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Item No. Info 2
North West Community Council
May 12, 2025

TO: Chair and Members of the North West Community Council

FROM: Brad Anguish, Commissioner of Operations

DATE: March 11, 2025

SUBJECT: Bedford West Water Quality Status Update – Final 2024

INFORMATION REPORT

ORIGIN

Bedford Municipal Planning Strategy, Bedford West Secondary Planning Strategy, Policies BW-3, SW-4 and SW-5. Development Agreements between the Halifax Regional Municipality and West Bedford Holdings Ltd, between Halifax Regional Municipality and Cresco Ltd, and between Halifax Regional Municipality and Clayton Developments Ltd.

EXECUTIVE SUMMARY

A water quality monitoring program has been ongoing in the Bedford West Secondary Plan area since 2009, through Development Agreements executed under the Bedford West Secondary Planning Strategy. Results from the fall 2024 sampling event, the 2024 Final Report for the monitoring program are presented in this report.

In 2024, samples were taking earlier than in previous years, in late April rather than late May, to better capture mixing conditions in the lake. Exceedances of the 10 µg/L phosphorus threshold were observed at every sampling station in the spring 2024. Resampling took place in June 2024, when all but two sampling stations also showed exceedances.

Exceedances of the 10 µg/L phosphorus threshold were observed at all locations in the summer 2024 sampling event. Resampling took place in September 2024, when all sampling stations showed exceedances, although most exceedances were lower than those observed in August.

Exceedances of the 10 µg/L phosphorus threshold were observed at all locations in the fall 2024 sampling event. Resampling look place in December 2024, when only sampling station KL-3 showed an exceedance.

The full final report from the 2024 Bedford West sampling program prepared by WSP Canada Inc is available on the halifax.ca website.

BACKGROUND

The Bedford West area is one of three areas designated as existing growth areas under the Regional Plan for serviced development (municipal water and wastewater systems). The Bedford West area is approximately 1,052 hectares (2,600 acres) in size and located on the west side of the Bicentennial Highway, in the vicinity of Hammonds Plains Road and Kearney Lake Road. In 2006, the Bedford West

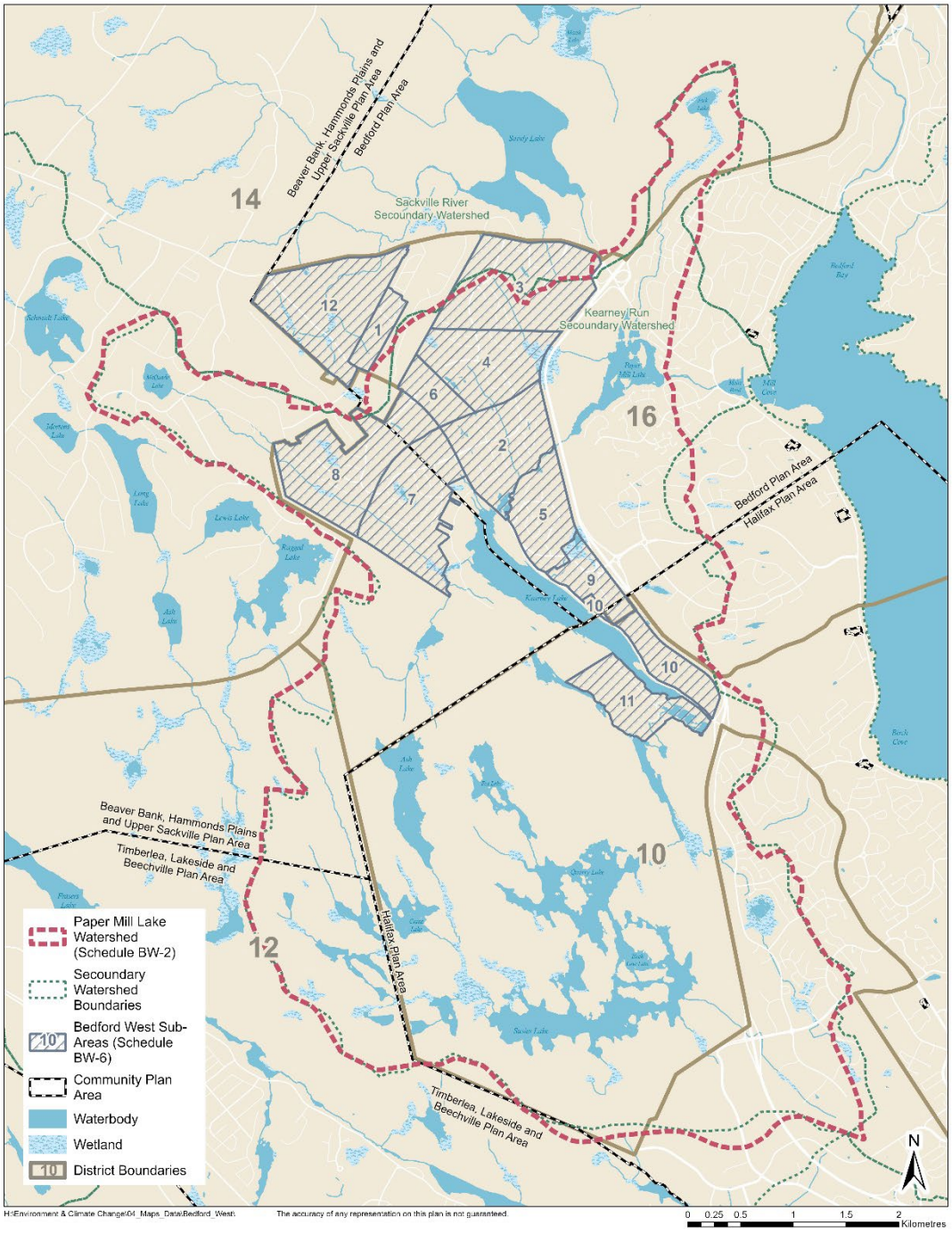

Figure 1: Sub-areas identified under the Bedford West Secondary Planning Strategy within the Paper Mill Lake watershed.

Secondary Planning Strategy (BWSPS) was adopted with the policy directive to enable new mixed-use communities while ensuring their design considered protection of the natural environment. *Figure 1* illustrates the areas encompassed by the BWSPS. Sub Areas 2 to 9 have approved development agreements and are either constructed or under construction. Sub Areas 1, 10 and 12 are Special Planning Areas designated through the Province of Nova Scotia's *Housing in the Halifax Regional Municipality Act*.

Policy BW-3 of the BWSPS requires a water quality monitoring program for the Paper Mill Lake watershed to track the eutrophication process. Eutrophication is the process of nutrient enrichment in lakes. While this eutrophication can happen naturally, it is primarily caused by human activities. Policy BW-3 aims to prevent nutrient enrichment from impacts of human activities in the Paper Mill Lake watershed. Land disturbances during construction, surface hardening, the use of chemical fertilizers, stormwater inputs, in-use and historic on-site septic systems, and vegetation removal are all potential sources of nutrients in lakes. These changes can result in relatively rapid changes in trophic status, from lower trophic states (fewer nutrients) to higher trophic states (more nutrients). This rapid change in water quality leads to excessive plant growth, excessive algae growth, cyanobacteria blooms, and conditions generally resembling a poorly circulating backyard pond.

The water quality monitoring program was specified in the BWSPS in response to the Municipality's statement "that best management practices may be needed both during development and afterward to maintain water quality in the lakes" and "that a water quality monitoring program be established on lakes throughout the watershed" as published in the BWSPS in 2006.[1]

The terms of the monitoring program are specified within the Development Agreements that have been negotiated in consultation with the former Bedford Watershed Advisory Board (Sub Areas 1-9). This board was dissolved in 2013 and replaced with the broader Regional Watersheds Advisory Board (RWAB). Development agreements for the Bedford West subdivision negotiated between 2013-2022 occurred in consultation with RWAB. While the municipal planning strategy policies supporting the monitoring program remains in place, and development agreements continue to require the monitoring, there has been no referral of planning applications to advisory committees since the adoption of Bill 137 in 2022, which introduced amendments to the *HRM Charter* suspending the referrals for a period of three years. The adoption of Bill 68 in March 2025 further extended the suspension of referrals to advisory committees until November 25, 2026.

All Development Agreements under the BWSPS have identified the value of 10 micrograms per litre (µg/L) of total phosphorus (TP) as a "trigger value," representing the transition point between the oligotrophic and mesotrophic states per Environment and Climate Change Canada's criteria (*Table 1*).

Table 1: Summary of Canadian trophic status triggers. Environment and Climate Change Canada (2004).

Trophic Status	Total Phosphorus (µg/L)
Ultra-oligotrophic	<4
Oligotrophic	4-10
Mesotrophic	10-20
Meso-Eutrophic	20-35
Eutrophic	35-100

[1] The Bedford West Secondary Planning Strategy can be found online here: THE BEDFORD WEST SECONDARY PLANNING STRATEGY.pdf (halifax.ca)

Hyper-eutrophic	>100

In accordance with the terms for the Bedford West Development Agreements, the Municipality is required to submit test results to the Developer and the North West Community Council (NWCC) within three months of being received from the consultant, or immediately, if TP or bacterial results exceed management thresholds identified therein. RWAB was dissolved by Regional Council on July 9, 2024.[2] The Environment & Sustainability Standing Committee (ESSC) is the successor body to RWAB.[3] Subsequent reports submitted in compliance with the BWSPS will be sent to NWCC and ESSC.

Monitoring provisions in the DA could be seen as assuming that development activity bears relation to the test results. Research done by the Centre for Water Resource Studies (CWRS) [4] in the Paper Mill Lake Watershed has since pointed out that site-specific changes in water quality identified from lake sampling cannot be attributed to a single source and has recommended that individual developments should not be regulated based on trophic state indicators in a lake. Some reasons for this are:

1. Development-derived surface water contamination tends to originate from non-point sources, for example contamination tends to come from overland water flow across an entire site rather than from a single discharge pipe into a lake.
2. In-lake phosphorus, while easily measured, cannot be traced back to a single source. For example, phosphorus released by decomposing plant material in a lake cannot be differentiated analytically from phosphorus released by sediment flowing into a lake from a development site.

In cases where an exceedance of phosphorus is noted, staff can request confirmation testing and determine whether any corrective action is required by the developer as per their sedimentation and erosion plan.

DISCUSSION

The purpose of this report is to share the results of this water quality monitoring program in the Paper Mill Lake watershed undertaken as part of the Bedford West Development Agreements at the 2024 fall sampling event and present the final report from the 2024 monitoring program, prepared by WSP Canada Inc, who also carried out the 2024 sampling program. A map identifying sampling locations is included in Attachment A.

Spring sampling took place over two days on April 25-26, 2024; resampling for this event took place over two days on June 19-20, 2024. Summer sampling took place over two days on August 28-29, 2024; resampling for this event took place on September 23, 2024. Fall sampling took place over two days on October 29-30, 2024; resampling for this event took place over two days on December 4-5, 2024.

Results from all 2024 sampling events, including the fall 2024 event, are posted publicly on the HRM Lakes & Rivers webpage. Exceedances from the spring and summer sampling events are discussed in detail in previous staff reports to the North West Community Council,[5] and are also included in the final report linked

[2] The report associated with this decision of Regional Council is available online: Governance Review – Phase 1 Implementation Plan and Advisory Committee Review - July 9/24 Regional Council | Halifax.ca
[3] The full text of Administrative Order 1 is available online here: Administrative Order One, Respecting the Procedures of Council | Halifax.ca
[4] Presentation by Rob Jamieson, Ph.D., P.Eng., entitled “Phosphorus Loading and Trophic State Assessment in the Paper Mill Lake Watershed”, North West Community Council, November 15. 2016. The presentation can be found online here: https://legacycontent.halifax.ca/Commcoun/central/documents/161115nwcc1131pres.pdf.
[5] Spring Report is available online here: https://www.halifax.ca/sites/default/files/documents/city-hall/community-councils/241007nwccinfo2.pdf. Summer report is available online here: Bedford West Water Quality Status Update – Summer 2024, North West Community Council January 13, 2025 | Halifax.ca.

above.

No exceedances of the recreational bacteria (*E. coli*) guideline (235 colony forming units (CFU)/100 mL were observed in the fall sampling event. Resampling was not requested for this parameter.

Fall 2024 total phosphorus (low level) concentrations observed are listed in *Table 2*. Exceedances of the total phosphorus (low level) threshold of 10 µg/L set out in the BWSPS were observed at all sampling locations at the fall sampling event. Resampling to confirm concentrations was requested by staff, and took place at all sampling locations. All locations saw a decrease in phosphorus concentration from the original fall event, with only two exceedances observed at resampling, at locations KL-3 and LSD.

Table 2: Fall 2024 Total Phosphorus

Sampling Location	Acceptable Phosphorus Concentration (µg/L)	October 29-30 Total Phosphorus (µg/L)	Resample Total Phosphorus (µg/L)
PML-1	10	**35**	<2
PML-2	10	**45**	<2
HWY102-1	10	**88**	2
HWY102-2	10	**54**	5
LU	10	**35**	4
KL-1	10	**10**	4
KL-2	10	**35**	3
KL-3	10	**35**	**13**
KL-4	10	**35**	<2
KL-5	10	**35**	<2
LSD	10	**35**	**10**

Other water quality parameters were measured that exceed thresholds set in the *Nova Scotia Tier 1 Environmental Quality Standards for Surface Water and Groundwater Discharging to Surface Water* (EQS).[6] These values are tabulated in Attachment B and are consistent with results found during other sampling events under this program, and likely reflect background conditions in the watershed based on bedrock and soil characteristics in the area.

Water Quality Trends

Historical water quality trends for the following key are discussed in more detail in the final report prepared by WSP Canada Inc for the conclusion of the 2024 sampling program, available online here. They are presented in the report in the order listed below:

- Chloride
- Chlorophyll-α
- Conductivity
- pH
- Total phosphorus (low level)
- Total suspended solids

In general, water chemistry observed in the 2024 program is consistent with historical observations. While there is no clear increasing trend in phosphorus concentration in Paper Mill or Kearney Lake observed

[6] These standards can be found online here: Tab 3, NS Tier I EQS Surface Water and GW discharging to SW.xlsx

since the program commenced in 2009, exceedances of the 10 µg/L threshold are commonly observed, suggesting the lakes are approaching mesotrophic conditions, if they do not already exist in the lakes. Anecdotal reports from residents of increased aquatic plant growth support this suggestion. In general, oligotrophic lakes such as Paper Mill and Kearney Lakes are sensitive in even small increases in phosphorus concentrations.

High chloride concentrations have also been repeatedly observed in this program. Concentrations above the guideline value can negatively impact aquatic organisms (plants, fish, and invertebrates), who are adapted to freshwater conditions.

Both phosphorus and chloride inputs into surface water bodies are commonly derived from human, land-based activities, including development, construction, and roadworks.

Program Adaptations

As discussed in the Spring 2024 report, the spring sampling event was moved from late-May to late-April for the first time in 2024 to better capture mixing conditions in the lake. This change will be integrated into the program going forward. Total phosphorus concentrations measured in lakes during spring mixing can be considered most representative because typically the water is too cold for plant and algae growth. When these plants are growing, they uptake phosphorus, and concentrations observed in the water may appear lower than actual conditions. While exceedances were observed at all sampling locations in the spring sampling event, values were in line with what has been observed in springtime events in previous years; more than one year of sampling in April will be required to determine whether increasing trends in phosphorus concentrations are being observed in spring through this program.

Other, minor changes are planned for the monitoring program starting in 2025, as listed below:

- Resampling will be requested when exceedances are greater than ≤20µg/L
- Resampling events will be pre-scheduled as part of overall project planning
    - Resampling will still only take place where exceedances are observed. Scheduling these events in advance will allow the consultants to plan in advance to resample quickly after exceedances are observed, minimizing time between events where water chemistry conditions may change
- Results of water quality analysis will be reported to HRM in a format compatible with Atlantic DataStream's reporting template
    - Using this format, results can be shared with the public more quickly, and in a more user-friendly manner already being used by the Nova Scotian water monitoring community
    - This aligns with the practice used by the LakeWatchers program, which is already sharing water quality results on Atlantic DataStream

A specific management plan for Kearney Lake, one of two primary lakes sampled under this program, was requested by Regional Council. A report recommending remediation actions was presented to Regional Council on August 23, 2022,[7] and the recommendations put forward by staff in the report were accepted by Regional Council at that time.

Staff are currently working to complete the recommended remediation. The CWRS and municipal staff, through a research partnership, have received funding to install an array of floating treatment wetlands in Kearney Lake. The project will test various wetland configurations and plant species to test treatment efficiency and maintenance requirements, and aims to determine if larger deployment of these treatment wetlands will have an impact on water quality in the municipality's urban lakes.

[7] Report is available online here: Kearney Lake and Little Kearney Lake Management Plan - Aug 23/22 Regional Council | Halifax.ca.

Next Steps

To address the requirements of BWSPS Policy BW-5[8] moving forward, staff are taking a combination of approaches to monitoring and managing development impacts on water systems. Water quality data collected under this program and through other programs underway in the area subject to the Bedford West Development Agreements is being considered collectively to assess current watershed health and lake trophic status. Staff are using this information to inform future development approvals, and to develop a watershed management framework for the entire municipality.

Development with the potential to affect lakes is being monitored as part of the LakeWatchers baseline water quality monitoring program. This program samples over 70 lakes basins in the municipality semi-annually and reports the results against CCME thresholds. An example of this is the development underway at the former Penhorn Mall, upslope from Penhorn Lake.

In addition, on August 20, 2024, Regional Council accepted a draft framework for watershed management for implementation by staff.[9] In coordination with the Halifax Green Network Plan and Regional Plan, this framework will support proactive protection of aquatic ecosystems and set water quality targets for managing land-based activities affecting water quality, aquatic and riparian ecosystems, and water resources. This framework will seek to manage collective land-use impacts on a watershed scale, in alignment with the terms of Policy BW-5 as quoted above. The Kearney Run watershed was recommended for the second round of watershed plan development, expected to begin in 2027.

FINANCIAL IMPLICATIONS

There are no financial implications associated with this report.

COMMUNITY ENGAGEMENT

No community engagement was required for this report.

LEGISLATIVE AUTHORITY

The Halifax Regional Municipality Charter, Part VIII, Planning and Development, Section 240, Development Agreements.

ATTACHMENTS

Attachment A Bedford West Water Quality Monitoring Program Sampling Locations
Attachment B Tier 1 Environmental Quality Standards Exceedances, Fall 2024

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[8] Policy BW-5 states: In the event that water quality threshold levels, as specified under clause (c) of Policy BW-3, for Paper Mill Lake of Kearney Lake are reached, the Municipality shall undertake an assessment and determine an appropriate course of action respecting watershed management and future land use development in the area. An assessment shall consider the CCME guidelines. Water quality thresholds and any assessment reports shall be made available to the public

[9] The staff report can be accessed online: Municipal Watershed Management Framework - Aug 20/24 Regional Council | Halifax.ca

Attachment A – Bedford West Water Quality Monitoring Program Sampling Locations

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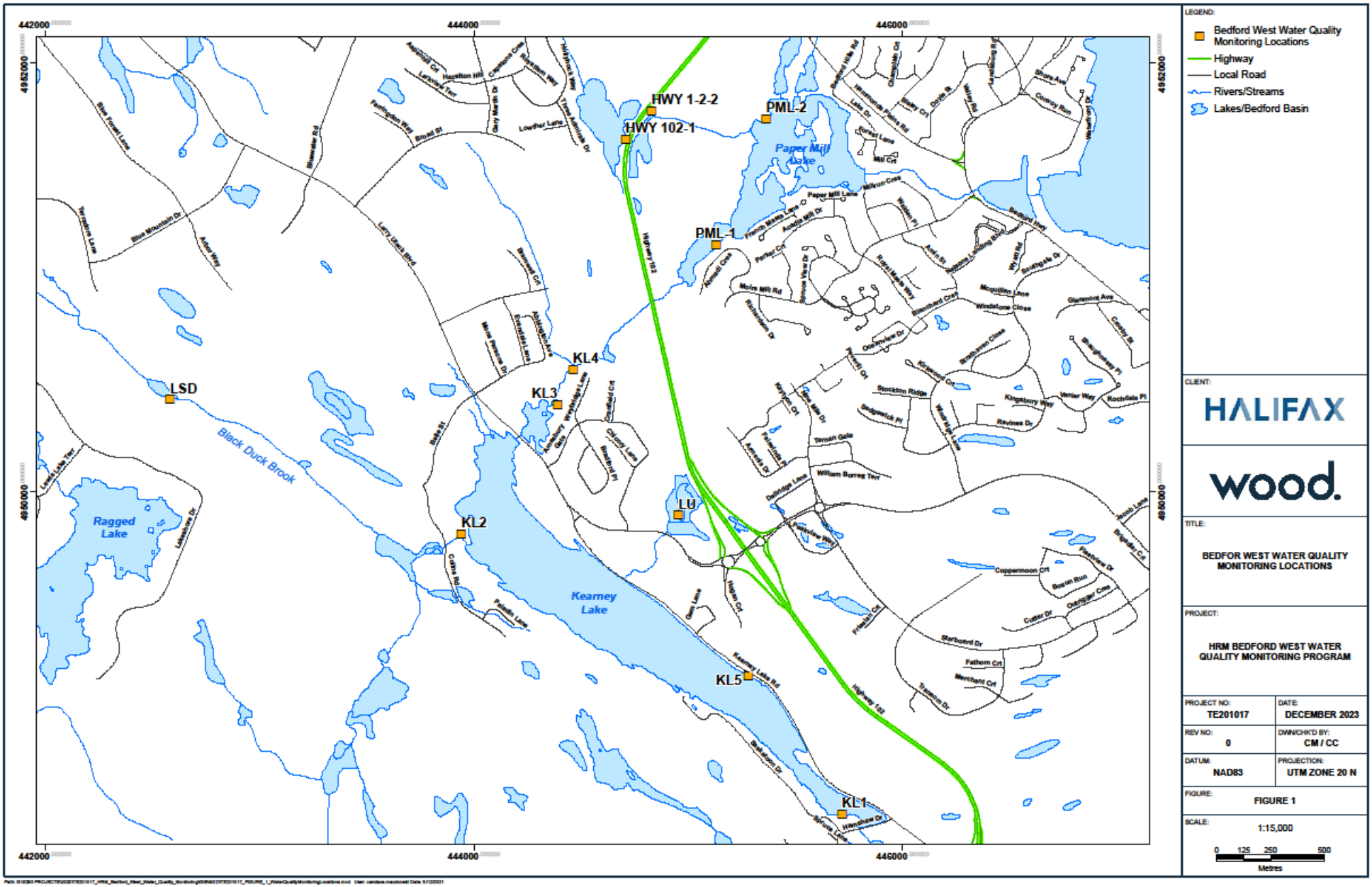

Attachment B – Nova Scotia Tier 1 Environmental Quality Standards Exceedances Observed – Fall 2025

Water Quality Parameter	Aluminum (µg/L)	Copper (µg/L)	Fluoride (mg/L)	Iron (µg/L)	Nitrite (mg/l as N)	Zinc (µg/L)
Threshold Value	**5 µg/L**	**2 µg/L**	**0.12 mg/L**	**300 µg/L**	**0.06 mg/L as N**	**7 µg/L**
KL-1	45		0.17		0.18	
Kl-2	125					
KL-3	54					
KL-4	55					
KL-5	70		0.15			
HWY102-1	136			2240		
HWY102-2	58	15				
LU	121					97
LSD	45			363		
PML-1	43		0.17		0.11	
PML-2	47		0.14		0.07	7