P.O. Box 1749
Halifax, Nova Scotia
B3J 3A5 Canada

Item No. 15.2.1
Halifax Regional Council
August 20, 2024

TO: Mayor Savage Members of Halifax Regional Council

FROM: Councillor Tony Mancini, Chair, Environment and Sustainability Standing Committee

DATE: August 1, 2024

SUBJECT: Municipal Watershed Management Framework

ORIGIN

August 1, 2024 meeting of Environment and Sustainability Standing Committee, Item 13.1.2.

RECOMMENDATION

The Environment and Sustainability Standing Committee recommends that Halifax Regional Council:

1. Endorse the draft Framework for Integrated Watershed Management as set out in Attachment A of the staff report dated May 29, 2024;

2. Direct the Chief Administrative Officer to direct staff to implement the steps outlined in the Framework for Integrated Watershed Management in the Dartmouth Lakes watershed and return to Council with a completed watershed management plan for approval; and

3. Direct the Chief Administrative Officer to direct staff to implement the steps outlined in the Framework for Integrated Watershed Management in the Nine Mile River watershed and return to Council with a completed watershed management plan for approval.

BACKGROUND

Environment and Sustainability Standing Committee received a staff recommendation report dated May 29, 2024 to consider the implementation of the draft Framework for Integrated Watershed Management.

For further information refer to the attached staff report dated May 29, 2024.

DISCUSSION

Environment and Sustainability Standing Committee considered the staff report dated May 29, 2024 and approved the recommendation to Halifax Regional Council as outlined in this report.

FINANCIAL IMPLICATIONS

Financial implications are outlined in the attached staff report dated May 29, 2024.

RISK CONSIDERATION

Risk consideration is outlined in the attached staff report dated May 29, 2024.

COMMUNITY ENGAGEMENT

Meetings of the Environment and Sustainability Standing Committee are open to public attendance and members of the public are invited to address the Standing Committee for up to five (5) minutes during the Public Participation portion of the meeting. Meetings are live webcast on Halifax.ca. The agenda, reports, video, and minutes of the Standing Committee are posted on Halifax.ca.

For further information on Community Engagement refer to the attached staff report dated May 29, 2024.

ENVIRONMENTAL IMPLICATIONS

Environmental implications are outlined in the staff report dated May 29, 2024.

ALTERNATIVES

Alternatives are outlined in the attached staff report dated May 29, 2024.

LEGISLATIVE AUTHORITY

Legislative Authority is outlined in the attached staff report dated May 29, 2024.

Administrative Order One, *Respecting the Procedures of the Council Administrative Order*, Schedule 5 Environment and Sustainability Standing Committee Terms of Reference, subsection 1(2)(c) and subsection 6(a) provide:

Purpose

(2) The other purposes of the Environment and Sustainability Standing Committee are to:

…

(c) promote policies appropriate to protect water resources, parks, open spaces and green environment in the Municipality.

Water Resource Management

6. The Environment and Sustainability Committee shall:

(a) be involved in policy development and oversight of policies appropriate to promote and protect water resources in the Municipality;

ATTACHMENTS

Attachment 1 – Staff recommendation report dated May 29, 2024.

Report Prepared by: Dorothy Maponga, Legislative Assistant, Municipal Clerk's Office 902.478.2408

Attachment 1

P.O. Box 1749
Halifax, Nova Scotia
B3J 3A5 Canada

Item No.13.1.2
Environment and Sustainability Standing Committee
August 1, 2024

TO: Chair and Members of the Environment and Sustainability Standing Committee

SUBMITTED BY: **-ORIGINAL SIGNED-**

John Traves, K.C., Acting Chief Administrative Officer

DATE: May 29, 2024

SUBJECT: Municipal Watershed Management Framework

ORIGIN

August 23, 2022 Regional Council motion (15.1.12)

MOVED by Councillor Morse, seconded by Deputy Mayor Lovelace

THAT Halifax Regional Council: 1. Approve in principle the proposed management plan approach for Kearney Lake and Little Kearney Lake outlined in the staff report dated August 16, 2022. 2. Direct the Chief Administrative Officer to develop a municipal lake watershed management framework, to standardize the approach to lake management in future Lake Management Plans, as described in the staff report dated August 16, 2022. 3. Direct the Chief Administrative Officer to pursue funding for the installation of a living shoreline along Kearney Lake Road, and to refine cost estimates based on available funding. 4. Approve the installation of five floating treatment wetlands in 2023 with existing Environment & Climate Change budget for water operations.

MOTION PUT AND PASSED UNANIMOUSLY.

RECOMMENDATION

It is recommended that the Environment and Sustainability Standing Committee recommend that Halifax Regional Council:

1. Endorse the draft Framework for Integrated Watershed Management as set out in Attachment A to this report;

2. Direct the Chief Administrative Officer to direct staff to implement the steps outlined in the Framework for Integrated Watershed Management in the Dartmouth Lakes watershed and return to Council with a completed watershed management plan for approval; and

RECOMMENDATIONS CONTINUED ON PAGE 2

3. Direct the Chief Administrative Officer to direct staff to implement the steps outlined in the Framework for Integrated Watershed Management in the Nine Mile River watershed and return to Council with a completed watershed management plan for approval.

EXECUTIVE SUMMARY

The Halifax Regional Municipality[1] is home to over 1000 lakes and 20 rivers and streams, all situated within roughly 50 secondary and shore-direct watersheds.[2] Access to water and nature is a core value of residents. Ensuring the ongoing health and security of these ecosystems requires thoughtful, active management. This is necessary to mitigate ecosystem degradation, degraded water quality and risk to infrastructure caused by human activities.

This report presents a *Framework for Municipal Watershed Management*, which is included in Attachment A. This framework, modelled from those successfully implemented in other North American jurisdictions, describes the procedure for collaborative development and implementation of a watershed management plan by interest groups using a consensus-based decision-making process.

A Steering Committee is proposed, responsible for establishing the vision, goals, and outcomes of the watershed management plan, commissioning any necessary environmental studies, and developing the management plan. Committee members will represent key interest groups in the watershed. For the pilot phase proposed in this report, an external facilitator will lead Steering Committee meetings and the development of the watershed management plan.

Actions recommended by the Steering Committee in a watershed management plan may be implemented in a variety of ways. Where new policies, funding, and/or by-law or policy amendments are necessary, municipal staff will present the Steering Committee's recommendations to Regional Council for consideration.

The Steering Committee will lead the establishment of watershed stewardship groups in each watershed where a plan is being developed. Like existing groups in the municipality, these stewardship groups will be volunteer-led and supported by the municipality. Watershed-specific details about stewardship group activities will be included in the completed management plan for each watershed. Stewardship groups will support community outreach and restoration in the watershed and participate in water quality monitoring.

To implement the proposed framework, staff recommend engaging a facilitator to lead key interest groups through the watershed planning process in each of two proposed pilot watersheds, the Dartmouth Lakes secondary watershed and the Nine Mile River watershed. The pilot program is estimated to take place over two years, at the completion of which staff will return to Regional Council to present the proposed watershed management plans.

BACKGROUND

There are over 1000 lakes and more than 20 rivers and streams in the Halifax Regional Municipality, located within roughly 50 secondary and shore direct watersheds. The number and wide geographic distribution of water bodies presents unique management challenges for the municipality. These challenges are further

[1] This report uses English place names for the locations discussed herein. An inexhaustive list of Mi'kmaw place names is available online here: Mi'kmaw Place Names Digital Atlas (mapdev.ca)

[2] The term primary watershed refers to a geographic area where all water drains into the same river or lake system. A local example of a primary watershed is the Sackville River watershed, which drains into the Atlantic Ocean. The term secondary watershed refers to a subdivision of a primary watershed, where all water drains into the same, smaller system. A local example of a secondary watershed is the Kearney Run watershed, which is within the Sackville River primary watershed. The term shore direct watershed refers to small watersheds without defined river or stream systems, where all water drains directly to the coast.

complicated by the shared and sometimes overlapping jurisdiction over freshwater in Nova Scotia between federal, provincial, and municipal governments.

Management of aquatic systems in the municipality are impacted by both physical and administrative risks.

Physical Risks

- Nutrient enrichment
- Chloride contamination (salination)
- Biodiversity loss
- Increased flood risk
- Decreased water security for households not within the municipal service boundary

Administrative Challenges

- Policy and regulations that do not sufficiently address changing environmental conditions
- Inadequate valuation of services provided by natural assets
- Insufficient funding for spending on habitat restoration and water quality remediation

DISCUSSION

To address the social and environmental pressures on water systems, staff recommend the adoption and implementation of a framework for integrated watershed management. This work also supports Actions 13, 14, 20, 21, 23, 25, 26, and 34 of *HalifACT: Acting on Climate Together*, the municipality's climate action plan. Further discussion of these actions is included in Attachment A.

The proposed framework, intended as a draft to be finalized at the end of a pilot phase, is included with this report as Attachment A. A successful framework will produce completed management plans for each watershed where the process is applied. Watershed management plans will:

- Define clear, measurable goals and outcomes (for example, maintain lakes' current trophic status, increase the percent of naturalized shoreline, decrease the percent of impervious surface).
- Identify the party responsible for meeting each outcome.
- Make recommendations for land use by-laws focused on maintaining ecosystem resilience.
- Identify a funding plan for proposed actions.
- Propose a mechanism for program evaluation.

This framework has been modelled after successful programs and guidance by the Alberta Lake Management Society,[3] the North Saskatchewan Watershed Alliance,[4] and Nova Scotia's Department of Environment and Climate Change (NSECC).[5]

A Framework for Integrated Watershed Management in the Halifax Regional Municipality

Borrowing heavily from Alberta Lake Management Society's (ALMS) *Watershed Management Planning Workbook*[6] and applying the principles of source water protection provided by NSECC, staff developed a *Framework for Integrated Watershed Management in the Halifax Regional Municipality*.

This version of the framework is intended as a draft. If accepted, staff intends to lead the implementation of this framework in a small number of watersheds as a pilot project. Lessons learned will inform a final

[3] More information available online here: Healthy Lakes for Alberta's Future - ALMS
[4] More information available online here: Home Page ~ North Saskatchewan Watershed Alliance (nswa.ab.ca)
[5] More information available online here: Developing a Municipal Source Water Protection Plan | Drinking Water (novascotia.ca)
[6] Available online here: ALMS_WMPWorkbook.pdf

version of the framework. The final version will include case studies from the pilot project and more region-specific instructions for participants in subsequent watershed management planning processes.

This document was created to provide a user's manual to guide practitioners through the process of creating and implementing a watershed management program. It is important to emphasize, if the recommendations of this report are accepted, municipal staff will be driving the process of watershed management planning but would be involved as participants representing a key interest group (i.e., the municipal government).

The main principles of watershed management proposed by this framework are as follows:

- Representatives from all key interest groups currently operating within a watershed participate in the visioning and planning process.
- All goals, outcomes, and decisions are reached by consensus.
- Pressures are addressed at the source, rather than focusing on managing symptoms.
- Nature-based solutions and green infrastructure are considered for use before hard infrastructure,
- Watershed management plans and related environmental policies are consistently evaluated and adapted to reflect environmental reality.
- Collaboration between all key interest groups is a foundational component of management plan implementation, monitoring, and evaluation.

If the framework is endorsed, municipal staff will lead the assembly of a Steering Committee in each of the selected pilot watersheds. Members of the Steering Committee will be representatives of key interest groups in the subject watershed. A well-rounded Steering Committee could consist of municipal government staff, utility operators, members of community environmental groups, members of Indigenous nations, developers working in the watershed, organizations running recreational programming, and academics, among others. The Steering Committee should remain relatively small to allow effective work.

The Steering Committee is responsible for establishing the vision, goals, and outcomes of the watershed management plan, commissioning any necessary environmental studies, and developing the management plan. By including representatives from all key interest groups, competing and perhaps even conflicting, goals and desired outcomes are to be expected. Staff recommend an external facilitator be engaged to lead the Steering Committee through the planning process. Because municipal staff are participants in the planning process representing a key interest group, an external facilitator will reduce opportunities for conflicts of interest that could arise if the process is also led by municipal staff. An experienced facilitator will help the Steering Committee navigate their conflicting interests and deliver a completed watershed plan within an acceptable timeframe, with participants having reached consensus on the delivered product. As such, $50,000 to be accommodated between the operating budgets for 2024/25 and 2025/26 for facilitation services in each pilot watershed has been included within this report.

Functioning in a similar fashion to the HalifACT Change Network, the Steering Committee will engage with all key interest groups and the community at large to identify specific management criteria for the watershed they are working in, and preferred strategies for realizing management goals. For example, a management goal in an urban watershed may be the reduction of overland stormwater flow by a certain percentage. The Steering Committee would identify solutions, such as installing green infrastructure elements, and prioritize locations for those solutions to be installed.

The Steering Committee will lead the establishment of watershed stewardship groups in each watershed where a plan is being developed. Like existing groups in the municipality, these stewardship groups will be volunteer-led and supported by the municipality. Watershed-specific details about stewardship group activities will be included in the completed management plan for each watershed. Stewardship groups will support community outreach and restoration in the watershed and participate in water quality monitoring.

At the completion of the pilot period, estimated to take place over two years, the completed watershed plans, final *Integrated Framework for Watershed Management in the Halifax Regional Municipality,* and proposed program costs will be presented to Regional Council.

Expected actions proposed by watershed management plans may include:

- Ecological restoration on municipal property
- Water and environmental quality monitoring
- Community outreach
- Amendments to planning documents
- Amendments to existing by-laws or Administrative Orders
- Land acquisition
- Suggested approaches to industrial land development

Neither the work of the Steering Committee, nor the completed watershed management plan, will include commenting on or setting requirements for specific development proposals.

Pilot Watersheds

The number of secondary and shore-direct watersheds in the Halifax area poses a unique set of management challenges, including that limited resources must be widely distributed. Staff recommend that the steps outlined in the management framework be piloted in a maximum of two secondary watersheds in the municipality before moving to wider implementation. Developing a watershed management plan is a complex process reliant on adaptive management. The pilot program will help identify necessary changes and deficiencies so that implementation can proceed more easily in the municipality's other watersheds.

Staff, supported by a student in Dalhousie University's Masters of Resource & Environmental Management program, assessed potential pilot watersheds within the municipality. The full Dalhousie report is posted on the Halifax Regional Municipality's website, here. Assessments were based on challenges and goals identified through public engagement, Regional Council's environmental priorities, level of planned and current development in the watershed, existing water resource and habitat pressures, availability of environmental data, economic value, and the ecosystem services provided.

One of the goals of the pilot program is to have a wide variety of potential challenges that will need be addressed as part of the watershed planning process. For that reason, staff recommend pilot watersheds be chosen in both urban and rural areas.

Urban Pilot Watershed

Consideration was given to the Kearney Run secondary watershed and the Dartmouth Lakes Secondary watershed as pilot watersheds in urban areas. These were considered over other urban watersheds in the area because Regional Council has requested management plans for lakes in both watersheds in the past five years. These watersheds share many common characteristics, including:

- High degree of development
- Cover a relatively small geographic area
- High recreational use
- Close proximity to major roadways
- Active community interest
- Relatively high volume of water quality data

The advantages of selecting the Dartmouth Lakes secondary watershed include:

- A lake management plan has already been accepted by Regional Council, which can serve as the basis for a watershed management plan.
- Parks & Recreation is implementing a coordination strategy for Lake Banook, which has six focus areas including water quality improvement.
- The watershed is heavily developed, with a mix of residential, commercial and industrial uses.
- There are active community environmental groups in the area.

- Significant construction and infrastructure upgrades are planned within the watershed, including completing the daylighting of Sawmill Creek.
- It is relatively small, with a geographic area of 1100 ha.
- Much environmental data already exists for this watershed.
- A significant amount of recreational activity takes place in this watershed, including international paddling competitions and a municipal supervised beach, both of which require land-use changes if they are to continue operating safely into the future.

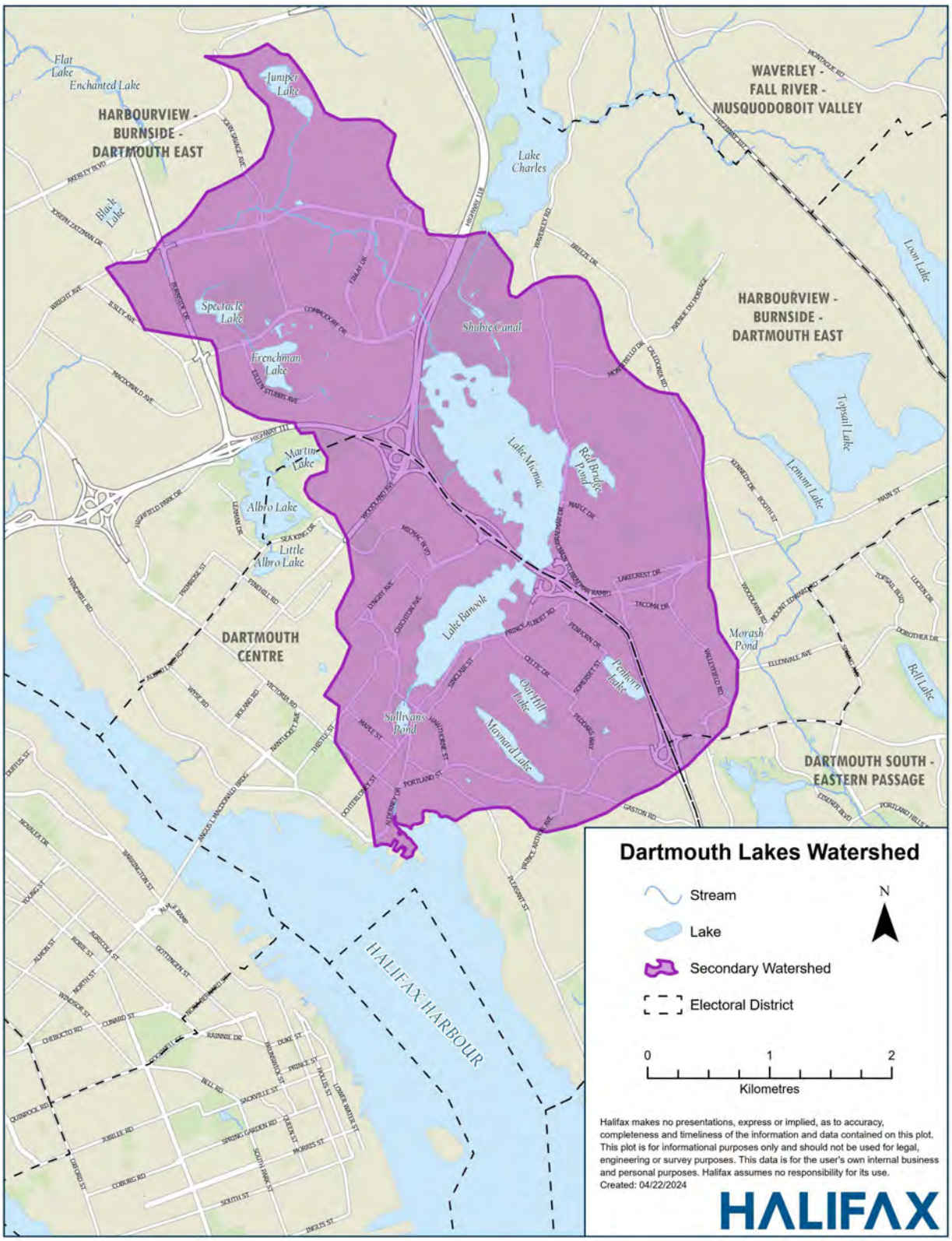


Figure 1: Dartmouth Lakes Secondary Watershed

The advantages of selecting the Kearney Run secondary watershed include:

- A lake management plan has already been accepted by Regional Council, which can serve as the basis for a watershed management plan.
- Many developments are planned upstream of and within the watershed, including within two sites identified as Provincial Special Planning Areas[7].
- Water quality data has been collected in this watershed since 2009 as part of the requirements of the Bedford West Secondary Planning Strategy.
- There are active community environmental groups in the area.
- A significant amount of recreational activity takes place in this watershed, including competitive paddling and a municipal supervised beach, both of which will require land-use changes if they are to continue operating safely into the future.

Staff recommend the Dartmouth Lakes secondary watershed as the urban pilot watershed due to the opportunity to coordinate with other municipal planning and infrastructure initiatives planned within that watershed in the short term. Staff recommend the Kearney Run secondary watershed for consideration as a priority area to implement the watershed management framework after completion of the pilot program.

Rural Pilot Watershed

Consideration as a rural pilot watershed was given to the Nine Mile River secondary watershed in the Prospect area, and the Musquodoboit River watershed. These were considered over other rural watersheds due to their relatively low level of development, even compared to other rural watersheds.

Advantages of selecting the Nine Mile River secondary watershed include:

- The municipality is working with the Natural Assets Initiative (NAI)[8] on a natural assets valuation study to determine the level of ecosystem services provided by natural systems in the Nine Mile River watershed and estimate the economic value of those services.
- Land use in the watershed is primarily rural residential (with associated recreational uses), resource and agricultural, so many of the challenges anticipated in other rural watersheds are present here.
- The degree of development is relatively low, providing equal opportunities for conservation and restoration.
- Several areas of ecological significance have been identified within the watershed.

Advantages of selecting the Musquodoboit River watershed include:

- Musquodoboit Harbour, at the mouth of the watershed, has been identified as a Rural Growth Node in the Regional Plan.
- Land use in the watershed is primarily rural residential (with associated recreational uses), resource and agricultural, so many of the challenges anticipated in other rural watersheds are present here.
- The degree of development is relatively low, providing equal opportunities for conservation and restoration.
- Several areas of ecological significance have been identified within the watershed.

[7] More information about Provincial Special Planning Areas is available online here: Provincial Special Planning Areas (SPAs) | Halifax
[8] NAI | Natural Assets Initiative – Making Nature Count (mnai.ca)

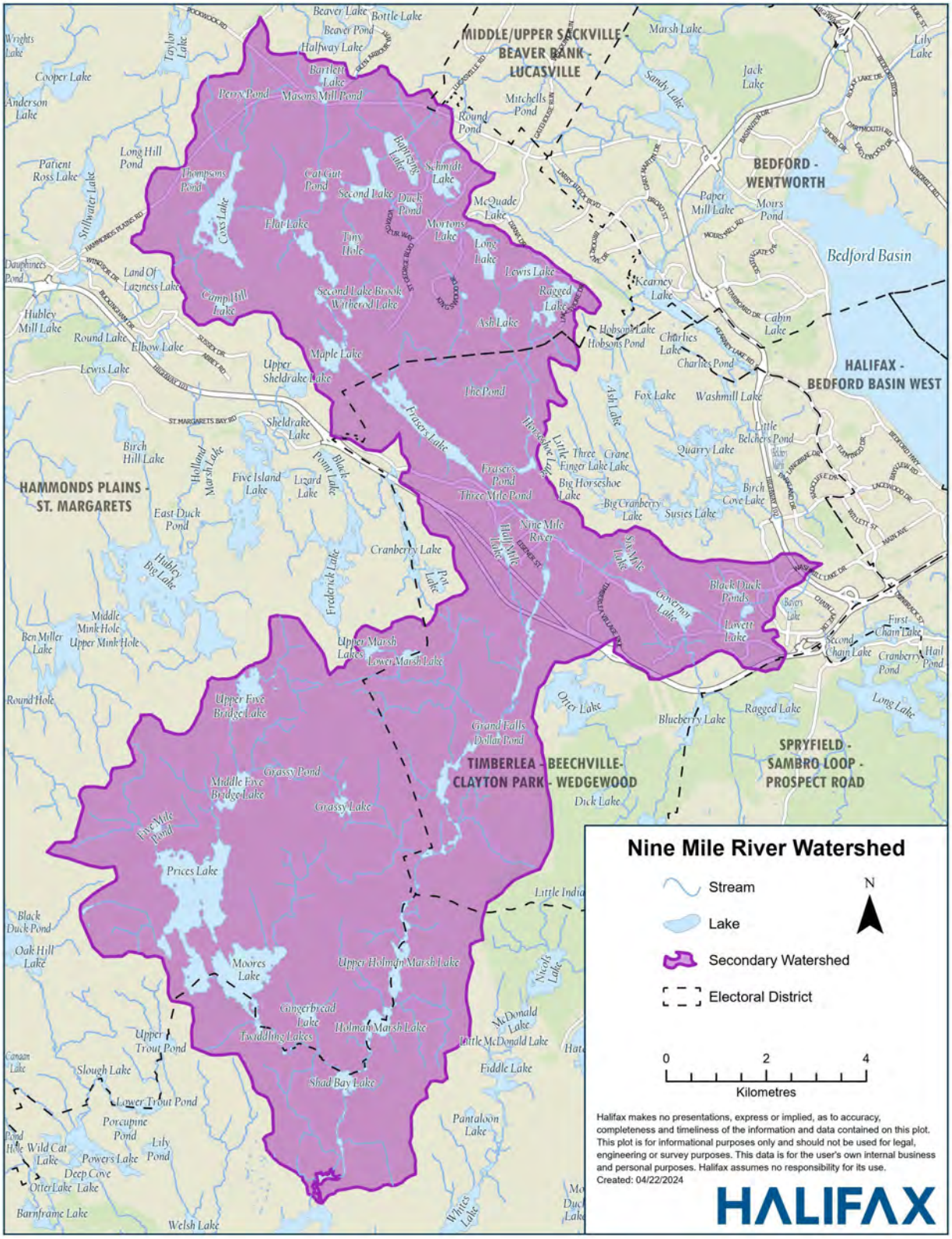


Figure 2: Nine Mile River Secondary Watershed

Staff recommend the Nine Mile River secondary watershed as the rural pilot watershed to take advantage of the data and recommended management strategies to be delivered by NAI's natural assets valuation. The Musquodoboit River watershed is relatively data poor, and staff estimate developing a management plan for this watershed would require extensive data collection that may extend beyond the proposed two-year pilot phase. Staff recommend the Musquodoboit River watershed for consideration as a priority area to implement the watershed management framework after completion of the pilot program.

The differences in land use, degree and type of development, ecological pressures, and recreational uses in each of the proposed pilot watersheds will maximize the ability to test the proposed framework.

FINANCIAL IMPLICATIONS

As discussed in the Discussion section of this report, the financial implications associated with the recommendations are limited to engaging an experienced facilitator to lead watershed plan development.

Standard day-rates for facilitation services range from $1,500-$2,000. Eight annual facilitation sessions are recommended for the two-year pilot period in each of the selected watersheds. This is a total cost of $50,000 (approximately $12,500 for facilitation per watershed per year from the D935 operating budget, with $2,000 for administration), at an annual cost of $25,000 in both the 2024/25 and 2025/26 fiscal years. This can be accommodated in the existing D935 operating budget.

Specific programming identified as necessary to implement the completed watershed plans (i.e., ecosystem restoration, outreach programming, increased monitoring) will be determined by the Steering Committees in the planning process. Additional financial implications will be included in a recommendation report to Regional Council once the pilot program is complete.

RISK CONSIDERATION

The risk associated with implementing the proposed framework is low.

The consensus approach to developing the management plan will help to mitigate foreseeable challenges of implementing the plan, as there are many competing and sometimes conflicting interests between groups with traditional, historic, and current ties to a given watershed. There is the risk that consensus may not be reached. If this is the case, municipal staff remain empowered to recommend actions within municipal jurisdiction to Regional Council for implementation, such as changes to by-laws and planning policies or restoration projects on municipal property.

The recommendation made in this report to engage an independent facilitator to lead watershed plan development in the selected pilot watersheds will help mitigate this risk and encourage buy-in from all interest groups party to the watershed plan development.

COMMUNITY ENGAGEMENT

The attached management framework reflects over a year of strategic community engagement. Staff held a 'listening tour' throughout the winter and spring of 2023, consisting of over 30 interviews with staff at the Halifax Regional Municipality, Halifax Water, Nova Scotia Environment & Climate Change, local environmental NGOs and water stewardship organizations, academics working on water issues, and local subject matter experts in water and planning issues, among others. The goal of these interviews was for interested parties to share their vision of successful watershed and environmental management in the municipality, and the identify gaps and barriers they see in the way of achieving that vision. The broad themes that arose from these interviews were:

- Environmental stewardship is a high priority for all interviewees.

- Need for clear shared language and goals.
- Integrated watershed management is possible, and we can learn from work being done in other places.
- Need for better mechanisms for sharing data and using shared data.
- Non-profit groups working in this space need logistical and financial support.

Perceived gaps, barriers, and visions for change identified during interviews are summarized in Attachment B. Progress made by municipal staff, either ongoing or initiated because of this engagement, is also included in Attachment B. The actions outlined in this table do not reflect commitments by the Municipality but supported the direction and development of the watershed management work. Interviews were also held with staff from other municipal, provincial, and state governments and watershed agencies who demonstrate leadership in watershed management.

On March 22, 2023, staff hosted a Watersheds Workshop at the Saint Mary's Boat Club that was attended by roughly 50 water professionals and volunteers. ECC staff presented the results of the listening tour, indicated the next steps to be taken, and hosted small, facilitated discussions with all participants.

Further community engagement has been ongoing since the March 2023 workshop and will continue throughout the application of the management framework in the pilot watersheds. The principle of consensus-based decision-making ensures that all interests are represented. Regular reporting and feedback periods will provide further avenues for the public to engage with the watershed management plan.

ENVIRONMENTAL IMPLICATIONS

Conducting environmental management at the watershed scale brings municipal planning and development policy inline with geographic and hydrological reality. The impacts of activities happening at the headwaters, such as sedimentation leading to nutrient enrichment, will be carried throughout the watershed by flowing water. This means impacts are magnified in lakes, rivers, and streams lower in the watershed, who are impacted not only by local activities, but also by activities happening upstream in the watershed.

Working within existing planning policies, watershed management plans administered by consensus and involving all key interest groups can fill policy gaps in environmental stewardship. Standards for water and habitat quality, minimum natural area requirements, and restoration of degraded natural features will help to offset the impact of human activities on our valuable natural systems and will also provide clarity and certainty for the development community.

Adopting and implementing management plans for the municipality's watersheds will result in positive environmental impacts for the entire region. Poor or degraded surface and groundwater quality reflects unbalanced aquatic and terrestrial ecosystems. By managing and mitigating the cumulative impacts of human activities at the source through a management plan as proposed by the attached Framework, the municipality will maintain focus on preventative action, and limit the burden of ecosystem restoration required for resilience to the impacts of development and anthropogenic climate change.

ALTERNATIVES

The Environment and Sustainability Standing Committee may recommend that Halifax Regional Council:

1. Refuse to endorse the attached Framework for Integrated Watershed Management. Adopting this alternative will mean watershed management plans will not be developed for the pilot watersheds identified in this report.
2. Refuse to implement the steps outlined in the Framework for Integrated Watershed Management in the Dartmouth Lakes watershed.
3. Refuse to implement the steps outlined in the Framework for Integrated Watershed Management

in the Nine Mile River watershed.

None of these are recommended for reasons outlined in this report.

LEGISLATIVE AUTHORITY

Halifax Regional Municipality Charter, SNS 2008, c 39:

Purposes of Municipality
7A The purposes of the Municipality are to (a) provide good government; (b) provide services, facilities and other things that, in the opinion of the Council, are necessary or desirable for all or part of the Municipality; and (c) develop and maintain safe and viable communities.

Municipal expenditures
79A (1) Subject to subsections (2) to (4), the Municipality may only spend money for municipal purposes if (a) the expenditure is included in the Municipality's operating budget or capital budget or is otherwise authorized by the Municipality; (b) the expenditure is in respect of an emergency under the Emergency Management Act; or (c) the expenditure is legally required to be paid.

Part VII Planning and Development

ATTACHMENTS

Attachment A Framework for Integrated Watershed Management in the Halifax Regional Municipality
Attachment B Gaps, Barriers, and Opportunities

A copy of this report can be obtained online at halifax.ca or by contacting the Office of the Municipal Clerk at 902.490.4210.

Report Prepared by: Elizabeth Montgomery / Water Resources Specialist / Environment & Climate Change / Property, Fleet & Environment / 902.943.1954

Attachment A – Framework for Integrated Watershed Management in the Halifax Regional Municipality

Framework for Integrated Watershed Management in the Halifax Regional Municipality

June 13, 2024

HalifACT Acting on Climate Together

This user guide presents a practical approach to watershed management within the Halifax region and can be tailored and applied to any watershed. This framework builds upon the mandates of the Halifax Regional Municipality and the Province of Nova Scotia, significant consultation and collaboration with interest groups, indicators of robust ecosystems from scientific and traditional ecological knowledge and long-term planning goals to mitigate and adapt to the impacts of climate change and the effects of development.

Halifax Regional Municipality's Environment & Climate Change team would like to sincerely thank everyone who contributed their time and expertise throughout the development of this framework.

This framework has been adapted for the Halifax Regional Municipality with significant influence from other guides, including the Alberta Lake Management Society's *Workbook for Developing Lake Watershed Management Plans in Alberta*.

Contents

1.0 GLOSSARY

Adsorption – the attraction of molecules to the surface of a solid

Deleterious – in the context of the Fisheries Act, any activity or substance that, if applied to water, would degrade or alter water quality such that it could directly or indirectly harm fish, fish habitat, or the use of fish by humans.

Runoff – water flowing overland from precipitation or snowmelt was not able to infiltrate into the ground.

Trophic state – a measure defining the biological productivity of a lake. A lake's trophic state is typically defined by its total phosphorus concentration. Trophic states as defined by Environment & Climate Change Canada are outlined in the table below.

Trophic Status	TP (µg/L)
Ultra-oligotrophic	• < 4
Oligotrophic	• 4-10
Mesotrophic	• 10-20
Meso-eutrophic	• 20-35
Eutrophic	• 35-100
Hyper-eutrophic	• > 100

Watershed – a geographic area of land where all water drains to a common outlet.

2.0 BACKGROUND

Residents of the Halifax Regional Municipality enjoy the many benefits of living, and recreating in a wide range of ecosystems. There are over 1,000 lakes and more than 20 river systems across the municipality. Proximity to water is one of the many draws of the Halifax region.

The municipality sits within Mi'kma'ki, the ancestral, traditional and unceded lands of the Mi'kmaq people. As Canada's governments work toward reconciliation, our duty of stewardship extends to all our relations, including the water that flows in our rivers and lakes through our modern communities. As such, the municipal government has a responsibility to protect the diverse ecosystems within, and downstream from, our borders.

Ecosystem stewardship is especially important in 2024, as the municipality continues to experience rapid population growth. In 2022, the population of the Halifax region increased by roughly 4.5 per cent, making the municipality one of the fastest growing cities in Canada. Because population growth is connected to more planned and ongoing development, it puts added pressure on remaining natural spaces.

In addition to development pressures, the impacts of human-caused climate change are already apparent in the municipality. In 2023, unprecedented wildfires and extreme rainfall that led to extensive flooding caused irreversible changes to the municipality's built and natural environment. We can expect these sorts of extreme weather events to happen more frequently and with more intensity over time.

Successful watershed management will enable the delivery of other municipal policies and goals and has been developed in alignment with the *Regional Municipal Planning Strategy* (Regional Plan), *HalifACT* and other priorities plans.

3.0 WATERSHED MANAGEMENT IN THE HALIFAX REGION

A VISION FOR THE FUTURE

In 2050, the Halifax Regional Municipality is projected to reach a population of one million residents. What will our communities look like as they experience this unprecedented growth?

If growth and development are planned and constructed in alignment with ecological principles, we can look forward to a positive future – all residents will have safe, easy access to nature; natural spaces will exist as a series of interconnected hubs, providing space for people, wildlife and ecological processes; communities will have increased resilience to the effects of climate change; housing will be built sustainably, using clearly defined thresholds that consider the cumulative impact of all human activities to guide where and how development occurs.

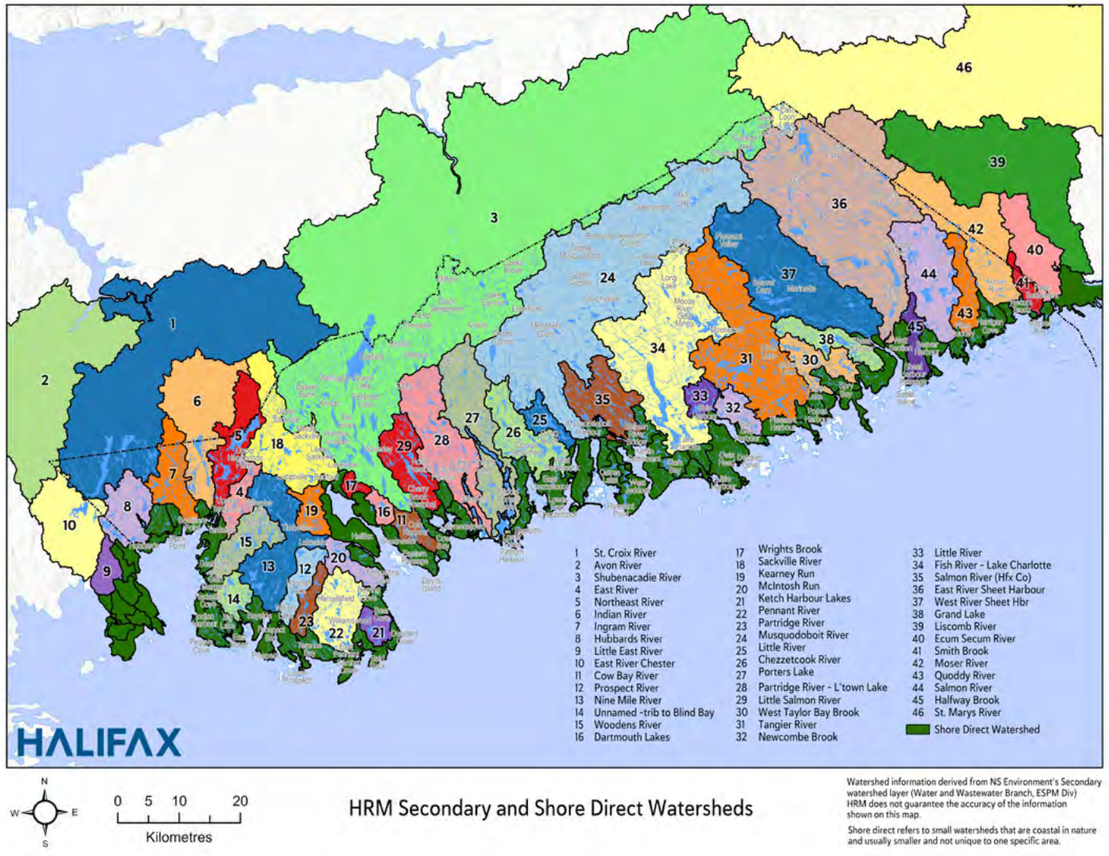
The health of our lakes, streams, forests, meadows and remaining wetlands can improve over time. Our native flora and fauna can thrive. Our municipality can be ***a place where people want to come, stay, and live.***

What is a watershed?

A watershed is an area of land where all water drains into one interconnected water system. Watersheds can be defined at different levels:

- primary watershed – the largest type of watershed by land area
- secondary watershed – primary watersheds can be subdivided into secondary watersheds, which typically follow a single river system
- tertiary watersheds – secondary watersheds can be further subdivided into tertiary watersheds, comprised of smaller stream systems or interconnected lakes

With its many secondary and shore-direct watersheds, the municipality faces a unique set of management challenges. The complex network of rivers and lakes running across the municipality has resulted in many small-to-medium watersheds each requiring related but unique management strategies. The number of watersheds within the municipality has resulted in a lack of management of individual watersheds because the required resources (i.e. people, community, regulatory, financial, logistical and data) have not been in place.



Until 2024, development of lake management plans has been requested by Regional Council on a case-by-case basis, typically focusing on urban lakes with recreational value. While these plans have identified and sometimes resolved local issues and led to some improvements in water quality, they do not provide solutions for addressing larger problems, which is necessary for successful watershed management.

Maintaining natural features requires less time, money and effort than allowing these features to be degraded and then restored later. The value of maintenance over restoration is especially true with lakes, where complete restoration is often not possible. Effective conservation takes a highly collaborative effort, involving interest groups from all levels of government, utilities, residents, advocacy and stewardship organizations, academia and the business and development communities.

In favour of taking practical measures to protect water quality and aquatic ecosystems, this framework will help users develop and implement a multi-barrier approach to watershed management. A multi-barrier approach puts multiple tools in place to prevent surface and groundwater contamination and ecosystem degradation, so if one tool is not sufficient to meet management goals, there are others available to fill the gaps.

Municipal governments are well-placed to conduct watershed-level management. Water chemistry in both ground and surface water depends on the characteristics of the environment around it, and that surrounding land is managed by municipal plans, policies and by-laws. This framework presents an approach focused on managing impacts and risk at the source.

While the causes of stress to aquatic ecosystems are varied, their effects can be generally grouped into the following categories:

1. Eutrophication – nutrient enrichment leads to poor water quality and excessive plant and algae growth

2. Erosion and Sedimentation – overland water flow erodes the soil and deposits it in surface water bodies

3. Salinization – sea level rise, storm surge and road salt increase salt content in fresh water, changing water chemistry and causing stress for aquatic organisms

4. Flooding and Drought – development changes stormwater flow patterns, reducing soil infiltration and causing damage to constructed and natural infrastructure; changes to precipitation patterns due to climate change cause fluctuations in water levels that can drastically change water quality and reduce access to fresh water

5. Thermal pollution – relatively warm water, typically discharged from pipes, is added to surface water, suddenly changing the water temperature, causing disruptions to water chemistry, stress to aquatic species, and decreasing the concentration of dissolved oxygen

6. Invasive species – native species are out-competed by opportunistic invasive species, who thrive in a changing climate and environments disturbed by development

These stressors can be addressed and mitigated through thoughtful land use planning, community-based stewardship and monitoring and adaptive management. If the negative ecological effects of development never reach the water, their impacts don't travel as readily and are more manageable.

In Nova Scotia, the Municipality of the County of Kings (Kings County) has operated a water quality monitoring program that aims to manage water quality and ecosystem health through watershed management. Since 1994, a multi-interest group committee has met to define the level of development the ecosystem can handle and to influence municipal planning policies. Water quality monitoring has been ongoing in Kings County's lakes since 1997.

4.0 REGULATORY CONTEXT

In Nova Scotia, surface water and groundwater are the jurisdiction of the provincial government, and regulations related to water are primarily administered by Nova Scotia Environment & Climate Change (NSECC); however, in practice, jurisdiction can be complex. For example, a construction project working below the ordinary high-water mark in a watercourse would need building permits from the municipality, a watercourse alteration permit from NSECC and approval to do work that could affect fish habitat from the federal Department of Fisheries and Oceans (DFO). Successful watershed management depends on collaboration and is not the sole responsibility of a single level of government.

4.1 Federal Regulations and Guidelines

4.1.1 Canada Water Agency and the Canada Water Act

The *Canada Water Agency* was created by the federal government within Environment and Climate Change Canada (ECCC) to strengthen inter-jurisdictional collaboration on water issues. The Canada Water Agency currently exists within ECCC and has a mandate "to improve freshwater management in Canada by providing leadership, effective collaboration federally, and improved coordination and collaboration with provinces, territories, and Indigenous Peoples to proactively address national and regional transboundary freshwater challenges and opportunities."

Currently, its primary activities are to strengthen the *Canada Water Act* and deliver on the objectives of the *Freshwater Action Plan*. The eventual goal is for the Canada Water Agency to be a stand-alone agency.

The *Canada Water Act*, adopted in 1970 and most recently amended in 2014, sets a framework for inter-governmental collaboration to manage water resources. Annual reporting shares progress in research, collaboration and conservation activities carried out under the act. The *Freshwater Action Plan* is also administered under this act. This action plan prioritizes conservation and management in major lake and river systems and freshwater protection more generally across the country.

4.1.2 Other Regulations and Guidelines

One of Canada's longest-standing environmental protection policies is the Fisheries Act (1985), which is administered by DFO and prohibits activities that are deleterious to fish and fish habitat. Typically, DFO does not take an active role in managing inland waters, limiting their involvement to issuing approvals and permits, and compliance enforcement.

Both Health Canada and the Canadian Council of Ministers of the Environment (CCME) issue water quality guidelines for recreational use, drinking water and the health of freshwater aquatic life.

Compliance with federal regulations and guidelines is the priority under the framework presented in this document.

4.2 Provincial Regulations and Policy

In Nova Scotia, freshwater and freshwater bodies below the ordinary high-water mark (the high-water mark that can be expected under normal conditions) fall under the jurisdiction of the provincial government. The Nova Scotia Department of Natural Resources and Renewables (NSDNRR) manages inland fisheries and forestry activities, and NSECC manages watercourse and wetland alteration permitting, and regulates drinking water and wastewater supplies, as well as on-site septic systems.

The Province of Nova Scotia released its *Water for Life Strategy* in 2011. Intended as a 10-year plan for water resource management in the province, this program included a phased Watershed Assessment Program, of which Phase A, Part 1 was completed in 2011. This document is now rarely referenced. In the 2021 *Environmental Goals and Climate Change Reduction Act* (EGCCRA) NSECC has committed to publishing water quality objectives by 2026.

4.2.1 Wetland and Watercourse Approvals

Any activities altering or infilling wetlands and/or watercourses below the ordinary high-water mark require a permit from NSECC. Watercourse alteration approvals work together with DFO to ensure that work will not affect fish passage or the ability of fish to travel through the water between habitats required for their life cycle.

NSECC manages wetland inventory mapping for the province, which is the starting point for identifying wetlands in areas proposed for development. If a development proposal requires a wetland alteration, the developer must provide compensation for the affected wetland area at a minimum of a 2:1 ratio; other forms of compensation, such as studies or the development of models may also be accepted. Because the number of remaining wetlands in the municipality is limited, compensation projects are usually located outside the watershed where the wetland has been altered or infilled and therefore often outside the municipality.

Wetlands in the province can be designated as Wetlands of Special Significance (WSS) and are granted additional protection if they:

- are salt marshes
- provide habitat for species at-risk
- are designated as Ramsar Wetlands of International Importance
- are within provincial wildlife management areas, provincial parks, nature reserve, wilderness area or lands owned or legally protected by non-government charitable conservation land trusts
- are high-functioning wetlands as determined by WESP-AC
- are in designated protected water areas as described within Section 106 of the Environment Act

WSS approvals are limited to projects that serve a necessary public function, which can be defined as including housing, industrial/commercial uses and renewable energy projects.

After an approval for altering or infilling a wetland or watercourse on a property is granted by NSECC, development may proceed through the municipal permit approval process.

4.2.2 Water and Wastewater Servicing

Water and wastewater utilities receive their approvals to operate from NSECC and remain in good standing by complying with the conditions of these approvals. Additional information about utilities across the Halifax region can be found in Section 3.4.

Water supply well construction in Nova Scotia is also regulated by NSECC. Well contractors must be certified, and the requirements for drilling or digging wells is provided in regulation. For public water supplies, water quality testing, treatment and monitoring are also subject to strict regulations. NSECC maintains a public database of water well records online and also provides a guide for municipalities for assessing groundwater supply for subdivisions that are to be provided by private wells. This guide has been adopted by the Halifax Regional Municipality for use in the subdivision approval process. Once in operation, maintenance and, where necessary, decommissioning of private wells is the responsibility of the well owner.

The installation of privately-owned on-site septic and wastewater treatment systems is regulated by NSECC. Systems must be installed by a certified installer, designed in compliance with technical guidelines and approved by NSECC.

4.3 Municipal Policies and By-laws

The municipality is responsible for managing land use through a series of municipal planning strategies, priorities plans, by-laws and land-use by-laws. Many of the municipality's parks, trails, roads, and developments are near watercourses and wetlands. When stormwater from roads and properties is discharged directly to surface water, the impacts are shared and, therefore, so is the responsibility of stewardship.

The municipality's *Regional Plan* presents the strategic planning vision to guide how the municipality will build, grow and meet the current and future needs of our rapidly growing population. The 2014 *Regional Plan* covers this growth until 2031, stating its "vision for the future is to enhance our quality of life by fostering the growth of healthy and vibrant communities, a strong and diverse economy, and sustainable environment."

The *Halifax Green Network Plan* (HGNP) is a strategic priorities plan intended to define a connected network of ecological corridors via Open Space designation across the municipality. This network will allow connectivity for wildlife, ecological processes and ecosystem resilience to the impacts of climate change. Many of the proposed wildlife corridors encompass wetlands, watercourses and riparian areas.

The municipality's long-term climate action plan, *HalifACT: Acting on Climate Together*, also lays groundwork for municipal watershed management. Specific relevant actions are outlined in *Table 1*.

Table 1: HalifACT Actions Relevant to Municipal Watershed Management

HalifACT Action	Description	Target or Objective
13	Develop a holistic, integrated, and climate-informed water supply strategy	Future proof water systems and supply
14	Develop a holistic, integrated and climate-informed stormwater man-agement plan and program	Future proof water systems and supply
20	Fund and implement the *Green Network Plan* and *Urban Forestry Management Plan*	Protect, restore, maintain and expand natural areas and green infrastructure assets
21	Continue the naturalization program through pilot projects, public educa-tion and awareness to support the development of a region-wide natu-ralization program	Protect, restore, maintain and expand natural areas and green infrastructure assets
23	Integrate climate into land use plan-ning policies and processes	Plan and build a low-carbon resilient region
25	Increase land protection and con-servation on private lands through partnerships, collaboration and mu-nicipal planning requirements	Plan and build a low-carbon resilient region
26	Acquire more land to preserve natu-ral areas and ecosystem health in alignment with the Green Network Plan	Plan and build a low-carbon resilient region
34	Work purposefully, meaningfully and collaboratively with the Mi'kmaq and other groups seeking reconcili-ation, including African Nova Scotian communities	Engage deeply and collaboratively

In 2020, the municipality initiated a review of the *Regional Plan*. A draft of the new *Regional Plan* was released in 2023. It is anticipated that Regional Council will approve the updated *Regional Plan* in 2024. Watercourse protections and watershed stewardship measures are proposed to be augmented in the proposed update to the draft *Regional Plan. Chapter 6: Protecting the Environment and Acting on Climate*, enables municipal planners to think of watersheds as fundamental units of planning and to engage in more active management at the watershed level.

Many secondary municipal planning strategies (SMPS) require specific considerations for surface water quality within their boundaries. These SMPSs consider and attempt to address local impacts of human activities on watercourses. Some examples include:

- policy 14G.8 (1) (c) in the *Land-Use By-Law for Planning Districts 14/17* requiring new developments exceeding eight units/lots to prove there will be no net increase in surface water phosphorus concentrations as a result of their activities
- policy BW-3 in the *Bedford West Secondary Planning Strategy*, within the *Secondary Municipal Planning Strategy* for Bedford requiring water quality monitoring in the Paper Mill Lake watershed for the duration of the development
- policy ML-22 (a) in the *Morris-Russell Lake Secondary Planning Strategy* within the *Secondary Municipal Planning Strategy for Cole Harbour/Westphal* requiring at least 50 per cent of shoreline in lakefront development within any development agreement application to be designated public land

As detailed in *Administrative Order 2020-101-OP: Respecting Stormwater Management Standards for Development Activities*, development, excepting low-density individual lots, must also meet certain requirements intended to manage stormwater and protect watercourses. Designs are required to demonstrate no net increase in stormwater volume leaving a site before and after development. Some developments are required to capture an additional 10mm of precipitation falling on a site, as well as to maintain an average removal of 80% of total suspended solids on an annual loading basis. Erosion and sedimentation control plans must be submitted to demonstrate erosion protection measures are in place to mitigate sediment runoff during construction.

The intent of these protective measures is to reduce the impact of construction and development on watercourses and wetlands; however, they fail to account for cumulative impacts of development across an entire watershed and are only effective when properly monitored and enforced. Adopting active management regimes, like the one outlined in this framework, set common management goals and help interest groups apply policies leading to better outcomes in the aquatic environment.

4.4 Halifax Regional Water Commission

Within the serviced areas of the Halifax region, water, wastewater and stormwater services are delivered by the Halifax Regional Water Commission (HW). While their operations are separate from the Halifax Regional Municipality, HW and the municipality work closely to deliver their respective services.

HW operates three large and six small water supply plants. The three large water supply plants draw their supplies from carefully managed source water protection areas. Employing a multi-barrier approach, HW supplies clean drinking water to its customers by limiting opportunities for contaminants to enter the lakes from which it draws its supply. The principles used by HW to manage its source water can be applied to the development of other watershed management plans because the most effective way to reduce contamination of fresh water is to prevent it from happening in the first place.

HW operates seven large and seven small wastewater treatment plants. The majority of HW's treated wastewater effluent is discharged into marine waters, although some smaller treatment plants do discharge into freshwater. The content of this effluent is heavily monitored and regulated. Due to changes in elevation, wastewater in parts of the municipality must be pumped to the treatment plant by a pumping station. Occasionally, due to heavy precipitation and/or power outages, equipment at the pumping stations fails, causing an overflow of wastewater into the nearest water body. Although this occurs rarely, overflows can have serious negative impacts on the water body they flood into, including elevated fecal bacteria and nutrient loading.

STORMWATER RUNOFF

When rain falls or snow melts, that water will flow via the path of least resistance. This overland flow is called runoff. Runoff flows more quickly over impermeable surfaces like asphalt that don't allow the water to percolate into the ground. Vegetated land, especially land with a variety of plant types with different root depths, allows more water to percolate into the ground where it falls. Water that is not contained where it falls will flow downslope, eventually entering either public stormwater infrastructure or bodies of water like lakes, ponds, rivers, streams or the ocean.

Except for a small number of areas in Dartmouth and peninsular Halifax, stormwater infrastructure is separate from wastewater infrastructure. Stormwater management is the responsibility of the municipality until it enters a Halifax Water catch basin or drainage ditch. In Nova Scotia, there are currently no guidelines for stormwater quality and stormwater is mandated to discharge into the nearest surface water body. HW and the municipality work together to manage stormwater via their *Integrated Stormwater Management Plan*.

5.0 DEVELOPING A PLAN

This framework borrows heavily from plans developed by the Alberta Lake Management Society (ALMS) and the North Saskatchewan Watershed Alliance (NSWA), with local adaptations informed by NSECC's guidance for developing source water protection plans.

The first step is to establish a shared definition of watershed management, as it may vary depending on the management goals and conditions within a given watershed.

The Nevada Division of Water Planning explains "watershed management involves the analysis, protection, development, operation and/or maintenance of the land, vegetation, and water resources of a drainage basin for the conservation of all its resources for the benefit of its residents."

Planning and management at the watershed scale focuses on the cumulative impacts of human activities on natural systems and recognizes watersheds as key natural boundaries on the landscape. Pollutants entering the water from land-based sources accumulate in river and lake systems as water flows downstream. Each additional square metre of impervious surface added in a watershed contributes to reduced surface water and groundwater quality without adequate measures in place to offset the negative effects. Cumulative loss of natural areas drastically reduces the resilience of the lower watershed to mitigate flooding, filter pollutants and support habitat. Due to these cumulative effects, ecological impacts should be considered as potential limitations in decision-making around land use.

Successful ecosystem and watershed management does not have to be at odds with development, especially as there is a clear need to increase available and affordable housing in the Halifax area. The intent of watershed planning is to identify and implement environmentally sensitive development practices which protect and enhance ecological features and can help to reverse adverse impacts. This could include increasing development density in existing urban areas or incentivizing or requiring green infrastructure for stormwater management, among other options discussed later in this framework.

5.1 Establishing Key Interest Groups

When developing a management plan, determine who should be involved in the planning process, executing the management plan and adapting it over time. The quality of the management plan and its outcomes are direct reflections of the multiple points-of-view included in the planning process. Including multiple perspectives and focusing on consensus-building from the beginning will enable the creation of a strong and actionable management plan.

5.1.1 Steering Committee and Advisory Committee

It is critical to assemble a steering committee or board to drive the management plan from conception to implementation. This steering committee should be comprised of representatives from key interest groups in the watershed. Examples of key interest groups could include representatives from all municipal governments with land in the watershed boundary, utilities, Indigenous nations, African Nova Scotian communities, environmental non-profits, developers, recreation groups, homeowners' associations, industry, research institutions and residents.

It is essential that all major interest groups are represented at this stage. Unlike many other government-led initiatives, **decisions made by the steering committee related to watershed planning must be reached by consensus.** If key interest groups are missing from the steering committee, their interests will not be represented in the decision-making process, which will lead to dissatisfaction with the process and reduce the chance of success.

Steering committee members should have both the time and institutional support to implement the management plan. A clear workplan and timeline to implement these actions is needed at the outset of the process. Suggested key actions of the steering committee include:

- Creating Terms for Reference for the planning process
- Compiling and disseminating background information on the status of the watershed
- Developing the watershed management plan
- Securing funding and resourcing for the implementation of the plan
- Facilitating community engagement
- Documenting, tracking and modifying the management plan as necessary

There is urban development in many of the municipality's watersheds. As a result, there may be a complicated mix of land uses with many interest groups coexisting within watershed boundaries. It may not be appropriate or practical to include every individual interest group at the steering committee level. In this case, representatives of each interest group can collaborate with advisory groups with similar and shared interests. Advisory groups may require less of a time commitment for members than participating in the steering committee.

5.1.2 Consensus-based Decision Making

A common feature of successful watershed management planning is the **commitment to consensus-based decision making** and **collaboration between all interest groups to meet shared goals**. Best practices in forming a steering committee include:

- ensure all members understand the consensus-based approach and their roles and responsibilities
- clearly define the committee's mandate
- **emphasize the importance of good-faith participation and the benefits of multi-interest group management**
- build relationships, facilitate healthy conflict management and establish common goals

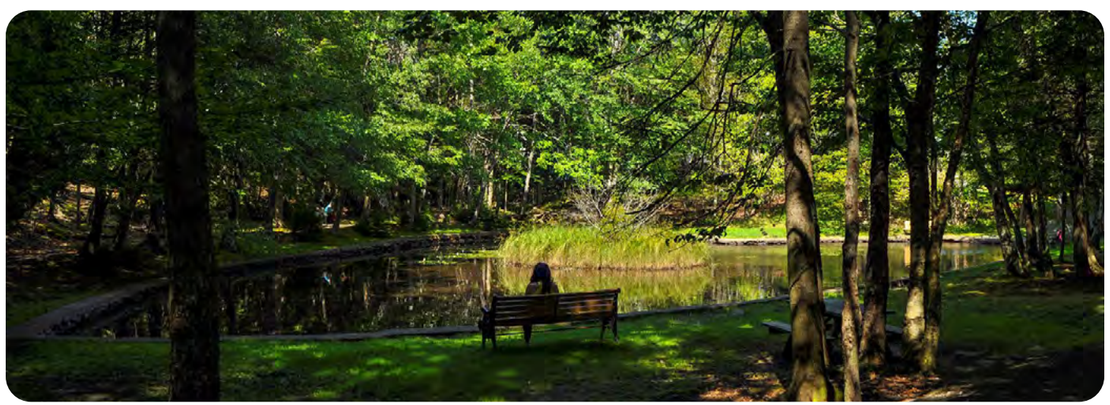
The strength of any plan depends on the ability of the steering committee to work together through competing interests, while maintaining a respectful, solution-oriented process.

The final watershed management plan should reflect the management goals of the plan **and** provide a path forward for all key interest groups to operative responsibly and sustainably within the watershed. Decisions made by group consensus may take longer, but they are ultimately stronger and easier to implement.

Decisions made throughout the watershed planning process will inform the content of the watershed plan. The completed plan will be brought to Regional Council, who will decide whether to accept the plan. If the watershed plans recommend actions related to land use changes or other municipal functions, those will also require approval by Regional Council.

5.2 Determining the Current State of the Watershed

To begin the management process, the current state of the selected watershed must be determined. At minimum, this includes compiling historical data, identifying major land uses (historic, current and future), identifying existing regulatory protections and constraints and mapping existing land cover. This is typically compiled in a State of the Watershed report that identifies current conditions in the target watershed and highlights future pressures.



5.2.1 Data Gathering

In some watersheds, sufficient water quality and land use data may already exist. Potential sources of this data are listed in *Table 2*. In other watersheds, data may be lacking. Water quality data gives planners an indication of existing conditions and ecological stressors, especially if data has been collected over the medium- or long-term. Land cover and land use mapping also gives planners an indication of the type and location of potential stressors, and their potential pathways to impact water resources.

Table 2: Potential Sources of Data for State of the Watershed Reporting

Data Type	Potential Sources	Publicly Available
Community collected water data	- Atlantic DataStream - Direct request from community group	- Yes - Possibly, by request
Municipal water data	- Municipal Open Data - Staff reports on water quality programs	- Yes - Yes
Municipal land use data	- Municipal Open Data	- Yes
Provincial water data	- Provincial Open Data - Well Log Database	- Yes - Yes
Provincial land use data and map-ping	- Provincial Landscape Viewer - Wet Areas Mapping - Interactive watershed mapping - Species at Risk Habitat	- Yes - Yes - Yes - Yes

The steering committee should ensure they have captured enough data to give a full picture of the current state of the watershed and identify gaps where additional information is necessary.

For watersheds in the Halifax Region, the most likely data gaps will be surface water and groundwater quality information, streamflow volumes and groundwater quantity data. Effort should be made to begin collecting this data in the target watershed, because it is essential for determining management criteria and measuring the performance of the management plan.

5.2.2 State of the Watershed Reporting
A completed State of the Watershed document should clearly present current, historic and future land uses. It should also include:

- historic and existing land uses
- all available water quality and biotic data
- Indigenous traditional knowledge of the watershed
- demographic and economic information within the watershed
- areas of current and historic importance to social or cultural groups

The document helps inform management criteria and establishes a baseline from which to develop a management plan and monitor its progress.

Where possible, the management plan should identify how effort and resources will be dedicated to fill identified gaps in data, especially in watersheds lacking in historic or current water quality data. Additional options are outlined in Section 4.3.4.

There are numerous examples of State of the Watershed reports prepared for Canadian watersheds. In Nova Scotia, Kings County has prepared a Lakeshore Capacity Model based on existing conditions in their watershed. The Clean Annapolis River Project (CARP) has been producing annual watershed report cards since 2004.

Working with community groups and non-profit organizations is an effective way to leverage local knowledge and increase capacity for gathering data. It is advisable to organize baseline sampling and habitat evaluation for at least two seasons of data collection, so key indicators can be established (examples listed in Section 4.3). State of the Watershed reports should clearly outline the current state of the watershed, what happened in the past that may be affecting water quality and ecosystem resilience today and the stressors predicted for the watershed in the future.

Conditions are constantly changing within a watershed, so State of the Watershed reports are intended to be dynamic and present an accurate representation of the current health of the watershed. Future progress reports (see Section 7.0) can be considered State of the Watershed reports and can be compared to track progress.

5.3 Determining Management Goals

After completing a State of the Watershed report, the steering committee should establish management goals that outline a specific vision for the future of the watershed. Management goals are also described in more detail as a set of thresholds and objectives.

TROPHIC STATE

Many management plans set the goal of maintaining the trophic state of the lakes in their watershed. The trophic state of a lake is a measure of the biological productivity of a lake. The concentration of phosphorus, a nutrient used by plants and algae, measured in a lake is often used to determine trophic state.

Thresholds set the maximum acceptable limit for a given criterion. In some cases, thresholds are established in guidelines, such as for recreational water quality, public health or the preservation of aquatic life. In other cases, thresholds are based on watershed-specific conditions.

Some examples of management plan objectives are:

- establish a target maximum percentage of impervious surface coverage across the watershed
- restore a given area of riparian zones to naturalized conditions within the first five years of plan implementation
- reduce the volume of stormwater that flows untreated into surface water bodies by a given per cent
- increase the amount of salmonid spawning habitat in a given reach of stream by a given per cent

Thresholds and objectives should be tied to defined timelines. Objectives are concrete deliverables of the management plan and the plan's success is dependent on setting clear and achievable goals at the start of the planning process.

5.3.1 Water Quality Criteria

Water quality can be easily measured with sufficient resources and funding. If there is a group or program already collecting and compiling water quality data, the priority should be to assist that group, whether by facilitating the work of volunteers, funding lab access or equipment or supporting quality assurance practices.

The steering committee should first look to existing guidelines and standards to determine appropriate water quality management thresholds. In watersheds with heavy recreational use, Health Canada's *Guidelines for Recreational Water Quality* should be considered. Where management is primarily for habitat protection, the CCME *Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life* should be considered.

Locally, the Bedford West Secondary Planning Strategy specifies that the effects of development may not cause the phosphorus concentration in the Papermill Lake watershed to increase above 10 µg/L. This concentration represents the boundary between two trophic states, as defined by Health Canada, but is not a specific threshold set out in any water quality guidelines.

In some cases, where sensitive habitat has been identified and where guidelines do not exist, or where interest groups are prioritizing a high standard of ecosystem protection, the steering committee may choose to set thresholds below guideline values. In this case, threshold values should be achievable relative to background conditions in the watershed and what can be measured.

Table 3: Suggested Water Quality Indicators, based on ALMS' Workbook

Indicator	Assessment Description	Measurement
Lake Trophic Status	Provides a general assessment of a lake's productivity or fertility.	Based on the following collective or individual measures: - Total phosphorus (µg/L) - Chlorophyll A (µg/L) - Secchi-disk visibility (m)
Nutrients	Provides a general measure of nutrient concentrations in lakes and streams and may be used to assess non-point source nutrient contamination.	Dissolved and total Phosphorus, Total nitrogen, nitrate/ nitrite, ammonia. All in µg/L.
Dissolved oxygen	Provides insight into potential factors influencing the distribution and abun-dance of aquatic species, as well as oth-er critical chemical processes, including the release and adsorption of pollutants in sediments. Also reflects degree of mixing of lake water.	- Concentration of dissolved oxygen (mg/L) - Per cent saturation
Water temperature	Provides insight into the distribution and abundance of aquatic species.	Water temperature (°C)
pH	Provides information on the chemical balance and biological state of the eco-system.	Relative acidity of water
Salination	Provides indication of the impact of road salt application on aquatic species.	Chloride concentration (mg/L)
Sediment contamination	Provides information on sediment sup-ply and contaminant dynamics, as many nutrients and contaminants adhere strongly to sediment.	- Total suspended solids (TSS) - Turbidity (Secchi depth or NTU)

In surface water in the Halifax region, phosphorus and chloride are the two primary contaminants of concern. Chloride contamination mostly comes from road salt application, which is transported into surface water when it rains or when snow melts. Phosphorus contamination can come from a variety of sources, including stormwater runoff, chemical fertilizer application, soil erosion or disruption during construction activities, wastewater cross-connections, malfunctioning or poorly decommissioned on-site septic systems and wastewater overflows.

Any plan for urban watershed management will likely consist of limiting further phosphorus and chloride contamination and remediating affected lakes and streams through habitat restoration. In a plan for a rural watershed, management will more likely consist of working with landholders to maintain and conserve natural vegetated conditions wherever possible, especially in wetlands and riparian areas.

5.3.2 Biotic Criteria

Biotic, or biological, components are literally the life of the watershed. High biodiversity, especially among native species, (plants, animals, and insects) is an indicator of the overall health of a watershed. Sensitive species occupying a specific niche within the watershed will be the first to disappear when stressed.

When chemical parameters are out of balance, changes to plant, animal or insect communities can be clear indicators. For example, when there is an abundance of phosphorus in the water, aquatic plant growth may accelerate compared to other years. When dissolved oxygen concentrations are low, fish populations may experience mass die-offs. Both these effects tend to be more obvious to casual observers than the chemical changes that caused them.

Historically in the Halifax region, apart from blue-green algae blooms, these indicators have not been consistently monitored at the municipal level. Partnerships with local research institutes or non-profit organizations, like the Nova Scotia Salmon Foundation, will likely be the most effective tool for watershed managers to effectively gather biotic data.

In addition to monitoring populations, keeping track of biotic indicators will consist of field monitoring and habitat restoration. Examples of habitat restoration efforts include streambed restoration for migratory fish species, increased riparian vegetative cover to provide shade and increased control of runoff, managing erosion and sedimentation and restoration of natural channel width.

Table 4: Suggested Biotic Indicators, based on ALMS' Workbook

Indicator	Assessment Description	Measurement
Macroinvertebrate Populations	Index of Biotic Integrity Reflects the quality and amount of aquatic habitat.	Species composition and abundance
Fish Populations	Index of Biotic Integrity Reflects the quality and amount of aquatic habitat.	Subset of the following fish species richness, composition, abundance, and condition metrics: - Total number of fish species - Numbers of specific native, intolerant, and sensitive fish species - Percentage of fish that are omnivores, insectivores, and carnivores - Per cent of individuals that are hybrids - Per cent of individuals that are diseased or deformed
Macrophyte Community (aquatic plants)	May reflect level of eutrophication, or other condition within water body.	Species composition and abundance.
Blue-green algae occurrences	Reflects level of water body eutroph-ication and provides frequency and level of potential risk to human, ani-mal and ecosystem health.	- Chlorophyll a (µg/L) - Microcystin (µg/L) - Record of cyanobacterial blooms
Species at Risk Habitat	Indicates the quality of habitat for species at risk and the sensitivity of the watershed.	- Species composition and abundance, current and historic - Extent of potential species at risk habitat

5.3.3 Physical Criteria

Physical management criteria indicate the physical conditions within the watershed. These criteria capture the effects of land use and the extent of human-caused disturbance to natural systems in a watershed.

It is worth noting that the goal of watershed management is not wholesale ecosystem conservation. The population of the municipality is growing considerably, and that growth is predicted to continue. The number of people experiencing homelessness in the Halifax region is also growing rapidly and urban areas are experiencing extremely low vacancy rates. Some level of development is necessary to accommodate that growth.

The physical indicators listed below in Table 4 are meant to set management goals for accommodating the unprecedented growth the municipality is experiencing within the constraints of the ecosystems in which we live. Successful watershed management acknowledges the competing priorities between human societies and the ecosystem sustainability and prioritizes development projects that work **within** those constraints to provide housing while minimizing the impact on natural systems.

Table 5: Suggested Physical Indicators, based on ALMS' Workbook

Indicator	Assessment Description	Measurement
Lake Level Index	Shows the status of individual lakes from year to year. This information can assist in interpreting related ob-servations of changes in water quali-ty, fisheries or recreational opportu-nities as lake levels change over time.	Lake level elevation relative to a standard level (water level in m above sea level)
Wetland inventory	Reflects land use conversion from a natural to a "developed" state and identifies potential alterations to local hydrological patterns and water quality.	- Historical wetland area - Current wetland area - Wetland type
Riparian health	Reflects type and extent of human disturbance and degree of natural ecosystem function contributing to lake health.	- Width of vegetated zone - Species composition, age structure, and percentage of tree canopy cover within the riparian area - Extent of impervious area - Bank condition
Land Cover	Identifies habitat types within the watershed	Impervious area, bare area, and vegetated area by type.
Land Use	Extent and location of natural and human disturbed areas. Percentage of land in natural state is an excellent indicator of watershed health.	- Identify areas where undeveloped conditions still exist. - Percentage of industrial, commercial, residential, agricultural, protected area, forest, etc. within watershed boundary. - Attempt to include future development and watershed stressors.
Fertilizer/Pesticide application rates	Provides measure of water quality degradation risk via contaminated runoff.	- Fertilizer application rates as measured in census. - Pesticide applications as measured by provincial permits granted.
Livestock Density	Provides a measure of water quality degradation risk via contaminated runoff and effluent.	Livestock units per unit area
Linear Development	Provides a general measure on ex-tent of human disturbance and frag-mentation.	km/km2 of roads, utility corridors, and seis-mic lines.

5.3.4 Risk Management

In a large municipality like the Halifax region, with roughly 50 secondary and shore-direct watersheds, resourcing an adequate monitoring program for each individual watershed can be a challenge. When working with municipalities to develop source water protection plans, NSECC recommends taking a risk-management approach when historical data and resources are limited. This principle can be applied here as well.

Informed assumptions based on the scientific literature can be made about the types of pressures different land uses pose and these pressures can be managed accordingly. Designing a management plan based on robust environmental data is the preferred and more precise method, but the **absence of enough data and resources should not completely prevent management**. Management plans should be adjusted as more local information becomes available. This principle of adaptation is discussed further in Section 7.0.

HARD SURFACES

Land cover can be used as an indicator of expected water quality, especially in cases where good data does not exist. When impervious surfaces – hard surfaces like asphalt that do not allow water to percolate into the ground – cover more than 15 per cent of the land in a watershed, negative water quality effects are observed. In sensitive watersheds, negative effects can be observed with as little as five per cent impervious surface cover. Serious aquatic habitat degradation typically occurs when impervious surface coverage exceeds 25 per cent.

Examples of risk-based management tools that can be implemented where data gaps exist include:

- In urbanized areas, incentivize (or require) the use of green infrastructure practices to manage stormwater volume and improve stormwater quality
- Implement maximum target percentages of impervious surface coverage in new developments, and incentivize impervious surface reduction in existing developments
- Develop guidelines establishing minimum watercourse buffer width, and clearly define standards for acceptable vegetative cover within those buffers. Require reinstatement of appropriate, native vegetation in buffer areas that have been disturbed during construction and incentivize renaturalization in buffer areas that were historically disturbed
- Allow land acquisition by the municipality or land trust
- Incentivize public transit and active transportation as primary modes of mobility where possible
- Require and enforce regular on-site septic system maintenance and proper decommissioning of on-site septic systems at the end of life

Managing the impact of known stressors and contaminant sources is the most effective way to protect water quality, aquatic and riparian ecosystems and the services they provide to communities. Local watershed data—especially water quality, biotic and habitat information—will help refine specific management criteria.

INTEGRATED MOBILITY

Roads, especially paved and salted roads, have negative impacts on wildlife connectivity, and can severely degrade water quality through sedimentation, hydrocarbon pollution and chloride pollution. Reducing personal vehicle traffic has many co-benefits, including the reduced need for roads. The goals of Halifax Regional Municipality's Integrated Mobility Plan include increasing opportunities for residents to bike, walk or take transit instead of driving.

6.0 THE PLAN

In developing the plan, careful consideration should be taken to ensure all participants in the planning process understand and are committed to the consensus-based decision-making process.

6.1 Terms of Reference

Developing clear and well-considered Terms of Reference (ToR) is essential for establishing and achieving watershed management goals. The ToR should incorporate the issues, pressures and priorities identified by interest groups and outline the watershed reporting described in previous sections.

The Alberta Lake Management Society suggests the following elements be included in the ToR:

- description of the lead organization and the general intent of the watershed plan
- watershed characteristics as established in the background research
- vision statement and planning objectives
- watershed issues of major concern and suggested prioritization
- scope of the management plan
- committee roles, responsibilities and operating procedures
- engagement plan
- plan processes and components
- process for endorsement and approvals
- estimate of required resources

All members of the steering committee must approve and sign the ToR before further action is taken. Other interest groups and participants in the planning process should also endorse or approve the ToR at this stage.

Once the active participants have reached consensus on the ToR, the document should be circulated publicly.

6.2 Engagement

	Level 1		Level 2	Level 3
	Increasing level of key partner impact →			
	Inform	**Consult**	**Involve**	**Collaborate**
Key Partner Engagement Goal	As many key partners as possible are kept aware of the PLWMP process, opportunities to be involved, information available, outputs and progress.	As many key partners as possible are given input and feedback opportunities during the PLWMP process.	As many key partners as possible have opportunities to interact, question and discuss PLWMP content and recommendations.	Through direct involvment, a cross section of watershed key partners support the module recommendations and can explain the thinking behind them.
Promise to Key Partners	You will be informed.	You will have input and feedback opportunities. Survey results will be made available.	Through in-person dialogue you will have the opportunity to influence the thinking and outputs of the PLWMP modules.	You will have the opportunity to join committees or make other substantial contributions to the PLWMP process.
Opportunities to be Involved	Visit the PLWMP website Sign-up to receive PLWMP communication	Complete surveys Submit comments Attend public information sessions	Public engagement through: i. Panels ii. Discussion/Focus Groups iii. Webinars	WMP Steering Committee and module subcommittees

Figure 2: Proposed Levels of Interest group Engagement, from ALMS Workbook based on the Pigeon Lake Watershed Management Plan (PLWMP) implementation.

The level of engagement various groups can expect from the creation, implementation and ongoing delivery of the watershed management plan should be clearly defined and shared publicly at the beginning of the process. Public interest in environmental policy changes, and water issues in particular, is high throughout the municipality, as demonstrated in the *Water Quality Monitoring Policy and Program Development*, the AECOM report informing the municipality's LakeWatchers program. Managing expectations about where, when and how public participation will occur throughout planning and implementation, and then following through on the published schedule, will help manage the volume and timing of requests to participate from residents not directly involved in the active planning process.

Municipal staff will draw on Planning & Development's *Public Engagement Guidebook* for public engagement during watershed plan development and prior to implementation of the completed plan.

Engagement goals should aim to balance as much interest group input as possible without affecting the steering committee's ability to meet its deadlines.

6.3 Selecting Management Criteria

This is the stage where the management vision begins to materialize. Based on the information collected in the background studies, initial interest group engagement and data compilation, the key indicators should be clear to the steering committee.

For example, a watershed system in a relatively undeveloped part of the municipality might be interested in managing pressures associated with on-site septic systems, forestry or agriculture. The identification of those pressures could take different forms, like setting a desired phosphorus concentration in lakes in the watershed or achieving a certain acreage of riparian buffer restored to pre-development condition.

Once the steering committee reaches consensus on the criteria to be monitored and managed and the thresholds for determining success, they must evaluate the feasibility of all potential methods to achieve the management goals. Feasibility includes economic, political, regulatory, social, cultural and technical barriers to success. Constraints will be specific to the location and case in question, even between watersheds in the same municipality.

To support the ability to meet management outcomes, as many actions as possible should be taken. There are endless options for how these outcomes can be met, ranging from extremely technical in-lake treatments to simply reducing mowed area. The ALMS proposes that actions tend to fall in the following general categories:

- change to or improved enforcement of policy and regulation
- implementing best management practices
- planning, zoning and conservation
- knowledge sharing and public education
- research and technology

Identifying partnership opportunities with research institutions and technical experts is vital at this stage. There are many experts in water and watershed management in the Halifax region who can help evaluate the impact and probability of success of highly technical remediation options. The North American Lake Management Society (NALMS) also provides resources to support decision makers at this stage.

Once consensus has been reached on the course of action, there will be opportunities to re-evaluate and change course, but this will be more difficult once the plan has been shared publicly. Actions should be prioritized by evaluating the predicted impact on meeting the plan's stated outcomes, the ease of implementation and the forecasted cost and timeline.

The plan should clearly outline specific actions, accountability, predicted costs, potential funding sources and timelines. Participants in the planning process should be realistic about these factors. For example, while major legislative changes protecting natural systems may be technically possible, they may not be the easiest way to achieve management goals. Watershed planners can consider interim actions while trying to achieve the more time-consuming actions like legislative changes. The willingness of the responsible group to complete any given action is as important as whether they are empowered to do so. Time spent at this stage will save time, money, potential conflict and resources later.

6.4 Drafting the Plan

The drafting of the plan should not begin until the steering committee and other participants in the planning process have reached consensus regarding their vision, outcomes, management criteria, actions and implementation methods. No new information or objectives should be added at this stage.

The management plan document should stand alone and outline:

- purpose and objectives
- detailed actions and the delivery timeline
- budget
- the organization, interest group or level of government responsible for carrying out each action
- the criteria to be managed, including thresholds and proposed remediation measures, where necessary
- evaluation criteria for indicator values and plan implementation

6.4.1 Sharing the Plan

Once consensus has been reached and the watershed management plan has been finalized, the steering committee must share the management plan and associated action plan publicly. This is necessary for feedback, adaptive management and transparency. When public engagement is complete and feedback has been incorporated into the completed plan, it will require approval from Regional Council.

Broad acceptance of the plan is essential. If the plan does not meet wider community needs and priorities, additional engagement may be considered. This may include securing statements of support from key community members and stewardship organizations to strengthen the plan put forward by the steering committee.

7.0 IMPLEMENTING THE PLAN

At the point of implementation, a watershed management plan has been created and accepted. Through the principle of consensus-based decision making, potential conflicts have been anticipated and flagged and **all participants are working from a shared understanding of the next steps and management goals**. If consensus has not been reached, it is strongly recommended time is spent working toward this, even if achieving consensus means making slight adjustments to specific thresholds, objectives or timelines so that collaborative management is possible.

7.1 Administration of the Plan

Once the plan has been accepted for implementation, the steering committee may step back and transfer responsibility for the plan to an implementation committee. In general, while an implementation committee works closely with the steering committee, they are separate parties. The steering committee retains responsibility for monitoring the progress of the plan's actions, ensuring deliverables are completed on schedule and responding to changing conditions within the watershed.

The implementation committee works to carry out the actions described in the management plan and facilitates the ongoing monitoring and adaptation of the plan. Members should hold professional or community roles where they are impowered to make or influence decisions. A well-organized management plan will clearly identify accountability for each action, whether that be different levels of government, Indigenous leaders, the development community, environmental stewardship groups or non-profits. The implementation committee should include representation from a broad range of interest groups, and should act nimbly and effectively.

While the plan itself has no legal authority, the recommended actions in the plan will have the support of committee members working in government, and approval by Regional Council. These participants will be well-placed to implement the actions through by-laws, policies or priority plans because the management plan's actions will have achieved broad support across multiple sectors through early and consistent focus on consensus-building.

7.2 Resourcing

It is unlikely that municipal budgets can accommodate resourcing a management plan on their own. To facilitate resourcing at the municipal level, individual actions can be divided into separate projects and managed by the responsible participant. It is expected that some actions will not require funding outside of staff workplans, although large projects requiring additional staff will require additional resources. This includes the workplans of all participants in the planning process, not just municipal staff. Volunteer contributions, including those of existing conservation and trail maintenance groups, will also be essential to the success of the project.

When planning large restoration or conservation practices, funding external to municipal budgets is often sought to supplement municipal contributions – this would be the case with actions associated with watershed management as well. Requests for funding large conservation and restoration projects will be brought to Regional Council as needed.

Other projects, especially those being carried out by community stewardship groups and non-profits or involving habitat restoration or purchasing of land for conservation, will require additional funding. The implementation committee should dedicate time and resources to fundraising and completing grant applications to support full implementation of the management plan and its outcomes. Relying on unpaid volunteers is not a sustainable model for long-term management success. Municipal resourcing and potential funding sources should be included as part of original planning and project timelines should consider federal, provincial and private funding cycles.

8.0 MONITORING AND ADAPTIVE MANAGEMENT

After a watershed management plan has been developed and implemented, ongoing monitoring is essential to evaluate the success of the plan. Monitoring means both environmental monitoring and monitoring the progress of the plan's implementation.

Regular reporting is necessary for accountability and transparency. At minimum, progress reports should include:

- actionable goals that were committed to be completed within the reporting period
- progress made toward completing these goals
- goals that were not met and identification of the barriers that prevented meeting them
- water quality, land use and biotic data collected during the reporting period and analysis of this data, including comparison to historic data
- predicted future stressors
- proposed new actions to mitigate and adapt to the effects of current and future development
- proposed actionable goals for the upcoming reporting period

Goals will be set and accomplished over different timelines. Tracking incremental progress on longer-term goals will promote ongoing planning and encourage curiosity. Watershed managers should consistently revisit the questions: *What are we trying to accomplish? Are the steps we have in place moving us closer to accomplishing these goals? What is the data telling us? Are there missing interest groups or criteria that need to be included going forward?* The answers will help advance the plan and ensure it continues to align with the initial management goals.

Feedback gained from consistent monitoring should be thoughtfully applied to adapt the program. If land uses in a watershed change significantly, different environmental stressors may warrant higher concern. For example, if a new road is constructed near a previously remote lake, managing chloride may become necessary. Managers should revisit and evaluate the original watershed plan at least every 5 years to ensure it still serves the vision established by the steering committee and that resources are being dedicated effectively and appropriately.

In larger watersheds with complex land uses, this may mean the entire plan should be updated on a regular basis to reflect:

- changes in government priorities and regulations
- changes to best practices
- scientific advances that inform risks, stressors and what level of management is achievable
- conditions in the watershed
- reconciliation efforts
- impacts from climate change
- ongoing successes and failures of the management plan

Consistent community engagement will strengthen the plan through public buy-in and by identifying new pressures facing the watershed ecosystems. The collaborative nature of watershed management requires consistent support. Demonstrating that the plan is effective in achieving its goals and responsive to changing times and conditions will build the trust necessary for continued success.

NOTES

NOTES

NOTES

NOTES

HalifACT Acting on Climate Together

Attachment B

Gaps, Barriers, and Opportunities for Improved Watershed Management Identitifed in 2023 Listening Tour

Theme	Challenges	Status	Opportunities	Interest Groups
Data Sharing	Lots of community data exists but is not being used to the fullest capacity in decision-making	· Community data is considered in background studies informing secondary planning	· Establish appropriate time in planning, development approval, and permitting process to incorporate data review · Work with developers to include review of available data as part of application packages, where appropriate	· Community stewardship groups and ENGOS · Municipal planning staff · Environmental consultants
	Methods of data collection are not necessarily standardized	· Atlantic Water Network regularly works with community groups to standardize sample and field data collection	· Work with Atlantic Water Network and Atlantic DataStream to confirm quality assurance of community data	· Atlantic Water Network · Atlantic DataStream · Community stewardship groups and ENGOs · Municipal staff
	Non-profit groups need support with data management	· Some support is available from Atlantic Water Network and Atlantic DataStream, but these groups lack full capacity and are not only focused in HRM	· Support the work of Atlantic Water Network and Atlantic DataStream as they support stewardship groups · Support the creation of a stewardship support network	· Atlantic Water Network · Atlantic DataStream · Community stewardship groups and ENGOs · Municipal staff
	Municipal governments need to share more of their data on Open Data	· ECC is working through its back catalogue of water quality data and reformatting as necessary to upload on HRM's Open Data portal	· Establish regular data upload schedule · Work with Atlantic DataStream to share data on their platform · Work with consultants to provide new data in a comaptible format for ease of sharing	· Atlantic DataStream · Municipal staff
	More focus on habitat restoration is required	· Typically this is not happening on municpally-led projects within HRM currently	· Identify opportunities for wetland compensation projects within HRM · Partner with conservation and restoration organizations to expand capacity	· Municipal staff · Community stewardships and ENGOs · Development community · Provincial government staff

Ecosystems	More protection is needed for naturalized or undisturbed riparian buffers	· Policy enables and requires this, but enforcement and restoration standards are lacking	· Urban Forestry Management Plan update will propose strategies to improve protection outomces · Restoration and natualization pilot projects proposed in HRM Parks · Education and restoration campaigns targeting riparian landowners to improve and restore their riparian land to a natural state · Revisit the possiblity of a tree removal by-law	· Municipal staff · Development community · Landowners of waterside properties
	More focus is needed on aquifer recharge when developments are being planned	· This is currently considered as a part of pre-development land use assessments and watershed studies, and as part of subdivision approvals where domestic water is supplied by private wells	· Investigate opportunities to set a maximum acceptable percent coverage of impervious surface on developed lots or across developments	· Municipal staff · Development community
	Need to reduce impervious surface coverage on developed lots	· The Phase 4 Regional Plan update indicates this should be considered with all new developments		
	Floodplains must be defined across the municipality	· Flood risk mapping under development across the municipality · Implementation of Sackville River floodplain mapping into municipal policy is underway	· Apply lessons learned from Sackville River floodplain mapping implemenation to entire municipality	· HRM staff
	Wilderness connectivity needs to be prioritized, and the Green Network Plan fully implemented	· The Green Network Plan Coordinator position is **WHAT?** · Green Network Plan ecological corridor mapping and policies for implementation are part of the Phase 4 and 5 Regional Plan update	· Finalize GNP mapping and put into policy	· HRM staff

	More effort needs to be made to incorporate traditional indigenous ecological knowledge into environmental policies	· Formal incorporation of TEK into policy in not currently municipal practice	· Using the attached framework to implement a watershed management plan, all interest groups much reach consensus on all decisions	· Local Indigenous nations · Municipal staff (HRM and adjacent municipalities) · Community stewardship groups and ENGOs · Development community · Other levels of government
	HRM needs to prioritize access to nature for all residents	· New subdivion developments require 10% of land be set aside as dedicated parkland · Open space zoning and conservations easements allow for land conservation · Green Network Plan corridors will conserve natural spaces through otherwise developed areas	· Finalize GNP mapping and put into policy	· HRM Planning & Development, Real Estate, and Parks staff
Framework	Need for a framework with clear and defined roles Need a process to develop water quality outcomes for receiving bodies Should include fixed goals Allow for adaptive management Proposed policies need teeth	· Proposed framework addressing these challenges in Attachment A of this report	· Adopt the attached watershed management framework · Pilot implementing the framework in 1-2 watersheds	· Municipal staff (HRM and adjacent municipalities) · Local Indigenous nations · Community stewardship groups and ENGOs · Development community · Other levels of government
	Close exploitable loopholes between municipal and provincial approvals	· ECC staff are chairing a working group with staff from NSECC, planning and water treatment staff from the municipality of East Hants, and HRM staff from several business units to coordinate information sharing	· Potential to develop a shared application viewer, or improved communication channels between approving bodies	· Municipal staff (HRM and adjacent municipalities) · Proviincial government staff
	Consider water quality impacts of stormwater discharge and post-development impacts	· Administrative Order 2020-010-OP outlines development requirements pertaining to stormwater quality and quantity	· Implement green infrastructure as a first option for stormwater management · Promote water infiltration into the	· Municipal staff

Policy Coordination	Change design standards to include green infrastructure	· The Resilient Infrastructure Standards team is working on green infrastructure design standards to be included in HRM's Red Book	ground and groundwater recharge · Support development of stormwater quality guidelines at the provincial level	· NSECC staff
	Move toward collaborative governance at the watershed scale	· Proposed framework addressing these challenges in Attachment A of this report	· Adopt the attached watershed management framework	· Municipal staff (HRM and adjacent municipalities) · Local Indigenous nations · Community stewardship groups and ENGOs · Development community · Other levels of government
	Use geographic (watershed) boundaries as planning units	· This has been proposed for exploration in Phase 4 of the Regional Plan update	· Scope development impacts at a watershed scale · Consider cumulative impacts of all development within a watershed	· Municipal staff
Regulation & Enforcement	Improved erosion and sedimentation control monitoring is necessary	· NSECC is releasing new guidance for construction sites	· Increased compliance staffing capacity · Increased education for construction managers	· Municipal staff · Provincial staff · Development community
	Meaningful penalities for chronic non-compliance	· The current approach is to work with construction managers to improve practices · Penalties not used as a first resort	· Increased compliance staffing capacity · Increased inspection frequency · Tie fees/fines to restoration projects	· Municipal staff · Provincial staff · Development community
	Challenge to reach as-of-right development with new policies	· Suburban plan review is underway · Municipal by-law review is underway	· Increased compliance staffing capacity · Full implementation of GNP · Increase environmental protections attached to properties through zoning	· Municipal staff
	Need to reframe risk to consider the liability of not acting on climate change	· Reflects the priorities of HalifACT to mainstream climate mitigation and adaptation across the municipality	· Look to other municipality's shifting perspective and policy · Munciipal Natural Asset Initiative will help assign econmic value to natural features and systems, and the services they provide to help capture costs that are typically externalities	· Municipal staff, especially those working on risk, climate, and emergency management

Support for Community Groups	Most groups working in this space do not have adequate funding, especially for operational expenses	· Municipal community grants are available for capital costs · Provincial grants are available for capital costs	· Support the work of Atlantic Water Network and Atlantic DataStream as they support stewardship groups · Investigate opportunities for supporting operational funding for stewardship groups	· Municipal staff · Community stewardship groups and ENGOs · Other levels of government
	Need for administrative and program support	· Some support is available from Atlantic Water Network and Atlantic DataStream, but these groups lack full capacity and are not only focused in HRM	· Support the work of Atlantic Water Network and Atlantic DataStream as they support stewardship groups · Support the creation of a stewardship support network · Provide direct support from municipal	
	Need for education and outreach support, and support for event facilitation			
	Need for support with succession planning an volunteer recruitment			
	Desire to leverage the groups that exist into a network	· Similar formal networks have previously existed among trail associations	· Support the creation of a stewardship support network	