

**AGENDA
MUNICIPAL COUNCIL**

Bridgewater, NS

Tuesday, April 9, 2019 – 9:00 a.m.

Time & Page

1. CALL TO ORDER
2. ANNOUNCEMENTS, ACKNOWLEDGEMENTS, RECOGNITION
3. PUBLIC INPUT (15 Minutes)
4. APPROVAL OF AGENDA
5. APPROVAL OF MINUTES - March 26, 2019
6. BUSINESS ARISING FROM MINUTES
 - 6.1 Letter of Support – Shoreham Village1-3
7. AWARDING OF TENDERS/RFPs
 - 7.1 Award of Tender 2018-05-021 On-Site Sewage Disposal System Project Group #204-6
 - 7.2 Award of Tender 2018-08-024 On-Site Sewage Disposal System Project Group #217-10
8. PRESENTATIONS/SCHEDULED TIMES
 - 8.1 Josh Goode, Facility Manager, HB Studios Sports Centre.....9:15 a.m. 11-60
 - 8.2 George Buranyi, Declare Climate Emergency10:15 a.m. 61-71
9. CONSIDERATION OF CORRESPONDENCE (Nil)
10. RECOMMENDATIONS FROM COMMITTEES & BOARDS
 - 10.1 Finance
 - 10.1.1 Proposed Changes to Audit Standing Committee Terms of Reference..... (70) 72-88
 - 10.1.2 Full & Partial Tax Exemptions..... (70) 89-93
 - 10.1.3 Council Summer Break (70)
 - 10.2 Sherbrooke Lake Stewardship Committee
 - 10.2.1 Implementation of Community Plan & Public Release of Reports94-139
11. STAFF REPORTS - Nil
12. MAYOR’S/DEPUTY MAYOR’S/COUNCILLORS’ MATTERS
 - 12.1 MJSB Update
 - 12.2 Deputy Mayor’s Update
 - 12.3 Mayor’s Update
13. ADDED ITEMS
14. IN CAMERA
 - 14.1 Contract Negotiations re HB Studios Sports Centre under Section 22(2)(e) of the MGA
15. ADJOURNMENT



Municipality of the District of Lunenburg

MEMORANDUM

TO: Mayor Carolyn Bolivar-Getson and Council
FROM: Tina Robichaud-Bond
DATE: April 9, 2019
RE: **Shoreham Village – Letter of Support**

Council, on March 12, 2019, deferred the following motion until further information could be provided on the renovation plan at the Shoreham Village long term care facility:

“that Municipal Council forward a letter of support for the project Shoreham Village is undertaking to get approval and funding for their renovation plan”.

Attached is an email received from Janet Simm, CEO of the Shoreham Village Senior Citizens Association, in response to Council’s request.

A motion is required to put the deferred motion back on the floor.

Tina Robichaud-Bond

/trb
Attach.

Tina Robichaud-Bond

From: Janet Simm <j.simm@shorehamvillage.com>
Sent: March 26, 2019 10:35 PM
To: Tina Robichaud-Bond
Subject: Shoreham Village Senior Citizen Association

Hi Tina,

In follow up to our conversation, please find below a summary of our issues and a high level description of our plan. At our Family Council meeting this past fall, our Family Council met with our Board Chair and discussed the state of our building. They decided to engage the community to raise awareness of the challenges faced by Shoreham Village, thus the letter that was received by the Municipality of the District of Lunenburg.

Please let me know if you have any additional questions.

The Shoreham Village Senior Citizen Association Long Term Care home is a one story, wood framed building originally built in 1975 with a gross area of approx. 44,533 sq. ft. (37,737 sq. ft. at level 1 and 6,796 sq. ft. in the basement).

The Facility sits on a 3.71 acre lot, part of 3 other lots owned by the Shoreham Village Senior Citizens Association and Shoreham Village Senior Citizens Apartments Association. Access to the lot is via Shoreham Village Crescent off Highway #3 with both the main entrance and shipping/receiving entrance located on the north side of the building. The topography of the site is relatively flat, with a large wetland to the east and wooded area to the south.

The building contains 89 resident beds with a mix of single and double occupancy units (21 in single units and 68 in double units), one respite care bed and one Palliative care suite. The layout comprises 5 resident wings, each containing approximately 18 beds and a very modest living and dining area.

Living area, programming space and dining facilities do not meet the current Department of Health Long Term Care Facility Standards.

We have a significant number of infrastructure issues including:

- Sanitary underground piping is in very poor condition. Many cast iron pipe sections are fully corroded,
- Worn out and corroded domestic hot and cold water and distribution piping. Many of the water the hot and cold water lines are located over resident room ceilings, which has resulted in many water leaks causing significant disruption and safety risk to the residents and staff.
- The double roof has created issues with ventilation, condensation, ice build up and leaking.
- The building exterior continues to deteriorate. There are many areas that the shingles are warped, rotten and have water in underneath them
- Resident bedroom and washroom sizes are smaller than the current standard and present challenges for residents in terms of allowing proper mobility and assistance from care staff
- Flooring throughout the facility is worn. We have 57 resident rooms in total – 22 of these rooms require new flooring (two of these rooms the flooring contains asbestos). In some areas the flooring is torn. In addition to safety concerns, this creates infection control issues.
- The facility's ventilation system does not provide adequate ventilation as required under CSA Z317.2
- The main electrical panel requires replacement and should ventilation be added to the building, a 600 volt system is recommended to economically deal with the increased loads.

In 2013, government announced that Shoreham was one of a number of Long Term Care Facilities to be replace/renovated. Government has not been in a position to follow through on this commitment. Utilizing the findings of another infrastructure review that was commissioned government in the spring of 2017, we have devised a cost effective approach that:

- addresses our infrastructure issues,
- addresses our deficiencies with respect to the DHW Facility design standards
- does not impede the placement process (our 89 beds will remain available to Nova Scotians during the entire renovation project, and
- allows us to remain in our current location at the center of the community as part of a campus that has a fantastic vision for the future.

The plan proposed involves a full renovation of the facility with a new addition on existing property. This project is estimated to cost approximately half of replacing the facility. In addition to addressing the infrastructure issues, the renovation will:

- Reduce the number of double occupancy rooms.
- Enlarge the resident washrooms where possible.
- Enlarge the living and dining rooms in each resident wing.
- Provide larger, more inviting entry foyer.
- Providing additional therapeutic baths.
- Providing additional Soiled Utility and Clean Utility rooms.
- Reducing the risk of cross-contamination between laundry and food service
- Providing a larger, more functional receiving area.

Janet

Janet Simm

CEO

Shoreham Village Senior Citizens Association

Phone: (902) 275-5631

Fax: (902) 275-2586

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Municipality of the District of Lunenburg

MEMORANDUM

REPORT TO: Council

SUBMITTED BY: Maria Butts, LaHave River Project Coordinator

DATE: April 9, 2019

RE: Tender Award: On-Site Sewage Disposal System Installations for LaHave River Properties. Project Group #20

RECOMMENDATIONS

Authorize staff to award tender 2018-05-021 to CK Earthworks Limited in the amount of \$95,279.00 plus HST.

EXECUTIVE SUMMARY

Three (3) bids were received and accepted for *Tender 2018-05-021 On-Site Sewage Disposal System Installations for LaHave River Properties. Project Group #20.*

The scope of work consists of the supply and installation of five septic systems located on private property belonging to homeowners who have applied to participate in the LaHave River Straight Pipe Replacement Program (SPRP), administered by the Municipality of the District of Lunenburg (MODL).

Tender 2018-05-021 is a bundle of five Alternative Treatment Units (ATUs).

BACKGROUND

In the Spring of 2016, *Our Living Future* campaign was launched to bring awareness and education around the issue of straight pipes and their impact on the LaHave River and Council authorized staff to make an application to the New Build Canada Fund for a SPRP. Staff were directed to prepare a Wastewater Management District (WWMD) By-Law and policies to implement such a program. The drafted By-Law and policies have since been adopted by Council.

On June 29, 2017, federal and provincial authorities announced joint funding along with the Municipality for the replacement of straight pipes with on-site sewage disposal systems along the LaHave River.

Replacement of straight pipes with functioning septic systems required the services of a qualified engineer to select, design, and oversee the installation of approved septic systems. As such, council authorized staff to award of *RFP 2017-05-400 On-Site Sewage Disposal System Design for Lahave River properties* to ABLE Engineering Services Inc (ABLE) on August 22, 2017.

To date, MODL has received 164 applications for replacement from property owners within the WWMD and has installed seventy-seven new On-Site Sewage Disposal Systems.

Over the past number of months, MODL has been working with ABLE to produce sewage disposal designs for each property owner enrolled in the SPRP. Five designs were selected from those completed to date for inclusion in tender 2018-05-021.

No Municipal dollars are being spent on this program as the federal and provincial grants cover up to two thirds of the cost and all eligible homeowners are required to pay the remaining one third.

DISCUSSION

Tender 2018-05-021 was posted on Tuesday, March 19, 2019 and closed on Tuesday, April 2, 2019.

Three (3) bids were received by the deadline. Tenderer names and bids are described in Table 1 below:

Funding	Total Bid (w/o HST)
Provincial/Federal Grants	2/3
Property Owner	1/3
Tenderers	
Dennis Lively Construction & Backhoe Services	\$113,800.00
Town & Country Property Imp. Ltd.	\$97,348.05
CK Earthworks Limited	\$95,279.00

Table 1: Accepted Bids for Tender 2018-05-021

Under the scope of work for this tender, the successful bidder is required to complete all excavation, bedding, pipe laying, backfill and compactions. They are to supply all septic tanks, miscellaneous fittings, filter sand, stone and concrete. The successful bidder is also required to complete leakage testing, and all surface restoration and any other work as specified and shown on the design drawings.

CONCLUSION

Tender 2018-05-021: Three (3) bids were submitted. The lowest bid was received by CK Earthworks Limited, of Bedford Nova Scotia.

Tender Award Recommendation

Tender: 2018-05-021 On-Site Sewage Disposal System Installation for LaHave River Properties. Project Group #20.

Scope of Work: Install five On-Site Sewage Disposal Systems on five properties along the LaHave River.

Closing Date: April 2, 2019

Funding	Total Bid (w/o HST)
Provincial/Federal Grants	2/3
Property Owner	1/3
Tenderers	
Dennis Lively Construction & Backhoe Services	\$113,800.00
Town & Country Property Imp. Ltd.	\$97,348.05
CK Earthworks Limited	\$95,279.00

Table 1: Accepted Bids for Tender 2018-05-021

Tender Award Recommendation:

Council award Tender 2018-05-021 to CK Earthworks Limited for the cost of \$95,279.00 plus HST.



Municipality of the District of Lunenburg

MEMORANDUM

REPORT TO: Council

SUBMITTED BY: Maria Butts, LaHave River Project Coordinator

DATE: April 9, 2019

RE: Tender Award: On-Site Sewage Disposal System Installations for LaHave River Properties. Project Group #21

RECOMMENDATIONS

Authorize staff to award tender 2018-05-024 to Dennis Lively Construction and Backhoe Services Ltd in the amount of 63,480.00 plus HST.

EXECUTIVE SUMMARY

Four (4) bids were received for *Tender 2018-05-024 On-Site Sewage Disposal System Installations for LaHave River Properties. Project Group #21*. Two (2) were accepted and two (2) were rejected.

The scope of work consists of the supply and installation of five septic systems located on private property belonging to homeowners who have applied to participate in the LaHave River Straight Pipe Replacement Program (SPRP), administered by the Municipality of the District of Lunenburg (MODL).

Tender 2018-05-024 is a bundle of four traditional systems and one ATU.

BACKGROUND

In the Spring of 2016, *Our Living Future* campaign was launched to bring awareness and education around the issue of straight pipes and their impact on the LaHave River and Council authorized staff to make an application to the New Build Canada Fund for a SPRP. Staff were directed to prepare a Wastewater Management District (WWMD) By-Law and policies to implement such a program. The drafted By-Law and policies have since been adopted by Council.

On June 29, 2017, federal and provincial authorities announced joint funding along with the Municipality for the replacement of straight pipes with on-site sewage disposal systems along the LaHave River.

Replacement of straight pipes with functioning septic systems required the services of a qualified engineer to select, design, and oversee the installation of approved septic systems. As such, council authorized staff to award of *RFP 2017-05-400 On-Site Sewage Disposal System Design for Lahave River properties* to ABLE Engineering Services Inc (ABLE) on August 22, 2017.

To date, MODL has received 164 applications for replacement from property owners within the WWMD and has installed seventy-seven new On-Site Sewage Disposal Systems.

Over the past number of months, MODL has been working with ABLE to produce sewage disposal designs for each property owner enrolled in the SPRP. Five designs were selected from those completed to date for inclusion in tender 2018-05-024.

No Municipal dollars are being spent on this program as the federal and provincial grants cover up to two thirds of the cost and all eligible homeowners are required to pay the remaining one third.

DISCUSSION

Tender 2018-05-024 was posted on Tuesday, March 19, 2019 and closed on Tuesday, April 2, 2019.

Four (4) bids were received by the deadline. Two bids were rejected for failure to include the addendum as explicitly stated in the posted documents. Accepted tenderer names and bids are described in Table 1 below:

Funding	Total Bid (w/o HST)
Provincial/Federal Grants	2/3
Property Owner	1/3
Tenderers	
Dennis Lively Construction & Backhoe Services	\$63,480.00
CK Earthworks Limited	\$66,748.00

Table 1: Accepted Bids for Tender 2018-05-024

Rejected tenderer names and bids are described in the Table 2 below:

Tenderers	Total Bid (w/o HST)
Town and Country Property Improvements Ltd	\$58,614.73
Craig Fancy	\$69,476.96

Table 2: Rejected Bids for Tender 2018-05-024

Under the scope of work for this tender, the successful bidder is required to complete all excavation, bedding, pipe laying, backfill and compactions. They are to supply all septic tanks, miscellaneous fittings, filter sand, stone and concrete. The successful bidder is also required to

complete leakage testing, and all surface restoration and any other work as specified and shown on the design drawings.

CONCLUSION

Tender 2018-05-024: Four (4) bids were submitted and two accepted. Of the two accepted bids, the lowest bid was received by Dennis Lively Construction and Backhoe Services of Beaver Bank, NS.

Tender Award Recommendation

Tender: 2018-05-024 On-Site Sewage Disposal System Installation for LaHave River Properties. Project Group #21.

Scope of Work: Install five On-Site Sewage Disposal Systems on five properties along the LaHave River.

Closing Date: April 2, 2019

Four (4) bids were received by the deadline. Two bids were rejected for failure to include the addendum as explicitly stated in the posted documents. Accepted tenderer names and bids are described in Table 1 below:

Funding	Total Bid (w/o HST)
Provincial/Federal Grants	2/3
Property Owner	1/3
Tenderers	
Dennis Lively Construction & Backhoe Services	\$63,480.00
CK Earthworks Limited	\$66,748.00

Table 1: Accepted Bids for Tender 2018-05-024

Rejected tenderer names and bids are described in the Table 2 below:

Tenderers	Total Bid (w/o HST)
Town and Country Property Improvements Ltd	\$58,614.73
Craig Fancy	\$69,476.96

Table 2: Rejected Bids for Tender 2018-05-024

Tender Award Recommendation:

Council award Tender 2018-05-024 to Dennis Lively Construction and Backhoe Services for the cost of \$63,480.00 plus HST.



HB STUDIOS SPORTS CENTRE T: +1 (902) 543 5348 E: info@hbssc.ca
543 Glen Allan Drive, Bridgewater, Nova Scotia B4V 0A3

Council
Item: #8.1
Date: April 9, 2019
Authorization: K. Malloy

To: Municipality of the District of Lunenburg Council
From: South Shore Fieldhouse Society
Re: Update to January 31st, 2019 'Request for Support'

The purpose of this memo is to update our January 31st, 2019 request to coincide with the April 9th, 2019 Municipal Council meeting.

The request in the January 31st, 2019 Report to both the Municipality of the District of Lunenburg (MODL) and the Town of Bridgewater (TOB) was as noted: "The SSFHS, MODL and TOB work together to select the alternative which best fits with an overall recreation strategy for the two Municipal units and the residents of the region."

Due to the fact that the extension for our line of credit expires on May 31st, 2019 and our cash flow isn't sustainable after May (eg. see the projected cash flow reviewed with the Finance Committee on November 6th, 2018), our request is for \$40,000 over five (5) years totaling \$200,000.

As a follow-up to the January 31st, 2019 Report a number of key activities have taken place and align with the recommendations put forth by the Operational Review consultants including:

1. Our Board has been working with Flourish to diversify the facility to include a seniors centre. The new Minister of Seniors, Filomena Tassi, has liaised with Flourish and the group utilized the facility to host her visit to the region. The visit from the Minister took place on March 6th, 2019;
2. A public meeting was hosted by the SSFHS on March 14th, 2019 to review the last 10 years of operations with the community, our current status, the challenges we are experiencing and what is needed to overcome these challenges and keep the facility operating. The meeting provided an opportunity to answer questions, receive feedback and recommendations and ask for community support. Subsequent to this meeting we have sourced \$9500 in sponsorship revenue. With the assistance of community members we are continuing to engage others in the community including businesses to build on the funding recently received;
3. Our current financial institution and another banking institution have both offered to work closely with the Board to assist in making the facility financially viable;
4. We have engaged HB Studios, our current naming sponsor, and Soccer Nova Scotia, who represents our largest user group, to review the facilities financial issues and request assistance with the financial deficit and get us to our goal in having the facility debt free;
5. The independent consultants recommended that committees were created such as Programming/Events, Marketing, Fundraising/Sponsorship to support the HBSSC Board. This process has begun by inviting community members to consider serving on these committees;



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6. We are having the field professionally appraised to determine the lifespan of the turf which upon further discussion we believe could last up to 15 more years; and
7. The Board attended the Town of Bridgewater Council meeting on March 5th, 2019 with the same request made in this memo.

However, as confirmed by the external consultants, we require financial support from the Municipalities to be sustainable.

HB Studios Sports Centre Report

To: Kevin Malloy & Tammy Wilson

From: South Shore Fieldhouse Society

Re: Request for Support

Origin

The Board of the South Shore Fieldhouse Society (SSFHS) received a letter dated November 26th, 2018 that the Municipality of the District of Lunenburg (MODL) was authorizing the payment of \$31,000 from the 2018-19 budget to SSFHS and that MODL had entered in to discussions with the Town of Bridgewater (TOB) and SSFHS with the support of an independent review to look at a financial plan going forward for SSFHS including the option of integrating SSFHS into the overall recreation strategy.

Background

SSFHS began running into cash flow problems during the 2016-17 fiscal year as the payment of annual grants from the two Municipalities and HB Studios had expired and approximately \$450,000 remained on the long-term debt.

The current Board prepared a report in the Fall of 2017 which reviewed the financial history of the facility including the details leading to the long-term debt; a request to the 6 Lunenburg/Queens County municipal units for a total of \$66,000 to address the cash flow issue over the next 8 months; an overview of the many activities taking place at the facility and highlighting the benefits of the facility to the region. A video prepared by a grade 12 Park View Education Centre student with input from a range of users was part of the presentations. These presentations took place in January and February of 2018 with the MODL, TOB, the Town of Lunenburg and the Town of Mahone Bay inviting SSFHS to make a presentation to support their request. The SSFHS noted they planned to have a year business plan prepared by August, 2018. Over the next 8 months, SSFHS received grants from TOB (\$25,000), MODL (\$32,000) and the Town of Lunenburg (\$600) to assist the cash flow for 2017-18.

On September 4th, 2018, at the request of MODL, representatives of SSFHS made a presentation of their Business Plan for 2018-2020 at a Committee of the Whole. At the October 9th, 2018 meeting SSFHS was awarded a grant of \$31,000 subject to MODL's receipt of a positive cash flow projection to March 31st, 2019. A cash flow projection extending to December, 2019, was prepared and forwarded to MODL (See Appendix C - Projected Cash Flow - Oct/18 to Sept/19). The cash flow indicated an overdraft position of \$62,250 as of March, 2019 and increasing to \$123,500 as of December, 2019 based upon the current level of operational revenues and expenditures.

At the request of MODL, the Treasurer of SSFHS met with the Finance Committee on November 6th, 2018 to address questions. Subsequent to this, the November 26th, 2018 letter was sent to the CAO of TOB and the SSFHS requesting a meeting. On December 14th, 2018 the Chair and the Treasurer of SSFHS met with the two CAO's. The outcome of the meeting was for SSFHS to arrange for an independent review, with the Municipalities contributing up to \$2,000 for the review, and the financial plan being submitted by SSFHS by January 31st, 2019.

Through a series of discussions with the two CAO's and the MODL's Director of Parks and Recreation the following occurred:

1. A matching grant was applied for and granted by Communities, Culture & Heritage up to a maximum of \$2,000; and
2. Dwight Macleod, Executive Director of the Credit Union Recreation Complex and the Valley District Soccer Association and Bob Quigley, a professional Recreation Consultant, agreed to undertake the independent review within the short time period
3. A scope of work was arrived at for the independent review as noted below:
 - "A concise report expressing your opinions/ideas on the financial operation of the facility including:
 - Are the revenues and expenditures reasonable in the size of the market which the facility is located.
 - Comment on those line items which could be improved (eg. revenues to increase and expenses to decrease) noting any suggestions which you can make.
 - Comment on the actions/initiatives which the Board are currently undertaking to improve the financial stability of the facility.
 - Are there any significant changes to the operation which should be explored;
 - Identify any governance, management or operational matters which should be addressed.
 - Comment on the physical condition of the facility.
 - Comment on the projected cash flow and business plan for 2019-20."

The two consultants spent January 10th, 2019 on-site touring the facility with the manager, meeting with various members of the Board and also had a meeting with staff of the two Municipalities. Prior to 10th and continuing after the 10th, the consultants reviewed various documents and communicated with the manager and several Board members prior to each preparing and submitting their reports, they met with the full Board and several staff of the Municipal units on January 23rd. See HB Studios Report dated Jan, 2019 prepared by D. Macleod Consulting and HB Studios Analysis dated January, 2019 prepared by Quigley Recreation Services.

Discussion

The sustainability of HB Studios Sports Centre is at risk and unless there is significant infusion of working capital to deal with the capital debt and a relatively smaller operating deficit, the facility and its Board of Directors will no longer be able to satisfy its bank obligations after Spring.

Both consultants share the following perspectives:

- The facility is relatively unique as it hosts a range of recreational activities covering all ages and has the potential to provide more activity through improved marketing;
- Cash flow is a significant problem, and unless solved, the operation isn't sustainable;
- The business model which we have been using over the past few years isn't working as it has left us vulnerable to relying on the users/tenants to generate revenue (eg. landlord to customer/tenant model).
- Through more communication with the user groups and the municipality recreation staff, the Board will try to facilitate more recreation opportunities for a range of interests in the area. This could involve looking after the registration for the recreational leagues, drop-in soccer, etc.
- The facility is an excellent location to develop a "senior centre", particularly given the demographics of the area.
- The Board has to improve its marketing and promotion of the facility and its activities.
- The facility is in relatively good condition through the efforts of staff and Board member Melvin Skinner. They were impressed with his efforts in exploring energy efficient solutions through Clean Nova Scotia (see two attached reports - "Small Business Energy Solutions-Opportunities Report" and "Energy Feasibility Study Report") in a cost effective manner taking advantage of significant grant/rebate possibilities.
- As outlined in one of the reports and discussed with the Board, there may be a possibility of utilizing the portable floor which the LCLC has to host food/trade shows at times that wouldn't conflict with the LCLC's own revenue generation.
- It was quickly obvious to the consultants that without adequate outside financial assistance this fantastic facility is most likely to close this Spring/Summer (See appendix C - Projected Cash Flow - October, 2018 to December, 2019)

Alternatives

Outlined below are several alternative actions for consideration with respect to the sustainability of the facility:

1. The Society transfer ownership of the facility to the two Municipalities along with the debt, this would be approximately \$400,000 as of April 30th, 2019. The \$400,000 would include both paying off the line of credit (eg. \$70,000) and the principle on the BMO loan (eg. \$330,000). This would provide the Society a chance of operating the facility with minimal financial reliance on the Municipal units. The Municipal units would look after the capital upgrades indicated in the report to ensure that this multi-million facility remains operationally efficient;
2. The 2 Municipalities continue to provide grants to the Society. As noted in our 5 year plan, the annual grants would gradually decrease from a high of \$84,000 (eg. \$42,000 per unit) to \$62,000 (eg. \$31,000 per unit). 2 capital projects likely to be required by the facility are the possible replacement of the soccer field turf (eg. \$250,000) and an upgrade to the HVAC system (eg. \$40,000 net of grants/rebates);
3. The Society transfer the ownership and operation of the facility to the two Municipal units. The units could elect to offer the current Board members to join an advisory committee. This alternative could significantly impact the workload of the Municipal unit's staff and Councils;
4. The Municipalities could turn down the Society's request for financial support. This alternative would result in the Society having to cease operations as it wouldn't be able to meet its financial requirements to the Bank past the Spring of 2019 without a significant capital infusion from other sources.

Request

The SSFHS, MODL and TOB work together to select the alternative which best fits with an overall recreation strategy for the two Municipal units and the residents of the region.

Appendices

1. HB Studios report dated Jan, 2019 prepared by D. Macleod Consulting;
2. HB Studios analysis dated January, 2019 prepared by Quigley Recreation Services
3. Appendix A & Supplement - 5 Year Projected Operating Budget - 2018-19 to 2022-23
4. Appendix B & Supplement - Analysis of Operational Results - Current & Past
5. Appendix C - Projected Cash Flow - October, 2018 to September, 2019
6. Small Business Energy Solutions - Opportunities Report
7. Energy Feasibility Study Report

HB Studios Sports Center

January, 2019

Executive Summary

HB Studios Sports Center (HBSSC) is an indoor recreation complex located in the Town of Bridgewater, Lunenburg County, Nova Scotia.

HBSSC is owned and operated by the South Shore Field House Society, a registered not for profit society.

Constructed in 2008, with a footprint of 49,000 sqft, the HBSSC consists of a 200 ft by 100 ft artificial grass surface, Field Turf, along with a 60 m sprint track on the ground floor. It also has a 4-lane 209 m oval running track on the second floor.

At present time, HSSC has 2 full-time tenants, Plan "A" Dance Center and Bridgewater Judo Club.

The facility is staffed by a full-time manager and 2 part-time attendants. A board of directors oversees the fiscal and overall management of the facility.

Sources of incomes to cover the operating costs include and not limited to; renting out of sports field for soccer, football, rugby, baseball, and other sports. Other user groups utilizing the field include a model plane flying club, camps, school events, birthday parties, and moms and tots playtime. Both tracks are also rented out for various events including a walking program and track and field events.

Income is also brought in by space rental (tenants) and sponsorship.

The following report will identify challenges that the facility is presently facing, along with recommendations.

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1. Introduction

This report has been produced for the South Shore Field House Society, as a result of request by the South Shore Field House Society to provide an independent review of HB Studios Sports Center.

The scope of work was to provide a concise report expressing opinions/ideas on the financial operation of the facility including:

1. Looking at revenue and expenses and ways to improve upon each
2. Operation of the building
3. Identifying any governance, management or operational concerns that need to be addressed
4. Provide comments on the physical condition of the facility

This report will deal with 5 components, each with its own descriptions, observations, challenges and recommendations; physical condition, financial, human resources, programming and sponsorship.

In preparation of this report I have met and gathered information as follows:

- a. Thursday, Jan 9, 2019, 12 noon - meet with Josh Goode (Facility Manager) and Ken Smith (board member). Tour of building, orientation and information session.
- b. Thursday, Jan 9, 2019, 3 pm –meet with recreation stakeholders for discussion on past, present and possible recreation programs.
 1. Trudy Payne - Director of Recreation, Municipality of the District of Lunenburg
 2. Tissy Bolivar - Recreation Program Director, Municipality of the District of Lunenburg
 3. Sandy Mair-Dodman - past Director of Parks, Rec and Culture for the Town of Bridgewater

- 4. Nick Brown - Development Officer, Town of Bridgewater
- c. Thursday, Jan 9, 2019, 4 pm - meet with Doug Quinn - Chairperson of South Shore Field House Society
- d. Thursday, Jan 9, 2019, 5 pm - meet with Melvin Skinner, board member

Other information was gathered as required through Josh Goode and Ken Smith.

This final report is submitted by Dwight Macleod and has been written without bias or prejudice to any one person or group and has been written to the best ability with the information that was gathered.

2. Building Physical Condition

The building is in good shape overall. The staff do a good job in the cleaning and it shows.

Observations and suggestions:

1. The AED (automated external defibrillator) located on the second floor should be brought down and displayed somewhere near the staff working area on first floor. This would provide quick and easy access to the main floor playing surface where the risk is higher due to more strenuous workout. Also, a sign above the AED cabinet displaying the civic address would be helpful in the event of an emergency. That way someone calling in to a dispatcher would have correct information.
2. All mechanical rooms should be clear of any clutter and not used for storage space.
3. There are electrical panels on the second floor that are exposed. There should be a false wall built around them with a locked door. At the very least the panels should be locked. It is surprising this was not picked up on by fire inspectors.
4. Some fresh paint would do a lot as part of a rejuvenation of the building, more on that in sponsorship. Especially the front entrance and lobby.
5. The field lighting should be looked at in terms of replacing with High Bay LED fixtures. This will provide much better lighting on the field. The green field absorbs a lot of light, making for a somewhat dim appearance. Again, this all part the rejuvenation project.
6. The field itself (Field Turf) is now 10 years old and starting to show its age. Suggest that a representative from Field Turf come in to evaluate the field in order to give a much needed opinion on the wear and remaining life expectancy of the turf. Also, the turf needs to be groomed professionally by Field Turf.
From experience, the machine being used now is not able to do such.

7. Equipment should be kept in one area, stored in a room when not in use.

3. Human Resources

The facility is staffed with 3 employees. A full-time building manager and 2 part-time attendants.

The building manager is fairly knowledgeable in regards to all aspects of running the facility.

Observations and suggestions:

1. Staff should be outfitted with clothing (shirts or sweatshirts) that reflects the brand logo of the facility, in this case HB Studios. This would make staff more identifiable and add a more professional appearance to the facility. More on this in the sponsorship section.
2. Building manager should be equipped with a cell phone, as he/she should be spending time away from the facility, see section on promotions.
3. A detailed operational guide should be available showing all procedures that the building uses in bookings, collection of rentals, opening and closing of facility, dressing room procedures, etc. Staff should have knowledge and procedures on-hand.
4. All staff should be trained in WHMIS, how to react and deal with a fire alarm, how to shut down sprinkler system in event of a sprinkler head being damaged, how to react and deal with power outage, and basic first aid training.
5. Staff should not be working in a secondary capacity on the field whether it be refereeing or coaching, while they are working. It is very important that they are visible at the front desk as much as reasonably possible.

4. Financial

This is the biggest challenge society is faced in running the facility.

Present cash flow for the 2018-2019 fiscal year shows a shortfall of \$53,500 of which they are using a credit line to continue to operate. This cannot continue.

At the very least, a breakeven financial plan needs to be put into place. Ideally, a plan would also allow for a small sum of money to be put away each year under future capital costs. The minimum for this could be set at \$ 10,000

I have divided the revenue and expense into 2 separate categories with observations and suggestions for both.

A. Expenses

In reviewing the expenses over the last few years, it is evident that the board has done a great job in reducing expenses in almost every category. What is left are expenses that are in-line with the daily operations of the facility.

Suggestions:

1. The biggest expense is the mortgage payment/interest on long term debt. Only as a last resort, should the society look at extending the terms of the mortgage.
2. I would get an assessment of what it would cost to replace the building and see if it fits the amount of insurance being paid. In all likelihood, the building is carrying too much insurance on replacement value.
3. Where possible all related costs in regards to maintenance, cleaning supplies, insurance, etc. should be put out to tender each year.
4. Perhaps a quick look to make sure staff hours are not overlapping.

B. Revenue

Revenue has dropped significantly over the past year.

1. The loss of annual commitments from various levels of government and corporate, due to 10-year agreements coming to an end.
2. The loss of a major tenant, roughly \$20,000
3. Lower field rentals due to decline in registration numbers.

Suggestions:

1. Develop a programming committee that looks after the facility looking after soccer registrations. Expanded in the programming section.
2. Meet with the Municipality of the District of Lunenburg and Town of Bridgewater to negotiate a grant for hours. Expanded in the programming section.
3. Develop an aggressive sponsorship campaign as detailed in the sponsorship section.
4. Actively engage other sports through meetings and social media about the availability and benefits of using your facility. Expanded in the programming section.

5. Programming and Promotion

Programming/Promotion is the major key to bringing up the revenue for the building and I would make recommendations as follows:

1. The Society should meet with both municipal units to look at negotiating annual grants of \$30,000 from each. In return, the building would give back:
 - a. 10 hours per week from Monday to Friday before 5 pm to be used and split by both municipal units for programming they could set up. This could be for after school programs, moms & tots, seniors, etc.
 - b. 2 hours per weekend to be used and split by both municipal units for programming they set up.
 - c. Working with both municipal units to create a free Senior's Center within the facility.
2. At the present time, soccer clubs look after registration for indoors, and some of these volunteer run clubs are only active 4 months of the year. The facility should consider looking after the registration and promotion of such registrations themselves. This could be done for all ages. In the younger age groups, work with the South Shore Soccer Association's Technical Director to set up weekend programs for them to learn/train.
3. Meet with other sport groups, community groups, etc to develop partnerships with the goal of rentals.
4. Develop a colorful brochure listing all activities that take place and have them put wherever people gather ie: waiting rooms, municipal offices, etc.
5. Use social media to connect with as many people and groups as possible.

6. Sponsorship

Sponsorship and advertising is should be one of the key ways to bring revenue into the facility.

At present time there are dressing rooms that are sponsored, some paid, some not, signage on field, some paid, some not.

Contrary to popular belief any sign that is not paid for should come down. This makes for good business practice. In rural Nova Scotia word travels fast and having signage up that is not paid for makes it hard to sell to new clients. The adage of leaving signage up to make it look like there is advertising is a myth.

With all that being said, the opportunities to entice corporate sponsorship are endless.

An aggressive sponsorship campaign should be developed and include a plan of action to ensure there is follow-up. This includes phone calls and visits to prospective sponsors.

Some ideas to be included in a campaign:

1. A large monitor should be on display in the front lobby, showing who is in dressing rooms. The present chalkboard is good, but the monitor gives the chance to sell advertising. There are many free programs out there that allow you to list dressing rooms on one side, with ticker tape sports news, weather, etc and of course spots for ads.
2. Signage on the field, which is already in place. Ensure that all signage is the same size and production quality for optics.
3. Dressing rooms, again already underway, allow for a sponsor to paint the room in their colors, put material in rooms and have their name displayed on the monitor.
4. Work with either Coke or Pepsi to have a machine put in. The building would look after filling it themselves, thus keep any money that is earned

above cost. As part of this agreement, the soft drink company would provide sponsorship, complete with large sign on the field, in around the \$ 500 per year range, provided all beverages are bought through them.

Naming sponsor/Branding

At present time HB Studio is the official naming sponsor.

Upon further review, it was determined that in December of 2007 a letter was signed by HB Studios and the South Shore Field House Society to agree that HB Studio be the naming sponsor and they agreed to provide installments for such over a ten year period. There is nothing else mentioned about the exact term of the agreement.

This leaves a very unclear term as to how long before renewal on the naming rights comes up. Both sides could argue either way.

In light of this, I would suggest a meeting with owners of HB studios and representative(s) from the Society to discuss continued naming rights. Part of which can be the Society's goal to rejuvenate the building to create an excitement within the community and the hope that HB studios will be a part of that.

A very strong case could be made to re-enter into a new contract asking for \$10,000 per year in exchange for:

1. Exclusive naming rights to the building.
2. Their brand name on all staff clothing.
3. Their brand name to continue on signage attached to exterior of building.
4. The monitor in main lobby displaying their brand.
5. Other possibilities exist that can be drawn up between both parties.

Regardless, a contract should be signed showing the length of the term for sponsorship.

HB Studios Sports Center is a great asset to the Town of Bridgewater and the Municipality of Lunenburg. It provides another recreational facility to help attract business and residents to the area.

Past and Present board members of the South Shore Field House Society have done a tremendous job in the management of the facility. Their passion to work with various stakeholders has been well documented over the past while. However help is now needed from these stakeholders to work with the board in continuing to provide programming to the benefit of all ages.

I have outlined a few possible solutions to increase revenue and I am sure others may come up with more.

I encourage all sides to work together towards some of these goals.

Thank you for letting me present some ideas and if needed I am available to expand even further on them.

Best wishes and kindest regards

Dwight MacLeod

902-680-2752

HB Studio Analysis



Quigley Recreation Services
January 2019

Introduction

The HB Studio facility has been operating primarily as a soccer facility for nine years. The facility also has a track, meeting rooms, facility rental space, and a concession area.

This analysis has been requested by the non-profit volunteer Board of Directors to review the operation due to a reduction in operating revenues. The reduction in revenues are due to an accumulation of factors that are primarily a result in the reduction of the historic revenue model of the facility.

The historic revenue model is based on dependency of outside third parties, mainly soccer, and room rental space. This, while has been, a low overhead net revenue scenario, has left the facility open to a lack of control over ongoing revenue.

The result has been controlled costs but lower revenues mainly due to lower soccer registration for the turf field, loss of the physiotherapy clinic, and resulting under-utilization of spin-off rentals and concessions.



Facility Costs

In this consultant's opinion the HB Studio facility is operating at a level of minimal costs based on staffing and the operating equipment that currently exists in the facility.

As part of this collaborative study is a mechanical report that can explain the opportunities for energy savings.

From a staffing expense it this consultant's opinion the facility is operating at a minimal level and is still clean, well maintained and in excellent condition. There are three staff, including the manager, and they all clean the facility. In addition, they are non-unionized and receive no benefits. The manager receives a below scale salary and the two cleaners receive minimum wage.

Next Steps

Obviously, the next step in this facility's evolution is to create a path forward for the citizens of Lunenburg County and Town of Bridgewater. In this consultant's opinion the HB Studios facility is an under utilized gem in the community.

This facility offers a dimension to the community that meets a broad spectrum of needs. The turf for soccer and football, the track for seniors walking and winter runners plus youth track and field.

In this consultant's opinion, due to the closure of the Bridgewater Seniors Centre as part of the former arena closure, HB Studios could provide community space to meet the requirements of the ageing demographics of the Town of Bridgewater and Lunenburg County.

The facility is suited to accessible access with considerable square footage for senior gatherings and events. Plus the track as previously discussed. This can be a considerable attribute to the community if it is used to it's true potential.

There is an opportunity, as outlined by municipal staff, for significant improvement in marketing and advertising of the facility. This has been restricted due to budget restraints. It is advised that a coordinated effort with the GM of HB Studios and the two Municipalities be maintained on an ongoing bases to facilitate broad based exposure for the facility. These would include website updates, social media pages and posts, and database management. This would also include marketing materials, mail out flyers, trifold drop-offs, exposure on both municipality's websites and any other advertising inclusion.

In discussions with the Board Chair of HB Studios, Doug Quinn, the floor of the HB soccer field emits a surface temperature of 55 degrees Fahrenheit. This creates a potential usage of the ice cover over the turf for events on the HB field turf which may significantly increase the potential of the facility and diversify revenue. This consultant has discussed the potential with Sandy Henderson, the sales representative of Covermaster Terraplast flooring. This is the same floor used by LCLC to cover their ice for events. With some simple testing, it would confirm if this is possible. The testing would involve six sheets of the ice cover to be installed on the HB Studio turf for 24 hours to determine if the cover convection would recede enough to flatten out on the surface.

If successful this would open, through cooperation with both municipalities, a whole new revenue centre and utilization for both the Town of Bridgewater and the County of Lunenburg.

Advantages

There is an excellence asset in this facility that has a dedicated Board and a well operated facility. Mechanically sound and in need of a future lifecycle plan for the anticipation of future facility requirements.



Future Considerations

In this consultant's opinion the Town of Bridgewater and the County of Lunenburg should take over the pending renewal of the facilities debt and share it through a municipal finance loan which will lower the interest rate. In addition, there should be allocation for any requirement needed in energy savings. This may require \$80,000 operational expenses and an additional capital expense based on the energy study. In addition, if this were acceptable than a time-sharing arrangement could be agreed upon to allow the two municipality's recreation departments to access the facility in return for a contra arrangement.

Secondly, the non-profit Board of Directors should remain to manage the facility in conjunction with appointed representatives of both the County of Lunenburg and the Town of Bridgewater to provide oversight on the operational aspects of the facility.

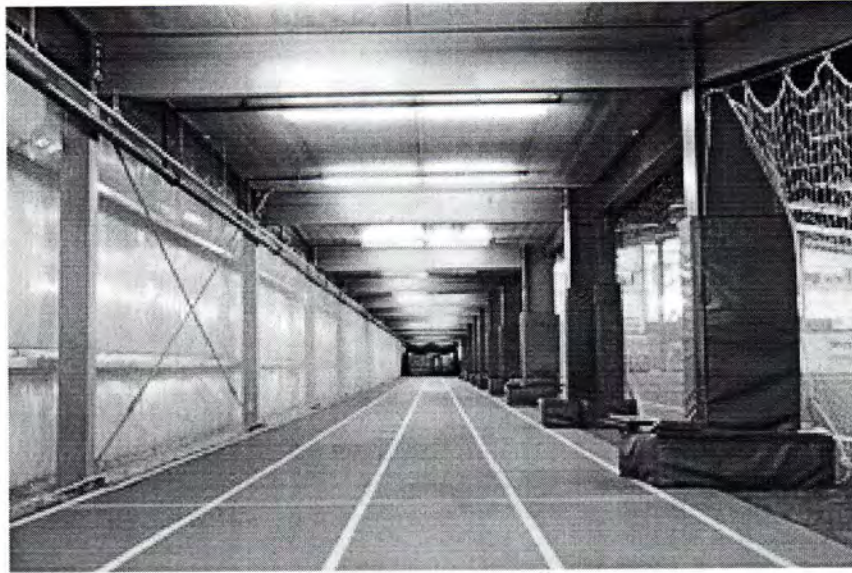
Failing the Councils approval of these recommendations the only reasonable alternative is to reduce the facilities operating hours.

To facilitate significant reductions in operating costs would only result in the layoff of staff which would be of minimal savings.

The closure of the mechanical systems will result in a significant deterioration of the facility.

Conclusion

It is the conclusion of this consultant that the HB Studio facility be operated by the non-profit Board of Directors and a cooperative funding arrangement be developed between the Town of Bridgewater and the County of Lunenburg to maintain this significant asset for the citizens of the community.



APPENDIX A

South Shore Fieldhouse Society 5 Year Projected Operating Budgets 2018-19 to 2022-23

<u>Facility Revenue</u>	'18/19	'19/20	'20/21	'21/22	'22/23
Field Rentals①	\$87300	\$96000	\$100000	\$105000	\$110000
Rental Income-tenants①	13000	15000	15500	16000	16500
Track Fees②	27500	30000	30000	32000	32000
Advertising Revenue③	<u>10000</u>	<u>10000</u>	<u>11000</u>	<u>12000</u>	<u>13000</u>
	<u>\$137800</u>	<u>\$151000</u>	<u>\$156500</u>	<u>\$165000</u>	<u>\$171000</u>
<u>Grants, Contributions & Donations</u>					
Operating grants④	90000	82000	82000	76000	81000
Corporate & individual donation⑤	10000	10000	10000	10000	10000
Contributed services	<u>5200</u>	<u>5200</u>	<u>5200</u>	<u>5200</u>	<u>5200</u>
	<u>\$105200</u>	<u>\$97200</u>	<u>\$97200</u>	<u>\$89200</u>	<u>\$96200</u>
Total	\$243000	\$248200	\$253700	\$256200	\$267200
<u>Expenditures</u>	'18/19	'19/20	'20/21	'21/22	'22/23
Accounting fees	\$3000	\$3000	\$3000	\$3500	\$3500
Advertising & promotion⑥	2000	2500	2500	2500	2500
Business taxes, licenses	200	400	500	500	500
Equipment	1500	1500	1500	1650	1650
Insurance⑥	10000	10000	10000	10000	10000
Interest & bank charges⑦	13000	4000	4000	4000	4000
Interest long term debt⑦	15000	18500	16000	13500	11000
Office	1500	2000	2000	2500	2500
Professional fees	5200	5200	5200	5200	5200
Repair & maintenance	12000	14000	15000	16000	18000
Salaries and wages	80000	82000	84000	86000	88000

Phone & internet	1700	2300	2300	2300	2300
Utilities ^⑧	42000	43000	44000	45000	46000
Total	\$187100	\$188400	\$190000	\$192550	\$199350

Operational Surplus (deficit)	<u>\$55900</u>	<u>\$59800</u>	<u>\$63700</u>	<u>\$63550</u>	<u>\$67850</u>
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Required Principle to Pay Down Debt	<u>\$55830</u>	<u>\$59430</u>	<u>\$63253</u>	<u>\$63253</u>	<u>\$67322</u>
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See Appendix A supplement for comments

Appendix A - Supplement

Notes to Appendix A - 5 Year Projected Operating Budget

- 1) % increase each year in the 5-10% range for Rental Income to recognize increased field usage with improved marketing and promotion plus more "buy-in" from user groups (eg. more camps/tournaments & adding another tenant).
- 2) 16% increase over 4 years to recognize more "walkers" as a result of a "seniors centre" and improved marketing and communication.
- 3) Increase in advertising as a result of allocating more of the manager's focus in this area plus improved promotion and marketing
- 4) Operating grants - maintain government grants for activity and decrease Municipal grant level as other revenues increase
- 5) Corporate & individual donations - decrease reliance on donations from a Board member and replace with a major sponsor for the "seniors centre"
- 6) Minor adjustment to advertising/promotion and insurance to reflect consultants' recommendations
- 7) Decrease in interest on long-term debt and interest on line of credit as a result of re-negotiation of long-term debt and consolidating the line of credit into the negotiated package
- 8) Utilities - based upon study and capital expenditure recommended

Appendix B

South Shore Fieldhouse Society Analysis of Operational Results

<u>Facility Revenue</u>	<u>Average of</u> 2011-2016	2015-16	2016-17	Prior to JE's 2017-18	Projected 2018-19
Rental Income	\$146154	\$138736	\$139990	\$110365	\$100000
Merchandise Sales	42227	15324	579	239	300
SSDSA fees	14778	1200	5948	0	0
Track fees	27338	22296	29766	24072	27500
Advertising	6118	0	750	271	10000
Misc.	7498	373	434	0	0
	<u>\$244104</u>	<u>\$177929</u>	<u>\$177467</u>	<u>\$134947</u>	<u>\$137800</u>

Grants, Contributions & Donations

Operating grant	Not reviewed	\$1	\$6001	\$67600	\$90000
Corporate/individual donations	Not reviewed	10000	27520	13000	10000
Contributed services	Not reviewed	5200	5200	5200	5200
		<u>\$15201</u>	<u>\$38721</u>	<u>\$85800</u>	<u>\$105200</u>
Total		<u>\$193130</u>	<u>\$216188</u>	<u>\$220747</u>	<u>\$243000</u>

Expenditures

Accounting fees	\$3372	\$1180	\$3480	\$3752	\$3000
Advertising/promotion	1232	670	1132	1002	2000
Business taxes/licenses	637	110	69	179	200
Equipment	5738	1566	1692	2025	1500
Insurance	10289	11082	10785	11440	10000
Interest & bank charges	3411	3294	2718	12774	13000
Interest on long term debt	40125	30540	27561	18573	15000
Land rental	1	1	1	1	1
Office	3260	2652	1398	948	1500
Professional fees	5065	5200	5200	7300	5200
Purchases	31477	15229	2141		
Repairs & maintenance	32866	35182	11203	8507	12000
Salaries & wages	116870	58752	79669	80603	80000
Phone/internet	4083	2226	1419	1603	1700
Utilities	47743	41936	57800	41253	42000

Vehicle	2221	0	0	0	0
Total	\$308410	\$209620	\$206268	\$189960	\$187101
Operational surplus (deficit)		\$(16490)	\$9920	\$30787	\$55899

Note: See Appendix B Supplement for comments

Appendix B - Supplement

Notes to Appendix B - Analysis of Operational Results

- 1) The financial figures under the column "Average of 2011-2016" are based upon the average of the line items as per the annual financial statements from 2011-2016.
- 2) The financial statements are not audited but are "Accountants Review" by Belliveau Veinotte Inc.
- 3) The 2 columns labelled 2016-17 and 2015-16 indicate the line items from the financial statements for those fiscal years.
- 4) The column labelled "prior to J.E's 2017-18" indicates the line items for the fiscal year 2017-18 as per the trial balance prior to year-end journal entries leading to the financial statements.
- 5) The column labelled "projected 2018-19" indicates the line items as per projecting the current year 2018-19.
- 6) Purchases and vehicle expense account are no longer relevant. Also, land rentals amount of \$1 is not material for purposes of the report.
- 7) Outlined is a "snapshot" of 3 years illustrating the challenge with the cash flow:

<u>Operational Surplus (deficit)</u>		<u>Required payment on Principle</u>	<u>Negative impact on cash flow</u>
2015-16	(16490)	\$46314	\$62804
2016-17	9920	\$49294	\$39374
2017-18	30789	\$52464	\$21075

Appendix C

Projected Cash Flow

October, 2018 to September 2019

Cash Receipts

<u>October</u>	<u>November</u>	<u>December</u>	<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>
\$40800	\$5250	\$18650	\$15650	\$16550	\$23550	\$14950	\$6750	\$5550	\$2150	\$2150	\$3550

Expenditures

<u>October</u>	<u>November</u>	<u>December</u>	<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>
\$18450	\$14550	\$18650	\$19550	\$26750	\$14750	\$29450	\$12950	\$16250	\$11800	\$13950	\$11950

Net of Receipts vs Expenditures

<u>October</u>	<u>November</u>	<u>December</u>	<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>
\$22350	\$-(9300)	\$0	\$-(3900)	\$-(10200)	\$8800	\$-(14500)	\$-(6200)	\$-(10700)	\$-(9650)	\$-(11800)	\$-(8400)

Overdraft balance

<u>October</u>	<u>November</u>	<u>December</u>	<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>
\$47650	\$56950	\$56950	\$60850	\$71050	\$62250	\$75750	\$82950	\$93650	\$103300	\$115100	\$123500

Small Business Energy Solutions Opportunities Report

Report compiled for: HB Studios Sport Centre
Facility Address: 543 Glen Allan Drive
Audit date: March 12, 2016
PID: 204600



Auditor name: RJ Roy
Company: RJ Roy Energy Management Services
Phone: (902) 521-2453
Email: rjroyenergy@gmail.com
Report date: April 26, 2017

Auditor notes:

RJ Roy Energy Management Services performed an energy audit to identify potential energy efficient upgrades and their corresponding Efficiency Nova Scotia incentives. HB Studios Sport Center is a complex with indoor soccer field, walking / running track and rented business space. The facility is open all year long with soccer running between October to May. The 3 biggest energy consumers are heating, lighting and ventilation and the audit's focus centered around these 3 areas.

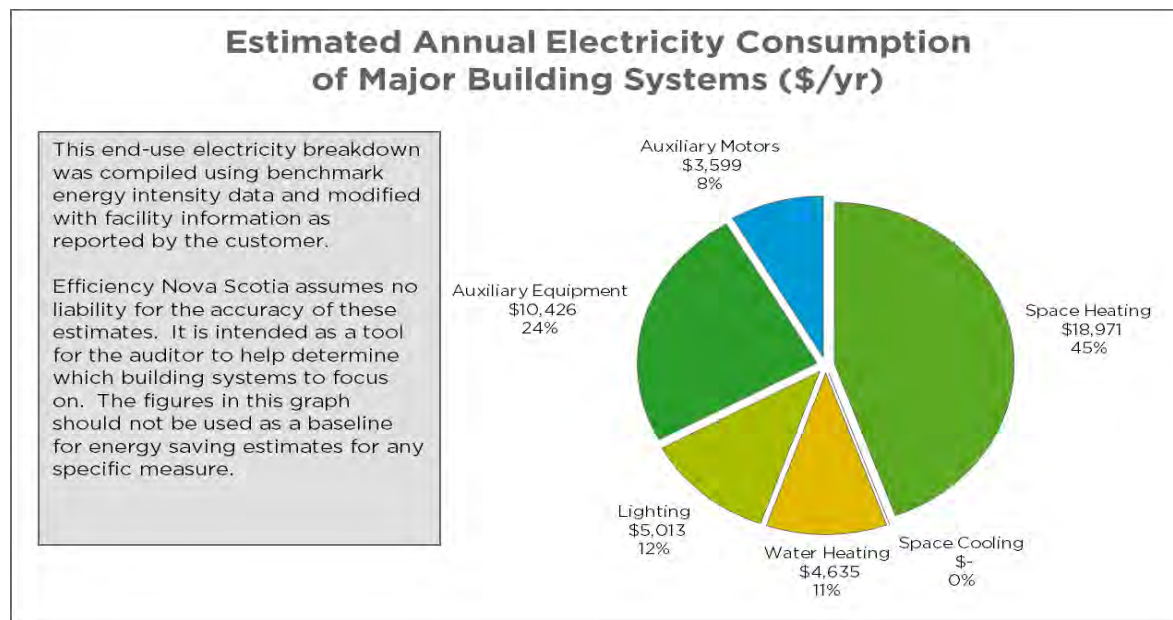
A geothermal heat pump supplies heating the to lobby / office area. A forced air resistive heating system supplies heat to the field area with a maintained space temperature setpoint of 15°C.

The rented spaces were not audited. The energy used in these spaces is metered and charged back to the tenants. Heating in these areas is done with air / air heat pumps.

Efficiency Nova Scotia Notes

Prepared by:

Energy savings for the destratification system comes from the current electric resistive heating system. Should you choose to install the heat pumps, these calculations would change.



Annual Electrical Energy Consumption:
Facility Conditioned Area:

285,300 kWh
49,000 SqFt

Opp #	Opportunity Description	Estimated Annual Energy Savings (kWh)	Estimated Annual Electrical Savings (\$)	Estimated Project Cost (\$)	Estimated Rebate* (\$)	Simple Payback (years)	Report Page Number
1	Install Destratification fans to reclaim ceiling heat	40,173	\$ 6,005	\$ 18,075	\$ 10,043	1.3	4
2	High-Bay Luminaire >20'	13,987	\$ 2,091	\$ 10,800	\$ 3,497	3.5	4
3	Linear Replacement Lamp	13,102	\$ 1,958	\$ 11,233	\$ 3,276	4.1	4
4	Interior Occupancy Sensor	1,756	\$ 263	\$ 2,040	\$ 439	6.1	5
5	Split & Unitary	205,645	\$ 30,738	\$ 80,000	\$ 46,800	1.1	5
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
Totals*		171,180	\$41,055	\$122,148	\$64,055		

*Opportunity rebates are subject to installed measure approval.

Next Steps for HB Studios Sport Centre - 543 Glen Allan Drive

The list above details all the potential opportunities for energy savings as determined by your auditor.

In the following pages you will find detailed descriptions of each item to help you decide which energy efficient products and opportunities for your facility. Before you purchase and install your chosen upgrades, follow these steps to confirm pre-approval for the products you have chosen:

Step 1:

Select the energy efficient upgrades you would like to complete and find a contractor to install your upgrades. You may already have a contractor in mind, or you can visit our Efficiency Partner Network to find a contractor efficiencyns.ca/sbes.

Step 2:

Before you purchase and install the upgrades, complete your application and the relevant product worksheets. Request quotes from the distributor or retailer for the products you intend to purchase, and include copies of the quotes with your application. Please follow the Quote and Invoice Guidelines to help gather all the information we require. Once complete, email your application and quote(s) to info@efficiencyns.ca or fax to 902 470 3599.

Step 3:

We'll send you a Summary and Approval to let you know when your application has been approved so you can proceed with purchasing and installing your new products.

Step 4:

Within 60 days of your Summary and Approval date, submit your invoice(s) for products and labour to info@efficiencyns.ca or fax to 902 470 3599. Be sure to include your business name and contact details in your submission.

1 - Install Destratification fans to reclaim ceiling heat

Existing Technology:	Field is heated with resistive electric.
Total Quantity:	1
Energy Efficiency Product Description:	Install Destratification fans to reclaim ceiling heat
Product Details	Destratification fans.

Estimated Project Cost: \$18,075
Estimated Rebate: \$10,043
Estimated Cost to you: **\$8,032**

Additional Notes:

2 - High-Bay Luminaire >20'

Existing Technology:	36 Enclosed 400W Metal halide fixtures
Total Quantity:	36
Energy Efficiency Product Description:	High-Bay Luminaire >20'
Product Details	20,000 - 29,999 lm LED Design Light Consortium (DLC) certified products only Includes High-Bay luminaires and retrofit kits Note: Projects replacing existing energy efficient lighting, such as T5 or T8 fluorescent are not eligible
Estimated Project Cost:	\$10,800
Estimated Rebate:	<u>\$3,497</u>
Estimated Cost to you:	\$7,303

Additional Notes:

3 - Linear Replacement Lamp

Existing Technology:	400 T8 quad tube tandem fixtures 198 T8 double tube fixtures
Total Quantity:	598
Energy Efficiency Product Description:	Linear Replacement Lamp
Product Details:	4 foot LED linear replacement lamp LED Design Light Consortium (DLC) certified linear replacement lamps only. Designed to replace T8/T12/T5 fluorescent lamps
Estimated Project Cost:	\$11,233
Estimated Rebate:	<u>\$3,276</u>
Estimated Cost to you:	\$7,957

Additional Notes:

4 - Interior Occupancy Sensor

Existing Technology:	No existing controls
Total Quantity:	40
Energy Efficiency Product Description:	Interior Occupancy Sensor
Product Details:	Wall-switch or fixture mounted Ballasts required to be upgraded to program-start or with LED lamps
Estimated Project Cost:	\$2,040
Estimated Rebate:	<u>\$439</u>
Estimated Cost to you:	\$1,601
Additional Notes:	

5 - Split & Unitary

Existing Technology:	Electric resistance,
Total Quantity:	2
Energy Efficiency Product Description:	Split & Unitary
Product Details:	High Efficiency Air Source Heat Pump 135 to 240 kBTU/h Min COP (8.3C): 3.2 Min COP (-8.3C): 2.05 Min EER: 10.4
Estimated Project Cost:	\$80,000
Estimated Rebate:	<u>\$46,800</u>
Estimated Cost to you:	\$33,200
Additional Notes:	

Next Steps

Before you purchase and install your chosen upgrades, follow these steps to confirm pre-approval for the products you have chosen:

Step 1:

Select the energy efficient upgrades you would like to complete and find a contractor to install your upgrades. You may already have a contractor in mind, or you can visit our Efficiency Partner Network to find a contractor efficiencyns.ca/sbes.

Step 2:

Before you purchase and install the upgrades, complete your application and the relevant product worksheets. Request quotes from the distributor or retailer for the products you intend to purchase, and include copies of the quotes with your application. Please follow the Quote and Invoice Guidelines to help gather all the information we require. Once complete, email your application and quote(s) to besconsent@efficiencyns.ca or fax to **902 470 3599**.

Step 3:

We'll send you a Preapproval to let you know when your application has been approved so you can proceed with purchasing and installing your new products.

Step 4:

Within 60 days of your Summary and Approval date, submit your invoice(s) for products and labour to Info@efficiencyns.ca or fax to **902 470 3599**. Be sure to include your business name and contact details in your

Questions about this report?

Contact your Certified Energy Auditor below:

Auditor name:	RJ Roy
Company:	RJ Roy Energy Management Services
Phone:	(902) 521-2453
Email:	rjroyenergy@gmail.com

Disclaimer

Small Business Energy Solutions Audit Report delivered to HB Studios Sport Centre (the customer) by Efficiency Nova Scotia (the Administrator).

The information provided in this report are estimates determined by the Small Business Energy Auditor. The information is to be used for general consideration regarding feasibility of the included measures. Quotes should be obtained from a qualified contractor or product supplier. Energy savings and equipment performance are dependent on the specific products installed, equipment operation, occupant behavior, and installation. Rebates are subject to change at the sole discretion of the Administrator.

The Administrator's and/or its agents' and/or its service providers' review of the design, construction, operation or maintenance of the project or energy efficiency measures shall not constitute any representation as to the economic or technical feasibility, operational capability, or reliability of the project or measures, nor shall the Customer, in any way, make such a representation to a third party. The Customer is solely responsible for the economic and technical feasibility, construction, operational capability and reliability of the customer's project and measures. The Administrator makes no warranty, whether statutory, expressed or implied, including, without limitation, the implied warranties of merchantability and fitness for any particular purpose, use or application.



Energy Feasibility Study Report

for



December 5th, 2018

December 5th, 2018

HB Studios Sports Centre

543 Glen Allan Drive

Bridgewater, Nova Scotia

B4V 0A3

Attention: **Melvin Skinner**, South Shore Fieldhouse Society

Re: **Energy Feasibility Study Report**

Melvin,

PMC is pleased to provide you with the following Energy Feasibility Study Report and associated proposal outlining budget cost, potential energy savings and benefits of an Energy Retrofit project at HB Studios Sports Centre.

The purpose of this feasibility study is two-fold; (1) to identify and analyze feasible energy efficiency and conservation opportunities related to the HVAC systems, and (2) to address the concerns over insufficient ventilation air provided to artificial grass field and track areas on both the ground floor and top floor.

The implementation of the Energy Conservation and Efficiency Measures (ECM's) outlined in this report is strongly recommended. The comprehensive energy measures present the best opportunity to reduce the facility's operating costs and environmental footprint.

If you have any questions or require clarifications regarding specific items addressed in this proposal, please feel free to contact me at your convenience.

Kind Regards,

A handwritten signature in blue ink that reads "Scott Hue".

Scott Hue, B.Eng.

Business Development and Engineering

scott@pmcenergy.ca

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1. BACKGROUND INFORMATION

1.1 General Description of Building

Completed in late 2008, the HB Studios Sports Centre is a community-based recreation facility located in the Town of Bridgewater on the South Shore of Nova Scotia. The indoor multi-sport fieldhouse and walking track encompasses a total area of 49,000-square-foot. The facility includes a sports field, sprint track and oval running track, matted fitness area, multi-purpose function room, and a lounge.

1.2 Occupancy Summary

Apart from a few small sub-tenant areas within the facility, the main sports field is used primarily between October and March of each year. During those months, operating hours are as follows:

- **Monday to Friday:** 4:30pm to 9pm
- **Saturday:** 8am to 5pm
- **Sunday:** 9am to 9pm

It should be noted, however, that the facility is actively looking for opportunities to extend the use of the facility year-round and future operating hours are expected to increase.

1.3 Mechanical Equipment

The lower level at the front area of the facility includes the main lobby, male and female washrooms, and the multi-purpose function room. Heating, cooling and ventilation is provided to this area via a 10-ton water-source, ground loop heat pump unit as well as an Energy Recovery Ventilator (ERV) providing exhaust air to the locker rooms and fresh air to the return section of the heat pump. Aside from some minor repairs and a recommended recommissioning effort; PMC did not identify any major deficiencies or recommended efficiency measures for this area.

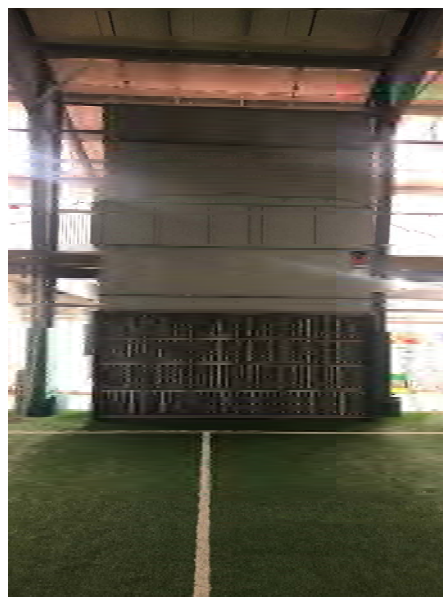


Figure 1 - Vertical Air Handler

The sports field, sprint track and oval running track is currently served from a large vertical air handler with three 5hp fan motors and a 200kW electric heating coil (see Figure 1 above). Although the unit was ordered with fresh air dampers, they remain closed as there is no fresh air connection to the unit. The air handler is located midway down the right-hand side of the track. Return air is drawn into the air handler, heated and then discharged from the top of the unit. The only option to add a fresh air connection to the vertical air handler in its current location would be to block off the corridor on the right side of the track.

1.4 Lighting Systems

The lighting systems were not examined as part of the current audit and investigation. HB Studios Sports Centre management indicated that a lighting retrofit had been explored during a previous investigation by Efficiency NS in 2016, and that some retrofit work was already underway.

1.5 Building Automation System (BAS)

The heat pump unit and ERV serving the lower level, at the front area of the facility, are connected and controlled via an Alerton building automation system. The Alerton system also provides connection and control of the main electrical room exhaust fan and elevator room exhaust fan. The vertical air handler, electric hot water heater and a few mini-splits in the sub-tenant areas are not connected to the control system.

2. ENERGY AND COST SUMMARY

2.1 Historical Utility Consumption

There is one main electrical meter for the facility. A summary table was assembled from the most recent year of utility data (2017 and 2018) and can be found in Appendix A. An annual summary of this period as well as some previous periods is presented below.

1. Annual kWh Consumption as per 2016 Small Business Energy Solutions Opportunities Report = **285,300 kWh** (unclear as to what dates were included in this total)
2. September 14, 2014 to September 21, 2015 = **300,600 kWh**
3. September 19, 2017 to September 14, 2018 = **253,980 kWh**

HB Studios Sports Centre falls under Nova Scotia Power Charitable Organization Rate Class. Under this class there are no demand charges, but there is a monthly base charge (\$10.83 per month as of Dec 2018). The current electrical consumption is at a rate of \$0.15331 per kWh.

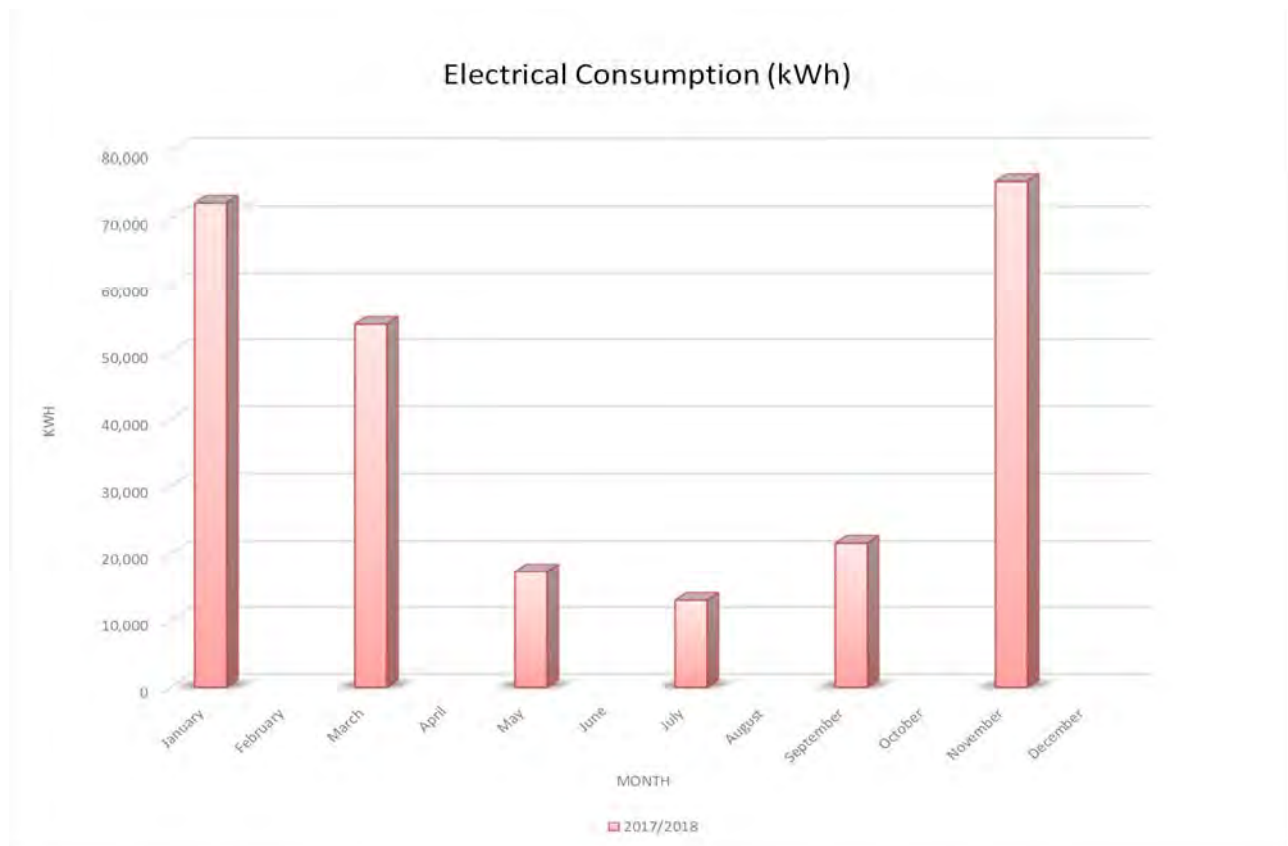


Figure 2 - Electrical Consumption Profile

2.2 Energy Performance - Energy Utilization Index (EUI)

A common way to gauge the energy performance of a building is to measure its energy intensity or Energy Utilization Index (EUI). EUI of a building is defined as the ratio of the total annual energy consumption (all fuel sources) to the total floor space. HB Studios Sports Centre has a EUI of 5.183 kWh/ft².

2.3 Regression Analysis

A linear regression analysis of the utility baseline data was completed to establish a correlation between heating degree days (HDD) and energy consumption (kWh). Various base temperatures were examined to determine the best match for the data. The correlation between kWh consumption and HDD's was most favourable at a base temperature of 50°F resulting in R² value of 0.9864. This base temperature correlates to the information provided by the client. Given they maintain the sports field at a temperature of 59°F it makes sense that heating is not required until the outdoor temperatures fall below 50°F. The total annual HDD (°F) is 3052.1.

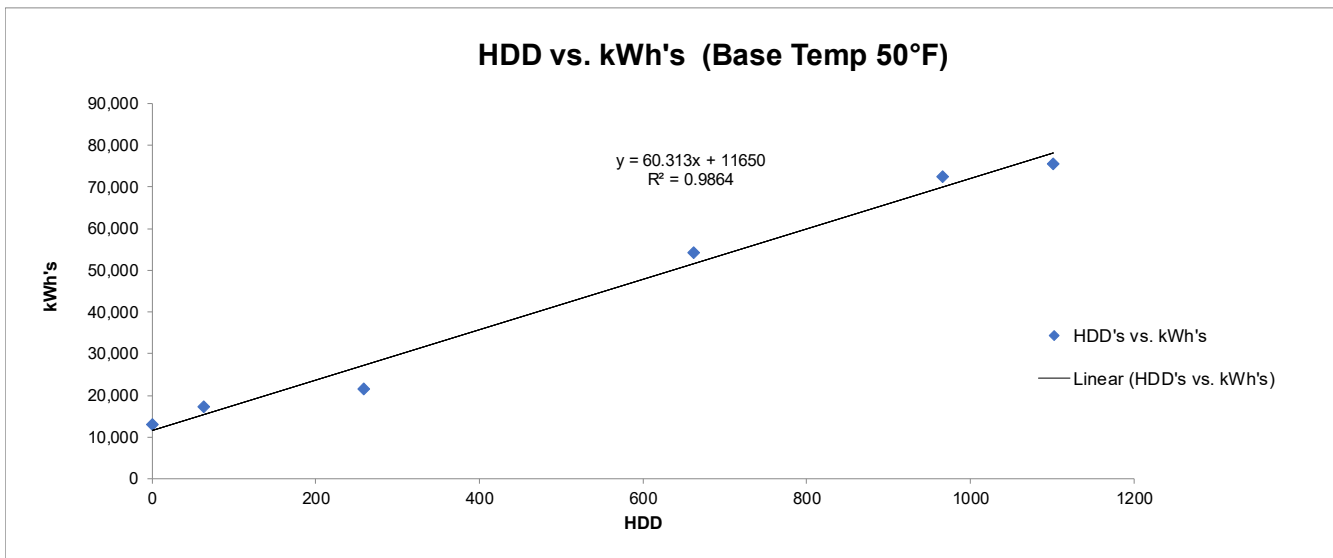


Figure 3 - HDD Regression Analysis Graph (HDD vs kWh)

2.4 Heating and Ventilation Air Load Calculations

PMC completed a heating and ventilation load calculation of the sports field and track area to verify capacity requirements of the existing and any new potential equipment being considered. A summary of the calculation outputs is shown below for reference.

Assumptions / Inputs:

- Wall and Roof R-Value: 10
- Roof Surface Area: 45,904 square feet
- Wall Surface Area: 19,624 square feet
- Floor Surface Area: 43,488 square feet
- Volume: 1,211,793 cubic feet
- Outdoor Design Temperature: 0°F
- Indoor Design Temperature: 59°F

Calculation Outputs:

- Space Heating Load: 433,980 Btu/hr
- Ventilation Air Load: 734,054 Btu/hr

3. ENERGY EFFICIENCY MEASURE 1 – SPORTS FIELD HEATING RETROFIT

PMC has completed a detailed review of the site conditions and equipment and has identified the following recommended Energy Efficiency and Conservation Measures (ECM's). It should be noted that each opportunity was evaluated independently of the others in order to eliminate the impact of one opportunity on the results of another.

3.1 Base Energy Case

The sports field is currently heated via a large vertical air handler with three 5hp fan motors and a 200kw electric heating coil. Although the existing vertical air handling unit provides sufficient heat to the sports field there are opportunities to improve both the energy performance and comfort of the occupants through a replacement of this unit with a high efficiency infrared radiant tube heating system.

3.2 Energy Efficient Case

We recommend decommissioning the current air handling unit and electric coil resistance heater and installing a new high efficiency infrared radiant tube heating system. The following scope of work was selected to improve controllability, comfort and to reduce energy costs.

- Decommission the current vertical air handling unit. Remove electrical feed and make safe the breaker in the electrical panel. [Physical removal of the air handling unit to be by others, unless otherwise requested.](#)
- Supply and install a new vacuum pump low intensity radiant system. The system will be comprised of four main branches sized at 270,000 Btu/hr per branch. As currently designed, the vent would go through the roof travelling vertically from the vacuum pump located near the center of the building. See proposed system layout in Figure 4 shown below. An optional sports guard has also been selected for the tube heaters to protect them from possible damage.
- The vacuum pump will come with a VFD which will provide modulation of the system from 60% minimum firing rate to 100% firing rate. With this approach all four branches of the system are controlled as a single zone, modulating as one system.
- Supply and install all interior propane piping at the ceiling level, including regulators and venting. Obtain all necessary permits required for the installation. Provide all lifts required to complete work at height.
- PMC met with both Wilson's and Blue Wave energy to review propane tank sizing and placement at the site. There were differences between the two submissions, both in terms of per liter costs as well as fees associated with tank placement, trenching, vaporizer, and tank protection. Based on this variability [PMC has not included any costs for this aspect of the work](#) in our scope and estimate. The submission from each supplier are attached to the end of this report for your review and decision. Once a provider and final scope is confirmed, we can provide updates for any exterior work that may be required (i.e., electrical feed in trench for vaporizer).
- A new building automation controller and six temperature sensors will be installed around the perimeter of the sports field and upper track areas. Based on measured temperatures, the building controller will provide a modulating signal to the vacuum pump to increase or reduce the

firing rate.

- Provide a web-based graphical interface for remote temperature control, scheduling and system monitoring purposes. System alerts and alarms will be set-up to send via text and/or email to the relevant parties.

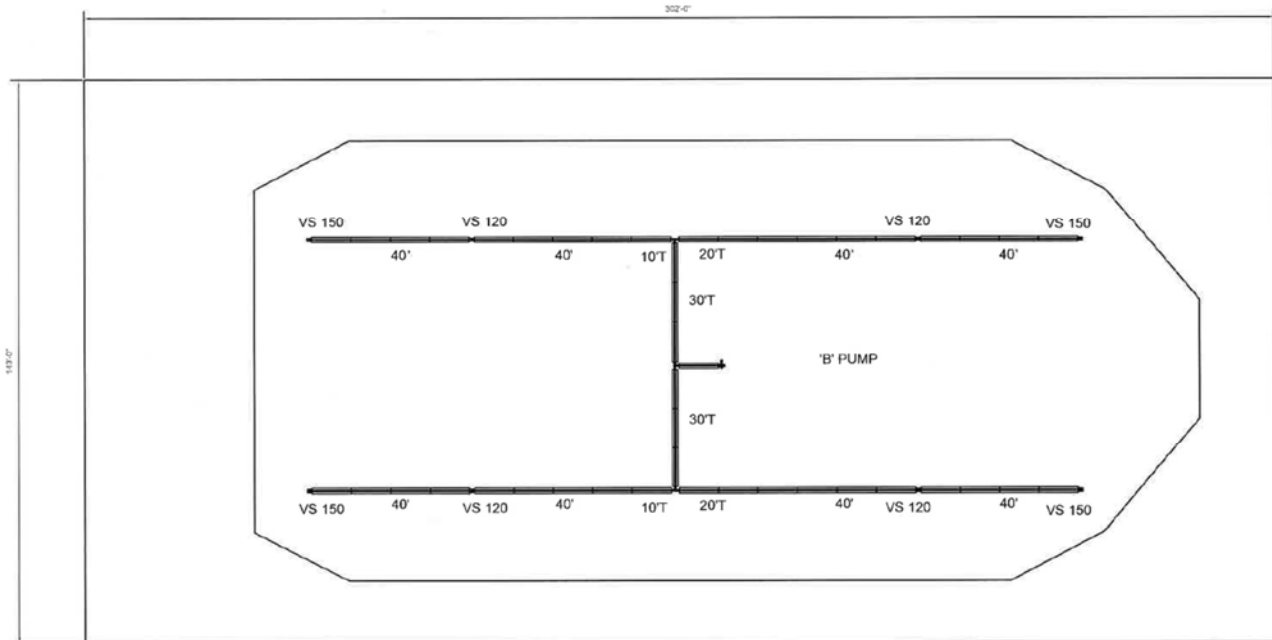


Figure 4 - Radiant Tube System Layout

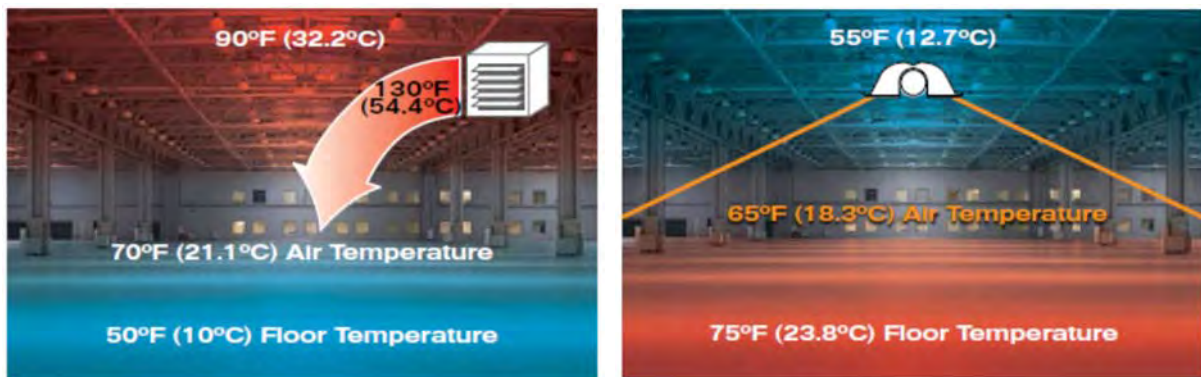


Figure 5 - Example of Forced Air vs Radiant Tube

3.3 Savings and Cost Estimates

The table below provides a summary of the energy efficiency and conservation measure, highlighting the impact in tenant comfort, maintenance requirements, energy savings and financial indicators such as payback.

Table 1 - ECM-1 Summary

ECM #1 - Sports Field Heating Retrofit (Current Electric Heating vs High Eff Infrared Radiant Tube)				
Measure Description		Decommission the current air handling unit and electric coil resistance heater and installing a new high efficiency infrared radiant tube heating system.		
Impact on Occupant Comfort		Continuous infrared heating systems will heat the floor and other objects in the space. Together with direct heat from the system, the reradiated heat from these objects increases the MRT in the space at a lower ambient temperature than other systems.		
Impact on Operations and Maintenance		There is additional maintenance required with a gas heating system as compared to an electric resistive heating element. Typically two maintenance visits per year would be recommended.		
Energy and Financial Summary				
Total Installation Estimate:		\$123,424.00	Total Utility Bill Savings in Dollars:	\$15,030.57
- Estimated Efficiency NS Incentive:		\$20,612.93	+ Additional Annual Costs (Maint):	\$0.00
= Total Investment:		\$102,811.07	= Total Annual Savings Estimate:	\$15,030.57
Annual Consumption Savings (kWh's):		171,774.45	Simple Payback:	6.8
Annual Demand Savings (kW):		N/A	Useful Life (years):	15
New Propane Consumption (Litres):		29,514.81	Return on Investment:	7.95%
Elect. Consumption Rate (per kWh):		\$0.15331	Propane Consumption Rate (per Litre):	\$0.38300
Electrical Demand Rate (max monthly kW):		N/A	Estimated Efficiency NS Rebate (\$ per kWh):	\$0.12

4. ENERGY EFFICIENCY MEASURE 2 – VENTILATION AIR VIA SOLAR WALL

4.1 Base Energy Case

Currently the sports field and track areas are not provided with any ventilation air. The large vertical air handler currently providing heat to the area does include a set of dampers at the rear of the unit that would allow fresh air to be introduced to the space. However, the addition of a fresh air connection and ductwork is unfavorable because it would block off the corridor on the right side of the track. It was also determined, through our review of the heating and ventilation air load calculations, that the existing coil would not have sufficient capacity to provide both space heating, as well as to satisfy the ventilation air requirements recommended by ASHRAE. A new make-up air with an electric heating coil is the least expensive installation option, but would come with a high energy and operating cost.

4.2 Energy Efficient Case

The minimum recommended ventilation rate for the sports field and track areas is 7,828cfm, when in-use. The rate increases by an additional 20cfm for every occupant. We anticipated a maximum people count of 175, which results in a maximum ventilation rate of 11,328cfm. From this, the maximum sensible heating load is calculated to be 734,054 Btu/hr (~215kW). PMC investigated two options. The first was a standard make-up air unit with an electric resistive element. Due to the high operating costs for the first option, a Solar Wall was investigated as a more cost-effective option. The

rear wall of the facility is a south facing wall that receives direct sunlight for the majority of the day, which is the optimal scenario for a solar wall.

The following scope of work was developed to supply and install a Lubi Solar Wall system complete with recirculation and bypass dampers, jet fan, duct sock and jet nozzles. This will provide cost-effective make-up air to the sports field and track areas.

- Supply and install a 1500sq.ft LubiTM solar wall collector system on the rear wall of the HB Studios Sports Centre. The LubiTM is a solar air heater based on EnerConcept Technologies' patented perforated glazing technology (PGT). Its high performance nearly reaches the physical limits of solar heat transfer, with results of over 80% efficiency in transforming solar light into hot air. It is recognized as an industry leader.

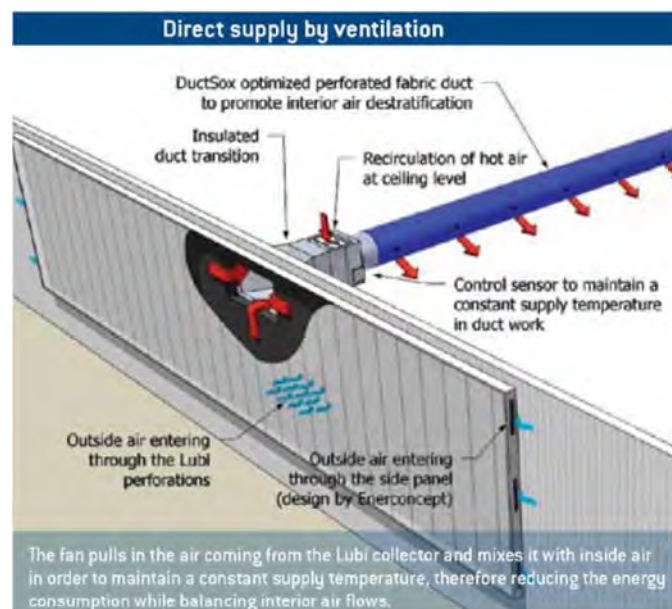


Figure 6 - Example Installation

- A jet fan rated for 11,320cfm at the design static pressures will be installed on the inside of the building, near the rear wall directly overtop the large row of windows. The fan will include bypass dampers to allow a portion of air from the ceiling level to be mixed and recirculated with the outdoor air introduced through the solar wall. Two hundred feet of fabric duct sock with 3" jet nozzles will have significant air throw to promote destratification, and will run down the center of the building overtop the sports field.
- Supply and install all associated ducting, louvres, dampers, wiring and controls to make a fully functional system. Controls will include multiple temperature, CO2, and humidity sensors around the sports field and track area so that additional sequences can be employed (i.e., free-cooling, night time purge).
- Provide a web-based graphical interface for remote temperature control, scheduling and system monitoring purposes. System alerts and alarms will be set-up to send via text and/or email to the relevant parties.

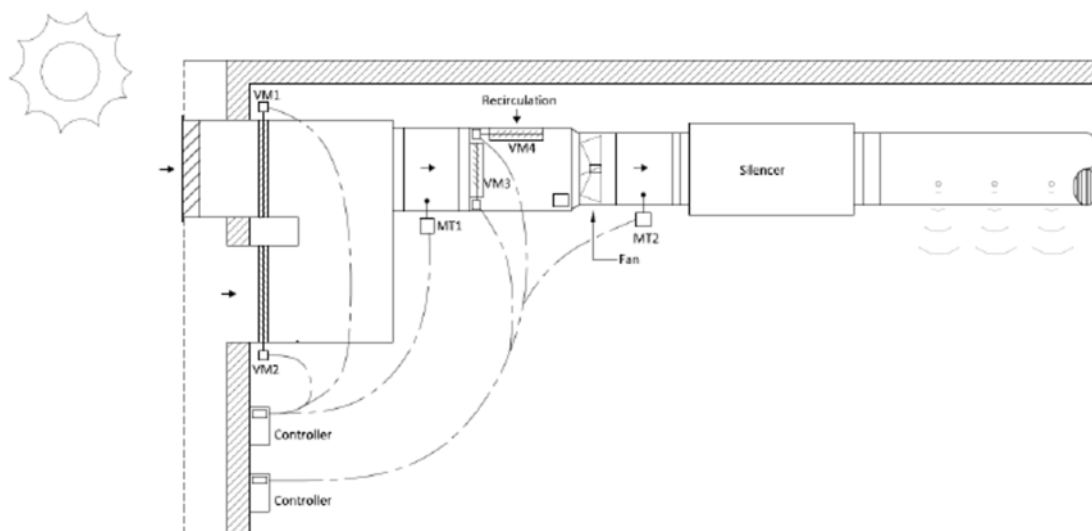


Figure 7 - Fan with Bypass Arrangement of Solar Wall

4.3 Savings and Cost Estimates

The table below provides a summary of the energy efficiency and conservation measure highlighting the impact on tenant comfort, maintenance requirements, energy savings and financial indicators, such as payback.

Table 2 - ECM-2 Summary

ECM #2 - Ventilation Air via Solar Wall vs Base Case of Electric Resistance Heating				
Measure Description		Install Lubi Solar Wall system complete with recirculation and bypass dampers, jet fan, duct sock and jet nozzles to provide cost efficient make-up air to the sports field and track areas.		
Impact on Occupant Comfort		The introduction of fresh air will have a positive impact of the comfort and air quality inside the facility.		
Impact on Operations and Maintenance		There will be some minor additional maintenance associated with the jet fan (i.e., fan belts) and dampers.		
Energy and Financial Summary				
Total Installation Estimate:		\$164,796.00	Total Utility Bill Savings in Dollars:	\$40,254.43
- Estimate Efficiency NB Incentive:		\$28,357.44	+ Additional Annual Savings (Maint):	\$0.00
= Total Investment:		\$136,438.56	= Total Annual Savings Estimate:	\$40,254.43
Annual Consumption Savings (kWh's):		262,568.85	Simple Payback:	3.4
Annual Demand Savings (kW):		N/A	Useful Life (years):	20
Equiv. Annual Consumption Savings (GJ's):		945.25	Return on Investment:	24.50%
Elect. Consumption Rate (per kWh):		\$0.15331	Propane Consumption Rate (per Litre):	\$0.38300
Electrical Demand Rate (max monthly kW):		N/A	Estimated Efficiency NS Rebate (\$ per kWh):	\$0.12

APPENDIX A – Utility Baseline

Baseline ELECTRICAL CONSUMPTION & DEMAND for HB Studios Sports Centre

METER NUMBER: 1258602

Period	2018 01/18 - 03/15	2018 03/15 - 05/17	2018 05/17 - 07/18	2018 07/18 - 09/14	2018 09/19 - 11/17	2017 11/17 - 01/18	2017	2017	2017	2017	2017	2017	2017
BASELINE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Days in billing period	57		64		63		59		59		63		365
Consumption (kWh)	72,360		54,180		17,280		12,960		21,600		75,600		253,980
Energy Cost (\$-HST)	\$11,115.17		\$8,328.00		\$2,670.86		\$2,008.56		\$3,275.27		\$11,468.00		\$38,865.85
Average Cost per kWh	0.1536		0.1537		0.1546		0.1550		0.1516		0.1517		\$0.1534

Building Size (sq.ft): 49,000

Elect Energy Index (kWh / sq.ft / year): 5.183

TOTAL FACILITY ENERGY SUMMARY

Total Energy Index (kWh / sq.ft / year): 5.183 ** This is the addition of all Energy Sources*

Total Energy Cost (\$-HST): \$38,865.85

Energy Cost per sq.ft: \$0.793

APPENDIX B – Energy Calculations

Tina Robichaud-Bond

From: Lee Nauss
Sent: March 26, 2019 12:39 PM
To: Tina Robichaud-Bond
Subject: FW: Request for motion to Declare Climate Emergency

From: George Buranyi
Sent: March 25, 2019 5:01 PM
To: Lee Nauss <Lee.Nauss@modl.ca>
Subject: Request for motion to Declare Climate Emergency

Dear Mr. Nauss:

I have arranged to make a presentation on April 9 to MODL council asking that they consider declaring a climate emergency. As you are likely aware HRM has done this recently as has Mahone Bay. They are among the over 324 councils across Canada that have declared a climate emergency. Over 8.5 million Canadian citizens now live in jurisdictions that have declared a climate emergency. Councils have developed or are developing plans to reduce green house gas emissions (GHG), many in line with or going beyond what the Intergovernmental Panel on Climate Change (IPCC) recommended in their recent report. The IPCC is the UN world body for assessing the science related to climate change. It represents 195 nations. The recent report is the most comprehensive study to date on the climate, and was written by 91 authors and review editors from 40 countries and cited over 6000 studies. The key recommendation is that we need to reduce GHG emissions by 45% by 2030 to keep world temperature rise below 1.5°C. Failure to do so takes us to 2°C, with dire consequences for billions of people.

My hope is that you and/or others on MODL council will put forward a motion to declare a climate emergency and develop a climate emergency plan to expand on the current MODL Integrated Community Sustainability Plan.

I would like to have the opportunity to discuss this with you in person or by phone prior to April 9 and obtain your support. I live in district 3. I also represent the group Extinction Rebellion Nova Scotia. It is part of an international group established in over 35 countries. We are organizing support for this request from other groups and organizations concerned about the climate crisis. We hope that if councils throughout

Nova Scotia move in this direction and declare a climate emergency, it will create pressure on the provincial government to do the same. This would, we hope, result in better coordination and cooperation between the various levels of government and contribute positively to setting policy to achieve goals and determine funding priorities.

Sincerely,

George Buranyi

A site that tracks Councils that have declared a climate emergency. This has not yet included Hamilton which recently passed the resolution.

<https://climateemergencydeclaration.org/climate-emergency-declarations-cover-15-million-citizens/>

IPCC Executive summary for policy makers:

<https://www.ipcc.ch/sr15/chapter/summary-for-policy-makers/>

This link provides an easier to digest take away of the IPCC Executive summary and a link to the significant economic benefits (\$26 trillion through to 2030) of climate action.

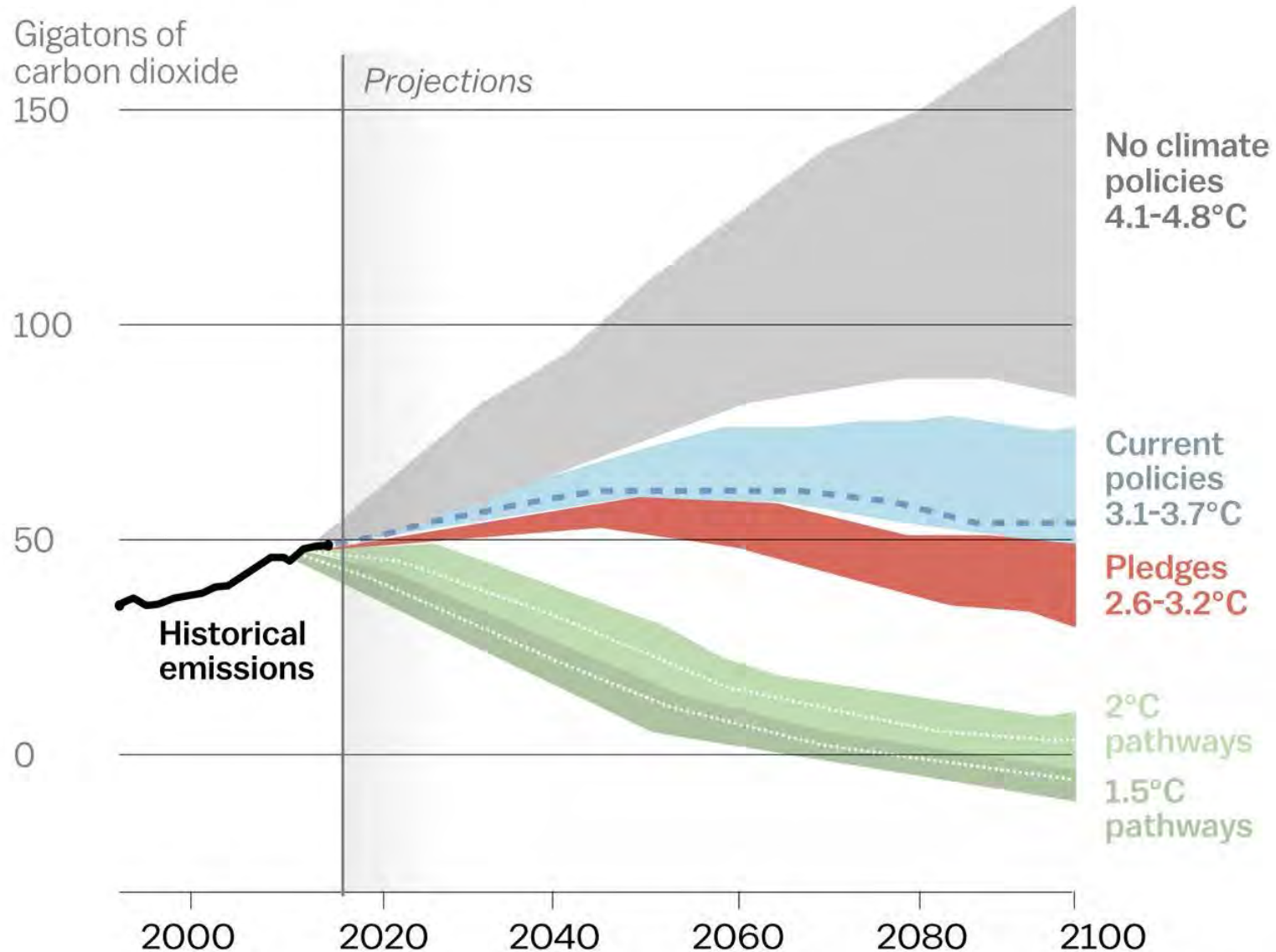
<https://www.wri.org/blog/2018/10/8-things-you-need-know-about-ipcc-15-c-report>

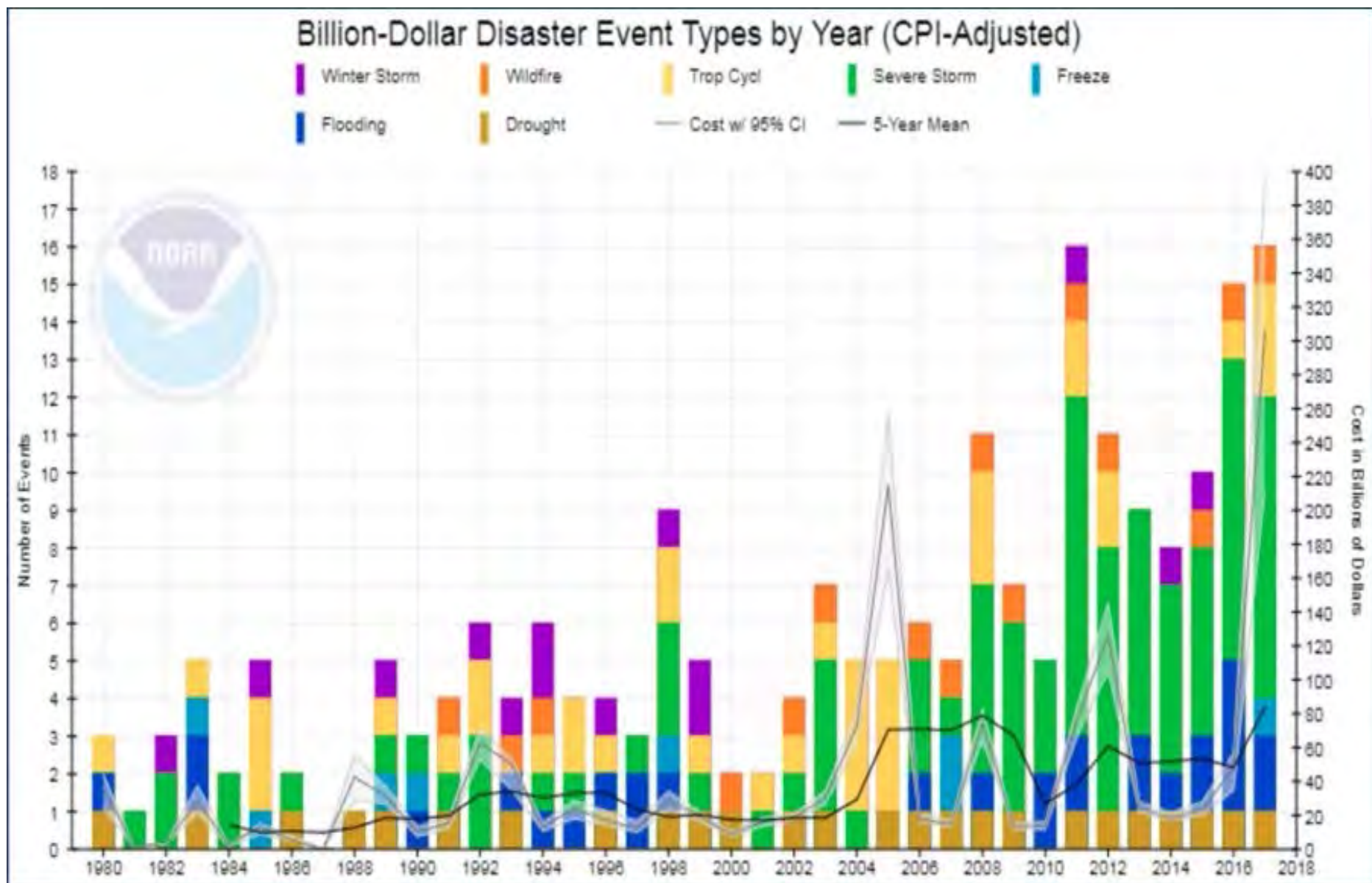
Extinction Rebellion link: <https://rebellion.earth/>

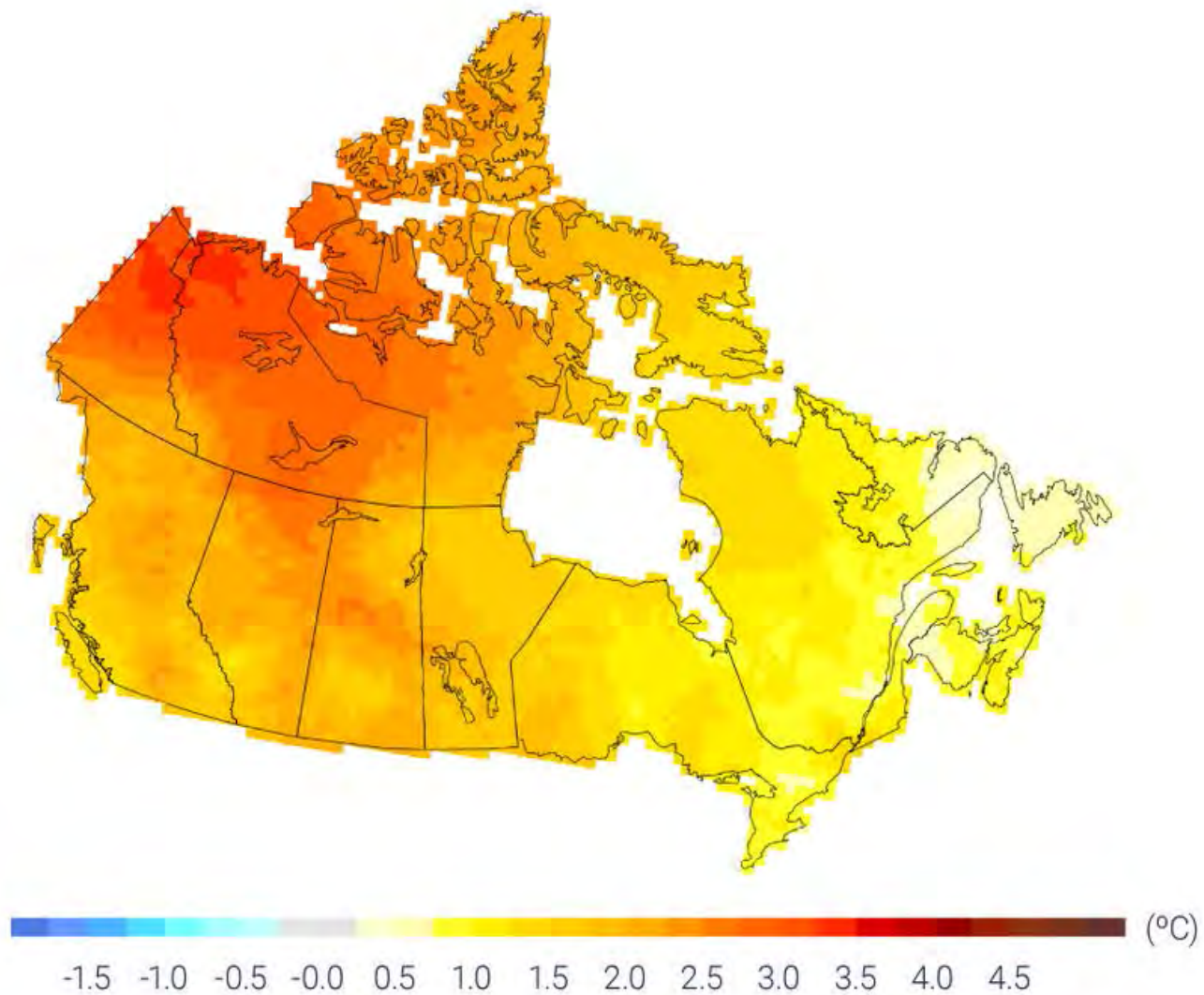
Effect of current pledges and policies

Global greenhouse gas emissions

Council
Item: #8.2
Date: April 9, 2019
Authorization: K. Malloy

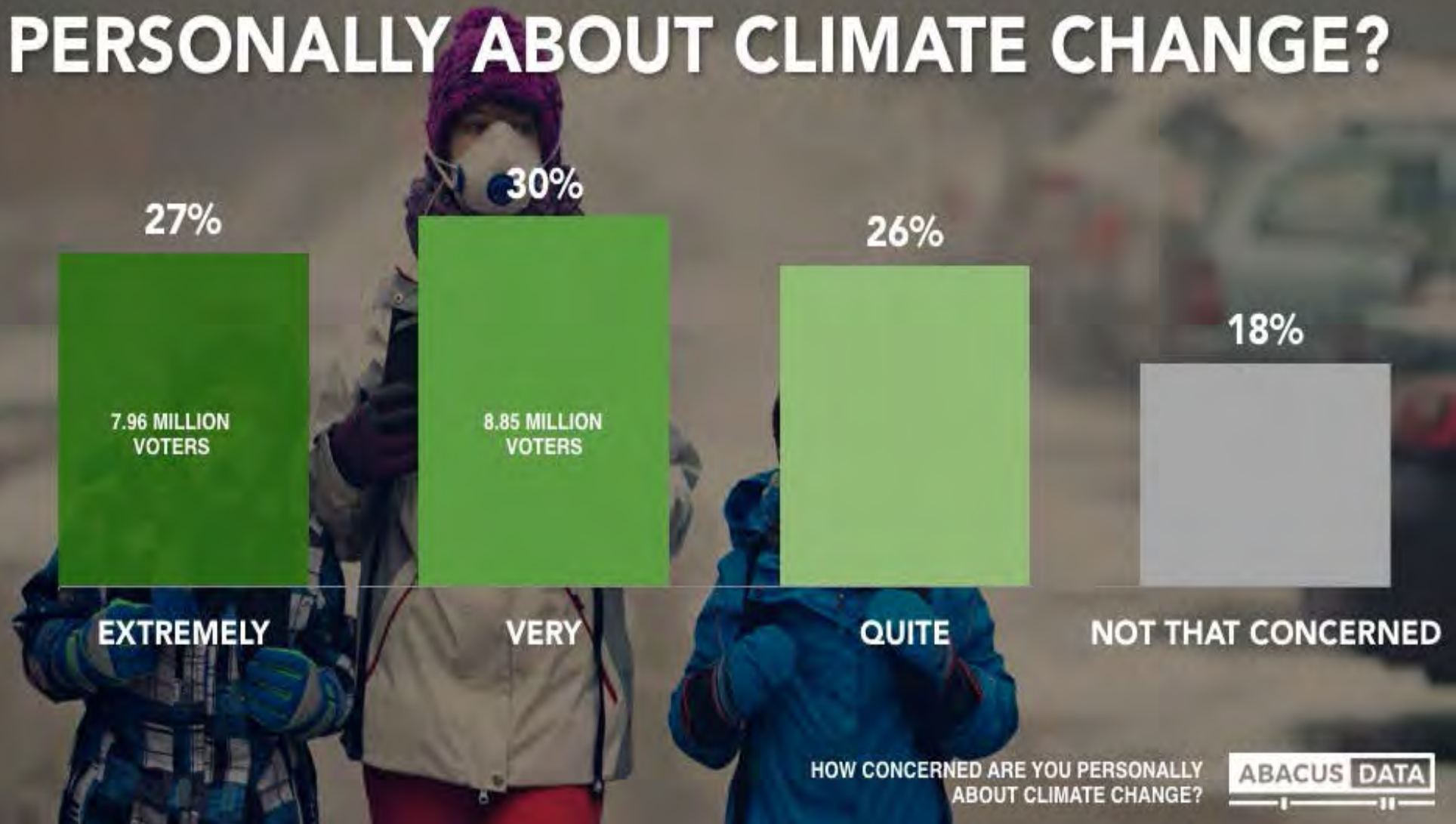






Observed changes (°C) in annual temperature across Canada between 1948 and 2016, based on linear trends. (CANADA'S CHANGING CLIMATE REPORT)

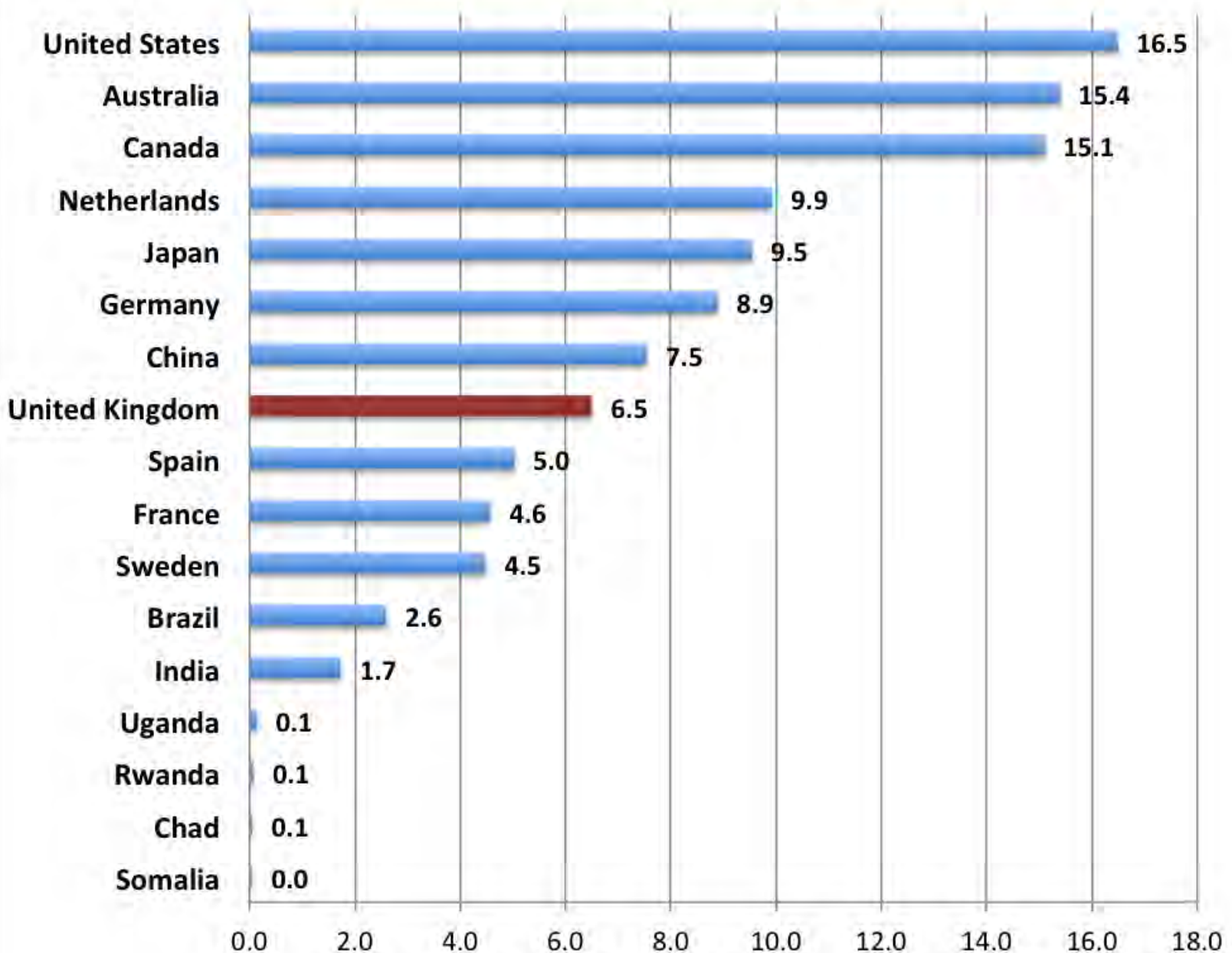
HOW CONCERNED ARE YOU PERSONALLY ABOUT CLIMATE CHANGE?



Climate Emergency

Over 325 Canadian Councils have declared a Climate Emergency and over 8.5 million Canadians now live in such jurisdictions.











































CO2 emissions per capita



www.economicshelp.org | Source: World Bank - EN.ATM.CO2E.PC - Accessed 27 Oct 2017.

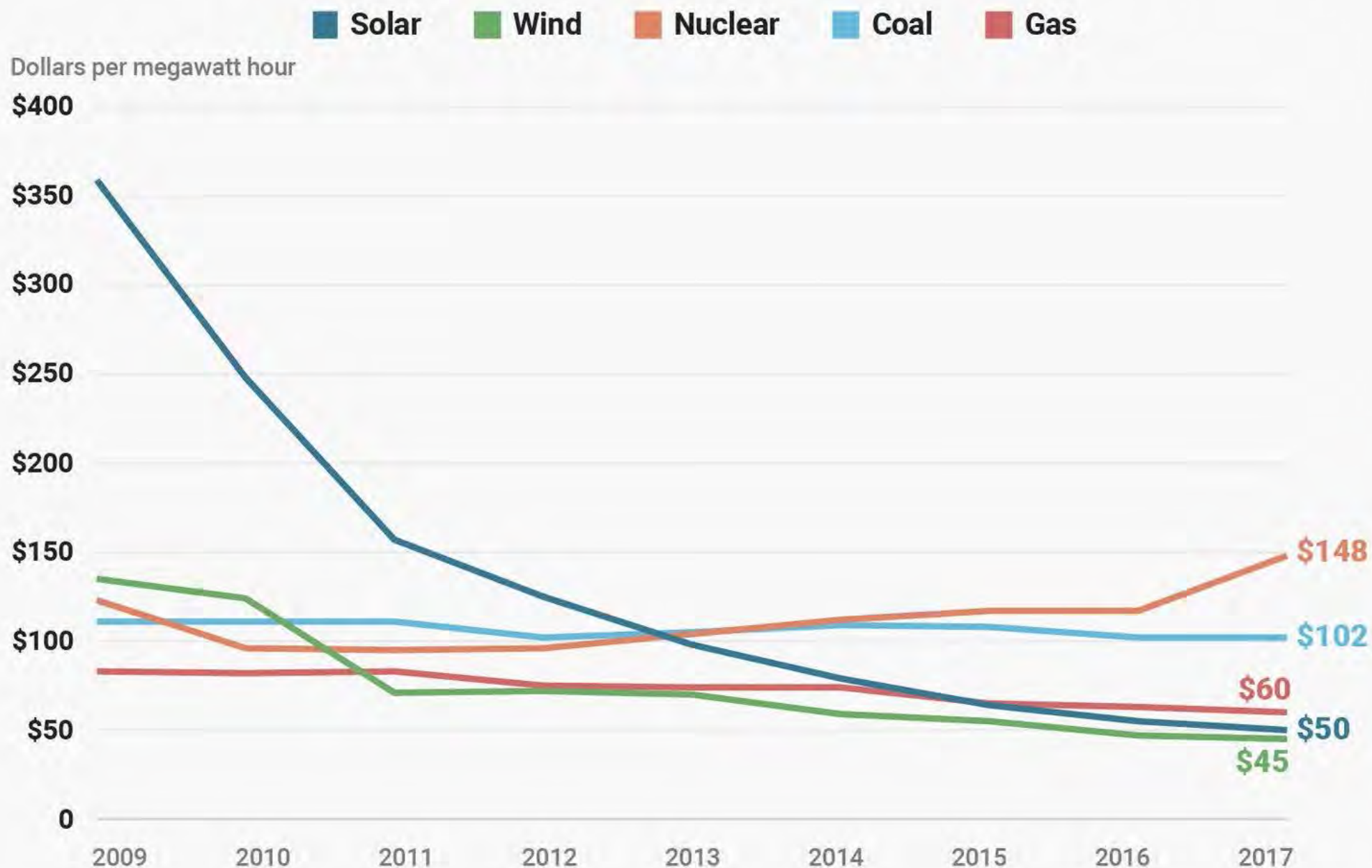
68 Metric tonnes per capita

Since 2000, More Than 20 Countries Have Reduced Annual GHG Emissions While Growing Their Economies

COUNTRY	CHANGE IN CO ₂ (2000–2014)	CHANGE IN GDP (2000–2014)
Austria	-3% 	 21%
Belgium	-12% 	 21%
Bulgaria	-5% 	 62%
Czech Republic	-14% 	 40%
Denmark	-30% 	 8%
Finland	-18% 	 18%
France	-19% 	 16%
Germany	-12% 	 16%
Hungary	-24% 	 29%
Ireland	-16% 	 47%
Netherlands	-8% 	 15%
Portugal	-23% 	 1%
Romania	-22% 	 65%
Slovakia	-22% 	 75%
Spain	-14% 	 20%
Sweden	-8% 	 31%
Switzerland	-10% 	 28%
Ukraine	-29% 	 49%
United Kingdom	-20% 	 27%
United States	-6% 	 28%
Uzbekistan	-2% 	 28%

Sources: BP Statistical Review of World Energy 2015; World Bank World Development Indicators

The average cost of energy in North America







Municipality of the District of Lunenburg

210 Aberdeen Road Bridgewater Nova Scotia Canada B4V 4G8
Phone: 902-543-8181 / Fax: 902-543-7123 / Web Site: www.modl.ca

April 3, 2019

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

Dear Mayor and Councillors:

The Finance Committee, in session on Tuesday, April 2, 2019, made the following recommendations to Council:

1. that Municipal Council approve the amended Terms of Reference for the Audit Standing Committee as presented.
2. that Municipal Council approve the full and partial tax exemptions for qualifying non-profit organizations as outlined in the attached schedules.
3. that Municipal Council approve the summer break from Council and Council committee meetings from July 29 – August 23, 2019.

Respectfully submitted,

Chairman and Members
Finance Committee

/rh
Attachments



Municipality of the District of Lunenburg

REQUEST FOR DECISION

REPORT TO: Finance Committee

SUBMITTED BY: Elana Wentzell, CPA,CMA, Director of Finance

DATE: April 2, 2019

RE: Proposed Changes to the Audit Standing Committee Terms of Reference

RECOMMENDATION

That the Finance Committee recommend to Council that Council approve the Terms of Reference for the Audit Standing Committee as presented.

EXECUTIVE SUMMARY

The Province of Nova Scotia has amended the *Financial Accounting and Reporting Manual (FRAM)* to include the minimum requirements for expense and hospitality policies and the manner in which municipal accounts are to be audited.

The FRAM is a regulation pursuant to sections 451 and 520 of the *Municipal Government Act (MGA)*. Prior to these amendments, the FRAM outlined the system for accounting that is to be used by municipalities, the information that is to be provided by municipalities to the Minister, the procedure for calculating the municipality's requirements for the purposes of establishing tax rates, and the information required for calculating standard expenditures.

The existing Terms of Reference for the Audit Committee meet the legislative requirements as set out in the MGA but should be updated to meet the new FRAM legislative requirements.

BACKGROUND

Staff have reviewed the requirements set out in the FRAM and have provided an updated Terms of Reference attached. Changes have been highlighted. As well, a copy of Section 5 of the FRAM manual has been provided which outlines the Nova Scotia Municipal Audit Requirements.

DISCUSSION

The FRAM now sets out detailed duties for the Audit Committee around Financial Reporting, External Audit Function, Accounting System and Internal Controls, Risk Management, Alleged Wrong-Doing and Statutory and Regulatory Compliance. The Committee was performing many of these duties already. The FRAM is just setting them into policy.

As well, the Department of Municipal Affairs will now prescribe training for Audit Committees. This training has not yet been made available, however, the Department is working with the Association of Municipal Administrators to develop a curriculum.

The Committee has been following the MGA requirements. Any new Committee work is highlighted in the details of responsibility below:

Responsibility	Who	When
<i>Financial Reporting</i>		
Review Annual Financial Statements	Committee, Auditor, Staff	September
Changes in accounting principles/practices	Committee, Auditor, Staff	September
Significant annual budget variances (Treasurer's report)	Committee, Staff	September
Review/Discuss Financial Condition Indicators	Committee, Staff	July? Special meeting?
<i>External Audit Function</i>		
Discuss extent, timing & completion of the audit including materiality level	Committee, Auditor	July
Promote cooperation between management and the auditor	Committee	
Review estimated and final audit fee	Committee, Auditor, Staff	September
Discuss whether terms of engagement letter were met	Committee, Auditor, Staff	September
Recommend a change in auditor due to competence after an adequate inquiry	Committee, Staff	Call of the Chair
Review problems/restrictions encountered during the audit	Committee, Auditor, Staff	September
<i>Accounting System & Internal Control</i>		
Review the management & internal control letter	Committee, Auditor, Staff	September
Discuss the annual evaluation of the internal control systems together with management's response and action plan	Committee, Auditor, Staff	September

Obtain reasonable assurance that the municipality has implemented appropriate systems of internal controls and that they are operating effectively	Committee, Auditor, Staff	September
Identify, monitor, mitigate and report significant financial or operational risk exposures and that these systems are operating effectively	Committee, Auditor, Staff	September
Receive and review any internal reports relating to accounting procedures and internal controls	Committee, Staff	
Risk Management Function		
Understand the risks of the Municipality	Committee, Auditor, Staff	July
Review risk management controls and policies	Committee, Staff	September
Obtain reasonable assurance that management's systems to eliminate or manage risks are effective	Committee, Auditor, Staff	September
Receive reports of the management of financial risks	Committee, Auditor	September
Alleged Wrong Doing Function		
Enquire fully into any activities or transactions that may be illegal, questionable or unethical and the control procedures in place to ensure they are being guarded against	Committee, Auditor and/or Staff	As required
Ensure management has implemented a policy and/or process to review and respond to complaints or allegations of wrong doing by elected officials or municipal employees	Committee, Staff, Third Party/Auditor	
Review and advise Council members with respect to complaints or allegations of wrong doing	Committee	As required
Statutory and Regulatory Compliance		
Review the municipality's compliance with statutory and regulatory obligations within the Committee's area of responsibility	Committee, Staff	
Review the summary of Council/CAO remuneration and expenses note in the annual financial statements for reasonableness	Committee, Staff, Auditor	September

Review the annual summary of hospitality expenses note in the financial statements	Committee, Staff, Auditor	September
Review the adequacy of staffing in relation to both number and competence for accounting and financial responsibilities	Committee, Staff, Auditor	September
Training		
Participate in any training prescribed by the department of Municipal Affairs	Committee	As required

BUDGET IMPLICATIONS

There could be a small increase in costs if more meetings are required to meet the new legislative requirements for the Member-at-Large position which is paid on a per meeting basis.

STRATEGIC PLAN

N/A

ALTERNATIVES

These changes are required to meet the legislative changes as set out in the FRAM.

CONCLUSION

Staff recommend that the Terms of Reference for the Audit Standing Committee be updated to meet the legislative requirements set out in the FRAM.

Department: Administration

Report Prepared By: Elana Wentzell

Date: March 26, 2019

Report Approved By: Kevin Malloy, CAO

Date:

Reviewed By CAO:

Date

**Municipality of the District of Lunenburg
AUDIT STANDING COMMITTEE
TERMS of REFERENCE**

1.0 Mandate

The Audit Committee's mandate is to oversee all audit matters and receive the annual external audit report, thereby assisting Council in meeting its responsibilities by ensuring the adequacy and effectiveness of financial reporting, risk management and internal controls as per Section 44 of the *Municipal Government Act*.

2.0 Audit

The Committee shall:

- 2.1 Recommend the appointment of an external auditor to conduct an annual financial audit of MODL financial statements.
- 2.2 ~~Receive and review the Annual Financial Statements with management and the external auditors and recommend to Council for approval. (see 4.1)~~
- 2.3 ~~Discuss with the external auditor the annual evaluation of the adequacy and effectiveness of the internal control systems in relation to financial controls and risk management as established by the Administration and recommendations for improvements. (see 4.3)~~
- 2.4 Discuss with the external auditor any correspondence between management and the audit firm on alternative interpretations or presentations of municipal financial information.
- 2.5 Review matters arising out of the audit as may appear to require further investigation.
- 2.6 ~~Review annual Risk Management Assessments conducted by staff concerning the risks and financial implications associated with such areas as: Human Resources, Operational and Corporate Insurance Strategies of the Municipality. (see 4.4)~~
- 2.7 ~~Inquire into any activities or transactions that may be illegal, questionable or unethical. (see 4.5)~~
- 2.8 ~~Review the overall reasonableness of CAO and Council expenses. (see 4.6)~~
- 2.9 Other matters as referred to the Committee by Council and to fulfill legislative functions as specified in Section 4.

3.0 Committee Membership, Terms & Procedures

- 3.1 Membership of the Committee shall consist of the whole of Council and up to two members from the public who are not a member of Council or an employee of the Municipality. The Municipality shall advertise to recruit the member(s) from the public at least once every six months until the position is filled. Recruitment to fill a position will be undertaken at the expiration of each term. The member(s) should possess a financial background, accounting designation and experience in financial reporting and auditing.
- 3.2 All applications for the member-at-large position(s) meeting the minimum requirements will be reviewed by the Nominating Committee. The Nominating Committee will recommend appointment(s) to Council and Council will have final approval.
- 3.3 At-large members shall be appointed for three-year terms or until such time as their successor(s) is appointed. If two member-at-large appointments are approved, the initial appointment of at-large members shall be for a one two-year term and one three-year term. Any member may re-offer for a second three-year term when their term expires, however, the member will have to apply through the recruitment process undertaken for that position.
- 3.4 The Committee shall annually select a Chair and Vice Chair by secret ballot at their November meeting. The sitting Chair and Vice-Chair may re-offer for the same position.

- 3.5 The Committee shall meet a minimum of two times in each fiscal year at the call of the Chair. Once to meet with the Auditor and once to review the results of the audit.
- 3.6 The Committee shall follow the meeting procedures outlined in MDL-01 Council Procedures; except where specifically noted otherwise in these terms of reference.

4.0 Responsibilities and Functions

4.1 Financial Reporting Function – Responsibilities Related to the Financial Reporting

The Committee shall:

- 4.1.1 review the audited annual financial statements in depth with management and the external auditor; if satisfied that they present fairly the financial position and results of operations, recommend their acceptance to Council;
- 4.1.2 review with management any changes in accounting principles and practices followed by municipalities;
- 4.1.3 review any significant variance in comparison to prior year and/or budget;
- 4.1.4 review and discuss the financial condition indicators.

4.2 External Audit Function – Responsibilities Related to the Work of the Auditor

The Committee shall:

- 4.2.1 discuss the extent, timing and completion of the audit including the level of materiality to be used;
- 4.2.3 review estimated and final audit fee;
- 4.2.4 discuss whether the terms of the letter of engagement were met;
- 4.2.5 recommend to Council the change of the municipal auditor if management questions the competence of the incumbent auditor and the Committee confirms the view; the recommendation to appoint a new auditor would follow an adequate inquiry into the auditor's competence and reputation;
- 4.2.6 review the problems and restrictions encountered by the auditor and degree of cooperation received; and
- 4.2.7 promote cooperation between the management and the auditor.

4.3 Accounting System and Internal Controls Function – Responsibilities Related to Internal Controls.

The Committee shall:

- 4.3.1 obtain and review the management and internal control letter addressed to Council;
- 4.3.2 discuss with the auditor, the annual evaluation of the internal control systems related to the financial reporting and the recommendations for improvements of accounting procedures and internal controls related to the financial reporting, together with management's response;
- 4.3.3 discuss management's response to the recommendations and adequacy of management's action plan;
- 4.3.4 Obtain reasonable assurance that the municipality has implemented appropriate systems of internal controls: over the financial reporting and that these systems are operating effectively;
- 4.3.5 Obtain assurance the Municipality is in compliance with its policies and procedures and that these systems are operating effectively; and
- 4.3.6 Identify, monitor, mitigate and report significant financial or operational risk exposures and that these systems are operating effectively; and
- 4.3.7 receive and review any internal reports relating to accounting procedures and internal controls.

4.4 Risk Management Function – Responsibilities Related to Risk Management

The Committee shall:

- 4.4.1 understand the risks of the Municipality;
- 4.4.2. review the Municipality's risk management controls and policies;
- 4.4.3 obtain reasonable assurance that management's systems to eliminate or manage the risks are effective; and
- 4.4.5 receive reports on the management of financial risks.

4.5 Alleged Wrong-Doing Function – Responsibilities Related to Questionable Activities

The Committee shall:

4.5.1 enquire fully into any activities or transactions that may be illegal, questionable or unethical, and into the Municipality's control procedures to ensure that such activities are being guarded against;

4.5.2 ensure management has implemented a policy and/or process to review and respond to complaints or allegations of wrong-doing or questionable acts by elected officials, or municipal employees; and

4.5.3 review and advise Council members with respect to complaints or allegations of wrong-doing.

4.6 Statutory and Regulatory Compliance Function and Other Responsibilities

The Committee shall:

4.6.1 review the municipality's compliance with statutory and regulatory obligations within the Committee's area of responsibility (for example reporting compliance);

4.6.2 review the overall reasonableness of expenses of the Clerk/CAO and of Council members. Specifically; review the summary of remuneration and expenses schedule for reportable individuals for reasonableness;

4.6.3 review the annual summary hospitality expense note; and

4.6.4 review adequacy of staffing in relation to both number and competence for accounting and financial responsibilities.

5.0 Staff Support

5.1 The Director of Finance will act as the primary Municipal Contact for the Committee.

6.0 Training

6.1 All committee members shall participate in a regular training program which will include, at minimum:

6.1.1 An introduction and overview of the functions, authority, and role of the audit committee at the beginning of every council term.

6.1.2 Training on interpreting financial documents and identifying fraud at least once per council term.

6.1.3 Ongoing training on topic-specific issues that arise or may arise in the activities of the committee.

6.1.4 Any training prescribed by the department of Municipal Affairs

6.2 Notwithstanding the training program, it is acknowledged that committee members will continue to require expert advice from outside advisors where appropriate.

Approved by Municipal Council.....March 27, 2018

Section 5 Nova Scotia Municipal Audit Requirements

5(1) Municipal Audit Requirements

5(1)(a) Municipal Audit Standards

(i) **Audit Standards-** The municipal audit shall be in accordance with CPA Canada Handbook requirements and in a form that is acceptable to Municipal Affairs and is in accordance with generally accepted auditing standards.

5(1)(b) Requirement to Use a Registered Municipal Auditor

Section 42 (1) of the *Municipal Government Act* states that council shall appoint a municipal auditor who is registered pursuant to that Act to be the auditor for the municipality. A person, firm or partnership shall not act as, or exercise or perform any of the duties of, a municipal auditor unless registered as a municipal auditor pursuant to the provisions of Section 457 of the *Municipal Government Act*. Refer to Section 5(1)(a) Municipal Audit Standards and 5(2) Municipal Auditor Appointment and Restrictions in the Manual for details.

5(1)(c) Additional Municipal Audit Requirements

In addition, to adhering to Generally Accepted Auditing Standards examination standards as outlined in the CPA Handbook, the municipal auditor must ensure that the municipality has performed its duties in accordance with the act(s) and special legislation under which it is governed. Municipal Auditor verification and disclose should include, but not limited to, the following:

- (i) Municipality received approval of the Minister of Municipal Affairs for:
 - (a) borrowings by a municipality other than borrowing for the purpose of providing for payment of part of the annual expenditures, a guarantee of a borrowing or a long-term commitment that exceeds \$100,000; Note: Halifax Regional Municipality refer to the *Halifax Regional Municipality Charter*, threshold is \$500,000;
 - (b) the issuance of debentures or other term debt;
- (ii) the verification that all capital expenditures were incurred for the purpose for which the debenture issue or term debt was authorized;
- (iii) the authority to raise funds for the purpose of paying those amounts (if any) reported on the respective capital fund balance sheets as "due to general operating funds";
- (iv) the filing of claims or returns immediately upon receipt of all the applicable information with the appropriate department or government so as to avoid delay in receiving payment of grants, contributions or tax rebates (federal and provincial);
- (v) the verification that all expenditures incurred (capital and operating) were spent on items for which the municipality had authority;
- (vi) the approval of municipal council for commitments and expenditures incurred by the administration on behalf of the municipality;
- (vii) the tax sale surplus account is appropriately funded as per the *Municipal Government Act Section 146 (4)* which states "Except as provided in this Section, no part of the balance may be withdrawn from the tax sale surplus account during the period in which the land may be redeemed"; and
- (viii) the amount of tax sale surplus that will be transferred to the Capital Reserve Fund in the next year is to be disclosed in the notes to the financial statements.

5(2) Municipal Auditor Appointment and Restrictions

- (a) **Requirement** - Section 42 (1) of the *Municipal Government Act* states that council shall appoint a municipal auditor who is registered pursuant to that Act to be the auditor for the municipality. A person, firm or partnership shall not act as, or exercise or perform any of the duties of, a municipal auditor unless registered as a municipal auditor pursuant to the provisions of Section 457 of the *Municipal Government Act*.
- (b) **Eligibility Requirements** -Section 457(1) and (2) of the *Municipal Government Act* defines the requirements for registration as a municipal auditor. The individual or firm must be:
 - (i) A person licensed as a public accountant pursuant to the Public Accountants Act.
 - (ii) A firm or partnership may be registered as a municipal auditor, if a majority of the members of the firm or partnership are licensed as public accountants pursuant to the Public Accountants Act.
- (c) **Restrictions:** Section 42 (7) of the *Municipal Government Act* states that: "No person shall be appointed as auditor who, at any time during the fiscal year in which the auditor is appointed, is or has been:
 - (i) a council member;
 - (ii) a contractor⁸ hired by the Municipality; or
 - (iii) an employee of the Municipality (exception -auditor may be reappointed); or
 - (iv) In order for a registered municipal auditor to provide services in addition to those as municipal auditor, it is recommended that council pass a resolution authorizing the appointment for the required service and that the registered municipal auditor supplement this resolution by an engagement letter confirming the terms of the appointment. Financial advice of an ongoing nature provided during the year by the auditor will not require a resolution of council.

⁸ **Please Note:** Clause 5(2)(c)(ii) above has been interpreted by Municipal Affairs as enabling a registered municipal auditor to engage in management consulting functions and thereby provide additional services, such as water rate studies, amalgamation/ annexation reviews and human resource advice. "Management consulting" includes investigating and identifying management and business problems related to the policy, organization, operational, financial, administrative or technical aspects of organizations and recommending appropriate solutions.

5(3) Municipal Audit Committees

5(3)(a) General Requirements

(i) Audit Committee Requirement –

Municipalities and villages in Nova Scotia have a significant degree of public accountability. All municipalities and villages must establish an audit committee. The duties of the audit committee can be performed by a separate committee or they may be delegated to an existing committee, such as the finance committee.

(ii) Definition –

An audit committee acts as an advisory board carrying out critical review functions on behalf of council/commission. The primary function of the audit committee is to assist council or village commission in fulfilling their oversight responsibilities related to quality and integrity of financial reporting along with ensuring the appropriate systems and controls for the proper recording of transaction and protection of assets are in place.

(iii) Policy Requirement –

The committee shall be constituted by a policy of council and village commission, which would provide the terms of reference of its responsibilities and functions. Please refer 3(5)(c) for required policy content.

(iv) Authority and Access -

The audit committee should have unrestricted and complete authority to delve into any affair of the municipality, or village commission, with full access to the management and auditor.

(v) Reporting Requirement –

The audit committee must maintain minutes of its meetings and submit written reports to council or council as a committee of the whole or village commission.

5(3)(b) Audit Committee Purpose

The objectives of an audit committee are to:

- (i) help council or village commission meet its fundamental responsibilities of protecting the municipal assets and managing operations as efficiently as possible;
- (ii) provide better communication between the auditor and council or village commission, and promote better understanding of the audit process;

- (iii) enhance the external auditor's independent position;
- (iv) increase the credibility and objectivity of the municipality's or village's financial report; and
- (v) strengthen the role of council/village commission and committee members.

5(3)(c) Audit Committee Composition

- (i) The audit committee must be composed of at least three members.
- (ii) The audit committee membership may have elected members from the council or village commission; however, subject to iii, an audit committee must include a minimum of one person who is not a member of council or village commission or an employee of the municipality/village. This person cannot be related to a member of council or village commission or to an employee of the municipality or village.
- (iii) Where an audit committee does not include the person referred to in subsection (ii): the audit committee shall continue to meet and perform its duties and may exercise its powers; and the municipality shall advertise to recruit a person who is not a member of council or village commission or an employee of the municipality or village at least once every six months until the requirement is met.
- (iv) Audit committee members should be financially literate⁹. It is recommended that at least one of the committee members should have a financial designation or relevant financial management expertise.
- (v) Each audit committee member must complete training as prescribed by the department.

⁹ Financially literate means the member has the ability to read and understand a set of financial statements which present a breadth and level of complexity of accounting issues that are generally comparable to the breadth and level of complexity of the issues reasonably that can be expected to be raised by a municipal or village financial statement.

5(3)(d) Meeting Requirements

- (i) An audit committee should convene whenever circumstances demand such a meeting; however, the committee must meet at least twice in each fiscal year.
- (ii) It is recommended the audit committee meet at least four times, and the meeting should coincide with the stages of the audit. The following topics are recommended to be included on the audit committee's agendas:
 - a. role and responsibilities of the auditor;
 - b. review of the roles and responsibility of the audit committee;
 - c. appointment of municipal auditor;
 - d. quarterly financial information;
 - e. audited Financial Statements and auditor's work;
 - f. management or Internal Control letter and management's response;
 - g. adequacy and effectiveness of internal controls;
 - h. financial condition indicators; and
 - i. financial risk management.
- (iii) There is a requirement that audit committee meeting dates be specifically established and agendas developed to address its terms of reference and responsibilities.
- (iv) There will on occasion, be a need for the auditor to meet with the audit committee, without any appointed officials present. This would be accommodated through a request by either the committee or the auditor to one another.

5(3)(e) Audit Committee Responsibilities and Functions

The functions of a municipal audit committee can be categorized as follows:

(i) Financial Reporting Function – Responsibilities Related to the Financial Reporting

The Committee shall:

- a. review the audited annual financial statements in depth with management and the external auditor; if satisfied that they present fairly the financial position and results of operations, recommend their acceptance to council or village commission;
- b. review with management any changes in accounting principles and practices followed by municipalities or village commissions;
- c. review any significant variance in comparison to prior year and/or budget; and
- d. review and discuss the financial condition indicators.

(ii) External Audit Function – Responsibilities Related to the Work of the Auditor

The Committee shall:

- a. discuss the extent, timing and completion of the audit including the level of materiality to be used;
- b. review estimated and final audit fee;
- c. discuss whether the terms of the letter of engagement were met;
- d. recommend to council or village commission the change of the municipal auditor if management questions the competence of the incumbent auditor and the committee confirms the view; the recommendation to appoint a new auditor would follow an adequate inquiry into the auditor's competence and reputation;
- e. review the problems and restrictions encountered by the auditor and degree of cooperation received; and
- f. promote cooperation between the management and the auditor.

(iii) Accounting System and Internal Controls Function – Responsibilities Related to Internal Controls.

The Committee shall:

- a. obtain and review the management and internal control letter addressed to council or village commission;
- b. discuss with the auditor the annual evaluation of the internal control systems related to the financial reporting and the recommendations for improvements of accounting procedures and internal controls related to the financial reporting, together with management's response;
- c. discuss management's response to the recommendations and adequacy of management's action plan;
- d. Obtain reasonable assurance that the municipality or village has implemented appropriate systems of internal controls:
 - i. Over the financial reporting and that these systems are operating effectively;
 - ii. Obtain assurance the municipality or village is in compliance with its policies and procedures and that these systems are operating effectively; and
 - iii. Identify, monitor, mitigate and report significant financial or operational risk exposures and that these systems are operating effectively; and
- e. receive and review any internal reports relating to accounting procedures and internal controls.

(iv) Risk Management Function – Responsibilities Related to Risk Management¹⁰ The Committee shall:

- a. understand the risks of the municipality or village;
- b. review the municipality or village risk management controls and policies;
- c. obtain reasonable assurance that management's systems to eliminate or manage the risks are effective; and
- d. receive reports on the management of financial risks.

¹⁰ These functions could be prepared by another sub-committee; however, the audit committee should be aware and understand the risks to the municipality or village.

(v) Alleged Wrong-Doing Function – Responsibilities Related to Questionable Activities

The Committee shall:

- a. enquire fully into any activities or transactions that may be illegal, questionable or unethical, and into the municipality's or villages control procedures to ensure that such activities are being guarded against;
- b. ensure management has implemented a policy and/or process to review and respond to complaints or allegations of wrong-doing or questionable acts by elected officials, or municipal/village employees; and
- c. review and advise council or village commission members with respect to complaints or allegations of wrong-doing.

(vi) Statutory and Regulatory Compliance Function and Other Responsibilities

The Committee shall:

- a. review the municipality or village's compliance with statutory and regulatory obligations within the Committee's area of responsibility (for example reporting compliance);
- b. review the overall reasonableness of expenses of the Clerk/CAO and of council members or village commission members and Village Clerk. Specifically; review the summary of remuneration and expenses schedule for reportable individuals for reasonableness;
- c. review the annual summary hospitality expense note; and
- d. review adequacy of staffing in relation to both number and competence for accounting and financial responsibilities.



Municipality of the District of Lunenburg

REQUEST FOR A DECISION

REPORT TO: Finance Committee

SUBMITTED BY: Elana Wentzell, CMA, CPA

DATE: April 2, 2019

RE: Partial and Full Tax Exemptions

RECOMMENDATION

Move that the Finance Committee recommend to Council that Municipal Council approve the full and partial tax exemptions for qualifying non-profit organizations as outlined in the attached schedules.

EXECUTIVE SUMMARY

The Municipality has a full and partial tax exemption By-law as authorized by Sections 71 (1) and (2) of the Municipal Government Act (MGA) and outlined in MDL-12 Tax Exemption/Reduction Policy.

Based primarily on the benefit or service to the community, the tax exemptions apply to qualifying non-profit organizations that provide community programs and services in charitable, fraternal, recreational, religious, educational, cultural, or sporting organizations.

Applications for tax exempt status are due annually on February 28. Awards are for a three-year period; renewal is required on the third year following the year of the initial award. Awards do not cover tax arrears or area rates. Final awards are subject to the approval of Municipal Council as per the Tax Exemption Policy.

DISCUSSION

Please find enclosed a detailed listing of applications that meet the Tax Exemption Policy requirements. Full tax exemptions are granted for those qualifying properties that are classified as residential. Partial tax exemptions are granted for those qualifying properties that

are classified as commercial – the exemption is the difference between the commercial and residential tax rate.

BUDGET IMPLICATIONS

The 2019-20 Draft Budget of \$91,000 remains unchanged from the previous year and can accommodate the current applications and exemptions that have been previously awarded.

CONCLUSION

All applications received meet the requirements as set out in the By-Law/Policy and should be awarded.

Department: Finance and Administration

Report Prepared By: Elana Wentzell

Date: March 27, 2019

Report Approved By: _____

Date _____

Reviewed By CAO: _____

Date _____

**PROPERTY TAX EXEMPTION RENEWAL APPLICATIONS
FOR THE FISCAL YEAR 2019/2020
(FULL EXEMPTION)**

APPLICATIONS SENT TO:	ASSESSMENT NUMBER	2018 AMOUNT	2019 ESTIMATE	NOTATIONS
Trustees Barss Corner Community	#00231827	\$ 1,172.24	\$ 1,172.24	
Camperdown Community Hall	#00635847	\$ 1,064.61	\$ 1,037.21	
Community Hall Upper Cornwall	#00889407	\$ 1,532.33	\$ 1,553.86	
Simpson's Corner Hall Society	#00889415	\$ 565.57	\$ 565.57	
Pinehurst Community Hall	#00889423	\$ 1,782.83	\$ 1,765.21	
Branch Lahave Community Hall	#00889431	\$ 1,281.84	\$ 1,293.58	
Community Hall Upper Northfield	#00889458	\$ 798.46	\$ 814.11	
Broad Cove Comm. Hall Association	#00889474	\$ 1,798.48	\$ 1,794.57	
Waterloo Community Hall	#00889512	\$ 618.41	-	building demolished
Community Hall Vogler's Cove	#00889636	\$ 1,714.33	\$ 1,733.90	
Independent Order of Odd Fellows	#02137909	\$ 1,268.14	\$ 1,268.14	
Trustees of the Lake Centre & New Cumb.	#02410249	\$ 385.53	\$ 385.53	
Maplewood-Parkdale Agricultural Society	#03016722	\$ 2,213.37	\$ 2,209.45	
Hillcrest Lodge No. 93	#03075788	\$ 1,583.21	\$ 1,587.13	
Vogler's Cove Community Hall	#03185036	\$ 143.37	\$ 143.37	
New Germany Amateur Athletic Association	#03490807	\$ 146.78	\$ 146.78	

**PROPERTY TAX EXEMPTION RENEWAL APPLICATIONS
FOR THE FISCAL YEAR 2019/2020
(FULL EXEMPTION)**

APPLICATIONS SENT TO:	ASSESSMENT NUMBER	2018 AMOUNT	2019 ESTIMATE	NOTATIONS
Newburne Community Hall	#03492788	\$ 1,260.31	-	no longer in use
Riverport Community Hall	#03971252	\$ 3,659.59	\$ 3,634.15	
Tancook Island Rec. Centre Association	#04524764	\$ 2,019.62	\$ 1,986.36	
Trustees Conquerall Mills Comm. Society	#04682092	\$ 1,812.18	\$ 1,773.04	
Trustees West Northfield Comm.	#04684842	\$ 1,146.80	\$ 1,160.50	
Union Square Youth Hall	#04710126	\$ 418.80	\$ 424.67	
West Dublin Community Hall	#04873513	\$ 2,405.15	-	did not receive application
Parkdale-Maplewood Comm. Museum	#05404584	\$ 3,835.72	\$ 3,808.32	
Municipality of Lunenburg S.H.A.I.D	#08171777	\$ 3,072.49	\$ 3,013.78	
New Germany and Area Medical Centre Assoc.	#08193592	\$ 3,125.33	\$ 3,050.96	
Lunenburg Co. Search & Rescue	#08218293	\$ 4,015.76	\$ 4,002.07	
Vogler's Cove Community Hall	#09741933	\$ 9.72	\$ 9.72	
New Germany Amateur Athletic Association	#10033438	\$ 146.78	\$ 146.78	
Mahone Islands Conser. Association	#10078466	\$ 119.07	\$ 119.07	
Kingsburg Coastal Conservancy	#10340217	Farm Exempt	Farm Exempt	
	#10350026	\$ 265.68	\$ 265.68	
		\$ 41,098.63	\$ 40,865.75	
		TOTAL Full Exemption (2019)	TOTAL Full Estimated (2020)	

**PROPERTY TAX EXEMPTION RENEWAL APPLICATIONS
FOR THE FISCAL YEAR 2019/2020
(PARTIAL EXEMPTION)**

APPLICATIONS SENT:	ASSESSMENT ACCOUNT #	2018 AMOUNT	2019 Commercial	2019 Residential	2019 Estimate	Notations
The Atlantic Jewish Council	#00645648	\$ 15,837.78	\$ 26,771.76	\$ 11,080.80	\$ 15,690.96	
Lahave River Yacht Club	#02407523	\$ 4,500.83	\$ 8,103.94	\$ 3,354.21	\$ 4,749.73	
Lunenburg Co. Christmas Tree Prod. Association	#02588455	\$ 411.77	\$ 684.95	\$ 283.50	\$ 401.45	
Lunenburg Yacht Club	#02620588	\$ 8,020.97	\$ 13,567.88	\$ 5,615.73	\$ 7,952.15	
Kathleen Noblet Trust	#02770229	\$ 1,726.24	\$ 3,000.08	\$ 1,241.73	\$ 1,758.35	
Mic-Mac Rod Gun club	#03223272	\$ 610.20	\$ 1,037.21	\$ 429.30	\$ 607.91	
The Lunenburg Rod and Gun Club	#04746775	\$ 1,805.38	\$ 2,998.12	\$ 1,240.92	\$ 1,757.20	
Lunenburg Yacht Club	#08154147	\$ 4,573.09	\$ 7,804.52	\$ 3,230.28	\$ 4,574.24	
South Shore Bluegrass Association	#08211213	\$ 2,852.59	\$ 4,855.32	\$ 2,009.61	\$ 2,845.71	
		\$ 40,338.85			\$ 40,337.70	
		TOTAL PARTIAL (2019)			TOTAL ESTIMATED (2020)	

To: Councils of Chester and MODL

Re: Report of the results of the 2018 water quality baseline sampling program on Sherbrooke Lake.

The Sherbrooke Lake Stewardship Committee has completed the first year of a five-year water quality sampling program which will establish a baseline of knowledge concerning water quality conditions in the Sherbrooke Lake. This baseline knowledge will allow Councils and the public to assess the importance and possible sources of changes to the lake's water quality. It has been a challenging first year, as we planned and implemented our first successful field season. Our work has been substantially assisted by the staff of Coastal Action both in the training of volunteers and analysis of results. We respectfully submit the following documents for information and action:

- 1) A two-page summary of the results of the 2018 sampling program,
- 2) A technical support document including detailed results and analysis,
- 3) A communications plan for reaching the public,
- 4) A proposed budget for the 2019 sampling program.

Thank you for your continued support, Garth Bangay, Chair of the Sherbrooke Lake Stewardship Committee

Sherbrooke Lake's 2018 Water Quality Report

Sherbrooke Lake is the largest waterbody in the LaHave River watershed. It covers 16.94 km², has a drainage basin of 285 km², and is fed by 14 inlet streams. Sherbrooke Lake's drainage basin is used for forestry, silviculture, and agriculture, with cottage development and rural communities concentrated around the lake.

Sherbrooke Lake Sampling

A group of trained volunteers, comprised of property-owners around the lake, take field measurements and water samples each month, from May-October. Water samples are collected from lake and stream sites and tested for total suspended solids, total nitrogen, total phosphorus, fecal coliform, hydrocarbons, and chlorophyll A. Four streams are monitored bimonthly, while seven streams around the lake are tested after a large rain event to monitor for water quality changes related to high runoff events. Bottom sediment samples are also collected at two lake sites and one river site, to assess the long-term accumulation of nutrients and metals which can also influence the lake's water chemistry.

How is Sherbrooke Lake's Water Quality?

Bacteria : All lake sites are consistently below Health Canada's 400 CFU/100 mL recreational limits for fecal coliform – the highest lake concentration was 20 CFU/100 mL, well below the threshold. All streams have also never exceeded Health Canada guidelines; however, bacteria concentrations did rise close to the threshold after rainfall events (350 CFU/100 mL was recorded at Butler Lake Brook, and 320 CFU/100 mL at Zwicker Brook, both after more than 30 mm of rain). It appears rain is flushing bacteria into rivers from surrounding surfaces. Although it does not appear to affect the lake quality, **swimming in rivers after a rainfall event should be avoided**. Water from the lake and the rivers should always be treated prior to consumption (i.e. bathing, washing, drinking).

Algal Blooms : Algal blooms are a part of the natural cycle in lakes but can be enhanced in size and frequency if there are pollution sources adding extra nutrients into the environment. In balanced environments, algae and other organisms' growth is limited by the amount of nutrients available; however, if nutrients become available (both naturally through fall and spring turnover and sediment resuspension of nutrients, or human-caused pollution), algae can spread. Not all plumes are algae (pollen from pine trees can form films in the water), and not all algae are toxic; however, only a water quality test can confirm the presence/absence of toxic algae species. No algal bloom was detected in Sherbrooke Lake during 2018; however, there is always the possibility for blooms in the future.

Sherbrooke Lake Stewardship

Monitoring of Sherbrooke Lake is led by the Sherbrooke Lake Stewardship Committee, a group comprised of five citizen representatives appointed by the Municipality of Chester, and the Municipality of the District of Lunenburg. The group receives technical support from Coastal Action, which is also leading the related LaHave River watershed study which includes monitoring of water quality at one tributary to the lake and downstream of the lake's output since 2007. In 2018, the cost of the Sherbrooke Lake water quality survey was \$22,000.00, primarily for laboratory analyses of the water samples. Both municipalities share this funding in support of the program to provide public access to Sherbrooke Lake.

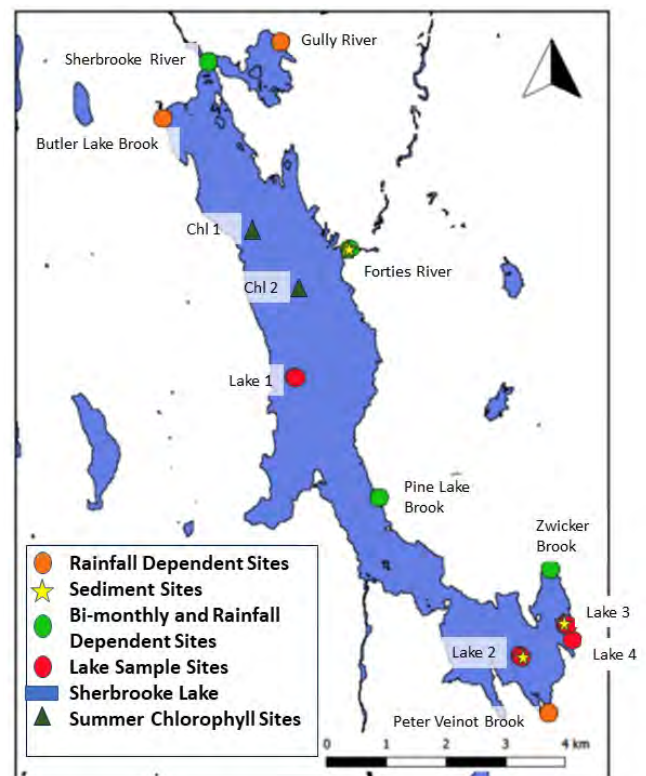


Figure 1: Sampling sites for the 2018 Sherbrooke Lake water quality program.

Nutrients : The tributaries feeding Sherbrooke Lake have higher nutrient concentrations than the lake; however, rainfall sampling observed the highest peaks of nutrients, suggesting nutrients and fertilizers are flushed off land and into the water during storms. 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 shoreline and watershed. Nutrient inputs from human activities should be minimized as much as possible.

Hydrocarbons : Throughout the entire 2018 program, no site has had detectable concentrations of hydrocarbons (carbon compounds found in petroleum and natural gas).

Other Concerns : Two other conditions in the lake are of concern: first, the low oxygen conditions that occur in deep bottom waters during the summer and the implications this holds for organisms and potential nutrient re-release from bottom sediments and second, the elevated levels of mercury, arsenic, cadmium, and lead in lake sediments and the implications for uptake by aquatic biota, including fish.

Overall the 2018 sampling program indicated that Sherbrooke Lake is healthy but shows that human activity has already impacted the lake. The current lake water quality remains vulnerable to the addition of nutrients and fecal bacteria from its tributaries and increased shoreline development and use. A more detailed report on the 2018 sampling program is available upon request or online from the Municipality of Chester and the Municipality of the District of Lunenburg.

- chester.ca/recreation-parks/sherbrooke-lake-park
- modl.ca/sherbrookelake



Figure 2: Algal bloom washing ashore a lake's beach. Smpsy/Shutterstock.com.

How Can You Help?

To help protect the Sherbrooke Lake, and all other water bodies, it is important to remember that you have an impact on the environment!

To Reduce Nutrients and Algal Blooms: When mowing your lawn, or harvesting crops, leave a buffer zone (known as a 'riparian zone') along the edge of all waterbodies. This zone will help protect the water against erosion, and filter runoff pollutants and excess nutrients! Be mindful when buying dish soaps – some contain phosphorus which can promote algal blooms. Do not fertilize your lawns, as those nutrients will be washed into nearby streams and into Sherbrooke Lake. **If an algal bloom occurs, inform your homeowners association president so the situation can be assessed;** remember, if toxic algae are present, their toxins can last several weeks after the bloom disappears, so be careful around the water and rinse off after contact (including pets!).

To Reduce Fecal Bacteria: No one should discharge their sewage or grey water through a straight pipe to the lake or its tributaries. A properly designed and maintained septic tank or approved composting system are the only effective ways which can properly treat domestic waste (See Nova Scotia Environment for further information). Maintain and pump your septic system regularly, keep livestock out of the water by providing them with alternative watering sources, and pick up your dog's waste.

To Reduce Hydrocarbons: Don't let your boat's motor idle – turn it off when not in use. Be cautious with fuels and chemicals used around the house, car, and boat; be careful not to spill, and to clean up and dispose of waste properly if a spill occurs.



Figure 4: A secchi disk, which is used by Sherbrooke Lake volunteers to determine the clarity of the water.



Figure 3: A YSI sonde with built-in sensors used by Sherbrooke Lake volunteers to monitor the physical properties of the water.



Coastal Action is a community-based charitable organization with a mandate to address environmental concerns along the South Shore of Nova Scotia. Coastal Action's mission is to restore and protect the environment through research, education, and action.

Sherbrooke Lake

2018 Water Quality Monitoring Report

Prepared for
Municipality of Chester
Municipality of the District of Lunenburg
Sherbrooke Lake Stewardship Committee

By
Bluenose Coastal Action Foundation
37 Tannery Road, PO Box 730
Lunenburg, N.S.
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December 2018



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1. Introduction

1.1. Sherbrooke Lake Background

Sherbrooke Lake (SL) is located in the headwaters of the LaHave River watershed, in Southern Nova Scotia. Sherbrooke Lake covers 16.94 km² – the largest waterbody within the LaHave watershed – and has a 285 km² drainage basin (Figure 1). Although SL is fed by 14 inlet streams, many are less than 1 km in length. Sherbrooke River is the largest inlet stream feeding SL, while North Branch is the only outlet stream of the lake - located on the South-Southwest side of the lake.

The water quality of the LaHave River watershed has been monitored by Coastal Action since 2007. The program monitors 15 sites throughout the watershed, including the Sherbrooke River which feeds the lake, and the lake's outlet downstream. A water quality index (WQI) report card of the status of the watershed and the individual sites is reported annually and available at the Coastal Action website (<http://coastalaction.org/Wordpress/>).

Forestry, silviculture, and agriculture dominate the LaHave River watershed and SL sub-watershed. Rural communities are also located throughout, with cottages and camps found along the edge of SL.

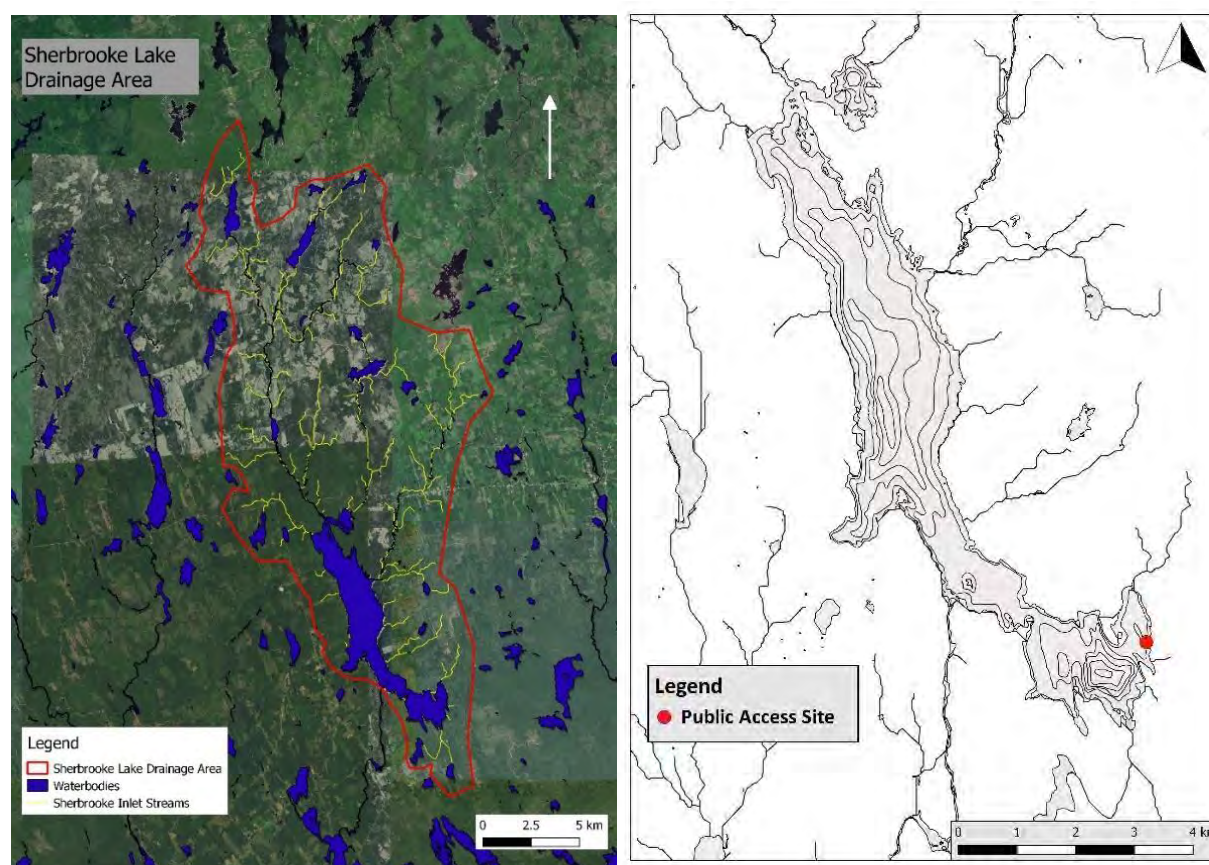


Figure 1: Left - Streams (yellow) and drainage boundary (red) of Sherbrooke Lake. Right – Bathymetry of Sherbrooke Lake and proposed public access site (red circle).

In 2015, the Municipality of the District of Lunenburg (MODL) began investigating ways to allow public access to the lake by appointing the Sherbrooke Lake Access Advisory Committee (SLAAC). SLAAC was to present options for accessing SL, and to obtain community advice and input throughout the process. After public consultations, held by UPLAND Planning + Design, a section of land on the South-Eastern side of the lake was determined to be the public access site (Figure 1). In the report provided to SLAAC by UPLAND Planning + Design, the implementation of a water quality committee for Sherbrooke Lake was recommended.

1.2. Program Background

As a result of the planned public access site at SL, the Sherbrooke Lake Stewardship Committee (SLSC) was formed. The SLSC, a joint commitment between MODL and the Municipality of Chester (MOC), is comprised of one Bluenose Coastal Action Foundation (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 Sherbrooke Lake prior to 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.

Although a preliminary monitoring program was implemented in 2017, the full Sherbrooke Lake Water Quality Monitoring Program began in May 2018. The 2018 monitoring program consisted of three lake sites monitored for various chemicals monthly from May to October, two additional lake sites monitored during the summer months for chlorophyll *a*, four streams monitored bimonthly from May to October, seven streams monitored once after a rainfall event (>20 mm rainfall within 24 hours), two lake sites and one stream site where one-time sediment samples were obtained for analyses, and two lake sites where one-time lake profiles and nutrients at-depth were obtained for analyses (Figure 2, Table 1). The 2018 monitoring program incorporated trained volunteers to collect the water and sediment samples throughout the field season, while Coastal Action coordinated the sampling and analyzed the data (for full methodology please refer to the *Sherbrooke Lake Water Quality Monitoring Program* available upon request from either the Municipality of Chester or the Municipality of the District of Lunenburg).

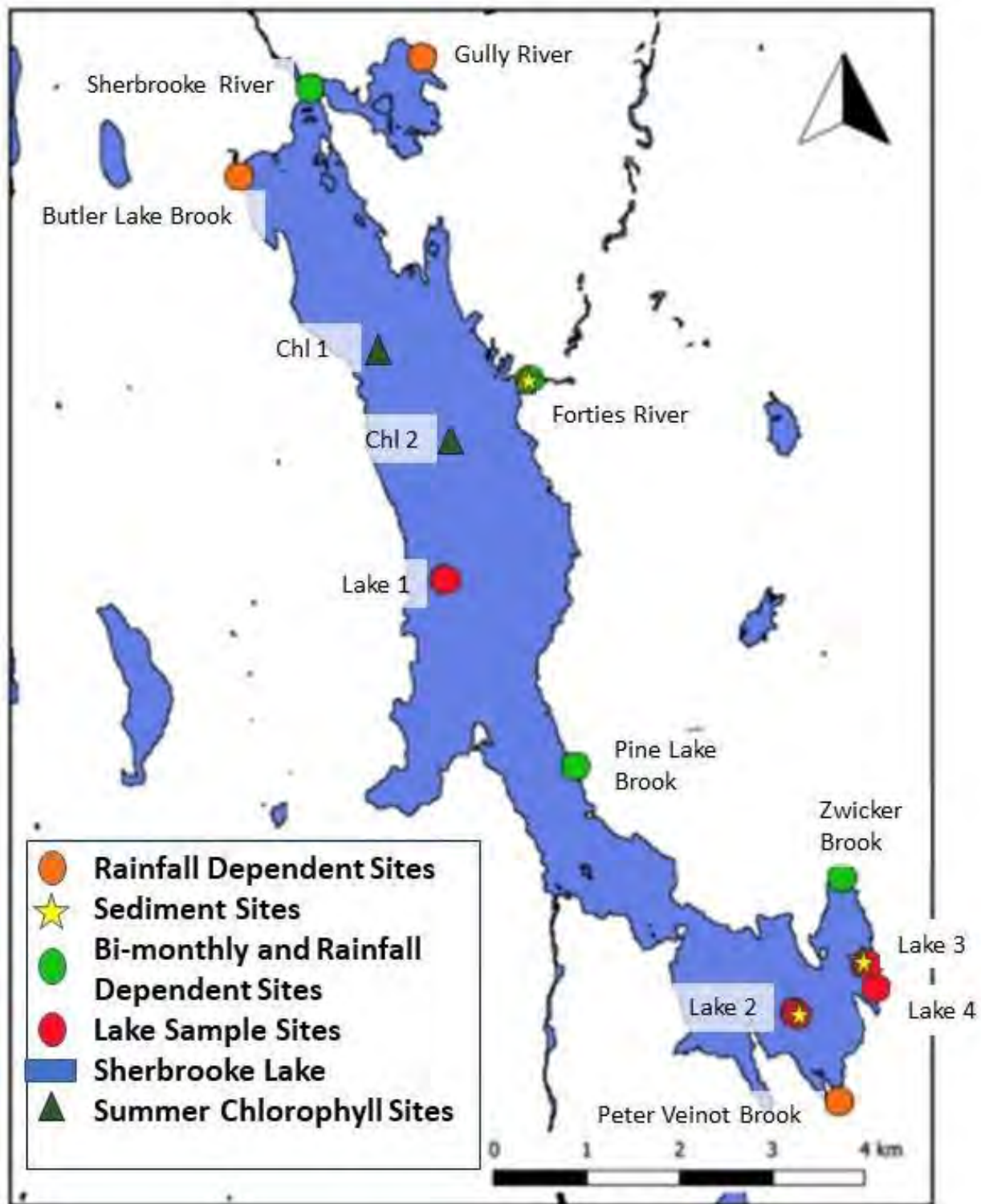


Figure 2: Sherbrooke Lake 2018 Water Quality Monitoring Program sampling locations.

Table 1: Monitoring program parameters, site locations, and sampling frequencies for the 2018 Sherbrooke Lake Water Quality Monitoring Program. New coordinates to access river sites via road are in blue.

Sample Site Name	Site Coordinates (UTM Zone 20T)	Sampling Frequency	Parameters Sampled
Lake 1	372287 E, 4947688 N	Monthly (May-Oct.)	YSI ⁺ , hydrocarbons, total suspended solids, total phosphorus, total nitrogen, fecal coliform, chlorophyll <i>a</i> , Secchi disk depth. One-time depth profile.
Lake 2	376072 E, 4943018 N	Monthly (May-Oct.)	YSI, hydrocarbons, total suspended solids, total phosphorus, total nitrogen, fecal coliform, chlorophyll <i>a</i> , Secchi disk depth. One-time dept profile and sediment grab.
Lake 3 (Public Access)	376831 E, 4943540 N	Monthly (May-Oct.)	YSI, hydrocarbons, total suspended solids, total phosphorus, total nitrogen, fecal coliform, chlorophyll <i>a</i> , Secchi disk depth. One-time sediment grab.
Lake 4* (Public Access Boat Launch)	376844 E, 4943371 N	Monthly (Sept – Oct.)	YSI, hydrocarbons, total suspended solids, total phosphorus, total nitrogen, fecal coliform, chlorophyll <i>a</i> .
Chl 1	371682 E, 4949984 N	Monthly (June-Aug.)	YSI, chlorophyll <i>a</i> , Secchi disk depth.
Chl 2	372466 E, 4949027 N	Monthly (June-Aug.)	YSI, chlorophyll <i>a</i> , Secchi disk depth.
Butler Lake Brook	370079 E, 4952036 N	One-time, rainfall-dependent	YSI, total suspended solids, total phosphorus, total nitrogen, fecal coliform, chlorophyll <i>a</i> .
Sherbrooke River	370845 E, 4952984 N 369774 E, 4954072 N	Bi-monthly (May, July, Sept.) & rainfall-dependent	YSI, total suspended solids, total phosphorus, total nitrogen, fecal coliform, chlorophyll <i>a</i> .
Gully River	372050 E, 4953315 N 372246 E, 4953404 N	One-time, rainfall-dependent	YSI, total suspended solids, total phosphorus, total nitrogen, fecal coliform, chlorophyll <i>a</i> .
Forties River	373210 E, 4949840 N 373539 E, 4949823 N	Bi-monthly (May, July, Sept.) & rainfall-dependent	YSI, total suspended solids, total phosphorus, total nitrogen, fecal coliform, chlorophyll <i>a</i> . One-time sediment grab.
Pine Lake Brook	373705 E, 4945670 N	Bi-monthly (May, July, Sept.) & rainfall-dependent	YSI, total suspended solids, total phosphorus, total nitrogen, fecal coliform, chlorophyll <i>a</i> .
Zwicker Brook	376582 E, 4944469 N	Bi-monthly (May, July, Sept.) & rainfall-dependent	YSI, total suspended solids, total phosphorus, total nitrogen, fecal coliform, chlorophyll <i>a</i> .
Peter Veinot Brook	376552 E, 4942058 N 376507 E, 4941558 N	One-time, rainfall-dependent	YSI, total suspended solids, total phosphorus, total nitrogen, fecal coliform, chlorophyll <i>a</i> .

⁺YSI is a multi-parameter water quality device that measures the physical characteristics (temperature, dissolved oxygen, pH, total dissolved solids, salinity, pressure, and specific conductivity) of the water at the time of sampling.

*Lake 4 site added in September 2018 after a Sherbrooke Park Design Meeting to obtain water quality specifically at the lake site near the planned boat launch.

1.3. Objectives and Scope of Work

The objective of this program is to provide a water quality overview for Sherbrooke Lake, which can help the SLSC provide evidence-based advice to both MODL and MOC. Within the SLSC, Coastal Action's scope of work included:

- Designing and writing the Sherbrooke Lake 2018 Water Quality Monitoring Program
- Ordering and ensuring correct bottles from Maxxam Analytics
- Creating and printing waterproof field sheets for each sampling month
- Implementing two days of volunteer training
- Calibrating and caring for the MODL-MOC YSI monthly
- Ensuring volunteers obtained all required field equipment for field work
- Transferring data from field sheets and Maxxam into a database and analyzing data
- Attending SLSC meetings and presenting water quality results
- Preparing this report to summarize results and recommendations for water quality related to Sherbrooke Lake

2. Water Quality Monitoring Results

2.1. Physical Water Parameters

2.1.1. Surface Water Temperature

Water temperature is a key parameter in understanding and assessing the health and productivity of an aquatic environment, as it directly impacts organisms, while also affecting other physical and chemical parameters. Water temperature can impact the presence and survival of fish, where temperatures outside of a species' optimal range can negatively affect fish survival (NSSA, 2014); 20°C is the maximum acceptable temperature for salmon and trout (Alabaster and Lloyd, 1982). In addition, increased water temperature decreases a waterbody's capacity to hold oxygen, thereby limiting available oxygen to aquatic organisms.

In the lake sites, temperatures ranged from 10.2-26.7°C, while streams ranged from 13-26.5°C (Figures 3 and 4). The lake sites exceeded 20°C between June to August 2018, while the stream sites exceeded 20°C in July and August 2018. In the lake, surface temperatures exceeding 20°C will not greatly affect organisms, as aquatic life can take refuge in the cooler deep waters below; however, this is not the case for streams. The highest water temperatures were recorded at Sherbrooke River and Forties River. The lower temperatures observed at Pine Lake Brook and Zwicker Brook may be due to higher percentage of shade covering the waters (from tree canopies) due to smaller stream widths (compared to Sherbrooke and Forties). Pine Lake Brook and Zwicker Brook exceeded that 20°C threshold only once (by 0.1°C in July 2018) – these streams appear to provide a suitable habitat for aquatic organisms year-round.

Following the one-time rainfall sampling event, 5/7 streams were below 20°C, with only Sherbrooke and Forties exceeding the threshold.

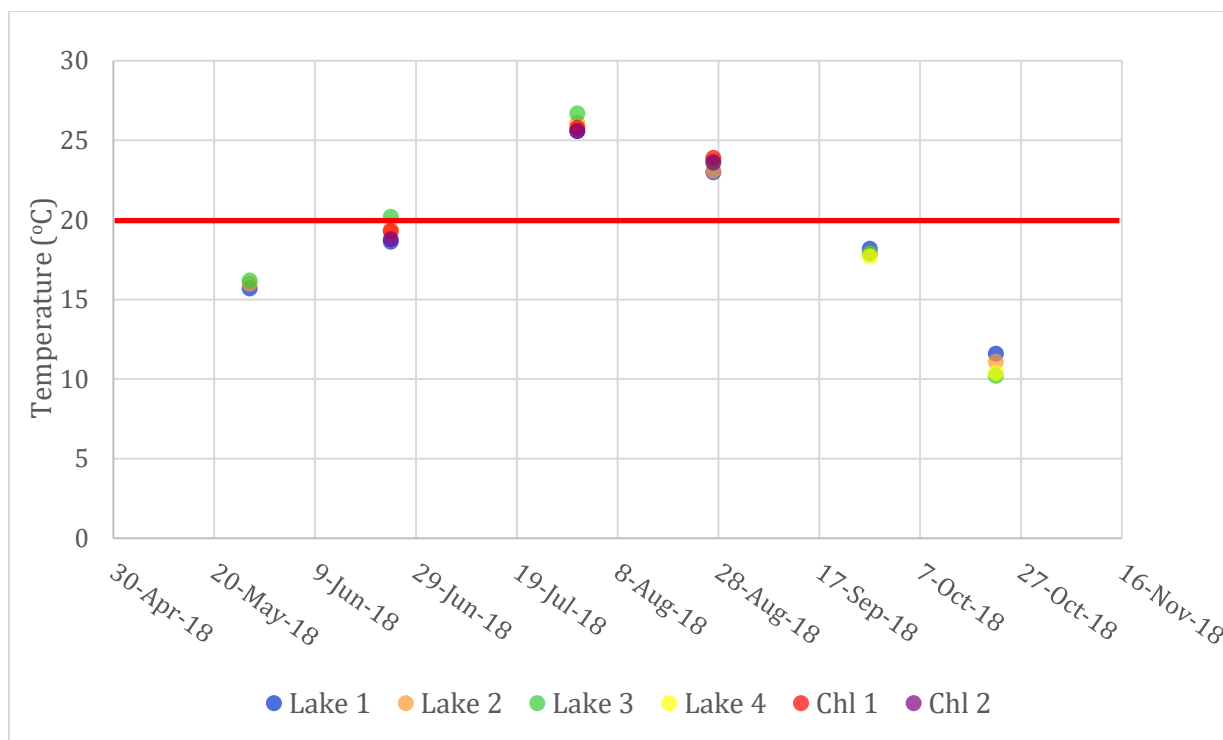


Figure 3: Water temperatures at four monthly lake sites (Lake 1-4), and two summer-only sites (Chl 1 and Chl 2) during the May-October 2018 SL water quality field season. Red line indicates the 20°C limit for survival of aquatic organisms.

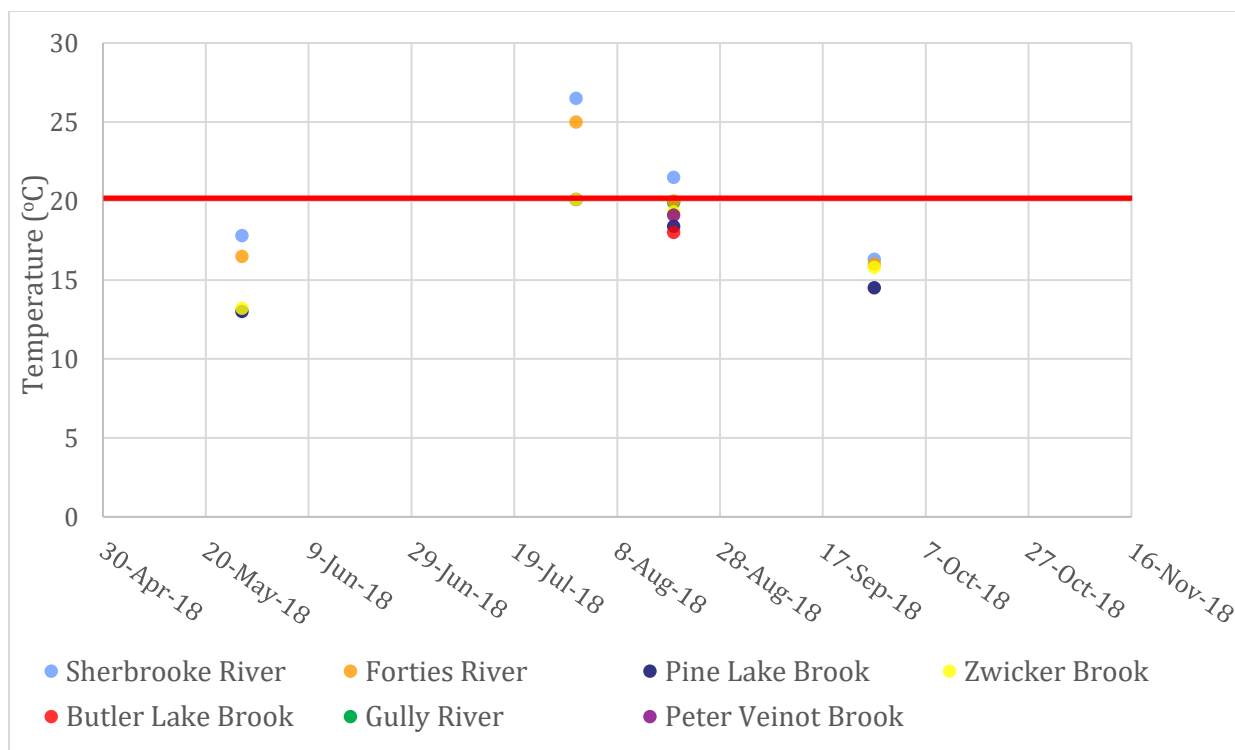


Figure 4: Water temperatures at four bimonthly and rainfall-dependent stream sites (Sherbrooke River, Forties River, Pine Lake, and Zwicker Brook), in addition to three rainfall-dependent stream sites (Butler Lake Brook, Gully River, and Peter Veinot Brook). Red line indicates the 20°C limit for survival of aquatic organisms.

2.1.2. Surface Dissolved Oxygen

Dissolved oxygen (DO) is another key physical water parameter, as it is required for the survival of aquatic organisms and affects how nutrients are cycled and released within lake waterbodies. The Canadian Council of Ministers of the Environment (CCME) set a guideline at ≥ 6.5 mg/L for the protection of aquatic life for cold water species – species found in lakes such as Sherbrooke (CCME, 1999). DO not only affects aquatic organisms, but also is controlled by organisms (due to consumption), water temperature, and the waterbody's ability to mix and engulf DO (wind and waves increase dissolved oxygen into the water).

Of the lake and stream sites, only one stream site had DO below 6.5 mg/L throughout the 2018 field season (Figures 5 and 6). The six lake sites monitored in SL were always >7 mg/L, even as DO decreased during summer months due to biological demand. The high DO concentrations may be attributed to the sampling depths for these monthly and bimonthly samples, as only surface water was monitored and therefore influenced by the DO engulfment via winds and waves. The seven stream sites also appear to be well oxygenated and suitable for aquatic life – even the Peter Veinot Brook measurement below 6.5 mg/L was only 0.09 mg/L below the threshold.

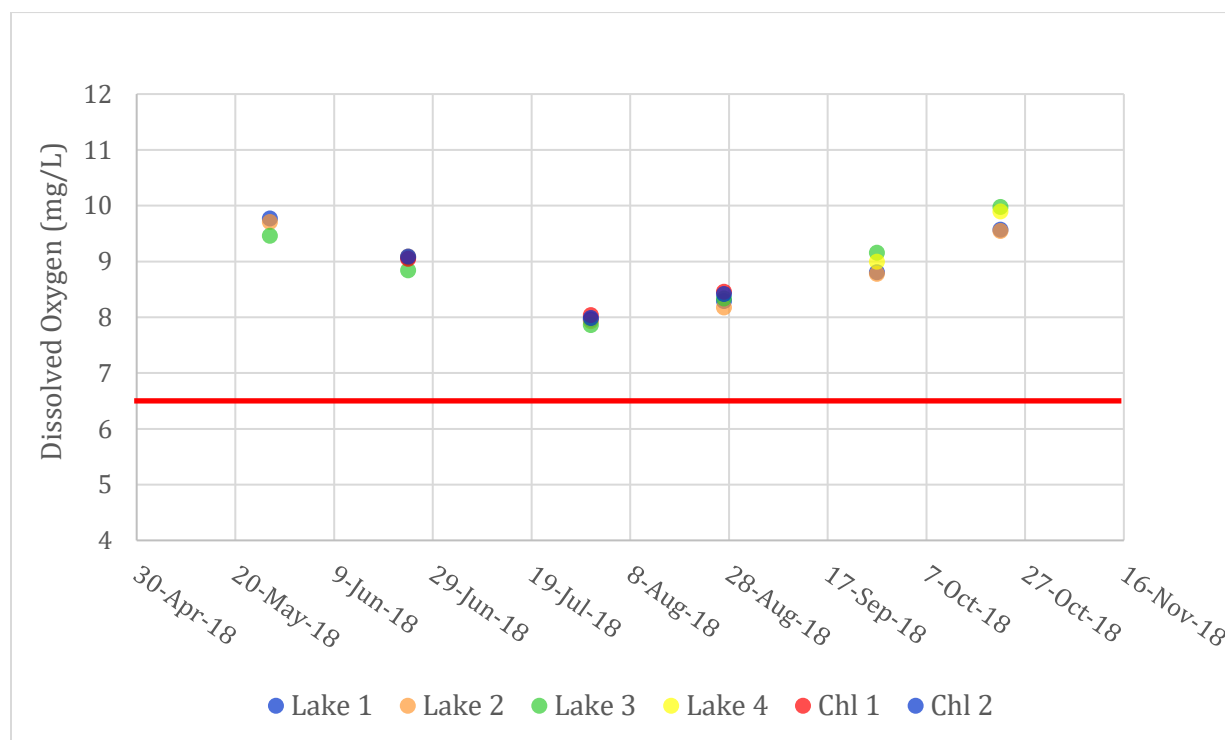


Figure 5: DO at four monthly lake sites (Lake 1-4), and two summer-only sites (Chl 1 and Chl 2) during the May-October 2018 SL water quality field season. Red line indicates CCME's 6.5 mg/L DO minimum-threshold for survival of aquatic organisms.

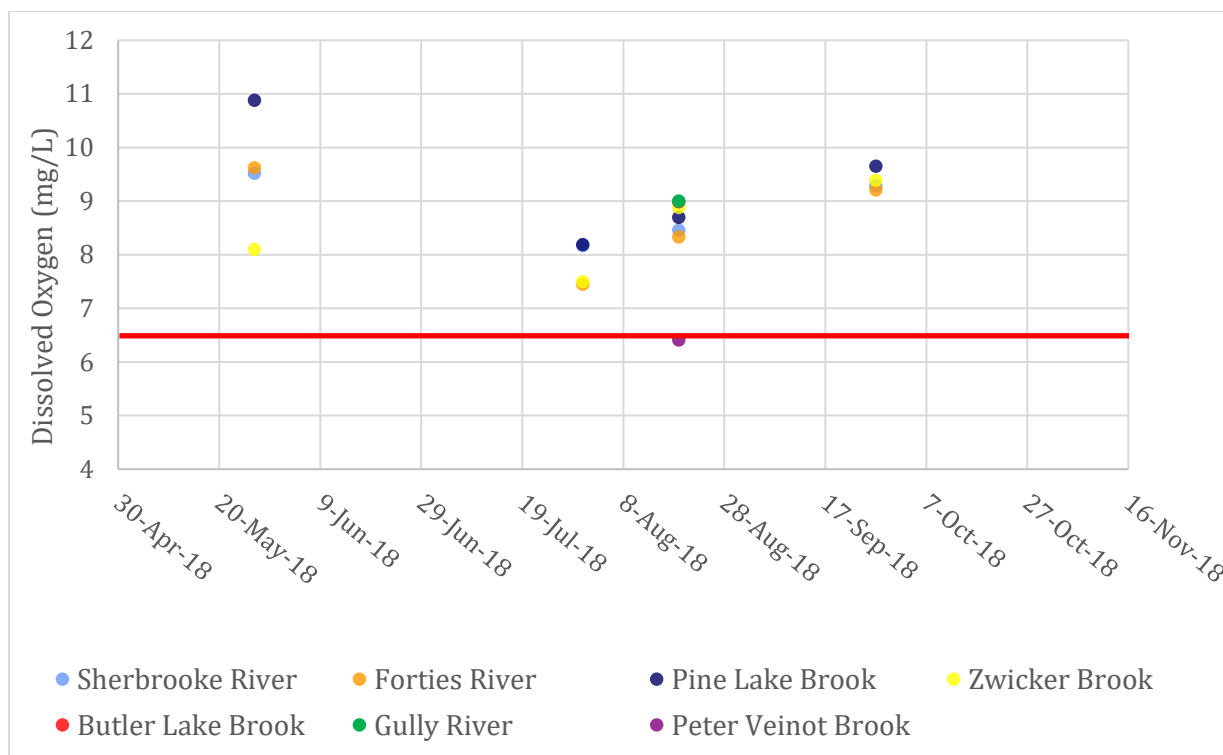


Figure 6: DO at four bimonthly and rainfall-dependent stream sites (Sherbrooke River, Forties River, Pine Lake, and Zwicker Brook), in addition to three rainfall-dependent stream sites (Butler Lake Brook, Gully River, and Peter Veinot Brook). Red line indicates CCME's 6.5 mg/L DO minimum-threshold for survival of aquatic organisms.

2.1.3. Depth Profiles

2.1.3.1. At-Depth Water Temperature

The water profile at lake sites 1 and 2 in August 2018 indicate that both sites have a thermal stratification – Lake 2 having a stronger stratification than Lake 1 (Figure 7). Stratification begins at a shallower depth (5 m) for Lake 2 than Lake 1 (8 m). Lake 2's thermocline is 8 m thick, separating the >20°C surface waters from the <10°C deep waters. Lake 1's thermocline is only 2 m thick, with ~5°C separation between surface and deep waters. The presence of a thermocline at both lake sites indicates that the nutrient-rich, cold deep waters are not mixing with the nutrient-limited, warm surface waters during the summer months; mixing and redistribution of nutrients within the lake is therefore only occurring during spring and fall turnover, when water temperature is uniform at all depths and no density-differences inhibit mixing.

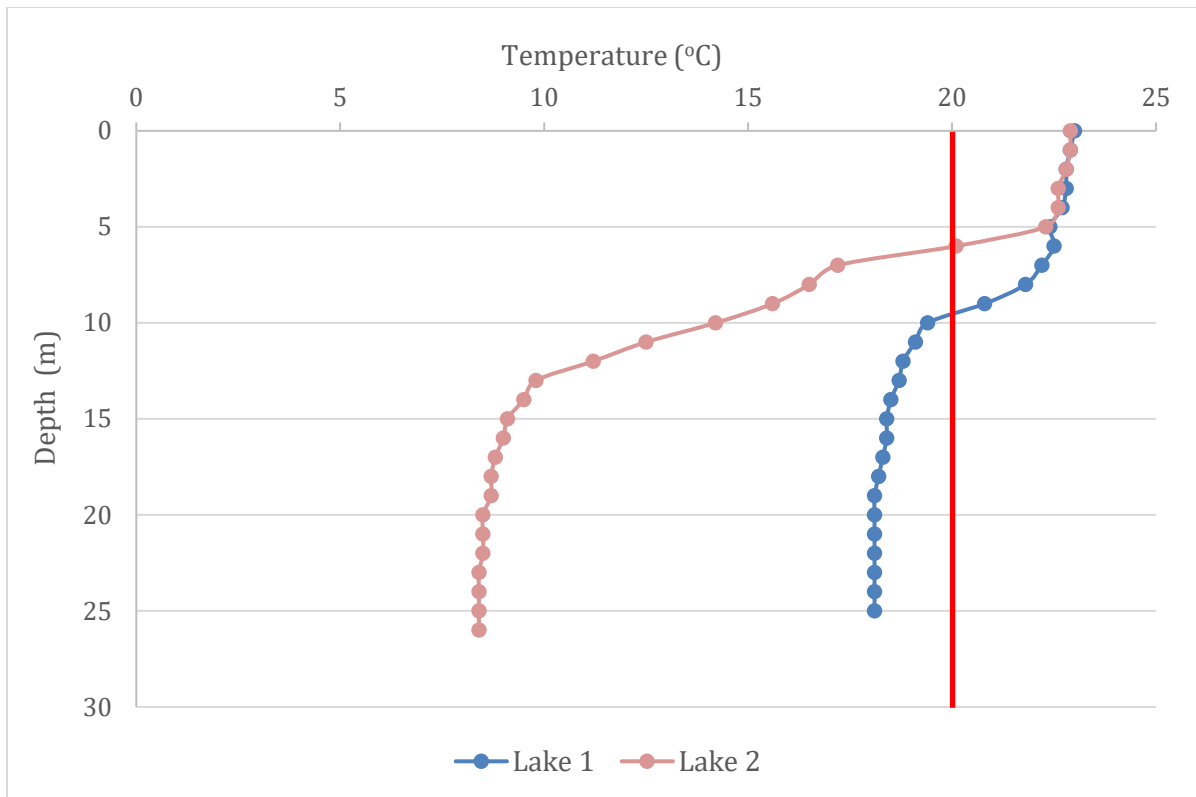


Figure 7: Water temperature depth profile from two lakes during the August 2018 sampling of SL. Red line indicates the 20°C limit for survival of aquatic organisms.

2.1.3.2. At-Depth Dissolved Oxygen

In addition to the thermocline that is present in the lake sites' depth profiles, DO is also stratified at the two sites (Figure 8). Of the four common DO profiles in lakes (Figure 9), Lake 1 presents a clinograde curve, where DO is highest in the surface waters and lowest in the deep waters. Clinograde curves often occur in mesotrophic and eutrophic lakes, where microbial decomposition uses and depletes the lake's DO. Lake 2 appears to have a negative heterograde curve. Negative heterograde curves have a distinct reduction in DO at depth – this may be due to increased organic matter trapped within the thermocline, acting as a source of food for microbes and increasing DO depletion from microbial decomposition. DO increases past the decomposition depth due to the lack of food encouraging microbial decomposition. There is a drop of DO at the base of the lake in Lake 2 - this may be due to increased microbial presence – again due to increased nutrients available (decaying organisms and litter would sink to the sediment, acting as a food source of microbes).

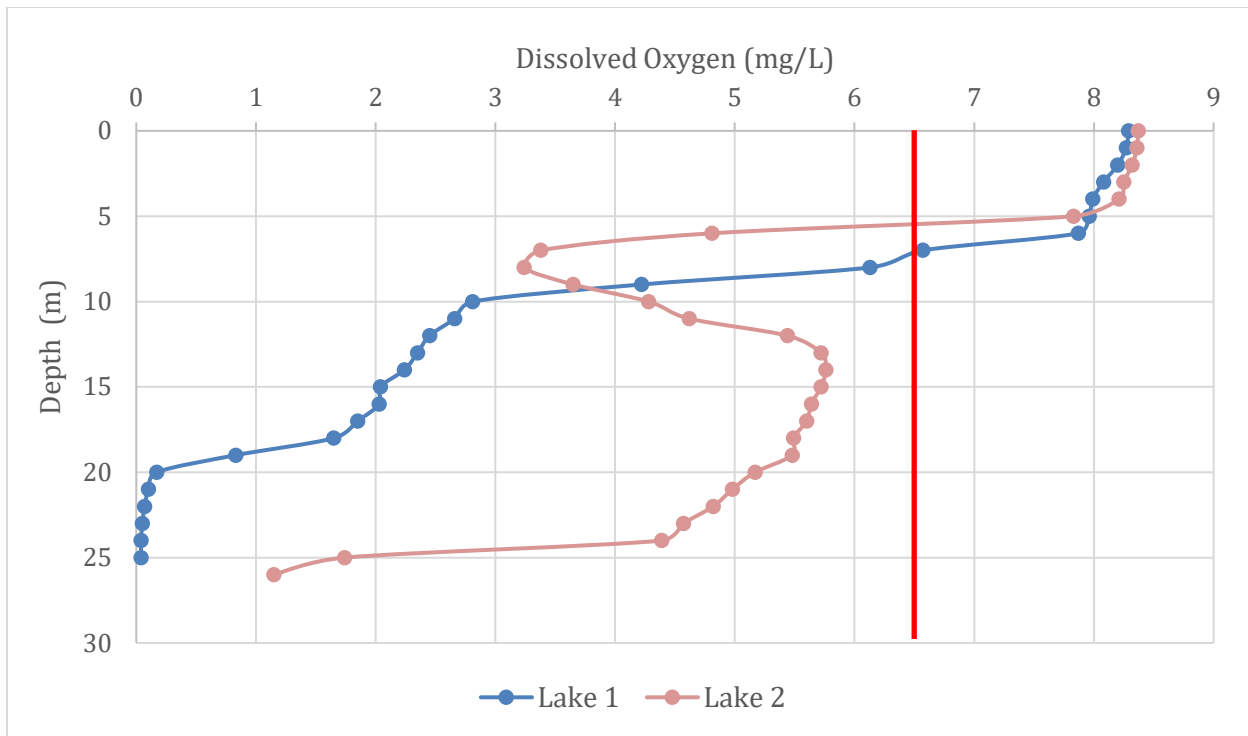


Figure 8: DO depth profile from two lake sites during the August 2018 sampling of SL. Red line indicates CCME's 6.5 mg/L DO minimum-threshold for survival of aquatic organisms.

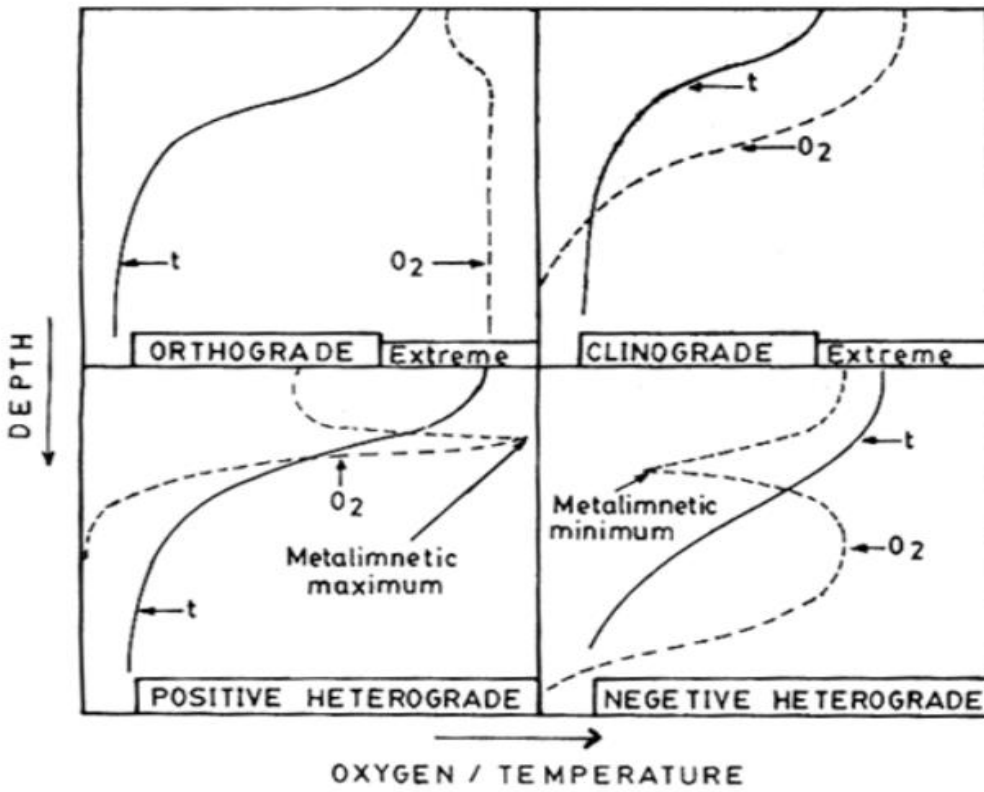


Figure 9: Four common water temperature and DO depth profiles, from Hutchinson, 1957.

Due to the stratification of the lake sites 1 & 2, no summer mixing occurs, resulting in a finite supply of DO for organisms below the thermocline until fall turnover. At depths below 7 m for Lake 1, DO falls below the CCME 6.5 mg/L guideline, while depths below 5 m at Lake 2 also have <6.5 mg/L of DO available. As microbes continue to consume the finite supply of DO in the deep lake waters, the stress of low-DO on aquatic organisms will only increase until the water's DO is replenished during fall turnover.

It appears at the bottom of the lake at both Lake 1 and Lake 2, waters become hypoxic (<2 mg/L) and anoxic (<1 mg/L) and have decreased capacity to support aquatic life (USGS, 2014; Brylinsky, 2004). As oxygen is necessary for aquatic life, anoxic conditions can be harmful and even kill organisms that pass through anoxic waters. In addition, anoxic conditions can cause phosphorus locked in the sediment to change states and be released into the water column, potentially over-enriching the waters with new nutrients and causing algal blooms.

2.1.4. pH

pH is a parameter used to access the acidity of a substance, with pH being the negative logarithmic of the hydrogen ion concentration of the solution (Equation 1). The pH scale ranges from 0 (most acidic) to 14 (most basic), with 7 being the neutral point. In natural waters, due to the dissolution of carbon dioxide, water pH is slightly more acidic than neutral (~6.5), with geology, organic materials, and rain inputs also affecting the water's natural pH state; due to such natural variations, the CCME has set a pH range of 6.5-9.0 as a guideline for the protection of aquatic life (CCME, 2007).

Equation 1: $pH = -\log([H^+])$

Particularly in Nova Scotia, natural organic matter, acid rock drainage from specific bedrock formations, and decades of acid precipitation have lowered the pH of waters in the province and negatively affected fish populations. Although the CCME has set a threshold of 6.5, many aquatic organisms have adjusted to Nova Scotia's acidic waters, with trout species surviving in waters as low as 4.7 (NSSA, 2014). Although organisms can survive in acidic conditions, Harvey and Lee (1982) reported fish kills associated with exposure to highly acidic waters from hours to days, while Courtney and Clements (1998) reported significant reductions in invertebrates after seven days of exposure to acidic conditions (pH 4.0).

pH within the lakes and rivers of the 2018 SL monitoring program varied between 3.2-6.6 (Figures 10 and 11). Lake 3 consistently had the highest pH values, while only Lake 2 and Lake 4 fell below 5.5 (4.22 and 3.24, respectively). It is unclear what caused Lake 4's pH to drop to 3.24 during the October sampling, and more data is required to understand if the pH of this site is commonly acidic, or if this was an anomaly. Of the stream sites, the lowest recorded pH was 5.05 at Pine Lake Brook – Pine Lake Brook was consistently one of the lowest pH sites during the 2018 field season.

Even with pH values below the CCME's 6.5-pH threshold at lake and river sites, the data suggest that pH would not negatively affect aquatic life in the streams and most lake sites. For the stream sites, pH >5.0 is adequate for the survival of fish and invertebrates (Morris, Taylor, and Brown, 1989). Of the lake sites, only Lake 2 and Lake 4 pose a threat to aquatic life; however, as the length of the low-pH conditions are

unknown – due to the monthly sampling frequency of the program – it is unclear if these conditions pose short-term or long-term concerns to aquatic life.

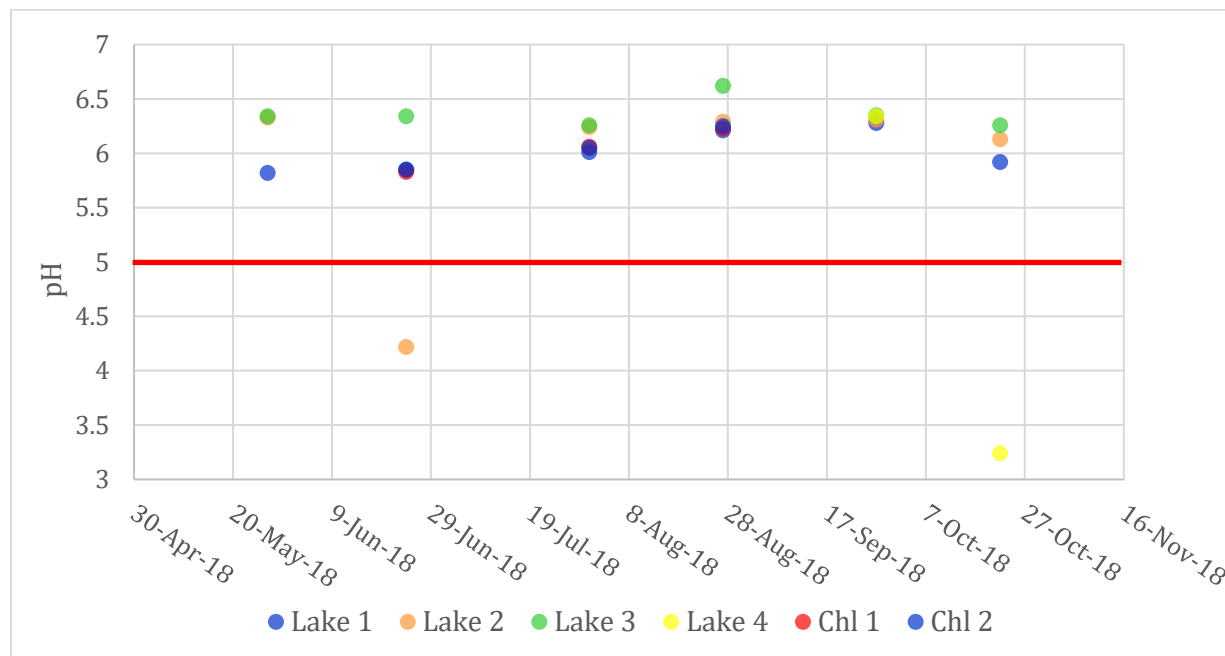


Figure 10: pH at four monthly lake sites (Lake 1-4), and two summer-only sites (Chl 1 and Chl 2) during the May-October 2018 SL water quality field season. Red line indicates the 5.0-pH minimum threshold for survival of fish and invertebrates (Morris, Taylor, and Brown, 1989).

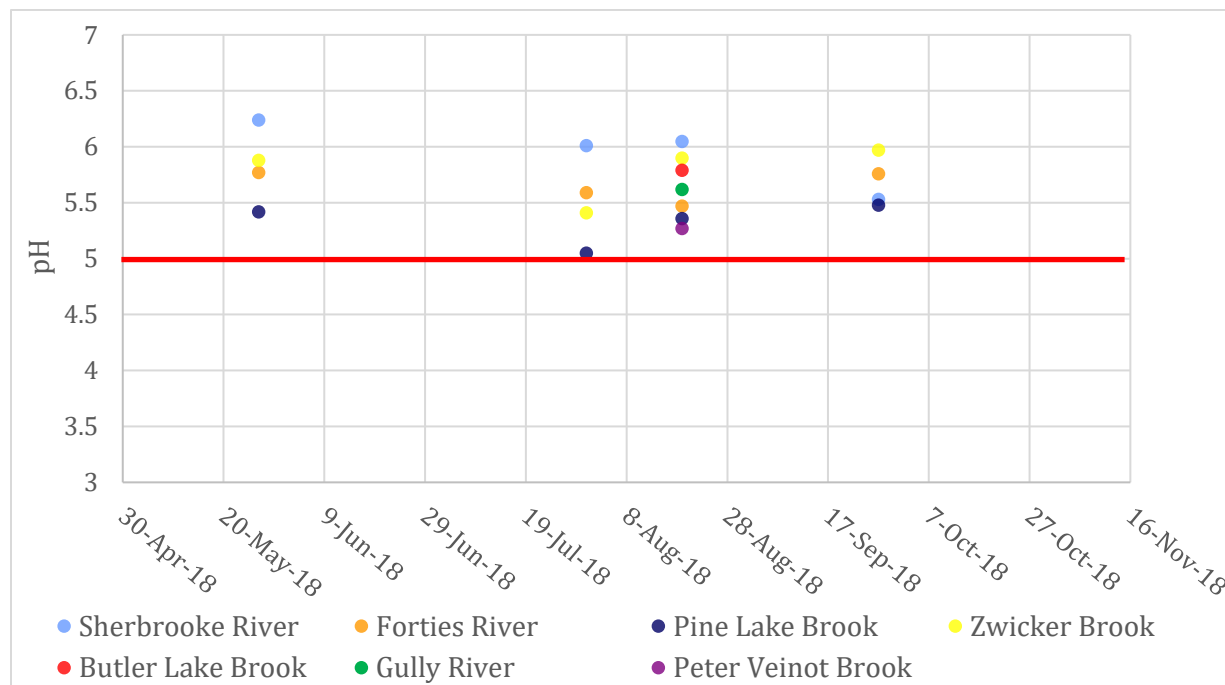


Figure 11: pH at four bimonthly and rainfall-dependent stream sites (Sherbrooke River, Forties River, Pine Lake, and Zwicker Brook), in addition to three rainfall-dependent stream sites (Butler Lake Brook, Gully River, and Peter Veinot Brook). Red line indicates the 5.0-pH minimum threshold for survival of fish and invertebrates (Morris, Taylor, and Brown, 1989).

2.1.5. Total Dissolved Solids

Total dissolved solids (TDS) – a measurement of dissolved materials in water – is an invaluable parameter. TDS can be influenced by construction, deforestation, sewage effluent, urban and agricultural run-off, industrial waste, road salts, forest fires, and rainfall/flooding events, and therefore provides insight into potential pollution issues affecting the water. Although there is no CCME guideline for TDS, high concentrations of TDS can affect a water's taste, colour, and clarity (NSSA, 2014), and reductions in clarity can decrease the depth of light penetration and affect rooted vegetation. For most of Nova Scotia's lakes, TDS ranges from 5 to 235 mg/L (Nova Scotia Lake Inventory Program, 2017).

TDS of the six SL lake sites never exceeded 20.0 mg/L, while most streams had TDS concentrations >20 mg/L (Table 2, Figures 12 and 13). TDS was very similar between lake sites, while streams had slightly more TDS concentration variation between sites. Of the four bimonthly stream sites monitored, no site indicated an increase in TDS during the rainfall sampling event. Butler Brook had the highest recorded TDS concentration (39 mg/L), which is consistent with its 2017 preliminary data (33.8 mg/L), suggesting that the brook has naturally high TDS concentrations. TDS concentrations from SL fall along the lower end of the TDS range for Nova Scotia's lakes.

Table 2: Mean and maximum TDS concentrations from lake and river sites during the 2018 SL field season.

Site Type	Site	Mean TDS (mg/L)	Maximum TDS (mg/L)
Lake	Lake 1	18.8	20.0
	Lake 2	18.2	19.0
	Lake 3	18.2	19.0
	Lake 4	18.5	19.0
	Chl 1	19.0	20.0
	Chl 2	18.3	19.0
Stream	Sherbrooke River	21.3	23
	Forties River	19.0	24
	Pine Lake Brook	17.9	21
	Zwicker Brook	19.0	23
	Butler Brook	-	39
	Gully River	-	14
	Peter Veinot Brook	-	21

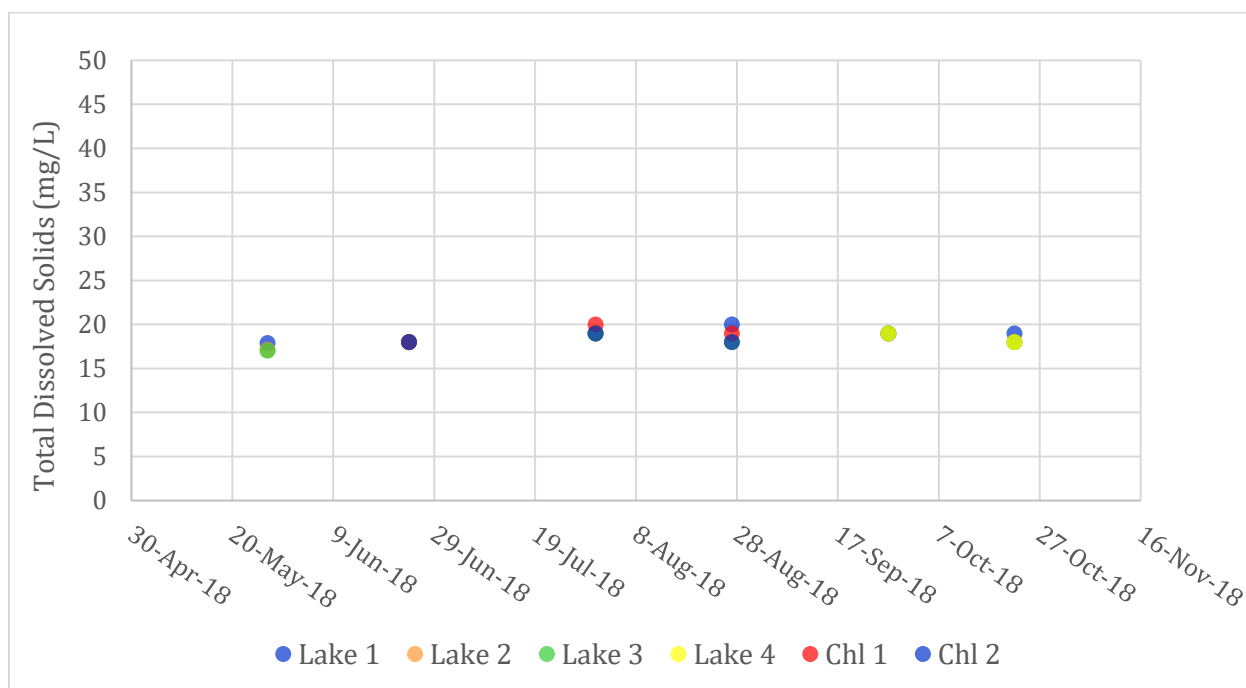


Figure 12: TDS at four monthly lake sites (Lake 1-4), and two summer-only sites (Chl 1 and Chl 2) during the May-October 2018 SL water quality field season.

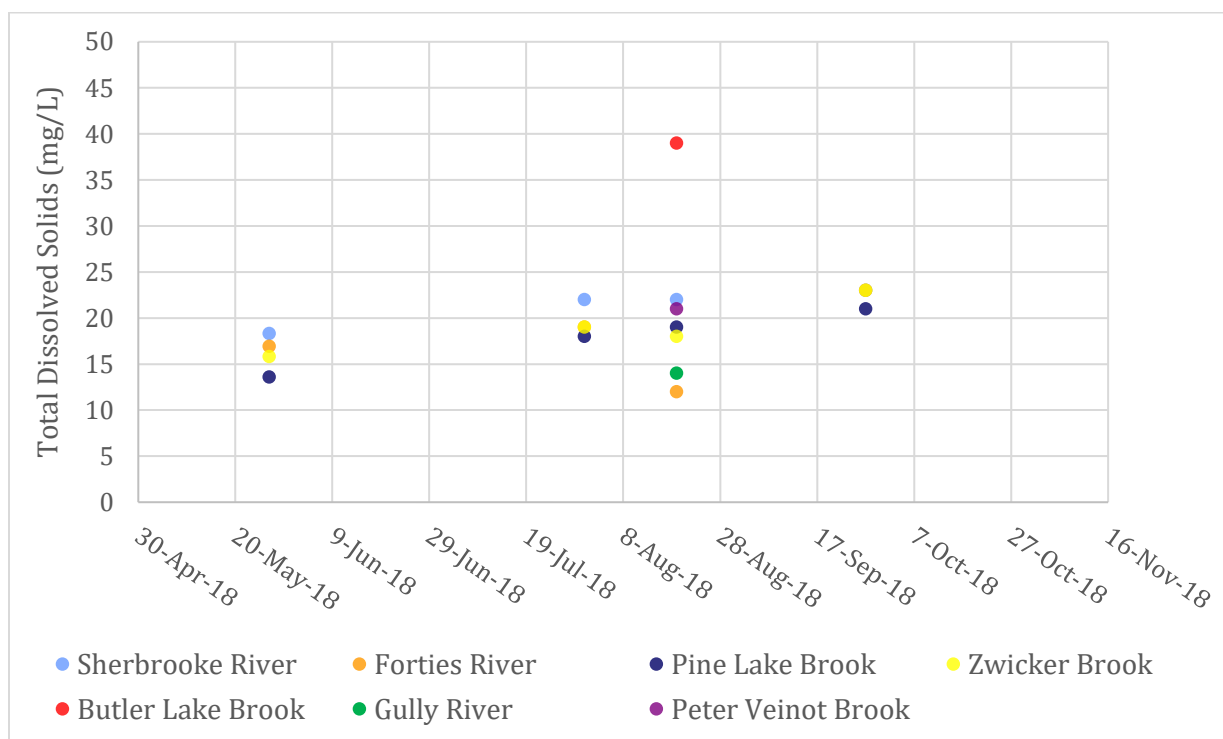


Figure 13: TDS at four bimonthly and rainfall-dependent stream sites (Sherbrooke River, Forties River, Pine Lake, and Zwicker Brook), in addition to three rainfall-dependent stream sites (Butler Lake Brook, Gully River, and Peter Veinot Brook).

2.2. Chemical Water Parameters

2.2.1. Total Suspended Solids

Total suspended solids (TSS) is a measurement of all suspended materials in the water column. Increases in TSS can be natural due to erosion or general disturbance of land upstream or can be unnatural (release of substance from deforestation, mining, etc.). According to the Nova Scotia Environment Act (1994-95), *'No person shall release or permit the release into the environment of a substance in an amount, concentration or level of at a rate of release that causes or may cause adverse effect, unless authorized by an approval of the regulations'*; by monitoring and obtaining an initial reference point of TSS and other water quality parameters prior to future potential land disturbances, the SLSC can address and mitigate any possible substance release events.

TSS concentrations ranged from <1 mg/L to 3.4 mg/L for SL lake and river sites (Figures 14 and 15). Most lake sites had <1 mg/L of TSS during the field season, with minimal differences between lake sites. For the stream sites, Zwicker Brook had, in general, the highest TSS concentrations; however, Sherbrooke River did have the highest TSS of the 2018 field season (3.4 mg/L). The high TSS concentration at Sherbrooke River coincides with the rainfall-dependent event; however, no other stream experienced increased TSS during the rainfall event. In Nova Scotia, TSS in lakes ranges from 0.8 to 15 mg/L (Nova Scotia Lake Inventory Program, 2017); SL TSS concentrations fall along the lower end of this range.

Secchi disk depth – the depth to which a black and white disk just is barely visible within a waterbody – can act as a proxy for TSS in lakes. In SL, Secchi disk depths were measured for sites Lake 1-4. Lake 1 was visible to a maximum depth of 2.65 m, with a mean depth of 2.21 m. Lake 2 had a maximum visible depth of 2.84 m and mean depth of 2.43 m. At Lake 3 and 4, the Secchi depths were equivalent to the depth of water, due to the shallowness of the sites (mean depth of 1.78 m and 2.38 m, respectively). Although Secchi depth provides an indication of light penetration into waterbodies, the measurements can be skewed due to an individual's eyesight, and different individuals performing the measurement on different days.

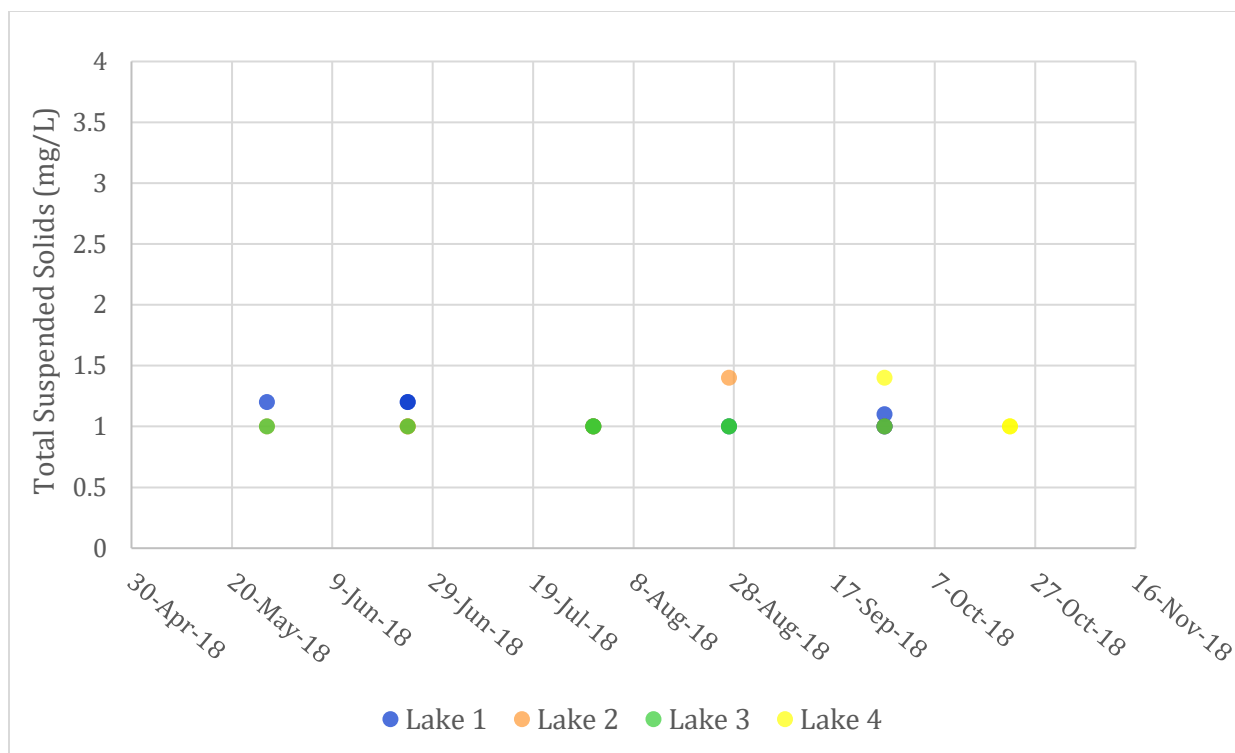


Figure 14: TSS at four monthly lake sites (Lake 1-4) during the May-October 2018 SL water quality field season.

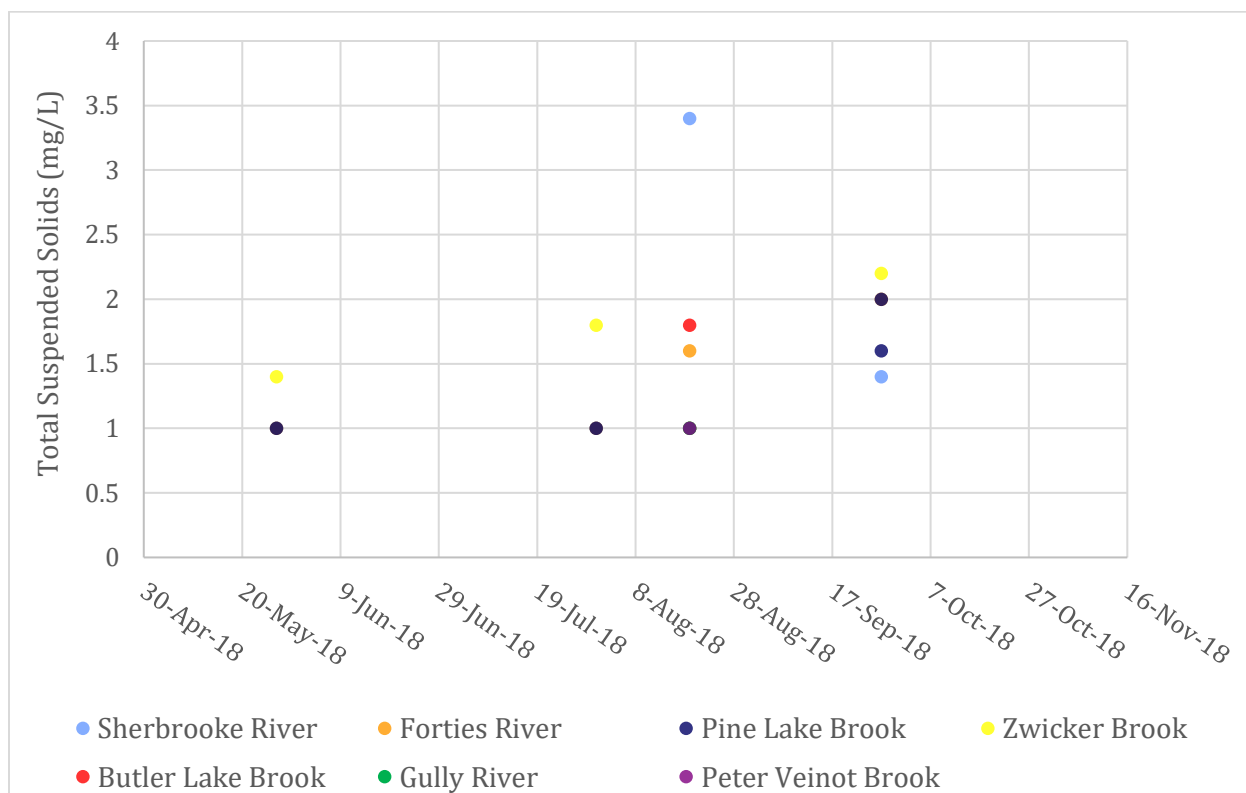


Figure 15: TSS at four bimonthly and rainfall-dependent stream sites (Sherbrooke River, Forties River, Pine Lake, and Zwicker Brook), in addition to three rainfall-dependent stream sites (Butler Lake Brook, Gully River, and Peter Veinot Brook).

2.2.2. Total Phosphorus

Phosphorus concentrations (both organic and inorganic) are extremely important in healthy ecosystems; phosphorus acts as a nutrient to various organisms and plants within watersheds. Due to minimal natural sources of phosphorus and high demand of phosphorus by plants, phosphorus concentrations are low in aquatic environments and therefore a growth-limiting factor. As phosphorus is a key nutrient in freshwater environments, and not considered a toxic substance, the CCME does not have set guidelines; however, Ontario's Ministry of Environment and Climate Change (MOECC) has set a total phosphorus guideline of ≤ 0.02 mg/L for lakes, and ≤ 0.03 mg/L for rivers and streams (MOE, 1979). By monitoring phosphorus, pollution sources can be located due to 'pockets' of elevated phosphorus concentrations. In addition, by monitoring phosphorus below a lake's thermocline, we can assess how nutrients are being used/supplied in deeper waters, and if nutrient-enrichment will be a problem once the waters mix during fall and spring turnover.

Lake sites were consistently lower than streams (Figures 16 and 17, Table 3). Lake phosphorus concentrations ranged from <0.004 mg/L to 0.017 mg/L, while streams ranged from 0.011 mg/L to 0.04 mg/L. No lake phosphorus concentrations exceeded the MOECC lake guideline of 0.02 mg/L, while three stream sites exceeded the MOECC stream guideline of 0.03 mg/L. Zwicker Brook, Forties River, and Sherbrooke River all exceeded the guideline by 0.01 mg/L, while Pine Lake Brook, Butler Lake Brook, and Gully River were at the threshold (0.03 mg/L). Phosphorus concentrations increased at the four bimonthly streams during the rainfall event; phosphorus concentrations were also elevated at the three rainfall-dependent sites, but as these sites were not sampled more than once, it is unclear if these phosphorus concentrations are elevated or natural. Due to the increase in phosphorus of the bimonthly streams, it is reasonable to assume that the rainfall caused increased flushing of phosphorus into the streams. As the monthly sampling for August did not occur until 10 days after the rainfall event, the effects of the stream phosphorus flushing on lake sites would be minimal.

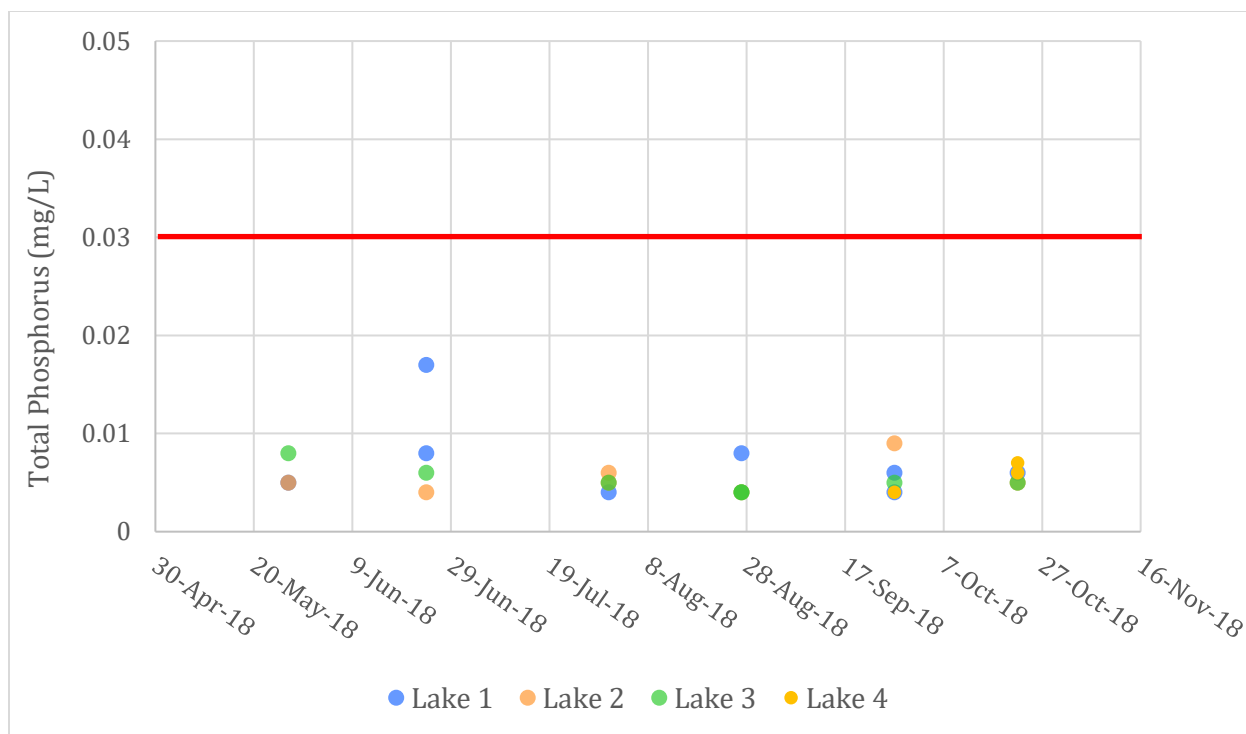


Figure 16: Total phosphorus at four monthly lake sites (Lake 1-4) during the May-October 2018 SL water quality field season. Red line indicates the MOECC 0.03 mg/L guideline for phosphorus in streams.

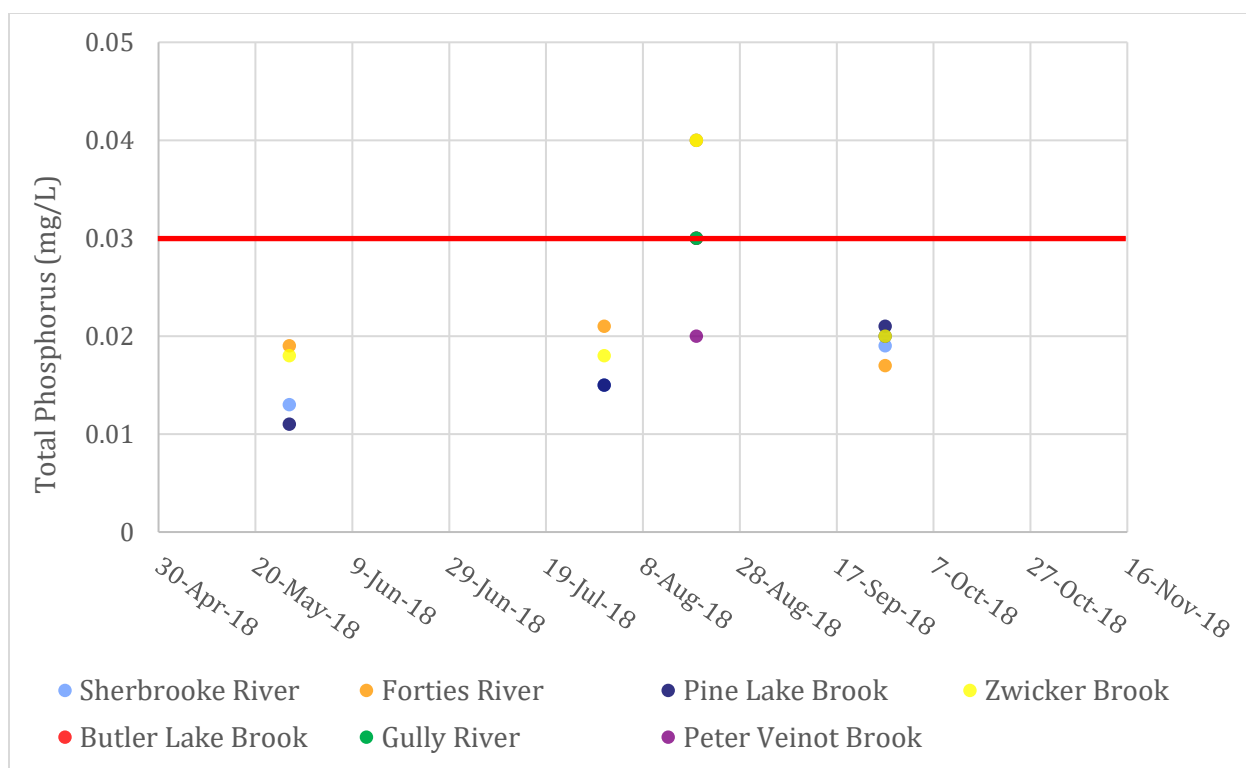


Figure 17: Total phosphorus at four bimonthly and rainfall-dependent stream sites (Sherbrooke River, Forties River, Pine Lake, and Zwicker Brook), in addition to three rainfall-dependent stream sites (Butler Lake Brook, Gully River, and Peter Veinot Brook). Red line indicates the MOECC 0.03 mg/L guideline for phosphorus in streams.

Phosphorus concentrations during the 2018 field season differ at several sites compared to the 2017 preliminary data (Table 3). Phosphorus concentrations are similar for all lake sites, while all stream sites have increased phosphorus concentrations. The difference between the stream concentrations may be due to the weather differences during sampling events, as the 2017 samples were collected on a day without rain, while the 2018 samples collected during the same month (August) were collected during the rainfall-dependent event.

Table 3: Range in total phosphorus concentrations between 2017 and 2018; July-August for lake samples, August for river samples.

Site	2017 Range	2018 Range
Lake 1	0.005-0.008	0.004-0.008
Lake 2	0.004-0.005	0.004-0.009
Lake 3	No data	0.004-0.005
Lake 4	No data	0.004-0.007
Sherbrooke River	0.007	0.04
Forties River	0.016	0.04
Pine Lake Brook	0.019	0.03
Zwicker Brook	0.024	0.04
Butler Lake Brook	0.013	0.03
Gully River	0.01	0.03
Peter Veinot Brook	0.01	0.02

Elevated phosphorus concentrations below the thermocline may indicate a possible nutrient-enrichment event during fall turnover, with a potential for eutrophication and algal blooms. In SL, phosphorus concentrations below the thermocline ('phosphorus at-depth') were not significantly lower than surface concentrations (Table 4). Phosphorus at-depth was 0.001 mg/L lower than Lake 1 surface waters, while Lake 2 saw an increase of 0.021 mg/L between surface and at-depth concentrations. High phosphorus concentrations in the deeper lake waters suggests that the thermocline is not allowing nutrient mixing within the lake profile, and that there is minimal assimilation of phosphorus at-depth. Although no algal bloom occurred during fall turnover in SL, caution should be advised to residents of SL during the fall, as the mixing of elevated phosphorus concentrations increases the risk of a fall algal bloom in the future.

Table 4: Total phosphorus concentrations from two lake sites, obtained both at the surface and below the thermocline, in August for the SL 2018 Water Quality Monitoring Program.

Site	Surface Phosphorus (mg/L)	Phosphorus At-Depth (mg/L)
Lake 1	0.008	0.007
Lake 2	0.004	0.025

2.2.3. Total Nitrogen

Like phosphorus, nitrogen concentrations are also key and limiting nutrients for plants and other organisms in freshwater environments. No CCME guidelines exist for nitrogen; however, Dodds and Welch (2000) have established a ≤ 0.9 mg/L guideline for freshwater environments, while Underwood and Josselyn (1979) reported a guideline of ≤ 0.3 mg/L for oligotrophic waterbodies.

Lake nitrogen concentrations ranged from 0.18 mg/L to 0.359 mg/L, while stream nitrogen concentrations ranged from 0.35 mg/L to 0.883 mg/L (Figures 18 and 19, Table 5). Total nitrogen, just as total phosphorus, was lower in lake sites than stream sites, and total nitrogen increased at all stream sites compared to the 2017 preliminary sampling data – possibly due to a difference in sampling event types. No stream or lake site exceeded the Dodds and Welch (2000) 0.9 mg/L threshold; however, the Lake 1 site did exceed the Underwood and Josselyn (1979) 0.3 mg/L threshold for oligotrophic waterbodies once – 0.359 mg/L on July 31st, 2018.

Exceedance of the oligotrophic threshold, in addition to the elevated nitrogen concentrations at all seven streams during the rainfall event suggests that nitrogen pollution may be a problem in SL in the future, and that rainfall may be a key driver of how pollutants enter the lake. Of the bimonthly streams monitored during the sampling program, all four streams had increases in total nitrogen during the rainfall-dependent sampling. Of the lake sites sampled during the monthly August event, nitrogen concentrations only increased at Lake 2, while Lake 1 and 3 dropped from the July concentrations – as sampling occurred 10 days after the rainfall-dependent sampling, it is possible that the influx of nitrogen from the inlet streams had been assimilated by plants, and therefore the lake's elevated nitrogen concentrations associated with the rainfall event may have been missed.

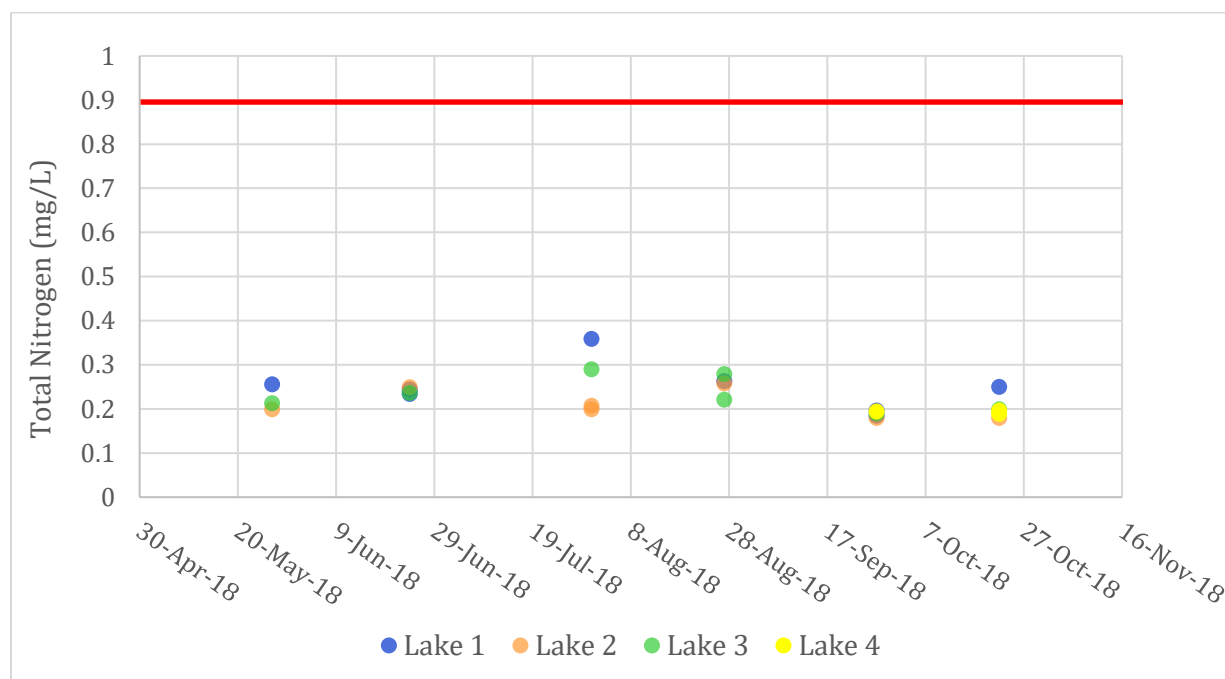


Figure 18: Total nitrogen at four monthly lake sites (Lake 1-4) during the May-October 2018 SL water quality field season. Red line indicates the Dodds and Welch (2000) 0.9 mg/L nitrogen threshold for freshwaters.

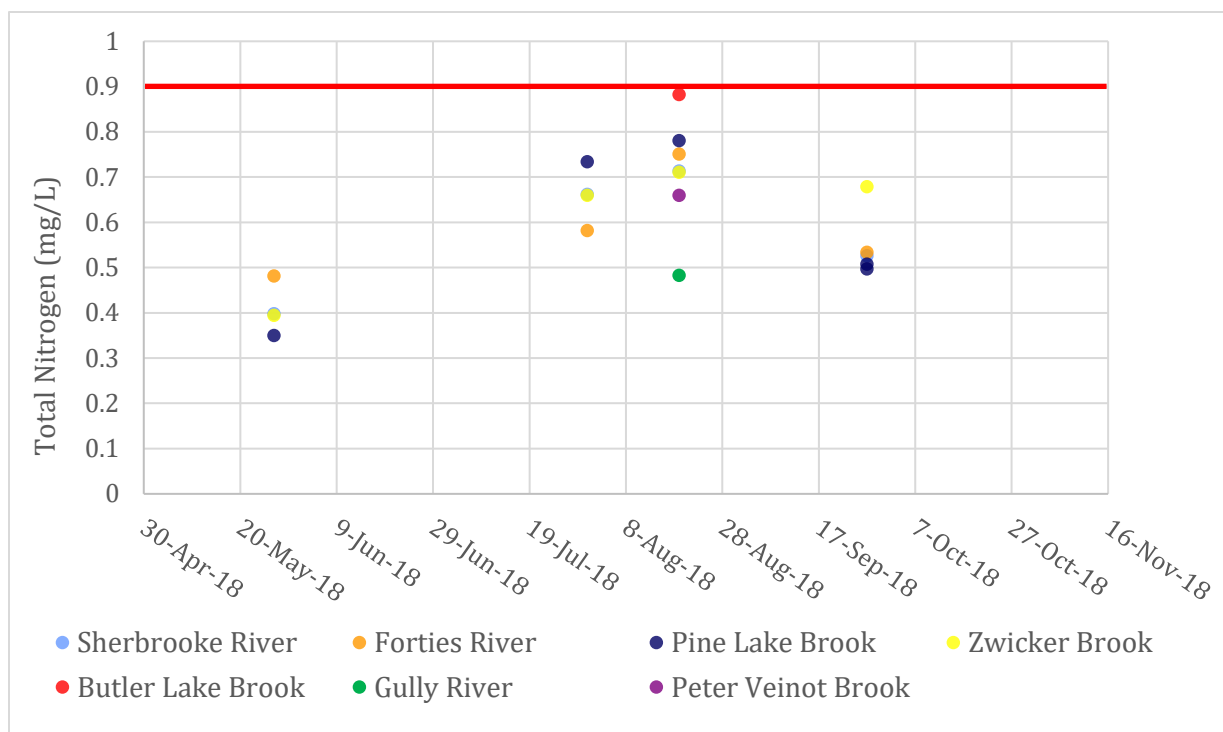


Figure 19: Total nitrogen at four bimonthly and rainfall-dependent stream sites (Sherbrooke River, Forties River, Pine Lake, and Zwicker Brook), in addition to three rainfall-dependent stream sites (Butler Lake Brook, Gully River, and Peter Veinot Brook). Red line indicates the Dodds and Welch (2000) 0.9 mg/L nitrogen threshold for freshwaters.

Table 5: Range in total nitrogen concentrations between 2017 and 2018; July-August for lake samples, August for river samples.

Site	2017 Range	2018 Range
Lake 1	0.258-0.36	0.185-0.359
Lake 2	0.234-0.324	0.18-0.258
Lake 3	No data	0.19-0.29
Lake 4	No data	0.189-0.196
Sherbrooke River	0.511	0.714
Forties River	0.685	0.751
Pine Lake Brook	0.629	0.781
Zwicker Brook	0.592	0.711
Butler Lake Brook	0.434	0.883
Gully River	0.441	0.483
Peter Veinot Brook	0.374	0.66

Just as with phosphorus, elevated nitrogen concentrations below the thermocline may indicate a possible nutrient-enrichment event during fall turnover, with a potential for eutrophication and algal

blooms. In SL, nitrogen concentrations at-depth were not significantly lower than surface concentrations (Table 6). Lake 2 had almost double the surface nitrogen concentration in the waters below the thermocline. With elevated phosphorus and nitrogen concentrations below the thermocline, SL fall turnover is essential for nutrient dispersal – and a concern for eutrophication. Although no algal bloom occurred in fall 2018 in SL, caution should be taken in the future, especially at Lake 2 where nutrients are particularly high.

Table 6: Total nitrogen concentrations from two lake sites, obtained both at the surface and below the thermocline, in August for the SL 2018 Water Quality Monitoring Program.

Site	Surface Nitrogen (mg/L)	Nitrogen At-Depth (mg/L)
Lake 1	0.263	0.223
Lake 2	0.258	0.46

2.2.4. Hydrocarbons

Hydrocarbons are chains of carbon and hydrogen molecules which are the main components of natural gases and petroleum products. Monitoring hydrocarbons provides insight to whether anthropogenic activities are influencing water quality in the region - such as boating and combustion of petroleum products causing atmospheric deposition of polycyclic aromatic hydrocarbons (PAHs) (Das, Routh, and Roychoudhury, 2008; Andren and Strand, 1979).

No hydrocarbons were detectable at any lake sites during either the preliminary-2017 and full-2018 SL Water Quality Monitoring Program. Hydrocarbons should continue to be monitored at all lake sites to monitor for changes in detectable amounts of hydrocarbons – especially at sites Lake 3 and 4, where a public boat launch is proposed, which would see an increase in boat traffic, and by association, increases in the potential for hydrocarbon releases into the lake. As hydrocarbons commonly form particulate complexes that settle out of solution, collecting sediment hydrocarbon samples at sites Lake 3 and 4 may also be useful in developing a reference point prior to the installment of the SL public access site.

2.2.5. Chlorophyll *a*

Chlorophyll *a* is a parameter used as a proxy for biological activity within water and can be an indicator for potential algal blooms if it increases to elevated levels (Stumpf, 2001). For SL, chlorophyll *a* never exceeded 7 µg/L (Figure 20). Chlorophyll *a* decreased over the 2018 sampling season and plateaued from August to October. The highest chlorophyll *a* concentration was observed at Lake 1 in May 2018, while Lake 3 consistently had the lowest chlorophyll *a* concentrations. The low chlorophyll *a* concentrations throughout the 2018 field season, and no increase in chlorophyll *a* during the fall turnover, coincide with the lack of algal blooms observed within the lake.

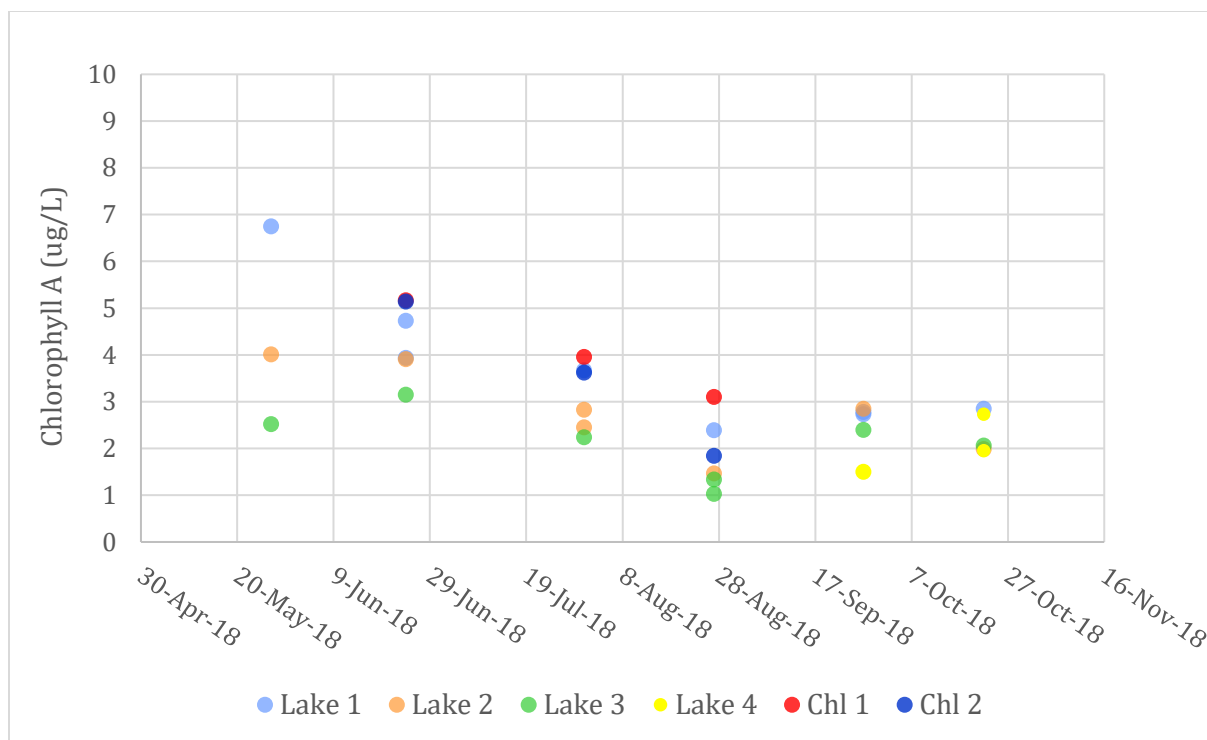


Figure 20: Chlorophyll a at four monthly lake sites (Lake 1-4), and two summer-only sites (Chl 1 and Chl 2) during the May-October 2018 SL water quality field season.

2.2.6. Fecal Coliform Bacteria

Fecal coliform bacteria are found in the waste of warm-blooded animals and used as indicators of fecal pollution within freshwater environments. Sources of bacteria can include agricultural lands – due to the spreading of manure on crops, stream crossings by livestock, and livestock feces (Stephenson and Street, 1978; Hunter et al., 1999; Crane et al., 1983), domestic and wild animal feces, leachate from landfills (Maqbool et al., 2011), malfunctioning septic systems, illegal straight-pipes, and stormwater run-off (both urban areas and overland flow in rural regions).

In recreational waters, the presence of fecal pollution presents a risk to the public, as the possible presence of pathogenic microorganisms can infect humans and animals and cause serious illnesses. As testing for the hundreds of disease-causing microorganisms is costly and impractical, this program uses fecal coliforms measured in coliform forming units per 100 mL (CFU/100mL) as an indicator of fecal pollution. Fecal coliforms act as a proxy for *Escherichia coli* (*E. coli*), Health Canada's indicator bacteria for fecal contamination in freshwaters, under the assumption that 90% of fecal coliforms are *E. coli*. For recreational waters, Health Canada has set a limit of < 400 CFU/100 mL of fecal coliforms and *E. coli* during primary contact activities (activities where the body, face, or trunk are submersed, and it is likely that water will be swallowed, such as: swimming, surfing, canoeing, etc.) (Health Canada, 2012). Although the presence of fecal coliforms indicates the presence of fecal contamination, the absence of fecal coliforms should not be interpreted to mean that all pathogenic organisms are absent.

In the four lake sites and seven inlet stream sites monitored during the 2018 field season, no site exceeded the Health Canada primary contact limit (Figures 21 and 22). The highest fecal coliform count

within the lake sites was 20 CFU/100 mL, found at Lake 2 in July 2018. Samples were below laboratory detection limits for all eight Lake 1 samples, six of seven Lake 2 samples, six of seven Lake 3 samples, and two of three Lake 4 samples. For the streams, concentrations ranged from <10 CFU/100 mL to 350 CFU/100 mL. The highest bacteria concentration was recorded at Butler Lake Brook (350 CFU/100 mL), during the rainfall-dependent event.

Elevated stream bacteria concentrations were recorded during both the August rainfall-dependent event and September bimonthly event – these elevated concentrations may be due to flushing of bacteria on land into the streams, as both samples coincided with heavy rainfall. Increases in bacteria in waterbodies following rainfall is commonly reported in the literature (Rodgers et al., 2003; Hunter, McDonald, and Beven, 1992; Stephenson and Street, 1978); however, it appears that the increases did not affect lake water quality. Although the rainfall-dependent sampling did not include sampling lake sites, the September sampling event coincided with heavy rainfall and required both lake and bimonthly sampling of the four primary inlet streams. Though the four streams had elevated September bacteria concentrations, no increase in bacteria concentrations was recorded at any lake site. Caution should still be maintained by the public after rainfall events, to avoid exposure to high fecal bacteria concentrations, especially around streams and where streams and the lakes intersect. In addition, caution should be taken in streams that have known bacteria sources upstream.

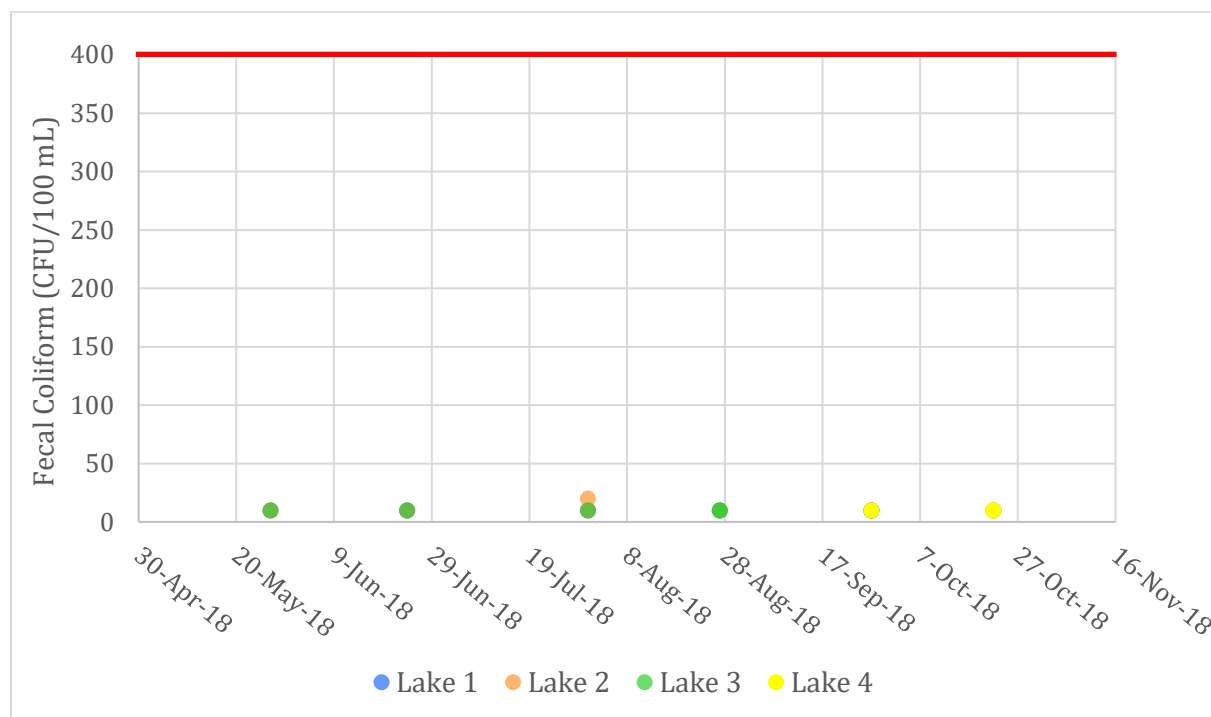


Figure 21: Fecal coliform at four monthly lake sites (Lake 1-4) during the May-October 2018 SL water quality field season. Red line indicates Health Canada's fecal coliform concentration limit for recreation in freshwaters (400 CFU/100 mL).

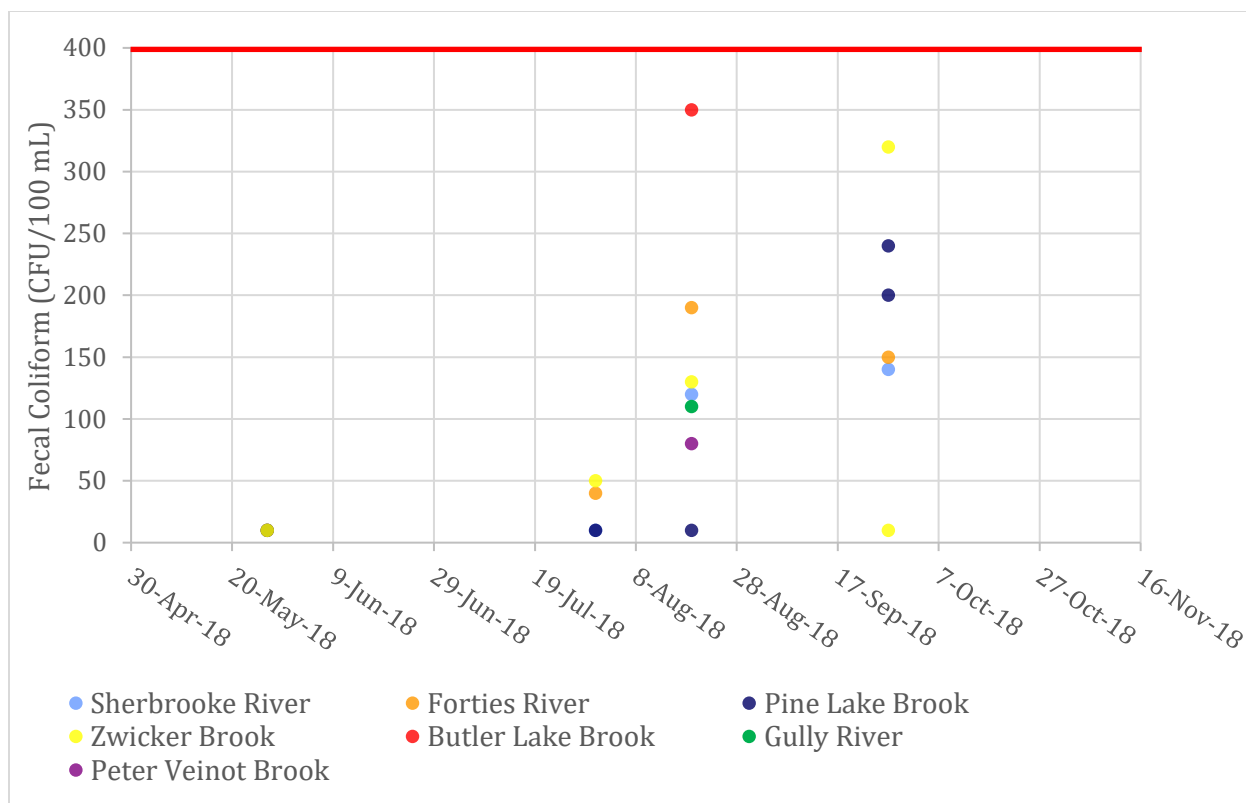


Figure 22: Fecal coliform at four bimonthly and rainfall-dependent stream sites (Sherbrooke River, Forties River, Pine Lake, and Zwicker Brook), in addition to three rainfall-dependent stream sites (Butler Lake Brook, Gully River, and Peter Veinot Brook). Red line indicates Health Canada's fecal coliform concentration limit for recreation in freshwaters (400 CFU/100 mL).

2.3. Sediment Sampling

Sediments can have adverse effects on water quality in lakes and rivers, as sediment acts as a reservoir for metals, nutrients, and organisms. During turbulence in streams, chemicals held within sediment can be released, causing an influx of more than just TSS and TDS, but increases in metals, bacteria, organic matter, and nutrients (Reddy et al., 1999; Brylinsky, 2004) – all of which can negatively affect a lake's fragile chemical equilibrium.

For sediments found at the bottom of lakes, resuspension is less likely; however, sediments can affect bottom-feeding organisms due to high concentrations of metals which settle out of suspension and accumulate on the lake bottom (Guthrie and Perry, 1980). Affecting bottom-feeders thereby affects other organisms due to bioaccumulation of chemicals through the food-chain (Fishar and Ali, 2005; Chen and Chen, 1999). In addition, different forms of phosphorus held in sediments can greatly affect lakes. Orthophosphate is a bioavailable form of phosphorus which 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; Howell, 2010). For phosphorus held into complexes with metals, anoxic conditions facilitate the dissolution of complexes and release of phosphorus from sediments (Hayes, Reid, and Cameron, 1985). Increased levels of phosphorus released from sediments into the water (internal phosphorus loading) can cause nutrient-enrichment and potential eutrophication and algal

blooms (Sondergaard, Jensen, and Jeppesen, 2003) – this is particularly susceptible during turnover, when nutrient-rich bottom waters are mixed throughout the lake, providing new food sources for organisms.

High concentrations of metals within the lake bottom sites, unlike the Forties River site, may negatively affect aquatic life (Table 7). Within the Lake 2 and 3 sites, arsenic, cadmium, lead, and mercury exceed the CCME interim sediment quality guidelines (ISQG). In addition, manganese and selenium concentrations appear to be close to CCME sediment guidelines and should be monitored (CCME, 2001). Lake 2 has more exceedances of metal guidelines than Lake 3 – this may be due to the increased depth and greater slope of Lake 2. Water depth and slope are associated with increased metal concentrations due to funneling of particulate matter towards deeper lake-bottom pockets, as observed by Hakanson (1977) in Lake Vanern, Sweden.

Sediment metal concentrations at both SL lake sites are comparable to metal concentrations found in four Kejimikujik lakes monitored from 2000-2009. Sediment samples were collected by Environment and Climate Change Canada from Hichemakaar Lake, Big Dam East, Cobrielle Lake, and Peskowsk between 2000 and 2009 (Kirk, 2018). Although the SL and Kejimikujik lakes have comparable sediment metal concentrations, many of these metals' concentrations exceed CCME guidelines. The high metal concentrations at Lake 2 are greater than the mean metal concentrations found at Kejimikujik for arsenic, cadmium, lead, manganese, and mercury (Table 8). In addition, the concentration of cadmium in sediment at Lake 2 and 3 is greater than the maximum cadmium concentration found in the four Kejimikujik lakes. Although Lake 1 sediment was not sampled during the 2018 monitoring program, it is recommended that sediment sampling be done at the site in the future, due to the high metal concentrations recorded at the Lake 2 and 3 sites.

As Forties River does not exceed any guidelines, it does not appear to be a significant influence on metal concentrations within the lake sites. It is possible that one (or multiple) of the other 13 inlet streams is affecting metal concentrations within the lake sediments; the lake sediments may also just be the accumulation over time from metal inputs from other inlet streams. Expanding sediment analyses to slowly assess sediment quality from the other six main inlet streams would help determine whether one or multiple streams are influencing lake sediments accumulation quantities.

Table 7: Concentration of metals within site sediment samples sampled on August 27th, 2018. Interim sediment quality guideline (ISQG) is the recommendation by CCME of total concentrations of chemicals in surficial sediment, while the probable effect level (PEL) is the CCME upper value in which adverse effects are expected (CCME, 2001). Nova Scotia environmental quality standards (NSEQS) are sediment guidelines specifically set by the Nova Scotia Environment (NSE, 2014). Light yellow indicates parameters approaching one of the guidelines, while dark yellow indicates an exceedance of one of the guidelines.

Metal	UNITS	Sediment Sample Concentrations				Concentration Guidelines		
		Lake 2	Lake 3	Forties River	RDL*	ISQG	PEL	NSEQS
Acid Extractable Aluminum (Al)	mg/kg	22000	6700	4300	10	-	-	-
Acid Extractable Antimony (Sb)	mg/kg	ND*	ND	ND	2.0	-	-	-
Acid Extractable Arsenic (As)	mg/kg	16	8.3	2.7	2.0	5.9	17	17
Acid Extractable Barium (Ba)	mg/kg	42	26	26	5.0	-	-	-
Acid Extractable Beryllium (Be)	mg/kg	ND	ND	ND	2.0	-	-	-
Acid Extractable Bismuth (Bi)	mg/kg	ND	ND	ND	2.0	-	-	-
Acid Extractable Boron (B)	mg/kg	ND	ND	ND	50	-	-	-
Acid Extractable Cadmium (Cd)	mg/kg	1.0	1.5	ND	0.30	0.6	3.5	3.5
Acid Extractable Chromium (Cr)	mg/kg	14	4.6	4.7	2.0	37.3	90	90
Acid Extractable Cobalt (Co)	mg/kg	8.8	6.8	2.3	1.0	-	-	-
Acid Extractable Copper (Cu)	mg/kg	15	13	ND	2.0	35.7	197	197
Acid Extractable Iron (Fe)	mg/kg	14000	10000	8300	50	-	-	47,766
Acid Extractable Lead (Pb)	mg/kg	49	13	3.3	0.50	35	91.3	91.3
Acid Extractable Lithium (Li)	mg/kg	10	11	20	2.0	-	-	-
Acid Extractable Manganese (Mn)	mg/kg	480	1000	200	2.0	-	-	1,100
Acid Extractable Mercury (Hg)	mg/kg	0.27	0.16	ND	0.10	0.17	0.486	0.486
Acid Extractable Molybdenum (Mo)	mg/kg	ND	ND	ND	2.0	-	-	-
Acid Extractable Nickel (Ni)	mg/kg	7.5	5.7	2.3	2.0	-	-	75
Acid Extractable Phosphorus (P)	mg/kg	1900	400	180	100	-	-	-
Acid Extractable Rubidium (Rb)	mg/kg	6.3	4.7	17	2.0	-	-	-
Acid Extractable Selenium (Se)	mg/kg	1.8	ND	ND	1.0	-	-	2
Acid Extractable Silver (Ag)	mg/kg	ND	ND	ND	0.50	-	-	1
Acid Extractable Strontium (Sr)	mg/kg	13	ND	ND	5.0	-	-	-
Acid Extractable Thallium (Tl)	mg/kg	0.26	0.34	0.12	0.10	-	-	-
Acid Extractable Tin (Sn)	mg/kg	3.0	2.0	ND	2.0	-	-	-
Acid Extractable Uranium (U)	mg/kg	5.7	1.7	0.52	0.10	-	-	-
Acid Extractable Vanadium (V)	mg/kg	30	11	11	2.0	-	-	-
Acid Extractable Zinc (Zn)	mg/kg	93	96	20	5.0	123	315	315
Orthophosphate (P)	mg/kg	0.067	0.26	0.33	0.050	-	-	-

*RDL = Reportable Detection Limit; ND = Not Detected

Table 8: Comparison of 2018 sediment metal concentrations from SL Lake 2, Lake 3, and Forties River to the range and mean metal concentrations from four Kejimikujik Lakes (Hilchemakaar, Big Dam East, Cobrielle, and Peskowsk) monitored from 2000-2009 (Kirk, 2018).

Metal	Unit	Lake 2	Lake 3	Forties River	Kejimkujik Range	Kejimkujik Mean Concentration
Acid Extractable Arsenic (As)	mg/kg	16	8.3	2.7	3.55-27.1	10.50
Acid Extractable Cadmium (Cd)	mg/kg	1.0	1.5	ND*	0.1-0.4	0.26
Acid Extractable Lead (Pb)	mg/kg	49	13	3.3	43-62.5	48.40
Acid Extractable Manganese (Mn)	mg/kg	480	1000	200	28.7-666	273.40
Acid Extractable Mercury (Hg)	mg/kg	0.27	0.16	ND	0.14-0.345	0.22
Acid Extractable Selenium (Se)	mg/kg	1.8	ND	ND	1.39-3.17	2.24

*RDL = Reportable Detection Limit; ND = Not Detected

Regarding the phosphorus levels within the lake and river sediment (Table 9), although Lake 2 has the highest amount of phosphorus in sediment, Forties River has the highest orthophosphate to phosphorus ratio. All three sites had low orthophosphate to phosphorus ratios (<0.2% each), indicating that the bioavailable orthophosphate is being quickly assimilated by organisms and therefore most of the phosphorus in the sediment is in non-bioavailable forms. Although there is no sediment phosphorus guideline set by the CCME, Ontario's Provincial Sediment Quality Guidelines have a 600-2000 mg/kg range, where 2000 mg/kg of phosphorus in sediment is the 'severe effect level' (Ontario MOE, 2008). Lake 3 and Forties River are below the Ontario guidelines, suggesting minimal influence by pollution and no negative effects on aquatic organisms; however, Lake 2 is close to the 2000 mg/kg severe effect level (1900 mg/kg at Lake 2) and therefore may indicate pollution affecting the lake, and a potential for internal loading for phosphorus in the lake causing algal blooms. Lake 2 should be considered a 'site of concern' and be continued to be monitored due to high potential for nutrient-enrichment, eutrophication, and algal blooms.

Table 9: Phosphorus concentrations in sediment samples from lake and river sites sampled on August 27th, 2018.

	Lake 2	Lake 3	Forties River
Orthophosphate in sediment (mg/kg)	0.0067	0.26	0.33
Acid extractable phosphorus in sediment (mg/kg)	1900	400	180

3. Discussion

3.1. Trophic State of Sherbrooke Lake

Trophic states describe the productivity of a waterbody which can aid in tracking how a waterbody changes over time. Trophic states range from oligotrophic (low productivity and minimal biomass) to hypereutrophic (high productivity and maximum biomass). The trophic state index (TSI), proposed by Carlson (1977), uses the depth of transparency (Secchi disk), and concentrations of chlorophyll *a* and phosphorus to apply a number to the waterbody's state (Equations 2, 3, and 4) – associated with its trophic state. Tracking a waterbody's TSI allows comparison between years using the same methods.

Equation 2: $TSI (Secchi\ disk) = 60 - 14.41 \times \ln(Mean\ Secchi\ disk\ [m])$

Equation 3: $TSI (chlorophyll\ A) = 30.6 + 9.81 \times \ln(Mean\ chlorophyll\ A\ [\frac{\mu g}{L}])$

Equation 4: $TSI (total\ phosphorus) = 4.15 + 14.42 \times \ln(Mean\ total\ phosphorus\ [\frac{\mu g}{L}])$

In SL, the lake's TSI could be based on sites Lake 1 and Lake 2, therefore a TSI was created for both sites (Table 10; Figure 23). Both sites indicate mainly mesotrophic conditions, with phosphorus concentrations towards oligotrophic status. Concern should be minimal for the Secchi disk/water transparency eutrophic-approaching indices, as water transparency is not an exact indication of a waterbody's productivity, and can be influenced by factors other than biomass, such as suspended particles within the water column (NSSA, 2014; EPA, 2002). For 2018, the SL trophic status should be considered borderline oligotrophic-mesotrophic.

Table 10: Carlson (1977) 2018 SL TSI scores and trophic states for total phosphorus, chlorophyll A, and Secchi disk for Lake 1 (red) and Lake 2 (blue).

TSI Score	Trophic State	Phosphorus	Chlorophyll A	Secchi Disk
< 40	Oligotrophic	33.3 28.6		
40-50	Mesotrophic		42.3 40.7	48.6 47.38
> 50	Eutrophic			

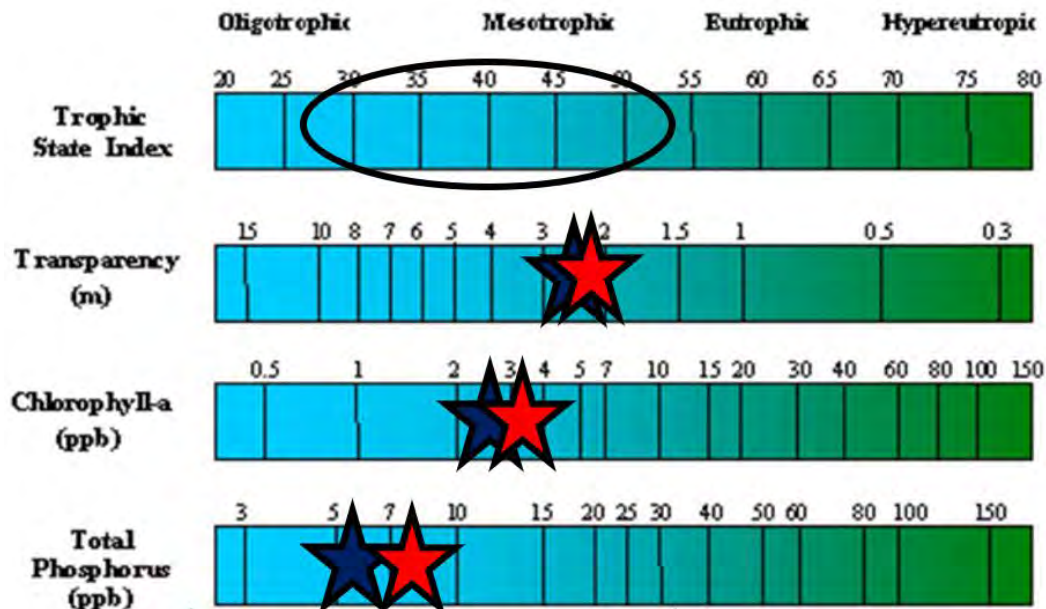


Figure 23: Carlson TSI for lakes, with TSI ranks for SL Lake 1 (red star) and Lake 2 (blue star). Transparency determined using Secchi disk depth. From Carlson (1977).

3.2. Algal Blooms

An algal bloom is the rapid increase and accumulation of microscopic plankton algae (phytoplankton) in water bodies and can be detrimental of ecosystems (Hallegraeff, 2003). Ecosystems have a fragile balance, where biomass is sustained and limited by available nutrients; however, when excess nutrients enter an ecosystem, biomass can expand (Heisler et al., 2008). In waterbodies, excess nutrients allow algae to flourish, exceeding normal densities and assimilating all nutrients. The increased biomass presence causes decreased water transparency – blocking off the depth of which sunlight penetrates a waterbody – and as the algae decay, increased microbial decomposition reduces dissolved oxygen – leading to hypoxic and anoxic conditions (Paerl et al., 2001).

In addition to the detrimental environmental effects, algae blooms can pose a risk to humans and animals if they consist of cyanobacteria. Cyanobacteria, commonly referred to as blue-green algae, can emit toxins into the water, causing serious illness and even death in humans (Lawton and Codd, 1991). Aside from humans, cyanobacteria blooms have also been associated with fish kills (Rodger et al., 1994), and the death of dogs (Backer et al., 2013). Although not all cyanobacteria are toxic, it is important to test each bloom to confirm which strains are present and if toxins are a threat within the waterbody.

For SL, algal blooms have been reported in previous years; however, no bloom was sampled and confirmed during the 2018 field season. Chlorophyll *a* – a proxy for biomass and indicator of potential blooms – remained low throughout the summer and did not spike after fall turnover when nutrients increased. In addition, algal blooms can occur in pockets, and it is possible that a bloom did occur, but not at the sampling sites. Although no algal bloom was detected in 2018, the literature suggests an increase in both size and frequency of algae blooms in the future (Michalak et al., 2013), therefore SL may still experience algae blooms in years to come.

3.3. Pollution

Based on the low nutrient and bacteria concentrations, lack of detectable hydrocarbons and algal blooms, and an oligotrophic-mesotrophic state of the lake, pollution appears to be minimal within SL. Rainfall appears to be the biggest threat to water quality within the lake – affecting the seven inlet streams via bacteria and nutrient levels. Though no effect was observed within the lake during the rainfall events, the continued input from these streams may influence long-term productivity of the lake.

Heavy metals within the lake sediments suggests that some degree of pollution does exist within the lake. Although heavy metals do have natural sources, and the metal concentrations from SL sediment are comparable to nearby sediment in Kejimikujik, concentrations for mercury, arsenic, cadmium, and lead exceed CCME guidelines for aquatic life. The accumulation of heavy metals in SL sediment may be exacerbated by development and atmospheric inputs originating from industry.

As the SL water quality is not heavily affected by human pollution – aside from long-term sediment contamination - it is important to continue monitoring and highlighting changes in water quality within the lake and its inlet streams, to ensure issues are identified and best management practices are applied. In addition, as high metal concentrations have been found within SL sediment, sediment analyses should also be included in long-term monitoring and management plans of SL.

4. Recommendations

The following recommendations are suggested for the SL Water Quality Monitoring Program, based on the 2018 water quality results:

- The SL Water Quality Monitoring Program should continue in 2019 and beyond, as construction of the public access site - and expected increased lake-usage - is expected to continue into future years, and this program was developed to establish a water quality baseline to aid in evidence based decisions concerning the development of the properties acquired by MODL for public use.
 - Sampling of the seven inlet streams should continue during rainfall-dependent events, to determine how rainfall events are affecting inlet streams. Sampling of one lake site during the rainfall-dependent event would also add information regarding how the streams are influencing the lake during rainfall events.
 - The program should consider purchasing a rainfall and water level gauge, to be set up and monitored by volunteers, to provide volunteers greater decision-making tools when trying to capture a rainfall-dependent sampling event.
- The Lake 4 site should be added to the 2019 water quality monitoring program, with a minimum of hydrocarbons being sampled at the location.
- The addition of monitoring hydrocarbons in the sediment of sites Lake 3 and 4 should be considered to track hydrocarbon loading at the lake bottom in areas with projected high traffic and potential high contamination.
- The 2019 stream sediment sample should be obtained from a different inlet stream, to gather more spatial information about nutrient and metal loading from the different streams discharging into the lakes, especially to locate if one stream is contributing excess pollutants and highly influencing lake sediment.
- Fecal bacteria testing should be switched from fecal coliforms to *E. coli*, as *E. coli* is Health Canada's primary indicator of fecal contamination.
- Monitoring of Chl 1 and Chl 2 sites should be ceased, as Lake 1 is close enough to both sites that duplication of sampling should be avoided.
- Monitoring of Lake 1 bottom sediments should be undertaken to determine the levels of phosphorus and metals in bottom sediments.
- Residents of SL should continue to be supplied with laboratory-certified bottles and sampling procedures for the collection of water samples during an algae bloom.
 - There should be emphasis in public education about the SL monitoring program, with increased awareness of what blooms are, how they occur, what they look like, and actions to take in the event of a bloom. Information should be shared with both residents of the lake, and at the public access site for visitors of the lake.
 - Caution should be advised to SL users during the fall, due to fall turnover and high potential for an algal bloom – especially at the Lake 2 site.

5. References

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Sherbrooke Lake Water Quality Monitoring

Communications Plan

March 14, 2019

Background

Sherbrooke Lake, located in Lunenburg County, is a 15-minute drive east of the community of New Germany and a 35-minute drive north of Bridgewater. The lake is home to permanent residents, lakefront cottages, and a summer camp; however, it does not currently have a dedicated space for the general public to enjoy the lake.

For over three decades the Municipality of the District of Lunenburg has identified public access to large bodies of water as a priority for its recreation network. In 2003 the Municipality developed and adopted its Open Space Strategic Plan. The plan formalized a variety of priorities for acquiring and developing open space recreational land. Public access to Sherbrooke Lake is one of the Municipality's top five open space priorities. A park plan was presented to Council in October 2018.

A common theme in the open houses, in questions about objectives, and in the open-ended questions was that the natural environment of Sherbrooke Lake—and its continued health—is very important to respondents. Any public space on Sherbrooke Lake should be respectful of the natural environment and be designed to enhance it.

As a response to the public concerns of Sherbrooke Lake's health, a water quality monitoring program was established in the spring of 2018. A group of trained volunteers, comprised of trained volunteers, take field measurements and water samples each month from May to October. The monitoring program is led by the Sherbrooke Lake Stewardship Committee, a group comprised of five citizen representatives appointed by the Municipality of Chester and the Municipality of the District of Lunenburg. The group receives technical support from Coastal Action. Both municipalities fund the program in support of their desire to provide public access to Sherbrooke Lake.

Council priority

Open Space Strategic Plan

Approach

We will apply an integrated marketing communication approach, designed to achieve our objectives through the use of paid advertising, public relations, community relations, social media and paid assets. Consistent messaging will be delivered in all tactics and across all mediums.

Goal 1: To increase public awareness over time about current and changing water quality conditions in Sherbrooke lake.

Goal 2: To focus public concern on the need to protect Sherbrooke lake water quality and associated environmental conditions.

Goal 3: To reinforce the message that maintaining Sherbrooke lake's current water quality is everyone's responsibility and that volunteering through the Stewardship committee is welcome.

Sherbrooke Lake Water Quality Monitoring

Communications Plan

March 14, 2019

Output-based Objectives

- Accurate and positive media coverage of key messages and program facts based on content analysis of media coverage.
- Attendance at Summer 2019 open houses to exceed 30 people per open house.
- Reach 420 (100%) of households on Sherbrooke Lake (420 properties in total abutting the lake; 226 in MODL and 194 in MODC) through a direct mail letter with a call to action and educational content
- Hits on web pages specific to the program will increase from 100 pageviews before March 5, 2019, to more than 500 pageviews by October 31, 2019.

Outcome-based Objectives

- Increase water quality monitoring volunteers by 3 people by October 30, 2019.

Solution Overview

Our research led us to pursue the following solutions:

1. Positive messaging
2. Focus on positive environmental change
3. Face to face communication

Tactic	Responsibility	Budget
Coastal Action Report	Sarah M (Coastal Action)	\$0
Coastal Action One Pager	Sarah M (Coastal Action)	\$0
Website content - FAQ	Sarah M to write Questions, Sarah M and Committee to write Answers, and additional Q&As, Sarah and Jennifer to post on modl.ca and chester.ca	\$0
News release	Sarah K to write, distribute, Jennifer to approve, Committee to approve	\$0
Newspaper ads re: open house	Sarah K to write, Committee to approve	\$400
Municipal Matters (MODL) & Municipal Insight (MODC)	Sarah K to write, Committee to approve	\$0
Open houses	Sarah K to organize, Committee to lead/speak. One in New Ross and one in Parkdale Maplewood, in July on a weekend	\$600
Coastal Action's reach (email, social media, Coastal Chronical)	Sarah K to write, Committee to approve, Sarah (Coastal Action) to distribute	\$0
Posters distributed in the community	Sarah K to have designed and printed, Committee to distribute	\$300
Carolyn's Corner article in South Shore Breaker	Sarah K to write, Committee to approve	\$0

Sherbrooke Lake Water Quality Monitoring

Communications Plan

March 14, 2019

Sherbrooke Lake Email List	Sarah K to write, Committee to approve, Sarah to send	\$0
Direct mail to Sherbrooke Lake homeowners	Sarah K to write, Committee to approve, Sarah to arrange distribution	\$300
Facebook content	Sarah K to write, Committee to approve, Sarah to post, Jennifer to post	\$0
Facebook ads	Sarah K to write, Committee to approve, Sarah to post	\$500
Total		\$2,000

Evaluation

We will know we were successful by:

- Accurate and positive media coverage of key messages and program facts based on content analysis of media coverage.
- Attendance at Summer 2019 open houses to exceed 30 people per open house.
- Reach 420 (100%) of households on Sherbrooke Lake (420 properties in total abutting the lake; 226 in MODL and 194 in MODC) through a direct mail letter with a call to action and educational content
- Hits on web pages specific to the program will increase from 100 pageviews before March 5, 2019, to more than 500 pageviews by October 31, 2019. (Sarah to check current pageviews)
- Increase water quality monitoring volunteers by 3 people by October 30, 2019.

Proposed Budget for 2019 Sherbrooke Lake Monitoring Program

Table 1 – Maxxam Analytics Laboratory analysis fees for the Sherbrooke Lake Monitoring Program for May – October 2019.

Expenditure	Cost Breakdown	Total Cost
Sediment sampling at 4 sites	\$520.80 per site x 4 sites	\$2,083.20
Nutrient sampling for depth profiles at 2 sites	\$86.15 per site x 2 sites	\$172.30
Rainfall-dependent sampling at 7 inlet streams	\$178.60 per site x 7 sites	\$1,250.20
Potential Cyanobacteria Toxin Testing	\$131.00 per sample X 2 possible events	\$262.00
6 monthly sampling events at 4 lake sites and 4 bi-monthly inlet streams	Inlet streams: \$178.60 per site x 4 sites (+ 2 field replicates for QA/QC) X 3 monthly sampling events Lake sites: 178.60 per site x 3 sites (+ 2 field replicates for QA/QC) Additional bacteria-only lake site: \$51.20 per site x 1 site X 6 monthly sampling events	\$8,880.00
Sub-total		\$12,647.50
15% HST (HST #: 14067 2106 RT 0001)		\$1,897.13
Total		\$14,544.63

Table 2 – Coastal Action fees for Sherbrooke Lake Stewardship Committee activities.

Expenditure	Cost Breakdown	Total Cost
AcuRite 01012M Remote Monitoring Weather Station and Rain Gauge	\$249.99/unit + \$20/lithium batteries for unit	\$269.99
Staff participation in committee meetings and council presentations	\$100.00/meeting x 7 meetings	\$700.00
Staff participation in the Sherbrooke Lake Open House	\$250.00/day x 1 day	\$250.00
Development of 2019 water quality report	\$250.00/day x 8 days	\$2,000.00
Development of 2019 water quality booklet	\$250.00/day x 6 days	\$1,500.00
Staff services for 2019 volunteer training	\$250.00/day x 1 day	\$250.00
Project Management	\$250.00/day x 7 days	\$1,750.00
Sub-total		\$6,719.99
15% HST (HST #: 14067 2106 RT 0001)		\$1,008.00
Total		\$7,727.99

TOTAL 2019 PROGRAM: \$22,272.62

Total 2018 Program: \$24,535.25