for approximately 5 hours.
- The moment when the gates of the proposed aboiteau are closed and the tide level is less than the lake level - downstream flow (Figure 7, Figure 10). This lasts for approximately 6 hours.

Several different areas were plotted to demonstrate the magnitude of velocities and flow patterns at key locations including:

- The overall study area.
- Downstream of the proposed aboiteau.
- Upstream of the proposed aboiteau.
- Downstream of the existing aboiteau.
- Upstream of the existing aboiteau.

The analysis of these maps illustrates that when the main gates are open, it can be observed that there are high flow velocities occurring in the channel at the existing and proposed aboiteaux (Figure 5). Circular flow patterns (eddies) form downstream of the existing and proposed aboiteau likely due to changes in channel size and potentially for the proposed aboiteau, side channels creating flow obstructions. When the active gates are closed and the tide is greater than the lake level, there are generally low velocities in the study area, as water only moves through the fishways. However, increased flow velocities do occur through the existing aboiteau due to flow constriction (Figure 6). When the active gates are closed and the flows are downstream, there are relatively low velocities during downstream flows (Figure 7), again because the flow only occur through the fishways. Although there is a slight increase in velocities in the channel of the existing aboiteau relative to the removal of the aboiteau, these are still generally low.

In addition to the maps, cross-sections of velocities were included to demonstrate the distribution of flow velocities in the water column. Nine cross-sections were included - three surrounding the proposed aboiteau (Figure 11), three surrounding the existing aboiteau (Figure 12), and one through the channel in-between the structures (Figure 13). The cross-sections represent the moment when the proposed aboiteau gates are open, during which peak velocities occur.

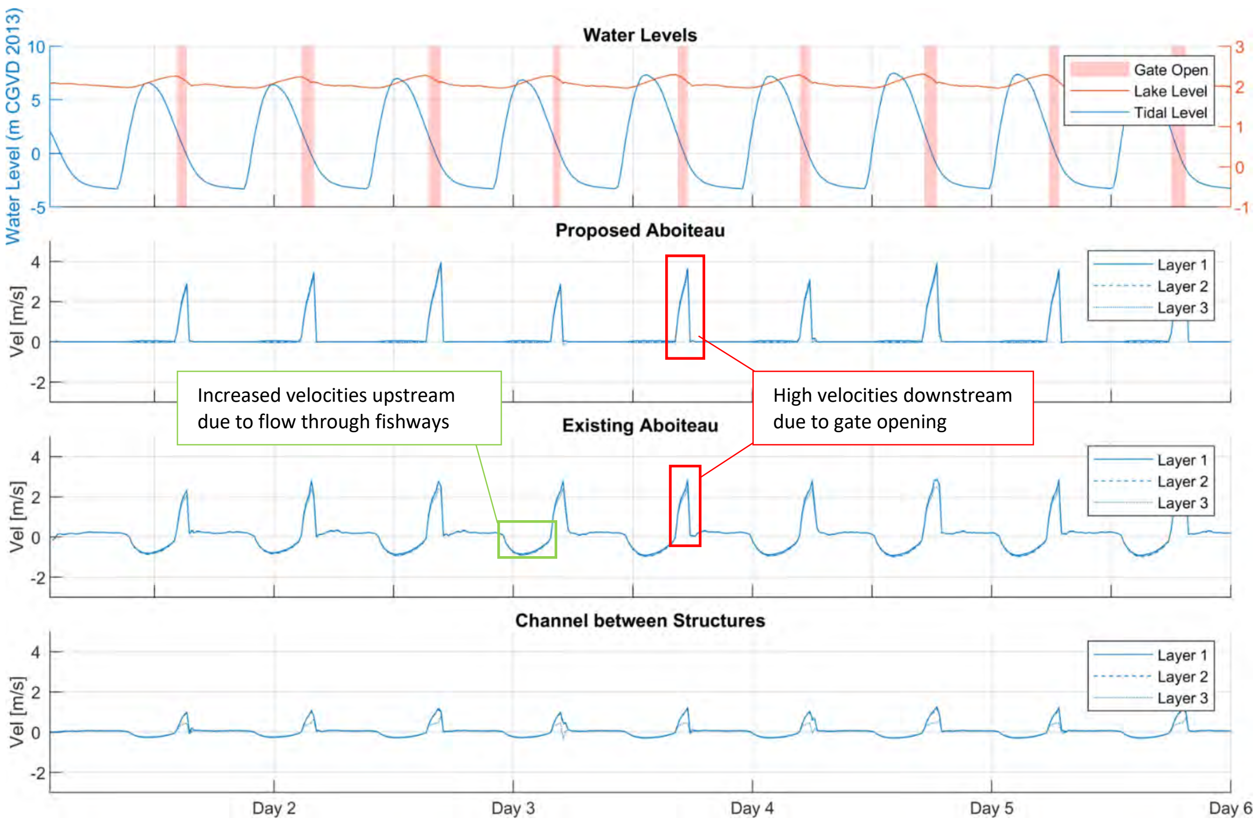


Figure 3: Time series of velocities at various locations for the Brackish Scenario (dry season, spring tide). Note: positive velocities indicate downstream flow direction and negative velocities indicate upstream flow direction.

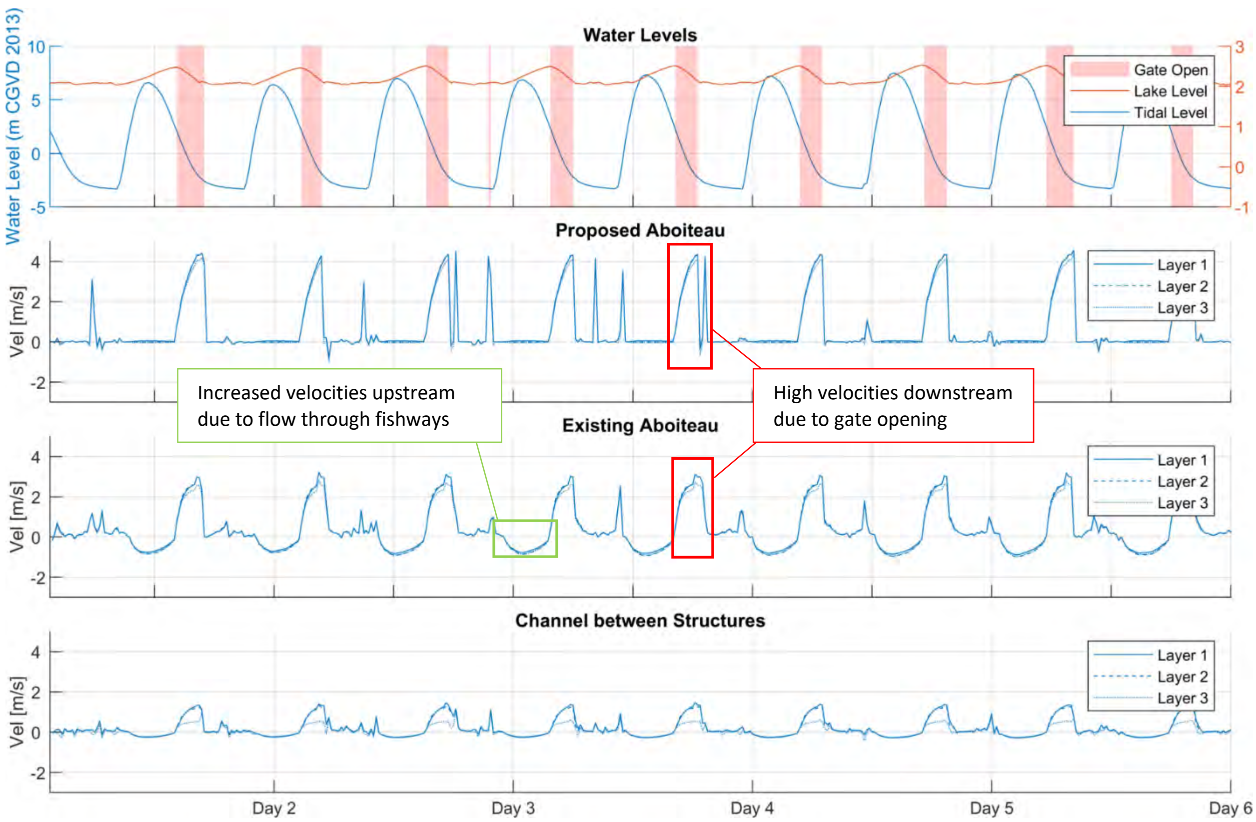


Figure 4: Time series of velocities at various locations for the Brackish Scenario (wet season, spring tide). Note: positive velocities indicate downstream flow direction and negative velocities indicate upstream flow direction.

Table 3: Duration Active Gates are Open in the Slightly Brackish Scenario Depending on Seasonal Conditions and Tide Type.

	Dry Season	Wet Season
Spring Tide	1.1 hours	2.5 hours
Neap Tide	0.5 hours	2 hours

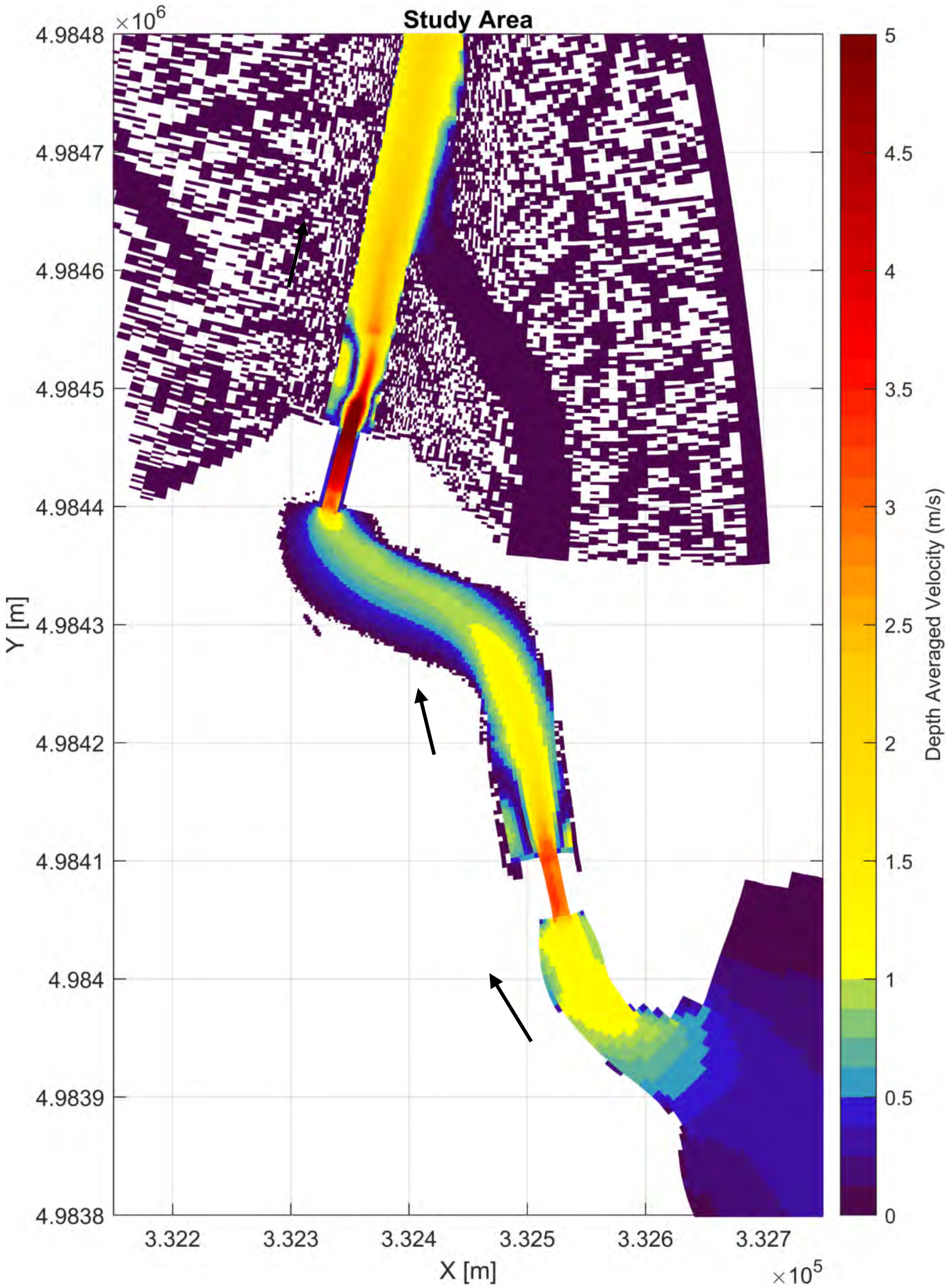


Figure 5a: Map of the depth-averaged velocity when the active gates are open for the Brackish Scenario (wet season) – Overall Study Area.

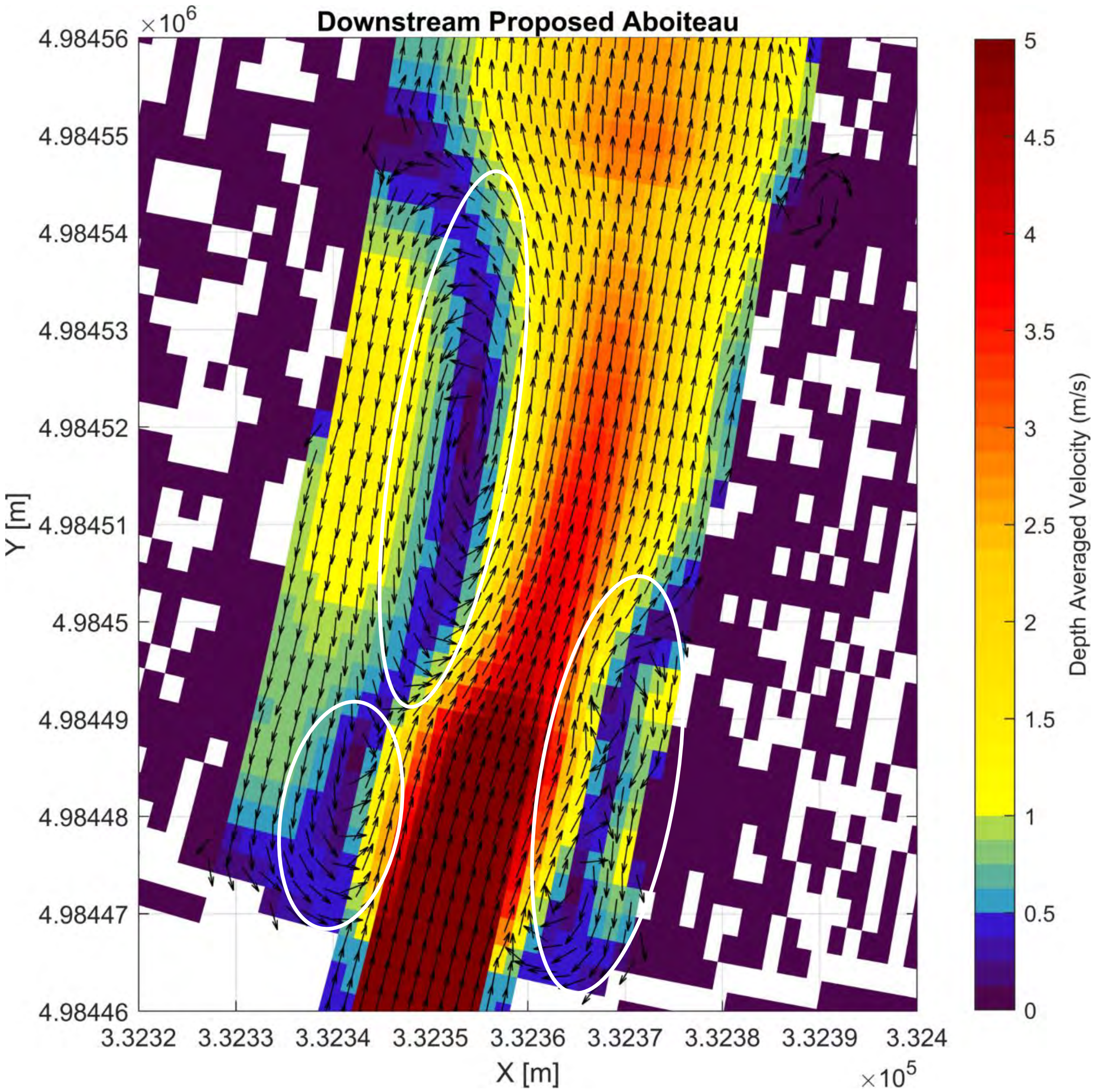


Figure 5b: Map of the depth-averaged velocity when the active gates are open for the Brackish Scenario (wet season) – Downstream Proposed Aboiteau. Eddies are highlighted (white circles). Velocities within the structure reach values higher than 5 m/s.

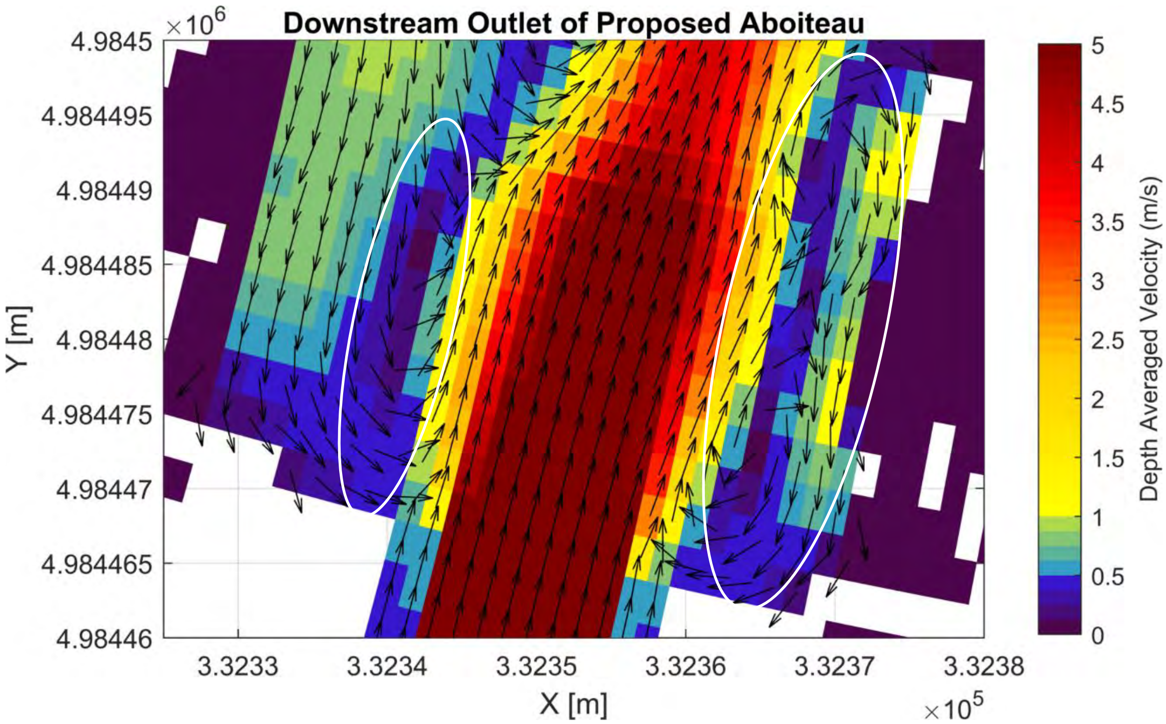


Figure 5c: Map of the depth-averaged velocity when the active gates are open for the Brackish Scenario (wet season) – Downstream Proposed Aboiteau (Only Outlet). Eddies are highlighted (white circles). Velocities within the structure reach values higher than 5 m/s.

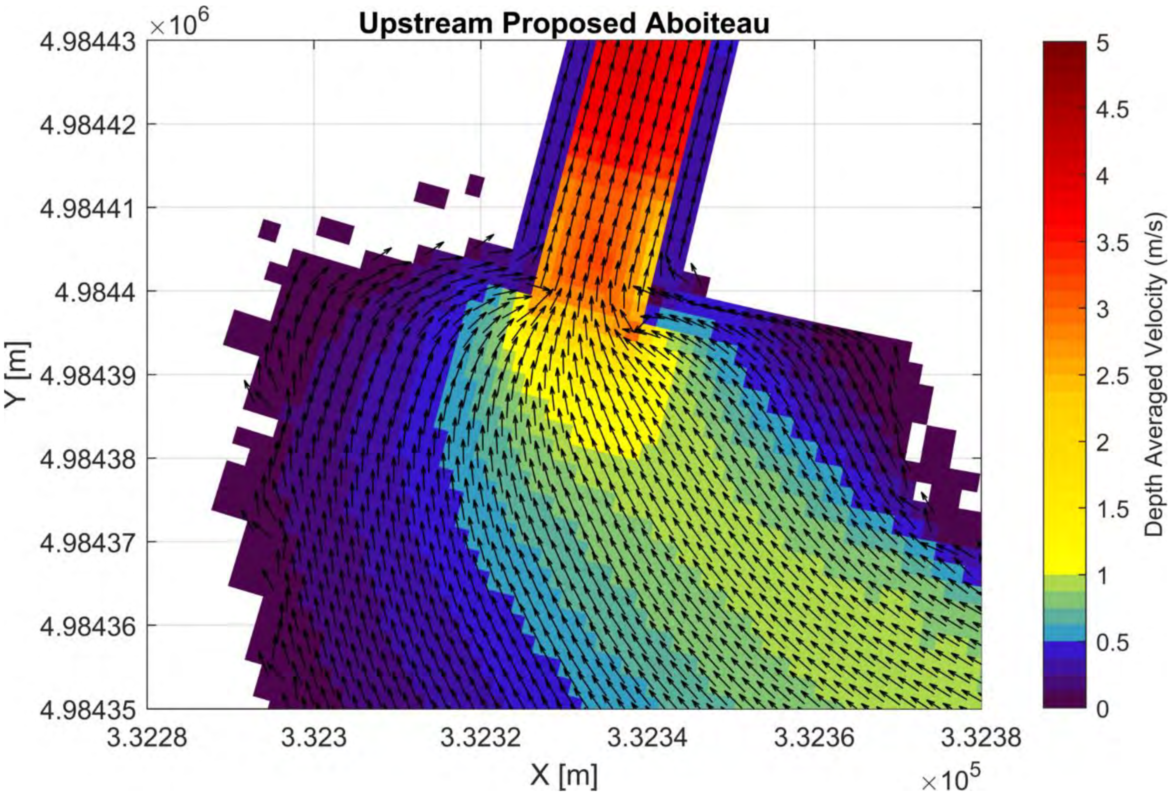


Figure 5d: Map of the depth-averaged velocity when the active gates are open for the Brackish Scenario (wet season) – Upstream Proposed Aboiteau.

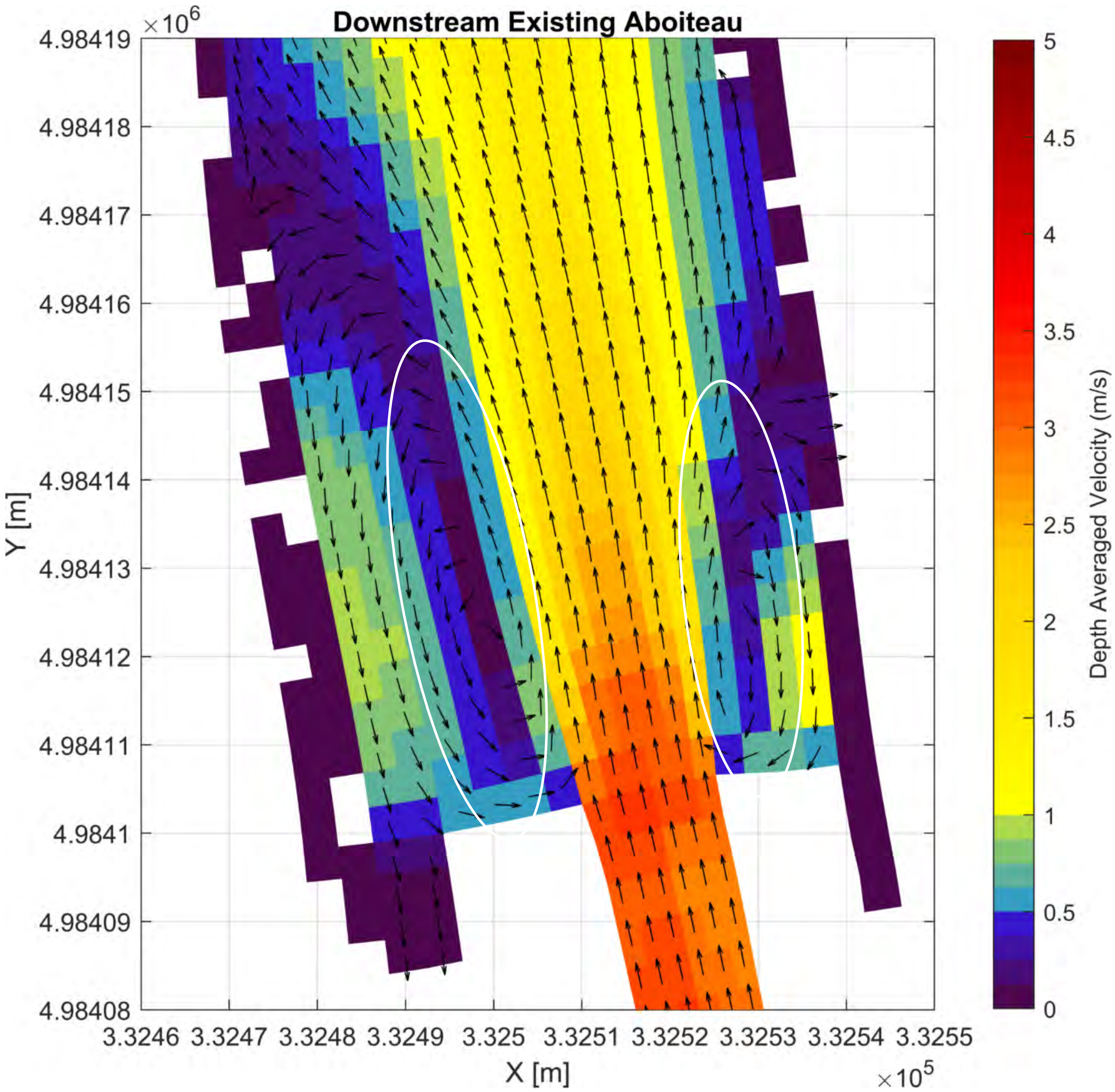


Figure 5e: Map of the depth-averaged velocity when the active gates are open for the Brackish Scenario (wet season) – Downstream Existing Aboiteau.

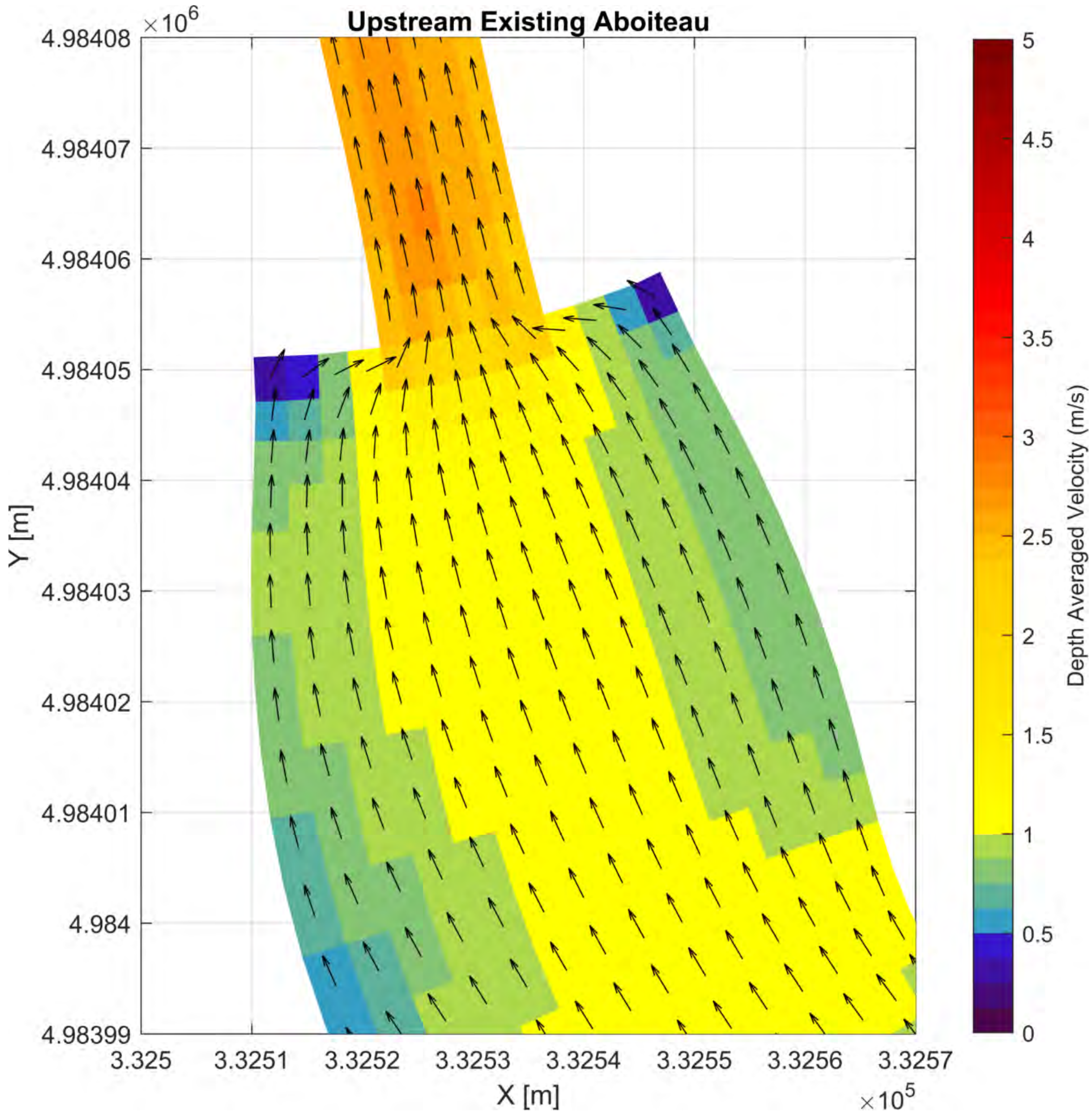


Figure 5f: Map of the depth-averaged velocity when the active gates are open for the Brackish Scenario (wet season) – Upstream Existing Aboiteau.

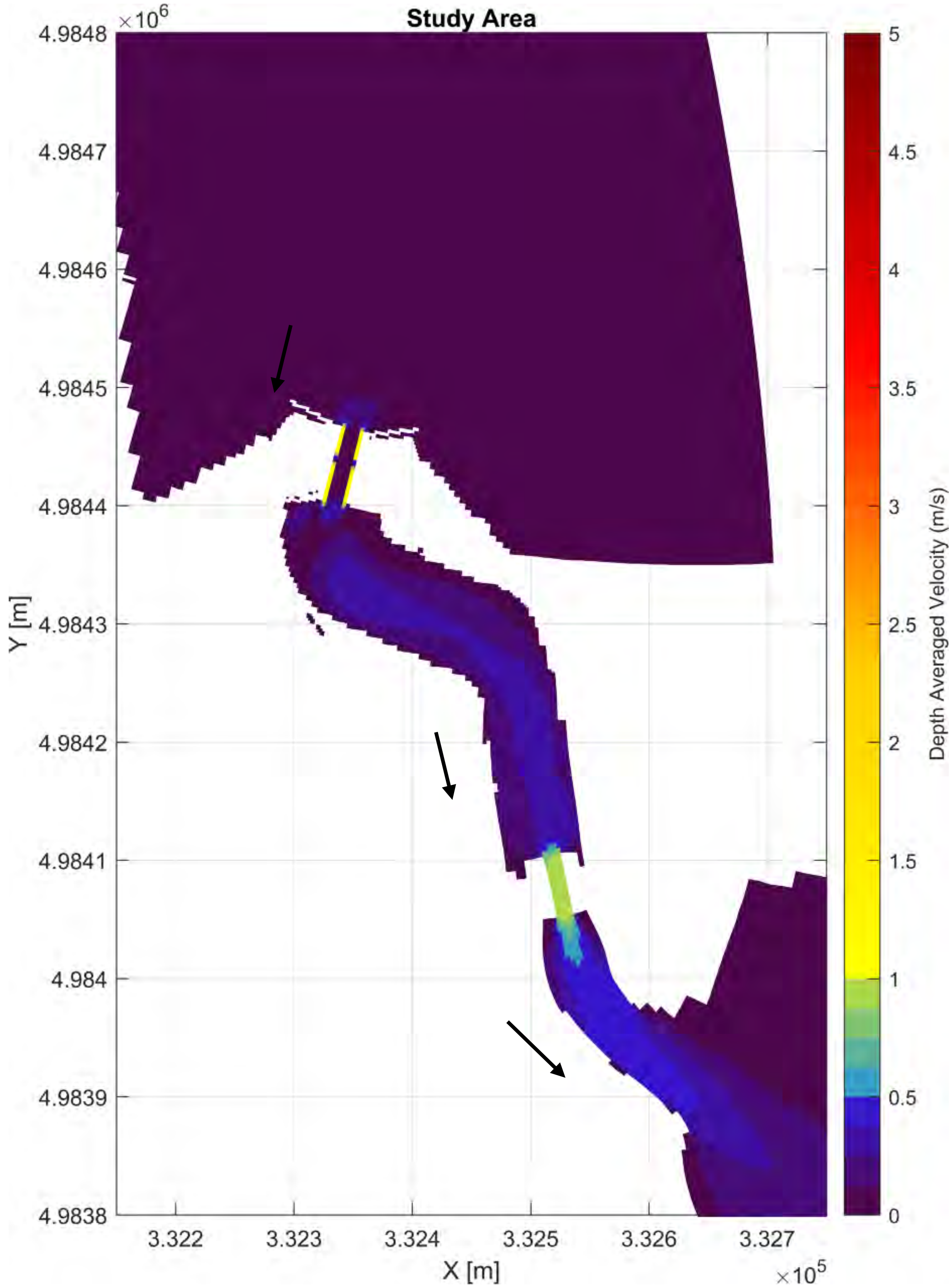


Figure 6a: Map of the depth-averaged velocity when the active gates are closed and the tide is greater than the lake level for the Brackish Scenario (wet season) – Overall Study Area.

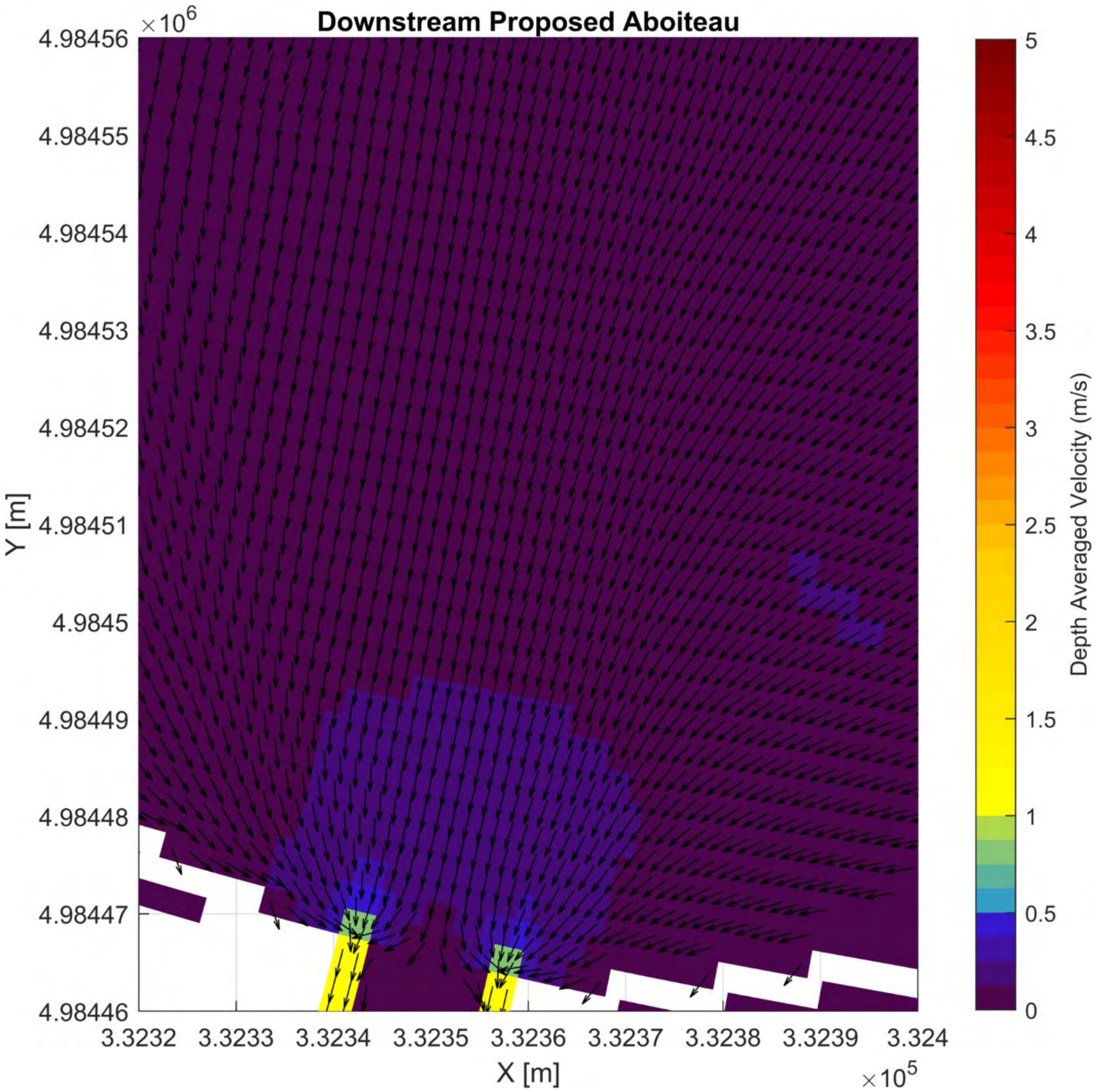


Figure 6b: Map of the depth-averaged velocity when the active gates are closed and the tide is greater than the lake level for the Brackish Scenario (wet season) – Downstream Proposed Aboiteau.

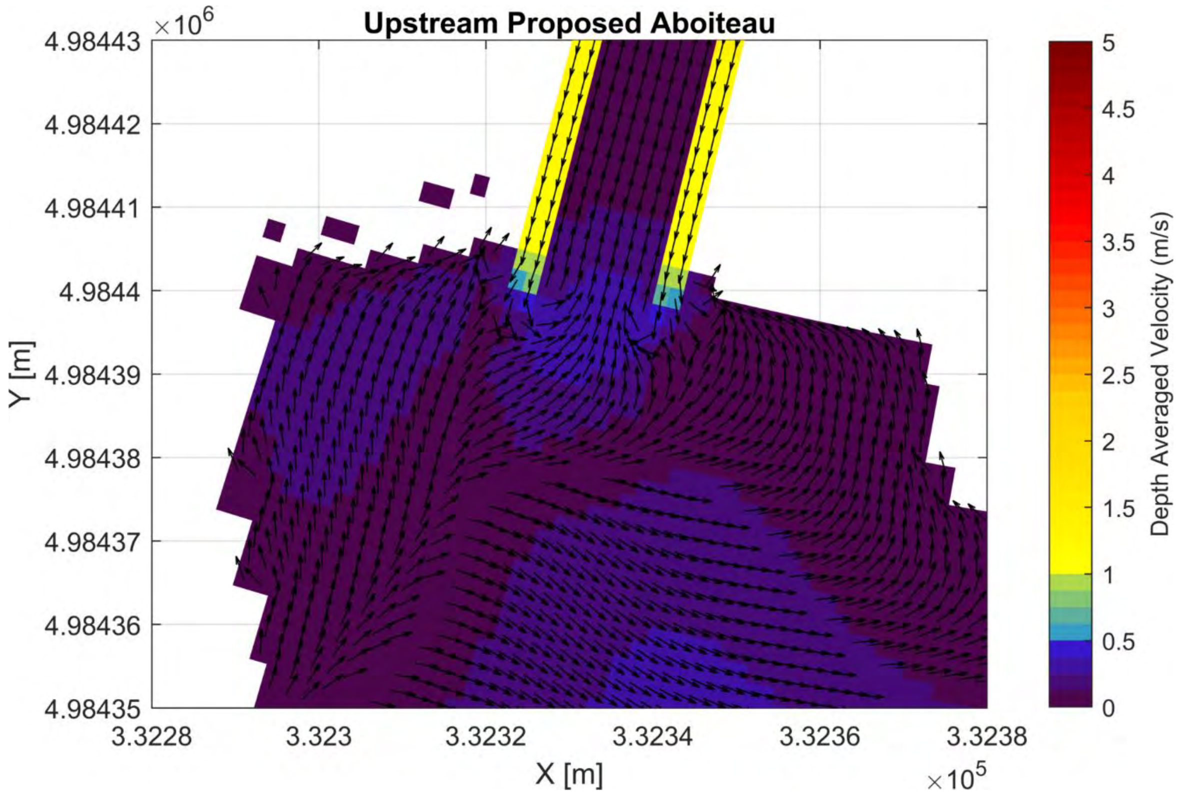


Figure 6c: Map of the depth-averaged velocity when the active gates are closed and the tide is greater than the lake level for the Brackish Scenario (wet season) – Upstream Proposed Aboiteau.

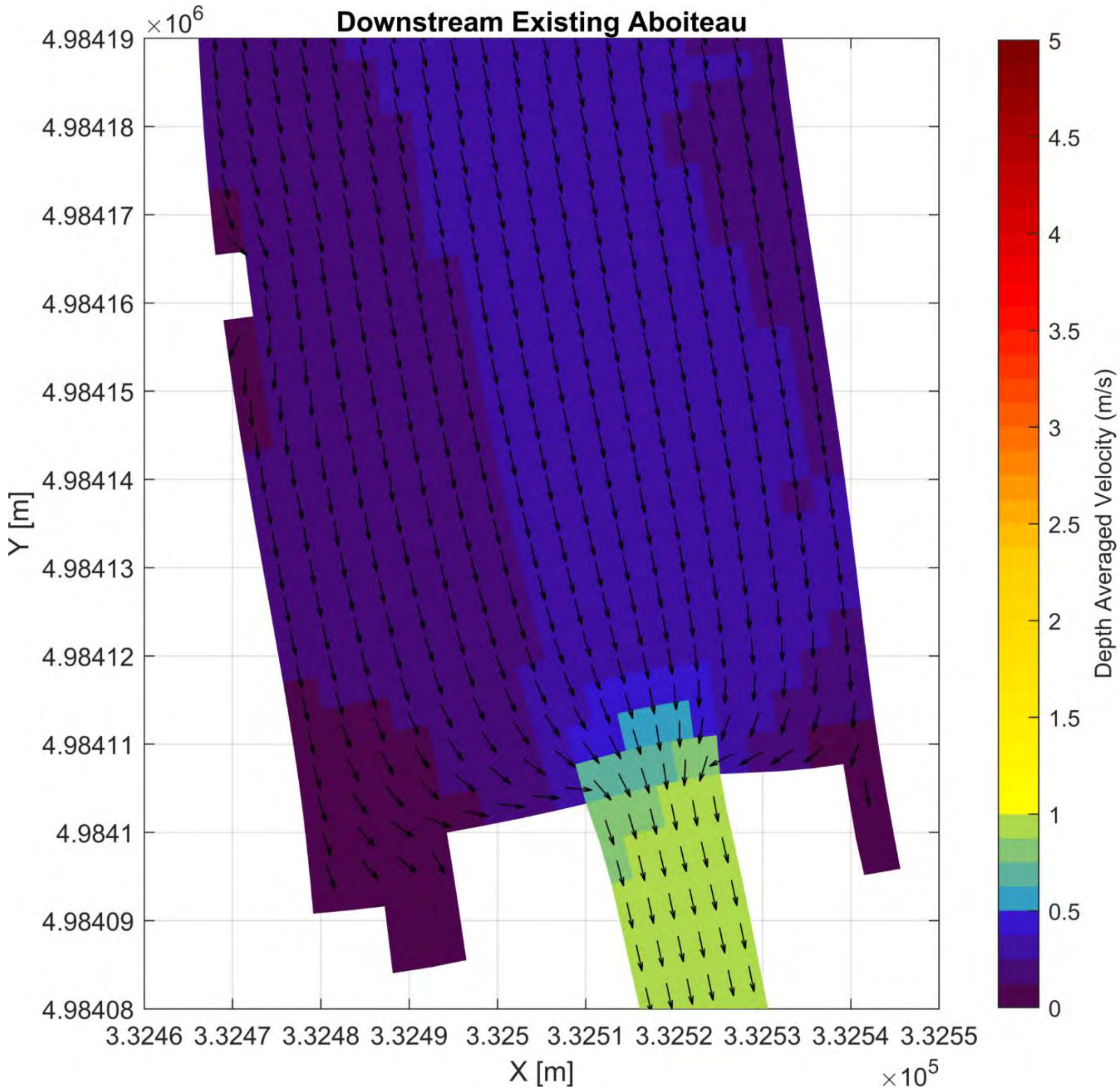


Figure 6d: **Map of the depth-averaged velocity when the active gates are closed and the tide is greater than the lake level for the Brackish Scenario (wet season) – Downstream Existing Aboiteau.**

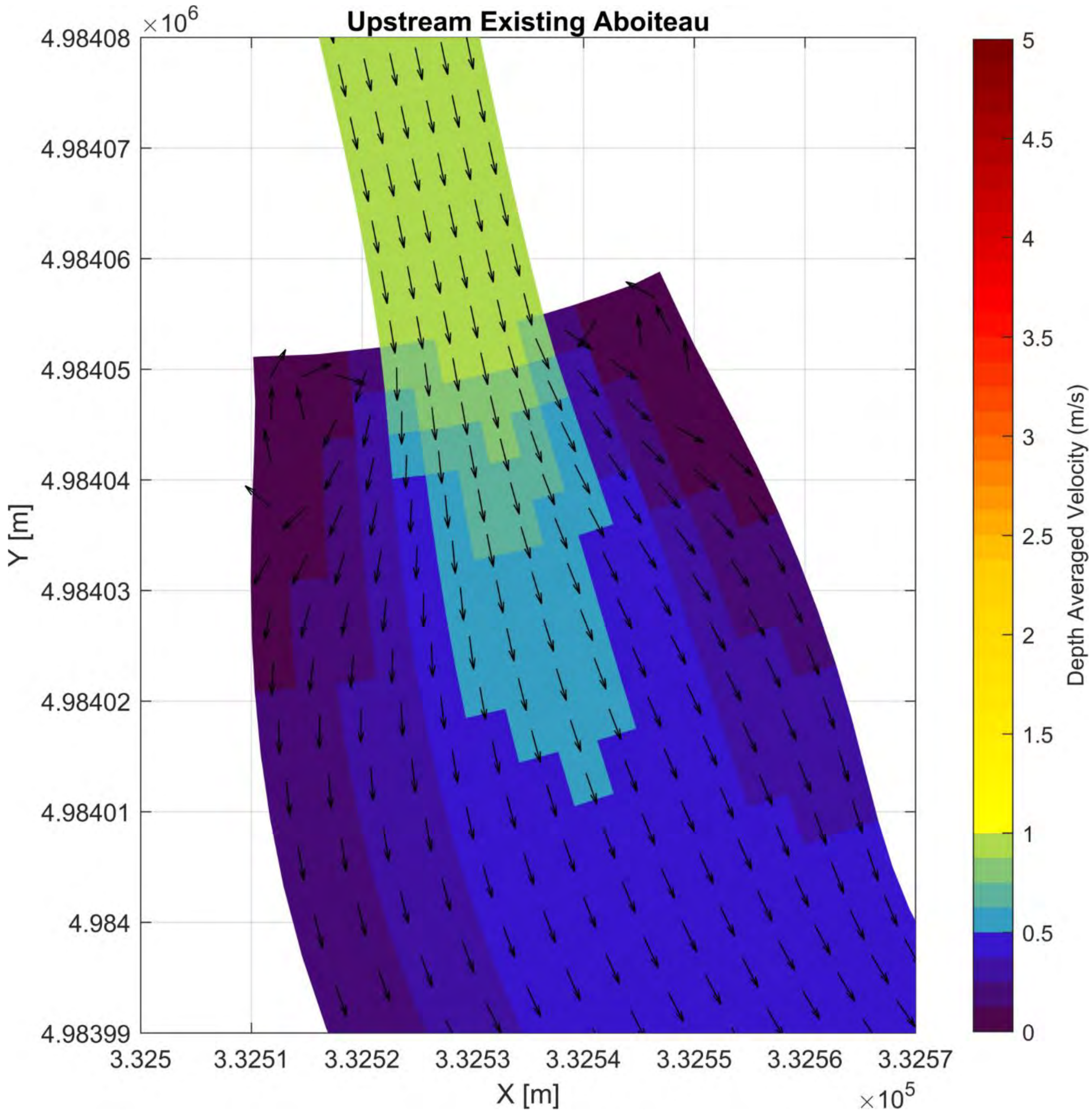


Figure 6e: Map of the depth-averaged velocity when the active gates are closed and the tide is greater than the lake level for the Brackish Scenario (wet season) – Upstream Existing Aboiteau.

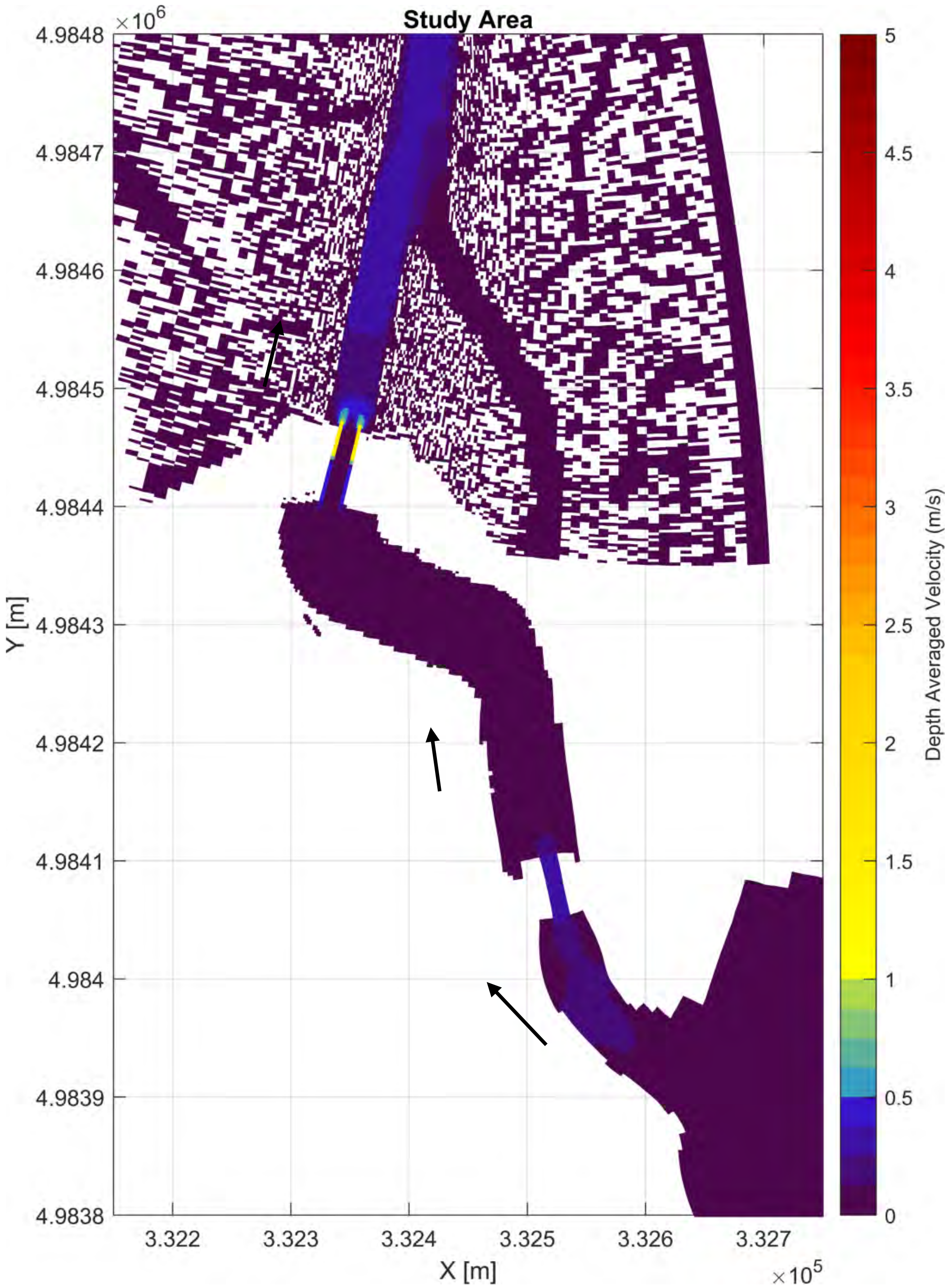


Figure 7a: Map of the depth-averaged velocity when the active gates are closed and the tide is lower than the lake level for the Brackish Scenario (wet season) – Overall Study Area.

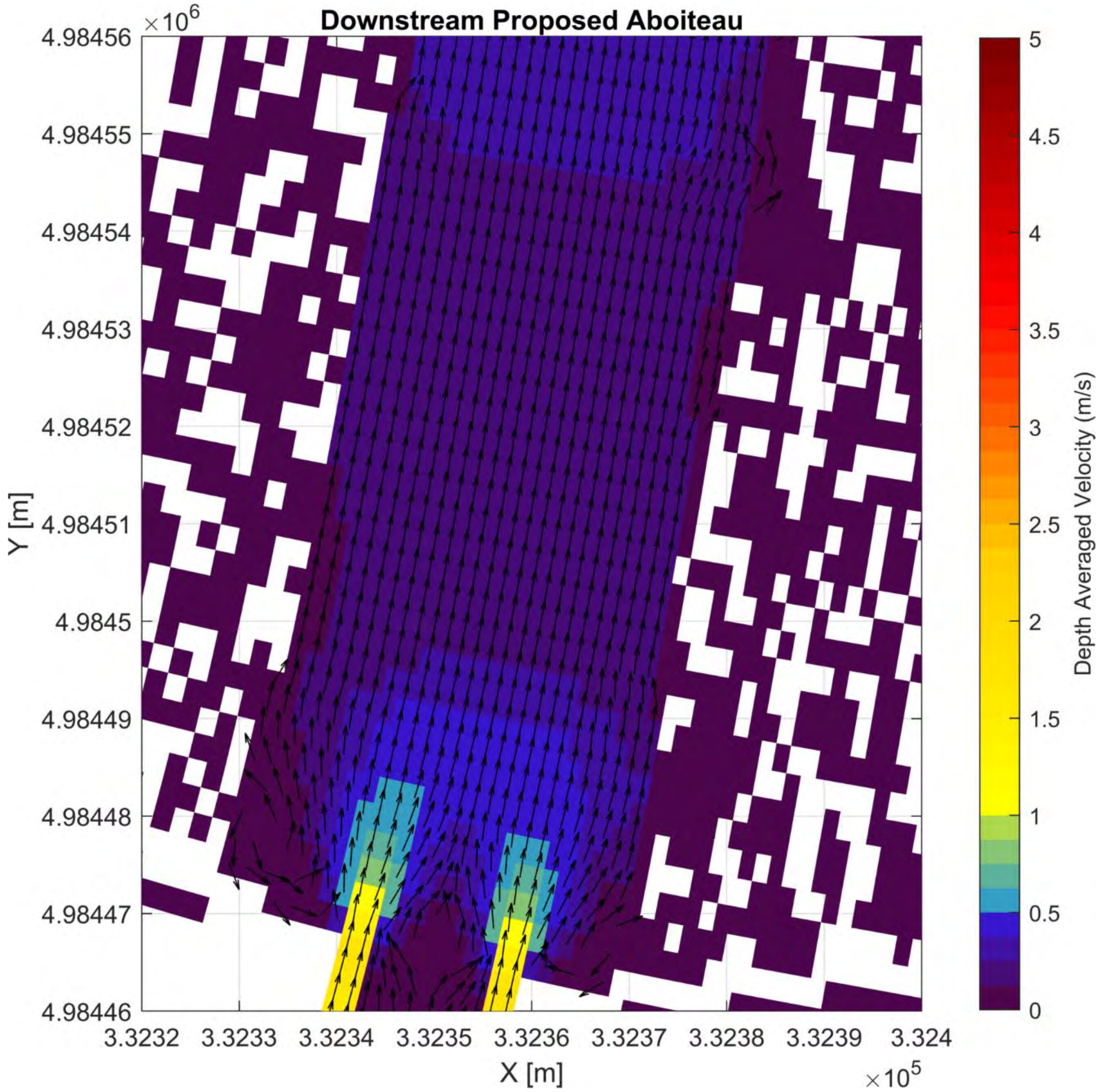


Figure 7b: Map of the depth-averaged velocity when the active gates are closed and the tide is lower than the lake level for the Brackish Scenario (wet season) – Downstream Proposed Aboiteau.

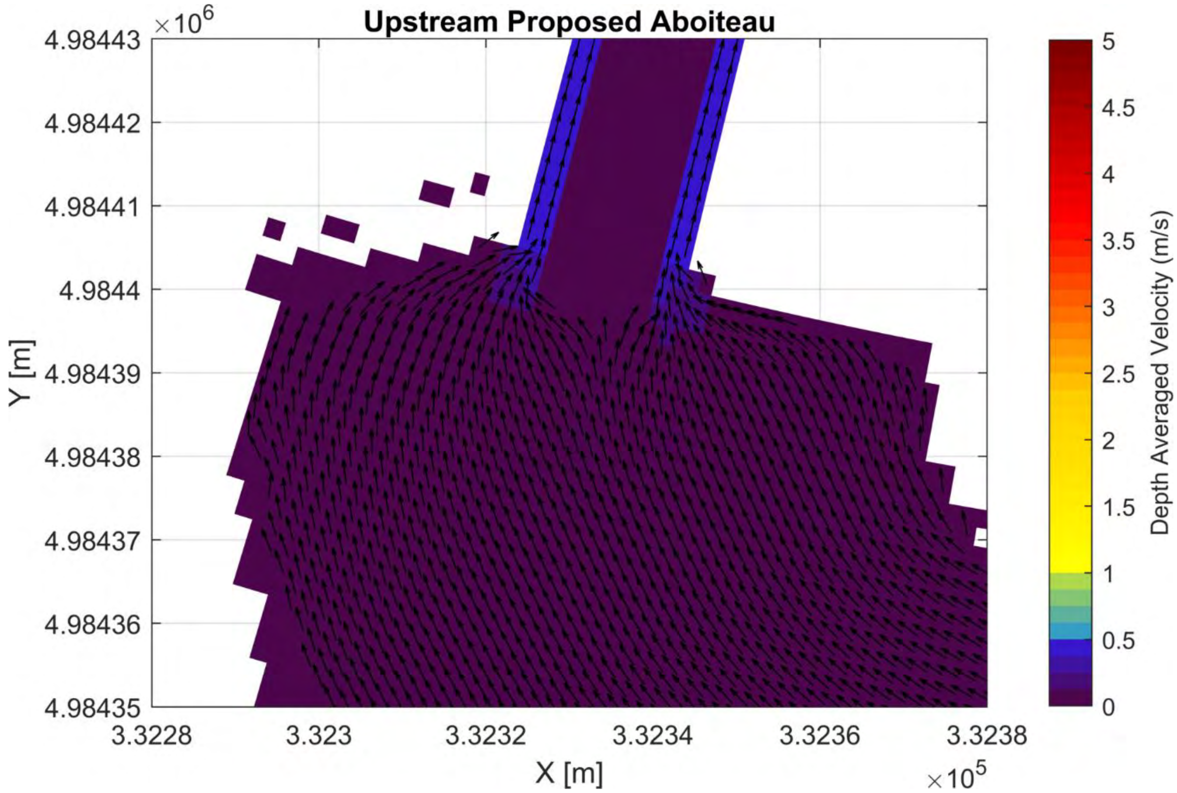


Figure 7c: Map of the depth-averaged velocity when the active gates are closed and the tide is lower than the lake level for the Brackish Scenario (wet season) – Upstream Proposed Aboiteau.

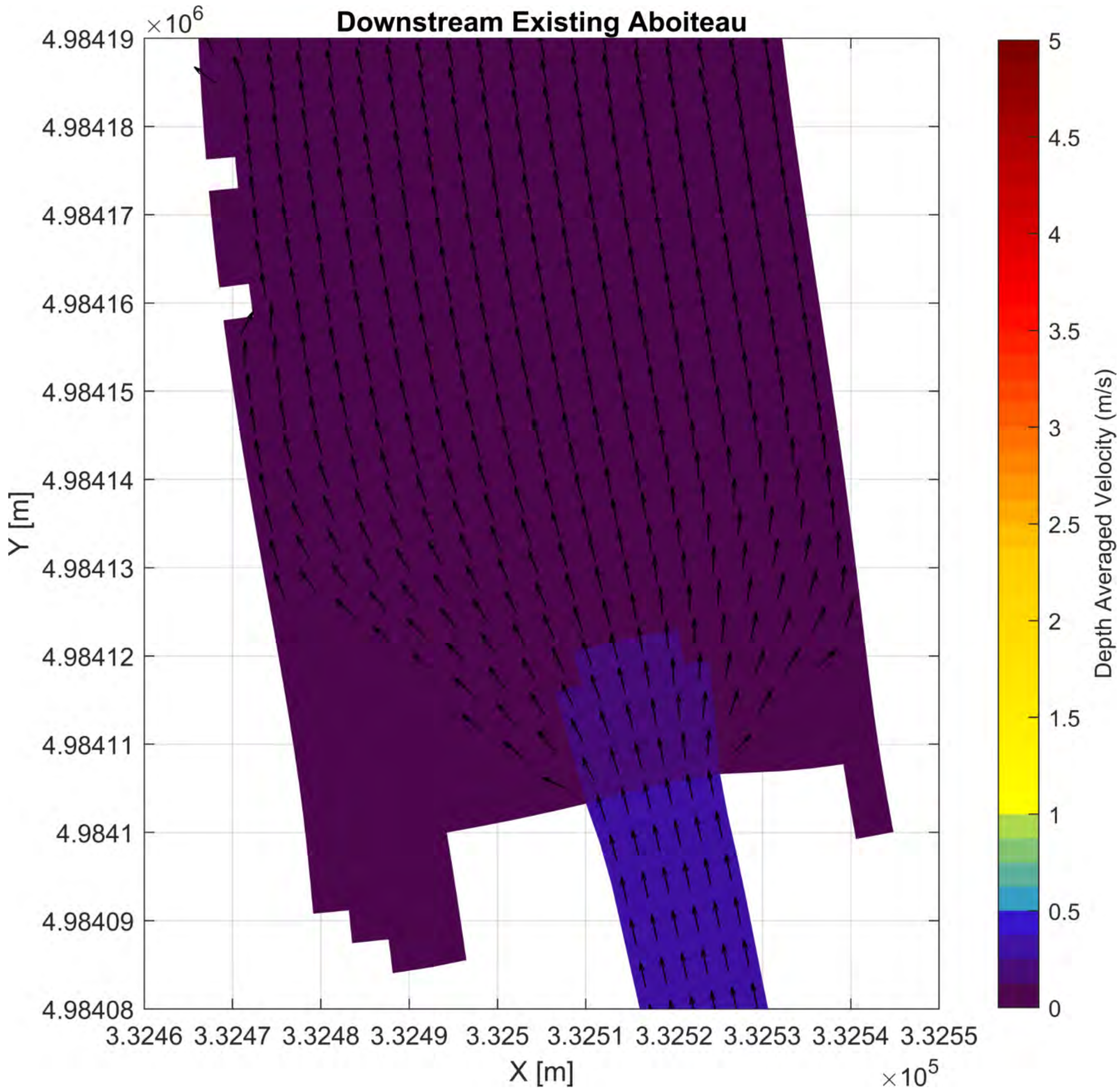


Figure 7d: **Map of the depth-averaged velocity when the active gates are closed and the tide is lower than the lake level for the Brackish Scenario (wet season) – Downstream Existing Aboiteau.**

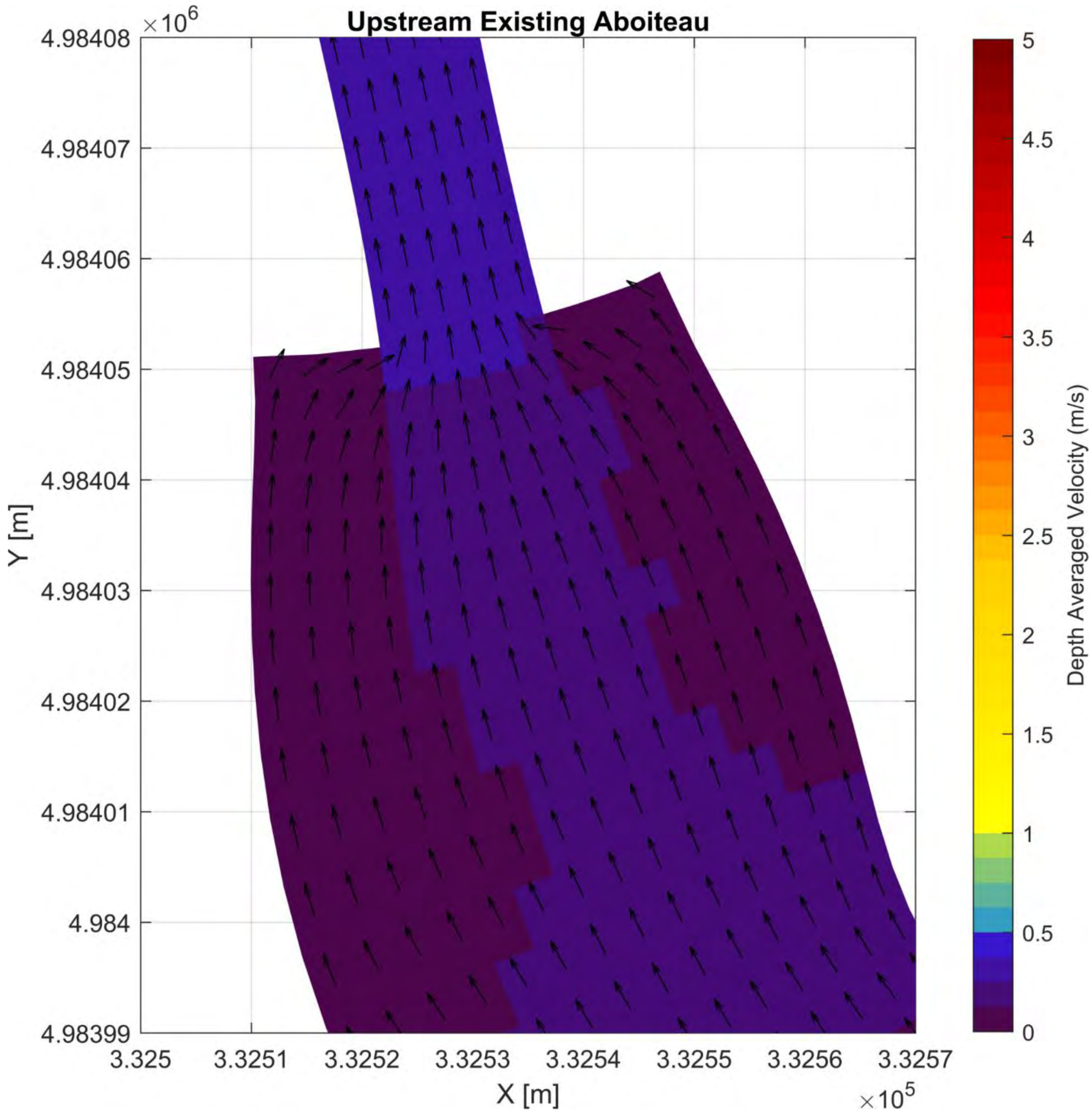


Figure 7e: Map of the depth-averaged velocity when the active gates are closed and the tide is lower than the lake level for the Brackish Scenario (wet season) – Upstream Existing Aboiteau.

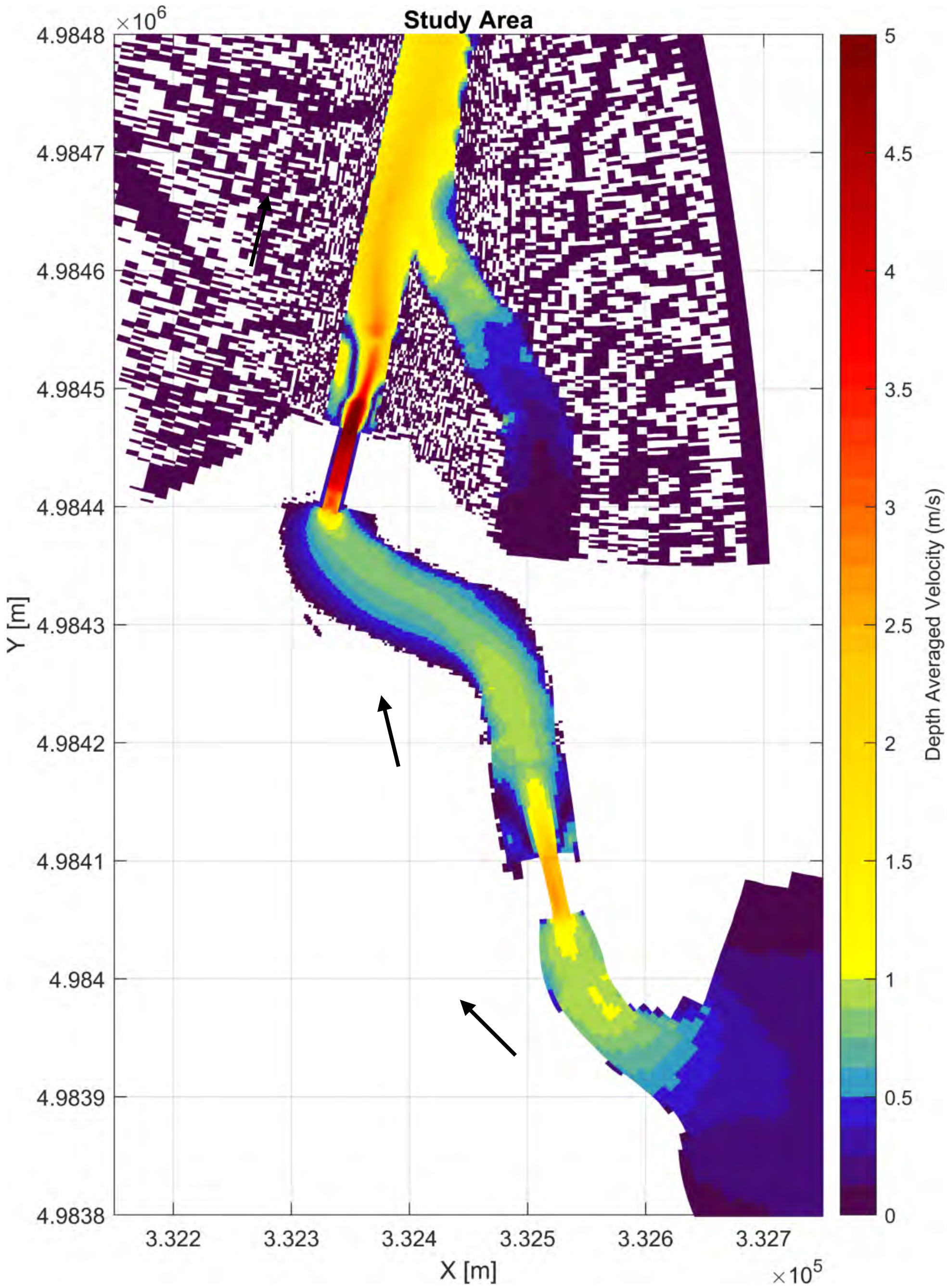


Figure 8: Map of the depth-averaged velocity when the active gates are open for the Brackish Scenario (dry season).

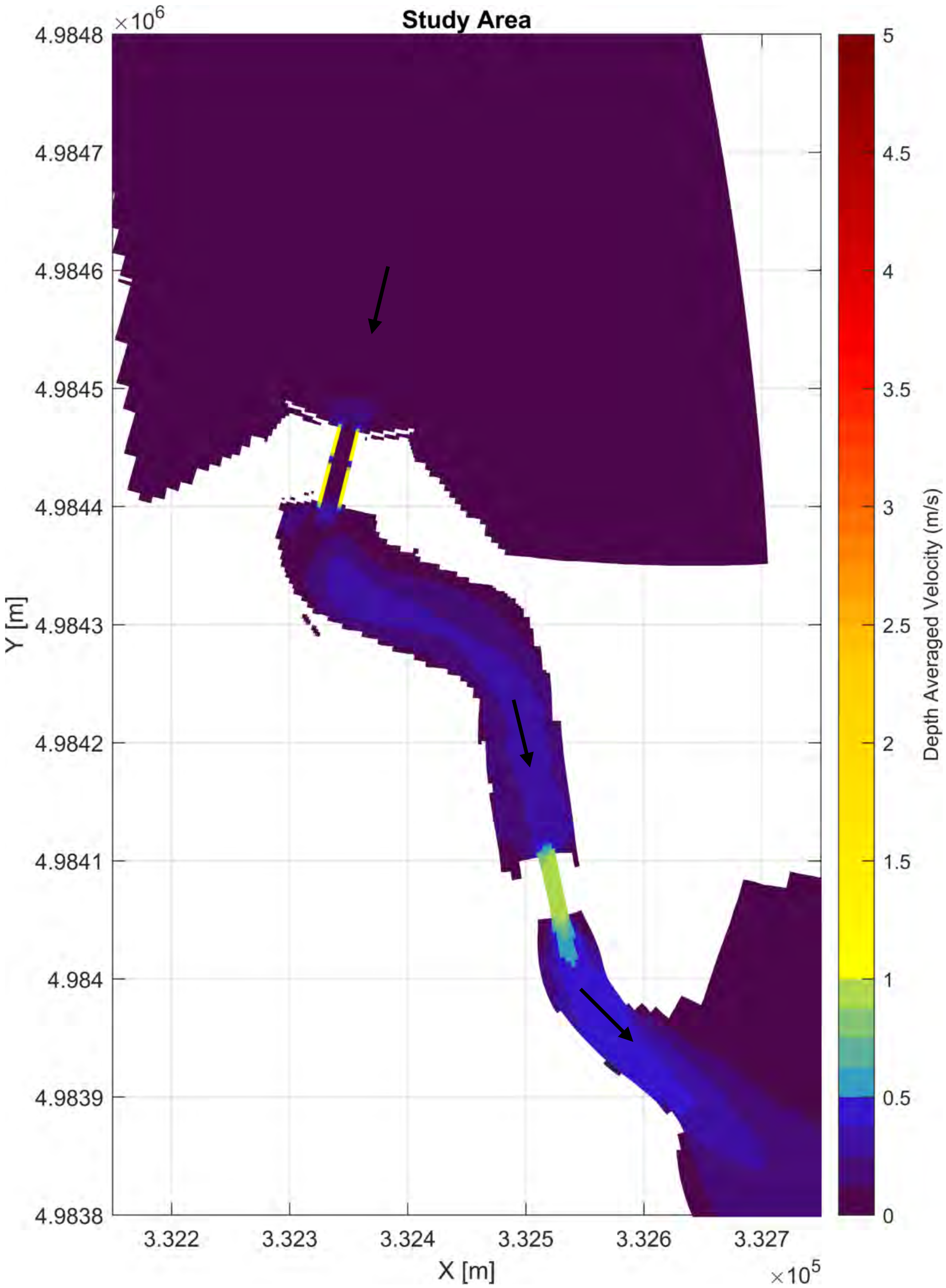


Figure 9: Map of the depth-averaged velocity when the active gates are closed and the tide is greater than the lake level for the Brackish Scenario (dry season).

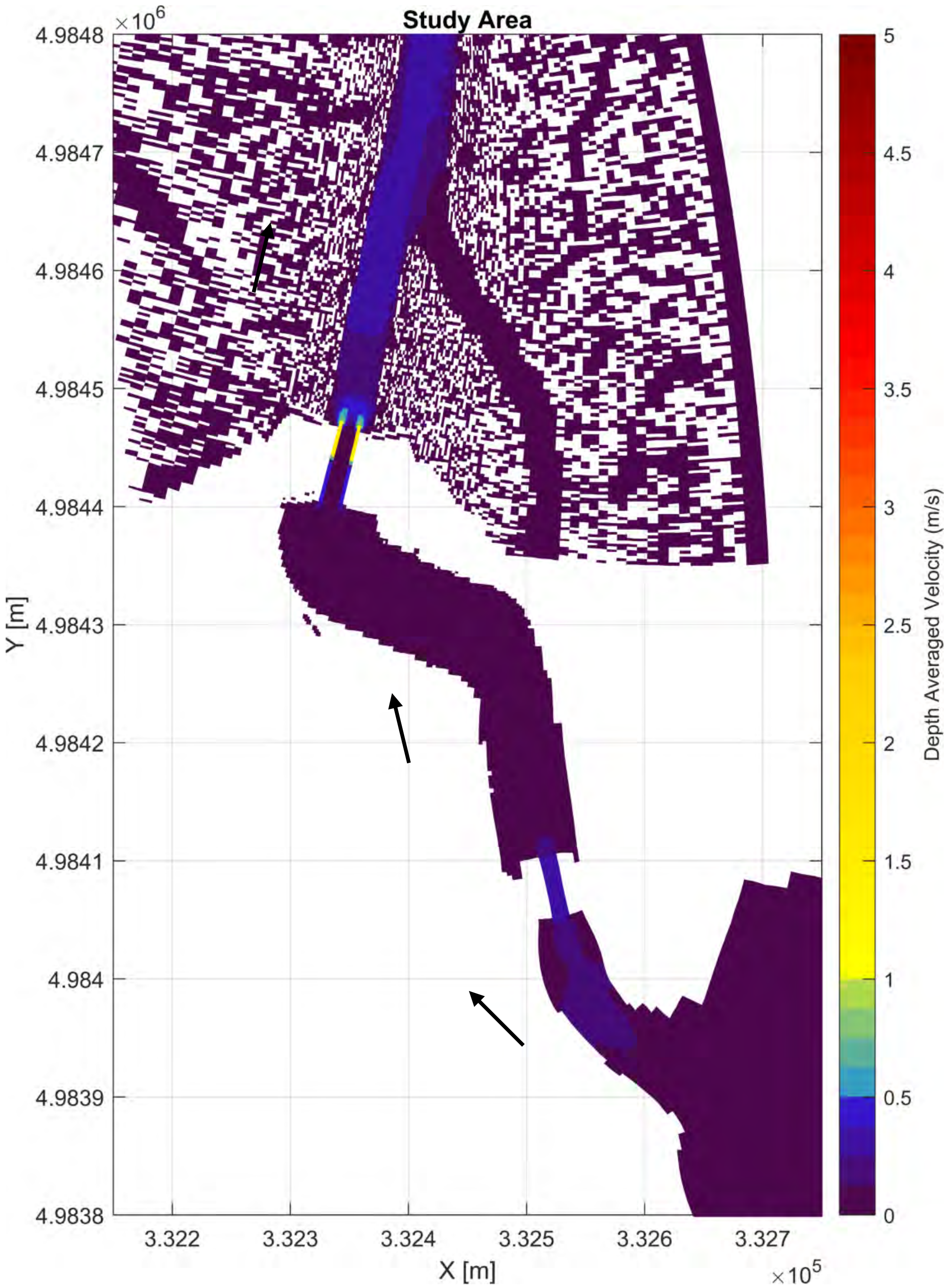


Figure 10: Map of the depth-averaged velocity when the active gates are closed and the tide is lower than the lake level for the Brackish Scenario (dry season).

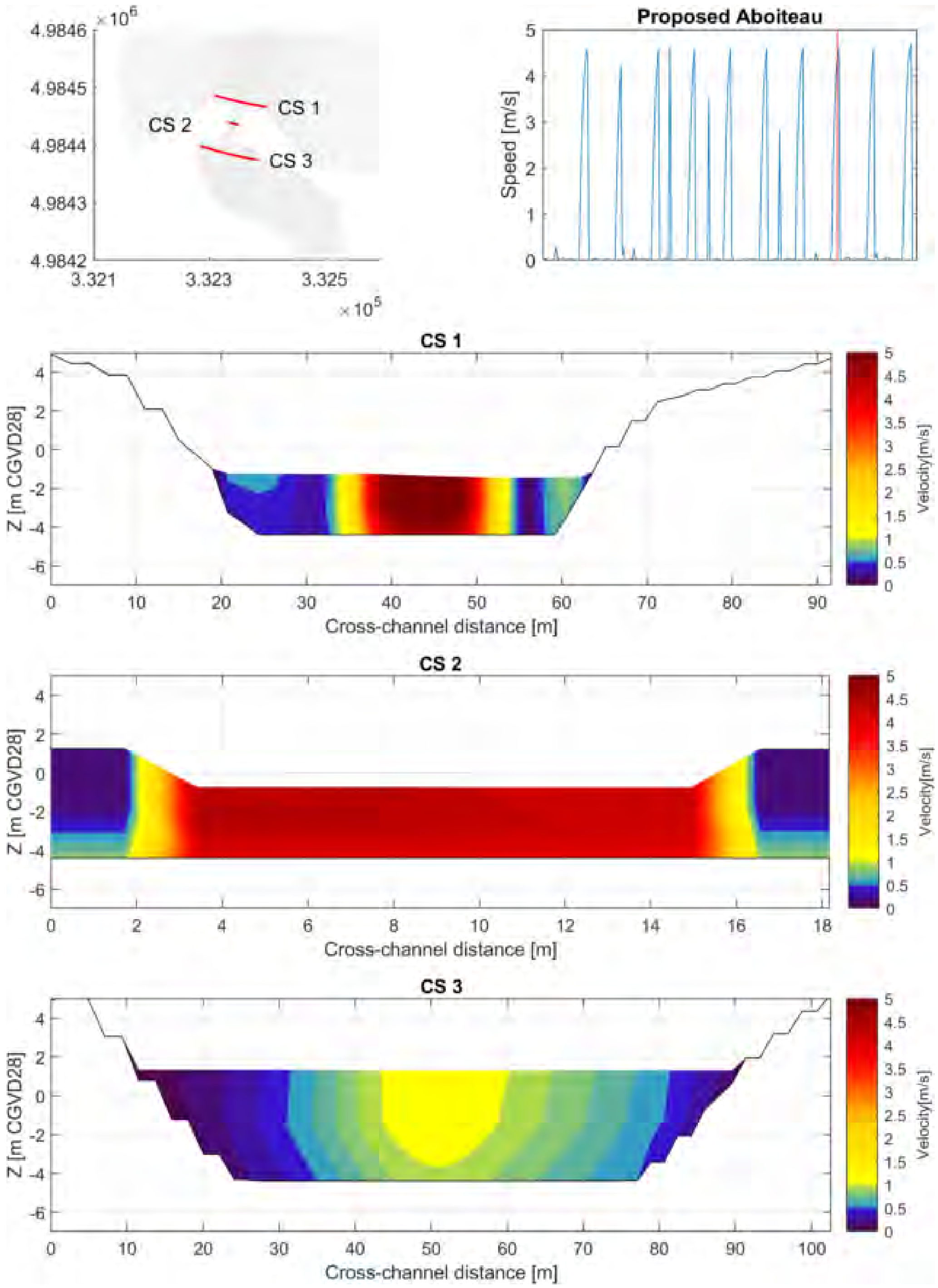


Figure 11: Cross-sections of velocities at proposed aboiteau for the Brackish Scenario (peak flow velocities, downstream flow direction).

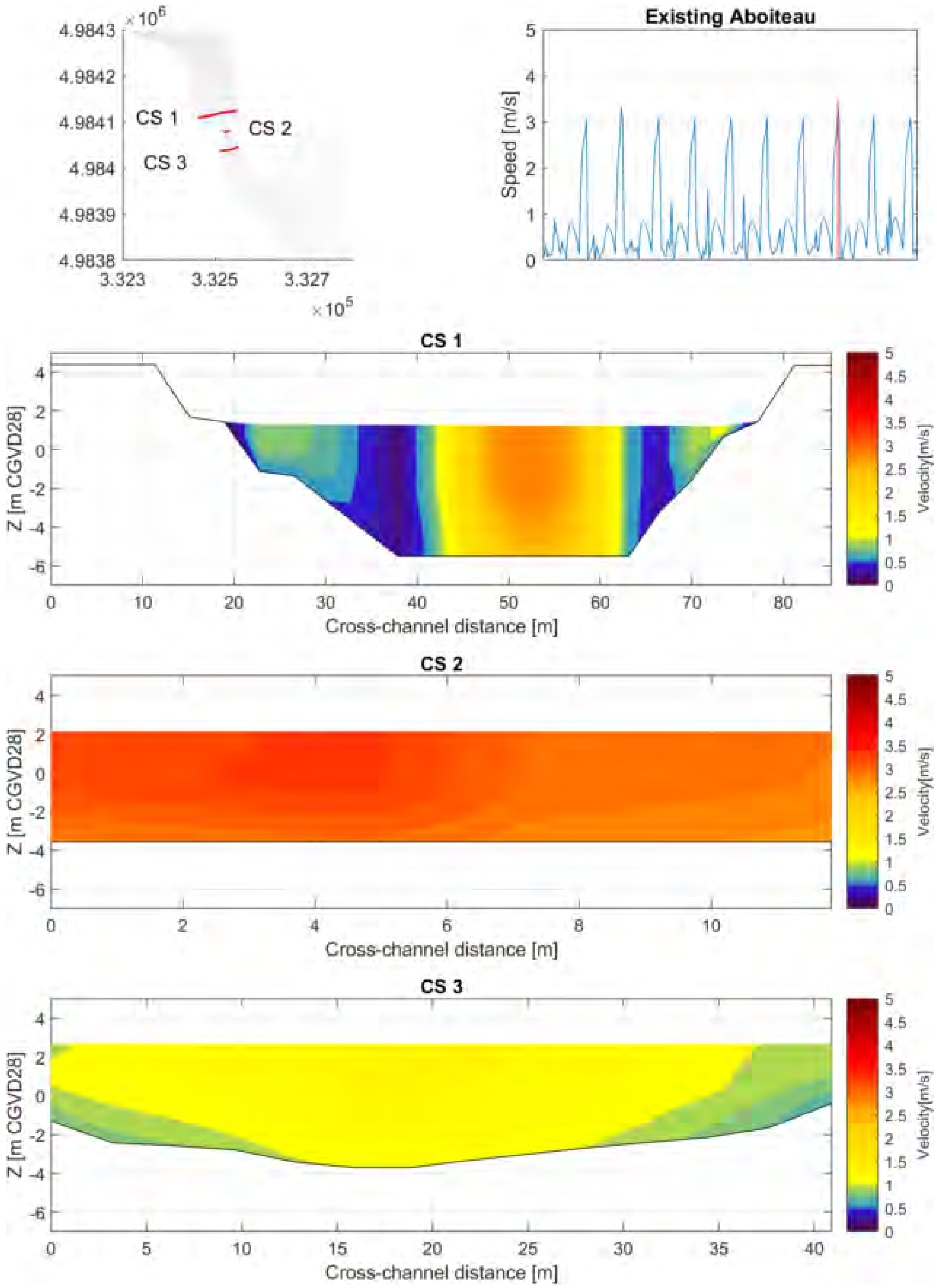


Figure 12: Cross-sections of velocities at existing aboiteau for the Brackish Scenario (peak flow velocities, downstream flow direction).

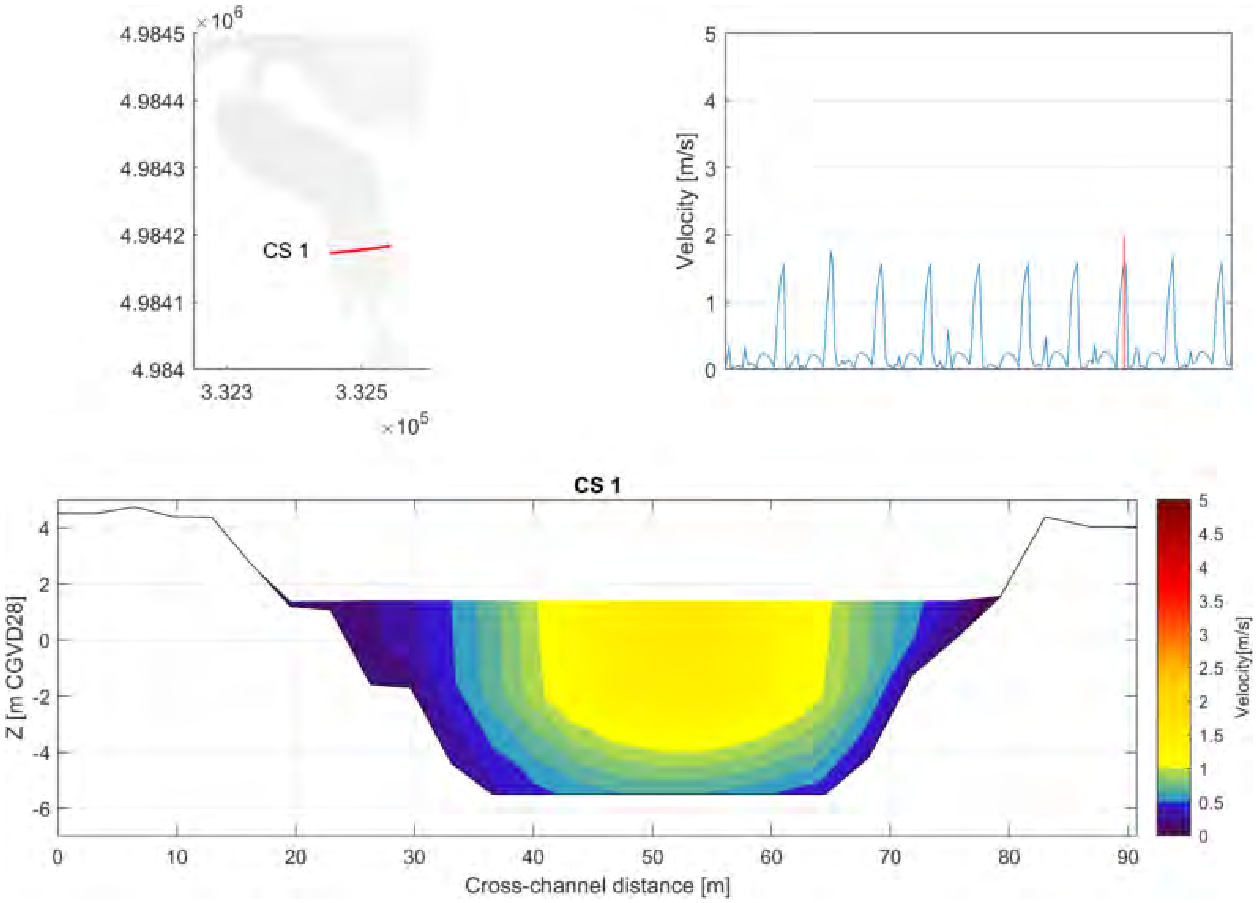


Figure 13: Cross-section of velocities in-between structures for the Brackish Scenario (peak flow velocities, downstream flow direction).

4.1.2 Dampened Tidal Scenario

The velocities in each layer at the proposed aboiteau, existing aboiteau, and the centre of the channel in-between the structures are illustrated in Figure 14 for spring tide, and in Figure 15 for neap tide (a map of the point locations are shown in Figure 2). These figures demonstrate that when flow is exiting the lake, high velocities are maintained until the lake level is similar to the tidal level. Similarly, increased velocities upstream occur when the lake level is less than the tidal level due to large volumes of water entering the lake through the proposed aboiteau. In particular, high velocities occur towards the bed at the proposed aboiteau due to flow entering below the gate. Flows in the upstream direction occur for approximately 5.5 to 6 hours and in the downstream direction for 6.5 to 7 hours, depending on seasonal conditions (Table 4).

The depth-averaged velocity of the Dampened Tidal Scenario was plotted in planform at the locations of the existing and proposed aboiteaux. Two time periods were plotted:

- The period when the tide is entering through the permanent opening in the main gates, which generates high velocities in the upstream flow direction (Figure 16).
- The period when the tide is lower than the lake level, and the passive gates of the proposed aboiteau allow the lake to flow out, which generates peak velocities in the downstream flow direction (Figure 17).

Several different areas were plotted to demonstrate the magnitude of velocities and flow patterns at key locations including:

- The overall study area.
- Downstream of the proposed aboiteau.
- Upstream of the proposed aboiteau.
- Downstream of the existing aboiteau.
- Upstream of the existing aboiteau.

The analysis of these maps indicates that when the tide is greater than the lake level, velocities through the proposed and existing structures are increased compared to the Slightly Brackish Scenario (Figure 16). This is due to the large volume of water entering the lake through the opening in the main gates, and constrictions of the structures. When the flow is downstream, large volumes of water exit the lake during this period, resulting in peak velocities through the structures and channel (Figure 17). Similar to the Slightly Brackish Scenario, circular flow patterns (eddies) form downstream of the existing and proposed aboiteau, likely due to changes in channel size and potentially for the proposed aboiteau, side channels creating flow obstructions.

In addition to the maps, cross-sections of velocities were included to demonstrate the distribution of flow velocities in the water column. Nine cross-sections were included - three surrounding the proposed aboiteau, three surrounding the existing aboiteau, and one through the channel in-between the structures. The cross-sections are taken both during peak flows in the upstream flow direction (Figure 20, Figure 21, and Figure 22) and the downstream flow direction (Figure 23, Figure 24, and Figure 25).

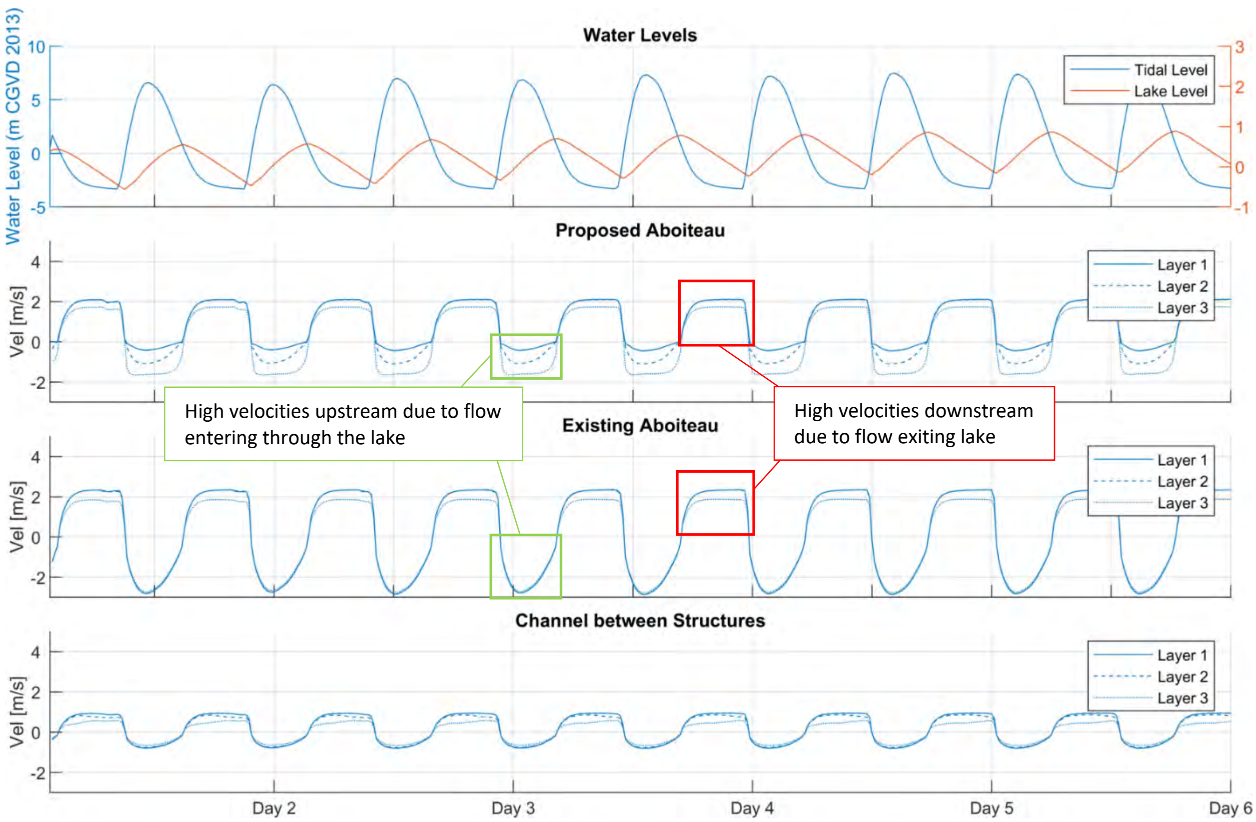


Figure 14: Time series of velocities at various locations for the Dampened Tidal Scenario (spring tide). Note: positive velocities indicate downstream flow direction and negative velocities indicate upstream flow direction.

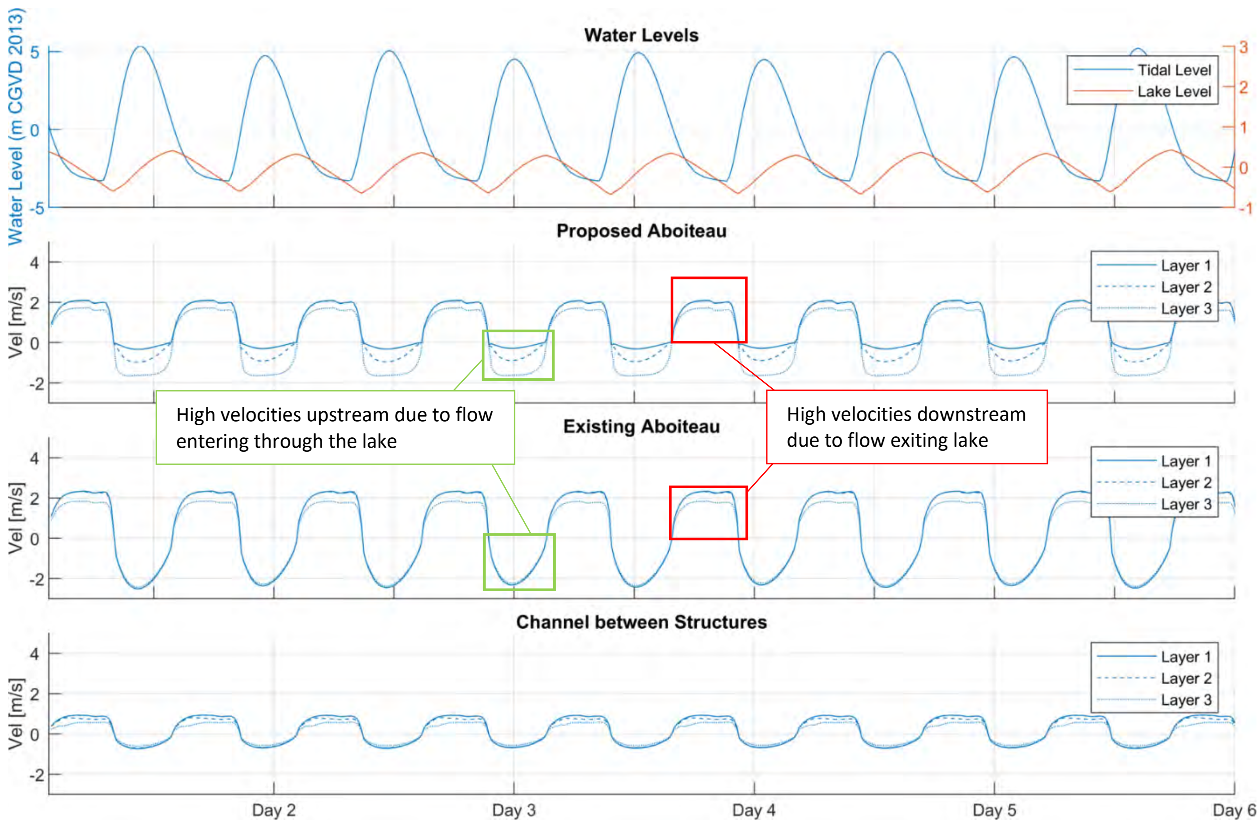


Figure 15: Time series of velocities at various locations for the Dampened Tidal Scenario (neap tide). Note: positive velocities indicate downstream flow direction and negative velocities indicate upstream flow direction.

Table 4: Length of Time that Upstream and Downstream Flow Conditions Occur for the Dampened Tidal Scenario, Depending on Seasonal Conditions and Tide Type

Dry Season		Wet Season	
Upstream Flow	**Downstream Flow**	**Upstream Flow**	**Downstream Flow**
6 hours	6.5 hours	5.5 hours	7 hours
6 hours	6.5 hours	5.5 hours	7 hours

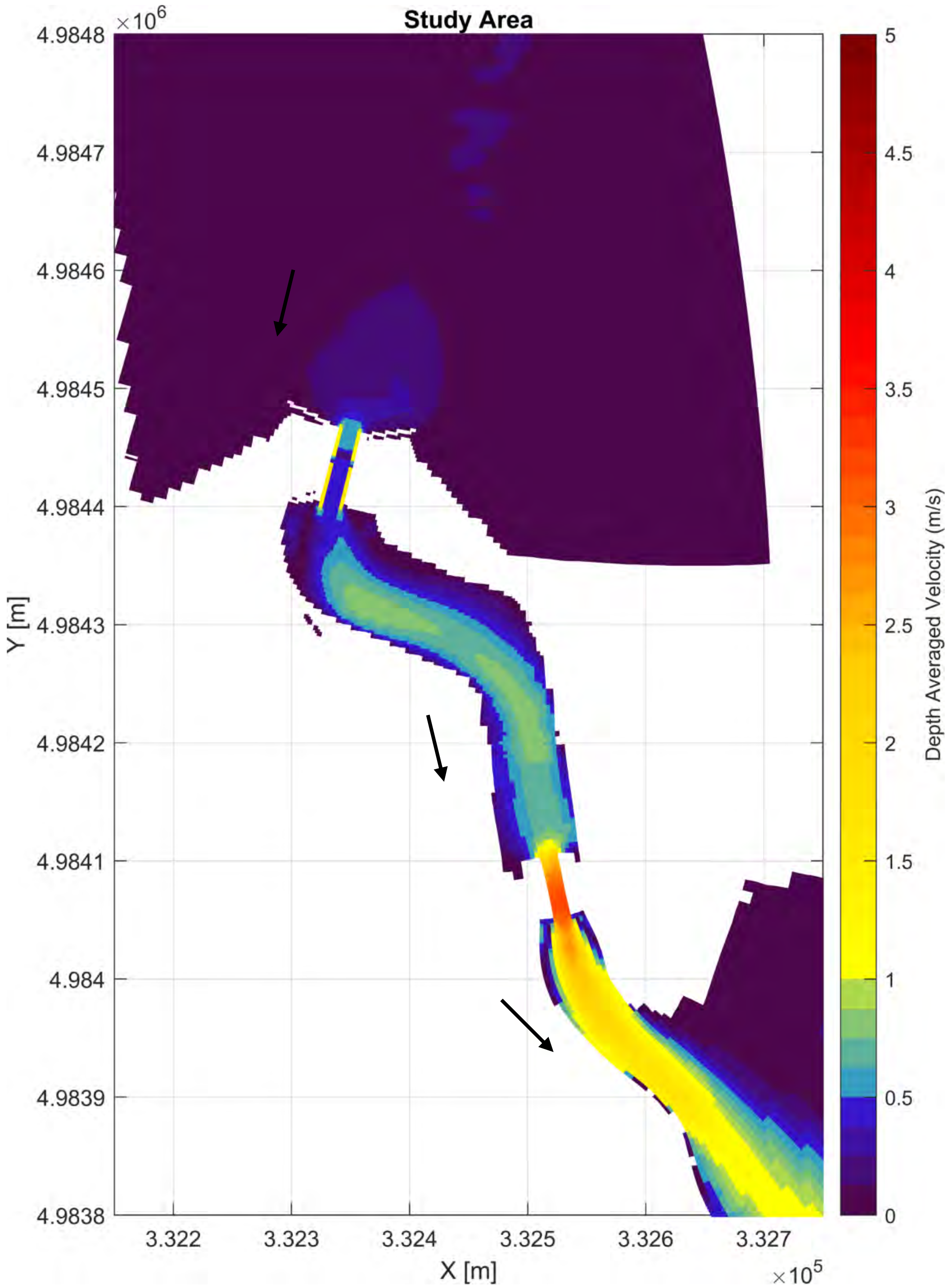


Figure 16a: Map of the depth-averaged velocity at high tide for the Dampened Tidal Scenario (spring tide) – Overall Study Area.

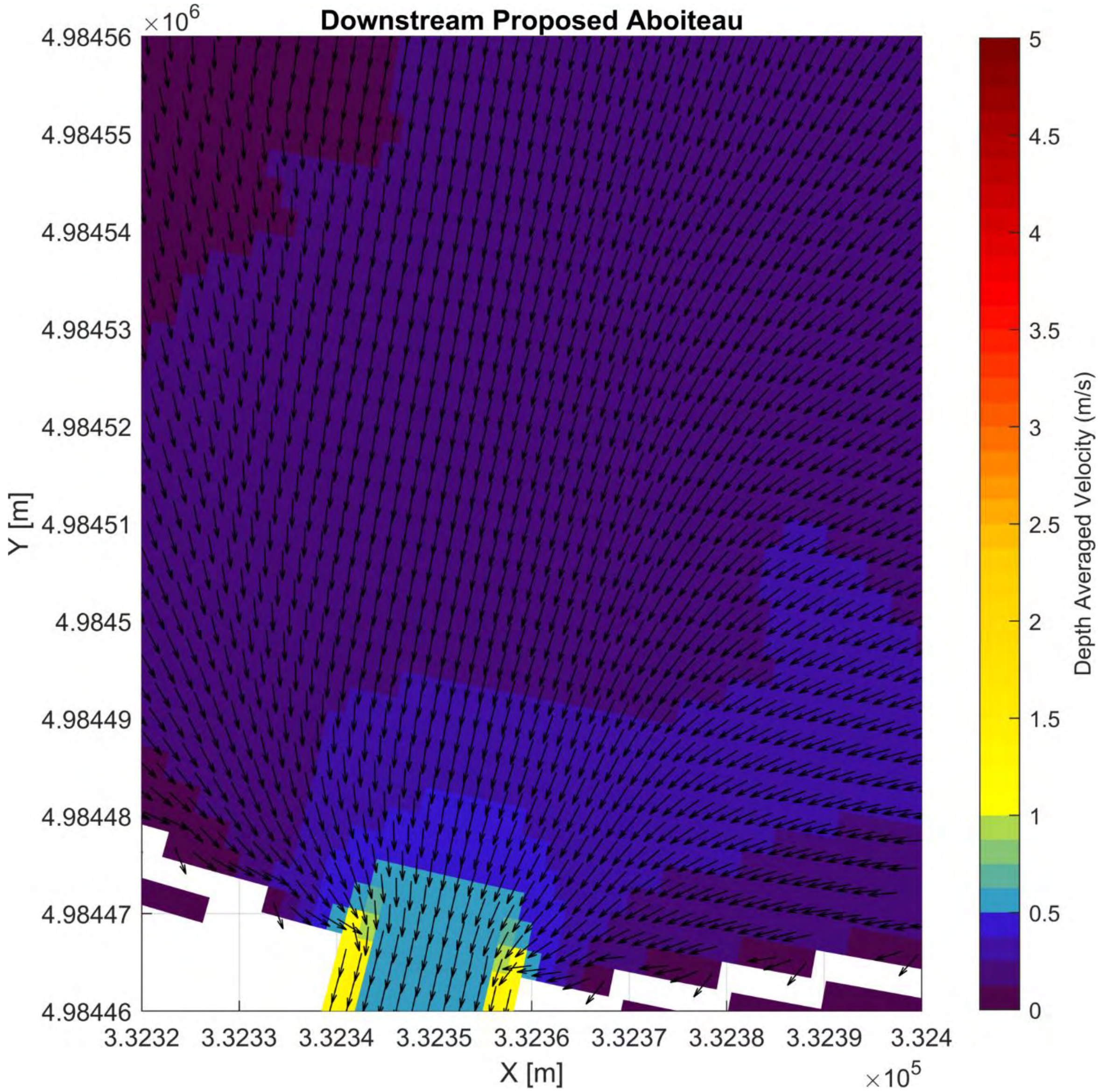


Figure 16b: Map of the depth-averaged velocity at high tide for the Dampened Tidal Scenario (spring tide) – Downstream Proposed Aboiteau.

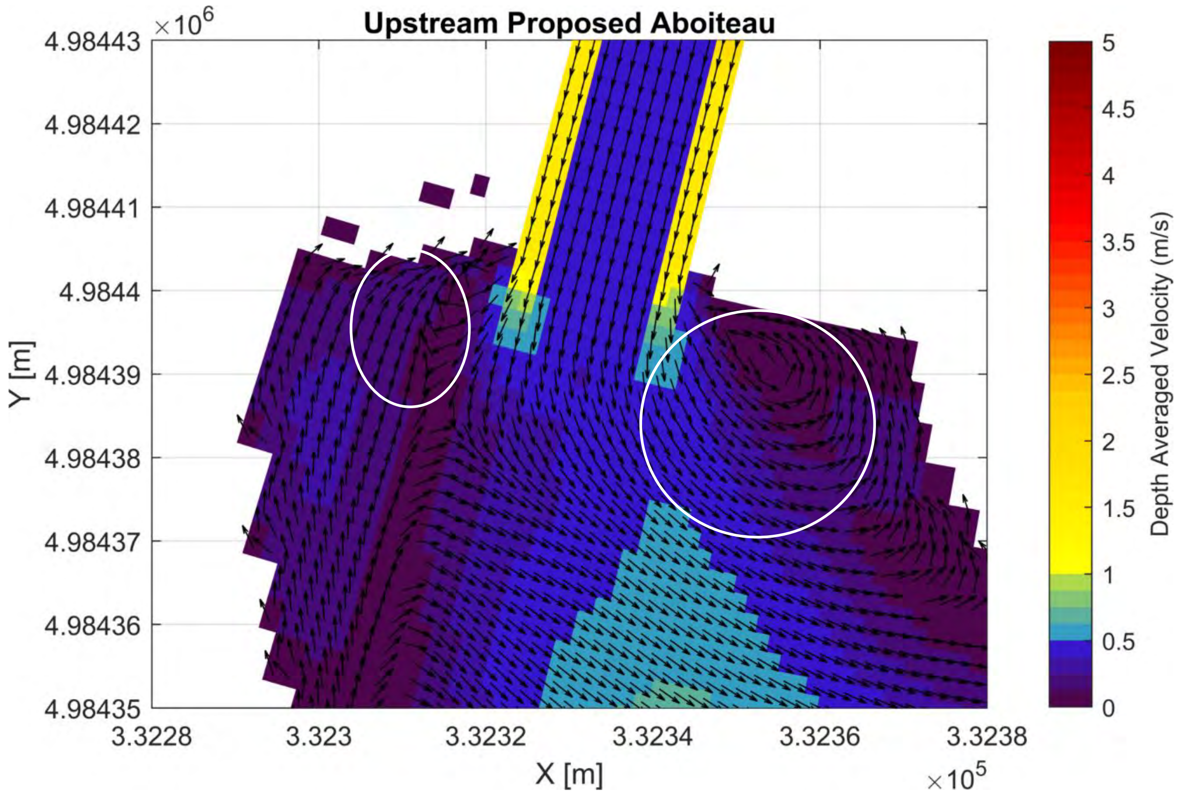


Figure 16c: Map of the depth-averaged velocity at high tide for the Dampened Tidal Scenario (spring tide) – Upstream Proposed Aboiteau. Eddies are highlighted (white circles).

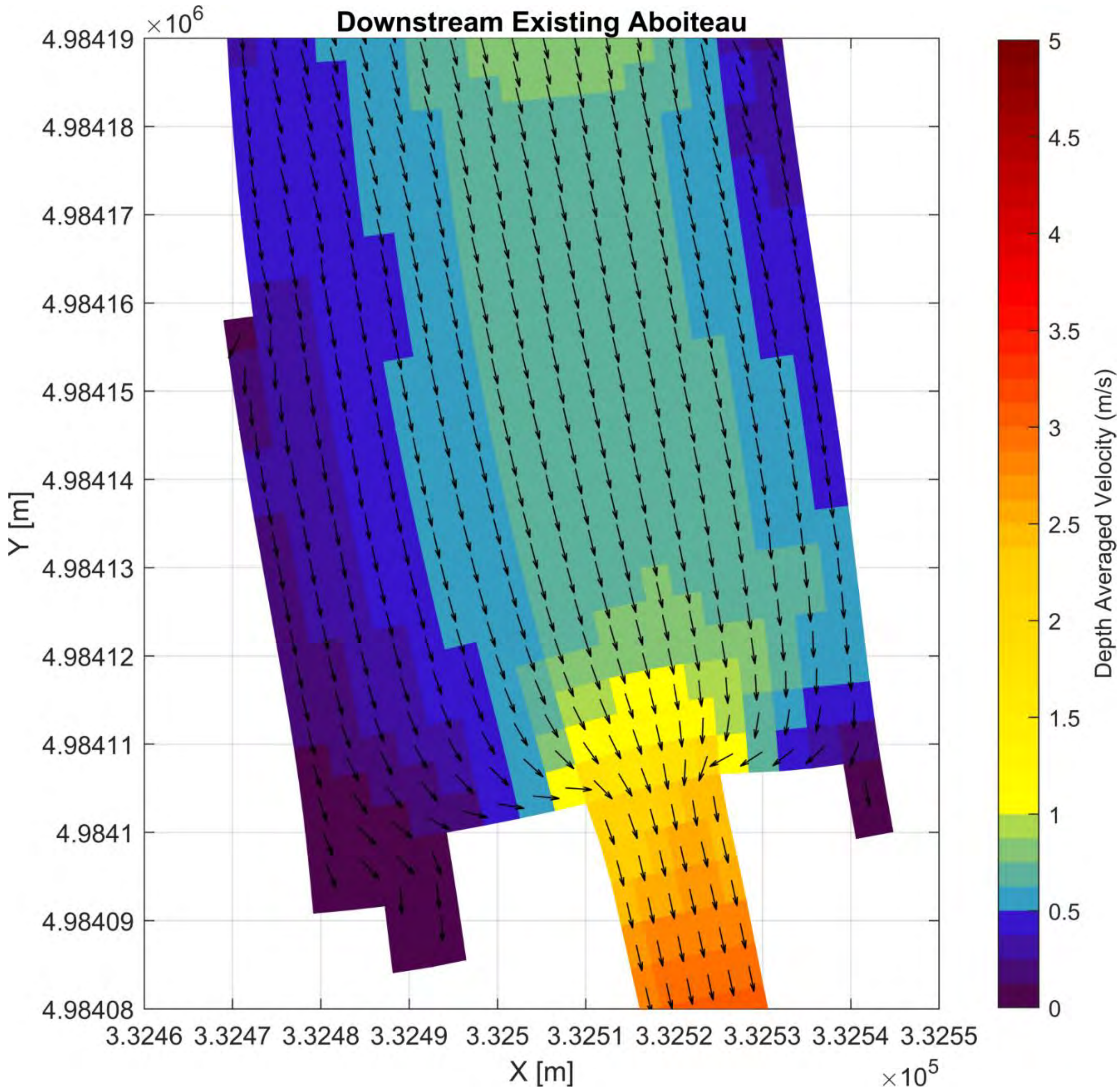


Figure 16d: Map of the depth-averaged velocity at high tide for the Dampened Tidal Scenario (spring tide) – Downstream Existing Aboiteau.

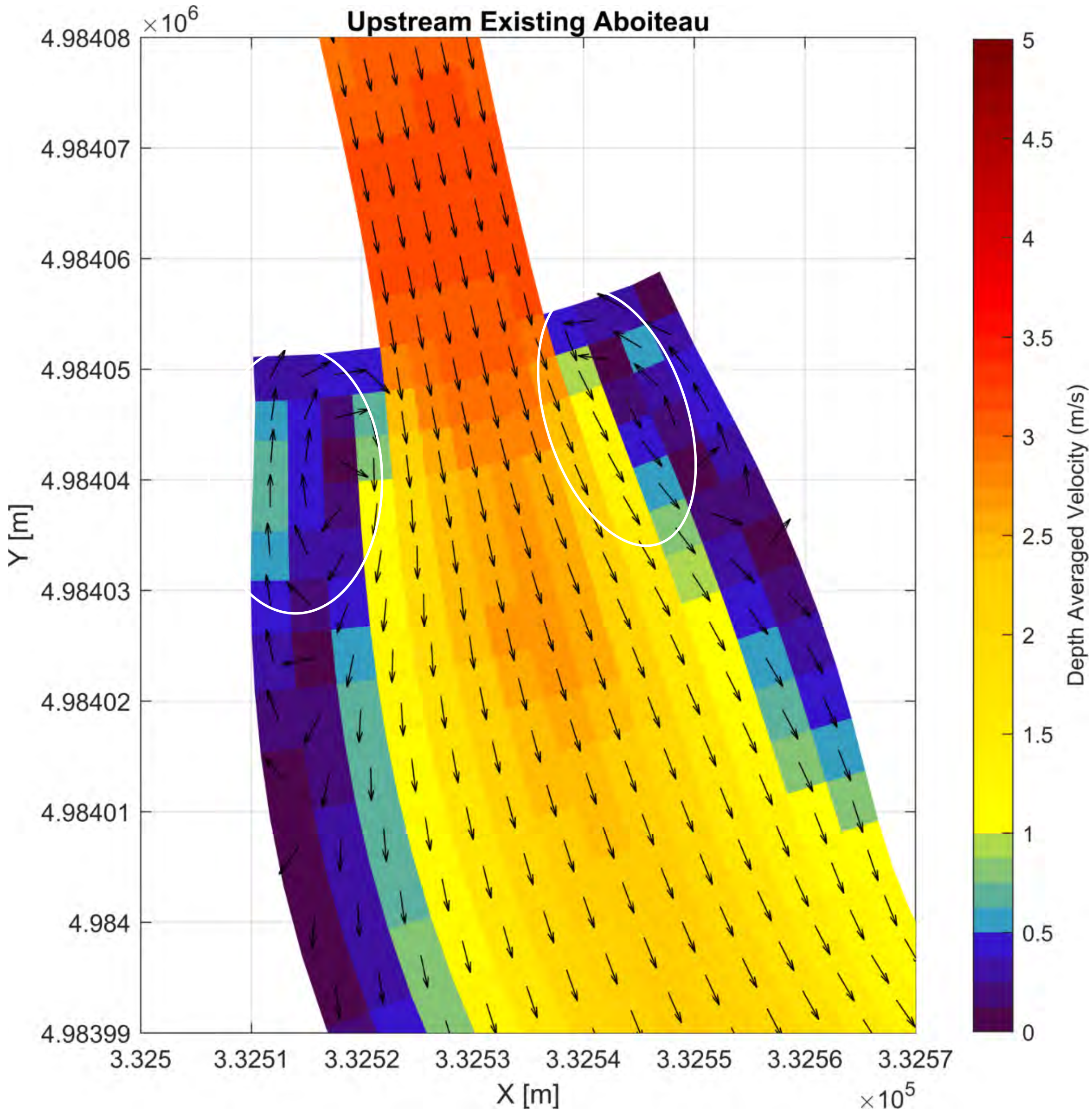


Figure 16e: Map of the depth-averaged velocity at high tide for the Dampened Tidal Scenario (spring tide) – Upstream Existing Aboiteau. Eddies are highlighted (white circles).

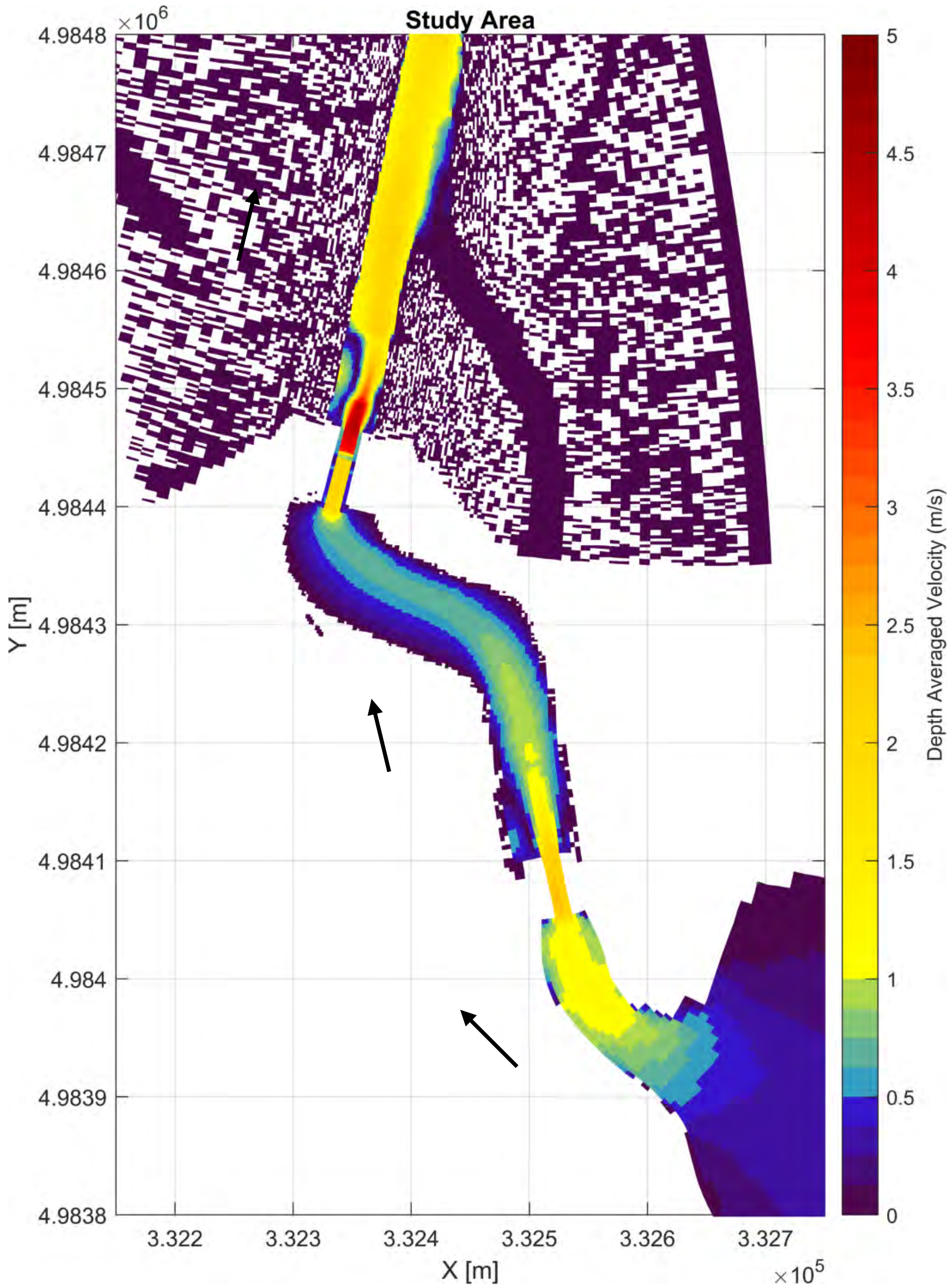


Figure 17a: Map of the depth-averaged velocity at low tide for the Dampened Tidal Scenario (spring tide) – Overall Study Area.

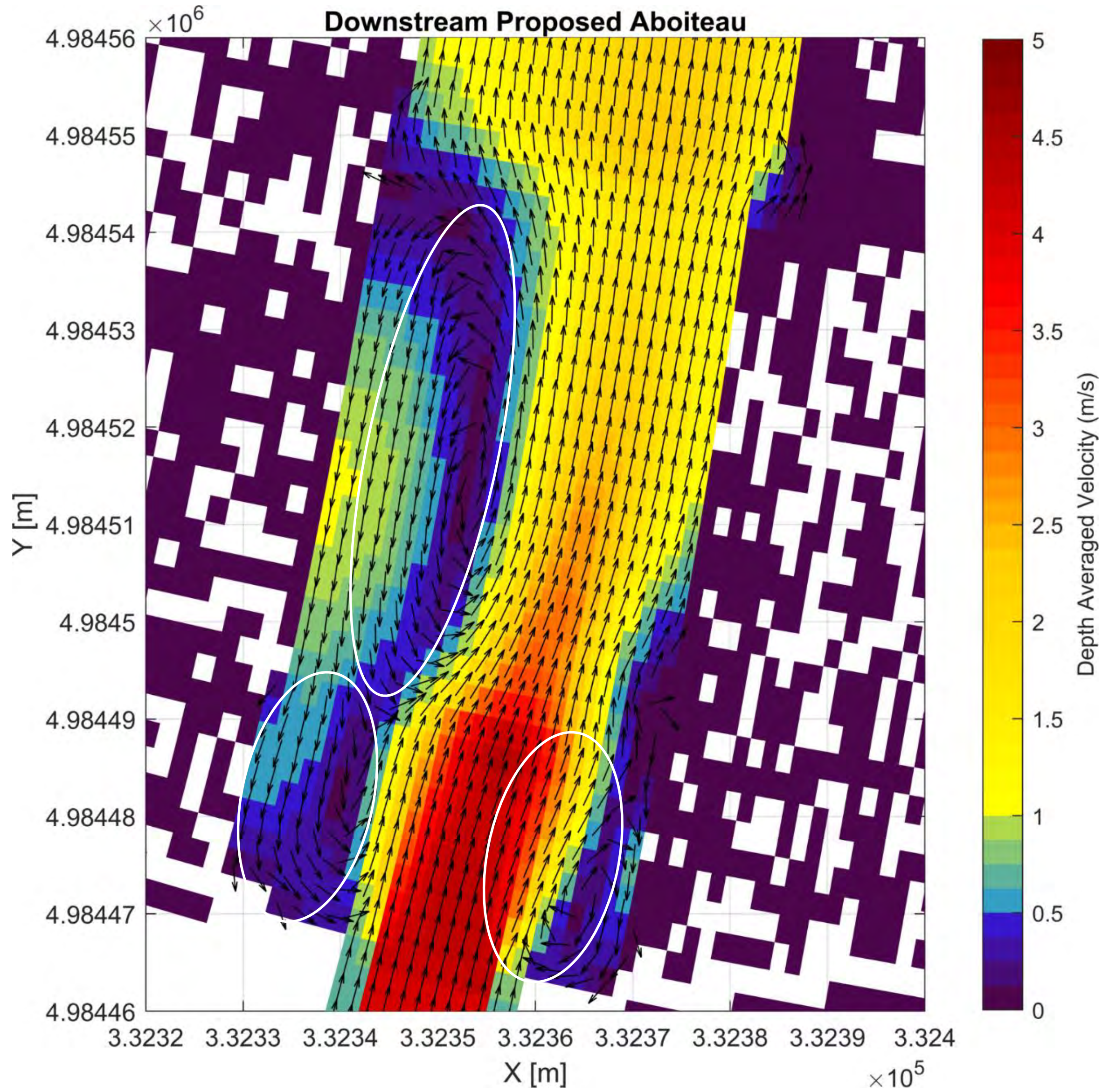


Figure 17b: Map of the depth-averaged velocity at low tide for the Dampened Tidal Scenario (spring tide) – Downstream Proposed Aboiteau. Eddies are highlighted (white circles). Velocities within the structure reach values higher than 5 m/s.

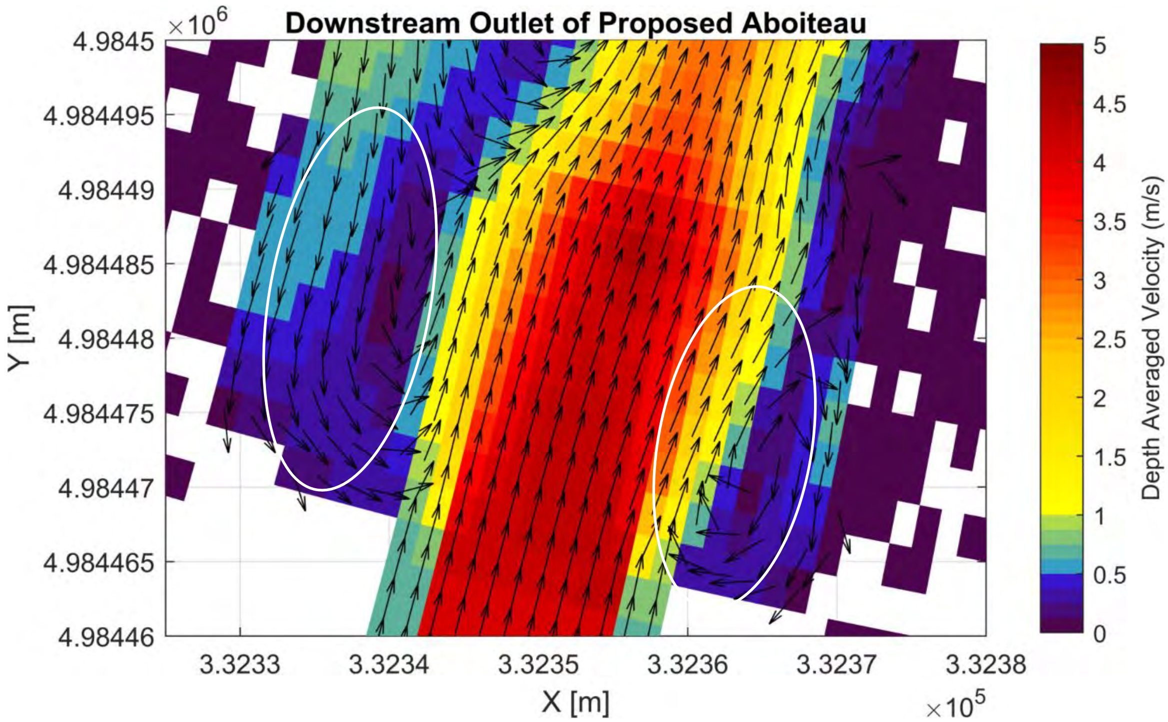


Figure 17c: Map of the depth-averaged velocity at low tide for the Dampened Tidal Scenario (spring tide) – Downstream Proposed Aboiteau (Only Outlet). Eddies are highlighted (white circles). Velocities within the structure reach values higher than 5 m/s.

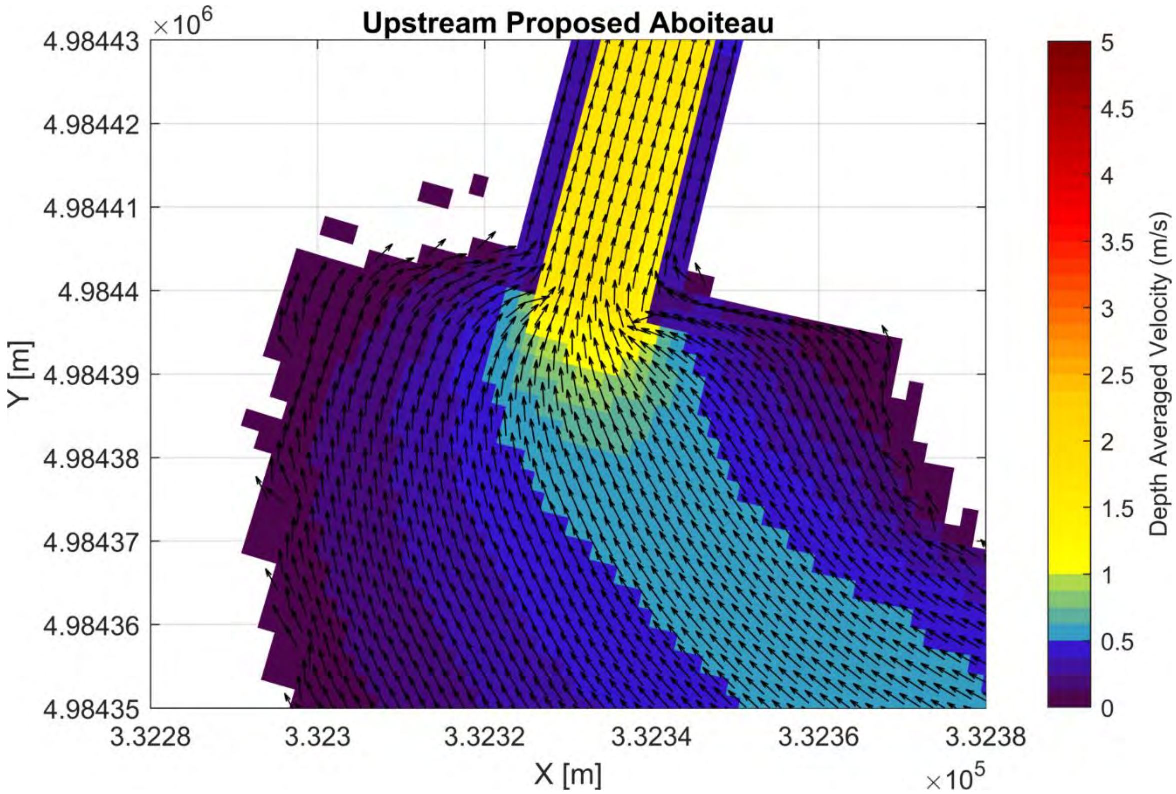


Figure 17d: Map of the depth-averaged velocity at low tide for the Dampened Tidal Scenario (spring tide) – Upstream Proposed Aboiteau.

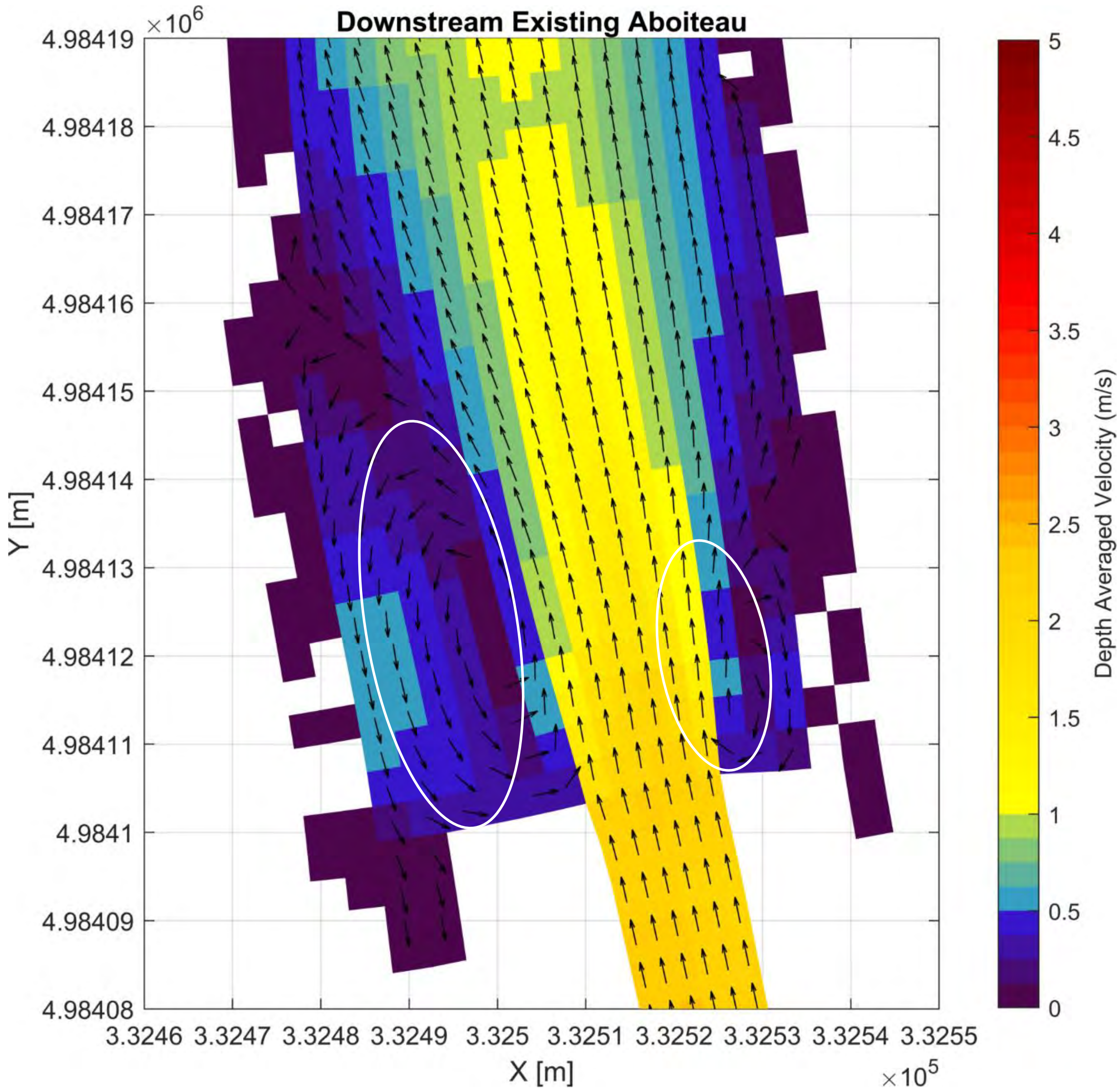


Figure 17e: Map of the depth-averaged velocity at low tide for the Dampened Tidal Scenario (spring tide) – Downstream Existing Aboiteau. Eddies are highlighted (white circles).

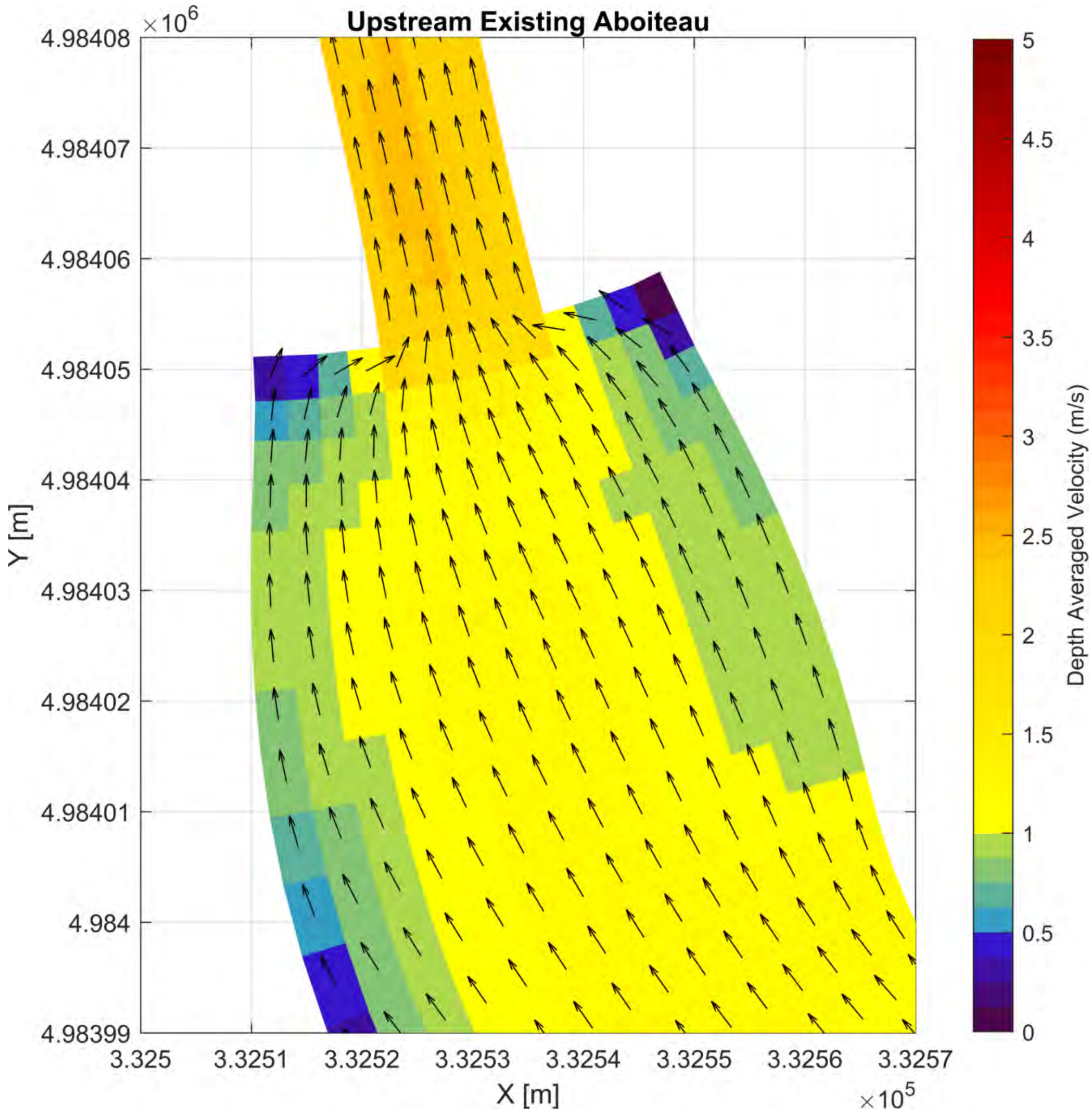


Figure 17f: Map of the depth-averaged velocity at low tide for the Dampened Tidal Scenario (spring tide) – Upstream Existing Aboiteau.

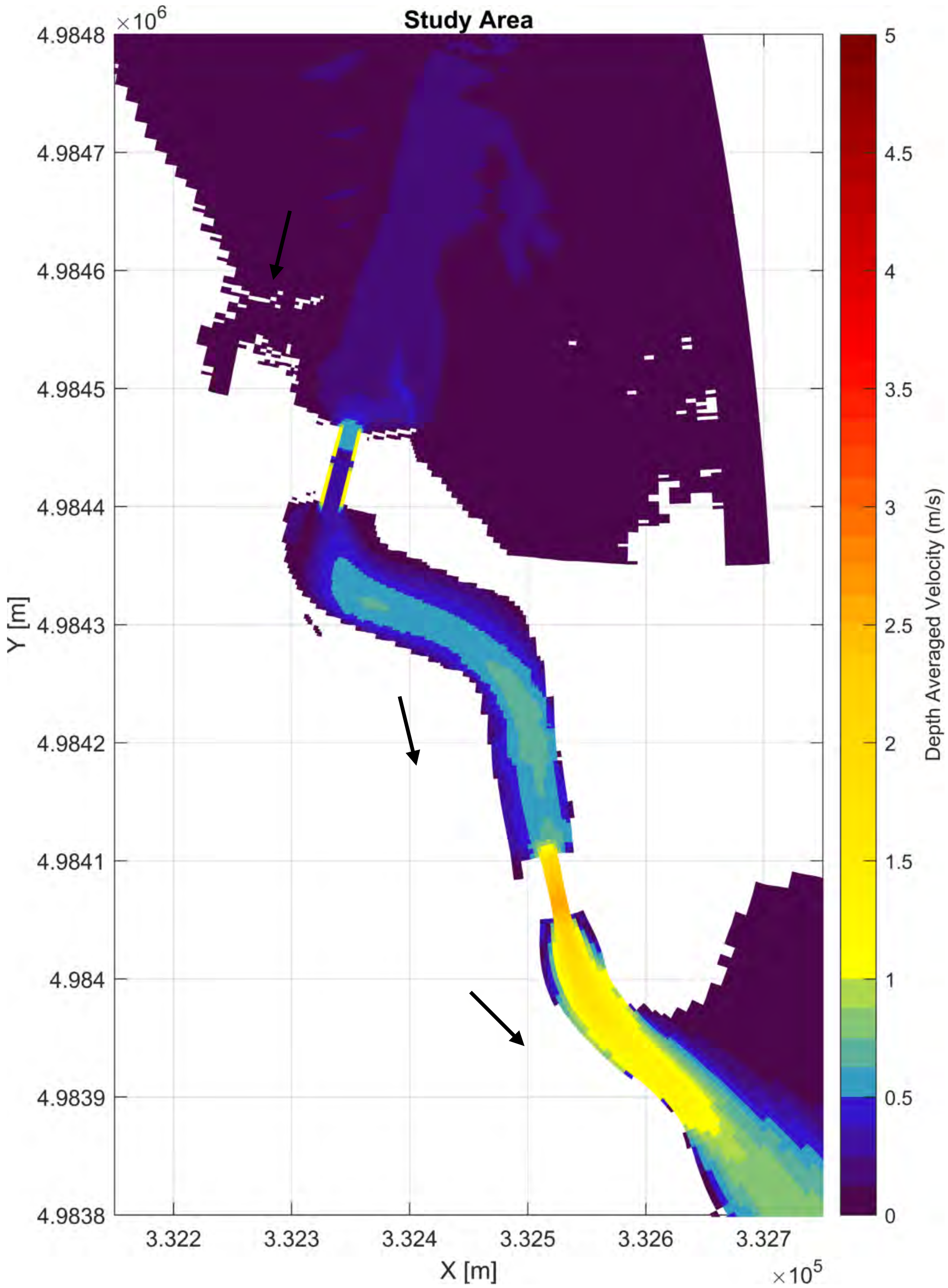


Figure 18: Map of the depth-averaged velocity at high tide for the Dampened Tidal Scenario (neap tide).

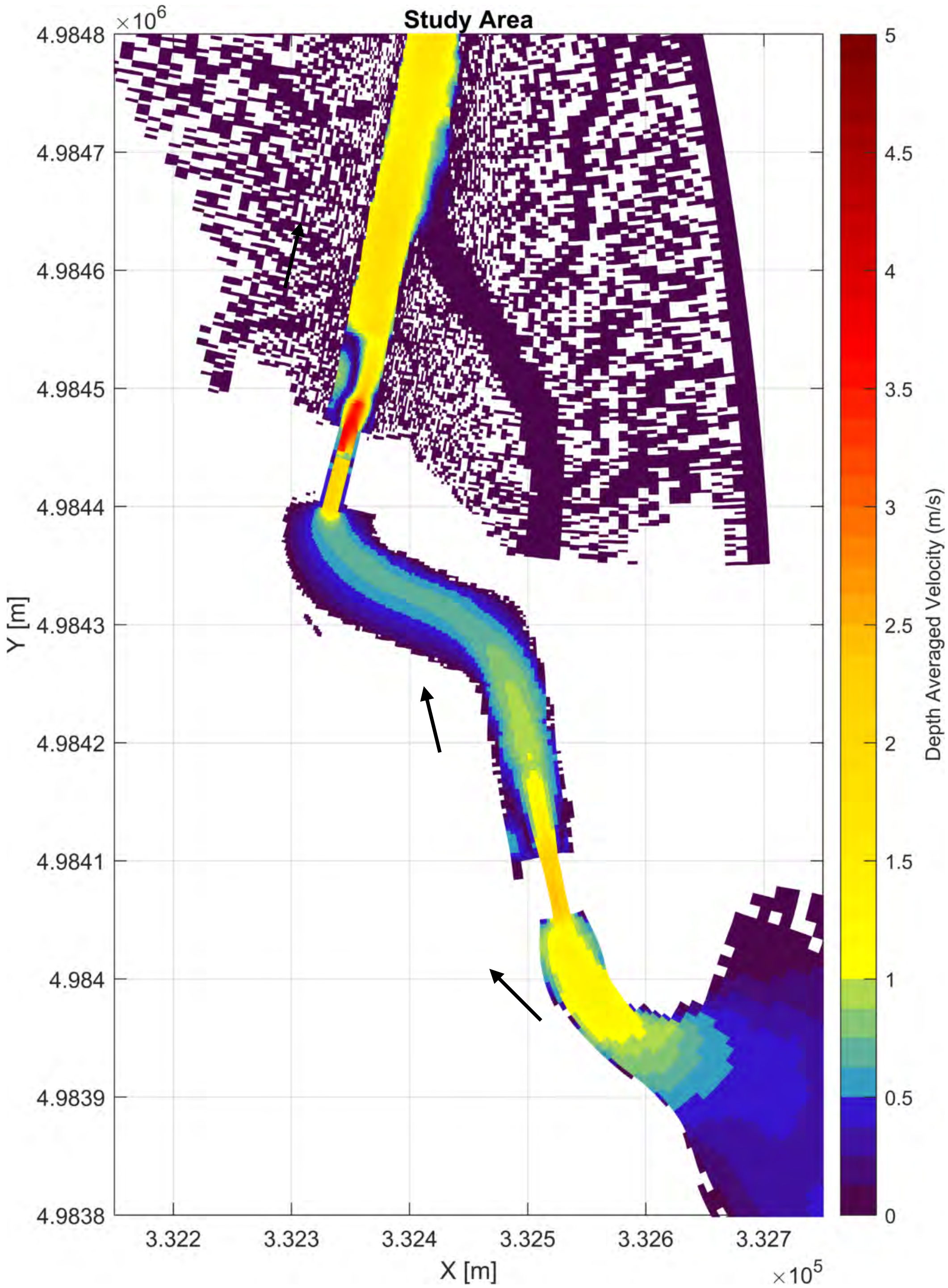


Figure 19: Map of the depth-averaged velocity at low tide for the Dampened Tidal Scenario (neap tide).

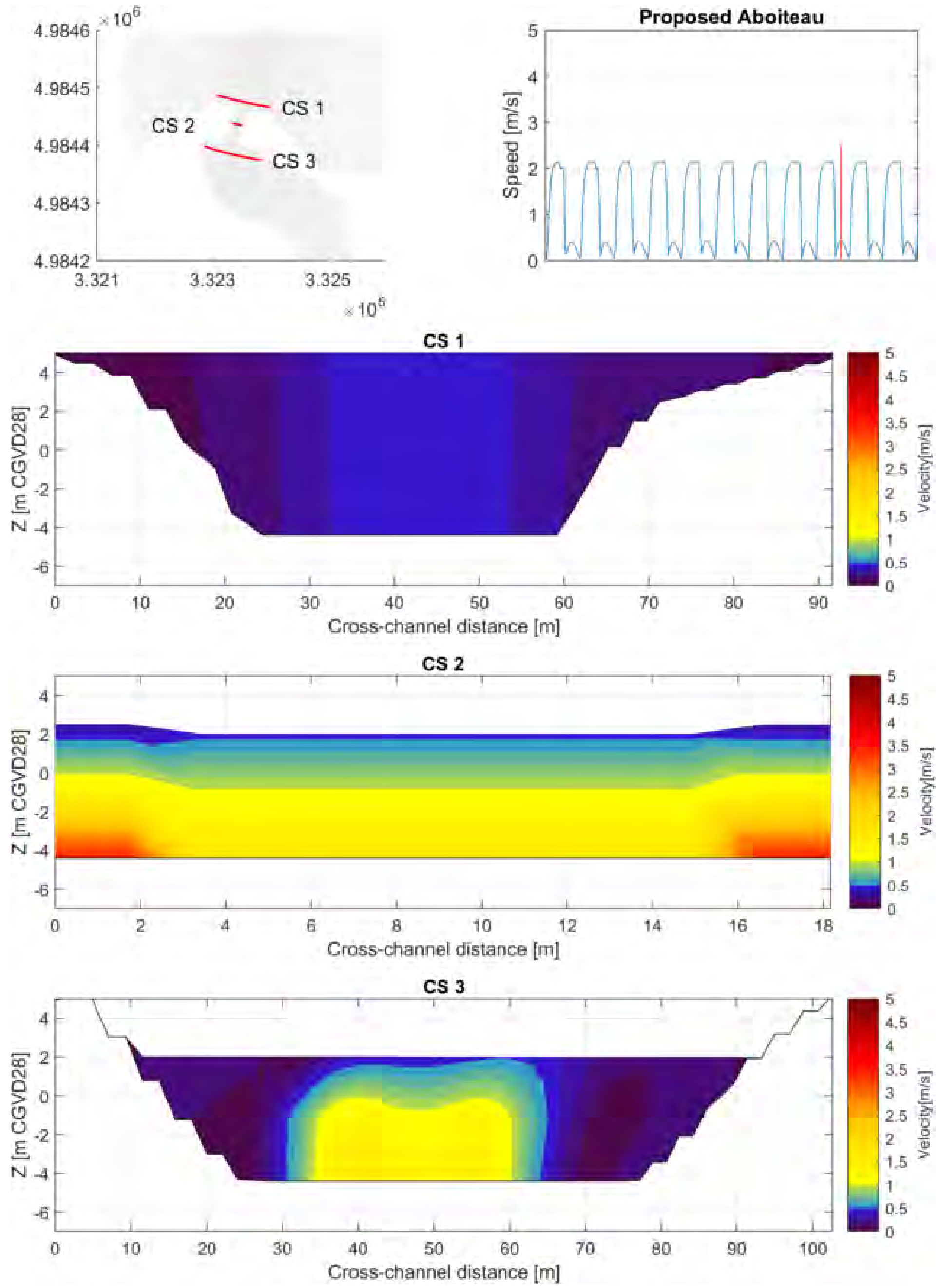


Figure 20: Cross-sections of velocities at the proposed aboiteau for the Dampened Tidal Scenario during spring tide (upstream flow direction).

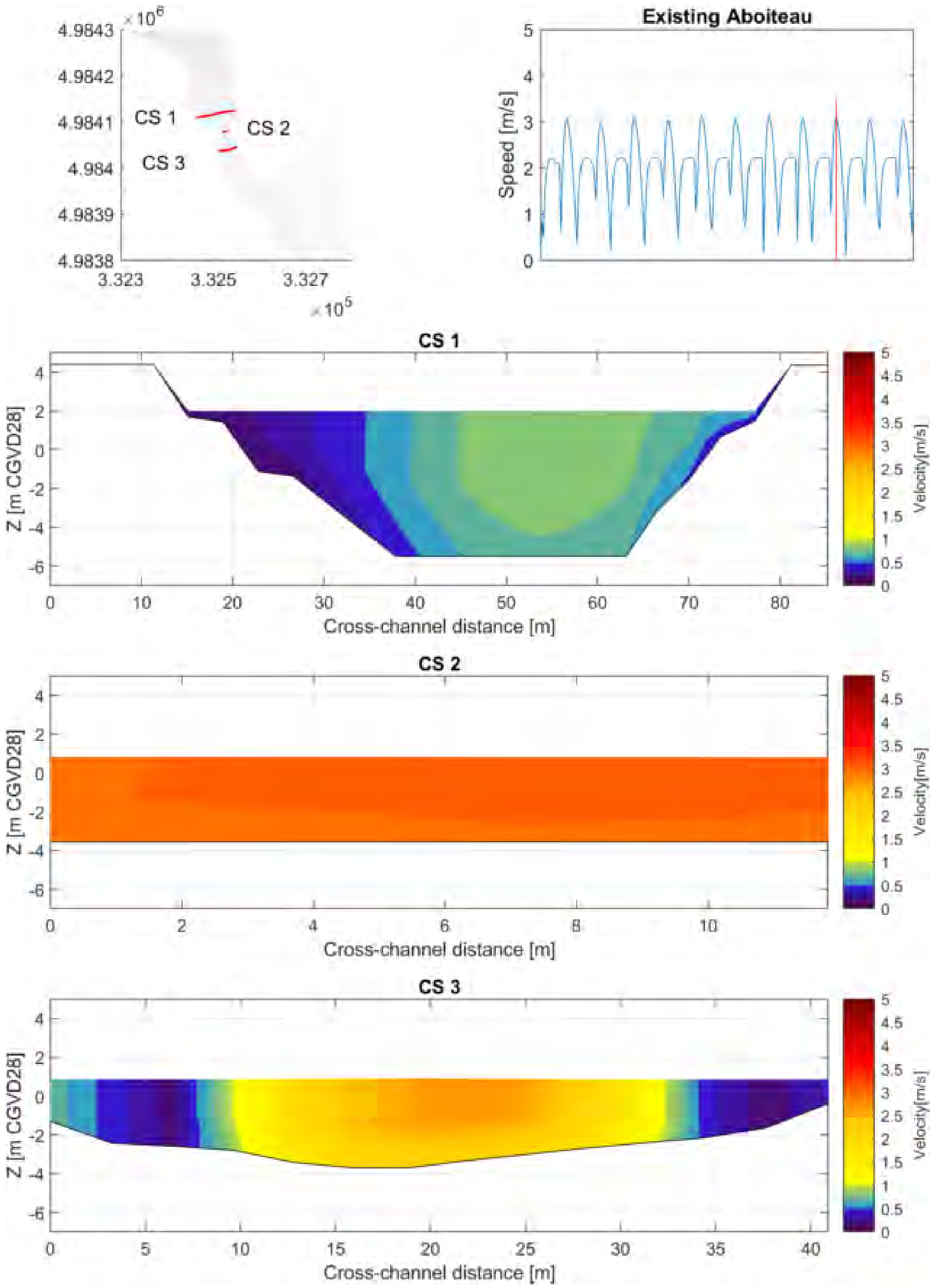


Figure 21: Cross-sections of velocities at the existing aboiteau for the Dampened Tidal Scenario (upstream flow direction).

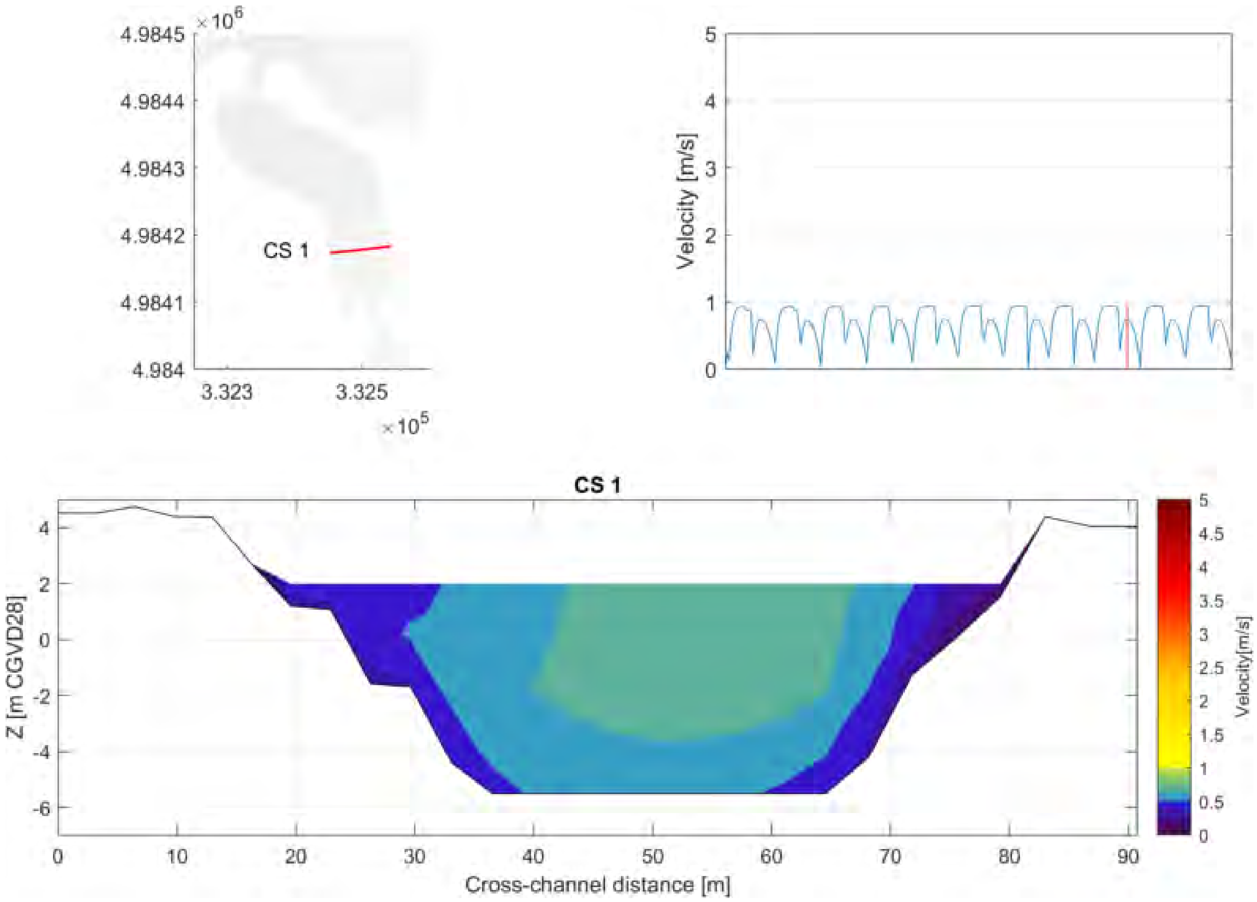


Figure 22: Cross-sections of velocities in-between structures for the Dampened Tidal Scenario (upstream flow direction).

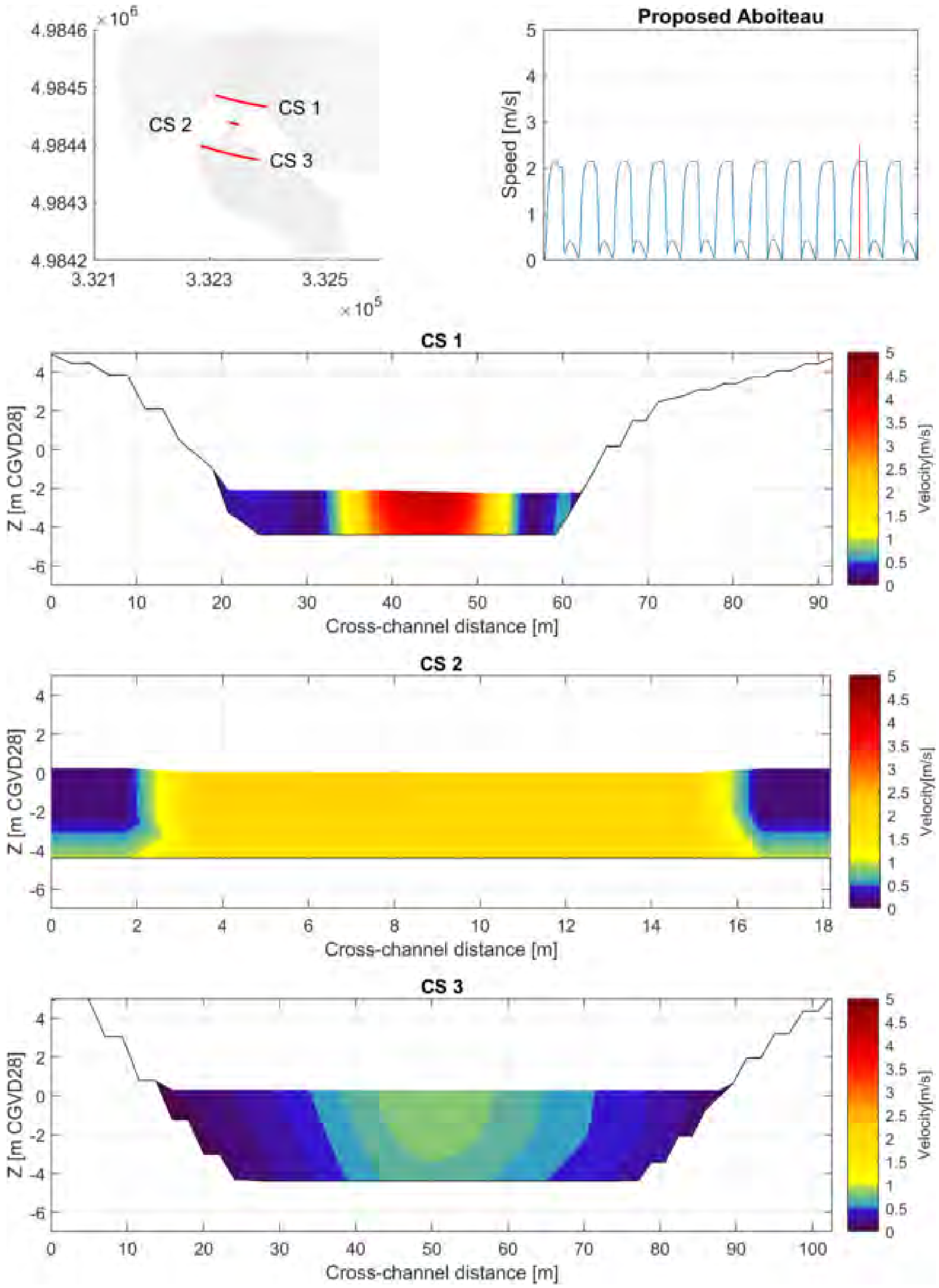


Figure 23: Cross Sections of velocities at proposed aboiteau for the Dampened Tidal Scenario (downstream flow direction).

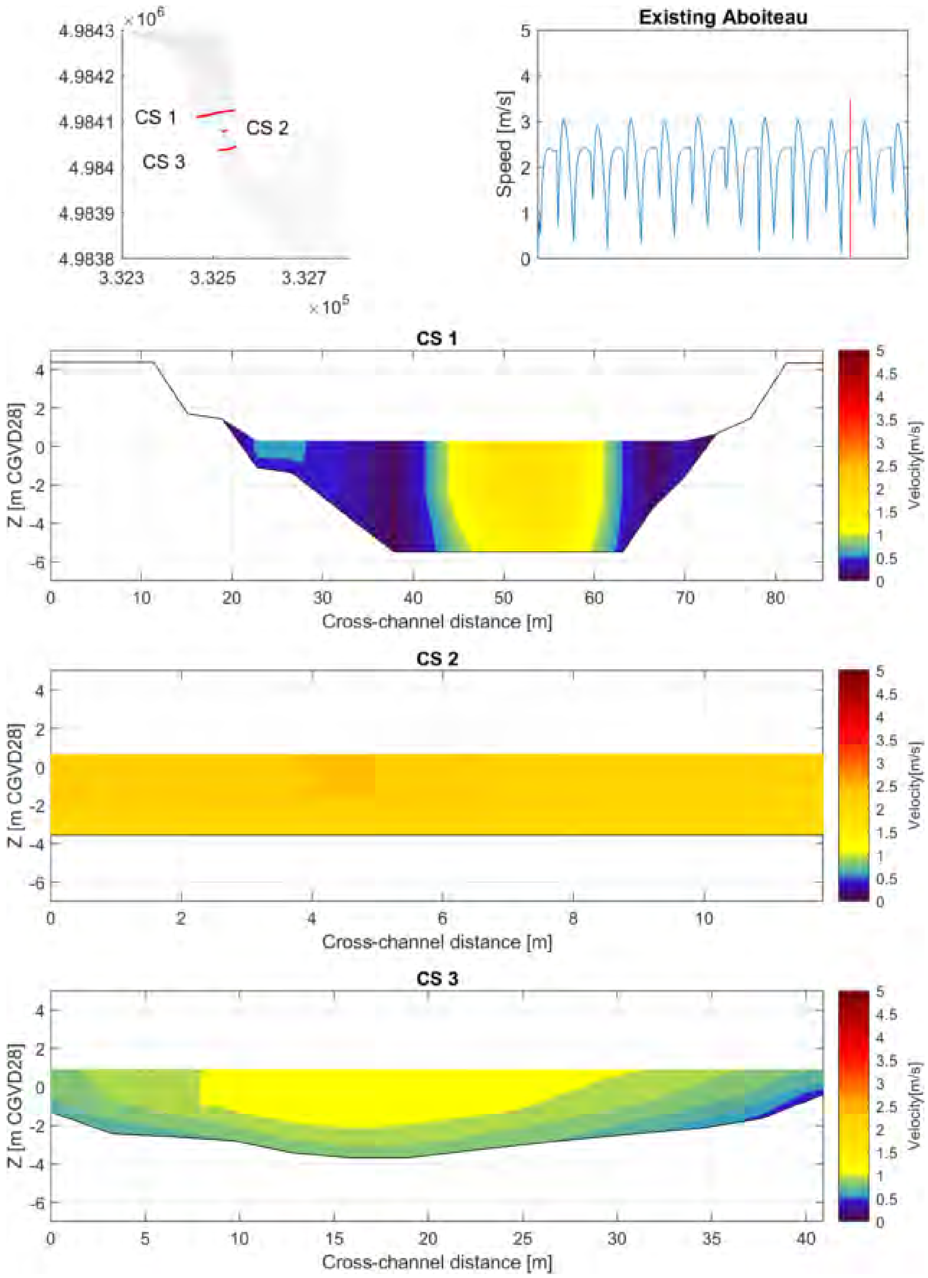


Figure 24: Cross Sections of velocities at existing aboiteau for the Dampened Tidal Scenario (downstream flow direction).

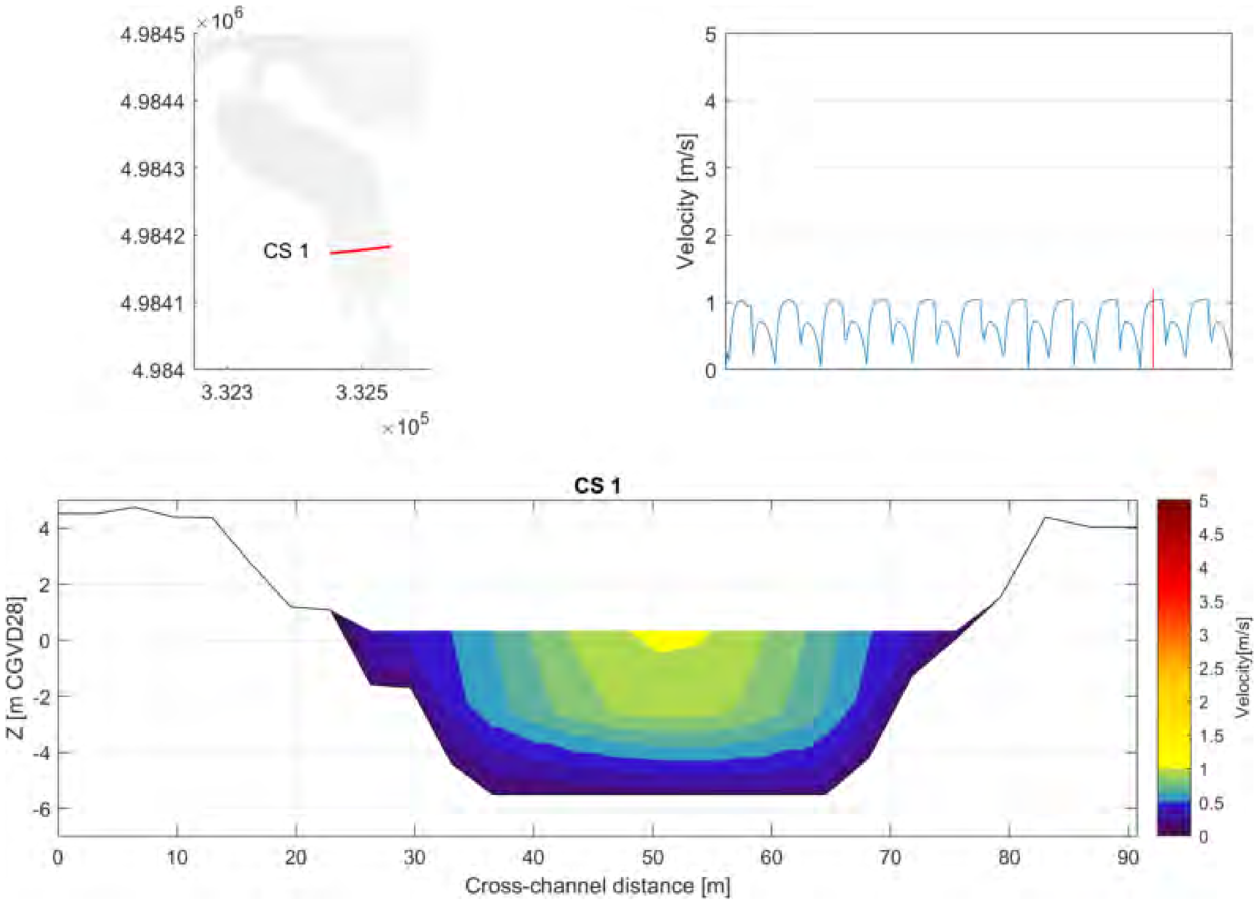


Figure 25: **Cross Sections of velocities at velocities in-between structures for the Dampened Tidal Scenario (downstream flow direction).**

4.2 Effect of Removal of the Existing Aboiteau

This section of the memo shows the velocity patterns if the existing aboiteau was removed. Similar to Section 4.1 Comparison between Water Management Scenarios, a summary of the results illustrated in this section includes:

- Time series of the velocities in each layer at the location of the structures and channel in-between them.
- Maps of depth-averaged velocities for the general study area.

Maps of the velocities in each layer are included in the Appendix.

4.2.1 Brackish Scenario

The velocities in each layer at the proposed aboiteau, where the existing aboiteau was removed, and the centre of the channel in-between the structures are illustrated in Figure 26 for the dry season and Figure 27 for the wet season (a map of the point locations are shown in Figure 2). Similar to when the existing aboiteau is in place, there is a sudden increase in velocity when the active gates of the proposed structure open. A main difference in these results is that where the existing aboiteau was removed, the velocities were reduced, due to the removal of the flow constriction. However, the extent of high velocities (~1m/s) extend further in the channel. In addition, the velocities at the proposed structure are slightly higher due to the reduced losses from the removal of the existing aboiteau.

When flow is in the upstream direction, there are some increased velocities, which occur when the tidal level is greater than the lake level due to the flow entering through the fishways; however, these are generally low. Again, the flow velocities where the existing aboiteau was removed are reduced during these moments.

The depth-averaged velocity of the Slightly Brackish Water Scenario was plotted in planform for the general study area. Three different time periods were plotted:

- The moment when the gates of the proposed aboiteau open, which generates maximum velocities in the downstream flow direction (Figure 28, Figure 31).
- The moment when the gates of the proposed aboiteau are closed and the tide is greater than the lake level - upstream flow (Figure 29, Figure 32).
- The moment when the gates of the proposed aboiteau are closed and the tide is les than the lake level - downstream flow (Figure 30, Figure 33).

The analysis of these maps illustrates that when the main gates are open, it can be observed that there are greater flow velocities occurring in the channel at the existing and proposed aboiteau. When the active gates are closed and the tide level is greater than the lake level, there are generally low velocities in the study area. Although there is a slight increase in velocities in the channel, these are still generally low. When the active gates are closed and the tide is lower than the lake level, there are relatively low velocities during downstream flows. Overall, the removal of the existing aboiteau results in less constriction and therefore, there are no increased velocities where the existing aboiteau would be. However, the extent of high velocities is increased in the channel.

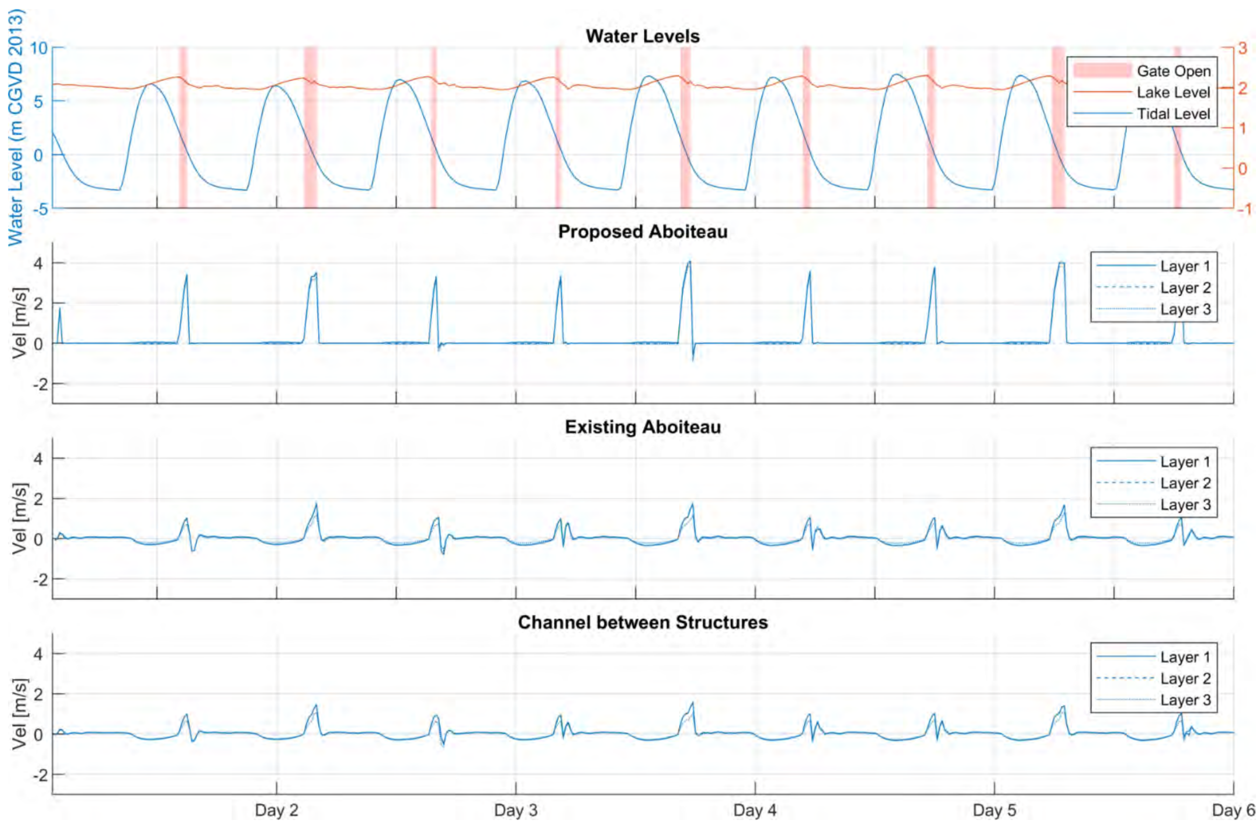


Figure 26: Time series of velocities at various locations for the Brackish Scenario with the existing aboiteau removed (dry season). Note: positive velocities indicate downstream flow direction and negative velocities indicate upstream flow direction.

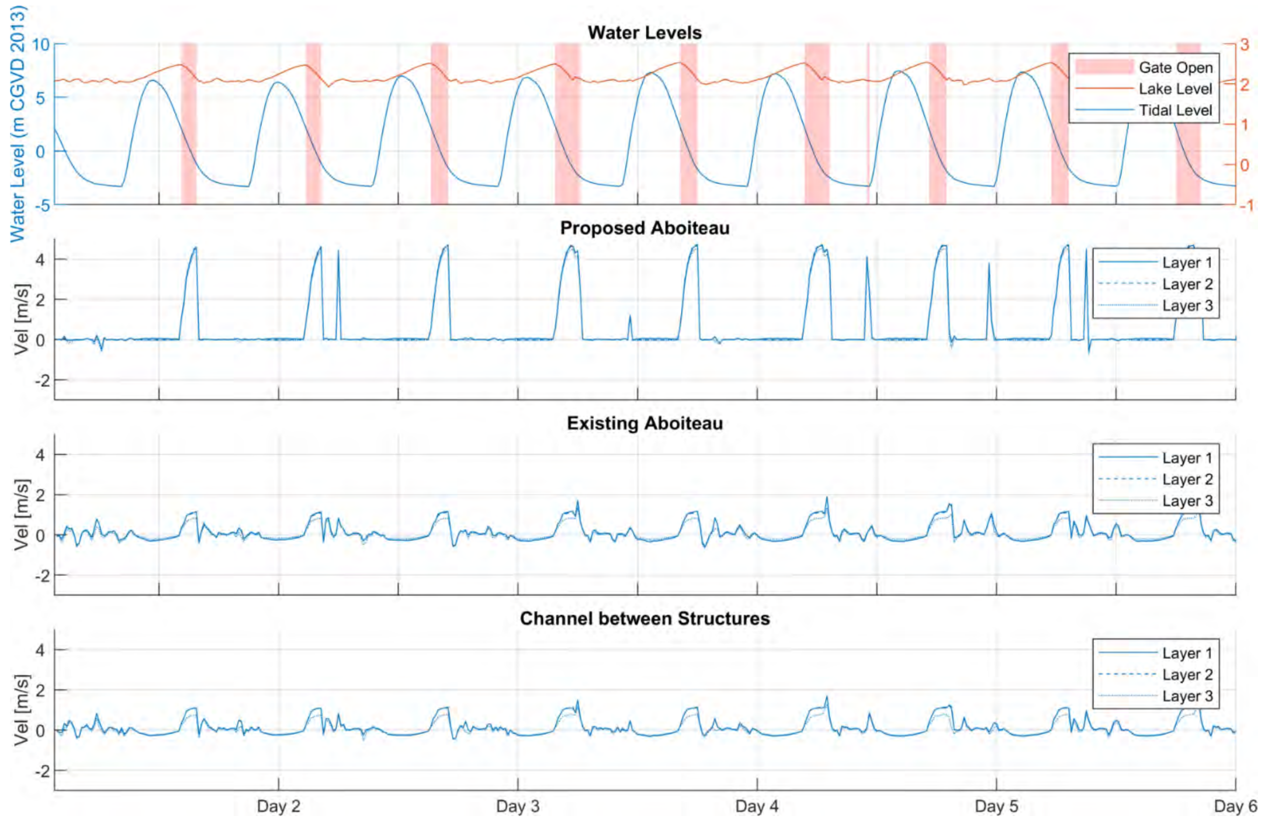


Figure 27: Time series of velocities at various locations for the Brackish Scenario with the existing aboiteau removed (wet season). Note: positive velocities indicate downstream flow direction and negative velocities indicate upstream flow direction.

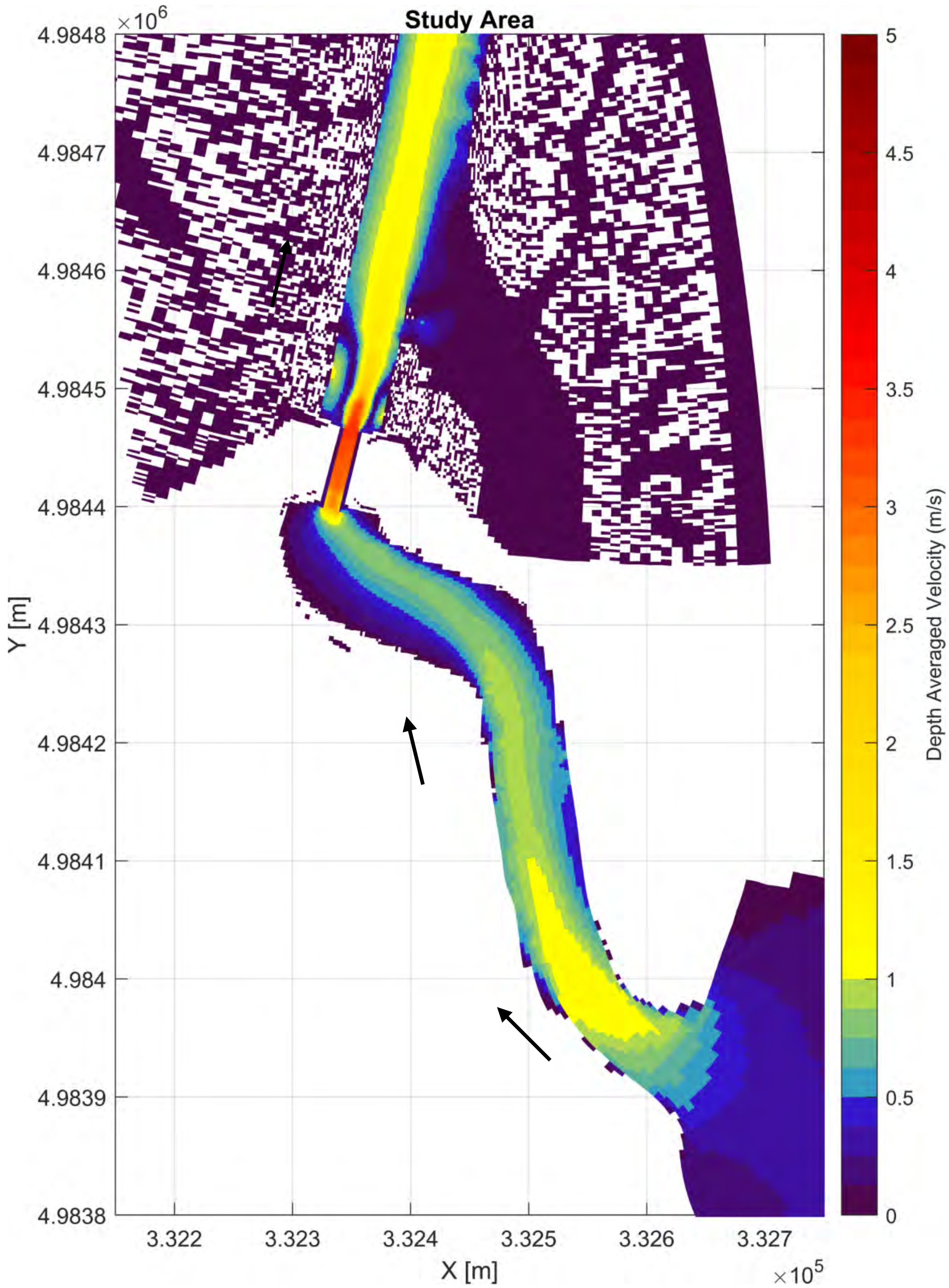


Figure 28: Map of the depth-averaged velocity when the active gates opens for the Brackish Scenario without the existing aboiteau (dry season).

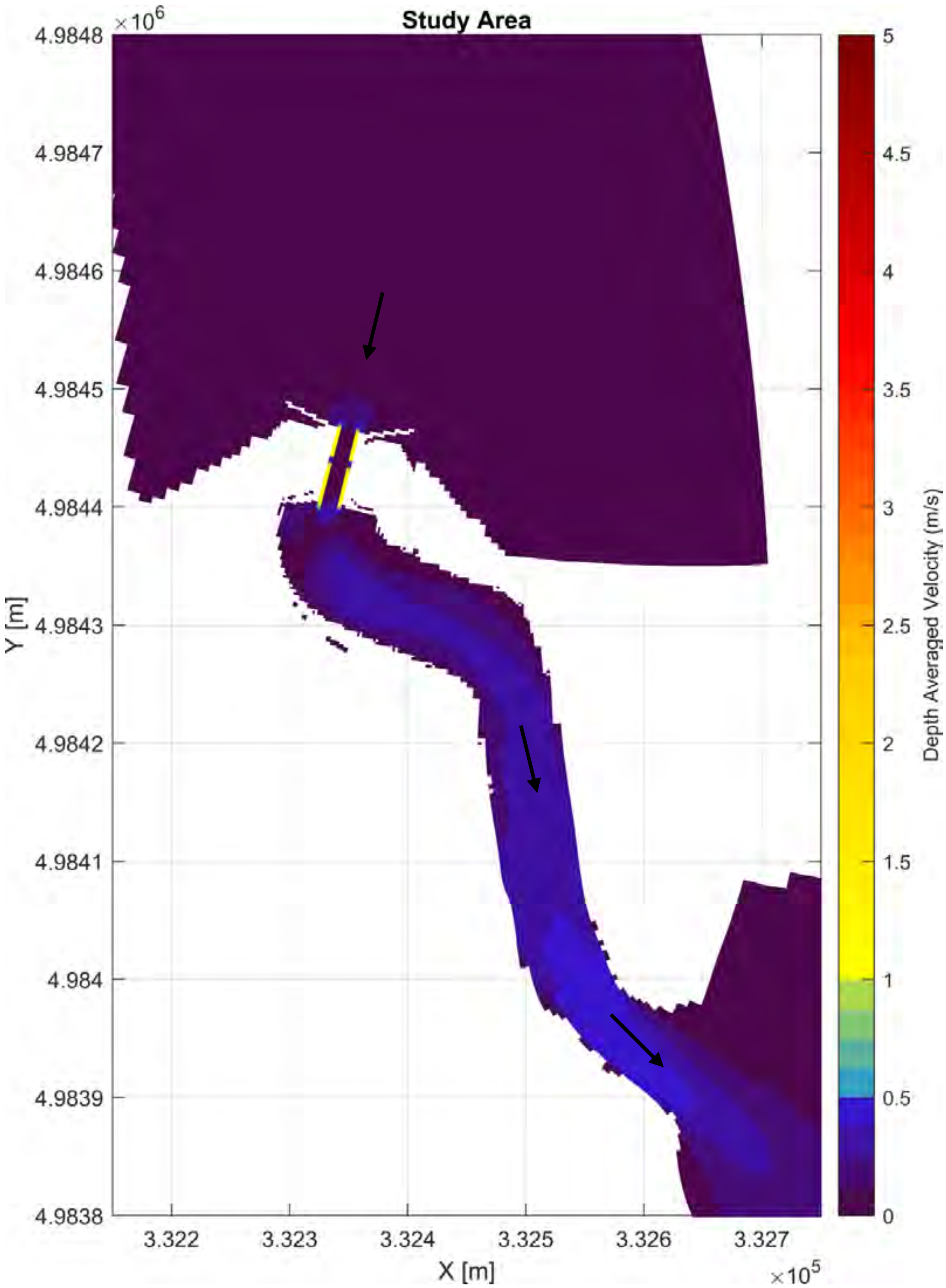


Figure 29: Map of the depth-averaged velocity when the gate is closed and the tide is greater than the lake level for the Brackish Scenario without the existing aboiteau (dry season).

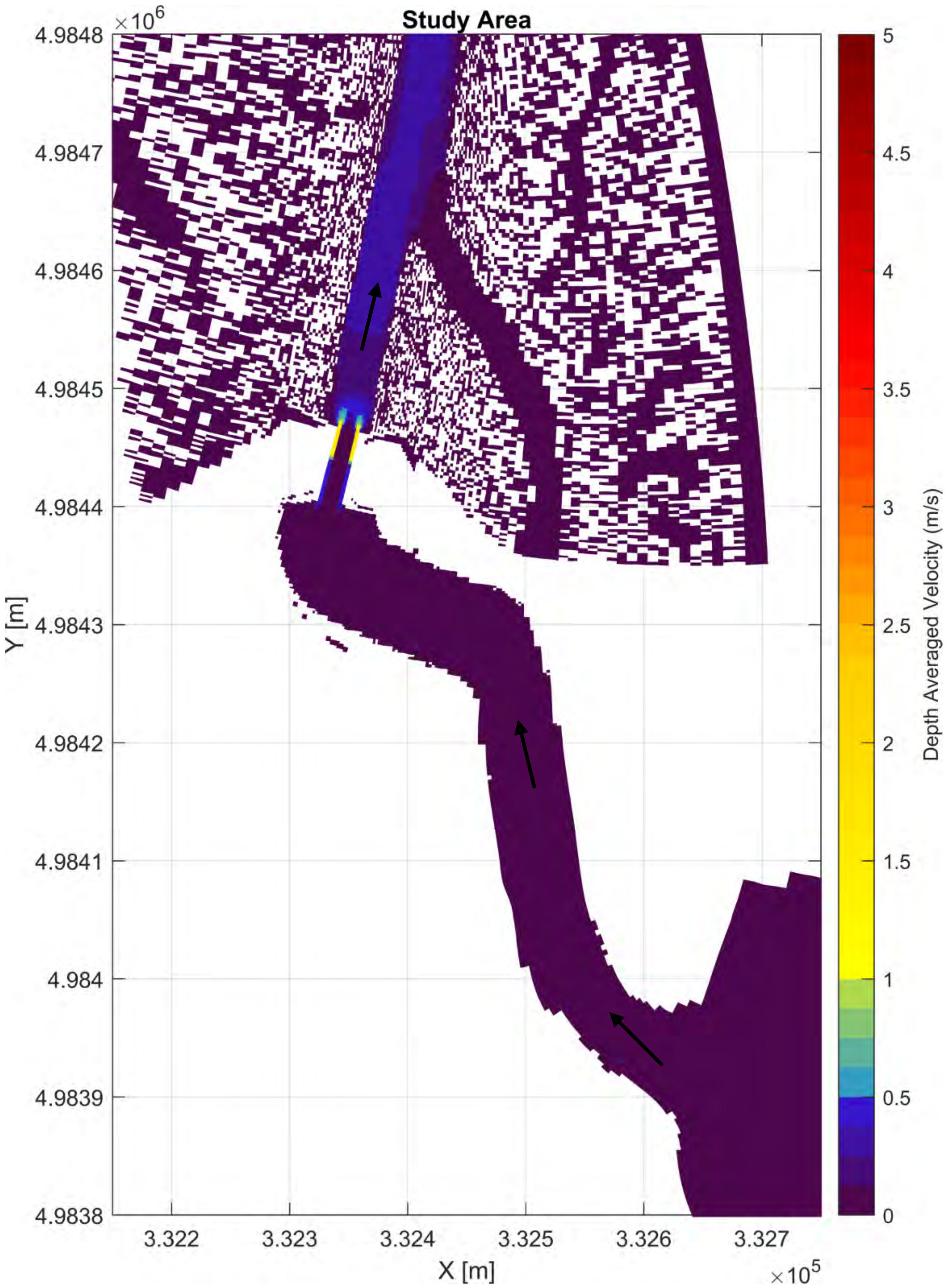


Figure 30: Map of the depth-averaged velocity when the gate is closed and the tide is lower than the lake level for the Brackish Scenario without the existing aboiteau (dry season).

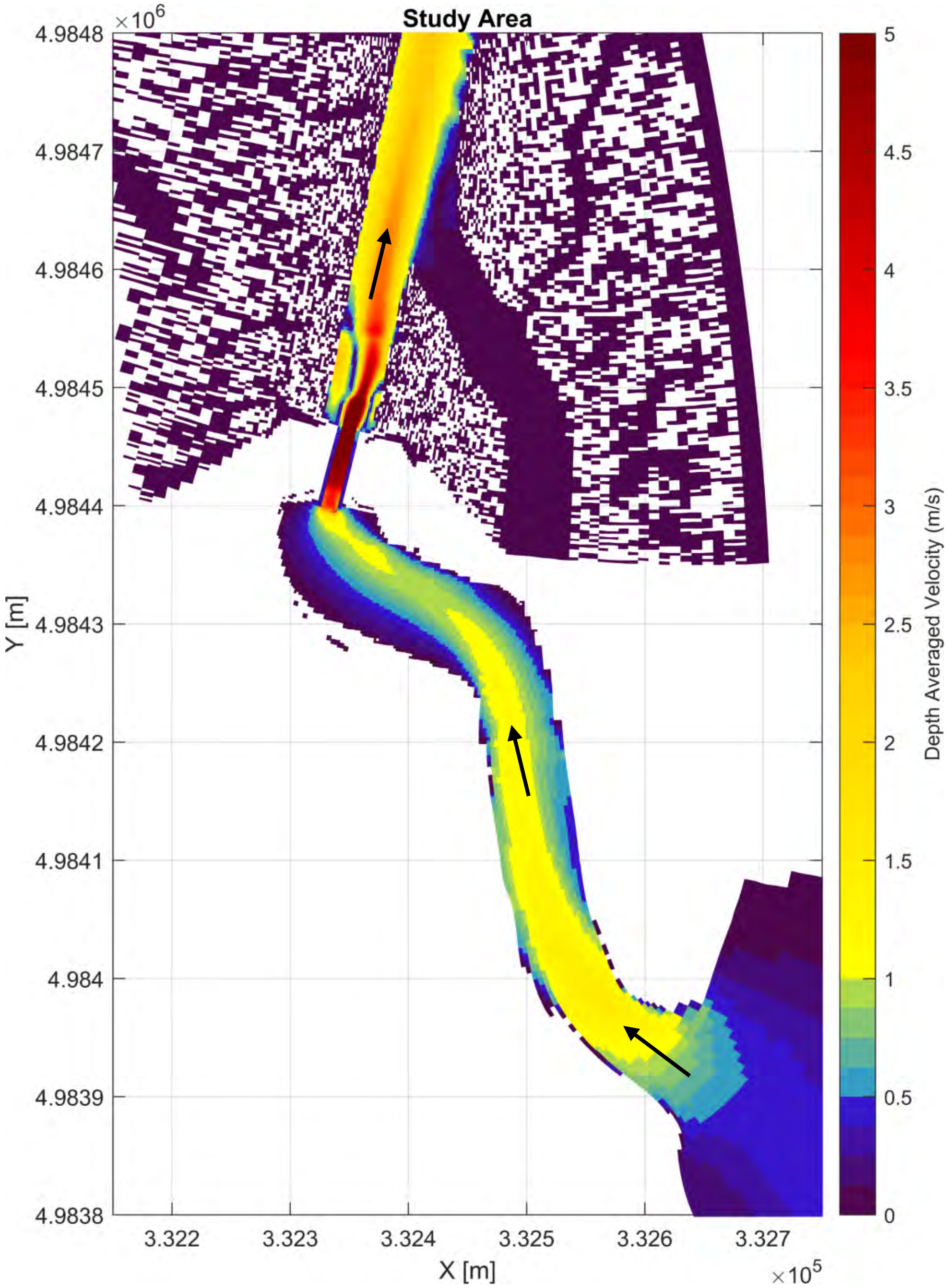


Figure 31: Map of the depth-averaged velocity when the active gates open for the Brackish Scenario without the existing aboiteau (wet season). Velocities within the structure reach values higher than 5 m/s.

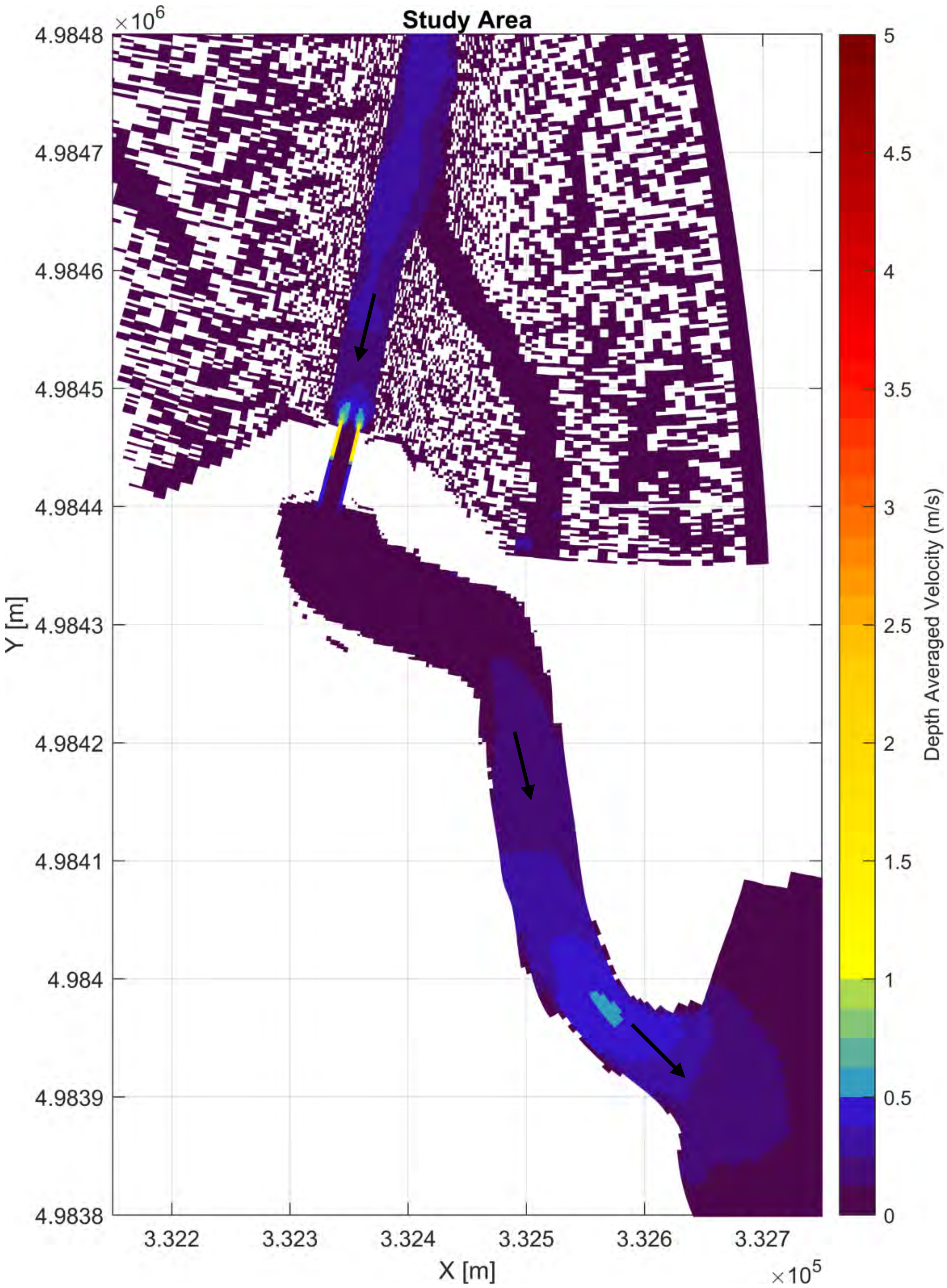


Figure 32: Map of the depth-averaged velocity when the gate is closed and the tide is greater than the lake level for the Brackish Scenario (wet season).

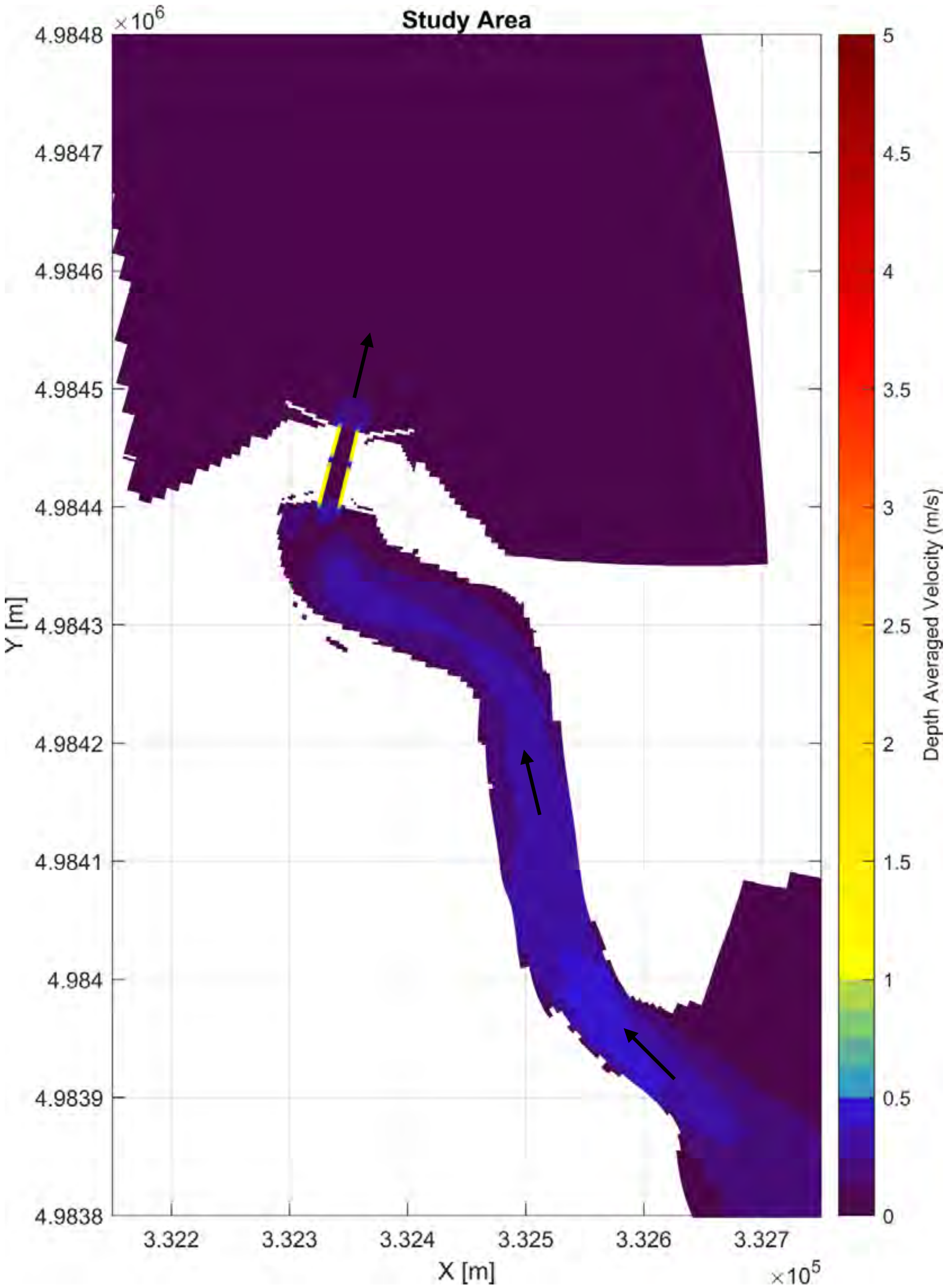


Figure 33: Map of the depth-averaged velocity when the gate is closed and the tide is lower than the lake level for the Brackish Scenario (wet season).

4.2.2 Dampened Tidal Scenario

The velocities in each layer at the proposed aboiteau, where the existing aboiteau was removed, and the centre of the channel in-between the structures, are illustrated in Figure 34 for spring tide and Figure 35 for neap tide (a map of the point locations are shown in Figure 2). These figures demonstrate that when flow is exiting the lake, high velocities are maintained until the lake level is similar to the tidal level. Similarly, increased velocities upstream occur when the lake level is less than the tidal level, due to large volumes of water entering the lake through the proposed aboiteau. In particular, higher velocities occur towards the bed at the proposed aboiteau due to flow entering below the gate. Due to the removal of the existing aboiteau, the velocities at this location are reduced.

The depth-averaged velocity of the Dampened Tidal Scenario was plotted in planform at the locations of the existing and proposed aboiteaux. Two time periods were plotted:

- The period of low tide, which generates peak velocities in the downstream flow direction (Figure 36 and Figure 38).
- The moment of high tides, which generates high velocities in the upstream flow direction (Figure 37 and Figure 39).

The analysis of these maps indicates that during low tide, large volumes of water exit the lake during this period through the main gates, resulting in peak velocities through the structures and channel. When the tide is greater than the lake level, velocities through the proposed and existing structure are increased. This is due to the large volume of water entering the lake through the main gates in the Dampened Tidal Scenario and constrictions of the structures. Overall, the removal of the existing aboiteau results in a reduction of velocities at the location of the existing aboiteau, due to the constriction being removed. However, the extent of high velocities (~ 1 m/s) is increased in the channel, likely due to a reduction in losses that were created by the existing aboiteau being removed.

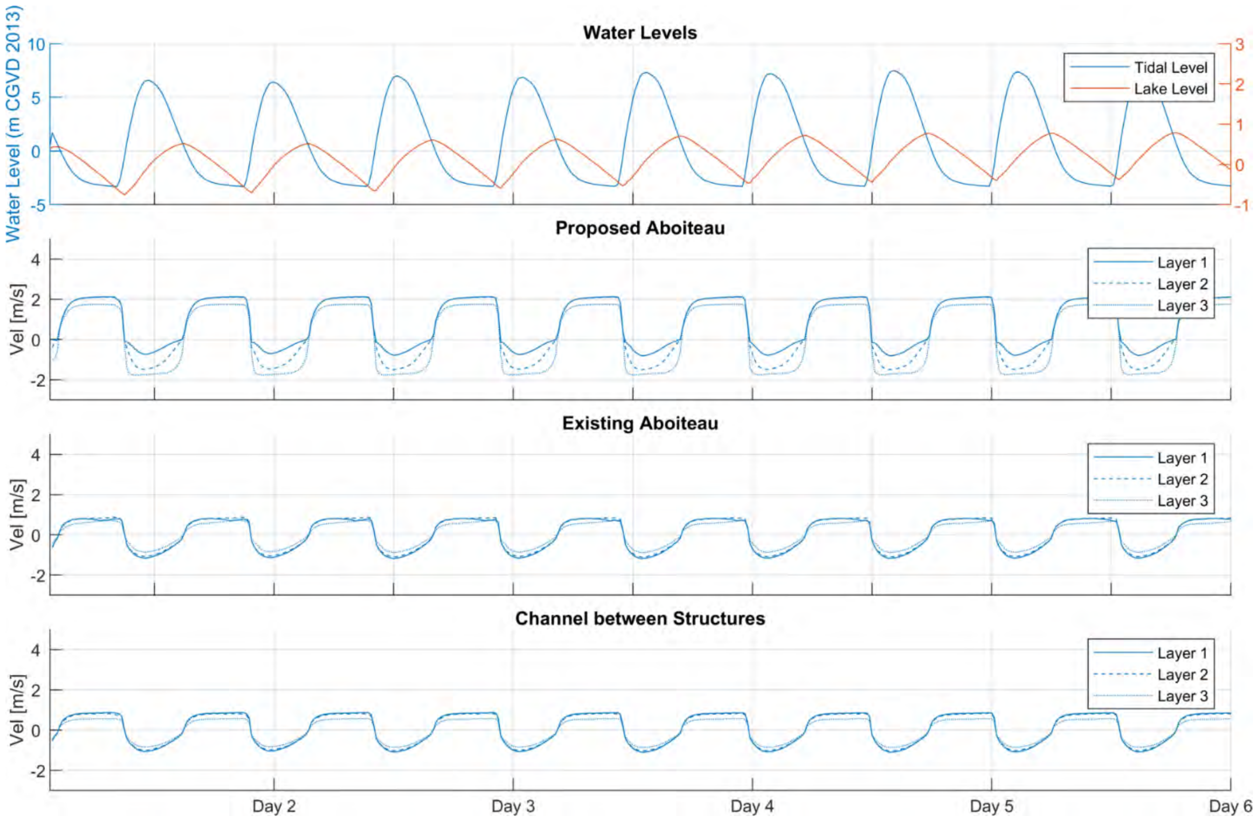


Figure 34: Time series of velocities at various locations for the Dampened Tidal Scenario with the existing aboiteau removed (spring tide). Note: positive velocities indicate downstream flow direction and negative velocities indicate upstream flow direction.

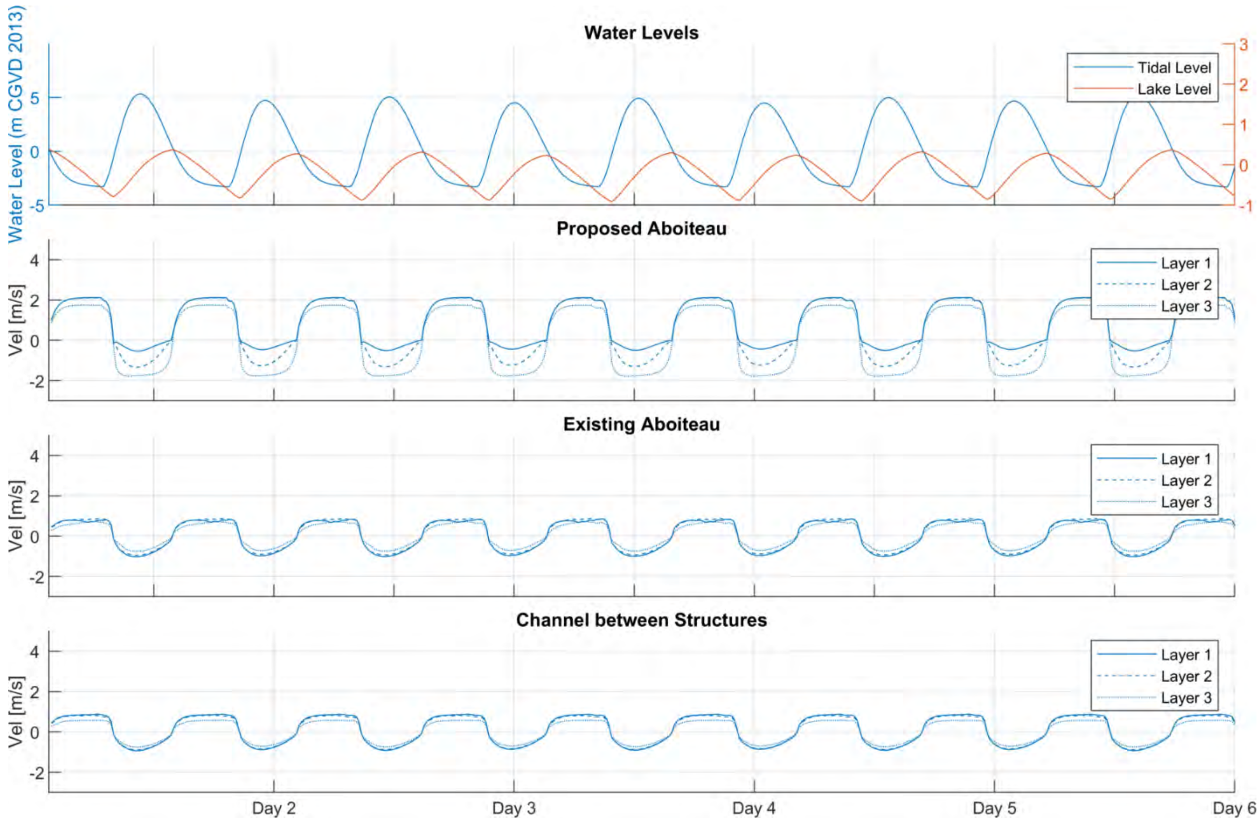


Figure 35: Time series of velocities at various locations for the Dampened Tidal Scenario (neap tide). Note: positive velocities indicate downstream flow direction and negative velocities indicate upstream flow direction.

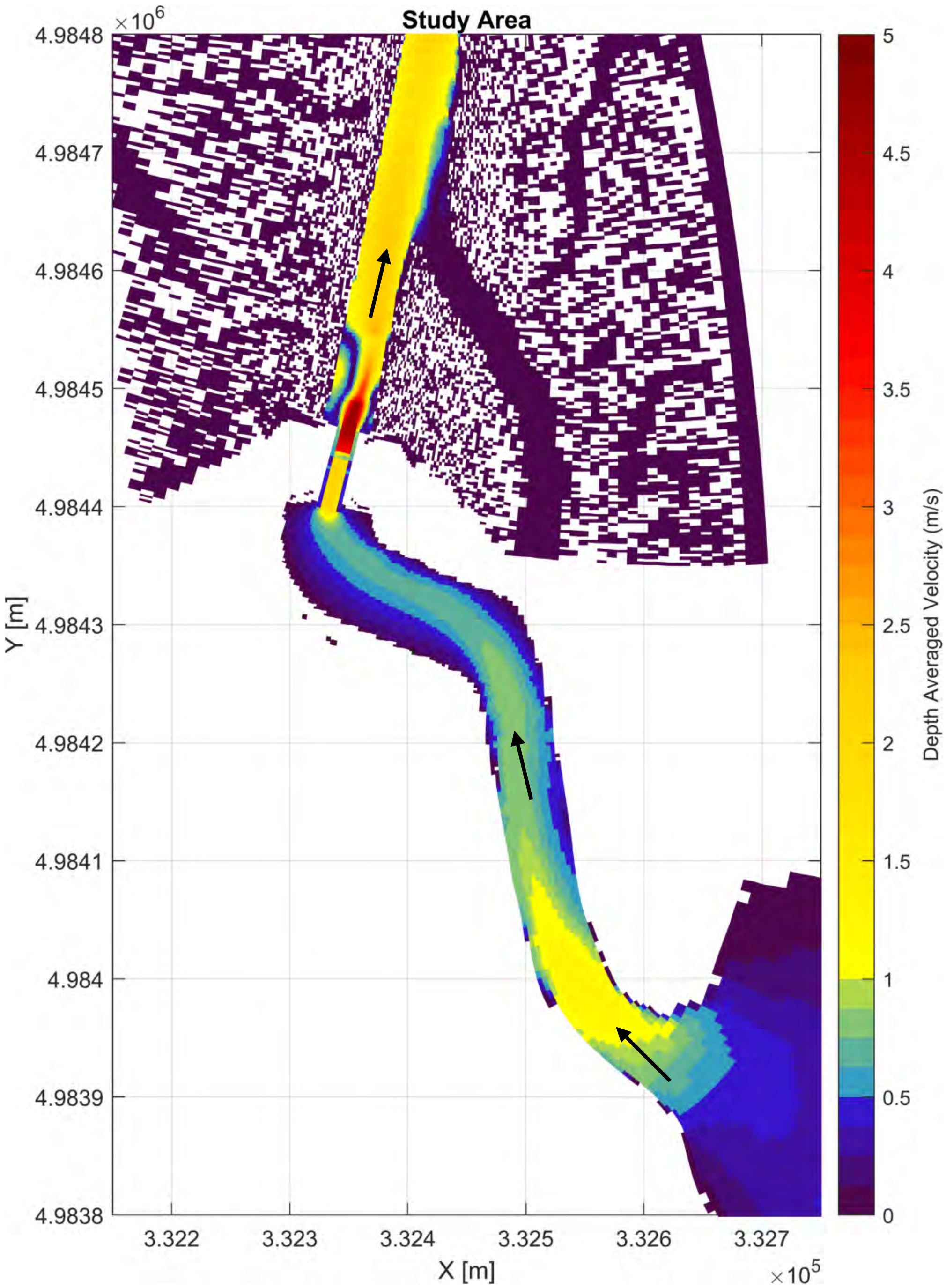


Figure 36: Map of the depth-averaged velocity at low tide for the Dampened Tidal Scenario without the existing aboiteau (spring tide). Velocities within the structure reach values higher than 5 m/s.

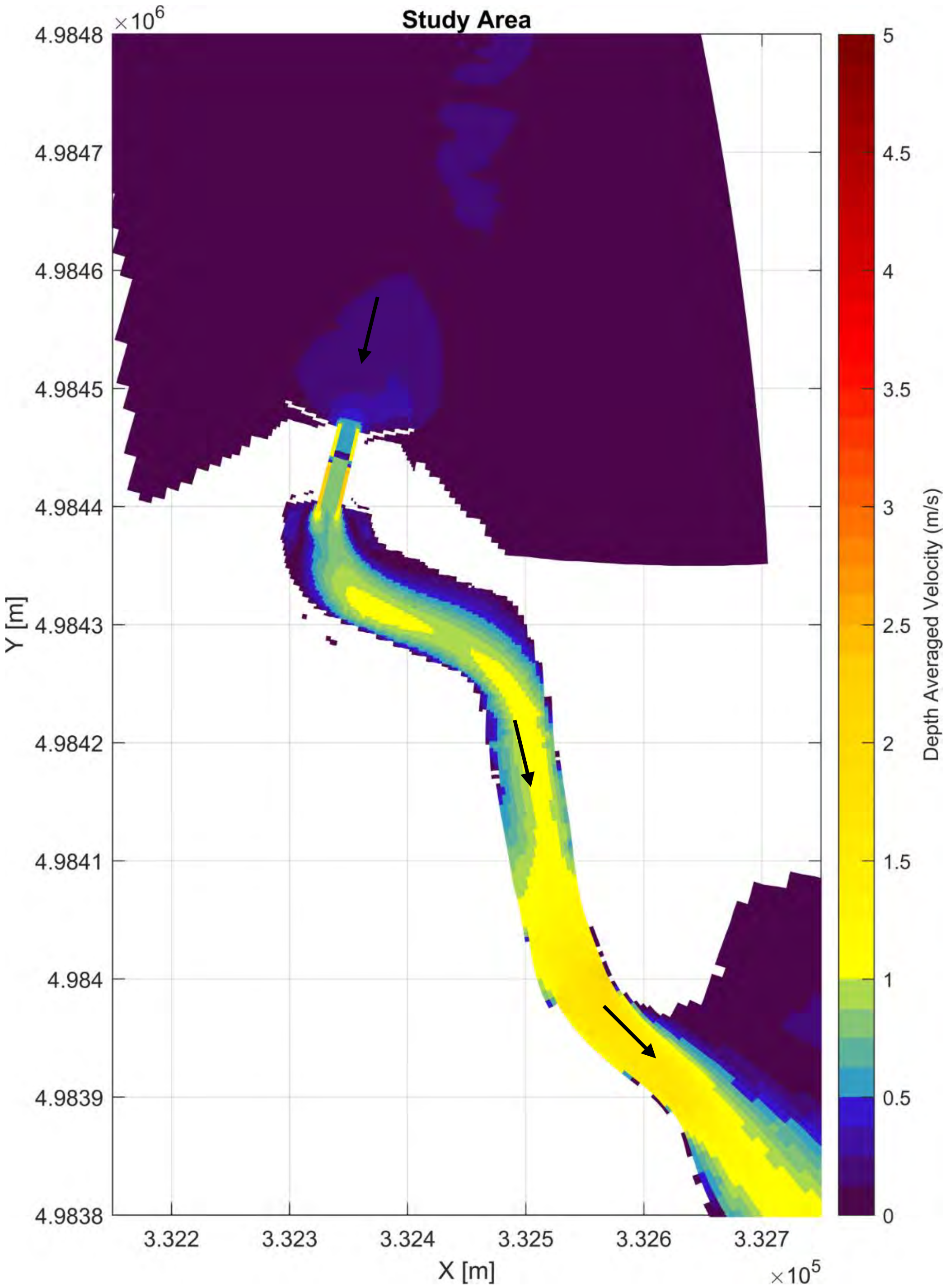


Figure 37: Map of the depth-averaged velocity at high tide for the Dampened Tidal Scenario without the existing aboiteau (spring tide).

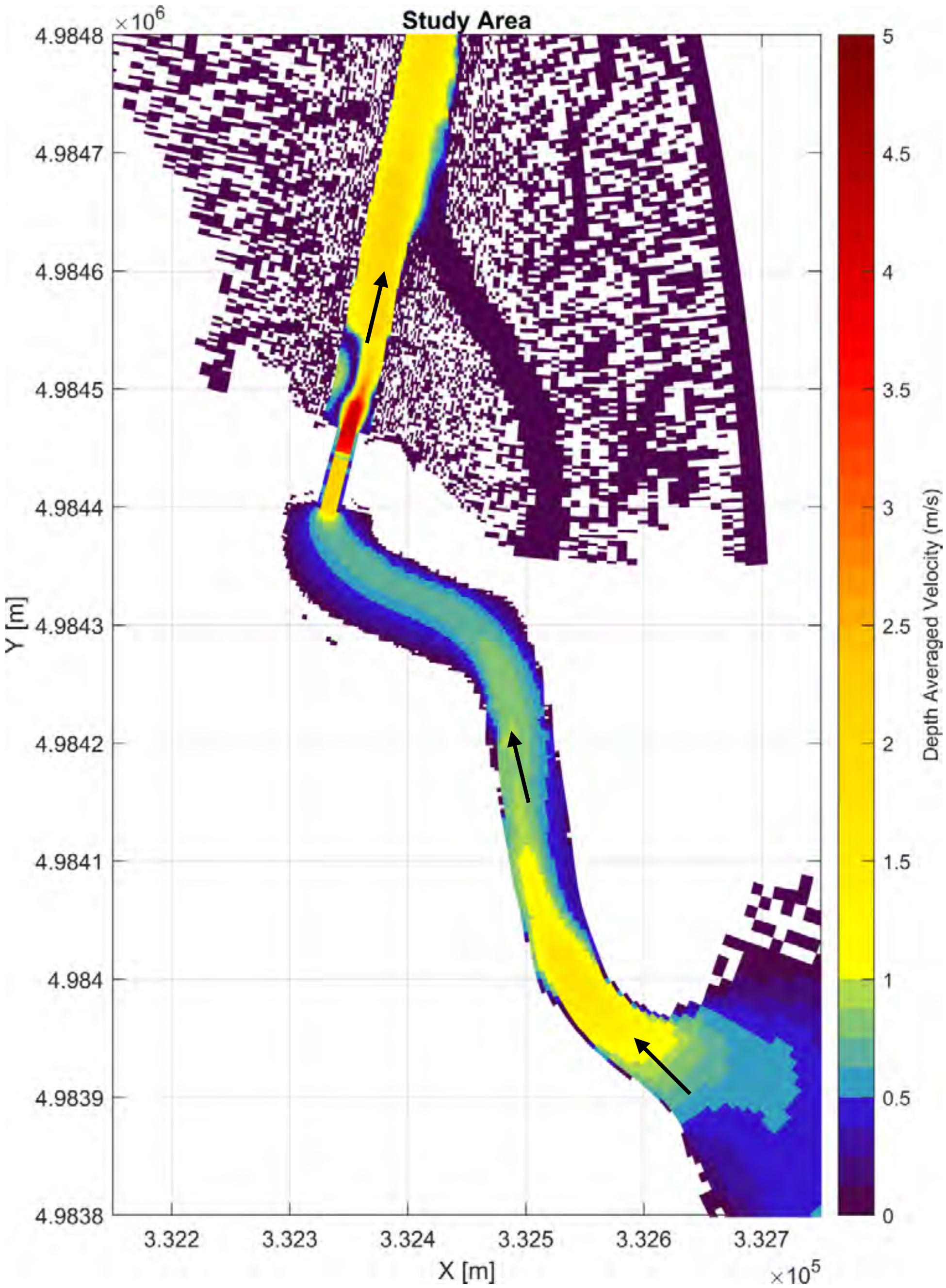


Figure 38: Map of the depth-averaged velocity at low tide for the Dampened Tidal Scenario without the existing aboiteau (neap tide). Velocities within the structure reach values higher than 5 m/s.

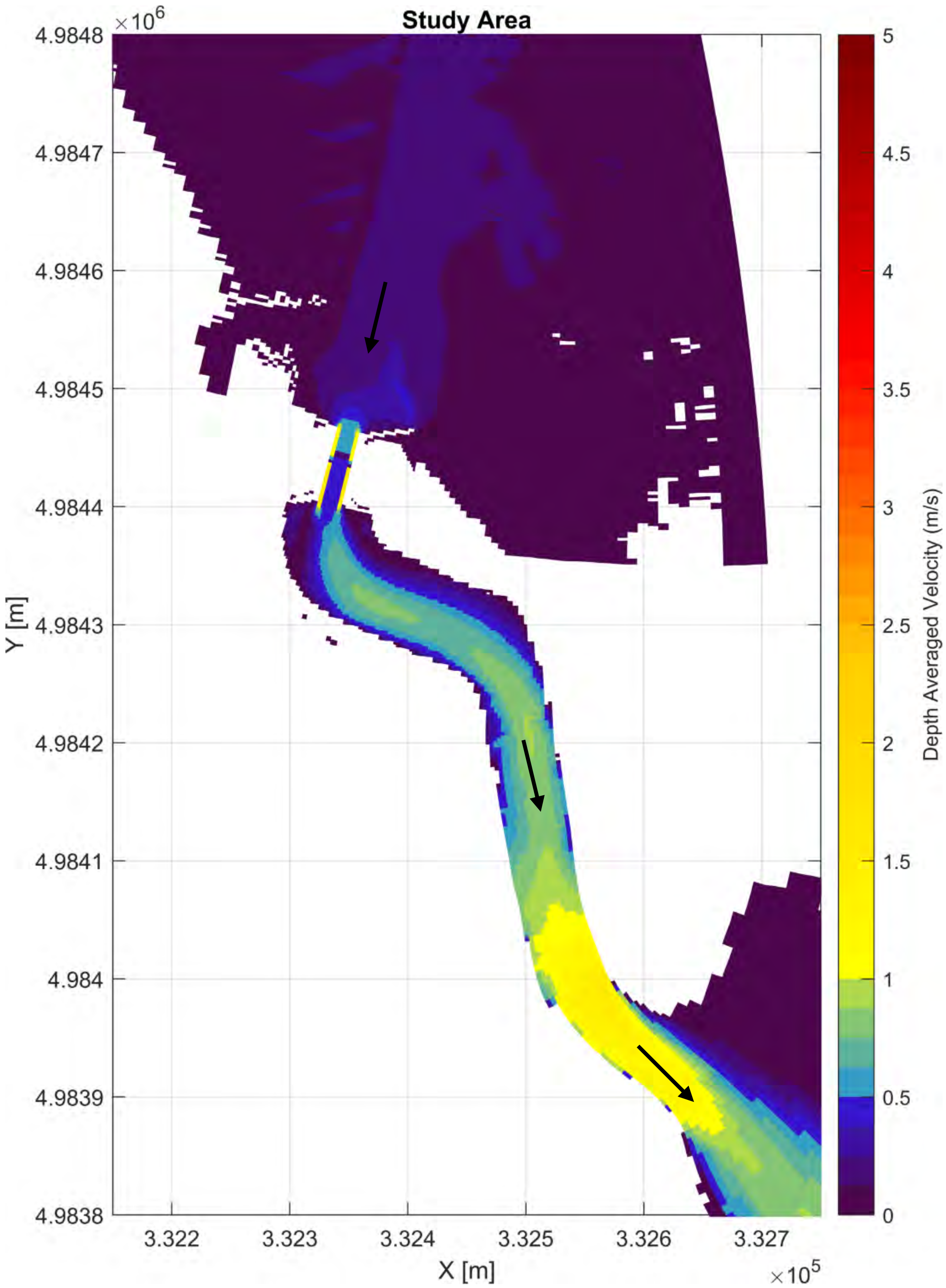


Figure 39: Map of the depth-averaged velocity at high tide for the Dampened Tidal Scenario without the existing aboiteau (neap tide).

5 Concluding Remarks

This analysis provides a summary of the velocities through the structures and in-between the existing and proposed aboiteau based on the Delft3D modelling. Overall, high velocities occur when the gates are open both when the aboiteau remains in place or when it is removed, due to high volumes of water exiting the lake through a constricted channel. Velocities at the location of the existing aboiteau are reduced when the aboiteau is removed; however, velocities are increased through the in-between channel.

In the **Slightly Brackish Scenario**, the active gates typically open for approximately 0.5 to 2.5 hours per tidal cycle (depending on tidal and freshwater conditions), resulting in high flow velocities during this period. The removal of the existing aboiteau reduces the velocities through the existing aboiteau, however, the overall magnitude of the velocities in the in-between channel is increased. When the gates are closed, velocities remain generally low in the study area, with the exception of the constriction at the existing aboiteau.

In the **Dampened Tidal Estuary Scenario**, high velocities were observed through the channel with flow in the downstream direction when the lake is draining through the passive gates. High velocities were also observed with upstream flow direction, as water flows through the main gates. This results in high volumes of water being free to flow in and out of the lake depending on the tide level. Upstream flow occurs for approximately 5.5 to 6 hours and downstream flow occurs for 6.5 to 7 hours, depending on the freshwater input conditions. The removal of the existing aboiteau reduces velocities locally, however velocities are increased through the in-between channel.

The findings of this memo are based on information collected to date at the time of writing, and on simplified mathematical formulations of complex dynamic natural processes. While the modelling effort incorporated as much relevant data as possible within the study schedule and budget, uncertainties associated with data gaps and modelling approximations are inherent to this type of study. Results should be interpreted with caution and actual conditions encountered in the future may vary from predictions.

Appendix A - Velocity Maps

List of Figures

A1 Water Management Scenarios - Brackish

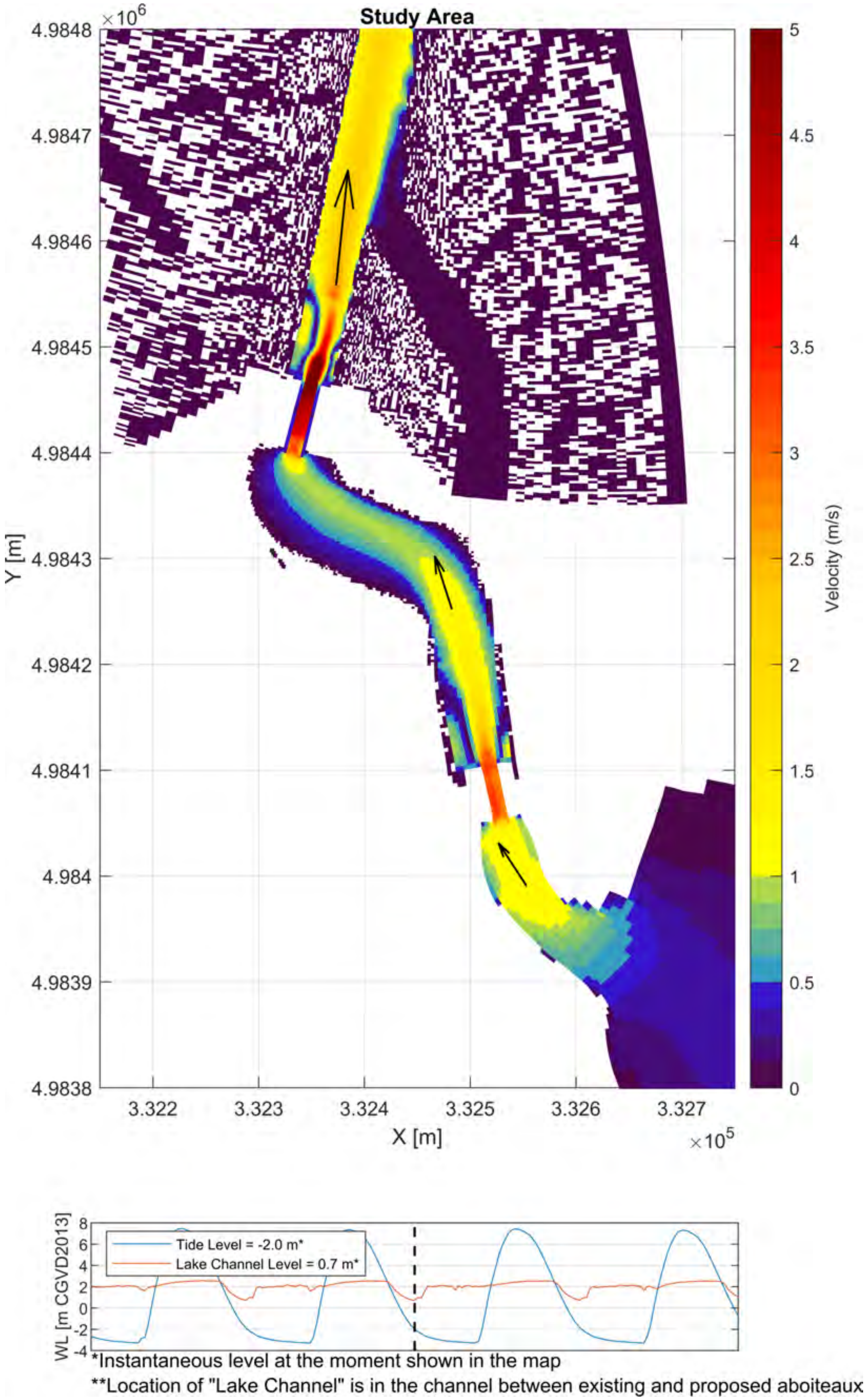
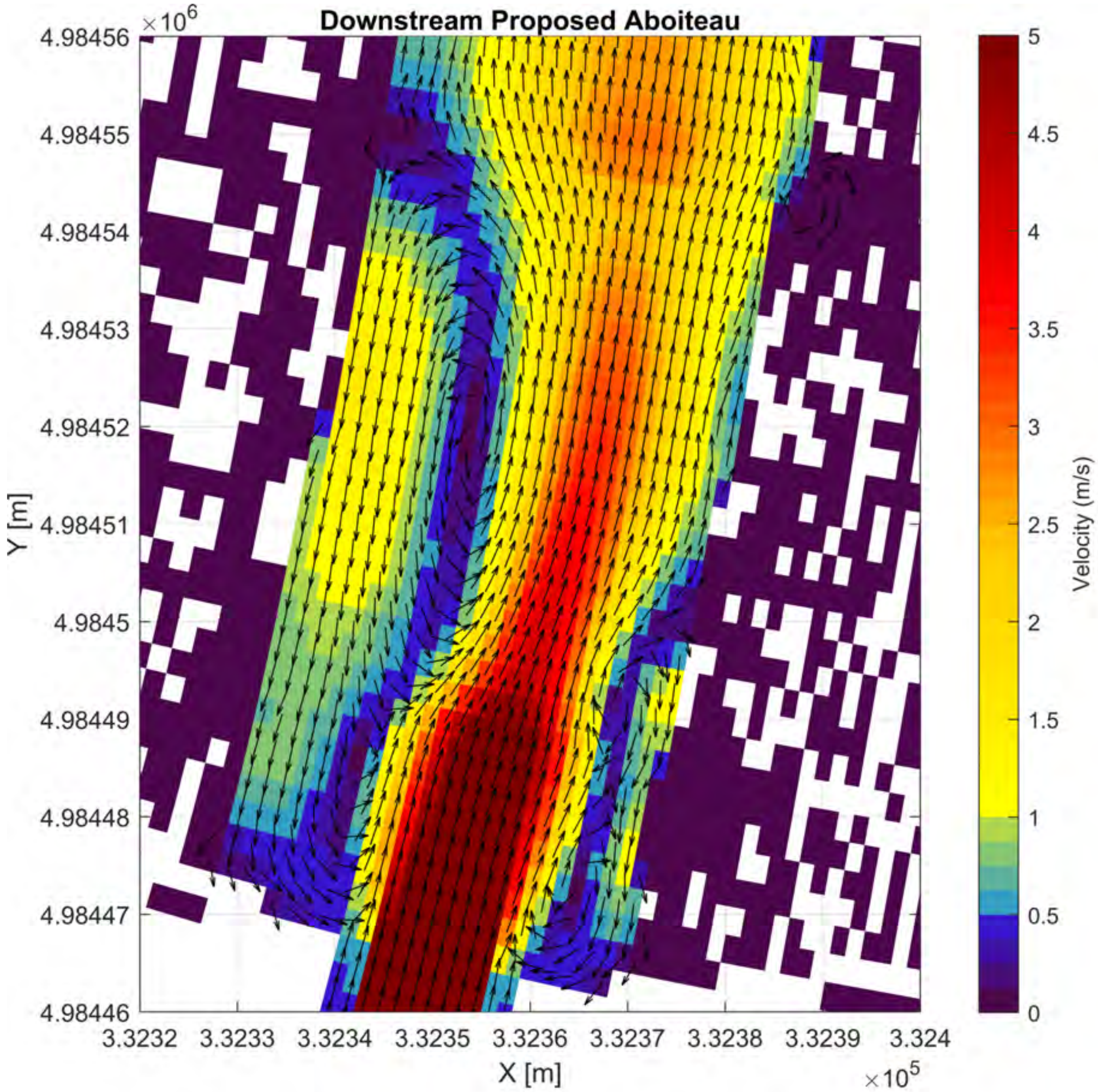
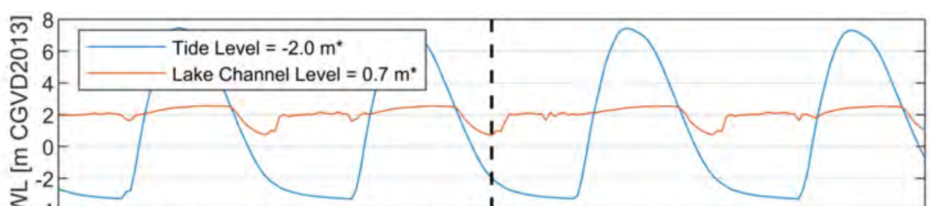


Figure A1.1: Map of Velocities for Top Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Overall Study Area.





*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.2: Map of Velocities for Top Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Downstream Proposed Aboiteau.

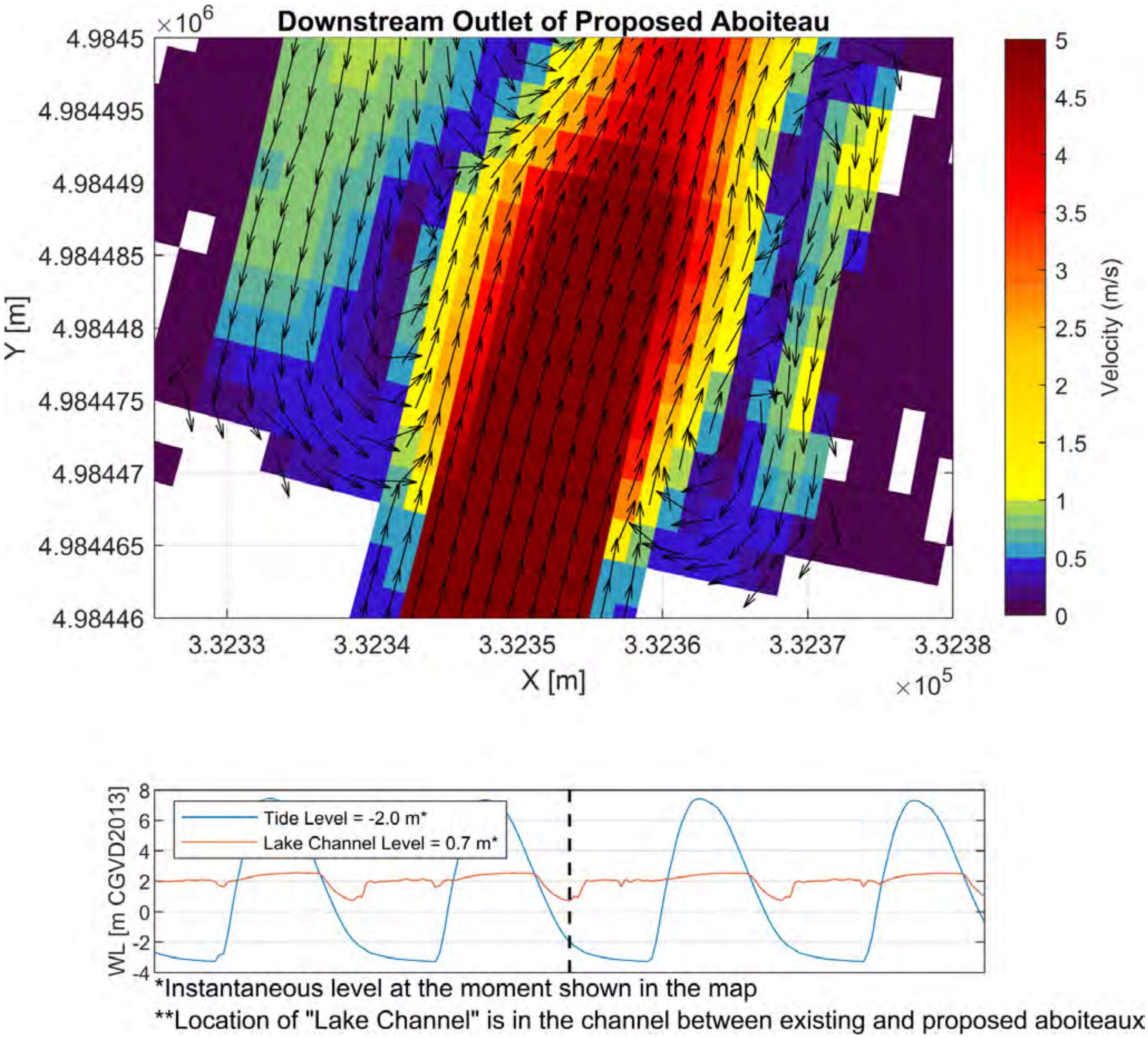
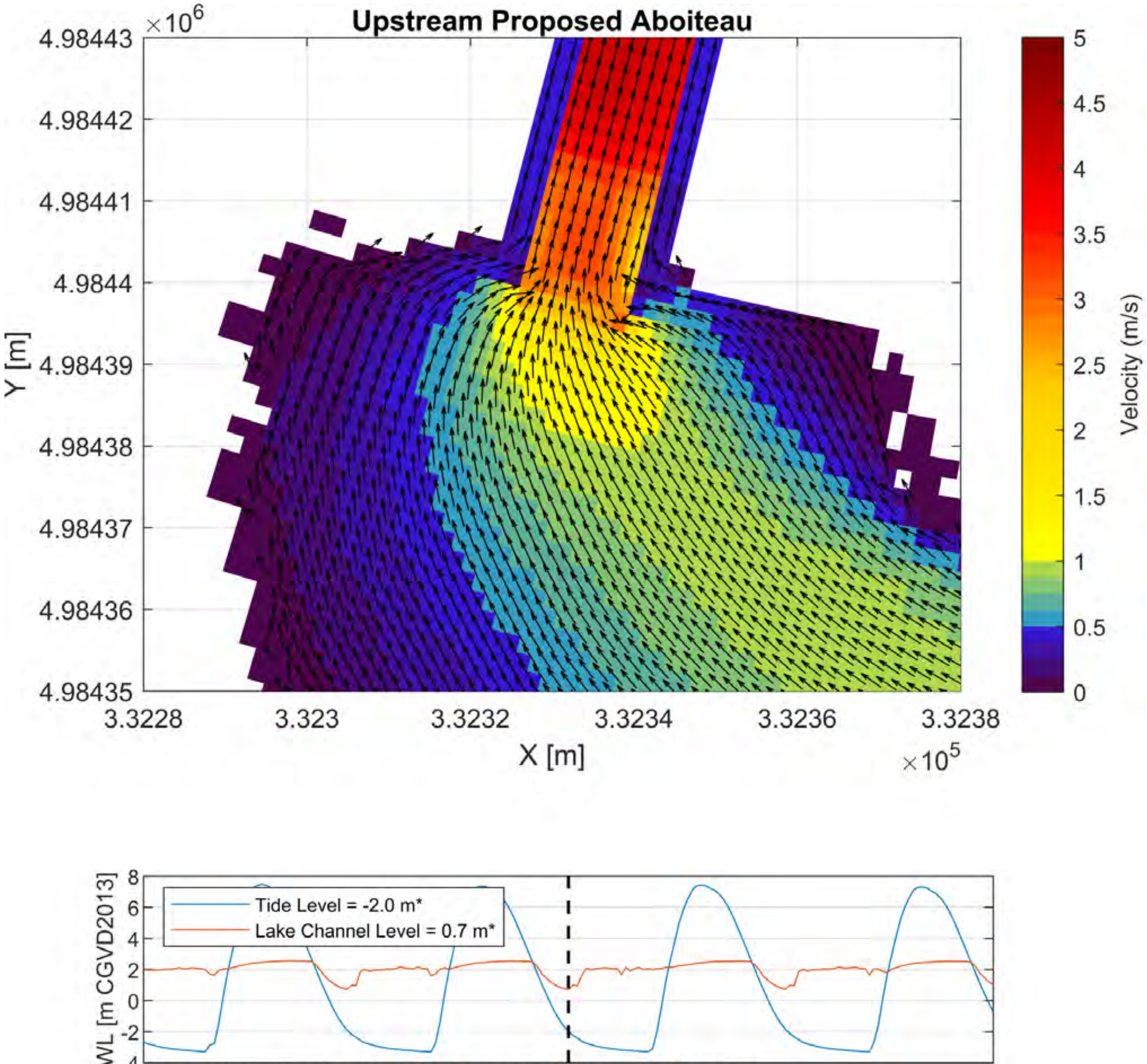


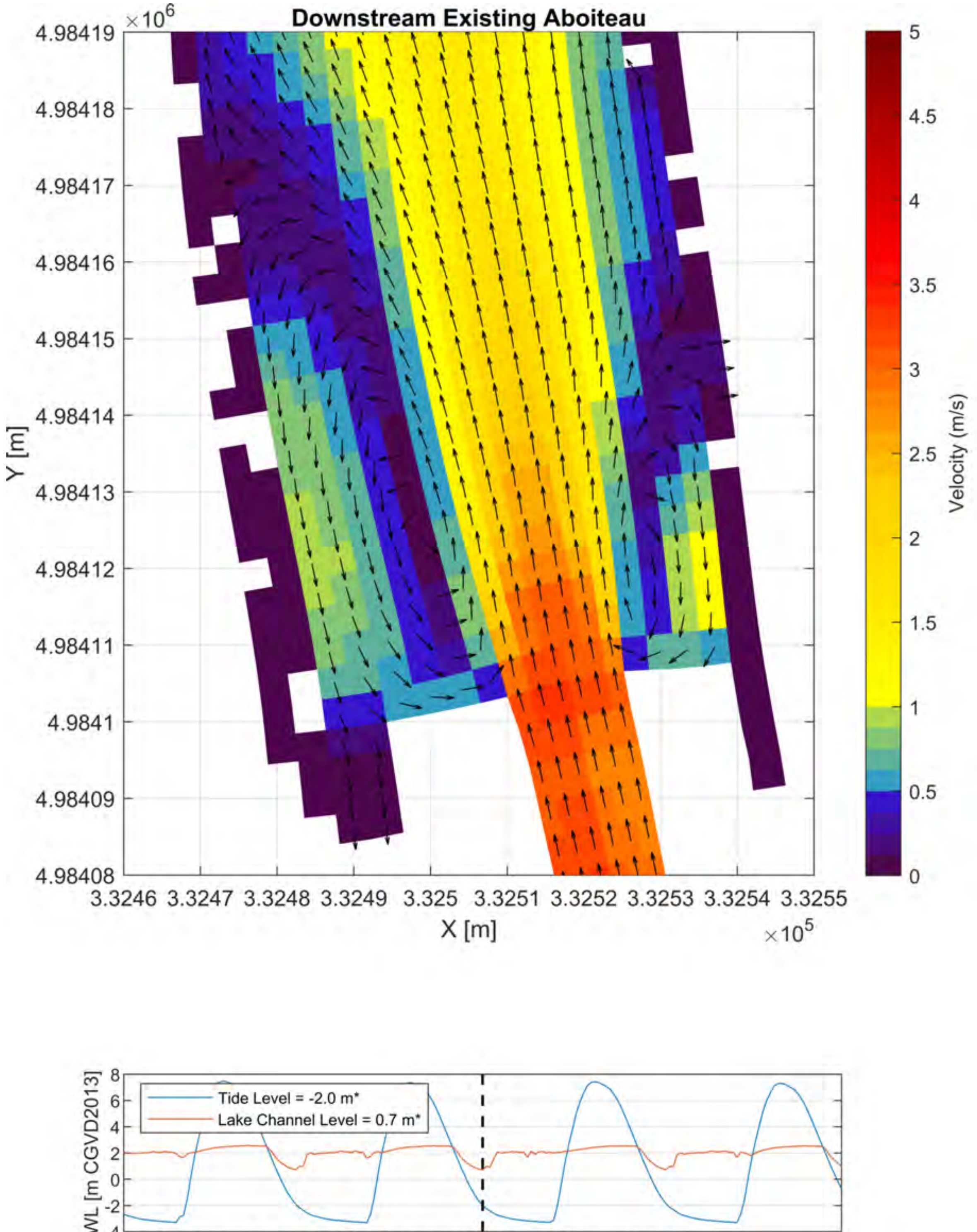
Figure A1.3: Map of Velocities for Top Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Downstream Outlet of Proposed Aboiteau.



*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.4: Map of Velocities for Top Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Upstream Proposed Aboiteau.



*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.5: Map of Velocities for Top Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Downstream Existing Aboiteau.

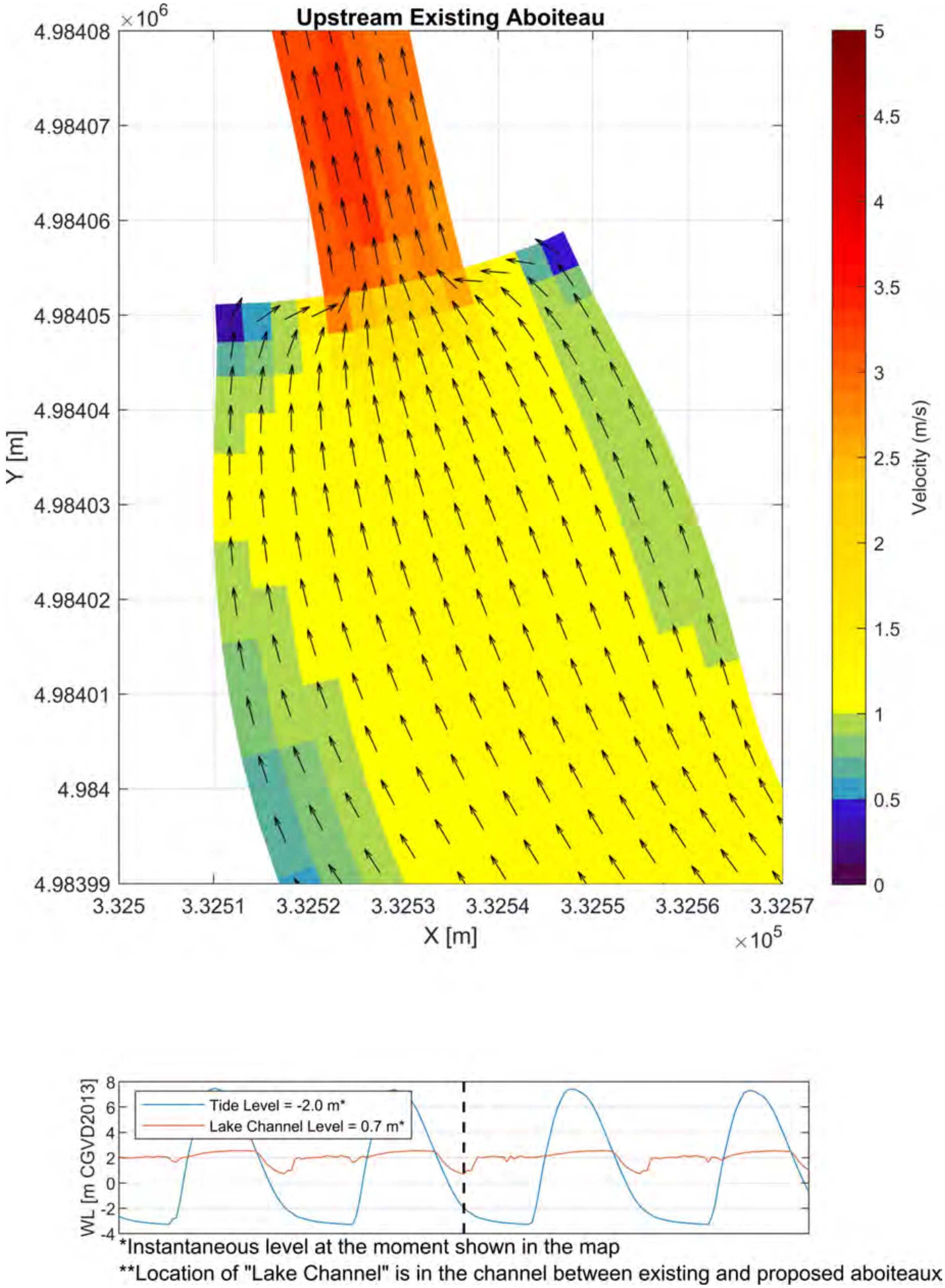


Figure A1.6: Map of Velocities for Top Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Upstream Existing Aboiteau.

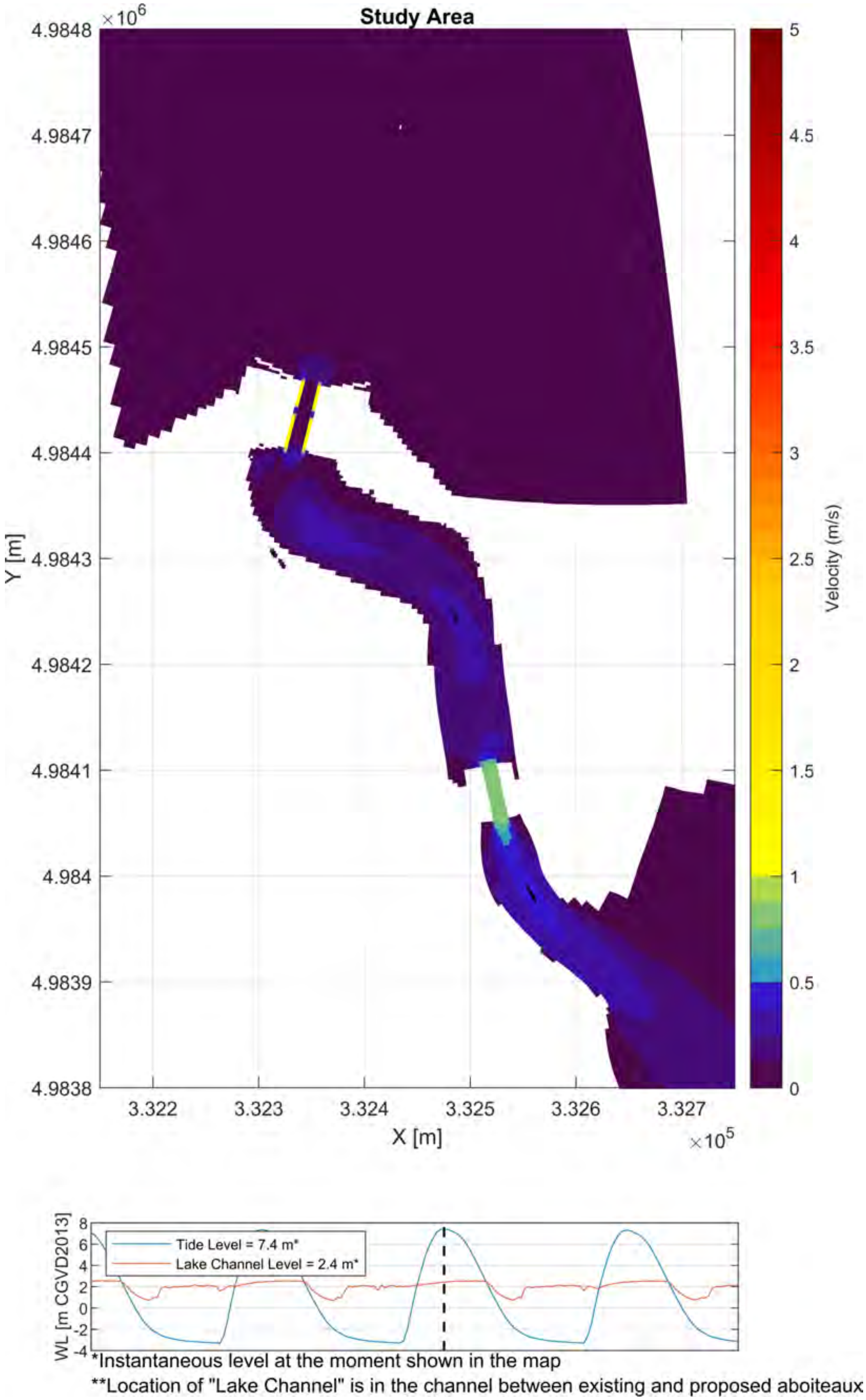
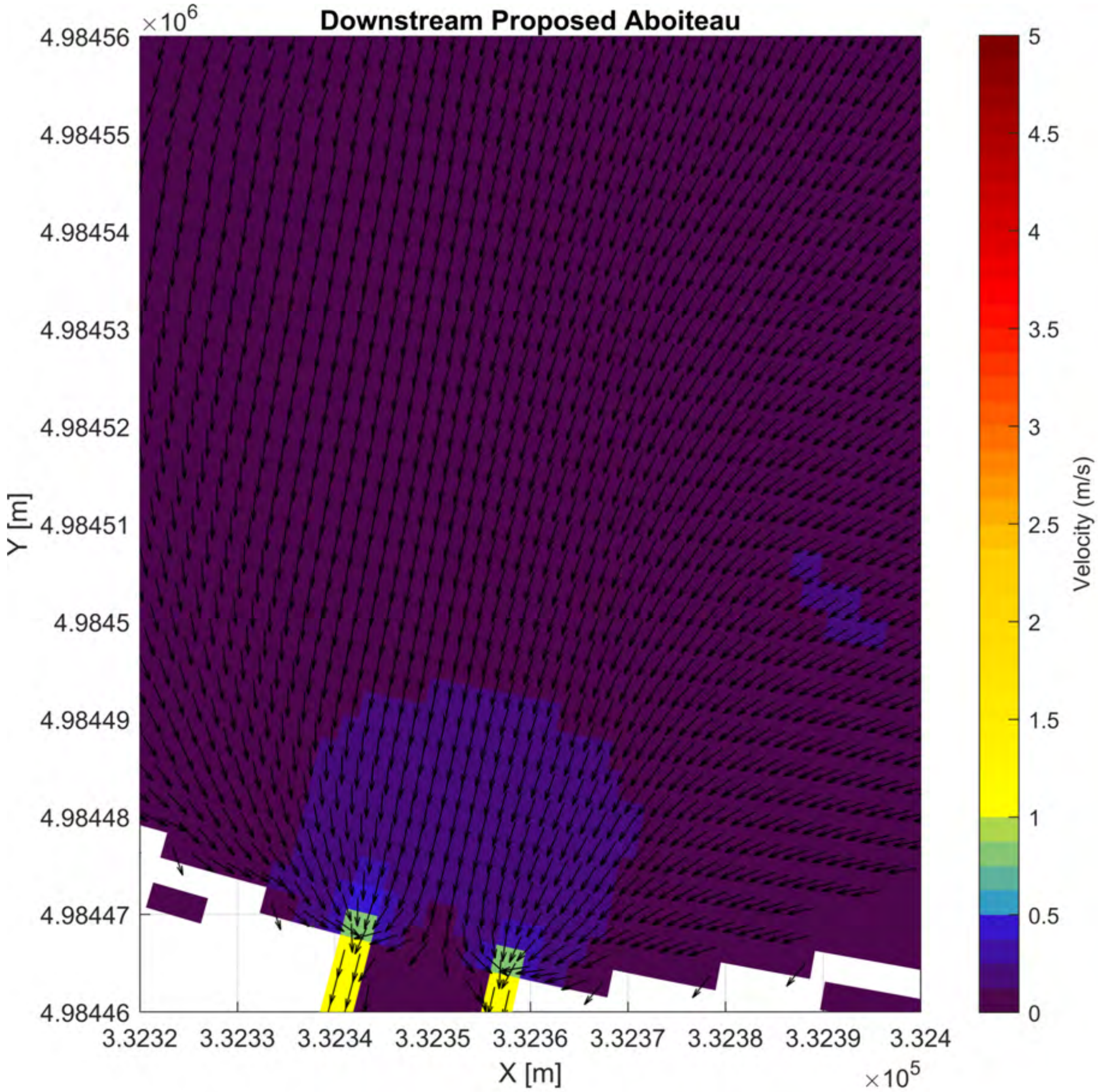


Figure A1.7: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Overall Study Area.



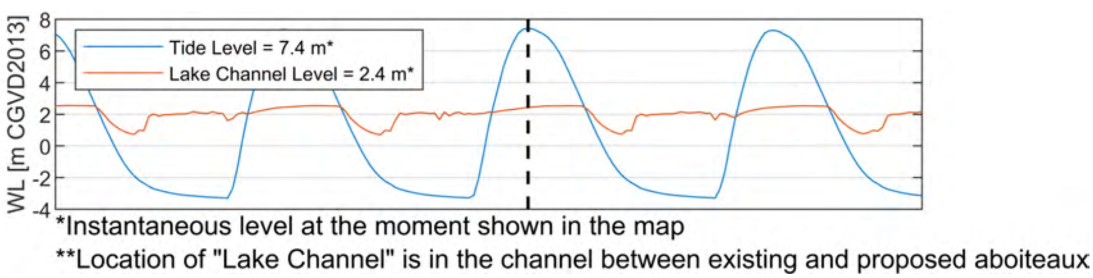


Figure A1.8: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Downstream Proposed Aboiteau.

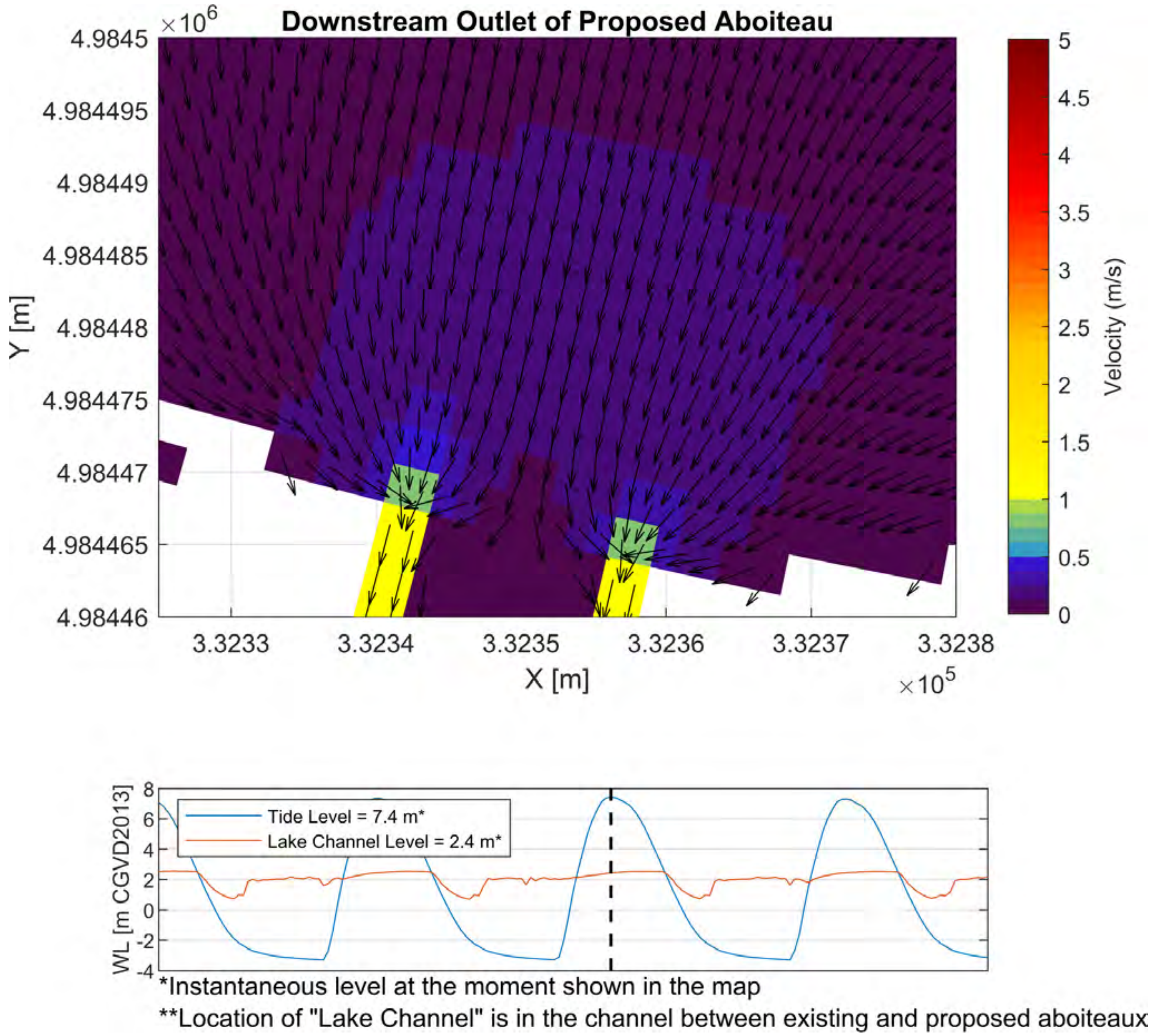


Figure A1.9: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Downstream Outlet of Proposed Aboiteau.

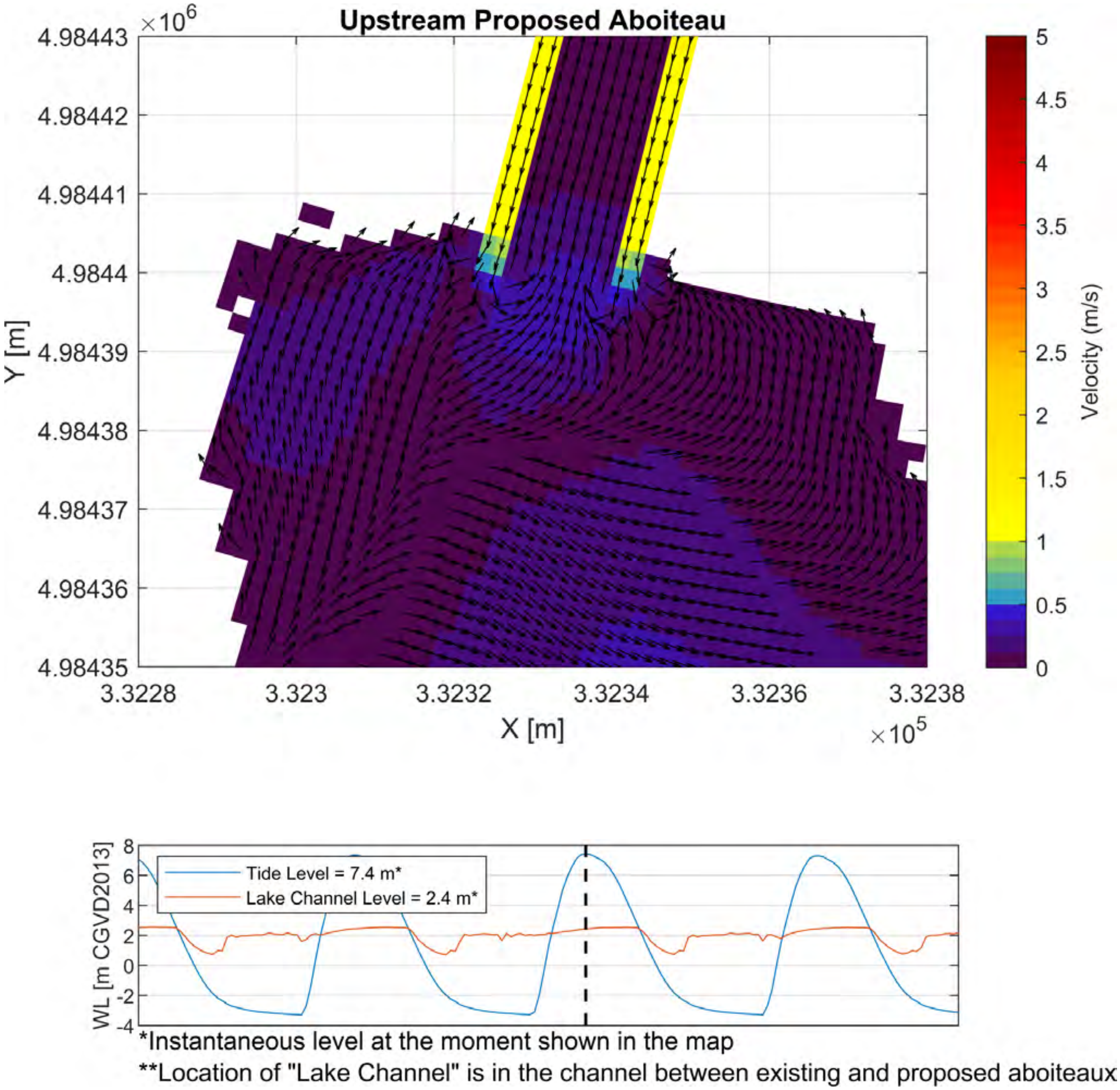


Figure A1.10: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Upstream Proposed Aboiteau.

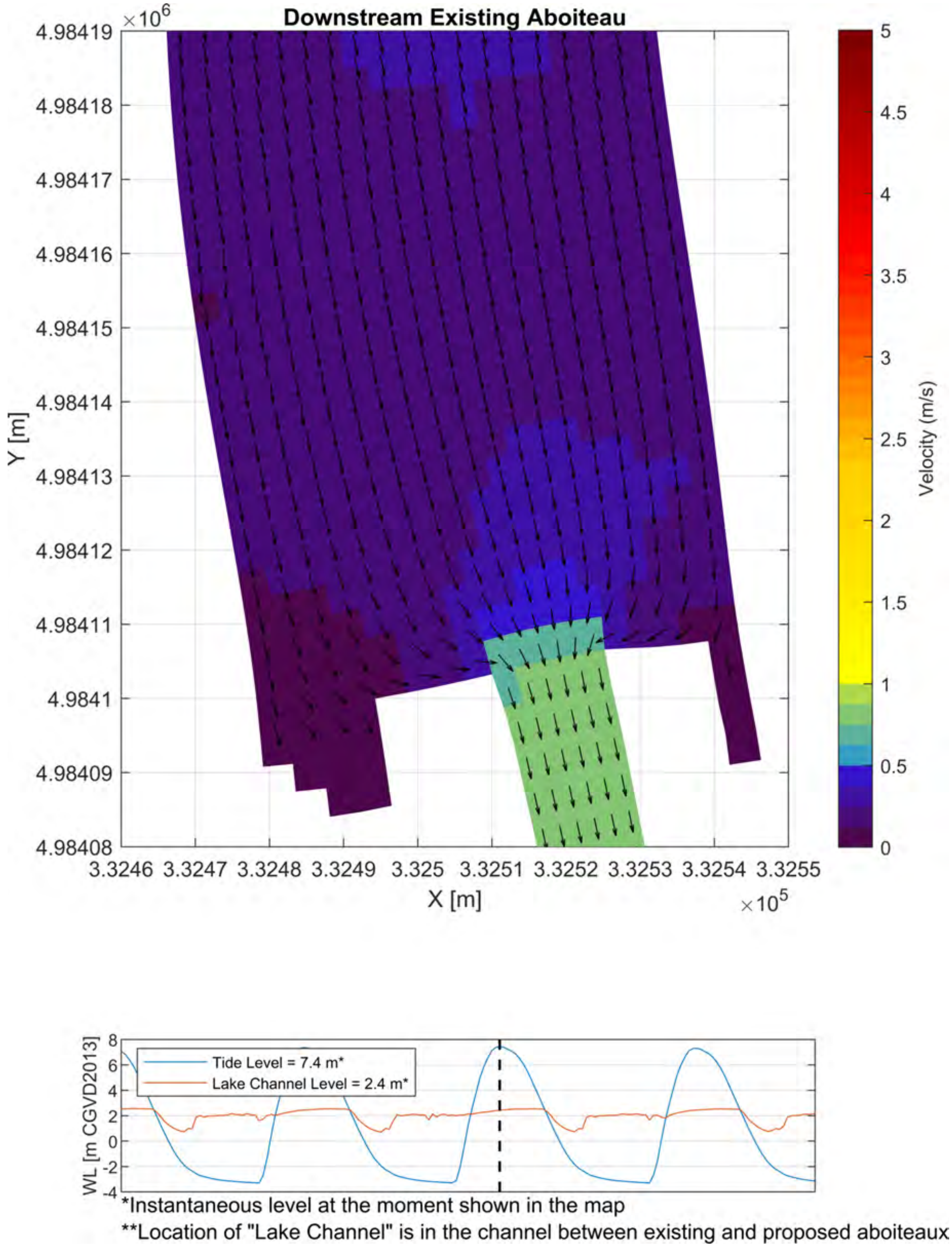
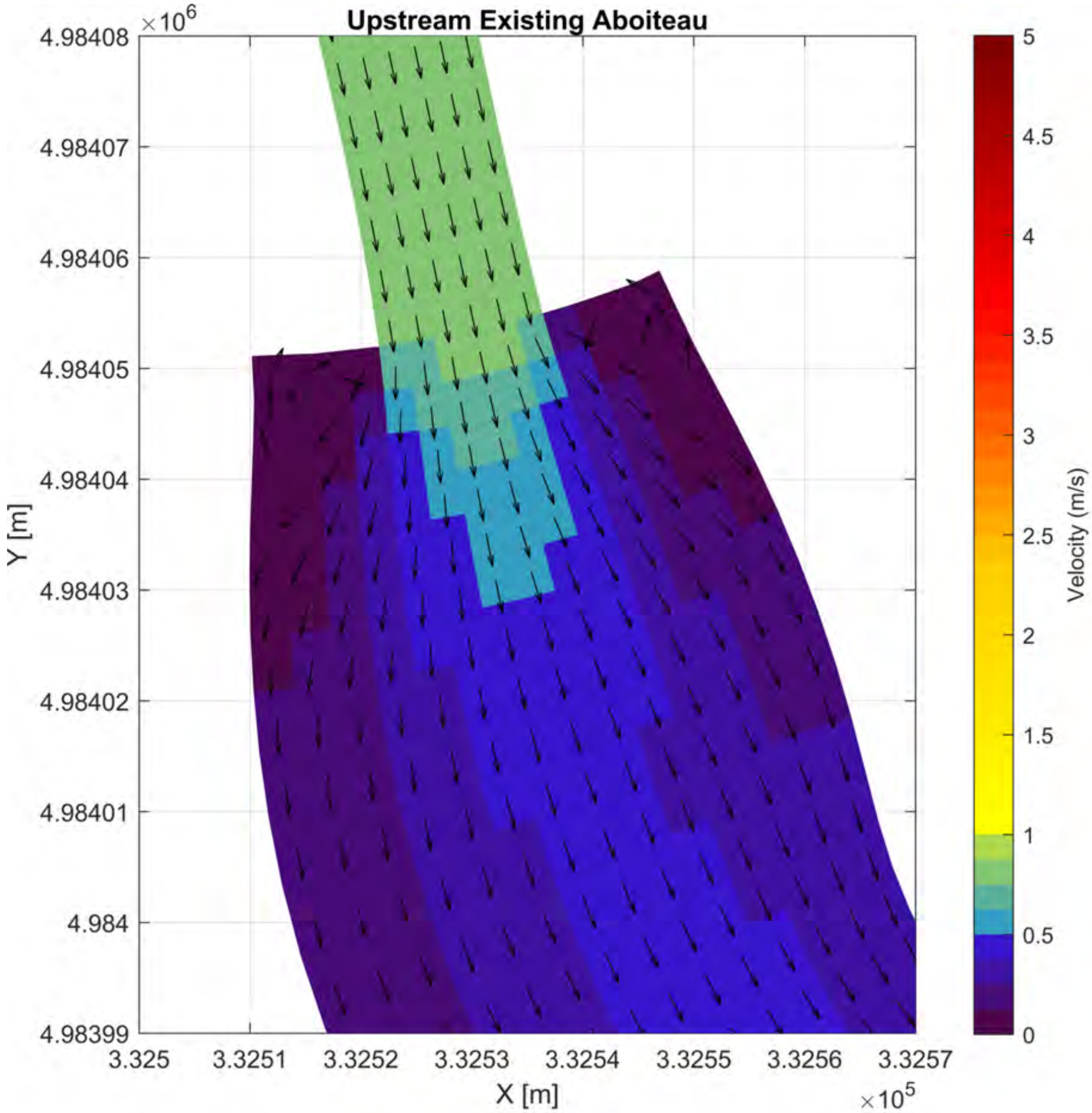


Figure A1.11: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Downstream Existing Aboiteau.



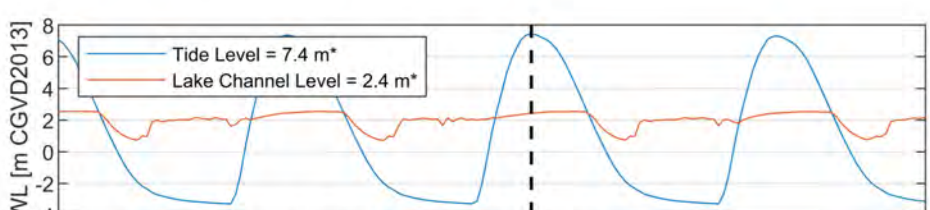


Figure A1.12: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Upstream Existing Aboiteau.

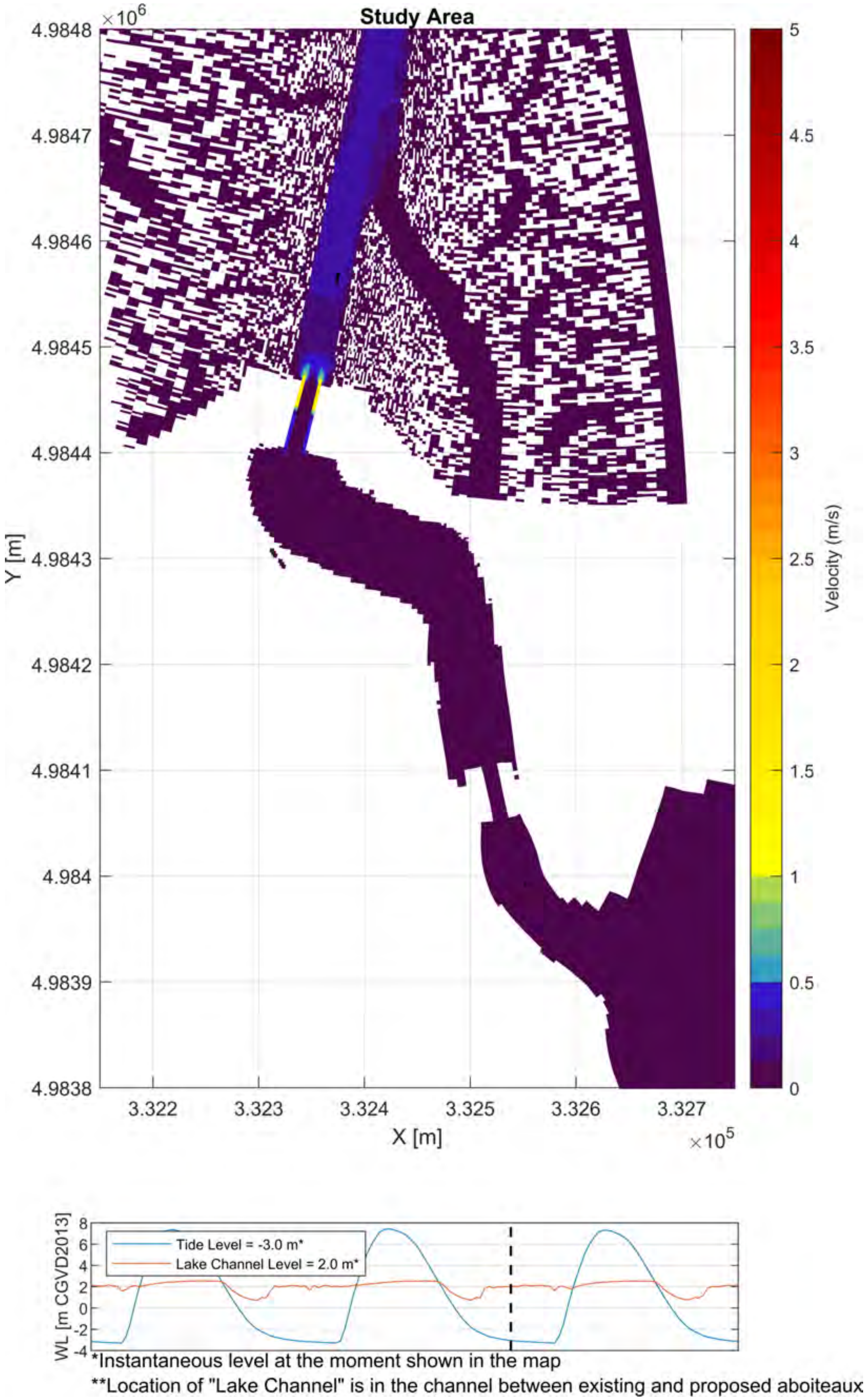
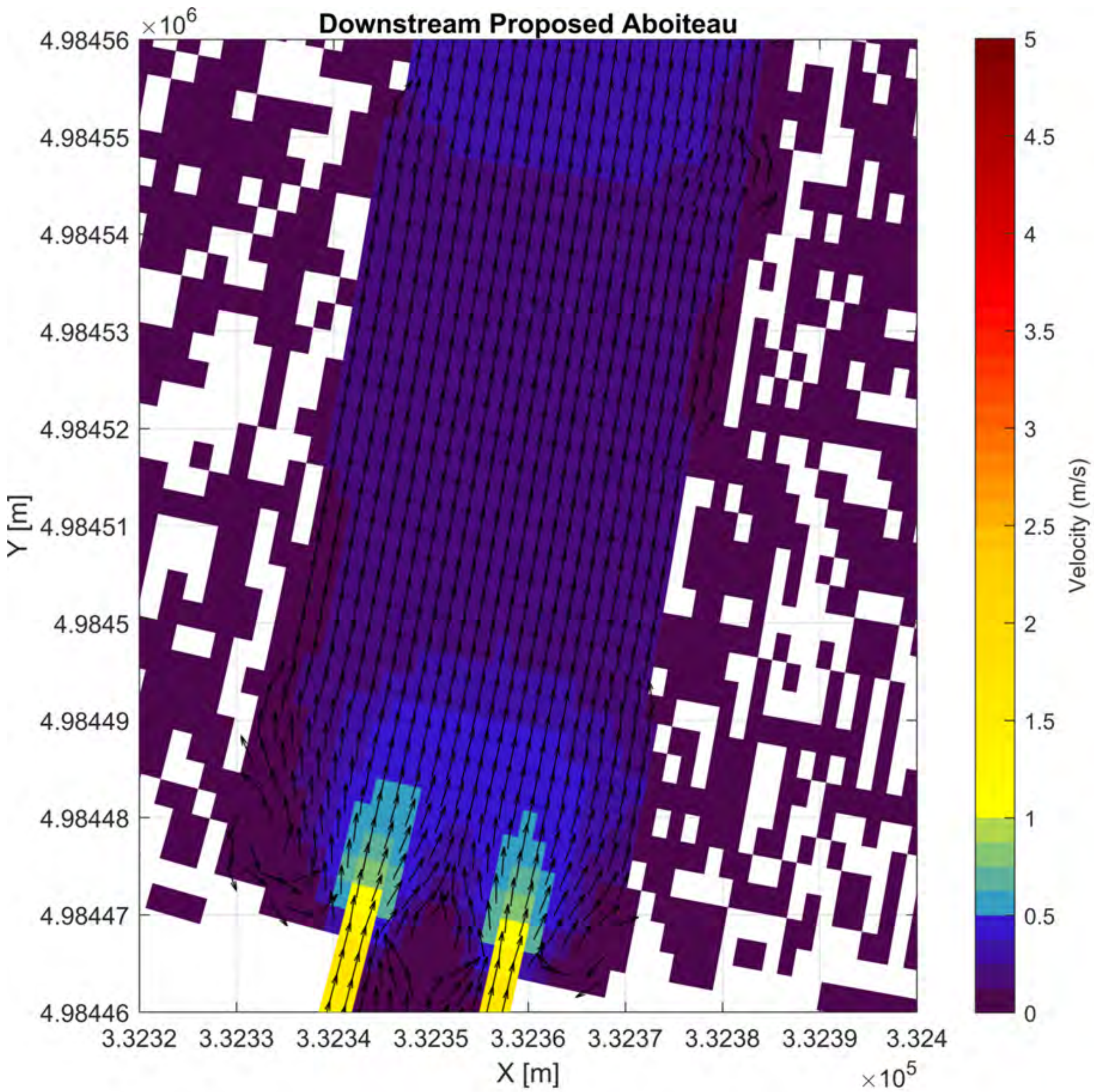


Figure A1.13: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Overall Study Area.



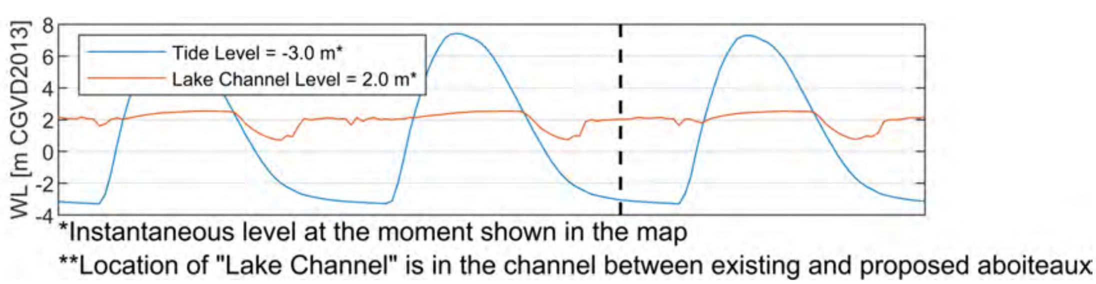


Figure A1.14: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Downstream Proposed Aboiteau.

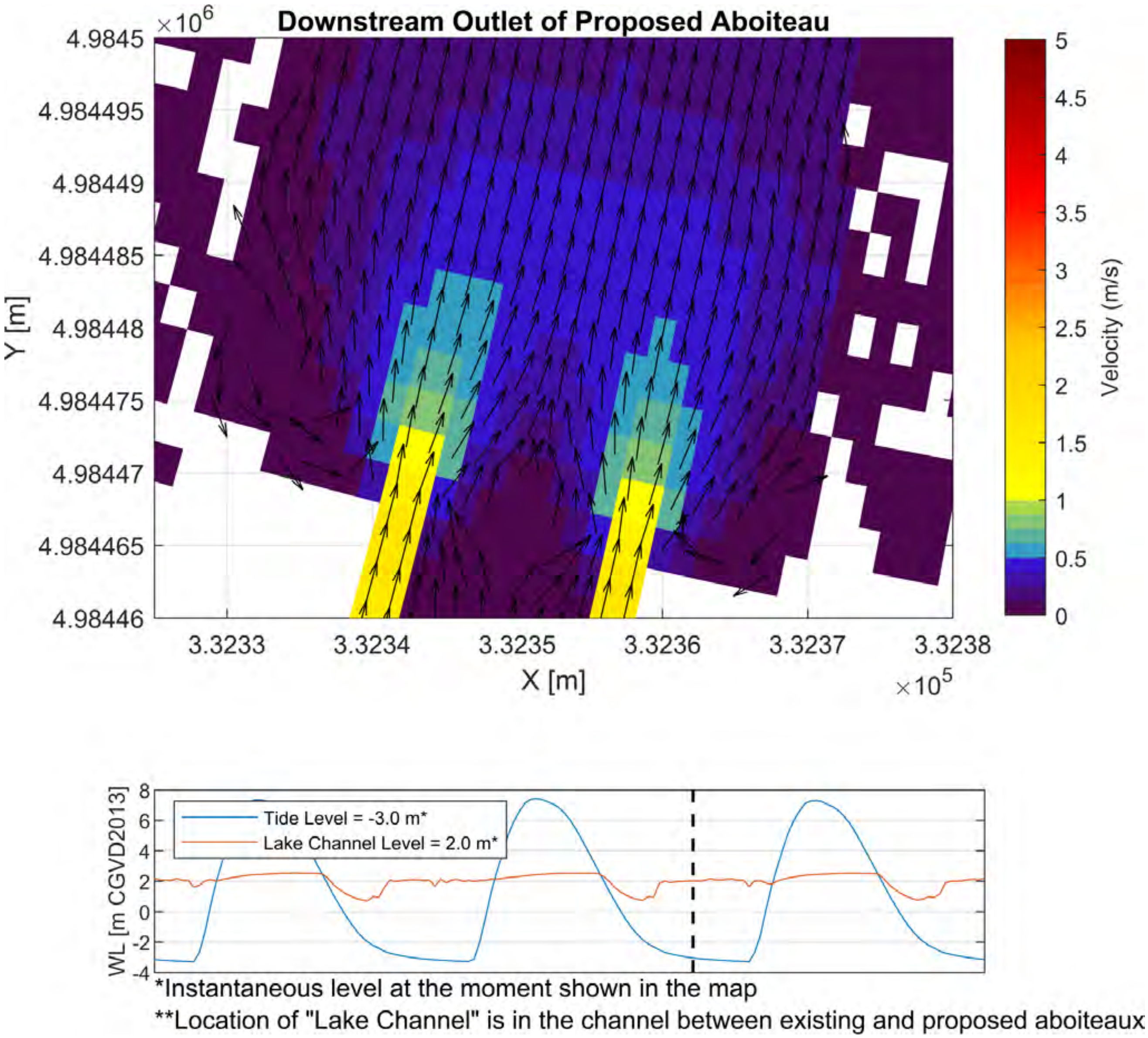


Figure A1.15: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Downstream Outlet of Proposed Aboiteau.

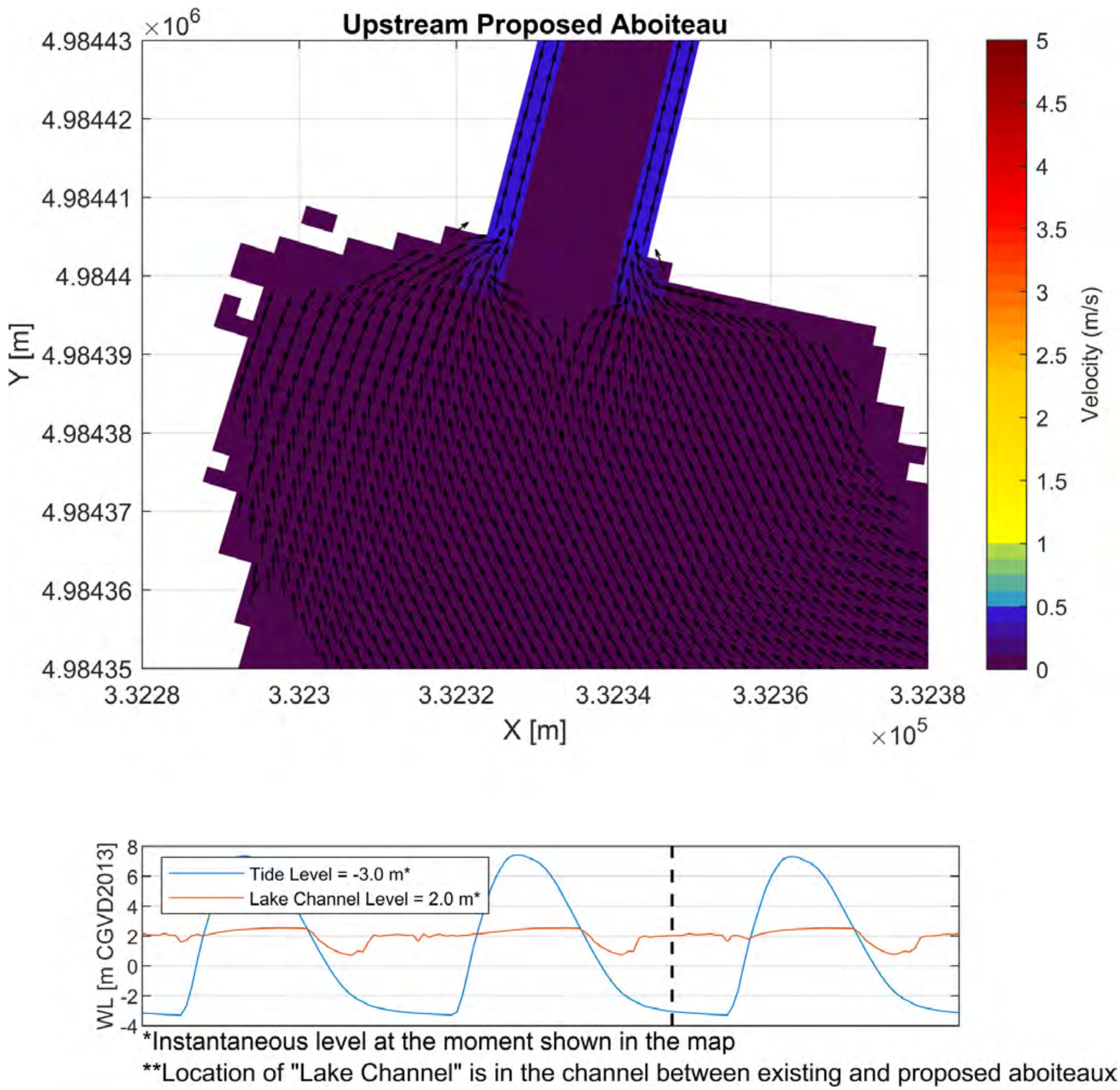
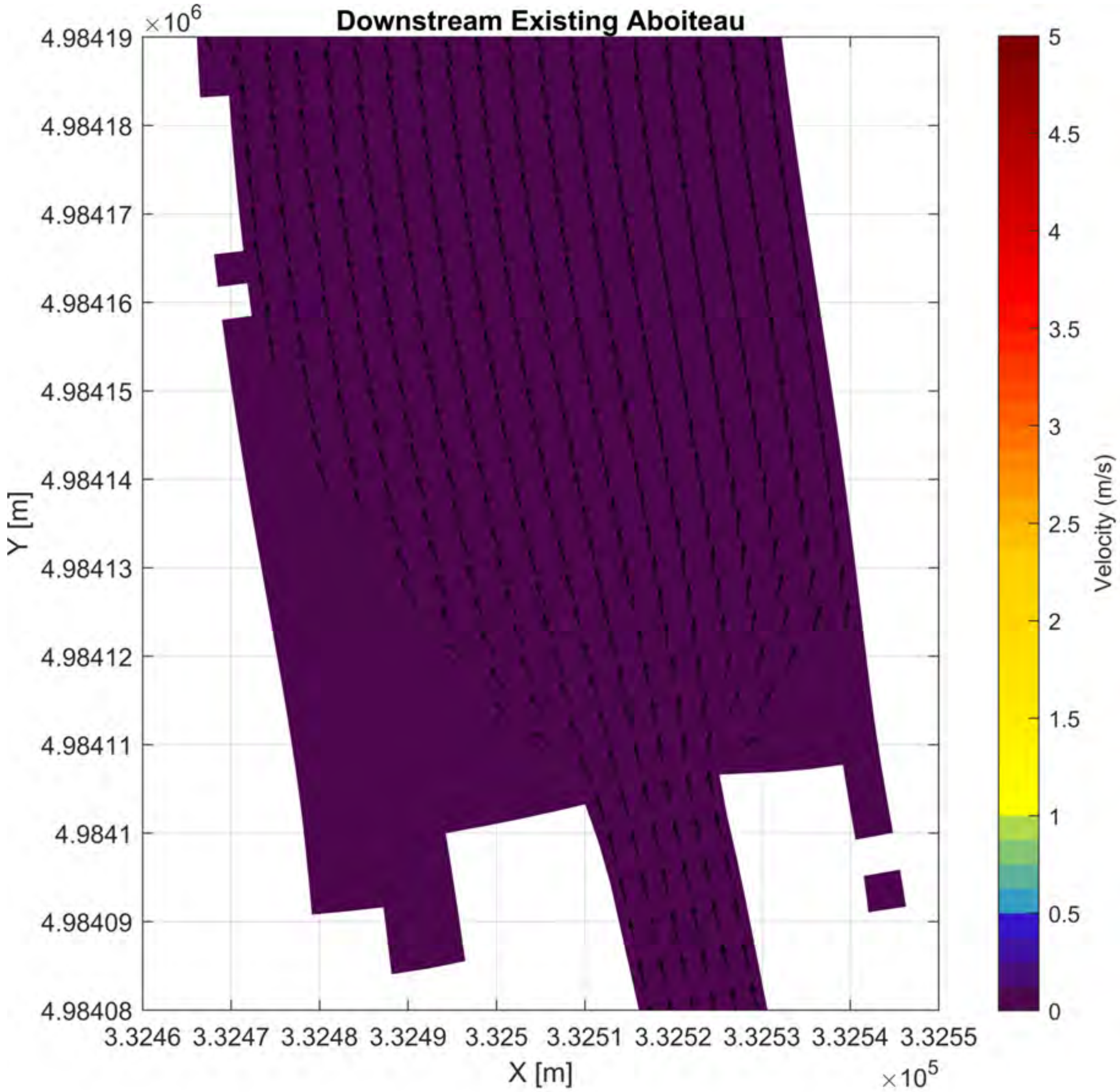
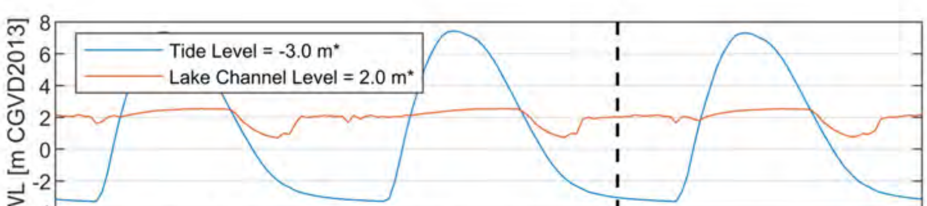


Figure A1.16: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Upstream Proposed Aboiteau.

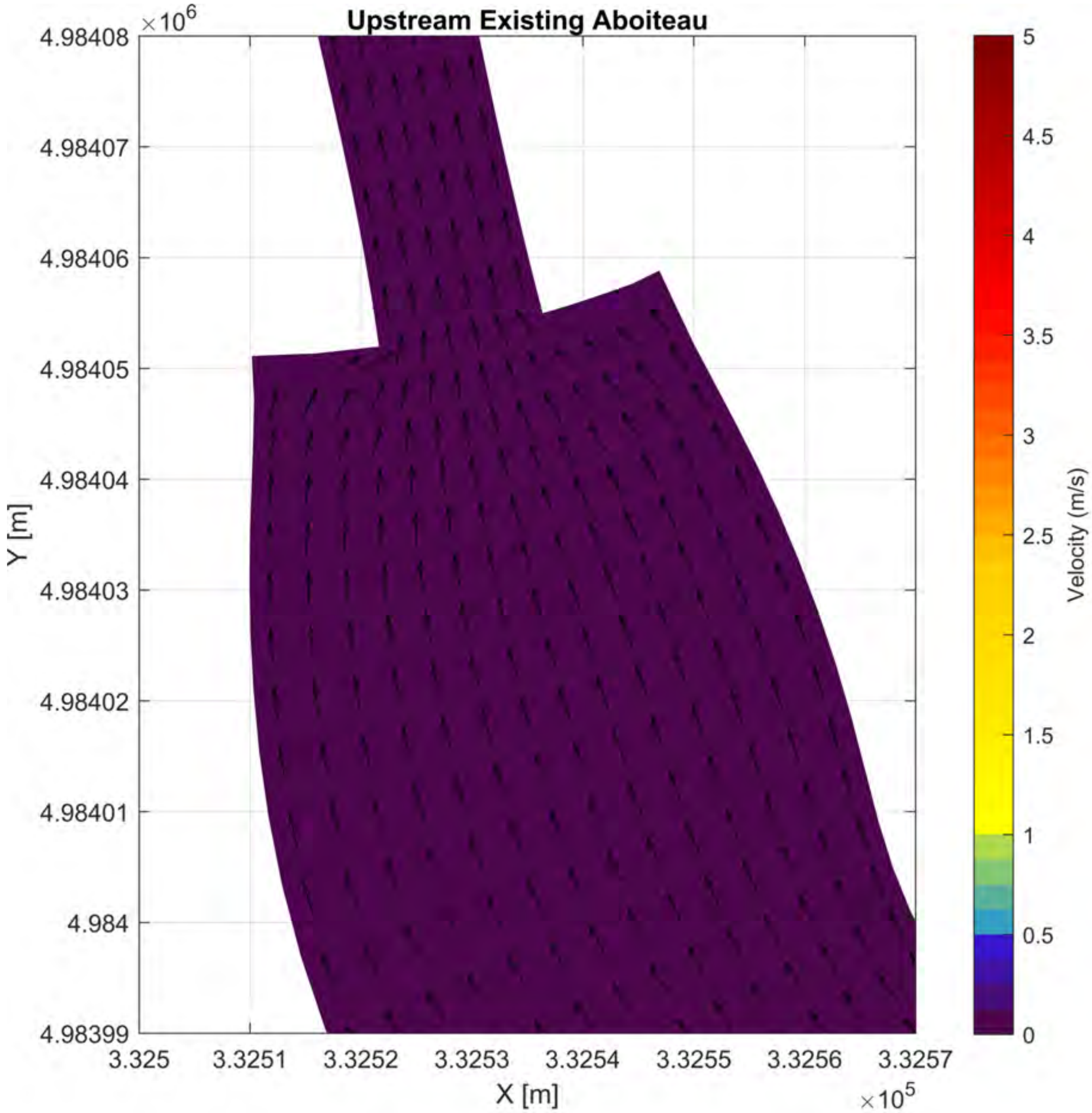




*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.17: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Downstream Existing Aboiteau.



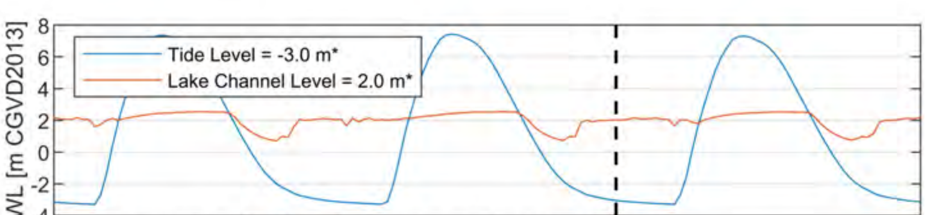


Figure A1.18: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Upstream Existing Aboiteau.

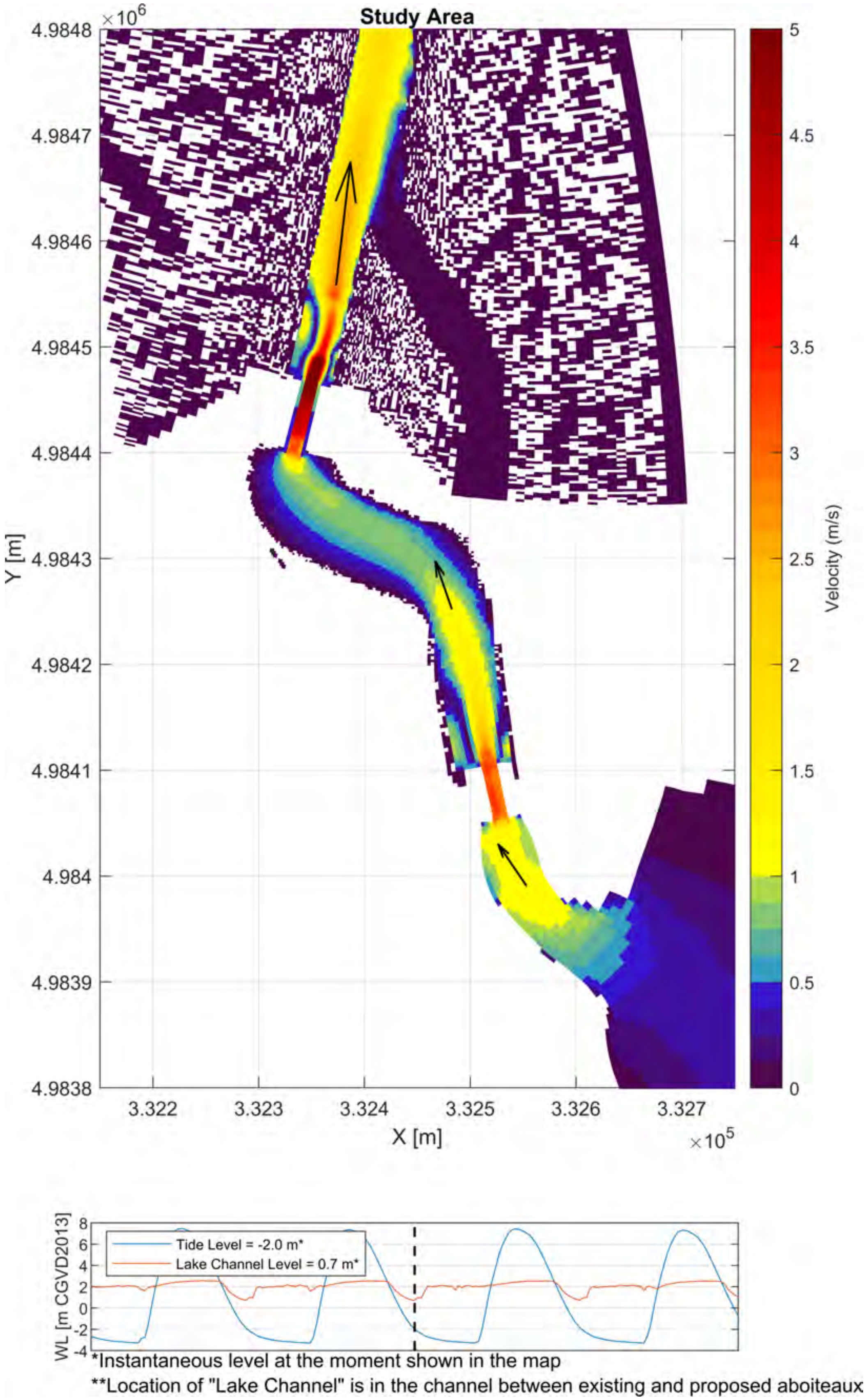
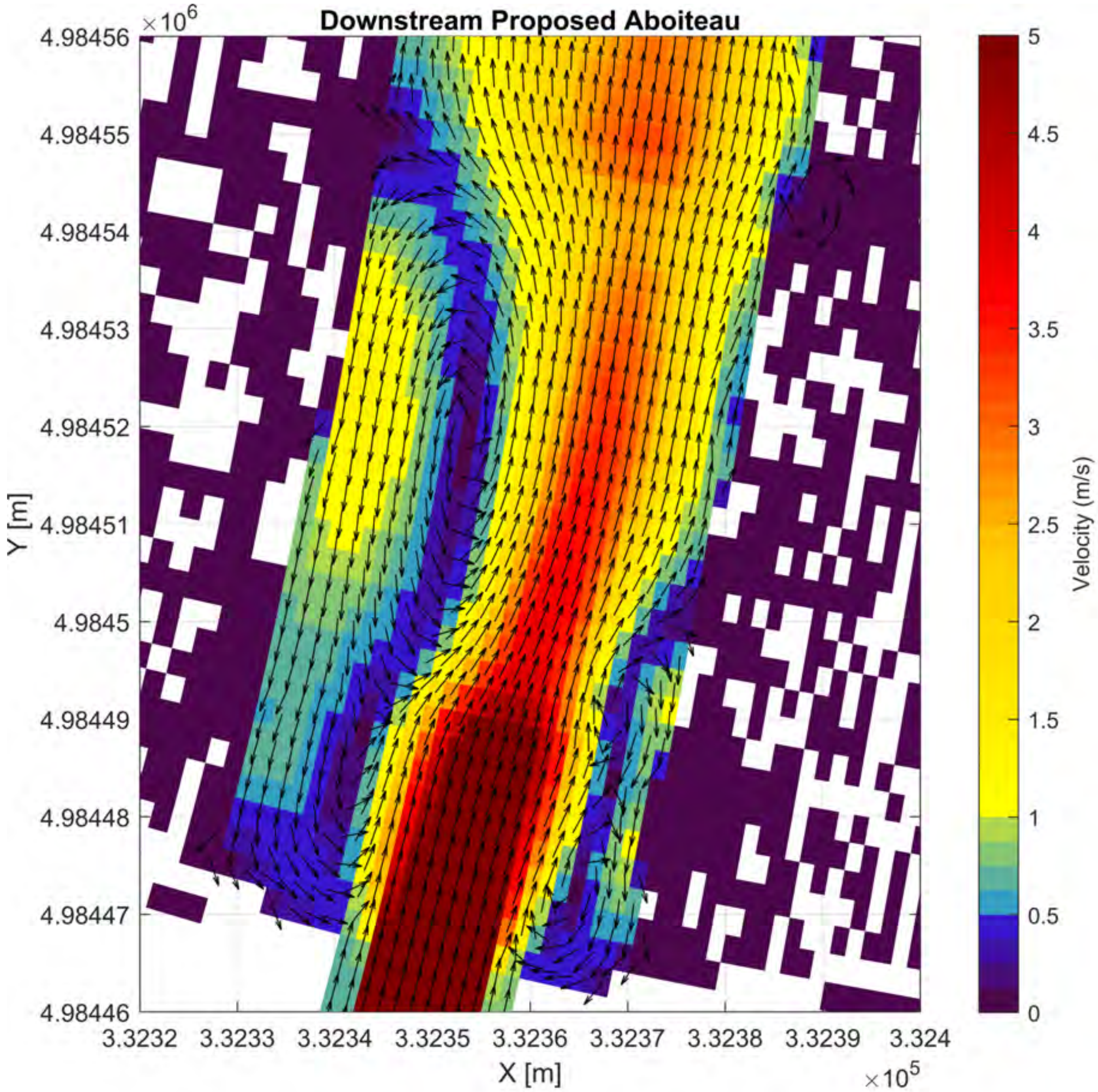
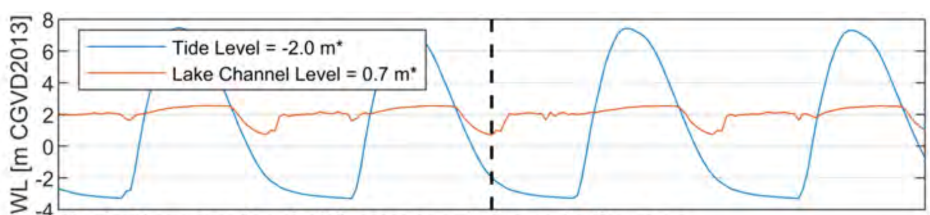


Figure A1.19: Map of Velocities for Middle Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Overall Study Area.





*Instantaneous level at the moment shown in the map
**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.20: Map of Velocities for Middle Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Downstream Proposed Aboiteau.

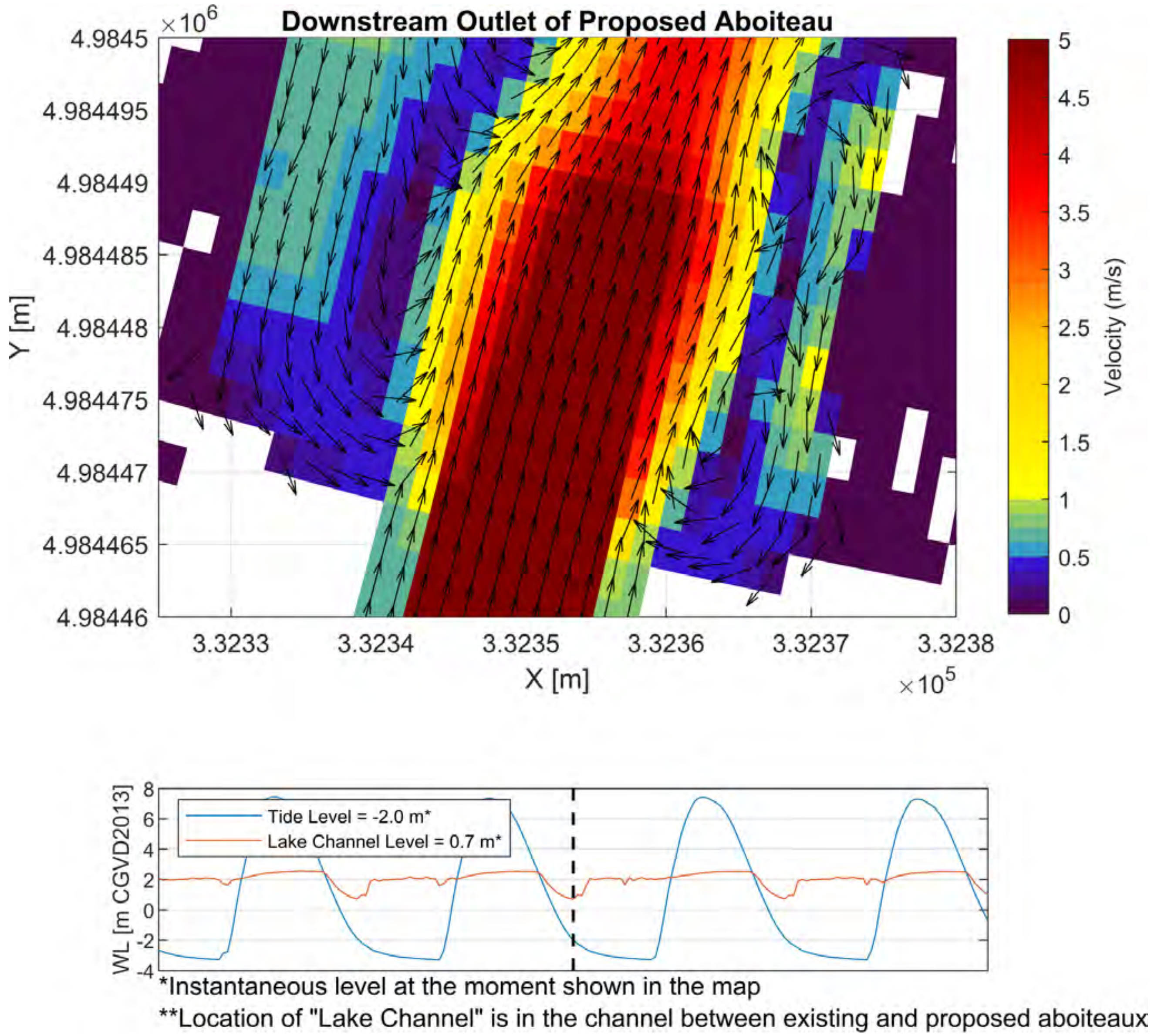
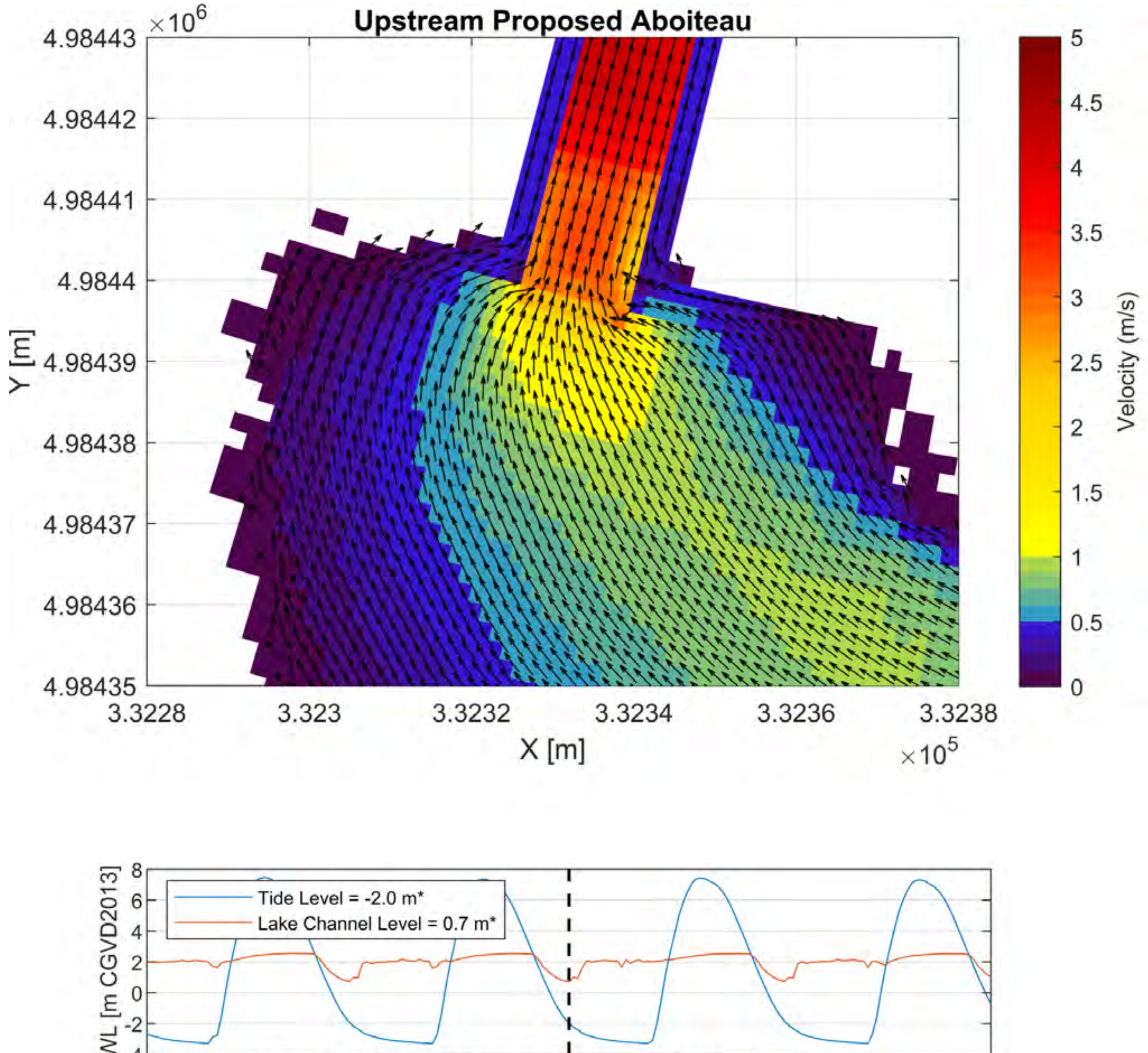


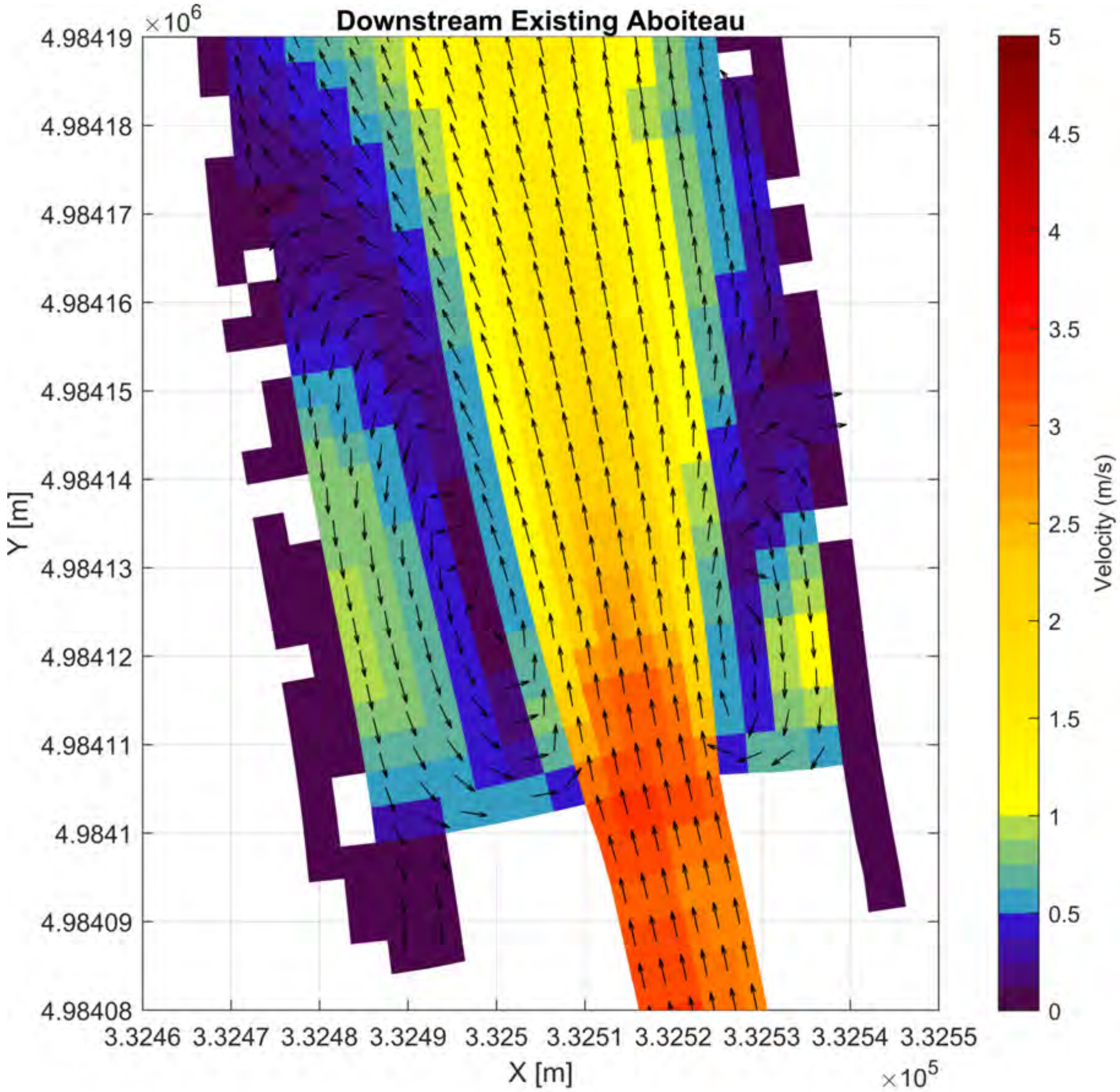
Figure A1.21: Map of Velocities for Middle Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Downstream Outlet of Proposed Aboiteau.

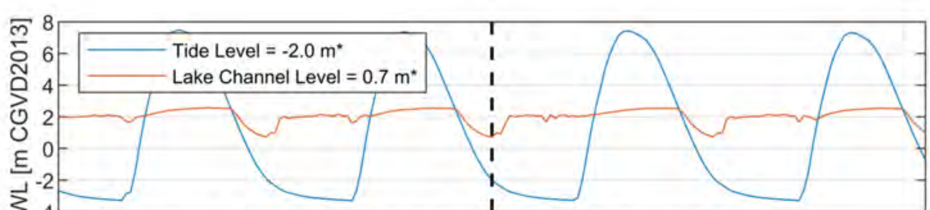


*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.22: Map of Velocities for Middle Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Upstream Proposed Aboiteau.





*Instantaneous level at the moment shown in the map
**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.23: Map of Velocities for Middle Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Downstream Existing Aboiteau.

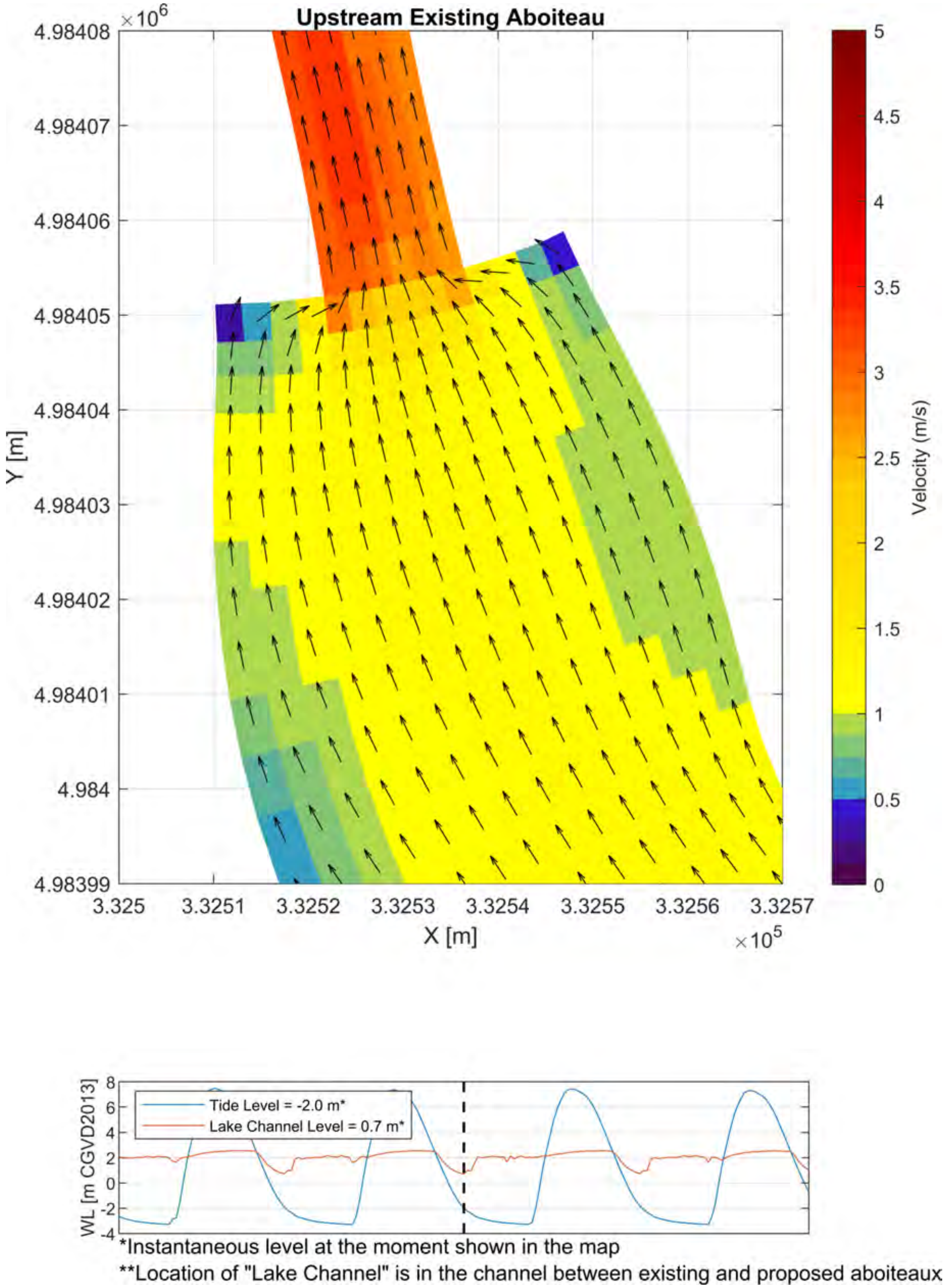


Figure A1.24: Map of Velocities for Middle Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Upstream Existing Aboiteau.

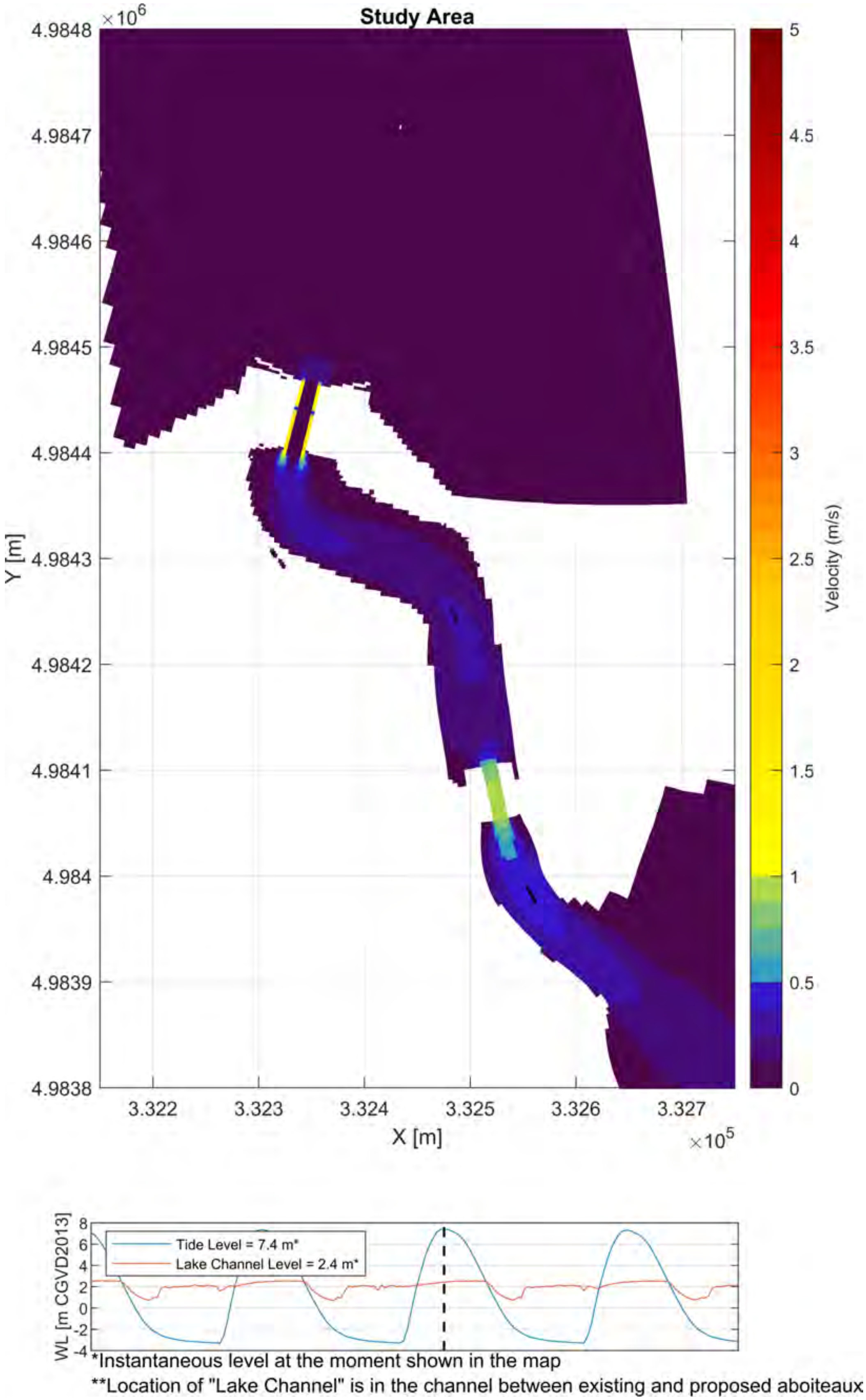


Figure A1.25: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Overall Study Area.

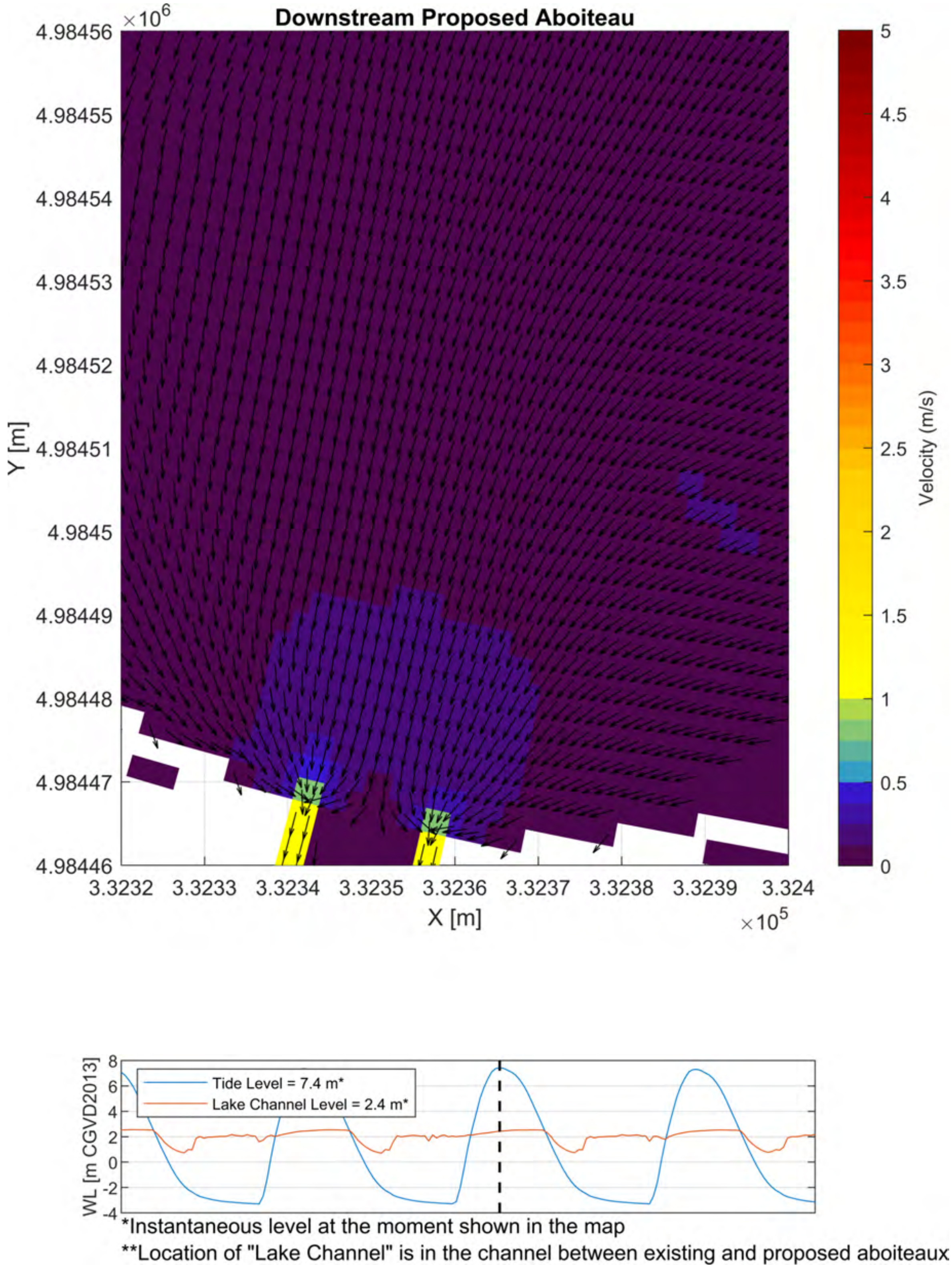
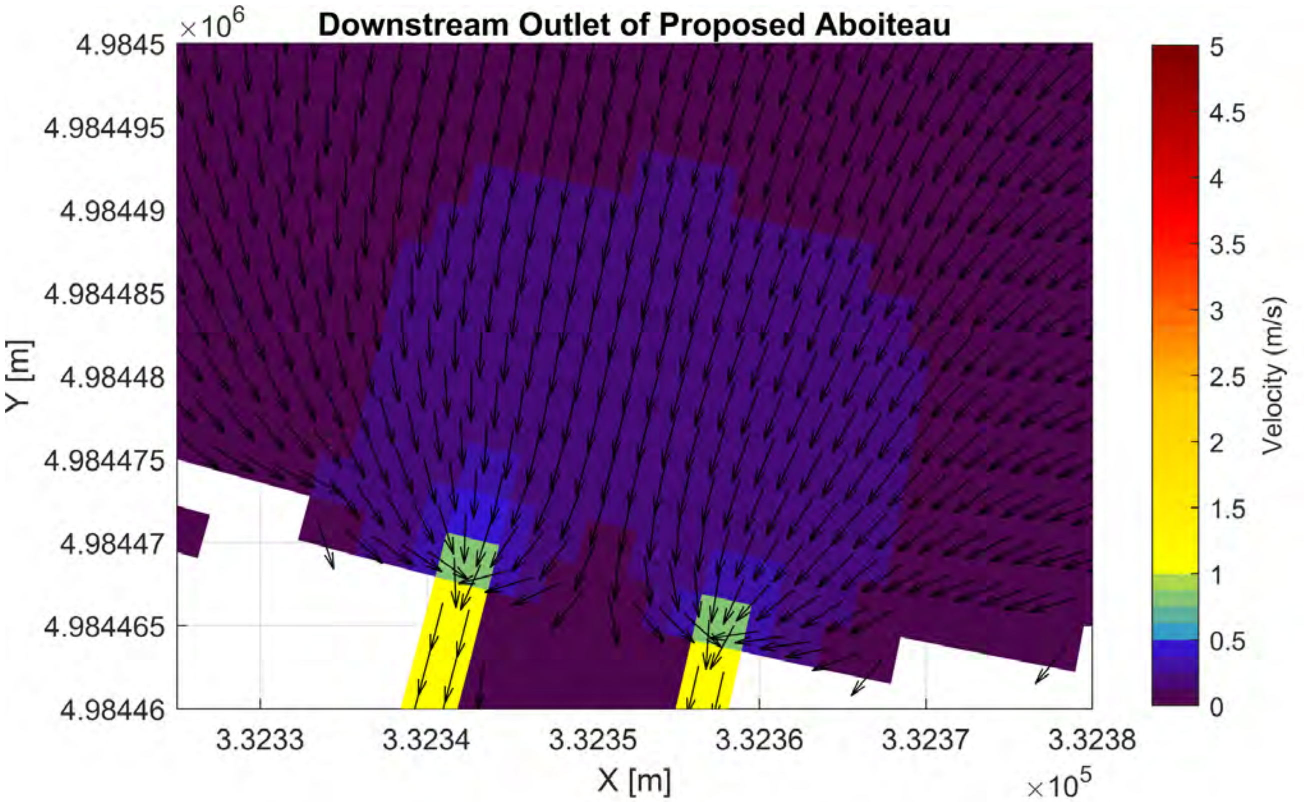


Figure A1.26: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Downstream Proposed Aboiteau.



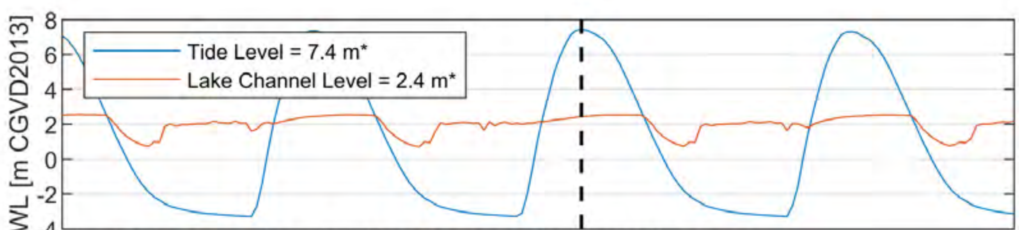
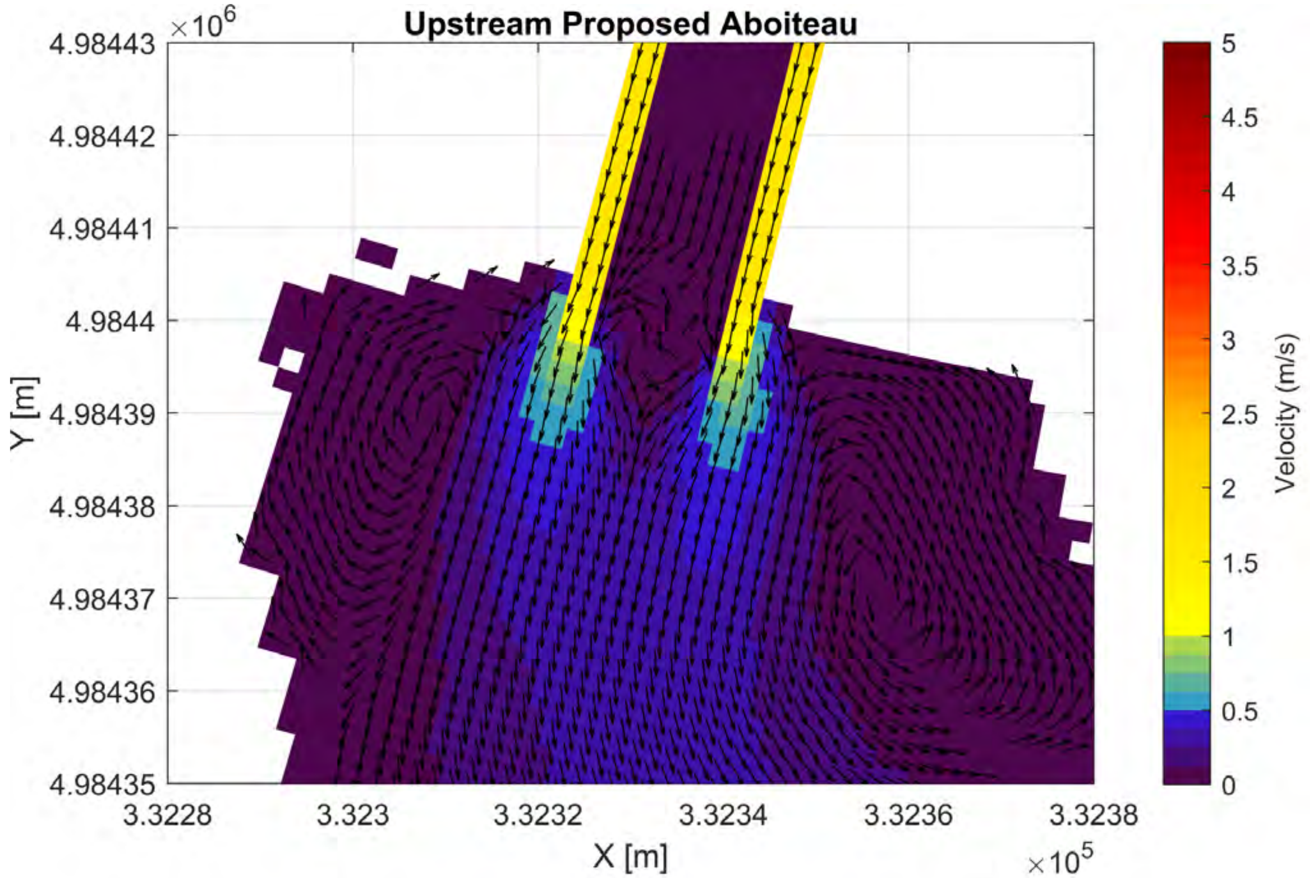


Figure A1.27: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Downstream Outlet of Proposed Aboiteau.



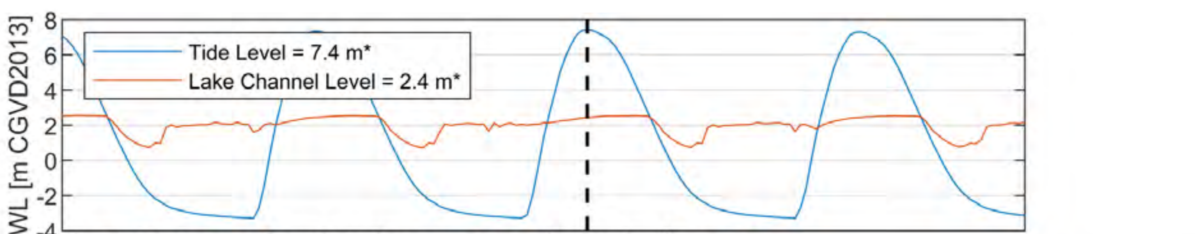
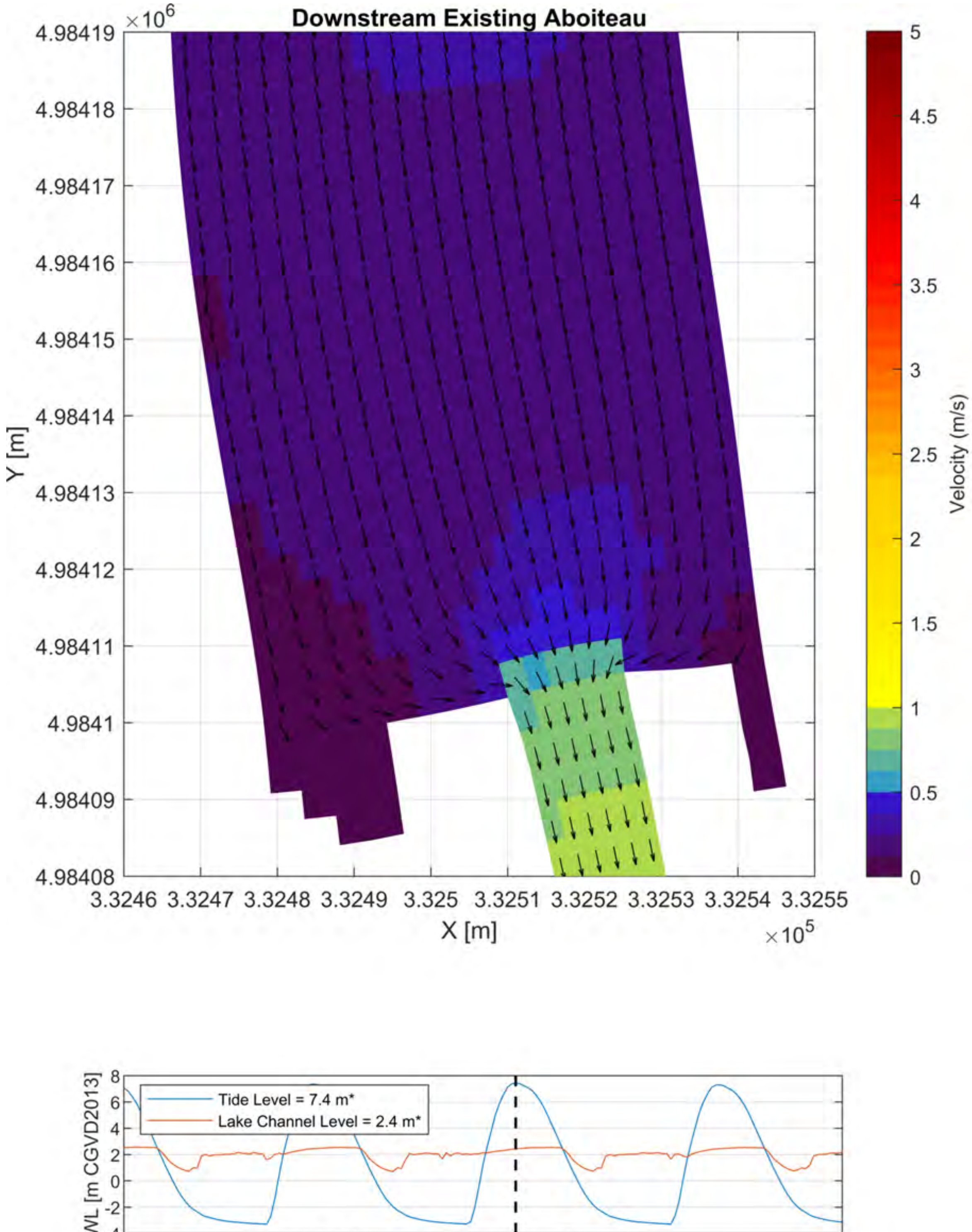


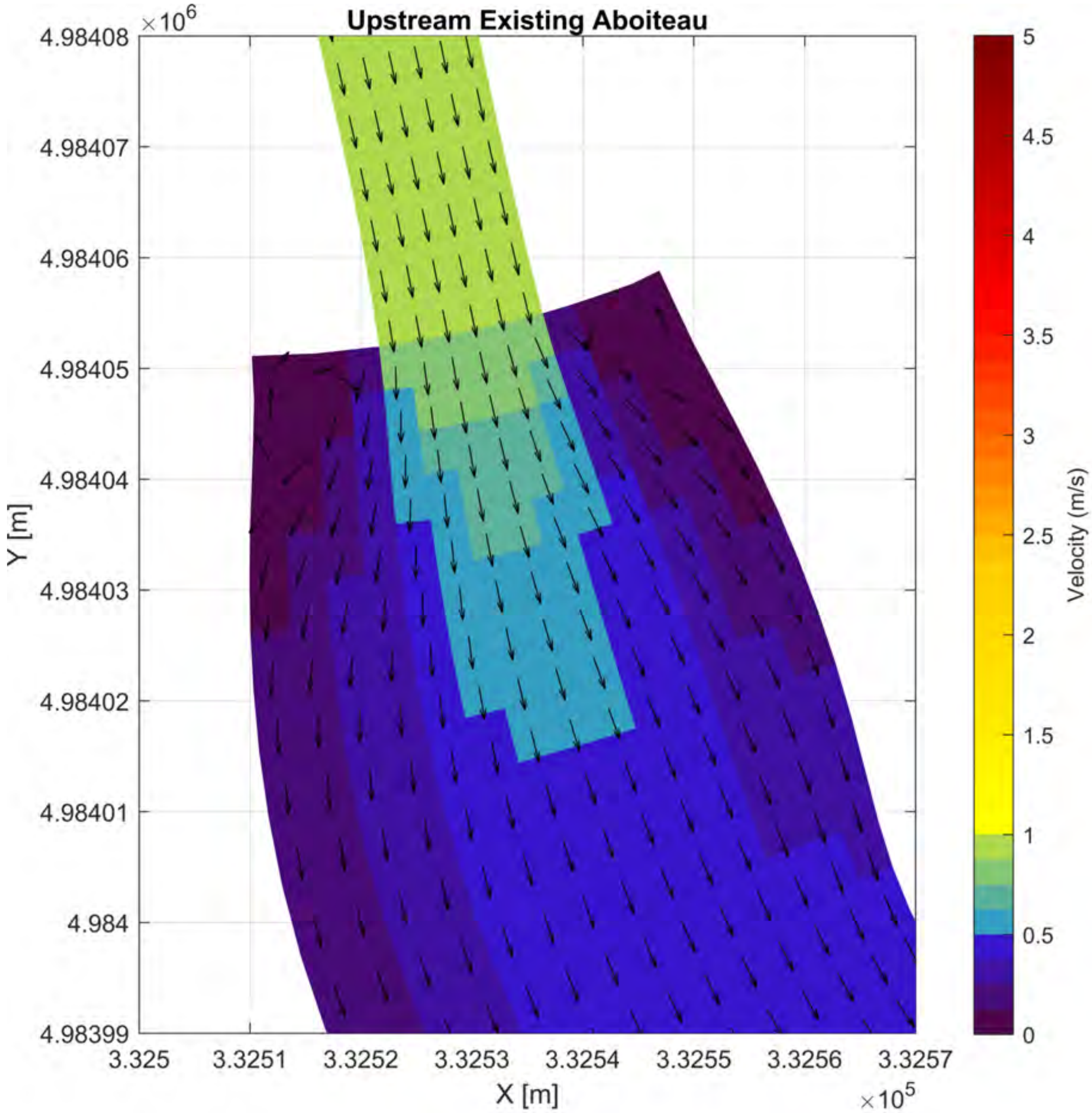
Figure A1.28: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Upstream Proposed Aboiteau.



*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.29: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Downstream Existing Aboiteau.



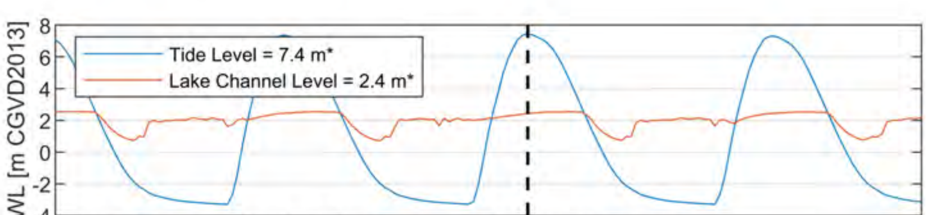
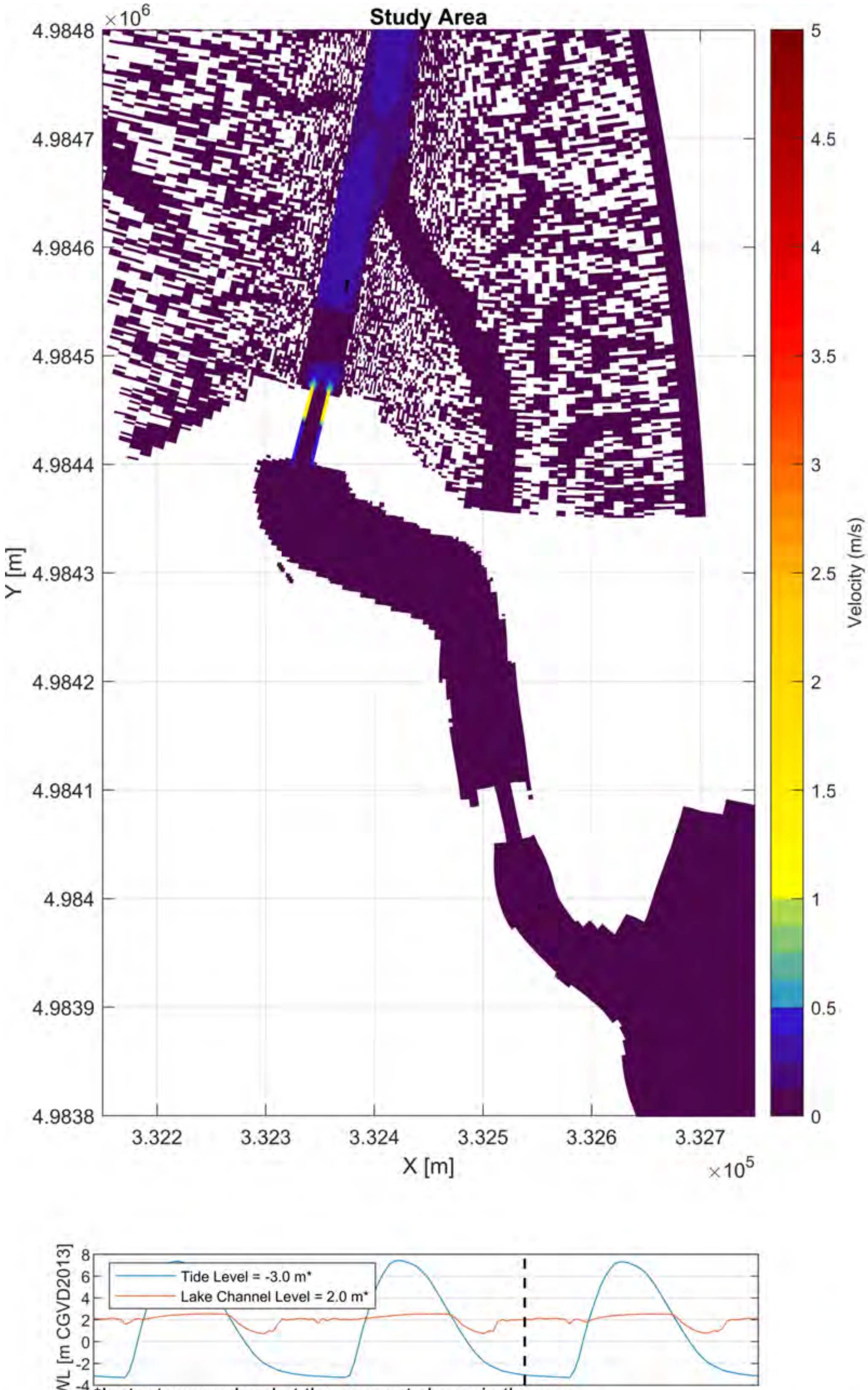


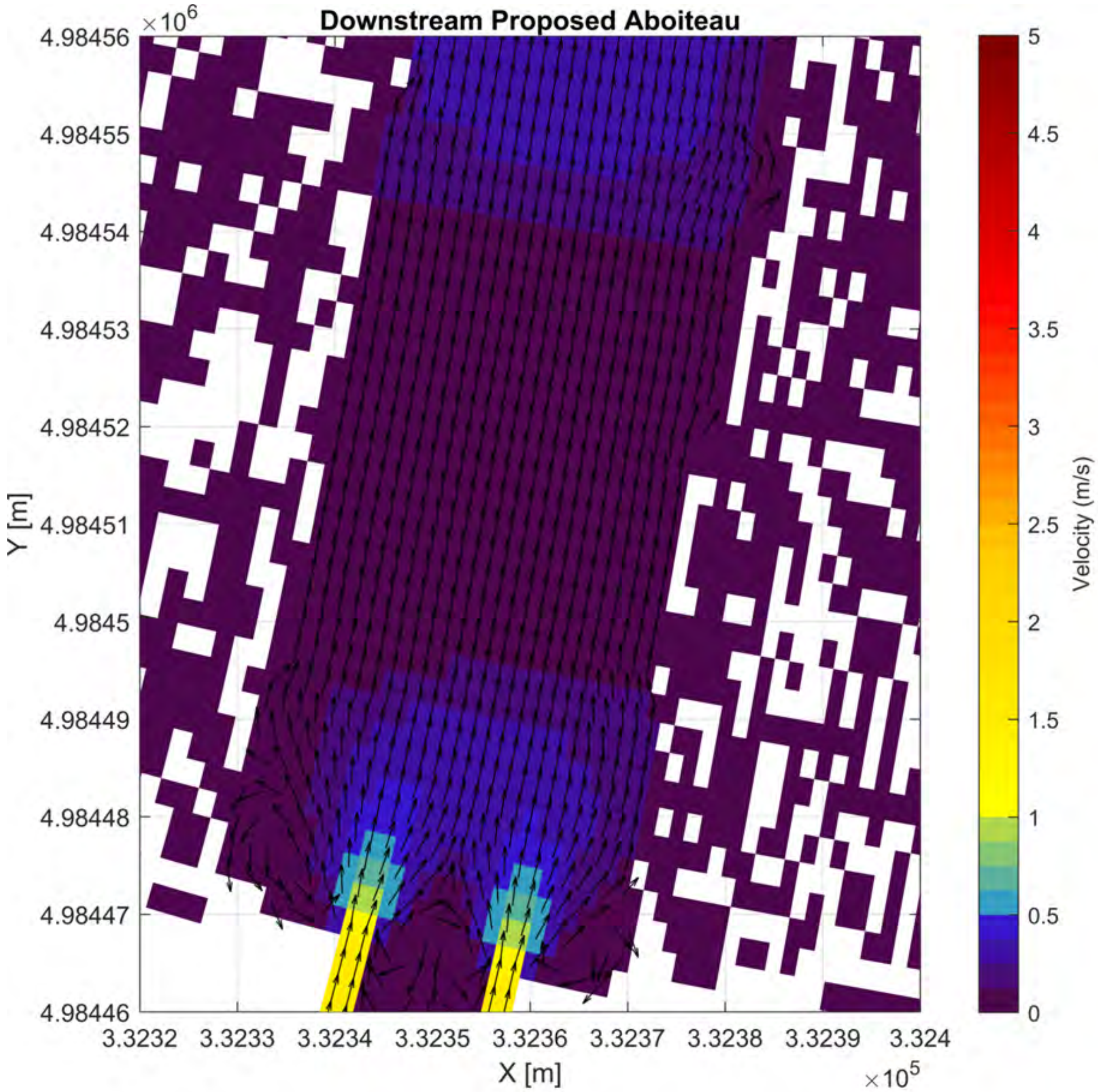
Figure A1.30: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Upstream Existing Aboiteau.



*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.31: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Overall Study Area.



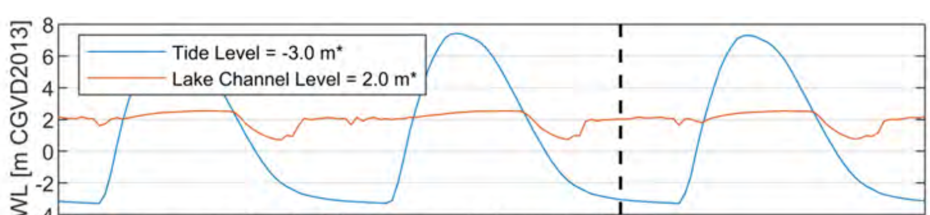
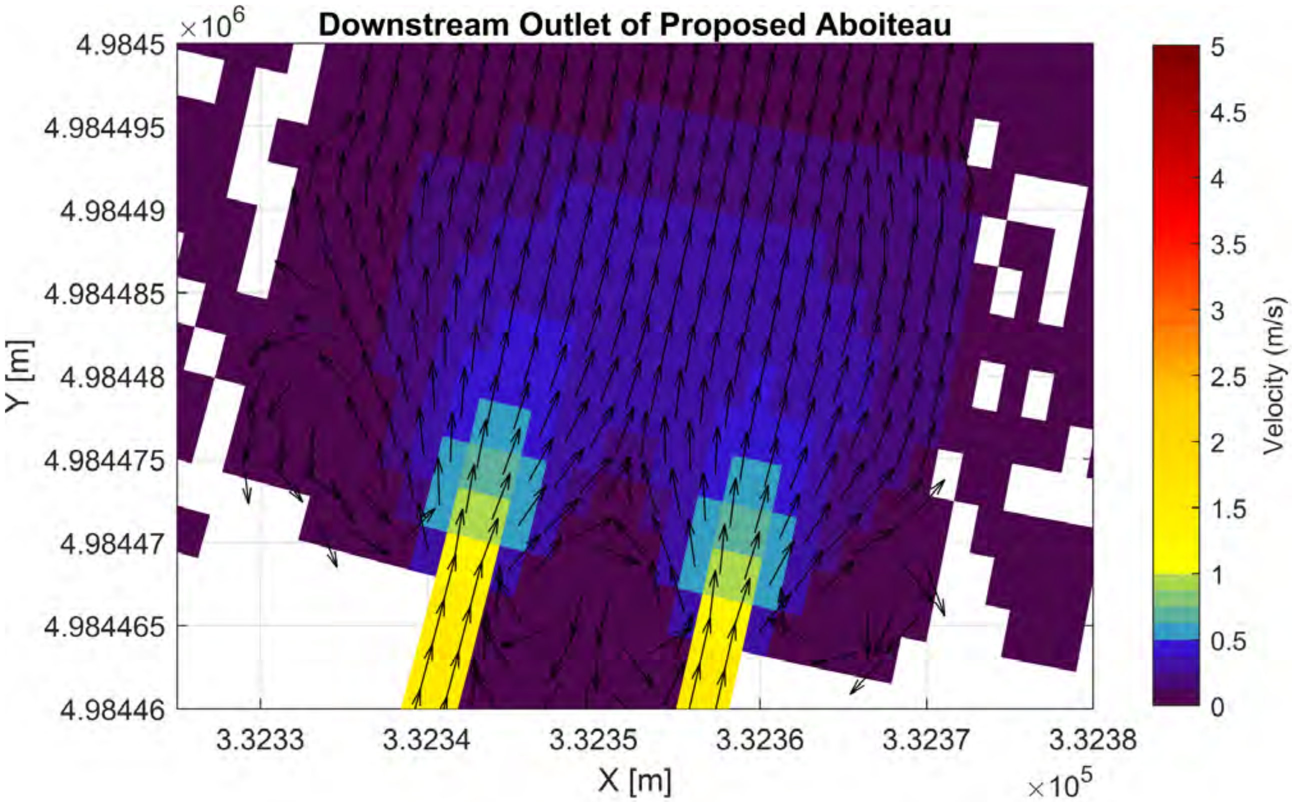


Figure A1.32: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Downstream Proposed Aboiteau.



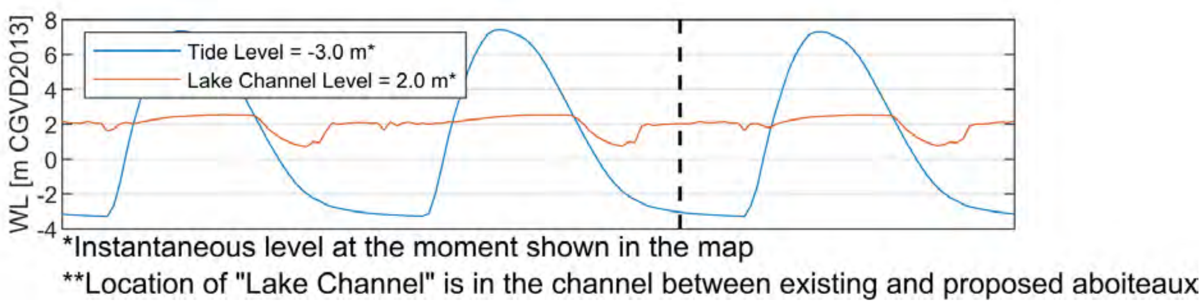
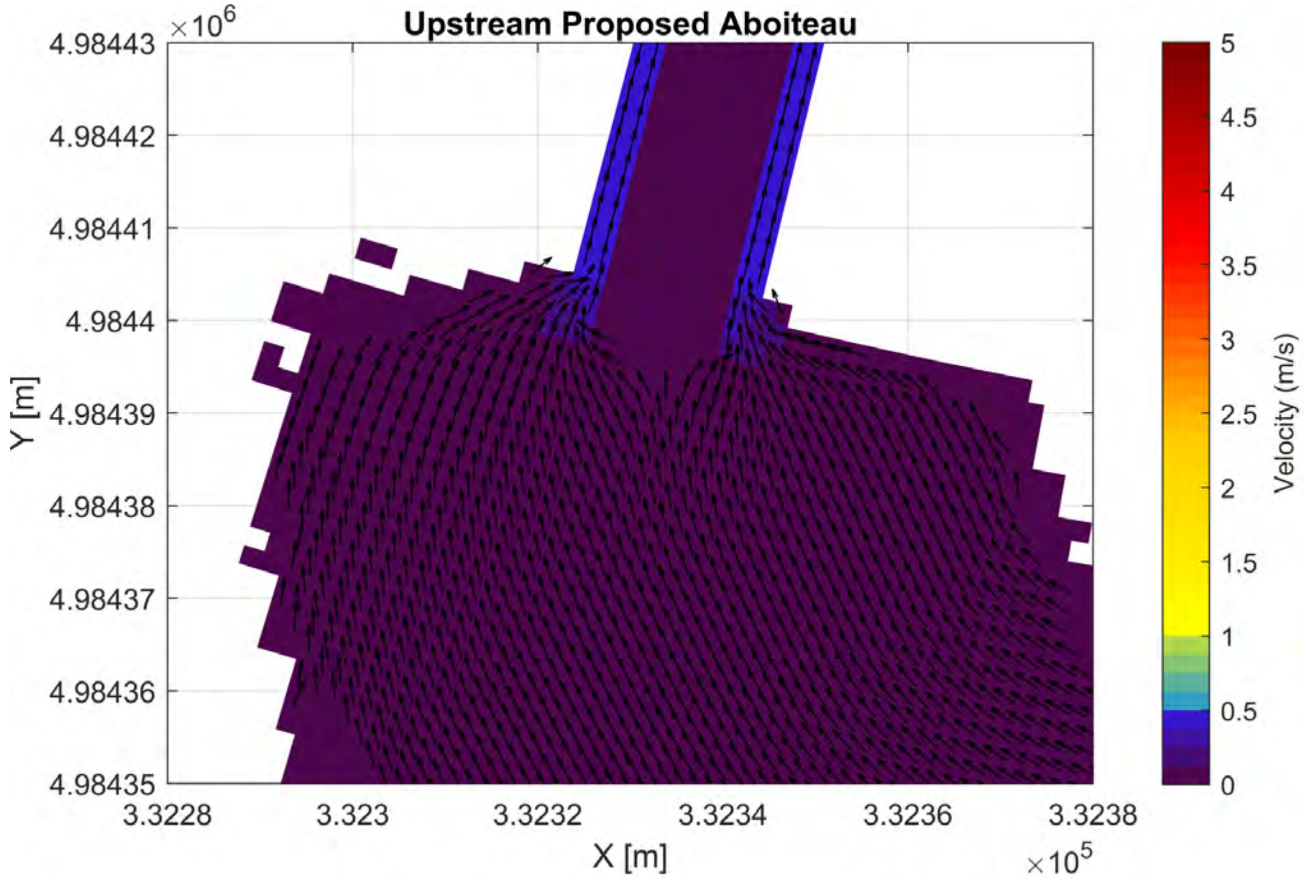


Figure A1.33: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Downstream Outlet of Proposed Aboiteau.



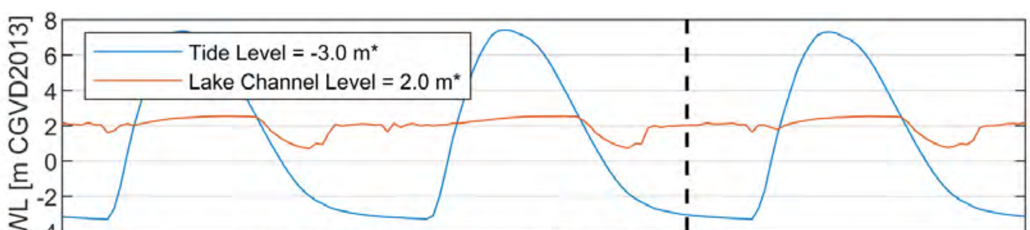
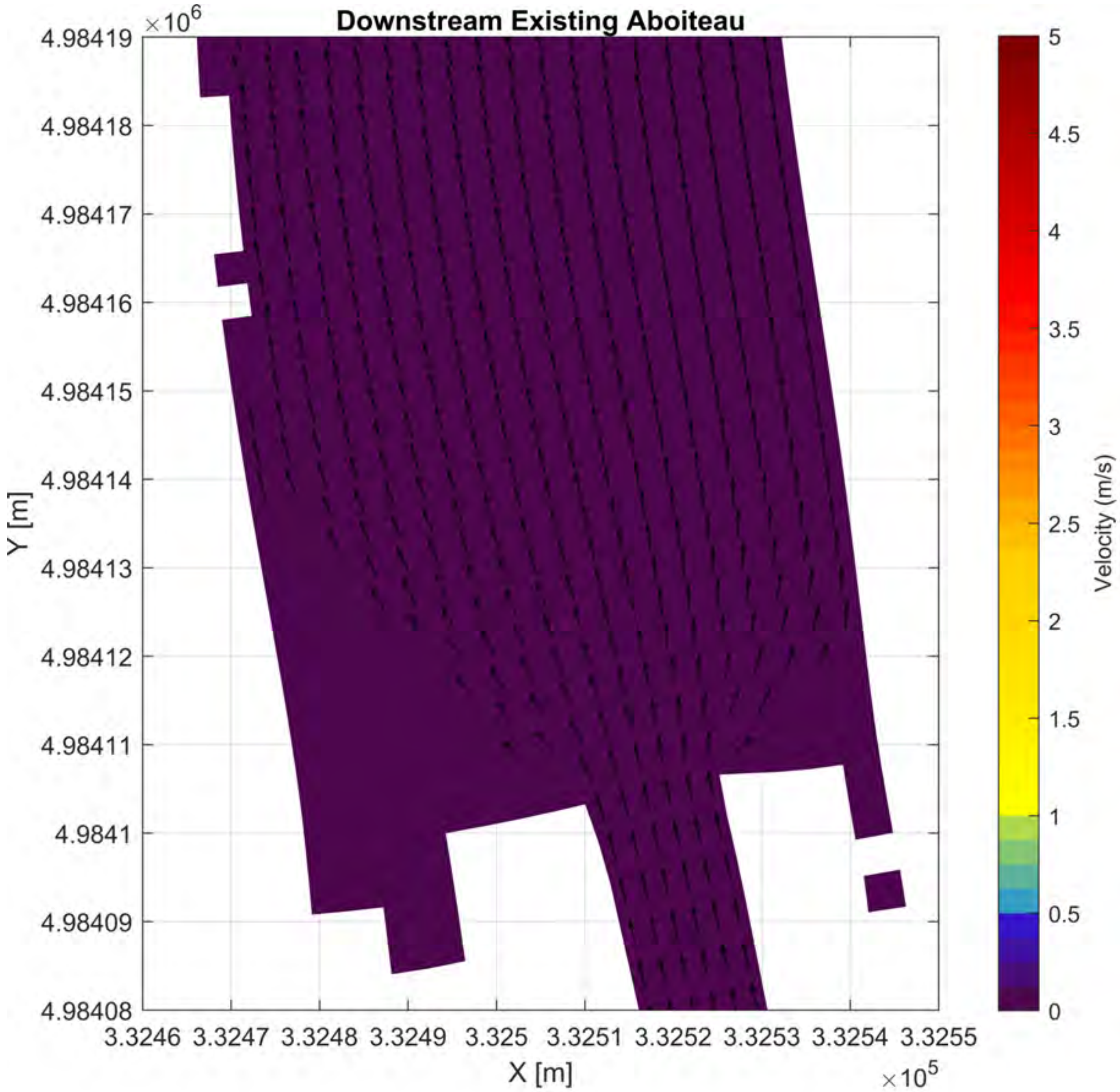


Figure A1.34: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Upstream Proposed Aboiteau.



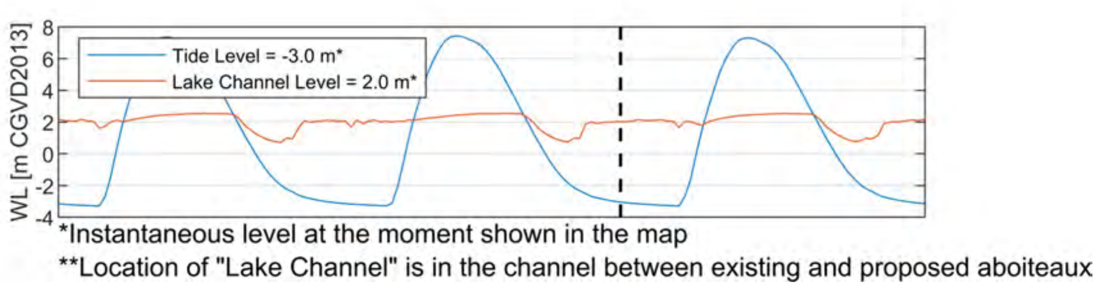


Figure A1.35: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Downstream Existing Aboiteau.

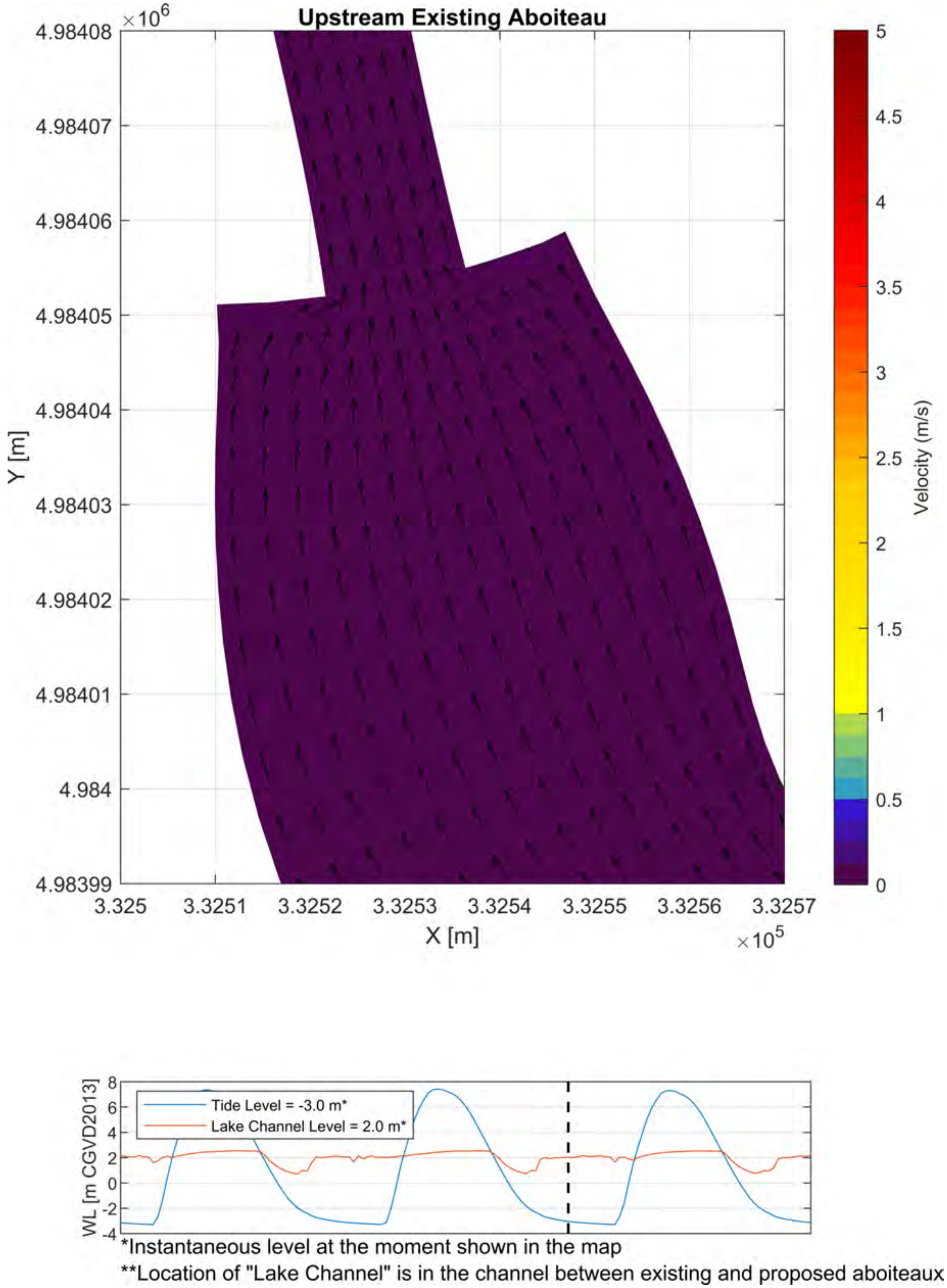


Figure A1.36: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Upstream Existing Aboiteau.

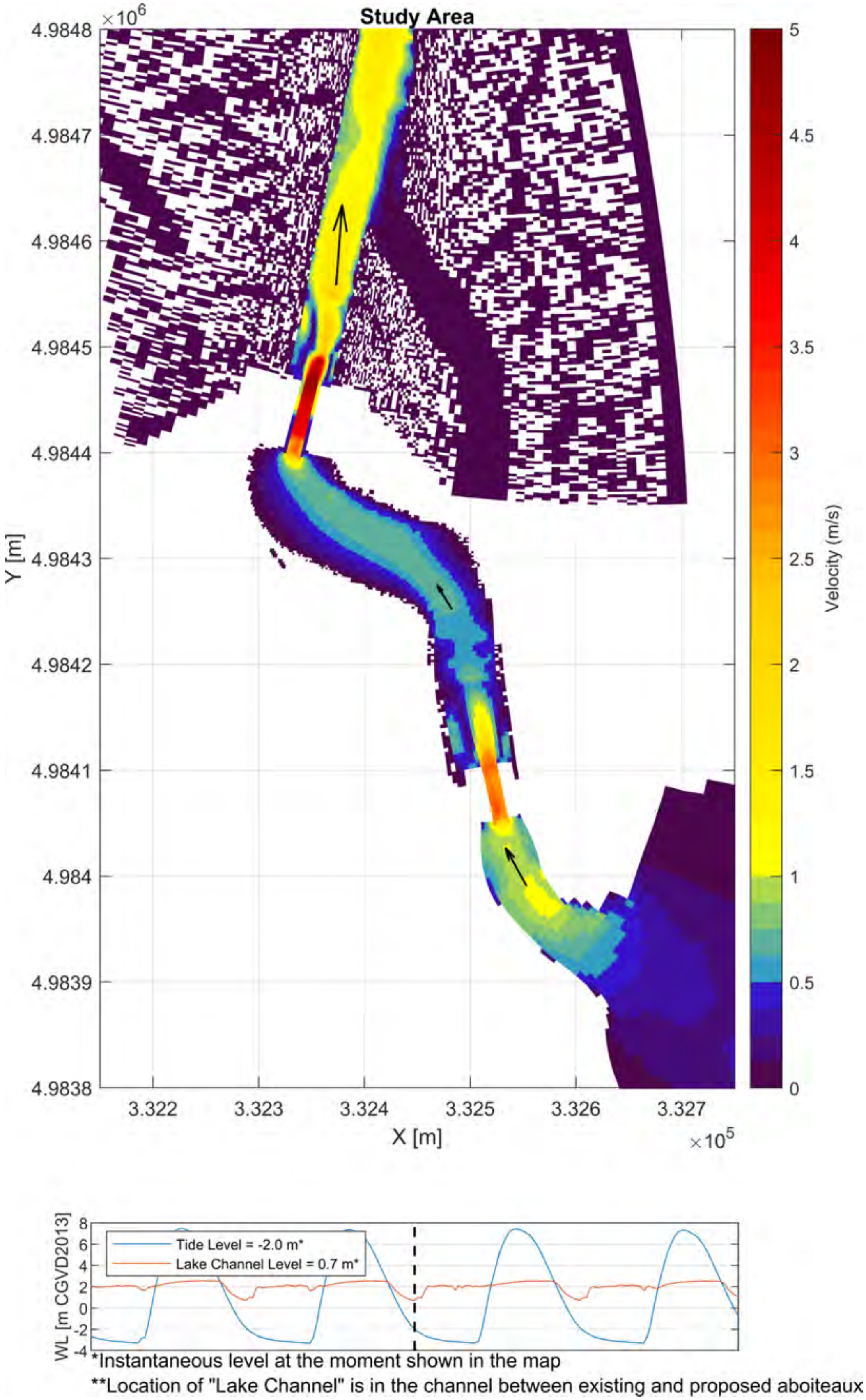
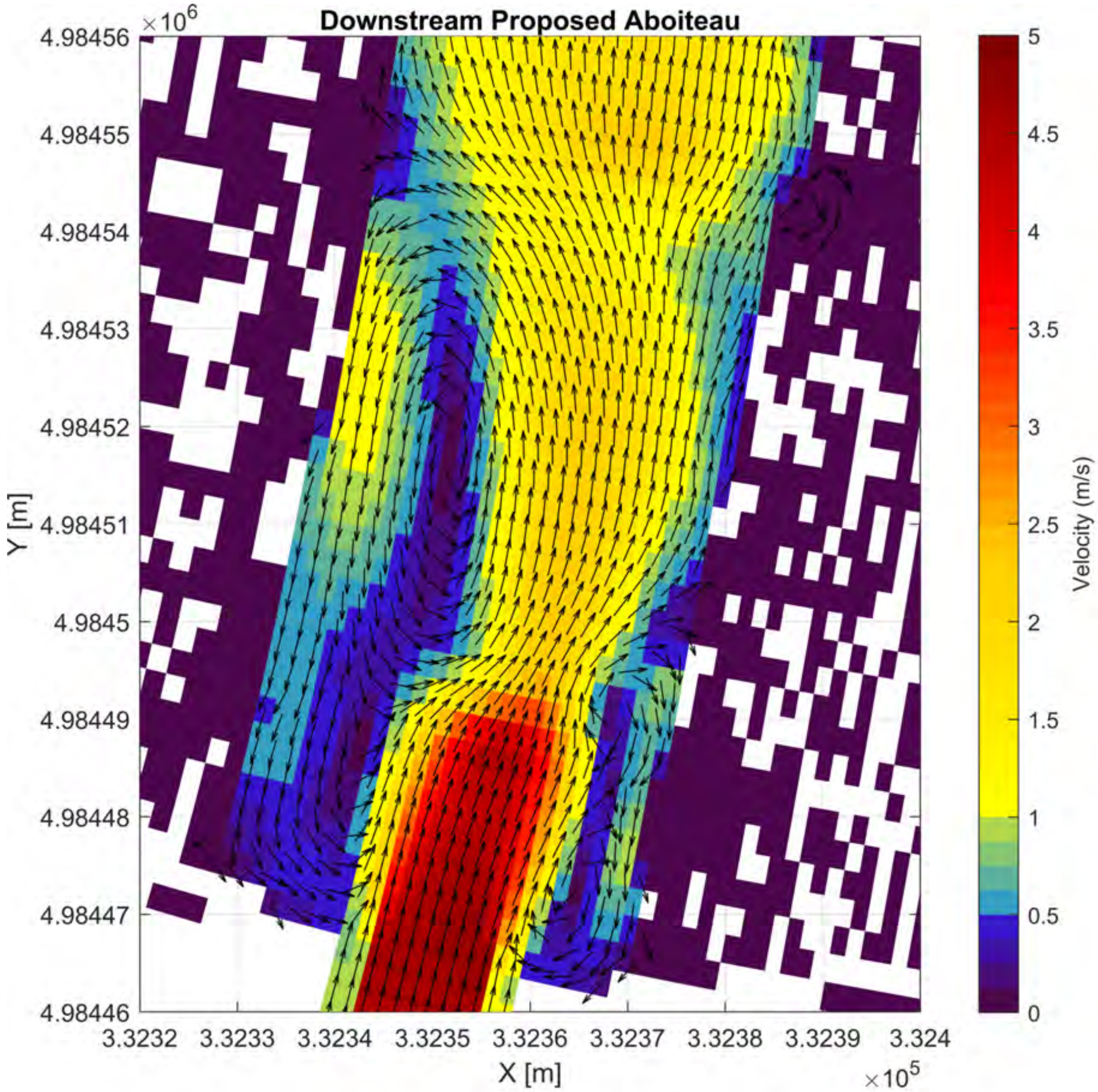


Figure A1.37: Map of Velocities for Bottom Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Overall Study Area.



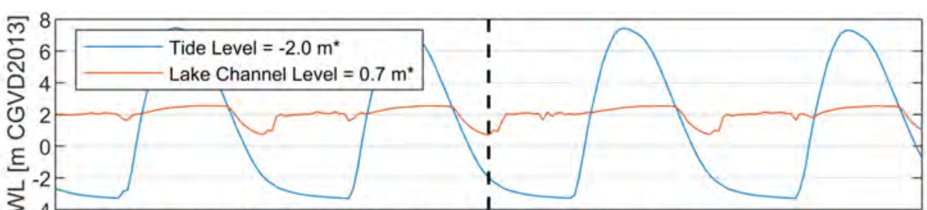


Figure A1.38: Map of Velocities for Bottom Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Downstream Proposed Aboiteau.

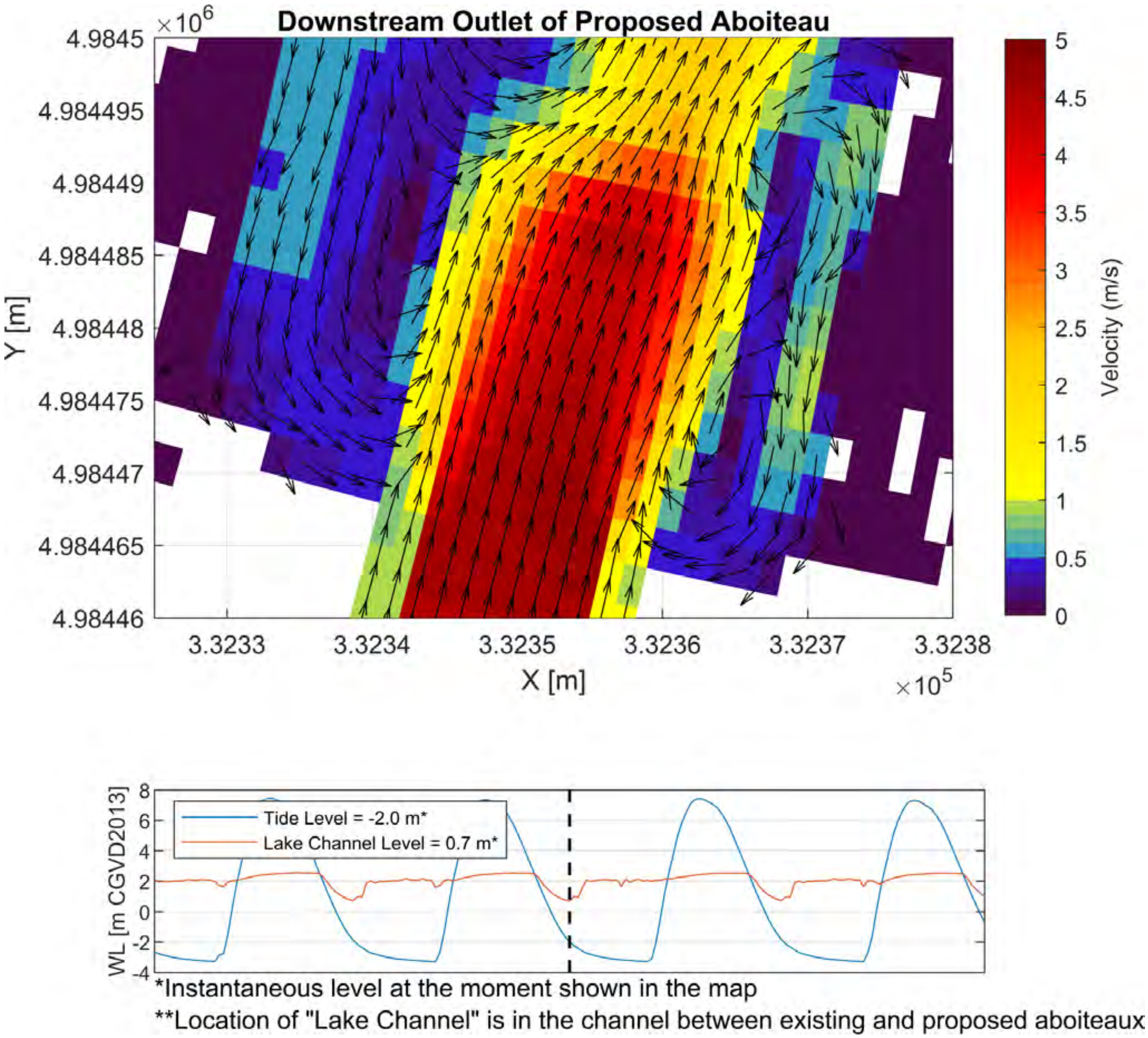


Figure A1.39: Map of Velocities for Bottom Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Downstream Outlet of Proposed Aboiteau.

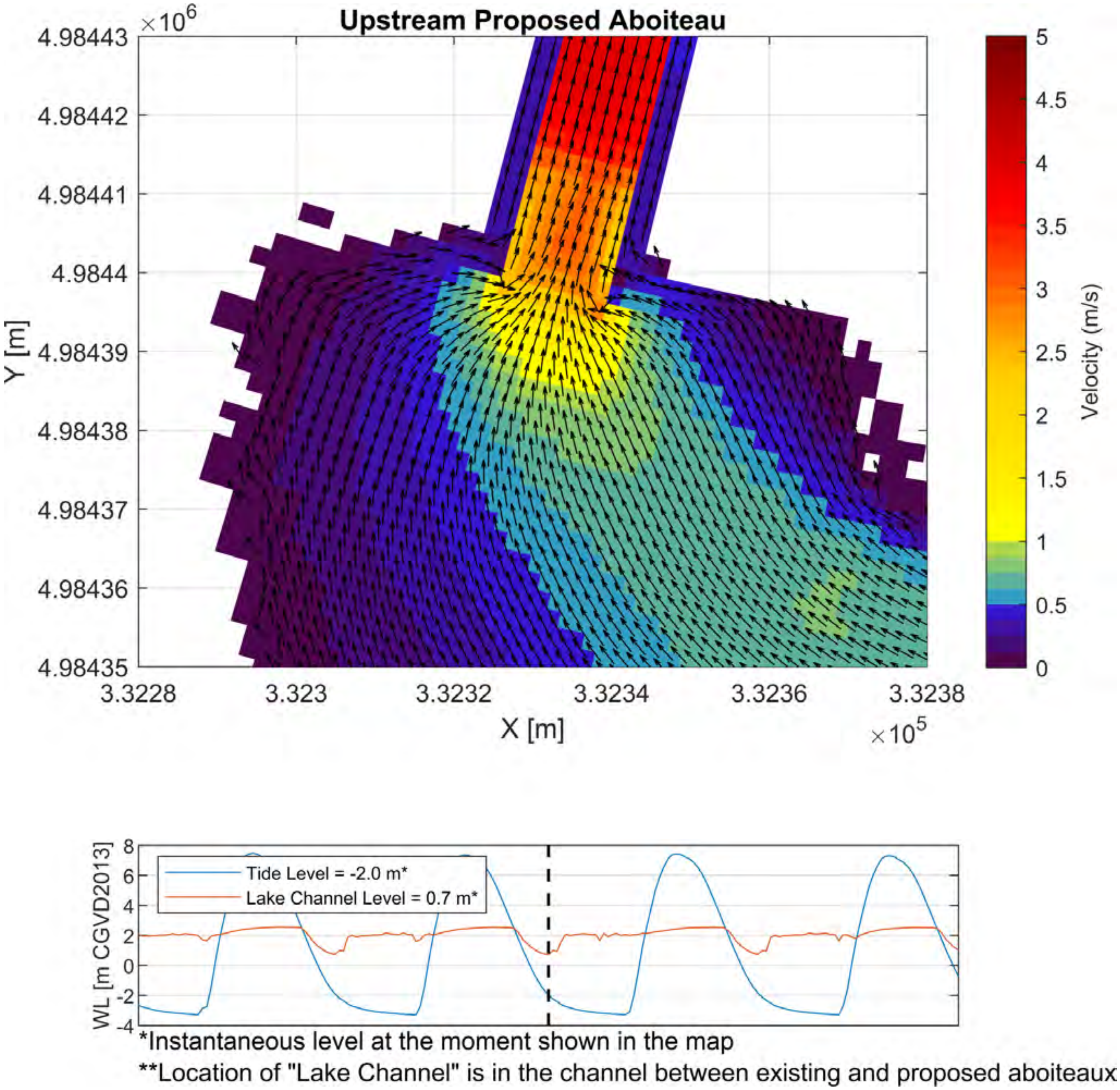
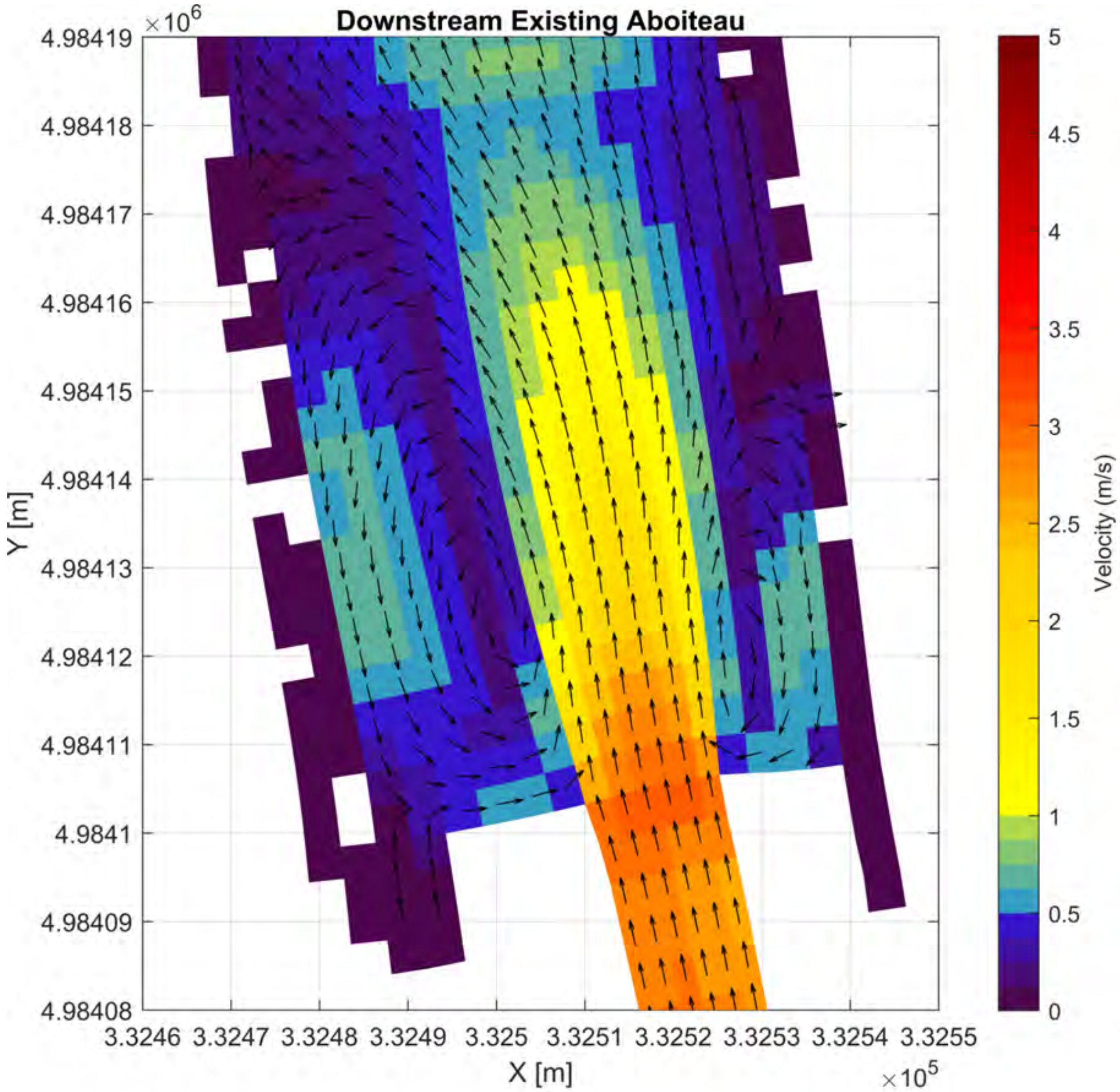


Figure A1.40: Map of Velocities for Bottom Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Upstream Proposed Aboiteau.



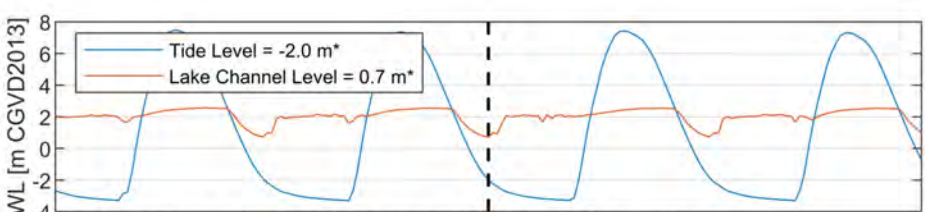
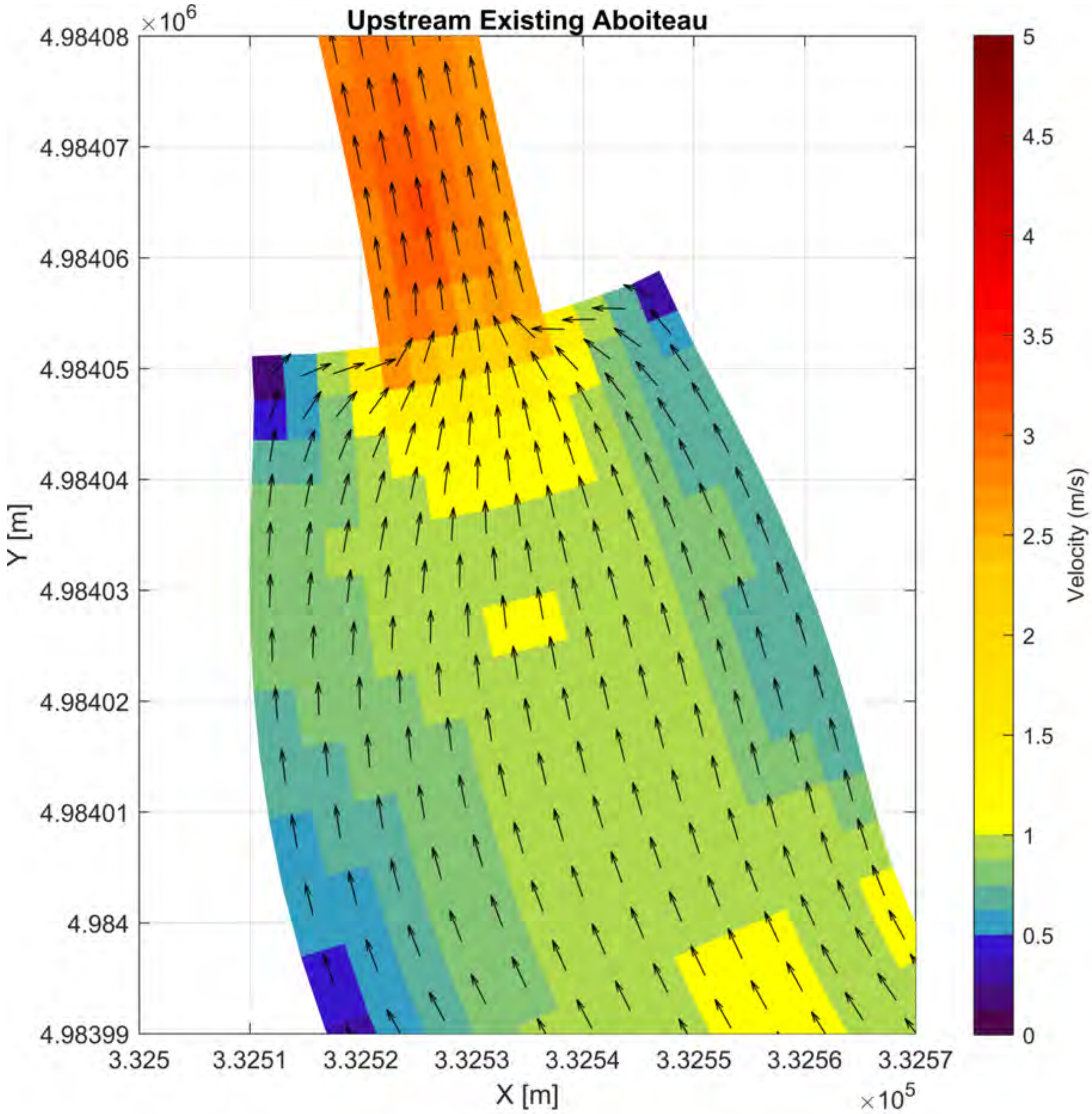


Figure A1.41: Map of Velocities for Bottom Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Downstream Existing Aboiteau.



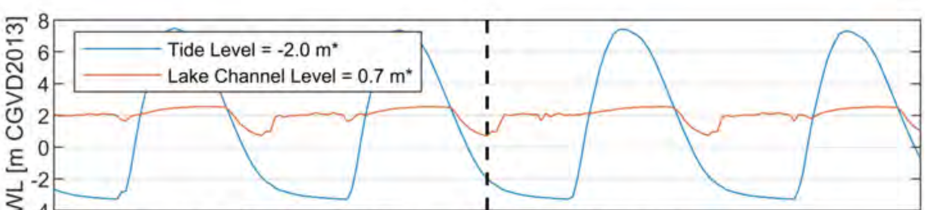


Figure A1.42: Map of Velocities for Bottom Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Upstream Existing Aboiteau.

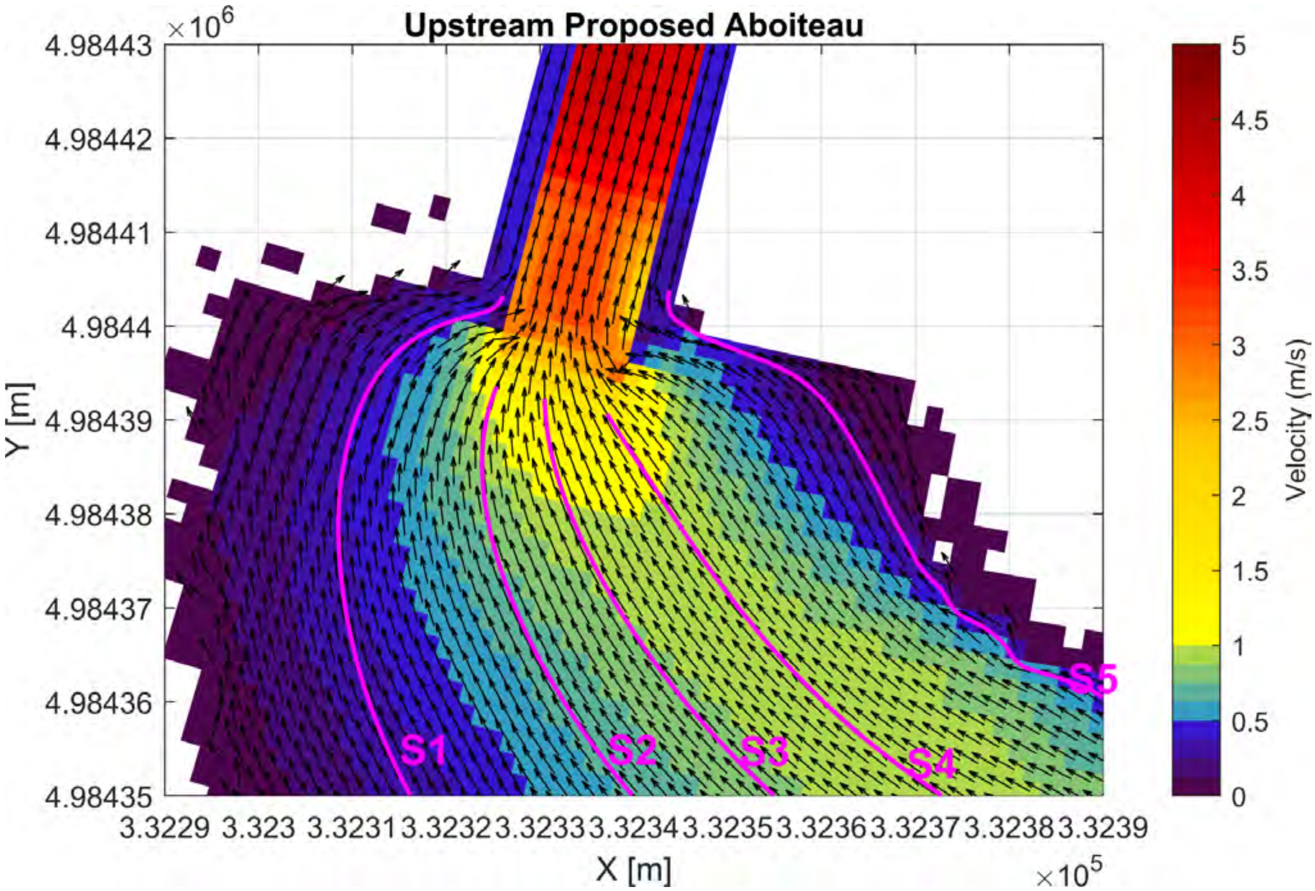


Figure A1.43: Location of Selected Streamlines - Velocities When the Active Gates are Open for the Brackish Scenario (Wet Conditions).

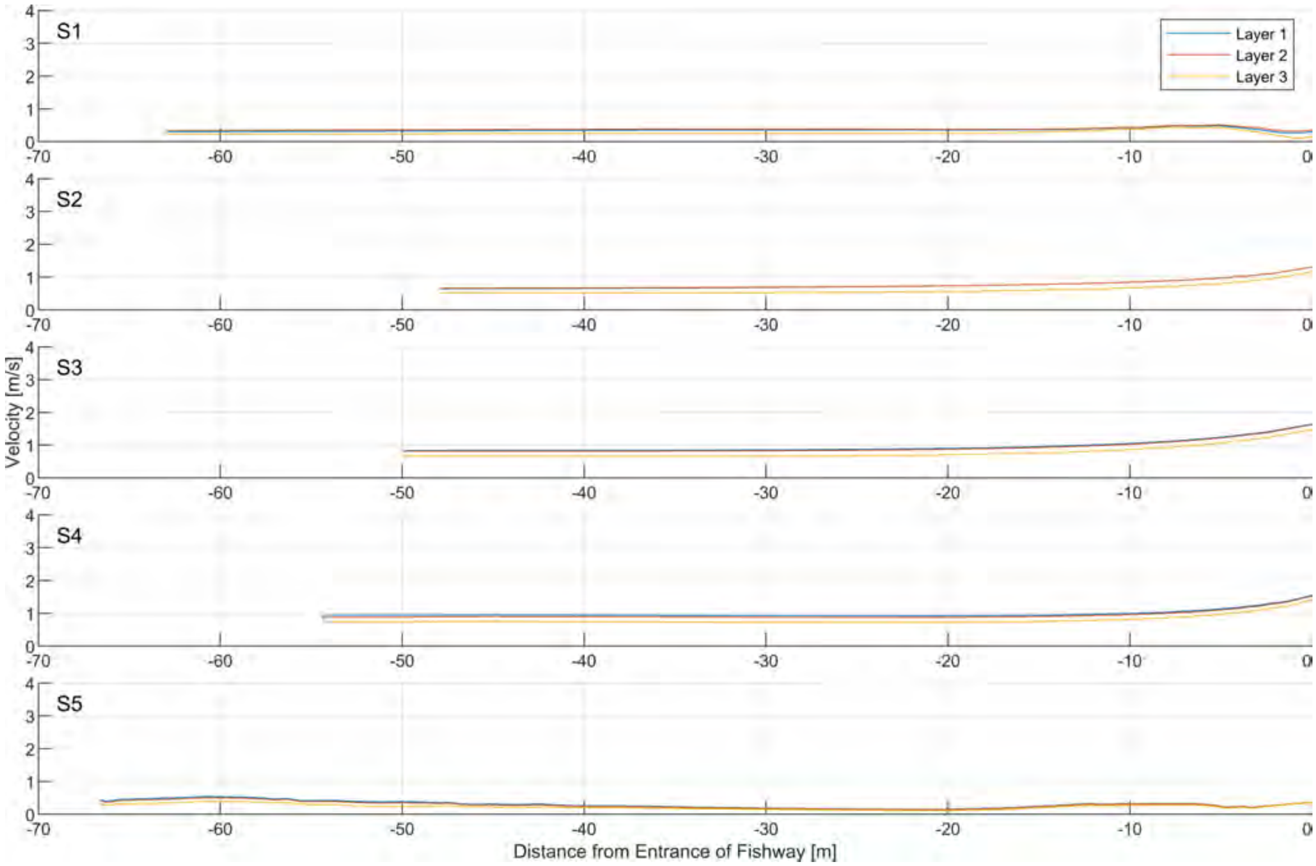


Figure A1.44: Velocity Along Streamlines - When the Active Gates are Open for the Brackish Scenario (Wet Conditions).

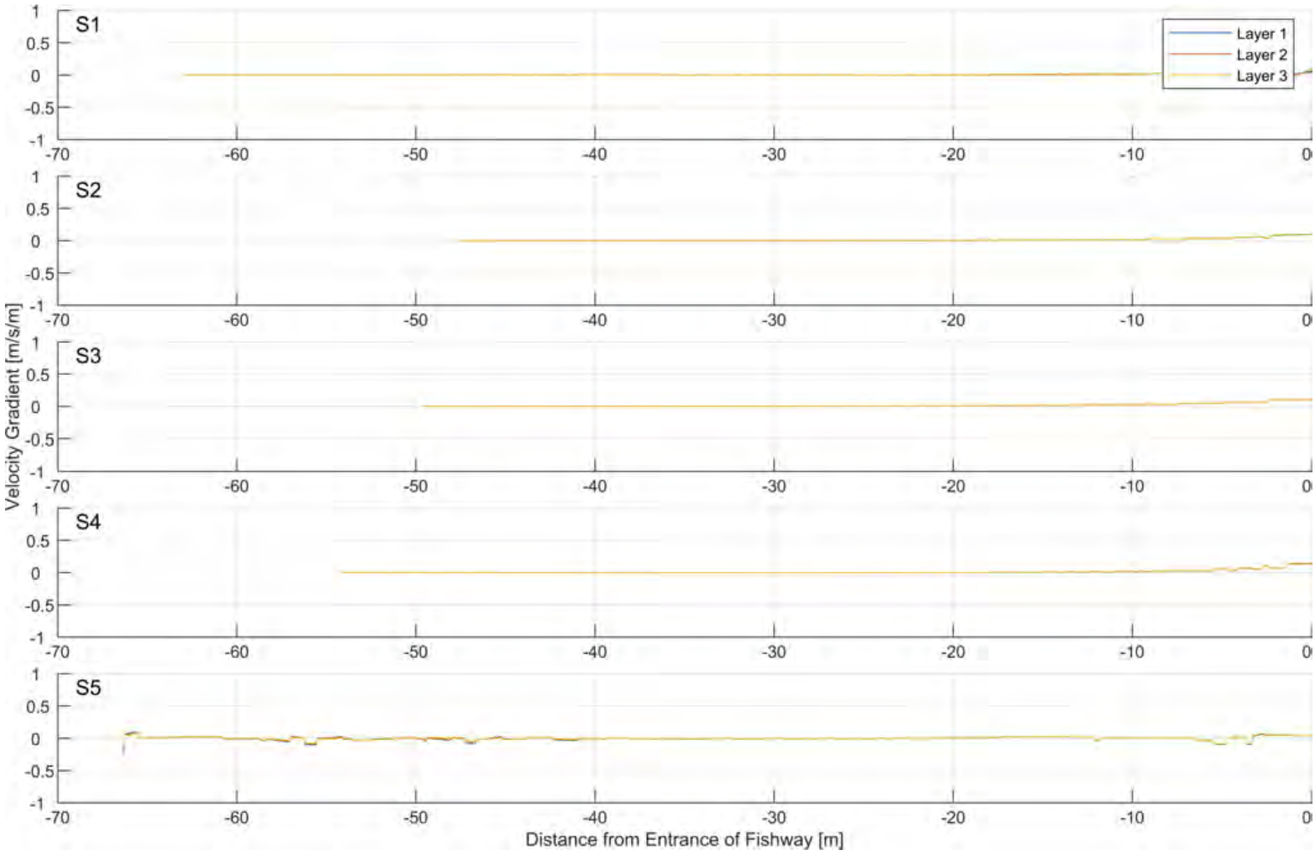


Figure A1.45: Velocity Gradient Along Streamlines - When the Active Gates are Open for the Brackish Scenario (Wet Conditions).

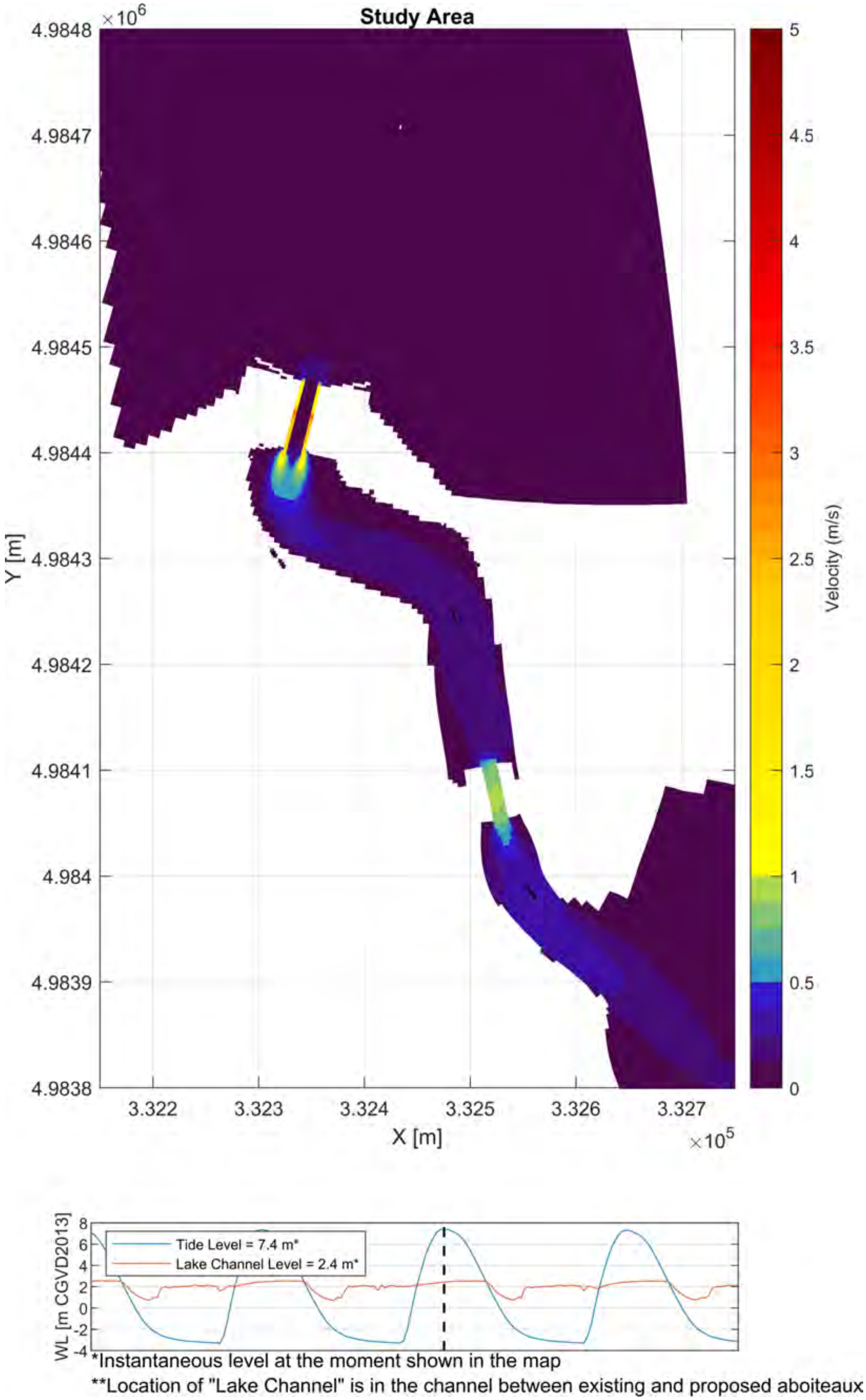
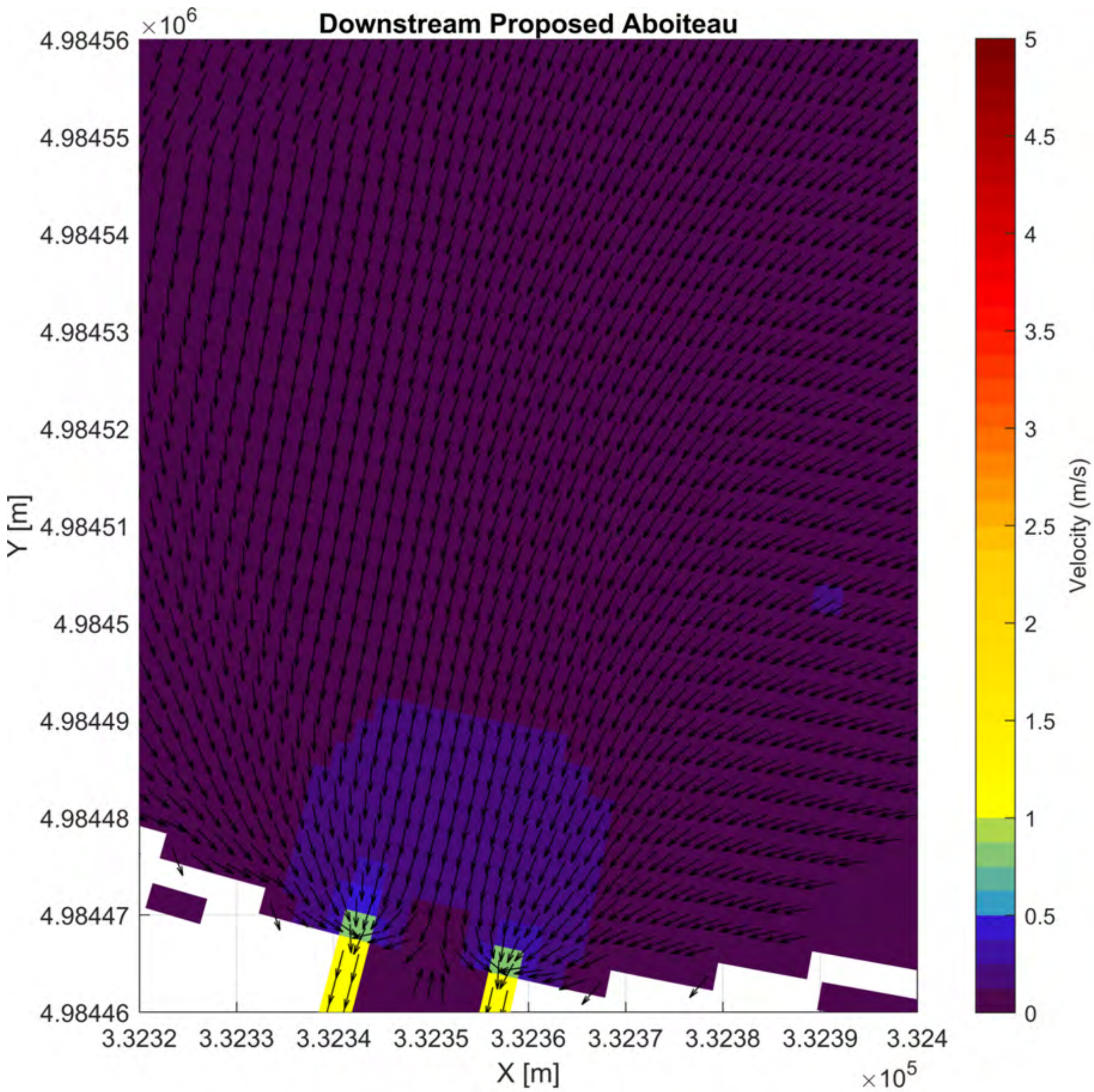


Figure A1.46: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Overall Study Area.



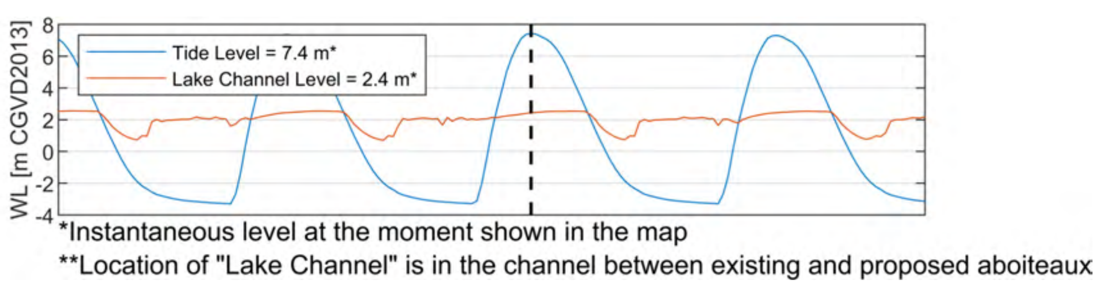
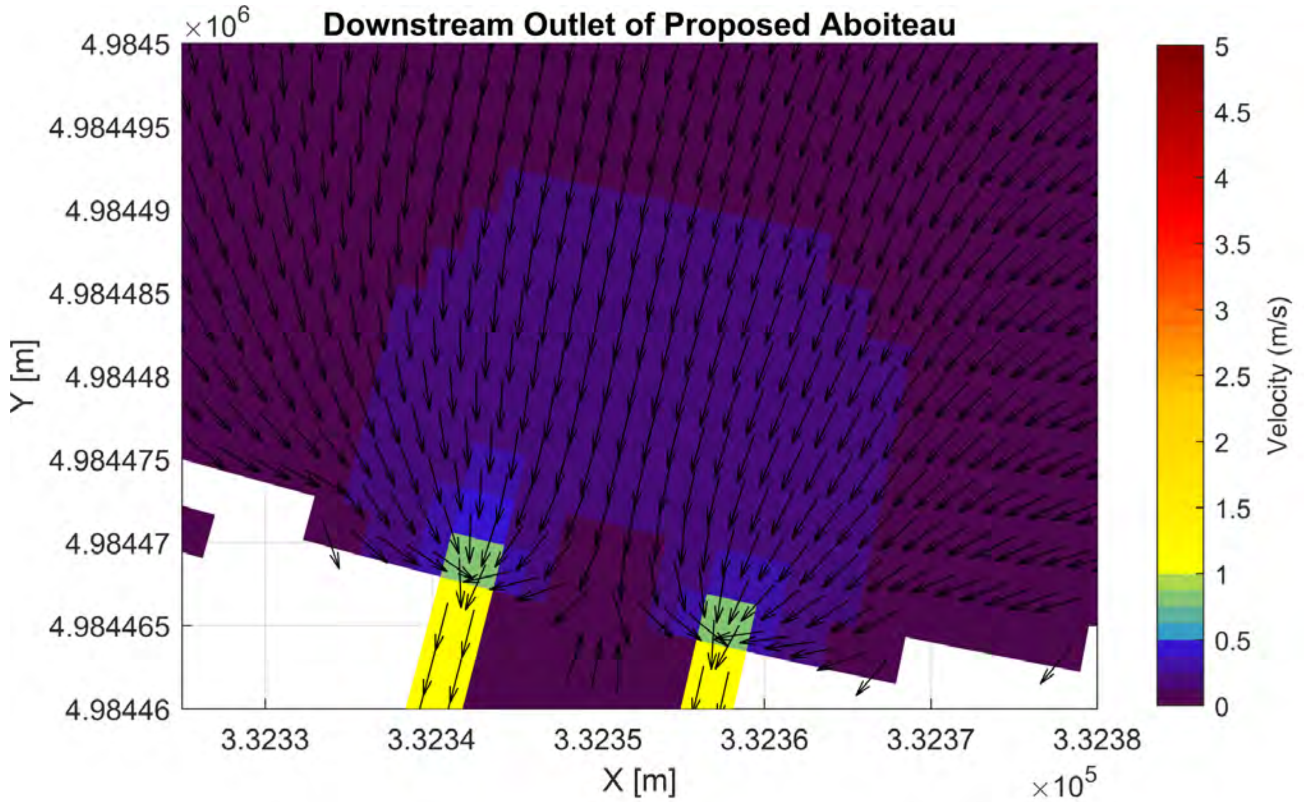


Figure A1.47: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Downstream Proposed Aboiteau.



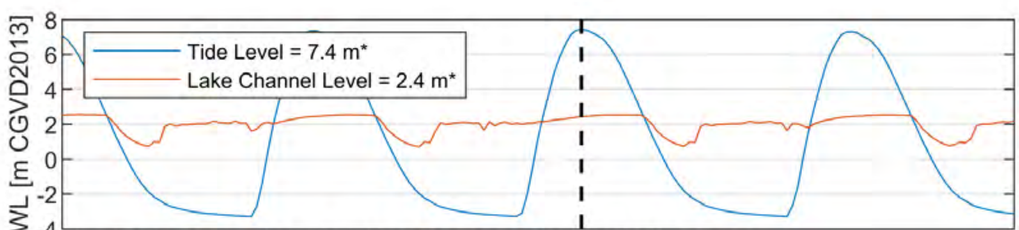


Figure A1.48: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Downstream Outlet of Proposed Aboiteau.

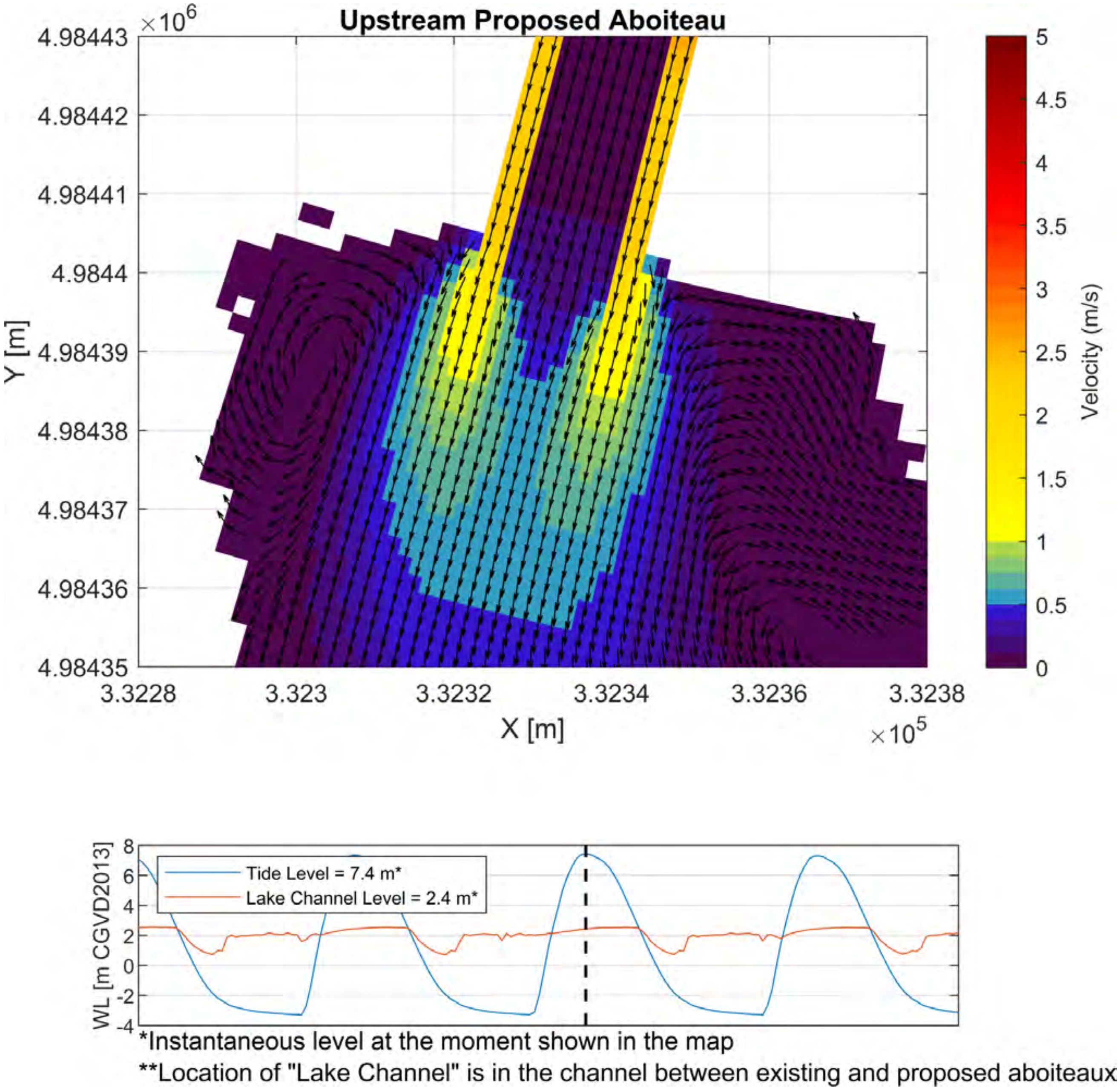
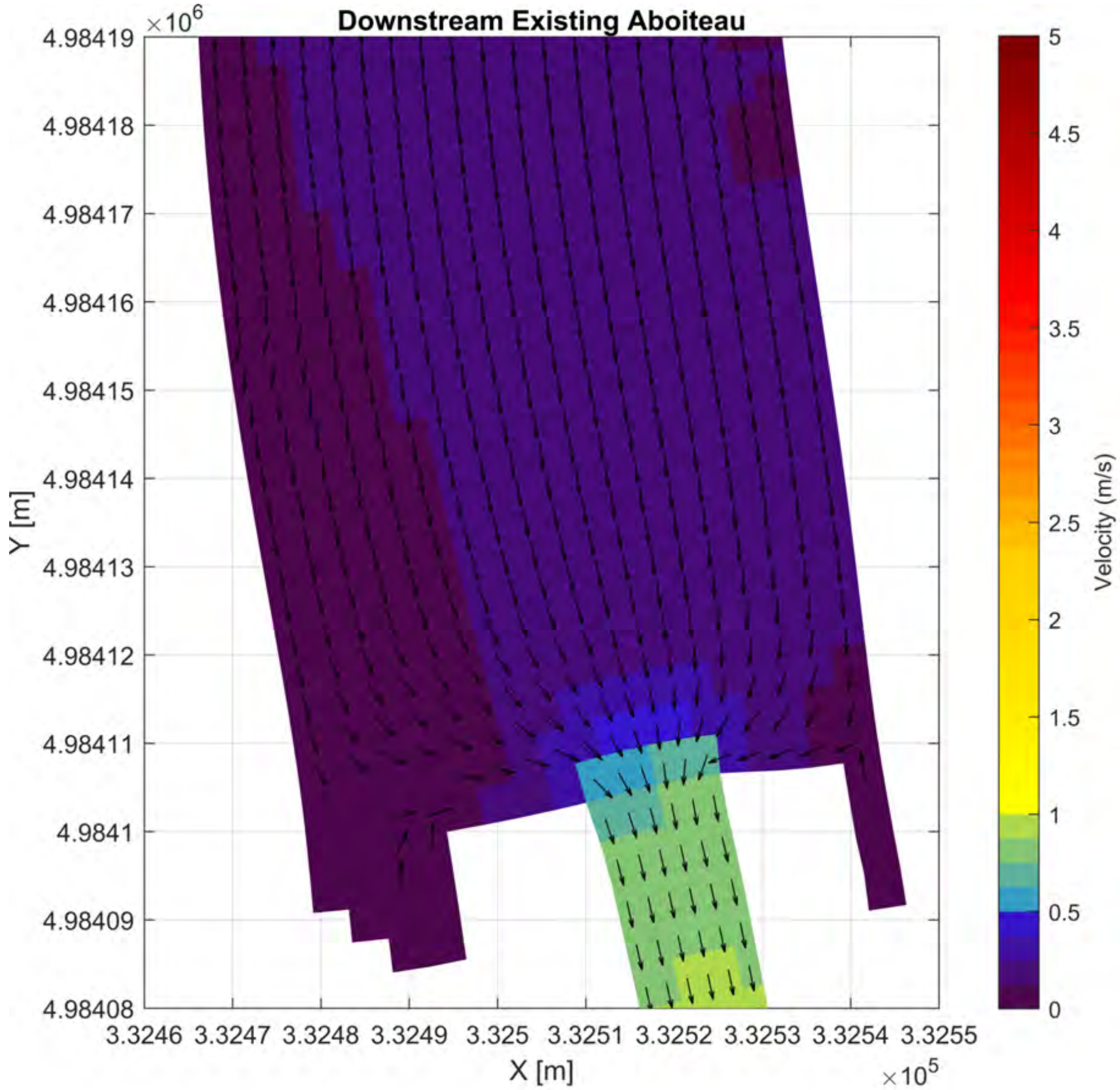


Figure A1.49: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Upstream Proposed Aboiteau.



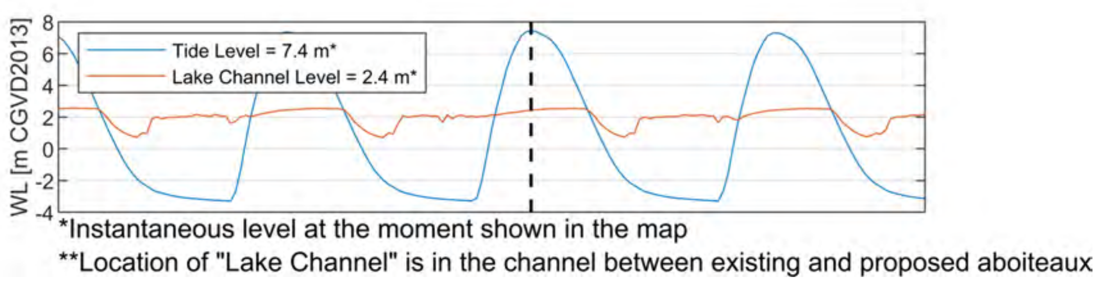


Figure A1.50: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Downstream Existing Aboiteau.

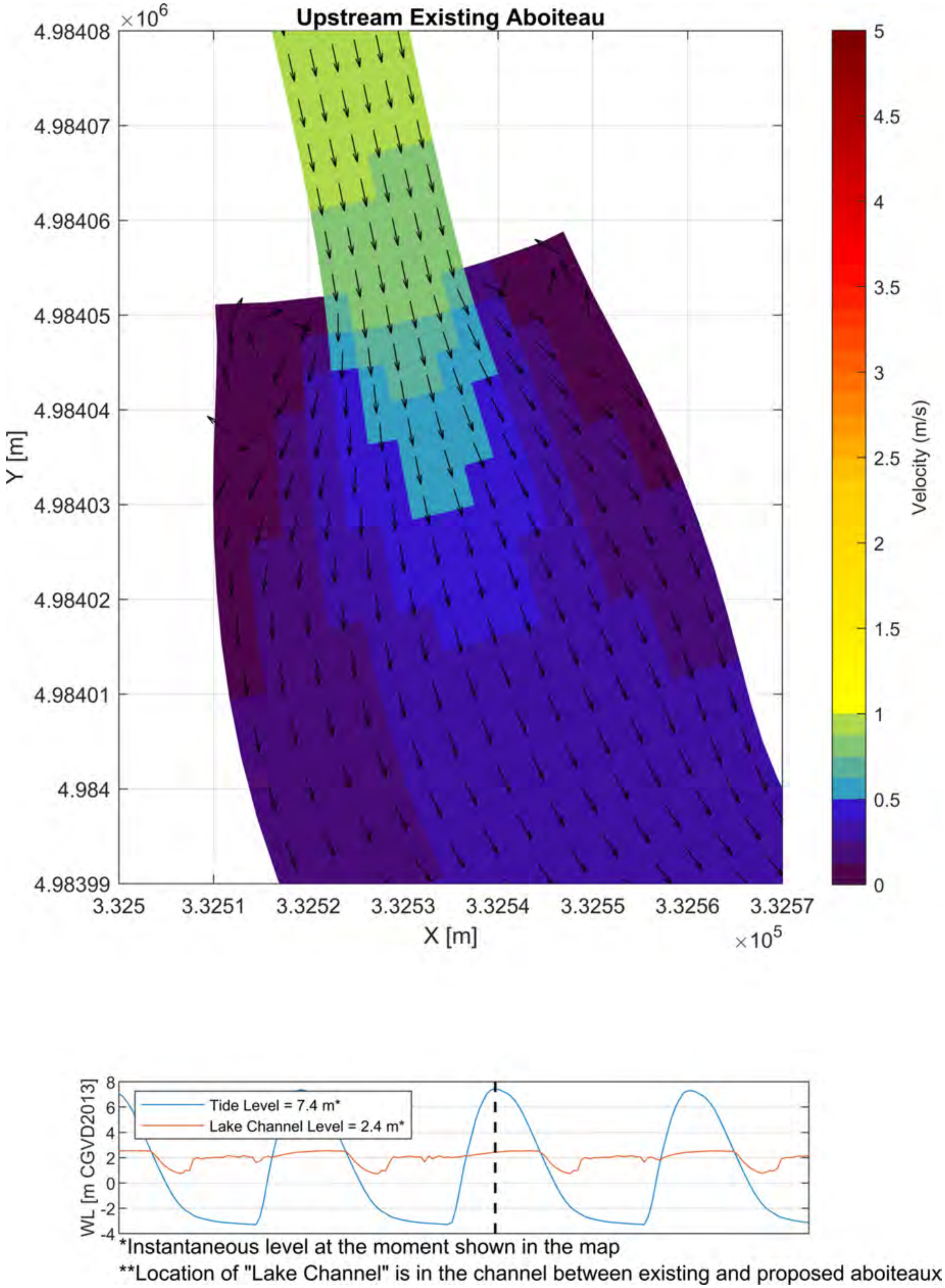
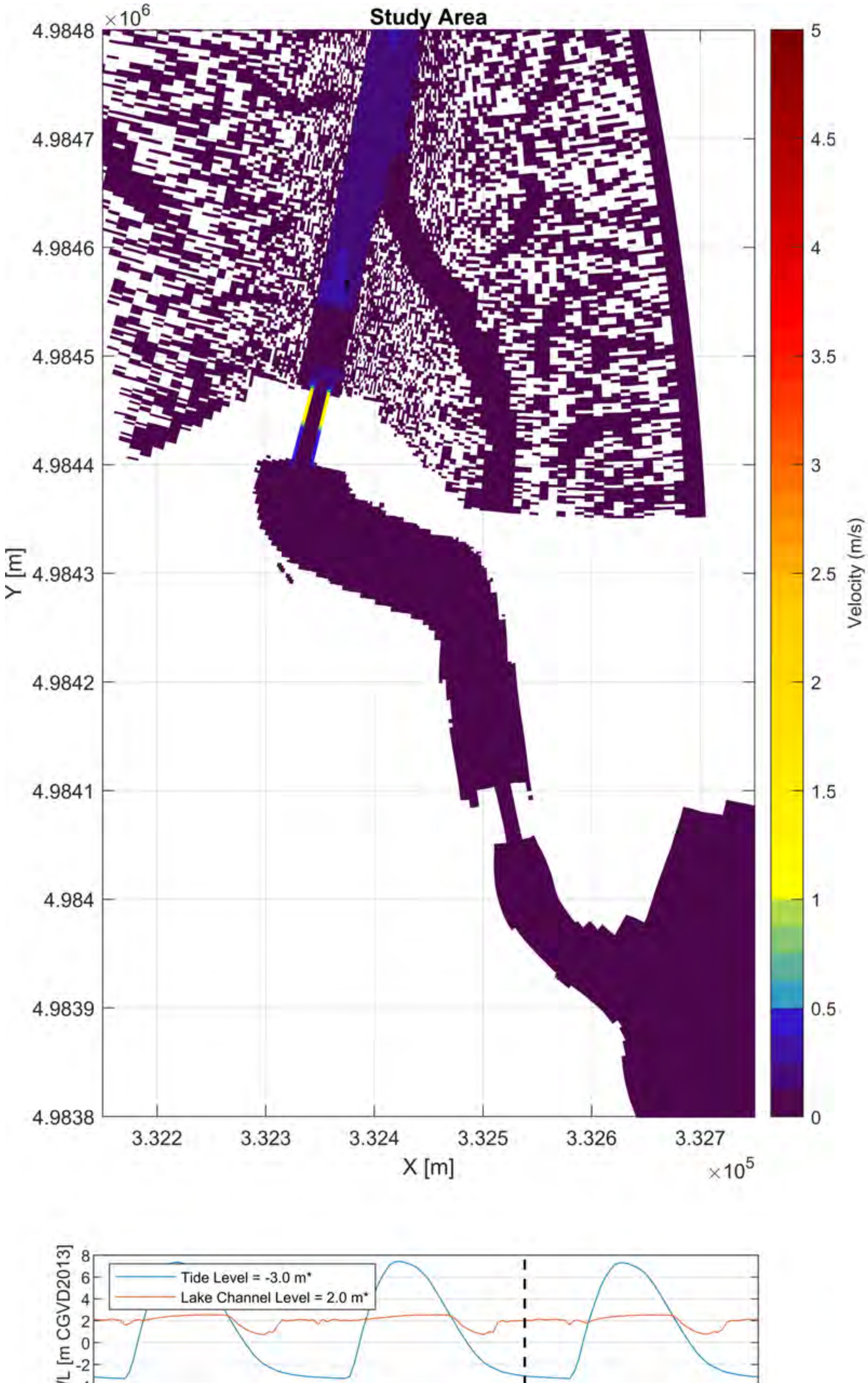


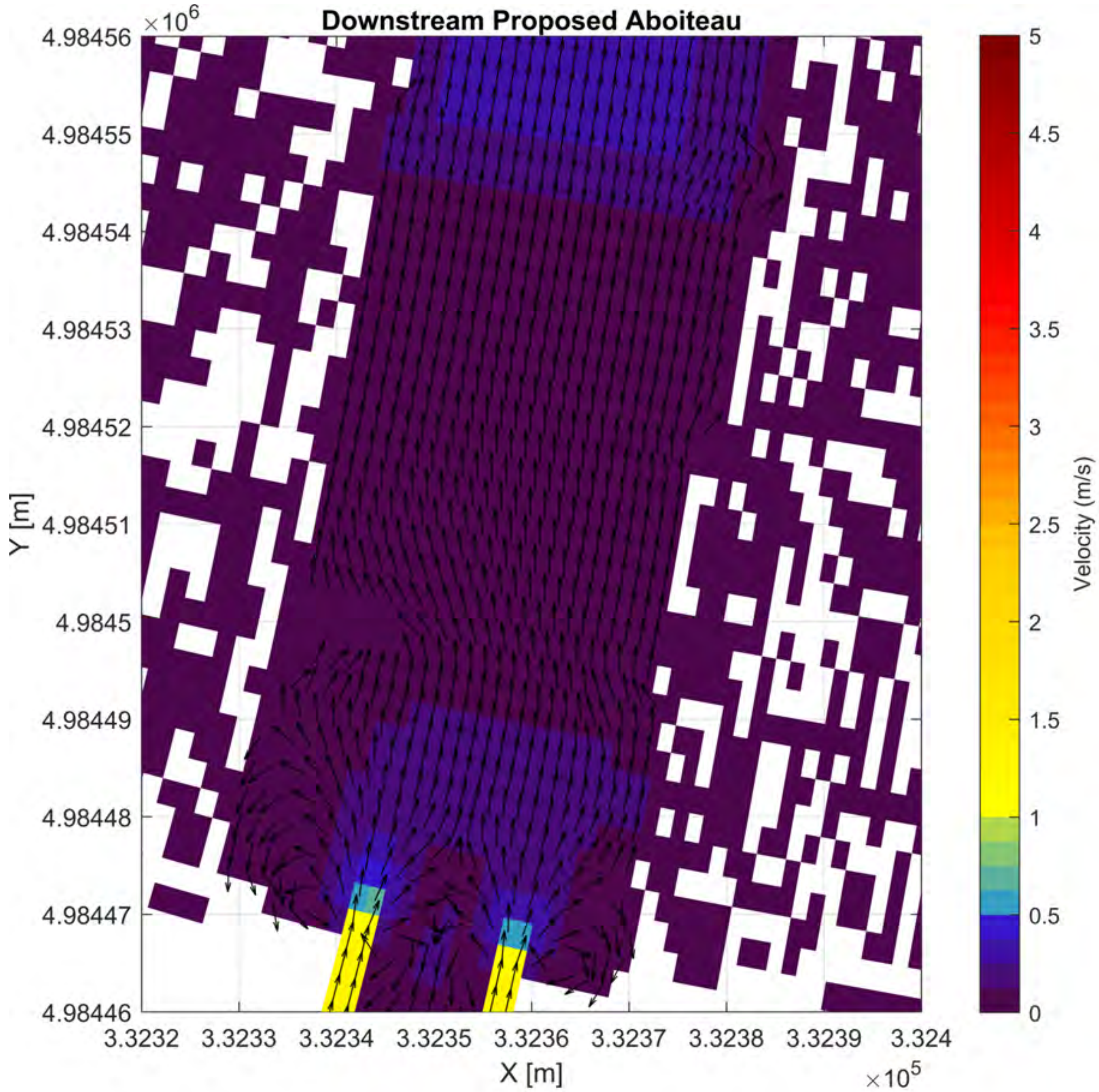
Figure A1.51: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Upstream Existing Aboiteau.

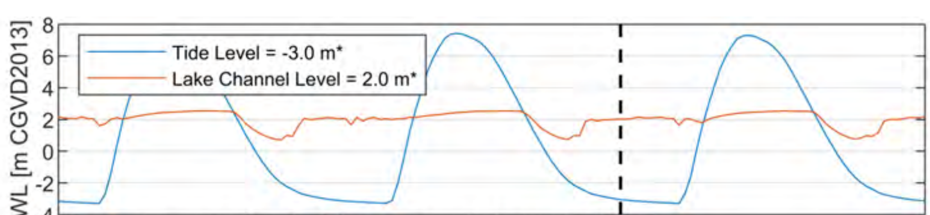


*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.52: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Overall Study Area.





*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.53: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Downstream Proposed Aboiteau.

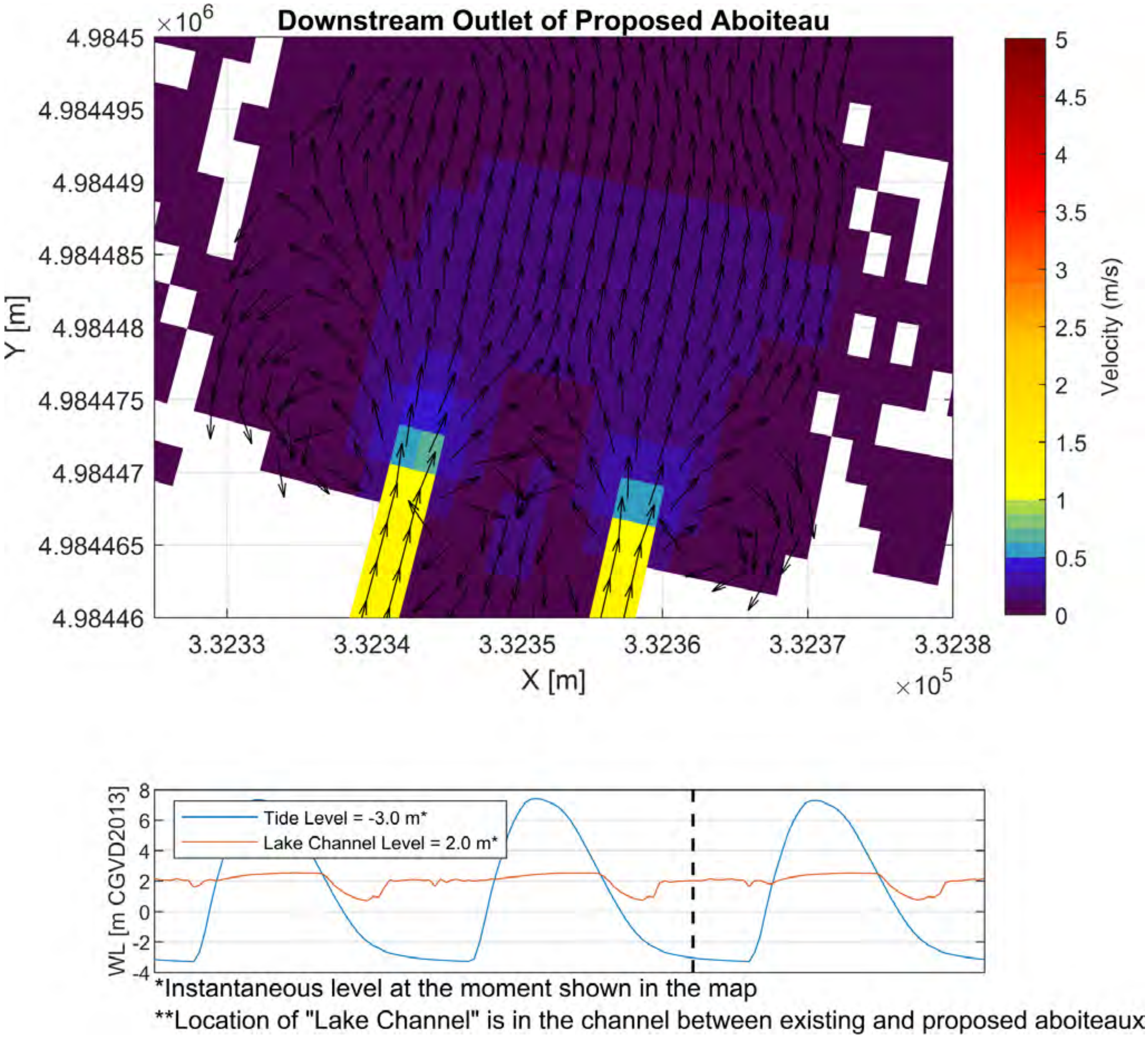
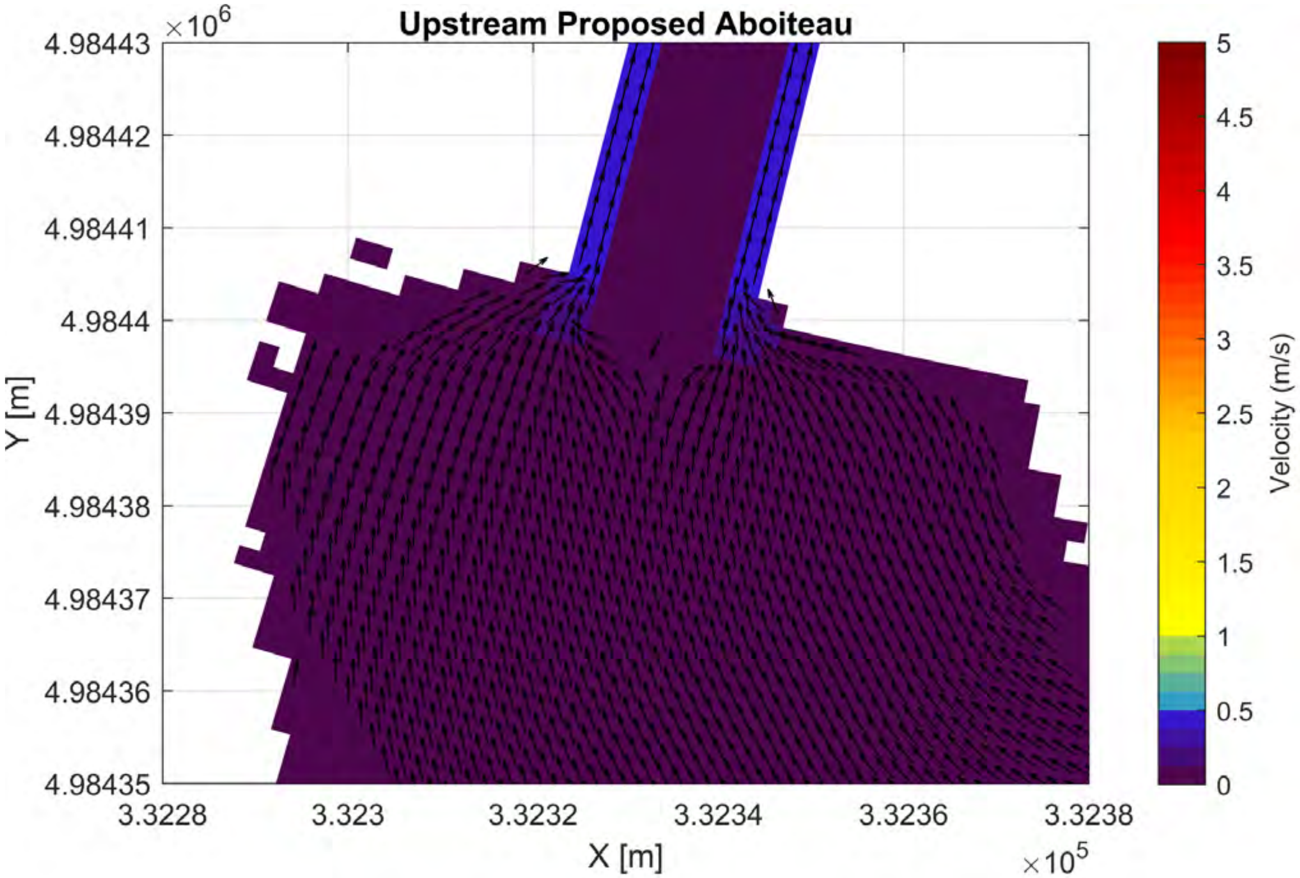


Figure A1.54: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Downstream Outlet of Proposed Aboiteau.



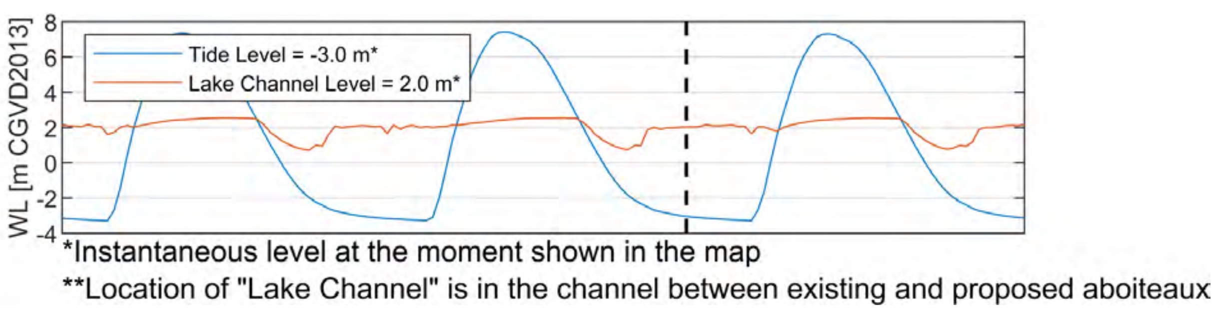
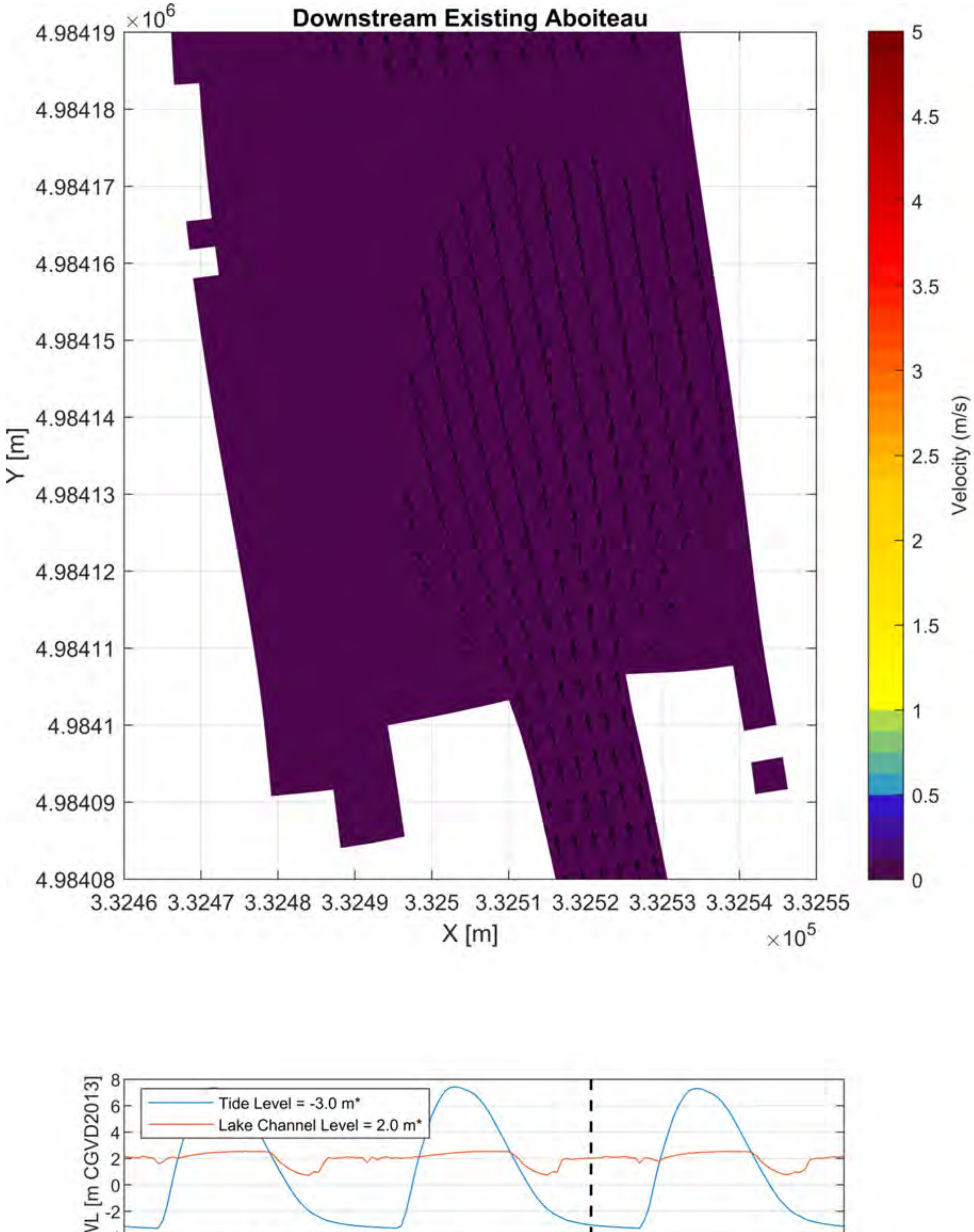


Figure A1.55: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Upstream Proposed Aboiteau.



*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.56: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Downstream Existing Aboiteau.

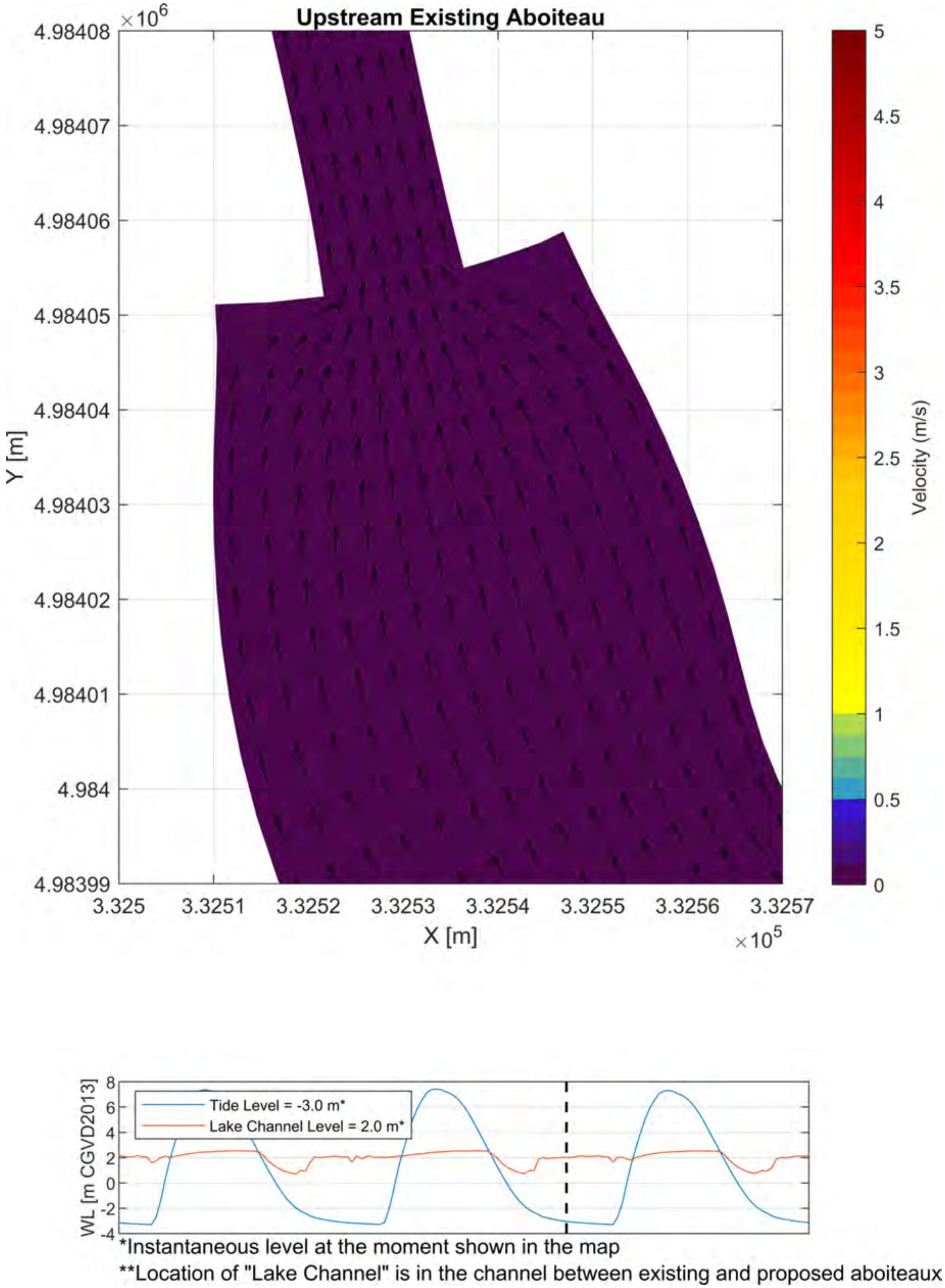


Figure A1.57: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Upstream Existing Aboiteau.

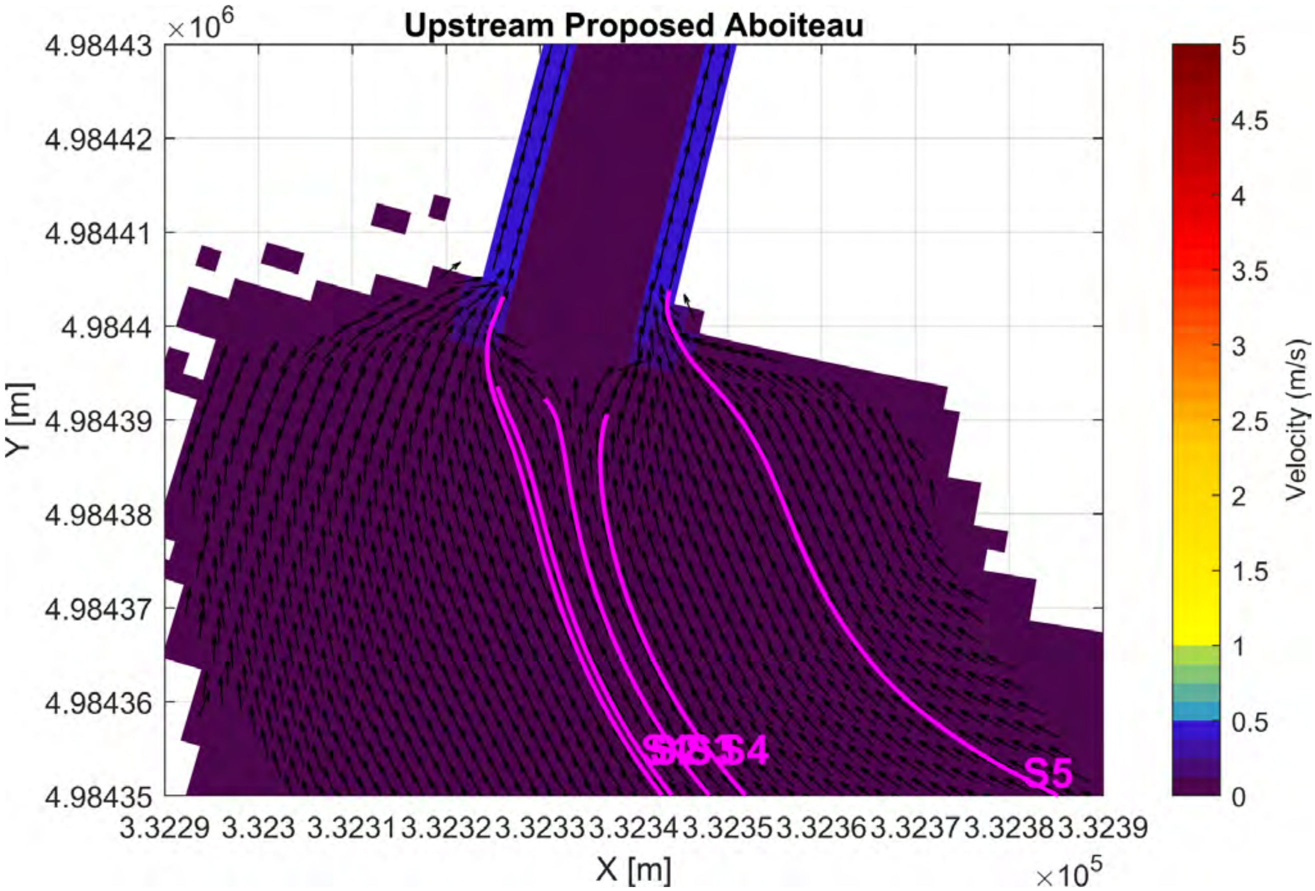


Figure A1.58: Location of Selected Streamlines - Velocities When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions).

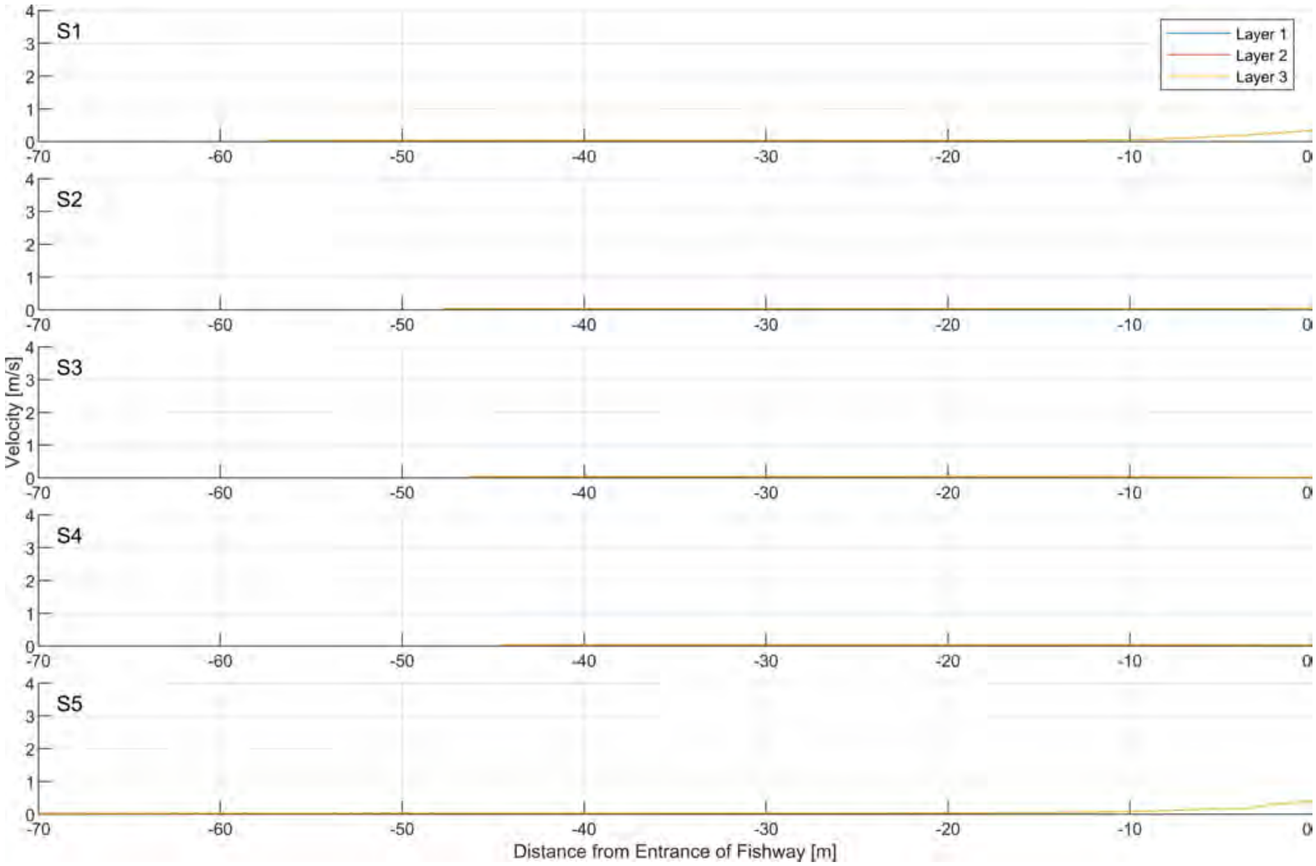


Figure A1.59: Velocity Along Streamlines - When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions).

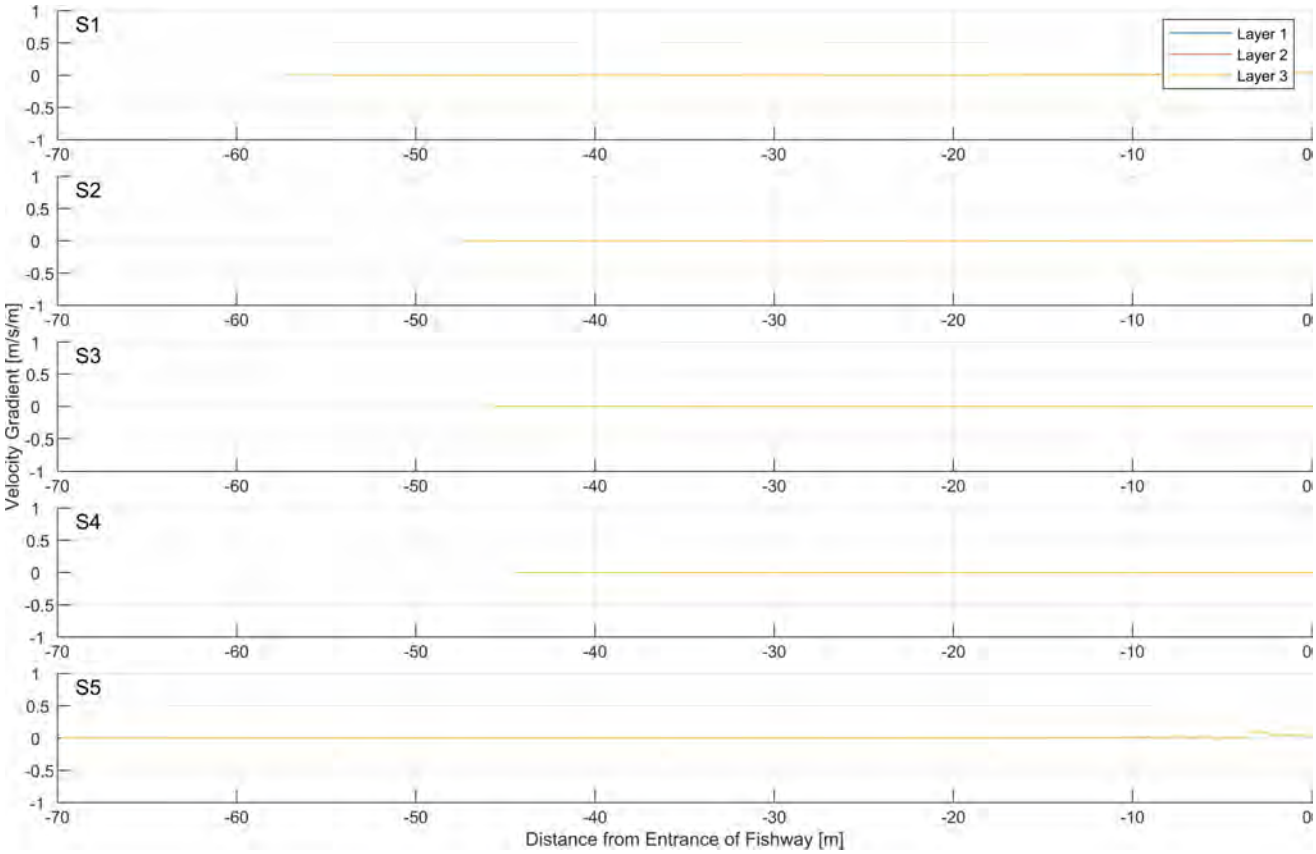


Figure A1.60: Velocity Gradient Along Streamlines - When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions).

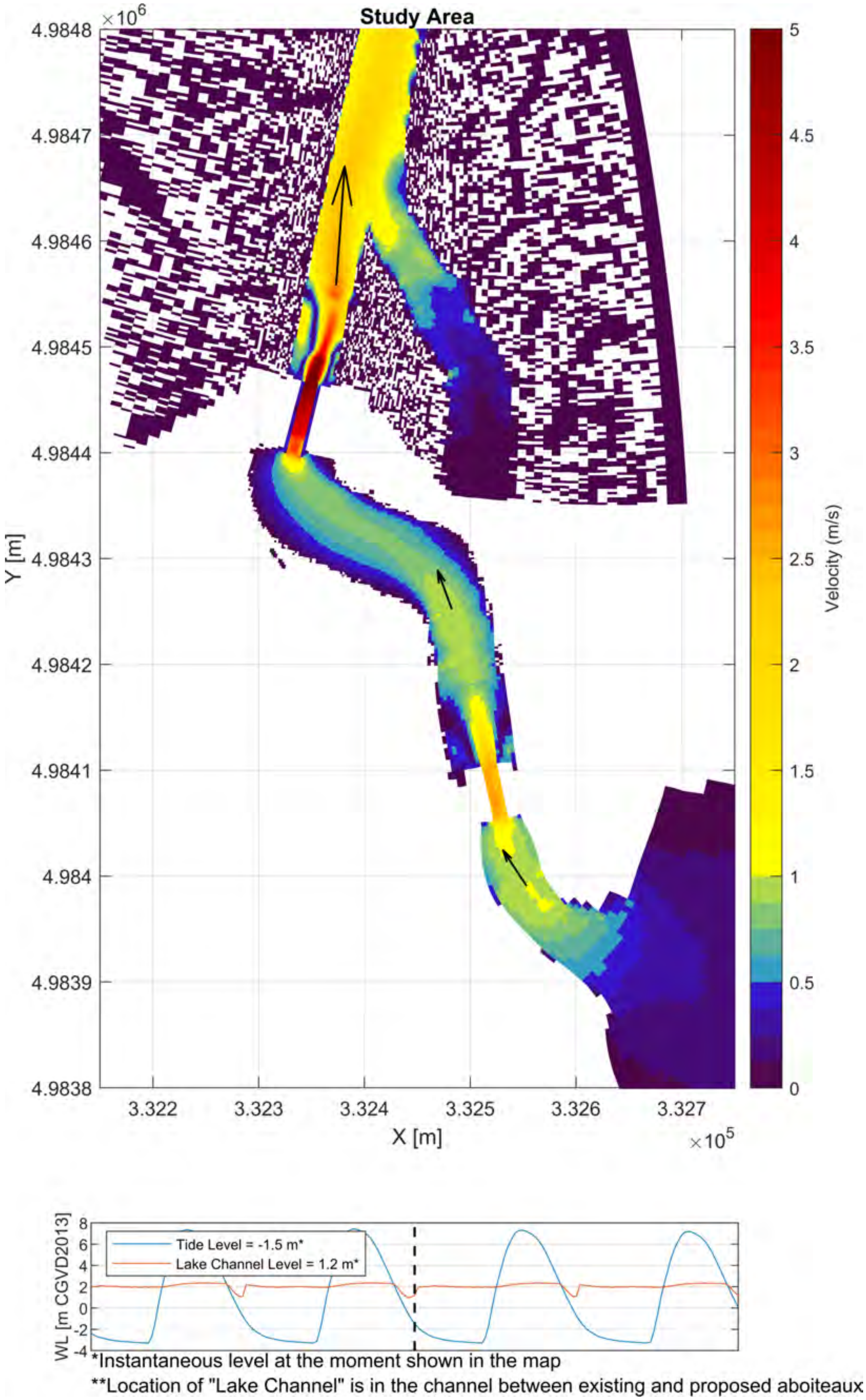
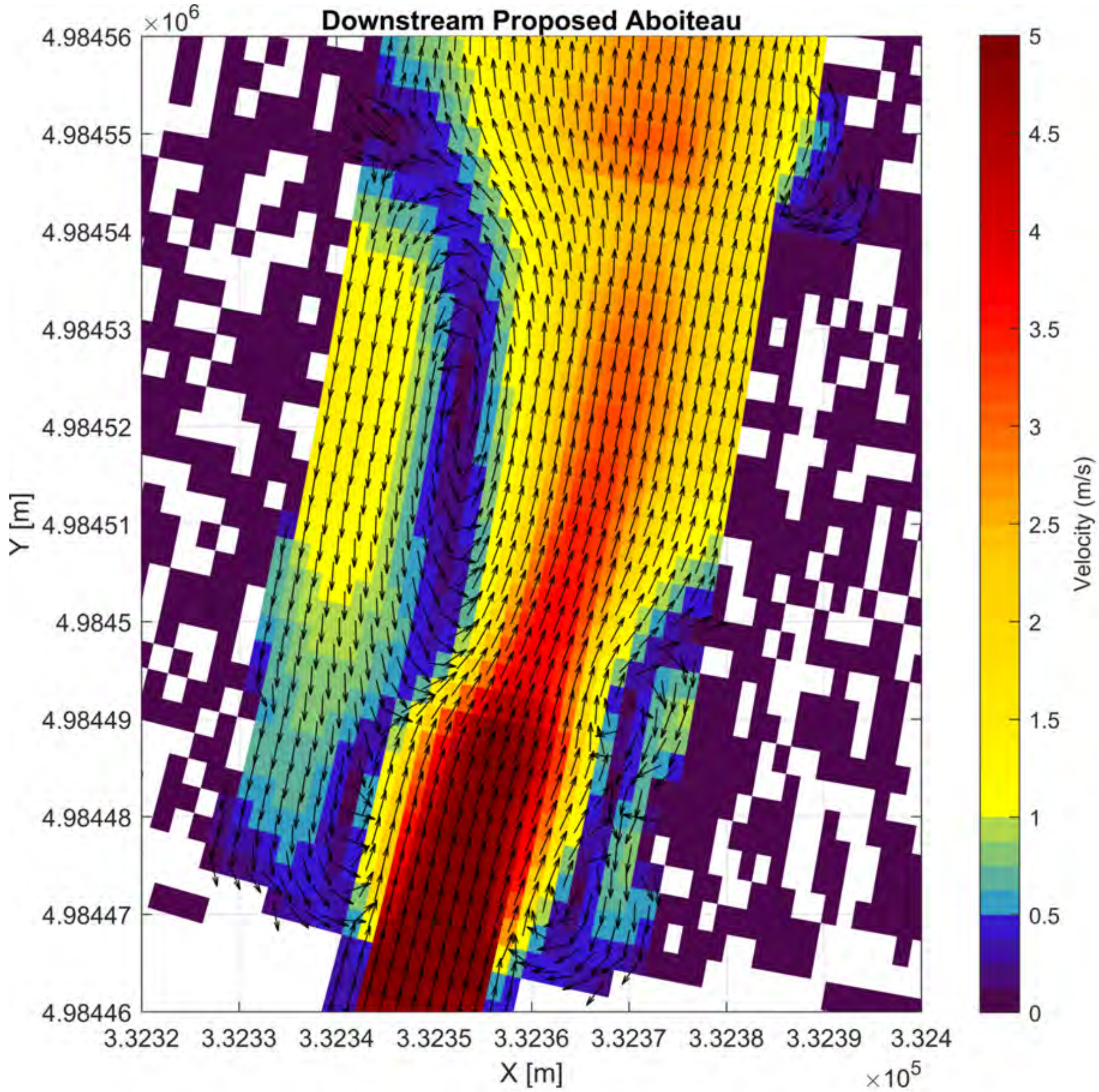
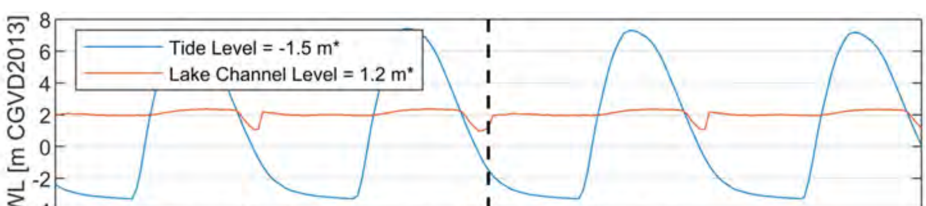


Figure A1.61: Map of Velocities for Top Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Overall Study Area.

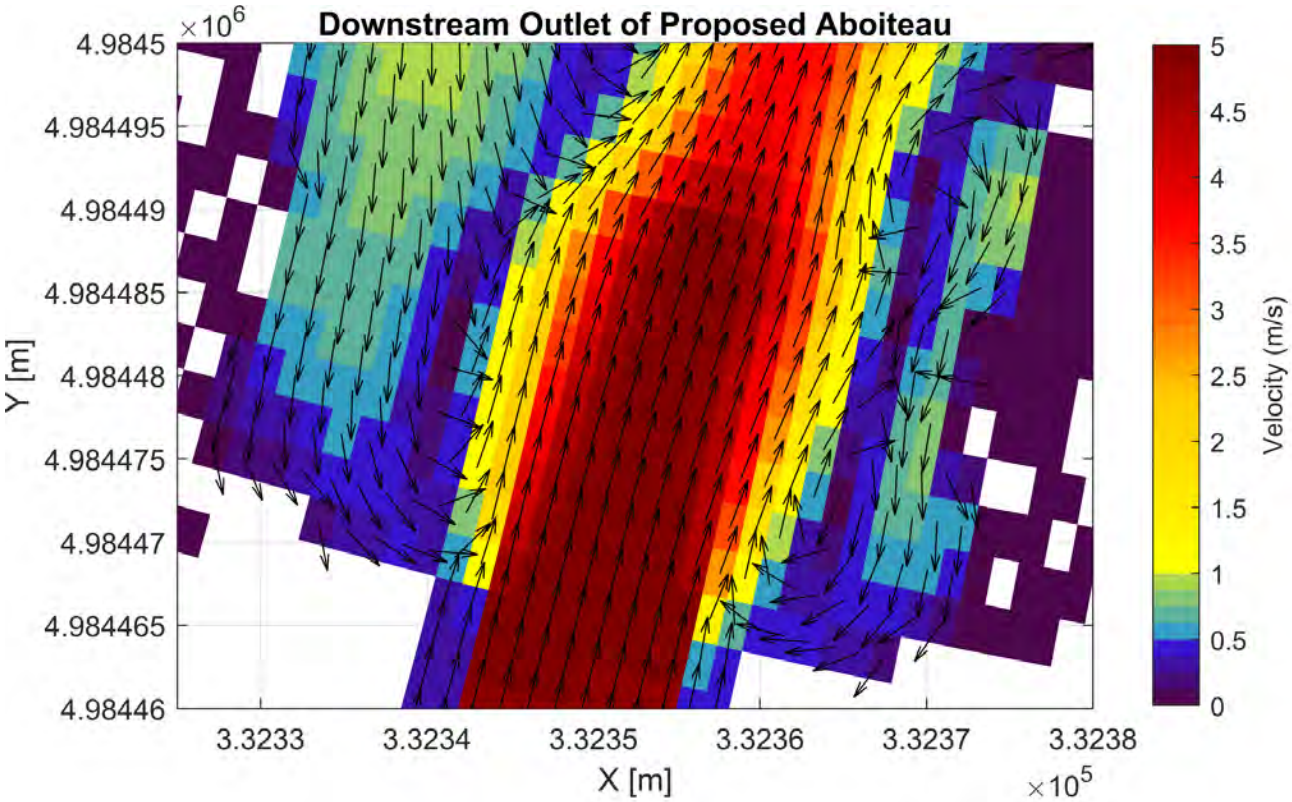




*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.62: Map of Velocities for Top Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Downstream Proposed Aboiteau.



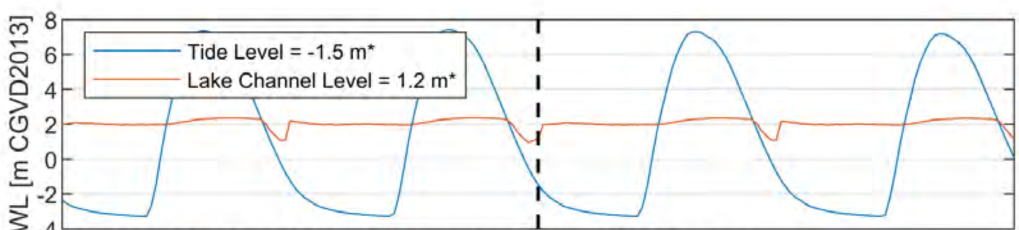


Figure A1.63: Map of Velocities for Top Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Downstream Outlet of Proposed Aboiteau.

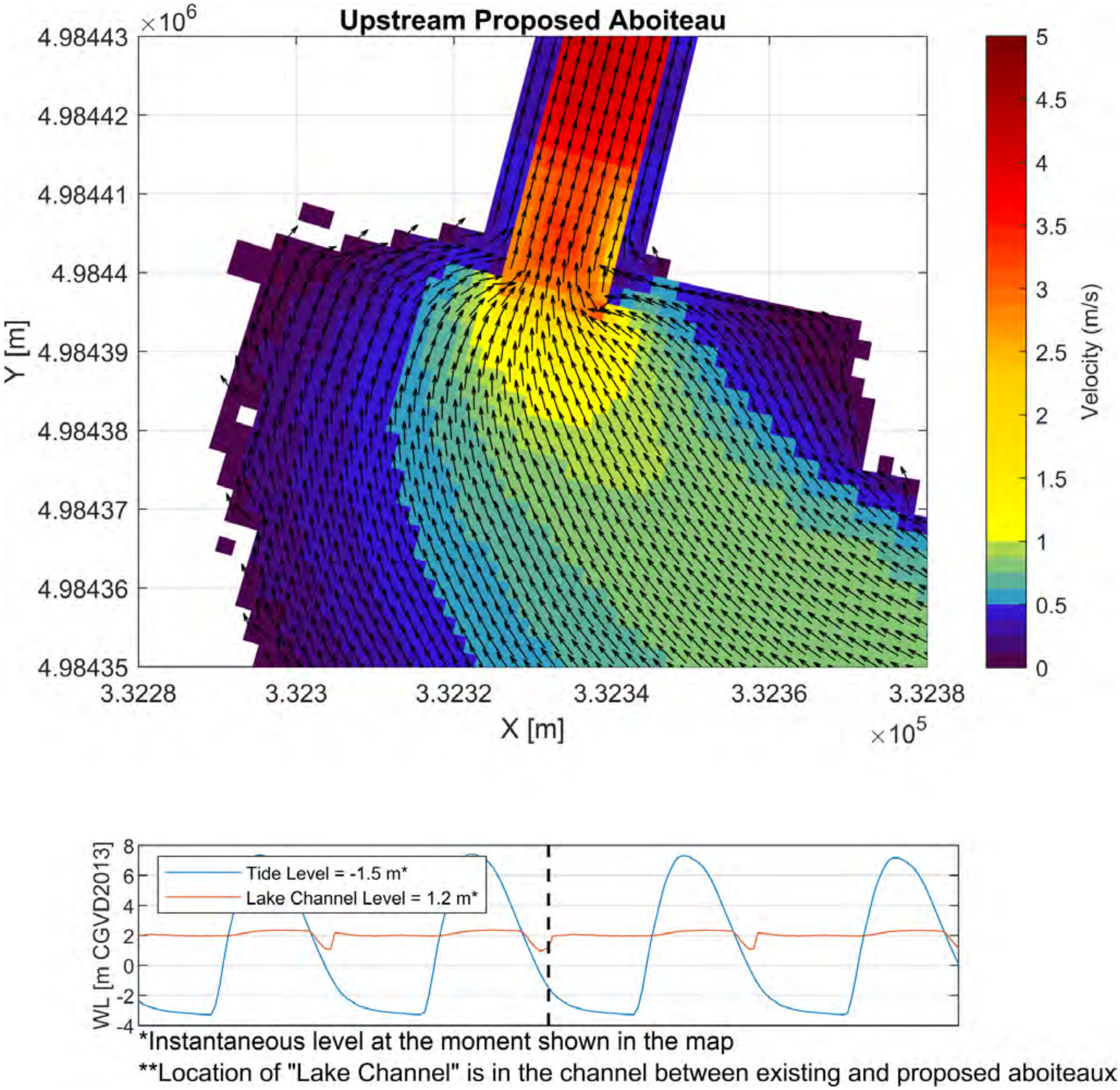
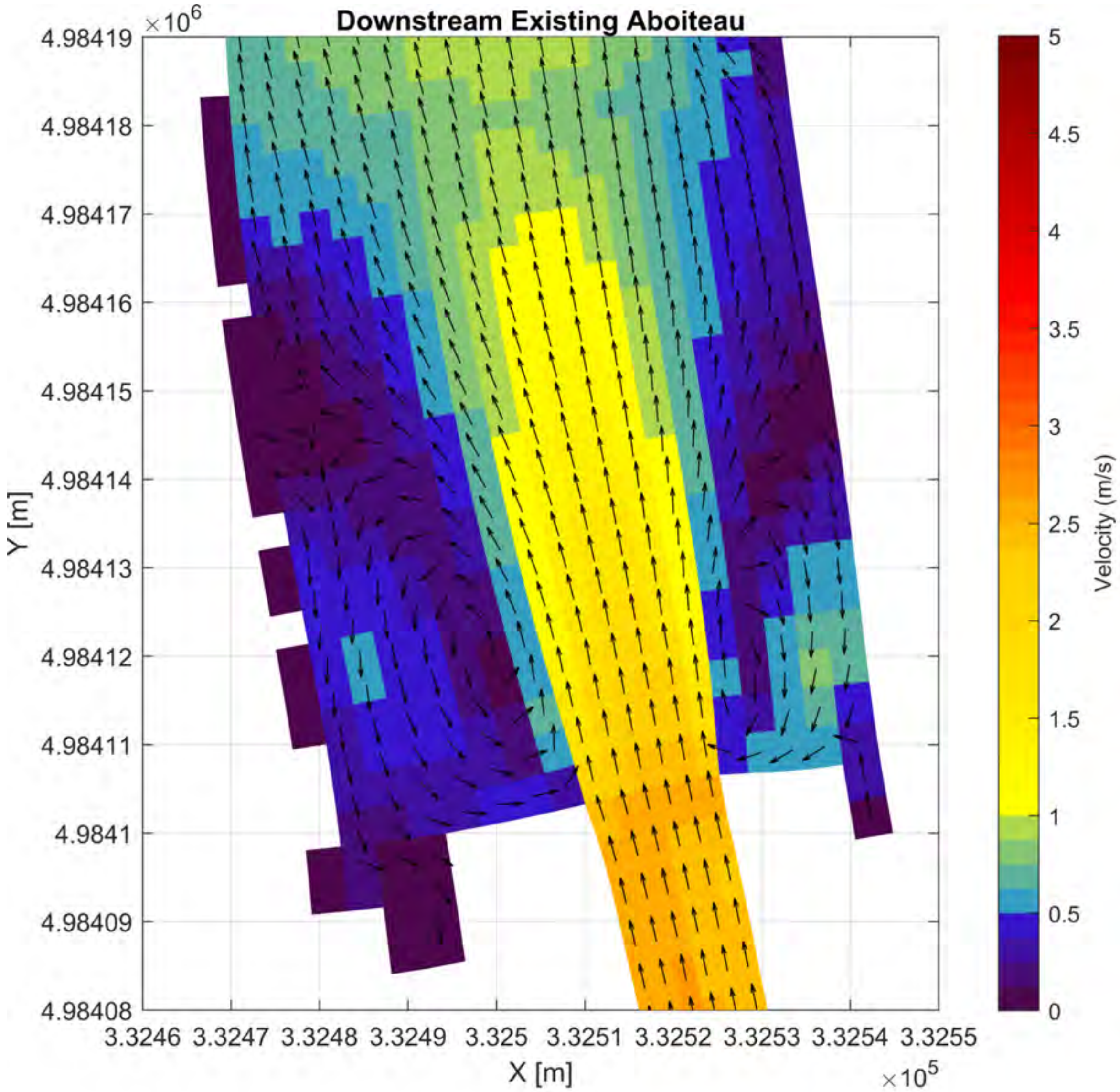


Figure A1.64: Map of Velocities for Top Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Upstream Proposed Aboiteau.



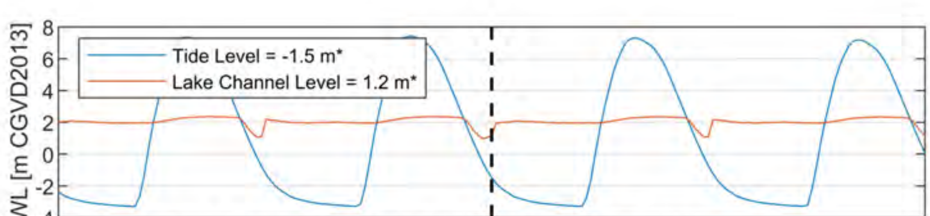
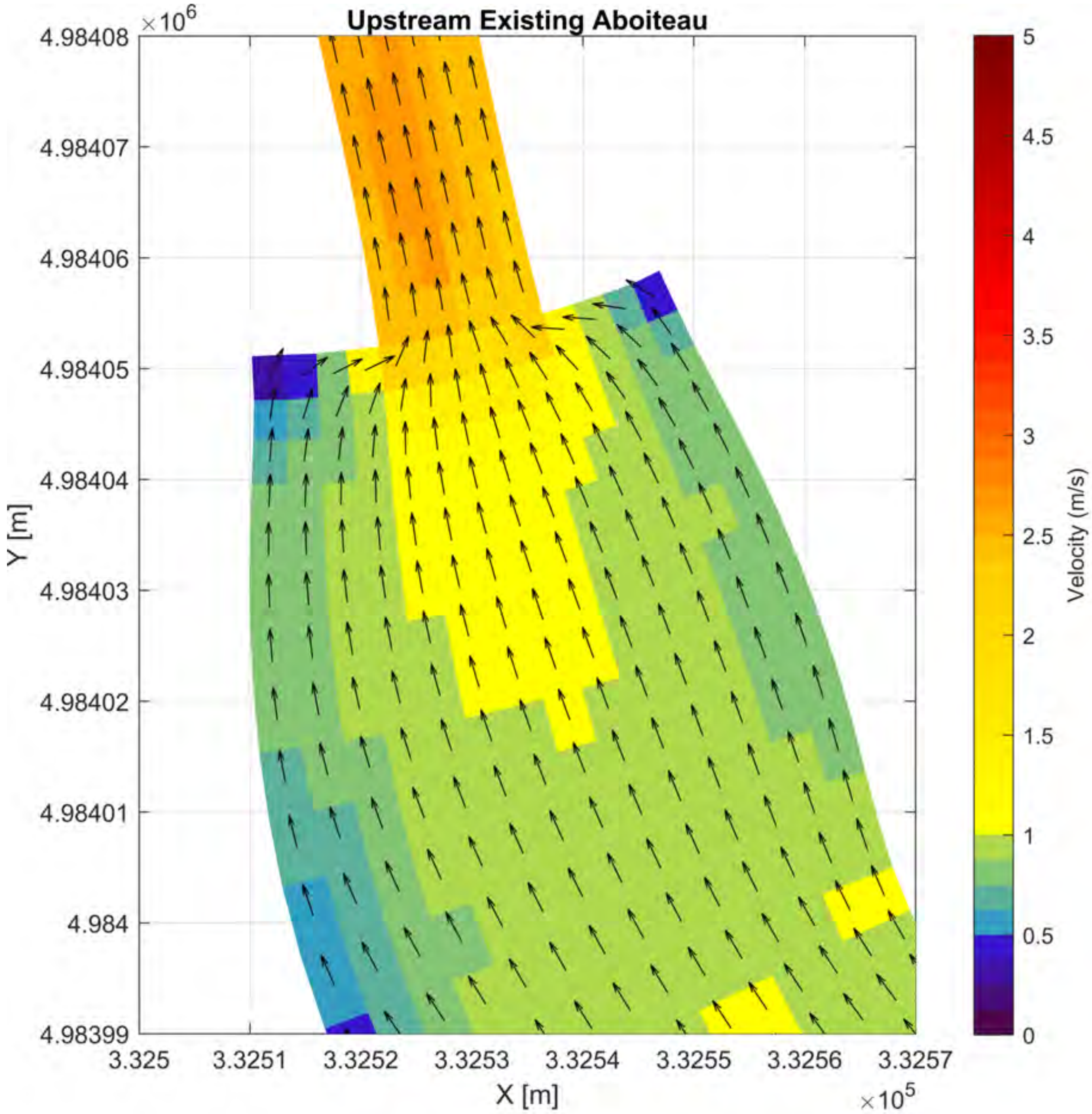


Figure A1.65: Map of Velocities for Top Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Downstream Existing Aboiteau.



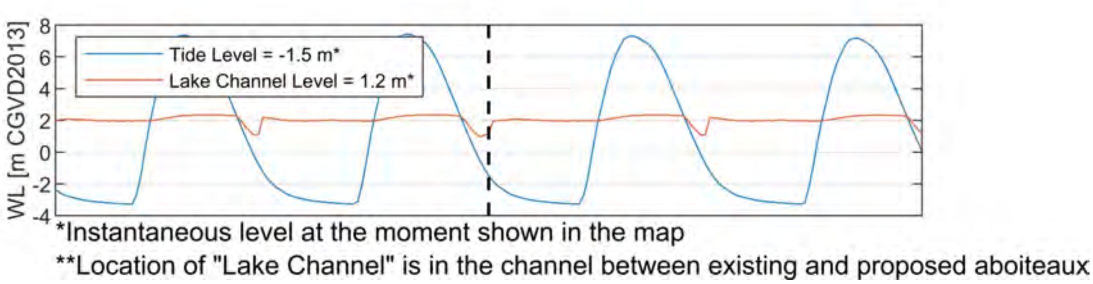


Figure A1.66: Map of Velocities for Top Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Upstream Existing Aboiteau.

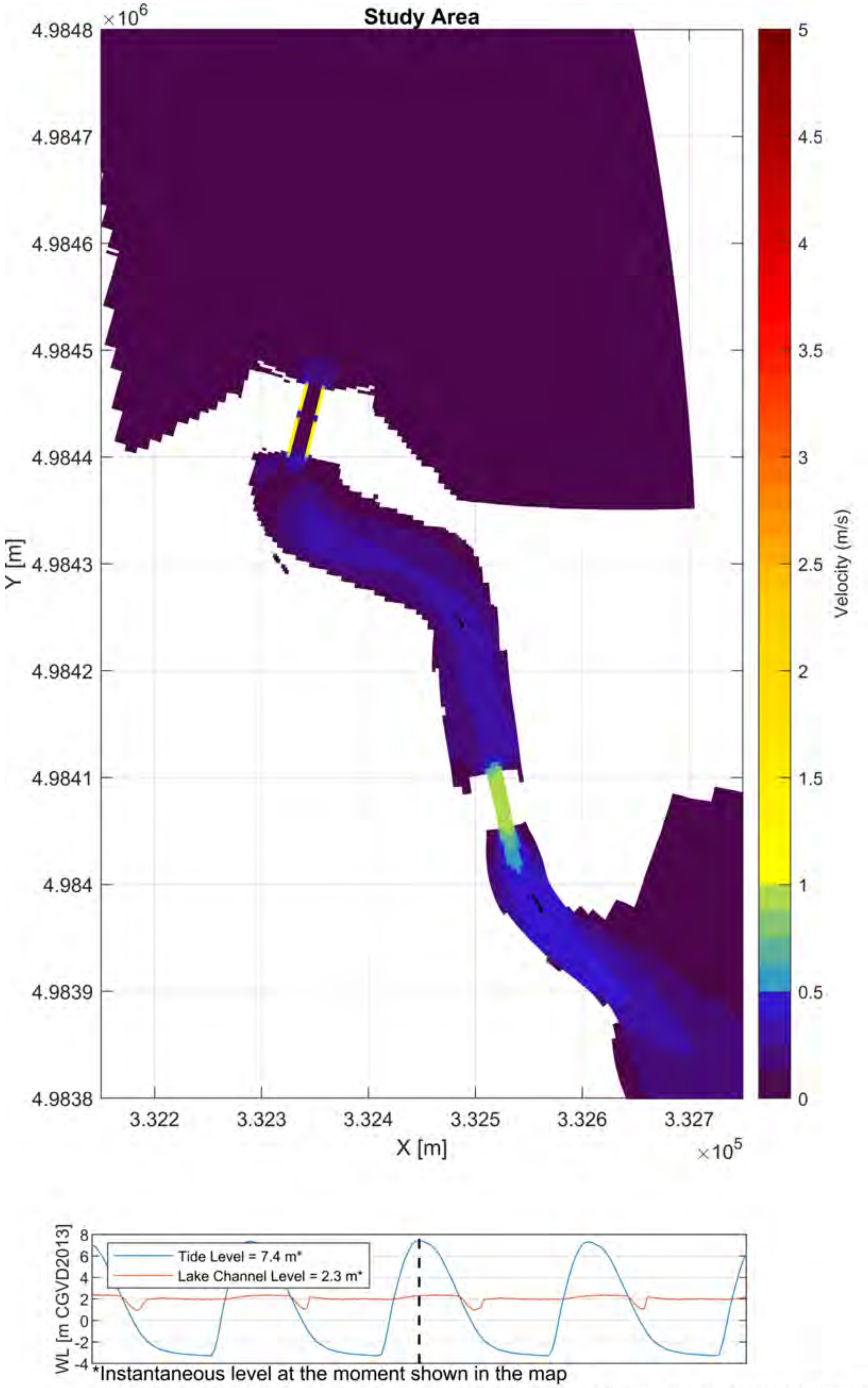
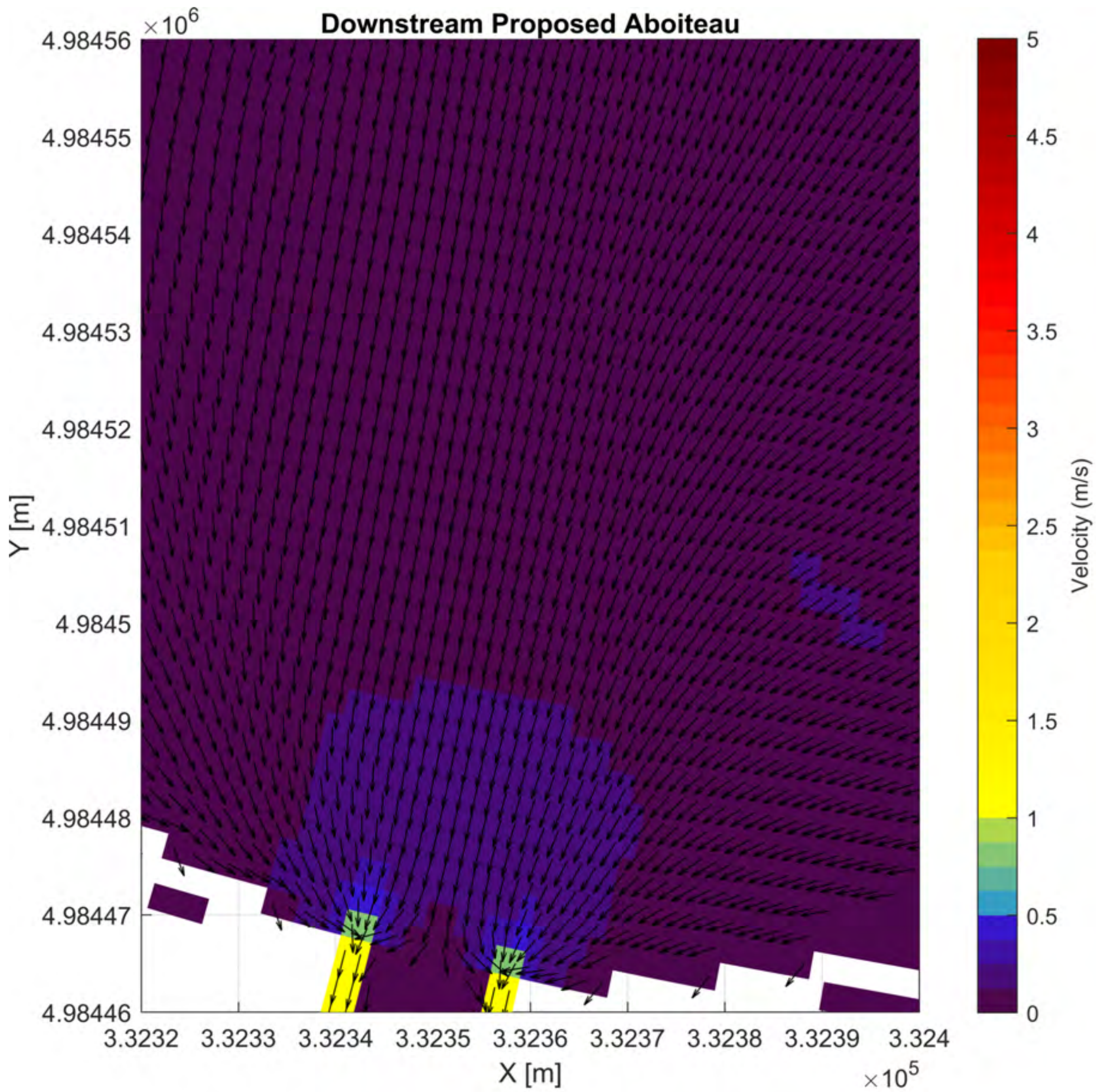


Figure A1.67: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Overall Study Area.



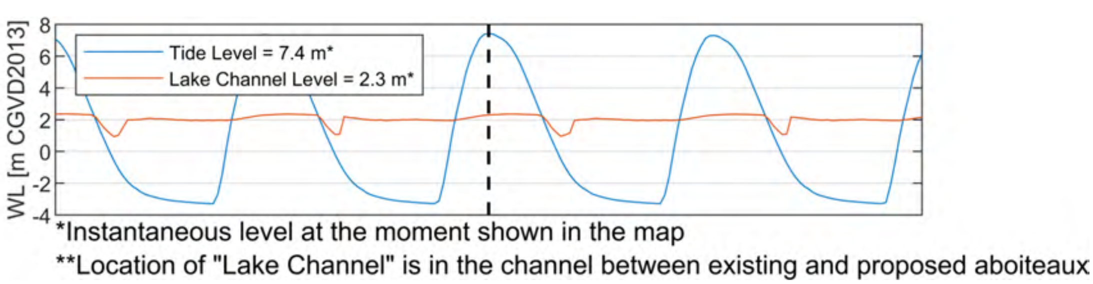


Figure A1.68: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Downstream Proposed Aboiteau.

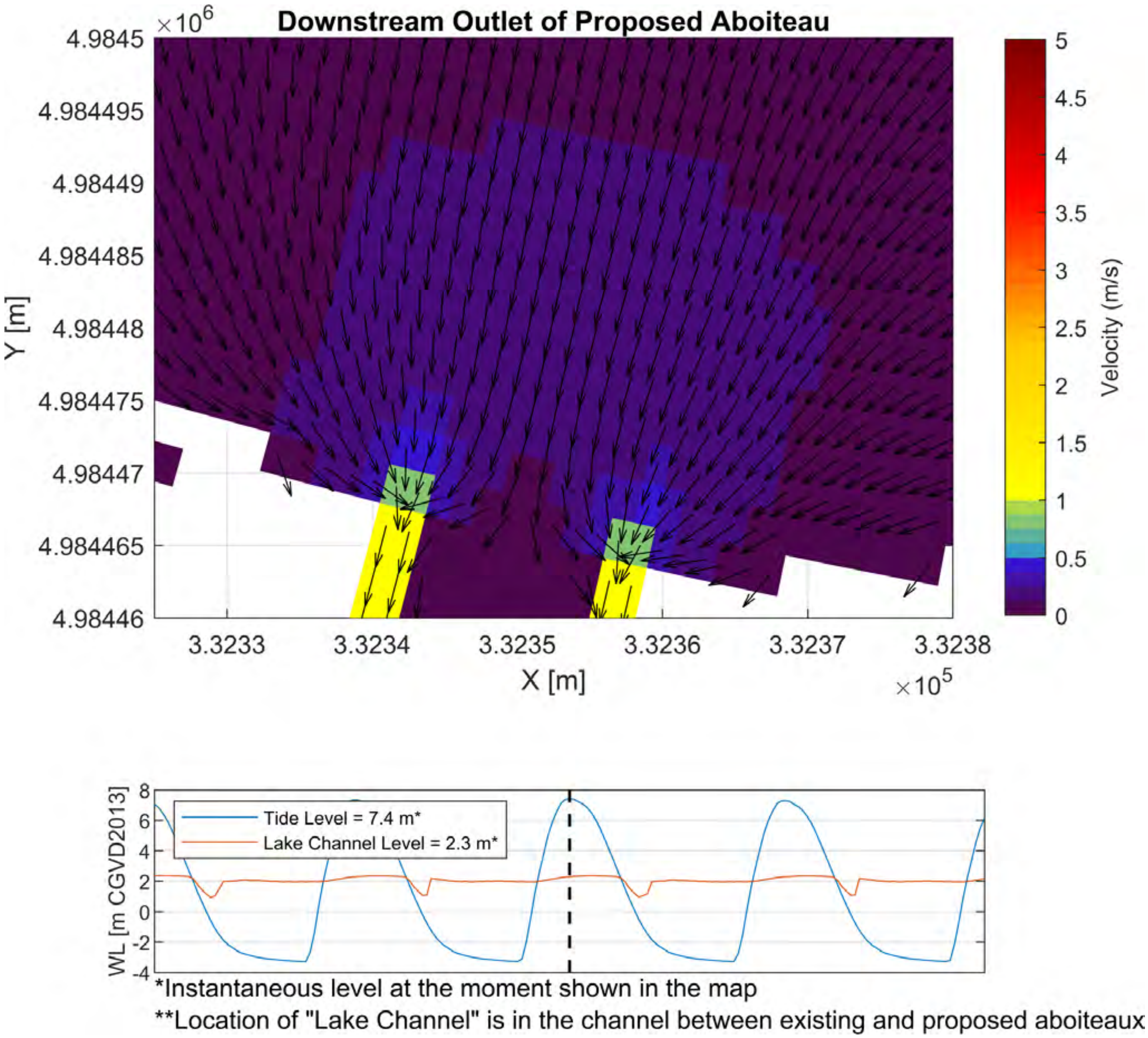


Figure A1.69: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Downstream Outlet of Proposed Aboiteau.

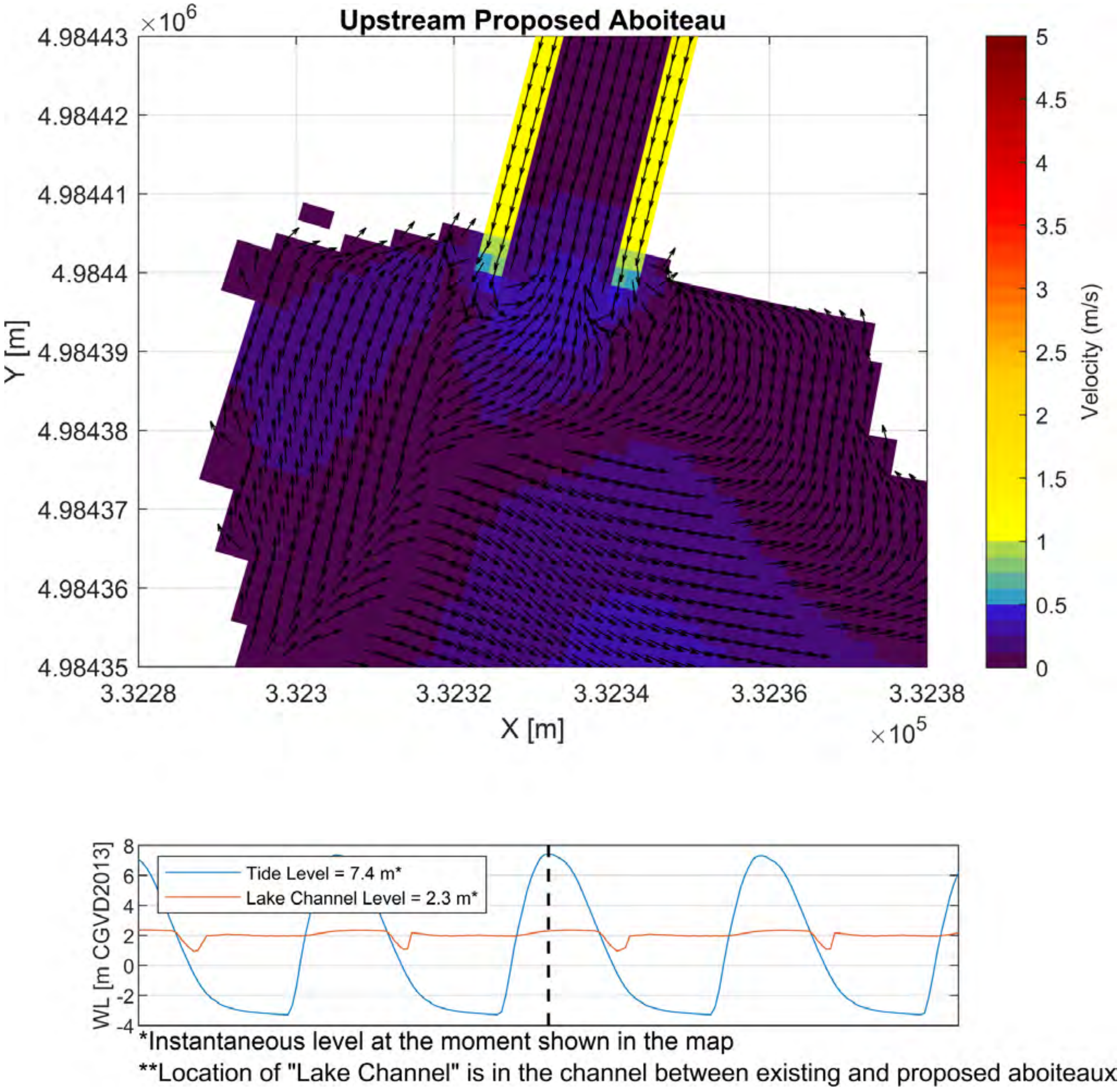
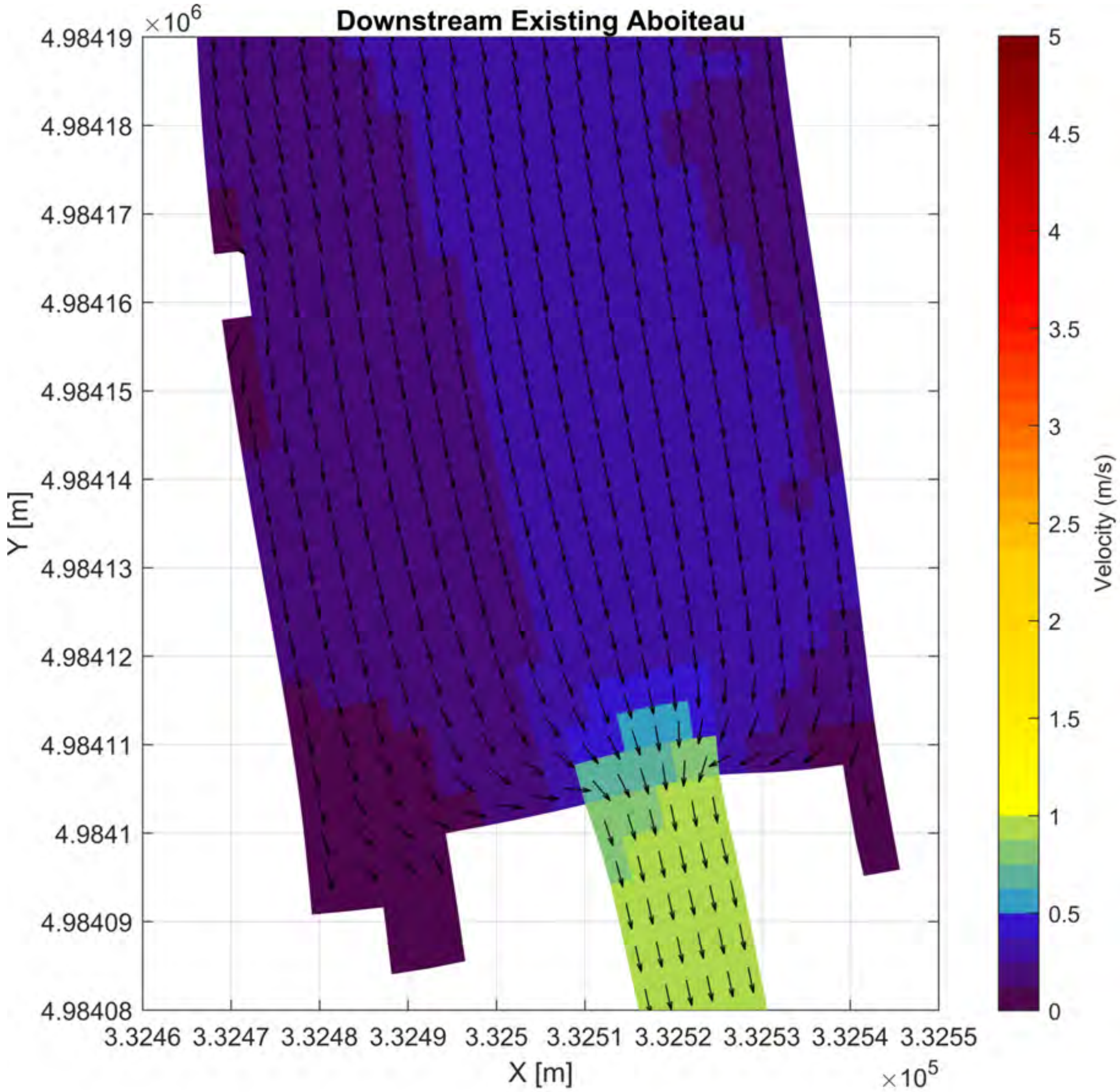


Figure A1.70: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Upstream Proposed Aboiteau.



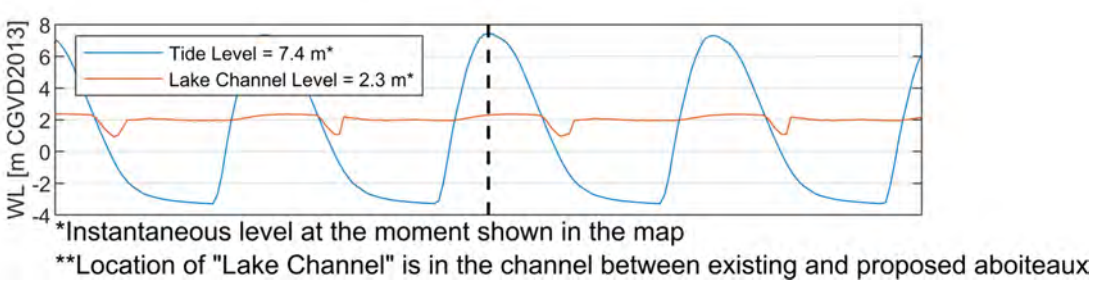


Figure A1.71: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Downstream Existing Aboiteau.

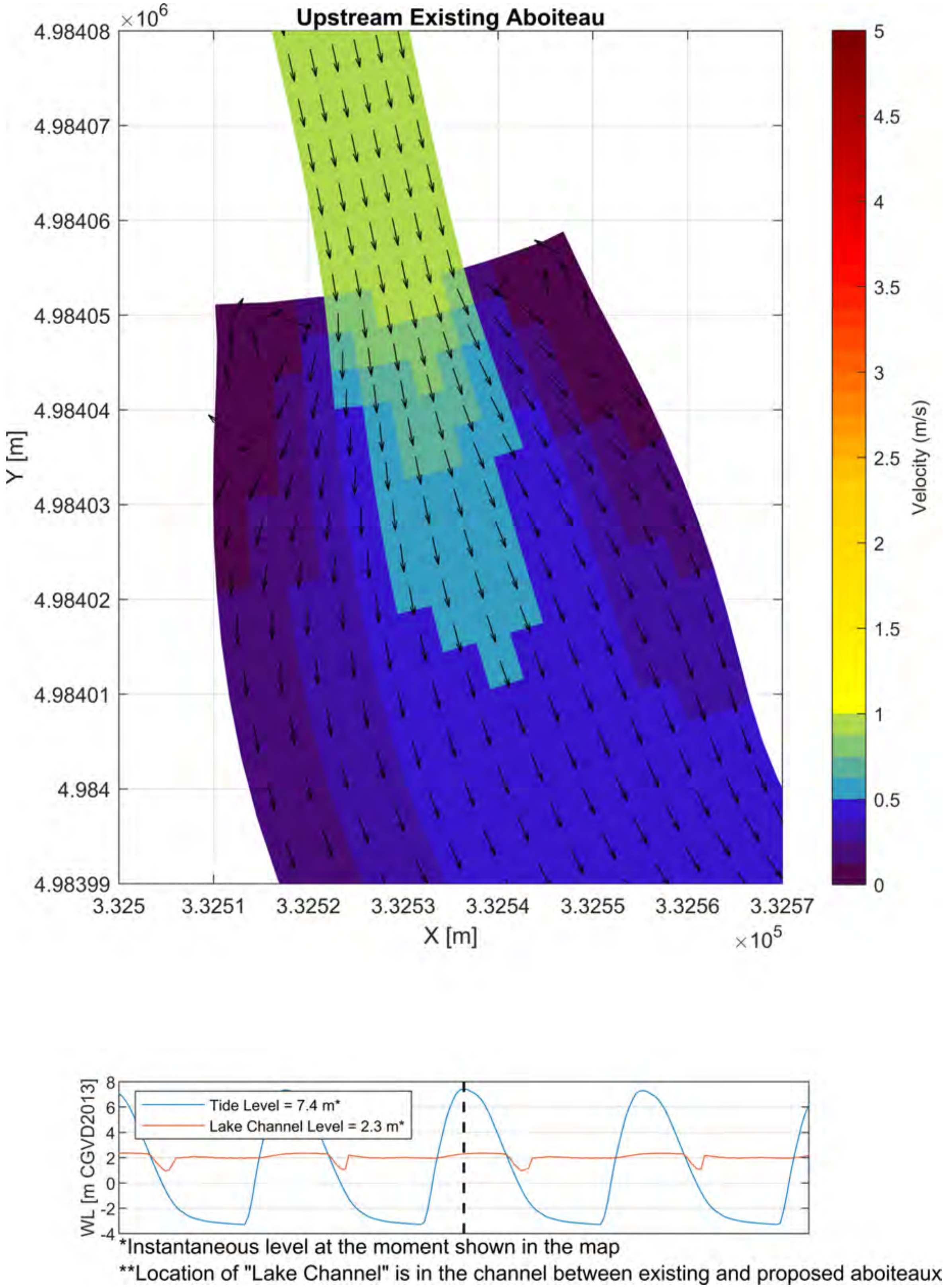


Figure A1.72: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Upstream Existing Aboiteau.

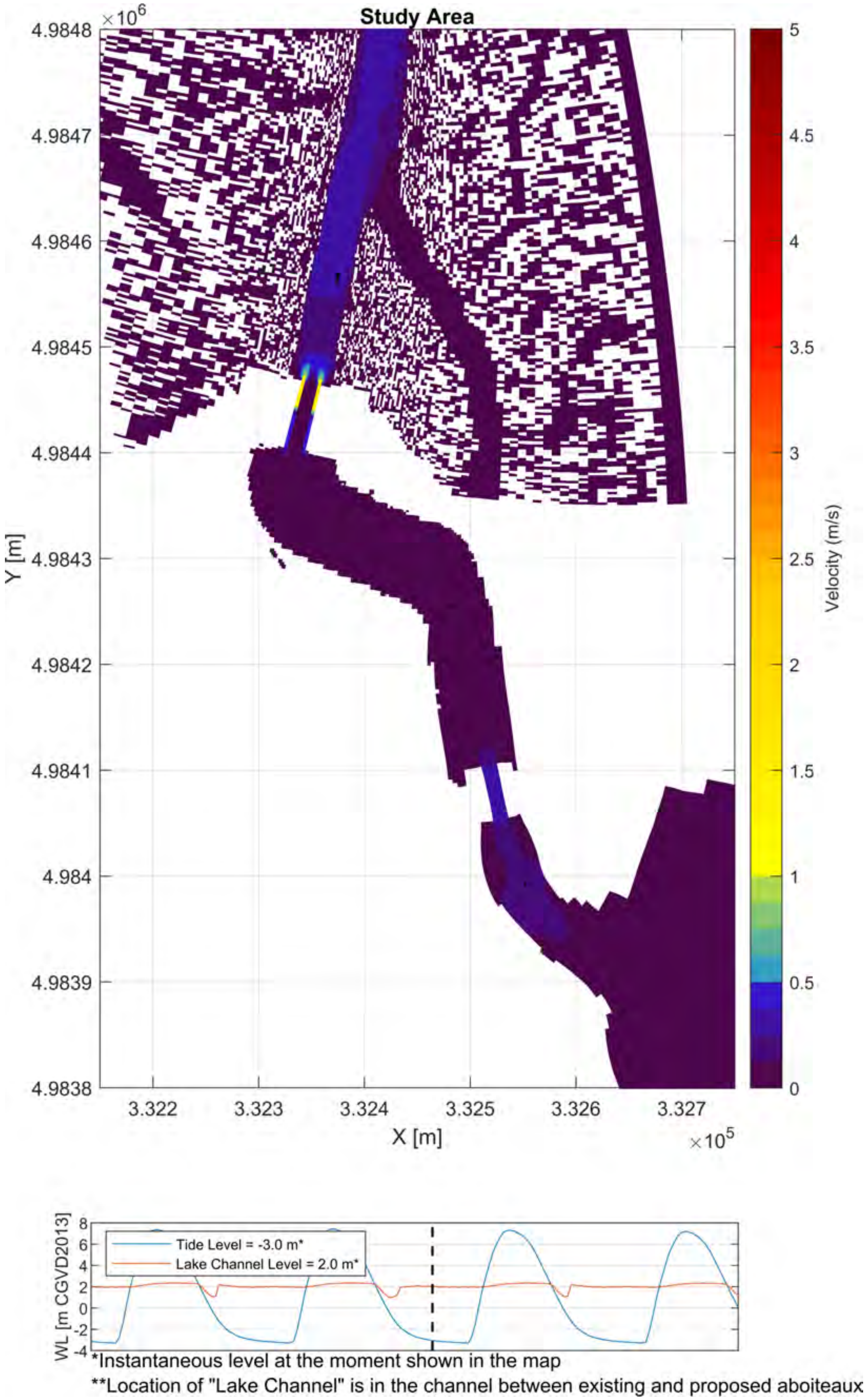
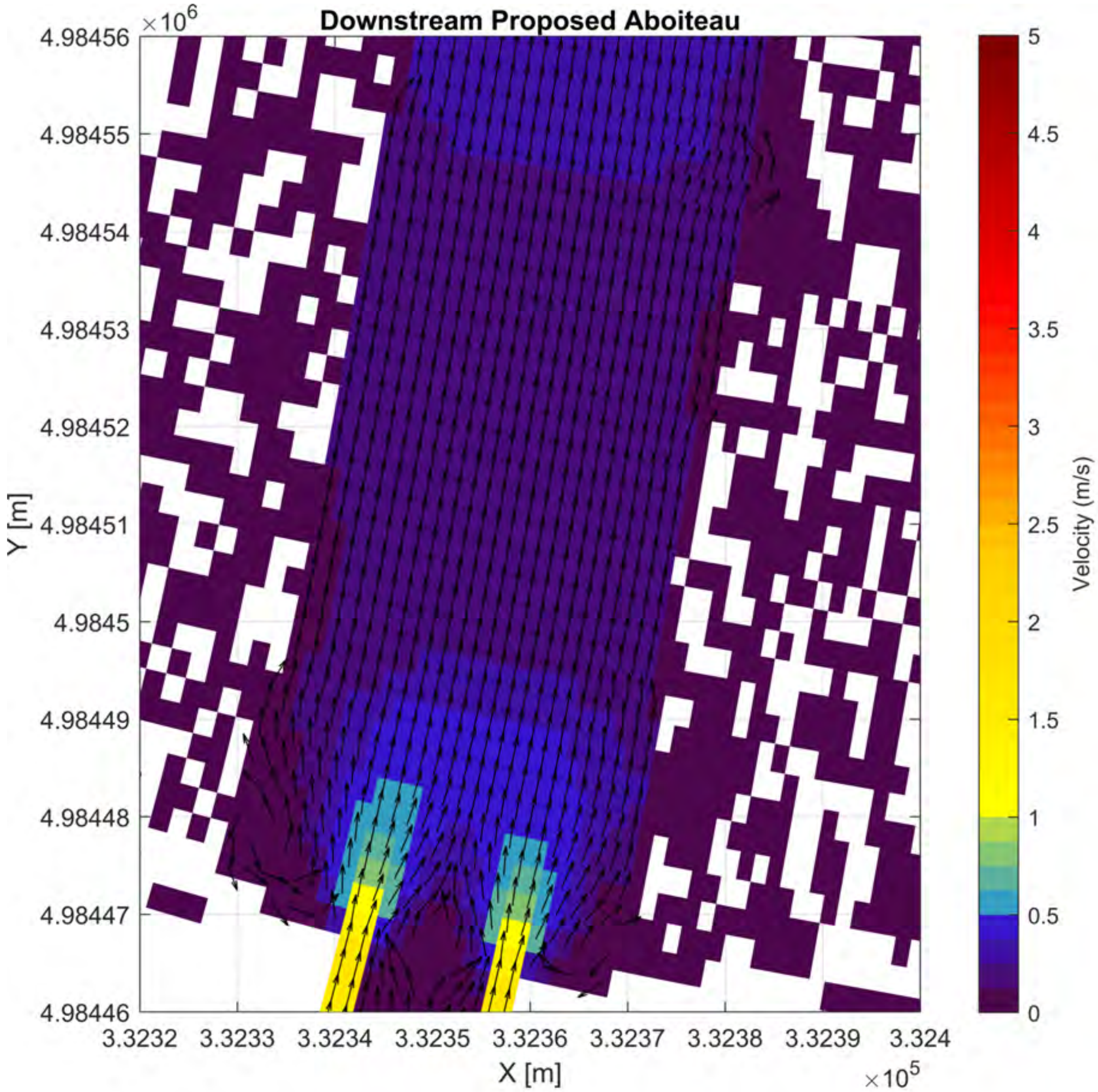
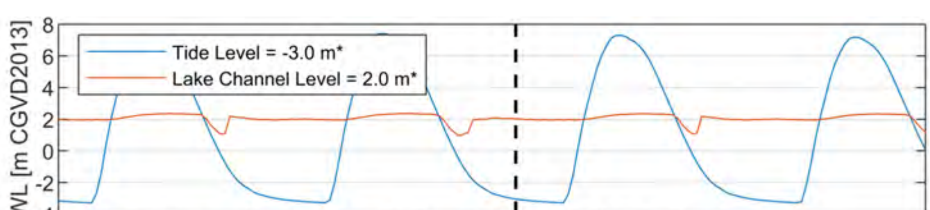


Figure A1.73: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Overall Study Area.

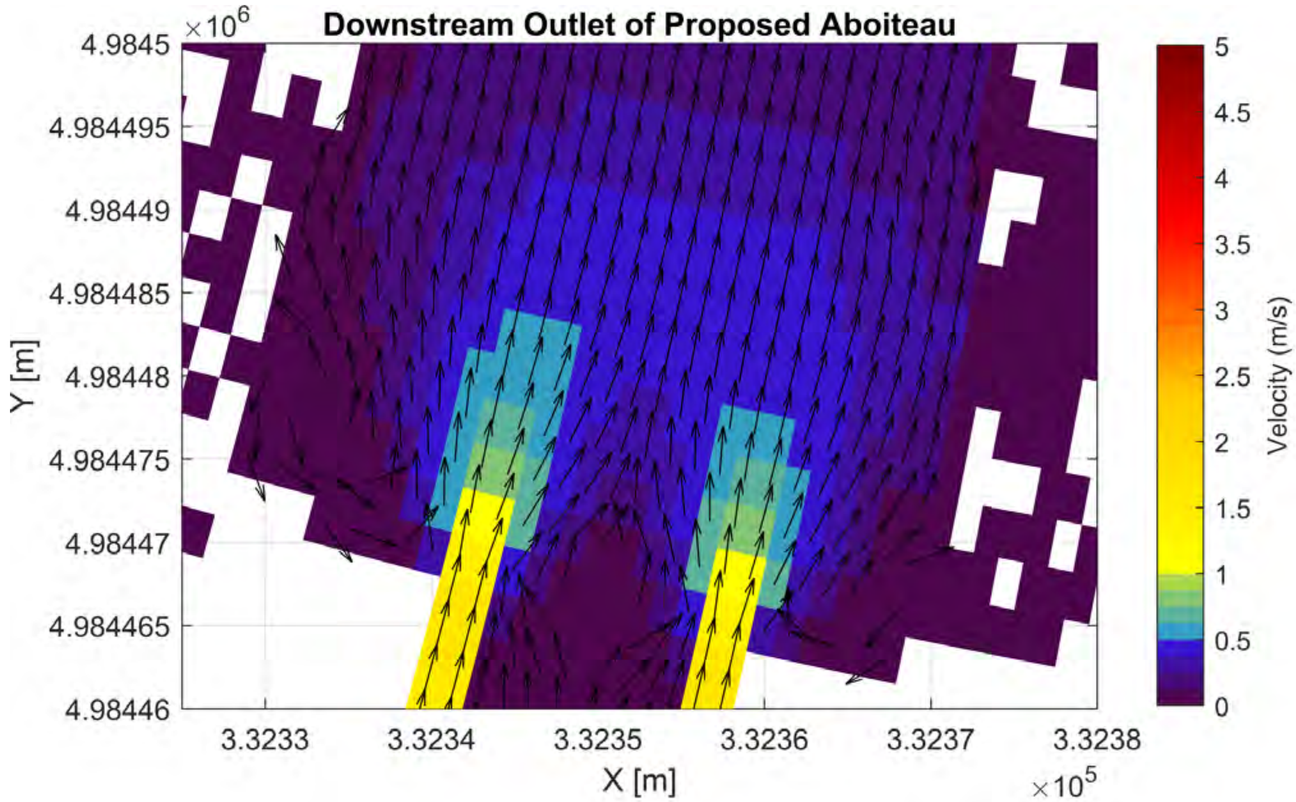




*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.74: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Downstream Proposed Aboiteau.



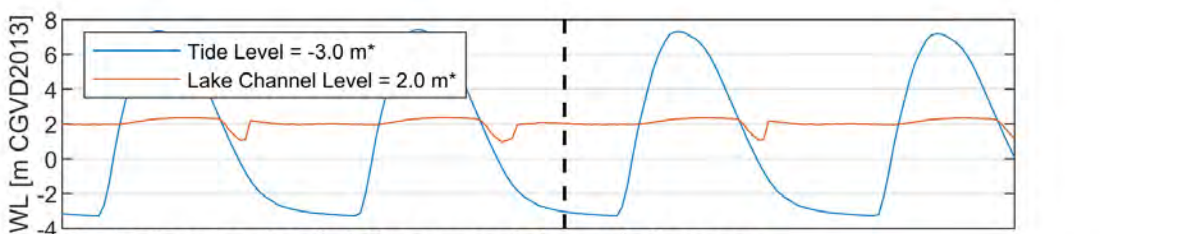


Figure A1.75: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Downstream Outlet of Proposed Aboiteau.

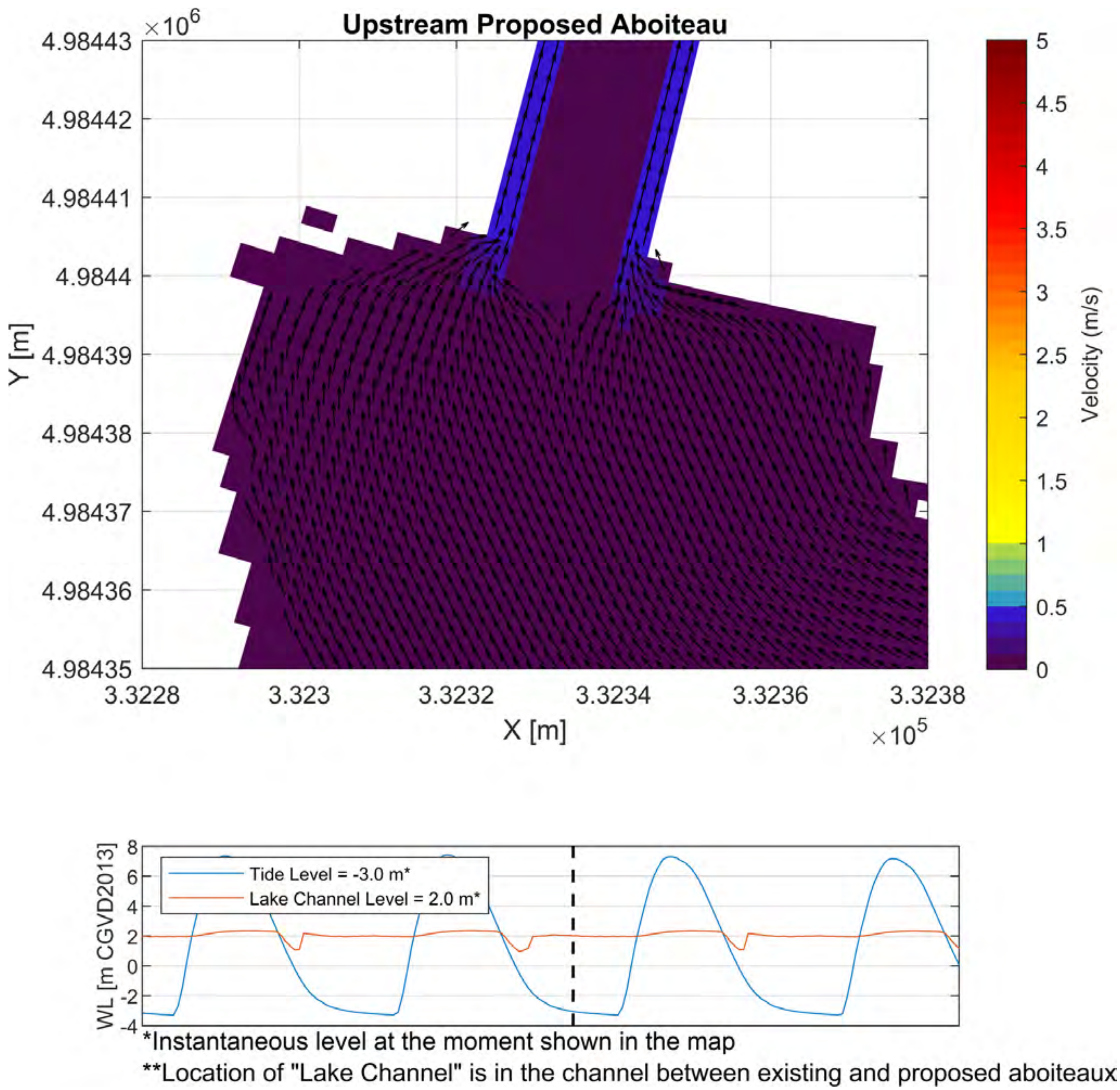


Figure A1.76: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Upstream Proposed Aboiteau.

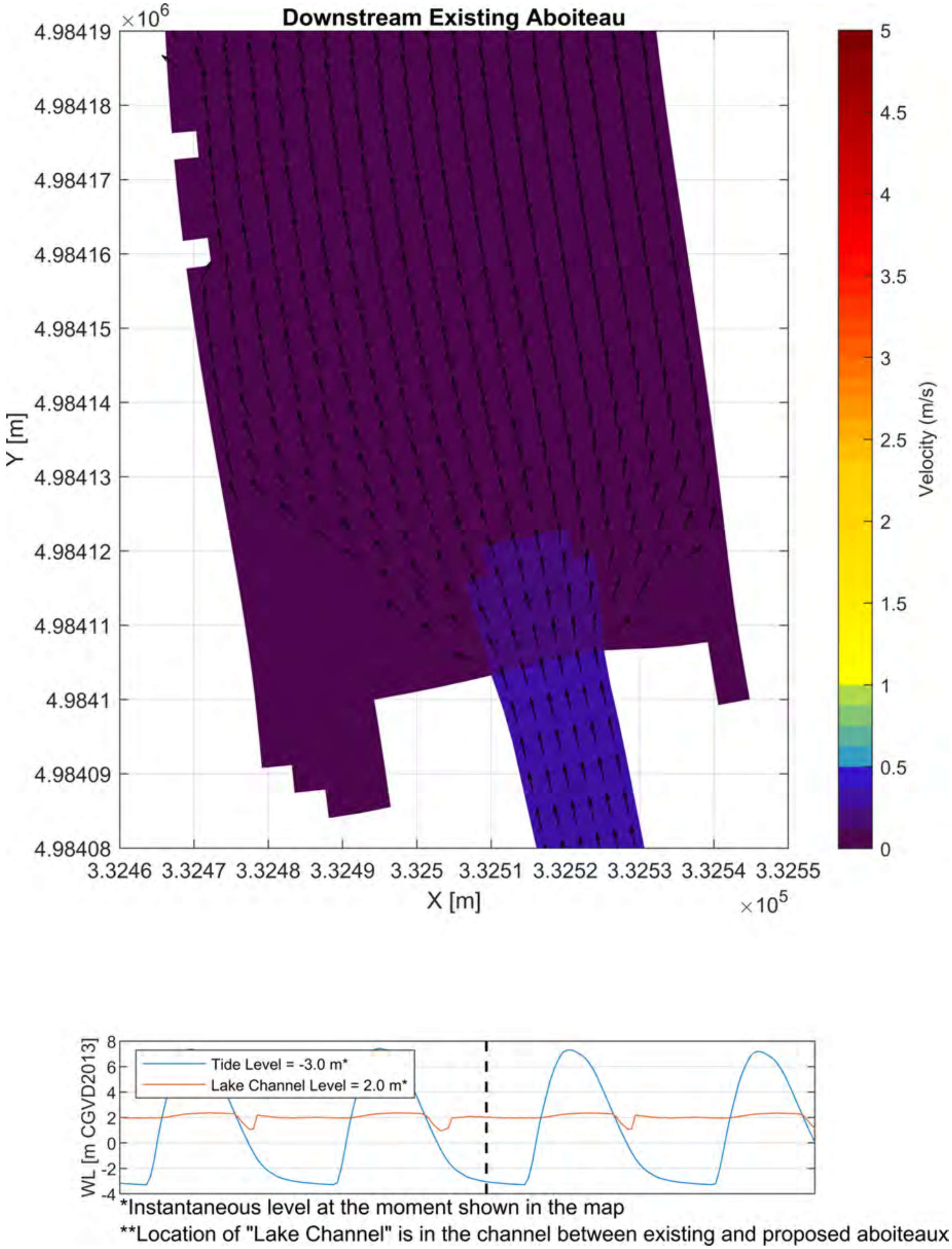
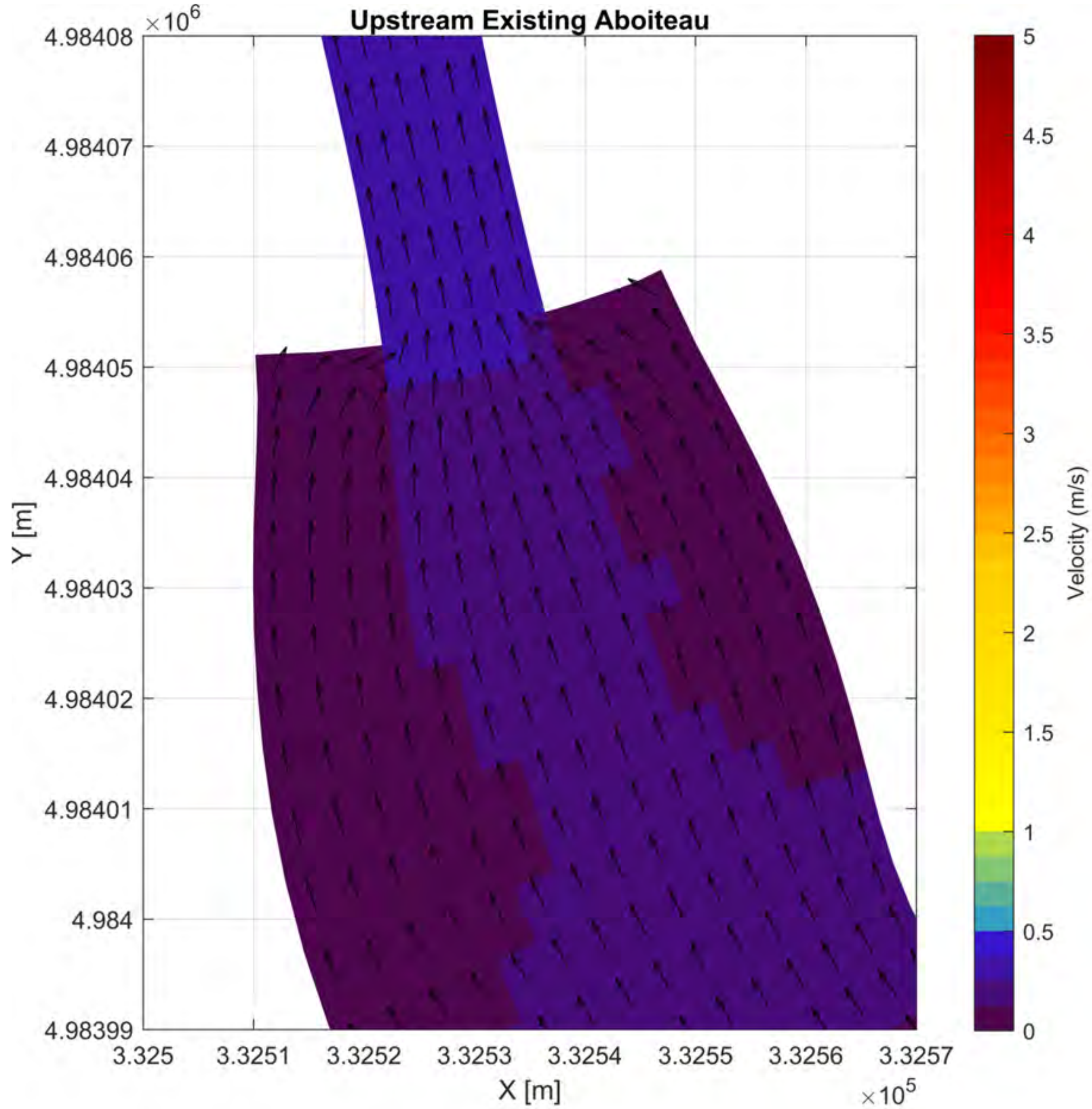


Figure A1.77: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Downstream Existing Aboiteau.



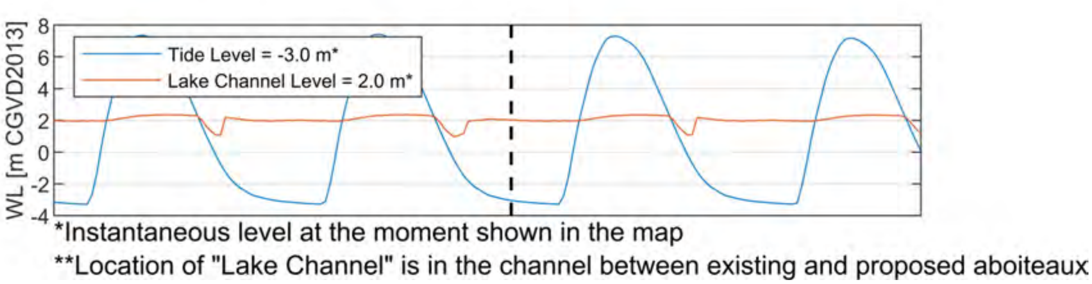


Figure A1.78: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Upstream Existing Aboiteau.

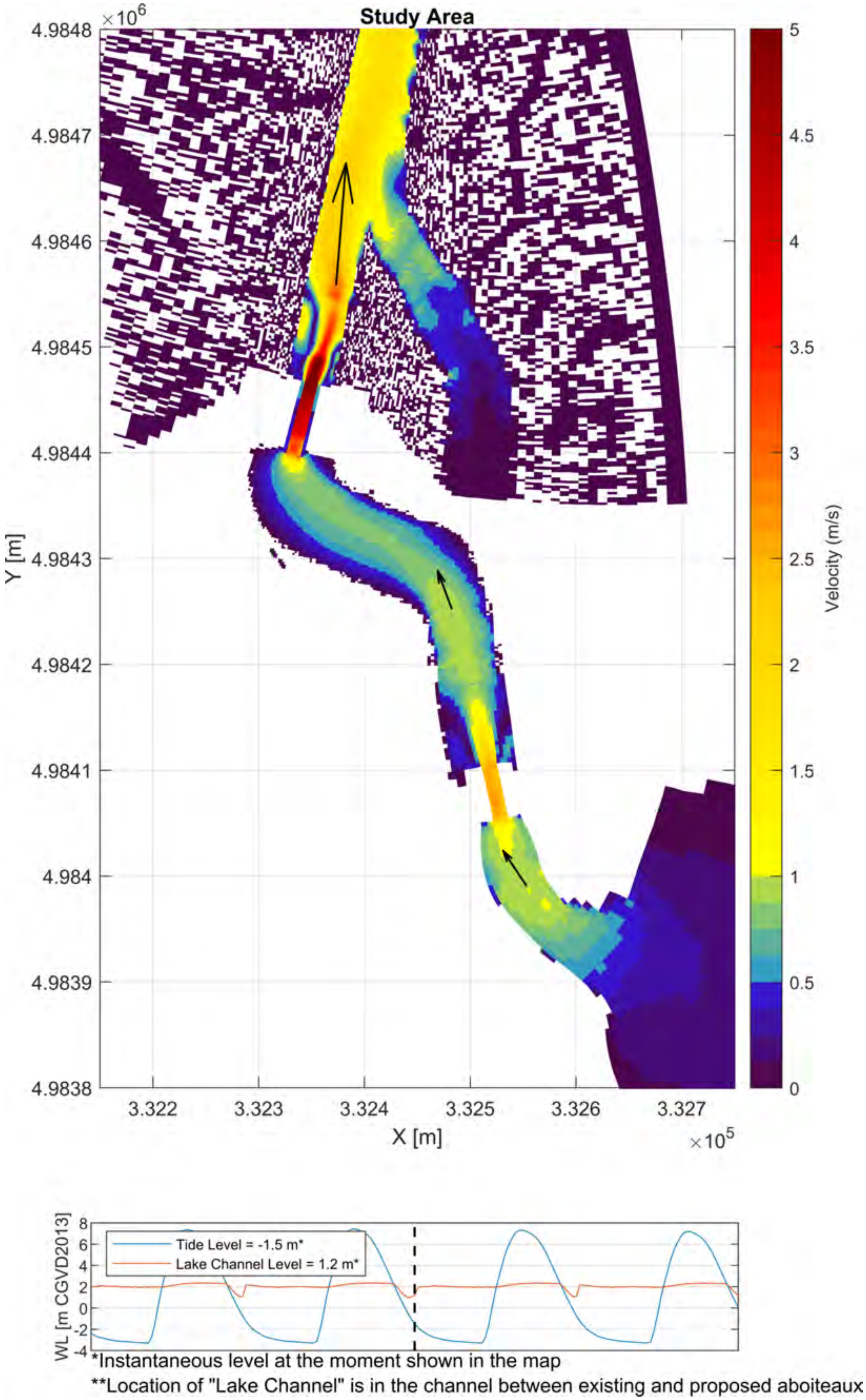
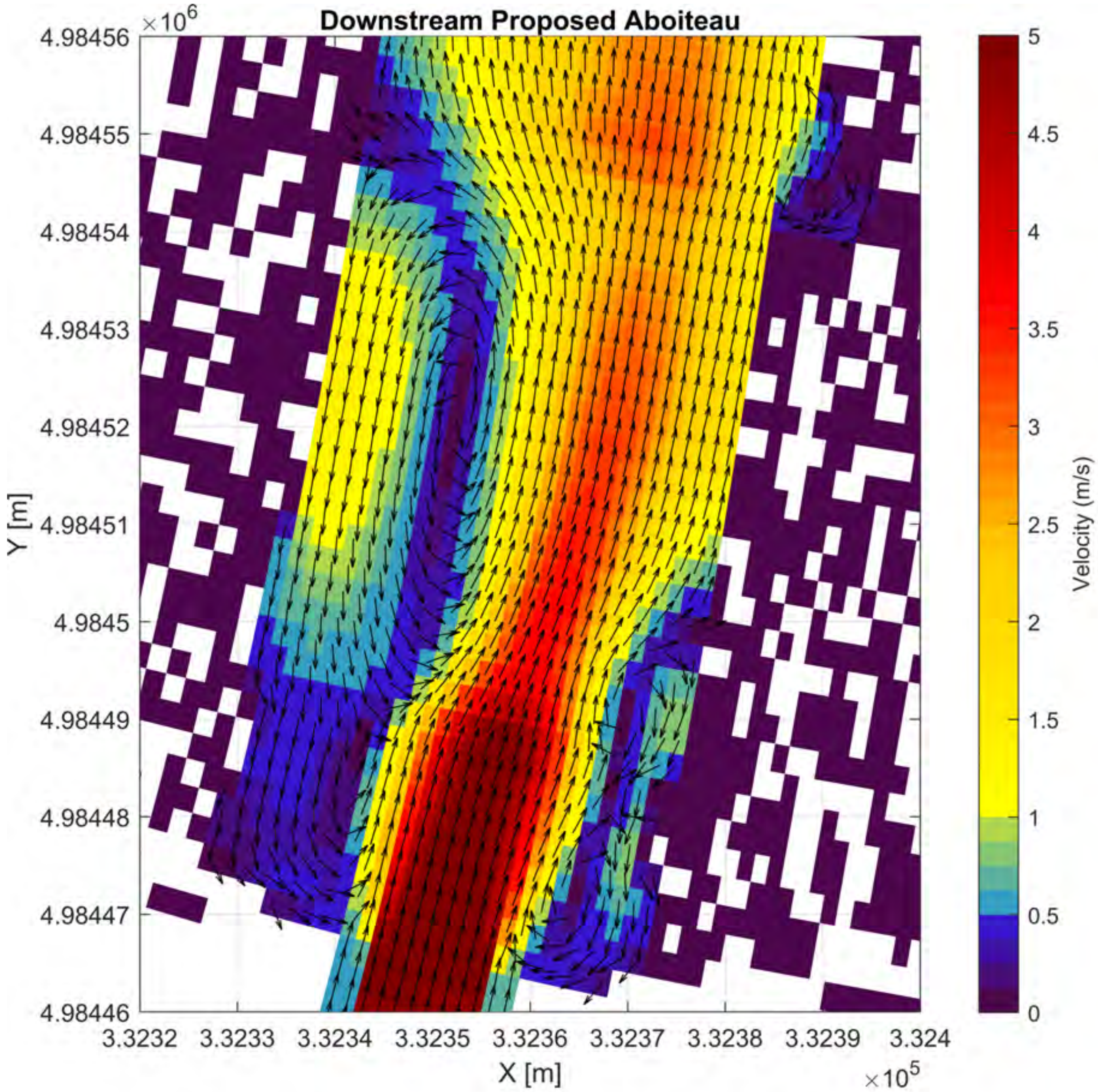
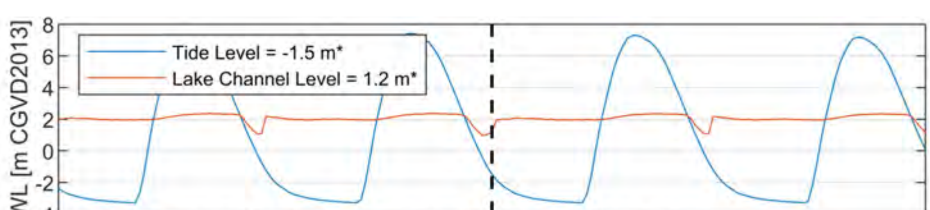


Figure A1.79: Map of Velocities for Middle Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Overall Study Area.





*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.80: Map of Velocities for Middle Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Downstream Proposed Aboiteau.

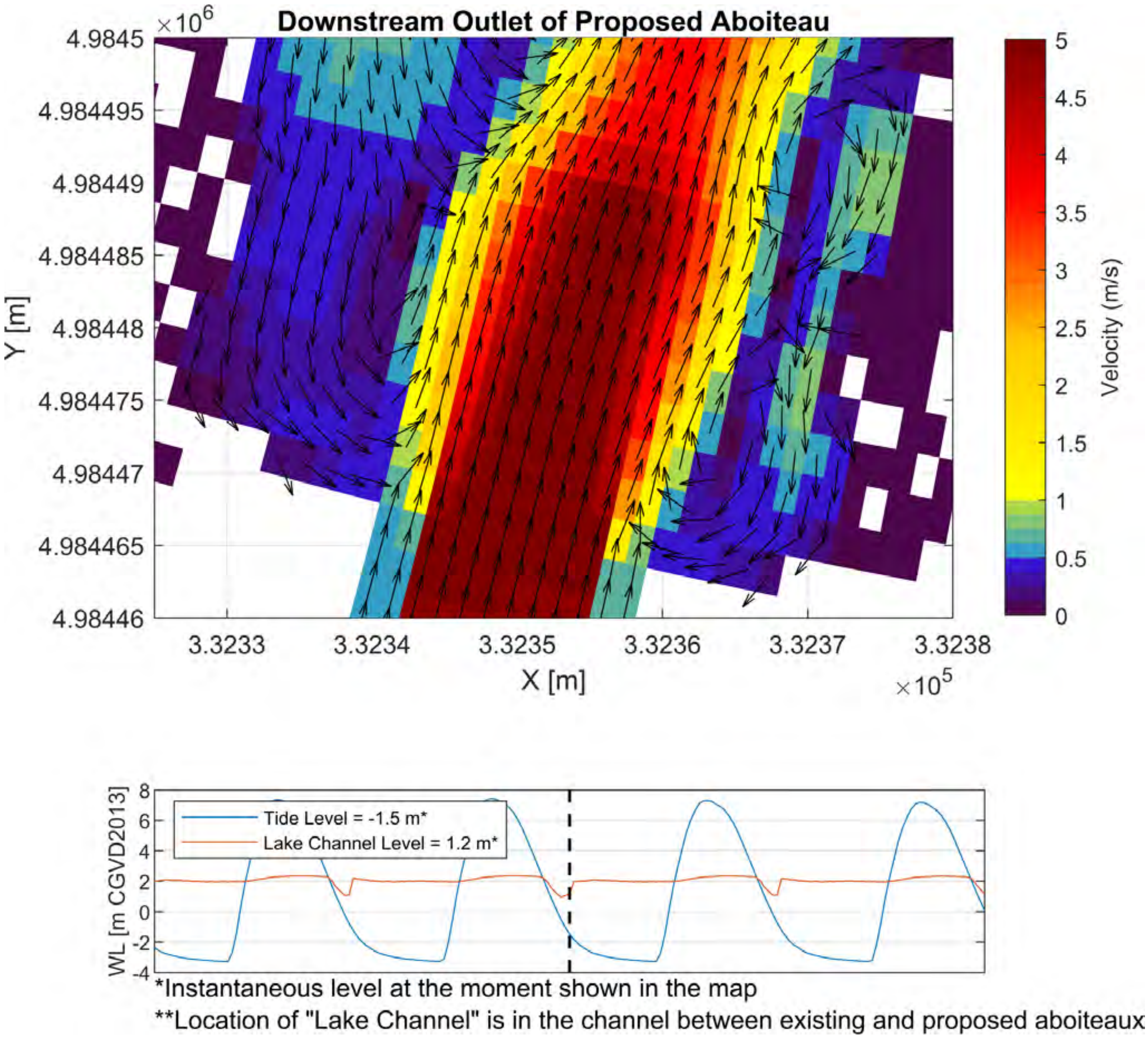


Figure A1.81: Map of Velocities for Middle Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Downstream Outlet of Proposed Aboiteau.

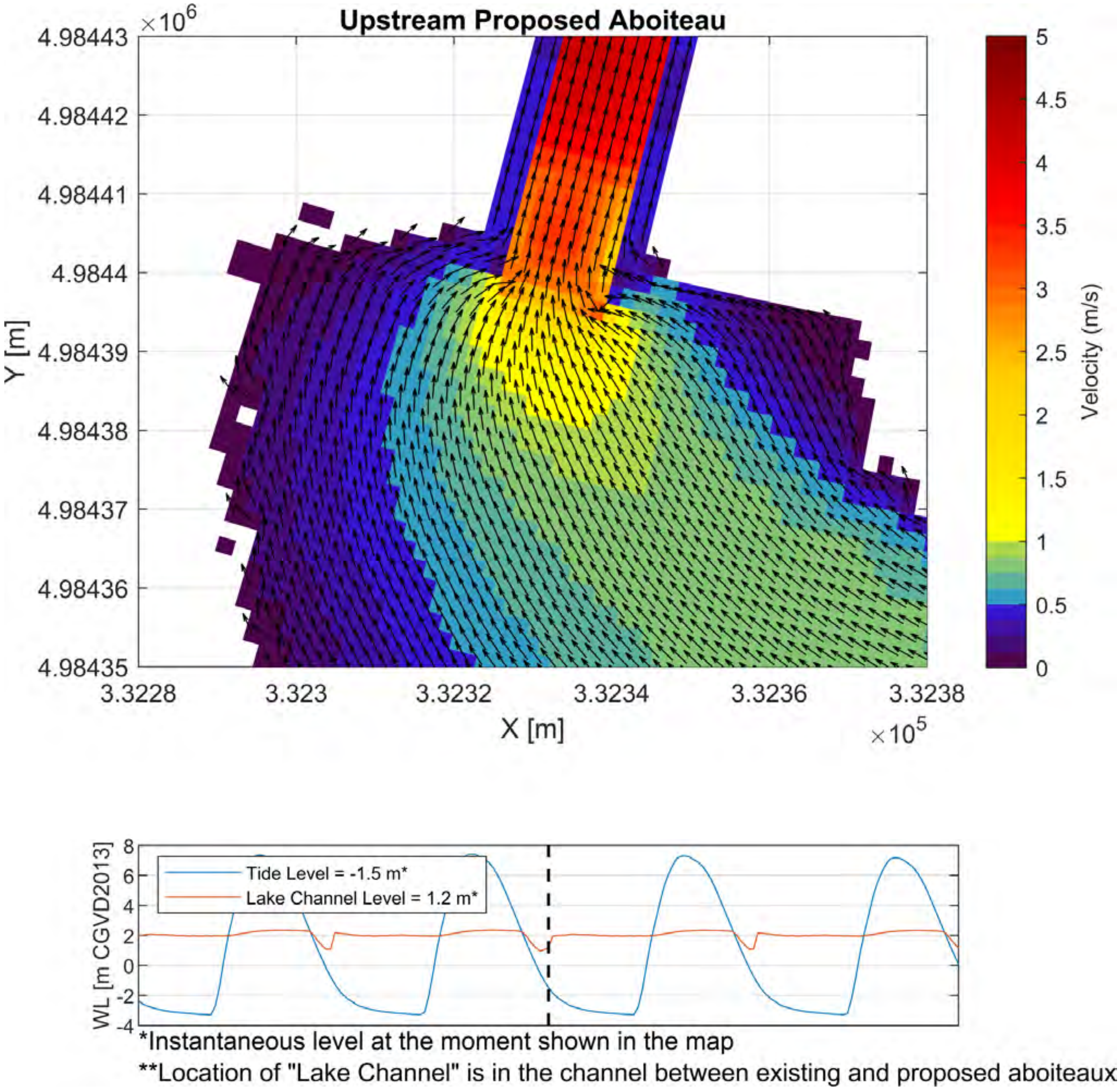
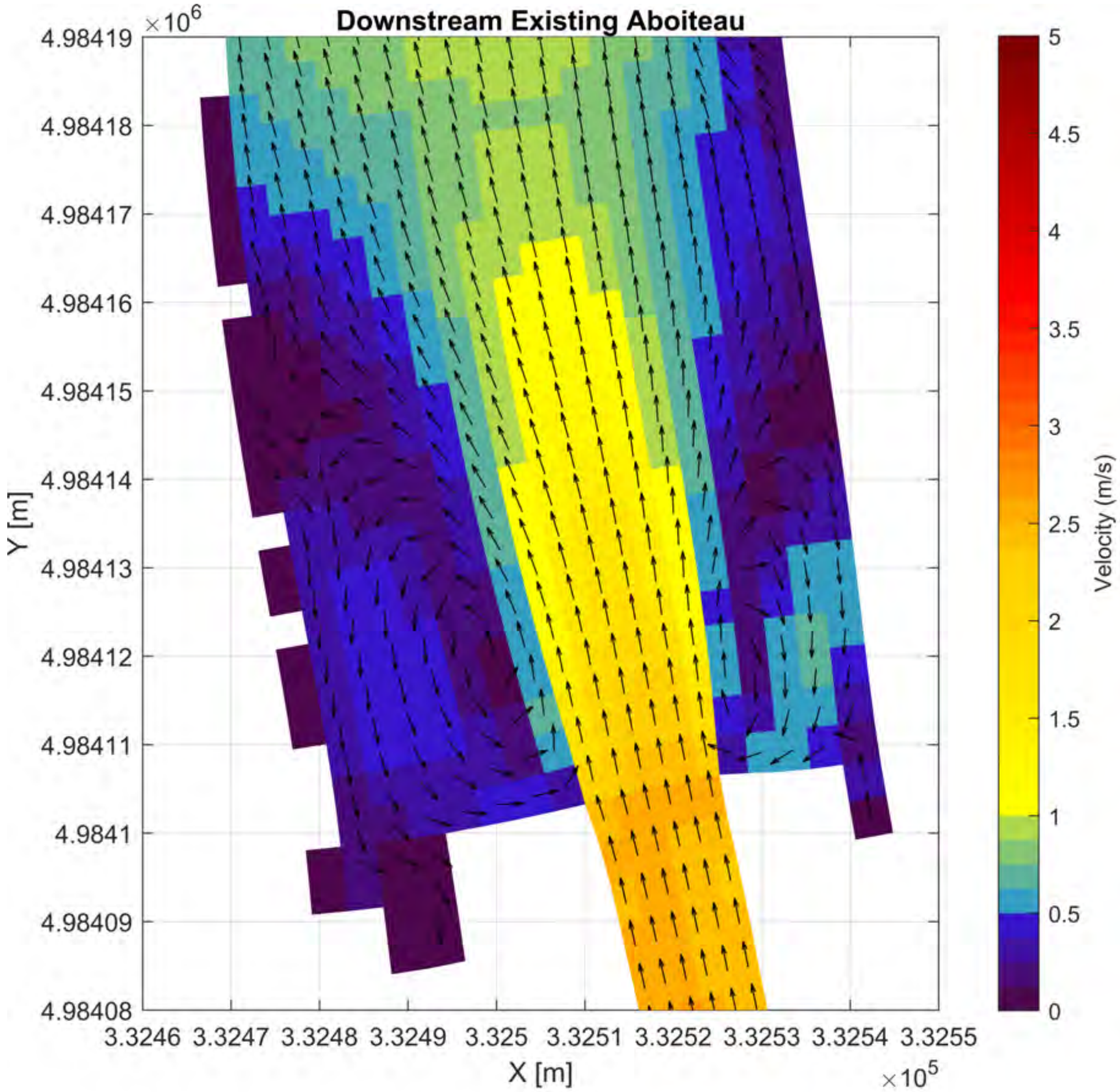


Figure A1.82: Map of Velocities for Middle Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Upstream Proposed Aboiteau.



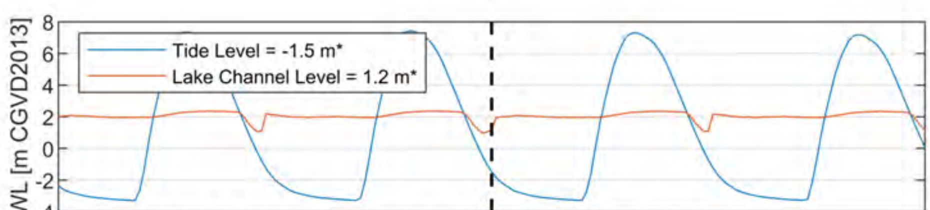
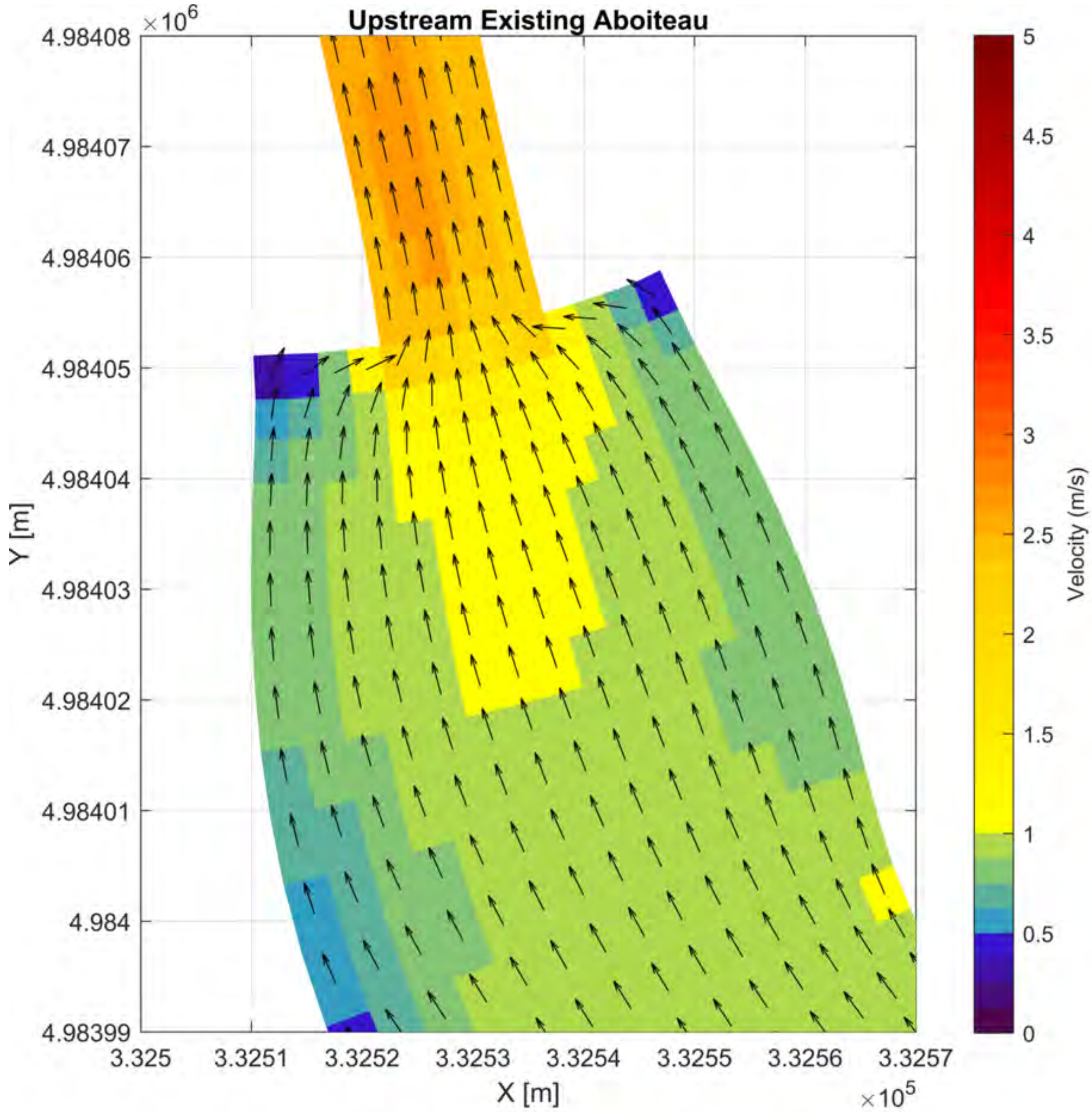


Figure A1.83: Map of Velocities for Middle Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Downstream Existing Aboiteau.



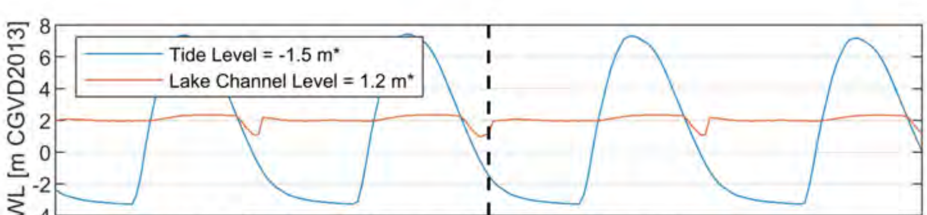


Figure A1.84: Map of Velocities for Middle Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Upstream Existing Aboiteau.

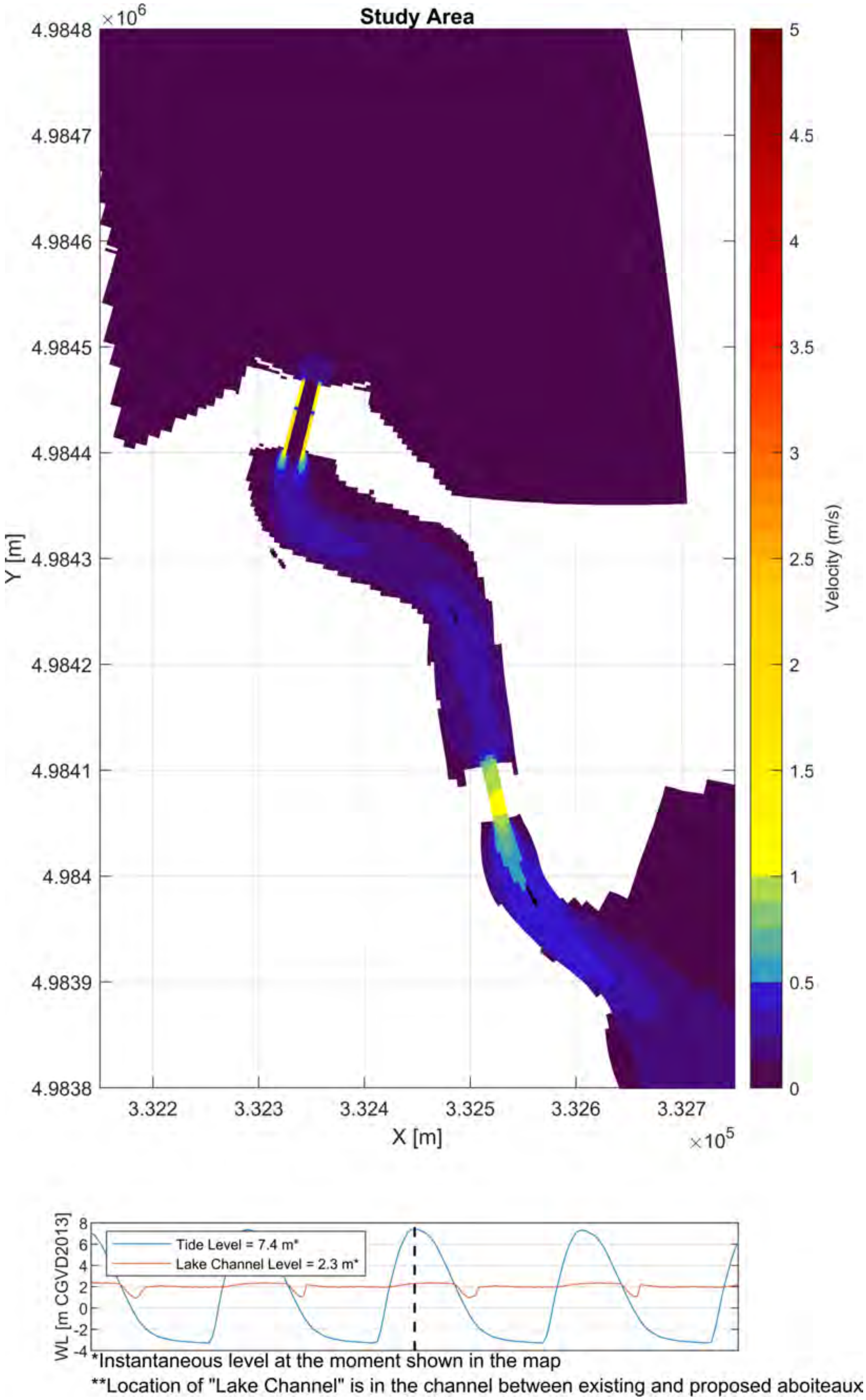


Figure A1.85: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Overall Study Area.

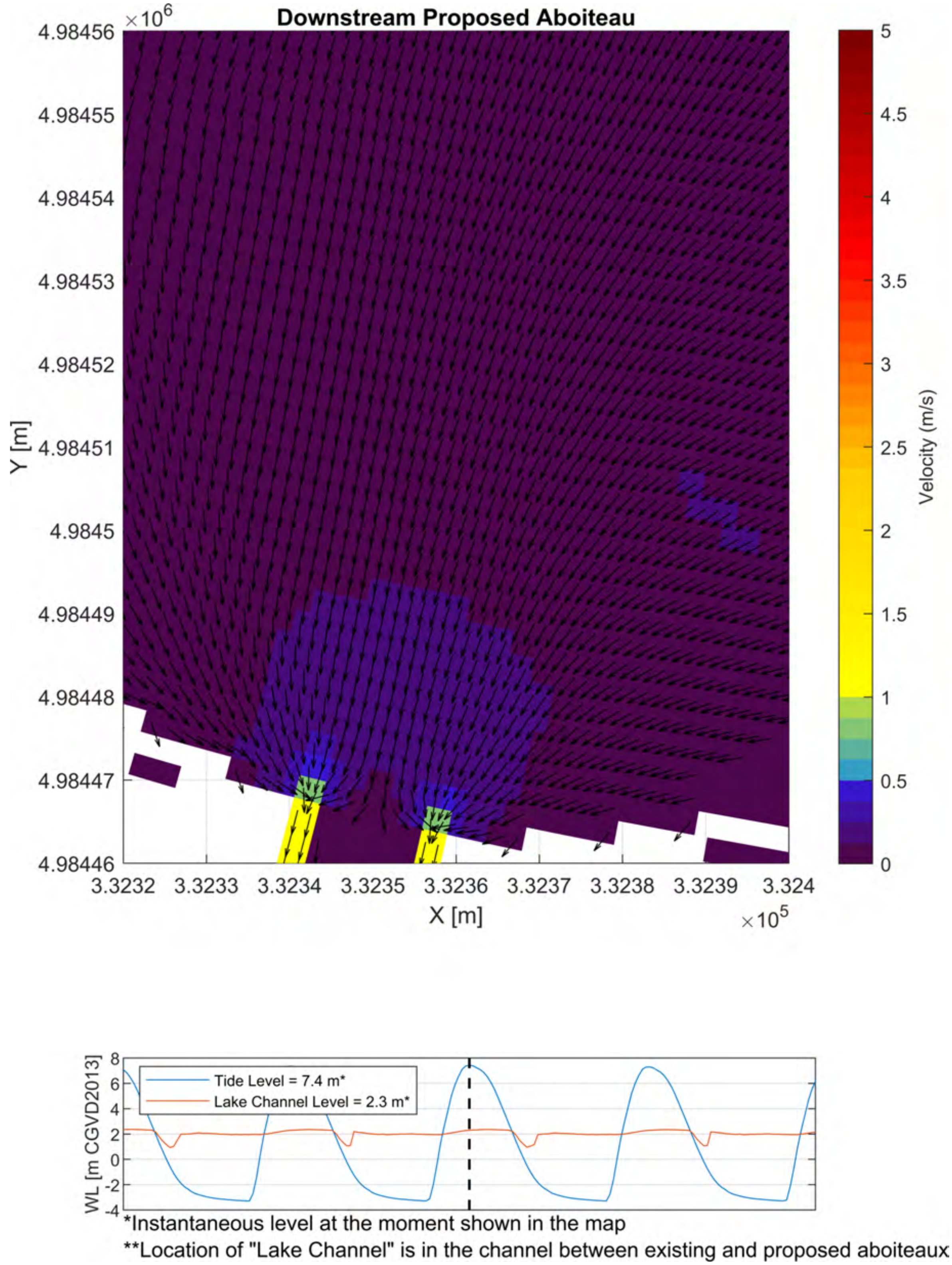


Figure A1.86: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Downstream Proposed Aboiteau.

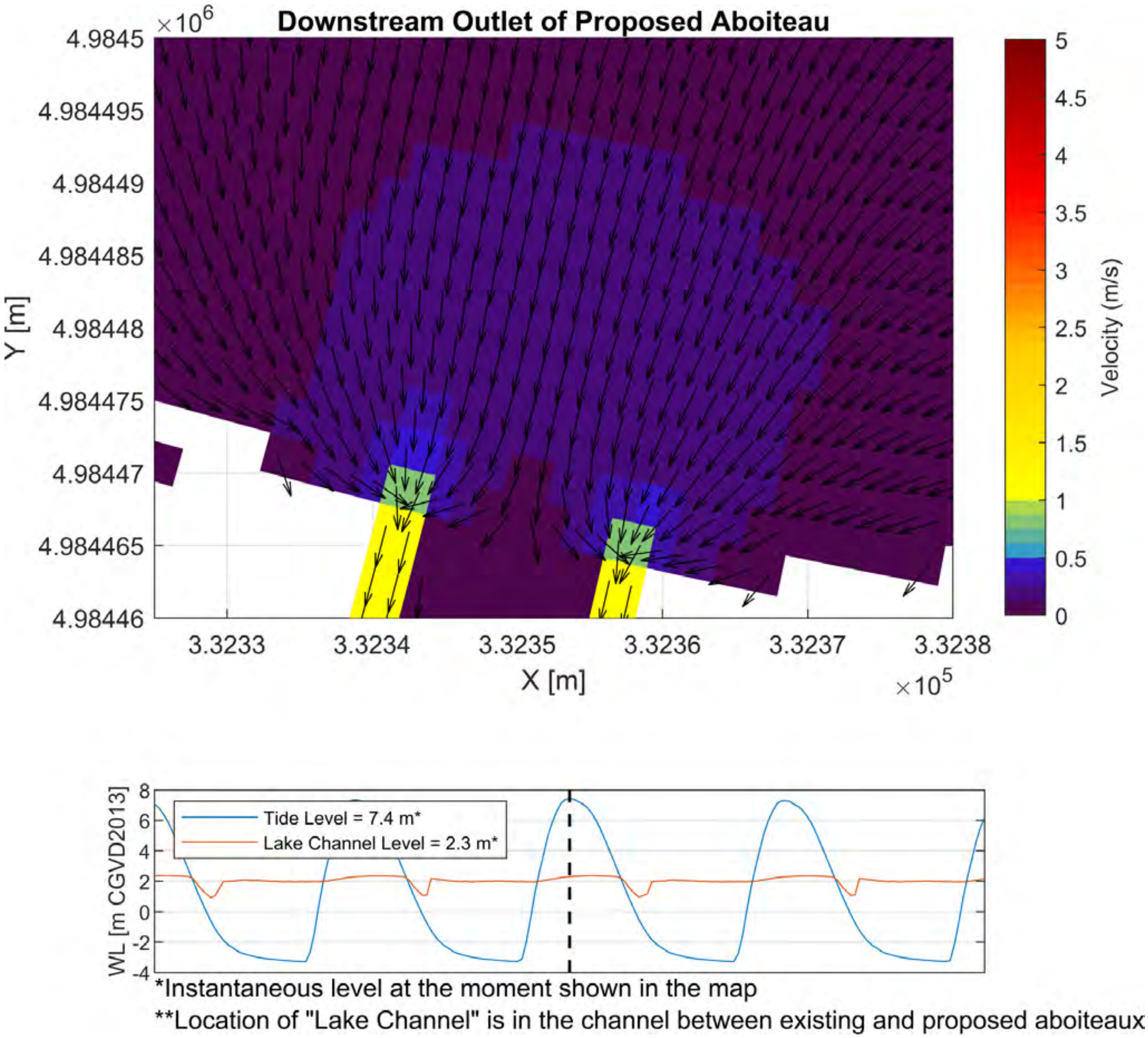
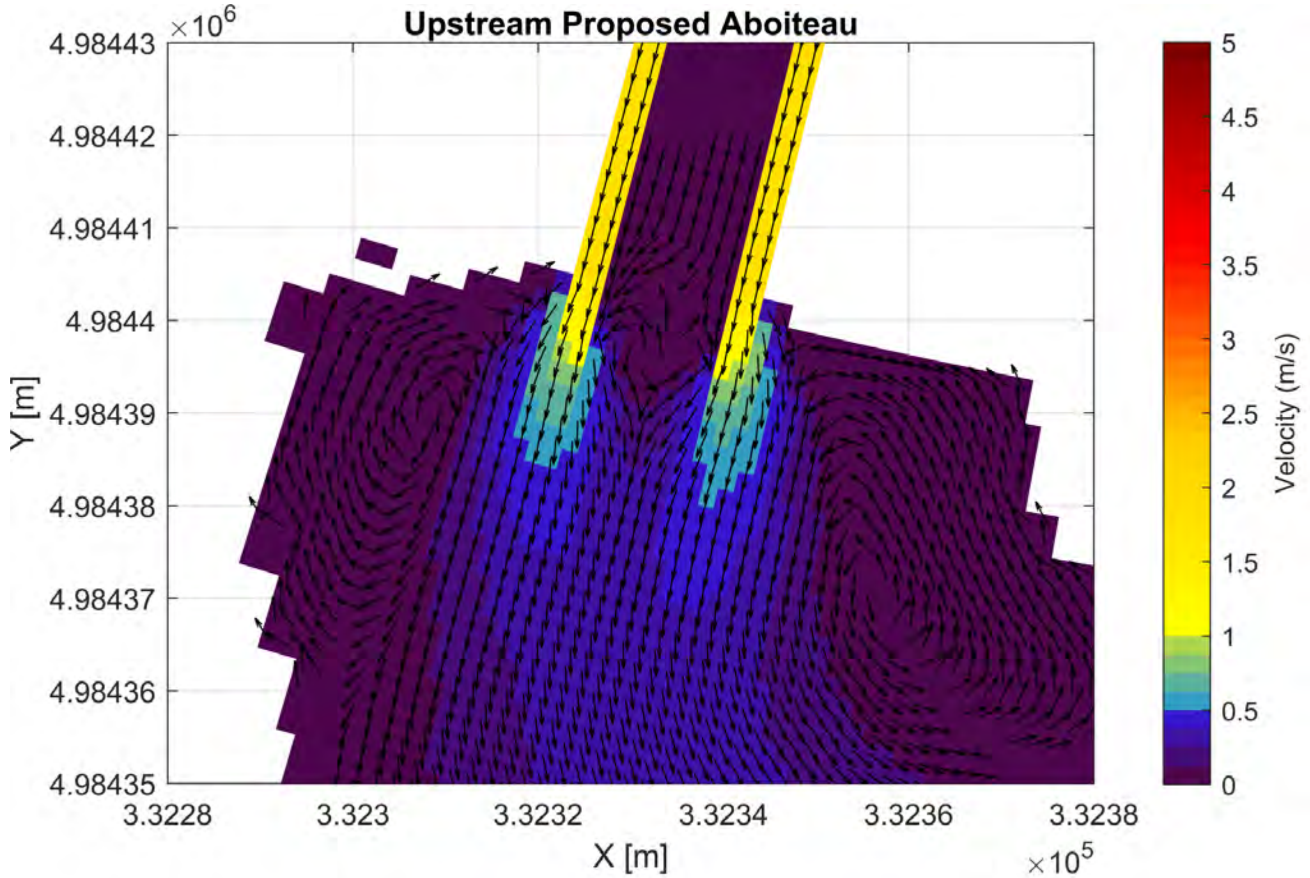


Figure A1.87: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Downstream Outlet of Proposed Aboiteau.



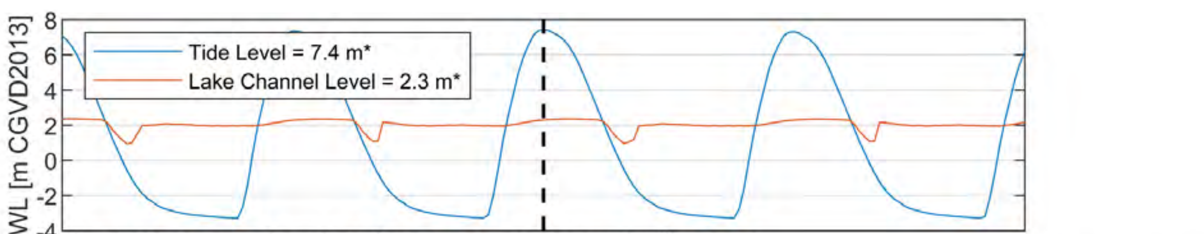
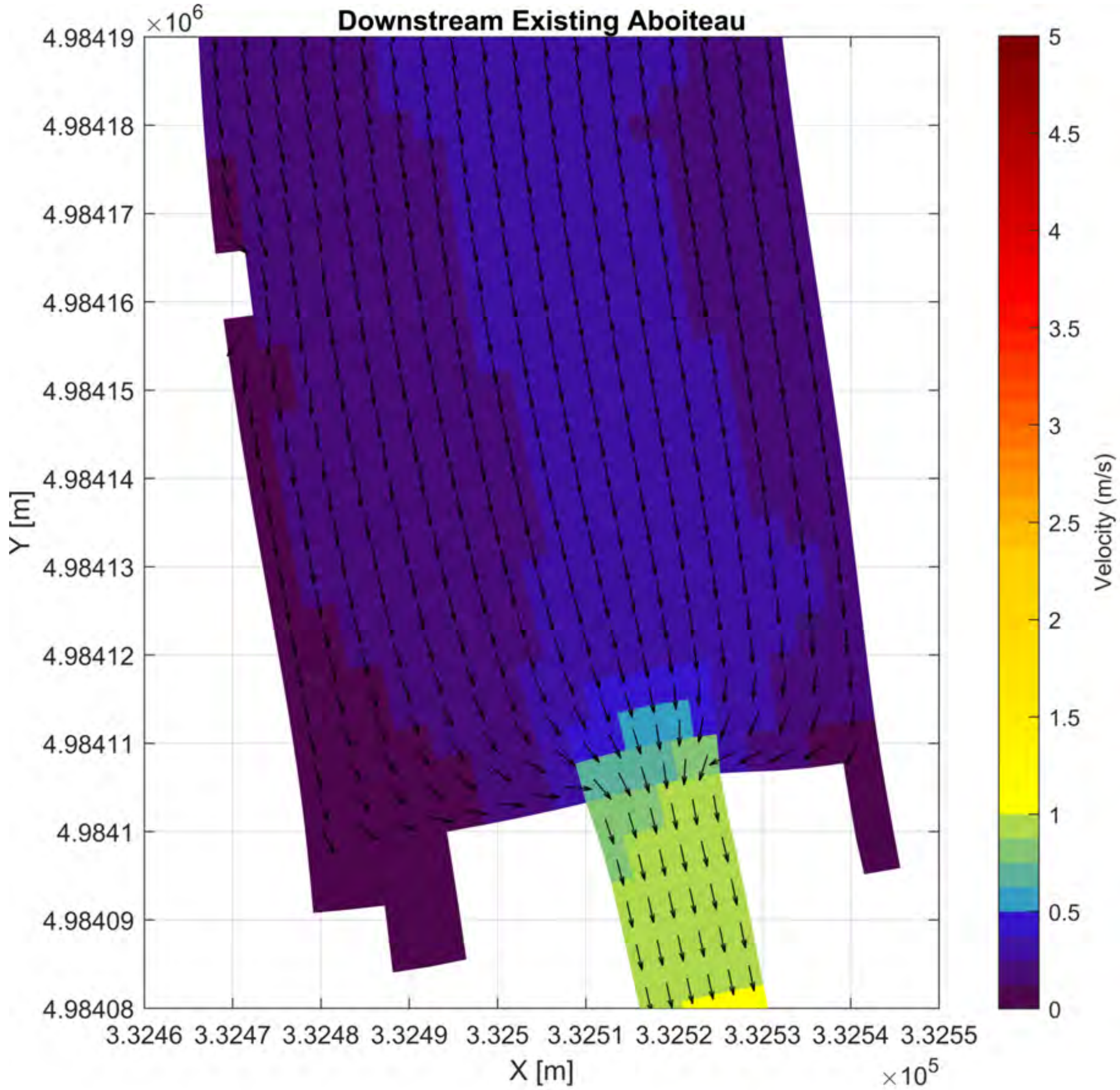


Figure A1.88: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Upstream Proposed Aboiteau.



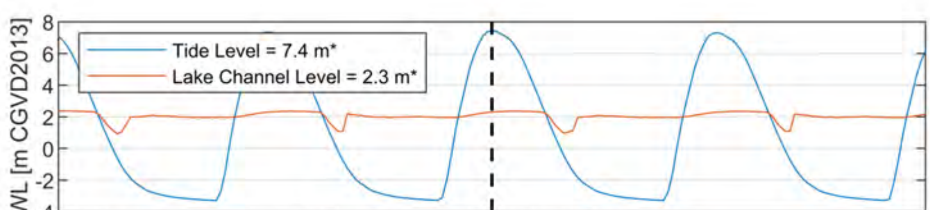
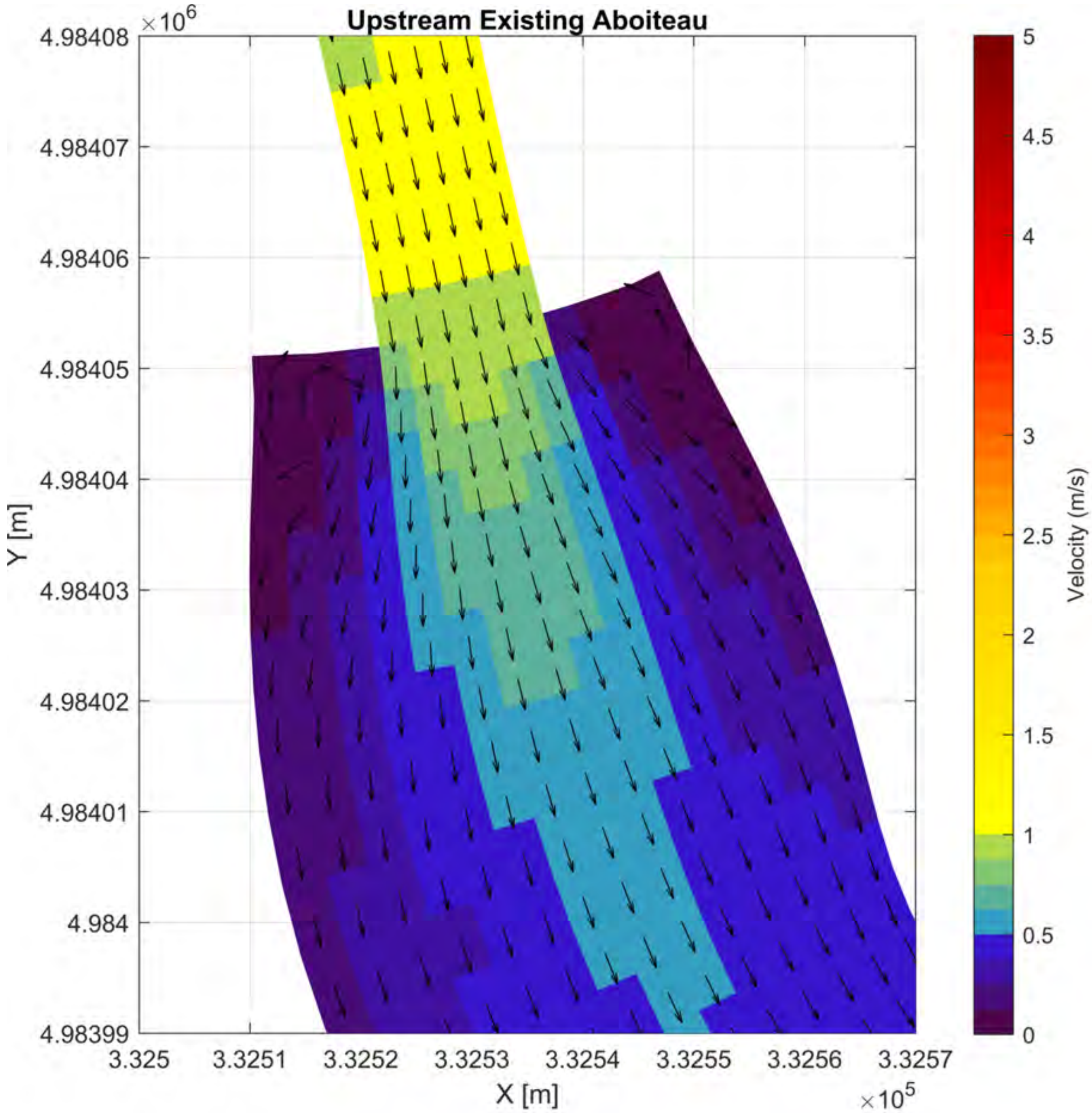
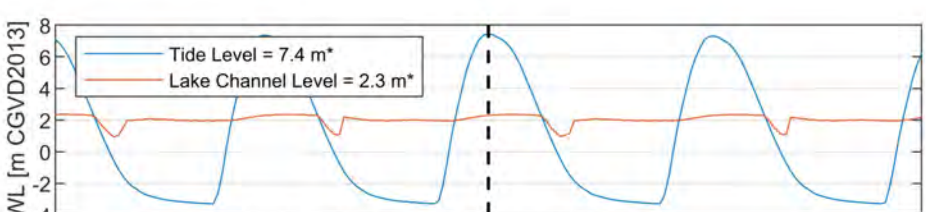


Figure A1.89: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Downstream Existing Aboiteau.

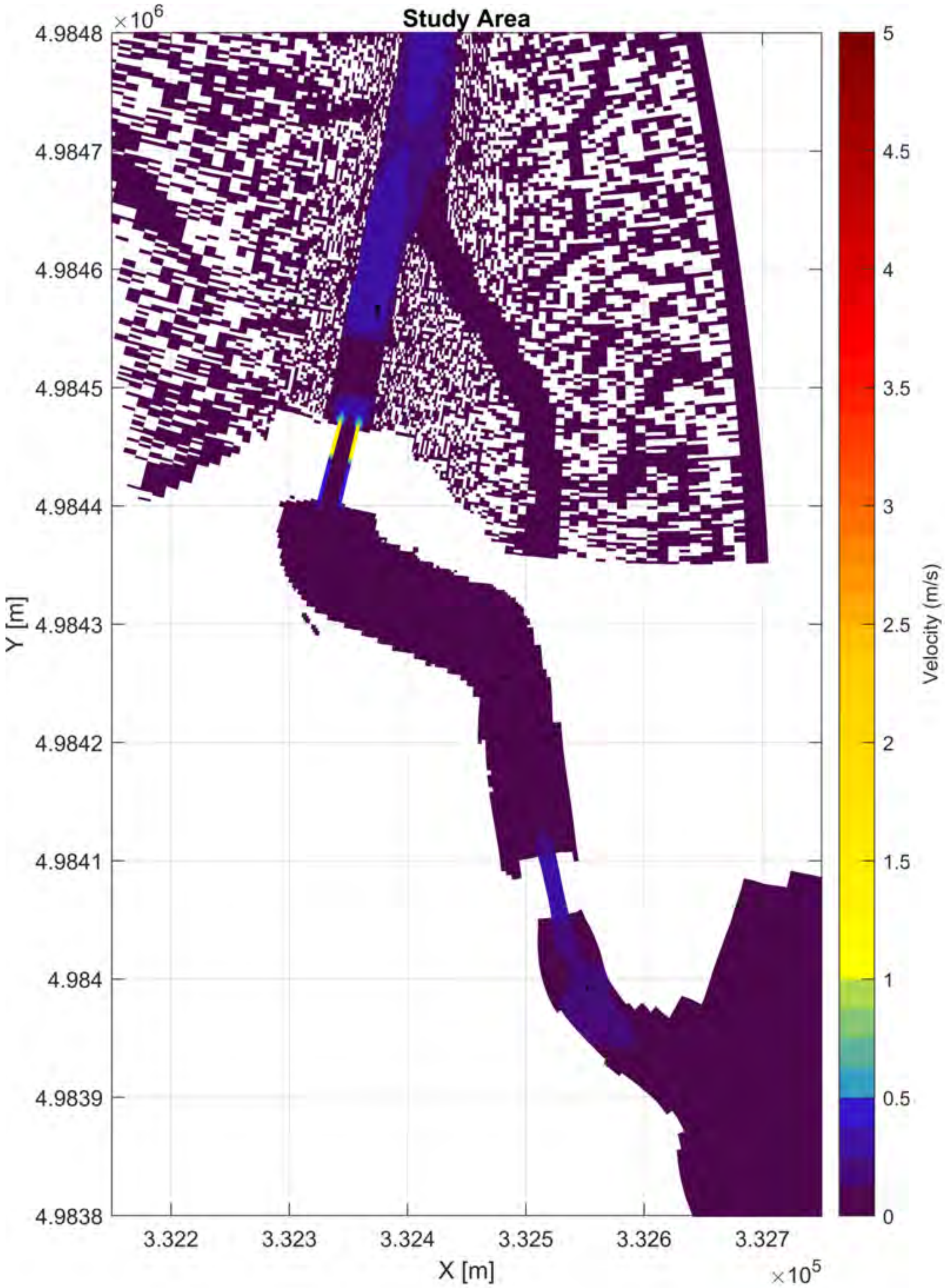


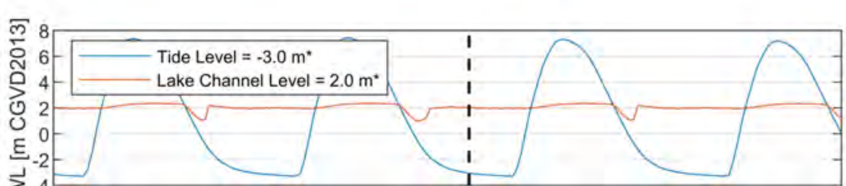


*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.90: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Upstream Existing Aboiteau.

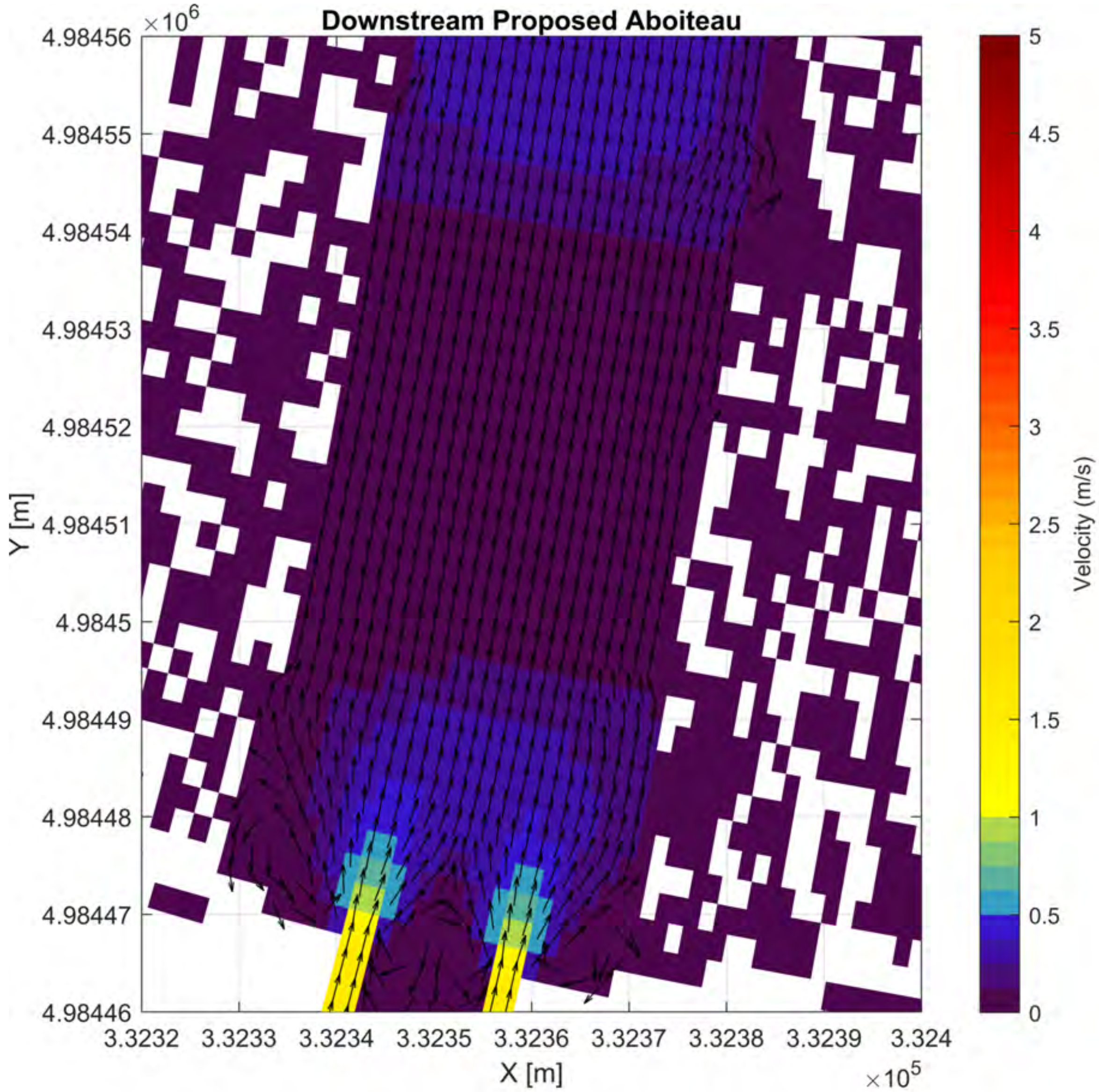


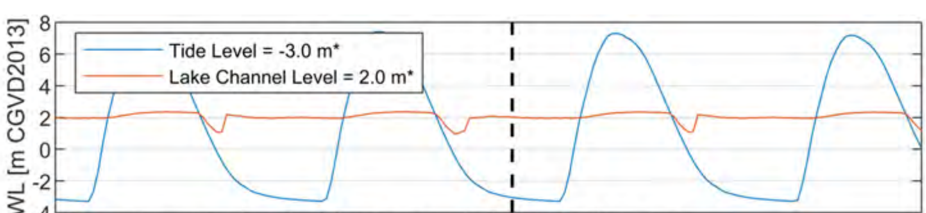


*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.91: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Overall Study Area.





*Instantaneous level at the moment shown in the map
**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.92: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Downstream Proposed Aboiteau.

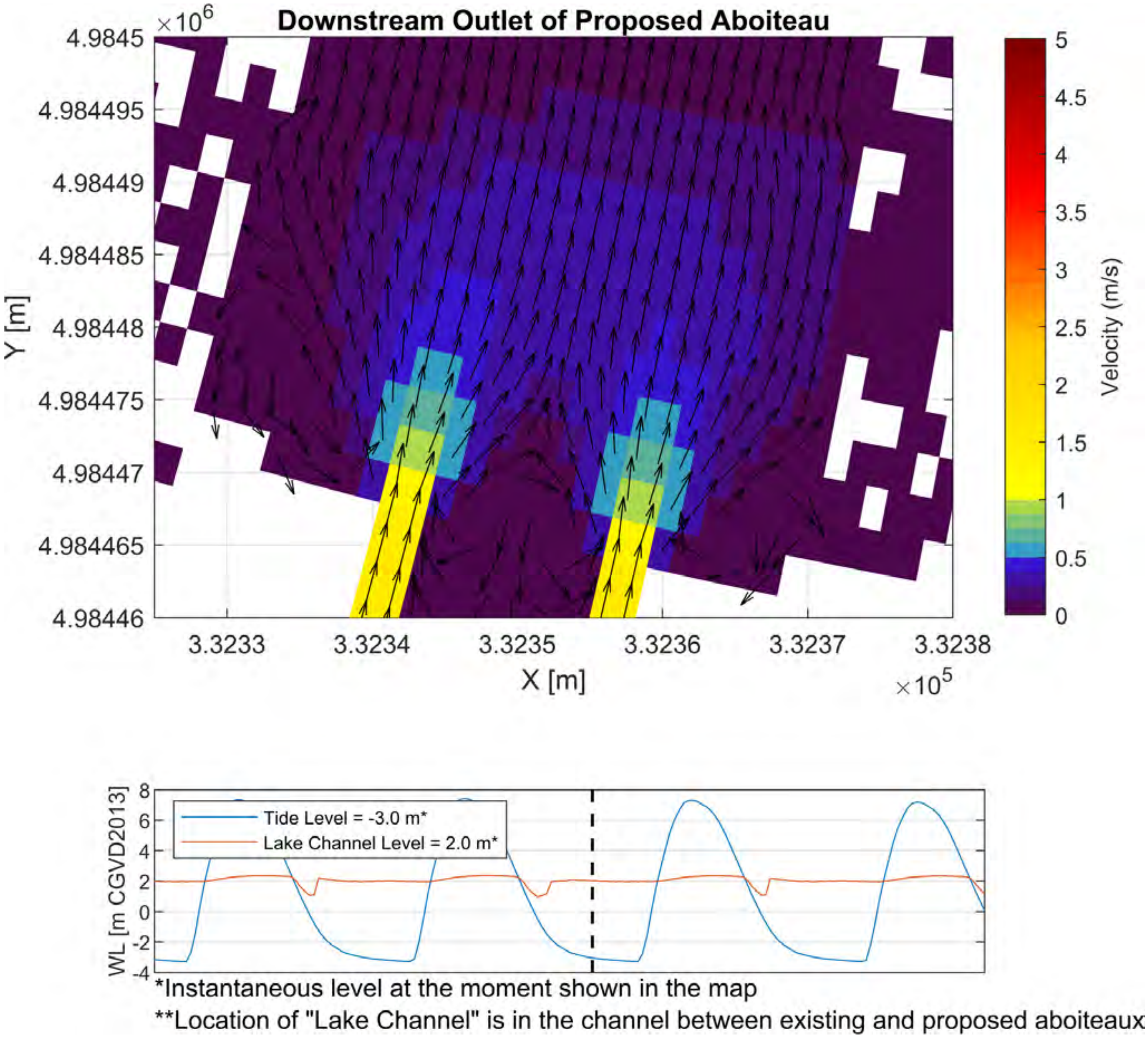
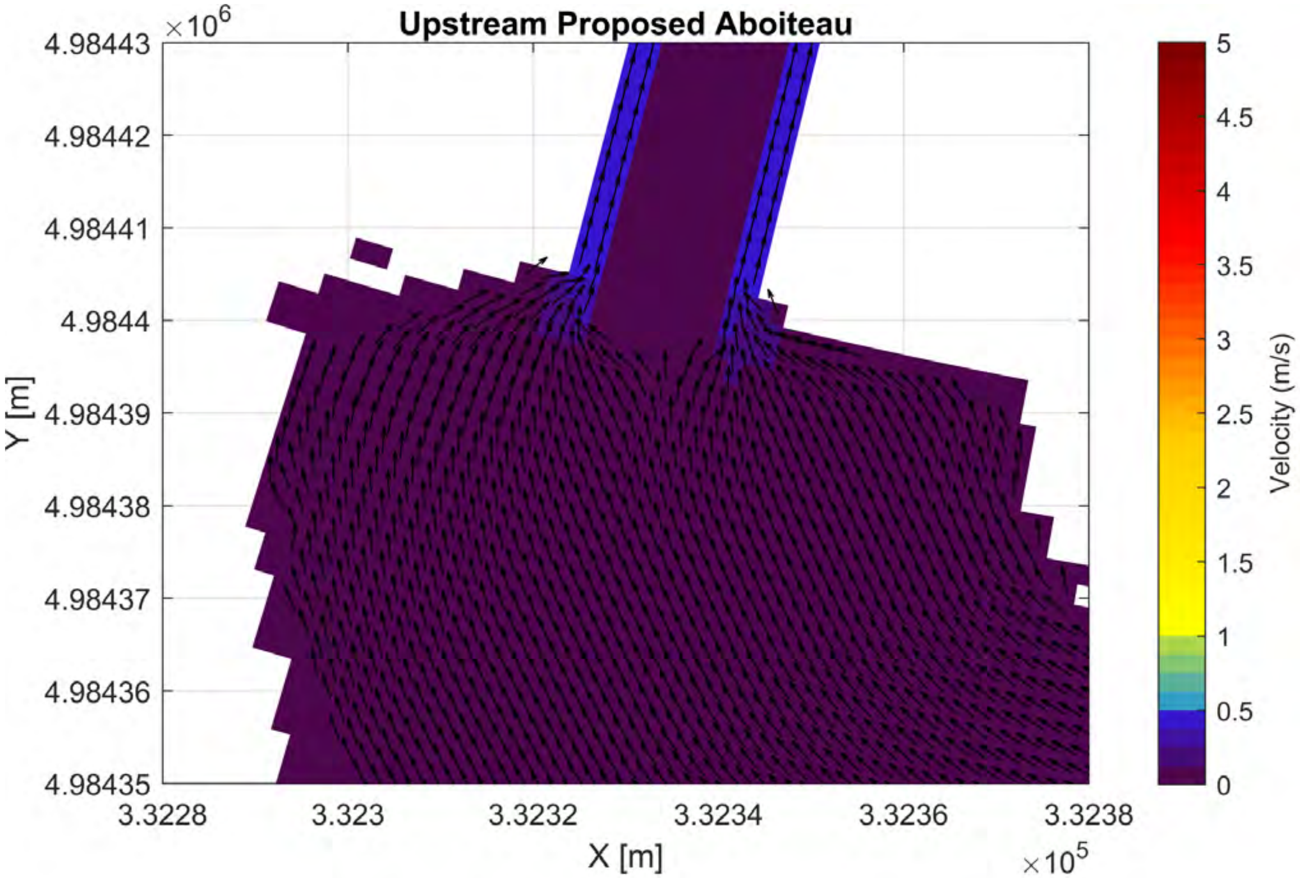


Figure A1.93: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Downstream Outlet of Proposed Aboiteau.



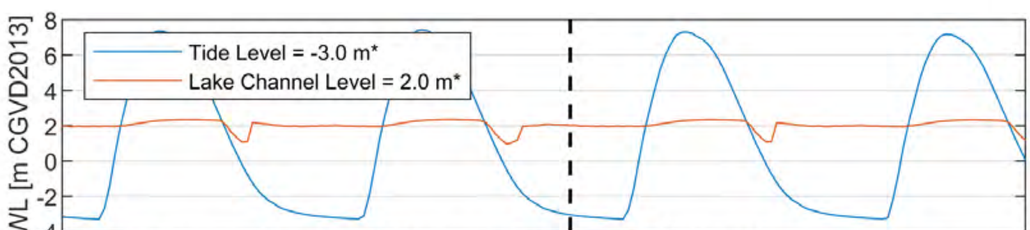
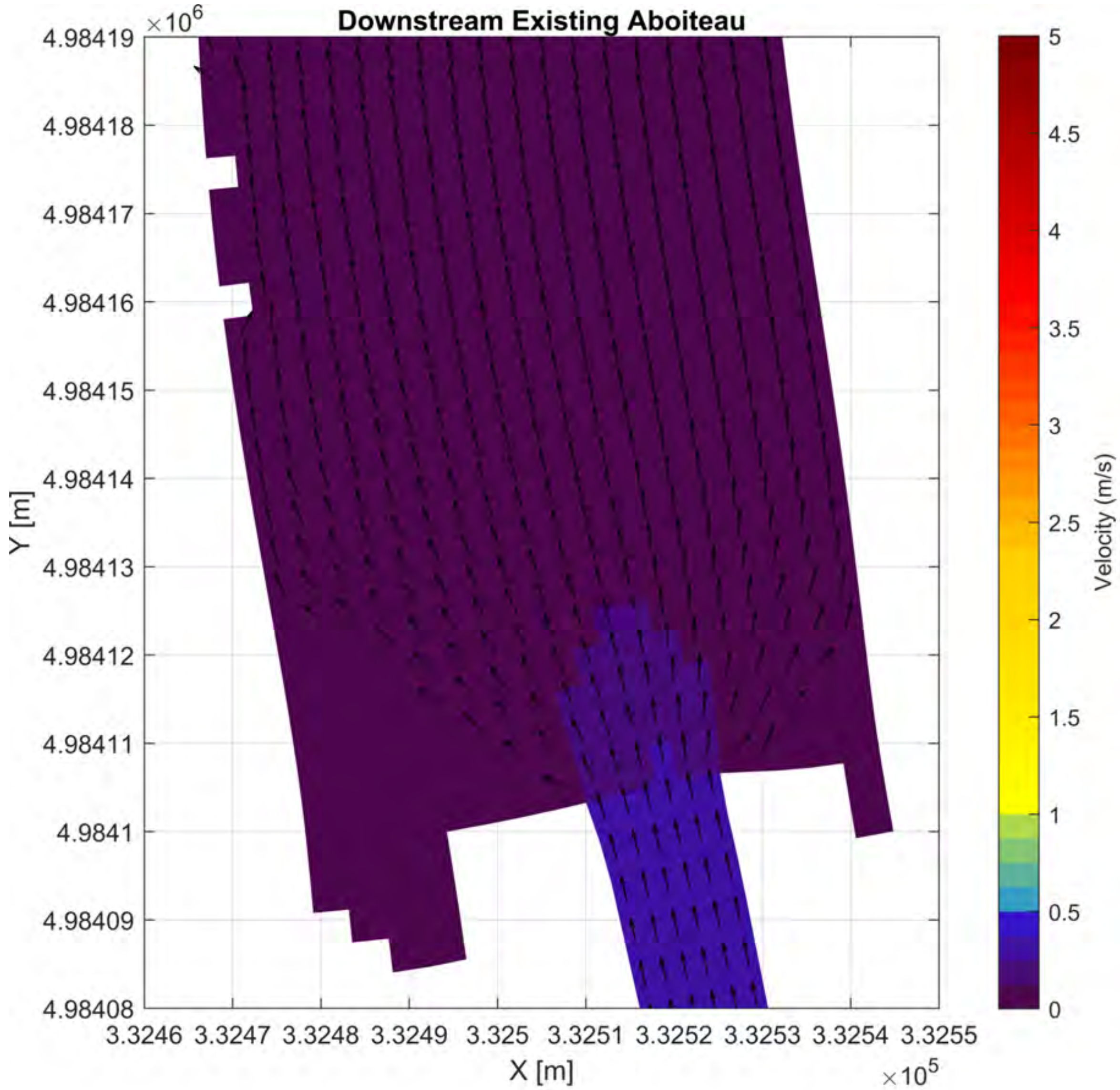


Figure A1.94: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Upstream Proposed Aboiteau.



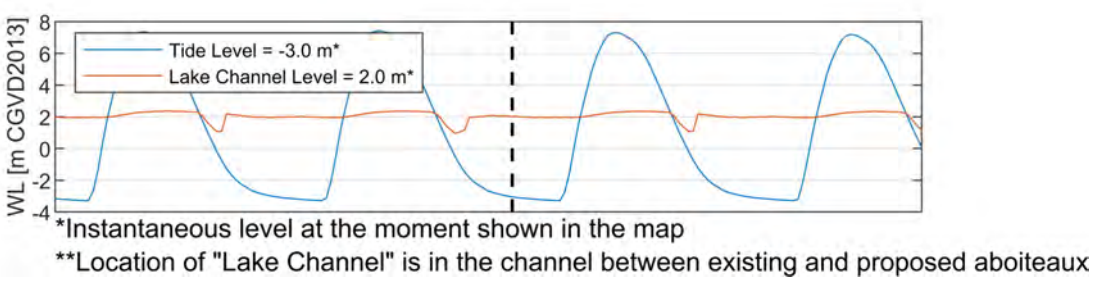
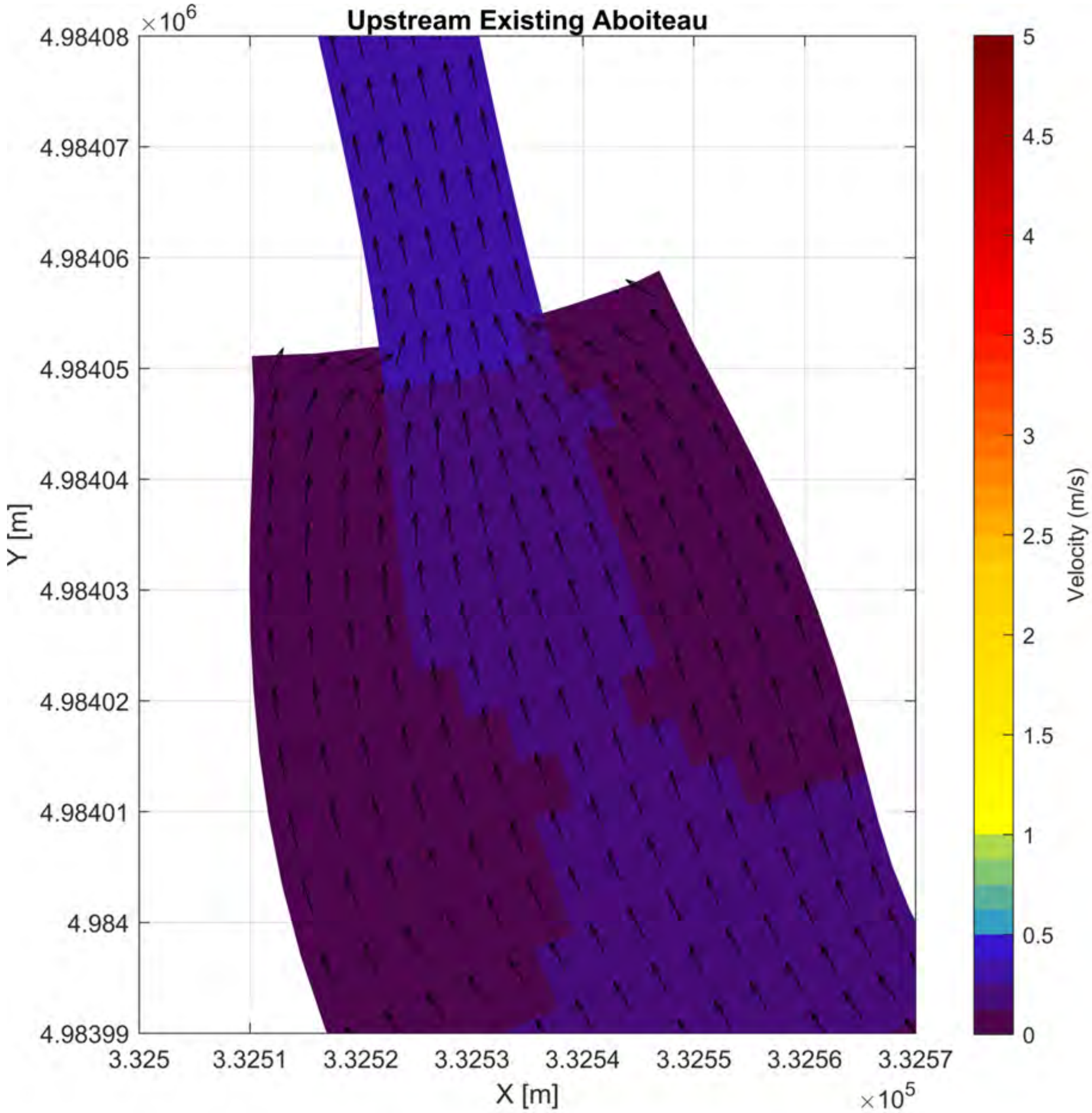


Figure A1.95: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Downstream Existing Aboiteau.



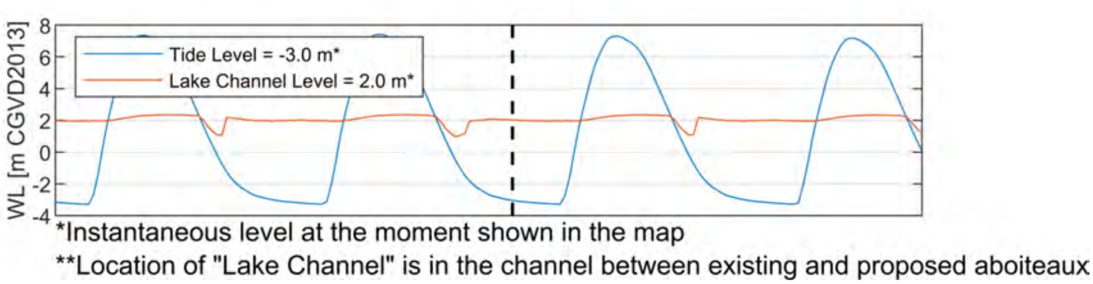
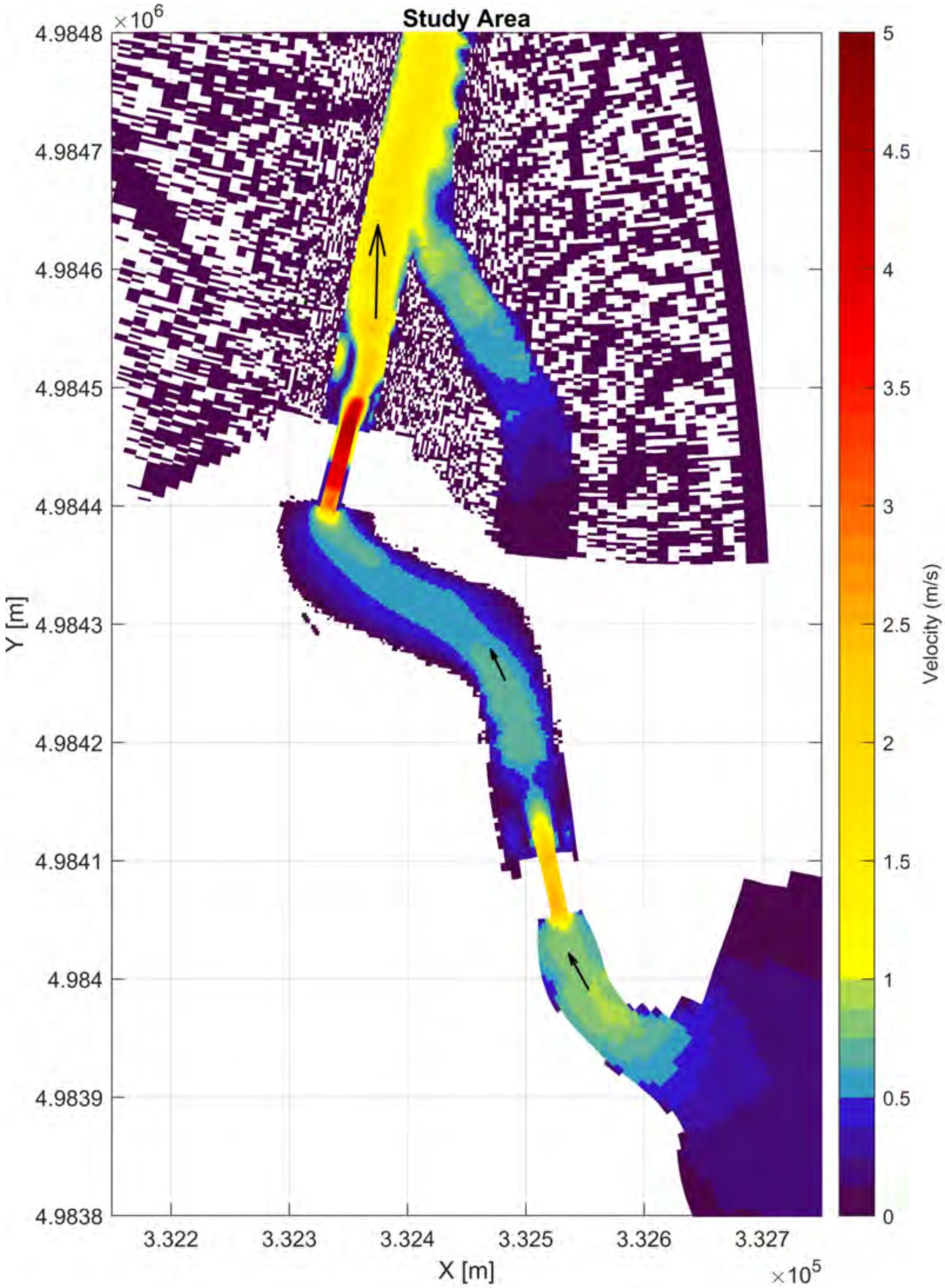
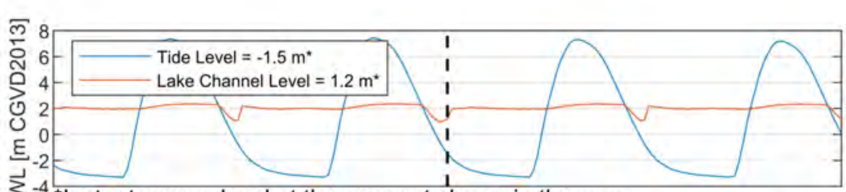


Figure A1.96: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Upstream Existing Aboiteau.





*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.97: Map of Velocities for Bottom Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Overall Study Area.

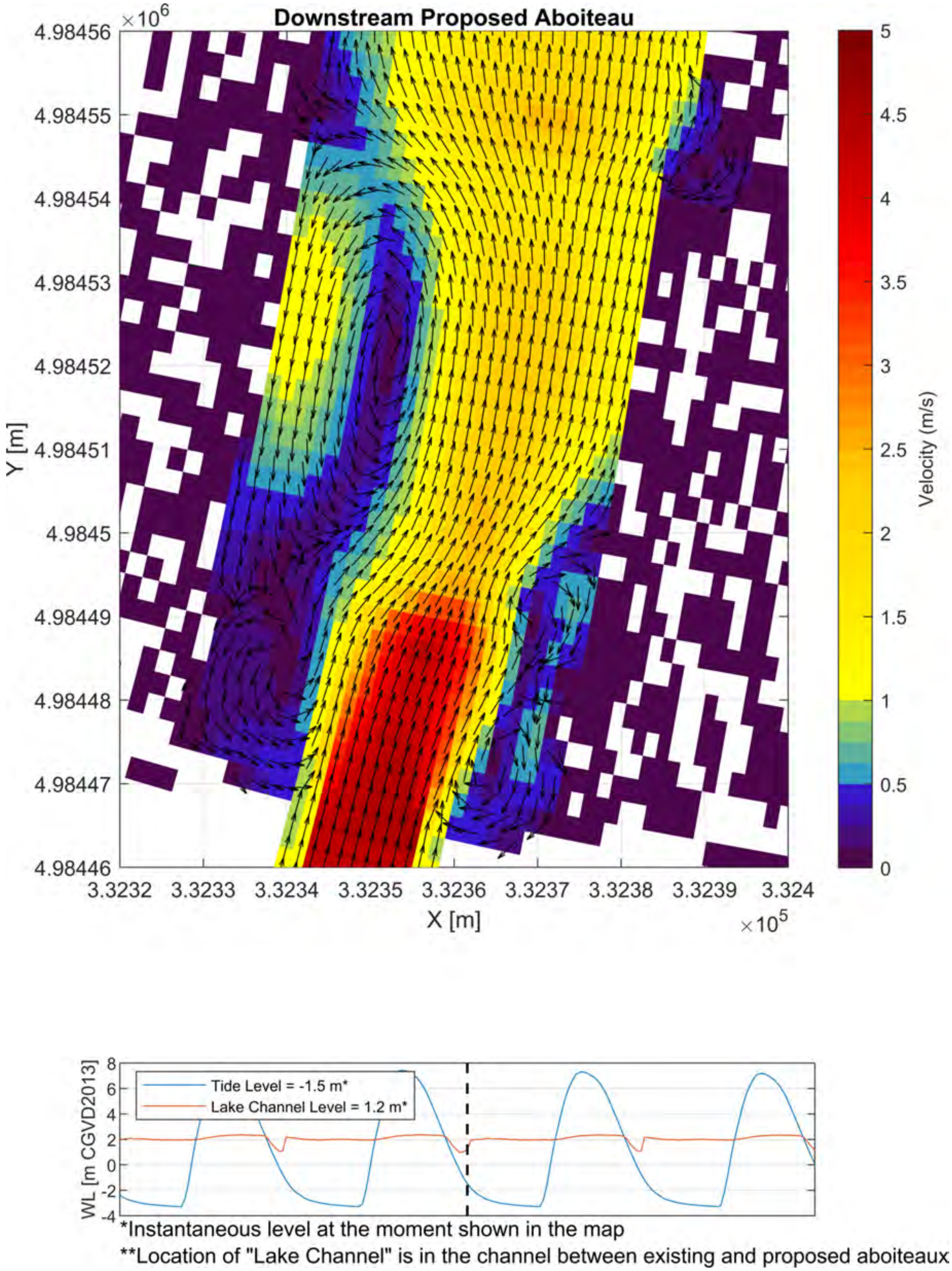
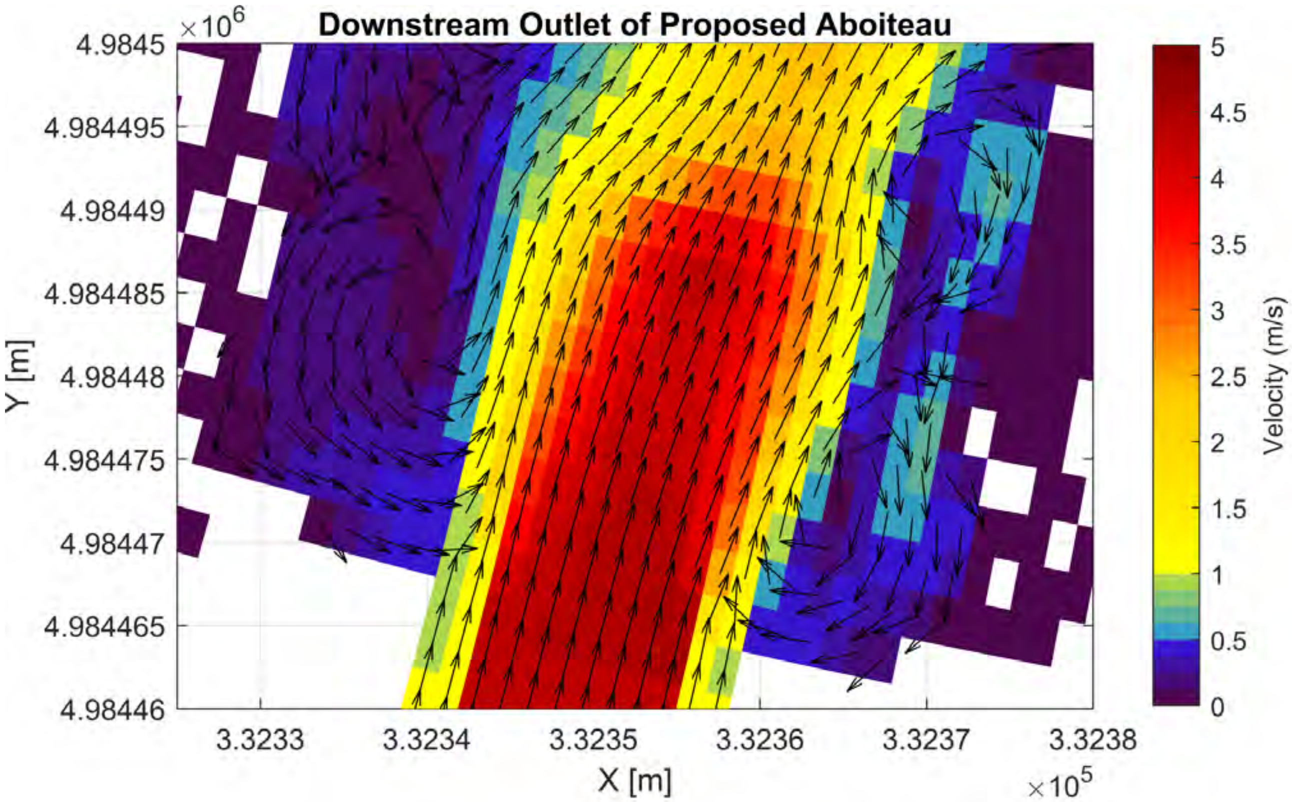


Figure A1.98: Map of Velocities for Bottom Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Downstream Proposed Aboiteau.



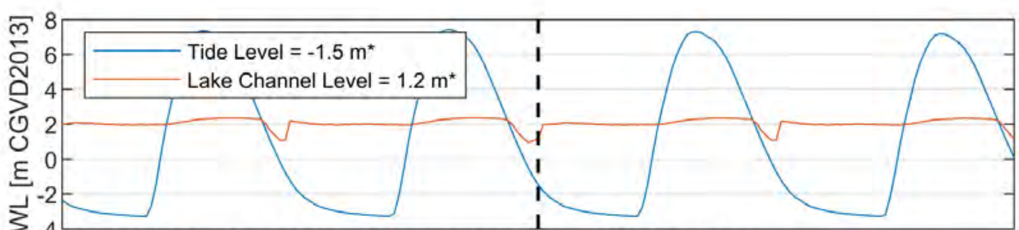


Figure A1.99: Map of Velocities for Bottom Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Downstream Outlet of Proposed Aboiteau.

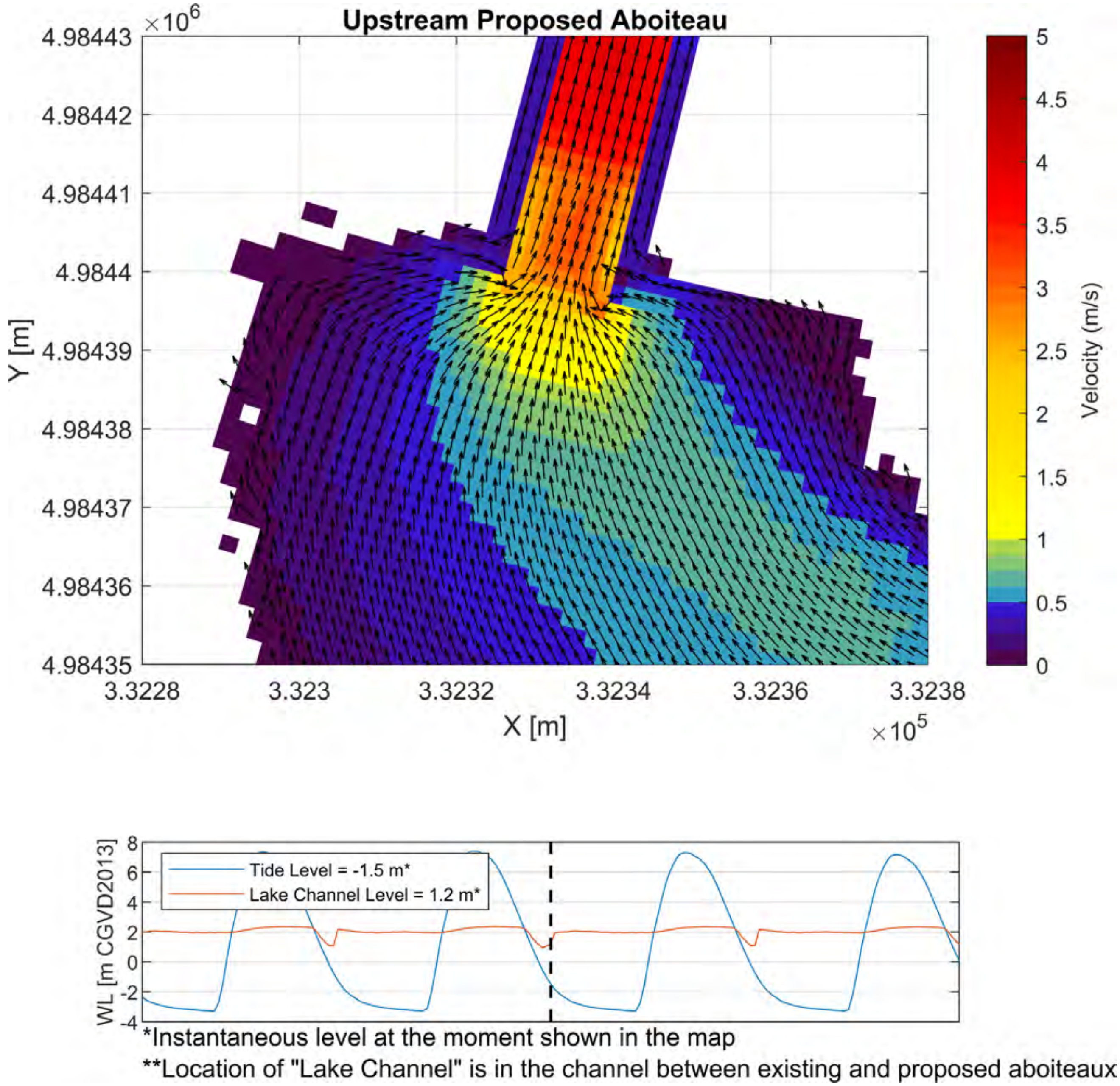
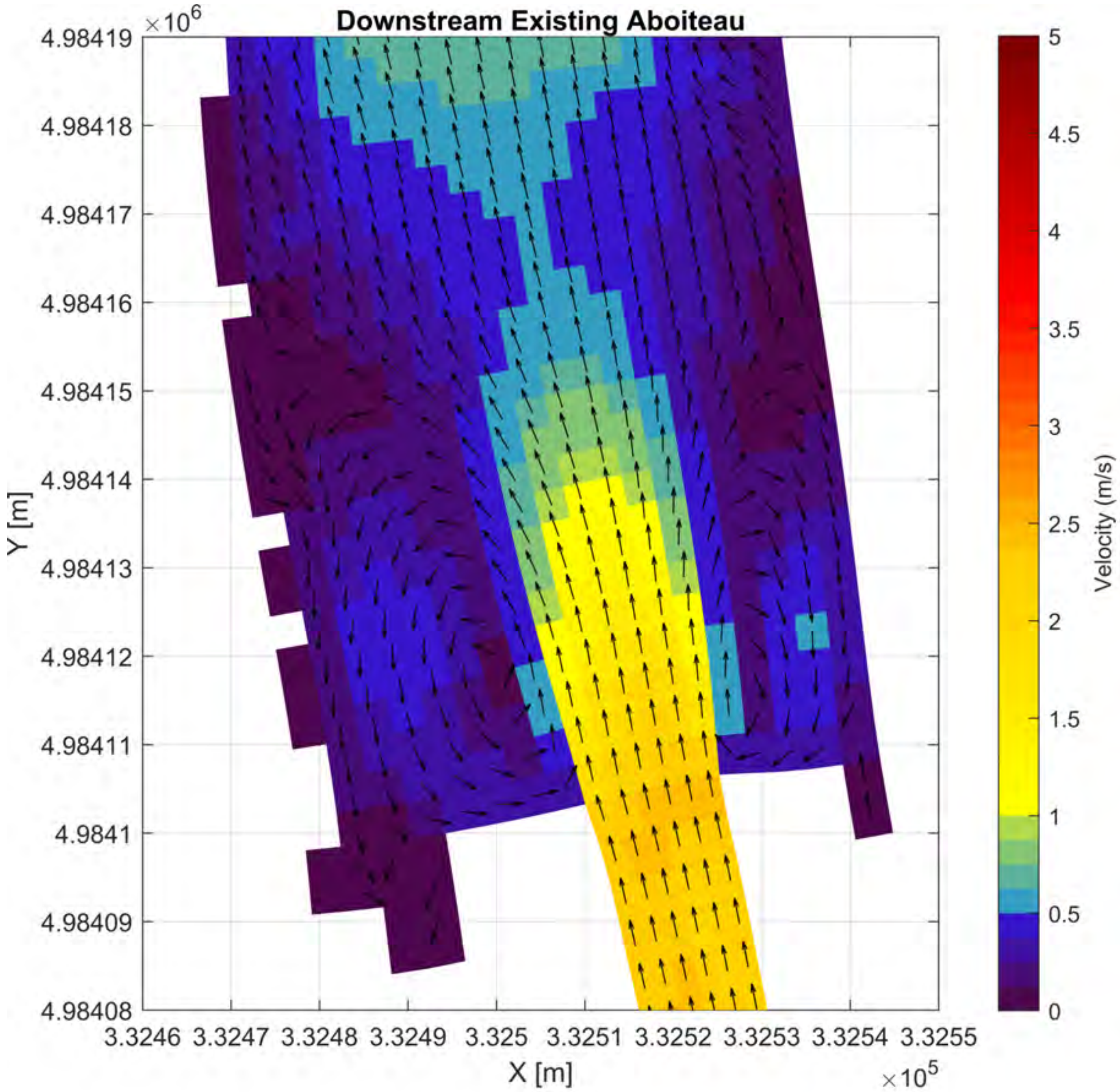


Figure A1.100: Map of Velocities for Bottom Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Upstream Proposed Aboiteau.



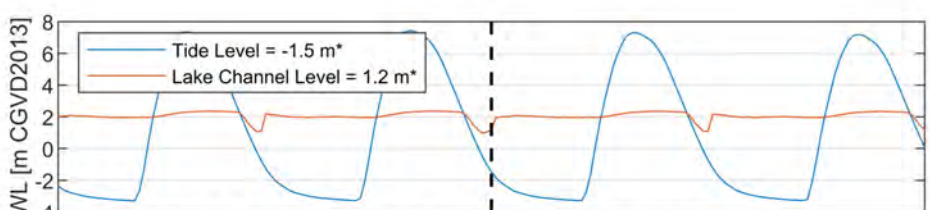
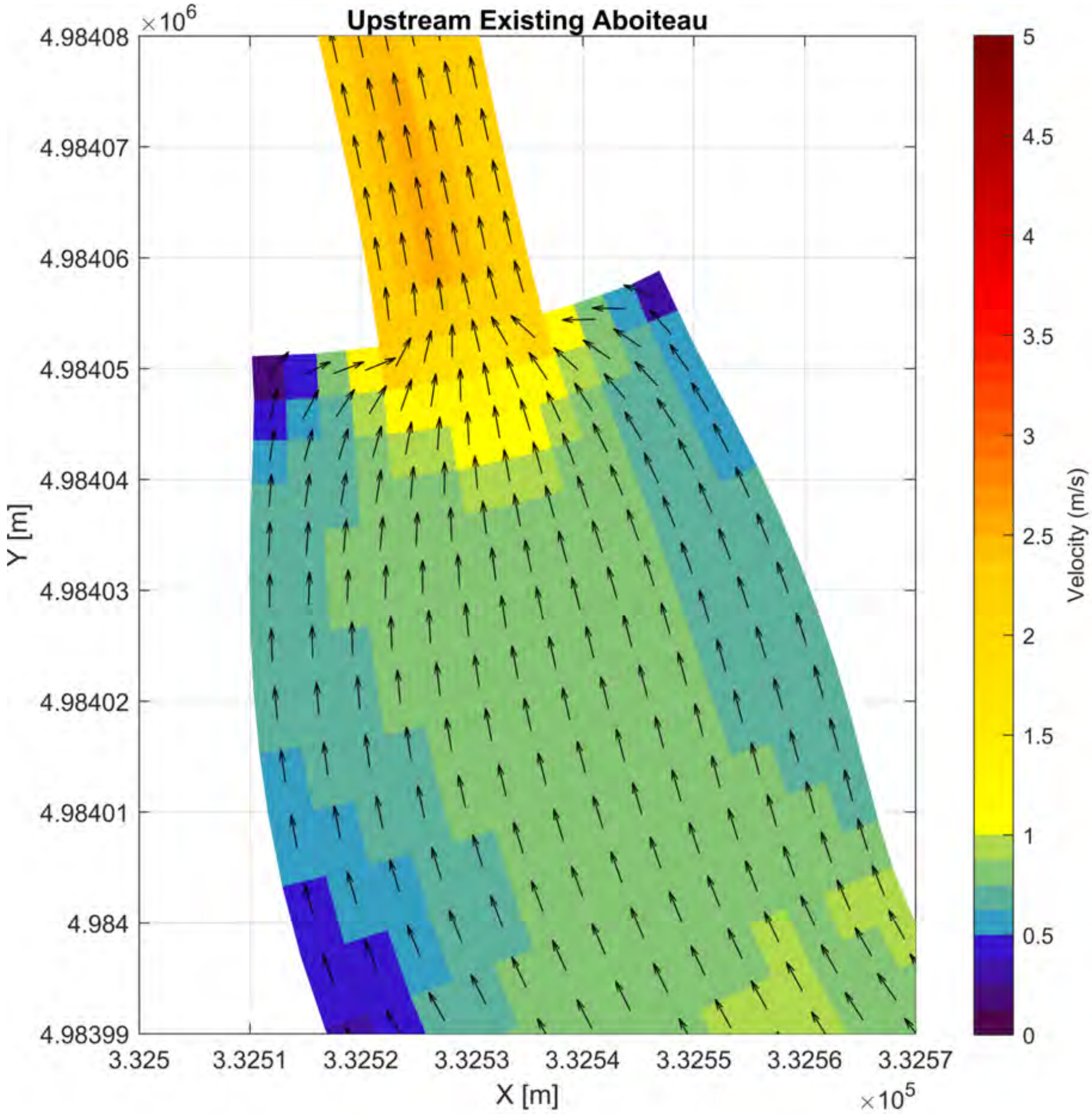
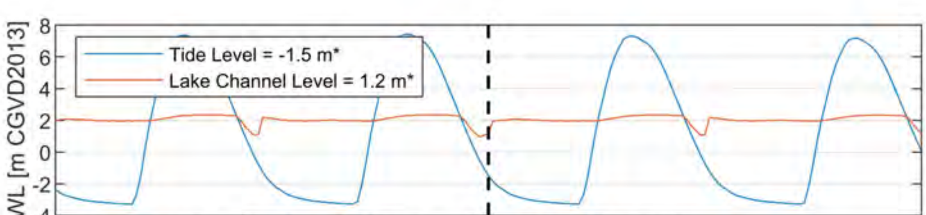


Figure A1.101: Map of Velocities for Bottom Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Downstream Existing Aboiteau.





*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.102: Map of Velocities for Bottom Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Upstream Existing Aboiteau.

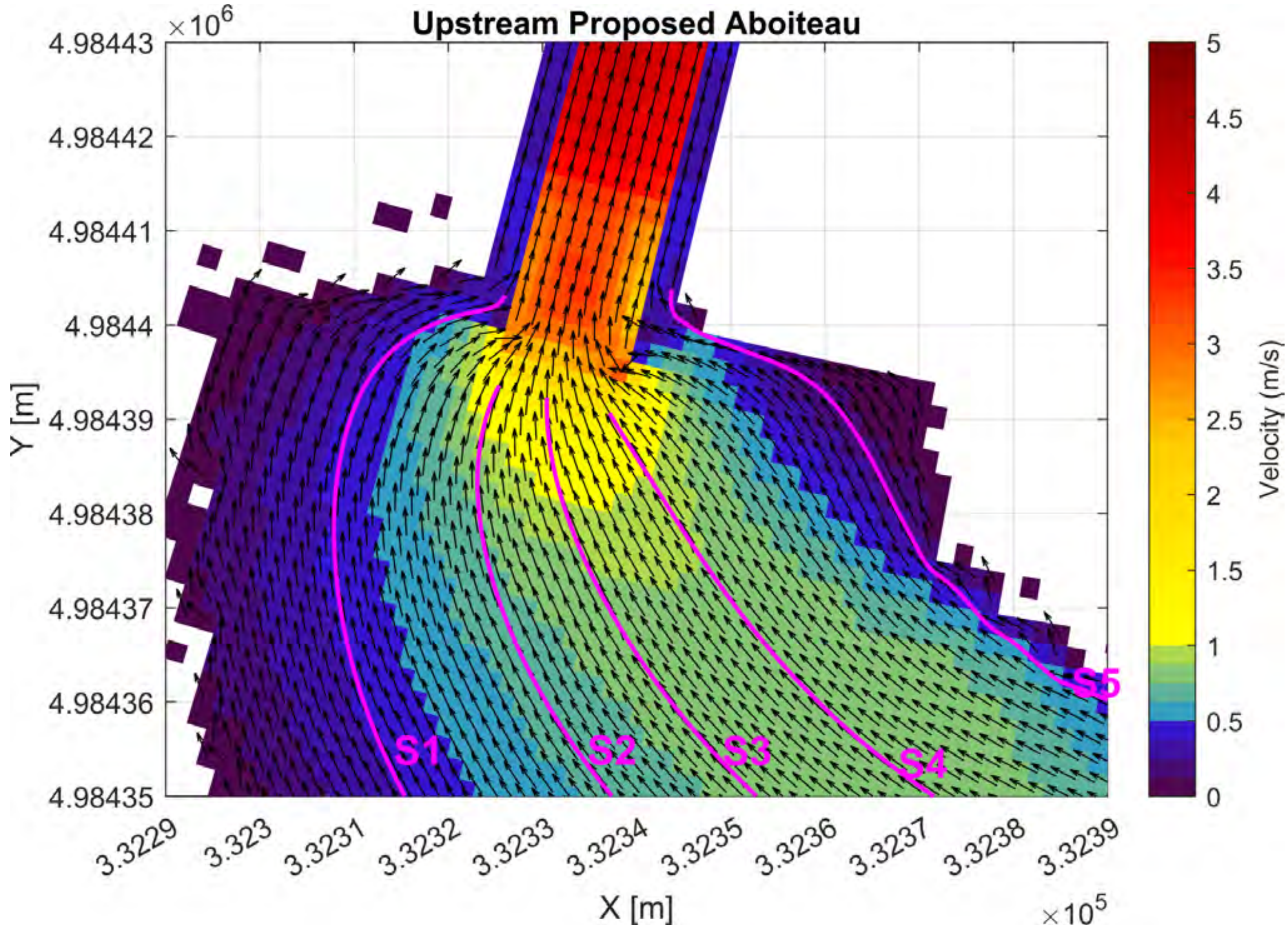


Figure A1.103: Location of Selected Streamlines - Velocities When the Active Gates are Open for the Brackish Scenario (Dry Conditions).

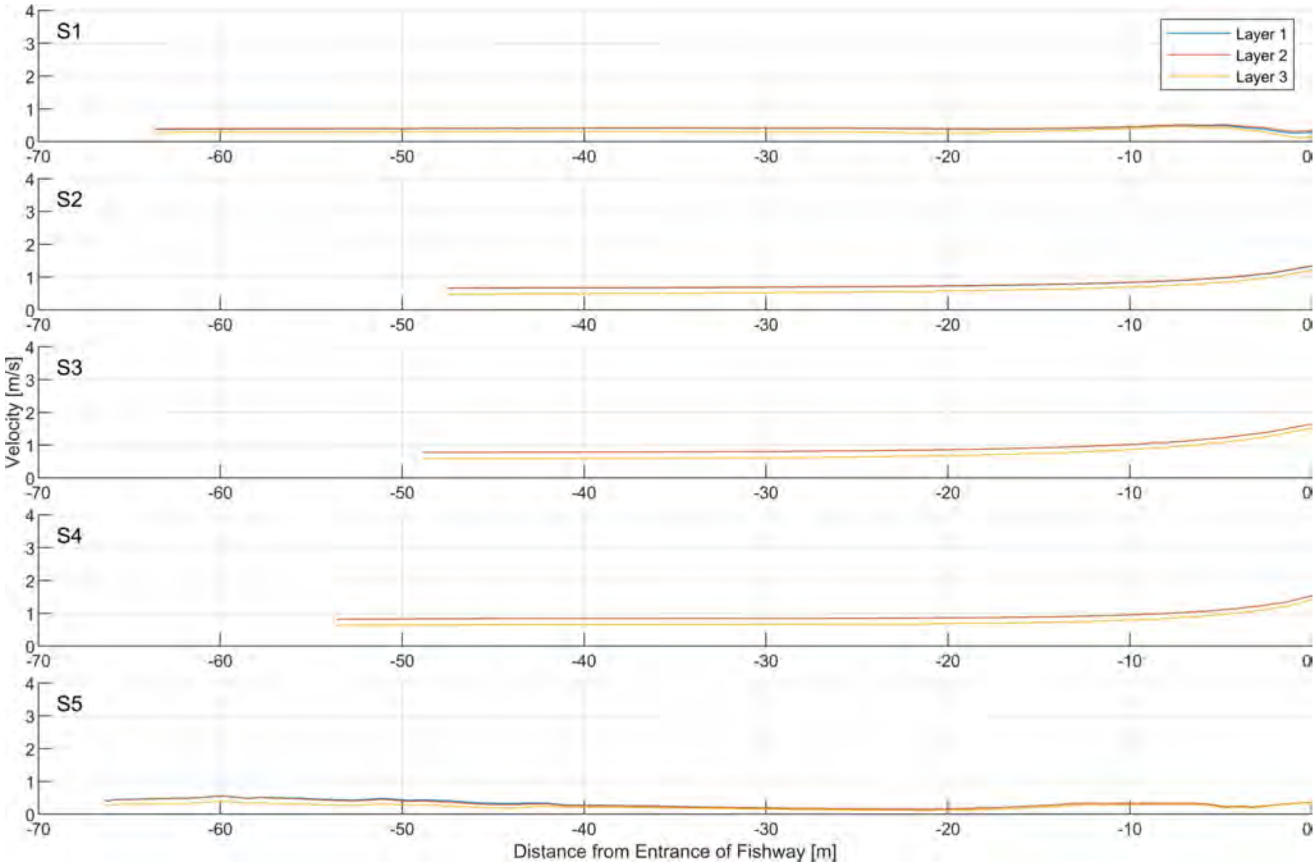


Figure A1.104: Velocity Along Streamlines - When the Active Gates are Open for the Brackish Scenario (Dry Conditions).

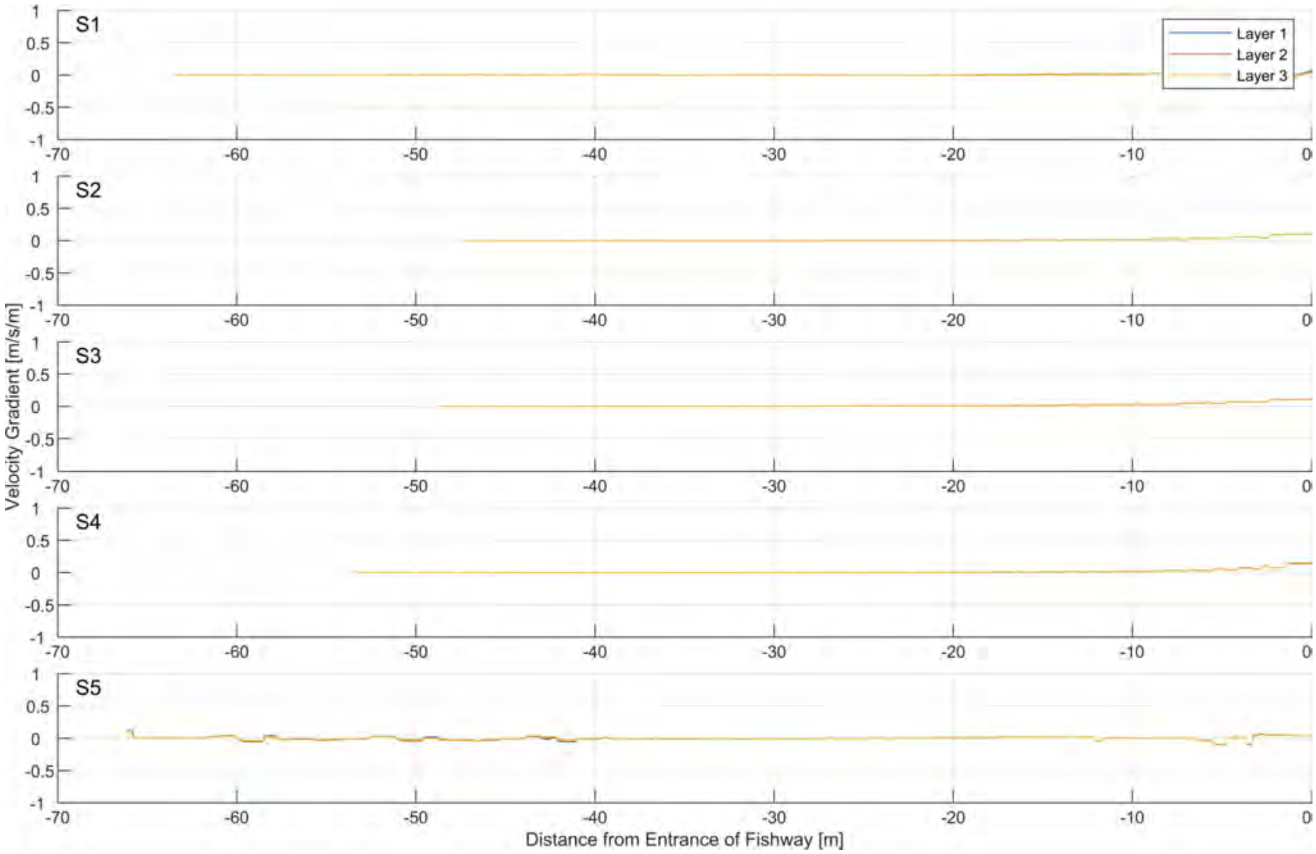
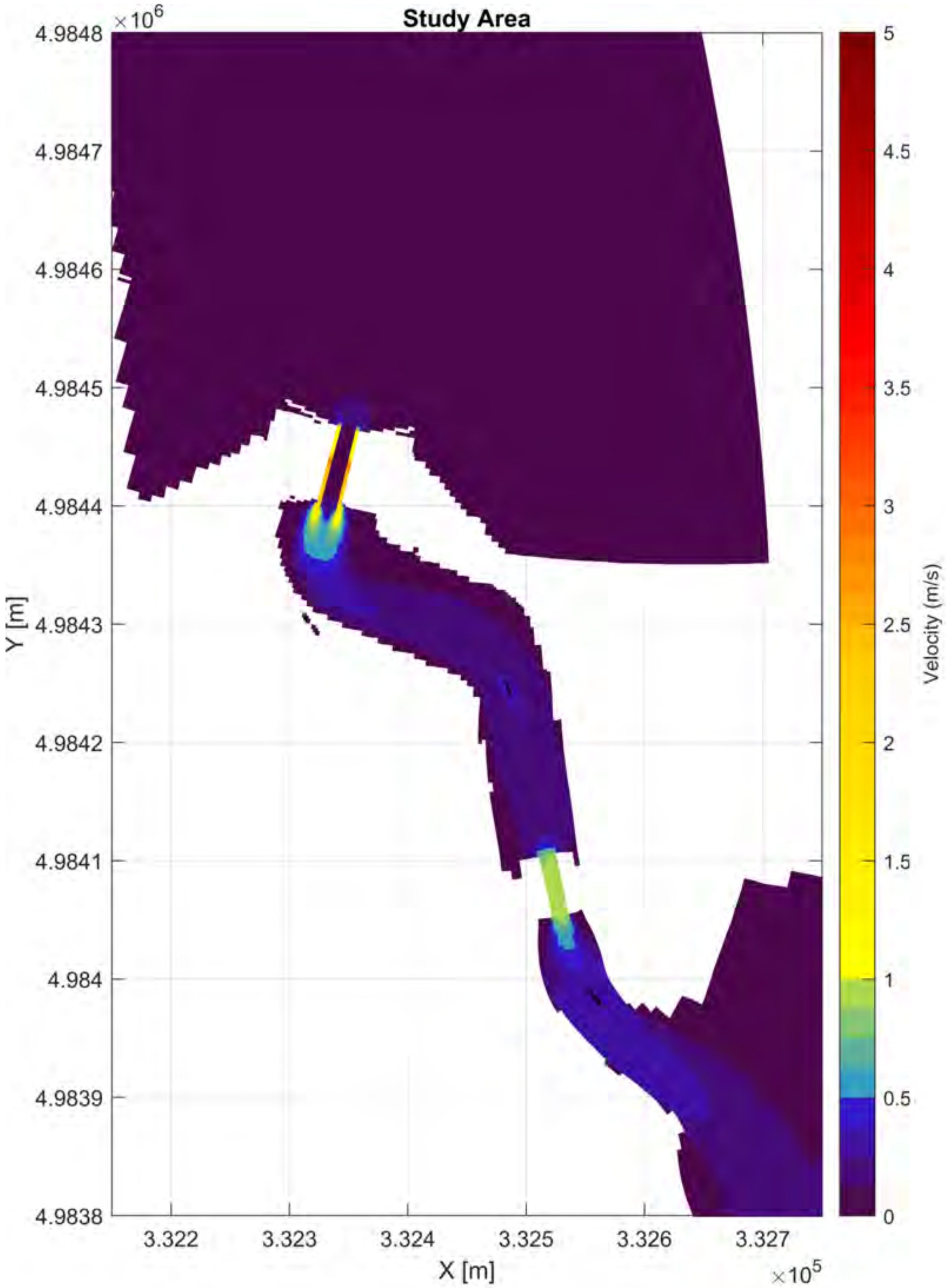
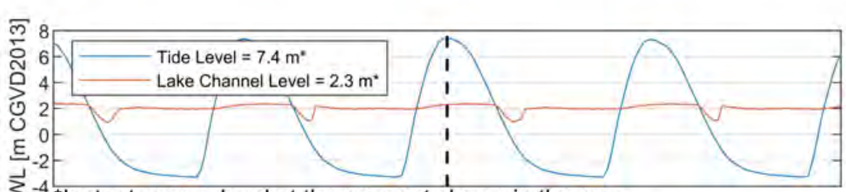


Figure A1.105: Velocity Gradient Along Streamlines - When the Active Gates are Open for the Brackish Scenario (Dry Conditions).

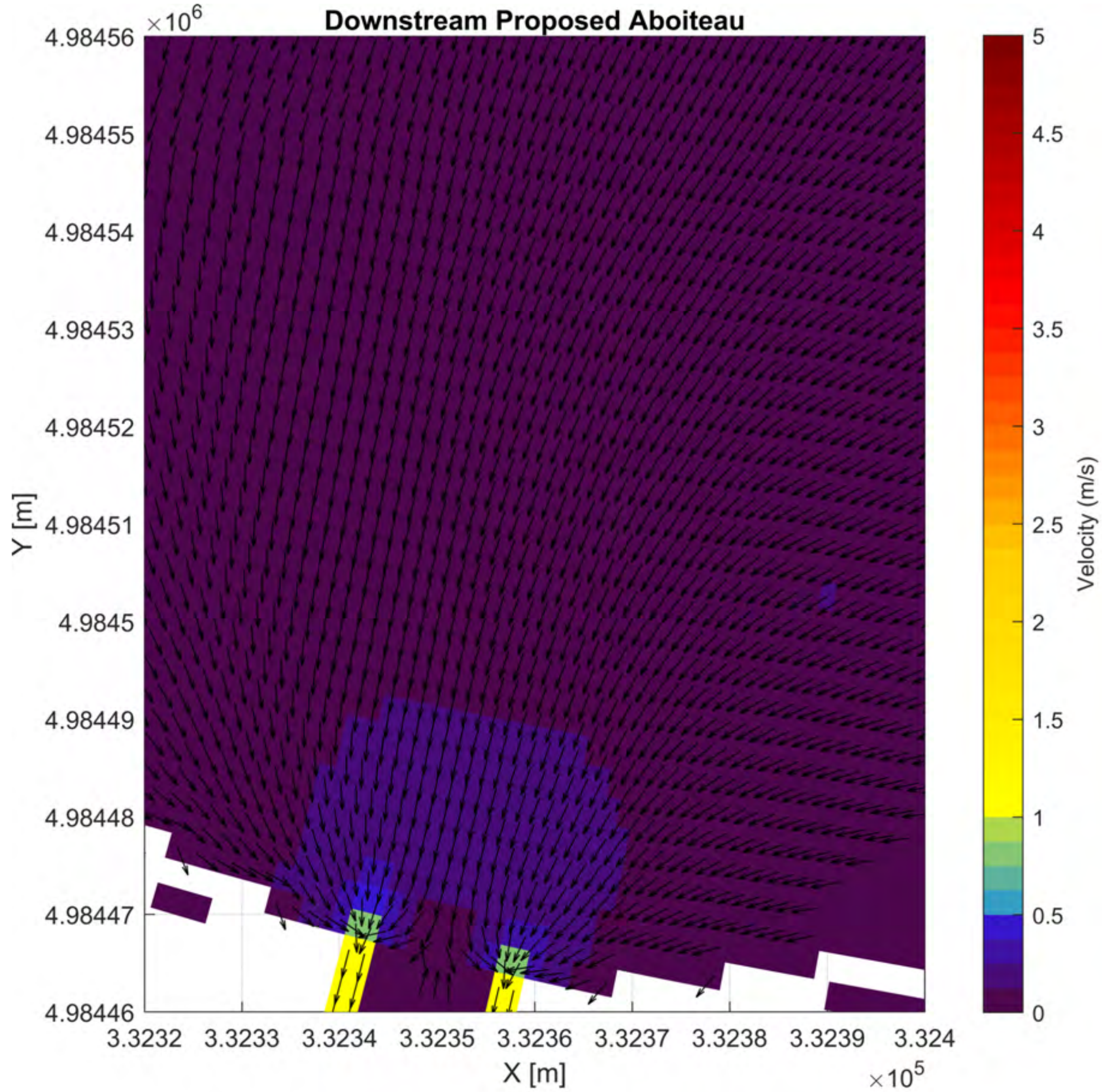


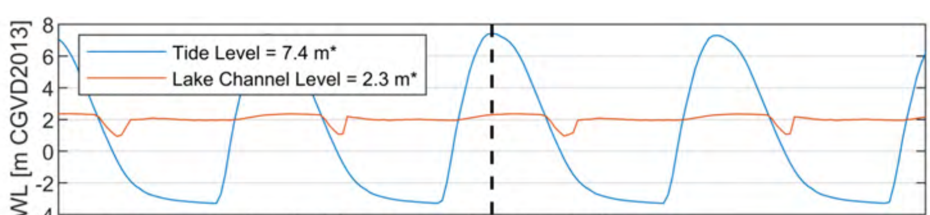


*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.106: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Overall Study Area.





*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.107: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Downstream Proposed Aboiteau.

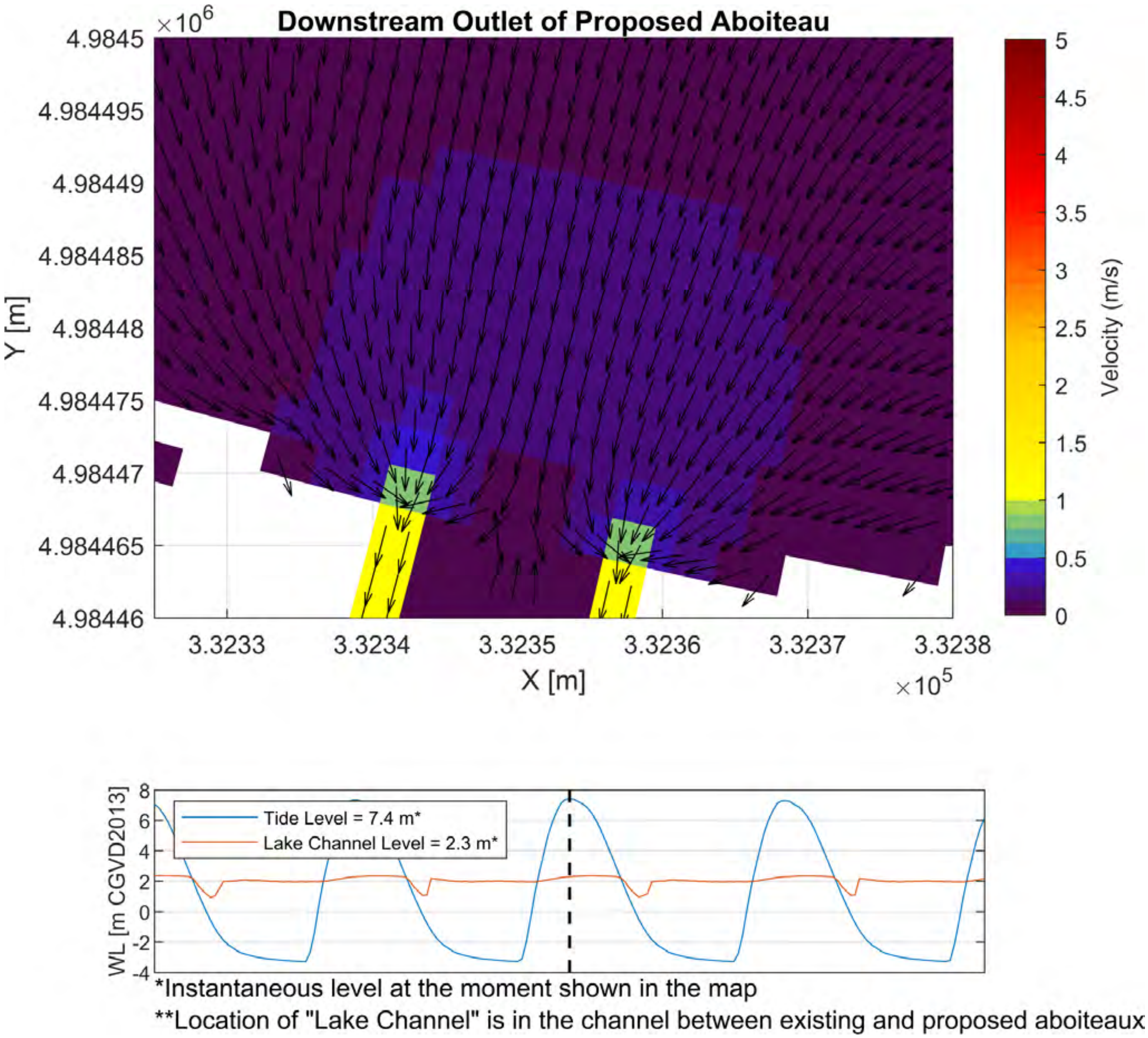


Figure A1.108: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Downstream Outlet of Proposed Aboiteau.

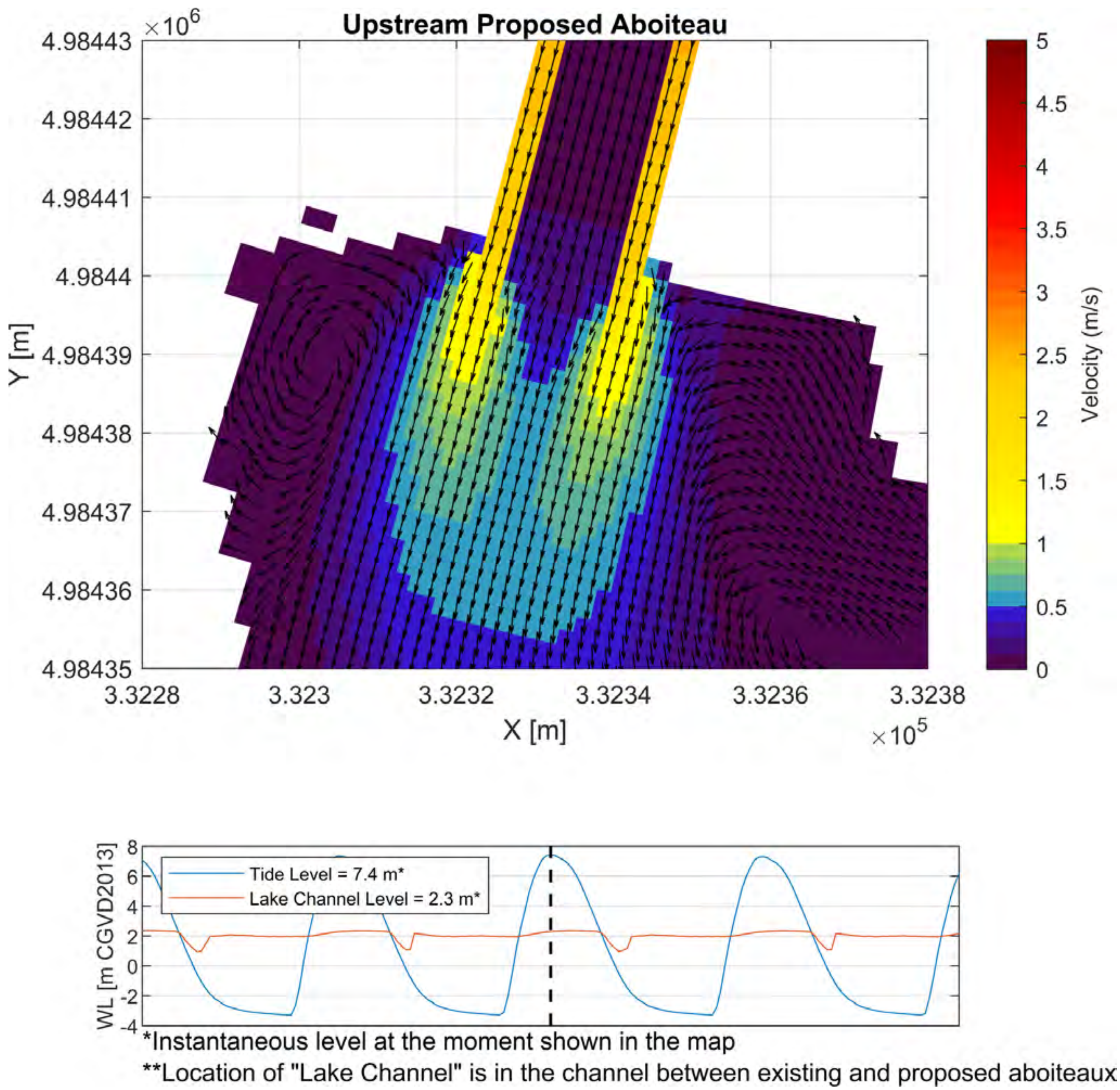
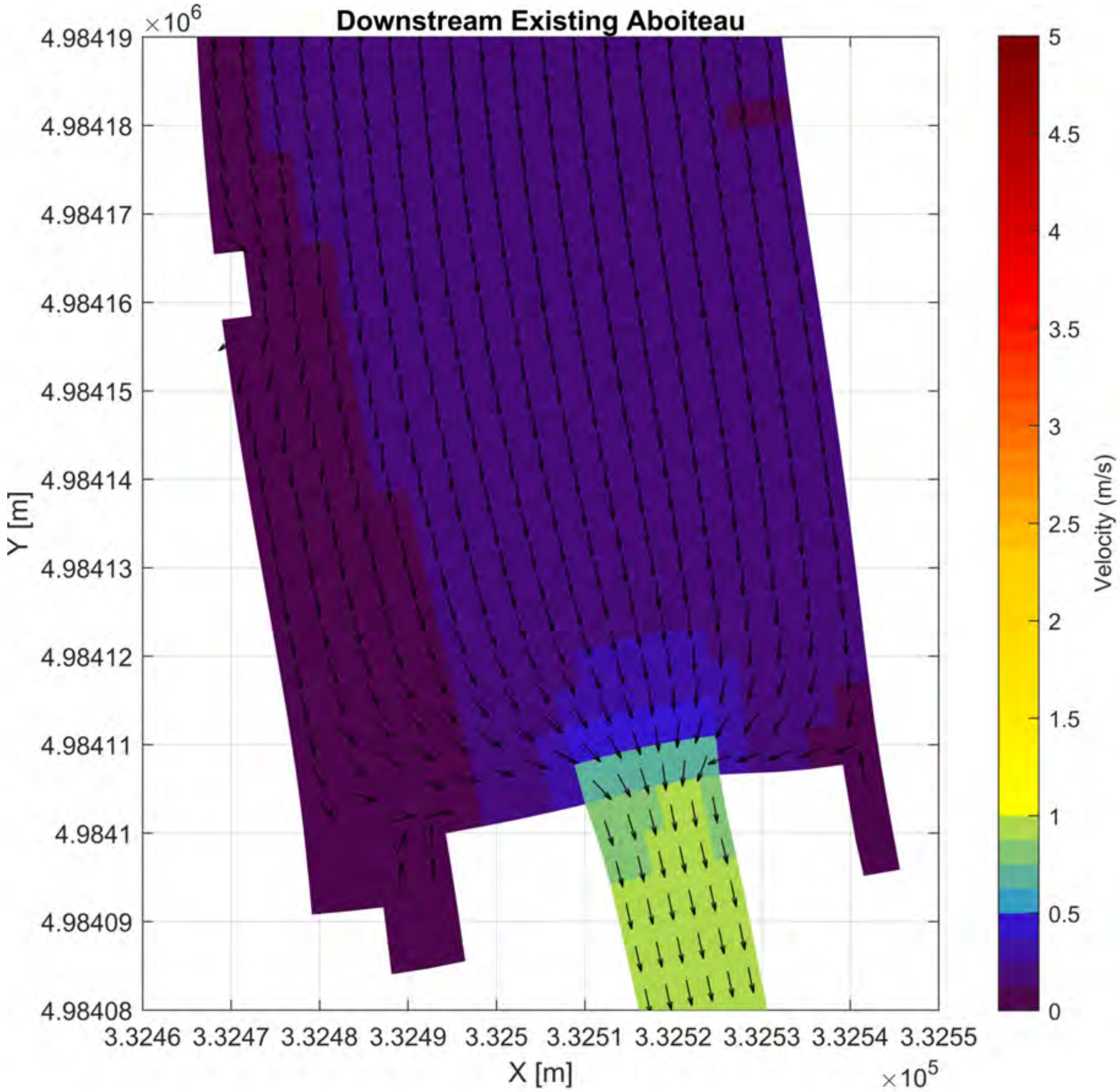
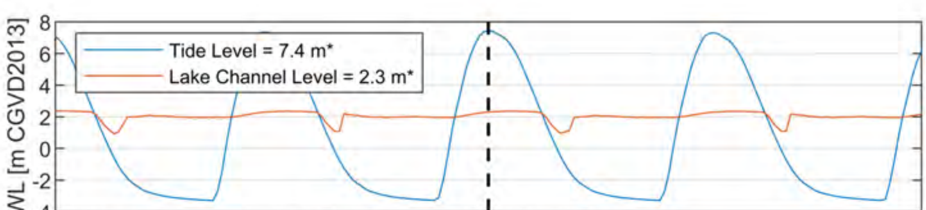


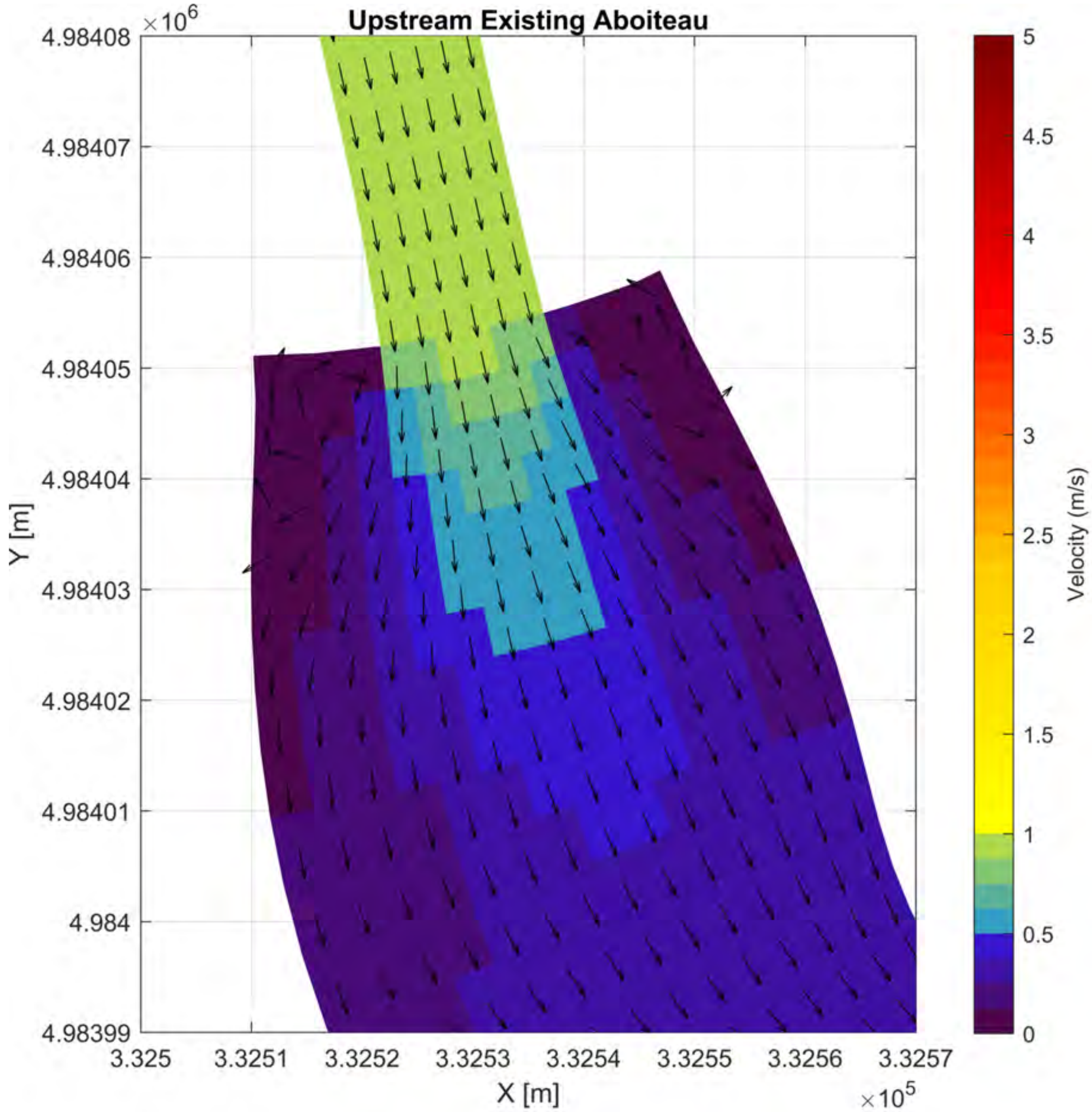
Figure A1.109: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Upstream Proposed Aboiteau.

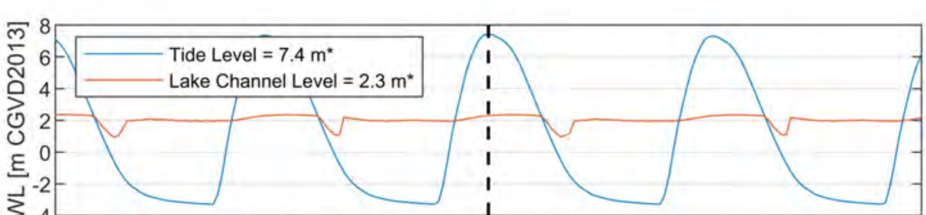




*Instantaneous level at the moment shown in the map
**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.110: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Downstream Existing Aboiteau.





*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.111: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Upstream Existing Aboiteau.

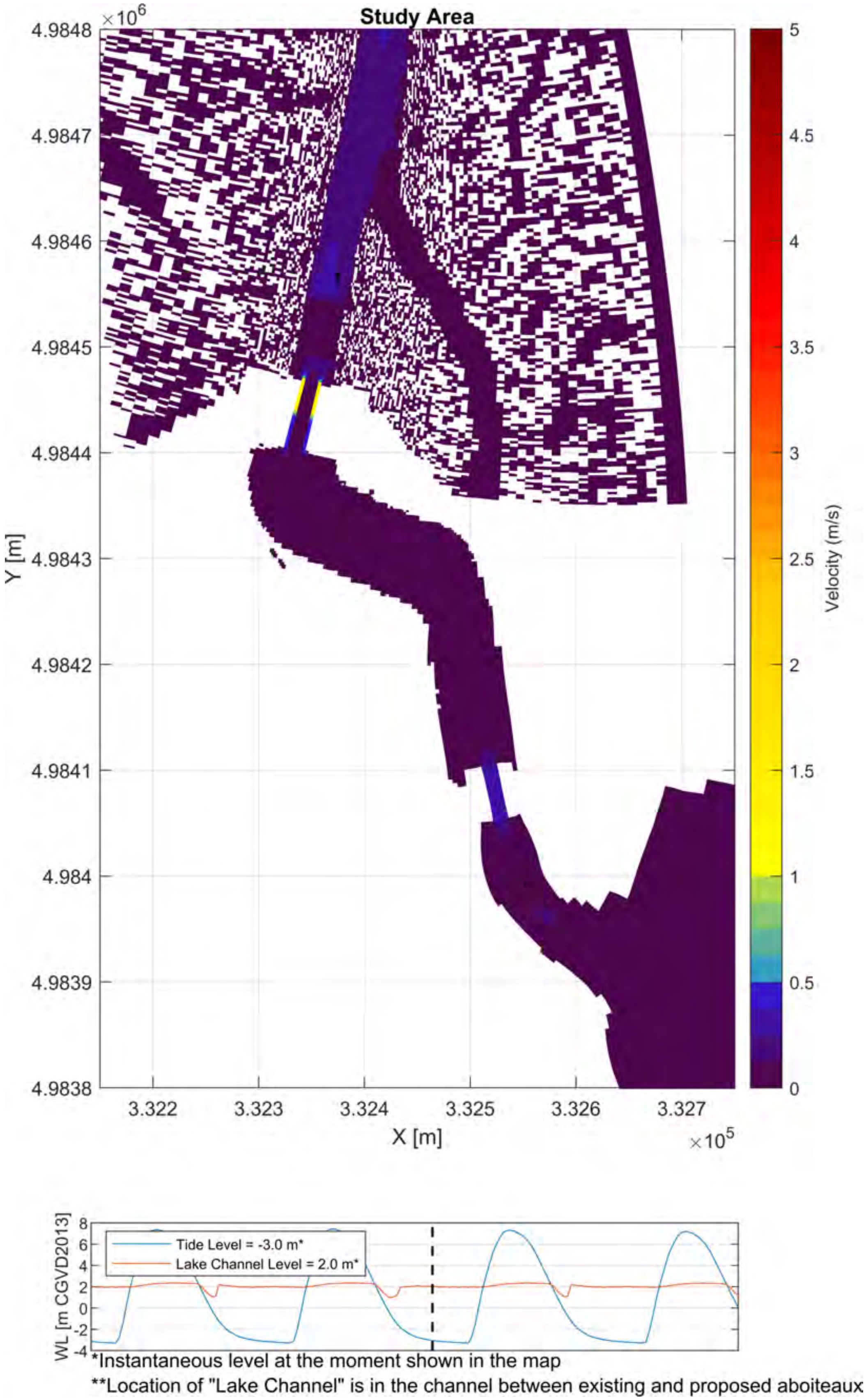
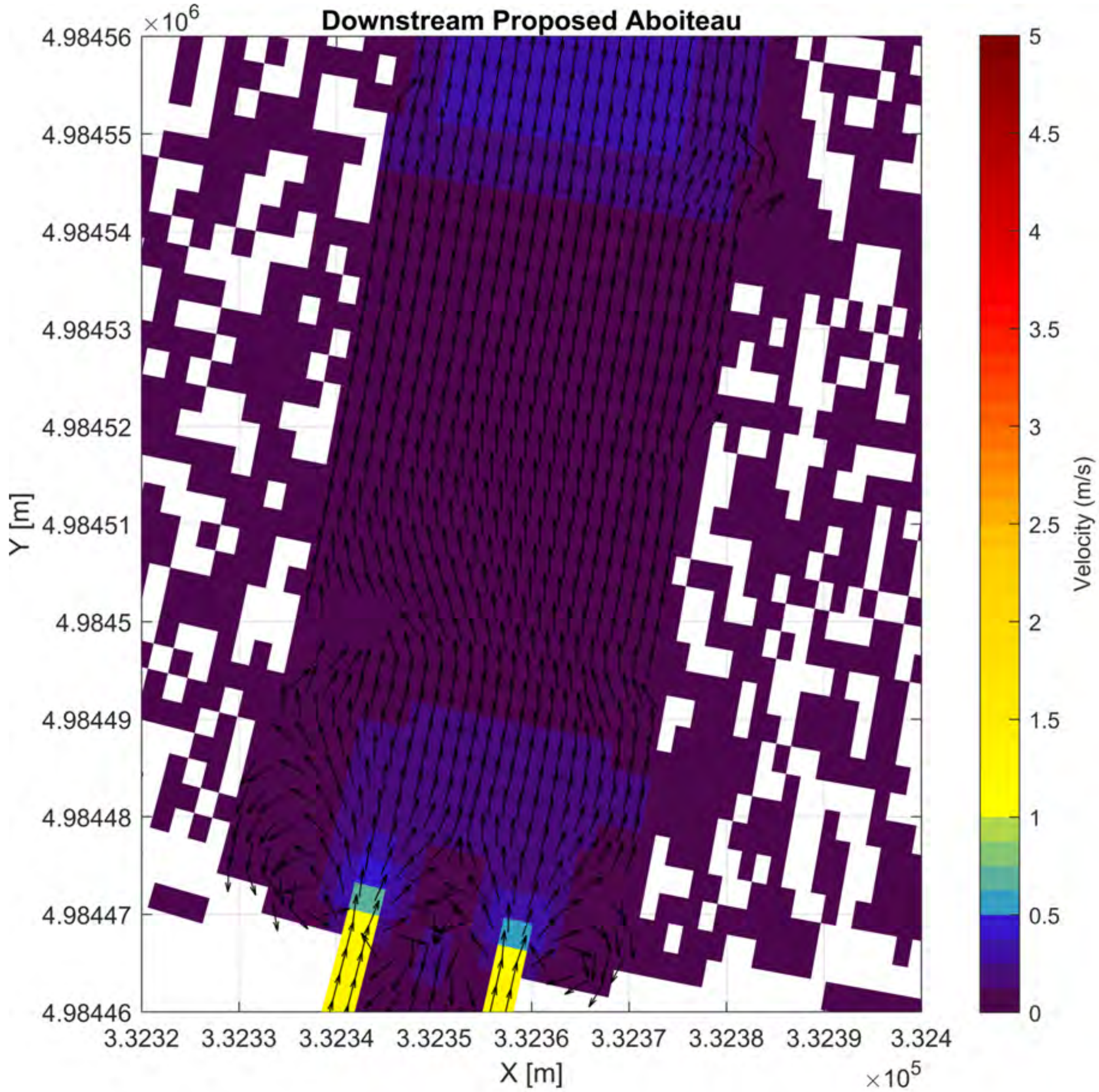
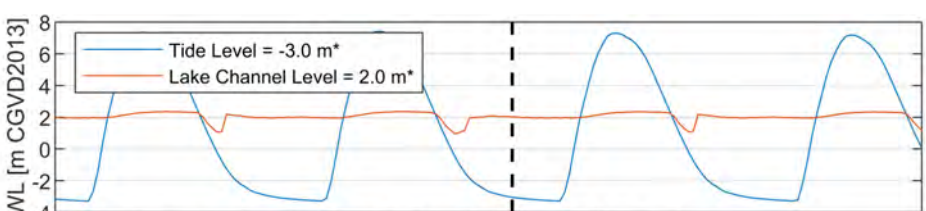


Figure A1.112: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Overall Study Area.





*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A1.113: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Downstream Proposed Aboiteau.

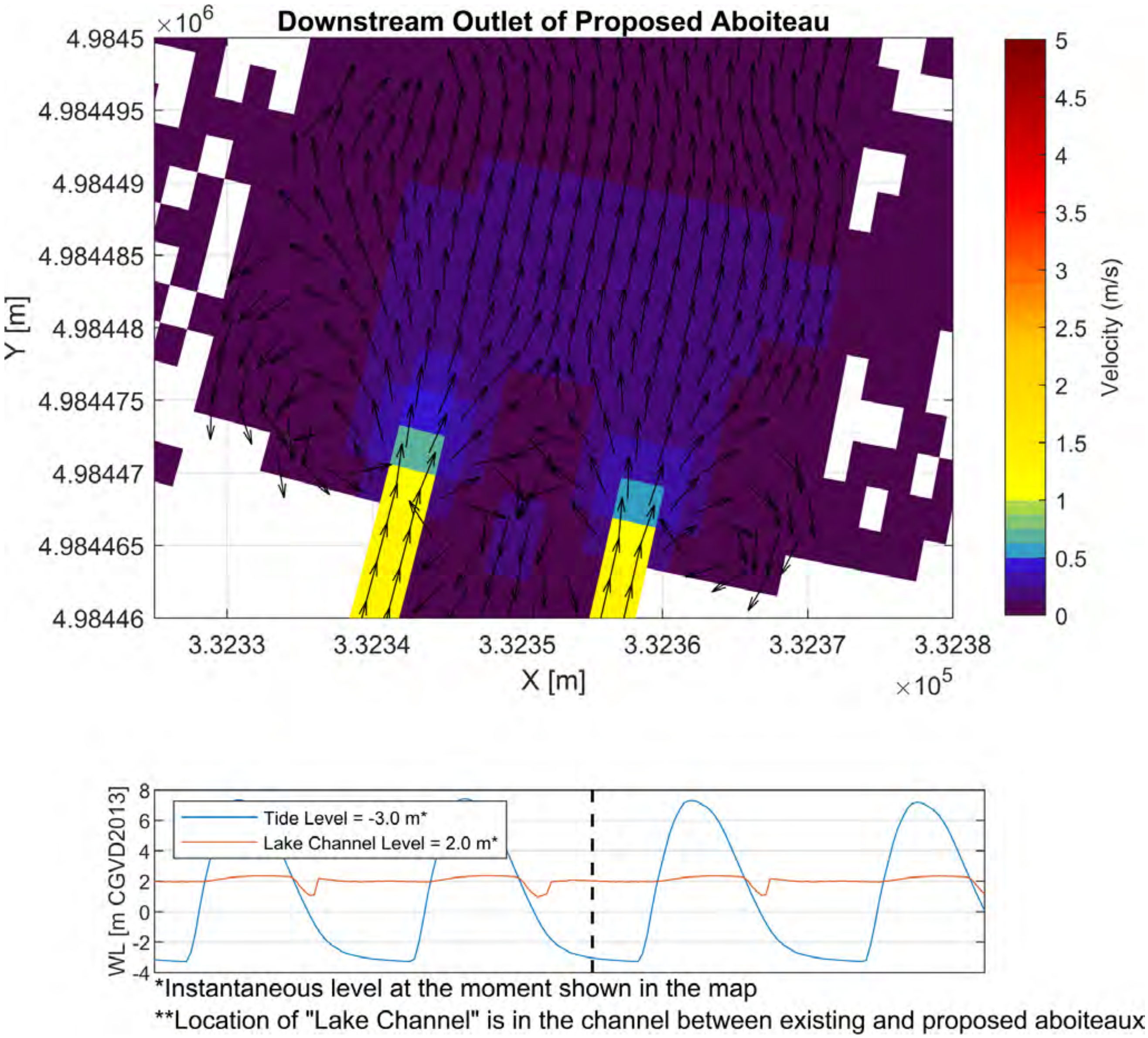


Figure A1.114: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Downstream Outlet of Proposed Aboiteau.

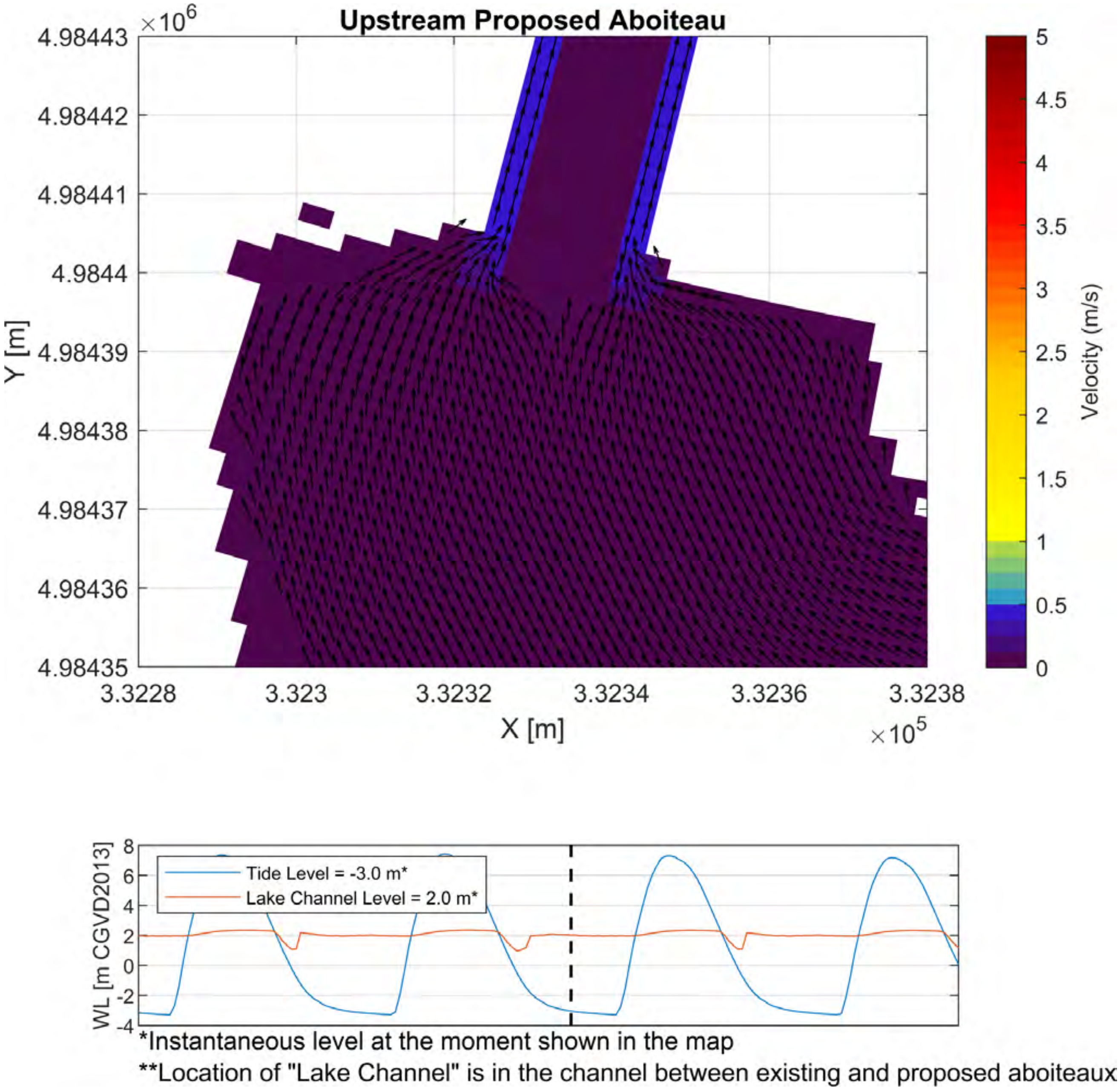


Figure A1.115: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Upstream Proposed Aboiteau.

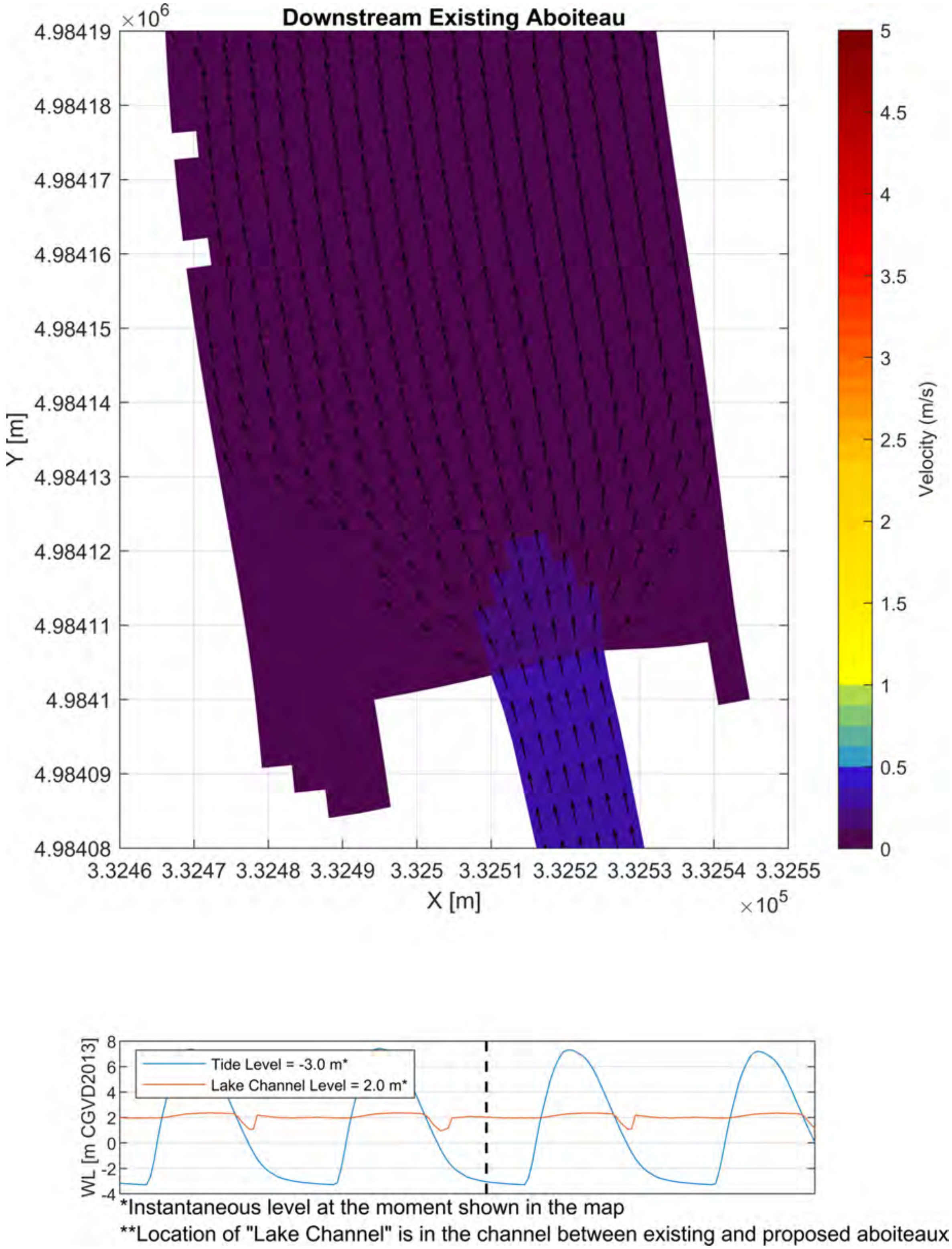
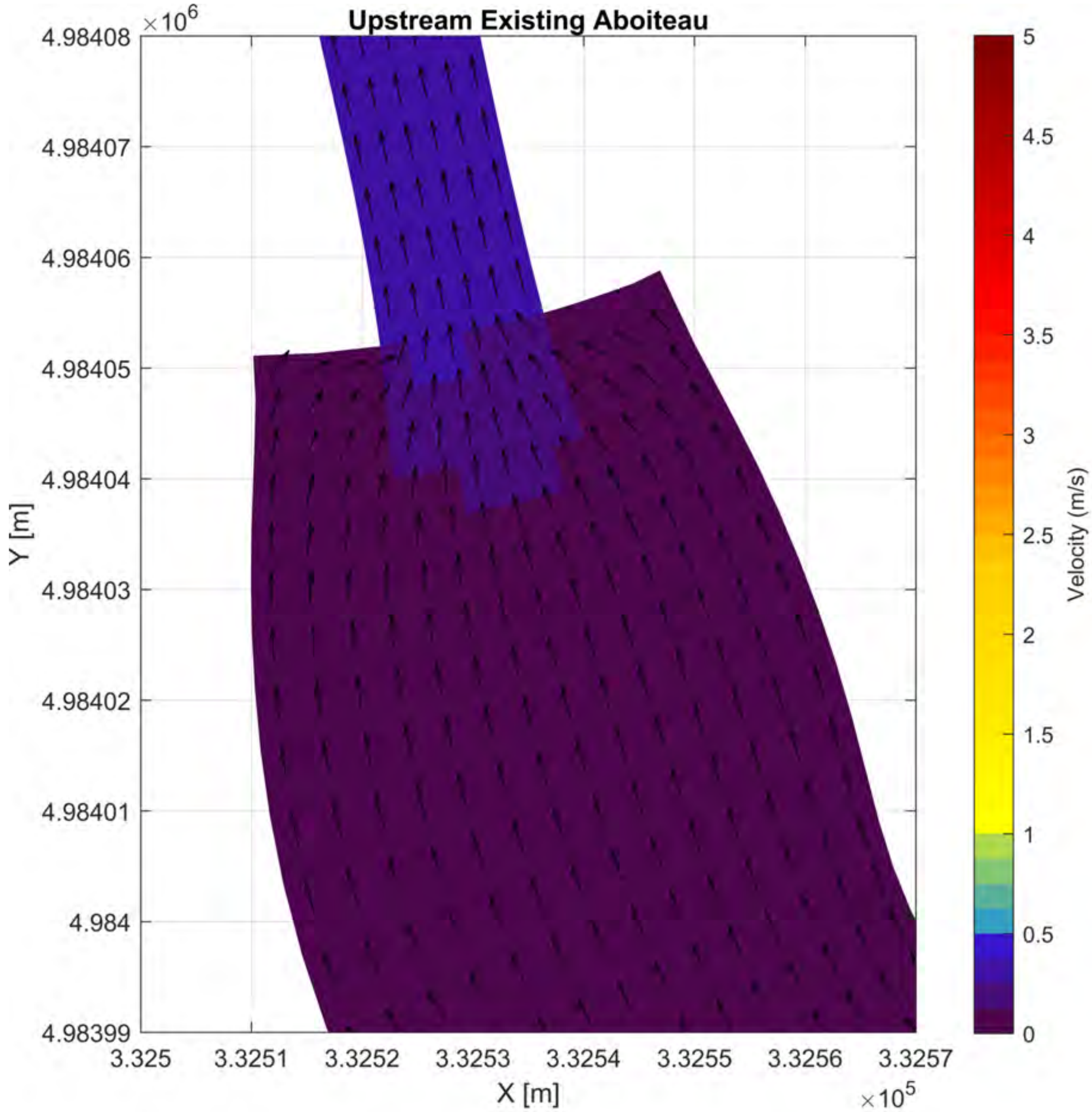


Figure A1.116: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Downstream Existing Aboiteau.



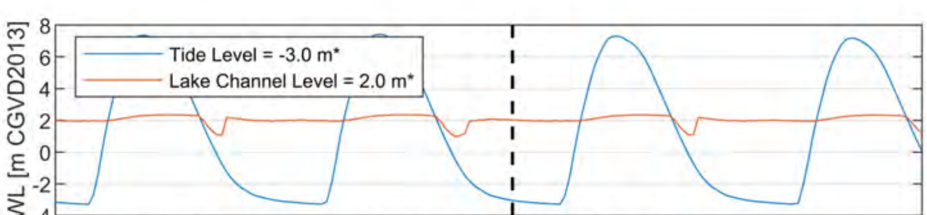


Figure A1.117: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Upstream Existing Aboiteau.

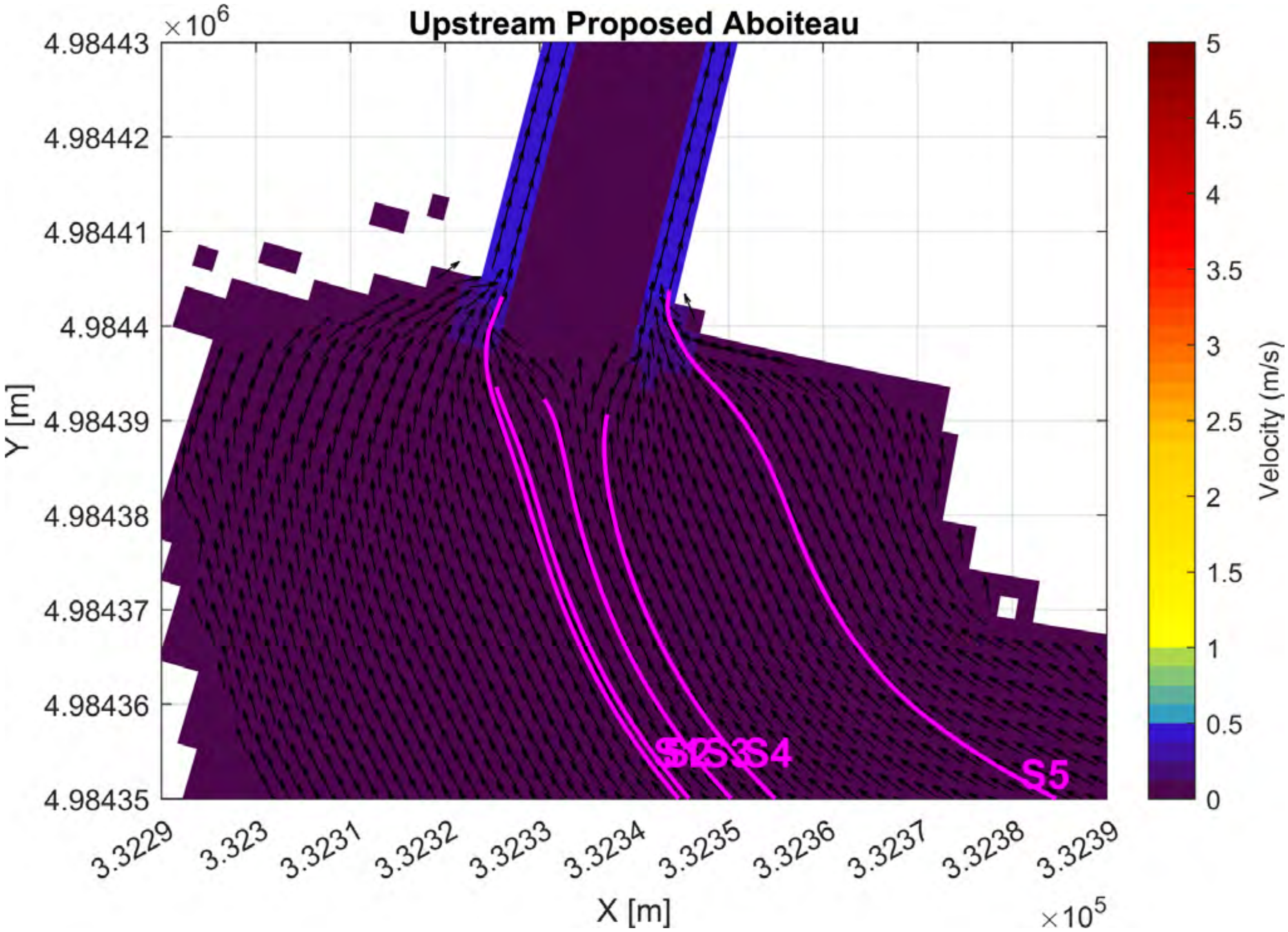


Figure A1.118: Location of Selected Streamlines - Velocities When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions).

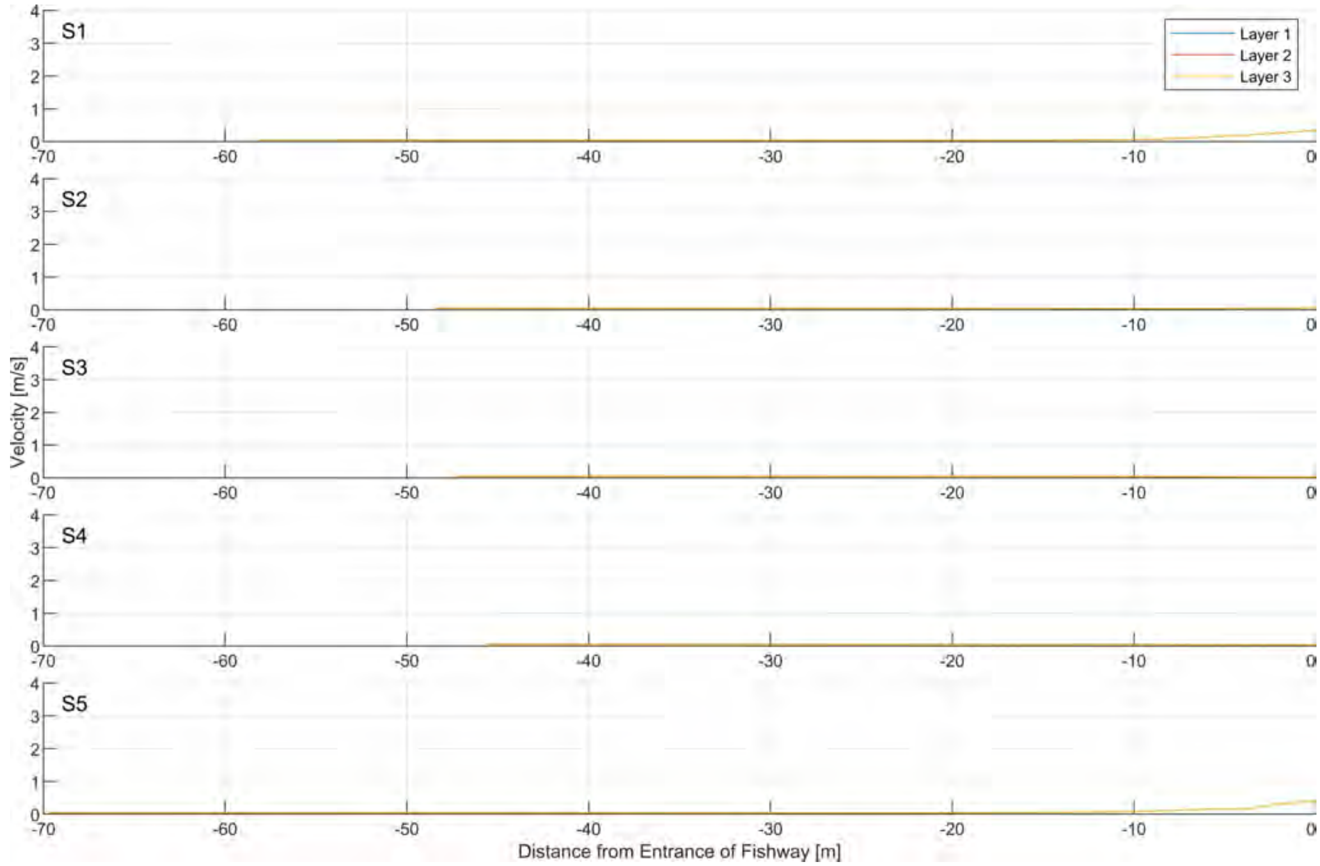


Figure A1.119: Velocity Along Streamlines - When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions).

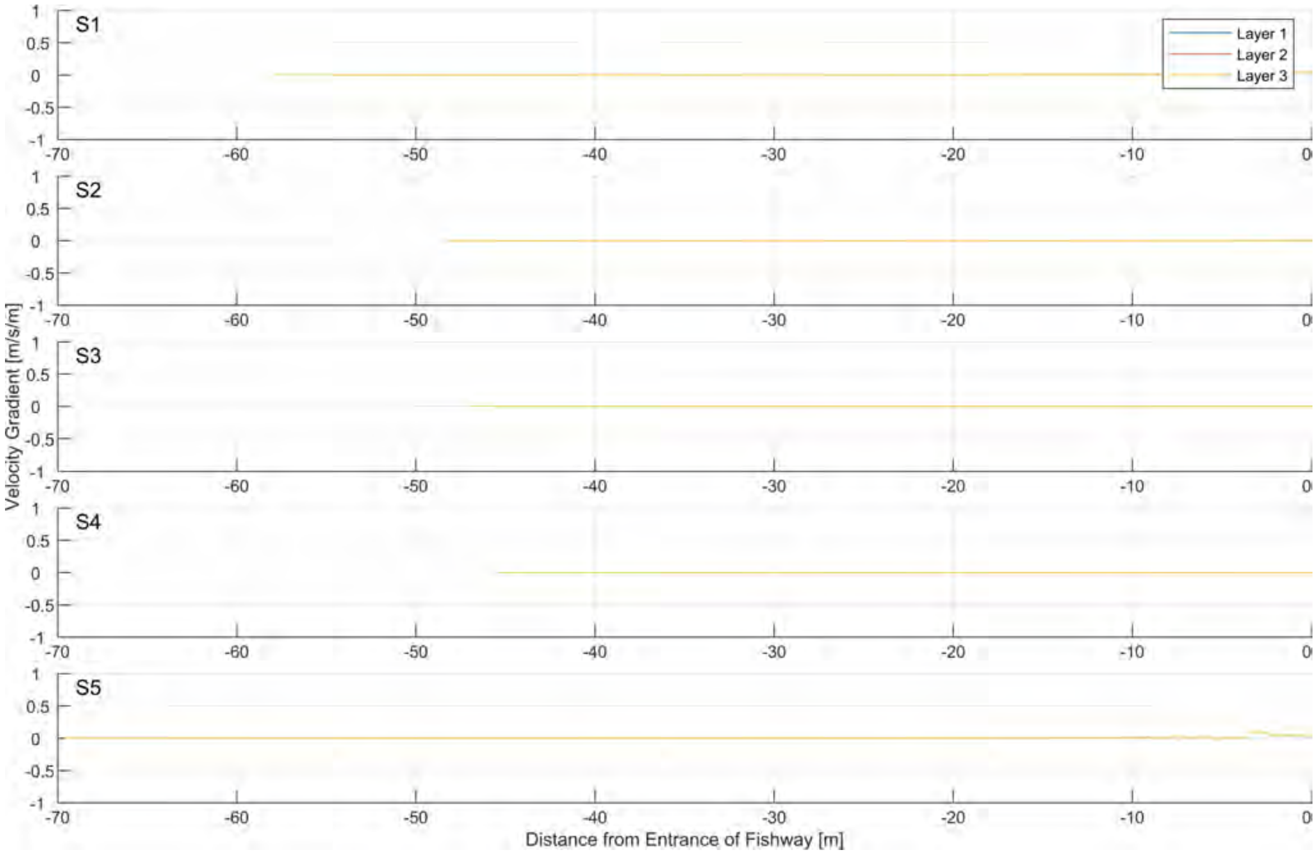
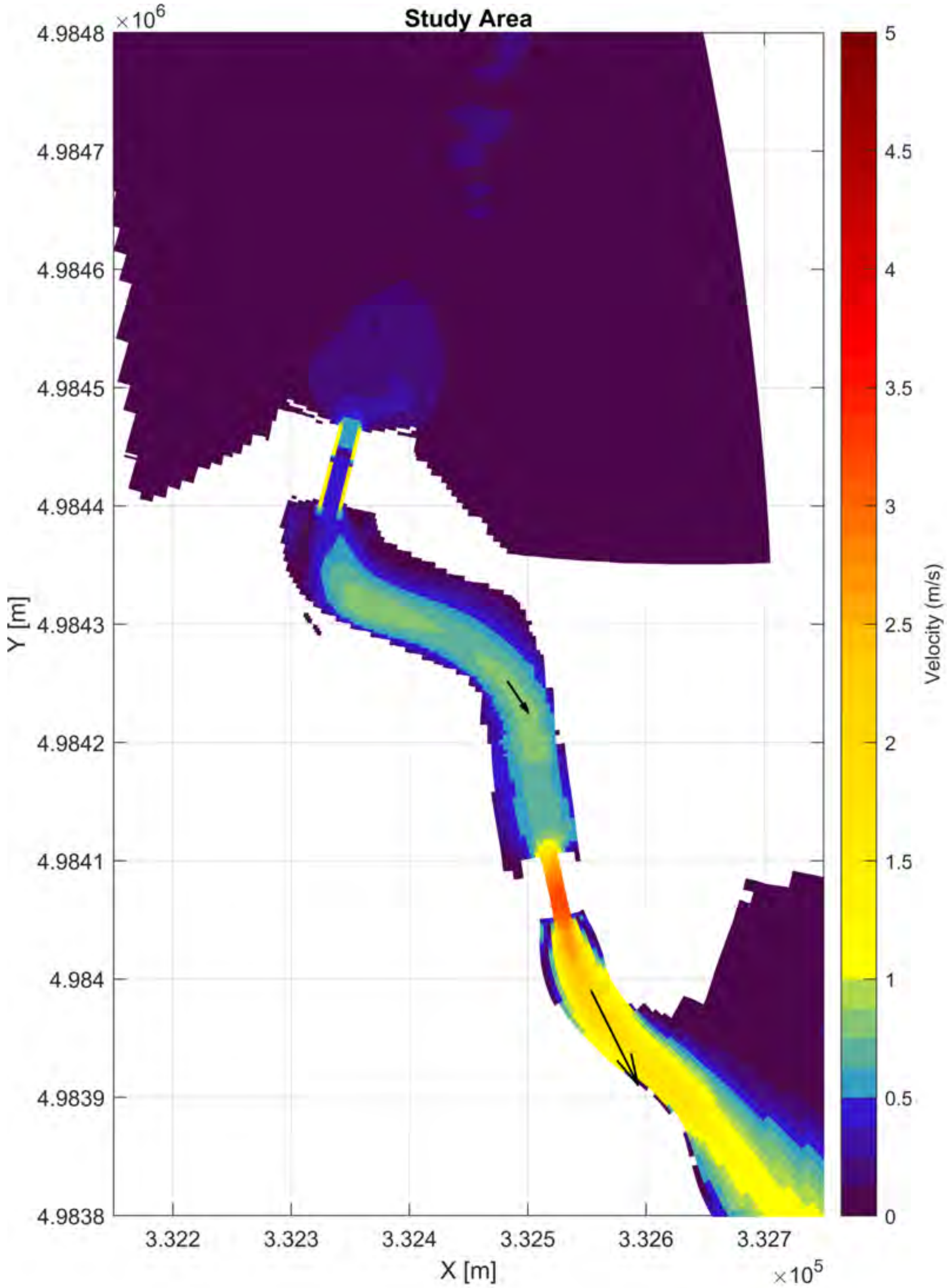


Figure A1.120: Velocity Gradient Along Streamlines - When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions).

A2 Water Management Scenarios - Dampened Tidal



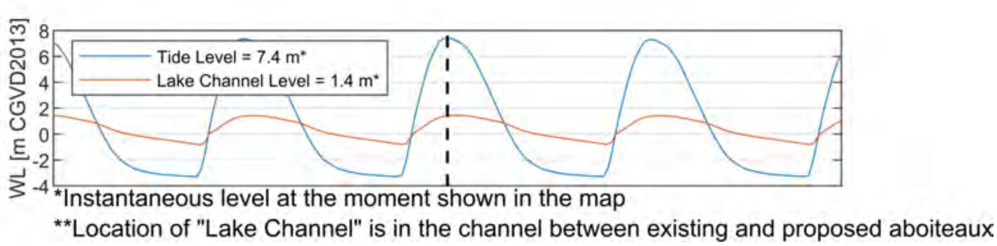
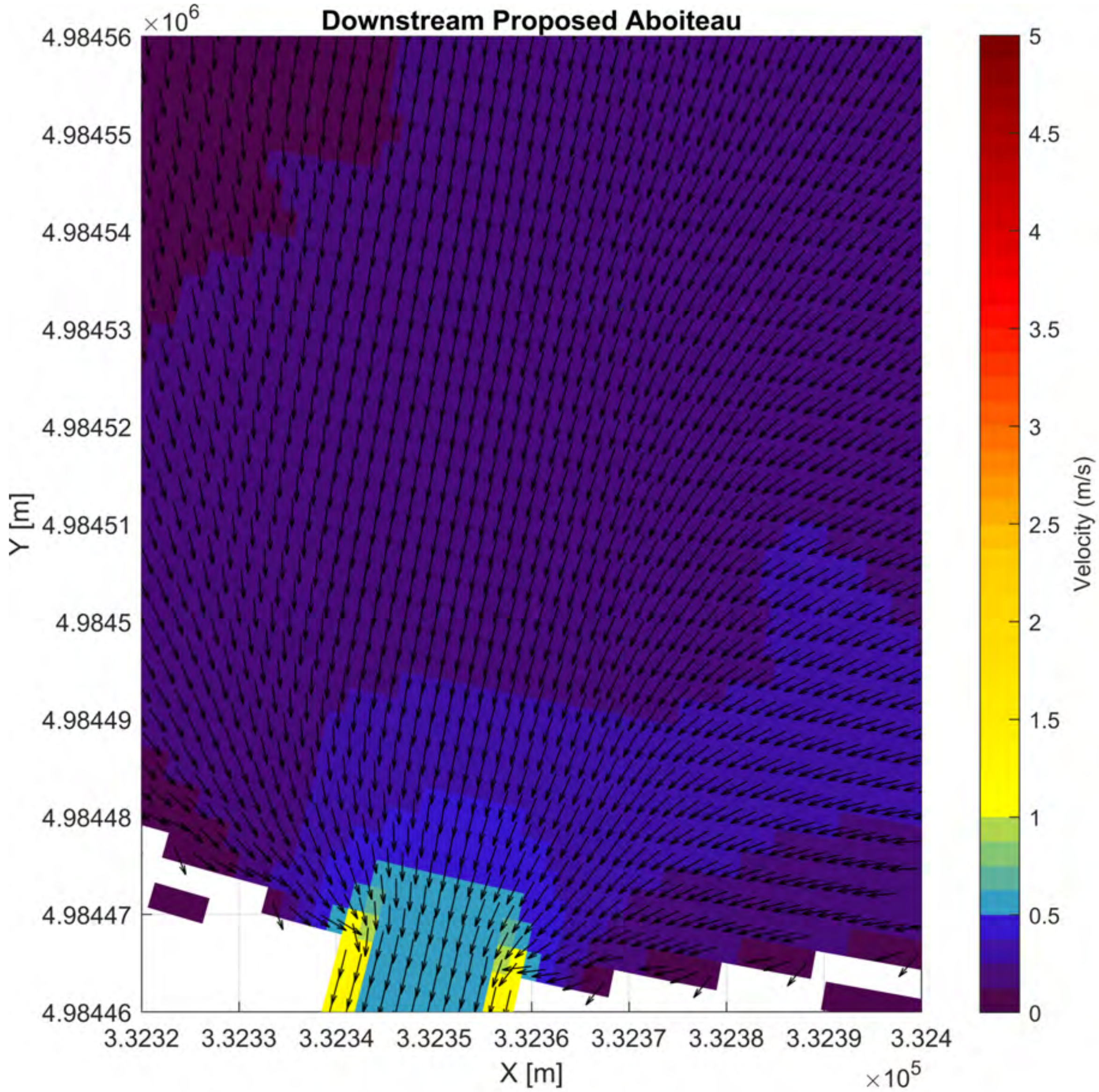


Figure A2.1: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Overall Study Area.



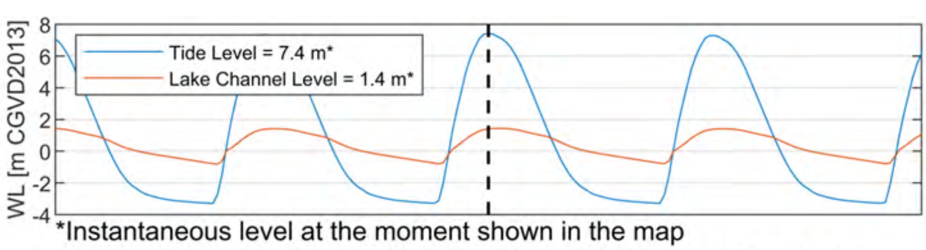
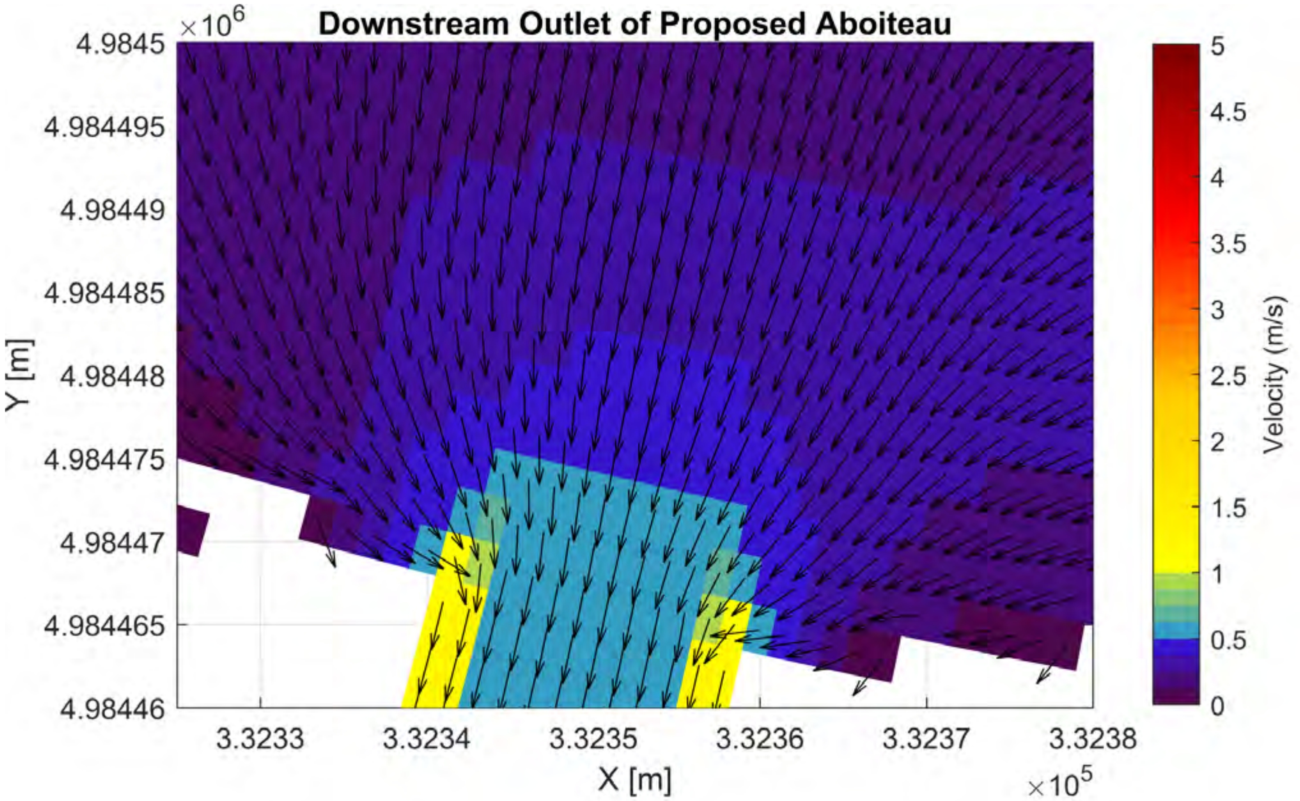


Figure A2.2: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Downstream Proposed Aboiteau.



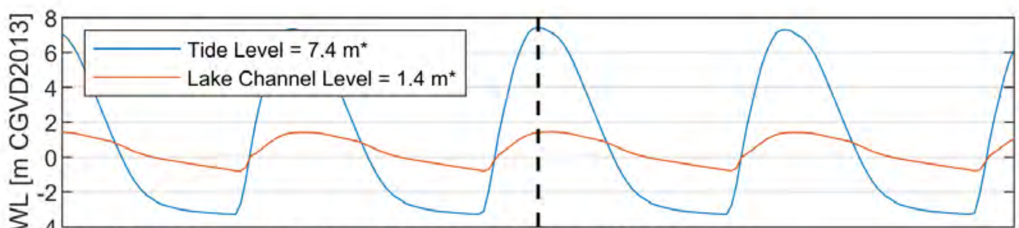


Figure A2.3: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Downstream Outlet of Proposed Aboiteau.

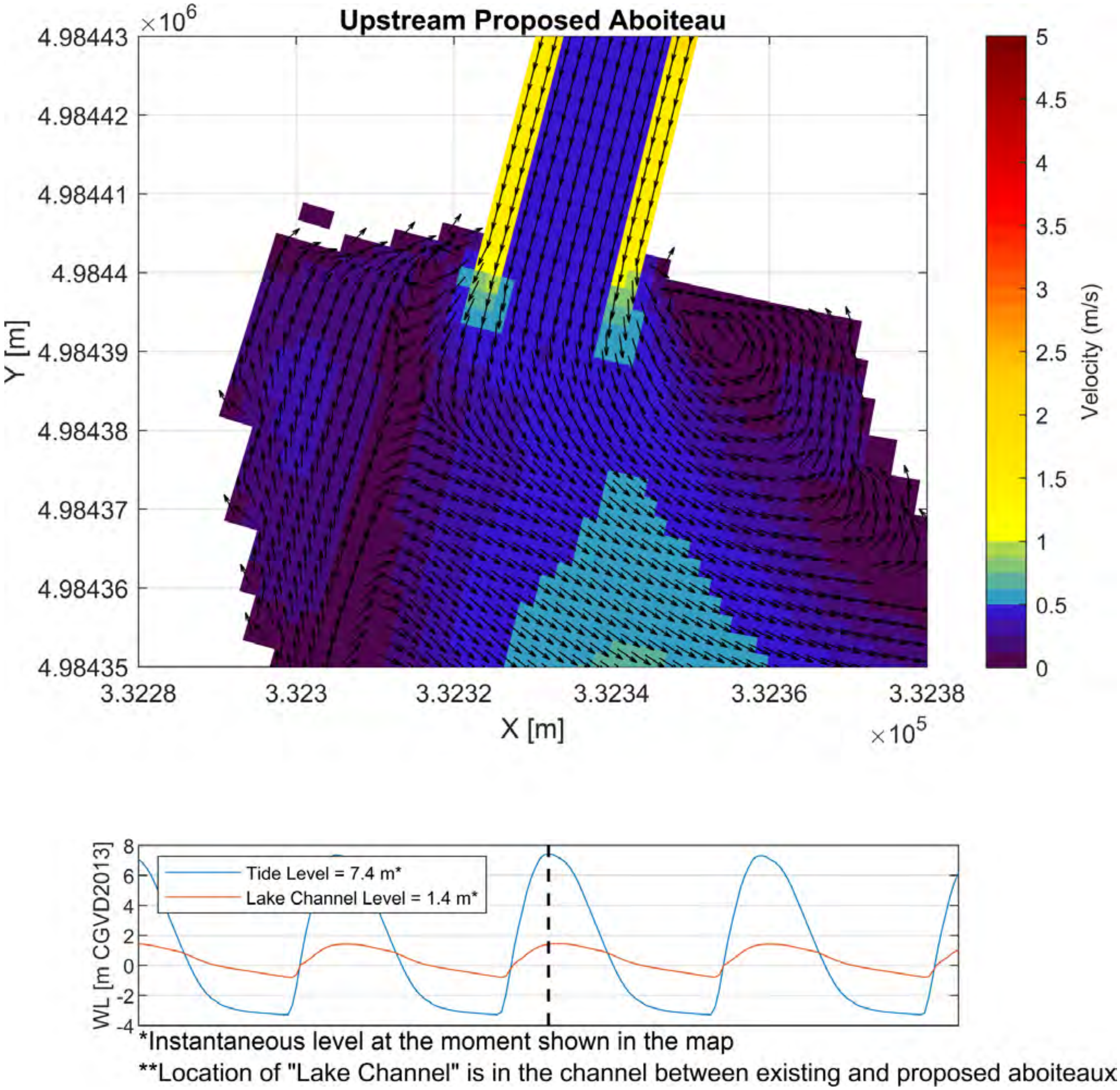
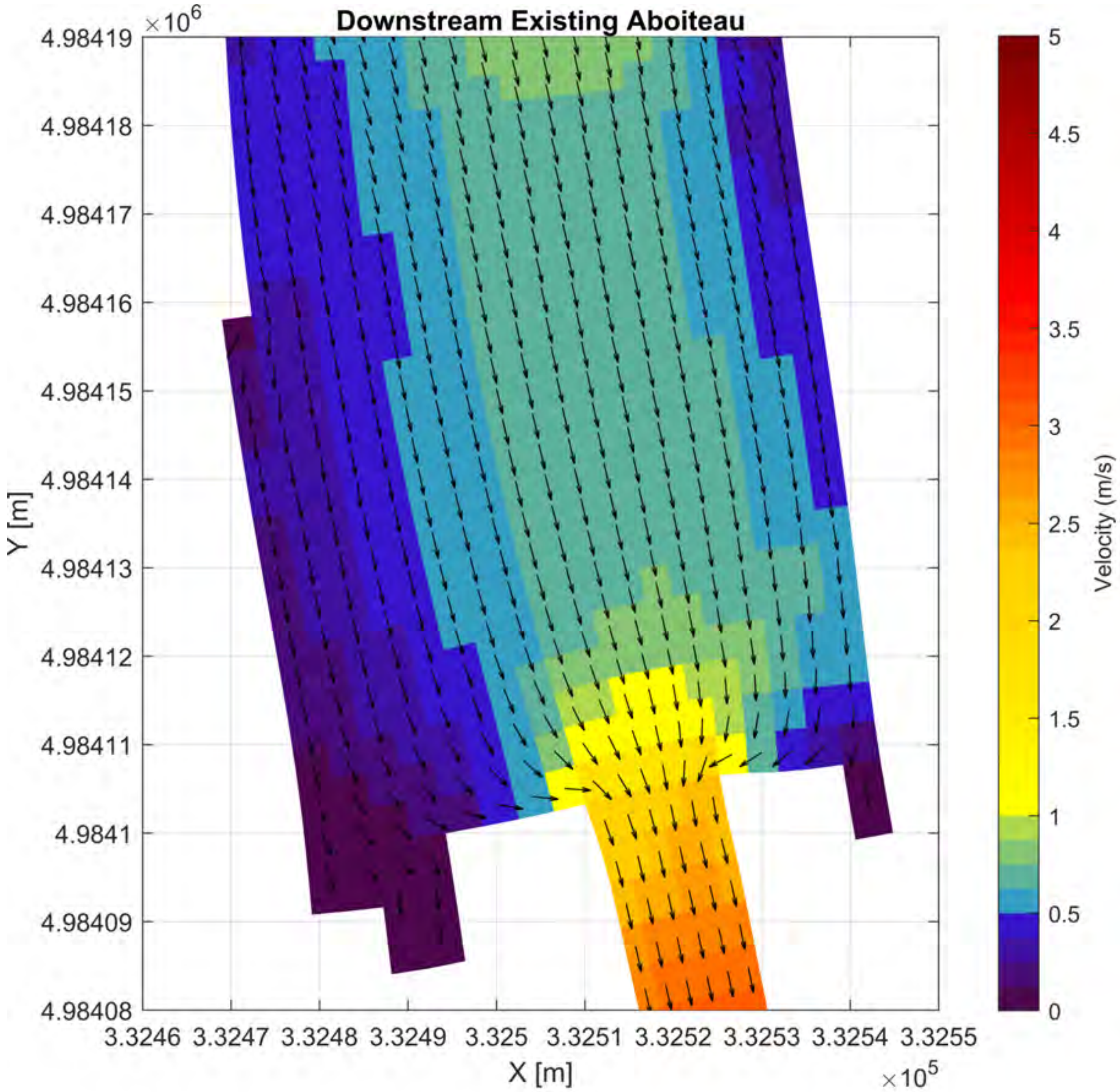
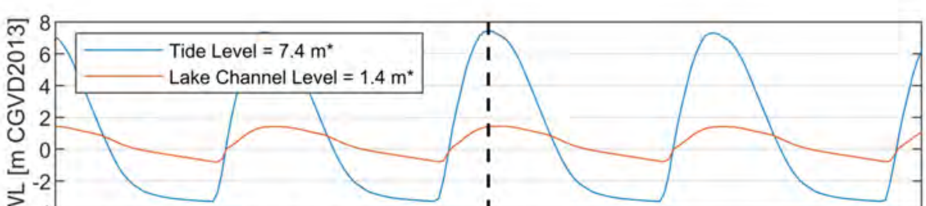


Figure A2.4: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Upstream Proposed Aboiteau.

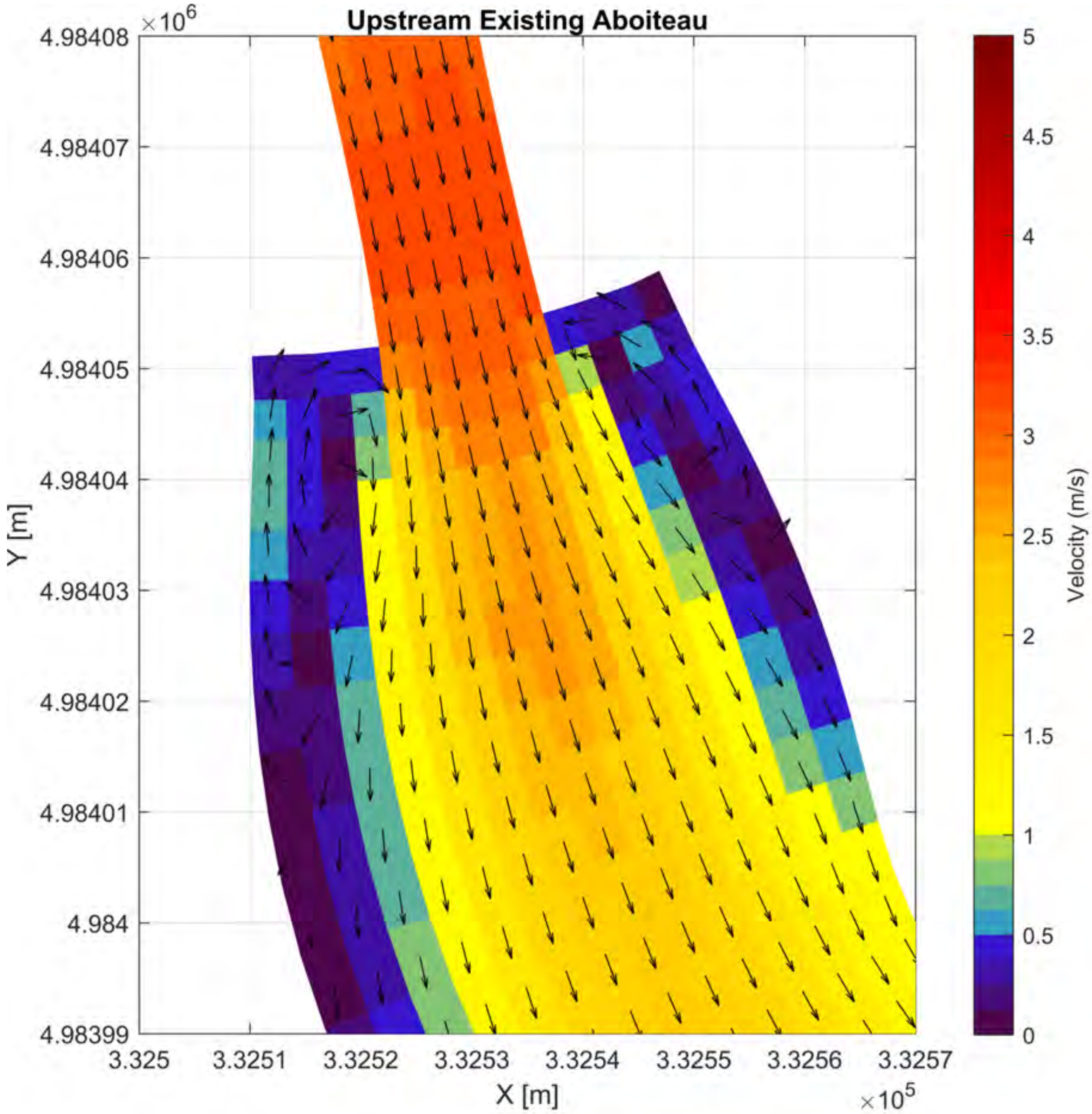


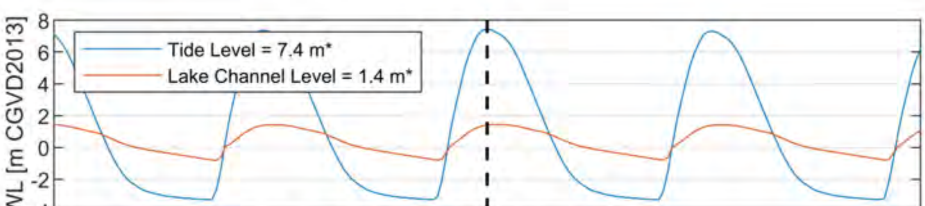


*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A2.5: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Downstream Existing Aboiteau.





*Instantaneous level at the moment shown in the map
**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A2.6: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Upstream Existing Aboiteau.

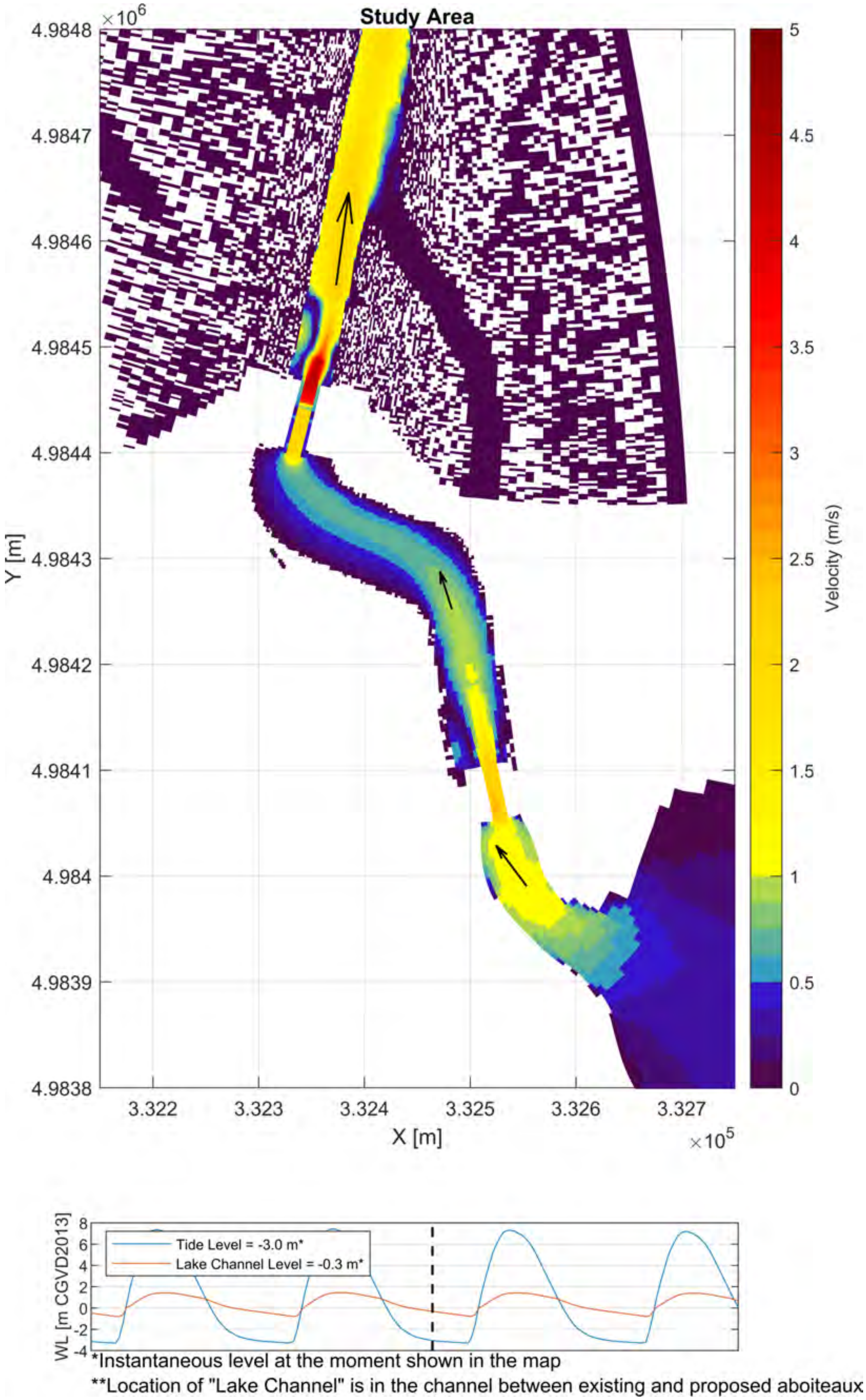
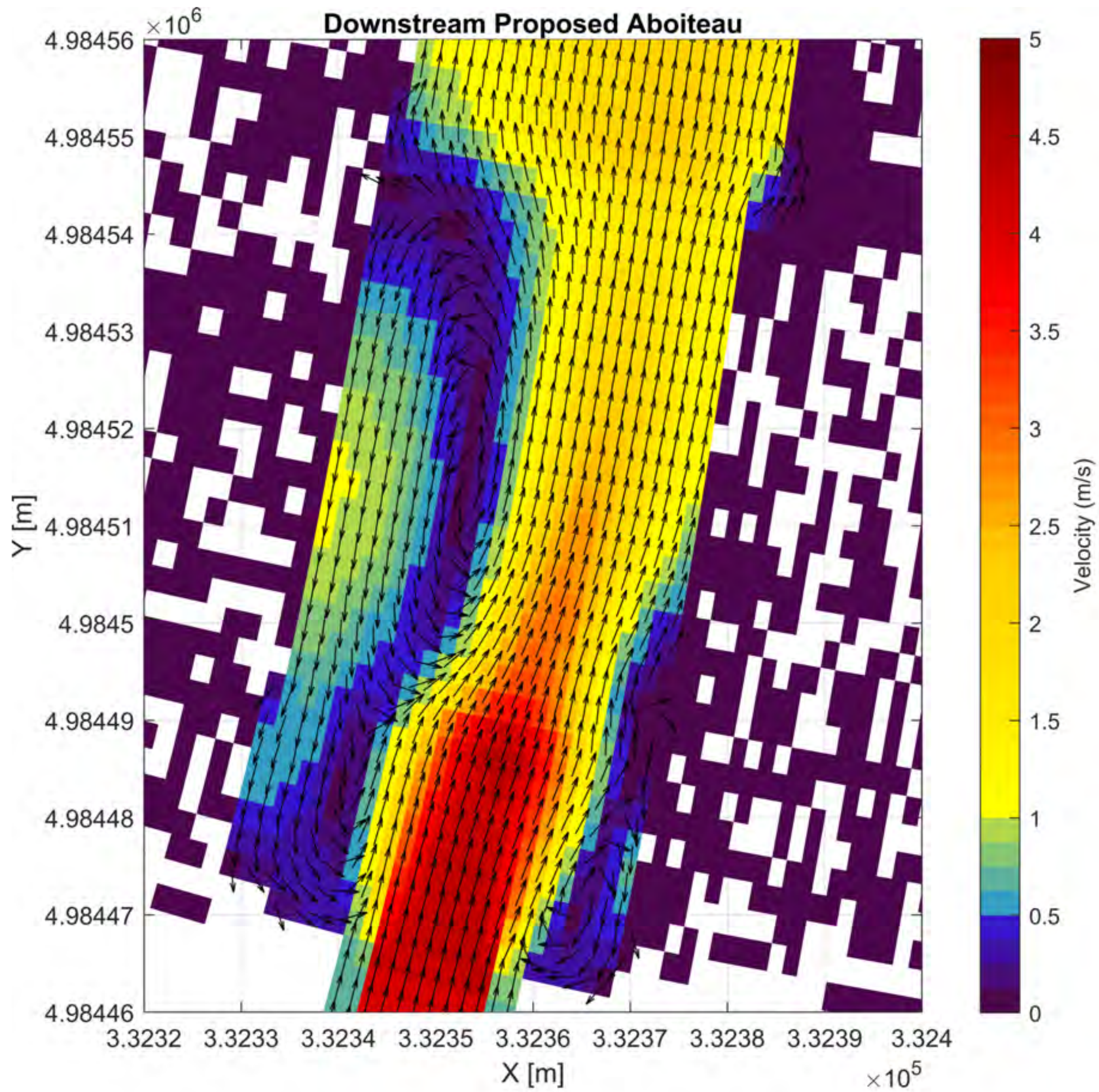


Figure A2.7: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Overall Study Area.



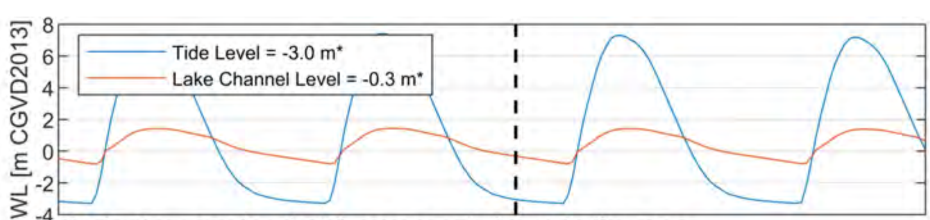
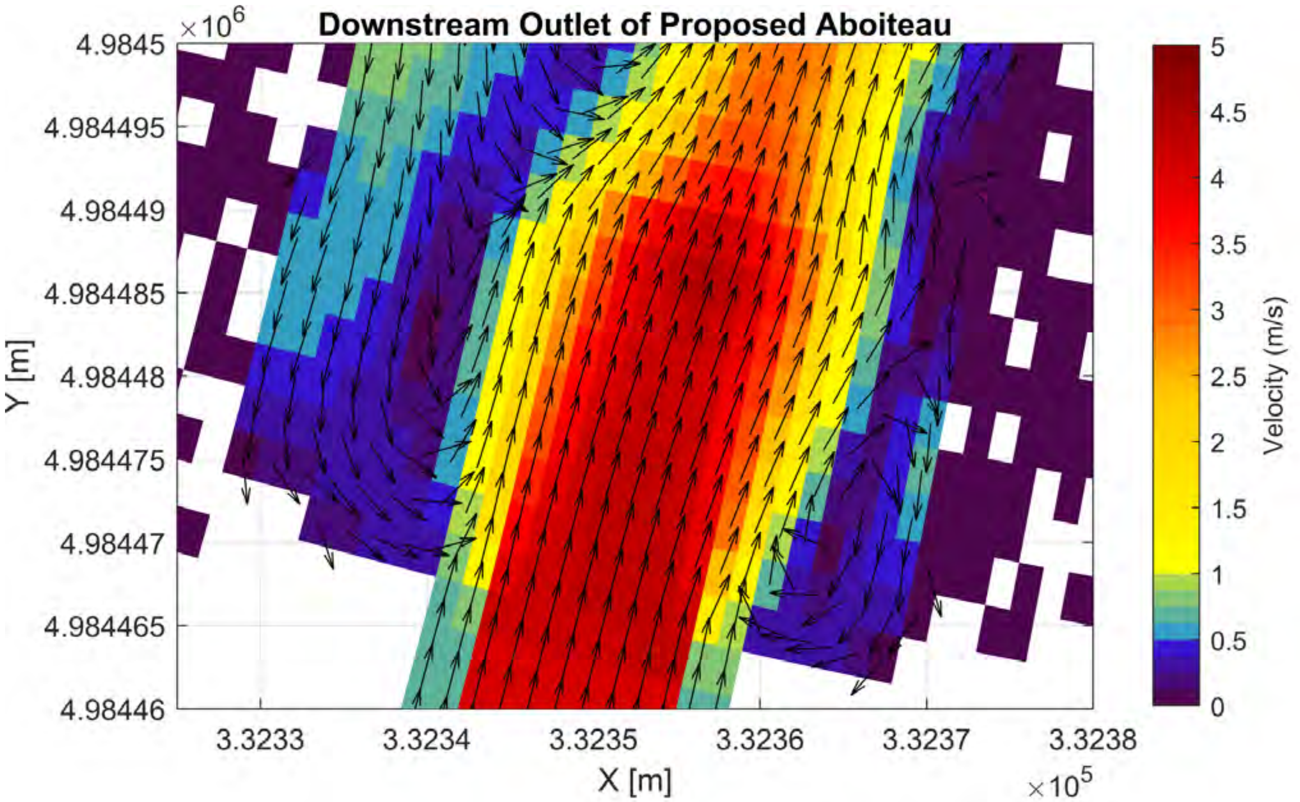


Figure A2.8: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Downstream Proposed Aboiteau.



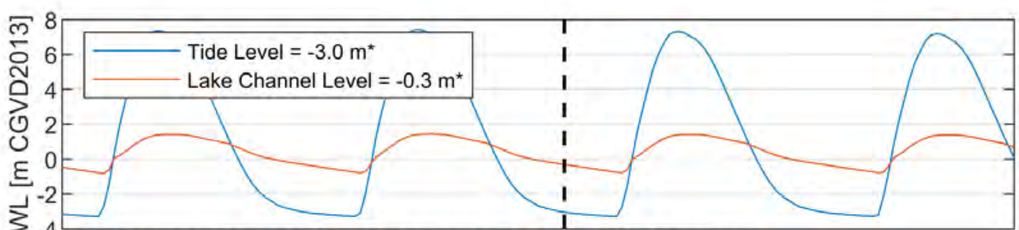


Figure A2.9: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Downstream Outlet of Proposed Aboiteau.

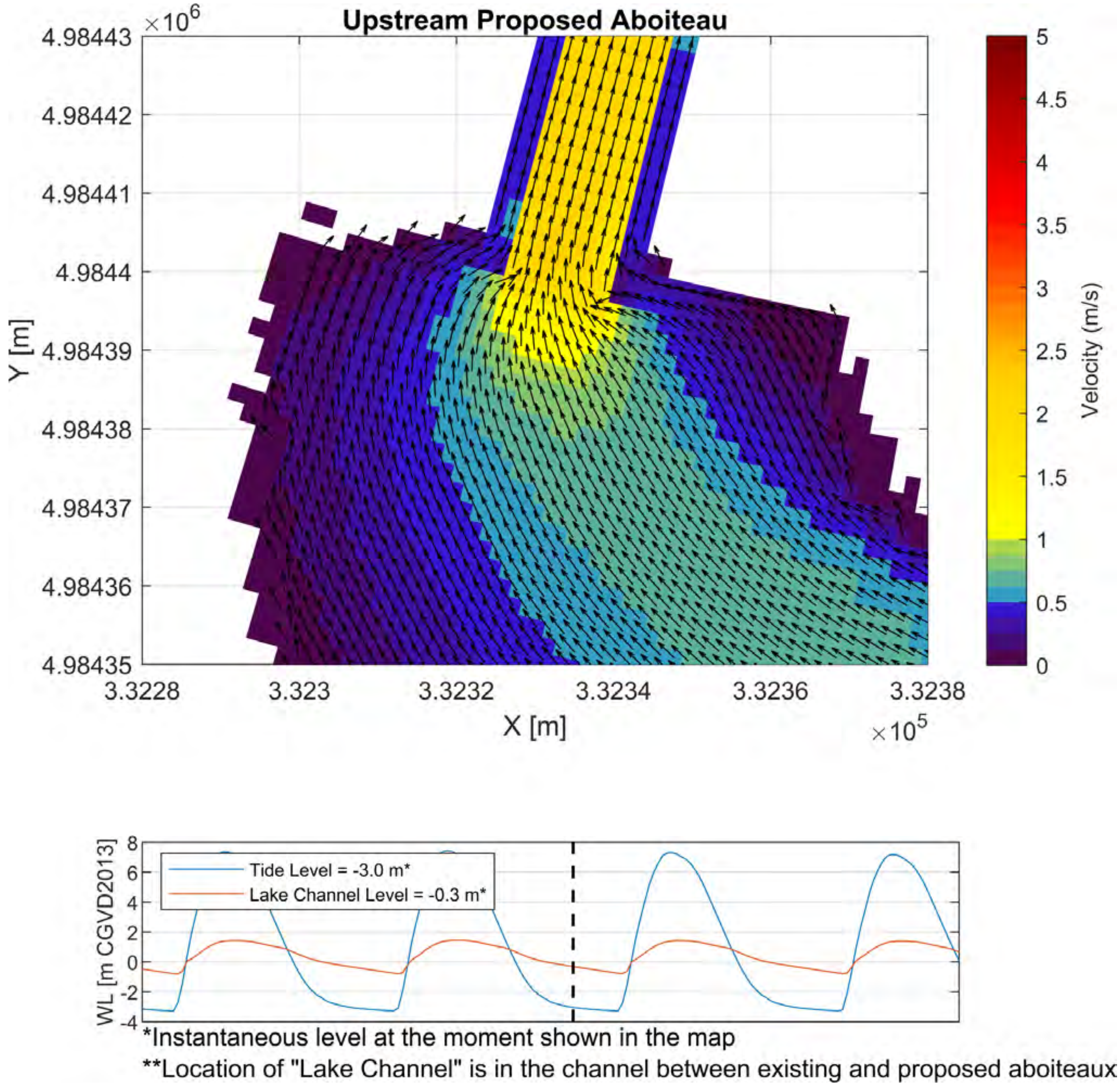


Figure A2.10: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Upstream Proposed Aboiteau.

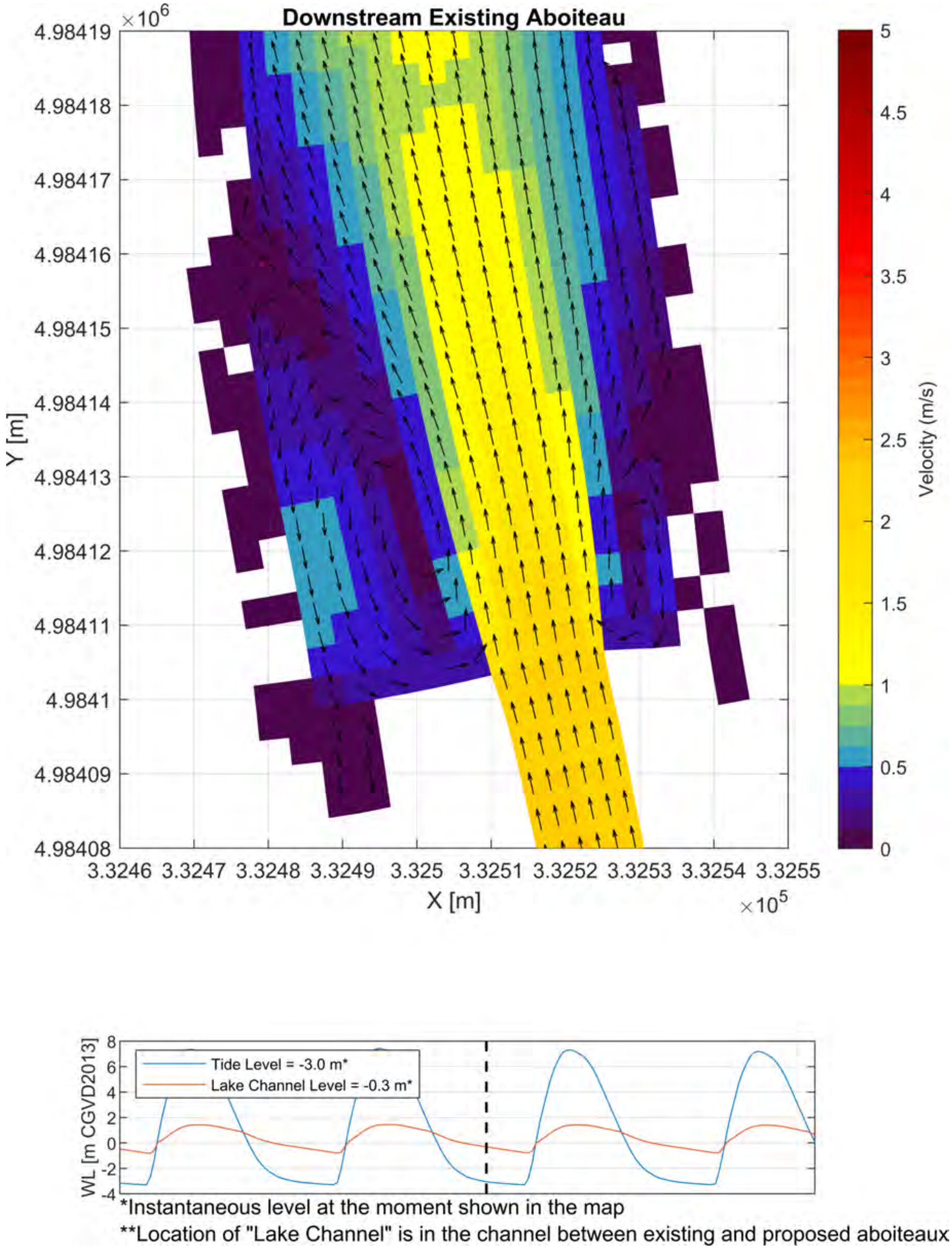


Figure A2.11: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Downstream Existing Aboiteau.

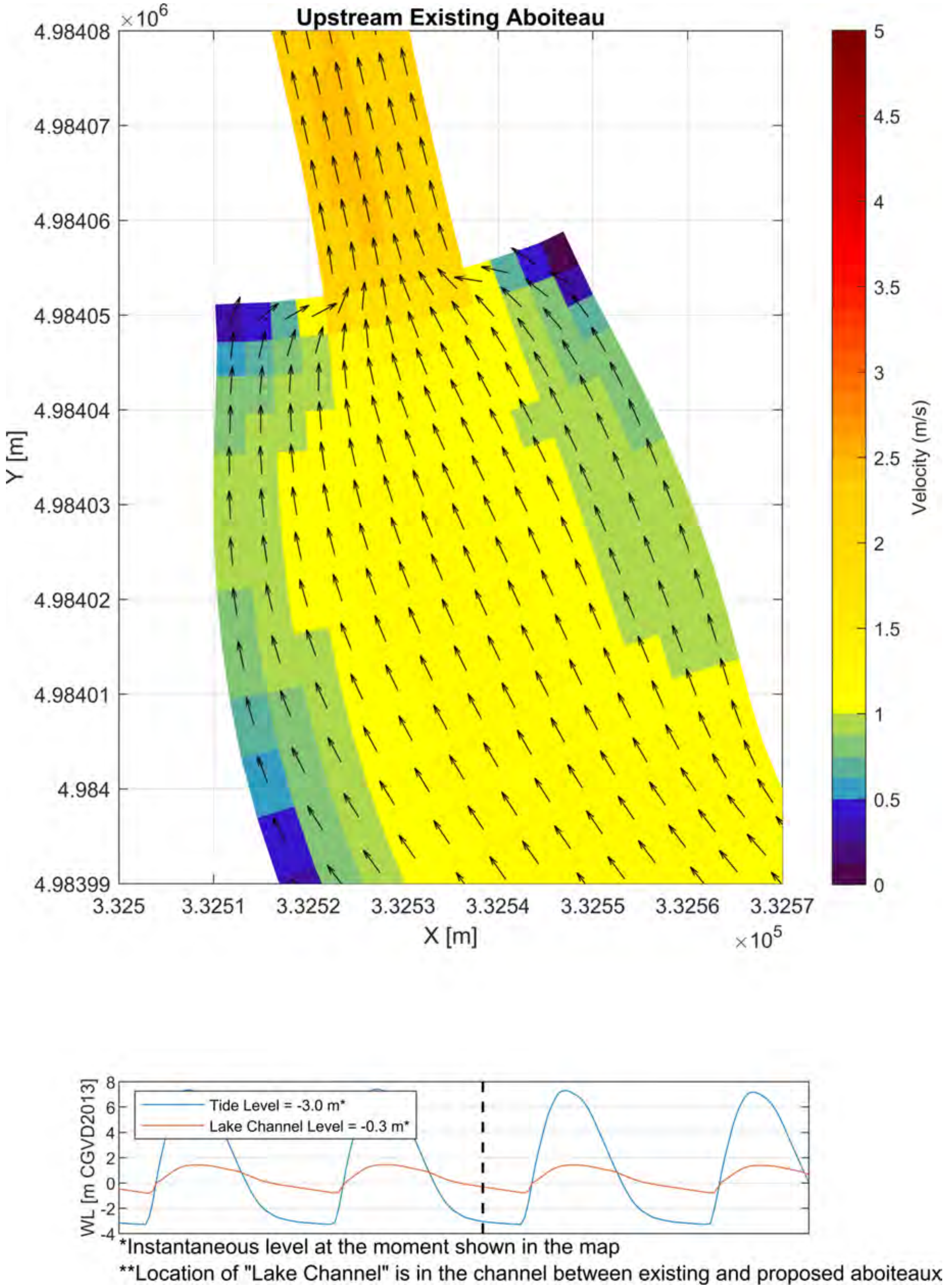


Figure A2.12: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Upstream Existing Aboiteau.

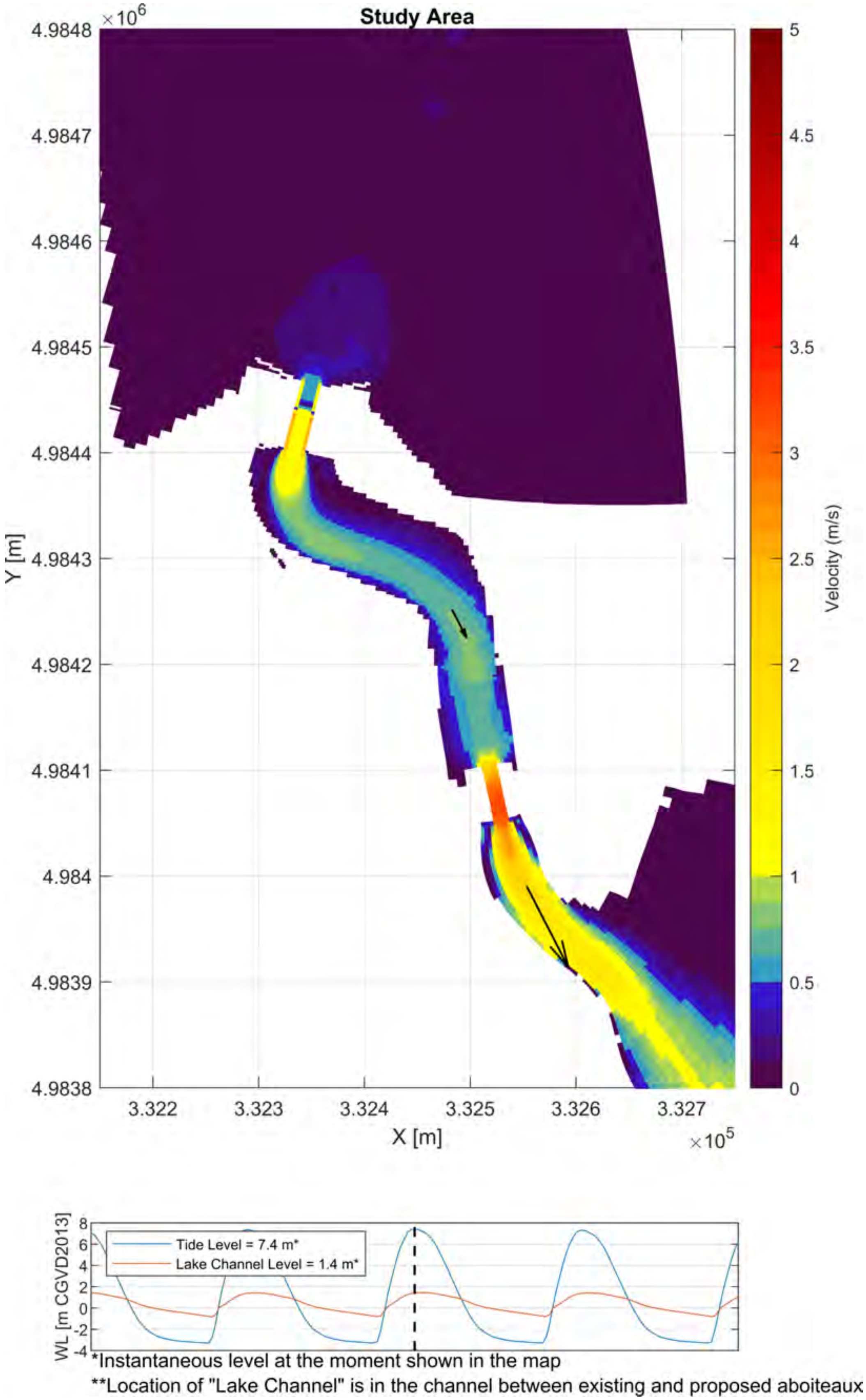
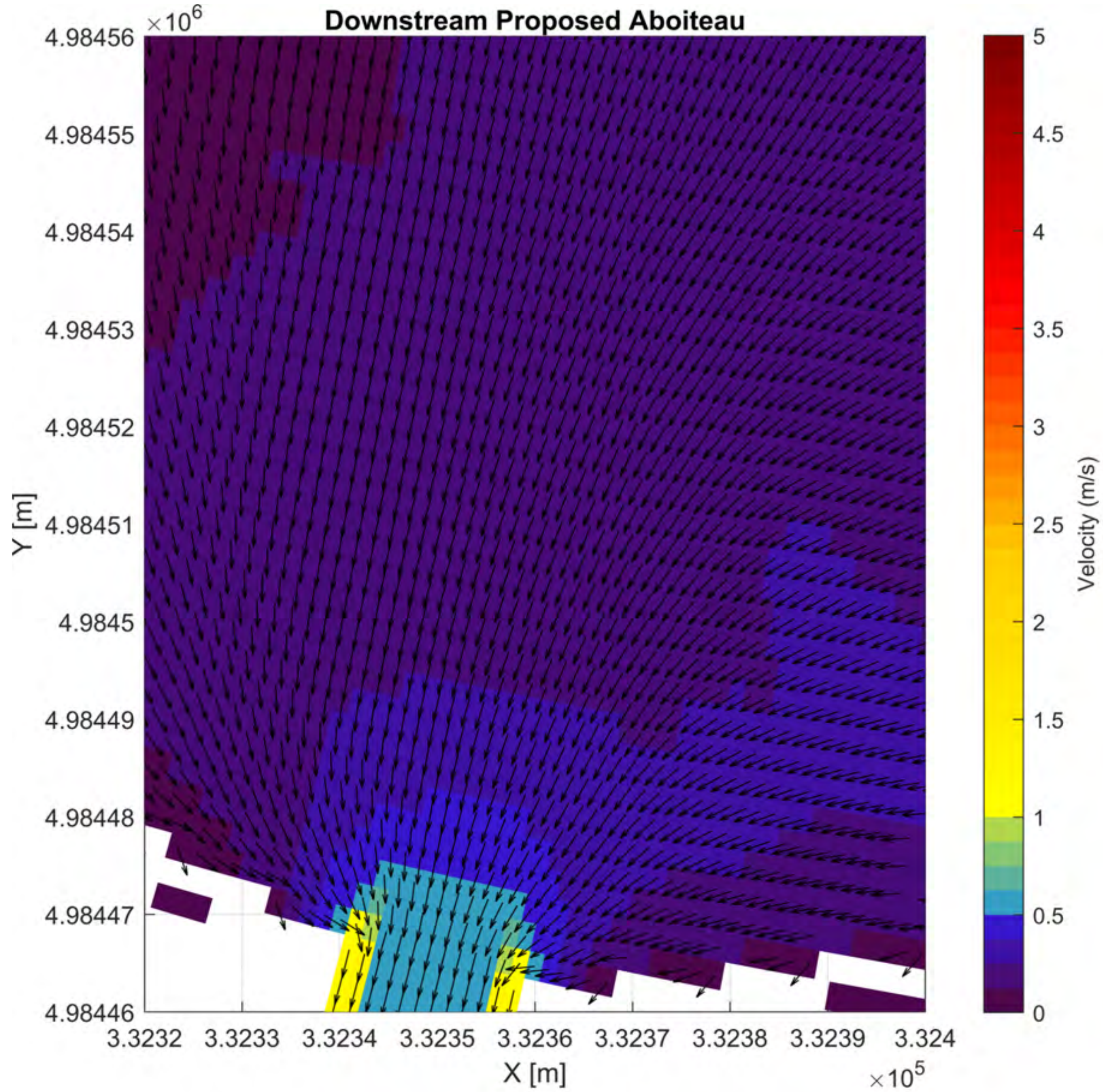


Figure A2.13: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Overall Study Area.



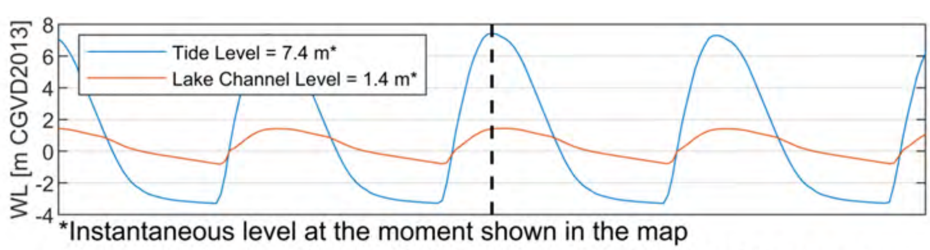
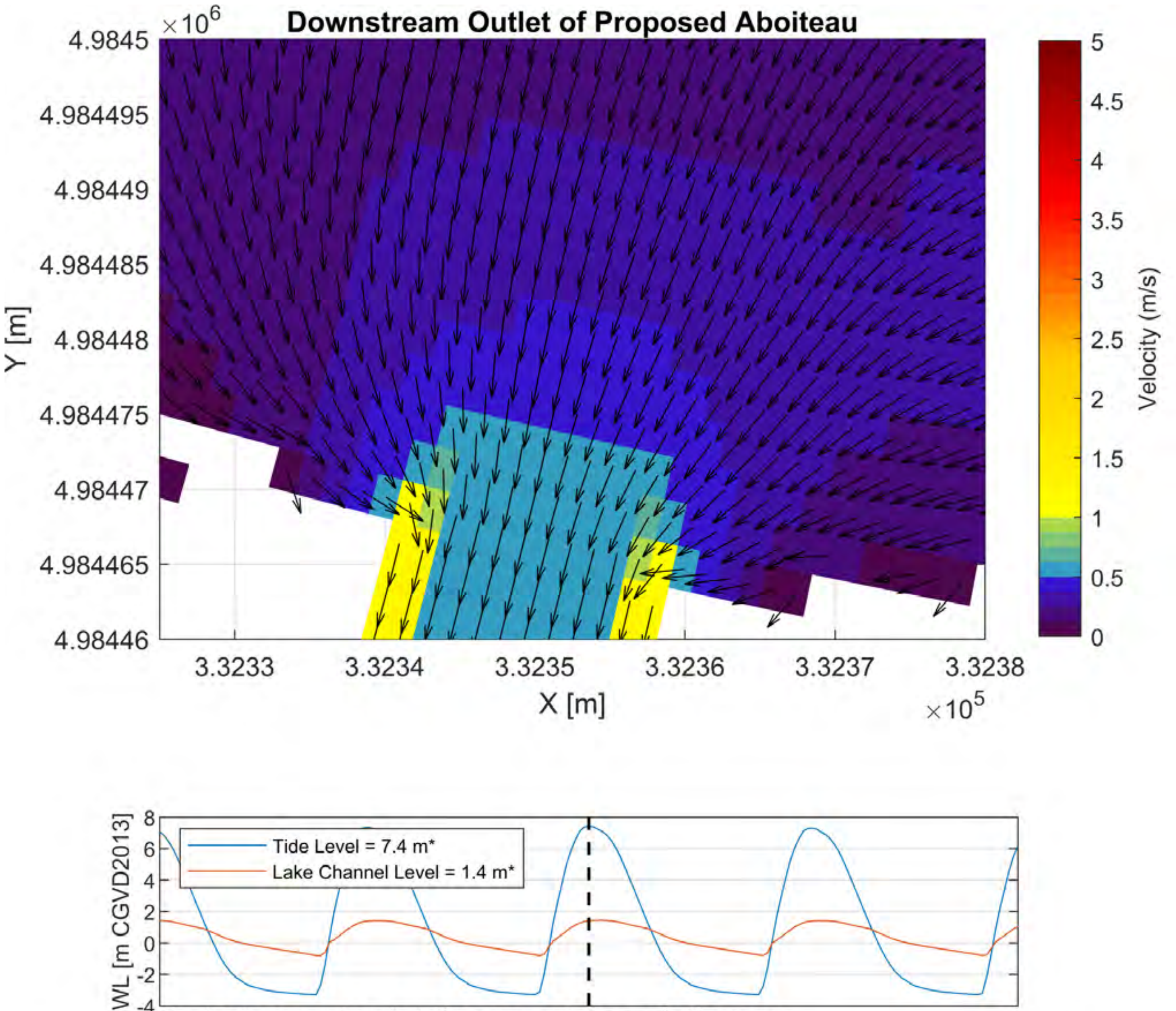


Figure A2.14: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Downstream Proposed Aboiteau.



*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A2.15: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Downstream Outlet of Proposed Aboiteau.

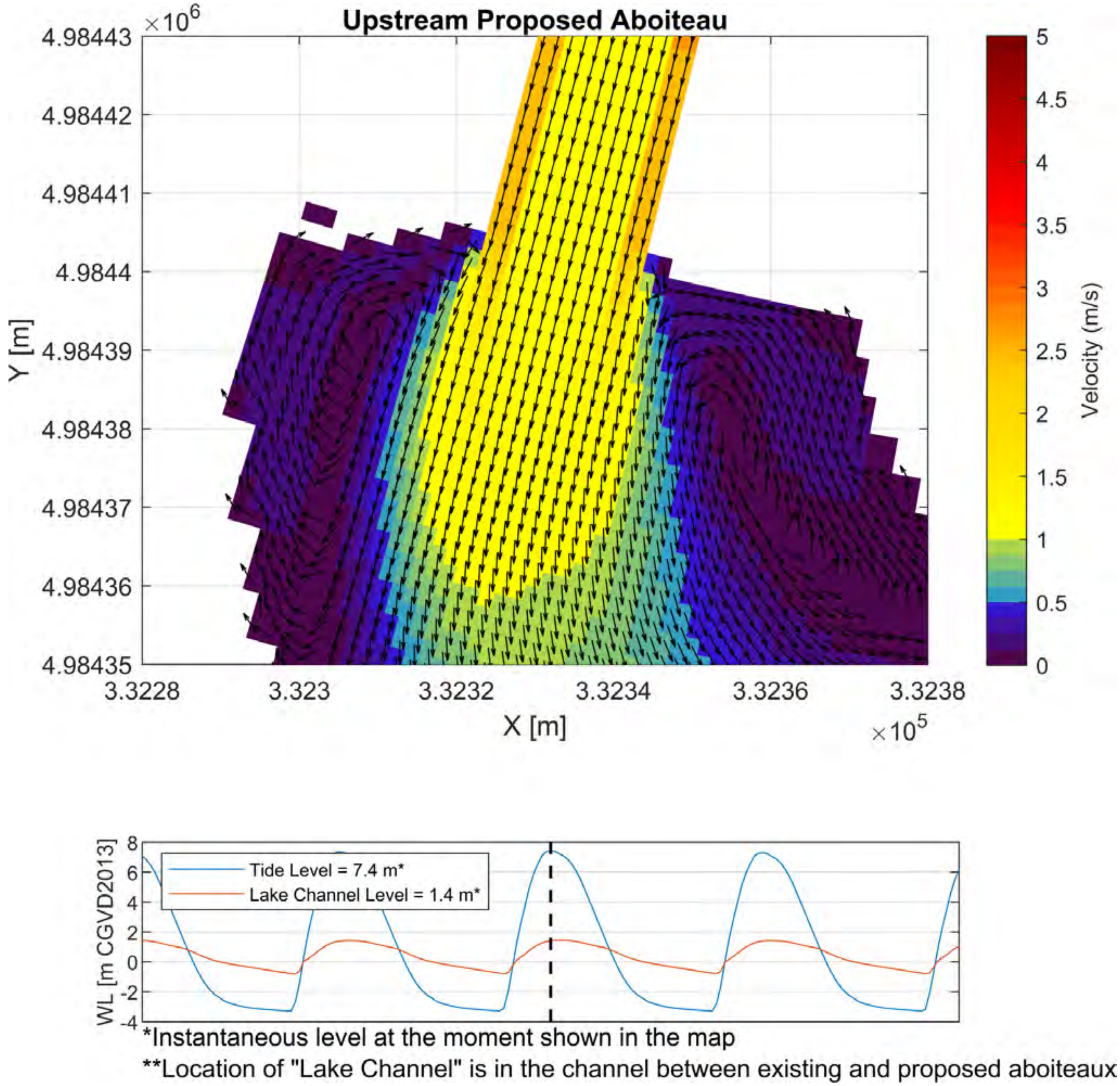
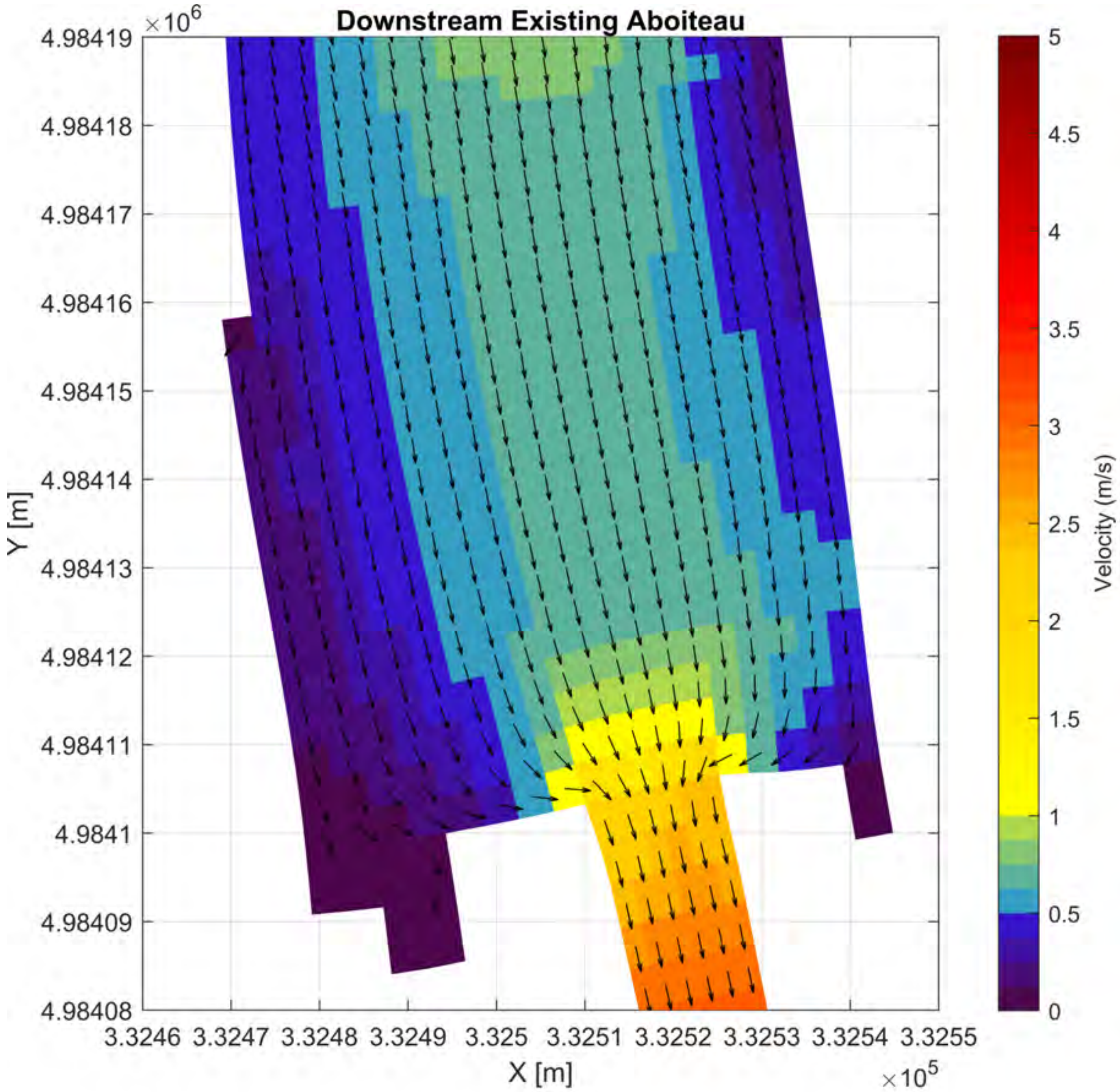
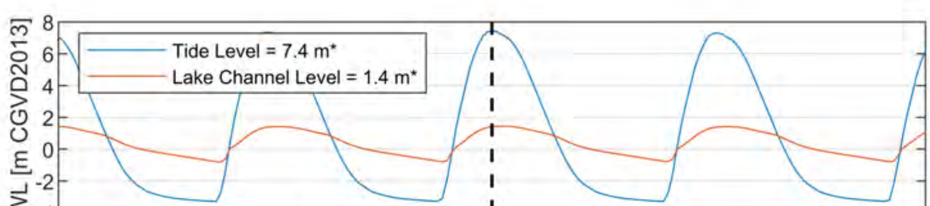


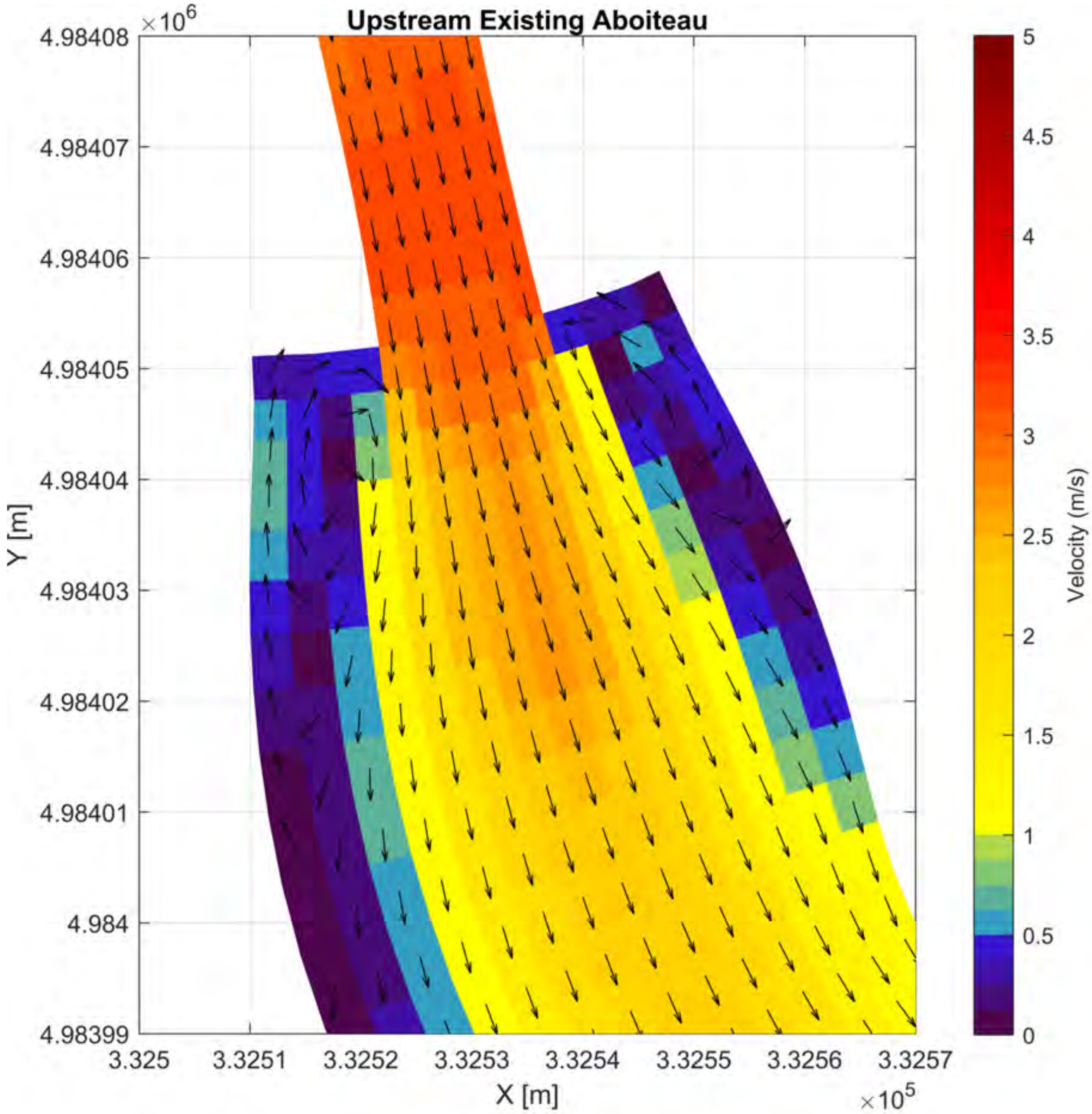
Figure A2.16: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Upstream Proposed Aboiteau.





*Instantaneous level at the moment shown in the map
**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A2.17: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Downstream Existing Aboiteau.



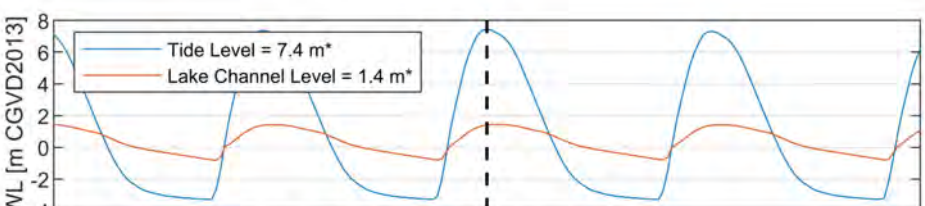


Figure A2.18: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Upstream Existing Aboiteau.

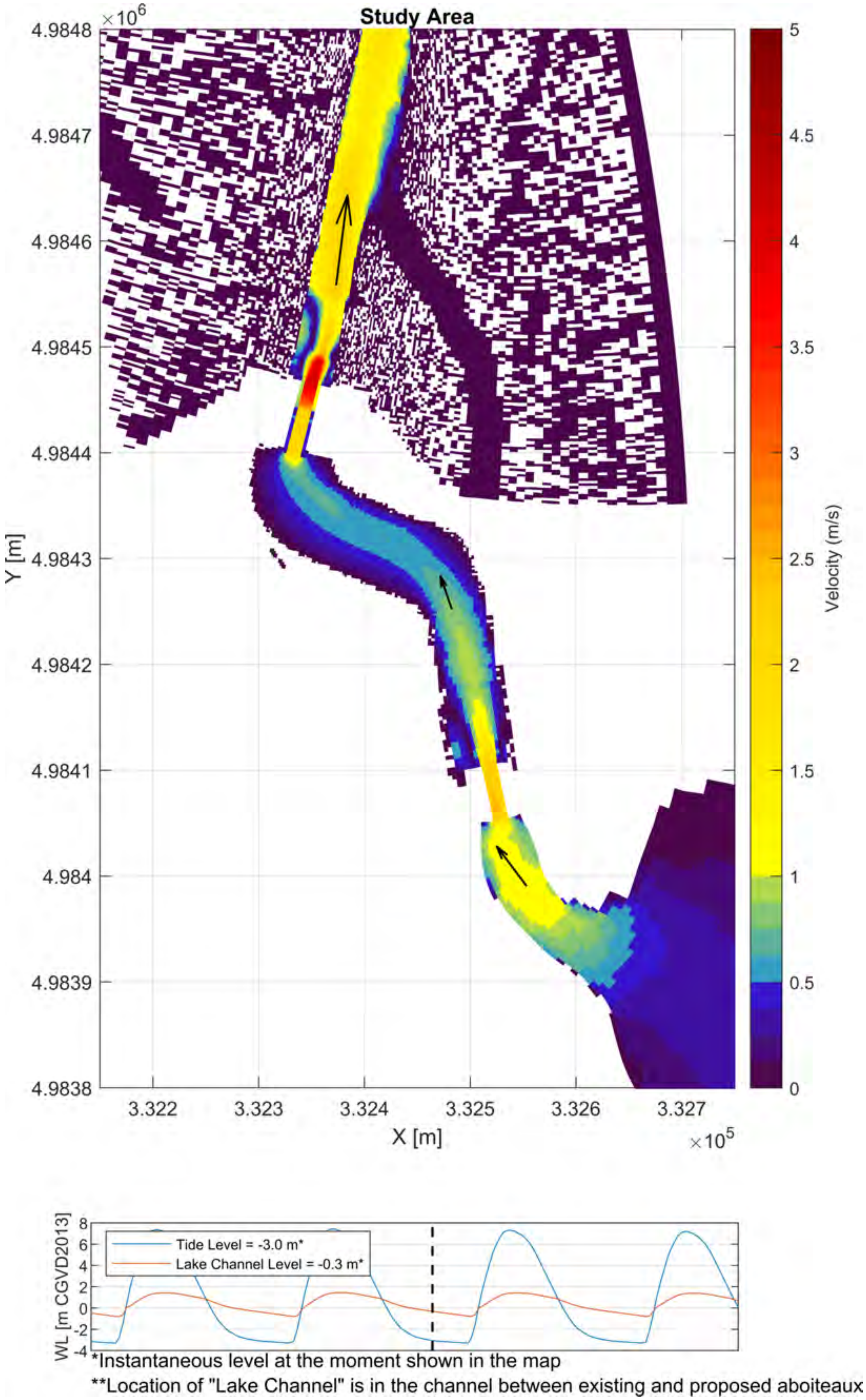
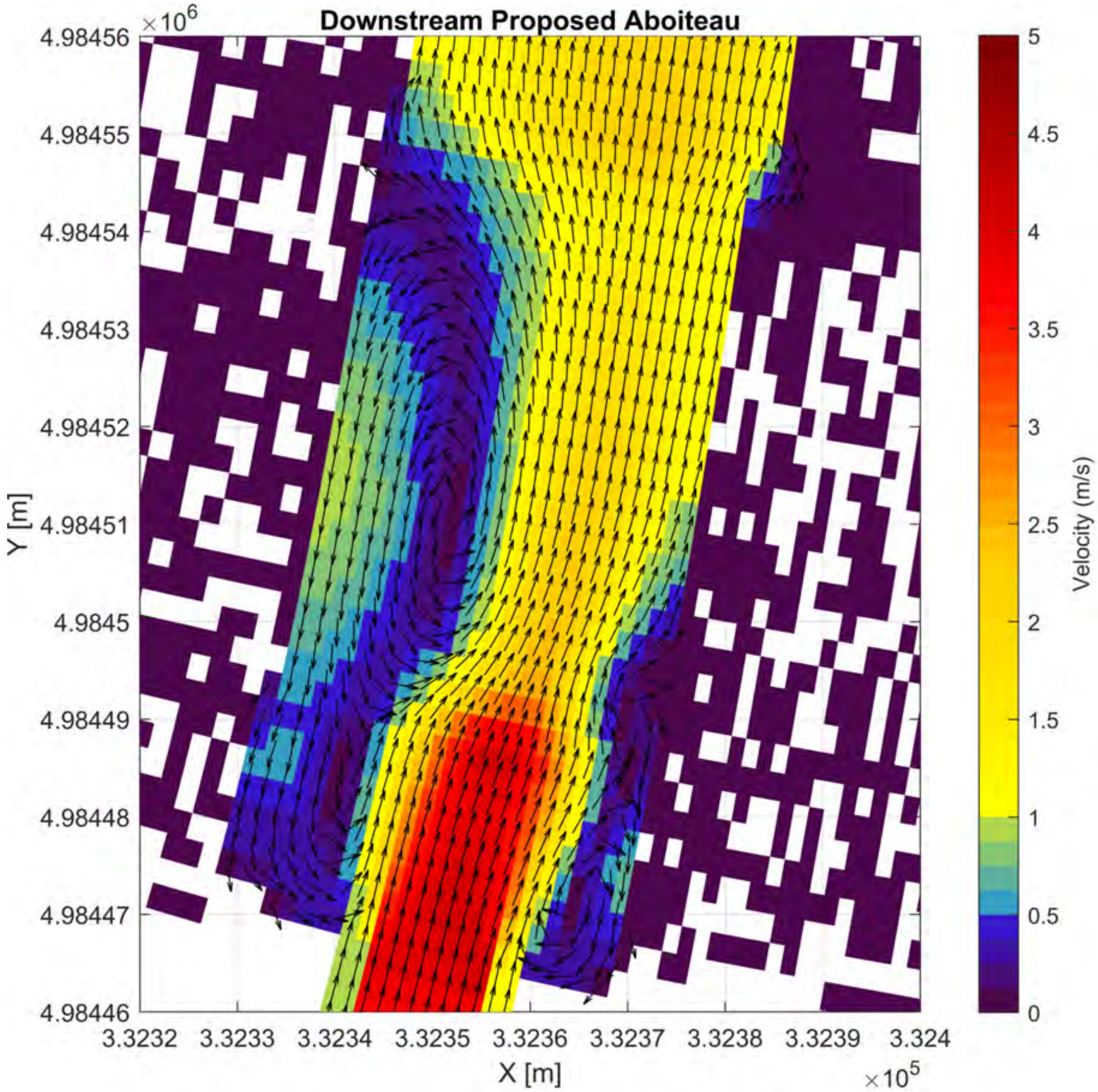
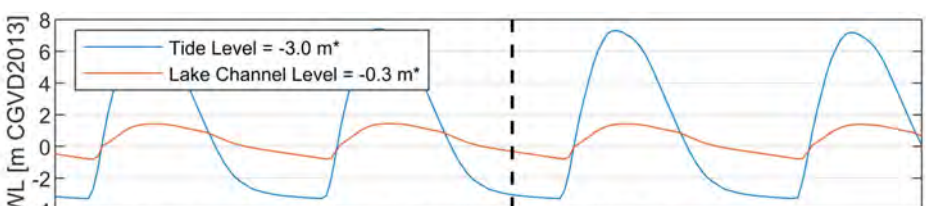


Figure A2.19: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Overall Study Area.

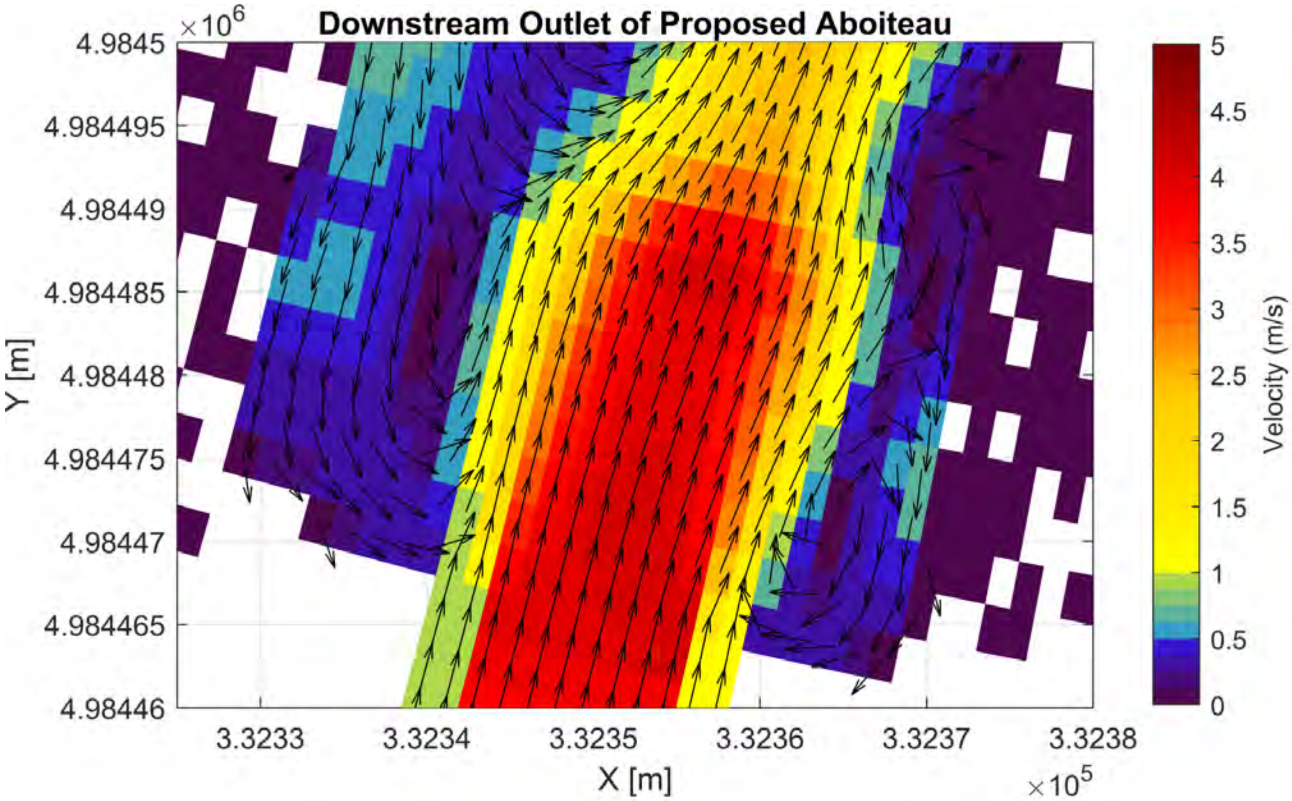




*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A2.20: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Downstream Proposed Aboiteau.



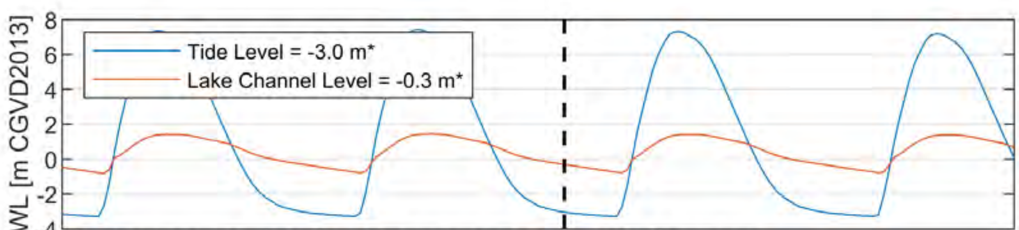


Figure A2.21: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Downstream Outlet of Proposed Aboiteau.

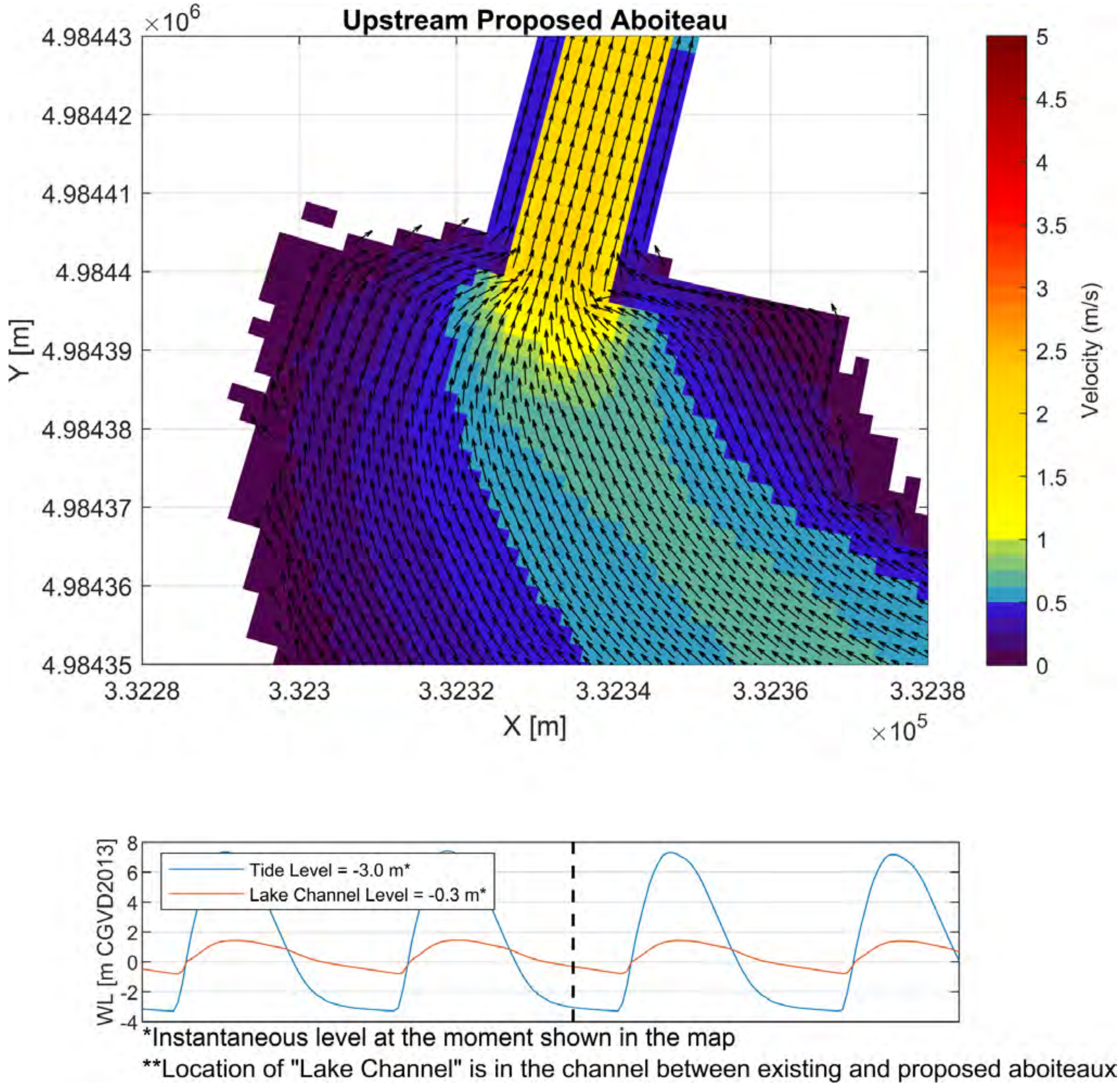
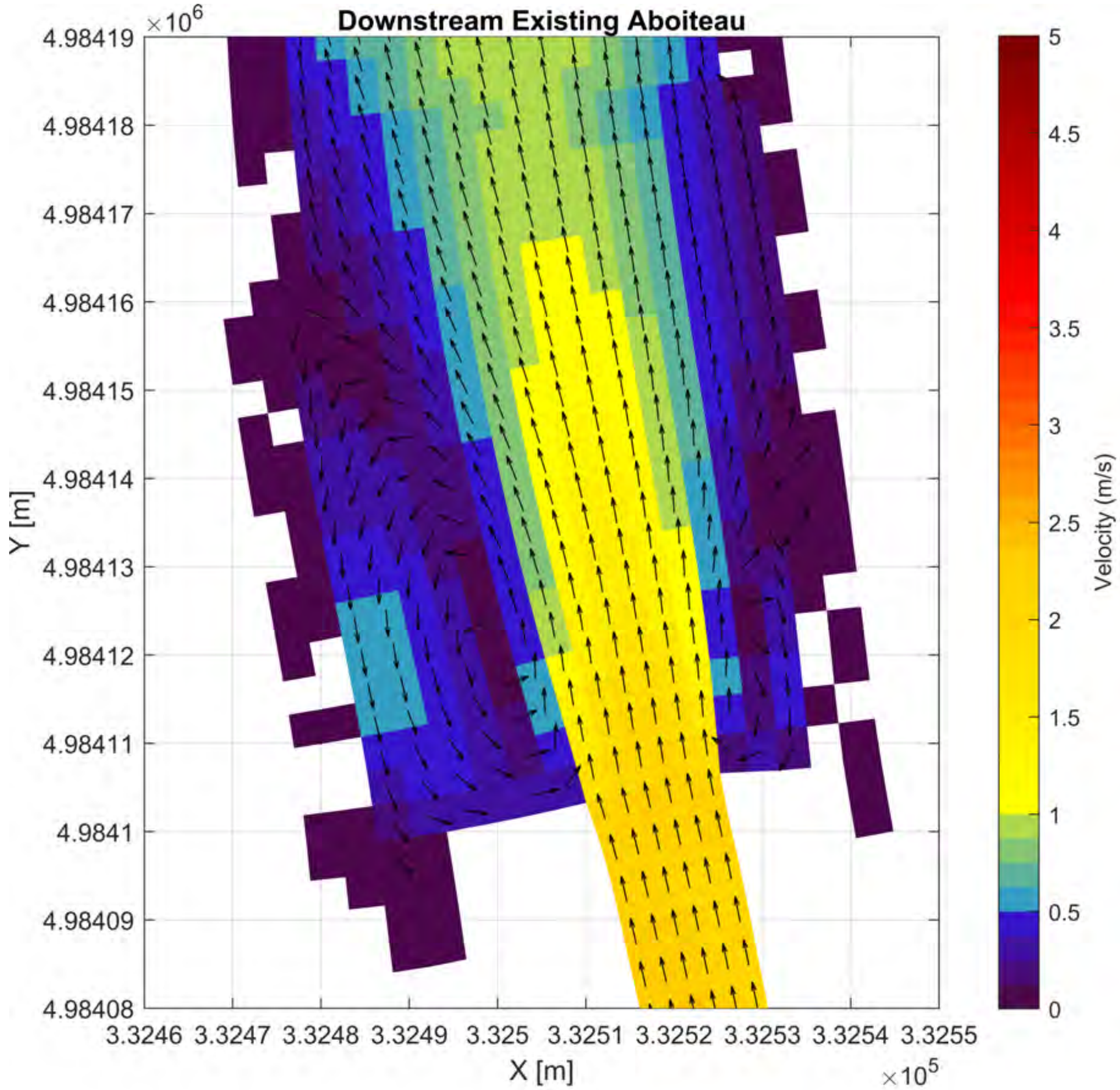
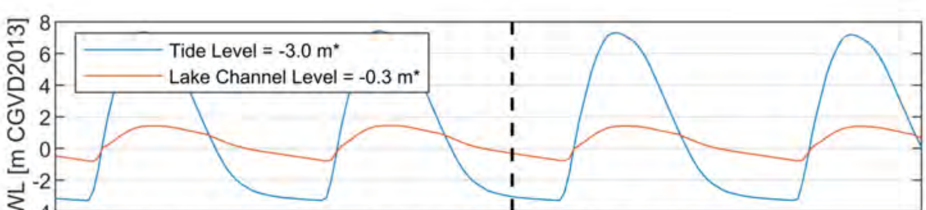


Figure A2.22: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Upstream Proposed Aboiteau.

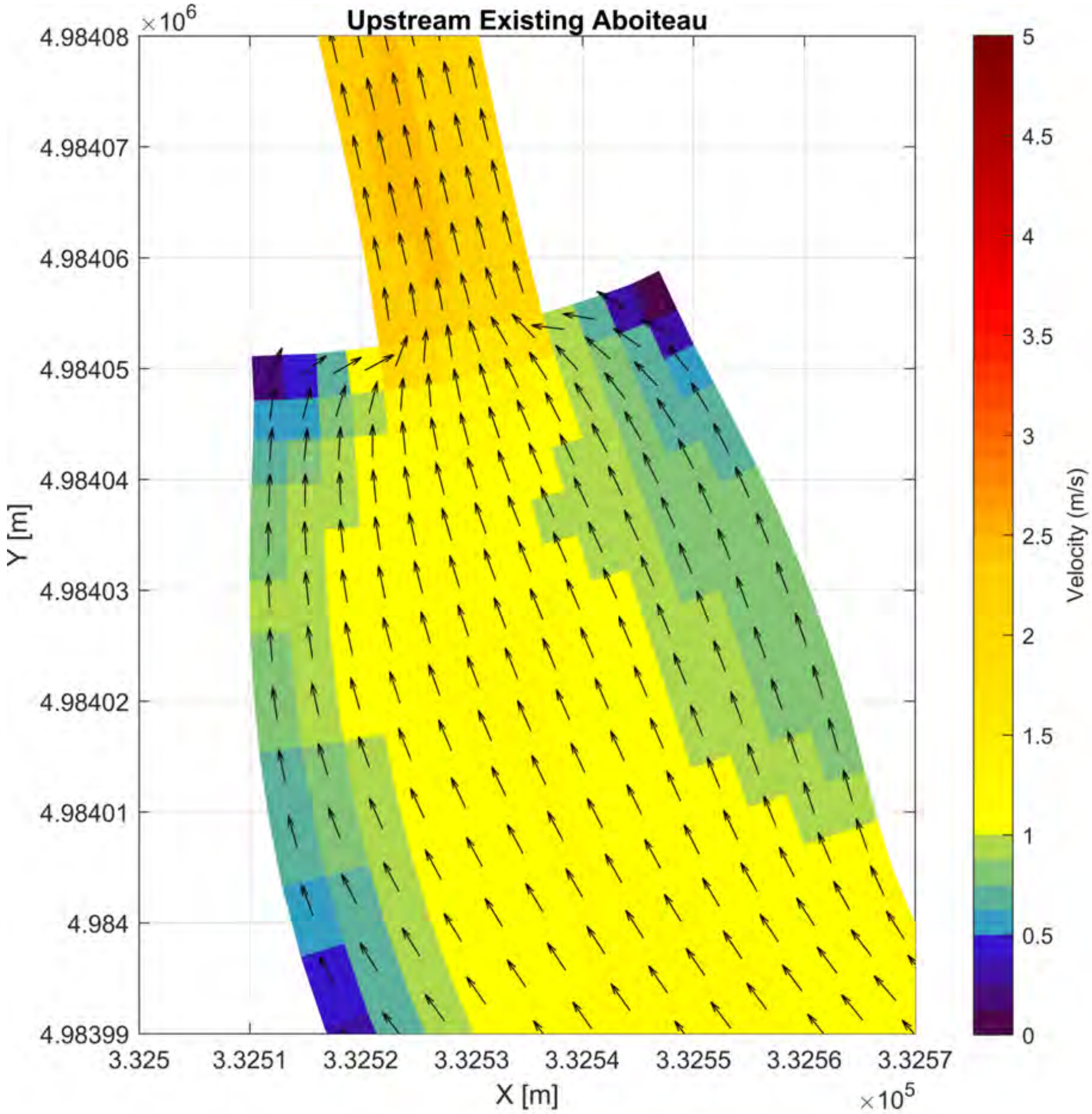




*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A2.23: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Downstream Existing Aboiteau.



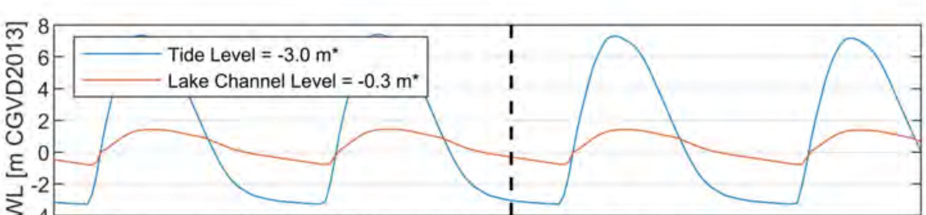


Figure A2.24: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Upstream Existing Aboiteau.

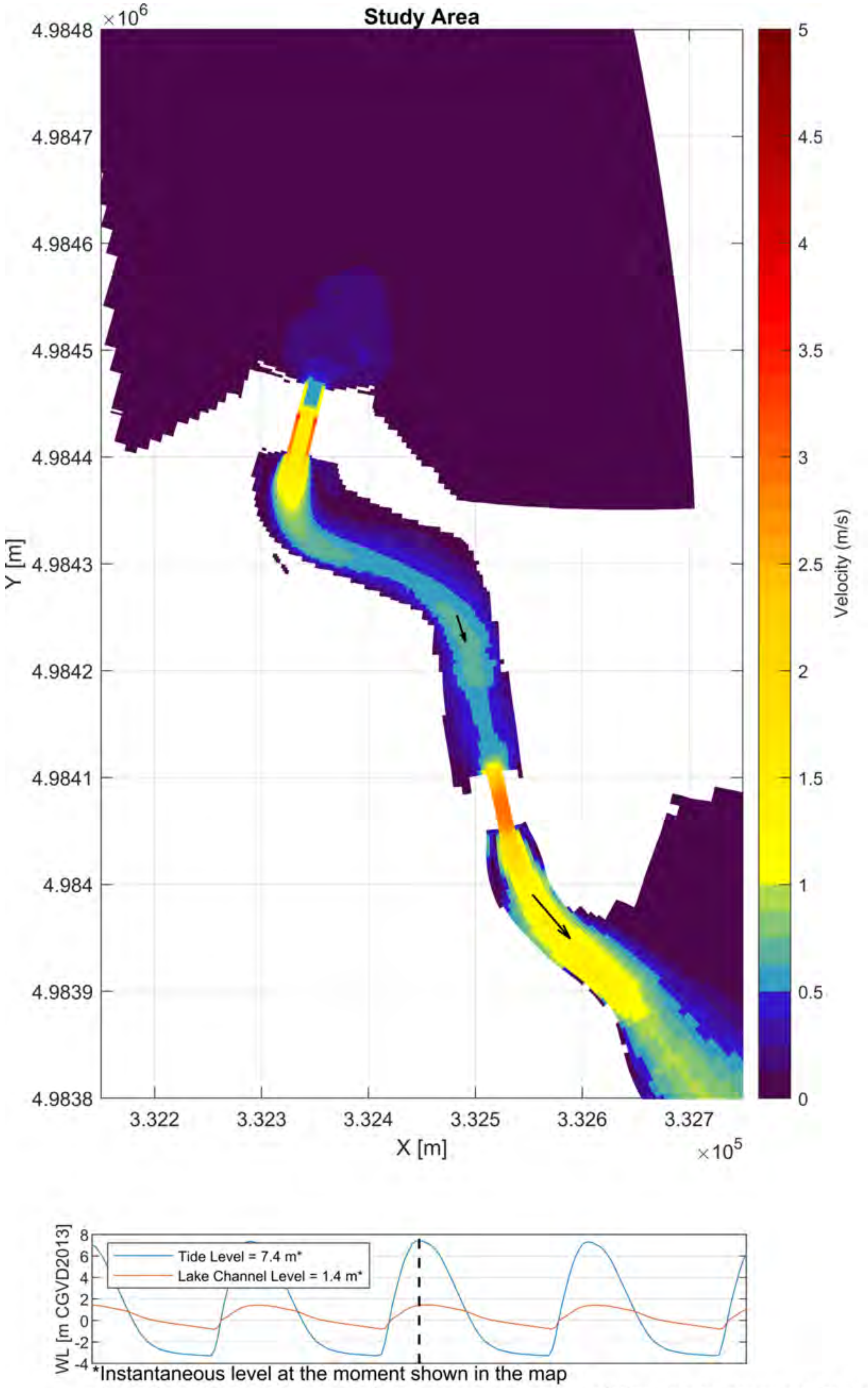


Figure A2.25: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Overall Study Area.

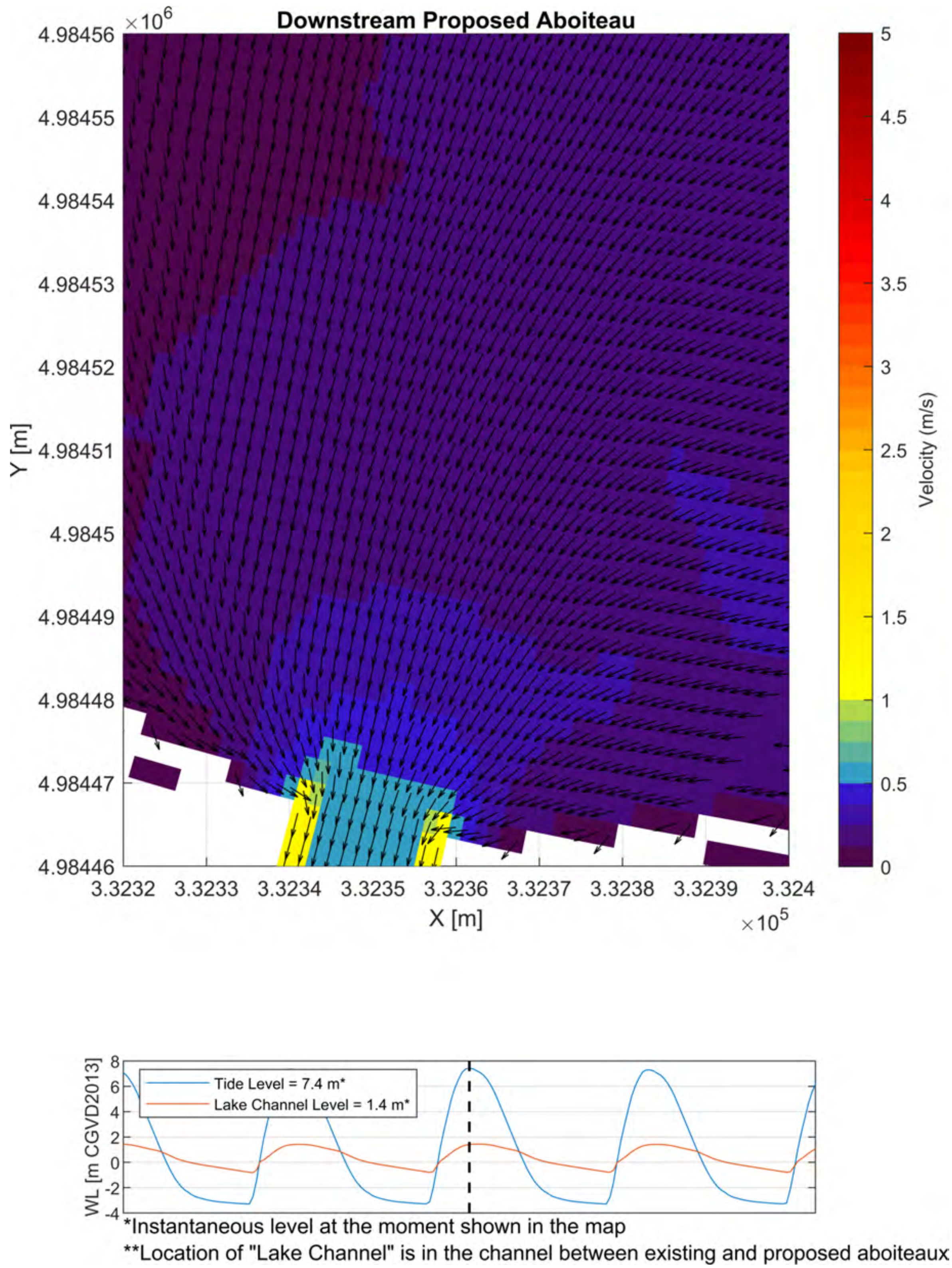


Figure A2.26: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Downstream Proposed Aboiteau.

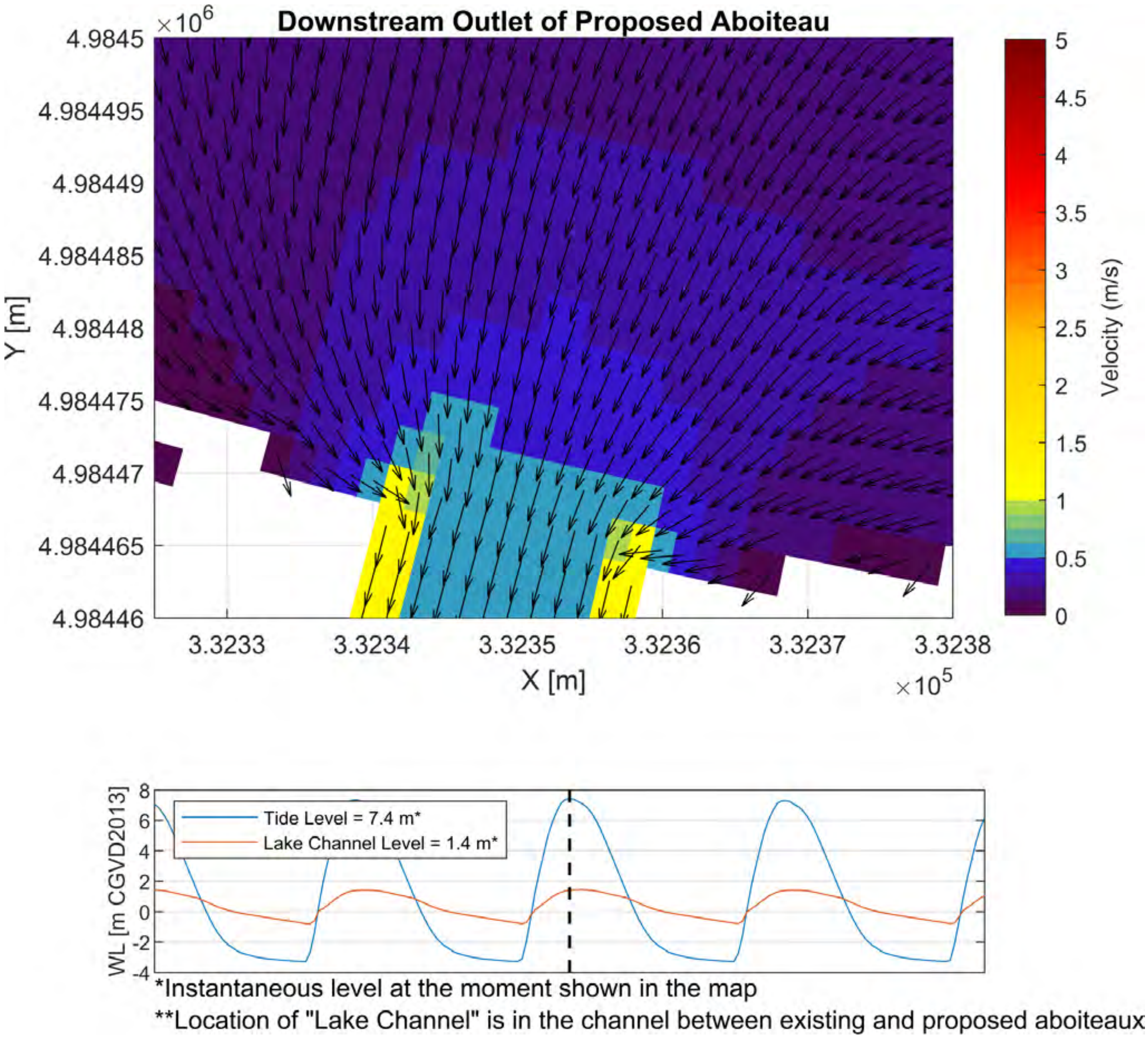


Figure A2.27: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Downstream Outlet of Proposed Aboiteau.

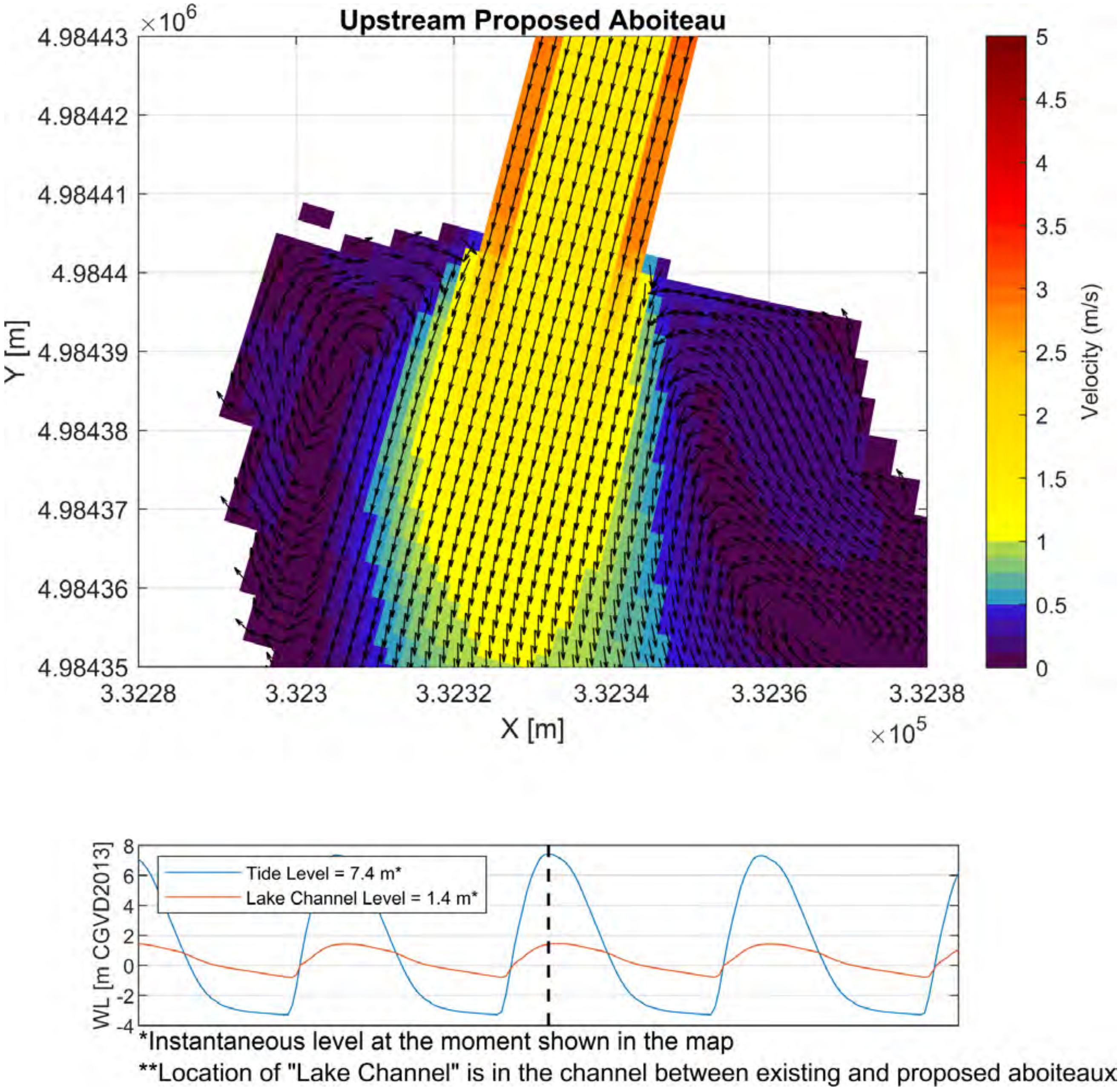
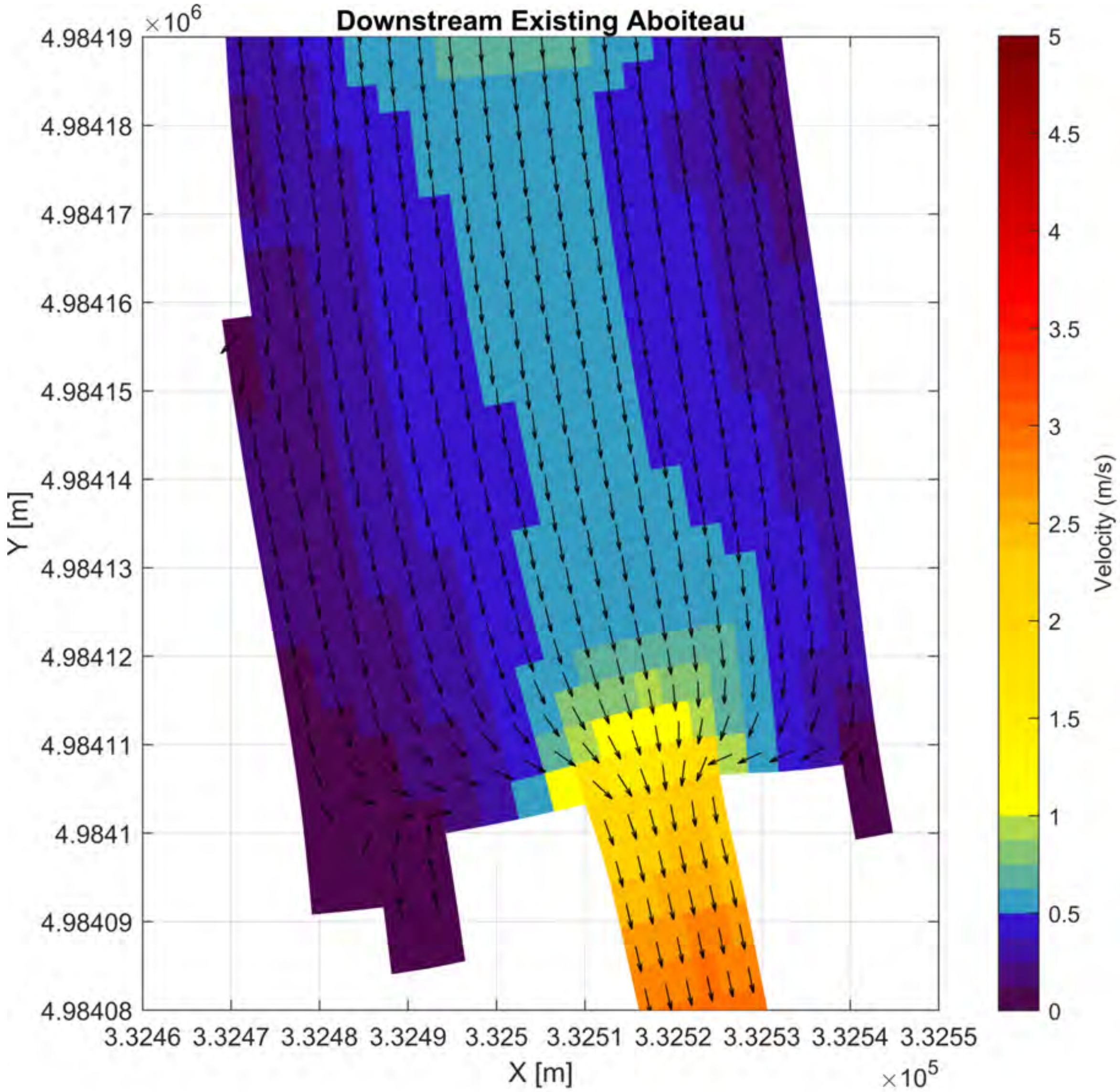


Figure A2.28: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Upstream Proposed Aboiteau.



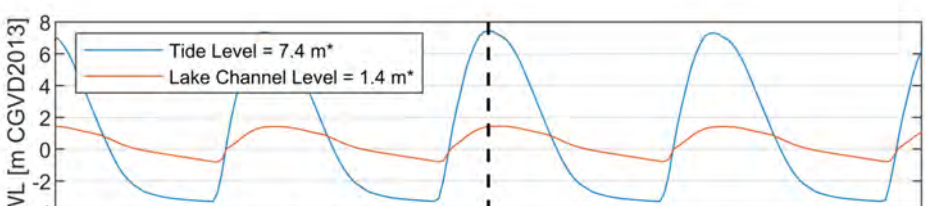


Figure A2.29: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Downstream Existing Aboiteau.

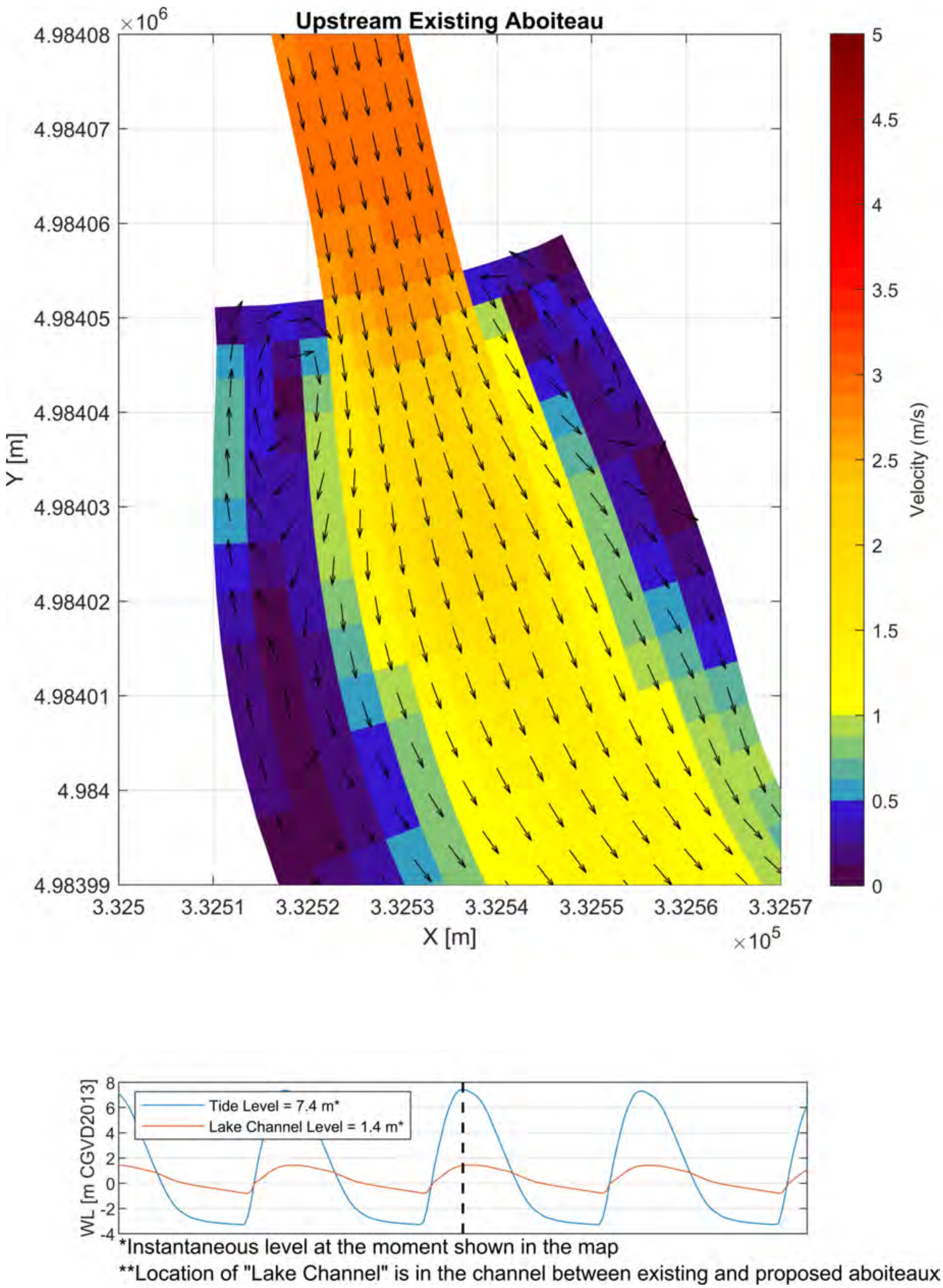


Figure A2.30: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Upstream Existing Aboiteau.

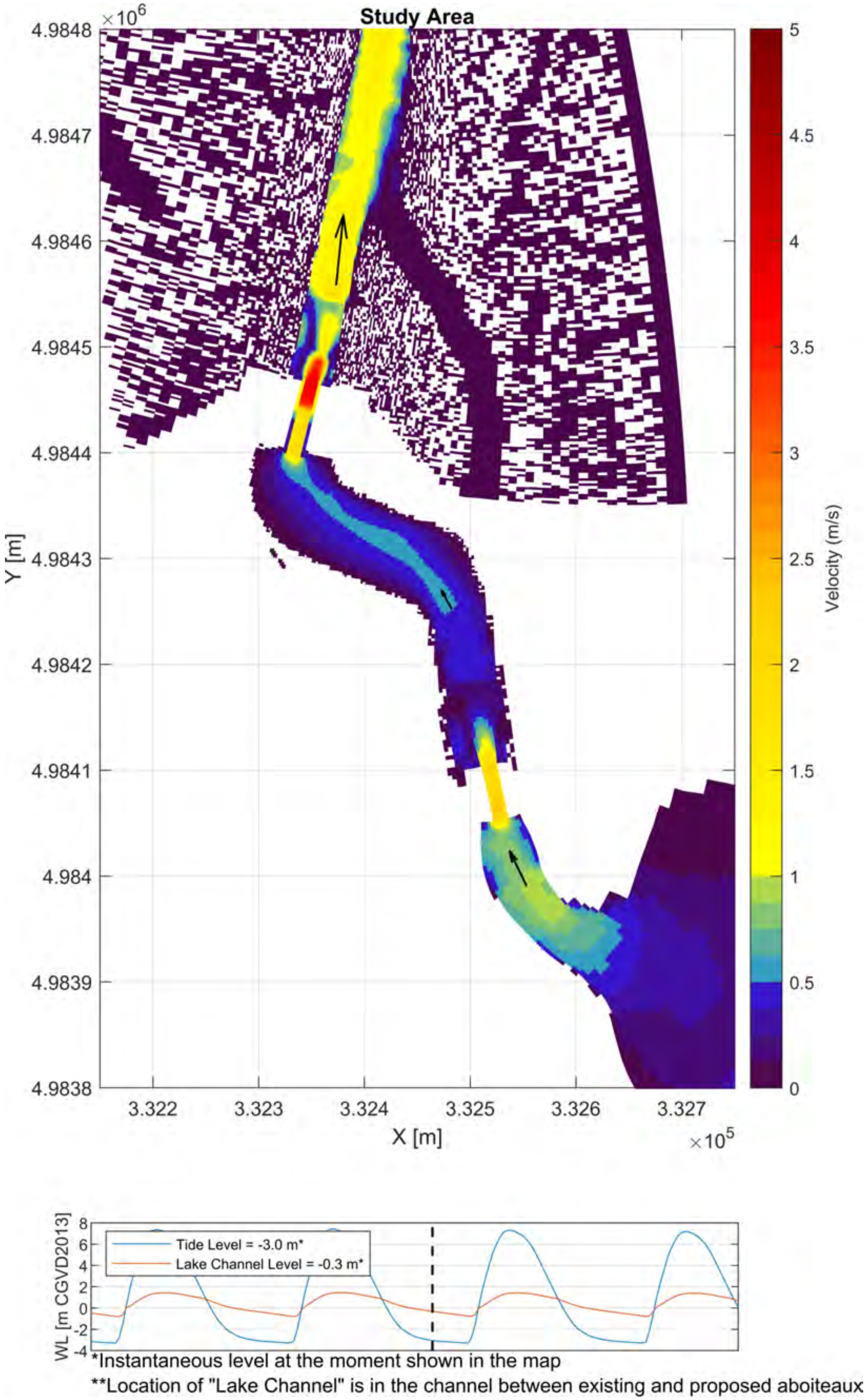
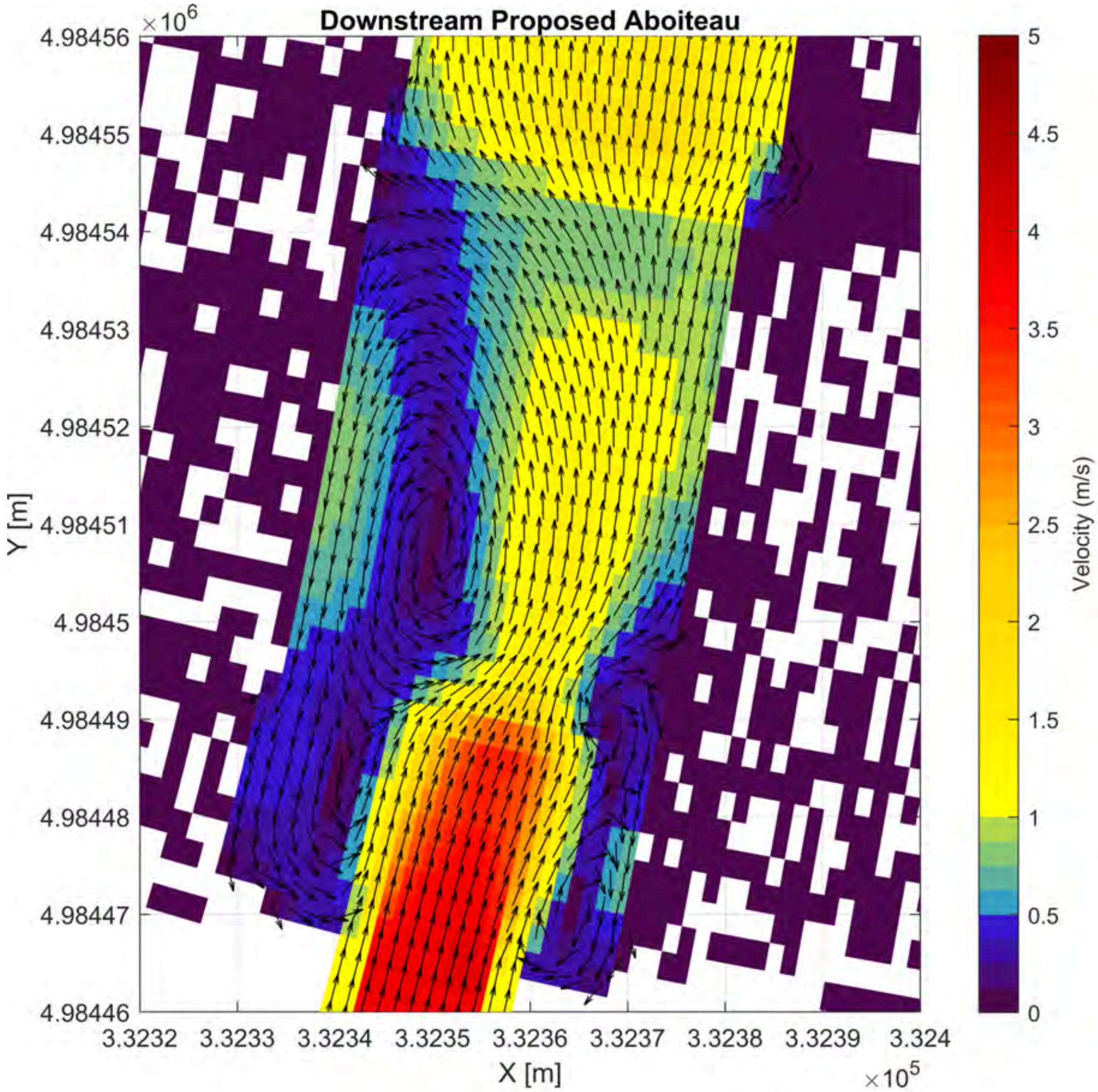
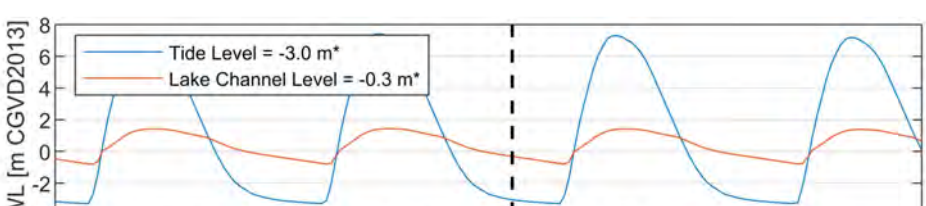


Figure A2.31: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Overall Study Area.





*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A2.32: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Downstream Proposed Aboiteau.

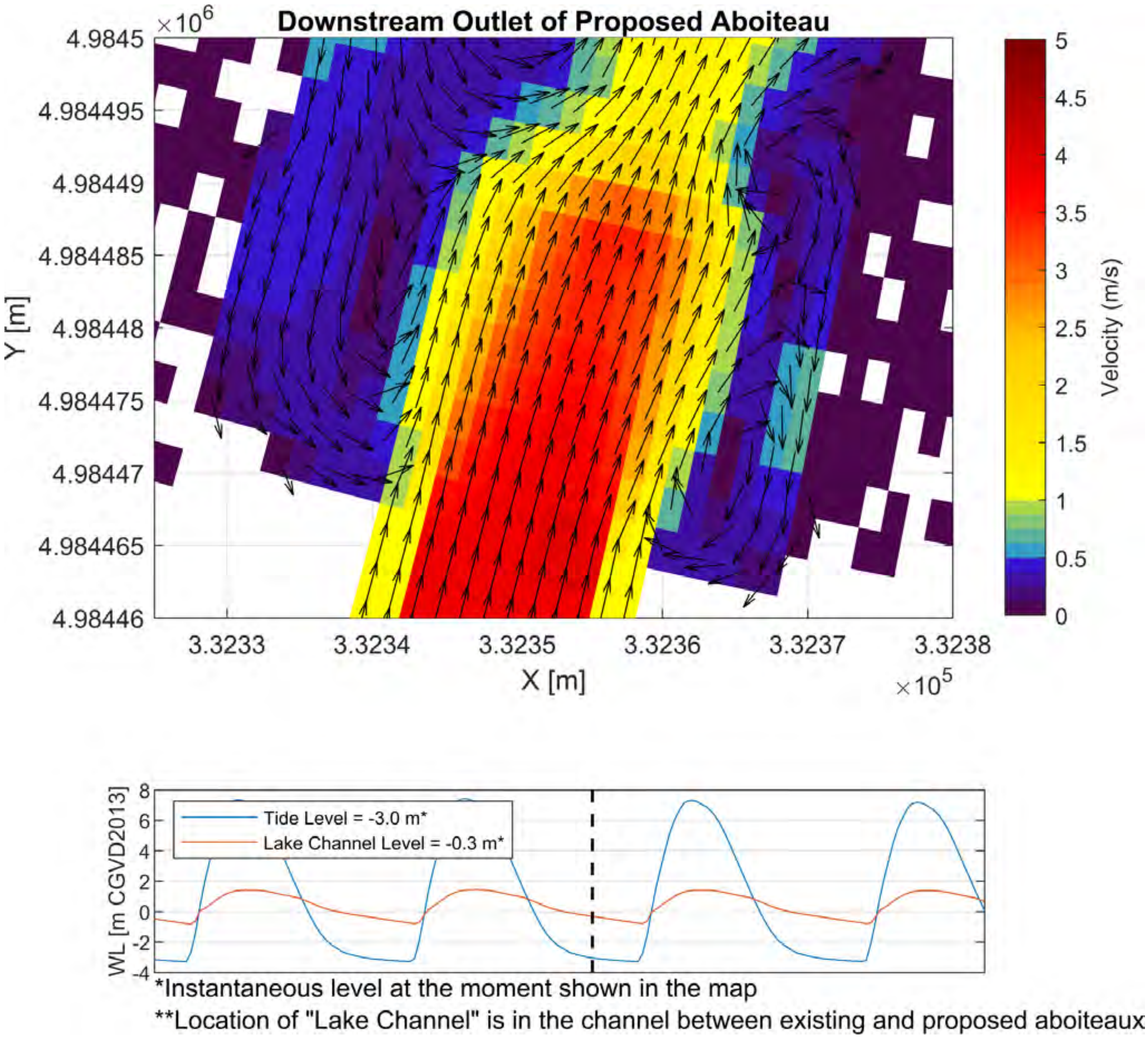


Figure A2.33: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Downstream Outlet of Proposed Aboiteau.

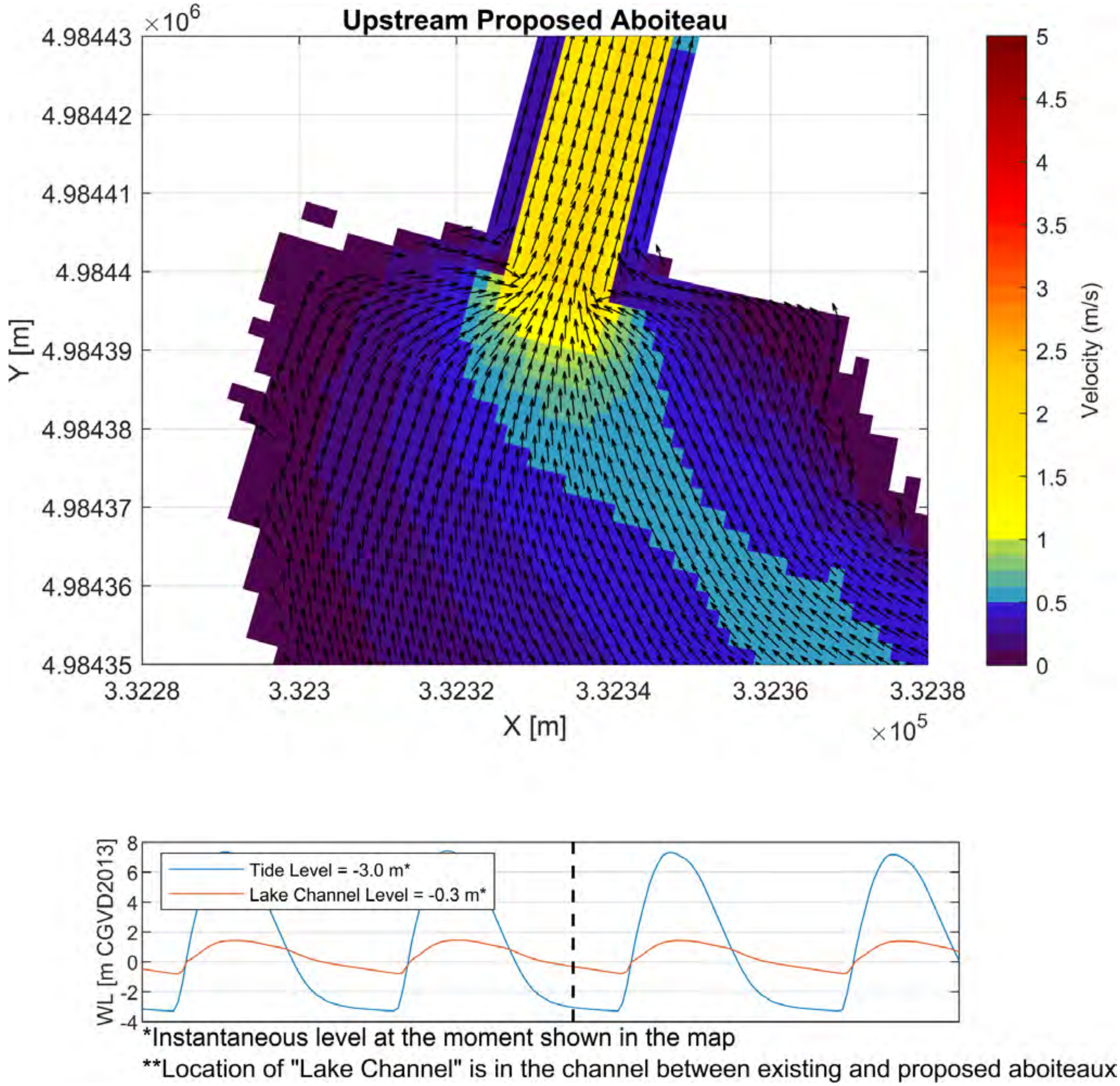
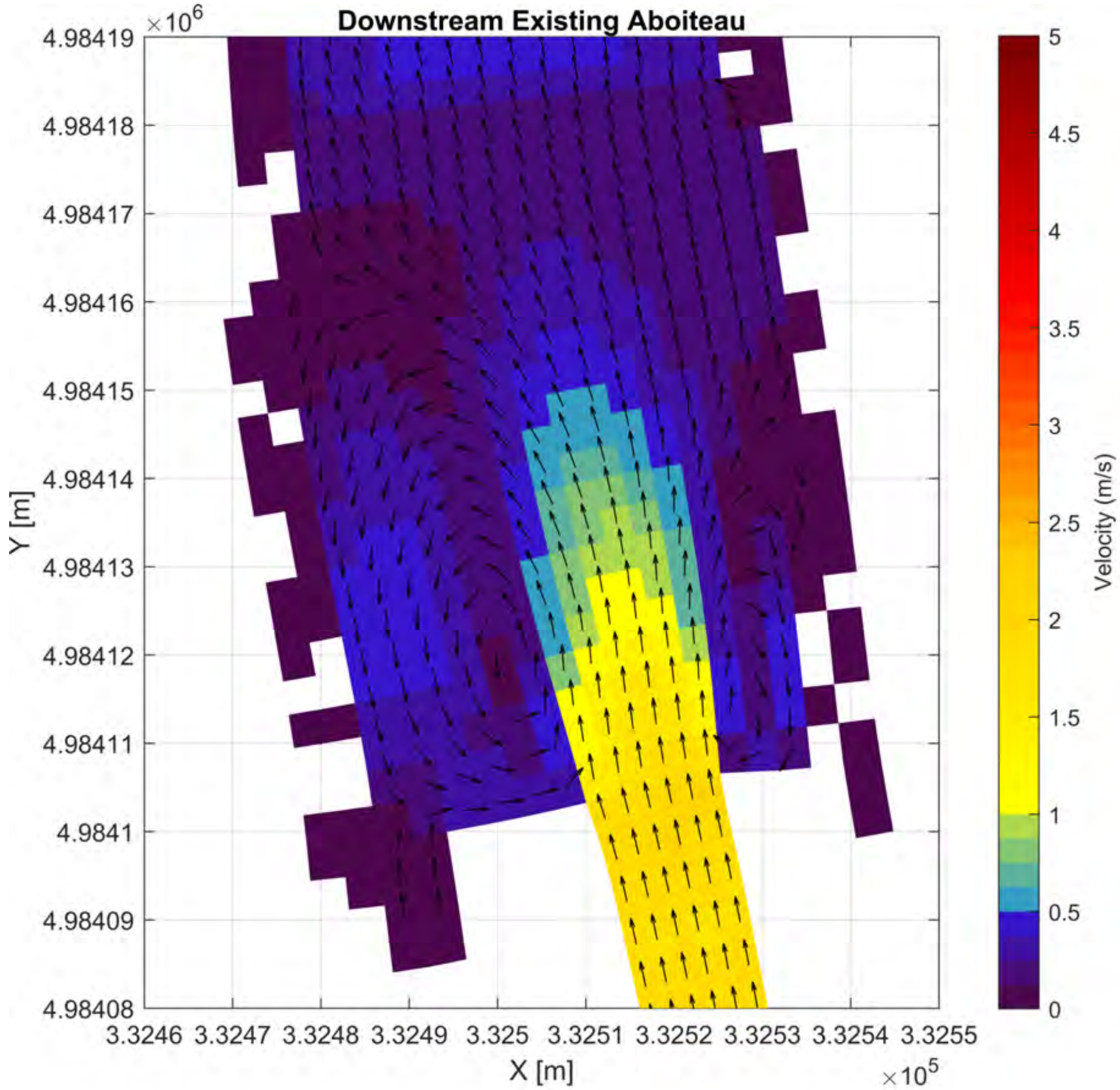
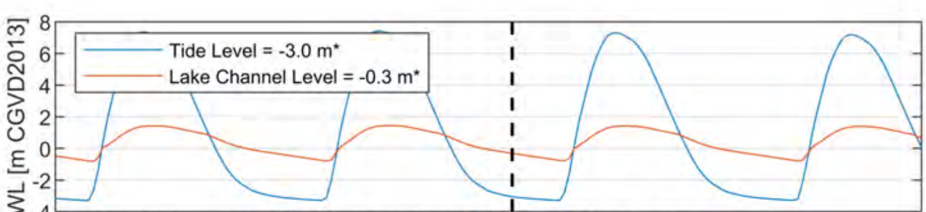


Figure A2.34: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Upstream Proposed Aboiteau.

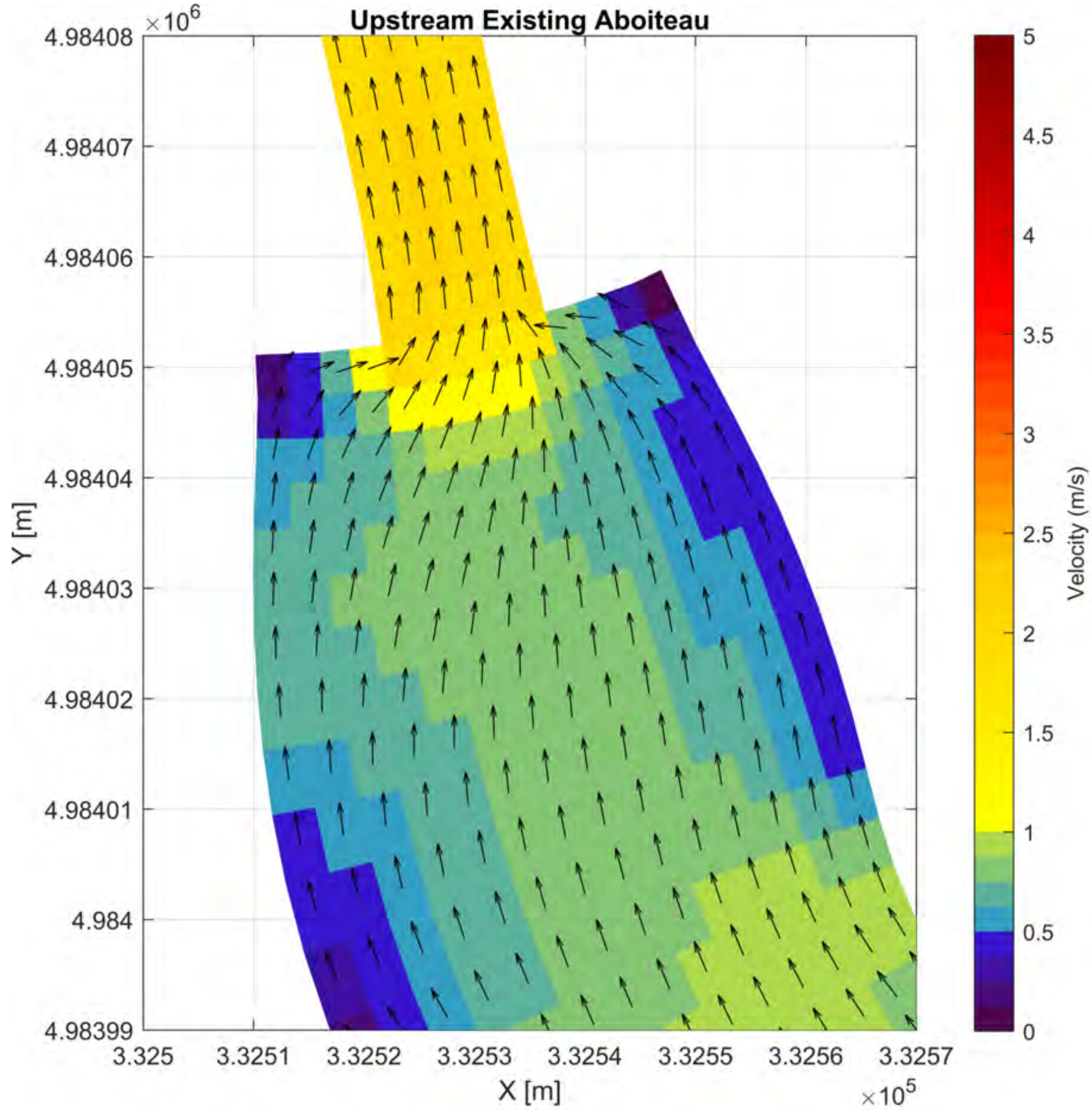


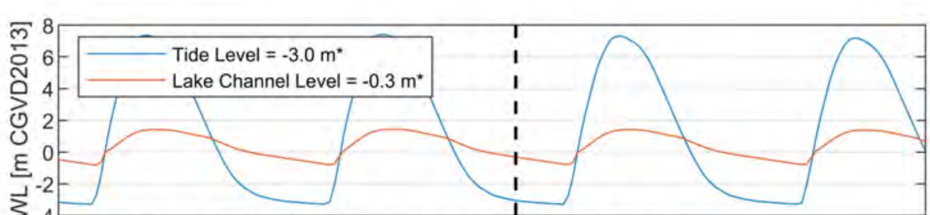


*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A2.35: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Downstream Existing Aboiteau.





*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A2.36: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Upstream Existing Aboiteau.

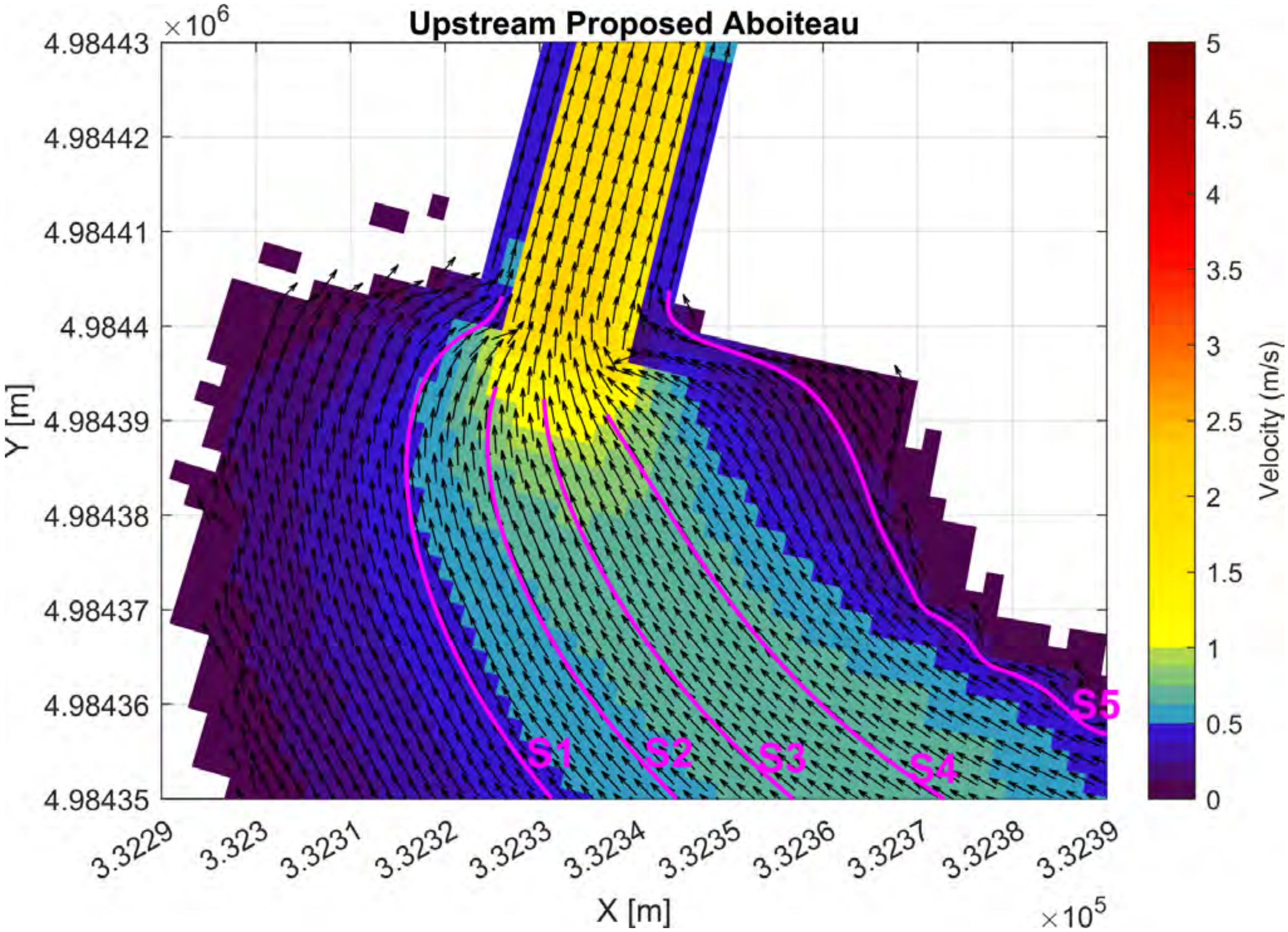


Figure A2.37: Location of Selected Streamlines - Velocities When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide).

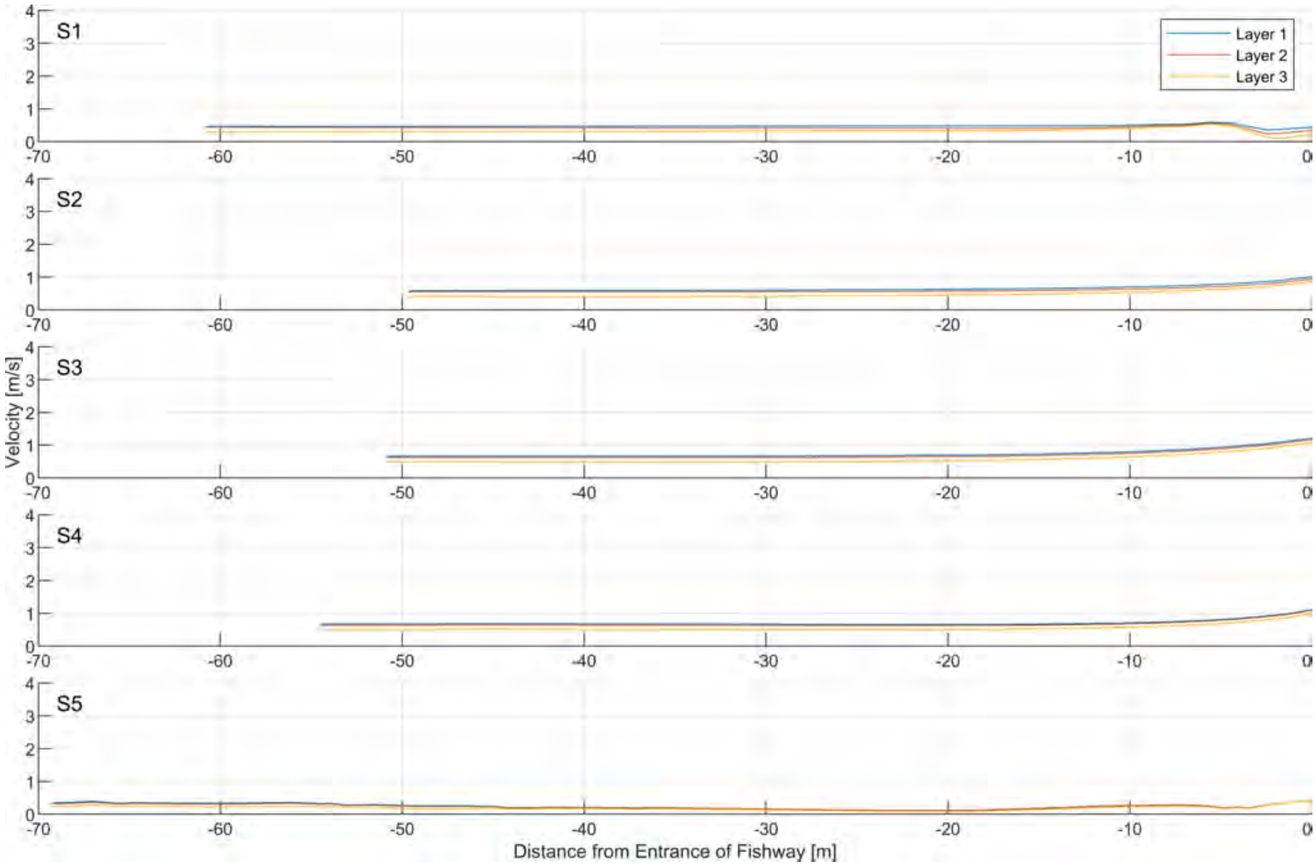


Figure A2.38: Velocity Along Streamlines - When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide).

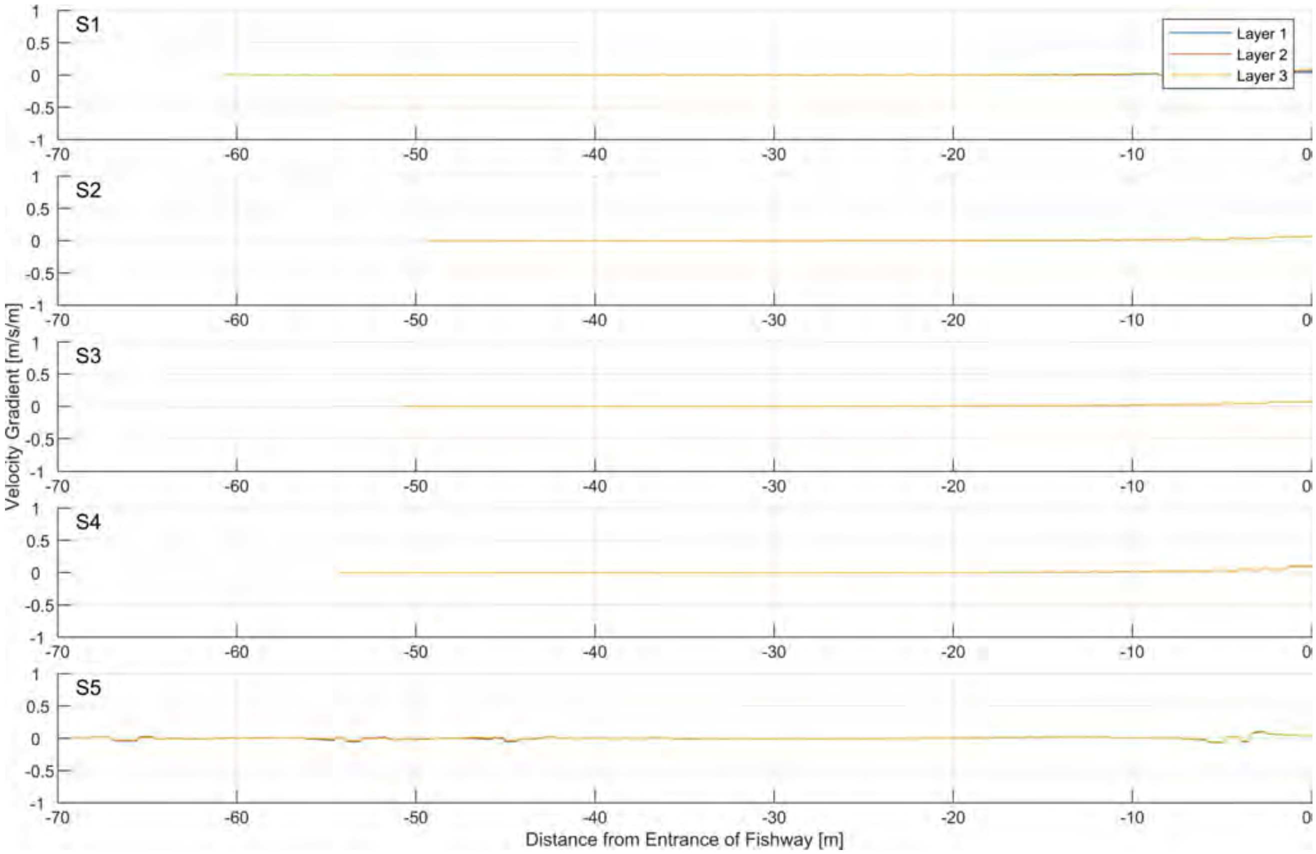


Figure A2.39: Velocity Gradient Along Streamlines - When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide).

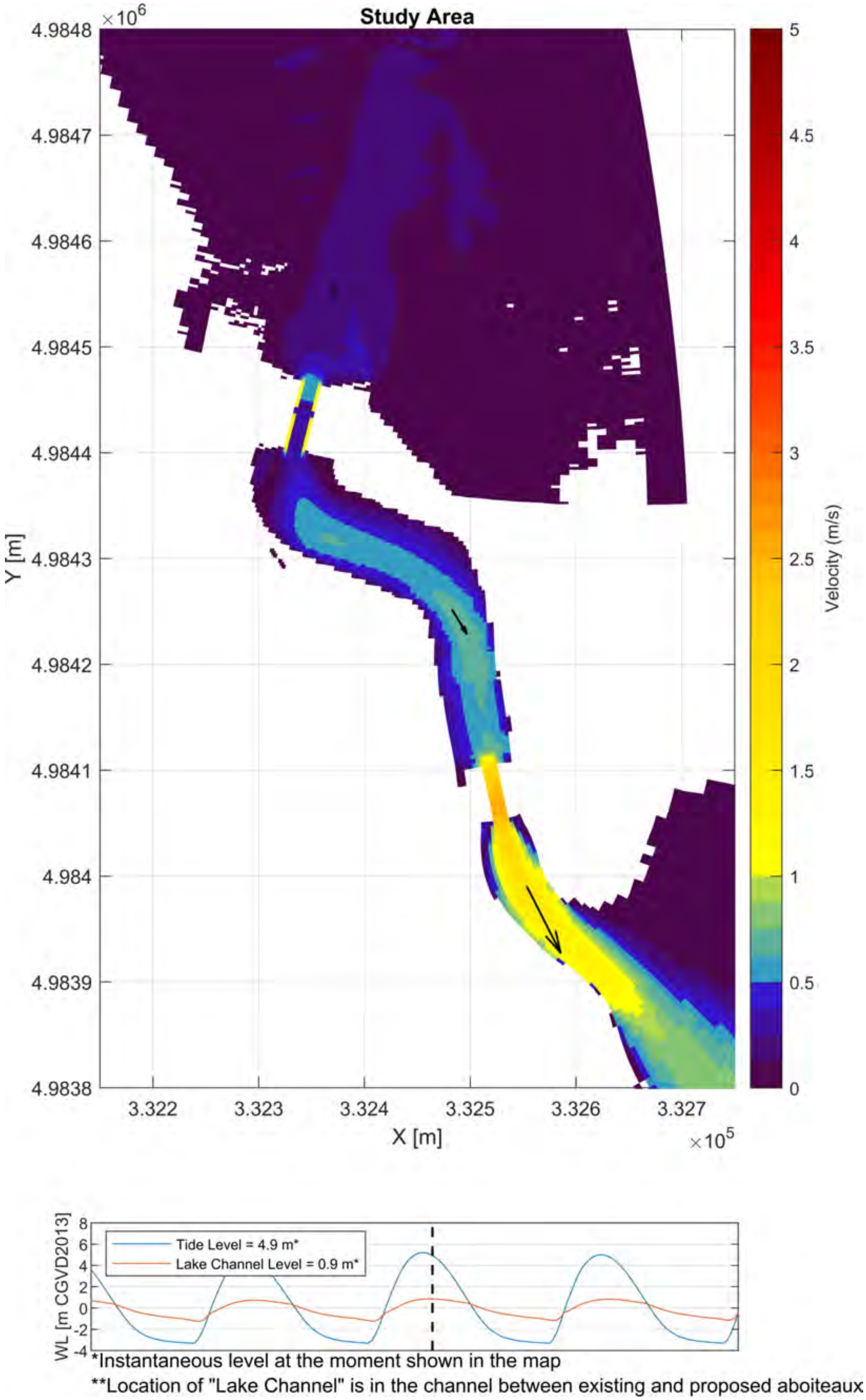
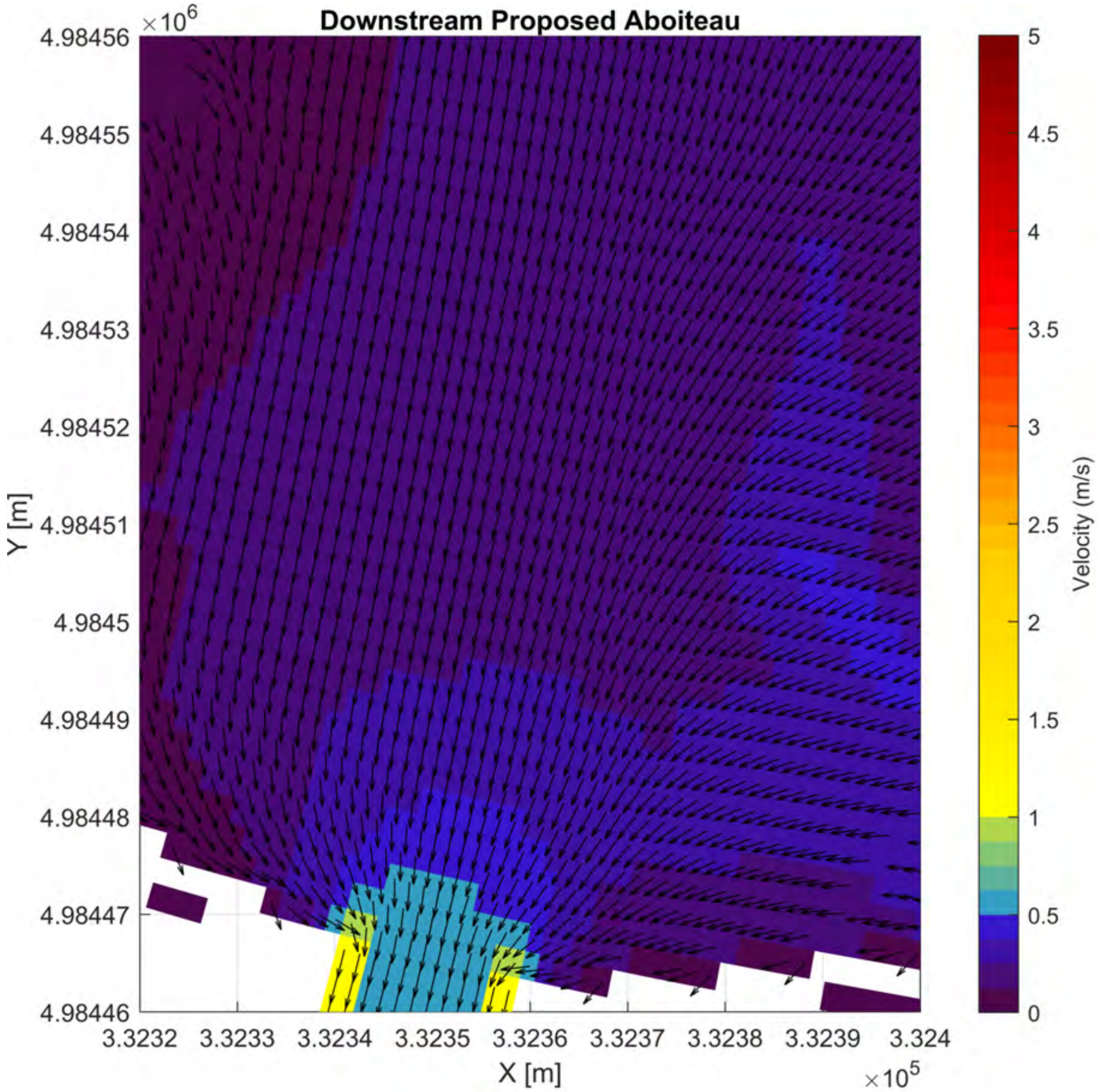
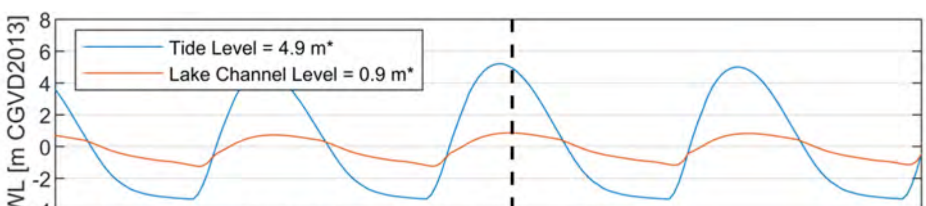


Figure A2.40: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Overall Study Area.





*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A2.41: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Downstream Proposed Aboiteau.

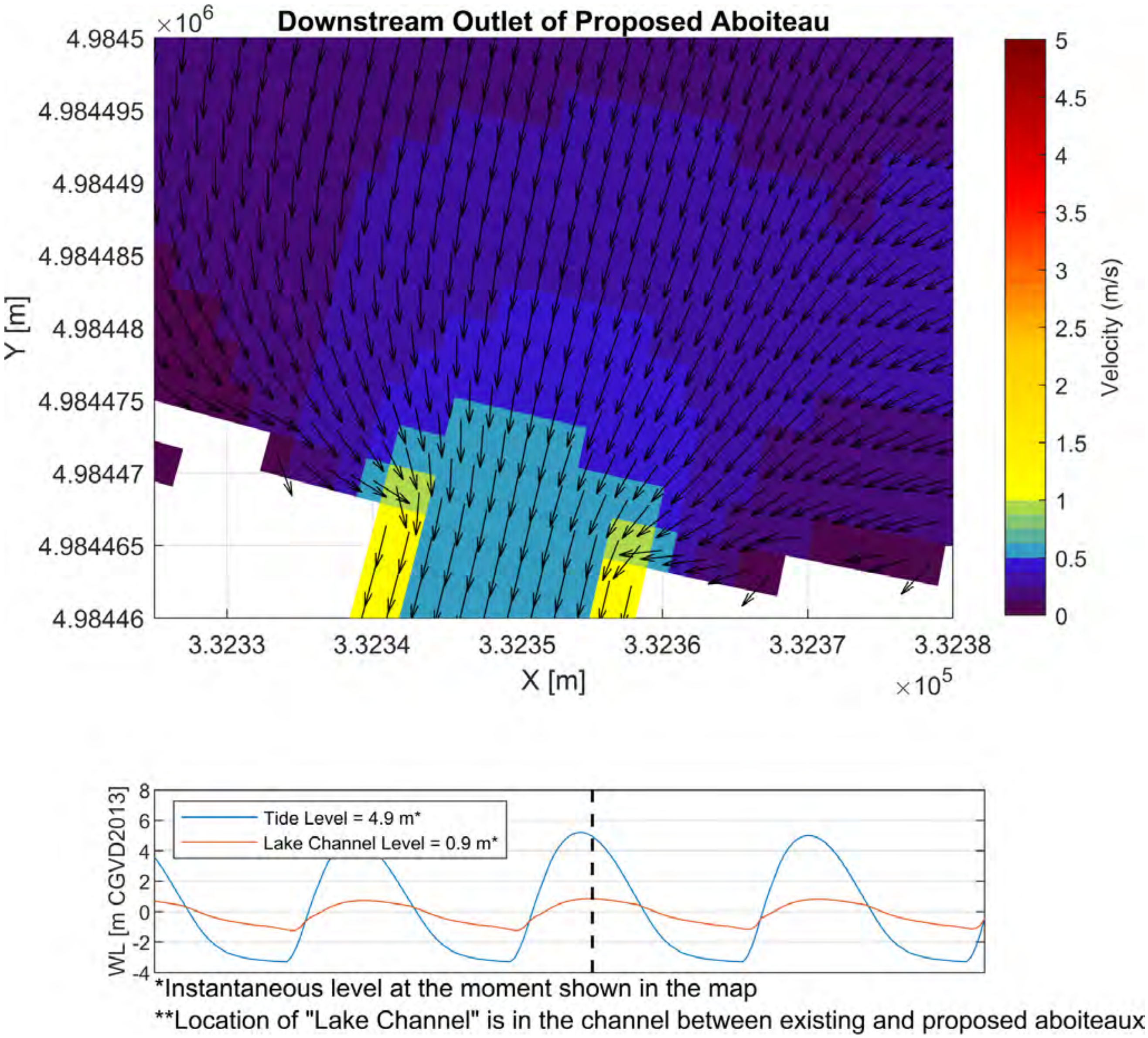
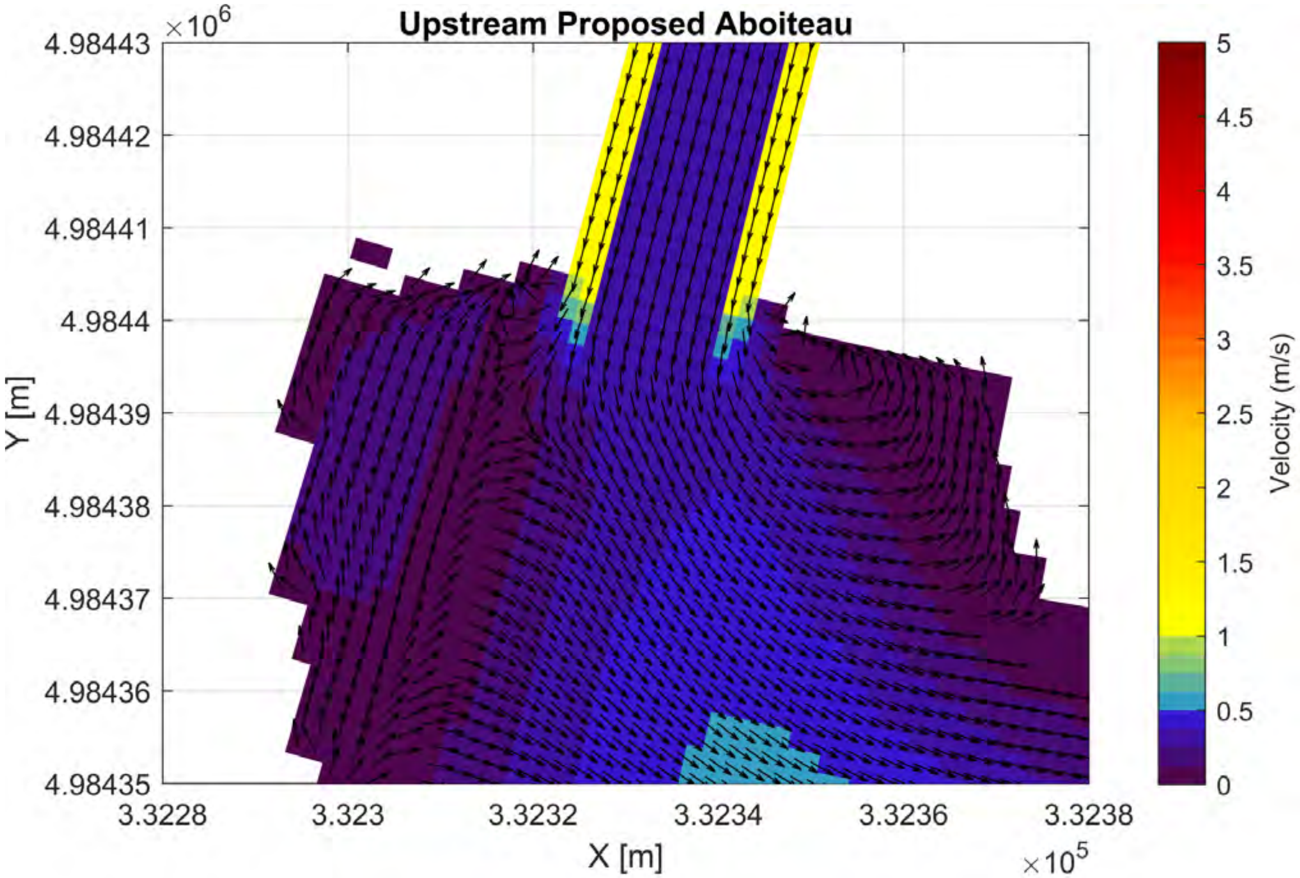


Figure A2.42: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Downstream Outlet of Proposed Aboiteau.



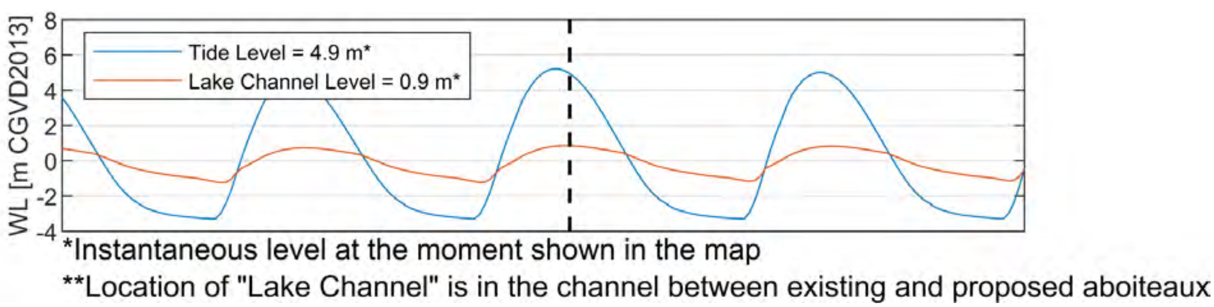
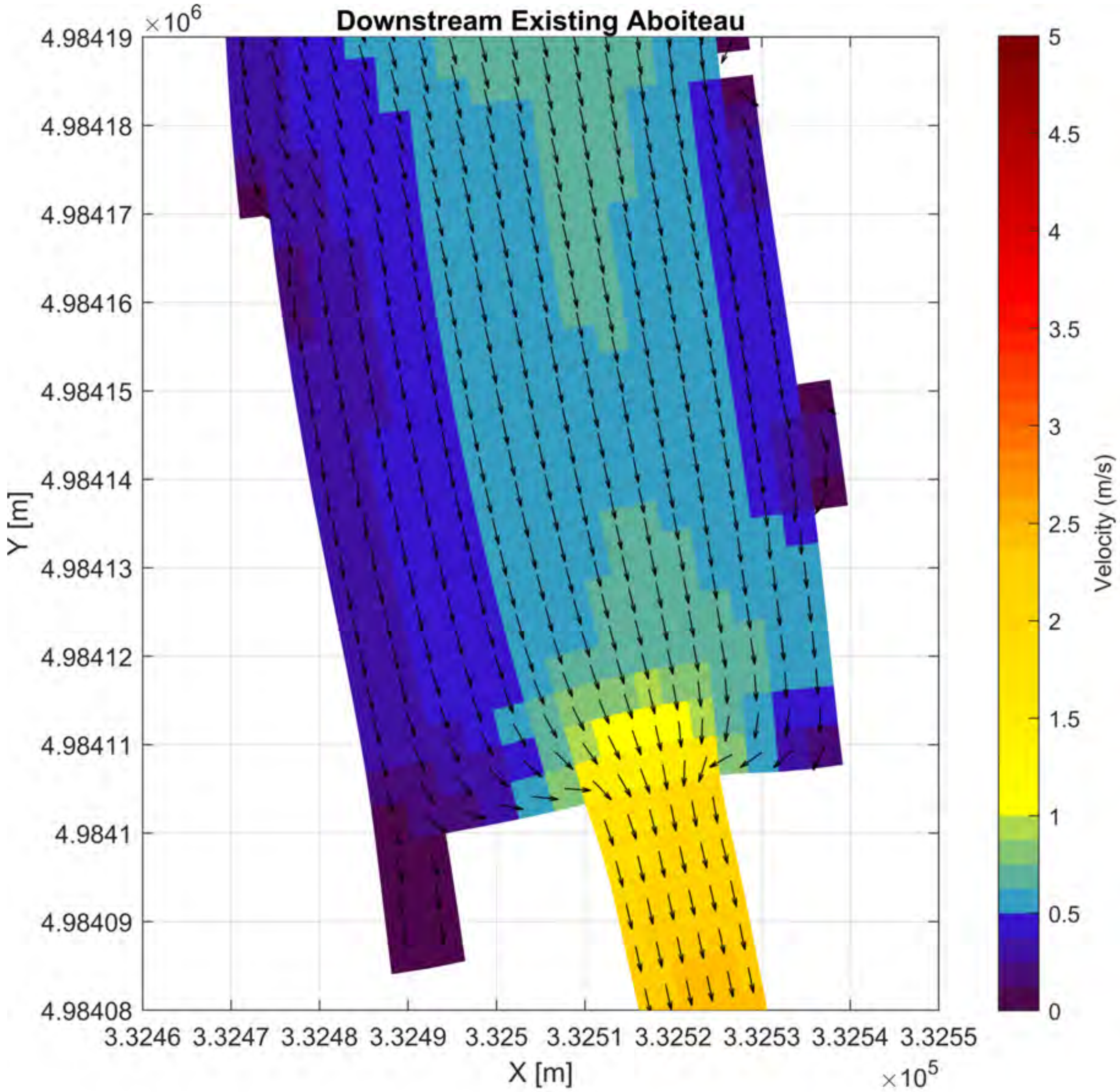


Figure A2.43: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Upstream Proposed Aboiteau.



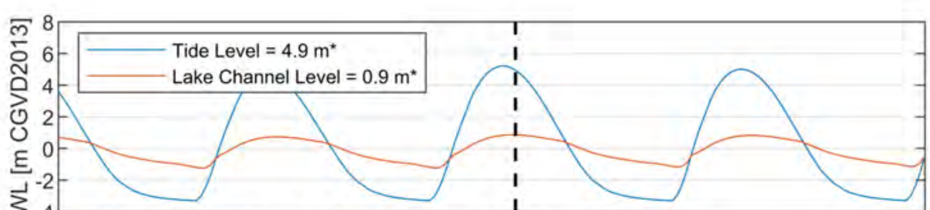
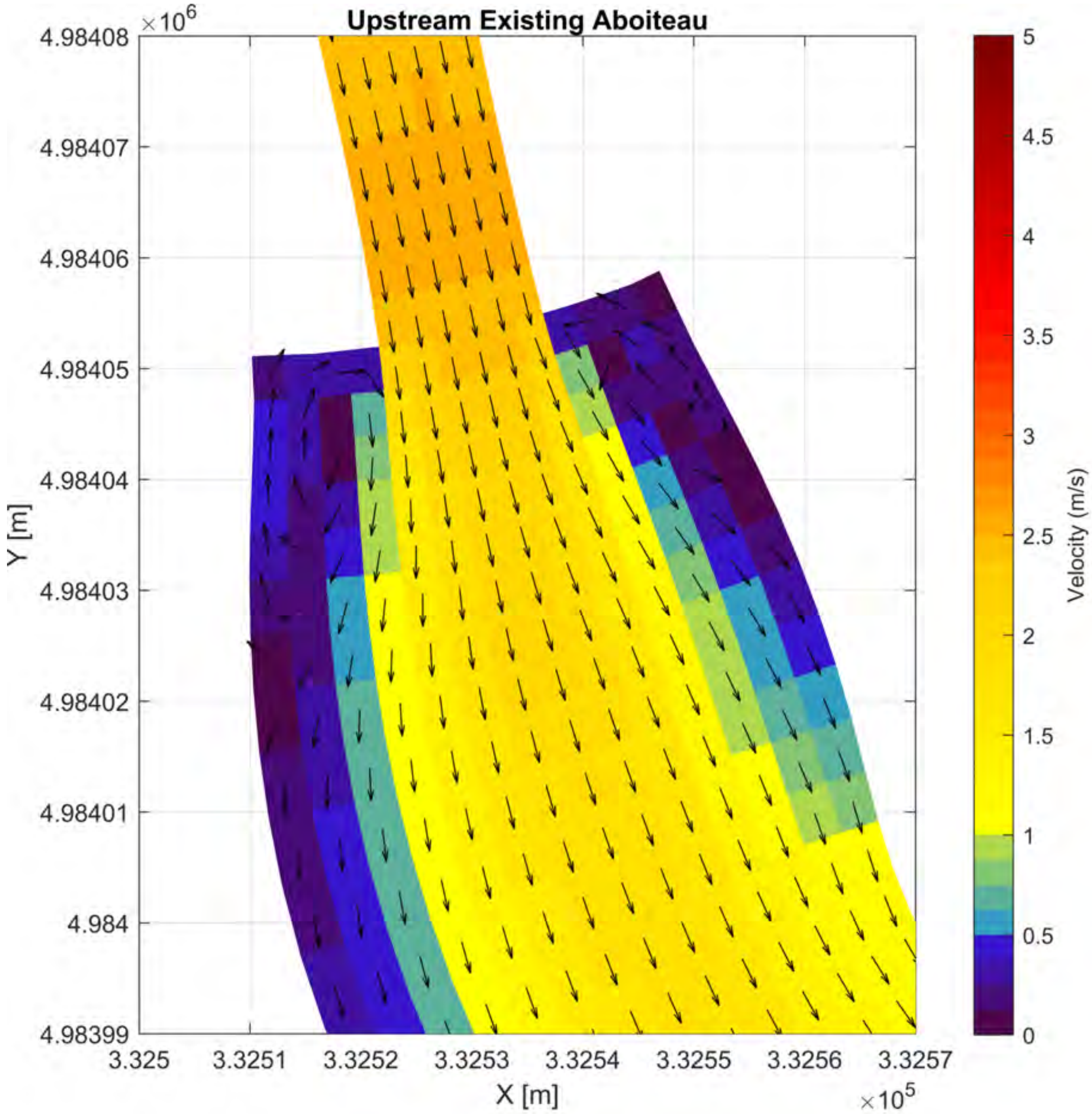


Figure A2.44: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Downstream Existing Aboiteau.



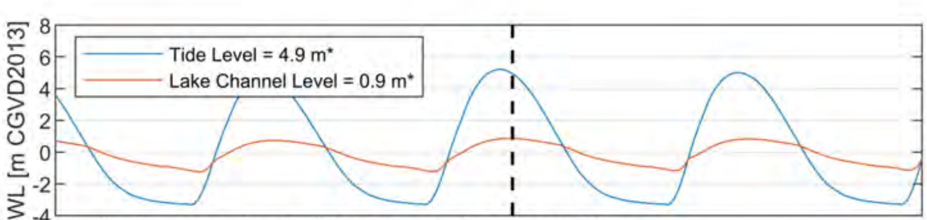


Figure A2.45: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Upstream Existing Aboiteau.

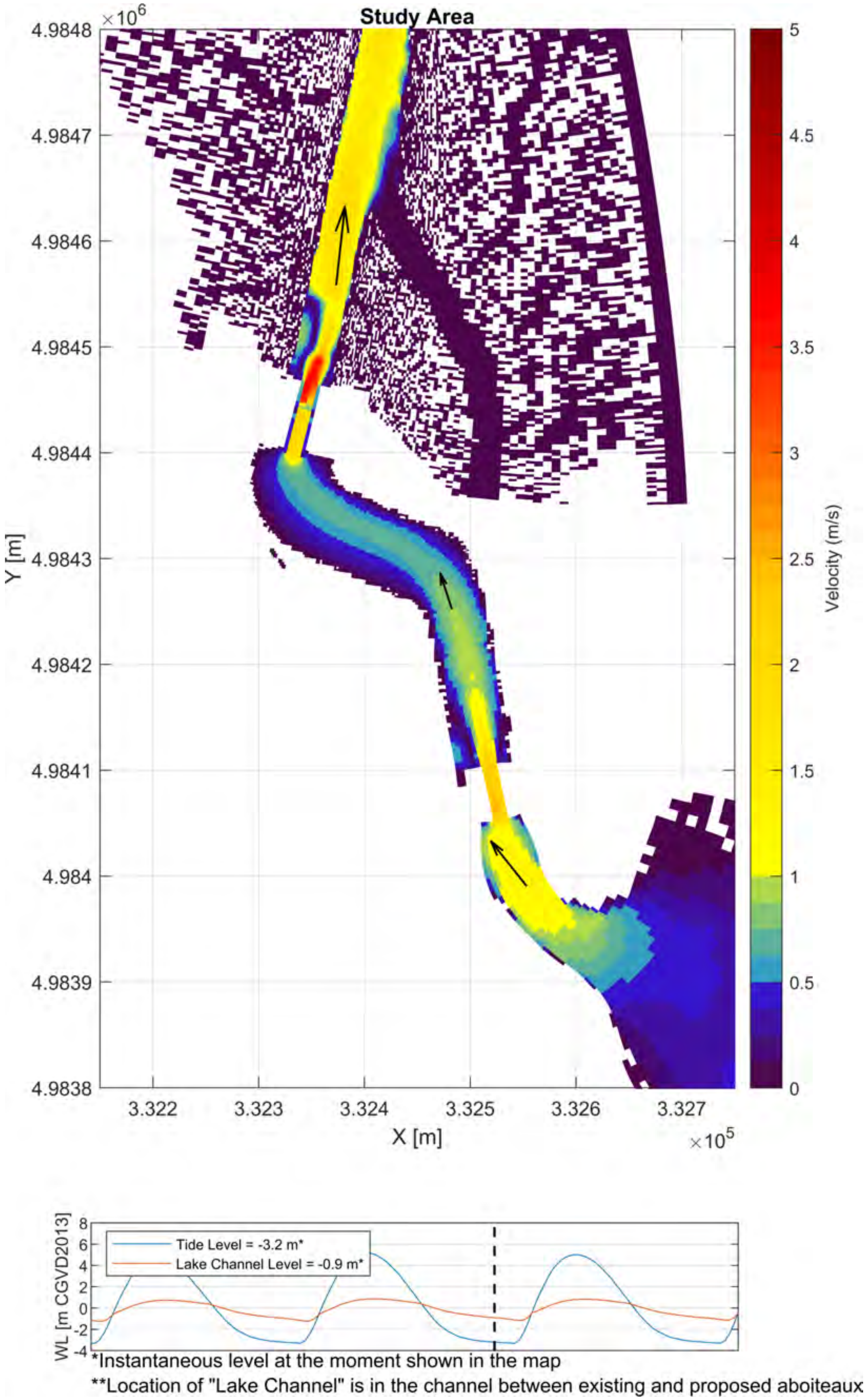
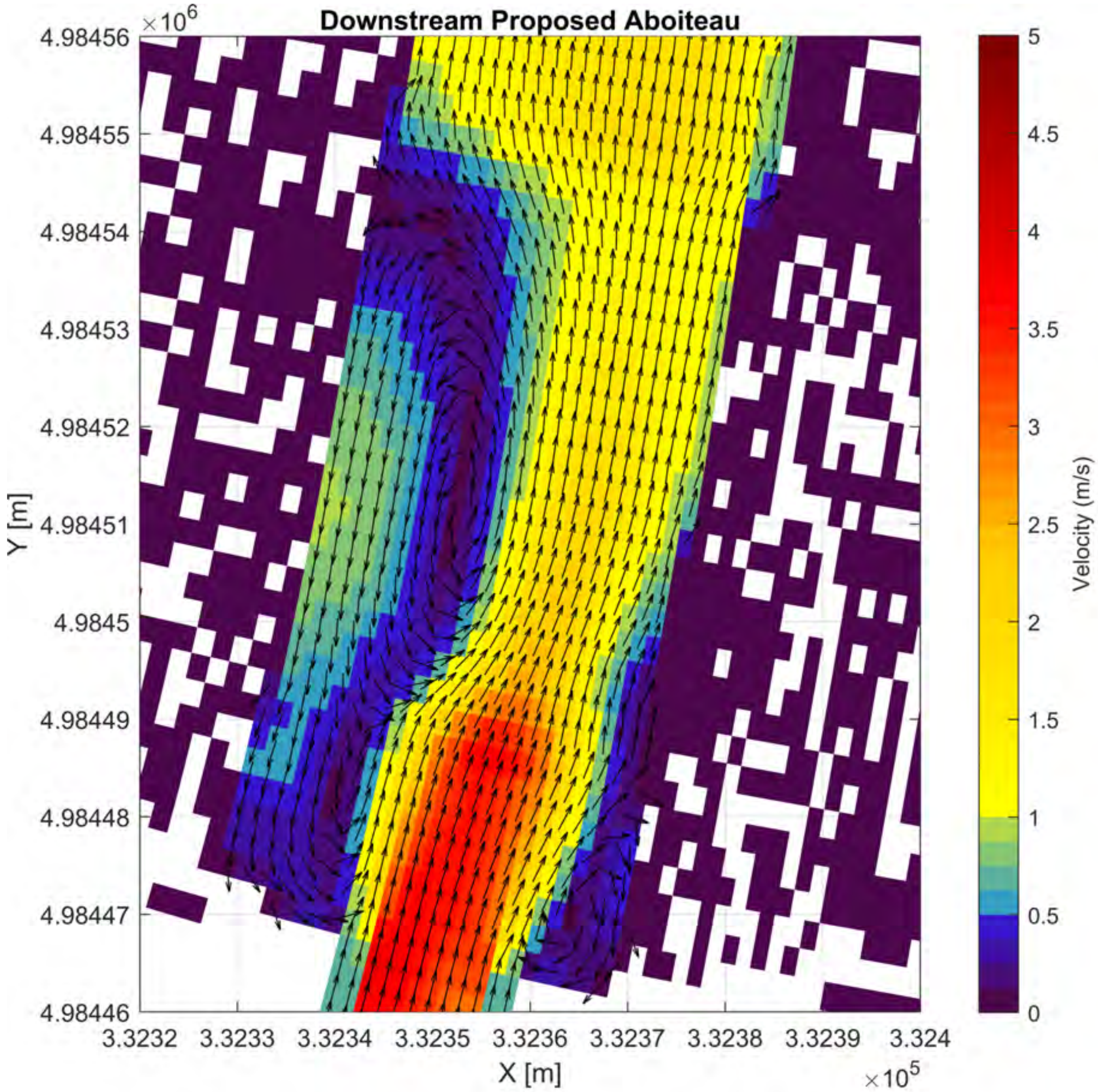
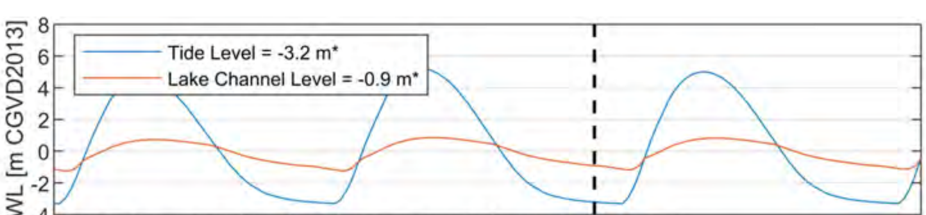


Figure A2.46: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Overall Study Area.

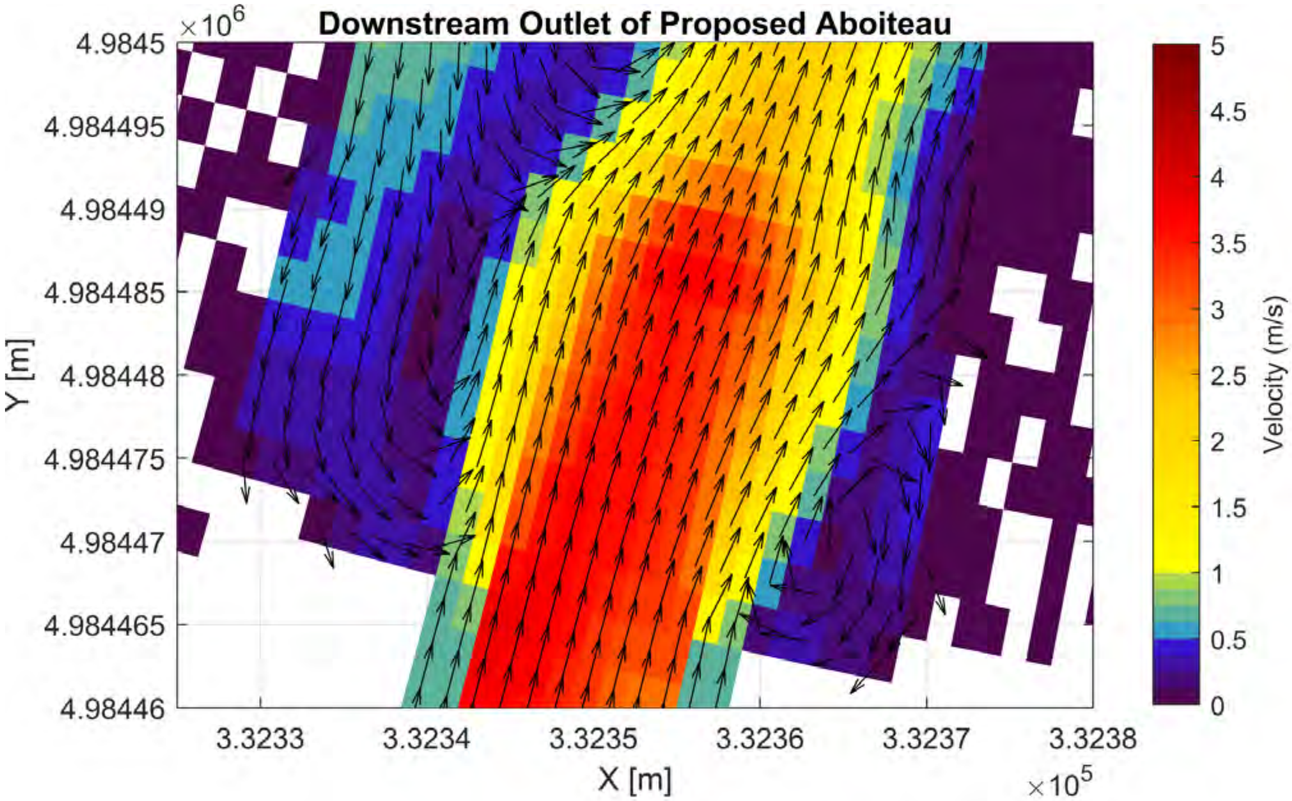




*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A2.47: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Downstream Proposed Aboiteau.



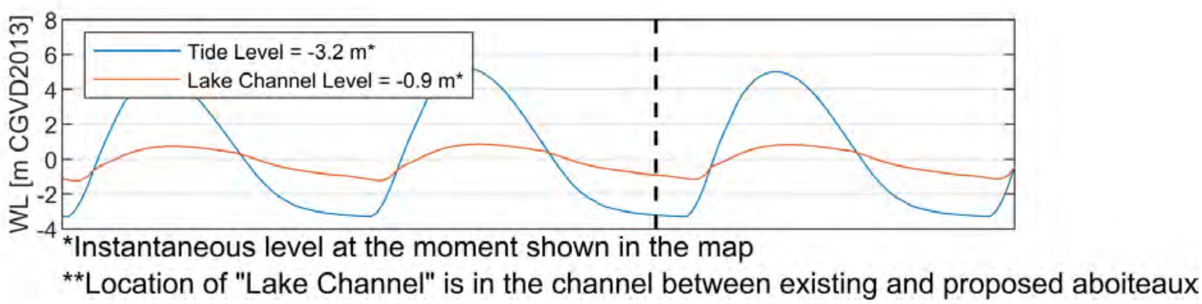


Figure A2.48: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Downstream Outlet of Proposed Aboiteau.

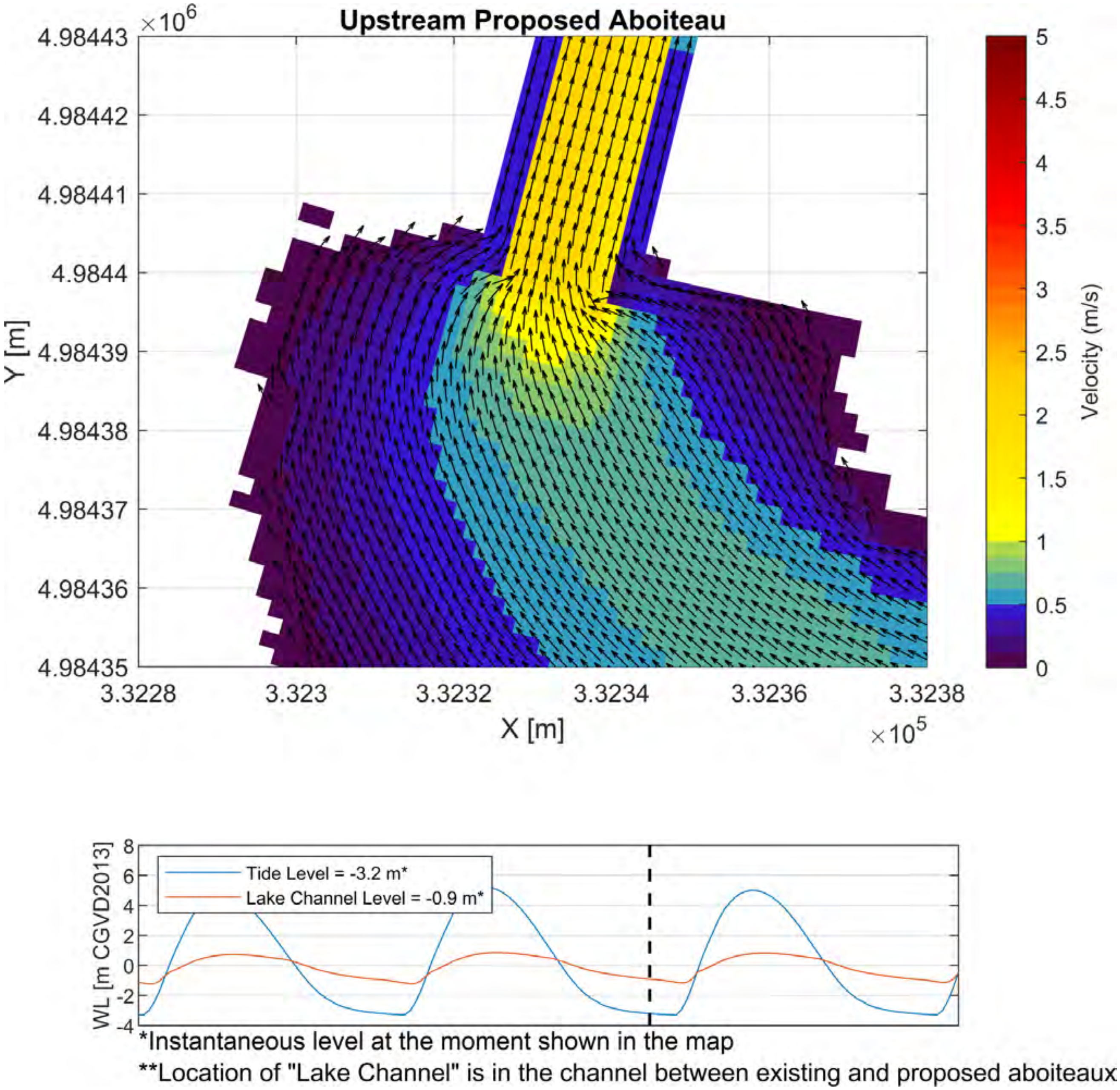


Figure A2.49: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Upstream Proposed Aboiteau.

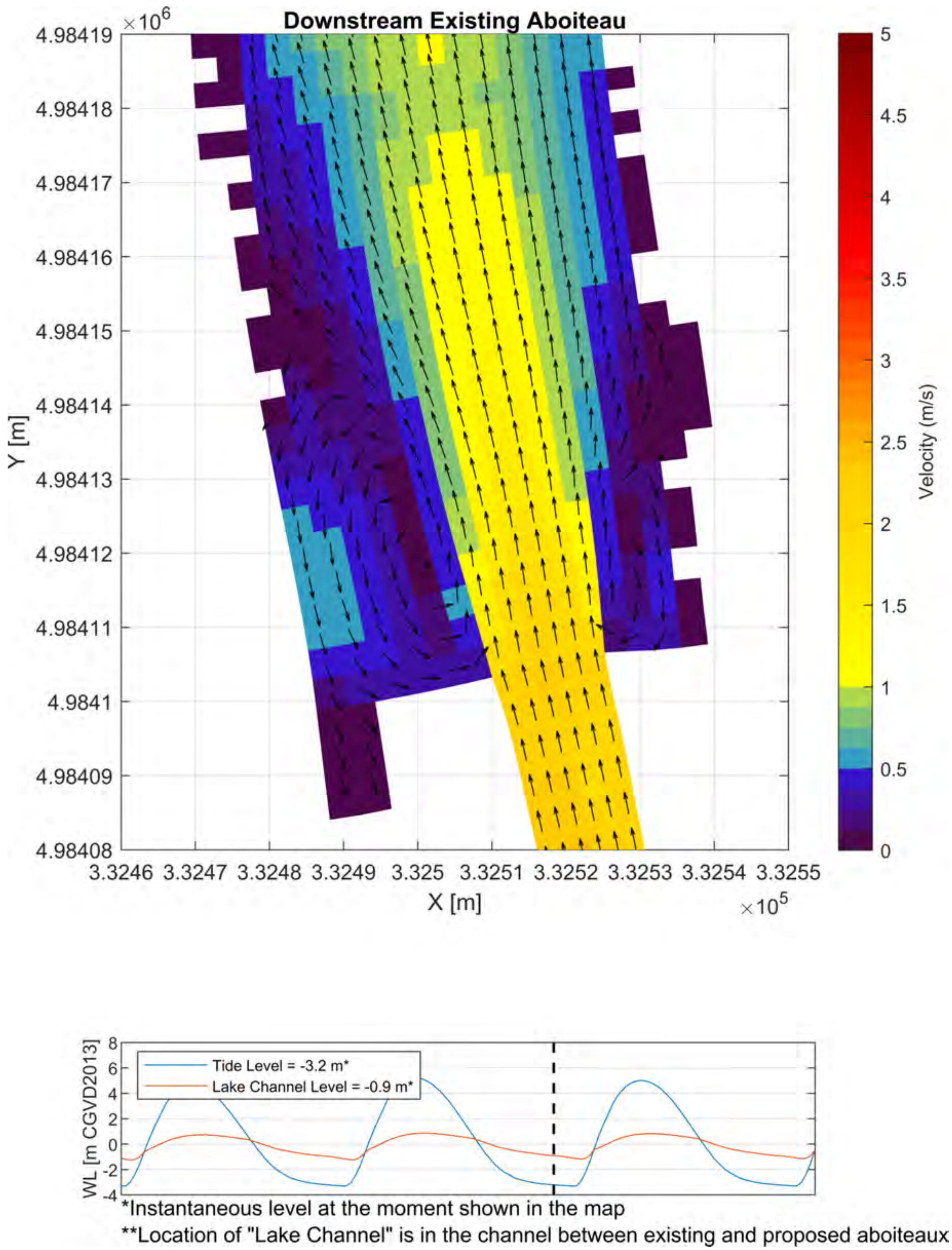
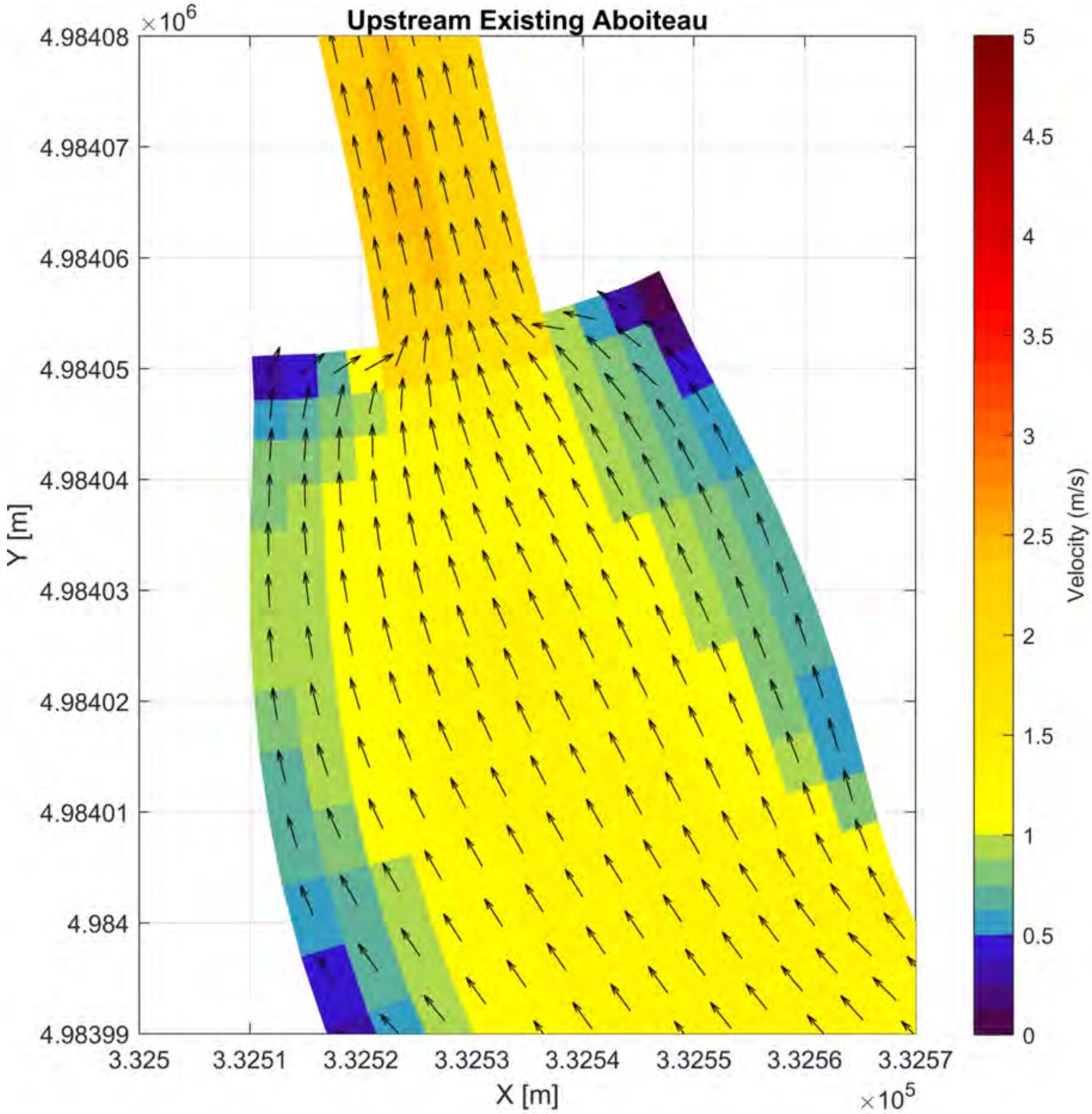
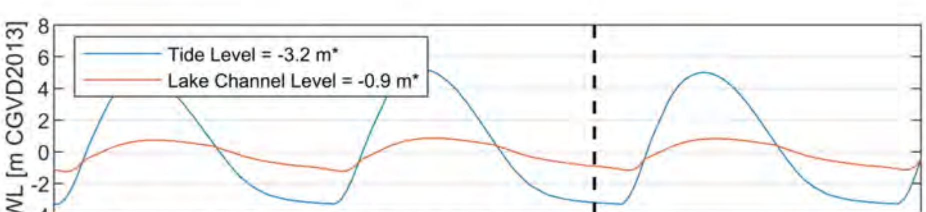


Figure A2.50: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Downstream Existing Aboiteau.





*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A2.51: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Upstream Existing Aboiteau.

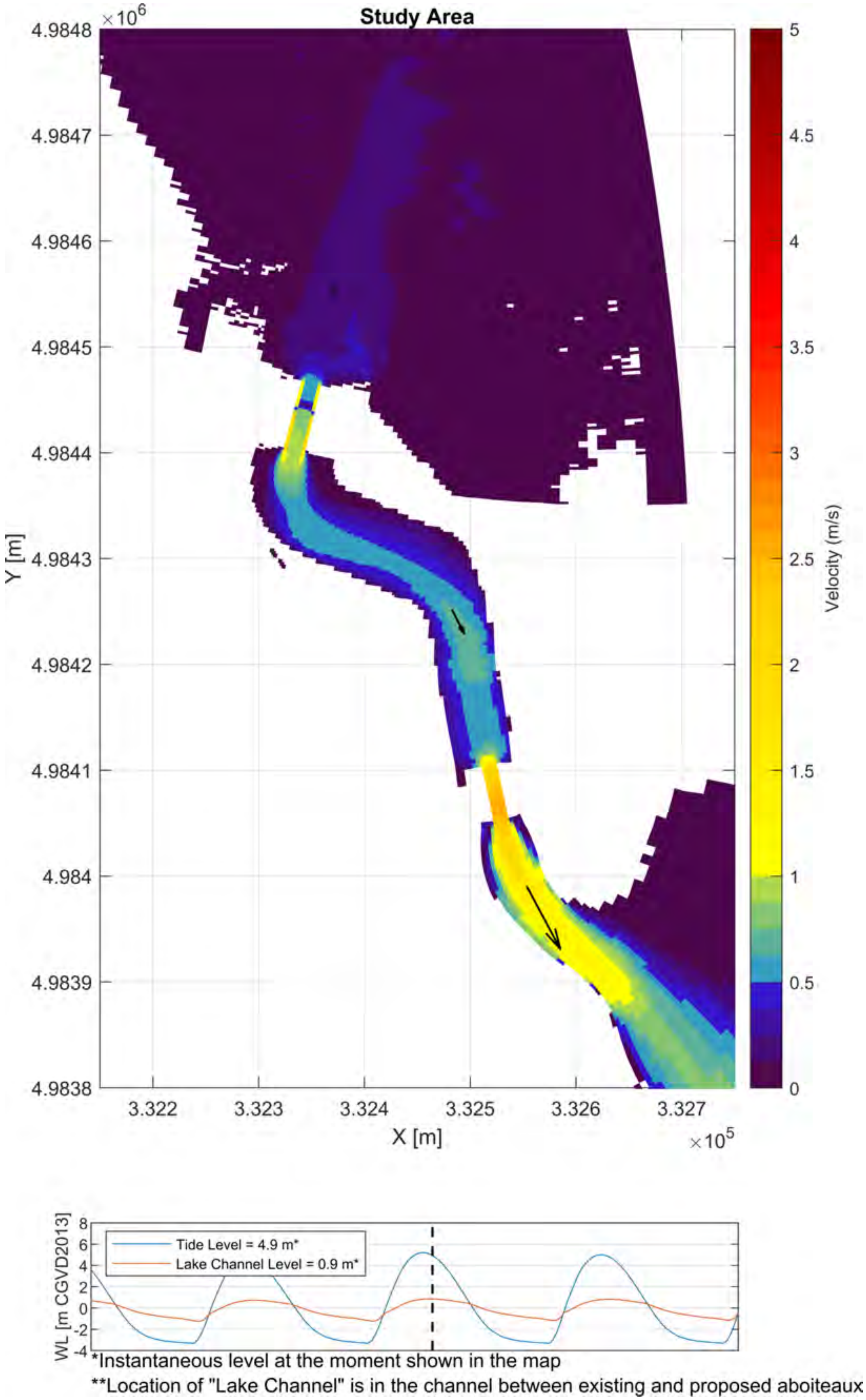


Figure A2.52: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Overall Study Area.

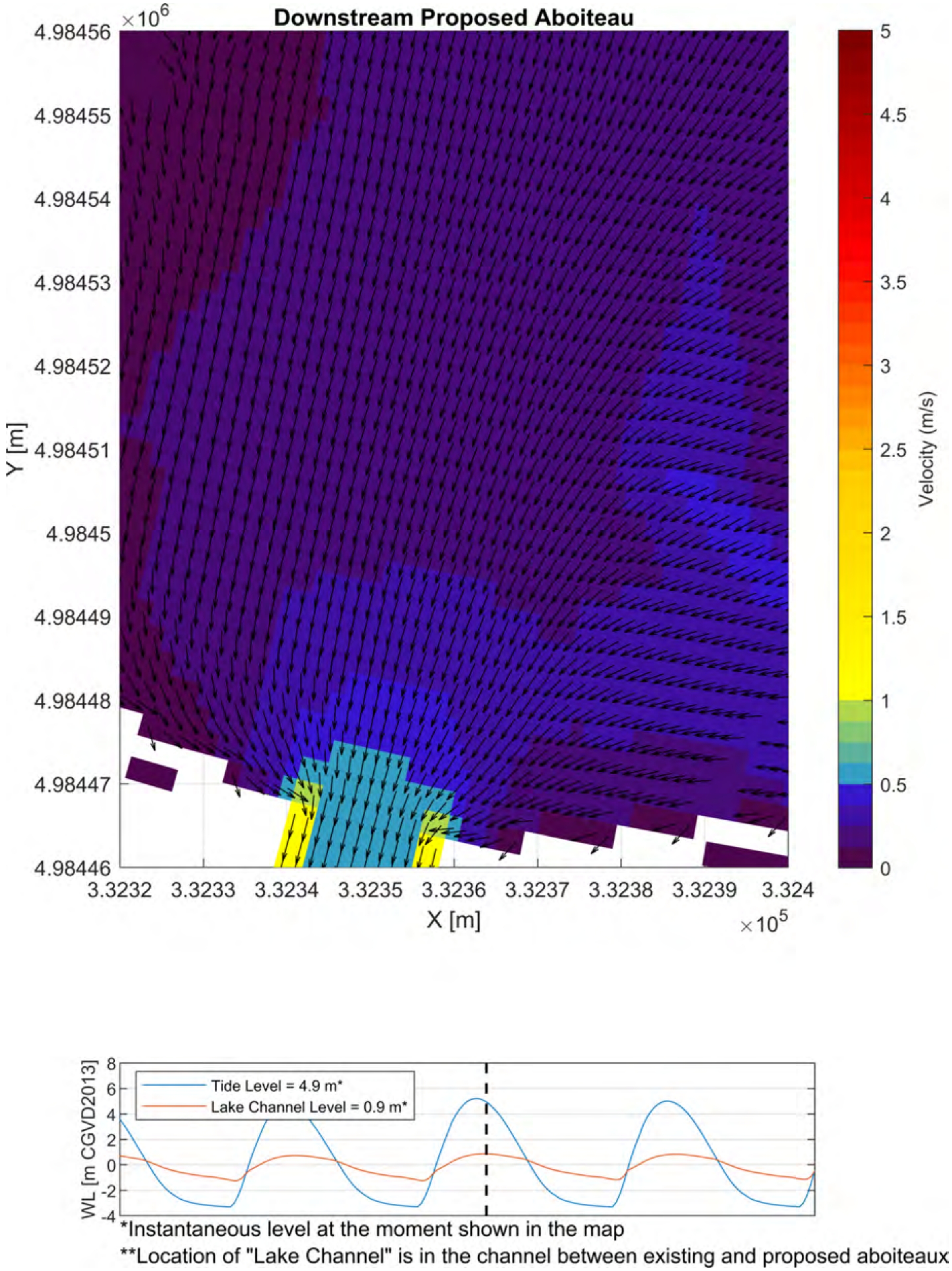


Figure A2.53: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Downstream Proposed Aboiteau.

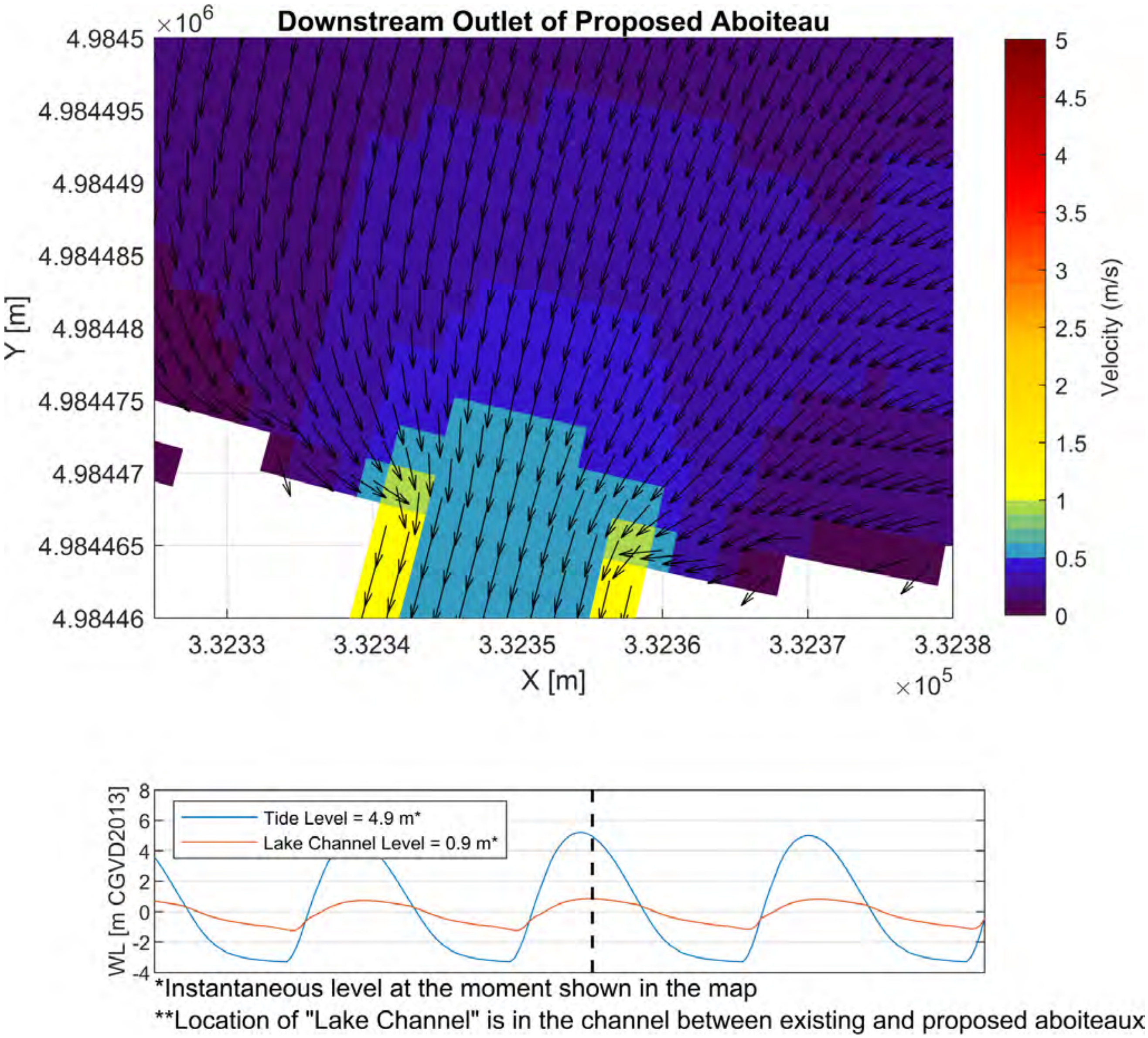


Figure A2.54: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Downstream Outlet of Proposed Aboiteau.

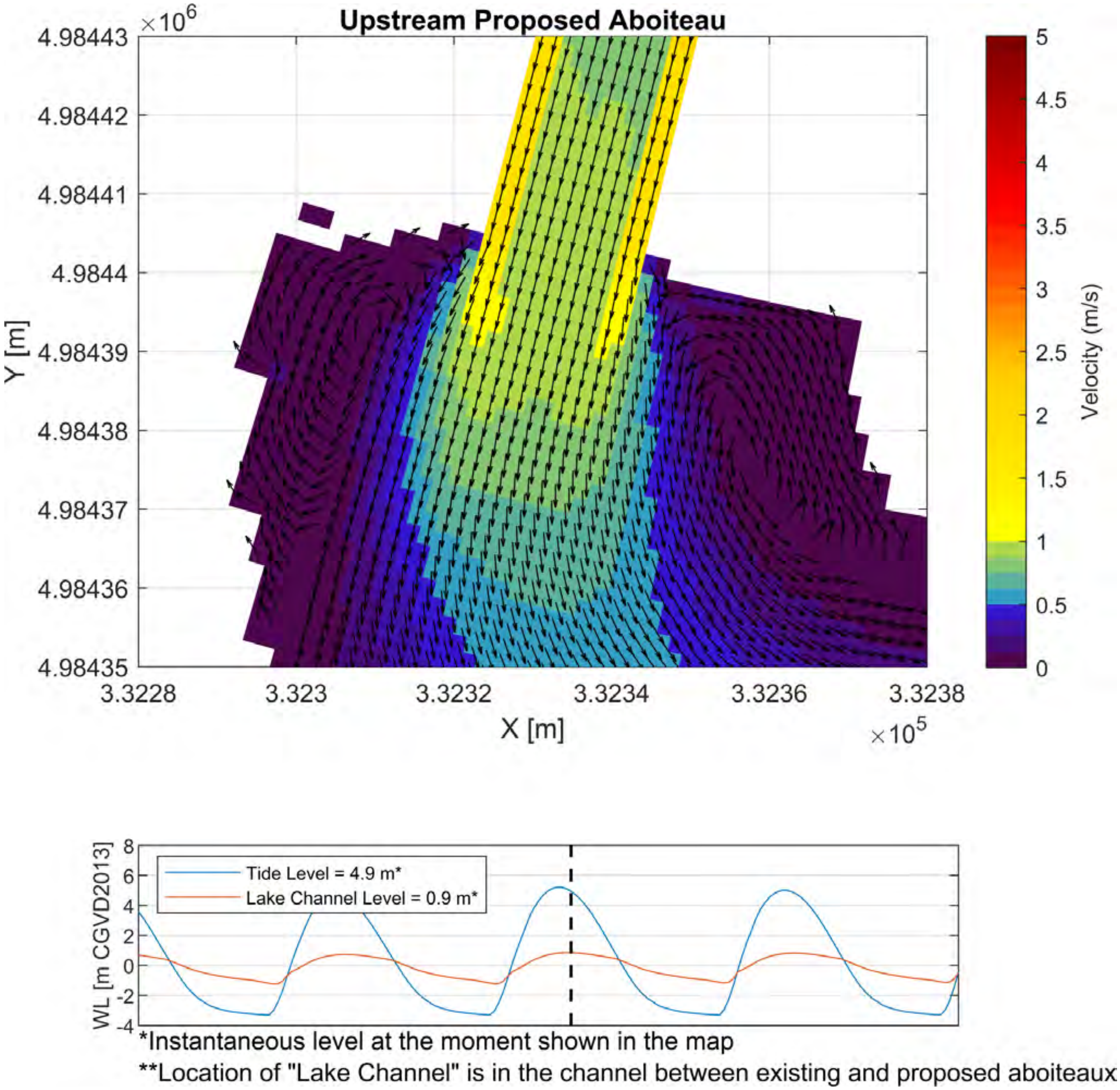
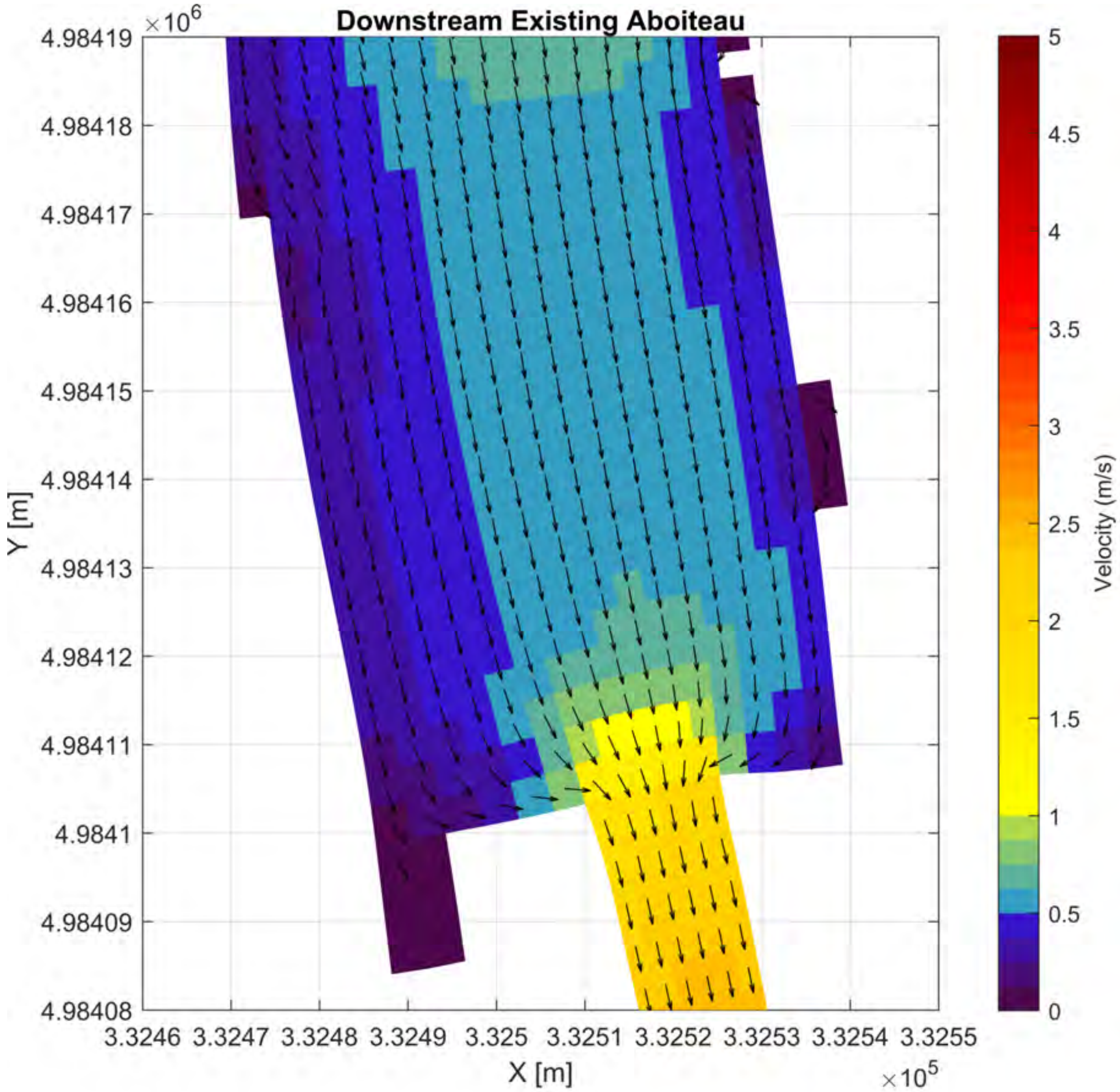
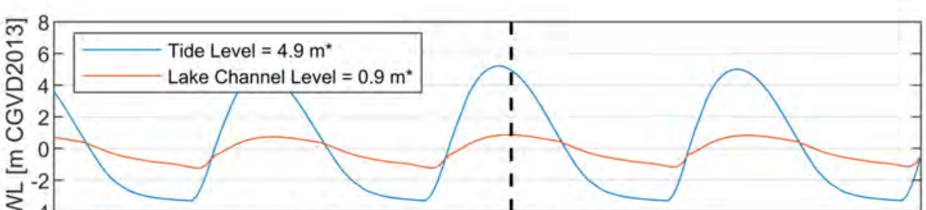


Figure A2.55: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Upstream Proposed Aboiteau.

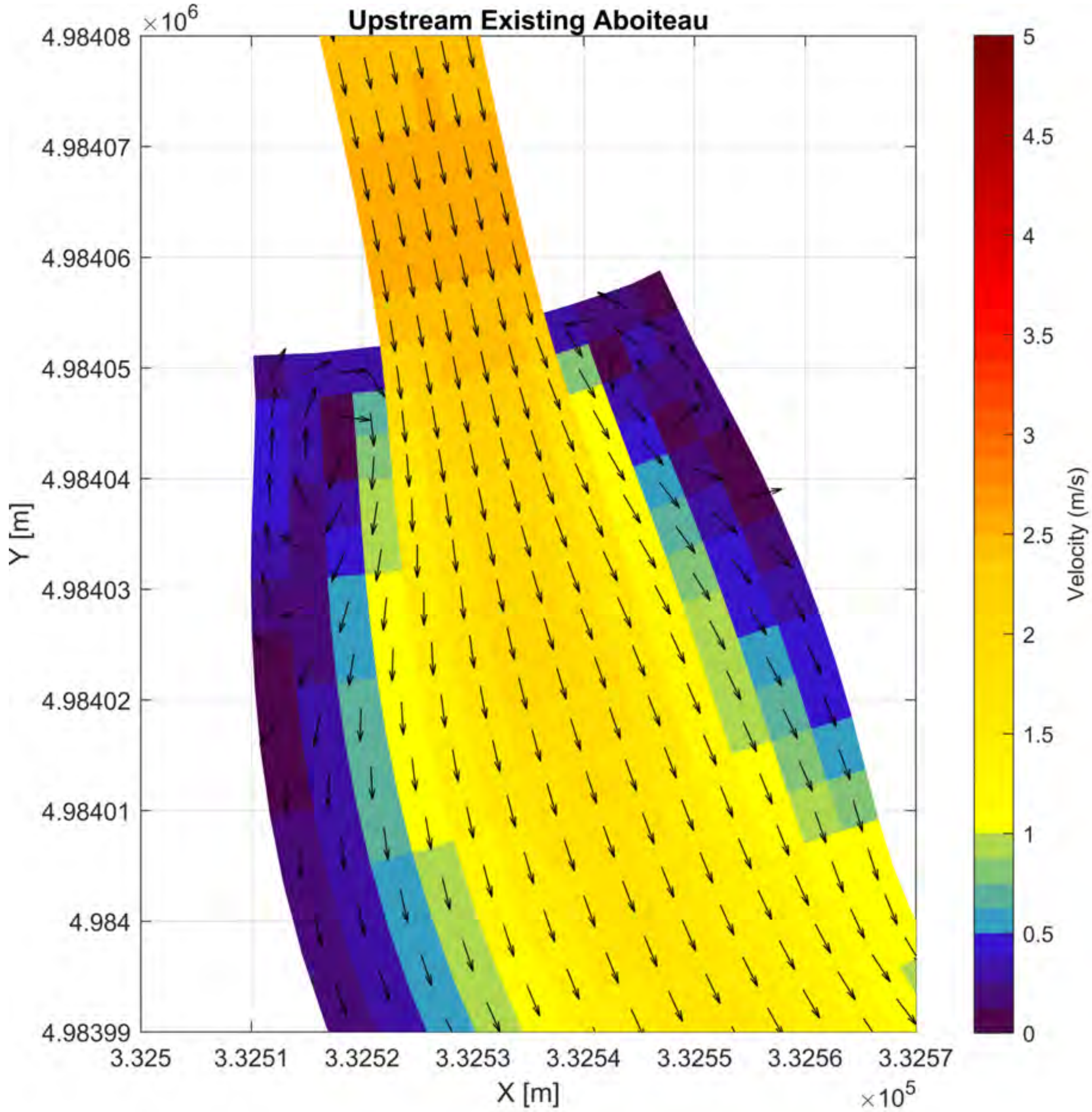




*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A2.56: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Downstream Existing Aboiteau.



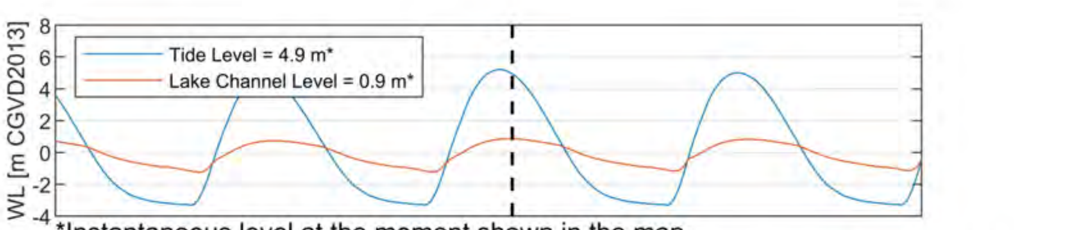


Figure A2.57: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Upstream Existing Aboiteau.

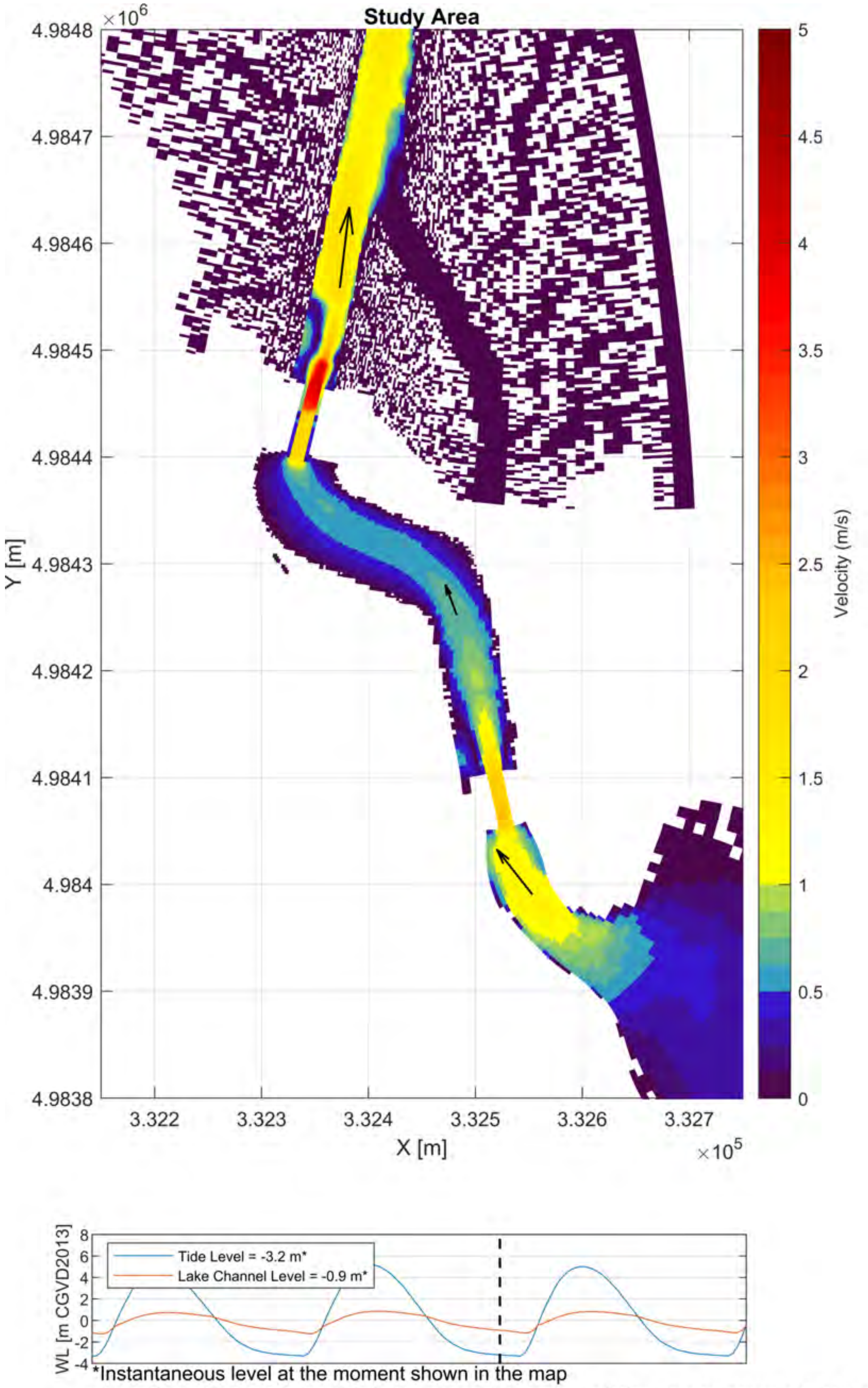
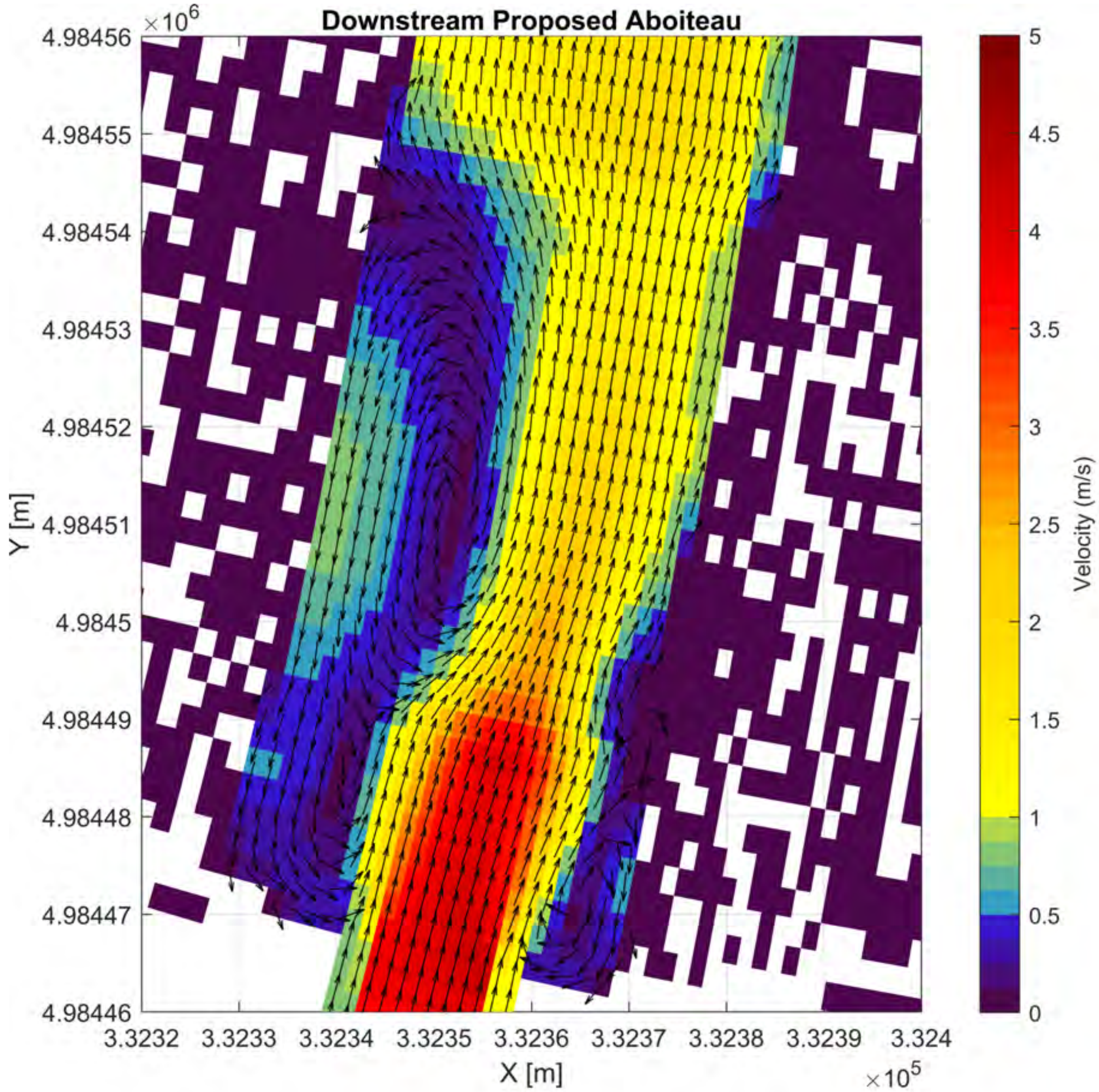
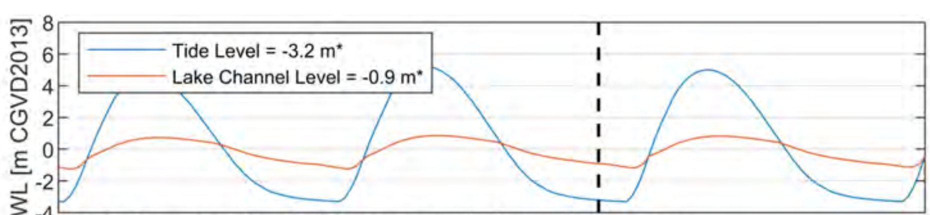


Figure A2.58: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Overall Study Area.





*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A2.59: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Downstream Proposed Aboiteau.

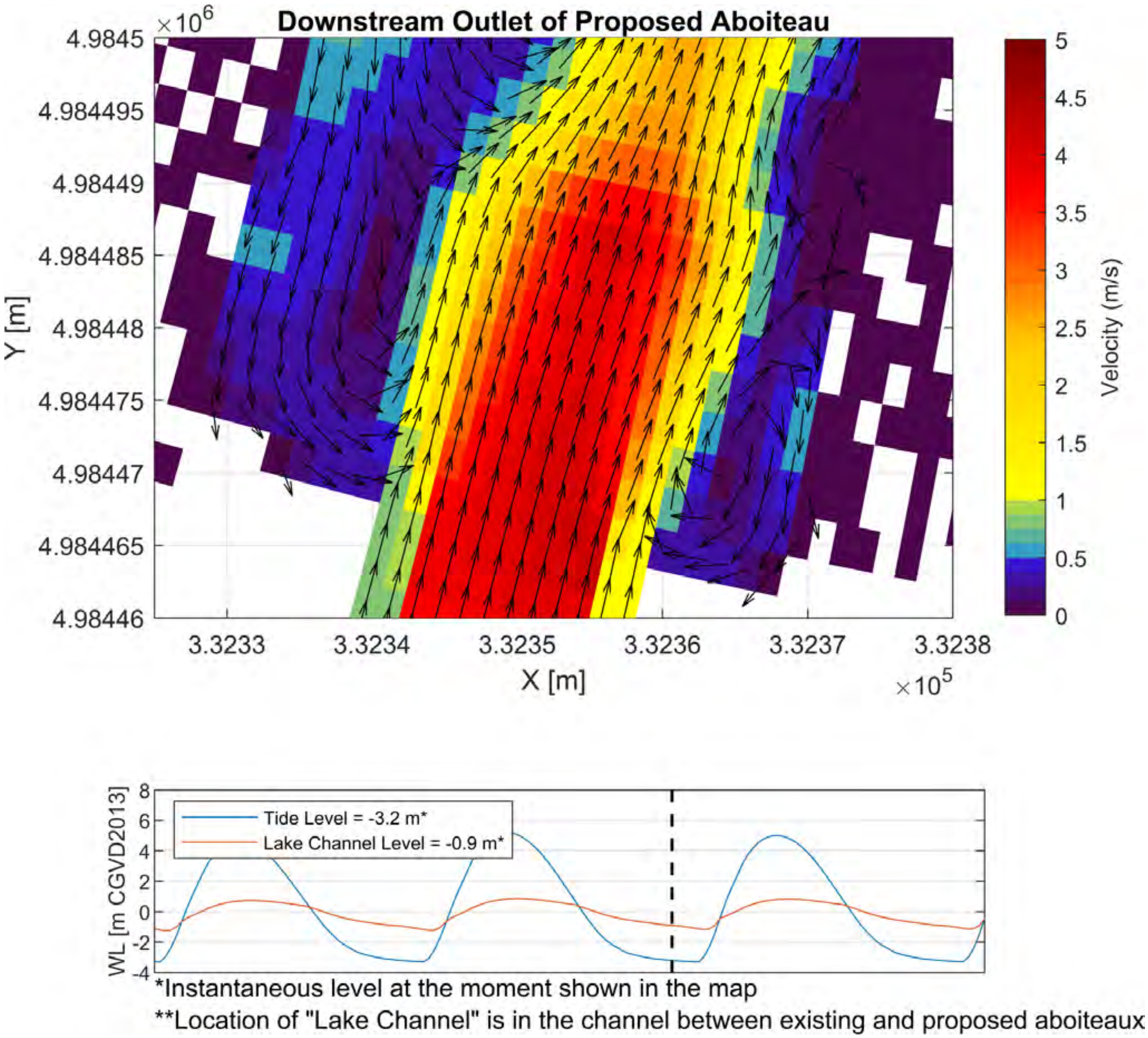
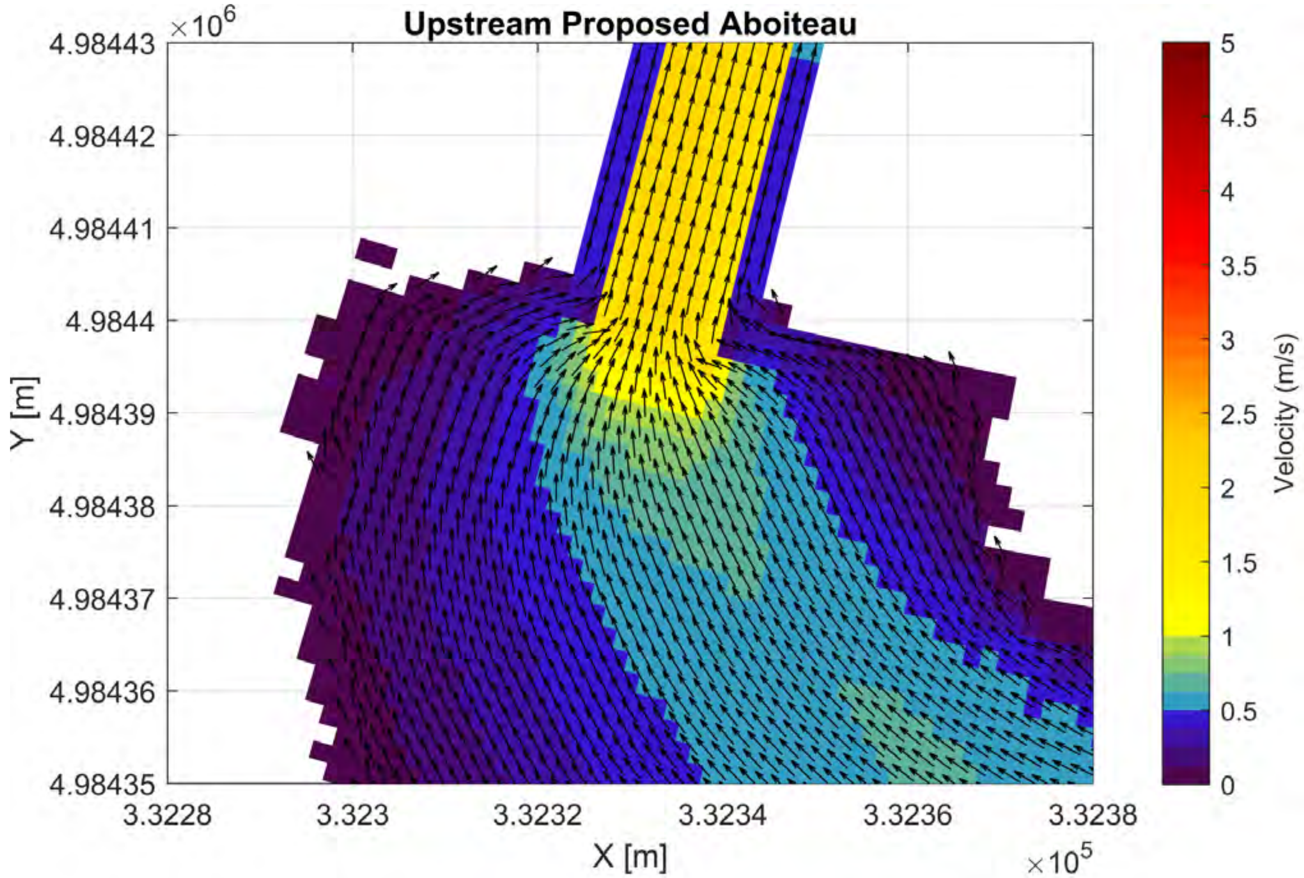


Figure A2.60: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Downstream Outlet of Proposed Aboiteau.



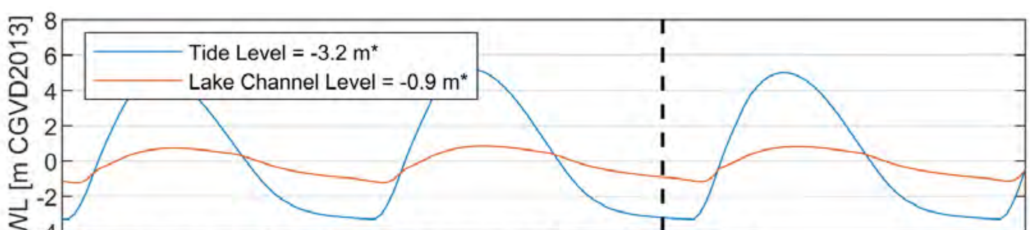
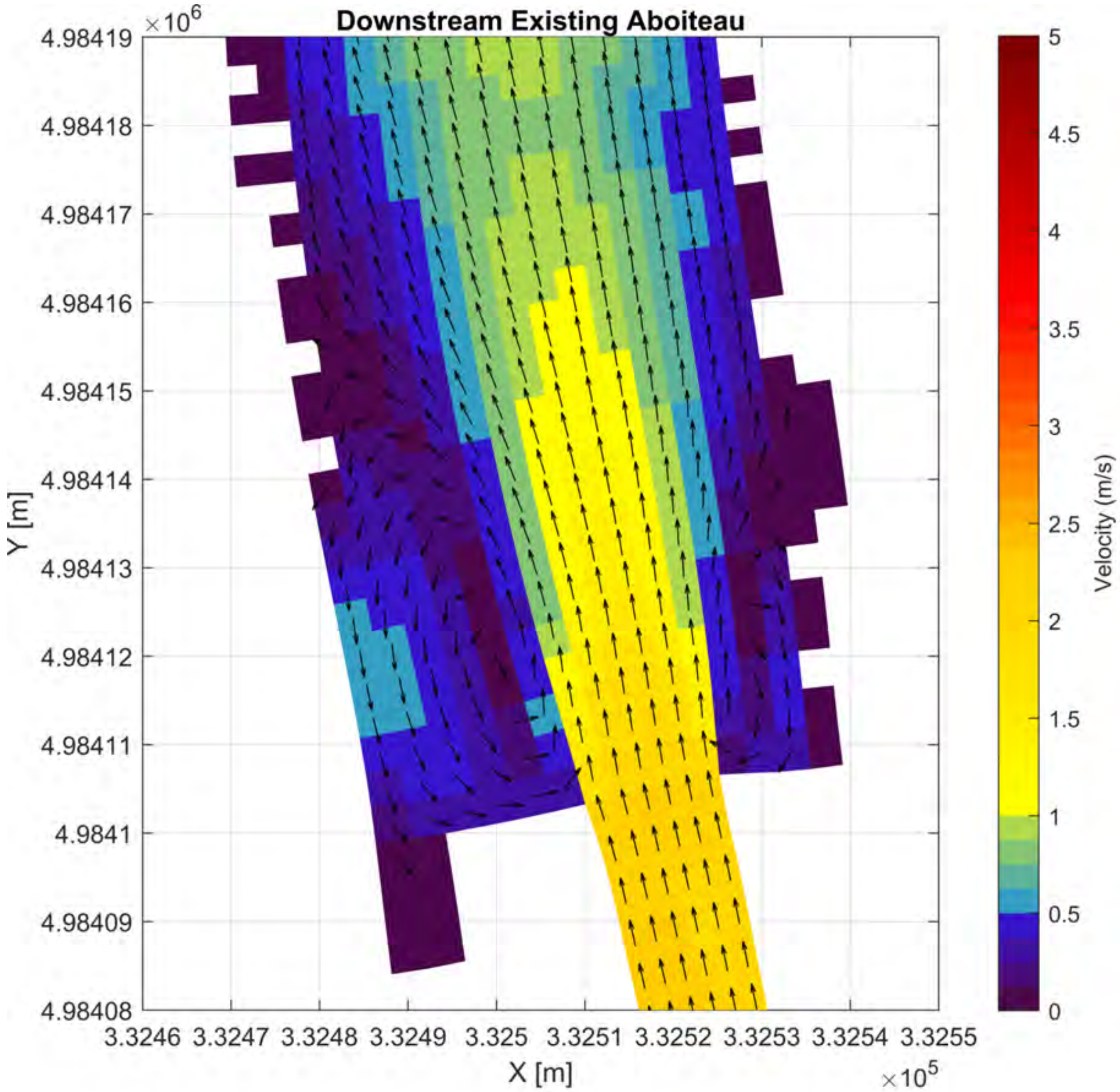


Figure A2.61: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Upstream Proposed Aboiteau.



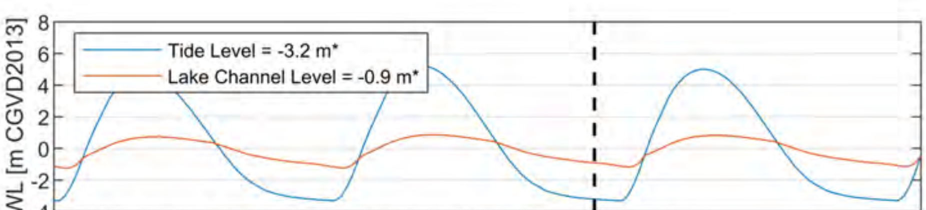
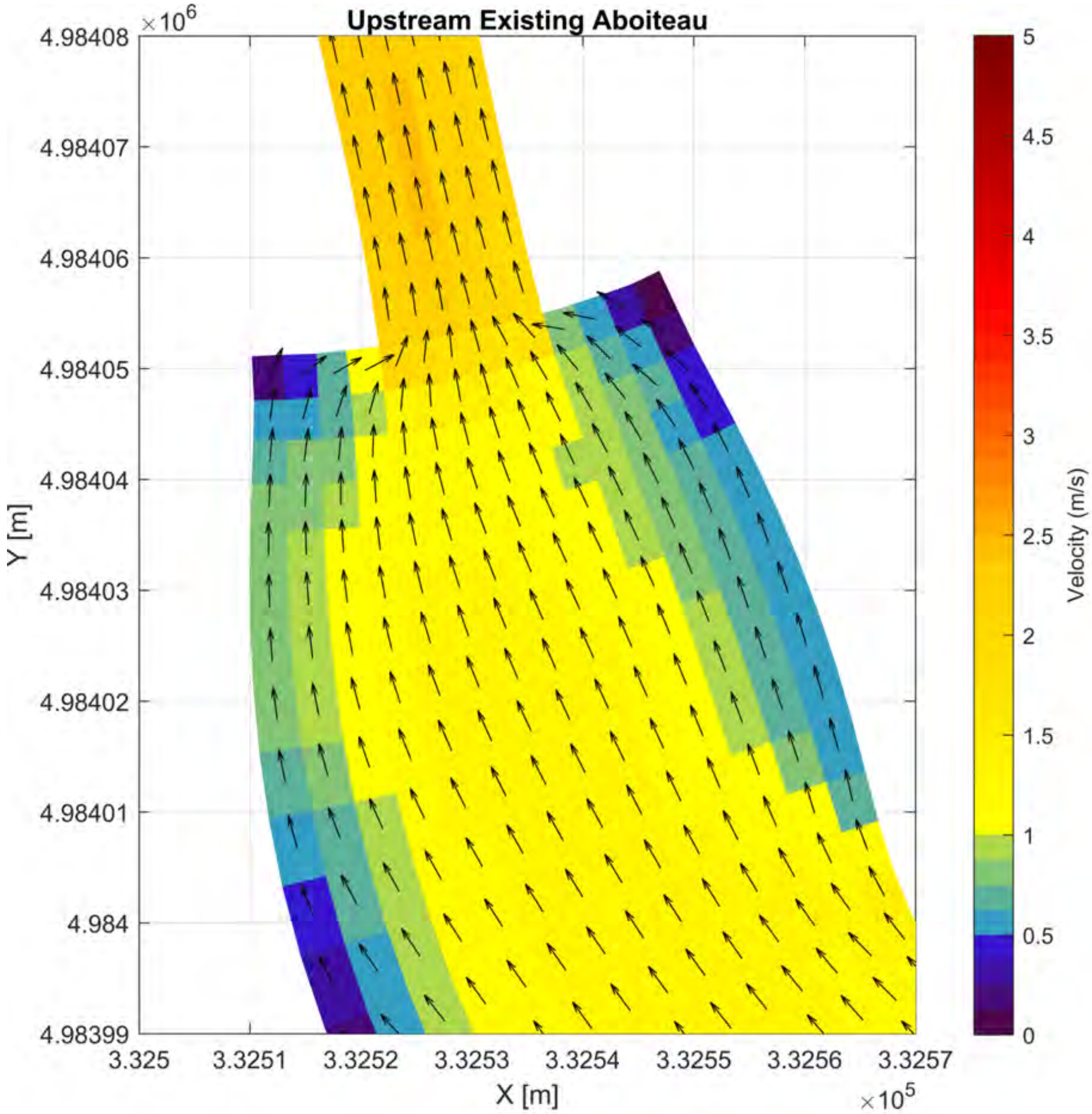
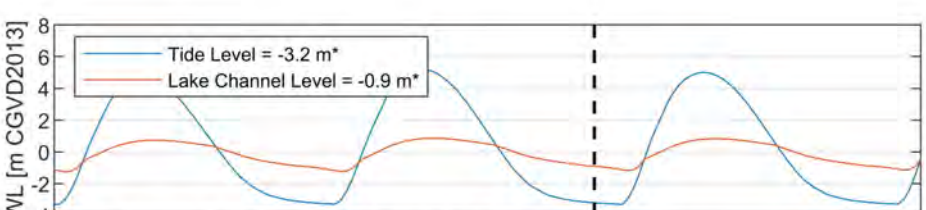


Figure A2.62: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Downstream Existing Aboiteau.

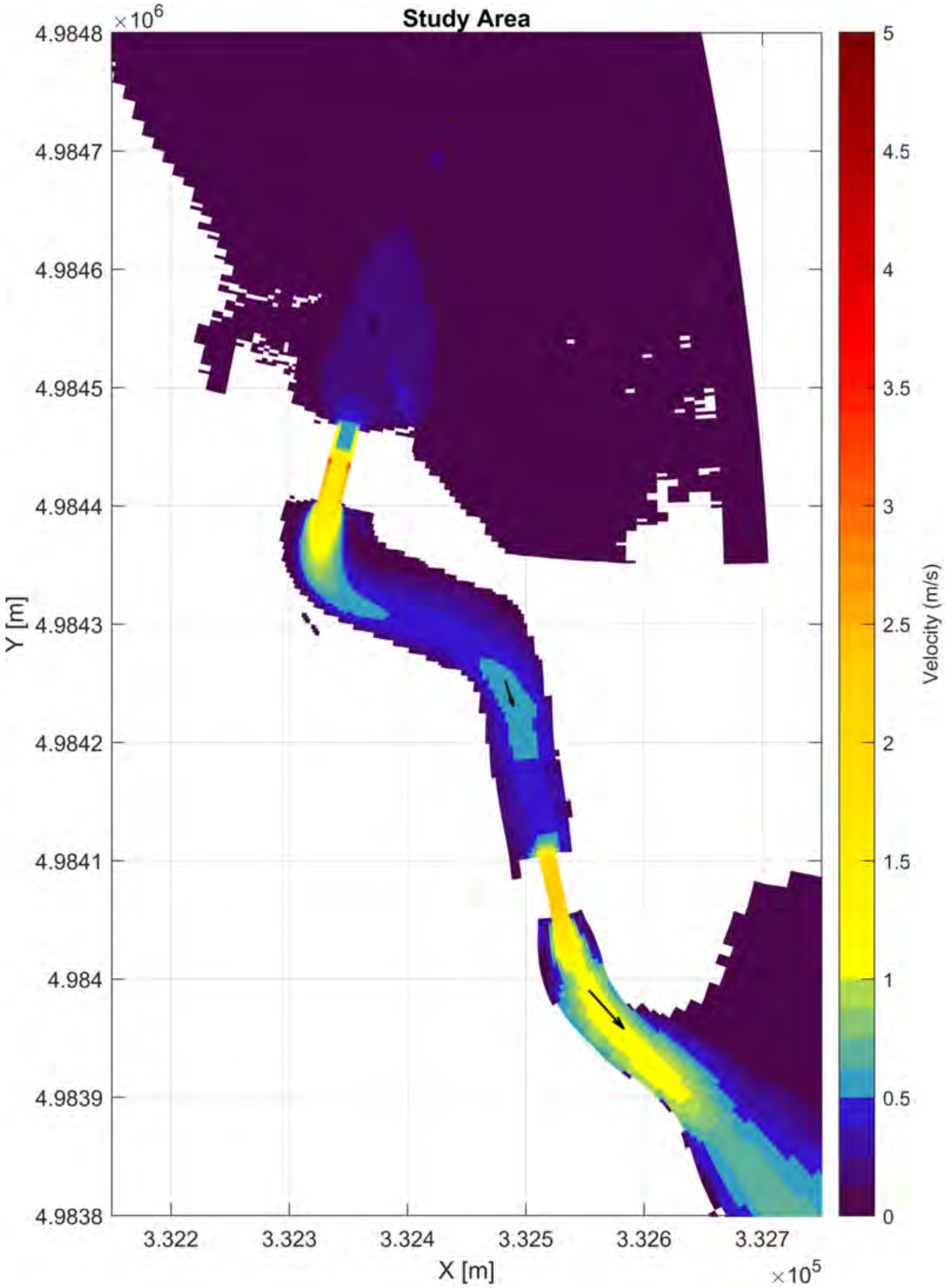




*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A2.63: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Upstream Existing Aboiteau.



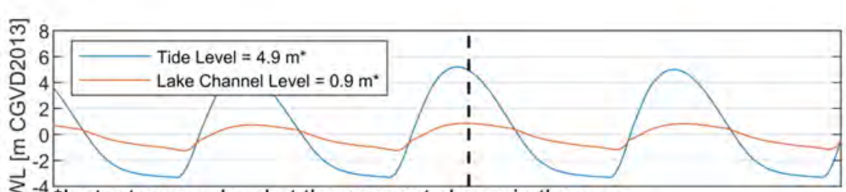
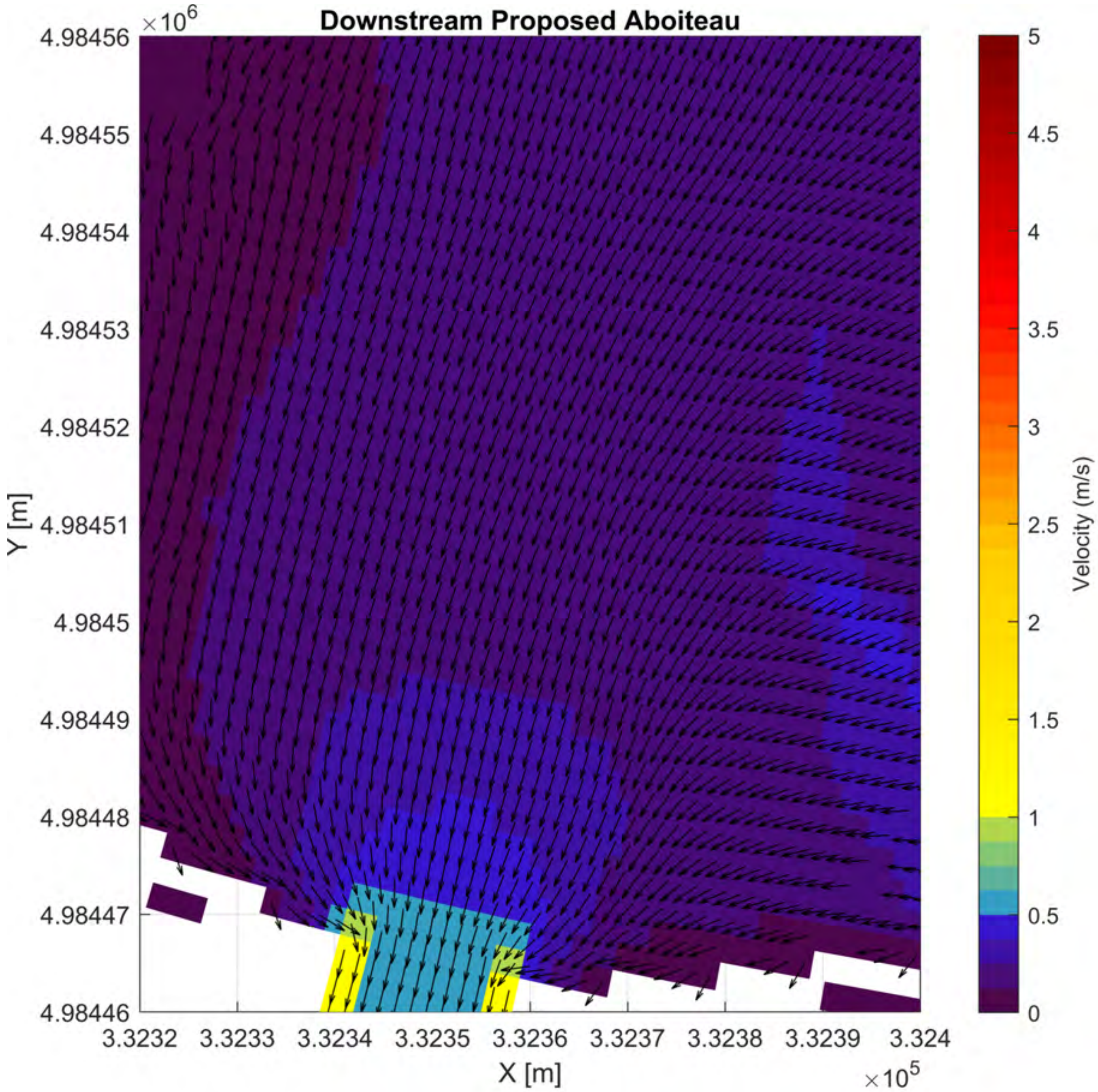
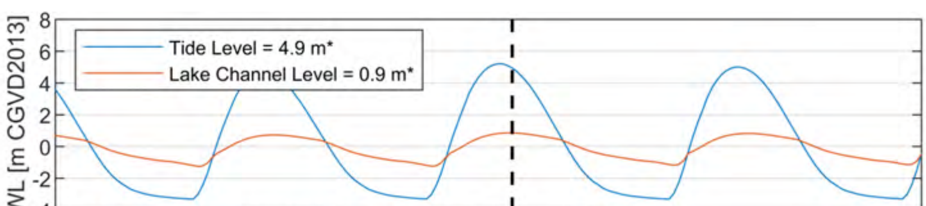


Figure A2.64: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Overall Study Area.





*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A2.65: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Downstream Proposed Aboiteau.

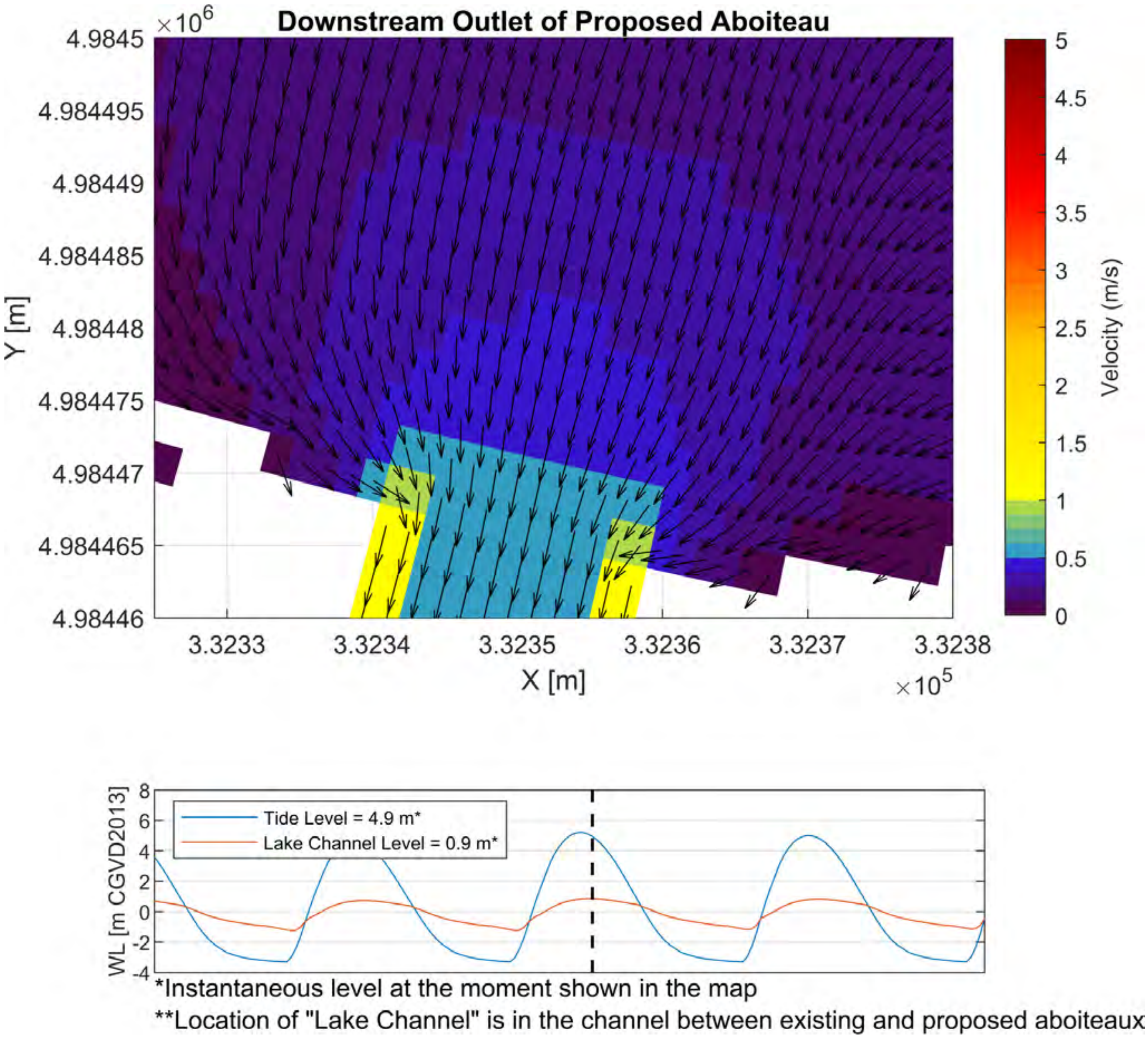


Figure A2.66: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Downstream Outlet of Proposed Aboiteau.

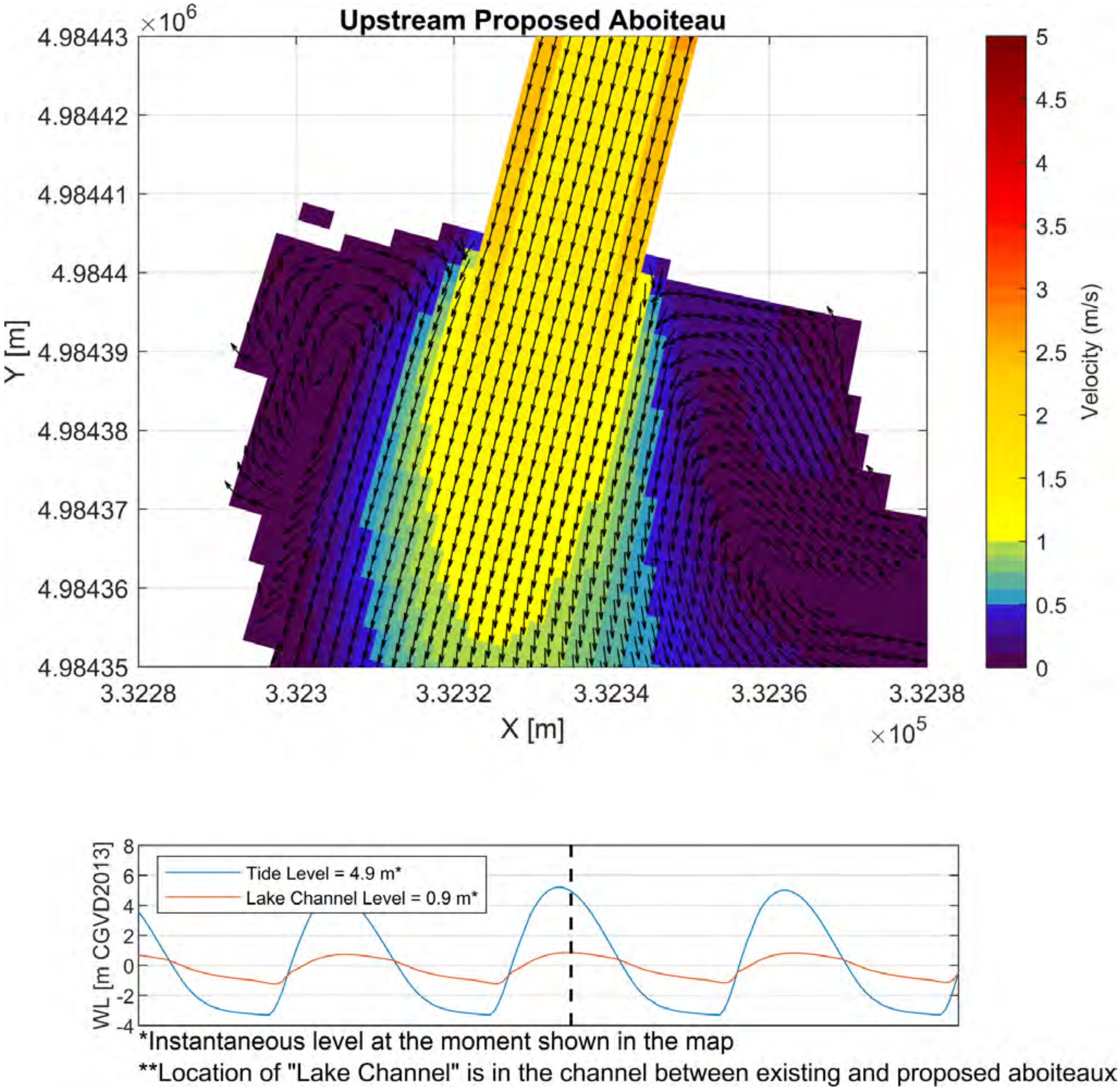


Figure A2.67: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Upstream Proposed Aboiteau.

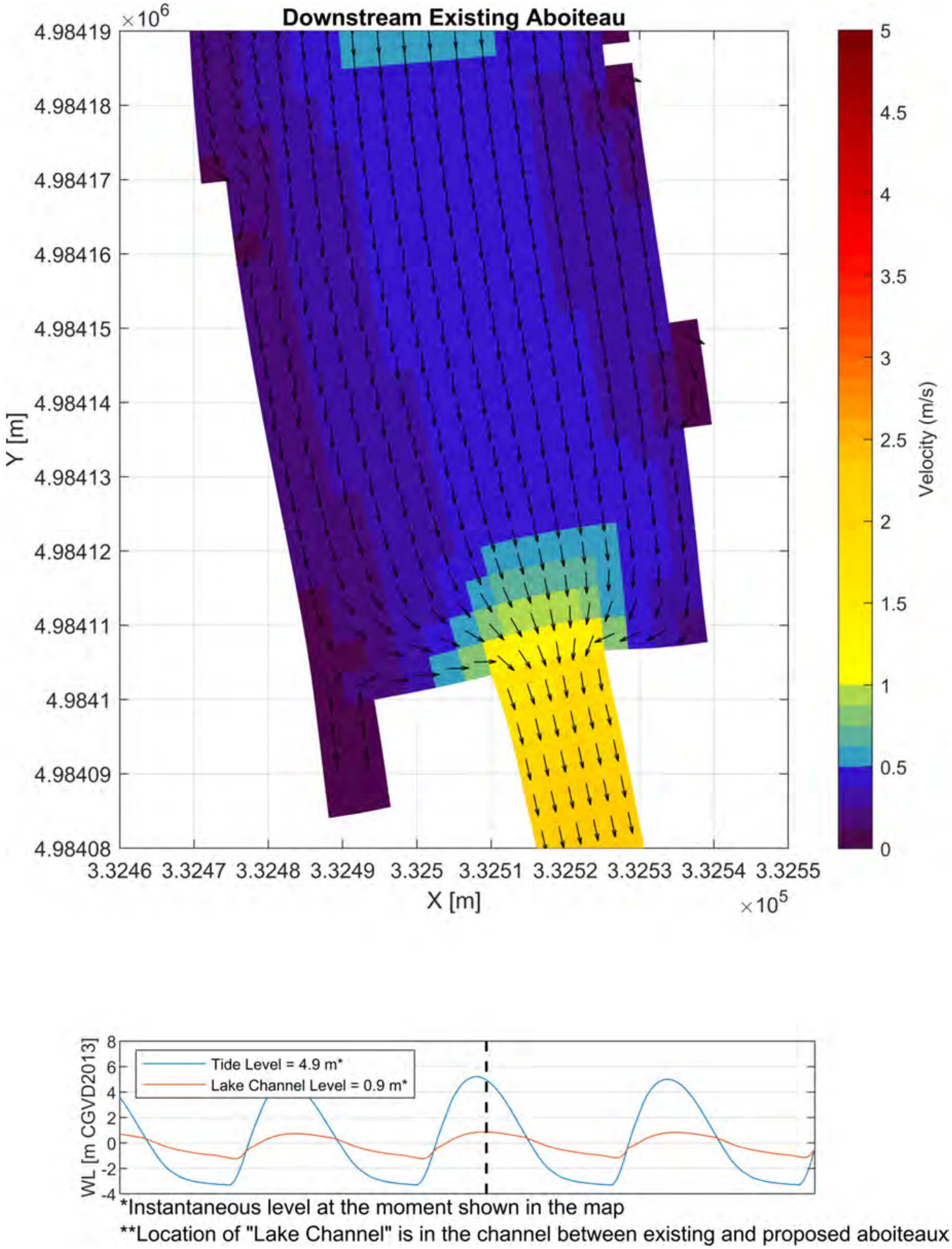


Figure A2.68: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Downstream Existing Aboiteau.

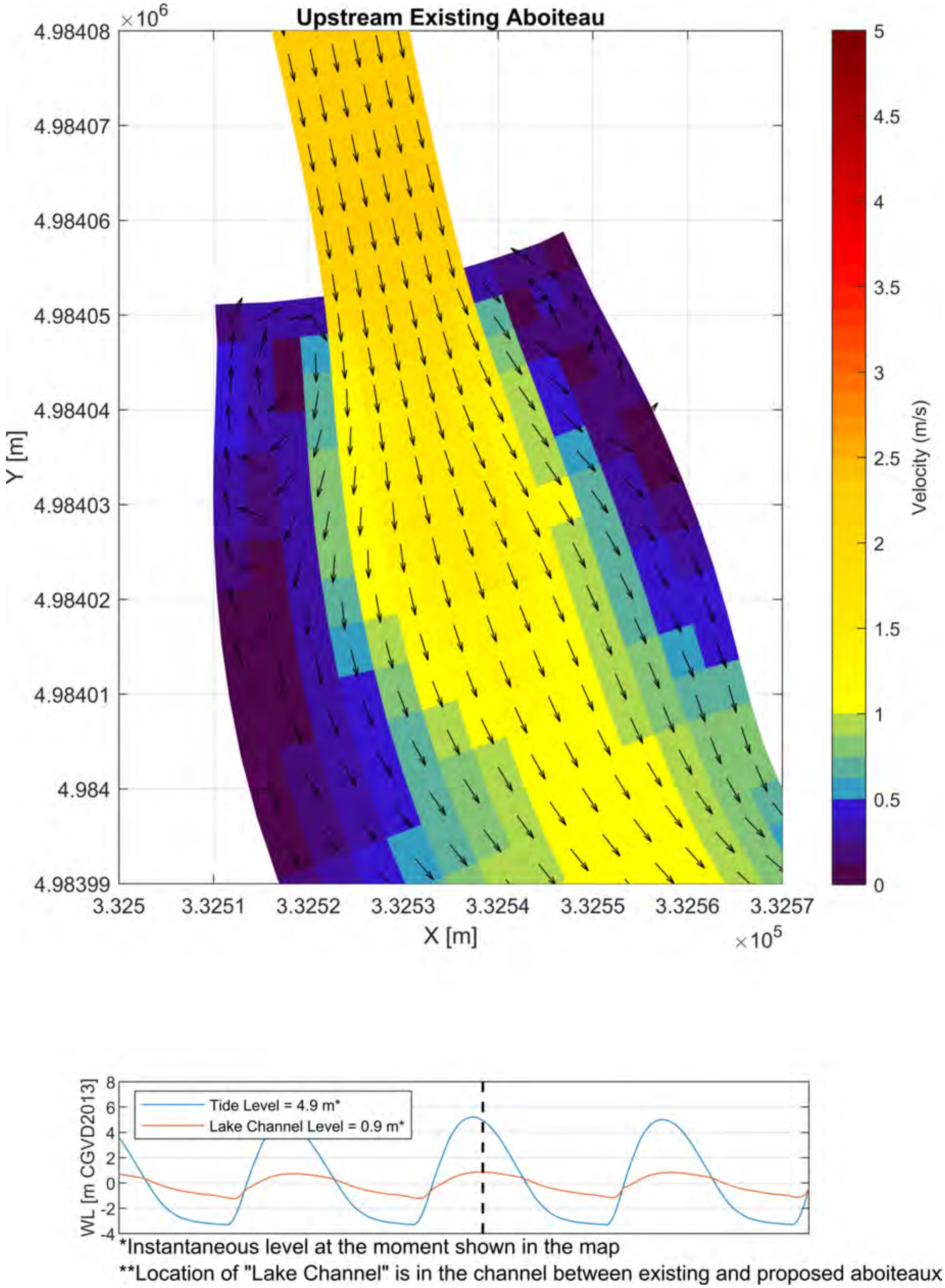
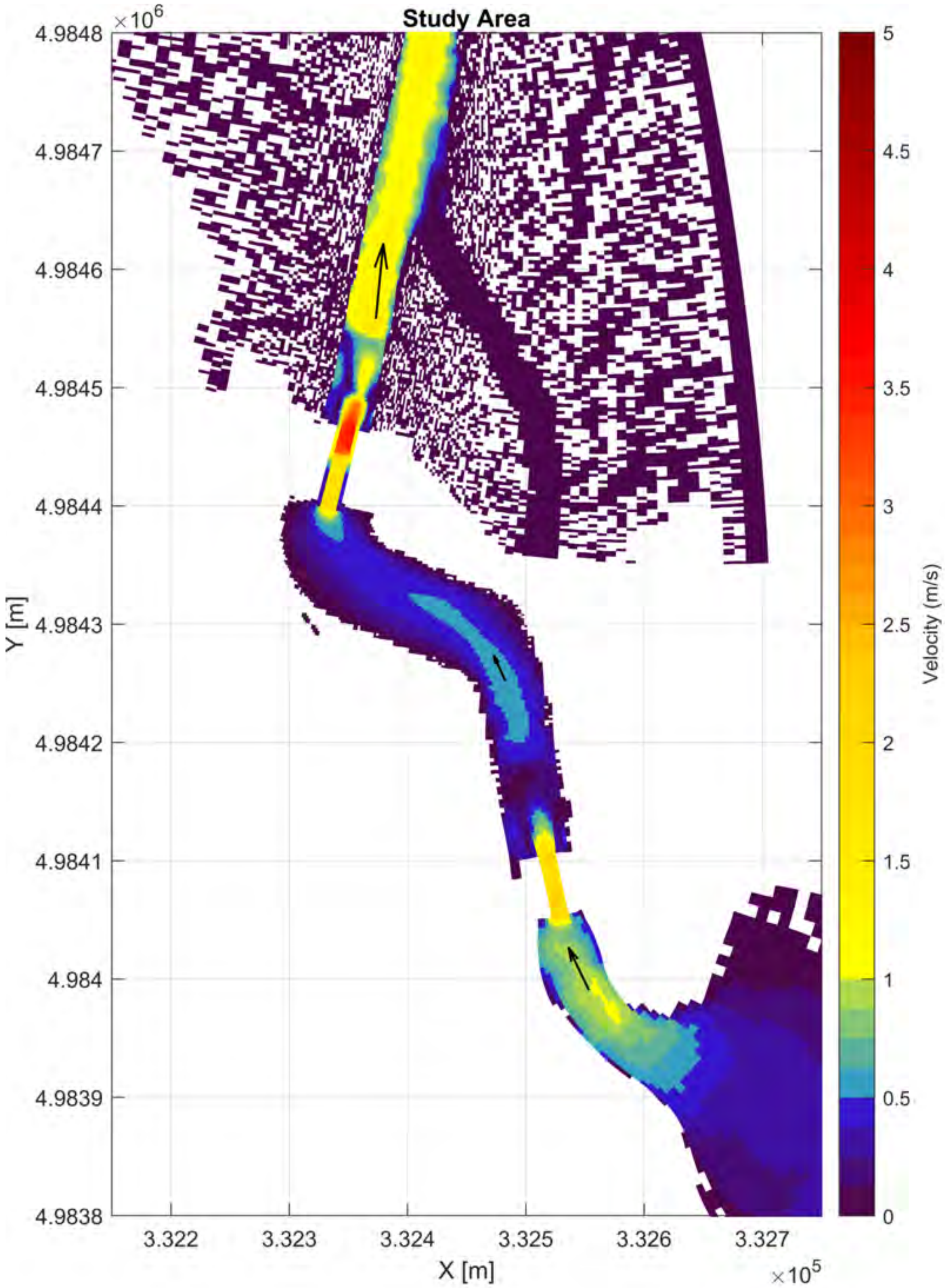


Figure A2.69: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Upstream Existing Aboiteau.



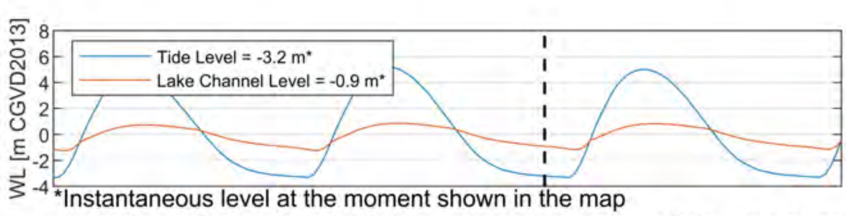
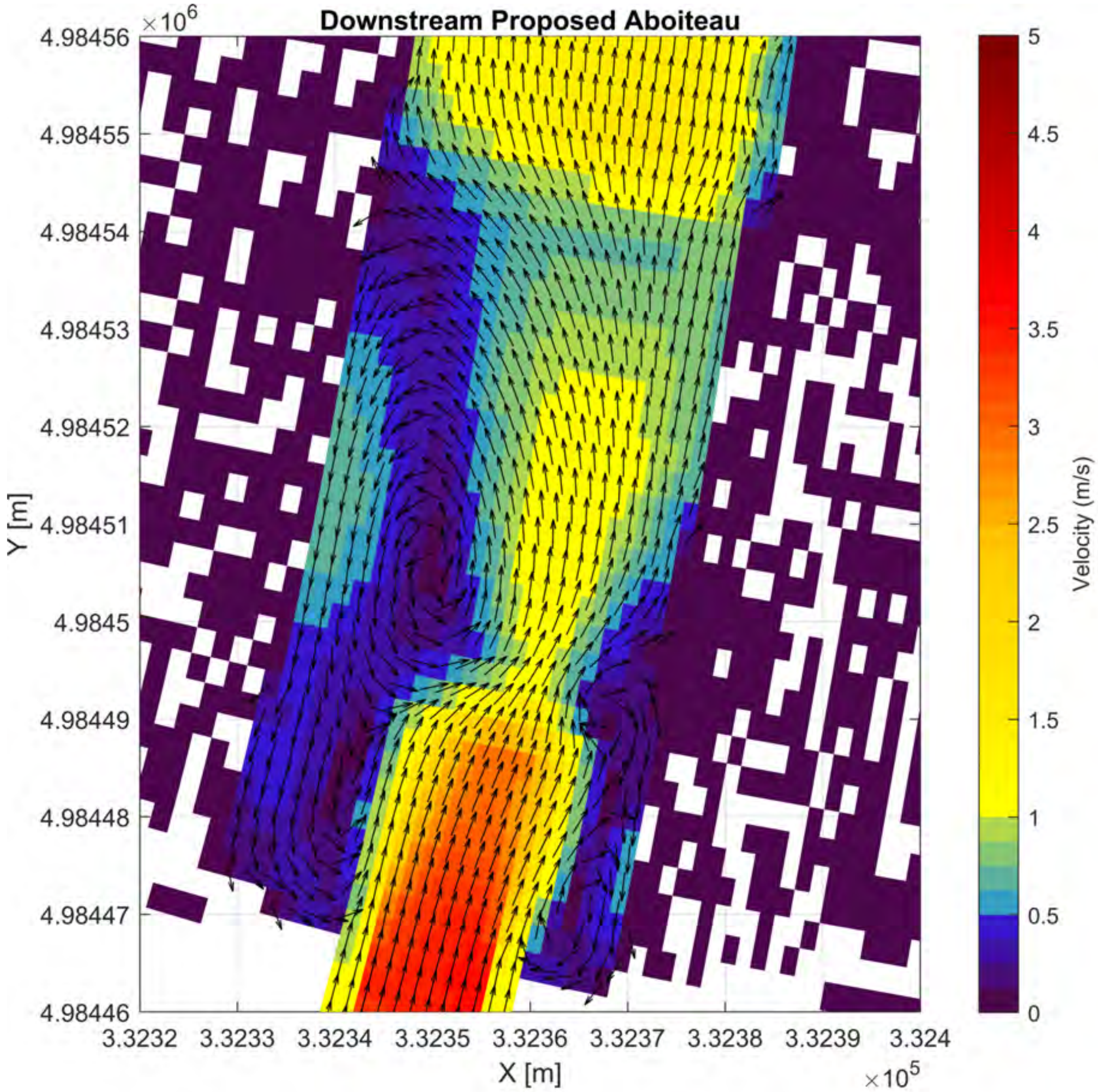
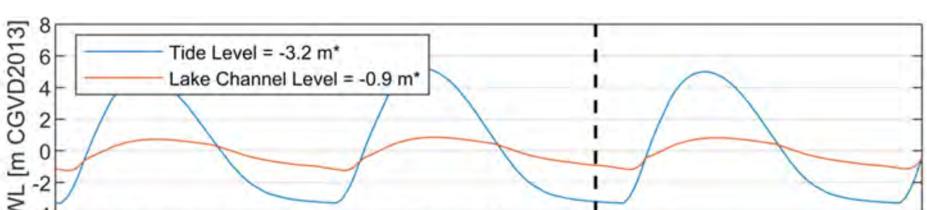


Figure A2.70: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Overall Study Area.





*Instantaneous level at the moment shown in the map
**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A2.71: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Downstream Proposed Aboiteau.

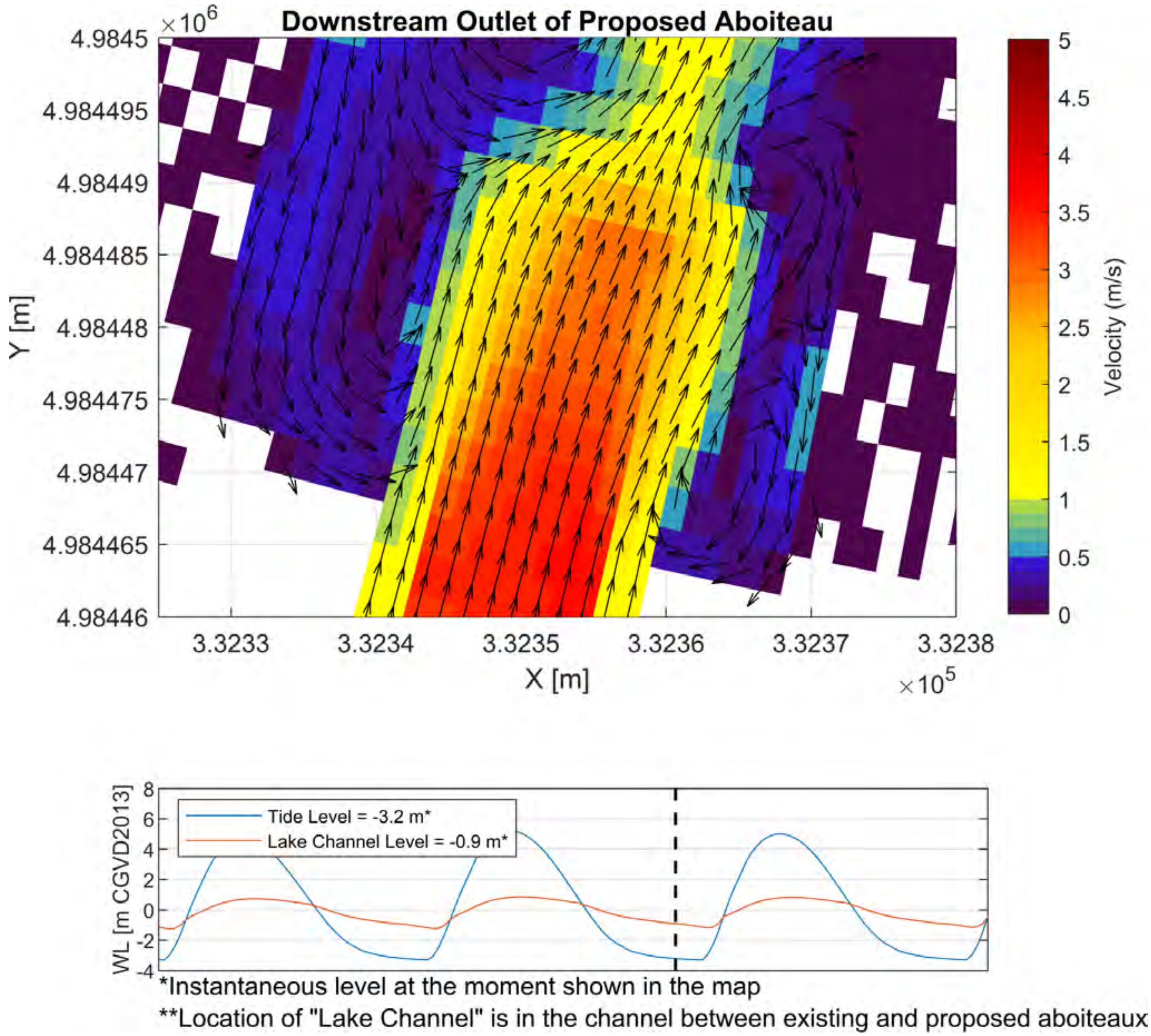


Figure A2.72: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Downstream Outlet of Proposed Aboiteau.

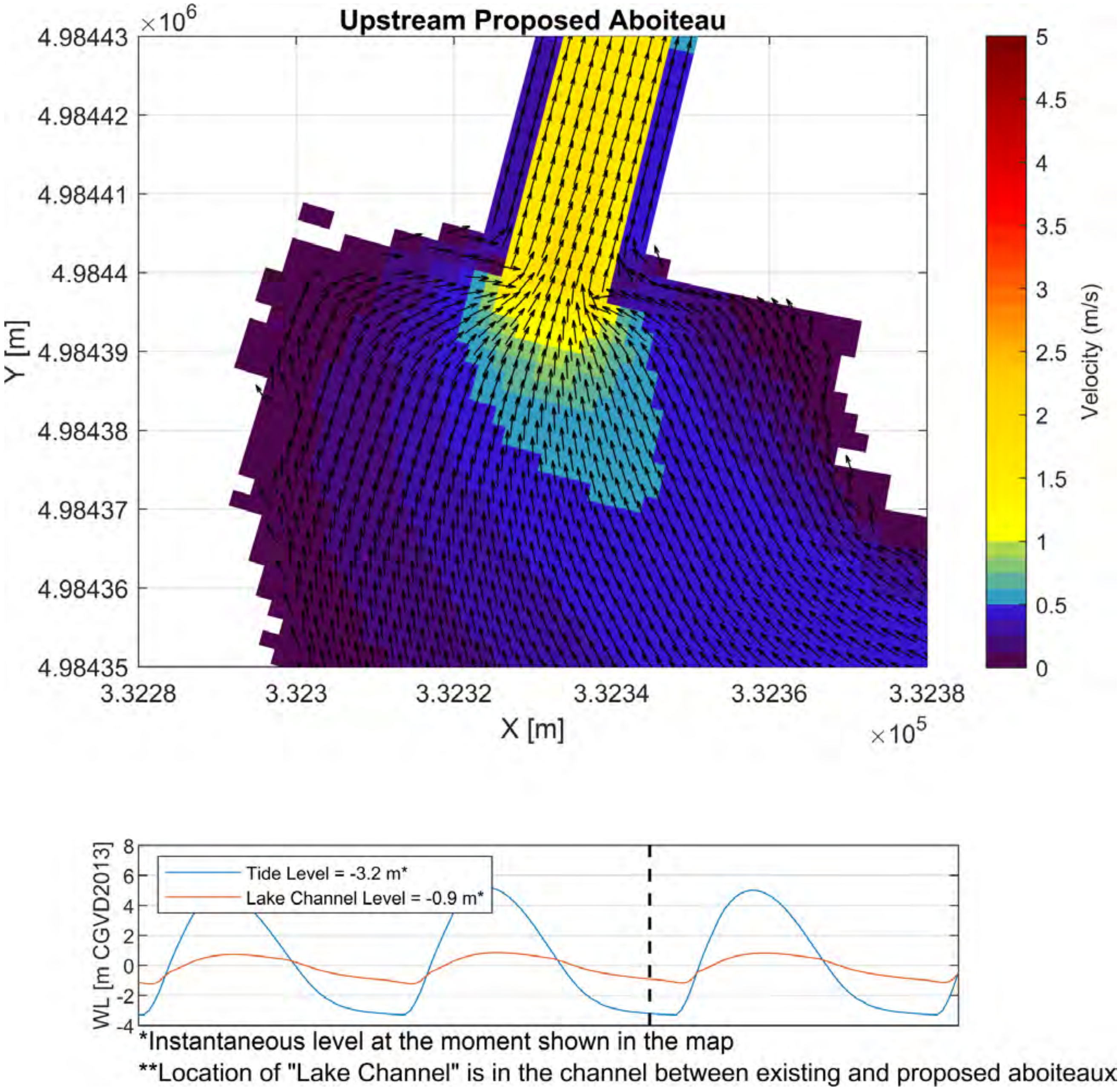
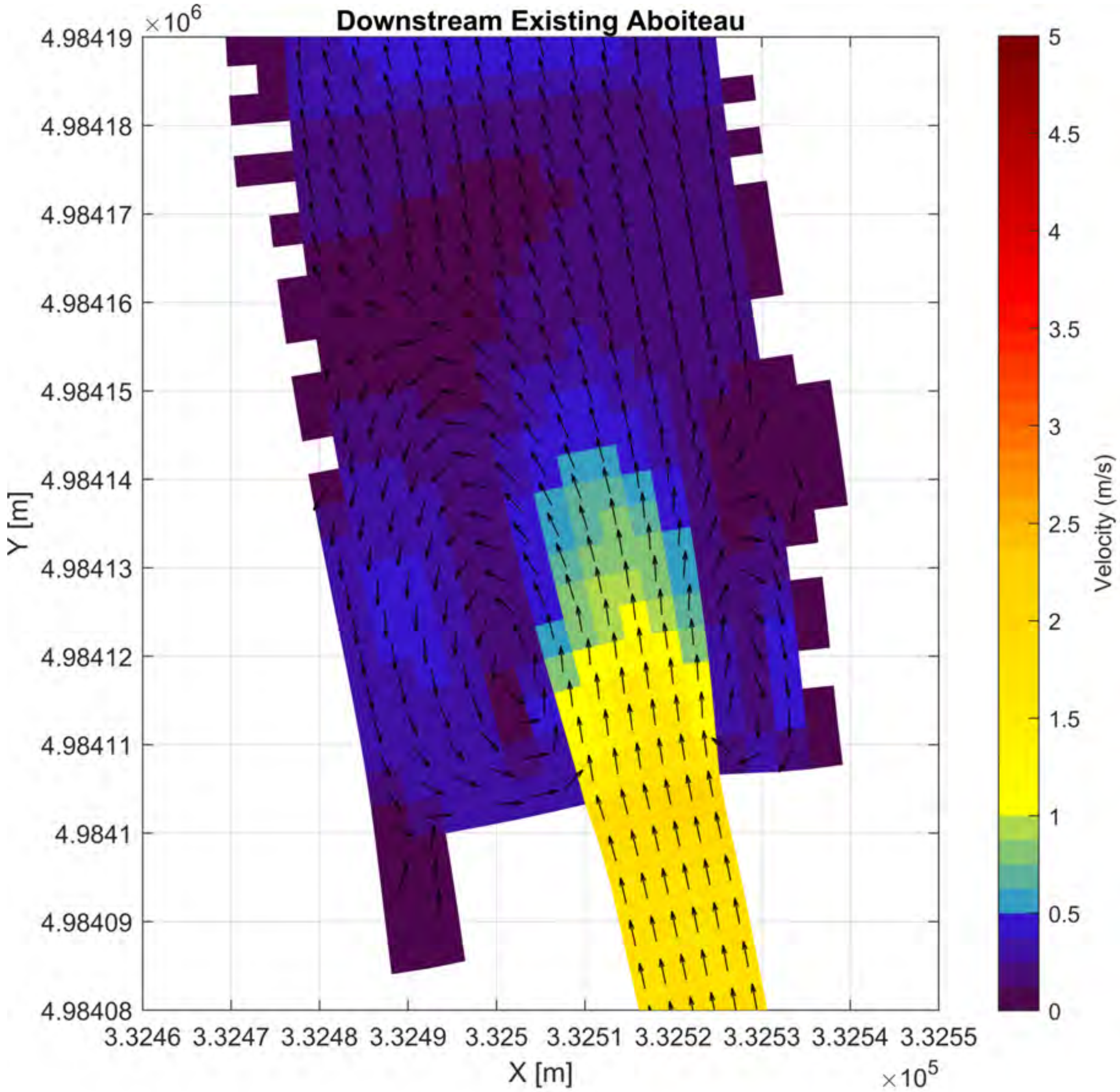


Figure A2.73: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Upstream Proposed Aboiteau.



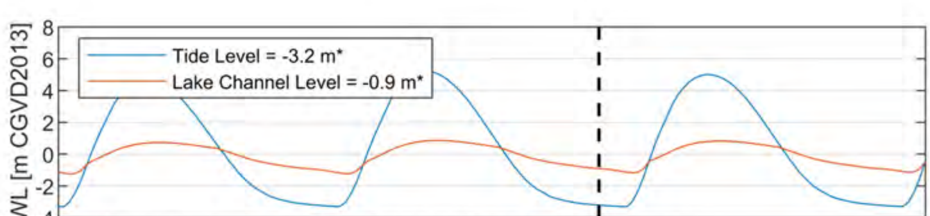
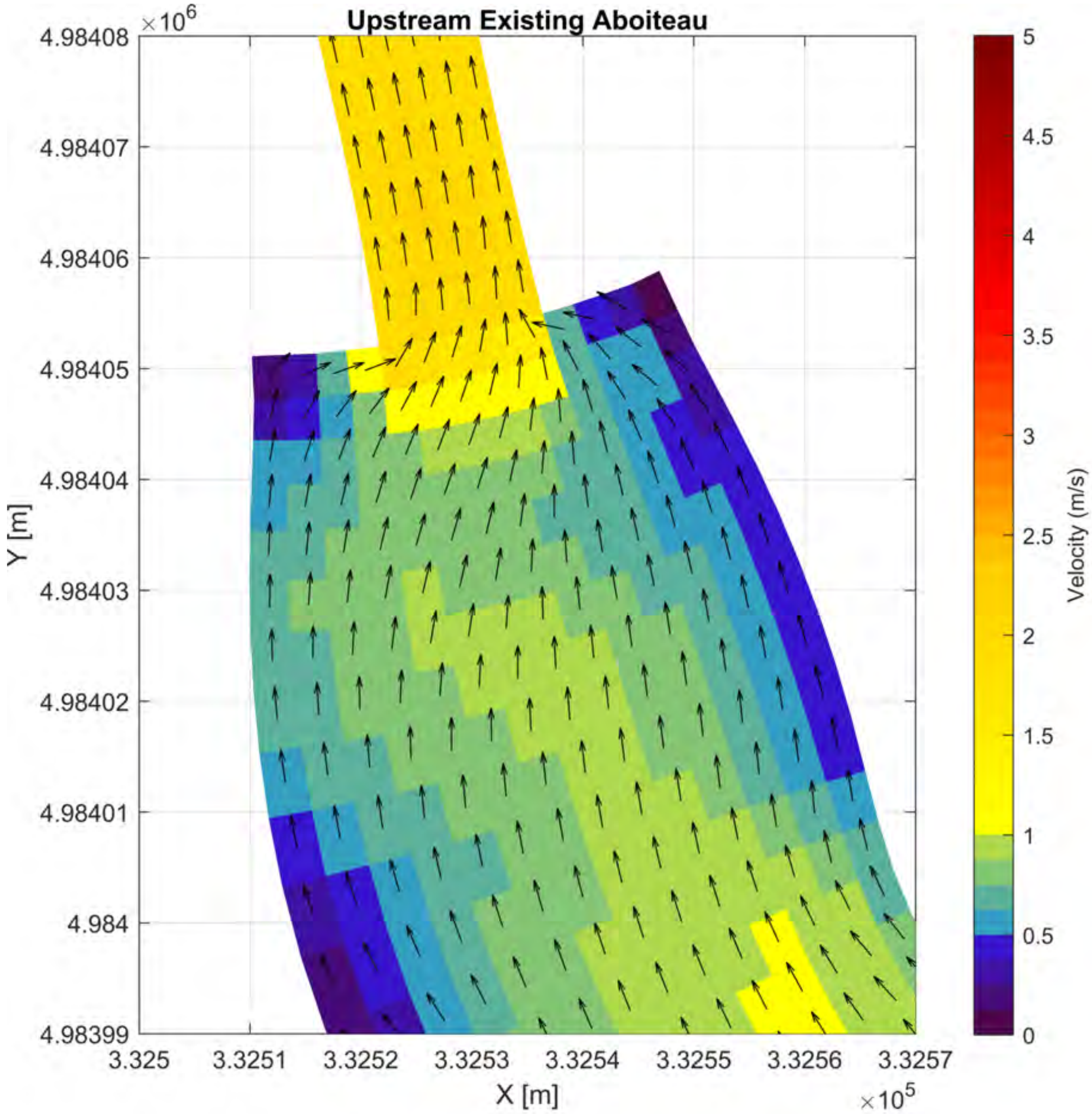
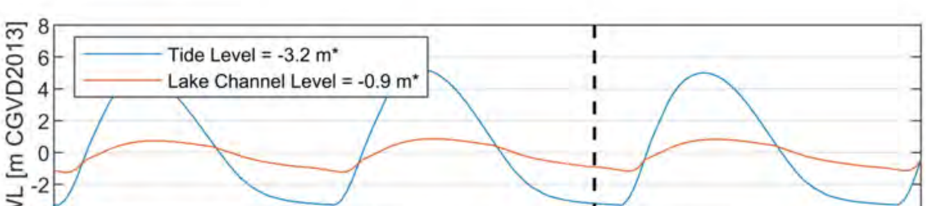


Figure A2.74: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Downstream Existing Aboiteau.





*Instantaneous level at the moment shown in the map
**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A2.75: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Upstream Existing Aboiteau.

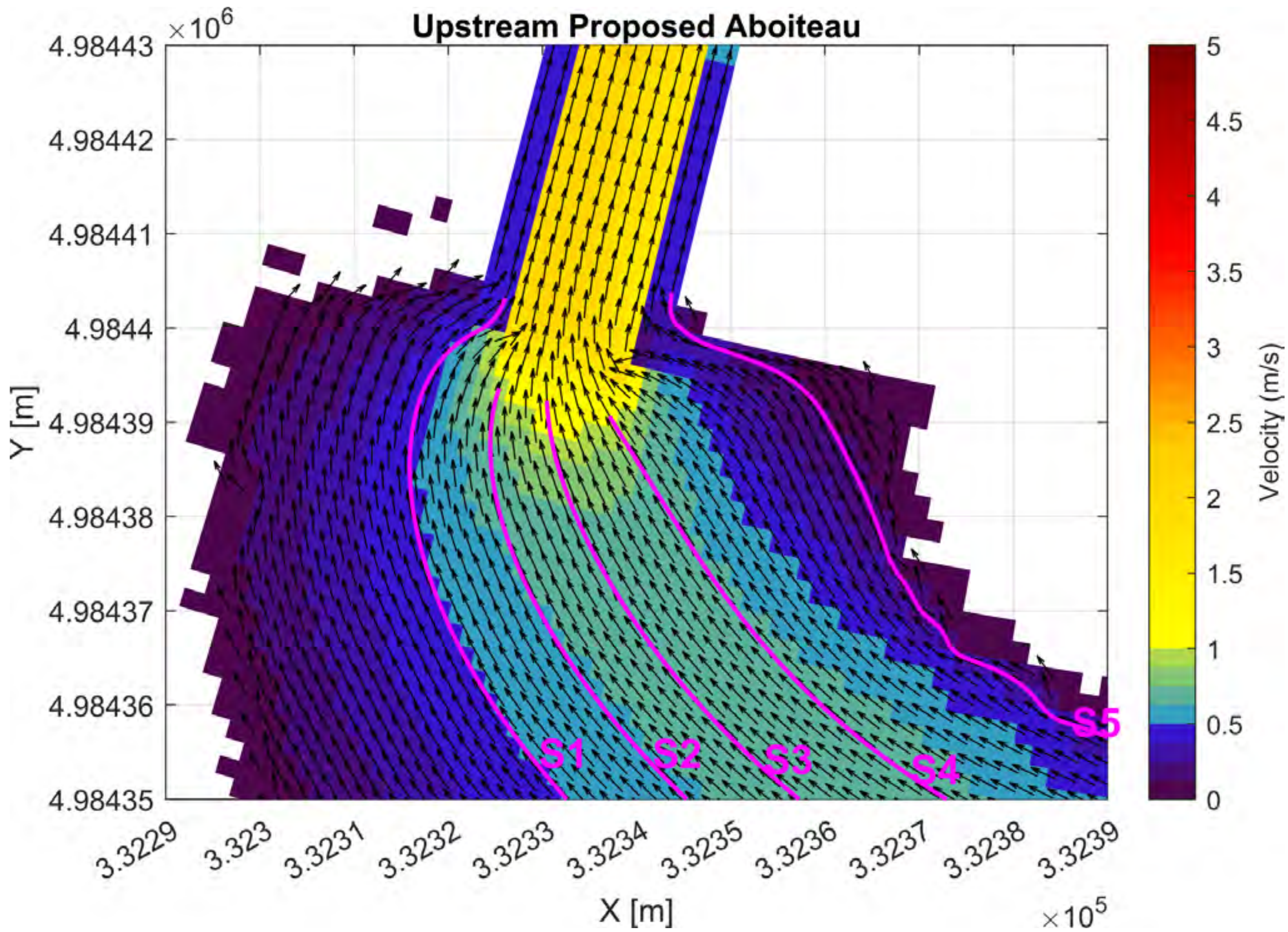


Figure A2.76: Location of Selected Streamlines - Velocities When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide).

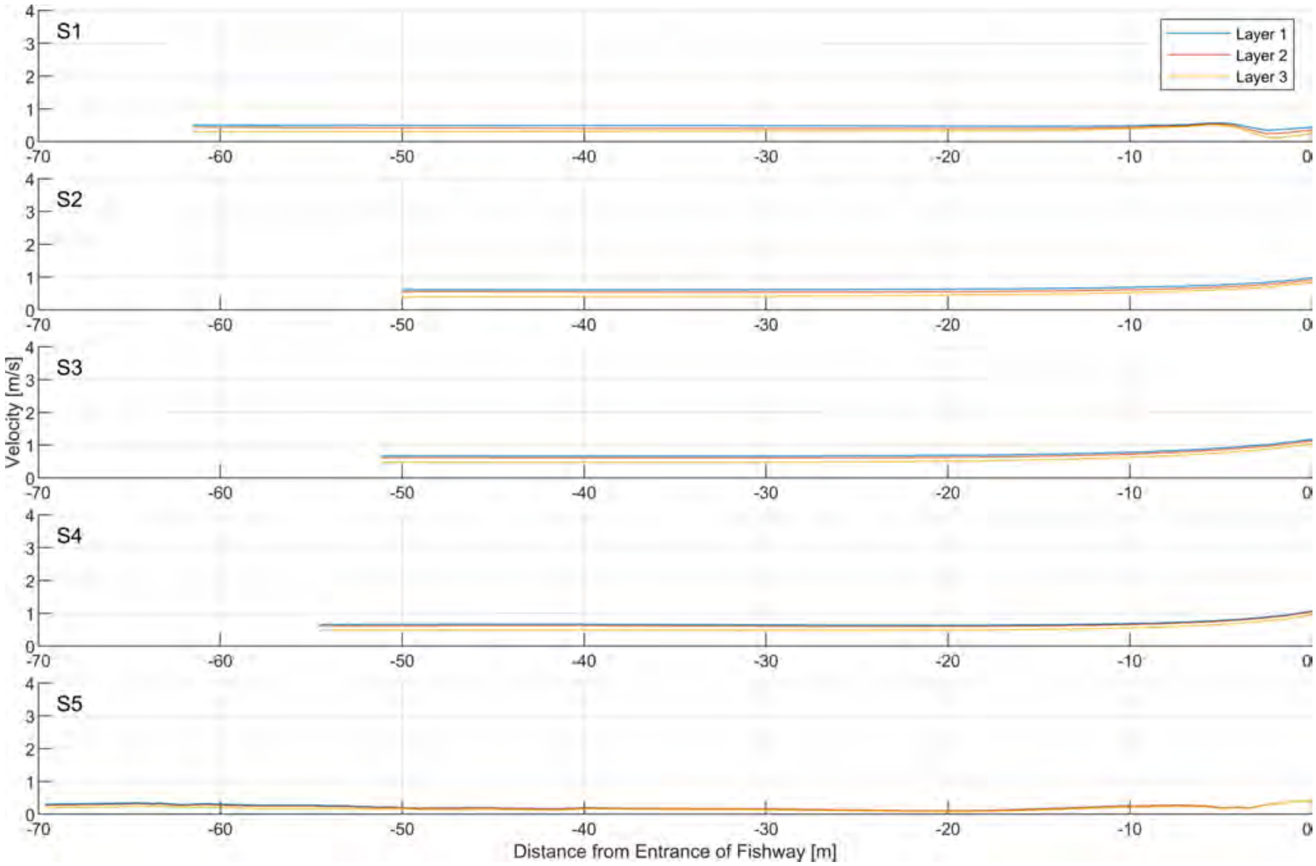


Figure A2.77: Velocity Along Streamlines - When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide).

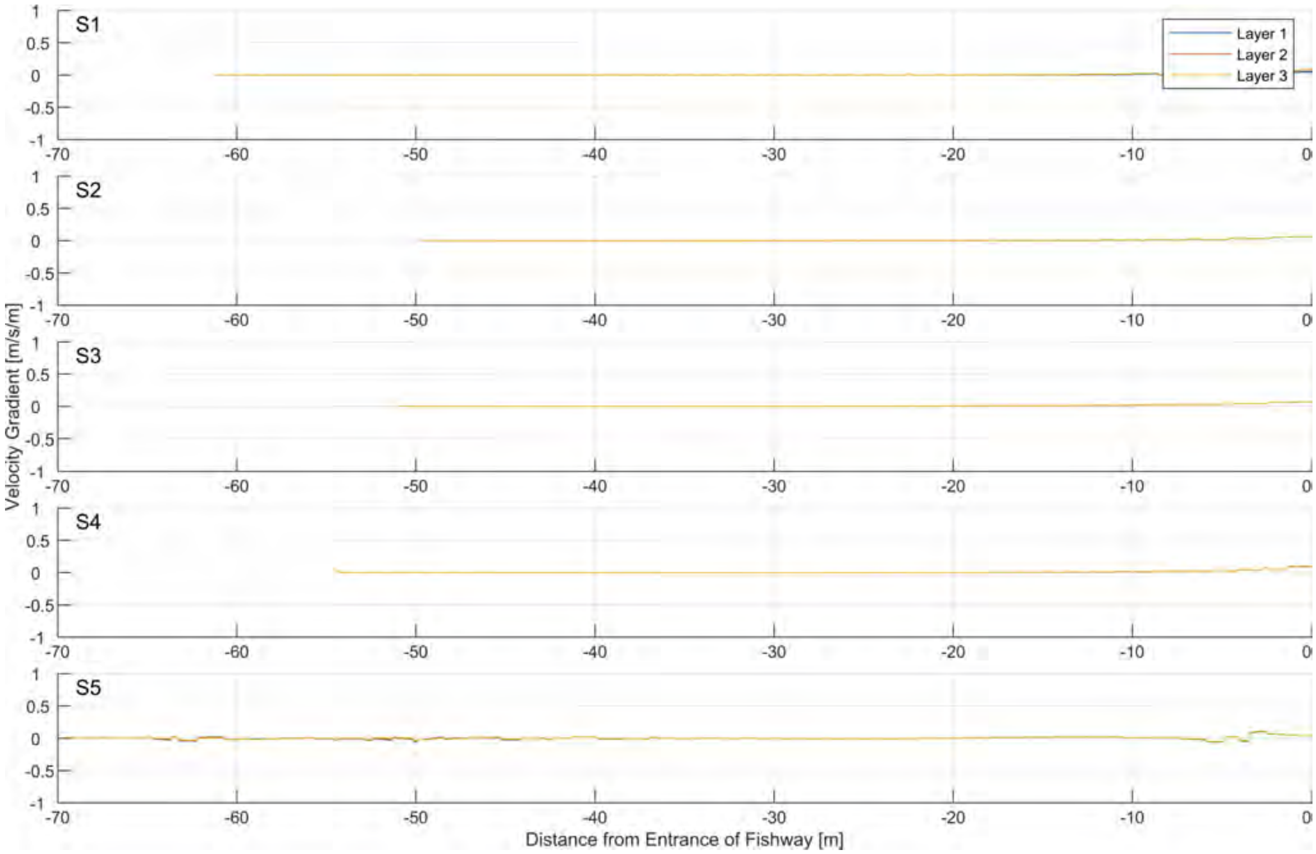


Figure A2.78: Velocity Gradient Along Streamlines - When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide).

A3 Removal of Existing Aboiteau - Brackish

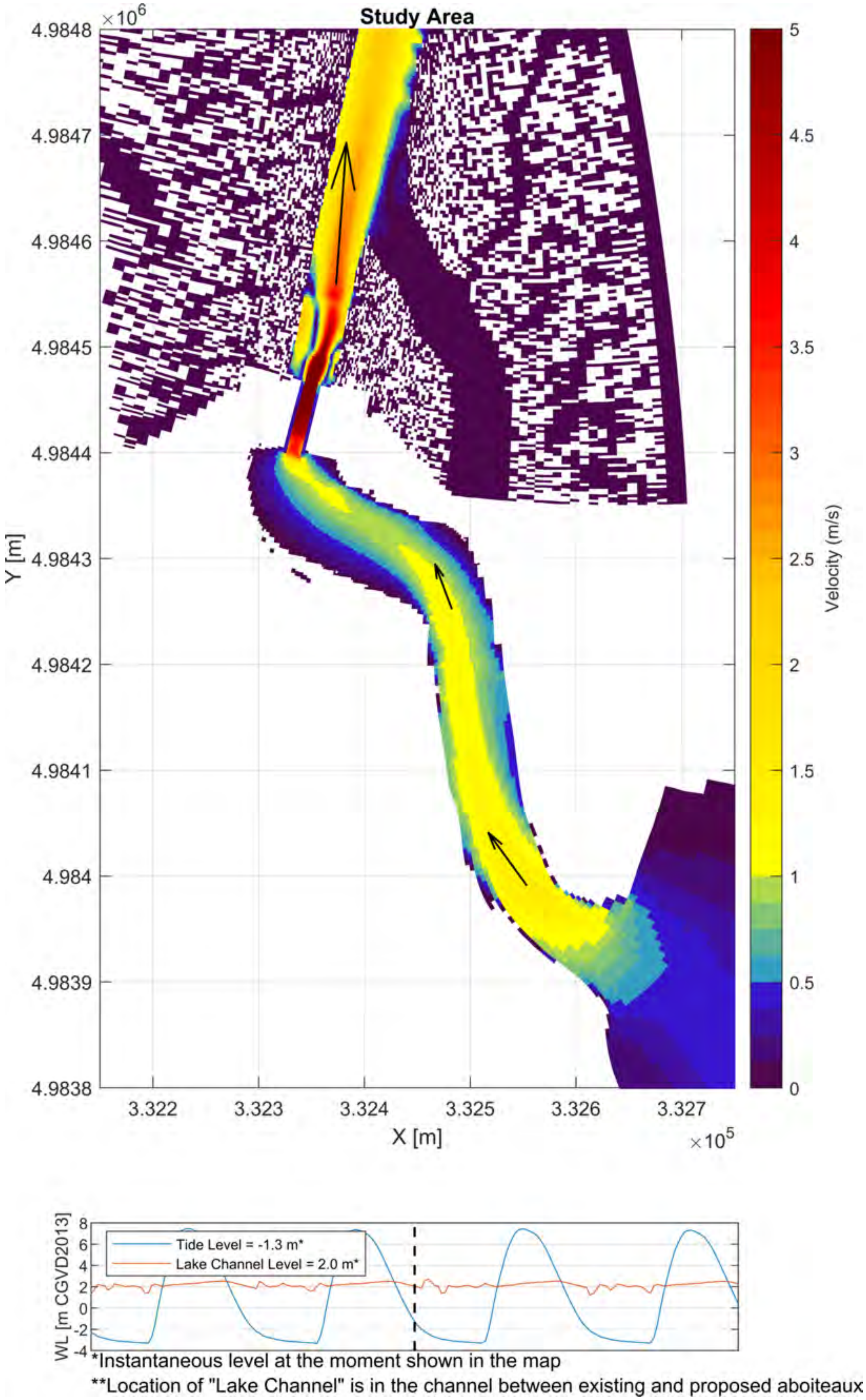


Figure A3.1: Map of Velocities for Top Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Overall Study Area.

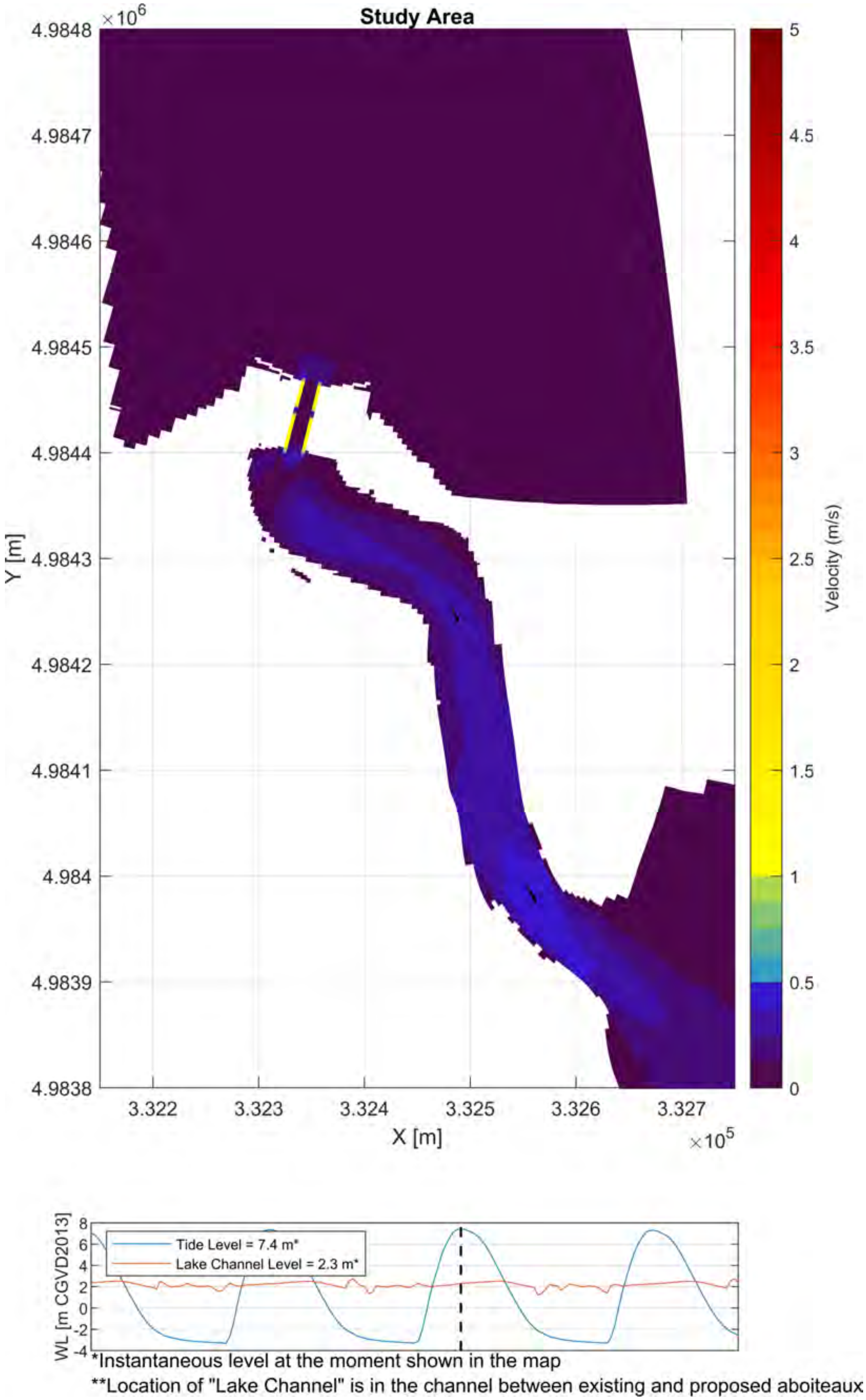


Figure A3.2: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Overall Study Area.

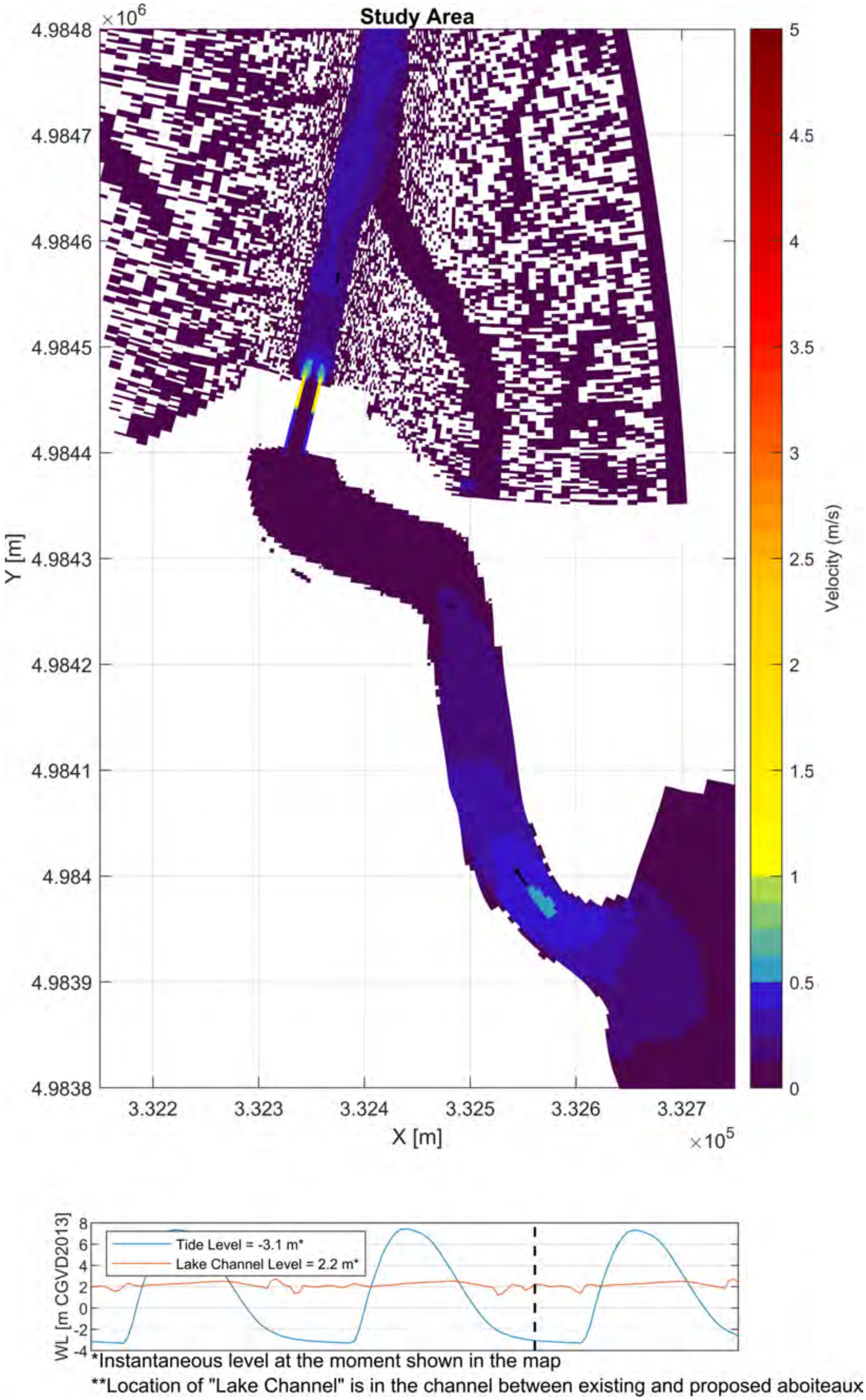


Figure A3.3: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Overall Study Area.

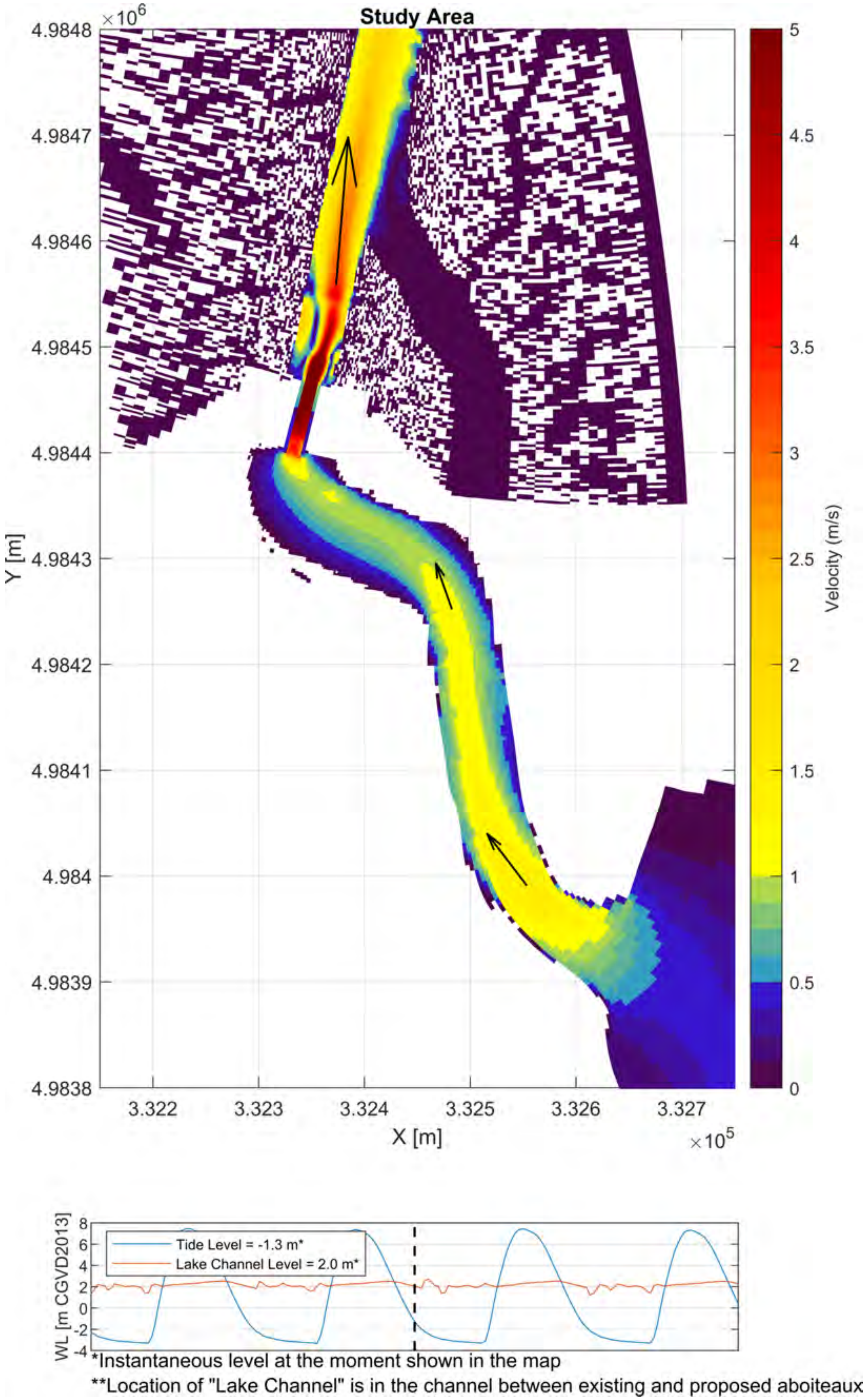


Figure A3.4: Map of Velocities for Middle Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Overall Study Area.

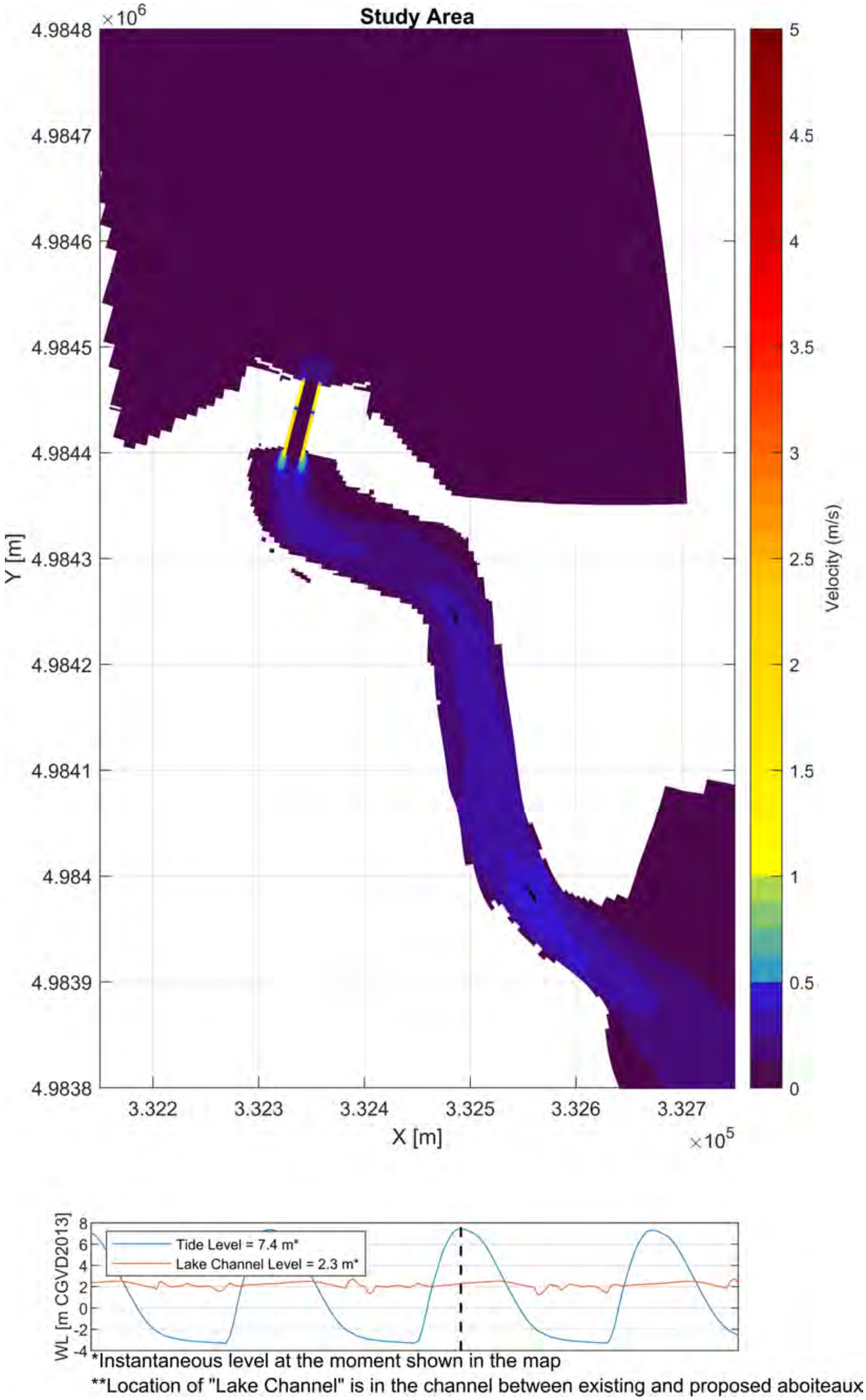
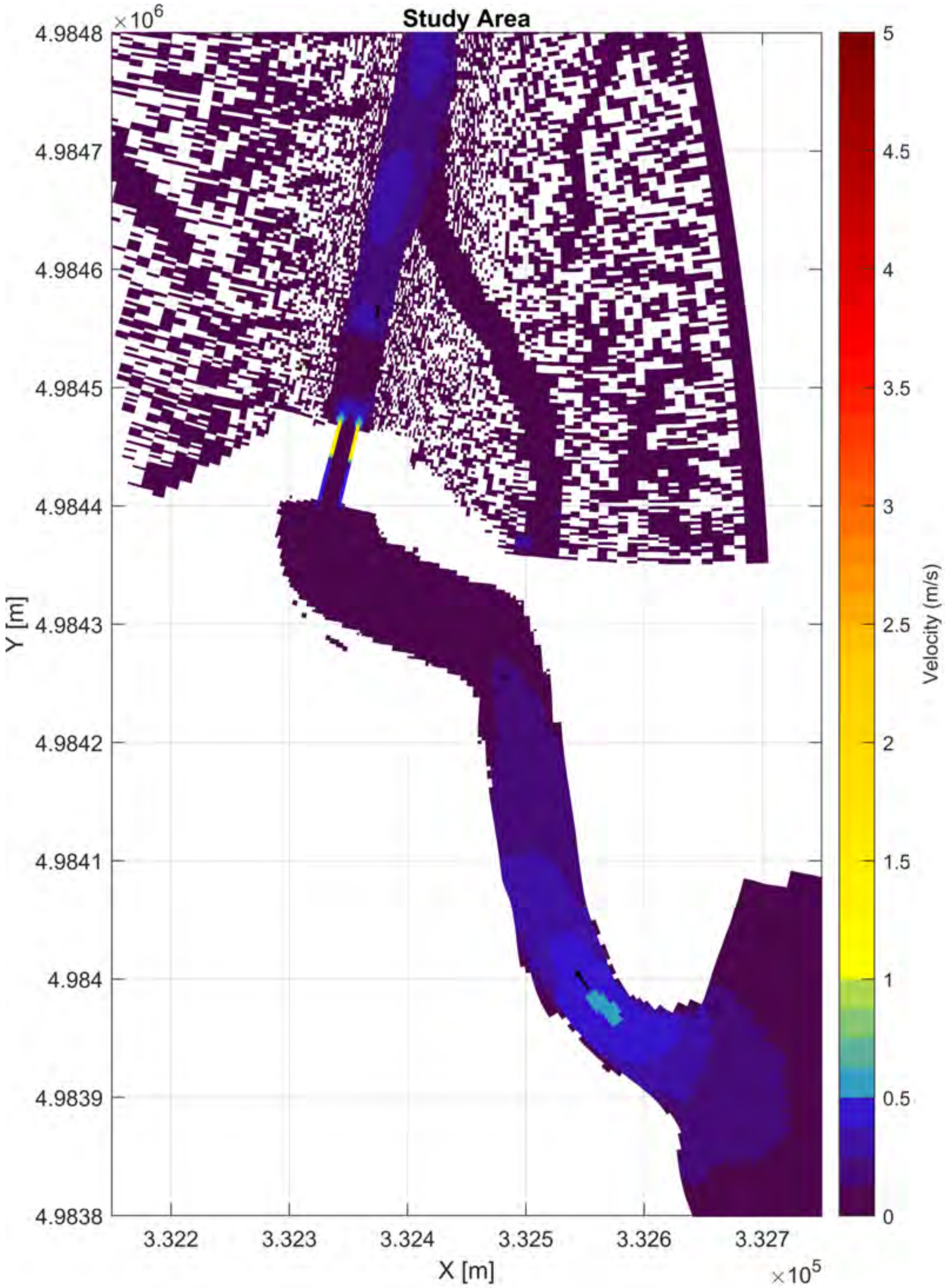
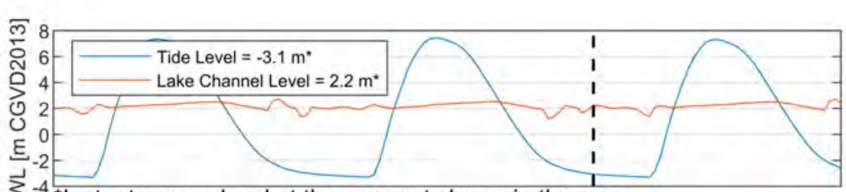


Figure A3.5: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Overall Study Area.





*Instantaneous level at the moment shown in the map

**Location of "Lake Channel" is in the channel between existing and proposed aboiteaux

Figure A3.6: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Overall Study Area.

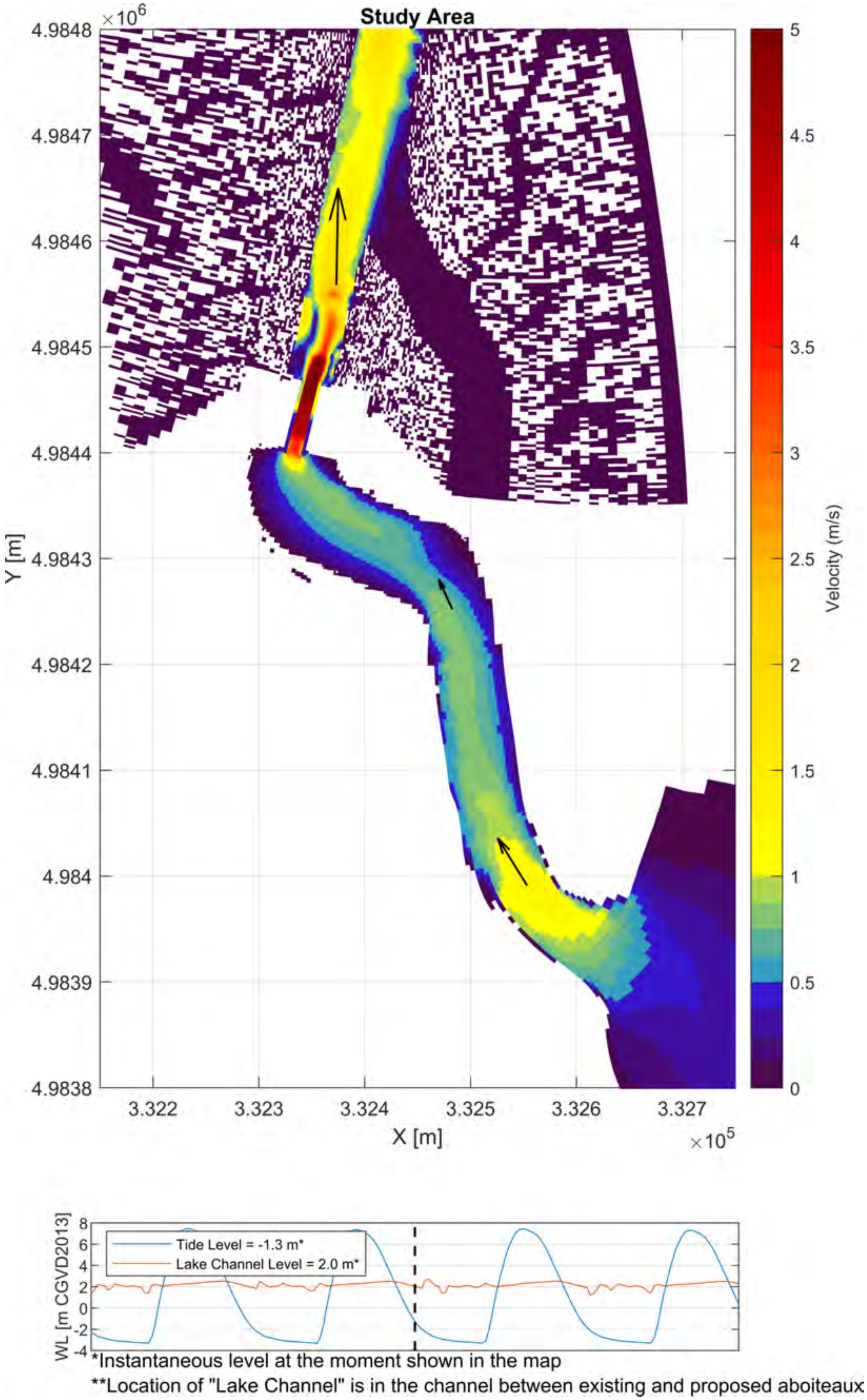


Figure A3.7: Map of Velocities for Bottom Layer When the Active Gates are Open for the Brackish Scenario (Wet Conditions) - Overall Study Area.

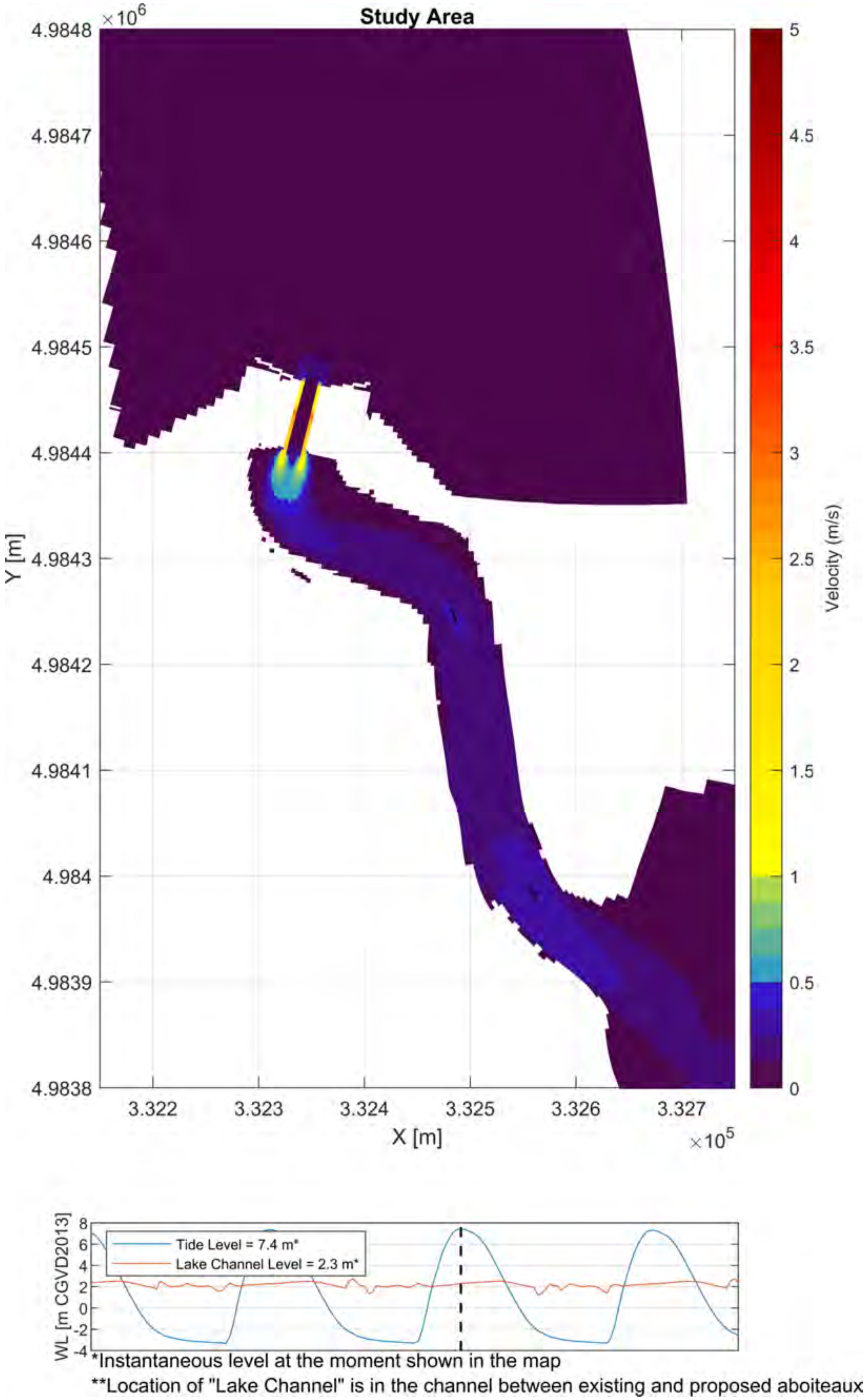


Figure A3.8: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Wet Conditions) - Overall Study Area.

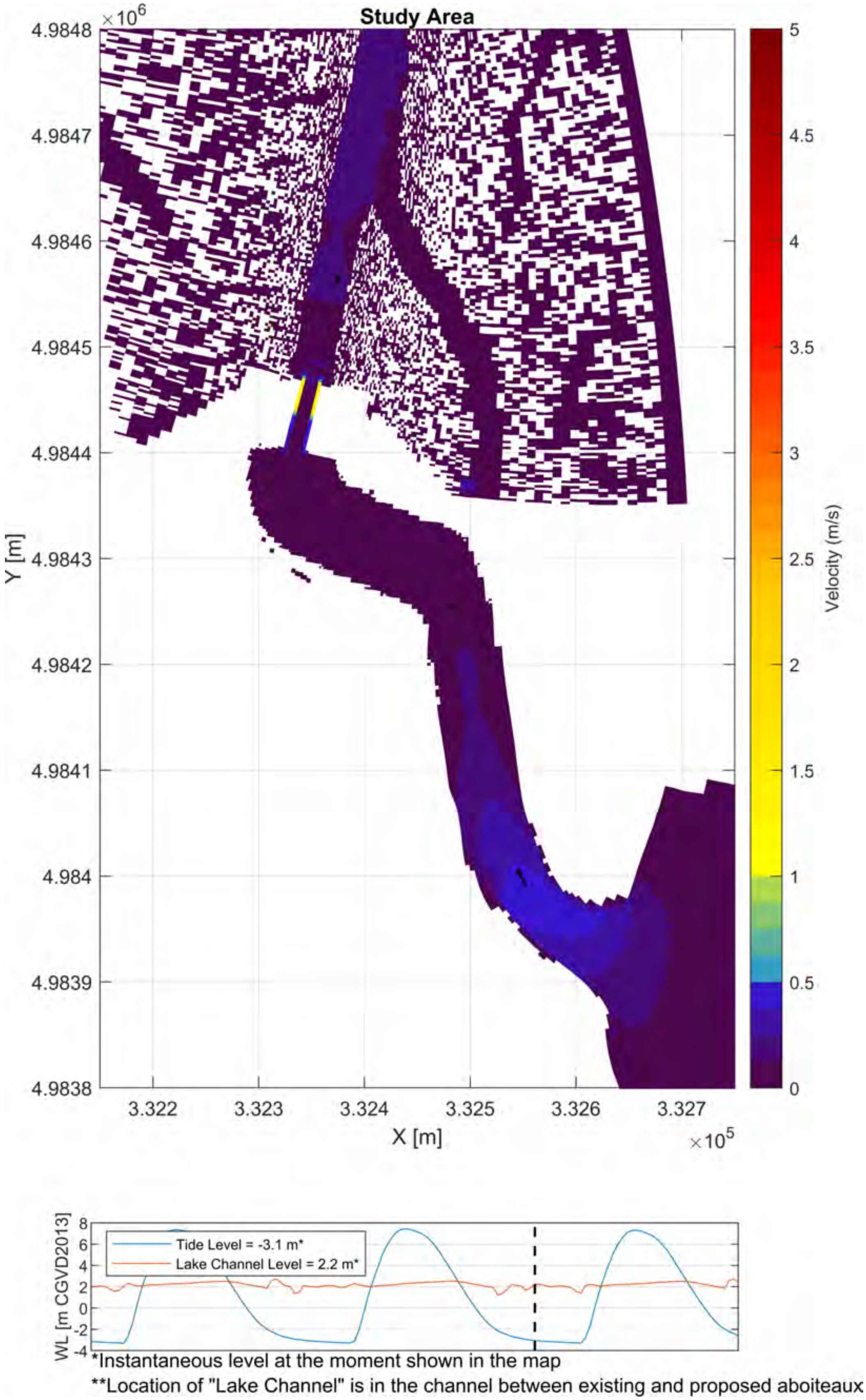


Figure A3.9: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Wet Conditions) - Overall Study Area.

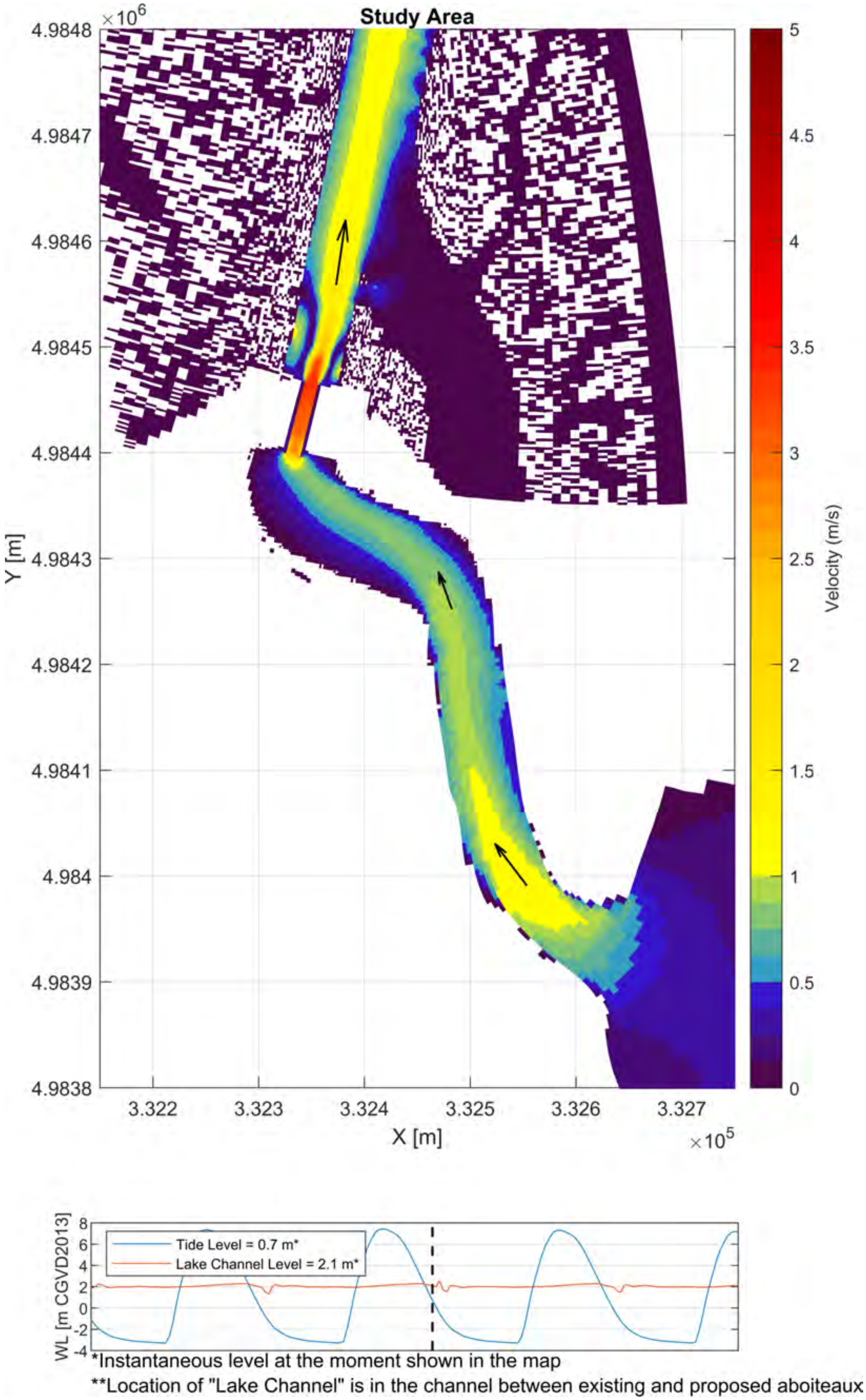


Figure A3.10: Map of Velocities for Top Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Overall Study Area.

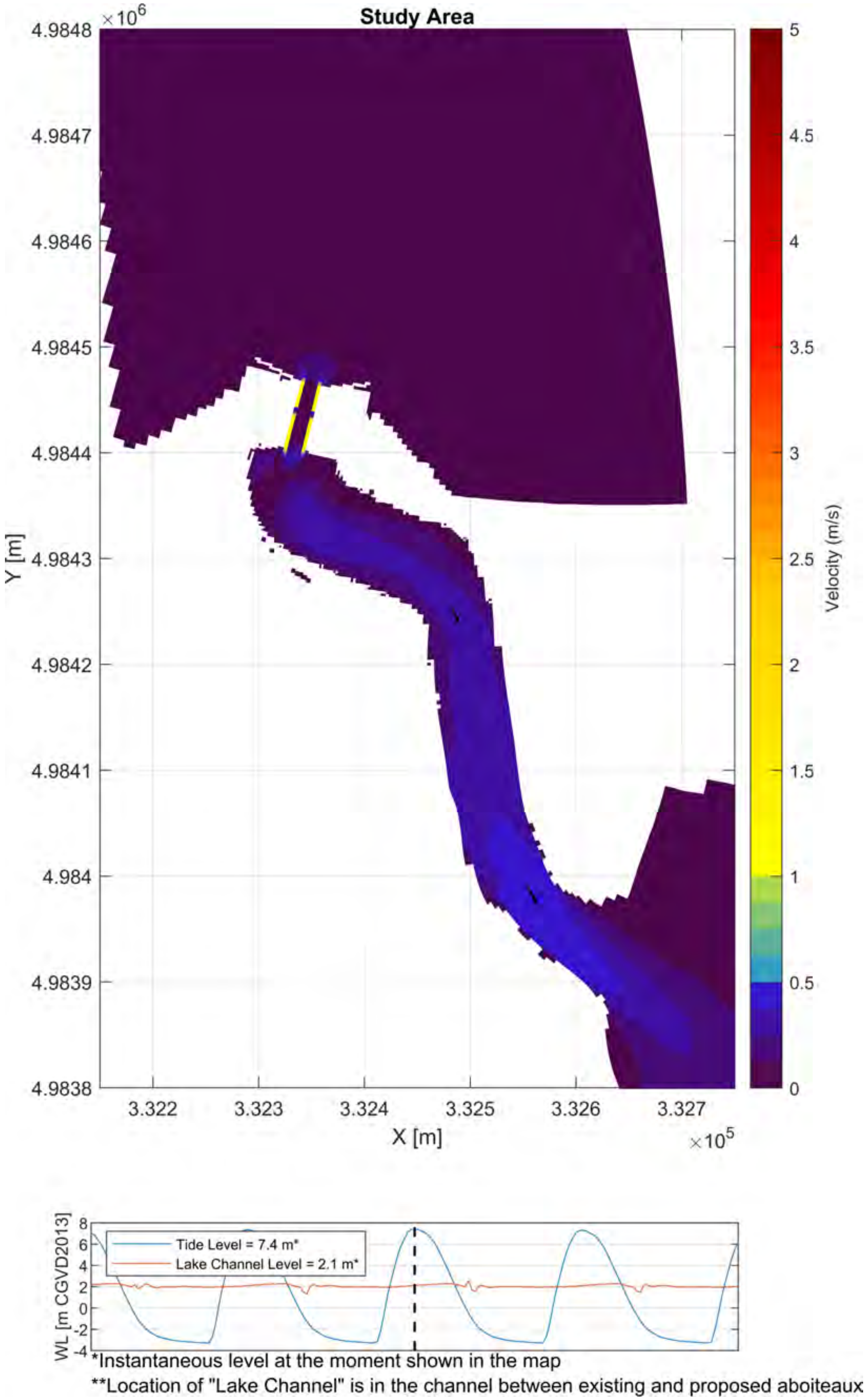


Figure A3.11: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Overall Study Area.

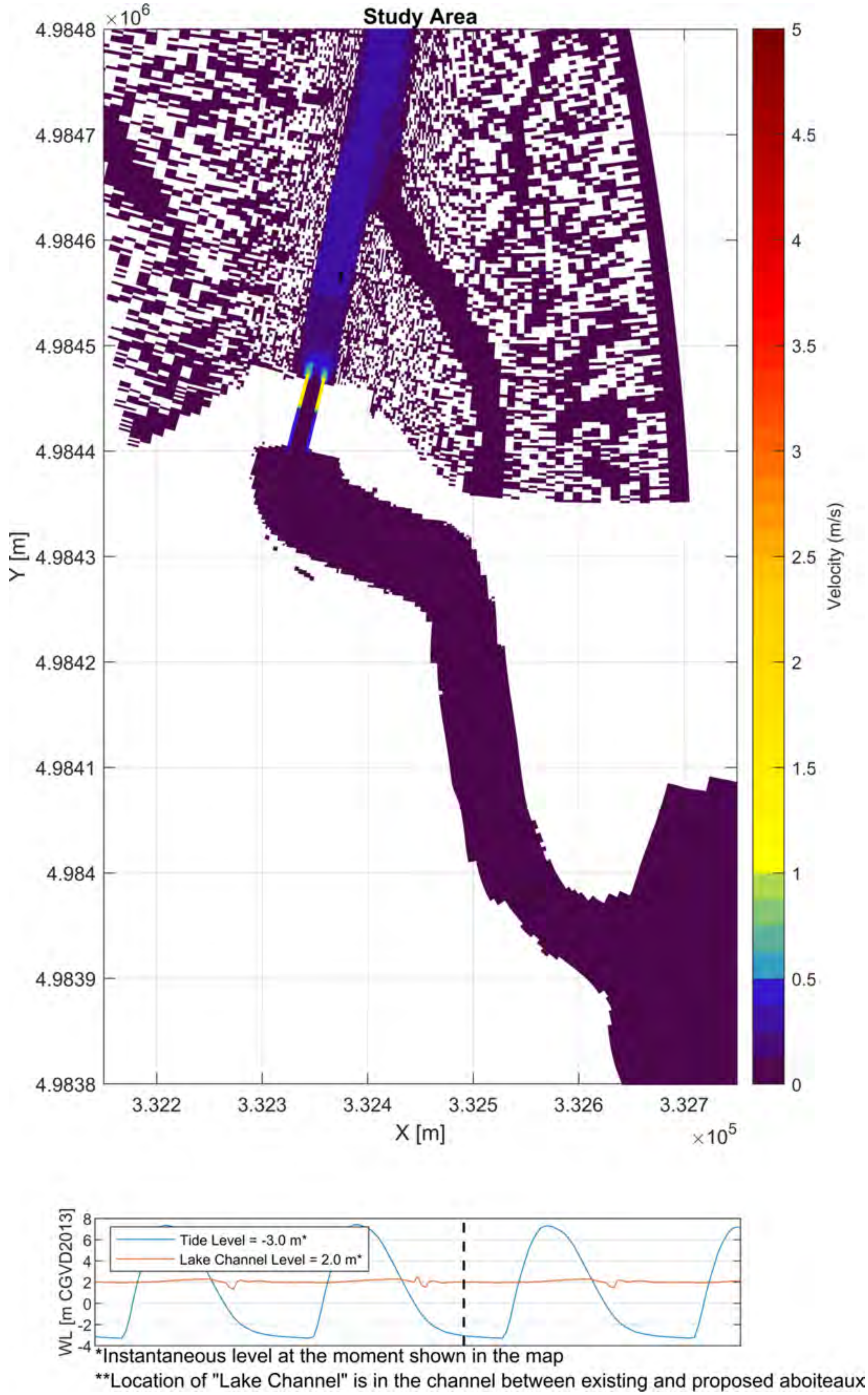


Figure A3.12: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Overall Study Area.

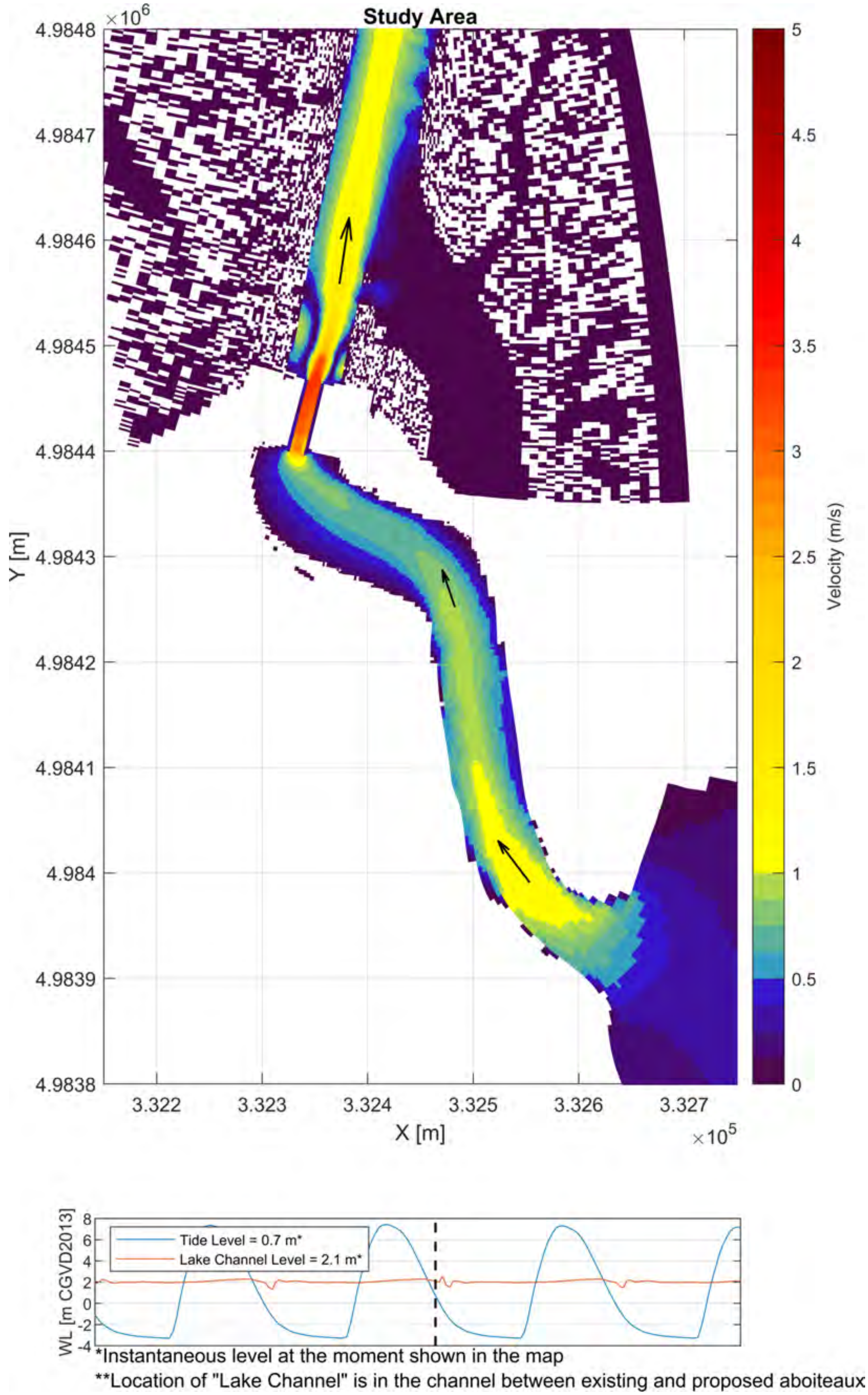


Figure A3.13: Map of Velocities for Middle Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Overall Study Area.

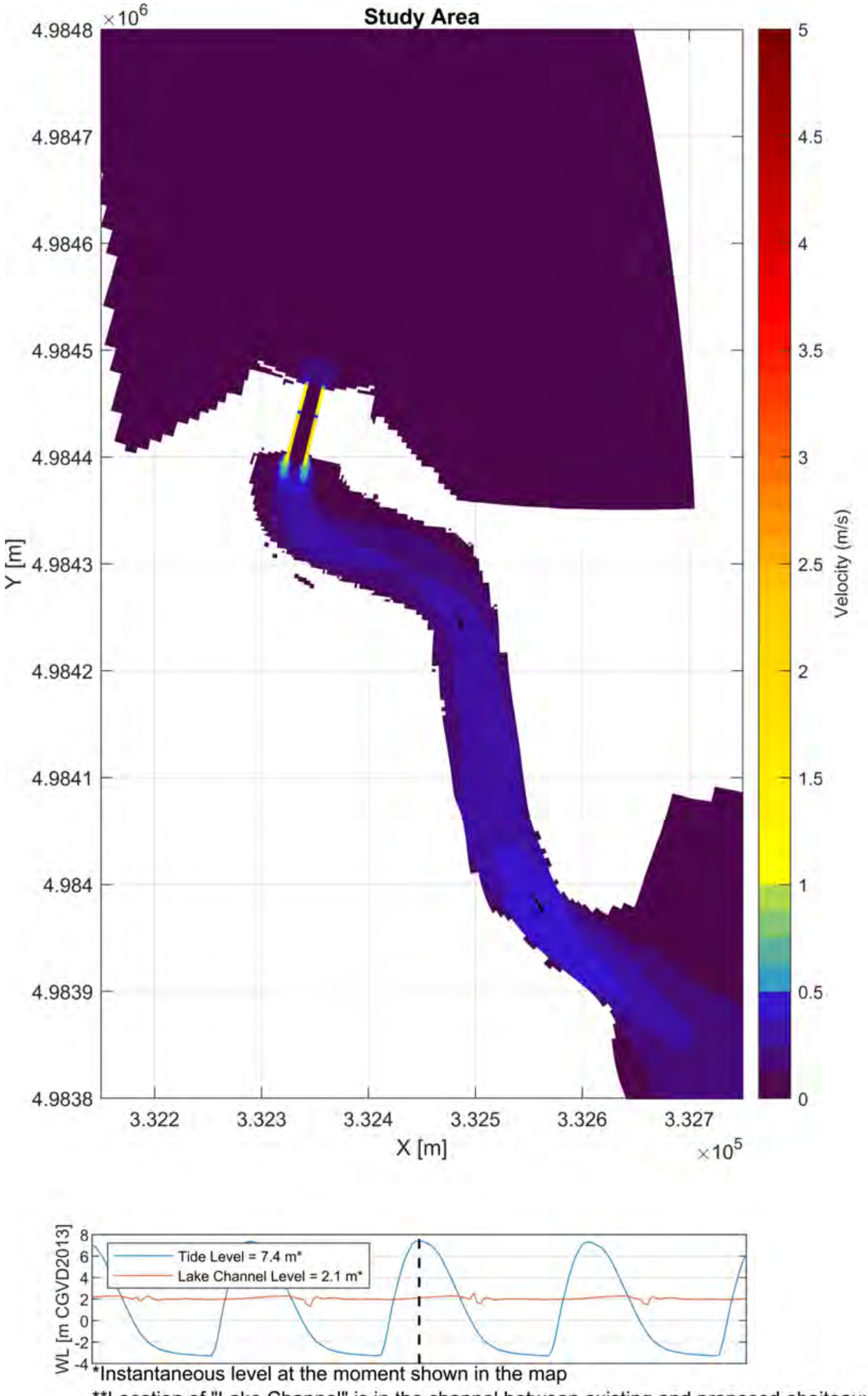


Figure A3.14: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Overall Study Area.

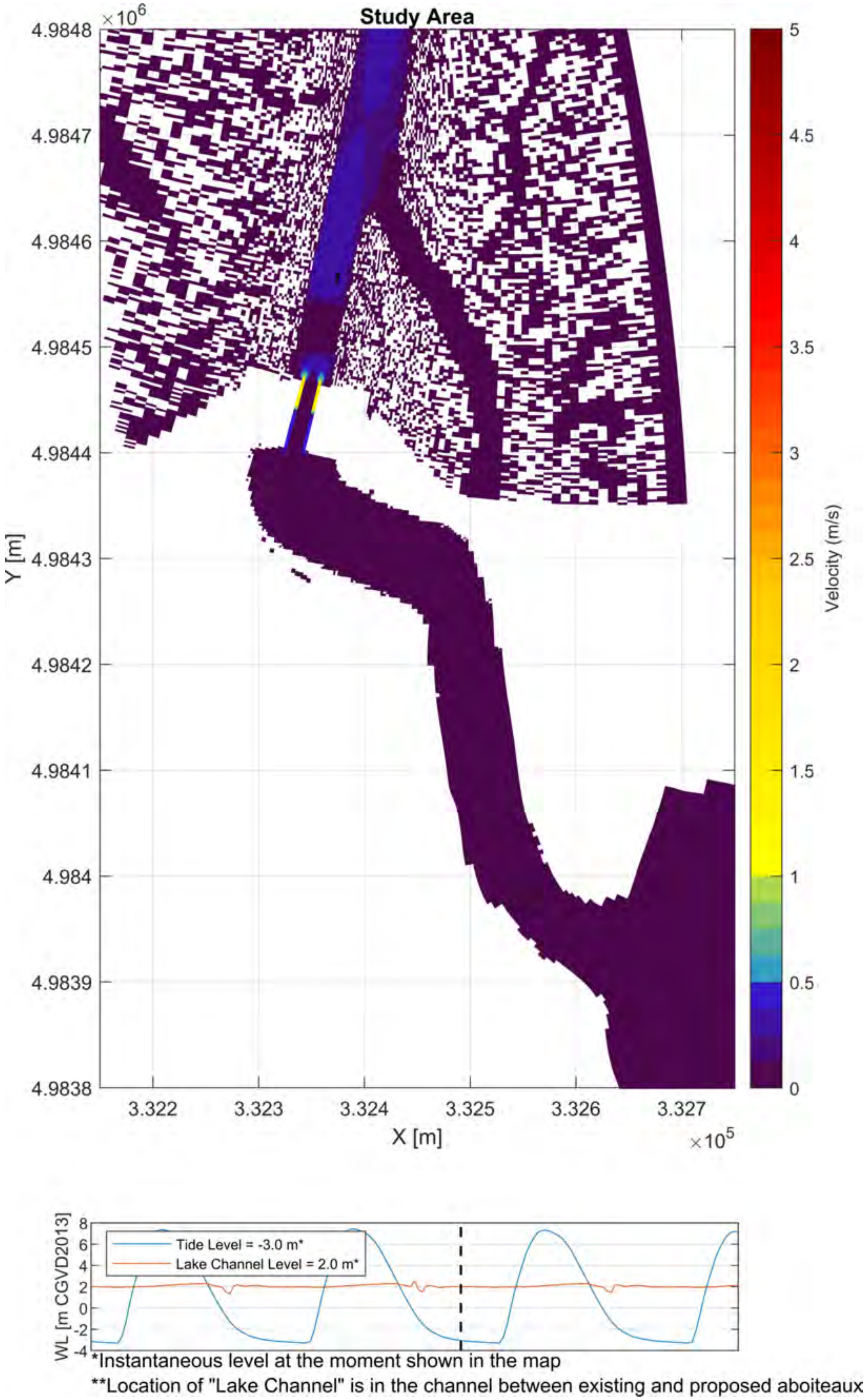


Figure A3.15: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Overall Study Area.

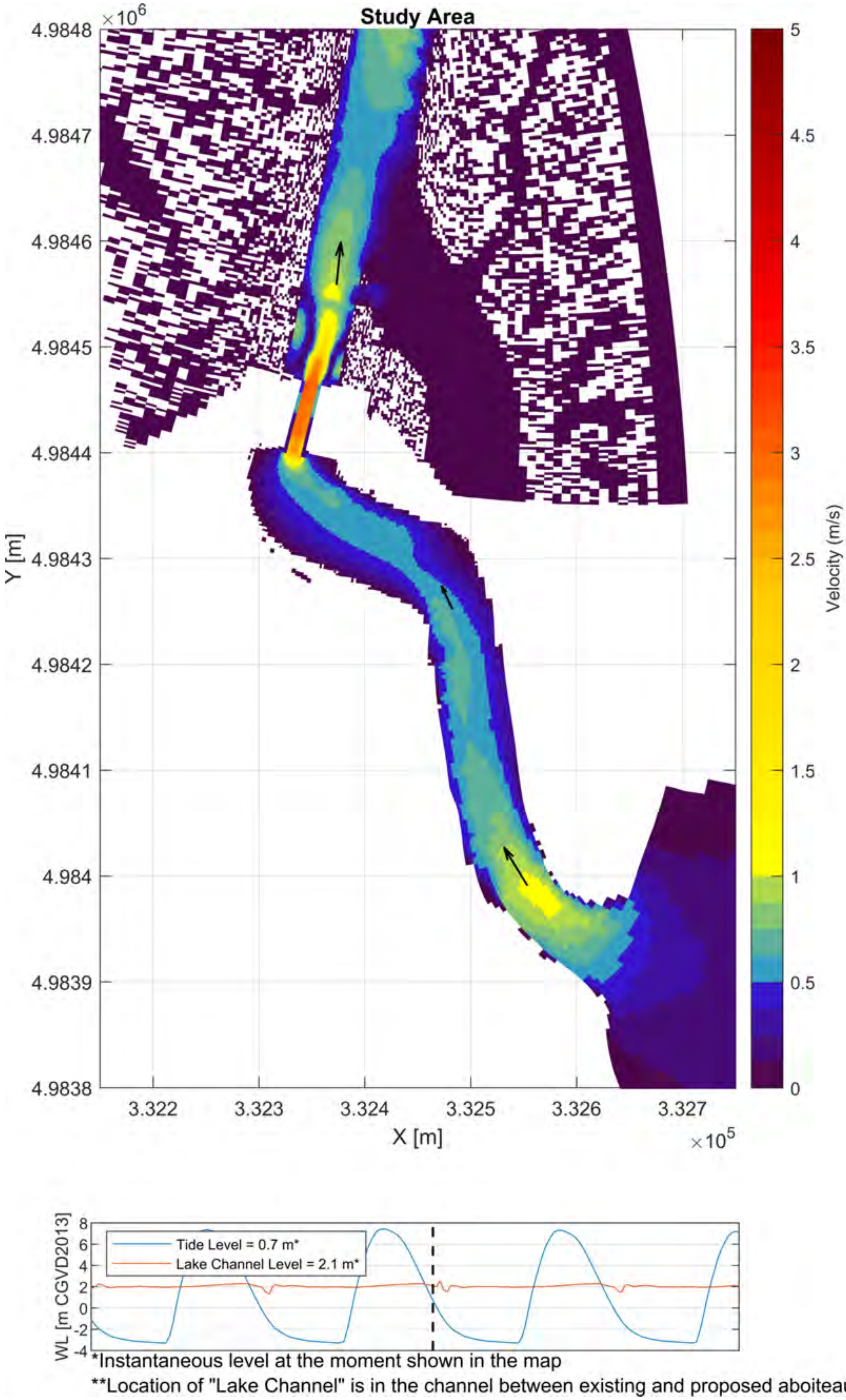


Figure A3.16: Map of Velocities for Bottom Layer When the Active Gates are Open for the Brackish Scenario (Dry Conditions) - Overall Study Area.

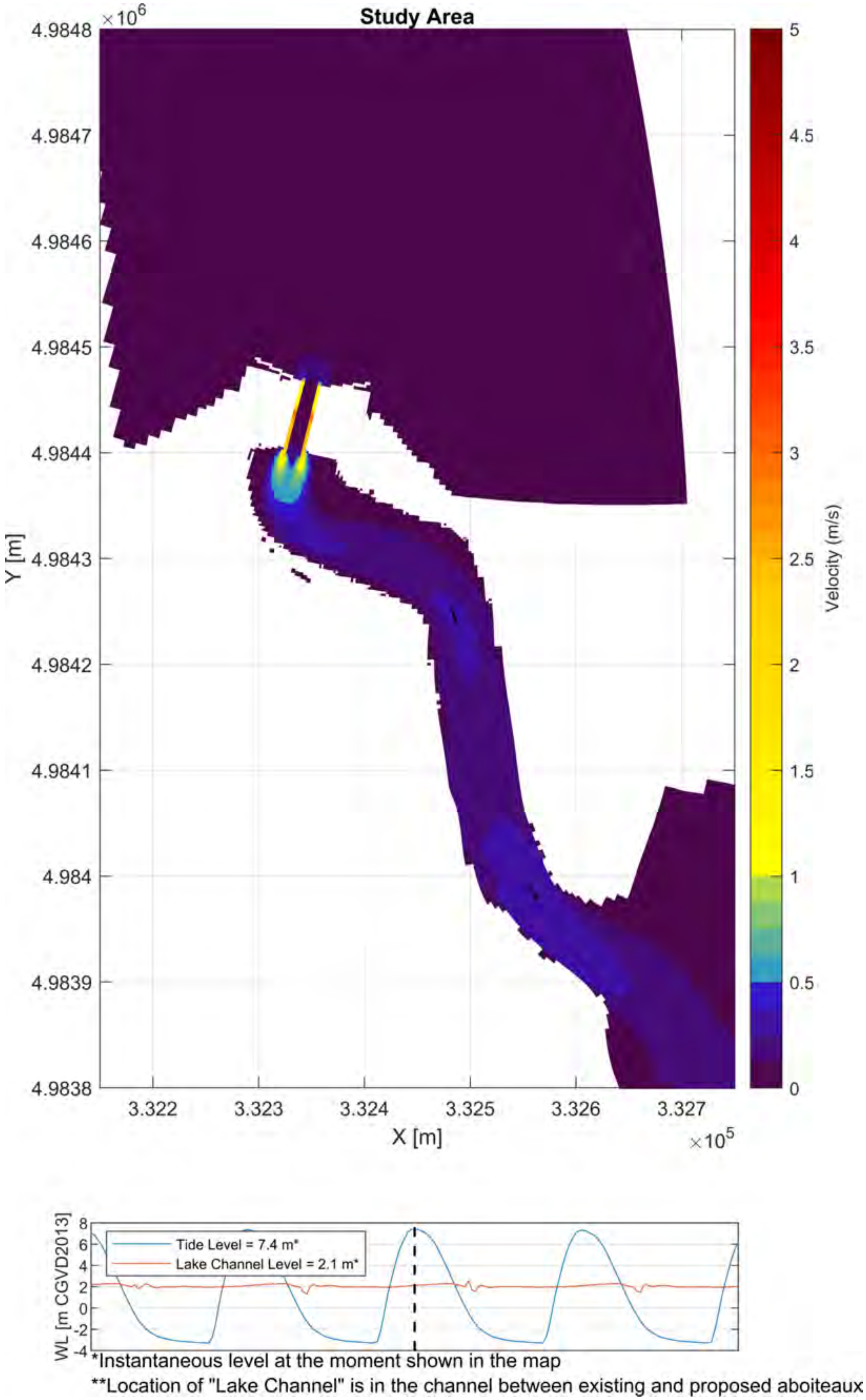


Figure A3.17: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Brackish Scenario (Dry Conditions) - Overall Study Area.

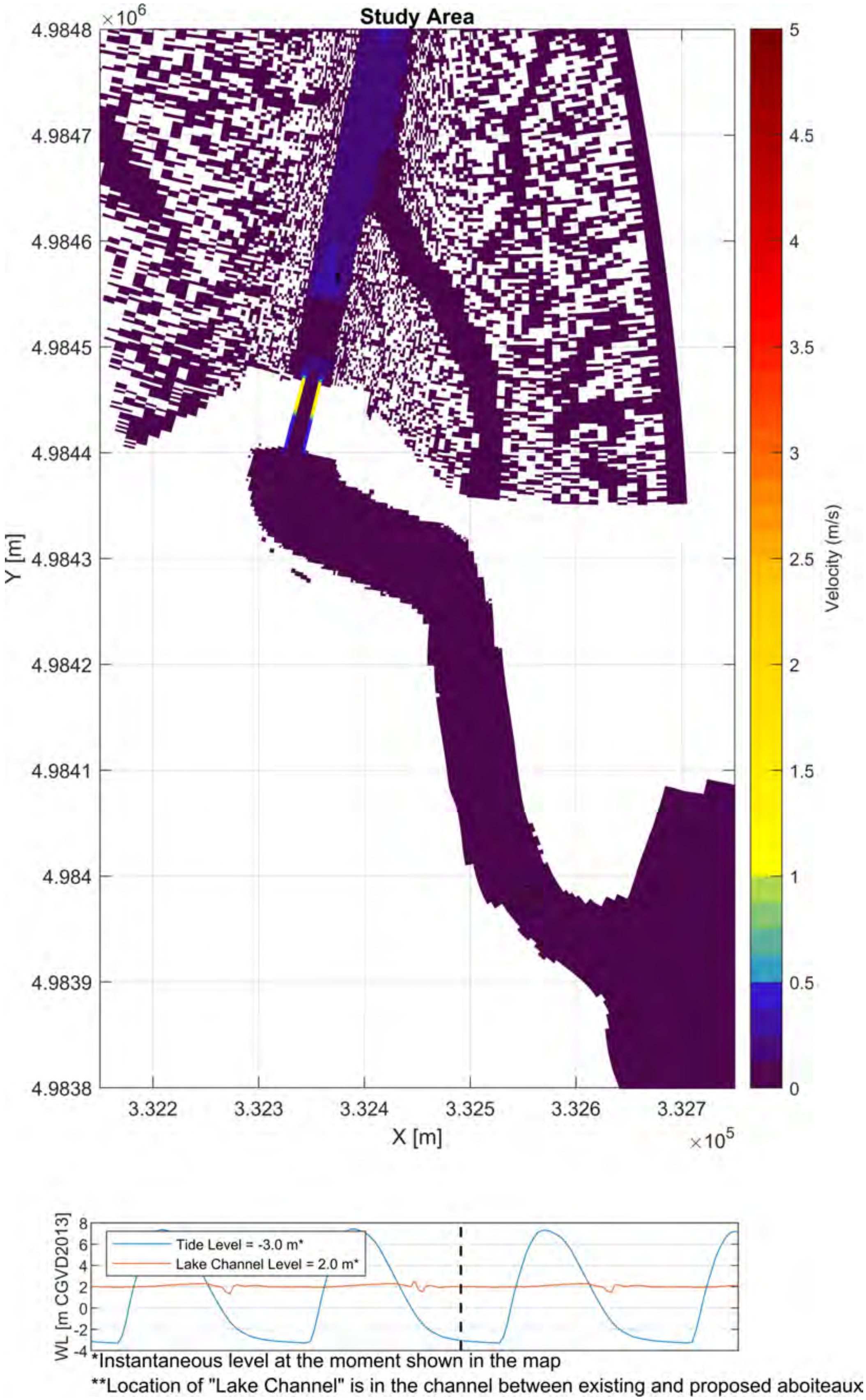


Figure A3.18: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Brackish Scenario (Dry Conditions) - Overall Study Area.

A4 Removal of Existing Aboiteau - Dampened Tidal

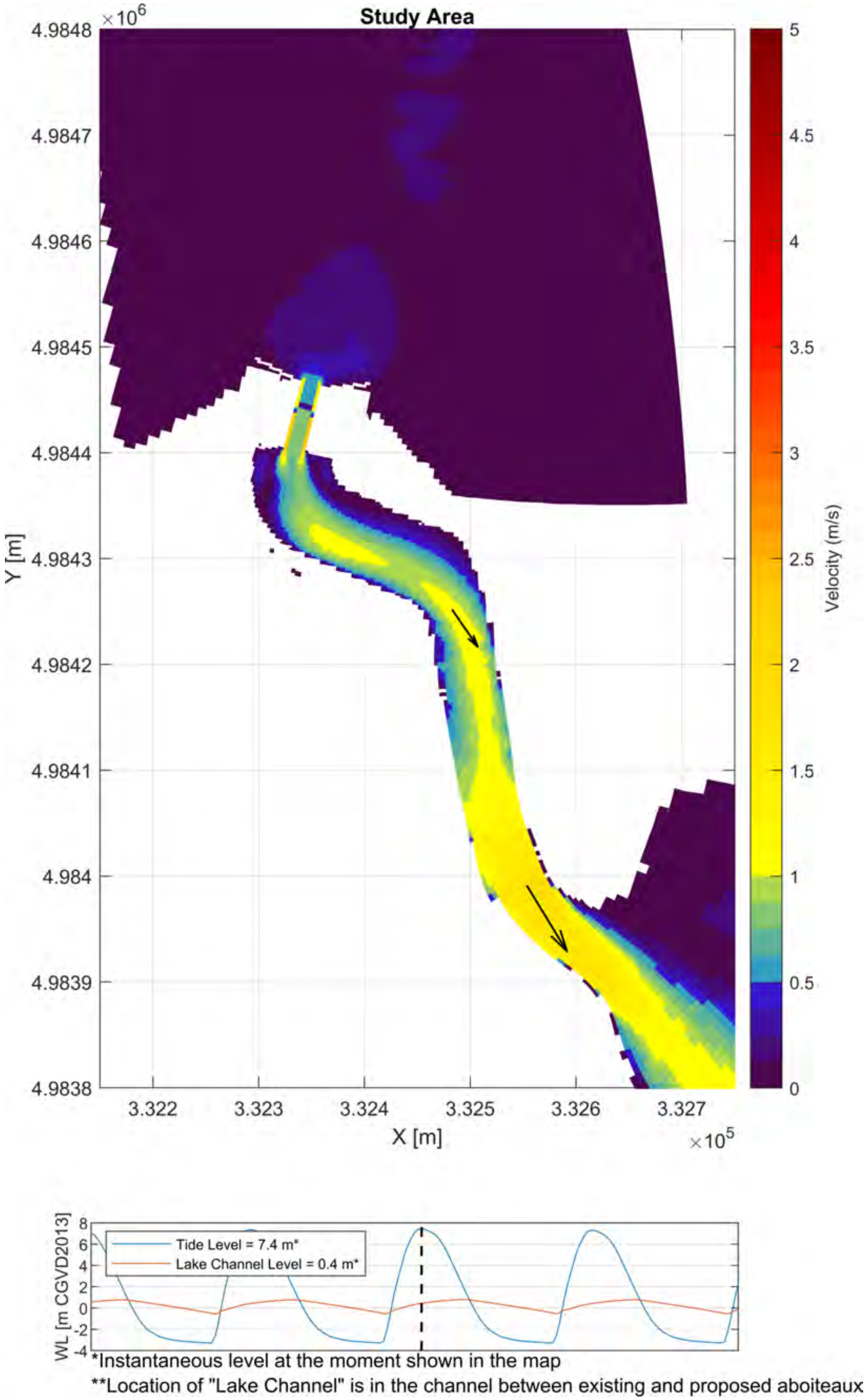


Figure A4.1: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Overall Study Area.

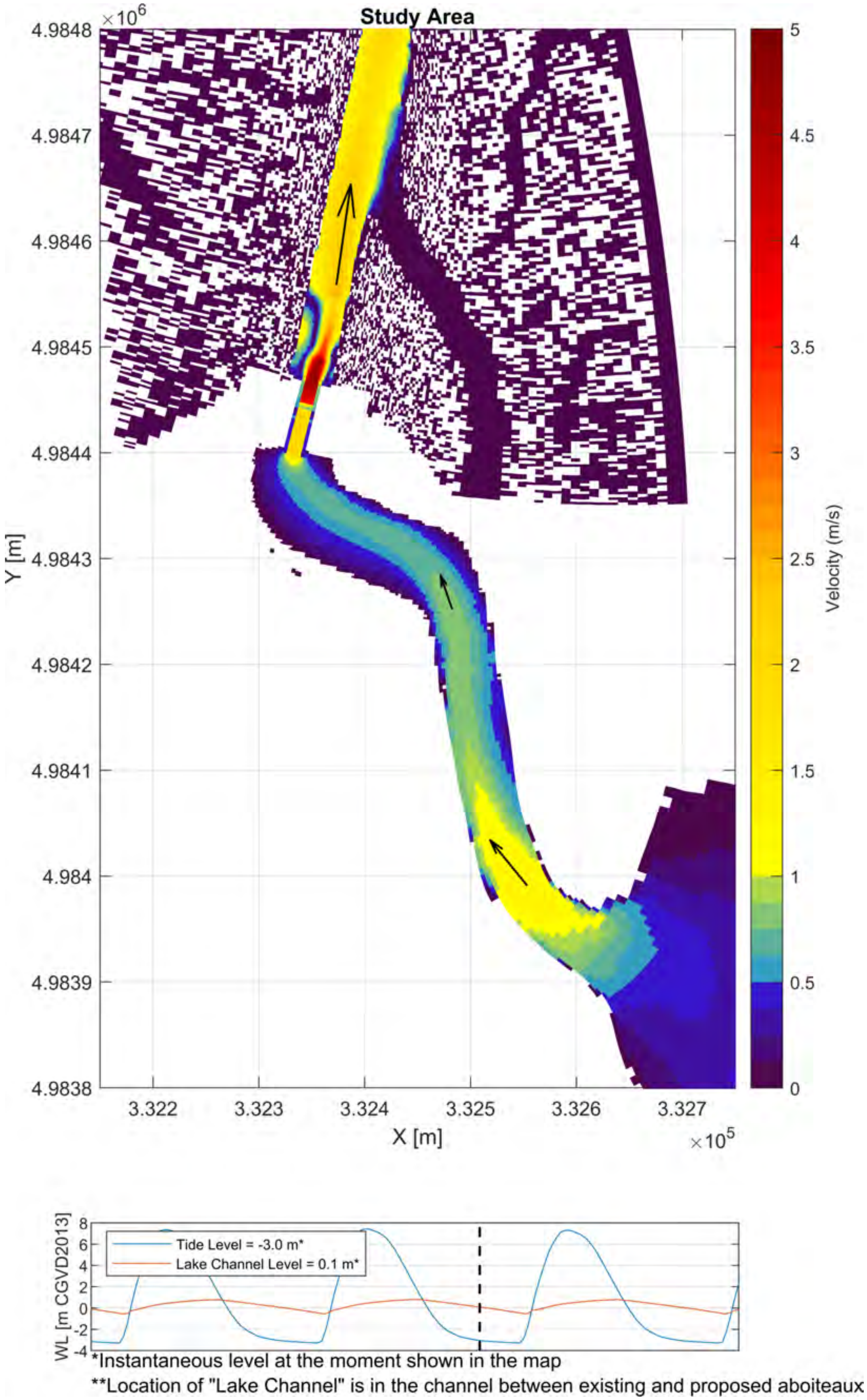


Figure A4.2: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Overall Study Area.

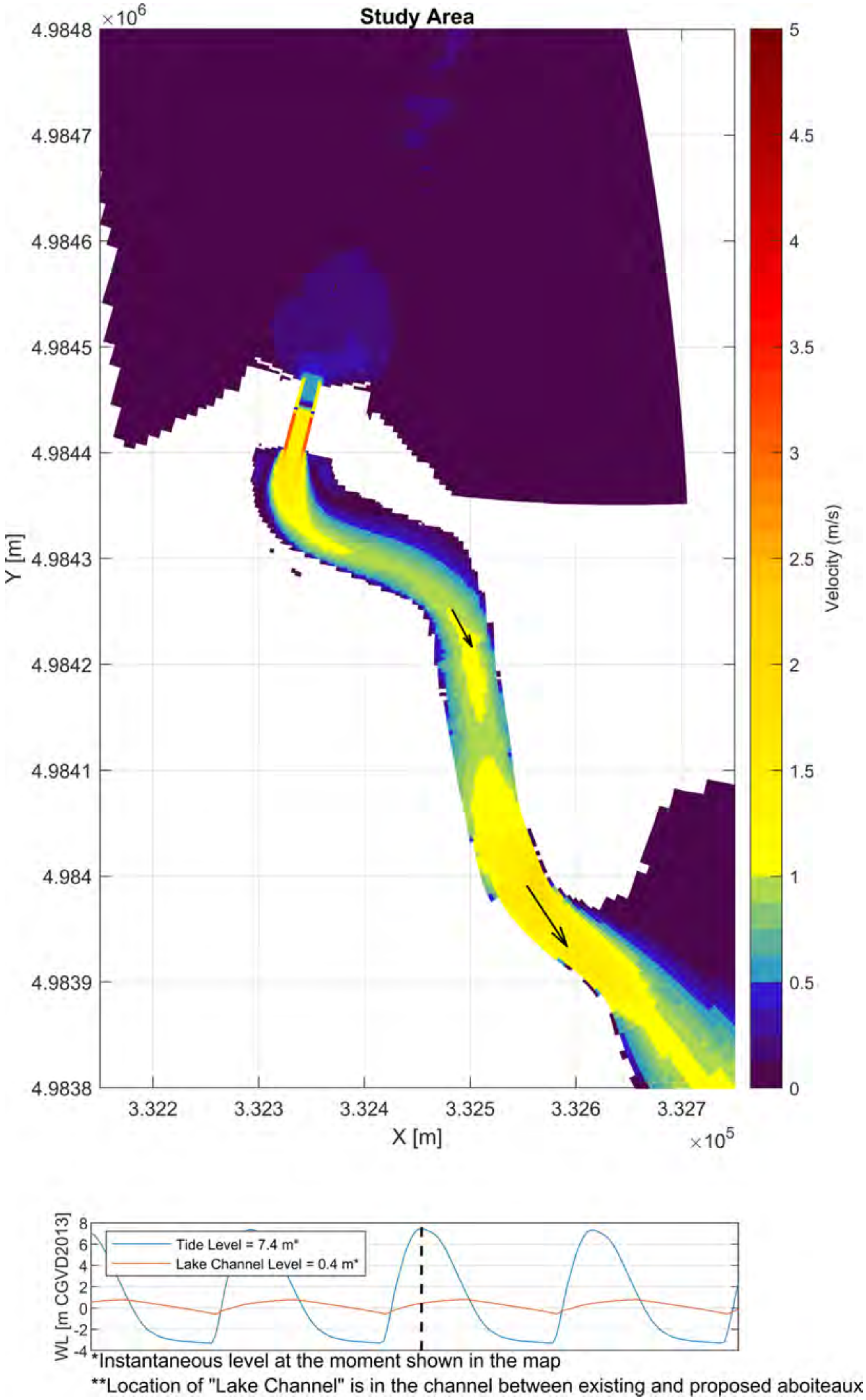


Figure A4.3: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Overall Study Area.

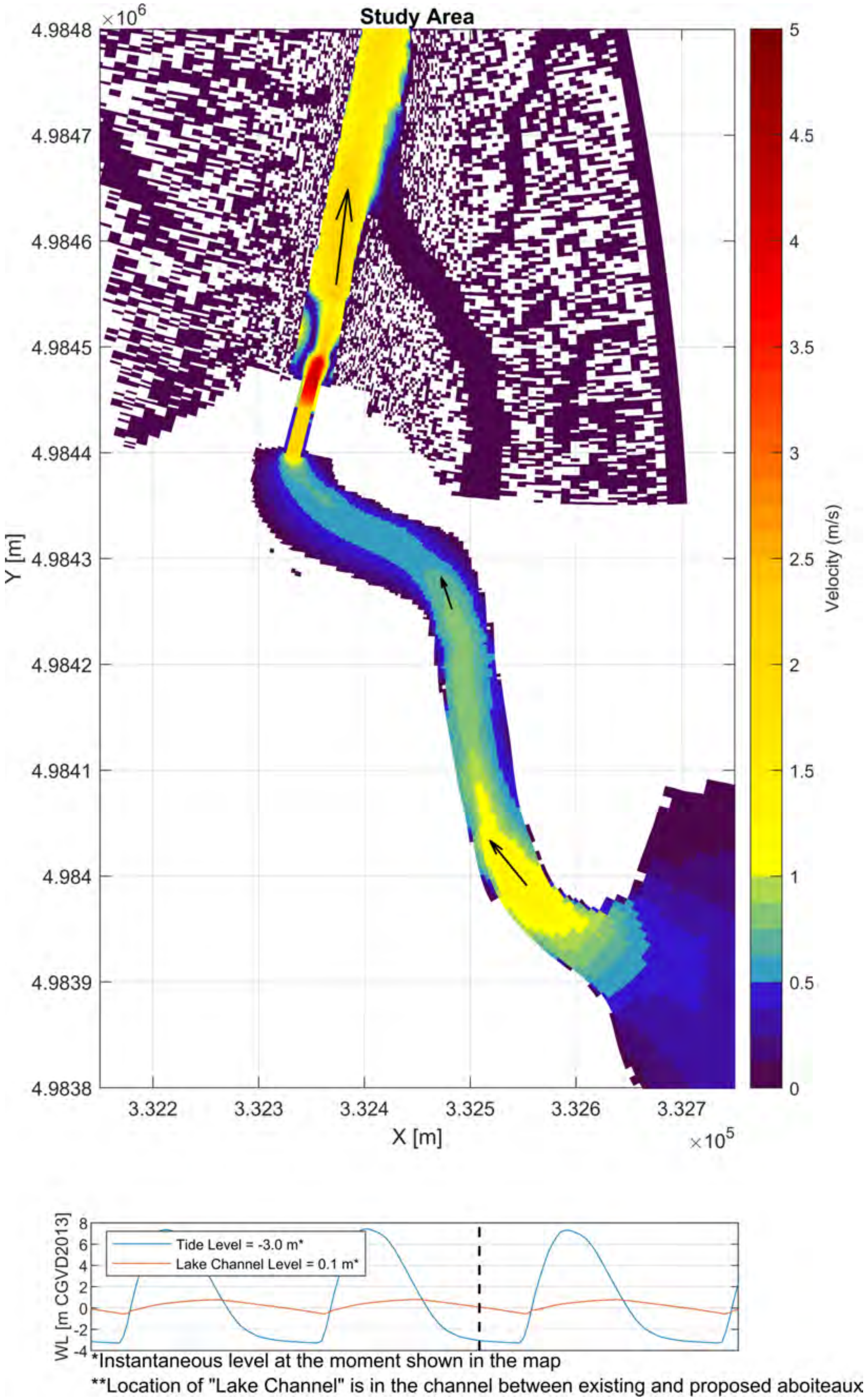


Figure A4.4: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Overall Study Area.

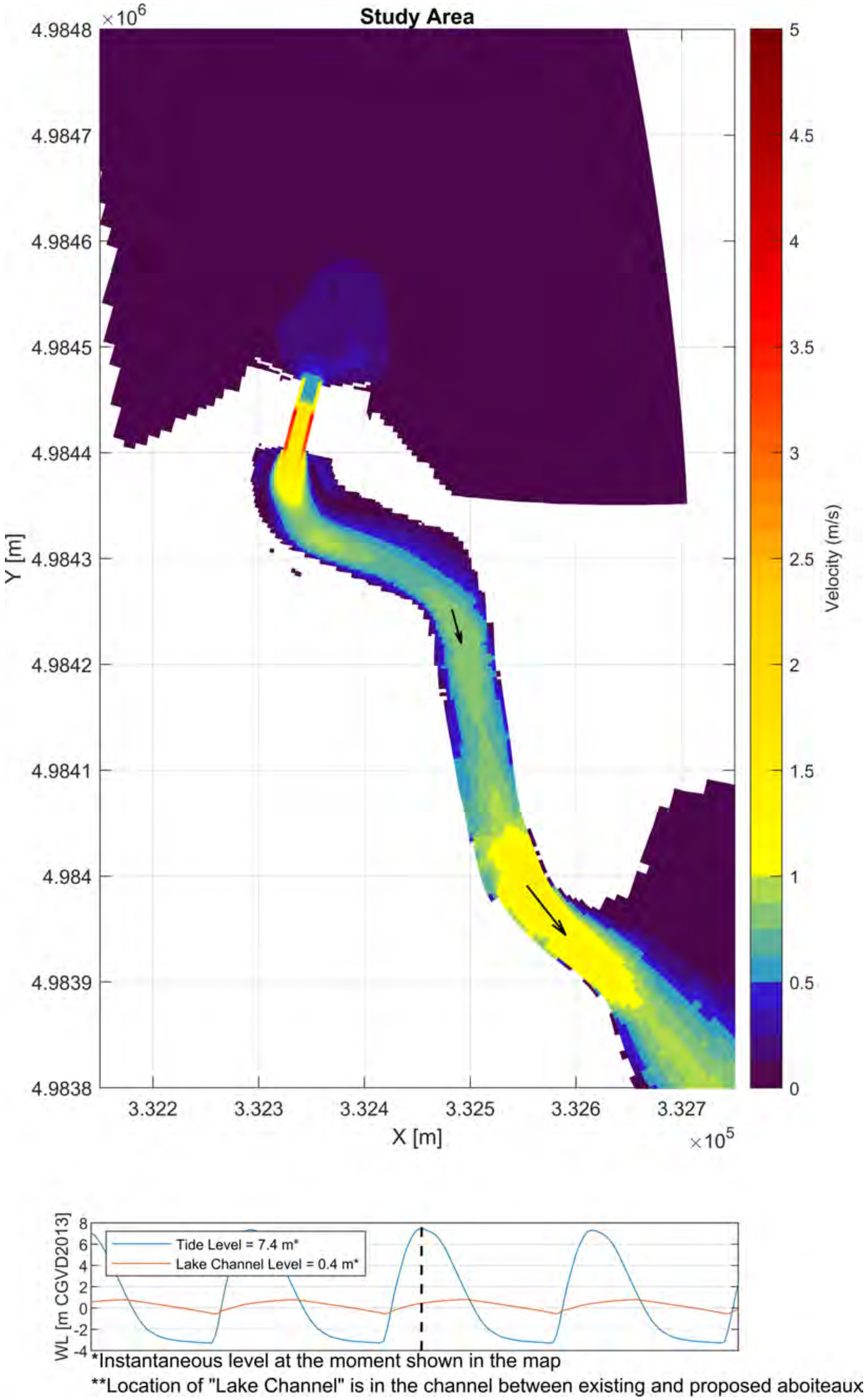


Figure A4.5: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Spring Tide) - Overall Study Area.

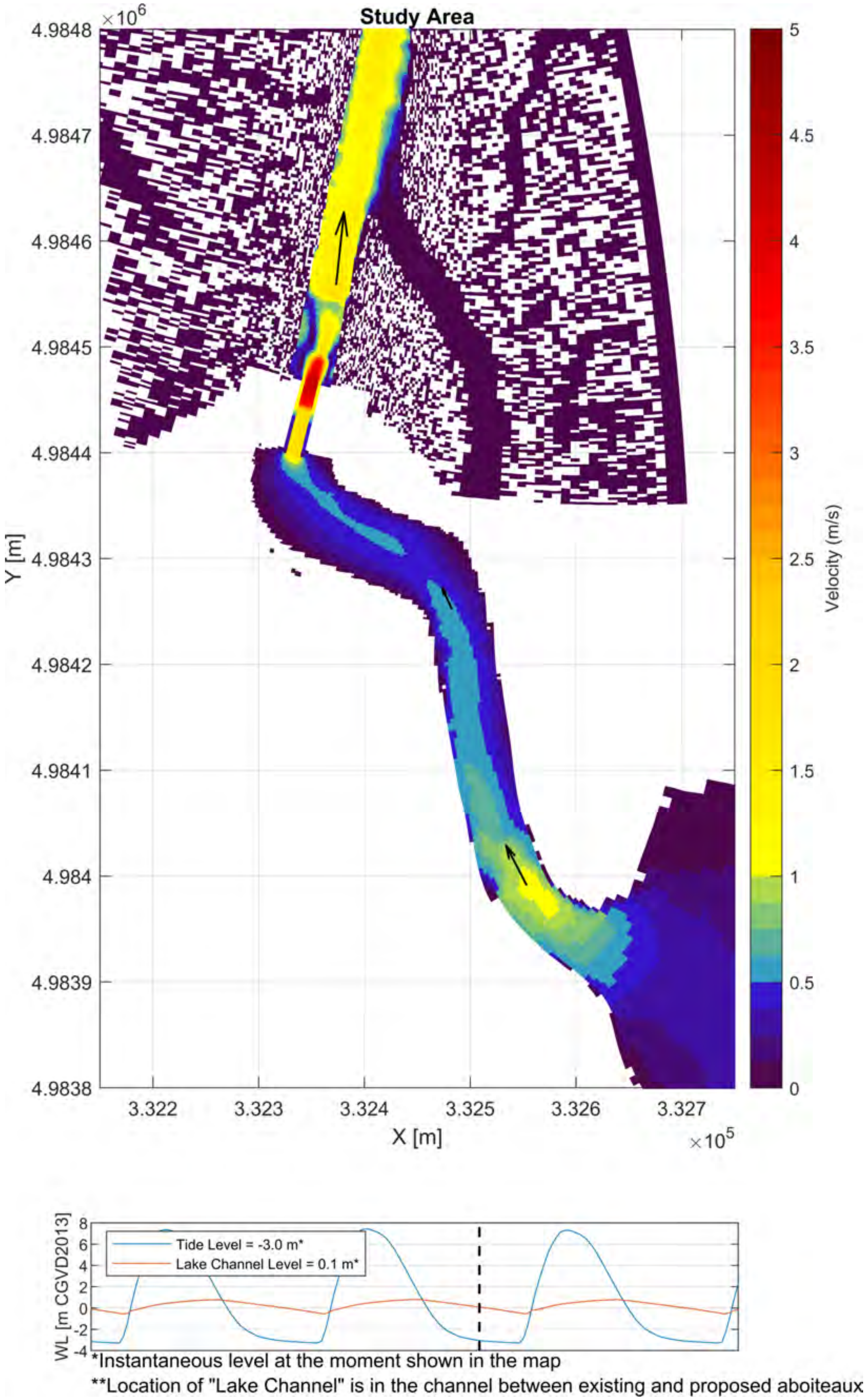


Figure A4.6: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Spring Tide) - Overall Study Area.

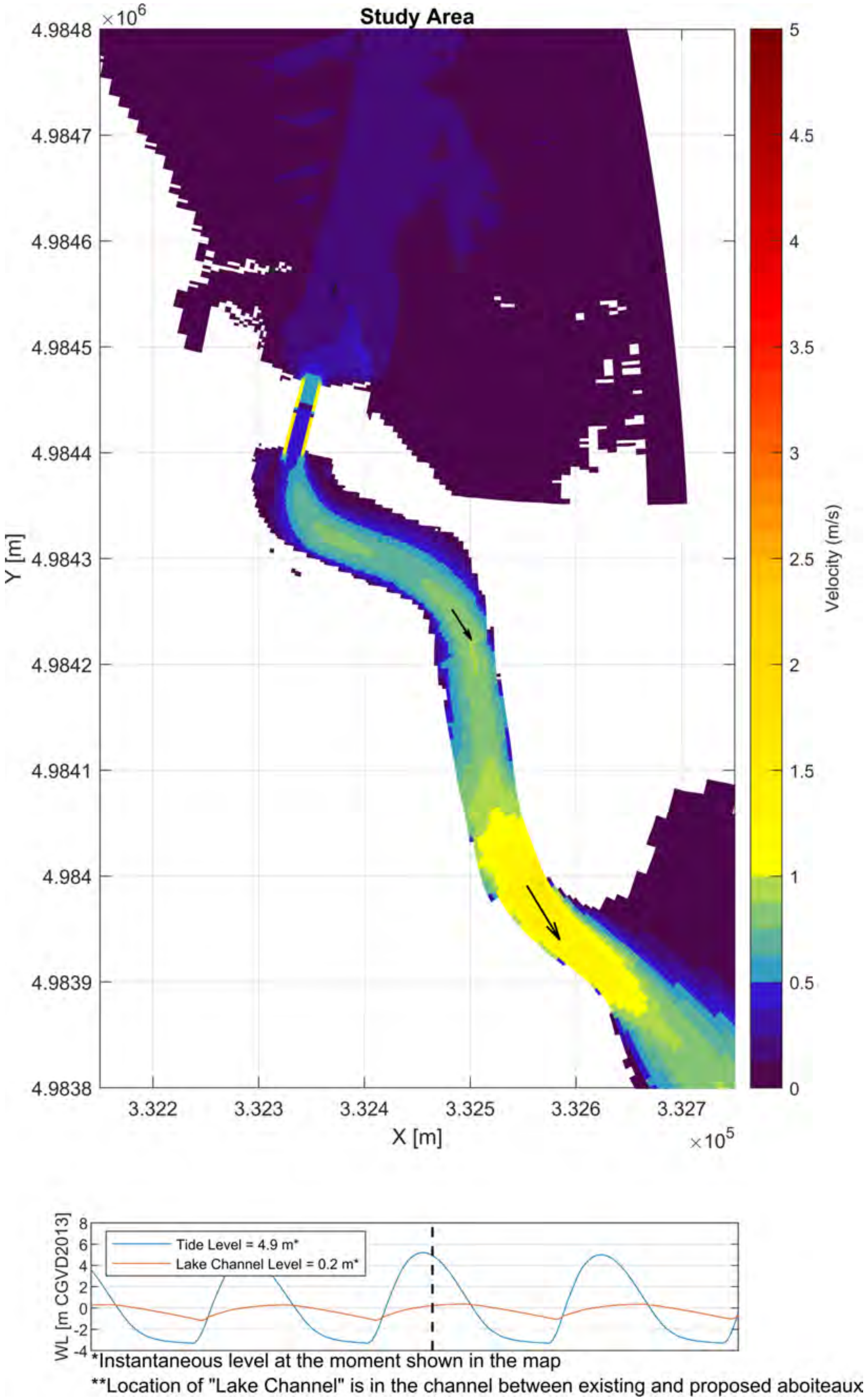


Figure A4.7: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Overall Study Area.

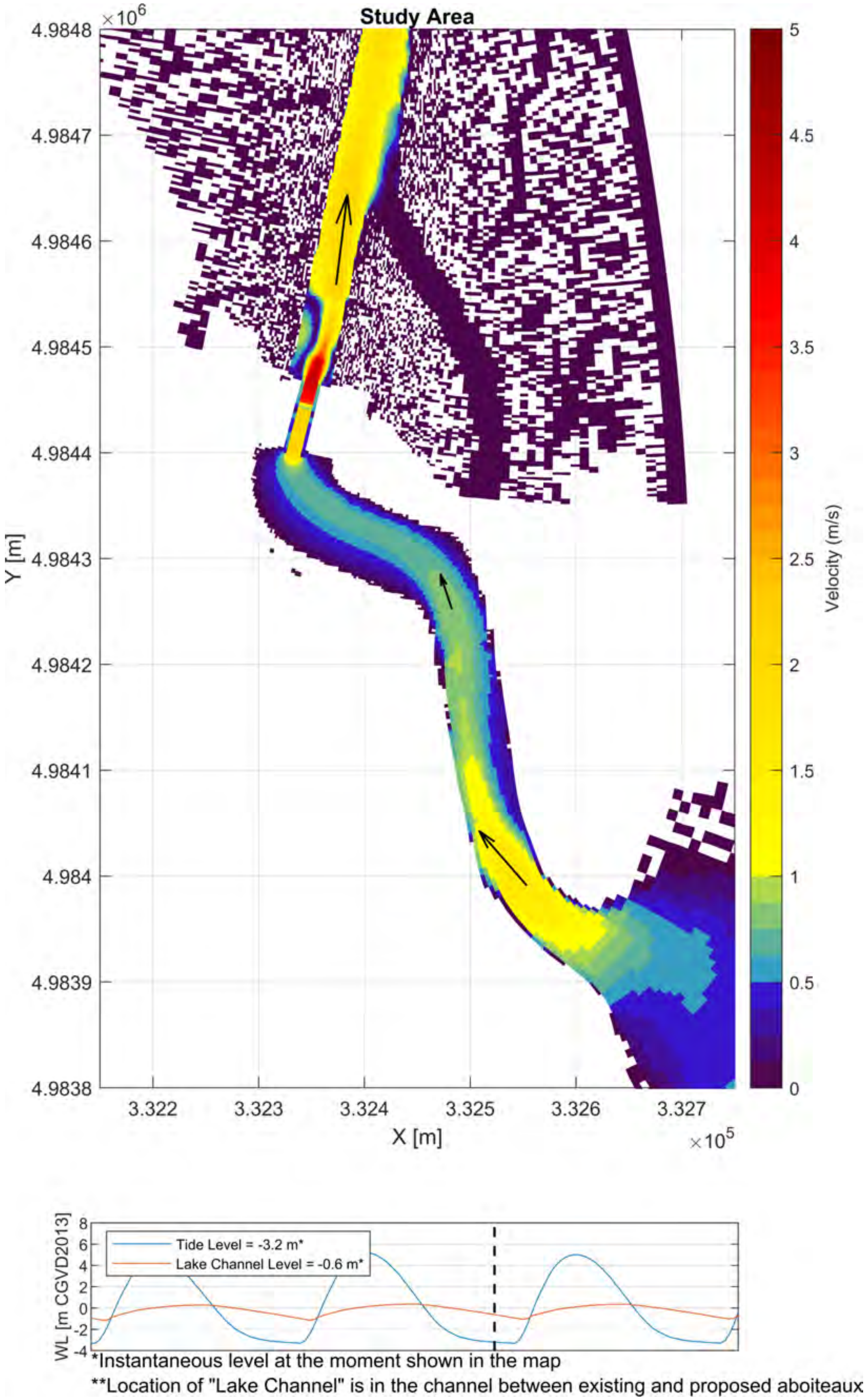


Figure A4.8: Map of Velocities for Top Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Overall Study Area.

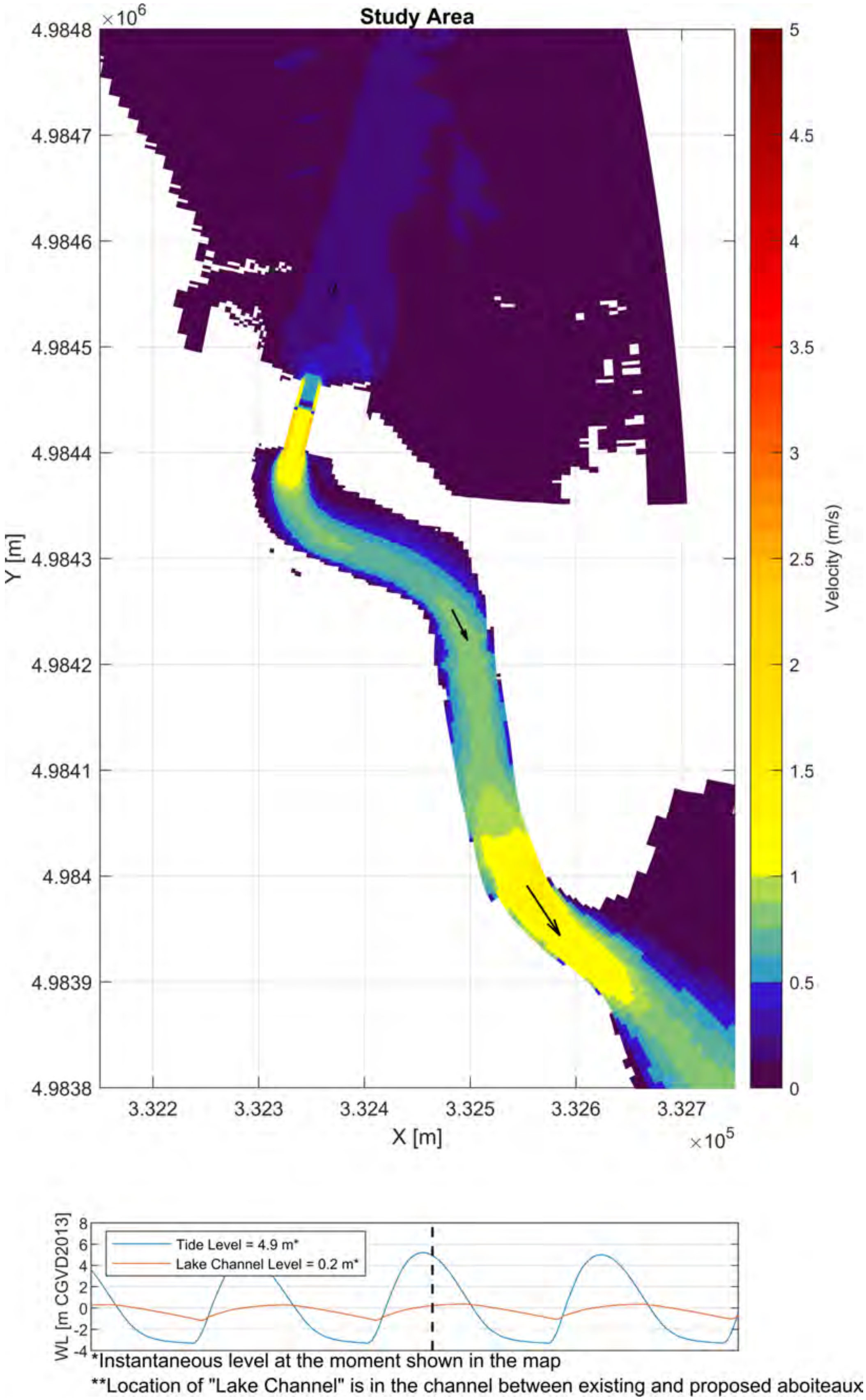


Figure A4.9: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Overall Study Area.

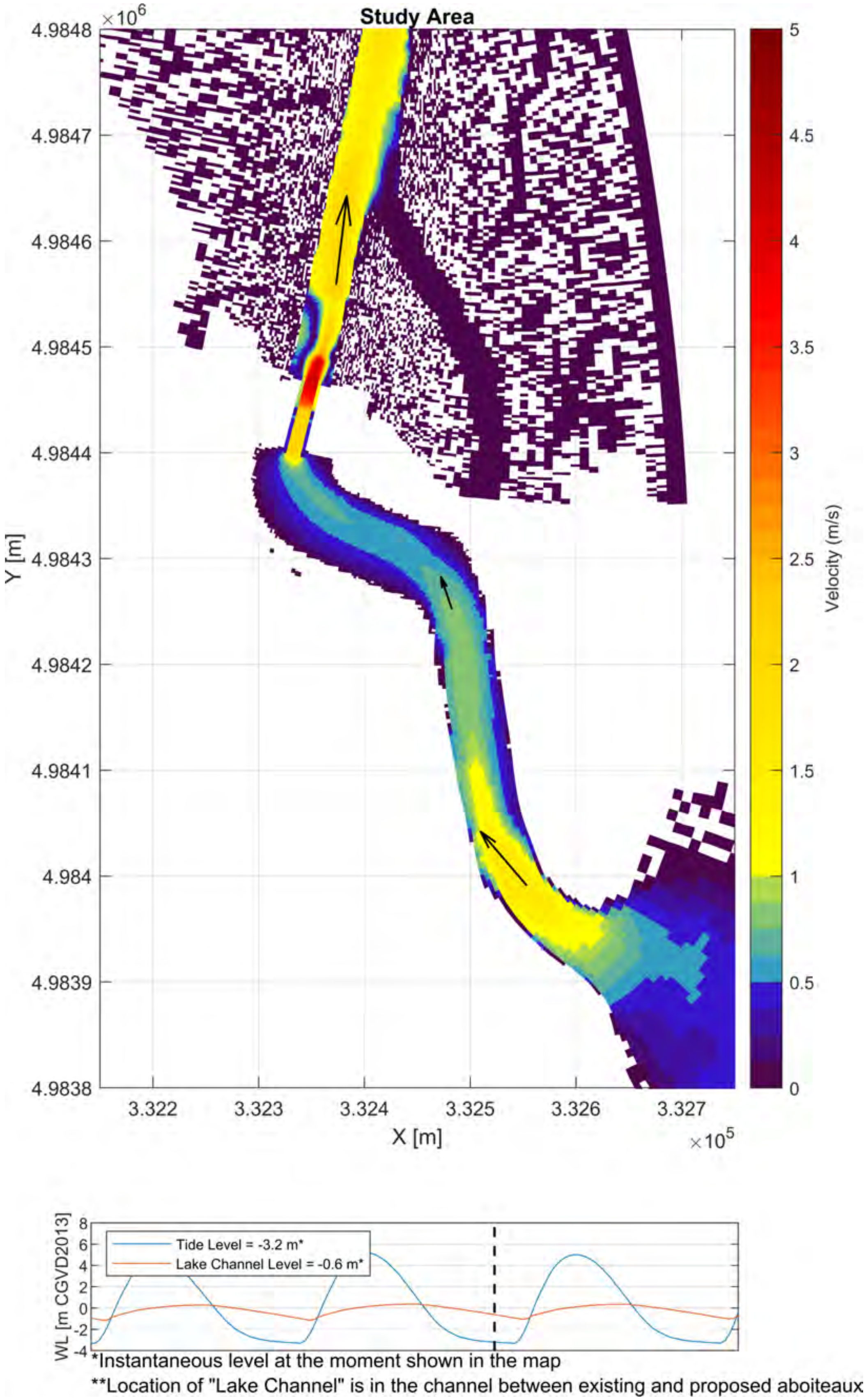


Figure A4.10: Map of Velocities for Middle Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Overall Study Area.

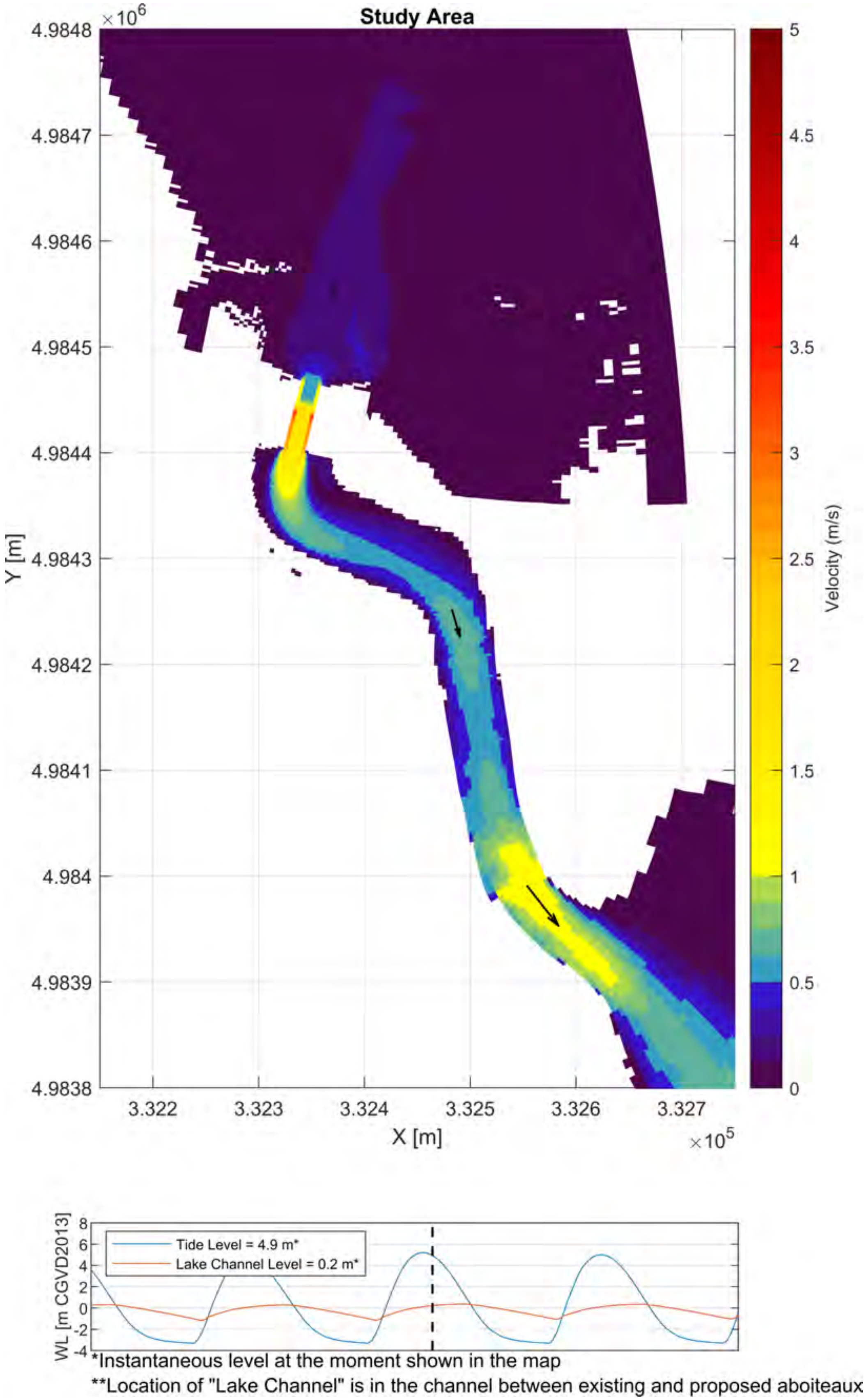


Figure A4.11: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Incoming for the Dampened Tidal Scenario (Neap Tide) - Overall Study Area.

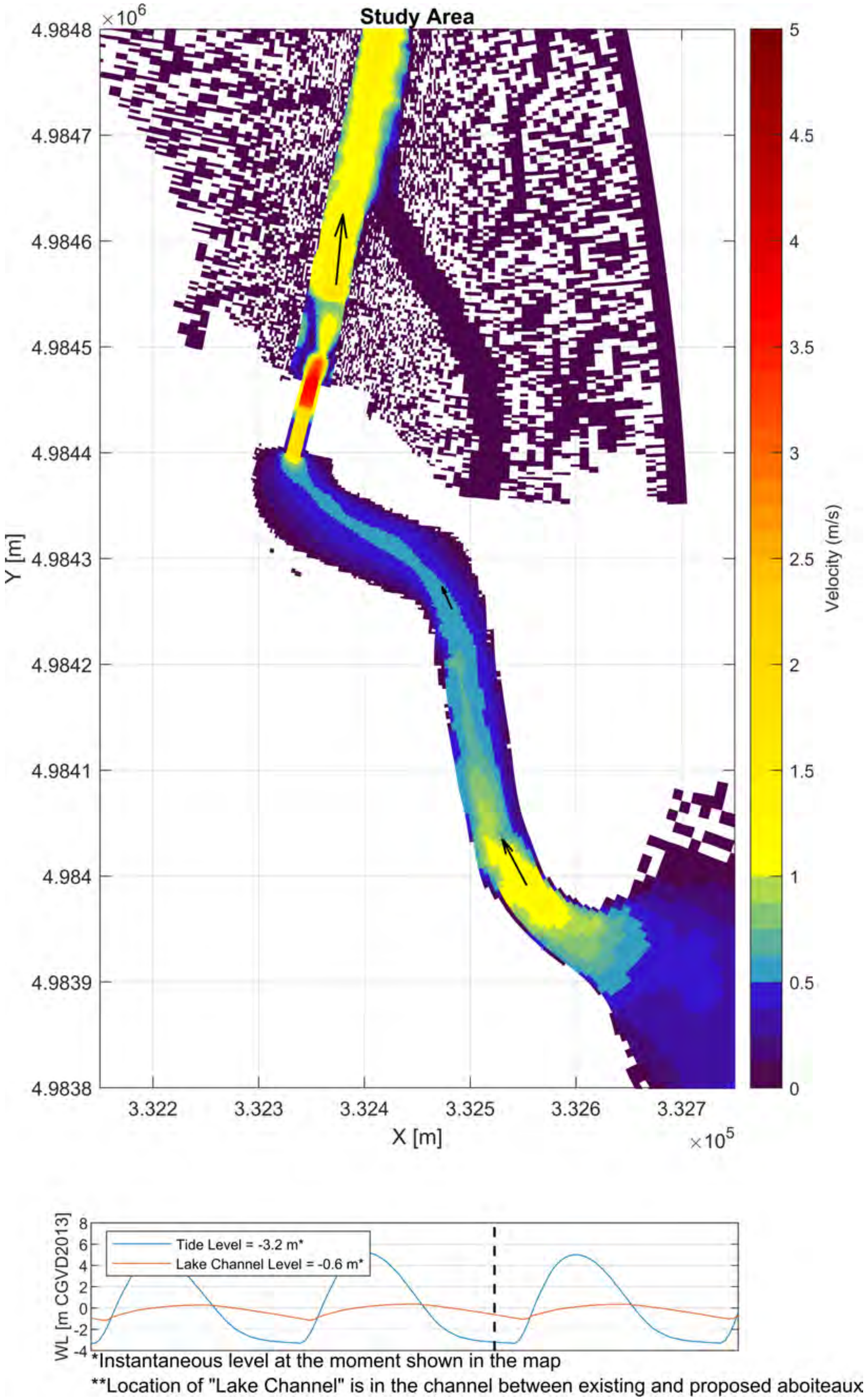


Figure A4.12: Map of Velocities for Bottom Layer When the Active Gates are Closed and Tide is Outgoing for the Dampened Tidal Scenario (Neap Tide) - Overall Study Area.

APPENDIX G

Groundwater Report

Avon River Aboiteau Replacement

Baseline Groundwater Monitoring

Final Draft

CBCL

171046.01 • October 2021

Contents

Appendices

List of Figures

List of Tables

Chapter 1 Introduction

CBCL Limited (CBCL) was engaged by the Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) to provide engineering and environmental services for the planned replacement of the Avon River Aboiteau and Causeway. This report describes a Groundwater Monitoring Program completed to provide baseline data. Baseline data were collected to establish conditions prior to replacement of the aboiteau and causeway, and to provide a basis for the assessment of groundwater flow systems in the area. The work focused on conditions in the subsurface units directly adjacent to Lake Pesaquid and the lower reaches of the Avon River.

The baseline groundwater monitoring program comprised following tasks:

- **Conceptual Model:** Existing data were compiled to develop a high-level understanding of geologic units, potential flow systems, potable water wells, and potential interactions of groundwater with the Avon River.
- **Private Well Survey and Sampling Program:** Non-serviced homes located within 1500 m of the Avon River (between Sangster Bridge Road and the causeway) were surveyed to gather information on the existing quality and quantity of private water supplies in the study area. Sixteen homeowners agreed to have a water quality sample collected.
- **Riverbank Groundwater Monitoring Program:** Twelve monitoring wells were installed at 10 locations directly adjacent to the Avon River. Each well was instrumented with an automated sensor to collect water levels; six of these locations included instrumentation to measure electrical conductivity. Water quality samples were collected from each well in the spring, summer, and fall seasons.
- **Supplemental Causeway Monitoring Program:** Dataloggers were installed to collect conductivity and water level data in monitoring wells installed on the upstream and downstream sides of the causeway.

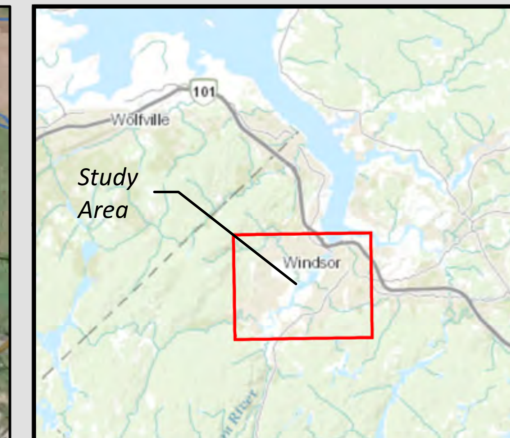
Chapter 2 Physical Setting

The study area, shown on Figure 2.1, is situated along the portion of the Avon River between Sangster Bridge Road and the Windsor Causeway. Parts of the study area are located within the community boundaries of Falmouth, Upper Falmouth, Windsor, Martock, and Windsor Forks.

The study area lies within the Hants-Colchester lowlands physiographic zone. Most of the area is situated on the valley plain bounded by Grey Mountain to the northwest and an arm of the South Mountain to the southeast. The lowlands are characterized by low-lying, level terrain and extend up to one kilometer from the riverbank, transitioning to gently sloping terrain (2-3%) near the margins of the valley plain. The ground elevation ranges from 5 m near the river to approximately 180 m in upland areas. Land use in the lowlands is primarily agricultural, and the uplands are largely forested. Portions of the tidal flats near the Avon River Estuary were reclaimed for farmland through dyke building in the 17^{th} and 18^{th} centuries.

The climate in the area is humid temperate. Total annual precipitation is on the order of 1200 mm/a (1981-2010 climate normal, Kentville climate station). Annual evapotranspiration is expected to be on the order of 500 mm/a, peaking between July and September.

The study area is situated within the St. Croix River watershed (1DE), draining into the Bay of Fundy. Provincial watershed mapping is shown on Figure 2.2. The area is drained by tributaries that flow from the uplands into the Avon River. The Avon River Estuary is separated from the upstream portion by the Windsor Causeway, including an aboiteaux control structure that is used to regulate discharge. Following the construction of the Windsor Causeway in 1970, the upstream portion of Avon River converted from a tidal estuarine environment to fluvial-lacustrine environment, forming the freshwater body Lake Pesaquid (Amos, 1978). The tidal range in the estuary reaches 8.22 m near the causeway, whereas the lake level is relatively stable and largely controlled by the causeway gate operation (Van Proosdij, 2017).



Groundwater Monitoring Wells

- Causeway Monitoring Wells
- River Monitoring Wells
- Private Water Wells
- Surface Water Sampling Locations

CBCL

Avon Aboiteau and Causeway Upgrade Design

Baseline Groundwater Monitoring Program

Figure 2.1. Study Area

Drawn: PA	Date: 2021-08-04
Checked:	CBCL Project Number: 171046.01
Approved:	Scale @ 11"x17" : 1:30,000

Sheet: 1 of 1

NOTES:

0 300 600 900 1,200 m

Coordinate System: NAD 1983 UTM Zone 20N
Units: Meter

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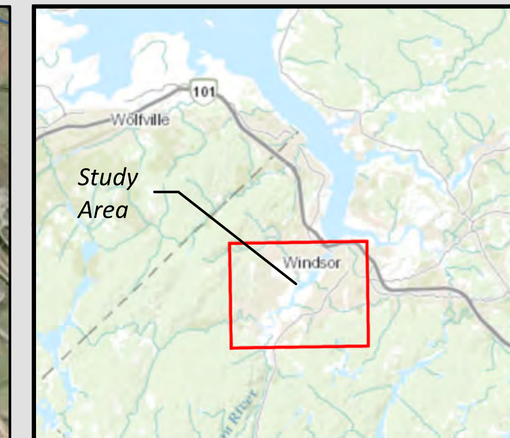

Tertiary Watersheds
Private Water Wells
Groundwater Monitoring Wells
Causeway Monitoring Wells
River Monitoring Wells

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Avon Aboiteau and Causeway Upgrade Design

Baseline Groundwater Monitoring Program

Figure 2.2. Watershed map

Drawn: PA	Date: 2021-08-04
Checked:	CBCL Project Number: 171046.01
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Units: Meter

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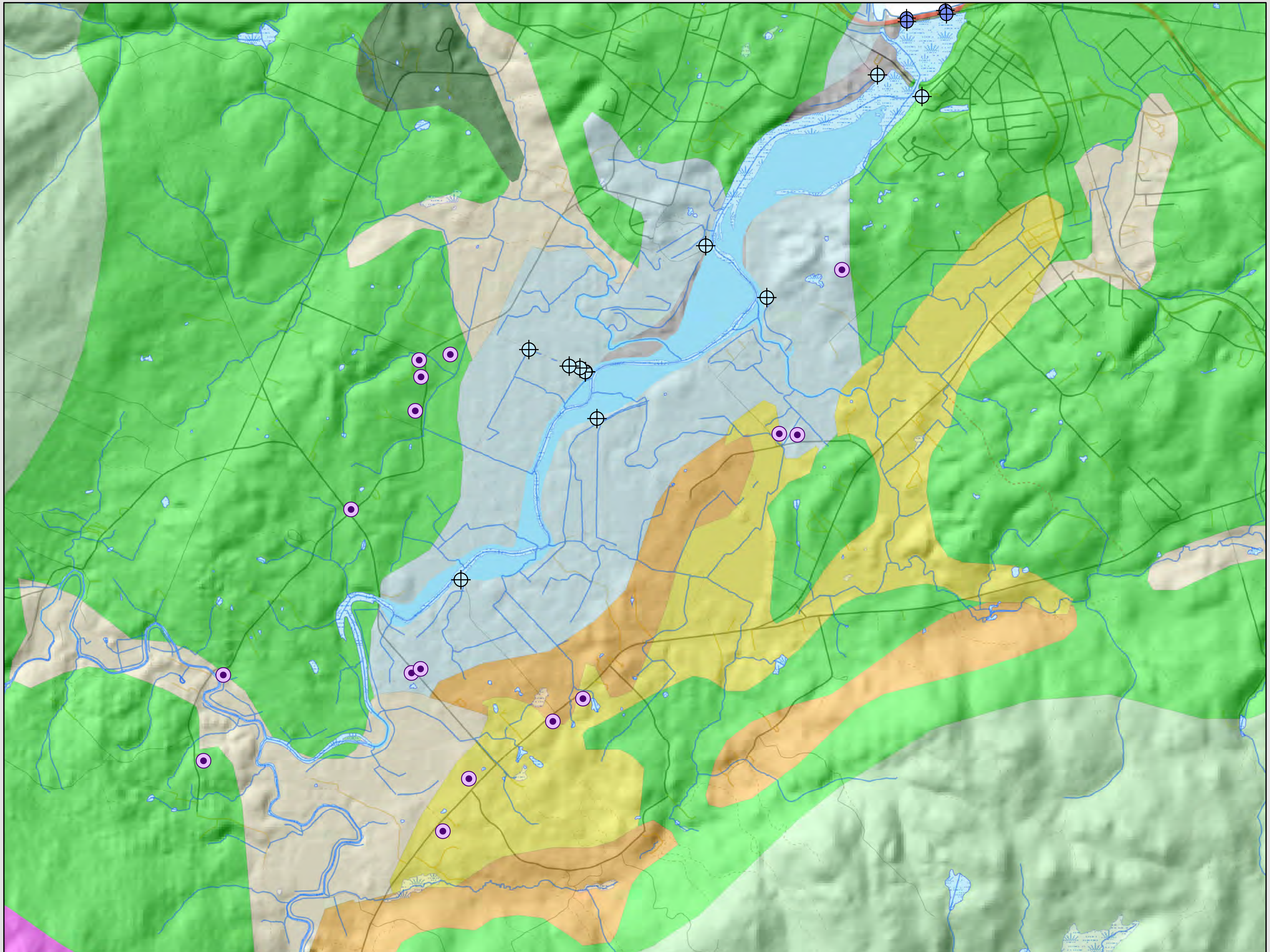
Chapter 3 Hydrogeologic Setting

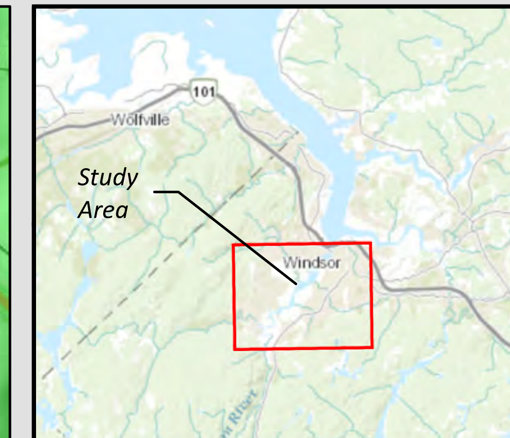
3.1 Surficial geology

Surficial geology mapping is presented on Figure 3.1 (Stea et al. 1992). Most of the area is covered by glacial sediments. Glacial till, including silty till plains and stony till plains, dominate upland areas, and vary in texture and composition depending on the underlying bedrock type (Hennigar, 1965). Glaciofluvial deposits, including kames, eskers and outwash fans are composed of sandy material deposited by glacial meltwater. These deposits form elongated discontinuous chains along the modern stream valley flanks or along ancient drainage courses and valleys. Alluvial deposits represent recent deposition and occur locally on the floodplains of modern streams. A large part of the study area adjacent to Avon River is covered by post-glacial marine deposits dominated by fine-grained silt and clay with thin irregular sandy lenses (Trescott, 1969). The thickness of surficial material is generally thinner in the uplands and thicker in the lowlands, reaching thicknesses of up to 30 meters on the valley plain (Trescott, 1969).

3.2 Bedrock geology

Bedrock geology mapping is presented on Figure 3.2. Most of the study area is underlain by Early Carboniferous (Mississippian) rocks of the Windsor Group, shown in blue (Keppie, 2000). The Windsor Group rocks consist of marine evaporites (gypsum, anhydrite) and carbonates (limestone, dolostone) with minor presence of shale and sandstone. The Windsor Group conformably overlies the Horton Group of Late Devonian to Early Carboniferous age. Horton Group rocks directly underlie the surficial deposits in the northwest and southwest of the study area on the flanks of the uplands, shown in yellow and bronze. To the southwest, Horton group rocks contact metamorphic rock of the Goldenville Formation and into igneous rock of South Mountain Batholith (pink).





Private Water Wells

Groundwater Monitoring Wells

Causeway Monitoring Wells

River Monitoring Wells

Surficial Geology

Alluvial Deposits

Marine Deposits

Glaciofluvial Deposits (Outwash Fans)

Glaciofluvial Deposits (Kames and Eskers)

Stony Till Plain (Ground Moraine)

Silty Till Plain (Ground Moraine)

Silty Drumlin (Drumlin Facies)

Bedrock

CBCL

Avon Aboiteau and Causeway Upgrade Design

Baseline Groundwater Monitoring Program

Figure 3.1. Surficial Geology Map

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Checked:	CBCL Project Number: 171046.01
Approved:	Scale @ 11"x17" : 1:30,000
Sheet: 1 of 1	

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Units: Meter

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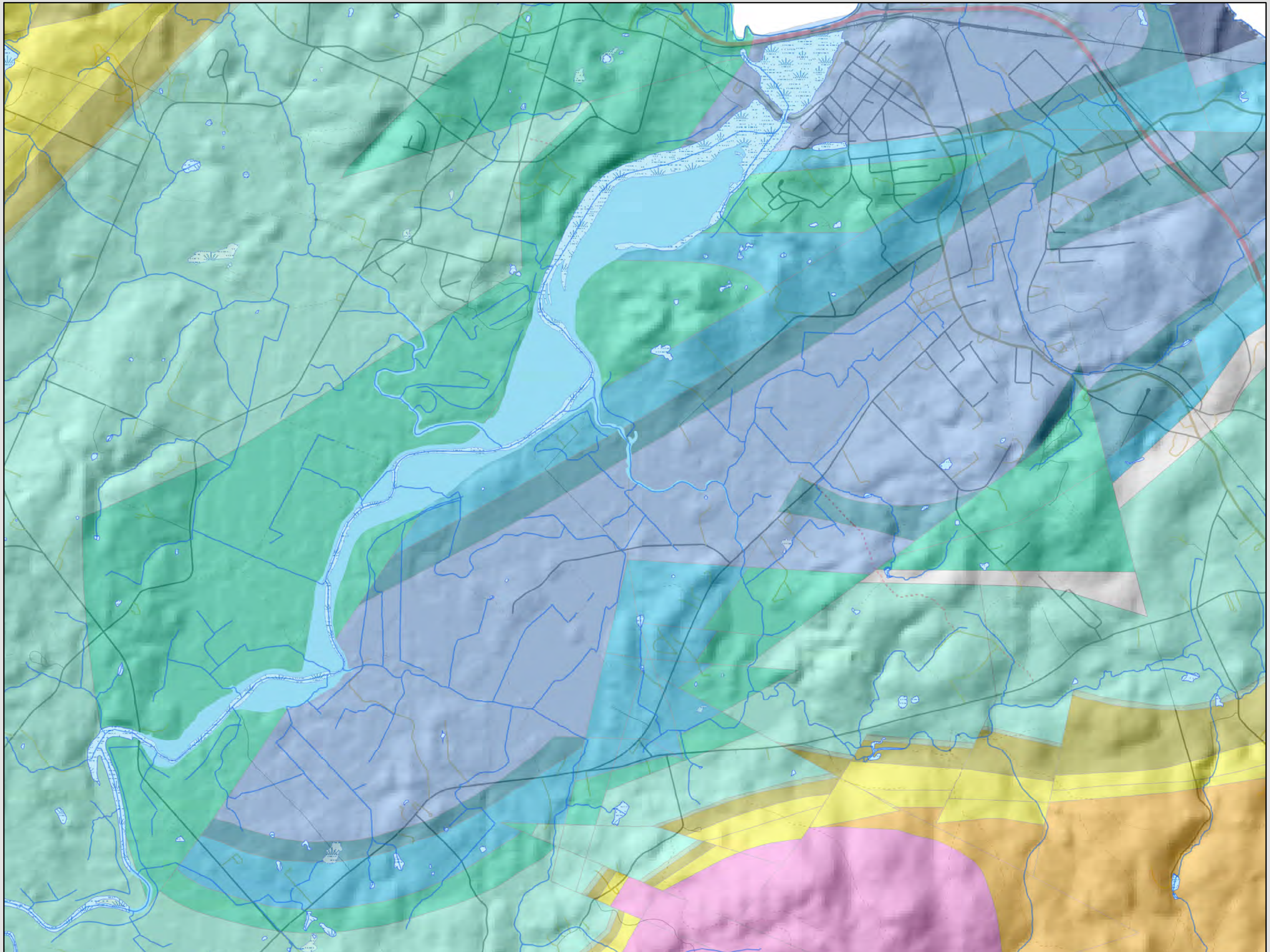

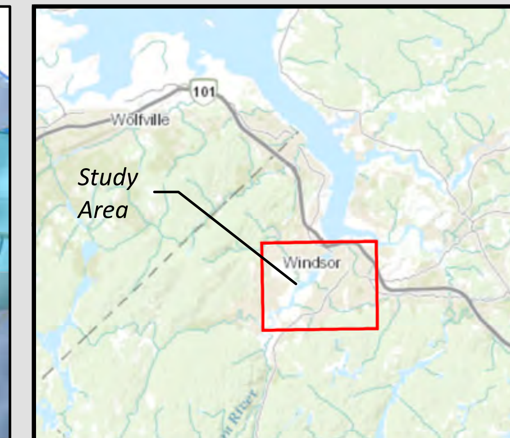

Bedrock Geology

- Plutonic
- Plutonic
- Goldenville FM
- Horton Bluff Lower
- Horton Bluff Middle
- Horton Bluff Upper
- Horton Bluff FM
- Cheverie FM
- Fault Zone
- Miller Creek FM
- White Quarry FM
- Wentworth Station FM
- Pesaquid Lake FM
- Murphy Road FM
- Stewiacke FM
- Macumber FM
- Watering Brook FM

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Avon Aboiteau and Causeway Upgrade Design

Baseline Groundwater Monitoring Program

Figure 3.2. Bedrock Geology Map

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Approved:	Scale @ 11"x17" : 1:25,000
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0 300 600 900 1,200 m

Coordinate System: NAD 1983 UTM Zone 20N
Units: Meter

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3.3 Conceptual Model

The groundwater system in the study area can be described in terms of four major hydrostratigraphic units corresponding to material type. These hydrostratigraphic units include:

- Overburden units
    - Alluvial/Glaciofluvial deposits - the wells located in this hydrostratigraphic unit tend to have greatest yields in comparison with other hydrostratigraphic units in the area. The limiting factor for groundwater production from this unit are seasonal fluctuations of the water table that can reduce water availability in the dryer periods. In addition, the groundwater in this unit can have poor water quality due to inputs of groundwater with high TDS concentrations (primarily sulphate and chloride) from underlying gypsum beds (Trescott, 1969).
    - Marine deposits are dominated by fine grained sediments and in most cases will exhibit low permeability and yield. Under certain conditions, such as localized sand lenses with an adequate saturated thickness, dug wells in this unit can provide enough water for single household use.
    - Silty/stony till deposits are predominantly fine grained but can vary in composition depending on the properties of the bedrock of origin. As with marine deposits, low permeability and low yields are more likely in till, however, dug wells in sandy, gravelly, till with a shallow water table can provide conditions adequate for domestic supply.
- Bedrock units
    - The Windsor Group consists mainly of evaporite rocks (gypsum, anhydrite, occasional limestone). Solution channels in these rocks tend to increase hydraulic conductivity and well yields. Gypsum and anhydrite tend to impart high concentrations of dissolved solids, sulphate, and chloride to groundwater.
    - Horton Group rocks include sandstone, shale, and conglomerates. Areas with the highest sandstone content show the most favourable yields.
    - Metamorphic and Plutonic rock underly a small portion of the study area. The water storage and flow in these units are governed by secondary (fracture) porosity and permeability. Metamorphic and plutonic bedrock units are characterized by lower yields and transmissivities in comparison to the Windsor Group and Horton Group bedrock units.

The NSE Well Log Database contained records of 89 wells located within 1500 m of the Avon River study area. Provincial mapping (Kennedy and Drage, 2008) shows that most of the study area belongs to carbonate/evaporite bedrock groundwater region. Shallow dug wells (completed in surficial material) account for 25% of well records in the area. Drilled well records indicate that the bedrock depth varies between 2.4 and 61 m, with a median value of 12.6 m. Drilled wells in the area show a median depth of 36.5 m, and a median yield of 22.7 L/min.

The regional setting indicates that the Avon River acts as a regional groundwater discharge zone. Groundwater flow is inferred to be recharging in the upland areas with regional flow toward the Avon River. Flow systems discharging to the river may travel through sandy horizons of the overburden, and through the underlying evaporite rock. Flow systems originating in the evaporite would tend to contribute elevated concentrations of dissolved solids to the river and coastal estuary.

Shallower flow paths are likely to interact with local streams and wetlands. At local scales groundwater flow directions tend to be influenced by local stratigraphy and seasonal changes. Generally, shallow groundwater in the upland areas is likely to be younger and derived from recent recharge, whereas the lowlands may receive flow from deeper horizons. Flow systems originating in sandy overburden have the potential to interact with the river. Under tidal conditions, conditions in the river could affect water levels and water quality in groundwater systems directly adjacent to the river.

The Avon River causeway and aboiteaux have established generally higher water levels and freshwater conditions in the river for approximately fifty years (relative to baseline, pre-construction conditions). These changes are likely to affect groundwater discharge rates and flow patterns and may influence groundwater quality in near-shore areas. As the core of the causeway contains granular material, fresh groundwater is likely to seep through and/or under the causeway, discharging to the tidal estuary downstream of the causeway. Bay of Fundy tides are likely to affect this flow system and could influence groundwater gradients and water quality on the upstream side of the causeway.

Recharge rates can vary due to differences in soil infiltration capacities and slope. Average recharge in the study area can be approximated roughly using stream baseflow estimates. Baseflow is the groundwater contribution to the streamflow and can be evaluated by analysis of hydrograph data (daily flow rates). A baseflow separation analysis was performed for streamflow data from North Brook at Sheffield Mills Environment Canada hydrometric station, located 31 km north-west of the study area using an automated Recursive Digital Filtering (RDF) method (Arnold et al., 1995). The average baseflow in 2011-2019 was estimated at 470 mm/a, and average baseflow in the lowest flow month (August) for the same years was 250 mm/a. This suggests that recharge in the area is on the order of 250 to 500 mm/a.

Chapter 4 Methodology

4.1 Private Well Survey and Sampling Program

4.1.1 Water Well Survey

The purpose of the water well survey was to gather additional information on the existing quality and quantity of water available to non-serviced homes in the study area (supplementing existing information in the NSE Water Well Database). Information from the survey was used to supplement the conceptual understanding of hydrogeology in the study area and provided information on baseline conditions of private water supplies prior to construction.

The water well survey was initiated with a homeowner questionnaire, providing owner-supplied impressions of the quality and quantity of existing groundwater supplies (survey template provided in Appendix A). The survey was distributed to non-serviced homes located within 1500 m of the Avon River, between Sangster Bridge Road and the causeway. Survey responses were tabulated and compiled in GIS to be used for selection of the locations for baseline water quality sampling. The survey provided each homeowner in the area with the opportunity to participate in the water sampling program.

4.1.2 Water Quality Sampling

Samples were collected from 16 homes responding to the survey and opting to participate in the water quality survey. As the groundwater investigation was focussed on shallow flow systems, dug wells were targeted preferentially for sampling (one drilled well owner responded to the survey, and this well was not sampled).

Sampling protocol included collection of raw water sample from a tap inside the home, following a three-step process, outlined below:

- **Water System Inspection:**
  The well casing was inspected to confirm drilled or dug well type, and to note the condition of the casing, cap, the ground surface around the well, and the position of the well with respect to the home and the surrounding landscape (e.g., septic system position, oil tank, surface water). If possible, samples were collected from a tap that

bypassed the pressure vessel and treatment system(s). The kitchen tap was used if there was no treatment on the cold-water line, and if there was no tap prior to the pressure tank. If an aerator was present it was removed prior to sampling. The type(s) of treatment systems in use (e.g., water softener, UV, RO, sand, or cartridge filters) was noted and logged. Only locations where the treatment system could be bypassed were included in the sampling program.

- **Disinfection and Flushing:**
  The tap was disinfected using an alcohol swab. Flushing was completed by turning on the cold water tap and running for 5 minutes at a moderate flow rate. The purpose of flushing was to remove stagnant water that may exhibit artificially elevated metals concentrations from the piping, well casing, or pressure tank.
- **Collection of Untreated Water Sample:**
  When flushing was complete the flow was reduced to a low rate. A new pair of disposable nitrile gloves was used to handle the bottles and collect samples. Neither the bottle neck nor the cap were allowed to touch any surfaces during sample collection.

Water quality sampling was completed in two rounds, with 11 wells sampled on September 10, 2020, and 5 additional wells sampled on November 16, 2020. Water quality samples were submitted for analysis by an accredited laboratory. The parameters for laboratory analysis included:

- General chemistry, including physical parameters, major ions, nutrients, and dissolved metals.
- Total coliforms and *E. coli*.

Water quality samples were collected in laboratory-supplied sample bottles and preserved in accordance with CCME water quality sampling documents (CCME 2015; CCME 2011). At a minimum, all sample containers were filled to the rim with no head space, except where head space is recommended by the laboratory. Water samples were stored in coolers on ice at or below 4 °C and transported to the laboratory. Samples for analysis of total coliforms and *E. coli* were analyzed within a hold-time not exceeding 24 hours.

The following information was recorded on the field sampling log: civic address; on-site sewage treatment systems; observable water quality (e.g., odour, colour, sediment, fixture staining); description of well and water supply system; and location of sample tap. Sampling results were compiled and provided to participating homeowners.

4.2 Riverbank Groundwater Monitoring Program

4.2.1 Borehole Drilling and Well Installation

A drilling program was developed to assess the subsurface hydrostratigraphy and to install monitoring wells. Monitoring wells were installed to establish the baseline conditions of groundwater adjacent to the Avon River. Desktop information was used to select drilling locations at various riverbank locations between the Sangster Bridge Road and the causeway. The borehole locations were selected with the intent to target:

- Areas closest to the shoreline, most likely to respond to an altered tidal regime.
- Three to four shoreline positions progressively upstream, showing varying responses to tidal influences.
- Areas most likely to intercept a direct flow path from the river flood plain to the river.
- Areas adjacent to surface water sampling locations.

Site reconnaissance and property access agreements were arranged in collaboration with NSTIR. Twelve monitoring wells were drilled at 10 monitoring locations, shown on Figure 2.1. Nine of the monitoring locations were completed as a single well targeting the shallowest unit of granular material with a suspected connection to the adjacent river. Monitoring location MW7 provided information on groundwater responses at varying depths, and locations MW7, MW8, MW9, and MW10 comprised a transect for evaluating changes in groundwater conditions with distance from the river.

Each borehole was drilled using a geotechnical rig equipped with hollow-stem augers and a split-spoon sampler. Boreholes were advanced into the saturated zone until the first interval of sandy material was encountered, collecting continuous split spoon samples at 0.6 m intervals.

The boreholes were completed as monitoring wells with 5.1 cm di. flush-threaded PVC riser pipes and No. 10 machine-slotted, threaded well screens. The total depth of monitoring wells varied between 7.2 and 21 m, with screen lengths between 1.5 m and 4.6 m. The annular space around the screen and 0.3 m above the screen was filled with No. 2 filter sand. The annular space around the riser pipe was sealed with bentonite in the intervals 1.5 m above the sand pack and in the upper 1.5 m of the borehole. The annular space between bentonite seal intervals was backfilled with cuttings. All installations were completed with a stick-up protective casing and j-plug cap. Table 4.1 provides a summary of monitoring wells. The borehole logs and monitoring well construction details are provided in Appendix B.

Each monitoring well was developed to remove fine-grained material from the filter pack and formation around the well screen. Well development was completed by flushing several well volumes, or until the turbidity of flushed water was nominal. Data loggers with electrical conductivity sensors were installed in each monitoring well during development. In addition, a multiparameter handheld meter was used to measure the pH, temperature, and conductivity of the flushed water. Following development, a bail-down rising-head test was performed at each well to evaluate the hydraulic conductivity of the material in the vicinity of the well screen. Water level recovery data were analyzed using the Hvorslev solution (1951).

Table 4.1 Summary of Riverbank Monitoring Wells

Monitoring Well	Easting[1]	Northing[1]	Depth (m)	Screen Length (m)	Hydraulic Conductivity[2] (m/s)	Material	Bank[3], Distance from Causeway[4] (m)
MW1	409454	4982752	13.47	4.57	7.49E-05	Brown fine sand	NW, 500
MW2	409817	4982575	7.16	2.29	6.66E-06	Reddish brown fine sand	SE, 500
MW3	408054	4981358	17.31	1.52	8.58E-06	Till with coarse sand and gravel seams	NW, 2500
MW4	408552	4980935	12.50	3.35	6.44E-06	Till with coarse sand seams	SE, 2500
MW5	407167	4979948	10.67	6.10	8.22E-05	Reddish brown fine sand	SE, 4400
MW6	406058	4978634	8.23	3.05	2.75E-04	Reddish brown fine sand with coarse sand seams	SE, 6000 (Martock intake)
MW7-S	407072	4980331	10.36	3.05	2.52E-05	Coarse sand, some gravel and fine sand seams	NW, 6000 d[5]=20 m
MW7-I	407075	4980331	15.24	3.05	9.06E-05	Medium to coarse sand	NW, 6000
MW7-D	407073	4980328	21.03	3.05	1.45E-04	Brown fine sand	NW, 6000
MW8	407029	4980362	10.36	2.44	2.97E-06	Brown fine sand	NW, 6000 d[5]=75 m
MW9	406942	4980376	11.58	3.66	5.25E-06	Brown fine sand	NW, 6000 d[5]=150 m
MW10	406613	4980511	14.63	2.44	2.72E-05	Coarse sand, some gravel and fine sand seams	NW, 6000 d[5]=500 m

[1]Measured using hand-held GPS
[2]Hydraulic conductivity of geologic material that intersects well screen
[3]Northwest bank or southwest bank of Avon River
[4]Approximate distance upstream from Avon River Causeway
[5]"d"=Distance from river along transect perpendicular to Avon River

4.2.2 Groundwater Monitoring

Following well installation, each of the monitoring wells was equipped with a data logger with pressure and temperature sensors. Data loggers installed in monitoring wells MW2, MW3, MW4, MW5, MW6, and MW7-S included an electrical conductivity sensor. All loggers were set to record hourly data between July 2020 and April 2021. Loggers were downloaded and manual water levels were measured quarterly. Water levels were compensated for atmospheric pressure using hourly atmospheric pressure from Environment Canada Kentville station located 30 km north-west of the study area. The data were compiled as time series and analyzed for presence for periodic fluctuations, responses to precipitation events, seasonal changes, and tidal effects. Water level monitoring data are provided in Appendix C.

4.2.3 Water Quality Sampling

Following well installation, each of the monitoring wells was equipped with a dedicated Hydrasleeve no-purge sampling device. Hydrasleeve samplers collect an instantaneous slug of water from a well-defined vertical interval in the well with little to no water displacement and agitation. The samples were collected from the midpoint of each well screen, representing conditions in the screened unit due to ambient and/or diffusive flow of groundwater through the well screen.

Water quality samples were transferred to laboratory supplied containers using disposable nitrile gloves. Samples were preserved, stored in coolers on ice at or below 4 °C, and transported to the laboratory with the appropriate Chain of Custody documentation for tracking purposes.

Three rounds of water sampling were conducted at each sampling location, with one event occurring in each of the summer, fall, and spring seasons.
Sample dates were as follows:

- Summer dry season - September 10, 2020
- Fall wet season – November 16, 2020
- Spring freshet – April 21, 2021

4.3 Supplemental Causeway Groundwater Monitoring Program

Four causeway monitoring wells (113, 114, 115, and 116) were installed as part of a previous investigation. CBCL compiled hourly water level and electrical conductivity data collected from August to December of 2019, and from March to August of 2020 from the causeway monitoring wells. These wells were paired to provide indications of groundwater gradients through the causeway. Data sets were analyzed in terms of hydraulic response to tides and the water level in Lake Pesaquid. Hydraulic gradients and potential flow paths were assessed in conjunction with a conceptual understanding of the subsurface based on the available geological information from the drilling records, including the following:

- Geologic profile aligned with the causeway.
- Potential flow paths through a unit of sand and gravel underlying the causeway.
- Potential flow paths through the gravelly fill unit of the causeway, further to the east.

Chapter 5 Results

5.1 Private Well Survey and Sampling Program

Many well owners reported occurrences of high concentrations of TDS and/or salinity, and elevated hardness. These parameters may be related to natural sources (e.g., elevated TDS due to dissolution of ions in gypsum and anhydrite beds) or external sources (e.g., road salt). Elevated turbidity is relatively common in private dug wells supplies, usually caused by a poor seal at the ground surface, at the joints of crocks, or by older construction techniques (e.g. rock-line wells). Some respondents indicated that the wells experienced occasional shortages during summer dry periods. Most of the wells from the survey were equipped with a water treatment system, such as a softener and/or UV light for disinfection. A summary of water well survey responses is provided in Table A1, Appendix A.

Approximately 60 surveys were distributed within the study area and 36 responses were received. Twenty-five survey respondents agreed to water quality sampling, and 16 water supplies were sampled, shown on Figure 2.1. Nine water supplies were not sampled due to lack of access to the raw water line, or because the homeowner was unresponsive to scheduling requests. The results of water quality sampling are summarized in Table D1. Laboratory certificates are provided in Appendix E. Parameters exceeding health based and aesthetic guidelines of Health Canada Guideline for Drinking Water Quality (GCDWQ) are shown as highlighted values.

All samples were collected from dug wells, which are commonly susceptible to inputs at the ground surface. Consequently, the raw water of most sampled wells showed the presence of total coliforms. Six of the wells showed the presence of *E. coli*.

Table D1 shows exceedances of health-based guidelines for the following parameters:

- Arsenic at one location.
- Lead at four locations.
- Manganese at three locations.

The exceedance of an aesthetic guideline (which may include iron, manganese, sodium, chloride, colour, sulphate, and Total Dissolved Solids (TDS)) was observed in multiple samples. Sample location 1-3 showed elevated concentrations of chloride and sodium, suggesting that this well may draw brackish water from the marine unit of the valley plain. A nearby sample (1-2) showed a different chemical composition, indicating that the two wells draw water from separate formations, or that sample 1-3 was affected by de-icing salt.

The chemical composition of groundwater is presented as Piper trilinear diagrams on Figure C1. The relative composition of major cations and anions provides a means of grouping samples with a similar chemical fingerprint. Most of the private well samples can be classified as calcium bicarbonate and calcium sulphate types, with only one sample of sodium chloride type, and one sample of mixed type. Calcium bicarbonate samples are mainly associated with lower TDS concentrations and likely represent groundwater that receives fresh local recharge.

The areal distribution of major anion composition is shown on Figure C4. Bicarbonate-dominant samples are mostly distributed in higher elevation areas, consistent with recharge zones. Calcium sulphate-type samples are associated with elevated TDS concentrations and could indicate longer residence times and deeper flow paths. Deeper flow paths may be influenced by the evaporite bedrock, or the glacial till in these areas may include material that was scoured from the underlying gypsum bedrock. The sodium chloride type observed in sample 1-3 distinguishes the source of water to this well from other areas.

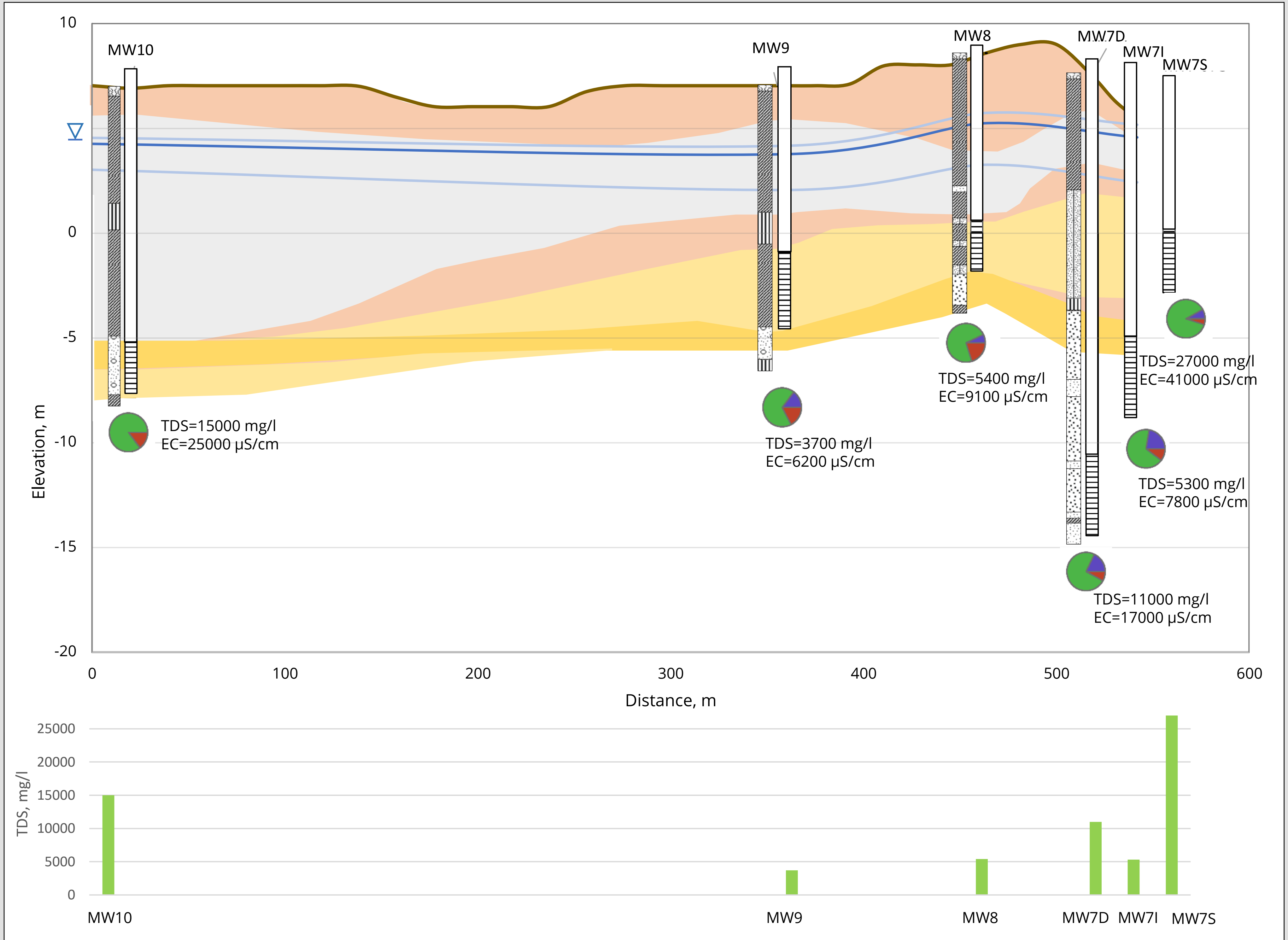
5.2 Riverbank Groundwater Monitoring Program

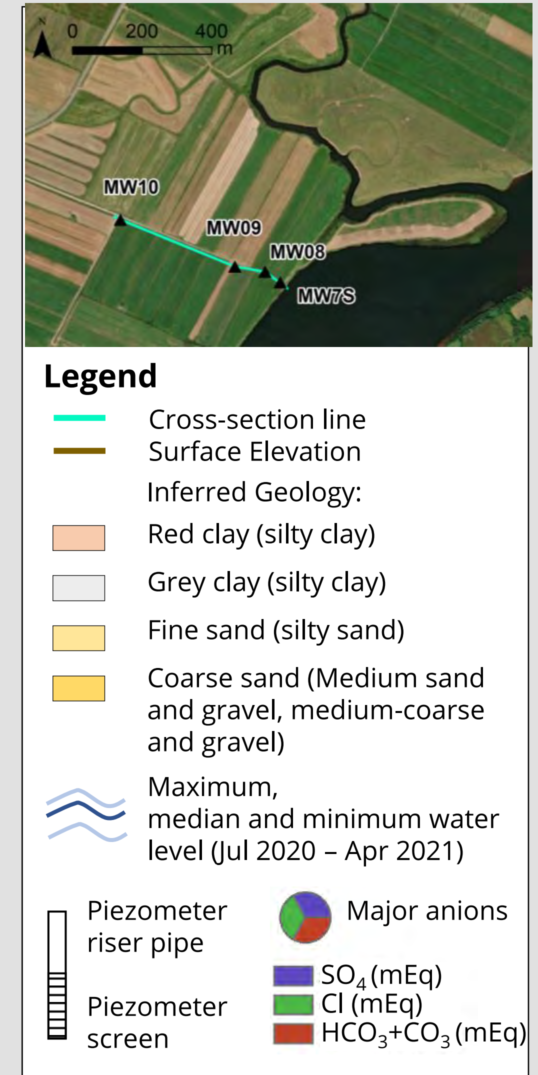
5.2.1 Drilling results

The subsurface material intersected by boreholes was consistent with marine sediments and glacial till deposits. Subsurface stratigraphy encountered during drilling consisted of clay and silty clay of thicknesses from 3 to 17 m, overlying units of sand, silty sand, and gravel of varying thicknesses. The water table was generally encountered at 1.5 m to 4.5 m below grade. The bedrock surface was not encountered in any of the boreholes.

Location MW7 was completed as a monitoring well nest, comprising three monitoring wells screened over shallow, intermediate, and deeper intervals of a confined aquifer system. Each of the units in this system were separated by 0.4 m thick clay units. A cross-section showing inferred general stratigraphy along the transect of wells MW7-MW10 is shown on Figure 5.1.

The hydraulic conductivity estimated from single-well rising-head tests in the monitoring wells varied between 2.75×10^{-4} and 3×10^{-6} m/s (Table 4.1). The presence of fine-grained





Avon River Aboiteau and Causeway Upgrade

Baseline Groundwater Monitoring

Figure 5.1. Conceptual Cross-Section of the Well Transect MW7-MW10

CBCL Project Number: 171046.01

Date: 2021-05-22

material overlying granular material, and the position of the water table within the clay unit indicates that all monitoring wells were installed in a confined setting. These confined units represent the shallowest flow zones with a suspected (or demonstrated) connection to the Avon River. No unconfined aquifers were encountered.

5.2.2 Water Level Monitoring

Appendix C provides water level and conductivity time series graphs for each monitoring well. With the exception of MW2, all wells showed similar patterns of water level changes. Water levels were relatively stable between July 2020 and February 2021 and declined between March and April 2021. Monitoring well MW2 showed a seasonal signature, with low water levels after the dry summer period and increases after the fall wet season. The position of the potentiometric surface along the transect of wells from MW7 to MW10 is shown on Figure 5.1 and indicates a relatively neutral gradient perpendicular to the river.

Figure 5.2 shows groundwater levels in each well, plotted as the change with respect to the average water level in July 2020. Groundwater levels are compared to the average water level in Lake Pesaquid, calculated from SCADA data collected from 2008-2019 at the NSDA gauging station at the Windsor Causeway. Figure 5.3 shows a detailed plot of water level changes in monitoring wells and in Lake Pesaquid between July 15 and August 1, 2020. Water level variations in monitoring wells closely resembled average lake level variations (Figure 5.2) and short-term fluctuations in the lake level (Figure 5.3). The lake level was affected by tide cycles and operation of the aboiteau, and caused corresponding responses in the sandy units within the banks of the Avon River. Water level declines in March and April 2021 were related to a DFO ministerial order to lower the water level in Lake Pesaquid.

The amplitude of groundwater responses to longer-term changes in the lake level varied. Frequency analysis showed that, in addition to longer-term changes, groundwater levels fluctuated with a period of 12.4 hours, showing tidal influences. The amplitude of the tidal signal in different wells varied from 0.02 to 0.05 m. These responses indicate that there is a hydraulic connection between the shallow confined marine unit and the Avon River. The variation in magnitude and delay of hydraulic responses is attributed to variations in local hydrostratigraphy and reflect the strength of hydraulic connections to the river.

Water level responses at MW2 were distinct from those of other wells. The tidal signal was weak, and longer-term changes were subdued with respect to other wells. The elevation and nature of the granular material screened at MW2 suggests that it is not directly connected to Lake Pesaquid. Further indications from water quality data are discussed in Section 5.2.3.

Figure 5.4 shows groundwater level changes with precipitation data from the Kentville climate station. Groundwater levels appeared to increase after precipitation events,

Figure 5.2. Water Levels in River Groundwater Monitoring Wells in 2020-2021 with Average Level at Lake Pesaquid in 2008-2019

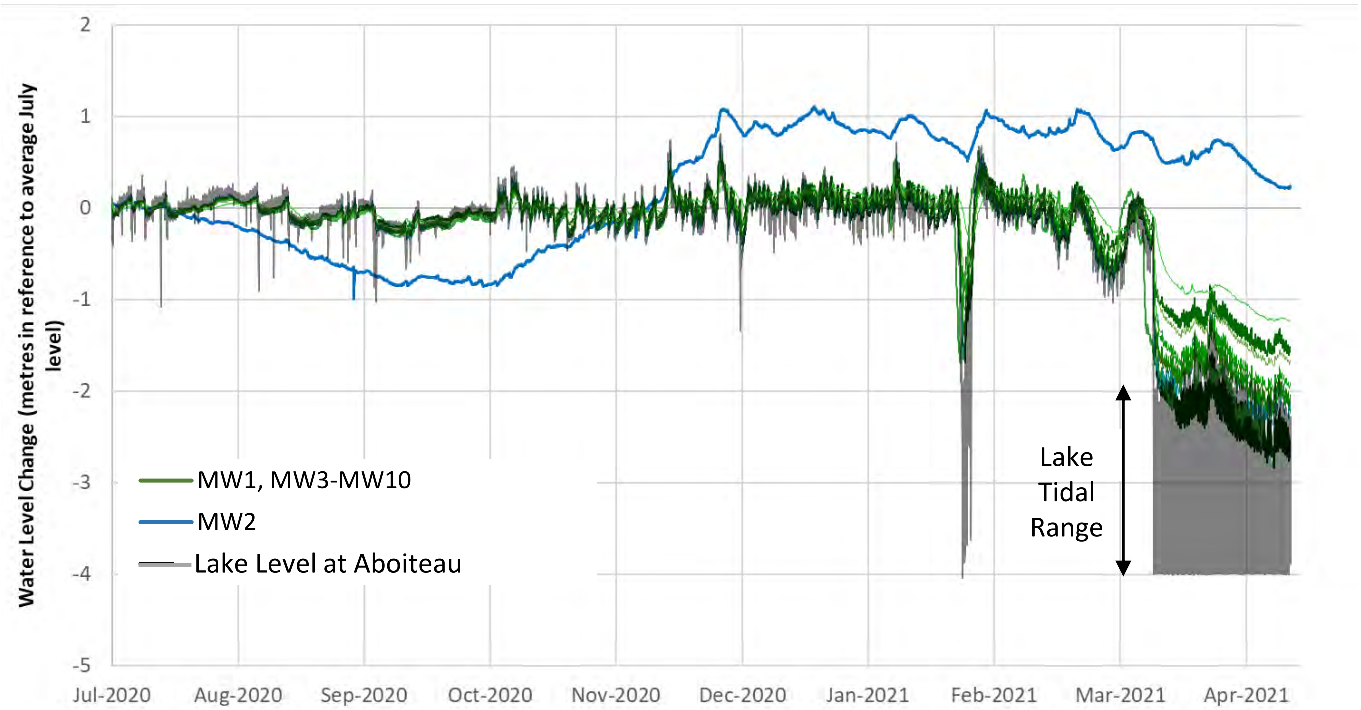


Figure 5.3. Water Levels in River Groundwater Monitoring Wells with Level at Lake Pesaquid in July-August 2020

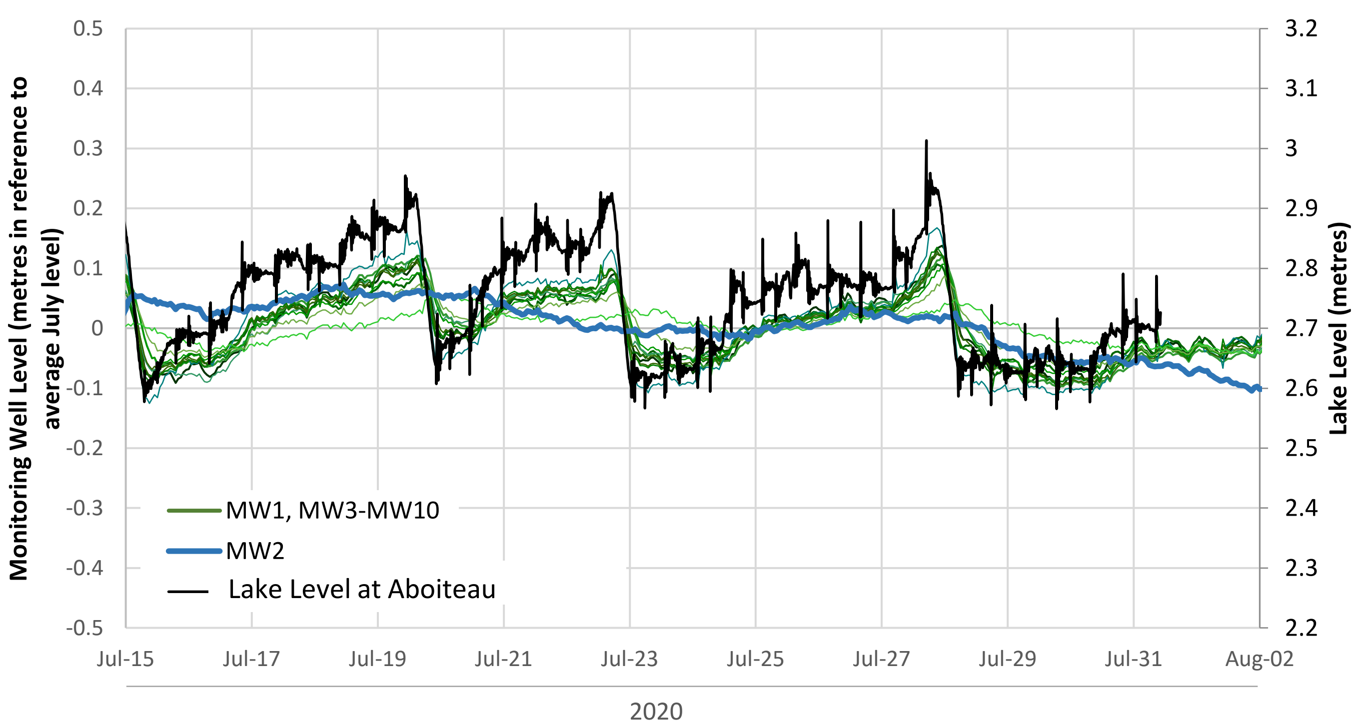


Figure 5.4. Water Levels in River Groundwater Monitoring Wells with Daily Precipitation from Environment Canada Kentville Station

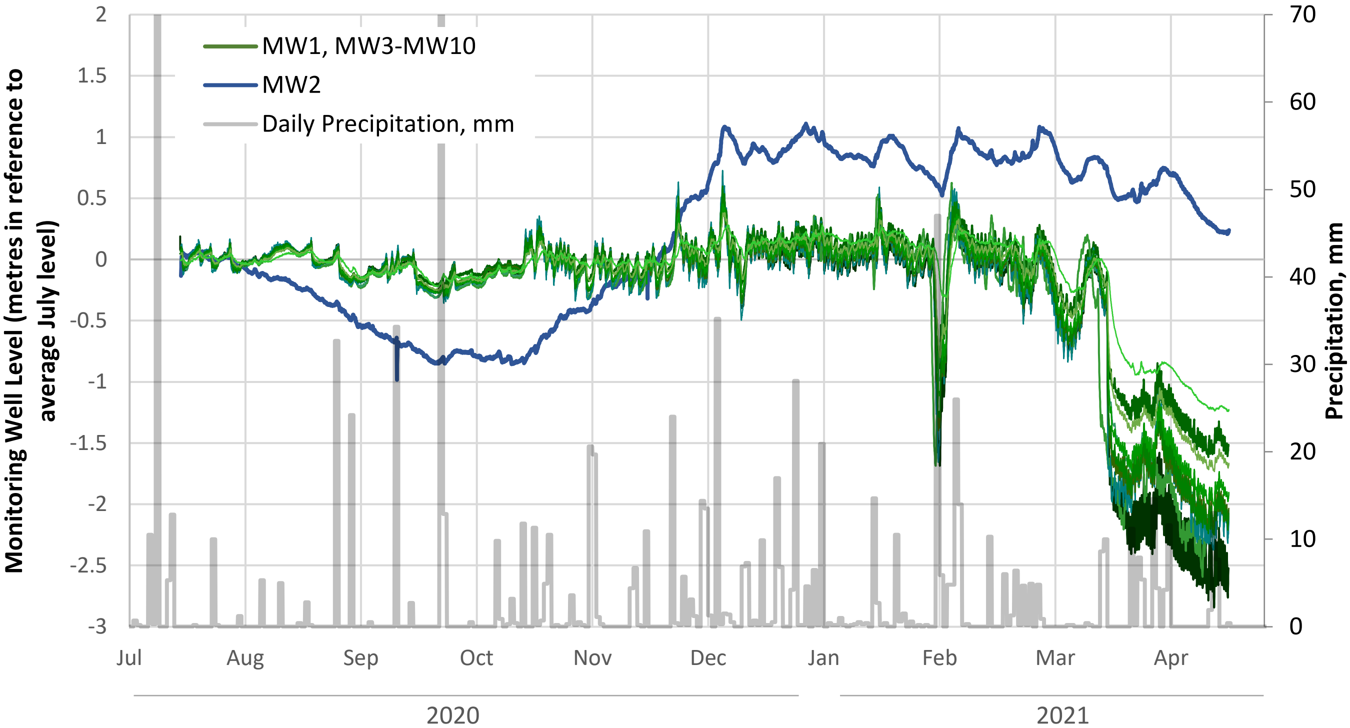
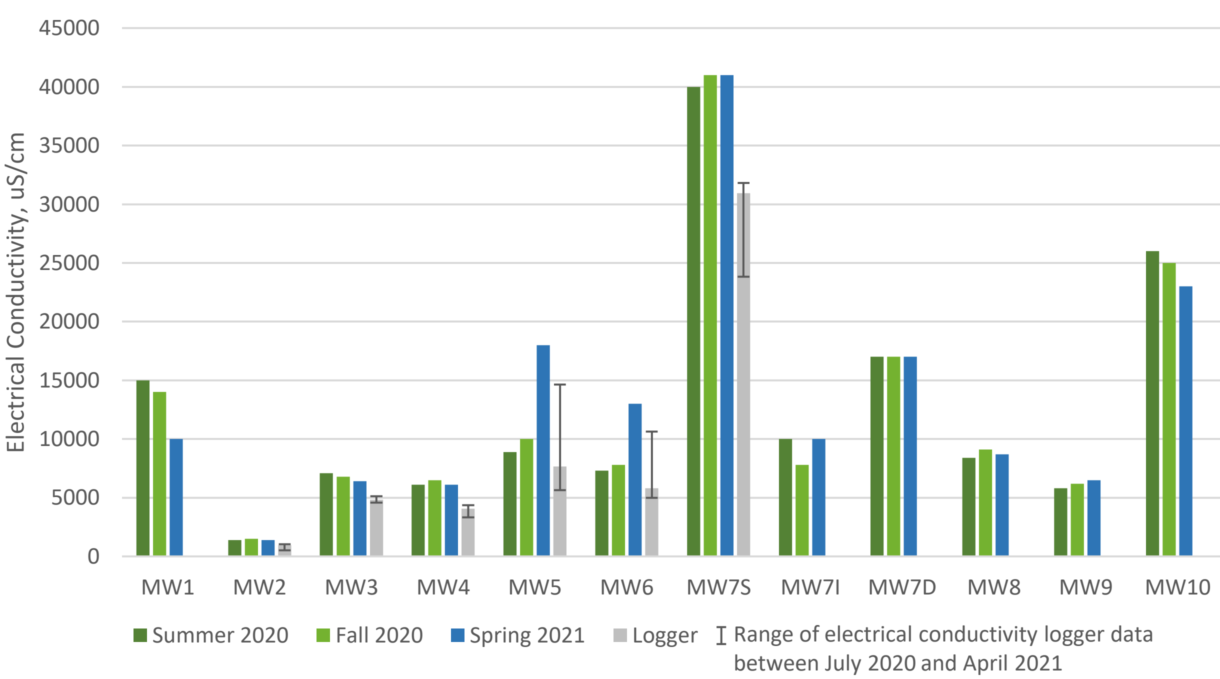


Figure 5.5. Distribution of electrical conductivity from laboratory analysis of groundwater samples during three sampling events and median electrical conductivity from the in-situ logger data between July 2020 and April 2021.



showing larger and more frequent changes in the rainy season. Variation between wells also increased during the rainy season, and when the lake level was lowered in March-April 2021. This variation reflects a more direct connection of some wells to the river and/or the recharge zones that supply the shallow aquifer systems.

5.2.3 Electrical Conductivity Monitoring

Figure 5.5 shows distribution of electrical conductivity evaluated from laboratory analysis of groundwater samples during three sampling events and median electrical conductivity from in-situ logger data between July 2020 and April 2021. Most of the wells exhibited a conductivity of 5000 µS/cm or greater, which indicates that total dissolved solids concentrations are elevated in the sandy units adjacent to the river. Locations MW1, MW7D, and MW10 showed a conductivity on the order of 15,000 µS/cm, and MW7S showed a conductivity of 40,000 µS/cm.

Water with a conductivity of less than 1000 µS/cm is generally regarded as fresh, and sea water has a conductivity of 55,000 µS/cm. Data from the study area generally indicates that background conditions are brackish (water of mixed composition). Brackish water is observed in deep flow systems with long residence times, and in mixing zones influenced by tidal waters. As the flow systems intersected by the monitoring wells are relatively shallow, the observed groundwater quality appears to be consistent with a tidal mixing zone, most likely reflecting conditions as they existed prior to construction of the causeway in 1970. Varying rates of freshwater flushing and/or interaction with the river may be responsible for the differences observed from well to well. MW2 appears to have intersected a fresh, perched water table that has poor hydraulic connection to the river.

Time series data are presented in Appendix C. Rapid shifts in electrical conductivity in September and/or November 2020 observed in MW2, MW3, and MW4 time series coincided with sampling and data download events. These conductivity shifts were likely caused by mixing in the water column and/or changes in sensor position in the well after redeployment of the logger and are not interpreted to reflect changes in formation conditions.

MW2

- The conductivity was relatively stable, varying by less than 100 µS/cm.
- The conductivity peaked in the fall, suggesting that fall recharge conditions led to higher TDS water in the well.
- A smaller peak was discernible in the spring.

MW3

- The conductivity showed nominal daily variations.
- The conductivity declined steadily over the monitoring period, at a rate of 9 µS/cm per day.
- The total decline in conductivity was approximately 400 µS/cm.

MW4

- The conductivity showed short-term variations corresponding to water level changes.
- Short-term variations were generally on the order of 200 µS/cm, over periods of two to seven days.
- Increases in the water level frequently led to decreases in conductivity.
- During select periods, increasing water levels corresponded to increases in conductivity.
- The lowered river level in the spring of 2021 led to generally lower conductivity.

MW5

- The conductivity showed short-term variations corresponding to water level changes.
- The magnitude of short-term variations ranged from 500 to 2000 µS/cm, reaching up to 5000 µS/cm on two occasions.
- Short-term variations showed a period of two to seven days.
- Larger water level changes were associated with larger conductivity changes.
- There was a long-term increase from 6000 to 14,000 µS/cm.
- Increases in the water level generally led to decreases in conductivity.
- The lowered river level in the spring of 2021 was associated with a significant increase in conductivity and larger short-term fluctuations.

MW6

- The conductivity showed short-term variations corresponding to water level changes.
- The magnitude of short-term variations ranged from 300 to 800 µS/cm, when the water level was maintained at approximately 3.5 m geodetic.
- Short-term variations were on the order of 4000 µS/cm when the water level decreased below 2 m geodetic.
- Short-term variations showed a period of two to seven days.
- Larger water level changes were associated with larger conductivity changes.
- There was a long-term increase from 5000 to 7000 µS/cm.
- Increases in the water level generally led to decreases in conductivity.
- The lowered river level in the spring of 2021 was associated with a significant increase in conductivity and larger short-term fluctuations.

MW7S

- The conductivity showed short-term variations corresponding to water level changes.
- The magnitude of short-term variations ranged from 200 to 500 µS/cm, reaching up to 700 µS/cm in October 2020.
- Short-term variations showed a period of two to three days.
- Larger water level changes were associated with larger conductivity changes.

- There was a long-term increase from 24,000 to 32,000 µS/cm.
- Increases in the water level generally led to decreases in conductivity.
- The lowered river level in the spring of 2021 was *not* associated with a significant increase in conductivity and larger short-term fluctuations.

Decreases in conductivity that correspond to increasing water levels are generally consistent with a fresh source of water entering the well. This could be related to one of the following effects:

- A direct response to precipitation effects.
- A response to fresh water in the river affecting the formation.
- Density effects within the water column of the well.

Further observation and groundwater monitoring work would be required to provide a mechanistic explanation for the observed changes in conductivity. The monitoring data generally show that the groundwater regime close to the river is affected by river levels, however, to date there are no indications that saline water from the river flows into the formation or increases salinity in the confined marine unit adjacent to the river. The generally high TDS concentrations associated with the high observed conductivities are suggestive of influences such as historical flooding by sea water or regional flow systems conveying water from the underlying gypsum rock.

5.2.4 Water Quality Sampling

Water quality samples were collected on September 10, 2020, November 16, 2020, and April 21, 2021. The results of sampling are summarised in Table D2, Appendix D, and laboratory certificates are provided in Appendix E. Parameters highlighted in Table D2 indicate exceedances of an aesthetic guideline (which may include iron, sodium, chloride, colour, sulphate, and total dissolved solids). The summary table also shows exceedances of health-based guidelines for the following:

- Arsenic at two locations (MW5 and MW6).
- Manganese at most locations.
- Strontium at two locations (MW3 and MW4).

The chemical composition of groundwater was plotted on Piper trilinear diagrams, on Figure D2, Appendix D. Major ion concentrations are shown as a percent of the total (mEq/L), to provide a characteristic fingerprint for each sample.

Most of the samples showed elevated TDS concentrations (>3000 mg/L) and a composition dominated by sodium chloride-type water, which indicates brackish conditions (a mixture of fresh and salt water), consistent with results of electrical conductivity monitoring. Samples from MW3 and MW4 may be located on the boundary of the sodium chloride zone, suggested by a higher calcium content. The sample from MW2 showed sodium bicarbonate type water, showing that it is not installed in the confined marine unit. The general chemical composition did not change substantially between sampling events, although some fluctuations of TDS and major ion concentrations were observed at number of well locations.

Figures D3 and D4, Appendix D, provide a comparison of the major ion composition of samples from private wells, monitoring wells, and surface water samples. The full results of surface water sampling work were provided in previous reporting (CBCL, 2021). Private water wells and monitoring wells showed distinct chemical signatures, with private well samples dominated by calcium bicarbonate and calcium sulphate types, and monitoring well samples generally of sodium chloride type.

Surface water samples were clustered in the mixed type on Figure D3, Appendix D, consistent with a mixture of sources. Median TDS concentrations were as follows:

- 44 mg/L in surface water samples.
- 296 mg/L in private well samples.
- 5350 mg/L in monitoring well samples.

TDS concentrations, electrical conductivity, and the major anion composition of samples from monitoring wells along the transect MW7-MW10 are presented on a conceptual cross-section provided on Figure 5.1. Samples from the monitoring wells completed along a transect in the shallow part of the confined marine sandy unit (MW9, MW8 and MW7s) indicated an apparent salinity gradient westward away from the river, but high TDS was measured at MW10, located at the greatest distance from the river. TDS concentrations at monitoring well nest MW7 varied at different depths, with the highest concentration observed in the shallowest well and the lowest concentration in the sample from the intermediate well.

5.3 Supplemental Causeway Groundwater Monitoring Program

5.3.1 Groundwater Level Monitoring

Appendix E provides water level and conductivity data compiled for four causeway monitoring wells (113, 114, 115, and 116). These wells are paired and provide indications of groundwater gradients through the causeway.

Cross-sectional data show:

- Figure E1 – potential flow paths through a unit of sand and gravel underlying the causeway.
- Figure E2 – potential flow paths through the gravelly fill unit of the causeway, further to the east.
- Figure E3 shows the geologic profile aligned with the causeway.

Figures E4 through E10 show the following:

- All four of the wells showed a hydraulic response to tides and the water level in Lake Pesaquid.
- The hydraulic response at 113/114 suggests a relatively direct hydraulic connection to the estuary (all tide cycles are represented).
- Gradients suggest that flow from Lake Pesaquid toward the tidal marshes predominated in the 2019 dataset, but in the spring of 2020 the gradient was reversed (Figure E8).
- The hydraulic response at 115/116 showed an apparent response to the lake levels, including a cycle with a period of 2-3 days.
- Gradients suggest that flow from the tidal marsh toward Lake Pesaquid predominated in this flow system.
- The causeway wells appear to be installed in the mixing zone of a salt water wedge.
- The conductivity at 113 and 114 was stable, indicating no responses to tides or lake levels, which is consistent with a deeper or confined groundwater flow system.
- Conductivity data at 113 were limited in 2020, as the well screen apparently filled with silt, suggesting that it was damaged and/or routinely inundated with tidal surface water.
- In 2020 the conductivity at 116 was lower and more stable compared to 2019; and
- The conductivity at 115 decreased from 15,000 to 11,000 µS/cm between June and July, 2020, corresponding to an increase in head of 1.2 m; this change corresponded to an increase in the level of Lake Pesaquid and was likely caused by an increase in the freshwater head of the lake.

Chapter 6 Summary

CBCL conducted a baseline groundwater monitoring study, to establish current groundwater conditions in the vicinity of the Avon River upstream of the existing Windsor Causeway and Avon River aboiteau structure.

The key findings were as follows:

- Private well sampling program showed that dug wells were affected by surface water inputs, including the presence of *E. coli* in multiple samples and potential contamination by road salt in one of the samples.
- On the valley plain in the material mapped as marine deposits, there is a system of confined sandy units overlain by fine-grained clayey material. Horizons within the confined sandy unit are subdivided in places by beds of silt and clay.
- The setting of the Avon River indicates that it is a regional groundwater discharge zone. The hydraulic head measured in the sandy unit adjacent to the river was similar to the elevation of the river.
- Water level responses in monitoring wells showed a hydraulic connection to Lake Pesquid and the Avon River. Monitoring data indicated that the unit screened at MW2 is a part of a freshwater system unrelated to the confined unit observed in other wells, with a limited connection to the river.
- Three dominant types of groundwater in the study area were calcium bicarbonate, calcium sulphate and sodium chloride, consistent with the results of the previous studies (Trescott, 1969). Most of the private wells were calcium bicarbonate and calcium sulphate type. Most of the monitoring wells were sodium chloride type. Surface water in Lake Pesaquid was of mixed type, suggesting that it is influenced by both fresh water and saline sources.
- TDS concentrations in water samples were highest in the riverbank monitoring wells (median TDS of 5350 mg/l) in comparison to the surface water samples (median TDS of 44 mg/l) and private wells samples (median TDS of 296 mg/l).
- The groundwater chemical composition, TDS concentrations and long-term electrical conductivity monitoring results appear to be consistent with a tidal mixing zone, most likely reflecting conditions as they existed prior to construction of the causeway in 1970.
- Groundwater conductivity changes over time show that conditions in the formation(s) adjacent to the river respond to seasonal variations.

- Groundwater level and chemistry data from the MW7-MW10 transect and the nest at MW7 are suggestive of a complex, multilayered system, affected by interactions the water level in the river. Other shallower independent freshwater systems occur at greater distance from the river.
- Controlling influences over groundwater flow patterns and quality are likely to include variable stratigraphy and hydraulic conductivity, and historical flooding of the river plain by dense seawater.

Chapter 7 Closure

This report provides a summary of the baseline physical and chemical parameters measured in groundwater wells near Lake Pesaquid and the Avon River between July 2020 and April 2021. Conclusions presented represent the best judgement of the assessors based on current environmental standards and on the observed site conditions. Due to the nature of the investigation and the limited data available, the assessor cannot warrant against undiscovered environmental liabilities. Conclusions are based on results from the assessed Study Area and can only be extrapolated to limited and an undefined spatial area and temporal scale around the sampling locations.

Prepared by:
Colin Walker, M.Sc., P.Geo., FGC
Senior Hydrogeologist
Direct: (902) 421-7241 x 2262
E-Mail: colinw@cbcl.ca

Reviewed by:
Melissa Rutherford, B.Sc.
Environmental Scientist

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APPENDIX A

Water Well Survey

AVON RIVER STUDY - WATER SUPPLY SURVEY

Nova Scotia Transportation and Infrastructure Renewal (NSTIR) is completing work to assess the quality of water supplied by private water wells to homes and farms in the Avon River area. To aid in this endeavor, we are requesting that property owners who rely on water wells take a few moments to complete this survey. NSTIR's Engineering Consultant, CBCL Limited, will be collecting water quality samples from approximately 30 well water supplies after the survey results are in.

Are you interested in completing the survey? ❑ Yes ❑ No

If *No*, please explain why below. If insufficient space, feel free to attach further correspondence.

____

____

____

____

____

If *Yes*, please complete the questionnaire as outlined below.

Would you like to participate in the water quality sampling program?

❑ Yes ❑ No

If *Yes*, please provide your preferred contact information:

Name: ____

How would you like us to contact you?

❑ Phone ____________________________ ❑ Text ____________________________

❑ Email ____

It is anticipated that the sampling program will be conducted over a two-week period in September 2019. NSTIR will make an effort to accommodate all of those who wish to participate in the sampling program, however, please note that if interest is high, it will not be possible to collect a high density of samples from each neighborhood.

Learn more about caring for your well:

https://www.novascotia.ca/nse/water/privatewatersupplies.asp
https://www.novascotia.ca/nse/water/docs/DisinfectWaterWell.pdf
https://www.novascotia.ca/nse/water/docs/ConstructWell.pdf
https://www.novascotia.ca/nse/groundwater/docs/Homeowners-Guide-Wells-Septic-Oil-Tanks-2013.pdf

Residential Users

Type of Residence

❑ Permanent (12 months of the year) ❑ Rental Months Occupied # ________

❑ Multi-Unit # of units ___________ ❑ Other ___________________________

Number of persons served by this well ____________

Do you use the well to fill a swimming pool? ❑ Yes ❑ No

Civic Address of residence ____

Agricultural Users

Peak Daily Well Water Use ____

____

❑ Irrigation Crop ______________________ Acreage __________________

____

❑ Livestock Type ______________________ Number __________________

____

❑ Orchard Type ______________________ Trees ____________________

❑ Greenhouse Size _______________________

❑ Other ____

Commercial Users

Business name

____

Type of business

____

Civic address

____

Number of employees ___________________ Number of customers per day _____________

Days per week of operation ______________

Estimated water use per day ______________ ❑ Unknown

Is this a registered public drinking water supply? ❑ Yes ❑ No

If yes, registration number ____

Water Quality & Quantity

When was the well-constructed? ______________________ ❑ Unknown

Name of well driller/digger? _________________________ ❑ Unknown

Do you drink the water from your well? ❑ Yes ❑ No

Has the well water ever been tested for bacteria? ❑ Yes ❑ No

1. If yes, who did the testing? ❑ Owner ❑ Government Inspector ❑ Other
2. Approximate date tested ______________________
3. Is a copy of the results available? (please provide if yes) ❑ Yes ❑ No

Has the well water ever been tested for chemical quality? ❑ Yes ❑ No

1. If yes, who did the testing? ❑ Owner ❑ Government Inspector ❑ Other
2. Approximate date tested ______________________
3. Is a copy of the results available? (please provide if yes) ❑ Yes ❑ No

Have you experienced any water shortages? ❑ Yes ❑ No

Describe: ____

____

____

Have you had water delivered to supplement or replace your well water? ❑ Yes ❑ No

- If yes, where was the water delivered? ❑ Into the well ❑ Storage Tank
- Is trucked water your main supply? ❑ Yes ❑ No

Have you had any other problems with your well water ? ❑ Yes ❑ No

If yes, check any that apply: ❑ Odour ❑ Taste ❑ Sediments ❑ Cloudiness ❑ Staining

❑ Other____

Do you treat your water? ❑ Yes ❑ No

If yes, indicate equipment: ____

____

____

Well Information

❑ **Drilled Well**

❑ **Dug Well**

Drilled Well	Dug Well
Diameter ❑ 4 inch ❑ 6 inch ❑ Other	Diameter ❑ 3 feet ❑ Other _____
Which best describes your well?	How far above ground surface is the top of the well? ________________
❑ It sticks up out of the ground / it is in the yard.	Does the well have a concrete cover (as shown above)? ❑ Yes ❑ No
How high above the ground (inches)? ______	Construction of well:
❑ In the basement.	❑ Concrete ❑ Rock-lined
❑ In a concrete chamber.	❑ Other ________________
❑ It is buried / I have never seen it.	Is the ground mounded around the well?
Describe well cap / seal:________________	❑ Yes ❑ No
________________________________	Are the joints between the crocks sealed?
Depth of Well________________	❑ Yes ❑ No ❑ Unknown
Depth of Steel Casing ________________	Depth of Well ________________
Depth of intake / pump depth: ____________	

Has the well been repaired or serviced by a contractor in the last 5 years? ❑ Yes ❑ No

If yes, describe problem and repairs: ____

____

____

General Survey Comments:

____

____

____

____

____

____

Table A1. Summary of Water Well Survey Responses

Survey ID#	Participate in WQ Sampling	Resi-dents	Well Type	Well Date	Di.	Casing Stick-up	Concrete Cover	Well Construction	Ground Mounded	Sealed Joints	Well Depth
1	Y	4	Dug	1998	3 ft	1 m	Y	Concrete	N	Y	Unknown
2	Y	2	Dug	1974	42 in	7 in	Y	Concrete	N	U	6 crocks
3	Y	2	Dug	Unknown	3.5 ft		Y	Concrete	N	U	Maybe 16 ft
4	Y	1	Dug	Unknown	3 ft	above ground	Y	Concrete	?	U	Unknown
5	Y		Dug	1997	3 ft	1 ft	Y	Concrete	N	Y	3 crocks
6	Y	2	Dug	Unknown	3 ft	above ground	Y	Concrete	Y/N	U	3 crocks
8	Y	4	Dug	~1987	3 ft	15 in	Y	Concrete	Y	U	20 ft
9	Y	2	Dug	1978	3 ft	3 ft	Y	Concrete/rock	Y	N	20 ft
10	N	2	Dug	1988		2.5 ft	Y	Concrete	Y	Y	18 ft
11	Y	2	Dug	1981	3 ft	18 in	Y	Concrete	N	N	24 ft
12	Y	4	Dug	Unknown	3 ft	1 ft	Y	Concrete	Y	U	15 ft
13	Y	2	Dug	1980	3 ft	9 in	Y	Concrete	Y	N	7 crocks
14	N	2	Drilled	Unknown	6 in						
15	Y	2	Dug	2009-2011	42 in	20 in	Y	Concrete	N	Y	15 ft
16	Y	4	Dug	1991	3 ft	30 in	Y	Concrete	Y	N	9 Crocks
17	Y	1	Dug	1975	3 ft	Several ft	N	Concrete	?	U	Unknown
18	Y	2	Dug	Unknown		3 ft	Y	Concrete	Y	N	15 ft
19	Y	2	Dug	1992	3 ft	3 ft	Y	Concrete	N	Y	21 ft
21	Y	4-6	Dug	2010		2 ft	Y	Rock-lined	N	N	15 ft
22	Y	1	Dug	1800's, 1990		4 ft, 4 ft, 6 in	Y	Concrete/rock	N	U	20-30 ft
23	Y	2	Dug	1981	4 ft	8 in	Y	Concrete	Y	Y	15 ft
25	Y	2	Dug	1999	3 ft	8 in	Y	Concrete	N	N	8-9 crocks
26	Y	8	Dug	Unknown	3 ft	18 in	Y	Concrete	N	Y	20 ft
27	Y	2	Dug	2009	3 ft	12 in	Y	Concrete	Y	U	25 ft
28	Y	2	Dug	Unknown	3 ft	12 in	Y	Concrete	Y	U	10 ft
29	Y	2	Dug	Unknown	3 ft	4 ft	Y	Concrete	Y	U	13 ft
30	Y	1	Dug	1967	3 ft	3 ft	Y	Concrete	Y	U	15-18 ft
31	Y	5	Dug	Unknown	5 ft?	1 ft	Y	Rock-lined	Y	U	12 ft
32	Y	5-7	Dug	Unknown	3 ft	at grade	N	Rock-lined	Y	U	15 ft
33	Y	3-4	Dug	2001	3 ft	3-4 in	Y	Concrete	Y	Y	24-26 ft
34	Y	2	Dug	1983			Y	Concrete	N		
57	Y	2	Dug	Unknown							5-6 crocks
58	Y	3	Dug	Unknown							15 ft

Table A1. Summary of Water Well Survey Responses

Survey ID#	Drinking Water from Well	Bacteria Sample	Bacteria Sample Date	Chemical Sample	Chemical Sample Date	Water Shortages	Odour	Taste	Staining	Sediment	Hardness, Iron	Cloudiness	Treatment
1	Y	Y	2018	Y	2017	N	Y				Y		Softener
2	Y	Y	1993, 2009	Y	2012	Y		Y	Y	Y			Softener, Distiller
3	Y	Y		Y		N	Y		Y				Softener, UV
4	N	N		N	N/A	Y	Y					Y	N
5	N	N		N	N/A	N	Y		Y				N
6	Y	Y	2013	?	N/A	Y	Y			Y			
8	Y	Y	1987	Y	~1987	N		Salt					Filter, UV
9	N	N		Y	1978	Y							N
10	Y	Y	1988	N	N/A								N
11	Y	N		N	N/A	Y					Y		N
12	Y	Y		Y	2007	Y				Y		Y	N
13	N	N		N	N/A	Y							N
14	N	Y	Long ago	Y	Recently	N	Y	Y	Y				Softener
15	N	Y	2012	Y	2012	N	Y	Y	Y	Y			Filter, Softener
16	N	N		N	N/A	Y							N
17	N	Y	1975	N	N/A	Y	Y	Y	Y	Y		Y	N
18	Y	Y	2017	N	N/A	N				Y			N
19	Y	Y	2017	Y	2017	N							Filter, UV
21	Y	Y	2018	Y	2018	N							Softener
22	N	N		N	N/A	Y							N
23	Y	Y	2015	Y	2004, 2015	N							UV
25	N	Y	Unknown	N	N/A	N					Y		Softener
26	N	Y	Unknown	Y		Y	Y	Y	Y	Y			Y
27	Y	N	July 2019	N		Y							Softener
28	Y	Y	May 2012	N		N							N
29	Y	Y	2002	N	N/A	Y							N
30	Y	Y	2013	Y	2013	N	Y					Y	N
31	Y	N		N		Y			Y	Y			N
32	N	N		N		Y		Y				Y	Filter, UV
33	Y	Y		Y	2016	N						Y	UV
34	Y	Y	1983, 2010	N		Y							
57	Y					Y					Y		N
58	Y										Y		

APPENDIX B

Borehole Logs and Monitoring Well Construction Details

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molgb`q =k^jb=== Avon River Aboiteau Replacement		_lobelib=krj_bo	**MW2**
molgb`q =krj_bo== **171046.01**		`ljmibqflk=a^ qb	**May 26, 2020**
`ifbkq= **NSTIR**		dolrka=bibs ^qflk	**8.018 m**
il`^ qflk **409817 4982575 UTM 20N**		qlm =lc=mfmb=bibs ^qflk	**0.895 m above grade**
aofiifkd=jbqela **Hollow-stem auger with split-spoon sampling**		m^db===1============1=lc============	

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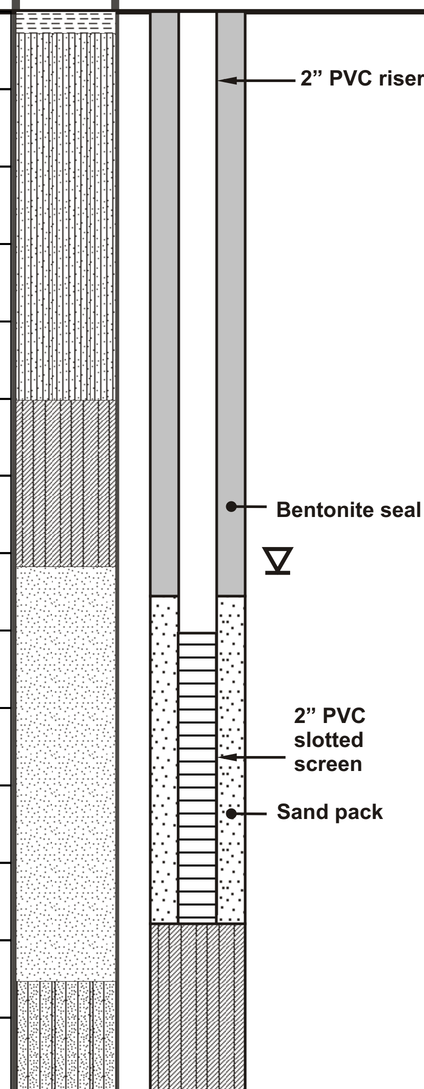

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molgb`q =krj_bo==	171046.01	`ljmibqflk=a^ qb	May 26, 2020
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il`^ qflk	408054 4981358 UTM20N	qlm =lc=mfmb=bibs ^qflk	0.875 m above grade
aofiifkd=jbqela	Hollow-stem auger with split-spoon sampling	m^db====1=============1=lc============	

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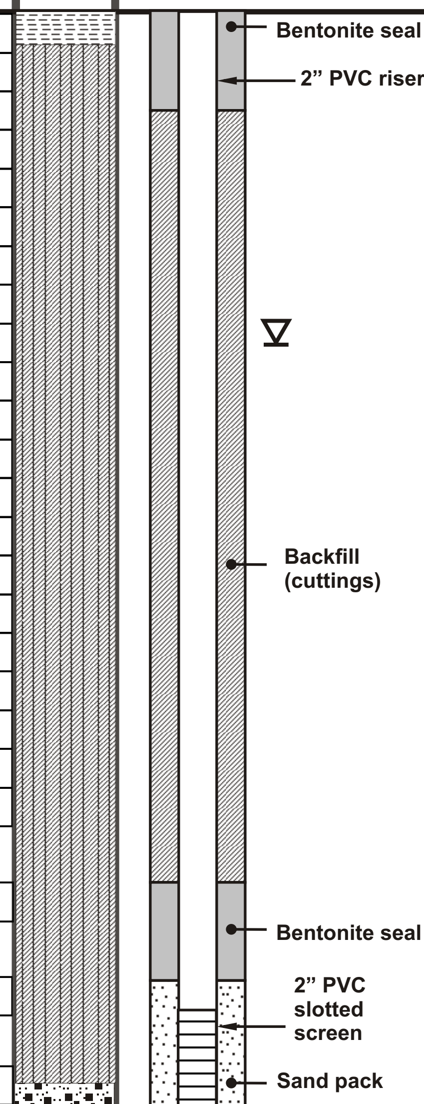

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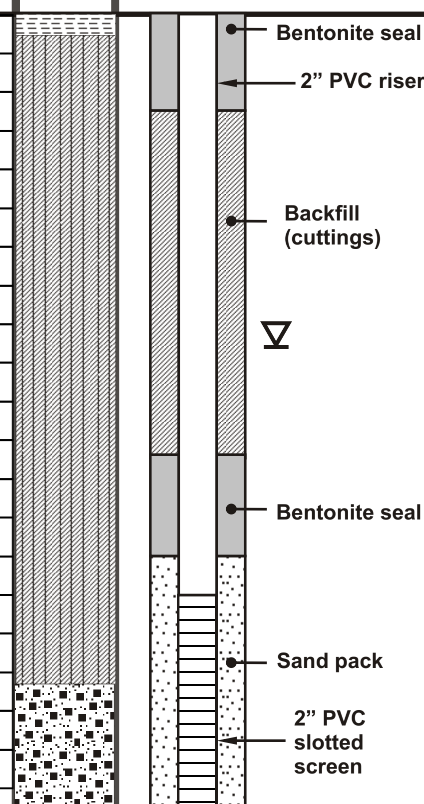
molgb`q =k^jb=== **Avon River Aboiteau Replacement**		_lobelib=krj_bo	**MW4**
molgb`q =krj_bo== **171046.01**		`ljmibqflk=a^ qb	**June 1, 2020**
`ifbkq= **NSTIR**		dolrka=bibs ^qflk	**5.6 m a.s.l.**
il`^ qflk		qlm =lc=mfmb=bibs ^qflk	**0.865 m above grade**
aofiifkd=jbqela **Hollow-stem auger with split-spoon sampling**		m^db====1============1=lc============	

abmqe EãF	EÑíF	dblildf`^i =abp`ofmqflk	p^jmib p~ãéäÉ	_äçïë=L=NR=Åã
M	M	lêÖ~åáÅë oÉÇ=ëáäíó=Åä~ó=	í	îĚíĚíĚí
			î	îĚîĚïĚî
O			ï	îĚîĚïĚî
			ï	ïĚîĚěĚìĚí
	NM		ï	îĚîĚíĚí
Q		a~êâ=ÖêÉó=ëáäíó=Åä~ó páäíó=ë~åÇ	ì	íĚíĚíĚí
			í	ïĚíĚíĚî
			į	ìĚíĚĭĚıĳ
		dä~Åá~ä=íááä	ĳ	ïĚıĳĚíıĳĚîĭ
S	OM		îì	îìĚîĭĚîĭĚîĭ
			îí	įĚîĭĚíìĚîĭ
		qááä dê~åáíÉ=ÄçìäÇÉê	îî	îíĚîĭĚîíĚîĭ
U		qááä=ïáíÜ=ëçãÉ=Öê~îÉäë	îï	îĭĚîĭĚîĭĚîĭ
			îì	ïĭĚîìĚîĭĚîì
	PM		îï	ìîĚìì
NM			îï	ïĚîìĚîïĚîį
			íì	îìĚîĭĚîĭĚîĭ
		dê~îÉäë	íį	îĭĚîĭĚîìĚîĭ
			íĳ	îìĚîĭĚîìĚîĭ
NO	QM		îì	îĭĚîĭĚîĭĚîĭ
		ble=]=NOKR=ã		
NQ				
	RM			
NS				
NU	SM			
OM				

do^mef`

_lobelib fkcloj^ qflk



Saturated zone

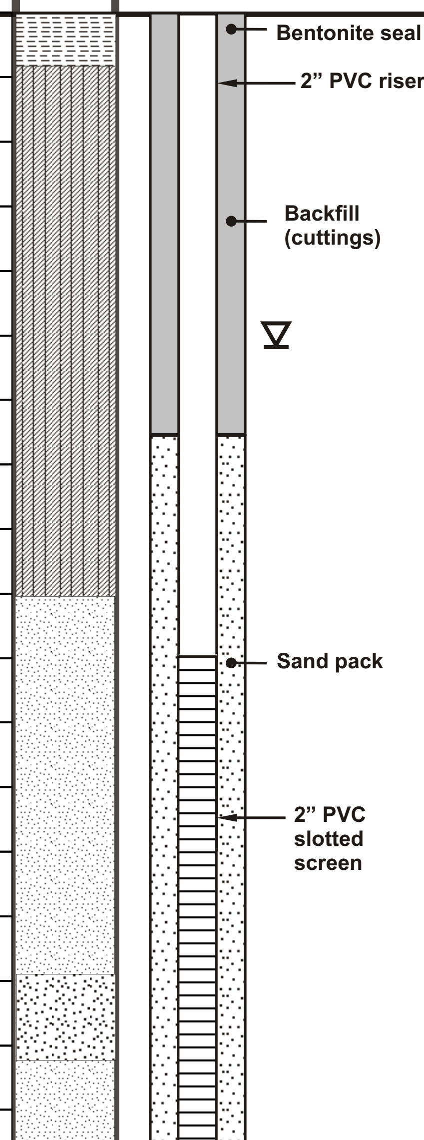
CBCL

pqo^ qfdo^mef`= ^ka=fkpqorjbkq ^qflk=ild

molgb`q =k^jb===	**Avon River Aboiteau Replacement**	_lobelib=krj_bo	**MW5**
molgb`q =krj_bo==	**171046.01**	`ljmibqflk=a^ qb	**June 2, 2020**
`ifbkq=	**NSTIR**	dolrka=bibs ^qflk	**6.237 m a.s.l.**
il`^ qflk	**407167 4979948 UTM 20N**	qlm =lc=mfmb=bibs ^qflk	**0.88 m above grade**
aofiifkd=jbqela	**Hollow-stem auger with split-spoon sampling**	m^db====1=============1=lc============	

abmqe EãF	abmqe EÑíF	dblildf`^i =abp`ofmqflk	p^jmib p~ãéäÉ	p^jmib _äçïë=L=NR=Åã
M	M	lëÖ~åáÅë oÉÇ=ëáäíó=Åä~ó=	í	íĚíĚíĚí
			î	îĚîĚîĚî
	R	a~êâ=ÖêÉó=ëáäíó=Åä~ó	ĩ	ìĚíĚíĚí
O		oÉÇ=ëáäíó=Åä~ó= a~êâ=ÖêÉó=ëáäíó=Åä~ó oÉÇ=ëáäíó=Åä~ó=	ï	ìĚìĚìĚì
	NM	a~êâ=ÖêÉó=éä~ëíáÅ=ëáäíó=Åä~ó	ī	ìĚìĚìĚì
			ĭ	ìĚìĚìĚì
Q		a~êâ=ÖêÉó=ëáäíó=ë~åÇ=	į	ìĚìĚìĚì
	NR	páäíó=Åä~ó páäíó=ë~åÇ	ı	ìĚíĚíĚĩ
		_êçïå=ÑáåÉ=ë~åÇ	Ĳ	ĩĚìĚĩĚì
S	OM		îĭ	ĩĚĩĚĩĚĩ
		_êçïå=ÑáåÉ=ë~åÇ=ïáíÜ=çêÖ~åáÅ=áåÅäìëáçåë	íí	ìĚĩĚìĚì
		_êçïå=ÑáåÉ=ë~åÇ	îî	íĚĲĚĲĚî
	OR	oÉÇ=ÑáåÉ=ë~åÇ oÉÇÇáëÜ=Äêçïå=ÑáåÉ=ë~åÇ	îĩ	ĩĚîĚįĚî
U			îï	îĚĩĚîĚĩ
	PM	jÉÇáìã Åç~êëÉ=ë~åÇ	îī	îĚĩĚįĚį
			îĭ	ĩĚìĚįĚį
NM		cáåÉ=ë~åÇ jÉÇáìã Åç~êëÉ=ë~åÇ=ïáíÜ=ÑáåÉ=ë~åÇ	íì	ĩĚĲĚįĚĩ
	PR	_êçïå=ÑáåÉ=ë~åÇ	íį	ĲĚíĚíĚį
NO		ble=]=NMKT=ã		

do^mef` — _lobelib fkcloj^ qflk



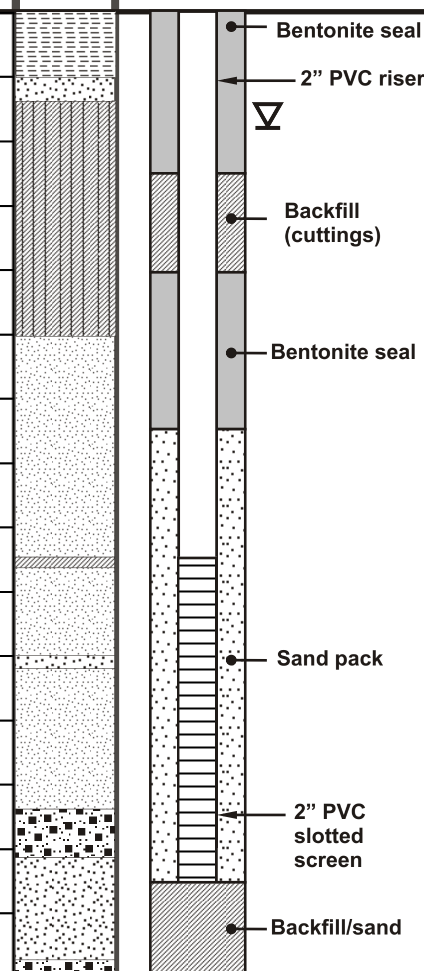
Saturated zone

CBCL

pqo^ qfdo^mef`= ^ka=fkpqorjbkq ^qflk=ild

molgb`q =k^jb===	Avon River Aboiteau Replacement	_lobelib=krj_bo	**MW6**
molgb`q =krj_bo==	**171046.01**	`ljmibqflk=a^ qb	**June 2, 2020**
`ifbkq=	**NSTIR**	dolrka=bibs ^qflk	**5.372 m a.s.l.**
il`^ qflk	**406058 4978634 UTM 20N**	qlm =lc=mfmb=bibs ^qflk	**0.88 m above grade**
aofiifkd=jbqela	**Hollow-stem auger with split-spoon sampling**	m^db====1============1=lc============	

abmqe EãF	abmqe EÑíF	dblildf`^i =abp`ofmqflk	p^jmib p~ãéäÉ	p^jmib _äçïë=L=NR=Åã	do^mef`	_lobelib fkcloj^ qflk
M	M	lêÖ~åáÅë	í	îĔîĔîĔî		
		jÉÇáìã=Åç~êëÉ=ë~åÇ=~åÇ=Öê~îÉä oÉÇ=ëáäíó=Åä~ó=	î	ĩĔïĔïĔî		
	R		ĩ	îĔîĔîĔî		
O		oÉÇ=ëáäíó=Åä~ó=ïáíÜ=çêÖ~åáÅë a~êâJÖêÉó=ëáäíó=Åä~ó	ï	îĔïĔĩĔï		
	NM		ī	ïĔïĔīĔì		
		_êçïå=ÑáåÉ=ë~åÇ=ïáíÜ=Åä~ó a~êâJÖêÉó=Åä~ó _êçïå=ÑáåÉ=ë~åÇ=ïáíÜ=Åä~ó	ĭ	îĔîĔĩĔĩ		
Q			i	ĩĔĭĔĩĔī		
	NR	_êçïå=ÑáåÉ=ë~åÇ=ïáíÜ=çêÖ~åáÅë	ĵ	ìĔíĔïĔï		
		dêÉó=Åä~ó _êçïå=ÑáåÉ=ë~åÇ	IJ	ïĔĭĔĭĔì		
S	OM	jÉÇáìã=Åç~êëÉ=ë~åÇ=~åÇ=Öê~îÉä _êçïå=ÑáåÉ=ë~åÇ	íì	ïĔïĔIJĔì		
			íí	ĭĔìĔĵĔĵ		
			íî	īĔĭĔĭĔî		
	OR	p~åÇ=~åÇ=Öê~îÉä	íĩ	îĔïĔïĔĭ		
U		jÉÇáìã=Åç~êëÉ=ë~åÇ= `ç~êëÉ=ë~åÇ	íï	ìĔìĔïĔĭ		
	PM	`ç~êëÉ=ë~åÇ=~åÇ=Öê~îÉä	íī	ĩĔïĔĭĔï		
		ble=]=VKNã				
NM	PR					
NO						



Saturated zone

CBCL

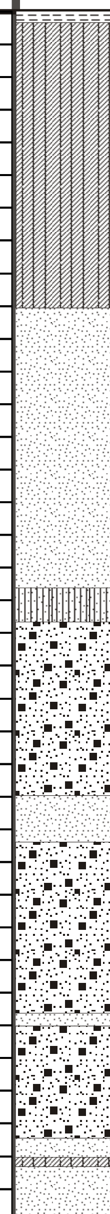
pqo^ qfdo^mef`= ^ka=fkpqorjbkq ^qflk=ild

molgb`q =k^jb===	**Avon River Aboiteau Replacement**	_lobelib=krj_bo	**MW7D**
molgb`q =krj_bo==	**171046.01**	`ljmibqflk=a^ qb	**May 29, 2020**
`ifbkq=	**NSTIR**	dolrka=bibs ^qflk	**8.28 m a.s.l.**
il`^ qflk	**407073 4980328 UTM 20N**	qlm =lc=mfmb=bibs ^qflk	**0.875 m above grade**
aofiifkd=jbqela	**Hollow-stem auger with split-spoon sampling**	m^db=== 1 ============ 1 lc============	

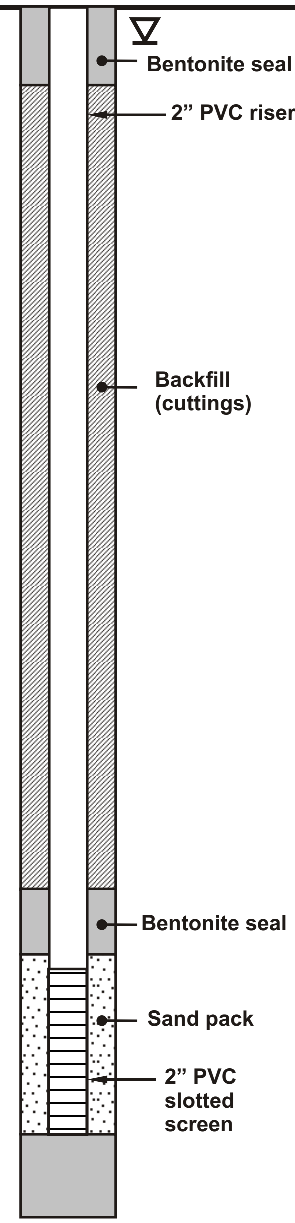
abmqe EãF	abmqe EÑíF	dblildf`^i =abp`ofmqflk	p~ãéäÉ	_äçïë=L=NR=Åã
M	M	oÉÇ=ÑáåÉ=ëáäíó=ë~åÇ lêÖ~åáÅë	í	ÎĔÍĔÎĔÎ
		oÉÇ=ëáäíó=Åä~ó=	î	ÎĔÎĔÎĔÎ
			ï	ÌĔÌĔÌĔÍ
			ð	ÍĔÍĔÎĔÍ
	NM	a~êâJÖêÉó=ëáäíó=Åä~ó	ñ	ÌĔÌĔÌĔÌ
			ò	ÌĔÌĔÌĔÌĔ
		a~êâ=Äêçïå=éä~ëíáÅ=ëáäíó=Åä~ó	ó	ÌĔÌĔÍĔÍ
R		oÉÇÇáëÜJÄêçïå=ÑáåÉ=ë~åÇ=~åÇ=ë~åÇó=ëáäí	ö	ÌĔÌĔÌĔÍ
			ÍĴ	ÌĔÌĔÍĔÍ
	OM		Îĩ	ÌĔÌĔÍĔÎ
			Íí	ÌĔÌĔÍĔÌ
			Íî	ÌĔÌĔÎĔÍ
			Íï	ÎĔÎĔÍĔÎ
			Íð	ÏĔÌĔÌĴĔÍĴ
	PM	oÉÇÇáëÜJÄêçïå=ë~åÇ=ïáíÜ=ëçãÉ=Ää~Åâ= çêÖ~åáÅ=áåÅäìëáçåë	Íñ	ÏĔÍĔÎĔĮ
NM		cáåÉ=ë~åÇ=ãáñÉÇ=ïáíÜ=ëçãÉ=ãÉÇáìãJÅç~êëÉ=ë~åÇ	Íò	ÎĔÌĔÍĔÎ
		oÉÇÇáëÜJÄêçïå=ëáäíó=Åä~ó=ïáíÜ=íÜáå=ÄÉÇë=çÑ=ÑáåÉ=ë~åÇ	Íó	ÎĔÎĔÍĔÎ
		`ç~êëÉ=ë~åÇ=ïáíÜ=Öê~îÉä	Íö	ÎĔÍĔÎĔÍ
			ÎĴ	ÌĔÍĔÎĔÍ
	QM		Îî	ÎĔÍĔĮĔĮ
			Îí	ÍĔÍĔĮĔĴ
			Îï	ÍĨĔĴĔÏĔÍĴ
			Îð	ÍĨĔÍĨĔÍĨĔÍĨ
			Îñ	ÌĔĴĔĮĔÎ
NR	RM	cáåÉ=ë~åÇ	Îò	ÍĨĔÍĨĔÍĨĔÍ
		jÉÇáìãJÅç~êëÉ=íç=Åç~êëÉ=ë~åÇ=ïáíÜ=Öê~îÉä	Îó	ĮĔÍĔÍĨĔÍ
			Îö	ÌĔÎĔÍĔÌ
			ÎĮ	ÌĔÍĔÍĔÌ
		jÉÇáìãJÅç~êëÉ=íç=Åç~êëÉ=ë~åÇ=ïáíÜ=Öê~îÉä	ÎĴ	ÍĨĔÍĨĔÍĔÍĴ
	SM	cáåÉ=ë~åÇ `ç~êëÉ=ë~åÇ=ïáíÜ=Öê~îÉä iáÖÜí=ÖêÉó=Åä~ó	Îĩ	ÌĔÍĨĔÍĨ
			Îí	ÍĨĔÍĨĔÍĨĔÍĨ
OM		cáåÉ=ë~åÇ=ïáíÜ=Öê~îÉä	Îî	ÍĨĔÍĨĔÍĨĔÍĨ
			Îï	ÎĨĔÍĨĔÍĨĔÍĨ
		jÉÇáìãJÅç~êëÉ=ë~åÇ=ïáíÜ=Öê~îÉä	Îð	ÎĨĔÍĨĔÍĴĔÍĨ
	TM	pááíó=Åä~ó	Îñ	ÎĨĔÍĨĔÍĨĔÍĨ
		cáåÉ=ë~åÇ jÉÇáìãJÅç~êëÉ=ë~åÇ=ïáíÜ=Öê~îÉä	Îò	ĮĔÍĨĔÍĨĔÍĨ
			Îó	ÌĔÍĨĔÍĨ

ble=]=OOKP=ã

do^mef`



_lobelib fkcloj^ qflk



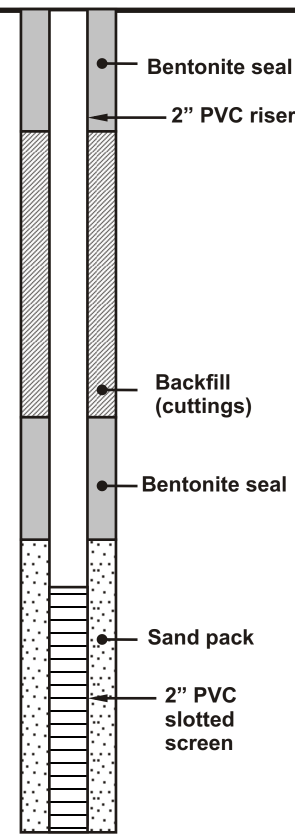
Saturated zone

CBCL

pqo^ qfdo^mef`= ^ka=fkpqorjbkq ^qflk=ild

molgb`q =k^jb===**Avon River Aboiteau Replacement**	_lobelib=krj_bo **MW7I**
molgb`q =krj_bo== **171046.01**	`ljmibqflk=a^ qb
`ifbkq= **NSTIR**	dolrka=bibs ^qflk **8.152 m a.s.l.**
il`^ qflk **407075 4980331 UTM 20N**	qlm =lc=mfmb=bibs ^qflk **0.865 m above grade**
aofiifkd=jbqela **Hollow-stem auger with split-spoon sampling**	m^db====1=============1=lc============

abmqe EãF	abmqe EÑíF	dblildf`^i =abp`ofmqflk	p^jmib p~ãéäÉ	p^jmib _äçïë=L=NR=Åã	do^mef`	_lobelib fkcloj^ qflk
M	M					
O						
	NM					
Q						
S	OM					
		_êçïå=ÑáåÉ=ë~åÇ	Í	N=N=N=N		
U		_êçïå=ÑáåÉ=ë~åÇ=~åÇ=ëáäí	Î	M=M=O=R		
			Ï	U=U=T=U		
	PM	_êçïå=ÑáåÉ=ë~åÇ=ïáíÜ=çêÖ~åáÅë	ï	O=O=Q=S		
NM		jÉÇáìã Åç~êëÉ=ë~åÇ	Ī			
		ble=]=NRKR=ã				
NO	QM					
NQ						
	RM					
NS						



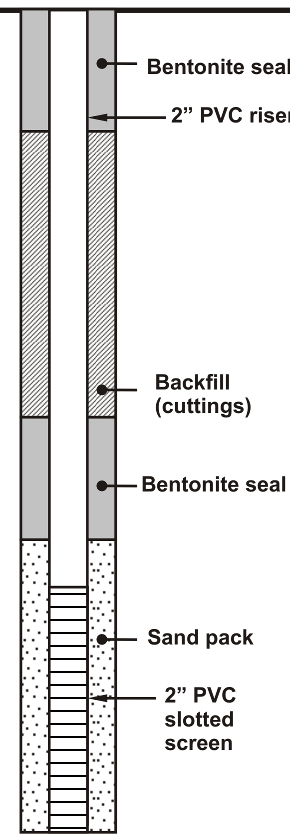
Saturated zone

CBCL

pqo^ qfdo^mef`= ^ka=fkpqorjbkq ^qflk=ild

molgb`q =k^jb===	Avon River Aboiteau Replacement	_lobelib=krj_bo	**MW7S**
molgb`q =krj_bo==	171046.01	`ljmibqflk=a^ qb	
`ifbkq=	NSTIR	dolrka=bibs ^qflk	8.386 m a.s.l.
il`^ qflk	407072 4980331 UTM 20N	qlm =lc=mfmb=bibs ^qflk	0.895 m above grade
aofiifkd=jbqela	Hollow-stem auger with split-spoon sampling	m^db====1============1=lc============	

abmqe EãF	abmqe EÑíF	dblildf`^i =abp`ofmqflk	p^jmib p~ãéäÉ	p^jmib _äçïë=L=NR=Åã	do^mef`	_lobelib fkcloj^ qflk
M	M					
O						
	NM					
Q						
S	OM					
		_êçïå=ÑáåÉ=ë~åÇ	Í	N=N=N=N		
U		_êçïå=ÑáåÉ=ë~åÇ=~åÇ=ëáäí	Î	M=M=O=P		
			Ï	U=U=T=U		
	PM	_êçïå=ÑáåÉ=ë~åÇ=ïáíÜ=çêÖ~åáÅë	ï	O=O=Q=S		
NM		jÉÇáìã Åç~êëÉ=ë~åÇ	Ī			
		ble=]=NMKQ=ã				
NO	QM					
NQ						
	RM					
NS						



Saturated zone

CBCL

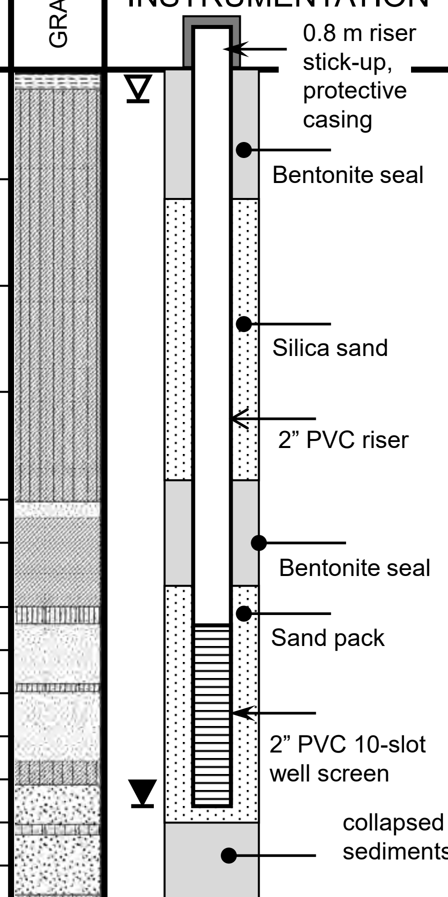
STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME	**Avon River Aboiteau Replacement**	BOREHOLE NUMBER	**MW8**
PROJECT NUMBER	**171046.01**	COMPLETION DATE	**May 29, 2020**
CLIENT	**NSTIR**	GROUND ELEVATION	**9 m a.s.l.**
LOCATION	**E 407029 N 4980362 (UTM 20)**	TOP OF PIPE ELEVATION	**0.9 m above grade**
DRILLING METHOD	**Hollow Stem Auger & Split Spoon Sampling**	PAGE 1 OF 1	

Depth scale: (m) 0–16; (ft) 0–52

GEOLOGICAL DESCRIPTION	SAMPLE No.	Type	Blow count
Organics Red silt and CLAY	1	SS	2 3 3 2
	2	SS	0 0 0 0
Brown silty CLAY	3	SS	0 0 0 0
Grey brown CLAY and silt	4	SS	0 0 0 0
	5	SS	0 0 0 0
	augered		
Sandy SILT Fine red SAND	6	SS	0 0 2 3
Fine SAND, with seams of silty clay	7	SS	0 2 2 3
	8	SS	1 5 4 6
	9	SS	0 0 5 5
Dark grey CLAY and silt	10	SS	9 8 11 7
Reddish-brown medium coarse SAND / Fine SAND and SILT	11	SS	2 3 3 2
	12	SS	3 3 5 6
Grey silty CLAY — **EOH @ 11.9 m**			

GRAPHIC / MONITORING WELL INSTRUMENTATION



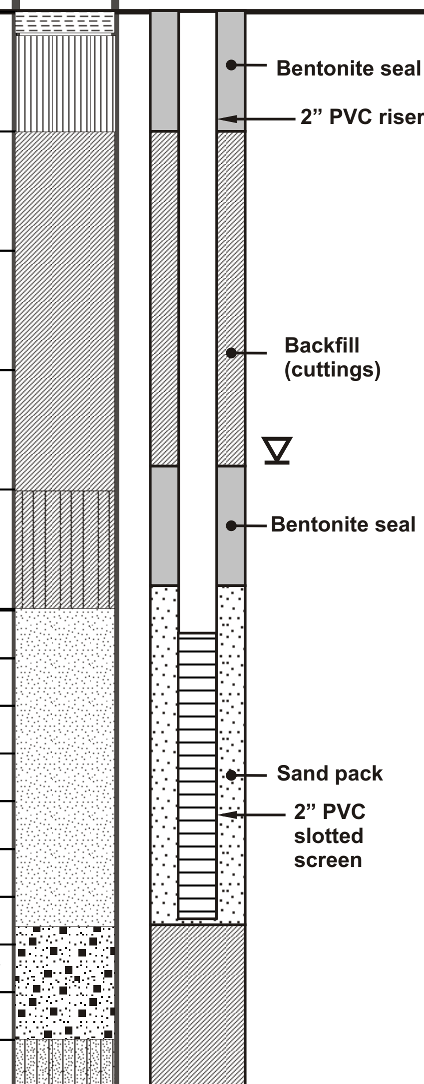
∇ Saturated zone (at the time of drilling)

CBCL

pqo^ qfdo^mef`= ^ka=fkpqorjbkq ^qflk=ild

molgb`q =k^jb=== **Avon River Aboiteau Replacement**	_lobelib=krj_bo **MW9**
molgb`q =krj_bo== **171046.01**	`ljmibqflk=a^ qb **May 27, 2020**
`ifbkq= **NSTIR**	dolrka=bibs ^qflk **7 m a.s.l.**
il`^ qflk **406942 4980376 UTM 20N**	qlm =lc=mfmb=bibs ^qflk **0.93 m above grade**
aofiifkd=jbqela **Hollow-stem auger with split-spoon sampling**	m^db====1============1=lc============

abmqe EãF	abmqe EÑíF	dblildf`^i =abp`ofmqflk	p^jmib p~ãéäÉ	p^jmib B=oÉÅ	p^jmib _äçïëL NR=Åã	do^mef`	_lobelib fkcloj^ qflk
M		lêÖ~åáÅë oÉÇ=ëáäí	í		îĚîĚîĚî		
O	R	iáÖÜíJÖêÉó=éä~ëíáÅ=Åä~ó=ïáíÜ=ëçãÉ=ëáäí	î		ìĚìĚìĚì		
	NM		ĩ		ìĚìĚìĚì		
Q	NR		ï		ìĚìĚìĚì		
S	OM	oÉÇÇáëÜ=Äêçïå=Åä~ó=~åÇ=ëáäí	ī		ìĚìĚìĚì		
U	OR	_êçïå=ÑáåÉ=ë~åÇ	ĭ		ìĚìĚìĚì		
			į		ìĚìĚíĚî		
	PM		ĳ		ïĚîĚìĚį		
NM			ĲJ		îĚîĚîĚì		
	PR		îĵ		îĚîĚìĚì		
			íí		ïĚîĚîĚï		
NO		`ç~êëÉ=ë~åÇ=ïáíÜ=Öê~îÉä	îĵ		ìĚìĚîĚì		
	QM		îĩ		ĵĚìĚĲĚĵ		
		dêÉó=ëáäíó=ë~åÇ	îï		ïĚĳĚįĚì		
NQ	QR	ble=]=NPKT=ã	îī		ííĚíĚ ííĚĩ		



Saturated zone

CBCL

pqo^ qfdo^mef`= ^ka=fkpqorjbkq ^qflk=ild

molgb`q =k^jb===	Avon River Aboiteau Replacement	_lobelib=krj_bo	**MW10**
molgb`q =krj_bo==	171046.01	`ljmibqflk=a^ qb	May 26, 2020
`ifbkq=	NSTIR	dolrka=bibs ^qflk	6.956 m a.s.l.
il`^ qflk	406613 4980511 UTM 20N	qlm =lc=mfmb=bibs ^qflk	0.895 m above grade
aofiifkd=jbqela	Hollow-stem auger with split-spoon sampling	m^db====1============1=lc============	

abmqe EãF	abmqe EÑíF	dblildf`^i =abp`ofmqflk	p~ãéäÉ	B=oÉÅ	_äçïëL NR=Åã
M	M	lêÖ~åáÅë oÉÇ=Åäó mä~ëíáÅ=ÖêÉó=Åä~ó	N	SM	NQ PO
			O	NMM	ON OD
O			P	NMM	MM MM
			Q	NMM	MM MM
	NM		R	NMM	NN MM
Q			S	NMM	MM MM
			T	NMM	MM MM
			U	UO	MM MM
			=V	NMM	MM MM
		mä~ëíáÅ=ÖêÉó=Åä~ó=ïáíÜ=ëçãÉ=ÑáåÉ=ëáäí	NM	NMM	MM MM
S	OM		NN	TR	MM MM
		mä~ëíáÅ=ÖêÉó=Åä~ó	NO	NMM	MM MM
			NP	NMM	MM MM
U			NQ	NMM	
	PM		NR	NMM	MM MM
			NS	NMM	MM OP
NM			NT	NMM	OQ QQ
			NU	NMM	MM MD
			NV	NMM	OD OQ
NO	QM	cáåÉ=ë~åÇ=ïáíÜ=Öê~îÉä	OM	NMM	VT NNNP
		oÉÇ=ãÉÇáìãJÅç~êëÉ=ë~åÇ	ON	RT	MM PR
			OO	SS	RNM VNN
NQ		cáåÉ=ë~åÇ=ïáíÜ=ëçãÉ=Öê~îÉä=	OP	NMM	PS VV
			OQ	NMM	TV NNNM
	RM	oÉÇÇáëÜ=ëáäíó=Åä~ó	OR	NMM	SU NQNN
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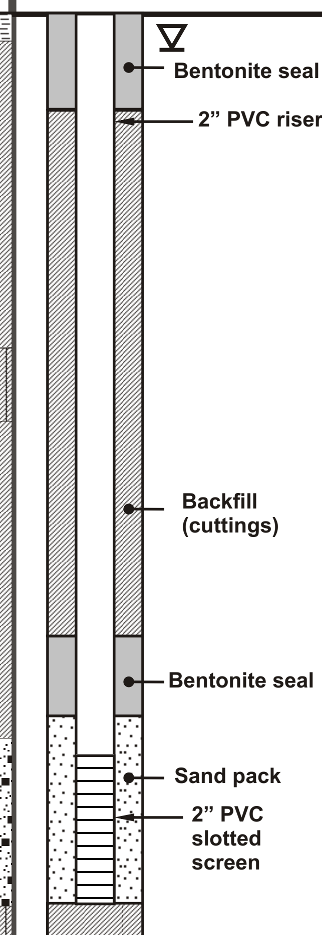


Saturated zone

CBCL

APPENDIX C

Riverbank Monitoring Figures

Figure C1. Groundwater Elevation in Monitoring Well MW1 in 2020-2021

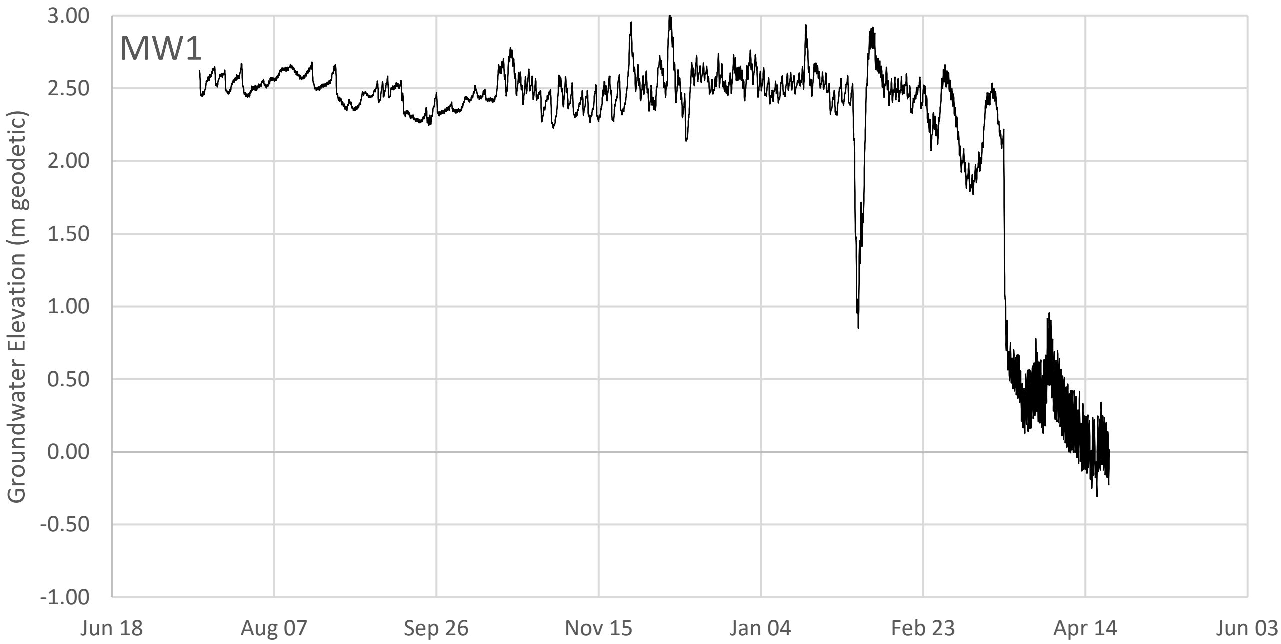


Figure C2. Groundwater Elevation in Monitoring Well MW2 in 2020-2021

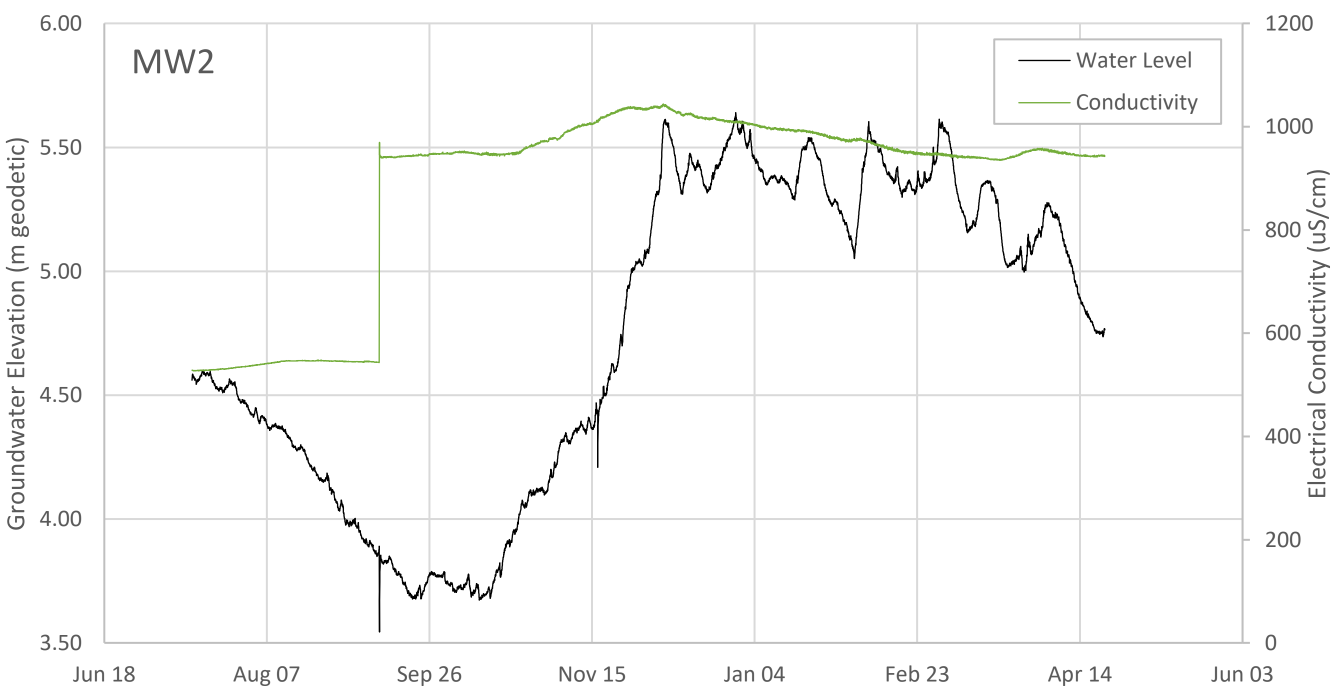


Figure C3. Groundwater Elevation and Electrical Conductivity in Monitoring Well MW3 in 2020-2021

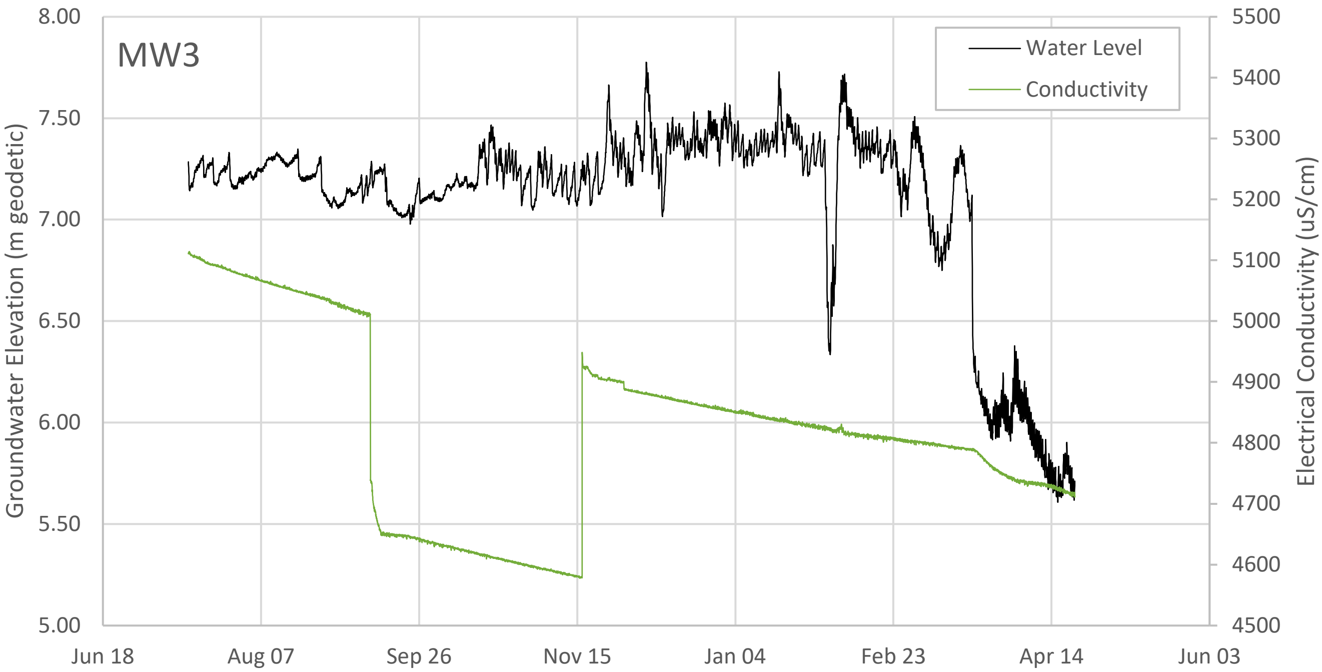


Figure C4. Groundwater Elevation and Electrical Conductivity in Monitoring Well MW4 in 2020-2021

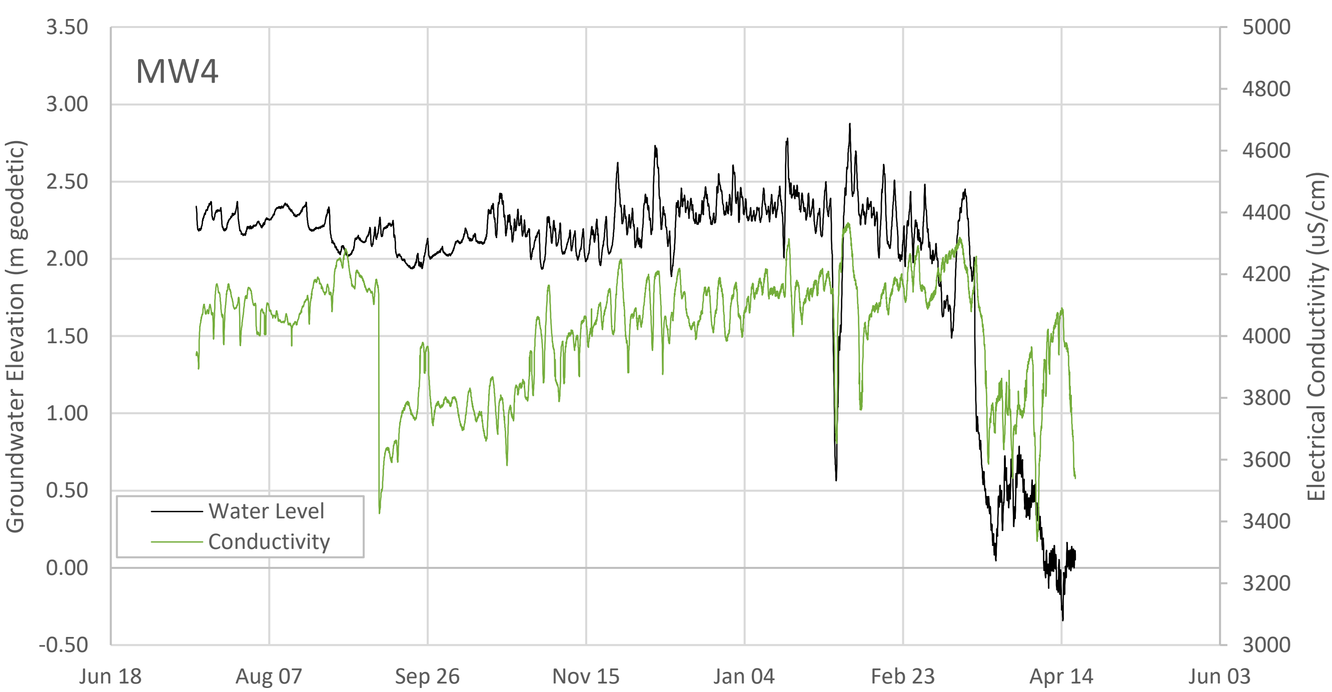


Figure C5. Groundwater Elevation and Electrical Conductivity in Monitoring Well MW5 in 2020-2021

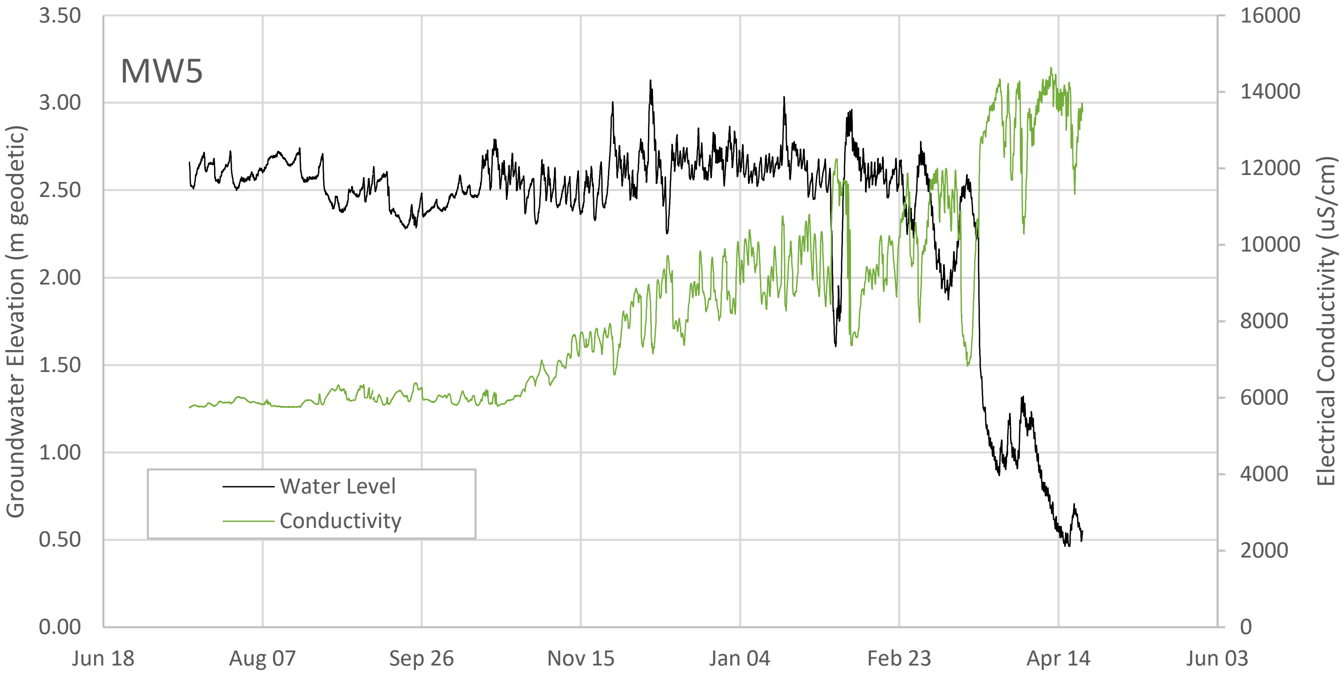


Figure C6. Groundwater Elevation and Electrical Conductivity in Monitoring Well MW6 in 2020-2021

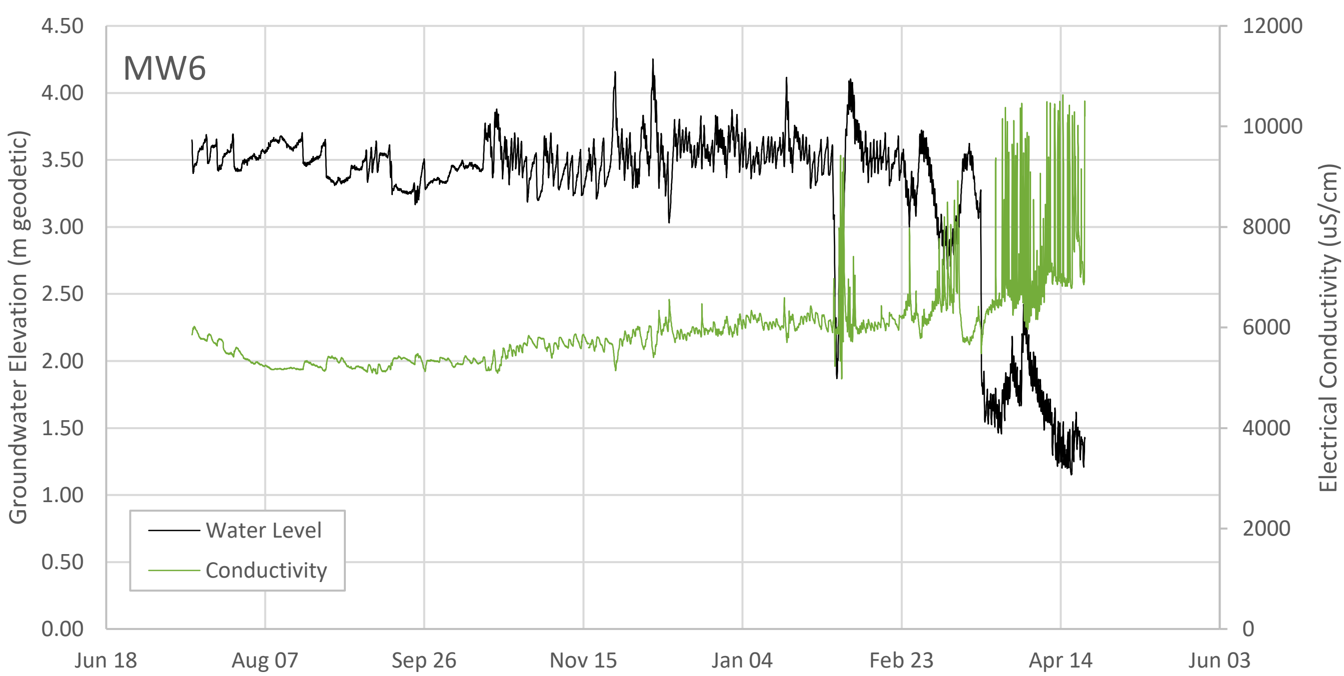


Figure C7. Groundwater Elevation in Monitoring Wells MW7S, MW7I and MW7D and Electrical Conductivity in Monitoring Wells MW7S in 2020-2021

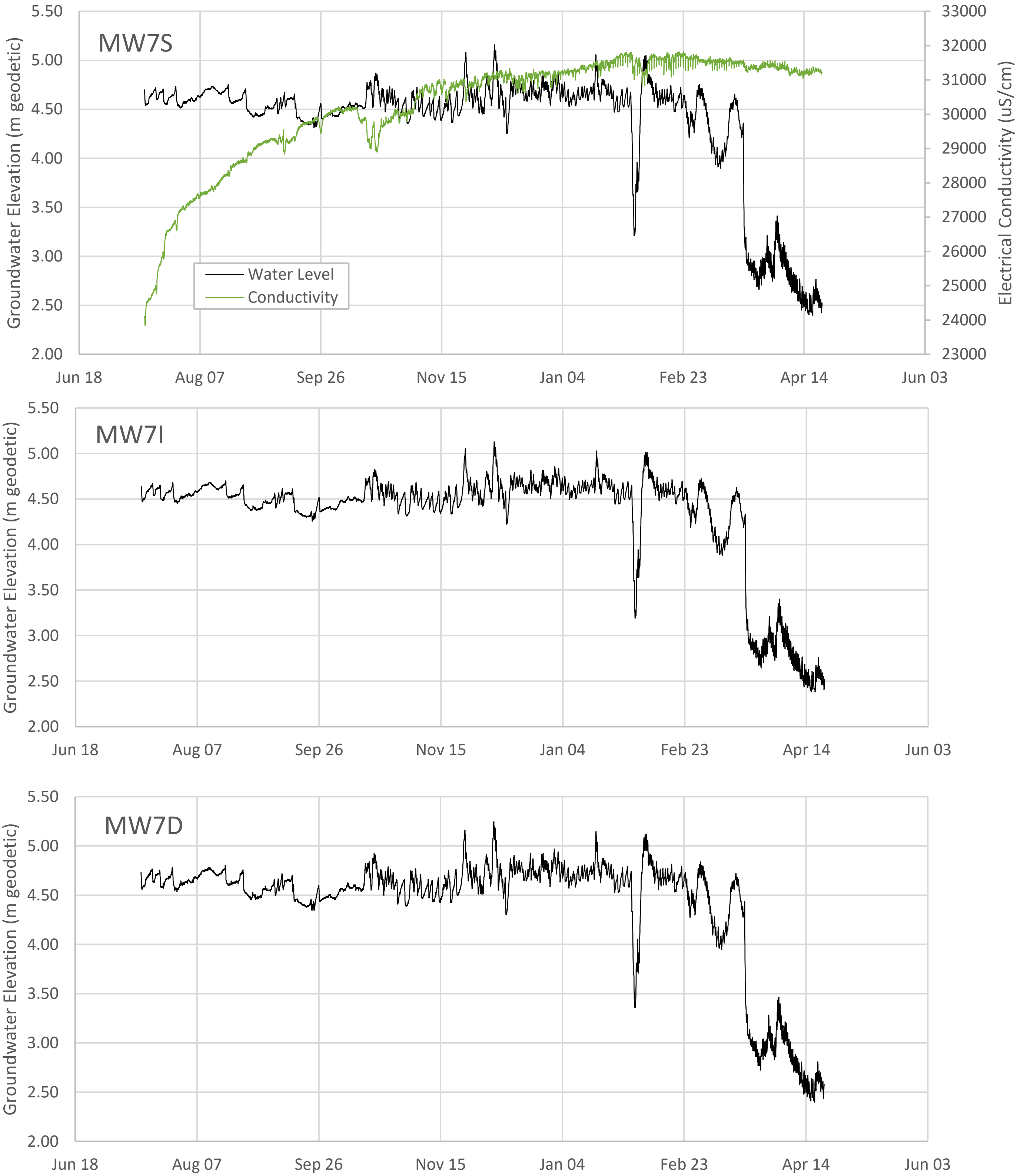
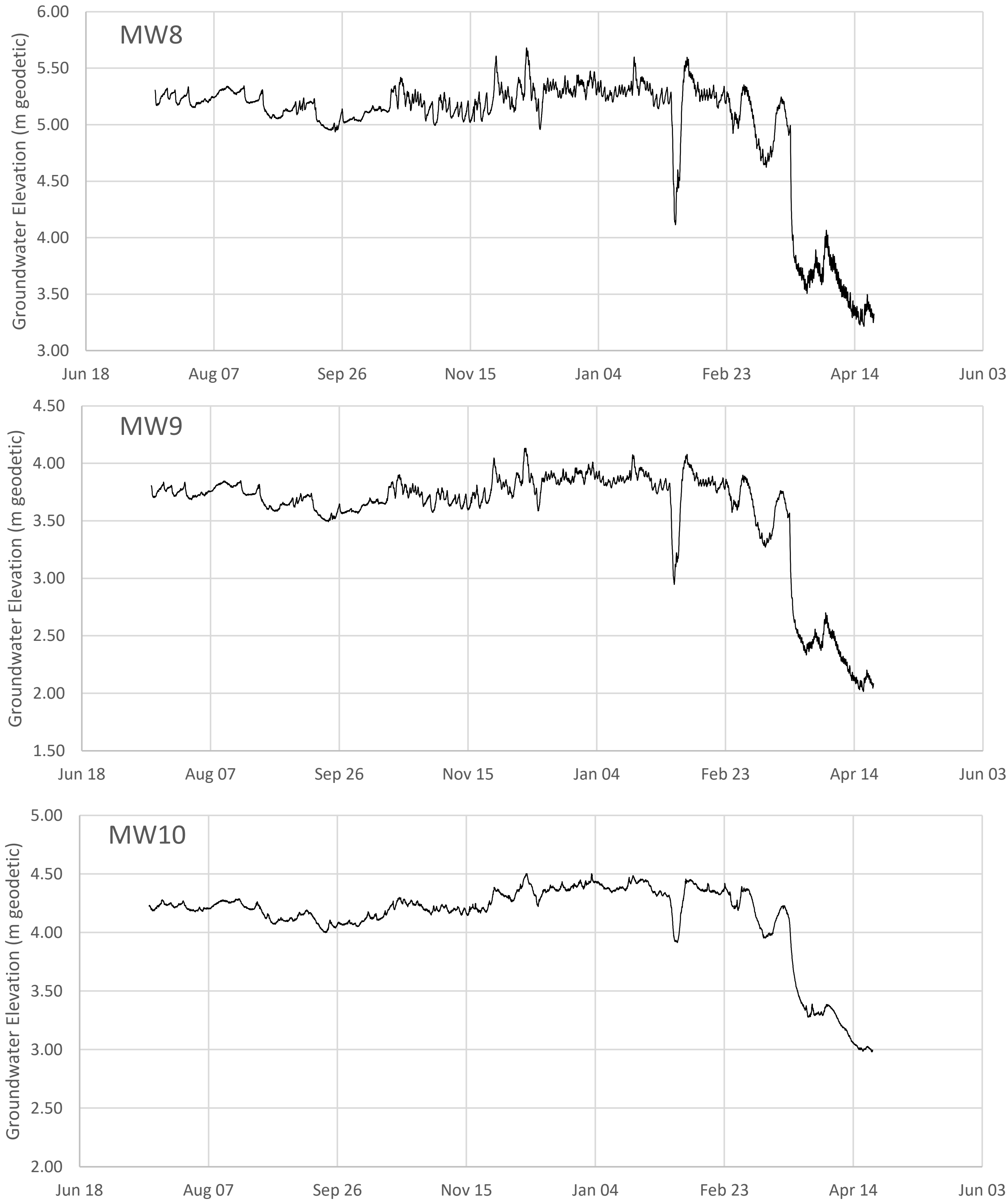


Figure C8. Groundwater Elevation in Monitoring Wells MW8, MW9 and MW10 in 2020-2021



APPENDIX D

Water Quality Sampling Figures and Tables

Figure D1. Piper Diagram of chemical composition of water samples collected from Private Water Sampling Program.

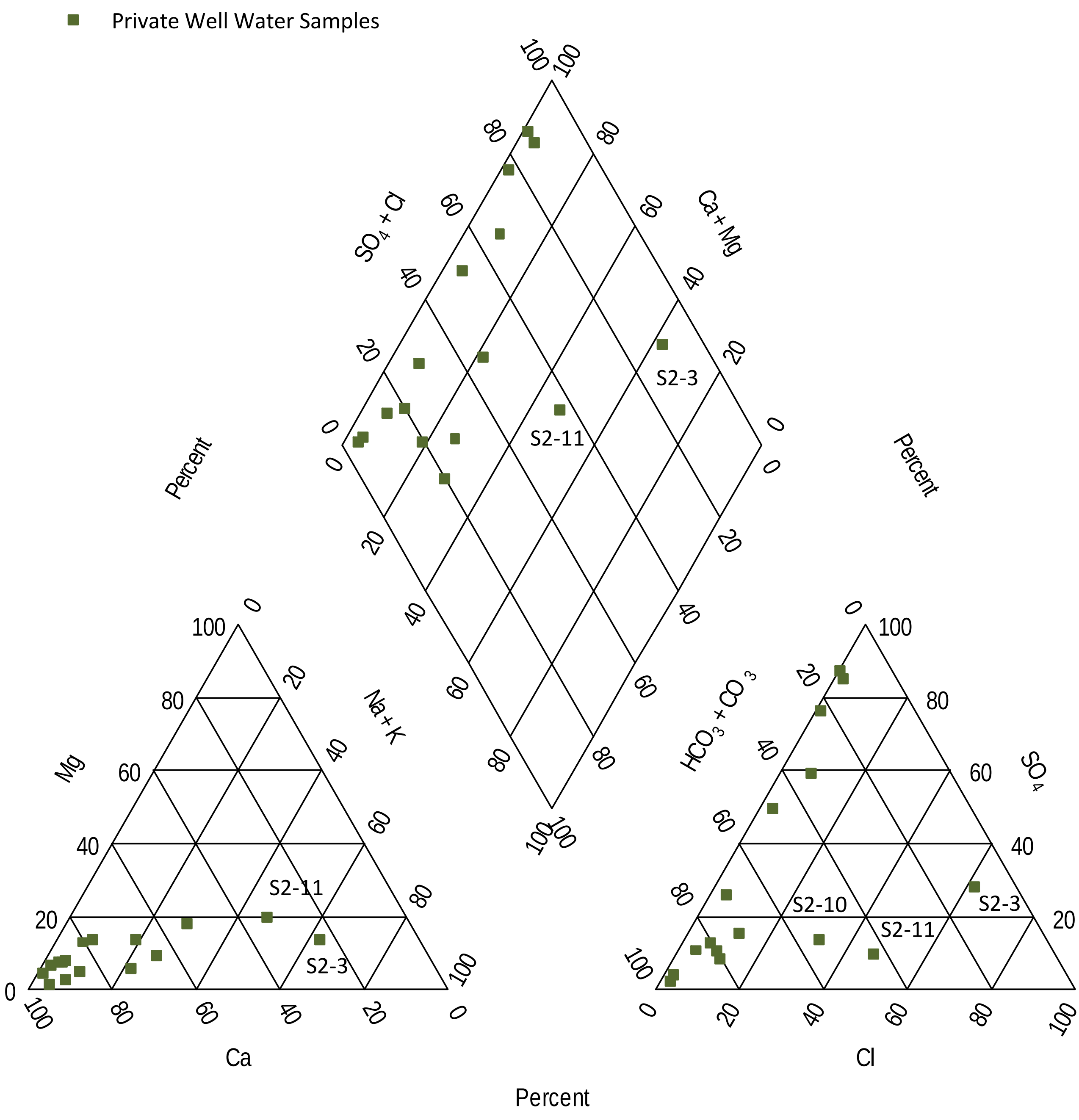


Figure D2. Piper Diagram of chemical composition of water samples collected from River Groundwater Monitoring Wells

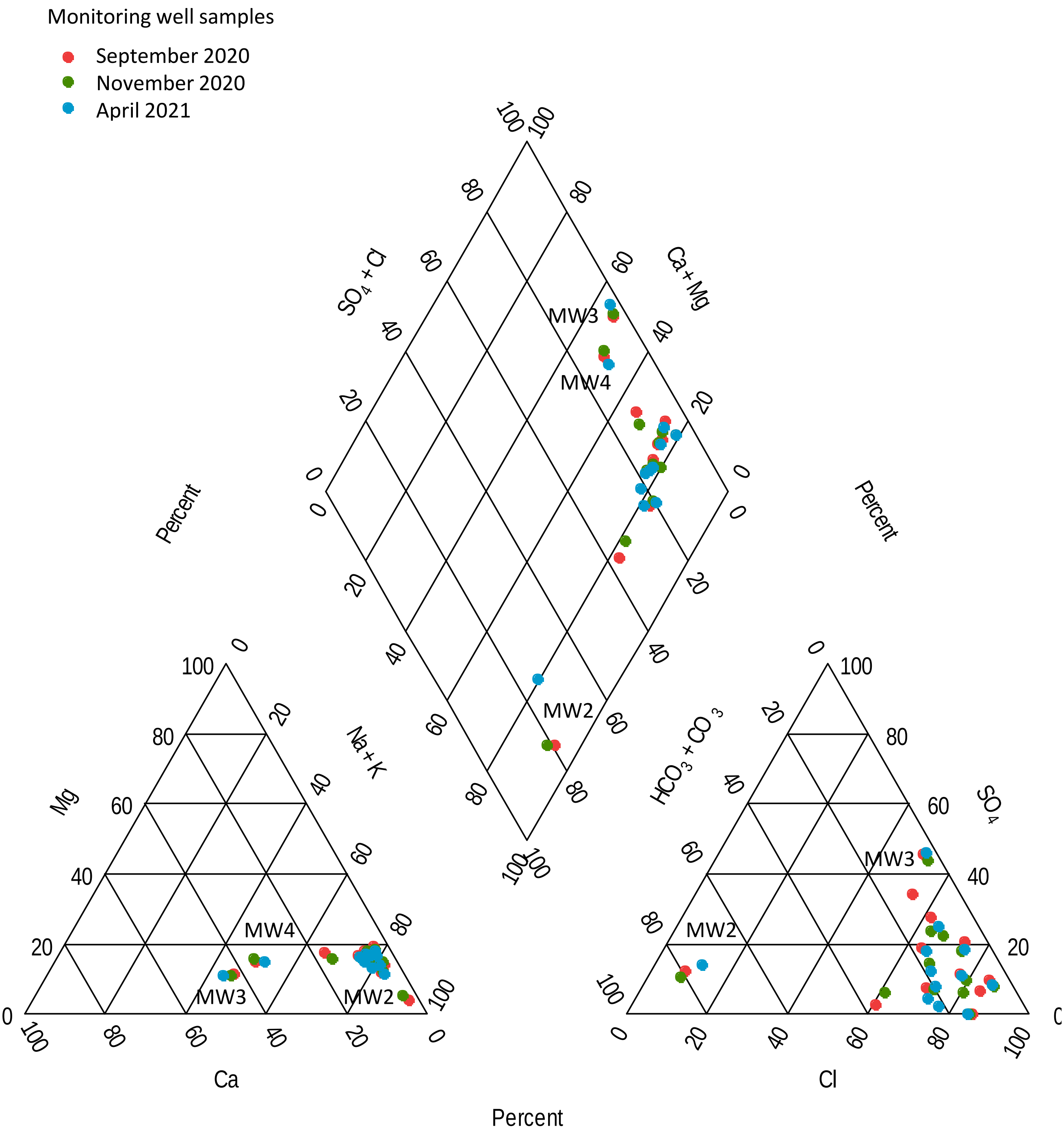
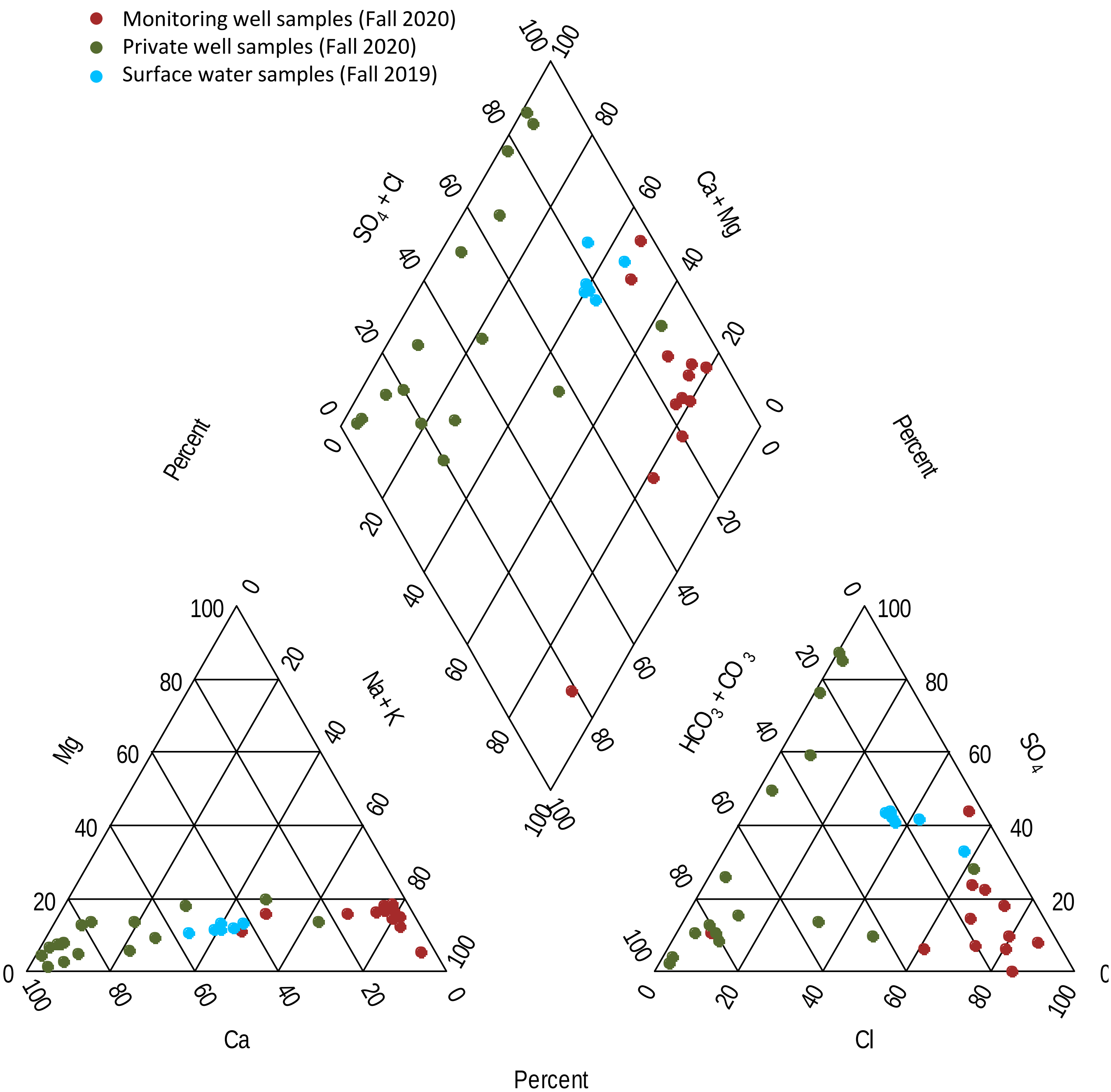
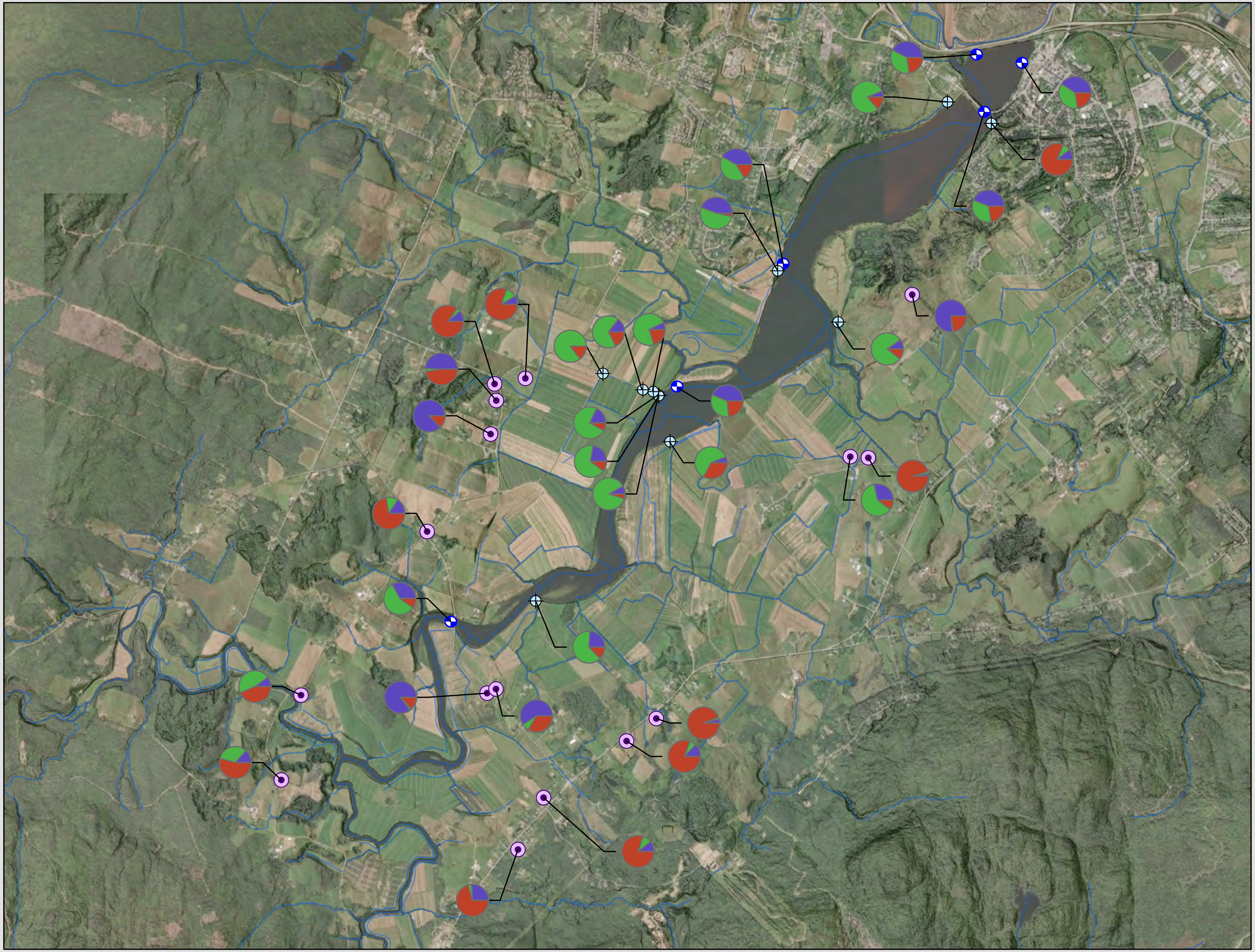
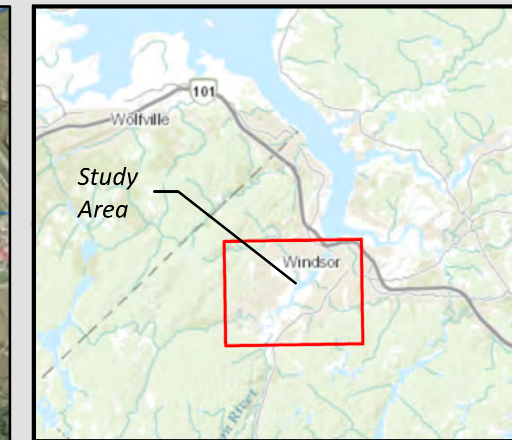


Figure D3. Piper Diagram of chemical composition, comparison of private well water samples, river groundwater monitoring well samples and surface water samples







- Private Water Wells
- Groundwater Monitoring Wells
- Surface Water Sampling Locations

Major anion composition

- SO4 (mEq)
- Cl (mEq)
- HCO3 + CO3 (mEq)

CBCL

Avon Aboiteau and Causeway Upgrade Design

Baseline Groundwater Monitoring Program
Figure D4. Major Anion Water Samples Composition

Drawn: PA	Date: 2021-08-04
Checked:	CBCL Project Number: 171046.01
Approved:	Scale @ 11"x17" : 1:30,000
Sheet: 1 of 1	

NOTES:

0 300 600 900 1,200 m

Coordinate System: NAD 1983 UTM Zone 20N
Units: Meter

K:\Projects\171046.00 Avon River Aboiteau\20 CAD\08 GIS\171046.00 - GW RE001 FIG C4.mxd 2021-08-04 9:44:12 AM

Table D1. Summary of Water Quality Samples from Private Water Wells (page 1 of 3)

Sample ID				1-1	1-2	1-3	1-4	1-5	1-6
Address				664 College Road, Windsor Forks	128 Redden Road, Windsor Forks	136 Redden Road, Windsor Forks	4189 Highway 14, Windsor Forks	4100 Hwy 14, Windsor Forks	199 Sangster Bridge Rd, Windsor Forks
Sampling Date				2020-09-16	2020-09-16	2020-09-16	2020-09-16	2020-09-16	2020-09-16
Distance to Nearest Surface Water				620 m	330 m	380 m	760 m	700 m	350 m
	Units	Guidelines for Canadian Drinking Water Quality							
		Maximum Acceptable Concentration	Aesthetic Objective	1-1	1-2	1-3	1-4	1-5	1-6
Total Coliforms	P/A	none detectable per 100 mL[1]		**PRESENT**	**PRESENT**	**PRESENT**	**PRESENT**	**PRESENT**	**PRESENT**
Escherichia coli	P/A	none detectable per 100 mL[1]		ABSENT	ABSENT	**PRESENT**	ABSENT	ABSENT	**PRESENT**
pH				7.77	7.84	7.71	8.02	7.86	7.72
Chloride	mg/L		≤ 250	4	6	*1230*	13	5	24
Fluoride	mg/L	1.5		0.12	<0.12	0.83	<0.12	<0.12	0.49
Sulphate	mg/L		≤ 500	347	7	*761*	21	47	*1440*
True Color	TCU		≤ 15 TCU	*21*	8	*30*	13	*16*	*18*
Turbidity	NTU	≤ 0.3 NTU[2]		0.6	<0.5	4.6	0.6	1.3	1.5
Nitrate as N	mg/L	10		<0.05	<0.05	0.23	2.38	0.58	1.08
Nitrite as N	mg/L	1		<0.05	<0.05	<0.05	<0.05	0.06	<0.05
Sodium	mg/L		≤ 200	4.2	5.1	*901*	7.6	5.6	32.3
Calculated TDS	mg/L		≤ 500	*601*	350	*3500*	225	209	*2270*
Antimony	ug/L	6		<2	<2	<2	<2	<2	<2
Arsenic	ug/L	10		<2	<2	**15**	<2	<2	<2
Barium	ug/L	2000		73	115	147	121	98	25
Boron	ug/L	5000		46	21	530	32	25	262
Cadmium	ug/L	7		<0.017	0.052	0.046	0.028	0.018	<0.017
Chromium	ug/L	50		<1	<1	3	2	<1	<1
Copper	ug/L	2000	1000	16	8	259	15	7	4
Iron	ug/L		≤ 300	87	61	*972*	72	146	128
Lead	ug/L	5		<0.5	0.9	3.7	2.6	<0.5	<0.5
Manganese	ug/L	120	≤ 20	3	*39*	**591**	<2	*40*	*37*
Selenium	ug/L	50		<1	<1	14	<1	<1	3
Strontium	ug/L	7000		1820	177	3060	146	112	2750
Uranium	ug/L	20		0.5	1.4	0.3	0.3	0.2	1.7
Zinc	ug/L		≤ 5000	26	8	161	49	12	20

[1]in water leaving a treatment plant and in non-disinfected groundwater leaving the well

[2]Conventional and direct filtration: ≤ 0.3 NTU
Slow sand and diatomaceous earth filtration: ≤ 1.0 NTU
Membrane filtration: ≤ 0.1 NTU

Parameter exceeds Maximum Acceptable Concentration

Parameter exceeds Aesthetic Objective Concentration

Table D1. Summary of Water Quality Samples from Private Water Wells (page 2 of 3)

Sample ID				1-7	1-8	1-9	1-10	1-11	2-1
Address				4410 Highway 14, Windsor Forks	894 Falmouth Dyke Road, Falmouth	940 Falmouth Dyke Road, Falmouth	501 Castle Frederick Road, Falmouth	343 Castle Frederick Rd, Falmouth	4360 Highway 14, Windsor Forks
Sampling Date				2020-09-16	2020-09-16	2020-09-16	2020-09-16	2020-09-16	2020-11-13
Distance to Nearest Surface Water				1,160 m	1,100 m	1,060 m	420 m	45 m	2,740 m from Avon River. 780 m from small lake
	Units	Guidelines for Canadian Drinking Water Quality							
		Maximum Acceptable Concentration	Aesthetic Objective	1-7	1-8	1-9	1-10	1-11	2-1
Total Coliforms	P/A	none detectable per 100 mL[1]		ABSENT	**PRESENT**	**PRESENT**	**PRESENT**	**PRESENT**	**PRESENT**
Escherichia coli	P/A	none detectable per 100 mL[1]		ABSENT	ABSENT	ABSENT	**PRESENT**	**PRESENT**	ABSENT
pH				8.02	7.9	7.82	7.97	7.51	7.09
Chloride	mg/L		≤ 250	3	5	<1	42	113	3
Fluoride	mg/L	1.5		0.21	0.14	<0.12	0.18	0.24	<0.12
Sulphate	mg/L		≤ 500	9	112	*1510*	24	32	8
True Color	TCU		≤ 15 TCU	11	*17*	8	10	9	*101*
Turbidity	NTU	≤ 0.3 NTU[2]		1	1.9	27.6	1.8	1.6	1
Nitrate as N	mg/L	10		0.69	0.09	<0.05	<0.05	0.87	<0.05
Nitrite as N	mg/L	1		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sodium	mg/L		≤ 200	3	4.2	9.8	13.5	68.6	4.3
Calculated TDS	mg/L		≤ 500	215	261	*2360*	183	364	59
Antimony	ug/L	6		<2	<2	<2	<2	<2	<2
Arsenic	ug/L	10		<2	<2	4	<2	<2	<2
Barium	ug/L	2000		122	43	15	49	196	35
Boron	ug/L	5000		13	20	196	9	64	10
Cadmium	ug/L	7		0.084	<0.017	<0.017	<0.017	<0.017	<0.017
Chromium	ug/L	50		<1	<1	<1	<1	<1	<1
Copper	ug/L	2000	1000	272	133	24	19	63	99
Iron	ug/L		≤ 300	212	236	*2970*	147	233	*314*
Lead	ug/L	5		**16.9**	**8.8**	<0.5	0.7	1.3	**7.9**
Manganese	ug/L	120	≤ 20	3	9	**253**	**243**	*117*	13
Selenium	ug/L	50		<1	<1	3	<1	1	<1
Strontium	ug/L	7000		111	352	4520	175	200	37
Uranium	ug/L	20		0.8	0.5	1	0.4	1.1	<0.1
Zinc	ug/L		≤ 5000	113	37	18	18	71	145

[1]in water leaving a treatment plant and in non-disinfected groundwater leaving the well

[2]Conventional and direct filtration: ≤ 0.3 NTU
Slow sand and diatomaceous earth filtration: ≤ 1.0 NTU
Membrane filtration: ≤ 0.1 NTU

Parameter exceeds Maximum Acceptable Concentration

Parameter exceeds Aesthetic Objective Concentration

Table D1. Summary of Water Quality Samples from Private Water Wells (page 3 of 3)

Sample ID				2-2	2-3	2-4	2-5
Address				821 Falmouth Dyke Road	1186 Falmouth Dyke Road	868 Falmouth Dyke Road	196 Sangster Bridge Road
Sampling Date				2020-11-13	2020-11-13	2020-11-13	2020-11-13
Distance to Nearest Surface Water				1,990 m from Avon River	1,310 m from Avon River	2,350 m from Avon River	855 m from Avon River
	Units	Guidelines for Canadian Drinking Water Quality					
		Maximum Acceptable Concentration	Aesthetic Objective	2-2	2-3	2-4	2-5
Total Coliforms	P/A	none detectable per 100 mL[1]		**PRESENT**	**PRESENT**	**PRESENT**	**PRESENT**
Escherichia coli	P/A	none detectable per 100 mL[1]		**PRESENT**	**PRESENT**	ABSENT	ABSENT
pH				7.92	7.57	7.76	7.34
Chloride	mg/L		≤ 250	23	12	8	23
Fluoride	mg/L	1.5		0.3	<0.12	0.25	<0.12
Sulphate	mg/L		≤ 500	24	21	29	251
True Color	TCU		≤ 15 TCU	*<5.00*	*<5.00*	5.05	*<5.00*
Turbidity	NTU	≤ 0.3 NTU[2]		0.9	0.6	1.2	1.2
Nitrate as N	mg/L	10		0.33	1.78	0.3	0.91
Nitrite as N	mg/L	1		<0.05	<0.05	<0.05	0.05
Sodium	mg/L		≤ 200	40.2	17.6	8	19.6
Calculated TDS	mg/L		≤ 500	304	161	289	*558*
Antimony	ug/L	6		<2	<2	<2	<2
Arsenic	ug/L	10		<2	<2	<2	<2
Barium	ug/L	2000		54	65	87	77
Boron	ug/L	5000		176	29	49	57
Cadmium	ug/L	7		<0.017	<0.017	<0.017	0.074
Chromium	ug/L	50		<1	<1	<1	<1
Copper	ug/L	2000	1000	10	25	139	21
Iron	ug/L		≤ 300	86	91	110	228
Lead	ug/L	5		<0.5	1.2	0.8	**8.1**
Manganese	ug/L	120	≤ 20	3	<2	10	6
Selenium	ug/L	50		<1	<1	<1	1
Strontium	ug/L	7000		352	187	535	435
Uranium	ug/L	20		1.2	<0.1	1.8	0.7
Zinc	ug/L		≤ 5000	6	27	33	106

[1]in water leaving a treatment plant and in non-disinfected groundwater leaving the well

[2]Conventional and direct filtration: ≤ 0.3 NTU
Slow sand and diatomaceous earth filtration: ≤ 1.0 NTU
Membrane filtration: ≤ 0.1 NTU

Parameter exceeds Maximum Acceptable Concentration

Parameter exceeds Aesthetic Objective Concentration

Table D2. Summary of Water Quality Samples from Monitoring Wells, Selected Parameters (page 1 of 4)

	Units	Guidelines for Canadian Drinking Water Quality: MAC*	Guidelines for Canadian Drinking Water Quality: Aesthetic Objective	MW1			MW2			MW3		
				2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21
pH				7.48	7.43	7.65	8.36	8.25	8.07	7.64	7.52	7.59
Chloride	mg/L		≤ 250	*4500*	*4100*	*2900*	45	46	65	*1400*	*1500*	*1400*
Sulphate	mg/L		≤ 500	480	430	240	91	83	110	*1700*	*1700*	*1700*
True Color	TCU		≤ 15 TCU	*19*	*38*	*170*	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Turbidity	NTU	≤ 0.3 NTU[2]		600	>1000	140	21	65	11	>1000	>1000	39
Nitrate (N)	mg/L	10		<0.050	0.067	<0.050	0.55	0.55	0.54	<0.050	<0.050	0.082
Nitrite (N)	mg/L	1		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Sodium	mg/L		≤ 200	*2500*	*2200*	*2100*	*310*	*310*	*260*	*840*	*760*	*720*
Calculated TDS	mg/L		≤ 500	*8500*	*7800*	*6400*	*850*	*880*	*880*	*4900*	*4800*	*4700*
Antimony	ug/L	6		<10	<10	<10	<1.0	<1.0	<1.0	<1.0	<10	<1.0
Arsenic	ug/L	10		<10	<10	<10	1.8	1.6	**<1.0**	<1.0	<10	<1.0
Barium	ug/L	2000		62	32	18	33	45	48	28	23	19
Boron	ug/L	5000		1300	1700	2100	490	560	610	410	<500	360
Cadmium	ug/L	7		<0.10	<0.10	<0.10	<0.010	<0.010	<0.010	0.054	<0.10	0.035
Chromium	ug/L	50		<10	<10	<10	1.2	1	<1.0	<1.0	<10	<1.0
Copper	ug/L	2000	1000	<5.0	<5.0	11	1	1.7	0.91	0.54	<5.0	1
Iron	ug/L		≤ 300	<500	<500	<500	<50	<50	<50	<50	<500	<50
Lead	ug/L	5		<5.0	<5.0	<5.0	<0.50	<0.50	<0.50	<0.50	<5.0	<0.50
Manganese	ug/L	120	≤ 20	**3000**	**2800**	**2100**	<2.0	<2.0	<2.0	**3200**	**3500**	**4400**
Selenium	ug/L	50		<5.0	<5.0	<5.0	<0.50	<0.50	<0.50	<0.50	<5.0	<0.50
Strontium	ug/L	7000		3000	1800	1500	46	61	140	**8600**	**8200**	**8000**
Uranium	ug/L	20		4.8	1.8	<1.0	5.1	4.6	2.7	1.3	1	1.3
Zinc	ug/L		≤ 5000	<50	<50	<50	<5.0	<5.0	<5.0	<5.0	<50	9.7

* Maximum acceptable concentration

Parameter exceeds Maximum Acceptable Concentration	*Parameter exceeds Aesthetic Objective Concentration*

Table D2. Summary of Water Quality Samples from Monitoring Wells, Selected Parameters (page 2 of 4)

	Units	Guidelines for Canadian Drinking Water Quality		MW4			MW5			MW6		
		MAC*	Aesthetic Objective	2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21
pH				7.44	7.31	7.44	8.04	7.84	7.84	7.66	7.51	7.75
Chloride	mg/L		≤ 250	*1600*	*1900*	*1800*	*2000*	*2400*	*5800*	*1500*	*1900*	*3800*
Sulphate	mg/L		≤ 500	320	320	340	120	320	220	*1300*	*970*	*920*
True Color	TCU		≤ 15 TCU	<5.0	<5.0	<5.0	*310*	*300*	*260*	*20*	*22*	*110*
Turbidity	NTU	≤ 0.3 NTU[2]		380	>1000	>1000	820	>1000	500	290	>1000	>1000
Nitrate (N)	mg/L	10		<0.050	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	0.06	0.4
Nitrite (N)	mg/L	1		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.02	0.078
Sodium	mg/L		≤ 200	*680*	*690*	*710*	*1800*	*1900*	*3200*	*1100*	*1200*	*2100*
Calculated TDS	mg/L		≤ 500	*44444*	*3700*	*3600*	*5300*	*6200*	*11000*	*4700*	*4800*	*8200*
Antimony	ug/L	6		<1.0	<10	<1.0	<1.0	<10	<10	<10	<10	<10
Arsenic	ug/L	10		<1.0	<10	<1.0	**41**	**24**	**22**	**14**	<10	<10
Barium	ug/L	2000		51	50	48	5.3	<10	20	25	16	14
Boron	ug/L	5000		200	<500	250	2800	2600	3200	1100	1100	2000
Cadmium	ug/L	7		0.022	<0.10	0.2	<0.10 (2)	<0.10	<0.10	<0.10	<0.10	<0.10
Chromium	ug/L	50		<1.0	<10	<1.0	3.8	<10	<10	<10	<10	<10
Copper	ug/L	2000	1000	0.7	<5.0	5.4	8	<5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L		≤ 300	<50	<500	<50	*320*	*540*	*<500*	*13000*	<500	<500
Lead	ug/L	5		<0.50	<5.0	<0.50	<0.50	<5.0	<5.0	<5.0	<5.0	<5.0
Manganese	ug/L	120	≤ 20	**3100**	**3300**	**3100**	**1400**	**1100**	**1000**	**2900**	**3100**	**3600**
Selenium	ug/L	50		<0.50	<5.0	<0.50	<0.50	<5.0	<5.0	<5.0	<5.0	<5.0
Strontium	ug/L	7000		**8900**	**9600**	**7700**	900	1100	2400	1900	1900	1700
Uranium	ug/L	20		6.9	6.6	6.4	0.32	<1.0	<1.0	<1.0	<1.0	<1.0
Zinc	ug/L		≤ 5000	<5.0	<50	8.5	<5.0	<50	<50	<50	<50	<50

* Maximum acceptable concentration

Parameter exceeds Maximum Acceptable Concentration	*Parameter exceeds Aesthetic Objective Concentration*

Table D2. Summary of Water Quality Samples from Monitoring Wells, Selected Parameters (page 3 of 4)

	Units	Guidelines for Canadian Drinking Water Quality: MAC*	Guidelines for Canadian Drinking Water Quality: Aesthetic Objective	MW7D			MW7I			MW7S		
				2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21
pH				7.62	7.49	7.52	7.70	7.55	7.59	7.64	7.48	7.61
Chloride	mg/L		≤ 250	*4700*	*4900*	*5400*	*2300*	*2000*	*2700*	*13000*	*15000*	*15000*
Sulphate	mg/L		≤ 500	*1800*	*1600*	*1800*	*1400*	*900*	*1400*	*2000*	*1900*	*2000*
True Color	TCU		≤ 15 TCU	*23*	*23*	*22*	*43*	*32*	*41*	*66*	*71*	*78*
Turbidity	NTU	≤ 0.3 NTU[2]		350	440	680	190	190	300	120	120	130
Nitrate (N)	mg/L	10		<0.050	<0.050	<0.050	<0.050	0.059	0.052	<0.050	<0.050	<0.050
Nitrite (N)	mg/L	1		<0.010	<0.010	<0.010	<0.010	0.011	<0.010	<0.010	<0.010	<0.010
Sodium	mg/L		≤ 200	*2900*	*2900*	*2800*	*1700*	*1700*	*1800*	*7800*	*8100*	*8000*
Calculated TDS	mg/L		≤ 500	*10000*	*11000*	*11000*	*6200*	*5300*	*6600*	*25000*	*27000*	*28000*
Antimony	ug/L	6		<10	<10	<10	<10	<10	<10	<10	<10	<10
Arsenic	ug/L	10		<10	<10	<10	<10	<10	<10	<10	<10	<10
Barium	ug/L	2000		43	49	31	34	<10	<10	140	85	84
Boron	ug/L	5000		1900	1700	2000	1800	1700	1900	3700	3800	4000
Cadmium	ug/L	7		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chromium	ug/L	50		<10	<10	<10	<10	<10	<10	<10	<10	<10
Copper	ug/L	2000	1000	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L		≤ 300	*23000*	<500	<500	*17000*	<500	<500	*11000*	<500	<500
Lead	ug/L	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Manganese	ug/L	120	≤ 20	**1600**	**1600**	**1500**	**1100**	**1100**	**990**	**6800**	**6700**	**6500**
Selenium	ug/L	50		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Strontium	ug/L	7000		3700	3500	3300	1600	1500	1600	5200	5400	5200
Uranium	ug/L	20		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Zinc	ug/L		≤ 5000	<50	<50	<50	<50	<50	<50	<50	<50	<50

* Maximum acceptable concentration

Parameter exceeds Maximum Acceptable Concentration | *Parameter exceeds Aesthetic Objective Concentration*

Table D2. Summary of Water Quality Samples from Monitoring Wells, Selected Parameters (page 4 of 4)

	Units	Guidelines for Canadian Drinking Water Quality		MW8			MW9			MW10		
		MAC*	Aesthetic Objective	2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21
pH				7.99	7.89	7.91	7.59	7.55	7.61	7.59	7.55	7.60
Chloride	mg/L		≤ 250	*2100*	*2500*	*2600*	*1300*	*1600*	*1600*	*8700*	*8200*	*8300*
Sulphate	mg/L		≤ 500	310	330	380	*520*	470	*600*	<2.0	4.4	*<2.0*
True Color	TCU		≤ 15 TCU	*110*	*110*	*150*	*36*	*33*	*40*	*74*	*62*	*73*
Turbidity	NTU	≤ 0.3 NTU[2]		76	560	55	640	350	150	>1000	>1000	330
Nitrate (N)	mg/L	10		<0.050	0.11	0.35	0.071	<0.050	<0.050	<0.050	<0.050	0.094
Nitrite (N)	mg/L	1		<0.010	<0.010	0.053	<0.010	<0.010	<0.010	<0.010	<0.010	0.3
Sodium	mg/L		≤ 200	*1400*	*1600*	*1600*	*1000*	*1000*	*1100*	*4900*	*4500*	*4300*
Calculated TDS	mg/L		≤ 500	*4600*	*5400*	*5500*	*3400*	*3700*	*3900*	*16000*	*15000*	*15000*
Antimony	ug/L	6		<10	<10	<10	<1.0	<10	<10	<10	<10	<10
Arsenic	ug/L	10		<10	<10	<10	1.7	<10	<10	<10	<10	<10
Barium	ug/L	2000		58	17	21	39	29	26	210	170	130
Boron	ug/L	5000		2000	1900	2200	1200	1100	1300	2000	1900	2100
Cadmium	ug/L	7		<0.10	<0.10	<0.10	<0.010	<0.10	<0.10	<0.10	<0.10	<0.10
Chromium	ug/L	50		<10	<10	<10	1.1	<10	<10	<10	<10	<10
Copper	ug/L	2000	1000	<5.0	<5.0	<5.0	0.71	<5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L		≤ 300	*4400*	<500	540	<50	<500	<500	<500	<500	<500
Lead	ug/L	5		<5.0	<5.0	<5.0	<0.50	<5.0	<5.0	<5.0	<5.0	<5.0
Manganese	ug/L	120	≤ 20	**3100**	**3000**	**2400**	**2000**	**2000**	**1700**	**2900**	**3200**	**3300**
Selenium	ug/L	50		<5.0	<5.0	<5.0	<0.50	<5.0	<5.0	<5.0	<5.0	<5.0
Strontium	ug/L	7000		880	950	910	710	700	710	3700	3300	3100
Uranium	ug/L	20		1.1	4.1	3.8	2.1	1.5	<1.0	<1.0	1.6	<1.0
Zinc	ug/L		≤ 5000	<50	<50	<50	<5.0	<50	<50	<50	<50	<50

* Maximum acceptable concentration

Parameter exceeds Maximum Acceptable Concentration	*Parameter exceeds Aesthetic Objective Concentration*

Table D3. Results Water Quality Samples from Monitoring Wells (page 1 of 12)

Monitoring well		MW1			MW2		
Sampling Date		2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21
Calculated Parameters	**UNITS**						
Anion Sum	me/L	150	143	112	15.4	16.2	16.2
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	670	970	1300	600	650	590
Calculated TDS	mg/L	8500	7800	6400	850	880	880
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.9	2.5	5.3	13	11	T
Cation Sum	me/L	146	126	116	14.8	15.3	15.1
Hardness (CaCO3)	mg/L	1700	1300	1100	51	66	150
Ion Balance (% Difference)	%	1.27	6.45	1.88	2.19	2.98	3.52
Langelier Index (@ 20C)	N/A	0.789	0.711	0.980	0.506	0.541	0.644
Langelier Index (@ 4C)	N/A	0.551	0.472	0.741	0.259	0.295	0.397
Nitrate (N)	mg/L	<0.050	0.067	<0.050	0.55	0.55	0.54
Saturation pH (@ 20C)	N/A	6.69	6.72	6.67	7.85	7.71	7.42
Saturation pH (@ 4C)	N/A	6.93	6.96	6.91	8.10	7.95	7.67
Inorganics							
Total Alkalinity (Total as CaCO3)	mg/L	670	970	1300	610	660	600
Dissolved Chloride (Cl-)	mg/L	4500	4100	2900	45	46	65
Colour	TCU	19	38	170	<5.0	<5.0	<5.0
Nitrate + Nitrite (N)	mg/L	<0.050	0.067	<0.050	0.55	0.55	0.54
Nitrite (N)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrogen (Ammonia Nitrogen)	mg/L	4.0	5.0	5.3	0.057	0.10	<0.050
Total Organic Carbon (C)	mg/L	11 (1)	<50 (1)	32 (1)	1.0	<5.0 (1)	140 (2)
Orthophosphate (P)	mg/L	0.011	0.024	0.16	<0.010	0.018	<0.010
pH	pH	7.48	7.43	7.65	8.36	8.25	8.07
Reactive Silica (SiO2)	mg/L	28	29	44	7.5	7.4	7.5
Dissolved Sulphate (SO4)	mg/L	480	430	240	91	83	110
Turbidity	NTU	600	>1000	140	21	65	11
Conductivity	uS/cm	15000	14000	10000	1400	1500	1400

Monitoring well		MW1			MW2		
Sampling Date		2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21
Metals							
Dissolved Aluminum (Al)	ug/L	<50	<50	59	13	15	10
Dissolved Antimony (Sb)	ug/L	<10	<10	<10	<1.0	<1.0	<1.0
Dissolved Arsenic (As)	ug/L	<10	<10	<10	1.8	1.6	<1.0
Dissolved Barium (Ba)	ug/L	62	32	18	33	45	48
Dissolved Beryllium (Be)	ug/L	<10	<10	<10	<1.0	<1.0	<1.0
Dissolved Bismuth (Bi)	ug/L	<20	<20	<20	<2.0	<2.0	<2.0
Dissolved Boron (B)	ug/L	1300	1700	2100	490	560	610
Dissolved Cadmium (Cd)	ug/L	<0.10	<0.10	<0.10	<0.010	<0.010	<0.010
Dissolved Calcium (Ca)	ug/L	220000	140000	110000	7900	10000	22000
Dissolved Chromium (Cr)	ug/L	<10	<10	<10	1.2	1.0	<1.0
Dissolved Cobalt (Co)	ug/L	<4.0	<4.0	<4.0	<0.40	<0.40	<0.40
Dissolved Copper (Cu)	ug/L	<5.0	<5.0	11	1.0	1.7	0.91
Dissolved Iron (Fe)	ug/L	<500	<500	<500	<50	<50	<50
Dissolved Lead (Pb)	ug/L	<5.0	<5.0	<5.0	<0.50	<0.50	<0.50
Dissolved Magnesium (Mg)	ug/L	290000	220000	200000	7500	9700	24000
Dissolved Manganese (Mn)	ug/L	3000	2800	2100	<2.0	<2.0	<2.0
Dissolved Molybdenum (Mo)	ug/L	<20	<20	<20	6.9	5.4	2.3
Dissolved Nickel (Ni)	ug/L	<20	<20	<20	<2.0	<2.0	<2.0
Dissolved Phosphorus (P)	ug/L	<1000	<1000	<1000	<100	<100	<100
Dissolved Potassium (K)	ug/L	94000	82000	76000	10000	14000	25000
Dissolved Selenium (Se)	ug/L	<5.0	<5.0	<5.0	<0.50	<0.50	<0.50
Dissolved Silver (Ag)	ug/L	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10
Dissolved Sodium (Na)	ug/L	2500000	2200000	2100000	310000	310000	260000
Dissolved Strontium (Sr)	ug/L	3000	1800	1500	46	61	140
Dissolved Thallium (Tl)	ug/L	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10
Dissolved Tin (Sn)	ug/L	<20	<20	<20	<2.0	<2.0	<2.0
Dissolved Titanium (Ti)	ug/L	<20	<20	<20	<2.0	<2.0	<2.0
Dissolved Uranium (U)	ug/L	4.8	1.8	<1.0	5.1	4.6	2.7
Dissolved Vanadium (V)	ug/L	<20	<20	<20	<2.0	<2.0	<2.0
Dissolved Zinc (Zn)	ug/L	<50	<50	<50	<5.0	<5.0	<5.0

Table D3, page 2 of 12 (continued)

(1) Elevated reporting limit due to turbidity.

(2) Elevated reporting limit due to sample matrix.

Table D3. Results Water Quality Samples from Monitoring Wells (page 3 of 12)

Monitoring well		MW3			MW4		
Sampling Date		2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21
Calculated Parameters	**UNITS**						
Anion Sum	me/L	78.9	79.3	77.2	58.6	68.7	65.4
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	140	130	98	340	360	370
Calculated TDS	mg/L	4900	4800	4700	3400	3700	3600
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cation Sum	me/L	79.9	73.2	71.9	59.9	61.5	59.8
Hardness (CaCO3)	mg/L	2200	2000	2000	1500	1600	1400
Ion Balance (% Difference)	%	0.620	4.01	3.56	1.05	5.48	4.41
Langelier Index (@ 20C)	N/A	0.827	0.637	0.619	0.868	0.753	0.866
Langelier Index (@ 4C)	N/A	0.588	0.397	0.379	0.626	0.512	0.625
Nitrate (N)	mg/L	<0.050	<0.050	0.082	<0.050	0.050	<0.050
Saturation pH (@ 20C)	N/A	6.82	6.88	6.97	6.57	6.56	6.58
Saturation pH (@ 4C)	N/A	7.06	7.12	7.21	6.82	6.80	6.82
Inorganics							
Total Alkalinity (Total as CaCO3)	mg/L	140	130	99	340	360	370
Dissolved Chloride (Cl-)	mg/L	1400	1500	1400	1600	1900	1800
Colour	TCU	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Nitrate + Nitrite (N)	mg/L	<0.050	<0.050	0.082	<0.050	0.050	<0.050
Nitrite (N)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrogen (Ammonia Nitrogen)	mg/L	0.32	0.80	0.30	0.13	0.45	0.12
Total Organic Carbon (C)	mg/L	<5.0 (1)	<5.0 (1)	<5.0 (1)	<5.0 (1)	<50 (1)	5.1 (1)
Orthophosphate (P)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
pH	pH	7.64	7.52	7.59	7.44	7.31	7.44
Reactive Silica (SiO2)	mg/L	10	9.7	11	15	15	16
Dissolved Sulphate (SO4)	mg/L	1700	1700	1700	320	320	340
Turbidity	NTU	>1000	>1000	39	380	>1000	>1000
Conductivity	uS/cm	7100	6800	6400	6100	6500	6100

Monitoring well		MW3			MW4		
Sampling Date		2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21
Metals							
Dissolved Aluminum (Al)	ug/L	<5.0	<50	<5.0	<5.0	<50	<5.0
Dissolved Antimony (Sb)	ug/L	<1.0	<10	<1.0	<1.0	<10	<1.0
Dissolved Arsenic (As)	ug/L	<1.0	<10	<1.0	<1.0	<10	<1.0
Dissolved Barium (Ba)	ug/L	28	23	19	51	50	48
Dissolved Beryllium (Be)	ug/L	<1.0	<10	<1.0	<1.0	<10	<1.0
Dissolved Bismuth (Bi)	ug/L	<2.0	<20	<2.0	<2.0	<20	<2.0
Dissolved Boron (B)	ug/L	410	<500	360	200	<500	250
Dissolved Cadmium (Cd)	ug/L	0.054	<0.10	0.035	0.022	<0.10	0.20
Dissolved Calcium (Ca)	ug/L	680000	630000	650000	420000	430000	390000
Dissolved Chromium (Cr)	ug/L	<1.0	<10	<1.0	<1.0	<10	<1.0
Dissolved Cobalt (Co)	ug/L	1.4	<4.0	0.87	5.1	5.9	4.5
Dissolved Copper (Cu)	ug/L	0.54	<5.0	1.0	0.70	<5.0	5.4
Dissolved Iron (Fe)	ug/L	<50	<500	<50	<50	<500	<50
Dissolved Lead (Pb)	ug/L	<0.50	<5.0	<0.50	<0.50	<5.0	<0.50
Dissolved Magnesium (Mg)	ug/L	110000	100000	96000	110000	120000	110000
Dissolved Manganese (Mn)	ug/L	3200	3500	4400	3100	3300	3100
Dissolved Molybdenum (Mo)	ug/L	6.8	<20	7.9	3.7	<20	3.9
Dissolved Nickel (Ni)	ug/L	6.5	<20	3.3	3.7	<20	4.0
Dissolved Phosphorus (P)	ug/L	<100	<1000	<100	<100	<1000	<100
Dissolved Potassium (K)	ug/L	13000	11000	8800	4000	4100	4200
Dissolved Selenium (Se)	ug/L	<0.50	<5.0	<0.50	<0.50	<5.0	<0.50
Dissolved Silver (Ag)	ug/L	<0.10	<1.0	<0.10	<0.10	<1.0	<0.10
Dissolved Sodium (Na)	ug/L	840000	760000	720000	680000	690000	710000
Dissolved Strontium (Sr)	ug/L	8600	8200	8000	8900	9600	7700
Dissolved Thallium (Tl)	ug/L	<0.10	<1.0	<0.10	<0.10	<1.0	0.11
Dissolved Tin (Sn)	ug/L	<2.0	<20	<2.0	<2.0	<20	<2.0
Dissolved Titanium (Ti)	ug/L	<2.0	<20	<2.0	<2.0	<20	<2.0
Dissolved Uranium (U)	ug/L	1.3	1.0	1.3	6.9	6.6	6.4
Dissolved Vanadium (V)	ug/L	<2.0	<20	<2.0	<2.0	<20	<2.0
Dissolved Zinc (Zn)	ug/L	<5.0	<50	9.7	<5.0	<50	8.5

Table D3, page 4 of 12 (continued)

(1) Elevated reporting limit due to turbidity

(2) Elevated reporting limit due to sample matrix.

Table D3. Results Water Quality Samples from Monitoring Wells (page 5 of 12)

Monitoring well		MW5			MW6		
Sampling Date		2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21
Calculated Parameters	**UNITS**						
Anion Sum	me/L	94.8	113	216	79.2	83.9	154
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	1700	1800	2300	460	530	1400
Calculated TDS	mg/L	5300	6200	11000	4700	4800	8200
Carb. Alkalinity (calc. as CaCO3)	mg/L	18	12	15	2.0	1.6	7.4
Cation Sum	me/L	97.0	105	185	74.3	77.5	122
Hardness (CaCO3)	mg/L	850	960	2000	1300	1300	1400
Ion Balance (% Difference)	%	1.15	3.53	7.69	3.18	3.93	11.6
Langelier Index (@ 20C)	N/A	1.31	1.17	1.48	0.944	0.858	1.33
Langelier Index (@ 4C)	N/A	1.07	0.928	1.24	0.703	0.618	1.10
Nitrate (N)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.40
Saturation pH (@ 20C)	N/A	6.73	6.67	6.36	6.71	6.66	6.42
Saturation pH (@ 4C)	N/A	6.97	6.91	6.60	6.96	6.90	6.65
Inorganics							
Total Alkalinity (Total as CaCO3)	mg/L	1700	1800	2300	460	530	1400
Dissolved Chloride (Cl-)	mg/L	2000	2400	5800	1500	1900	3800
Colour	TCU	310	300	260	20	22	110
Nitrate + Nitrite (N)	mg/L	<0.050	<0.050	<0.050	<0.050	0.060	0.48
Nitrite (N)	mg/L	<0.010	<0.010	<0.010	<0.010	0.020	0.078
Nitrogen (Ammonia Nitrogen)	mg/L	14	16	26	3.4	4.5	9.2
Total Organic Carbon (C)	mg/L	<50 (1)	55 (1)	52 (1)	5.9	<50 (1)	30 (1)
Orthophosphate (P)	mg/L	4.7	4.2	6.7	<0.010	0.038	0.21
pH	pH	8.04	7.84	7.84	7.66	7.51	7.75
Reactive Silica (SiO2)	mg/L	31	30	34	29	27	32
Dissolved Sulphate (SO4)	mg/L	120	320	220	1300	970	920
Turbidity	NTU	820	>1000	500	290	>1000	>1000
Conductivity	uS/cm	8900	10000	18000	7300	7800	13000

Monitoring well		MW5			MW6		
Sampling Date		2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21
Metals							
Dissolved Aluminum (Al)	ug/L	20	<50	<50	<50	<50	<50
Dissolved Antimony (Sb)	ug/L	<1.0	<10	<10	<10	<10	<10
Dissolved Arsenic (As)	ug/L	41	24	22	14	<10	<10
Dissolved Barium (Ba)	ug/L	5.3	<10	20	25	16	14
Dissolved Beryllium (Be)	ug/L	<1.0	<10	<10	<10	<10	<10
Dissolved Bismuth (Bi)	ug/L	<2.0	<20	<20	<20	<20	<20
Dissolved Boron (B)	ug/L	2800	2600	3200	1100	1100	2000
Dissolved Cadmium (Cd)	ug/L	<0.10 (2)	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Calcium (Ca)	ug/L	68000	77000	150000	250000	250000	200000
Dissolved Chromium (Cr)	ug/L	3.8	<10	<10	<10	<10	<10
Dissolved Cobalt (Co)	ug/L	3.5	<4.0	<4.0	<4.0	<4.0	<4.0
Dissolved Copper (Cu)	ug/L	8.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dissolved Iron (Fe)	ug/L	320	540	<500	13000	<500	<500
Dissolved Lead (Pb)	ug/L	<0.50	<5.0	<5.0	<5.0	<5.0	<5.0
Dissolved Magnesium (Mg)	ug/L	170000	190000	400000	160000	150000	220000
Dissolved Manganese (Mn)	ug/L	1400	1100	1000	2900	3100	3600
Dissolved Molybdenum (Mo)	ug/L	2.3	<20	<20	<20	<20	<20
Dissolved Nickel (Ni)	ug/L	<2.0	<20	<20	<20	<20	<20
Dissolved Phosphorus (P)	ug/L	5100	8600	8000	2000	<1000	<1000
Dissolved Potassium (K)	ug/L	76000	68000	95000	47000	47000	72000
Dissolved Selenium (Se)	ug/L	<0.50	<5.0	<5.0	<5.0	<5.0	<5.0
Dissolved Silver (Ag)	ug/L	<0.10	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Sodium (Na)	ug/L	1800000	1900000	3200000	1100000	1200000	2100000
Dissolved Strontium (Sr)	ug/L	900	1100	2400	1900	1900	1700
Dissolved Thallium (Tl)	ug/L	<0.10	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Tin (Sn)	ug/L	<2.0	<20	<20	<20	<20	<20
Dissolved Titanium (Ti)	ug/L	25	29	<20	<20	<20	<20
Dissolved Uranium (U)	ug/L	0.32	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Vanadium (V)	ug/L	70	42	28	<20	<20	<20
Dissolved Zinc (Zn)	ug/L	<5.0	<50	<50	<50	<50	<50

Table D3, page 6 of 12 (continued)

(1) Elevated reporting limit due to turbidity
(2) Elevated reporting limit due to sample matrix.

Table D3. Results Water Quality Samples from Monitoring Wells (page 7 of 12)

Monitoring well		MW7D			MW7I		
Sampling Date		2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21
Calculated Parameters	**UNITS**						
Anion Sum	me/L	180	186	202	105	83.7	116
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	500	740	700	570	430	590
Calculated TDS	mg/L	10000	11000	11000	6200	5300	6600
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.9	2.2	2.2	2.7	1.5	2.2
Cation Sum	me/L	172	173	168	99.7	101	104
Hardness (CaCO3)	mg/L	2200	2200	2100	1200	1200	1300
Ion Balance (% Difference)	%	2.23	3.75	9.29	2.79	9.38	5.56
Langelier Index (@ 20C)	N/A	0.931	0.955	0.939	0.744	0.487	0.665
Langelier Index (@ 4C)	N/A	0.693	0.718	0.701	0.505	0.247	0.426
Nitrate (N)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.052
Saturation pH (@ 20C)	N/A	6.69	6.54	6.58	6.96	7.06	6.93
Saturation pH (@ 4C)	N/A	6.93	6.78	6.82	7.20	7.30	7.17
Inorganics							
Total Alkalinity (Total as CaCO3)	mg/L	500	740	700	570	440	590
Dissolved Chloride (Cl-)	mg/L	4700	4900	5400	2300	2000	2700
Colour	TCU	23	23	22	43	32	41
Nitrate + Nitrite (N)	mg/L	<0.050	<0.050	<0.050	<0.050	0.059	0.052
Nitrite (N)	mg/L	<0.010	<0.010	<0.010	<0.010	0.011	<0.010
Nitrogen (Ammonia Nitrogen)	mg/L	4.0	5.0	4.9	3.8	2.8	3.6
Total Organic Carbon (C)	mg/L	8.4 (1)	10 (1)	12 (1)	11 (1)	13 (1)	14 (1)
Orthophosphate (P)	mg/L	<0.010	<0.010	<0.010	0.050	0.027	0.059
pH	pH	7.62	7.49	7.52	7.70	7.55	7.59
Reactive Silica (SiO2)	mg/L	22	21	23	36	28	39
Dissolved Sulphate (SO4)	mg/L	1800	1600	1800	1400	900	1400
Turbidity	NTU	350	440	680	190	190	300
Conductivity	uS/cm	17000	17000	17000	10000	7800	10000

Monitoring well		MW7D			MW7I		
Sampling Date		2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21
Metals							
Dissolved Aluminum (Al)	ug/L	<50	52	<50	<50	<50	<50
Dissolved Antimony (Sb)	ug/L	<10	<10	<10	<10	<10	<10
Dissolved Arsenic (As)	ug/L	<10	<10	<10	<10	<10	<10
Dissolved Barium (Ba)	ug/L	43	49	31	34	<10	<10
Dissolved Beryllium (Be)	ug/L	<10	<10	<10	<10	<10	<10
Dissolved Bismuth (Bi)	ug/L	<20	<20	<20	<20	<20	<20
Dissolved Boron (B)	ug/L	1900	1700	2000	1800	1700	1900
Dissolved Cadmium (Cd)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Calcium (Ca)	ug/L	310000	300000	290000	130000	120000	140000
Dissolved Chromium (Cr)	ug/L	<10	<10	<10	<10	<10	<10
Dissolved Cobalt (Co)	ug/L	6.2	19	30	6.2	21	<4.0
Dissolved Copper (Cu)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dissolved Iron (Fe)	ug/L	23000	<500	<500	17000	<500	<500
Dissolved Lead (Pb)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dissolved Magnesium (Mg)	ug/L	350000	340000	330000	220000	220000	220000
Dissolved Manganese (Mn)	ug/L	1600	1600	1500	1100	1100	990
Dissolved Molybdenum (Mo)	ug/L	<20	<20	<20	<20	<20	<20
Dissolved Nickel (Ni)	ug/L	<20	<20	<20	<20	<20	<20
Dissolved Phosphorus (P)	ug/L	1200	<1000	<1000	3600	<1000	<1000
Dissolved Potassium (K)	ug/L	94000	96000	96000	72000	70000	75000
Dissolved Selenium (Se)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dissolved Silver (Ag)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Sodium (Na)	ug/L	2900000	2900000	2800000	1700000	1700000	1800000
Dissolved Strontium (Sr)	ug/L	3700	3500	3300	1600	1500	1600
Dissolved Thallium (Tl)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Tin (Sn)	ug/L	<20	<20	<20	<20	<20	<20
Dissolved Titanium (Ti)	ug/L	<20	<20	<20	<20	<20	<20
Dissolved Uranium (U)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Vanadium (V)	ug/L	<20	<20	<20	<20	<20	<20
Dissolved Zinc (Zn)	ug/L	<50	<50	<50	<50	<50	<50

Table D3, page 8 of 12 (continued)

(1) Elevated reporting limit due to turbidity
(2) Elevated reporting limit due to sample matrix.

Table D3. Results Water Quality Samples from Monitoring Wells (page 9 of 12)

Monitoring well		MW7S			MW8		
Sampling Date		2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21
Calculated Parameters	**UNITS**						
Anion Sum	me/L	419	484	498	83.0	97.7	102
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	1100	1200	1200	900	970	980
Calculated TDS	mg/L	25000	27000	28000	4600	5400	5500
Carb. Alkalinity (calc. as CaCO3)	mg/L	4.5	3.3	4.6	8.3	7.1	7.6
Cation Sum	me/L	440	453	451	76.7	88.8	84.4
Hardness (CaCO3)	mg/L	4700	4800	4800	670	750	710
Ion Balance (% Difference)	%	2.43	3.33	4.96	3.92	4.73	9.26
Langelier Index (@ 20C)	N/A	1.39	1.29	1.44	1.10	1.01	1.02
Langelier Index (@ 4C)	N/A	1.15	1.05	1.20	0.855	0.769	0.776
Nitrate (N)	mg/L	<0.050	<0.050	<0.050	<0.050	0.11	0.35
Saturation pH (@ 20C)	N/A	6.25	6.20	6.17	6.90	6.88	6.90
Saturation pH (@ 4C)	N/A	6.49	6.44	6.41	7.14	7.12	7.14
Inorganics							
Total Alkalinity (Total as CaCO3)	mg/L	1100	1200	1200	900	980	990
Dissolved Chloride (Cl-)	mg/L	13000	15000	15000	2100	2500	2600
Colour	TCU	66	71	78	110	110	150
Nitrate + Nitrite (N)	mg/L	<0.050	<0.050	<0.050	<0.050	0.11	0.41
Nitrite (N)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.053
Nitrogen (Ammonia Nitrogen)	mg/L	15	15	15	11	12	11
Total Organic Carbon (C)	mg/L	17 (1)	19 (1)	22 (1)	18 (1)	21 (1)	240 (3)
Orthophosphate (P)	mg/L	2.8	3.2	3.8	4.5	4.5	6.1
pH	pH	7.64	7.48	7.61	7.99	7.89	7.91
Reactive Silica (SiO2)	mg/L	37	36	40	35	34	39
Dissolved Sulphate (SO4)	mg/L	2000	1900	2000	310	330	380
Turbidity	NTU	120	120	130	76	560	55
Conductivity	uS/cm	40000	41000	41000	8400	9100	8700

Monitoring well		MW7S			MW8		
Sampling Date		2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21
Metals							
Dissolved Aluminum (Al)	ug/L	<50	<50	<50	<50	<50	<50
Dissolved Antimony (Sb)	ug/L	<10	<10	<10	<10	<10	<10
Dissolved Arsenic (As)	ug/L	<10	<10	<10	<10	<10	<10
Dissolved Barium (Ba)	ug/L	140	85	84	58	17	21
Dissolved Beryllium (Be)	ug/L	<10	<10	<10	<10	<10	<10
Dissolved Bismuth (Bi)	ug/L	<20	<20	<20	<20	<20	<20
Dissolved Boron (B)	ug/L	3700	3800	4000	2000	1900	2200
Dissolved Cadmium (Cd)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Calcium (Ca)	ug/L	380000	390000	390000	84000	86000	82000
Dissolved Chromium (Cr)	ug/L	<10	<10	<10	<10	<10	<10
Dissolved Cobalt (Co)	ug/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Dissolved Copper (Cu)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dissolved Iron (Fe)	ug/L	11000	<500	<500	4400	<500	540
Dissolved Lead (Pb)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dissolved Magnesium (Mg)	ug/L	900000	920000	920000	110000	130000	120000
Dissolved Manganese (Mn)	ug/L	6800	6700	6500	3100	3000	2400
Dissolved Molybdenum (Mo)	ug/L	<20	<20	<20	<20	20	<20
Dissolved Nickel (Ni)	ug/L	<20	<20	<20	<20	<20	<20
Dissolved Phosphorus (P)	ug/L	7500	3900	4800	6900	5700	6500
Dissolved Potassium (K)	ug/L	240000	240000	250000	66000	69000	68000
Dissolved Selenium (Se)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dissolved Silver (Ag)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Sodium (Na)	ug/L	7800000	8100000	8000000	1400000	1600000	1600000
Dissolved Strontium (Sr)	ug/L	5200	5400	5200	880	950	910
Dissolved Thallium (Tl)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Tin (Sn)	ug/L	<20	<20	<20	<20	<20	<20
Dissolved Titanium (Ti)	ug/L	<20	<20	<20	<20	<20	<20
Dissolved Uranium (U)	ug/L	<1.0	<1.0	<1.0	1.1	4.1	3.8
Dissolved Vanadium (V)	ug/L	<20	<20	<20	<20	<20	<20
Dissolved Zinc (Zn)	ug/L	<50	<50	<50	<50	<50	<50

Table D3, page 10 of 12 (continued)

(1) Elevated reporting limit due to turbidity

(2) Elevated reporting limit due to sample matrix.

Table D3. Results Water Quality Samples from Monitoring Wells (page 11 of 12)

Monitoring well		MW9			MW10		
Sampling Date		2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21
Calculated Parameters	**UNITS**						
Anion Sum	me/L	57.3	66.3	70.2	286	271	275
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	500	580	570	2000	2000	2100
Calculated TDS	mg/L	3400	3700	3900	16000	15000	15000
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.8	1.9	2.2	7.6	6.7	7.9
Cation Sum	me/L	59.6	59.7	62.0	286	259	248
Hardness (CaCO3)	mg/L	690	690	710	3300	2900	2700
Ion Balance (% Difference)	%	1.99	5.25	6.15	0.0300	2.09	5.34
Langelier Index (@ 20C)	N/A	0.448	0.446	0.478	1.35	1.26	1.31
Langelier Index (@ 4C)	N/A	0.207	0.205	0.237	1.11	1.02	1.07
Nitrate (N)	mg/L	0.071	<0.050	<0.050	<0.050	<0.050	0.094
Saturation pH (@ 20C)	N/A	7.14	7.11	7.13	6.25	6.30	6.30
Saturation pH (@ 4C)	N/A	7.38	7.35	7.37	6.48	6.53	6.53
Inorganics							
Total Alkalinity (Total as CaCO3)	mg/L	500	580	580	2100	2000	2100
Dissolved Chloride (Cl-)	mg/L	1300	1600	1600	8700	8200	8300
Colour	TCU	36	33	40	74	62	73
Nitrate + Nitrite (N)	mg/L	0.071	<0.050	<0.050	<0.050	<0.050	0.40
Nitrite (N)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.30
Nitrogen (Ammonia Nitrogen)	mg/L	2.0	2.1	2.3	21	19	16
Total Organic Carbon (C)	mg/L	17 (1)	15 (1)	17 (1)	27 (1)	<50 (1)	25 (1)
Orthophosphate (P)	mg/L	<0.010	0.025	0.028	0.12	0.072	0.19
pH	pH	7.59	7.55	7.61	7.59	7.55	7.60
Reactive Silica (SiO2)	mg/L	34	33	39	19	18	24
Dissolved Sulphate (SO4)	mg/L	520	470	600	<2.0	4.4	<2.0
Turbidity	NTU	640	350	150	>1000	>1000	330
Conductivity	uS/cm	5800	6200	6500	26000	25000	23000

Monitoring well		MW9			MW10		
Sampling Date		2020-09-10	2020-11-16	2021-04-21	2020-09-10	2020-11-16	2021-04-21
Metals							
Dissolved Aluminum (Al)	ug/L	5.4	<50	<50	<50	<50	<50
Dissolved Antimony (Sb)	ug/L	<1.0	<10	<10	<10	<10	<10
Dissolved Arsenic (As)	ug/L	1.7	<10	<10	<10	<10	<10
Dissolved Barium (Ba)	ug/L	39	29	26	210	170	130
Dissolved Beryllium (Be)	ug/L	<1.0	<10	<10	<10	<10	<10
Dissolved Bismuth (Bi)	ug/L	<2.0	<20	<20	<20	<20	<20
Dissolved Boron (B)	ug/L	1200	1100	1300	2000	1900	2100
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Calcium (Ca)	ug/L	79000	76000	73000	220000	200000	190000
Dissolved Chromium (Cr)	ug/L	1.1	<10	<10	<10	<10	<10
Dissolved Cobalt (Co)	ug/L	<0.40	<4.0	<4.0	<4.0	<4.0	<4.0
Dissolved Copper (Cu)	ug/L	0.71	<5.0	<5.0	<5.0	<5.0	<5.0
Dissolved Iron (Fe)	ug/L	<50	<500	<500	<500	<500	<500
Dissolved Lead (Pb)	ug/L	<0.50	<5.0	<5.0	<5.0	<5.0	<5.0
Dissolved Magnesium (Mg)	ug/L	120000	120000	130000	660000	580000	540000
Dissolved Manganese (Mn)	ug/L	2000	2000	1700	2900	3200	3300
Dissolved Molybdenum (Mo)	ug/L	25	24	23	<20	24	21
Dissolved Nickel (Ni)	ug/L	<2.0	<20	<20	<20	<20	<20
Dissolved Phosphorus (P)	ug/L	<100	<1000	<1000	<1000	<1000	<1000
Dissolved Potassium (K)	ug/L	62000	57000	60000	160000	150000	140000
Dissolved Selenium (Se)	ug/L	<0.50	<5.0	<5.0	<5.0	<5.0	<5.0
Dissolved Silver (Ag)	ug/L	<0.10	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Sodium (Na)	ug/L	1000000	1000000	1100000	4900000	4500000	4300000
Dissolved Strontium (Sr)	ug/L	710	700	710	3700	3300	3100
Dissolved Thallium (Tl)	ug/L	<0.10	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Tin (Sn)	ug/L	<2.0	<20	<20	<20	<20	<20
Dissolved Titanium (Ti)	ug/L	<2.0	<20	<20	<20	<20	<20
Dissolved Uranium (U)	ug/L	2.1	1.5	<1.0	<1.0	1.6	<1.0
Dissolved Vanadium (V)	ug/L	<2.0	<20	<20	<20	<20	<20
Dissolved Zinc (Zn)	ug/L	<5.0	<50	<50	<50	<50	<50

Table D3, page 12 of 12 (continued)

(1) Elevated reporting limit due to turbidity
(2) Elevated reporting limit due to sample matrix.

APPENDIX E

Laboratory Certificates

11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
http://www.agatlabs.com

CLIENT NAME: CBCL LTD
1489 HOLLIS STREET PO BOX 606
HALIFAX, NS B3J2R7
(902) 421-7241

ATTENTION TO: Laura Jenkins

PROJECT: 171046.00

AGAT WORK ORDER: 20X651411

MICROBIOLOGY ANALYSIS REVIEWED BY: Marta Manka, Data Reporter

WATER ANALYSIS REVIEWED BY: Marta Manka, Data Reporter

DATE REPORTED: Sep 28, 2020

PAGES (INCLUDING COVER): 15

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (902) 468-8718

*Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days following analysis, unless expressly agreed otherwise in writing. Please contact your Client Project Manager if you require additional sample storage time.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This Certificate shall not be reproduced except in full, without the written approval of the laboratory.*
- *The test results reported herewith relate only to the samples as received by the laboratory.*
- *Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.*
- *All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.*

Certificate of Analysis

AGAT WORK ORDER: 20X651411
PROJECT: 171046.00

11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
http://www.agatlabs.com

CLIENT NAME: CBCL LTD
SAMPLING SITE:

ATTENTION TO: Laura Jenkins
SAMPLED BY:

Total Coliforms and E.coli - Presence/Absence

DATE RECEIVED: 2020-09-16

DATE REPORTED: 2020-09-28

			SAMPLE DESCRIPTION:	1	2	3	4	5	6	7	8
			SAMPLE TYPE:	Water	Water	Water	Water	Water	Water	Water	Water
			DATE SAMPLED:	2020-09-16 08:30	2020-09-16 09:00	2020-09-16 09:30	2020-09-16 10:00	2020-09-16 10:30	2020-09-16 10:45	2020-09-16 11:20	2020-09-16 11:50
Parameter	Unit	G / S	RDL	1451296	1451297	1451298	1451299	1451300	1451301	1451302	1451303
Total Coliforms (P/A)	(P/A)			PRESENT	PRESENT	PRESENT	PRESENT	PRESENT	PRESENT	ABSENT	PRESENT
Escherichia coli (P/A)	(P/A)			ABSENT	ABSENT	PRESENT	ABSENT	ABSENT	PRESENT	ABSENT	ABSENT

			SAMPLE DESCRIPTION:	9	10	11
			SAMPLE TYPE:	Water	Water	Water
			DATE SAMPLED:	2020-09-16 13:30	2020-09-16 14:30	2020-09-16 15:00
Parameter	Unit	G / S	RDL	1451304	1451305	1451306
Total Coliforms (P/A)	(P/A)			PRESENT	PRESENT	PRESENT
Escherichia coli (P/A)	(P/A)			ABSENT	PRESENT	PRESENT

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
Analysis performed at AGAT Halifax (unless marked by *)

Certified By: Marta Manta

Certificate of Analysis

AGAT WORK ORDER: 20X651411

PROJECT: 171046.00

11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
http://www.agatlabs.com

CLIENT NAME: CBCL LTD

ATTENTION TO: Laura Jenkins

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis + Total Metals

DATE RECEIVED: 2020-09-16

DATE REPORTED: 2020-09-28

		SAMPLE DESCRIPTION:		1		2		3		4	5
		SAMPLE TYPE:		Water		Water		Water		Water	Water
		DATE SAMPLED:		2020-09-16 08:30		2020-09-16 09:00		2020-09-16 09:30		2020-09-16 10:00	2020-09-16 10:30
Parameter	Unit	G / S	RDL	1451296	RDL	1451297	RDL	1451298	RDL	1451299	1451300
pH				7.77		7.84		7.71		8.02	7.86
Reactive Silica as SiO2	mg/L		0.5	8.4	0.5	10.7	0.5	11.7	0.5	16.0	4.3
Chloride	mg/L		1	4	1	6	20	1230	1	13	5
Fluoride	mg/L		0.12	0.12	0.12	<0.12	0.12	0.83	0.12	<0.12	<0.12
Sulphate	mg/L		10	347	2	7	40	761	2	21	47
Alkalinity	mg/L		5	96	5	324	5	271	5	152	123
True Color	TCU		5	21	5	8	5	30	5	13	16
Turbidity	NTU		0.5	0.6	0.5	<0.5	0.5	4.6	0.5	0.6	1.3
Electrical Conductivity	umho/cm		1	813	1	637	1	5350	1	404	357
Nitrate + Nitrite as N	mg/L		0.05	<0.05	0.05	<0.05	0.05	0.23	0.05	2.38	0.64
Nitrate as N	mg/L		0.05	<0.05	0.05	<0.05	0.05	0.23	0.05	2.38	0.58
Nitrite as N	mg/L		0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.06
Ammonia as N	mg/L		0.03	<0.03	0.03	<0.03	0.03	0.97	0.03	<0.03	<0.03
Total Organic Carbon	mg/L		0.5	1.0	0.5	1.5	0.5	6.8	0.5	0.8	3.2
Ortho-Phosphate as P	mg/L		0.01	<0.01	0.01	0.03	0.01	0.10	0.01	0.03	0.01
Total Sodium	mg/L		0.1	4.2	0.1	5.1	0.1	901	0.1	7.6	5.6
Total Potassium	mg/L		0.1	0.8	0.1	1.4	0.1	31.2	0.1	4.1	1.9
Total Calcium	mg/L		0.1	179	0.1	129	0.1	305	0.1	74.4	71.3
Total Magnesium	mg/L		0.1	8.1	0.1	6.6	0.1	107	0.1	2.6	1.3
Bicarb. Alkalinity (as CaCO3)	mg/L		5	96	5	324	5	271	5	152	123
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	10	<10	10	<10	10	<10	<10
Hydroxide	mg/L		5	<5	5	<5	5	<5	5	<5	<5
Calculated TDS	mg/L		1	601	1	350	1	3500	1	225	209
Hardness	mg/L			480		349		1200		196	183
Langelier Index (@20C)	NA			0.34		0.82		0.89		0.45	0.18
Langelier Index (@ 4C)	NA			0.02		0.50		0.57		0.13	-0.14
Saturation pH (@ 20C)	NA			7.43		7.02		6.82		7.57	7.68
Saturation pH (@ 4C)	NA			7.75		7.34		7.14		7.89	8.00
Anion Sum	me/L			9.25		6.79		56.0		4.01	3.62

Certified By: Marta Manta

Certificate of Analysis

AGAT WORK ORDER: 20X651411
PROJECT: 171046.00

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CANADA B3B 1M2
TEL (902)468-8718
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CLIENT NAME: CBCL LTD
SAMPLING SITE:
ATTENTION TO: Laura Jenkins
SAMPLED BY:

Standard Water Analysis + Total Metals

DATE RECEIVED: 2020-09-16
DATE REPORTED: 2020-09-28

Parameter	Unit	G / S	RDL	1451296	RDL	1451297	RDL	1451298	RDL	1451299	1451300
SAMPLE DESCRIPTION:				1		2		3		4	5
SAMPLE TYPE:				Water		Water		Water		Water	Water
DATE SAMPLED:				2020-09-16 08:30		2020-09-16 09:00		2020-09-16 09:30		2020-09-16 10:00	2020-09-16 10:30
Cation sum	me/L			9.82		7.25		64.1		4.37	3.97
% Difference/ Ion Balance	%			3.0		3.3		6.8		4.3	4.6
Total Aluminum	ug/L		5	9	5	6	5	28	5	7	13
Total Antimony	ug/L		2	<2	2	<2	2	<2	2	<2	<2
Total Arsenic	ug/L		2	<2	2	<2	2	15	2	<2	<2
Total Barium	ug/L		5	73	5	115	5	147	5	121	98
Total Beryllium	ug/L		2	<2	2	<2	2	<2	2	<2	<2
Total Bismuth	ug/L		2	<2	2	<2	2	<2	2	<2	<2
Total Boron	ug/L		5	46	5	21	5	530	5	32	25
Total Cadmium	ug/L		0.017	<0.017	0.017	0.052	0.017	0.046	0.017	0.028	0.018
Total Chromium	ug/L		1	<1	1	<1	1	3	1	2	<1
Total Cobalt	ug/L		1	<1	1	<1	1	1	1	<1	<1
Total Copper	ug/L		1	16	1	8	1	259	1	15	7
Total Iron	ug/L		50	87	50	61	50	972	50	72	146
Total Lead	ug/L		0.5	<0.5	0.5	0.9	0.5	3.7	0.5	2.6	<0.5
Total Manganese	ug/L		2	3	2	39	2	591	2	<2	40
Total Molybdenum	ug/L		2	<2	2	<2	2	<2	2	<2	<2
Total Nickel	ug/L		2	6	2	4	2	16	2	4	3
Total Phosphorus	mg/L		0.1	<0.1	0.1	<0.1	0.1	0.2	0.1	<0.1	<0.1
Total Selenium	ug/L		1	<1	1	<1	1	14	1	<1	<1
Total Silver	ug/L		0.1	0.3	0.1	<0.1	0.1	<0.1	0.1	<0.1	<0.1
Total Strontium	ug/L		5	1820	5	177	5	3060	5	146	112
Total Thallium	ug/L		0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	<0.1
Total Tin	ug/L		2	<2	2	<2	2	<2	2	<2	<2
Total Titanium	ug/L		2	3	2	<2	2	5	2	<2	<2
Total Uranium	ug/L		0.1	0.5	0.1	1.4	0.1	0.3	0.1	0.3	0.2
Total Vanadium	ug/L		2	<2	2	<2	2	16	2	<2	<2
Total Zinc	ug/L		5	26	5	8	5	161	5	49	12

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CANADA B3B 1M2
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Certificate of Analysis

AGAT WORK ORDER: 20X651411
PROJECT: 171046.00

CLIENT NAME: CBCL LTD
SAMPLING SITE:

ATTENTION TO: Laura Jenkins
SAMPLED BY:

Standard Water Analysis + Total Metals

DATE RECEIVED: 2020-09-16

DATE REPORTED: 2020-09-28

Parameter	Unit	G / S	RDL	1451301	RDL	1451302	RDL	1451303	RDL	1451304
SAMPLE DESCRIPTION:				6		7		8		9
SAMPLE TYPE:				Water		Water		Water		Water
DATE SAMPLED:				2020-09-16 10:45		2020-09-16 11:20		2020-09-16 11:50		2020-09-16 13:30
pH				7.72		8.02		7.90		7.82
Reactive Silica as SiO2	mg/L		0.5	14.5	0.5	11.2	0.5	4.6	0.5	11.0
Chloride	mg/L		1	24	1	3	1	5	1	<1
Fluoride	mg/L		0.12	0.49	0.12	0.21	0.12	0.14	0.12	<0.12
Sulphate	mg/L		40	1440	2	9	4	112	40	1510
Alkalinity	mg/L		5	217	5	197	5	102	5	219
True Color	TCU		5	18	5	11	5	17	5	8
Turbidity	NTU		0.5	1.5	0.5	1.0	0.5	1.9	0.5	27.6
Electrical Conductivity	umho/cm		1	2300	1	404	1	417	1	2320
Nitrate + Nitrite as N	mg/L		0.05	1.08	0.05	0.69	0.05	0.09	0.05	<0.05
Nitrate as N	mg/L		0.05	1.08	0.05	0.69	0.05	0.09	0.05	<0.05
Nitrite as N	mg/L		0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05
Ammonia as N	mg/L		0.03	<0.03	0.03	<0.03	0.03	<0.03	0.03	<0.03
Total Organic Carbon	mg/L		0.5	1.4	0.5	1.8	0.5	1.3	0.5	1.1
Ortho-Phosphate as P	mg/L		0.01	0.02	0.01	<0.01	0.01	0.01	0.01	0.01
Total Sodium	mg/L		0.1	32.3	0.1	3.0	0.1	4.2	0.1	9.8
Total Potassium	mg/L		0.1	1.4	0.1	1.7	0.1	0.7	0.1	1.3
Total Calcium	mg/L		0.1	635	0.1	72.8	0.1	73.0	0.1	685
Total Magnesium	mg/L		0.1	5.2	0.1	3.8	0.1	4.0	0.1	19.7
Bicarb. Alkalinity (as CaCO3)	mg/L		5	217	5	197	5	102	5	219
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	10	<10	10	<10	10	<10
Hydroxide	mg/L		5	<5	5	<5	5	<5	5	<5
Calculated TDS	mg/L		1	2270	1	215	1	261	1	2360
Hardness	mg/L			1610		197		199		1790
Langelier Index (@20C)	NA			1.14		0.56		0.14		1.27
Langelier Index (@ 4C)	NA			0.82		0.24		-0.18		0.95
Saturation pH (@ 20C)	NA			6.58		7.46		7.76		6.55
Saturation pH (@ 4C)	NA			6.90		7.78		8.08		6.87
Anion Sum	me/L			35.1		4.26		4.52		35.8

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CANADA B3B 1M2
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AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 20X651411
PROJECT: 171046.00

CLIENT NAME: CBCL LTD
SAMPLING SITE:

ATTENTION TO: Laura Jenkins
SAMPLED BY:

Standard Water Analysis + Total Metals

DATE RECEIVED: 2020-09-16

DATE REPORTED: 2020-09-28

			SAMPLE DESCRIPTION:	6		7		8		9
			SAMPLE TYPE:	Water		Water		Water		Water
			DATE SAMPLED:	2020-09-16 10:45		2020-09-16 11:20		2020-09-16 11:50		2020-09-16 13:30
Parameter	Unit	G / S	RDL	1451301	RDL	1451302	RDL	1451303	RDL	1451304
Cation sum	me/L			33.6		4.15		4.20		36.4
% Difference/ Ion Balance	%			2.1		1.4		3.7		0.9
Total Aluminum	ug/L		5	16	5	8	5	59	5	6
Total Antimony	ug/L		2	<2	2	<2	2	<2	2	<2
Total Arsenic	ug/L		2	<2	2	<2	2	<2	2	4
Total Barium	ug/L		5	25	5	122	5	43	5	15
Total Beryllium	ug/L		2	<2	2	<2	2	<2	2	<2
Total Bismuth	ug/L		2	<2	2	<2	2	<2	2	<2
Total Boron	ug/L		5	262	5	13	5	20	5	196
Total Cadmium	ug/L		0.017	<0.017	0.017	0.084	0.017	<0.017	0.017	<0.017
Total Chromium	ug/L		1	<1	1	<1	1	<1	1	<1
Total Cobalt	ug/L		1	<1	1	<1	1	<1	1	2
Total Copper	ug/L		1	4	1	272	1	133	1	24
Total Iron	ug/L		50	128	50	212	50	236	50	2970
Total Lead	ug/L		0.5	<0.5	0.5	16.9	0.5	8.8	0.5	<0.5
Total Manganese	ug/L		2	37	2	3	2	9	2	253
Total Molybdenum	ug/L		2	<2	2	<2	2	<2	2	2
Total Nickel	ug/L		2	26	2	4	2	3	2	28
Total Phosphorus	mg/L		0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1
Total Selenium	ug/L		1	3	1	<1	1	<1	1	3
Total Silver	ug/L		0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1
Total Strontium	ug/L		5	2750	5	111	5	352	5	4520
Total Thallium	ug/L		0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1
Total Tin	ug/L		2	<2	2	<2	2	<2	2	<2
Total Titanium	ug/L		2	8	2	<2	2	<2	2	8
Total Uranium	ug/L		0.1	1.7	0.1	0.8	0.1	0.5	0.1	1.0
Total Vanadium	ug/L		2	<2	2	<2	2	<2	2	<2
Total Zinc	ug/L		5	20	5	113	5	37	5	18

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DATE RECEIVED: 2020-09-16

DATE REPORTED: 2020-09-28

			SAMPLE DESCRIPTION:	10		11
			SAMPLE TYPE:	Water		Water
			DATE SAMPLED:	2020-09-16 14:30		2020-09-16 15:00
Parameter	Unit	G / S	RDL	1451305	RDL	1451306
pH				7.97		7.51
Reactive Silica as SiO2	mg/L		0.5	4.5	0.5	14.7
Chloride	mg/L		1	42	2	113
Fluoride	mg/L		0.12	0.18	0.12	0.24
Sulphate	mg/L		2	24	2	32
Alkalinity	mg/L		5	90	5	138
True Color	TCU		5	10	5	9
Turbidity	NTU		0.5	1.8	0.5	1.6
Electrical Conductivity	umho/cm		1	352	1	667
Nitrate + Nitrite as N	mg/L		0.05	<0.05	0.05	0.87
Nitrate as N	mg/L		0.05	<0.05	0.05	0.87
Nitrite as N	mg/L		0.05	<0.05	0.05	<0.05
Ammonia as N	mg/L		0.03	0.16	0.03	<0.03
Total Organic Carbon	mg/L		0.5	3.0	0.5	3.0
Ortho-Phosphate as P	mg/L		0.01	0.02	0.01	0.01
Total Sodium	mg/L		0.1	13.5	0.1	68.6
Total Potassium	mg/L		0.1	2.5	0.1	4.3
Total Calcium	mg/L		0.1	44.2	0.1	43.6
Total Magnesium	mg/L		0.1	2.1	0.1	15.7
Bicarb. Alkalinity (as CaCO3)	mg/L		5	90	5	138
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	10	<10
Hydroxide	mg/L		5	<5	5	<5
Calculated TDS	mg/L		1	183	1	364
Hardness	mg/L			119		174
Langelier Index (@20C)	NA			-0.04		-0.35
Langelier Index (@ 4C)	NA			-0.36		-0.67
Saturation pH (@ 20C)	NA			8.01		7.86
Saturation pH (@ 4C)	NA			8.33		8.18
Anion Sum	me/L			3.48		6.68

Certified By: Marta Manta

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Certificate of Analysis

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SAMPLING SITE:

ATTENTION TO: Laura Jenkins
SAMPLED BY:

Standard Water Analysis + Total Metals

DATE RECEIVED: 2020-09-16

DATE REPORTED: 2020-09-28

			SAMPLE DESCRIPTION:	10		11
			SAMPLE TYPE:	Water		Water
			DATE SAMPLED:	2020-09-16 14:30		2020-09-16 15:00
Parameter	Unit	G / S	RDL	1451305	RDL	1451306
Cation sum	me/L			3.06		6.58
% Difference/ Ion Balance	%			6.4		0.7
Total Aluminum	ug/L		5	39	5	11
Total Antimony	ug/L		2	<2	2	<2
Total Arsenic	ug/L		2	<2	2	<2
Total Barium	ug/L		5	49	5	196
Total Beryllium	ug/L		2	<2	2	<2
Total Bismuth	ug/L		2	<2	2	<2
Total Boron	ug/L		5	9	5	64
Total Cadmium	ug/L		0.017	<0.017	0.017	<0.017
Total Chromium	ug/L		1	<1	1	<1
Total Cobalt	ug/L		1	<1	1	<1
Total Copper	ug/L		1	19	1	63
Total Iron	ug/L		50	147	50	233
Total Lead	ug/L		0.5	0.7	0.5	1.3
Total Manganese	ug/L		2	243	2	117
Total Molybdenum	ug/L		2	<2	2	<2
Total Nickel	ug/L		2	10	2	4
Total Phosphorus	mg/L		0.1	<0.1	0.1	<0.1
Total Selenium	ug/L		1	<1	1	1
Total Silver	ug/L		0.1	<0.1	0.1	<0.1
Total Strontium	ug/L		5	175	5	200
Total Thallium	ug/L		0.1	<0.1	0.1	<0.1
Total Tin	ug/L		2	<2	2	<2
Total Titanium	ug/L		2	<2	2	<2
Total Uranium	ug/L		0.1	0.4	0.1	1.1
Total Vanadium	ug/L		2	<2	2	<2
Total Zinc	ug/L		5	18	5	71

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ATTENTION TO: Laura Jenkins

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis + Total Metals

DATE RECEIVED: 2020-09-16

DATE REPORTED: 2020-09-28

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

1451296-1451306 % Difference / Ion Balance, Hardness, Langelier Index, Nitrate + Nitrite, Hydroxide and Saturation pH are calculated parameters. The calculated parameters are non-accredited. The component parameters of the calculations are accredited.

Analysis performed at AGAT Halifax (unless marked by *)

Certified By: Marta Manta

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Quality Assurance

CLIENT NAME: CBCL LTD
PROJECT: 171046.00
SAMPLING SITE:

AGAT WORK ORDER: 20X651411
ATTENTION TO: Laura Jenkins
SAMPLED BY:

Water Analysis

RPT Date: Sep 28, 2020			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Standard Water Analysis + Total Metals															
pH	1465759		7.75	7.75	0.0%	<	100%	80%	120%	NA			NA		
Reactive Silica as SiO2	1451296	1451296	8.4	8.3	1.1%	< 0.5	99%	80%	120%	97%	80%	120%	92%	80%	120%
Chloride	1451296	1451296	4	4	NA	< 1	92%	80%	120%	NA	80%	120%	93%	70%	130%
Fluoride	1451296	1451296	0.12	<0.12	NA	< 0.12	104%	80%	120%	NA	80%	120%	90%	70%	130%
Sulphate	1451296	1451296	(274)	(281)	2.7%	< 2	109%	80%	120%	NA	80%	120%	NA	70%	130%
Alkalinity	1465759		169	169	0.2%	< 5	91%	80%	120%	NA			NA		
True Color	1451500		8	7	NA	< 5	95%	80%	120%	NA			NA		
Turbidity	1451304	1451304	27.6	27.8	0.7%	< 0.5	91%	80%	120%	NA			NA		
Electrical Conductivity	1465759		2220	2200	0.9%	< 1	105%	90%	110%	NA			NA		
Nitrate as N	1451296	1451296	<0.05	<0.05	NA	< 0.05	97%	80%	120%	NA	80%	120%	85%	70%	130%
Nitrite as N	1451296	1451296	<0.05	<0.05	NA	< 0.05	83%	80%	120%	NA	80%	120%	106%	70%	130%
Ammonia as N	1451493		9.20	9.12	1.0%	< 0.03	102%	80%	120%	101%	80%	120%	NA	70%	130%
Total Organic Carbon	1453931		4.8	4.8	0.4%	< 0.5	100%	80%	120%	NA	80%	120%	99%	80%	120%
Ortho-Phosphate as P	1451296	1451296	<0.01	<0.01	NA	< 0.01	92%	80%	120%	105%	80%	120%	96%	80%	120%
Total Sodium	1453489		113	100	12.5%	< 0.1	104%	80%	120%	109%	80%	120%	NA	70%	130%
Total Potassium	1453489		<0.1	<0.1	NA	< 0.1	109%	80%	120%	114%	80%	120%	95%	70%	130%
Total Calcium	1453489		0.4	0.5	NA	< 0.1	99%	80%	120%	105%	80%	120%	88%	70%	130%
Total Magnesium	1453489		<0.1	<0.1	NA	< 0.1	107%	80%	120%	111%	80%	120%	89%	70%	130%
Bicarb. Alkalinity (as CaCO3)	1465759		169	169	0.2%	< 5	NA	80%	120%	NA			NA		
Carb. Alkalinity (as CaCO3)	1465759		<10	<10	NA	< 10	NA	80%	120%	NA			NA		
Hydroxide	1465759		<5	<5	NA	< 5	NA	80%	120%	NA			NA		
Total Aluminum	1453489		7	8	NA	< 5	105%	80%	120%	106%	80%	120%	95%	70%	130%
Total Antimony	1453489		<2	<2	NA	< 2	84%	80%	120%	96%	80%	120%	103%	70%	130%
Total Arsenic	1453489		7	7	NA	< 2	81%	80%	120%	89%	80%	120%	NA	70%	130%
Total Barium	1453489		<5	<5	NA	< 5	85%	80%	120%	93%	80%	120%	102%	70%	130%
Total Beryllium	1453489		<2	<2	NA	< 2	92%	80%	120%	90%	80%	120%	108%	70%	130%
Total Bismuth	1453489		<2	<2	NA	< 2	86%	80%	120%	93%	80%	120%	92%	70%	130%
Total Boron	1453489		19	20	NA	< 5	90%	80%	120%	100%	80%	120%	114%	70%	130%
Total Cadmium	1453489		<0.017	<0.017	NA	< 0.017	82%	80%	120%	88%	80%	120%	95%	70%	130%
Total Chromium	1453489		<1	<1	NA	< 1	87%	80%	120%	88%	80%	120%	114%	70%	130%
Total Cobalt	1453489		<1	<1	NA	< 1	87%	80%	120%	91%	80%	120%	112%	70%	130%
Total Copper	1453489		5	5	3.4%	< 1	87%	80%	120%	92%	80%	120%	106%	70%	130%
Total Iron	1453489		56	75	NA	< 50	88%	80%	120%	89%	80%	120%	113%	70%	130%
Total Lead	1453489		<0.5	<0.5	NA	< 0.5	81%	80%	120%	92%	80%	120%	92%	70%	130%
Total Manganese	1453489		11	12	7.1%	< 2	87%	80%	120%	89%	80%	120%	NA	70%	130%
Total Molybdenum	1453489		<2	<2	NA	< 2	82%	80%	120%	85%	80%	120%	110%	70%	130%
Total Nickel	1453489		<2	<2	NA	< 2	90%	80%	120%	90%	80%	120%	105%	70%	130%
Total Phosphorus	1451304	1451304	<0.1	<0.1	NA	< 0.1	96%	80%	120%	94%	80%	120%	100%	70%	130%
Total Selenium	1453489		<1	<1	NA	< 1	83%	80%	120%	115%	80%	120%	92%	70%	130%

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Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
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AGAT Laboratories

Quality Assurance

CLIENT NAME: CBCL LTD
PROJECT: 171046.00
SAMPLING SITE:

AGAT WORK ORDER: 20X651411
ATTENTION TO: Laura Jenkins
SAMPLED BY:

Water Analysis (Continued)

RPT Date: Sep 28, 2020			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits Lower	Acceptable Limits Upper	Recovery	Acceptable Limits Lower	Acceptable Limits Upper	Recovery	Acceptable Limits Lower	Acceptable Limits Upper
Total Silver	1453489		<0.1	<0.1	NA	< 0.1	87%	80%	120%	92%	80%	120%	96%	70%	130%
Total Strontium	1453489		<5	<5	NA	< 5	86%	80%	120%	89%	80%	120%	109%	70%	130%
Total Thallium	1453489		<0.1	<0.1	NA	< 0.1	84%	80%	120%	93%	80%	120%	94%	70%	130%
Total Tin	1453489		<2	<2	NA	< 2	82%	80%	120%	86%	80%	120%	118%	70%	130%
Total Titanium	1453489		<2	<2	NA	< 2	99%	80%	120%	99%	80%	120%	92%	70%	130%
Total Uranium	1453489		<0.1	<0.1	NA	< 0.1	84%	80%	120%	92%	80%	120%	106%	70%	130%
Total Vanadium	1453489		3	3	NA	< 2	84%	80%	120%	86%	80%	120%	120%	70%	130%
Total Zinc	1453489		39	40	3.9%	< 5	88%	80%	120%	90%	80%	120%	104%	70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Standard Water Analysis + Total Metals

Ammonia as N	1451298	1451298	0.97	0.96	0.8%	< 0.03	101%	80%	120%	99%	80%	120%	94%	70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Certified By: Marta Manta

11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
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Method Summary

CLIENT NAME: CBCL LTD

PROJECT: 171046.00

SAMPLING SITE:

AGAT WORK ORDER: 20X651411

ATTENTION TO: Laura Jenkins

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Microbiology Analysis			
Total Coliforms (P/A)	MIC-121-7000	SM 9221 D	Incubator/UV light
Escherichia coli (P/A)	MIC-121-7000	SM 9221 D	Incubator/UV Light

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11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
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Method Summary

CLIENT NAME: CBCL LTD
PROJECT: 171046.00
SAMPLING SITE:
AGAT WORK ORDER: 20X651411
ATTENTION TO: Laura Jenkins
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
pH	INOR-121-6001	SM 4500 H+B	PC TITRATE
Reactive Silica as SiO2	INOR-121-6027	SM 4500-SiO2 F	COLORIMETER
Chloride	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Fluoride	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Alkalinity	INOR-121-6001	SM 2320 B	
True Color	INOR-121-6014	SM 2120 C	NEPHELOMETER
Turbidity	INOR-121-6022	SM 2130 B	NEPHELOMETER
Electrical Conductivity	INOR-121-6001	SM 2510 B	PC TITRATE
Nitrate + Nitrite as N	INORG-121-6005	SM 4110 B	CALCULATION
Nitrate as N	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-121-6047	SM 4500-NH3 H	COLORIMETER
Total Organic Carbon	INOR-121-6026	SM 5310 B	TOC ANALYZER
Ortho-Phosphate as P	INOR-121-6012	SM 4500-P G	COLORIMETER
Total Sodium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Potassium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Calcium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Magnesium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Bicarb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC TITRATE
Carb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC TITRATE
Hydroxide	INORG-121-6001	SM 2320 B	PC-TITRATE
Calculated TDS	CALCULATION	SM 1030E	CALCULATION
Hardness	CALCULATION	SM 2340B	CALCULATION
Langelier Index (@20C)	CALCULATION	CALCULATION	CALCULATION
Langelier Index (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 20C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Anion Sum	CALCULATION	SM 1030E	CALCULATION
Cation sum	CALCULATION	SM 1030E	CALCULATION
% Difference/ Ion Balance	CALCULATION	SM 1030E	CALCULATION
Total Aluminum	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Antimony	MET121-6104 & MET-121-6105	SM 3125	ICP-MS
Total Arsenic	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Barium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Beryllium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Bismuth	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Boron	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Cadmium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS

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11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
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FAX (902)468-8924
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Method Summary

CLIENT NAME: CBCL LTD
PROJECT: 171046.00
SAMPLING SITE:

AGAT WORK ORDER: 20X651411
ATTENTION TO: Laura Jenkins
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Chromium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Cobalt	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Copper	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Iron	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Lead	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Manganese	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Molybdenum	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Nickel	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Phosphorus	MET-121-6104 and MET-121-6113	SM 3120B	ICP/OES
Total Selenium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Silver	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Strontium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Thallium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Tin	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Titanium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Uranium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Vanadium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Zinc	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS

11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
http://www.agatlabs.com

CLIENT NAME:	CBCL LTD 1505 BARRINGTON STREET, SUITE 901 HALIFAX, NS B3J 2R7 (902) 421-7241
ATTENTION TO:	Laura Jenkins
PROJECT:	171046.00
AGAT WORK ORDER:	20X677400
MICROBIOLOGY ANALYSIS REVIEWED BY:	Marta Manka, Data Reporter
WATER ANALYSIS REVIEWED BY:	Marta Manka, Data Reporter
DATE REPORTED:	Nov 25, 2020
PAGES (INCLUDING COVER):	12
VERSION*:	1

Should you require any information regarding this analysis please contact your client services representative at (902) 468-8718

*Notes

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days following analysis, unless expressly agreed otherwise in writing. Please contact your Client Project Manager if you require additional sample storage time.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
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- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.

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11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
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Certificate of Analysis

AGAT WORK ORDER: 20X677400
PROJECT: 171046.00

CLIENT NAME: CBCL LTD

ATTENTION TO: Laura Jenkins

SAMPLING SITE:

SAMPLED BY:

Total Coliforms and E.coli - Presence/Absence

DATE RECEIVED: 2020-11-13

DATE REPORTED: 2020-11-25

			SAMPLE DESCRIPTION:	S1	S2	S3	S4	S5
			SAMPLE TYPE:	Water	Water	Water	Water	Water
			DATE SAMPLED:	2020-11-13 07:50	2020-11-13 07:50	2020-11-13 07:50	2020-11-13 07:50	2020-11-13 07:50
Parameter	Unit	G / S	RDL	1684440	1684446	1684447	1684449	1684451
Total Coliforms (P/A)	(P/A)			PRESENT	PRESENT	PRESENT	PRESENT	PRESENT
Escherichia coli (P/A)	(P/A)			ABSENT	PRESENT	PRESENT	ABSENT	ABSENT

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Halifax (unless marked by *)

Certified By: Marta Manka

Certificate of Analysis

AGAT WORK ORDER: 20X677400
PROJECT: 171046.00

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11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
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CLIENT NAME: CBCL LTD
ATTENTION TO: Laura Jenkins
SAMPLING SITE:
SAMPLED BY:

Standard Water Analysis + Total Metals

DATE RECEIVED: 2020-11-13
DATE REPORTED: 2020-11-25

Parameter	Unit	G / S	RDL	S1	S2	S3	S4	RDL	S5
			SAMPLE DESCRIPTION:	S1	S2	S3	S4		S5
			SAMPLE TYPE:	Water	Water	Water	Water		Water
			DATE SAMPLED:	2020-11-13 07:50	2020-11-13 07:50	2020-11-13 07:50	2020-11-13 07:50		2020-11-13 07:50
				1684440	1684446	1684447	1684449		1684451
pH				7.09	7.92	7.57	7.76		7.34
Reactive Silica as SiO2	mg/L		0.5	5.2	13.7	9.4	8.5	0.5	14.2
Chloride	mg/L		1	3	23	12	8	1	23
Fluoride	mg/L		0.12	<0.12	0.30	<0.12	0.25	0.12	<0.12
Sulphate	mg/L		2	8	24	21	29	10	251
Alkalinity	mg/L		5	42	225	91	227	5	138
True Color	TCU		5.00	101	<5.00	<5.00	5.05	5.00	<5.00
Turbidity	NTU		0.5	1.0	0.9	0.6	1.2	0.5	1.2
Electrical Conductivity	umho/cm		1	117	563	298	535	1	817
Nitrate + Nitrite as N	mg/L		0.05	<0.05	0.33	1.78	0.30	0.05	0.96
Nitrate as N	mg/L		0.05	<0.05	0.33	1.78	0.30	0.05	0.91
Nitrite as N	mg/L		0.05	<0.05	<0.05	<0.05	<0.05	0.05	0.05
Ammonia as N	mg/L		0.03	<0.03	<0.03	<0.03	<0.03	0.03	<0.03
Total Organic Carbon	mg/L		0.5	2.1	1.8	2.9	4.5	0.5	2.0
Ortho-Phosphate as P	mg/L		0.01	0.02	0.02	0.11	0.03	0.01	0.02
Total Sodium	mg/L		0.1	4.3	40.2	17.6	8.0	0.1	19.6
Total Potassium	mg/L		0.1	1.0	1.1	2.6	1.3	0.1	1.5
Total Calcium	mg/L		0.1	15.4	65.3	41.2	95.8	0.1	159
Total Magnesium	mg/L		0.1	1.9	13.4	3.6	9.4	0.1	16.8
Bicarb. Alkalinity (as CaCO3)	mg/L		5	42	225	91	227	5	138
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	<10	<10	<10	10	<10
Hydroxide	mg/L		5	<5	<5	<5	<5	5	<5
Calculated TDS	mg/L		1	59	304	161	289	1	558
Hardness	mg/L			46.3	218	118	278		466
Langelier Index (@20C)	NA			-1.66	0.45	-0.46	0.46		0.02
Langelier Index (@ 4C)	NA			-1.98	0.13	-0.78	0.14		-0.30
Saturation pH (@ 20C)	NA			8.75	7.47	8.03	7.30		7.32
Saturation pH (@ 4C)	NA			9.07	7.79	8.35	7.62		7.64
Anion Sum	me/L			1.09	5.67	2.72	5.39		8.70

Certified By: Marta Manta

Certificate of Analysis

AGAT WORK ORDER: 20X677400

PROJECT: 171046.00

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11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
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CLIENT NAME: CBCL LTD

ATTENTION TO: Laura Jenkins

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis + Total Metals

DATE RECEIVED: 2020-11-13

DATE REPORTED: 2020-11-25

			SAMPLE DESCRIPTION:	S1	S2	S3	S4		S5
			SAMPLE TYPE:	Water	Water	Water	Water		Water
			DATE SAMPLED:	2020-11-13 07:50	2020-11-13 07:50	2020-11-13 07:50	2020-11-13 07:50		2020-11-13 07:50
Parameter	Unit	G / S	RDL	1684440	1684446	1684447	1684449	RDL	1684451
Cation sum	me/L			1.16	6.15	3.19	5.95		10.2
% Difference/ Ion Balance	%			3.0	4.0	8.0	5.0		8.1
Total Aluminum	ug/L		5	13	25	18	29	5	46
Total Antimony	ug/L		2	<2	<2	<2	<2	2	<2
Total Arsenic	ug/L		2	<2	<2	<2	<2	2	<2
Total Barium	ug/L		5	35	54	65	87	5	77
Total Beryllium	ug/L		2	<2	<2	<2	<2	2	<2
Total Bismuth	ug/L		2	<2	<2	<2	<2	2	<2
Total Boron	ug/L		5	10	176	29	49	5	57
Total Cadmium	ug/L		0.017	<0.017	<0.017	<0.017	<0.017	0.017	0.074
Total Chromium	ug/L		1	<1	<1	<1	<1	1	<1
Total Cobalt	ug/L		1	<1	<1	<1	<1	1	<1
Total Copper	ug/L		1	99	10	25	139	1	21
Total Iron	ug/L		50	314	86	91	110	50	228
Total Lead	ug/L		0.5	7.9	<0.5	1.2	0.8	0.5	8.1
Total Manganese	ug/L		2	13	3	<2	10	2	6
Total Molybdenum	ug/L		2	<2	<2	<2	<2	2	<2
Total Nickel	ug/L		2	3	3	<2	4	2	6
Total Phosphorous	mg/L		0.02	0.03	<0.02	0.14	0.04	0.02	0.07
Total Selenium	ug/L		1	<1	<1	<1	<1	1	1
Total Silver	ug/L		0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1
Total Strontium	ug/L		5	37	352	187	535	5	435
Total Thallium	ug/L		0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1
Total Tin	ug/L		2	<2	<2	<2	<2	2	<2
Total Titanium	ug/L		2	<2	<2	<2	<2	2	3
Total Uranium	ug/L		0.1	<0.1	1.2	<0.1	1.8	0.1	0.7
Total Vanadium	ug/L		2	<2	<2	<2	<2	2	<2
Total Zinc	ug/L		5	145	6	27	33	5	106

Certified By: Marta Manta

11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
http://www.agatlabs.com

CLIENT NAME: CBCL LTD

ATTENTION TO: Laura Jenkins

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis + Total Metals

DATE RECEIVED: 2020-11-13

DATE REPORTED: 2020-11-25

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

1684440-1684451 % Difference / Ion Balance, Hardness, Langelier Index, Nitrate + Nitrite, Hydroxide and Saturation pH are calculated parameters. The calculated parameters are non-accredited. The component parameters of the calculations are accredited.

Analysis performed at AGAT Halifax (unless marked by *)

Certified By: Marta Manta

AGAT Laboratories

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Quality Assurance

CLIENT NAME: CBCL LTD
PROJECT: 171046.00
SAMPLING SITE:

AGAT WORK ORDER: 20X677400
ATTENTION TO: Laura Jenkins
SAMPLED BY:

Water Analysis

RPT Date: Nov 25, 2020			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits Lower	Acceptable Limits Upper	Recovery	Acceptable Limits Lower	Acceptable Limits Upper	Recovery	Acceptable Limits Lower	Acceptable Limits Upper
Standard Water Analysis + Total Metals															
pH	1692735		6.07	6.10	0.5%	<	100%	80%	120%	NA			NA		
Reactive Silica as SiO2	1692723		8.2	8.0	2.3%	< 0.5	100%	80%	120%	94%	80%	120%	99%	80%	120%
Chloride	1692640		8	7	2.3%	< 1	88%	80%	120%	NA	80%	120%	91%	70%	130%
Fluoride	1692640		0.19	0.19	NA	< 0.12	100%	80%	120%	NA	80%	120%	94%	70%	130%
Sulphate	1692640		10	10	NA	< 2	103%	80%	120%	NA	80%	120%	91%	70%	130%
Alkalinity	1692735		6	8	NA	< 5	91%	80%	120%	NA			NA		
True Color	1701066		<5.00	<5.00	NA	< 5	99%	80%	120%	82%	80%	120%	NA		
Turbidity	1701066		<0.5	<0.5	NA	< 0.5	93%	80%	120%	NA			NA		
Electrical Conductivity	1692735		34	34	1.2%	< 1	103%	90%	110%	NA			NA		
Nitrate as N	1692640		0.07	<0.05	NA	< 0.05	90%	80%	120%	NA	80%	120%	84%	70%	130%
Nitrite as N	1692640		<0.05	<0.05	NA	< 0.05	86%	80%	120%	NA	80%	120%	104%	70%	130%
Ammonia as N	1684440	1684440	<0.03	<0.03	NA	< 0.03	NA	80%	120%	NA	80%	120%	90%	70%	130%
Total Organic Carbon	1685843		12.0	12.2	1.7%	1.1	105%	80%	120%	NA	80%	120%	114%	80%	120%
Ortho-Phosphate as P	1692723		0.01	0.01	NA	< 0.01	92%	80%	120%	97%	80%	120%	93%	80%	120%
Total Sodium	1684616		3.3	3.7	9.5%	< 0.1	92%	80%	120%	92%	80%	120%	NA	70%	130%
Total Potassium	1684616		3.0	3.3	10.9%	< 0.1	117%	80%	120%	115%	80%	120%	NA	70%	130%
Total Calcium	1684616		0.5	0.5	NA	< 0.1	108%	80%	120%	108%	80%	120%	130%	70%	130%
Total Magnesium	1684616		<0.1	<0.1	NA	< 0.1	117%	80%	120%	115%	80%	120%	112%	70%	130%
Bicarb. Alkalinity (as CaCO3)	1692735		6	8	NA	< 5	NA	80%	120%	NA			NA		
Carb. Alkalinity (as CaCO3)	1692735		<10	<10	NA	< 10	NA	80%	120%	NA			NA		
Hydroxide	1692735		<5	<5	NA	< 5	NA	80%	120%	NA			NA		
Total Aluminum	1684616		402	443	9.7%	< 5	118%	80%	120%	120%	80%	120%	NA	70%	130%
Total Antimony	1684616		<2	<2	NA	< 2	101%	80%	120%	113%	80%	120%	113%	70%	130%
Total Arsenic	1684616		<2	<2	NA	< 2	115%	80%	120%	109%	80%	120%	114%	70%	130%
Total Barium	1684616		<5	<5	NA	< 5	113%	80%	120%	100%	80%	120%	126%	70%	130%
Total Beryllium	1684616		<2	<2	NA	< 2	121%	80%	120%	104%	80%	120%	115%	70%	130%
Total Bismuth	1684616		<2	<2	NA	< 2	125%	80%	120%	109%	80%	120%	117%	70%	130%
Total Boron	1684616		6	6	NA	< 5	119%	80%	120%	104%	80%	120%	121%	70%	130%
Total Cadmium	1684616		<0.017	<0.017	NA	< 0.017	107%	80%	120%	101%	80%	120%	111%	70%	130%
Total Chromium	1684616		<1	<1	NA	< 1	116%	80%	120%	107%	80%	120%	122%	70%	130%
Total Cobalt	1684616		<1	<1	NA	< 1	116%	80%	120%	105%	80%	120%	129%	70%	130%
Total Copper	1684616		<1	<1	NA	< 1	112%	80%	120%	106%	80%	120%	121%	70%	130%
Total Iron	1684616		144	161	NA	< 50	120%	80%	120%	109%	80%	120%	125%	70%	130%
Total Lead	1684616		<0.5	<0.5	NA	< 0.5	109%	80%	120%	97%	80%	120%	118%	70%	130%
Total Manganese	1684616		20	21	4.0%	< 2	114%	80%	120%	103%	80%	120%	NA	70%	130%
Total Molybdenum	1684616		<2	<2	NA	< 2	110%	80%	120%	103%	80%	120%	81%	70%	130%
Total Nickel	1684616		2	<2	NA	< 2	115%	80%	120%	102%	80%	120%	113%	70%	130%
Total Phosphorous	1684616		<0.02	0.03	NA	< 0.02	139%	80%	120%	120%	80%	120%	118%	70%	130%
Total Selenium	1684616		<1	<1	NA	< 1	115%	80%	120%	108%	80%	120%	99%	70%	130%

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Quality Assurance

CLIENT NAME: CBCL LTD
PROJECT: 171046.00
SAMPLING SITE:

AGAT WORK ORDER: 20X677400
ATTENTION TO: Laura Jenkins
SAMPLED BY:

Water Analysis (Continued)

RPT Date: Nov 25, 2020			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits Lower	Acceptable Limits Upper	Recovery	Acceptable Limits Lower	Acceptable Limits Upper	Recovery	Acceptable Limits Lower	Acceptable Limits Upper
Total Silver	1684616		<0.1	<0.1	NA	< 0.1	107%	80%	120%	101%	80%	120%	129%	70%	130%
Total Strontium	1684616		<5	<5	NA	< 5	113%	80%	120%	106%	80%	120%	119%	70%	130%
Total Thallium	1684616		<0.1	<0.1	NA	< 0.1	111%	80%	120%	96%	80%	120%	118%	70%	130%
Total Tin	1684616		<2	<2	NA	< 2	107%	80%	120%	107%	80%	120%	115%	70%	130%
Total Titanium	1684616		<2	<2	NA	< 2	113%	80%	120%	112%	80%	120%	112%	70%	130%
Total Uranium	1684616		<0.1	<0.1	NA	< 0.1	119%	80%	120%	101%	80%	120%	115%	70%	130%
Total Vanadium	1684616		<2	<2	NA	< 2	111%	80%	120%	103%	80%	120%	127%	70%	130%
Total Zinc	1684616		<5	<5	NA	< 5	110%	80%	120%	103%	80%	120%	114%	70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.
Reference Material: Less than 10% of elements not within acceptance limits.

Standard Water Analysis + Total Metals															
pH	1684368		7.18	7.21	0.4%	<	100%	80%	120%	NA			NA		
Alkalinity	1684368		52	51	1.2%	< 5	91%	80%	120%	NA			NA		
Electrical Conductivity	1684368		883	884	0.1%	< 1	102%	90%	110%	NA			NA		
Bicarb. Alkalinity (as CaCO3)	1684368		52	51	1.2%	< 5	NA	80%	120%	NA			NA		
Carb. Alkalinity (as CaCO3)	1684368		<10	<10	NA	< 10	NA	80%	120%	NA			NA		
Hydroxide	1684368		<5	<5	NA	< 5	NA	80%	120%	NA			NA		

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Certified By: Marta Manka

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CANADA B3B 1M2
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QA Violation

CLIENT NAME: CBCL LTD

AGAT WORK ORDER: 20X677400

PROJECT: 171046.00

ATTENTION TO: Laura Jenkins

RPT Date: Nov 25, 2020			REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Sample Id	Sample Description	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
				Lower	Upper		Lower	Upper		Lower	Upper
Standard Water Analysis + Total Metals											
Total Beryllium		S1	121%	80%	120%	104%	80%	120%	115%	70%	130%
Total Bismuth		S1	125%	80%	120%	109%	80%	120%	117%	70%	130%
Total Phosphorous		S1	139%	80%	120%	120%	80%	120%	118%	70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.
Reference Material: Less than 10% of elements not within acceptance limits.

AGAT Laboratories

11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
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Method Summary

CLIENT NAME: CBCL LTD
PROJECT: 171046.00
SAMPLING SITE:

AGAT WORK ORDER: 20X677400
ATTENTION TO: Laura Jenkins
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Microbiology Analysis			
Total Coliforms (P/A)	MIC-121-7000	SM 9221 D	Incubator/UV light
Escherichia coli (P/A)	MIC-121-7000	SM 9221 D	Incubator/UV Light

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Method Summary

CLIENT NAME: CBCL LTD | AGAT WORK ORDER: 20X677400
PROJECT: 171046.00 | ATTENTION TO: Laura Jenkins
SAMPLING SITE: | SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
pH	INOR-121-6001	SM 4500 H+B	PC TITRATE
Reactive Silica as SiO2	INOR-121-6027	SM 4500-SiO2 F	COLORIMETER
Chloride	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Fluoride	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Alkalinity	INOR-121-6001	SM 2320 B	
True Color	INOR-121-6008	SM 2120 B	LACHAT FIA
Turbidity	INOR-121-6022	SM 2130 B	NEPHELOMETER
Electrical Conductivity	INOR-121-6001	SM 2510 B	PC TITRATE
Nitrate + Nitrite as N	INORG-121-6005	SM 4110 B	CALCULATION
Nitrate as N	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-121-6047	SM 4500-NH3 H	COLORIMETER
Total Organic Carbon	INOR-121-6026	SM 5310 B	TOC ANALYZER
Ortho-Phosphate as P	INOR-121-6012	SM 4500-P G	COLORIMETER
Total Sodium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Potassium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Calcium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Magnesium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Bicarb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC TITRATE
Carb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC TITRATE
Hydroxide	INORG-121-6001	SM 2320 B	PC-TITRATE
Calculated TDS	CALCULATION	SM 1030E	CALCULATION
Hardness	CALCULATION	SM 2340B	CALCULATION
Langelier Index (@20C)	CALCULATION	CALCULATION	CALCULATION
Langelier Index (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 20C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Anion Sum	CALCULATION	SM 1030E	CALCULATION
Cation sum	CALCULATION	SM 1030E	CALCULATION
% Difference/ Ion Balance	CALCULATION	SM 1030E	CALCULATION
Total Aluminum	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Antimony	MET121-6104 & MET-121-6105	SM 3125	ICP-MS
Total Arsenic	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Barium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Beryllium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Bismuth	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Boron	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Cadmium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS

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Method Summary

CLIENT NAME: CBCL LTD
PROJECT: 171046.00
SAMPLING SITE:

AGAT WORK ORDER: 20X677400
ATTENTION TO: Laura Jenkins
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Chromium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Cobalt	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Copper	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Iron	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Lead	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Manganese	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Molybdenum	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Nickel	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Phosphorous	MET-121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Selenium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Silver	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Strontium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Thallium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Tin	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Titanium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Uranium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Vanadium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Zinc	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS

BUREAU VERITAS

Your Project #: 171046.00
Site Location: AVON
Your C.O.C. #: 791748-02-01, 791748-01-01

Attention: Laura Jenkins

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2020/09/18
Report #: R6336716
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0N6259
Received: 2020/09/11, 08:39

Sample Matrix: Water
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbonate, Bicarbonate and Hydroxide	10	N/A	2020/09/16	N/A	SM 23 4500-CO2 D
Carbonate, Bicarbonate and Hydroxide	2	N/A	2020/09/17	N/A	SM 23 4500-CO2 D
Alkalinity	4	N/A	2020/09/17	ATL SOP 00013	EPA 310.2 R1974 m
Alkalinity	8	N/A	2020/09/18	ATL SOP 00013	EPA 310.2 R1974 m
Chloride	1	N/A	2020/09/16	ATL SOP 00014	SM 23 4500-Cl- E m
Chloride	1	N/A	2020/09/17	ATL SOP 00014	SM 23 4500-Cl- E m
Chloride	10	N/A	2020/09/18	ATL SOP 00014	SM 23 4500-Cl- E m
Colour	1	N/A	2020/09/17	ATL SOP 00020	SM 23 2120C m
Colour	11	N/A	2020/09/18	ATL SOP 00020	SM 23 2120C m
Conductance - water	10	N/A	2020/09/16	ATL SOP 00004	SM 23 2510B m
Conductance - water	2	N/A	2020/09/17	ATL SOP 00004	SM 23 2510B m
Hardness (calculated as CaCO3)	7	N/A	2020/09/16	ATL SOP 00048	Auto Calc
Hardness (calculated as CaCO3)	5	N/A	2020/09/17	ATL SOP 00048	Auto Calc
Metals Water Diss. MS (1)	2	N/A	2020/09/15	ATL SOP 00058	EPA 6020B R2 m
Metals Water Diss. MS (1)	4	N/A	2020/09/16	ATL SOP 00058	EPA 6020B R2 m
Metals Water Diss. MS (as rec'd)	5	N/A	2020/09/15	ATL SOP 00058	EPA 6020B R2 m
Metals Water Diss. MS (as rec'd)	1	N/A	2020/09/16	ATL SOP 00058	EPA 6020B R2 m
Ion Balance (% Difference)	12	N/A	2020/09/18	N/A	Auto Calc.
Anion and Cation Sum	4	N/A	2020/09/17	N/A	Auto Calc.
Anion and Cation Sum	8	N/A	2020/09/18	N/A	Auto Calc.
Nitrogen Ammonia - water	2	N/A	2020/09/16	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen Ammonia - water	2	N/A	2020/09/17	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen Ammonia - water	8	N/A	2020/09/18	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	1	N/A	2020/09/16	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrate + Nitrite	11	N/A	2020/09/17	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	1	N/A	2020/09/16	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrite	11	N/A	2020/09/17	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	1	N/A	2020/09/17	ATL SOP 00018	ASTM D3867-16
Nitrogen - Nitrate (as N)	11	N/A	2020/09/18	ATL SOP 00018	ASTM D3867-16
pH (2)	10	N/A	2020/09/16	ATL SOP 00003	SM 23 4500-H+ B m

Your Project #: 171046.00
Site Location: AVON
Your C.O.C. #: 791748-02-01, 791748-01-01

Attention: Laura Jenkins

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2020/09/18
Report #: R6336716
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0N6259
Received: 2020/09/11, 08:39

Sample Matrix: Water
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
pH (2)	2	N/A	2020/09/17	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	1	N/A	2020/09/16	ATL SOP 00021	SM 23 4500-P E m
Phosphorus - ortho	11	N/A	2020/09/18	ATL SOP 00021	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C)	12	N/A	2020/09/18	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	12	N/A	2020/09/18	ATL SOP 00049	Auto Calc.
Reactive Silica	1	N/A	2020/09/16	ATL SOP 00022	EPA 366.0 m
Reactive Silica	11	N/A	2020/09/17	ATL SOP 00022	EPA 366.0 m
Sulphate	1	N/A	2020/09/16	ATL SOP 00023	ASTM D516-16 m
Sulphate	7	N/A	2020/09/17	ATL SOP 00023	ASTM D516-16 m
Sulphate	4	N/A	2020/09/18	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc)	12	N/A	2020/09/18	N/A	Auto Calc.
Organic carbon - Total (TOC) (3)	12	N/A	2020/09/15	ATL SOP 00203	SM 23 5310B m
Turbidity	12	N/A	2020/09/15	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

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Your Project #: 171046.00
Site Location: AVON
Your C.O.C. #: 791748-02-01, 791748-01-01

Attention: Laura Jenkins

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2020/09/18
Report #: R6336716
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0N6259
Received: 2020/09/11, 08:39

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Sample filtered in laboratory prior to analysis for dissolved metals.
(2) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(3) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Keri Mackay, Customer Experience Team Lead
Email: Keri.MACKAY@bvlabs.com
Phone# (902)420-0203 Ext:294
==
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BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: C0N6259
Report Date: 2020/09/18

CBCL Limited
Client Project #: 171046.00
Site Location: AVON
Sampler Initials: LLJ

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		NPL665			NPL667			NPL667		
Sampling Date		2020/09/10 14:00			2020/09/10 13:30			2020/09/10 13:30		
COC Number		791748-01-01			791748-01-01			791748-01-01		
	UNITS	**MW1**	**RDL**	**QC Batch**	**MW3**	**RDL**	**QC Batch**	**MW3 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L	150	N/A	6940580	78.9	N/A	6940580			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	670	1.0	6940636	140	1.0	6940636			
Calculated TDS	mg/L	8500	1.0	6940585	4900	1.0	6940585			
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.9	1.0	6940636	<1.0	1.0	6940636			
Cation Sum	me/L	146	N/A	6940580	79.9	N/A	6940580			
Hardness (CaCO3)	mg/L	1700	1.0	6940578	2200	1.0	6940578			
Ion Balance (% Difference)	%	1.27	N/A	6940579	0.620	N/A	6940579			
Langelier Index (@ 20C)	N/A	0.789		6940638	0.827		6940638			
Langelier Index (@ 4C)	N/A	0.551		6940639	0.588		6940639			
Nitrate (N)	mg/L	<0.050	0.050	6940581	<0.050	0.050	6940581			
Saturation pH (@ 20C)	N/A	6.69		6940638	6.82		6940638			
Saturation pH (@ 4C)	N/A	6.93		6940639	7.06		6940639			
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	670	100	6948834	140	25	6946337	140	25	6946337
Dissolved Chloride (Cl-)	mg/L	4500	100	6948842	1400	20	6946507	1400	20	6946507
Colour	TCU	19	5.0	6948845	<5.0	5.0	6946514	<5.0	5.0	6946514
Nitrate + Nitrite (N)	mg/L	<0.050	0.050	6948849	<0.050	0.050	6946519	<0.050	0.050	6946519
Nitrite (N)	mg/L	<0.010	0.010	6948850	<0.010	0.010	6946522	<0.010	0.010	6946522
Nitrogen (Ammonia Nitrogen)	mg/L	4.0	0.25	6949373	0.32	0.050	6949373			
Total Organic Carbon (C)	mg/L	11 (1)	5.0	6943985	<5.0 (1)	5.0	6943985			
Orthophosphate (P)	mg/L	0.011	0.010	6948847	<0.010	0.010	6946517	<0.010	0.010	6946517
pH	pH	7.48		6946227	7.64		6946227			
Reactive Silica (SiO2)	mg/L	28	1.0	6948844	10	0.50	6946511	10	0.50	6946511
Dissolved Sulphate (SO4)	mg/L	480	10	6948843	1700	100	6946509	1700	100	6946509
Turbidity	NTU	600	1.0	6943760	>1000	1.0	6943760			
Conductivity	uS/cm	15000	1.0	6946226	7100	1.0	6946226			
Metals										
Dissolved Aluminum (Al)	ug/L	<50	50	6943775	<5.0	5.0	6943775			
Dissolved Antimony (Sb)	ug/L	<10	10	6943775	<1.0	1.0	6943775			
Dissolved Arsenic (As)	ug/L	<10	10	6943775	<1.0	1.0	6943775			
Dissolved Barium (Ba)	ug/L	62	10	6943775	28	1.0	6943775			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

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ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		NPL665			NPL667			NPL667		
Sampling Date		2020/09/10 14:00			2020/09/10 13:30			2020/09/10 13:30		
COC Number		791748-01-01			791748-01-01			791748-01-01		
	UNITS	**MW1**	**RDL**	**QC Batch**	**MW3**	**RDL**	**QC Batch**	**MW3 Lab-Dup**	**RDL**	**QC Batch**
Dissolved Beryllium (Be)	ug/L	<10	10	6943775	<1.0	1.0	6943775			
Dissolved Bismuth (Bi)	ug/L	<20	20	6943775	<2.0	2.0	6943775			
Dissolved Boron (B)	ug/L	1300	500	6943775	410	50	6943775			
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	6943775	0.054	0.010	6943775			
Dissolved Calcium (Ca)	ug/L	220000	1000	6943775	680000	100	6943775			
Dissolved Chromium (Cr)	ug/L	<10	10	6943775	<1.0	1.0	6943775			
Dissolved Cobalt (Co)	ug/L	<4.0	4.0	6943775	1.4	0.40	6943775			
Dissolved Copper (Cu)	ug/L	<5.0	5.0	6943775	0.54	0.50	6943775			
Dissolved Iron (Fe)	ug/L	<500	500	6943775	<50	50	6943775			
Dissolved Lead (Pb)	ug/L	<5.0	5.0	6943775	<0.50	0.50	6943775			
Dissolved Magnesium (Mg)	ug/L	290000	1000	6943775	110000	100	6943775			
Dissolved Manganese (Mn)	ug/L	3000	20	6943775	3200	2.0	6943775			
Dissolved Molybdenum (Mo)	ug/L	<20	20	6943775	6.8	2.0	6943775			
Dissolved Nickel (Ni)	ug/L	<20	20	6943775	6.5	2.0	6943775			
Dissolved Phosphorus (P)	ug/L	<1000	1000	6943775	<100	100	6943775			
Dissolved Potassium (K)	ug/L	94000	1000	6943775	13000	100	6943775			
Dissolved Selenium (Se)	ug/L	<5.0	5.0	6943775	<0.50	0.50	6943775			
Dissolved Silver (Ag)	ug/L	<1.0	1.0	6943775	<0.10	0.10	6943775			
Dissolved Sodium (Na)	ug/L	2500000	1000	6943775	840000	100	6943775			
Dissolved Strontium (Sr)	ug/L	3000	20	6943775	8600	20	6943775			
Dissolved Thallium (Tl)	ug/L	<1.0	1.0	6943775	<0.10	0.10	6943775			
Dissolved Tin (Sn)	ug/L	<20	20	6943775	<2.0	2.0	6943775			
Dissolved Titanium (Ti)	ug/L	<20	20	6943775	<2.0	2.0	6943775			
Dissolved Uranium (U)	ug/L	4.8	1.0	6943775	1.3	0.10	6943775			
Dissolved Vanadium (V)	ug/L	<20	20	6943775	<2.0	2.0	6943775			
Dissolved Zinc (Zn)	ug/L	<50	50	6943775	<5.0	5.0	6943775			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

BV Labs Job #: C0N6259
Report Date: 2020/09/18

CBCL Limited
Client Project #: 171046.00
Site Location: AVON
Sampler Initials: LLJ

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		NPL668			NPL669			NPL675		
Sampling Date		2020/09/10 14:55			2020/09/10 16:10			2020/09/10 12:30		
COC Number		791748-01-01			791748-01-01			791748-02-01		
	UNITS	MW4	RDL	QC Batch	MW5	RDL	QC Batch	MW9	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	58.6	N/A	6940580	94.8	N/A	6940684	57.3	N/A	6940684
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	340	1.0	6940636	1700	1.0	6940636	500	1.0	6940636
Calculated TDS	mg/L	3400	1.0	6940585	5300	1.0	6940686	3400	1.0	6940686
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	6940636	18	1.0	6940636	1.8	1.0	6940636
Cation Sum	me/L	59.9	N/A	6940580	97.0	N/A	6940684	59.6	N/A	6940684
Hardness (CaCO3)	mg/L	1500	1.0	6940578	850	1.0	6940682	690	1.0	6940682
Ion Balance (% Difference)	%	1.05	N/A	6940579	1.15	N/A	6940683	1.99	N/A	6940683
Langelier Index (@ 20C)	N/A	0.868		6940638	1.31		6940638	0.448		6940638
Langelier Index (@ 4C)	N/A	0.626		6940639	1.07		6940639	0.207		6940639
Nitrate (N)	mg/L	<0.050	0.050	6940685	<0.050	0.050	6940685	0.071	0.050	6940685
Saturation pH (@ 20C)	N/A	6.57		6940638	6.73		6940638	7.14		6940638
Saturation pH (@ 4C)	N/A	6.82		6940639	6.97		6940639	7.38		6940639
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	340	25	6948834	1700	100	6948834	500	25	6948834
Dissolved Chloride (Cl-)	mg/L	1600	50	6948842	2000	50	6948842	1300	50	6948842
Colour	TCU	<5.0	5.0	6948845	310	100	6948845	36	5.0	6948845
Nitrate + Nitrite (N)	mg/L	<0.050	0.050	6948849	<0.050	0.050	6948849	0.071	0.050	6948849
Nitrite (N)	mg/L	<0.010	0.010	6948850	<0.010	0.010	6948850	<0.010	0.010	6948850
Nitrogen (Ammonia Nitrogen)	mg/L	0.13	0.050	6949373	14	1.0	6949373	2.0	0.050	6946768
Total Organic Carbon (C)	mg/L	<5.0 (1)	5.0	6943985	<50 (1)	50	6943985	17 (1)	5.0	6943985
Orthophosphate (P)	mg/L	<0.010	0.010	6948847	4.7	0.30	6948847	<0.010	0.010	6948847
pH	pH	7.44		6946227	8.04		6946227	7.59		6948674
Reactive Silica (SiO2)	mg/L	15	0.50	6948844	31	1.0	6948844	34	1.0	6948844
Dissolved Sulphate (SO4)	mg/L	320	10	6948843	120	10	6948843	520	20	6948843
Turbidity	NTU	380	1.0	6943760	820	1.0	6943760	640	1.0	6943760
Conductivity	uS/cm	6100	1.0	6946226	8900	1.0	6946226	5800	1.0	6948673
Metals										
Dissolved Aluminum (Al)	ug/L	<5.0	5.0	6943775	20	5.0	6943775	5.4	5.0	6943775
Dissolved Antimony (Sb)	ug/L	<1.0	1.0	6943775	<1.0	1.0	6943775	<1.0	1.0	6943775
Dissolved Arsenic (As)	ug/L	<1.0	1.0	6943775	41	1.0	6943775	1.7	1.0	6943775
Dissolved Barium (Ba)	ug/L	51	1.0	6943775	5.3	1.0	6943775	39	1.0	6943775
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6943775	<1.0	1.0	6943775	<1.0	1.0	6943775

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

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ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		NPL668			NPL669			NPL675		
Sampling Date		2020/09/10 14:55			2020/09/10 16:10			2020/09/10 12:30		
COC Number		791748-01-01			791748-01-01			791748-02-01		
	UNITS	**MW4**	**RDL**	**QC Batch**	**MW5**	**RDL**	**QC Batch**	**MW9**	**RDL**	**QC Batch**
Dissolved Bismuth (Bi)	ug/L	<2.0	2.0	6943775	<2.0	2.0	6943775	<2.0	2.0	6943775
Dissolved Boron (B)	ug/L	200	50	6943775	2800	50	6943775	1200	50	6943775
Dissolved Cadmium (Cd)	ug/L	0.022	0.010	6943775	<0.10 (1)	0.10	6943775	<0.010	0.010	6943775
Dissolved Calcium (Ca)	ug/L	420000	100	6943775	68000	100	6943775	79000	100	6943775
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	6943775	3.8	1.0	6943775	1.1	1.0	6943775
Dissolved Cobalt (Co)	ug/L	5.1	0.40	6943775	3.5	0.40	6943775	<0.40	0.40	6943775
Dissolved Copper (Cu)	ug/L	0.70	0.50	6943775	8.0	0.50	6943775	0.71	0.50	6943775
Dissolved Iron (Fe)	ug/L	<50	50	6943775	320	50	6943775	<50	50	6943775
Dissolved Lead (Pb)	ug/L	<0.50	0.50	6943775	<0.50	0.50	6943775	<0.50	0.50	6943775
Dissolved Magnesium (Mg)	ug/L	110000	100	6943775	170000	1000	6943775	120000	1000	6943775
Dissolved Manganese (Mn)	ug/L	3100	2.0	6943775	1400	2.0	6943775	2000	2.0	6943775
Dissolved Molybdenum (Mo)	ug/L	3.7	2.0	6943775	2.3	2.0	6943775	25	2.0	6943775
Dissolved Nickel (Ni)	ug/L	3.7	2.0	6943775	<2.0	2.0	6943775	<2.0	2.0	6943775
Dissolved Phosphorus (P)	ug/L	<100	100	6943775	5100	100	6943775	<100	100	6943775
Dissolved Potassium (K)	ug/L	4000	100	6943775	76000	100	6943775	62000	100	6943775
Dissolved Selenium (Se)	ug/L	<0.50	0.50	6943775	<0.50	0.50	6943775	<0.50	0.50	6943775
Dissolved Silver (Ag)	ug/L	<0.10	0.10	6943775	<0.10	0.10	6943775	<0.10	0.10	6943775
Dissolved Sodium (Na)	ug/L	680000	100	6943775	1800000	1000	6943775	1000000	100	6943775
Dissolved Strontium (Sr)	ug/L	8900	20	6943775	900	2.0	6943775	710	2.0	6943775
Dissolved Thallium (Tl)	ug/L	<0.10	0.10	6943775	<0.10	0.10	6943775	<0.10	0.10	6943775
Dissolved Tin (Sn)	ug/L	<2.0	2.0	6943775	<2.0	2.0	6943775	<2.0	2.0	6943775
Dissolved Titanium (Ti)	ug/L	<2.0	2.0	6943775	25	2.0	6943775	<2.0	2.0	6943775
Dissolved Uranium (U)	ug/L	6.9	0.10	6943775	0.32	0.10	6943775	2.1	0.10	6943775
Dissolved Vanadium (V)	ug/L	<2.0	2.0	6943775	70	2.0	6943775	<2.0	2.0	6943775
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	6943775	<5.0	5.0	6943775	<5.0	5.0	6943775

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Elevated reporting limit due to sample matrix.

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BV Labs Job #: C0N6259
Report Date: 2020/09/18

CBCL Limited
Client Project #: 171046.00
Site Location: AVON
Sampler Initials: LLJ

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		NPL676		
Sampling Date		2020/09/10 13:00		
COC Number		791748-02-01		
	UNITS	**MW10**	**RDL**	**QC Batch**
Calculated Parameters				
Anion Sum	me/L	286	N/A	6940684
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	2000	1.0	6940636
Calculated TDS	mg/L	16000	1.0	6940686
Carb. Alkalinity (calc. as CaCO3)	mg/L	7.6	1.0	6940636
Cation Sum	me/L	286	N/A	6940684
Hardness (CaCO3)	mg/L	3300	1.0	6940682
Ion Balance (% Difference)	%	0.0300	N/A	6940683
Langelier Index (@ 20C)	N/A	1.35		6940638
Langelier Index (@ 4C)	N/A	1.11		6940639
Nitrate (N)	mg/L	<0.050	0.050	6940685
Saturation pH (@ 20C)	N/A	6.25		6940638
Saturation pH (@ 4C)	N/A	6.48		6940639
Inorganics				
Total Alkalinity (Total as CaCO3)	mg/L	2100	250	6948834
Dissolved Chloride (Cl-)	mg/L	8700	100	6948842
Colour	TCU	74	25	6948845
Nitrate + Nitrite (N)	mg/L	<0.050	0.050	6948849
Nitrite (N)	mg/L	<0.010	0.010	6948850
Nitrogen (Ammonia Nitrogen)	mg/L	21	1.0	6946768
Total Organic Carbon (C)	mg/L	27 (1)	5.0	6943985
Orthophosphate (P)	mg/L	0.12	0.010	6948847
pH	pH	7.59		6948674
Reactive Silica (SiO2)	mg/L	19	0.50	6948844
Dissolved Sulphate (SO4)	mg/L	<2.0	2.0	6948843
Turbidity	NTU	>1000	1.0	6943760
Conductivity	uS/cm	26000	1.0	6948673
Metals				
Dissolved Aluminum (Al)	ug/L	<50	50	6943775
Dissolved Antimony (Sb)	ug/L	<10	10	6943775
Dissolved Arsenic (As)	ug/L	<10	10	6943775
Dissolved Barium (Ba)	ug/L	210	10	6943775
Dissolved Beryllium (Be)	ug/L	<10	10	6943775

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

BUREAU VERITAS

BV Labs Job #: C0N6259
Report Date: 2020/09/18

CBCL Limited
Client Project #: 171046.00
Site Location: AVON
Sampler Initials: LLJ

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		NPL676		
Sampling Date		2020/09/10 13:00		
COC Number		791748-02-01		
	UNITS	**MW10**	**RDL**	**QC Batch**
Dissolved Bismuth (Bi)	ug/L	<20	20	6943775
Dissolved Boron (B)	ug/L	2000	500	6943775
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	6943775
Dissolved Calcium (Ca)	ug/L	220000	1000	6943775
Dissolved Chromium (Cr)	ug/L	<10	10	6943775
Dissolved Cobalt (Co)	ug/L	<4.0	4.0	6943775
Dissolved Copper (Cu)	ug/L	<5.0	5.0	6943775
Dissolved Iron (Fe)	ug/L	<500	500	6943775
Dissolved Lead (Pb)	ug/L	<5.0	5.0	6943775
Dissolved Magnesium (Mg)	ug/L	660000	1000	6943775
Dissolved Manganese (Mn)	ug/L	2900	20	6943775
Dissolved Molybdenum (Mo)	ug/L	<20	20	6943775
Dissolved Nickel (Ni)	ug/L	<20	20	6943775
Dissolved Phosphorus (P)	ug/L	<1000	1000	6943775
Dissolved Potassium (K)	ug/L	160000	1000	6943775
Dissolved Selenium (Se)	ug/L	<5.0	5.0	6943775
Dissolved Silver (Ag)	ug/L	<1.0	1.0	6943775
Dissolved Sodium (Na)	ug/L	4900000	1000	6943775
Dissolved Strontium (Sr)	ug/L	3700	20	6943775
Dissolved Thallium (Tl)	ug/L	<1.0	1.0	6943775
Dissolved Tin (Sn)	ug/L	<20	20	6943775
Dissolved Titanium (Ti)	ug/L	<20	20	6943775
Dissolved Uranium (U)	ug/L	<1.0	1.0	6943775
Dissolved Vanadium (V)	ug/L	<20	20	6943775
Dissolved Zinc (Zn)	ug/L	<50	50	6943775

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: C0N6259
Report Date: 2020/09/18

CBCL Limited
Client Project #: 171046.00
Site Location: AVON
Sampler Initials: LLJ

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NPL666			NPL666			NPL670		
Sampling Date		2020/09/10 14:55			2020/09/10 14:55			2020/09/10 16:40		
COC Number		791748-01-01			791748-01-01			791748-01-01		
	UNITS	**MW2**	**RDL**	**QC Batch**	**MW2 Lab-Dup**	**RDL**	**QC Batch**	**MW6**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L	15.4	N/A	6940684				79.2	N/A	6940684
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	600	1.0	6940636				460	1.0	6940636
Calculated TDS	mg/L	850	1.0	6940686				4700	1.0	6940686
Carb. Alkalinity (calc. as CaCO3)	mg/L	13	1.0	6940636				2.0	1.0	6940636
Cation Sum	me/L	14.8	N/A	6940684				74.3	N/A	6940684
Hardness (CaCO3)	mg/L	51	1.0	6940682				1300	1.0	6940682
Ion Balance (% Difference)	%	2.19	N/A	6940683				3.18	N/A	6940683
Langelier Index (@ 20C)	N/A	0.506		6940638				0.944		6940638
Langelier Index (@ 4C)	N/A	0.259		6940639				0.703		6940639
Nitrate (N)	mg/L	0.55	0.050	6940685				<0.050	0.050	6940685
Saturation pH (@ 20C)	N/A	7.85		6940638				6.71		6940638
Saturation pH (@ 4C)	N/A	8.10		6940639				6.96		6940639
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	610	50	6948834				460	25	6948834
Dissolved Chloride (Cl-)	mg/L	45	1.0	6948842				1500	50	6948842
Colour	TCU	<5.0	5.0	6948845				20	5.0	6948845
Nitrate + Nitrite (N)	mg/L	0.55	0.050	6948849				<0.050	0.050	6948849
Nitrite (N)	mg/L	<0.010	0.010	6948850				<0.010	0.010	6948850
Nitrogen (Ammonia Nitrogen)	mg/L	0.057	0.050	6949373				3.4	0.25	6949373
Total Organic Carbon (C)	mg/L	1.0	0.50	6943985				5.9	0.50	6943990
Orthophosphate (P)	mg/L	<0.010	0.010	6948847				<0.010	0.010	6948847
pH	pH	8.36		6946227				7.66		6946227
Reactive Silica (SiO2)	mg/L	7.5	0.50	6948844				29	1.0	6948844
Dissolved Sulphate (SO4)	mg/L	91	2.0	6948843				1300	100	6948843
Turbidity	NTU	21	0.10	6943760	21	0.10	6943760	290	1.0	6943760
Conductivity	uS/cm	1400	1.0	6946226				7300	1.0	6946226
Metals										
Dissolved Aluminum (Al)	ug/L	13	5.0	6943777				<50	50	6943777
Dissolved Antimony (Sb)	ug/L	<1.0	1.0	6943777				<10	10	6943777
Dissolved Arsenic (As)	ug/L	1.8	1.0	6943777				14	10	6943777
Dissolved Barium (Ba)	ug/L	33	1.0	6943777				25	10	6943777
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	6943777				<10	10	6943777

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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BV Labs Job #: C0N6259
Report Date: 2020/09/18

CBCL Limited
Client Project #: 171046.00
Site Location: AVON
Sampler Initials: LLJ

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NPL666			NPL666			NPL670		
Sampling Date		2020/09/10 14:55			2020/09/10 14:55			2020/09/10 16:40		
COC Number		791748-01-01			791748-01-01			791748-01-01		
	UNITS	**MW2**	**RDL**	**QC Batch**	**MW2 Lab-Dup**	**RDL**	**QC Batch**	**MW6**	**RDL**	**QC Batch**
Dissolved Bismuth (Bi)	ug/L	<2.0	2.0	6943777				<20	20	6943777
Dissolved Boron (B)	ug/L	490	50	6943777				1100	500	6943777
Dissolved Cadmium (Cd)	ug/L	<0.010	0.010	6943777				<0.10	0.10	6943777
Dissolved Calcium (Ca)	ug/L	7900	100	6943777				250000	1000	6943777
Dissolved Chromium (Cr)	ug/L	1.2	1.0	6943777				<10	10	6943777
Dissolved Cobalt (Co)	ug/L	<0.40	0.40	6943777				<4.0	4.0	6943777
Dissolved Copper (Cu)	ug/L	1.0	0.50	6943777				<5.0	5.0	6943777
Dissolved Iron (Fe)	ug/L	<50	50	6943777				13000	500	6943777
Dissolved Lead (Pb)	ug/L	<0.50	0.50	6943777				<5.0	5.0	6943777
Dissolved Magnesium (Mg)	ug/L	7500	100	6943777				160000	1000	6943777
Dissolved Manganese (Mn)	ug/L	<2.0	2.0	6943777				2900	20	6943777
Dissolved Molybdenum (Mo)	ug/L	6.9	2.0	6943777				<20	20	6943777
Dissolved Nickel (Ni)	ug/L	<2.0	2.0	6943777				<20	20	6943777
Dissolved Phosphorus (P)	ug/L	<100	100	6943777				2000	1000	6943777
Dissolved Potassium (K)	ug/L	10000	100	6943777				47000	1000	6943777
Dissolved Selenium (Se)	ug/L	<0.50	0.50	6943777				<5.0	5.0	6943777
Dissolved Silver (Ag)	ug/L	<0.10	0.10	6943777				<1.0	1.0	6943777
Dissolved Sodium (Na)	ug/L	310000	100	6943777				1100000	1000	6943777
Dissolved Strontium (Sr)	ug/L	46	2.0	6943777				1900	20	6943777
Dissolved Thallium (Tl)	ug/L	<0.10	0.10	6943777				<1.0	1.0	6943777
Dissolved Tin (Sn)	ug/L	<2.0	2.0	6943777				<20	20	6943777
Dissolved Titanium (Ti)	ug/L	<2.0	2.0	6943777				<20	20	6943777
Dissolved Uranium (U)	ug/L	5.1	0.10	6943777				<1.0	1.0	6943777
Dissolved Vanadium (V)	ug/L	<2.0	2.0	6943777				<20	20	6943777
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	6943777				<50	50	6943777

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: C0N6259
Report Date: 2020/09/18

CBCL Limited
Client Project #: 171046.00
Site Location: AVON
Sampler Initials: LLJ

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NPL671			NPL672			NPL672		
Sampling Date		2020/09/10 11:00			2020/09/10 11:20			2020/09/10 11:20		
COC Number		791748-01-01			791748-01-01			791748-01-01		
	UNITS	**MW7S**	**RDL**	**QC Batch**	**MW7I**	**RDL**	**QC Batch**	**MW7I Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L	419	N/A	6940684	105	N/A	6940684			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	1100	1.0	6940636	570	1.0	6940636			
Calculated TDS	mg/L	25000	1.0	6940686	6200	1.0	6940686			
Carb. Alkalinity (calc. as CaCO3)	mg/L	4.5	1.0	6940636	2.7	1.0	6940636			
Cation Sum	me/L	440	N/A	6940684	99.7	N/A	6940684			
Hardness (CaCO3)	mg/L	4700	1.0	6940682	1200	1.0	6940682			
Ion Balance (% Difference)	%	2.43	N/A	6940683	2.79	N/A	6940683			
Langelier Index (@ 20C)	N/A	1.39		6940638	0.744		6940638			
Langelier Index (@ 4C)	N/A	1.15		6940639	0.505		6940639			
Nitrate (N)	mg/L	<0.050	0.050	6940685	<0.050	0.050	6940685			
Saturation pH (@ 20C)	N/A	6.25		6940638	6.96		6940638			
Saturation pH (@ 4C)	N/A	6.49		6940639	7.20		6940639			
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	1100	100	6948834	570	50	6948834			
Dissolved Chloride (Cl-)	mg/L	13000	500	6948842	2300	100	6948842			
Colour	TCU	66	25	6948845	43	5.0	6948845			
Nitrate + Nitrite (N)	mg/L	<0.050	0.050	6948849	<0.050	0.050	6948849			
Nitrite (N)	mg/L	<0.010	0.010	6948850	<0.010	0.010	6948850			
Nitrogen (Ammonia Nitrogen)	mg/L	15	1.0	6949373	3.8	0.25	6946758	3.8	0.25	6946758
Total Organic Carbon (C)	mg/L	17 (1)	5.0	6943990	11 (1)	5.0	6943990			
Orthophosphate (P)	mg/L	2.8	0.20	6948847	0.050	0.010	6948847			
pH	pH	7.64		6946227	7.70		6946227			
Reactive Silica (SiO2)	mg/L	37	1.0	6948844	36	1.0	6948844			
Dissolved Sulphate (SO4)	mg/L	2000	100	6948843	1400	100	6948843			
Turbidity	NTU	120	1.0	6943760	190	1.0	6943760			
Conductivity	uS/cm	40000	1.0	6946226	10000	1.0	6946226			
Metals										
Dissolved Aluminum (Al)	ug/L	<50	50	6943777	<50	50	6943777			
Dissolved Antimony (Sb)	ug/L	<10	10	6943777	<10	10	6943777			
Dissolved Arsenic (As)	ug/L	<10	10	6943777	<10	10	6943777			
Dissolved Barium (Ba)	ug/L	140	10	6943777	34	10	6943777			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated reporting limit due to sample matrix.

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NPL671			NPL672			NPL672		
Sampling Date		2020/09/10 11:00			2020/09/10 11:20			2020/09/10 11:20		
COC Number		791748-01-01			791748-01-01			791748-01-01		
	UNITS	MW7S	RDL	QC Batch	MW7I	RDL	QC Batch	MW7I Lab-Dup	RDL	QC Batch
Dissolved Beryllium (Be)	ug/L	<10	10	6943777	<10	10	6943777			
Dissolved Bismuth (Bi)	ug/L	<20	20	6943777	<20	20	6943777			
Dissolved Boron (B)	ug/L	3700	500	6943777	1800	500	6943777			
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	6943777	<0.10	0.10	6943777			
Dissolved Calcium (Ca)	ug/L	380000	1000	6943777	130000	1000	6943777			
Dissolved Chromium (Cr)	ug/L	<10	10	6943777	<10	10	6943777			
Dissolved Cobalt (Co)	ug/L	<4.0	4.0	6943777	6.2	4.0	6943777			
Dissolved Copper (Cu)	ug/L	<5.0	5.0	6943777	<5.0	5.0	6943777			
Dissolved Iron (Fe)	ug/L	11000	500	6943777	17000	500	6943777			
Dissolved Lead (Pb)	ug/L	<5.0	5.0	6943777	<5.0	5.0	6943777			
Dissolved Magnesium (Mg)	ug/L	900000	1000	6943777	220000	1000	6943777			
Dissolved Manganese (Mn)	ug/L	6800	20	6943777	1100	20	6943777			
Dissolved Molybdenum (Mo)	ug/L	<20	20	6943777	<20	20	6943777			
Dissolved Nickel (Ni)	ug/L	<20	20	6943777	<20	20	6943777			
Dissolved Phosphorus (P)	ug/L	7500	1000	6943777	3600	1000	6943777			
Dissolved Potassium (K)	ug/L	240000	1000	6943777	72000	1000	6943777			
Dissolved Selenium (Se)	ug/L	<5.0	5.0	6943777	<5.0	5.0	6943777			
Dissolved Silver (Ag)	ug/L	<1.0	1.0	6943777	<1.0	1.0	6943777			
Dissolved Sodium (Na)	ug/L	7800000	1000	6943777	1700000	1000	6943777			
Dissolved Strontium (Sr)	ug/L	5200	20	6943777	1600	20	6943777			
Dissolved Thallium (Tl)	ug/L	<1.0	1.0	6943777	<1.0	1.0	6943777			
Dissolved Tin (Sn)	ug/L	<20	20	6943777	<20	20	6943777			
Dissolved Titanium (Ti)	ug/L	<20	20	6943777	<20	20	6943777			
Dissolved Uranium (U)	ug/L	<1.0	1.0	6943777	<1.0	1.0	6943777			
Dissolved Vanadium (V)	ug/L	<20	20	6943777	<20	20	6943777			
Dissolved Zinc (Zn)	ug/L	<50	50	6943777	<50	50	6943777			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

BV Labs Job #: C0N6259
Report Date: 2020/09/18

CBCL Limited
Client Project #: 171046.00
Site Location: AVON
Sampler Initials: LLJ

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NPL673			NPL673			NPL674		
Sampling Date		2020/09/10 11:45			2020/09/10 11:45			2020/09/10 12:00		
COC Number		791748-01-01			791748-01-01			791748-01-01		
	UNITS	**MW7D**	**RDL**	**QC Batch**	**MW7D Lab-Dup**	**RDL**	**QC Batch**	**MW8**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L	180	N/A	6940684				83.0	N/A	6940684
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	500	1.0	6940636				900	1.0	6940636
Calculated TDS	mg/L	10000	1.0	6940686				4600	1.0	6940686
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.9	1.0	6940636				8.3	1.0	6940636
Cation Sum	me/L	172	N/A	6940684				76.7	N/A	6940684
Hardness (CaCO3)	mg/L	2200	1.0	6940682				670	1.0	6940682
Ion Balance (% Difference)	%	2.23	N/A	6940683				3.92	N/A	6940683
Langelier Index (@ 20C)	N/A	0.931		6940638				1.10		6940638
Langelier Index (@ 4C)	N/A	0.693		6940639				0.855		6940639
Nitrate (N)	mg/L	<0.050	0.050	6940685				<0.050	0.050	6940685
Saturation pH (@ 20C)	N/A	6.69		6940638				6.90		6940638
Saturation pH (@ 4C)	N/A	6.93		6940639				7.14		6940639
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	500	50	6948834	440	50	6948834	900	100	6948834
Dissolved Chloride (Cl-)	mg/L	4700	100	6948842	4800	100	6948842	2100	100	6948842
Colour	TCU	23	5.0	6948845	23	5.0	6948845	110	25	6948845
Nitrate + Nitrite (N)	mg/L	<0.050	0.050	6948849	<0.050	0.050	6948849	<0.050	0.050	6948849
Nitrite (N)	mg/L	<0.010	0.010	6948850	<0.010	0.010	6948850	<0.010	0.010	6948850
Nitrogen (Ammonia Nitrogen)	mg/L	4.0	0.25	6949373				11	0.50	6946768
Total Organic Carbon (C)	mg/L	8.4 (1)	5.0	6943990				18 (1)	5.0	6943990
Orthophosphate (P)	mg/L	<0.010	0.010	6948847	<0.010	0.010	6948847	4.5	0.30	6948847
pH	pH	7.62		6946227				7.99		6946227
Reactive Silica (SiO2)	mg/L	22	1.0	6948844	22	1.0	6948844	35	1.0	6948844
Dissolved Sulphate (SO4)	mg/L	1800	100	6948843	1800	100	6948843	310	10	6948843
Turbidity	NTU	350	1.0	6943760				76	0.10	6943760
Conductivity	uS/cm	17000	1.0	6946226				8400	1.0	6946226
Metals										
Dissolved Aluminum (Al)	ug/L	<50	50	6943777				<50	50	6943777
Dissolved Antimony (Sb)	ug/L	<10	10	6943777				<10	10	6943777
Dissolved Arsenic (As)	ug/L	<10	10	6943777				<10	10	6943777
Dissolved Barium (Ba)	ug/L	43	10	6943777				58	10	6943777

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated reporting limit due to sample matrix.

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BV Labs Job #: C0N6259
Report Date: 2020/09/18

CBCL Limited
Client Project #: 171046.00
Site Location: AVON
Sampler Initials: LLJ

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NPL673			NPL673			NPL674		
Sampling Date		2020/09/10 11:45			2020/09/10 11:45			2020/09/10 12:00		
COC Number		791748-01-01			791748-01-01			791748-01-01		
	UNITS	MW7D	RDL	QC Batch	MW7D Lab-Dup	RDL	QC Batch	MW8	RDL	QC Batch
Dissolved Beryllium (Be)	ug/L	<10	10	6943777				<10	10	6943777
Dissolved Bismuth (Bi)	ug/L	<20	20	6943777				<20	20	6943777
Dissolved Boron (B)	ug/L	1900	500	6943777				2000	500	6943777
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	6943777				<0.10	0.10	6943777
Dissolved Calcium (Ca)	ug/L	310000	1000	6943777				84000	1000	6943777
Dissolved Chromium (Cr)	ug/L	<10	10	6943777				<10	10	6943777
Dissolved Cobalt (Co)	ug/L	6.2	4.0	6943777				<4.0	4.0	6943777
Dissolved Copper (Cu)	ug/L	<5.0	5.0	6943777				<5.0	5.0	6943777
Dissolved Iron (Fe)	ug/L	23000	500	6943777				4400	500	6943777
Dissolved Lead (Pb)	ug/L	<5.0	5.0	6943777				<5.0	5.0	6943777
Dissolved Magnesium (Mg)	ug/L	350000	1000	6943777				110000	1000	6943777
Dissolved Manganese (Mn)	ug/L	1600	20	6943777				3100	20	6943777
Dissolved Molybdenum (Mo)	ug/L	<20	20	6943777				<20	20	6943777
Dissolved Nickel (Ni)	ug/L	<20	20	6943777				<20	20	6943777
Dissolved Phosphorus (P)	ug/L	1200	1000	6943777				6900	1000	6943777
Dissolved Potassium (K)	ug/L	94000	1000	6943777				66000	1000	6943777
Dissolved Selenium (Se)	ug/L	<5.0	5.0	6943777				<5.0	5.0	6943777
Dissolved Silver (Ag)	ug/L	<1.0	1.0	6943777				<1.0	1.0	6943777
Dissolved Sodium (Na)	ug/L	2900000	1000	6943777				1400000	1000	6943777
Dissolved Strontium (Sr)	ug/L	3700	20	6943777				880	20	6943777
Dissolved Thallium (Tl)	ug/L	<1.0	1.0	6943777				<1.0	1.0	6943777
Dissolved Tin (Sn)	ug/L	<20	20	6943777				<20	20	6943777
Dissolved Titanium (Ti)	ug/L	<20	20	6943777				<20	20	6943777
Dissolved Uranium (U)	ug/L	<1.0	1.0	6943777				1.1	1.0	6943777
Dissolved Vanadium (V)	ug/L	<20	20	6943777				<20	20	6943777
Dissolved Zinc (Zn)	ug/L	<50	50	6943777				<50	50	6943777

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	13.0°C

Sample NPL665 [MW1] : Elevated reporting limits for trace metals due to sample matrix. ortho-Phosphate > Total Phosphorus: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Sample NPL670 [MW6] : Elevated reporting limits for trace metals due to sample matrix.

Sample NPL671 [MW7S] : Elevated reporting limits for trace metals due to sample matrix.

Sample NPL672 [MW7I] : Elevated reporting limits for trace metals due to sample matrix.

Sample NPL673 [MW7D] : Elevated reporting limits for trace metals due to sample matrix.

Sample NPL674 [MW8] : Elevated reporting limits for trace metals due to sample matrix.

Sample NPL676 [MW10] : Elevated reporting limits for trace metals due to sample matrix. ortho-Phosphate > Total Phosphorus: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Results relate only to the items tested.

BV Labs Job #: C0N6259
Report Date: 2020/09/18

CBCL Limited
Client Project #: 171046.00
Site Location: AVON
Sampler Initials: LLJ

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6943760	SHW	QC Standard	Turbidity	2020/09/15		105	%	80 - 120
6943760	SHW	Spiked Blank	Turbidity	2020/09/15		92	%	80 - 120
6943760	SHW	Method Blank	Turbidity	2020/09/15	<0.10		NTU	
6943760	SHW	RPD [NPL666-01]	Turbidity	2020/09/15	2.3		%	20
6943775	BAN	Matrix Spike	Dissolved Aluminum (Al)	2020/09/15		98	%	80 - 120
			Dissolved Antimony (Sb)	2020/09/15		99	%	80 - 120
			Dissolved Arsenic (As)	2020/09/15		96	%	80 - 120
			Dissolved Barium (Ba)	2020/09/15		92	%	80 - 120
			Dissolved Beryllium (Be)	2020/09/15		96	%	80 - 120
			Dissolved Bismuth (Bi)	2020/09/15		98	%	80 - 120
			Dissolved Boron (B)	2020/09/15		94	%	80 - 120
			Dissolved Cadmium (Cd)	2020/09/15		99	%	80 - 120
			Dissolved Calcium (Ca)	2020/09/15		NC	%	80 - 120
			Dissolved Chromium (Cr)	2020/09/15		98	%	80 - 120
			Dissolved Cobalt (Co)	2020/09/15		99	%	80 - 120
			Dissolved Copper (Cu)	2020/09/15		92	%	80 - 120
			Dissolved Iron (Fe)	2020/09/15		103	%	80 - 120
			Dissolved Lead (Pb)	2020/09/15		97	%	80 - 120
			Dissolved Magnesium (Mg)	2020/09/15		97	%	80 - 120
			Dissolved Manganese (Mn)	2020/09/15		100	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/09/15		104	%	80 - 120
			Dissolved Nickel (Ni)	2020/09/15		100	%	80 - 120
			Dissolved Phosphorus (P)	2020/09/15		101	%	80 - 120
			Dissolved Potassium (K)	2020/09/15		101	%	80 - 120
			Dissolved Selenium (Se)	2020/09/15		98	%	80 - 120
			Dissolved Silver (Ag)	2020/09/15		97	%	80 - 120
			Dissolved Sodium (Na)	2020/09/15		NC	%	80 - 120
			Dissolved Strontium (Sr)	2020/09/15		100	%	80 - 120
			Dissolved Thallium (Tl)	2020/09/15		100	%	80 - 120
			Dissolved Tin (Sn)	2020/09/15		103	%	80 - 120
			Dissolved Titanium (Ti)	2020/09/15		101	%	80 - 120
			Dissolved Uranium (U)	2020/09/15		106	%	80 - 120
			Dissolved Vanadium (V)	2020/09/15		100	%	80 - 120
			Dissolved Zinc (Zn)	2020/09/15		99	%	80 - 120
6943775	BAN	Spiked Blank	Dissolved Aluminum (Al)	2020/09/15		100	%	80 - 120
			Dissolved Antimony (Sb)	2020/09/15		94	%	80 - 120
			Dissolved Arsenic (As)	2020/09/15		94	%	80 - 120
			Dissolved Barium (Ba)	2020/09/15		93	%	80 - 120
			Dissolved Beryllium (Be)	2020/09/15		96	%	80 - 120
			Dissolved Bismuth (Bi)	2020/09/15		99	%	80 - 120
			Dissolved Boron (B)	2020/09/15		97	%	80 - 120
			Dissolved Cadmium (Cd)	2020/09/15		97	%	80 - 120
			Dissolved Calcium (Ca)	2020/09/15		94	%	80 - 120
			Dissolved Chromium (Cr)	2020/09/15		96	%	80 - 120
			Dissolved Cobalt (Co)	2020/09/15		99	%	80 - 120
			Dissolved Copper (Cu)	2020/09/15		96	%	80 - 120
			Dissolved Iron (Fe)	2020/09/15		104	%	80 - 120
			Dissolved Lead (Pb)	2020/09/15		98	%	80 - 120
			Dissolved Magnesium (Mg)	2020/09/15		106	%	80 - 120
			Dissolved Manganese (Mn)	2020/09/15		99	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/09/15		103	%	80 - 120
			Dissolved Nickel (Ni)	2020/09/15		98	%	80 - 120
			Dissolved Phosphorus (P)	2020/09/15		101	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Potassium (K)	2020/09/15		98	%	80 - 120
			Dissolved Selenium (Se)	2020/09/15		97	%	80 - 120
			Dissolved Silver (Ag)	2020/09/15		96	%	80 - 120
			Dissolved Sodium (Na)	2020/09/15		98	%	80 - 120
			Dissolved Strontium (Sr)	2020/09/15		98	%	80 - 120
			Dissolved Thallium (Tl)	2020/09/15		101	%	80 - 120
			Dissolved Tin (Sn)	2020/09/15		102	%	80 - 120
			Dissolved Titanium (Ti)	2020/09/15		101	%	80 - 120
			Dissolved Uranium (U)	2020/09/15		106	%	80 - 120
			Dissolved Vanadium (V)	2020/09/15		98	%	80 - 120
			Dissolved Zinc (Zn)	2020/09/15		100	%	80 - 120
6943775	BAN	Method Blank	Dissolved Aluminum (Al)	2020/09/15	<5.0		ug/L	
			Dissolved Antimony (Sb)	2020/09/15	<1.0		ug/L	
			Dissolved Arsenic (As)	2020/09/15	<1.0		ug/L	
			Dissolved Barium (Ba)	2020/09/15	<1.0		ug/L	
			Dissolved Beryllium (Be)	2020/09/15	<1.0		ug/L	
			Dissolved Bismuth (Bi)	2020/09/15	<2.0		ug/L	
			Dissolved Boron (B)	2020/09/15	<50		ug/L	
			Dissolved Cadmium (Cd)	2020/09/15	<0.010		ug/L	
			Dissolved Calcium (Ca)	2020/09/15	<100		ug/L	
			Dissolved Chromium (Cr)	2020/09/15	<1.0		ug/L	
			Dissolved Cobalt (Co)	2020/09/15	<0.40		ug/L	
			Dissolved Copper (Cu)	2020/09/15	<0.50		ug/L	
			Dissolved Iron (Fe)	2020/09/15	<50		ug/L	
			Dissolved Lead (Pb)	2020/09/15	<0.50		ug/L	
			Dissolved Magnesium (Mg)	2020/09/15	<100		ug/L	
			Dissolved Manganese (Mn)	2020/09/15	<2.0		ug/L	
			Dissolved Molybdenum (Mo)	2020/09/15	<2.0		ug/L	
			Dissolved Nickel (Ni)	2020/09/15	<2.0		ug/L	
			Dissolved Phosphorus (P)	2020/09/15	<100		ug/L	
			Dissolved Potassium (K)	2020/09/15	<100		ug/L	
			Dissolved Selenium (Se)	2020/09/15	<0.50		ug/L	
			Dissolved Silver (Ag)	2020/09/15	<0.10		ug/L	
			Dissolved Sodium (Na)	2020/09/15	<100		ug/L	
			Dissolved Strontium (Sr)	2020/09/15	<2.0		ug/L	
			Dissolved Thallium (Tl)	2020/09/15	<0.10		ug/L	
			Dissolved Tin (Sn)	2020/09/15	<2.0		ug/L	
			Dissolved Titanium (Ti)	2020/09/15	<2.0		ug/L	
			Dissolved Uranium (U)	2020/09/15	<0.10		ug/L	
			Dissolved Vanadium (V)	2020/09/15	<2.0		ug/L	
			Dissolved Zinc (Zn)	2020/09/15	<5.0		ug/L	
6943775	BAN	RPD	Dissolved Calcium (Ca)	2020/09/15	1.9		%	20
6943777	BAN	Matrix Spike	Dissolved Aluminum (Al)	2020/09/15		95	%	80 - 120
			Dissolved Antimony (Sb)	2020/09/15		94	%	80 - 120
			Dissolved Arsenic (As)	2020/09/15		93	%	80 - 120
			Dissolved Barium (Ba)	2020/09/15		93	%	80 - 120
			Dissolved Beryllium (Be)	2020/09/15		98	%	80 - 120
			Dissolved Bismuth (Bi)	2020/09/15		99	%	80 - 120
			Dissolved Boron (B)	2020/09/15		94	%	80 - 120
			Dissolved Cadmium (Cd)	2020/09/15		99	%	80 - 120
			Dissolved Calcium (Ca)	2020/09/15		92	%	80 - 120
			Dissolved Chromium (Cr)	2020/09/15		96	%	80 - 120
			Dissolved Cobalt (Co)	2020/09/15		97	%	80 - 120

BUREAU VERITAS

BV Labs Job #: C0N6259
Report Date: 2020/09/18

CBCL Limited
Client Project #: 171046.00
Site Location: AVON
Sampler Initials: LLJ

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Copper (Cu)	2020/09/15		95	%	80 - 120
			Dissolved Iron (Fe)	2020/09/15		101	%	80 - 120
			Dissolved Lead (Pb)	2020/09/15		98	%	80 - 120
			Dissolved Magnesium (Mg)	2020/09/15		104	%	80 - 120
			Dissolved Manganese (Mn)	2020/09/15		99	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/09/15		100	%	80 - 120
			Dissolved Nickel (Ni)	2020/09/15		97	%	80 - 120
			Dissolved Phosphorus (P)	2020/09/15		100	%	80 - 120
			Dissolved Potassium (K)	2020/09/15		99	%	80 - 120
			Dissolved Selenium (Se)	2020/09/15		94	%	80 - 120
			Dissolved Silver (Ag)	2020/09/15		98	%	80 - 120
			Dissolved Sodium (Na)	2020/09/15		96	%	80 - 120
			Dissolved Strontium (Sr)	2020/09/15		98	%	80 - 120
			Dissolved Thallium (Tl)	2020/09/15		100	%	80 - 120
			Dissolved Tin (Sn)	2020/09/15		104	%	80 - 120
			Dissolved Titanium (Ti)	2020/09/15		97	%	80 - 120
			Dissolved Uranium (U)	2020/09/15		107	%	80 - 120
			Dissolved Vanadium (V)	2020/09/15		98	%	80 - 120
			Dissolved Zinc (Zn)	2020/09/15		101	%	80 - 120
6943777	BAN	Spiked Blank	Dissolved Aluminum (Al)	2020/09/15		99	%	80 - 120
			Dissolved Antimony (Sb)	2020/09/15		97	%	80 - 120
			Dissolved Arsenic (As)	2020/09/15		92	%	80 - 120
			Dissolved Barium (Ba)	2020/09/15		95	%	80 - 120
			Dissolved Beryllium (Be)	2020/09/15		98	%	80 - 120
			Dissolved Bismuth (Bi)	2020/09/15		102	%	80 - 120
			Dissolved Boron (B)	2020/09/15		95	%	80 - 120
			Dissolved Cadmium (Cd)	2020/09/15		97	%	80 - 120
			Dissolved Calcium (Ca)	2020/09/15		92	%	80 - 120
			Dissolved Chromium (Cr)	2020/09/15		95	%	80 - 120
			Dissolved Cobalt (Co)	2020/09/15		97	%	80 - 120
			Dissolved Copper (Cu)	2020/09/15		94	%	80 - 120
			Dissolved Iron (Fe)	2020/09/15		102	%	80 - 120
			Dissolved Lead (Pb)	2020/09/15		99	%	80 - 120
			Dissolved Magnesium (Mg)	2020/09/15		102	%	80 - 120
			Dissolved Manganese (Mn)	2020/09/15		98	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/09/15		103	%	80 - 120
			Dissolved Nickel (Ni)	2020/09/15		97	%	80 - 120
			Dissolved Phosphorus (P)	2020/09/15		100	%	80 - 120
			Dissolved Potassium (K)	2020/09/15		98	%	80 - 120
			Dissolved Selenium (Se)	2020/09/15		95	%	80 - 120
			Dissolved Silver (Ag)	2020/09/15		96	%	80 - 120
			Dissolved Sodium (Na)	2020/09/15		96	%	80 - 120
			Dissolved Strontium (Sr)	2020/09/15		98	%	80 - 120
			Dissolved Thallium (Tl)	2020/09/15		102	%	80 - 120
			Dissolved Tin (Sn)	2020/09/15		103	%	80 - 120
			Dissolved Titanium (Ti)	2020/09/15		96	%	80 - 120
			Dissolved Uranium (U)	2020/09/15		108	%	80 - 120
			Dissolved Vanadium (V)	2020/09/15		98	%	80 - 120
			Dissolved Zinc (Zn)	2020/09/15		100	%	80 - 120
6943777	BAN	Method Blank	Dissolved Aluminum (Al)	2020/09/15	<5.0		ug/L	
			Dissolved Antimony (Sb)	2020/09/15	<1.0		ug/L	
			Dissolved Arsenic (As)	2020/09/15	<1.0		ug/L	
			Dissolved Barium (Ba)	2020/09/15	<1.0		ug/L	

BUREAU VERITAS

BV Labs Job #: C0N6259
Report Date: 2020/09/18

CBCL Limited
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Site Location: AVON
Sampler Initials: LLJ

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Beryllium (Be)	2020/09/15	<1.0		ug/L	
			Dissolved Bismuth (Bi)	2020/09/15	<2.0		ug/L	
			Dissolved Boron (B)	2020/09/15	<50		ug/L	
			Dissolved Cadmium (Cd)	2020/09/15	<0.010		ug/L	
			Dissolved Calcium (Ca)	2020/09/15	<100		ug/L	
			Dissolved Chromium (Cr)	2020/09/15	<1.0		ug/L	
			Dissolved Cobalt (Co)	2020/09/15	<0.40		ug/L	
			Dissolved Copper (Cu)	2020/09/15	<0.50		ug/L	
			Dissolved Iron (Fe)	2020/09/15	<50		ug/L	
			Dissolved Lead (Pb)	2020/09/15	<0.50		ug/L	
			Dissolved Magnesium (Mg)	2020/09/15	<100		ug/L	
			Dissolved Manganese (Mn)	2020/09/15	<2.0		ug/L	
			Dissolved Molybdenum (Mo)	2020/09/15	<2.0		ug/L	
			Dissolved Nickel (Ni)	2020/09/15	<2.0		ug/L	
			Dissolved Phosphorus (P)	2020/09/15	<100		ug/L	
			Dissolved Potassium (K)	2020/09/15	<100		ug/L	
			Dissolved Selenium (Se)	2020/09/15	<0.50		ug/L	
			Dissolved Silver (Ag)	2020/09/15	<0.10		ug/L	
			Dissolved Sodium (Na)	2020/09/15	<100		ug/L	
			Dissolved Strontium (Sr)	2020/09/15	<2.0		ug/L	
			Dissolved Thallium (Tl)	2020/09/15	<0.10		ug/L	
			Dissolved Tin (Sn)	2020/09/15	<2.0		ug/L	
			Dissolved Titanium (Ti)	2020/09/15	<2.0		ug/L	
			Dissolved Uranium (U)	2020/09/15	<0.10		ug/L	
			Dissolved Vanadium (V)	2020/09/15	<2.0		ug/L	
			Dissolved Zinc (Zn)	2020/09/15	<5.0		ug/L	
6943777	BAN	RPD	Dissolved Aluminum (Al)	2020/09/15	18		%	20
			Dissolved Antimony (Sb)	2020/09/15	NC		%	20
			Dissolved Arsenic (As)	2020/09/15	3.8		%	20
			Dissolved Barium (Ba)	2020/09/15	0.66		%	20
			Dissolved Beryllium (Be)	2020/09/15	NC		%	20
			Dissolved Bismuth (Bi)	2020/09/15	NC		%	20
			Dissolved Boron (B)	2020/09/15	NC		%	20
			Dissolved Cadmium (Cd)	2020/09/15	14		%	20
			Dissolved Calcium (Ca)	2020/09/15	0.060		%	20
			Dissolved Chromium (Cr)	2020/09/15	NC		%	20
			Dissolved Cobalt (Co)	2020/09/15	NC		%	20
			Dissolved Copper (Cu)	2020/09/15	0.052		%	20
			Dissolved Iron (Fe)	2020/09/15	1.3		%	20
			Dissolved Lead (Pb)	2020/09/15	NC		%	20
			Dissolved Magnesium (Mg)	2020/09/15	0.90		%	20
			Dissolved Manganese (Mn)	2020/09/15	8.5		%	20
			Dissolved Molybdenum (Mo)	2020/09/15	NC		%	20
			Dissolved Nickel (Ni)	2020/09/15	NC		%	20
			Dissolved Phosphorus (P)	2020/09/15	NC		%	20
			Dissolved Potassium (K)	2020/09/15	1.1		%	20
			Dissolved Selenium (Se)	2020/09/15	NC		%	20
			Dissolved Silver (Ag)	2020/09/15	NC		%	20
			Dissolved Sodium (Na)	2020/09/15	0.65		%	20
			Dissolved Strontium (Sr)	2020/09/15	1.9		%	20
			Dissolved Thallium (Tl)	2020/09/15	NC		%	20
			Dissolved Tin (Sn)	2020/09/15	NC		%	20
			Dissolved Titanium (Ti)	2020/09/15	5.4		%	20

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

BV Labs Job #: C0N6259
Report Date: 2020/09/18

CBCL Limited
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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Uranium (U)	2020/09/15	7.1		%	20
			Dissolved Vanadium (V)	2020/09/15	NC		%	20
			Dissolved Zinc (Zn)	2020/09/15	11		%	20
6943985	YLG	Matrix Spike	Total Organic Carbon (C)	2020/09/15		96	%	85 - 115
6943985	YLG	Spiked Blank	Total Organic Carbon (C)	2020/09/15		96	%	80 - 120
6943985	YLG	Method Blank	Total Organic Carbon (C)	2020/09/15	<0.50		mg/L	
6943985	YLG	RPD	Total Organic Carbon (C)	2020/09/15	1.0		%	15
6943990	YLG	Matrix Spike	Total Organic Carbon (C)	2020/09/15		89	%	85 - 115
6943990	YLG	Spiked Blank	Total Organic Carbon (C)	2020/09/15		97	%	80 - 120
6943990	YLG	Method Blank	Total Organic Carbon (C)	2020/09/15	<0.50		mg/L	
6943990	YLG	RPD	Total Organic Carbon (C)	2020/09/15	NC (1)		%	15
6946226	SHW	Spiked Blank	Conductivity	2020/09/16		100	%	80 - 120
6946226	SHW	Method Blank	Conductivity	2020/09/16	<1.0		uS/cm	
6946226	SHW	RPD	Conductivity	2020/09/16	0.96		%	10
6946227	SHW	Spiked Blank	pH	2020/09/16		100	%	97 - 103
6946227	SHW	RPD	pH	2020/09/16	2.8		%	N/A
6946337	EMT	Matrix Spike [NPL667-01]	Total Alkalinity (Total as CaCO3)	2020/09/17		NC	%	80 - 120
6946337	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2020/09/17		112	%	80 - 120
6946337	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2020/09/17	<5.0		mg/L	
6946337	EMT	RPD [NPL667-01]	Total Alkalinity (Total as CaCO3)	2020/09/17	1.1		%	20
6946507	EMT	Matrix Spike [NPL667-01]	Dissolved Chloride (Cl-)	2020/09/16		NC	%	80 - 120
6946507	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2020/09/16		100	%	80 - 120
6946507	EMT	Method Blank	Dissolved Chloride (Cl-)	2020/09/16	<1.0		mg/L	
6946507	EMT	RPD [NPL667-01]	Dissolved Chloride (Cl-)	2020/09/16	0.75		%	20
6946509	EMT	Matrix Spike [NPL667-01]	Dissolved Sulphate (SO4)	2020/09/16		NC	%	80 - 120
6946509	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2020/09/16		111	%	80 - 120
6946509	EMT	Method Blank	Dissolved Sulphate (SO4)	2020/09/16	<2.0		mg/L	
6946509	EMT	RPD [NPL667-01]	Dissolved Sulphate (SO4)	2020/09/16	0.019		%	20
6946511	EMT	Matrix Spike [NPL667-01]	Reactive Silica (SiO2)	2020/09/16		NC	%	80 - 120
6946511	EMT	Spiked Blank	Reactive Silica (SiO2)	2020/09/16		95	%	80 - 120
6946511	EMT	Method Blank	Reactive Silica (SiO2)	2020/09/16	<0.50		mg/L	
6946511	EMT	RPD [NPL667-01]	Reactive Silica (SiO2)	2020/09/16	0.11		%	20
6946514	EMT	Spiked Blank	Colour	2020/09/17		96	%	80 - 120
6946514	EMT	Method Blank	Colour	2020/09/17	<5.0		TCU	
6946514	EMT	RPD [NPL667-01]	Colour	2020/09/17	NC		%	20
6946517	EMT	Matrix Spike [NPL667-01]	Orthophosphate (P)	2020/09/16		91	%	80 - 120
6946517	EMT	Spiked Blank	Orthophosphate (P)	2020/09/16		97	%	80 - 120
6946517	EMT	Method Blank	Orthophosphate (P)	2020/09/16	<0.010		mg/L	
6946517	EMT	RPD [NPL667-01]	Orthophosphate (P)	2020/09/16	NC		%	20
6946519	EMT	Matrix Spike [NPL667-01]	Nitrate + Nitrite (N)	2020/09/16		87	%	80 - 120
6946519	EMT	Spiked Blank	Nitrate + Nitrite (N)	2020/09/16		94	%	80 - 120
6946519	EMT	Method Blank	Nitrate + Nitrite (N)	2020/09/16	<0.050		mg/L	
6946519	EMT	RPD [NPL667-01]	Nitrate + Nitrite (N)	2020/09/16	NC		%	20
6946522	EMT	Matrix Spike [NPL667-01]	Nitrite (N)	2020/09/16		102	%	80 - 120
6946522	EMT	Spiked Blank	Nitrite (N)	2020/09/16		102	%	80 - 120
6946522	EMT	Method Blank	Nitrite (N)	2020/09/16	<0.010		mg/L	
6946522	EMT	RPD [NPL667-01]	Nitrite (N)	2020/09/16	NC		%	20
6946758	EMT	Matrix Spike [NPL672-03]	Nitrogen (Ammonia Nitrogen)	2020/09/16		NC	%	80 - 120
6946758	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2020/09/16		103	%	80 - 120
6946758	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2020/09/17	<0.050		mg/L	
6946758	EMT	RPD [NPL672-03]	Nitrogen (Ammonia Nitrogen)	2020/09/16	0.73		%	20
6946768	EMT	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2020/09/16		103	%	80 - 120
6946768	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2020/09/16		105	%	80 - 120

BV Labs Job #: C0N6259
Report Date: 2020/09/18

CBCL Limited
Client Project #: 171046.00
Site Location: AVON
Sampler Initials: LLJ

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6946768	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2020/09/17	<0.050		mg/L	
6946768	EMT	RPD	Nitrogen (Ammonia Nitrogen)	2020/09/16	8.8		%	20
6948673	SHW	Spiked Blank	Conductivity	2020/09/17		102	%	80 - 120
6948673	SHW	Method Blank	Conductivity	2020/09/17	<1.0		uS/cm	
6948673	SHW	RPD	Conductivity	2020/09/17	1.1		%	10
6948674	SHW	Spiked Blank	pH	2020/09/17		100	%	97 - 103
6948674	SHW	RPD	pH	2020/09/17	1.6		%	N/A
6948834	EMT	Matrix Spike [NPL673-01]	Total Alkalinity (Total as CaCO3)	2020/09/18		NC	%	80 - 120
6948834	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2020/09/17		112	%	80 - 120
6948834	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2020/09/17	<5.0		mg/L	
6948834	EMT	RPD [NPL673-01]	Total Alkalinity (Total as CaCO3)	2020/09/18	13		%	20
6948842	EMT	Matrix Spike [NPL673-01]	Dissolved Chloride (Cl-)	2020/09/18		NC	%	80 - 120
6948842	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2020/09/17		99	%	80 - 120
6948842	EMT	Method Blank	Dissolved Chloride (Cl-)	2020/09/17	<1.0		mg/L	
6948842	EMT	RPD [NPL673-01]	Dissolved Chloride (Cl-)	2020/09/18	1.5		%	20
6948843	EMT	Matrix Spike [NPL673-01]	Dissolved Sulphate (SO4)	2020/09/18		NC	%	80 - 120
6948843	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2020/09/17		110	%	80 - 120
6948843	EMT	Method Blank	Dissolved Sulphate (SO4)	2020/09/17	<2.0		mg/L	
6948843	EMT	RPD [NPL673-01]	Dissolved Sulphate (SO4)	2020/09/18	1.1		%	20
6948844	EMT	Matrix Spike [NPL673-01]	Reactive Silica (SiO2)	2020/09/17		NC	%	80 - 120
6948844	EMT	Spiked Blank	Reactive Silica (SiO2)	2020/09/17		99	%	80 - 120
6948844	EMT	Method Blank	Reactive Silica (SiO2)	2020/09/17	<0.50		mg/L	
6948844	EMT	RPD [NPL673-01]	Reactive Silica (SiO2)	2020/09/17	0.099		%	20
6948845	EMT	Spiked Blank	Colour	2020/09/18		91	%	80 - 120
6948845	EMT	Method Blank	Colour	2020/09/18	<5.0		TCU	
6948845	EMT	RPD [NPL673-01]	Colour	2020/09/18	0.91		%	20
6948847	EMT	Matrix Spike [NPL673-01]	Orthophosphate (P)	2020/09/18		81	%	80 - 120
6948847	EMT	Spiked Blank	Orthophosphate (P)	2020/09/18		96	%	80 - 120
6948847	EMT	Method Blank	Orthophosphate (P)	2020/09/18	<0.010		mg/L	
6948847	EMT	RPD [NPL673-01]	Orthophosphate (P)	2020/09/18	NC		%	20
6948849	EMT	Matrix Spike [NPL673-01]	Nitrate + Nitrite (N)	2020/09/17		102	%	80 - 120
6948849	EMT	Spiked Blank	Nitrate + Nitrite (N)	2020/09/17		104	%	80 - 120
6948849	EMT	Method Blank	Nitrate + Nitrite (N)	2020/09/17	<0.050		mg/L	
6948849	EMT	RPD [NPL673-01]	Nitrate + Nitrite (N)	2020/09/17	NC		%	20
6948850	EMT	Matrix Spike [NPL673-01]	Nitrite (N)	2020/09/17		106	%	80 - 120
6948850	EMT	Spiked Blank	Nitrite (N)	2020/09/17		109	%	80 - 120
6948850	EMT	Method Blank	Nitrite (N)	2020/09/17	<0.010		mg/L	
6948850	EMT	RPD [NPL673-01]	Nitrite (N)	2020/09/17	NC		%	20
6949373	EMT	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2020/09/18		NC	%	80 - 120
6949373	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2020/09/18		101	%	80 - 120
6949373	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2020/09/18	<0.050		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6949373	EMT	RPD	Nitrogen (Ammonia Nitrogen)	2020/09/18	1.1		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Elevated reporting limit due to turbidity.

BV Labs Job #: C0N6259
Report Date: 2020/09/18

CBCL Limited
Client Project #: 171046.00
Site Location: AVON
Sampler Initials: LLJ

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Eric Dearman, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Your Project #: 171046.00
Your C.O.C. #: 45468

Attention: Laura Jenkins

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2020/11/24
Report #: R6423111
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0U5726
Received: 2020/11/17, 09:37

Sample Matrix: Water
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbonate, Bicarbonate and Hydroxide	10	N/A	2020/11/20	N/A	SM 23 4500-CO2 D
Alkalinity	10	N/A	2020/11/23	ATL SOP 00013	EPA 310.2 R1974 m
Chloride	10	N/A	2020/11/24	ATL SOP 00014	SM 23 4500-Cl- E m
Colour	10	N/A	2020/11/23	ATL SOP 00020	SM 23 2120C m
Conductance - water	10	N/A	2020/11/20	ATL SOP 00004	SM 23 2510B m
Hardness (calculated as CaCO3)	10	N/A	2020/11/23	ATL SOP 00048	Auto Calc
Metals Water Diss. MS (1)	10	N/A	2020/11/20	ATL SOP 00058	EPA 6020B R2 m
Ion Balance (% Difference)	10	N/A	2020/11/24	N/A	Auto Calc.
Anion and Cation Sum	10	N/A	2020/11/24	N/A	Auto Calc.
Nitrogen Ammonia - water	1	N/A	2020/11/23	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen Ammonia - water	9	N/A	2020/11/24	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	10	N/A	2020/11/23	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	10	N/A	2020/11/23	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	10	N/A	2020/11/24	ATL SOP 00018	ASTM D3867-16
pH (2)	10	N/A	2020/11/20	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	10	N/A	2020/11/23	ATL SOP 00021	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C)	10	N/A	2020/11/24	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	10	N/A	2020/11/24	ATL SOP 00049	Auto Calc.
Reactive Silica	10	N/A	2020/11/23	ATL SOP 00022	EPA 366.0 m
Sulphate	6	N/A	2020/11/23	ATL SOP 00023	ASTM D516-16 m
Sulphate	4	N/A	2020/11/24	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc)	10	N/A	2020/11/24	N/A	Auto Calc.
Organic carbon - Total (TOC) (3)	3	N/A	2020/11/19	ATL SOP 00203	SM 23 5310B m
Organic carbon - Total (TOC) (3)	7	N/A	2020/11/20	ATL SOP 00203	SM 23 5310B m
Turbidity	5	N/A	2020/11/19	ATL SOP 00011	EPA 180.1 R2 m
Turbidity	5	N/A	2020/11/20	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

Your Project #: 171046.00
Your C.O.C. #: 45468

Attention: Laura Jenkins

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2020/11/24
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CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0U5726
Received: 2020/11/17, 09:37

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Sample filtered in laboratory prior to analysis for dissolved metals.
(2) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(3) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Keri Mackay, Customer Experience Team Lead
Email: Keri.MACKAY@bvlabs.com
Phone# (902)420-0203 Ext:294
==
This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		OEO921		OEO922			OEO922		
Sampling Date		2020/11/16 10:30		2020/11/16 16:00			2020/11/16 16:00		
COC Number		45468		45468			45468		
	UNITS	AVON MW-1	RDL	AVON MW-2	RDL	QC Batch	AVON MW-2 Lab-Dup	RDL	QC Batch
Calculated Parameters									
Anion Sum	me/L	143	N/A	16.2	N/A	7062299			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	970	1.0	650	1.0	7062296			
Calculated TDS	mg/L	7800	1.0	880	1.0	7062306			
Carb. Alkalinity (calc. as CaCO3)	mg/L	2.5	1.0	11	1.0	7062296			
Cation Sum	me/L	126	N/A	15.3	N/A	7062299			
Hardness (CaCO3)	mg/L	1300	1.0	66	1.0	7062297			
Ion Balance (% Difference)	%	6.45	N/A	2.98	N/A	7062298			
Langelier Index (@ 20C)	N/A	0.711		0.541		7062304			
Langelier Index (@ 4C)	N/A	0.472		0.295		7062305			
Nitrate (N)	mg/L	0.067	0.050	0.55	0.050	7062300			
Saturation pH (@ 20C)	N/A	6.72		7.71		7062304			
Saturation pH (@ 4C)	N/A	6.96		7.95		7062305			
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	970	100	660	50	7067731			
Dissolved Chloride (Cl-)	mg/L	4100	50	46	1.0	7070180			
Colour	TCU	38	5.0	<5.0	5.0	7070184			
Nitrate + Nitrite (N)	mg/L	0.067	0.050	0.55	0.050	7070190			
Nitrite (N)	mg/L	<0.010	0.010	<0.010	0.010	7070192			
Nitrogen (Ammonia Nitrogen)	mg/L	5.0	0.25	0.10	0.050	7070627	0.13	0.050	7070627
Total Organic Carbon (C)	mg/L	<50 (1)	50	<5.0 (1)	5.0	7065438			
Orthophosphate (P)	mg/L	0.024	0.010	0.018	0.010	7070185			
pH	pH	7.43		8.25		7066874			
Reactive Silica (SiO2)	mg/L	29	1.0	7.4	0.50	7070183			
Dissolved Sulphate (SO4)	mg/L	430	10	83	2.0	7070181			
Turbidity	NTU	>1000	1.0	65	0.10	7065343			
Conductivity	uS/cm	14000	1.0	1500	1.0	7066873			
Metals									
Dissolved Aluminum (Al)	ug/L	<50	50	15	5.0	7064639			
Dissolved Antimony (Sb)	ug/L	<10	10	<1.0	1.0	7064639			
Dissolved Arsenic (As)	ug/L	<10	10	1.6	1.0	7064639			
Dissolved Barium (Ba)	ug/L	32	10	45	1.0	7064639			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		OEO921		OEO922			OEO922		
Sampling Date		2020/11/16 10:30		2020/11/16 16:00			2020/11/16 16:00		
COC Number		45468		45468			45468		
	UNITS	**AVON MW-1**	**RDL**	**AVON MW-2**	**RDL**	**QC Batch**	**AVON MW-2 Lab-Dup**	**RDL**	**QC Batch**
Dissolved Beryllium (Be)	ug/L	<10	10	<1.0	1.0	7064639			
Dissolved Bismuth (Bi)	ug/L	<20	20	<2.0	2.0	7064639			
Dissolved Boron (B)	ug/L	1700	500	560	50	7064639			
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	<0.010	0.010	7064639			
Dissolved Calcium (Ca)	ug/L	140000	1000	10000	100	7064639			
Dissolved Chromium (Cr)	ug/L	<10	10	1.0	1.0	7064639			
Dissolved Cobalt (Co)	ug/L	<4.0	4.0	<0.40	0.40	7064639			
Dissolved Copper (Cu)	ug/L	<5.0	5.0	1.7	0.50	7064639			
Dissolved Iron (Fe)	ug/L	<500	500	<50	50	7064639			
Dissolved Lead (Pb)	ug/L	<5.0	5.0	<0.50	0.50	7064639			
Dissolved Magnesium (Mg)	ug/L	220000	1000	9700	100	7064639			
Dissolved Manganese (Mn)	ug/L	2800	20	<2.0	2.0	7064639			
Dissolved Molybdenum (Mo)	ug/L	<20	20	5.4	2.0	7064639			
Dissolved Nickel (Ni)	ug/L	<20	20	<2.0	2.0	7064639			
Dissolved Phosphorus (P)	ug/L	<1000	1000	<100	100	7064639			
Dissolved Potassium (K)	ug/L	82000	1000	14000	100	7064639			
Dissolved Selenium (Se)	ug/L	<5.0	5.0	<0.50	0.50	7064639			
Dissolved Silver (Ag)	ug/L	<1.0	1.0	<0.10	0.10	7064639			
Dissolved Sodium (Na)	ug/L	2200000	1000	310000	100	7064639			
Dissolved Strontium (Sr)	ug/L	1800	20	61	2.0	7064639			
Dissolved Thallium (Tl)	ug/L	<1.0	1.0	<0.10	0.10	7064639			
Dissolved Tin (Sn)	ug/L	<20	20	<2.0	2.0	7064639			
Dissolved Titanium (Ti)	ug/L	<20	20	<2.0	2.0	7064639			
Dissolved Uranium (U)	ug/L	1.8	1.0	4.6	0.10	7064639			
Dissolved Vanadium (V)	ug/L	<20	20	<2.0	2.0	7064639			
Dissolved Zinc (Zn)	ug/L	<50	50	<5.0	5.0	7064639			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

BV Labs Job #: C0U5726
Report Date: 2020/11/24

CBCL Limited
Client Project #: 171046.00

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		OEO923			OEO924			OEO924		
Sampling Date		2020/11/16 11:00			2020/11/16 15:30			2020/11/16 15:30		
COC Number		45468			45468			45468		
	UNITS	**AVON MW-3**	**RDL**	**QC Batch**	**AVON MW-4**	**RDL**	**QC Batch**	**AVON MW-4 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L	79.3	N/A	7062299	68.7	N/A	7062299			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	130	1.0	7062296	360	1.0	7062296			
Calculated TDS	mg/L	4800	1.0	7062306	3700	1.0	7062306			
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	7062296	<1.0	1.0	7062296			
Cation Sum	me/L	73.2	N/A	7062299	61.5	N/A	7062299			
Hardness (CaCO3)	mg/L	2000	1.0	7062297	1600	1.0	7062297			
Ion Balance (% Difference)	%	4.01	N/A	7062298	5.48	N/A	7062298			
Langelier Index (@ 20C)	N/A	0.637		7062304	0.753		7062304			
Langelier Index (@ 4C)	N/A	0.397		7062305	0.512		7062305			
Nitrate (N)	mg/L	<0.050	0.050	7062300	0.050	0.050	7062300			
Saturation pH (@ 20C)	N/A	6.88		7062304	6.56		7062304			
Saturation pH (@ 4C)	N/A	7.12		7062305	6.80		7062305			
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	130	25	7067731	360	25	7070302	350	25	7070302
Dissolved Chloride (Cl-)	mg/L	1500	50	7070180	1900	50	7070296	2000	50	7070296
Colour	TCU	<5.0	5.0	7070184	<5.0	5.0	7070289	<5.0	5.0	7070289
Nitrate + Nitrite (N)	mg/L	<0.050	0.050	7070190	0.050	0.050	7070205	<0.050	0.050	7070205
Nitrite (N)	mg/L	<0.010	0.010	7070192	<0.010	0.010	7070274	<0.010	0.010	7070274
Nitrogen (Ammonia Nitrogen)	mg/L	0.80	0.050	7070627	0.45	0.050	7070627			
Total Organic Carbon (C)	mg/L	<5.0 (1)	5.0	7065442	<50 (1)	50	7065442			
Orthophosphate (P)	mg/L	<0.010	0.010	7070185	<0.010	0.010	7070287	<0.010	0.010	7070287
pH	pH	7.52		7066874	7.31		7066874	7.26		7066874
Reactive Silica (SiO2)	mg/L	9.7	0.50	7070183	15	0.50	7070292	15	0.50	7070292
Dissolved Sulphate (SO4)	mg/L	1700	100	7070181	320	10	7070294	310	10	7070294
Turbidity	NTU	>1000	1.0	7065343	>1000	1.0	7064640	>1000	1.0	7064640
Conductivity	uS/cm	6800	1.0	7066873	6500	1.0	7066873	6500	1.0	7066873
Metals										
Dissolved Aluminum (Al)	ug/L	<50	50	7064639	<50	50	7064639			
Dissolved Antimony (Sb)	ug/L	<10	10	7064639	<10	10	7064639			
Dissolved Arsenic (As)	ug/L	<10	10	7064639	<10	10	7064639			
Dissolved Barium (Ba)	ug/L	23	10	7064639	50	10	7064639			

RDL = Reportable Detection Limit
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Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		OEO923			OEO924			OEO924		
Sampling Date		2020/11/16 11:00			2020/11/16 15:30			2020/11/16 15:30		
COC Number		45468			45468			45468		
	UNITS	**AVON MW-3**	**RDL**	**QC Batch**	**AVON MW-4**	**RDL**	**QC Batch**	**AVON MW-4 Lab-Dup**	**RDL**	**QC Batch**
Dissolved Beryllium (Be)	ug/L	<10	10	7064639	<10	10	7064639			
Dissolved Bismuth (Bi)	ug/L	<20	20	7064639	<20	20	7064639			
Dissolved Boron (B)	ug/L	<500	500	7064639	<500	500	7064639			
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	7064639	<0.10	0.10	7064639			
Dissolved Calcium (Ca)	ug/L	630000	1000	7064639	430000	1000	7064639			
Dissolved Chromium (Cr)	ug/L	<10	10	7064639	<10	10	7064639			
Dissolved Cobalt (Co)	ug/L	<4.0	4.0	7064639	5.9	4.0	7064639			
Dissolved Copper (Cu)	ug/L	<5.0	5.0	7064639	<5.0	5.0	7064639			
Dissolved Iron (Fe)	ug/L	<500	500	7064639	<500	500	7064639			
Dissolved Lead (Pb)	ug/L	<5.0	5.0	7064639	<5.0	5.0	7064639			
Dissolved Magnesium (Mg)	ug/L	100000	1000	7064639	120000	1000	7064639			
Dissolved Manganese (Mn)	ug/L	3500	20	7064639	3300	20	7064639			
Dissolved Molybdenum (Mo)	ug/L	<20	20	7064639	<20	20	7064639			
Dissolved Nickel (Ni)	ug/L	<20	20	7064639	<20	20	7064639			
Dissolved Phosphorus (P)	ug/L	<1000	1000	7064639	<1000	1000	7064639			
Dissolved Potassium (K)	ug/L	11000	1000	7064639	4100	1000	7064639			
Dissolved Selenium (Se)	ug/L	<5.0	5.0	7064639	<5.0	5.0	7064639			
Dissolved Silver (Ag)	ug/L	<1.0	1.0	7064639	<1.0	1.0	7064639			
Dissolved Sodium (Na)	ug/L	760000	1000	7064639	690000	1000	7064639			
Dissolved Strontium (Sr)	ug/L	8200	20	7064639	9600	20	7064639			
Dissolved Thallium (Tl)	ug/L	<1.0	1.0	7064639	<1.0	1.0	7064639			
Dissolved Tin (Sn)	ug/L	<20	20	7064639	<20	20	7064639			
Dissolved Titanium (Ti)	ug/L	<20	20	7064639	<20	20	7064639			
Dissolved Uranium (U)	ug/L	1.0	1.0	7064639	6.6	1.0	7064639			
Dissolved Vanadium (V)	ug/L	<20	20	7064639	<20	20	7064639			
Dissolved Zinc (Zn)	ug/L	<50	50	7064639	<50	50	7064639			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: C0U5726
Report Date: 2020/11/24

CBCL Limited
Client Project #: 171046.00

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		OEO925			OEO926			OEO927		
Sampling Date		2020/11/16 15:00			2020/11/16 14:00			2020/11/16 13:30		
COC Number		45468			45468			45468		
	UNITS	AVON MW-5	RDL	QC Batch	AVON MW-6	RDL	QC Batch	AVON MW-7 S	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	113	N/A	7062299	83.9	N/A	7062299	484	N/A	7062299
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	1800	1.0	7062296	530	1.0	7062296	1200	1.0	7062296
Calculated TDS	mg/L	6200	1.0	7062306	4800	1.0	7062306	27000	1.0	7062306
Carb. Alkalinity (calc. as CaCO3)	mg/L	12	1.0	7062296	1.6	1.0	7062296	3.3	1.0	7062296
Cation Sum	me/L	105	N/A	7062299	77.5	N/A	7062299	453	N/A	7062299
Hardness (CaCO3)	mg/L	960	1.0	7062297	1300	1.0	7062297	4800	1.0	7062297
Ion Balance (% Difference)	%	3.53	N/A	7062298	3.93	N/A	7062298	3.33	N/A	7062298
Langelier Index (@ 20C)	N/A	1.17		7062304	0.858		7062304	1.29		7062304
Langelier Index (@ 4C)	N/A	0.928		7062305	0.618		7062305	1.05		7062305
Nitrate (N)	mg/L	<0.050	0.050	7062300	<0.050	0.050	7062300	<0.050	0.050	7062300
Saturation pH (@ 20C)	N/A	6.67		7062304	6.66		7062304	6.20		7062304
Saturation pH (@ 4C)	N/A	6.91		7062305	6.90		7062305	6.44		7062305
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	1800	100	7067731	530	50	7067731	1200	100	7067731
Dissolved Chloride (Cl-)	mg/L	2400	50	7070180	1900	50	7070180	15000	250	7070180
Colour	TCU	300	100	7070184	22	5.0	7070184	71	25	7070184
Nitrate + Nitrite (N)	mg/L	<0.050	0.050	7070190	0.060	0.050	7070190	<0.050	0.050	7070190
Nitrite (N)	mg/L	<0.010	0.010	7070192	0.020	0.010	7070192	<0.010	0.010	7070192
Nitrogen (Ammonia Nitrogen)	mg/L	16	1.0	7070627	4.5	0.25	7070634	15	1.0	7070634
Total Organic Carbon (C)	mg/L	55 (1)	50	7065442	<50 (1)	50	7065442	19 (1)	5.0	7065438
Orthophosphate (P)	mg/L	4.2	0.20	7070185	0.038	0.010	7070185	3.2	0.20	7070185
pH	pH	7.84		7066874	7.51		7066874	7.48		7066874
Reactive Silica (SiO2)	mg/L	30	1.0	7070183	27	1.0	7070183	36	1.0	7070183
Dissolved Sulphate (SO4)	mg/L	320	10	7070181	970	20	7070181	1900	100	7070181
Turbidity	NTU	>1000	1.0	7065343	>1000	1.0	7067118	120	1.0	7067118
Conductivity	uS/cm	10000	1.0	7066873	7800	1.0	7066873	41000	1.0	7066873
Metals										
Dissolved Aluminum (Al)	ug/L	<50	50	7064639	<50	50	7064639	<50	50	7064639
Dissolved Antimony (Sb)	ug/L	<10	10	7064639	<10	10	7064639	<10	10	7064639
Dissolved Arsenic (As)	ug/L	24	10	7064639	<10	10	7064639	<10	10	7064639
Dissolved Barium (Ba)	ug/L	<10	10	7064639	16	10	7064639	85	10	7064639
Dissolved Beryllium (Be)	ug/L	<10	10	7064639	<10	10	7064639	<10	10	7064639

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		OEO925			OEO926			OEO927		
Sampling Date		2020/11/16 15:00			2020/11/16 14:00			2020/11/16 13:30		
COC Number		45468			45468			45468		
	UNITS	AVON MW-5	RDL	QC Batch	AVON MW-6	RDL	QC Batch	AVON MW-7 S	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L	<20	20	7064639	<20	20	7064639	<20	20	7064639
Dissolved Boron (B)	ug/L	2600	500	7064639	1100	500	7064639	3800	500	7064639
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	7064639	<0.10	0.10	7064639	<0.10	0.10	7064639
Dissolved Calcium (Ca)	ug/L	77000	1000	7064639	250000	1000	7064639	390000	1000	7064639
Dissolved Chromium (Cr)	ug/L	<10	10	7064639	<10	10	7064639	<10	10	7064639
Dissolved Cobalt (Co)	ug/L	<4.0	4.0	7064639	<4.0	4.0	7064639	<4.0	4.0	7064639
Dissolved Copper (Cu)	ug/L	<5.0	5.0	7064639	<5.0	5.0	7064639	<5.0	5.0	7064639
Dissolved Iron (Fe)	ug/L	540	500	7064639	<500	500	7064639	<500	500	7064639
Dissolved Lead (Pb)	ug/L	<5.0	5.0	7064639	<5.0	5.0	7064639	<5.0	5.0	7064639
Dissolved Magnesium (Mg)	ug/L	190000	1000	7064639	150000	1000	7064639	920000	1000	7064639
Dissolved Manganese (Mn)	ug/L	1100	20	7064639	3100	20	7064639	6700	20	7064639
Dissolved Molybdenum (Mo)	ug/L	<20	20	7064639	<20	20	7064639	<20	20	7064639
Dissolved Nickel (Ni)	ug/L	<20	20	7064639	<20	20	7064639	<20	20	7064639
Dissolved Phosphorus (P)	ug/L	8600	1000	7064639	<1000	1000	7064639	3900	1000	7064639
Dissolved Potassium (K)	ug/L	68000	1000	7064639	47000	1000	7064639	240000	1000	7064639
Dissolved Selenium (Se)	ug/L	<5.0	5.0	7064639	<5.0	5.0	7064639	<5.0	5.0	7064639
Dissolved Silver (Ag)	ug/L	<1.0	1.0	7064639	<1.0	1.0	7064639	<1.0	1.0	7064639
Dissolved Sodium (Na)	ug/L	1900000	1000	7064639	1200000	1000	7064639	8100000	1000	7064639
Dissolved Strontium (Sr)	ug/L	1100	20	7064639	1900	20	7064639	5400	20	7064639
Dissolved Thallium (Tl)	ug/L	<1.0	1.0	7064639	<1.0	1.0	7064639	<1.0	1.0	7064639
Dissolved Tin (Sn)	ug/L	<20	20	7064639	<20	20	7064639	<20	20	7064639
Dissolved Titanium (Ti)	ug/L	29	20	7064639	<20	20	7064639	<20	20	7064639
Dissolved Uranium (U)	ug/L	<1.0	1.0	7064639	<1.0	1.0	7064639	<1.0	1.0	7064639
Dissolved Vanadium (V)	ug/L	42	20	7064639	<20	20	7064639	<20	20	7064639
Dissolved Zinc (Zn)	ug/L	<50	50	7064639	<50	50	7064639	<50	50	7064639

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		OEO928		OEO929		OEO930		
Sampling Date		2020/11/16 13:15		2020/11/16 13:00		2020/11/16 12:30		
COC Number		45468		45468		45468		
	UNITS	AVON MW-7 INT	RDL	AVON MW-7 D	RDL	AVON MW-8	RDL	QC Batch
Calculated Parameters								
Anion Sum	me/L	83.7	N/A	186	N/A	97.7	N/A	7062299
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	430	1.0	740	1.0	970	1.0	7062296
Calculated TDS	mg/L	5300	1.0	11000	1.0	5400	1.0	7062306
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.5	1.0	2.2	1.0	7.1	1.0	7062296
Cation Sum	me/L	101	N/A	173	N/A	88.8	N/A	7062299
Hardness (CaCO3)	mg/L	1200	1.0	2200	1.0	750	1.0	7062297
Ion Balance (% Difference)	%	9.38	N/A	3.75	N/A	4.73	N/A	7062298
Langelier Index (@ 20C)	N/A	0.487		0.955		1.01		7062304
Langelier Index (@ 4C)	N/A	0.247		0.718		0.769		7062305
Nitrate (N)	mg/L	<0.050	0.050	<0.050	0.050	0.11	0.050	7062300
Saturation pH (@ 20C)	N/A	7.06		6.54		6.88		7062304
Saturation pH (@ 4C)	N/A	7.30		6.78		7.12		7062305
Inorganics								
Total Alkalinity (Total as CaCO3)	mg/L	440	25	740	50	980	100	7067731
Dissolved Chloride (Cl-)	mg/L	2000	50	4900	50	2500	50	7070180
Colour	TCU	32	5.0	23	5.0	110	25	7070184
Nitrate + Nitrite (N)	mg/L	0.059	0.050	<0.050	0.050	0.11	0.050	7070190
Nitrite (N)	mg/L	0.011	0.010	<0.010	0.010	<0.010	0.010	7070192
Nitrogen (Ammonia Nitrogen)	mg/L	2.8	0.25	5.0	0.25	12	0.75	7070634
Total Organic Carbon (C)	mg/L	13 (1)	5.0	10 (1)	5.0	21 (1)	5.0	7065442
Orthophosphate (P)	mg/L	0.027	0.010	<0.010	0.010	4.5	0.20	7070185
pH	pH	7.55		7.49		7.89		7066874
Reactive Silica (SiO2)	mg/L	28	1.0	21	1.0	34	1.0	7070183
Dissolved Sulphate (SO4)	mg/L	900	20	1600	100	330	10	7070181
Turbidity	NTU	190	1.0	440	1.0	560	1.0	7067118
Conductivity	uS/cm	7800	1.0	17000	1.0	9100	1.0	7066873
Metals								
Dissolved Aluminum (Al)	ug/L	<50	50	52	50	<50	50	7064639
Dissolved Antimony (Sb)	ug/L	<10	10	<10	10	<10	10	7064639
Dissolved Arsenic (As)	ug/L	<10	10	<10	10	<10	10	7064639
Dissolved Barium (Ba)	ug/L	<10	10	49	10	17	10	7064639
Dissolved Beryllium (Be)	ug/L	<10	10	<10	10	<10	10	7064639

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		OEO928		OEO929		OEO930		
Sampling Date		2020/11/16 13:15		2020/11/16 13:00		2020/11/16 12:30		
COC Number		45468		45468		45468		
	UNITS	AVON MW-7 INT	RDL	AVON MW-7 D	RDL	AVON MW-8	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L	<20	20	<20	20	<20	20	7064639
Dissolved Boron (B)	ug/L	1700	500	1700	500	1900	500	7064639
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	7064639
Dissolved Calcium (Ca)	ug/L	120000	1000	300000	1000	86000	1000	7064639
Dissolved Chromium (Cr)	ug/L	<10	10	<10	10	<10	10	7064639
Dissolved Cobalt (Co)	ug/L	21	4.0	19	4.0	<4.0	4.0	7064639
Dissolved Copper (Cu)	ug/L	<5.0	5.0	<5.0	5.0	<5.0	5.0	7064639
Dissolved Iron (Fe)	ug/L	<500	500	<500	500	<500	500	7064639
Dissolved Lead (Pb)	ug/L	<5.0	5.0	<5.0	5.0	<5.0	5.0	7064639
Dissolved Magnesium (Mg)	ug/L	220000	1000	340000	1000	130000	1000	7064639
Dissolved Manganese (Mn)	ug/L	1100	20	1600	20	3000	20	7064639
Dissolved Molybdenum (Mo)	ug/L	<20	20	<20	20	20	20	7064639
Dissolved Nickel (Ni)	ug/L	<20	20	<20	20	<20	20	7064639
Dissolved Phosphorus (P)	ug/L	<1000	1000	<1000	1000	5700	1000	7064639
Dissolved Potassium (K)	ug/L	70000	1000	96000	1000	69000	1000	7064639
Dissolved Selenium (Se)	ug/L	<5.0	5.0	<5.0	5.0	<5.0	5.0	7064639
Dissolved Silver (Ag)	ug/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	7064639
Dissolved Sodium (Na)	ug/L	1700000	1000	2900000	1000	1600000	1000	7064639
Dissolved Strontium (Sr)	ug/L	1500	20	3500	20	950	20	7064639
Dissolved Thallium (Tl)	ug/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	7064639
Dissolved Tin (Sn)	ug/L	<20	20	<20	20	<20	20	7064639
Dissolved Titanium (Ti)	ug/L	<20	20	<20	20	<20	20	7064639
Dissolved Uranium (U)	ug/L	<1.0	1.0	<1.0	1.0	4.1	1.0	7064639
Dissolved Vanadium (V)	ug/L	<20	20	<20	20	<20	20	7064639
Dissolved Zinc (Zn)	ug/L	<50	50	<50	50	<50	50	7064639

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	6.3°C

Sample OEO921 [AVON MW-1] : Elevated reporting limits for trace metals due to sample matrix. ortho-Phosphate > Total Phosphorus: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Poor RCAp Ion Balance due to sample matrix. Cation sum does not include contribution from Mn, Sr, and B.

Sample OEO922 [AVON MW-2] : ortho-Phosphate > Total Phosphorus: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Sample OEO923 [AVON MW-3] : Elevated reporting limits for trace metals due to sample matrix.

Sample OEO924 [AVON MW-4] : Elevated reporting limits for trace metals due to sample matrix.

Poor RCAp Ion Balance due to sample matrix. Cation sum does not include contribution from Mn and Sr.

Sample OEO925 [AVON MW-5] : Elevated reporting limits for trace metals due to sample matrix.

Sample OEO926 [AVON MW-6] : Elevated reporting limits for trace metals due to sample matrix. ortho-Phosphate > Total Phosphorus: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Sample OEO927 [AVON MW-7 S] : Elevated reporting limits for trace metals due to sample matrix.

Sample OEO928 [AVON MW-7 INT] : Elevated reporting limits for trace metals due to sample matrix. ortho-Phosphate > Total Phosphorus: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Poor RCAp Ion Balance due to sample matrix. Possibly due to fine particulate matter. Anion sum does not include contribution from Total Organic Carbon.

Sample OEO929 [AVON MW-7 D] : Elevated reporting limits for trace metals due to sample matrix.

Sample OEO930 [AVON MW-8] : Elevated reporting limits for trace metals due to sample matrix.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7064639	BAN	Matrix Spike	Dissolved Aluminum (Al)	2020/11/20		99	%	80 - 120
			Dissolved Antimony (Sb)	2020/11/20		73 (1)	%	80 - 120
			Dissolved Arsenic (As)	2020/11/20		NC	%	80 - 120
			Dissolved Barium (Ba)	2020/11/20		90	%	80 - 120
			Dissolved Beryllium (Be)	2020/11/20		93	%	80 - 120
			Dissolved Bismuth (Bi)	2020/11/20		88	%	80 - 120
			Dissolved Boron (B)	2020/11/20		87	%	80 - 120
			Dissolved Cadmium (Cd)	2020/11/20		91	%	80 - 120
			Dissolved Calcium (Ca)	2020/11/20		NC	%	80 - 120
			Dissolved Chromium (Cr)	2020/11/20		93	%	80 - 120
			Dissolved Cobalt (Co)	2020/11/20		NC	%	80 - 120
			Dissolved Copper (Cu)	2020/11/20		NC	%	80 - 120
			Dissolved Iron (Fe)	2020/11/20		88	%	80 - 120
			Dissolved Lead (Pb)	2020/11/20		91	%	80 - 120
			Dissolved Magnesium (Mg)	2020/11/20		92	%	80 - 120
			Dissolved Manganese (Mn)	2020/11/20		89	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/11/20		NC	%	80 - 120
			Dissolved Nickel (Ni)	2020/11/20		95	%	80 - 120
			Dissolved Phosphorus (P)	2020/11/20		95	%	80 - 120
			Dissolved Potassium (K)	2020/11/20		NC	%	80 - 120
			Dissolved Selenium (Se)	2020/11/20		97	%	80 - 120
			Dissolved Silver (Ag)	2020/11/20		89	%	80 - 120
			Dissolved Sodium (Na)	2020/11/20		NC	%	80 - 120
			Dissolved Strontium (Sr)	2020/11/20		NC	%	80 - 120
			Dissolved Thallium (Tl)	2020/11/20		93	%	80 - 120
			Dissolved Tin (Sn)	2020/11/20		90	%	80 - 120
			Dissolved Titanium (Ti)	2020/11/20		93	%	80 - 120
			Dissolved Uranium (U)	2020/11/20		91	%	80 - 120
			Dissolved Vanadium (V)	2020/11/20		96	%	80 - 120
			Dissolved Zinc (Zn)	2020/11/20		95	%	80 - 120
7064639	BAN	Spiked Blank	Dissolved Aluminum (Al)	2020/11/20		100	%	80 - 120
			Dissolved Antimony (Sb)	2020/11/20		90	%	80 - 120
			Dissolved Arsenic (As)	2020/11/20		92	%	80 - 120
			Dissolved Barium (Ba)	2020/11/20		94	%	80 - 120
			Dissolved Beryllium (Be)	2020/11/20		96	%	80 - 120
			Dissolved Bismuth (Bi)	2020/11/20		96	%	80 - 120
			Dissolved Boron (B)	2020/11/20		96	%	80 - 120
			Dissolved Cadmium (Cd)	2020/11/20		94	%	80 - 120
			Dissolved Calcium (Ca)	2020/11/20		91	%	80 - 120
			Dissolved Chromium (Cr)	2020/11/20		93	%	80 - 120
			Dissolved Cobalt (Co)	2020/11/20		93	%	80 - 120
			Dissolved Copper (Cu)	2020/11/20		92	%	80 - 120
			Dissolved Iron (Fe)	2020/11/20		100	%	80 - 120
			Dissolved Lead (Pb)	2020/11/20		94	%	80 - 120
			Dissolved Magnesium (Mg)	2020/11/20		102	%	80 - 120
			Dissolved Manganese (Mn)	2020/11/20		96	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/11/20		98	%	80 - 120
			Dissolved Nickel (Ni)	2020/11/20		96	%	80 - 120
			Dissolved Phosphorus (P)	2020/11/20		101	%	80 - 120
			Dissolved Potassium (K)	2020/11/20		100	%	80 - 120
			Dissolved Selenium (Se)	2020/11/20		95	%	80 - 120
			Dissolved Silver (Ag)	2020/11/20		94	%	80 - 120
			Dissolved Sodium (Na)	2020/11/20		98	%	80 - 120
			Dissolved Strontium (Sr)	2020/11/20		96	%	80 - 120
			Dissolved Thallium (Tl)	2020/11/20		98	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Tin (Sn)	2020/11/20		103	%	80 - 120
			Dissolved Titanium (Ti)	2020/11/20		95	%	80 - 120
			Dissolved Uranium (U)	2020/11/20		101	%	80 - 120
			Dissolved Vanadium (V)	2020/11/20		95	%	80 - 120
			Dissolved Zinc (Zn)	2020/11/20		101	%	80 - 120
7064639	BAN	Method Blank	Dissolved Aluminum (Al)	2020/11/20	<5.0		ug/L	
			Dissolved Antimony (Sb)	2020/11/20	<1.0		ug/L	
			Dissolved Arsenic (As)	2020/11/20	<1.0		ug/L	
			Dissolved Barium (Ba)	2020/11/20	<1.0		ug/L	
			Dissolved Beryllium (Be)	2020/11/20	<1.0		ug/L	
			Dissolved Bismuth (Bi)	2020/11/20	<2.0		ug/L	
			Dissolved Boron (B)	2020/11/20	<50		ug/L	
			Dissolved Cadmium (Cd)	2020/11/20	<0.010		ug/L	
			Dissolved Calcium (Ca)	2020/11/20	<100		ug/L	
			Dissolved Chromium (Cr)	2020/11/20	<1.0		ug/L	
			Dissolved Cobalt (Co)	2020/11/20	<0.40		ug/L	
			Dissolved Copper (Cu)	2020/11/20	<0.50		ug/L	
			Dissolved Iron (Fe)	2020/11/20	<50		ug/L	
			Dissolved Lead (Pb)	2020/11/20	<0.50		ug/L	
			Dissolved Magnesium (Mg)	2020/11/20	<100		ug/L	
			Dissolved Manganese (Mn)	2020/11/20	<2.0		ug/L	
			Dissolved Molybdenum (Mo)	2020/11/20	<2.0		ug/L	
			Dissolved Nickel (Ni)	2020/11/20	<2.0		ug/L	
			Dissolved Phosphorus (P)	2020/11/20	<100		ug/L	
			Dissolved Potassium (K)	2020/11/20	<100		ug/L	
			Dissolved Selenium (Se)	2020/11/20	<0.50		ug/L	
			Dissolved Silver (Ag)	2020/11/20	<0.10		ug/L	
			Dissolved Sodium (Na)	2020/11/20	<100		ug/L	
			Dissolved Strontium (Sr)	2020/11/20	<2.0		ug/L	
			Dissolved Thallium (Tl)	2020/11/20	<0.10		ug/L	
			Dissolved Tin (Sn)	2020/11/20	<2.0		ug/L	
			Dissolved Titanium (Ti)	2020/11/20	<2.0		ug/L	
			Dissolved Uranium (U)	2020/11/20	<0.10		ug/L	
			Dissolved Vanadium (V)	2020/11/20	<2.0		ug/L	
			Dissolved Zinc (Zn)	2020/11/20	<5.0		ug/L	
7064639	BAN	RPD	Dissolved Aluminum (Al)	2020/11/20	3.7		%	20
			Dissolved Antimony (Sb)	2020/11/20	NC		%	20
			Dissolved Arsenic (As)	2020/11/20	0.14		%	20
			Dissolved Barium (Ba)	2020/11/20	6.5		%	20
			Dissolved Beryllium (Be)	2020/11/20	NC		%	20
			Dissolved Bismuth (Bi)	2020/11/20	NC		%	20
			Dissolved Boron (B)	2020/11/20	NC		%	20
			Dissolved Cadmium (Cd)	2020/11/20	NC		%	20
			Dissolved Calcium (Ca)	2020/11/20	7.1		%	20
			Dissolved Chromium (Cr)	2020/11/20	NC		%	20
			Dissolved Cobalt (Co)	2020/11/20	8.2		%	20
			Dissolved Copper (Cu)	2020/11/20	14		%	20
			Dissolved Iron (Fe)	2020/11/20	NC		%	20
			Dissolved Lead (Pb)	2020/11/20	NC		%	20
			Dissolved Magnesium (Mg)	2020/11/20	6.7		%	20
			Dissolved Manganese (Mn)	2020/11/20	NC		%	20
			Dissolved Molybdenum (Mo)	2020/11/20	5.0		%	20
			Dissolved Nickel (Ni)	2020/11/20	NC		%	20
			Dissolved Phosphorus (P)	2020/11/20	NC		%	20
			Dissolved Potassium (K)	2020/11/20	11		%	20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Selenium (Se)	2020/11/20	4.1		%	20
			Dissolved Silver (Ag)	2020/11/20	NC		%	20
			Dissolved Sodium (Na)	2020/11/20	7.4		%	20
			Dissolved Strontium (Sr)	2020/11/20	6.7		%	20
			Dissolved Thallium (Tl)	2020/11/20	NC		%	20
			Dissolved Tin (Sn)	2020/11/20	NC		%	20
			Dissolved Titanium (Ti)	2020/11/20	NC		%	20
			Dissolved Uranium (U)	2020/11/20	0.71		%	20
			Dissolved Vanadium (V)	2020/11/20	NC		%	20
			Dissolved Zinc (Zn)	2020/11/20	NC		%	20
7064640	SHW	QC Standard	Turbidity	2020/11/19		100	%	80 - 120
7064640	SHW	Spiked Blank	Turbidity	2020/11/19		94	%	80 - 120
7064640	SHW	Method Blank	Turbidity	2020/11/19	<0.10		NTU	
7064640	SHW	RPD [OEO924-01]	Turbidity	2020/11/19	NC		%	20
7065343	SHW	QC Standard	Turbidity	2020/11/19		100	%	80 - 120
7065343	SHW	Spiked Blank	Turbidity	2020/11/19		94	%	80 - 120
7065343	SHW	Method Blank	Turbidity	2020/11/19	<0.10		NTU	
7065343	SHW	RPD	Turbidity	2020/11/19	5.3		%	20
7065438	YLG	Matrix Spike	Total Organic Carbon (C)	2020/11/19		96	%	85 - 115
7065438	YLG	Spiked Blank	Total Organic Carbon (C)	2020/11/19		98	%	80 - 120
7065438	YLG	Method Blank	Total Organic Carbon (C)	2020/11/19	<0.50		mg/L	
7065438	YLG	RPD	Total Organic Carbon (C)	2020/11/19	NC (2)		%	15
7065442	YLG	Matrix Spike	Total Organic Carbon (C)	2020/11/20		97	%	85 - 115
7065442	YLG	Spiked Blank	Total Organic Carbon (C)	2020/11/20		99	%	80 - 120
7065442	YLG	Method Blank	Total Organic Carbon (C)	2020/11/20	<0.50		mg/L	
7065442	YLG	RPD	Total Organic Carbon (C)	2020/11/20	0.60 (2)		%	15
7066873	SHW	Spiked Blank	Conductivity	2020/11/20		99	%	80 - 120
7066873	SHW	Method Blank	Conductivity	2020/11/20	<1.0		uS/cm	
7066873	SHW	RPD [OEO924-01]	Conductivity	2020/11/20	0.75		%	10
7066874	SHW	Spiked Blank	pH	2020/11/20		100	%	97 - 103
7066874	SHW	RPD [OEO924-01]	pH	2020/11/20	0.74		%	N/A
7067118	SHW	QC Standard	Turbidity	2020/11/20		101	%	80 - 120
7067118	SHW	Spiked Blank	Turbidity	2020/11/20		96	%	80 - 120
7067118	SHW	Method Blank	Turbidity	2020/11/20	<0.10		NTU	
7067118	SHW	RPD	Turbidity	2020/11/20	NC		%	20
7067731	EMT	Matrix Spike	Total Alkalinity (Total as CaCO3)	2020/11/23		100	%	80 - 120
7067731	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2020/11/23		105	%	80 - 120
7067731	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2020/11/23	<5.0		mg/L	
7067731	EMT	RPD	Total Alkalinity (Total as CaCO3)	2020/11/23	NC		%	20
7070180	EMT	Matrix Spike	Dissolved Chloride (Cl-)	2020/11/24		103	%	80 - 120
7070180	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2020/11/24		98	%	80 - 120
7070180	EMT	Method Blank	Dissolved Chloride (Cl-)	2020/11/24	<1.0		mg/L	
7070180	EMT	RPD	Dissolved Chloride (Cl-)	2020/11/24	5.9		%	20
7070181	EMT	Matrix Spike	Dissolved Sulphate (SO4)	2020/11/23		100	%	80 - 120
7070181	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2020/11/23		100	%	80 - 120
7070181	EMT	Method Blank	Dissolved Sulphate (SO4)	2020/11/23	<2.0		mg/L	
7070181	EMT	RPD	Dissolved Sulphate (SO4)	2020/11/23	NC		%	20
7070183	EMT	Matrix Spike	Reactive Silica (SiO2)	2020/11/23		90	%	80 - 120
7070183	EMT	Spiked Blank	Reactive Silica (SiO2)	2020/11/23		90	%	80 - 120
7070183	EMT	Method Blank	Reactive Silica (SiO2)	2020/11/23	<0.50		mg/L	
7070183	EMT	RPD	Reactive Silica (SiO2)	2020/11/23	3.7		%	20
7070184	EMT	Spiked Blank	Colour	2020/11/23		100	%	80 - 120
7070184	EMT	Method Blank	Colour	2020/11/23	<5.0		TCU	
7070184	EMT	RPD	Colour	2020/11/23	NC		%	20
7070185	EMT	Matrix Spike	Orthophosphate (P)	2020/11/23		92	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7070185	EMT	Spiked Blank	Orthophosphate (P)	2020/11/23		101	%	80 - 120
7070185	EMT	Method Blank	Orthophosphate (P)	2020/11/23	<0.010		mg/L	
7070185	EMT	RPD	Orthophosphate (P)	2020/11/23	NC		%	20
7070190	EMT	Matrix Spike	Nitrate + Nitrite (N)	2020/11/23		100	%	80 - 120
7070190	EMT	Spiked Blank	Nitrate + Nitrite (N)	2020/11/23		99	%	80 - 120
7070190	EMT	Method Blank	Nitrate + Nitrite (N)	2020/11/23	<0.050		mg/L	
7070190	EMT	RPD	Nitrate + Nitrite (N)	2020/11/23	2.9		%	20
7070192	EMT	Matrix Spike	Nitrite (N)	2020/11/23		99	%	80 - 120
7070192	EMT	Spiked Blank	Nitrite (N)	2020/11/23		97	%	80 - 120
7070192	EMT	Method Blank	Nitrite (N)	2020/11/23	<0.010		mg/L	
7070192	EMT	RPD	Nitrite (N)	2020/11/23	NC		%	20
7070205	EMT	Matrix Spike [OEO924-01]	Nitrate + Nitrite (N)	2020/11/23		97	%	80 - 120
7070205	EMT	Spiked Blank	Nitrate + Nitrite (N)	2020/11/23		104	%	80 - 120
7070205	EMT	Method Blank	Nitrate + Nitrite (N)	2020/11/23	<0.050		mg/L	
7070205	EMT	RPD [OEO924-01]	Nitrate + Nitrite (N)	2020/11/23	0.10		%	20
7070274	EMT	Matrix Spike [OEO924-01]	Nitrite (N)	2020/11/23		99	%	80 - 120
7070274	EMT	Spiked Blank	Nitrite (N)	2020/11/23		102	%	80 - 120
7070274	EMT	Method Blank	Nitrite (N)	2020/11/23	<0.010		mg/L	
7070274	EMT	RPD [OEO924-01]	Nitrite (N)	2020/11/23	NC		%	20
7070287	EMT	Matrix Spike [OEO924-01]	Orthophosphate (P)	2020/11/23		90	%	80 - 120
7070287	EMT	Spiked Blank	Orthophosphate (P)	2020/11/23		96	%	80 - 120
7070287	EMT	Method Blank	Orthophosphate (P)	2020/11/23	<0.010		mg/L	
7070287	EMT	RPD [OEO924-01]	Orthophosphate (P)	2020/11/23	NC		%	20
7070289	EMT	Spiked Blank	Colour	2020/11/23		105	%	80 - 120
7070289	EMT	Method Blank	Colour	2020/11/23	<5.0		TCU	
7070289	EMT	RPD [OEO924-01]	Colour	2020/11/23	NC		%	20
7070292	EMT	Matrix Spike [OEO924-01]	Reactive Silica (SiO2)	2020/11/23		NC	%	80 - 120
7070292	EMT	Spiked Blank	Reactive Silica (SiO2)	2020/11/23		93	%	80 - 120
7070292	EMT	Method Blank	Reactive Silica (SiO2)	2020/11/23	<0.50		mg/L	
7070292	EMT	RPD [OEO924-01]	Reactive Silica (SiO2)	2020/11/23	2.6		%	20
7070294	EMT	Matrix Spike [OEO924-01]	Dissolved Sulphate (SO4)	2020/11/23		NC	%	80 - 120
7070294	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2020/11/24		101	%	80 - 120
7070294	EMT	Method Blank	Dissolved Sulphate (SO4)	2020/11/24	<2.0		mg/L	
7070294	EMT	RPD [OEO924-01]	Dissolved Sulphate (SO4)	2020/11/23	1.0		%	20
7070296	EMT	Matrix Spike [OEO924-01]	Dissolved Chloride (Cl-)	2020/11/24		NC	%	80 - 120
7070296	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2020/11/24		104	%	80 - 120
7070296	EMT	Method Blank	Dissolved Chloride (Cl-)	2020/11/24	<1.0		mg/L	
7070296	EMT	RPD [OEO924-01]	Dissolved Chloride (Cl-)	2020/11/24	3.9		%	20
7070302	EMT	Matrix Spike [OEO924-01]	Total Alkalinity (Total as CaCO3)	2020/11/23		NC	%	80 - 120
7070302	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2020/11/23		102	%	80 - 120
7070302	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2020/11/23	<5.0		mg/L	
7070302	EMT	RPD [OEO924-01]	Total Alkalinity (Total as CaCO3)	2020/11/23	1.4		%	20
7070627	EMT	Matrix Spike [OEO922-04]	Nitrogen (Ammonia Nitrogen)	2020/11/24		101	%	80 - 120
7070627	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2020/11/23		101	%	80 - 120
7070627	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2020/11/23	<0.050		mg/L	
7070627	EMT	RPD [OEO922-04]	Nitrogen (Ammonia Nitrogen)	2020/11/24	NC		%	20
7070634	EMT	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2020/11/23		95	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7070634	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2020/11/24		107	%	80 - 120
7070634	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2020/11/24	<0.050		mg/L	
7070634	EMT	RPD	Nitrogen (Ammonia Nitrogen)	2020/11/23	4.3		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery is within QC acceptance limits. < 10 % of compounds in multi-component analysis in violation.

(2) Elevated reporting limit due to turbidity.

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Mike MacGillivray, Scientific Specialist (Inorganics)

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

Your Project #: 171046.00
Your C.O.C. #: 45469

Attention: Colin Walker

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2020/11/24
Report #: R6423109
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0U5776
Received: 2020/11/17, 09:37

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbonate, Bicarbonate and Hydroxide	2	N/A	2020/11/20	N/A	SM 23 4500-CO2 D
Alkalinity	2	N/A	2020/11/23	ATL SOP 00013	EPA 310.2 R1974 m
Chloride	2	N/A	2020/11/24	ATL SOP 00014	SM 23 4500-Cl- E m
Colour	2	N/A	2020/11/23	ATL SOP 00020	SM 23 2120C m
Conductance - water	2	N/A	2020/11/20	ATL SOP 00004	SM 23 2510B m
Hardness (calculated as CaCO3)	2	N/A	2020/11/23	ATL SOP 00048	Auto Calc
Metals Water Diss. MS (1)	2	N/A	2020/11/20	ATL SOP 00058	EPA 6020B R2 m
Ion Balance (% Difference)	2	N/A	2020/11/24	N/A	Auto Calc.
Anion and Cation Sum	2	N/A	2020/11/24	N/A	Auto Calc.
Nitrogen Ammonia - water	1	N/A	2020/11/23	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen Ammonia - water	1	N/A	2020/11/24	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	2	N/A	2020/11/23	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	2	N/A	2020/11/23	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	2	N/A	2020/11/24	ATL SOP 00018	ASTM D3867-16
pH (2)	2	N/A	2020/11/20	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	2	N/A	2020/11/23	ATL SOP 00021	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C)	2	N/A	2020/11/24	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	2	N/A	2020/11/24	ATL SOP 00049	Auto Calc.
Reactive Silica	2	N/A	2020/11/23	ATL SOP 00022	EPA 366.0 m
Sulphate	1	N/A	2020/11/23	ATL SOP 00023	ASTM D516-16 m
Sulphate	1	N/A	2020/11/24	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc)	2	N/A	2020/11/24	N/A	Auto Calc.
Organic carbon - Total (TOC) (3)	2	N/A	2020/11/20	ATL SOP 00203	SM 23 5310B m
Turbidity	2	N/A	2020/11/20	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All

Your Project #: 171046.00
Your C.O.C. #: 45469

<u>Attention: Colin Walker</u>

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2020/11/24
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CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0U5776
Received: 2020/11/17, 09:37

data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Sample filtered in laboratory prior to analysis for dissolved metals.
(2) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(3) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Keri Mackay, Customer Experience Team Lead
Email: Keri.MACKAY@bvlabs.com
Phone# (902)420-0203 Ext:294
==
This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		OEP045		OEP046		
Sampling Date		2020/11/16 12:15		2020/11/16 12:00		
COC Number		45469		45469		
	UNITS	**AVON MW9**	**RDL**	**AVON MW10**	**RDL**	**QC Batch**
Calculated Parameters						
Anion Sum	me/L	66.3	N/A	271	N/A	7062299
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	580	1.0	2000	1.0	7062296
Calculated TDS	mg/L	3700	1.0	15000	1.0	7062306
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.9	1.0	6.7	1.0	7062296
Cation Sum	me/L	59.7	N/A	259	N/A	7062299
Hardness (CaCO3)	mg/L	690	1.0	2900	1.0	7062297
Ion Balance (% Difference)	%	5.25	N/A	2.09	N/A	7062298
Langelier Index (@ 20C)	N/A	0.446		1.26		7062304
Langelier Index (@ 4C)	N/A	0.205		1.02		7062305
Nitrate (N)	mg/L	<0.050	0.050	<0.050	0.050	7062300
Saturation pH (@ 20C)	N/A	7.11		6.30		7062304
Saturation pH (@ 4C)	N/A	7.35		6.53		7062305
Inorganics						
Total Alkalinity (Total as CaCO3)	mg/L	580	50	2000	250	7067731
Dissolved Chloride (Cl-)	mg/L	1600	50	8200	100	7070180
Colour	TCU	33	5.0	62	25	7070184
Nitrate + Nitrite (N)	mg/L	<0.050	0.050	<0.050	0.050	7070190
Nitrite (N)	mg/L	<0.010	0.010	<0.010	0.010	7070192
Nitrogen (Ammonia Nitrogen)	mg/L	2.1	0.25	19	1.0	7070634
Total Organic Carbon (C)	mg/L	15 (1)	5.0	<50 (1)	50	7065442
Orthophosphate (P)	mg/L	0.025	0.010	0.072	0.010	7070185
pH	pH	7.55		7.55		7066874
Reactive Silica (SiO2)	mg/L	33	1.0	18	0.50	7070183
Dissolved Sulphate (SO4)	mg/L	470	10	4.4	2.0	7070181
Turbidity	NTU	350	1.0	>1000	1.0	7067118
Conductivity	uS/cm	6200	1.0	25000	1.0	7066873
Metals						
Dissolved Aluminum (Al)	ug/L	<50	50	<50	50	7064639
Dissolved Antimony (Sb)	ug/L	<10	10	<10	10	7064639
Dissolved Arsenic (As)	ug/L	<10	10	<10	10	7064639
Dissolved Barium (Ba)	ug/L	29	10	170	10	7064639
Dissolved Beryllium (Be)	ug/L	<10	10	<10	10	7064639
Dissolved Bismuth (Bi)	ug/L	<20	20	<20	20	7064639
Dissolved Boron (B)	ug/L	1100	500	1900	500	7064639

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		OEP045		OEP046		
Sampling Date		2020/11/16 12:15		2020/11/16 12:00		
COC Number		45469		45469		
	UNITS	AVON MW9	RDL	AVON MW10	RDL	QC Batch
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	<0.10	0.10	7064639
Dissolved Calcium (Ca)	ug/L	76000	1000	200000	1000	7064639
Dissolved Chromium (Cr)	ug/L	<10	10	<10	10	7064639
Dissolved Cobalt (Co)	ug/L	<4.0	4.0	<4.0	4.0	7064639
Dissolved Copper (Cu)	ug/L	<5.0	5.0	<5.0	5.0	7064639
Dissolved Iron (Fe)	ug/L	<500	500	<500	500	7064639
Dissolved Lead (Pb)	ug/L	<5.0	5.0	<5.0	5.0	7064639
Dissolved Magnesium (Mg)	ug/L	120000	1000	580000	1000	7064639
Dissolved Manganese (Mn)	ug/L	2000	20	3200	20	7064639
Dissolved Molybdenum (Mo)	ug/L	24	20	24	20	7064639
Dissolved Nickel (Ni)	ug/L	<20	20	<20	20	7064639
Dissolved Phosphorus (P)	ug/L	<1000	1000	<1000	1000	7064639
Dissolved Potassium (K)	ug/L	57000	1000	150000	1000	7064639
Dissolved Selenium (Se)	ug/L	<5.0	5.0	<5.0	5.0	7064639
Dissolved Silver (Ag)	ug/L	<1.0	1.0	<1.0	1.0	7064639
Dissolved Sodium (Na)	ug/L	1000000	1000	4500000	1000	7064639
Dissolved Strontium (Sr)	ug/L	700	20	3300	20	7064639
Dissolved Thallium (Tl)	ug/L	<1.0	1.0	<1.0	1.0	7064639
Dissolved Tin (Sn)	ug/L	<20	20	<20	20	7064639
Dissolved Titanium (Ti)	ug/L	<20	20	<20	20	7064639
Dissolved Uranium (U)	ug/L	1.5	1.0	1.6	1.0	7064639
Dissolved Vanadium (V)	ug/L	<20	20	<20	20	7064639
Dissolved Zinc (Zn)	ug/L	<50	50	<50	50	7064639

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	6.3°C

Sample OEP045 [AVON MW9] : Elevated reporting limits for trace metals due to sample matrix. ortho-Phosphate > Total Phosphorus: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Poor RCAp Ion Balance due to sample matrix. Cation sum does not include contribution from Mn and B.

Sample OEP046 [AVON MW10] : Elevated reporting limits for trace metals due to sample matrix. ortho-Phosphate > Total Phosphorus: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Results relate only to the items tested.

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

BV Labs Job #: C0U5776
Report Date: 2020/11/24

CBCL Limited
Client Project #: 171046.00

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7064639	BAN	Matrix Spike	Dissolved Aluminum (Al)	2020/11/20		99	%	80 - 120
			Dissolved Antimony (Sb)	2020/11/20		73 (1)	%	80 - 120
			Dissolved Arsenic (As)	2020/11/20		NC	%	80 - 120
			Dissolved Barium (Ba)	2020/11/20		90	%	80 - 120
			Dissolved Beryllium (Be)	2020/11/20		93	%	80 - 120
			Dissolved Bismuth (Bi)	2020/11/20		88	%	80 - 120
			Dissolved Boron (B)	2020/11/20		87	%	80 - 120
			Dissolved Cadmium (Cd)	2020/11/20		91	%	80 - 120
			Dissolved Calcium (Ca)	2020/11/20		NC	%	80 - 120
			Dissolved Chromium (Cr)	2020/11/20		93	%	80 - 120
			Dissolved Cobalt (Co)	2020/11/20		NC	%	80 - 120
			Dissolved Copper (Cu)	2020/11/20		NC	%	80 - 120
			Dissolved Iron (Fe)	2020/11/20		88	%	80 - 120
			Dissolved Lead (Pb)	2020/11/20		91	%	80 - 120
			Dissolved Magnesium (Mg)	2020/11/20		92	%	80 - 120
			Dissolved Manganese (Mn)	2020/11/20		89	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/11/20		NC	%	80 - 120
			Dissolved Nickel (Ni)	2020/11/20		95	%	80 - 120
			Dissolved Phosphorus (P)	2020/11/20		95	%	80 - 120
			Dissolved Potassium (K)	2020/11/20		NC	%	80 - 120
			Dissolved Selenium (Se)	2020/11/20		97	%	80 - 120
			Dissolved Silver (Ag)	2020/11/20		89	%	80 - 120
			Dissolved Sodium (Na)	2020/11/20		NC	%	80 - 120
			Dissolved Strontium (Sr)	2020/11/20		NC	%	80 - 120
			Dissolved Thallium (Tl)	2020/11/20		93	%	80 - 120
			Dissolved Tin (Sn)	2020/11/20		90	%	80 - 120
			Dissolved Titanium (Ti)	2020/11/20		93	%	80 - 120
			Dissolved Uranium (U)	2020/11/20		91	%	80 - 120
			Dissolved Vanadium (V)	2020/11/20		96	%	80 - 120
			Dissolved Zinc (Zn)	2020/11/20		95	%	80 - 120
7064639	BAN	Spiked Blank	Dissolved Aluminum (Al)	2020/11/20		100	%	80 - 120
			Dissolved Antimony (Sb)	2020/11/20		90	%	80 - 120
			Dissolved Arsenic (As)	2020/11/20		92	%	80 - 120
			Dissolved Barium (Ba)	2020/11/20		94	%	80 - 120
			Dissolved Beryllium (Be)	2020/11/20		96	%	80 - 120
			Dissolved Bismuth (Bi)	2020/11/20		96	%	80 - 120
			Dissolved Boron (B)	2020/11/20		96	%	80 - 120
			Dissolved Cadmium (Cd)	2020/11/20		94	%	80 - 120
			Dissolved Calcium (Ca)	2020/11/20		91	%	80 - 120
			Dissolved Chromium (Cr)	2020/11/20		93	%	80 - 120
			Dissolved Cobalt (Co)	2020/11/20		93	%	80 - 120
			Dissolved Copper (Cu)	2020/11/20		92	%	80 - 120
			Dissolved Iron (Fe)	2020/11/20		100	%	80 - 120
			Dissolved Lead (Pb)	2020/11/20		94	%	80 - 120
			Dissolved Magnesium (Mg)	2020/11/20		102	%	80 - 120
			Dissolved Manganese (Mn)	2020/11/20		96	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/11/20		98	%	80 - 120
			Dissolved Nickel (Ni)	2020/11/20		96	%	80 - 120
			Dissolved Phosphorus (P)	2020/11/20		101	%	80 - 120
			Dissolved Potassium (K)	2020/11/20		100	%	80 - 120
			Dissolved Selenium (Se)	2020/11/20		95	%	80 - 120
			Dissolved Silver (Ag)	2020/11/20		94	%	80 - 120
			Dissolved Sodium (Na)	2020/11/20		98	%	80 - 120
			Dissolved Strontium (Sr)	2020/11/20		96	%	80 - 120
			Dissolved Thallium (Tl)	2020/11/20		98	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Tin (Sn)	2020/11/20		103	%	80 - 120
			Dissolved Titanium (Ti)	2020/11/20		95	%	80 - 120
			Dissolved Uranium (U)	2020/11/20		101	%	80 - 120
			Dissolved Vanadium (V)	2020/11/20		95	%	80 - 120
			Dissolved Zinc (Zn)	2020/11/20		101	%	80 - 120
7064639	BAN	Method Blank	Dissolved Aluminum (Al)	2020/11/20	<5.0		ug/L	
			Dissolved Antimony (Sb)	2020/11/20	<1.0		ug/L	
			Dissolved Arsenic (As)	2020/11/20	<1.0		ug/L	
			Dissolved Barium (Ba)	2020/11/20	<1.0		ug/L	
			Dissolved Beryllium (Be)	2020/11/20	<1.0		ug/L	
			Dissolved Bismuth (Bi)	2020/11/20	<2.0		ug/L	
			Dissolved Boron (B)	2020/11/20	<50		ug/L	
			Dissolved Cadmium (Cd)	2020/11/20	<0.010		ug/L	
			Dissolved Calcium (Ca)	2020/11/20	<100		ug/L	
			Dissolved Chromium (Cr)	2020/11/20	<1.0		ug/L	
			Dissolved Cobalt (Co)	2020/11/20	<0.40		ug/L	
			Dissolved Copper (Cu)	2020/11/20	<0.50		ug/L	
			Dissolved Iron (Fe)	2020/11/20	<50		ug/L	
			Dissolved Lead (Pb)	2020/11/20	<0.50		ug/L	
			Dissolved Magnesium (Mg)	2020/11/20	<100		ug/L	
			Dissolved Manganese (Mn)	2020/11/20	<2.0		ug/L	
			Dissolved Molybdenum (Mo)	2020/11/20	<2.0		ug/L	
			Dissolved Nickel (Ni)	2020/11/20	<2.0		ug/L	
			Dissolved Phosphorus (P)	2020/11/20	<100		ug/L	
			Dissolved Potassium (K)	2020/11/20	<100		ug/L	
			Dissolved Selenium (Se)	2020/11/20	<0.50		ug/L	
			Dissolved Silver (Ag)	2020/11/20	<0.10		ug/L	
			Dissolved Sodium (Na)	2020/11/20	<100		ug/L	
			Dissolved Strontium (Sr)	2020/11/20	<2.0		ug/L	
			Dissolved Thallium (Tl)	2020/11/20	<0.10		ug/L	
			Dissolved Tin (Sn)	2020/11/20	<2.0		ug/L	
			Dissolved Titanium (Ti)	2020/11/20	<2.0		ug/L	
			Dissolved Uranium (U)	2020/11/20	<0.10		ug/L	
			Dissolved Vanadium (V)	2020/11/20	<2.0		ug/L	
			Dissolved Zinc (Zn)	2020/11/20	<5.0		ug/L	
7064639	BAN	RPD	Dissolved Aluminum (Al)	2020/11/20	3.7		%	20
			Dissolved Antimony (Sb)	2020/11/20	NC		%	20
			Dissolved Arsenic (As)	2020/11/20	0.14		%	20
			Dissolved Barium (Ba)	2020/11/20	6.5		%	20
			Dissolved Beryllium (Be)	2020/11/20	NC		%	20
			Dissolved Bismuth (Bi)	2020/11/20	NC		%	20
			Dissolved Boron (B)	2020/11/20	NC		%	20
			Dissolved Cadmium (Cd)	2020/11/20	NC		%	20
			Dissolved Calcium (Ca)	2020/11/20	7.1		%	20
			Dissolved Chromium (Cr)	2020/11/20	NC		%	20
			Dissolved Cobalt (Co)	2020/11/20	8.2		%	20
			Dissolved Copper (Cu)	2020/11/20	14		%	20
			Dissolved Iron (Fe)	2020/11/20	NC		%	20
			Dissolved Lead (Pb)	2020/11/20	NC		%	20
			Dissolved Magnesium (Mg)	2020/11/20	6.7		%	20
			Dissolved Manganese (Mn)	2020/11/20	NC		%	20
			Dissolved Molybdenum (Mo)	2020/11/20	5.0		%	20
			Dissolved Nickel (Ni)	2020/11/20	NC		%	20
			Dissolved Phosphorus (P)	2020/11/20	NC		%	20
			Dissolved Potassium (K)	2020/11/20	11		%	20

BV Labs Job #: C0U5776
Report Date: 2020/11/24

CBCL Limited
Client Project #: 171046.00

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Selenium (Se)	2020/11/20	4.1		%	20
			Dissolved Silver (Ag)	2020/11/20	NC		%	20
			Dissolved Sodium (Na)	2020/11/20	7.4		%	20
			Dissolved Strontium (Sr)	2020/11/20	6.7		%	20
			Dissolved Thallium (Tl)	2020/11/20	NC		%	20
			Dissolved Tin (Sn)	2020/11/20	NC		%	20
			Dissolved Titanium (Ti)	2020/11/20	NC		%	20
			Dissolved Uranium (U)	2020/11/20	0.71		%	20
			Dissolved Vanadium (V)	2020/11/20	NC		%	20
			Dissolved Zinc (Zn)	2020/11/20	NC		%	20
7065442	YLG	Matrix Spike	Total Organic Carbon (C)	2020/11/20		97	%	85 - 115
7065442	YLG	Spiked Blank	Total Organic Carbon (C)	2020/11/20		99	%	80 - 120
7065442	YLG	Method Blank	Total Organic Carbon (C)	2020/11/20	<0.50		mg/L	
7065442	YLG	RPD	Total Organic Carbon (C)	2020/11/20	0.60 (2)		%	15
7066873	SHW	Spiked Blank	Conductivity	2020/11/20		99	%	80 - 120
7066873	SHW	Method Blank	Conductivity	2020/11/20	<1.0		uS/cm	
7066873	SHW	RPD	Conductivity	2020/11/20	0.75		%	10
7066874	SHW	Spiked Blank	pH	2020/11/20		100	%	97 - 103
7066874	SHW	RPD	pH	2020/11/20	0.74		%	N/A
7067118	SHW	QC Standard	Turbidity	2020/11/20		101	%	80 - 120
7067118	SHW	Spiked Blank	Turbidity	2020/11/20		96	%	80 - 120
7067118	SHW	Method Blank	Turbidity	2020/11/20	<0.10		NTU	
7067118	SHW	RPD	Turbidity	2020/11/20	NC		%	20
7067731	EMT	Matrix Spike	Total Alkalinity (Total as CaCO3)	2020/11/23		100	%	80 - 120
7067731	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2020/11/23		105	%	80 - 120
7067731	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2020/11/23	<5.0		mg/L	
7067731	EMT	RPD	Total Alkalinity (Total as CaCO3)	2020/11/23	NC		%	20
7070180	EMT	Matrix Spike	Dissolved Chloride (Cl-)	2020/11/24		103	%	80 - 120
7070180	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2020/11/24		98	%	80 - 120
7070180	EMT	Method Blank	Dissolved Chloride (Cl-)	2020/11/24	<1.0		mg/L	
7070180	EMT	RPD	Dissolved Chloride (Cl-)	2020/11/24	5.9		%	20
7070181	EMT	Matrix Spike	Dissolved Sulphate (SO4)	2020/11/23		100	%	80 - 120
7070181	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2020/11/23		100	%	80 - 120
7070181	EMT	Method Blank	Dissolved Sulphate (SO4)	2020/11/23	<2.0		mg/L	
7070181	EMT	RPD	Dissolved Sulphate (SO4)	2020/11/23	NC		%	20
7070183	EMT	Matrix Spike	Reactive Silica (SiO2)	2020/11/23		90	%	80 - 120
7070183	EMT	Spiked Blank	Reactive Silica (SiO2)	2020/11/23		90	%	80 - 120
7070183	EMT	Method Blank	Reactive Silica (SiO2)	2020/11/23	<0.50		mg/L	
7070183	EMT	RPD	Reactive Silica (SiO2)	2020/11/23	3.7		%	20
7070184	EMT	Spiked Blank	Colour	2020/11/23		100	%	80 - 120
7070184	EMT	Method Blank	Colour	2020/11/23	<5.0		TCU	
7070184	EMT	RPD	Colour	2020/11/23	NC		%	20
7070185	EMT	Matrix Spike	Orthophosphate (P)	2020/11/23		92	%	80 - 120
7070185	EMT	Spiked Blank	Orthophosphate (P)	2020/11/23		101	%	80 - 120
7070185	EMT	Method Blank	Orthophosphate (P)	2020/11/23	<0.010		mg/L	
7070185	EMT	RPD	Orthophosphate (P)	2020/11/23	NC		%	20
7070190	EMT	Matrix Spike	Nitrate + Nitrite (N)	2020/11/23		100	%	80 - 120
7070190	EMT	Spiked Blank	Nitrate + Nitrite (N)	2020/11/23		99	%	80 - 120
7070190	EMT	Method Blank	Nitrate + Nitrite (N)	2020/11/23	<0.050		mg/L	
7070190	EMT	RPD	Nitrate + Nitrite (N)	2020/11/23	2.9		%	20
7070192	EMT	Matrix Spike	Nitrite (N)	2020/11/23		99	%	80 - 120
7070192	EMT	Spiked Blank	Nitrite (N)	2020/11/23		97	%	80 - 120
7070192	EMT	Method Blank	Nitrite (N)	2020/11/23	<0.010		mg/L	
7070192	EMT	RPD	Nitrite (N)	2020/11/23	NC		%	20
7070634	EMT	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2020/11/23		95	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7070634	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2020/11/24		107	%	80 - 120
7070634	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2020/11/24	<0.050		mg/L	
7070634	EMT	RPD	Nitrogen (Ammonia Nitrogen)	2020/11/23	4.3		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery is within QC acceptance limits. < 10 % of compounds in multi-component analysis in violation.

(2) Elevated reporting limit due to turbidity.

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Mike MacGillivray, Scientific Specialist (Inorganics)

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

Confirmation of Sample Receipt

BV Labs Job Number: C1B2448
Job Received: 2021/04/26 15:17
Final Report Due: 2021/05/04 18:00
Disposal Date: 2021/05/26

Invoice Information

Attn: ACCOUNTS PAYABLE
CBCL Limited
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS, B3J 3Y6
Email to:
acct@cbcl.ca

Report Information

Attn: Laura Jenkins
CBCL Limited
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS, B3J 3Y6
Email to:
ljenkins@cbcl.ca
colinw@cbcl.ca

Project Information

Quote #: C05476
PO/AFE#:
Project #: 171046.01
Site Location:
Site #: AVON
Sampled By: PA

Analytical Summary

A: Due On 2021/05/04 18:00

Lab ID	Client Sample ID	Sampling Date/Time	Matrix	Atl. RCAp-MS Dissolved (LabFilt) in W	Filtered by Lab
COC# 822472-01-01					
PKU228	MW1	2021/04/21 10:30	W	A	A
PKU229	MW2	2021/04/21 16:30	W	A	A
PKU230	MW3	2021/04/21 11:30	W	A	A
PKU231	MW4	2021/04/21 16:00	W	A	A
PKU232	MW5	2021/04/21 14:30	W	A	A
PKU233	MW6	2021/04/21 14:00	W	A	A
PKU234	MW7-S	2021/04/21 12:30	W	A	A
PKU235	MW7-INT	2021/04/21 12:15	W	A	A
PKU236	MW7-D	2021/04/21 12:00	W	A	A
PKU237	MW8	2021/04/21 13:00	W	A	A
COC# 822472-02-01					
PKU238	MW9	2021/04/21 13:15	W	A	A
PKU239	MW10	2021/04/21 13:30	W	A	A

Include Criteria on CofA: No

Sample Inspection Observations & Comments

# of Samples Received: 12
Details: Sample(s) received in good condition.
Average Temperature: Package 1: 2.3 °C

BV Labs PM: Keri Mackay (Keri.MACKAY@bureauveritas.com or 902-420-0203 Ext: 294)

Additional Notes

- Unless special storage arrangements are made, all samples will be disposed 30 days after receipt. Additional fees may be applied for extended storage.
- Additional fees may be applied for the disposal of hazardous samples.

The contents of this report are subject to change. For up to date information, please refer to the Customer Portal.

Confirmation of Sample Receipt

Parameter Summary

Package/Test	Parameter	RDL *	Unit	Samples
Atl. RCAp-MS Dissolved (LabFilt) in W	Total Alkalinity (Total as CaCO3)	5	mg/L	All
	Anion Sum	N/A	me/L	All
	Cation Sum	N/A	me/L	All
	Bicarb. Alkalinity (calc. as CaCO3)	1	mg/L	All
	Carb. Alkalinity (calc. as CaCO3)	1	mg/L	All
	Dissolved Chloride (Cl-)	1	mg/L	All
	Colour	5	TCU	All
	Conductivity	1	uS/cm	All
	Hardness (CaCO3)	1	mg/L	All
	Ion Balance (% Difference)	N/A	%	All
	Dissolved Aluminum (Al)	5	ug/L	All
	Dissolved Antimony (Sb)	1	ug/L	All
	Dissolved Arsenic (As)	1	ug/L	All
	Dissolved Barium (Ba)	1	ug/L	All
	Dissolved Beryllium (Be)	1	ug/L	All
	Dissolved Bismuth (Bi)	2	ug/L	All
	Dissolved Boron (B)	50	ug/L	All
	Dissolved Cadmium (Cd)	0.01	ug/L	All
	Dissolved Calcium (Ca)	100	ug/L	All
	Dissolved Chromium (Cr)	1	ug/L	All
	Dissolved Cobalt (Co)	0.4	ug/L	All
	Dissolved Copper (Cu)	0.5	ug/L	All
	Dissolved Iron (Fe)	50	ug/L	All
	Dissolved Lead (Pb)	0.5	ug/L	All
	Dissolved Magnesium (Mg)	100	ug/L	All
	Dissolved Manganese (Mn)	2	ug/L	All
	Dissolved Molybdenum (Mo)	2	ug/L	All
	Dissolved Nickel (Ni)	2	ug/L	All
	Dissolved Phosphorus (P)	100	ug/L	All
	Dissolved Potassium (K)	100	ug/L	All
	Dissolved Selenium (Se)	0.5	ug/L	All
	Dissolved Silver (Ag)	0.1	ug/L	All
	Dissolved Sodium (Na)	100	ug/L	All
	Dissolved Strontium (Sr)	2	ug/L	All
	Dissolved Thallium (Tl)	0.1	ug/L	All
	Dissolved Tin (Sn)	2	ug/L	All
	Dissolved Titanium (Ti)	2	ug/L	All
	Dissolved Uranium (U)	0.1	ug/L	All
	Dissolved Vanadium (V)	2	ug/L	All
	Dissolved Zinc (Zn)	5	ug/L	All
	Nitrate (N)	0.05	mg/L	All
	Nitrate + Nitrite (N)	0.05	mg/L	All
	Nitrite (N)	0.01	mg/L	All

Confirmation of Sample Receipt

Parameter Summary

Package/Test	Parameter	RDL *	Unit	Samples
Atl. RCAp-MS Dissolved (LabFilt) in W	Nitrogen (Ammonia Nitrogen)	0.05	mg/L	All
	Total Organic Carbon (C)	0.5	mg/L	All
	pH	N/A	pH	All
	Orthophosphate (P)	0.01	mg/L	All
	Reactive Silica (SiO2)	0.5	mg/L	All
	Langelier Index (@ 20C)	N/A	N/A	All
	Saturation pH (@ 20C)	N/A	N/A	All
	Langelier Index (@ 4C)	N/A	N/A	All
	Saturation pH (@ 4C)	N/A	N/A	All
	Dissolved Sulphate (SO4)	2	mg/L	All
	Calculated TDS	1	mg/L	All
	Turbidity	0.1	NTU	All
Filtered by Lab	Filter	N/A	N/A	All

**RDLs are subject to change based on interferences present at the time of analysis.*

BV Labs PM: Keri Mackay (Keri.MACKAY@bureauveritas.com or 902-420-0203 Ext: 294)

Confirmation of Sample Receipt

Cost Estimate

#	Description	Matrix	Quote #	Rate	Test Total
12	Atl. RCAp-MS Dissolved (LabFilt) in W	W	C05476	$ 157.00	$ 1,884.00
12	Filtered by Lab	W		$ 10.00	$ 120.00
12	Non hazardous disposal/container supply	W	C05476	$ 5.00	$ 60.00
				Total (excluding applicable taxes):	**$ 2,064.00**

BV Labs PM: Keri Mackay (Keri.MACKAY@bureauveritas.com or 902-420-0203 Ext: 294)

Bureau Veritas Laboratories
200 Bluewater Road, Bedford, Nova Scotia Canada B4B 1G9 Tel:(902) 420-0203 Toll-free:800-563-6266 Fax:(902) 420-8612 www.bvlabs.com

Chain Of Custody Record

INVOICE TO:		Report Information		Project Information	
Company Name	#41018 CBCL Limited	Company Name		Quotation #	C05476
Contact Name	ACCOUNTS PAYABLE	Contact Name	Laura Jenkins & COLIN WALKER	P.O. #	
Address	1505 Barrington Street Suite 901 / PO Box 606 Halifax NS B3J 3Y6	Address		Project #	171046.01
				Project Name	
Phone	(902) 421-7241 Fax: (902) 423-3938	Phone	Fax:	Site #	Avon
Email	acct@cbcl.ca	Email	ljenkins@cbcl.ca / colinw@cbcl.ca	Sampled By	PA

Laboratory Use Only

BV Labs Job #	Bottle Order #:
C1B2448	822472
Chain Of Custody Record	Project Manager
C#822472-01-01	Keri Mackay

Regulatory Criteria:

Special Instructions

** Specify Matrix: Surface/Ground/Tapwater/Sewage/Effluent/Seawater Potable/Nonpotable/Tissue/Soil/Sludge/Metal

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered & Preserved	Lab Filtration Required	At. RCAp-MS Dissolved (FieldFilt) in W
1		MW1	21/04/21	10:30			X	X
2		MW2	21/04/21	16:30			X	X
3		MW3	21/04/21	11:30			X	X
4		MW4	21/04/21	16:00			X	X
5		MW5	21/04/21	14:30			X	X
6		MW6	21/04/21	14:00			X	X
7		MW7-S	21/04/21	12:30			X	X
8		MW7-INT	21/04/21	12:15			X	X
9		MW7-D	21/04/21	12:00			X	X
10		MW8	21/04/21	13:00			X	X

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: ☑

(will be applied if Rush TAT is not specified):

Standard TAT = 5-7 Working days for most tests.

Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)

Date Required: Time Required: ☐

# of Bottles	Comments / Hazards / Other Required Analysis

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Laura Jenkins	26/04/21		Daria Wisniowska			

Lab Use Only		
Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
☐	3, 3, 1	☐ Yes ☐ No

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: BV Labs Yellow: Client

2021 APR 26 15:17

Bureau Veritas Canada (2019) Inc.

Bureau Veritas Laboratories
200 Bluewater Road, Bedford, Nova Scotia Canada B4B 1G9 Tel:(902) 420-0203 Toll-free:800-563-6266 Fax:(902) 420-8612 www.bvlabs.com

Chain Of Custody Record

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#41018 CBCL Limited	Company Name		Quotation #	C05476	BV Labs Job #	Bottle Order #:
Contact Name	ACCOUNTS PAYABLE	Contact Name	Laura Jenkins	P.O. #		C1B2448	822472
Address	1505 Barrington Street Suite 901 / PO Box 606	Address		Project #	171046.01	Chain Of Custody Record	Project Manager
	Halifax NS B3J 3Y6			Project Name		C#822472-02-01	Keri Mackay
Phone	(902) 421-7241 Fax: (902) 423-3938	Phone	Fax:	Site #			
Email	acct@cbcl.ca	Email	ljenkins@cbcl.ca	Sampled By			

Regulatory Criteria:

** Specify Matrix: Surface/Ground/Tapwater/Sewage/Effluent/Seawater Potable/Nonpotable/Tissue/Soil/Sludge/Metal

Special Instructions

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT:
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests..
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: Time Required:

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered & Preserved	Lab Filtration Required	Al. RCAp-MS Dissolved (FieldFilt) in W	# of Bottles	Comments / Hazards / Other Required Analysis
1		MW9	21/04/21	13:15			X	X		
2		MW10	21/04/21	13:30			X	X		
3								X		
4								X		
5								X		
6										
7										
8										
9										
10										

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only		
[signature]			Darcea Wommacker				Time Sensitive	Temperature (°C) on Receipt 3,3,1	Custody Seal Intact on Cooler? Yes No

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: BV Labs Yellow: Client

2021 APR 26 15:17

Bureau Veritas Canada (2019) Inc.

Your Project #: 171046.01
Your C.O.C. #: 822472-02-01, 822472-01-01

Attention: Laura Jenkins

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2021/05/04
Report #: R6620657
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1B2448
Received: 2021/04/26, 15:17

Sample Matrix: Water
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbonate, Bicarbonate and Hydroxide	12	N/A	2021/04/30	N/A	SM 23 4500-CO2 D
Alkalinity	12	N/A	2021/05/03	ATL SOP 00013	EPA 310.2 R1974 m
Chloride	12	N/A	2021/05/03	ATL SOP 00014	SM 23 4500-Cl- E m
Colour	12	N/A	2021/05/03	ATL SOP 00020	SM 23 2120C m
Conductance - water	12	N/A	2021/04/30	ATL SOP 00004	SM 23 2510B m
Hardness (calculated as CaCO3)	10	N/A	2021/05/03	ATL SOP 00048	Auto Calc
Hardness (calculated as CaCO3)	2	N/A	2021/05/04	ATL SOP 00048	Auto Calc
Metals Water Diss. MS (1)	10	N/A	2021/05/01	ATL SOP 00058	EPA 6020B R2 m
Metals Water Diss. MS (1)	2	N/A	2021/05/03	ATL SOP 00058	EPA 6020B R2 m
Ion Balance (% Difference)	12	N/A	2021/05/04	N/A	Auto Calc.
Anion and Cation Sum	12	N/A	2021/05/04	N/A	Auto Calc.
Nitrogen Ammonia - water	12	N/A	2021/05/03	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	12	N/A	2021/05/03	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	12	N/A	2021/05/03	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	12	N/A	2021/05/04	ATL SOP 00018	ASTM D3867-16
pH (2)	12	N/A	2021/04/30	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	12	N/A	2021/05/03	ATL SOP 00021	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C)	12	N/A	2021/05/04	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	12	N/A	2021/05/04	ATL SOP 00049	Auto Calc.
Reactive Silica	12	N/A	2021/05/03	ATL SOP 00022	EPA 366.0 m
Sulphate	12	N/A	2021/05/03	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc)	12	N/A	2021/05/04	N/A	Auto Calc.
Organic carbon - Total (TOC) (3)	11	N/A	2021/04/29	ATL SOP 00203	SM 23 5310B m
Organic carbon - Total (TOC) (3)	1	N/A	2021/04/30	ATL SOP 00203	SM 23 5310B m
Turbidity	12	N/A	2021/04/30	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession

Your Project #: 171046.01
Your C.O.C. #: 822472-02-01, 822472-01-01

Attention: Laura Jenkins

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2021/05/04
Report #: R6620657
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1B2448
Received: 2021/04/26, 15:17

using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Sample filtered in laboratory prior to analysis for dissolved metals.
(2) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(3) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Keri Mackay, Customer Experience Team Lead
Email: Keri.MACKAY@bureauveritas.com
Phone# (902)420-0203 Ext:294
==
This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: C1B2448
Report Date: 2021/05/04

CBCL Limited
Client Project #: 171046.01
Sampler Initials: PA

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		PKU228		PKU229		PKU230		PKU231		
Sampling Date		2021/04/21 10:30		2021/04/21 16:30		2021/04/21 11:30		2021/04/21 16:00		
COC Number		822472-01-01		822472-01-01		822472-01-01		822472-01-01		
	UNITS	MW1	RDL	MW2	RDL	MW3	RDL	MW4	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	112	N/A	16.2	N/A	77.2	N/A	65.4	N/A	7322601
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	1300	1.0	590	1.0	98	1.0	370	1.0	7322598
Calculated TDS	mg/L	6400	1.0	880	1.0	4700	1.0	3600	1.0	7322605
Carb. Alkalinity (calc. as CaCO3)	mg/L	5.3	1.0	6.5	1.0	<1.0	1.0	<1.0	1.0	7322598
Cation Sum	me/L	116	N/A	15.1	N/A	71.9	N/A	59.8	N/A	7322601
Hardness (CaCO3)	mg/L	1100	1.0	150	1.0	2000	1.0	1400	1.0	7322599
Ion Balance (% Difference)	%	1.88	N/A	3.52	N/A	3.56	N/A	4.41	N/A	7322600
Langelier Index (@ 20C)	N/A	0.980		0.644		0.619		0.866		7322603
Langelier Index (@ 4C)	N/A	0.741		0.397		0.379		0.625		7322604
Nitrate (N)	mg/L	<0.050	0.050	0.54	0.050	0.082	0.050	<0.050	0.050	7322602
Saturation pH (@ 20C)	N/A	6.67		7.42		6.97		6.58		7322603
Saturation pH (@ 4C)	N/A	6.91		7.67		7.21		6.82		7322604
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	1300	75	600	75	99	5.0	370	25	7330234
Dissolved Chloride (Cl-)	mg/L	2900	50	65	1.0	1400	50	1800	50	7330265
Colour	TCU	170	25	<5.0	5.0	<5.0	5.0	<5.0	5.0	7330268
Nitrate + Nitrite (N)	mg/L	<0.050	0.050	0.54	0.050	0.082	0.050	<0.050	0.050	7330271
Nitrite (N)	mg/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	7330272
Nitrogen (Ammonia Nitrogen)	mg/L	5.3	0.25	<0.050	0.050	0.30	0.050	0.12	0.050	7330542
Total Organic Carbon (C)	mg/L	32 (1)	5.0	140 (2)	1.5	<5.0 (1)	5.0	5.1 (1)	5.0	7325612
Orthophosphate (P)	mg/L	0.16	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	7330269
pH	pH	7.65		8.07		7.59		7.44		7327252
Reactive Silica (SiO2)	mg/L	44	2.5	7.5	0.50	11	0.50	16	0.50	7330267
Dissolved Sulphate (SO4)	mg/L	240	10	110	10	1700	100	340	10	7330266
Turbidity	NTU	140	1.0	11	0.10	39	0.10	>1000	1.0	7327322
Conductivity	uS/cm	10000	1.0	1400	1.0	6400	1.0	6100	1.0	7327248
Metals										
Dissolved Aluminum (Al)	ug/L	59	50	10	5.0	<5.0	5.0	<5.0	5.0	7327984
Dissolved Antimony (Sb)	ug/L	<10	10	<1.0	1.0	<1.0	1.0	<1.0	1.0	7327984
Dissolved Arsenic (As)	ug/L	<10	10	<1.0	1.0	<1.0	1.0	<1.0	1.0	7327984
Dissolved Barium (Ba)	ug/L	18	10	48	1.0	19	1.0	48	1.0	7327984
Dissolved Beryllium (Be)	ug/L	<10	10	<1.0	1.0	<1.0	1.0	<1.0	1.0	7327984

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.
(2) Elevated reporting limit due to sample matrix.

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

BV Labs Job #: C1B2448
Report Date: 2021/05/04

CBCL Limited
Client Project #: 171046.01
Sampler Initials: PA

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		PKU228		PKU229		PKU230		PKU231		
Sampling Date		2021/04/21 10:30		2021/04/21 16:30		2021/04/21 11:30		2021/04/21 16:00		
COC Number		822472-01-01		822472-01-01		822472-01-01		822472-01-01		
	UNITS	**MW1**	**RDL**	**MW2**	**RDL**	**MW3**	**RDL**	**MW4**	**RDL**	**QC Batch**
Dissolved Bismuth (Bi)	ug/L	<20	20	<2.0	2.0	<2.0	2.0	<2.0	2.0	7327984
Dissolved Boron (B)	ug/L	2100	500	610	50	360	50	250	50	7327984
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	<0.010	0.010	0.035	0.010	0.20	0.010	7327984
Dissolved Calcium (Ca)	ug/L	110000	1000	22000	100	650000	100	390000	100	7327984
Dissolved Chromium (Cr)	ug/L	<10	10	<1.0	1.0	<1.0	1.0	<1.0	1.0	7327984
Dissolved Cobalt (Co)	ug/L	<4.0	4.0	<0.40	0.40	0.87	0.40	4.5	0.40	7327984
Dissolved Copper (Cu)	ug/L	11	5.0	0.91	0.50	1.0	0.50	5.4	0.50	7327984
Dissolved Iron (Fe)	ug/L	<500	500	<50	50	<50	50	<50	50	7327984
Dissolved Lead (Pb)	ug/L	<5.0	5.0	<0.50	0.50	<0.50	0.50	<0.50	0.50	7327984
Dissolved Magnesium (Mg)	ug/L	200000	1000	24000	100	96000	100	110000	1000	7327984
Dissolved Manganese (Mn)	ug/L	2100	20	<2.0	2.0	4400	2.0	3100	2.0	7327984
Dissolved Molybdenum (Mo)	ug/L	<20	20	2.3	2.0	7.9	2.0	3.9	2.0	7327984
Dissolved Nickel (Ni)	ug/L	<20	20	<2.0	2.0	3.3	2.0	4.0	2.0	7327984
Dissolved Phosphorus (P)	ug/L	<1000	1000	<100	100	<100	100	<100	100	7327984
Dissolved Potassium (K)	ug/L	76000	1000	25000	100	8800	100	4200	100	7327984
Dissolved Selenium (Se)	ug/L	<5.0	5.0	<0.50	0.50	<0.50	0.50	<0.50	0.50	7327984
Dissolved Silver (Ag)	ug/L	<1.0	1.0	<0.10	0.10	<0.10	0.10	<0.10	0.10	7327984
Dissolved Sodium (Na)	ug/L	2100000	1000	260000	100	720000	100	710000	100	7327984
Dissolved Strontium (Sr)	ug/L	1500	20	140	2.0	8000	20	7700	20	7327984
Dissolved Thallium (Tl)	ug/L	<1.0	1.0	<0.10	0.10	<0.10	0.10	0.11	0.10	7327984
Dissolved Tin (Sn)	ug/L	<20	20	<2.0	2.0	<2.0	2.0	<2.0	2.0	7327984
Dissolved Titanium (Ti)	ug/L	<20	20	<2.0	2.0	<2.0	2.0	<2.0	2.0	7327984
Dissolved Uranium (U)	ug/L	<1.0	1.0	2.7	0.10	1.3	0.10	6.4	0.10	7327984
Dissolved Vanadium (V)	ug/L	<20	20	<2.0	2.0	<2.0	2.0	<2.0	2.0	7327984
Dissolved Zinc (Zn)	ug/L	<50	50	<5.0	5.0	9.7	5.0	8.5	5.0	7327984

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs Job #: C1B2448
Report Date: 2021/05/04

CBCL Limited
Client Project #: 171046.01
Sampler Initials: PA

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		PKU231			PKU232			PKU233		
Sampling Date		2021/04/21 16:00			2021/04/21 14:30			2021/04/21 14:00		
COC Number		822472-01-01			822472-01-01			822472-01-01		
	UNITS	**MW4 Lab-Dup**	**RDL**	**QC Batch**	**MW5**	**RDL**	**QC Batch**	**MW6**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L				216	N/A	7322601	154	N/A	7322601
Bicarb. Alkalinity (calc. as CaCO3)	mg/L				2300	1.0	7322598	1400	1.0	7322598
Calculated TDS	mg/L				11000	1.0	7322605	8200	1.0	7322605
Carb. Alkalinity (calc. as CaCO3)	mg/L				15	1.0	7322598	7.4	1.0	7322598
Cation Sum	me/L				185	N/A	7322601	122	N/A	7322601
Hardness (CaCO3)	mg/L				2000	1.0	7322599	1400	1.0	7322599
Ion Balance (% Difference)	%				7.69	N/A	7322600	11.6	N/A	7322600
Langelier Index (@ 20C)	N/A				1.48		7322603	1.33		7322603
Langelier Index (@ 4C)	N/A				1.24		7322604	1.10		7322604
Nitrate (N)	mg/L				<0.050	0.050	7322602	0.40	0.050	7322602
Saturation pH (@ 20C)	N/A				6.36		7322603	6.42		7322603
Saturation pH (@ 4C)	N/A				6.60		7322604	6.65		7322604
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L				2300	250	7330234	1400	75	7330234
Dissolved Chloride (Cl-)	mg/L				5800	100	7330265	3800	100	7330265
Colour	TCU				260	50	7330268	110	25	7330268
Nitrate + Nitrite (N)	mg/L				<0.050	0.050	7330271	0.48	0.050	7330271
Nitrite (N)	mg/L				<0.010	0.010	7330272	0.078	0.010	7330272
Nitrogen (Ammonia Nitrogen)	mg/L	0.11	0.050	7330542	26	1.0	7330542	9.2	0.25	7330546
Total Organic Carbon (C)	mg/L				52 (1)	5.0	7325612	30 (1)	5.0	7325612
Orthophosphate (P)	mg/L				6.7	0.20	7330269	0.21	0.010	7330269
pH	pH				7.84		7327252	7.75		7327252
Reactive Silica (SiO2)	mg/L				34	1.0	7330267	32	1.0	7330267
Dissolved Sulphate (SO4)	mg/L				220	10	7330266	920	20	7330266
Turbidity	NTU				500	1.0	7327322	>1000	1.0	7327326
Conductivity	uS/cm				18000	1.0	7327248	13000	1.0	7327248
Metals										
Dissolved Aluminum (Al)	ug/L				<50	50	7327984	<50	50	7327984
Dissolved Antimony (Sb)	ug/L				<10	10	7327984	<10	10	7327984
Dissolved Arsenic (As)	ug/L				22	10	7327984	<10	10	7327984
Dissolved Barium (Ba)	ug/L				20	10	7327984	14	10	7327984
Dissolved Beryllium (Be)	ug/L				<10	10	7327984	<10	10	7327984

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

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BV Labs Job #: C1B2448
Report Date: 2021/05/04

CBCL Limited
Client Project #: 171046.01
Sampler Initials: PA

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		PKU231			PKU232			PKU233		
Sampling Date		2021/04/21 16:00			2021/04/21 14:30			2021/04/21 14:00		
COC Number		822472-01-01			822472-01-01			822472-01-01		
	UNITS	MW4 Lab-Dup	RDL	QC Batch	MW5	RDL	QC Batch	MW6	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L				<20	20	7327984	<20	20	7327984
Dissolved Boron (B)	ug/L				3200	500	7327984	2000	500	7327984
Dissolved Cadmium (Cd)	ug/L				<0.10	0.10	7327984	<0.10	0.10	7327984
Dissolved Calcium (Ca)	ug/L				150000	1000	7327984	200000	1000	7327984
Dissolved Chromium (Cr)	ug/L				<10	10	7327984	<10	10	7327984
Dissolved Cobalt (Co)	ug/L				<4.0	4.0	7327984	<4.0	4.0	7327984
Dissolved Copper (Cu)	ug/L				<5.0	5.0	7327984	<5.0	5.0	7327984
Dissolved Iron (Fe)	ug/L				<500	500	7327984	<500	500	7327984
Dissolved Lead (Pb)	ug/L				<5.0	5.0	7327984	<5.0	5.0	7327984
Dissolved Magnesium (Mg)	ug/L				400000	1000	7327984	220000	1000	7327984
Dissolved Manganese (Mn)	ug/L				1000	20	7327984	3600	20	7327984
Dissolved Molybdenum (Mo)	ug/L				<20	20	7327984	<20	20	7327984
Dissolved Nickel (Ni)	ug/L				<20	20	7327984	<20	20	7327984
Dissolved Phosphorus (P)	ug/L				8000	1000	7327984	<1000	1000	7327984
Dissolved Potassium (K)	ug/L				95000	1000	7327984	72000	1000	7327984
Dissolved Selenium (Se)	ug/L				<5.0	5.0	7327984	<5.0	5.0	7327984
Dissolved Silver (Ag)	ug/L				<1.0	1.0	7327984	<1.0	1.0	7327984
Dissolved Sodium (Na)	ug/L				3200000	1000	7327984	2100000	1000	7327984
Dissolved Strontium (Sr)	ug/L				2400	20	7327984	1700	20	7327984
Dissolved Thallium (Tl)	ug/L				<1.0	1.0	7327984	<1.0	1.0	7327984
Dissolved Tin (Sn)	ug/L				<20	20	7327984	<20	20	7327984
Dissolved Titanium (Ti)	ug/L				<20	20	7327984	<20	20	7327984
Dissolved Uranium (U)	ug/L				<1.0	1.0	7327984	<1.0	1.0	7327984
Dissolved Vanadium (V)	ug/L				28	20	7327984	<20	20	7327984
Dissolved Zinc (Zn)	ug/L				<50	50	7327984	<50	50	7327984

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		PKU233			PKU234			PKU234		
Sampling Date		2021/04/21 14:00			2021/04/21 12:30			2021/04/21 12:30		
COC Number		822472-01-01			822472-01-01			822472-01-01		
	UNITS	**MW6 Lab-Dup**	**RDL**	**QC Batch**	**MW7-S**	**RDL**	**QC Batch**	**MW7-S Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L				498	N/A	7322601			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L				1200	1.0	7322598			
Calculated TDS	mg/L				28000	1.0	7322605			
Carb. Alkalinity (calc. as CaCO3)	mg/L				4.6	1.0	7322598			
Cation Sum	me/L				451	N/A	7322601			
Hardness (CaCO3)	mg/L				4800	1.0	7322599			
Ion Balance (% Difference)	%				4.96	N/A	7322600			
Langelier Index (@ 20C)	N/A				1.44		7322603			
Langelier Index (@ 4C)	N/A				1.20		7322604			
Nitrate (N)	mg/L				<0.050	0.050	7322602			
Saturation pH (@ 20C)	N/A				6.17		7322603			
Saturation pH (@ 4C)	N/A				6.41		7322604			
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L				1200	75	7330234			
Dissolved Chloride (Cl-)	mg/L				15000	500	7330265			
Colour	TCU				78	25	7330268			
Nitrate + Nitrite (N)	mg/L				<0.050	0.050	7330271			
Nitrite (N)	mg/L				<0.010	0.010	7330272			
Nitrogen (Ammonia Nitrogen)	mg/L				15	0.75	7330546			
Total Organic Carbon (C)	mg/L				22 (1)	5.0	7325612	22 (1)	5.0	7325612
Orthophosphate (P)	mg/L				3.8	0.20	7330269			
pH	pH				7.61		7327252			
Reactive Silica (SiO2)	mg/L				40	1.0	7330267			
Dissolved Sulphate (SO4)	mg/L				2000	100	7330266			
Turbidity	NTU	>1000	1.0	7327326	130	1.0	7327322			
Conductivity	uS/cm				41000	1.0	7327248			
Metals										
Dissolved Aluminum (Al)	ug/L				<50	50	7327984			
Dissolved Antimony (Sb)	ug/L				<10	10	7327984			
Dissolved Arsenic (As)	ug/L				<10	10	7327984			
Dissolved Barium (Ba)	ug/L				84	10	7327984			
Dissolved Beryllium (Be)	ug/L				<10	10	7327984			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

BV Labs Job #: C1B2448
Report Date: 2021/05/04

CBCL Limited
Client Project #: 171046.01
Sampler Initials: PA

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		PKU233			PKU234			PKU234		
Sampling Date		2021/04/21 14:00			2021/04/21 12:30			2021/04/21 12:30		
COC Number		822472-01-01			822472-01-01			822472-01-01		
	UNITS	MW6 Lab-Dup	RDL	QC Batch	MW7-S	RDL	QC Batch	MW7-S Lab-Dup	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L				<20	20	7327984			
Dissolved Boron (B)	ug/L				4000	500	7327984			
Dissolved Cadmium (Cd)	ug/L				<0.10	0.10	7327984			
Dissolved Calcium (Ca)	ug/L				390000	1000	7327984			
Dissolved Chromium (Cr)	ug/L				<10	10	7327984			
Dissolved Cobalt (Co)	ug/L				<4.0	4.0	7327984			
Dissolved Copper (Cu)	ug/L				<5.0	5.0	7327984			
Dissolved Iron (Fe)	ug/L				<500	500	7327984			
Dissolved Lead (Pb)	ug/L				<5.0	5.0	7327984			
Dissolved Magnesium (Mg)	ug/L				920000	1000	7327984			
Dissolved Manganese (Mn)	ug/L				6500	20	7327984			
Dissolved Molybdenum (Mo)	ug/L				<20	20	7327984			
Dissolved Nickel (Ni)	ug/L				<20	20	7327984			
Dissolved Phosphorus (P)	ug/L				4800	1000	7327984			
Dissolved Potassium (K)	ug/L				250000	1000	7327984			
Dissolved Selenium (Se)	ug/L				<5.0	5.0	7327984			
Dissolved Silver (Ag)	ug/L				<1.0	1.0	7327984			
Dissolved Sodium (Na)	ug/L				8000000	1000	7327984			
Dissolved Strontium (Sr)	ug/L				5200	20	7327984			
Dissolved Thallium (Tl)	ug/L				<1.0	1.0	7327984			
Dissolved Tin (Sn)	ug/L				<20	20	7327984			
Dissolved Titanium (Ti)	ug/L				<20	20	7327984			
Dissolved Uranium (U)	ug/L				<1.0	1.0	7327984			
Dissolved Vanadium (V)	ug/L				<20	20	7327984			
Dissolved Zinc (Zn)	ug/L				<50	50	7327984			

RDL = Reportable Detection Limit
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Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: C1B2448
Report Date: 2021/05/04

CBCL Limited
Client Project #: 171046.01
Sampler Initials: PA

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		PKU235			PKU235			PKU236		
Sampling Date		2021/04/21 12:15			2021/04/21 12:15			2021/04/21 12:00		
COC Number		822472-01-01			822472-01-01			822472-01-01		
	UNITS	**MW7-INT**	**RDL**	**QC Batch**	**MW7-INT Lab-Dup**	**RDL**	**QC Batch**	**MW7-D**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L	116	N/A	7322601				202	N/A	7322601
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	590	1.0	7322598				700	1.0	7322598
Calculated TDS	mg/L	6600	1.0	7322605				11000	1.0	7322605
Carb. Alkalinity (calc. as CaCO3)	mg/L	2.2	1.0	7322598				2.2	1.0	7322598
Cation Sum	me/L	104	N/A	7322601				168	N/A	7322601
Hardness (CaCO3)	mg/L	1300	1.0	7322599				2100	1.0	7322599
Ion Balance (% Difference)	%	5.56	N/A	7322600				9.29	N/A	7322600
Langelier Index (@ 20C)	N/A	0.665		7322603				0.939		7322603
Langelier Index (@ 4C)	N/A	0.426		7322604				0.701		7322604
Nitrate (N)	mg/L	0.052	0.050	7322602				<0.050	0.050	7322602
Saturation pH (@ 20C)	N/A	6.93		7322603				6.58		7322603
Saturation pH (@ 4C)	N/A	7.17		7322604				6.82		7322604
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	590	50	7330283	590	50	7330283	700	75	7330234
Dissolved Chloride (Cl-)	mg/L	2700	50	7330284	2700	50	7330284	5400	100	7330265
Colour	TCU	41	5.0	7330288	41	5.0	7330288	22	5.0	7330268
Nitrate + Nitrite (N)	mg/L	0.052	0.050	7330291	<0.050	0.050	7330291	<0.050	0.050	7330271
Nitrite (N)	mg/L	<0.010	0.010	7330293	<0.010	0.010	7330293	<0.010	0.010	7330272
Nitrogen (Ammonia Nitrogen)	mg/L	3.6	0.25	7330546				4.9	0.25	7330546
Total Organic Carbon (C)	mg/L	14 (1)	5.0	7327271				12 (1)	5.0	7325612
Orthophosphate (P)	mg/L	0.059	0.010	7330289	0.056	0.010	7330289	<0.010	0.010	7330269
pH	pH	7.59		7327252				7.52		7327252
Reactive Silica (SiO2)	mg/L	39	1.0	7330286	38	1.0	7330286	23	1.0	7330267
Dissolved Sulphate (SO4)	mg/L	1400	100	7330236	1400	100	7330236	1800	100	7330266
Turbidity	NTU	300	1.0	7327322				680	1.0	7327322
Conductivity	uS/cm	10000	1.0	7327248				17000	1.0	7327248
Metals										
Dissolved Aluminum (Al)	ug/L	<50	50	7327984				<50	50	7327984
Dissolved Antimony (Sb)	ug/L	<10	10	7327984				<10	10	7327984
Dissolved Arsenic (As)	ug/L	<10	10	7327984				<10	10	7327984
Dissolved Barium (Ba)	ug/L	<10	10	7327984				31	10	7327984
Dissolved Beryllium (Be)	ug/L	<10	10	7327984				<10	10	7327984

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

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BV Labs Job #: C1B2448
Report Date: 2021/05/04

CBCL Limited
Client Project #: 171046.01
Sampler Initials: PA

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		PKU235			PKU235			PKU236		
Sampling Date		2021/04/21 12:15			2021/04/21 12:15			2021/04/21 12:00		
COC Number		822472-01-01			822472-01-01			822472-01-01		
	UNITS	**MW7-INT**	**RDL**	**QC Batch**	**MW7-INT Lab-Dup**	**RDL**	**QC Batch**	**MW7-D**	**RDL**	**QC Batch**
Dissolved Bismuth (Bi)	ug/L	<20	20	7327984				<20	20	7327984
Dissolved Boron (B)	ug/L	1900	500	7327984				2000	500	7327984
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	7327984				<0.10	0.10	7327984
Dissolved Calcium (Ca)	ug/L	140000	1000	7327984				290000	1000	7327984
Dissolved Chromium (Cr)	ug/L	<10	10	7327984				<10	10	7327984
Dissolved Cobalt (Co)	ug/L	<4.0	4.0	7327984				30	4.0	7327984
Dissolved Copper (Cu)	ug/L	<5.0	5.0	7327984				<5.0	5.0	7327984
Dissolved Iron (Fe)	ug/L	<500	500	7327984				<500	500	7327984
Dissolved Lead (Pb)	ug/L	<5.0	5.0	7327984				<5.0	5.0	7327984
Dissolved Magnesium (Mg)	ug/L	220000	1000	7327984				330000	1000	7327984
Dissolved Manganese (Mn)	ug/L	990	20	7327984				1500	20	7327984
Dissolved Molybdenum (Mo)	ug/L	<20	20	7327984				<20	20	7327984
Dissolved Nickel (Ni)	ug/L	<20	20	7327984				<20	20	7327984
Dissolved Phosphorus (P)	ug/L	<1000	1000	7327984				<1000	1000	7327984
Dissolved Potassium (K)	ug/L	75000	1000	7327984				96000	1000	7327984
Dissolved Selenium (Se)	ug/L	<5.0	5.0	7327984				<5.0	5.0	7327984
Dissolved Silver (Ag)	ug/L	<1.0	1.0	7327984				<1.0	1.0	7327984
Dissolved Sodium (Na)	ug/L	1800000	1000	7327984				2800000	1000	7327984
Dissolved Strontium (Sr)	ug/L	1600	20	7327984				3300	20	7327984
Dissolved Thallium (Tl)	ug/L	<1.0	1.0	7327984				<1.0	1.0	7327984
Dissolved Tin (Sn)	ug/L	<20	20	7327984				<20	20	7327984
Dissolved Titanium (Ti)	ug/L	<20	20	7327984				<20	20	7327984
Dissolved Uranium (U)	ug/L	<1.0	1.0	7327984				<1.0	1.0	7327984
Dissolved Vanadium (V)	ug/L	<20	20	7327984				<20	20	7327984
Dissolved Zinc (Zn)	ug/L	<50	50	7327984				<50	50	7327984

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		PKU237			PKU237			PKU238		
Sampling Date		2021/04/21 13:00			2021/04/21 13:00			2021/04/21 13:15		
COC Number		822472-01-01			822472-01-01			822472-02-01		
	UNITS	**MW8**	**RDL**	**QC Batch**	**MW8 Lab-Dup**	**RDL**	**QC Batch**	**MW9**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L	102	N/A	7322601				70.2	N/A	7322601
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	980	1.0	7322598				570	1.0	7322598
Calculated TDS	mg/L	5500	1.0	7322605				3900	1.0	7322605
Carb. Alkalinity (calc. as CaCO3)	mg/L	7.6	1.0	7322598				2.2	1.0	7322598
Cation Sum	me/L	84.4	N/A	7322601				62.0	N/A	7322601
Hardness (CaCO3)	mg/L	710	1.0	7322599				710	1.0	7322599
Ion Balance (% Difference)	%	9.26	N/A	7322600				6.15	N/A	7322600
Langelier Index (@ 20C)	N/A	1.02		7322603				0.478		7322603
Langelier Index (@ 4C)	N/A	0.776		7322604				0.237		7322604
Nitrate (N)	mg/L	0.35	0.050	7322602				<0.050	0.050	7322602
Saturation pH (@ 20C)	N/A	6.90		7322603				7.13		7322603
Saturation pH (@ 4C)	N/A	7.14		7322604				7.37		7322604
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	990	75	7330234				580	75	7330234
Dissolved Chloride (Cl-)	mg/L	2600	100	7330265				1600	50	7330265
Colour	TCU	150	25	7330268				40	5.0	7330268
Nitrate + Nitrite (N)	mg/L	0.41	0.050	7330271				<0.050	0.050	7330271
Nitrite (N)	mg/L	0.053	0.010	7330272				<0.010	0.010	7330272
Nitrogen (Ammonia Nitrogen)	mg/L	11	0.50	7330546				2.3	0.25	7330546
Total Organic Carbon (C)	mg/L	240 (1)	3.0	7325612				17 (2)	5.0	7325612
Orthophosphate (P)	mg/L	6.1	0.20	7330269				0.028	0.010	7330269
pH	pH	7.91		7327252	7.88		7327252	7.61		7327252
Reactive Silica (SiO2)	mg/L	39	1.0	7330267				39	1.0	7330267
Dissolved Sulphate (SO4)	mg/L	380	10	7330266				600	20	7330266
Turbidity	NTU	55	0.10	7327322				150	1.0	7327322
Conductivity	uS/cm	8700	1.0	7327248	8800	1.0	7327248	6500	1.0	7327248
Metals										
Dissolved Aluminum (Al)	ug/L	<50	50	7327984				<50	50	7327984
Dissolved Antimony (Sb)	ug/L	<10	10	7327984				<10	10	7327984
Dissolved Arsenic (As)	ug/L	<10	10	7327984				<10	10	7327984
Dissolved Barium (Ba)	ug/L	21	10	7327984				26	10	7327984

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated reporting limnit due to sample matrix.
(2) Elevated reporting limit due to turbidity.

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		PKU237			PKU237			PKU238		
Sampling Date		2021/04/21 13:00			2021/04/21 13:00			2021/04/21 13:15		
COC Number		822472-01-01			822472-01-01			822472-02-01		
	UNITS	MW8	RDL	QC Batch	MW8 Lab-Dup	RDL	QC Batch	MW9	RDL	QC Batch
Dissolved Beryllium (Be)	ug/L	<10	10	7327984				<10	10	7327984
Dissolved Bismuth (Bi)	ug/L	<20	20	7327984				<20	20	7327984
Dissolved Boron (B)	ug/L	2200	500	7327984				1300	500	7327984
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	7327984				<0.10	0.10	7327984
Dissolved Calcium (Ca)	ug/L	82000	1000	7327984				73000	1000	7327984
Dissolved Chromium (Cr)	ug/L	<10	10	7327984				<10	10	7327984
Dissolved Cobalt (Co)	ug/L	<4.0	4.0	7327984				<4.0	4.0	7327984
Dissolved Copper (Cu)	ug/L	<5.0	5.0	7327984				<5.0	5.0	7327984
Dissolved Iron (Fe)	ug/L	540	500	7327984				<500	500	7327984
Dissolved Lead (Pb)	ug/L	<5.0	5.0	7327984				<5.0	5.0	7327984
Dissolved Magnesium (Mg)	ug/L	120000	1000	7327984				130000	1000	7327984
Dissolved Manganese (Mn)	ug/L	2400	20	7327984				1700	20	7327984
Dissolved Molybdenum (Mo)	ug/L	<20	20	7327984				23	20	7327984
Dissolved Nickel (Ni)	ug/L	<20	20	7327984				<20	20	7327984
Dissolved Phosphorus (P)	ug/L	6500	1000	7327984				<1000	1000	7327984
Dissolved Potassium (K)	ug/L	68000	1000	7327984				60000	1000	7327984
Dissolved Selenium (Se)	ug/L	<5.0	5.0	7327984				<5.0	5.0	7327984
Dissolved Silver (Ag)	ug/L	<1.0	1.0	7327984				<1.0	1.0	7327984
Dissolved Sodium (Na)	ug/L	1600000	1000	7327984				1100000	1000	7327984
Dissolved Strontium (Sr)	ug/L	910	20	7327984				710	20	7327984
Dissolved Thallium (Tl)	ug/L	<1.0	1.0	7327984				<1.0	1.0	7327984
Dissolved Tin (Sn)	ug/L	<20	20	7327984				<20	20	7327984
Dissolved Titanium (Ti)	ug/L	<20	20	7327984				<20	20	7327984
Dissolved Uranium (U)	ug/L	3.8	1.0	7327984				<1.0	1.0	7327984
Dissolved Vanadium (V)	ug/L	<20	20	7327984				<20	20	7327984
Dissolved Zinc (Zn)	ug/L	<50	50	7327984				<50	50	7327984

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: C1B2448
Report Date: 2021/05/04

CBCL Limited
Client Project #: 171046.01
Sampler Initials: PA

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		PKU239		
Sampling Date		2021/04/21 13:30		
COC Number		822472-02-01		
	UNITS	MW10	RDL	QC Batch
Calculated Parameters				
Anion Sum	me/L	275	N/A	7322601
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	2100	1.0	7322598
Calculated TDS	mg/L	15000	1.0	7322605
Carb. Alkalinity (calc. as CaCO3)	mg/L	7.9	1.0	7322598
Cation Sum	me/L	248	N/A	7322601
Hardness (CaCO3)	mg/L	2700	1.0	7322599
Ion Balance (% Difference)	%	5.34	N/A	7322600
Langelier Index (@ 20C)	N/A	1.31		7322603
Langelier Index (@ 4C)	N/A	1.07		7322604
Nitrate (N)	mg/L	0.094	0.050	7322602
Saturation pH (@ 20C)	N/A	6.30		7322603
Saturation pH (@ 4C)	N/A	6.53		7322604
Inorganics				
Total Alkalinity (Total as CaCO3)	mg/L	2100	250	7330234
Dissolved Chloride (Cl-)	mg/L	8300	100	7330265
Colour	TCU	73	25	7330268
Nitrate + Nitrite (N)	mg/L	0.40	0.050	7330271
Nitrite (N)	mg/L	0.30	0.010	7330272
Nitrogen (Ammonia Nitrogen)	mg/L	16	0.75	7330546
Total Organic Carbon (C)	mg/L	25 (1)	5.0	7325612
Orthophosphate (P)	mg/L	0.19	0.010	7330269
pH	pH	7.60		7327252
Reactive Silica (SiO2)	mg/L	24	1.0	7330267
Dissolved Sulphate (SO4)	mg/L	<2.0	2.0	7330266
Turbidity	NTU	330	1.0	7327322
Conductivity	uS/cm	23000	1.0	7327248
Metals				
Dissolved Aluminum (Al)	ug/L	<50	50	7327984
Dissolved Antimony (Sb)	ug/L	<10	10	7327984
Dissolved Arsenic (As)	ug/L	<10	10	7327984
Dissolved Barium (Ba)	ug/L	130	10	7327984
Dissolved Beryllium (Be)	ug/L	<10	10	7327984
Dissolved Bismuth (Bi)	ug/L	<20	20	7327984

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

BV Labs Job #: C1B2448
Report Date: 2021/05/04

CBCL Limited
Client Project #: 171046.01
Sampler Initials: PA

ATL. RCAP-MS DISSOLVED (LABFILT) IN W

BV Labs ID		PKU239		
Sampling Date		2021/04/21 13:30		
COC Number		822472-02-01		
	UNITS	MW10	RDL	QC Batch
Dissolved Boron (B)	ug/L	2100	500	7327984
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	7327984
Dissolved Calcium (Ca)	ug/L	190000	1000	7327984
Dissolved Chromium (Cr)	ug/L	<10	10	7327984
Dissolved Cobalt (Co)	ug/L	<4.0	4.0	7327984
Dissolved Copper (Cu)	ug/L	<5.0	5.0	7327984
Dissolved Iron (Fe)	ug/L	<500	500	7327984
Dissolved Lead (Pb)	ug/L	<5.0	5.0	7327984
Dissolved Magnesium (Mg)	ug/L	540000	1000	7327984
Dissolved Manganese (Mn)	ug/L	3300	20	7327984
Dissolved Molybdenum (Mo)	ug/L	21	20	7327984
Dissolved Nickel (Ni)	ug/L	<20	20	7327984
Dissolved Phosphorus (P)	ug/L	<1000	1000	7327984
Dissolved Potassium (K)	ug/L	140000	1000	7327984
Dissolved Selenium (Se)	ug/L	<5.0	5.0	7327984
Dissolved Silver (Ag)	ug/L	<1.0	1.0	7327984
Dissolved Sodium (Na)	ug/L	4300000	1000	7327984
Dissolved Strontium (Sr)	ug/L	3100	20	7327984
Dissolved Thallium (Tl)	ug/L	<1.0	1.0	7327984
Dissolved Tin (Sn)	ug/L	<20	20	7327984
Dissolved Titanium (Ti)	ug/L	<20	20	7327984
Dissolved Uranium (U)	ug/L	<1.0	1.0	7327984
Dissolved Vanadium (V)	ug/L	<20	20	7327984
Dissolved Zinc (Zn)	ug/L	<50	50	7327984

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	2.3°C

Sample PKU228 [MW1] : Elevated reporting limits for trace metals due to sample matrix. ortho-Phosphate > Phosphorus: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Sample PKU232 [MW5] : Elevated reporting limits for trace metals due to sample matrix.

Poor RCAp Ion Balance due to sample matrix. Cation sum does not include contribution from Mn, Sr and B.

Sample PKU233 [MW6] : Elevated reporting limits for trace metals due to sample matrix. ortho-Phosphate > Phosphorus: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Poor RCAp Ion Balance due to sample matrix. Cation sum does not include contribution from Mn, Sr and B.

Sample PKU234 [MW7-S] : Elevated reporting limits for trace metals due to sample matrix.

Sample PKU235 [MW7-INT] : Elevated reporting limits for trace metals due to sample matrix. ortho-Phosphate > Phosphorus: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Poor RCAp Ion Balance due to sample matrix. Cation sum does not include contribution from Mn, Sr and B.

Sample PKU236 [MW7-D] : Elevated reporting limits for trace metals due to sample matrix.

Poor RCAp Ion Balance due to sample matrix. Cation sum does not include contribution from Mn, Sr and B.

Sample PKU237 [MW8] : Elevated reporting limits for trace metals due to sample matrix.

Poor RCAp Ion Balance due to sample matrix. Cation sum does not include contribution from Mn, Sr and B.

Sample PKU238 [MW9] : Elevated reporting limits for trace metals due to sample matrix. ortho-Phosphate > Phosphorus: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Poor RCAp Ion Balance due to sample matrix. Cation sum does not include contribution from Mn, Sr and B.

Sample PKU239 [MW10] : Elevated reporting limits for trace metals due to sample matrix. ortho-Phosphate > Phosphorus: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Poor RCAp Ion Balance due to sample matrix. Cation sum does not include contribution from Mn, Sr and B.

Results relate only to the items tested.

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BV Labs Job #: C1B2448
Report Date: 2021/05/04

CBCL Limited
Client Project #: 171046.01
Sampler Initials: PA

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7325612	YLG	Matrix Spike [PKU234-04]	Total Organic Carbon (C)	2021/04/29		NC	%	85 - 115
7325612	YLG	Spiked Blank	Total Organic Carbon (C)	2021/04/29		92	%	80 - 120
7325612	YLG	Method Blank	Total Organic Carbon (C)	2021/04/29	<0.50		mg/L	
7325612	YLG	RPD [PKU234-04]	Total Organic Carbon (C)	2021/04/29	1.6 (1)		%	15
7327248	SHW	Spiked Blank	Conductivity	2021/04/30		99	%	80 - 120
7327248	SHW	Method Blank	Conductivity	2021/04/30	<1.0		uS/cm	
7327248	SHW	RPD [PKU237-01]	Conductivity	2021/04/30	0.99		%	10
7327252	SHW	Spiked Blank	pH	2021/04/30		100	%	97 - 103
7327252	SHW	RPD [PKU237-01]	pH	2021/04/30	0.45		%	N/A
7327271	YLG	Matrix Spike	Total Organic Carbon (C)	2021/04/30		93	%	85 - 115
7327271	YLG	Spiked Blank	Total Organic Carbon (C)	2021/04/30		95	%	80 - 120
7327271	YLG	Method Blank	Total Organic Carbon (C)	2021/04/30	<0.50		mg/L	
7327271	YLG	RPD	Total Organic Carbon (C)	2021/04/30	NC (1)		%	15
7327322	SHW	QC Standard	Turbidity	2021/04/30		102	%	80 - 120
7327322	SHW	Spiked Blank	Turbidity	2021/04/30		100	%	80 - 120
7327322	SHW	Method Blank	Turbidity	2021/04/30	<0.10		NTU	
7327322	SHW	RPD	Turbidity	2021/04/30	4.1		%	20
7327326	SHW	QC Standard	Turbidity	2021/04/30		102	%	80 - 120
7327326	SHW	Spiked Blank	Turbidity	2021/04/30		101	%	80 - 120
7327326	SHW	Method Blank	Turbidity	2021/04/30	<0.10		NTU	
7327326	SHW	RPD [PKU233-01]	Turbidity	2021/04/30	NC		%	20
7327984	BAN	Matrix Spike	Dissolved Aluminum (Al)	2021/05/01		97	%	80 - 120
			Dissolved Antimony (Sb)	2021/05/01		98	%	80 - 120
			Dissolved Arsenic (As)	2021/05/01		94	%	80 - 120
			Dissolved Barium (Ba)	2021/05/01		93	%	80 - 120
			Dissolved Beryllium (Be)	2021/05/01		95	%	80 - 120
			Dissolved Bismuth (Bi)	2021/05/01		92	%	80 - 120
			Dissolved Boron (B)	2021/05/01		94	%	80 - 120
			Dissolved Cadmium (Cd)	2021/05/01		95	%	80 - 120
			Dissolved Calcium (Ca)	2021/05/01		NC	%	80 - 120
			Dissolved Chromium (Cr)	2021/05/01		92	%	80 - 120
			Dissolved Cobalt (Co)	2021/05/01		94	%	80 - 120
			Dissolved Copper (Cu)	2021/05/01		91	%	80 - 120
			Dissolved Iron (Fe)	2021/05/01		97	%	80 - 120
			Dissolved Lead (Pb)	2021/05/01		92	%	80 - 120
			Dissolved Magnesium (Mg)	2021/05/01		97	%	80 - 120
			Dissolved Manganese (Mn)	2021/05/01		94	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/05/01		101	%	80 - 120
			Dissolved Nickel (Ni)	2021/05/01		95	%	80 - 120
			Dissolved Phosphorus (P)	2021/05/01		102	%	80 - 120
			Dissolved Potassium (K)	2021/05/01		94	%	80 - 120
			Dissolved Selenium (Se)	2021/05/01		100	%	80 - 120
			Dissolved Silver (Ag)	2021/05/01		93	%	80 - 120
			Dissolved Sodium (Na)	2021/05/01		88	%	80 - 120
			Dissolved Strontium (Sr)	2021/05/01		93	%	80 - 120
			Dissolved Thallium (Tl)	2021/05/01		96	%	80 - 120
			Dissolved Tin (Sn)	2021/05/01		96	%	80 - 120
			Dissolved Titanium (Ti)	2021/05/01		93	%	80 - 120
			Dissolved Uranium (U)	2021/05/01		98	%	80 - 120
			Dissolved Vanadium (V)	2021/05/01		99	%	80 - 120
			Dissolved Zinc (Zn)	2021/05/01		96	%	80 - 120
7327984	BAN	Spiked Blank	Dissolved Aluminum (Al)	2021/05/01		115	%	80 - 120
			Dissolved Antimony (Sb)	2021/05/01		97	%	80 - 120
			Dissolved Arsenic (As)	2021/05/01		95	%	80 - 120

BV Labs Job #: C1B2448
Report Date: 2021/05/04

CBCL Limited
Client Project #: 171046.01
Sampler Initials: PA

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Barium (Ba)	2021/05/01		95	%	80 - 120
			Dissolved Beryllium (Be)	2021/05/01		94	%	80 - 120
			Dissolved Bismuth (Bi)	2021/05/01		93	%	80 - 120
			Dissolved Boron (B)	2021/05/01		94	%	80 - 120
			Dissolved Cadmium (Cd)	2021/05/01		97	%	80 - 120
			Dissolved Calcium (Ca)	2021/05/01		106	%	80 - 120
			Dissolved Chromium (Cr)	2021/05/01		93	%	80 - 120
			Dissolved Cobalt (Co)	2021/05/01		95	%	80 - 120
			Dissolved Copper (Cu)	2021/05/01		95	%	80 - 120
			Dissolved Iron (Fe)	2021/05/01		114	%	80 - 120
			Dissolved Lead (Pb)	2021/05/01		93	%	80 - 120
			Dissolved Magnesium (Mg)	2021/05/01		116	%	80 - 120
			Dissolved Manganese (Mn)	2021/05/01		96	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/05/01		99	%	80 - 120
			Dissolved Nickel (Ni)	2021/05/01		98	%	80 - 120
			Dissolved Phosphorus (P)	2021/05/01		116	%	80 - 120
			Dissolved Potassium (K)	2021/05/01		110	%	80 - 120
			Dissolved Selenium (Se)	2021/05/01		99	%	80 - 120
			Dissolved Silver (Ag)	2021/05/01		97	%	80 - 120
			Dissolved Sodium (Na)	2021/05/01		110	%	80 - 120
			Dissolved Strontium (Sr)	2021/05/01		98	%	80 - 120
			Dissolved Thallium (Tl)	2021/05/01		95	%	80 - 120
			Dissolved Tin (Sn)	2021/05/01		99	%	80 - 120
			Dissolved Titanium (Ti)	2021/05/01		96	%	80 - 120
			Dissolved Uranium (U)	2021/05/01		98	%	80 - 120
			Dissolved Vanadium (V)	2021/05/01		99	%	80 - 120
			Dissolved Zinc (Zn)	2021/05/01		98	%	80 - 120
7327984	BAN	Method Blank	Dissolved Aluminum (Al)	2021/05/01	<5.0		ug/L	
			Dissolved Antimony (Sb)	2021/05/01	<1.0		ug/L	
			Dissolved Arsenic (As)	2021/05/01	<1.0		ug/L	
			Dissolved Barium (Ba)	2021/05/01	<1.0		ug/L	
			Dissolved Beryllium (Be)	2021/05/01	<1.0		ug/L	
			Dissolved Bismuth (Bi)	2021/05/01	<2.0		ug/L	
			Dissolved Boron (B)	2021/05/01	<50		ug/L	
			Dissolved Cadmium (Cd)	2021/05/01	<0.010		ug/L	
			Dissolved Calcium (Ca)	2021/05/01	<100		ug/L	
			Dissolved Chromium (Cr)	2021/05/01	<1.0		ug/L	
			Dissolved Cobalt (Co)	2021/05/01	<0.40		ug/L	
			Dissolved Copper (Cu)	2021/05/01	<0.50		ug/L	
			Dissolved Iron (Fe)	2021/05/01	<50		ug/L	
			Dissolved Lead (Pb)	2021/05/01	<0.50		ug/L	
			Dissolved Magnesium (Mg)	2021/05/01	<100		ug/L	
			Dissolved Manganese (Mn)	2021/05/01	<2.0		ug/L	
			Dissolved Molybdenum (Mo)	2021/05/01	<2.0		ug/L	
			Dissolved Nickel (Ni)	2021/05/01	<2.0		ug/L	
			Dissolved Phosphorus (P)	2021/05/01	<100		ug/L	
			Dissolved Potassium (K)	2021/05/01	<100		ug/L	
			Dissolved Selenium (Se)	2021/05/01	<0.50		ug/L	
			Dissolved Silver (Ag)	2021/05/01	<0.10		ug/L	
			Dissolved Sodium (Na)	2021/05/01	<100		ug/L	
			Dissolved Strontium (Sr)	2021/05/01	<2.0		ug/L	
			Dissolved Thallium (Tl)	2021/05/01	<0.10		ug/L	
			Dissolved Tin (Sn)	2021/05/01	<2.0		ug/L	
			Dissolved Titanium (Ti)	2021/05/01	<2.0		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Uranium (U)	2021/05/01	<0.10		ug/L	
			Dissolved Vanadium (V)	2021/05/01	<2.0		ug/L	
			Dissolved Zinc (Zn)	2021/05/01	<5.0		ug/L	
7327984	BAN	RPD	Dissolved Calcium (Ca)	2021/05/01	1.5		%	20
			Dissolved Magnesium (Mg)	2021/05/01	2.0		%	20
			Dissolved Sodium (Na)	2021/05/01	2.1		%	20
7330234	EMT	Matrix Spike	Total Alkalinity (Total as CaCO3)	2021/05/03		100	%	80 - 120
7330234	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/05/03		110	%	80 - 120
7330234	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/05/03	<5.0		mg/L	
7330234	EMT	RPD	Total Alkalinity (Total as CaCO3)	2021/05/03	NC		%	20
7330236	EMT	Matrix Spike [PKU235-01]	Dissolved Sulphate (SO4)	2021/05/03		NC	%	80 - 120
7330236	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/05/03		107	%	80 - 120
7330236	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/05/03	<2.0		mg/L	
7330236	EMT	RPD [PKU235-01]	Dissolved Sulphate (SO4)	2021/05/03	0.21		%	20
7330265	EMT	Matrix Spike	Dissolved Chloride (Cl-)	2021/05/03		98	%	80 - 120
7330265	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/05/03		100	%	80 - 120
7330265	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/05/03	<1.0		mg/L	
7330265	EMT	RPD	Dissolved Chloride (Cl-)	2021/05/03	0.59		%	20
7330266	EMT	Matrix Spike	Dissolved Sulphate (SO4)	2021/05/03		124 (2)	%	80 - 120
7330266	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/05/03		115	%	80 - 120
7330266	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/05/03	<2.0		mg/L	
7330266	EMT	RPD	Dissolved Sulphate (SO4)	2021/05/03	NC		%	20
7330267	EMT	Matrix Spike	Reactive Silica (SiO2)	2021/05/03		99	%	80 - 120
7330267	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/05/03		99	%	80 - 120
7330267	EMT	Method Blank	Reactive Silica (SiO2)	2021/05/03	<0.50		mg/L	
7330267	EMT	RPD	Reactive Silica (SiO2)	2021/05/03	1.2		%	20
7330268	EMT	Spiked Blank	Colour	2021/05/03		95	%	80 - 120
7330268	EMT	Method Blank	Colour	2021/05/03	<5.0		TCU	
7330268	EMT	RPD	Colour	2021/05/03	0.081		%	20
7330269	EMT	Matrix Spike	Orthophosphate (P)	2021/05/03		87	%	80 - 120
7330269	EMT	Spiked Blank	Orthophosphate (P)	2021/05/03		93	%	80 - 120
7330269	EMT	Method Blank	Orthophosphate (P)	2021/05/03	<0.010		mg/L	
7330269	EMT	RPD	Orthophosphate (P)	2021/05/03	NC		%	20
7330271	EMT	Matrix Spike	Nitrate + Nitrite (N)	2021/05/03		70 (3)	%	80 - 120
7330271	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/05/03		100	%	80 - 120
7330271	EMT	Method Blank	Nitrate + Nitrite (N)	2021/05/03	<0.050		mg/L	
7330271	EMT	RPD	Nitrate + Nitrite (N)	2021/05/03	NC		%	20
7330272	EMT	Matrix Spike	Nitrite (N)	2021/05/03		79 (3)	%	80 - 120
7330272	EMT	Spiked Blank	Nitrite (N)	2021/05/03		103	%	80 - 120
7330272	EMT	Method Blank	Nitrite (N)	2021/05/03	<0.010		mg/L	
7330272	EMT	RPD	Nitrite (N)	2021/05/03	NC		%	20
7330283	EMT	Matrix Spike [PKU235-01]	Total Alkalinity (Total as CaCO3)	2021/05/03		NC	%	80 - 120
7330283	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/05/03		107	%	80 - 120
7330283	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/05/03	<5.0		mg/L	
7330283	EMT	RPD [PKU235-01]	Total Alkalinity (Total as CaCO3)	2021/05/03	0.44		%	20
7330284	EMT	Matrix Spike [PKU235-01]	Dissolved Chloride (Cl-)	2021/05/03		NC	%	80 - 120
7330284	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/05/03		97	%	80 - 120
7330284	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/05/03	<1.0		mg/L	
7330284	EMT	RPD [PKU235-01]	Dissolved Chloride (Cl-)	2021/05/03	0.38		%	20
7330286	EMT	Matrix Spike [PKU235-01]	Reactive Silica (SiO2)	2021/05/03		NC	%	80 - 120
7330286	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/05/03		99	%	80 - 120
7330286	EMT	Method Blank	Reactive Silica (SiO2)	2021/05/03	<0.50		mg/L	
7330286	EMT	RPD [PKU235-01]	Reactive Silica (SiO2)	2021/05/03	1.4		%	20
7330288	EMT	Spiked Blank	Colour	2021/05/03		98	%	80 - 120

BV Labs Job #: C1B2448
Report Date: 2021/05/04

CBCL Limited
Client Project #: 171046.01
Sampler Initials: PA

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7330288	EMT	Method Blank	Colour	2021/05/03	<5.0		TCU	
7330288	EMT	RPD [PKU235-01]	Colour	2021/05/03	1.0		%	20
7330289	EMT	Matrix Spike [PKU235-01]	Orthophosphate (P)	2021/05/03		89	%	80 - 120
7330289	EMT	Spiked Blank	Orthophosphate (P)	2021/05/03		93	%	80 - 120
7330289	EMT	Method Blank	Orthophosphate (P)	2021/05/03	<0.010		mg/L	
7330289	EMT	RPD [PKU235-01]	Orthophosphate (P)	2021/05/03	4.9		%	20
7330291	EMT	Matrix Spike [PKU235-01]	Nitrate + Nitrite (N)	2021/05/03		91	%	80 - 120
7330291	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/05/03		91	%	80 - 120
7330291	EMT	Method Blank	Nitrate + Nitrite (N)	2021/05/03	<0.050		mg/L	
7330291	EMT	RPD [PKU235-01]	Nitrate + Nitrite (N)	2021/05/03	4.1		%	20
7330293	EMT	Matrix Spike [PKU235-01]	Nitrite (N)	2021/05/03		97	%	80 - 120
7330293	EMT	Spiked Blank	Nitrite (N)	2021/05/03		104	%	80 - 120
7330293	EMT	Method Blank	Nitrite (N)	2021/05/03	<0.010		mg/L	
7330293	EMT	RPD [PKU235-01]	Nitrite (N)	2021/05/03	NC		%	20
7330542	EMT	Matrix Spike [PKU231-03]	Nitrogen (Ammonia Nitrogen)	2021/05/03		95	%	80 - 120
7330542	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2021/05/03		104	%	80 - 120
7330542	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2021/05/03	<0.050		mg/L	
7330542	EMT	RPD [PKU231-03]	Nitrogen (Ammonia Nitrogen)	2021/05/03	9.2		%	20
7330546	EMT	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2021/05/03		99	%	80 - 120
7330546	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2021/05/03		105	%	80 - 120
7330546	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2021/05/03	<0.050		mg/L	
7330546	EMT	RPD	Nitrogen (Ammonia Nitrogen)	2021/05/03	NC		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Elevated reporting limit due to turbidity.

(2) Elevated spike recovery due to probable sample matrix interference.

(3) Poor spike recovery due to probable sample matrix interference.

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Eric Dearman, Scientific Specialist

Mike MacGillivray, Scientific Specialist (Inorganics)

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

Bureau Veritas Laboratories
200 Bluewater Road, Bedford, Nova Scotia Canada B4B 1G9 Tel:(902) 420-0203 Toll-free:800-563-6266 Fax:(902) 420-8612 www.bvlabs.com

Chain Of Custody Record

INVOICE TO:		Report Information		Project Information	
Company Name	#41018 CBCL Limited	Company Name		Quotation #	C05476
Contact Name	ACCOUNTS PAYABLE	Contact Name	Laura Jenkins & COLIN WALKER	P.O. #	
Address	1505 Barrington Street Suite 901 / PO Box 606	Address		Project #	171046.01
	Halifax NS B3J 3Y6			Project Name	Avon
Phone	(902) 421-7241 Fax: (902) 423-3938	Phone	Fax:	Site #	
Email	acct@cbcl.ca	Email	ljenkins@cbcl.ca / colinw@cbcl.ca	Sampled By	PA

Laboratory Use Only

BV Labs Job #	Bottle Order #:
C1B2448	822472
Chain Of Custody Record	Project Manager
C#822472-01-01	Keri Mackay

Regulatory Criteria:

Special Instructions

** Specify Matrix: Surface/Ground/Tapwater/Sewage/Effluent/Seawater Potable/Nonpotable/Tissue/Soil/Sludge/Metal

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT:
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: Time Required:

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered & Preserved	Lab Filtration Required	At. RCAp-MS Dissolved (FieldFilt) in W	# of Bottles	Comments / Hazards / Other Required Analysis
1		MW1	21/04/21	10:30			X	X		
2		MW2	21/04/21	16:30			X	X		
3		MW3	21/04/21	11:30			X	X		
4		MW4	21/04/21	16:00			X	X		
5		MW5	21/04/21	14:30			X	X		
6		MW6	21/04/21	14:00			X	X		
7		MW7-S	21/04/21	12:30			X	X		
8		MW7-INT	21/04/21	12:15			X	X		
9		MW7-D	21/04/21	12:00			X	X		
10		MW8	21/04/21	13:00			X	X		

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Laura Jenkins	26/04/21		Daria Wisniowska			

Lab Use Only: Time Sensitive ☐ | Temperature (°C) on Receipt: 3, 3, 1 | Custody Seal Intact on Cooler? ☐ Yes ☐ No

White: BV Labs Yellow: Client

2021 APR 26 15:17

Bureau Veritas Canada (2019) Inc.

Bureau Veritas Laboratories
200 Bluewater Road, Bedford, Nova Scotia Canada B4B 1G9 Tel:(902) 420-0203 Toll-free:800-563-6266 Fax:(902) 420-8612 www.bvlabs.com

Chain Of Custody Record

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#41018 CBCL Limited	Company Name		Quotation #	C05476	BV Labs Job #	Bottle Order #:
Contact Name	ACCOUNTS PAYABLE	Contact Name	Laura Jenkins	P.O. #		C1B2448	822472
Address	1505 Barrington Street Suite 901 / PO Box 606	Address		Project #	171046.01	Chain Of Custody Record	Project Manager
	Halifax NS B3J 3Y6			Project Name		C#822472-02-01	Keri Mackay
Phone	(902) 421-7241 Fax: (902) 423-3938	Phone	Fax:	Site #			
Email	acct@cbcl.ca	Email	ljenkins@cbcl.ca	Sampled By			

Regulatory Criteria:

** Specify Matrix: Surface/Ground/Tapwater/Sewage/Effluent/Seawater Potable/Nonpotable/Tissue/Soil/Sludge/Metal

Special Instructions

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT:
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: Time Required:

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered & Preserved	Lab Filtration Required	At. RCAp-MS Dissolved (FieldFilt) in W	# of Bottles	Comments / Hazards / Other Required Analysis
1		MW9	21/04/21	13:15			X	X		
2		MW10	21/04/21	13:30			X	X		
3								X		
4								X		
5								X		
6										
7										
8										
9										
10										

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only
[signature]			Darcie Wombolt				Time Sensitive; Temperature (°C) on Receipt: 3, 3, 1; Custody Seal Intact on Cooler? Yes / No

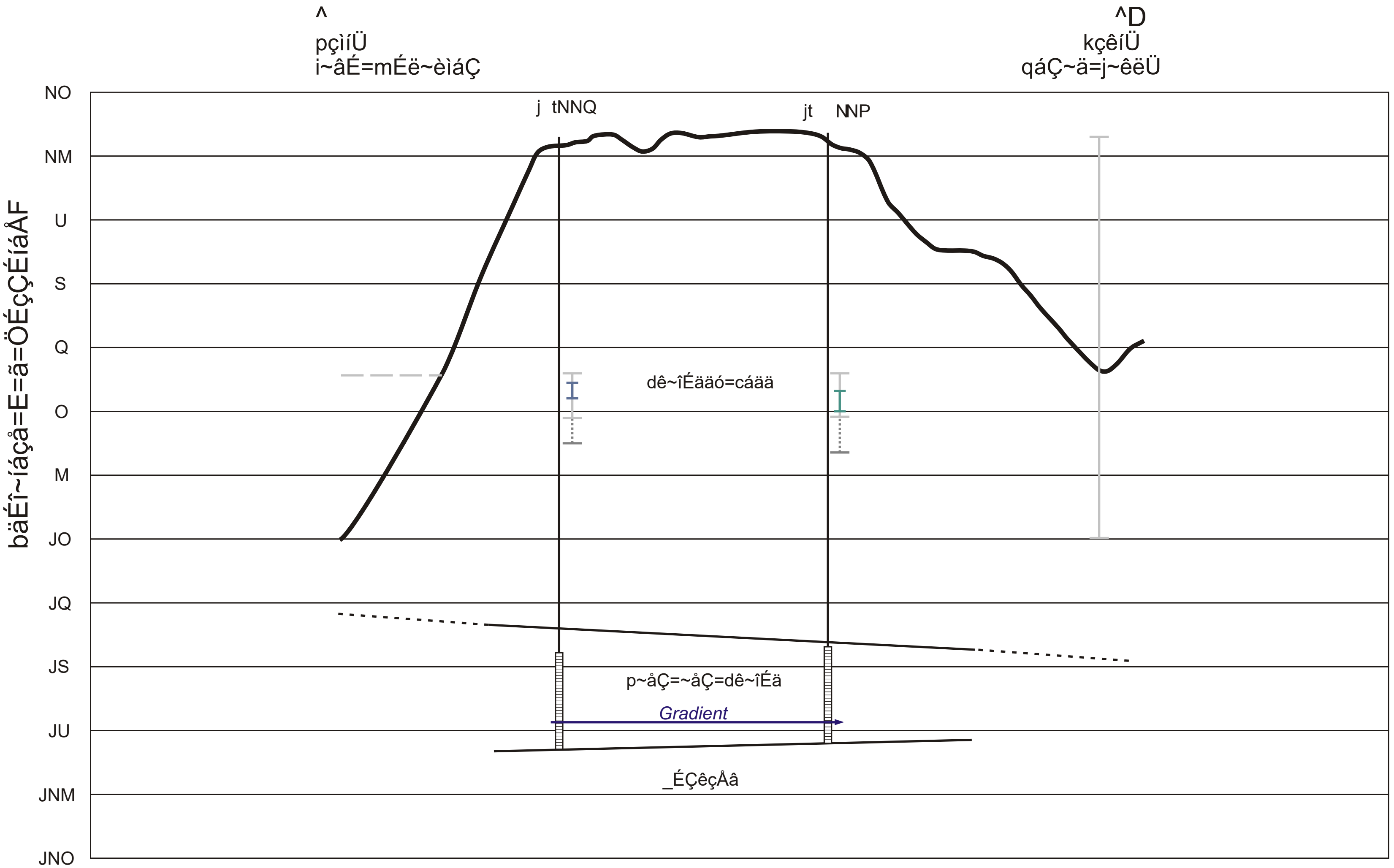
* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: BV Labs Yellow: Client

2021 APR 26 15:17

APPENDIX F

Supplementary Causeway Monitoring Program



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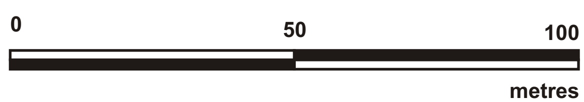
Vertical Exaggeration: 3.33



LEGEND

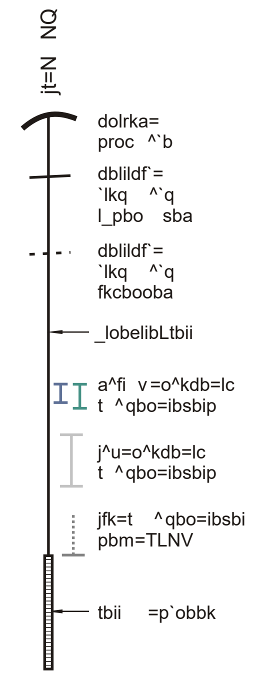
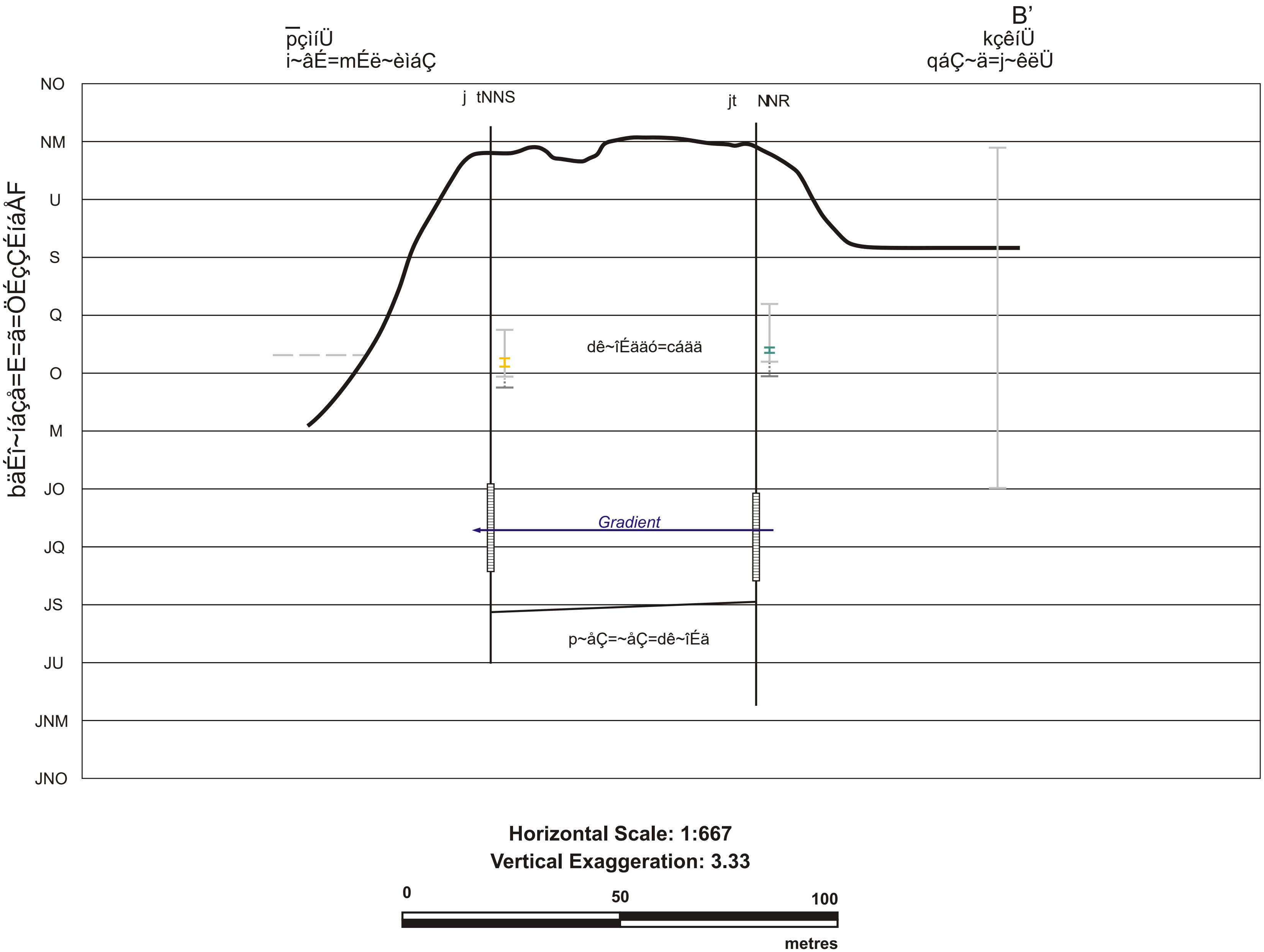


FIGURE F1

GEOLOGICAL CROSS-SECTION A-A'

AVON RIVER ABOITEAU

CBCL



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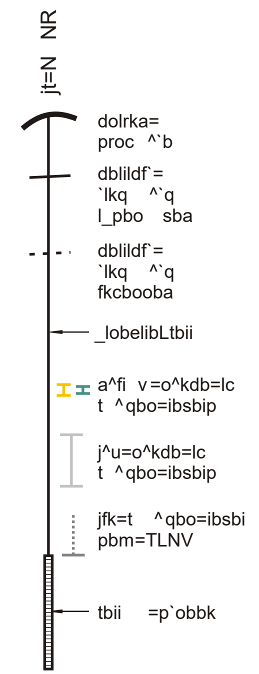


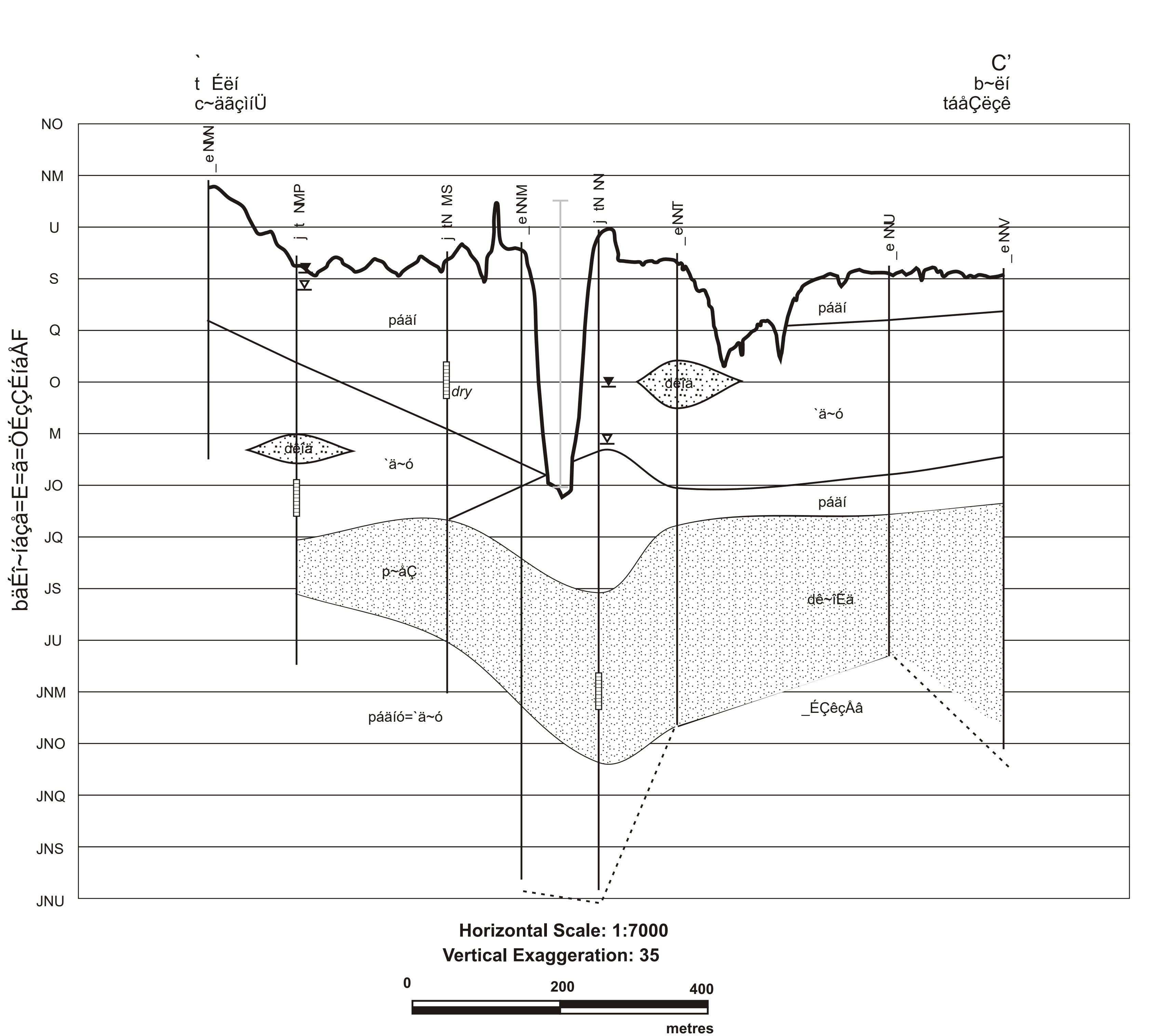
FIGURE F2

GEOLOGICAL CROSS-SECTION B-B’

AVON RIVER ABOITEAU

j~êÅÜ=OMOM

molgb`q =kIKW=NTNMQSKMN



LEGEND

FIGURE F3

GEOLOGICAL CROSS-SECTION C-C'

AVON RIVER ABOITEAU

Figure F4. Water Level Responses in 2019, West Causeway Monitoring Wells

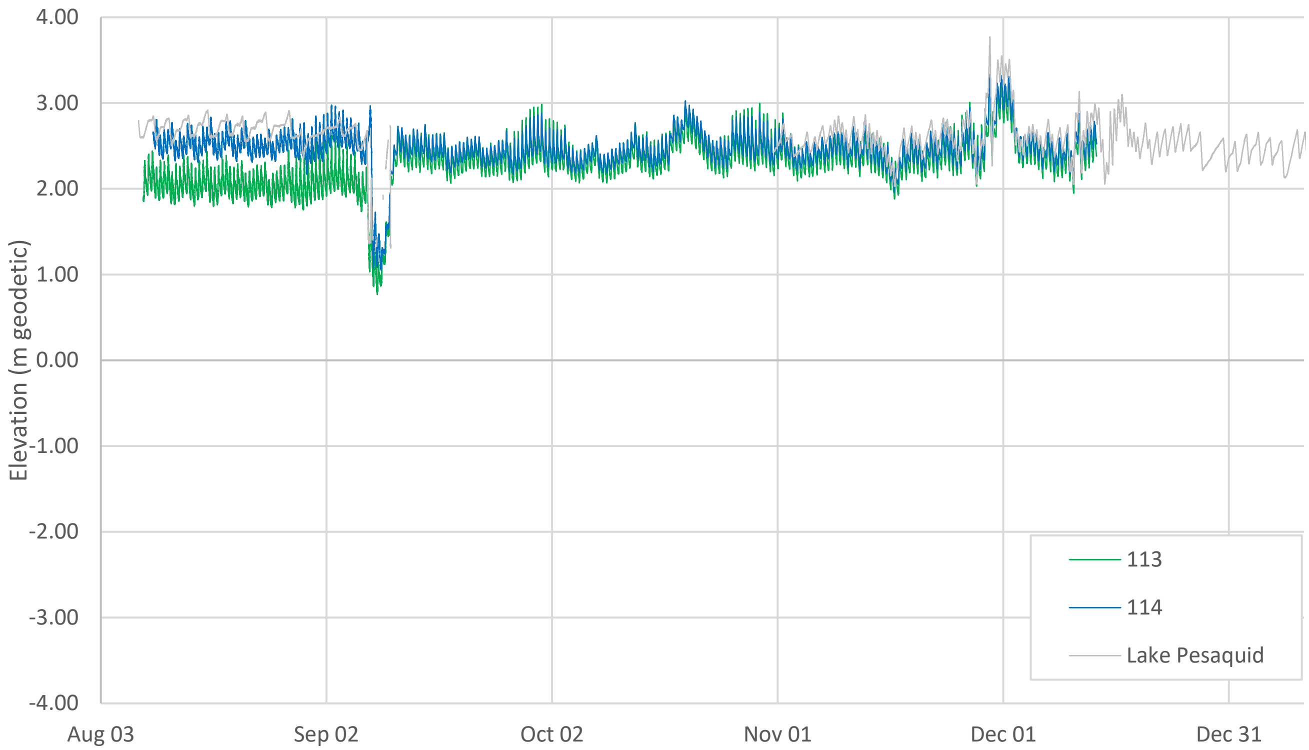


Figure F5. Water Level Responses in 2020, West Causeway Monitoring Wells

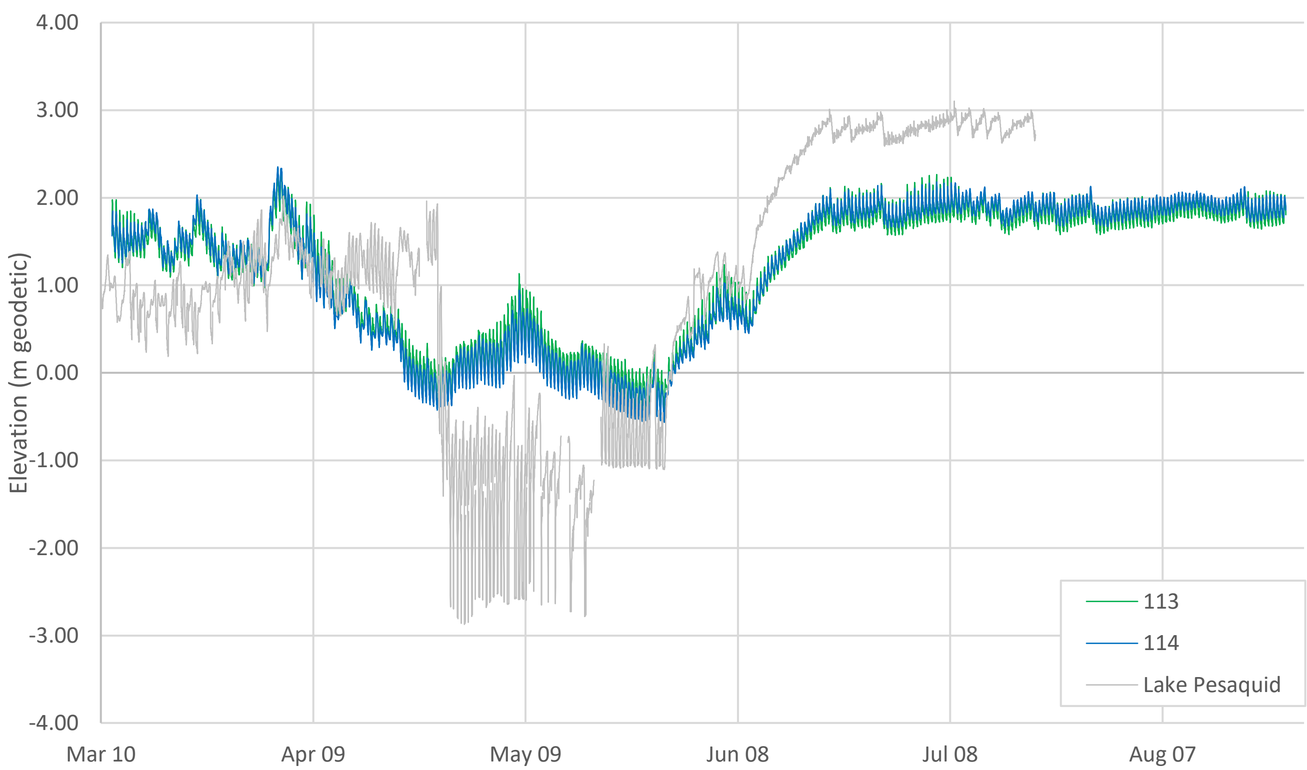


Figure F6. Water Level Responses in 2019, East Causeway Monitoring Wells

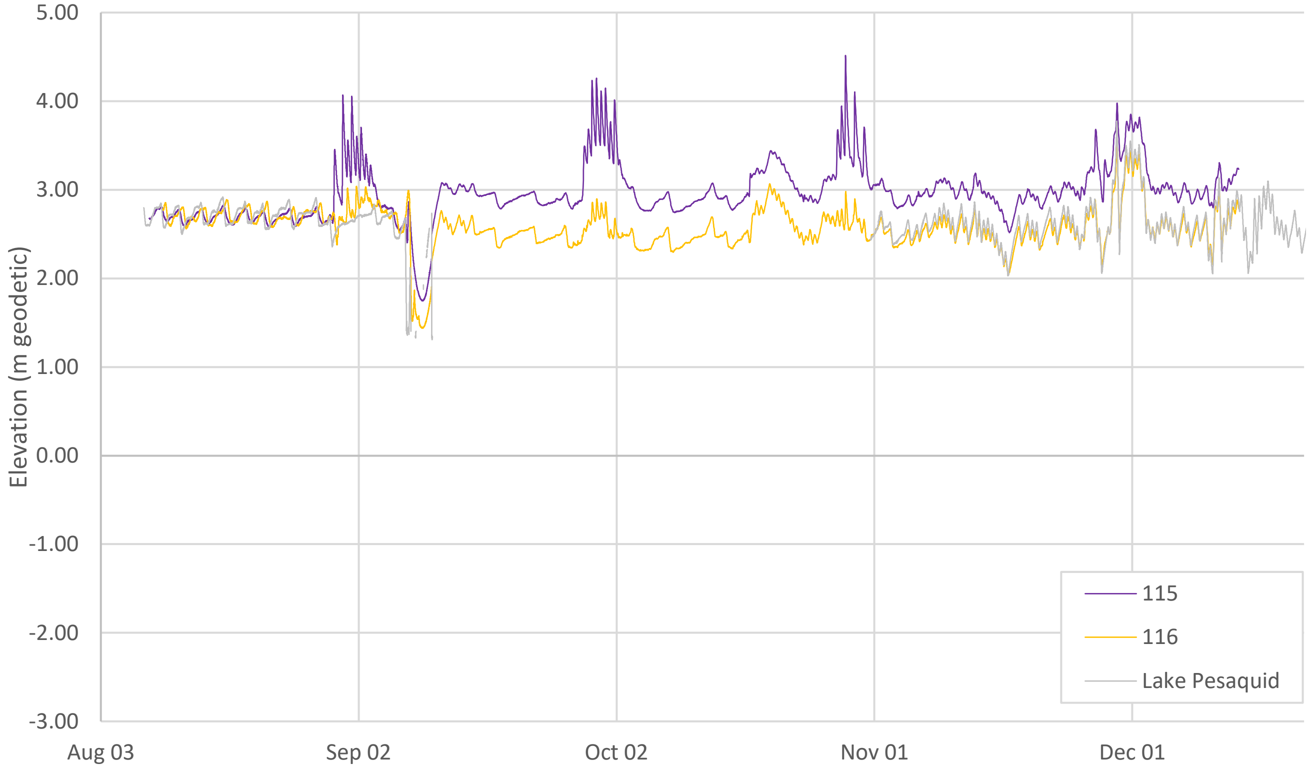


Figure F7. Water Level Responses in 2019, East Causeway Monitoring Wells

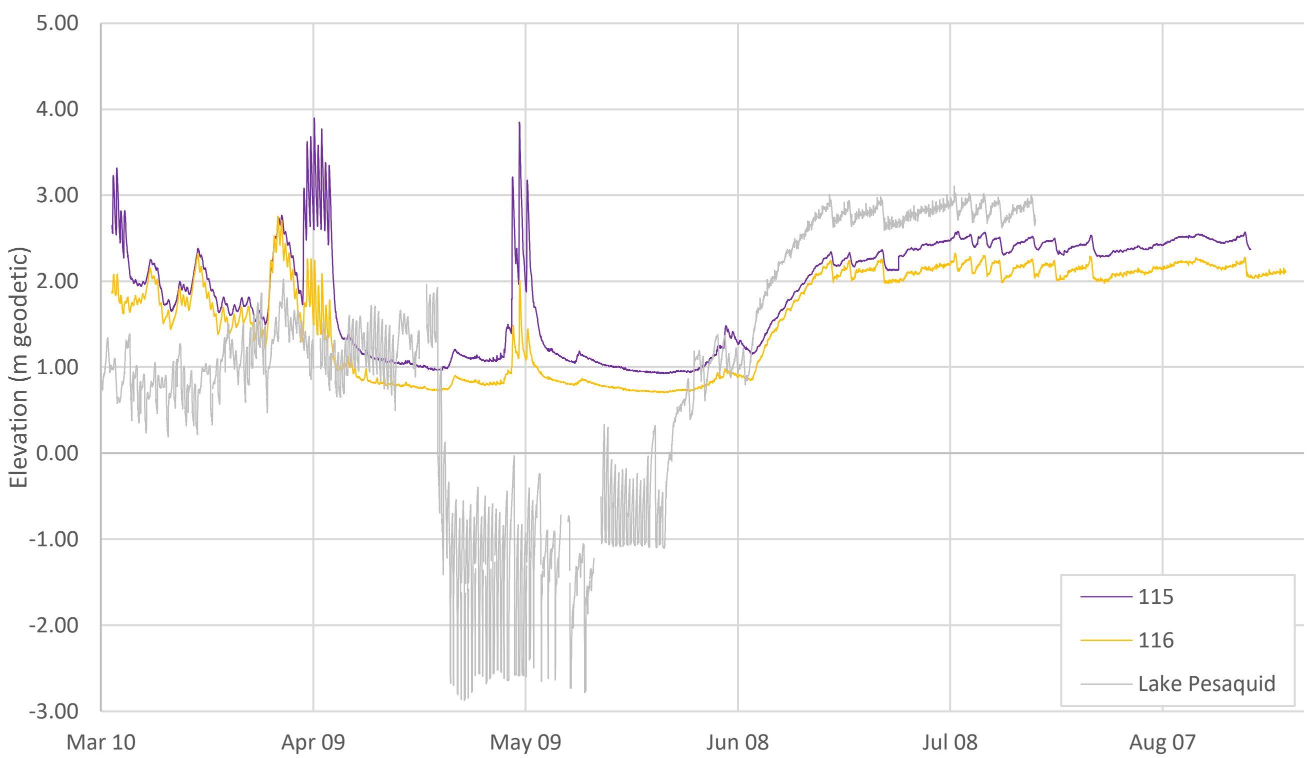


Figure F8. Horizontal Gradients at Causeway Monitoring Wells

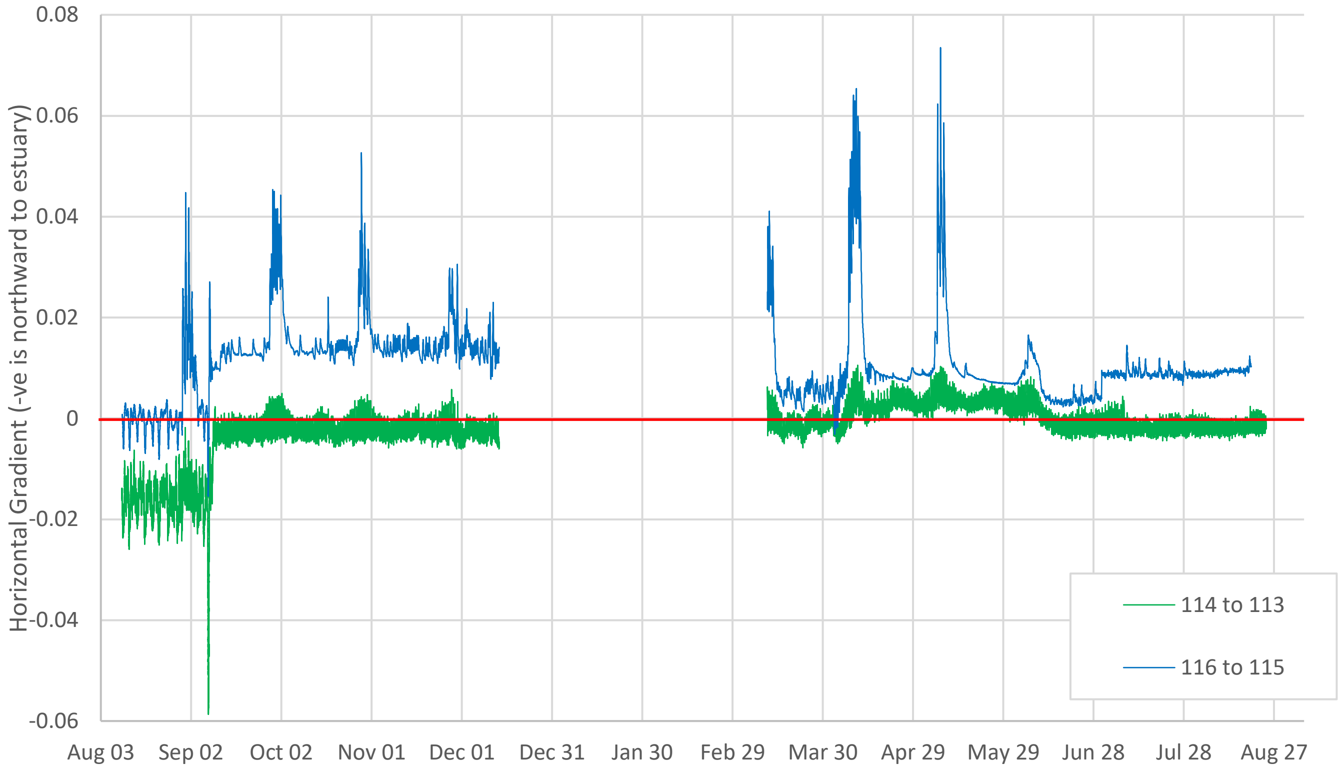


Figure E9. Electrical Conductivity in 2019 at Causeway Monitoring Wells

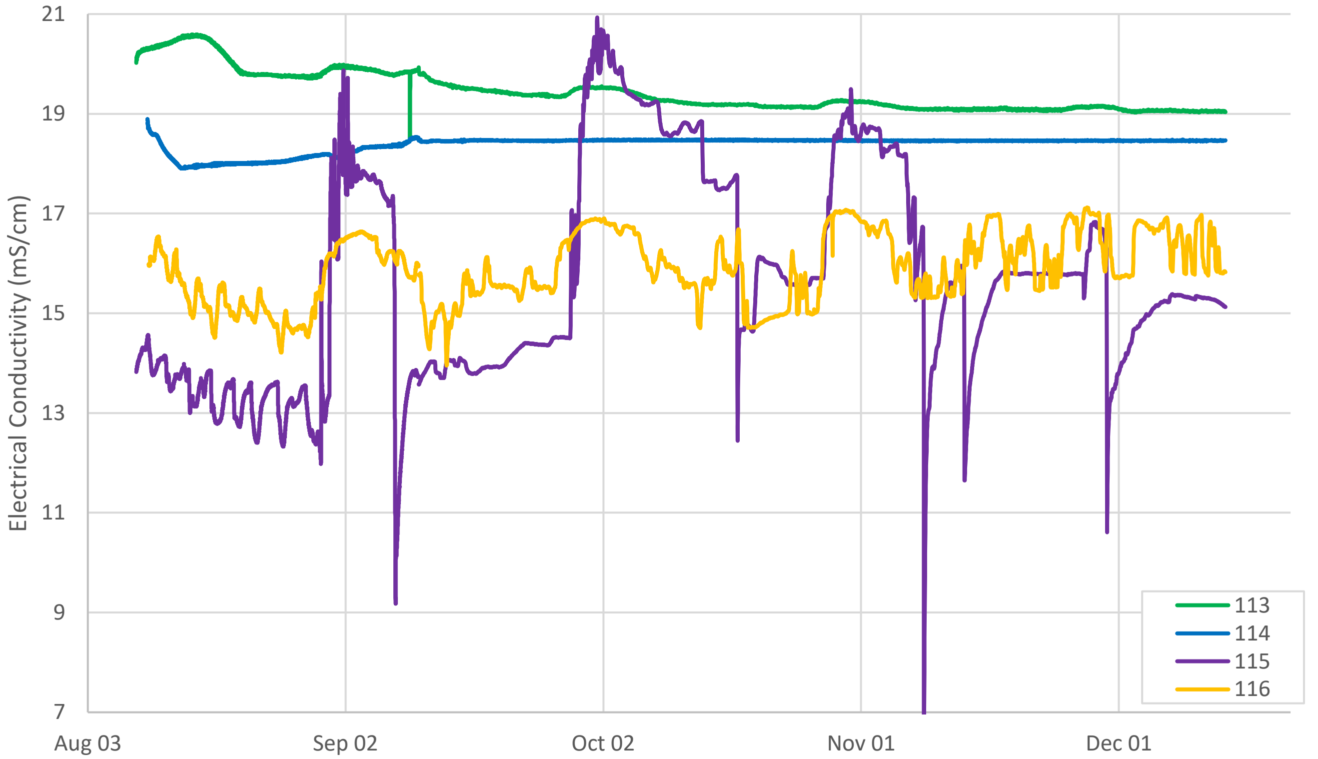
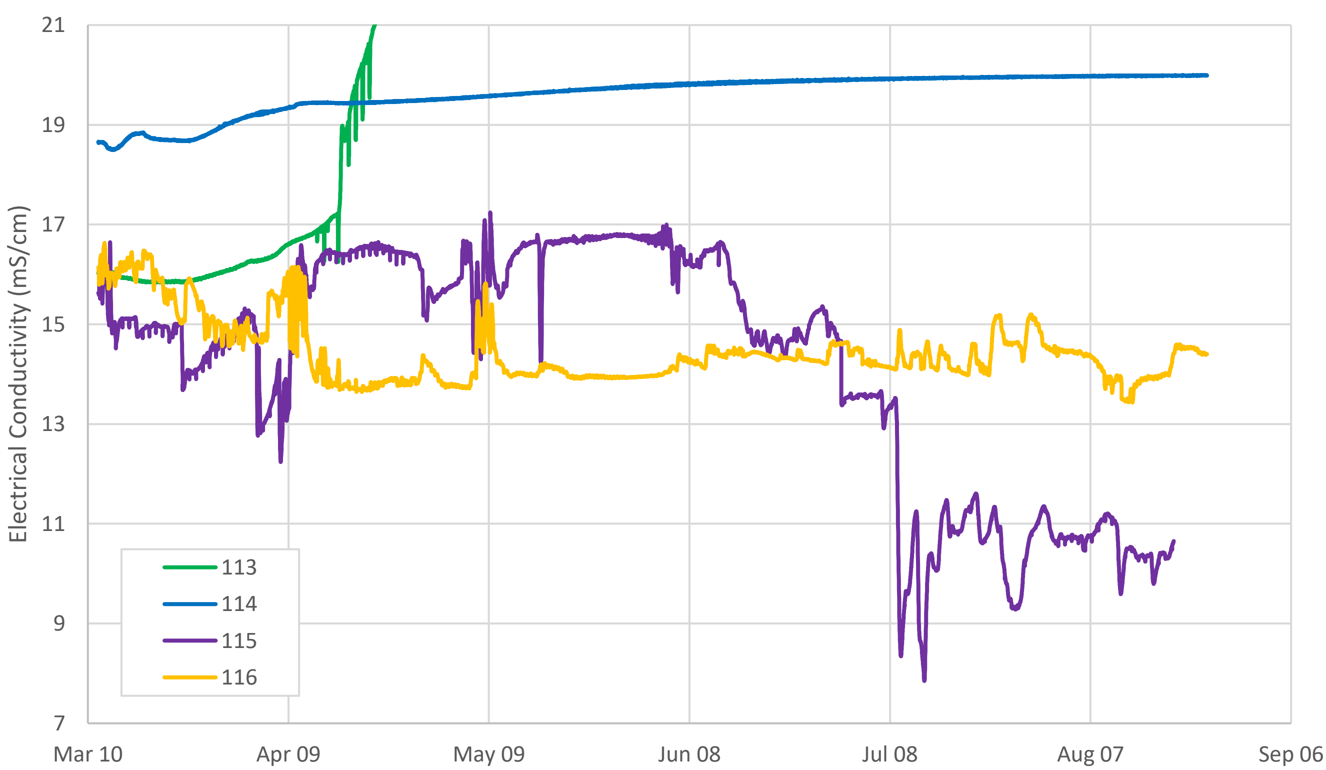


Figure E10. Electrical Conductivity in 2020 at Causeway Monitoring Wells

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APPENDIX H

Wetland and Vegetation

Belt Transects

CBCL LIMITED
Consulting Engineers

Figure H.1

Location of Transect Surveys at Sampling Location AR-02 on the Avon River

Drawn: RM	Date: 18/09/2019
Checked: BC	
Approved: IB	Scale @ 11"x17" = 1:250
Proj. Numb.: 211244.00	

Notes:

0 5 10 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter

Z:\171046.01 - AVON RIVER ABOITEAU ENVIRO\GIS\171046.01 - Veg Monitoring Station - AR02.mxd 18/09/2019 8:56:13 AM

Belt Transects

CBCL LIMITED
Consulting Engineers

Figure H.2

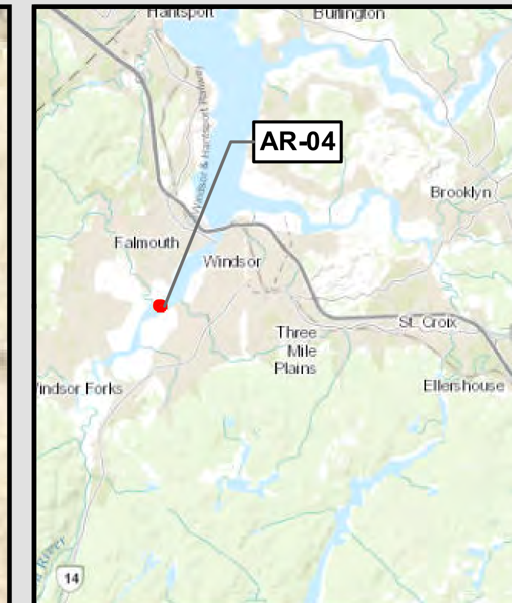
Location of Transect Surveys at Sampling Location AR-03 on the Avon River

Drawn: RM	Date: 18/09/2019
Checked: BC	
Approved: IB	Scale @ 11"x17" = 1:300
Proj. Numb.: 211244.00	

Notes:

0 5 10 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter



Belt Transects

CBCL LIMITED

Consulting Engineers

Figure H.3

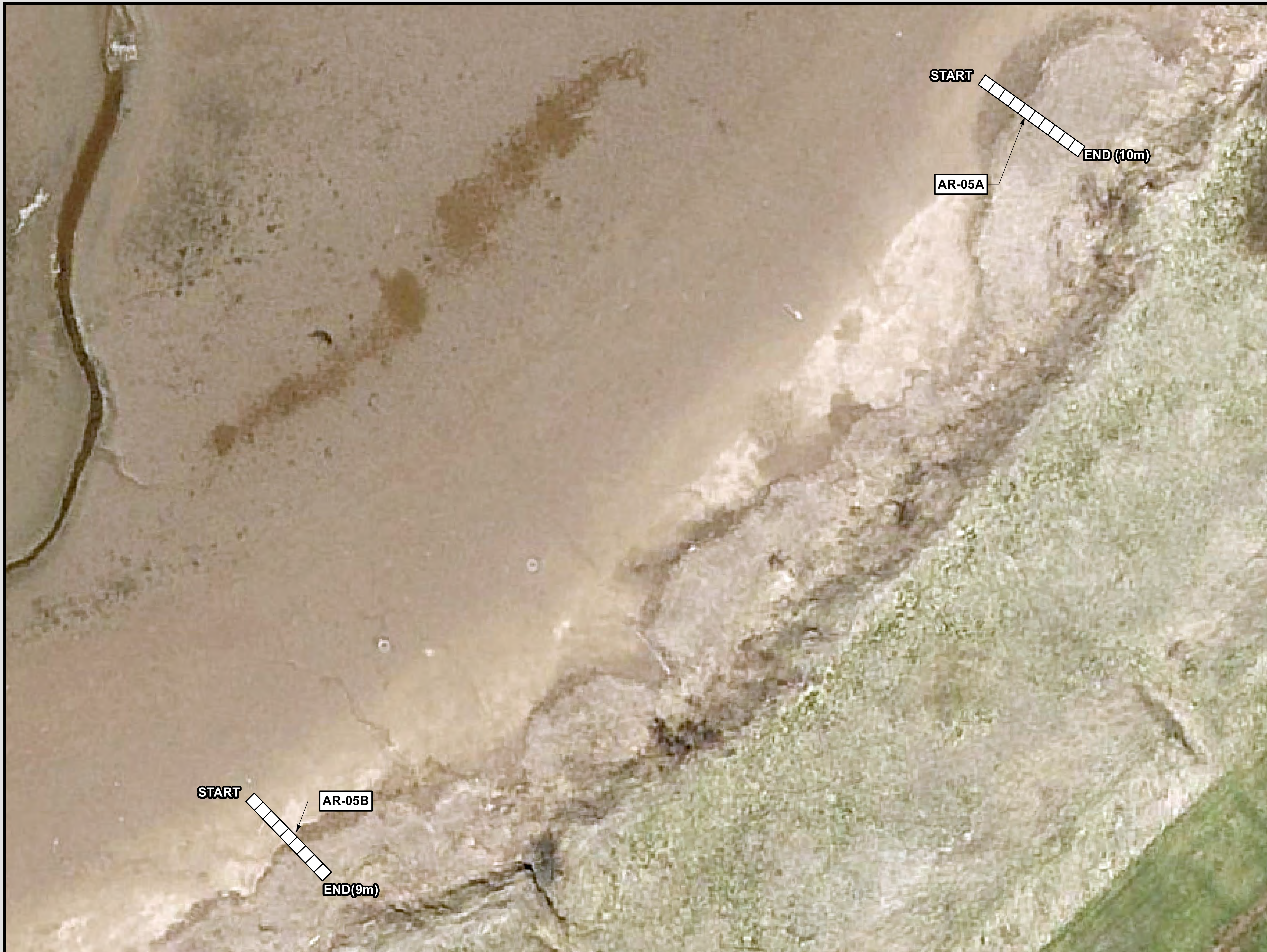
Location of Transect Surveys at Sampling Location AR-04 on the Avon River

Drawn: RM	Date: 17/09/2019
Checked: BC	
Approved: IB	Scale @ 11"x17" = 1:300
Proj. Numb.: 211244.00	

Notes:

0 5 10 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter



Belt Transects

CBCL LIMITED
Consulting Engineers

Figure H.4

Location of Transect Surveys at Sampling Location AR-05 on the Avon River

Drawn: RM	Date: 18/09/2019
Checked: BC	
Approved: IB	Scale @ 11"x17" = 1:300
Proj. Numb.: 211244.00	

Notes:

0 5 10 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter

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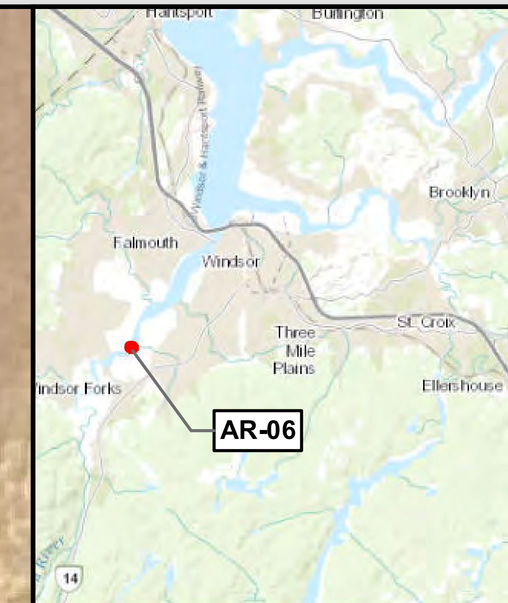

Belt Transect

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Figure H.5

Location of Transect Surveys at Sampling Location AR-06 on the Avon River

Drawn: RM	Date: 18/09/2019
Checked: BC	
Approved: IB	Scale @ 11"x17" = 1:300
Proj. Numb.: 211244.00	

Notes:

0 5 10 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter

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Belt Transects

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Figure H.6

Location of Transect Surveys at Sampling Location AR-07 on the Avon River

Drawn: RM	Date: 18/09/2019
Checked: BC	
Approved: IB	Scale @ 11"x17" = 1:300m
Proj. Numb.: 211244.00	

Notes:

0 5 10 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter

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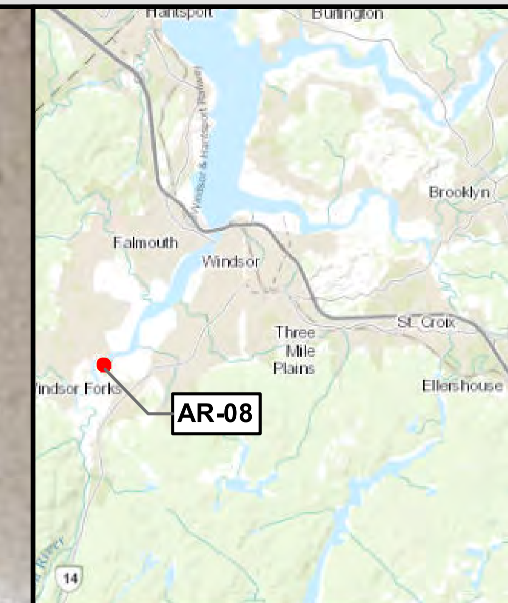

Belt Transects

CBCL LIMITED
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Figure H.7

Location of Transect Surveys at Sampling Location AR-08 on the Avon River

Drawn: RM	Date: 18/09/2019
Checked: BC	
Approved: IB	Scale @ 11"x17" = 1:300
Proj. Numb.: 211244.00	

Notes:

0 5 10 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter

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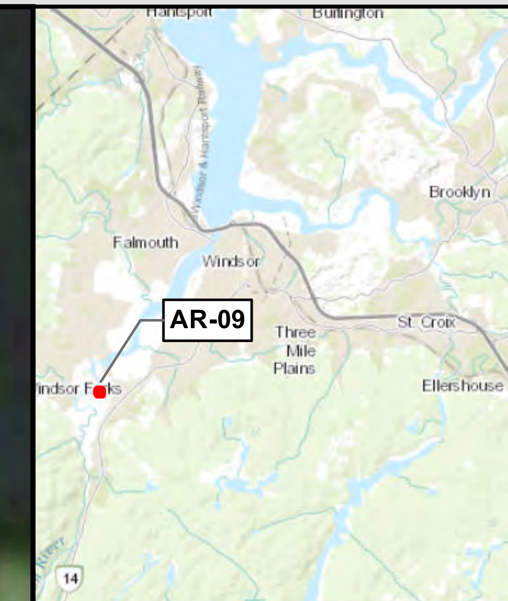

Belt Transects

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Figure H.8

Location of Transect Surveys at Sampling Location AR-09 on the Avon River

Drawn: RM	Date: 18/09/2019
Checked: BC	
Approved: IB	Scale @ 11"x17" = 1:300
Proj. Numb.: 211244.00	

Notes:

0 5 10 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter

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Figure H.9

Location of Transect Surveys at Sampling Location AR-10 on the Avon River

Drawn: RM	Date: 18/09/2019
Checked: BC	
Approved: IB	Scale @ 11"x17" = 1:300
Proj. Numb.: 211244.00	

Notes:

0 5 10 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter

Belt Transects

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Figure H.10

Location of Transect Surveys at Sampling Location AR-11 on the Avon River

Drawn: RM	Date: 18/09/2019
Checked: BC	
Approved: IB	Scale @ 11"x17" = 1:300
Proj. Numb.: 211244.00	

Notes:

0 5 10 m

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Units: Meter

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Table H.1 Riparian Vegetation Assessment Species List by Site

Family	Scientific Name	Common Name	Wetland Indicator Status	NS S-Rank	Assessment Location									
					AR-02	AR-03	AR-04	AR-05	AR-06	AR-07	AR-08	AR-09	AR-10	AR-11
Aceraceae	*Acer rubrum*	Red Maple	FAC	S5	•									
Alismataceae	*Alisma triviale*	Northern Water Plantain	OBL	S5										•
Anacardiaceae	*Toxicodendron radicans*	Poison Ivy	FAC	S4				•						
Apiaceae	*Cicuta bulbifera*	Bulbous Water-hemlock	OBL	S5			•			•	•	•		
	Cicuta maculata	Spotted Water-Hemlock	OBL	S5	•									
	Daucus carota	Queen Anne's Lace	FACU	SNA				•			•	•		•
	Sium suave	Common Water Parsnip	OBL	S5				•	•	•				•
	Angelica lucida	Seaside Angelica	FACW	S4									•	
Apocynaceae	*Apocynum androsaemifolium*	Spreading Dogbane	UPL	S5				•						
Araceae	*Calla palustris*	Wild Calla	OBL	S5				•						
Asclepiadaceae	*Asclepias incarnata*	Swamp Milkweed	OBL	S4		•								
Asteraceae	*Achillea millefolium*	Common Yarrow	FACU-	S5	•						•			
	Bidens frondosa	Devil's Beggarticks	FACW	S5	•	•		•						•
	Centaurea nigra	Black Knapweed	FAC	SNA		•		•						
	Cirsium vulgare	Bull Thistle	FAC	SNA							•			
	Leucanthemum vulgare	Oxeye Daisy	FAC	SNA								•		•
	Solidago canadensis	Canada Goldenrod	FAC	S4S5		•	•	•						
	Solidago rugosa	Rough-stemmed Goldenrod	FAC	S5				•			•		•	•
	Solidago sp.	A goldenrod	FAC*	#N/A	•		•	•		•			•	•
	Taraxacum officinale	Common Dandelion	FAC-	SNA	•									
	Tragopogon pratensis	Meadow Goatsbeard	FACU	SNA	•			•			•			
	Tussilago farfara	Coltsfoot	FAC	SNA	•	•		•						
	Eupatorium maculatum	Spotted Joe-pye-weed	FACW	S5						•	•	•	•	•
	Arctium minus	Common Burdock	FAC	SNA							•			•
	Erigeron sp.	A fleabane	FAC*	#N/A							•		•	
	Eupatorium perfoliatum	Common Boneset	FACW	S5									•	
	Solidago sp.	A goldenrod	FAC*	#N/A								•		
	Cichorium intybus	Wild Chicory	FACU	SNA							•			
	Symphyotrichum sp.	An aster	FAC*	#N/A		•								
	Euthamia graminifolia	Grass-leaved Goldenrod	FAC	S5	•			•						
	Prenanthes trifoliolata	Three-leaved Rattlesnakeroot	FACU	S5				•						
	Eurybia macrophylla	Large-leaved Aster	FACU	S5				•						
	Oclemena acuminata	Whorled Wood Aster	FACU	S5				•						
	Matricaria discoidea	Pineapple Weed	FACU	SNA				•						
	Lactuca biennis	Tall Blue Lettuce	FACU	S5	•									
	Ambrosia artemisiifolia	Common Ragweed	FACU	S5							•			
	Aster sp.	#N/A	FAC*	#N/A										•

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Family	Scientific Name	Common Name	Wetland Indicator Status	NS S-Rank	Assessment Location									
					AR-02	AR-03	AR-04	AR-05	AR-06	AR-07	AR-08	AR-09	AR-10	AR-11
Balsaminaceae	*Impatiens capensis*	Spotted Jewelweed	FAC	S5		●	●	●	●		●	●	●	●
Berberidaceae	*Berberis vulgaris*	Common Barberry	FACU	SNA	●									
Betulaceae	*Alnus incana*	Speckled Alder	FACW	S5	●	●	●	●	●	●	●	●	●	●
	Betula populifolia	Gray Birch	FAC	S5							●	●		
	Corylus cornuta	Beaked Hazel	FAC	S5				●						
Boraginaceae	*Myosotis laxa*	Small Forget-Me-Not	OBL	S5		●			●		●	●		●
	Myosotis sylvatica	Woodland Forget-Me-Not	UPL	SNA							●			
Brassicaceae	*Raphanus raphanistrum*	Wild Radish	FAC	SNA	●								●	
	Hesperis matronalis	Dame's Rocket	FAC	SNA	●								●	
	Stellaria graminea	Little Starwort	FAC	SNA								●		
Clusiaceae	*Triadenum fraseri*	Fraser's Marsh St John's-wort	OBL	S5									●	
Convolvulaceae	*Calystegia sepium*	Hedge False Bindweed	FACW	S5		●	●	●	●	●		●	●	●
	Convolvulus arvensis	Field Bindweed	UPL	SNA				●						
Cornaceae	*Cornus sericea*	Red Osier Dogwood	FACW	S5	●							●		
Cucurbitaceae	*Echinocystis lobata*	Wild Cucumber	FAC	SNA		●			●	●	●	●		●
Cyperaceae	*Carex folliculata*	Northern Long Sedge	OBL	S5										●
	Carex gynandra	Nodding Sedge	FACW	S5		●				●		●	●	●
	Carex lupulina	Hop Sedge	OBL	S3									●	●
	Carex lurida	Sallow Sedge	OBL	S5				●				●		●
	Carex nigra	Smooth Black Sedge	FACW	S5	●									
	Carex projecta	Necklace Sedge	FACW	S5		●				●		●		
	Carex sp.	A sedge	FACW*	#N/A	●	●	●					●		
	Carex utriculata	Northern Beaked Sedge	OBL	S5				●			●		●	
	Eleocharis palustris	Common Spikerush	OBL	S5				●	●				●	
	Schoenoplectus tabernaemontani	Softstem Bulrush	OBL	S5		●		●	●	●	●	●	●	
	Scirpus atrocinctus	Black-girdled Bulrush	FACW	S5						●				
	Scirpus cyperinus	Common Woolly Bulrush	FACW	S5		●		●	●	●	●		●	●
	Scirpus microcarpus	Small-fruited Bulrush	OBL	S5						●	●		●	
	Carex crinita	Fringed Sedge	OBL	S5				●			●			
	Carex arctata	Black Sedge	FAC	S5				●						
	Carex scoparia	Broom Sedge	FAC	S5				●						
	Carex radiata	Eastern Star Sedge	FACW	S4				●						
Dennstaedtiaceae	*Pteridium aquilinum*	Bracken Fern	FACU	S5				●						
Dryopteridaceae	*Onoclea sensibilis*	Sensitive Fern	FACW	S5			●		●				●	●
	Dryopteris intermedia	Evergreen Wood Fern	FAC	S5								●		
	Polystichum acrostichoides	Christmas Fern	FACU	S5				●						
Equisetaceae	*Equisetum arvense*	Field Horsetail	FAC	S5	●	●	●	●			●	●		●

Table H.1 Riparian Vegetation Assessment Species List by Site

Family	Scientific Name	Common Name	Wetland Indicator Status	NS S-Rank	Assessment Location									
					AR-02	AR-03	AR-04	AR-05	AR-06	AR-07	AR-08	AR-09	AR-10	AR-11
	Equisetum fluviatile	Water Horsetail	OBL	S5						•	•	•		
Fabaceae	*Apios americana*	American Groundnut	FACW	S5			•						•	
	Lotus corniculatus	Garden Bird's-foot Trefoil	FACU	SNA	•							•		
	Trifolium pratense	Red Clover	FACU	SNA	•			•						•
	Vicia cracca	Tufted Vetch	FAC	SNA	•		•	•	•		•			•
	Melilotus albus	White Sweet-clover	FACU	SNA				•			•			
	Trifolium repens	White Clover	FACU	SNA				•						
	Trifolium campestre	Low Hop Clover	FACU	SNA	•									
Fagaceae	*Quercus rubra*	Northern Red Oak	FACU	S5				•						
	Fagus grandifolia	American Beech	UPL	S5				•						
Iridaceae	*Iris versicolor*	Harlequin Blue Flag	FACW+	S5	•			•	•			•	•	
Juncaceae	*Juncus articulatus*	Jointed Rush	OBL	S5	•				•	•				
	Juncus balticus	Baltic Rush	FACW	S5	•									
	Juncus canadensis	Canada Rush	OBL	S5				•			•			
	Juncus effusus	Soft Rush	FACW	S5				•	•	•				•
	Juncus militaris	Bayonet Rush	OBL	S5				•						
	Juncus sp.	A rush	FACW*	#N/A					•	•		•		
	Juncus filiformis	Thread Rush	OBL	S5				•						
Lamiaceae	*Lycopus americanus*	American Water Horehound	OBL	S5	•			•		•				
	Mentha arvensis	Wild Mint	FACW	#N/A	•									
	Scutellaria lateriflora	Mad-dog Skullcap	FACW	S5		•				•			•	
	Stachys palustris	Marsh Hedge-Nettle	FAC	SNA		•	•	•	•		•		•	
	Stachys arvensis	Field Hedge-nettle	UPL	SNA				•						
	Galeopsis tetrahit	Common Hemp-nettle	FAC	SNA				•						
Lemnaceae	*Lemna turionifera*	Turion Duckweed	OBL	S5								•		
Lentibulariaceae	*Utricularia macrorhiza*	Greater Bladderwort	OBL	S5		•	•			•		•	•	•
Liliaceae	*Clintonia borealis*	Yellow Bluebead Lily	FAC	S5				•						
	Maianthemum racemosum	Large False Solomon's Seal	FACU	S4S5				•						
Myricaceae	*Myrica gale*	Sweet Gale	OBL	S5							•			
Oleaceae	*Fraxinus americana*	White Ash	FAC	S5	•									
Onagraceae	*Chamerion angustifolium*	Fireweed	FAC	S5				•			•			
	Oenothera biennis	Common Evening Primrose	FACU	S5								•		
	Epilobium hirsutum	Hairy Willowherb	FACW	SNA		•								
	Ludwigia palustris	Marsh Seedbox	OBL	S5				•						
	Epilobium ciliatum	Northern Willowherb	FAC	S5	•									
Pinaceae	*Tsuga canadensis*	Eastern Hemlock	FACU	S4S5			•							
Plantaginaceae	*Plantago major*	Common Plantain	FAC	SNA	•			•				•		
Poaceae	*Agrostis* sp.	An Agrostis	FAC*	#N/A	•									

Table H.1 Riparian Vegetation Assessment Species List by Site

Family	Scientific Name	Common Name	Wetland Indicator Status	NS S-Rank	Assessment Location									
					AR-02	AR-03	AR-04	AR-05	AR-06	AR-07	AR-08	AR-09	AR-10	AR-11
	Calamagrostis canadensis	Bluejoint Reed Grass	FACW	S5			•			•		•	•	•
	Glyceria fluitans	Water Manna Grass	OBL	SNA						•		•	•	•
	Glyceria laxa	Northern Mannagrass	FACW/OBL*	S4?		•			•			•	•	
	Glyceria sp.	A manna grass	FACW/OBL*	#N/A		•								
	Phalaris arundinacea	Reed Canary Grass	FACW	S5	•	•		•	•	•	•	•	•	•
	Spartina pectinata	Prairie Cord Grass	FACW+	S5	•	•	•	•		•		•	•	•
	Phleum pratense	Common Timothy	FACU	SNA			•	•			•			
	Lolium perenne	Perennial Rye Grass	FACU	SNA				•			•			
	Briza media	Perennial Quaking Grass	UPL	SNA				•						
Polygonaceae	*Polygonum arifolium*	Halberd-leaved Tearthumb	OBL	S2								•		
	Polygonum hydropiperoides	False Waterpepper	OBL	SNA	•	•	•	•	•	•	•	•	•	•
	Polygonum sagittatum	Arrow-leaved Smartweed	OBL	S5		•						•	•	•
	Rumex crispus	Curled Dock	FAC	SNA		•		•				•		•
	Rumex sp.	A Rumex sp.	FAC*	#N/A									•	
Pontederiaceae	*Pontederia cordata*	Pickerelweed	OBL	S5				•			•	•	•	•
Potamogetonaceae	*Potamogeton perfoliatus*	Clasping-leaved Pondweed	OBL	S5		•	•			•				
	Potomogeton sp.	A pondweed	OBL	#N/A										•
Primulaceae	*Lysimachia nummularia*	Creeping Yellow Loosestrife	FACW	SNA	•	•								
	Lysimachia terrestris	Swamp Yellow Loosestrife	FACW+	S5	•	•		•	•	•		•		•
Ranunculaceae	*Ranunculus repens*	Creeping Buttercup	FAC	SNA	•							•		•
	Thalictrum pubescens	Tall Meadow-Rue	FACW	S5			•	•			•	•	•	•
	Clematis virginiana	Virginia Clematis	FACW	S5									•	
Rosaceae	*Geum canadense*	White Avens	FACW	S4S5								•		•
	Craetagus sp.	A hawthorn	FAC*	#N/A	•	•								
	Geum canadense	White Avens	FACW	S4S5								•	•	
	Rosa eglanteria	Briar Rose	FACU	SNA	•	•								
	Rosa multiflora	Multiflora Rose	FACU	SNA	•	•					•			
	Rosa virginiana	Virginia Rose	FAC	S5		•	•	•			•	•	•	•
	Prunus virginiana	Chokecherry	FAC	S5				•			•	•		•
	Spiraea tomentosa	Steeplebush	FAC	S5			•			•		•		
	Fragaria virginiana	Wild Strawberry	FAC	S5			•							
	Malus pumila	Common Apple	FACU	SNA		•					•			
	Rubus idaeus	Red Raspberry	FAC	S5				•			•			
	Rosa micrantha	Small-flowered Rose	UPL	SNA	•									
	Sorbus aucuparia	European Mountain Ash	FAC	SNA	•									
	Crataegus macrosperma	Big-Fruit Hawthorn	FAC	S4							•			
Rubiaceae	*Galium palustre*	Common Marsh Bedstraw	FACW+	S5	•	•		•	•	•	•	•		•
	Galium mollugo	Smooth Bedstraw	FACU	SNA	•								•	

Table H.1 Riparian Vegetation Assessment Species List by Site

Family	Scientific Name	Common Name	Wetland Indicator Status	NS S-Rank	Assessment Location									
					AR-02	AR-03	AR-04	AR-05	AR-06	AR-07	AR-08	AR-09	AR-10	AR-11
Salicaceae	*Populus tremuloides*	Trembling Aspen	FAC	S5							•			
	Salix bebbiana	Bebb's Willow	FAC	S5	•						•			
	Salix sp.	A willow	FAC/FACW*	#N/A			•					•	•	
	Salix lucida	Shining Willow	FACW	S5				•						
	Salix eriocephala	Cottony Willow	FACW	S5							•			
Scrophulariaceae	*Chelone glabra*	White Turtlehead	FACW+	S5										•
	Verbascum thapsus	Common Mullein	FACU	SNA							•			
	Veronica officinalis	Common Speedwell	FACU	S5				•						
Solanaceae	*Solanum dulcamara*	Bittersweet Nightshade	FAC	SNA	•									
Typhaceae	*Typha angustifolia*	Narrow-Leaved Cattail	OBL	S5		•	•	•		•		•	•	
	Typha latifolia	Broad-leaved Cattail	OBL	S5			•	•						
Valerianaceae	*Valeriana officinalis*	Common Valerian	FAC	SNA	•									
Verbenaceae	*Verbena hastata*	Blue Vervain	FACW	S3									•	
Violaceae	*Viola cucullata*	Marsh Blue Violet	FAC	S5									•	
Vitaceae	*Parthenocissus quinquefolia*	Virginia Creeper	FAC	SNA		•								
	Vitis riparia	Riverbank Grape	FACU	SNA		•								

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
AR-02-A	**1**	Unvegetated	Unvegetated	100
	2	Herb	*Galium palustre*	0.05
		Narrow-leaved emergent	*Juncus articulatus*	2
		Unvegetated	Unvegetated	97.95
	3	Broad-leaved emergent	*Cicuta maculata*	2
		Herb	*Lotus corniculatus*	1
			Solidago sp.	4
			Trifolium pratense	5
			Vicia cracca	1
		Narrow-leaved emergent	*Equisetum arvense*	1
			Juncus articulatus	30
			Phalaris arundinacea	55
		Unvegetated	Unvegetated	1
	4	Herb	*Solidago* sp.	1
			Trifolium pratense	0.05
			Vicia cracca	0.05
		Narrow-leaved emergent	*Equisetum arvense*	2
			Juncus articulatus	40
			Undetermined	40
		Unvegetated	Unvegetated	16.9
	5	Herb	*Ranunculus repens*	1
			Solidago sp.	2
			Trifolium pratense	1
			Vicia cracca	5
		Narrow-leaved emergent	*Agrostis* sp.	10
			Equisetum arvense	35
			Juncus balticus	20
			Phalaris arundinacea	16
			Spartina pectinata	0.05
		Unvegetated	*Bare ground*	9.95
	6	Herb	*Solidago* sp.	10
			Trifolium pratense	1
			Vicia cracca	0.05
		Moss	*Undetermined*	5
		Narrow-leaved emergent	*Equisetum arvense*	25
		Tall shrub	*Rosa multiflora*	15
			Salix bebbiana	
		Tree/tall shrub	*Craetagus* sp.	30
			Fraxinus americana	10
		Unvegetated	*Bare ground*	3.95
	7	Herb	*Solidago* sp.	5
			Vicia cracca	1

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
		Narrow-leaved emergent	*Equisetum arvense*	15
		Tree/tall shrub	*Acer rubrum*	2
			Craetagus sp.	
		Unvegetated	*Bare ground*	77
	8	Herb	*Solidago* sp.	5
			Vicia cracca	2
		Tall shrub	*Rosa multiflora*	10
		Unvegetated	Drift debris	40
			Timber	15
			Unvegetated	28
	9	Herb	*Solidago* sp.	10
		Narrow-leaved emergent	*Equisetum arvense*	10
			Spartina pectinata	1
		Tall shrub	*Rosa eglanteria*	5
		Unvegetated	Unvegetated	74
	10	Herb	*Solidago* sp.	30
		Narrow-leaved emergent	*Equisetum arvense*	15
			Spartina pectinata	45
		Unvegetated	Unvegetated	10
AR-02-B	**1**	Unvegetated	Open water	100
	2	Herb	*Polygonum hydropiperoides*	0.05
		Unvegetated	Open water	99.95
	3	Unvegetated	Open water	100
	4	Narrow-leaved emergent	*Equisetum arvense*	0.05
		Unvegetated	Open water	99.95
	5	Herb	*Achillea millefolium*	0.05
			Galium palustre	0.05
			Lotus corniculatus	1
			Polygonum hydropiperoides	0.05
			Taraxacum officinale	0.05
			Trifolium pratense	0.05
		Narrow-leaved emergent	*Equisetum arvense*	1
			Juncus articulatus	2
			Spartina pectinata	1
		Unvegetated	Small gravel and sand	94.75
	6	Herb	*Lysimachia terrestris*	0.05
			Tragopogon pratensis	2
		Moss	Undetermined	25
		Narrow-leaved emergent	*Equisetum arvense*	8
			Juncus articulatus	2
			Spartina pectinata	1
		Unvegetated	Bare ground	46.95

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
			Cobble	3
			Gravel	12
	7	Herb	*Lycopus americanus*	0.05
			Mentha arvensis	1
			Tragopogon pratensis	2
			Trifolium pratense	3
		Moss	A moss	20
		Narrow-leaved emergent	*Equisetum arvense*	20
			Juncus balticus	0.05
			Spartina pectinata	0.05
		Tall shrub	*Salix bebbiana*	3
		Unvegetated	Bare ground	45.85
			Cobble	2
			Gravel	3
	8	Herb	*Lotus corniculatus*	1
			Lysimachia nummularia	1
			Lysimachia terrestris	0.05
			Mentha arvensis	0.05
			Ranunculus repens	0.05
			Tragopogon pratensis	1
			Trifolium pratense	1
		Narrow-leaved emergent	*Carex nigra*	0.05
			Equisetum arvense	10
			Undetermined	0.05
		Unvegetated	Bare ground	20.75
			Cobble	5
			Gravel	60
	9	Herb	*Lotus corniculatus*	1
			Tragopogon pratensis	1
			Vicia cracca	0.05
		Low shrub	*Cornus sericea*	2
		Narrow-leaved emergent	*Equisetum arvense*	2
			Undetermined	20
		Tall shrub	*Salix bebbiana*	
		Unvegetated	Bare ground	63.95
			Leaf litter/ drift line	10
	10	Herb	*Iris versicolor*	0.05
		Narrow-leaved emergent	*Equisetum arvense*	10
		Tall shrub	*Alnus incana*	
			Salix bebbiana	0.05
		Tree/tall shrub	*Acer rubrum*	0.05
		Unvegetated	Bare ground	62.85

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
			Cobble	2
			Leaf litter	25
AR-03	**1**	Submerged plants	*Potamogeton perfoliatus*	70
		Unvegetated	Open water	30
	2	Submerged plants	*Potamogeton perfoliatus*	90
		Unvegetated	Open water	10
	3	Robust emergent	*Typha angustifolia*	5
		Submerged plants	*Potamogeton perfoliatus*	10
		Unvegetated	Open water	85
	4	Robust emergent	*Typha angustifolia*	15
		Unvegetated	Open water	85
	5	Robust emergent	*Typha angustifolia*	20
		Unvegetated	Open water	80
	6	Herb	*Polygonum hydropiperoides*	0.05
		Robust emergent	*Typha angustifolia*	20
		Unvegetated	Open water	79.95
	7	Robust emergent	*Typha angustifolia*	30
		Unvegetated	Open water	39.95
	8	Herb	*Polygonum hydropiperoides*	5
		Robust emergent	*Typha angustifolia*	20
		Unvegetated	Open water	74.95
	9	Herb	*Polygonum hydropiperoides*	25
		Robust emergent	*Typha angustifolia*	20
		Unvegetated	Open water	55
	10	Herb	*Polygonum hydropiperoides*	15
		Robust emergent	*Typha angustifolia*	20
		Unvegetated	Open water	65
	11	Herb	*Polygonum hydropiperoides*	2
		Robust emergent	*Typha angustifolia*	30
		Submerged plants	*Utricularia macrorhiza*	15
		Unvegetated	Open water	68
	12	Herb	*Polygonum hydropiperoides*	2
		Robust emergent	*Typha angustifolia*	60
		Unvegetated	Open water	38
	13	Herb	*Polygonum hydropiperoides*	3
		Robust emergent	*Typha angustifolia*	60
		Unvegetated	Open water	37
	14	Herb	*Polygonum hydropiperoides*	30
		Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	0.05
		Robust emergent	*Typha angustifolia*	30
		Unvegetated	Open water	40

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
	15	Herb	*Polygonum hydropiperoides*	2
		Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	1
		Robust emergent	*Typha angustifolia*	30
	16	Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	2
		Robust emergent	*Typha angustifolia*	40
		(blank)	Unvegetated	58
	17	Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	2
		Robust emergent	*Typha angustifolia*	20
	18	Herb	*Galium palustre*	1
			Myosotis laxa	0.05
			Polygonum hydropiperoides	48.95
		Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	20
		Robust emergent	*Typha angustifolia*	30
	19	Floating plant	*Glyceria laxa*	15
		Herb	*Polygonum hydropiperoides*	20
		Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	10
			Undetermined	0.05
		Robust emergent	*Typha angustifolia*	15
	20	Floating plant	*Glyceria laxa*	5
		Herb	*Galium palustre*	20
		Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	15
		Robust emergent	*Typha angustifolia*	20
	21	Floating plant	*Glyceria laxa*	10
		Herb	*Bidens frondosa*	0.05
			Galium palustre	15
			Impatiens capensis	0.05
			Polygonum hydropiperoides	2
			Polygonum sagittatum	0.05
		Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	15
		Robust emergent	*Typha angustifolia*	5
	22	Herb	*Galium palustre*	2
		Narrow-leaved emergent	*Carex projecta*	10
			Scirpus cyperinus	15
		Robust emergent	*Typha angustifolia*	5
		Unvegetated	Open water	111

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
			Typha debris	30
	23	Herb	*Lysimachia terrestris*	3
			Polygonum hydropiperoides	2
			Stachys palustris	2
		Robust emergent	*Typha angustifolia*	15
	24	Herb	*Galium palustre*	0.05
		Robust emergent	*Typha angustifolia*	8
		Unvegetated	*Typha debris*	20
	25	Herb	*Asclepias incarnata*	0.05
			Galium palustre	3
			Impatiens capensis	0.05
		Narrow-leaved emergent	*Carex* sp.	2
		Unvegetated	Open water	14.09
			Typha debris	80
	26	Herb	*Rumex crispus*	1
			Stachys palustris	0.05
		Robust emergent	*Typha angustifolia*	0.05
		Unvegetated	*Typha debris*	98.9
	27	Herb	*Stachys palustris*	0.05
		Low shrub	*Rosa virginiana*	1
		Tree/tall shrub	*Craetagus* sp.	0.05
	28	Herb	*Calystegia sepium*	4
			Impatiens capensis	2
			Stachys palustris	4
		Unvegetated	*Typha debris*	90
	29	Herb	*Calystegia sepium*	2
			Impatiens capensis	5
			Stachys palustris	3
		Unvegetated	*Typha debris*	90
AR-04	**1**	Robust emergent	*Typha angustifolia*	5
		Submerged plants	*Potamogeton perfoliatus*	0.05
		Unvegetated	Open water	94.95
	2	Robust emergent	*Typha angustifolia*	1
		Unvegetated	Open water	99
	3	Robust emergent	*Typha angustifolia*	15
		Submerged plants	*Utricularia macrorhiza*	10
		Unvegetated	Open water	75
	4	Robust emergent	*Typha angustifolia*	15
		Unvegetated	Open water	85
	5	Robust emergent	*Typha angustifolia*	25
		Submerged plants	*Utricularia macrorhiza*	5
		Unvegetated	Open water	70

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
	6	Robust emergent	*Typha angustifolia*	30
		Unvegetated	Open water	70
	7	Robust emergent	*Typha angustifolia*	30
		Unvegetated	Open water	70
	8	Robust emergent	*Typha angustifolia*	35
		Unvegetated	Open water	65
	9	Robust emergent	*Typha angustifolia*	40
		Unvegetated	Open water	60
	10	Robust emergent	*Typha angustifolia*	45
		Unvegetated	Open water	55
	11	Robust emergent	*Typha angustifolia*	40
		Unvegetated	Open water	60
	12	Herb	*Polygonum hydropiperoides*	20
		Robust emergent	*Typha angustifolia*	20
		Unvegetated	Open water	60
	13	Herb	*Polygonum hydropiperoides*	10
		Robust emergent	*Typha angustifolia*	20
		Unvegetated	Open water	70
	14	Herb	*Polygonum hydropiperoides*	10
		Robust emergent	*Typha angustifolia*	25
		Unvegetated	Open water	65
	15	Herb	*Polygonum hydropiperoides*	8
		Robust emergent	*Typha angustifolia*	30
		Unvegetated	Open water	62
	16	Broad-leaved emergent	*Cicuta bulbifera*	0.05
		Herb	*Polygonum hydropiperoides*	5
		Robust emergent	*Typha angustifolia*	30
		Unvegetated	Open water	64.95
	17	Herb	*Polygonum hydropiperoides*	30
		Robust emergent	*Typha angustifolia*	10
		Unvegetated	Open water	60
	18	Herb	*Polygonum hydropiperoides*	3
		Robust emergent	*Typha angustifolia*	30
		Unvegetated	Open water	67
	19	Herb	*Polygonum hydropiperoides*	5
		Robust emergent	*Typha angustifolia*	30
		Unvegetated	Open water	65
	20	Herb	*Polygonum hydropiperoides*	2
		Robust emergent	*Typha angustifolia*	45
		Unvegetated	Open water	53
	21	Herb	*Stachys palustris*	0.05
		Robust emergent	*Typha angustifolia*	50

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
		Unvegetated	*Vegetative debris*	49.95
	22	Herb	*Calystegia sepium*	1
			Stachys palustris	2
		Robust emergent	*Typha angustifolia*	50
		Unvegetated	*Vegetative debris*	47
	23	Herb	*Calystegia sepium*	60
			Stachys palustris	2
		Narrow-leaved emergent	*Carex* sp.	0.05
		Robust emergent	*Typha angustifolia*	25
		Unvegetated	*Vegetative debris*	12.95
	24	Herb	*Apios americana*	5
			Calystegia sepium	45
			Solidago sp.	10
		Narrow-leaved emergent	*Carex* sp.	15
		Unvegetated	*Vegetative debris*	25
	25	Herb	*Apios americana*	20
			Calystegia sepium	5
			Solidago canadensis	45
			Vicia cracca	2
		Narrow-leaved emergent	*Carex* sp.	10
		Unvegetated	*Vegetative debris*	18
	26	Herb	*Apios americana*	65
			Thalictrum pubescens	2
			Vicia cracca	2
		Narrow-leaved emergent	*Carex* sp.	20
		Unvegetated	*Vegetative debris*	11
AR-05-A	**1**	Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	30
		Unvegetated	Open water	70
	2	Narrow-leaved emergent	*Juncus militaris*	0.05
			Schoenoplectus tabernaemontani	30
		Unvegetated	Open water	69.95
	3	Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	30
		Unvegetated	Open water	70
	4	Broad-leaved emergent	*Sium suave*	0.05
		Herb	*Polygonum hydropiperoides*	0.05
		Narrow-leaved emergent	*Juncus canadensis*	0.05
			Phalaris arundinacea	1
			Schoenoplectus tabernaemontani	35

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
		Unvegetated	Open water	63.85
	5	Broad-leaved emergent	*Sium suave*	0.05
		Narrow-leaved emergent	*Juncus canadensis*	0.05
			Phalaris arundinacea	10
			Schoenoplectus tabernaemontani	15
		Robust emergent	*Typha latifolia*	15
		Unvegetated	Open water	59.9
	6	Herb	*Galium palustre*	0
		Narrow-leaved emergent	*Phalaris arundinacea*	50
			Schoenoplectus tabernaemontani	1
			Spartina pectinata	0.05
		Robust emergent	*Typha latifolia*	10
		Unvegetated	Open water	38.95
	7	Herb	*Galium palustre*	5
			Iris versicolor	1
		Narrow-leaved emergent	*Phalaris arundinacea*	20
			Schoenoplectus tabernaemontani	7
		Robust emergent	*Typha latifolia*	8
		Unvegetated	Open water	59
	8	Herb	*Calystegia sepium*	2
			Galium palustre	5
			Iris versicolor	3
			Lycopus americanus	0.05
			Lysimachia terrestris	5
			Polygonum hydropiperoides	2
			Stachys palustris	0
		Narrow-leaved emergent	*Carex lurida*	1
			Phalaris arundinacea	5
			Schoenoplectus tabernaemontani	5
		Unvegetated	*Vegetative debris*	71.95
	9	Herb	*Bidens frondosa*	3
			Calystegia sepium	10
			Impatiens capensis	0.05
			Lysimachia terrestris	20
			Polygonum hydropiperoides	2
			Stachys palustris	5
			Thalictrum pubescens	1
		Robust emergent	*Typha angustifolia*	20

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
		Unvegetated	*Vegetative debris*	38.95
	10	Herb	*Calystegia sepium*	5
			Impatiens capensis	0.05
			Lysimachia terrestris	1
			Stachys palustris	40
		Narrow-leaved emergent	*Phalaris arundinacea*	5
			Spartina pectinata	3
		Robust emergent	*Typha latifolia*	10
		Unvegetated	*Vegetative debris*	35.95
AR-05-B	**1**	Herb	*Polygonum hydropiperoides*	0.05
		Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	15
	2	Herb	*Polygonum hydropiperoides*	0.05
		Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	10
	3	Herb	*Polygonum hydropiperoides*	5
		Narrow-leaved emergent	*Juncus canadensis*	0.05
		Unvegetated	*Schoenoplectus tabernaemontani*	10
	4	Broad-leaved emergent	*Sium suave*	0.05
		Herb	*Polygonum hydropiperoides*	15
		Narrow-leaved emergent	*Juncus canadensis*	1
			Schoenoplectus tabernaemontani	15
	5	Unvegetated	*Carex gynandra*	5
			Galium palustre	0.05
			Juncus canadensis	1
			Open water	66.95
			Phalaris arundinacea	2
			Polygonum hydropiperoides	20
			Schoenoplectus tabernaemontani	5
	6	Narrow-leaved emergent	*Carex utriculata*	50
			Phalaris arundinacea	1
			Schoenoplectus tabernaemontani	2
		Unvegetated	Open water	47
	7	Herb	*Calystegia sepium*	0.05
		Narrow-leaved emergent	*Carex utriculata*	60
		Unvegetated	Open water	39.95
	8	Herb	*Calystegia sepium*	1
		Narrow-leaved emergent	*Carex utriculata*	5

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
			Phalaris arundinacea	10
		Unvegetated	*Vegetative debris*	84
	9	Herb	*Solidago* sp.	0.05
			Tussilago farfara	10
		Narrow-leaved emergent	*Equisetum arvense*	4
			Phalaris arundinacea	5
		Unvegetated	*Bare ground*	50.95
			Vegetative debris	30
AR-06-A	**1**	Herb	*Polygonum hydropiperoides*	1
		Unvegetated	Open water	99
	2	Herb	*Polygonum hydropiperoides*	2
		Narrow-leaved emergent	*Eleocharis palustris*	10
			Phalaris arundinacea	0.05
		Unvegetated	Open water	87.95
	3	Herb	*Polygonum hydropiperoides*	1
		Narrow-leaved emergent	*Eleocharis palustris*	35
			Schoenoplectus tabernaemontani	1
		Unvegetated	Open water	63
	4	Narrow-leaved emergent	*Eleocharis palustris*	40
			Schoenoplectus tabernaemontani	1
		Unvegetated	Open water	59
	5	Narrow-leaved emergent	*Eleocharis palustris*	30
			Schoenoplectus tabernaemontani	1
			Scirpus cyperinus	15
		Unvegetated	Open water	54
	6	Herb	*Polygonum hydropiperoides*	3
		Narrow-leaved emergent	*Eleocharis palustris*	30
			Schoenoplectus tabernaemontani	2
		Unvegetated	Open water	65
	7	Herb	*Polygonum hydropiperoides*	20
		Narrow-leaved emergent	*Eleocharis palustris*	30
			Phalaris arundinacea	0.05
			Scirpus cyperinus	3
		Unvegetated	Open water	46.95
	8	Broad-leaved emergent	*Sium suave*	1
		Herb	*Polygonum hydropiperoides*	2
		Narrow-leaved emergent	*Eleocharis palustris*	35
			Phalaris arundinacea	1

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
			Scirpus cyperinus	5
		Unvegetated	Open water	56
	9	Herb	*Polygonum hydropiperoides*	1
		Narrow-leaved emergent	*Eleocharis palustris*	40
			Phalaris arundinacea	4
			Scirpus cyperinus	35
		Unvegetated	Open water	20
	10	Herb	*Polygonum hydropiperoides*	1
		Narrow-leaved emergent	*Eleocharis palustris*	20
			Schoenoplectus tabernaemontani	1
			Scirpus cyperinus	15
		Unvegetated	Open water	63
	11	Herb	*Galium palustre*	0.05
			Polygonum hydropiperoides	1
		Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	2
			Scirpus cyperinus	30
		Unvegetated	Open water	66.95
	12	Herb	*Galium palustre*	0.05
			Polygonum hydropiperoides	0.05
		Narrow-leaved emergent	*Juncus articulatus*	0.05
			Phalaris arundinacea	2
			Schoenoplectus tabernaemontani	2
			Scirpus cyperinus	30
		Unvegetated	Open water	65.85
	13	Broad-leaved emergent	*Sium suave*	0.05
		Narrow-leaved emergent	*Scirpus cyperinus*	40
		Unvegetated	Open water	59.95
	14	Broad-leaved emergent	*Sium suave*	0.05
		Herb	*Galium palustre*	0.05
		Narrow-leaved emergent	*Juncus articulatus*	0.05
			Phalaris arundinacea	0.05
			Schoenoplectus tabernaemontani	1
			Scirpus cyperinus	40
		Unvegetated	Open water	58.8
	15	Broad-leaved emergent	*Sium suave*	0.05
		Narrow-leaved emergent	*Phalaris arundinacea*	0.05
			Scirpus cyperinus	40
		Unvegetated	Open water	59.9

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
	16	Broad-leaved emergent	*Sium suave*	1
		Narrow-leaved emergent	*Eleocharis palustris*	2
			Scirpus cyperinus	25
		Unvegetated	Open water	72
	17	Broad-leaved emergent	*Sium suave*	2
		Herb	*Lysimachia terrestris*	0.05
		Narrow-leaved emergent	*Phalaris arundinacea*	2
			Schoenoplectus tabernaemontani	1
			Scirpus cyperinus	20
		Unvegetated	Open water	74.95
	18	Broad-leaved emergent	*Sium suave*	1
		Herb	*Polygonum hydropiperoides*	0.05
		Narrow-leaved emergent	*Eleocharis palustris*	5
			Juncus articulatus	1
			Phalaris arundinacea	10
			Schoenoplectus tabernaemontani	1
			Scirpus cyperinus	10
		Unvegetated	Open water	71.95
	19	Broad-leaved emergent	*Sium suave*	0.05
		Herb	*Lysimachia terrestris*	0.05
		Narrow-leaved emergent	*Eleocharis palustris*	5
			Scirpus cyperinus	30
		Unvegetated	Open water	64.9
	20	Broad-leaved emergent	*Sium suave*	2
		Herb	*Polygonum hydropiperoides*	0.05
		Narrow-leaved emergent	*Eleocharis palustris*	8
			Phalaris arundinacea	10
			Scirpus cyperinus	10
		Unvegetated	Open water	69.95
	21	Broad-leaved emergent	*Sium suave*	1
		Herb	*Lysimachia terrestris*	0.05
			Polygonum hydropiperoides	1
		Narrow-leaved emergent	*Eleocharis palustris*	30
			Phalaris arundinacea	2
		Unvegetated	Open water	65.95
	22	Broad-leaved emergent	*Sium suave*	0.05
		Herb	*Iris versicolor*	5
			Myosotis laxa	1
		Narrow-leaved emergent	*Eleocharis palustris*	10
			Phalaris arundinacea	15

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
		Unvegetated	Open water	68.95
	23	Broad-leaved emergent	*Sium suave*	0.05
		Herb	*Polygonum hydropiperoides*	1
		Narrow-leaved emergent	*Scirpus cyperinus*	20
		Unvegetated	Open water	78.95
	24	Broad-leaved emergent	*Sium suave*	1
		Herb	*Polygonum hydropiperoides*	0.05
		Narrow-leaved emergent	*Juncus* sp.	1
			Scirpus cyperinus	20
		Unvegetated	Open water	77.95
	25	Broad-leaved emergent	*Sium suave*	0.05
		Herb	*Polygonum hydropiperoides*	0.05
		Narrow-leaved emergent	*Phalaris arundinacea*	2
			Schoenoplectus tabernaemontani	1
			Scirpus cyperinus	15
		Unvegetated	Open water	81.9
	26	Herb	*Lysimachia terrestris*	0.05
		Narrow-leaved emergent	*Juncus effusus*	2
			Phalaris arundinacea	5
			Scirpus cyperinus	20
		Unvegetated	Open water	72.95
	27	Broad-leaved emergent	*Sium suave*	0.05
		Narrow-leaved emergent	*Phalaris arundinacea*	20
			Scirpus cyperinus	8
		Unvegetated	Open water	71.95
	28	Narrow-leaved emergent	*Phalaris arundinacea*	15
			Scirpus cyperinus	20
		Unvegetated	*Vegetative debris*	65
	29	Narrow-leaved emergent	*Phalaris arundinacea*	40
			Scirpus cyperinus	10
		Unvegetated	*Vegetative debris*	50
	30	Narrow-leaved emergent	*Phalaris arundinacea*	40
			Scirpus cyperinus	10
		Unvegetated	*Vegetative debris*	50
	31	Narrow-leaved emergent	*Phalaris arundinacea*	40
			Scirpus cyperinus	10
		Unvegetated	*Vegetative debris*	50
	32	Herb	*Calystegia sepium*	2
		Narrow-leaved emergent	*Phalaris arundinacea*	70
		Unvegetated	*Vegetative debris*	28
	33	Herb	*Calystegia sepium*	3

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
		Narrow-leaved emergent	*Phalaris arundinacea*	80
		Unvegetated	*Vegetative debris*	17
	34	Herb	*Calystegia sepium*	10
			Stachys palustris	1
		Narrow-leaved emergent	*Phalaris arundinacea*	30
		Tall shrub	*Alnus incana*	2
		Unvegetated	*Vegetative debris*	57
	35	Herb	*Calystegia sepium*	8
		Narrow-leaved emergent	*Phalaris arundinacea*	5
		Tall shrub	*Alnus incana*	50
		Unvegetated	*Vegetative debris*	37
	36	Herb	*Calystegia sepium*	5
			Impatiens capensis	2
			Onoclea sensibilis	2
			Stachys palustris	15
		Narrow-leaved emergent	*Phalaris arundinacea*	5
		Unvegetated	*Vegetative debris*	71
AR-07-A	**1**	Robust emergent	*Typha angustifolia*	10
		Unvegetated	Unvegetated	90
	2	Robust emergent	*Typha angustifolia*	10
		Unvegetated	Unvegetated	90
	3	Robust emergent	*Typha angustifolia*	10
		Unvegetated	Unvegetated	90
	4	Robust emergent	*Typha angustifolia*	15
		Unvegetated	Unvegetated	85
	5	Robust emergent	*Typha angustifolia*	20
		Unvegetated	Unvegetated	80
	6	Robust emergent	*Typha angustifolia*	15
		Unvegetated	Unvegetated	85
	7	Herb	*Polygonum hydropiperoides*	2
		Narrow-leaved emergent	*Phalaris arundinacea*	0.05
		Robust emergent	*Typha angustifolia*	25
		Unvegetated	Unvegetated	72.95
	8	Herb	*Polygonum hydropiperoides*	1
		Narrow-leaved emergent	*Phalaris arundinacea*	0.05
		Robust emergent	*Typha angustifolia*	10
		Unvegetated	Unvegetated	88.95
	9	Herb	*Polygonum hydropiperoides*	1
		Narrow-leaved emergent	*Phalaris arundinacea*	3
			Schoenoplectus tabernaemontani	2
		Robust emergent	*Typha angustifolia*	10

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
		Unvegetated	Unvegetated	84
	10	Broad-leaved emergent	*Cicuta bulbifera*	0.05
		Herb	*Polygonum hydropiperoides*	1
		Narrow-leaved emergent	*Phalaris arundinacea*	15
		Robust emergent	*Typha angustifolia*	2
		Unvegetated	Unvegetated	81.95
	11	Broad-leaved emergent	*Cicuta bulbifera*	0.05
		Herb	*Polygonum hydropiperoides*	1
		Narrow-leaved emergent	*Phalaris arundinacea*	15
		Robust emergent	*Typha angustifolia*	1
		Unvegetated	Unvegetated	82.95
	12	Broad-leaved emergent	*Cicuta bulbifera*	1
		Herb	*Galium palustre*	1
		Narrow-leaved emergent	*Juncus effusus*	3
			Juncus sp.	1
			Phalaris arundinacea	20
		Unvegetated	Unvegetated	74
	13	Broad-leaved emergent	*Sium suave*	0
		Herb	*Galium palustre*	4
		Narrow-leaved emergent	*Juncus articulatus*	2
			Juncus effusus	5
			Phalaris arundinacea	15
		Unvegetated	Unvegetated	74
	14	Narrow-leaved emergent	*Carex gynandra*	5
			Carex projecta	30.05
			Equisetum fluviatile	0.05
			Juncus effusus	8
			Phalaris arundinacea	25
		Unvegetated	Unvegetated	31.9
	15	Herb	*Galium palustre*	5
			Lysimachia terrestris	0.05
		Narrow-leaved emergent	*Carex gynandra*	3
			Carex projecta	2
			Equisetum fluviatile	3
			Juncus articulatus	1
			Juncus effusus	3
			Phalaris arundinacea	20
		Robust emergent	*Typha angustifolia*	0.05
		Unvegetated	Unvegetated	62.9
	16	Herb	*Galium palustre*	5
			Lycopus americanus	0.05
		Narrow-leaved emergent	*Carex gynandra*	1

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
			Carex projecta	2
			Equisetum fluviatile	2
			Juncus effusus	1
			Phalaris arundinacea	20
			Scirpus microcarpus	2
		Unvegetated	Unvegetated	66.95
	17	Herb	*Galium palustre*	2
		Narrow-leaved emergent	*Equisetum fluviatile*	1
			Phalaris arundinacea	15
			Scirpus atrocinctus	5
			Scirpus cyperinus	20
		Robust emergent	*Typha angustifolia*	3
		Unvegetated	Unvegetated	54
	18	Herb	*Calystegia sepium*	0.05
			Solidago sp.	1
		Narrow-leaved emergent	*Calamagrostis canadensis*	0.05
			Carex projecta	2
			Equisetum fluviatile	2
			Phalaris arundinacea	30
			Scirpus atrocinctus	2
		Unvegetated	Unvegetated	62.9
AR-07-B	**1**	Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	5
		Unvegetated	Unvegetated	95
	2	Herb	*Polygonum hydropiperoides*	0.05
		Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	2
		Unvegetated	Unvegetated	97.95
	3	Herb	*Polygonum hydropiperoides*	5
		Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	3
		Unvegetated	Unvegetated	92
	4	Herb	*Polygonum hydropiperoides*	4
		Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	3
		Unvegetated	Unvegetated	93
	5	Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	0.05
		Unvegetated	Unvegetated	99.95
	6	Narrow-leaved emergent	*Schoenoplectus tabernaemontani*	1
		Unvegetated	Unvegetated	99

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
	7	Narrow-leaved emergent	*Phalaris arundinacea*	1
			Schoenoplectus tabernaemontani	1
		Unvegetated	Unvegetated	98
	8	Herb	*Lysimachia terrestris*	0.05
			Polygonum hydropiperoides	0.05
		Narrow-leaved emergent	*Equisetum fluviatile*	0.05
			Phalaris arundinacea	30
			Scirpus cyperinus	1
		Unvegetated	Unvegetated	68.85
	9	Narrow-leaved emergent	*Equisetum fluviatile*	1
			Juncus effusus	0.05
			Juncus sp.	1
			Phalaris arundinacea	45
			Scirpus cyperinus	5
		Unvegetated	Unvegetated	47.95
AR-08-A	**1**	Narrow-leaved emergent	*Phalaris arundinacea*	15
			Schoenoplectus tabernaemontani	5
		Unvegetated	Unvegetated	80
	2	Narrow-leaved emergent	*Phalaris arundinacea*	20
			Schoenoplectus tabernaemontani	15
		Unvegetated	Unvegetated	65
	3	Narrow-leaved emergent	*Phalaris arundinacea*	0.05
			Schoenoplectus tabernaemontani	55
		Unvegetated	Unvegetated	44.95
	4	Narrow-leaved emergent	*Phalaris arundinacea*	30
		Unvegetated	Unvegetated	70
	5	Broad-leaved emergent	*Cicuta bulbifera*	1
		Herb	*Galium palustre*	15
		Narrow-leaved emergent	*Carex utriculata*	3
			Equisetum fluviatile	0.05
			Phalaris arundinacea	2
			Schoenoplectus tabernaemontani	10
			Scirpus microcarpus	5
		Unvegetated	Unvegetated	63.95
	6	Herb	*Galium palustre*	2
			Stachys palustris	1
		Narrow-leaved emergent	*Equisetum arvense*	2

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
			Scirpus cyperinus	5
			Scirpus microcarpus	15
		Unvegetated	Unvegetated	75
	7	Herb	*Chamerion angustifolium*	2
			Galium palustre	1
			Impatiens capensis	1
			Myosotis laxa	3
			Stachys palustris	2
		Narrow-leaved emergent	*Scirpus cyperinus*	20
			Scirpus microcarpus	2
		Unvegetated	Unvegetated	69
AR-08-B	**1**	Narrow-leaved emergent	*Phalaris arundinacea*	25
			Schoenoplectus tabernaemontani	25
			Scirpus microcarpus	5
		Unvegetated	Unvegetated	45
	2	Narrow-leaved emergent	*Phalaris arundinacea*	8
			Schoenoplectus tabernaemontani	3
			Scirpus microcarpus	5
		Unvegetated	Unvegetated	84
	3	Narrow-leaved emergent	*Carex utriculata*	15
			Phalaris arundinacea	25
			Schoenoplectus tabernaemontani	8
			Scirpus microcarpus	5
		Unvegetated	Unvegetated	47
	4	Narrow-leaved emergent	*Phalaris arundinacea*	5
			Schoenoplectus tabernaemontani	5
			Scirpus microcarpus	25
		Unvegetated	Unvegetated	65
	5	Narrow-leaved emergent	*Carex utriculata*	5
			Phalaris arundinacea	15
			Schoenoplectus tabernaemontani	5
			Scirpus microcarpus	10
		Tall shrub	*Alnus incana*	2
		Unvegetated	Unvegetated	63
	6	Narrow-leaved emergent	*Carex utriculata*	3
			Phalaris arundinacea	2
			Scirpus microcarpus	10

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
		Tall shrub	*Alnus incana*	20
		Unvegetated	Unvegetated	65
	7	Herb	*Polygonum hydropiperoides*	10
		Narrow-leaved emergent	*Carex utriculata*	10
			Phalaris arundinacea	20
			Scirpus microcarpus	15
		Tall shrub	*Alnus incana*	1
		Unvegetated	Unvegetated	44
	8	Herb	*Polygonum hydropiperoides*	10
		Narrow-leaved emergent	*Carex utriculata*	2
			Phalaris arundinacea	5
			Scirpus microcarpus	1
		Tall shrub	*Alnus incana*	35
		Unvegetated	Unvegetated	47
	9	Herb	*Polygonum hydropiperoides*	10
		Narrow-leaved emergent	*Carex utriculata*	2
			Phalaris arundinacea	0.05
		Tall shrub	*Alnus incana*	15
		Unvegetated	Unvegetated	72.95
AR-09-A	**1**	Herb	*Polygonum hydropiperoides*	0.05
		Unvegetated	Unvegetated	99.95
	2	Herb	*Polygonum hydropiperoides*	0.05
		Robust emergent	*Typha angustifolia*	30
		Unvegetated	Unvegetated	69.95
	3	Herb	*Polygonum hydropiperoides*	0.05
		Robust emergent	*Typha angustifolia*	30
		Unvegetated	Unvegetated	69.95
	4	Robust emergent	*Typha angustifolia*	25
		Unvegetated	Unvegetated	5.05
	5	Robust emergent	*Typha angustifolia*	20
		Unvegetated	Unvegetated	74.95
	6	Narrow-leaved emergent	*Equisetum fluviatile*	0.05
			Phalaris arundinacea	1
		Robust emergent	*Typha angustifolia*	20
		Unvegetated	Unvegetated	78.95
	7	Narrow-leaved emergent	*Equisetum fluviatile*	1
		Robust emergent	*Typha angustifolia*	15
		Unvegetated	Unvegetated	84
	8	Herb	*Polygonum hydropiperoides*	3
		Narrow-leaved emergent	*Phalaris arundinacea*	5
		Robust emergent	*Typha angustifolia*	10
		Unvegetated	Unvegetated	82

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
	9	Narrow-leaved emergent	*Phalaris arundinacea*	25
		Unvegetated	Unvegetated	75
	10	Herb	*Polygonum hydropiperoides*	5
		Narrow-leaved emergent	*Phalaris arundinacea*	10
		Robust emergent	*Typha angustifolia*	2
		Unvegetated	Unvegetated	83
	11	Narrow-leaved emergent	*Equisetum fluviatile*	1
			Phalaris arundinacea	10
		Robust emergent	*Typha angustifolia*	10
		Unvegetated	Unvegetated	79
	12	Narrow-leaved emergent	*Equisetum fluviatile*	1
		Robust emergent	*Typha angustifolia*	15
		Unvegetated	Unvegetated	84
	13	Narrow-leaved emergent	*Equisetum fluviatile*	1
			Schoenoplectus tabernaemontani	0
		Robust emergent	*Typha angustifolia*	10
		Unvegetated	Unvegetated	89
	14	Narrow-leaved emergent	*Equisetum fluviatile*	1
			Schoenoplectus tabernaemontani	5
		Robust emergent	*Typha angustifolia*	30
		Unvegetated	Unvegetated	64
	15	Robust emergent	*Typha angustifolia*	5
		Unvegetated	Unvegetated	95
	16	Herb	*Polygonum hydropiperoides*	1
		Narrow-leaved emergent	*Phalaris arundinacea*	10
			Schoenoplectus tabernaemontani	15
		Unvegetated	Unvegetated	74
	17	Narrow-leaved emergent	*Phalaris arundinacea*	3
			Schoenoplectus tabernaemontani	40
		Unvegetated	Unvegetated	57
	18	Herb	*Polygonum hydropiperoides*	2
		Narrow-leaved emergent	*Juncus* sp.	1
			Phalaris arundinacea	5
			Schoenoplectus tabernaemontani	20
		Unvegetated	Unvegetated	72
	19	Herb	*Myosotis laxa*	1
			Polygonum hydropiperoides	5

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
		Narrow-leaved emergent	*Glyceria fluitans*	3
			Phalaris arundinacea	1
			Schoenoplectus tabernaemontani	10
		Unvegetated	Unvegetated	80
	20	Herb	*Galium palustre*	0.05
			Impatiens capensis	1
			Polygonum sagittatum	0.05
		Narrow-leaved emergent	*Carex lurida*	0.05
			Carex projecta	20
			Carex sp.	0.05
			Schoenoplectus tabernaemontani	3
		Unvegetated	Unvegetated	75.8
AR-09-B	**1**	Broad-leaved emergent	*Pontederia cordata*	1
		Robust emergent	*Typha angustifolia*	1
		Submerged plants	*Utricularia macrorhiza*	5
		Unvegetated	Unvegetated	93
	2	Robust emergent	*Typha angustifolia*	10
		Submerged plants	*Utricularia macrorhiza*	0.05
		Unvegetated	Unvegetated	89.95
	3	Robust emergent	*Typha angustifolia*	20
		Submerged plants	*Utricularia macrorhiza*	1
		Unvegetated	Unvegetated	79
	4	Robust emergent	*Typha angustifolia*	20
		Unvegetated	Unvegetated	80
	5	Robust emergent	*Typha angustifolia*	20
		Unvegetated	Unvegetated	80
	6	Herb	*Polygonum hydropiperoides*	0.05
		Narrow-leaved emergent	*Phalaris arundinacea*	0.05
		Robust emergent	*Typha angustifolia*	20
		Unvegetated	Unvegetated	79.9
	7	Herb	*Polygonum hydropiperoides*	2
		Narrow-leaved emergent	*Phalaris arundinacea*	1
		Robust emergent	*Typha angustifolia*	20
		Unvegetated	Unvegetated	77
	8	Herb	*Galium palustre*	0.05
		Narrow-leaved emergent	*Phalaris arundinacea*	20
		Robust emergent	*Typha angustifolia*	5
		Unvegetated	Unvegetated	74.95
	9	Broad-leaved emergent	*Cicuta bulbifera*	0.05
		Herb	*Galium palustre*	0.05

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
		Narrow-leaved emergent	*Phalaris arundinacea*	70
		Robust emergent	*Typha angustifolia*	5
		Unvegetated	Unvegetated	24.9
	10	Herb	*Galium palustre*	5
		Narrow-leaved emergent	*Phalaris arundinacea*	70
		Robust emergent	*Typha angustifolia*	5
		Unvegetated	Unvegetated	20
	11	Broad-leaved emergent	*Cicuta bulbifera*	0.05
		Herb	*Galium palustre*	40
			Myosotis laxa	5
			Polygonum sagittatum	1
		Robust emergent	*Typha angustifolia*	10
		Unvegetated	Unvegetated	43.95
	12	Herb	*Galium palustre*	20
			Myosotis laxa	5
			Polygonum sagittatum	5
			Rumex crispus	5
		Robust emergent	*Typha angustifolia*	8
		Tall shrub	*Alnus incana*	5
		Unvegetated	Unvegetated	52
	13	Herb	*Calystegia sepium*	1
			Galium palustre	5
			Polygonum arifolium	20
			Polygonum hydropiperoides	5
		Robust emergent	*Typha angustifolia*	5
		Tall shrub	*Alnus incana*	5
		Unvegetated	Unvegetated	59
	14	Herb	*Calystegia sepium*	5
			Myosotis laxa	5
			Polygonum arifolium	50
		Robust emergent	*Typha angustifolia*	5
		Tall shrub	*Alnus incana*	1
		Unvegetated	Unvegetated	34
	15	Herb	*Calystegia sepium*	10
			Echinocystis lobata	5
			Myosotis laxa	2
			Ranunculus repens	1
		Robust emergent	*Typha angustifolia*	1
		Tall shrub	*Alnus incana*	40
		Unvegetated	Unvegetated	41
	16	Herb	*Calystegia sepium*	15
			Echinocystis lobata	1

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
			Myosotis laxa	5
			Ranunculus repens	1
			Thalictrum pubescens	1
		Tall shrub	*Alnus incana*	
		Unvegetated	Unvegetated	77
	17	Herb	*Calystegia sepium*	2
			Geum canadense	5
			Impatiens capensis	1
			Rumex crispus	5
			Thalictrum pubescens	2
		Unvegetated	Unvegetated	85
AR-10-A	**1**	Narrow-leaved emergent	*Glyceria fluitans*	5
		Robust emergent	*Typha angustifolia*	10
		Submerged plants	*Utricularia macrorhiza*	0.05
		Unvegetated	Unvegetated	84.95
	2	Narrow-leaved emergent	*Glyceria fluitans*	5
		Robust emergent	*Typha angustifolia*	10
		Submerged plants	*Utricularia macrorhiza*	0.05
		Unvegetated	Unvegetated	84.95
	3	Robust emergent	*Typha angustifolia*	0.05
		Unvegetated	Unvegetated	99.95
	4	Broad-leaved emergent	*Pontederia cordata*	5
		Narrow-leaved emergent	*Carex utriculata*	2
		Robust emergent	*Typha angustifolia*	2
		Submerged plants	*Utricularia macrorhiza*	0.05
		Unvegetated	Unvegetated	90.95
	5	Herb	*Polygonum hydropiperoides*	1
		Narrow-leaved emergent	*Carex utriculata*	40
			Scirpus microcarpus	5
			Spartina pectinata	5
		Unvegetated	Unvegetated	49
	6	Herb	*Impatiens capensis*	2
		Narrow-leaved emergent	*Carex gynandra*	2
			Carex utriculata	30
			Phalaris arundinacea	25
		Unvegetated	Unvegetated	41
	7	Herb	*Impatiens capensis*	3
			Polygonum sagittatum	0.05
		Low shrub	*Rosa virginiana*	5
		Narrow-leaved emergent	*Phalaris arundinacea*	60
		Unvegetated	Unvegetated	31.95
	8	Herb	*Apios americana*	5

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
			Impatiens capensis	10
		Low shrub	*Rosa virginiana*	2
		Narrow-leaved emergent	*Phalaris arundinacea*	60
		Robust emergent	*Typha angustifolia*	10
		Unvegetated	Unvegetated	13
	9	Herb	*Apios americana*	3
			Impatiens capensis	5
			Scutellaria lateriflora	0.05
		Low shrub	*Rosa virginiana*	20
		Narrow-leaved emergent	*Phalaris arundinacea*	20
		Unvegetated	Unvegetated	51.95
	10	Herb	*Impatiens capensis*	40
			Polygonum sagittatum	3
			Solidago rugosa	2
		Narrow-leaved emergent	*Carex gynandra*	30
			Phalaris arundinacea	15
		Unvegetated	Unvegetated	10
AR-10-B	**1**	Narrow-leaved emergent	*Calamagrostis canadensis*	2
			Eleocharis palustris	2
		Unvegetated	Unvegetated	96
	2	Narrow-leaved emergent	*Eleocharis palustris*	35
		Unvegetated	Unvegetated	65
	3	Herb	*Iris versicolor*	1
			Polygonum hydropiperoides	1
		Narrow-leaved emergent	*Eleocharis palustris*	30
			Phalaris arundinacea	1
		Unvegetated	Unvegetated	67
	4	Herb	*Iris versicolor*	25
		Narrow-leaved emergent	*Eleocharis palustris*	3
			Phalaris arundinacea	5
			Scirpus cyperinus	30
		Unvegetated	Unvegetated	37
	5	Herb	*Apios americana*	8
			Calystegia sepium	1
		Low shrub	*Rosa virginiana*	3
		Narrow-leaved emergent	*Carex utriculata*	20
			Phalaris arundinacea	40
			Scirpus cyperinus	5
		Unvegetated	Unvegetated	23
	6	Herb	*Calystegia sepium*	1
			Impatiens capensis	3
		Narrow-leaved emergent	*Phalaris arundinacea*	70

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
		Unvegetated	Unvegetated	26
	7	Herb	*Apios americana*	2
			Calystegia sepium	3
			Triadenum fraseri	1
		Low shrub	*Rosa virginiana*	3
		Narrow-leaved emergent	*Phalaris arundinacea*	30
		Unvegetated	Unvegetated	61
	8	Herb	*Apios americana*	5
			Impatiens capensis	15
		Narrow-leaved emergent	*Phalaris arundinacea*	30
		Unvegetated	Unvegetated	50
	9	Herb	*Apios americana*	2
			Impatiens capensis	35
			Polygonum sagittatum	2
			Raphanus raphanistrum	2
		Narrow-leaved emergent	*Phalaris arundinacea*	5
		Unvegetated	Unvegetated	54
	10	Herb	*Impatiens capensis*	60
			Onoclea sensibilis	15
			Polygonum sagittatum	1
			Solidago sp.	1
		Low shrub	*Rosa virginiana*	2
		Narrow-leaved emergent	*Phalaris arundinacea*	1
		Unvegetated	Unvegetated	20
AR-11-A	**1**	Floating plant	*Potamogeton* sp.	50
		Narrow-leaved emergent	*Glyceria fluitans*	10
		Unvegetated	Unvegetated	40
	2	Narrow-leaved emergent	*Glyceria fluitans*	10
		Submerged plants	*Utricularia macrorhiza*	5
		Unvegetated	Unvegetated	85
	3	Herb	*Polygonum hydropiperoides*	0.05
		Unvegetated	Unvegetated	99.85
	4	Unvegetated	Unvegetated	100
	5	Herb	*Polygonum hydropiperoides*	3
		Narrow-leaved emergent	*Calamagrostis canadensis*	1
			Carex gynandra	2
			Scirpus cyperinus	40
		Unvegetated	Unvegetated	54
	6	Herb	*Polygonum hydropiperoides*	30
		Narrow-leaved emergent	*Calamagrostis canadensis*	1
			Carex gynandra	2
			Carex lupulina	10

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
			Juncus effusus	15
			Phalaris arundinacea	5
		Unvegetated	Unvegetated	37
	7	Herb	*Galium palustre*	0.05
			Impatiens capensis	0.05
			Myosotis laxa	2
			Onoclea sensibilis	8
			Ranunculus repens	1
			Thalictrum pubescens	0
		Narrow-leaved emergent	*Carex lupulina*	5
			Juncus effusus	20
			Phalaris arundinacea	30
			Scirpus cyperinus	11
			Spartina pectinata	0.05
		Unvegetated	Unvegetated	21.85
	8	Broad-leaved emergent	*Sium suave*	0.05
		Herb	*Bidens frondosa*	1
			Calystegia sepium	0.05
			Impatiens capensis	1
			Myosotis laxa	1
			Onoclea sensibilis	1
			Polygonum hydropiperoides	10
			Ranunculus repens	2
		Narrow-leaved emergent	*Carex gynandra*	1
			Phalaris arundinacea	3
		Unvegetated	Unvegetated	79.9
	9	Herb	*Galium palustre*	2
			Myosotis laxa	1
			Polygonum hydropiperoides	20
			Polygonum sagittatum	1
			Ranunculus repens	20
		Narrow-leaved emergent	*Carex gynandra*	20
			Glyceria fluitans	2
			Phalaris arundinacea	1
		Unvegetated	Unvegetated	33
	10	Herb	*Polygonum hydropiperoides*	10
			Ranunculus repens	10
			Rumex crispus	0.05
		Narrow-leaved emergent	*Carex lupulina*	25
			Glyceria fluitans	5
		Tall shrub	*Alnus incana*	5
		Unvegetated	Unvegetated	44.95

Table H.2. Riparian Vegetation Assessment, Percent Cover Values by Species and Quadrat for Belt Transects at all Avon River Vegetation Assessment Locations.

Transect Name	Quadrat #	Cover Type/ Vegetation Form	Scientific Name	Total
	11	Herb	*Echinocystis lobata*	0.05
			Myosotis laxa	70
			Ranunculus repens	1
		Narrow-leaved emergent	*Carex lupulina*	1
			Glyceria fluitans	0.05
		Unvegetated	Unvegetated	27.9
	12	Herb	*Echinocystis lobata*	2
			Geum canadense	2
			Impatiens capensis	1
			Lysimachia terrestris	25
			Myosotis laxa	30
			Solidago rugosa	2
			Thalictrum pubescens	2
		Narrow-leaved emergent	*Carex folliculata*	2
			Equisetum arvense	2
		Tall shrub	*Alnus incana*	
		Unvegetated	Unvegetated	32

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