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Item No. 15.1.12
Halifax Regional Council
August 23, 2022

TO: Mayor Savage and Members of Halifax Regional Council

SUBMITTED BY: Original Signed by

Jacques Dubé, Chief Administrative Officer

DATE: August 16, 2022

SUBJECT: Kearney Lake and Little Kearney Lake Management Plan

ORIGIN

On December 7, 2021, the following motion of Regional Council regarding item 15.1.2 was proposed by Councillor Morse, seconded by Councillor Cuttell.

THAT Halifax Regional Council direct the Chief Administrative Officer to prepare a report for Regional Council on the development of a management plan for Kearney Lake and Little Kearney Lake and associated tributaries, with the goal of protecting lake water quality for all users. The management plan should address the sustainability of the multiple recreational uses of the lake."

MOTION PUT AND PASSED.

LEGISLATIVE AUTHORITY

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

Halifax Regional Municipality Regional Plan. Section 2.3. Water, a limited and precious resource, is one of HRM's most highly valued environmental assets. Protection of this resource for potable water supply, wildlife habitat, recreational enjoyment, and aesthetic value is crucial for HRM. HRM's strategy aims to protect this resource through land use control and retention of those features that regulate water flow, mitigate flooding, reduce water pollution and protect ecological functions.

RECOMMENDATION ON PAGE 2

RECOMMENDATION

It is recommended that Halifax Regional Council

1. Approve in principle the proposed management plan approach for Kearney Lake and Little Kearney Lake outlined in this report.

2. Direct the Chief Administrative Officer to develop a municipal lake watershed management framework, to standardize the approach to lake management in future Lake Management Plans, as described in this report.

3. Direct the Chief Administrative Officer to pursue funding for the installation of a living shoreline along Kearney Lake Road, and to refine cost estimates based on available funding.

4. Approve the installation of five floating treatment wetlands in 2023 with existing Environment & Climate Change budget for water operations.

EXECUTIVE SUMMARY

At the request of Regional Council, this report recommends a management plan for Kearney Lake and Little Kearney Lake, with an aim of protecting water quality for recreational use. The principal concerns to be addressed by this management plan are insufficient capacity at Kearney Lake Beach to accommodate population increases associated with future development, and poor quality stormwater from developments both directly adjacent to Kearney Lake and Little Kearney Lake and upstream in the larger watershed entering the lake and negatively affecting water quality.

This report recommends that shoreline naturalization, using a combination of living shorelines and floating wetlands, be installed to capture stormwater runoff from Kearney Lake Road. Aligning these recommendations with the forthcoming proposed Bedford West Parks Facilities Plan will attempt to address the concerns raised about beach capacity. This report also recommends a lake watershed management framework be developed for Halifax Regional Municipality to standardize its approach to lake management.

BACKGROUND

Kearney Lake (KL) is a roughly 63-hectare (ha) lake located in Halifax, Nova Scotia. Upstream from KL, Little Kearney Lake (LKL) is a small, shallow lake with largely undisturbed shoreline that is home to a variety of wildlife, including migratory birds and beavers. Part of the larger Kearney Run watershed, inflow comes from Washmill Lake into LKL, and from there through to KL at its south-eastern end (*Figure 1*). Other inflow into KL comes from Black Duck Brook on the north-western shore. Outflow from KL is via a small dam at the north-eastern end, with Kearney Run connecting KL to Papermill Lake.

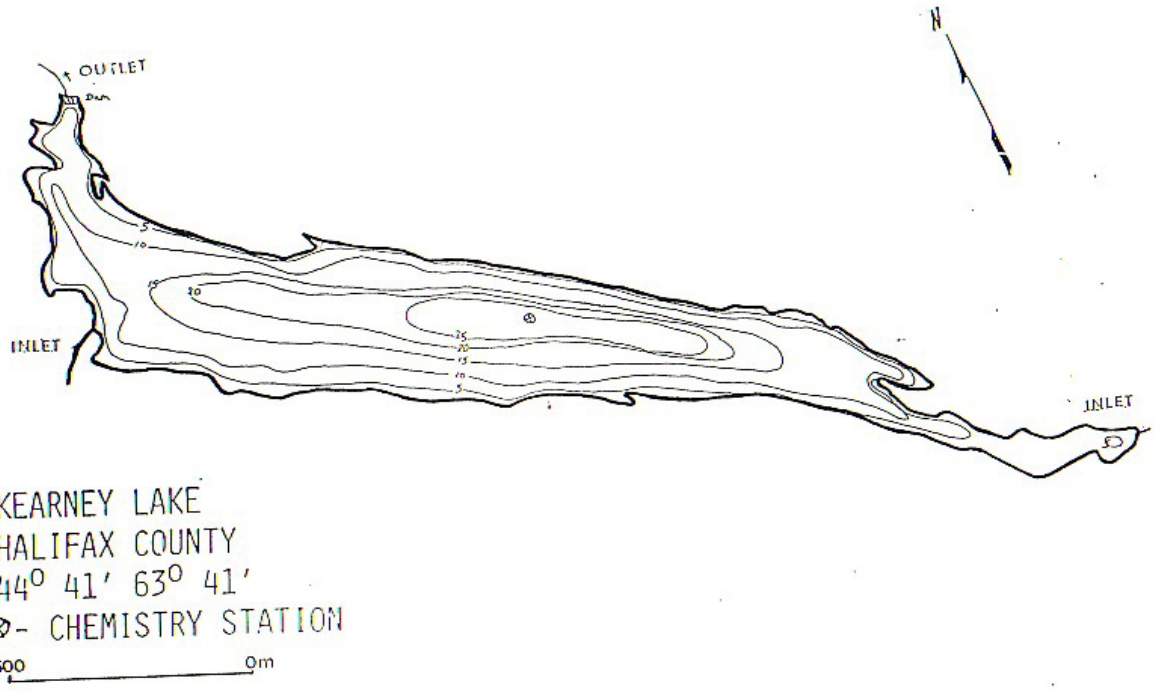

Figure 1: Kearney Lake bathymetry map, with labeled inlets and outlet. Credit Soil & Water Conservation Society of Metro Halifax.

Kearney Lake Road is a major collector running for 3 km along the northeast side of the lake. The shoreline along Kearney Lake Road is primarily riprap. The remaining shoreline is largely undisturbed or naturalized, apart from where residential lawns extend to the high-water mark.

Figure 2: Riprap shoreline with partial vegetative cover along Kearney Lake Road.

The Blue Mountain-Birch Cove Lakes Wilderness Area (BMBC) is a 1767 ha provincial protected area located to the north and north-west of KL. This is a heavily used recreational area, with trails for hiking, biking, cross-country skiing, and snowshoeing. BMBC is currently a candidate to become a National Urban Park. Several lakes upstream from KL and LKL in the Kearney Run watershed are situated within BMBC, and used by canoers, kayakers, anglers, and swimmers.

Currently and historically, the primary use of the lake is for recreation. Kearney Lake Beach (KLB), at KL's southeast end, is heavily used during the summer. According to the Long-Term Aquatic Strategy,[1] KLB is the third most used municipal beach in the region. This beach is supervised by municipal lifeguards and is monitored for fecal bacteria and cyanobacteria between July 1 - August 31 annually. Maskwa Canoe Club, located on the southwest shore of the lake, holds regular training in defined lanes, and is an overflow training site and racecourse for paddling competitions. Residents in the area also use the lake for boating, swimming, and fishing.

KL and LKL are located between several ongoing and proposed development sites. The Bedford West development has been ongoing since 2009. The Bedford West Phase 10 SubArea (BW10), one of the subareas defined under the larger Bedford West development agreement, is one of nine Special Planning Areas designated by the province. BW10 is located along Kearney Lake Road directly adjacent to KL, between Kearney Lake Road and Highway 102. Most of the area identified for development sits on a former quarry site, with a Halifax Water (HW) wastewater pumping station also located on the site. BW10 includes an estimated 1,300 units planned for construction.

Just south of KL, and directly adjacent to LKL, the Highway 102 West Corridor Lands are defined as a future serviced community in the 2014 Regional Plan. Along with three other areas, these lands are being considered for future urban development, beginning with a series of background studies required under the Regional Plan, including a watershed study, land suitability analysis and baseline infrastructure studies.

On the southwest side of KL, there are several existing unserviced residential areas. Previous studies have

[1] Report can be found online here: Long Term Aquatic Strategy - May 14/19 Regional Council | Halifax.ca

identified on-site septic systems associated with these developments as contributing phosphorus to KL.[2]

DISCUSSION

The purpose of this report is to provide a lake management plan for KL and LKL focused on beach facility upgrades, comprehensive stormwater management, and prioritizing the use of landscape and shoreline naturalization and green infrastructure solutions wherever possible.

Residents of the area, Regional Councillors, canoe club users, supporters of BMBC and others have been raising concerns for the future water quality of KL and LKL in the context of current and proposed developments. There is significant concern from these communities that the increase in developed land and the associated local population increase will adversely affect KL and LKL. To address these concerns, a lake management plan, modeled from the Municipality's existing plan for Lake Banook and Lake Micmac[3] was requested by Regional Council on December 7, 2021.

Concerns raised by residents and related stakeholders are principally related to their desire to maintain water quality at an acceptable level for continued use of KL and LKL for recreation, and the protection of ecosystems for wildlife. Their concerns can be grouped roughly into three categories:

1. Population increases in the immediate vicinity of KL may further overcrowd KLB and the associated parking lot.
2. Disruptions to soil cover caused by development activities, both surrounding KL and LKL and upstream in the larger Kearney Run watershed, will cause contamination of KL and LKL through increased sediment and nutrient deposition.
3. The increase in impermeable surfaces associated with completed developments directly adjacent to KL and LKL may adversely affect water quality in KL and LKL.

In addition to adequate stormwater management within developments, an effective lake management plan for KL and LKL will address these issues going forward. Maintaining lake water quality to a standard that allows for continued recreational use of the lakes is as much about managing land use in the watershed as the lake itself. Of the three main concerns raised by stakeholders, two are related to land-derived contaminants, therefore the proposed lake management plan should primarily address containing stormwater and other runoff carrying contaminants into KL and LKL, rather than treatment within the lake itself.

Along Kearney Lake Road, runoff travels nearly unobstructed from the road surface, through the riprap on the shore and into KL, carrying with it contaminants like sediment, road salt, and motor oils. There are also five stormwater outfalls along Kearney Lake Road, which discharge directly into KL.

Stormwater control, including the adoption of best management practices for development, is supported by the Regional Plan. The municipality's engineering design requirements[4] mandate that there shall be no net increase in stormwater runoff from a development site as a result of development activities. Halifax Water and the Province of Nova Scotia also carry these requirements. Standards regarding the quality of stormwater runoff are minimal. The proposed development around KL and LKL should contribute no increase in stormwater volume to the lakes. Action should be taken, based on the recommendations in this report, to mitigate potential adverse water quality effects of increases in sediment loading associated with development and land disturbances from residents.

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[2] Report can be found online here: 161212nwccinfo1.pdf (halifax.ca)
[3] Report can be found online here: Pollution Control at Lake Banook and Lake Micmac - Sep 29/20 Regional Council | Halifax.ca
[4] Administrative Order can be found online here: Administrative Order 2020-010-OP, Respecting Stormwater Management Standards for Development Activities | Halifax.ca

As part of policy considerations to enable future development in future serviced communities, the Municipality requires a watershed study and land suitability study be conducted to determine the predicted impacts of development. The watershed study identifies potential risks posed by development to wildlife habitat, water quality and quantity, and ecologically sensitive areas. It also identifies risks of developing in a given area, for example due to flooding. The Highway 102 West Corridor Lands watershed study has not yet been completed. The results of that study and the land suitability study will inform Regional Council of environmental issues they should consider before they proceed with establishing any new land use policy in the area and can also pinpoint focus areas for the lake watershed management plan recommended in this report.

The other essential component of a successful lake management plan is consistent monitoring. Lake water quality can change over time and reflects inputs into the watershed. The only way to ensure the success of the other components of the management plan as described below is to verify with water quality analysis. Consistent water quality or improvements to water quality from the established baseline will indicate the program is meeting its defined outcomes.

There are several water quality monitoring programs already underway in KL. The runoff monitoring associated with the Bedford West development has been ongoing in KL and Papermill Lake since 2009. This program has found repeatedly high levels of phosphorus in KL associated with inadequate stormwater control on development sites and residential on-site septic systems. The Paper Mill Lake Watershed Total Phosphorus Characterization Project, conducted by CBCL in 2016, concluded that in the KL sub-watershed, on-site septic systems were the largest contributor of phosphorus to KL.[5] On-site septic, which is regulated by the provincial government, is controlled and regulated by the Provincial Government except for instances where the Municipality establishes a wastewater management district, which is not recommended in this case. ECC plans to launch an education campaign to encourage homeowners to perform regular maintenance of their on-site septic systems, as other means of addressing this source of phosphorus to KL are unavailable to the municipality.

Fecal bacteria (*E. coli*) monitoring is conducted weekly by the Municipality at KLB between July 1 – August 31. Maskwa Canoe Club conducts their own *E. coli* monitoring regularly during the summer. Bacteria monitoring will continue as long as a supervised beach is operating on Kearney Lake, and will indicate the success of stormwater management, especially in the beach area.

For the past decade, *E. coli* levels at KLB have stayed consistently low. *Table 1* below shows the beach was closed for just 16 days total due to elevated fecal bacteria between 2013-2021. Representatives from Maskwa reported that they only see elevated *E. coli* after heavy rainfall events when migratory geese are present.

While several properties on the southwestern side of KL and LKL are serviced by on-site septic systems, the consistently low fecal bacteria levels found in KL indicate they are not contributing significant fecal bacteria to KL. Therefore, the management plan for KL and LKL does not need to include specific procedures for eliminating fecal bacteria contamination.

[5] Report can be found online here: 161212nwccinfo1.pdf (halifax.ca)

Table 1: Closures at Kearney Lake Beach, 2013-2021

Kearney Lake Beach Closures 2013-2021			
Date Closed	**Date Re-opened**	**Days Closed**	**Reason for Closure**
11-Jul-13	12-Jul-13	2	Elevated *E. Coli* levels
2-Aug-13	7-Aug-13	5	Elevated *E. Coli* levels
22-Jul-15	23-Jul-15	1	Elevated *E. Coli* levels
6-Aug-15	10-Aug-15	4	Elevated *E. Coli* levels
24-Aug-16	26-Aug-16	2	Elevated *E. Coli* levels
23-Jul-19	25-Jul-19	2	Elevated *E. Coli* levels

Further ongoing water quality monitoring at KL began in spring 2022 with the launch of the Municipality's LakeWatchers program.[6] This is a community-based water quality monitoring program taking place in 76 lakes in the Halifax Regional Municipality. Data collected from this program will be used for measuring performance metrics of the management objectives laid out in this report and will establish a baseline for key parameters as land-use around KL and LKL changes.

At this time, the existing water quality monitoring programs are collecting data at an acceptable scope and frequency to inform the management plan recommended in this report.

Park Plan

The effects of poor water quality in KL and LKL are felt acutely at KLB. The beach and associated park are the main point of public access to KL. An effective management plan for these lakes must incorporate the needs of beach and park users and seek to mitigate the effects of heavy lake use at the beach. Success here will require coordinating the execution of the recommendations in this report and future plans for the KLB park.

The Bedford West Park Facilities Plan was initiated by Parks and Recreation, Policy and Planning by way of the 2020/21 Budget and Business Plan with the intention of presenting the final Plan to Regional Council later in 2022. The intention of the Bedford West Park Facilities Plan is to understand the broad recreation needs of the community and to anticipate recreation park space needs in the future.

Specific to KLB, community engagement feedback that was collected during the park planning process includes concern from some community members and stakeholders about the capacity of the park at KLB to safely handle the expected increase in use associated with planned developments. Feedback from residents has been compiled into 'What We Heard' documents, which will guide the park planning process in Bedford West going forward.[7] Some of the identified concerns included insufficient parking and pedestrian safety measures, crowding on the beach itself, damage to the natural environment, and a lack of adequate washroom facilities.

Further consultation with residents was conducted by Environment & Climate Change (ECC) during the preparation of this report. According to residents consulted at this time, KLB's existing parking lot is not large enough to hold the volume of cars visiting the beach in the supervised season. They report that especially on summer weekends, when the parking lot fills, cars park on the shoulder of Hamshaw Drive. The parked cars obstruct the narrow road, slowing down through traffic and potentially restricting the ability

[6] More information on the LakeWatchers program can be found online here: https://www.halifax.ca/about-halifax/energy-environment/lakes-rivers/lakewatchers
[7] More information about the proposed Park Plan and the 'What We Heard' report outlining resident priorities for parkland can be found online here: Bedford West | Parks Plan | New Developments | Halifax, and here: engagement_summaries.pdf (halifax.ca)

of vehicles to pass. There are parking and stopping restrictions in place on Hamshaw Drive, and the speed limit was recently reduced to 40km/h to account for its narrow width. Heavy traffic, narrowed roads due to parked cars, and the large number of children using the park and beach are all factors increasing the risk of accidents between pedestrians and cars.

There are limited opportunities for public access to KL. Staff will consider alternative opportunities for water access within or nearby the community through the implementation of the forthcoming Bedford West Park Facilities Plan.

While KLB is supervised, the Municipality provides portable washrooms on-site. During the rest of the year, there are no washroom facilities, and there is anecdotal evidence from residents that park- and beach-users relieve themselves in the wooded area around the beach.

A recommendation in the forthcoming Bedford West Park Facilities Plan is to develop a site-specific park plan to resolve some of the functional issues at Kearney Lake Beach. Addressing the issues raised about limited access to KL, vehicle traffic around KLB, and a lack of year-round washroom access will help to directly address water quality concerns in KL. Providing additional access points for recreational users will distribute the impacts of human use around the lake and alleviate negative water quality impacts from human and canine sources at KLB. Providing additional access points will also help prevent destruction of vegetated buffers at informal access points around KL. Providing more efficient parking at KLB will help to put distance between vehicles and KL, reducing the risk for pedestrians and preventing potential contaminants from vehicles from entering KL and LKL. If feasible, installing permanent washroom facilities will reduce the potential of park users relieving themselves in the woods, and prevent associated contaminants from entering the water body.

The proposed park plan addresses the majority of issues related to KLB raised by residents, stakeholders and the December 7, 2021 motion that initiated this report. Park planning and improvements need to be supported by measures to ensure that as additional surrounding development occurs, lake water quality is protected through the measures suggested in this report. Discussion and collaboration between ECC and Parks will be necessary to ensure continuity between the other recommended projects in this report and the park plan.

Currently there is a Nova Scotia Power Inc. (NSPI) utility structure on KLB and another in KL itself, spanning just under 300 m from the beach. There are five more structures along the lake on the Kearney Lake Road. NSPI is currently planning an upgrade to its infrastructure, subject to approval by the Nova Scotia Utility and Review Board, which will increase the safety, serviceability, and reliability of the infrastructure and mitigate unplanned or unforeseen customer impacts.

The Municipality has not received the full details on this upgrade, as NSPI is still in the planning and design stage for this work. ECC and Parks will work together with NSPI to ensure the work conforms with water quality, recreation, and environmental goals for the area.

Since this proposed project is likely to be disruptive to the shoreline until it is completed, it is recommended that the Municipality start the stormwater infrastructure installations recommended in this report in areas that will not be affected by the proposed NSPI upgrades.

Parks recommends the park plan for KLB be developed after the completion of the NSPI infrastructure upgrades. The details of the above-described upgrades to KLB, park, parking lot, and NSPI infrastructure are within the scope of other proposed and upcoming projects and will not be replicated by the recommendations in this report.

Proposed Stormwater Management Solutions

Living Shorelines

A living shoreline is a naturalized shoreline designed for erosion prevention and stormwater control. Native plants and organic material such as logs, branches, haybales, and mulch are planted and woven into the shoreline of an ocean, lake, river, or pond.[8] These installations cover exposed soil to prevent erosion, use root systems of varying depths as bank stabilization, reduce wave impact, and improve receiving water quality by using vegetation to capture stormwater runoff. Living shorelines provide habitat corridors for wildlife, shade for aquatic organisms, and landscape restoration. This method of shoreline stabilization is becoming increasingly common in Canada and the United States as people are looking to reduce and/or supplement harder, less natural options like concrete retaining walls and riprap.

The proposed installation site at KL runs along the eastern shore of the lake. Most of this shore is currently covered with riprap with minimal vegetative cover. An initial assessment of priority areas for living shoreline installation are illustrated in Attachment A. These were chosen as areas with the least vegetative cover and the largest stretch between the road and high-water mark, and the most likely areas to be affected by planned development. Gaps in the riprap will be planted with native species. The root systems of these plants will anchor and further stabilize the shoreline. As the installation becomes established, these plants will spread and fill additional gaps in the riprap. The existing trees and shrubs will be incorporated into the project design.

The estimated cost of installing a living shoreline using the green riprap method is $70/square foot ($ft^2$). At an estimated total project area of 15,000ft^2, the projected cost of covering unvegetated areas in that area is approximately $1,000,000. It is recommended this project be spread over 3 years to allow for plants to become established in stages, and for greater ease of replacing the small number of plants that will naturally not survive the initial shock of planting. This will also spread the cost over several budget cycles.

There are five HW stormwater outfalls in the riprap on Kearney Lake Road. Their locations are mapped in Attachment B. Minimizing the impact of these outfalls will be addressed in the next section of this report. HW has been consulted on this project and are supportive. The design of the living shoreline will need to ensure these outfalls remain clear of obstruction from plant material to prevent the stormwater system from backing up. Utility locates will need to be obtained to avoid planting deep rooting vegetation where pipes are present. HW also requires a restoration standard for when the shoreline is disturbed during infrastructure maintenance.

The Province of Nova Scotia owns the land below the high-water mark. Planting below the high-water mark will require a watercourse alteration permit from Nova Scotia Environment & Climate Change (NSECC). A Request for Review from the federal Department of Fisheries and Oceans (DFO) will also be required for work that could affect fish habitat.

On July 7, 2022, the Environment and Sustainability Standing Committee accepted a recommendation to expand the naturalization pilot to a municipality-wide program[9] for municipal parks and rights of way. The focus of this program is the renaturalization of public spaces, reducing impermeable surface coverage and mown lawns. The recommendations in this report are well aligned with the goals of the naturalization program.

Floating Treatment Wetlands

Floating treatment wetlands are engineered structures designed to treat water through filtration, mimicking

[8] More information on living shorelines and their functions can be found online here: Understanding Living Shorelines | NOAA Fisheries
[9] Report can be found online here: Naturalization Strategy - July 7, 2022 Environment & Sustainability Standing Committee | Halifax.ca

a natural wetland.[10] They typically consist of a floating supporting frame and growing medium that is planted with native emergent plants, whose roots protrude past the bottom of the frame into the water column.

Predicted contaminant retention varies site-to-site, but floating wetlands have been shown to remove up to 88% of phosphorus[11] and up to 80% of suspended solids[12] in stormwater runoff. When combined with the increased runoff capture by the living shoreline, this strategy could significantly reduce sediment loading and runoff-derived contaminants in KL.

Based on a literature review, the estimated cost of a floating wetland is $40/ft^2 plus installation and plants. Assuming five 100ft^2 wetlands, one per stormwater outfall, the predicted material cost is roughly $20,000. Including labour, it is estimated the floating wetlands can be installed for approximately $50,000. There will be added maintenance costs, primarily in the form of labour, to thin planted grasses, reinforce structures, and to remove any invasive plants. Anticipated life span of the floating treatment wetlands and annual maintenance requirements will vary depending on the impacts of winter ice cover, and the productivity of the wetlands. Predicted maintenance requirements include repairing damaged wetland structures, harvesting excess plant growth, and replacing dead plants. A review of literature indicates floating treatment wetlands can be expected to last at least 10 years.[13] However, expert consultation as part of the procurement process will confirm the expected lifespan of the floating treatment wetlands recommended in this report.

Watercourse alteration permits will be required from NSECC to install floating wetlands in KL. A Request for Review from DFO will also be required for work potentially affecting fish habitat.

It is recommended that both the floating wetlands and the living shoreline be installed in KL. To ensure the water quality in KL remains suitable for recreational uses, this project should be designed to maximize the volume of runoff filtered. The living shoreline will be designed to retain overland flow from the road and adjacent developments, while the floating wetlands will filter the more concentrated flow from storm drains. Together these two installations will filter the majority of stormwater coming from Kearney Lake Road into KL.

Public Engagement

The naturalization work recommended in this report will change the appearance of the shoreline. Supplementing the work recommended in this report with a public engagement campaign is recommended to increase community support.

The proposed engagement plan would consist of regular progress updates to the public on the project, with the aim of walking the public through the installation process. Permanent signs will also be installed sharing information about the living shoreline and floating wetlands, their function in KL, and the reason the Municipality has chosen to install green infrastructure instead of a more traditionally engineered stormwater system.

Public engagement will serve the dual function of teaching about naturalized stormwater control and how it can be applied by residents on their own properties, and to increase transparency about the Municipality's infrastructure projects. This project will provide opportunities for public participation in the execution of the

[10] More information about floating wetlands can be found online here: TP324 - Floating Wetland Review-Final.pdf (aucklandcity.govt.nz), and here: Floating Treatment Wetlands and Plant Bioremediation: Nutrient treatment in eutrophic freshwater lakes (iisd.org)
[11] Citation: TP324 - Floating Wetland Review-Final.pdf (aucklandcity.govt.nz)
[12] Citation: https://www.iisd.org/system/files/publications/floating-treatment-wetlands.pdf
[13] Examples can be found online here Durability through Biomimicry - FLOATING ISLAND INTERNATIONAL, here Panel Report on Floating Treatment Wetlands in Existing Wet Ponds (chesapeakebay.net), and here Floating Treatment Wetlands: (iisd.org)

naturalization work.

Lake Watershed Management Framework

It is recommended that the Municipality develop a lake watershed management framework that can be applied as necessary to individual lakes. Climate change and development pressures threaten water quality in many of Halifax Regional Municipality's lakes, and the municipal government lacks capacity for developing management strategies for each lake on a case-by-case basis.

This framework would consider the various activities taking place on and around lakes in the Municipality and develop guidelines for land and water use in a watershed dependent on these activities. Potential activities that could be incorporated in a management plan include, but are not limited to:

1. Land Use
2. Agriculture
3. Recreation, including
    a. Boating
    b. Paddling
    c. Swimming
    d. Fishing
4. Public utilities such as water, wastewater, and power
5. Residential use including on-site septic and drinking water
6. Wildlife habitat
7. Ecosystem services as determined by natural asset valuation initiatives
8. Trail systems

A lake watershed management program begins with defining desired water quality outcomes for the lake in question and working backwards to develop appropriate land-use guidelines. Data from ongoing water quality monitoring programs like LakeWatchers will be used to develop acceptable water quality thresholds for key parameters in managed lakes. Similar programs are in place in other regions in Canada.[14] These will serve as models for Halifax's proposed framework.

This recommendation is not dependent on the proposed management plan specific to KL and LKL described in this report, which is primarily focused on runoff control and upgrades to beach facilities. Development of a municipal lake management framework will be a long-term, multi-stakeholder process that can be initiated upon the adoption of the recommendations in this report. The proposed management plan for KL and LKL, and the plan currently in place for Lake Banook and Lake Micmac should be considered as the basis for informing the larger framework.

[14] Examples of other Canadian watershed management programs can be found online here: untitled (nswa.ab.ca) , and here: ALMS_WMPWorkbook.pdf

FINANCIAL IMPLICATIONS

The projected costs of this recommendation can be broken into three sections:

1. Development of a municipal lake watershed management program
2. Floating treatment wetland installation
3. Living shoreline installation

The costs of developing a municipal lake watershed management program can be accommodated within the existing Environment and Climate Change (ECC) budget (D935) through staff work plans. Recommended public engagement will also be accommodated within existing budget and is not expected to require any new funding.

The projected cost of installing floating treatment wetlands at the stormwater outfalls in KL is estimated at $50,000. The living shoreline installation will require preliminary survey work estimated at $10,000. These costs can be accommodated within the existing ECC budget for water operations. ECC will also pursue the opportunity to reduce the cost of installation by engaging the community to participate in the wetland construction, reducing staff labour requirements.

The projected cost of installing a living shoreline on Kearney Lake Road in the priority areas highlighted in Attachment A is $1,000,000. As the work will be completed in stages, the expenses associated with the project will be disbursed over a minimum of three years.

Staff will investigate external funding opportunities for this portion of the recommendations. Potential funding options for the living shoreline include Infrastructure Canada's Natural Infrastructure Fund[15] and Investing in Canada Infrastructure Fund,[16] and the Canadian Federation of Municipalities' Green Municipal Fund.[17] The time required to secure funding will allow the Bedford West Parks Facilities Plan and NSPI's planned infrastructure work to be approved and integrated into the living shoreline project plan. In the event funding is secured, ECC will detail the year over year costs of the living shoreline installation in the relevant year's budget.

If ECC is unable to secure the funding required for the living shoreline, ECC will return to Regional Council with a modified recommendation for this proposed project.

RISK CONSIDERATION

Risks associated with undertaking the proposed management plan and applying the principles of green infrastructure to stormwater controls must be balanced with the risk of taking no action, and the associated risks posed by climate change to the municipality's freshwater resources.

There is a low risk the living shoreline and floating wetlands will not be successful at reducing the volume of sediment and contaminants in runoff entering KL and LKL and will not prevent the effects of development from negatively affecting water quality in KL and LKL.

Due to budgetary constraints, there is risk that implementation of improvements to KLB as determined through the Bedford West Park Facilities Plan will not be able to be implemented in an appropriate timeline

[15] More information on the Natural Infrastructure Fund can be found online here: https://www.infrastructure.gc.ca/nif-fin/index-eng.html
[16] More information on the Investing in Canada Infrastructure Fund can be found online here: https://www.infrastructure.gc.ca/plan/icp-pic-INFC-eng.html
[17] More information on the Green Municipal Fund can be found online here: www.greenmunicipalfund.ca

to help address water quality concerns. This risk will be addressed in the creation of the Park plan and mitigated with the implementation of other initiatives as outlined in this report.

COMMUNITY ENGAGEMENT

Consultation with stakeholders was conducted in preparation for this report. Interviews with members of the Kearney Lake Resident's Association, Maskwa Canoe Club, and district Councillor for the area were conducted on-site at KL and LKL to identify particular areas of concern to these communities.

Further consultation took place with representatives from HW, NSPI, and Halifax Regional Municipality's Parks & Recreation (Parks) and Planning & Development departments. If Regional Council chooses to adopt the recommendations set out in this report, ECC will work closely with these stakeholders to ensure a successful, integrated approach.

There are opportunities for community participation in the installation of both the living shoreline and the floating wetlands.

Additional engagement with residents and stakeholders, particularly the paddling community and residents working in the interests of BMBC will also be conducted if this recommendation is accepted by Regional Council. Including the communities who initially raised concerns about KL and LKL in the living shoreline design process will create goodwill between the Municipality and these groups. This will help to ensure their joint vision of environmental stewardship and continued sustainable recreational use of KL and LKL is realized by the management plan.

ENVIRONMENTAL IMPLICATIONS

A good lake management strategy has many positive environmental impacts. The plan proposed in this recommendation will reduce inputs into KL and LKL contributing to adverse water quality effects. While the focus of this report has been on human uses of KL and LKL, maintaining water quality and increasing the volume of riparian vegetation provides safe, healthy habitat for both land and aquatic animals, fish, and other organisms.

Working from a defined lake management framework will ensure a cohesive environmental strategy going forward. Establishing standards for water quality will inform the type and intensity of activities permitted in KL and LKL. In addition, a lake watershed management strategy would provide increased clarity and standardization of the Municipality's environmental goals in the watershed.

The environmental benefits of installing green infrastructure for stormwater management are numerous. Living shorelines provide robust stormwater management, and gain strength over time as plants and their root systems become more established. This is the opposite of hard engineered options, which are strongest on the day they are installed. As explained in the discussion section of this report, catching stormwater runoff drastically reduces inputs of sediment, nutrients, potentially harmful bacteria, and other land-derived contaminants. Vegetated shorelines catch runoff and direct it downward into the soil via plant roots and soil infiltration, diverting it from the lake entirely, and reducing the risk of flash flooding. Floating wetlands provide many of the same ecosystem services below drainage pipes where flow is concentrated, filtering contaminants from runoff as it passes through.

Minimal disruption causing detrimental effects on wildlife habitat, both above and below the high-water mark, is expected due to the work proposed by these recommendations.

SOCIAL VALUE

The social value of preserving urban lakes for recreation and wildlife habitat is extensive. Providing public access to safe natural spaces allows people to move, exercise, and relax in nature who do not have that opportunity on their own private property.

The recommendations proposed in this report, if adopted, also offer the Municipality an opportunity to pilot a demonstration site for using green infrastructure and naturalized stormwater management for public education. Showing the link between increased vegetated cover and increased water quality outcomes and conducting the pilot with transparency around the project process and costing can be used as part of the Municipality's strategy to encourage residents to install these solutions to manage stormwater on their own properties.

ALTERNATIVES

That Halifax Regional Council:

1. Not approve the management plan approach for Kearney Lake and Little Kearney Lake as described in this report. This is not recommended due to the reasons outlined in this report.

2. Direct the Chief Administrative Officer to not develop a municipal lake watershed management framework, to standardize the approach to lake management in future Lake Management Plans, as described in this report.

3. Direct the Chief Administrative Officer to wait to approve pursuing funding for installation of a living shoreline until the Bedford West Park Facilities Plan is approved, and the infrastructure work planned by NSPI is complete. This is not recommended based on the reasons outlined in this report.

4. Direct the Chief Administrative Officer to approve the installation of only the floating wetlands as outlined in this report and refuse to approve the installation of the living shoreline. This is not recommended based on the reasons outlined in this report.

ATTACHMENTS

Attachment A. Priority Areas for Living Shoreline Installation
Attachment B. Halifax Water Stormwater Outfall Locations

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

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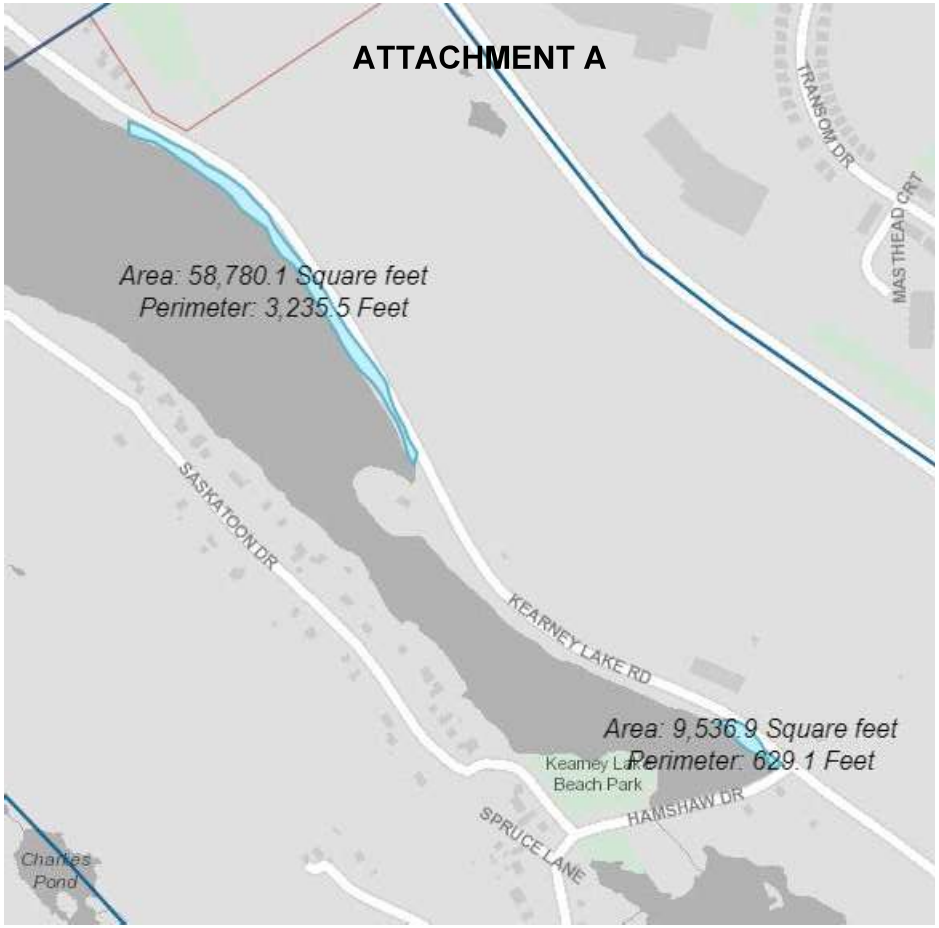
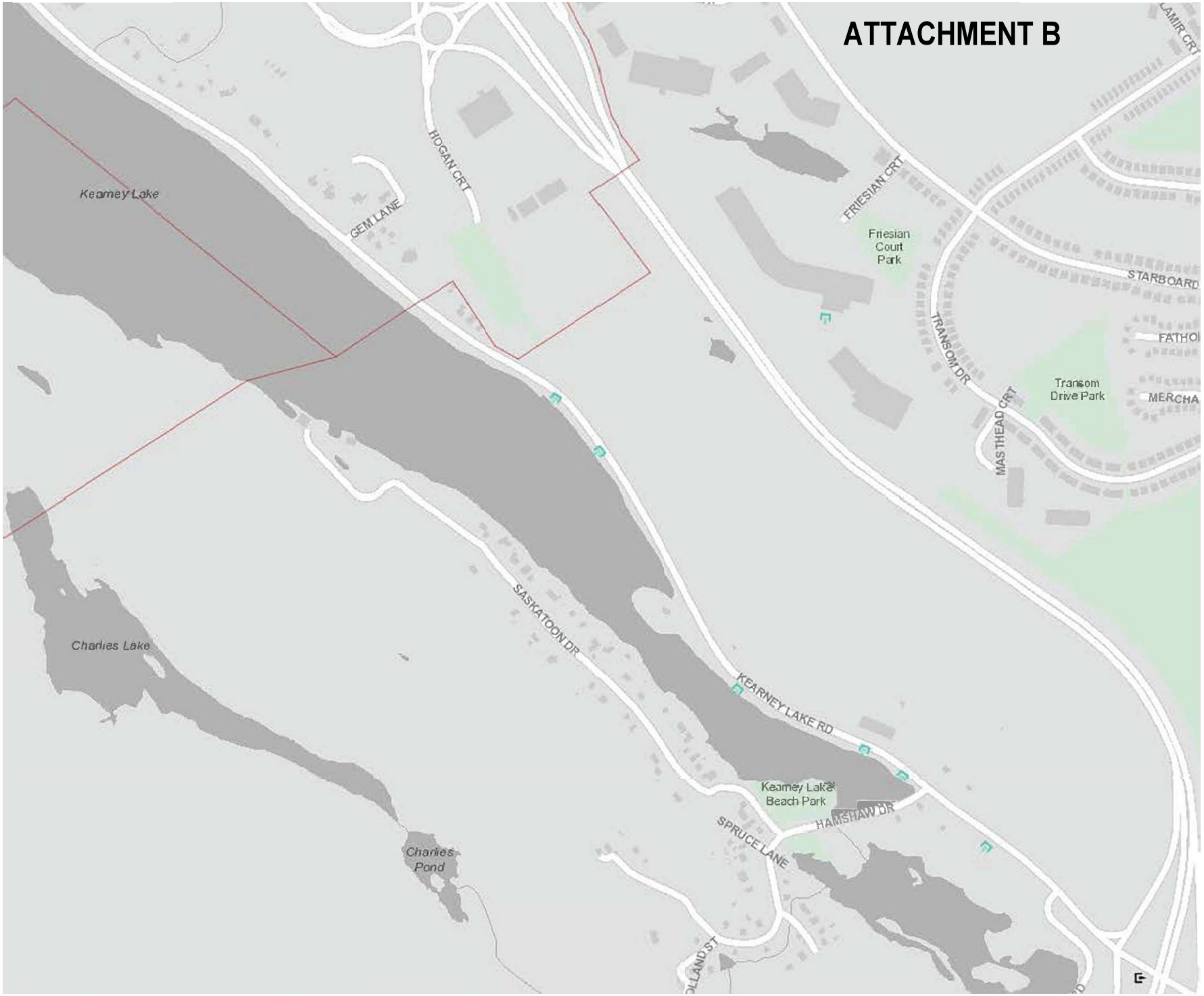
902.943.1954

ATTACHMENT A




ATTACHMENT B
Kearney Lake
GEM LANE
HOGAN CRT
FRIESIAN CRT
Friesian Court Park
STARBOARD
TRANSOM DR
Transom Drive Park
MASTHEAD CRT
SASKATOON DR
KEARNEY LAKE RD
Charlies Lake
Kearney Lake Beach Park
HAMSHAW DR
SPRUCE LANE
Charlies Pond