

This document was created using best practices in document accessibility. Should you need assistance reading or understanding this document, call 902-543-8181 or email [info@modl.ca](mailto:info@modl.ca).

## **Municipal Council Meeting Agenda**

**Tuesday, May 28, 2024 – 9:00 a.m.**

**MODL Council Chambers – 10 Allée Champlain Drive, Cookville**

- 1. Call to Order**
  - 1.1 Mi'kma'ki Territorial Acknowledgement
- 2. Announcements, Acknowledgements, Recognition**
  - 2.1 Proclamation – Parks and Recreation Month..... 1
- 3. Public Input (15 Minutes)**
- 4. Changes/Approval of Agenda (as circulated)**
- 5. Approval of Minutes - May 14, 2024**
- 6. Business Arising from Minutes**
- 7. Awarding of Tenders/RFPs**
  - 7.1 Award of Design of Facilities at Mush-a-Mush Beach ..... 2-4
- 8. Presentations/Scheduled Times - Nil**
- 9. Consideration of Correspondence - Nil**
- 10. Recommendations from Committees & Boards**
  - 10.1 Policy & Strategy Committee** **5**
    - 10.1.1 Annual Operating and Major Recreation Capital Grants..... 6-20
    - 10.1.2 Sawpit Wharf Lease Renewal..... 21-29
- 11. Staff Reports**
  - 11.1 Planning & Development Services**
    - 11.1.1 5-Year Transit Operational & Business Plan ..... 9:15 a.m. 30-87
  - 11.2 Recreation, Parks & Trails**
    - 11.2.1 Sherbrooke Lake 5-Year Water Quality Report ..... 10:15 a.m. 88-187
    - 11.2.2 MARC Playground Equipment ..... 188-190
    - 11.2.3 Major Recreation Grant – Ground Search & Rescue ..... 191-192
- 12. Mayor's/Deputy Mayor's/Councillors' Matters**
  - 12.1 Deputy Mayor's Update
  - 12.2 Mayor's Update
- 13. Added Items**

**14. In Camera**

- 14.1 Contract Negotiations under Section 22(2)(e) of the MGA
- 14.2 Contract Negotiations under Section 22(2)(e) of the MGA
- 14.3 Potential Litigation under Section 22(2)(f) of the MGA
- 14.4 Potential Litigation under Section 22(2)(f) of the MGA

**15. Adjournment**

**Council**  
Item: #2.1  
Date: May 28, 2024  
Authorization: T. MacEwan



### **Parks and Recreation Month Proclamation**

**Whereas**, in the Municipality of the District of Lunenburg we are fortunate to have a variety of recreation and parks systems providing many opportunities for residents and visitors to be active and explore this beautiful province; and

**Whereas**, participating in recreational activities helps strengthen the bonds of family and friendship, enhances spirit, helps children and youth develop a positive self-image, strengthens volunteer and community development; and

**Whereas**, our parks, open spaces and trails ensure ecological beauty, provide places to enjoy nature, help maintain clean air and water, preserve Mi'kma'ki where we live, work and play, and preserve plant and animal wildlife.

**Therefore**, be it resolved that the Municipality of the District of Lunenburg does hereby proclaim the month of June 2024 to be **“Parks and Recreation Month”** to recognize and celebrate the year-round benefits of recreation and parks at the local, and regional and provincial level.

**Council**  
Item: #7.1  
Date: May 28, 2024  
Authorization: T. MacEwan



## **Municipality of the District of Lunenburg**

### **Request for Decision**

**Report to:** Municipality of the District of Lunenburg Council

**Submitted by:** Stephen W. Pace, Director of Engineering & Public Works

**Date:** May 28, 2024

**Re:** Mush-a-Mush Beach Park – Design of Accessible Vault Washrooms and Change Rooms

---

### **Recommendation**

Council authorize staff to award the design of accessible vault washrooms and change rooms at Mush-a-Mush Beach Park to Stantec Consulting Ltd. for the amount of \$30,295, including a 15% contingency and net HST.

### **Executive summary**

MODL seeks to implement some of the recommendations of a recently completed Accessibility Audit Report of five MODL owned parks. Council approved \$190,000 for the design and construction of accessible vault washrooms and changerooms for Mush-a-Mush Beach Park in the 2024/25 Capital Budget. Professional fee Proposals were requested from two firms on the MODL's Standing Offer for Engineering Design and Construction Oversight Services. A fee Proposal from Stantec Consulting of \$30,295, including a 15% contingency and net HST, was deemed to be the preferred choice for the project.

### **Discussion**

MODL engaged **exp** Services Inc. to conduct an accessibility audit of five municipally-owned parks, including Mush-a-Mush Beach Park. **Exp** completed and submitted a final Accessibility Audit Report in April 2024. The Report outlines current deficiencies and makes a number of suggestions for park improvements. Suggestions included parking lot / circulation upgrades; park layout changes; pathway upgrades; new picnic tables, benches and waste receptacles; mobility beach access and improved wayfinding.

In April, 2024, Council approved \$190,000 in the 2024/25 Capital Budget for the design and construction of accessible vault washrooms and change rooms.

The design scope of work includes:

- Topographic survey;
- Environmental field review to delineate wetlands and watercourses to assist in locating the new facilities;
- Development of architectural, structural and civil scope of work;
- Support through tendering phase;
- Support construction phase;
- Creation of As-Built drawings for record keeping.

Stantec Consulting Ltd. and **exp** Services Inc. were requested to submit professional fee Proposals for the design of the accessible vault washrooms and change rooms at Mush-a-Mush Beach Park. Both firms are on MODL’s Standing Offer for Engineering, Design and Construction Oversight Services, EOI 2021-01-500, and both offer a full range of multi-disciplinary engineering and architectural services in-house.

Results of the fee Proposals are shown in the table below:

Proponent	Pricing		
	Base Price	Including 15% Contingency	Including Net HST
Exp Services Inc.	\$41,000	\$47,150	\$49,173
Stantec Consulting Ltd.	\$25,260	\$29,049	\$30,295

### Budget implications

The 2024/25 approved capital budget includes \$190,000 for the design and construction of accessible vault washrooms and changerooms at the Mush-a-Mush Beach Park. The \$30,295 will come from this \$190,000 approved in the capital budget.

### Strategic plan

This work aligns with Council’s Re-Create Parks Strategic Priority.

### Work plan

The design is expected to take 8-10 weeks after award. A construction tender will then be issued with the submitted bids coming back to Council for consideration. Construction is scheduled for the Fall, 2024.

### Alternatives

Not award the design work to Stantec and postpone the project for a future time.

### Conclusion

MODL Council has determined that the design and construction of accessible vault washrooms and changerooms for Mush-a-Mush Beach Park is a priority for the overall park upgrade. Professional fee Proposals were requested from two firms on the MODL's Standing Offer for Engineering Design and Construction Oversight Services. A fee Proposal from Stantec Consulting of \$30,295, including a 15% contingency and net HST, was deemed to be the preferred choice for the project.

Report Preparation	
Department	Engineering & Public Works
Report Prepared by	Stephen W. Pace, Director of Engineering & Public Works
Report Approved by	Tom MacEwan, CAO
Date Reviewed by C.A.O.	May 21, 2024

**Council**  
Item: #10.1  
Date: May 28, 2024  
Authorization: T. MacEwan



## Municipality of the District of Lunenburg

10 Allée Champlain Drive, Cookville, Nova Scotia, Canada, B4V 9E4  
Phone: 902.543.8181 Fax: 902.543.7123 Web Site: [www.modl.ca](http://www.modl.ca)

May 21, 2024

To Her Worship, Mayor Bolivar-Getson, and Councillors  
of the Municipality of the District of Lunenburg

Dear Mayor and Councillors:

The Policy & Strategy Committee, in session on Tuesday, May 21, 2024, made the following recommendations to Council:

1. That Municipal Council approve the applications for the 2024-2025 Annual Operating Grant program in the amount of \$80,064 as presented.
2. That Municipal Council approve the applications for the 2024-2025 Major Recreation Capital Grant program in the amount of \$67,861 as presented.
3. That Municipal Council approve sending a letter to the Department of Natural Resources and Renewables, Land Services Branch, notifying them of the Municipality's intent to renew Lease #4814 for an additional 15 years which pertains to lands owned by the Province of Nova Scotia that currently forms part of the Sawpit Wharf Park.

Respectfully submitted,

Chairperson and Members  
Policy & Strategy Committee

/jp

**Council**  
Item: #10.1.1  
Date: May 28, 2024  
Authorization: T. MacEwan



## **Municipality of the District of Lunenburg**

### **Request for Decision**

**Report to:** Municipal Council

**Submitted by:** Trudy Payne, Director of Recreation, Parks & Tourism

**Date:** Annual Operating and Major Recreation Capital Grants

**Re:** May 21, 2024

---

#### **Recommendations**

**That Council for the Municipality of the District of Lunenburg approve the applications for the 2024-2025 Annual Operating Grant program in the amount of \$80,064 as presented.**

**That Council for the Municipality of the District of Lunenburg approve the applications for the 2024-2025 Major Recreation Capital Grant program in the amount of \$67,861 as presented.**

#### **Background**

Each year the Municipality of the District of Lunenburg offers an Annual Operating Grant (AO) and Major Recreation Capital Grant (MRC) program to its non-profit groups to support the many volunteers and volunteer groups that make our communities better places to live, work and play.

This year, the Municipality of the District of Lunenburg received 49 applications by the deadline of March 1st, totaling \$200,520.60 for Annual Operating Grants, seeing an approximate 30% increase on the requests in 2023/24 (\$154,042), and a total of 14 applications in the amount of \$193,516.86 in requests for Major Recreation Capital grants, an increase of around just over 55% on requests in 2023/24 (\$124,658). This year's applications include requests from 14 new organizations for assistance with annual operating expenses.

As with every year, there were more requests than funds available. This year saw a significant increase in the number of requests totaling a combined ask of \$394,037.46. The 2024/25 budget for contingency grants (a combined account to provide funding for both Annual Operating Grant and Major Recreation Capital Grant requests) is \$147,925, after paying carried over grants from 2023-2024 and awarding Food Vibes \$5,000 from the annual operating grant funds.

**Summary**

The applications were reviewed based on the approved criteria. Recommendations are based on the criteria and the budget available. After using the criteria, for most groups another 54% was deducted for the Annual Operating and for Major Recreation Capital another 45% to align with the budget.

If Council approves the recommended amount for those applications that met the deadline, there will be \$0.00 remaining to address any late applications from the annual operating and major recreation capital grant funds.

GRANT SUMMARY (Budget \$147,925)	Requested 2024-25	Recommendation
Annual Operating	\$200,520.60	\$80,064.00
Major Rec. Capital	\$193,516.86	\$67,861.00
Late Applications	\$27,000	\$0.00
<b>TOTALS</b>	<b>\$421,037.46</b>	<b>\$147,925.00</b>
<b>REMAINING BUDGET</b>	<b>-\$273,112.46</b>	<b>\$0.00</b>

Please see the attached spreadsheet for details of applications and the recommended awards.

The following pages provide more information on the organizations.

Report Preparation	
<b>Department</b>	Recreation, Parks & Trails
<b>Report Prepared by</b>	Trudy Payne, Director of Recreation, Parks & Trails
<b>Report Approved by</b>	
<b>Date Reviewed by C.A.O.</b>	

## Annual Operating Grants

### Organizational Overview

#### **Achievers 4-Club – Registered in District of Lunenburg \*NEW**

This Club is an individual branch stemming from the overall 4-H program. The vision for operating this branch is to offer organized programming for youth involvement, encouraging members to become responsible members of society. The Club provides opportunities for leadership and skill development while promoting agriculture awareness. 2024 is their initial year of start-up.

Operational expenses include travel, administrative expenses, advertising, supplies, insurance, rent, repairs and maintenance of equipment, and equipment to get the club started. Revenue sources include membership dues, fundraising and donations.

**2024-2025: Amount Requested \$5,000 recommended amount \$2,194.**

#### **Barss Corner Community Hall Association – Registered in District of Lunenburg**

This community hall is 100% volunteer supported and relies on fundraising and rentals as its main means of support. The hall is used for suppers, meetings, election polls, receptions, and other community events.

Operational expenses include supplies, advertising, bank fees, insurance, utilities and repairs and maintenance. Revenue sources include rentals, donations, grants, and fundraising.

**2024-2025: Amount Requested \$4,645.90 recommended amount \$2,039.**

#### **Bridgewater Sports and Cultural Association – Registered in Lunenburg County \*NEW**

The Association was formed in January 2024 to oversee and assist four established groups/teams in Lunenburg County: The Lunenburg Cricket Club, the South Shore Malayalis Cultural Group, the Lunenburg FC Soccer Team, and the Bluenose Giants Tug of War Team. Their mandate is to enhance the quality of life for community members by providing opportunities for physical activity, cultural engagement, and social interaction.

The Association provides opportunities for newcomers, people of diverse cultural backgrounds and the broader community to come together through sports, recreation, and cultural activities. This benefits the community by helping newcomers settle and integrate and by providing Lunenburg County residents with new sports, recreational and cultural opportunities.

Operational expenses include travel, administrative expenses, advertising and promotions, insurance, professional fees for performers, and venue rentals. Revenues include fundraising, donations, grants, and corporate funding.

**2024- 2025: Amount Requested \$5,000, recommended amount \$2,194.**

#### **Broad Cove Community Centre – Registered in District of Lunenburg \*NEW**

The community hall's mandate is to provide facilities for the residents and various organizations of the community of Broad Cove, and for other persons or organizations who may wish to rent the facilities. Their mandate is also to protect and preserve Broad Cove beach and adjacent lands in their natural state for the enjoyment of residents of Broad Cove and any such persons that share this objective.

Operational expenses include advertising, supplies, insurance, bank fees, utilities, repairs and maintenance. Revenue sources include membership fees, fundraising, donations, cash on hand, rentals, and grants.

**2024-2025: Amount requested \$4,300, recommending \$1,887.**

#### **Canadian Dory Racing Association – Registered in the Town of Lunenburg**

This Club competes internationally. They have a free junior program, learn-to-row lessons, and advance rowing technique coaching. They have been racing on the Lunenburg waterfront for over 70 years.

Operational expenses include travel to international races, office supplies, advertising, insurance, apparel purchasing, professional fees and dory repairs. Revenue sources include membership fees, apparel sales, fundraisers, and cash on hand.

**2024-2025: Amount requested \$5,000, recommending \$1,229.**

#### **Chester Brass Band Society – Registered in the Municipality of the District of Chester \*NEW**

The purpose of the Society is to contribute to the Nova Scotian quality of life, with particular emphasis on Chester Area residents, by providing the general public an opportunity to learn about and enjoy music in the brass band tradition. Members come from all over, including the District of Lunenburg. They perform with other municipal ensembles, with vocalists and instrumental soloists of distinction. The Band performs in concert halls, theatres, schools, churches, parks, for charitable organizations and other community activities including concerts

for public observances, holidays, and community events. The Band collaborates with Legions, schools, and churches throughout the District of Lunenburg and with musical organizations such as the Studio Singers and the Seaside A Capella.

Operational expenses include administrative expenses, membership, insurance, professional fees, utilities and repairs and maintenance to the Chester Brass Band building. Revenue sources include donations, cash on hand and grants.

**2024-2025: Amount Requested \$2,000, recommended amount \$765.**

#### **Coastal Action – Registered in the Town of Mahone Bay**

Coastal Action is seeking financial support to support their water quality monitoring component of the LaHave River Watershed Project. Project initiatives include monthly water quality monitoring, aquatic connectivity assessments in the Main River and West Branch sub-watersheds, fish habitat restoration work in the Main River and West Branch sub-watersheds, community outreach and education initiatives.

Operational expenses include salaries, field supplies and materials, lab fees, travel, office and meeting space, rent, communications, insurance, and office equipment. Revenue sources include funding from the Atlantic Salmon Conservation Foundation, NSA Adopt-A-Stream, EcoAction and the Town of Bridgewater.

**2024-2025: Amount Requested \$5,000, recommended amount \$1,893.**

#### **Elderfit Lunenburg County – Registered in Lunenburg County**

Elderfit provides aquatic exercises designed primarily for seniors and those with mobility issues, but anyone can participate.

Operational expenses include training, administrative expenses, supplies, insurance, pool rental, equipment, professional fees, and events. Revenue sources include program registration fees, events, donations, cash on hand, and grants.

**2024-2025: Amount Requested \$1,500, recommended amount \$575.**

#### **Friends of DesBrisay (DesBrisay Museum) – Registered in Town of Bridgewater**

The DesBrisay Museum is a community museum that houses the oldest history collection in Nova Scotia, and fifth oldest in Canada. It showcases the history of Lunenburg County, as well

as highlighting its citizens, architecture, and culture. It is the only community museum in Lunenburg County which operates a year-round facility.

Their operational expenses include salaries and benefits, maintenance & repair costs, administration, professional development, and programming. Their revenue sources include grants from all levels of government, sponsorship, program fees and donations.

**2024-2025: Amount Requested \$5,000, recommending \$2,118.**

#### **Hemford Music Association – Registered in District of Lunenburg \*NEW**

This recently registered association has a mission to bring the community together by holding music events and raise money to donate back into the community, to other organizations or groups that do positive things for the community, such as food banks and help centres.

Operational expenses include advertising, professional fees for musicians, utilities and repairs and maintenance to the stage and grounds. Their revenue sources include donations from local businesses and the general public.

**2024-2025: Amount Requested \$5,000 but based on budget maximum can request is \$2,525, recommended amount \$1,107.**

#### **Heritage Boatyard Co-op Limited – Registered in Town of Mahone Bay**

The Heritage Boatyard Co-op is dedicated to all the past and present wooden boat activities along the South Shore. Traditional ship building methods are preserved and they promote the available local historic skills and advertise the area through trade shows and events.

Operational expenses include insurance, building maintenance, utilities, administrative expenses, events, travel costs to boat festivals. Revenue sources business donations, grants, events, and support from the Mystic Seaport Museum's annual Wooden Boat Festival.

**2024-2025 – Amount Requested \$5,000, recommending \$2,066.**

#### **Kinship Performing Arts Centre Association – Registered in Town of Bridgewater**

This Association was established in 2019 and became a registered charity in 2023. The KPAC has committed to bring more performing art opportunities to Nova Scotia's South Shore. Opportunities such as educational classes, performances, guest instructors, and collaborations with other community and municipal groups.

KPAC's mission is to provide comprehensive performing arts education and enriching opportunities in a welcoming environment. Their values are Education, Collaboration, Communication, Celebration, and Evaluation. Their guiding principles are "We Teach. We Train. We Practice."

Operational expenses include salaries/wages, training, administrative expenses, supplies, advertising, insurance, professional fees, rent, utilities, repairs and maintenance, recital fees, equipment and after school program. Revenue sources include membership fees, sale of merchandise, ticket sales and cash on hand.

**2024-2025 – Amount Requested \$3,500, recommending \$994.**

#### **LaHave Islands Marine Museum Society – Registered in District of Lunenburg**

The Society was established in 1978 to preserve, display, and be the depository of the history of the LaHave Islands and the area's inshore fisheries. They own the Museum building, the Community Hall on Bells Island and have responsibility for St. John the Evangelist Anglican Church. Two of these buildings hold heritage status.

Operational expenses include summer student wages and benefits, administration, facility maintenance, marketing, and programming. Their revenue sources include fundraising, donations, gift shop sales, rentals, federal and provincial grants, and membership dues.

**2024-2025: Amount Requested \$750 recommended amount \$750.**

#### **LaHave River Salmon Association – Registered in District of Lunenburg \*NEW**

The Association is dedicated to the conservation of Atlantic Salmon and other native species on the beautiful LaHave River in Nova Scotia. Since its conception in 1963, the LHRA has been a steward of the river, helping maintain and enhance the native fish population and increase angling opportunities.

Operating expenses include summer staff wages, mileage for volunteers, Sports and RV shows, YSI water quality sampler, protective equipment and gear, website, insurance, consultant for watershed plan, banking fees, and rent. Revenue sources include fundraising, cash on hand and grants from various funding partners.

**2024-2025: Amount Requested \$5,000, recommended amount \$2,305.**

#### **Lunenburg & District Swimming Pool Society- Registered in Town of Lunenburg**

The Society maintains a summer swimming pool facility for use of all ages and provides water safety and aquatic leadership instruction, swim team, public swims, and other recreational activities for the residents of the Town of Lunenburg, District of Lunenburg and surrounding communities, as well as provide opportunities for employment and volunteering for the youth of the community.

Their operational expenses include staffing, advertising and promotion, administrative expenses, merchandise, membership, insurance, professional fees, utilities and repairs and maintenance. Revenue sources include pool memberships and registration fees, grants, fundraising and donations.

**2024-2025: Amount requested \$5,000, recommending \$1,880.**

#### **Lunenburg County Hikers Club- Registered in Lunenburg County**

The Club promotes active lifestyles through guided hikes in and around Lunenburg County. They generally host four or more hikes per month, year-round. Their Facebook page also serves as a meeting place to find out about hiking, local trails, and other people to hike with outside of the club's guided events. Their Facebook account has 3400 members. They have grown from 4 leaders to 12 and are expanding further. All leaders are nationally certified by the Outdoor Council of Canada and one of their leaders is also an Outdoor Council of Canada instructor.

Their operational expenses include Recreation NS membership, insurance, first aid supplies, volunteer training and administrative expenses. Revenue sources include donations and grants.

**2024-2025: Amount requested \$500, recommending \$500.**

#### **Lunenburg County Historical Society – Registered in District of Lunenburg**

The Lunenburg County Historical Society maintains and operates the Fort Point Museum in LaHave. They conduct research, gather, compile, and preserve historic documents and artifacts, and provide historic education programs, events, and celebrations.

Their operational expenses include staff salaries and benefits, facility maintenance, utilities, insurance, and administration. Their revenue sources are donations, fundraising, government funding including grants, membership fees and gift shop sales.

**2024-2025: Amount Requested \$5,000 recommended amount \$2,161.**

**Lunenburg County North River Recreation Committee Society- Registered in District of Lunenburg**

Community hall that provides a venue for activities such as bingo, music jams, funerals, teas, kids parties, ice skating, basketball, dance practice and elections. It is the focal point of the community.

Their operational expenses include canteen, administrative expenses, cleaning, supplies, advertising, insurance, power bill, repairs and maintenance, phone, and alarm. Revenue sources include donations, grants, canteen, 50/50 events, rental, and bingo.

**2024-2025: Amount requested \$5,000 recommending \$2,066.**

**Lunenburg Doc Fest- Registered in Town of Lunenburg**

The Doc Fest showcases a diverse lineup of remarkable regional and international documentaries annually in the heart of Lunenburg. Their mission is to entertain, educate, and inspire by showcasing the documentary art form and creating a cultural connection between the audiences and artists. The Doc Fest hosts a robust screen industry conference which offers a variety of different programming formats to help filmmakers achieve their goals. Presenting a balance of professional development, peer to peer engagement and networking opportunities, the Doc Fest Market is ideal for filmmakers seeking quality time and connections with potential partners.

Their operational expenses include staffing, advertising and promotion, travel and meals, equipment rental, insurance, professional fees, legal and accounting fees, office expenses. Revenue sources include grants, sponsors, festival passes, film passes, ticket sales, concessions.

**2024-2025: Amount requested \$5,000, recommending \$1,860.**

**Lunenburg Foundation for the Arts- Registered in District of Lunenburg**

The Foundation works for the benefits of the arts community in MODL. They act as an advocacy organization for the arts within the County and support other arts-based organizations through logistical and operational support. Through fundraising they support local artists and arts initiatives by providing grants and bursaries to artists who are creating work within Lunenburg County.

Operational costs include grants to artists and art organizations, Lunenburg County high school bursaries, website, events, and administrative expenses. Revenue sources include donations, fundraising and grants.

**2024-2025: Amount Requested \$4,000, recommended amount \$1,756.**

**Lunenburg Regional Fire & Emergency Services Committee- Registered in Lunenburg County \*NEW**

This Association provides a forum for Lunenburg County firefighters to meet monthly to share ideas, work, listen to others with similar concerns, provide some social activities to interact with police and Emergency Health Services. They also manage a bursary fund for post secondary education for fire services related individuals and provide funding for food for various training courses.

Their biggest operational expense is training. Revenue sources include membership dues, gold event and \$12,000 from MODL. Proposed expenses for 2024 are \$16,900, of which \$15,000 is for training.

**2024-2025: Amount requested \$5,000 recommending \$0.00 (recommending 0.00 as already receive funding for training from MODL)**

**Mahone Bay Founders Society – Registered in Town of Mahone Bay**

The Mahone Bay Museum is a small community museum run by the Mahone Bay Founders Society. They protect and provide on-site and on-line access to the history of the Mahone Bay area. The Museum values diversity of the community, protecting histories in the archives and making them accessible.

Operational costs include salaries, office supplies, advertising, exhibits and collections, programming, utilities, insurance, utilities, and heating oil. Revenue sources include grants, corporate donations and general donations, campaigns, events, and retail sales.

**2024-2025: Amount Requested \$3,000, recommended amount \$1,226.**

**Mahone Bay Signature Festivals – Registered in Town of Mahone Bay \*NEW**

The Signature Festivals promote Mahone Bay as a desirable location to live, work, shop, and visit. The Scarecrow and the Father Christmas Festivals continue to expand and draw visitors from all over the world.

Operational costs include printing, website, event supplies, insurance, rent, equipment. Revenue sources include grants, donations, merchandise, and cash on hand.

**2024-2025: Amount Requested \$5,000, recommended amount \$2,066.**

**Mahone Bay United Soccer Association – Registered in Town of Mahone Bay \*NEW**

The Association is an all-inclusive, not-for-profit soccer club, run by a diverse group of volunteers committed to offering free-of-charge and accessible participation to anyone under 18 who wants to play. Their mission is to have as many people as possible enjoying the benefits of the game. They are building a solid foundation for a long-lasting soccer club that is part of the fabric of the community of Mahone Bay and surrounding areas. In addition to youth programming, they offer weekly adult men’s and women’s games. In partnership with MODL, they have offered a walking soccer program.

Operational costs include administrative expenses, coach development, travel, advertising, professional fees, rental, electricity for the shed, repairs and maintenance to the field, equipment library and shed. Revenue sources include grants and donations.

**2024-2025: Amount Requested \$5,000, recommended amount \$2,161.**

**New Elm Union Church – Registered in District of Lunenburg \*NEW**

Provide a meeting space for church, cemetery and community offerings. They provide a space for frequent get togethers, a senior’s space and a venue for kids’ crafts and fund days.

Operational costs include supplies, insurance, utilities, repairs, and maintenance. Sources of revenue are fundraising, donations and grants.

**2024-2025: Amount requested \$2,154.70, recommended amount \$847.**

**New Germany Area Medical Centre Association– Registered in District of Lunenburg**

The Association is responsible for the upkeep and maintenance of the medical Centre which provides office space for doctors, nurse practitioners and family practice nurses as well as the receptionist. All building expenses are paid for by the Association.

Operational costs include power, phone, insurance, cleaning, grounds, repairs, and upgrades. Revenue sources include rent and donations.

**2024-2025 Amount Requested \$5,000; recommended amount \$1,884.**

**Nova Scotia Sea School – Registered in Town of Lunenburg**

The Sea School offers multi-day sailing and wilderness programs for youth aged 12-19 in Lunenburg, exploring the coastline between Chester and the LaHave Islands. Their mandate is to provide experiential and adventure opportunities that transform how participants see

themselves, the world around them and their capacity to contribute to society. The programs are skill-building and life-training courses and provide an essential leadership opportunity with the outcome of creating responsible citizens who contribute to society.

Their operational expenses include salaries and benefits, program costs, facility costs, and fleet costs. Their revenue sources include tuition fees, donations, and government grants.

**2024-2025: Amount Requested \$5,000, recommended amount \$1,884.**

**Parkdale Maplewood Community Centre Association – Registered in District of Lunenburg**

This Association operates a community hall. The Hall services the areas of Parkdale, Maplewood, Scarsdale, Farmington, Four Mileswoods area plus part of Newburne and outlying areas. This is the only building in the area that can accommodate large crowds of 125-175. The Hall is used by senior groups, church groups, 4-H, youth groups, the local museum, and for funerals and weddings. Many fundraisers take place such as the monthly breakfast.

Operational expenses include janitor fees, supplies, insurance, bank fees, utilities, oil, propane, maintenance of grounds and building. Revenue sources include fundraising, donations, membership fees and cash on hand.

**2024-2025: Amount requested \$2,000, recommending \$860.**

**Parkdale-Maplewood Community Museum - Registered in District of Lunenburg**

This is one of three museums in the Municipality that fulfill the requirements for the Provincial Community Museums Assistance Program. It is dependent on all three levels of government as well as local volunteers to carry out their mission of preserving community history.

Their operational expenses include salaries and benefits, program costs, facility costs, insurance, and administration. Their revenue sources include donations, operating grants, fundraising, and membership dues.

**2024-2025: Amount Requested \$3,000, recommended amount \$1,346.**

**Riverport Community Centre – Registered in District of Lunenburg**

The RCC consists of many community organizations/clubs/recreational activities. Their scope is wide. As a heritage building, they care for the past, present and future which poses challenges. Their newest challenge is to support the old school property in Rosebay, which is undergoing a

park initiative, developing a concept of community recreational space available for all ages and capabilities.

The Centre provides a safe and free community space for clubs, community events, recreational activities, celebrations, information sessions, celebrations of life. They partner with other community non-profit groups such as Food Vibes and the fire department.

Operating expenses include insurance, cleaners, repairs and maintenance, professional fees, Wi-Fi, toilet rentals and grass cutting. Revenue sources include rentals, fundraising, events, donations, and grants.

**2024-2025: Amount Requested \$5,000, recommended amount \$2,161.**

#### **Rossini Opera Festival (L.A.M.P.) – Registered in Town of Lunenburg**

Based in the Lunenburg Academy, LAMP is one of the most innovative and exciting post-graduate music schools in Canada. In addition to the Spring and Autumn concert series full of world class internationally renowned performers, LAMP offers an equally outstanding outreach program. Artists at LAMP go into Lunenburg County schools and care facilities performing live music to students and residents at no cost. They also offer several free concerts per year.

Their operational expenses include rent, salaries and benefits, performance fees, insurance, and administration costs. Their revenue sources include government grants, donations, tuition fees, sponsorships and ticket sales.

**2024-2025: Amount Requested \$5,000, recommended amount \$2,238.**

#### **Seaside A Cappella Show Chorus Association – Registered in District of Lunenburg**

The Chorus is an educational organization striving to teach women of all ages proper vocal and performance skills that enhances the quality of the chorus experience for members. Over 70% of the chorus are seniors over the age of sixty.

Their operational expenses include music purchase & licensing and rent. Their revenue comes from membership dues and fundraising.

**2024-2025: Amount Requested \$5,000, recommended amount \$1,337.**

#### **SHAIID Tree Shelter Society – Registered in District of Lunenburg**

The Shelter endeavors to relieve the suffering of animals by providing temporary care and shelter to helpless, abandoned, homeless or unwanted animals in distress. They place as many pets as possible in responsible and caring homes. They are proudly a no-kill shelter and have been serving the community since 1986. They strive to educate the public in responsible pet ownership and promote the spaying and neutering of pets.

Operational expenses include professional fees, advertising/marketing, animal expenses, insurance, office expenses, taxes, repairs and maintenance, salaries, phone, utilities, travel, medical and security. Revenue sources are from adoptions, bequests, donations, fundraising, grants, and memorials.

**2024-2025: Amount Requested \$5,000, recommended amount \$1,911.**

#### **South Shore Ice Storm – based out of the Lunenburg County Lifestyle Centre**

The South Shore Ice Storm is the sledge hockey program based out of the Lunenburg County Lifestyle Centre. In sledge hockey, everybody can play. It is open to male and females, able-bodied and disabled players of all ages. This Association began in 2017 and now operates a team with 37 members. The Ice Storm envisions a future with the full and active participation of persons with disabilities in sport at all levels and in all forms, to the extent of their abilities and interests.

Operational expenses include ice rental, equipment, referees, tournament fees, advertising. Revenue sources are predominantly through membership fees, tournament fees and grants.

**2024-2025: Amount Requested \$3,000, recommended amount \$1,364.**

#### **South Shore Lightning Basketball Association – Registered in District of Lunenburg**

This Association is dedicated to providing quality basketball programs and experiences for youth in the South Shore area. They are committed to promoting the values of sportsmanship and teamwork, while also fostering a love for the game.

Operational expenses include equipment, coaches training, advertising, supplies, website, insurance, phone, referees, uniforms, gym rental, association fees and team gear. The revenue sources are from club fees, sponsorship, donations, and fundraising.

**2024-2025 Amount Requested \$5,000, recommended amount \$2,325.**

**South Shore Minor Hockey – Registered in Lunenburg County \*NEW**

South Shore Minor Hockey Association oversees coaching and operations of 265 registered hockey players from U7 to U18 levels. They have a diverse Board that is focused on diversity and inclusion with the hockey players and promote healthy and active lifestyle.

Operational expenses include referee costs, training, insurance, administrative expenses, and ice rental. Revenue sources are from registration fees and fundraising (Gary Wentzell Tournament).

**2024-2025: Amount Requested \$5,000, recommended amount \$1,868.**

**South Shore Multicultural Association – Registered in South Shore \*NEW**

The Association has been active in Lunenburg/Queens since 2013. They welcome newcomers to the area and work to provide a warm social environment in which recent immigrants and people of diverse cultural backgrounds can find important social, cultural, and recreational opportunities. They host festivals, celebrations, and programming throughout the year. The SSMA is often the first point of contact for those seeking immigration and settlement information. They are the umbrella group for many cultural communities, which is especially important in rural areas.

Operational expenses include salaries, training, travel, administrative expenses, advertising, insurance, rentals for venues for events, phone, internet. Revenue sources are from event sponsors, donations, and grants.

**2024-2025: Amount Requested \$5,000, recommended amount \$2,169.**

**South Shore Sexual Health – Registered in Town of Bridgewater**

The Society offers support, services, and supplies to promote sexual and reproductive health throughout Lunenburg and Queens Counties. They provide for free safer sex supplies, pregnancy testing, HIV self-testing, menstrual supplies, gender-affirming gear for the trans community, guidance and support, contraception, emergency contraception, health care navigation and workshops for both youth and the community at large.

Operational expenses include payroll, training, travel, administrative expenses, advertising, rent, insurance, supplies, phone, internet, and professional fees. The revenue sources are from Sexual Health Nova Scotia, grants, selling merchandise, fundraising and donations. They will also be seeking funding from the Towns of Bridgewater, Mahone Bay and Lunenburg, and the Municipality of Chester.

**2024-2025 Amount Requested \$3,870, recommended amount \$1,399.**

**South Shore Theatrical Players – Registered in Town of Bridgewater**

South Shore Players provide entertainment, advance cultural development and foster talent through their live productions and workshops, also aiding in the promotion of local playwrights as well as teaching skills involved in the behind-the-scenes aspects of live theatre. They offer youth camps during the summer and strive to inspire a love of theatre among the young and old alike.

Operational expenses include rent, professional fees, supplies, advertising, and insurance. Revenue sources are from membership fees, ticket sales, sponsorship, donations, grants, and workshops.

**2024-2025: Amount Requested \$5,000, recommended amount \$2,161.**

**Tancook Island Recreational Centre Association – Registered in District of Lunenburg**

The Tancook Island Recreational Centre is an integral part of the community, holding almost all the Island's extracurricular activities and events. Currently the Centre is used as the weekly gymnasium for the elementary school, a tourism centre during the summer months, a venue for the Island's events and gatherings and home to the local emergency response association.

Their operational expenses include administration, cleaning, heat, insurance, power, renovations, maintenance, canteen, summer student salary. Their revenue sources include fundraising, donations, memberships, canteen and merchandise sales, grants, and cash on hand.

**2024-2025: Amount Requested \$5,000, recommended amount \$2,453.**

**The 644 Revitalization Network – Registered in District of Lunenburg \*NEW**

The Network is a new group who want to see services and support for residents of the community. Their mission is "Working together to enrich the vitality and diversity of New Germany and surrounding areas." Their goals are food security, local infrastructure, senior social inclusion, supporting vulnerable and underserved community members, and nurturing rural arts.

Their operational expenses include facility rental, insurance, website, marketing, farmers market. Their revenue sources include primarily grants, fundraising, donations.

**2024-2025: Amount Requested \$5,000, recommended amount \$2,325.**

**The Society of St. Vincent de Paul – Registered in Town of Bridgewater**

Through the Society’s Helping Neighbours-in-Need program, they aid individuals and families who need immediate help to meet their basic needs, such as power, rent, fuel, oil, firewood, medical supplies, eyeglasses, dental care, school supplies and a vast variety of other necessities.

Their operational expenses include food assistance, medical assistance, helping to pay power bills and fuel, rent assistance, gas cards, bus fares, house related expenses, assistance with phone and internet bills. Their revenue sources include donations, fundraising and funds from other registered charities.

**2024-2025: Amount Requested \$2,500, recommended amount \$1,318.**

**Upper Cornwall Community Hall – Registered in District of Lunenburg**

The hall organizes and hosts events throughout the year for the public. The hall is available for rent. Volunteers raise funds to ensure hall is maintained for community use.

Their operational expenses include power, auditor, oil, supplies, phone, insurance, repairs and maintenance. Their revenue sources include donations, fundraising and rentals.

**2024-2025: Amount Requested \$2,500, recommended amount \$958.**

**Upper Northfield Community Cemeteries – Registered in District of Lunenburg \*NEW**

The Upper Northfield Community Cemeteries exist to provide burial plots for community members and associated members. The organization is the community as a whole.

Their operational expenses include mowing, grass seed and general maintenance. Their revenue sources include plot sales and donations.

**2024-2025: Amount Requested \$1,800, recommended amount \$688.**

**Upper Northfield Community Hall – Registered in District of Lunenburg**

The Hall provides space for community gatherings and for events.

Their operational expenses include supplies, insurance, utilities, and propane. Their revenue sources are cash on hand and grants.

**2024-2025: Amount Requested \$5,000, recommended amount \$2,161.**

**West Dublin Hall Company – Registered in District of Lunenburg**

The Hall has been providing a community space since 1922 for meetings, gatherings, events, and social functions. Their objective is to provide a functional and accessible space with low barrier of entry to allow for maximum community involvement and inclusion. The hall is a cherished and important pillar in the community and surrounding areas as it has been providing a focal point for cultural events and community engagement for all residents for over 100 years.

Their operational expenses include advertising, insurance utilities, internet, cleaners and repairs and maintenance. Revenue sources include fundraising, donations and hall rentals.

**2024-2025: Amount Requested \$2,500, recommended amount \$1,033.**

**West Northfield Community Centre – Registered in District of Lunenburg**

The Centre has been operating since 1970 to host many community events such as meetings, dinners, fundraisers, luncheons, weddings, funerals, birthday parties, and anniversary celebrations.

Operational expenses include supplies, insurance, utilities, and property maintenance. Sources of revenue include hall rentals, cash on hand and fundraising.

**2024-2025: Amount requested \$5,000, recommending \$2,453.**

**West Northfield Twirlettes Association – Registered in District of Lunenburg**

The group has been operating since 1970 and became registered as a not-for-profit within the last two years. The Association provides majorette classes and performance opportunities to youth ages 3-18. Their goal is to provide youth, especially girls, with a positive experience of being active, while keeping registration fees and associated costs low.

Operational expenses include instructor fees, equipment, uniforms, insurance, administration fees. Sources of revenue include registration fees, fund raisers, grants, and donations.

**2024-2025: Amount requested \$3,000, recommending \$1,239.**

**YMCA King Street Youth Centre – Registered in Town of Bridgewater**

The YMCA King Street Youth Centre provides a space to implement unique programming for the youth of our communities. It assists youth in developing positive friendships and growing up healthy. The youth centre provides a place where youth can gather and be themselves. Requested funding will be used to help support the programming currently offered, enhance programming, and support the operations of the Youth Centre.

Their operational expenses include salaries and benefits, program supplies, lease and utilities, insurance, administration, and education. Their revenue sources include primarily youth grants, membership, fundraising, and YMCA funding.

**2024-2025: Amount Requested \$5,000, recommended amount \$1,860.**

**Major Recreation Capital Grants**

**Organization/Project Overview**

**Bridgewater Baseball Association – Registered in Town of Bridgewater**

The Association provides a fun and inclusive baseball experience for youth aged 5-18. Their mission is to foster a love for the sport while promoting teamwork, sportsmanship, and skill development. Through expert coaching, well-maintained facilities, and a supportive community, they aim to instill valuable life lessons and create lasting memories for the young players. The Town of Bridgewater owns the field.

Project: Renovate the canteen facility to offer a wider range of refreshments and snacks for spectators and players. The storage facility requires upgrading to accommodate the growing inventory of equipment. An updated batting cage will also be constructed, and the pitching warm up areas will be upgraded.

Anticipated Project Costs: **\$34,757**

Anticipated Funding Sources: MODL, Town of Bridgewater (\$3,000) the Association and community sponsors.

**2024-2025 Amount Requested \$15,000, recommended amount \$3,000.**

**Broad Cove Community Centre – Registered in District of Lunenburg**

The community hall's mandate is to provide facilities for the residents and various organizations of the community of Broad Cove, and for other persons or organizations who may wish to rent the facilities. Their mandate is also to protect and preserve Broad Cove beach and adjacent lands in their natural state for the enjoyment of residents of Broad Cove and any such persons that share this objective.

Project: Replace shingles on the North and West exterior walls. Install rain gutters and spouts.

Anticipated Project Costs: **\$22,627.23**

Anticipated Funding Sources: MODL, Community Facilities Improvement Grant, fundraising, donations and cash on hand.

**2024-2025: Amount Requested \$11,000, recommended amount \$5,257.**

**Fire Protection Commissioners for the District of Dayspring – Registered in District of Lunenburg**

They are a fire department with 40+ members. They provide fire protection service, land and marine rescue service and first response medical assistance to the residents of District 3 of the Municipality. The hall is also used as a comfort centre with barrier free access and wheelchair accessible washrooms. The hall is also used by other community groups, and they host a community breakfast 6 times a year.

Project: Installing a new metal roof over 25-year-old asphalt shingles. Planning the installation of solar panels in the future.

Anticipated Project Costs: **\$51,962.05**

Anticipated Funding Sources: MODL, own building repair budget and a Community Facilities Improvement Program grant.

**2024-2025: Amount Requested \$15,000, recommended amount \$7,450.**

**Hillcrest Masonic Lodge – Registered in District of Lunenburg**

The Lodge shares space with two other organizations – the Rosedale Seniors Citizens Club and the New Germany and Area Lions Club. The space is well used by the community.

Project: Replace the south side of the roof using steel or metal roofing. Insulate and install vinyl siding as well.

Anticipated Project Costs: **\$17,588.72**

Anticipated Funding Sources: MODL, contributions from all three groups that use the hall, and fundraising.

**2024-2025: Amount Requested \$8,791.86, recommended amount \$3,998.**

**Lunenburg County Ground Search and Rescue - Regional**

The main purpose of this group is to search and locate lost or missing persons. They also volunteer to train and support Project Lifesaver – a bracelet program to locate vulnerable persons in the County. They also teach a program for children and adults called Adventure Smart Hug A Tree – a program about how to not get lost and what to do if you do get lost.

The group does act as a comfort centre. They also teach education programs at the building.

Project: Upgrade the electrical and lighting system.

Anticipated Project Costs: **\$13,225**

Anticipated Funding Sources: MODL. They also have cash on hand.

**2024-2025: Amount Requested \$12,225, (grant capped at 50% of project cost to so eligible for up to \$6,612.50) recommended amount \$0.00. This organization does receive annual funds from MODL that can be used to aid in operational and/or capital expenses. The facility they are proposing for the electrical and lighting system does not appear to be available for community use, other than through the education courses they directly provide.**

**Lunenburg County Historical Society – Registered in District of Lunenburg**

The Lunenburg County Historical Society maintains and operates the Fort Point Museum in LaHave. They conduct research, gather, compile, and preserve historic documents and artifacts, and provide historic education programs, events, and celebrations.

Project: To replace all picnic tables with plastic recycled tables, replace lumber for benches, heat pumps for community room, bike rack and an event tent.

Anticipated Project Costs: **\$24,932.75**

Anticipated Funding Sources: MODL, Provincial Funding, fundraising, donations and the Society itself.

**2024-2025: Amount Requested \$12,500, recommended amount \$6,732.**

**Lunenburg Tennis Club – Registered in Town of Lunenburg**

They are a membership-based club maintaining a club house and 3 tennis courts for use by the public and its members. They currently have 154 adult members and 142 youth members, including 32 family memberships. Their mission is to help young players develop skills and confidence through tennis and to encourage players of all ages to stay active through participation in this healthy sport.

Project: Resurface the three courts.

Anticipated Project Costs: **\$170,140.**

Anticipated Funding Sources: MODL, Town of Lunenburg (\$10,000), Provincial funding, donations (to date have \$14,532); reserve fund \$91,608.

**2024-2025: Amount Requested \$15,000, recommended amount \$6,643.**

### **Lunenburg Yacht Club – Registered in District of Lunenburg**

The Club was founded in 1947 for the purpose of facilitating recreational sailing for citizens of Lunenburg and surrounding areas. It was registered as a not-for-profit in 1981. The Club offers education in the sports of sailing and coastal rowing to youths and adults through various on the water programs, for members and non-members, in a welcoming and inclusive family-friendly environment. They also offer the SailAble program, which facilitates the adaptive sailing experience for adults with physical and cognitive challenges. This year the Club is hosting the Mobility Cup which is an international regatta which will see over 40 adaptive sailors and their support teams from Canada and around the world meeting in Lunenburg to compete on the beautiful waters of Mahone Bay.

Project: To rebuild the Clubhouse deck to make it accessible in preparation of the Mobility Cup and as a legacy. Part of the deck rebuild project is replacement of the main entrance to the Club with a double-wide commercial entrance system with automatic doors. Minor modifications will also be needed on the Clubhouse interior to finish the area just inside the new doors.

Anticipated Project Costs: **\$65,109**

Anticipated Funding Sources: MODL, Provincial funding, and the Club itself.

**2024-2025: Amount Requested \$15,000, recommended amount \$6,823.**

### **Michelin Social and Athletic Club – Registered in Town of Bridgewater**

This is non-profit club that houses a fitness centre, large gymnasium that is used by various community groups and a social area. The club services Michelin employees, their families, and the community to promote healthy living in a welcoming environment.

Project: Replace aging fitness equipment with updated equipment.

Anticipated Project Costs: **\$46,425.**

Anticipated Funding Sources: MODL, Town of Bridgewater, the Club itself.

**2024-2025: Amount Requested \$15,000, recommended amount \$5,834.**

### **Riverport Community Centre – Registered in District of Lunenburg**

The RCC consists of many community organizations/clubs/recreational activities. Their scope is wide. As a heritage building, they care for the past, present and future which poses challenges. Their newest challenge is to support the old school property in Rosebay, which is undergoing a park initiative, developing a concept of community recreational space available for all ages and capabilities.

The Centre provides a safe and free community space for clubs, community events, recreational activities, celebrations, information sessions, celebrations of life. They partner with other community non-profit groups such as Food Vibes and the fire department.

Project: Start implementation of the park project at the former Riverport School.

Anticipated Project Costs: **\$33,817**

Anticipated Funding Sources: MODL, Provincial funding, fundraising, donations and the Centre itself.

**2024-2025: Amount Requested \$10,000, recommended amount \$5,686. (Did receive funding last year but request is for a different facility under their umbrella)**

### **South Shore Fieldhouse Society – Registered in Town of Bridgewater**

The Society's mandate is to provide an affordable, accessible, and inclusive recreational, health and wellness facility for community members in the South Shore.

Project: Install a solar wall

Anticipated Project Costs: **\$261,000**

Anticipated Funding Sources: MODL, Town of Bridgewater, Provincial grant, Efficiency NS funding and the Society itself.

**2024-2025: Amount Requested \$10,000, recommended amount \$4,608.**

### **South Shore Theatrical Players – Registered in Town of Bridgewater**

South Shore Players provide entertainment, advance cultural development and foster talent through their live productions and workshops, also aiding in the promotion of local playwrights as well as teaching skills involved in the behind-the-scenes aspects of live theatre. They offer youth camps during the summer and strive to inspire a love of theatre among the young and old alike.

Project: Need to outfit new space (former arena in Bridgewater) to accommodate theatrical requirements. This includes seating, lighting, sound, painting, storage and dressing rooms, and a small kitchen.

Anticipated Project Costs: **\$257,500**

Anticipated Funding Sources: MODL, Town of Bridgewater, fundraising, donations and the Society itself.

**2024-2025: Amount Requested \$30,000 (maximum request can be \$15,000), recommended amount \$6,553.**

**Tri-District Fire Rescue – Registered in District of Lunenburg**

In 2013, three fire departments amalgamated together to form Tri District Fire Rescue. In April 2022 the Wileville Fire Department merged with Tri District. Together they bring over 200 years of emergency services experience to its residents. They are a fully volunteer department. They do offer a community centre for residents where members of the public can participate in events such as suppers and breakfasts. The facility is also used for weddings, birthday parties, funeral receptions and public meetings.

Project: Install heat pumps in the community centre and truck bays, along with electrical upgrades required.

Anticipated Project Costs: **\$47,918.55**

Anticipated Funding Sources: MODL, Community Facilities Improvement grant, Efficiency NS and Tri- District Fire Rescue.

**2024-2025: Amount Requested \$10,000, recommended amount \$5,267.**

**West Northfield Community Centre – Registered in District of Lunenburg**

The Centre has been operating since 1970 to host many community events such as meetings, dinners, fundraisers, luncheons, weddings, funerals, birthday parties, and anniversary celebrations.

Project: Replace kitchen countertop, add commercial dishwasher, replace floor in storage room, repair accessible ramp and a generator.

Anticipated Project Costs: **\$37,629.13**

Anticipated Funding Sources: MODL, Provincial funding (confirmed), fundraising and the Centre itself.

**2024-2025: Amount Requested \$14,000, recommended amount \$0.00 (this facility received funding last year – policy says 24 months must pass).**

**Late Applications – Annual Operating Grant**

- **Bridgewater Barracudas Swim Club – Registered in Town of Bridgewater**
  - Requested \$5,000
- **Lunenburg Art Gallery Society – Registered in Town of Lunenburg**
  - Requested \$2,000
- **The Flourish 55+ Healthy Active Society – Registered in Town of Bridgewater**
  - Requested \$5,000

**Late Application – Major Recreation Capital Grant**

- **Royal Canadian Legion Br 24 – Registered in Town of Bridgewater**
  - Requested \$15,000 for a multi-phase elevator repair project (Ph. 1 – acquiring necessary parts)

If Council approves the recommendations in the staff report, there will be no funds remaining in the Annual Operating and Major Recreation Grant funds to provide these groups with funding.

Date	Type	Organization	Amount	Recommend
2/29/2024	AO	Achievers 4-H Club	\$5,000.00	\$2,194.00
1/29/2024	AO	Barss Corner Community Hall Association	\$4,645.90	\$2,039.00
2/29/2024	AO	Bridgewater Sports and Cultural Association	\$5,000.00	\$2,194.00
2/29/2024	AO	Broad Cove Community Association	\$4,300.00	\$1,887.00
1/29/2024	AO	Canadian Dory Racing Association	\$5,000.00	\$1,299.00
2/13/2024	AO	Chester Brass Band Society	\$2,000.00	\$765.00
2/29/2024	AO	Coastal Action Foundation	\$5,000.00	\$1,893.00
3/1/2024	AO	Elderfit Lunenburg Society	\$1,500.00	\$575.00
2/28/2024	AO	Friends of the DesBrisay	\$5,000.00	\$2,118.00
2/29/2024	AO	Hemford Music Association	\$5,000.00	\$1,107.00
2/29/2024	AO	Heritage Boatyard Co-op Limited	\$5,000.00	\$2,066.00
2/20/2024	AO	Kinship Performing Arts Centre Association	\$3,500.00	\$994.00
1/22/2024	AO	LaHave Island Marine Museum Society	\$750.00	\$750.00
2/29/2024	AO	LaHave River Salmon Association	\$5,000.00	\$2,305.00
3/1/2024	AO	Lunenburg & District Swimming Pool Society	\$5,000.00	\$1,880.00
2/22/2024	AO	Lunenburg County Hikers Club	\$500.00	\$500.00
2/27/2024	AO	Lunenburg County Historical Society	\$5,000.00	\$2,161.00
2/21/2024	AO	Lunenburg County North River Recreation Comm Soc	\$5,000.00	\$2,066.00
3/1/2024	AO	Lunenburg Doc Fest	\$5,000.00	\$1,860.00
2/22/2024	AO	Lunenburg Foundation for the Arts	\$4,000.00	\$1,756.00
3/1/2024	AO	Lunenburg Regional Fire & Emergency Services Comm	\$5,000.00	\$0.00
2/29/2024	AO	Mahone Bay Founders Society	\$3,000.00	\$1,226.00
2/29/2024	AO	Mahone Bay Signature Festivals Society	\$5,000.00	\$2,066.00
1/3/2024	AO	Mahone Bay United Soccer Association	\$5,000.00	\$2,161.00
2/12/2024	AO	New Elm Union Church	\$2,154.70	\$847.00
2/20/2024	AO	New Germany Area Medical Centre	\$5,000.00	\$1,884.00
2/29/2024	AO	Nova Scotia Sea School	\$5,000.00	\$1,844.00
2/13/2024	AO	Parkdale Maplewood Community Centre Association	\$2,000.00	\$860.00
2/21/2024	AO	Parkdale Maplewood Community Museum	\$3,000.00	\$1,346.00
2/29/2024	AO	Riverport & District Community Centre	\$5,000.00	\$2,161.00
2/29/2024	AO	Rossini Opera Festival Nova Scotia (LAMP)	\$5,000.00	\$2,238.00
2/28/2024	AO	Seaside A Cappella Show Chorus Association	\$5,000.00	\$1,337.00
3/1/2024	AO	SHAID Tree Shelter Society	\$5,000.00	\$1,911.00
2/20/2024	AO	South Shore ICE Storm	\$3,000.00	\$1,364.00
2/29/2024	AO	South Shore Lighting Basketball Association	\$5,000.00	\$2,325.00
2/29/2024	AO	South Shore Minor Hockey Association	\$5,000.00	\$1,868.00
2/29/2024	AO	South Shore Multicultural Association	\$5,000.00	\$2,169.00
2/27/2024	AO	South Shore Sexual Health Society	\$3,870.00	\$1,399.00
2/12/2024	AO	South Shore Theatrical Players	\$5,000.00	\$2,161.00
2/29/2024	AO	Tancook Island Recreational Centre Association	\$5,000.00	\$2,453.00
3/1/2024	AO	The 644 Revitalization Network	\$5,000.00	\$2,325.00
2/20/2024	AO	The Society of Saint Vincent de Paul	\$2,500.00	\$1,318.00
3/1/2024	AO	Upper Cornwall Community Hall	\$2,500.00	\$958.00
2/12/2024	AO	Upper Northfield Community Cemeteries	\$1,800.00	\$688.00

2/28/2024	AO	Upper Northfield Community Hall	\$5,000.00	\$2,161.00
2/29/2024	AO	West Dublin Hall	\$2,500.00	\$1,033.00
3/1/2024	AO	West Northfield Community Centre	\$5,000.00	\$2,453.00
2/28/2024	AO	West Northfield Twirlettes Association	\$3,000.00	\$1,239.00
2/27/2024	AO	YMCA Lunenburg County	\$5,000.00	\$1,860.00
		<b>TOTAL ANNUAL OPERATING</b>	<b>\$200,520.60</b>	<b>\$80,064.00</b>
Date	Grant Ty	Organization	Amount	
2/29/2024	MRC	Bridgewater Baseball Association	\$15,000.00	\$3,000.00
2/26/2024	MRC	Broad Cove Community Association	\$11,000.00	\$5,267.00
2/29/2024	MRC	Fire Protection CommS for the District of Dayspring	\$15,000.00	\$7,450.00
2/22/2024	MRC	Hillcrest Masonic Lodge #93	\$8,791.86	\$3,998.00
2/28/2024	MRC	Lunenburg County Ground Search and Rescue	\$12,225.00	\$0.00
2/29/2024	MRC	Lunenburg County Historical Society	\$12,500.00	\$6,732.00
1/17/2024	MRC	Lunenburg Tennis Club	\$15,000.00	\$6,643.00
2/29/2024	MRC	Lunenburg Yacht Club	\$15,000.00	\$6,823.00
2/29/2024	MRC	Michelin Social & Athletic Club	\$15,000.00	\$5,834.00
2/12/2024	MRC	New Elm Union Church		
2/29/2024	MRC	Riverport & District Community Centre/PARK Ass	\$10,000.00	\$5,686.00
2/29/2024	MRC	South Shore Fieldhouse Society	\$10,000.00	\$4,608.00
2/12/2024	MRC	South Shore Theatrical Players	\$30,000.00	\$6,553.00
2/29/2024	MRC	Tri District Fire Rescue	\$10,000.00	\$5,267.00
2/8/2024	MRC	Walden Volunteer Fire Department		
3/1/2024	MRC	West Northfield Community Centre	\$14,000.00	\$0.00
		<b>TOTAL MAJOR REC CAPITAL</b>	<b>\$193,516.86</b>	<b>\$67,861.00</b>
LATE APPLICATIONS				
3/18/2024	AO	Bridgewater Barracudas Swim Club	\$5,000.00	\$0.00
3/14/2024	AO	Lunenburg Art Gallery Society	\$2,000.00	\$0.00
5/1/2024	AO	The Flourish 55+ Healthy Active Society	\$5,000.00	\$0.00
3/5/2024	MRC	Royal Canadian Legion Br 24, Bridgewater	\$15,000.00	\$0.00
		<b>TOTAL LATE APPLICATIONS</b>	<b>\$27,000.00</b>	<b>\$0.00</b>

**Council**  
Item: #10.1.2  
Date: May 28, 2024  
Authorization: T. MacEwan



## **Municipality of the District of Lunenburg**

### **Request for Decision**

**Report to:** Policy and Strategy Committee  
**Submitted by:** Trudy Payne, Director of Recreation, Parks, & Tourism  
**Date:** May 21, 2024  
**Re:** Sawpit Wharf Lease Renewal

---

#### **Recommendation**

**That Council for the Municipality of the District of Lunenburg approve sending a letter to Department of Natural Resources and Renewables, Land Services Branch, notifying them of the Municipality's intent to renew Lease # 4814 for an additional 15 years which pertains to lands owned by the Province of Nova Scotia that currently forms part of the Sawpit Wharf Park.**

#### **Background**

On October 9, 2009, the Municipality of the District of Lunenburg entered into a 15-year lease agreement with Her Majesty the Queen in right of the Province of Nova Scotia, represented in this behalf by the Minister of Natural Resources for the Province of Nova Scotia, to develop and operate a park at the site currently referred to as the Sawpit Wharf Park. The lease agreement, along with a map, is attached. The agreed upon annual rent was set at \$336.60 due on the anniversary date of the lease.

In the lease it states "this lease will be renewed and continue in force for a further fifteen (15) year term at an annual rent and administration fee to be fixed by the Lessor provided that the Lessee has complied with the terms and conditions of the Lease to the satisfaction of the Lessor and further provided that the Lessee, on or before three (3) months prior to the termination of this Lease, notifies the Lessor in writing of its intention to renew the Lease."

## **Executive summary**

The lease agreement with the Province of Nova Scotia that currently forms a portion of the Sawpit Wharf Park will end on August 31, 2024, unless the Municipality of the District of Lunenburg notifies the Department of Natural Resources and Renewables on or before three months prior to the termination of the lease, of their intention to renew the lease for another 15 years.

The Municipality has recently undertaken a community consultation process to gather input and feedback from the community on a vision for the park. The consultant, based on this feedback, will begin developing a concept plan for the Sawpit Wharf Advisory Committee and Council's consideration. This concept plan will involve the lands owned by the Province of Nova Scotia. One of the stakeholders engaged during the public consultation process was the Department of Natural Resources and Renewables. They are aware of the public usage of this park and the project underway to create a vision for the park that could lead to upgrades and improvements.

## **Discussion**

The discussion before Council is whether to send a letter to the Department of Natural Resources notifying them of the Municipality's intent to renew the lease for another 15 years.

## **Budget implications**

The budget implications would be the annual rental agreed upon for the next 15 years, which if it follows the current lease, would be due on the anniversary date of the lease.

## **Strategic plan**

Sawpit Wharf Park is a current park managed by the Municipality and forms part of the park system. It is identified in the Parks Standards document and the Municipality has invested funds this current fiscal year to have a community plan of the park completed. It would fall within the Municipality's Re-Create Parks strategic priority.

## **Work Plan**

Re-Create Parks is a strategic priority of Council.

## **Alternatives**

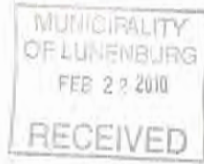
1. Not notify the Department of Natural Resources of the Municipality's intent to renew the lease for an additional 15 years, which would mean there would be no formal agreement in place to use the province's land as part of the Sawpit Wharf Park.

## Conclusion

The lands owned by the Province of Nova Scotia currently form part of the Sawpit Wharf Park and without the renewal of a 15-year lease would dramatically impact the parking provided and the future vision for the park.

Report Preparation	
Department	Recreation, Parks, & Tourism
Report Prepared by	Trudy Payne, Director of Recreation, Parks & Tourism
Report Approved by	
Date Reviewed by C.A.O.	

Copy



February 16, 2010

Municipality of the District of Lunenburg  
c/o Ms. Tammy Wilson  
210 Aberdeen Road  
Bridgewater NS B4V 4G8

Dear Ms. Wilson:

**Re: Lease 4814 - MUNICIPALITY OF THE DISTRICT OF LUNENBURG  
Garden Lots (Back Harbour) Lunenburg County**

Attached please find a copy of the above document for your records. Please note this lease has not been recorded into the Land Registration System. If you wish to have the document recorded, please let us know and we will forward the original document to you.

If you have any questions, please call Denise Saultier at 424-3148.

Yours truly,

Anne Alexander  
Secretary to Manager  
Acquisitions and Leases

aa

Attachment

- c Sandra Johnston, Western Regional Resource Manager - Lunenburg
- Pat Murphy, Area Supervisor - Lunenburg/Queens - Lunenburg
- Tina Boutilier, Financial Services - Halifax

Lease No. 4814

Petition No. 36619

THIS LEASE made this 9<sup>th</sup> day of October, 2009

**BETWEEN:** **HER MAJESTY THE QUEEN** in right of the Province of Nova Scotia, represented in this behalf by the Minister of Natural Resources for the Province of Nova Scotia, pursuant to subsection 5(1) of the Ministerial Land Transactions Regulations made pursuant to the *Court and Administrative Reform Act*, S.N.S. 1996, C. 23. (hereinafter called the "Lessor")

**OF THE FIRST PART**

- and -

**MUNICIPALITY OF THE DISTRICT OF LUNENBURG**, a body corporate with its registered office at Bridgewater, in the County of Lunenburg, Province of Nova Scotia (hereinafter called the "Lessee")

**OF THE SECOND PART**

**WITNESSETH** that the Lessor for and in consideration of the rents, covenants, conditions and reservations hereinafter contained doth hereby demise and lease unto the Lessee, for the sole purpose outlined below, all that certain parcel of land, the said parcel of land being situate at Garden Lots (Back Harbour), in the County of Lunenburg, described in Schedule "A" and shown outlined in bold on Schedule "B" (hereinafter called the "demised property"), all schedules attached hereto and forming part of this Lease.

**TO HAVE AND TO HOLD** the demised property, unto the Lessee for and during the full term of fifteen (15) years from the 1st day of September, (hereinafter referred to as the "anniversary date"), 2009 to the 31st day of August, 2024 at the annual rent of three hundred and thirty-six dollars and thirty cents (\$336.30) due and payable on the anniversary date of the Lease.

This Lease will be renewed and continue in force for a further fifteen (15) year term at an annual rent and administration fee to be fixed by the Lessor provided that the Lessee has complied with the terms and conditions of this Lease to the satisfaction of the Lessor and further provided that **the Lessee, on or before three (3) months prior to the termination of this Lease, notifies the Lessor in writing of its intention to renew the Lease.**

**THE PARTIES HERETO AGREE AS FOLLOWS:**

1. **PURPOSE**

Unless agreed otherwise by the Lessor, the Lessee shall use the demised property for the sole purpose of developing and maintaining a waterfront park, and for no other purpose.

2. **RENT**

The Lessee shall pay rent provided for herein when due.

3. **TAXES AND OPERATING COSTS**

- (a) The Lessee shall pay and discharge any taxes or charges levied by any Municipal or Provincial or Federal Authority upon the demised property, which shall include, but not be limited to, property taxes, betterment charges, business taxes and occupancy charges.
- (b) The Lessee shall be responsible for all costs associated with the operation of the demised property except as hereafter specifically set out.

4. **COMPLIANCE WITH LAWS**

- (a) The Lessee shall comply with all applicable provisions of law including, but not limited to, federal and provincial legislative enactments, and any applicable laws and regulations relating to public health and environmental protection.
- (b) The Lessee shall be responsible for obtaining and maintaining all approvals and permits necessary for the purpose outlined in paragraph one (1). The Lessor does not by the fact of entering into this Lease, covenant that such approvals or permits will be issued by the Province of Nova Scotia or other body. Failure of the Lessee to obtain and keep current the required approvals and permits shall be considered a breach of the terms of this Lease.

5. **MAINTENANCE AND REPAIR**

- (a) The Lessee shall not cause or permit any nuisance or damage to adjacent or nearby properties. In accordance with the purpose described in paragraph 1, the Lessee shall be responsible for the maintenance of the demised property and shall keep the demised property in good repair and in a clean and tidy condition to the satisfaction of the Lessor and shall yield up same in good repair and in a clean and tidy condition to the satisfaction of the Lessor at the expiration or termination of this Lease. The Lessee shall make such repairs to the demised property as are required by the Lessor from time to time. The cost of such repairs shall be paid by the Lessee.
- (b) The Lessee shall not, during the currency of this Lease, do, suffer or permit to be done any act or thing which may impair, damage or injure the demised property beyond the damage occasioned by reasonable use in accordance with the purpose described herein in paragraph 1, and shall, at the Lessee's own cost and expense, maintain and repair all portions of the demised property which may at any time be damaged other than through reasonable use thereof, the Lessor to be the sole judge of the meaning of the words "reasonable use".
- (c) The Lessor may, upon reasonable notice, enter the demised property for purposes of inspection of the demised property in order to determine the conditions or state of repair of any of the demised property.
- (d) All garbage and waste material resulting from the use of the demised property shall either be disposed of at an approved Municipal Garbage Disposal Site or as directed in writing by the Regional Resource Manager.

6. **FIRE HAZARDS**

The Lessee shall not do and will not permit to be done on the demised property anything which will or might increase the fire hazard.

7. **ERECTION OF EQUIPMENT AND STRUCTURES**

- (a) The Lessee may, upon receiving prior written approval by the Lessor, place or erect on the demised property only such equipment, buildings, structures and other personal property deemed necessary for the purpose described in paragraph 1. The Lessee shall keep the same in good repair to the satisfaction of the Lessor and shall forthwith make such repairs as requested by the Lessor.
- (b) The Lessee shall not do any major repairs, excavation, alterations, construction or rebuilding without the consent of the Lessor in writing, whose consent may be withheld for any reason whatsoever. All such buildings or structures or other improvements shall be constructed and thereafter maintained by and at the cost and expense of the Lessee to the satisfaction of the Lessor.

8. **REMOVAL OF EQUIPMENT AND STRUCTURES**

The Lessee shall remove all equipment, buildings, structures and personal property immediately upon the expiration of this Lease. If such equipment, buildings, structures, and personal property have not been removed upon expiration, or if this Lease has been cancelled or earlier terminated the Lessee shall, upon written notice by the Lessor, pursuant to Section 39 of Chapter 114, Revised Statutes of Nova Scotia, 1989, the *Crown Lands Act*, remove such within sixty (60) days from the date of said notice, otherwise, the Lessor may, without incurring any liability, remove or demolish the same in whatever manner the Lessor deems necessary. The Lessee shall pay all costs of such removal or demolition and shall be responsible for all damage or loss caused to the demised property in this regard. The Lessee's obligation to observe or perform this covenant shall survive the expiration, cancellation or termination of this Lease.

9. **BOUNDARIES**

The Lessee shall, during the term of this Lease, maintain all boundary markings on the demised property so that such boundaries are readily visible and ascertainable. The Lessor shall not be liable for any damage to the demised property which occurs as a result of the Lessee's failure to maintain such boundaries.

10. **TREECUTTING**

The Lessee shall not cut trees for fuel or for any other purpose on the demised property or in the area surrounding the demised property without the written consent of the Lessor, or his designate, whose consent may be withheld for any reason whatsoever.

11. **NON-INTERFERENCE WITH FOREST MANAGEMENT PRACTICES**

The Lessee shall not interfere in any way with the use of adjoining lands by the Lessor or any Licensee or owner of the adjoining lands in the harvesting of forest products and the Lessee recognizes the right of the Lessor or any Licensee or owner of the adjoining lands to conduct forestry operations or forest management activities including without limiting the generality thereof: the construction and maintenance of roads; the application of approved herbicides and pesticides; and the use of forestry equipment and machinery thereon without interference by the Lessee.

12. **LIABILITY AND INSURANCE**

- (a) The Lessee shall be deemed to be the occupier of the demised property leased herein and shall be responsible for ensuring the demised property is maintained to a standard suitable for the use of the demised property as set out in paragraph 1. The Lessee shall be solely liable to third parties for all activities which take place on the property. The Lessee is not in any way the agent of the Lessor.

- (b) The Lessee shall not have any claim or demand against the Lessor for loss, damage or injury of any nature whatsoever or howsoever caused to the person or property of the Lessee or third parties unless such loss, damage or injury is due to the negligence of any officer or servant of the Lessor while acting within the scope of their employment.
- (c) The Lessee shall be responsible for the actions and safety of all persons authorized by the Lessee to visit the demised property.
- (d) The Lessee and/or its guests, invitees and permitted assigns voluntarily accept all risks incurred while visiting or staying on the demised property.
- (e) The Lessee shall provide at its cost any insurance the Lessee deems necessary with respect to the uses to be made of the demised property.
- (f) The Lessee shall not do or omit to do or suffer anything to be done or omitted to be done with regard to the demised property which will in any way impair or invalidate such coverage.

13. **INDEMNITY**

- (a) The Lessee shall at all times indemnify and save harmless the Lessor or any of Her officers, employees or agents from and against all claims, demands, losses, costs, damages, including personal injury or death, actions, suits and other proceedings by whomsoever made, sustained, brought or prosecuted, or from anything done or omitted by the Lessee, in any manner based upon, occasioned by or attributable to the execution of this Lease, unless such claims, etc., result from the negligence of any officer, employee or agent of the Lessor while acting within the scope of their duty or employment.
- (b) Details of claims, etc. brought against the Lessee with respect to the demised property are to be immediately reported to the Lessor.

14. **TRESPASS**

- (a) The Lessor shall not be liable for the loss of or damage to any property of the Lessee by theft or otherwise.
- (b) The Lessee shall be responsible for providing for the safety and security of the demised property.
- (c) The Lessee shall not erect any signs or gates on the demised property without prior written approval of the Regional Resource Manager.
- (d) Expenses incurred to keep predators off the demised property or prosecute trespassers shall be paid for by the Lessee.

15. **THE LESSOR HEREBY COVENANTS** with the Lessee for the peaceful and quiet enjoyment of the demised property during the said term hereby demised, subject to the provisions herein.

16. **REVISIONS**

The Lessor may at any time review the terms of this Lease and may add or revise same upon giving the Lessee thirty (30) days notice in writing of any such addition or revision. Such revisions may include but are not restricted to revisions in annual rent.

17. **ASSIGNMENT AND TRANSFER**

The Lessee shall not assign or any way encumber the demised property, or any part thereof, without the prior written consent of the Lessor whose consent may be withheld for any reason whatsoever.

18. **CANCELLATION**

- (a) The Lessee may cancel this Lease, for any reason whatsoever, upon giving sixty (60) days notice in writing to the Lessor.
- (b) The Lessor may cancel this Lease, for any reason whatsoever, upon giving sixty (60) days notice in writing to the Lessee.

19. **TERMINATION**

- (a) This Lease may be terminated by the Lessor if, at any time during the term of this Lease,
  - (i) rent payments required under this Lease be in arrears, or,
  - (ii) the demised property is used for any purpose other than that for which it is let, or,
  - (iii) if the Lessee fails to use the demised property, or,
  - (iv) if there be any other default, breach or nonobservance by the Lessee at any time in respect of any other covenant, proviso, condition or reservation herein contained and the Lessee has failed to remedy such default, breach or nonobservance after being given thirty (30) days notice to remedy the same.
- (b) Upon termination, the term hereby created shall be at an end and the Lessor may re-enter and take possession of the demised property.

20. **DISSOLUTION OR BANKRUPTCY**

In the event of winding up or dissolution of the Lessee, or the adjudication of the Lessee as bankrupt, or an assignment by the Lessee for the benefit of its creditors, or the commencement of proceedings under any insolvency legislation, or the appointment of a receiver or trustee to its property, then this Lease shall terminate immediately and the term herein created be at an end and the Lessee shall quit and surrender the demised property to the Lessor, but shall notwithstanding remain liable for any loss or damage suffered by the Lessor.

21. **TITLE**

It is hereby declared and this Lease is accepted by the Lessee upon the express condition that the Lessee shall have no recourse against the Lessor should the Lessor's title to the demised property be found to be defective or should these presents prove ineffectual by reason of any defect in title or access.

22. **DELIVERY OF PROPERTY**

- (a) The Lessee at the expiration or earlier termination of this Lease shall peacefully and quietly yield up and deliver possession of the demised property in a condition satisfactory to the Lessor.

(b) On the termination of this Lease for any circumstances whatsoever, the Lessee shall forthwith vacate the demised property and the Lessor shall incur no further expense, liability or cost in this regard.

23. **NOTICES**

Any notice or document required to be given by this Lease shall be deemed to have been received if delivered or mailed postage pre-paid:

- (i) to the Lessor at the Department of Natural Resources, PO Box 698, Halifax, Nova Scotia, B3J 2T9 or at such other address as the Lessor may direct from time to time;
- (ii) to the Lessee at its ordinary place of business. The Lessee shall notify the Lessor in writing of any change in its current address;

five days following the day such notice or document was mailed.

24. **ENUREMENT**

This Lease shall enure to the benefit of and be binding upon the Lessor, Her Heirs, Successors, assigns and authorized representatives, and upon the Lessee, its successors and permitted assigns.

25. **WAIVER**

The failure of the Lessor to insist upon a strict performance of any covenants, provisos, conditions or reservations contained in this Lease shall not be deemed a waiver of any rights or remedies that the Lessor may have and shall not be deemed a waiver of any subsequent breach or default in the covenants, provisos, conditions or reservations contained in this Lease.

26. **AMENDMENT TO LEASE**

This Lease shall not be changed, modified or discharged orally. Any changes shall be made in writing and when agreed upon by both parties, shall be incorporated and form part of this Lease.

27. **DISPUTE**

In the event of any dispute or difference arising as to any matter or thing connected with this Lease or the interpretation thereof, the same shall be determined by and at the sole discretion of the Lessor.

28. **TIME**

Time is of the essence.

**RESERVING**, however, to the Lessor, Her Heirs and Successors, all mines and minerals, with full liberty at all times to search, quarry, bore, secure, obtain and dig for and appropriate and carry away the same and for that purpose to enter from time to time upon the demised property or any part thereof and from time to time to authorize any other person or persons, corporation or corporations by grant, lease, license, or otherwise to exercise the said liberty or right hereby reserved.

**AND FURTHER RESERVING** to the Lessor, Her Heirs and Successors, all rights, interests, claims, privileges, easements, possessions and liberties heretofore granted, leased or licensed or otherwise lawfully acquired in or in respect of any such mines or minerals on the demised property or any part thereof.

**AND FURTHER RESERVING** to the Lessor, the right to complete or open and complete any road through the demised property or any part thereof that the Lessor deems expedient to complete or open and complete together with the right to grant a right-of-way across the demised property related to the transmission of energy or communications.

**EXCEPT AS PROVIDED HEREIN, FURTHER RESERVING** to the Lessor all timber and trees now standing or growing or hereafter to be standing or growing upon the demised property or any part thereof.

**EXCEPT AS PROVIDED HEREIN**, that no exclusive right or privilege to take game or fish in any manner whatsoever from the demised property or the lakes, rivers, brooks, or streams or other waters in or upon the demised property shall by virtue of this Lease pass to the Lessee.

**IN THIS LEASE** and where the context requires, words in the singular include the plural and vice versa, and words importing the masculine gender shall include the feminine and neuter genders, and words importing persons shall include firms and corporations and vice versa, and all covenants, provisos, stipulations, agreements, liabilities and obligations entered into by or imposed upon the Lessee herein, if more than one, shall be joint and several.

**IN WITNESS WHEREOF**, the parties have hereunto set their hands and affixed their seals on the day and year first above written.

SIGNED SEALED AND DELIVERED )  
in the presence of )

*Barbara Hunt*  
Witness

HER MAJESTY THE QUEEN IN RIGHT  
OF THE PROVINCE OF NOVA SCOTIA

*John McNeill*  
Minister of Natural Resources

*Weather A. Whynott*  
Witness


MUNICIPALITY OF THE DISTRICT  
OF LUNenburg

*[Signature]*  
Per:  
Title: Chief Administrative Officer

*Ronald M. Zwick*  
Per:  
Title: Deputy Mayor

ROVINCE OF NOVA SCOTIA  
COUNTY OF LUNENBURG

On this <sup>25<sup>th</sup></sup> day of *September*, 2009, before me the subscriber, personally came and appeared *Heather A. Whynott*, a subscribing witness to the foregoing Indenture, who having been by me duly sworn, made oath and said that the **Municipality of the District of Lunenburg**, one of the parties thereto, caused the same to be executed in its name and on its behalf and its seal to be thereunto affixed by the hands of *Tammy S. Wilson*, its *Chief Admin. Officer* and *Donald M. Zwicker*, its *Deputy Mayor* the proper officers duly authorized in that behalf and in the subscribing witness's presence.

  
A COMMISSIONER OF THE SUPREME  
COURT OF NOVA SCOTIA

Gordon A. Pettipas  
A Commissioner of the Supreme Court  
of Nova Scotia

SCHEDULE "A"

ALL and singular those certain parcels or tracts of land, situated, lying and being at Garden Lots, Lunenburg County, Nova Scotia and being designated Parcel G, Parcel R and Parcel H, Crown Land, as shown on Plan of Survey, filed at the Department of Natural Resources office at Halifax, under Field Plot P-043/09 and under Order of Survey S-030/09, prepared by Peter A.A. Berrigan, Nova Scotia Land Surveyor No. 629, dated July 8, 2009, which said lots may be more particularly described as follows:

**BEGINNING** at a point marked by survey marker L2824, set on the Northeastern side line (30.480 metres from the centre line thereof) of Public Highway No. 332 (Lunenburg Truck Route), which said point marks the most Northern corner of the herein described lot, the division line with Parcel 2, property of Municipality of the District of Lunenburg, identified as P.I.D. No. 60167137 and is located at a bearing of South 71 degrees 27 minutes 31 seconds East for a distance of 511.198 metres from Nova Scotia Coordinate Monument No. 27107.

**THENCE** from said point so located South 82 degrees 05 minutes 23 seconds East along Parcel 2 and Parcel 1, other property of Municipality of the District of Lunenburg, identified as P.I.D. No. 60402039, 227.136 metres to survey marker L2823, marking the most Eastern corner of the herein described lot, the most Southern corner of Lot 1 and the division line with property of John Tolley Jenkins and Glenna Marie Jenkins, identified as P.I.D. No. 60167525.

**THENCE** South 09 degrees 41 minutes 04 seconds West along property of John Tolley Jenkins and Glenna Marie Jenkins, 99.874 metres to survey marker L2822.

**THENCE** South 10 degrees 25 minutes 07 seconds West along property of John Tolley Jenkins and Glenna Marie Jenkins, 41.469 metres to survey marker L2821, marking the most Southern corner of the herein described lot and the Northeastern side line (30.480 metres from the centre line thereof) of Public Highway No. 332.

**THENCE** North 54 degrees 35 minutes 45 seconds West along the Northeastern side line of Public Highway No. 332, 89.769 metres to a point.

**THENCE** Northwesterly along the Northeastern side line of Public Highway No. 332, along the arc of a curve to the right, having a radius of 667.402 metres, an arc distance of 174.575 metres to survey marker L2824, marking the place of beginning, tie line between the last mentioned point and survey marker described as North 47 degrees 06 minutes 09 seconds West for a distance of 174.077 metres.

**The herein described lots of land contains an area of 1.775 hectares.**





# MODL Transit Strategy and 5-Year Business Plan



MODL Council  
May 28, 2024



## Project Objectives



- o Facilitate the shaping of Osprey Village as a transit-oriented development by providing hourly transit service that connects to Bridgewater Transit
- o Use additional capacity from a one-hour transit service to Osprey Village to reach other key transit opportunities within MODL's nearby communities

MODL Transit Strategy and 5-Year Business Plan

2

## Why Transit?



- o **Social Equity:** Providing more employment and social opportunities for low income and mobility challenged residents.
- o **Economic:** Opening up a larger potential worker pool for employers.
- o **Transportation Demand Management:** Reducing parking space requirements and congestion impacts of vehicle travel.
- o **Environmental:** Reducing emissions and noise impacts of vehicles and creating greater energy efficiency by attracting trips away from private vehicle travel and by creating opportunity to employ electric vehicle technology.

## Why Osprey Village?



- o **Transit-orientation:** Residents look to move into a community with good transit service, others learn to take advantage of it.
- o **Commercial attraction:** Businesses (particularly retail) rely on transit for employee commuting as well as customer access.
- o **Economic growth:** Supports greater densities and mixed use development.

## Why Wileville and Hebbville?



- o **Higher density:** Trailer park in Wileville, Jubilee Road apartments in Hebbville.
- o **Social need:** Lower income areas have greatest need for public transit.

## Two Service Approaches



- o **Connected Service:** Single-bus service remains within MODL boundaries. Connects to Bridgewater Transit at the jurisdictional boundary.
- o **Unified Service:** Bridgewater and MODL two-bus service integrated and overlapping, provides coverage within Bridgewater and key surrounding MODL nodes.

## Principle of Coverage vs. Frequency



- o **Coverage:** Expand the service area to reach as many people as possible, but with limited frequency.
- o **Frequency:** Limit the service area and have buses arrive more frequently.

*To meet the project objectives, frequency (minimum one-hour service) must take priority*

## What we did



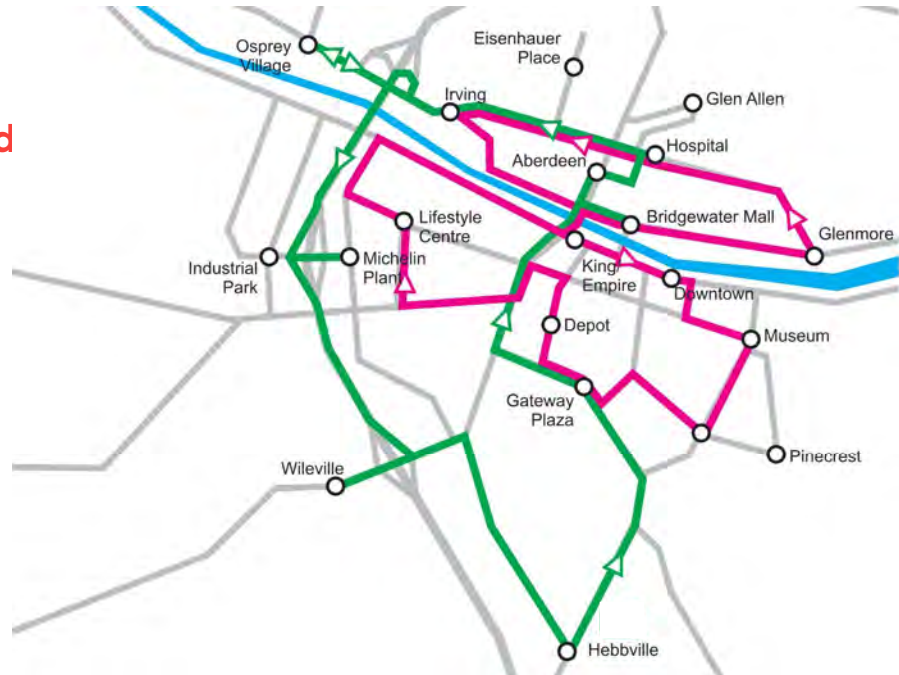
- o **Engaged with the Community:**

Osprey Village Community Workshop	Bridgewater Transit
Lunenburg County Wheels	Joint Regional Transportation Agency
Regional Accessibility Coordinator	Riverview Enhanced Living
MODL Transportation Committee	
- o **Generated scenarios:** Produced 15 unique routing scenarios.
- o **Short-listed and assessed scenarios:** Short-listed 5 scenarios and conducted a comparative customer service time assessment.
- o **Governance review:** Identified opportunities for operation of the service.
- o **Selected preferred scenario and developed business plan:** Selected an integrated plan and calculated capital and operating costs.

## Options for Service Operation

Operator	Description	Examples
<b>MODL</b>	The Municipality could operate the service itself, hiring staff and creating a Transit department within the organization.	Bridgewater, HRM, CBRM
<b>Regional Authority</b>	Regional authorities are often used in Nova Scotia to deliver common services to multiple municipalities.	Kings Transit (serves six municipalities in the Annapolis Valley)
<b>Bridgewater Transit</b>	Bridgewater Transit could operate both routes and bill MODL either what it calculates to be the direct cost of operating the MODL route or 50% (or another negotiated percentage) of the total operating costs for both routes.	
<b>Lunenburg County Wheels</b>	Lunenburg County Wheels could operate the proposed fixed route as part of their service billing MODL for the direct operating costs.	Antigonish Community Transit CHAD Transit (Pictou County)
<b>Multi-Area Operator</b>	Although we are aware of few examples, we believe Nova Scotia would benefit from having a single operator for multiple smaller non-contiguous transit systems. WSP has proposed this idea to the Joint Regional Transportation Agency. Kings Transit might also be positioned to take on a role like this.	BC Transit
<b>Private Sector Operator</b>	There are some private sector bus charter companies within Nova Scotia who might consider contracting to operate a fix route.	

## Preferred Routing



## Vehicle Options

Used Gas Bus  
\$50k - \$100k



New Gas Bus  
\$200k - \$250k



New Battery  
Electric Bus  
\$200k - \$600k



## Start-up Capital Cost

	Gas	Electric
One new bus	\$220,000	\$600,000
One 150 kW plug-in charger		\$150,000
Signs, shelters, concrete pads, etc.	\$42,000	\$42,000
Phase 2 plan, tracker app ext	\$40,000	\$40,000
<b>START-UP CAPITAL COST</b>	<b>\$302,000</b>	<b>\$832,000</b>

## Annual Operating Costs

	Gas	Electric
Driver salaries	\$133,000	\$133,000
Fuel/Energy	\$44,000	\$19,000
Vehicle maintenance, licensing, etc.	\$26,000	\$20,000
Leasing a spare bus as required	\$2,000	\$2,000
Driver training, equipment, etc.	\$5,000	\$5,000
MODL incremental service	\$31,000	\$31,000
MODL staff administration	\$31,000	\$31,000
Less revenue from fares	(\$34,000)	(\$34,000)
<b>ANNUAL OPERATING COST</b>	<b>\$238,000</b>	<b>\$207,000</b>

## Considerations



- o **Licensing:** Providing service outside of jurisdictional boundary will require a license from NSUARB.
- o **Fare integration:** Reach an agreement with Bridgewater Transit to use their fare media and have both bus systems issue free transfers.
- o **One-year pilot:** Start with a used bus.

MUNICIPALITY OF THE DISTRICT OF LUNENBURG

# PUBLIC TRANSIT OPERATING & FIVE-YEAR BUSINESS PLAN





# PUBLIC TRANSIT OPERATING & FIVE-YEAR BUSINESS PLAN

MUNICIPALITY OF THE DISTRICT  
OF LUNENBURG

FINAL REPORT

PROJECT NO.: CA0018731.7272

CLIENT REF: PO #13270

DATE: MAY 09, 2024

WSP

WSP.COM

# REVISION HISTORY

FIRST ISSUE				
April 26, 2024		Draft Final Report		
Prepared by	Reviewed by			
D.McCusker	P.Hatton			
REVISION 1				
May 9, 2024		Final Report		
Prepared by	Reviewed by			
D.McCusker	P.Hatton			
REVISION 2				
Prepared by	Reviewed by			

---

# SIGNATURES

PREPARED BY



May 9, 2024

---

David McCusker, P.Eng.  
Senior Transportation Engineer

---

Date

APPROVED<sup>1</sup> BY *(must be reviewed for technical accuracy prior to approval)*



May 9, 2024

---

Patrick Hatton, P.Eng.  
Senior Transportation Engineer

---

Date

WSP Canada Limited (“WSP”) prepared this report solely for the use of the intended recipient, Municipality of the District of Lunenburg, in accordance with the professional services agreement between the parties. In the event a contract has not been executed, the parties agree that the WSP General Terms for Consultant shall govern their business relationship which was provided to you prior to the preparation of this report.

The report is intended to be used in its entirety. No excerpts may be taken to be representative of the findings in the assessment.

The conclusions presented in this report are based on work performed by trained, professional and technical staff, in accordance with their reasonable interpretation of current and accepted engineering and scientific practices at the time the work was performed.

The content and opinions contained in the present report are based on the observations and/or information available to WSP at the time of preparation, using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by WSP and other engineering/scientific practitioners

---

<sup>1</sup> Approval of this document is an administrative function indicating readiness for release and does not impart legal liability on to the Approver for any technical content contained herein. Technical accuracy and fit-for-purpose of this content is obtained through the review process. The Approver shall ensure the applicable review process has occurred prior to signing the document.

working under similar conditions, and subject to the same time, financial and physical constraints applicable to this project.

WSP disclaims any obligation to update this report if, after the date of this report, any conditions appear to differ significantly from those presented in this report; however, WSP reserves the right to amend or supplement this report based on additional information, documentation or evidence.

WSP makes no other representations whatsoever concerning the legal significance of its findings.

The intended recipient is solely responsible for the disclosure of any information contained in this report. If a third party makes use of, relies on, or makes decisions in accordance with this report, said third party is solely responsible for such use, reliance or decisions. WSP does not accept responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken by said third party based on this report.

WSP has provided services to the intended recipient in accordance with the professional services agreement between the parties and in a manner consistent with that degree of care, skill and diligence normally provided by members of the same profession performing the same or comparable services in respect of projects of a similar nature in similar circumstances. It is understood and agreed by WSP and the recipient of this report that WSP provides no warranty, express or implied, of any kind. Without limiting the generality of the foregoing, it is agreed and understood by WSP and the recipient of this report that WSP makes no representation or warranty whatsoever as to the sufficiency of its scope of work for the purpose sought by the recipient of this report.

In preparing this report, WSP has relied in good faith on information provided by others, as noted in the report. WSP has reasonably assumed that the information provided is correct and WSP is not responsible for the accuracy or completeness of such information.

Benchmark and elevations used in this report are primarily to establish relative elevation differences between the specific testing and/or sampling locations and should not be used for other purposes, such as grading, excavating, construction, planning, development, etc.

The original of this digital file will be kept by WSP for a period of not less than 10 years. As the digital file transmitted to the intended recipient is no longer under the control of WSP, its integrity cannot be assured. As such, WSP does not guarantee any modifications made to this digital file subsequent to its transmission to the intended recipient.

This limitations statement is considered an integral part of this report.

---

# CONTRIBUTORS

## CLIENT

Ella Gindi	Planner I
Jeff Merrill	Director of Planning and Development Services

## WSP

David McCusker	Project Manager
Shervin Bakhtiari	Electrification Consultant

## PROJECT STEERING

Tom MacEwan	Chief Administrative Office (MODL)
Dave Waters	Director, Economic Development (MODL)
Reid Sheppard	Manager, Planning (MODL)
Jessica McDonald	Town of Bridgewater
Mackenzie Childs	Town of Bridgewater
Jim Coleman	Town of Bridgewater



# TABLE OF CONTENTS

1	INTRODUCTION .....	1
1.1	Background.....	1
1.2	Project Objectives .....	2
1.3	Work Plan .....	2
2	EXISTING CONDITIONS .....	3
2.1	Osprey Village.....	3
2.2	Suburban Areas Adjacent to Osprey Village.....	4
2.3	Bridgewater Transit.....	4
2.4	Maritime Bus .....	5
2.5	Lunenburg County Wheels.....	5
2.6	Background Studies.....	6
2.7	Stakeholder Engagement .....	6
3	ROUTING SCENARIOS.....	9
3.1	Approach to Developing Scenarios.....	9
3.2	The Principle of Coverage Versus Frequency.....	9
3.3	Strategic Connection Points to Bridgewater Transit.....	10
3.4	The Scenarios .....	12
3.5	Scenario Short-List Analysis .....	12
3.6	The Preferred Route .....	14
4	BUSINESS PLAN.....	15
4.1	Integration with Bridgewater Transit.....	15
4.2	Governance Models .....	15
4.3	Capital Cost.....	18
4.4	Operating Cost.....	20
4.5	Revenue Projection .....	21
4.6	Five Year Plan .....	21
4.7	Using Battery-Electric Instead of Diesel Buses .....	23
5	SUMMARY AND CONCLUSIONS .....	27

---

**TABLES**

TABLE 1: SCORING OF CONNECTION POINTS .....11  
 TABLE 2: SCENARIO LIST .....12  
 TABLE 3: TRANSIT TRIP PRODUCERS AND  
 ATTRACTORS .....13  
 TABLE 4: ROUTE SCENARIO ANALYSIS .....13  
 TABLE 5: GOVERNANCE MODELS .....16  
 TABLE 6: TRANSIT SERVICE RESPONSIBILITIES FOR  
 THE MUNICIPALITY AND THE  
 OPERATOR .....17  
 TABLE 7: BUS STOP INFRASTRUCTURE COSTS .....20  
 TABLE 8: DAILY SERVICE TOTALS .....20  
 TABLE 9: OPERATING COST .....21  
 TABLE 10: SERVICE COST SUMMARY .....22

---

**FIGURES**

FIGURE 1: OSPREY VILLAGE AND SURROUNDING  
 AREA .....1  
 FIGURE 2: OSPREY VILLAGE SITE LAYOUT .....3  
 FIGURE 3: DWELLING UNIT DISTRIBUTION WITHIN  
 THE OSPREY VILLAGE AREA .....4  
 FIGURE 4: BRIDGEWATER TRANSIT ROUTING .....5  
 FIGURE 5: CANDIDATE CONNECTION POINTS .....10  
 FIGURE 7: HALIFAX HARBOUR BRIDGES SHUTTLE  
 BUS .....19  
 FIGURE 8: IMAGE FROM SCOTIASHARE BUS SALES  
 WEBSITE .....19

---

**APPENDICES**

- A: ROUTING SCENARIOS
- B: DETAILED ROUTING PLAN

# 1 INTRODUCTION

## 1.1 BACKGROUND

Nestled on the South Shore of Nova Scotia, the Municipality of the District of Lunenburg (MODL) shares borders with the Municipalities of Chester to the north and Queens to the south. The Municipality surrounds and interacts with the Towns of Bridgewater, Mahone Bay and Lunenburg. Encompassing over 1,700 square kilometres, the geographical expanse of MODL is characterized by rural landscapes featuring shorelines, lakes, rivers, wetlands, and forests. The region's allure stems from its rich blend of culture, history, topography, and ecology, which continues to draw residents and visitors alike.

MODL has an extensive network of 125 kilometres of connected Rails to Trails (provincially owned multi-use pathways) and 1,613 kilometres of roads connecting communities. At present, the Municipality offers door-to-door public transportation services to MODL residents through a partnership with Lunenburg County Wheels. The service extension of Lunenburg County Wheels into the larger western Lunenburg County area has significantly improved accessibility for MODL, Bridgewater, and neighbouring communities. With a growing population of over 25,500, MODL's shifting population demographics emphasize the necessity for practical, inclusive, and accessible public transit networks, including a well-defined fixed-route system.

Osprey Village, located off of Exit 12 of Highway 103 is a commercial development park that includes a mixture of businesses from big-box retailers to hotels, restaurants and smaller retail outlets. The Municipality plans to transform the Osprey Village area into a growth centre by encouraging mixed-use development and increasing connectivity.

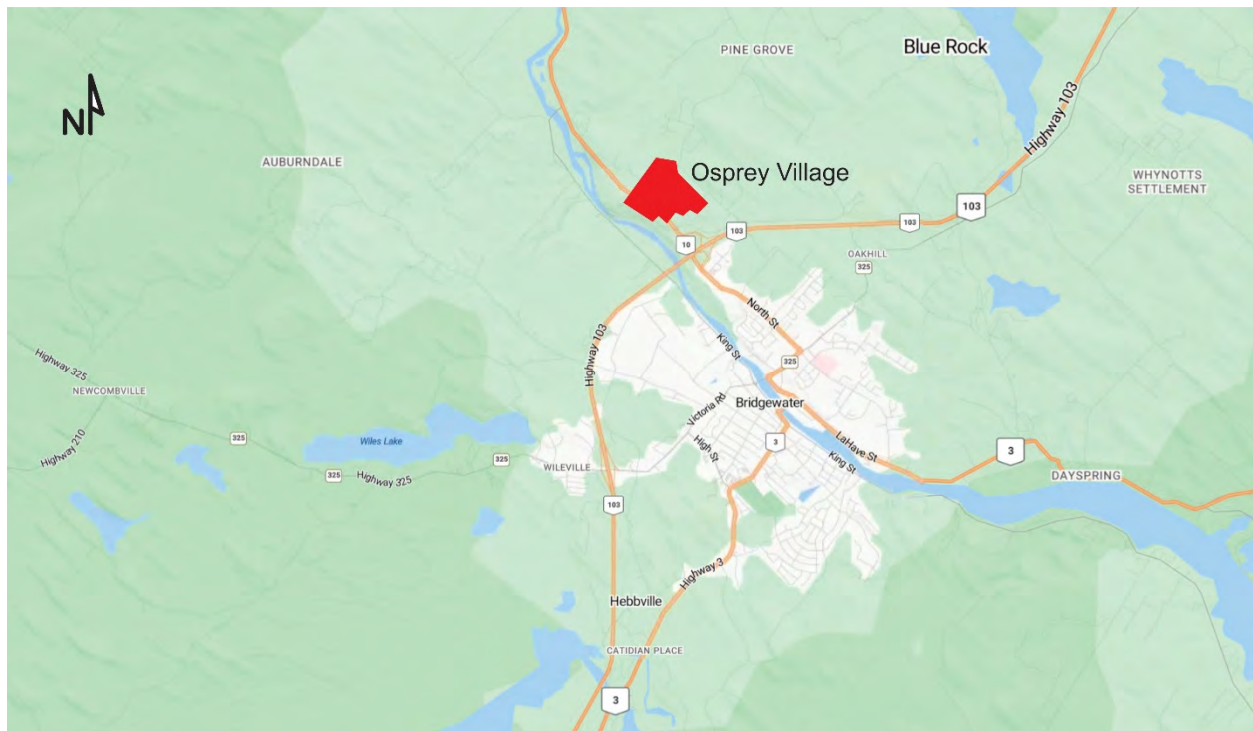


Figure 1: Osprey Village and Surrounding Area

---

## 1.2 PROJECT OBJECTIVES

The magnitude of development expected for Osprey Village far exceeds anything experienced within MODL. The Municipality recognizes that this area with its planned high density residential development in close proximity to a concentration of employment and retail makes it an ideal location for transit to be successful.

*MODL recognizes the need to reconsider the conventional approaches to land use and infrastructure. As part of MODL2040, MODL is rebalancing the development patterns that are dispersed, very low density which makes it harder for public transit to thrive<sup>2</sup>.*

Accordingly, the following objectives were established to guide the Public Transit Operating Plan:

- Facilitate the shaping of Osprey Village as a transit-oriented development by providing hourly transit service that connects to Bridgewater Transit; and
- Use additional capacity from a one-hour transit service to Osprey Village to reach other key transit opportunities within MODL's nearby communities.

By introducing a dedicated fixed public transit route alongside existing travel modes such as active transportation, MODL aims to transform the Municipality into a vibrant, interconnected, health-oriented and eco-friendly community. Meeting the objectives of the Transit Operating Plan help MODL to meet the overall goals of delivering transit service. They include:

- **Social Equity:** Providing more employment and social opportunities for low income and mobility challenged residents.
- **Economic:** Opening up a larger potential worker pool for employers.
- **Transportation Demand Management:** Reducing parking space requirements and congestion impacts of vehicle travel.
- **Environmental:** Reducing emissions and noise impacts of vehicles and creating greater energy efficiency by attracting trips away from private vehicle travel and by creating opportunity to employ electric vehicle technology.

---

## 1.3 WORK PLAN

To achieve the project objectives, the following steps will be taken:

1. Engage with local stakeholder groups to determine opportunities for optimizing and connecting the future transit service;
2. Develop a robust set of routing scenarios that include past routing proposals and new schemes that will deliver service to meet the project objectives;
3. Create a short list of 3-4 scenarios to advance to more detailed benefit modeling; and
4. Select one preferred scenario to advance to a business case analysis.

Decision making during this process would be made by the WPS-MODL Project Team with input from Bridgewater Transit and the MODL Transportation Committee.

---

<sup>2</sup> Local Climate Action Plan 2030; Municipality of the District of Lunenburg; November, 2022.

# 2 EXISTING CONDITIONS

## 2.1 OSPREY VILLAGE

Osprey Village is growing. With about 630 jobs already, it is forecasted to be home for more than 2,000 new residents and 200 additional jobs in the next 5 years<sup>3</sup>. Figure 2 show the layout of the existing Osprey Village and growth areas within it.

While it is anticipated that many of the trips generated by future Osprey Village residents will be internal to the site (work and shop within the neighbourhood) connections will be needed to the Town of Bridgewater and to residential communities nearby. By creating an environment where making those trips by public transit is an attractive choice, significant value can be gained in the reduction of traffic and parking infrastructure as well as greenhouse gas emissions.



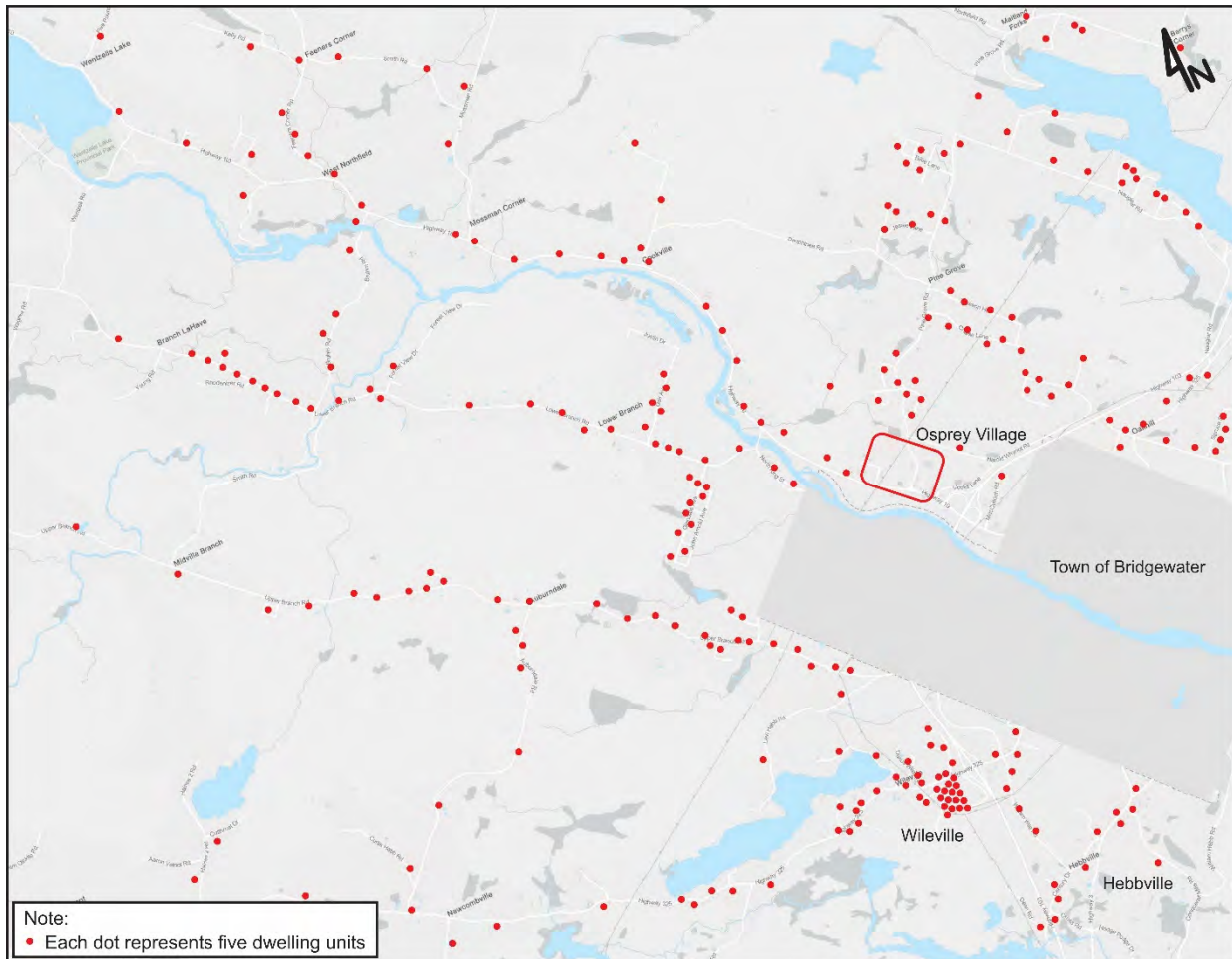
Figure 2: Osprey Village Site Layout

<sup>3</sup> <https://engage.modl.ca/osprey-village-2022> and MODL staff correspondence

---

## 2.2 SUBURBAN AREAS ADJACENT TO OSPREY VILLAGE

Residential development within MODL and to the west and north-west of the Town of Bridgewater is generally dispersed low density (see Figure 3). The communities of Wileville and Hebbville exhibit some residential concentration and an evident presence of lower income housing within those two communities may provide opportunity for generation of transit ridership.



**Figure 3: Dwelling Unit Distribution Within the Osprey Village Area**

---

## 2.3 BRIDGEWATER TRANSIT

Initiated in 2017 as a pilot project, Bridgewater Transit provides hourly transit service within the Town of Bridgewater using a 19-passenger accessible bus. In 2019 it was adopted as a core service by Town Council and is currently owned and operated by the Town.

A map of the Bridgewater Transit service is provided in Figure 4. The routing consists of two one-way loops on either side of the LaHave River. The full circuit takes one hour to complete, including four minutes of dwell time at the Lunenburg County Lifestyle Centre. There is a combination of fixed bus stops and areas of flag-stopping. The service operates from 6:00 AM to 8:00 PM on weekdays, with reduced hours on Saturdays and no service Sundays and some Holidays.

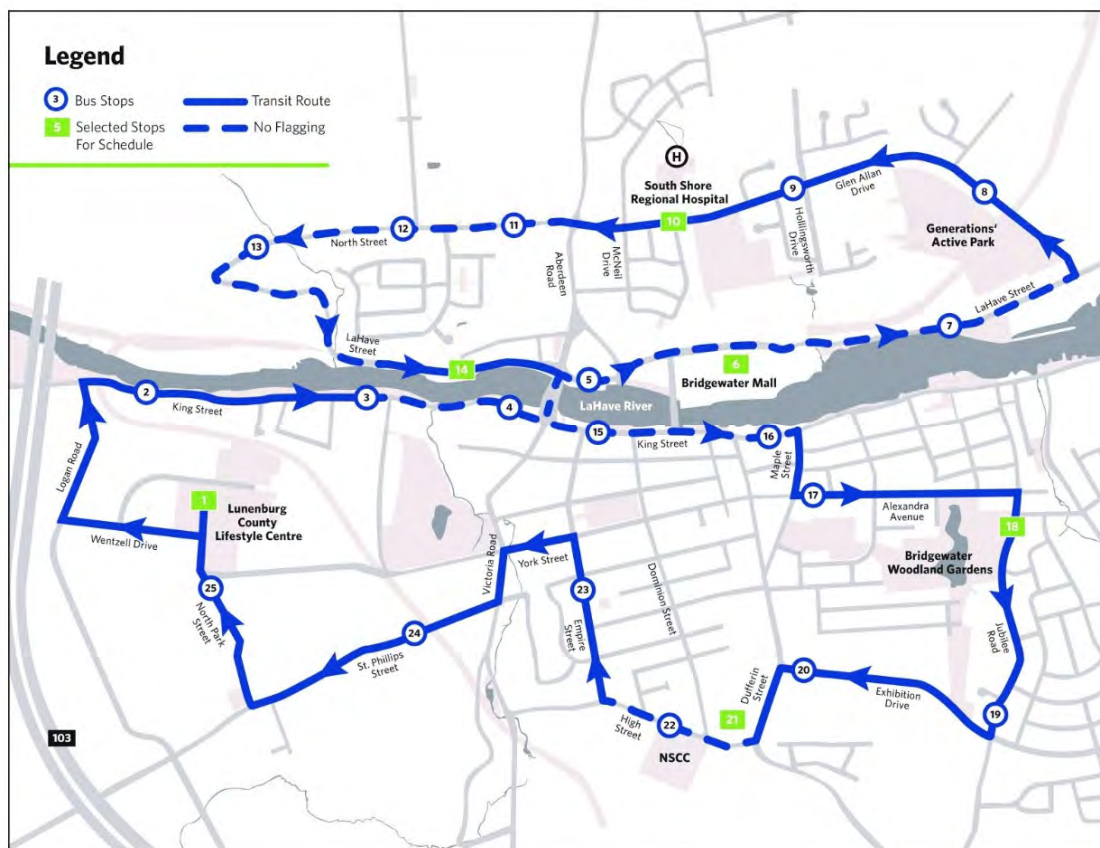


Figure 4: Bridgewater Transit Routing<sup>4</sup>

## 2.4 MARITIME BUS

Maritime Bus operates intercity transit within Atlantic Canada including a route that provides service from Lunenburg, Bridgewater and Mahone Bay to Halifax and Dartmouth. The bus boards passengers at the Bridgewater Mall and the Bridgewater Esso on North Street with 8:30 am departures and 5:45 pm arrivals four days a week.

## 2.5 LUNENBURG COUNTY WHEELS

Lunenburg County Wheels has operated an on-demand public transit service for 32 years. Originally limiting its service to seniors and those with mobility challenges, the service eliminated eligibility limits following COVID. The service currently uses two buses and 4 vans. New vehicles being added to the fleet soon will allow them to provide full coverage through Lunenburg County. They report that areas west and southwest of Bridgewater generate high demand for trips but areas to the northwest do not. Many of their trips to Bridgewater are destined for Osprey Village or to the Maritime Bus stops.

<sup>4</sup> Source: [bridgewater.ca](http://bridgewater.ca)

---

## 2.6 BACKGROUND STUDIES

Several recently completed studies, listed below, were considered in developing aspects of the plan.

### AMENDMENTS TO THE OSPREY VILLAGE SECONDARY PLANNING STRATEGY AND LAND USE BY-LAW (2022)

These documents describe the intent of developing Osprey Village and the regulations that guide it. The MODL website also includes information presented to the public during engagement sessions in 2022.

### TOWN MASTER INFRASTRUCTURE PLAN: GLEN ALLAN EXPANSION AND BUSINESS PARK EXPANSION / LANDS NORTH OF HIGHWAY 103 (2021)

This document identifies the potential extent of two potential growth areas within the Town of Bridgewater. Future transit service to these areas will be a consideration.

### FEASIBILITY STUDY: PUBLIC TRANSIT (2019)

This study, commissioned by Citizens for Public Transit, an advocacy group within MODL, explored opportunities for delivering future transit service throughout the Municipality. Although this work examined a study area much larger than what this current plan will, it may provide some ideas for routing or routing components and service delivery ideas.

### BRIDGEWATER TRANSIT: TRANSIT NEEDS ASSESSMENT (2022)

Using community engagement, this study explored ways to improve the service provided by Bridgewater Transit and developed a five-year growth plan. Amongst the recommendations in this report are the extension of service to Osprey Village and exploration of integration with MODL.

### LOCAL CLIMATE CHANGE ACTION PLAN 2030 (2022)

Prepared for MODL, this plan focuses on ways to reduce greenhouse gas emissions within the Municipality. One of the goals for community climate action is to expand MODL public transit services with an assigned priority of “high”.

### BRIDGEWATER TRANSIT: ELECTRIC BUS FEASIBILITY ASSESSMENT (2022)

The purpose of this strategy was to explore bus replacement strategies that would allow Bridgewater Transit to migrate its fleet to battery-electric buses through both longer- and shorter-term scenarios. Staff’s presentation of the study to Town Council included a recommendation to adopt a strategy of delayed acquisition of battery-electric buses until end-of-life for their existing fleet vehicles (approximately 2030) and to acquire smaller shuttle-type buses with seating capacity of 19-25.

---

## 2.7 STAKEHOLDER ENGAGEMENT

An open house engagement session aimed at businesses and property owners within Osprey Village was held from 10:00 am to 11:30 am on January 16, 2024 at the Best Western Plus Bridgewater Hotel. Notification was provided on a postcard that was hand delivered to each of the existing businesses and mailed to a list of registered property owners provided by MODL. A single business owner attended the session and indicated that they feel transit service is a critical part of being able to attract employees to their business.

Several groups and individuals with an interest in public transit were consulted by the Project Team. A summary of what we heard is provided below.

### BRIDGEWATER TRANSIT

Jim Coleman, Jessica McDonald, Mackenzie Childs

During the course of the study, WSP met with Bridgewater Transit three times and the following issues were discussed:

- Study scope at project start-up

- Approach to development of routing scenarios
- Enhancements to and opportunities within Bridgewater Transit service and review of short-listed scenarios

We learned that the transit service is doing well and has become a valued element in the quality of life in Bridgewater. They are satisfied with the existing routing and expect no immediate changes. The 2022 Transit Needs Assessment made several recommendations for Bridgewater Transit that are being worked on, relative to service provision and prioritization of connections. However, the exploration of service expansion opportunities is currently viewed as a low priority amongst other interests competing for limited municipal funds.

Bridgewater Transit would welcome a well-designed connection to a MODL service and would not be opposed to considering a service that overlaps into the Town with more than just a simple single connection point. They may also be interested in exploring an agreement with MODL to operate a service on their behalf. In either case, adequate information would be needed for a sound decision to be made.

### LUNENBURG COUNTY WHEELS

Daron Lantz, Jerome Tanner

When asked if Lunenburg County Wheels was capable of operating a one-bus fixed route service on behalf of MODL, they indicated some interest but were cautious about the timing, given their ongoing service and fleet expansion work (see Section 2.5).

### JOINT REGIONAL TRANSPORTATION AGENCY

Tanya Davis, Matthew Neville, David Espeseth

The Joint Regional Transportation Agency (JRTA) is in the process of developing a transportation plan for the Halifax Regional Municipality and surrounding communities. The plan will establish a coordinated and strategic vision for a regional transportation system that makes sustainable growth and development possible and improves the safe and efficient flow of people and goods into, out of, and throughout Halifax and surrounding communities.

The plan recognizes that centres like the Town of Bridgewater and MODL may see greater need for travel into the Halifax core as growth pressures will expand the Halifax commutershed. With limited highway and urban street network capacity, diversion of trips to transit is likely to be key to the plan. Development of a MODL transit service with connectivity to Bridgewater Transit and to future intercity transit is seen as contributing to the realization of this plan.

### REGIONAL ACCESSIBILITY CO-ORDINATOR

Ellen Johnson

We were told that lack of transportation has been, and continues to be, a big barrier for persons with mobility challenges. Osprey Village and destinations within the Town of Bridgewater are important connections for residents within MODL. The bus tracker app and buses stopping at storefronts within the malls are of benefit to users, but further steps like on-board stop enunciation would also be of benefit. The hospital, NSCC and Bridgewater Mall are important destinations.

### RIVERVIEW ENHANCED LIVING

Rebecca Hill, Kathleen Bell

Riverview is an assisted living facility that is shifting from its current congregate living facility in Dayspring to more dispersed apartment-style living. It has 12 fleet vehicles (SUVs, minivans and one bus) to transport residents that go unused much of the day and they wonder if there an opportunity for partnering.

# 3 ROUTING SCENARIOS

---

## 3.1 APPROACH TO DEVELOPING SCENARIOS

Our approach to reaching an outcome of a single preferred routing scenario is to begin by expanding our vision of what a transit service might look like and generate a wide range of potential scenarios. Each of the scenarios developed in this exercise is presented in Appendix A. At this stage, scenarios are presented in only very schematic form to ensure that the focus is on the nodes connected by the service and not on the finer details of how the service is provided.

The commonality to each of the scenarios is:

- (1) Hourly service to Osprey Village
- (2) A timed connection to Bridgewater Transit at a strategic transfer point

An additional starting point for scenario development was the expectation that MODL would operate its own transit service separately from (but connected to) Bridgewater Transit. However, some scenarios were developed that provide more extensive service into the Town that reach new unserved destinations and/or overlap the existing Bridgewater Transit route and destinations over and above a single connection point.

To determine route timings, a model was developed to simulate travel times within the study area roadway network. Where possible, travel time on individual network links were calibrated to existing run times on Bridgewater Transit. For links where no transit service currently exists, roadway speed limits and distances were used, combined with additional time for traffic delay, larger vehicle maneuverability, and passenger pickups.

---

## 3.2 THE PRINCIPLE OF COVERAGE VERSUS FREQUENCY

When designing transit service, sacrificing frequency so that the same level of resources can be used to expand the coverage area can be very attractive from a political perspective. However, to achieve our objectives, a high frequency service (one hour minimum) is critical and the coverage area needs to be well-contained to achieve that frequency predictably.

Expanding coverage beyond Osprey Village, Wileville and Hebbville will be ineffective using a fixed route system and the use of existing on-demand service will be more appropriate.

Halifax's most recent transit plan<sup>5</sup> used extensive public engagement to create several service principles, including the following:

*This principle [focusing resources on high demand areas] speaks to the role of public transit in building a more socially, environmentally, and economically sustainable community. Increasing the proportion of resource allocated to high ridership services will help to reduce congestion, pollution, and the need to build, expand and maintain additional roadway and parking infrastructure, while also making the service more cost effective.*

The plan went on to say:

*To achieve this Principle, resources must be reallocated towards services that have the highest potential demand, and these services must be increased and improved to support higher ridership. This means that areas or service with low demand may have minimal service or no service at all.*

Applying this principle to the Halifax Transit system has resulted in the development of high-frequency corridors and termination or coverage reduction on seven routes.

---

<sup>5</sup> Moving Forward Together Plan, Halifax Transit, 2014.

### 3.3 STRATEGIC CONNECTION POINTS TO BRIDGEWATER TRANSIT

One of the service fundamentals stated is a single connection point to Bridgewater Transit with a synchronized arrival time. Since the Nova Scotia Utility and Review Board requires Municipal transit agencies that provide service outside of their jurisdictional boundary to apply for a Service License, the simplest approach to connecting to Bridgewater Transit would be for both services to stop at locations either side of, but in close proximity to, the Municipal boundary and have transferring passengers walk between stops. This solution is clearly impractical, both from the perspective of inconveniencing transferring passengers and meeting the needed characteristics of a transfer location. Accepting this impracticality is also an acceptance of the MODL transit service requiring licensing under the Nova Scotia Utility and Review Board.

So while close proximity to the Municipal boundary may be impractical, near proximity may be desirable to reduce the amount of overlap and duplication provided by the two services. A set of potential connection points were identified and tested against desirable characteristics. A listing of those candidate connection points is shown in Figure 5 and a comparison matrix is provided in Table 1.

In the comparison matrix, each of the candidate connection points is judged based on its ability to satisfy each of the four evaluation criteria identified. The scoring is based on simple judgement and none of the evaluation criteria are weighted. The score assigned is from zero to four where zero (red shading) indicates a failure to satisfy the evaluation criteria and four (dark green shading) means fully meeting the evaluation criteria. Scores of one, two or three are intermediate results. No attempt was made to calculate and overall score, the matrix is simply a means of indicating the characteristics of each of the connection points.



**Figure 5: Candidate Connection Points**

**Table 1: Scoring of Connection Points**

CRITERIA	RATIONALE	CONNECTION POINT OPTION				
		1	2	3	4	5
Located close to Municipal boundary	Locations closer to the Municipal boundary reduce overlap of routes and duplication of service.					
Located out of traffic	Buses will be required to wait, sometimes for several minutes, to ensure transferring can be completed. To avoid causing traffic congestion, the buses will need to wait outside of traffic lanes. For on-street stops, this may mean a bus bay may need to be constructed or a parking lane allocated for transit.					
Located so that buses can stop end-to-end traveling in the same direction	Buses stopping to connect on opposite sides of the street or on adjacent legs of an intersection require transferring passengers to cross the street.					
Located where a shelter can be built or, ideally, close to a facility that allows passengers to wait inside	Overall, there will be more passenger waiting at a connection point than at a normal bus stop. A location where an indoor waiting and public washrooms are available is ideal, although an enclosed glass shelter will suffice. This also provides an opportunity for the bus driver to take a washroom break during the transfer time.					

**KEY TO SCORING**

Meets the criteria well	
Mostly meets the criteria	
Partially meets the criteria	
Mostly misses meeting the criteria	
Fails to meet the criteria	

Following a review of the comparative scoring by the Project Team, it was agreed that Bridgewater Mall (#4) was the preferred location for a connection point. Nevertheless, some of the scenarios will use other locations for a connection point.

---

## 3.4 THE SCENARIOS

To ensure a robust examination of a variety of approaches to introducing transit and integrating it into the existing Bridgewater service, a total of fourteen scenarios were developed for consideration. Some came from the previous Citizens for Public Transit (CPT) Study, some were proposed by the MODL staff team, some were proposed by Bridgewater Transit or by their 5-year plan, but most were developed by the WSP project team. Creating scenarios was an iterative process with some later suggestions being based on modification of previously generated scenarios.

The scenarios are summarized in Table 2 and routing schematics are shown in Appendix A.

**Table 2: Scenario List**

SCENARIO	DESCRIPTION
A	CPT Study – New Germany Extension
B	CPT Study – Public Suggestion Brown Route
C	CPT Study – Public Suggestion Purple Route
D	Integration with Bridgewater Transit – “Daisy Petal” Loops
E	Tight MODL Route Connecting at Lunenburg County Lifestyle Centre
F	MODL Industrial Park Overlap
G	MODL Nearby Communities
H	MODL Gateway Plaza Connection
J	Bridgewater Transit Overlap with Aberdeen Road Connection
K	Integration with Bridgewater Transit – Reverse of the Existing Loop (75 minute cycle)
L	MODL Suggested Plan C
M	MODL Suggested Plan D
N	Osprey Village Shuttle Plus On-Demand Service
P	Bridgewater Transit Suggestion : 45-Minute Loops
Q	Modification of Scenario L

---

## 3.5 SCENARIO SHORT-LIST ANALYSIS

From the long list of scenarios, the Project Team selected six for further consideration and analysis. To assist in quantifying the benefits of the service to the public, travel times for a set of common transit trips was determined. These common transit trips were generated by selecting eight areas of **trip production** and five areas of **trip attraction**. Trip producers are areas of population, typically defined as residential neighbourhoods, and trip

attractors are areas of employment and/or retail activity. The areas selected for the analysis are shown in Table 3. Note that Osprey Village is both a producer and an attractor of trips.

**Table 3: Transit Trip Producers and Attractors**

TRIP PRODUCERS	TRIP ATTRACTORS
Osprey Village	Osprey Village
Glen Allan area	Regional Hospital
Jubilee Road area	Bridgewater Mall
Dominion/Hillcrest area	Downtown
Lifestyle Centre area	Gateway Plaza / NSCC
North Street area	
Wileville	
Hebbsville	

Transit trips are then generated in a matrix where every trip producer creates trips to every trip attractor. With eight trip producers and five trip attractors, this trip matrix would have a total of 40 producer-to-attractor trips and 40 attractor-to-producer trips. Weight can be given to each producer based on the number of dwelling units and to each trip attractor based on the magnitude of employment and/or retail activity. Once the number of trips is determined through the cross-multiplication of weights, it can be further multiplied by the transit trip time to get a total system travel time (as well as an average trip time).

The results of this analysis are shown in Table 4.

Along with the average trip times, the analysis chart shows whether or not the route scenario connects to key MODL destinations, Wileville and Hebbsville as well as providing a gauge of the relative value of the scenario to MODL versus the Town of Bridgewater.

		Ave Trip Time (min)	Serves Wileville	Serves Hebbsville	MODL Value Meter
Scenario J	Shuttle Plus Wileville	29.0	●		
Scenario K	Reversing Loops	18.9			
Scenario L	MODL Suggestion C	32.7	●	●	
Scenario M	MODL Suggestion D	34.0	●		
Scenario N	Shuttle + On-Demand	29.8	●	●	
Scenario Q	Scenario L Revised	33.0	●	●	

**Note:** The MODL Value Meter column indicates the relative value of the proposed routing to MODL (green shading) and the Town (yellow shading)

**Table 4: Route Scenario Analysis**

---

## 3.6 THE PREFERRED ROUTE

Considering the travel time analysis, the perceived value of the service to MODL, and the ability to meet the project objectives, the Project Team selected Scenario Q as the preferred route.

The Project Team acknowledged the effectiveness and the value of establishing a new route that duplicated the existing Bridgewater Transit loop, but in the opposite direction, and with an extended coverage area that included Osprey Village (Scenario K). Nevertheless, it was determined that the value of this service was too weighted towards the Town more so than to MODL. This was judged to be impractical given the expressed concern by Bridgewater Transit regarding the ability to fund expanded Town service at this time. Nevertheless, it will be important to keep this scenario in mind when developing future transit strategies for the Bridgewater area.

Details of the proposed routing, along with the Bridgewater Transit route and key timing points, is provided in Appendix B.

The service would begin at Bridgewater Mall at 6:10 every weekday (8:10 am on Saturdays) and end at Osprey Village (Walmart) at 7:30 pm on weekdays (5:30 pm on Saturdays).

Stopping to pick up passengers should be reflective of the Bridgewater Transit system where a combination of fixed stops and flag stopping is used. We propose a total of eleven new fixed stops for the MODL route in Osprey Village the Michelin Site, Wileville and Dufferin Street in addition to the existing fix stops that would be shared with Bridgewater Transit. The remainder of the route would operate with flag stopping. The locations of the proposed fixed stops are shown in the route map found in Appendix B.

# 4 BUSINESS PLAN

---

## 4.1 INTEGRATION WITH BRIDGEWATER TRANSIT

The new MODL service can only be successful if it is closely integrated with the existing Bridgewater Transit service. If working well, passengers should be unaware that they are using a network that is shared by two owners.

One of the keys to this success is fare integration. Riders should pay a single fare and be able to transfer between routes without an additional fare. Monthly passes and tickets should be common to both services. Bridgewater Transit already has the infrastructure and systems in place to collect and process fares and it makes sense for them to provide that service for both routes. Since MODL is entitled to the share of the revenue that their service generates, a fare-sharing method is needed. We suggest that revenues from all fare payment methods be allocated back to the two municipalities based on annual boarding counts. Drivers on both routes would count passengers as they board (as is currently done on Bridgewater Transit buses) to determine total boardings per year. The percentage of boardings for each system would determine the percentage of fare revenue to be returned. Bridgewater Transit would be entitled to a portion of the fares collected in return for their costs of collection.

Other opportunities for promoting an integrated service are to expand the bus tracker app to include both buses and to provide combined route maps with schedule times on both municipal websites. MODL should also use a bus stop sign consistent with signs used by Bridgewater Transit.

It is important to recognize that the proposed MODL service overlaps and, in some cases, duplicates existing Bridgewater Transit service. It is possible, for example, for someone to board either a MODL bus or a Bridgewater Transit bus at Gateway Plaza (departing at two different times) to travel to the Bridgewater Mall. While potentially problematic from a regulatory and political perspective, for the public this appears simply as an increased level of service. Implementation of the proposed routing will require both MODL and Bridgewater Transit to recognize and agree that an overlapping two-bus service is in the overall best interest of the community. Part of the role of the NSURB is to ensure that new transit services do not create an unwelcome infringement on existing services, so will be keenly interested in the Town of Bridgewater's buy-in to the proposed service.

---

## 4.2 GOVERNANCE MODELS

There are several options for MODL to consider for the operation of the proposed route. MODL would be the "owner" of the service but could operate it in one of the ways shown in Table 5.

**Table 5: Governance Models**

<b>Operator</b>	<b>Description</b>	<b>Examples</b>
<b>MODL</b>	The Municipality could operate the service itself, hiring staff and creating a Transit department within the organization.	Bridgewater, HRM, CBRM
<b>Regional Authority</b>	Regional authorities are often used in Nova Scotia to deliver common services to multiple municipalities.	Kings Transit (serves six municipalities in the Annapolis Valley)
<b>Bridgewater Transit</b>	Bridgewater Transit could operate both routes and bill MODL either what it calculates to be the direct cost of operating the MODL route or 50% (or another negotiated percentage) of the total operating costs for both routes.	
<b>Lunenburg County Wheels</b>	Lunenburg County Wheels could operate the proposed fixed route as part of their service billing MODL for the direct operating costs.	Antigonish Community Transit CHAD Transit (Pictou County)
<b>Multi-Area Operator</b>	Although we are aware of few examples, we believe Nova Scotia would benefit from having a single operator for multiple smaller non-contiguous transit systems. WSP has proposed this idea to the Joint Regional Transportation Agency. Kings Transit might also be positioned to take on a role like this.	BC Transit <sup>6</sup>
<b>Private Sector Operator</b>	There are some private sector bus charter companies within Nova Scotia who might consider contracting to operate a fix route.	

Regardless of the model MODL chooses to pursue, the costs to operate the service will be very similar. We will refer in the assignment of responsibilities and cost analysis to whoever is selected to operate the service as “the Operator”. Table 6 outlines various aspects of operating a transit service and how those responsibilities might be allocated between MODL and the Operator.

---

<sup>6</sup> BC Transit, which began as the Urban Transit Authority in 1979 is a provincial crown agency charged with providing transit service throughout BC outside of the Greater Vancouver Area. Victoria Transit is the only service operated directly by BC Transit, while regional services in over fifty other communities are operated either by the municipality or by a private contractor. In addition to funding, the individual regional services receive high-level planning and operational support from BC Transit.

**Table 6: Transit Service Responsibilities for the Municipality and the Operator**

<b>Transit service Responsibility</b>	<b>Municipality</b>	<b>Operator</b>
<b>Owns the service</b> (General oversight and management. Oversees scheduling, level of service, hours of operation adjustments, etc.).	✓	Reports back to Municipality on performance/issues
<b>Purchases and owns the bus</b>	✓	optional
<b>Operates the service</b>		✓
<b>Maintains the bus</b>	Pays invoice from third party service provider	Schedules and organizes vehicle drop off and pick up
<b>Stores the bus</b>		✓
<b>Insures the bus</b>	✓	optional
<b>Insures the service</b>	✓	
<b>Ensures drivers are properly licensed</b>		✓
<b>Sets up and maintains bus stops</b>	✓	
<b>Receives the revenue</b>	See Section 4.1	
<b>Collects and monitors Q/A or concerns from the public</b>	Secondary Contact (long range and management)	Primary Contact (first and best knowledge of daily service)
<b>Markets and communicates</b>	✓	

More detailed discussion of the responsibilities follows:

**OWNERSHIP OF THE SERVICE**

The Operator will operate the fixed route service under agreement with the Municipality who will be the owner. As part of the contract agreement, the Operator will be expected to report on a certain set of key performance indicators (e.g. ridership, day-to-day operations, scheduling/service challenges and solutions). On the Municipality’s side, staff will be required to set key performance standards, oversee the service, and coordinate with the Owner regularly.

## OWNERSHIP OF THE BUS

MODL should purchase and own the vehicle. In addition to the main operating vehicle, a spare is needed for times when breakdowns occur or scheduled maintenance is required. The Operators under consideration both own buses that could be used as spares, but relying on those is clearly a “best-case” assumption. Negotiation with the Operator may result in MODL having to purchase two buses and alternate them daily with one always available as a spare.

## OPERATING THE SERVICE

The transit service will be operated by the Operator according to certain performance standards stipulated by MODL and agreed upon by the Operator in the terms and conditions of their contract. Routine reports should be provided back to the Municipality at a regular and specified interval agreed upon by the two parties.

## MAINTAINING THE BUS

Ensuring that the bus is maintained and serviced at regular intervals will fall on both parties. Since MODL owns both the service and the bus, it is in their best interest to ensure the vehicle is well-taken care of. While MODL will be responsible for ensuring routine maintenance is conducted, the Operator would be responsible for coordinating and scheduling regular appointments as well as bringing the vehicle in for inspections as required by the Province. The Municipality will be responsible for paying the invoices from any third party for maintenance and servicing.

## SETTING UP AND MAINTAINING BUS STOPS

Like Bridgewater Transit, the MODL service will consist of both fixed stops and flag-stopping. For fixed stops on municipally-owned streets, or on provincially-owned roads within the Municipality, MODL will be responsible for the capital and maintenance costs of stops and shelters (if any). For new stops on private property (Osprey Village, Victoria Ridge and the Michelin site) MODL will have to reach an agreement with the individual property owners. For stops within the Town of Bridgewater that are shared, an agreement will have to be reached with the Town. We have been in contact with the management at Victoria Ridge and have confirmed that they are in conceptual agreement with MODL buses being able to stop for passengers and turn around on their property.

## COLLECTING AND MONITORING COMMENTS AND QUESTIONS FROM THE PUBLIC

Providing a contact for the public will be an important component of the service provision. Both the Operator and MODL would have a role to play for public communication. The Operator would have the first and best knowledge of the day-to-day operations and therefore should be the organization that the public reaches out to first. For long-range planning and general oversight management, the public would be directed (by the Operator) to a designated representative within the Municipality.

## MARKETING AND COMMUNICATION

As MODL owns the service and realizes the benefits of transit service, the marketing and communications related to promoting and informing the public should fall on them. More effort and resources will be required at service start up, however once the service is established, ongoing marketing and communications will primarily be addressed as follows:

- **Communication Regarding Service Changes:** MODL and the Operator work together to determine what those changes are, then MODL issues the public notice through its communication media protocols;
- **Responses to Customer Inquiries:** The Operator would respond to day-to-day questions while the Municipality will collect questions and feedback on the long-term planning and overall management;
- **Recruitment of New Riders:** MODL is expected to carry on regular marketing activities for the service, with insight on messaging, communication, and service delivery needs identified by the Operator.

---

## 4.3 CAPITAL COST

We recommend that a low-floor cut-away 24-foot bus with capacity for a minimum of 16 passengers and 2 wheelchair positions be purchased through a tendering process. As a guide, Crestline Coaches sells a bus of this description new for between \$180,000 and \$220,000. The bus should have an access ramp and a front bumper bike rack. Other desirable features are video cameras and air conditioning.

Should MODL prefer to position the initiation of transit service as a pilot, a better alternative to purchasing a new bus may be to explore the local used bus market. WSP is aware of shuttle-type buses potentially being available through Halifax Harbour Bridges (decommissioned shuttle buses used during the Big Lift project, see Figure 6), Halifax Stanfield Airport (decommissioned Park-and-Fly buses) and Halifax Transit (decommissioned Access-a-Bus vehicles). If the Operator determines that they can not provide a service back-up bus, one of these decommissioned vehicles may fit that role alongside purchase of a new vehicle for regular route service. Other opportunities are available through brokers in the region. As a guide, the bus shown in Figure 7 is currently available through ScotiaShare Bus Sales in Moncton for \$95,000 plus tax.



**Figure 6: Halifax Harbour Bridges Shuttle Bus**



**2016 Ford E450 – Elkhart  
Coach 18 Passenger + 2 W/C +  
Driver**

**Figure 7: Image from ScotiaShare Bus Sales Website**

Consideration might also be given to purchasing a battery electric bus. Although double the cost of a gas bus, they have significantly lower operating costs and provide significant environmental benefits. The life cycle cost of a battery electric bus will be less than that of a diesel or gas bus. This type of bus would also align with Bridgewater Transit’s plan to migrate its fleet to battery electric. Additionally, there are several funding opportunities specifically tied to the purchase of batter electric buses<sup>7</sup>.

There will also be a capital cost associated with bus stop infrastructure (see Table 7). A minimum of three transit shelters should be constructed (Walmart, Michelin Plant, and Victoria Ridge) with the landowners’ permission. Ideally, there will be a sidewalk on the side of the street that the bus stops. At a minimum, there should be a concrete pad installed to allow for the front door ramp to be lowered onto. Bus stop signs will also need to be fabricated and installed at the fixed stops.

---

<sup>7</sup> Funding opportunities include Infrastructure Canada’s (INFC’s) Zero Emission Transit Funding (ZETF) program and the Rural Transit Solutions Fund (RTSF) along with their Canada Infrastructure Bank (CIB)

**Table 7: Bus Stop Infrastructure Costs**

ITEM	UNIT COST	TOTAL COST
Bus shelter (Osprey Village)	\$14,000	\$14,000
Bus stop signs and posts (11)	\$180	\$2,000
Concrete pad (8)	\$3,500	\$28,000
<b>TOTAL</b>		<b>\$44,000</b>

Note: all prices include taxes

## 4.4 OPERATING COST

The proposed MODL route measures approximately 18.8 kilometres in length compared to the approximately 17.0 kilometers in the Bridgewater Transit route. Table 8 shows the total amount of time and distance traveled for the route by weekday and by Saturday.

**Table 8: Daily Service Totals**

	WEEKDAYS		SATURDAY	
	Daily Hours	Daily Kilometres	Daily Hours	Daily Kilometres
<b>In-Service</b>	13.3	249	9.3	174
<b>Dead-heading (return to depot and start/end of daily operations)</b>	1.4	7	1.4	7

With a service day of 14.7 hours, it is most likely that this will be filled by two drivers doing a shift of 7 to 8 hours each. With the Saturday hours reduced to a total of 10.7, it is possible that one driver could do this in a single long shift, although dividing it into two shorter shifts may be more appealing to drivers. To cover vacations, illnesses, etc. three full-time drivers (in a shift rotation plan) or two full-time drivers and two casual or part-time drivers would be needed.

We expect that a portion of a MODL staff person will be required to coordinate and supervise operation of the service. We suggest that 40% of a position be assigned this responsibility (although additional time can be expected during the service start-up).

There will also be some costs prior to initiation of the service. A Phase 2 study will help to add detail to this Phase 1 study related to needed infrastructure and processes. Service promotion, customer information brochures, and an extension of the current Bridgewater Transit bus tracking app will also be required.

A summary of operating costs is provided in Table 9.

**Table 9: Operating Cost**

	Assumptions	Weekday Cost	Saturday Cost	Annual Cost <sup>2</sup>
<b>Drivers</b>	\$30.50/hr <sup>1</sup>	\$448	\$326	\$129,000
<b>Fuel</b>	34 litres/100 km \$1.70/litre	\$148	\$105	\$42,000
<b>Vehicle maintenance, inspections, licensing, and cleaning</b>				\$25,000
<b>Driver training, uniforms and equipment</b>				\$5,000
<b>Leasing a spare bus as needed</b>				
<b>MODL staff administrative position (0.4 FTE)</b>				\$30,000
<b>Incremental MODL service cost<sup>3</sup></b>				\$30,000
<b>Total annual operating costs</b>				<b>\$254,000</b>

Notes:

1. Driver cost is \$25 base salary plus 22% for benefits
  2. Annual cost is based on 250 weekdays and 52 Saturdays per year accounting for no service on Sundays and holidays
  3. May include marketing, liability insurance, and bus stop maintenance and snow removal incremental to services already covered in the Municipal budget.
- All prices include taxes

## 4.5 REVENUE PROJECTION

Projection of revenue is based on revenue from the Bridgewater Transit system which recorded revenues from fares of approximately \$45,000 in 2023. As the MODL service will be a start-up (and may take some time to build ridership) and serves areas with less trip production capability, we would conservatively project gross revenues from fares as \$36,000. Taking into account our suggestion that fare collection be handled by Bridgewater Transit, we have reduced this figure by an 8% service fee to get a net fare revenue of \$33,000.

Transit systems in similar population areas typically recover between 15% and 20% of their operating costs from revenues so our projection of 14% recovery of costs through fares seems to be close to the expected range.

Transit systems, including Bridgewater Transit, receive some revenue from advertising (on and inside the buses, on transit shelters and on system maps and brochures). To be conservative, we will assume zero revenue from advertising, at least for the first few years of operation.

## 4.6 FIVE YEAR PLAN

Our five year plan is based on the idea that MODL will initially provide approval for a one-year pilot operation. At the end of the pilot, MODL staff will report on ridership and public feedback and confirm assumptions related to operating costs and revenues. A decision would then be made regarding permanent continuation of the service. Bridgewater Transit took an approach like this in 2017 to initiate its service.

To minimize costs that might be lost should a decision be made to discontinue the service at the end of the one-year pilot, we recommend that a used bus be sought and procured. A new bus would be purchased in year two if the

service is made permanent and the used bus could be resold, used as a spare, or decommissioned. Also, fixed stops will only be fitted with signs and concrete pads and shelters will only be installed in year two.

A summary of the system costs over the first five years of operation are shown in Table 10. We have used an annual inflation rate of 3% for all elements of the service other than fuel which we assume will increase at 4%.

For fare revenue, we have not assumed any fare increases, but anticipate that as the service matures, ridership will increase by 3% per year.

**Table 10: Service Cost Summary (Gas Bus)**

	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Capital Costs</b>					
Used gas bus	\$100,000				
New gas bus		\$220,000			
Signs, shelters, concrete pads, etc.	\$2,000	\$42,000			
<b>Operating Costs</b>					
Driver salaries	\$129,000	\$133,000	\$137,000	\$141,000	\$145,000
Fuel	\$42,000	\$44,000	\$45,000	\$47,000	\$49,000
Vehicle maintenance, licensing, etc.	\$25,000	\$26,000	\$27,000	\$27,000	\$28,000
Leasing a spare bus as required	\$2,000	\$2,000	\$2,100	\$2,100	\$2,200
Driver training, equipment, etc.	\$5,000	\$5,000	\$5,000	\$5,000	\$6,000
Phase 2 plan, tracker app extension	\$40,000				
MODL incremental service	\$30,000	\$31,000	\$32,000	\$33,000	\$34,000
MODL staff administration	\$30,000	\$31,000	\$32,000	\$33,000	\$34,000
<b>Revenue</b>					
Net revenue from fares	\$33,000	\$34,000	\$35,000	\$36,000	\$37,000
Miscellaneous revenue (advertising, etc.)			\$10,000	\$10,000	\$11,000
<b>TOTAL CAPITAL COST</b>	<b>\$102,000</b>	<b>\$262,000</b>			
<b>TOTAL OPERATING COST</b>	<b>\$303,000</b>	<b>\$272,000</b>	<b>\$270,000</b>	<b>\$278,000</b>	<b>\$288,000</b>
<b>LESS NET REVENUE</b>	<b>\$33,000</b>	<b>\$34,000</b>	<b>\$45,000</b>	<b>\$46,000</b>	<b>\$48,000</b>
<b>ANNUAL SERVICE COST</b>	<b>\$372,000</b>	<b>\$500,000</b>	<b>\$225,000</b>	<b>\$232,000</b>	<b>\$240,000</b>

Note: All prices include taxes

## 4.7 USING BATTERY-ELECTRIC INSTEAD OF DIESEL BUSES

Battery-electric buses are seeing much wider use in municipal public transit systems. The key reasons for this are:

- Help to meet Municipal climate change targets;
- Have lower operating costs and a lower life-cycle cost;
- Produce less noise and exhaust, particularly beneficial in downtowns and urban areas; and
- Are better supported by Federal funding programs.

One issue that arises with battery-electric buses is that they do not have enough battery range to complete a full day of service. Larger batteries can be custom-installed, but the added weight greatly reduces the efficiency of the bus. Some transit systems install in-route chargers so that buses can “top up” their batteries for 5-10 minutes at timing points along the route. The infrastructure required to do this, however, is prohibitively expensive<sup>8</sup> and only justified when a large number of routes can share the charging infrastructure. Three options seem evident for the MODL service:

- Take the battery-electric bus out of service for one of its mid-day cycles for a one-hour battery top-up. This cycle could either be a gap in the schedule, or filled by a backup bus.
- Purchase two battery-electric buses and swap them in and out of service at one or two points during the day. Although it seems inefficient to purchase two battery-electric buses to do the service of one gas bus, it should be considered that a bus doing only a half-day of service everyday can be expected to last twice as long as a bus that continually does a full day of service.
- Bridgewater Transit is considering a future migration to battery-electric buses and a truly integrated system could employ three battery-electric buses to operate the proposed two-route system. A swapping-out timetable would be developed whereby two buses are in service while the third is receiving a mid-day recharge.

Using a 24-seat battery-electric bus similar to the gas bus that was recommended in Section 4.3 and, again, using Crestline Coaches as a representative sample, the cost of a new bus would be approximately \$600,000. The cost of a 150kW charging station would be \$150,000 installed.

Tables 11 and 12 illustrate capital and operating costs for using battery-electric buses instead of gas buses.

**Table 11: Operating Costs (Battery Electric Bus)**

	Assumptions	Annual Cost
<b>Energy</b>	Consumption: 0.80kW/km 0 to 200 (peak demand value): \$0.15076/kWh 200 (peak demand value) plus: \$0.11779/kWh Demand charge: \$10/kw	\$18,800
<b>Maintenance</b>		\$20,000
<b>Total annual operating costs</b>		<b>\$38,800</b>

<sup>8</sup> A 450 kW fast charger designed for a quick connect to in-route vehicles would cost between \$1.0 and \$1.2 million.

**Table 12: Service Cost Summary (Battery-Electric Bus)**

	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Capital Costs</b>					
Used gas bus	\$100,000				
One new battery electric bus		\$600,000			
One 150 kW plug-in charger		\$150,000			
Signs, shelters, concrete pads, etc.	\$2,000	\$42,000			
<b>Operating Costs</b>					
Driver salaries	\$129,000	\$133,000	\$137,000	\$141,000	\$145,000
Fuel	\$42,000				
Energy		\$19,000	\$20,000	\$21,000	\$21,000
Vehicle maintenance, licensing, etc.	\$25,000	\$20,000	\$21,000	\$21,000	\$22,000
Leasing a spare bus as required	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
Driver training, equipment, etc.	\$5,000	\$5,000	\$5,000	\$5,000	\$6,000
Phase 2 plan, tracker app extension	\$40,000				
MODL incremental service	\$30,000	\$31,000	\$32,000	\$33,000	\$34,000
MODL staff administration	\$30,000	\$31,000	\$32,000	\$33,000	\$34,000
<b>Revenue</b>					
Net revenue from fares	\$33,000	\$34,000	\$35,000	\$36,000	\$37,000
Miscellaneous revenue (advertising, etc.)			\$10,000	\$10,000	\$11,000
<b>TOTAL CAPITAL COST</b>	<b>\$102,000</b>	<b>\$792,000</b>			
<b>TOTAL OPERATING COST</b>	<b>\$303,000</b>	<b>\$241,000</b>	<b>\$249,000</b>	<b>\$256,000</b>	<b>\$264,000</b>
<b>LESS NET REVENUE</b>	<b>\$33,000</b>	<b>\$34,000</b>	<b>\$45,000</b>	<b>\$46,000</b>	<b>\$48,000</b>
<b>ANNUAL SERVICE COST</b>	<b>\$372,000</b>	<b>\$999,000</b>	<b>\$204,000</b>	<b>\$210,000</b>	<b>\$216,000</b>

Both Infrastructure Canada's (INFC's) Zero Emission Transit Funding (ZETF) program and the Rural Transit Solutions Fund (RTSF) along with their Canada Infrastructure Bank (CIB) financing components offer an opportunity to fund purchase of a battery-electric bus and charging support. However, the RTSF funding will require MODL to demonstrate the rural character of the communities that the transit electrification project will serve. Maximum project contribution from the RTSF is capped 80 per cent of the eligible capital expenses of the project up to \$5 million. Federal stacking from other programs is allowed and limited to 80 per cent of total capital expenses of the project.

## 5 SUMMARY AND CONCLUSIONS

The existing commercial activity and the planned residential density within Osprey Village make it an attractive opportunity to introduce public transit in MODL. Through extensive examination of options and mapping of routing possibilities, this study has developed what we believe to be an optimal routing scheme that connects Osprey Village to Hebbville, Wileville, and key destinations within the Town of Bridgewater.

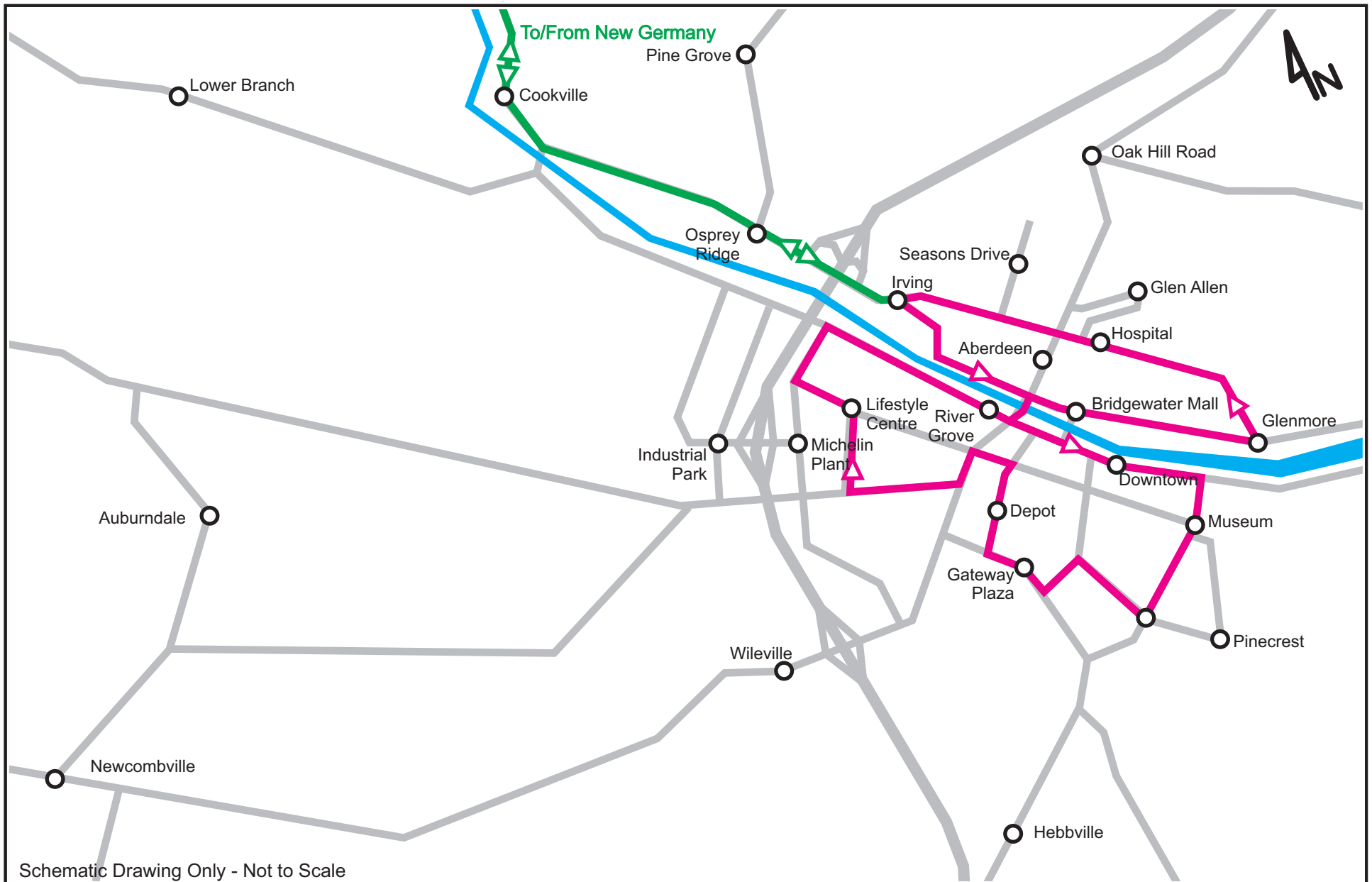
Close coordination with the Town of Bridgewater will be needed to bring the proposed service to reality. Firstly, since the service extends across the Town boundary, services destinations within the Town, and overlaps the existing service in some places, an Operating License will be needed from the Nova Scotia Utility and Review Board. Full support from the Town will be needed for granting of this license. Secondly, fare integration at a minimum, and ideally reliance on Bridgewater Transit to vend passes and tickets, collect and process cash fares, and distribute revenues will greatly benefit the MODL service.

The proposed service shown in Appendix B will provide hourly transit service to Osprey Village, the Michelin site, Wileville, Hebbville, and several key destinations within the Town of Bridgewater. The costs and revenues associated with the operation of this service are described in this report. As can be expected with any public transit service, the operating cost far exceeds the revenue realized. It must be recognized that public transit is a municipal service that provides environmental, accessibility, and social equality benefits and attractiveness to prospective residents and businesses. It adds a measurable increment to the quality of life of residents within the service area.

This plan has provided financial projections based on the assumptions made in the study. This will provide MODL with a picture of the magnitude of investment needed to initiate public transit. Prior to initiating service, MODL may wish to consider such things as modification of the routing, a different model for operating the system, or other changes to the assumptions made in this study. Even so, financial implications should not vary significantly from the projections made in this study.

# APPENDIX

## **A** *ROUTING SCENARIOS*



Schematic Drawing Only - Not to Scale



TRANSIT FEASIBILITY &  
5 - YEAR BUSINESS PLAN



### ROUTE LAYOUT A

CPT Study - New Germany Extension  
Agenda Page 71 of 192

**1 bus**  
60 min. cycle  
52 min. in-service time  
8 min. dwell time

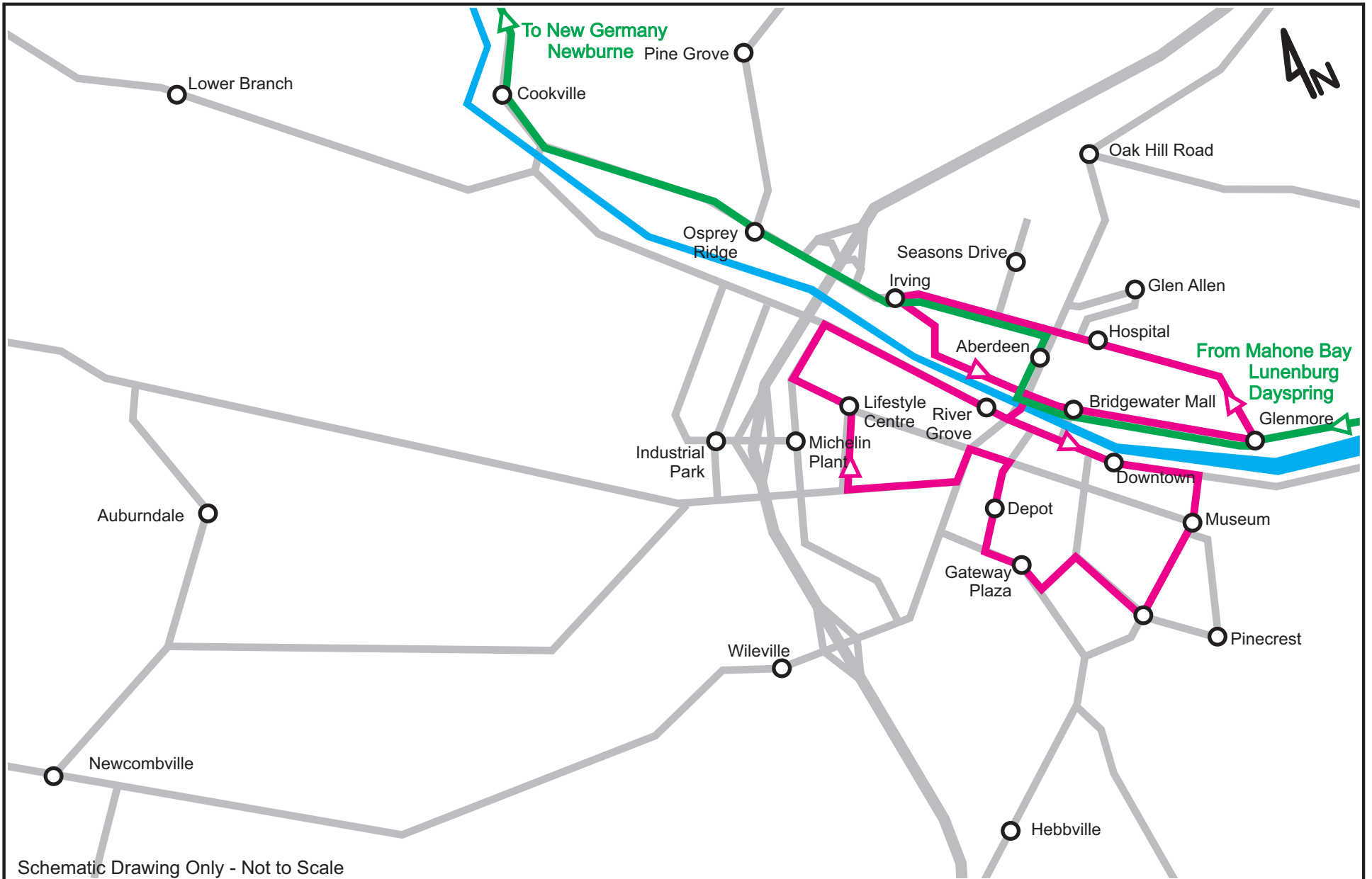
**1 bus**  
60 min. cycle  
54 min. in-service time  
6 min. dwell time

#### LIFESTYLE CENTRE

arr 0:56  
dep 0:00

#### IRVING

arr 0:20	arr 0:25
dep 0:28	dep 0:25



Schematic Drawing Only - Not to Scale



TRANSIT FEASIBILITY &  
5 - YEAR BUSINESS PLAN



### ROUTE LAYOUT B

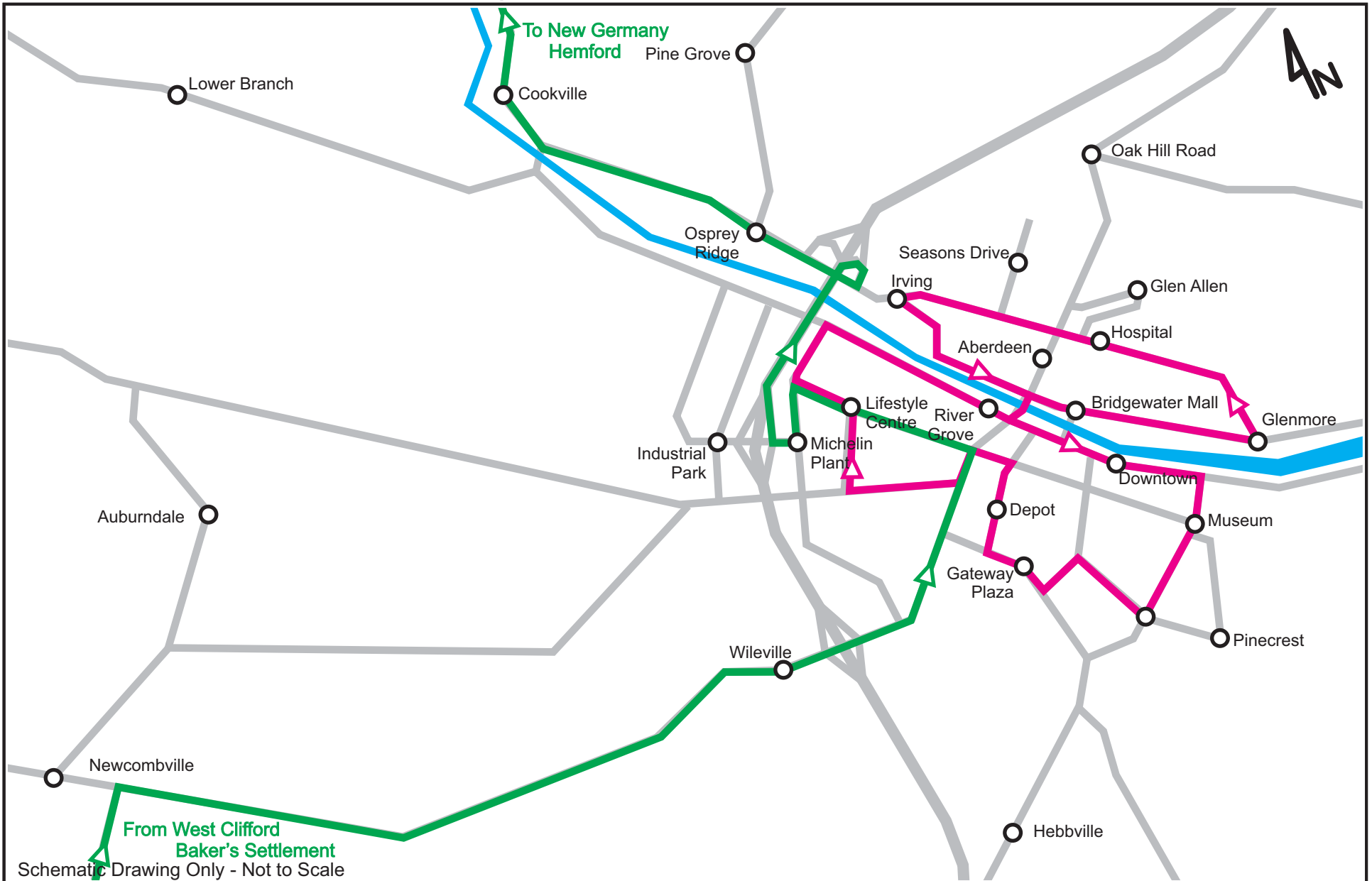
CPT Study - Public Suggestion (Brown Route)  
Agenda Page 72 of 192

**1 bus**  
180 min. cycle  
135 min. in-service time  
45 min. dwell time

**1 bus**  
60 min. cycle  
54 min. in-service time  
6 min. dwell time

<b>LIFESTYLE CENTRE</b>
arr 0:56 dep 0:00

<b>IRVING</b>
connects every third bus
arr 0:25 dep 0:25



TRANSIT FEASIBILITY &  
5 - YEAR BUSINESS PLAN



### ROUTE LAYOUT C

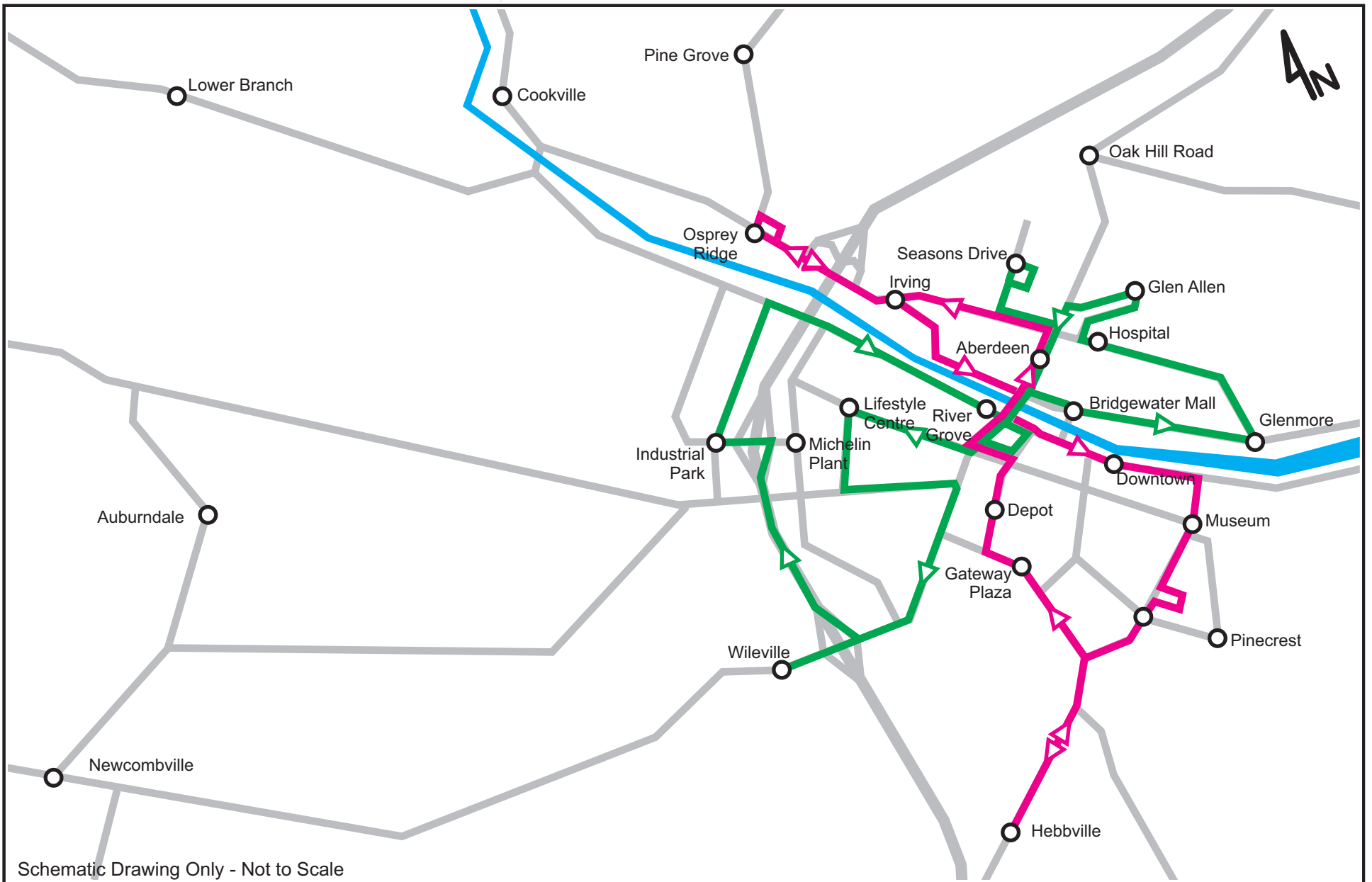
CPT Study - Public Suggestion (Purple)  
Agenda Page 73 of 192

**1 bus**  
120 min. cycle  
70 min. in-service time  
50 min. dwell time

**1 bus**  
60 min. cycle  
54 min. in-service time  
6 min. dwell time

**LIFESTYLE CENTRE**  
connects every second bus  
arr 0:56  
dep 0:00

**IRVING**  
arr 0:25  
dep 0:25



Schematic Drawing Only - Not to Scale



TRANSIT FEASIBILITY &  
5 - YEAR BUSINESS PLAN



### ROUTE LAYOUT D

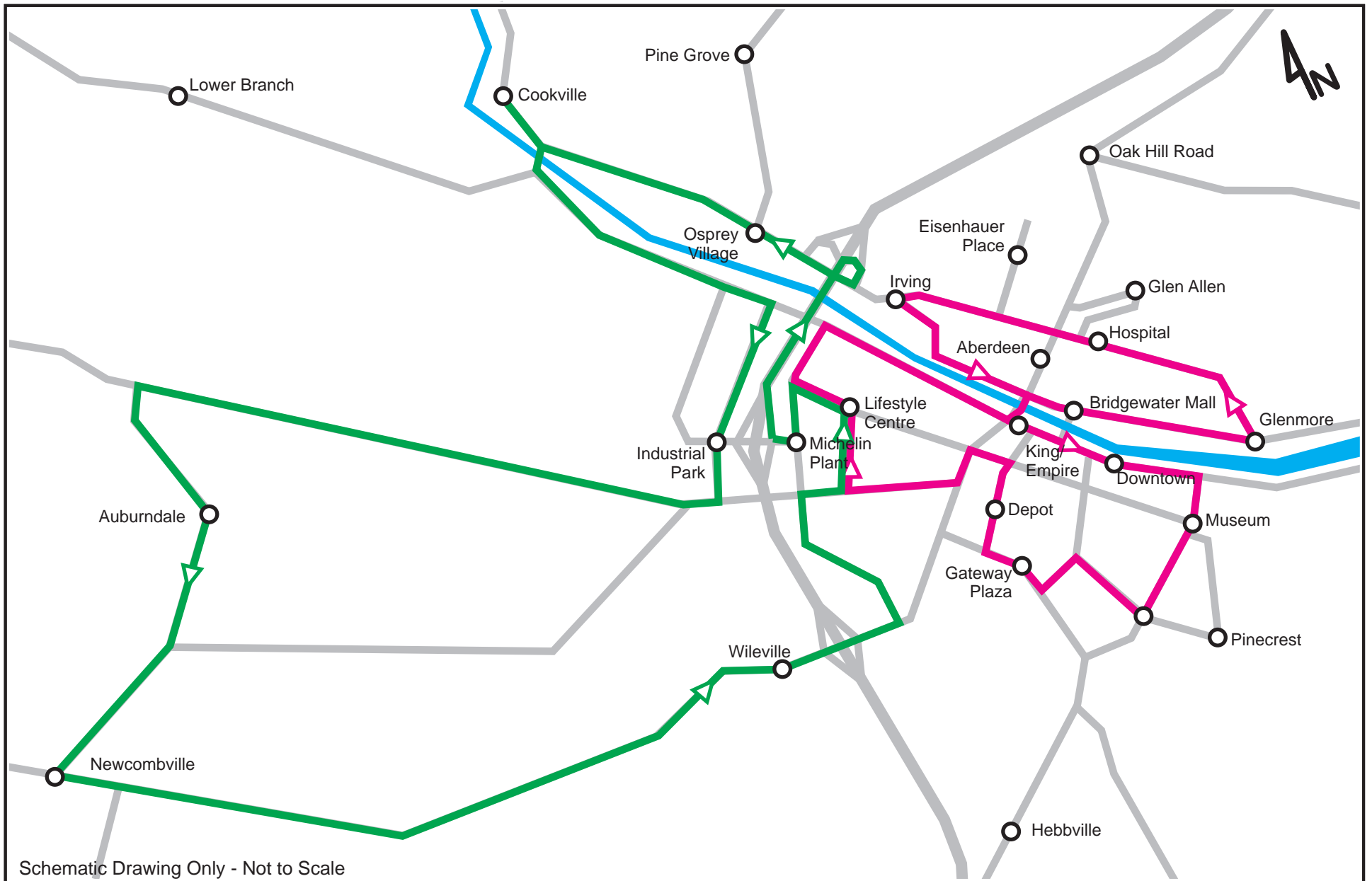
Daisy Petals  
Agenda Page 74 of 192

0:00 dep River Grove  
0:14 Wileville  
0:28 arr River Grove  
0:32 dep River Grove  
0:46 Hospital  
0:56 arr River Grove

0:00 dep River Grove  
0:15 Osprey Ridge  
0:28 arr River Grove  
0:32 dep River Grove  
0:42 Hebbville  
0:53 arr River Grove

1 bus  
60 min. cycle  
52 min. in-service time  
8 min. dwell time

1 bus  
60 min. cycle  
49 min. in-service time  
11 min. dwell time



Schematic Drawing Only - Not to Scale



TRANSIT FEASIBILITY &  
5 - YEAR BUSINESS PLAN



### ROUTE LAYOUT E

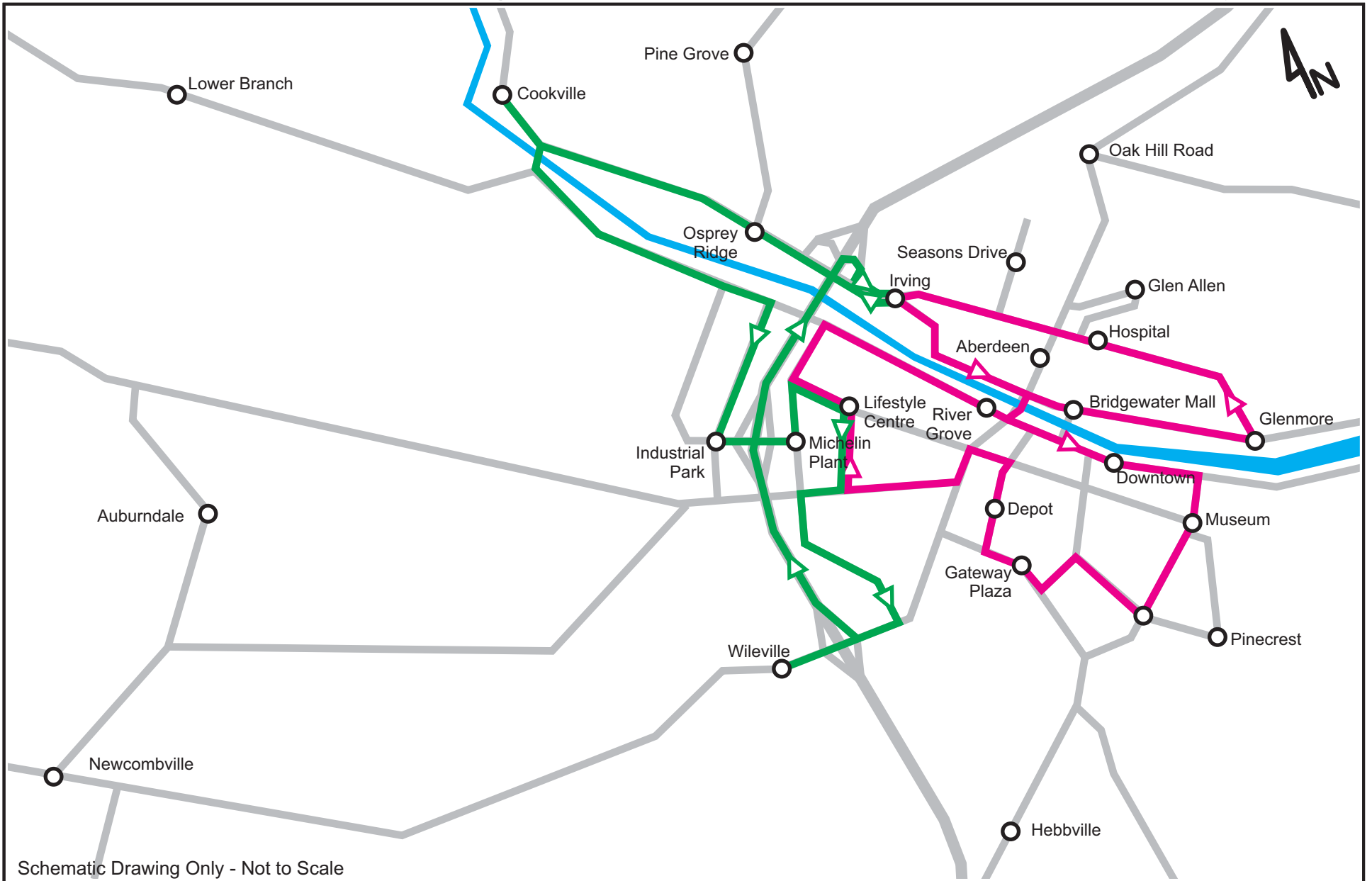
Tight County Route  
Agenda Page 75 of 192

**1 bus**  
60 min. cycle  
54 min. in-service time  
6 min. dwell time

**1 bus**  
60 min. cycle  
54 min. in-service time  
6 min. dwell time

LIFESTYLE CENTRE	
arr 0:56	arr 0:56
dep 0:00	dep 0:00

IRVING	
arr 0:25	arr 0:25
dep 0:25	dep 0:25



Schematic Drawing Only - Not to Scale



TRANSIT FEASIBILITY &  
5 - YEAR BUSINESS PLAN



### ROUTE LAYOUT F

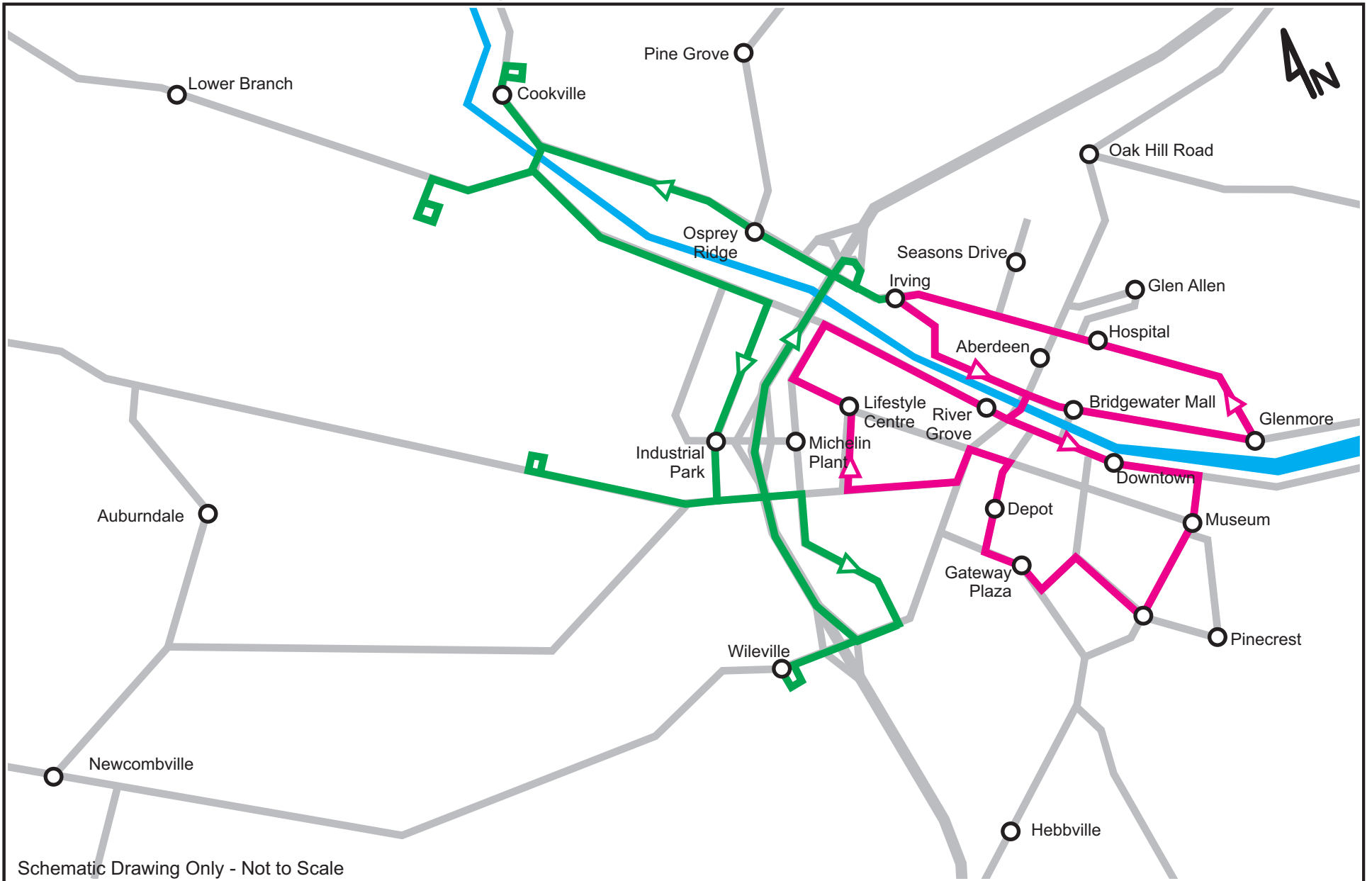
Industrial Park Overlap  
Agenda Page 76 of 192

**1 bus**  
60 min. cycle  
44 min. in-service time  
16 min. dwell time

**1 bus**  
60 min. cycle  
54 min. in-service time  
6 min. dwell time

LIFESTYLE CENTRE	
arr 0:56	arr 0:56
dep 0:00	dep 0:00

IRVING	
arr 0:18	arr 0:25
dep 0:30	dep 0:25



Schematic Drawing Only - Not to Scale



TRANSIT FEASIBILITY &  
5 - YEAR BUSINESS PLAN



**ROUTE LAYOUT G**

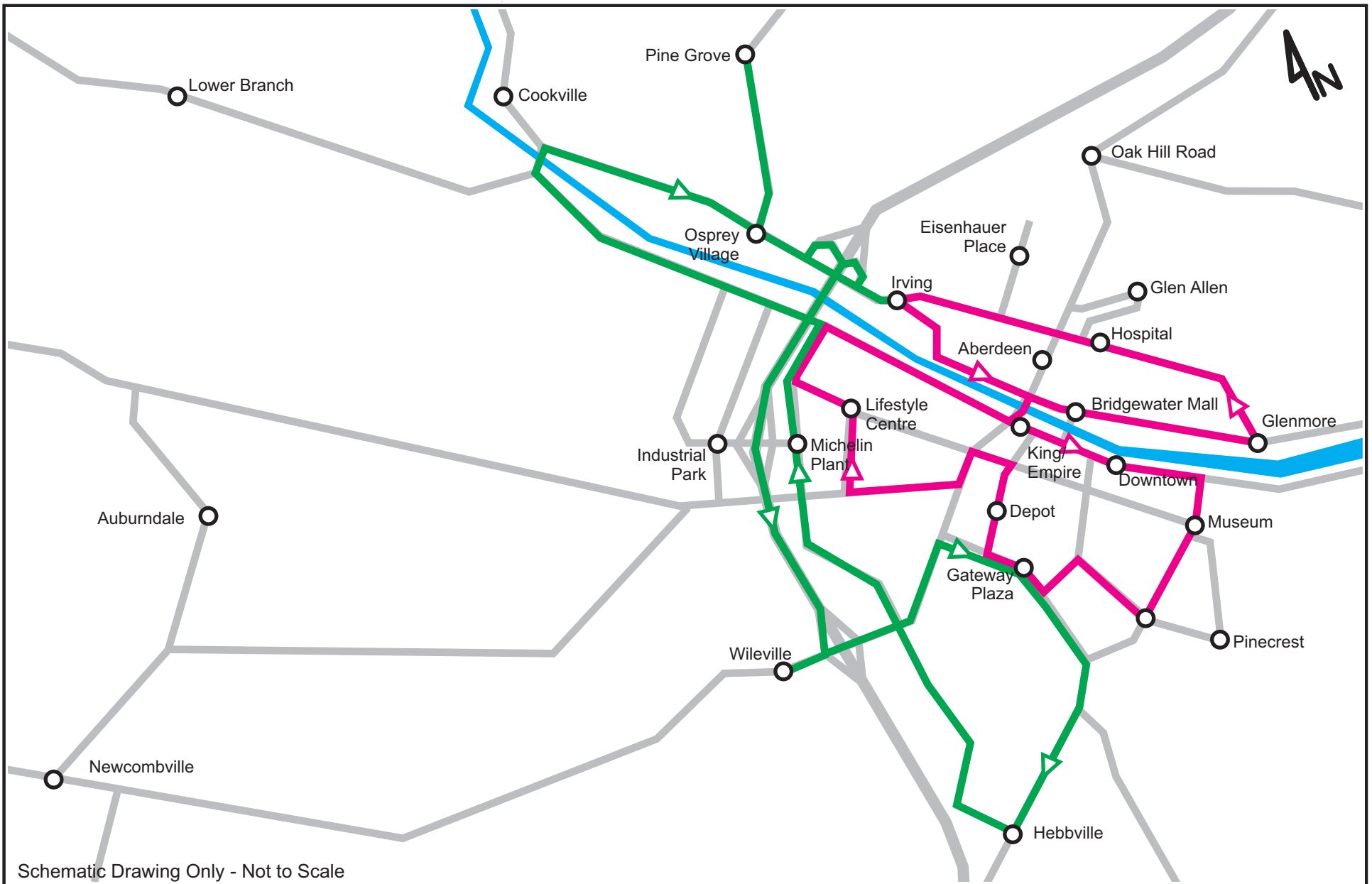
MODL Nearby Communities  
Agenda Page 77 of 192

**1 bus**  
60 min. cycle  
49 min. in-service time  
11 min. dwell time

**1 bus**  
60 min. cycle  
54 min. in-service time  
6 min. dwell time

<b>LIFESTYLE CENTRE</b>
arr 0:56 dep 0:00

<b>IRVING</b>	
arr 0:18 dep 0:29	arr 0:25 dep 0:25



Schematic Drawing Only - Not to Scale



TRANSIT FEASIBILITY &  
5 - YEAR BUSINESS PLAN



### ROUTE LAYOUT H

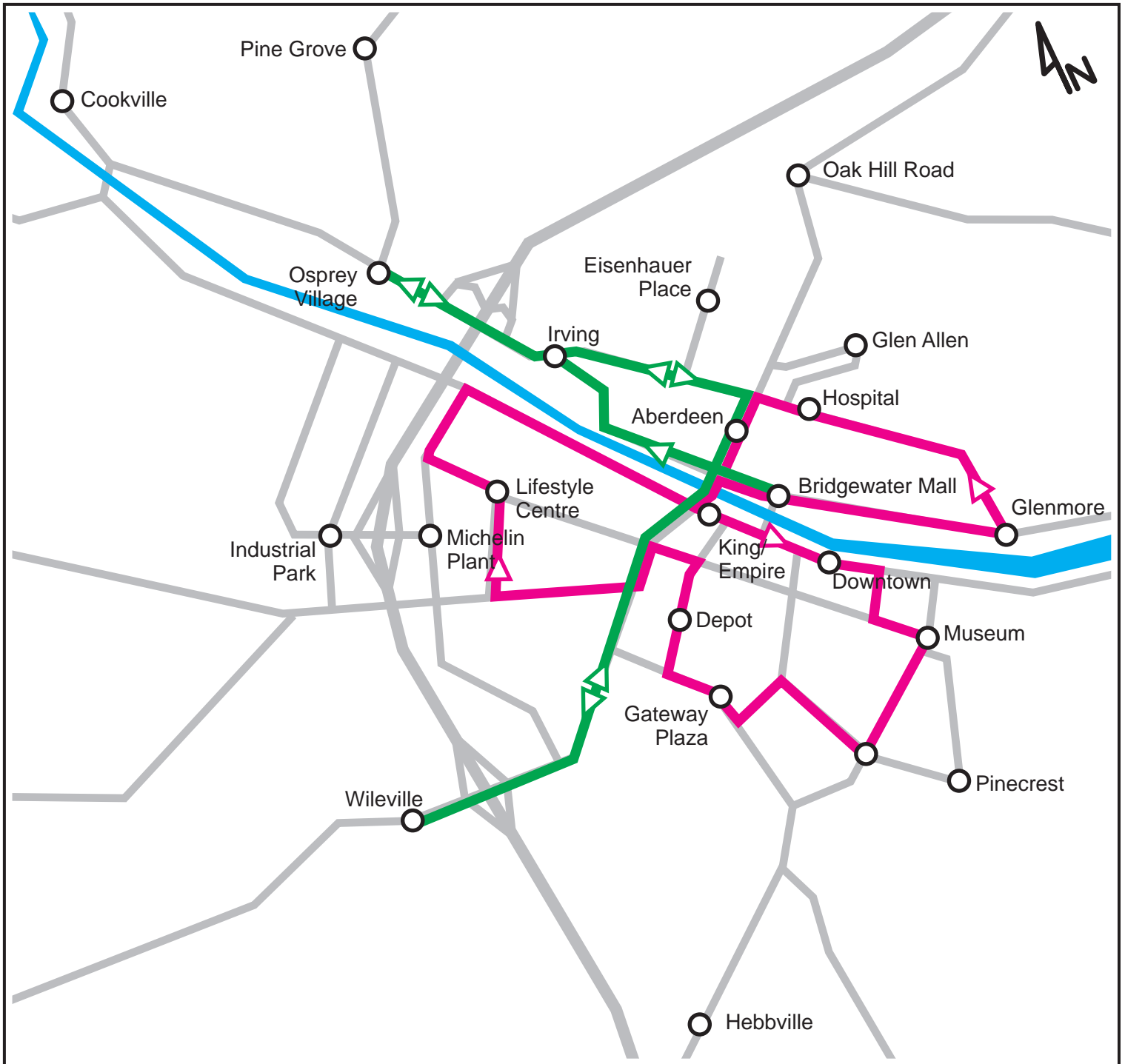
Gateway Plaza Connection  
Agenda Page 78 of 192

0:18 dep Osprey Village	0:48 dep Gateway Plaza
0:20 Pine Grove	0:51 Hebbville
0:25 arr Irving	0:00 Michelin
0:27 dep Irving	0:10 Turner Heights
0:32 Osprey Village	0:16 arr Osprey Village
0:40 Wileville	
0:46 arr Gateway Plaza	

0:00 dep LCLC
0:25 arr Irving
0:27 dep Irving
0:46 arr Plaza
0:48 dep Plaza
0:00 arr LCLC

1 bus
60 min. cycle
54 min. in-service time
6 min. dwell time

1 bus
60 min. cycle
56 min. in-service time
4 min. dwell time



1 bus  
60 min. cycle  
54 min. in-service time  
6 min. dwell time

1 bus  
60 min. cycle  
53 min. in-service time  
7 min. dwell time

Schematic Drawing Only - Not to Scale



TRANSIT FEASIBILITY &  
5 - YEAR BUSINESS PLAN

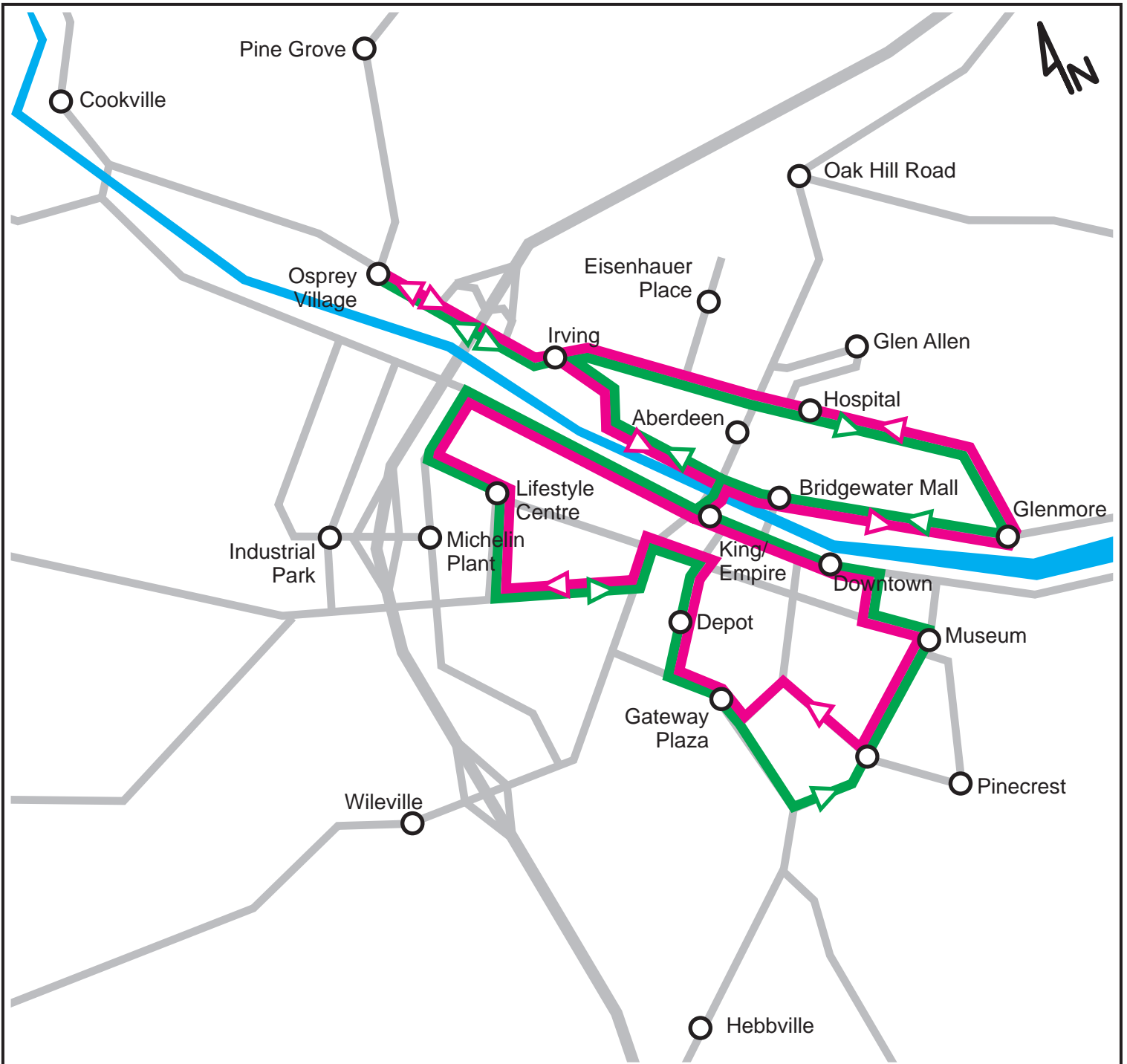


### ROUTE LAYOUT J

Shuttle Plus Wileville  
Agenda Page 79 of 192

0:16 dep Osprey Village  
0:22 arr Aberdeen  
0:25 dep Aberdeen  
0:32 Osprey Village  
0:41 Hospital  
0:54 Wileville  
0:13 arr Osprey Village

0:00 dep LCLC  
0:22 arr Aberdeen  
0:25 dep Aberdeen  
0:44 Gateway Plaza  
0:56 arr LCLC



1 bus  
75 min. cycle  
65 min. in-service time  
10 min. dwell time

1 bus  
75 min. cycle  
65 min. in-service time  
10 min. dwell time

Schematic Drawing Only - Not to Scale



TRANSIT FEASIBILITY &  
5 - YEAR BUSINESS PLAN

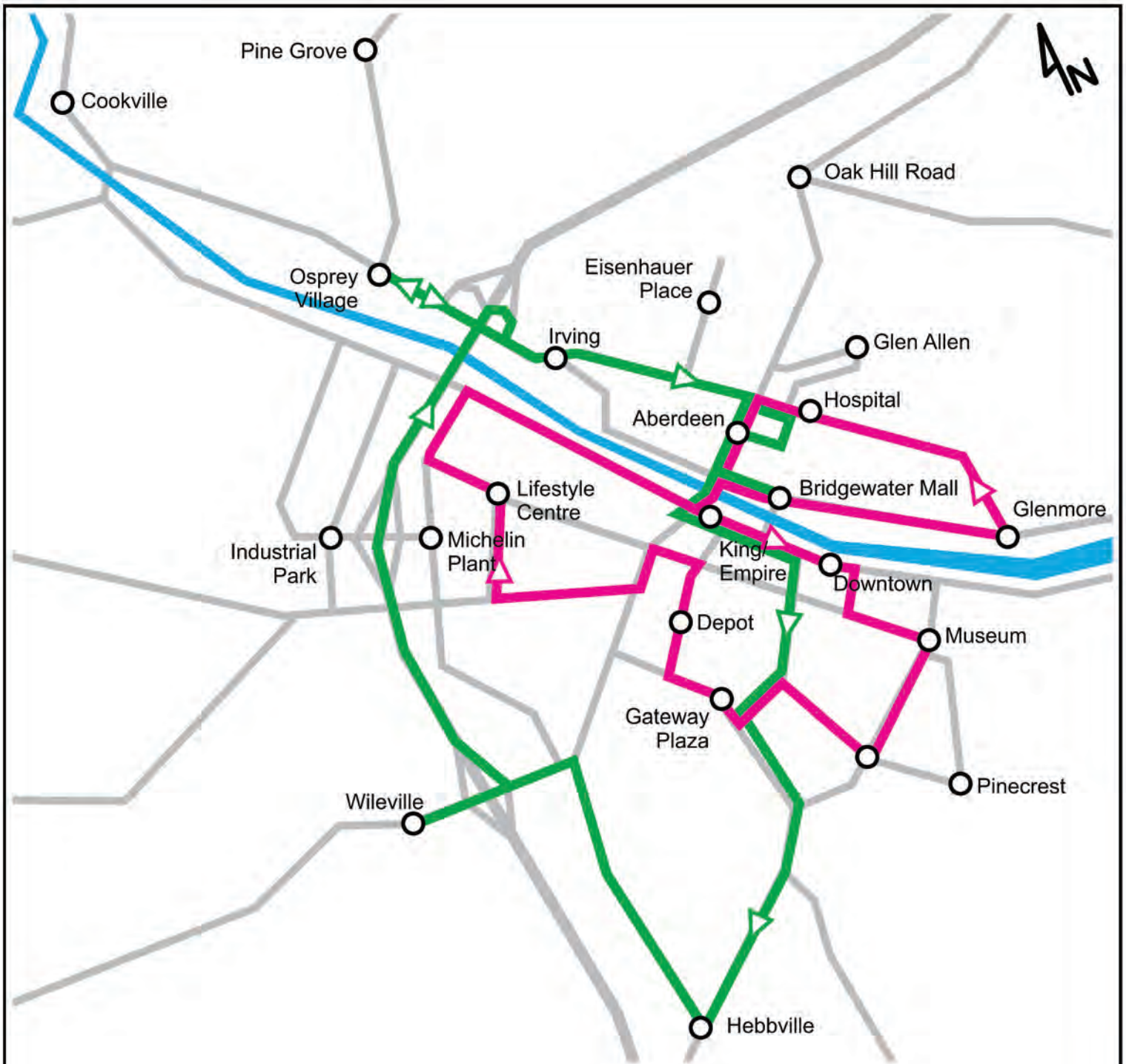


**ROUTE LAYOUT K**

Reversing Loops  
Agenda Page 80 of 192

0:00 dep LCLC  
0:30 arr Osprey Village  
0:35 dep Osprey Village  
0:42 King/Empire  
1:10 arr LCLC

0:00 dep LCLC  
0:21 King/Empire  
0:31 arr Osprey Village  
0:36 dep Osprey Village  
1:10 arr LCLC



1 bus  
60 min. cycle  
51 min. in-service time  
9 min. dwell time

1 bus  
60 min. cycle  
53 min. in-service time  
7 min. dwell time

Schematic Drawing Only - Not to Scale



TRANSIT FEASIBILITY &  
5 - YEAR BUSINESS PLAN

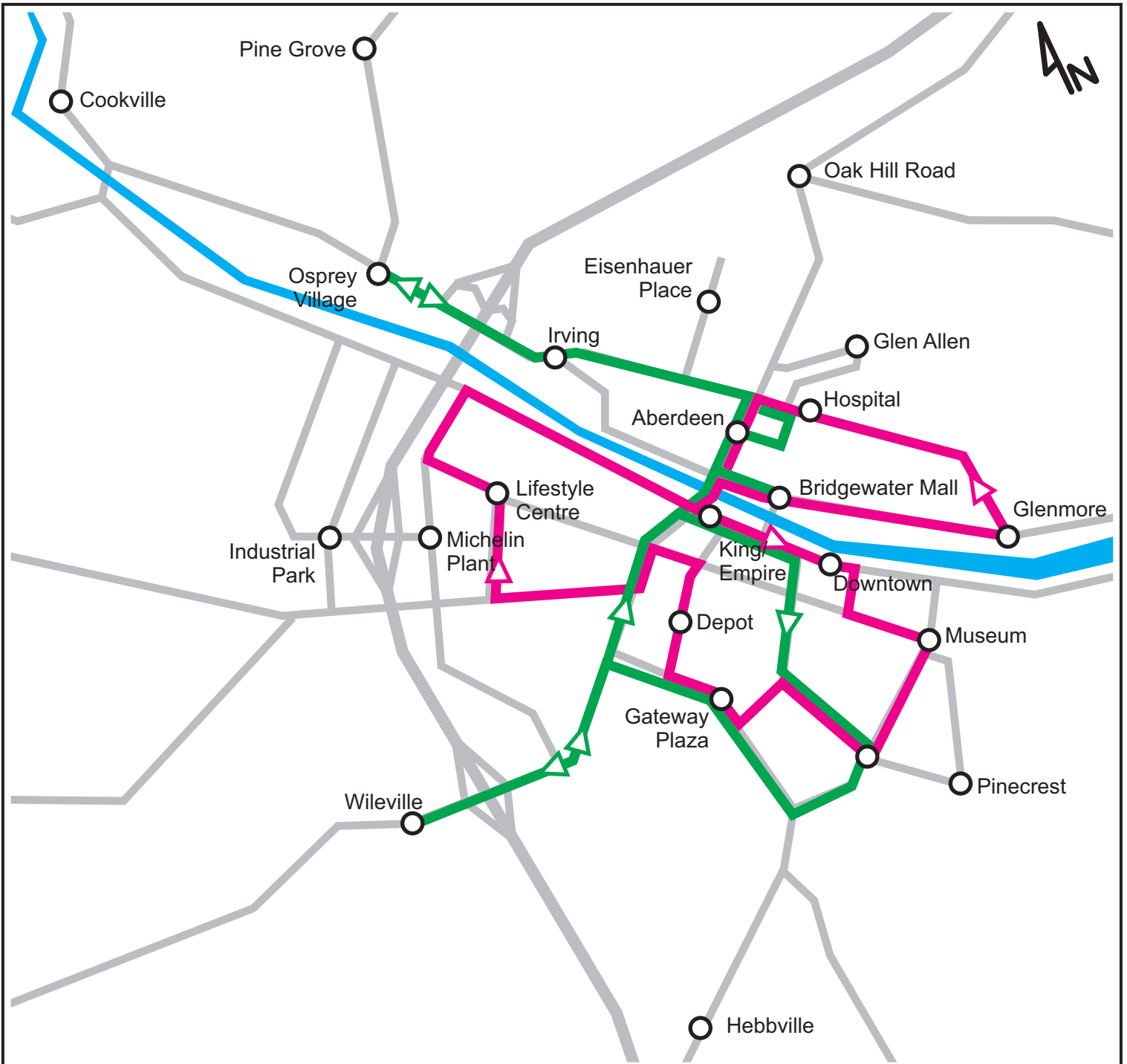


ROUTE LAYOUT L

MODL Staff Suggestion C  
Agenda Page 81 of 192

0:00 dep Osprey Village  
0:12 arr Mall  
0:15 dep Mall  
0:28 Gateway Plaza  
0:32 Hebbville  
0:42 Wileville  
0:54 arr Osprey Village

0:00 dep LCLC  
0:12 arr Mall  
0:15 dep Mall  
0:44 Gateway Plaza  
0:56 arr LCLC



1 bus  
60 min. cycle  
60 min. in-service time  
0 min. dwell time

1 bus  
60 min. cycle  
53 min. in-service time  
7 min. dwell time

Schematic Drawing Only - Not to Scale



TRANSIT FEASIBILITY &  
5 - YEAR BUSINESS PLAN

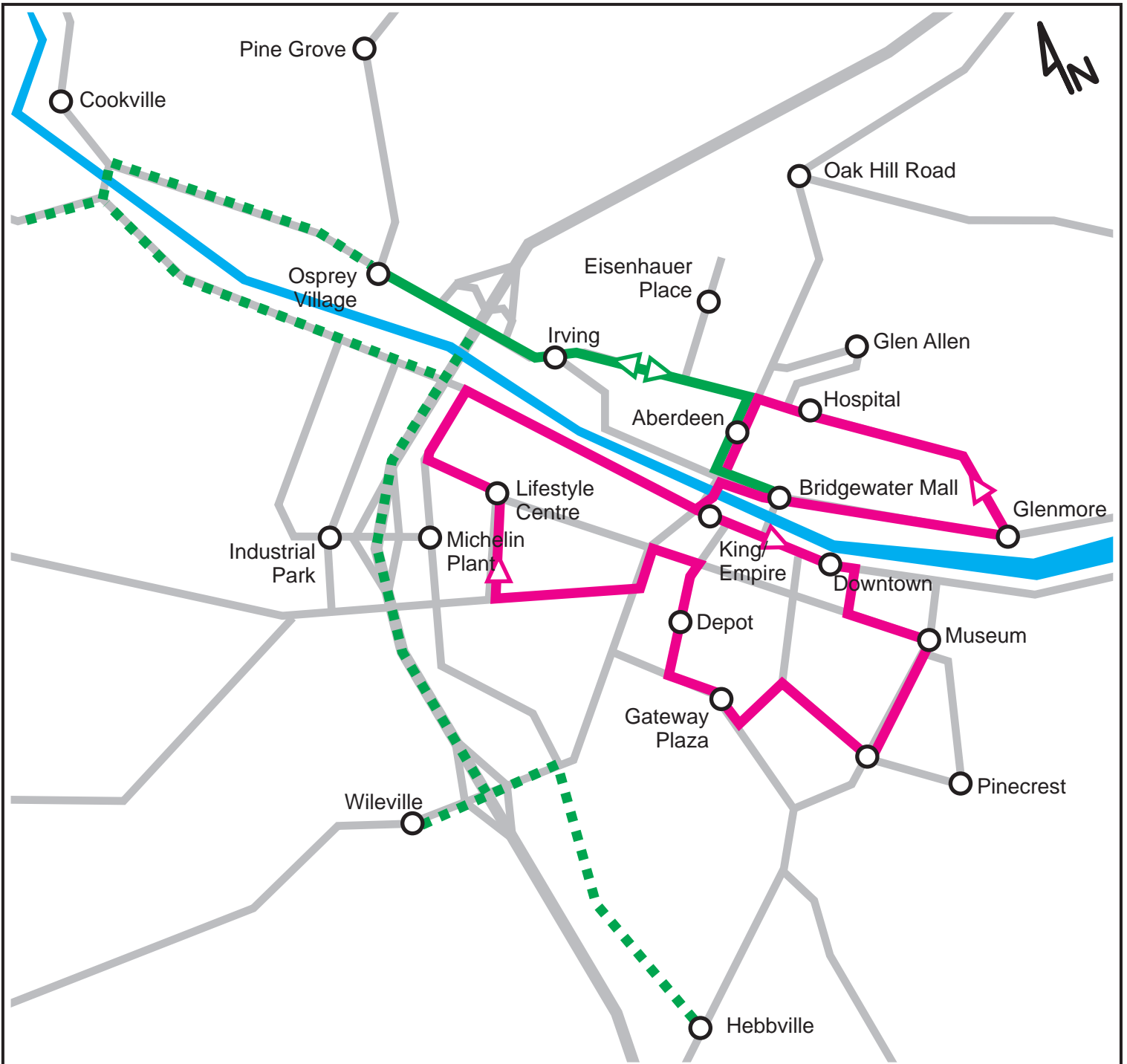


ROUTE LAYOUT M

MODL Staff Suggestion D  
Agenda Page 82 of 192

0:00 dep Osprey Village  
0:12 arr Mall  
0:15 dep Mall  
0:32 Gateway Plaza  
0:39 Wileville  
0:00 arr Osprey Village

0:00 dep LCLC  
0:12 arr Mall  
0:15 dep Mall  
0:44 Gateway Plaza  
0:56 arr LCLC



1 bus  
 60 min. cycle  
 27 min. fixed route  
 33 min. dwell & on-demand

1 bus  
 60 min. cycle  
 53 min. in-service time  
 7 min. dwell time

0:00 dep Osprey Village  
 0:12 arr Mall  
 0:15 dep Mall  
 0:27 arr Osprey Village  
 0:27 to 0:59  
 Window for on-demand

0:00 dep LCLC  
 0:12 arr Mall  
 0:15 dep Mall  
 0:44 Gateway Plaza  
 0:56 arr LCLC

Schematic Drawing Only - Not to Scale

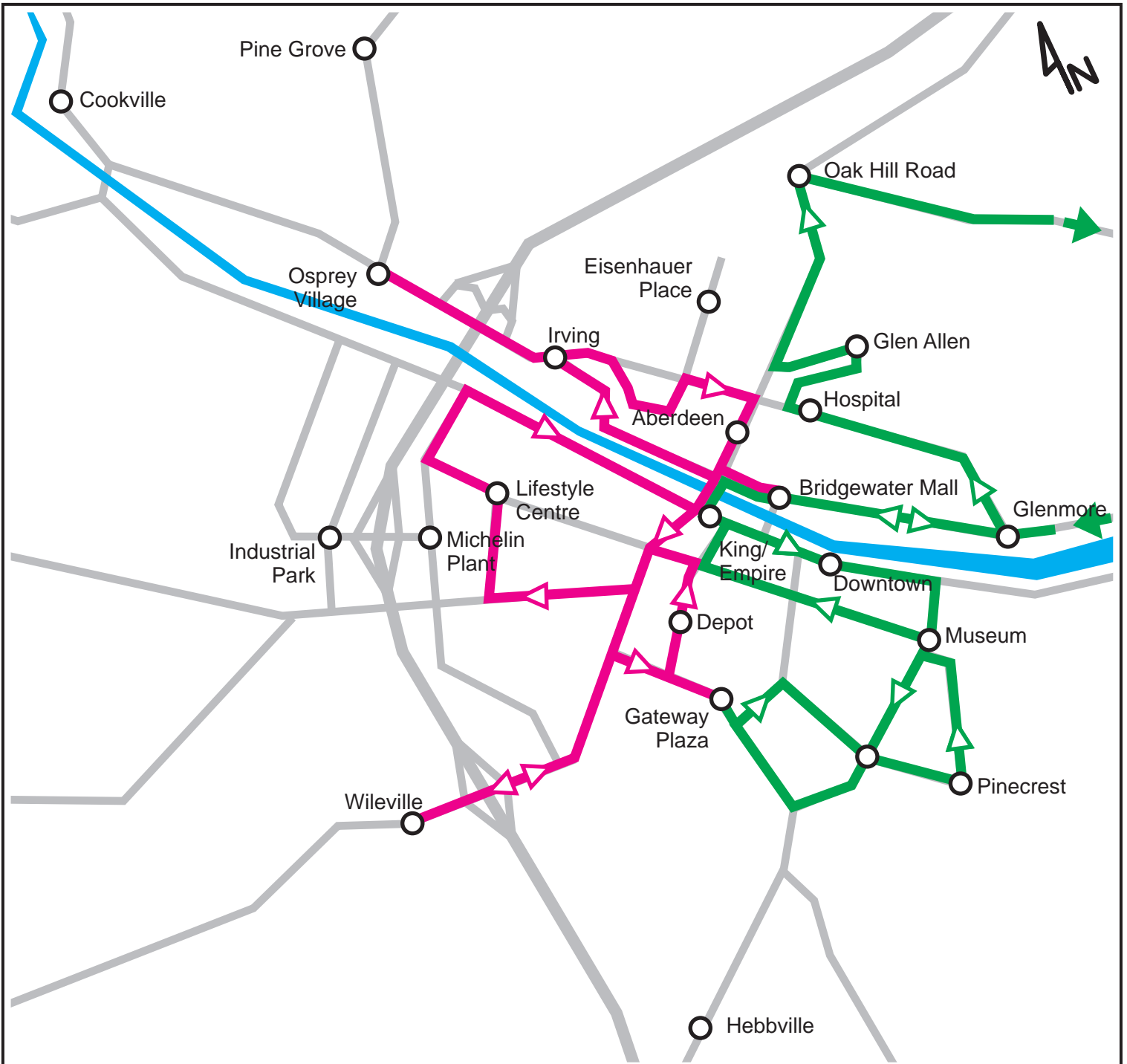


TRANSIT FEASIBILITY &  
 5 - YEAR BUSINESS PLAN



ROUTE LAYOUT N

Shuttle Plus On-Demand  
 Agenda Page 83 of 192



1 bus  
80 min. cycle  
53 min. in-service time  
27 min. dwell time

1 bus  
80 min. cycle  
74 min. in-service time  
6 min. dwell time

0:00 dep Mall  
0:08 Hospitala  
0:22 arr Mall  
0:32 dep Mall  
0:48 arr Gateway Plaza  
0:52 dep Gateway Plaza  
0:60 Museum  
0:67 arr Mall

0:00 dep Mall  
0:15 Osprey Village  
0:29 arr Mall  
0:32 dep Mall  
0:42 Wileville  
0:51 arr Gateway Plaza  
0:52 dep Gateway Plaza  
0:60 LCLC  
0:78 arr Mall

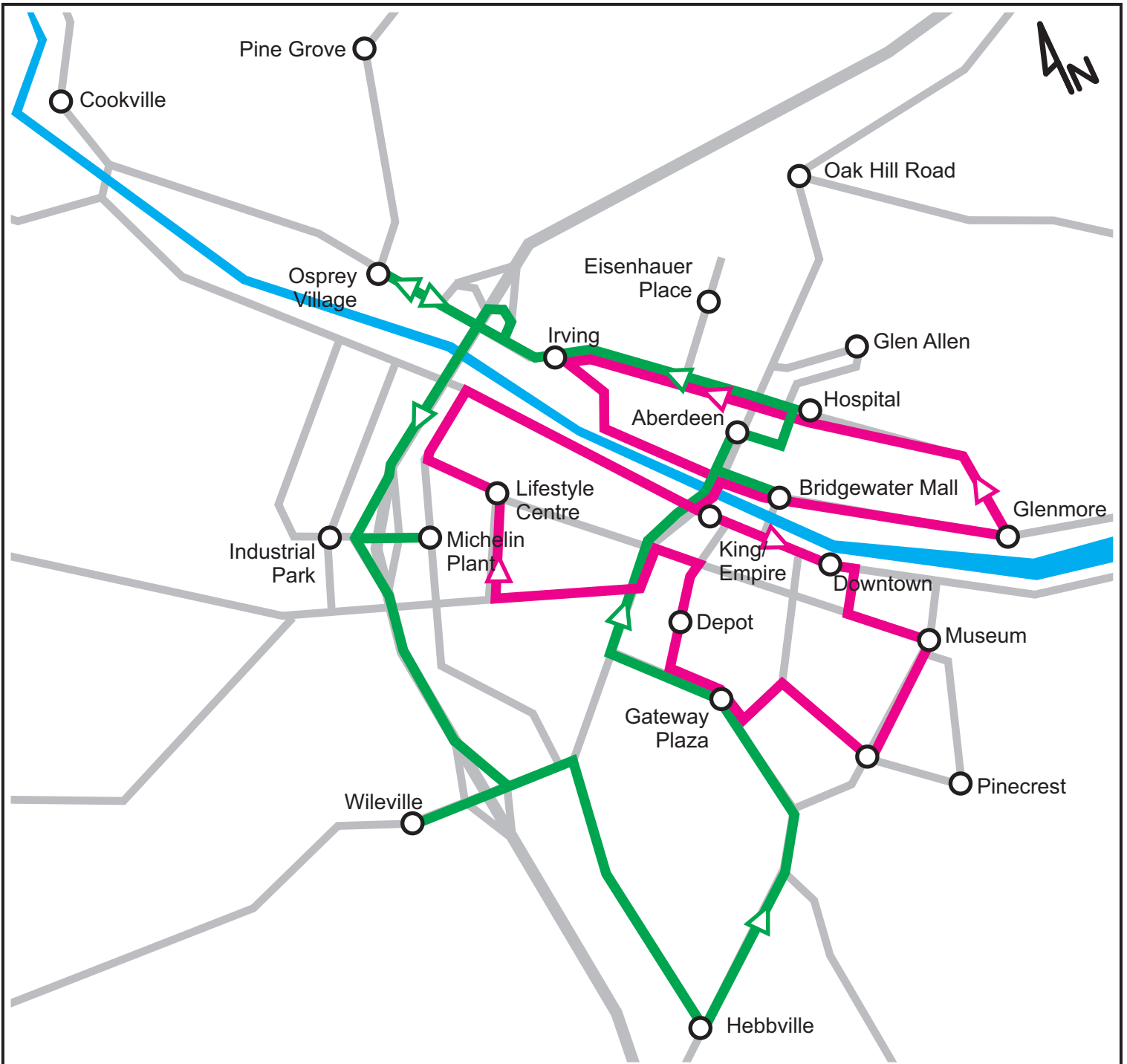
Schematic Drawing Only - Not to Scale



TRANSIT FEASIBILITY &  
5 - YEAR BUSINESS PLAN



ROUTE LAYOUT P



1 bus  
60 min. cycle  
53 min. in-service time  
7 min. dwell time

1 bus  
60 min. cycle  
56 min. in-service time  
4 min. dwell time

0:33 dep Osprey Village  
0:42 Michelin Plant  
0:47 Wileville  
0:55 Hebbville  
0:59 Gateway Plaza  
0:10 arr Mall  
0:14 dep Mall  
0:30 arr Osprey Village

0:00 dep LCLC  
0:12 arr Mall  
0:12 dep Mall  
0:44 Gateway Plaza  
0:56 arr LCLC

Schematic Drawing Only - Not to Scale



TRANSIT FEASIBILITY &  
5 - YEAR BUSINESS PLAN

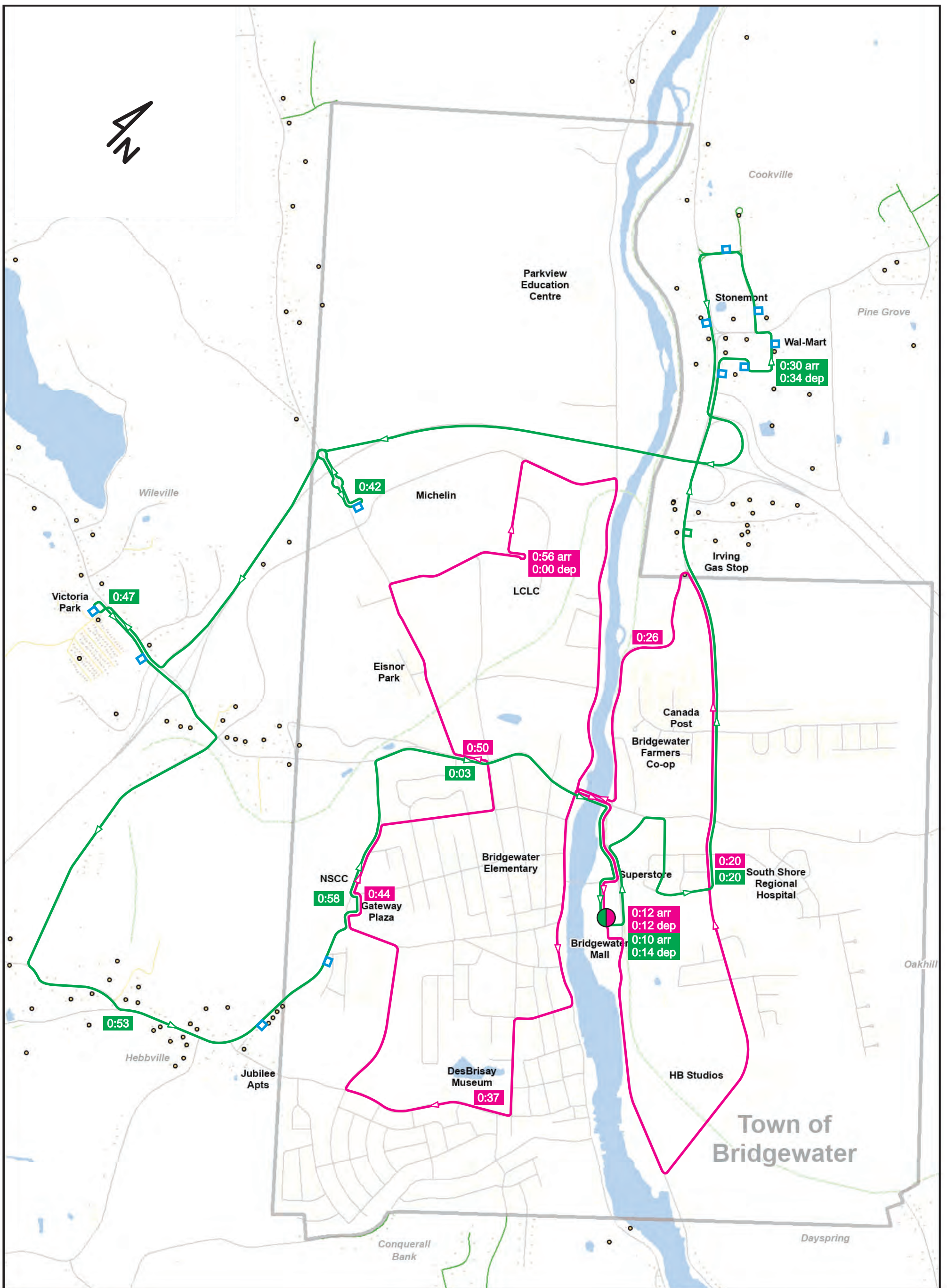


**ROUTE LAYOUT Q**

Modification of Route Layout L  
Agenda Page 85 of 192

# APPENDIX

## ***B*** *DETAILED ROUTING PLAN*



### APPENDIX B

## Proposed Routing and Time Points

- Businesses (2020)
- Civic Points
- Buildings
- Provincial Road
- Municipal Road
- Private Road
- Water Body
- Proposed MODL Route
- Existing Bridgewater Transit Route
- Proposed New Bus Stop
- Proposed Timed Transfer Point
- 0:37 Route Time Point (minutes after the hour)

Sources: Digital Base Map Data from the Nova Scotia Geomatics Centre, Amherst, NS

Disclaimer: Information compiled from numerous sources and may not be complete or accurate: Graphical representation only.



Base Map Prepared By:  
Municipality of the District of Lunenburg



## Sherbrooke Lake Overview



- 5-year water quality monitoring program, started in 2017 to establish a baseline of the lake and its tributaries.
- The program was jointly funded by the Municipality of the District of Lunenburg (MoDL) and the Municipality of Chester (MOC).
- Fieldwork was carried out by a dedicated group of volunteers.

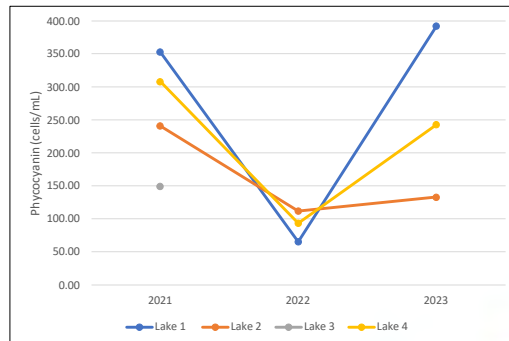


## Sherbrooke Lake Chlorophyll-α & Phycocyanin

Pigments found in photosynthetic organisms. Chlorophyll-α is an indicator of primary productivity, and Phycocyanin can be an indicator of cyanobacteria.

Can impact:

- Productivity & growth of organisms
  - Oxygen levels
  - Turbidity
  - Harmful algae blooms
- PC guidelines: Level 1 20,000 cells/mL; Level 2 100,000 cells/mL
  - Chlorophyll-α: No guidelines

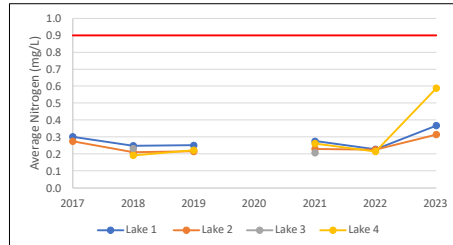
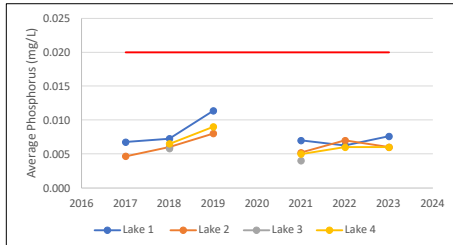


Phycocyanin has not approached guidelines at any sites.



## Sherbrooke Lake Total Phosphorus & Nitrogen

Essential nutrients required by aquatic plants and algae for growth, but excessive levels can lead to eutrophication, where water bodies become overgrown with algae and other aquatic plants.



Excessive levels of TP can lead to:

- Algae blooms
- Reduced oxygen
- Fish kills
- Changes in plant community

Average TP and TN did not exceed guidelines.



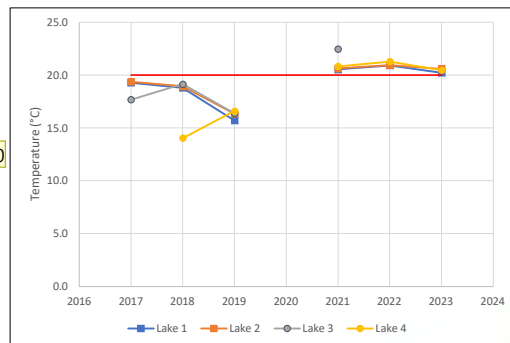
## Sherbrooke Lake Surface Water Temperature

Water temperature appears to be increasing, but not enough data for robust statistical analyses. Daily fluctuations. Impacts nearly all physical, chemical and biological processes.

Prolonged elevated temperature can impact:

- Oxygen levels
  - Organism growth and development
  - Metabolism
  - Habitat
  - Species composition
- Guideline 20°C for cold water fish species

SR0



If increasing, over time it could impact the lake's ecosystem making it more vulnerable to other negative impacts.

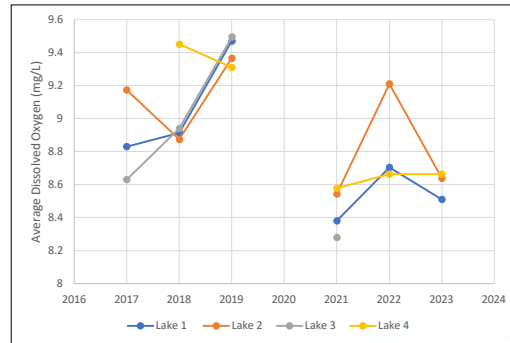


## Sherbrooke Lake Dissolved Oxygen

Dissolved Oxygen (DO) refers to the amount of oxygen that is dissolved in water, and it is measured in milligrams per litre (mg/L) or as a percentage of saturation (% SAT). Daily fluctuations.

Low levels can impact:

- Respiration
- Organism growth and reproduction
- Habitat quality
- Guideline of 6.5 mg/L



DO levels do not appear to be detrimental to aquatic life.

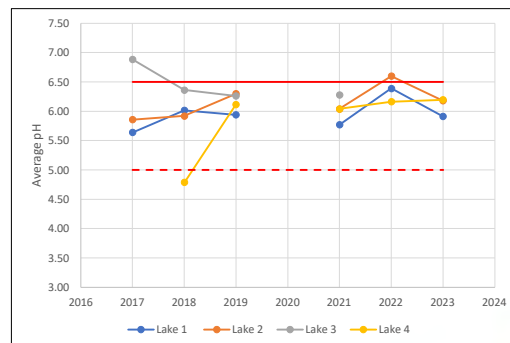


## Sherbrooke Lake pH

The acidity of water. Most aquatic organisms have different tolerances to pH levels.

Can impact:

- Acidification
- Alkalinity
- Organism growth
- Reproduction
- Contaminants
- NSSA guidelines (5.0 pH)
- CCME guidelines (6.5 pH)



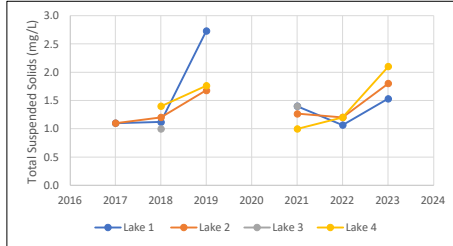
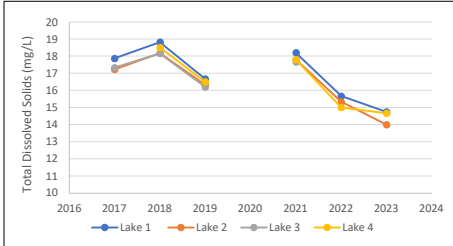
The acidity of SL poses minimal threat to organisms; an upward trend for pH at all sites.



# Sherbrooke Lake

## Total Dissolved & Suspended Solids

TDS are small particles including salts and minerals that pass through a 45 µm filter. TSS are larger particles such as silt, sediment, and organic matter. Algae, dead organic materials, silt.



Can impact:

- DO levels
- Water chemistry
- Habitat quality
- Water taste and odor
- Water clarity
- Light penetration
- Sedimentation

Do not appear to be detrimental to SL.



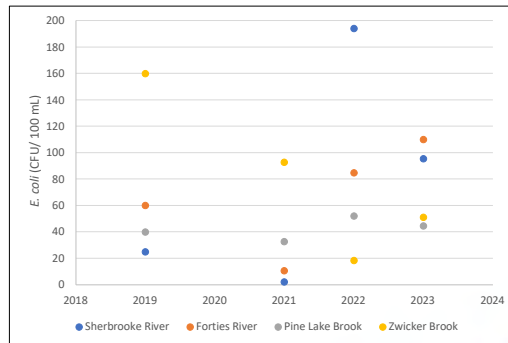
# Sherbrooke Lake

## *E. coli*

*E. coli* (Escherichia coli) is bacteria found in the intestines of warm-blooded animals. It is often used as an indicator of fecal contamination.

*E. coli* can lead to:

- Human health risks
  - Waterborne diseases
- Aquatic life impacts
- Primary recreational guideline: 235 CFU/100 mL
- Secondary recreational guideline: 705 CFU/100 mL



All yearly average readings below guidelines. SL often had undetectable levels.



# Sherbrooke Lake

## Sediment Samples

27 Metals, phosphorus, and orthophosphate.  
Assess risk of internal nutrient loading and the potential risk from the accumulation of metals.

Readings exceeding guidelines highlighted.			
Approaching guidelines	Interim Sediment Quality Guideline	CCME Probable Effect Levels	NS Environmental Quality Standards

Metals	Lake 1				Lake 2				Lake 3	Lake 4				Zwicker Brook	
	2019	2021	2022	2023	2018	2019	2021	2022	2023	2018	2019	2021	2022	2023	2023
Arsenic (As)	8.4	4.8	6.8	8.6	16	12	6.8	12	16	8.3	8.1	9.8	8.3	8.2	9.6
Cadmium (Cd)	0.76	0.31	0.69	0.78	1	0.99	0.46	0.81	1.4	1.5	0.76	0.63	0.66	0.82	1.3
Lead (Pb)	34	8.8	30	37	49	24	8	43	97	13	13	8.9	17	28	29
Mercury (Hg)	0.27	0.15	0.25	0.34	0.27	0.2	0.12	0.21	0.35	0.16	ND	0.12	0.14	0.2	0.15
Selenium (Se)	1.3	0.89	1.2	1.4	1.8	1.8	1.1	1.5	1.9	ND	ND	1.7	1.5	1.6	0.95
Zinc (Zn)	87	46	71	83	93	89	48	70	120	96	66	110	100	110	120

2023 - first year a stream site exceeded or approached guidelines.  
Increasing concentrations of metals in sediment.



# Sherbrooke Lake

## Conclusions

- No apparent issues in WQ trends in lake or tributaries. Low pollution levels (low nutrients and *E. coli*)
- Baseline information on the current water quality trends.
- Assess the impacts of future developments.
- Maintain or improve the trends observed in this baseline study.



# Sherbrooke Lake 5-Year Water Quality Baseline Report: 2018 - 2023

Kaylee MacLeod

Matthew Molyneux

Sam Reeves

January 2024

## Sherbrooke Lake 5-Year Water Quality Baseline Report: 2018 – 2023

### Contributing Authors and Surveyors:

#### Coastal Action Staff:

Kaylee MacLeod, BScH, MSc, Watersheds & Water Quality Project Coordinator

Matthew Molyneux, WCT, Watersheds & Water Quality Project Coordinator

Sam Reeves, BET, Watersheds & Water Quality Team Lead, Coastal Action

Sarah MacLeod, MSc, Former Watersheds & Water Quality Team Lead

Melanie Kingsbury, PhD, Former Watersheds & Water Quality Team Lead

Blake McNeely, BSc, Former Watersheds & Water Quality Team Lead

Emma Kinley, BSc, Former Field Operations Lead

Martina Hubley, NRET student, Watersheds & Water Quality Field Technician

#### Volunteers:

Mike Morrison

Tim Garriock

Murray Coolican

Hugh Harper

Sally Yardley

Tim Mader

John Fraser

Garth Bangay

#### Sherbrooke Lake Stewardship Committee Members:

Garth Bangay, Chair

Robin McAdam

William Baldrige

Ronald Renz

Staff Resource Support:

Trudy Payne, Municipality of the District of Lunenburg

Chad Haughn, Municipality of Chester

January 2024

Coastal Action

45 School Street, Suite 403

Mahone Bay, N.S., B0J 2E0

Ph: (902) 634-9977

Email: [info@coastalaction.org](mailto:info@coastalaction.org)

Correct citation for this publication:

MacLeod, K., Molyneux, M, Reeves, S. 2024. Sherbrooke Lake 5-Year Water Quality Baseline Report: 2018 – 2023.

This work was supported by:



# Table of Content

List of Figures .....	v
List of Tables .....	x
Executive Summary .....	xi
1.0 Introduction .....	1
1.1 Monitoring Program Background .....	3
1.2 Sherbrooke Lake .....	6
1.3 Southwest Nova Scotia .....	8
2.0 Water Quality Monitoring Results .....	8
2.1 YSI Water Quality Parameters .....	8
2.1.1. Chlorophyll- $\alpha$ , and Phycocyanin .....	8
2.1.2. Surface Water Temperatures .....	11
2.1.3 Surface Dissolved Oxygen .....	14
2.1.4 pH .....	17
2.1.5 Total Dissolved Solids .....	19
2.2 Chemical Water Quality Parameters .....	21
2.2.1 Total Suspended Solids .....	21
2.2.2 Total Phosphorus .....	24
2.2.3 Total Nitrogen .....	28
2.3 Biological Water Quality Parameters .....	32
2.3.1 Fecal Bacteria .....	32

2.3.2 Microcystin-LR & Algal Blooms .....	36
2.4 Sediment Sampling .....	36
2.4.1 Metals.....	37
2.4.2 Sediment Phosphorus and Orthophosphate.....	44
3.0 Discussion.....	46
3.1 Baseline Data.....	46
3.2 Lake Water Quality .....	47
3.3 Stream Water Quality .....	48
3.4 Cyanobacteria Blooms in Sherbrooke Lake .....	49
3.5 Trophic State of Sherbrooke Lake .....	50
4.0 Conclusions .....	52
5.0 Call to Action.....	54
5.1 Homeowner Resources .....	56
6.0 Acknowledgements.....	56
7.0 References .....	60
8.0 Appendix .....	64

## List of Figures

Figure 1. Sherbrooke Lake Water Quality Monitoring Program 2023 monitoring sites.....	4
Figure 2. Sampling sites from 2018, showing the locations of Chl 1 and 2. ....	5
Figure 3. Regular monthly sampling sites for the LaHave River Watershed Project. ....	7
Figure 4. Average yearly phycocyanin (cells/mL) levels from the 2021 - 2023 summer sampling events at the lake sites. The WHO provides two guidelines; Alert level 1 at 20,000 cells/mL, and Alert level 2 at 100,000 cells/mL. ....	9
Figure 5. Summer months average yearly phycocyanin (cells/mL) levels from the 2021 - 2023 sampling events at the stream sites. The WHO provides two guidelines; Alert level 1 at 20,000 cells/mL, and Alert level 2 at 100,000 cells/mL.....	10
Figure 6. Phycocyanin (cells/mL) levels from the rainfall-dependent sampling events at the stream sites from 2021 - 2023, including the additional, rainfall-specific sites. The WHO provides two guidelines: Alert level 1 at 20,000 cells/mL, and Alert level 2 at 100,000 cells/mL.....	10
Figure 7. Average annual temperature (°C) readings from the 2017 to 2023 summer month sampling events at the lake sites. The red line indicates the 20°C threshold for cold-water fish set by NSSA. ....	12
Figure 8. Average annual temperature (°C) readings from the 2017 to 2023 summer month sampling events at the stream sites. The red line indicates the 20°C threshold for cold-water fish set by NSSA. ....	13
Figure 9. Temperature (°C) readings from the rainfall-dependent sampling at the stream sites, including the additional, rainfall-specific sites from 2018 - 2023. The red line indicates the 20°C threshold for cold-water fish set by NSSA. ....	14
Figure 10. Average annual dissolved oxygen (mg/L) readings from the 2017 to 2023 summer month sampling events at the lake sites. Note vertical scale starts at 8 mg/L and does not show the CCME threshold of 6.5 mg/L. ....	15
Figure 11. Average annual dissolved oxygen (mg/L) readings from the 2017 to 2023 summer month sampling events at the stream sites. The red line indicates the 6.5 mg/L minimum for aquatic species set by CCME.....	16

Figure 12. Dissolved Oxygen (mg/L) readings from the 2018 to 2023 rainfall-dependent sampling event at the stream sites, including the additional, rainfall-specific sites. The red line indicates the 6.5 mg/L minimum for aquatic species set by CCME. .... 17

Figure 13. Average annual pH readings from the 2017 - 2023 summer month sampling events at the lake sites. The solid red line indicates the 6.5 pH threshold set by CCME, and the dotted red line indicates the 5.0 pH threshold identified by NSSA..... 18

Figure 14. Average annual pH readings from the 2017 - 2023 summer month sampling events at the stream sites. The solid red line indicates the 6.5 pH threshold set by CCME, and the dotted red line indicates the 5.0 pH threshold identified by NSSA..... 18

Figure 15. pH readings from the 2017 - 2023 rainfall-dependent sampling event at the stream sites, including the additional, rainfall-specific sites. The solid red line indicates the 6.5 pH threshold set by CCME, and the dotted red line indicates the 5.0 pH threshold identified by NSSA. .... 19

Figure 16. Average annual Total Dissolved Solids (mg/L) readings from the 2017 - 2023 summer month sampling events at the lake sites. .... 20

Figure 17. Average annual Total Dissolved Solids (mg/L) readings from the 2017 - 2023 summer month sampling events at the stream sites. .... 20

Figure 18. Total Dissolved Solids (mg/L) readings from the 2017 - 2023 rainfall-dependent sampling event at the stream sites, including the additional, rainfall-specific sites ..... 21

Figure 19. Average annual Total Suspended Solids (mg/L) readings from the 2017 - 2023 summer month sampling events at the lake sites. .... 22

Figure 20. Average annual Total Suspended Solids (mg/L) readings from the 2017 - 2023 summer month sampling events at the stream sites. .... 23

Figure 21. Total Suspended Solids (mg/L) readings from the 2017 - 2023 rainfall-dependent sampling event at the stream sites, including the additional, rainfall-specific sites. TSS was below detection levels at Gully River in 2018, 2019, 2021 and 2023; at Peter Veinot Brook in 2018, 2021, and 2023; at Forties River in 2022 and 2023; at Pine Lake Brook, Zwicker Brook and Butler Lake Brooke in 2023. .... 23

Figure 22. Average annual total phosphorus (mg/L) readings from the 2017 - 2023 summer month sampling events at the lake sites. .... 25

Figure 23. Average annual Total Phosphorus (mg/L) levels from the summer month sampling events at the lake sites. The red line indicates the MOECC guideline for phosphorus in lakes. Error bars indicate standard error. The blue dotted line indicates the trendline.. 26

Figure 24. Average annual Total Phosphorus (mg/L) readings from the 2017 - 2023 summer month sampling events at the stream sites. The red line indicates the MOECC guideline for total phosphorus in streams..... 27

Figure 25. Total Phosphorus (mg/L) readings from the 2018 - 2023 rainfall-dependent sampling event at the stream sites, including the additional, rainfall-specific sites. .... 27

Figure 26. At-depth total phosphorus readings from the once-yearly sampling..... 28

Figure 27. Average annual total nitrogen (mg/L) readings from the 2017 - 2023 summer month sampling events at the lake sites..... 29

Figure 28. Average annual Total Nitrogen (mg/L) levels from the summer month sampling events at the lake sites. The red line indicates the Dodds and Welch guideline for nitrogen in lakes. Error bars indicate standard error. The blue dotted line indicates the trendline. .... 30

Figure 29. Average annual Total Nitrogen (mg/L) levels from the summer month sampling events at the stream sites. The red line indicates the Dodds and Welch guideline for nitrogen in streams..... 31

Figure 30. Total Nitrogen (mg/L) readings from the 2022 rainfall-dependent sampling event at the stream sites, including the additional, rainfall-specific sites. The red line indicates the Dodds and Welch guideline for nitrogen in streams..... 31

Figure 31. At-depth total nitrogen readings from the once-yearly sampling..... 32

Figure 32. Average annual fecal coliform (CFU/100 mL) readings from the 2018 summer month sampling events at the stream sites. The solid red line indicates Health Canada’s primary guideline of 235 CFU/100 mL. .... 33

Figure 33. Average annual E. coli (CFU/100 mL) readings from the 2019 - 2023 summer month sampling events at the stream sites. .... 34

Figure 34. Fecal coliform (CFU/100 mL) readings from the 2018 rainfall-dependent sampling event at the stream sites. The red line indicates Health Canada’s primary guideline of 235 CFU/100 mL..... 35

Figure 35. E. coli (CFU/100 mL) readings from the 2019 – 2023 rainfall-dependent sampling events at the stream sites, including the additional, rainfall-specific sites. The solid red line indicates Health Canada's primary recreational guideline of 235 CFU/100 mL and the dashed red line indicates Health Canada's secondary recreational guideline of 705 CFU/100 mL. 35

Figure 36. Orthophosphate from sediment samples from 2018 to 2023. 2023 was not included in the stream sites due to the small sample size. .... 44

Figure 37. Acid extractable phosphorus (mg/kg) from the 2018 to 2023 sediment samples. 2022 at Pine Lake Brook was below detection levels..... 45

Figure 38. Carlson Trophic State Index parameters (Carlson 1977)..... 51

Figure 39. Comparison of Lake site TSI scores from 2018 to 2023 using the Carlson (1977) trophic equations for total phosphorus, chlorophyll- $\alpha$ , and Secchi disk (2020 excluded)... 52

Figure 40. Volunteers and Coastal Action staff..... 57

Figure 41. Volunteers ready for sampling ..... 57

Figure 42. Volunteers with sampling gear. .... 58

Figure 43. Volunteers sampling..... 59

Figure 44. Average annual temperature ( $^{\circ}\text{C}$ ) readings from the 2017 to 2023 summer month sampling events at the lake sites. The red line indicates the  $20^{\circ}\text{C}$  threshold for cold-water fish set by NSSA. The black error bars indicate standard error. The blue dotted line indicates the trendline..... 64

Figure 45. Average annual temperature ( $^{\circ}\text{C}$ ) readings from the 2017 to 2023 summer month sampling events at the stream sites. The red line indicates the  $20^{\circ}\text{C}$  threshold for cold-water fish set by NSSA. The black error bars indicate standard error. The blue dotted line indicates the trendline..... 66

Figure 46. Average annual dissolved oxygen (mg/L) readings from the 2017 to 2023 summer month sampling events at the lake sites. The solid red line indicates the CCME threshold of 6.5 mg/L. The black error bars indicate standard error. The blue dotted line indicates the trendline. .... 67

Figure 47. Average annual dissolved oxygen (mg/L) readings from the 2017 to 2023 summer month sampling events at the stream sites. The solid red line indicates the CCME threshold

of 6.5 mg/L. The black error bars indicate standard error. The blue dotted line indicates the trendline. .... 68

Figure 48. Average annual pH readings from the 2017 - 2023 summer month sampling events at the lake sites. The solid red line indicates the 6.5 pH threshold set by CCME, and the dotted red line indicates the 5.0 pH threshold identified by NSSA. The black error bars indicate the standard error. The blue dotted line indicates the trendline. .... 69

Figure 49. Average annual pH readings from the 2017 to 2023 summer month sampling events at the stream sites. The solid red line indicates the 6.5 pH threshold set by CCME, and the dotted red line indicates the 5.0 pH threshold identified by NSSA. The black error bars indicate the standard error. The blue dotted line indicates the trendline. .... 70

Figure 50. Average annual Total Dissolved Solids (mg/L) readings from the 2017 to 2023 summer month sampling events at the lake sites. The blue dotted line indicates the trendline. .... 71

Figure 51. Average annual Total Dissolved Solids (mg/L) readings from the 2017 to 2023 summer month sampling events at the stream sites. The blue dotted line indicates the trendline. .... 72

## List of Tables

Table 1. Rainfall-dependent sampling dates and amount of rain (mm) from 2018 to 2023...	6
Table 2. Concentrations of acid extractable metals within lake site sediment samples. All metals are acid extractable except for Orthophosphate. All units are mg/kg. Light yellow indicates parameters approaching one of the guidelines, orange indicates an exceedance of ISQG, and red indicates an exceedance of either the PEL or NSEQS guidelines. ....	39
Table 3. Concentrations of metals within stream site sediment samples.....	41
Table 4. Summary of guideline exceedances of acid extractable metals in sediment samples. Light yellow indicates parameters approaching one of the guidelines, orange indicates an exceedance of the ISQG, and red indicates an exceedance of either the PEL or NSEQS guidelines. Units are all mg/kg. ....	43
Table 5. What homeowners can do to reduce the occurrence of cyanobacteria blooms and maintain healthy waterways. ....	55
Table 6. Surface temperature (°C) readings from the 2017 to 2023 summer sampling events at the lake sites.....	65
Table 7. Orthophosphate and Total Phosphorus levels from the annual sediment samples at the Lake and Stream Sites. FR = Forties River; ZB = Zwicker Brook; SR = Sherbrooke River; PLB = Pine Lake Brook. ND = less than the detectable limit. Orthophosphate was not able to be completed for ZB in 2023. ....	73

## Executive Summary

This report outlines the activities and results of the five-year Sherbrooke Lake (SL) water quality monitoring program, initiated in response to the planned development of a municipal public access site at Sherbrooke Lake. The program's goals included determining a baseline understanding of water quality conditions within SL before the construction of the public access site, monitoring water quality during and after the construction, and the provision of evidence-based advice to MODL and MOC regarding ways to address water quality changes and concerns within the lake.

The sampling schedule and locations changed slightly over the five years of this project, changes were based on initial test results and scientific advice regarding sampling protocols. A preliminary monitoring program occurred in 2017 to determine the best monitoring methods and select sampling sites for the program, when appropriate, this data was included in the baseline summary. In 2019, lake sites Chl 1 and Chl 2 (additional sites for monitoring chlorophyll- $\alpha$ ) were removed from the program, as they showed similar results to the lake sites and were not providing beneficial data. Hydrocarbons were initially sampled in 2018 and 2019 but removed from the program because all readings were below detection levels. Lake 3 was changed to *E. coli*-only sampling in 2022 and 2023.

Phycocyanin levels did not exceed guidelines set by the World Health Organization throughout this project. The average yearly concentration of nutrients that are known to contribute to the production of algae and cyanobacteria, total phosphorus and total nitrogen, did not exceed guidelines set by Ontario's Ministry of Environment and Climate Change guidelines, except for at-depth samples in 2021 and 2022.

All lake sites displayed a slight trend of increasing average surface water temperatures in the summer months, and the average annual temperature exceeded the 20°C temperature threshold for cold-water fish species (NSSA 2014) in 2021, 2022 and 2023. Sufficient data was not collected for statistical analyses to determine if this trend is significant or due to other factors such as time of sample collection, or weather conditions before and during sampling. The time of day and season of each sample could influence the temperature and dissolved oxygen concentrations, so continuous in-situ temperature monitoring using a temperature logger would provide more accurate trend data. If water temperatures are increasing, this could, over time, significantly impact the lake's ecosystem making it more vulnerable to other negative impacts. Cyanobacteria blooms are more likely to occur in warm, slow-moving waters with high levels of nutrients, so with increasing temperatures, there could be increased risks of blooms. The stream sites showed cooler average annual temperatures than the lake, and only three sites exceeded the threshold.

The average annual surface dissolved oxygen (DO) at all lake sites stayed above the minimum threshold of 6.5 mg/L set by the Canadian Council of Ministers of the Environment (CCME) for cold-water species (CCME 1999b). Two stream sites fell below the minimum threshold, likely due to low water flow conditions and warm average water temperatures in late summer. Dissolved oxygen levels did not appear to be detrimental to aquatic life during this study, as the readings mostly remained above thresholds.

pH measurements for most sites fell below the 6.5-pH threshold set by the CCME (2002); however, the acidity of SL waters is not uncommon for southwest NS lakes, which generally have lower pH values than the 6.5 threshold. It appears that most of the time, the acidity of the waters at SL poses minimal threat to organisms, and there was an upward trend for pH at all sites. This upward trend indicates that the waters are becoming less acidic. If this trend continues, it could improve populations of sensitive aquatic species such as salmonids, that rely on a specific range of pH values.

The average concentration of smaller particles in the water column (total dissolved solids) had a downward trend, while larger particles (total suspended solids) had an upward trend. These concentrations can be influenced by soil erosion, dead organic material, significant rainfall events, flooding, and runoff. This is an important parameter for monitoring the impacts of future lake-shore development, as development can increase sedimentation in the water which is reflected in these measurements.

The average annual *E. coli* levels at the lake and stream sites did not exceed the primary recreational guideline of 235 CFU/100 mL. The rainfall-dependent samples generally had higher levels of bacteria than the regular monthly or bi-monthly sampling. The generally low *E. coli* and nutrient levels of the lake suggest that pollution was minimal at Sherbrooke Lake during this study. Although bacteria levels were low, swimming in rivers should be avoided for 24 hours after a rainfall event and water from the lake and the rivers should always be treated prior to use (i.e., bathing, washing, drinking).

Arsenic, cadmium, and mercury levels exceeded guidelines at most lake sites in the sediment samples. Lead levels were low at most lake sites, except Lake 2, which exceeded the Interim Sediment Quality Guideline (ISQG). Metal concentrations in the stream site did not approach any of the guidelines except for the 2023 samples, which exceeded guidelines for both arsenic and cadmium. Sherbrooke Lake is at high risk of pollution from both uranium and arsenic due to the local geology. Heavy metals can biomagnify within food webs, which can pose a threat to human health if fish are consumed. For guidelines on fish consumption in Nova Scotia regarding pollutants, visit the consumption advisory at <https://novascotia.ca/nse/fish-consumption-advisory.asp>. Generally, sediment in aquatic systems has higher concentrations of heavy metals than the water column itself (Luoma,

1989), but for more information on drinking water guidelines visit Nova Scotia Environment [https://novascotia.ca/nse/water/docs/Drop\\_on\\_Water\\_English.pdf](https://novascotia.ca/nse/water/docs/Drop_on_Water_English.pdf).

Based on the mean depth of transparency (Secchi disk), and mean concentrations of chlorophyll- $\alpha$  and phosphorus, a Trophic State Index (TSI) score has been calculated annually to assess biological productivity. Trophic states range from oligotrophic (low productivity and minimal biomass) to hypereutrophic (high productivity and maximum biomass). The trophic state of SL appears to be maintaining a steady TSI score over the five years this data has been collected. The TSI of SL was consistently between oligotrophic and mesotrophic, suggesting that it has moderate biological productivity.

Sherbrooke Lake is generally healthy but is vulnerable to anthropogenic impacts. Human activities such as fertilizing lawns, removing vegetative buffers between lawns and the lake, and improper management of septic fields can all impact the lake's water quality. Currently, Sherbrooke Lake's nutrient status is at the low end for freshwater lakes. This is encouraging, but will only be sustained through continued vigilance in the face of increasing development and alteration of the lake's shoreline and surrounding watershed.

Overall, the water quality at Sherbrooke Lake and its tributaries showed no significant issues of concern within the water quality trends during the five years of this project. This baseline study provides information on the current water quality trends of the lake, that could be used to assess the impacts of future developments. While this study showed no apparent issues, residents should be aware of how land-use practices impact water quality and the occurrence of cyanobacteria blooms. Implementing good land-use practices can help to maintain or improve the trends observed in this baseline study.

### **Best Land-use Practices and Information:**

- <https://nsinvasives.ca/plant-wise/>
- [https://nsinvasives.ca/wp-content/uploads/2023/07/CCIS-NSISC-Grow-Me-Instead-Guide\\_2023\\_EN\\_web.pdf](https://nsinvasives.ca/wp-content/uploads/2023/07/CCIS-NSISC-Grow-Me-Instead-Guide_2023_EN_web.pdf)
- <https://www.transcoastaladaptations.com/green-shores>
- <https://www.countyofkings.ca/residents/services/permits/types/Lakeshore>
- [https://www.countyofkings.ca/upload/All\\_Uploads/Living/services/permits/lakeshore/Lake%20Development%20Brochure.pdf](https://www.countyofkings.ca/upload/All_Uploads/Living/services/permits/lakeshore/Lake%20Development%20Brochure.pdf)
- <https://loveyourlake.ca/project/responsible-shoreline-development/>
- <https://novascotia.ca/nse/wastewater/docs/homeowners.guide.to.septic.systems.pdf>
- <https://www.speciesatrisk.ca/stewardshipguide/>


# WHAT YOU CAN DO

N = Nitrogen    P = Phosphorus    S = Sediment

Action	Benefits	What is reduced
Leave a natural vegetative buffer along lake, stream, ditch, or other waterway.	Grass or wood buffers help filter pollutants and reduce flood damage. This can also help to reduce occurrences of algae blooms.	N P S
Remember to inspect and pump your septic every 3-5 years.	A properly maintained septic system prevents costly repairs and untreated sewage discharge into our streams.	N P S
Plant a rain garden or install a rain barrel.	Rain gardens and rain barrels help reduce stormwater runoff and can cut down on landscaping costs.	N P S
Follow the 4 Rs of fertilizer use: right source, right amount, right place and right time.	The 4 Rs approach promotes the wise use of fertilizer by farmers, residents, and landscapers to reduce costly nutrient loss that pollutes our streams.	N P
Plant cover crops.	Cover crops build healthy soils that help hold back nutrients and water and increase crop yields.	N P S
Install a drainage management system.	Managing field drainage reduces nutrient loss while saving water for when your crops need it most.	N P
Properly manage livestock and pet waste.	Properly storing and disposing of animal waste reduces nutrients and prevents harmful bacteria from entering local waters.	N P
Help your community develop a plan that supports low impact development.	Smart development fosters growth and protects the local resources and character of the community.	N P S

This table is adapted from the March 2014 Mills Creek Report Card, Erie Soil and Water Conservation District

This project was undertaken with the financial support of:  
 Ce projet a été réalisé avec l'appui financier de:

 Environment and Climate Change Canada    Environnement et Changement climatique Canada



## 1.0 Introduction

The following report summarizes the results of the Sherbrooke Lake Water Quality Monitoring Program. Monitoring activities were conducted at Sherbrooke Lake (SL) by trained volunteers with support from Coastal Action from 2018 to 2023, after a preliminary monitoring program in 2017. Preliminary monitoring activities in 2017 were used to determine the best methods and select sampling sites for the program, and when appropriate, this data was included in the baseline summary. No monitoring was conducted in 2020 due to COVID-19 restrictions. This report summarizes changes and trends in the water quality of Sherbrooke Lake and its tributaries over the five years of baseline data and the additional preliminary data from 2017.

This program receives financial support from both the Municipality of the District of Lunenburg (MODL) and the Municipality of Chester (MOC).

Following several years of consultations regarding the development of a municipal public access site at Sherbrooke Lake, the Sherbrooke Lake Stewardship Committee (SLSC) was formed. The SLSC, a joint commitment between MODL and MOC, is comprised of one Coastal Action staff, two residents of MODL, two residents of MOC, a water quality expert, and supporting municipal staff.

The SLSC was tasked with developing and implementing a water quality monitoring program to: determine a baseline understanding of water quality conditions within SL before the construction of the public access site, monitor water quality during and after the construction, and provide evidence-based advice to MODL and MOC regarding ways to address water quality changes and concerns within the lake.

The sites chosen for regular monthly or bi-monthly monitoring included four lake sites; two were near the proposed public access site, one located in the deepest part of the lake at the southern basin, and one near the middle of the lake. Seven tributaries of the lake (streams or rivers that enter the lake) were also monitored for this program; four of which were part of the regular sampling and three that were only sampled following a rainfall event of  $\geq 25$  mm. Monitoring tributaries could give insight into lake water quality, as land use around these rivers and streams could differ from the lake, and impact overall water quality such as nutrient or bacteria input.

The water quality monitoring program included a combination of in-field measurements using a YSI multi-parameter probe, and samples that were submitted to a laboratory for analysis. A ProDSS YSI unit, owned jointly by MOC and MODL, was used throughout the program. This unit measures the physical characteristics of water at the time of sampling, including temperature, dissolved oxygen, pH, total dissolved solids, salinity, pressure, and

specific conductivity. In 2021, the MODL purchased a ProDSS Total Algae PC Sensor for the municipal YSI to monitor chlorophyll- $\alpha$  and phycocyanin concentrations. Water samples were collected for total suspended solids, total phosphorus, total nitrogen, fecal coliform, and chlorophyll- $\alpha$ . Secchi disk readings were also taken at the lake sites, which indicates turbidity. Once annually, an at-depth sample was taken at two of the lake sites to assess nitrogen and phosphorus below the thermocline, as well as sediment samples from two lake sites and one tributary site.

Some water quality parameters that can be impacted by development include turbidity, total dissolved and total suspended solids, dissolved oxygen, bacteria and nutrients (nitrogen and phosphorus). Measuring these parameters before and after a development can give insight into how the development impacted overall water quality.

Cyanobacteria, or blue-green algae, have also been a growing concern for many communities in the last few years. To measure this, chlorophyll- $\alpha$  gives an overview of algal production in water, while the ProDSS Algal probe measures both chlorophyll- $\alpha$  and phycocyanin, which is the pigment found in cyanobacteria. Factors that contribute to cyanobacteria blooms include excess amounts of nitrogen and phosphorus, temperature, and, wind and water movement that can form or dissipate blooms. Suspected blooms were sampled for the toxin microcystin and species present when possible.

As part of this program, the Trophic State Index (TSI) of the lake was analyzed annually. This uses the Secchi disk readings, total phosphorus, and chlorophyll- $\alpha$  concentrations to assess the overall productivity of the lake. The TSI value does not rate the lake's water quality but describes the biological productivity of the lake. The TSI levels range from oligotrophic (low productivity) to hypereutrophic (highest productivity). Changes in the TSI value could indicate that factors influencing productivity have also changed, such as nutrient inputs.

The annual sediment sampling included heavy metals and nutrients that could be resuspended in the water column if the sediment is disturbed. This indicates the natural occurrence or pollution of heavy metals as well as nutrient loading within the sediment.

These parameters sampled over the five years of the program provide a baseline overview of lake health and trends in water quality that can be used for assessing the impact of future development.

## 1.1 Monitoring Program Background

Coastal Action acts as technical support for a group of trained volunteers, who conducted the monthly sampling (Figure 1). From 2018 to 2021, rainfall-dependent sampling was conducted by volunteers, in 2022 and 2023 this sampling was conducted by Coastal Action. The rainfall-dependent sampling occurred at tributaries to Sherbrooke Lake following rainfall exceeding 25 mm within 24 hours, which is defined as a “significant rainfall”. Sampling after a significant rainfall monitors the potential effect of runoff (i.e., influx of nutrients, bacteria, sediment), which may impact water quality. Following preliminary ground-truthing activities in 2017, the full Sherbrooke Lake Water Quality Monitoring Program was conducted in 2018, 2019, 2021, 2022, and 2023.

Further details on the program can be found in the *Sherbrooke Lake Water Quality Monitoring Program*, and the *Sherbrooke Lake Water Quality Monitoring Report (2018, 2019, 2021 & 2022)*; all are available upon request from either MOC or MODL.



Figure 1. Sherbrooke Lake Water Quality Monitoring Program 2023 monitoring sites.

The sampling schedule and locations changed slightly over the 5 years of this project. In 2019, lake sites Chl 1 and Chl 2 (additional sites for monitoring chlorophyll- $\alpha$ ) were removed from the program because these sites had similar results to the other lake sites and were not providing additional data (Figure 2). Hydrocarbons were initially sampled in 2018 and 2019 but removed from the program because all readings were below detection levels. Lake 3 was changed to *E. coli*-only sampling in 2022 and 2023. All changes to sites and sampling regimes were based on the newly available data and scientific advice.

In 2017 to gain baseline information, lake samples were taken in July, August, September and November. In 2018 and 2019, samples were taken at the lake sites monthly from May to October, while samples taken from stream sites during this time were collected bi-monthly. In 2020, sampling was not performed due to COVID-19 pandemic restrictions. In 2021, lake

samples were taken monthly from June to October, and stream samples were taken in June, July, September, and October. In 2022, lake and stream samples were taken in June, August, and September. In 2023, lake and stream samples were taken in June, July, and September.

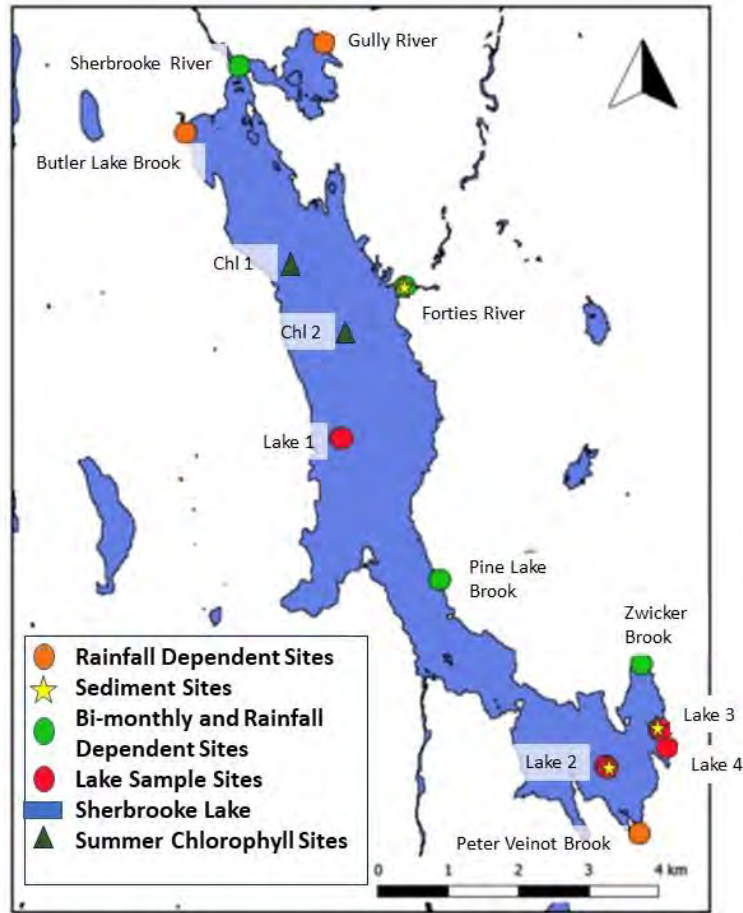


Figure 2. Sampling sites from 2018, showing the locations of Chl 1 and 2.

The rainfall-dependent samples were taken during different months each year, due to unpredictable weather and volunteer or Coastal Action staff availability (Table 1).

Table 1. Rainfall-dependent sampling dates and amount of rain (mm) from 2018 to 2023.

Date	Rainfall amount (mm) within 24 hours
19-Aug-18	30+
09-Sep-19	100+
18-Oct-21	25+
01-Dec-22	29+
07-Jun-23	70+

## 1.2 Sherbrooke Lake

Sherbrooke Lake is located on the South Shore of Nova Scotia, in both the Municipality of the District of Lunenburg and the Municipality of Chester. Sherbrooke Lake is the largest waterbody in the LaHave River watershed with a size of 16.94 km<sup>2</sup>. The lake's drainage basin is 285 km<sup>2</sup> in size and includes 18 lakes and several large tributaries feeding into Sherbrooke Lake. The lake has 14 inlet streams, several of which are less than 1 km in length. The largest inlet streams are Sherbrooke River, with a sub-watershed drainage area of 121 km<sup>2</sup>; Gully River, with a sub-watershed drainage area of 34 km<sup>2</sup>; and Forties River, with a sub-watershed drainage area of 49 km<sup>2</sup>. The lake has a single outlet called the North Branch which flows through several lakes before joining the main stem of the LaHave River at Wentzells Lake, approximately 22 km downstream from Sherbrooke Lake.

The Sherbrooke Lake drainage basin is dominated by forestry, silviculture, and agricultural land use, while cottage development and small rural communities are spread throughout the area on a smaller scale.

Coastal Action has conducted a water quality monitoring program in the LaHave River watershed since 2007. This program has a total of 15 sample sites, two of which provide some information about the conditions of Sherbrooke Lake (Figure 3). The Franey Corner sample site is located on the Sherbrooke River where it crosses Forties Road. This site allows Coastal Action to monitor the largest tributary to the lake. The Sherbrooke sample site is located on the North Branch outlet, where it crosses Newburne Road and provides information about the conditions of the water draining out of Sherbrooke Lake. Over the years, these sites have displayed some of the best water quality in the entire watershed, with a general trend of good water quality throughout the headwaters and a decline as the system flows downstream into more densely populated and developed parts of the watershed.

## Water Quality Monitoring Sites in the LaHave River Watershed

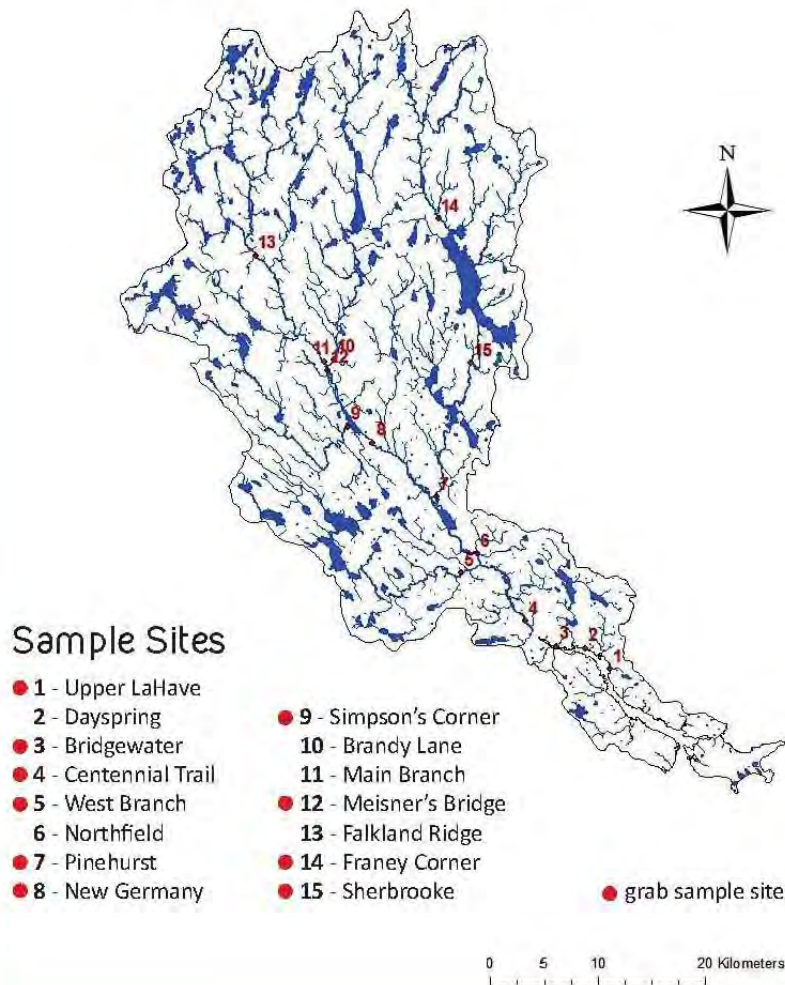


Figure 3. Regular monthly sampling sites for the LaHave River Watershed Project.

Additionally, Sherbrooke Lake is unique because it hosts one of two known populations of lake trout (*Salvelinus namaycush*) in Nova Scotia. Lake trout require a large, deep, well-oxygenated hypolimnion and follow a unique life cycle of moving from shallow to deep regions when surface water temperatures reach 15°C in the spring (Inland Fisheries 2005). Sherbrooke Lake provides this species with the water depth and substrate characteristics

needed to complete its life cycle. Since 2020, there have been studies conducted by the NS Department of Aquaculture and Fisheries, Acadia University, Saint Mary's University and Coastal Action on the lake trout in Sherbrooke Lake.

### **1.3 Southwest Nova Scotia**

Southwest Nova Scotia generally has lower surface water pH than other places in Canada (Clair et al. 2007), which is attributed to local geology, high abundance of wetlands, and historic acid rain deposition. Granite and shale bedrock, which have low base cations (alkaline metals such as calcium, aluminum, magnesium, potassium, etc.), are common in this area (Shilts 1981; White & Horne 2012). These bedrock parent materials produce soils with low base cations and water that drains through these soils is more vulnerable to acidification due to its limited buffering capacity (Stumm et al. 1987). Southwest Nova Scotia also has an abundance of peat-dominated wetlands, which generally have a low pH (ECCNS 2009b).

Acid rain has also contributed to the low pH of surface waters in Nova Scotia. Acid rain occurs when pollutants in the atmosphere mix with water in the air to form acidic compounds. Due to the existing low buffering capacity from natural conditions, southwest Nova Scotia has a low tolerance for acid deposition (ECCNS 2009a). However, new regulations have decreased emissions contributing to acid deposition (Nixon & Curran 1998) and studies are showing the effects of acid deposition on North American soils are beginning to reverse (Lawrence et al. 2015).

## **2.0 Water Quality Monitoring Results**

### **2.1 YSI Water Quality Parameters**

#### **2.1.1. Chlorophyll- $\alpha$ , and Phycocyanin**

In 2021, a ProDSS Total Algae PC Sensor was purchased by MODL to use on the ProDSS YSI unit owned jointly by MOC and MODL. This probe measures concentrations of chlorophyll- $\alpha$  and phycocyanin present in water. Phycocyanin is a pigment found in cyanobacteria, or blue-green algae, and provides an estimate of total cyanobacteria production. Chlorophyll- $\alpha$  is a pigment produced by all types of algae and provides an estimate of total algae production.

Collecting this data over multiple seasons provides baseline concentrations of phycocyanin in SL. Long-term monitoring with this probe, paired with the collection of Microcystin-LR

water samples during blooms, will help to identify spikes in phycocyanin concentrations. This data can also be used to develop a predictive curve for the relationship between the concentrations of these algal pigments and the occurrence of algal blooms in SL.

Algal concentrations are measured as Relative Fluorescence Units (RFU), which is a measurement of the fluorescence of pigment in algae. Phycocyanin RFU were converted to the total number of phycocyanin cells per mL of water (Genzoli & Kann 2016). World Health Organization (WHO) provides two guideline levels, 'alert level 1' is reached when 20,000 phycocyanin cells/mL are observed, and 'alert level 2' is reached when 100,000 phycocyanin cells/mL are observed. Readings outside of the probe's detection limits (i.e., negative RFU values) were replaced with zero (Ma et al. 2023). At no point were the WHO guidelines exceeded or approached (Figure 4, Figure 5, Figure 6).

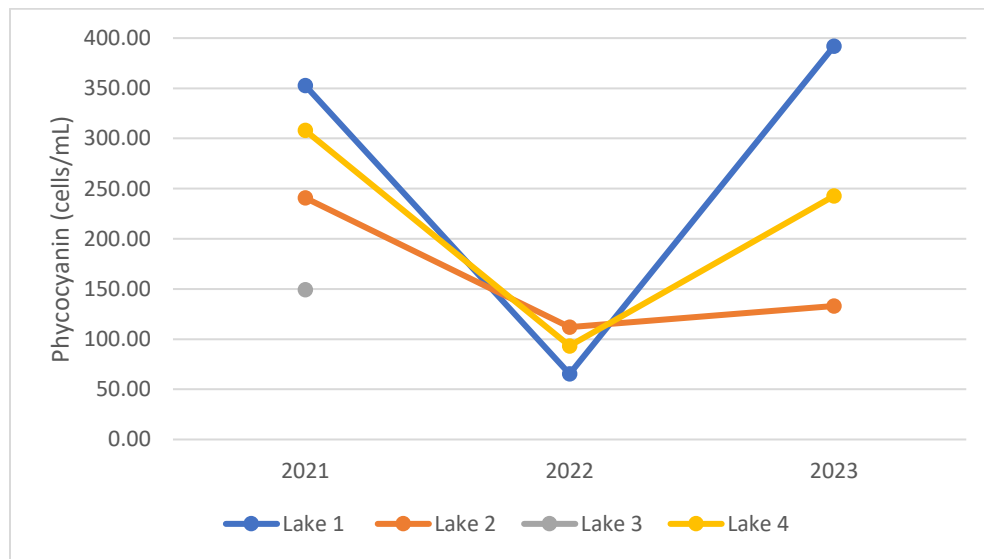


Figure 4. Average yearly phycocyanin (cells/mL) levels from the 2021 - 2023 summer sampling events at the lake sites. The WHO provides two guidelines; Alert level 1 at 20,000 cells/mL, and Alert level 2 at 100,000 cells/mL.

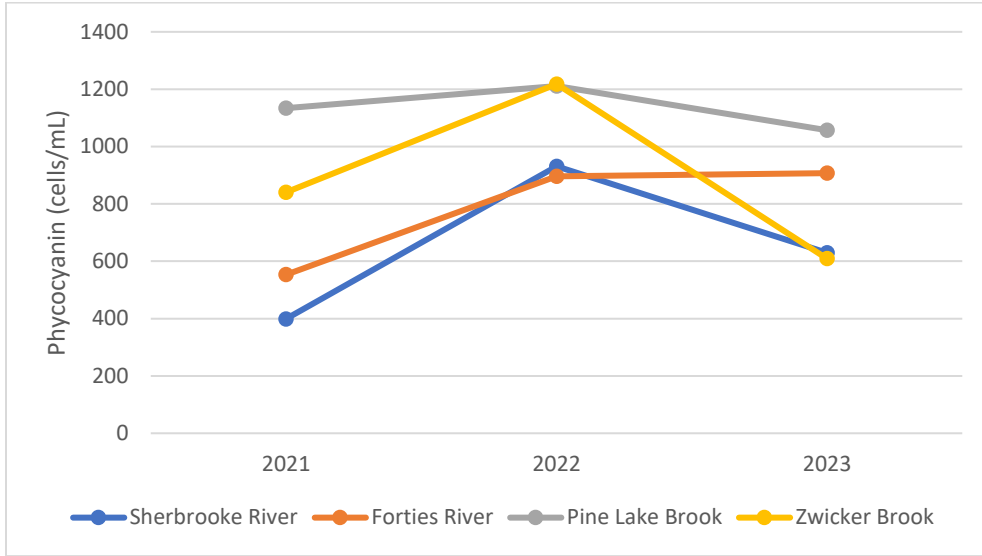


Figure 5. Summer months average yearly phycocyanin (cells/mL) levels from the 2021 - 2023 sampling events at the stream sites. The WHO provides two guidelines; Alert level 1 at 20,000 cells/mL, and Alert level 2 at 100,000 cells/mL.

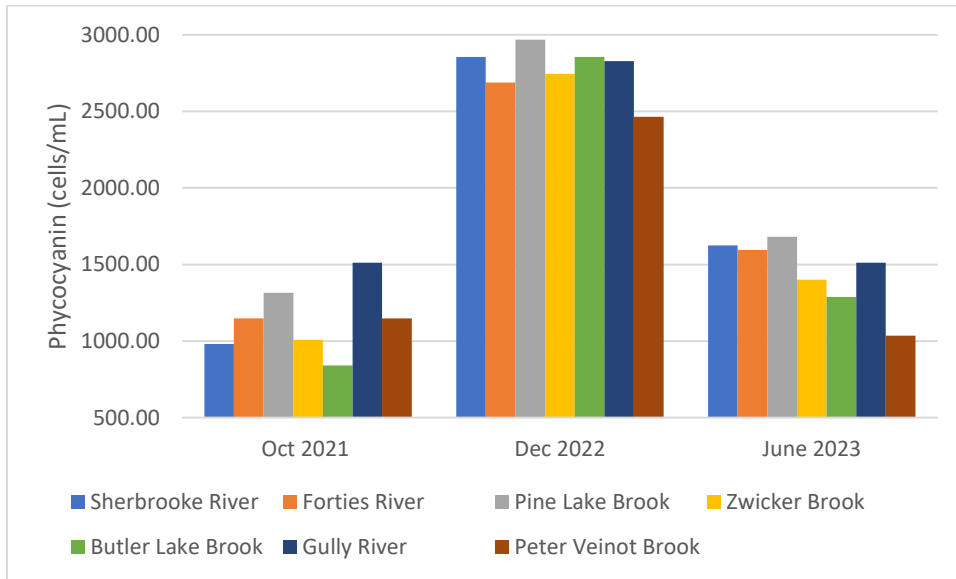


Figure 6. Phycocyanin (cells/mL) levels from the rainfall-dependent sampling events at the stream sites from 2021 - 2023, including the additional, rainfall-specific sites. The WHO provides two guidelines: Alert level 1 at 20,000 cells/mL, and Alert level 2 at 100,000 cells/mL.

### **2.1.2. Surface Water Temperatures**

Average yearly temperatures of the lake ranged from 14.1°C to 22.5°C (Figure 7). At Lake 4 in 2018, temperature readings were only taken in September and October. The highest average annual temperature occurred at Lake 3 in 2021, where readings were only taken during the warmer summer months, June to September. The average yearly surface temperature at all lake sites exceeded the threshold of 20°C for cold-water fish species in 2021, 2022, and 2023 (Nova Scotia Salmon Association [NSSA] 2014). All lake sites show a trend of slightly increasing surface water temperatures in the summer months; however, there is not enough data for statistical analyses to determine if this trend is significant or due to other factors such as time of sample collection or weather conditions before sampling. See the Appendix for graphs of individual site surface water readings showing the variance of data.

The stream sites showed cooler average temperatures than the lake, ranging from 10.3°C to 20.4°C (Figure 8). The highest average annual temperature at the tributaries occurred in 2021 at Forties River. Sherbrooke River also exceeded the threshold for coldwater species in 2018. Forties River was just below the threshold (19.9°C) in 2018 and exceeded it in 2021.

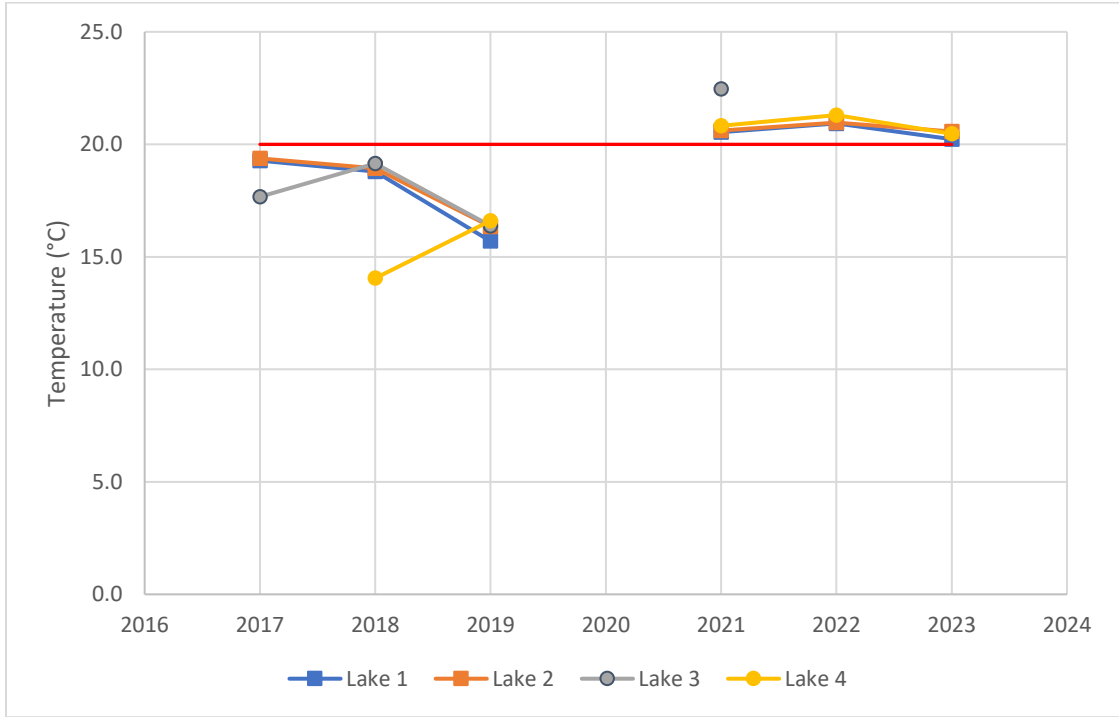


Figure 7. Average annual temperature (°C) readings from the 2017 to 2023 summer month sampling events at the lake sites. The red line indicates the 20°C threshold for cold-water fish set by NSSA.

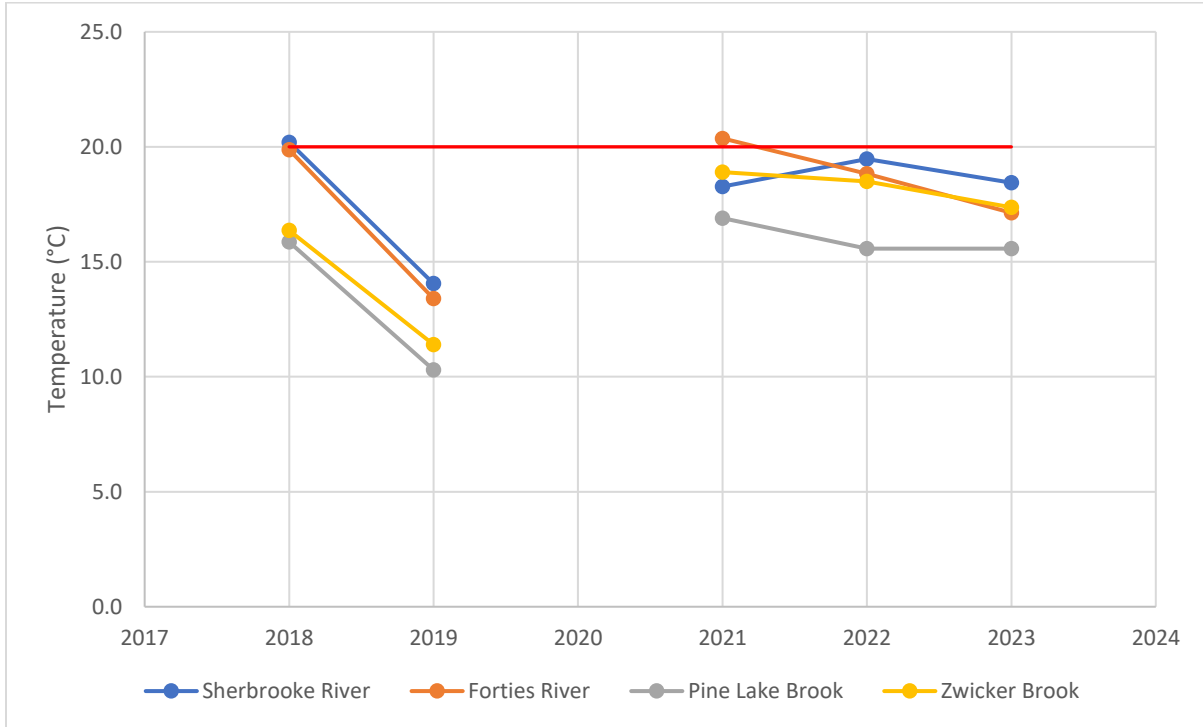


Figure 8. Average annual temperature (°C) readings from the 2017 to 2023 summer month sampling events at the stream sites. The red line indicates the 20°C threshold for cold-water fish set by NSSA.

Surface water temperature readings were taken during rainfall-dependent sampling events, at each of the stream sites, including three additional sites not sampled during regular monthly sampling. The 2022 samples were collected later into the year than usual due to a lack of significant rainfall events during the summer and fall months. Temperatures from the rainfall-dependent sampling datasets range from 5°C to 21.5°C (Figure 9).

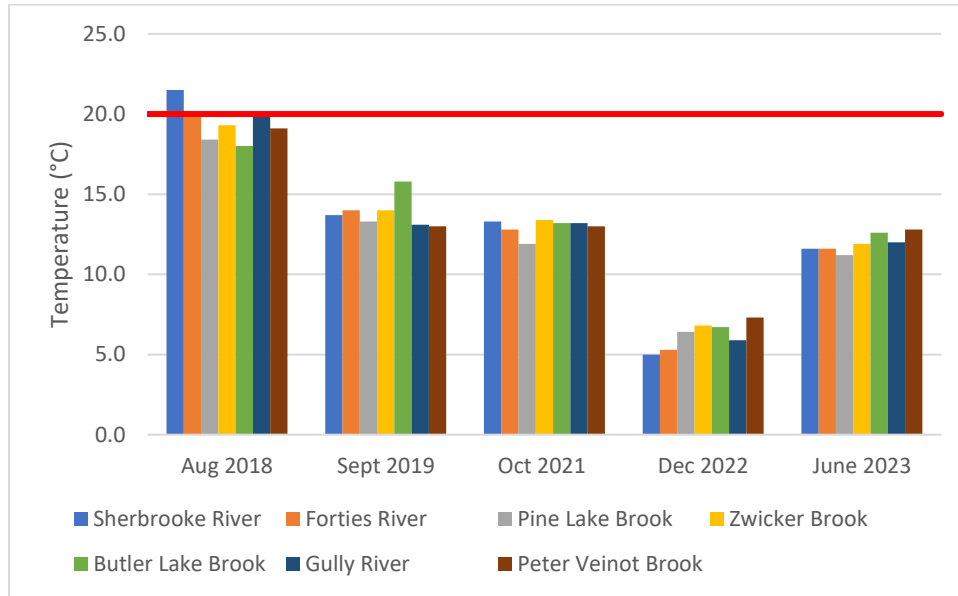


Figure 9. Temperature (°C) readings from the rainfall-dependent sampling at the stream sites, including the additional, rainfall-specific sites from 2018 - 2023. The red line indicates the 20°C threshold for cold-water fish set by NSSA.

### 2.1.3 Surface Dissolved Oxygen

Average dissolved oxygen (DO) readings at the lake sites ranged from 8.28 mg/L to 9.50 mg/L (Figure 10). The lowest average DO concentration of the lake sites was at Lake 3 in 2021. DO is a requirement for the survival of aquatic organisms, with a minimum threshold of 6.5 mg/L set by the Canadian Council of Ministers of the Environment (CCME) for cold-water species (CCME 1999b). None of the average yearly DO readings were below this threshold at the lake sites. The DO concentrations at each site show a slight downward trend. See the Appendix for graphs of individual site DO readings showing the variance of data.

Pine Lake Brook had the lowest and highest yearly average DO readings of the stream sites ranging from 4.80 mg/L to 10.79 mg/L (Figure 11). The average DO at Pine Lake Brook and Zwicker Brook were below the 6.5 mg/L threshold in 2017 and 2022, respectively. See the Appendix for graphs of individual site readings showing the variance of data.

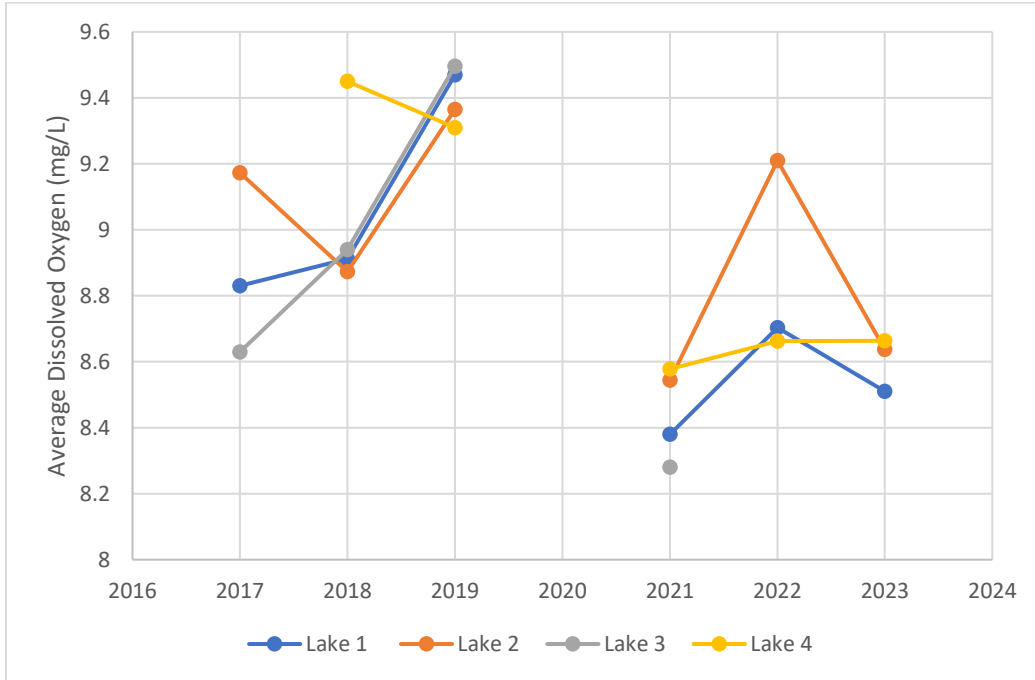


Figure 10. Average annual dissolved oxygen (mg/L) readings from the 2017 to 2023 summer month sampling events at the lake sites. Note vertical scale starts at 8 mg/L and does not show the CCME threshold of 6.5 mg/L.

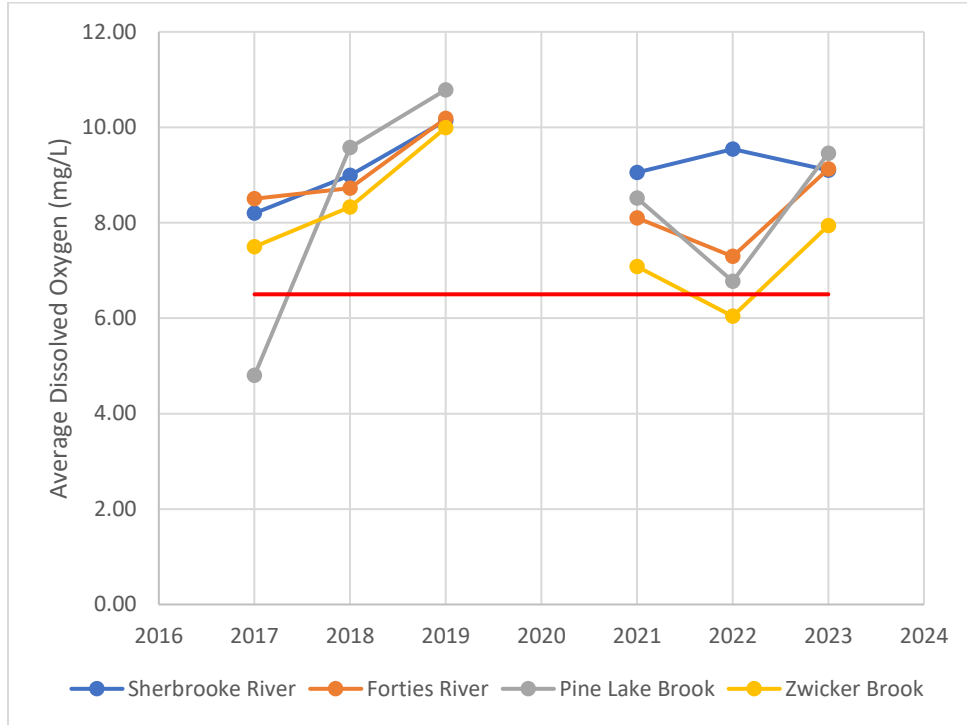


Figure 11. Average annual dissolved oxygen (mg/L) readings from the 2017 to 2023 summer month sampling events at the stream sites. The red line indicates the 6.5 mg/L minimum for aquatic species set by CCME.

Dissolved oxygen readings were taken yearly, excluding 2020, during each rainfall-dependent sampling event, including three additional sites not included in the regular monthly samples. DO levels within the tributaries ranged from 6.15 mg/L to 12.56 mg/L (Figure 12). Peter Veinot Brook was below the 6.5 mg/L threshold in 2018 and 2021.

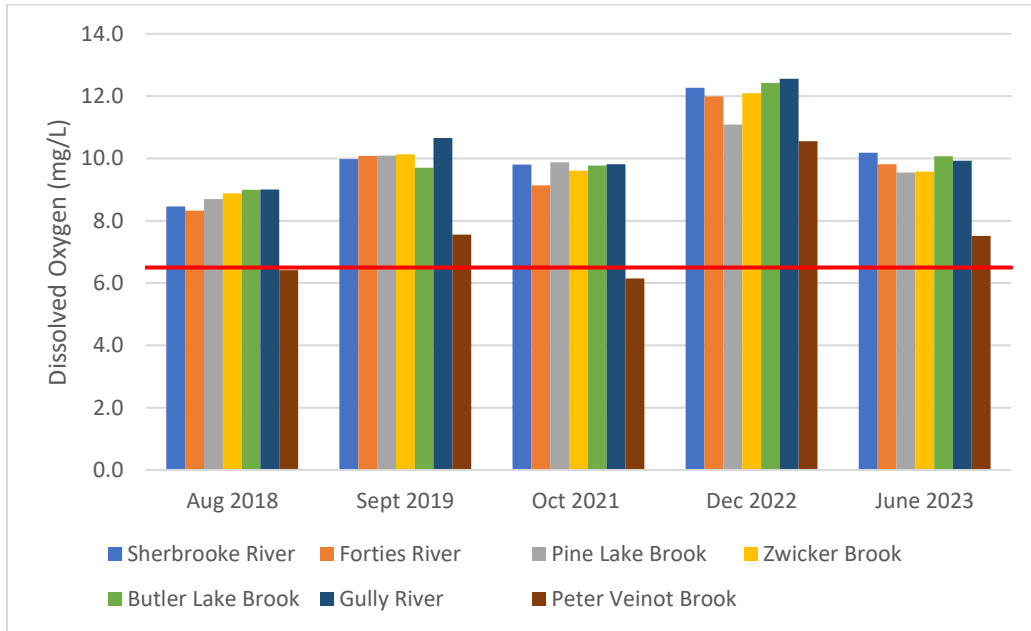


Figure 12. Dissolved Oxygen (mg/L) readings from the 2018 to 2023 rainfall-dependent sampling event at the stream sites, including the additional, rainfall-specific sites. The red line indicates the 6.5 mg/L minimum for aquatic species set by CCME.

### 2.1.4 pH

Although almost all of the average pH measurements fell below the 6.5-pH threshold set by the CCME (CCME 2002), the acidity of SL waters is not uncommon for southwest NS lakes. At the lake sites, the average summer month pH ranged from 4.79 to 6.88 (Figure 13), while the stream sites ranged from 3.12 to 6.11 (Figure 14). Readings taken during the yearly rainfall-dependent sampling were also consistently below the threshold of 6.5 (Figure 15). As Nova Scotia has experienced high amounts of acid precipitation in the past, and its geology limits the replenishment of base cations to soils (NSSA 2015), surface waters in southwest Nova Scotia are generally lower than the 6.5-pH threshold. In addition, though the Sherbrooke Lakes' pH values are lower than 6.5 pH, many fish species can survive in waters >5.0-pH (NSSA 2014) and therefore it appears that most of the time, the acidity of the waters in SL poses minimal threat to organisms, except for some stream sites. All lake and stream sites had a trend of increasing pH values from 2018 to 2023. See the Appendix for graphs of individual site pH readings showing the variance of data.

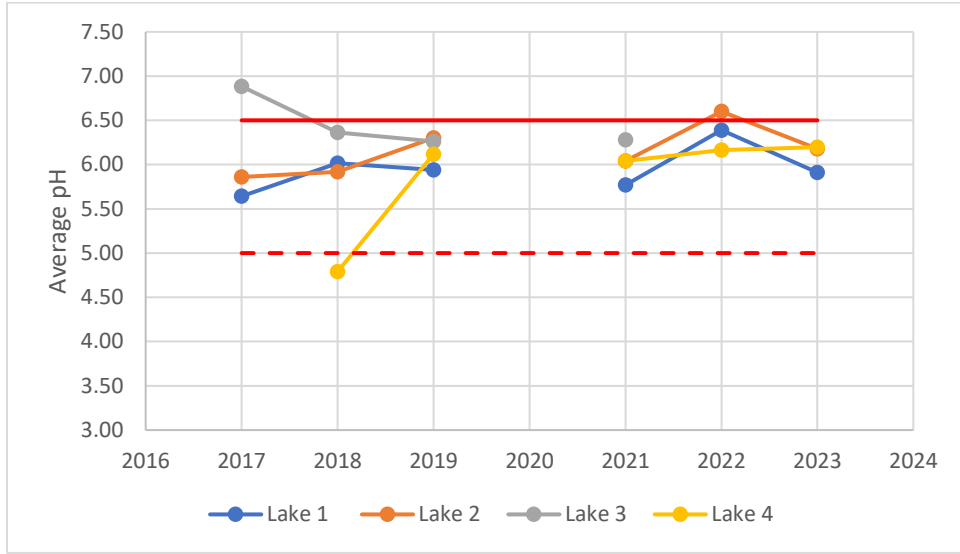


Figure 13. Average annual pH readings from the 2017 - 2023 summer month sampling events at the lake sites. The solid red line indicates the 6.5 pH threshold set by CCME, and the dotted red line indicates the 5.0 pH threshold identified by NSSA.

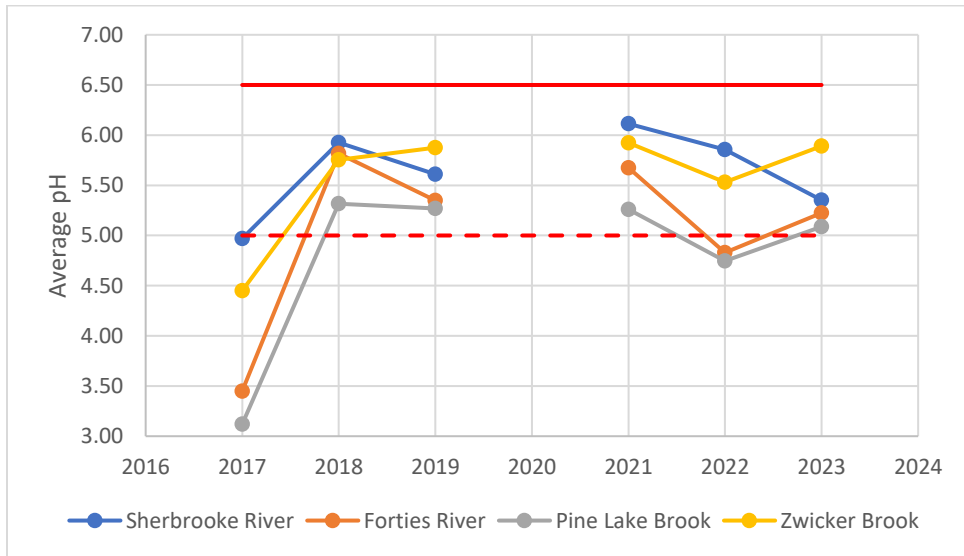


Figure 14. Average annual pH readings from the 2017 - 2023 summer month sampling events at the stream sites. The solid red line indicates the 6.5 pH threshold set by CCME, and the dotted red line indicates the 5.0 pH threshold identified by NSSA.

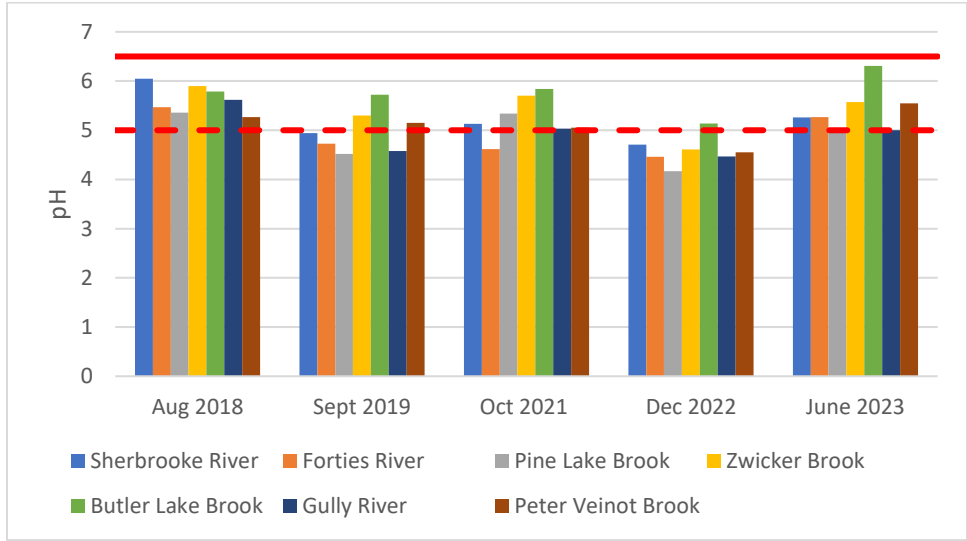


Figure 15. pH readings from the 2017 - 2023 rainfall-dependent sampling event at the stream sites, including the additional, rainfall-specific sites. The solid red line indicates the 6.5 pH threshold set by CCME, and the dotted red line indicates the 5.0 pH threshold identified by NSSA.

### 2.1.5 Total Dissolved Solids

Average yearly Total Dissolved Solids (TDS) readings at the lake sites ranged from 14.0 mg/L to 18.8 mg/L (Figure 16), and 13.5 mg/L to 22 mg/L at the stream sites (Figure 17). The highest average TDS at all lake sites was Lake 1 in 2018, and the highest reading of the stream sites was taken at Zwicker Brook in 2022. Overall trends show TDS levels have been declining at both lake and stream sites. See the Appendix for graphs of individual site TDS readings showing the variance of data.

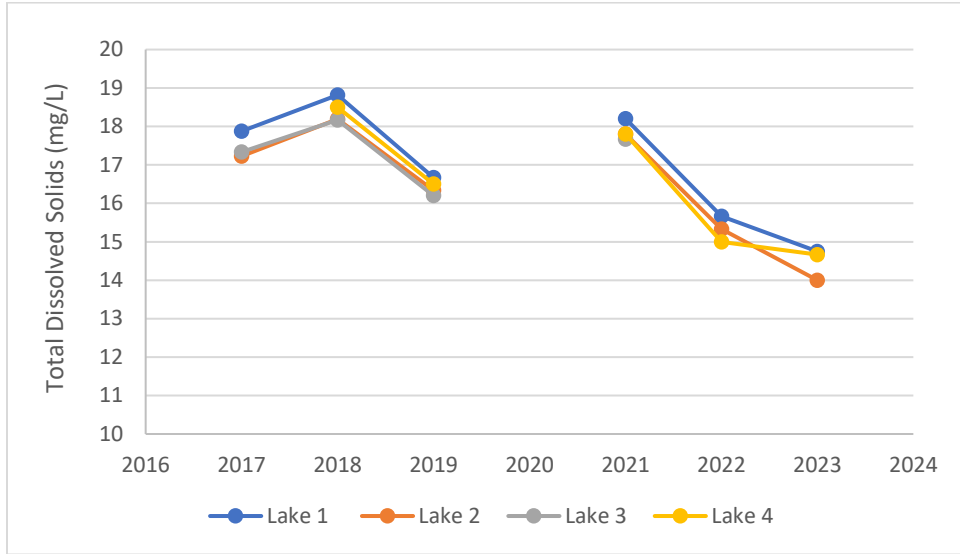


Figure 16. Average annual Total Dissolved Solids (mg/L) readings from the 2017 - 2023 summer month sampling events at the lake sites.

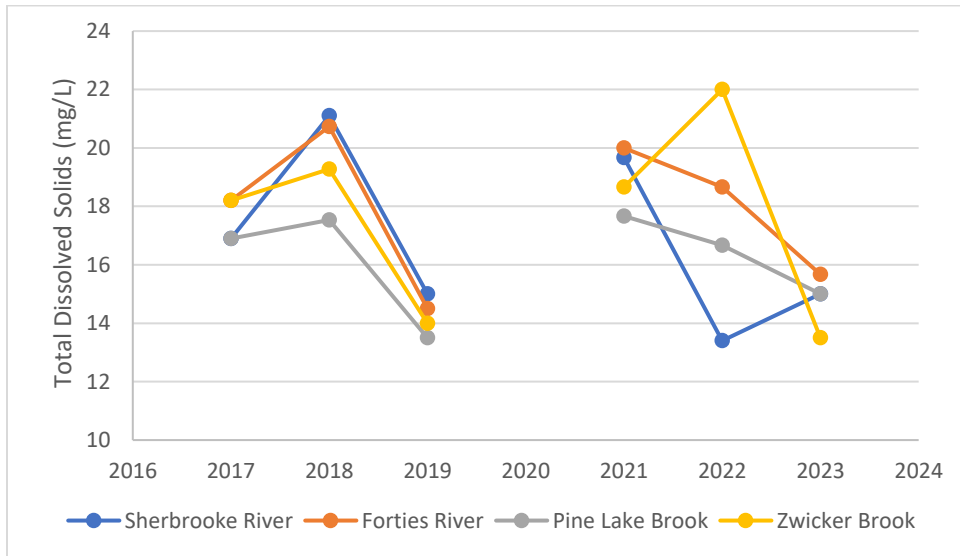


Figure 17. Average annual Total Dissolved Solids (mg/L) readings from the 2017 - 2023 summer month sampling events at the stream sites.

TDS readings during the yearly rainfall-dependent sampling event ranged from 10 mg/L at Zwicker Brook in 2023 to 39 mg/L at Butler Lake Brook in 2018 (Figure 18).

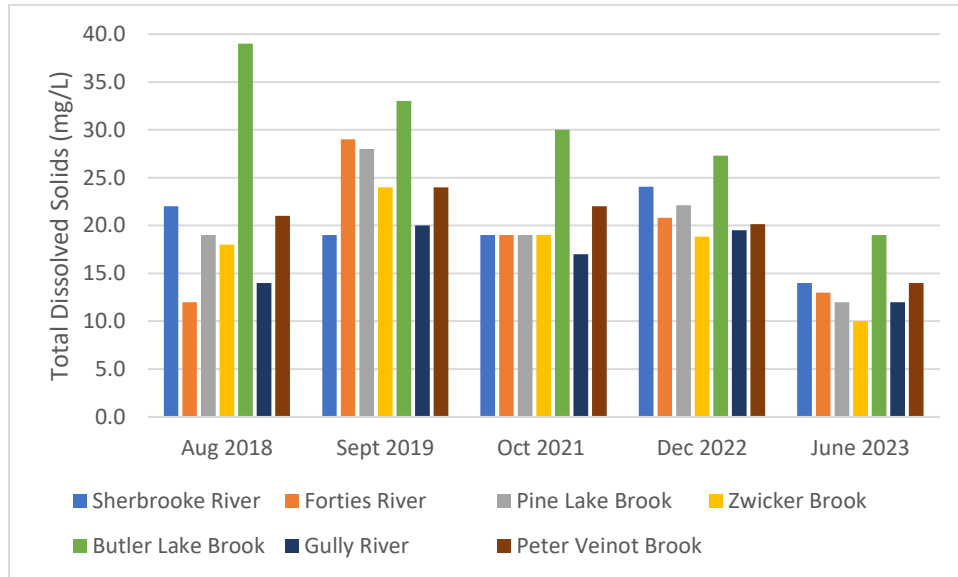


Figure 18. Total Dissolved Solids (mg/L) readings from the 2017 - 2023 rainfall-dependent sampling event at the stream sites, including the additional, rainfall-specific sites

There is no guideline for TDS set by the CCME for the protection of aquatic health; however, Hinch and Underwood (1985) found that pristine Nova Scotian lakes had an average of 20 mg/L. The presence of high TDS is not necessarily harmful as dissolved materials can be from both anthropogenic and natural sources. As TDS does not have a guideline for the protection of aquatic organisms, TDS concentrations do not appear to be detrimental to Sherbrooke Lake.

## 2.2 Chemical Water Quality Parameters

### 2.2.1 Total Suspended Solids

Total Suspended Solids (TSS) are measured as the value of solids suspended in a water column that do not pass through a 45 µm glass fibre filter. Overall TSS has shown a trend of slightly increasing at the lake sites. At the lake sites, the average yearly TSS readings ranged

from 1.00 mg/L to 2.73 mg/L (Figure 19), while stream sites ranged from 1.1 mg/L to 14.5 mg/L (Figure 20). Some stream sites show a declining trend in TSS, while others are showing a slight increase.

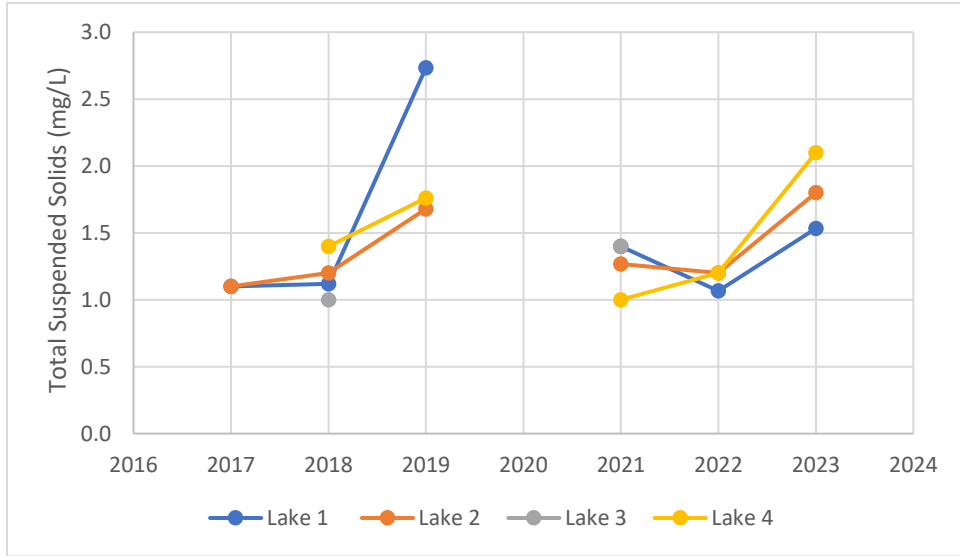


Figure 19. Average annual Total Suspended Solids (mg/L) readings from the 2017 - 2023 summer month sampling events at the lake sites.

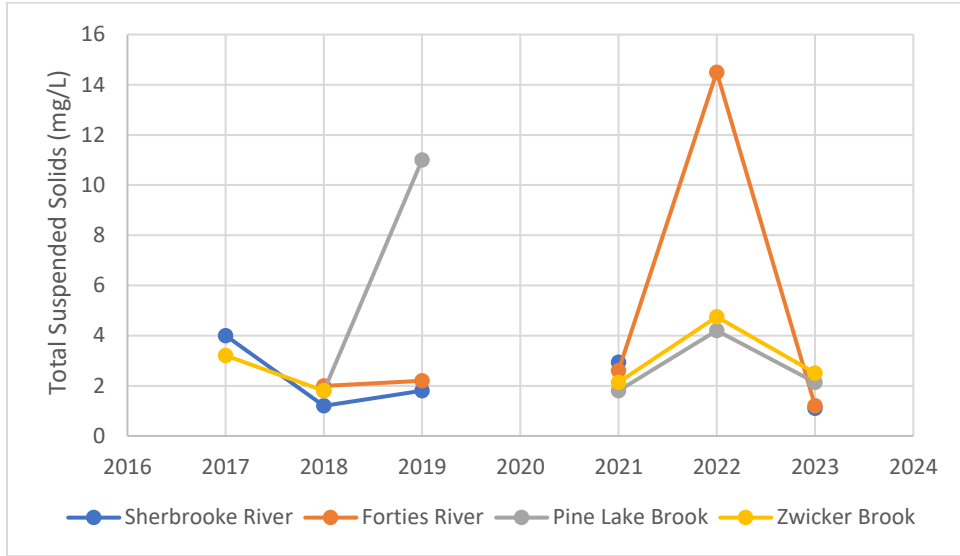


Figure 20. Average annual Total Suspended Solids (mg/L) readings from the 2017 - 2023 summer month sampling events at the stream sites.

TSS levels from the yearly rainfall-dependent sampling events ranged from not detected (<1 mg/L) to 14.5 mg/L at Forties River in 2022 (Figure 21).

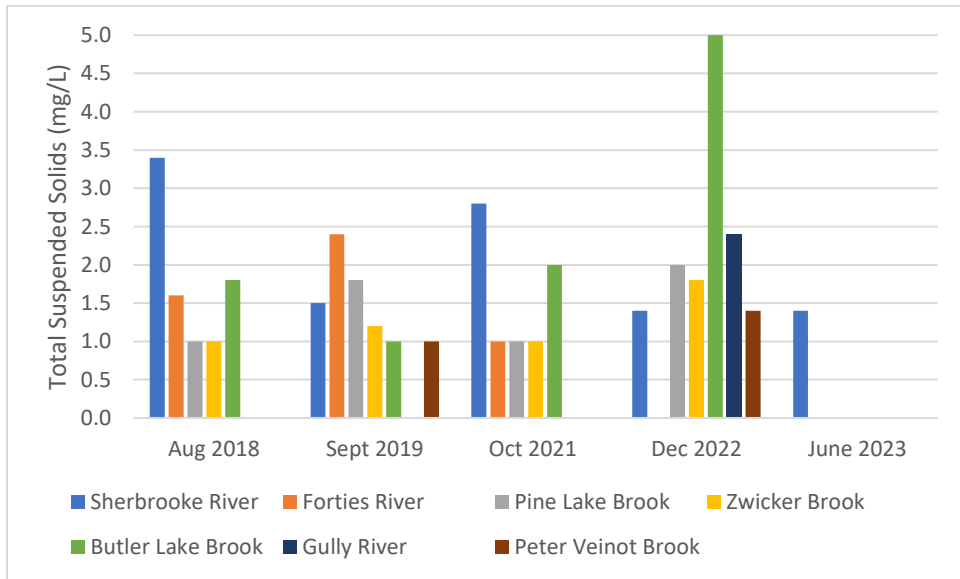


Figure 21. Total Suspended Solids (mg/L) readings from the 2017 - 2023 rainfall-dependent sampling event at the stream sites, including the additional, rainfall-specific sites. TSS was below detection levels at Gully River in 2018, 2019, 2021 and 2023; at Peter Veinot Brook in 2018, 2021, and 2023; at Forties River in 2022 and 2023; at Pine Lake Brook, Zwicker Brook and Butler Lake Brook in 2023.

As the CCME has a guideline of a 10 mg/L allowable increase from baseline in waterbodies with TSS  $\leq$  100 mg/L (CCME 2002), the TSS levels observed in 2022 at Forties River exceed this guideline for both the rainfall event and regular monthly sampling. The rest of the TSS levels observed are not a threat to aquatic organisms based on CCME guidelines.

### **2.2.2 Total Phosphorus**

At the lake sites, the average yearly surface total phosphorus (TP) levels ranged from 0.004 mg/L at Lake 3 to 0.011 mg/L at Lake 1 (Figure 22). All lake sites show a trend of declining average TP levels, except Lake 2, which shows a slight increase (Figure 23). Lake sites 2, 3, and 4 show little variance within the samples, while Lake 1 shows the most variance indicated by error bars in Figure 23. Some TP readings were below the detectable limit of 0.004 mg/L. The average yearly TP readings at the stream sites ranged from 0.007 mg/L to 0.024 mg/L (Figure 24).

Ontario's Ministry of Environment and Climate Change (MOECC) has established two guidelines for phosphorus in water bodies:  $\leq$  0.02 mg/L for lakes, and  $\leq$  0.03 mg/L for rivers and streams (Ontario's Ministry of Environment [MOE] 1979). The average yearly TP concentrations at the lake and stream sites did not exceed the MOECC guidelines.

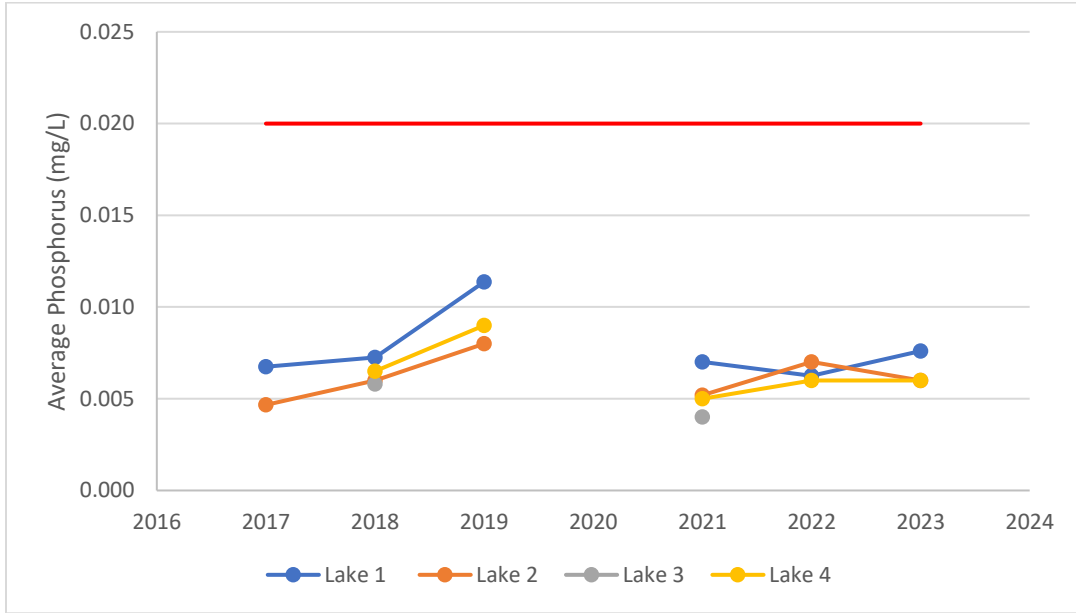


Figure 22. Average annual total phosphorus (mg/L) readings from the 2017 - 2023 summer month sampling events at the lake sites.

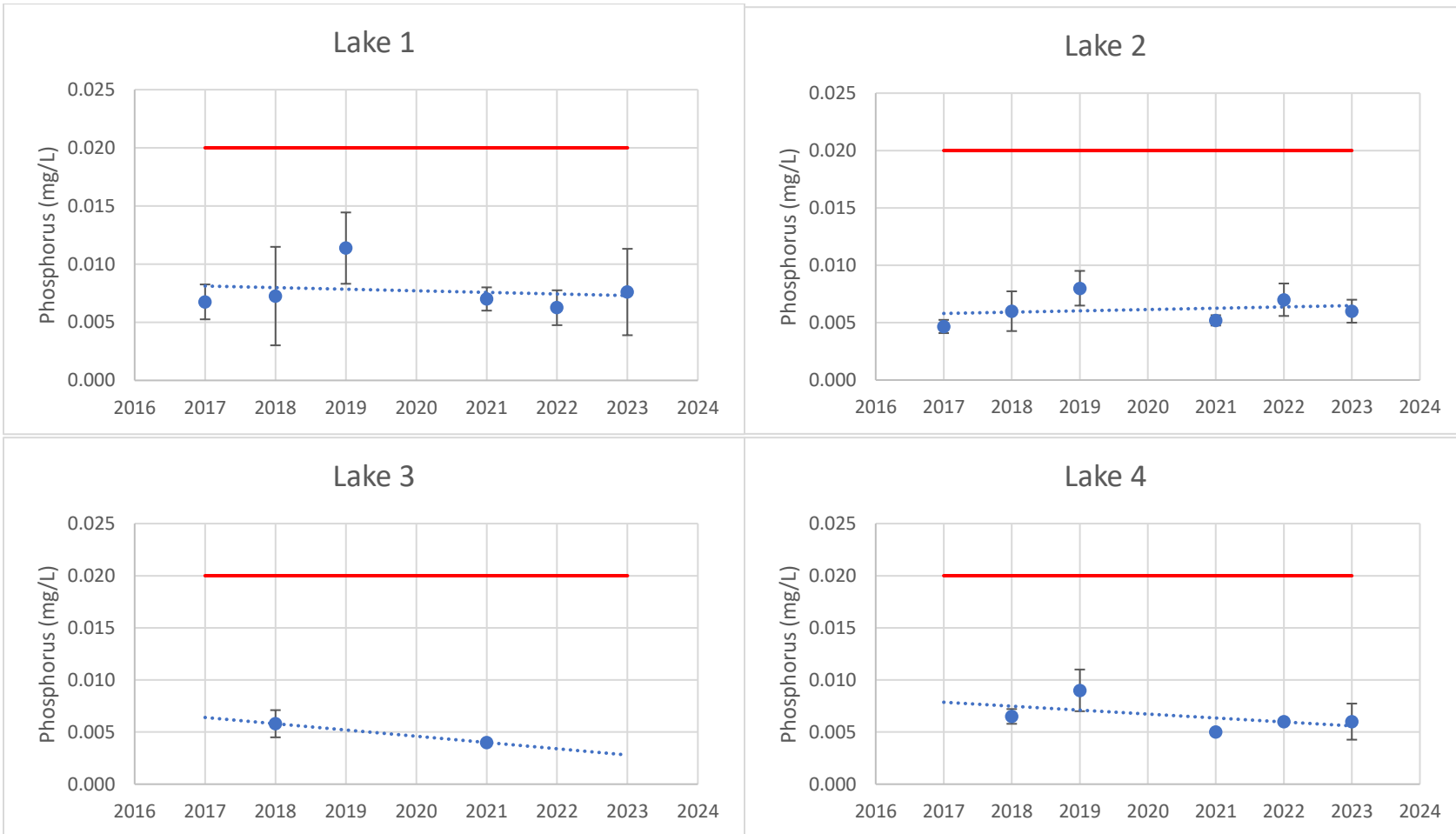


Figure 23. Average annual Total Phosphorus (mg/L) levels from the summer month sampling events at the lake sites. The red line indicates the MOECC guideline for phosphorus in lakes. Error bars indicate standard error. The blue dotted line indicates the trendline.

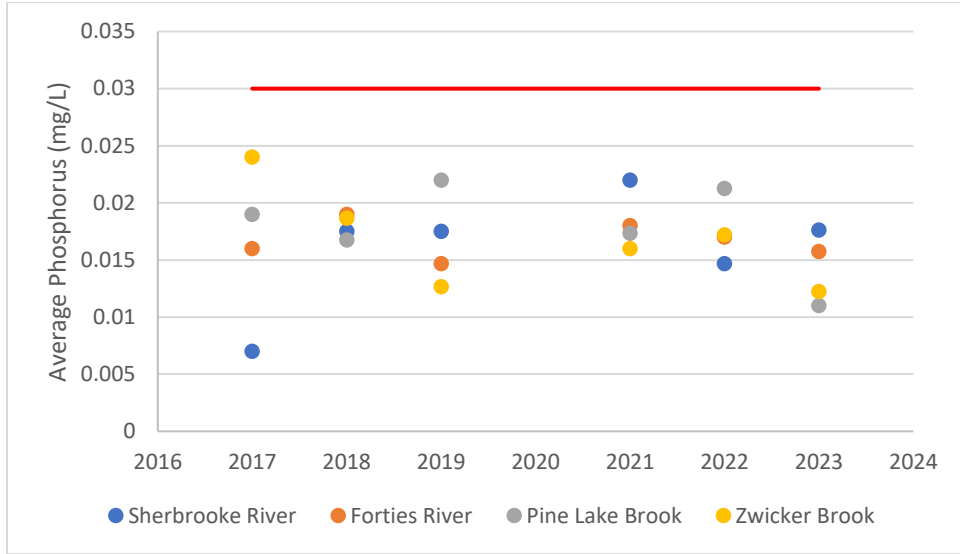


Figure 24. Average annual Total Phosphorus (mg/L) readings from the 2017 - 2023 summer month sampling events at the stream sites. The red line indicates the MOECC guideline for total phosphorus in streams.

Total phosphorus samples taken during the yearly rainfall-dependent sampling event ranged from 0.007 mg/L to 0.04 mg/L (Figure 25).

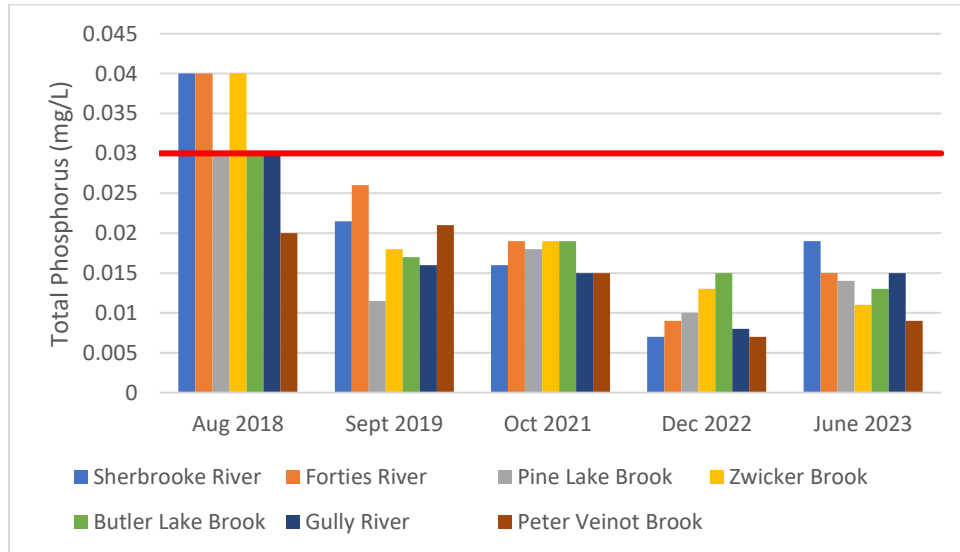


Figure 25. Total Phosphorus (mg/L) readings from the 2018 - 2023 rainfall-dependent sampling event at the stream sites, including the additional, rainfall-specific sites.

Once each year during the sediment sampling, at-depth water samples were analyzed for total phosphorus. These samples were taken below the thermocline at Lake 1 and Lake 2. TP at-depth ranges from 0.007 mg/L at Lake 1 to 0.430 mg/L at Lake 2 in 2021 (Figure 26). These results exceed the MOECC guidelines at Lake 2 in 2018 and 2021, indicating the deeper waters at this site were nutrient-enriched during these years.

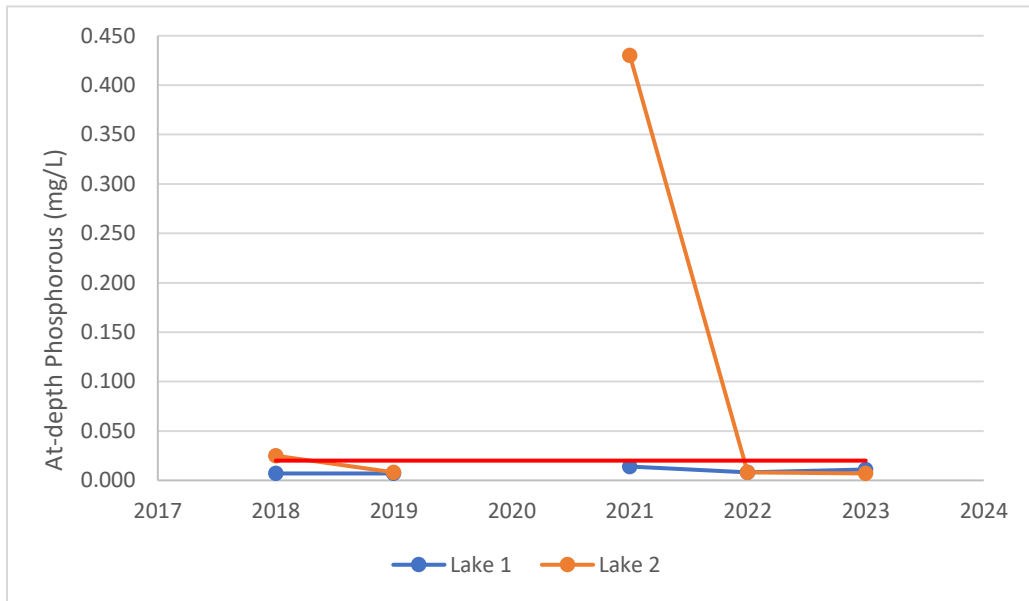


Figure 26. At-depth total phosphorus readings from the once-yearly sampling.

### 2.2.3 Total Nitrogen

At the lake sites, the average yearly surface total nitrogen (TN) levels ranged from 0.193 mg/L to 0.588 mg/L (Figure 27). Lake 1 and 2 show a trend of slightly increasing average TN levels, and Lake 3 shows a slight decline but was only sampled during two years (Figure 28). Lake 4 shows a strong trend of increasing TN values; however, there was a single spike to 1.14 mg/L in July 2023, which was an outlier value. The average yearly TN readings at the stream sites ranged from 0.244 mg/L to 0.78775 mg/L (Figure 29). Dodds and Welch (2000) have established a guideline for nitrogen in waterbodies of 0.9 mg/L. The average yearly TN levels did not exceed this at any lake or stream site.

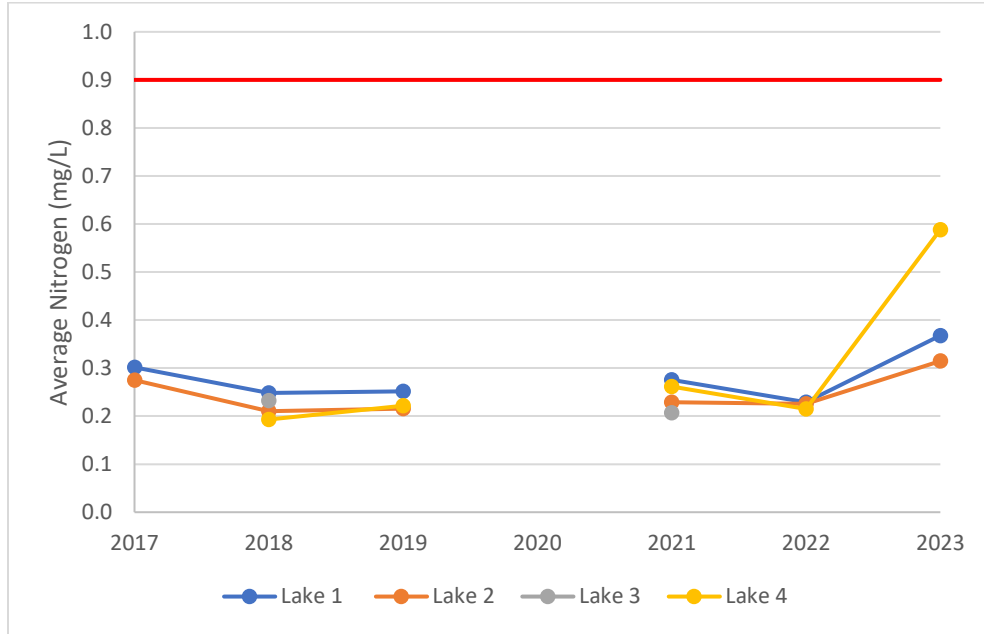


Figure 27. Average annual total nitrogen (mg/L) readings from the 2017 - 2023 summer month sampling events at the lake sites.

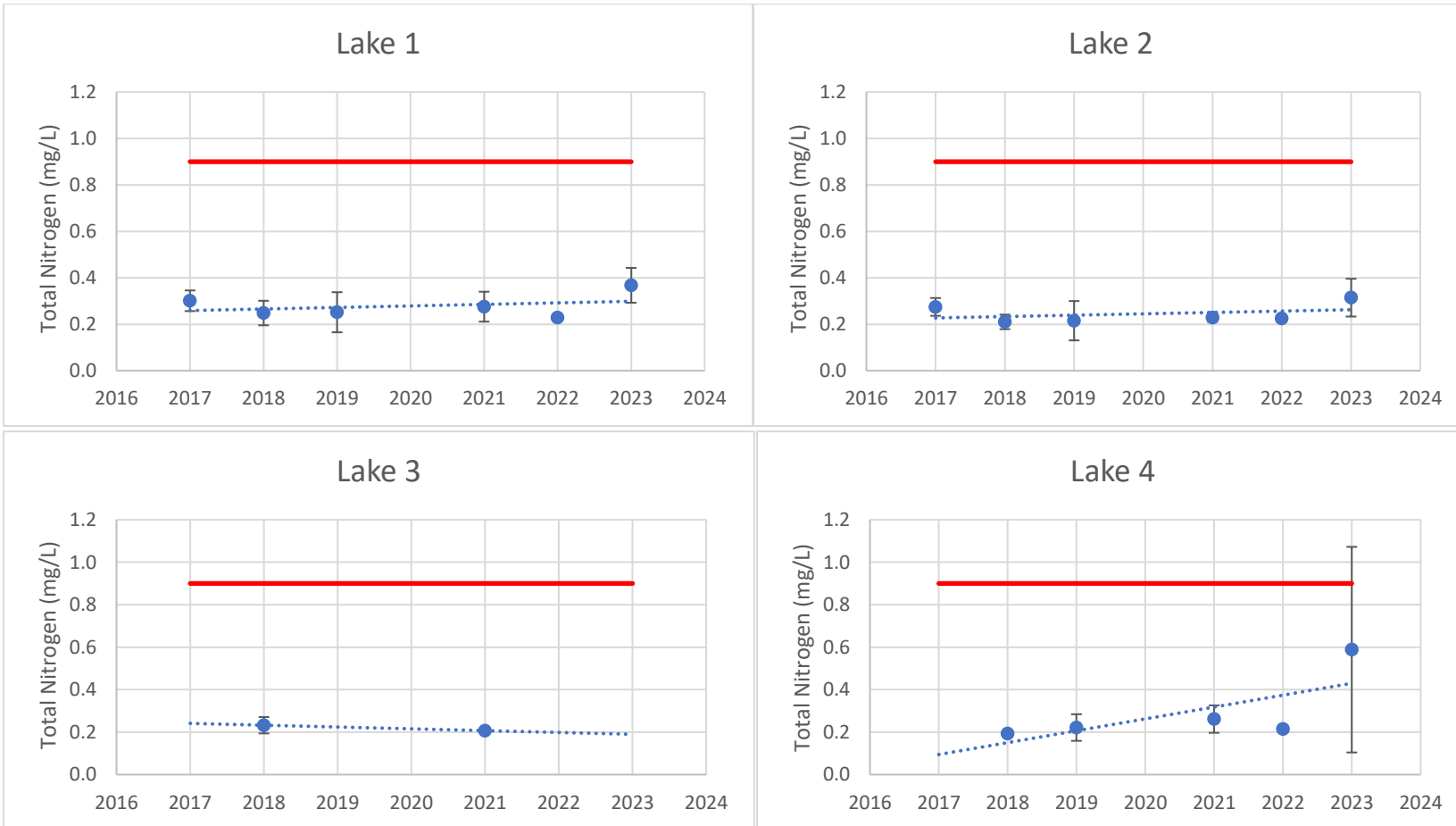


Figure 28. Average annual Total Nitrogen (mg/L) levels from the summer month sampling events at the lake sites. The red line indicates the Dodds and Welch guideline for nitrogen in lakes. Error bars indicate standard error. The blue dotted line indicates the trendline.

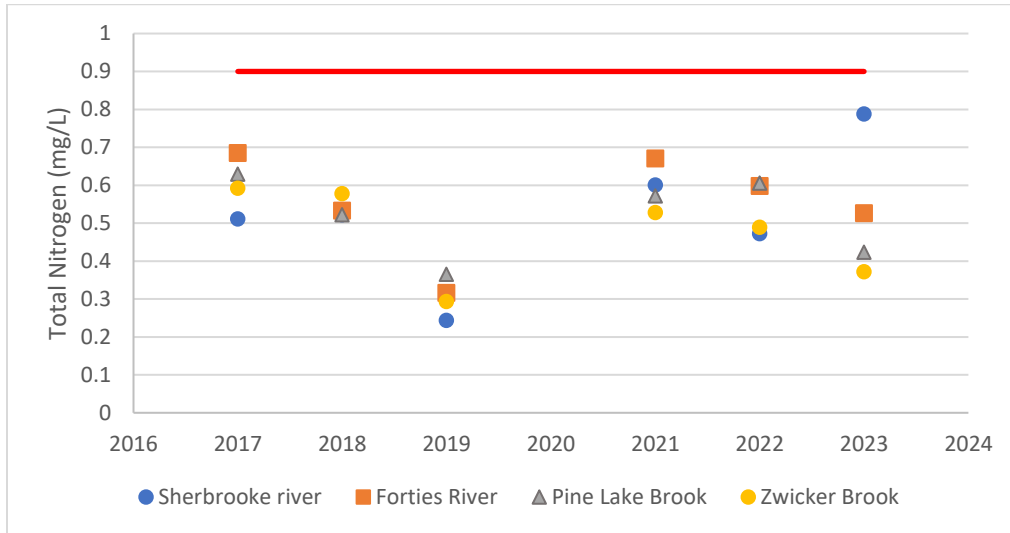


Figure 29. Average annual Total Nitrogen (mg/L) levels from the summer month sampling events at the stream sites. The red line indicates the Dodds and Welch guideline for nitrogen in streams.

During the yearly rainfall-dependent sampling, TN levels ranged from 0.355 mg/L to 0.883 mg/L (Figure 30).

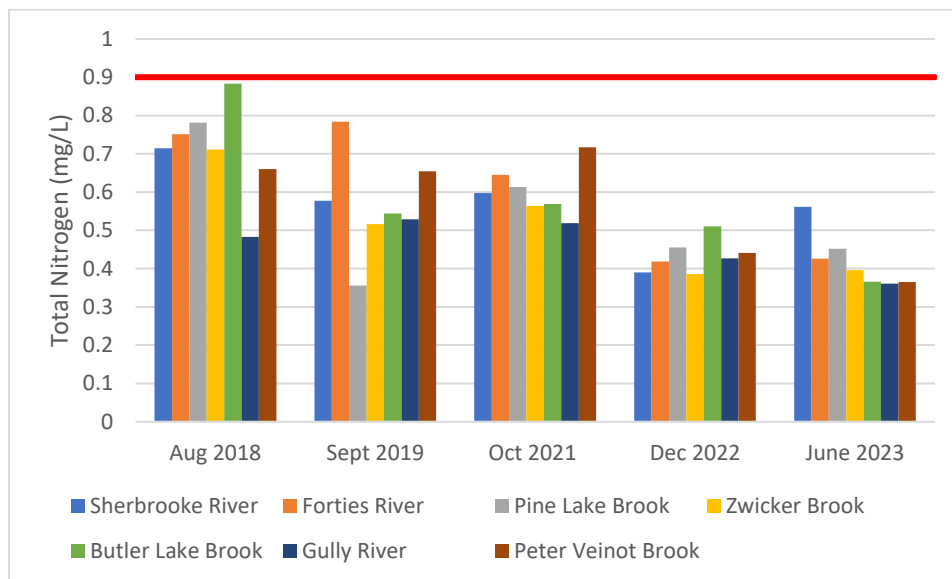


Figure 30. Total Nitrogen (mg/L) readings from the 2022 rainfall-dependent sampling event at the stream sites, including the additional, rainfall-specific sites. The red line indicates the Dodds and Welch guideline for nitrogen in streams.

Total Nitrogen concentrations were measured below the thermocline at Lake 1 and Lake 2 once annually. Lake 2 exceeded the Dodds and Welch guideline of 0.9 mg/L in 2021, while Lake 1 exceeded it in 2022 (Figure 31). Higher nitrogen concentrations below the thermocline in certain years may indicate a possible nutrient-enrichment event during fall turnover, with a potential for eutrophication and algal blooms.

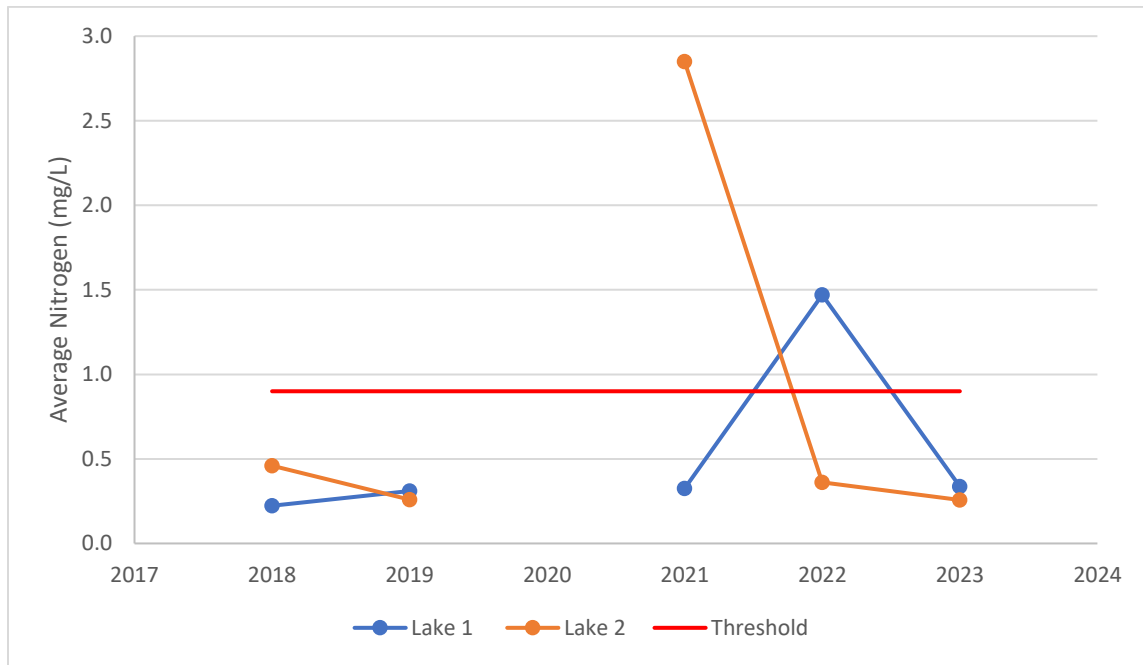


Figure 31. At-depth total nitrogen readings from the once-yearly sampling.

## 2.3 Biological Water Quality Parameters

### 2.3.1 Fecal Bacteria

In recreational waters, the presence of fecal pollution poses a risk to the public due to the potential presence of pathogenic microorganisms, which can infect humans and animals and cause serious illnesses. Fecal coliforms are a type of bacteria produced in the intestines of warm-blooded animals, while *E. coli* is a sub-group of fecal coliform. In 2017 and 2018, the bacteria analyzed were fecal coliforms and changed to the more specific *E. coli* readings in 2019. Fecal coliforms were previously used as a proxy for *E. coli*, with the assumption that 90% of fecal coliforms are *E. coli* in freshwater. In 2023, the Health Canada primary contact

guideline for *E. coli* changed from  $\leq 400$  CFU/100 mL to  $\leq 235$  CFU/100 mL, based on new literature on human health and fecal bacteria (Health Canada 2023).

In 2017, fecal coliform at the lake sites was below detection levels (ND =  $\leq 10$  CFU/100 mL), and in 2018 ranged from  $<10$  CFU/100 mL to 3.3 CFU/100 mL. From 2019 to 2023, the average yearly *E. coli* readings at the lake sites ranged from not detected (ND) to 30 CFU/100 mL. In July 2023, Lake 3 and 4 had the highest *E. coli* results of any lake site during the program at 60 CFU/100 mL and 90 CFU/100 mL respectively, remaining below Health Canada Guidelines.

The stream sites had consistently higher fecal coliform and *E. coli* results than the lake sites. The average fecal coliform readings from 2018 at the stream sites ranged from 76 CFU/100 mL to 185 CFU/100 mL (Figure 32). The average *E. coli* readings from 2019 to 2023 ranged from 2 CFU/100 mL to 160 CFU/100 mL (Figure 33).

All yearly average readings were below Health Canada’s primary and secondary recreational contact guidelines for *E. coli* in freshwaters of  $\leq 235$  CFU/100 mL and  $\leq 705$  CFU/100 mL (Health Canada 2023). These primary contact activities are activities where the body, face, or trunk are submersed and it is likely water will be swallowed (Health Canada 2012).

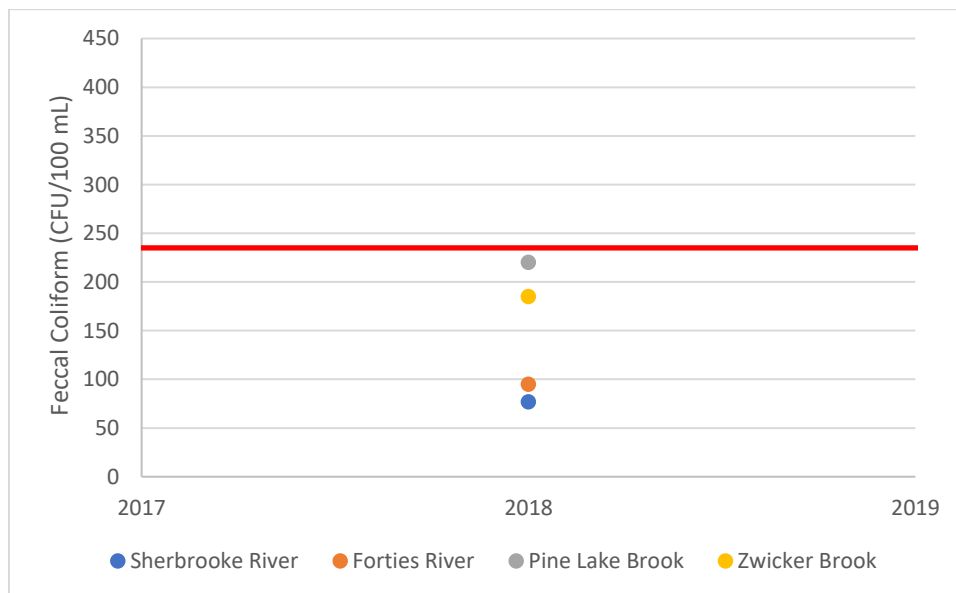


Figure 32. Average annual fecal coliform (CFU/100 mL) readings from the 2018 summer month sampling events at the stream sites. The solid red line indicates Health Canada’s primary guideline of 235 CFU/100 mL.

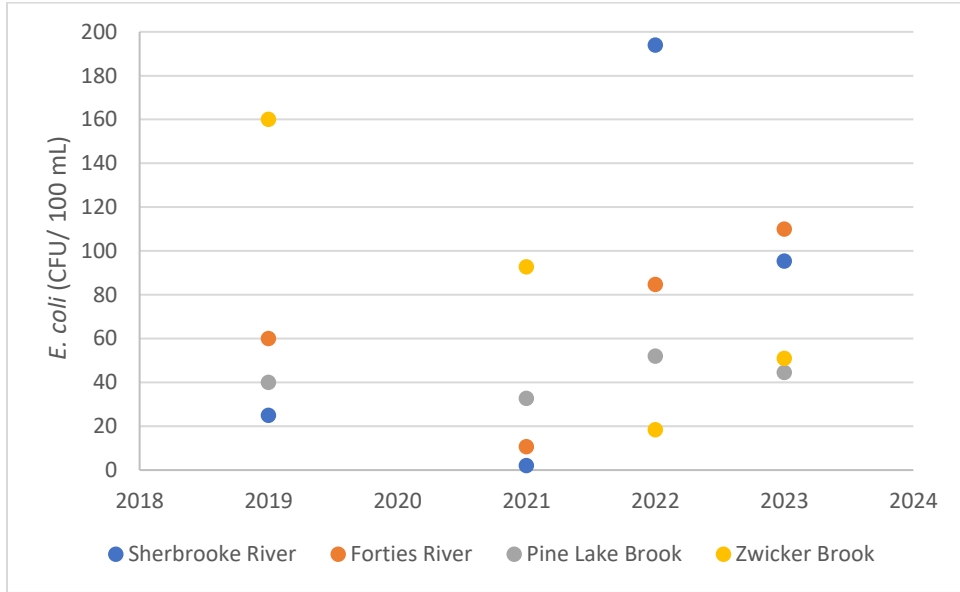


Figure 33. Average annual *E. coli* (CFU/100 mL) readings from the 2019 - 2023 summer month sampling events at the stream sites.

Fecal coliform concentrations during the 2018 rainfall-dependent sampling ranged from 10 CFU/100 mL to 350 CFU/100 mL (Figure 34). *E. coli* concentrations from the yearly rainfall-dependent sampling ranged from 20 CFU/100 mL to 720 CFU/100 mL (Figure 35). Forties River exceeded the Health Canada secondary recreational guideline in 2019. The primary guideline was exceeded by Sherbrooke River in 2019 and Peter Veinot Brook in 2022.

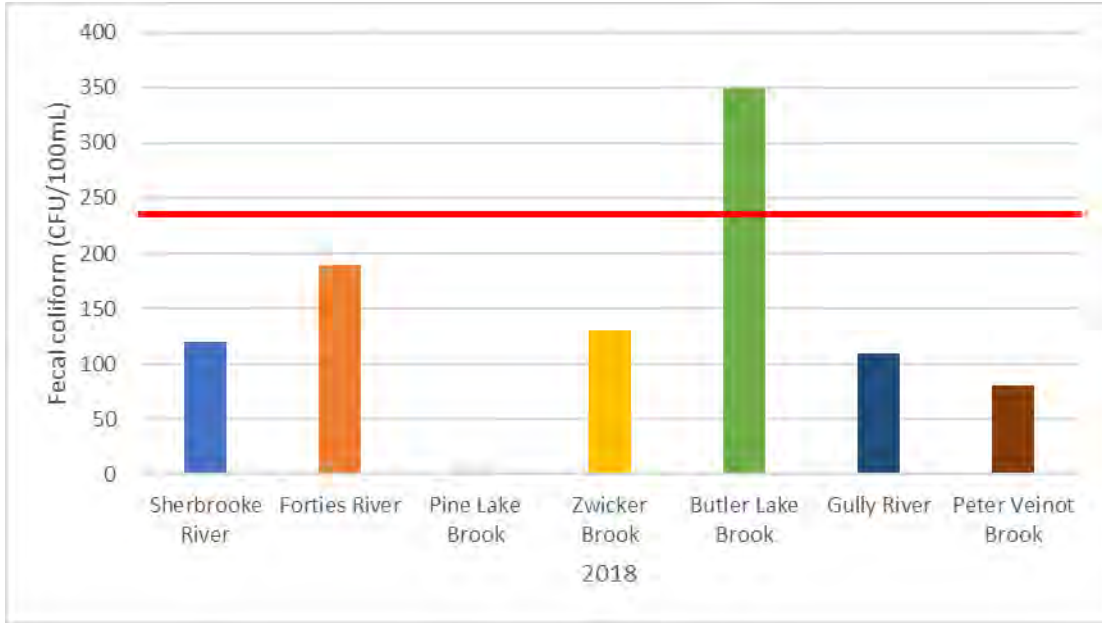


Figure 34. Fecal coliform (CFU/100 mL) readings from the 2018 rainfall-dependent sampling event at the stream sites. The red line indicates Health Canada's primary guideline of 235 CFU/100 mL.

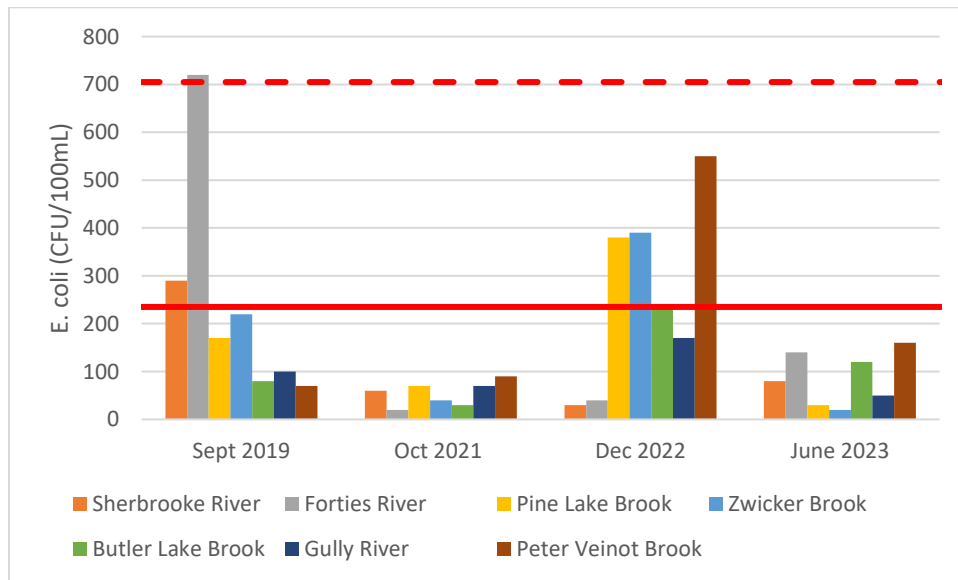


Figure 35. E. coli (CFU/100 mL) readings from the 2019 – 2023 rainfall-dependent sampling events at the stream sites, including the additional, rainfall-specific sites. The solid red line indicates Health Canada's primary recreational guideline of 235 CFU/100 mL and the dashed red line indicates Health Canada's secondary recreational guideline of 705 CFU/100 mL.

### **2.3.2 Microcystin-LR & Algal Blooms**

The recreational guideline for total cyanobacterial toxins – Microcystin-LR is 10 µg/L (Health Canada 2022). This guideline is meant to protect against exposure to microcystins and other toxins that may be present in an algal bloom. The Health Canada guideline of 10 µg/L is for total microcystins, which includes dissolved microcystins present in the water and microcystins within the cyanobacteria cells (Health Canada 2022). Currently, microcystins are the only cyanotoxins with recreational guidelines, as there is a lack of data for the other toxins (Health Canada 2022).

Not all algal blooms are toxic cyanobacteria blooms, and Microcystin-LR is only one of the possible toxins in a cyanobacteria bloom. As well, For this reason, every algal bloom should be treated with caution and reported to the Nova Scotia Department of Environment and Climate Change (NSECC). Following a suspected bloom, recreational activities on the water should be treated with caution, as Microcystin-LR can persist in aquatic environments after a visible bloom has dissipated (Jones & Orr 1994).

During the five years of monitoring for this program, no algal blooms were sampled that contained microcystin.

In 2018, no blooms were reported, in 2019 a total of nine blooms were reported, and two were sampled and sent to Maxxam Analytics (now Bureau Veritas) to be tested, along with an algae sample sent to Dalhousie University to identify the species present. These blooms were below the detection level for microcystin and the dominant algae species in that sample was green algae – a non-toxic species. In 2020, sampling activities were paused due to the COVID-19 pandemic restrictions. A bloom was reported to NSECC in July 2020 but was not tested for microcystins. In 2021, one bloom was reported and sampled but contained no detectable microcystin. There was one potential bloom reported in 2022 and another in 2023 but each dissipated before it could be sampled.

### **2.4 Sediment Sampling**

Sediment sampling at lake and stream sites occurred each year starting in 2018. The bottom substrate was analyzed for metals, phosphorus, and orthophosphate, to assess the risk of internal nutrient loading within the lake and the potential risk from the accumulation of metals within the sediments.

In 2018, Lake 2, Lake 3, and Forties River were sampled. From 2019 to 2023 (excluding 2020) Lake 1, Lake 2, and Lake 4 were sampled. The 2019 stream was Zwicker Brook, the

2021 stream was Sherbrooke River, the 2022 stream was Pine Lake Brook, and the 2023 stream was Zwicker Brook.

### **2.4.1 Metals**

Three guidelines are used for sediment analysis; the CCME's recommended Interim Sediment Quality Guideline (ISQG), the CCME's Probable Effect Levels (PEL), and the Nova Scotia Environmental Quality Standards (NSEQS) contamination threshold.

Arsenic concentrations were noticeably high and exceeded the ISQG guidelines at all lake sites every year except at Lake 1 in 2021. Lake 2 had the highest recorded levels of arsenic, with 2018 and 2023 levels approaching the PEL and NSEQS guidelines. Increased arsenic levels reduce the abundance of benthic invertebrates, the main food source for many aquatic species (CCME 2002). Arsenic levels increased from 2021 to 2023 at Lakes 1 and 2, whereas Lake 4 had a slight decrease of 1.5 mg/kg from 2021 to 2022 and then a further 0.1 mg/kg decrease from 2022 to 2023 (Table 2).

Cadmium levels exceeded the ISQG guidelines at all lake sites in all years except at Lake 1 and Lake 2 in 2021. The highest cadmium concentration recorded was 1.5 mg/kg at Lake 3 in 2018. Like arsenic, cadmium reduces the abundance of benthic invertebrates and damages aquatic species, as exposure can reduce feeding behaviour, reproduction and growth rates, as well as cause mortality (CCME 1999a). However, cadmium levels are generally low at all sites and were not detected at any of the stream sites except Zwicker Brook in 2023. All cadmium readings fell below the probable effect levels. The highest concentration recorded only exceeded the ISQG guidelines by 0.9 mg/kg.

Lead levels exceeded the ISQG guideline in 2018, 2022, and 2023 at Lake 2, and 2023 at Lake 1. At Lake 1 in 2019, the ISQG guideline was approached but not exceeded with a level of 34 mg/kg. Lead levels at the stream sites were very low in all years, except 2023 which saw the highest of all stream sites, 29 mg/kg at Zwicker Brook. Lead can reduce the abundance of benthic invertebrates, and depending on the physicochemical conditions, can be harmful to other aquatic organisms (CCME 2002).

Mercury levels are relatively high at all lake sites. The ISQG guideline was either exceeded or approached at each lake site each year except Lake 4 in 2019. The level of mercury increased at each site from 2021 to 2023. Mercury was not detected at any of the stream sites, except for Zwicker Brook in 2023.

Selenium levels approached the NSEQS guideline at Lake 2 in 2018, 2021, and 2023, and at Lake 4 in 2021 and 2023. Selenium was undetected at any stream sites.

Of the stream sites, Zwicker Brook in 2023 was the only site with metal concentrations above or approaching guidelines (Table 3). Arsenic and cadmium exceeded ISQG guidelines, while mercury and zinc approached them.

See Table 4 for a summary of all exceedances of metals from 2018 to 2023.

Table 2. Concentrations of acid extractable metals within lake site sediment samples. All metals are acid extractable except for Orthophosphate. All units are mg/kg. Light yellow indicates parameters approaching one of the guidelines, orange indicates an exceedance of ISQG, and red indicates an exceedance of either the PEL or NSEQS guidelines.

Metals	Lake 1				Lake 2					Lake 3	Lake 4				Concentration Guidelines		
	2019	2021	2022	2023	2018	2019	2021	2022	2023	2018	2019	2021	2022	2023	ISQG	PEL	NS
Aluminum (Al)	22000	12000	18000	1900	22000	25000	16000	18000	24000	6700	7200	22000	20000	20000			
Antimony (Sb)	ND	ND	<2 (ND)	<2 (ND)	ND	ND	ND	<2 (ND)	<2 (ND)	ND	ND	ND	<2 (ND)	<2 (ND)			25
Arsenic (As)	8.4	4.8	6.8	8.6	16	12	6.8	12	16	8.3	8.1	9.8	8.3	8.2	5.9	17	17
Barium (Ba)	49	26	42	46	42	50	30	35	44	26	17	35	33	38			
Beryllium (Be)	ND	ND	1.5	1.5	ND	2.1	ND	1.6	2	ND	ND	ND	1.5	1.7			
Bismuth (Bi)	ND	ND	<2 (ND)	<2 (ND)	ND	ND	ND	<2 (ND)	<2 (ND)	ND	ND	ND	<2 (ND)	<2 (ND)			
Boron (B)	ND	ND	<50 (ND)	<50 (ND)	ND	ND	ND	<50 (ND)	<50 (ND)	ND	ND	ND	<50 (ND)	<50 (ND)			
Cadmium (Cd)	0.76	0.31	0.69	0.78	1	0.99	0.46	0.81	1.4	1.5	0.76	0.63	0.66	0.82	0.6	3.5	3.5
Chromium (Cr)	15	8	13	14	14	14	8.7	11	16	4.6	5.1	14	12	13	37.3	90	90
Cobalt (Co)	9	4.3	5.7	7.3	8.8	11	5.2	5.7	7.7	6.8	4.1	6.6	6.2	6			
Copper (Cu)	12	6	9.3	10	15	10	6.1	8.7	13	13	3.1	9.5	8.4	9.4	35.7	197	197
Iron (Fe)	14000	6600	9300	11000	14000	15000	9100	11000	14000	10000	9400	9000	8400	9200			47766
Lead (Pb)	34	8.8	30	37	49	24	8	43	97	13	13	8.9	17	28	35	91.3	91.3
Lithium (Li)	17	8	15	16	10	9.7	4.9	8.9	12	11	14	13	12	14			
Manganese (Mn)	540	230	260	370	480	1300	430	380	460	1000	290	460	420	360			1100
Mercury (Hg)	0.27	0.15	0.25	0.34	0.27	0.2	0.12	0.21	0.35	0.16	ND	0.12	0.14	0.2	0.17	0.486	0.486
Molybdenum (Mo)	ND	ND	<2 (ND)	<2 (ND)	ND	2	ND	<2 (ND)	<2 (ND)	ND	ND	2	<2 (ND)	<2 (ND)			
Nickel (Ni)	10	4.9	8	9.3	7.5	6.9	4.3	5.8	9.4	5.7	4.6	8.7	7.2	8.5			75
Phosphorus (P)	1900		1600	1700	1900	2200		1600	1700	400	490		1700	1600			
Rubidium (Rb)	11	5.9	9.5	11	6.3	6.2	3.5	5.2	7.8	4.7	5.5	7	6.5	7.9			
Selenium (Se)	1.3	0.89	1.2	1.4	1.8	1.8	1.1	1.5	1.9	ND	ND	1.7	1.5	1.6			2

Silver (Ag)	ND	ND	<0.5 (ND)	<0.5 (ND)	ND	ND	ND	<0.5 (ND)	<0.5 (ND)	ND	ND	ND	<0.5 (ND)	<0.5 (ND)			1
Strontium (Sr)	13	6.1	9.3	11	13	13	8.1	9.6	12	ND	ND	8.7	7.8	8.5			
Thallium (Tl)	0.26	0.13	0.18	0.21	0.26	0.24	0.13	0.17	0.23	0.34	0.11	0.31	0.21	0.2			
Tin (Sn)	2.5	ND	2	2.7	3	1.5	ND	2.1	4.5	2	ND	ND	1.1	1.6			
Uranium (U)	4.3	2.6	3.5	3.8	5.7	6.5	3.7	4.3	5.9	1.7	2	7.3	5.7	5.9			
Vanadium (V)	23	12	17	19	30	34	21	25	39	11	12	24	22	24			
Zinc (Zn)	87	46	71	83	93	89	48	70	120	96	66	110	100	110	123	315	315
Orthophosphate (P)	0.15	0.39	0.51	0.11	0.067	0.086	0.27	0.24	0.1	0.26	0.24	0.24	0.26	0.088			

Table 3. Concentrations of metals within stream site sediment samples.

Metals	UNITS	Forties River	Zwicker Brook	Sherbrooke River	Pine Lake Brook	Zwicker Brook	Concentration Guidelines		
		2018	2019	2021	2022	2023	ISQG	PEL	NS
Acid Extractable Aluminum (Al)	mg/kg	4300	4700	3300	730	1100			
Acid Extractable Antimony (Sb)	mg/kg	ND	ND	ND	ND	<2 (ND)			25
Acid Extractable Arsenic (As)	mg/kg	2.7	ND	ND	ND	9.6	5.9	17	17
Acid Extractable Barium (Ba)	mg/kg	26	18	18	ND	82			
Acid Extractable Beryllium (Be)	mg/kg	ND	ND	ND	ND	1.2			
Acid Extractable Bismuth (Bi)	mg/kg	ND	ND	ND	ND	<2 (ND)			
Acid Extractable Boron (B)	mg/kg	ND	ND	ND	ND	<50 (ND)			
Acid Extractable Cadmium (Cd)	mg/kg	ND	ND	ND	ND	1.3	0.6	3.5	3.5
Acid Extractable Chromium (Cr)	mg/kg	4.7	4	4	ND	9.6	37.3	90	90
Acid Extractable Cobalt (Co)	mg/kg	2.3	2.2	1.9	ND	23			
Acid Extractable Copper (Cu)	mg/kg	ND	4.2	ND	ND	12	35.7	197	197
Acid Extractable Iron (Fe)	mg/kg	8300	6800	5800	1200	15000			47,766
Acid Extractable Lead (Pb)	mg/kg	3.3	3.3	4.2	1	29	35	91.3	91.3
Acid Extractable Lithium (Li)	mg/kg	20	21	16	4.1	25			
Acid Extractable Manganese (Mn)	mg/kg	200	110	150	40	3200			1,100
Acid Extractable Mercury (Hg)	mg/kg	ND	ND	ND	ND	0.15	0.17	0.486	0.486
Acid Extractable Molybdenum (Mo)	mg/kg	ND	ND	ND	ND	<2 (ND)			
Acid Extractable Nickel (Ni)	mg/kg	2.3	3.1	2.2	ND	7.7			75
Acid Extractable Phosphorus (P)	mg/kg	180	190		ND	920			
Acid Extractable Rubidium (Rb)	mg/kg	17	7.8	11	3.1	11			
Acid Extractable Selenium (Se)	mg/kg	ND	ND	ND	ND	0.95			2

Acid Extractable Silver (Ag)	mg/kg	ND	ND	ND	ND	<0.5 (ND)			1
Acid Extractable Strontium (Sr)	mg/kg	ND	ND	ND	ND	31			
Acid Extractable Thallium (Tl)	mg/kg	0.12	ND	ND	ND	0.16			
Acid Extractable Tin (Sn)	mg/kg	ND	ND	ND	ND	1.6			
Acid Extractable Uranium (U)	mg/kg	0.52	0.77	0.46	0.17	8.2			
Acid Extractable Vanadium (V)	mg/kg	11	9	7.3	ND	22			
Acid Extractable Zinc (Zn)	mg/kg	20	34	20	ND	120	123	315	315
Orthophosphate (P)	mg/kg	0.28	0.38	0.36	0.79				

Table 4. Summary of guideline exceedances of acid extractable metals in sediment samples. Light yellow indicates parameters approaching one of the guidelines, orange indicates an exceedance of the ISQG, and red indicates an exceedance of either the PEL or NSEQS guidelines. Units are all mg/kg.

Metals	Lake 1				Lake 2					Lake 3	Lake 4					Zwicker Brook
	2019	2021	2022	2023	2018	2019	2021	2022	2023	2018	2019	2021	2022	2023	2023	
Arsenic (As)	8.4	4.8	6.8	8.6	16	12	6.8	12	16	8.3	8.1	9.8	8.3	8.2	9.6	
Cadmium (Cd)	0.76	0.31	0.69	0.78	1	0.99	0.46	0.81	1.4	1.5	0.76	0.63	0.66	0.82	1.3	
Lead (Pb)	34	8.8	30	37	49	24	8	43	97	13	13	8.9	17	28	29	
Mercury (Hg)	0.27	0.15	0.25	0.34	0.27	0.2	0.12	0.21	0.35	0.16	ND	0.12	0.14	0.2	0.15	
Selenium (Se)	1.3	0.89	1.2	1.4	1.8	1.8	1.1	1.5	1.9	ND	ND	1.7	1.5	1.6	0.95	
Zinc (Zn)	87	46	71	83	93	89	48	70	120	96	66	110	100	110	120	

## 2.4.2 Sediment Phosphorus and Orthophosphate

Concentrations of both acid-extractable (total) phosphorus and bioavailable orthophosphate in sediment were analyzed from 2018 to 2023 (Figures 36 and 37). Orthophosphate was not included in the 2023 sample due to a small sample size.

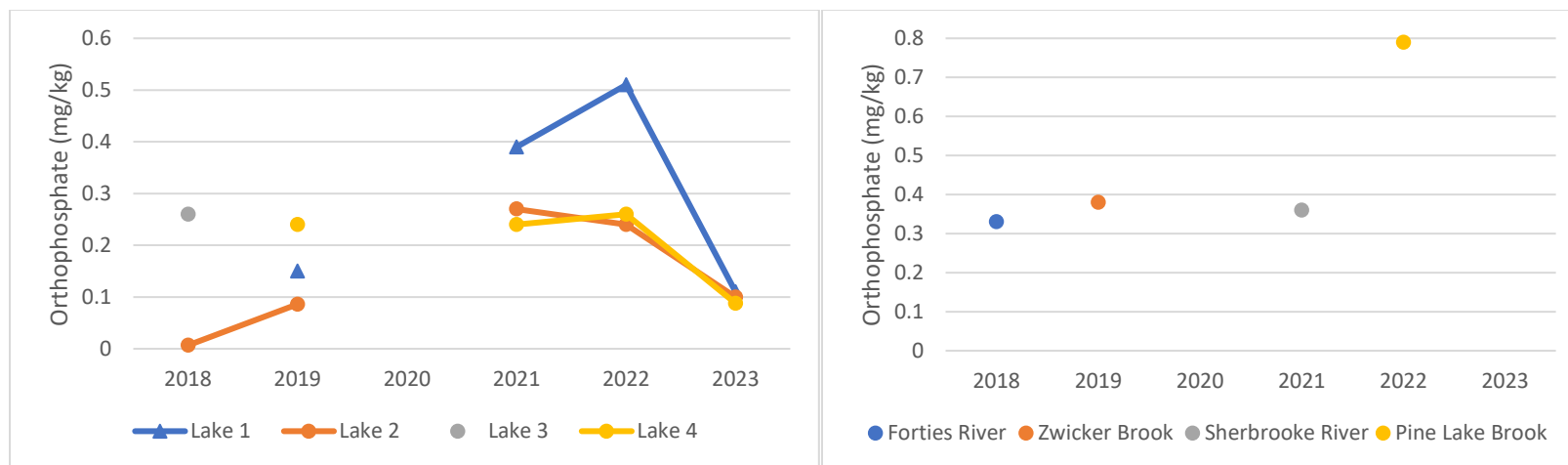


Figure 36. Orthophosphate from sediment samples from 2018 to 2023. 2023 was not included in the stream sites due to the small sample size.

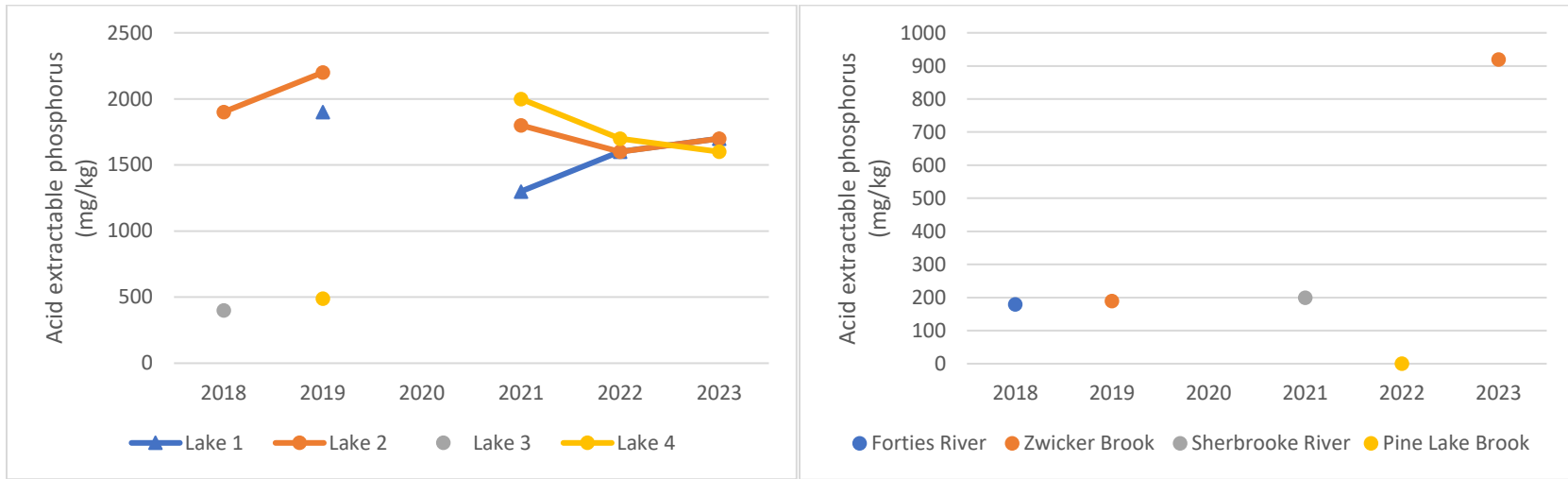


Figure 37. Acid extractable phosphorus (mg/kg) from the 2018 to 2023 sediment samples. 2022 at Pine Lake Brook was below detection levels.

Orthophosphate levels at the lake sites spiked in 2021 and 2022 and then decreased at all sites in 2023. The sample results from Pine Lake Brook showed higher levels of orthophosphate than the three other stream sites. According to Ontario's provincial sediment quality guidelines, pollution can range from clean/marginally polluted ('lowest effect level') at 600 mg/kg of phosphorus to heavily contaminated ('severe effect level') at >2000 mg/kg of phosphorus in sediment (MOE 2008). These guidelines have previously been approached and exceeded at Lake 1, Lake 2, Lake 4, and Zwicker Brook in 2023, but not Lake 3 or other sample sites.

Orthophosphate is a bioavailable form of phosphorus that tends to be in lower concentrations due to high demand by plants; however, as plants decompose, orthophosphate is released back into the environment (CCME 2004). For phosphorus held into complexes with metals, anoxic conditions facilitate the dissolution of complexes and release of phosphorus from sediments (Hayes et al. 1985). Increased levels of phosphorus released from sediments into the water (internal phosphorus loading) can cause nutrient-enrichment and potential eutrophication and algal blooms (Søndergaard et al. 2003). This is particularly susceptible during a turnover when nutrient-rich bottom waters are mixed throughout the lake, providing new food sources for organisms.

## **3.0 Discussion**

### **3.1 Baseline Data**

Baseline studies are often short-term studies used to provide contextual information for environmental assessments or to collect a snapshot of water quality to determine if future activities could be a threat. The objective of this program was to collect baseline information about water quality at Sherbrooke Lake before the development of a public access point. This study provided five years of baseline data from the summer months and does not account for water quality conditions year-round. The additional data from 2017 was also included where relevant, as it was the preliminary baseline data for the study. Sampling times were not consistent in the later years of the program, as changes to the program were made to reflect the data and scientific advice as well as volunteer availability. During this program, several extreme weather events influenced sampling dates and may have influenced water quality results including droughts, hurricanes, tropical storms, and flooding. Due to the limited amount of data collected through the study, only basic statistics were performed for the water quality parameters to avoid skewed and unreliable trends which may not represent the actual conditions within the lake.

### 3.2 Lake Water Quality

The water quality results did not identify any apparent issues over the five years of this program. Some water quality trends to note include temperature and dissolved oxygen; these are both important for the productivity of an aquatic environment. The average surface temperature at the lake sites shows an upward trend; however, due to the limited dataset collected, robust statistical analyses were not run to avoid skewed or biased results. The time of sample collection can influence parameters such as temperature and dissolved oxygen which are closely related, as water temperature tends to be higher during the day and cooler at night. Sampling during heat waves, which occurred during this project, could also influence the data. Also, the time of year samples were taken could influence temperature (i.e., sampled early June 2018 but late June 2019). Continuous monitoring using in-situ temperature loggers would provide more accurate trend estimates.

Dissolved oxygen concentrations are influenced by water temperature, as oxygen is less soluble in warm water, and during spring and summer, there are increased metabolic rates that affect biochemical oxygen demand (BOD), photosynthesis, and respiration in aquatic plants (MPCA 2009). This is shown in the slight decline of surface dissolved oxygen at the lake sites as temperature increased. In the last three years, the average surface temperatures have surpassed the threshold of 20°C for coldwater species, like trout and salmon (NSSA 2014). However, surface dissolved oxygen levels at the lake sites remained above the threshold for aquatic life throughout this project.

pH levels had a slight upward trend from 2018 to 2023, at all lake sites except Lake 3. This could be due to regulations that reduced the amount of acid rain Nova Scotia experiences, and the soil beginning to restore base cation concentrations. Between the initial investigative work in 2017 and 2023, the average pH at Lake 1 increased by 0.27, 0.32 at Lake 2, 1.41 at Lake 4, and declined by 0.60 at Lake 3. The average pH at most sites increased to be closer to the CCME threshold of 6.5. This is beneficial for aquatic and human health, as pH can influence the solubility and bioavailability of certain metals. Mercury tends to be more bioavailable in waterbodies with lower pH, resulting in elevated mercury in fish tissues as it biomagnifies in the food web (Jardine et al. 2013). Similarly, aluminum is more soluble at pH 4.0 and can bind to fish gills, impacting respiration and causing mortality (Mani 2003). As aquatic species often have pH thresholds for survival, this increase in pH could improve reproduction of existing sensitive species such as trout, and improve biodiversity in the area (USEPA 2023).

Total phosphorus (TP) is typically the most important nutrient for controlling plant growth, which includes algae. TP concentrations show a slight decline at the lake sites. Nitrogen concentrations have shown a slight increase at the lake sites, but all nutrient concentrations have remained below the thresholds for the duration of this monitoring. The at-depth

nutrient concentrations spiked in Lake 2 in 2021 but remained low during all other sampling events. This spike in nutrients is an anomaly in the data and suggests at-depth nutrient enrichment at Lake 2 during this period.

Throughout this monitoring period, the average concentration of smaller particles in the water column (total dissolved solids) had a downward trend, while larger particles (total suspended solids) had an upward trend. These concentrations can be influenced by soil erosion, dead organic material, significant rainfall events, flooding, and runoff. This is an important parameter for monitoring the impacts of future lake-shore development.

The trends of low bacteria and nutrient levels and the oligotrophic-mesotrophic state of the lake suggest that pollution is minimal at Sherbrooke Lake.

Heavy metal concentrations in the sediment may be naturally occurring or due to historic pollution. Uranium and arsenic are naturally occurring pollutants across Nova Scotia, with Sherbrooke Lake being at high risk for contamination for both (Kennedy & Drage 2017; Kennedy & Drage 2020). Uranium is often accompanied by heavy metal pollution, such as cadmium, copper, lead, manganese, and zinc (Zhang et al. 2023). Mercury was also elevated in sediment, which can naturally occur from geologic processes or anthropogenic sources like coal-fired plants, combustion of plant biomass such as fires or biofuel use (Falandysz et al. 2020). Heavy metals in sediment can pose a threat to human and ecological health, as they biomagnify within food webs. For guidelines on fish consumption in Nova Scotia regarding pollutants, visit the consumption advisory at <https://novascotia.ca/nse/fish-consumption-advisory.asp>. Water depth and slope are associated with increased metal concentrations due to the funnelling of particles towards deeper lake-bottom pockets (Håkanson 1977). This was seen in SL, as Lake 2 is the deepest section of the lake and had the most exceedances for metal guidelines. Generally, sediment in aquatic systems has higher concentrations of heavy metals than the water column itself (Luoma, 1989), but for more information on drinking water visit Nova Scotia Environment at <https://novascotia.ca/nse/water/docs/Drop on Water English.pdf>.

### **3.3 Stream Water Quality**

No apparent water quality issues were identified at the tributary sites over the five years of the program. Similar trends were observed at the lake and stream sites. The average yearly temperatures show an upward trend at the stream sites; however, unlike the lake, two of the stream sites (Pine Lake Brook and Sherbrooke River) showed a slight increase in average dissolved oxygen. The stream sites showed trends of increasing pH values over the five years. The tributaries had much greater increases in pH than the lake sites, with Sherbrooke River increasing by 0.38, Forties River by 1.77, Pine Lake Brook by 1.97, and Zwicker Brook by

1.44. The increase in pH at the stream sites could improve overall stream health and improve biodiversity (USEPA 2023).

Although bacteria levels were higher at the tributaries than at the lake, test results rarely surpassed the primary recreational guidelines. Despite elevated bacteria at some stream sites, it is unlikely impacting the lake sites as the lake bacteria remained low throughout the program.

During the regular monthly or bi-monthly sampling, the stream sites showed similar water quality results to the lake. This suggests that the tributaries to the lake are not significantly impacting the water quality of the lake.

Rainfall events increased the bacteria levels and total dissolved solids at the tributaries. After the rainfall events, Butler Lake consistently had the highest TDS readings of all the tributary sites, which could be due to land use around the waterbody, as several main roads cross over this brook.

### **3.4 Cyanobacteria Blooms in Sherbrooke Lake**

NS Environment and Climate Change's current system of notifying lake residents of potentially harmful algae blooms is reactive and can be ineffective. NSECC responds to reports of suspected blooms but inspectors are not always able to respond in time to witness the bloom. NSECC rarely collects water samples for analysis and often has to post precautionary advisories based on the appearance of a bloom in photographs provided by residents. Lake closure advisories are posted via Twitter and other online locations.

Microcystin-LR is not the only toxin produced by cyanobacteria. Anatoxins, Cylindrospermopsins, Nodularins, Saxitoxins, Dermatotoxins, and other irritant toxins are also produced by cyanobacteria (Health Canada 2022). The majority of commercial labs in Canada do not test for these toxins and there are no recreational guidelines for cyanotoxins other than microcystins (Health Canada 2022). This means that the absence of Microcystin-LR in a water sample does not mean that a bloom does not contain other toxins. Because of this, lake residents should be made aware of all blooms and treat all blooms with the same level of caution. Although the blooms sampled at Sherbrooke Lake throughout this program did not contain detectable levels of microcystin, it is important to be aware of the potential toxins and impacts of cyanobacteria.

As algal blooms can be induced and intensified by increases in nutrients to ecosystems (whether naturally from the mixing of waters or anthropogenically from pollution), trends

in algal blooms are hard to predict and can vary spatially. The literature predicts increases in both the size and frequency of blooms, globally, in the future (Michalak et al. 2013). Although the overall nitrogen and phosphorus levels remain low, residents near freshwater should be made aware of algal bloom causes, health effects, precautions to take, and the reporting procedure if a bloom occurs.

In 2021, Coastal Action implemented a pilot study to detect algal blooms through regular monitoring of phycocyanin and chlorophyll- $\alpha$ . Four sampling days were carried out in July, August, and October of 2021. During three of the sampling days, water samples were collected for both microcystin and chlorophyll- $\alpha$  analysis. Water samples were collected on a fourth day in October when an algae bloom was detected by lake residents. Depth profiles using the municipal YSI, and Secchi disk readings were also taken on three of the sampling days.

A total of eight water samples were collected across the four sampling days, seven baseline samples, and one bloom event. All seven baseline days showed no detected microcystin and low levels of chlorophyll- $\alpha$  ranging from 3.01  $\mu\text{g}/\text{L}$  to 9.42  $\mu\text{g}/\text{L}$ . The bloom event yielded no microcystin but elevated chlorophyll- $\alpha$  levels of 123  $\mu\text{g}/\text{L}$ . This result shows that there was indeed a bloom on October 10, 2021, but it likely did not consist of blue-green algae. This pilot study did not yield usable data due to the sporadic water and YSI sampling.

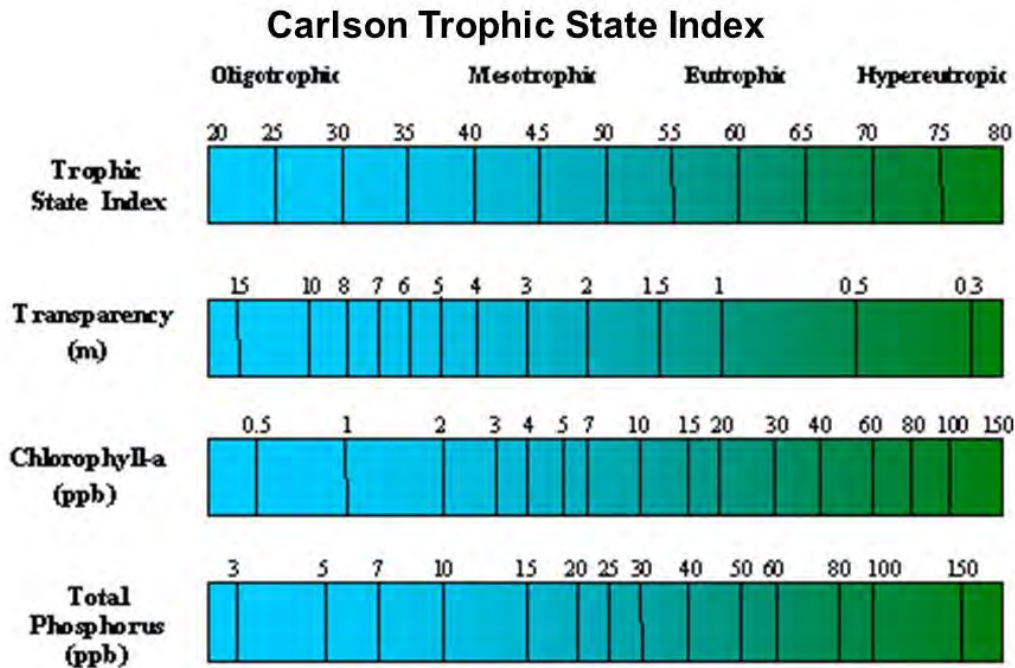
### 3.5 Trophic State of Sherbrooke Lake

The biological productivity of SL has been assessed and monitored for changes over time by identifying its trophic state annually. Based on the mean depth of transparency (Secchi disk), and mean concentrations of chlorophyll- $\alpha$  and phosphorus, a Trophic State Index (TSI) score can be calculated using the Carlson (1977) equations (Equations 1, 2, and 3). Trophic states range from oligotrophic (low productivity and minimal biomass) to hypereutrophic (high productivity and maximum biomass).

$$\text{Equation 1: } TSI (\text{Secchi disk}) = 60 - 14.41 \times \ln(\text{Mean Secchi disk } [m])$$

$$\text{Equation 2: } TSI (\text{Chlorophyll } a) = 30.6 + 9.81 \times \ln(\text{Mean Chlorophyll } a \left[ \frac{\mu\text{g}}{\text{L}} \right])$$

$$\text{Equation 3: } TSI (\text{Total Phosphorus}) = 4.15 + 14.42 \times \ln(\text{Mean Total Phosphorus} \left[ \frac{\mu\text{g}}{\text{L}} \right])$$



*Figure 38. Carlson Trophic State Index parameters (Carlson 1977).*

The trophic state of SL has remained oligotrophic-mesotrophic from 2018 to 2023; ranging from 39.11 to 42.44. SL appears to be maintaining a steady TSI score over the five years this data has been collected (Figure 39). The oligotrophic-mesotrophic state of SL indicates moderate biological productivity. A slight increase in TSI in 2023 could be the result of lower Secchi disk readings. The average total suspended solids and chlorophyll- $\alpha$  readings were higher in 2023 compared to previous years, which correlates with reduced visibility for Secchi disk readings. Secchi depth readings are highly influenced by several factors; therefore, the TSI score for Total Phosphorus should be considered the most accurate reflection of biological productivity in SL.

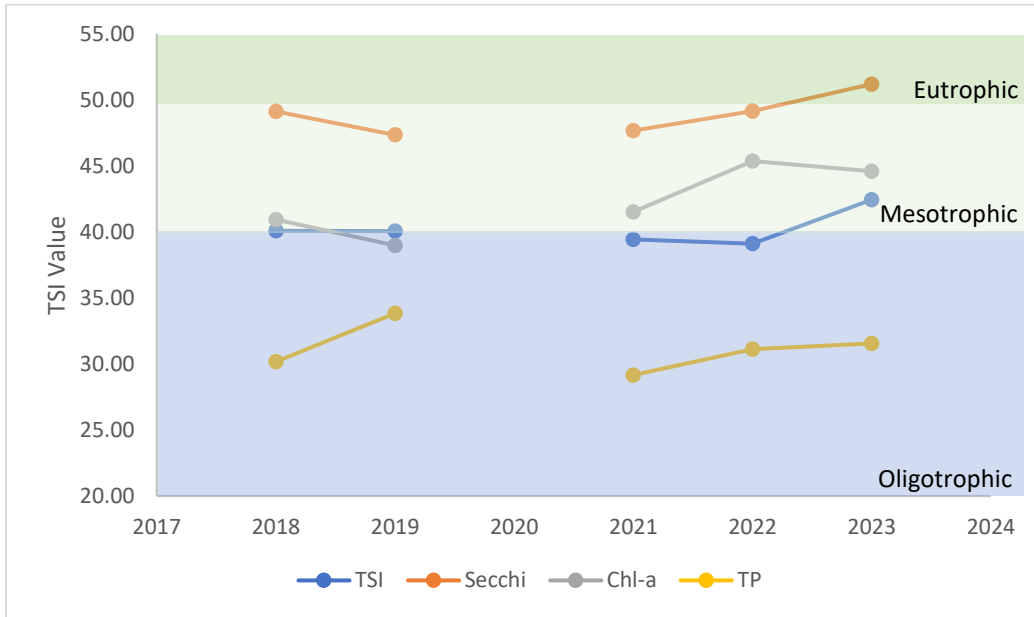


Figure 39. Comparison of Lake site TSI scores from 2018 to 2023 using the Carlson (1977) trophic equations for total phosphorus, chlorophyll- $\alpha$ , and Secchi disk (2020 excluded).

## 4.0 Conclusions

Overall, the water quality at Sherbrooke Lake and its tributaries showed no apparent issues over the five years of this project, but trends should continue to be monitored. This baseline study provides information on the current water quality trends of the lake, that could be used to assess the impacts of future developments.

Although the upward trend of temperature at the lake sites could be attributed to other factors, the temperature of the lake and its tributaries should continue to be monitored. Factors that can influence temperature include weather conditions, time of sampling, and consistency of sampling (i.e., the same months and time of day sampled). Continuous monitoring using in-situ temperature loggers would provide more accurate trend estimates for the lake surface temperature. If water temperatures are increasing, this could make the lake's ecosystem more vulnerable to other changes, as many organisms have sensitive temperature thresholds which dictate their survival. Increasing temperatures could also contribute to cyanobacteria blooms, as they tend to grow in warm, slow-moving waters with high levels of nutrients (Nova Scotia 2023).

pH levels show a slight increasing trend over the years. This could be showing that the soils are beginning to recover from acid rain deposition, and increasing their buffering capacity.

If this trend continues, it could benefit aquatic species such as trout, and improve biodiversity in the area (USEPA 2023).

Metals concentrations in sediment from most of the lake sites exceeded guidelines. Heavy metals can biomagnify within food webs, which can impact human health if contaminated fish are consumed. For consumption guidelines of fish visit <https://novascotia.ca/nse/fish-consumption-advisory.asp>. For information on drinking water guidelines visit Nova Scotia Environment at [https://novascotia.ca/nse/water/docs/Drop\\_on\\_Water\\_English.pdf](https://novascotia.ca/nse/water/docs/Drop_on_Water_English.pdf).

While microcystins were not detected in algae blooms tested at Sherbrooke Lake from 2017 to 2023, residents should continue to be diligent in monitoring for cyanobacteria blooms and exercise caution with water-based recreation when there is a suspected bloom. Suspected blooms should be reported to the local Nova Scotia Environment and Climate Change (NSECC) office, or at the general NSECC phone number 1-877-936-8476.

Parameters that are commonly impacted by development (i.e., temperature, dissolved oxygen, total suspended and dissolved solids, nutrients, and bacteria) should be monitored in the future to determine if increased residential development on the lake shores and tributaries is impacting water quality. MOC has a by-law of 20m vegetated buffer from the high-water mark for waterbodies, while MODL has no current standardized vegetative buffer regulations.

Additional risks to Sherbrooke Lake include invasive species. Invasive species can be transported on watercraft or other gear, so it is important to always clean, drain, and dry equipment before entering a new water body. To learn more about aquatic invasive species or to report invasive species sightings, visit the Nova Scotia Invasive Species Council website <https://nsinvasives.ca/>. Increased boat traffic on the lake could increase the risk of invasive species transport, as well as an increased risk of pollutants from fuel spills. A spill kit should be carried on any motorized watercraft.

While this study showed no apparent water quality issues, residents should be aware of how land-use practices impact water quality and the occurrence of cyanobacteria blooms. Implementing good land-use practices can help to maintain or improve the water quality trends observed in this baseline study.

## 5.0 Call to Action

Sherbrooke Lake is considered generally healthy but vulnerable to change. Human activities such as fertilizing lawns, removing vegetative buffers between lawns and the lake, and improper management of septic fields can all impact the lake's water quality. Currently, Sherbrooke Lake's nutrient status is at the low end for freshwater lakes. This is encouraging news, but only through continued vigilance will that situation continue in the face of increasing development and alteration of the lake's shoreline and surrounding watershed.

Some good land-use practices to maintain healthy waterways include leaving or implementing a natural vegetative buffer strip between the waterway and development. Native plants along the shoreline can help stabilize the soil to prevent erosion, reduce runoff from rainfall, and reduce the amount of nutrients entering the waterway; all of which improve the health of the ecosystem. This buffer strip can also provide habitat for songbirds, provide temperature control of the water, and benefit pollinator species. For a list of native plants in Nova Scotia visit the Nova Scotia Invasive Species Council "Plant Wise" page at <https://nsinvasives.ca/wp-content/uploads/2023/07/CCIS-NSISC-Grow-Me-Instead-Guide-2023-EN-web.pdf>. For additional information on sustainable and resilient shoreline management, visit the TransCoastal Adaptations webpage on GreenShores, <https://www.transcoastaladaptations.com/green-shores>.

To reduce nutrients entering waterways, homeowners can reduce or eliminate fertilizing lawns. Ensuring your septic system is regularly maintained and pumped can also help reduce the amount of bacteria and nutrients entering waterways. Similarly, properly storing or disposing of manure or waste piles from animals including pets and livestock can reduce the amount of nutrients and bacteria in the water.

Motorized watercraft can also impact local waterways. Carry a spill kit on motorized watercraft to contain and clean up any unexpected fuel spills. To reduce the spread of aquatic invasive species, ensure that you are properly cleaning, draining, and drying any equipment (watercraft, waders, etc.) before entering a new water body.

Discuss with your neighbours and friends what you're doing to promote healthy freshwater ecosystems, as protecting and conserving our freshwater is a community effort.

Table 5. What homeowners can do to reduce the occurrence of cyanobacteria blooms and maintain healthy waterways.


# WHAT YOU CAN DO

N = Nitrogen    P = Phosphorus    S = Sediment

Action	Benefits	What is reduced
Leave a natural vegetative buffer along lake, stream, ditch, or other waterway.	Grass or wood buffers help filter pollutants and reduce flood damage. This can also help to reduce occurrences of algae blooms.	N P S
Remember to inspect and pump your septic every 3-5 years.	A properly maintained septic system prevents costly repairs and untreated sewage discharge into our streams.	N P S
Plant a rain garden or install a rain barrel.	Rain gardens and rain barrels help reduce stormwater runoff and can cut down on landscaping costs.	N P S
Follow the 4 Rs of fertilizer use: right source, right amount, right place and right time.	The 4 Rs approach promotes the wise use of fertilizer by farmers, residents, and landscapers to reduce costly nutrient loss that pollutes our streams.	N P
Plant cover crops.	Cover crops build healthy soils that help hold back nutrients and water and increase crop yields.	N P S
Install a drainage management system.	Managing field drainage reduces nutrient loss while saving water for when your crops need it most.	N P
Properly manage livestock and pet waste.	Properly storing and disposing of animal waste reduces nutrients and prevents harmful bacteria from entering local waters.	N P
Help your community develop a plan that supports low impact development.	Smart development fosters growth and protects the local resources and character of the community.	N P S

This table is adapted from the March 2014 Mills Creek Report Card, Erie Soil and Water Conservation District

This project was undertaken with the financial support of:  
 Ce projet a été réalisé avec l'appui financier de:




## 5.1 Homeowner Resources

### Nova Scotia Drinking Water Guidelines:

- [https://novascotia.ca/nse/water/docs/Drop\\_on\\_Water\\_English.pdf](https://novascotia.ca/nse/water/docs/Drop_on_Water_English.pdf)

### Nova Scotia Fish Consumption Guidelines:

- <https://novascotia.ca/nse/fish-consumption-advisory.asp>

### Best Land-use Practices and Information:

- <https://nsinvasives.ca/plant-wise/>
- [https://nsinvasives.ca/wp-content/uploads/2023/07/CCIS-NSISC-Grow-Me-Instead-Guide\\_2023\\_EN\\_web.pdf](https://nsinvasives.ca/wp-content/uploads/2023/07/CCIS-NSISC-Grow-Me-Instead-Guide_2023_EN_web.pdf)
- <https://www.transcoastaladaptations.com/green-shores>
- <https://www.countyofkings.ca/residents/services/permits/types/Lakeshore>
- [https://www.countyofkings.ca/upload/All\\_Uploads/Living/services/permits/lakeshore/Lake%20Development%20Brochure.pdf](https://www.countyofkings.ca/upload/All_Uploads/Living/services/permits/lakeshore/Lake%20Development%20Brochure.pdf)
- <https://loveyourlake.ca/project/responsible-shoreline-development/>
- <https://novascotia.ca/nse/wastewater/docs/homeowners.guide.to.septic.systems.pdf>
- <https://www.speciesatrisk.ca/stewardshipguide/>

## 6.0 Acknowledgements

This project is funded by the Municipality of the District of Lunenburg (MODL) and the Municipality of Chester (MOC). Coastal Action would like to thank the volunteers, the Sherbrooke Lake Stewardship Committee, and municipal staff for their contributions that made for the successful completion of this baseline study.



Figure 40. Volunteers and Coastal Action staff.



Figure 41. Volunteers ready for sampling.



*Figure 42. Volunteers with sampling gear.*



Figure 43. Volunteers sampling.

## 7.0 References

Canadian Council of Ministers of the Environment (CCME). 1999a. Canadian soil quality guidelines for the protection of environmental and human health: Cadmium (1999). In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg

Canadian Council of Ministers of the Environment (CCME). 1999b. Canadian water quality guidelines for the protection of aquatic life: Dissolved oxygen (Freshwater). In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.

Canadian Council of Ministers of the Environment (CCME). 2002. Canadian water quality guidelines for the protection of aquatic life: Total particulate matter. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.

Canadian Council of Ministers of the Environment (CCME). 2004. Canadian water quality guidelines for the protection of aquatic life: Phosphorus: Canadian guidance framework for the management of freshwater systems. In: Canadian environmental quality guidelines, 2004, Canadian Council of Ministers of the Environment, Winnipeg.

Carlson, R. E. 1977. A trophic state index for lakes. *Limnol. Oceanogr.*, 22(2), 361-369.

Clair, T. A., Dennis, I. F., Scruton, D. A., & Gilliss, M. 2007. Freshwater acidification research in Atlantic Canada: A review of results and predictions for the future. *Environmental Reviews*, 15(NA), 153-167. <https://doi.org/10.1139/A07-004>

Dodds, W.K. and Welch, E.B. 2000. Establishing nutrient criteria in streams. *J. N. Am. Benthol. Soc.*, 19(1), 186-196.

Environment and Climate Change Nova Scotia (ECCNS). 2009a. Acid rain. Government of Nova Scotia. <https://novascotia.ca/nse/air/acidrain.asp>

Environment and Climate Change Nova Scotia (ECCNS). 2009b. Nova Scotia's wetlands. Government of Nova Scotia. <https://novascotia.ca/nse/wetland/>

Falandysz, J., Shi, J., & Monti, C. (2020). Environmental cycling and fate of mercury: 2020. *Chemosphere*, 261, 127766. <https://doi.org/10.1016/j.chemosphere.2020.127766>

Genzoli, L. and Kann, J. 2016. Evaluation of phycocyanin probes as a monitoring tool for toxigenic cyanobacteria in the Klamath River below Iron Gate Dam. 10.13140/RG.2.2.23897.31841.

Håkanson, L. (1977). The influence of wind, fetch, and water depth on the distribution of sediments in Lake Vänern, Sweden. *Canadian Journal of Earth Sciences*, 14(3), 397-412.

Hayes, F.R., Reid, B.L, and Cameron, M.L. 1985. Lake water and sediment. *Limnol. Oceanogr*, 3, 308-317.

Health Canada. 2012. Guidelines for Canadian recreational water quality, Third Edition. Water Air, and Climate Change Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario. (Catalogue No H129-15/2012E).

Health Canada. 2022. Guidelines for Canadian recreational water quality: Cyabacteria and their toxins. Health Canada, Ottawa, Ontario. (Catalogue No H129-129/2022E-PDF).

Health Canada. 2023. Guidelines for Canadian recreational water quality: Indicators of fecal contamination. Guideline technical document. Health Canada, Ottawa, Ontario. (Catalogue: H144-115/2023E-PDF).

Hinch, P.R. and Underwood, J.K. 1985. A study of aquatic conditions in Lake Echo during 1984. N.S. Dept. Env. Lib. L192.1 85/00 C2. 38 p.

Inland Fisheries. (2005). Nova Scotia Trout Management Plan (Final Draft). Nova Scotia Department of Agriculture and Fisheries.

Jardine, T., Kidd, K. A., and O'Driscoll, N. 2013. Food web analysis reveals effects of pH on mercury bioaccumulation at multiple trophic levels in streams. *Aquatic Toxicology*, 132-133, 46–52. <https://doi.org/10.1016/j.aquatox.2013.01.013>

Jones, G.J. and Orr, P.T. 1994. Release and degradation of microcystin following algicide treatment of a *Microcystis aeruginosa* bloom in a recreational lake, as determined by HPLC and protein phosphatase inhibition assay. *Water Res.*, 28: 871–876.

Kennedy, G. W., & Drage, J. M. 2017. An arsenic in well water risk map for Nova Scotia based on observed patterns of well water concentrations of arsenic in bedrock aquifers. Halifax, Nova Scotia.

Kennedy, G.W., and Drage, J. M. 2020. A uranium in well water risk map for Nova Scotia based on observed uranium concentrations in bedrock aquifers. Halifax, Nova Scotia.

Lawrence, G. B., Hazlett, P. W., Fernandez, I. J., Ouimet, R., Bailey, S. W., Shortle, W. C., Smith, K. T., & Antidormi, M. R. 2015. Declining acidic deposition begins reversal of forest-soil acidification in the northeastern U.S. and Eastern Canada. *Environmental Science & Technology*, 49(22), 13103–13111. <https://doi.org/10.1021/acs.est.5b02904>

Luoma S. N. 1989 Can we determine the biological availability of sediment-bound trace elements? *Hydrobiologia* 50, 379–396. [https://doi.org/10.1007/978-94-009-2376-8\\_35](https://doi.org/10.1007/978-94-009-2376-8_35).

Ma, L., Maldonado, J. F. G., Zamyadi, A., Dorner, S., & Prévost, M. (2023). Monitoring of cyanobacterial breakthrough and accumulation by in situ phycocyanin probe system within full-scale treatment plants. *Environmental monitoring and assessment*, 195(9), 1042. <https://doi.org/10.1007/s10661-023-11657-0>

Mani Sharma C. 2003 Effects of exposure to aluminum on fish in acidic waters. The Department of Ecology and Natural Resource Management (INA) Agricultural University of Norway. *Journal of World Ecology*;56:17–22.

Michalak, A.M., Anderson, E.J., Beletsky, D., Boland, S., Bosch, N.S., Bridgeman, T.B., Chaffin, J.D., Cho, K., Confesor, R., Daloğlu, I. and DePinto, J.V. 2013. Record-setting algal bloom in Lake Erie caused by agricultural and meteorological trends consistent with expected future conditions. *P. Natl. Acad. Sci.*, 201216006.

Minnesota Pollution Control Agency (MPCA). 2009. Low dissolved oxygen in water • water quality/impaired waters 3.24 • February 2009 page 2

Nixon, A., and Curran, T. 1998. Acid rain 79-37E. Parliamentary Research Branch, Science and Technology Division. Government of Canada.

Nova Scotia Salmon Association (NSSA) NSLC Adopt-A-Stream Program. 2014. Walking the river: A citizen's guide to interpreting water quality data. 43 p.

Nova Scotia Salmon Association (NSSA) NSLC Adopt-a-Stream Program. 2015. Acid Rain. [<http://www.nssalmon.ca/issues/acid-rain>].

Ontario Ministry of the Environment (MOE). 1979. Rationale for the establishment of Ontario's provincial water quality objectives. Queen's Printer for Ontario. 236 p.

Ontario Ministry of the Environment (MOE). 2008. Guidelines for identifying, assessing and managing contaminated sediments in Ontario. Queen's Printer for Ontario. 112 p.

Shilts, W.W. 1981. Sensitivity of bedrock to acid precipitation: modification by glacial processes. Paper 81–14. Geological Survey of Canada, Ottawa, ON.

Søndergaard, M., Jensen, J. P., and Jeppesen, E. 2003. Role of sediment and internal loading of phosphorus in shallow lakes. *Hydrobiologia*, 506(1-3), 135-145.

Stumm, Werner., Sigg, Laura., & Schnoor, J. L. 1987. Aquatic chemistry of acid deposition. *Environmental Science & Technology*, 21(1), 8-13. <https://doi.org/10.1021/es00155a001>

United States Environmental Protection Agency (USEPA). 2023. pH. [Accessed Jan 23, 2024]. <https://www.epa.gov/caddis-vol2/ph#low>

White, C. E. and Horne, R. J. 2012. Bedrock geology map of the New Germany area, NTS sheet 21A/10, Annapolis, Kings, Lunenburg and Queens counties, Nova Scotia; Nova Scotia Department of Natural Resources, Mineral Resources Branch, Open File Map ME 2012-079, scale 1:50 000.

Zhang, Z., Tang, Z., Liu, Y., He, H., Guo, Z., Feng, P., Chen, L., & Sui, Q. (2023). Study on the Ecotoxic Effects of Uranium and Heavy Metal Elements in Soils of a Uranium Mining Area in Northern Guangdong. *Toxics*, 11(2), 97. <https://doi.org/10.3390/toxics11020097>

## 8.0 Appendix

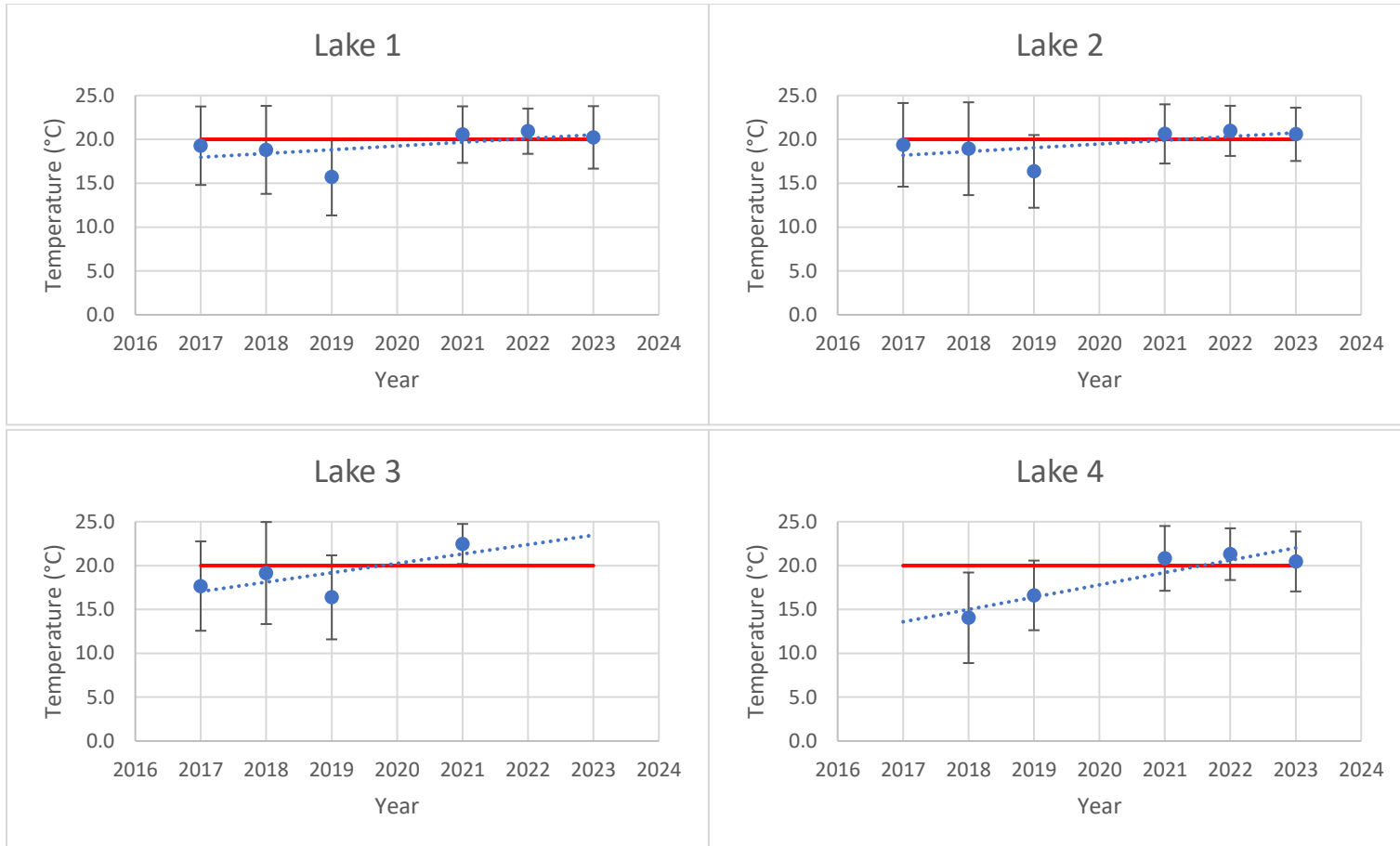


Figure 44. Average annual temperature (°C) readings from the 2017 to 2023 summer month sampling events at the lake sites. The red line indicates the 20°C threshold for cold-water fish set by NSSA. The black error bars indicate standard error. The blue dotted line indicates the trendline.

Table 6. Surface temperature (°C) readings from the 2017 to 2023 summer sampling events at the lake sites.

	Lake 1 Surface temperature (°C)					
	2017	2018	2019	2021	2022	2023
May		15.7	9			
June		18.6	13.9	20.8	19.2	16.4
July	22.6	25.6	17.2	22.1		24.8
Aug	20.4	23	22.4	24.4	23.9	
Sept	21.4	18.2	15.8	19.7	19.7	19.8
Oct		11.6	15.1	15.7		

	Lake 3 Surface temperature (°C)					
	2017	2018	2019	2021	2022	2023
May		16.2	11			
June		20.2	14.6			
July		26.7		22.9		
Aug	20.2	23.7	23.2	24.5		
Sept	21	17.9	19.1	20		
Oct		10.2	14			

	Lake 2 Surface temperature (°C)					
	2017	2018	2019	2021	2022	2023
May		16	10.1			
June		19.4	14.7	21.4	20.3	17.5
July	23.5	26.1	17.4	22.4		24
Aug	20.5	23.1	22.4	24.2	24.1	
Sept	21	17.9	18.5	19.8	18.5	20.4
Oct		11.1	15	15.3		

	Lake 4 Surface temperature (°C)					
	2017	2018	2019	2021	2022	2023
May			11.3			
June			14.8	21.5	21.4	18.3
July			17	23.2		24.4
Aug			22.8	24.4	24.2	
Sept		17.7	18.9	20.1	18.3	18.7
Oct		10.4	14.7	14.9		

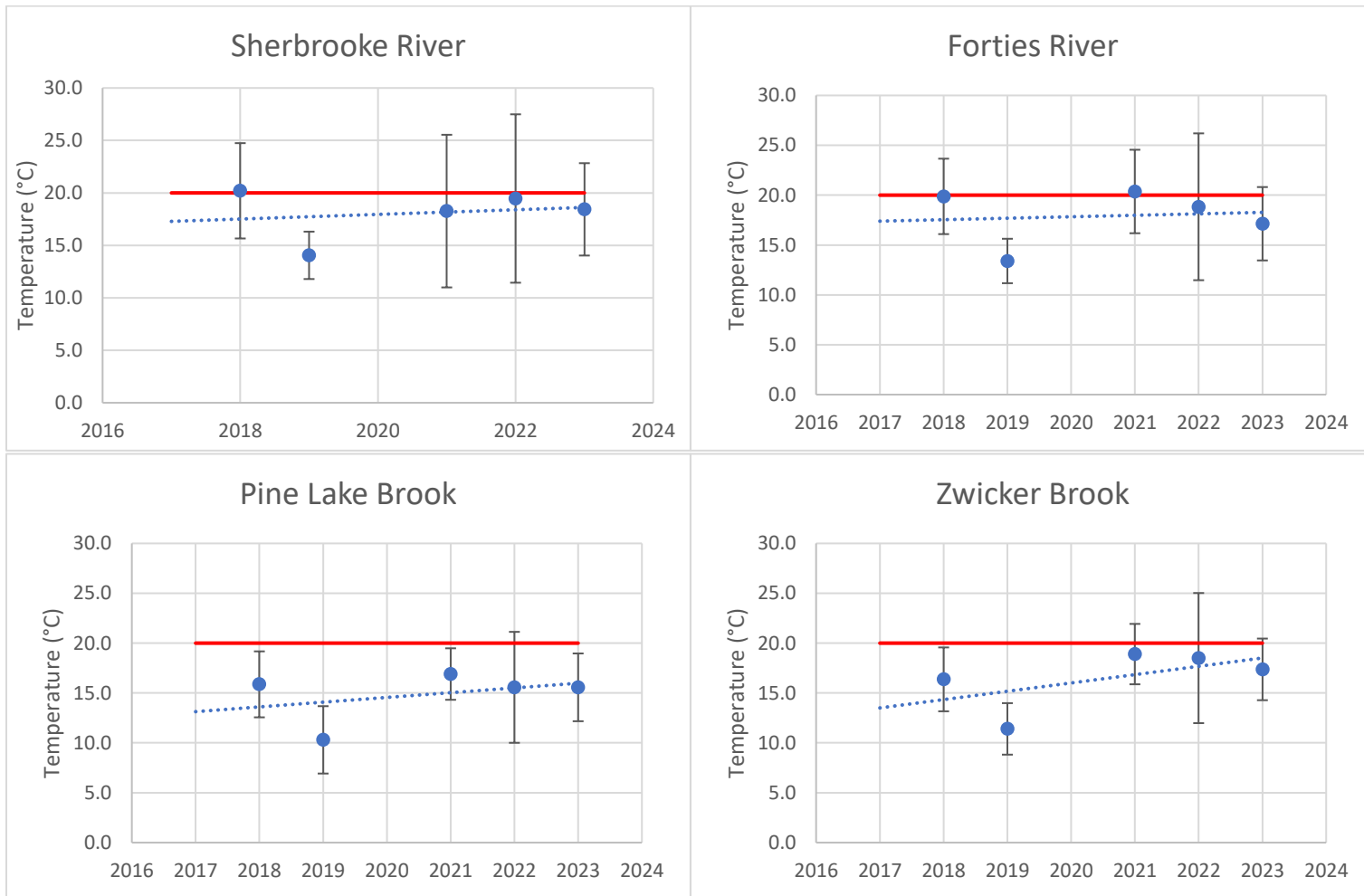


Figure 45. Average annual temperature (°C) readings from the 2017 to 2023 summer month sampling events at the stream sites. The red line indicates the 20°C threshold for cold-water fish set by NSSA. The black error bars indicate standard error. The blue dotted line indicates the trendline.

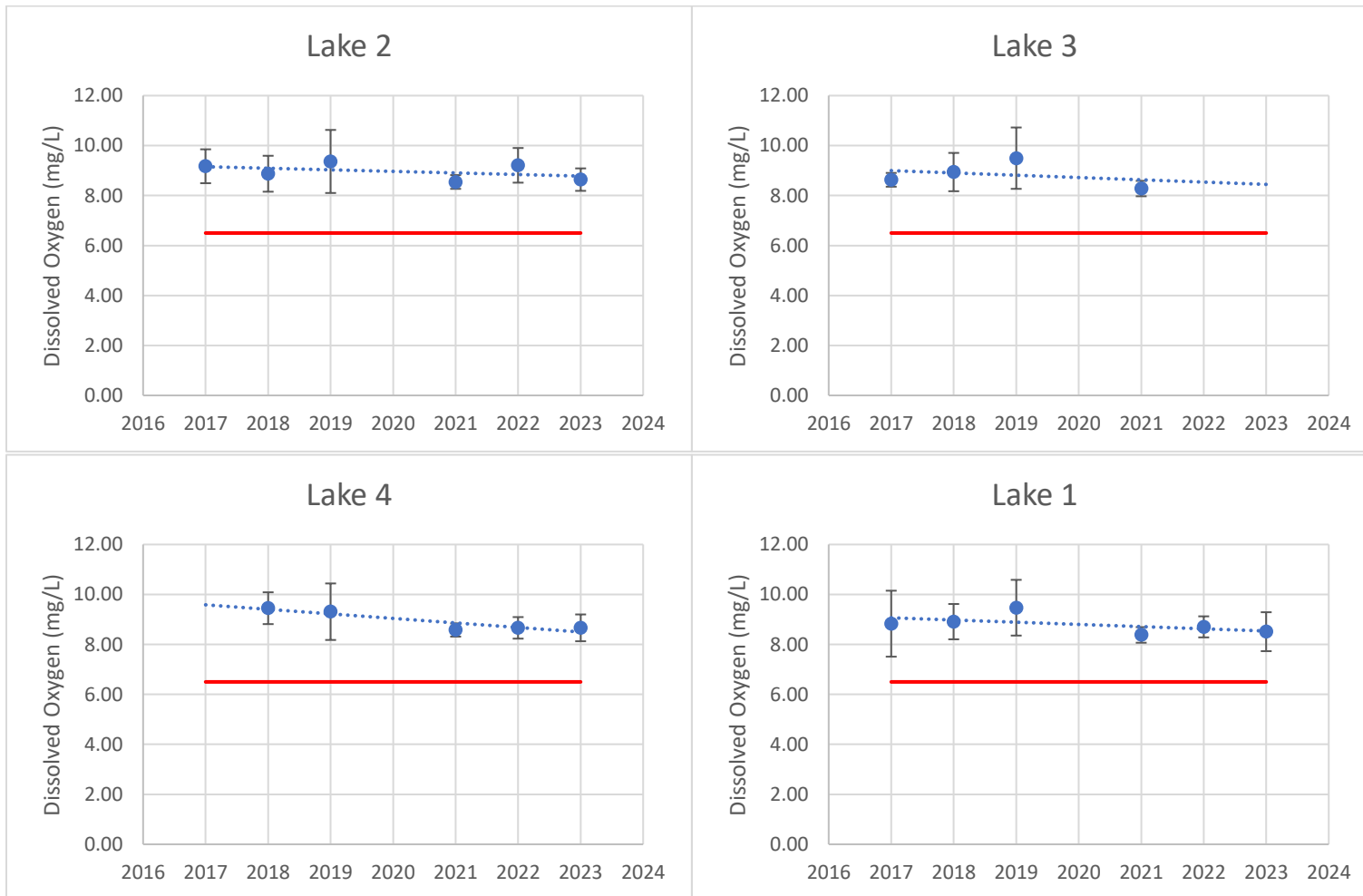


Figure 46. Average annual dissolved oxygen (mg/L) readings from the 2017 to 2023 summer month sampling events at the lake sites. The solid red line indicates the CCME threshold of 6.5 mg/L. The black error bars indicate standard error. The blue dotted line indicates the trendline.

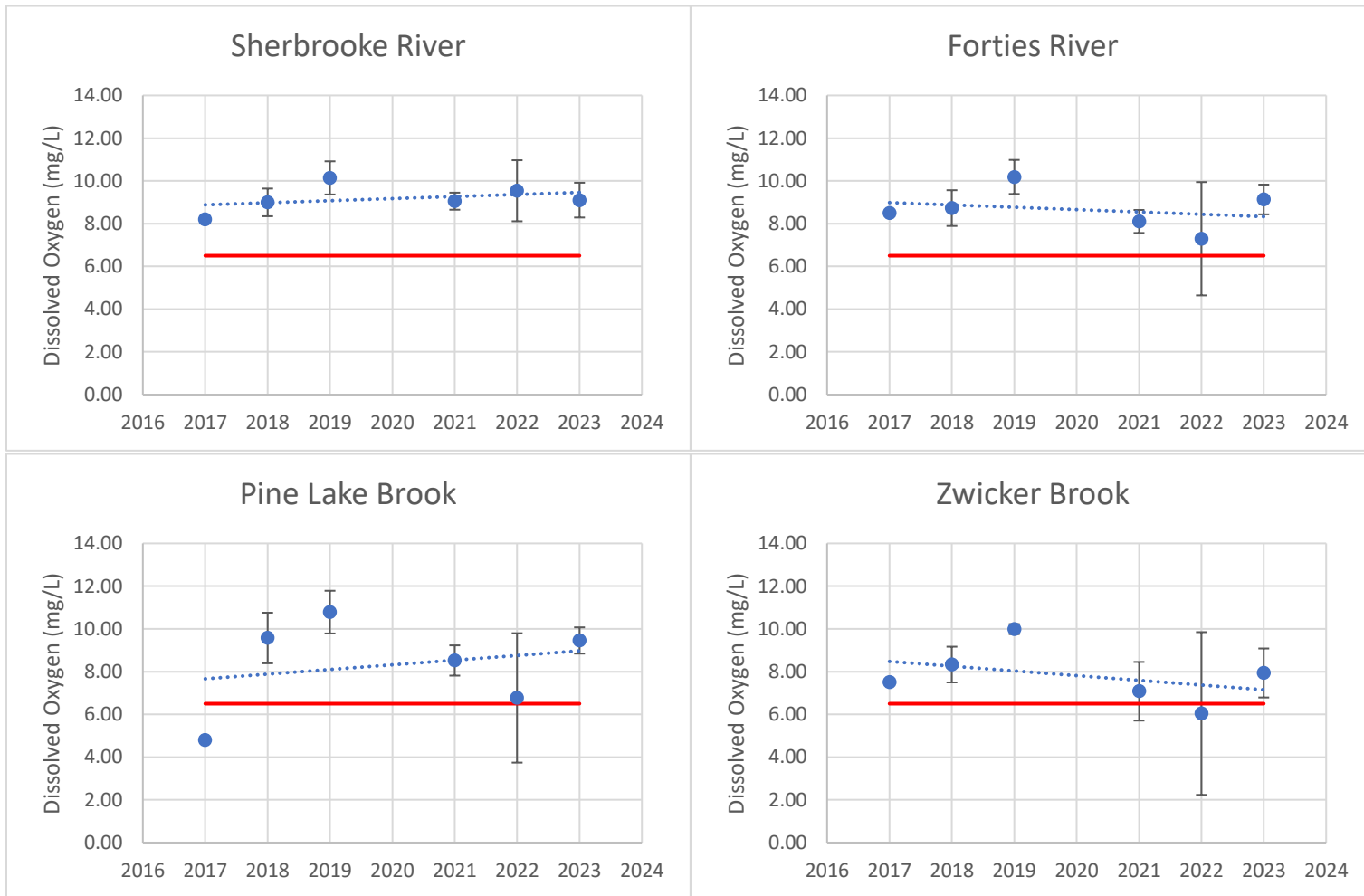


Figure 47. Average annual dissolved oxygen (mg/L) readings from the 2017 to 2023 summer month sampling events at the stream sites. The solid red line indicates the CCME threshold of 6.5 mg/L. The black error bars indicate standard error. The blue dotted line indicates the trendline.

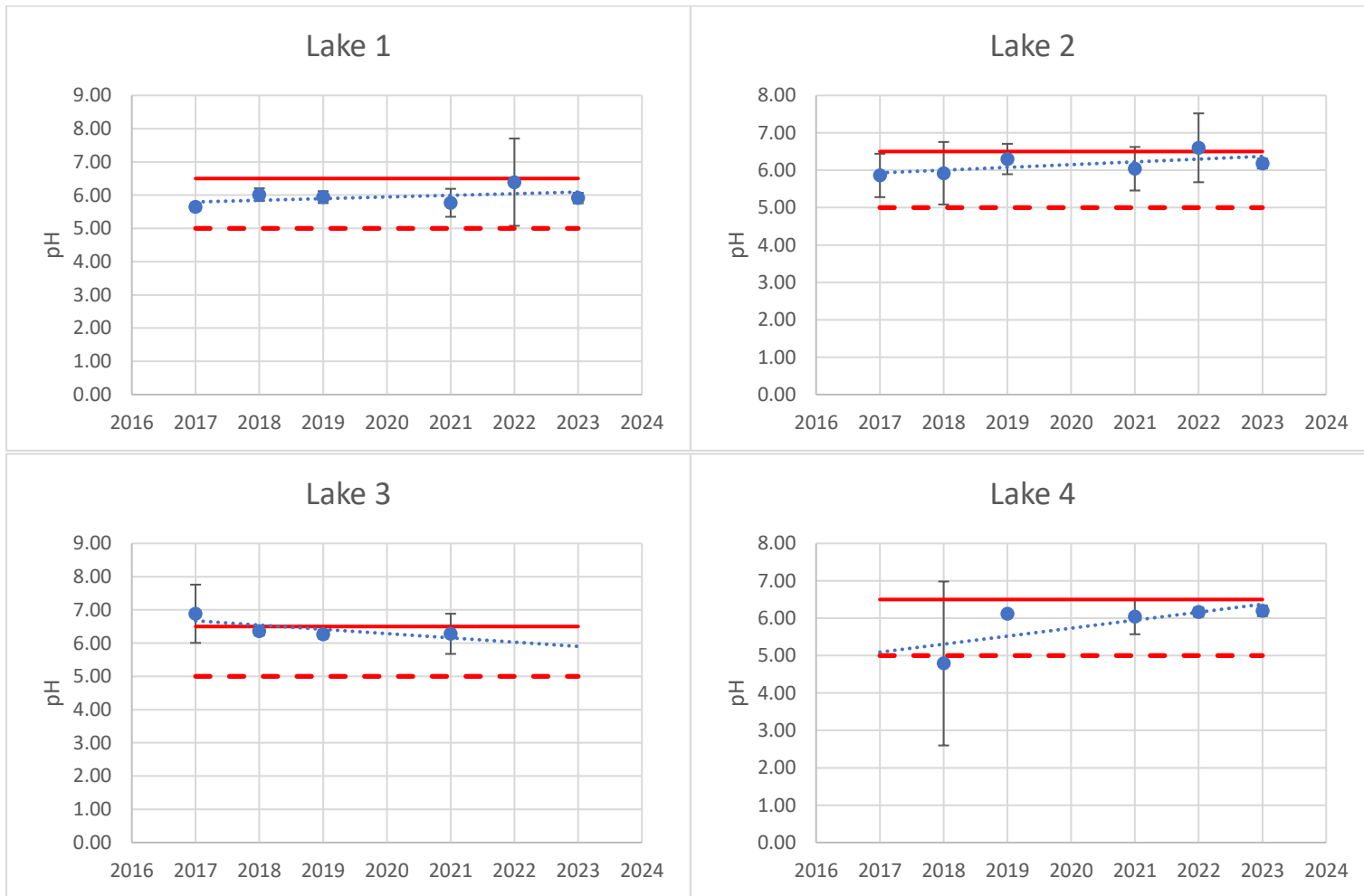


Figure 48. Average annual pH readings from the 2017 - 2023 summer month sampling events at the lake sites. The solid red line indicates the 6.5 pH threshold set by CCME, and the dotted red line indicates the 5.0 pH threshold identified by NSSA. The black error bars indicate the standard error. The blue dotted line indicates the trendline.

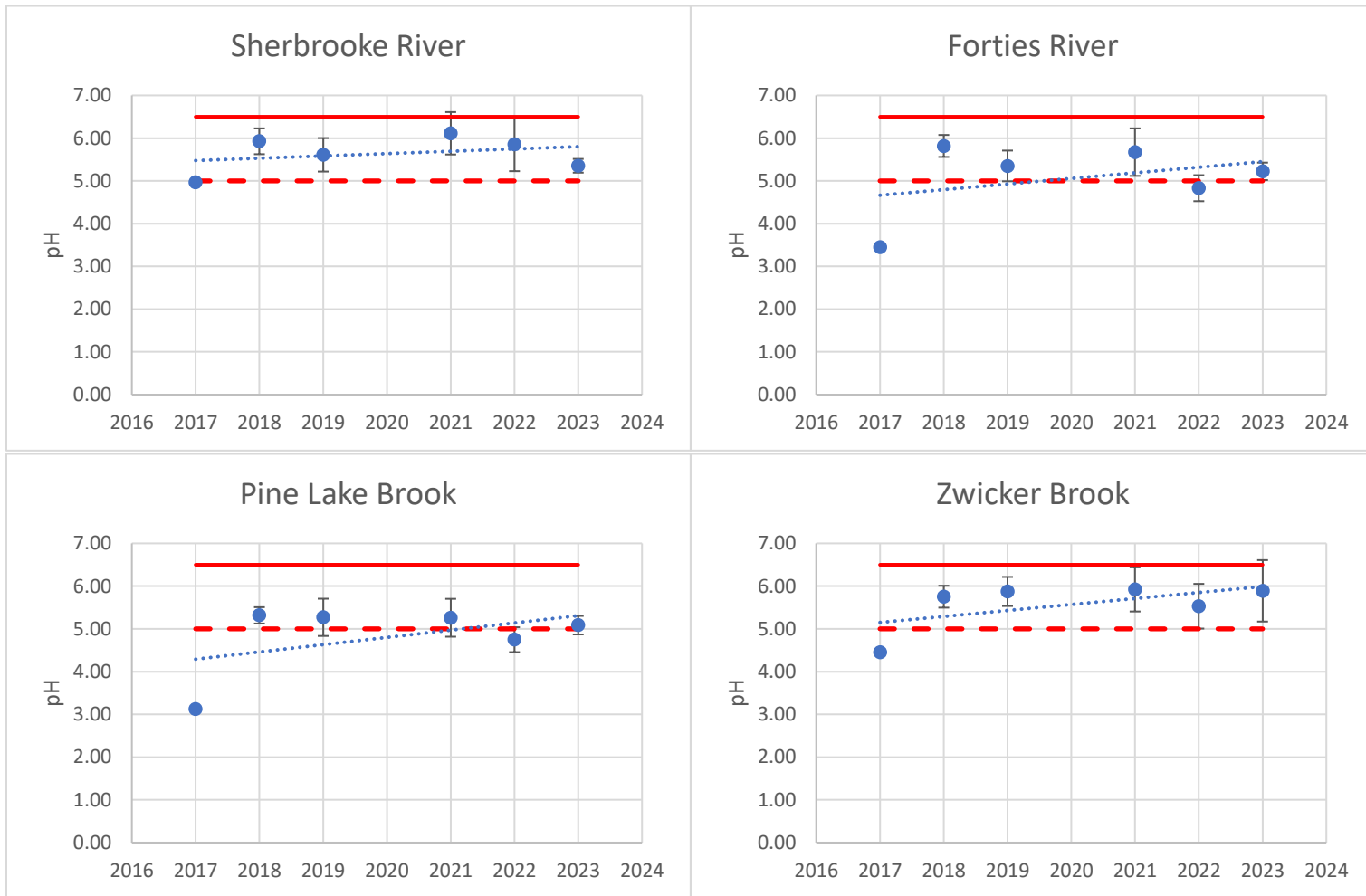


Figure 49. Average annual pH readings from the 2017 to 2023 summer month sampling events at the stream sites. The solid red line indicates the 6.5 pH threshold set by CCME, and the dotted red line indicates the 5.0 pH threshold identified by NSSA. The black error bars indicate the standard error. The blue dotted line indicates the trendline.

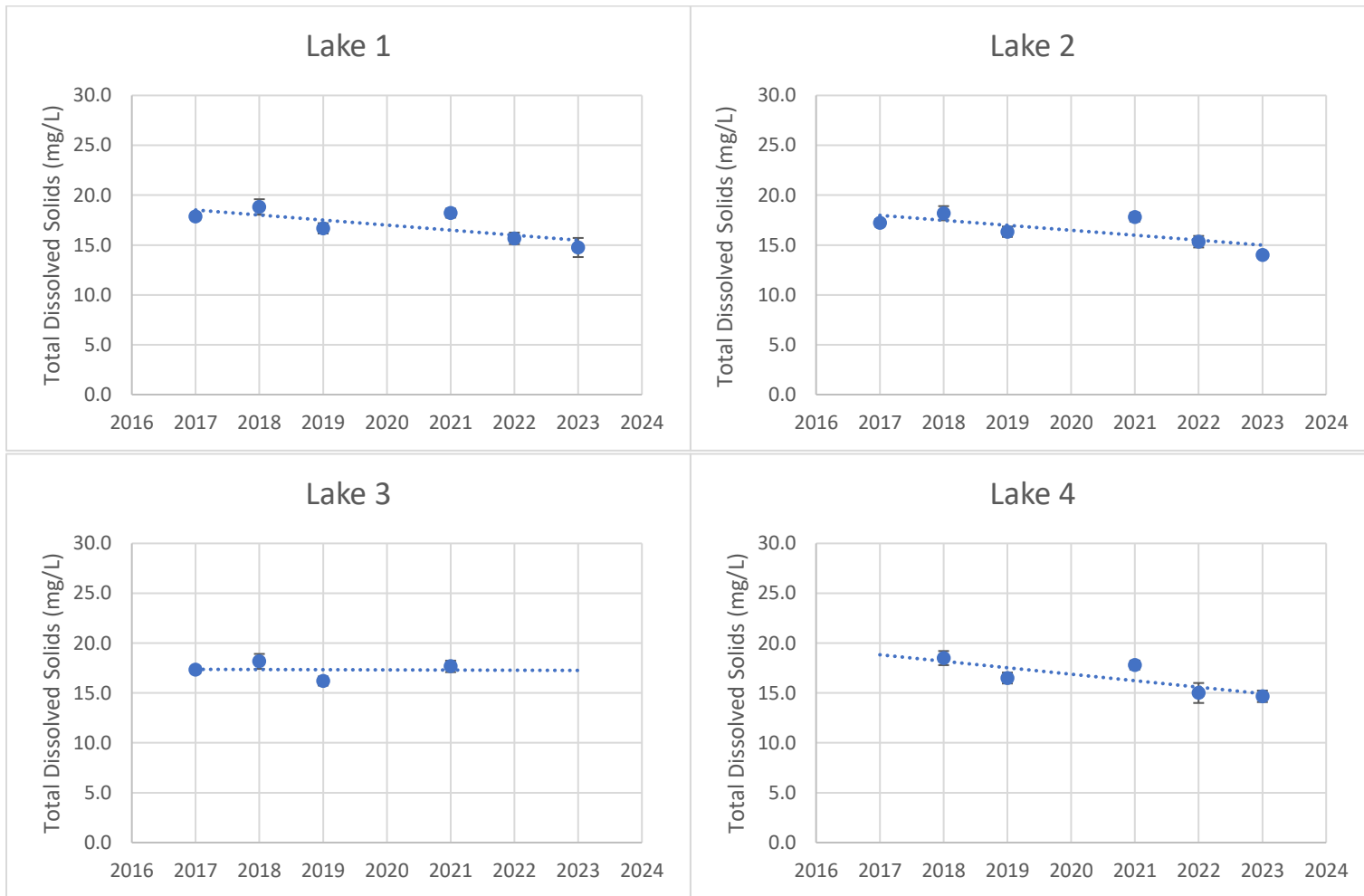


Figure 50. Average annual Total Dissolved Solids (mg/L) readings from the 2017 to 2023 summer month sampling events at the lake sites. The blue dotted line indicates the trendline.

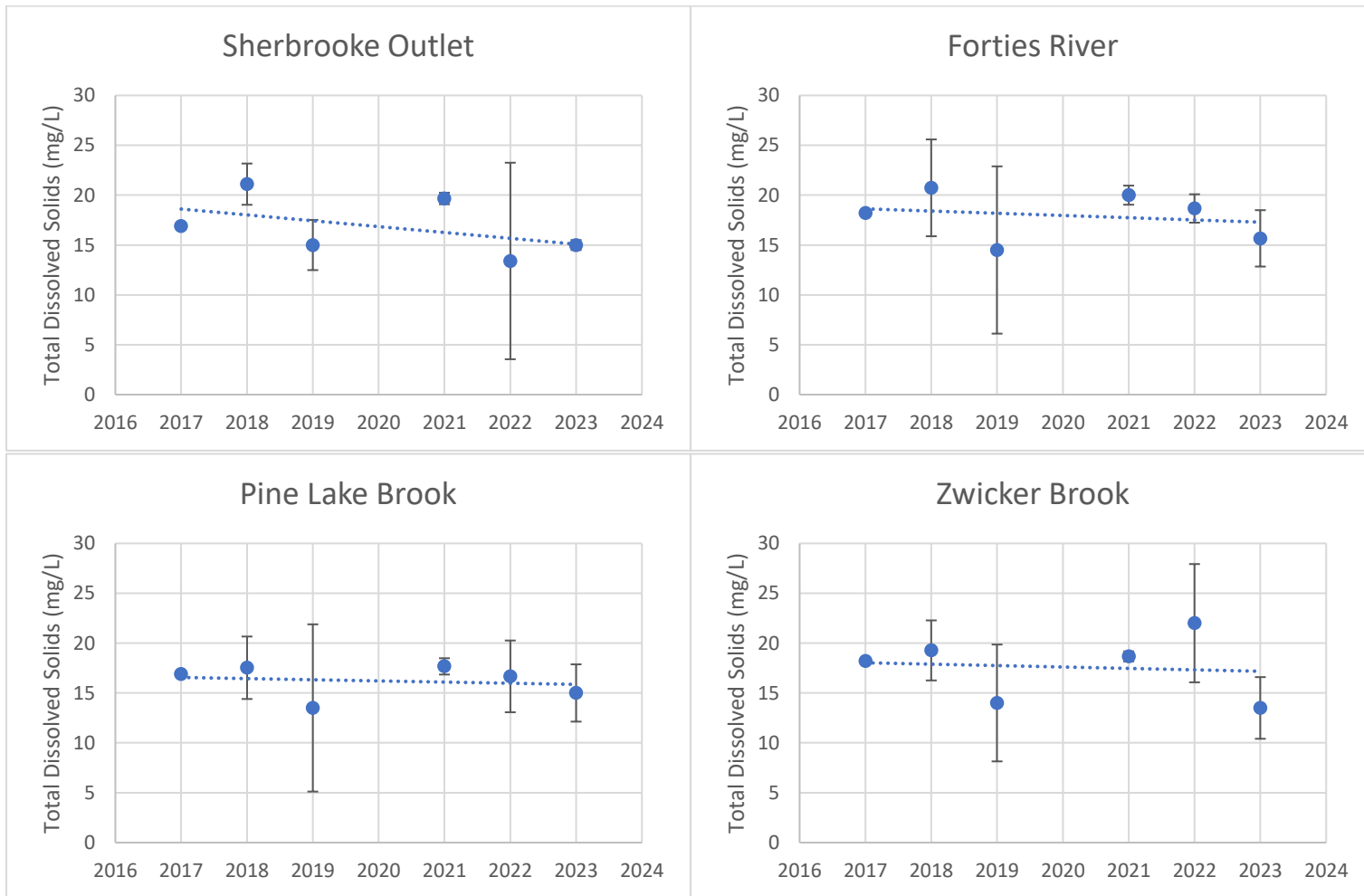


Figure 51. Average annual Total Dissolved Solids (mg/L) readings from the 2017 to 2023 summer month sampling events at the stream sites. The blue dotted line indicates the trendline.

Table 7. Orthophosphate and Total Phosphorus levels from the annual sediment samples at the Lake and Stream Sites. FR = Forties River; ZB = Zwicker Brook; SR = Sherbrooke River; PLB = Pine Lake Brook. ND = less than the detectable limit. Orthophosphate was not able to be completed for ZB in 2023.

Parameter (Units)	Lake 1				Lake 2					Lake 3	Lake 4				FR	ZB	SR	PLB	ZB
	2019	2021	2022	2023	2018	2019	2021	2022	2023	2018	2019	2021	2022	2023	2018	2019	2021	2022	2023
Orthophosphate in sediment (mg/kg)	0.15	0.39	0.51	0.11	0.0067	0.086	0.27	0.24	0.1	0.26	0.24	0.24	0.26	0.09	0.33	0.38	0.36	0.79	
Acid extractable phosphorus in sediment (mg/kg)	1900	1300	1600	1700	1900	2200	1800	1600	1700	400	490	2000	1700	1600	180	190	200	ND	920

# Sherbrooke Lake 2018 - 2023 Water Quality Report Card

## Sherbrooke Lake STEWARDSHIP Committee

Monitoring of Sherbrooke Lake's water quality was led by the Sherbrooke Lake Stewardship Committee (SLSC). This committee was comprised of citizen representatives appointed by the Municipality of Chester (MOC), and the Municipality of the District of Lunenburg (MODL), in addition to a water quality expert, and officials from both Municipalities. The group received technical support from Coastal Action, who are also leading the related LaHave River Watershed Project which has studied water quality throughout the watershed since 2007. Both municipalities provided funding to support the program, while trained property owners around the lake provided hands-on work to collect the samples.

## Sherbrooke Lake Sampling

2023 marked the final year of the Sherbrooke Lake water quality monitoring program. Monitoring activities were not completed in 2020 due to COVID-19 pandemic restrictions. In 2017, a preliminary monitoring program determined the best methods and sampling sites for the baseline study. In 2018, hydrocarbons were sampled to assess the impact from motorized boats, but all readings were below detection levels so it was removed from the program in subsequent years. From 2018 to 2023, water samples were collected from lake and inlet stream sites during summer months and tested for total suspended solids, total nitrogen, total phosphorus, E. coli, and chlorophyll- $\alpha$ . A ProDSS YSI unit was used for in-situ measurements of temperature, barometric pressure, dissolved oxygen (% and mg/L), specific conductivity, total dissolved solids, salinity and pH. Four streams were monitored with the lake sites, while seven streams around the lake were tested once annually after a large rain event to monitor water quality changes related to high runoff events. Bottom sediment samples were also collected at three lake sites and one river site once annually, to assess the long-term accumulation of nutrients and metals, which can also influence the lake's water chemistry. In response to concerns about cyanobacteria blooms the lake, MODL purchased a Total Algae Probe in 2021, this probe was fixed to the YSI sampling device used to obtain on-site water quality readings of Chlorophyll, a compound present in all algae species, and Phycocyanin, which is a specific colour found in potentially toxic cyanobacteria (also called blue-green algae).

## How is Sherbrooke Lake's water quality?

### Bacteria

All lake sites were consistently below Health Canada's 235 CFU/100 mL recreational limits for E. coli – the highest average lake concentration was 3.3 CFU/100 mL, well below the threshold. Lake sites were consistently lower than stream sites. Health Canada guidelines were also not exceeded for stream samples, except during the rainfall-

dependent sampling in 2019 and 2022. Associated with this exceedance, and spikes in bacteria concentrations at other streams, were large rainfall events. A spike in bacteria after rainfall is common. Although it does not appear to affect the lake quality, swimming in rivers should be avoided for 24 hours after a rainfall event. Water from the lake and the rivers should always be treated prior to consumption (i.e., bathing, washing, drinking).

### Temperature

All lake sites displayed a slight trend of increasing average surface water temperatures in the summer months, and the average annual temperature exceeded the 20°C temperature threshold for cold-water fish species (NSSA 2014) in 2021, 2022 and 2023. There is currently not enough data available for statistical analyses to determine if this trend is significant or due to other factors such as the time of sampling, and the weather before and at the time of sampling. If the lake surface water temperatures are increasing, this could make the lake more vulnerable to increased occurrences of cyanobacteria blooms and changes to the species composition of the lake, due to temperature thresholds that impact survival, reproduction and growth.



Figure 1: 2023 map of Sherbrooke sampling sites.

## Did you know?

Algal blooms are a natural part of lake ecology but can be enhanced in size and frequency if pollution sources add extra nutrients into the environment. In a balanced ecosystem, algae and other organisms' growth is limited by the availability of nutrients; however, if nutrients become available in excess (both naturally through fall and spring turnover and sediment resuspension, or from human-caused pollution), algal blooms can occur. Not all blooms are algae (i.e., pine tree pollen forms a film on the water's surface), and not all algae blooms are toxic. Blooms should be treated with caution and should be reported with a photo to the Nova Scotia Environment and Climate Change Office in Bridgewater (902-543-4685).

### Nutrients

The average annual surface nitrogen and phosphorus concentrations fell below their respective guidelines for freshwater rivers and lakes; however, both nutrients peaked following rainfall events. The increase in nutrients comes from rain washing nutrients into nearby waterbodies from surrounding sources, including roads, lawns, gardens, etc. Currently, Sherbrooke Lake's nutrient status is at the low end for freshwater lakes. This is encouraging news, but only through continued vigilance will that situation continue in the face of increasing development and alteration of the lake's shoreline and surrounding watershed. Nutrient inputs from human activities should be minimized as much as possible.

### Algal Blooms

12 algal blooms were reported over the five years of this project, 2 of which were reported to NSECC (Nova Scotia Environment and Climate Change). Three of these blooms were tested and did not contain detectable microcystin (the main neurotoxin found in cyanobacteria blooms). The remaining blooms dissipated before volunteers could sample them.

### Overall Lake Health

Sherbrooke Lake is considered generally healthy but vulnerable. There were no apparent water quality issues found in the baseline study, but human activities such as fertilizing lawns, removing vegetative buffers between lawns and the lake, and improper management of septic fields can all impact the lake's water quality. Additional threats to the lake include invasive species and pollutants from motorized watercraft. A more detailed report on the 2018 - 2023 sampling program is available upon request from the Municipality of Chester and the Municipality of the District of Lunenburg.



Figure 2: Volunteers and staff training for sampling.



Figure 3: Volunteers ready for sampling.

## Thank you!

This project was funded by the Municipality of the District of Lunenburg (MODL) and the Municipality of Chester (MOC). Coastal Action would like to thank the volunteers, the Sherbrooke Lake Stewardship Committee, and municipal staff for their contributions that made for the successful completion of this baseline study.

Take Charge of your Environment!

# Ask Yourself:

Are you maintaining a natural vegetative buffer along lake shores, streams, ditches and other waterways?

- Grass or wood buffers help filter pollutants and reduce flood damage. This can also help to reduce occurrences of algae blooms.

If you transport your boat or other gear between waterbodies, do you clean, drain, and dry it between sites?

- Aquatic invasive species can be transported between waterbodies on watercraft, fishing gear or other equipment. These invasive species can cause both environmental and economic damage. For more information visit the Nova Scotia Invasive Species Council website: <https://nsinvasives.ca/clean-drain-dry/>.

Do you have a spill kit in your boat?

- Spills from fuel or oils can impact people, property and the environment. Keeping a spill kit on your motorized watercraft can help contain, clean and dispose of any spilled chemicals on the water.

Have you talked to your neighbour about what they're doing to protect our waterways?

- Protecting our environment and waterways is a community effort. Fostering community engagement protects local resources and the character of the community.

When was your septic pumped last?

- A properly maintained septic system prevents costly repairs and untreated sewage discharge into our streams.

Do you need to fertilize your lawn?

- Many fertilizers add excess nutrients to waterways such as nitrogen and phosphorus, which can contribute to blue-green algae blooms. If you decide to fertilize your property, use the 4 R's: right source, right amount, right place and right time.



Coastal Action is a charitable organization on the south shore of Nova Scotia that believes in safeguarding a healthy environment for future generations. For over 25 years, our goal has been to promote the restoration and conservation of our environment through research, education, action, and community engagement. We work in five core areas: Watersheds & Water Quality, Species at Risk & Biodiversity, Climate Change, Environmental Education, and Coastal & Marine.

## The Sherbrooke Lake Baseline Study, Proposed Next Steps:

The water monitoring program on Sherbrooke Lake was initiated in response to the planned development of a municipal public access site. The program's goals included determining a baseline understanding of water quality conditions within Sherbrooke Lake before the construction of the public access site, monitoring water quality during and after construction, and the provision of evidence-based advice to MODL and MOC regarding ways to address water quality changes and concerns within the lake. The commitment of establishing a five-year base line (excluding not testing during COVID) has been reached and the results are provided in Coastal Action's Sherbrook Lake 5-Year Water Quality Baseline Report:2018-2023.

Not only have we developed a good picture of the lake's current condition but have had an opportunity, through the annual technical reports and public information documents, to inform and hopefully educate the public about their role as lake stewards. These reports have been provided by email to all lake property owners and through postings on both municipalities' web sites to all residents of both municipalities.

Probably the most significant occurrence through this period was the observations over several years of suspected blue-green algae blooms in different parts of the lake. These earlier sightings resulted in the NS Ministry of Environment and Climate Change visiting the suspect areas and making shoreline observations and then consulting with the NS Ministry of Health. The outcome was several public advisories issued through their website advising lake users to avoid water contact activities including drinking lake water. These blanket advisories for the entire lake for the summer season solicited considerable public concern. MODL reacted quickly to this by approving the purchase of new sampling probes and more resources for laboratory testing. Subsequent lake sampling of site-specific suspected occurrences and through the general routine sampling and water analysis has not confirmed the presence of blue-green algae and associated toxic cyanobacteria.

This is a good news story and yet the occurrences of this water quality problem more generally in Atlantic Canada and elsewhere have been increasing and one should expect to face it here as well. While a single causative factor has not been identified, it is likely that increasing lake water temperatures associated with

climate warming, more nutrients being introduced to lake systems through lakeshore development, poorly functioning septic systems, and reduced ice cover could all be playing a role.

Given that the provincial government's current policy is to only sample and advise on suspected occurrences at publicly regulated swimming beaches, there will be continuing concern by lake property owners that some government agency takes responsibility to inform, advise and protect them.

So, what needs to be done?

Five years of baseline water quality knowledge about the lake is an important resource to guide both municipalities on future land use decisions affecting the lake. As we are also aware the development of a public access site has not happened, as of yet. In order to reveal any changes in the water quality of Sherbrooke Lake, it is being recommended that both Councils extend their support to a three-year recurring sampling of Sherbrooke Lake and tributaries adopting the same regime as has been used for the Baseline program. This will help ensure that the original intent of this water monitoring program is meeting its intended goals. Much work has been undertaken to establish this baseline and without supporting a three-year recurring regime based on the original baseline program will mean all the work of the Municipalities, the Committee, volunteers and Coastal Action will be lost.

Ideally the province will step up and track the occurrences of blue-green/cyanobacteria blooms and provide timely advice to those using lakes and rivers. They will also sponsor with university partners bi-annual cyanobacteria workshops as was done in June of 2022 to advance the understanding of this threat and actions to address it. Our committee has asked the province to do this. No commitment has been made.

Reducing wherever possible increases in nutrient additions to lakes is an important step to mitigate problems of diminished water quality. See Figs 1,-3.

Kings County has implemented a comprehensive lakeshore zoning program that determines lot sizes, preservation of natural shorelines and setbacks for buildings

away from water bodies. This has been very effective and because of its county-wide application protects all surface water resources. This is combined with an annual water quality survey of 13 lakes to track any changes.

Chester municipality has recently adopted a “lakeside zone” for application to their portion of the Sherbrooke Lake shoreline. This measure as in Kings County requires shoreline setbacks for the construction of new buildings and the preservation of natural vegetation along shorelines. These measures are a proven way of reducing the impact of people on lake water resources and the overall health of the aquatic ecosystem. Adoption of this measure required considerable time and effort but property owners on other lakes within the municipality are showing interest in adopting similar requirements on their lakes.

A meeting was held with the planning staff in MODL to urge the rapid adoption on a trial basis of similar shore zone protection measures which would then help to protect the entirety of the lake’s shoreline. This could also be expanded to include other water bodies where similar benefits would accrue. We are urging this Council to seriously consider this step.

In conclusion, the Committee recommends:

1. Both municipalities adopt the following motion:  
*“The Municipality of the District of (Chester/Lunenburg) Council approve conducting a three-year recurring water sampling of Sherbrooke Lake and tributaries adopting the same regime that was used for the baseline program to ensure the original intent of the water quality monitoring program, which was to provide MODL and MOC with evidence-based advice before, during and after the construction of a public access site on Sherbrooke Lake.”*
2. Both Councils initiate and support an ongoing Lake Stewardship education initiative targeting lakeside property owners to help them understand the actions they can take to protect lake health.
3. That terms of reference be developed in partnership with both municipalities for a new committee with a focus on fulfilling recommendation #2.
4. The Municipality of Chester has established a lakeside zone for the portion of Sherbrooke Lake that resides in that Municipality. It is recommended

that MODL move quickly to consider using this template of the “lakeside zone” for their portion of Sherbrooke Lake shoreline with the possibility to extend to other lakeshores in the municipality.

5. In order to help mitigate any human and ecosystem effects associated with future possible blue-green/cyanobacteria blooms that both municipalities urge the province to support biannual scientific reviews of this emerging threat.

Thank you,

**Sherbrooke Lake Stewardship Committee Members:**

Garth Bangay, Chair.

Robin McAdam,

William Baldrige

Ronald Renz

**Staff Resource Support**

Kaylee MacLeod, Coastal Action,

Sam Reeves, Coastal Action,

Trudy Payne, MODL,

Chad Haughn, MOC.

**Council**  
Item: #11.2.2  
Date: May 28, 2024  
Authorization: T. MacEwan



## **Municipality of the District of Lunenburg**

### **Request for Direction**

**Report to:** Municipal Council  
**Submitted by:** Trudy Payne, Director of Recreation, Parks & Tourism  
**Date:** May 28, 2024  
**Re:** MARC Playground Proposal

---

#### **Background**

On the May 22, 2024, Council meeting two parent/ball player representatives spoke during public input requesting that Council reconsider replacing the playground at the MARC by the ballfields. Their request included replacing the playground at the same location the previous playground was before it was removed due to safety concerns and to have it installed this year.

During the presentation the speaker noted that the ballfields at the MARC are used from May to October each year and that hundreds of children accompany parents/guardians/friends each week. The playground was a well-used facility by hundreds of children weekly and that five years is too long to wait for a replacement playground. The speakers did list a number of benefits of having a playground adjacent the ballfields which were:

1. Provides a space for kids to exercise and be active as opposed to being on their I-pads and phones.
2. A place to build friendships.
3. Keeps families together during ball games.
4. Children are able to see their parents being active.
5. Keeps the children entertained.

The speaker stated that a playground company located in Nova Scotia has provided them with a quote of \$65,000 to replace what was there which includes installation and could be completed by the end of the year.

The speaker went on to say that it was her understanding that an accessible playground is being installed at the MARC at some point in time. It is the speaker's recommendation to install an accessible playground near the buildings and the pond at the MARC and to replace the playground adjacent to the MARC ballfields with similar equipment that was previously installed.

### **Discussion**

During budget discussions for 2024-2025 Council made the decision to replace the MARC playground in the year 2027/2028 in the five-year capital plan. The intent of this replacement was to make it an accessible playground and for the design and placement of the playground to be determined after the Reimagining of the MARC which is scheduled in year 2026/2027. Installing an accessible playground aligns with the Lunenburg County Accessibility Plan that was approved by Council on February 9, 2021, and submitted to the provincial Accessibility Directorate on March 9, 2021. It states, "we are committed to fostering a culture of accessibility, encouraging the prevention and removal of barriers to participation, and building capacity in these areas amongst municipal staff, Council members, and the public."

The discussion before Council is whether to install a playground at the MARC adjacent the ballfields at the same location as the previous playground this fiscal year as requested by some residents and users of the ballfields, and if so, to determine the budget amount. The amount proposed by the speaker at the May 22<sup>nd</sup> Council meeting, to replace and install similar equipment on the same site was \$65,000.

It is staff's understanding that there are individuals that are prepared to host a ball tournament to raise funds for a playground and anticipate raising \$5,000 to be used towards the cost of the playground.

The Municipality is a member of the Canoe Procurement Group of Canada which is the largest municipal buying group in Canada. Depending on the Province it has more than 200 approved suppliers. By combining the purchasing power of over 5,000 public and not-for-profit organizations throughout Canada, Canoe is uniquely positioned to get members access to a wide range of trade-compliant products and services at preferred rates. Its size means Canoe is better positioned to absorb shocks in market and find solutions. Being a member enables the Municipality to go directly to suppliers and still comply with the Municipality's procurement policy. This could be an option for a playground at the MARC.

### **Budget Implications**

A playground has not been budgeted in the 2024-2025 capital budget. If Council wanted to revisit installing a playground adjacent to the MARC ballfields there are several reserves that could be considered to provide the funding. They are:

1. Open Space Capital Reserves – estimated opening balance of \$851,592 as of March 31, 2024.

2. Open Space Operating Reserves – estimated opening balance of \$280,246 as of March 31, 2024.
3. General Operating Reserves – estimated opening balance of \$12,983,833.

Another option is to not move forward with a planned capital project scheduled for this year and use the funds to fund a playground instead.

### Work Plan

The playground was not part of this year’s workplan. Improving our parks does align with the Municipality’s Re-Create Parks priority.

### Conclusion

At the May 22, 2024, Council meeting residents and users of the ballfield spoke at public input and requested that Council reconsider replacing the playground at the MARC adjacent the ballfields. Residents have sought out a playground equipment supplier in NS seeking out similar equipment that was at the previous playground, costs, and timelines for installation. Staff are seeking direction from Council on how they would like to proceed with this request.

Report Preparation	
Department	Recreation, Parks & Trails
Report Prepared by	Trudy Payne, Director of Recreation, Parks & Trails
Report Approved by	
Date Reviewed by C.A.O.	

**Council**  
Item: #11.2.3  
Date: May 28, 2024  
Authorization: T. MacEwan



## **Municipality of the District of Lunenburg**

### **Request for Decision**

**Report to:** Municipal Council

**Submitted by:** Trudy Payne, Director of Recreation, Parks & Tourism

**Date:** May 28, 2024

**Re:** Major Recreation Capital Grant – Ground Search & Rescue

---

#### **Recommendation**

That Council for the Municipality of the District of Lunenburg approve a major recreation capital grant in the amount of \$2,545.00 for the Lunenburg County Ground Search & Rescue organization to upgrade their electrical and lighting system and that these funds come from the Council Contingency Fund.

#### **Background**

On May 21, 2024, at the Policy and Strategy Committee meeting staff presented the Annual Operating and Major Recreation Capital grants recommendations report. The Committee made a motion to go to Council to approve the recommendations of staff, except for the recommendation that was presented for the Lunenburg County Ground Search & Rescue group. At that meeting, the Committee directed staff to reach out to Ground Search & Rescue to determine whether their facility could be rented or booked by community groups for public events/activities as this funding is to support the expansion or improvement of an indoor/outdoor cultural, social, heritage and/or recreation facility. Staff were also directed to bring the information back to a committee or Council meeting with their recommendation based on the group's response to this question.

#### **Executive Summary:**

The group clarified that their facility could be used for community groups and members of the public, but stated they often do not receive requests. Based on this information the following is staff's recommendation:

That Council for the Municipality of the District of Lunenburg approve a major recreation capital grant in the amount of \$2,545.00 for the Lunenburg County Ground Search & Rescue organization to upgrade their electrical and lighting system and that these funds come from the Council Contingency Fund.

Ground Search & Rescue requested \$12,225 and under the grant groups can only request up to 50% of the project costs. Since the project's costs are \$13,225 the maximum the group can request is \$6,612.50.

The amount being recommended by staff is based on using the criteria established for this grant program and deducting an additional 45% as was applied to the majority of groups that applied for the major recreation capital grant. This fiscal year.

### **Budget Implications**

If Council approves the Annual Operating and Major Recreation Capital grants amounts recommended by staff, there would be no funds available to provide to the Ground Search & Rescue group from the budget allocated to these grants. If Council approves the recommended amount \$2,545 would come from the Council Contingency Fund which has been allocated \$80,000 in this fiscal year, thus, no impact to the budget.

### **Work Plan**

Managing the annual operating and major recreation capital grant programs is part of the Department of Recreation, Parks and Tourism work plan.

### **Alternatives**

The alternatives are:

1. Not to award Ground Search & Rescue any funds for their capital project.
2. To increase the amount being recommended.
3. To decrease the amount being recommended.

### **Conclusion**

Ground Search & Rescue meets the criteria of the Major Recreation Capital Grant, therefore, a recommendation to award the group \$2,545 is being recommended.

<b>Report Preparation</b>	
<b>Department</b>	Recreation, Parks & Trails
<b>Report Prepared by</b>	Trudy Payne, Director of Recreation, Parks & Trails
<b>Report Approved by</b>	
<b>Date Reviewed by C.A.O.</b>	