MILL CREEK NATURE PARK

MASTER PLAN

March 2023

Riverview

ACKNOWLEDGMENTS

TOWN OF RIVERVIEW LAND ACKNOWLEDGMENT STATEMENT

We would like to acknowledge that the Town is located within the traditional, unceded territory of the Mi'kmaq Peoples. This territory is covered by the "Treaties of Peace and Friendship," which the Indigenous Peoples first signed with the British crown in 1725. The treaties did not deal with the surrender of lands and resources but recognized the Mi'kmaq and Wolastoqiyik titles and established the rules for what was to be an ongoing relationship between nations. We affirm our commitment and responsibility to improving relationships between nations and to improving our own understanding of local Indigenous Peoples and their cultures.

MILL CREEK NATURE PARK MASTER PLAN ACKNOWLEDGEMENTS

Many thanks to all those who contributed to the development of this master plan, including residents for their participation in intercept interviews, focus group meetings, community workshops and open house sessions; students from Riverview East, Riverview Middle and Riverview High Schools for their participation in school workshops; and the Friends of Mill Creek Nature Park Committee, Town Staff and Town Council for their valuable feedback, insights, passion, and dedication to the park.

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1.0 MILL CREEK NATURE PARK MASTER PLAN

1.1 CONTEXT

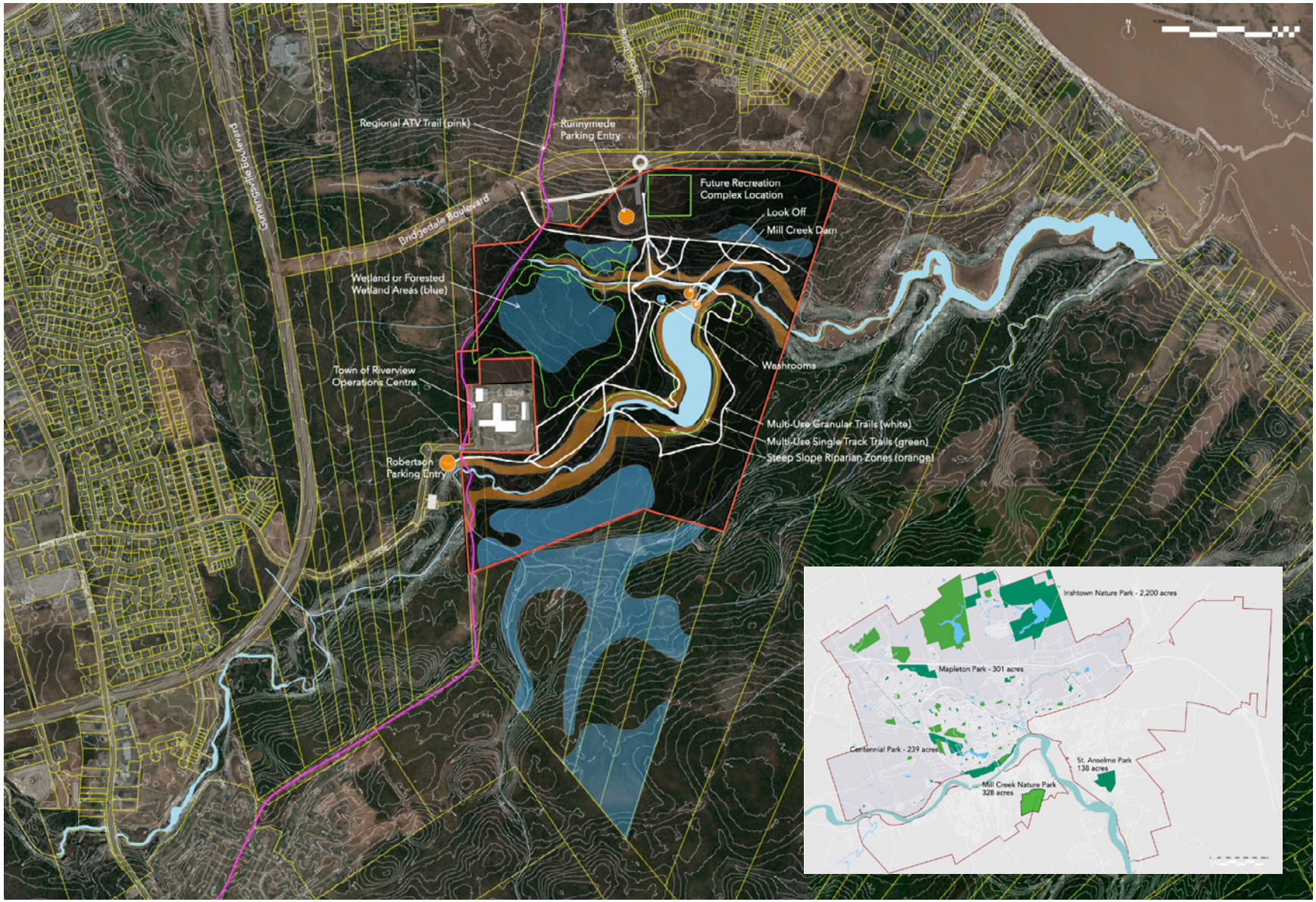
Mill Creek Nature Park is a flourishing 330-acre (134 hectares) nature park located in the Town of Riverview (see Figure 1 for location). Riverview residents have embraced Mill Creek Nature Park as a year-round destination to be active, socialize, relax, and connect with nature. The park serves the 20,654 residents of Riverview, with residents from the surrounding communities of Moncton and Dieppe also visiting the park on a daily, weekly and monthly basis.

The Mill Creek facility is a park imagined and proposed to Riverview's town council as a natural refuge from daily life by Daniel DeLong (then a student at Riverview High School). Mr. DeLong understood that the Town of Riverview was a rapidly growing municipality that lacked a formalized large passive park space where residents could walk and enjoy an authentic and conserved natural experience. Thus, in 2011, under the guidance of Riverview High School environmental science teacher Pamela Fowler, Mr. DeLong completed and presented a term project to town council. The councillors were highly impressed by the work and proceeded to enhance the proposed site from a cross-country ski facility to a regional nature park.

A Town-commissioned 2013 Mill Creek Nature Park Master Plan laid the foundational groundwork for today's nature park. The master plan expanded Mr. DeLong's work by making a series of statements defining the role of the park, a series of conservation strategies that ensure protection from intense adjacent residential and commercial development, and a series of projects that expand the role of passive park enjoyment within the context of the active ski trails.

The Town of Riverview commissioned this document, the 2023 Mill Creek Nature Park Master Plan, to evaluate facility development in regards to the 2013 plan, to update park infrastructure relative to existing, contemporary and emerging park activity, and to propose a modified series of sustainability initiatives relative to this activity, and relative to the long-term health of the park's natural environment.

FIGURE 1 | MILL CREEK NATURE PARK LOCATION



1.2 THE CONTEMPORARY MILL CREEK NATURE PARK

Figure 1 illustrates the regional and municipal location of the nature park. The figure also locates existing site conditions and characteristics relative to assets such as the multi-use and single-track trail systems, the existing dam and bridges, important wetland areas within the park and adjacent town-owned land, primary park gateways, and the location of a proposed Town of Riverview Recreation Complex (pool, field house, community gathering spaces). This master plan proposes sustainability, positioning and growth strategies for the nature park within the context of a growing town, region and province. Additionally, this master plan considers the placement of the nature park within the context of the Fundy region's growing active and passive nature-based destinations, such as the Fundy Parkway, Hopewell Rocks, Fundy National Park, and the White Rock Recreation Area trails in Hillsborough.

The contemporary nature park is a sustained landscape that provides a natural experience for active and passive recreation, while hosting forest and ground cover, and a watercourse that provides valuable air and water quality control habitat for the expanding adjacent urban environments. Thus, Mill Creek Nature Park's ecological setting must be evaluated and understood to define a conservation strategy that ensures habitat sustainability and resilience within the context of an evolving cultural setting.

At its core, relative to sustainability and resilience, the contemporary nature park seeks to provide a venue and experience within the following context.

INTACT ECOLOGIES. Forests are strongest when they are diverse, stratified and ecologically connected within the park and to important adjacent natural assets. Ecologies are evaluated through the lens of aquatic and terrestrial, and the transition between the two (the riparian area). High-quality ecological areas should be connected to provide a venue for wildlife movement and be well-buffered from the urban environment.

IMMERSION IN NATURE. Residents feel immersed in nature when a park is provided in distinct contrast to the urban environment. This immersion ensures an experience founded in a multi-sensory connection to the natural environment. This requires a high-quality ecological environment that is best suited to large parks.

WILDERNESS RECREATION. Biking, walking, skiing, running, birdwatching, photography, etc. are provided with limited infrastructure. The impacts of recreation must be stabilized through careful trail and land use planning that ensures minimal impact on important ecologies.

This master plan must propose a park evolution model that sustains the Mill Creek Nature Park as a place where ecology, nature immersion and recreation co-exist. The existing park size and shape are ignored and re-established based on these contemporary nature park components.

1.3 RECREATION AND NATURE PARKS

Nature parks contribute to community identity, provide active and passive recreational opportunities, appeal to all ages, contribute to the health and wellness of a community, and create valuable green space.[1] Unlike neighbourhood parks, nature parks serve large geographic areas with the aim of providing recreation to those seeking an escape from urban settings.

The benefits of nature parks include improving mental health, reducing stress, providing a connection to nature, and increasing social interactions, and to serving as venues for community events, activities, and public health programs. Urban nature parks provide natural infrastructure solutions that improve the environment, reduce flooding, and protect human health and property loss by deterring development in areas prone to events like mudslides, wildfires and flooding.[2]

Parks are essential components that support combating some of the most complex challenges in society—poor nutrition, hunger, obesity, and physical inactivity.[3] *The Framework for Recreation in Canada 2015* states that "the fields of physical activity, sport, recreation, parks, the environment and health all share a common mandate to enhance the well-being of individuals, communities and the environment." Thus, there is a clear need to coordinate these strategies and frameworks, and to collaborate on specific actions and initiatives.[4]

Following lockdowns from the COVID-19 pandemic, park visits increased by 63%.[5] While the growing interest in more contact with nature is positive, Peter H. Kahn, a professor of psychology at the University of Washington, reflects concern that it is also overly reliant on experiencing it visually. He affirms, "we need to deepen the forms of interaction with nature and make it more immersive."[6] This need makes parks and outdoor recreation important tools for helping people get the most benefits out of their interactions with nature.

HEALTH BENEFITS

The presence of nature parks and green space support good health for people of all abilities, ages, socioeconomic backgrounds, and ethnicities.[7] The presence of parks and proximity to parks can positively impact physical health, mental health, social interaction and safety/injury prevention.[8]

Relative to mental well-being, trees and greener environments are strongly linked to reduced negative thoughts, reduced symptoms of depression, better-reported moods, and increased life satisfaction.[9] And while most research to date has been focused on green spaces such as parks and forests, there is emerging research that blue spaces–places with views of bodies of water–offer the same health benefits.[10]

Studies have shown that time in nature—as long as people feel safe—is an antidote for stress.[11] It can lower blood pressure and stress hormone levels, reduce nervous system arousal, enhance immune system function, increase self-esteem, reduce anxiety, and improve mood.[12]

Even for people unable to engage with nature, nature can still have a positive impact. A study which looked at the recovery of surgical patients in a Pennsylvania hospital found that patients offered views of trees had shorter hospitalizations, less need for painkillers, and fewer negative comments in the nurses' notes compared to patients with views of brick walls.[13] Similar findings were found in a study in which students who looked out at a flowering green roof for 40 seconds midway through a dull attention-draining task made significantly fewer mistakes than those who paused for 40 seconds to gaze at a concrete rooftop.[14] Additionally, residents in housing projects with views of trees or grass experience reduced mental fatigue and reported that they are better able to cope with life's problems.[15]

Relative to physical well-being, study after study shows that when people can not reach parks, they often go without exercise; this is especially true for lower-income families.[16] But studies have shown that where people have access to parks, they exercise more.[17]A large-scale Cleveland Metro parks study of older park visitors found that two-thirds of them were highly or moderately active while in the parks.[18]

A study by the American Journal of Preventive Medicine shows that easy access to a place to exercise results in a 5.1% median increase in aerobic capacity, along with weight loss, a reduction in body fat, improvements in flexibility, and an increase in perceived energy.[19]

In a Cost-Benefit Analysis of Physical Activity Using Bike/Pedestrian Trails, it was estimated that for each dollar spent on building, maintaining, and using trails, nearly three dollars were realized in reduced health care costs by the trail users due to improvements in their health.[20]

Green spaces are also important for reducing the harmful effects of ultraviolet radiation. Ultimately, tree leaves can absorb around 95% of ultraviolet radiation, though using tree shade as protection from UV is not intuitively obvious.[21] Given that most skin cancers result from UV rays in sunlight, having access to shaded outdoor spaces where people can receive the benefits of being in nature while also minimizing their sun exposure is highly advantageous.

ENVIRONMENTAL BENEFITS

While nature parks are beneficial to humans, they are also beneficial to native plants and animals.[22] Parks offer many environmental benefits, such as safeguarding greenspace, mitigating environmental distress, reducing air pollution, and fostering respect for nature.

By establishing parks and greenspace, land is protected from rigorous development. This aids in wildlife conservation and helps to sustain natural ecosystems. In fact, greenways not only protect habitat but provide corridors for both people and wildlife.[23] Additionally, when nature parks offer a safe space for wildlife, more wildlife will flourish, and as a result, more people will visit the park to engage in animal spotting and birdwatching, thus contributing to overall respect and appreciation for the natural environment.[24]

Additionally, nature parks and greenways are essential in mitigating potential environmental disasters such as flooding and aquifer depletion.[25] Many environmental studies have shown that greenways and natural areas which contain trail systems offer valuable water quality benefits.[26] For example, by protecting land along rivers and streams, greenways prevent soil erosion and filter pollution caused by agricultural and road runoff.[27]

An increasingly important feature of greenspace is its role in reducing air temperatures. Parks generally, and nature parks specifically, have significantly lower air temperatures than surrounding areas, and their cool air often moves out to adjacent neighbourhoods. The cooling of surrounding areas tends to increase with park size and the percentage of the park covered by trees.[28] By reducing air temperatures, parks reduce building energy consumption in and around parks.[29]

Additionally, trees and vegetation in parks directly remove pollutants.[30] Large trees greater than 76 cm in trunk diameter store approximately 800 to 900 times more carbon than small trees less than 8 cm in diameter. Large healthy trees also remove about 50 times more carbon annually than small healthy trees.[31] This is why parks with forest-like conditions are critical because, in addition to having large and developed trees, parks with forest-like conditions can enhance carbon storage through time because net carbon can be accumulated in the soil along with the carbon retained in the trees.[32] While each acre of trees stores 40 tons of CO_2, the same area of soil holds 32 tons.[33] In one year, one acre of tree cover in a park will likely have pollution removal totals of around 80 pounds per year, but the total could exceed 200 pounds per year in more polluted areas with long growing seasons.[34]

Fossil fuel pollution is not the only pollution parks and trails help to reduce; they also help reduce light and noise pollution.[35] Light pollution is a global issue that has consequences for both humans and animals as artificial light wreaks havoc on natural body rhythms, and nocturnal light confuses the circadian rhythm that affects physiological processes in nearly all living organisms.[36] Studies show that light pollution is impacting animal behaviours such as migration patterns and habitat formation.[37] The same is true of noise pollution, which impacts animals' communication, mating, navigation, and foraging.[38] One of the best ways to help with noise control is dense, native vegetation that extends down to the ground.[39] A combination of evergreen trees and shrubs can provide year-round soundproofing.[40] Thus parks and greenways can offer safe harbours where wildlife may avoid these consequences.

ECONOMIC BENEFITS

Parks offer significant economic benefits for communities. According to a 2016 American study, public parks were responsible for $200 billion in annual economic activity, making parks one of the main drivers of economic growth.[41] They increase property value and contribute to ecotourism, and recent data found that park and recreation contributions to the economy held stout in the face of the COVID-19 pandemic.[42]

One of the ways in which parks and greenspace benefit the economy is by making communities more attractive places to live. A study in Washington State reported that homes within half a mile from a natural area or park had values 8-20% higher than those not near green spaces.[43] And it's been found that greenbelts next to residential communities increase the prices people will pay for homes by 32%.[44] In particular, trails highly impact property values as communities recognize them as safe places to be active, healthy and community oriented.[45] So much so that, when considering where to move, home buyers rank walking and biking paths as one of the most important features of a new community.[46]

This mentality is also evident in business location and relocation decisions. Companies often choose to locate in communities that offer a high level of amenities to employees as a means of attracting and retaining top-level workers.[47] Trails and greenways can make communities attractive to businesses looking to expand or relocate both because of the amenities they offer employees and the opportunities they offer to cater to trail visitors.[48]

Another economic benefit of parks and greenways is ecotourism.[49] According to research conducted by Tourism BC in 2009, 25 – 30% of all travellers from North America who participate in either hiking or biking chose their destination specifically for these types of recreation.[50] Additionally, conserving wildlife in parks also draws tourists who wish to spot unique and local wildlife.[51] By investing in parks and greenspace, communities have the opportunity to boost their local tourism.

YOUTH BENEFITS

One of the most impactful benefits of parks and nature is its impact on children and youth. Research shows that children who spend time outside have better test scores, better cognitive function, fewer behavioural problems, fewer signs of ADHD, and improved self-discipline.[52] In fact, doctors now prescribe time outdoors for some patients as part of a push by the National Recreation and Park Association.[53]

Not only do parks enhance children's multi-sensory experiences,[54] they are essential in promoting well-rounded cognitive, social, and physical development. Much of children and youth's lives are structured and supervised; outdoor play gives them freedom and independence to interact socially, make their own decisions, as well as learn to play independently.[55] This absence of structure is invaluable for the development of important executive function skills, such as planning, prioritizing, troubleshooting, and negotiating.[56]

The benefits of the outdoors can also be witnessed within the structured areas of children's lives, such as school. Research has found that educational facilities that adopted environment-based education as the central focus of their academic programs showed improvement in reading and mathematics scores, better performance in science and social studies, declines in classroom discipline problems, as well as high-level learning opportunities equalized among students.[57]

Additionally, playing freely on a playground helps children develop athletic abilities without the pressure of organized sports.[58] Common and invented games with other children can increase agility, develop fine and gross motor skills, improve balance and coordination, as well as prevent and combat obesity.[59] When children are allowed to take risks and choose their own play outdoors, they gain confidence, resilience to overcome challenges, and skills to manage risks for themselves.[60]

Outdoor play also offers inclusive spaces for children of all ages and abilities. In particular, parks are noteable spaces for children to practice inclusive play. Since outdoor play occurs within a more diverse environment, kids socialize with different children than they see every day in their classroom.[61] Additionally, a study from the University of Nebraska Lincoln showed that preschool children who interacted more frequently with children with disabilities had a more positive attitude toward all people with disabilities.[62] Thus,

establishing a safe and accessible space where this interaction can be facilitated is one of the key benefits parks offer for children.

Moreover, with recess at schools averaging 10 to 35 minutes a day,[63] community outdoor play spaces increase the opportunities for children to expand their time outdoors as well as their physical activity levels. When children are outdoors, they move more, sit less, and play longer.[64] Not only is the presence of these spaces for outdoor recreation important for children, but so is the ease at which youth can access them. An American study examined the correlation between physical activity in adolescent girls and proximity to parks and schools and found the girls who live closer participate in more physical activity than those who do not.[65] Additionally, given outdoor play serves as a gateway to other recreation, parks and greenspaces are key factors that contribute to children's development of lifelong healthy habits.

COMMUNITY BENEFITS

Parks and greenspaces benefit communities by strengthening connections, stimulating participation in community life, fostering community pride, and contributing to community identity.

One of the ways this is achieved is by strengthening community development. The accomplishment of creating a new park contributes to people's sense of involvement in the community and their belief that they can effect change.[66] This sense of unity, in turn, helps to foster stable neighbourhoods with strong social ties and community involvement.[67]

It has been shown that adults who use parks, recreation and cultural facilities and participate in recreation programs are more willing to volunteer than those who do not use these services.[68] Therefore, having accessible places for recreation is an essential tool to promote community involvement and foster a desire to actively contribute to the community.

Outdoor recreation specifically has the added benefit of potentially improving social relations. A Canadian study from Carleton University found that nature may make us nicer and more prosocial. The study found that elementary school children acted more prosocially to classmates as well as strangers following a field trip to a nature school than they did after a visit to an aviation museum.[69]

This positive impact of nature on social relationships goes beyond just improving them and can, in fact, help to reduce crime and aggression.[70] A study published by Netta Weinstein et al. found that contact with nature appeared to have a significant effect on

promoting community ties and reducing violence.[71] The study measured the relationships between individual and community assessments of exposure to nature, community cohesion and crime rates. The analysis revealed that the amount of accessible green spaces or farmlands in a community accounted for 4 percent of the variability in crime rates. This makes exposure to nature nearly as large of a factor in crime as socioeconomic deprivation, which accounts for 5 percent of crime rate variability.[72]

Parks can benefit the community by providing an established, maintained, protected outdoor public space. More often than not, disorderly environments send the message that no one values the property or will challenge crimes against it, which increases residents' general fear, weakens community controls, and invites criminal behaviour.[73] One of the best ways to address this is through trail networks. Because of their linear design, trails act as meeting places for communities. As a result, trails promote family unity as well as strengthen friendships and neighbour relations.[74] A well-managed trail can also serve as a focal point for a community for special events or serve as a gathering place, both of which can lead to greater interaction between residents and improve the cohesion of a community.[75]

Trails also benefit the community by helping to secure lands to protect in perpetuity.[76] They can preserve culturally and historically valuable areas[77] and increase the value of open space to the public by providing access.[78] Furthermore, trails offer an inclusive opportunity for users of all ages to learn more about nature, culture or history by providing firsthand experiences that educate users about the importance of the natural environment and respect for nature.[79]

Given hiking and walking trails are affordable forms of recreation,[80] investing in trails is also an investment in community equity. In addition to providing affordable opportunities for recreation, new trails can also help to dismantle the unequal distribution of trees and green spaces among communities with varying demographics such as income and race.[81] Although access to public green spaces, including parks, nature preserves, forests, and community gardens, varies across racial and economic lines,[82] establishing and promoting inclusive trail networks, both within and to community parks, serves as an indispensable tool for communities to actively combat inequity and contribute to a community identity that reflects and supports everyone who is a part of it.

1.4 PREVIOUS WORKS

The Mill Creek Master Plan is founded in a review of the following previously completed plans, studies, and other relevant strategic documents for relevant recreation context and lessons learned:

- *Mill Creek Nature Park Development Master Plan* (2013)
- *Regional Sustainable Transportation Master Plan* (2015)
- *Creating a Regional Nature Park: A Case Study on Community Engagement in Developing the Mill Creek Nature Park in the Town of Riverview, New Brunswick* (2017)
- *Riverview Recreation Complex Town of Riverview: Functional and Technical Program Report* (2020)
- *Cohort 2 National Project Summary Report* (2020)
- *Planning Considerations in the Mill Creek Area* (2021)
- *Mill Creek Singletrack Trail System Vision* (2021)
- *Mill Creek Nature Park Trails Proposal* (Draft)
- *Mill Creek Nature Park Conservation Strategy* (Draft)
- *Municipal Natural Asset Initiative Report*

MILL CREEK NATURE PARK DEVELOPMENT MASTER PLAN

The Mill Creek Nature Park Development Master Plan was released in 2013. The Plan proposes mixed-use development of the park within the context of nature and recreation and identifies the developmental themes of nature, play, and sport. The Master Plan's main focus is the north side of the core park boundary and within the boundary itself. It outlines key projects, trail projects, park amenities, an implementation theory and strategy, and a project budget.

REGIONAL SUSTAINABLE TRANSPORTATION MASTER PLAN

This document, published in 2015, includes a technical report and numerous technical appendices. The Regional Sustainable Transportation Master Plan serves to guide the development of a multi-modal transportation network to meet the needs of the Tri-Community of the City of Moncton, the City of Dieppe, and the Town of Riverview until 2040. The plan aims to promote sustainable development, protect the natural environment, promote economic vitality and healthy communities, and provide safe, affordable and efficient transportation for people and goods. Some of the priorities and actions mentioned in the Plan include developing well-connected trail and cycling networks, enhancing pedestrian circulation and walkability, and enhancing the safety of active transportation networks.

CREATING A REGIONAL NATURE PARK: A CASE STUDY ON COMMUNITY ENGAGEMENT IN DEVELOPING THE MILL CREEK NATURE PARK IN THE TOWN OF RIVERVIEW, NB

This paper was published in 2017 and explores the development and management of Mill Creek Nature Park. It identifies the park's unique features and history and provides a timeline of the Mill Creek Site and its development process. It investigates the park through the themes of inception, consultation, and materialization, and highlights how the park may serve as a template for other municipalities looking to develop their own parks of similar size and scope. The study praises the community-led planning attached to Mill Creek and attributes the early success of the park to consultation with the general community, local stakeholders, and future park users in the early design phase.

MILL CREEK SINGLETRACK TRAIL SYSTEM VISION

Published in November of 2021, this document details a vision for new singletrack trails in Mill Creek Nature Park. It recommends building trails for all ability levels, incorporating a range of trail styles to diversify the site, and catering to multiple trail users such as hikers and mountain bikers in the summer and fat biking and snowshoeing in the winter. The report breaks down eight new trail segment concepts and proposes a trail difficulty rating system. It also suggests incorporating Technical Trail Features near trailheads and key gathering points within the trail system. A budget and trail build phasing is also included.

RIVERVIEW RECREATION COMPLEX TOWN OF RIVERVIEW: FUNCTIONAL AND TECHNICAL PROGRAM REPORT

Published in 2020, this document outlines the plans for a multi-use Wellness Centre Complex in Riverview. The complex would include a competition-size swimming pool, a field house, a walking track and community space, as well as parking and exterior spaces. The document provides background information on the Town of Riverview, its demographics and population, facilities inventory, and user groups. The report references the 2013 Mill Creek Master Plan and asserts that the Town has identified an area within Mill Creek Nature Park as the preferred site for the Recreation Complex. It goes on to break down the Functional Program and Technical Program extensively.

MILL CREEK NATURE PARK TRAILS PROPOSAL (DRAFT)

This document aims to identify opportunities for new trails and improve the park map, as well as identify linkages to trails and neighbourhoods outside of the park. It identifies the existing Winter and Summer trails and highlights thesis trail types identified in the Master Plan. It also explains the park's conservation strategy use of zones to inform what types of development are appropriate in different areas of the park. The document proposes several new trails with name suggestions, all of which follow existing trail footprints and are intended for summer walking but may also be used for cycling, snowshoeing and fat biking.

MILL CREEK NATURE PARK CONSERVATION STRATEGY (DRAFT)

This document highlights a proposed policy to protect the habitat, diversity of life, and ecosystems within the boundaries of Mill Creek Nature Park with the aim of conserving it for future generations. Three zones have been delineated within the park to help guide the management, development and conservation priorities of the park. Zone 1 is the highest level of protection, Zone 2 is under moderate protection, and Zone 3 is the least restricted. The report also offers guidelines for park usage within the zones mentioned above and the protocols for individuals wishing to conduct research within the park.

PLANNING CONSIDERATIONS IN THE MILL CREEK AREA

This document was prepared in 2021. It offers an overview of the Municipal Natural Assets Initiative's Mill Creek Study, the current Municipal Plan and Zoning, and highlights key changes that should be considered when moving forward with the planning of Mill Creek.

MUNICIPAL NATURAL ASSET INITIATIVE REPORT

The following summary is provided in the above-noted report.

The Municipal Natural Asset Initiative (MNAI) project was initiated by Southeast Regional Service Commission (SERSC) in partnership with the Town of Riverview to increase their understanding of how proper management of the natural assets within the community contributes to improved stormwater management. The focus of the project was a large development area proposed within the Mill Creek Watershed that is being designed adjacent to a nature park. The community wants to explore development that protects and enhances natural assets while incorporating planned recreational, institutional, commercial, and residential development.

This project included the development of a natural asset inventory, condition assessment, stormwater modelling, economic assessment and initial planning considerations. The findings demonstrate that the wetlands and surrounding natural areas within the Mill Creek watershed provide valuable storage capacity that, if lost, will result in increased costs to taxpayers to meet the regulatory requirements of the stormwater design criteria. The costs increase further when future climate conditions are factored in.

Modelling was completed for four wetlands to assess the volume and peak flow reduction for 5-year storm events and 100-year storm events. The model was run under current development conditions as well as with the proposed development and with and without climate change. Project results indicate that the existing wetlands are currently attenuating nearly 19,000 m3 of total flow over 24 hours. Under future climate change conditions, the wetlands contribute an additional 284 m3 of flow attenuation over a 24-hour period. Peak flows were also analyzed through the modelling, which found that the larger wetlands in the sub-catchment that drains below the Mill Creek Dam currently attenuate about 4.5% of peak flows, or 3.4% of peak flows under future climate change conditions. The smaller wetland in the sub-catchment near the Operation Centre was found to be at its capacity to attenuate peak flows during a 100-year storm event.

Modelling also confirmed the importance of forest cover in reducing stormwater runoff. When comparing current development scenarios with the proposed development scenarios, the findings reveal that roughly 33,000 - 34,000 m3 of runoff is controlled by the existing vegetation. Less effective on a per area basis than wetlands, forests also provide a valuable contribution to stormwater control services.

The replacement cost method was used to estimate the value of Mill Creek's natural assets, specifically the 4 wetlands in the project area. The cost of replacing the Mill Creek wetlands with stormwater management ponds or constructed wetlands to provide an equivalent detention function for stormwater was based on the required storage volume and costs to design and construct a stormwater detention pond with landscaping and environmental components. This was then compared to existing stormwater design criteria, which requires that post-development peak flows do not exceed those of pre-development.

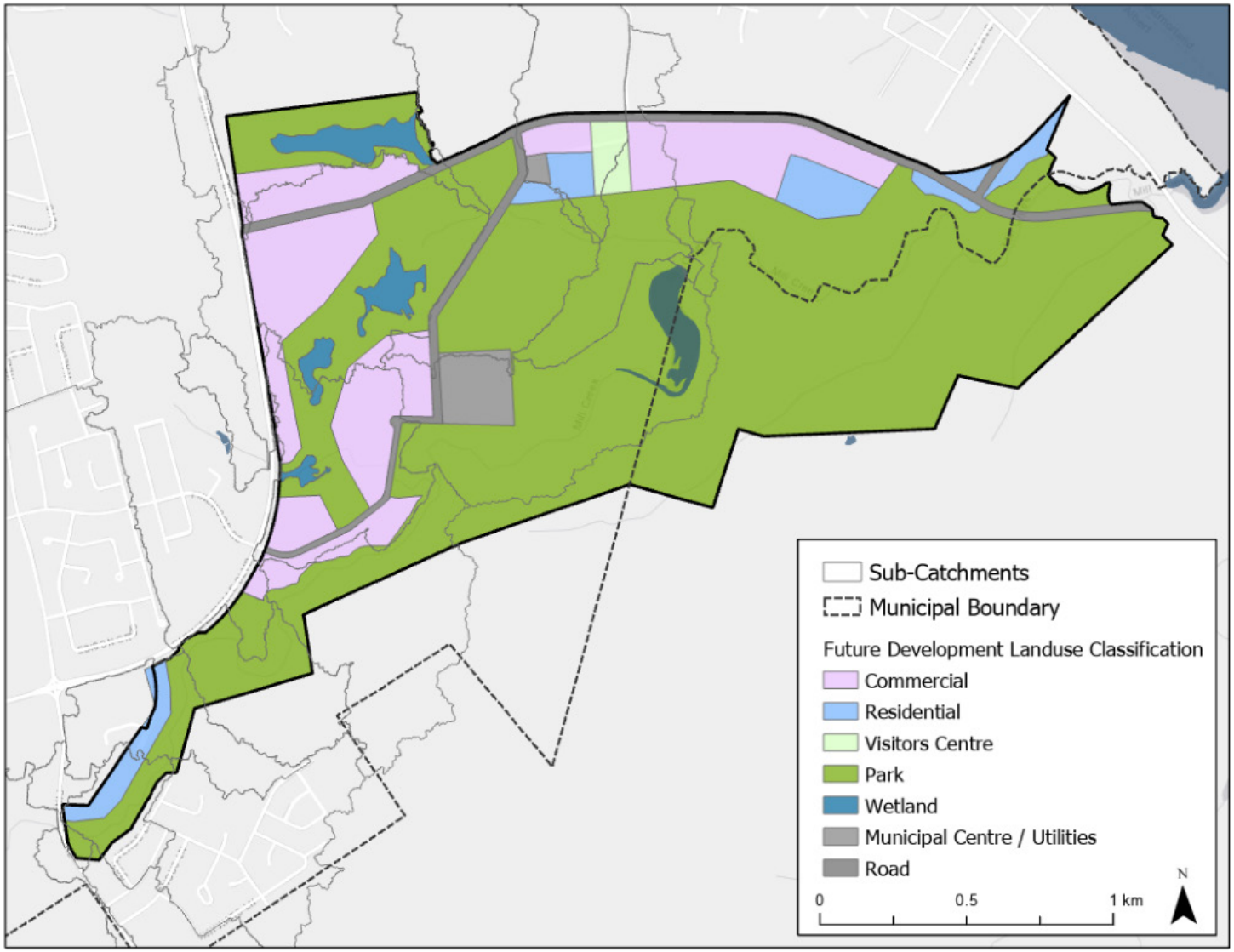
The monetary value of stormwater services provided by the wetlands for a 5-year return period precipitation event was estimated at roughly $1.07 million under current climate conditions. Factoring in future development, increases the estimated cost to $2.30 million and under assumed future climate conditions, the costs increase even further to $2.41 million. The same pattern exists for the 100-year precipitation event. That is, the estimated value of stormwater services provided by the wetlands for a 100-year return period precipitation event was estimated at roughly $1.40 million under current climate. Factoring in future development, increases the estimated cost to $2.30 million and under assumed future climate conditions, the costs increase even further to $2.73 million. The figures above exclude land purchases. Neither do the values include a range of co-benefits including improvements to water quality, provision of wildlife and aquatic habitat, health and recreational benefits, transportation benefits, safety and social benefits, educational benefits, promotion of environmental sustainability and economic benefits.

Annual monitoring, operating and maintenance expenditures for both natural assets and an engineered alternative were approximated for this project. Three scenarios representing different options for the Mill Creek project area were considered. The first scenario assumed development is done in a way that avoids damaging existing wetlands and factors in the construction of some engineered stormwater infrastructure to offset the net peak flow impact from development. The second scenario assumed the existing wetlands could be enhanced to achieve the required peak flow offset from development. The final scenario assumed development damages wetland to the point where their stormwater function is eliminated, resulting in the need for a fully engineered replacement to control stormwater flows. Life cycle costs (capital + operating and maintenance expenditure over 100-year planning horizon) for scenarios were considered for both current and future climate conditions. Under current climate conditions, the existence of wetlands offsets the present value of lifecycle costs by $1.17 million. These reduced costs are slightly higher under projected future climate conditions with a present value of $1.19 million in avoided costs.

Currently, no operation and management plans have been developed for the wetlands, however a web-based tool has been created to view the natural asset inventory and condition assessment alongside engineered assets. The tool and the modelling work completed for this project helps build a case for actively managing these wetlands to ensure they continue to provide services indefinitely. By doing so, the Town of Riverview can avoid the capital cost of building engineered alternatives while improving data accessibility for on-going decision-making.

Figure 2, next page, illustrates the location of the reviewed wetlands within the context of Mill Creek Nature Park.

FIGURE 2 | MILL CREEK NATURE PARK REVIEWED WETLANDS
(FROM MUNICIPAL NATURAL ASSET INITIATIVE REPORT | SERSC)



1.5 BIG IDEAS FROM PREVIOUS STUDIES

From the review of previous studies, three key themes of protection, community, and sustainability emerge. Protection of the park's natural assets, heritage, wildlife, and ecology are all important desires to keep in mind moving forward. The theme of community emerges through the community-led planning processes, the aim to establish a recreational hub, and the desire to serve the community presently and for generations to come. The theme of sustainability refers to the previous studies' vision of Mill Creek Nature Park and focuses on upholding the park's longevity for park users and the ever-changing community from which they come.

Additionally, the 2020 MNAI study reinforced the importance of the park's internal and adjacent wetlands as important sustainability tools. This, when considered with the 2013 Mill Creek Master Plan, highlights the continued importance of the multi-faceted benefits of nature parks in a community.

2

2.0 CONSULTATIONS AND MASTER PLAN CONCEPTS

Building on the original Master Plan's focus on community-led planning, public consultations serve as a pillar for the development of the park's new Master Plan. The enthusiasm of those who participated in the consultation process is directly reflected in the list of 96 Big Ideas (refer to Appendix A), which express the desires and needs of residents and stakeholders and forms the foundation of this master plan.

2.1 CONSULTATION PROCESS AND STRATEGY

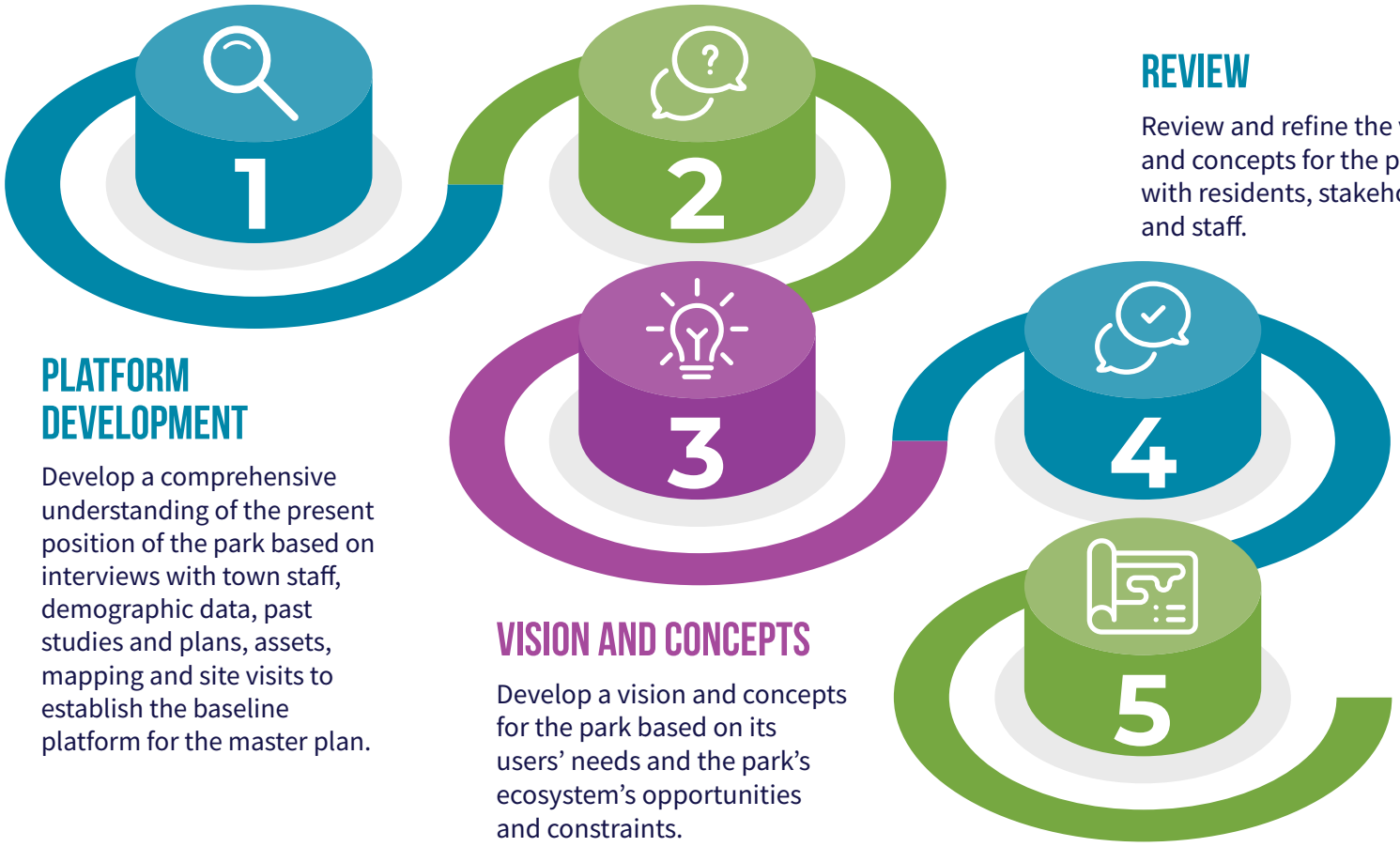
Creating this master plan required significant input from residents and key stakeholders. Workshops were conducted with Town Council, the Friends of Mill Creek, and town staff early in the development of the master plan. In-park sessions were held with walkers, skiers, bikers and nature enthusiasts. Sessions were also conducted at the elementary school, middle school, and high school levels, and an open house was held to introduce the Master Plan project to the public and gain insight into the immediate needs and desires of the community. Additionally, intercept interviews were conducted throughout Mill Creek Nature Park with a variety of different park users. The main themes that emerged from these sessions were trail amenities, trail conditions, and park offerings.

Figure 3, next page, describes the plan development process. Each consultation component is explained in more detail in Appendix A.

FIGURE 3 | PROCESS GRAPHIC

CONSULTATION COMMUNITIES

Undertake a comprehensive and unique public engagement process including park intercepts, school workshops, stakeholder sessions and public open house sessions.



REVIEW

Review and refine the vision and concepts for the park with residents, stakeholders and staff.

PLATFORM DEVELOPMENT

Develop a comprehensive understanding of the present position of the park based on interviews with town staff, demographic data, past studies and plans, assets, mapping and site visits to establish the baseline platform for the master plan.

VISION AND CONCEPTS

Develop a vision and concepts for the park based on its users' needs and the park's ecosystem's opportunities and constraints.

MASTER PLAN

Assemble the refined components into a master plan with proposed projects, recommendations and initiatives for implementation.

2.2 BIG STATEMENTS FOR MILL CREEK NATURE PARK

The following Mill Creek Nature Park 'Big Statements' are synthesized from the '96 Big Ideas' gathered during consultation (see Appendix A). Each category includes three statements that inform this master plan's vision.

RECREATIONAL ACTIVITIES

- Implement social and active recreation opportunities that utilize Mill Creek's natural features to serve all ages.
- Establish an inclusive solution and helpful amenities for pet owners to enjoy the park and engage in recreation within the park alongside their pet.
- Offer a variety of both independent and organized recreational opportunities along with the necessary equipment and infrastructure to facilitate it.

NATURE AND CONSERVATION

- Centralize a respect for nature in the design of the park's built environment through thoughtful place naming, interpretive panels, and non-destructive infrastructure.
- Develop wildlife supportive amenities such as pollinator gardens, protected areas, bird shelters and feeders.
- Use development of the park to maintain and improve forest cover, tackle erosion problems, and improve riparian zones and natural habitats.

IMPROVEMENTS AND AMENITIES

- Create a balanced all-season trail system suitable for all users that connects Mill Creek to other Riverview trail networks in a cohesive manner.
- Revitalize the reservoir to increase access and support water recreation.
- Enhance the park experience for youth with age specific amenities such as playgrounds and climbing infrastructure.

INCLUSIVE AND ACCESSIBLE, WINTER IMPROVEMENTS, SAFETY AND CONCERNS

- Establish a comprehensive shared winter trail system that speaks to the interests and priorities of park users.
- Ensure park amenities, such as washrooms, seating, and signage, are inclusive; and, offer trail networks with increased accessibility for those with mobility challenges and visual impairments.
- Prioritize safety and access both within the park and at its entrances through proper maintenance and effective infrastructure.

3

3.0 STRATEGIC VISION AND DIRECTIONS

As noted in this master plan's opening chapter, the Town of Riverview has a unique opportunity to create a national-class park that provides all-season amenities and natural space for residents and visitors while protecting biodiversity and managing the impacts of climate change. Although the park is created for local use, the site's relationship to the tourist-heavy Route 114 Highway provides the Province of New Brunswick with another significant South-East New Brunswick destination. Additionally, day visitors from within and outside the region capitalize on the park's all-season trails.

First and foremost, the park is created and sustained for the people of Riverview. Future growth relates to regional residential and tourism growth, and stresses applied to the park's unique habitat and activity networks/destinations.

Residents seek definitive actions related to integrated sustainability and activity that ensures the park's core habitats are protected as use intensifies, and clarifies the location and type of activity corridors and destinations within the park. Figure 4 (next page), as well as the following vision statement, guide this document's proposed actions.

With interconnected forest spaces and aquatic environments, Mill Creek Nature Park maintains and protects the functional integrity of its ecosystems and the prominent natural features that define its landscape character. It is the "green heart" of Riverview, providing habitat for wildlife, active and passive recreational opportunities and access to nature for residents and visitors, and a place where the natural and cultural heritage is recognized and celebrated.

The following sections bring together the previous chapter's big ideas with core landscape sustainability approaches to propose an evolutionary master plan that ensures the Town of Riverview sustains natural settings under increased cultural pressures.

FIGURE 4 | MASTER PLAN AND VISION STATEMENT

3.1 SUSTAINABLE PLATFORM

The park's reservoir, watercourse, and adjacent tributary streams and landforms combine to provide valuable water resources to sustain riparian and upland habitats for a mix of cultural and natural landscapes (on lands on both sides of Mill Creek between Pine Glen Road and Route 114). Several areas along the stream are previously developed; however, large tracts of tributary lands bordering the creek's tidal confluence zones remain undeveloped and continue to function as foundational riparian and associated land habitats.

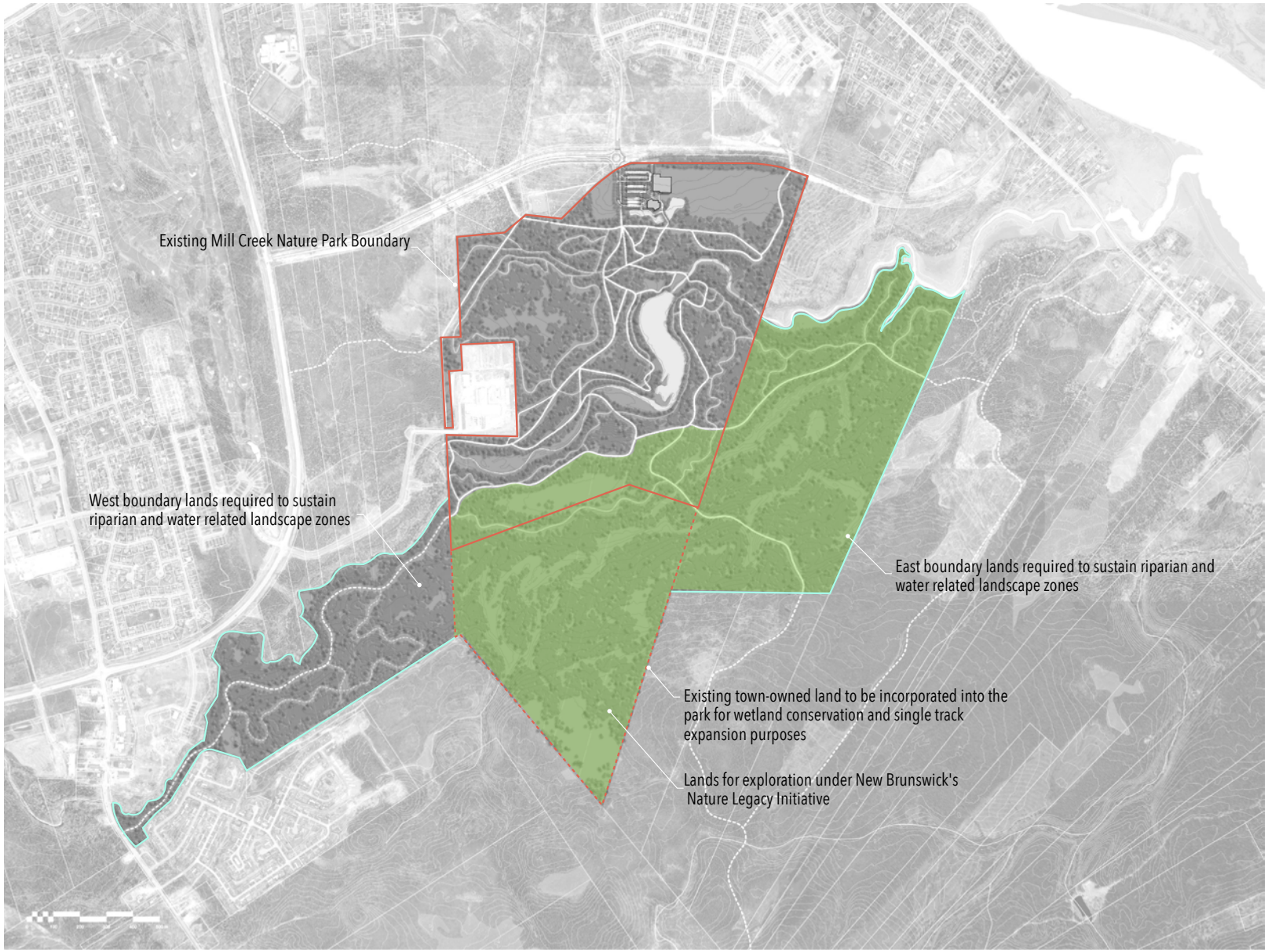
As mentioned above, residents desire a natural park environment that sustainably supports increased cultural intervention within core park habitat(s). This master plan proposes an expansion, where possible, of the existing park boundary to secure lands that support the notion of a sustained environmental setting in perpetuity for lands that directly contribute to Mill Creek. Thus, the following actions are proposed.

A. ADDITIONAL LAND ACQUISITION. This master plan includes a review of adjacent undeveloped and/or not-planned-for-development landforms and aquatic features that directly relate to the Mill Creek watercourse (see Appendix B). Conserving the identified lands will provide the town with a physical platform to sustain interrelated riparian and upland lands in perpetuity. Additionally, these lands provide a sufficient platform for park expansion (for both local and regional use). The park can grow as the town grows and the municipal tax base increases.

   Figure 5 illustrates the location of the park boundary expansion for the above-noted purposes. It is important to note that land acquisition will result in a land base more extensive than required to meet the objectives of this master plan. Therefore, the Town of Riverview can release lands for development in the future within the context of this master plan. The lands illustrated in Figure 5 that are designated as future recreation within lands located outside the park boundary, and within the required land base, will be retained for future Mill Creek extensions into developing areas. Developers will not be required to transfer lands for public purposes when subdividing land; however, they will be required to provide a 10% cash equivalent value for their lands upon approved subdivision.

B. CONSERVATION DESIGNATION. New lands assembled for expanded conservation and activity can form the basis of a discussion with Fundy Biosphere Region representatives about the assignment of new lands recognized for their conservation of biodiversity (see Figure 5 for location). This will ensure the desired conservation measures are implemented with an active program provider and may reduce property tax burdens on the Town of Riverview. It is important to note that conservation designation can only occur within the context of this master plan. Thus, all planned recreation activities and supporting infrastructure and amenities must be permitted, without limitations, under a a protected area designation for both existing and future recreation uses and activities.

FIGURE 5 | SUSTAINABLE PLATFORM



3.2 STORMWATER MANAGEMENT

Mill Creek is a relatively new park located within Riverview's fastest-growing residential area. Lands immediately bordering the park's north and northeast boundary continue to grow under the pressure of much-needed low, medium and higher-density housing. This development modifies traditional landform drainage models in a manner that increases the speed of stormwater flows at non-traditional and structured locations (that align with street infrastructure). This 'directed' stormwater approach occurs without attenuation strategies that reduce flow speed while providing opportunities to recharge plant root zones and groundwater zones. Thus, storm flow channels are quickly eroded, and the valuable water resources that sustain flora and fauna habitats are lost to primary watercourses (where only riparian zones benefit from heightened climate events). Climate change amplifies this problem.

The following actions serve to stabilize the existing environmental and activity setting.

A. STORMWATER MANAGEMENT STRATEGY. Mill Creek is the destination water body for several contributing landforms and streams and an inland tidal confluence between the Petitcodiac River and the creek. Lands developing adjacent to the northern park boundary are draining into the site at an accelerated rate, irrespective of traditional landform, natural attenuation and root zone/groundwater recharge systems. This is common in developing areas; however, this is problematic within the context of a nature park and its amenities.

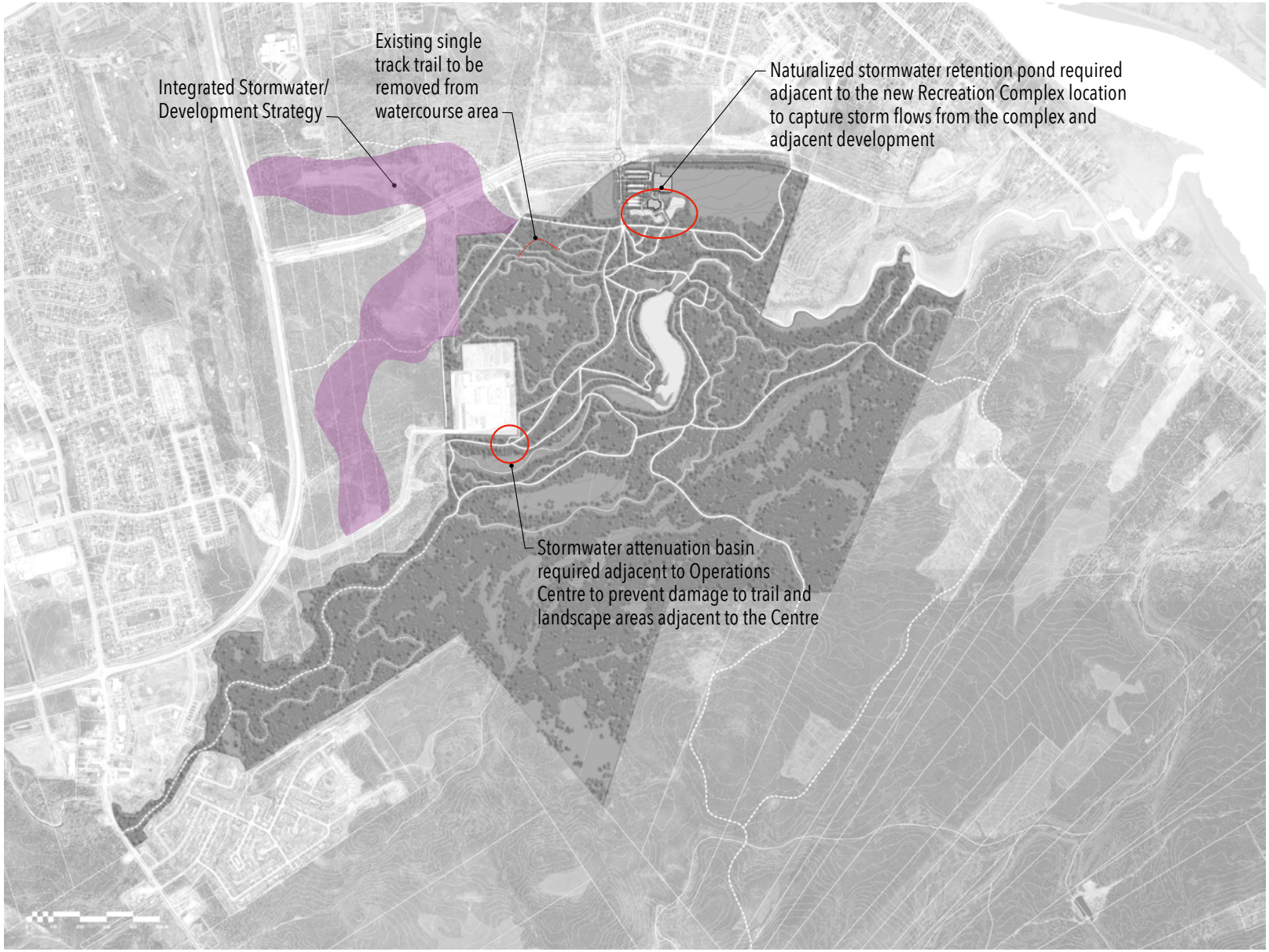
   The creation of a detailed stormwater management strategy is beyond the scope of this master plan; however, it is essential to sustaining the ecological health of the park. Therefore, the Town of Riverview and Southeast Regional Service Commission should collectively prepare the required supporting materials, zoning strategies and policy that ensure existing water flows enter the park's watercourses at present-day volumes, speeds and locations. The Town of Riverview will manage water assets to sustain existing root zones, groundwater aquifers and destination water bodies within the context of this master plan.

B. IN-PARK STABILIZATION EFFORTS. Before proceeding with new in-park projects, the town should stabilize trails and surfaces impacted by altered stormwater flows into the park. This includes creating a new attenuation feature adjacent to the Operations Centre, and for the park gateway lands adjacent to the Bridgedale Boulevard and Runneymeade Road intersection. This work also includes the stabilization or replacement of impacted trail surfaces. Although further assessment is required, this master plan assumes the trails require replacement for the areas indicated in Figure 6. It is important to note that retention and attenuation are required at the future recreation complex (adjacent to the Bridgedale Boulevard and Runnymeade Road intersection); however, temporary measures are necessary to ensure structural or ecological damage is mitigated ahead of this project.

Additionally, resident and professional trail builders have worked hard to create an initial series of single track trails within the park. These trails, through word-of-mouth, are well-used and attract new people to trail running, hiking, snowshoeing and fat biking.

This master plan describes lands that are suitable for future trail projects within the context of updated approaches to ecological and activity zoning within an expanded park boundary. Therefore, considerate of these updated contexts, the Town of Riverview should commission a national-level single-track trail construction expert to visit the park and to work with local trail builders to develop strategies, best practices and remediation plans for all of Mill Creek's existing and future single-track trails. Local trail builders can then proceed with remediation work and collectively work with the town on planning, designing and building future single-track trails.

FIGURE 6 | STORMWATER MANAGEMENT



3.3 USER EXPERIENCE IMPROVEMENTS

Mill Creek Nature Park is maturing. Residents suggest several ideas related to improving the user experience within the context of the site's special attributes. Also, this master plan must address the inherent and inevitable conflicts that occur as mixed-use visitation grows within a park (biking and walking, trail use and erosion, etc.). Increased use within the park applies pressure on existing trail and destination assets. Although no apparent environmental impacts occur, residents express concern related to the 'feeling of nature' during busy use periods. Expanding the trail and destination network spreads visitation over a larger footprint and reduces the appearance of perceived overuse.

Additionally, it is essential to note that Mill Creek Nature Park is created for and funded by the residents of the Town of Riverview. Although this master plan proposes growth and refinement strategies, these must relate to residents' desires for the park and the Town's financial capacity to support these desires. As mentioned in this document's first chapter, municipal ownership requires that any development within the park occurs relative to the Town's ability to maintain the site and that the growth of the park occurs relative to the Town of Riverview Municipal Plan's stated role of parks within the town.

The following actions extend from the previous chapter's big ideas for an improved park experience and are illustrated in Figure 7.

A. BROAD ACTIVITY ZONES. Generally, the park is administratively divided into two very broad areas. Lands to the north of Mill Creek remain activity-dominant lands within the context of nature, while the lands on the south side of Mill Creek are nature-dominant lands that permit active-use corridors and destinations under special conditions. Therefore, the active lands with primary park gateways located on the north side of the creek are fully managed by the Town of Riverview, while the lands on the south side of the creek may be co-managed by the town (activity), the Regional Service Commission (planning) and the Fundy Biosphere Region (conservation) where suitable park use agreements allow for these partnerships.

B. DESIGNATED MIXED-USE CORRIDORS AND TRAIL CLASSIFICATIONS. The Town of Riverview will provide trails within Mill Creek Nature Park under the active and passive categories within the park zone areas indicated in Figure 7. Activities within these two classifications will participate within designated shared-use corridors through mutual respect and friendship.

   It is important to note that trail use is not enforced; however, it is expected that those using trails improperly will be respectively advised by those who are properly using the trails. For example, cyclists that exceed 20km/hr on passive corridors should expect that those respecting the rules of use will ensure violators know the rules.

FIGURE 7 | USER EXPERIENCE

C. GATEWAY PRESENTATION. Mill Creek Nature Park is a local and regional destination and should express this at the park's primary gateways. Thus, the Town of Riverview should design, tender and install large park gateway signs at the Runnymeade Road entrance, and at the Bridgedale and Gunningsville intersection. Both signs should include the park and town brands, express the character of the park and hosted activities, and be mobile (to allow for placement at varied locations as the town and park evolve).

D. COMFORT STATIONS. Small seating and interpretive spaces located at the trail's edge provide social, wayfinding and rest amenities along trail corridors. These stations require locations at approximately 250-meter intervals, should be placed off-the-edge of trails, and include seating, shade, wayfinding signage and trash cans. Thus, the Mill Creek Nature Park Specifications Manual should be updated to include these stations at the locations illustrated in Figure 7.

E. CONTEXTUAL INTERPRETATION AND WAYFINDING. Residents expressed a desire to add additional directional and interpretive signage within the park that directs people toward key park destinations and describes how far a visitor is from any destination.

Present-day park signage is appropriate for the present-day park; however, it is placed at a scale that will become overpowering as the park grows. Additionally, the signage should be designed within the context of nature, and be subservient to the natural setting. Thus, the Town of Riverview should update the Mill Creek Nature Park Specifications Manual to include a contemporary and appropriate destination-based wayfinding and interpretive package that is simple to read, easy to follow, and easily editable as the park grows.

This signage program begins at the Runnymeade Road and Robertson Street parking areas. Both of these destinations will change as the park evolves; therefore, the town should place temporary seacan-based stations that provide information about park history and the master plan, provide a clear park map, describe how to use and oversee the safe use of the park, as well as provide stations for power-assist electric bikes and personal devices, shade, and washrooms. This is an important meeting point and a critical step toward the respectful use of shared-use trails within the park.

F. GROOMING AND TRAIL USE PROGRAM. Town of Riverview Operational staff winter grooming programs work well; however, it is important to evaluate grooming practices as the park evolves to align with current and future use in the park. For example, the expanded shared use of winter trails requires administrative refinement to ensure active and passive corridors function relative to this master plan. Thus, winter ski trail users expand to include fat bikers within the freestyle portion of the corridor. Park signage expresses a reduced tire pressure for bikes using the freestyle ski trail (8-10psi) to ensure minimal gouging of the trail surface. No biking is permitted over classic ski trail tracks.

   This approach to trail use expands the active winter network to include all ski trails and moves fat bikes away from passive park users. Summertime mixed-use trails include all trails. Thus, the passive trail network should include programming and signage that ensures users understand that cycling on the pedestrian-dominant trails is for passive use of the park only. An expanded active single-track network in presently-undeveloped park areas will reduce cycling pressure on the passive network.

G. THE ACTIVE GATEWAY. Many residents consulted during public and one-on-one sessions describe the need for an active play park in this area of Riverview. This should include multi-use court spaces, large multi-generational play equipment, outdoor skating and social amenities. Although this type of play facility is not in keeping with the notion of a natural park, it is in keeping with the notion of a community centre and should be included in the recreation complex project proposed for the corner of Runnymeade Road and Bridgedale Boulevard.

H. THE MILL CREEK NATURE ACTIVITY ZONE. This area of the park provides great panoramic park views within the context of mature forest cover. Any improvements for the purpose of creating improved or expanded activity within this area should include natural materials. For example, adding a climbing course constructed from wood and ropes is appropriate; however, steel posts and chain is not.

I. THE GREAT NATURE GATHERING GROUNDS. Something that is missing, according to consulted residents, is a large passive open space that is programmable for town-permitted volunteer-groups, all-season outdoor performances, large-event staging, nature learning programs, and other events that have town and regional attraction in the park.

Figure 7 illustrates the location of a new open space that expands the attraction of the future recreation complex with a multi-use, multi-generational and multi-family venue capable of hosting thousands of people for varied outdoor events at any time of the year.

J. ON-LEASH DOG PROGRAMS. Without a doubt, Riverview residents love their dogs and enjoy bringing them to the park for personal and pet well-being. Many residents expressed an interest in walking dogs without leashes; however, ecological integrity can not be retained where pet running in off-trail areas impacts forest floor conditions. Therefore, the Town of Riverview should develop a promotional program that encourages park visitors to bring dogs to the park, clean up after dogs, and place dog-refuse bags into the park's trash containers.

K. PADDLING DOCK/VIEWING PLATFORM. Residents express a desire to enjoy a passive interpretive experience at water's edge while the park's user groups wish to access the water for programmed paddling. The town should create a facility that provides venue for these activities at a location where user group paddle boats can drive into the site for boat delivery. Figure 7 illustrates the location of this facility.

3.4 EVOLVING MILL CREEK NATURE PARK

The previous three sections set the platform for the expansion of Mill Creek Nature Park. Expansion occurs for two reasons. First, to provide residents with an increased and diversified series of activities and natural settings that relieves use pressures applied upon existing settings. Second, trail and destination assets that expand into natural areas institutionalize the areas for recreation and, if recreational assets are sensitively placed on the land, retain park lands for conservation.

A. NATURE PARK ADVENTURE ASSOCIATION. The Mill Creek Nature Park is a community asset, and broad community participation in planning, programming and vision setting is essential to ensure that residents appropriately utilize the Town of Riverview's investment in the physical asset.

   The Friends of Mill Creek presently play a role in this effort. However, to ensure that initiatives are in keeping with resident-desired park activities, this effort by the Friends could benefit from additional community involvement, especially from residents that pay to use the park through property tax or regional residents that support park development or programming initiatives as part of a club or association.

   Trail builders presently work to establish a single-track network; however, they require additional training to build trails within the context of this master plan. Scouts, Women of the Wilderness, and other groups utilize that park and reservoir pond for learning adventures; however, they are not part of the park's primary programming efforts. Thus, a new approach to community participation is possible.

The Town of Riverview does not require a park oversight committee; however, it would greatly benefit from feedback from an advisory group of council-appointed individuals that can provide Council, on-request, with advice relative to park improvements that support community sustainability, adventure and learning activity, as well as provide advice on how investment should be focused within the park over the next three years. The Town of Riverview should consider the following two-step process that evolves the Friends of Mill Creek from its current format to a broader community group inclusive of both environmental and programming interests.

STEP ONE - REFINE THE 'FRIENDS'. As previously mentioned, the present-day Friends of Mill Creek Committee is an 'all-star' group of highly engaged and environmentally engaged professionals. This group has a deep knowledge of the park and an advanced knowledge of ecology and landscape management. Thus, this is an ideal foundational group to build upon and add community activity representation with a broadened mandate focusing on annual review and advice for both environment and activity.

Also, as previously mentioned, the existing 'Friends' include many individuals that, ideally, have participated in this group over several years. Thus, the existing committee should be reduced to half the existing numbers, thus allowing the town to call upon the 'shelved expertise' of retired members as remaining members reach their end-of-term dates. The present-day committee chair should remain in this position to oversee and guide the Mill Creek Nature Park Advisory Committee for a two-year period.

The immediately vacated seats should be filled with council-appointed community representation drawn from seniors, walking, cycling, marketing and communications, ski and single-track trail and maintenance groups. Additionally, this group should include at least one Council member and a staff member designated by the Director of Parks, Recreation and Community Relations. The new committee should become a committee of council, under the authority of Section 41 of By-Law 1000-10-05, to ensure the group has a meaningful role within the town and the nature park.

The first tasks of this group include the creation of a working committee to participate with the Town in developing a complete IMBA-level specification single-track network that functions as mountain and fat bike, hiking and snowshoeing trail running in a manner that ensures all-season maintenance by municipal and volunteer equipment, and that encourages use by all residents. The town will commission a supporting expert consultant to work with the working committee to develop the network plan.

STEP TWO - THE MILL CREEK NATURE PARK ADVENTURE ASSOCIATION. The Mill Creek Nature Park Advisory Committee should evolve toward a community and membership-based association of local and regional residents participating in learning and activity-based programming within the park. At a minimum, this should include walking, hiking, cycling, cross-country skiing, geocaching, dog walkers, naturalists, etc., and groups interested in using, developing use programs, and raising funds to contribute to operations within the park.

The existing 'Friends' should evolve toward this association before expanding the park into newly acquired lands. By agreement, the Town of Riverview will develop the trail and supporting amenity systems while the association delivers programmed activity within the park. Program staffing is funded by the association, while maintenance staffing is funded by residents through the Town of Riverview. Again, by agreement, special promotion initiatives raise funds for municipally operated trail grooming and maintenance equipment.

The refined committee defined in Step One evolves into an association Board of Directors. Membership in this association will continue to include staff and council representation; however, an additional operations staff member should be added to ensure direct communication between users and maintainers. Thus, the Mill Creek Nature Park Advisory Committee dissolves with the establishment of the association.

B. ALL-DAY/ALL-SEASON ACTIVE ZONES. The proposed recreation complex provides a launching point into the park from a high-use and high-visibility location. This centre will attract visitation for approximately 20 hours per day. Because of this, the nature park should offer easily accessible and easy-to-use family activities from this location. The town should consider the creation of a partnership-based gateway pavilion that includes club gathering facilities, seating, social and meeting space, washrooms, and a private business operation such as a small pub (see Figure 7 for location).

C. EXTEND INTO NEIGHBOURHOODS AND THE REGION. Once the lands described in this plan are acquired, there is an increased opportunity to connect the riverfront and regional trail systems to the Dobson Trail and the neighbourhoods, schools, etc., bordering the park (see Figure 7). Linkages to existing adjacent street and trail linkages that require street crossings must include a fully accessible crosswalk with personally activated flashing light fixtures.

D. EXPAND CULTURAL CONTEXTS. Section 3.3 describes a destination-based wayfinding system that directs park users to the primary park addresses. The park's newer active trail corridors use colour-based nomenclature. The Town should explore a refined naming system related to the park, town history, and First Nations use of the site and region.

E. STABILIZE THE POND AND DAM. The Town of Riverview will require a permanent solution for reservoir dam replacement over the next 25 years. The Town should explore the feasibility of a solution that includes burying the existing dam within a natural barrier that includes varied granular foundations with planted cover and an integrated fish and water passage. Thus, the dam will evolve toward a sustainable transfer from pond to stream while retaining a well-established pond's edge riparian zone and upland habitat. Additionally, the barrier can support accessible passage to the water's edge and the opposite side of the pond.

F. THE MILL CREEK APP. The association and town should work together to develop a handheld device app specific to Mill Creek Nature Park. This app provides comprehensive all-season trail mapping with live positioning, trail condition report, a calendar of events, activities and programs, and other important communications.

4

4.0 IMPLEMENTATION PLAN

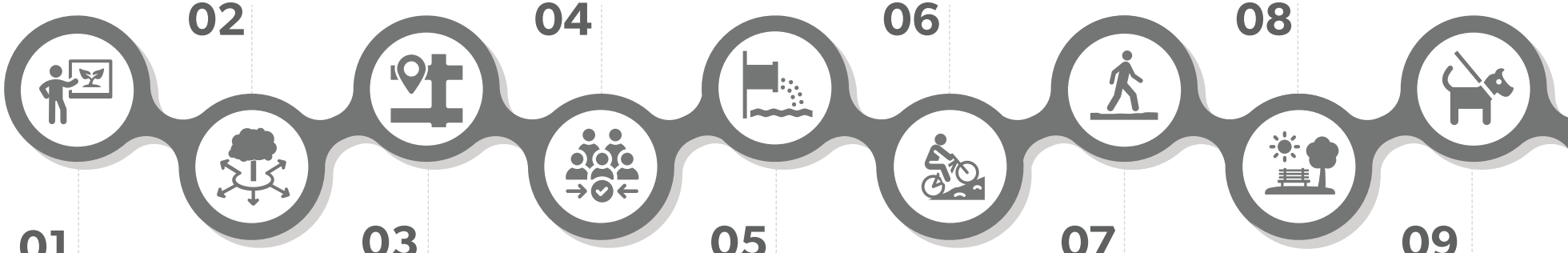
This chapter provides clear implementation steps for moving forward and the strategy that guides these steps. Although the plan presents steps in a linear format, it is understood that implementation is a highly iterative process that will not occur exactly as described in this chapter. It is important to note that actions may be undertaken relative to budget availability, funding opportunities, emerging and evolving user needs, etc. Changes to the implementation plan are normal and expected. Regular evaluation of the implementation strategy's direction and actions will ensure the Town is accomplishing the plan’s goals and objectives.

4.1 STRATEGY AND ROADMAP

The Mill Creek Nature Park Master Plan utilizes a three-phase strategy that ensures the facility is sustained for future generations, positioned relative to existing and emerging recreations, and evolves relative to future opportunities. The three phases with their projects are illustrated in figure 8 on the next two pages.

FIGURE 8 | IMPLEMENTATION PROCESS

PHASE ONE | STABILIZATION
Projects in this phase strengthen the existing ecological, administrative and physical park components relative to this master plan's objectives.



01
MANDATE
Achieve a mandate to implement this master plan at municipal, provincial and federal levels.

02
MUNICIPAL PLANNING AND LAND USE ZONES
Work with the Southeast Regional Service Commission and Fundy Biosphere Region to adopt master plan policies, and to establish in-park and adjacent land-use zones within the context of this master plan.

03
LAND ACQUISITION
Purchase and reserve the lands required to deliver a long-term sustainable habitat for the park.

04
EVOLVE THE FRIENDS OF MILL CREEK NATURE PARK
Dissolve and re-build the 'Friends' to create a future not-for-profit community group that is engaged in park sustainability and recreation activities.

05
STORMWATER MANAGEMENT
Work with the Southeast Regional Service Commission to develop a detailed strategy and program that addresses present and future stormwater requirements within and adjacent to the park.

06
SINGLE TRACK RENOVATION AND GROWTH MASTER PLAN
Develop a long-term plan that renovates or removes existing trails, and proposes future trails complete with construction and maintenance guidelines.

07
TRAIL DESIGNATIONS
Re-designate the park's trails to contemporary all-season mixed-use corridors with updated construction and maintenance standards.

08
GATEWAYS
Develop primary park entries at the Gunningsville and Runneymeade gateways, including temporary information/ washroom pavilions.

09
ON-LEASH PROGRAM
Encourage on-leash dog use of the park through pedestrian and dog activity programming at specified times.

PHASE TWO | POSITIONING PROJECTS

Projects within this phase position the park relative to existing, contemporary and emerging local and regional recreation opportunities.

PHASE THREE | MILL CREEK NATURE PARK EVOLUTION

The phase three projects address long-term requirements relative to how the park evolves relative to sustainability and growth.

10 PADDLING/VIEWING PLATFORM

Develop a combination paddling dock and viewing pavilion at a location where passive walkers can easily access the water's edge, and where boat delivery is possible on a wide trail.

11 WAYFINDING, INTERPRETATION & COMFORT PLAN

Develop a detailed wayfinding and storyline-base interpretation plan, and an associated amenity package that describes the type and location of seating, shade, washrooms, etc.

12 NATURE PLAY PARK

Design, tender and build a nature-based playground at the present-day dam area look-off (adjacent to the ladder stair and picnic shelters).

13 GREAT GATHERING GROUNDS

In association with detailed Recreation Complex plans, develop a detailed plan for the lands adjacent to the Bridgedale by-pass and the centre in a manner that explores requirements for event-based open space, forest protection and future boulevard edge development.

14 THE MILL CREEK PAVILION

Following the placement of the Recreation Complex, design and build a new park gateway pavilion complete with active play spaces for a splashpad, playground and all-wheel plaza activity.

15 SECONDARY PLANS

Work with the Southeast Regional Service Commission planning group to develop secondary plans for lands adjacent to the park. This should include the location and placement of all active transportation links for local and regional connectivity purposes.

16 FOREST MANAGEMENT STRATEGY

Work with a consulting expert and the evolved Friends to develop a forest management strategy that strengthens the existing and expanding canopy and ground cover in perpetuity.

17 DEVELOP A MILL CREEK NATURE PARK APP

Create a handheld digital device application that includes general park activity and event information, mapping and location support, and storyline interpretation.

18 POND & DAM STABILIZATION

Develop and implement a plan for the naturalized stabilization of the existing pond.

4.2 STABILIZATION PROJECTS

PROJECT NO.1 - ACHIEVE MANDATE TO IMPLEMENT THIS MASTER PLAN

This plan includes several important short, medium and long-term projects that will require ongoing communication among political representatives, residents, town council and staff.

This action involves acquiring a mandate from town council and funding/operation partners (e.g., the Province of New Brunswick and the Government of Canada). Although council has officially accepted this document, the plan's intent must be incorporated into the town's official planning documents/tools to ensure implementation relative to this master plan's three phases. Recreation department leadership must work with Southeast Regional Service Commission planning representatives to amend relevant documents, or to include policies in the next plan update.

In addition to this, recreation leadership should present this master plan to regional funding and support agencies such as the Province of New Brunswick's recreation staff, regional First Nation representatives, provincial MLAs, federal MPs, and key local and regional residents highly involved in park programming. It is important to note that consulted First Nations representatives can play several roles relative to the planning and development of the park, and the representatives can dictate both committment and involvement.

PROJECT NO.2 - MUNICIPAL PLANNING AND LAND USE ZONES

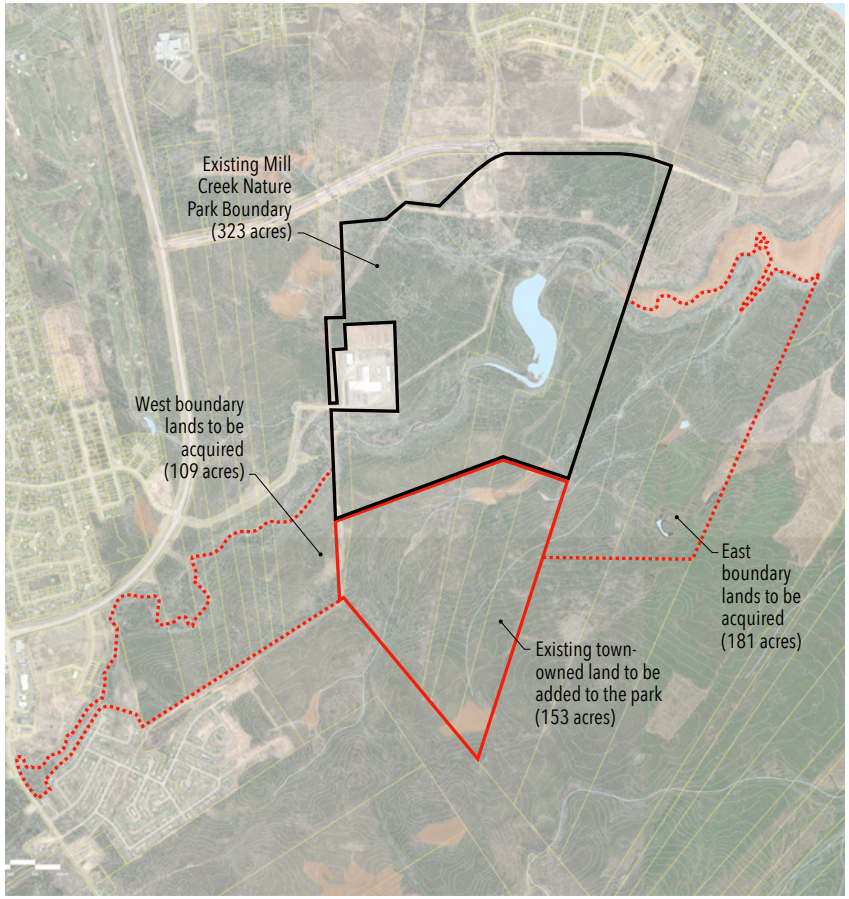
The Town's Recreation, Parks and Community Relations staff representatives will work with Southeast Regional Service Commission planning representatives and Fundy Biosphere Region to review all official strategic and regulatory planning tools/documents to determine all areas that should be revised to support the implementation of this master plan relative to both active and conservation measures. Planning representatives should update policy through amendments as soon as possible. This work should include the results of the MNAI work to ensure wetland conservation and planning moves to the forefront of development and growth initiatives within the park's 'neighbourhood'.

The strategy for moving this master plan forward involves embarking on the previously described three-phase implementation strategy. The administrative context required to execute this implementation plan is developed immediately for procedural ease and includes the adoption and integration of the policies provided in Section 4.5 of this master plan.

PROJECT NO.3 - LAND ACQUISITION

The Town of Riverview should actively seek, through purchase or acquire through Lands for Public Purpose designation, the lands indicated in figure 9. These lands are important for both recreation and conservation purposes and are an important component of long-term park sustainability.

FIGURE 9 | LAND ACQUISITION



PROJECT NO.4 - EVOLVE THE FRIENDS OF MILL CREEK NATURE PARK

The Town of Riverview should dissolve the Friends of Mill Creek Nature Park Committee and begin the process of creating the Mill Creek Nature Park Advisory Committee under the terms stated in the town's Section 41 of By-Law 1000-10-05. The committee should include a maximum of 12 members and include one councillor, six members with an understanding of landscape ecology, forestry, biking, hiking, cross-country skiing, etc., three day-to-day park users and two general interest group representatives (planning, landscape architecture, cultural heritage organizations, etc.).

Appointments to this committee should be two-year, with the ability to expand to the third year upon committee or member request. Appointments to the committee are made by council, based on staff and/or council recommendations.

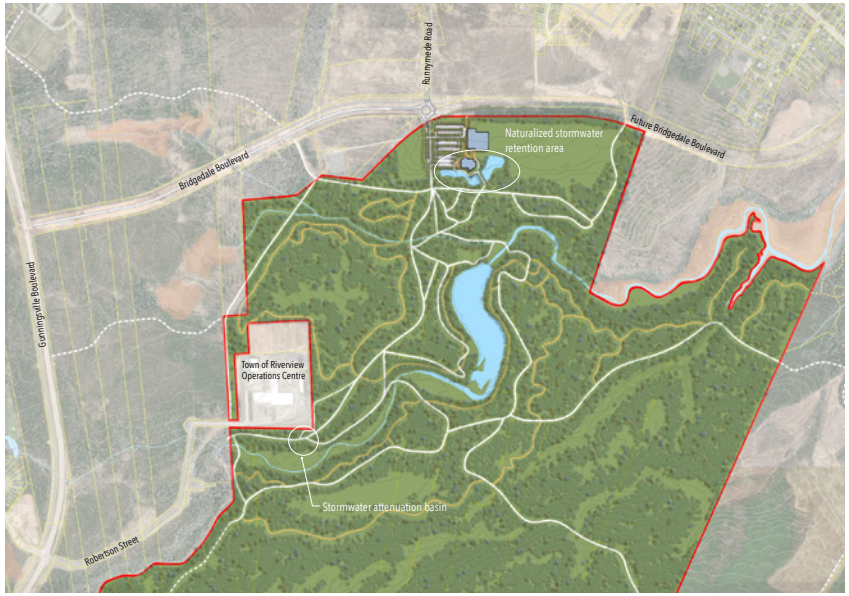
It is important to note that this committee is planned to 'sunset' after 3 to 5 years, and is intended to form the basis of the leadership of a community-based association that, with the participation of a vast membership, works to provide programmed activities within the park, creates and maintains new single track trail, grooms winter trails, as well as develops and implements forest and aquatic resource management plans.

PROJECT NO.5 - STORMWATER MANAGEMENT

The Town of Riverview should commence work on the design and construction of two retention/wetland projects where indicated in the adjacent figure. The Runnymeade wetland project should consider all existing area storm flows presently entering the park without attenuation, all stormwater requirements for the new Recreation Complex, and the existing forest canopy and ground cover that requires storm flows for flora sustainability.

The proposed retention basin located adjacent to the existing Operations Centre will direct existing flows away from the trail system ditches and will require re-establishing a presently damaged trail.

The costs of this project are to be determined.



PROJECT NO.6 - SINGLE TRACK RENOVATION AND GROWTH MASTER PLAN

The Town of Riverview is fortunate to have several residents interested in the planning, construction and maintenance of the park's single-track trail system. Thus, the town should commission an expert single-track trail consultant to work with staff and residents to review all existing works, propose a plan to upgrade or remove trails that impact the park's ecological setting, and plan new single-track trails throughout the park.

Additionally, this work should include the creation of a design and operational guideline document that ensures trails are planned and built relative to multi-use and multi-generational requirements. Planning and design guidelines must also provide the town and residents with a maintenance standard that allows municipal or community-owned machinery to maintain single-track trails.

PROJECT COST ESTIMATE:

Planning and design - $15,000 - $25,000

Construction costs to be determined.

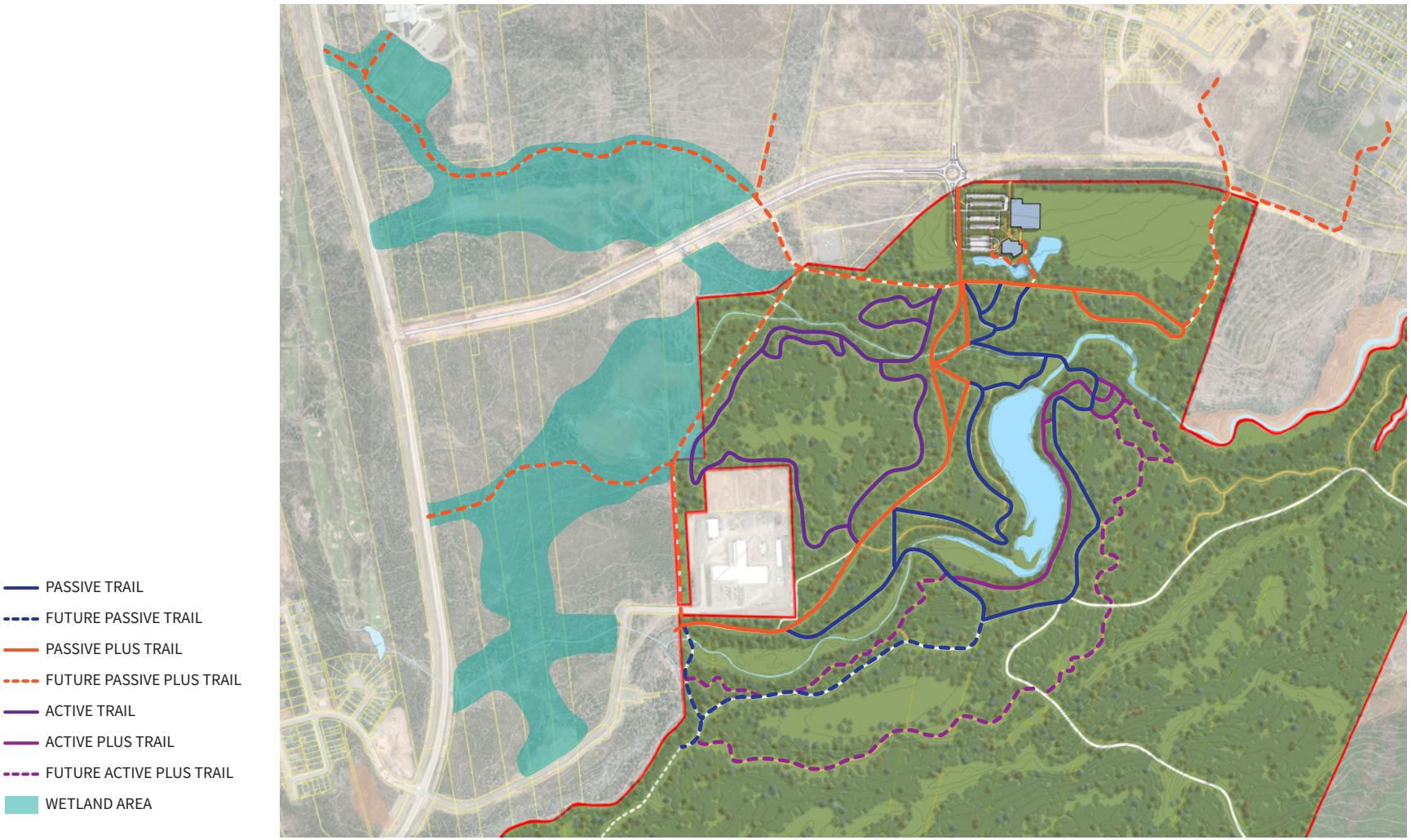




PROJECT NO.7 - TRAIL DESIGNATIONS

The existing trail network requires a minor modification to distribute trail-based activity within that park based on active and passive corridors.

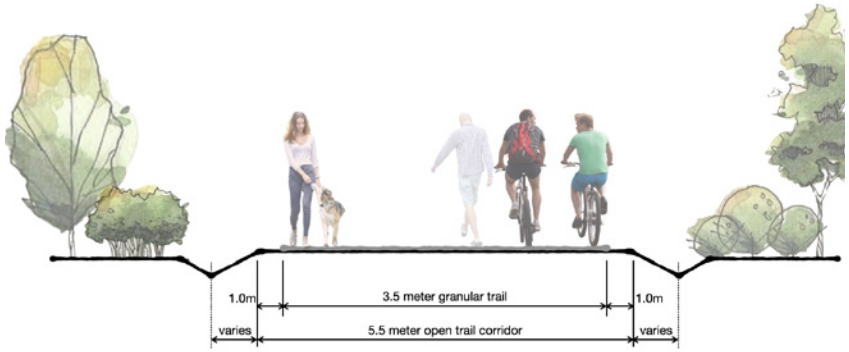
FIGURE 10 | THREE SEASON TRAILS



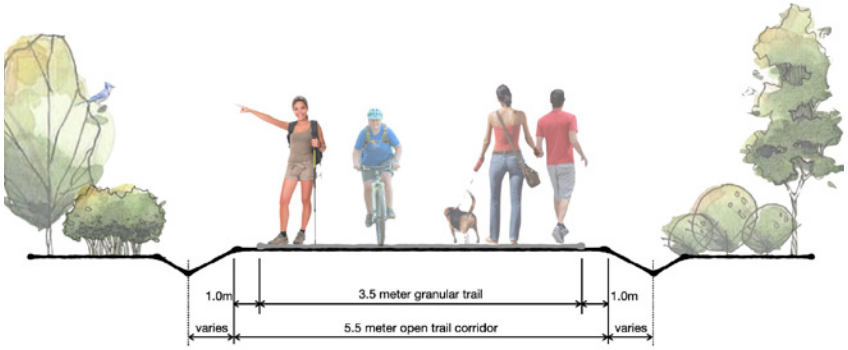
THREE-SEASON TRAILS

THREE-SEASON PASSIVE TRAIL. This 3.5 meter (minimum) granular surface is the dominant park trail and is designed as a multi-use, multi-family, multi-generational corridor with speed limits not exceeding 20km/hr. On-leash dog walking is permitted on this trail.

THREE SEASON PASSIVE-PLUS TRAIL. These trails are provided under the same specification as the passive trail; however, users can expect the passive-plus trails to cross steeper terrain, and provide a greater physical challenge. On-leash dog walking is permitted on this trail.



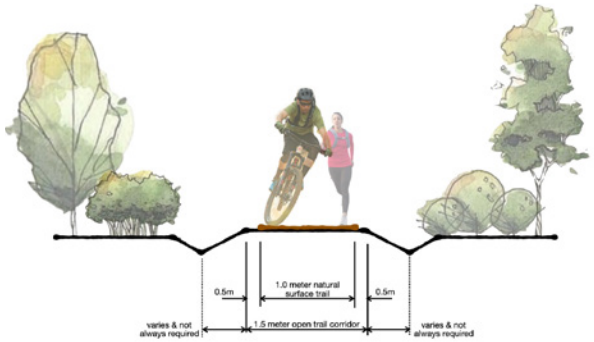
3 Season Passive Trail



3-Season Passive+ Trail

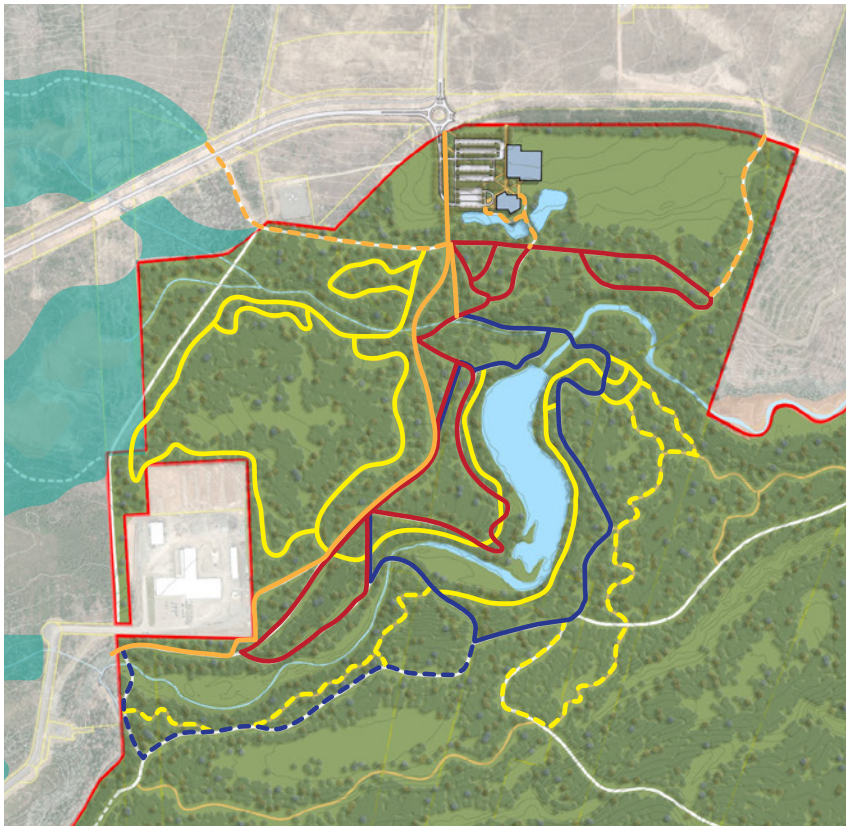
THREE SEASON ACTIVE TRAIL. These 1.0 meter (minimum) trails provide access to naturalized spaces for multi-family and multi-generational hiking, trail running and mountain biking. These trails are placed with a minimal ecological footprint and provide a continuous natural experience.

THREE-SEASON ACTIVE-PLUS TRAILS. These trails are provided under the same specification as the active trail; however, users can expect the active-plus trails to cross steeper terrain, and provide a greater physical challenge while still enjoying a continuous natural experience.



3-Season Active/Active+ Trail

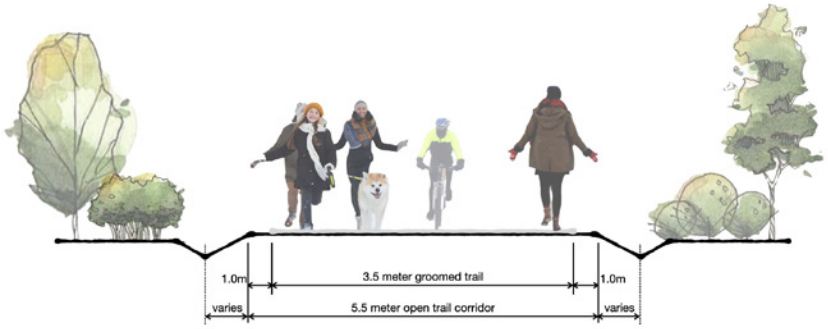
FIGURE 11 | WINTER TRAILS



PASSIVE TRAIL
FUTURE PASSIVE TRAIL
PASSIVE PLUS TRAIL
FUTURE PASSIVE PLUS TRAIL
ACTIVE TRAIL
ACTIVE PLUS TRAIL
FUTURE ACTIVE PLUS TRAIL
WETLAND AREA

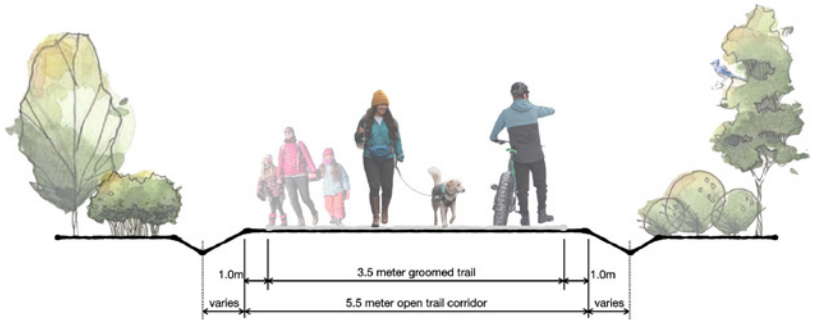
WINTER TRAILS

WINTER SEASON-PASSIVE TRAIL. This 3.5 meter (minimum) groomed surface is the dominant park trail, and is designed as a multi-use, multi-family and multi-generational corridor with speed limits not exceeding 20km/hr. On-leash dog walking is permitted on this trail.



Winter Season Passive Trail

WINTER SEASON PASSIVE-PLUS TRAIL. These trails are provided under the same specification as the passive trail; however, users can expect the passive-plus trails to cross steeper terrain, and provide a greater physical challenge. On-leash dog walking is permitted on this trail.

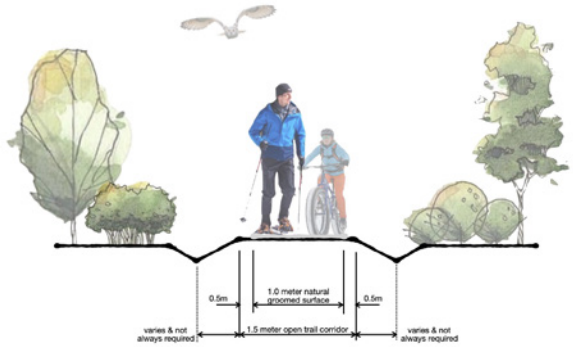


Winter Season Passive+ Trail

WINTER SEASON ACTIVE TRAIL. These 3.5 meter (minimum) groomed trails provide residents with a groomed active-use corridor for multi-family and multi-generational cross-country skiing and fat biking. Classic ski corridors are provided on single-use groomed surfaces, while freestyle ski and fat biking share the same groomed surface. It is important to note that fat bike tire pressures must be dropped to 8-10psi for these shared-used corridors.

Winter Season Active Trail

WINTER SEASON ACTIVE-PLUS TRAILS. These 1.0 meter (minimum) trails provide access to naturalized off-season spaces for multi-family and multi-generational snowshoeing and fat biking, and include all single-track trails.



Winter Season Active+ Trail

PROJECT NO.8 - GATEWAYS

This project includes the placement of new and large gateway signs at the park's Runnymeade and Gunningsville entries. The signs are to be designed as large panels that are readable by passing cars, articulate that visitors have arrived at a primary park entrance, and the activities available within the park. Additionally, the sign panels are to be designed as a contemporary fixture to articulate the notion of a park created for today's residents.

This project also includes the design, fabrication and placement of a temporary pavilion at both entrances that provide a washroom, updated destination-based wayfinding signage, as well as trail use and park habitat information. Again, this should be a highly contemporary project and can include a SeaCan adaption and placement to ensure the notion of 'temporary' is successfully articulated.

PROJECT COST ESTIMATE:

Gateway Sign Panels - $20,000-$25,000 per panel.

Temporary Pavilion - $35,000-$40,000 per pavilion.

PROJECT NO.9 - ON-LEASH PROGRAMMING

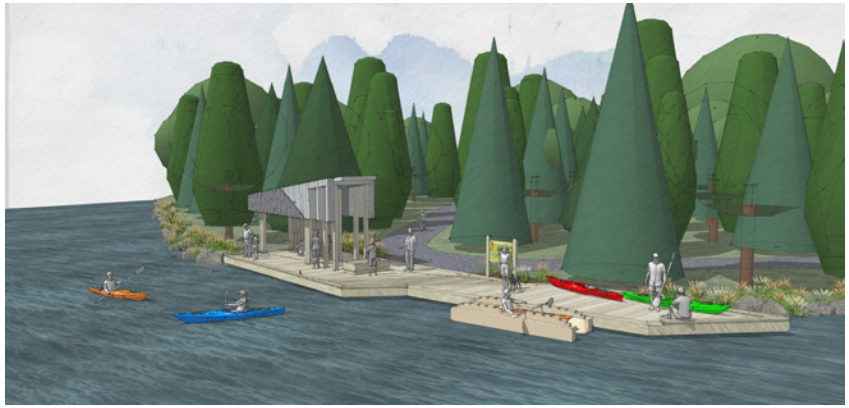
The Town of Riverview should develop a program that informs dog walkers how to enjoyably and responsibly use Mill Creek Nature Park with their pets. This program should include digital and physical promotional materials (pamphlets, signage, dog bag stations, etc.) that inform users that dogs must be on leashes and remain on the trails, as well as information about properly collecting and disposing of dog waste within the context of a nature park.

PROJECT NO.10 - PADDLING/VIEWING PAVILION

The Town of Riverview should design and develop a pavilion at a location where residents can walk to, and enjoy water views. For viewing purposes, the pavilion should include seating, shade and cultural/natural interpretation on a helical anchor deck system that extends over the water. The deck surface also provides water access for paddle boaters who can remove the rail to access a temporary paddleboat EZ Launch system, pro programmed use only.

PROJECT COST ESTIMATE:

Paddle and Viewing Pavilion - $55,000-$65,000



4.3 POSITIONING PROJECTS

PROJECT NO.11 - WAYFINDING, INTERPRETATION AND COMFORT PLAN

The Town of Riverview should develop and implement a detailed plan that includes the design, fabrication and installation of wayfinding and interpretation signage, as well as seating and shade stations at 250-meter intervals throughout the passive trail network (only). This work should include the proposed washroom locations as the park grows/evolves.

Work in this project includes capturing the unique habitat resources described in this document, and blending these with the unique cultural resources described in Daniel DeLong's original research to create a unique approach to storytelling within the park.

PROJECT COST ESTIMATE:

Planning and design (for tendering) park amenity package - $35,000 - $45,000

Fabrication and installation costs to be determined.

PROJECT NO.12 - NATURE ACTIVITY ZONE

The Town of Riverview should work with park user groups such as Scouts to develop a series of linear balance and strength activities at the lookout area that expands existing program offerings and activities here. Materials in this area should only include natural materials such as wood, rope, rocks, etc.

PROJECT COST ESTIMATE:

Planning and design (for tendering) - $5,000 - $8,000

Fabrication and installation costs - $18,000 - $22,000.

Example of activity zone elements by Earthscape

Example of activity zone elements (Ropes Direct)

Example of activity zone elements by Earthscape

PROJECT NO.13 - GREAT GATHERING GROUNDS

The Town of Riverview should expand their planning and design efforts for the Recreation Complex to include the creation of an event-based open space capable of hosting all-season events and activities and can be utilized for expanded recreation complex or new facility use (such as rinks, etc.)

Additionally, planning of this space should include consideration for mixed-use developments along the Bridgedale Boulevard as the boulevard extends west.

PROJECT COST ESTIMATE:

Project Cost Estimate: to be determined.

Photo by: Roman Boed

PROJECT NO.14 - THE MILL CREEK PAVILION

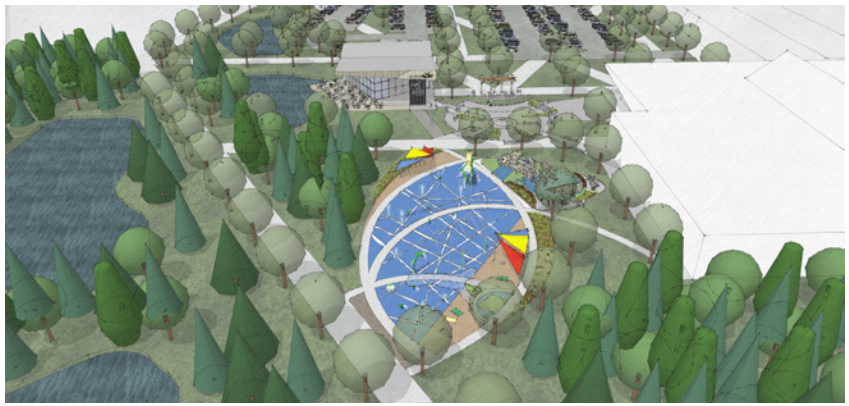
As the Recreation Complex plans evolve, the town should develop plans for the park's primary gateway in a location that extends the Recreation Complex site into the park, and creates a single powerful and multi-use recreation address within the Province of New Brunswick.

This pavilion offers a gateway and community meeting space, washrooms and a retail space such as a microbrew and snack outlet. A partnership with the private sector provides complete in-building operations. The town can maintain the site alongside the Recreation Complex.

Additionally, the site located between the pavilion and Recreation Complex should include active play elements that ensure multi-generational and multi-family use of the site, while expanding the destination's attraction. Elements should include an all-wheel plaza, splashpad and significant playground.

PROJECT COST ESTIMATE:

Project Cost Estimate: to be determined.



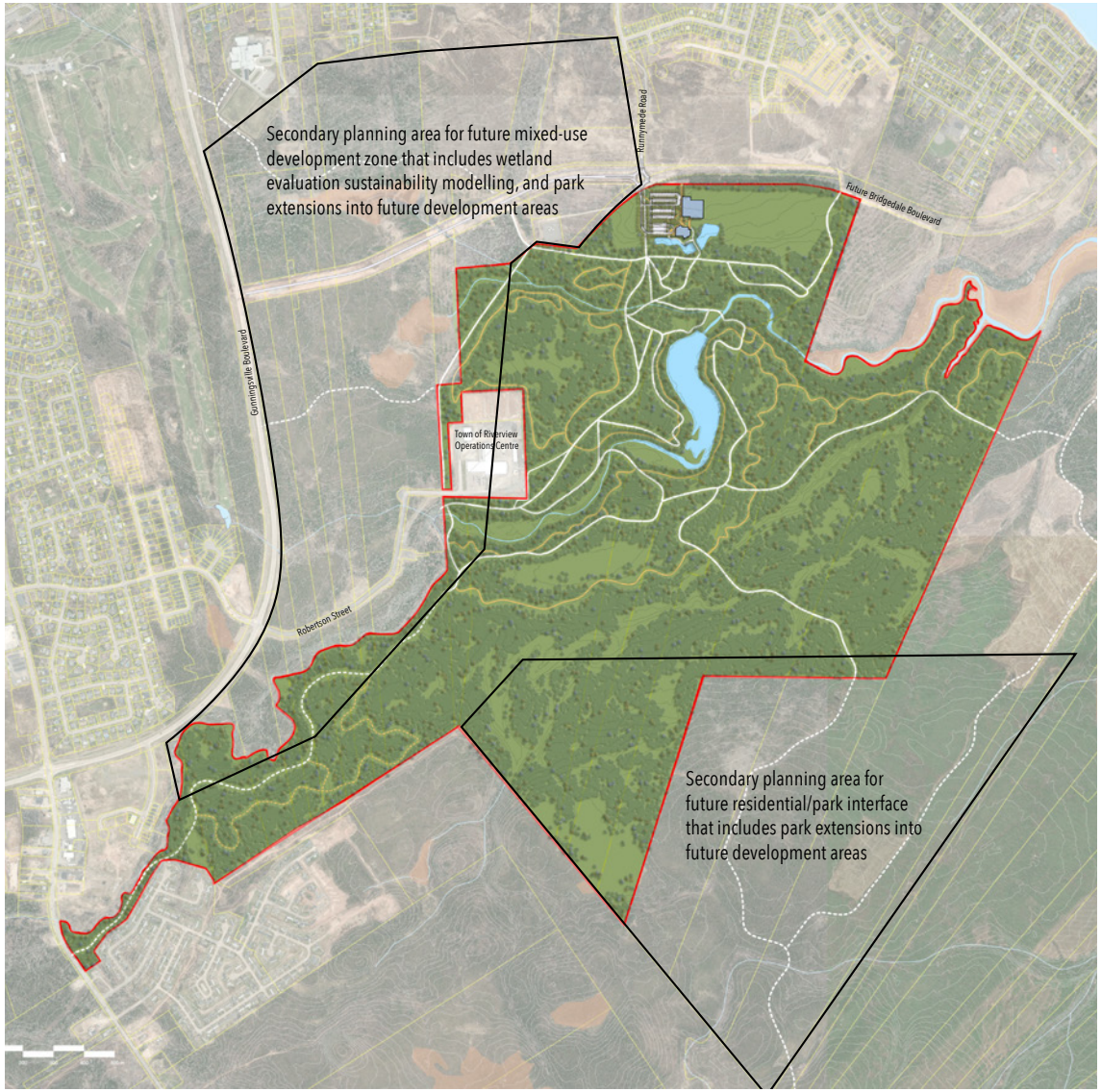
4.4 EVOLUTIONARY PROJECTS

PROJECT NO.15 - SECONDARY PLANS

The Town of Riverview should explore an updated land use model, in the form of secondary plans, for the two areas indicated on the adjacent map. This work should occur within the context of an updated municipal plan, and can occur when this process is required under the provincial planning act.

PROJECT COST ESTIMATE:

Planning and design (for master planning) - $45,000 - $55,000



PROJECT NO.16 - FOREST MANAGEMENT STRATEGY

The town of Riverview should work with a consulting expert and the evolved Friends to develop a forest management strategy that strengthens the existing and expanding canopy and ground cover in perpetuity.

The town and committee can use this report's Appendix B and the following to establish the program. A skilled professional will develop detailed actions to work with the following seven key forest management strategies.

ONE - Ground-truth assumptions about existing conditions, and identify landscape management targets for each mapped and categorized landscape polygon illustrated in Appendix B. The landscape management target categories may ultimately be different than existing condition landscape categories (i.e. The best plan for an area 'flagged for potential ecological importance' adjacent to development may be to act as a buffer or a heavy-use recreation area instead of being maintained as a highly protected area, while 'stable medium impact' areas could potentially be restored into higher quality habitat).

TWO - Landscape targets must be realistic, factor in future development and recreational use, and be robust to prevent degradation of sensitivity features, such as erosion-prone slopes and waterways.

THREE - Identify policy tools and recommendations, such as setbacks and vegetated buffers, to be included on private property as it is developed.

FOUR - Identify key Appendix B 'flagged for potential ecological importance' areas which can be protected as large intact patches through resilient landscape buffers against development, and fine-grained buffers against impacts from recreation.

FIVE - Develop an edge management strategy to prevent degradation of ecological integrity in key 'flagged for potential ecological importance' areas intended for protection, and maintain and enhance habitat connections between large protected 'flagged for potential ecological importance' areas.

SIX - Intentionally program recreation to keep widest, heaviest use trails and most impactful activities away from most sensitive areas, but allow access to destination park features. Additionally, develop a hierarchy of trail typologies and their impacts, and match them to the landscape management targets for each categorized landscape area. Assess whether seasonally appropriate trail use can reduce recreational impacts on ecology in some areas.

SEVEN - Assess whether 'stable medium impact' areas will be regenerated into higher quality and protected habitats or will be more heavily programmed. Additionally, areas identified for habitat improvement could have additional native species planted to catalyze regeneration, particularly in areas of past reforestation or monocultures, as well as invasive species removal.

PROJECT COST ESTIMATE:

Forest Management Strategy Consultant - $25,000 - $35,000

PROJECT NO.17 - DEVELOP A MILL CREEK NATURE PARK APP.

The Town of Riverview should commission a professional digital app creator to develop a handheld phone or tablet-based application that includes general park activity and event information, mapping and location support. This work can also include interpretation information, as well as locations where interpretation is available within the park.

PROJECT COST ESTIMATE:

Professional App Development - $20,000 - $25,000

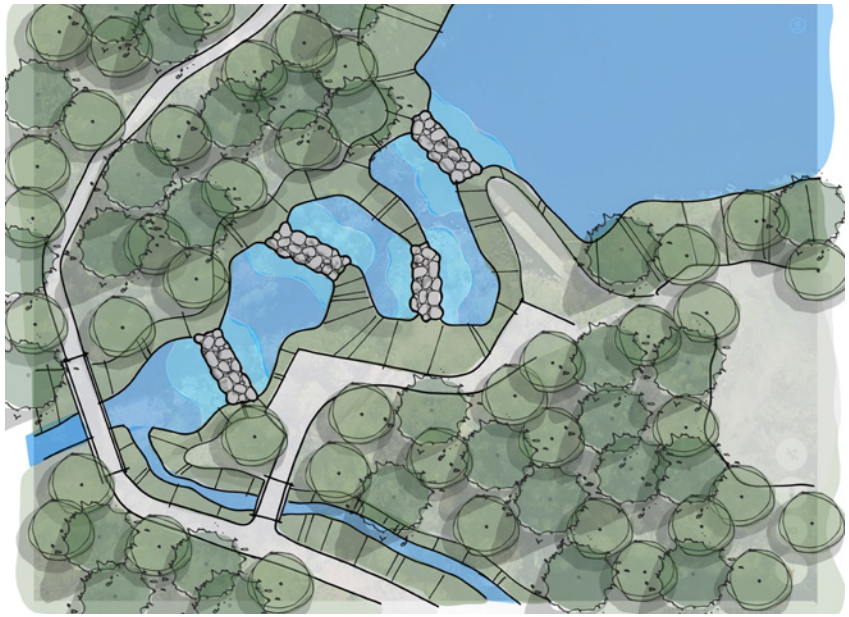
PROJECT NO.18- POND AND DAM STABILIZATION

The Town of Riverview should commission a landscape architect/ engineering team to develop a detailed plan for the nature-based stabilization of the existing dam. This design should include the burial of the existing dam with graded granular material, as well as the placement of concrete and natural rock to form a staged waterfall complete with pools and a fish ladder from the existing pond to the existing stream.

Planning and design should include representation from the Federal Department of Fisheries and the Petitcodiac Watershed Alliance.

PROJECT COST ESTIMATE:

Landscape Architect/Engineering Consultant - $45,000 - $55,000



4.5 IMPLEMENTATION POLICY

Through its enactment of the policies listed below, the Town of Riverview establishes the mandate for which the Mill Creek Nature Park Master Plan's implementation will be achieved.

POLICY MCNP-1 The Town of Riverview shall incorporate this Mill Creek Nature Park Master Plan's policies and projects into sections 3.2, 3.3 as well as chapters 9.0 and 11.0, and Schedule A of the Municipal Development Plan to ensure contextual and reciprocal compliance between the town and park plans.

POLICY MCNP-2 The Town of Riverview shall seek to acquire the Mill Creek Nature Park Master Plan Figure 9.0 lands presently not owned by the Town for use in park growth and habitat protection initiatives.

POLICY MCNP-3 The Town of Riverview Mayor and Council shall dissolve the Friends of Mill Creek Nature Park and establish the Mill Creek Nature Park Advisory Committee for a 5-year (maximum) period as a committee of council under the terms stated in the town's Section 41 of By-Law 1000-10-05 relative to the Project No.4 Mill Creek Nature Park Master Plan.

POLICY MCNP-4 Council shall mandate Parks, Recreation and Community Relations staff to actively work with the Mill Creek Nature Park Advisory Committee to expand community partnership with the committee and to develop ad-hoc committees that evolve into components of a future community association following the 5-year (maximum) Mill Creek Nature Park Advisory Committee lifespan.

POLICY MCNP-5 The Town of Riverview, with Plan360, a component of the Southeast Regional Service Commission, shall develop the Mill Creek Nature Park Master Plan's Project No.16 Forest Management Strategy to provide valuable baseline ecological data for future local and regional planning strategies.

POLICY MCNP-6 The Town of Riverview shall work actively with Plan360, a component of the Southeast Regional Service Commission, to develop secondary plans complete with contemporary stormwater management models for the Mill Creek Nature Park Master Plan's Projects No. 5 and 15.

POLICY MCNP-7 The Town of Riverview recognizes that the Mill Creek dam is an essential component of the cultural and ecological health of the Mill Creek Nature Park; therefore, the Town of Riverview shall explore naturalized approaches to retaining the dam structure while introducing fish passage structures as per Project No.18 of the Mil Creek Nature Park Master Plan.

ENDNOTES

1 "Benefits of Parks in Your Community." Miracle Recreation, https://www.miracle-recreation.com/blog/benefits-of-parks-in-your-community/?lang=can

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5 "Top 7 Benefits of Parks and Recreation." Omnify, https://www.getomnify.com/blog/top-7-benefits-of-parks-and-recreation

6 Robbins, Jim. "Ecopsychology: How Immersion in nature Benefits Your Health." Yale Environment 360, 9 Jan 2020, https://e360.yale.edu/features/ecopsychology-how-immersion-in-nature-benefits-your-health

7 "Role of Parks and Recreation on Health and Wellness." National Recreation and Park Association. https://www.nrpa.org/our-work/Three-Pillars/role-of-parks-and-recreation-on-health-and-wellness/

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12 Robbins, Jim. "Ecopsychology: How Immersion in nature Benefits Your Health." Yale Environment 360, 9 Jan 2020, https://e360.yale.edu/features/ecopsychology-how-immersion-in-nature-benefits-your-health

13 Gies, Erica. "The Health Benefits of Parks." Trust for the Public Land, https://www.tpl.org/health-benefits-parks, 2006.

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16 Gies, Erica. "The Health Benefits of Parks." Trust for the Public Land, https://www.tpl.org/health-benefits-parks, 2006.

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18 The Health and Social Benefits of Recreation. California State Parks, 2005, https://www.nps.gov/goga/learn/management/upload/1536_ca-health_benefits_081505-2.pdf

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28 Nowak, David J. And Gordon M. Heisler. “Air Quality Effects of Urban Trees and Parks.” National Recreation and Park Association. https://www.nrpa.org/uploadedFiles/nrpa.org/Publications_and_Research/Research/Papers/Nowak-Heisler-Research-Paper.pdf

29 Nowak, David J. And Gordon M. Heisler. “Air Quality Effects of Urban Trees and Parks.” National Recreation and Park Association. https://www.nrpa.org/uploadedFiles/nrpa.org/Publications_and_Research/Research/Papers/Nowak-Heisler-Research-Paper.pdf

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APPENDIX A | CONSULTATION SUMMARY

CONSULTATION SESSIONS

Each of the Mill Creek Nature Park master plan consultation sessions is described below. The 'Big Ideas' and 'Big Statements' resulting from consultation and guiding the master plan can be found in Chapter 2.

FRIENDS OF MILL CREEK SESSIONS

The 'Friends' is a community-based organization that provides advice to Riverview staff and council related to development, activity programming, sustainability and administrative tasks/actions within the park. An initial round of general ideas, largely related to landbase and the committee's role, were provided to the consulting team by committee members. Ongoing consultation with this committee included plan review and public session participation.

WALKING WORKSHOP

A "walkshop" was held on June 6th with select stakeholders. The session began in the Town of Riverview Operations Centre, followed by a walk into the park to continue the discussions. During the sessions, key themes were addressed, such as trails, as well as park amenities.

Participants praised the lack of vehicles in the park and the easy access to trail systems. They felt increasing access to garbage cans and washrooms would be beneficial, especially when accompanying young children in the park. It was also mentioned that children greatly enjoy the historical and informative signage, and they would like to see more signs about wildlife and signs tied to natural geography.

Additionally, attendees requested more shared spaces such as shelters, camping locations, and fire pits, as well as more picnic tables that are vandal-proof. They also suggested considering naming the bridges to improve navigation, as well as ensuring information provided on signage is comprehensive and useful for various types of park users.

SKI AND BIKE WORKSHOP

At the beginning of June, a ski and bike workshop was held at the Town of Riverview Operations Centre followed by a bike ride into the park to view important natural and activity settings. The session consisted of a key working group of stakeholders and generated conversations around the park's signage, trails, entryways, and connectivity.

Regarding signage, the main issues raised were regarding the rules of shared trails. Attendees reported word of mouth as the most effective way to keep walkers off ski trails and felt that signage should be minimal. Citing there should only be primary signage in the parks, but there should be gateway signs at entrances with information about trail difficulty. This could help alleviate the problem of people socializing and explaining information in the parking lot.

Concerning trails, the attendees reported hikers enjoy trail environments that are not completely flat and left somewhat natural as it makes for a better workout. With that being said, there was also concern over the maintenance of select trails, particularly by the water where washouts are occurring. It was also felt that there is a need for a higher skill set in building and grooming trails that is currently missing from Riverview. There was also significant conversation around the sharing of designated trails in the winter. Truro was given as an example for how fat bikes and skate skiers can successfully share trails.

When discussing the potential connectivity of Mill Creek, participants mentioned establishing a club that could entice and connect hikers, skiers, and bikers, as well as youth. Another suggestion was for a play park to be installed to draw some of the user groups who go to Centennial Park to exercise with their families.

NATURE WORKSHOP

On June 9th a Nature workshop was held and discussed themes of PNA (provincial protected natural area), environmental stewardship, and sharing the park.

Participants discussed the importance of educating the community about the PNA and recommended this be done through school environments, a forest master plan, and a nature-society/club attached to the park. Participants felt that establishing a PNA in place would show the community wants to protect the park.

There was a strong desire for the park not to be overdeveloped with trails, and to limit the amount of 3-meter trails in the park. Maintaining ecological integrity, such as natural wood and stone, was a significant request, as well as maintaining the environmental perspective throughout the project with the hopes of not losing sight that Mill Creek is a nature park first and foremost.

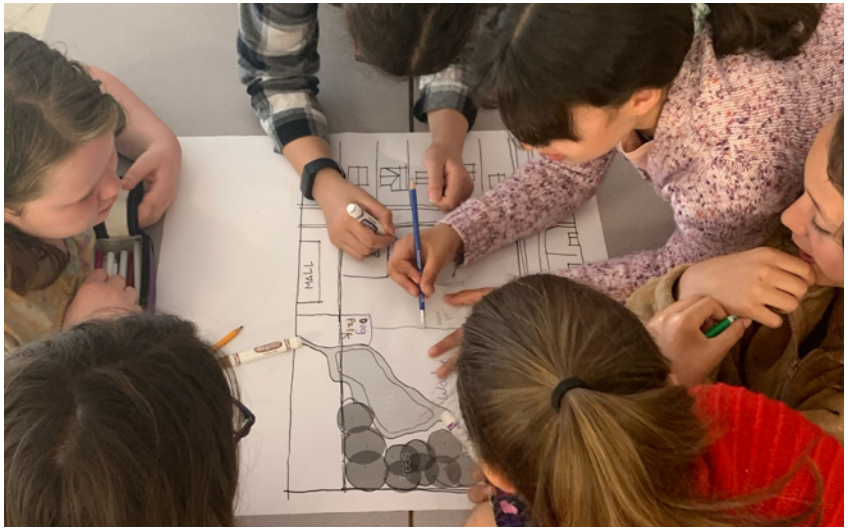
Attendees also felt signage and wayfinding should be kept minimal throughout the park, while making the signage streamlined and user-friendly. Any signage implemented in the park should also account for environmental impact.

SCHOOL SESSIONS

The school sessions were held at Riverview East, Riverview Middle, and Riverview High Schools. Each session opened with a general discussion of the student's relationship to the park, when and how they use it and who they use it with. Then, in groups, the students were given maps and asked to draw and list additions and ideas that would make Mill Creek a park they want to frequent.

The elementary school students primarily visited the park with their families and identified the activities of dog walking, running, sledding, climbing, exploring, geocaching, sightseeing and skating as activities they partake in Mill Creek. Multiple of them enjoy rolling down the hills at the park, and one student mentioned his Karate class sometimes held sessions there. The students also identified several things they would like to see in the park, such as bathrooms and a playground. They also mentioned having courts, fields and rinks for sports, an interactive water feature such as a water park or access to the waterfall, a designated dog area, and a pond for fishing. Additional things on their wish list included a Treego-style park with ziplines, camping sites, free wifi, pools with diving boards, tree houses, cable cars, climbing rocks, parking for food trucks, and more grassy green spaces.

The majority of the middle school students present at the session had visited Mill Creek, and most of them drove there with their parents. The things at the top of their wish list included a playground, dog park, locker room, water sports rentals, and camping sites. The students felt the park would benefit from more shaded rest areas, benches, and BBQ sites. They also suggested a bike park, water park, and zip line park. Water was a big theme for



them, whether it was in regard to fishing, swimming and diving, or kayaking and canoeing. In addition to the physical recreation infrastructure they mentioned, many students were also keen on social recreation infrastructure, such as picnic areas, a stage, and a notice board for community events.

The high school session was conducted with the Outdoor Pursuits class. Although the class's curriculum focuses on outdoor activities and survival skills, they do not use the park in class as it is too far away from the school. However, their teacher mentioned that if it were possible to set their class in the park, they would. The majority of the students who visit the park do so in the warmer months, and typically bike there. Interestingly, many of their ideas for the park revolved around biking. Students suggested adding bike jumps and courses to the park, single-track bike trails, and more bike parking at the entrances. Like the elementary and middle school students,

they also felt the addition of bathrooms was important as well as a designated camping area. Additional amenities they recommended were water fountains for dogs and people, a suspension bridge over the pond, fun fact signage, more fire pits, and benches or a hut by the pond for tying skates in the winter. In regards to physical recreation, the students recommended a high ropes course with employability for summer students, water sport rental equipment, and a sledding hill. The students were also passionate about social recreation in the park and recommended a community garden, planting edible berries and plants, an event space or an outdoor theatre. Conservation and protection of the natural landscape was also important to the students who felt the park should be kept as natural as possible and additions to preserve and support the wildlife, such as adding beehives and making the water swimmable, should be considered.

PARK INTERCEPTS

Intercepts were conducted at Mill Creek throughout varying hours of the day. The aim of the intercepts was to connect with trail users in an informal setting with the hopes of receiving helpful and candid feedback. Users were asked what they loved about the park, and what they would like to see in the park. Many people expressed their appreciation for the park's terrain as well as its quiet and uncrowded atmosphere. Other things that users cited as things they love about Mill Creek were the views, the lake, dog-walking, and its multi-season use. As for things they would like to see in the park, users cited specific recreational infrastructure such as a disc golf course, or programming such as kids camps and bird-watching tours. They also expressed interest in seeing more and better amenities such as picnic tables, benches, and garbage cans. Improving Mill Creek's offerings for children was also a common theme by installing a playground, having easier trails, and having interactive components along the trails.

COMMUNITY OPEN HOUSE

At the end of June, a community open house was held at Riverview Town Hall. Over a six hour period, attendants popped in and shared their concerns and hopes for the future of Mill Creek Nature Park. General themes that emerged from the conversations with those in attendance were dogs, trails, and prioritization of natural landscape. Many would like to see a solution to the issue of dog owners letting their dogs off-leash and not cleaning up after them. Suggestions included increasing the dog licensing fee, having specific off-leash trails or hours, increasing waste receptacles along trails, and providing dog bags. In regards to trails, many participants expressed a desire to improve wayfinding both along the trails, in the park, at its entrances, and in its parking lots. Installing emergency areas with secondary access, increasing the number of multi-use trails and their maintenance budget, establishing a winter equipment rental system, improving access to the water for sports, and establishing better viewpoints along the trails. Prioritization of the natural landscape was also a big concern, with those in attendance recommending the reduction of ATV noise, protection of big trees, planting flora and fauna to support pollinators, and naming trails by nature rather than after people.

PUBLIC SURVEY RESULTS

At the beginning of 2022, the Friends of Mill Creek conducted an on-line survey, which received 787 responses. Questions asked how frequently users visit the park, how they get to the park, and where they enter the park. The survey also asked users what their favourite activities were in the park, what kinds of programs and services they would like to see in the park, and what types of trails they would like to see more and less of in the park.

The most reported activities survey respondents participated in at Mill Creek were walking/hiking, cycling, cross-country skiing, snowshoeing, running, and nature appreciation. As for things users would like to see in the park, many mentioned programs for youth, teens, families and seniors; organized social gatherings such as bushwhacking, themed walks, guided walks, and scavenger hunts; nature conservation and trail maintenance education; designated dog hours or trail systems; and, a children's play area/ playground. Regarding recreation infrastructure, users mentioned having a stocked pond, disc golf, public gardens, docks, camping sites, picnic areas, a canteen, ziplines, and sports courts or fields.

The responses to the question "What types of trails would you like to see more, or less of, in the park?" were fairly split. The kinds of trails people would like to see more of, many people also reported wanting to see less of. Specific trail requests include loops with standard distances, dog-friendly ski trails, a trail below the dam following the creek, a connection between riverfront trails to the service corridor path leading to the park, wheelchair and stroller-accessible trails, and Mountain bike flow trails. Other common requests were more access points and lookout spots, fewer wide and cleared trails, and single-track trails for both biking and walking. The most frequently reported kind of trail respondents would like to see less of was skiing, and many respondents said they didn't want to see any more trail development.

96 BIG IDEAS FOR MILL CREEK NATURE PARK

Following this master plan's consultation sessions, all of the 'Big Ideas' were summarized under the following four categories: Recreational Activities, Nature and Conservation, Park and Trail Improvements and Amenities, and Inclusive and Accessible, Winter Improvements, Safety and concerns. The 96 big ideas are summarized on the following pages.

RECREATIONAL ACTIVITIES

- Implement organized social gatherings such as bonfires, stargazing, bushwhacking, themed walks, scavenger hunts, and bushcraft classes
- Develop designated dog areas
- Designate an Astronomer area (Urban Dark Sky Site Designation)
- Hire summer students
- Consider basketball courts, pickleball courts, a golf course, disc golf and a sports field
- Develop small camping sites and a winter camping site
- Work with schools to get students to the park
- Offer ski lessons and an outdoor running clinic
- Increase awareness of the responsibilities dog-owners have when using public recreational spaces
- Consider a Forest School
- Implement dog-specific amenities such as poop bags and water stations
- Develop Youth and Teen Programs such as Outdoor Adventure Club, Ski Club, Bike Club, and consider offering day camps and summer camps
- Develop a designated off-leash trail system for pet owners
- Consider specific off-leash hours
- Offer equipment rentals (paddleboards, skis, kayaks, fat bikes, etc.)
- Consider Treego, Zip lines, and high rope courses
- Ensure the park is inclusive of harness dog sports in the winter (skijoring)
- Establish an outdoor theatre space at the lookout where Shakespeare in the park, ceremonies, and other small events may take place
- Grow and promote geocaching in the park
- Establish a dog park within Mill Creek

NATURE AND CONSERVATION

- Integrate information panels about plants, trees, and wildlife at entrances and along trails
- Offer guided hikes, bird watching tours, Plant ID and wildlife ID walks
- Restrict commercialization of the park
- Increase bird feeders and offer bird feeding stations
- Leave parts undeveloped
- Minimize trail development to leave habitats untouched
- Protect Mill Creek as an actual nature park— do not attempt to mimic others like Centennial
- Grow park to help preserve forest that is threatened by housing development
- Prohibit commercial development such as canteens, rentals, pools, splash pads, and Treego
- Consider working with groups such as Petitcodiac Watershed Alliance to improve the riparian zones and green space
- Install beehives and a community garden
- Address the pollutants from surrounding businesses
- Consider naming trails after natural elements instead of people
- Create a traditional herbal medicine garden highlighting Indigenous heritage
- Protect Mill Creek as a wifi-free zone
- Establish a designated finishing area
- Address concern for erosion in areas of the park
- Designate an Astronomer area (Urban Dark Sky Site Designation)

PARK AND TRAIL IMPROVEMENTS AND AMENITIES

- Create a balanced all-season trail system suitable for all users
- Install rock climbing and general play climbing infrastructure
- Increase the number of multi-use trails
- Incorporate a playground, perhaps in one of the open green spaces by parking lots
- Improve access to water for canoe, kayak and water sports
- Add a dock for boats and canoes and kayaks
- Develop loops with standardized distances (5km, 8km, 10km)
- Consider an entire walking trail around the perimeter of the park
- Install single-track biking and walking trails
- Explore trails with destinations such as the waterfall, waterfront, and lookout, and develop trails along the water
- Increase the presence of narrow walking trails in the forest rather than the wide-open tree-cleared paths
- Establish a cohesive trail system that connects Riverfront to Mill Creek to Dobson to West Riverview
- Increase mountain bike trails
- Install adult and kiddie pools
- Develop a designated running trail
- Provide access to the reservoir
- Consider a bridge over the pond
- Finish incomplete trails
- Increase the difficulty of trails
- Stock the pond with fish

INCLUSIVE AND ACCESSIBLE, WINTER IMPROVEMENTS, SAFETY AND CONCERNS

- Incorporate specific signage for winter trail use
- Increase the presence of benches and incorporate inclusive seating as picnic tables are not accessible for everyone to sit at
- Offer un-groomed snowshoe trails
- Install lighting in parking lots
- Add a crosswalk at Gunningsville
- Prioritize investigation and prevention of Blue-Green Algae blooms
- Designate a section of the pond for public skating and ice hockey
- Implement support for people with mobility issues (walking poles, walking buddies, golf carts)
- Provide hockey nets at the pond
- Expand parking at Runnymeade entrance
- Improve winter trail conditions for all users
- Install guide wires for the visually impaired
- Consider a route accessible by car
- Consider a means to check the winter trail status online
- Develop a boardwalk for increased accessibility
- Vary the difficulty of ski trails
- Install a safety rail on the dam side park entrance
- Prioritize a balance between natural and accessible
- Establish a healing forest to have a natural space dedicated to reconciliation
- Select trails to be accessible for strollers
- Develop an app for visualizing all the trail networks and calculating distance and time
- Groom trails more quickly
- Consider Food Truck parking locations
- Install protected fat bike and snowshoe trails
- Link schools to the park
- Improve parking at the Robertson parking entrance
- Increase options for winter walking (a 3km loop would be ideal)
- Install signs at the Roundabout
- Establish safe and reliable active transportation routes connecting Mill Creek to the rest of Riverview
- Install a hut/shelter/benches by the pond for tying skates in the winter
- Improve and increase parking
- Provide lighting along specific trails for evening access and increased safety
- Establish a sledding hill
- Offer a help/safety service in the event of injury or getting lost and consider wifi hotspots for people to access in the event of an emergency
- Consider ice protection for the new bridges across the creek
- Improve maintenance standard
- Consider adding emergency areas and second access points
- Decentralize skiing in winter and decrease the amount of ski trails

APPENDIX B | LAND HOLDINGS BRIEF

LAND HOLDINGS BRIEF

2023 MILL CREEK NATURE PARK MASTER PLAN

This appendix describes an analysis of the lands within and adjacent to the Town of Riverview's Mill Creek Nature Park to identify what a modified park boundary should look like, and why. It is important to note that this is a master-plan level effort that includes the creation of forest cover mapping that identifies typologies and human impacts on baseline park ecological systems. Further analysis is required as master plan implementation proceeds; however, the analysis provides a sufficient rationale to support landbase decisions.

INTRODUCTION

The purpose of this appendix is to develop an overview of the existing conditions of the landscape and forest conditions at and surrounding Mill Creek Nature Park, and use that information to inform the Mill Creek Nature Park Master Plan, as well as future expansion of the park. As a piece of a master plan document, we categorize the opportunities and potential issues in regards to the ecology of this beautiful park. This is both a visionary document, and the preliminary stage of a landscape inventory that can inform detailed park design.

The approach taken is far-reaching in that it looks at land parcels that are not currently part of the park but could become part of a future Regional Park. This broader scope also allows for an understanding of the development pressures facing the park, its role in the greater Mill Creek Watershed, and how land acquisition or programming could be used to buffer and protect key ecological assets within the park.

The mapping work undertaken towards this inventory included a review of orthophoto imagery of the park and surrounding area, a review of resources available through GeoNB, including topographic contours and wetland classification, as well as direct observation of the landscape through drone aerial transects collected by the project team in early September 2022. The mapping produced as a result of this work should be considered a living document, and it is expected that future work will increase the resolution of the landscape inventory. In particular, geo-referenced site visits and incorporating information from community consultation are envisioned as the next steps.

METHODS

A base map of the park and surrounding area was prepared for baseline analysis. This resource included high-resolution orthophoto imagery, topographic contours, hillshade modelling, wetland and waterbody information, land parcel boundaries, as well as trail information. Observations of the site were made by cross-referencing high-resolution aerial imagery on the base map with low-flying drone video captured during September 2022. This provided the project team with the opportunity to make direct observations of the site, which were translated into polygons on the base map. These polygons should be understood as landscape areas with similar characteristics. Polygons were given a landscape designation of Orange, Green or Purple based on their ecological characteristics, vulnerabilities and potential to help guide the recommendations of the master plan. These categories are described in more detail in Landscape Inventory and Polygon Descriptions.

One of the strengths of this data collection method is that it allows for current estimates about the level of human impact and qualities of the site. As high-level observational work, this project is also able to identify areas where available information is lacking, and more detailed information is required as master plan implementation proceeds.

FIGURE 1 | DRONE FLIGHT PATHS - SEPTEMBER 2022

METHODOLOGY DESCRIPTION

A step-by-step description of the analysis methodology is described below (using line 13 as an example).

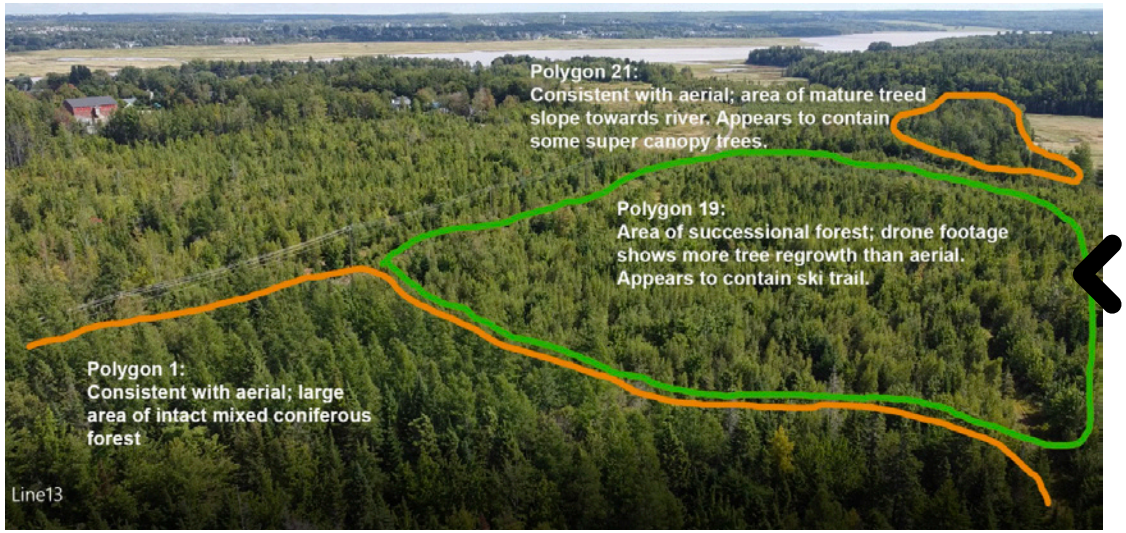
FIGURE 2 | STEP ONE

Step One (Figure 2) - Flight line 13 is mapped on the park base map.

FIGURE 3 | STEP TWO

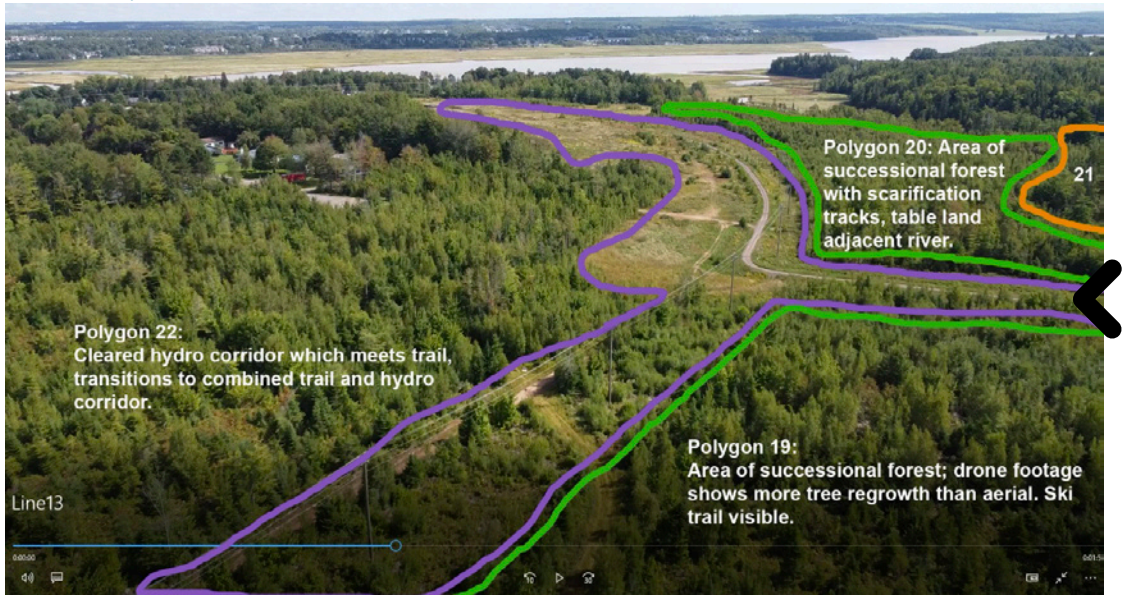
Step Two (Figure 3) - The flight path is cross-referenced with high-resolution aerial imagery.

FIGURE 4 | STEP THREE



Step Three (Figure 4.0) - Direct observation and categorization of land characteristics is made by viewing drone footage, cross-referenced with other available data.

FIGURE 5 | STEP FOUR



Step Four (Figure 5.0) - Example of Noted Features Visible on Drone Footage.

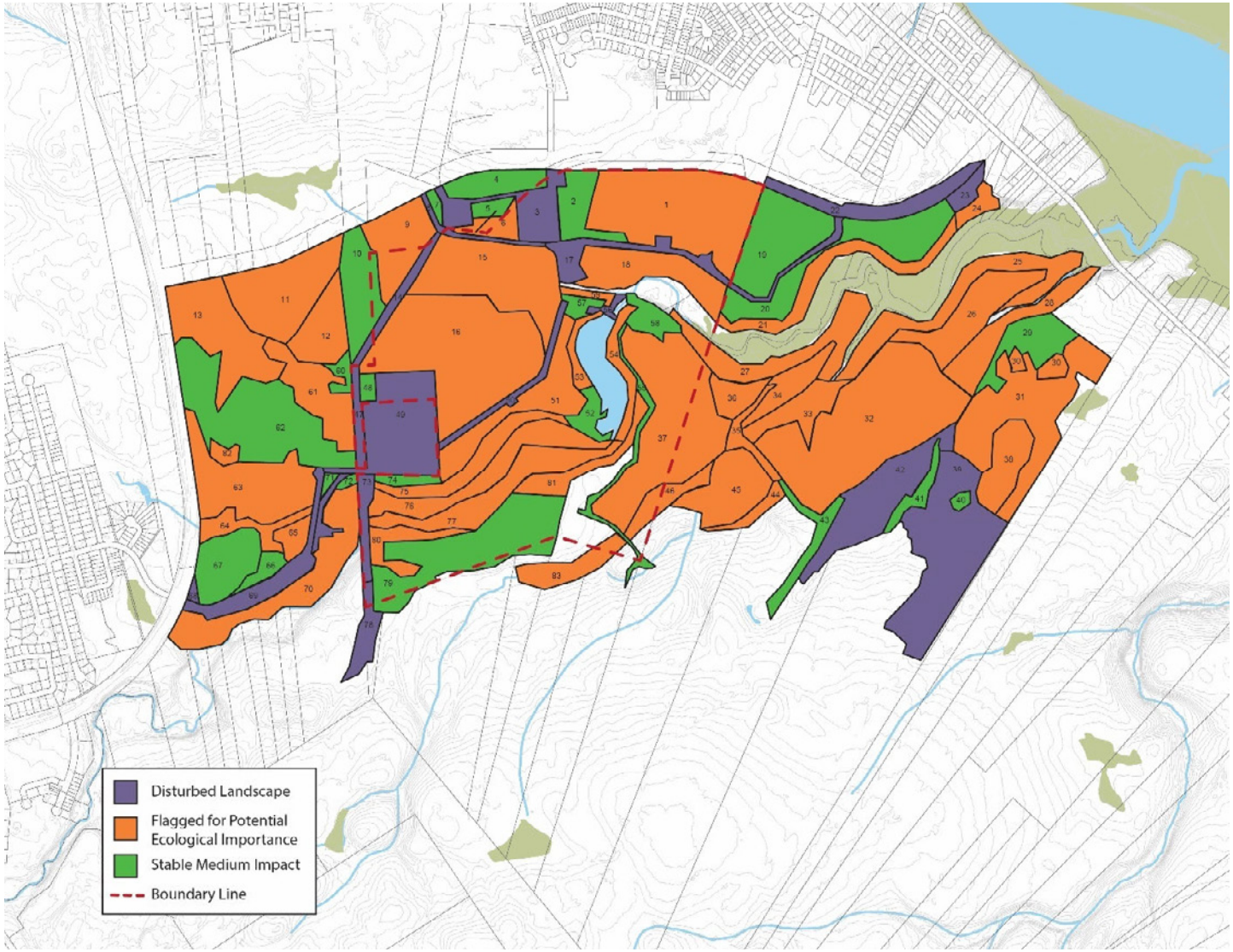
FIGURE 6 | STEP FIVE

Step Five (Figure 6.0) - Observations from the drone footage and base imagery are mapped into polygons on the base map.

The next steps for this work should include site visits to verify aerial observations, and the layering of forest stand and soil information from additional GeoNB resources to refine polygon shapes.

EXISTING FOREST COVER MAP

FIGURE 7 | BROAD LANDSCAPE CHARACTERISTICS AT MILL CREEK NATURE PARK



This map (Figure 7.0) broadly categorizes the landscape characteristics at Mill Creek Nature Park and of the surrounding landscape to inform the programming, protection and expansion of the park space. Descriptions of polygons and features are provided in the next section.

LANDSCAPE DESIGNATIONS:

ORANGE: AREAS FLAGGED FOR POTENTIAL ECOLOGICAL IMPORTANCE

- Area likely to have higher ecological integrity.
- Intact mature forest, floodplain, bog or wetland, meadow.
- Area which may be a destination or desirable park feature because of its ecological characteristics.
- Area may be sensitive and require a higher level of protection to preserve ecological integrity.

GREEN: STABLE AREA OR AREA OBSERVED TO HAVE SOME IMPACT

- has likely experienced some disturbance.
- Area of successional forest, forest replanting.
- Area of transition; appears ecology could be improved through intervention, or it could be transitioned to other uses with less ecological loss than orange areas (would have to be confirmed with site visit).

PURPLE: DISTURBED LANDSCAPE

- Disturbed landscape, appears to have limited intact ecology
- Road, trail, cleared area, building, parking lot, active industrial or agricultural uses.

FOREST COVER INVENTORY

The following table provides descriptions of features identified in the landscape polygons. It is important to note that not all flights lines are described in this section; however, all landscape polygons are described. Descriptions for each flight line is not required to complete all polygon descriptions.

FLIGHT LINE NO.1

Polygon No.	Designation	Comments
1	Orange	Large area of intact mixed coniferous forest, no visible trails
2	Green	Area of lower density successional forest, some clearings
3	Purple	Cleared area, road, parking lot, bare soil, hydro corridor, utility station
4	Green	Mixed forest, smaller patch size surrounded by roads
5	Green	Area of successional forest adjacent utility station
6	Orange	Smaller area of intact mixed coniferous forest, no visible trails.
7	Green	Small area group of mature coniferous trees, isolated by hydro corridor and roads.
8	Purple	Trail or road.
9	Orange	Large area of intact mixed forest, no visible trails. Includes watercourse and wetland area.

FLIGHT LINE NO.2

Polygon No.	Designation	Comments
15	Orange	Large area of mixed mature forest. Contains slope down to waterway and numerous trails.
16	Orange	Large area of mixed mature forest. Contains few trails and appears buffered from major roads.
17	Purple	Cleared areas and trail.
18	Orange	Area of mixed mature forest north of river. Contains slope down to water.
19	Green	Area of successional forest with scarification tracks visible in aerial. Appears to contain trails or logging roads, base data indicates possible ski trails (north of main trail).
20	Green	Area of successional forest with scarification tracks south of road, adjacent river.
21	Orange	Mature treed slope down to river, north side, appears to contain some super canopy trees.
59	Orange	Treed slope down to creek.

FLIGHT LINE NO.3

Polygon No.	Designation	Comments
10	Green	Area of successional forest and vegetation. May have been replanted (scarification visible in aerial). Possible creek or waterway.
11	Orange	Area of mixed forest, appears slightly younger than #13, more open areas. Appears to contain creek or waterway, and possible old trails.
12	Green	Successional area, possibly wetland, primarily deciduous.
13	Orange	Mixed forest, no trails visible. Large road on west side, otherwise buffered from disturbance.
14	Purple	Hydro corridor.

FLIGHT LINE NO.13

Polygon No.	Designation	Comments
22	Purple	Cleared hydro corridor which meets trail, transitions to combined trail and hydro corridor.
23	Purple	Cleared area adjacent hydro corridor and slope to river. Potential viewpoint.
24	Orange	Mature trees on slope down to river. Adjacent to residential area.

FLIGHT LINE NO.15

Polygon No.	Designation	Comments
29	Green	Mixed coniferous and hardwood successional forest, includes dirt track and some possible trails or regeneration after clearing.
30	Orange	Bogs or fens.
31	Orange	Area appears to be primarily coniferous forest, some variation in density and size.
32	Orange	Large area of mixed age primarily coniferous forest, possible informal trail.
33	Orange	Mature mixed coniferous forest on steep slope to water course.
34	Orange	Mature mixed coniferous forest, may include some super canopy trees.
35	Orange	Linear ribbon of deciduous trees, may include seasonal water course or trail.
36	Orange	Mature mixed coniferous forest, may include some super canopy trees.
37	Orange	Mixed primarily coniferous forest, no visible trails. Contains some lower areas that appear to have younger growth.

FLIGHT LINE NO.14

Polygon No.	Designation	Comments
25	Orange	Mature mixed trees on slope down to river. Higher deciduous presence.
26	Orange	Mature forest, located on peninsula between waterways.
27	Orange	Mature trees on slope down to river.
28	Orange	Mature trees on slope down to river, some areas which appear to be lower density or deciduous stands. Dirt track forms SE boundary.

FLIGHT LINE NO.16

Polygon No.	Designation	Comments
38	Orange	Mixed age coniferous and hardwood forest, includes some areas of lower density and regeneration.
39	Purple	Cleared land (blueberry farm?)
40	Green	Isolated stand of mature trees.
41	Green	Isolated stand of mature trees.
42	Purple	Cleared land (blueberry farm?)
43	Green	Possible trails or disturbance.
44	Orange	Wetland area.
45	Orange	Mature coniferous forest, may include some super canopy trees towards east side.
46	Orange	Mixed primarily deciduous forest with watercourse and wetland influence. Possible red maple presence.

FLIGHT LINE NO.11

Polygon No.	Designation	Comments
47	Purple	Road/hydro corridor.
48	Green	Isolated stand of mature trees.
49	Purple	Fenced industrial yard.
50	Purple	Cleared trail and trailhead.
51	Orange	Mature mixed forest with numerous trails.
52	Green	Area of gentler slope down to river with numerous trails and possible access points. Appears somewhat swampy, likely good bird habitat.
53	Orange	Mature primarily coniferous forest on steep slope down to river.
54	Orange	Mature primarily coniferous forest on steep slope down to river.
55	Green	Deciduous ribbon through primarily coniferous forest, appears to be along trail.

FLIGHT LINE NO.4

Polygon No.	Designation	Comments
60	Green	Successional area with even mix of deciduous and coniferous trees, trail passes through.
61	Orange	Area of primarily mature coniferous trees, trail passes through.
62	Green	Area of lower density and younger mixed coniferous/deciduous. May include areas of reforestation.

FLIGHT LINE NO.12

Polygon No.	Designation	Comments
56	Purple	Dam, cleared area for lookout, construction area below dam.
57	Green	Isolated stand of mature trees around lookout area.
58	Green	Area of mixed coniferous/deciduous forest in area of concentrated trails, bridge across creek.

FLIGHT LINE NO.8

Polygon No.	Designation	Comments
63	Orange	Mixed mature deciduous and coniferous forest, contains some lower density areas and possible waterway.
64	Orange	Primarily deciduous low-lying area, may have swamp or fen character.
65	Orange	Smaller grouping of mixed mature forest.
66	Green	Cleared area along Robertson St,. possibly meadow.
67	Orange	Mixed forest, central area appears to be more mature conifer, with increase deciduous presence around periphery.
68	Purple	Cleared area at intersection of paved roads (visible in drone footage only, not in ortho)
69	Purple	Robertson St., and cleared land adjacent for hydro.
70	Orange	Mixed mature forest buffering waterway. Slopes towards water, and deciduous presence increases towards water. Contains some large conifers and lower density areas.
71 and 72	Green	Isolated patches of mixed coniferous and deciduous trees.
82	Orange	Potential wetland area.

FLIGHT LINE NO.10

Polygon No.	Designation	Comments
73	Purple	Trailhead and cleared area for hydro corridor, dirt track. Waterway passes through.
74	Green	Mixed deciduous forest located on table lands between Operations Center and slope down to water. Includes trail.
75	Orange	Mixed mature coniferous/deciduous forest on slope down to waterway.
76	Orange	Low-lying floodplain adjacent waterway. Mixed deciduous and coniferous tree cover.
77	Orange	Steep slope down to waterway, high density of mature conifer forest cover. Limited trail impact visible (also shown in Flight Path 12).

FLIGHT LINE NO.20

Polygon No.	Designation	Comments
83	Orange	Wetland.

FLIGHT LINE NO.9

Polygon No.	Designation	Comments
78	Purple	Cleared area for hydro corridor, dirt track. Standing water and washout visible in drone footage.
79	Green	Flat area of younger and lower density forest.
80	Orange	Mature primarily coniferous forest on ridge before slope down to waterway.
81	Orange	Mature primarily coniferous forest on ridge before slope down to waterway.

PROPOSED LAND BASE

A future Mill Creek Nature Park land base is proposed based on the following four statements.

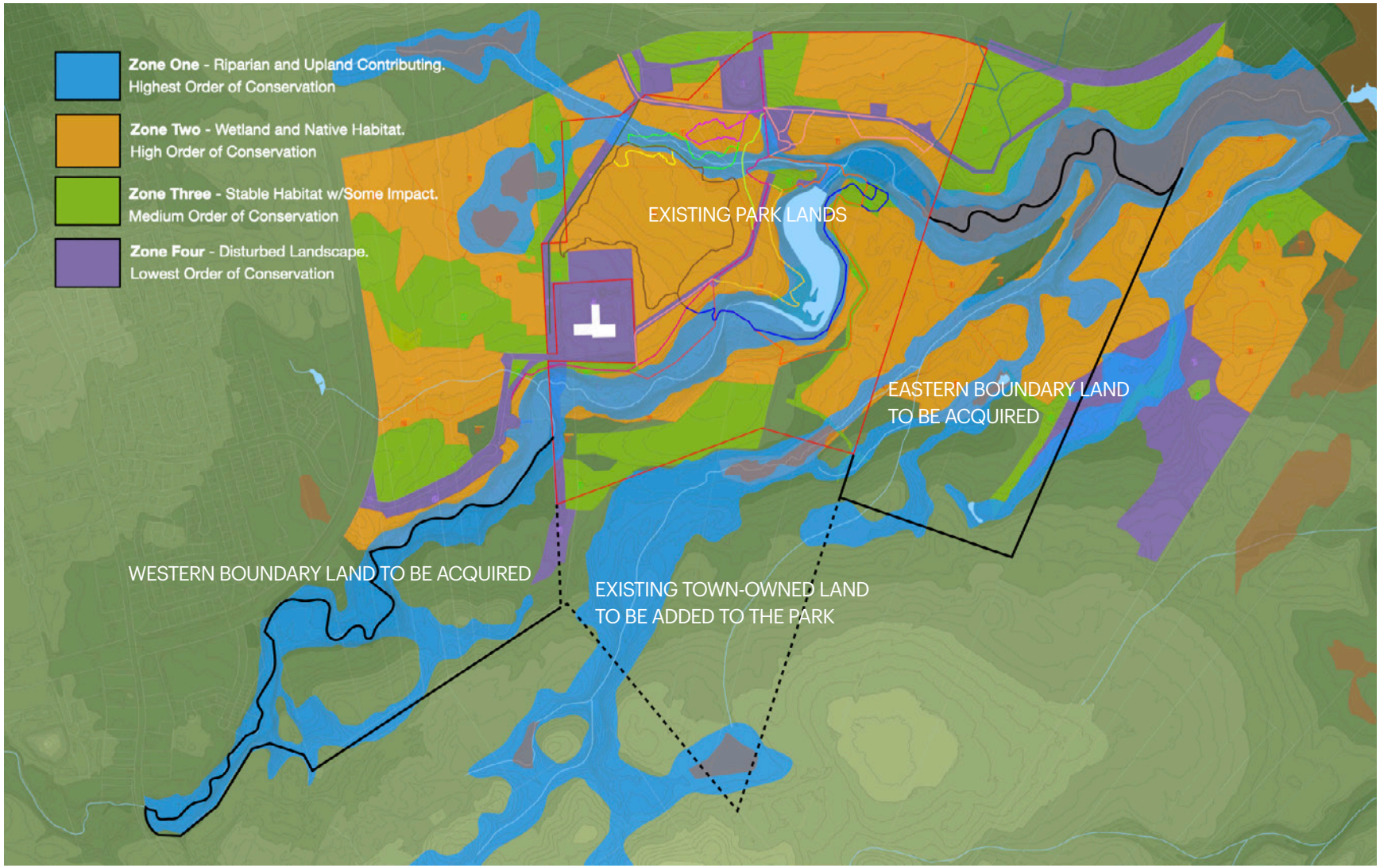
1. The existing land base and future recreation complex function as the activity heart and gateway of the Mill Creek Nature Park;
2. Forest cover mapping, when combined with topographic mapping, identifies where significant water's edge habitat should be retained to ensure the health of the park's central waterway (see Figure 8.0);
3. Topographic mapping illustrates where significant landform areas, such as contributing ravines, should be retained within the park boundary to ensure core watercourse health (Figure 9.0); and,
4. Although adjacent lands that fall within significant habitats will be developed, special sustainable planning approaches to land development will ensure the health of the central watercourse and parkland base health.

Figures 8.0 and 9.0 (next two pages) illustrate an updated future Mill Creek Nature Park boundary based on the above statements. This significantly expands the existing park area from 328 acres to 634 acres. Thus, the park becomes the region's second-largest municipal park, and the region's second-largest nature park. Additionally, the park becomes the largest regional park designed for contemporary and mixed-use passive and active nature interactions.

LAND USE PLANNING

As mentioned, areas outside of the park boundary require special sustainable planning approaches to support central watercourse health. Thus, special sustainable development planning district guidelines should be established that protect slopes, significant forest habitats and other natural features while extending ecological and functional park corridors into adjacent neighbourhoods. These guidelines will apply conservation requirements beyond provincial watercourse and wetland setbacks.

FIGURE 8 | PROPOSED LAND BASE

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