



City of Vaughan

BARTLEY SMITH GREENWAY TRAIL

Closing the Gap

FEASIBILITY STUDY & 30% TRAIL DESIGN

October 2023

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EXECUTIVE SUMMARY

The City of Vaughan (“City”) is home to the Bartley Smith Greenway (“BSG”) which is part of the Vaughan Super Trail. Currently there is a gap in the trail infrastructure between McNaughton Rd and Rutherford Rd. The Bartley Smith Greenway trail aims to establish pathways through the City’s greenspace corridors, utilizing road corridors where necessary to ensure connectivity in challenging areas. The primary objectives of the trail include promoting mobility connections, offering recreational opportunities, and facilitating a connection with nature. To ensure a seamless experience for all users, the trail prioritizes accessibility, featuring predominantly gentle slopes, asphalt paved surfaces, and widths ranging from 2.5 to 3.0 meters.

The gap in this system is a critical missing link which this feasibility study aims to correct in the existing trail infrastructure, resulting in approximately 15km of uninterrupted trail experience, connecting the communities of Maple, Carrville, and Thornhill, while also resulting in significant connectivity benefits for all trail users and the broader community.

WSP was retained by the City of Vaughan to complete a feasibility study and 30% detail design drawings to fill the critical gaps in the BSG, a segment totalling three kilometres. The study was conducted in two parts:

- Part 1 – Research and Preferred Trail Route Analysis, and
- Part 2 – 30% Detail Design Development.

Part 1: Research and Preferred Trail Route Analysis

Part 1 evaluated the feasibility to develop a continuous three-kilometre pedestrian and cycling trail system to fill the existing gap. As discussed in subsequent chapters, Part 1 research and analysis included a comprehensive review of existing conditions, policy and land use, engagement and outreach, the completion of various technical studies, a review of opportunities and constraints analysis, stage 1 archaeology assessment, trail route analysis, property and land acquisition needs assessment, as well as a review of operations and maintenance and implementation costing. As a result, master plan mapping, phasing and preliminary costing were developed.

As noted above, a major part of this process, which informed the 30% design recommendations, included a three-phased engagement and outreach program that targeted specific interest groups (e.g., technical staff, stakeholders, and the public).. Additional information about the engagement and outreach program can be found in Chapter three of this report: Stakeholder Engagement and Technical Study Summary.

Opportunities and constraints analysis of the proposed road crossing options, proposed trail alignment segments, and proposed bridge crossings is discussed in Chapter 4. Chapter 5 evaluates trail alignment options through a route crossing analysis evaluation matrix and pro's & con's comparison. Key criteria and objectives were developed for each proposed crossing type for evaluation and assessment. It was through this process the following recommendations were determined:

- Road Crossing Recommendations:
 - Road Crossing at McNaughton Rd. – Recommendation is for a below grade underpass/culvert crossing.
 - Road Crossing at Rutherford Rd. – Recommendation is for the use of the existing signalized intersection at Greenock Dr.
- Trail Segment Crossing Recommendations:
 - Segment between McNaughton Rd. and Major Mackenzie Dr. – Recommendation is for the route option with connection extending behind Mathewson St. homes.
 - Segment between Major Mackenzie Dr. and Rutherford Rd. – Recommendation is for alignment on east side of watercourse as presented to the public.
- Bridge Crossing Recommendation:
 - Bridge Crossing between Major Mackenzie Dr. and Rutherford Rd. – Recommendation is to proceed with a culvert/land crossing near Sport Village and protect for a potential Bridge Crossing #2 at Mount Charles Cres. in the long term.

The Master Plan Trail Design is discussed in Chapter 6, detailing the design response, summary of key 'moves' and proposed route overview, while Chapter 7 identifies on-road active transportation improvements. Chapter 8 discusses trail and crossing infrastructure design detail, comprising of:

- Trail and amenity design details which outline specific guidelines and strategies that apply to the design of the trail and amenities, including a listing of specific standard city details,
- Restoration and enhancement planting/seeding mixes; and
- Buffer enhancement plantings from light to robust buffer types.

Chapter 9 outlines the implementation method that was developed to guide the phased approach to future detail design and construction of the trail. The phased approach uses five target areas:

1. McNaughton Rd. to Major Mackenzie Dr.
2. Major Mackenzie Dr. to Naylon St. including Naylon Park.
3. (a) Naylon Park to Bevan Rd. and (b) Bevan Rd. to Merrick Dr.
4. Merrick Dr. to Rutherford Rd.
5. Rutherford Rd. to Keele St.

To further supplement the phasing approach, operations and maintenance costs were estimated along with implementation costs. An overview of suggested maintenance and operations practices are provided including risk management and liability, trail monitoring and maintenance strategies, safety, security, and emergency response.

Key recommendations are compiled in Chapter 10 for consideration when trail implementation proceeds. Recommendations include a pilot trail, undertaking tree inventory and management plans, development of a monitoring program, maintenance strategy, environmental stewardship education program, and ongoing monitoring of Rutherford Rd. to Keele St. trail extension.

Part 2: 30% Design Development

Part 2 of the project was the development of a 30% detail design drawing package of the preferred trail alignment. The 30% drawing package will be used to inform future detail design and will require further study and refinement prior to trail implementation. The drawing package includes layout, grading, planting restoration, cross sections, design standards, signage, wayfinding and pavement markings. Capital maintenance and lifecycle costing with phased implementation recommendations are also included. Geotechnical testing was deferred to future design and construction stages.

Conclusion

In summary, closing the gap of the existing Bartley Smith Greenway is feasible and will play a vital role in enhancing the quality of life to the residents of Vaughan and all its visitors. This large trail system links to key destinations, including the Toronto Trail Network, becoming a region-wide tourism destination while providing numerous health, conservation, and environmental benefits.

1 PROJECT GOALS AND PURPOSE

1.1 Bartley Smith Greenway Overview

The Bartley Smith Greenway (BSG) is part of the 100km city-wide Vaughan Super Trail, a signature recommendation of the City's 2020 Pedestrian and Bicycle Master Plan endorsed by City Council. There is currently a disconnect in trail infrastructure between the existing trail terminus at McNaughton Rd. and potential connection points along Keele St. and Rutherford Rd.

The BSG trail strives to develop alignments within the City's greenspace corridors with select sections utilizing on-road options as needed to achieve connectivity in constrained areas. The trail provides mobility connections, a source of recreation and facilitates an opportunity to connect with nature. The trail experience focuses on a high lens of accessibility with the majority of trails featuring minimal slopes, asphalt paved surface and 2.5m to 3.0m width.

The following key map showcases the location and preliminary trail alignment of the Vaughan Super Trail in relation to the BSG (dark green dotted line), and the current project site (red).

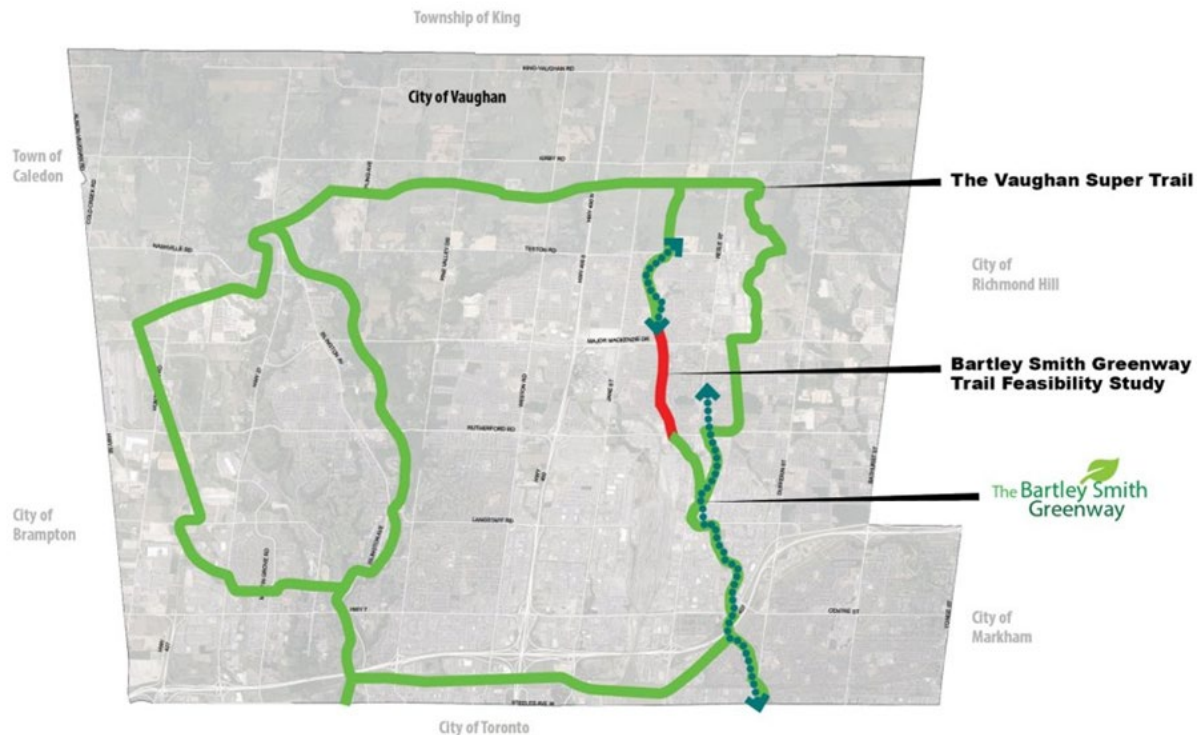


FIGURE 1: KEY MAP OF VAUGHAN SUPER TRAIL, BARTLEY SMITH GREENWAY AND THE PROJECT SITE.

This gap in the existing trail segment represents a critical missing link within the BSG, which originates at Teston Road and extends south to Steeles Avenue West, connecting to the Toronto trail network. Moreover, the BSG comprises an essential component of the Vaughan Super Trail, and upon completion, it will provide roughly 15km of uninterrupted trail experience that connects the communities of Maple, Carrville, and Thornhill. This initiative aims to bridge a critical gap in the current trail infrastructure, resulting in significant connectivity benefits for trail users and the broader community.

Trails play a vital role in enhancing the quality of life in communities by providing numerous benefits, including:

- Linking key destinations such as natural areas, parks, cultural features, historic sites, and other public spaces within urbanized settings.
- Act as a tool for ecology and conservation. Greenways and trails help preserve important natural landscapes within urban settings, provide controlled access and an environment that will help protect natural features and wildlife habitats, and indirectly offer opportunities for protecting plant and animal species from uncontrolled human activity.
- Create and provide healthy recreation and transportation opportunities by providing a safe space for people of all ages to enjoy, as well as being an element to an urban or regional multi-modal transportation system.

The BSG supports several strategic plans of the City such as the Official Plan (2010), Green Directions Vaughan (2019), Vaughan Active Together Master Plan (2018), 2020 Pedestrian and Bicycle Master Plan, and the TRCA Trail Strategy (2019).

1.2 Project Purpose & Process

The City of Vaughan (the “City”) retained WSP Canada Inc. to provide professional services in landscape architecture, design services, master planning, trail, and active transportation planning to complete a feasibility study and 30% detail design to fill critical gaps in the Bartley BSG along a three-kilometer segment in the Upper West Don River corridor between McNaughton Rd. and Keele St. (the Project).

Filling the gaps will provide a continuous north-south pedestrian and cycling trail, recreation, and active transportation opportunities for residents, as well as other community benefits.

The study process was divided into two parts:

Part 1: Research and Preferred Trail Route Analysis

Evaluate the feasibility of developing a continuous 3km pedestrian and cycling trail system.

Review existing conditions, opportunities and constraints.

Complete research, inventory, analysis, and impact assessment.

Master plan mapping, phasing, and preliminary costing (capital, maintenance, life cycle).

Stakeholder, public and Indigenous engagement.

Part 2: 30% Design Development

Prepare 30% detail design package of preferred trail alignment. The package will inform future design and will require further study and refinement prior to implementation.

Design includes layout, grading, planting restoration, cross sections, design standards, signage, wayfinding, and pavement markings.

Capital, maintenance and life cycle costing with phased implementation recommendations.

Geotechnical testing was identified but deferred to future design and construction stages.

1.3 Engagement & Outreach

This project positively impacts the community, and thus providing opportunities for public engagement throughout the whole process was a critical strategy for advancing the vision, objectives, and goals for inclusivity, social equity and informed decision-making. This process allows the public a chance to learn about the project, the opportunities and constraints, and helps inform the decision-making process which influences the final design recommendations. WSP's engagement and outreach program incorporated multiple opportunities and methods for public involvement, including:

- An online community engagement survey (Oct. 4 to 19, 2021)
- An online public focus group discussion (2 sessions on Nov. 30, 2021), and

- Two (2) public information centres (Feb. 24, 2022 (online) and July 7, 2022 (in-person and online))

The engagement and outreach program focused on three target groups:

- Technical stakeholders (Toronto and Region Conservation Authority, City staff and WSP specialists),
- General public (residents and visitors interested in the trail system), and
- Adjacent homeowners/residents (people who live in the immediate area).

The initial stages of the engagement program focused on developing a vision, priorities and principles that would inform the alignment and trail character. With a vision and mandate already in place for the BSG trail system, the visioning component of the Project focused on how best to facilitate a trail which *“provides both mobility connections, provides a source of recreation, and facilitates an opportunity to connect with nature”* while considering the site-specific needs, opportunities and constraints.

Technical stakeholders were engaged in the early stages to establish the limits of where the trail could be constructed, ensure the system would function with existing city infrastructure and identify viable alignment options prior to engaging the public.

High-level alignment options were shared with the public to gather feedback, as detailed studies were completed to further investigate opportunities and constraints. Through this process, alternative trail alignments were established and evaluated based on several criteria linked to the vision and goals established. A preferred alignment was established and further refined through focus groups, public information centres (PIC) and an additional session with concerned residents who requested further engagement after the second PIC in the summer of 2022.

The engagement activities took place in three phases as outlined in Figure 2.

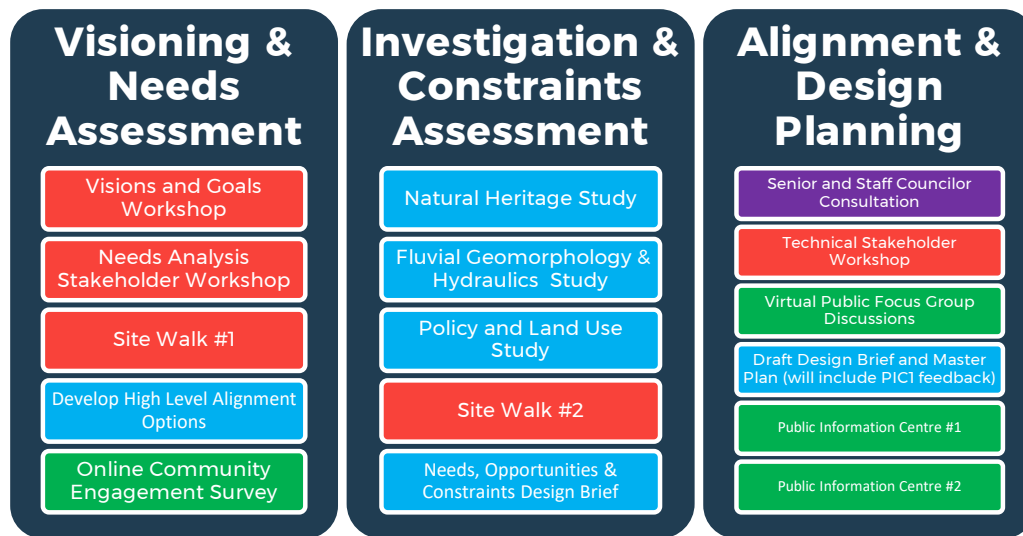


FIGURE 2: OVERVIEW OF THE TWO-PART COMPONENTS OF THE FEASIBILITY AND DESIGN STUDY.

Community engagement for the BSG will continue to be a vital component to ensure the success of the Project as it transitions from this feasibility study and preliminary design, into detail design and implementation. Based on the strong response rate and support from both internal and external stakeholders, there was a sense that the community has a strong interest in seeing the Project move forward to implementation.

The BSGs vision, principals and goals were supported by the majority of stakeholders and the public. Participants felt strongly about maintaining the trail within the greenspace corridor wherever possible to avoid interfaces with vehicular roadways. Approaches that included the use of underpasses and gentle slopes where strongly desired. Overall, the protection of the natural environment remained a high priority, while understanding that providing for an adequate buffer between rear lots abutting the project area and the trail will benefit both residents and trail users.

Some participants who have properties backing onto the greenspace, noted their concerns regarding the proximity of the trail to their rear yards, in select locations. It was clear that some residents feel strongly about preserving nature and wildlife, but do not want the trail too close to their homes, and do not want aspects of the trail to negatively impact their quality of life.

Prior to proceeding with detail design of the trail section from Bevan Road to the existing trail at Merrick Dr., additional engagement with the residents with yards backing onto this section of the trail is recommended. At this time, a review of possible alternatives and impact mitigation measures should be reviewed. The City of Vaughan will need to weigh the concerns of the homeowners in this area in the context of the community's desire for this corridor to be used for trail infrastructure.

Where opposition exists, concerns will need to be further addressed for residents who may be directly impacted through the introduction of trail infrastructure and users.

Refer to **Appendix A** for further details regarding the **Engagement Plan and Outcome Summaries**.

In addition to the general public engagement sessions, a letter was sent to Ministry of the Environment, Conservation and Parks (MECP) and Indigenous groups, inviting the Mississaugas of the Credit First Nation to partake in engagement activities regarding this project as their input is valuable in developing a quality outcome.

2 TECHNICAL STUDY SUMMARY AND STAKEHOLDER ENGAGEMENT

2.1 POLICY AND LAND USE REVIEW SUMMARY

A summary document was prepared on October 6th, 2021 that addressed and provided a comprehensive policy and land use background review that supports the Bartley Smith Greenway Feasibility Study. Legislation at the federal, provincial, regional and municipal levels were reviewed in relation to natural heritage and community planning. The key relevant legislation documents that supported the BSG Feasibility Study are outlined below. Please refer to the 'Bartley Smith Greenway Trail – Policy & Land Use Background Report (WSP, Oct 2021)' for additional information on the full comprehensive policy and land use background review.

The Policy and Land use review helped guide the BSG Feasibility Study and 30% detail design including: trail alignment positioning, opportunities and constraints analysis, understanding surrounding neighbourhood context, and master planning and mapping.

2.1.1 Federal Framework

The **Fisheries Act** (1985) provides a framework for proper management and control of fisheries and the conservation of fish and fish habitat. This applies to all fish and fish habitat in Canada and includes water frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes.

The **Migratory Bird Convention Act** (1994) contains provisions for protecting the nests and nesting activities of migratory birds.

The **Species At Risk Act** (2002) is a legislation that facilitates the designation of species at risk at the federal level. There are provisions for recovering species designated extirpated, endangered or threatened and for managing species designated special concern to prevent an escalation in risk.

2.1.2 Provincial Framework

The **Fisheries and Wildlife Conservation Act** (1997) contains provisions for protecting “specially protected wildlife”, including most birds not protected under the national Migratory Bird Convention Act (1994).

The **Endangered Species Act** (2007) contains provisions for protecting species in the Province of Ontario (the “Province”). Similar to the national Species at Risk Act (2002), there are provisions in place to protect species designated as extirpated, endangered, threatened and special concern.

The **Environmental Assessment Act** (1990) provides for the protection, conservation and wise management of the environment for the betterment of people in the Province. Through this Act, there is an environmental assessment (EA) process that ensures governments and public bodies consider potential environmental effects of infrastructure projects before such projects are initiated. It is important to note that the City of Vaughan has an ongoing Municipal Class EA for McNaughton Road West (Major Mackenzie to Falvo) Dr. Order of magnitude cost estimates for the BSG study are below the \$4.1m threshold for a Municipal Class EA for linear pathways.

The **Invasive Species Act** (2015) prohibits the propagation and sale of prohibited invasive species, and the transport of such species into Ontario unless authorized.

The **Conservation Authorities Act** (2015) provides for the establishment of conservation authorities in the province to conduct programs and services that further the conservation, restoration, development, and management of natural resources in Ontario watersheds. The Toronto and Region Conservation Authority (TRCA) regulates the project area under O. Reg 166/06 and a permit will be required.

The **Planning Act** is the provincial legislation which sets out the foundation of rules for land use planning in Ontario. Under Section 2 of the Act, it speaks to the protection of ecological systems, including natural areas, features and functions; the conservation of features of significant architectural, cultural, historical, archaeological or scientific interest; the adequate provision and distribution of educational, health, social, cultural and recreational facilities; and, the promotion of development that is designed to be sustainable, to support public transit and to be oriented to pedestrians.

The **Provincial Policy Statement** (PPS) (2020) provides policy direction for land use planning and development in Ontario. There are policies in place that support for appropriate and context-sensitive urban and rural development, environmental and resource protection, and social equity in planning matters. The PPS includes policies for protecting natural heritages and their ecological functions. Section 2.1.2 of the PPS requires that the diversity and connectivity of natural heritage features and the long-term ecological function of natural heritage systems be maintained, restored or improved where possible. The PPS seeks to build strong, healthy communities by recognizing the importance of parks and recreation, green spaces, trails and trail linkages. Section 1.5 of the PPS promotes healthy communities by establishing policies for public spaces, recreation, parks, trails and open spaces. Trails should facilitate active transportation and community connectivity.

The **Places to Grow: Growth Plan for the Greater Golden Horseshoe** (2019) contains policies that can be applied to support complete communities that expand convenient access to an appropriate supply of safe, publicly accessible open spaces. The Growth Plan also contains revisions associated with completion of the provincially led Natural Heritage System provided in the previous Growth Plan in 2017. Section 4.2.5 of the Growth Plan addresses policies regarding public open space, encouraging municipalities to develop a system of publicly accessible

parkland, open space and trails. It is important to note the Growth Plan speaks to planned urban growth centres and in Section 2.2.3 of the Growth Plan, the Vaughan Metropolitan Centre (VMC) is identified as an urban growth centre that is planned to be achieved by 2031 or earlier, a minimum density target of 200 residents and jobs combined per hectare. The VMC is located approximately six kilometres southwest of the proposed Bartley Smith Greenway trail alignment.

The **Greenbelt Plan** (2017) identifies where urbanization should be avoided to protect the agricultural land base and area's ecological and hydrological features. It builds on the policies of the PPS.

The **Oak Ridges Moraine Conservation Plan** (2017) provides land use and resource management planning direction concerning the protection of the Oak Ridges Moraine's ecological and hydrological features and functions.

The **GO Expansion** is part of the City of Vaughan's public transit infrastructure. Public transit is a sustainable transportation mode, and includes buses, streetcars, subways and trains. The City of Vaughan is served by three transit systems, York Region Transit (YRT), Toronto Transit Commission (TTC), and GO Transit. The GO Transit system is the regional public transit service for the Greater Toronto and Hamilton Area. GO Transit offers train services between Union Station, Rutherford Road Station and Maple Station in Vaughan. Go Transit also has bus services serving Kleinburg, Woodbridge, Highway 400 at Major Mackenzie, and Canada's Wonderland. The Region of York and City of Vaughan have plans for active transportation facilities on Langstaff Road, and the connection to Highway 7 can be improved to tie into new Viva bikeways near the proposed Concord GO Station. With the expanding GO Transit system, the BSG presents an opportunity to complete the remaining gaps in this area of the trail, connecting schools, neighbourhoods, parks, City Hall, GO Stations and other amenities and destinations. Connections to new active transportation facilities on Rutherford Road and GO Station improvements will make the trail more attractive for commuting purposes. As set out in the Growth Plan (2019), major transit station areas will be planned and designed to be transit supportive and to achieve multimodal access to stations and connections to nearby major trip generators by providing connections to local and regional transit services to support transit service integration and infrastructure to support active transportation.

2.1.3 Regional Policy Framework

The **York Region Official Plan** (2022) identifies the Regional Greenlands System and key natural heritage features and hydrological features to be protected and managed. The Official Plan also identifies environmentally significant areas, species at risk and their habitats in accordance with the PPS (2020). The Greenlands System identified in the Official Plan takes a natural heritage system approach to preserving natural heritage features. Parts of the Greenlands System are identified as Natural Heritage System of the Protected Countryside of the Greenbelt. This approach is aligned with the PPS (2020). Policy 5.6.14 of the Official Plan identifies how a Greenlands System Plan will be managed in an urban environment, including

how the system can provide recreational access or contributing to off-site enhancements; developing a trail system, which is integrated as appropriate into the mobility systems of the community. York Region is currently undergoing a Municipal Comprehensive Review. An objective of the Official Plan is to ensure that key natural heritage features and key hydrologic features and functions are protected and enhanced where possible.

The **Transportation Master Plan** (2016) is a regional master plan that provides a long-term vision for the mobility network in York Region. The Transportation Master Plan examines current and future conditions and plans for transportation network and infrastructure, outlining the policy and strategies needed to achieve this vision. It guides development and management of transit systems, cycling networks, road networks, and strategic goods movement. The Transportation Master Plan is designed to support an interconnected transportation system within the region and connected to the Greater Toronto Hamilton Area (GTHA). The Transportation Master Plan also outlines a regional trails strategy, noting that the trail system in York Region plays a dual role as a key transportation infrastructure element and as a place for recreation. Trails provide the opportunity to provide direct connections for both cyclists and pedestrians by cutting through the street network and natural barriers to link major destinations and municipalities.

The **York Region Accessibility Design Guidelines for York Regional Forest Trails** (2013) is a set of design guidelines to fulfill Accessibility for Ontarians with Disabilities Act (AODA) requirements and establish best practices for the design, construction, and maintenance of trails in York Region. The aim of the guidelines is: “to provide integrated recreational experiences for all visitors, with and without disabilities”. The contents of the Accessibility Design Guidelines for York Regional Forest Trails apply to all trails, including the Bartley Smith Greenway. However, it is mentioned in the document that characteristics of the natural environment such as terrain, soils and hydrology could prevent compliance with some technical provisions provided in the guidelines. The Accessibility Design Guidelines for York Regional Forest Trails indicate that the specifications of trail design presented in Sections 5.1 – 5.11 of the document shall be met by any trails and connecting surfaces that are designated for pedestrian use.

The **TRCA Trail Strategy** (2019) is a guiding document for encouraging and protecting potential trail alignments, and guides the planning, development and management of the trails across the Greater Toronto Region. There is a strong emphasis on connecting communities to nature. The Strategy describes how the TRCA plans to partner with municipalities and other community partners to achieve a larger, more connected trail network within the Greater Toronto Region. The TRCA Trail Strategy should be read in conjunction with the Living City Policies. It provides a vision for the Greater Toronto Region trail network and rationale for its choices, as well as objectives and actions for achieving this vision. Key highlights include:

- Expanding greenspace and providing trails more equitably across our jurisdiction will provide nature-based amenities and recreation opportunities to communities, while improving our collective health and well-being.

- The creation of new trails, trailheads, and neighbourhood linkages to the regional system will facilitate access to incredible destinations, allowing people to experience nature through the seasons.
- Natural and built green infrastructure (such as trails and associated structures) reduce flooding and erosion, filters water and air pollutants, provides additional ecosystem services (such as moderating the urban heat island effect), and provides opportunities for recreation and community aesthetics.

2.1.4 Municipal Policy Framework

The **City of Vaughan Official Plan** (2010), as outlined in Section 7.3, states that parks support active and passive recreation, along with open spaces that support passive recreational uses and ecological functions, such as trails, sensitive wetlands, valley lands and forests, cemeteries, the Don and Humber River systems, and the casually tended landscapes around stormwater management ponds and greenways. Creating and enhancing the full spectrum of open spaces and parkland is essential in developing a system that connects both significant and minor destinations, encouraging citizens to enjoy a range of recreational activities.

As defined in the Official Plan, woodlands are comprised of natural areas of vegetation in the landscape and their associated wildlife populations, with the variety of available woodland resources influencing the range of native biodiversity in Vaughan. The City is to support the maintenance of important environmental functions, attributes and linkages of woodland resources, recognizing that this will lead to more stable, resilient systems of vegetation and wildlife.

The Official Plan also sets out policies to encourage the accommodation of all modes of travel in the City, accommodating the different modes in an integrated and linked fashion. Improvements in the networks that support active transportation helps to increase mobility alternatives, which contributes to the establishment of healthy communities.

- Section 4.2.3 of the Official Plan includes policies that promote City-wide active transportation through the provision of appropriate infrastructure, such as sidewalks, trails and bicycle lanes. There are policies in place that support the City's network of natural heritage areas as a defining characteristic by protecting and enhancing the core features, enhancement areas, built-up valley lands, and the other lands that comprise the Natural Heritage Network, and, specifically; securing wherever possible, through the development process, such lands for public purposes; and, actively seeking, through the development process, to connect natural areas with existing parks, open spaces, pedestrian trails, greenways and bicycle routes.
- Section 3.6.6.6 reinforces the concept of using storm water management (SWM) facilities as part of the trail experience. This policy requires new SWM facilities to be designed as local amenities while also providing a utilitarian function, in part by:

- a. locating stormwater facilities adjacent to open spaces, parks and/or natural heritage areas contributing to a connected system and to encourage public access to these facilities, where appropriate;
- b. integrating stormwater facilities into surrounding developments as publicly accessible open space; and
- c. designing stormwater facilities as naturalized or formal landscapes that are complementary to adjacent features, including adjacent landscapes or natural heritage features.

Zoning By-law 001-2021 is the Comprehensive Zoning By-law for the City of Vaughan. As a result of the size of the study area of the BSG, there are multiple zones noted. These zones include Open Space (OS1), Environmental Protection (EP) Agricultural (A), Commercial (C4), and Residential (R2, R3, R4).

The **City of Vaughan Urban Design Guidelines** (2018) is a city-wide document that provides direction for building and site design. Urban Design Guidelines establish a consistent level of design in the City. An approach to extending green networks has been developed to direct the character of the City's streets, public spaces and communities. As the City is made up of almost forty percent natural areas, the Urban Design Guidelines has set out policies that support a green city approach which focuses on linking the natural areas together. This supports a priority identified by the City in Section 3.1, the importance of a well-connected network that is safe, comfortable and accessible. This priority provides direction for the establishment of a network of connections, designed to provide safety and visibility, prioritize active modes of movement and provide access to sunlight and generous landscape, particularly for pedestrians and cyclists. An additional priority set out in Section 3.1 is enhancing Vaughan's natural heritage network through the extension of tree canopies that provide ecological services, enhancing trail systems, and creating wildlife eco-passages.

The **City of Vaughan Inclusive Design Standards** (IDS) (2020) were developed with recognition of diversity, barrier removal, provincial directions, and changing demographics. Section 6.16.1 Recreational Trails discusses design standards for trailheads, trail entrance/exit points, trail clear width and headroom, trail surfaces, trail running and cross slopes, ramps, edge protection, trailhead signage, other media, audible signage and sensory experiences, understanding the Universal Trail Assessment Process (UTAP), and beach access routes and boardwalks. A recreational design checklist is included which is intended to assist staff when reviewing key design options for providing accessible recreational trails for users of all ages and abilities.

Both the **Active Together Master Plan** (2018) and the **Pedestrian and Bike Master Plan** (2020) support the establishment of a city-wide, comprehensive transportation network.

The 2018 **Active Together Master Plan** review and update was approved by Council on May 23, 2018. The plan provides an overview of the needs and priorities for parks and recreation facilities and spaces in Vaughan. Section 6.1 of the plan outlines policies for

recreational trails, noting that trails are a valued part of Vaughan’s open space system, and a sustainable active transportation network is a key principle of the Vaughan Official Plan, which refers to the use of “Greenways” as a part of the proposed green infrastructure. Trails provide opportunities for physical activity, social interaction, and environmental sustainability.

The 2020 **Pedestrian and Bicycle Master Plan** (PBMP) builds upon the original 2007 document, which was a progressive step towards making Vaughan a more walkable and bikeable community. The updated plan builds upon this with the aim of establishing a comprehensive transportation network that includes a range of mobility options, such as walking, cycling, and transit. The PBMP outlines a strategic plan to enhance the infrastructure and connected network for walking, rolling, and biking in Vaughan. The plan also includes guidance on the pedestrian and cycling networks, as well as recommendations for supporting the planning and design of future cycling facilities. Additionally, the PBMP provides details for the City’s Multi-Use Recreational Trail (MURT) Network and Policies, including the Vaughan Super Trail, which aims to create a continuous trail network by connecting missing links in existing trail facilities and optimizing the use of utility and transportation corridors.

A few key highlights from these documents include:

- Trails create a continuous and connected network of pedestrian and cycling routes that can be accessed by residents and visitors of all ages, abilities and socio-economic backgrounds.
- Market and trend research consistently indicate that interest and participation in unstructured, self-scheduled activities is rising and that, as a result, trails are in high demand and should be a top priority.
- Trails provide opportunities to promote healthier lifestyles, improve physical activity, help in stress reduction, social interaction are critical infrastructure for improving public health.
- Vaughan’s residents are seeking improvements to the network of trails and pathways – in the 2018 Active Together Master Plan survey, 92% of respondents felt that trails and pathways are important, but only 71% were satisfied with current opportunities, indicating a gap in expectations.
- Trails provide good value for tax dollars and are used by people of all ages. Studies found that when walking loops are present in parks, twice as many seniors are active.

Although the **Vaughan Super Trail** is not a government document, it does influence the feasibility of this project and the need to close the gap. The Vaughan Super Trail is a 100km multi-use recreational trail network that is being developed within the city limit. The trail network

was first endorsed by Council through the Cycling and Pedestrian Advisory Task Force recommendations on April 19, 2017.

The aim of the trail network is to connect existing trail facilities and create a continuous network for walking, rolling, and biking in Vaughan. The development of the planned multi-use recreational trail network had broad input from the public, and during the engagement process, there was strong support for the Vaughan Super Trail concept. The trail is integrated into the existing land use patterns, utility and transportation corridors, and the cycling network. This trail provides connections to well-established trail networks in surrounding municipalities, maximizes continuous pedestrian and cycling routes, and provides safe pedestrian and cycling routes and crossing locations.

2.2 STAFF AND AGENCY WORKSHOP RESULTS SUMMARY

As part of Part 1 – Research and Preferred Trail Route Analysis of the Project, two virtual workshops were held by WSP to present the project to technical stakeholders, as well as the opportunity for the project team to gather input, opinions, and recommendations. The Project Team was able to utilize input to revise proposed trail alignments and road crossings found in Chapter 4 Opportunities and Constraints Analysis.

The core project team was made up of experts from active transportation, trail design, public engagement, land use and policy planning, and structural engineering. Advisors and experts provided support as needed in addition to an advisory committee which included the following disciplines:

- Terrestrial ecology & natural heritage,
- Aquatics ecology,
- Archeology,
- Fluvial geomorphology, and
- Water resources.

The technical stakeholders included:

- the Toronto Regional Conservation Authority (TRCA),
- the City of Vaughan (the “City”), including individuals representing Planning, Transportation, Park Operations and Maintenance and Ecology.

As part of the workshops process, WSP used an online whiteboarding tool to obtain feedback from participants.

As noted in the Engagement Approach, due to the extent of regulatory and operational constraints, workshops were restricted to technical stakeholders and not opened to the public. A virtual general public session and public information centers (PICs) were held later in the process once the staff and technical stakeholders reviewed and advised on preliminary trail options.

2.2.1 Visioning and Goals Workshop

The first workshop (vision and goals workshop) was held on August 11th, 2021 and focused on the vision and goals of the Project. The purpose of the vision and goals workshop was to present high-level trail alignment on road crossing and bridge location options, identify key priorities for the study, and provide an opportunity to discuss opportunities and constraints for enhancement. A total of seven questions were proposed during the workshop:

- 1) Key concerns – Participants were asked to a) identify key concerns about the Project process, implementation and/or maintenance; and b). to highlight any other influencing factors outside the study area or through other past projects in the neighbourhood.
- 2) Key wish list items – Participants were asked to note what they want to see included in the study and trail design.
- 3) Trail Mapping – Participants were asked to highlight any key considerations for the trail.
- 4) Crossings – Participants were asked to indicate the preferred option for the proposed location of the Rutherford crossing, McNaughton crossing and the bridge crossing.
- 5) East/West connections to the trail – Participants were asked to note any on-road connections that should be strengthened and/or identify locations where they would like to see trailheads and/or parking accommodations.
- 6) Scope of encroachment and invasive species management – Participants were asked to a) list what would be appropriate to include in the Project and what would best to address separately; b) list any potential educational opportunities and long-term maintenance requirements; and, c) note their roles and responsibilities in relation to encroachment and invasive species management.
- 7) Permits, approval requirements and agreements – Participants were asked to list key items that the Project Team should consider regarding permits, approval requirements and agreements.

Appropriate changes were made to the proposed trail alignments based on feedback gathered from technical stakeholders during the vision and goals workshop. Figure 3 Mapping from Goals and Visions Workshop provides further details outlining the changes made; however, some high-level changes included:






- Alignment D, F and H were eliminated due to its proximity to the Provincially Significant Wetland (PSW);

- Alignment F was also eliminated in part due to the significant tree lined area and steep slopes;
- Alignment H was also eliminated in part due to the encroachment onto residential lots;
- McNaughton Road Crossing Option 4 was eliminated as the crossing would be too far from the trail; and
- Rutherford Road Crossing Option 2 was eliminated due to increased costs.

As a result of the workshop, an additional alignment option was added to connect the trail between Rutherford Rd. and Keele St., which travels through the wooded slopes on the west side of the creek, outside of the Tesma Way road right-of-way.

The Project Team provided a high-level overview of the key themes that emerged during the stakeholder visioning workshop relating to project needs, opportunities, and concerns (shown below). Using sticky notes, participants were asked to provide comments on key themes. Refer to **Appendix A** for the meeting summary of the stakeholder visioning workshop.

Key themes that emerged from the Vision and Goals Workshop are presented in Table 1 below.

	<u>GOAL</u>	<u>DESCRIPTION</u>
	Limit the impact to the existing natural heritage system.	Avoid higher quality treed areas and vegetated slopes; limit the proximity to the river and the number of watercourse crossings; and consider invasive species management techniques, construction impacts and trail materials.
	Protect the creek and flood plain limits while providing a buffer to adjacent residential yards.	Respect the need to protect the creek and flood plain limits, while providing a buffer to adjacent residential rear yards when determining the trail alignment.
	Provide connections that will link community destinations.	Provide connections that will link schools, shopping centres, childcare centres, parks etc..
	Limit the potential impacts of winter maintenance	Limit salt use in the creek corridor, while still providing a level of year-round function to the trail system.
	Take a holistic and detailed approach to determining the location and type of crossing infrastructure.	When determining the type of crossings for roads (Rutherford Rd., McNaughton Rd.) and when considering additional creek crossing connections, decisions should weigh the pros and


		<p>cons for users, maintenance and the environment – striving to identify the best solutions for both the short and long terms.</p>
	<p>Support placemaking along the trail with amenities and interpretive signage.</p>	<p>Consider opportunities for placemaking, including development of nodal gathering areas and interpretive/educational signage to connect users with the natural and cultural heritage of the trails local context.</p>

TABLE 1: VISION AND GOALS WORKSHOP - THEMES

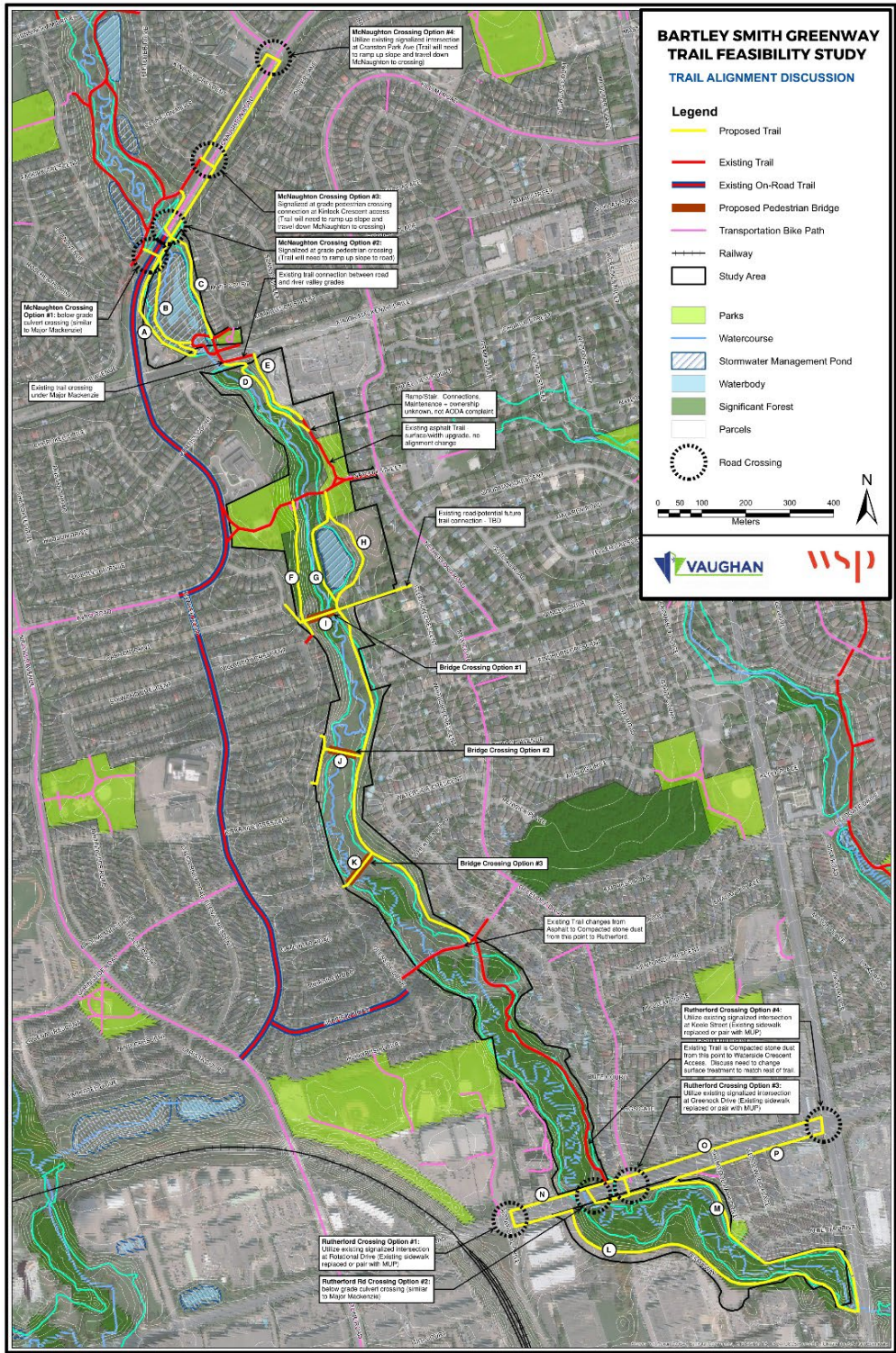


FIGURE 3: SAMPLE MAPPING FROM GOALS AND VISIONS WORKSHOP.

2.2.2 Needs Analysis Workshop

The second workshop (needs analysis workshop) with key stakeholders, including representatives from the City of Vaughan and various technical agencies, was held on September 8th, 2021 and focused on high-level needs, opportunities and strengths, and revised trail mapping based on feedback received from the vision and goals workshop. Survey questions were also discussed and developed during the needs analysis workshop that would be posted on the project website to engage the public and seek their feedback.

At the needs analysis workshop, the Project Team presented a high-level overview of key themes that emerged from the vision and goals workshop relating to project needs, opportunities and concerns. Workshop participants were asked to comment on the key themes. The Project Team also provided a brief overview of the revised trail mapping, which reflected comments received from the vision and goals workshop and invited participants to provide comments. Figure 4 captures the feedback from this specific exercise.

Key feedback and direction that emerged from the needs analysis workshop included:

- Overall agreement with Alignment E as it helps to avoid the Provincially Significant Wetland (PSW);
- Overall agreement with Alignment G as it keeps the trail on the east side of the creek, but avoids the future development area east of the stormwater pond;
- Add another potential pedestrian bridge crossing between Bridge Crossing Option 3 and Rutherford Rd. given the frequency of crossings towards Major Mackenzie Dr.;
- Remove Alignment Q (in addition to the previously removed culvert crossing option along Rutherford Rd.) as it is very difficult to implement and would work best if the culvert crossing were implemented;
- Remove Alignments O and P and replace with new alignments that connect the trail to the Sherwood Park Dr. neighbourhood; and
- Remove Rutherford Rd. Crossing Option 4 as it is located too far from the trail.
- Review opportunities to use existing sanitary easement between Major Mackenzie Dr. and Rutherford Rd. as a potential alignment alternative option.

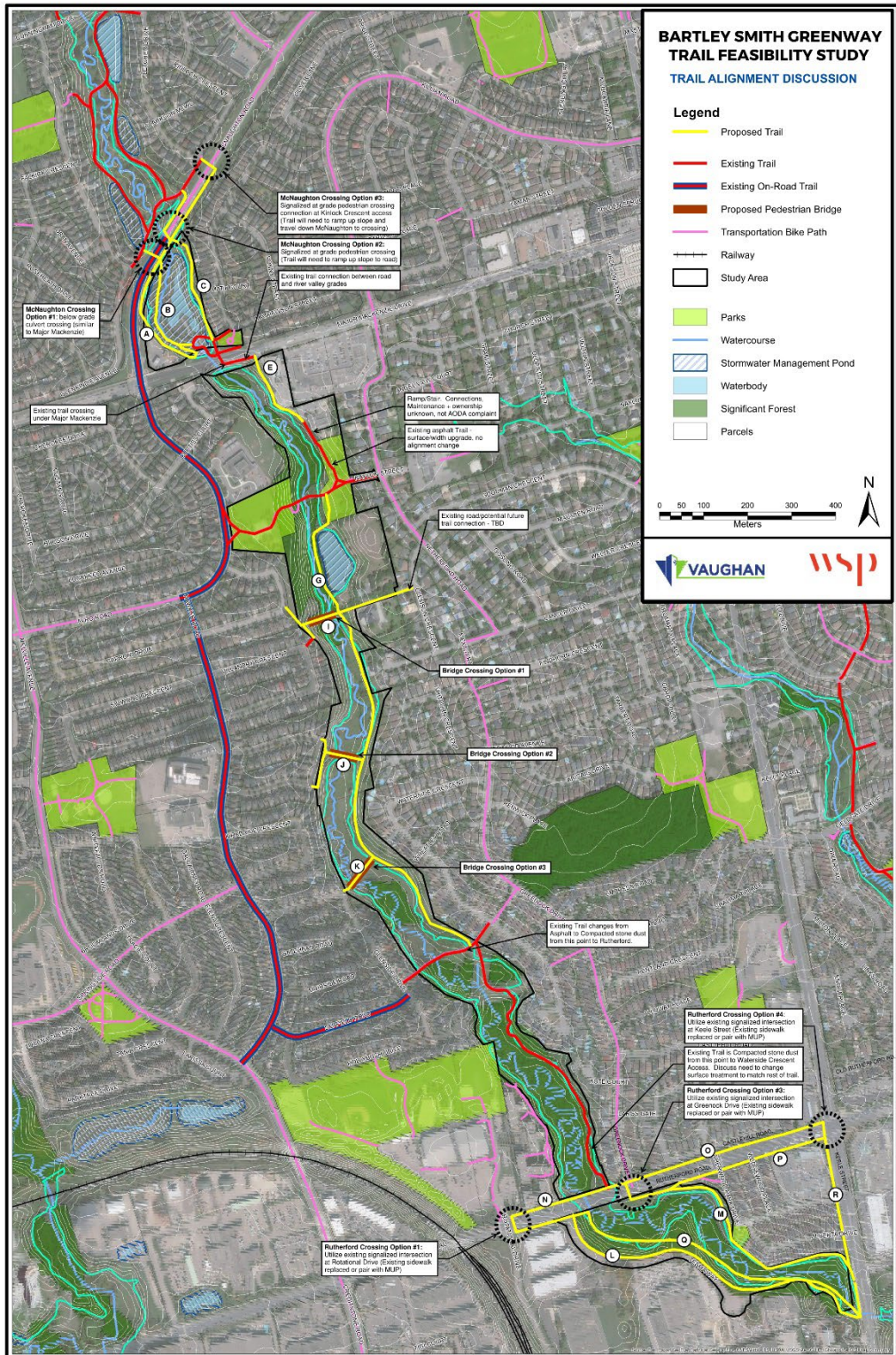


FIGURE 4: SAMPLE MAPPING FROM THE NEEDS ANALYSIS WORKSHOP

2.3 PUBLIC SURVEY RESULTS SUMMARY

An online public survey results summary memo was prepared by WSP Canada Inc. (WSP) on November 3rd, 2021 to inform the results from the BSG Trail Feasibility Study online public survey. The survey was used to engage the public and gather information and identify and evaluate options to close the three-kilometer gap in the existing BSG trail, and to select a preferred route that would be advanced to detail design and construction. The survey was made available online on the City's project website from October 4, 2021, to October 19, 2021. In total, 216 participants completed the survey. A summary of feedback has been categorized into key themes below.

SUMMARY OF KEY THEMES:

- **Safety:** safety should be a priority when determining the preferred trail alignment.
- **Environmental impacts:** there is a desire for low environmental impact and limited tree removal – residents enjoy walking outdoors through natural environments.
- **Connections:** Many participants were against road crossings in general and connecting trails to roadways/sidewalks. Most residents do not feel the need to create excess construction or trails – connecting existing trails and new entrances creates trail longevity and connectivity that is less impactful to the environment.
- **Infrastructure:** an underpass was a popular choice amongst residents, but the main issue was adequate lighting and safety within an underpass, as well as graffiti and debris concerns.
- **Cost:** many participants expressed concerns that costs would inhibit decision-making and prolong the approval process.
- **Amenities:** there is a desire for trail elements and features to look nice/enticing (e.g., bridge).

Please refer to the BSG Trail Gap Feasibility Study: Online Public Survey Results Summary Memo (**WSP, Nov 2021 – Appendix A**) for additional information on the complete online public survey results.

2.4 ARCHAEOLOGICAL ASSESSMENT SUMMARY

A Stage 1 Archaeological Assessment was conducted in June 2022 for the BSG, which included a review of the previous archaeological research, historical maps, aerial imagery, land registry documents, and local histories. This initial assessment was carried out in accordance with the Minister of Heritage, Sport, Tourism and Culture Industries (MHSTCI's) *Standards and Guidelines for Consultant Archaeologists* (2011) to meet the requirements for compliance with the *Ontario Heritage Act, 1990*. Based on the results of the Stage 1 assessment, a Stage 2 archaeological assessment is recommended for parts of the study area that held potential for

the presence of archeological resources. Please refer to **Appendix E - Archeological Assessment** for the full report and recommendations.

2.5 HYDRUALICS ASSESSMENT

A hydraulics memorandum was prepared by WSP on October 2021 which outlined the method, TRCA criteria, and next steps. The study area is situated within the Don River watershed, which falls in the TRCA jurisdiction. The TRCA completed the Don River Flood Mapping Phase II Study in 2020, which included a HEC-RAS hydraulic model and regulatory floodplain map for the existing conditions. The current Don River Phase II HEC-RAS model and two floodplain map sheets that cover the study area were provided by TRCA in September 2021.

TRCA provided general criteria for the development and additional criteria for water crossings and the trail, outlined below:

GENERAL CRITERIA

Where the development is within the regulatory floodplain, TRCA requires no loss to the floodplain storage is demonstrated and a hydraulic impact analysis be completed.

ADDITIONAL CRITERIA

If water crossings are proposed:

- Minimize fill placement within the regulatory floodplain.
- If possible, reduce the number of crossings (limit to one).
- Clearly show the top of bank on the drawings and the location of the erosion and sediment control features. This is necessary to show that silt fencing will be placed outside of the channel.
- If it is a new bridge or a replacement bridge with different geometry, a HEC-RAS model for 2 – 100 year and regional storm is required to demonstrate no adverse impacts to the local floodplain.
- Stone sizing should be provided based on the anticipated velocities through the channel. Supporting calculations should be provided and sizing details should be included on the drawings.
- Fluvial geomorphological analysis is required to support the proposed study, e.g., meander belt, 25/50 year channel migration, 25yr and/or 50yr erosion limit, etc.

For the trail:

- Minimize fill placement within the regulatory floodplain.
- Update the HEC-RAS model with the proposed changes to the geometry and show no impacts for the 2-100 year and regional storm events.

- Less intrusive trail design should be favored over impactful design such as pavement. It is recommended to reduce the number of impervious surfaces as much as possible.
- The trail should be set outside of the 25/50 year channel migration to prevent hardening the creek in the future to protect the trail.
- Address the sediment and erosion control measures proposed for the site and ensure the details are shown on the drawings.

The 30% design drawings were based off of the general trail design criteria documented in the hydraulics memorandum prepared in October 2021. A fluvial geomorphology assessment was prepared by WSP in September 2022 and an additional floodplain analysis was prepared by WSP in July 2022. Since then, water crossings have been omitted due to feedback received during the public open house in September 2022. Water crossings have been recommended for future designs but will not be part of this submission scope.

The summary is detailed below, for more information on the assessment, please refer to **Appendix D**.

2.5.1 Floodplain Analysis

A floodplain analysis was prepared by WSP in July 2022 to examine the preferred trail alignments, watercourse crossings and potential hydraulic impacts. The river ID (West Don Reach 18) and cross sections from the TRCA existing HEC-RAS Don River model are also illustrated in the memorandum.

Proposed Trail:

The floodplain analysis was conducted by examining the potential hydraulic impacts of the proposed trail within the floodlines. Figure 5 shows two examples of the cross sections that show the elevations of both the existing ground and the proposed trail.

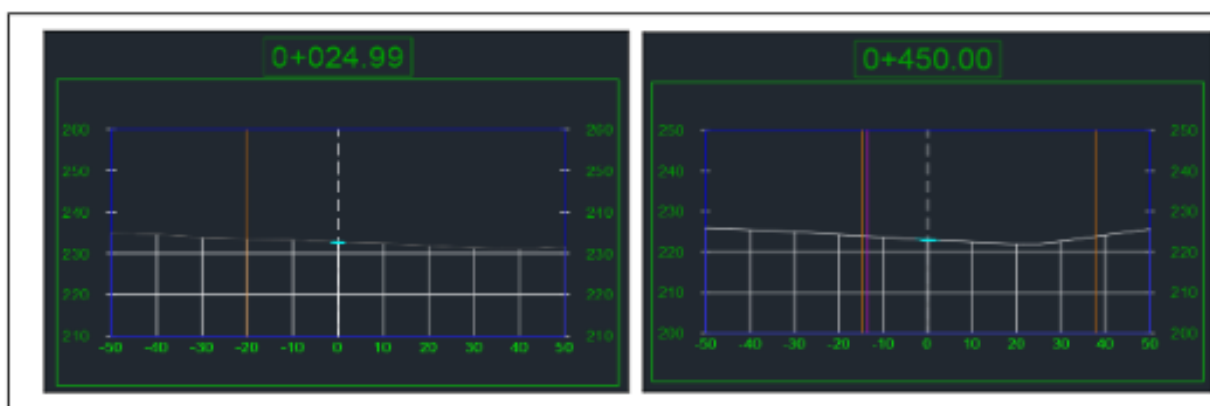


FIGURE 5: SAMPLE CROSS SECTIONS

The cross sections show the elevation of both the existing ground and the proposed trail, which were generated with a spacing of approximately 25 m along the trail alignment. The proposed trail elevations generally remain unchanged at the existing ground elevations. As a result, there would be no impacts to the existing regulatory floodlines. The cross section layout and plots are provided in the hydraulics memorandum (**Appendix D**). Note that portions of the proposed trail are located outside the regulatory floodlines and the cross sections with the proposed trail outside the regulatory floodlines are marked as “O_F”.

Proposed Bridge:

One watercourse crossing is proposed approximately 1 km south of Major Mackenzie Dr. West. Although this crossing was deferred for future consideration and study, an assessment was completed to further explore viability for future use if the crossing was desired.

A map with the proposed 33 m bridge location is presented in **Appendix F: Alternative Assessment & Future Options**. The abutments of the proposed bridge are situated outside of the TRCA Regulatory floodlines. As such, there would be no impacts to the existing regulatory floodlines. Refer to Section 4.3.1 for recommendation of water crossings.

2.5.2 Fluvial Geomorphology Assessment

A fluvial geomorphology assessment was prepared by WSP in September 2022 which presents the desktop assessment of the subject watercourse (Don River West Branch) channel located along the BSG preliminary design.

WSP’s approach for the desktop fluvial geomorphology assessment was as follows:

- Obtaining historical aerials;
- Adding watercourse alignments on historical aerials;
- Reviewing relevant TRCA guidance documents;
- Assessing historical aerials, including a composite figure; and
- Providing recommendations for the site based on findings, including a proposed setback.

Based on the desktop fluvial geomorphology assessment, the following conclusions and recommendations were determined:

- Based on historical aerials, the area was historically rural and is now urban, having been developed gradually between 1954 and 2005.
- Based on historical aerials, the watercourse channel has generally remained within a narrow band for approximately 74 years with some minor fluctuations.
- Based on TRCA (2015) Crossing Guidelines for Valley and Corridors (Appendix 2.A), the 100-year erosion rates for this reach were estimated as 4m.

- Based on TRCA (2014) The Living City Policies for Planning and Development in the Watersheds of the Toronto and Region Conservation Authority (Section 7.4.5.1.(h) and 8.10).
- WSP to consider the appropriate setback limit for the trail from the edge of the existing watercourse be 4m as determined in the hydraulics memorandum (see **Appendix D**).

2.6 NATURAL HERITAGE ASSESSMENT

2.6.1 Natural Heritage Existing Conditions

A natural heritage existing conditions report was prepared by WSP on October 28, 2021, to inform the selection of preferred trail alignments for the BSG. There was an update of the initial draft on July 27, 2022; a summary of findings is provided below.

The report documents the existing natural heritage features throughout the BSG study area. This included a review of available background information, a botanical inventory, confirmation and/or updates to existing data regarding vegetation communities, wildlife observations (i.e., the presence of amphibians, reptiles, insects, and mammals), a screening of Species at Risk (SAR) and field assessment of potential habitat, and identification and/or confirmation of natural heritage features outlined in the City of Vaughan Natural Heritage Network mapping and York Region Greenland features.

The following section includes key natural heritage analysis supporting the BSG Feasibility Study. Please refer to **Appendix C - Natural Heritage Existing Conditions Report (WSP, July 27, 2022)** for additional information on the complete natural heritage existing conditions report including study overview, background review, assessment methodology, existing conditions, impact assessment and mitigation recommendations.

PREFERRED ROUTE IMPACT ASSESSMENT

The preferred route was identified in the natural heritage existing conditions report (WSP, July 27, 2022) and is located between McNaughton Rd. to Major Mackenzie Dr., beginning at the proposed crossing infrastructure on McNaughton Rd., travelling south along the valley land adjacent to the rear yards of the properties on Matthewson St.. The trail alignment is proposed to turn west and cross the existing SWM pond with a proposed future pedestrian bridge structure to connect to the existing servicing route. The preferred route will have direct and indirect impacts on the natural heritage features within the study area. Impact assessment and considerations for detail design provided in the natural heritage existing conditions report are based on the preferred route and preliminary (30%) design as available in July 2022. Should the preferred route be modified at the detail design stage, additional impacts and mitigation may need to be considered and addressed. The impact assessment herein considers sensitive terrestrial and aquatic features and associated constraints such as timing windows and other mitigation measures to avoid impacts.

DESIGNATED NATURAL AREAS

Direct impacts are anticipated within TRCA regulation limits and as such, a permit under Ontario Regulation 166/06 is expected to be required. Impacts and mitigation measures can be found in the analysis below.

PROVINCIALY SIGNIFICANT WETLANDS

No development or site alteration is permitted within Provincially Significant Wetlands (PSWs). Unevaluated wetlands that may be impacted should be assessed for significance, in accordance with provincial criteria and to determine their importance, functions and means of protection to the satisfaction of the City. Development and site alteration on lands adjacent to wetlands (i.e., within 120 m) must demonstrate that there will be no loss of wetland features and function (including hydroperiod), no loss of contiguous wetland area and that development will not cause increased pressure on the wetland in the future. No impacts are anticipated within 30m of the PSW; however, the preferred route will include minor vegetation removals within 120 m of the PSW. These minor removals are not anticipated to result in a loss of wetland feature or function, and a restoration planting plan will be developed during detail design to enhance vegetation in the area. Encroachment into PSW adjacent lands should be avoided to the extent possible.

CITY OF VAUGHAN CORE FEATURES

The entire Don River West Branch valley corridor through the study area is considered a core feature in the City of Vaughan Official Plan (2010). Attributes that make up core features through the study area include valley and stream corridors, wetlands, woodlands and fish habitat. Based on the results of this study, the Don River West Branch valley may also provide significant wildlife habitat (SWH) and habitat of endangered and threatened species. Development and site alteration in core features are prohibited except for low-intensity and passive recreational activities where such activities will not result in a negative impact on the core features and will not have a negative impact on the ecosystem function. The trail works are limited in scope and trail placement avoids sensitive areas to the extent possible. While direct impacts to the Don River West Branch valley are anticipated, no negative impact to the ecosystem function is anticipated.

SIGNIFICANT WILDLIFE HABITAT

Development and site alteration within 120 m of significant wildlife habitat is prohibited unless no negative impacts on features has been demonstrated. One candidate SWH type (bat maternity colonies) and one confirmed SWH type (special concern and rare wildlife species – Eastern Wood-pewee) were identified through field investigations. Wildlife impacts and mitigation recommendations can be found in Section 2.6.4 below.

FISH AND FISH HABITAT IMPACTS

The 30% preliminary design does not include any watercourse crossings. Should the preferred route be updated to include a watercourse crossing at the detail design stage, an impact assessment of the proposed crossing would be required as the Don River West Branch is

classified as permanent direct fish habitat; any in-water works would need to be reviewed under the Federal Fisheries Act (FA) (1985).

During construction, there is potential for temporary impacts to fish and fish habitat. These impacts may include:

- Release of construction-generated sediment into associated watercourses and into Lake Ontario.
- Spills of contaminants, fuels and other materials that may reach natural areas.
- Unpermitted/authorized crossings of the Don River West Branch by construction equipment.
- Localized disturbance of immediately adjacent habitat and local disturbance of riparian vegetation for construction access.

These potential impacts to fish and fish habitat features can generally be managed through standard mitigation measures outlined below.

2.6.2 General Mitigation Recommendations

The mitigation measures outlined below encompass a series of general measures to minimize impacts to fish and fish habitat associated with working near watercourses. The standard mitigation measures have been adapted from the Department of Fisheries and Ocean's Canada *Fisheries Act* "measures to protect fish and fish habitat". These measures will be reviewed and refined at detail design.

As per TRCA standards for erosion and sediment control, all access to the work site shall be from either side of the watercourse. No equipment or vehicles are permitted to cross through the watercourse unless approved by TRCA.

FISH PROTECTION

Fish species are protected under the Federal Fisheries Act (FA, 1985). Proponents are responsible for planning and implementing works, undertakings or activities in a manner that avoids harmful impacts, specifically the death of fish and harmful alteration, disruption or destruction of fish habitat (HADD) of fish habitat. Works must respect timing windows to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed. As the Don River West Branch has a warmwater thermal regime, it is subject to the permissible in-water timing window of July 1 to March 31.

EROSION AND SEDIMENT CONTROL

- An erosion and sediment control plan will be developed and implemented on site to minimize risk of sedimentation from works adjacent to the watercourse during all phases of construction.

- Heed weather advisories and scheduling work to avoid wet, windy, and rainy periods that may result in high flow volumes and/or increase erosion and sedimentation.
- Erosion and sediment control measures should be monitored regularly and any issues addressed immediately. All non-biodegradable materials will be removed at the completion of construction. The need for extended retention of biodegradable materials until full vegetation establishment will be reviewed at the detail design stage to avoid impacts to natural features.

WATERCOURSES

- Under Ontario Regulation 166/06, any proposed development (such as future bridge crossings), interference or alteration within a regulated area requires a permit from TRCA. Encroachment into the floodplain should be avoided. Habitat of endangered and threatened species Redside Dace (RSD) is not expected to be impacted by on site works. This reach of the Don River West Branch is not confirmed as RSD habitat and individuals are unlikely to be present within the study area. Nonetheless, the presence of RSD habitat within the study area requires confirmation from agencies such as MECP and TRCA, if future development is proposed. Northern Brook Lamprey is classified as special concern; however, under the Endangered Species Act (ESA) and Species at Risk Act (SARA), the habitat of special concern species does not receive protection.

CONTAMINATION AND SPILL MANAGEMENT

- All works will be isolated from the watercourse to avoid the introduction of potential contaminants into the watercourse.
- All construction related materials, debris and soil will be stored at least 30 m from the watercourses and contained properly (e.g., within sediment and erosion control barriers) to minimize risk of release to waterbodies.
- An emergency response plan, including response materials and notification procedures, will be developed, reviewed with staff, and kept on site, where it will be implemented immediately in the event of a sediment release or spill of deleterious substance.

OPERATION OF MACHINERY

- All construction machinery will arrive on site in a clean condition and working order, and will be maintained free of fluid leaks, invasive species and noxious weeds.
- No equipment shall ford the watercourses except as specified in the contract package.
- Conduct equipment maintenance and refueling at a designated and properly contained maintenance area in a construction yard or at commercial garages.
- Report any spills of sewage, oil, fuel or other deleterious material whether near or directly into a waterbody.

- Develop a response plan to be implemented immediately in the event of a spill of a deleterious substance.

FISH HABITAT ENHANCEMENT OPPORTUNITIES

The following opportunities for fish and general aquatic habitat creation should be considered during detail design:

- Remove weir and debris jams that are creating barriers to fish migration,
- Stabilization banks that are highly eroded, and
- Plant riparian vegetation that increases instream cover.

2.6.3 Vegetation Impacts & Mitigation Recommendations

DIRECT IMPACTS

In areas where the works are expected to be limited to existing trail rehabilitation, impacts will include the negligible removal of vegetation composed of cultural meadow or turf-grass or low impacts to the edges of vegetation communities already subject to disturbance from pedestrian usage. In areas where a new trail will be created, direct impacts to vegetation have potential to be more significant and are discussed by trail section below in reference to preliminary trail route options. A tree inventory and preservation plan/arborist report are recommended for any planned removals to precisely document tree removals and ensure tree compensation requirements are met where tree preservation is not possible. Anticipated vegetation impacts for specific sections of the proposed trail, in reference to mapping found in **Appendix C Natural Heritage Report**, are as follows:

- **NORTHERN PORTION (MCNAUGHTON RD. TO NAYLON ST. MAPLE AIRPORT PARK)**
 - North of Major Mackenzie Dr., the preferred trail route will be constructed through Cultural Meadow, Cultural Savana and Cultural Woodlot. The Cultural Meadow and Cultural Savana communities are successional and highly resistant to disturbance; tree removals would not occur with enough frequency to alter the community structure and should be considered on an individual basis. Through these areas, the preferred route has a moderate slope with a wetland to the south. Standard erosion and sediment control measures would be required to reduce or eliminate indirect impacts to the nearby wetlands. Any construction disturbance or removals can be remediated with a standard seed mix or tree replacement planting. A number of tree removals will be required in the Cultural Woodland; however, these units are botanically poor with abundant weedy native and non-native species. There would be opportunity for restoration/invasive removals along the new trail to enhance the existing woodland area.

- CENTRAL PORTION (NAYLON ST. - MAPLE AIRPORT PARK TO THE EXISTING CROSSING OFF MERRICK DR.)
 - The preferred route continues south of Naylon St. through low-density residential Cultural Meadow, Cultural Savana and skirts the Meadow Marsh areas associated with the current Open Aquatic (OAO) pond area; the pond has been identified for removal as part of private development in the area. See Figure 12 in Section 3.2.2 for details on the proposed subdivision development. The land adjacent to the OAO pond, where the trail will be located, is flat and is currently maintained as a sewage easement; however, it is close to the creek and within the flood limit. The preferred route continues south primarily within Cultural Meadow until it reaches the Wheatley Rd. area, where it will cross Unit 20 marsh wetland. The area is subject to spring flooding and is less disturbance tolerant. Introduction of species such as Common Reed or European Swallowwort (Dog-strangling Vine) with increased pedestrian traffic becomes likely for this community. Appropriate compensation or remediation for these effects is unlikely to be achievable. The trail route should remain within the adjacent Cultural Meadow or at minimum, be constructed with a raised boardwalk and/or on the east edge of the marsh to reduce impacts. The preferred route continues south and passes through the corner of Cultural Thicket and through Cultural Woodland as it connects to the existing trail at Merrick Dr.. Several tree removals will be required in the Cultural Woodland. This unit is botanically poor with abundant weedy native and non-native species. There would be opportunity for restoration/invasive removals along the new trail to enhance the existing woodland area.

- SOUTHERN PORTION (EXISTING CROSSING OFF MERRICK DR. TO ROTATIONAL DR. IN THE SOUTH)
 - The preferred route through this section is existing trail which will be upgraded to 3m asphalt. The existing trail passes through Dry-Fresh White Pine - Sugar Maple Mixed Forest and adjacent Fresh-Moist Manitoba Maple Lowland Deciduous Forest. The White Pine and Sugar Maple Forest has mature remnant trees present in the 1954 aerial imagery. Tree removals in this area would have a high degree of impact on a relatively small vegetation community in one of the few sections of remnant forest, which is locally uncommon. No tree removals are anticipated in this area.

- REGIONALLY RARE SPECIES IMPACTS
 - No flora SAR were recorded within these areas. However, the following is a list of naturally occurring and regionally rare woody species in York Region (Vargaet al. 2000) that should be avoided for removals if possible: Silky Dogwood, Grey Dogwood, Black Walnut, Eastern Red Cedar, and White Oak. Likewise, locally rare in the TRCA jurisdiction is White Oak, White Spruce and Red Pine. Observed Spruce and Pine in non-Cultural Plantation areas may or may not have been planted. Overall,

removals are unlikely to alter the conservation status of these species in York Region. Transplantation or other specific efforts to salvage these species if they are not able to be conserved through standard mitigation measures, is not considered warranted. An arborist report will be required during future detail design stages.

INDIRECT IMPACTS

As with any construction activities, there is potential for indirect impacts to adjacent retained vegetation features during and following construction, including, but not limited to:

- Release of construction-generated sediment to adjacent habitats,
- Vegetation clearing/damage beyond the working area/trail alignment,
- Damage from excessive or improper application of herbicides and pesticides for maintenance requirements,
- Increased potential for introduction of non-native species,
- Spills of contaminants, fuels and other materials that may reach natural or semi-natural areas, and
- Changes in drainage patterns (groundwater and/or surface runoff flow) that can impact dependent vegetation/wetland areas located either upgradient or downgradient of the trail. Blocking of existing surface/subsurface drainage patterns can result in upstream and downstream vegetation dieback/condition changes. An increase in downstream runoff can result in erosion impacts on receiving vegetation.

VEGETATION MITIGATION RECOMMENDATIONS

Some general best practices outlined in the fish and fish habitat mitigation section are also relevant to vegetation and habitat protection. Additional recommended mitigation measures to minimize effects to the local vegetation communities and their associated habitat functions are provided below. These measures will be reviewed and refined at detail design.

- Vegetation clearing and retention zones will be delineated clearly on contract documents.
- Limit vegetation removals to the extent required for construction and as delineated on contract drawings.
- Trees shall not be removed from beyond the grading limits.
- Compensation plantings for tree removals should be considered.
- Seed mixes used for meadow habitat restoration or enhancement adjacent to the new trail should include milkweed seeds and other nectar plant seeds for improved Monarch habitat.
- Cut tree stems should be retained on the ground and in staked piles, where possible, for improved wildlife habitat opportunities.
- Employ appropriate vegetation clearing techniques (e.g., trees to be felled away from retained natural areas and watercourses, trimming of damaged branches and roots).
- Install and maintain temporary erosion and sediment control measures as noted above.

- Re-stabilize and re-vegetate exposed surfaces as soon as possible following disturbance, specifically within 15 days near watercourses and within 45 days in other graded areas. It is recommended that all disturbed habitats be re-vegetated with a native seed mix.
- Planting plans for rehabilitation areas (to be developed at detail design) will utilize plant species that are native to this region. To avoid monocultures, no more than 4 of the same Genus are to be planted within the same area and no more than 10% of the same Genus are to be planted within the entire project.
- Implement dust control using water, not chemical suppressants.
- Adhere to the Clean Equipment Protocol for Industry, as prepared by the Peterborough Stewardship Council and Ontario Invasive Plant Council (May 2016).
- Implement environmental inspection during construction to ensure that all mitigation measures are implemented properly, maintained, repaired and remedial measures are initiated in a timely manner where warranted.

2.6.4 Wildlife Habitat Impacts & Recommendations

Wildlife habitat impacts are generally like those described for vegetation. Consistent with the urban landscape context and extent, the vegetation supports local habitat and associated wildlife use; however, in general, the habitat edges that are likely to be impacted are already disturbed by surrounding land uses. There will be a minor loss of wildlife habitat associated with tree and vegetation removals along the preferred trail alignment, as well as potential temporary disturbances due to construction. These areas provide habitat that generally supports common, disturbance-tolerant wildlife species. There is potential for various wildlife (e.g., turtles, snakes, small mammals, deer, wild turkeys, foxes, coyotes etc.) to wander through the proposed work areas during construction. Although no nests were found during the field surveys, migratory birds are likely to nest in trees or other vegetation in the impact zones during construction. Therefore, potential impacts to birds include disturbance to nesting birds or possibly loss of nests or young depending on timing. Most birds and their nests are protected under the federal Migratory Birds Convention Act (MBCA, 1994). Removal of mature trees has the potential to impact roosting bats as well.

Although no evidence of turtle nesting was observed during field investigations, there is potential for turtles to nest along gravel road shoulders in the vicinity of the Don River West Branch.

The anticipated impacts to wildlife and wildlife habitat because of the proposed work can be managed through implementation of standard mitigation measures outlined in the considerations for detail design. An updated impact assessment should be completed as part of detail design if there are changes to the preferred trail route.

MITIGATION RECOMMENDATIONS

Wildlife-specific mitigation measures are outlined below, as well as specific measures to address potential for incidental SAR encounters.

- **MIGRATORY BIRDS**
 - Nesting migratory birds and their nests, eggs and young are protected under the Migratory Bird Convention Act (MBCA 1994) and Regulations (2014) under that Act. No work is permitted to proceed that would result in the destruction of active nests (i.e. nests with eggs or young birds), or the wounding or killing of bird species protected under the MBCA.
 - To ensure compliance with the MBCA, a due diligence approach is recommended, as follows:
 - **Awareness** of the potential for nesting activity within the project limits during the regional nesting period.
 - **Avoidance** of activities that may disturb or harm nesting migratory birds.
 - Vegetation clearing, including grubbing and tree/shrub/grass removal and any construction activities, in areas where migratory birds might nest (e.g. in culverts) should be scheduled to avoid the regional nesting period (approximately April 1 to August 31). The Contractor will be made aware that occasionally bird species will precede or exceed the approximate breeding bird window.
 - **Prevention and Mitigation** of potential impacts on migratory birds:
 - No active nests will be removed, or birds or nests disturbed in accordance with the MBCA.
 - The contractor will be advised that all temporary brush and loose soil piles should be tarped or otherwise inspected regularly to prevent nesting as they provide potentially suitable nesting sites for some species.
 - If a nesting migratory bird is identified within or adjacent to the construction site and the construction activities are such that continuing construction in that area might result in a contravention of the MBCA (i.e. potential harm or stress to nests, birds, eggs or young), all activities must cease, and the contractor administrator immediately notified.
- **OTHER WILDLIFE**
 - There is potential for turtles to nest along gravel road shoulders in the vicinity of the Don River West Branch. Exclusion fencing is recommended to isolate the work area from the Don River where potential turtle nesting habitat occurs. Exclusion fencing should be installed between September 1st and March 31st to prevent nesting in the work area.
 - For the protection of wildlife in general, the contractor will ensure that:
 - Any wildlife incidentally encountered during construction will not be knowingly harmed or harassed and will be allowed to move away on its own.

- If an animal encountered during construction does not move from the construction zone and construction activities are such that continuing construction in the area would result in harm to the animal, all activities that could potentially harm the animal will cease immediately and the contract administrator and/or environmental inspector will be notified.

2.6.5 Species At Risk (SAR) & Mitigation Recommendations

Two SAR, Eastern Wood-pewee and Monarch, were confirmed in the study area, and an additional four SAR have 'moderate' to 'high' potential to occur within the study area. Several Kentucky Coffee-tree (Threatened under the ESA) were also observed, but the trees were determined as likely to have been planted, as they are outside the normal range for natural occurrence of the species, but their origin is unconfirmed. Potential impacts on these species are outlined below:

Eastern Wood-pewee –Special Concern under the ESA. No direct impacts to this species are anticipated. This species is associated with forest communities, and impacts related to the preferred trail alignment and construction are not expected to include removal of forest areas.

Monarch –Special Concern under the ESA. No direct impacts to this species are anticipated as monarch were identified as foraging visitants to the area. Impacts to Monarch habitat (i.e. Cultural Thicket, Cultural Meadow and mowed areas with wildflowers) will be minor and temporary as these areas will be restored to a similar condition following construction. Abundant habitat of similar character is available in the broader landscape.

Barn Swallow –Threatened under the ESA. No direct impacts to this species are anticipated. Barn Swallow are unlikely to be impacted as foraging visitants and impacts to foraging habitat is expected to be minimal and temporary. Suitable nesting habitat is limited to culverts and other watercourse crossing structures; however, no nests were observed in the study area.

*Note: the status of Barn Swallow was recently assessed by Committee on the Status of Species at Risk in Ontario as Special Concern. This change in status is anticipated to be adopted by the ESA.

Myotis and Perimyotis Bats -Endangered under the ESA. These species typically use mature trees in forested habitats for maternity roost habitat. Trees with features such as cavities, crevices, knots, cracks, loose bark or leaf clusters could provide suitable bat maternity roosting habitat. Given that tree removals may be required, there is some potential for impacts to bats or bat habitat generally throughout the study area. While maternity roosts are unlikely to occur in the edge of a forest habitat, or in isolated trees/tree clusters, this cannot be conclusively eliminated without acoustic surveys. There is potential for breeding activity to be directly impacted if these are removed, or if construction occurs within the sensitive period for bats. A bat roosting survey will take place during the detailed design stage.

Butternut - Endangered under the ESA. Although this species was assessed as having moderate potential of occurrence, no individual Butternut Trees were observed in the areas of proposed trail routes during the 2021 field investigations, thereby, direct and indirect impacts are unlikely.

Snapping Turtle - Special Concern under the ESA. Impacts to snapping turtles are not anticipated as the Don River West Branch in the immediate vicinity of the study area does not contain turtle overwintering habitat. Overwinter habitat is potentially present in a stormwater management pond in the north portion of the study area; however, direct impacts to this pond are not anticipated.

Mitigation recommendations to address potential impact to aquatic and terrestrial resources, as well as SAR are provided below. An update to the impact assessment is recommended for the detail design stage to address any variation between the preferred route and the final route, and to update the mitigation recommendations made at this preliminary design stage.

MITIGATION RECOMMENDATIONS

Several confirmed and potential SAR are not expected to be impacted by the project as noted in the natural heritage findings. This is due to lack of breeding evidence or breeding habitat, low likelihood of nesting in edge habitat adjacent to urban areas or ability to leave the area of impact. However, SAR bats may pose constraints on the project:

- All mature forested units may support endangered bat habitat. Additionally, albeit to a lesser degree, mature isolated trees/tree clusters may also provide bat habitat. Where tree removals cannot be avoided, impacts are anticipated to be confined to forest edges along existing trails, or to isolated trees/tree clusters and are anticipated to be minimal. Where tree removals are unavoidable, consultation with MECP is recommended to determine whether targeted bat maternity roost habitat assessments, conducted during the appropriate season (i.e., leaf on and off) are required to identify whether suitable trees will be impacted by the chosen alignment. Ongoing consultation with MECP should be undertaken and a comprehensive impact assessment completed to determine whether a permit under the ESA is required, or whether a timing window restriction for tree clearing is sufficient to avoid impacts to potential bat maternity colonies in treed habitats. No tree removals are permitted during the active bat season April 1 to September 30.

2.6.6 Overall Natural Heritage Recommendations

The preferred route does not include watercourse crossings; however, options may be explored during detail design. Detailed habitat assessment of crossing areas should be undertaken and works assessed under the Fisheries Act. It should also be noted that the detail design process is likely to occur in stages and over several years, requiring a review and update of the existing

conditions documented herein, including a review of SAR and the irrelative status under the ESA. Recommendations for future work include:

- Tree inventory and protection plan/arborist report.
- Bat roost tree assessments (leaf on and/or off) to assess potential for impacts to SAR bat habitat and inform further consultation with MECP regarding ESA approvals for the project.
- Turtle nesting surveys to determine habitat use along the Don River West Branch and inform need and placement of exclusion fencing during construction. Aquatic habitat assessments at proposed new watercourse crossings, if identified.
 - Development of a restoration and enhancement planting plan.
 - Direct impacts will occur within the TRCA regulation limits and as such a permit under Ontario Regulation 166/06 is anticipated to be required.

2.7 PROPERTY AND LAND ACQUISITION NEEDS SUMMARY

PROPERTY PROXIMITY

Properties adjacent to and near the preferred trail alignment have been outlined in **Appendix B – Policy and Land Use Report**. Properties that both intersect and are within 5 m of the proposed primary trail alignment will require further engagement with the specific property owners and stakeholders. Further pursuit of land acquisition and user agreements are necessary for the intersecting properties. For example, Option C runs through St. David's Parish lands, and will require further discussions on easement allowance, land agreement and/or acquisition.

Properties that are within 5-10m of the proposed primary trail alignment would benefit from project notification, advising of the proposed trail alignment that is part of the BSG Feasibility Study. Lastly, properties that are 10-15m from the proposed trail alignment do not require additional engagement beyond the standard engagement that has been completed during this feasibility study.

OFFICIAL PLAN DESIGNATIONS

The designations set out in the Vaughan Official Plan have been illustrated in Figure 6 - official plan discussion map. The designations of the proposed primary trail route are natural area, parks and low-rise residential. Based on existing current information, two properties have been noted as private property.

ZONING

The zoning of land parcels of the proposed primary trail are shown in Figure 7 - zoning discussion map. The zoning by-law and references for each applicable zone are outlined in

Table 2 for By-law No. 001-2021. Zoning to be confirmed prior to implementation.

TABLE 2: ZONING AND PERMIT USE

Reference	Zoning	Permitted Uses
R2A 532	Second Density Residential Zone	Section 7.2.1 sets out permitted uses for R2 and R4 Zones: <ul style="list-style-type: none"> Community gardens are permitted in the R2 and R4 Zone.
R4 276	Fourth Density Residential Zone	
RT 589	Townhouse Residential Zone	Section 7.3.1 sets out permitted uses for RT Zones: <ul style="list-style-type: none"> Community gardens are permitted in the RT Zone.
EP	Environmental Protection Zone	Section 12.2.1 sets out the permitted uses in the Environmental Protection, Open Space, and Agriculture Zones: <ul style="list-style-type: none"> Passive recreational uses are permitted in the EP Zone.
EP 276		
EP 532		
EP 44		
EP 659		
EP 295		
EP 581		
EP 1098		
OS1 276	Open Space Zones	Section 12.2.1 sets out the permitted uses in the Environmental Protection, Open Space, and Agriculture Zones: <ul style="list-style-type: none"> Active recreational uses are permitted in the OS1 Zone. Passive recreational uses are permitted in the OP1 Zone. Community gardens are permitted in the OS1 Zone.
OS1 589		
OS1 433, 400		
OS1 809		
I1 433	General Institutional Zone	Section 13.2 sets out permitted uses in the Institutional and Other Zones: <ul style="list-style-type: none"> Community garden is a permitted in the I1 Zone. Conservation use is a permitted in the I1 Zone. Passive recreational uses are permitted in the I1 Zone.

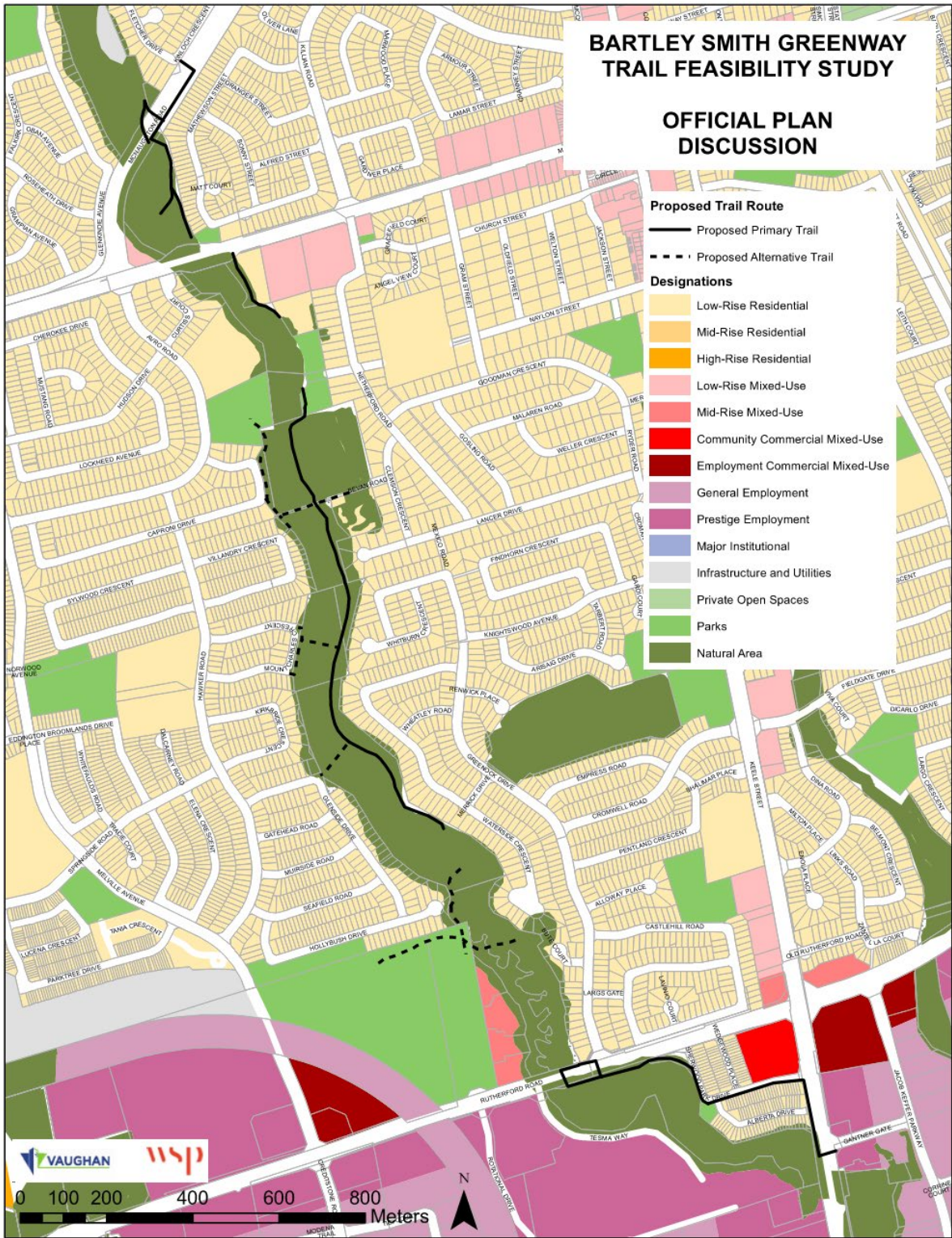


FIGURE 6: OFFICIAL PLAN DISCUSSION MAP

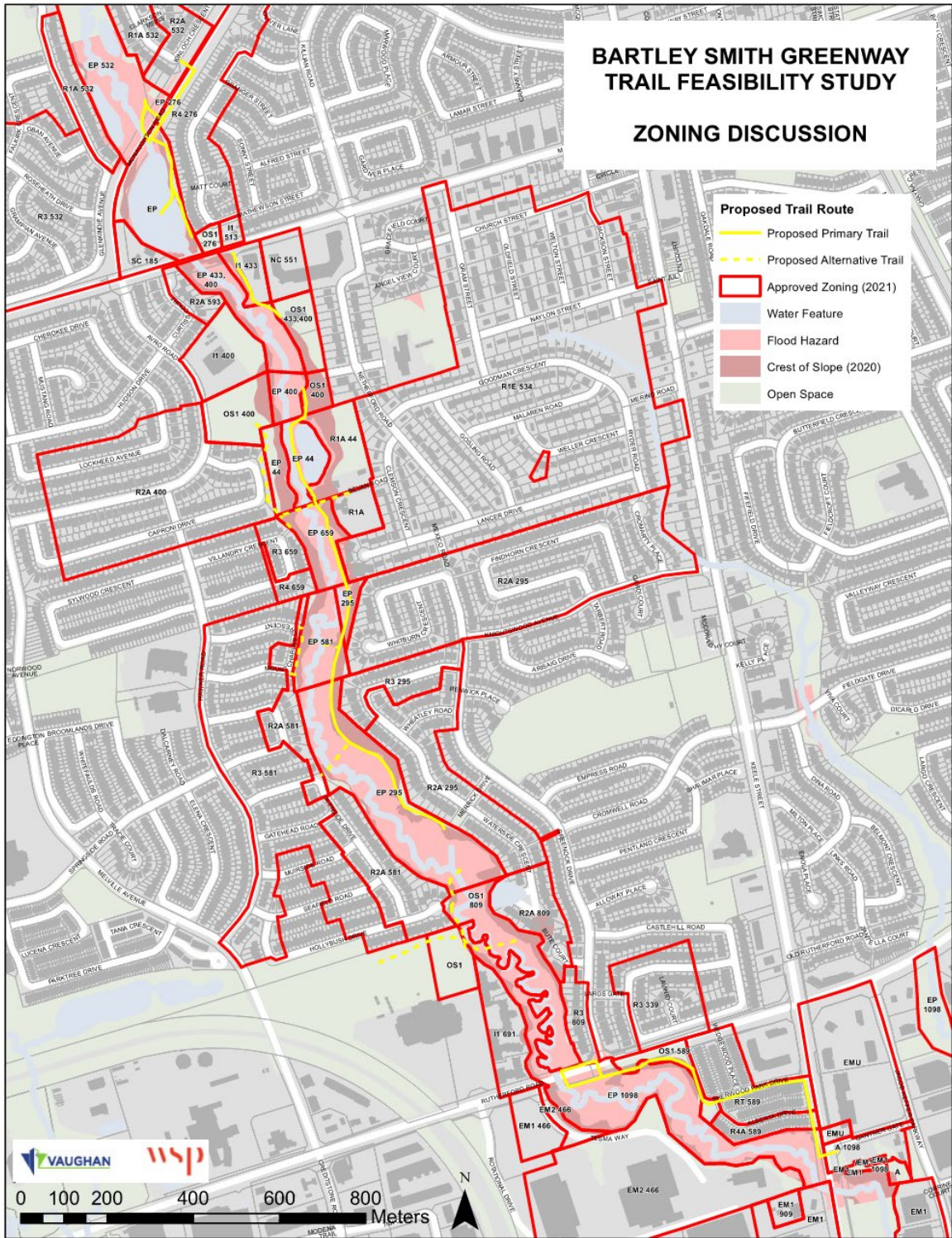


FIGURE 7: ZONING DISCUSSION MAP

3 OPPORTUNITIES AND CONSTRAINTS ANALYSIS

The route crossings have been classified into three categories with multiple crossing locations identified:

- Road crossings,
- Trail alignments, and
- Bridge crossings.

Opportunities and constraints have been identified for each category to inform the final crossing type and location recommendations.

3.1 ROAD CROSSINGS

3.1.1 Road Crossing Options at McNaughton Rd.

McNaughton Rd. is an existing 2-lane city road mostly lined with ditches in a suburban context. The posted speed limit is 50 km/h. To the east of the study area is the Maple Community Centre, Saint Joan of Arc High School, retail plazas, big box stores and the Maple GO Station. To the west of the study area is Major Mackenzie Dr., plazas, a hospital and Canada’s Wonderland.

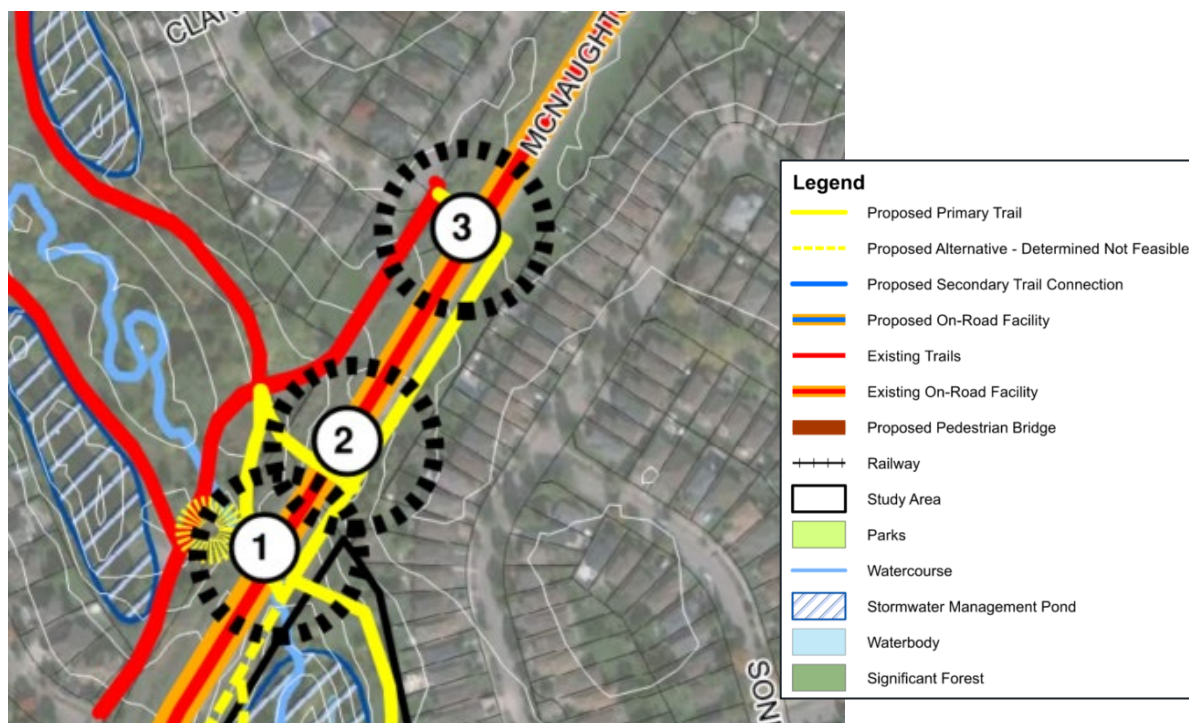


FIGURE 8: ROAD CROSSING OPTIONS AT MCNAUGHTON RD.

Three options for a safe road crossing were explored compared against opportunities and constraints and outlined below in Table 3.

TABLE 3: ROAD CROSSINGS AT MCNAUGHTON RD. OPTIONS CHART

Crossing Option	Opportunities	Constraints
Option 1: BELOW GRADE (UNDERPASS/CULVERT) CROSSING	Culvert crossing under road will avoid steep slopes, traffic impacts, conflicts between motor vehicles and trail users and is a direct connection for users.	Safety, maintenance, and very steep slopes on north side would create ramp requirements and result in poor sightlines. Issues pertaining to the Major Mackenzie Dr. underpass need to be addressed when considering this option.
	Similar to Major Mackenzie Dr. crossing that provides a traffic-free user experience.	Higher cost and complexity.
	Potential long-term solution that could be implemented as part of McNaughton Rd. widening.	
Option 2: NEW SIGNALIZED AT-GRADE CROSSING AT RIVER	Proposed at-grade signalized pedestrian and cyclist crossing to provide another crossing point between long blocks.	Slope from river valley to road results in a less direct crossing and may be perceived to be inconvenient for some users.
	Could be interim option, depending on timing of EA/Option 1.	Requires short diversion and approximately 100m segment of multi-use path along McNaughton Rd..
		Requires construction of a new signalized crossing that would introduce delay for trail users and motorists.
Option 3: SIGNALIZED AT-GRADE PEDESTRIAN CROSSING CONNECTION AT KINLOCH CRES/FLETCHER DR ACCESS	Proposed at-grade signalized pedestrian and cyclist crossing connection at Fletcher Dr. and Kinloch Cres. access.	Steep slope from river valley to road and location of existing crossing will create a very indirect trail alignment and require approximately 200m segment of multi-use trail along McNaughton Rd..
		Requires construction of a new signalized crossing that would introduce delay for trail users and motorists.

3.1.2 Road Crossing Options at Rutherford Rd.

Rutherford Rd. is a 4-lane arterial roadway (regional road) within a suburban context with a posted speed limit of 60 km/h. To the east of the study area are retail plazas and the Rutherford GO Station. To the west is a commercial area and Vaughan Mills Mall.

Regarding crossing alternatives, note that a grade-separated crossing is deemed currently impractical. It was not part of the planned Rutherford Rd. widening project and could trigger changes to the approved EA. Therefore, it is not included in the crossing options but is considered a long-term solution when the roadway is reconstructed again in the future.

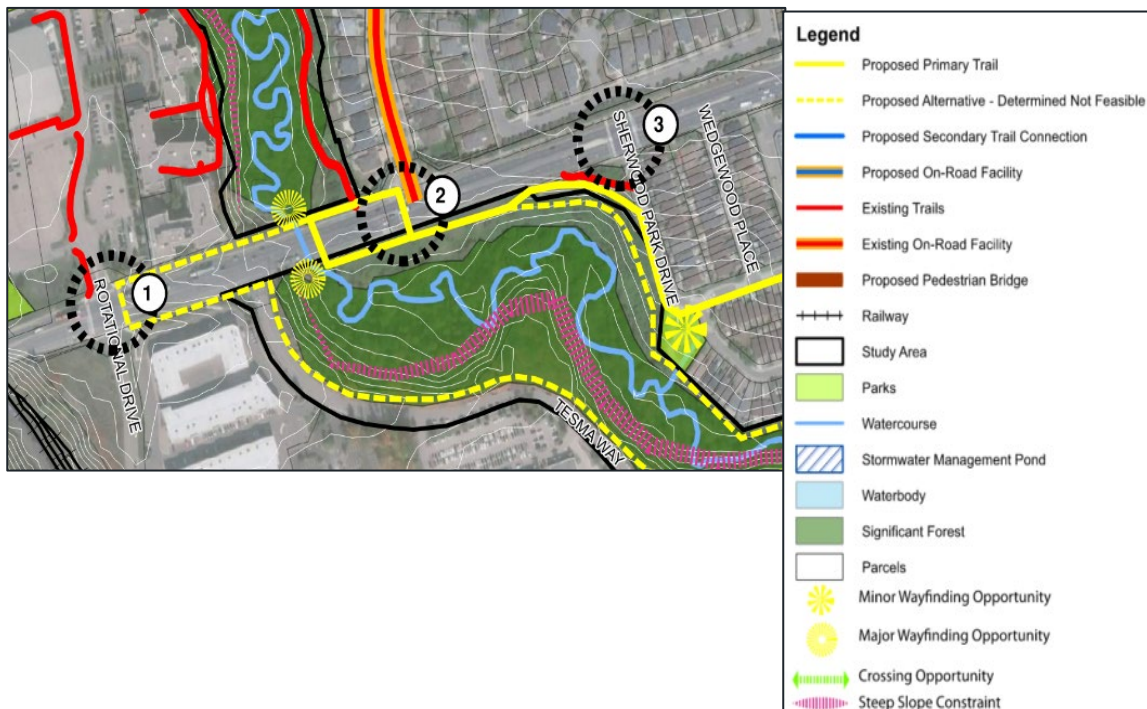


FIGURE 9: ROAD CROSSING OPTIONS AT RUTHERFORD RD.

Four options were explored and compiled into a comparison table outlining opportunities and constraints of each.

TABLE 4: ROAD CROSSING AT RUTHERFORD RD. OPTIONS CHART

Crossing Option	Opportunities	Constraints
Option 1: USE EXISTING SIGNALIZED INTERSECTION AT ROTATIONAL DR.	Existing signalized crossing.	Diverges from Greenway trail system and follows roadway. Less desired user experience.
	Access to recreational facilities at Sports Village Park.	Requires long segment of multi-use path or cycle track along Rutherford Rd.
	Most benefit if trail follows Tesma Way alternative.	Modify existing regional intersection for cycling cross ride markings (north-south cross rides currently not included in planned Rutherford Rd. improvements).
	Uses boulevard space within road right-of-way.	
Option 2: EXISTING SIGNALIZED INTERSECTION AT GREENOCK DR.	Existing signalized crossing.	Active transportation facilities required along Rutherford Rd. to connect to existing trail.
	Shortest deviation of the alternatives.	Modify existing regional intersection for cycling cross ride markings (north-south cross rides currently not included in planned Rutherford Rd. improvements).
Option 3: USE EXISTING SIGNALIZED INTERSECTION AT SHERWOOD PARK DR.	Existing signalized crossing.	Longer detour than Option 2 and active transportation facilities required along Rutherford Rd. to connect to existing trail.
		Modify existing regional intersection to provide cycling cross ride markings (north-south cross rides currently not included in planned Rutherford Rd. improvements).
Option 4: COMBINATION OF #2 (SOUTHBOUND CROSSING) AND #3 (NORTHBOUND CROSSING)	Existing signalized crossing.	Longer detour than Options 2 and 3.
	Some safety benefits from unidirectional implementation, which would not require modification of planned sidewalks and one-way cycle tracks along Rutherford Rd. but would require	Potentially unidirectional implementation would require additional wayfinding and potentially not as intuitive a route for users to follow.

Crossing Option	Opportunities	Constraints
	changes to include north-south cross rides.	
	Some benefit if preferred trail alignment follows Sherwood Park Dr. alternative.	

3.2 TRAIL ALIGNMENT

3.2.1 Trail Segment Between McNaughton Rd. and Major Mackenzie Dr.

This stretch of trail is bounded by McNaughton Rd. to the north and west, single detached residential lots to the east and Major Mackenzie Dr. W to the south. There is a gas station and convenience store to the southwest and Killian-Lamar Parkette to the southeast. Two crossing options are proposed:

- **Option A:** proposes a route with a bridge crossing. This route travels along the east of the site between a stormwater pond and the residential lots on Mathewson St. until it crosses over the storm water management pond (SWMP) and connects with an existing service path.
- **Option B:** proposes a route connection extending behind Mathewson St. homes. This route travels through the creek valley on the east side between the stormwater pond and rear of Mathewson St. residential lots until reaching the existing Killian-Lamar Parkette trail.

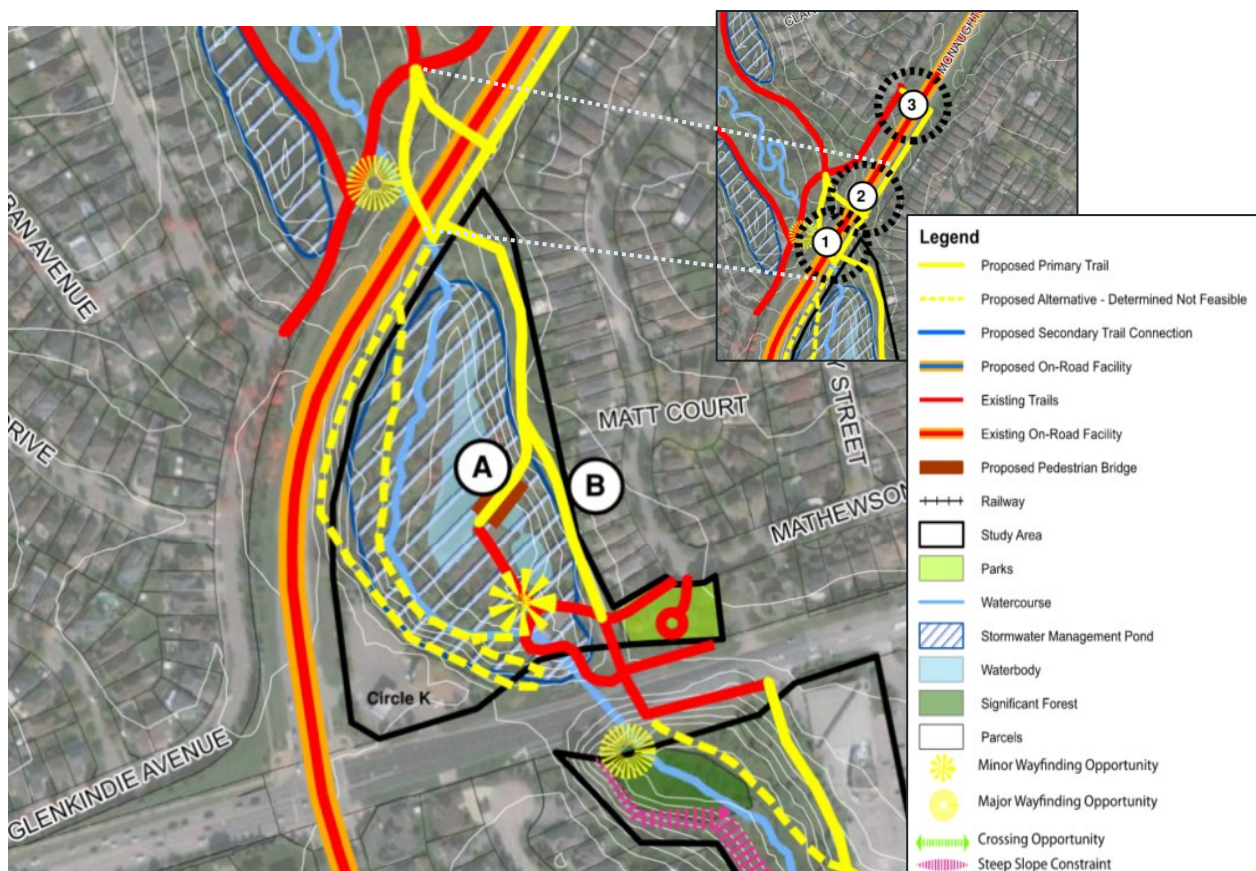


FIGURE 10: TRAIL SEGMENT BETWEEN MCNAUGHTON RD. AND MAJOR MACKENZIE DR.

The following comparison table outlines the opportunities and constraints for each option:

TABLE 5: TRAIL CROSSING OPTIONS FOR SEGMENT BETWEEN MCNAUGHTON RD. AND MAJOR MACKENZIE DR.

Crossing Option	Opportunities	Constraints
Option A: ROUTE WITH BRIDGE CROSSING	This alignment would provide users with a scenic view of the SWMP and natural heritage features.	A bridge infrastructure is required to complete this alignment which will incur additional cost.
	The route includes a new bridge crossing which would span across the existing SWMP.	There is a portion of this trail which is in close proximity to residential lots and may be a cause of nuisance concern.
	The existing slope conditions would allow for more space between the proposed trail and existing low rise residential units on Mathewson St. to provide more privacy for residence.	
	This trail alignment utilizes the existing trail infrastructure towards the south of the SWMP guiding users to Killian-Lamar Parkette.	
	According to the Natural Heritage Existing Conditions Report (WSP, Oct 2021) the SWMP at McNaughton Rd. where the bridge is proposed, is not considered a fish habitat, therefore the proposed bridge crossing would not be subject to the Federal Fisheries Act (FA, 1985), meaning construction can occur at any time.	
Option B: ROUTE CONNECTION EXTENDING BEHIND MATHEWSON ST. HOMES	There is an opportunity to provide a direct connection to Killian-Lamar Parkette and existing trails while providing users with a woodland experience.	This portion of the trail is in close proximity to residential lots. Includes numerous lots within 5-10 metres and 10-15 metres of proposed alignment.
	There will also likely be a significant cost saving as the site	Vegetation removal would be required to construct this trail alignment.

Crossing Option	Opportunities	Constraints
	does not require additional bridge infrastructure.	
	Natural heritage interest adding to the user experience.	

ROUTES DETERMINED NOT FEASIBLE

The City explored routes west of the SWMP (shown with dashed lines in Figure 10); however, they are not feasible due to steep slopes, erosion risks, proximity to the creek and the anticipated negative impact of vegetation removal.

- **Routes on McNaughton Rd. Right of Way**

- This route would travel on the outer edge of the vegetated site onto the right of way. This was explored as it offered an opportunity to provide a minimal disturbance to the valley and keep the trail outside the flood plain. This option was determined unviable due to the extreme slopes behind the private properties rendering the trail difficult to construct.
- A route that traverses Major Mackenzie Dr. to McNaughton Rd. and extending along the right of way was explored during further dialog with technical staff. This option was discounted for reasons based on continuity and user experience. This route would require users to traverse up and down slopes related to the culvert crossing of Major Mackenzie Dr. and detour away from the greenspace. Users would be pushed into the road corridor, a condition that contradicts the mandate of the trail when there is a viable option through the greenspace. In addition, the current conditions of McNaughton Rd. would require urbanization of the cross section or other physical barriers to provide safe separation for trail users.

- **Route along the Creek**

- This route would travel into the wooded areas at the bottom of the valley and provide an experience close to the creek on site. This alignment was originally articulated with the construction of the pond and the land graded to provide a flat area for a future trail. The alignment would provide an immersive experience of all the natural heritage features of the site. However, the proximity and significant negative impacts to the natural heritage system, the existing SWMP, creek and vegetation, was of great concern to TRCA. As the alignment sits at the base of a steep slope, there are signs of water runoff/garbage accumulation that would impede trail function and composition.

3.2.2 Trail Segment Between Major Mackenzie Dr. and Rutherford Rd.

A priority for this project is to limit the impact to natural systems in the area. To meet this goal, the trail between Major Mackenzie Dr. and Rutherford Rd. is currently proposed to travel along the east side of the creek (Routes C, D and E in Figure 11) since the west side of the creek is heavily treed and sloped.

Residential areas, Le Petit-Prince Catholic Elementary School, Maple Airport Park, Village Park baseball diamonds and Everest Academy are adjacent to the western portion of the site.

St. David's Parish, Mother of Carmel Childcare Centre, Naylon Parkette and low-density residential areas are adjacent to the eastern portion of the site. The site is bounded by Major Mackenzie Dr. to the north and Rutherford Rd. to the south.

Figure 11 identifies the trail alignment and proposed crossing options.

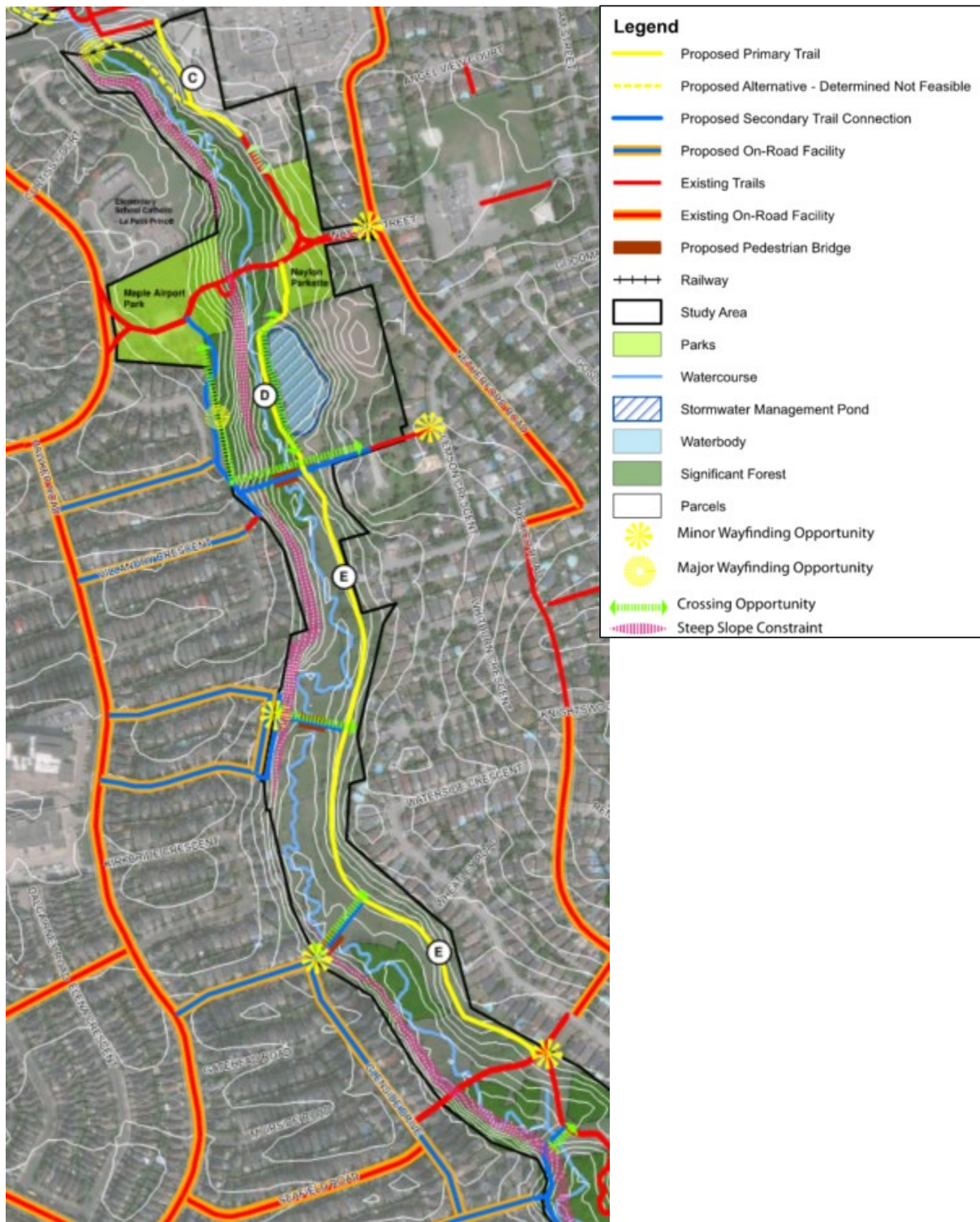


FIGURE 11: ROUTE ALIGNMENT BETWEEN MAJOR MACKENZIE RD. TO RUTHERFORD RD.

Three alignment options are proposed:

- **Option C: Alignment through Church Property**

- This route travels north and south at Major MacKenzie Rd. and connects to the existing trail, linking St. David's Parish and Mother of Carmel Child Care Centre parking lots to Naylor Park. The route crosses a portion of St. David's Parish.

- **Option D: Alignment through Sanitary Easement West of Existing SWM Pond**

- This proposed alignment traverses through an existing 0.33ha sanitary easement on the west side of an existing SWMP. The SWMP is to be removed due to the proposal of a subdivision development (Figure 12 below).
- Note: The owner for Zoning By-law Amendment File Z.17.014 and Draft Plan of Subdivision File 19T-17V003 located at 10 Bevan Rd. provided a resubmission September 27, 2022. The trail alignment option remains within the public pathway Block 24 hatched in blue.

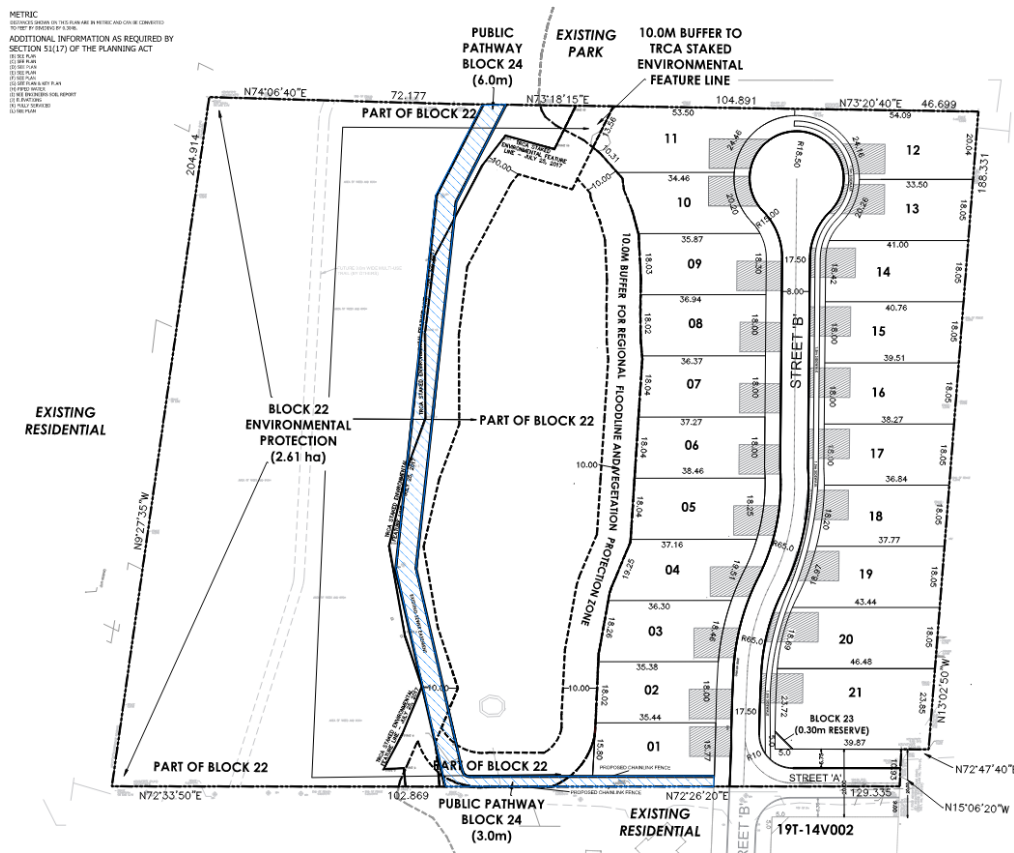


FIGURE 12: SNIP OF DRAFT PLAN OF SUBDIVISION FOR 19T-V003

- **Option E: Alignment West of Waterside Cres.**

- This proposed alignment runs through the eastern portion of the site close to the residential lots on Waterside Cres..

TABLE 6: TRAIL CROSSING OPTIONS BETWEEN MAJOR MACKENZIE DR. AND RUTHERFORD RD.

Crossing Option	Opportunities	Constraints
Option C: ALIGNMENT THROUGH CHURCH PROPERTY	This alignment supports a lower impact trail as the proposed route is located outside of the floodplain limit and the Provincially Significant Wetland.	Although outside the Provincially Significant Wetland, this route alignment will require an environmentally sensitive maintenance method for the trail due to its proximity to the PSW.
	According to the Natural Heritage Existing Conditions Report (Oct 28,2021), proposed primary trail alignment C will be constructed through Cultural Meadow and Cultural Woodland. These are botanically poor with abundant weedy native and non-native species. Access to removing these will be possible.	This alignment would provide for a less direct connection from the new trail culvert crossing along Major Mackenzie Dr. and users will be required to traverse the ramp to near street level.
	Low impact to existing vegetation.	Trail crosses onto the church property and may require an easement, user agreement or land acquisition.
	Provides a more direct access to street level users.	Area is sloped and trail design will require erosion mitigation.
Option D: ALIGNMENT THROUGH SANITARY EASEMENT WEST OF EXISTING SWM POND	This alignment is on a flat area and pose no significant slope challenges, it has also been kept clear of vegetation as it is a sanitary easement.	This alignment is within the flood limit and is near the creek which could result in an increased risk of flood damage and safety hazards due to periodic flooding resulting in increased maintenance challenges.
	There is an opportunity to connect this route to Naylon Parkette and the existing trail infrastructure running from Naylon Parkette to Avro Rd.	Maintenance challenges, potential environmental impact, and regulatory restrictions associated with constructing and managing a trail in a floodplain.

Crossing Option	Opportunities	Constraints
	Avoids wooded areas with slopes that have been identified as more sensitive landscapes.	
Option E: ALIGNMENT WEST OF WATERSIDE CRES.	This route does not pose much grading constraint and will impact minimal vegetation as it is largely an open field.	Due to the constraints of the flood limit, the trail alignment would be closer (within 5-15m) to the rear yards of the residential units on Waterside Cres..
		According to the Natural Heritage Existing Conditions Report (WSP, Oct 2021) alignment E is constructed through Unit 20 marsh wetland.

OTHER ROUTES DETERMINED NOT FEASIBLE

Options for a route closer to the existing creek (shown with dashed lines in Figure 11) were explored in the early stages of the project; however, were not feasible due to proximity to the creek, conflict with crossing and/or proximity to Provincially Significant Wetlands. From an operational and maintenance perspective, the trail would be subject to additional restrictions during winter months as salting poses a risk to the PSW.

3.2.3 Segment between Rutherford Rd. and Keele St.

There is one proposed route option in this segment to connect the trail between Rutherford Rd. and Keele St.. This portion of the site is bounded by Rutherford Rd. to the north, Keele St. to the east, Tesma Way to the south, and Rotational Dr. to the west. There is a low-rise residential area directly east of the site. Sherwood Parkette is east of the site located at the intersection of Sherwood Park Dr. and Alberta Dr. (Refer to Figure 13 below). Directly south of the site is a prestige employment area which includes a mix of businesses such as Amazon, Hanon Systems, Workplace Law Consulting Inc. and restaurants.

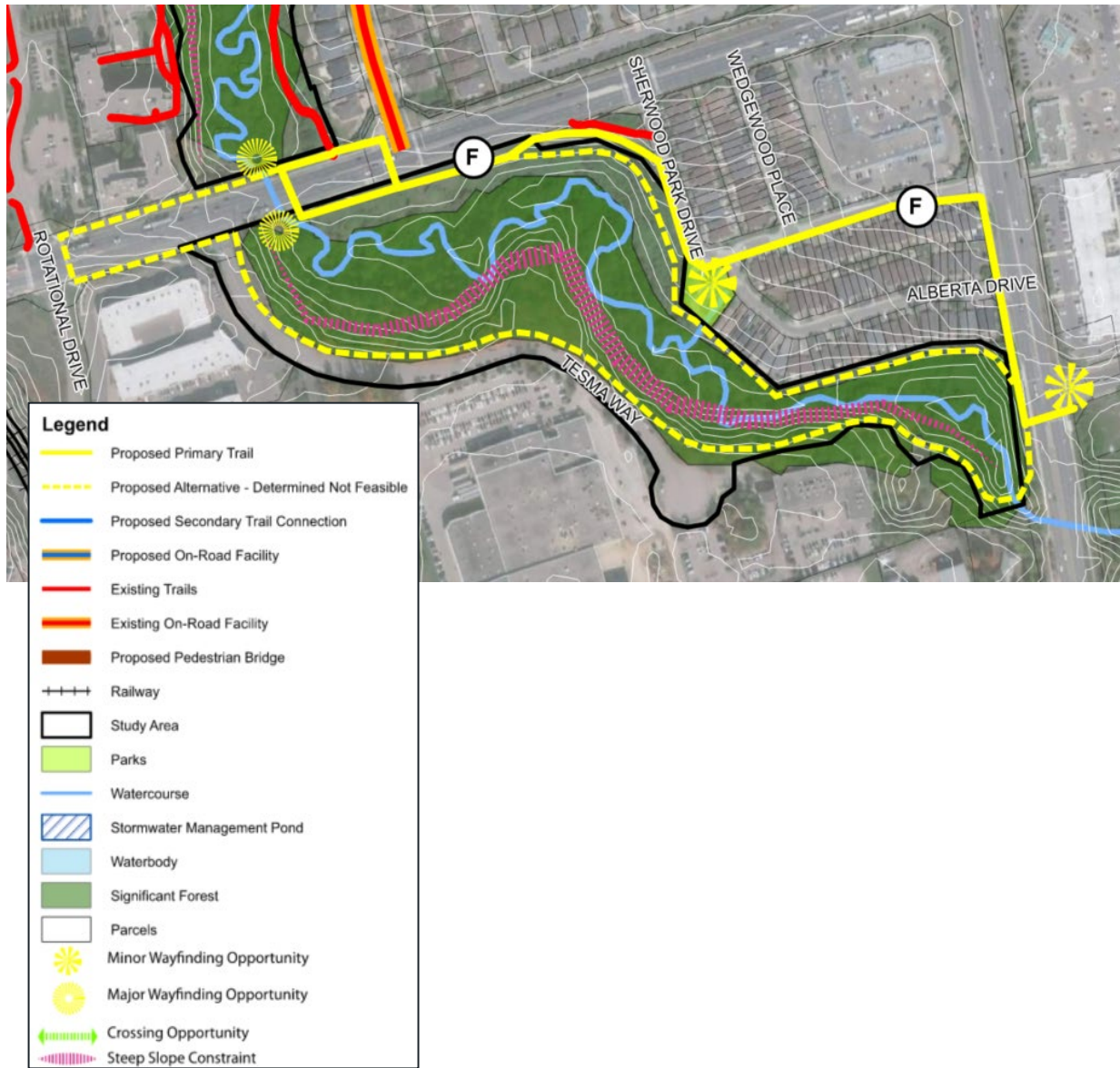


FIGURE 13: TRAIL SEGMENT BETWEEN SHERWOOD PARK DR. & ALBERTA DR.

Option F – Modified: Sherwood Park Dr./Alberta Dr. Alignment

- This route would travel parallel to Rutherford Rd. and Sherwood Park Dr. (separated from the Rutherford Rd. existing and planned active transportation (AT) infrastructure) until it reaches the parkette, after which point it travels on-road along Alberta Dr. and Keele St.. The trail will terminate at the existing signaled crossing at Gantner Gate. Note: Alignment F along Sherwood Park Dr. was originally

considered when put forward in the public survey; however, was changed to Alberta Dr. based on staff and public feedback.

TABLE 7: TRAIL CROSSING OPPORTUNITIES AND CONSTRAINTS FOR SHERWOOD PARK DR. AND ALBERTA DR.

Crossing Option	Opportunities	Constraints
<p>Option F: (modified)</p> <p>SHERWOOD PARK DR. / ALBERTA DR. ALIGNMENT</p>	<p>This alignment is flat and consists of existing lawn, sidewalks, cleared area for Rutherford reconstruction.</p> <p>Alignment allows for a connection to Sherwood Parkette.</p> <p>According to the Natural Heritage Existing Conditions Report (WSP, Oct 2021) proposed trail alignment F will have no or negligible impact to the vegetation.</p>	<p>This alignment utilizes Sherwood Park Dr. with limited space for a formal trail.</p>

Figure 14 highlights where there is sufficient boulevard space to add a 3.0m bi-directional cycle track between the existing sidewalk and curb on Keele St. from Alberta Dr. to the Gantner Gate intersection; an approximate distance of 100m. Approaching the intersection, it could merge with the existing 2.4m wide sidewalk as a shared-use multi-use path.



FIGURE 14: CONNECTION ALONG ALBERTA DR. AND KEELE ST.

Figure 15 shows the potential for a cycle track or multi-use pathway to be incorporated into the existing boulevard on Keele St. It can run from Alberta Dr. to Gantner Gate intersection.



FIGURE 15: POTENTIAL CYCLE TRACK OR MULTI-USE PATH ADDITION

Alberta Dr. is a neighbourhood street located in a residential area. The street is narrow with a posted speed limit of 40km per hour. This makes it conducive to be converted into a neighbourhood bikeway with sharrows and signage. Traffic calming devices such as speed humps could be added as well. An example of such a street is shown in Figure 17 below.



FIGURE 16: EXISTING CONDITION OF ALBERTA DR.



FIGURE 17: NEIGHBOURHOOD GREENWAY (SOURCE: CITY OF VANCOUVER, BC)

OTHER ROUTES DETERMINED NOT FEASIBLE

WSP and the City explored alternative route options along Tesma Way and to the east of the creek (shown with yellow dashed lines in Figure 13); however, these were not feasible due to the steep slopes, erosion risk, proximity to the creek, and the anticipated negative impact of vegetation removal.

Route west of the creek and fully within the valley corridor:

- This route could offer users a more natural trail route and connection to Sherwood Parkette, with nature and uninterrupted experiences desired. However, this alignment is within a steep sloped area that poses challenges at the Keele St. interface and there is high-quality woody and herbaceous vegetation in portions of the alignment. Therefore, significant vegetation clearing would be required to construct the trail.
- Due to the location of the creek and flood limits, the trail would need to be constructed within close proximity (5-10m in most areas, less than 5m in some locations) to the residential units of which have limited rear yard depths – increasing the impact to residents. The alignment would have negative impacts to both the creek and trail during rain events due to the proximity required as the trail nears Keele Street. The TRCA is not in support of alignments through this area due to the requirement to remove significant high-quality woody and herbaceous vegetation, as well as anticipated negative impacts to the creek during rain events. The connection point at Keele St. is also steep and would require ramp structures.

Tesma Way alignment:

- This route utilizes an existing two-lane roadway with parking permitted on both sides and although it could provide an opportunity to connect to surrounding businesses south of Tesma Way, to provide those working at these establishments the ability to use the trail. There is a wide lawn boulevard and sidewalk on the west side. The east side abuts steep sloped forested valley lands with a narrow turf shoulder containing street lighting poles. The road which services industrial/commercial places of work, comes to a dead end which would require the continuation of a trail to divert into the valley lands or cross multiple privately-owned lands.
- This alignment would be located within the road right-of-way, utilizing the west boulevard or through modifications to the road design/function with an array of active transportation facility approaches. The shoulder to the east would require relocation of utilities and/or modifications to the curb alignment to install a trail.

The trail connection beyond Tesma is not feasible currently due to property ownership, slopes, and natural heritage value. However, if land uses change and development occurs on the properties between Tesma Way and Keele St., this alignment would be a valuable addition to the BSG.

3.3 BRIDGE CROSSING

The trail route requires a crossing between Major Mackenzie Dr. and Rutherford Rd. To determine the best crossing options and typology, four bridge crossings were explored and assessed in addition to the existing trail connection culvert. Opportunities and constraints were developed for each crossing. Figure 18 highlights the location of these crossings along the trail.

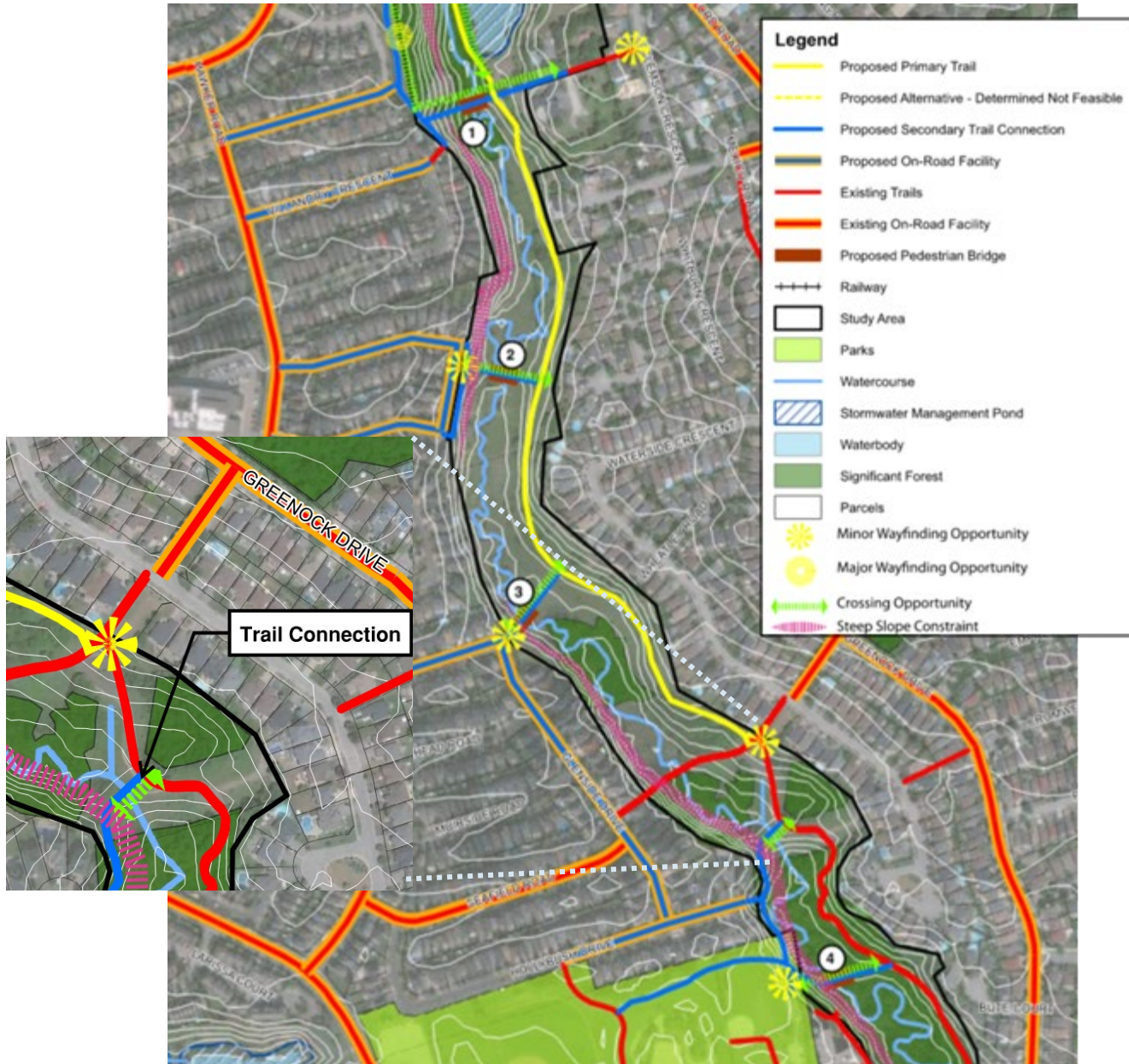


FIGURE 18: BRIDGE CROSSING OPTIONS BETWEEN MAJOR MACKENZIE DR. AND RUTHERFORD RD.

3.3.1 Bridge Crossing Between Major Mackenzie Dr. and Rutherford Rd.

Existing pedestrian bridges connect neighbourhoods to the east and west of the creek at Naylor Parkette and between Seafield Rd. and Merrick Dr.. The project explored adding new pedestrian bridge crossing(s) between Major Mackenzie Dr. and Rutherford Rd.

Four bridge crossing options are discussed below in addition to an existing crossing:

- **Option 1 – A new bridge and trail connecting Bevan Rd. and Caproni Dr.:**
 - o This alignment would connect the existing trail south of the storm water management pond running along Bevan Rd. to create a connection between Clemson Cres., Caproni Dr, and Villandry Cres.. The bridge proposed would run across the Don River West Branch.
- **Option 2 – A new bridge and trail connecting Mount Charles Cres. to the proposed trail:**
 - o This alignment would connect the proposed alignment to Mount Charles Cres. There are 2 schools (Blessed Trinity Catholic Elementary School, and Maple Creek Public School) and the West Maple Creek Park to the west of the site within 500m. The surrounding areas to the east and west of the site are low-rise residential areas.
 - o Opposition to this option was raised during engagement and outreach with concerns related to increasing pedestrian traffic near residential homes. Due to these concerns, the bridge connection was deferred for future consideration as it was not integral to the mandate of the project which is to close the gap in the BSG. The location remains ideal for a water crossing and should be revisited if demand for a trail connection to the neighbourhood becomes apparent (by request or evidence of informal crossing of the creek).
- **Option 3 – A new bridge and trail connecting Glenside Dr. to the proposed trail:**
 - o This alignment would connect the proposed alignment to Glenside Dr. The surrounding areas to the east and west of the site are low-rise residential areas.
 - o This alignment is not supported by the TRCA due to natural heritage impacts.
- **Option 4 – A new bridge crossing and trail connection to the baseball diamonds at the Sports Village Park:**
 - o This alignment would connect the existing trail to the east of the site to Sports Village Park baseball diamonds. The surrounding areas to the east and west of the site are low-rise residential areas, with a mid-rise mixed-use area south of the proposed route.
 - o This alignment is not supported by the TRCA due to natural heritage impacts.
- **Option 5 – Existing culvert connection as an alternative to a bridge crossing:**
 - o There is an existing 1.1m x 1.375m box culvert on site which could be utilized as a potential trail connection. This alignment would connect the existing trail across the creek to the western extent of the site.

A comparison table highlights the opportunities and constraints for each proposed option (refer to Table 8).

TABLE 8: BRIDGE CROSSING OPTIONS BETWEEN MAJOR MACKENZIE DR. AND RUTHERFORD RD.

Crossing Option	Opportunities	Constraints
<p>Option 1:</p> <p>A New Bridge and Trail Connecting Bevan Road and Caproni Dr.</p>	<p>According to the Natural Heritage Existing Conditions Report (WSP, Oct 2021) crossing option 1 would result in low impact tree removals in Cultural Woodlands.</p>	<p>According to the Natural Heritage Existing Conditions Report (WSP, Oct 2021) bridge crossing option 1 is proposed to be constructed over the Don River West Branch. The Don River West Branch is classified as permanent direct fish habitat therefore, any in-water works occurring in the watercourse must be reviewed under the Feasibility Assessment (FA).</p>
	<p>This alignment and bridge connection is situated on an existing 9m easement through land development planning and creates an opportunity to connect users from the proposed trail to the existing trail with connections to Clemson Cres.</p>	<p>This alignment poses grading challenges with steep slopes on the west approach tying the trail back to the existing trail connection on Villandry Cres.</p>
	<p>There is an opportunity to create a trail connection from Caproni Dr to Maple Airport Park.</p>	
	<p>Create a programmable linear park space along Caproni Dr. utilizing the development process to improve wayfinding and create a point of interest/placemaking feature.</p>	
<p>Option 2:</p> <p>A NEW BRIDGE AND TRAIL CONNECTING MOUNTCHARLES CRESCENT TO THE PROPOSED TRAIL</p>	<p>According to the Natural Heritage Existing Conditions Report (WSP, Oct 2021) crossing option 2 would require low impact tree removals in Cultural Woodlands.</p>	<p>According to the Natural Heritage Existing Conditions Report (WSP, Oct 2021) bridge crossing option 2 is proposed to be constructed over the Don River West Branch. The Don River West Branch is classified as permanent direct fish habitat. Therefore, any in-water works occurring in the watercourse must be reviewed under the FA.</p>
	<p>This alignment and bridge connection provides an opportunity to connect to Mountcharles Cres. which facilitates connections to two schools (Blessed Trinity Catholic Elementary School, and Maple Creek Public School) and a park</p>	

Crossing Option	Opportunities	Constraints
	(West Maple Creek Park) directly west of the bridge connection.	
	There is an opportunity to introduce active transportation and wayfinding enhancements to Mountcharles Cres. to strengthen the connection to Blessed Trinity School and West Maple Creek Park.	
	This crossing poses less grading and construction challenges than other crossings.	
Option 3: A NEW BRIDGE AND TRAIL CONNECTING GLENSIDE DR. TO THE PROPOSED TRAIL	This alignment and bridge connection provides an opportunity to connect users to Glenside Dr. and access two parks (Sports Village Park baseball diamonds and West Maple Creek Park), and two schools (Blessed Trinity Catholic Elementary School, and Maple Creek Public School) all within 750m distance.	According to the Natural Heritage Existing Conditions Report (WSP, Oct 2021) crossing option 3 directs the trail through the Unit 20 marsh wetland. The area is subject to spring flooding and is less disturbance tolerant. Introduction of species such as Common Reed or European Swallowwort (Dog-strangling Vine) with increased pedestrian traffic becomes highly likely for this community. Appropriate compensation or remediation for these effects is unlikely to be achievable.
	There is an opportunity to introduce active transportation and wayfinding enhancements to Glenside Dr. to strengthen the connection.	Bridge crossing option 3 is proposed to be constructed over the Don River West Branch. The Don River West Branch is classified as a permanent direct fish habitat. Therefore, any in-water works occurring in the watercourse must be reviewed under the FA.
		This alignment poses some grading challenges with steep slopes on the west approach tying the trail back to Glenside Dr.
		TRCA staff are of the opinion that this option is not viable due to impacts to the natural features and hazards of the site, including the presence of steep slopes, high impact of construction and construction access, wide floodplain

Crossing Option	Opportunities	Constraints
		and wetland communities. This proposed trail alignment would not comply with TRCA's The Living City Policies, since the protection hierarchy of avoidance, minimization and mitigation of impacts would not be achieved.
Option 4: A NEW BRIDGE CROSSING AND TRAIL CONNECTING THE BASEBALL DIAMONDS AT THE SPORTS VILLAGE PARK TO THE EXISTING TRAIL	This alignment and bridge connection creates an opportunity to connect users from the existing trail to Hollybush Dr., Sports Village Park and to a senior's residence.	According to the Natural Heritage Existing Conditions Report (WSP, Oct 2021) crossing option 4 would disturb unit 18, Dry-Fresh White Pine - Sugar Maple Mixed Forest and adjacent Fresh-Moist Manitoba Maple Lowland Deciduous Forest. The White Pine and Sugar Maple Forest has mature remnant trees present in the 1954 aerial imagery. This crossing would require high impact tree removals in a small vegetation community in one of the few sections of remnant forest which is locally uncommon in Maple.
	There is an opportunity for wayfinding and facilitate on-road trails on Hollybush Dr.	Bridge crossing option 4 is proposed to be constructed over the Don River West Branch. The Don River West Branch is classified as permanent direct fish habitat. Therefore, any in-water works occurring in the watercourse must be reviewed under the FA.
		TRCA are of the opinion that this option is not viable due to the presence of steep slopes, mature Significant Woodland, wide floodplain, the need for placement of fill and high impact of construction and construction access. It would not comply with TRCA's The Living City Policies, since the protection hierarchy of avoidance, minimization and mitigation of impacts would not be achieved.
		This alignment poses some grading challenges with steep slopes on the west approach tying the trail back to Sports Village Park baseball diamonds.
		Due to the nature of the site, there may be additional fill required to satisfy the construction of the bridge which may

Crossing Option	Opportunities	Constraints
		cause a concern based on TRCA criteria for water crossings (Appendix D – Floodplain Analysis).
Option 5: EXISTING CULVERT CONNECTION AS AN ALTERNATIVE TO A BRIDGE CROSSING	There is an opportunity to utilize existing infrastructure to create a low-cost trail connection to direct users to Hollybush Dr. and Sports Village Park baseball diamonds.	The slopes on the west side of the site are steep and the area is heavily vegetated where the connection to the park would extend – significant removals may need to occur; however, design may be able to mitigate.

4 ROUTE CROSSING ANALYSIS

A matrix was developed to guide the evaluation process, resulting in crossing recommendations. This matrix used four key criteria with objectives to evaluate and assess the proposed road crossing options.

The scoring methodology was based on preference level from most desirable (four being the highest) to not desirable (one being the lowest score). The levels were colour coded for visual differentiation.

SCORING METHODOLOGY
Most desirable (4/4)
(3/4)
(2/4)
Least desirable (1/4)

4.1 ROAD CROSSING

The road crossing options were assessed using a defined set of criteria shown in Table 9. Alignments were considered for both current conditions and possible future implementation.

TABLE 9: ROAD CROSSING CRITERIA










	Traffic Safety/User Comfort	Connectivity/Directness	Construction, Operating Costs & Complexity
Objectives	<ul style="list-style-type: none"> - provide comfortable crossings for all ages and abilities - minimize conflicts between all users - improve safety - accessibility - user experience 	<ul style="list-style-type: none"> - connectivity with proposed trail alignment - direct access to adjacent communities and key destinations - user delay 	<ul style="list-style-type: none"> - minimize cost to construction - minimize operating costs - design and construction risks - minimize impacts to existing infrastructure

4.1.1 Road Crossing Options at McNaughton Rd.

RECOMMENDATION: BELOW GRADE UNDERPASS/CULVERT CROSSING (OPTION 1)

This crossing type is preferred due to directness and improved user experience by keeping the alignment entirely off-road with a grade-separated crossing from vehicular traffic. While this increases cost and complexity, it is considered a long-term solution that can be implemented as part of the McNaughton Rd. Environmental Assessment road-widening project (currently underway and being led by The City of Vaughan). In addition to the ranking assessment (refer to Table 10), the public survey results indicated that the majority of respondents preferred Option 1, an underpass system. Until that time, a signalized at-grade crossing at the river (Option 2) can serve as an interim solution. See Figure 8 in Section 3.1.1 for a map.

TABLE 10: MCNAUGHTON RD. CROSSING RANKING

	CRITERIA	Traffic Safety / User Comfort	Connectivity / Directness	Construction and Operating Costs & Complexity	TOTAL SCORE	RANK	COMMENTS
		Objectives					
		<ul style="list-style-type: none"> -Provide comfortable crossings for all ages and abilities -Minimize conflicts between all users -Improve safety -Accessibility -User Experience 	<ul style="list-style-type: none"> -Connectivity with proposed trail alignment -Direct access to adjacent communities and key destinations -User delay 	<ul style="list-style-type: none"> -Minimize cost to construction -Minimize operating costs -Design and construction risks -Minimize impacts to existing infrastructure 			
	Weighting	30	30	40			
McNaughton Road Crossing	Option 1: Below Grade Culvert Crossing	 4 Entirely off-road and grade separated. Accessible option with relatively flat slope.	 4 Follows Greenway Trail System alignment. Grade separated crossing that minimizes delay crossing McNaughton Road.	 1 Requires construction of new culvert crossing at McNaughton Road.	70	1	Preferred due to directness through trail system and grade separation. Culvert introduces cost/complexity. Long-term solution as part of McNaughton Road EA.
	Option 2: Signalized At-Grade Pedestrian Crossing at River	 2 Signalized crossing requiring ramp up/down from McNaughton Road that may be uncomfortable for some users. Approx. 100m section of MUP required along McNaughton Road.	 3 Requires short diversion from Greenway Trail System alignment along McNaughton Road. Minimal opportunity for access to adjacent communities and key destinations based on length.	 2 Requires construction of new signalized crossing and section of MUP along McNaughton Road.	58	2	Potential alternative, not preferred due to trail diversion and steep ramp grades at crossing. Could be interim option, depending on timing of EA / Alternative #1.
	Option 3: Signalized At-Grade Pedestrian Crossing Connection at Kinloch Cres/Fletcher Dr Access	 2 Signalized crossing requiring ramp up/down from McNaughton Road that may be uncomfortable for some users. Approx. 200m section of MUP required along McNaughton Road.	 1 Requires diversion from Greenway Trail System Alignment along McNaughton Road. Minimal opportunity for access to adjacent communities and key destinations.	 2 Requires construction of new signalized crossing and section of MUP along McNaughton Road.	43	3	Not preferred due to relatively long diversion and steep ramp grades at crossing.

4.1.2 Road Crossing Options at Rutherford Rd.

RECOMMENDATION: EXISTING SIGNALIZED INTERSECTION AT GREENOCK DR. (OPTION 2)

Please note this section of trail is located within the future area phase for long-term implementation.

Preferred due to directness from preferred alignment (Alternative F) and relatively low cost. It is noted that changes to the design of Rutherford Rd. would be required to include a north-south crossride at Greenock Dr. and a bi-directional facility on the south side of Rutherford Rd. from Greenock Dr. to Sherwood Park Dr.. Refer to Table 11 for the ranking assessment.

Alternatively, while not as intuitive for users, a combination of a southbound crossing at Greenock Dr. and northbound crossing at Sherwood Park Dr. could be considered which maintains the unidirectional active transportation facilities on Rutherford Road. Additional wayfinding signage and pavement markings would be required.

In addition to the evaluation, the public survey results indicated that most respondents preferred Option 1, an underpass system. Although differing in opinion based on the WSP assessment, there are several factors that may make this crossing option preferable in the future. For example, factoring in future road reconstruction and/or assessing changes/additions to trail alignment(s) around Rutherford Road and Keele St. support the underpass crossing. See Figure 9 in Section 3.1.2 for map.

TABLE 11: RUTHERFORD RD. CROSSING RANKING

		2	3	2			
Rutherford Road Crossing	Option 1: Existing Signalized Intersection at Rotational Drive	Uses existing signalized crossing. Approx. 150m section of MUP/cycle track/sidewalk required on either side of Rutherford Road.	Diverges from the Greenway Trail System and loops back to connect. Opportunity for access to key destinations at Rotational Drive - "The Sports Village."	Requires construction of relatively long section of MUP/cycle track/sidewalk along Rutherford Road.	58	3	Potential alternative, not preferred due to trail diversion. Some benefit from access to rec. facilities and if trail alignment follows Tesma Way alternative.
	Option 2: Existing Signalized Intersection at Greenock Drive	Uses existing signalized crossing. Short section of MUP/cycle track/sidewalk required along Rutherford Road in order to connect to existing trail.	Deviates slightly from Greenway Trail System to reach crossing at Greenock Drive.	Requires construction of small section of MUP/cycle track/sidewalk along Rutherford Road.	83	1	Preferred due to directness through trail system and relatively low cost.
	Option 3: Use existing signalized intersection at Sherwood Park Drive	Uses existing signalized crossing. Approx. 250m section of MUP/cycle track/sidewalk required on north side of Rutherford Road, 100m on south side.	Relatively long diversion from Greenway Trail System with minimal opportunity for access to adjacent communities and key destinations.	Requires construction of relatively long section of MUP/cycle track/sidewalk along Rutherford Road.	43	4	Not preferred due to long diversion from trail system and relatively high associated costs. Greenock preferred.
	Option 4: Combination of #2 (southbound crossing) and #3 (northbound crossing)	Uses existing signalized crossing. Keeps cyclist travel along Rutherford Road as unidirectional, improving safety. Short section of Rutherford Road required for southbound crossing. Longer section required for northbound crossing.	Slight deviation from Greenway Trail System for southbound crossing. Longer diversion required for northbound crossing. Decreased directness from unidirectional implementation. Out of way travel for both Alignment L and M.	Use planned unidirectional cycle tracks as part of Rutherford Road improvements.	78	2	Not preferred due to long diversion from trail system and relatively high associated cost. Some safety benefits from unidirectional implementation, though comes at expense of directness through trail system. Some benefit if alignment follows Sherwood Park Drive alternative.

4.2 TRAIL SEGMENT CROSSINGS

A set of criteria was developed to evaluate, assess and analyze the different route options for the proposed trail. By considering factors such as user experience, comfort and safety, connectivity and directness, construction and operating costs and complexity, and engagement needs & feedback. (Table 12). Within each road segment, proposed trail routes were further analyzed using “pros” and “cons”.

Trail options were compared using the following criteria:

	User Experience, Comfort and Safety	Connectivity and Directness	Construction, Operating Costs and Complexity	Stakeholder Agency and Public Needs
Objectives	<ul style="list-style-type: none"> - Provide comfortable trails for all ages and abilities - Minimize conflicts between all users - Improve safety - Accessibility - User experience 	<ul style="list-style-type: none"> - Connectivity with proposed trail alignment - Direct access to adjacent communities and key destinations 	<ul style="list-style-type: none"> - Minimize cost to construction - Minimize operating costs design and construction risks - Minimize impacts to existing infrastructure - Impacts to private land ownership and land securement needs - Limit the potential impacts of winter maintenance - 	<ul style="list-style-type: none"> - Public needs and interest - Limit the impact to existing natural heritage systems - Protect the creek and floodplain limits while providing a buffer to adjacent residential yards - Provide connections that will link community destinations - Support placemaking along the trail with amenities and interpretive signages

TABLE 12: TRAIL ALIGNMENT CRITERIA

4.2.1 Trail Segment between McNaughton Rd. and Major Mackenzie Dr.

Recommendation: Route Option with Connection extending behind Mathewson St. homes

Public engagement survey results demonstrated that members of the public prefer Option A which features a bridge crossing. The bridge crossing option provides for open sightlines, direct and economical route for users, aesthetic appeal and user interest. It is the strongest option for mitigating adjacent property concerns. However, this option raises concerns with pond operations and will be a significant cost increase over the other alignment as a high-level cost

estimate for the bridge is approximately \$300,000. Thus, the bridge crossing is not feasible. See Figure 10 in Section 3.2.1 for map.

TABLE 13: TRAIL COMPARISON OPTIONS FOR ROUTES BETWEEN MCNAUGHTON RD. AND MAJOR MACKENZIE DR.

Route Option with Bridge Crossing	Pros <ul style="list-style-type: none"> - Natural heritage interest - Enhanced privacy for residential lots - Connectivity to existing trail and Killian-Lamar Parkette - Most desired option from the public engagement survey - SWMP not considered fish habitat. Bridge crossing would not be subjected to Federal Fisheries Act (FA,1985)
	Cons <ul style="list-style-type: none"> - Cost of bridge infrastructure development - Close proximity to residential lots. - Possible operational concerns with pond management
Route Option with Connection extending behind Mathewson St. homes	Pros <ul style="list-style-type: none"> - Connectivity to existing trail and Killian-Lamar Parkette - Natural heritage interest - Significant cost savings as no bridge infrastructure development is required
	Cons <ul style="list-style-type: none"> - Close proximity to residential lots

4.2.2 Trail Segment between Major Mackenzie Dr. and Rutherford Rd.

Recommendation: Alignment on east side of watercourse

Proposed trail alignments C, D and E are supported by stakeholders and the public as the most optimal route. WSP recommends this alignment and notes there may be minor modifications of proximity to watercourse and private properties. Minimum offsets from private property, minimizing crossings into flood limits and addressing private property crossings influenced the final alignment. See Figure 11 in Section 3.2.2.

4.2.3 Trail Segment between Rutherford Rd. and Keele St.

Recommendation: Alignment within the greenspace along Rutherford Rd. and Sherwood Park Dr. and within a shared facility on Alberta Dr. (modified alignment F)

Please note this alignment will be a long-term future area and is not included in the current target area phasing.

The proposed Alignment F route was determined most optimal by stakeholders and agency members due to minimal environmental impact; however, there were concerns from public survey discussions regarding the proposed use of Sherwood Park Dr. as a shared on-road facility. Based on that discussion it was determined that Alberta Dr. is better suited than Sherwood Park Dr. because of less vehicle traffic, despite its narrower cross section.

Through the public survey, the public noted their preference for an alignment that travels through natural areas instead of Alignment F. However, it was communicated that the alignment would be based on the principle of preserving natural heritage.

The option along Tesma Way was determined difficult due to construction complexities; however, it was favoured by the public. Tesma Way offers many positive attributes due to the opportunities it presents to the employment area and the available space within the road ROW. The difficulty with the connection between Tesma Way and Keele St is the key barrier dismissing this option. It is recommended the City continue to monitor developments in the area and revisit this option based on future development applications and/or new road construction that may provide opportunities for a stronger connection. See Figure 13 in Section 3.2.3.

4.3 BRIDGE CROSSING

Trail options were compared using the following criteria:

TABLE 14: BRIDGE CROSSING CRITERIA

	User Comfort and Safety	Connectivity and Directness	Construction and Operating Costs & Complexity	Stakeholder, Agency and Public Needs
Objectives	<ul style="list-style-type: none"> - Provide comfortable trails for all ages and abilities - Minimize conflicts between all users - Improve safety - Accessibility - User experience 	<ul style="list-style-type: none"> - Connectivity with proposed trail alignment - Direct access to adjacent communities and key destinations 	<ul style="list-style-type: none"> - Minimize cost to construction - Minimize operating costs - Design and construction risks - Minimize impacts to existing infrastructure - Minimize impacts to private land ownership and land securement needs - Minimize length of bridge structure - Minimize the needs for grading/ fill/ overall material import - Limit the potential impacts of winter maintenance - 	<ul style="list-style-type: none"> - Public needs and interest - Limit the Impact to the existing natural heritage systems - Protect the creek and floodplain limits while providing a buffer to adjacent residential yards - Provide connections that will link community destinations - Support placemaking along the trail with amenities and interpretive signages

4.3.1 Bridge Crossing between Major Mackenzie Dr. and Rutherford Rd.

Recommendation: Proceed with a culvert/land crossing near Sports Village Park and Complex and reconsider bridge crossing #2 at Mountcharles Cres. in the long term

There are currently four proposed bridge crossing options to connect the trail between Major Mackenzie Dr. and McNaughton Rd.. The preferred trail alignment has been determined Option 2: bridge crossing (Mountcharles Cres. connection) as the most optimal crossing is from a constructability and connectivity standpoint.

Feedback from the online engagement survey indicated most people prefer Option 2: a new bridge and trail linking Mountcharles Cres. to the proposed main trail. A number of participants

also indicated their preference for Option 4: a new bridge and trail linking the baseball diamonds at the Sports Village Park to the existing trail. However, alignment option 4 would have significant natural heritage impacts including tree removals of an existing remnant forest.

To facilitate the desired connection to Sport Village Park, it is recommended to utilize the existing culvert and land bridge to facilitate the connection as an interim alignment in advance of the McNaughton Rd. Environmental Assessment. See Figure 18 in Section 3.3.

TABLE 15: SITE COMPARISON FOR BRIDGE CROSSINGS BETWEEN MCNAUGHTON RD. AND MAJOR MACKENZIE DR.

<p>1. Bridge and trail connecting Bevan Road and Caproni Dr.</p>	<p>Pros</p> <ul style="list-style-type: none"> - Minimal tree removals in Cultural Woodlands - Site is situated on existing easement. - Potential connection to three neighbouring streets - Opportunities for future developments to improve connectivity and wayfinding in the area <p>Cons</p> <ul style="list-style-type: none"> - Grading challenges affect accessibility. - Built across Don River West (permanent fish habitat)
<p>2. Bridge and trail connecting Mountcharles Cres. to the proposed new trail</p>	<p>Pros</p> <ul style="list-style-type: none"> - Minimal tree removals in Cultural Woodlands - Potential connection to one neighbouring street - High connectivity to local schools and park - Most desired option from the public engagement survey - Opportunities for future developments to improve connectivity and wayfinding in the area - Option with the most minimal grading and construction challenges <p>Cons</p> <ul style="list-style-type: none"> - Built across Don River West (permanent fish habitat)
<p>3. Bridge and trail connecting Glenside Dr. To the proposed new trail</p>	<p>Pros</p> <ul style="list-style-type: none"> - High connectivity to two local schools and two parks <p>Cons</p> <ul style="list-style-type: none"> - Grading challenges affect accessibility

	<ul style="list-style-type: none"> - Built across Don River West (permanent fish habitat) - Built through marsh wetland – less disturbance tolerant - Increased pedestrian traffic due to a proposed trail/ bridge would increase the likelihood of invasive species on this site
<p>4. Bridge and trail connecting the baseball diamonds at the Sports Village Park to the existing trail</p>	<p>Pros</p> <ul style="list-style-type: none"> - Potential connection to one neighbouring street - High connectivity to one local sports park and one senior residence
	<p>Cons</p> <ul style="list-style-type: none"> - Grading challenges affect accessibility - Built across Don River West (permanent fish habitat) - Require high impact tree removals

5 MASTER PLAN TRAIL DESIGN

5.1 FINAL MASTER PLAN ALIGNMENT DESIGN RESPONSE OPPORTUNITIES, CONSTRAINTS AND ANALYSIS

This design has been informed by various public and stakeholder responses, in addition to technical staff input received to date. It is informed by technical experts, utilizing industry standard best practices and considers input from stakeholders and the public. The 30% conceptual trail design package can be found in Appendix G. Below is a list of strategies and considerations that inform the design of the trail:

- Locate trail outside of the 100-year floodplain (TRCA regulatory flood line) in areas where feasible (Appendix A - Preferred Trail Alignment).
 - In cases where this is not possible, the trail has been located within a 10m offset from the TRCA 100-year flood line; design rationale is provided on how the impacts would be mitigated.
- Trail is located the maximum distance away from PSWs where feasible to do so.
- Trail is located at a minimum 6-8m distance away from approximate top of bank of the Don River West Branch watercourse.
- A minimum buffer limit between the trail and residential property boundaries of 10m has been adhered to where feasible.
- Restoration, enhancement planting and seeding strategies have been integrated into the design to provide buffers between the trail and adjacent properties.
- Proposed route from Rutherford Rd. south to Keele St. utilizes existing/future on-road facilities and sidewalks to form trail connections and does not continue within the natural heritage area due to the existence of high-quality woodland, unfeasible steep slopes, proximity to the creek and proximity to residential rear yards.
- Accessible seating areas which include one accessible concrete pad, and one bench have been integrated into the design where it is feasible.

5.2 SUMMARY OF KEY MOVES

Key moves discussed below summarize decisions of note that were applied to the layout and elements of the final master plan alignment.

1. The “west route connection” connecting Maple Airport Park to Caproni Dr. and Villandry Cres. has been explored and will no longer be pursued due to complications with property acquisition and future developments.
2. The 3m trail along Bevan Rd. has been adjusted to show the alignment in the proposed development between 7 Bevan Rd. and 10 Bevan Rd.
3. An alternate proposed bridge crossing has been considered between Lancer Dr. and Whitburn Cres. due to concerns raised by residents. This option considered two bridge connections and an asphalt trail on the west side of the Don River West Branch watercourse to provide more space between residential backyards and the edge of trail. This option has been explored and will no longer be pursued due to the adverse environmental impacts.
4. Two trail design options have been proposed between Lancer Dr. and Greenock Dr. due to a headwall found on site walk #3 (March 17, 2022). Both options are to be explored further (see both approaches below). Consultations with the City, TRCA and MECP regarding habitat and ecological concerns in the subject area may be required.
 - Trail design Option 1: Proposed boardwalk trail
 - Trail design Option 2: Proposed asphalt trail with swale and culverts
5. The proposed bridge location and trail at Mountcharles Cres. has been explored and will not be pursued as part of this study due to concerns raised by residents in the Mountcharles Cres. neighbourhood related to increasing pedestrian traffic near residential homes. (Refer to the public engagement summary March 18, 2022 for more details). It will be revisited as a long-term consideration in the future.
6. An alternate trail location was considered on the west side of the Don River West Branch along Tesma Way which responded to residential concerns about the trail being located too close to residential backyards (refer to the public engagement summary March 18, 2022 for more details). This option is to be explored as part of a separate study. Consultations with the City, TRCA and MECP regarding habitat and ecological concerns in the subject area may be required.
7. 30% design development scope will end at Rutherford Rd. due to lack of support through public and stakeholder consultations. It is recommended that the proposed preliminary segment from Rutherford Rd. to Keele St. be revisited with more detail site investigation in the future. Due to this reason, implementation costs have not been included in this design brief.

5.3 PROPOSED ROUTE OVERVIEW

The following map is for reference as an overview of sections discussed below. Refer to **Appendix F** for a full scape map of the routes considered and the final master plan alignment. The map shown has been broken down into discussion segments of the final alignment that are described in greater detail in the following sections.

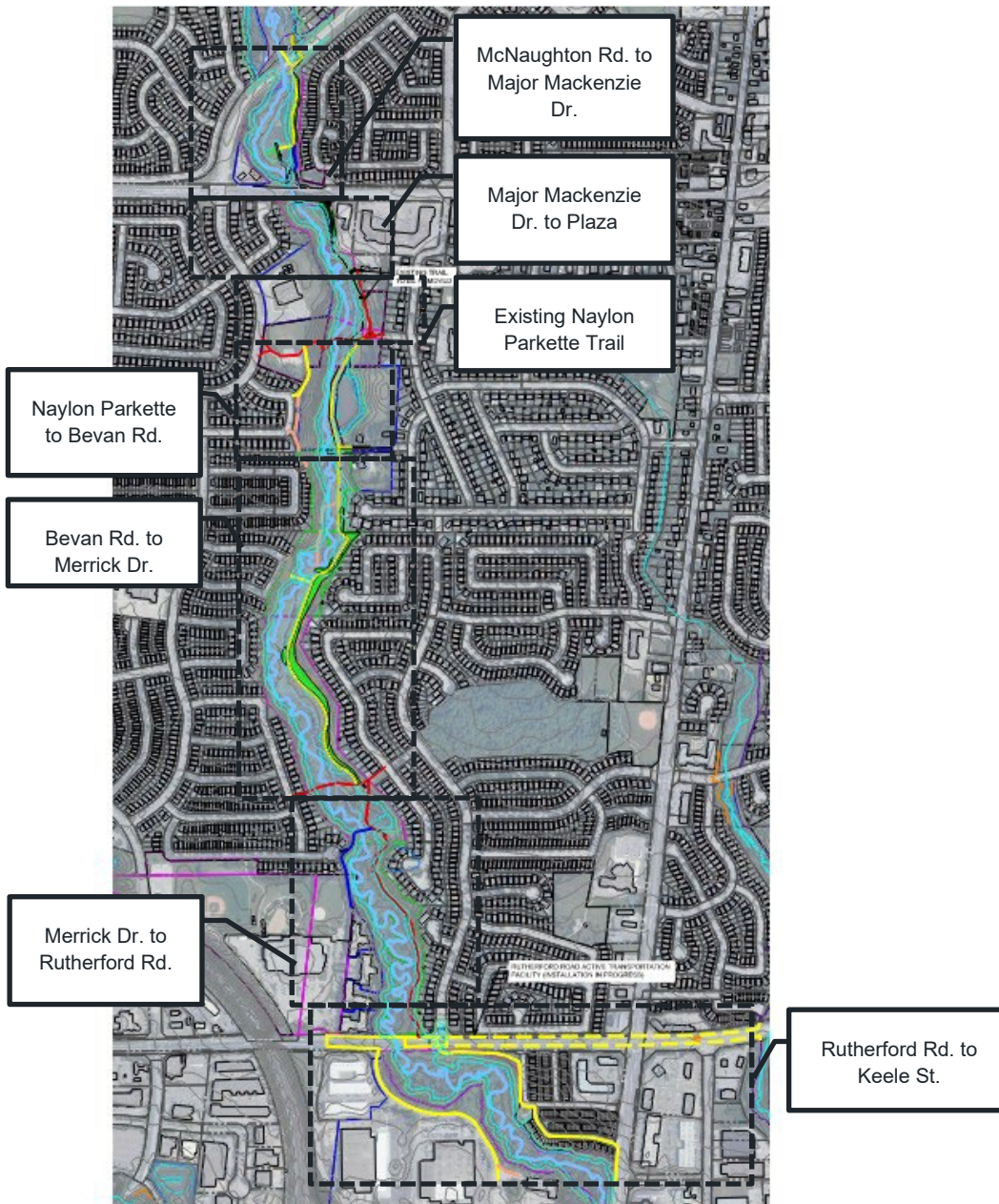


FIGURE 19: ALIGNMENT OVERVIEW MAP

5.3.1 McNaughton Rd. to Major Mackenzie Dr.

The recommended alignment between McNaughton Rd. and Major Mackenzie Dr. includes one controlled signalized pedestrian road crossing and select retaining walls/railings. Beginning at the proposed crossing infrastructure on McNaughton Rd., this trail will travel south along the valley land adjacent to the rear yards of the properties on Matthewson St. and connect to the existing servicing route. TRCA typically does not support retaining walls within the flood and erosion hazard of valley and stream corridors. To ensure the stability of the structure, a structural engineer's letter is required, including all applicable details regarding the proposed retaining wall.

WSP recommends that the long-term crossing approach be a pedestrian underpass at McNaughton Rd., similar to the existing crossing at Major Makenzie Dr. The signalized pedestrian crossing is proposed to act as an interim condition or incorporated as a permanent crossing if determined more feasible. It is recommended that the McNaughton Rd. EA address the assessment and inclusion of an underpass type crossing. Below is a brief description regarding each crossing and trail alignment option.

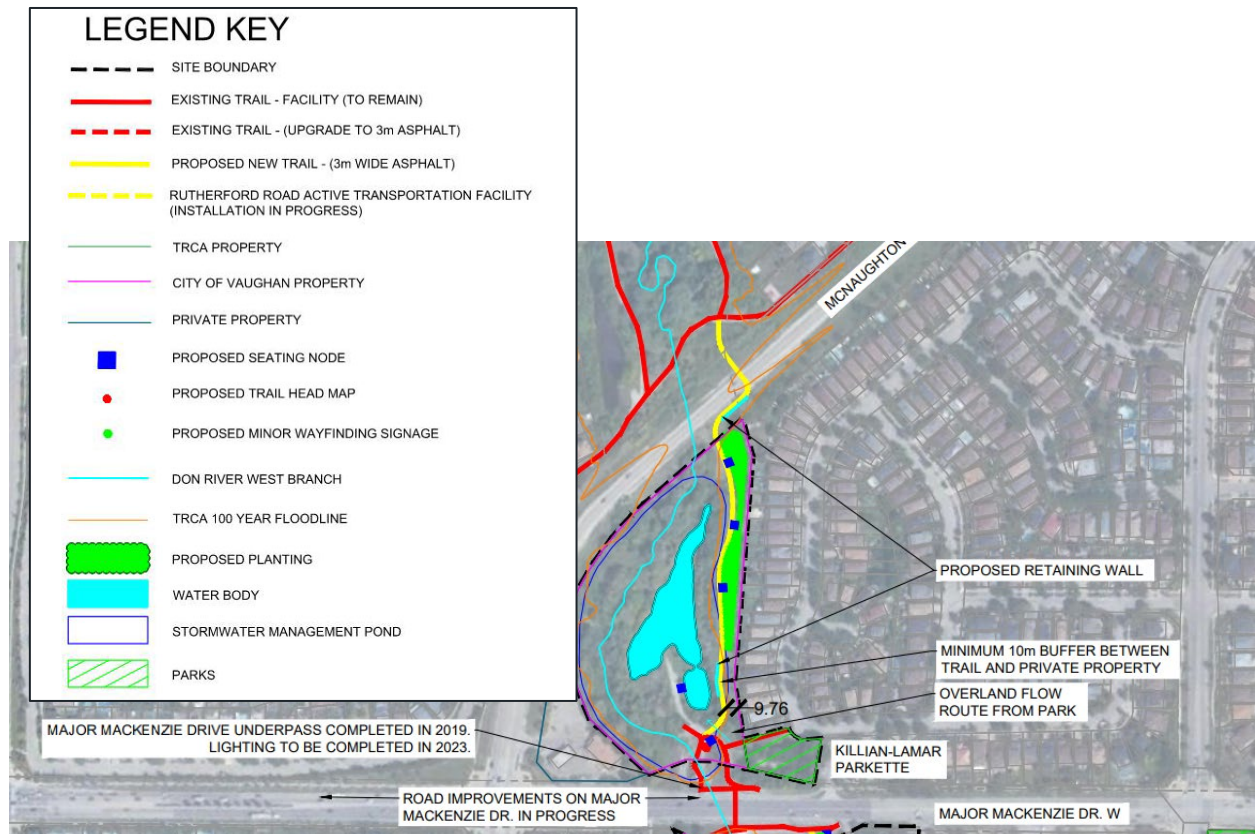


FIGURE 20: PROPOSED TRAIL ALIGNMENT

DESIGN ELEMENTS PROPOSED:

- One 3m asphalt trail
- Two P-gates to prevent vehicles from driving onto the trail on either side of McNaughton Rd.
- One proposed culvert to mitigate low point of site and allow water to flow underneath the proposed trail north of McNaughton Rd.
- One row or retaining wall to mitigate steep slopes presented by existing site conditions and meet the maximum 5% slope and 2% cross slope per best practice and City of Vaughan's asphalt trail details
- Five amenity seating nodes placed every 50m for users by providing benches and informal rock seating
- One proposed trailhead map to direct users at the existing Major Mackenzie Dr. trail entrance

OTHER DESIGN CONSIDERATIONS:

- Adjacent property relationship: The trail lies within 10-20m offset limit from the property line and within 8-10m of the property line at the south end of the pond.
- Buffer and restoration planting: Type 3 robust buffer planting and Bee Forage Meadow Mix restoration seeding is recommended for this area.
- Vegetation removal: Minimal vegetation removal is required. Trail will be in existing mowed turf areas, with select removal of trees and shrubs as needed to facilitate trail installation and grading.
- Minimize development within TRCA regional flood limit: The trail alignment has been pushed back as far from the TRCA regional flood line as possible while maintaining a meaningful buffer distance to the residential properties and minimizing grading disturbance within the valley.

5.3.2 Recommended Crossing Infrastructure (McNaughton Rd.)

Interim:

(Signalized Pedestrian Crossing)

Although an at-grade crossing is less desirable by users, this interim solution will facilitate crossing of McNaughton until the road is reconstructed.

Future:

(Tunnel Underpass)

While this introduces more cost and complexity, study will recommend that a tunnel is a long-term solution that can be implemented as part of McNaughton Road widening and should be further considered at the Environmental Assessment (EA) stage of that project.



FIGURE 21: TRAIL CROSSING OF MCNAUGHTON RD

An interim option prior to the future McNaughton Rd. widening is a new signalized trail crossing. The crossing treatment should be determined based on geometric and traffic characteristics by applying the warrant criteria from Ontario Traffic Manual Book 15: Pedestrian Crossings. It could be midblock pedestrian signals, a pedestrian crossover (PXO) or uncontrolled crossing with a median refuge island. Midblock pedestrian signals provide the most comfort for pedestrians and cyclists, but at a higher capital cost, while signals and PXOs introduce motor vehicle delay.

Table 6.4 – Application Environment for Uncontrolled Cycling Crossing

Two-Way Average Daily Traffic Volume	Posted Speed Limit (km/h)	1 or 2 Lanes	3 Lanes	4 Lanes
< 4,500	≤ 50	●	●	●
	60	●	●	○
	70–80	●		
4,500 to 6,000	≤ 50	●	●	○
	60	●	○	
	70–80	○		
6,000 to 7,500	≤ 50	●	●	○
	60	●	○	○
	70–80	○		
7,500 to 9,000	≤ 50	●	○	○
	60	○		
	70–80	○		

- Suitable application context (with or without median refuge)
- Suitable application context (median refuge recommended)

FIGURE 22: UNCONTROLLED CROSSING APPLICATION ENVIRONMENT FROM OTM BOOK 18

Table 7: Pedestrian Crossover Selection Matrix

Two-way Vehicular Volume			Posted Speed Limit (km/h)	Total Number of Lanes for the Roadway Cross Section ¹			
Time Period	Lower Bound	Upper Bound		1 or 2 Lanes	3 lanes	4 lanes w/raised refuge	4 lanes w/o raised refuge
8 Hour	750	2,250	≤50	Level 2 Type D	Level 2 Type C ³	Level 2 Type D ²	Level 2 Type B
4 Hour	395	1,185		Level 2 Type C	Level 2 Type B	Level 2 Type C ²	Level 2 Type B
8 Hour	750	2,250	60	Level 2 Type D	Level 2 Type B	Level 2 Type D ²	Level 2 Type B
4 Hour	395	1,185		Level 2 Type C	Level 2 Type B	Level 2 Type C ²	Level 2 Type B
8 Hour	2,250	4,500	≤50	Level 2 Type D	Level 2 Type B	Level 2 Type D ²	Level 2 Type B
4 Hour	1,185	2,370		Level 2 Type C	Level 2 Type B	Level 2 Type C ²	Level 2 Type B
8 Hour	2,250	4,500	60	Level 2 Type D	Level 2 Type B	Level 2 Type D ²	Level 2 Type B
4 Hour	1,185	2,370		Level 2 Type C	Level 2 Type B	Level 2 Type C ²	Level 2 Type B
8 Hour	4,500	6,000	≤50	Level 2 Type C	Level 2 Type B	Level 2 Type C ²	Level 2 Type B
4 Hour	2,370	3,155		Level 2 Type B	Level 2 Type B	Level 2 Type C ²	Level 2 Type B
8 Hour	4,500	6,000	60	Level 2 Type C	Level 2 Type B	Level 2 Type C ²	Level 2 Type B
4 Hour	2,370	3,155		Level 2 Type B	Level 2 Type B	Level 2 Type C ²	Level 2 Type B
8 Hour	6,000	7,500	≤50	Level 2 Type B	Level 2 Type B	Level 2 Type C ²	Level 1 Type A
4 Hour	3,155	3,950		Level 2 Type B	Level 2 Type B	Level 2 Type C ²	Level 1 Type A
8 Hour	6,000	7,500	60	Level 2 Type B	Level 2 Type B		
4 Hour	3,155	3,950		Level 2 Type B	Level 2 Type B		
8 Hour	7,500	17,500	≤50	Level 2 Type B	Level 2 Type B		
4 Hour	3,950	9,215		Level 2 Type B	Level 2 Type B		
8 Hour	7,500	17,500	60	Level 2 Type B			
4 Hour	3,950	9,215		Level 2 Type B			

Type A
 Type B
 Type C
 Type D

Approaches to roundabouts should be considered a separate roadways.

¹The total number of lanes is representative of crossing distance. The width of these lanes is assumed to be between 3.0 m and 3.75 m according to MTO Geometric Design Standards for Ontario Highways (Chapter D.2). A cross sectional feature (e.g. bike lane or on-street parking) may extend the average crossing distance beyond this range of lane widths.

²Use of two sets of side mounted signs for each direction (one on the right side and one on the median)

³Use Level 2 Type B PXO up to 3 lanes total, cross section one-way.

The hatched cells in this table show that a PXO is not recommended for sites with these traffic and geometric conditions. Generally a traffic signal is warranted for such conditions.

FIGURE 23: PEDESTRIAN CROSSOVER (PXO) SELECTION MATRIX FROM OTM BOOK 15

5.3.3 Recommended Future Crossing

A future crossing is preferred due to directness and improved user experience by keeping the alignment entirely off-road with a grade-separated crossing from motor vehicle traffic.

While this introduces more cost and complexity, it is considered a long-term solution that can be implemented as part of McNaughton Rd. widening and should be further considered at the EA stage of that project.

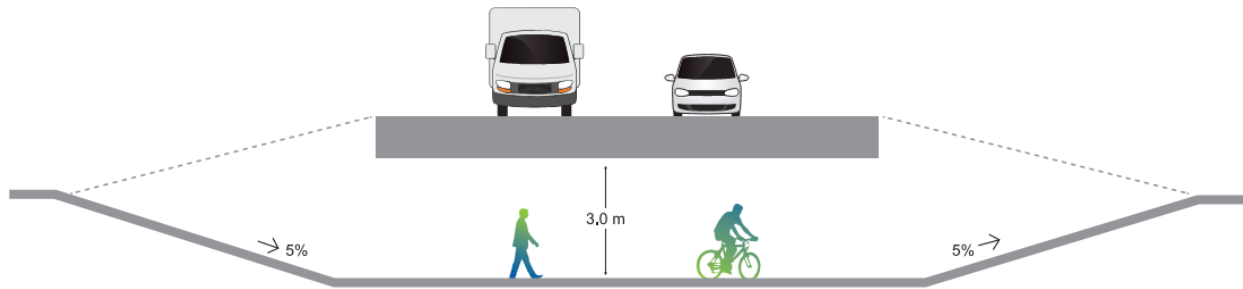


FIGURE 24: UNDERPASS ELEVATION PROFILE (SOURCE: YORK REGION PEDESTRIAN AND CYCLING PLANNING AND DESIGN GUIDELINES, 2018)

An underpass must be wide and tall enough for pedestrians and cyclists travelling in both directions to pass through safely. Vaulted or elliptical cross-sections are preferable to rectangular cross-sections for maximizing natural lighting. Regardless of the shape, the recommended width is 5m. This includes 0.5m of horizontal clearance when a cycling facility is adjacent to a wall, in addition to the width of the active transportation facility. A narrower underpass increases the risk of accidents due to a combination of descent speed, low light and the presence of sidewalls. A vertical clearance of at least 3m throughout the underpass will help ensure user comfort and optimal natural light during the day. As with ramps for bridges and overpasses, the grade on the approaches to an underpass should meet AODA requirements, ideally being a maximum of 5% longitudinal slope. The figures below show examples of pedestrian underpasses.

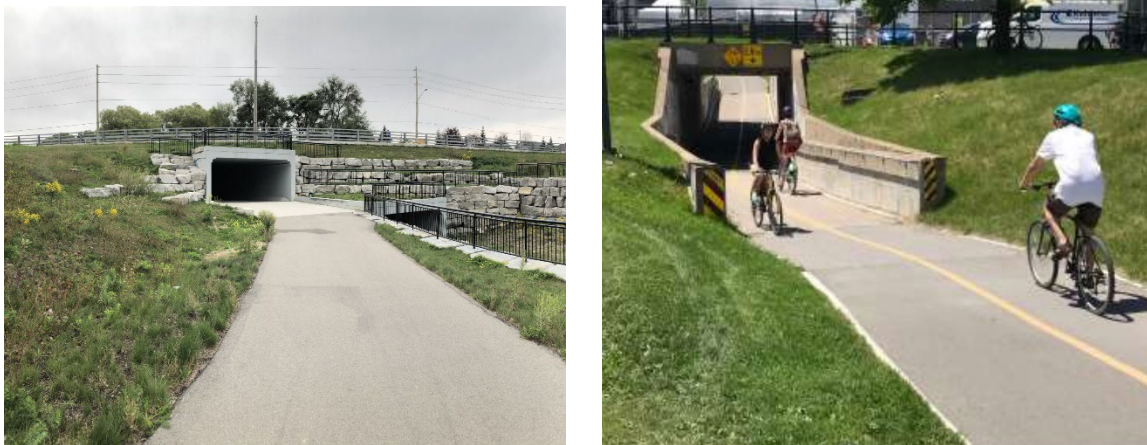


FIGURE 25: EXAMPLES OF TWO PEDESTRIAN/ CYCLING UNDERPASS OPTIONS

Lighting Infrastructure - The addition of lighting infrastructure is important through an underpass to facilitate evening trail use and for winter months where commuting hours are often dark. With the need for additional lighting in the Major Mackenzie Dr. underpass post construction, lighting should be included as part of any underpass infrastructure within the trail corridor. Lighting can be more than a functional amenity and incorporating lighting with dual function as a design feature can further serve to mitigate undesirable activity and/or perception of the underpass space by increasing frequency of users. The City of Vaughan should consider including colour and/or programmable LED lighting as part of the McNaughton Rd. underpass and future underpass projects. While the cost is greater than functional lighting products, the technology continues to progress and become more economical.

5.3.4 Major Mackenzie Dr. to Plaza Access Point

The recommended alignment between Major Mackenzie Dr. to the Plaza access point includes one property acquisition/land use agreement and section of retaining wall/railing to make the north connection to the exiting ramp. The recommended alignment starts from the existing pathway ramp that connects Major Mackenzie Dr. sidewalk to the existing trail underpass. The proposed trail continues south-west of St. David's Parish Church property until it meets the existing pathway. There is a connection point proposed traveling east-west connecting the existing parking lot to the preferred trail alignment. It is recommended that the connection ramp/stairs be reconstructed as an AODA compliant ramp.

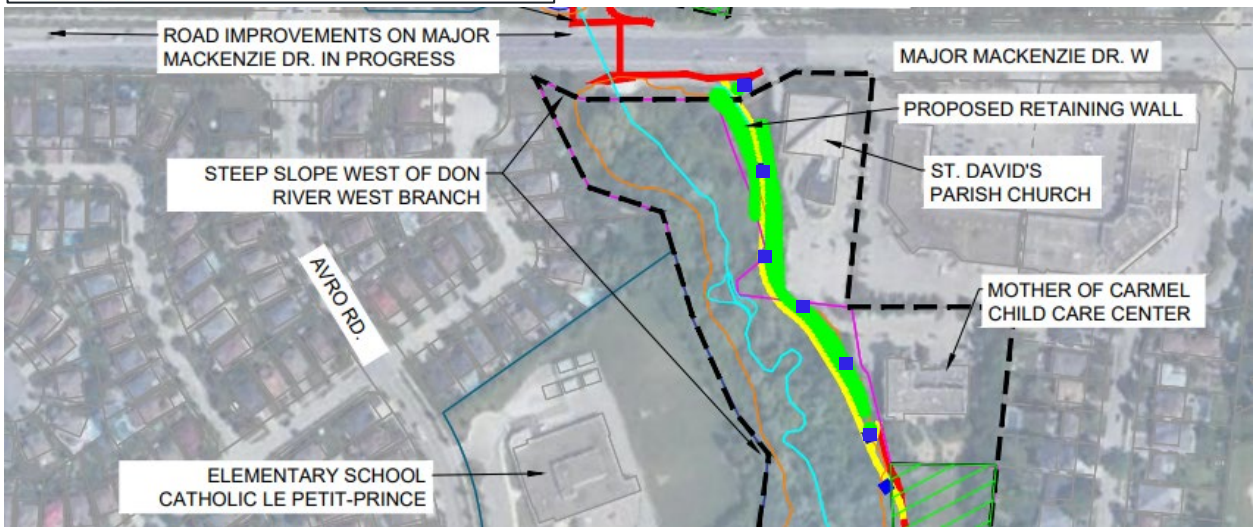
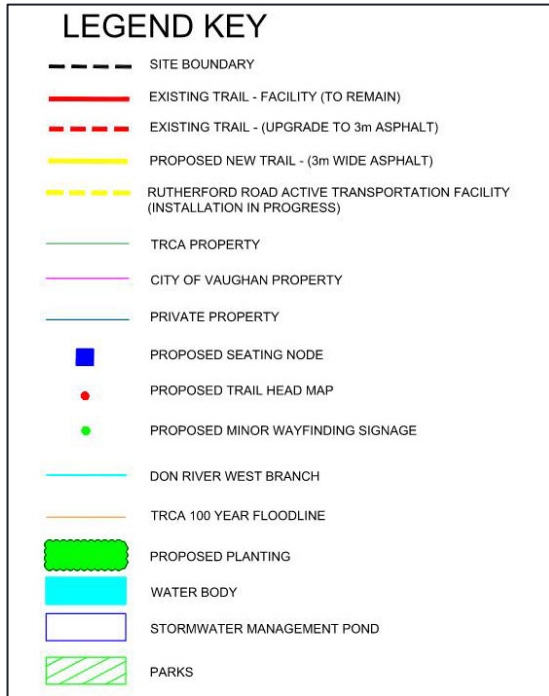


FIGURE 26: PROPOSED TRAIL ALIGNMENT

DESIGN ELEMENTS PROPOSED:

- Two p-gate access – to prevent vehicles from driving onto the trail on either side of McNaughton Rd.
- One retaining wall – to mitigate steep slopes as a result of existing site conditions as benching the trail is likely not be adequate to support the trail at the ramp connection.
- Four amenity nodes – a seating node to be placed approximately every 50m for users by providing benches and informal seating.

- One existing stairs/ramp is proposed to be redesigned to meet AODA standards.
- One existing trail removal – to facilitate a smooth transition between the existing trail and the preferred trail alignment.

OTHER DESIGN CONSIDERATIONS:

- Adjacent property relationship – the trail has been located within the limits of St. David’s Parish Church property due to minimizing impacts to the PSW. The trail is not able to meet the recommended 10m minimum distance from the property limit. Preliminary positive discussions have occurred between City staff and the property owner.
- Buffer and restoration planting – type 1 light buffer enhancement planting is proposed to the east of the trail, and type 3 robust buffer enhancement planting is proposed to the west to deter users from straying into the PSW. Bee forage meadow mix restoration seeding is recommended for seeding within the valleylands and the roadside edge seed mix is recommended for seeding within edge conditions.
- Vegetation removal – vegetation removal is required to facilitate trail installation and grading through existing wooded valleyland; however, trees are sparse and include non-native and native invasives.
- Invasive species removal – there are existing phragmites adjacent to the trail works that could be addressed through the construction of the trail.
- Minimize development within TRCA regional flood limit – the trail alignment has been pushed back as far from the TRCA regional flood line as possible while minimizing grading disturbance within the valley. There is a portion of trail which veers within the TRCA regional flood line beside the south parking lot at St. David’s Parish Church. Measures are taken to reduce the grading impacts within this area through the 30% design.
- Retaining wall - retaining wall length and height are to be kept to a minimum. Where possible, heights are to be kept below 600mm to avoid fall protection requirements. City staff should include inspection of retaining walls and railings during review of the entire trail network and recommend remediation of erosion or fall protection repair as necessary. TRCA geotechnical staff are to be consulted at detail design for specific requirements related to the proposed retaining walls.

5.3.5 Existing Naylon Parkette Trail

The recommended alignment between Mother of Carmel Childcare Centre to Naylon Parkette includes one existing trail proposed for resurfacing. The existing trail south of the childcare centre (located outside of the TRCA regional flood line) is proposed for resurfacing. The extent of resurfacing proposed will extend south until it meets the existing trail running east-west of Naylon Parkette. It is recommended that this location consider additional trail amenity

programming to develop an activity hub. This may include a fitness node or a larger shade structure with seating.



FIGURE 27: PROPOSED TRAIL ALIGNMENT

DESIGN ELEMENTS PROPOSED:

- One existing 3m asphalt trail proposed for resurfacing – to remediate the existing trail to create a safer and more accessible user experience.
- One amenity node – fitness node or a larger shade structure with seating.
- Wayfinding signage

OTHER DESIGN CONSIDERATIONS:

- Buffer and restoration planting – roadside edge seed mix is recommended beside the trail alignment to the limit of construction.
- Vegetation removal – there are no tree removals expected with the proposed trail alignment.
- Minimize development within TRCA regional flood limit – the proposed resurfacing is outside the TRCA regional flood limit.

5.3.6 Naylon Parkette to Bevan Rd.

The recommended alignment between Naylon Parkette to Bevan Rd. is a simple section of trail on flat terrain, utilizing a sewer easement that is being established as a trail easement as part of a land development application. The proposed trail alignment begins at the existing trail through Naylon Parkette, travels south-west between an existing pond (slated for removal as part of future development work) and the creek to Bevan Rd. The route will provide vistas of the creek and adjacent wooded area. There is an east- west trail alignment proposed creating a connection from Bevan Rd. to the main trail route.

The west route connection connecting Maple Airport Park to Caproni Dr. and Villandry Cres. was explored and will no longer be pursued due to complications with property ownership, steep slopes, proximity to residential yards (unable to buffer) and the availability of existing trail connections already in this area.

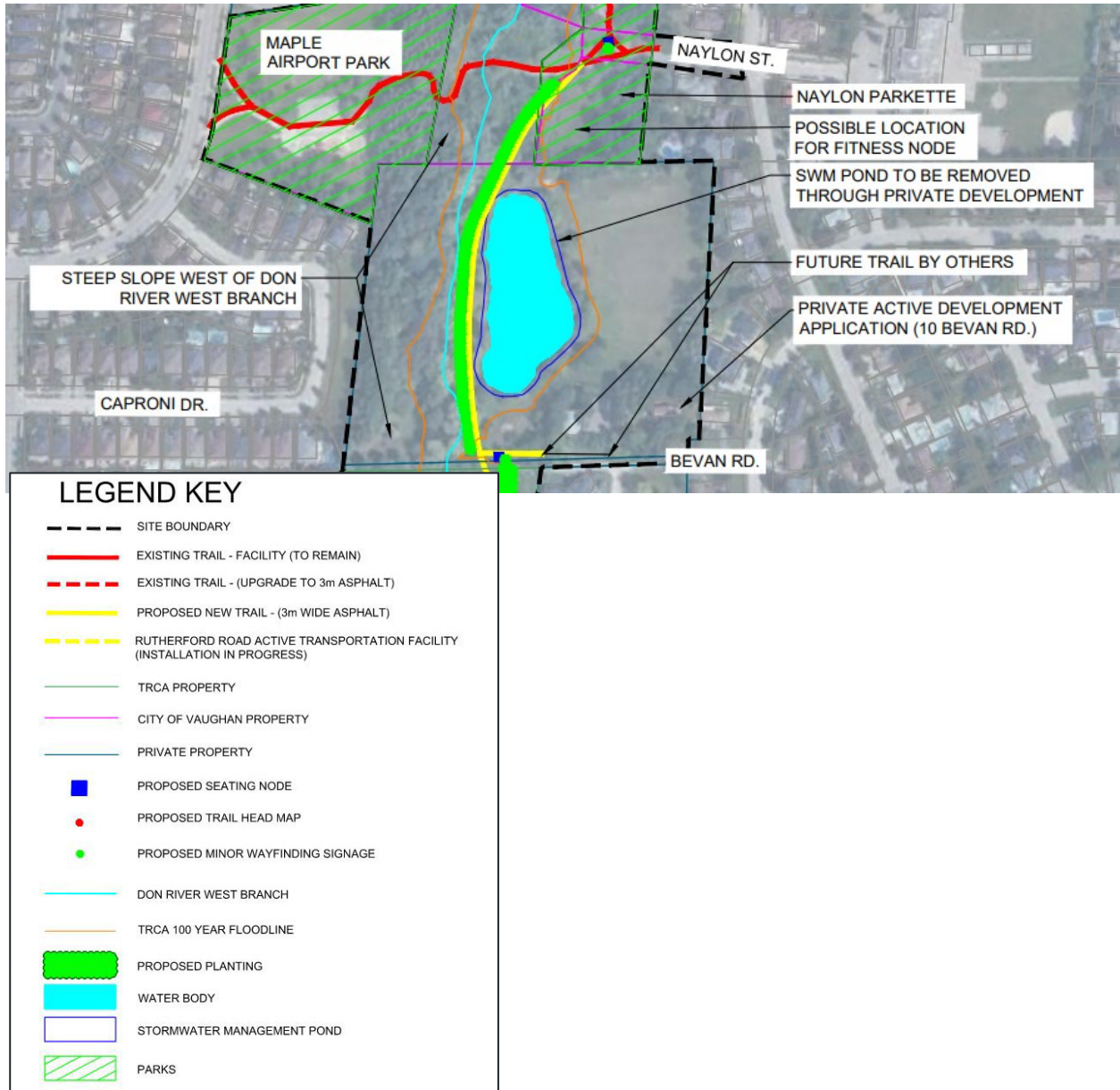


FIGURE 28: PROPOSED TRAIL ALIGNMENT

DESIGN ELEMENTS PROPOSED:

- One 3m asphalt trail.

OTHER DESIGN CONSIDERATIONS:

- Adjacent property relationship – the trail lies within the 10-20m offset limit from the property line.
- Buffer and restoration planting – bee forage meadow mix will be chosen for the impact of the trail construction.
- Vegetation removal – minimal vegetation removal is expected. Trail will be located in the existing sanitary easement with select removal of trees and shrubs as needed to facilitate trail installation and grading.
- Minimize grading within TRCA regional flood line – the trail alignment is within TRCA regional flood limit. Precautions to minimize grading disturbance within the valley are taken in the 30% design.

5.3.7 Bevan Rd. to Merrick Dr.

The recommended alignment between Bevan Rd. to Merrick Dr. includes two lengths of boardwalk trail and buffer planting and a potential future bridge connection to Mountcharles Cres.. The preferred alignment will travel south from Bevan Rd. and meander south-east of the 7 Bevan property through open space with sparse vegetation. It continues south with a 10-15m property offset behind lots on Lancer Dr. and continues south-west through open valley land where the offset behind lots is increased to 15-25m. Once the trail reaches Waterside Cres., it travels south until it meets Merrick Dr.

The proposed bridge location and trail at Mountcharles Cres. has been explored as part of the opportunities and constraints and crossing analyses and will not be pursued as part of this study due to concerns raised by residents in the Mountcharles Cres. neighbourhood related to increasing pedestrian traffic near residential homes. (Refer to sections 3.3.1, 4.3.1 and **Appendix A: Engagement Plan and Outcomes Summary** March 18, 2022 for more details). The proposed bridge will be revisited as a long-term consideration in the future.

The trail located behind properties on Lancer Dr. and Waterside Cres. area is also highly contentious and future design development should include continued consultation with homeowners in the area. (Refer to **Appendix A: Engagement Plan and Outcomes Summary**, fall 2022).

DESIGN ELEMENTS PROPOSED:

- One 3m asphalt trail.
- Two lengths of boardwalk trail – railings are likely not required due to low profile of the structure; however, consideration for a railing on the valley side is recommended to discourage entry into the sensitive landscape.
- One bio-swale/erosion mitigation planting – to mitigate existing erosion and better manage run-off from properties/drainage outlet. Alternately, implement woody shrub naturalization to replace manicured lawn areas/meadow turf and improve soil stability.
- One shelter – to act as a rest station and an opportunity for shaded seating for users entering from Merrick Dr.
- Twelve amenity nodes – a seating node placed approximately every 50m for users by providing benches and informal seating.

OTHER DESIGN CONSIDERATIONS:

- Adjacent property relationship – the trail lies outside a 20m offset limit from the property line for the exception of trails from Bevan Rd. to Lancer Dr. after which the offset increases (approximately at Waterside Cres.) where the trail lies within the 10m-15m offset from the property line due to the location of top of bank and an existing headwall drainage outlet. Special consideration and consultation should take place to minimize impacts to adjacent properties, including vegetation protection, level of screening and ongoing monitoring of trail user impacts.
- Buffer and restoration planting – bee forage meadow mix restoration seeding is recommended for seeding within the valleylands and the roadside edge seed mix is recommended for seeding within edge conditions. Use of shrubs is recommended to screen the trail while maintaining views into the valley from residential units. Select tree planting should be introduced through consultation with the public.
- Vegetation removal – there are minimal tree/vegetation removals expected within the proposed trail alignment with select removal of hazard/invasive trees and shrubs as needed to facilitate trail installation and grading. Modifications to the alignment at the detail design level can be made to ensure existing trees such as high-quality coniferous trees are saved and invasive species are removed.
- Trail alignment provides a 6m minimum offset from the top of bank, 2m greater than the 4m offset recommended through the fluvial geomorphology study.
- Boardwalk infrastructure selected to further minimize development within TRCA regional flood limit. The trail alignment has been pushed back as far from the top of bank as possible while maintaining a meaningful buffer distance to the residential properties.

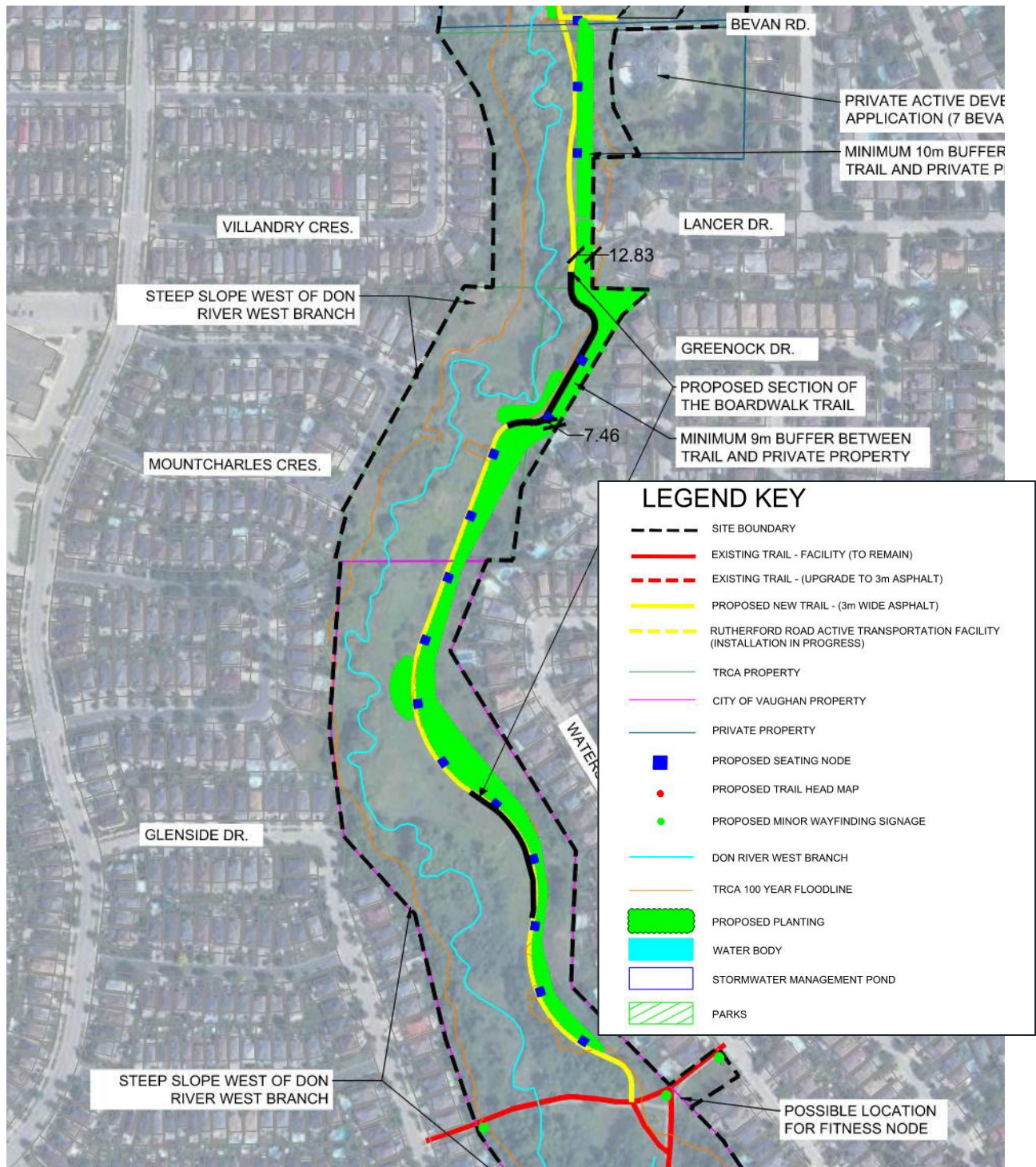


FIGURE 29: PROPOSED TRAIL ALIGNMENT

5.3.8 Merrick Dr. to Rutherford Rd.

The recommended alignment between Merrick Dr. to Rutherford Rd. includes one existing trail proposed for resurfacing and one informal trail alignment to connect Sports Village Park. The informal trail will require field fit to navigate existing trees and slopes for a low impact implementation approach and will have a low level of user accessibility. The informal trail will utilize an existing land bridge (control culvert) to traverse the creek. Modifications to the existing land bridge (control culvert) are not anticipated.

The existing trail running east-west from to Merrick Dr. and Glenside Dr. and the existing trail starting from Merrick Dr. running south to Rutherford Rd. are proposed for resurfacing.

DESIGN ELEMENTS PROPOSED:

- One existing 3m asphalt trail proposed for resurfacing – to remediate the existing trail for a more accessible and consistent user experience.
- One 1-2m footpath constructed by clearing herbaceous and shrub vegetation and smoothing/compacting the earthen surface. Surface to be topped with 50-100mm of chipped wood.
- Wayfinding signage.

OTHER DESIGN CONSIDERATIONS:

- Buffer and restoration planting – bee forage meadow mix restoration seeding is recommended for seeding within the valleylands and roadside edge seed mix is recommended for seeding within edge conditions.
- Vegetation removal – there are no tree removals expected with the proposed trail alignment. Select shrubs will be removed to facilitate the informal trail connection.
- Minimize development within TRCA regional flood limit – the proposed resurfacing is within the TRCA regional flood limit and precautions to minimize grading disturbance within the valley are taken in the 30% design.

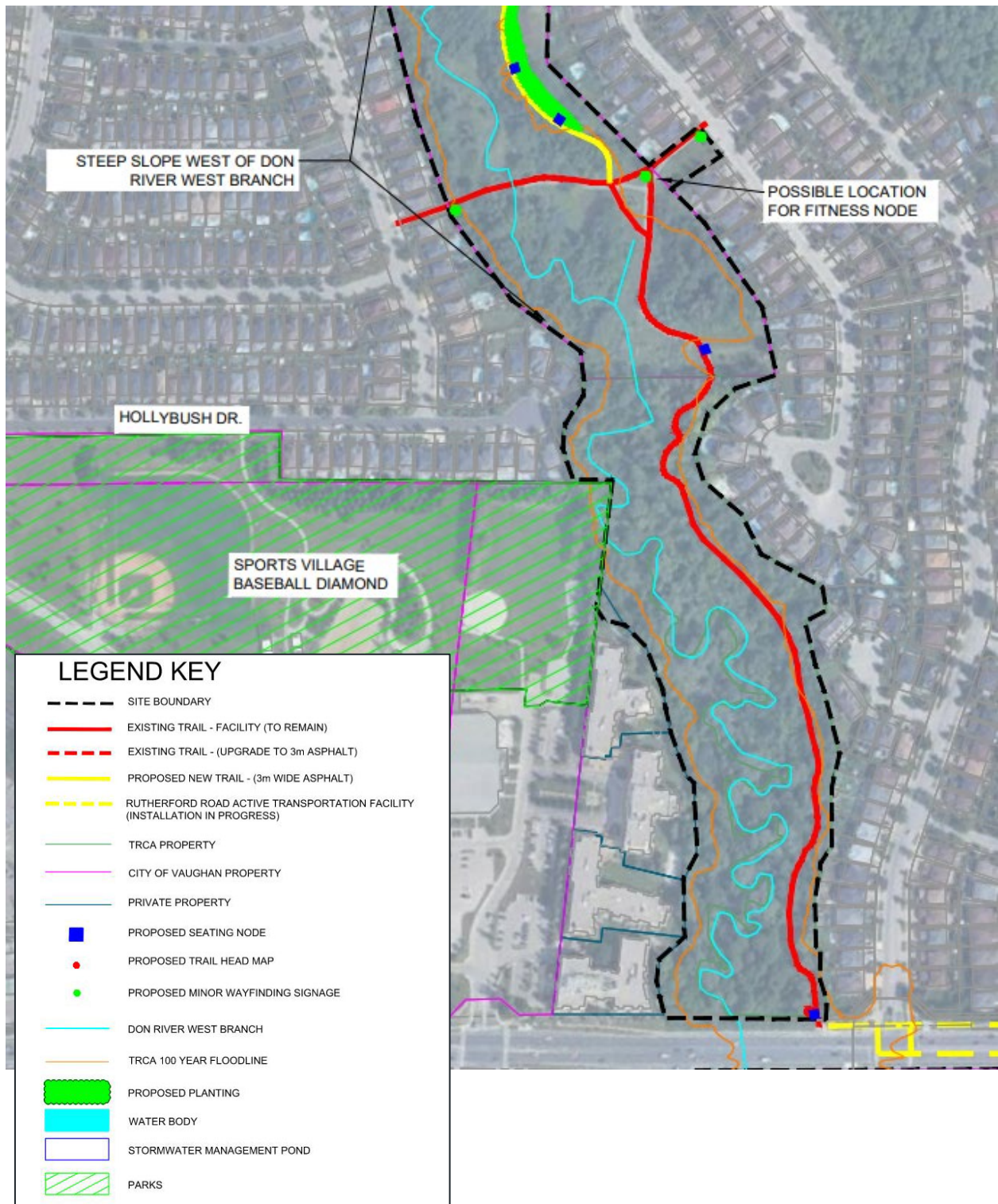


FIGURE 30: PROPOSED TRAIL ALIGNMENT

5.3.9 Rutherford Rd. to Keele St.

The scope of Part 2 of the BSG Feasibility Study, 30% Design Development, ends at Rutherford Rd. due to inconclusive results through public and stakeholder consultations. It is recommended that the proposed preliminary segment utilize the new infrastructure being implemented by York Region from Rutherford Rd. to Keele St.

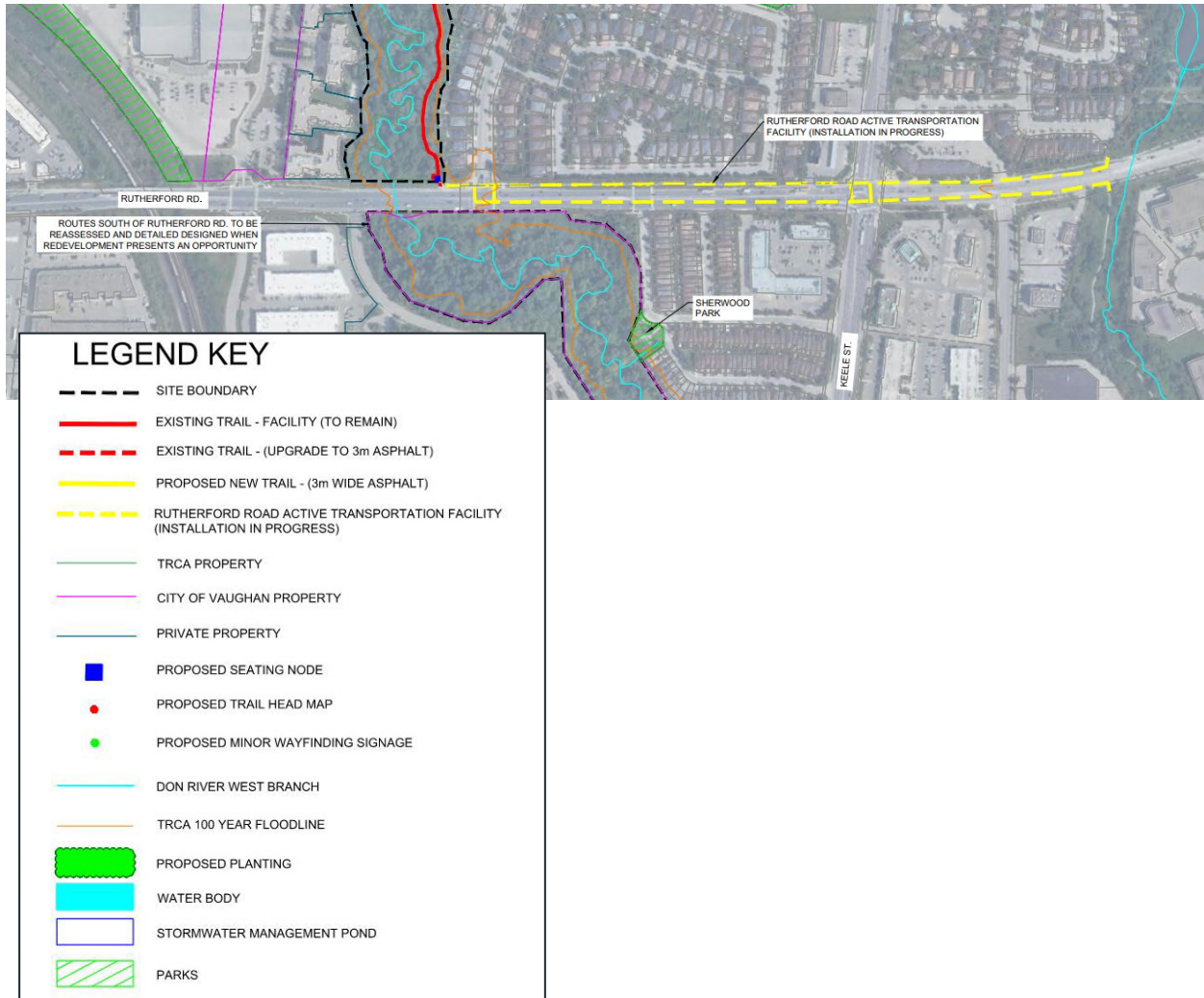


FIGURE 31: PROPOSED TRAIL ALIGNMENT

FUTURE ROUTE OPTION TO MONITOR:

A future route option that requires monitoring is Tesma Way within the Rutherford Rd. to Keele St. section.

- Long term recommended alignment is to utilize Tesma Way, which is not feasible at this time due to the 'land locked' terminus and slope constraints in the river corridor.
- Considerations to modifying the current road cross section to accommodate a multi-use pathway, reducing parking options along one side of the road.
- Recommend monitoring redevelopment in this area and reassess the potential alignment at that time.

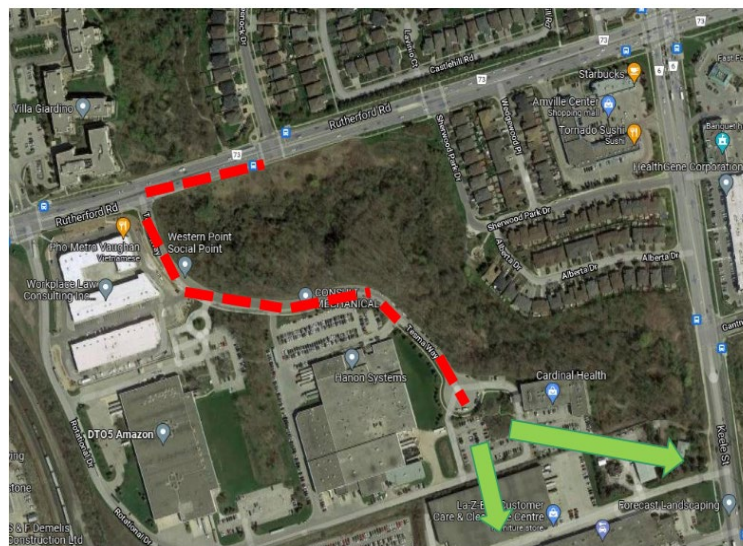


FIGURE 32: TESMA WAY ALIGNMENT

RECOMMENDED CROSSING INFRASTRUCTURE (RUTHERFORD RD.)

Changes to the design of Rutherford Rd. improvements would be required to include a north-south cross ride at Greenock Dr. and a bi-directional facility on the south side of Rutherford Rd. from Greenock Dr. to Sherwood Park Dr..

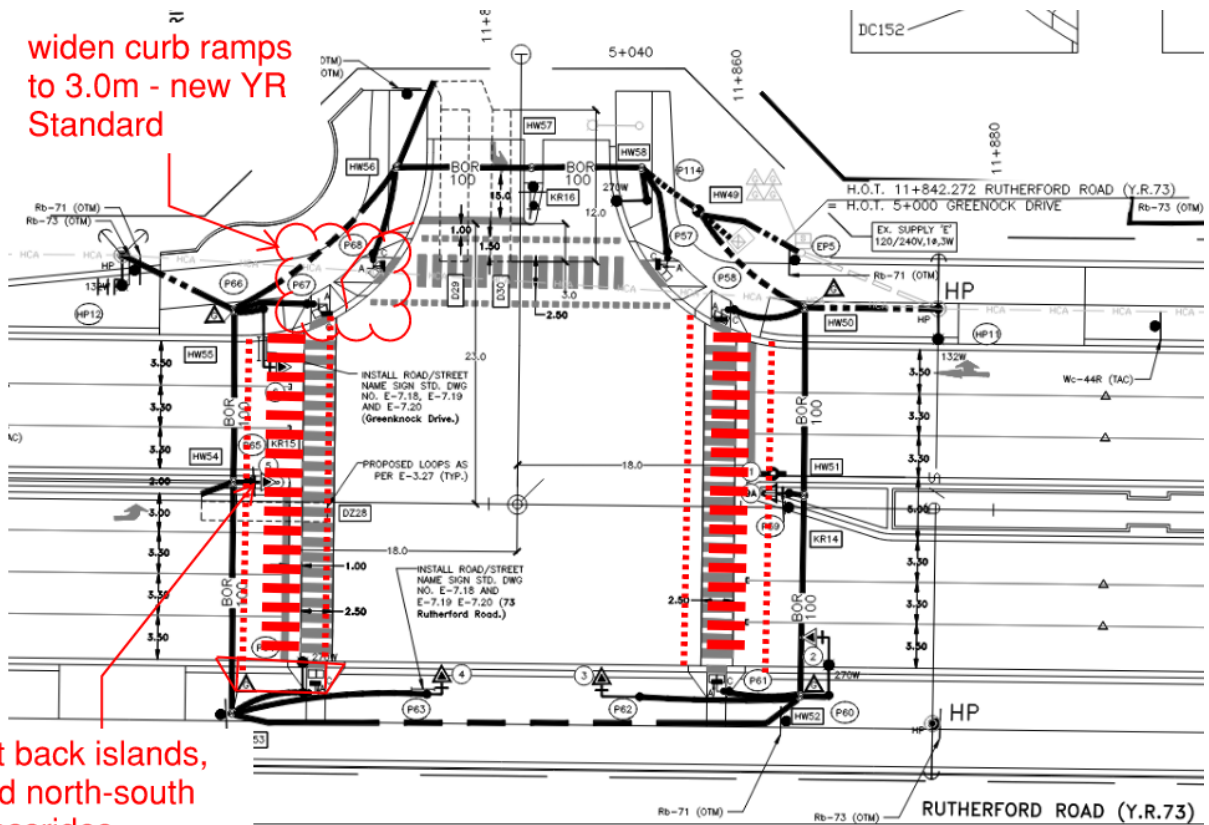


FIGURE 33: RECOMMENDED CROSSING

Alternatively, while not as intuitive for users, a combination of a southbound crossing at Greenock Dr. and northbound crossing at Sherwood Park Dr. could be considered which maintains the unidirectional active transportation facilities on Rutherford Rd.. Additional wayfinding signage and pavement markings would be required.

6 ON-ROAD ACTIVE TRANSPORTATION IMPROVEMENTS

There are several streets that have been identified for proposed on-road active transportation facility improvements and wayfinding along existing sidewalk infrastructure.

HOLLYBUSH DR.

Hollybush Dr. is a quiet local street with sidewalk on one side west of Glenside Dr., and no sidewalk east to the cul-de-sac. It provides active transportation connections to the Sports Village Park pathway and to Melville Ave. via a parking lot. The segment without a sidewalk serves 10 homes. While not desirable, it is acceptable to have pedestrians use the roadway in mixed traffic to access the future trail.



FIGURE 34: HOLLYBUSH DR. STREETVIEW

GLENSIDE DR.

Glenside Dr. is a quiet local street with sidewalk on one side, connecting to Hollybush Dr. and Hawker Rd. in the active transportation network. It is recommended that a tactile walking surface indicator (TWSI) be installed where the sidewalk meets the road to indicate a hazard for visually impaired pedestrians. Additionally, on-street parking should be restricted at the trail access point to allow for cyclists to easily transition to and from the roadway.



FIGURE 35: GLENSIDE DR. STREETVIEW

The route would travel parallel to Rutherford Rd. and Sherwood Park Dr. (separated from the Rutherford Rd. existing and planned AT infrastructure) until it reaches the parkette, after which it travels along Alberta Dr. and along Keele St.. The trail will terminate at the existing signalized crossing at Gantner Gate.

7 TRAIL AND CROSSING INFRASTRUCTURE DESIGN DETAIL

8.1 TRAIL AND AMENITY DESIGN DETAILS

Trail amenities refer to the various features and facilities incorporated alongside trails to enhance the overall experience and convenience for trail users. These amenities are designed to provide comfort, accessibility, safety and direction to nearby destinations to those who enjoy using trails. Wayfinding signage is important, but must be universally understood to be truly affective and inclusive for all visitors. The 30% design landscape drawings mark the locations of major and minor wayfinding signage along the trail, using the City of Vaughan’s wayfinding strategy and standard details as a guide.

Additional guidelines that apply to the design of the trail and trail amenities include:

- New and Revised Details (City of Vaughan, August 2020)
- City-Wide Urban Design Guidelines Volume 2 (City of Vaughan, January 2018)
- York Region Street Tree and Horticultural Design Guidelines (York Region, January 2022)
- Vaughan Citywide Streetscape Implementation Manual (City of Vaughan, November 2014)

CITY OF VAUGHAN STANDARD DETAILS

Please see table below listing the relevant details that are required for the implementation of the Bartley Smith Greenway Gap Trail. Refer to Appendix G for details included in the 30% design.

DETAIL NUMBER	DETAIL TITLE	DETAIL DESCRIPTION
TLA 100	Typical Cross- Sections	Typical cross sections of a multi-use trail (within park/ open space and abutting city boulevard/right of way)
TLA 101	Typical Trail Entrance Layout	Typical layout of trail elements at trail entrances
TLA 200	Pavement Marking	Typical graphics and application of trail pavement markings

TLA 300a	Heavy-Duty Asphalt Paving	Typical cross section of heavy-duty asphalt surfacing
TLA 300b	Light-Duty Asphalt Paving	Typical cross section of light-duty asphalt surfacing
TLA 320	Pathway Culvert	Typical cross sections of culvert installation beneath pathways/trails
TLA 401a	P-Gates (Offset Placement)	P-Gates detail, including p-gate spacing (offset placement)
TLA 401b	P-Gates (Opposite Placement)	P-Gates detail, including p-gate spacing (opposite placement)
TLA 500	Trail Sign-post & Installation	Trail sign-post and installation instruction and locations
TLA 501a	Trail Entrance Signage	Signage graphics for typical trail entrance signage and signage installation
TLA 501b	Trail Signage Graphics – Other (A)	Graphics for path narrows, steep slopes, and no winter maintenance warning signage
MLA 708	Park By-law signage graphics	Signage graphics for typical park by-law signage graphics
ULA 016	Furnishing - Bench	Backed bench on concrete pad
ULA 020	Waste Receptacle	Waste receptacle on concrete pad
ULA 101	Deciduous tree planting detail for trees under 90mm in caliper	Deciduous tree planting under 90mm in caliper at grade and on a slope
ULA 103	Coniferous tree planting detail for trees 2500mm in height or less	Coniferous tree planting for trees 2500mm in height or less at grade and on a slope
ULA 105	Shrub planting detail	Shrub planting detail at grade and on slope

ULA 107	Bare root tree planting detail for trees 30mm in caliper or less	Bare root tree planting detail at grade
ULA 110B	Light Duty Tree Hoarding Protection Detail (Snow Fence)	
ULA 111	Sediment Control Construction Fencing Detail	
ULA 211	Terraseeding Detail General Notes (1 of 2)	
ULA 212	Terraseeding Detail General Notes (2 of 2)	
ULA 309	Armour stone detail	Armour stone detail with sod, P-I-P concrete sidewalk, and precast concrete unit paving
ULA 310	Armour stone retaining wall detail	Armour stone retaining wall detail with perforated pipe
ULA 410	Identity Signage for Woodlots and Storm Ponds Elevation Detail	
ULA 411	Identity Signage for Woodlots and Storm Ponds Layout and Section Details	
Major Wayfinding Map	Bartley Smith Greenway Wayfinding Maps	(Vaughan to provide graphic and detail)
Minor Wayfinding Map	Bartley Smith Greenway Wayfinding Maps	(Vaughan to provide graphic and detail)

TABLE 15: DETAILS RELEVANT FOR THE 30% DESIGN

8.2 RESTORATION AND ENHANCEMENT PLANTING/ SEEDING

Please see list below for: seed mix composition, and buffer enhancement planting recommendations for the detail design of the BSG to mitigate construction impact.

SEED AND SOD:

The two seed mixes below are proposed for usage in the valley land areas of the trail:

1. Bobolinx & Meadowlark Seed Mix– St. Williams Nursery

This seed mix contains grasses, sedges and wildflowers for nesting birds. It is well adapted for medium-moist, rich soils in full sun and is suitable for field or meadow naturalization. This seed mix will tolerate both moist and dry conditions and will be applied to lower lying areas within the valley corridor.

• Riverbank Rye	<i>Elymus riparius</i>	30%
• Virginia Rye	<i>Elymus virginicus</i>	30%
• Big Blue Stem	<i>Andropogon gerrardii</i>	10%
• Canada Rye	<i>Elymus canadensis</i>	10%
• Fox Sedge	<i>Carex vulpinoida</i>	5%
• Switch Grass	<i>Panicum virgatum</i>	3%
• Awl-Fruited Sedge	<i>Carex stipata</i>	2%
• Fringed Sedge	<i>Carex crinite</i>	2%
• Showy Trefoil	<i>Desmodium canadense</i>	1%
• Brown Eyed Susan	<i>Rudbeckia hirta</i>	1%
• Green Headed Coneflower	<i>Rudbeckia laciniata</i>	1%
• Bergamot	<i>Monarda fistulosa</i>	1%
• Common Milkweed	<i>Asclepias syriaca</i>	1%
• Blue Vervain	<i>Verbena hastate</i>	1%
• Virginia Mountain Mint	<i>Pycnanthemum virginianum</i>	1%
• Woolgrass	<i>Scirpus cyperinus</i>	0.5%
• Bluejoint	<i>Calamagrostis canadensis</i>	0.5%

2. Bee Forage Meadow Seed Mix – St. Williams Nursery

This seed mix contains wildflowers and grasses. Designed to attract insects and bees, this seed mix is well adapted to establish in well drained soils. There is ability to customize this seed mix depending on the soil type and moisture availability on site. This seed mix will be applied to upland areas.

• Virginia Rye	<i>Elymus virginicus</i>	30%
• Indian Grass	<i>Sorghastrum nutans</i>	20%
• Slender Wheat Grass	<i>Elymus trachycaulis</i>	10%
• Canada Rye	<i>Elymus canadensis</i>	10%
• Little Blue Stem	<i>Shizachyrium scoparium</i>	10%
• Hairy Beard Tongue	<i>Penstemon hirsutus</i>	3%
• Green Headed Coneflower	<i>Rudbekia laciniata</i>	2%
• Virginia Mountain Mint	<i>Pycnanthemum virginianum</i>	2%
• Brown Eyed Susan	<i>Rudbekia hirta</i>	2%
• Spiked Blazing Star	<i>Liatris spicata</i>	2%
• Grey Goldenrod	<i>Solidago nemoralis</i>	2%
• Evening Primrose	<i>Oenothera biennis</i>	2%
• Showy Trefoil	<i>Desmodium canadense</i>	1%
• Prairie Cinquefoil	<i>Potentilla arguta</i>	1%
• Wild Bergamot	<i>Monarda fistulosa</i>	1%
• Bushclover	<i>Lespedeza capitata</i>	1%
• Upland White Aster	<i>Solidago ptarmicoides</i>	1%

3. Sodding is proposed for usage in the boulevard zone affected by trail construction.

- Sodding shall conform to Landscape Ontario's general landscape specifications.

7.3 BUFFER ENHANCEMENT PLANTING

There are three different types of buffer enhancement plantings proposed as part of the BSG trail design. Buffer types 1 to 3 below have been designed to provide for a range of height and density based off the feedback received from residents adjacent to the proposed preferred alignment. Further engagement with the City and residents is recommended to determine the location and usage of each type of buffering technique prior to finalizing implementation drawings.

Refer to **Appendix G** for full list of plant species.

TYPE 1 – LIGHT BUFFER ENHANCEMENT PLANTING

A mix between deciduous and evergreen tree species (tall buffers 10 metres+ in height) to provide a dappled view of the trail and valley. The light buffer enhancement planting is designed:

- Where space is limited or where a light buffer is desired.
- Desire to maintaining the viewshed of the valley.
- Desire to maintain stronger sightlines (support CPTED).
- Locations where shade and leaf litter will be tolerated.

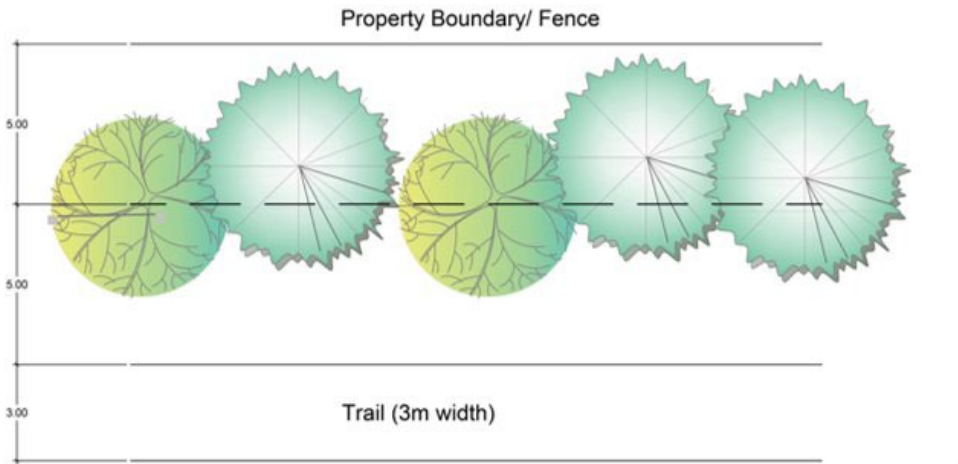


FIGURE 36: LIGHT BUFFER ENHANCEMENT PLANTING

TYPE 2 – MEDIUM BUFFER ENHANCEMENT PLANTING

A mix between deciduous and evergreen shrubs. The height of these species will range between 1.5-3m. The intent is to create a short visual barrier blocking views of trail users and to discourage users from straying off trail through the usage of thorny plant species. The medium buffer enhancement planting is designed to consider:

- Adjacent to yards with pools/gardens where shade and leaf litter are not desired.
- Desire to maintaining the viewshed of the valley.
- Match existing conditions while providing a buffer.

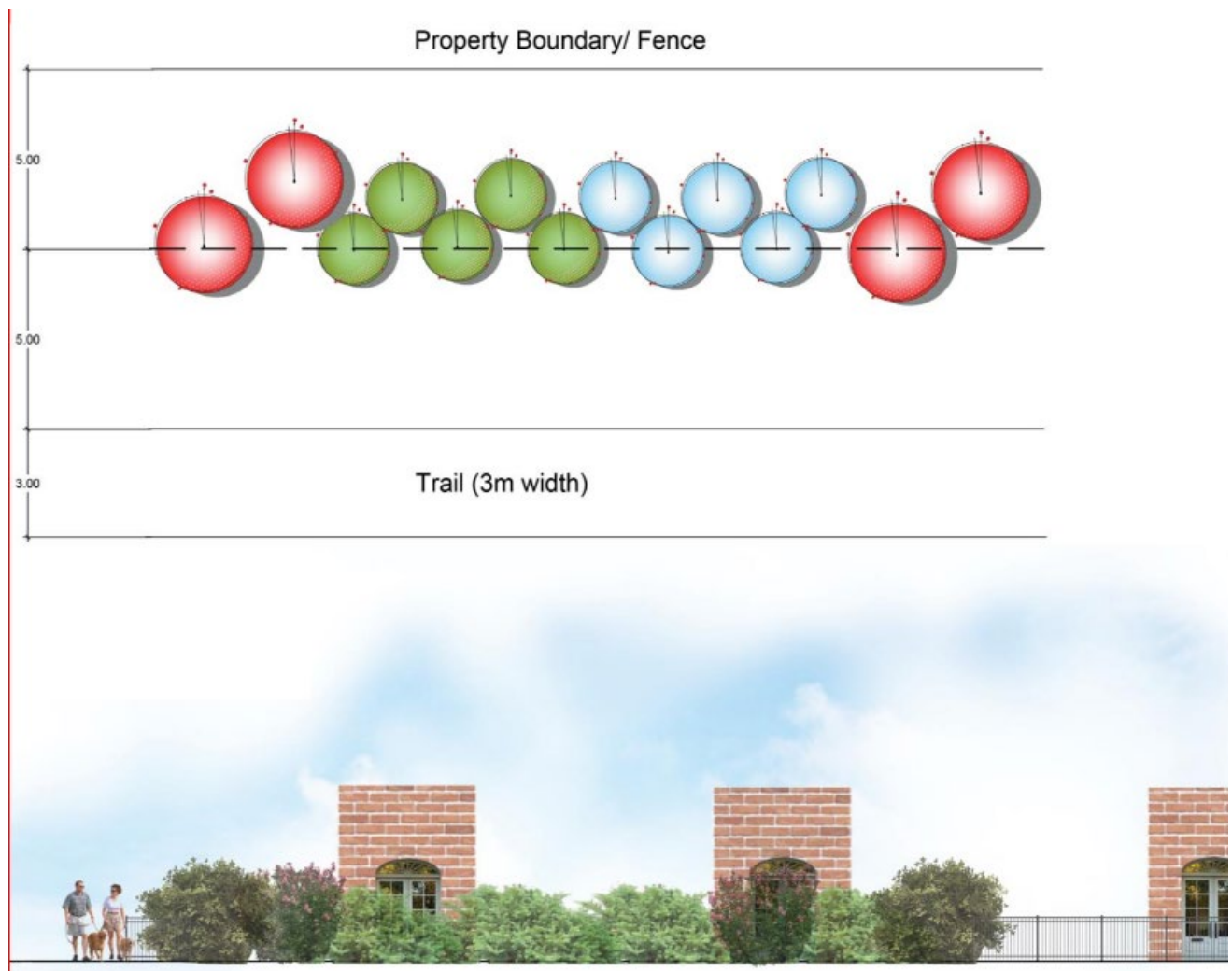


FIGURE 37: MEDIUM BUFFER ENHANCEMENT PLANTING

TYPE 3 – ROBUST BUFFER ENHANCEMENT PLANTING

A mix between deciduous and evergreen tree species and understory shrubs. The intent is to create a tall and dense ‘forest like’ visual barrier and to prevent users from straying off trail. The robust buffer enhancement planting is designed to consider:

- Desire for maximum privacy.
- Where sightlines are not a priority (minimal CPTED needs).
- Locations where shade and leaf litter will be tolerated.
- Areas where an enhanced level of privacy is desired.
- This buffer type will create shade on adjacent properties. Buffer type may not be appropriate where there are existing pools.
- To create a barrier between the trail and sensitive areas (i.e.: adjacent to a PSW or over steep slopes).

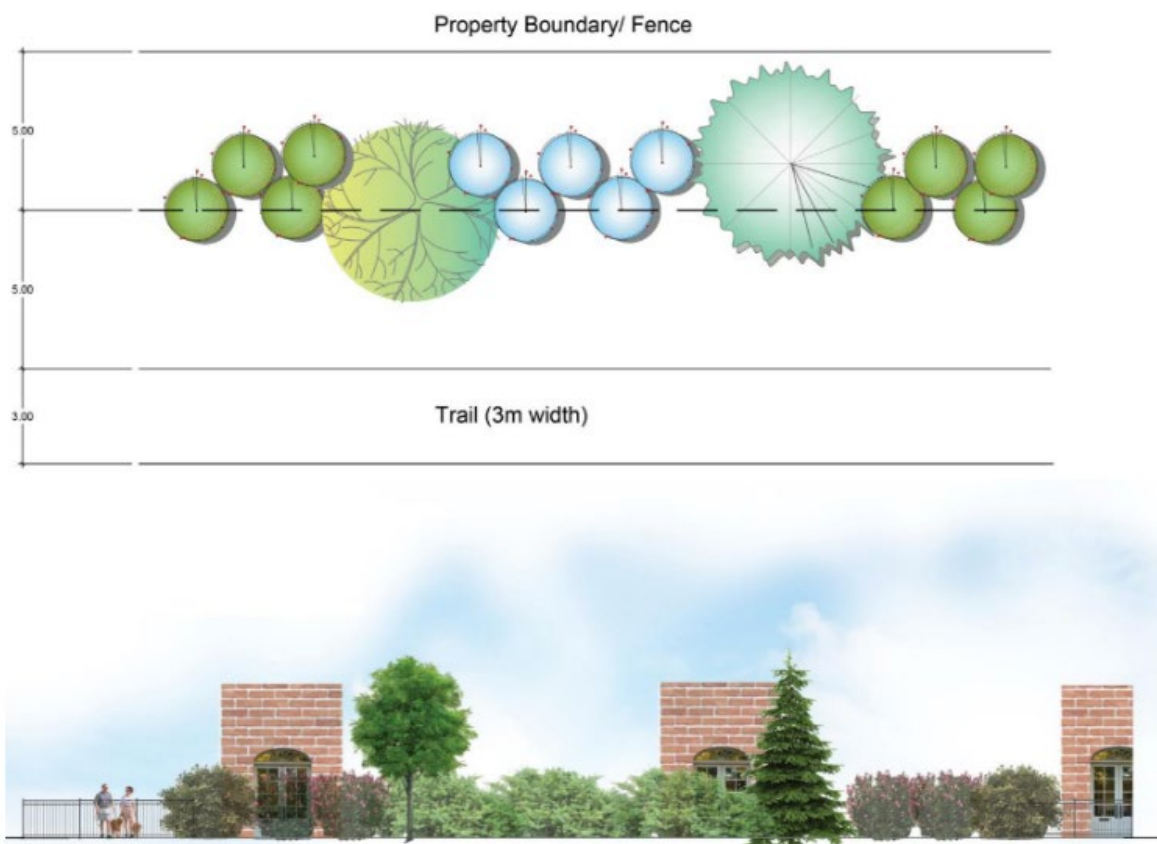


FIGURE 38: ROBUST BUFFER ENHANCEMENT PLANTING.

8 IMPLEMENTATION

The following implementation plan has been developed to guide a phased approach to future detail design and construction of the trail. The strategy prioritizes sections of trail that are easily implemented and of which will create meaningful connections for users to the existing trail and local amenities. The phasing plan was presented at the public virtual Open House in February 2022 and the July 2022 in-person public Open House with minor modifications related to subdividing larger sections to allow flexibility in project size and scope.

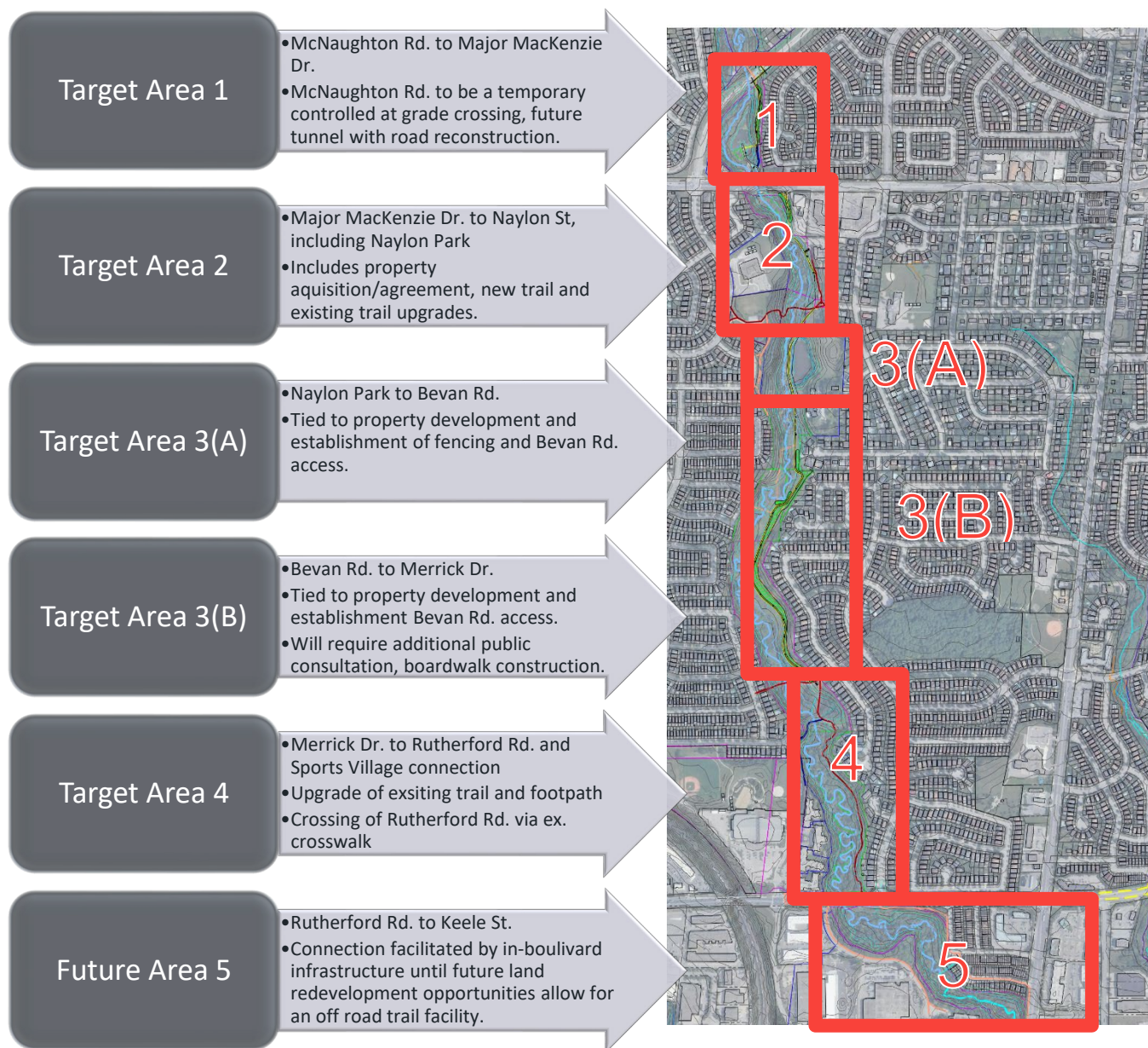


FIGURE 39: PHASED IMPLEMENTATION MAPPING

8.1 IMPLEMENTATION COST

The following tables contains trail implementation costs for each target area (Figure 39 above) which have been investigated within the project scope. These costs below reflect the 30% concept design and excludes items for future consideration. An overall summary is also included.

L.S. = Lump Sum
l.m. = Linear Meters
m2 = Square meters

Target Area 1: McNaughton Rd. to Major MacKenzie Dr.					
Item	Description	Unit	Estimated Quantity	Estimated Unit Price	TOTAL
1	General clearing, grubbing, excavation, and minor grading and site preparation	L.S.	1	\$ 80,000.00	\$ 80,000.00
2	New 3m wide heavy duty asphalt trail	l.m.	347	\$ 180.00	\$ 62,460.00
3	Armour stone single/multi-course retaining wall or Redi-rock modular retaining wall.	l.m.	43	\$ 800.00	\$ 34,016.00
4	New culverts under trail	each	4	\$ 4,000.00	\$ 16,000.00
5	Trail Directional/ wayfinding sign	each	2	\$ 1,000.00	\$ 2,000.00
6	P gates and access control	each	1	\$ 3,500.00	\$ 3,500.00
7	Amour stone rest areas (3 stones each)	each	2	\$ 900.00	\$ 1,800.00
8	Waste receptacle	each	1	\$ 2,000.00	\$ 2,000.00
9	Regulatory Signage	L.S.	1	\$ 14,000.00	\$ 14,000.00
10	Benches and concrete pads	each	3	\$ 3,500.00	\$ 10,500.00
11	Buffer enhancement planting - Shrubs	m2	1,410	\$ 25.00	\$ 35,250.00
12	Buffer enhancement planting - Trees	each	29	\$ 800.00	\$ 23,200.00
13	PXO Crossing (McNaughton Rd.) <i>Note: Interim solution until street widening construction occurs when an underpass can be incorporated.</i>	L.S.	1	\$ 150,000.00	\$ 150,000.00
				Subtotal Capital	\$ 434,726.00
				25% Contingency	\$ 108,681.50
				Total with Contingency	\$ 543,407.50
Excludes cost escalation, HST, consulting fees, administrative fees, land acquisition/ easements, and permitting fees.					

Target Area 2: Major MacKenzie Dr. to Naylor St.					
Item	Description	Unit	Estimated Quantity	Estimated Unit Price	TOTAL
1	General clearing, grubbing, excavation, and minor grading and site preparation	L.S.	1	\$ 80,000.00	\$ 80,000.00
2	New 3m wide heavy duty asphalt trail	l.m.	270	\$ 180.00	\$ 48,600.00
3	Trail Repaving (existing asphalt trail)	l.m.	307	\$ 68.00	\$ 20,876.00
4	Armour stone single/multi-course retaining wall or Redi-rock modular retaining wall.	l.m.	29	\$ 800.00	\$ 23,200.00
5	Barrier railing	l.m.	29	\$ 200.00	\$ 5,800.00
6	Trail Directional/ wayfinding sign	each	2	\$ 1,000.00	\$ 2,000.00
7	Amour stone rest areas (3 stones each)	each	2	\$ 900.00	\$ 1,800.00
8	Benches and concrete pads	each	4	\$ 3,500.00	\$ 14,000.00
9	Buffer enhancement planting - Shrubs	m2	852	\$ 25.00	\$ 21,300.00
10	Buffer enhancement planting - Trees	each	23	\$ 800.00	\$ 18,400.00
				Subtotal Capital	\$ 235,976.00
				25% Contingency	\$ 58,994.00
				Total with Contingency	\$ 294,970.00
Excludes cost escalation, HST, consulting fees, administrative fees, land acquisition/ easements, and permitting fees.					

Target Area 3(A): Naylor St. to Bevan Rd.					
Item	Description	Unit	Estimated Quantity	Estimated Unit Price	TOTAL
1	General clearing, grubbing, excavation, and minor grading and site preparation	L.S.	1	\$ 80,000.00	\$ 80,000.00
2	New 3m wide heavy duty asphalt trail	l.m.	316	\$ 180.00	\$ 56,880.00
3	Trail Directional/ wayfinding sign	each	3	\$ 1,000.00	\$ 3,000.00
4	Amour stone rest areas (3 stones each)	each	1	\$ 900.00	\$ 900.00
				Subtotal Capital	\$ 140,780.00
				25% Contingency	\$ 35,195
				Total with Contingency	\$ 175,975.00
Excludes cost escalation, HST, consulting fees, administrative fees, land acquisition/ easements, and permitting fees.					

Target Area 3 (B): Bevan Rd. to Merrick Dr.

Item	Description	Unit	Estimated Quantity	Estimated Unit Price	TOTAL
1	General clearing, grubbing, excavation, and minor grading and site preparation	L.S.	1	\$ 80,000.00	\$ 80,000.00
2	New 3m wide heavy duty asphalt trail	l.m.	767	\$ 180.00	\$ 138,034.80
3	Boardwalk Trail (install 2.4m wide wooden boardwalk including fibreglass frame on combination of helical pile and concrete pier foundation, 1.2m ht. wooden railings)	l.m.	238	\$ 2,500.00	\$ 595,000.00
4	Trail Directional/ wayfinding sign	each	1	\$ 1,000.00	\$ 1,000.00
5	Amour stone rest areas (3 stones each)	each	13	\$ 900.00	\$ 11,700.00
6	Benches and concrete pads	each	2	\$ 3,500.00	\$ 7,000.00
7	Buffer enhancement planting - Shrubs	m2	7,913	\$ 25.00	\$ 197,825.00
8	Buffer enhancement planting - Trees	each	27	\$ 800.00	\$ 21,600.00
				Subtotal Capital	\$ 1,052,159.80
				25% Contingency	\$ 263,039.95
				Total with Contingency	\$ 1,315,199.75
Excludes cost escalation, HST, consulting fees, administrative fees, land acquisition/ easements, and permitting fees.					

Target Area 4: Merrick Dr. to Rutherford Rd.

Item	Description	Unit	Estimated Quantity	Estimated Unit Price	TOTAL
1	General clearing, grubbing, excavation, and minor grading and site preparation	L.S.	0.5	\$ 80,000.00	\$ 40,000.00
2	New 3m wide heavy duty asphalt trail	l.m.	111	\$ 180.00	\$ 19,980.00
3	Trail Repaving (existing asphalt trail)	l.m.	800	\$ 68.00	\$ 54,400.00
4	Trail Directional/ wayfinding sign	each	2	\$ 1,000.00	\$ 2,000.00
5	Amour stone rest areas (3 stones each)	each	1	\$ 900.00	\$ 900.00
				Subtotal Capital	\$ 117,280.00
				25% Contingency	\$ 29,320.00
				Total with Contingency	\$ 146,600.00
Excludes cost escalation, HST, consulting fees, administrative fees, land acquisition/ easements, and permitting fees.					

Summary of Total Project Cost Estimate				
Phase	Length (m)	Subtotal Capital Cost	25% Contingency	Total with Contingency
Target Area 1	347	\$ 434,726.00	\$ 108,681.00	\$ 543,407.50
Target Area 2	270	\$ 215,100.00	\$ 53,775.00	\$ 294,970.00
Target Area 3(A)	316	\$ 327,076.00	\$ 81,769.00	\$ 175,975.00
Target Area 3(B)	1005	\$ 1,052,159.80	\$ 263,039.95	\$ 1,315,199.75
Target Area 4	111	\$ 117,280.00	\$ 29,320.00	\$ 146,600.00
Project Total with Contingency				\$ 2,476,152.25
Total new trail segments (m)				2,049
Excludes cost escalation, HST, consulting fees, administrative fees, land acquisition/ easements, and permitting fees.				

TABLE 16: IMPLEMENTATION CONSTRUCTION COST

The following table contains trail study costs which have been investigated within the project scope. The costs below reflect preferred alignment options and excludes items for future consideration. Please note that this additional study cost is applicable to each phase or a combination of phases. Costs may be reduced should two or more target areas be implemented together.

Additional Study Costs					
Item	Description	Unit	Estimated Quantity	Estimated Unit Price	TOTAL
1	Geotechnical Study	L.S.	1	\$ 30,000.00	\$ 30,000.00
2	Archaeology Stage 2 Study	L.S.	1	\$ 8,000.00	\$ 8,000.00
3	Tree Inventory and Arborist Report	L.S.	1	\$ 20,000.00	\$ 20,000.00
4	Topographic Survey	L.S.	1	\$ 50,000.00	\$ 50,000.00
5	Detail Trail Design	L.S.	1	\$120,000.00	\$120,000.00
6	Permitting	L.S.	1	\$ 15,000.00	\$ 15,000.00

TABLE 17: IMPLEMENTATION STUDIES COST

8.2 OPERATIONS AND MAINTENANCE COSTING

The following is a cost estimate for the maintenance and operation of the BSG trail.

City of Vaughan
Bartley Smith Greenway Feasibility Study
 (McNaughton Road to Rutherford Road.)
PROPOSED OPERATIONS & MAINTENANCE COSTING

Trail Name: Bartley Smith Greenway (McNaughton Road to Rutherford Road)

General Information

	Information Input	Average Annual Maintenance Cost	Average Lifecycle Replacement Cost for Forecast Timeline
Forecast Timeline (years)	15		
Net New Trail Length (m)	1,811		
Travel Surface Width (m)	3		
Tread Surface Type (\$ per m ²)	Asphalt	\$1,765.00	\$260,784.00
Boardwalk (\$ per m ²)	880	\$2,112.00	\$1,485,000.00
Tree Pruning / Hazard Tree Removal	25% Forest	\$3,200.00	
Mowing (\$ per m)	Yes	\$1,086.00	
Asphalt Trail Sweeping (\$ per m)	Yes	\$580.00	
Winter Maintenance w/o salting (\$ per m)	Yes	\$14,850.00	
Estimated Number of Vandalism Repairs per Year (Servicing or Mitigating)	10	\$2,000.00	
Total Number of Trouble Erosion Areas (based on 5% of length of trail)		\$450.00	
Estimated Cost:		\$26,043.00	\$1,745,784.00

Infrastructure Costs

	Information Input	Average Annual Maintenance Cost	Average Lifecycle Replacement Cost for Forecast Timeline
Retaining Wall Type	Natural Stone		
Retaining Wall (Square Face Meter) - height x length (m)	1920	N/A	\$345,600.00
Number of Drainage Culverts	4	\$400.00	\$7,920.00
Ramps Elevation Difference (m)	4.5		\$44,550.00
Estimated Cost:		\$400.00	\$398,070.00

Amenity Costs

	Information Input	Average Annual Maintenance Cost	Average Lifecycle Replacement Cost for Forecast Timeline
Number of Seating (one cleaning per year per seating area; one bench or group of three armour stone)	28	\$1,400.00	\$44,100.00
Number of Picnic Tables (one cleaning per year)	4	\$200.00	\$14,100.00
Number of Waste Receptacles (one cleaning per year)	5	\$150.00	\$12,375.00
Estimated Cost:		\$1,750.00	\$70,475.00

Additional Study Costs

	Information Input	Total Cost for Forecasted Timeline
Forecast Timeline (years)	15	
Safety Audit Study	Yes - Every 10 Years	\$4,720.00
Hazard Tree Assessment	Yes - Every 5 Years	\$10,000.00
Wayfinding Update Study	Yes - Every 10 Years	\$14,160.00
Estimated Additional Study Cost:		\$28,880.00

Total Yearly Maintenance Budgeted Cost (2023 Dollars)

	Information Input	Average Annual Maintenance Cost
Estimated Subtotal Annual Maintenance Cost (Excluding HST):		\$28,193.00
Geographic Market Price Adjustment (%)	0%	\$0.00
Contingency (%)	10%	\$2,819.30
ESTIMATED GRAND TOTAL:		\$31,012.30

Total Budgeted Cost for 15 Year Forecast Timeline (2023 Dollars)

	Information Input	Total Forecast Timeline Limit
Forecast Timeline (years)	15	
Estimated Total Maintenance Cost for Forecast Timeline (Excluding HST):		\$422,895.00

Estimated Total Lifecycle Cost for Forecast Timeline (Excluding HST):		<p style="text-align: right;">\$2,214,329.00</p>
ESTIMATED GRAND TOTAL LIFECYCLE PROJECT + MAINTENANCE + ADDITIONAL STUDIES (EXCLUDING HST):		<p style="text-align: right;">\$2,666,104.00</p>

8.3 OPERATIONS AND MAINTENANCE

Considerations for ongoing maintenance of the existing and proposed routes is needed to ensure successful implementation. User experience can be significantly impacted by inadequate or infrequent maintenance. The following section provides an overview of suggested maintenance practices for the City's consideration.

Once implementation has occurred, there is ongoing work which needs to be executed related to the trail system. The City will need to consider how they will maintain the existing and future trail system to ensure the trail and associated facilities are monitored and maintained to a level that is considered suitable for those managing the trail and effectively communicated to those using the trail.

RISK MANAGEMENT AND LIABILITY

Liability concerns are becoming a key consideration due to the potential for lawsuits. Adhering to widely accepted design, construction and maintenance standards are one of several strategies to manage risk. Aside from proper design, signage and operation of on and off-road trails, steps should be taken to address potential hazards including accidents, theft, vandalism and other problems.

Some general strategies which could be used to reduce risk and to help minimize the liability associated with providing designated trail facilities are listed below:

- Improve the physical environment, increase public awareness of the right and obligations of users and improve access to educational programs.
- Maintenance operations should conform to accepted/best practice standards, and a maintenance program that is achievable for the municipality should be developed, documented and acted on.
- If hazards cannot be immediately removed, they should be isolated with a barrier or identified with warning signs.
- Monitor trails on a regular basis to document the physical conditions and operations of the route. All reports of hazardous conditions received should be promptly and thoroughly investigated.
- Written records of all monitoring and maintenance activities should be documented and maintained.
- Avoid using descriptions such as “safe” or “safer” when describing trails when promoting their use. Identify practices that enable users to assess their own capabilities or level of comfort and make their choices accordingly.
- Ensure signage, mapping and promotional materials associate the term ‘recreational’ with trails and the trail network.

- Maintain proper insurance coverage as a safeguard against having to draw payments for damages from the public treasury.

Through the Ontario Trails Act, there were amendments to various Acts that have a bearing on recreation trails, including the Occupiers Liability Act, Public Lands Act and Trespass to Property Act which help to protect owners of properties that contain public trails, as well as adjacent landowners, and also provide penalties for those that trespass on private property (i.e. go off trail property onto private lands), vandalize or cause damage.

- The Occupiers' Liability Act has been amended to clarify that the lower standard of care (responsibility) applies to occupiers of trail property which are not-for-profit or public-sector organizations, even if there is an incidental fee related to access onto or use of the land, such as for parking; or if a public benefit or payment is given to a not-for-profit trail manager.
- The Public Lands Act has been amended to:
 - Make damage to Crown land and property an offence.
 - Enable a court to order a person, who has been convicted of this offence, to stop the activity and/or rehabilitate lands and repair any damage to property.
 - Provide the Ministry of Natural Resources and Forestry with new enforcement tools to stop vehicles, inspect documents and arrest persons suspected or caught violating the act.
 - Increase the maximum penalties for offenders and the length of time to initiate charges.
- The Trespass to Property Act has been amended to raise the maximum fine for trespassing from \$2,000 to \$10,000 and remove the limit on the number of damages that could be recovered in a prosecution.

Insurance coverage is often added to the liability insurance municipalities already carry for their other public parks and open space.

The risk management and liability prevention strategies identified above should be reviewed and incorporated into day to-day decision making processes where applicable when planning, designing and operating trails within the City of Vaughan.

TRAIL MONITORING AND MAINTENANCE STRATEGIES

A monitoring plan is an important component post-implementation to evaluate the success of a route and to inform smarter investments through data-driven measures. Research indicates that meaningful performance measures can help to prioritize future projects and appropriately allocate resources. The following approaches are recommended to be explored by City staff in further detail, for inclusion into the on-going workplans of monitoring for maintenance and operations staff.

Guiding next steps in the management and maintenance of trails, the City of Vaughan should consider adopting a log to document trail maintenance activities. The log should be updated when features are repaired, modified, replaced, removed or when new features are added.

Leveraging technology to collect managing data can be a powerful tool to finding efficiencies and more accurately budgeting for need. Digital dashboard style programs can be an effective interface for staff to organize inputs and action items. This type of technology can be linked to digital trail logging, user reporting systems, and on-site sensors (such as waste bin sensors) to create the ability for on-demand service and strategic deployment of resources.

Accurate trail logs also become a useful resource for determining maintenance budgets for individual items and tasks, and in determining total maintenance costs for the entire trail. In addition, they are a useful source of information during the preparation of tender documents for trail contracts, and to show the location of structures and other features that require maintenance.

Using the maintenance strategies outlined within the trail plan, as well as existing City maintenance practices specific to trail infrastructure, should be a starting point from which a trail specific maintenance plan and budget can be developed.

In addition, annual maintenance budgets should be refined to accommodate the maintenance of trail facilities. As the proposed trail is implemented the trail budget should increase to address the increasing number/length of trail facilities that have been implemented.

TABLE 18: RECOMMENDED TRAIL MAINTENANCE STRATEGIES

FREQUENCY	MAINTENANCE TASK
<p>IMMEDIATE (within 24 hours of becoming aware of the situation through a “hotline”, email or other notification or observation)</p>	<ul style="list-style-type: none"> – As a minimum, mark, barricade and sign the subject area to warn trail users or close the trail completely until the problem can be corrected. – Remove vegetation and/or windfalls, downed branches etc., where traffic flow on the trail is being impaired or the obstruction is resulting in a sight line issue. Remove hazard trees that have been identified. – Repair or replace items that have been vandalized or stolen/removed. This is especially important for regulatory signs that provide important information about trail hazards such as road crossings, steep grades and sharp curves. – Removal of trash in overflowing containers or material that has been illegally dumped. – Repair of obstructed drainage systems causing flooding that poses a hazard to trail users or that is resulting in deterioration that poses an immediate safety hazard.

	<ul style="list-style-type: none"> – Monitor trail areas and structures that are prone to erosion after severe summer storms and repair as required. – Repairs to structural elements on bridges such as beams, railings, access barriers and signs.
<p>REGULARLY (weekly/biweekly/monthly)</p>	<ul style="list-style-type: none"> – Trail patrols/inspections should review the trail conditions (as often as weekly in high-use areas), to assess conditions and prioritize maintenance tasks and monitor known problem areas. – Mow grass along edges of trails (in parks and open meadow settings only). Depending on trail location this may be done weekly, biweekly or monthly and the width can vary according to the location (typically 0.5 to 1.0m). This helps to keep the clear zone open and can slow the invasion of weeds into granular trail surfaces. Not all trails will have mown edges. In woodland and wetland areas, pruning and brushing is typically the only vegetation maintenance to be undertaken. – Regular garbage pickup (10-day cycle or more frequent for heavily used areas). – Repair within 30 days or less, partially obstructed drainage systems causing intermittent water backups that do not pose an immediate safety hazard, but that if left unchecked over time will adversely affect the integrity of the trail and/or any other trail infrastructure or the surrounding area.
<p>ANNUALLY</p>	<ul style="list-style-type: none"> – Conduct an annual safety audit. This task can be efficiently included with general annual safety audits for parks and other recreation facilities. – Evaluate support facilities/trailside amenities to determine repair and/or replacement needs. – Examine trail surface to determine the need for patching and grading. – Grading/grooming the surface of granular trails and topping up of wood chip trails. – Pruning/vegetation management for straight sections of trail and areas where branches may be encroaching into the clear zone. This task is more of a preventative maintenance procedure. Cuttings may be chipped on site and placed appropriately or used as mulch for new plantings. Remove branches from the site unless they can be used for habitat (i.e. brush piles in a woodlot setting), or used as part of the rehabilitation of closed trails. Where invasive species are being pruned and/or removed, branches and cuttings should be disposed of in an appropriate manner. – Inspect and secure all loose side rails, bridge supports, decking (ensure any structural repairs meet the original structural design criteria).
<p>EVERY 3 TO 5 YEARS</p>	<ul style="list-style-type: none"> – Cleaning and refurbishment of signs, benches and other trailside amenities.

EVERY 10 TO 20 YEARS

- Resurface asphalt trails (assume approximately every 15 years).
- Major renovation or replacement of large items such as bridges, kiosks, gates, parking lots, benches etc.

9 KEY RECOMMENDATIONS

Below is a highlight of key recommendations that should be considered when proceeding with trail implementation.

PILOT TRAIL (BEVAN RD. TO MERRICK DR.)

WSP recommends that an informal pilot trail be tested using the proposed alignment by mowing the meadow. This will allow for the trail to be tested and inform the decision to implement a permanent trail. The trail will not be complainant with accessibility standards and not ideal for stroller users/cyclists; however, there should be enough pedestrian traffic to gain insight into the conditions a future trail would create. Additional efforts may include removing any invasive woody species on the alignment, branch pruning, temporary trail signage and allowing for minor deviations as needed to facilitate the alignment. Informal trails exist through this space.

Based on detailed assessments of potential alignments in this area, the low-lying areas on the west side of the creek are not feasible for the trail due to the anticipated frequency of flooding, increased disturbance to habitat, low elevation of bridge abutments within the flood plain and future projections of creek alignment migration. Alternative routes for the trail would require use of an indirect route through narrow residential roads and use of Keele St., both of which will have impacts to multiple residential front yards and utility/storm water management conflicts.

The pilot will allow for residents to experience the trail with the intended results of acceptance and/or identifying specific mitigation measures based on observed concerns.

TREE INVENTORY AND MANAGEMENT PLANS

WSP recommends completing a detailed tree inventory for each section of trail as it is developed. The inventory should be used to inform minor changes to the alignment, tree protection plans and compensation planting/restoration planting. The tree inventory should quantify invasive species and make targeted recommendations for removals/management tactics. This document will be an important tool for coordinating with TRCA and as an information tool for interested members of the public.

MONITORING

WSP recommends that the City put in place a monitoring program focused on user activities such as entry into naturalized areas, littering, noise and other actions. Monitoring should look at volumes of users and where they are accessing the trail. The goal of monitoring is to inform any design changes, policing/bi-law requirements and levels of maintenance.

MAINTENANCE

WSP recommends that the City put a clear and transparent maintenance strategy in place within 5 years of trail implementation. This may include additional activities to support monitoring and improvement for user/adjacent residence experience. After the monitoring period, the actions should be assessed to determine what is required for long term practices.

The current practice of mowing along the fence line should be reevaluated as it is not conducive to discouraging encroachment and dumping by adjacent property owners.

ENVIRONMENTAL STEWARDSHIP EDUCATION

WSP recommends that an education program be put in place regarding encroachment, landscaping and composting in the greenspace. TRCA has expressed concern over these activities and desire for the trail project to include a rectification of the natural landscape.

Prior to trail construction, education material should be issued to those who have properties abutting the greenspace. This information should include direction discouraging mow, composting and planting gardens with clear examples of the harms these actions cause. When the trail is constructed, landscape areas should be restored to naturalized meadow with foreign items removed. Continued monitoring will need to occur to ensure prior practices do not continue. There was notable concern over items such as weeds, animal activity and build-up of shrubby vegetation. These are conditions that exist along a naturalized greenspace and continued education and monitoring will be required to manage negative actions that may be taken by residents. Overall, the residents want to preserve the integrity of the greenspace and the City should strive to arm them with the correct information and guidance to enable good stewardship practices.

RUTHERFORD TO KEELE TRAIL EXTENSION

WSP recommends that ongoing monitoring of development be taken to capture future opportunities to bring the section of trail along Rutherford Rd. off the roadway and into or adjacent to the greenspace.