ARUP

City of Brampton

Strategic Transportation and Master Stormwater Study for City of Brampton Major Transit Station Area (MTSA) Policy Framework

Final Report

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1. Executive Summary

Arup has been contracted to provide technical support for the development of street networks and mobility approaches, stormwater management strategies, and related policies for twelve City of Brampton major transit station areas (MTSAs).

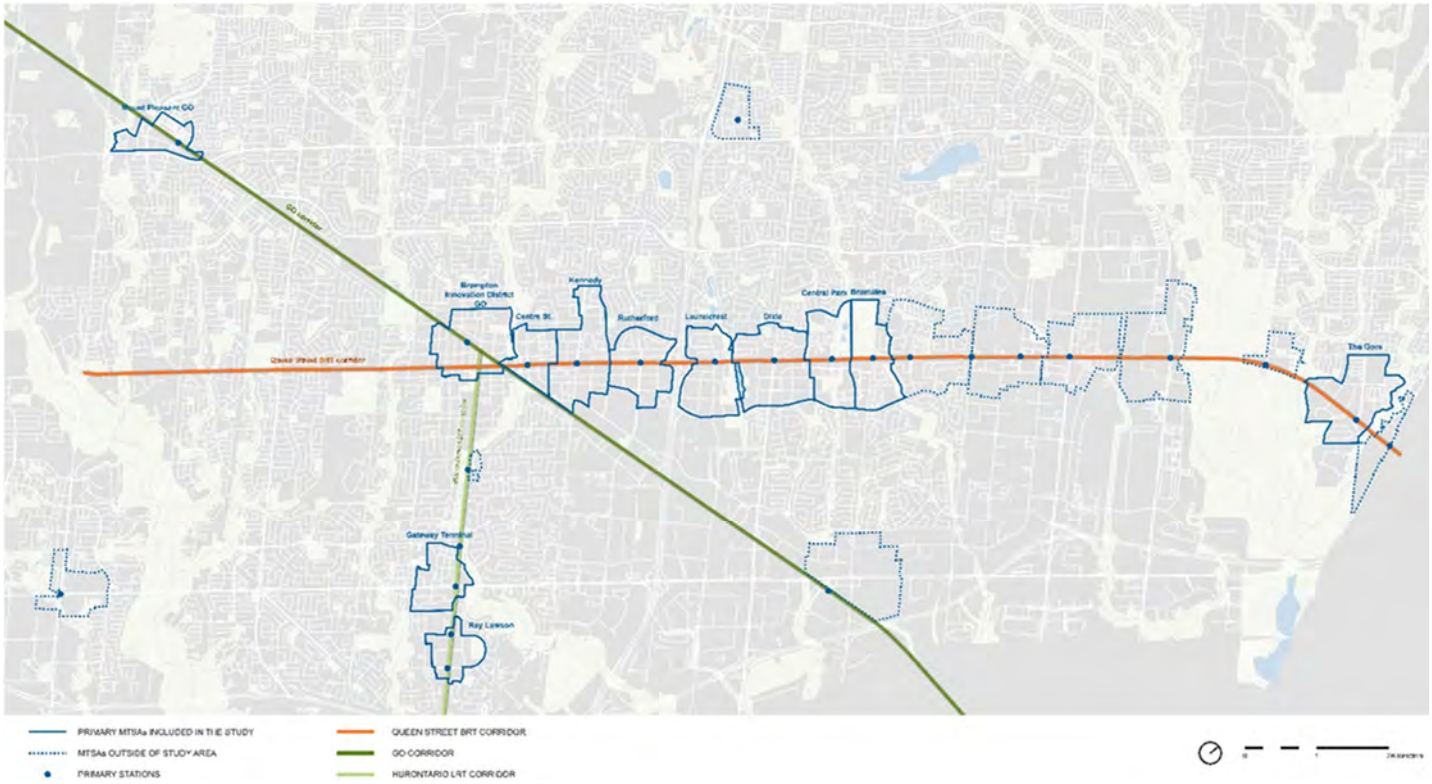

Figure 1-1 Brampton MTSAs

As part of numerous planning activities, the City of Brampton has articulated a vision for more sustainable land use and mobility patterns. Recognizing that “the best transportation plan is a land use plan,” Brampton’s draft official plan revision promotes the development of complete, compact neighbourhoods where daily travel needs are reduced and trips on foot, bicycle and transit are prioritized. Building on the City’s long-term 2040 vision, Brampton Plan orients the city toward the creation of exciting urban places for living and working that are well connected to transit and contribute to active lifestyles.

The provincial growth plan, “A Place to Grow,” establishes minimum targets for residential and employment density within MTSAs based on the transit mode. Within MTSAs served by light rail or bus rapid transit, the plan directs municipalities to achieve a combined minimum density of 160 residents and jobs per hectare; for areas served by the GO Transit rail network the target is 150 residents and jobs per hectare.

As strategic growth areas within the city, MTSAs represent a major component of the City’s approach to achieving their long-term vision to 2051. Across the city and within MTSAs, Brampton Plan describes a mobility framework that places active transport and public transit atop the transportation hierarchy. Among other outcomes, mobility policies aim to reorient away from suburban, autocentric development with a corresponding shift to more sustainable transport modes and a reduction in traffic violence and injury.

The scope of Arup's work in support of the City of Brampton's MTSA planning is limited to transportation and mobility and stormwater management concepts for city-owned rights-of-way. Water and wastewater servicing capacity and strategies were analyzed by other consultants under contract with the Region of Peel.

This report summarizes potential policies and strategies for inclusion within the official plan, precinct and secondary plans, and other city regulations and policies. The full report contains more detailed analysis and information to help guide future planning updates and policies.

1.1 Analysis and Approach

The proposed street networks for Brampton's MTSAs have been developed through an iterative process involving both qualitative and quantitative assessments aimed at ensuring safe, direct, and convenient active-travel trips between expected new development and the primary transit stations.

The City of Brampton planning and urban design groups prepared preliminary land use plans, urban-design concepts with potential massing and volumes for future development, and a preliminary future street network, which were included in preliminary area plans for each MTSA. The initial street network plans were refined collaboratively with Arup during workshops held in autumn 2022. Following the autumn workshops, refinements were incorporated into updated area plans and shared publicly during focus-group sessions held in winter and spring 2023. During these group sessions, members of the public were invited to provide comments on the proposed plans and networks via small group discussions. Comments on the area plans were also received via email.

Following this public engagement exercise, Arup performed a quantitative analysis to assess expected travel-demand distribution and circuity or directness (an assessment of the difference between straight-line distance between origins and destinations and the actual distance someone must travel over the network of streets or sidewalks). The purpose of these analyses using the programming language R was to help identify areas of potentially high demand for active travel, as well as opportunities to propose new links within the network that would allow residents of new developments to more directly reach new major transit stops and—by extension—the commercial and other amenities likely to accompany them. For vehicle travel, the analysis was intended to identify areas of potentially high demand warranting additional investigation as the MTSAs develop.

This analysis helped methodically identify areas of focus which either warranted additional safety and comfort refinements for active travellers due to high levels of use or warranted new connections to make trips more direct and convenient. The analysis also yielded information about streets that may be subject to high levels of vehicle demand. Additional detail on the active transportation and vehicular network assessments is provided in Appendix B.

Arup leveraged the feedback collected during the public engagement exercise and the outputs of the quantitative analysis to propose further network refinements to improve trip quality and prioritize pedestrians and cyclists. These recommendations were reviewed with the City to establish a final proposed network based on a range of factors including feasibility of implementation based on local conditions. Most of the reviewed recommendations were incorporated into council-approved land use plans adopted in October 2023.

As a final analytical step, Arup reassessed both public stormwater management capacity and travel demand distribution and trip circuity based on the final council-approved land-use plans. The final stormwater and network analyses are intended to help the city prioritize investments and interventions as it continues to develop fine-grained plans and negotiate with developers. Recommendations for further enhancements—including those accepted by City Planning but not included in the final land use plans—are described within each MTSA section in the full report.

1.2 Generally Applicable Secondary Plan policies for all MTSAs

The City of Brampton is expected to prepare both precinct-level and secondary plans covering all the MTSAs discussed in this report. This section of the executive summary describes generally applicable policies for potential inclusion within these future planning documents.

1.2.1 Public Realm Design

- Open spaces and public realm shall be designed to incorporate high quality plantings as a means of increasing tree cover and shading, reducing heat island impacts, and to intercept rainfall during extreme weather events.
- Streets and streetscapes are strongly encouraged to be designed and landscaped to function as a significant part of the public realm and be oriented to favor pedestrian use.
- Development and public realm improvements in the vicinity of future higher-order transit stops will be designed to: a) Provide direct and safe bike and pedestrian conditions; b) Act as a focal point contributing to the character of the local context and support an elevated architectural treatment that reflects the important role and function of higher-order transit corridors as hubs of activity for the community.

1.2.2 Street Network Development

- The land acquired for road widenings and new road links as a condition of development approval shall be included in the calculation of permissible gross floor area.
- The major road system consisting of Highways, Major and Minor Arterial Roads and Collector Roads provides sufficient flexibility to potentially provide bus routes within 400 metres of all residents.
- Where large size blocks are contemplated for development, access between properties at strategic locations to facilitate a local road network shall be considered at the development approval stage. As a condition of development approval, landowners may be required to enter agreements that among other matters shall determine ultimate access and shared parking arrangements.
- Access and curb cuts from Queen Street will be discouraged. Access and servicing to development from new or existing local collector streets will be encouraged. The impact of driveways, garages and parking areas along collector streets, arterial roads will be minimized by locating them at the side or back of buildings, or below grade where appropriate.
- All new developed streets should be designed according to the proposed enhanced “Green Complete Streets” guidelines to promote safe and comfortable active travel and on-site stormwater management.

1.2.3 Transit

- The City shall actively support the provision of local transit services with enhanced frequency during peak periods within or near areas expected to develop to accommodate additional ridership and facilitate connections with higher-order transit along the future Queen Street BRT corridor.
- The City shall actively support the provision of two-way all-day service during peak periods, on the GO Transit line from Toronto to Georgetown with the intent of improving inter-regional transit accessibility.
- To the greatest extent possible, the City shall actively support Brampton Transit and other services to adjust or develop routes that help achieve Brampton Transit’s near-term service proximity guideline of having 90% of the population within 400 metres of all routes and 800 metres of Zum BRT and Base Grid Routes and a long-term goal of transit service within 300 metres of all urban land uses.

1.2.4 Active Travel

- Fine-grain active-travel networks promote walking and biking, making relatively small blocks desirable. Research on transit-oriented developments notes that relatively small blocks with a proposed average block perimeter limit of up to 400 m to 450 m can enhance connectivity. Thomas, R., & et. al. (2018). Is transit-oriented development (TOD) an internationally transferable policy concept? Regional Studies. Vol. 50 No. 9, 1201-1213. The City shall work with property owners and developers to ensure the creation of publicly accessible mid-block connections or through-block walkways to facilitate pedestrian and cyclist movement within and across the MTSAs in accordance with schedules 13g, 13h, 13i, and 13j of the Official Plan. Additionally, wherever possible, connections through blocks shall be developed and direct walkway routes provided to natural areas and parks, businesses, transit stops, schools, community facilities and other desirable destinations.

- The City will identify “active-travel priority corridors” within the MTSAs between new developments and future higher-order transit stops based on expected active travel demand to help prioritize investments in public realm, amenities such as street furniture and lighting, and street-animating ground-level uses. Where feasible, the City will explore traffic-calming measures on local or neighbourhood streets to reduce cut-through vehicle traffic and enhance safety and comfort.

- Cycling connections to the city-wide pathways network, where appropriate, will be provided along arterial roads and minor collectors.

- The City will review and, where necessary, update snow removal and clearing policies and procedures to facilitate year-round active travel.

- Parks and open spaces will include multi-purpose recreational trails linked to the street network to enhance connectivity for cyclists.

- The City shall encourage the provision of connections from the trail system to the bicycle lanes through parks or open space corridors, and/or along quiet residential streets with the intent of providing pleasant environments and to minimize conflicts with vehicular traffic.

- Where feasible, the City will consider the use of “continuous sidewalks” or raised crosswalks instead of traditional curb cuts for alley, local street, and driveway entrances. Continuous sidewalks prioritize pedestrians and cyclists overturning motor vehicles by extending sidewalks at the same elevation, creating an uninterrupted path for active travellers. Where continuous sidewalks or raised crosswalks are deployed, the City will deploy tactile indicators or other devices to help ensure that visually impaired users are able to discern different travel spaces.

1.2.5 Bicycle Parking

- Cycling facilities and amenities such as bicycle parking and lock-up areas will be provided at all public destinations within MTSAs, including but not limited to transit stations, parks, schools, community centres, cultural facilities, other public institutions, and retail uses.

- Bicycle parking shall be provided by all residential, commercial, institutional, employment, recreational and civic buildings. Residential buildings shall offer secure bike parking at rates sufficient to facilitate the use of bicycles as an alternative to other less sustainable modes of transit. Employment locations will be required or encouraged to provide showers, changing facilities, and secure lockers to facilitate commuters’ and visitors’ use of bicycles.

- Standard electric outlets for charging electric bicycles and other micromobility devices shall be provided in accessible areas free of charge.

1.2.6 Stormwater Management

- All new developed streets should be designed according to the proposed enhanced "Green Complete Streets" guidelines. Exact retention swale dimensions should be calculated for each new street to ensure that the new streets do not cause increase in peak flow for each applicable design storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms)

1.2.7 Travel Demand Management

- Applications for development shall be required to submit travel-demand management plans scoped to reflect the proposed development and prepared by a qualified consultant that describe facilities and programs intended to discourage single-occupancy vehicle trips, minimize parking, and promote the use of transit, cycling, car and bike sharing, and car-pooling. Proposed TDM plans are encouraged to include developer, landlord, or employer-supported transit passes.

1.2.8 Parking

- Within major transit station areas, the City will consider the imposition of parking maximums where it deems that adequate transit services exist or will exist.
- Surface parking lots shall be avoided within MTSAs to promote sustainable mode shift and reduce impervious surfaces that contribute to excessive stormwater run-off and the urban heat island effect.
- To the extent that vehicle parking is required as a condition of development, shared parking facilities and shared vehicle access points will be encouraged. As a condition of development approval, landowners shall enter into agreements which among other matters shall determine ultimate access and shared parking arrangements.

1.2.9 Development Phasing

Development of public transit projects will keep pace with private development and will protect for the future expansion and long-term implementation of the transit system, including higher order transit, in the Secondary Plan Area.

1.3 Precinct Plan Development

The City of Brampton is expected to develop precinct-level plans for at least two groups of in-scope MTSAs:

- Precinct A: Centre, Kennedy, and Rutherford
- Precinct B: Laurelcrest, Dixie, Central Park, and Bramalea

The following section provides specific recommendations and observations for these precincts based on the background analysis and research conducted for this report.

1.3.1 Precinct A: Centre, Kennedy, and Rutherford

The Centre Street MTSA area plan concentrates high-rise mixed-use space along the Queen Street East corridor. To the north, the high-rise mixed-use space transitions to mid-rise mixed-use areas and then to low-rise residential areas. There is a pocket of mid-rise residential space in the northwest corner of the MTSA where an existing condo building is located. The northern portion of the MTSA also includes a large cemetery. The majority of the MTSA south of the high-density Queen Street corridor is dedicated to the Peel Memorial Centre for Integrated Health and Wellness.

The Kennedy MTSA area plan concentrates high-rise mixed-use space along the Queen Street East corridor. Building heights and densities reduce north and south from Queen Street East. North of Queen Street East, there

is a range of existing and proposed low-rise and mid-rise residential and mixed-use spaces and an existing secondary school. In some areas with existing condos, redevelopment potential is limited due to challenges associated with securing agreement among condo owners to redevelop. The southwest corner of the MTSA includes several existing mid-rise residential areas and proposed mid-rise mixed-use areas. The southeast corner includes proposed mid-rise mixed-use areas and existing industrial lands. A portion of the industrial lands in this area are covered by a Special Policy Area which restricts sensitive land uses due to proximity to the industrial lands south of Eastern Avenue. Several existing large blocks in this MTSA are broken up by new proposed pedestrian connections

The Rutherford MTSA area plan concentrates high-rise mixed-use space along the Queen Street East corridor. To the north, there is an established low-rise residential area. A new road and linear park / landscaped buffer are proposed to separate the high-rise corridor and the established low-rise neighbourhood. As there is a desire to remove vehicle access to buildings off Queen Street, this proposed road will play an important role in providing vehicles access to developments that front on Queen Street. To the south, the high-rise corridor is adjacent to mid-rise mixed-use areas. The southernmost part of the MTSA will feature prestige industrial space. Additionally, a community centre and neighbourhood park are planned for the southeast corner of the MTSA, and the fire station is planned to be relocated to the southwest corner.

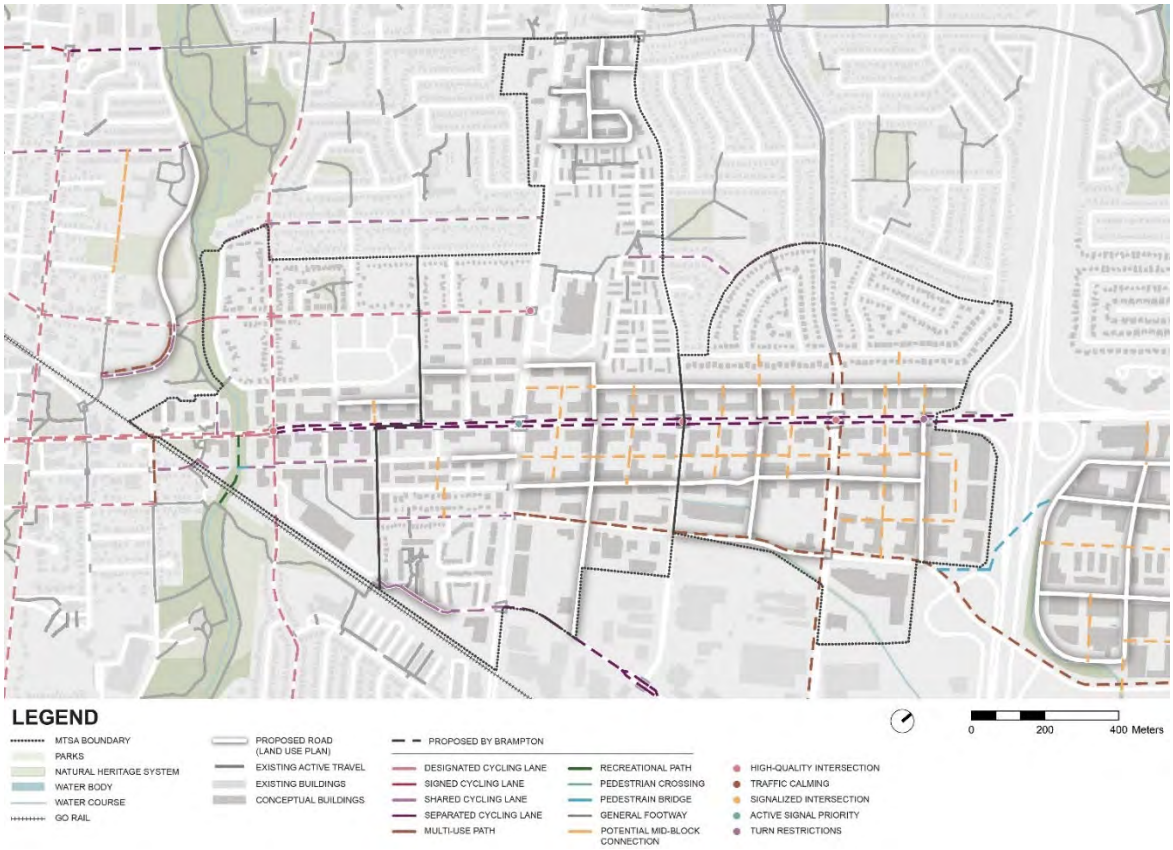

Figure 1-2 Future Street Network and Conceptual Development - Precinct A

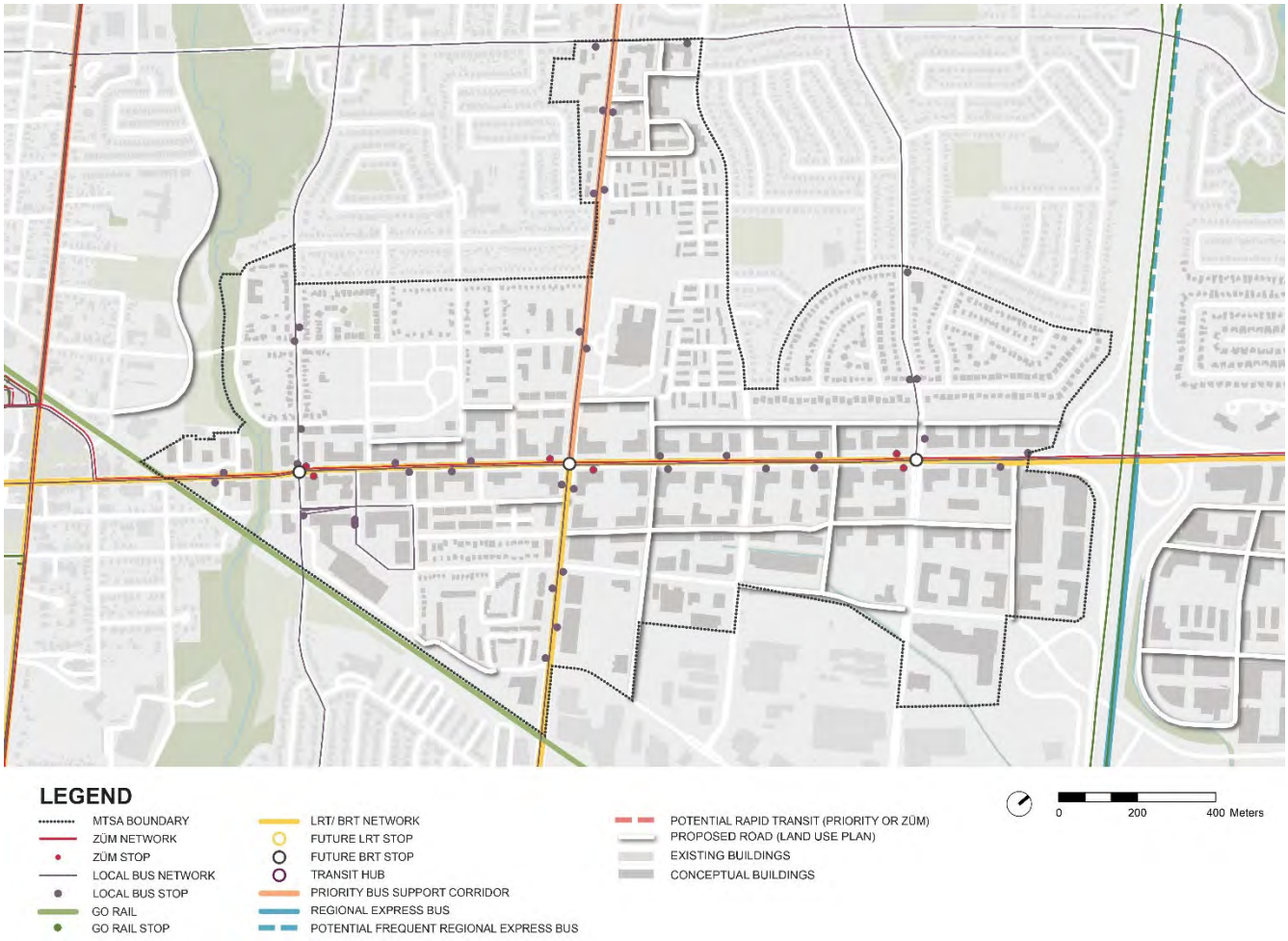

Figure 1-3 Existing and Future Public Transit Network - Precinct A

1.3.1.1 Public Transit Accessibility and Frequency

- Local bus service:
  - Within the precinct, significant growth is expected to occur south of Queen Street. The City shall actively support the provision of new local transit services through the areas expected to accommodate the most significant population and job growth. Among the local transit routes, the City shall explore with Brampton Transit (1) the extension of local bus service on Rutherford Road South between Queen Street and Clark Street or Orenda Road and (2) along the Clark Street extension and Eastern Avenue or Orenda Road. New routes shall be considered to bolster transit access to higher-order transit along Queen Street, the GO rail network, and other regional services.

1.3.1.2 Active travel

- Connectivity with existing and future networks:
  - Pedestrian and cyclist links shall be provided in accordance with schedules 13d, 13e, and 13f of the Official Plan and the Active Travel Master Plan to serve as a recreational, utilitarian and aesthetic amenity to the community and to integrate the elements of the Residential and Commercial Land Uses, Transportation, Recreational Open Space and Natural Heritage system.

- Pedestrian-priority design:
  - The City will identify “active-travel priority corridors” within the MTSAs between new developments and future Queen Street BRT stops based on expected active travel demand to help prioritize investments in public realm, amenities such as street furniture and lighting, and street-animating ground-level uses. Where feasible, the City will explore traffic-calming measures on local or neighbourhood streets to reduce cut-through vehicle traffic and enhance safety and comfort.
    - Within the Centre Street MTSA, active-transport facilities, including street furniture and tree planting, or Complete Streets upgrades should be prioritized for Queen Street East, Church Street, John Street and Lynch Street.
    - Within the Kennedy MTSA, active-transport facilities, including street furniture and tree planting, or Complete Streets upgrades should be prioritized for Queen Street East and Kennedy Road.

Within the Rutherford MTSA, active-transport facilities, including street furniture and tree planting, or Complete Streets upgrades should be prioritized for Queen Street East and roads within the southeast corner of the MTSA.

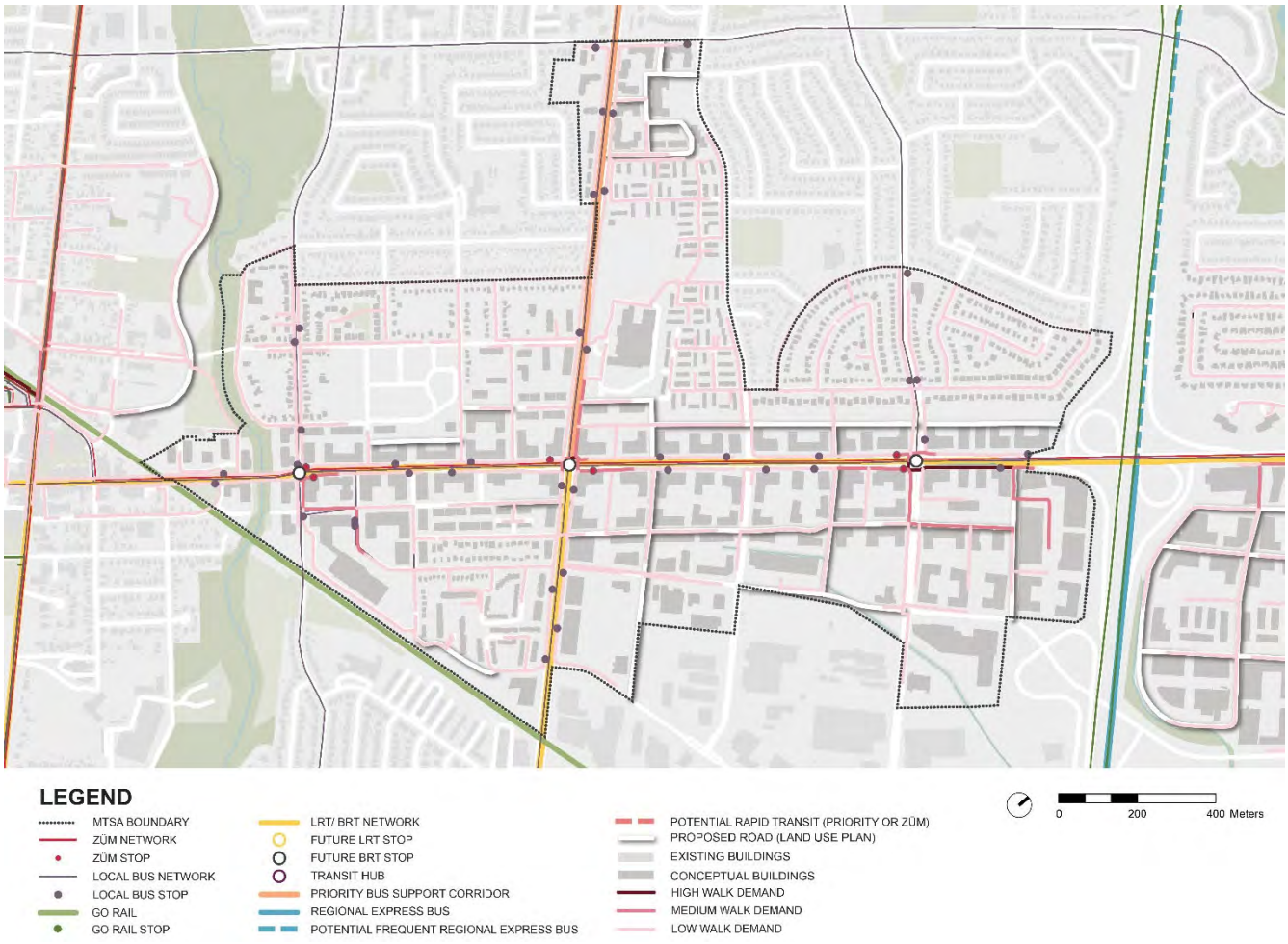

Figure 1-4 Overlay of Future Transit Network and Aggregated Active Travel Demand - Precinct A

1.3.1.3 Mode Shift

- Travel demand management:

- Applications for development shall be required to submit travel-demand management plans scoped to reflect the proposed development and prepared by a qualified consultant that describe facilities and programs intended to discourage single-occupancy vehicle trips, minimize parking, and promote the use of transit, cycling, car and bike sharing, and car-pooling. Proposed TDM plans are encouraged to include developer, landlord, or employer-supported transit passes.
    - Within the Centre Street MTSA, travel demand management should be emphasized for developments that contribute traffic to Queen Street, John Street, and Beech Street.
    - Within the Kennedy MTSA, travel demand management should be emphasized for developments expected to contribute traffic to Hansen Road, Eastern Avenue, John Street, Queen Street, and June Avenue.
    - Within the Rutherford MTSA, travel demand strategies should be emphasized for developments expected to contribute traffic to Hansen Road, Eastern Avenue, Orenda Road, the proposed street connection between Hansen Road and Rutherford Road North, and the proposed street connection between Queen Street East and Clark Boulevard.

1.3.1.4 Phasing and Development

- The Region of Peel has identified existing constraints within the wastewater servicing network in this precinct that will require long-term infrastructure upgrades. The City will work with developers to coordinate the phasing of development with short-, medium- and long-term upgrades. Within areas subject to capacity constraints, the City will encourage developers to explore the adoption of strategies to reduce wastewater flow, including water efficiency and greywater recycling. (For further details on water and sanitary servicing, consult the full report and the analyses prepared for the Region of Peel).

1.3.2 Precinct B: Laurelcrest, Dixie, Central Park, Bramalea

The Laurelcrest MTSA preliminary area plan has a large portion of land dedicated to the natural heritage system along its eastern edge. There is a development of single-family homes north of Queen Street with limited development potential. Most of the Laurelcrest MTSA's development potential is concentrated south of Queen Street. The highest density uses are concentrated along Queen Street, with mid-rise and industrial uses located farther south. An east-west landscape buffer is proposed to separate the industrial areas from mixed-use areas. A landscape buffer is also proposed to separate the MTSA from Highway 410, which runs north-south along the western edge of the MTSA.

The Dixie MTSA preliminary area plan clusters most redevelopment south of Queen Street. High-rise residential areas are located southwest of Queen Street and Dixie Road. Mid- and high-rise mixed-use areas are located southeast of Queen Street and Dixie Road. In particular, the preliminary area plan contemplates the eventual transition of the area currently occupied by the Bramalea City Centre shopping mall into a combination of mid- and high-rise development with corresponding street and active connections.

The Central Park MTSA area plan proposes high-rise mixed uses along Queen Street East. The northwest corner of the MTSA includes low-rise residential areas north of the high-rise mixed-use space on Queen Street East. The southwest corner includes a pocket of mid-rise mixed-use space within the high-rise mixed-use space. The southeast corner of the MTSA contains existing high-rise residential areas south of the planned high-rise mixed-use space on Queen Street East. The northeast corner of the MTSA is dominated by Chinguacousy Park. This MTSA also includes several important institutional features such as Region of Peel offices, Bramalea terminal, and the Chinguacousy Branch of the Brampton Library.

The Bramalea MTSA preliminary area plan largely reflects existing uses north of Queen Street East. The southwest and southeast corners of Bramalea Road and Queen Street East are marked for high-rise mixed uses. The southwest portion of the MTSA includes a lot of condos that are unlikely to redevelop, in part because of the

difficulty of achieving unanimous agreement from existing owners. The southeast portion of the MTSA includes low-rise residential areas, open space, and a school.

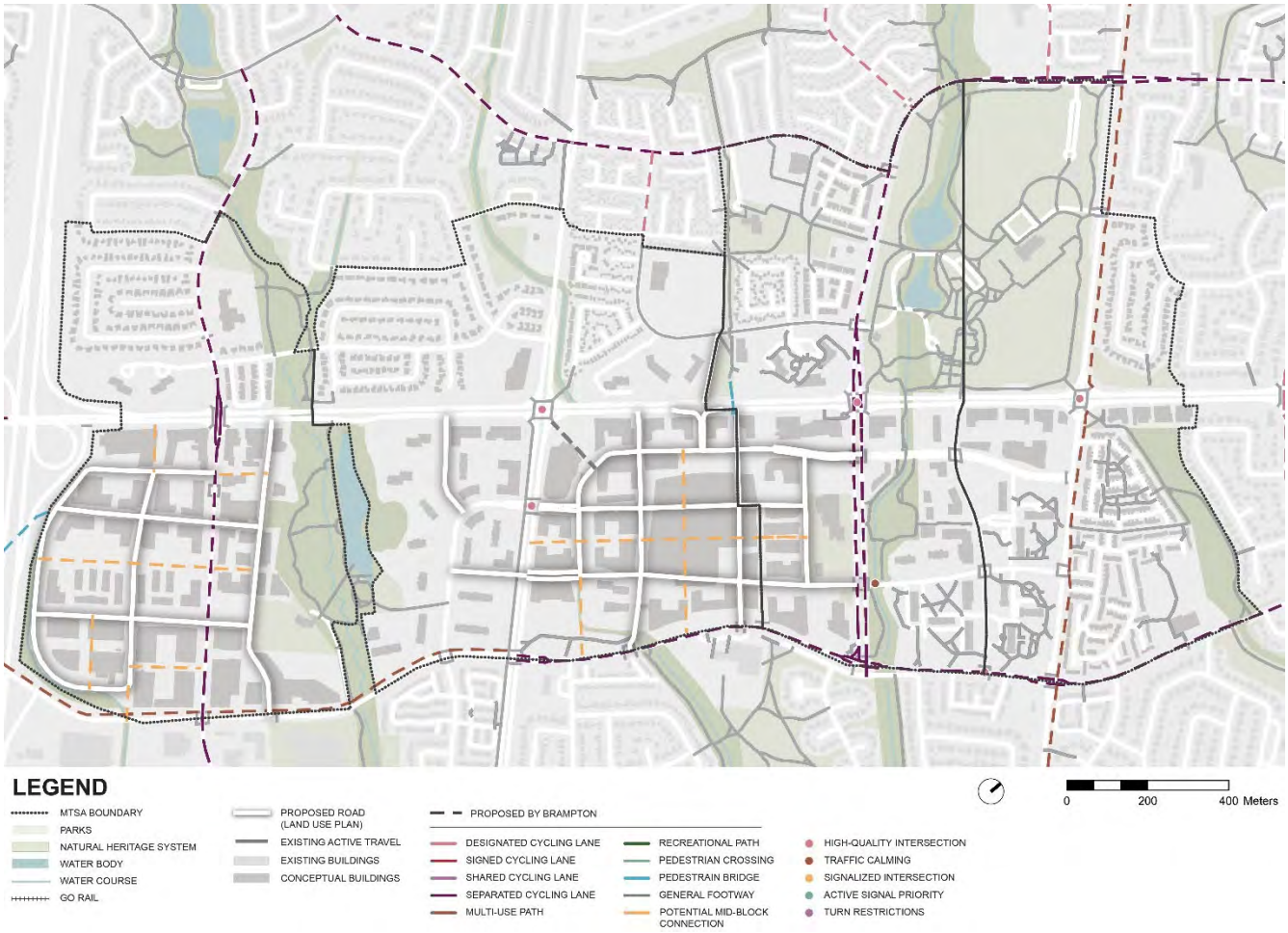

Figure 1-5 Future Street Network and Conceptual Development - Precinct B

Figure 1-6 Current and Future Public Transit Network - Precinct B

1.3.2.1 Public Transit Accessibility and Frequency

- Local bus service:
  - The City shall actively support the provision of new local transit services through the areas expected to accommodate the most significant population and jobs growth. Within this precinct, among the local transit routes the City shall explore with Brampton Transit are (1) new routes serving the Laurelcrest MTSA development area bounded by Queen Street, Highway 410, West Drive, and Clark Boulevard and (2) new routes serving the Dixie development area bounded by Queen Street, Central Park Drive, Clark Boulevard, and Dixie Road.

1.3.2.2 Active Travel

- Connectivity with existing and future networks:
  - Pedestrian and cyclist links shall be provided in accordance with schedules 13g, 13h, 13i, and 13j of the Official Plan and the Active Travel Master Plan to serve as a recreational, utilitarian, and aesthetic amenity to the community and to integrate the elements of the Residential and Commercial Land Uses, Transportation, Recreational Open Space and Natural Heritage System.

1.3.2.3 Pedestrian-Priority Design

- The City will identify “active-travel priority corridors” within the MTSAs between new developments and future Queen Street BRT stops based on expected active travel demand to help prioritize investments in public realm, amenities such as street furniture and lighting, and street-animating ground-level uses. Where feasible, the City will explore traffic-calming measures on local or neighbourhood streets to reduce cut-through vehicle traffic and enhance safety and comfort.
  - Within the Laurelcrest MTSA, active-transport facilities, including street furniture and tree planting, or Complete Streets upgrades should be prioritized for Queen Street East, West Drive, and the north-south road extending south from Queen Street East west of West Drive based on expected active demand.
  - Within the Dixie MTSA, active-transport facilities, including street furniture and tree planting, or Complete Streets upgrades should be prioritized for Queen Street East, Helena Court, and the street network planned for the Bramalea City Centre area based on expected active demand.
  - Within the Central Park MTSA, active-transport facilities, including street furniture and tree planting, or Complete Streets upgrades should be prioritized for Queen Street East, Central Park Drive, Team Canada Drive, Peel Centre Drive, and the north-south proposed street west of Team Canada Drive based on expected active demand.
  - Within the Bramalea MTSA, active-transport facilities, including street furniture and tree planting, or Complete Streets upgrades should be prioritized for Queen Street East, Bramalea Road, and Knightsbridge Road based on expected active demand.

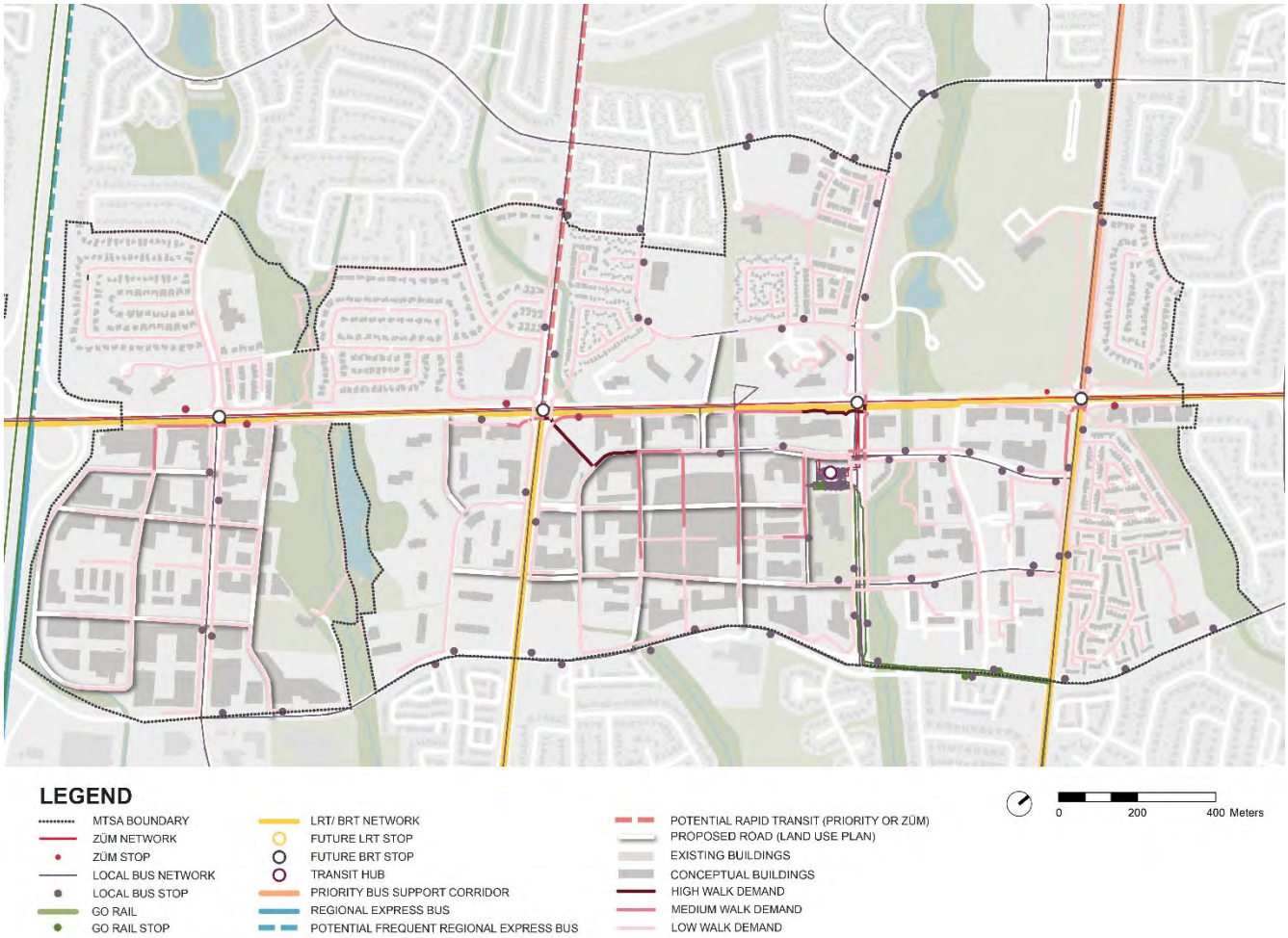

Figure 1-7 Overlay of Future Public Transit Network and Aggregated Walk Demand to BRT - Precinct B

1.3.2.4 Mode Shift

- Travel demand management:
  - Applications for development shall be required to submit travel-demand management plans scoped to reflect the proposed development and prepared by a qualified consultant that describe facilities and programs intended to discourage single-occupancy vehicle trips, minimize parking, and promote the use of transit, cycling, car and bike sharing, and car-pooling. Proposed TDM plans are encouraged to include developer, landlord, or employer-supported transit passes.
    - Within the Laurelcrest MTSA, travel demand management should be emphasized for developments that contribute traffic to Queen Street and Lambeth Street.
    - Within the Dixie MTSA, travel demand management should be emphasized for developments expected to contribute traffic to Queen Street East and portions of the new street network proposed for the current location of the Bramalea City Centre.
    - Within the Central Park MTSA, travel demand management should be emphasized for developments expected to contribute traffic to eastbound Queen Street East, Hanover Road, and portions of the new street network proposed for the existing Bramalea City Centre.

- Within the Bramalea MTSA, travel demand management should be emphasized for developments expected to contribute traffic to Queen Street East.

1.3.2.5 Phasing and Development

In this precinct, the Region of Peel has identified existing constraints within the wastewater servicing network. The principal constraints relate to the Spring Creek Tunnel Trunk, which is already under evaluation by the Region of Peel. As a result of required upgrades, work on Clark Boulevard has been deemed unavoidable despite constructability challenges. The City of Brampton will work with the Region of Peel to harmonize other planned interventions on Clark Boulevard to minimize disruptions. (For further information regarding water and sanitary servicing, consult the reports prepared for Peel Region.)

2. Introduction and Background

2.1 Introduction

The City of Brampton, Canada's ninth-largest municipality by population, is poised to experience a period of unprecedented growth. Between 2016 and 2021, the number of residents in Brampton increased by more than 10%, outpacing the rate of neighbouring Toronto by nearly fourfold. The expansion is expected to continue as the once predominantly suburban municipality becomes increasingly urban.

Much of Brampton's future growth is expected to occur within Major Transit Station Areas (MTSAs) as identified by the province of Ontario in its 2019 provincial growth plan, "A Place to Grow." Intended to encourage future development around priority transit locations, the provincial growth plan requires MTSAs to meet certain residential and employment intensification targets aimed at stimulating housing production to combat a critical shortage, facilitate a transition to more sustainable modes of living, and support major ongoing investments in public transport by bolstering ridership. The development of more compact, complete communities within Brampton's MTSAs will afford more people the opportunity to walk, bike, and take public transport to meet their needs, helping the city achieve its goal of becoming a connected, inclusive, and innovative city by 2040. To that end, the City of Brampton has launched a comprehensive planning initiative to guide efforts to achieve the provincially mandated residential and employment intensification targets within the MTSAs in their municipality. This planning effort will result in the adoption of new Official and Secondary Plans and related zoning by-laws for designated MTSAs.

Intensification within new, more compact complete communities will force the City to grapple with the challenge of accommodating increased demand for critical services, including transit and stormwater management. It also presents a unique opportunity to deploy these services in creative ways that promote better urban outcomes in cost effective ways.

As large autocentric commercial parcels give way to finer-grained mixed-use and residential development, for example, the City of Brampton has an opportunity to align public and private rights of way more efficiently, effectively bringing people closer to desirable destinations by shrinking the distance they must travel especially on foot or bike. The addition of new rights of way will increase the City's responsibility for managing, among other things, stormwater, particularly in areas where new impervious surfaces traverse what was once open space. But emerging approaches to stormwater management, relying on vegetation and engineered bioretention swales, offer the potential to capture, retain, and infiltrate rainfall within the right of way. These approaches may help reduce the need to invest in costly upgrades to stormwater sewer infrastructure, while simultaneously creating more pleasant, vegetated environments and reducing urban heat.

Arup is supporting this endeavour by preparing strategic transportation and stormwater management studies for the City's 12 primary MTSAs, which are located along the future Queen Street bus-rapid transit (BRT) line, the future Hurontario light-rail transit (LRT) line, and the existing Kitchener GO commuter-rail line.

The objective of this report is to provide an overview of the key considerations and objectives for transportation mobility strategies and stormwater servicing strategies for each MTSA. The hydrologic conditions for the existing and proposed MTSA development have been studied and summarized in this report to help inform the City's decisions around planning, infrastructure investment, and prioritization.

2.2 City of Brampton Major Transit Station Areas

A total of 12 MTSAs have been included in this analysis.

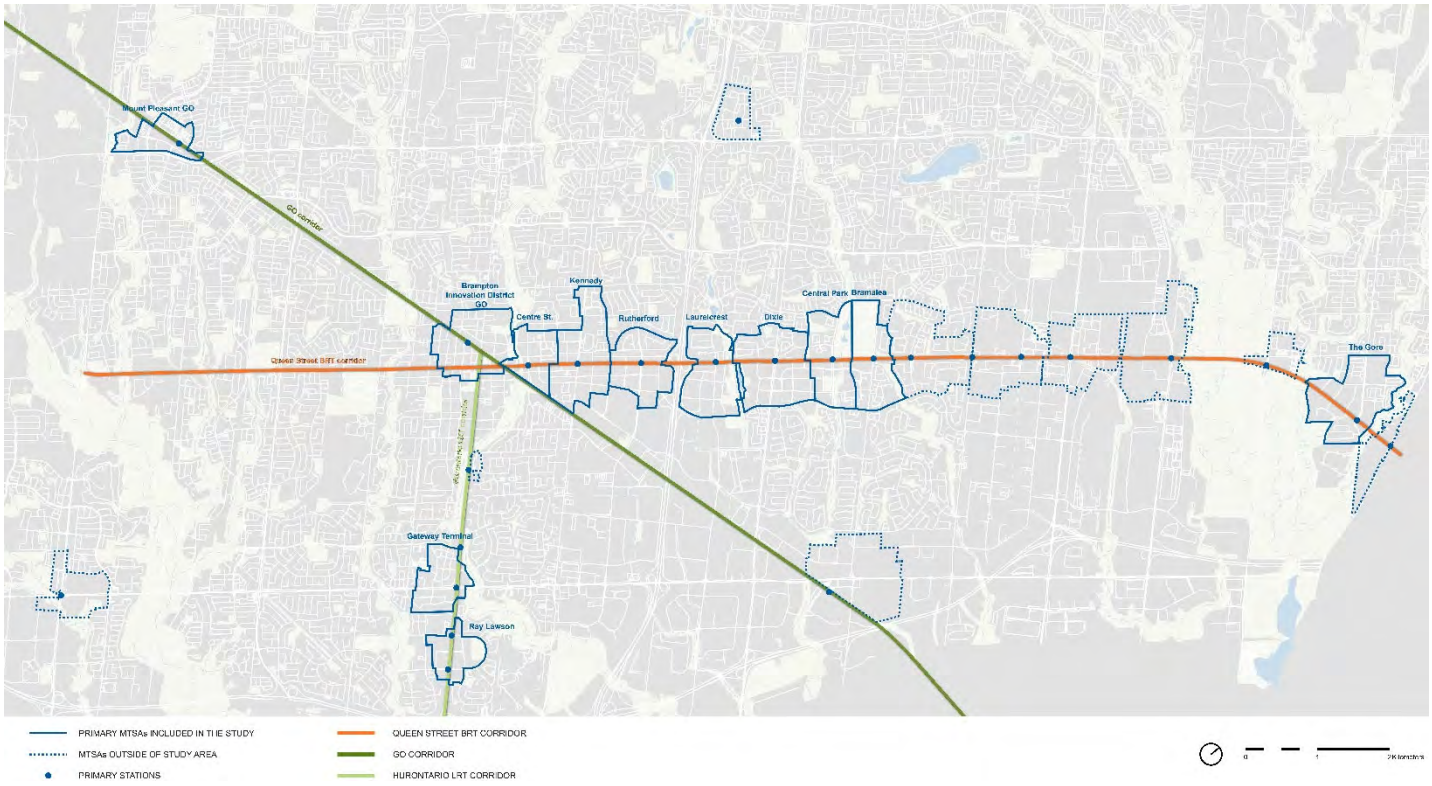

Figure 2-1: Overview Map of Brampton MTSAs Included in Analysis

The MTSAs span two conservation authority areas: Credit Valley Conservation (CVC) and the Toronto and Region Conservation Authority (TRCA). CVC is responsible for the Credit River watershed, which consists of all lands that drain into the Credit River, which, in turn, drains into Lake Ontario. These lands span the Region of Peel (City of Mississauga, City of Brampton, Town of Caledon, Town of Orangeville), the County of Wellington (Town of Erin) and Halton Region (Town of Halton Hills). These lands are split almost evenly among three main land uses: natural areas, urban areas, and agriculture/open space[1].

[1] "Our Watershed". Credit Valley Conservation, 2022, https://cvc.ca/our-watershed/.

The TRCA watersheds included in this project mandate are Etobicoke, Mimico, and Humber. Currently, 63% of the City of Brampton's population lives within TRCA watershed boundaries[2]. The population within the watersheds of the TRCA is growing quickly and presently numbers almost 5 million.

One MTSA (The Gore) is located within the Humber watershed. Seven of the project MTSAs are contained entirely within the Etobicoke watershed, and one MTSA (Bramalea) straddles the Etobicoke and Mimico watershed. These eight MTSAs are part of Brampton's east-west intensification corridor, also known as the Queen Street Corridor. This corridor is expected to grow through its status as part of the City of Brampton's Official Plan for its Urban Growth Centre and Central Area.

The Ray Lawson and Gateway Terminal MTSAs will form part of a future light rail-supported district, the Hurontario-Main Corridor. The area will be intensified with mixed-use developments and community facilities which are still in the concept phase. Brampton GO and Mount Pleasant GO are part of the Kitchener GO Line Corridor, which is also slated for transit-oriented development in the future. Mount Pleasant GO falls entirely within CVC jurisdiction, while Gateway Terminal and Ray Lawson straddle CVC and TRCA watersheds.

Figure 2-2: Map of Major Transit Station Areas and Watersheds

2.3 Analytical Overview and Process

To assist in the development of revised street networks and planning policies for Brampton's MTSAs, Arup conducted qualitative and quantitative analyses regarding active, public-transit, and vehicular travel demand and service availability. Arup also worked with the City of Brampton to propose and validate high-level concepts for the management of increased stormwater run-off from the expansion of the city street network within MTSAs. The analytical approaches applied are described in the following sections.

[2] "About TRCA". Toronto And Region Conservation Authority (TRCA), 2022, https://trca.ca/about/.

Separately, the Region of Peel commissioned studies from other consultants regarding water and wastewater/sanitary servicing for the in-scope MTSAs. Certain findings from these reports are referenced within our MTSA-by-MTSA discussion sections. These details have been included solely for the convenience of the reader and Arup assumes no liability for their accuracy or completeness. Readers of this report should consult the Peel Region servicing reports for further details and should not rely on our reference to them.

3. Transport and Mobility

As part of numerous planning activities, the City of Brampton has articulated a vision for more sustainable land use and mobility patterns. Recognizing that "the best transportation plan is a land use plan," Brampton's draft official plan revision promotes the development of complete, compact neighbourhoods where daily travel needs are reduced and trips on foot, bicycle and transit are prioritized. Building on the City's long-term 2040 vision, Brampton Plan orients the city toward the creation of exciting urban places for living and working that are well connected to transit and contribute to active lifestyles.

As strategic growth areas within the city, MTSAs represent a major component of the City's approach to achieving their long-term vision to 2051. Across the city and within MTSAs, Brampton Plan describes a mobility framework that places active transport and public transit atop the transportation hierarchy. Among other outcomes, mobility policies aim to reorient away from suburban, autocentric development with a corresponding shift to more sustainable transport modes and a reduction in traffic violence and injury.

3.1 Key Considerations and Objectives

The provincial growth plan, "A Place to Grow," establishes minimum targets for residential and employment density within MTSAs based on the transit mode. Within MTSAs served by light rail or bus rapid transit, the plan directs municipalities to achieve a combined minimum density of 160 residents and jobs per hectare; for areas served by the GO Transit rail network, the target is 150 residents and jobs per hectare.

Intensification within the City's MTSAs will allow more people to live close to high-quality, high-frequency rapid transit, offering greater possibilities to live, work, and play using sustainable modes of travel. To achieve this promise, the City will need to design new streets and refurbish existing ones to provide safe, direct, and inviting active travel routes between new and existing developments, key destinations such as parks and community facilities, and new and existing transit infrastructure. This will be especially important as new population translates into increased demand for travel.

The City has established ambitious goals for long-term shifts toward more sustainable modes of travel. Brampton Plan establishes a combined sustainable mode-share target of 35% by 2051. Approximately one quarter of trips are to be made by transit, while 10% are to be made by active modes, such as walking or cycling. The city intends to achieve this goal through increased connectivity, a focus on sustainable mobility, enhancement of the active transportation network, streets fit for all modes and uses, and the promotion of local and regional transit for longer trips through service and last-mile improvements. A shift toward more sustainable transportation patterns driven by urban form also underpins much of Brampton Plan's commitment to reduce greenhouse gas emissions to less than 80% of their 2016 levels by 2051.

Properly planned, the City's MTSAs will play a critical role in driving the shift toward more sustainable modes. The challenge is significant. As of 2016—the most recent year for which travel data are available from the regional origin-destination survey—mode share for transit and active transport during the p.m. peak was approximately 15%. Within the City's MTSAs, existing sustainable mode share rates vary greatly.

Table 3-1: Brampton Mode Split (2016)

Mode	Percentage (2016 TTS Data)
Local Transit	10%
Walking and Cycling	5%
Auto Drivers, Auto Passengers and Others	85%

3.2 Analytical Approach

The proposed street networks for Brampton's MTSAs have been developed through an iterative process involving both qualitative and quantitative assessments aimed at ensuring safe, direct, and convenient active-travel trips between expected new development and the primary transit stations.

The City of Brampton planning and urban design groups prepared preliminary land-use plans, urban-design concepts with potential massing and volumes for future development, and a preliminary future street network, which were included in preliminary area plans for each MTSA. The initial street network plans were refined collaboratively with Arup during workshops held in autumn 2022. Following the autumn workshops, refinements were incorporated into updated area plans and shared publicly during focus-group sessions held in winter and spring 2023. During these group sessions, members of the public were invited to provide comments on the proposed plans and networks via small-group discussions. Comments on the area plans were also received via email.

3.2.1 Travel demand

Following this public engagement exercise, Arup performed a quantitative analysis to assess expected travel-demand distribution and circuity or directness (an assessment of the difference between straight-line distance between origins and destinations and the actual distance someone must travel over the network of streets or sidewalks). The purpose of these analyses using the programming language R was to help identify areas of potentially high demand for active travel, as well as opportunities to propose new links within the network that would allow residents of new development to more directly reach new major transit stops and—by extension—the commercial and other amenities likely to accompany them. For vehicle travel, the analysis was intended to identify areas of potentially high demand warranting additional investigation as the MTSAs develop. The method to assess the active transportation network included:

1. Routing pedestrian and bike trips between buildings (existing and future) and key destinations in each MTSA (including the nearest transit station, healthcare facility, park/open space, grocery store, and school);
2. Joining anticipated pedestrian and bike demand to each route (see Appendix B for a description of how demand for each route was calculated);
3. Aggregating demand from all routes for each street segment; and
4. Calculating route circuity by comparing the network distance to the straight-line distance for each origin-destination pair.

The method to assess the vehicular network included:

1. Identifying appropriate origins and destinations for vehicle trips:
    a. Outgoing vehicle trips:

- Origin: the midpoints of street segments in the MTSA[3]
- Destination: traffic analysis zone (TAZ) points[4]

b. Incoming vehicle trips:

- Origin: TAZ points
- Destination: the midpoints of street segments in the MTSA

2. Routing trips between each street-segment midpoint and each TAZ point;
3. Joining anticipated vehicle demand to each route[5];
4. Aggregating demand from all routes for each street segment; and
5. Identifying roads where demand could potentially lead to congestion either due to high numbers of overlapping routes on local streets or due to demand values that exceed capacity as estimated based on number of lanes. ***(Given the conceptual nature of the MTSA network plans, this analysis of potential vehicular congestion is intended to serve only as a high-level diagnostic. The analysis relied solely on shortest-path routing and did not include dynamic modelling that could account for drivers' real-world decisions to select other alternative routes in the face of congestion.)***

This analysis helped methodically identify areas of focus which either warranted additional safety and comfort refinements for active travellers due to high levels of use or warranted new connections to make trips more direct and convenient. The analysis also yielded information about streets that may be subject to high levels of vehicle demand. Additional detail on the active transportation and vehicular network assessments is provided in Appendix B.

Arup leveraged feedback collected during the public engagement exercise and the outputs of the quantitative analysis to propose further network refinements to improve trip quality and prioritize pedestrians and cyclists. These recommendations were reviewed with the City to establish a final proposed network based on a range of factors including feasibility of implementation based on local conditions.

Many of the approved proposals for street and pedestrian network arrangement were incorporated into the council-approved land use plans contained within the Brampton Official Plan update adopted in October 2023.[6] The final council-approved land use plans served as the basis for Arup's final assessment of street network performance. In particular, Arup reassessed the final approved land use plan street works and conducted additional analyses of travel demand distribution and trip circuity. The final network analyses are intended to

[3] Midpoints of street segments were generated programmatically. Midpoints of street segments that would not have any trips starting or ending on them (because, for example, there are no buildings along them) were manually removed from the analysis.

[4] To reduce the number of individual vehicle routes that needed to be calculated, certain TAZ centroids were aggregated. In recognition of the fact that longer-distance routes heading in or coming from the same direction will likely converge on the same street segments to exit/enter the MTSA area, TAZ centroids farther from the MTSA centroid were aggregated. This analysis used all TAZs included in the 2041 demand matrices provided by the City of Brampton. TAZ centroids farther than 10 km from the MTSA centroid were aggregated to three evenly spaced points equidistant from the MTSA centroid. TAZ centroids between 5 and 10km from the MTSA centroid were aggregated to eight evenly spaced points equidistant from the MTSA centroid. TAZ centroids between 2.5 and 5km from the MTSA centroid were aggregated to 16 evenly spaced points equidistant from the MTSA centroid. TAZ centroids within 2.5km from the MTSA centroid were not aggregated and were routed to/from directly.

[5] Vehicle demand arriving to and leaving from each building was calculated using the method described in Appendix A. The demand for each building was aggregated to the block level and then divided amongst each street-segment midpoints touching that block. Each midpoint's demand was then proportionately divided across the routes going to each TAZ centroid based on the demand travelling between the MTSA and that TAZ centroid in the 2041 auto demand matrices shared by the City of Brampton.

[6] Brampton Plan, adopted Oct. 31, 2023, https://www.brampton.ca/EN/City-Hall/Official-Plan/Documents/Brampton%20Plan%202023.pdf.

help the city prioritize investments and interventions where demand may be greatest and to select sustainable-travel policies for inclusion within MTSA-specific secondary plans.

3.2.2 Public Transit Service

Arup also conducted a high-level analysis of public-transit accessibility based on Brampton's final proposed MTSA street networks, current and planned future service, and future development distribution. The aim of this analysis was to identify those areas within MTSAs expected to have more limited bus service. By identifying these areas, the City of Brampton will be able to work with Brampton Transit and other agencies to propose alterations or additions to routes to better align with future population locations. Within areas of more limited public transit service, the City of Brampton may also work with developers to provide privately funded alternatives, including shuttle buses to key transit locations.

3.3 Precedents

Policies and plans by the City of Brampton, policies and plans from other Ontario municipalities, and precedents for transit-oriented and supporting sustainable transportation strategies may serve as sources of inspiration for the MTSA Official and Secondary Plans.

3.3.1 Brampton Precedents

Across the city, Brampton has already deployed policies and approaches aimed at promoting more sustainable travel. These policies may be considered as precedents for application within MTSAs through Official and Secondary Plans.

3.3.1.1 Plans

- **Brampton Plan:** The City's draft Official Plan update establishes an overarching policy framework for the City's MTSAs. Primary MTSAs will be designated Mixed-Use Districts with a range of functions in a transit-rich environment. In some cases, the primary MTSAs will overlap with other districts, such as "centres" subject to enhanced development targets, and "employment areas" which will require additional studies. Part 2.3 of the draft Brampton Plan describes the following policies to encourage walking, cycling, and public transit:
  - Embrace complete street designs that protect the most vulnerable road users (pedestrians and cyclists) regardless of street classification to enhance safety for users of the Active Transportation Network and increase the city's active transportation mode share.
  - Promote the collocation of health, social, cultural, and recreational amenities in community hubs, especially with existing public services inside designated MTSAs or near planned rapid transit, reflecting a transition to integrated land use and transport planning that should characterize all MTSAs.
  - Create a city-wide "Eco Park" consisting of a network of interconnected green space to promote environmental stewardship, health, and social interaction. The Eco Park may provide a useful strategic lens to help direct the dedication of public and green space within the MTSAs. In turn, the MTSAs themselves may become important vehicles for the realization of this broader vision, which will have implications for active-travel comfort and enjoyment.
- **Let's Connect: Active Transportation Master Plan:** The City's Active Transportation Master Plan, published in 2019, defines a vision for an "integrated, attractive, and accessible system of sidewalks, cycling facilities, and trails." The plan's key goals include improving safety, providing opportunities for all ages residents regardless of age or ability, making better use of existing infrastructure, investing efficiently in network expansions, and improving access to transit by fomenting better options for first- and last-mile travel.

- **Brampton 2040 Vision – Living the Mosaic (May 2018)**: Brampton's vision for the next quarter century describes numerous actions to promote transit, cycling and walking. These include, among others, redirecting circulation in Brampton's centres to feed transit, designing complete streets, integrating transit, and implementing fare-free transit by 2040.

3.3.1.2 Existing Secondary Plan Precedents

The City of Brampton has adopted numerous policies within Secondary Plans that could readily be adapted to advance transportation-related goals within MTSAs. These precedents draw on the City's legal, policy, and spending authorities to promote the creation of denser, more complete communities. The policies and strategies generally fall into the following categories:

- **Advocacy:** Advocating at the regional level for transit service and active transportation network investments to align municipal and provincial goals.
- **Capital investment and phasing:** Matching infrastructure investment with phased development to accommodate and direct growth.
- **Density-supportive regulations:** Adjusting policies and regulations to ensure that they don't compromise intensification targets; for example, by allowing developers to include Rights of Way and other public dedications in the calculation of allowable density and removing parking minimums.
- **Infrastructure and urban design standards:** Incorporating active travel facilities into design standards for the new Rights of Way as required to support intensification and leveraging existing infrastructure to forge new active links.
- **Open space and ecosystem services:** Coordinating the management and expansion of open and green spaces into networks that promote recreation and facilitate active travel while simultaneously providing valuable services, including stormwater management and urban cooling.
- **Transportation network design:** Establishing a fine-grain transportation network that provides comfort, safety, and directness for active travelers through public investment and private contribution through the planning and approvals process.
- **Travel demand management:** Partnering with developers and public agencies to reduce overall travel demand and shift demand toward more sustainable transportation modes via incentives, such as privately subsidized transit passes, or market signals, such as charging full market rates for parking.

Table 3-2: Secondary Plan Precedents

Category	Type of Provision	Examples
Advocacy	Advocate at the regional level for transit-service improvements	Bramalea Mobility Hub Secondary Plan, s. 7.3.4. ("The City shall actively support the provision of two-way all-day service during peak periods, on the GO Transit line from Toronto to Georgetown with the intent of improving inter-regional transit accessibility.") Queen Street Corridor Secondary Plan, s. 6.2.3. ("The City shall actively support the provision of two-way all-day service during peak periods, on the GO Transit line from Toronto to Georgetown with the intent of improving inter-regional transit accessibility.") Bramalea Road South Gateway Redevelopment Area Secondary Plan, s. 7.3.4. ("The City shall actively support the provision of two-way all-day service during peak periods, on the GO Transit line from Toronto to Georgetown with the intent of improving inter-regional transit accessibility.")

Category	Type of Provision	Examples
Capital investment	Match growth and phasing with public transit investment	Heritage Heights Secondary Plan s. 10.3 (“Development of public transit infrastructure projects will keep pace with private development and will protect for the future expansion and long-term implementation of the transit system, including higher order transit, in the Secondary Plan Area.”) Hurontario-Main Corridor Secondary Plan s. 5.9.1.(iii) (“Enhance the overall traffic capacity of the transportation system by improving transit and the efficiency of the existing road network in conjunction with the construction of new connections.”)
Capital investment	Align with external objectives and funding opportunities	Heritage Heights Secondary Plan s. 10.6.3 (“Jurisdiction and financing of The Grand Boulevard within the GTA West Transportation Corridor will be determined once a decision is made by the Province of Ontario, regarding infrastructure within the Corridor. Potential scenarios have been established as part of the Heritage Heights Transportation Master Plan.”)
Density-supportive regulation	Ensure required public-realm dedication does not compromise density targets.	Secondary Plan Area 38 – Bramalea Road South Gateway Redevelopment Area Secondary Plan, s.7.2.6 (“The land acquired for road widenings and new road links as a condition of development approval shall be included in the calculation of permissible gross floor area”)
Infrastructure design	Leverage infrastructure to forge new active links	Heritage Heights Secondary Plan s. 10.10.6 (“Opportunities to provide a pedestrian/cyclist pathway along the Trans-Canada Pipeline (TCPL) will be explored as a means of providing local and community linkages.”). Mount Pleasant Secondary Plan s. 6.4.4. (“Opportunities to provide a pedestrian/cyclist pathway along the Trans-Canada Pipeline (TCPL) to provide local and community linkages.”) Vale of Castlemore Secondary Plan. 4.3.4. (“The primary function of the Trans Canada Gas Pipeline lands is the accommodation of high-pressure natural gas transmission lines, will also be dedicated as link park for the secondary purpose of accommodating pedestrian/bicycle paths.”)
Infrastructure design	Deploy physical traffic calming measures	Heritage Heights Secondary Plan s. 10.12.8 (“Traffic calming mechanisms to slow traffic and safety separating the pedestrian realm from vehicles may be required to support on-street parking.”) Downtown Brampton Secondary Plan s. 6.2.7 (“Use of reduced design speeds, street design standards and other measures to calm traffic and reduce conflicts between active transportation modes and vehicles.”)
Infrastructure design	Create transit-supportive infrastructure	The Northwest Sandalwood Parkway Secondary Plan - Secondary Plan Area 2A s. 4.2.3 (“Sidewalks along arterial and collector roads that are expected to accommodate transit routes shall incorporate bus pad widenings in appropriate locations in accordance with City standards.”) Fletchers Creek South Secondary Plan s. 6.8.4.(iii) (“Sidewalks located at the intersection of Hurontario Street and Steeles Avenue may be wider than standard to accommodate the higher pedestrian activity associated with major transit stops and intensified development.”) Bram West Secondary Plan Chapter 40(a) s. 4.2.3. (“Sidewalks along Arterial and Collector Roads that are expected to accommodate transit routes shall incorporate bus pad widenings in appropriate locations in accordance with City standards.”) Bram West Secondary Plan Chapter 40(a) s. 4.2.4. (“The Bram West Transportation Study (Marshall Macklin Monaghan) has identified locational and operational options for the development of either an on-street or off-street transit terminal.”) Vales of Castlemore Secondary Plan s. 4.2.3. (“Sidewalks along Arterial and Collector Roads that are expected to accommodate transit routes shall incorporate bus pad widenings in appropriate locations in accordance with City standards.”) Fletchers Meadow Secondary Plan s. 4.2.3. (“Sidewalks along Arterial and Collector Roads that are expected to accommodate transit routes shall incorporate bus pad widenings in appropriate locations in accordance with City standards.”)

Category	Type of Provision	Examples
		Fletchers Meadow Secondary Plan s. 4.2.4. ("In response to the City's anticipated need for a transit facility in the general vicinity of the GO Station, the Fletchers Meadow Transportation and Mixed OP2006-79 22 The Fletchers Meadow Secondary Plan Secondary Plan Area 44 February 2013 Use/GO Station Node Study (Marshall Macklin Monaghan) has identified locational and operational options for the development of either an on-street or off-street transit terminal in conjunction with the GO Station terminal.") Vale of Castlemore North Secondary Plan s. 5.2.3. ("Sidewalks along Arterial and Collector Roads that are expected to accommodate transit routes shall incorporate bus pad widenings in appropriate locations in accordance with City standards.") Vale of Humber Secondary Plan s. 6.2.7. ("Sidewalks along Arterial and Collector Roads that are expected to accommodate transit routes shall incorporate bus pad widenings in appropriate locations in accordance with the City of Brampton standards.") Fletchers Creek South Secondary Plan, s. 11.4.2 ("Appropriate setbacks of buildings on private lands will be required to protect future requirements for bus bays and bus lanes.") Bram East Secondary Plan s. 4.2.3. ("Sidewalks along Arterial and Collector Roads that are expected to accommodate transit routes shall incorporate bus pad widenings in appropriate locations in accordance with City standards.") Fletchers Creek Village Secondary Plan s. 4.2.3. ("Sidewalks along Arterial and Collector Roads that are expected to accommodate transit routes shall incorporate bus pad widenings in appropriate locations in accordance with City standards.")
Infrastructure design	Allocate and protect space for transit-priority measures.	Secondary Plan Area 38 – Bramalea Road South Gateway Redevelopment Area Secondary Plan, s. 7.3.5. ("The City shall ensure the protection of an adequate right-of-way along Steeles Avenue within the Secondary Plan Area for High Occupancy Vehicle Lanes (HOV)/Reserved Bus Lanes (RBL).") Queen Street Corridor Secondary Plan, s. 6.3.7. ("The City shall ensure the protection of an adequate right-of-way along Steeles Avenue within the Secondary Plan Area for High Occupancy Vehicle Lanes (HOV)/Reserved Bus Lanes (RBL).") Bramalea Road South Gateway Redevelopment Area Secondary Plan, s. 7.3.5. ("The City shall ensure the protection of an adequate right-of-way along Steeles Avenue within the Secondary Plan Area for High Occupancy Vehicle Lanes (HOV)/Reserved Bus Lanes (RBL).")
Infrastructure design	Allocate right-of-way space for protected active travel	Mount Pleasant Secondary Plan s. 6.4.3. ("Pedestrian/cyclist crossings of major roads shall be by underpass or other suitable arrangements where the City does not consider an at-grade pedestrian crossing to be appropriate or practical.") Mount Pleasant Secondary Plan s. 6.4.5. ("Cycling connections to the city-wide pathways network, where appropriate, will be provided along Arterial Roads and Minor Collectors.")
Mobility hubs / urban integration	Fully integrate higher-order transit stops and stations into the urban fabric / Create mobility hubs	Heritage Heights Secondary Plan s. 10.8.2 ("Development and public realm improvements in the vicinity of these transit stations will be designed to: a) Provide direct connections for pedestrians and cyclists above and below grade, as appropriate; b) Promote opportunities for the design of these transit stations and infrastructure to be integrated with mixed use, urban development and the public realm; and c) Act as a focal points contributing to the character of the local context and support an elevated architectural treatment that reflects the important role and function of the transit station as a hub of activity for the community.") Countryside Villages Secondary Plan Chapter 48(b) s. 7.3.1. ("Pedestrian and cyclist links shall be provided in accordance with Sections 4.4.6 and 4.6.9 of the Official Plan and the Pathways Master Plan to serve as a recreational, utilitarian and aesthetic amenity to the community and to integrate the elements of the Residential and Commercial Land Uses, Transportation, Recreational Open Space and natural heritage system.")

Category	Type of Provision	Examples
		Hurontario-Main Corridor Secondary Plan s. 5.9.1.(ii) (“Promote the use of public transit in conjunction with land use policies that will provide the support and ridership for a higher order transit system.”
Open space / ecosystem services	Use landscape to achieve co-benefits	Heritage Heights Secondary Plan s. 10.12.9 (“Surface parking lots, where appropriate, will be designed to incorporate plantings as a means of increasing tree cover and shading, reducing heat island impacts, and to intercept rainfall during extreme weather events.”)
Open space / ecosystem services	Preserve existing ecosystem services	Northwest Sandalwood Parkway Secondary Plan - Secondary Plan Area 2A s. 5.2.1 (“It is intended that significant, high quality tree specimens are retained to the greatest extent practicable in conjunction with all land uses to enhance the environment and aesthetics of the secondary plan area.”)
Open space / ecosystem services	Leverage open space and natural heritage areas to create a pleasant, well-connected active transportation network	Heritage Heights Secondary Plan s. 10.10.5 Active transportation facilities and linkages will be provided through, across, or along the edges of adjacent open space areas, as deemed ecologically appropriate. Road allowances may also be utilized and expanded to accommodate portions of the active transportation network where there is no other alternative. Heritage Heights Secondary Plan s. 10.10.7 Where there are identified potential impacts to the Natural Heritage System features and/or functions, an additional buffer area may be required to accommodate pedestrian and cyclist paths. Heritage Heights Secondary Plan s. 10.10.9 Parks and open spaces will include multi-purpose recreational trails linked to the street network to enhance connectivity for cyclists. The Northwest Sandalwood Parkway Secondary Plan - Secondary Plan Area 2A s. 4.3.1 (“Appropriate pedestrian/cyclist links shall be provided through or at the edge of all contiguous open space elements including active tableland parks, school sites and valley lands in an environmentally conscious manner.”) The Northwest Sandalwood Parkway Secondary Plan - Secondary Plan Area 2A s. 4.3.2 (“Appropriate pedestrian/cyclist links between open space elements shall be provided along suitably located roads, block walkways or at specific locations as determined by the City.”) The Northwest Sandalwood Parkway Secondary Plan - Secondary Plan Area 2A s. 4.3.3 (“To encourage an uninterrupted open space valley system, pedestrian/cyclist crossings of major roads such as McLaughlin Road and Mayfield Road shall be by underpass or other suitable arrangements where the City does not consider an at-grade crossing appropriate or practical.”) Downtown Brampton Secondary Plan s. 6.7.2 (“The City shall encourage the provision of connections from the trail system to the bicycle lanes through parks or open space corridors, and/or along quiet residential streets with the intent of providing pleasant environments and to minimize conflicts with vehicular traffic.”) Fletchers Creek South Secondary Plan s. 6.8.4.(v) (“Hurontario/Main Street shall be planned for an enhanced level of bicycle priority, as continuous as possible along the corridor.”) Queen Street Corridor Secondary Plan s. 6.7.2. (“The City shall encourage the provision of connections from the trail system to the bicycle lanes through parks or open space corridors, and/or along quiet residential streets with the intent of providing pleasant environments and to minimize conflicts with vehicular traffic.”) Vale of Castlemore Secondary Plan. 4.3.1. (“Appropriate pedestrian/cyclist links shall be provided through or at the edge of all contiguous open space elements including tableland parks, school sites and valley lands in an environmentally conscious manner.”) Vale of Castlemore Secondary Plan. 4.3.2. (“Appropriate pedestrian/cyclist links between open space elements shall be provided along suitably located roads, block walkways or in other specific locations as determined by the City.”)

Category	Type of Provision	Examples
		Fletchers Meadow Secondary Plan s. 4.3.2. (“Appropriate pedestrian/cyclist links between open space elements shall be provided along suitably located roads, block walkways or in other specific locations as determined by the City. Any proposed pedestrian/cyclist links crossing Highway No. 7 require approval by the Ministry of Transportation.”) Countryside Villages Secondary Plan Chapter 48(a) s. 7.3.1. (“Pedestrian and cyclist links shall be provided in accordance with Sections 4.4.6 and 4.6.9 of the Official Plan and the Pathways Master Plan to serve as a recreational, utilitarian and aesthetic amenity to the community and to integrate the elements of Land Use, Transportation, Recreational Open Space and natural heritage system, where feasible.”) Vale of Castlemore North Secondary Plan. 5.3.1. (“Appropriate pedestrian/cyclist links shall be provided through or at the edge of all contiguous open space elements including tableland parks, school sites and valley lands in an environmentally conscious manner.”) Vale of Castlemore North Secondary Plan. 5.3.2. (“Appropriate pedestrian/cyclist links between open space elements shall be provided along suitably located roads, block walkways or in other specific locations as determined by the City.”) Mount Pleasant Secondary Plan. 6.4.1. (“Pedestrian and cyclist links, facilities and infrastructure shall be provided, where appropriate, to integrate the elements of the Residential and Commercial Land Uses, Transportation, Recreational Open Space and Natural Heritage System s, to provide comprehensive access to those systems and to serve as a recreational and aesthetic amenity to the community.”) Mount Pleasant Secondary Plan. 6.4.2. (“Pedestrian/cyclist links shall be provided through or, where this is not possible, along the edge of contiguous open space elements including parks, school sites and stream corridors, where appropriate. Roads may be used as pedestrian/cyclist links. Road allowances may also be utilized and expanded to accommodate necessary linkages where there is no other alternative.”) Mount Pleasant Secondary Plan. 6.4.6. (“Pedestrian and Cyclist Links located outside of a designated right-of-way or trail system within the “Natural Heritage System Area” designation shall be gratuitously conveyed to the City of Brampton or in accordance with cost sharing arrangements.”) Hurontario-Main Corridor Secondary Plan s. 5.9.4.1.(iii) (“Wherever possible, streets shall provide landscaped buffers, trees and appropriate pedestrian amenities for pedestrian safety and convenience.”) Hurontario-Main Corridor Secondary Plan s. 5.9.4.1.(v) (“Wherever possible, connections through blocks shall be developed and direct walkway routes provided to natural areas and parks, businesses, transit stops, schools, community facilities and other desirable destinations.”) Bram West Secondary Plan Chapter 40(a) s. 4.3.1. (“Appropriate pedestrian/cyclist links shall be provided through or at the edge of all contiguous open space elements including tableland parks, school sites and valley lands.”) Bram West Secondary Plan Chapter 40(a) s. 4.3.2. (“Appropriate pedestrian/cyclist links between open space elements shall be provided along suitably located roads, block walkways or in other specific locations as determined by the City.”) Bram West Secondary Plan Chapter 40(a) s. 4.3.3. (“To encourage an uninterrupted open space valley system, pedestrian/cyclist crossings of major roads such as Steeles Avenue shall be by underpass or other suitable arrangements where the City does not consider an at-grade pedestrian crossing appropriate or practical.”) Bram East Secondary Plan s. 4.3.1. (“Appropriate pedestrian/cyclist links shall be provided through or at the edge of all contiguous open space elements including tableland parks, school sites and valley lands in an environmentally conscious manner.”) Bram East Secondary Plan s. 4.3.2. (“Appropriate pedestrian/cyclist links between open space elements shall be provided along suitably located roads, block walkways or in other specific locations as determined by the City.”)

Category	Type of Provision	Examples
		Bram East Secondary Plan s. 4.3.3. ("To encourage an uninterrupted open space valley system, pedestrian/cyclist crossings of major roads such as Williams Parkway and Highway 7 shall be by underpass or other suitable arrangements where the City does not consider an at-grade pedestrian crossing appropriate or practical.") Vale of Castlemore Secondary Plan s. 4.3.1. ("To encourage an uninterrupted open space valley system, pedestrian/cyclist crossings of major roads such as Humberwest Parkway shall be by underpass or other suitable arrangements where the City does not consider an at-grade pedestrian crossing appropriate or practical.") Fletchers Creek South Secondary Plan s. 4.3.1. ("Appropriate pedestrian/cyclist links shall be provided through or at the edge of all contiguous open space elements including active tableland parks, school sites and valley lands.") Fletchers Creek South Secondary Plan s. 4.3.2. ("Appropriate pedestrian/cyclist links between open space elements shall be provided along suitably located roads, block walkways or at specific locations as determined by the Community Services Department.") Fletchers Creek South Secondary Plan s. 4.3.3. ("To encourage an uninterrupted open space valley system, pedestrian/cyclist crossings of major roads such as Williams Parkway and Highway 7 shall be by underpass or other suitable arrangements where the City does not consider an at-grade crossing appropriate or practical.") Fletchers Meadow Secondary Plan s. 4.3.1. ("Appropriate pedestrian/cyclist links shall be provided through or at the edge of all contiguous open space elements including active tableland parks, school sites and valley lands.") Fletchers Meadow Secondary Plan s. 4.3.3. ("To encourage an uninterrupted open space valley system, pedestrian/cyclist crossings of major roads shall be by underpass or other suitable arrangements where the City does not consider an at-grade pedestrian crossing appropriate or practical. From a safety perspective, simultaneous compound changes in the grade and direction of underpass designs are not recommended.")
Sustainability targets	Set more ambitious sustainable mode-share targets	Secondary Plan Area 38 – Bramalea Road South Gateway Redevelopment Area Secondary Plan, s.7.3.3 ("The City shall attempt to promote increased transit usage in the Secondary Plan Area from the current modal share of 10% to the ultimate target of 30% by encouraging alternative transportation modes other than private automobile movements and reducing current parking standards of the appropriate zoning by-law.")
Sustainable transport facilities	Provide bicycle parking at key destinations	Heritage Heights Secondary Plan s. 10.10.10 ("Cycling facilities and amenities such as bicycle parking and lock-up areas will be provided at all public destinations within the Heritage Heights Secondary Plan, including but not limited to transit stations, parks, schools, community centres, cultural facilities, other public institutions, and retail uses.") Heritage Heights Secondary Plan s. 10.10.11 ("Sheltered bicycle lock-up facilities will be provided at and within High-Rise buildings.") Heritage Heights Secondary Plan s. 10.10.12 ("Developments located adjacent to the Heritage Heights GO Station and transit stations will be encouraged to include public bicycle parking in accessible, safe and secure indoor facilities.") Hurontario-Main Corridor Secondary Plan s. 5.9.5.1.(ii) ("Bicycle parking shall be provided by all residential, commercial, institutional, employment, recreational and civic buildings. Residential buildings shall offer secure bike parking at a rate of at least 1 bicycle parking space for every two units and employment uses shall offer secure bike parking at a rate of at least 1 bicycle parking space for every 500 square metres of gross commercial floor space. In addition, these buildings are encouraged to provide showers and change facilities.")
Sustainable transport facilities	Provide space for shared mobility/car-share programs	Heritage Heights Secondary Plan s. 10.12.6 ("Off-street parking facilities will be designed to accommodate spaces for car-share programs and include reserved spaces for drivers of car-share and electric vehicles.")

Category	Type of Provision	Examples
Local transit network and operations	Ensure adequate access to public transit feeder networks	Heritage Heights Secondary Plan s. s. 10.8.5 ("…Framework Streets which are to be designed with sufficient flexibility to deliver bus routes within 400 metres of most residents and to conveniently serve commercial, institutional, and employment uses.") The Northwest Sandalwood Parkway Secondary Plan - Secondary Plan Area 2A s. 4.2.1 ("The major road system consisting of Highways, Major and Minor Arterial Roads and Collector Roads provides sufficient flexibility to potentially provide bus routes within 400 metres of all residents.") Fletchers Creek South Secondary Plan s. 11.4.1. ("Council will encourage the provision of transit service within easy walking distance (300-700 metres) of all urban land uses.") Bram West Secondary Plan Chapter 40(a) s. 4.2.1. ("The major road system consisting of Highways, Major and Minor Arterial Roads and Collector Roads provides sufficient flexibility to potentially provide bus routes within 400 metres of all residents and to conveniently serve major employment and other uses.") Bram West Secondary Plan Chapter 40(a) s. 4.2.2. ("Subdivisions shall be designed to minimize walking distances to transit routes and shall incorporate through block walkways as required to achieve that objective, particularly to accommodate those who would otherwise be more than 300 metres (1,000 feet) walking distance from an existing or planned transit stop.") Bram East Secondary Plan s. 4.2.1. ("The major road system consisting of Highways, Major and Minor Arterial Roads and Collector Roads provides sufficient flexibility to potentially provide bus routes within 400 metres of all residents and to conveniently serve major employment and other uses.") Bram East Secondary Plan s. 4.2.2. ("Subdivisions shall be designed to minimize walking distances to transit routes and shall incorporate through block walkways as required to achieve that objective, particularly to accommodate residents who would otherwise be more than 300 metres (1,000 feet) walking distance from an existing or planned transit stop.") Vale of Castlemore Secondary Plan s. 4.2.1. ("The major road system consisting of Major and Minor Arterial Roads and Collector Roads provides sufficient flexibility to potentially provide bus routes within 400 metres (1312 feet) of all residents and to conveniently serve major employment and other uses.") Fletchers Creek Village Secondary Plan s. 4.2.1. ("The major road system consisting of Highways, Major and Minor Arterial Roads and Collector Roads provides sufficient flexibility to potentially provide bus stops within 400 metres of all residents.") Fletchers Creek Village Secondary Plan s. 4.2.2. ("Subdivisions shall be designed to minimize walking distances to transit routes and shall incorporate through block walkways as required to achieve that objective, particularly to accommodate residents who would otherwise be more than 300 metres (1000 feet) walking distance from an existing or planned transit stop.") Fletchers Meadow Secondary Plan s. 4.2.1. ("The major road system consisting of Highways, Major and Minor Arterial Roads and Collector Roads provides sufficient flexibility to provide bus routes within 400 metres of all residents and to conveniently serve major employment and other uses.") Fletchers Meadow Secondary Plan s. 4.2.2. ("Subdivisions shall be designed to minimize walking distances to transit routes and shall incorporate through block walkways as required to achieve that objective, particularly to accommodate those who would otherwise be more than 300 metres (1,000 feet) walking distance from an existing or planned transit stop.") Vales of Castlemore North Secondary Plan s. 5.2.1. ("The major road system consisting of Highways, Major and Minor Arterial Roads and Collector Roads provides sufficient flexibility to provide bus routes within 400 metres of all residents and to conveniently serve major employment and other uses.") Vales of Castlemore North Secondary Plan s. 5.2.2. ("Subdivisions shall be designed to minimize walking distances to transit routes and shall incorporate through block

Category	Type of Provision	Examples
		walkways as required to achieve that objective, particularly to accommodate those who would otherwise be more than 300 metres (1,000 feet) walking distance from an existing or planned transit stop.") Vales of Humber Secondary Plan s. 6.2.2. ("The major road system within and abutting the Secondary Plan as shown on Schedule 50(a) consists of Arterial Roads and Collector Roads that have been designed with sufficient flexibility to deliver bus routes within 400 metres of most residents and to conveniently serve commercial and institutional uses.") Vales of Humber Secondary Plan s. 6.2.3. ("Subdivisions shall be designed to minimize walking distances to transit routes and provide safe, attractive and direct pedestrian/cyclist access to transit stops.") Vales of Humber Secondary Plan s. 6.2.6. ("In order to encourage greater use of public transit within the community, local road and block patterns should be designed to accommodate pedestrian/cyclist access to collector roads and transit stops, to the extent practical.")
Transport network design	Leverage private development to ensure interconnected networks of pedestrian and active pathways	Secondary Plan Area 38 – Bramalea Road South Gateway Redevelopment Area Secondary Plan, s. 7.1.1(iv) (October 2020) ("provide for a bicycle path as shown by Schedule SP38(B) within the Steeles Avenue Road right-of-way. Bicycle paths are to be obtained as a condition of development approval"). Secondary Plan Area 38 – Bramalea Road South Gateway Redevelopment Area Secondary Plan, s.7.4.1 ("The need for an east-west bicycle route along Steeles Avenue has been identified on Schedule SP38(B). This bicycle route shall be located adjacent to the High Occupancy Vehicle (HOV) lane as an off-road facility.") Fletchers Creek South Secondary Plan, s. 6.8.4. (i) ("Streets and streetscapes are strongly encouraged to be designed and landscaped to function as a significant part of the public realm and be oriented to pedestrian use.") Heritage Heights Secondary Plan s. 10.10.8 ("Property requirements for active transportation facilities and related linkages located outside of a designated road right-of-way or outside of the Natural Heritage Areas designation will be gratuitously conveyed to the City of Brampton as a condition of development approval where it has been demonstrated that such facilities cannot be located within the public right-of way through the development process.") Hurontario-Main Corridor Secondary Plan s. 5.9.4.1.(i) ("New development and redevelopment shall support a pedestrian-scaled network of connected local streets and sidewalks linking neighbourhoods, parks, transit stops, services and other desirable destinations.") Hurontario-Main Corridor Secondary Plan s. 5.9.4.1.(ii) ("New development and redevelopment shall accommodate pedestrians on all streets along a network of connected sidewalks.") Hurontario-Main Corridor Secondary Plan s. 5.9.4.1.(vi) ("New development shall promote pedestrian connections. Gated developments, cul-de-sacs, and other approaches to development, which reduce connectivity, shall not be permitted.
Transport network design	Require property owners to dedicate land for local roads and intermediate connections	Secondary Plan Area 38 – Bramalea Road South Gateway Redevelopment Area Secondary Plan, s. 7.2.1 (Oct. 2020) ("Where large size blocks are contemplated for development, access between properties at strategic locations to facilitate a local road network shall be considered at the development approval stage. As a condition of development approval, landowners may be required to enter agreements that among other matters shall determine ultimate access and shared parking arrangements.")
Transport network design	Develop fine-grained multimodal street networks	Heritage Heights Secondary Plan s. 10.7.2 ("The planned street network shown on Schedule 52-9 - Street Network envisions a fine grain of public streets which will facilitate a high level of connectivity for pedestrians, cyclists, vehicles, and transit, to ensure efficient access to and from local destinations and transit.") See also ss. 10.7.1 and 10.7.3.

Category	Type of Provision	Examples
		Highway 427 Industrial Secondary Plan (Partially In Effect) s. 4.2.15. (“Encourage and promote the use of alternative travel modes to the automobile by providing effective transit service and opportunities for cycling and walking within the community as practical elements of the transportation system.”) Highway 427 Industrial Secondary Plan (Partially In Effect) s. 4.2.16. (“Create an inter-connected street system that is transit supportive and that promotes the safe, efficient movement of pedestrians, cyclists and traffic.”)
Transport network design	Prioritize direct active transportation links / reduce pedestrian circuity	Heritage Heights Secondary Plan s. 10.8.6 (“Development, streets and blocks, will be encouraged to be designed to minimize walking distances to transit stops and provide safe, convenient, attractive, and direct pedestrian and cyclist access to transit stops.”). Fletchers Creek South Secondary Plan s. 11.3.1 (“Pedestrian walkways should generally be provided in subdivision designs to reduce the walking distance from a number of dwelling units to transit, park, elementary school and convenience commercial facilities, and between residential neighbourhoods.”).
Travel demand management	Require travel demand management plans and strategies	Heritage Heights Secondary Plan s. 10.11.2 (“At the discretion of the City of Brampton, applications for development may be required to submit TDM plans scoped to reflect the proposed development and prepared by a qualified consultant that describe facilities and programs intended to discourage single-occupancy vehicle trips, minimize parking, and promote the use of transit, cycling, car and bike sharing, and car-pooling.”) Hurontario-Main Corridor Secondary Plan s. 5.9.6.(ix) (“Transportation Demand Management measures such as unbundled parking, shared parking, priority parking for car-sharing and reduction of parking requirement for employer supported transit passes will be encouraged.”)
Travel demand management	Reduce parking provision	Heritage Heights Secondary Plan s. 10.12.4 (“In efforts to support Transportation Demand Management Strategies, reduced parking requirements for residential and non-residential uses will be applied in transit supportive environments.”) Heritage Heights Secondary Plan s. 10.12.5 (“The City of Brampton will encourage a portion of parking provided for office and major institutional uses in Character Area A – Wellness/GO Station Area to be available for visitor public parking. The number of parking spaces for public use and their location will be determined with the submission of parking study with development applications. These public parking spaces may be owned and operated by the building owner or, if procured by the City of Brampton, be operated by a municipal authority.”) Downtown Brampton Secondary Plan s. 6.6.2 (“Council may from time-to-time exempt commercial, residential and mixed-use developments within the Downtown Brampton Secondary Plan from the on-site parking requirements of the appropriate zoning by-law and/or may enact a comprehensive zoning by-law to establish reduced parking standards across the Downtown Brampton Secondary Plan.”) Queen Street Corridor Secondary Plan s. 6.6.3 (“For mixed-use developments, the parking supply resulting from applying the parking standards of the appropriate zoning by-law may be reduced through the provision of shared or swing parking.”) Hurontario-Main Corridor Secondary Plan s. 5.9.6.(vii) (“Reduced parking requirements will be phased in over time through zoning by-law amendments as the higher order transit system is implemented and the Corridor intensifies.” Downtown Brampton Secondary Plan s. 6.6.3 (“For commercial and mixed-use developments, the parking supply resulting from applying the parking standards of the appropriate zoning by-law may be reduced through the provision of shared or swing parking.”) Fletchers Creek South Secondary Plan s. 6.7.(iii) (“Shared parking facilities and shared vehicle access points will be encouraged. As a condition of development approval, landowners shall enter into agreements with the City, which among other matters shall determine ultimate access and shared parking arrangements.”)

Category	Type of Provision	Examples
		Hurontario-Main Corridor Secondary Plan s. 5.9.6.(iv) (“Shared parking facilities and shared vehicle access points will be encouraged. As a condition of development approval, landowners shall enter into agreements which among other matters shall determine ultimate access and shared parking arrangements.”
Urban design	Minimize surface parking	Heritage Heights Secondary Plan s. 10.12.1 (“In Mixed Use Areas, above-grade parking structures, parking between buildings and adjacent streets is discouraged.”) Fletchers Creek South Secondary Plan s. 6.7.(i) (“Parking structures or underground parking will be encouraged. Surface parking is discouraged but, if provided, shall only be located behind or beside buildings. There shall be no surface parking between a building and Hurontario Street or at intersections.”)
Urban design	Use street parking to protect pedestrian areas	Heritage Heights Secondary Plan s. 10.12.7 (“On-street parking will be encouraged on minor collector and local streets, and on higher order streets where appropriate.”)
Urban design	Develop multimodal urban boulevards	Heritage Heights Secondary Plan s. 10 (2022) (“One of the ‘Objectives’ is rethinking the Provincial Transportation Corridor that traverses north-south through the Heritage Heights Secondary Plan Area . . . The City of Brampton’s Vision is guided by an urban Grand Boulevard, which prioritizes connectivity, active transportation, transit, and community safety and wellbeing. The Grand Boulevard will develop its own identity as an urban main street with active uses at grade and landscaped setbacks at appropriate locations providing pedestrian amenities.”). Heritage Heights Secondary Plan s. 10.6.1 (“The vision for The Grand Boulevard is for a total of six vehicular lanes separated by two dedicated transit lanes running in opposite directions. Service lanes will flank The Grand Boulevard and will include cycling facilities. Street parking, where appropriate, is envisioned along the collector lanes as a means of traffic calming and supporting retail function of The Grand Boulevard.”) Highway 427 Industrial Secondary Plan (Partially In Effect) s. 4.2.14. (“Develop an integrated multi-modal transportation system that considers the needs of pedestrians, cyclists, transit-users, motorists and goods movement and that includes roads, public transit, pathways, active transportation and transportation demand management measures and provides efficient connections.”) Hurontario-Main Corridor Secondary Plan s. 5.9.1.(iv) (“Encourage the development of a traffic circulation system that will enhance personal mobility, travel choices and transit access and service throughout the Secondary Plan Area and beyond.”)
Urban design	Ensure servicing access does not interfere with streetscape and active transport	Heritage Heights Secondary Plan s. 10.7.5 (“Access and servicing to development from new or existing local collector streets will be encouraged. The impact of driveways, garages and parking areas along collector streets, arterial roads and The Grand Boulevard will be minimized by locating them at the side or back of buildings, or below grade where appropriate.”) Fletchers Creek South Secondary Plan s. 6.8.(v) (“Streets and buildings shall be designed and developed to ensure attractive streetscapes, a walkable and human-scale community and to promote social interaction, transit usage and safety.”)

Through its zoning by-law, the City also has sought to implement many transport-related policies. For example, the City has reduced or eliminated minimum parking requirements, which increase housing costs and promote dependence on private automobiles. In 2021, the City removed parking requirements for all but low-density residential, lodging, and senior buildings within the Downtown, Central Area and the Hurontario/Main Corridor[7]. In some areas, the city also has adopted surface parking maximums for residential buildings and bicycle-parking requirements. Ten out of the 12 MTSAs covered within this report fall within the “Downtown, Central Area and Hurontario/Main Corridor,” which are affected by the by-law amendments.

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3.3.2 Potential Policies, Practices, and Strategies to Support Sustainable Mode Share within MTSAs

Local, national, and international precedents offer examples of policies, practices, and strategies that the City of Brampton may wish to consider applying within its MTSAs to complement or extend existing City policies. Empirical academic research also points toward effective interventions. Table 3-3 identifies a range of examples consulted to date, organized by category.

Table 3-3: Local, National, and International Precedents for MTSA Planning

Category	Type of Provision	Rationale, Examples, or References
Advocacy	Advocate at the regional level for transit-service improvements	In several secondary plans, Brampton pledges to advocate for two-way, all-day GO Transit service. As the municipal body closest to its residents, Brampton is well positioned to voice its needs for enhanced regional transit connectivity and service before regional and provincial operators and funders.
Advocacy	Engage with major local and regional stakeholders responsible for large parcels to advance MTSA design goals.	Regional and local stakeholders, such as Metrolinx, Peel Region, and others own large parcels of land that may offer key opportunities to rapidly build out sustainable travel networks or create more compact, livable communities. In Oakville, for example, city officials have pledged to coordinate with Metrolinx on the improvement of the Bronte GO Station with the aim of relocating some feeder transit facilities, implementing transit priority, and redeploy existing surface parking in favour of structured parking and eventual development. Oakville, Bronte GO MTSA Policies, Attachment 2 to OPA 41, s. 27.4.3(j).
Capital planning and investment	Match growth and phasing with public transit investment	Metrolinx's guidelines for mobility hubs recommends adopting detailed phasing plans and implementation strategies to coordinate investment with projected changes and maintain flexibility (Metrolinx Mobility Hub Guidelines for Greater Toronto and Hamilton Area (2011), https://www.metrolinxengage.com/sites/default/files/mhgbrochure.pdf). Many of Brampton's existing secondary plans call for transit and transport-network investments to align with private development through the expansion of service and futureproofing for future expansion by protecting and allocating space. This includes recent secondary plans for Heritage Heights and the Hurontario-Main Corridor. The city's Active Transportation Master Plan calls for $1.25M in annual capital funding to install missing sidewalks on arterial streets and to address particularly challenging locations.
Capital planning and investment	Leverage Development Charges to support required MTSA infrastructure	As part of its MTSA implementation strategies, Burlington has committed to including growth-related infrastructure as part of its next Development Charges By-law update.
Capital planning and investment	Think about meanwhile uses and the experience in the interim periods	Complete MTSA development will not occur at once. Planning for both the transport network and servicing must consider a phased approach to ensure that active mobility is not compromised as the areas grow. Planners should consider which parts of the transport network and public realm must be developed first. This will likely mean focusing on areas nearest new transit stops while also considering development blocks where plans already have been submitted. The transportation analysis conducted for this report may help the City of Brampton prioritize those routes between future development and new transit infrastructure that may be subject to the greatest demand.
Capital planning and investment	Align capital projects with external objectives and funding opportunities	Scenario planning in advance of regional and provincial funding determinations offers an opportunity to align capital projects with potential sources of funding. Brampton's secondary and transportation plans for the Heritage Heights "grand boulevard" describe various scenarios that depend on provincial infrastructure-spending decisions. As part of its MTSA planning efforts, Brampton may wish to review potential sources of external funding at the regional, provincial, and federal level. The Canadian federal government recently launched a $400 million active transportation fund to support municipal investment in footways, bicycle paths, and pedestrian bridges over five years. Although Infrastructure Canada is no longer

Category	Type of Provision	Rationale, Examples, or References
		accepting municipal funding applications, the program may be renewed or expanded in the future. (https://www.infrastructure.gc.ca/trans/index-eng.html)
Density-supportive regulations	Incentivize private developers to provide open and public space while pursuing transit-supportive density	The requirement to provide rights of way or other open space should not conflict with developers' ability to provide transit-supportive density. Many municipalities address this by mandating that space that developers are required to dedicate to rights of way or open space is included in the base calculation of allowable GFA/FSI. See, for example, Oakville, Bronte GO MTSA Policies, Attachment 2 to OPA 41, s. 27.9.2(a); City Oakville's Bronte GO MTSA Policies also allow for the transfer of height allowances across buildings within a single development. See also City of Toronto, Golden Mile Secondary Plan (2020), s. 6.26 ("Where lands are conveyed to the City for public park purposes, including lands designated Parks, this Plan recognizes that any gross density on such lands be redistributed to other lands on the Site and/or Block to provide for more compact built form"). Brampton's Bramalea Road South Gateway Redevelopment Area Secondary Plan, for example, ensures that required right-of-way dedications will not reduce allowable gross floor areas by retaining dedicated space in density calculations.
Density-supportive regulations	Balance small blocks for fine-grain transport networks with the need for large land assemblages for some building typologies	Fine-grain active-travel networks promote walking and biking, making relatively small blocks desirable. Research on transit-oriented developments notes that relatively small blocks with a proposed average block perimeter limit of up to 400 m to 450 m can enhance connectivity. Thomas, R., & et. al. (2018). Is transit-oriented development (TOD) an internationally transferable policy concept? Regional Studies. Vol. 50 No. 9, 1201-1213. At the same time, larger development parcels may be necessary to accommodate high-rise development, particularly when setbacks, stepbacks and separation distances are required by design guidelines.
Density-supportive regulations	Remove parking minimums, limit parking maximums. Apply flexible parking standards.	Brampton Plan aims to eliminate parking minimums within areas such as "Centres." Through secondary plans and zoning by-law amendments, Brampton already has made moves to reduce mandatory parking minimums for development in some transit-rich areas. This includes Fletchers Creek, Heritage Heights, Downtown Brampton, and others. These policies could be extended and enhanced. In Toronto, new zoning by-law provisions impose parking maximums for residential uses. By eliminating minimum parking requirements, imposing maximum limits and calculating requirements flexibly, cities can ensure that valuable developments space is not wasted, potentially reducing the cost of new housing and discouraging private-auto ownership. Eliminate minimum parking requirements and require maximum parking requirements (up to 9% of the surface area) Apply flexible parking standards. Thomas, R., & et. al. (2018). Is transit-oriented development (TOD) an internationally transferable policy concept? Regional Studies. Vol. 50 No. 9, 1201-1213. See also Park, Keunhyun, Reid Ewing, Brenda C. Scheer, and Guang Tian. "The impacts of built environment characteristics of rail station areas on household travel behavior." Cities 74 (2018): 277-283. Shared parking arrangements can also be encouraged to help developers flexibly meet parking requirements without oversupplying. Brampton encourages this approach in some secondary plans, such as the secondary Plan Area 38 – Bramalea Road South Gateway Redevelopment Area where "landowners may be required to enter agreements that among other matters shall determine ultimate access and shared parking arrangements."). The Downtown secondary plan is another example, which promotes shared or swing parking arrangements.
Engagement	Generate public buy-in and support by sharing information on progress and plans	The City of Mississauga has published an MTSA dashboard including present population and employment, MTSA maps, present density (people + jobs/hectare), planned density (people + jobs/hectare), and comparison of present and planned density with the Region of Peel's proposed density targets.

Category	Type of Provision	Rationale, Examples, or References
Engagement	Engage with and coordinate the activities of key stakeholders, including regional agencies and private landowners.	One or more key stakeholders may own or control significant portions of land within the MTSAs; their active support for the City of Brampton's MTSA objectives could prove essential. Early engagement with stakeholders can help shape more useful and equitable transport outcomes. As part of its MTSA planning efforts, Brampton has already conducted a public outreach session to provide details on the planned process and objectives. In some cases, municipalities have mandated that key stakeholders directly collaborate with one another. For example, Oakville, Ontario's, MTSA policies for the Bronte GO Station require landowners to work together to prepare "area design plans" under certain circumstances to ensure phasing and coordination issues "will not preclude the achievement of a compact, pedestrian-oriented and transit-supportive urban form." Oakville, Bronte GO MTSA Policies, Attachment 2 to OPA 41, s. 27.9.1(d).
Equity	Co-locate affordable housing with market-rate housing in areas adjacent to transit stops and stations	The British Columbia Ministry of Transportation and Infrastructure published the "Active Transportation and Transit-Oriented Development (TOD) Design Guide," (BCTOD Guide) notes that TODs represent an opportunity to advance equity because they can provide greater access to services and amenities. To do so, the guide indicates, "TODs should be designed through an equity lens" with a focus on universal access, all-ages-and-abilities comfort, supportive amenities such as seating, public washrooms, and weather protection and a range of housing types and transportation options. To achieve this, affordable and market rate housing should be collocated adjacent to transit stops and stations. Brampton Plan, the city's draft Official Plan update, commits the city to working with the Region of Peel on an amendment to establish inclusionary zoning minimums within MTSAs. Brampton Plan, s. 2.3.263.
Infrastructure design	Deploy physical traffic-calming measures	"Apply traffic-calming devices such as signal timing, speed bumps/tables, medians, undulating roads (chicanes), small curb radii, lower speeds and narrow roadways." (Thomas, R., & et. al. (2018). Is transit-oriented development (TOD) an internationally transferable policy concept? Regional Studies. Vol. 50 No. 9, 1201-1213).
Infrastructure design	Provide adequate buffers between vehicles and pedestrians and other active travellers	On-street parking can be used in areas where better curb uses, such as cafes or public space, are not viable, to calm traffic and protect adjacent pedestrian areas. Brampton already promotes on-street parking on minor and collector roads in some areas. For example, the Heritage Heights Secondary Plan s. 10.12.7 encourages on-street parking on "minor collector and local streets, and on higher order streets where appropriate." "Provide buffers that separate moving traffic from pedestrians (i.e., through landscaping elements such as trees, flower boxes or grass strips, or special features such as different materials or curb bulb-outs)." (Thomas, R., & et. al. (2018). Is transit-oriented development (TOD) an internationally transferable policy concept? Regional Studies. Vol. 50 No. 9, 1201-1213)
Infrastructure design	Design streets and public-space elements to be flexible and adaptable.	Previous planning efforts in Brampton have embraced this approach. Among other things, Brampton's 2017 Downtown Streetscape Study envisioned a flexible overhaul of Queen and Main with elements such as roll-over curbs and unit pavers to allow for easy conversion to car-free space for public events. Public events and other street-animating programming can be an important element of promoting active uses of rights-of-way and of forging a unique identity for each MTSA. These events can winter activities, concerts, flea markets, farmers' markets, art shows, outdoor theatre, occurring at different times of the day, week, and year. Thomas, R., & et. al. (2018). Is transit-oriented development (TOD) an internationally transferable policy concept? Regional Studies. Vol. 50 No. 9, 1201-1213.

Category	Type of Provision	Rationale, Examples, or References
Infrastructure design	Create transit-supportive infrastructure	Identifying and planning for transit-supportive infrastructure, including wider sidewalks near heavily used transit routes and space for expanded bus pads on arterial and collector roads during early stages of MTSA development can facilitate preservation of adequate space. Brampton has already done this in numerous secondary plans, including Northwest Sandalwood Parkway, Fletchers Creek South, Bram West and others. See, e.g., Northwest Sandalwood Parkway Secondary Plan - Secondary Plan Area 2A s. 4.2.3 ("Sidewalks along arterial and collector roads that are expected to accommodate transit routes shall incorporate bus pad widenings in appropriate locations in accordance with City standards.").
Infrastructure design	Allocate and protect space for transit-priority measures	Identifying desired transit-priority measures and locations during early MTSA planning can help ensure that new rights-of-way are adequately sized, and that required space is preserved. Brampton has used secondary plans to identify and protect space for transit-priority measures, such as dedicated bus/HOV lanes. See, e.g., Secondary Plan Area 38 – Bramalea Road South Gateway Redevelopment Area Secondary Plan, s. 7.3.5. ("The City shall ensure the protection of an adequate right-of-way along Steeles Avenue within the Secondary Plan Area for High Occupancy Vehicle Lanes (HOV)/Reserved Bus Lanes (RBL).")
Infrastructure design	Allocate appropriate right-of-way space for safe, comfortable, efficient active travel	Active journeys can be made more comfortable by ensuring infrastructure is adequately sized, providing ample space for movement while avoiding an appearance of emptiness, which can harm perceptions of safety. Some research suggests both minimum and maximum pavement/sidewalk widths in a range of 1.5 m to 7 m. (Thomas, R., & et. al. (2018). Is transit-oriented development (TOD) an internationally transferable policy concept? Regional Studies. Vol. 50 No. 9, 1201-1213). Brampton's Active Transportation Master Plan (ATMP) already encourages the city to exceed the minimum 1.5 m width requirement under the Accessibility for Ontarians with Disabilities Act. The ATMP provides design guidance for complete streets, including specifics on sidewalk and bike path design. (https://www.brampton.ca/EN/Business/planning-development/projects-studies/atmp/Documents/ATMP-Full-Report.pdf). The City of Toronto Green Standards v. 4 articulates sidewalk and pedestrian-space design standards in private developments that include: a 2.1 m clearway for pedestrians; "safe, direct, universally accessible pedestrian routes, including crosswalks and midblock crossings that connect the buildings on-site to the off-site pedestrian network and priority destinations;" covered outdoor waiting areas; and lighting to enhance safety and comfort.
Infrastructure design	Keep the number of vehicular travel lanes to a minimum.	Limiting the number lanes and overall roadway space dedicated to vehicle travel through road diets and lane narrowing has proven an effective means of maintaining flow and promoting safety while making better use of limited rights-of-way. The U.S. Federal Highway Administration notes that "classic" road diets--reducing four-lane undivided ways to three lanes--achieves numerous benefits including reduced travel speed and crash severity, shorter pedestrian crossings, more space for complete streets infrastructure. (FHWA, Road Diet Informational Guide (2014), https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/rdig.pdf). As part of its Active Transportation Master Plan, Brampton already has identified four-lane highways that represent opportunities for road diets.
Local transit network and operations	Ensure adequate access to public transit feeder networks	Robust, highly accessible local and feeder transit service can help promote public-transport mode share and spread the benefits of higher-order systems. To do so, local public transport routes must be coordinated to align with key local origins and destinations and services must be aligned. Brampton has established transit-stop accessibility targets through numerous secondary plans, including Heritage Heights Secondary, The Northwest Sandalwood Parkway, Fletchers Creek South, Bram West,

Category	Type of Provision	Rationale, Examples, or References
		and others. Within these plans, Brampton aims for most residents to be within 300 m to 400 m of a transit stop.
Mobility hubs / urban integration	Fully integrate higher-order transit stops and stations into the urban fabric / Create mobility hubs	Metrolinx Mobility Hub Guidelines for Greater Toronto and Hamilton Area (2011), https://www.metrolinxengage.com/sites/default/files/mhgbrochure.pdf
Monitoring and evaluation	Traffic volumes at key routes and intersections	Monitoring and evaluation of key transport and sustainability outcomes can help ensure that programs and policies are adjusted and improved as needed. Among the many things that can be tracked are traffic volumes at key intersections within and connecting to MTSAs. This information can be shared publicly. Burlington, in partnership with Halton Region, will establish a program to monitor MTSA development and functioning. Data points will include traffic volumes on key routes and intersections; travel characteristics and modal split (trends in volume and active transportation travel patterns); evaluation of traffic volumes and transit ridership in relation to available capacity; the effectiveness of proposed travel-demand management strategies; and evaluation of existing and proposed Development Concept Reports to assist in identifying and planning transportation improvements.
Monitoring and evaluation	Development-applications tracking	Burlington, in partnership with Halton Region, will establish a program to monitor MTSA development and functioning. Data points related to development application tracking will include existing and proposed floor space for zoning or site plan approvals that have been granted; status of development approvals; completions and occupancy; as well as population and employment generated by existing development and projected for approval but not yet occupied. Brampton is already tracking development applications within its MTSAs to identify trends and market demand and monitor projected populations and jobs densities. Brampton could consider extending this program and making the data publicly available as part of an MTSA dashboard.
Network planning principles	Adopt a whole-journey, universal access approach to active-travel network and facility planning	The British Columbia Ministry of Transportation and Infrastructure published the "Active Transportation and Transit-Oriented Development (TOD) Design Guide," (BCTOD Guide) published in June 2021, notes that "active transportation facilities and amenities in TODs should be designed to reduce all real and perceived safety concerns, so that users are comfortable when travelling to or through the development. This includes providing facilities that are comfortable for people of all ages and abilities and ensuring a stress-free transition between modes, which can mean convenient end-of-trip facilities (e.g., secure bicycle parking, showers, change rooms, etc.), pedestrian-scale lighting, and other security features."
Open space / ecosystem services	Leverage infrastructure to forge new active links	Partnering with utilities and other similar organizations with large right-of-way networks can provide a cost-effective and rapid means of expanding open-space and active-travel corridors. In its secondary plans for Heritage Heights, Mount Pleasant, and Vale of Castlemore, Brampton already has identified the Trans-Canada Pipeline as an opportunity "to provide local and community linkages" with a walking or cycling path.
Open space / ecosystem services	Use landscape to achieve co-benefits	Brampton already has encouraged the adoption of these approaches to maximize environmental and other benefits from transport infrastructure. For example, the Heritage Heights Secondary Plan requires surface parking lots to include plantings to bolster tree cover and shading, reduce heat, and capture, detain and infiltrate rainfall.

Category	Type of Provision	Rationale, Examples, or References
Open space / ecosystem services	Preserve existing ecosystem services	Brampton Plan reiterates the need to apply ecological buffers--in line with federal, provincial, and regional policies--to protect the integrity of natural heritage and hydrological features. Development and site alteration within 120 m of these features will require study to establish buffer areas sufficient to protect resources. Brampton Plan, s. 2.2.245. The minimum size of these buffers will vary depending on the nature of the feature to be protected. Within MTSAs, these buffers may protect vital ecosystem services and potentially contribute to connected open- and greenspace networks. Preservation of mature, high-quality trees can contribute to the maintenance of vital ecosystem services, such as water capture and filtration and air-pollution reduction. Brampton already mandates preservation within practical limits in secondary plans, such as the Northwest Sandalwood Parkway Secondary Plan - Secondary Plan Area 2A.
Open space / ecosystem services	Leverage open space and natural heritage areas to create a pleasant, well-connected active-transport network	Brampton Plan already calls for the creation of a city-wide network of green and sustainable public spaces known as the Eco Park, which will knit together public parks and other outdoor amenities to preserve ecological functions and provide recreational and social opportunities. This vision offers a strategic framework for considering the most appropriate locations of green public space within MTSAs, the development of which, in turn, represents a unique opportunity to expand and consolidate the Eco Park. Throughout numerous secondary plans, Brampton already recognizes the importance of linking green and open space and providing direct active access by mandating pedestrian and cyclist links "at the edge of all contiguous open space elements including tableland parks, school sites and valley lands." Other municipalities are pursuing this approach. Oakville, Ontario, has used its policies for the Bronte GO MTSA to call for the creation of open-space corridors in and around the station, as well as several new park spaces. Oakville, Bronte GO MTSA Policies, Attachment 2 to OPA 41, s. 27.6.9.
Private development design standards	Encourage developers to employ design standards that increase sustainable mode share	The City of Toronto Green Standards v. 4 offers developers refunds on development fees if they achieve particular levels of environmental performance by, among other things, providing cycling and walking infrastructures, as well as facilities for electrical-vehicle charging.
Public realm programming and maintenance	Develop winter maintenance programs in partnership with private developers	As part of its general MTSA policies, Burlington, for example, has called for developing a winter maintenance strategy that prioritizes public active transportation routes, linear parks with an active transportation function and flex streets.
Sustainability targets	Set more ambitious sustainable mode-share targets.	Metrolinx's guidelines for mobility hubs suggest targeting transit mode share for trips originating within 800 m of light-rail stations of 30% to 50%; for trips originating within 800 m of a bus-rapid-transit stop the transit mode-share target could be 20% to 35%. (Metrolinx Mobility Hub Guidelines for Greater Toronto and Hamilton Area (2011), https://www.metrolinxengage.com/sites/default/files/mhgbrochure.pdf).
Sustainable transportation facilities	Provide safe and secure bicycle parking at key origins and destinations	The City of Toronto Green Standards v. 4 recognizes zoning by-law standards for short- and long-term bicycle parking rates and stipulates the facilities' appropriate location within medium- and high-density developments. For long-term bicycle parking, at least 15% of stalls must have access to a 120-volt outlet for charging electric bicycles. The standards also reflect City of Toronto requirements for providing showering and changing facilities to promote active transport. Metrolinx’s DS-07 Bike Parking Design Standard Review provides requirements, configurations and design elements for bike parking, secure bike rooms and covered bike shelters. Arup’s Active Train Stations report provides actions and interventions to encourage active travel to train stations. To facilitate active-train combinations, stations should

Category	Type of Provision	Rationale, Examples, or References
		be fully accessible and attractive for pedestrians and cyclists. The report states that bike parking should be easy to find, signed, and conveniently located at multiple entrances. Bike parking should be safe to use, secure and monitored. Brampton already has adopted bicycle-parking standards through its zoning by-law. These could be extended and enhanced to promote active travel.
Sustainable transportation facilities	Leverage private development to expand publicly accessible bike parking facilities near transit stations	The City of Toronto Green Standards v. 4 encourages developments within 500 m of a transit station entrance to provide at least 10 additional publicly accessible, short-term bicycle parking spaces, at-grade on the site or within the public boulevard in addition to bicycle parking required under the zoning by-law.
Sustainable transportation facilities	Leverage transport and other corridor-based infrastructure to augment the transport network for active uses	Utility and rail corridors, including Hydro corridors, the Trans-Canada Pipeline, and active or abandoned rail alignments, present opportunities to forge new active links.
Sustainable transportation facilities	Allocate sufficient space within public rights of way near transit stops and stations for bicycle parking or car-share services, which may reduce the need for private-vehicle ownership	Metrolinx's guidelines for mobility hubs suggest promoting the seamless integration of different modes by providing plentiful and secure bike parking at stations. (Metrolinx Mobility Hub Guidelines for Greater Toronto and Hamilton Area (2011), https://www.metrolinxengage.com/sites/default/files/mhgbrochure.pdf).
Sustainable transportation facilities	Provide space for shared mobility / car-share programs	New mobility options, including car-share, could help reduce private-vehicle ownership and boost transit ridership by offering flexible travel and last-mile options. By providing adequate space for these services near stations and stops, Brampton could foster their use. Doing so requires preserving space when considering right-of-way configuration.
Transport network design	Leverage private development to ensure interconnected networks of pedestrian and active pathways	A fine-grained active travel network will help ensure connectivity and promote sustainable mode share. To achieve this, particularly within larger development blocks, it is essential to provide pedestrian pass-throughs and mid-block connections. Brampton Plan notes that private development approvals will be conditioned on dedication of necessary streets, pedestrian ways, and open spaces. Pedestrian and active direct connections to transit stops should be prioritized.
Transport network design	Leverage private development to ensure provision of adequate local roads and intermediate connections	A fine-grained street network with pedestrian and active amenities will help ensure connectivity and promote sustainable mode share. To achieve this, particularly within larger development blocks, it is essential to provide pedestrian pass-throughs and mid-block connections. Brampton Plan notes that private development approvals will be conditioned on dedication of necessary streets, pedestrian ways, and open spaces.
Transport network design	Develop fine-grained multimodal street networks and prioritize direct active-transport links/reduce pedestrian circuity	Grid networks and pedestrian-friendly street networks that directly connect local destinations through interventions such as pedestrian cut-through paths and avoid the creation of barriers such as highways or large parking lots have been positively associated with greater levels of active travel. Thomas, R., & et. al. (2018). Is transit-oriented development (TOD) an internationally transferable policy concept? Regional Studies. Vol. 50 No. 9, 1201-1213. Brampton Plan states a preference for grid-style networks.
Travel demand management	Require travel-demand-management plans and strategies	Requiring travel-demand management (TDM) strategies as a condition of private development approval can help advance sustainable mode shift. Among other things, private developers could be required to provide residents with free or discounted transit fare cards and real-time transit arrival and departure information in lobbies or public spaces. Brampton has included TDM plan requirements in some secondary plans, such as Heritage Heights and Hurontario-Main. Within the Heritage Heights plan, for example, Brampton indicated "applications for development may be required to submit TDM plans scoped to reflect the proposed development and prepared by a qualified consultant that describe facilities and programs intended to discourage

Category	Type of Provision	Rationale, Examples, or References
		single-occupancy vehicle trips, minimize parking, and promote the use of transit, cycling, car and bike sharing, and car-pooling."
Travel demand management	Provision of subsidized mobility tickets to reduce cost burden of using transit	To manage future mobility demand and the transition to sustainable, low carbon mobility, the sole provision of transport options will not be enough to achieve seamless transitions from one transport mode to another. Beyond providing the modalities necessary to manage a shift to more sustainable transport options, mobility behaviour also needs to chance. The provision of subsidized mobility tickets makes choosing sustainable transport options easier and more convenient. Arup/RISE's Mobility Hubs of the Future report focuses on promoting and incentivizing sustainable mobility to make alternative options easier, more attractive, and more convenient to use. In the Metrotown area of Burnaby, developers of four multi-family projects are providing transit pass subsidies for fixed periods of time to future residents to encourage the ridership of public transit.
Travel demand management	Prioritize snow clearing on local streets, sidewalks, and cycle routes first to promote active travel access	Plan Canada's Cycling through Winter report presents ideas and strategies for planners, operation personnel and decision makers on winter cycling. Adopting year-round transportation policies and strategies is crucial for winter cities to meet climate change targets and sustainability objectives. The article recommends updating snow removal and clearing by-laws and establishing winter maintenance procedures.
Urban design	Manage station- and stop-area parking to promote sustainable access modes	By locating parking further away from stations and stops, prime real estate for transit-supportive and -oriented residential development remains available. Cities and transit agencies should seek to locate housing and amenities closer to stations than commuter parking. Willson, Richard. "Parking policy for transit-oriented development: lessons for cities, transit agencies, and developers." Journal of public transportation 8, no. 5 (2005): 5. Metrolinx's mobility hub guidelines suggest, among other things, limiting commuter parking expansion, implementing commuter parking pricing with incentives, minimizing surface parking, and integrating parking within surrounding development.
Urban design	Foster a sense of place to enhance the active-travel experience	Studies have underscored the importance of breaking up long streets with parks or art or other interventions to avoid monotony. For example, people may be more willing to walk longer distances to transit stations and stops if the walking environment is "busy, fun, and shaded." Yang, J., Zegras, P. C. & Mehndiratta, S. (2012). Walk the line: station context, corridor type and bus rapid transit walk access in Jinan, China. Journal of Transport Geography, Vol 20, Issue 1, 1-14. The British Columbia Ministry of Transportation and Infrastructure published the "Active Transportation and Transit-Oriented Development (TOD) Design Guide," (BCTOD Guide) published in June 2021, notes that "TODs and their adjacent public spaces should include a range of design elements, landscaping, public art, and other amenities that make them attractive, enjoyable, and welcoming for people walking, cycling, and using other forms of active transportation. This also includes intuitive wayfinding such as signage, pavement markings, and universal design elements such as static tactile information and bilingual information where contextually appropriate." The BCTOD Guide observes the importance of developing a unique identity for each transit-oriented development. "Not all TODs look or function the same way. Through the typologies developed for this document, the type of active transportation

Category	Type of Provision	Rationale, Examples, or References
		integration should reflect the development's size, character, transit frequency, and surrounding context through active transportation facility design and the provision of specific amenities for each typology."
Urban design	Minimize and conceal surface parking	Excessive surface parking represents an inefficient use of space within urban areas, potentially compromising the ability to achieve density targets, and can encourage private-vehicle operation, discourage active travel and contribute to the urban heat island effect. Within transit-oriented areas, such as MTSAs, minimizing space dedicated to surface parking can free land for more beneficial functions. Brampton already is working to reduce surface parking within some areas covered by secondary plans, such as Heritage Heights, where above-grade and surface parking is discouraged in mixed-use zones, and Fletchers Creek South, where surface parking is generally discouraged and limited to locations behind or beside buildings. Within its secondary plan for the Bronte MTSA, Oakville indicates that it will reduce parking minimums or apply maximums, discourage surface parking in favour of structured facilities, and call for the incorporation of active uses, such as retail, on the ground floor of parking facilities. Oakville, Bronte GO MTSA Policies, Attachment 2 to OPA 41, s. 27.4.3(k). Charging for parking and adjusting pricing based on demand can help reduce demand, opening parking space for more beneficial, transit-supportive uses. The BART (Bay Area Rapid Transit) Parking is an app- and website-based payment system operating at 36 stations.
Urban design	Use street parking to protect pedestrian areas	Brampton heavily restricts on-street parking with time limits and bans on overnight parking. In some areas, it could be appropriate to consider on-street parking as a cost-effective means to calm traffic and to serve as protective barriers for curb-adjacent bike lanes or sidewalks. Misallocation of public space to private vehicle storage could also be addressed through the creation of a permit and fee system for on-street parking in areas where on-street parking might be desirable.
Urban design	Use filtered mobility to provide necessary vehicle access while prioritizing pedestrian connections in low-traffic neighbourhoods	Low Traffic Neighbourhoods (LTN) ban vehicles from using roads in residential neighbourhoods as shortcuts to major roads, which improve the safety for pedestrians and cyclists. In 2021, Transport for London, UK, established a programme called Streetspace and LTNs were an integral part of it. The benefit of LTNs is that such planning usually does not require major road construction and thus, it is easier to implement at lower cost. In October 2021, Barcelona City Council published the report, "Government Measure Barcelona Superblock for Urban Renewal in Barcelona and its Neighbourhoods", which aims to transform the city into a place with better sustainable mobility, public space, and economy. The Barcelona Superblock programme shift public areas from motorized vehicles to human interactions and contact with nature. Filtered mobility and low-traffic neighbourhoods may be a promising approach to Brampton's MTSAs. In most cases, new road networks are being forged allowing for advance planning. The city also has expressed the general objective of maintaining existing traffic on current arterials, avoiding cut-through travel within the new networks. Examples of successful low-traffic and quiet-streets approaches are abundant in Ontario and across Canada. Toronto's Quiet Streets program during the Covid-19 pandemic took halting steps toward this but relied on flimsy temporary infrastructure and voluntary compliance from motorists. In Montreal, some blocks have been permanently dedicated to pedestrian and active access, creating filters while ensuring emergency and service vehicle access.
Urban design	Provide street furniture for all users and ages to promote active travel/expand universal access	The British Columbia Ministry of Transportation and Infrastructure published the "Active Transportation and Transit-Oriented Development (TOD) Design Guide," (BCTOD Guide) notes that TODs represent an opportunity to advance equity because they can provide greater access to services and amenities. To do so, the guide indicates, "TODs should be designed through an equity lens" with a focus on universal access, all-ages-and-abilities comfort, supportive amenities such as seating,

Category	Type of Provision	Rationale, Examples, or References
		public washrooms, and weather protection and a range of housing types and transportation options. Oakville, Ontario's, policies for the Bronte GO MTSA underscore the importance of pedestrian-oriented streetscapes, including wide sidewalks, plantings, and facilities such as bike racks, and appropriate ground-level building uses. Oakville, Bronte GO MTSA Policies, Attachment 2 to OPA 41, s. 27.5.3 – Streetscapes. In some cases, the Bronte GO MTSA policies identify specific building locations require high degrees of ground-floor transparency and openings.
Urban design	Enforcing ground-level visibility through walking routes and massing for enhanced ground-level orientation at station	Requiring sightlines to station entrance doors through the nearby developments and the use different pavement materials, colors, and lights increases visibility of walking routes. Furthermore, this allows the space to accommodate for more community facilities. Akram Ogaily's conference proceeding on Urban Planning in Dubai; Cultural and Human Scale Context provides examples of land use zoning and urban plans that provide comfortable open spaces and building designs that reflect the local environment and culture. The article suggests reducing boldness of main roads through median landscaping and greenery to accommodate social and urban interaction.

4. Stormwater Management

The increase in frequency and intensity of storms due to climate change in Canada is well documented[8]. Meanwhile, rapid urban growth has been accompanied by an ever-increased demand for stormwater management infrastructure. Existing networks are known to be reaching – if not exceeding – their capacity, thereby increasing flood risks during major storm events. Further downstream, the ability of watercourses to receive stormwater is also showing its limits. Floodplains have been documented along watercourses by conservation authorities, and measures have been put in place to control maximum flow rates discharged into stormwater networks and watercourses. As such, in conjunction with the land-use densification proposed within the MTSAs, stormwater management measures need to be put in place to ensure these works do not generate or exacerbate flood risks.

The following sections summarize the approach taken to manage additional stormwater arising from the proposed densification works within the 12 in-scope MTSAs. The approach takes inspiration from various solutions that have been implemented by cities around the world in recent years, including in the Greater Toronto Area in its Green Streets Technical Guidelines[9], that promote the development of nature-based solutions to reduce stormwater runoff captured by existing stormwater infrastructure while reintroducing green and blue spaces within urban environments.

4.1 Key Considerations and Objectives

The planned densification within the MTSAs through the implementation of Secondary Plans will impact stormwater runoff in two major ways. Firstly, the redevelopment of private lots into denser, often mixed-use urban developments will, on average, result in an increase in impermeable surfaces, consequently increasing stormwater runoff. This effect is typically mitigated via regulations put in place by municipalities or other governing authorities that restrict developers from exceeding specified stormwater discharge rates. Brampton is no exception, in fact, regulations in place require developments discharging directly to the watercourses to respect quantity control targets established by TRCA and CVC must be used. Furthermore, developments discharging directly to the City or Regional storm sewer network must respect SWM control requirements established by the City or the Region to obtain their permit.

Secondly, and in much the same manner, the opening of new streets to service denser developments will also lead to increased stormwater runoff. Since streets are considered public rights-of-way (ROWs), they are not subject to the same regulations that limit stormwater discharge. It is however always required to consult with the City, the Region and conservation authorities to establish SWM requirements for these roads. Constructing new streets where permeable surfaces currently exist will unavoidably increase stormwater runoff volumes and discharge rates, whereas constructing new streets on existing land uses that already consist of paved surfaces, such as parking lots, will have little to no impact on stormwater runoff volumes and discharge rates; in fact, they could even present an opportunity to reduce stormwater runoff through the integration of vegetated or other permeable surfaces.

[8] Zhang, X., Flato, G., Kirchmeier-Young, M., Vincent, L., Wan, H., Wang, X., Rong, R., Fyfe, J., Li, G., Kharin, V.V. (2019): Changes in Temperature and Precipitation Across Canada; Chapter 4 in Bush, E. and Lemmen, D.S. (Eds.) Canada's Changing Climate Report. Government of Canada, Ottawa, Ontario, pp 112-193.

[9] City of Toronto. (2017). Green Streets Technical Guidelines Document (Report No. 17-11-08). City of Toronto. https://www.toronto.ca/ext/digital_comm/pdfs/transportation-services/green-streets-technical-guidelines-document-v2-17-11-08.pdf

The role of new streets, or ROWs, on stormwater management is particularly important given that existing regulations imposed by the TRCA and CVC already require post-development stormwater peak flows to be controlled to pre-development levels (i.e., “post-to-pre”) for all storms up to and including the 100-year storm. This means that landowners will be responsible for managing any increase in stormwater runoff at the source, before it reaches the municipal stormwater sewer network, leaving only increased runoff volumes from the construction of new streets to be managed within the MTSAs.

Given the cost and technical complexity of upgrading downstream stormwater networks and their corresponding quality treatment capacities to be able to absorb increased stormwater discharges from newly constructed streets, it is preferable to apply control measures that manage runoff at the source, much like as required for private properties. This study has therefore prioritized an analysis of technically-sound, sustainable, and cost-efficient strategies that allow for stormwater generated within new public rights of way to be managed entirely within the new streets to control post-development peak flows down to pre-development levels, thereby ensuring minimal impact on existing stormwater networks, facilities, and watercourses.

4.2 Analytical Approach

To assess the effectiveness of potential strategies with regards to post-to-pre peak flow control, Arup created a high-level hydrologic model for each MTSA consisting of sewersheds and corresponding outfalls delineated and identified by the Arup team. Built with PCSWMM software, the models were used to estimate runoff volumes and discharge rates for each MTSA under applicable design storms (i.e., 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year storm events). For the purposes of assessing the impacts of proposed development in the worst-case scenario, the 100-year storm peak flow was used as a baseline.

For this analysis the private lots’ densification were not considered. It was assumed that private developments would adhere to the existing regulations that restrict their runoff peak flow to predevelopment levels. Consequently, they are not expected to impact the current stormwater network. The proposed conditions of each sewershed were determined by applying the same land uses and parameters as in the existing conditions with the addition of new proposed streets. The streets were modelled with a runoff coefficient that was representative of their typical surface makeup (i.e., percentage of paved to unpaved surfaces) based on typical street plans developed in accordance with the City’s design standards.

By comparing the post-development 100-year peak flow with the corresponding pre-development peak flow of each sewershed, it was possible to calculate the volumes of runoff that would need to be retained within each sewershed to achieve post-to-pre peak flow control. The magnitude of these volumes subsequently informed the consideration of potential stormwater control solutions and served as the governing criterion for assessing their viability. The intention of the analysis was solely to identify relative changes in stormwater flow rates and not to assess absolute flows, absolute rain volumes, or existing network capacities. A detailed methodology underpinning the analytical approach specific to the solutions proposed, including hypotheses and limitations, can be found in the appendices.

4.3 Precedents

Green Infrastructure (GI) offers multi-functional benefits through the capture, storage, filtering, and conveyance of stormwater runoff in conjunction with the provision of environmental and economic co-benefits. This section summarizes various municipal publications that describe the adoption of a combination of grey and green infrastructure to meet stormwater management needs.

4.3.1 Policy and Technical Interventions

Different strategies have been adopted by cities to limit stormwater peak flows and control flood risks. Most of these policies and regulations are imposed on private developers to limit discharge from their developments into municipal networks and watercourses. Many urban centers have successfully incorporated stormwater management practices and GI, particularly retention swales, into their Complete Streets guidelines. Table 4-1 provides examples of various policies adopted by different cities and outlines their respective approaches.

Table 4-1: List of Precedents for Proposed Stormwater Practices

Municipality	Document / Publication	Proposed Stormwater Practice
Oakville, ON	Oakville, Bronte GO MTSA Policies, Attachment 2 to OPA 41, s. 27.4.4	Within the Bronte GO MTSA, Oakville calls for the incorporation of low-impact development practices, such as green infrastructure, into the design of new roads to convey, infiltrate, and treat stormwater. The Bronte GO MTSA policies also call for the provision of off-site stormwater management facilities that "may be located and integrated with future park and open spaces, where possible, to maintain developable areas" within the MTSA.
Halifax	Integrated Mobility Plan, 2017	- The HRM ROW charge is a Halifax Regional Municipality charge for the management of stormwater that comes from the public street right of way into Halifax Water's stormwater system. - Rain gardens may be implemented in some rights of ways.
Toronto	Green Streets Technical Guidelines, 2017	Green Infrastructure to be installed along streets, including bioretention planters, stormwater tree pits and trenches, retention swales, green gutters, filter strips, rainwater cisterns and permeable pavements.
Montreal	Règlement 20-030 Boite à outils infrastructures vertes - Guide de conception Guide des bonnes pratiques en matière d'urbanisme et de gestion des eaux pluviales	Stormwater discharge from private properties limited to a certain discharge rate (e.g., 35L/s/ha) depending on the catchment in which the development is located. Introduction of Green Infrastructure along streets including bioretention planters, curb extensions (bulb-outs) with bioretention, retention swales, green gutters, filter strips, rainwater cisterns and permeable pavements.
Vancouver	Integrated Rainwater Management Plan, 2016	Green infrastructure (GI) design targets include: - Retention of 90% of the average annual rainfall volume i.e., 43mm of rainfall during a 48mm, 24-hr duration storm event. - GI systems should be drained within 24 hrs after the end of the rainfall event, and the soil media should drain within 72 hours after the end of the rainfall event. - 80% removal of Total Suspended Solids during the first 48mm of rainfall.
Newark, NJ	Newark By-Laws Newark360 Master Plan, 2022	Post-to-pre flow condition correspondence assuming site in native condition (greenfield).
Washington, DC	SRC program, 2013	Stormwater credit program where a fee is charged based on the volume discharged from the property. If developers can retain more stormwater than required, they get credits accordingly.
Denver, CO	Complete Streets Design Guidelines, 2020	1-Bioretention Facilities - along the main streets, mixed-use streets and commercial streets. 2- Pervious Surfaces – along main streets with low traffic frequency, 3- Stormwater Tree Trenches along commercial streets.

4.3.2 Proposed Green Infrastructure Interventions

As previously stated, it is expected that policy interventions implemented through regulations will limit stormwater runoff from private properties to pre-development levels. The solutions assessed in this analysis were therefore limited to interventions that would manage the impacts generated by the construction of new streets.

To begin, the application of more traditional types of stormwater infrastructure, or “grey” infrastructure, was considered. However, this type of infrastructure has notable drawbacks in terms of costliness and impact on existing networks, and they are often ill-suited for managing stormwater runoff generated at source. For example, oversized pipes could be proposed in new streets to provide detention as well as conveyance of runoff, but this type of infrastructure tends to have a higher capital cost and incurs significant maintenance, refurbishment, and replacement costs in the long run. Similarly, traditional retention ponds can provide large detention volumes, but they are mono-functional and require additional space outside of new ROWs with additional network investments to convey stormwater to them. As a result, and in alignment with current best practices in stormwater management, the preferred solution was to make use of green infrastructure.

A variety of GI solutions, as implemented in other cities, were identified as more promising from the perspective of cost, aesthetics, and space utilization. Beyond their role in storing and treating stormwater, the greatest benefit of green infrastructure is that it is multipurpose, delivering co-benefits such as improved air quality and reduced urban heat island effect.

One popular example of GI implemented in urban environments are retention swales, sometimes referred to as bioretention swales. Bioretention swales are vegetated areas that temporarily manage stormwater by collecting, storing, infiltrating, and filtering stormwater runoff from impervious surfaces, often paved surfaces. Incorporated into the streetscape, bioretention swales can help reduce the load on municipal stormwater systems, limit discharge rates into local water bodies, filter pollutants from runoff, and contributes to improved air quality and aesthetic quality of the public realm.

Figure 4-1: Examples of Retention Swales Integrated into Urban Realms

Water squares, or floodable parks, also sometimes referred to as sponge parks, are another type of stormwater intervention. They consist of public spaces designed to accommodate significant retention volumes during major rainfall events. Such parks have been retained as a solution in specific circumstances, but they have some drawbacks, most notably in their space requirements and the need to direct stormwater runoff to them over some distance. However, the footprint occupied by such parks allow for a variety of public realm uses, as illustrated in Figure 4-2: Examples of Floodable Parks in the Public Realm.

For this analysis, Arup adopted bioretention swales as the primary stormwater management control measure for the new ROWs, and considered floodable parks as alternative solutions where sufficient detention volumes could not be achieved solely with bioretention swales.

Figure 4-2: Examples of Floodable Parks in the Public Realm (Source: Urbanisten.nl)

The functioning of bioretention swales is fairly simple. Stormwater runoff generated on paved surfaces (e.g., sidewalks, roadways, and bike lanes) is directed towards retention swales installed along the ROW. Stormwater is held within these retention swales for a period of time before being evacuated through a combination of infiltration and transpiration, and in extreme cases, with the aid of overflow drains. The methods in which stormwater can be directed towards retention swales are various, and can include the syphon method, curb cuts, or hydraulic channels beneath sidewalks or bike paths. This enables a high-level of flexibility in the adaptation and implementation of bioretention swales tailored to specific design constraints. This is also the case for the dimensioning of retention swales, where flexibility exists in adjusting parameters to suit conditions. A more detailed bioretention swale dimensioning methodology is presented in Figure 4-3: Cross-Section of Retention swale with Overflow Catch Basin

The swales presented in Appendix B were developed by Arup with dimensions tailored to effectively manage major storm events, with a recurrence of up to 1 in 100 years. Although they were designed to control the peak flow increase caused by the impermeabilization of the MTSA, those bioretention swales are also effective in managing stormwater quality through natural processes that help filter and treat runoff water. Notably, vegetation within bioretention swales, such as grasses, plants, and shrubs, play a significant role in filtering stormwater. Furthermore, while plant roots and soil act as natural filters, trapping sediments, pollutants, and debris from the runoff, the soil and organic matter absorb these trapped pollutants. The gradual slopes of the retention swales, also allow sedimentation which helps prevent the transport pollutants downstream. Through all the combined effects of vegetation, soil interactions, and sedimentation, bioretention swales contribute to reducing TSS concentrations in stormwater, thereby enhancing the overall quality of discharged water.

Given the vast expanse of the study area in this mandate and the level of analysis applied, it would be imprudent to regard the presented results in this report as definitive. Numerous uncontrollable variables come into play, notably the specific conditions of development and the detailed process of retention swale design and installation. Street grading and the presence of obstacles (e.g., driveways) are some factors that could not be considered at this scale. As such, the aim of the analysis conducted by Arup is to demonstrate the viability of the proposed solutions, emphasizing the need for a meticulous design phase to ensure seamless integration. Indeed, before adopting and implementing any green infrastructures in the City's right-of-way, consultation and close coordination must be done between all stakeholders within the City to ensure that the proposed approach is adapted to each specific site and responds to the needs of all stakeholders.

Figure 4-3: Cross-Section of Retention swale with Overflow Catch Basin

5. Integrated Approach for Transportation and Stormwater Management

Arup's integrated approach to achieving transportation and stormwater management objectives strives to improve the local road network within each MTSA and address potential flood risks during major storm events, all while enhancing the public realm. The incorporation of green spaces, pedestrian trails, and bike lanes into mixed-use transit-supportive neighbourhoods allows for growth and development that will help forge a distinct identity for Brampton's urban development. The proposed integrated strategy relies on the integration of stormwater management features into the Complete Streets typologies already developed for the City of Brampton. The following subsections describe these Complete Streets typologies, which the city intends to apply to the ROWs of all new developments and outlines an approach as to how they may be adapted to accommodate GI, such as expanded vegetated buffers and bioretention swales.

5.1 Street Typologies

The City of Brampton is adopting a "Complete Streets" approach with the objective of developing streets that safely accommodate all users. The *City of Brampton Complete Streets Guide* aims to guide development of an integrated, connected, safe, and user-friendly transportation network that supports compact, sustainable development and provides livable communities. The guide defines various types of streets and outlines the objectives and desired outcomes of each street type. It also provides dimensioned street cross-sections which apply the recommended Complete Streets Guidelines onto typical Brampton ROWs.

As part of the analysis leading up to this report, four predominant Complete Street typologies were identified as potentially applicable to new street segments within Brampton's MTSAs, based on their general compatibility with proposed ROW widths and current and planned adjacent land uses. For each new or altered ROW within the MTSAs, the corresponding Complete Street typology was selected based on current and future land use designation, expected ROW width, and anticipated number of travel lanes. Subject to manual adjustments to account for local conditions, the following classifications generally apply to proposed links within the studied MTSAs:

- **Type 1 - Downtown Streets:** Smaller streets that would typically be classified as city collector or local streets with ROW widths between 15m and 30m. Per the Brampton Complete Streets Guidelines, these streets often have shorter block lengths and accommodate high volumes of pedestrian traffic. As a baseline for the transportation and stormwater analyses discussed in this report, Arup assumed a ROW width of 23.4m consisting of 2 vehicular lanes and 2 bike lanes.
- **Type 2 - Mixed-Use Neighbourhood:** Streets that would traditionally be classified as local streets, or collectors, with ROW widths between 18m and 30m. Per the Brampton Complete Streets Guidelines, these typologies generally occur near major transit hubs or along priority corridors. As a baseline for the transportation and stormwater analyses discussed in this report, Arup assumed a width of 25.2m consisting of 3 vehicular lanes and 2 bike lanes.
- **Type 3 - Local Employment Streets:** Streets that would traditionally be classified as local streets in employment or industrial areas with ROW widths of 23m or less. Per the Brampton Complete Streets Guidelines, these streets are intended to accommodate both regular traffic and larger truck traffic. As a baseline for the transportation and stormwater analyses discussed in this report, Arup assumed a ROW width of 24.2m consisting of 2 vehicular lanes and 2 bike lanes.
- **Type 4 - Local Residential Streets:** Streets that would traditionally be classified as local streets in residential neighbourhoods with ROW widths between 17m and 20m. Per the Brampton Complete Streets

Guidelines, these streets are intended primarily to serve local traffic rather than through-vehicle traffic. As a baseline for the transportation and stormwater analyses discussed in this report, Arup assumed a width of 20.6m consisting of 3 vehicular lanes and no bike lanes.

Figure 5-1: Proposed Street Typologies

5.2 Proposed Street Cross-Sections

Integrating retention swales into the Brampton Complete Street Guide was the approach selected by Arup to minimize the impact of additional stormwater runoff resulting from the intensification of density within the 12 MTSAs. As previously mentioned, retention swales serve as effective stormwater management tools that help mitigate flooding, improve water quality, and enhance the overall sustainability of urban environments. The adoption of retention swales would simultaneously afford the city an opportunity to demonstrate their commitment to sustainable urban development and environmental stewardship.

To effectively integrate retention swales into the street typologies identified by the transportation analysis, in a manner where they can also satisfy stormwater detention needs, modifications to the City's existing Complete Streets Guide cross-sections are required. One of the key results of the stormwater modelling undertaken by Arup was that the space available to detain water when simply converting the planted areas (identified as "joint use trenches" in the Complete Streets Guide) into retention swales was insufficient. This conclusion was the result of calculating the volume available when applying typical retention swale parameters such as depth, side slopes, and longitudinal slopes to the planted areas while maintaining their overall widths to those indicated in the Complete Streets Guide.

To estimate the width of retention swales required to meet stormwater management objectives, an idealized street segment was modelled in PCSWMM for each of the four street typologies identified in Section 4.1. Starting from the assumption that the retention swales would be most effective if they could provide a detention volume that reduced runoff to the maximum extent possible in the most constraining existing-to-proposed

conditions (i.e., when a green space is replaced by a new street), the retention swale dimensions determined by Arup allow each new street to limit stormwater runoff to pre-development levels that corresponds to a permeable surfaces. Not only is this conservative approach useful given the adaptability required to carry out a proposed conditions analysis that considers the substitution of a large variety of existing land uses with new roads, but it also has the advantage of allowing the proposed street segments to, in many cases, autonomously manage more stormwater runoff than they generate.

For each street typology, new retention swale widths were therefore determined, holding steady most other parameters. These proposed widths and their impact on overall ROW widths are presented in the illustrative cross-sections accompanying this section. As previously indicated, the main purpose of proposing these retention swale dimensions was to demonstrate their effectiveness as an overarching measure across all new streets across all MTSAs. In practice, given the wide variety of specific conditions that will be encountered when designing individual new street segments, the main advantage of such a conservative sizing of the retention swales is to build-in flexibility to modulate parameters as needed. The detailed retention swale dimensioning methodology provided in the appendices further indicates the impact and trade-offs between the different design parameters.

One of the only potential limitations of relying primarily on retention swales to manage new stormwater runoff is their long-term effectiveness if not appropriately maintained. The City will therefore have to ensure a regular and rigorous maintenance strategy to ensure that the retention swales remain effective over time. This includes periodic cleaning, sediment removal, and management of vegetation to prevent clogging.

The City of Brampton will have to adopt final streets' layouts, widths and uses. This decision will have to be made in coordination with all relevant stakeholders. The cross sections in this report are presented to demonstrate the overall feasibility of the proposed solutions, to help guide the City of Brampton in their final decision. Final design choices need to be approved by the City of Brampton.

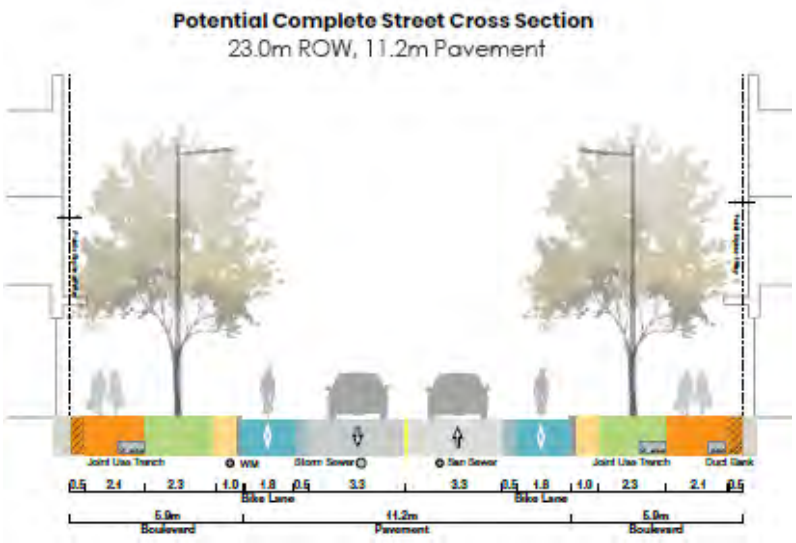

Figure 5-2: Complete Street - Downtown Street

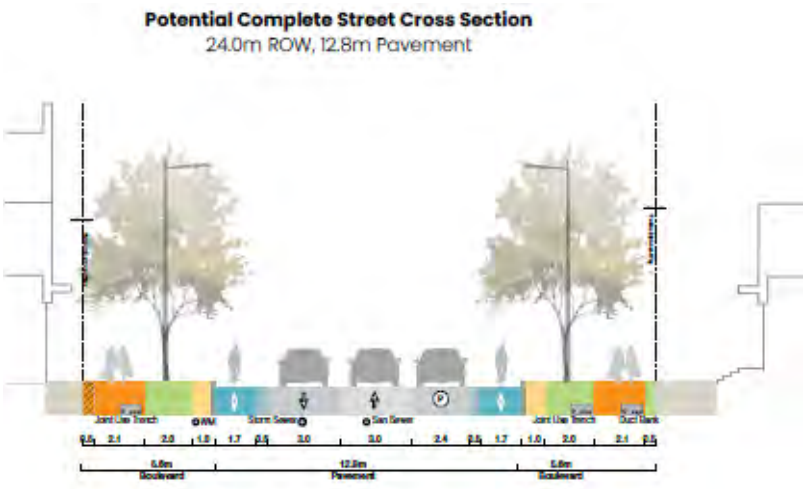

Figure 5-3: Complete Street - Mixed-Use Neighbourhood Street

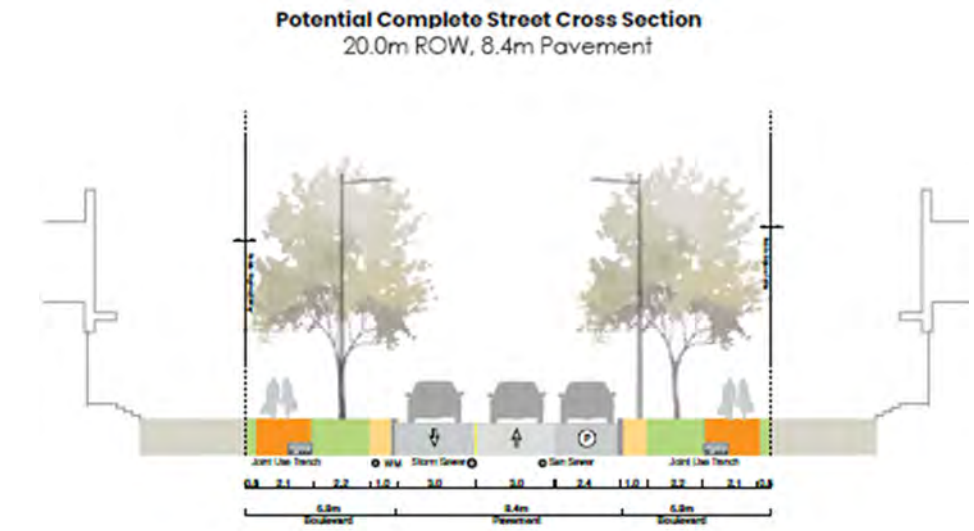

Figure 5-4: Complete Street - Local Residential Street

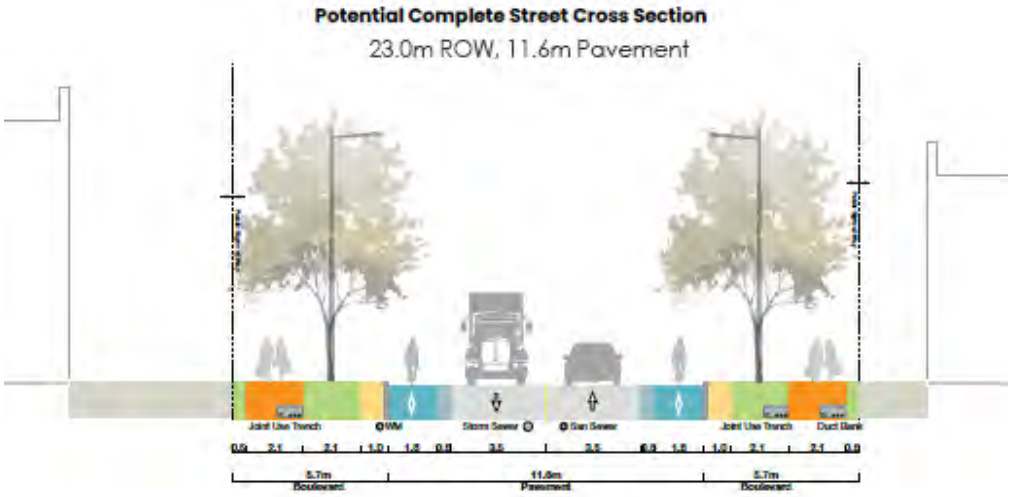

Figure 5-5: Complete Street - Local Employment Streets

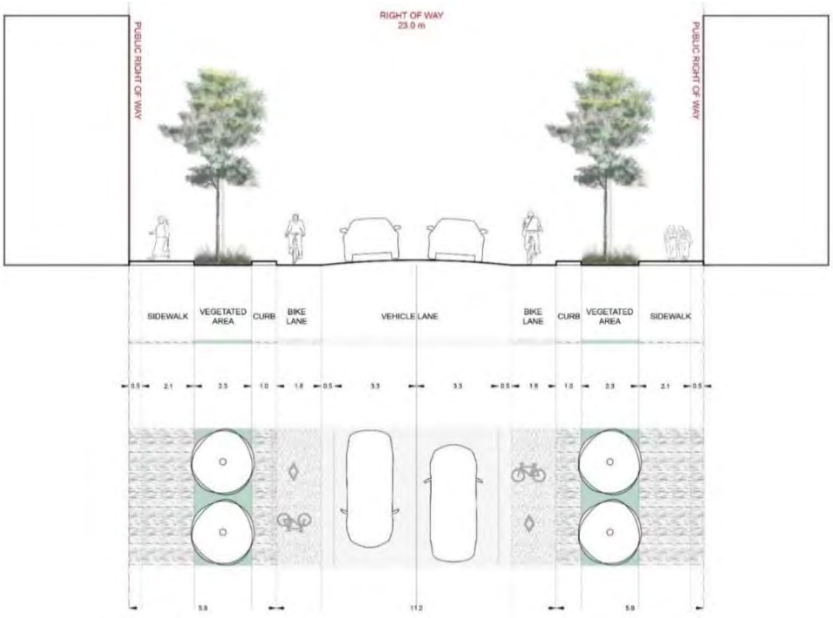

Figure 5-6: Existing Downtown Complete Street Cross-Section

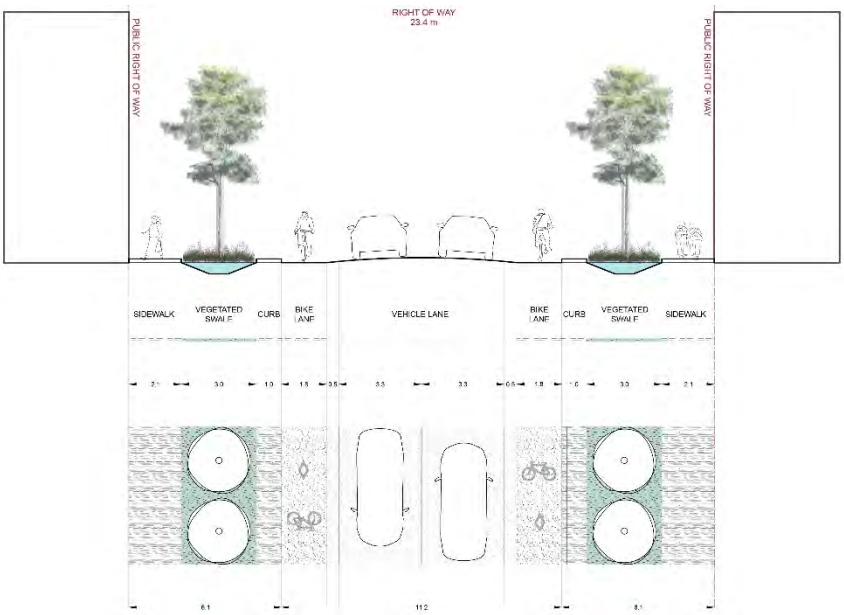

Figure 5-7: Optimized Downtown Complete Street Cross-Section

Table 5-1: Downtown Complete Street Right-of-Way Specifications

	Width (m)		
	Planted Area Width Per Side	RoW Total Width, No Consolidation	RoW Total Width, with Consolidation
Complete Street Guide	2.3	23.0	23.0
Proposed Optimization	3.0	24.4	23.4
Ratio of Increase	30%	6%	2%

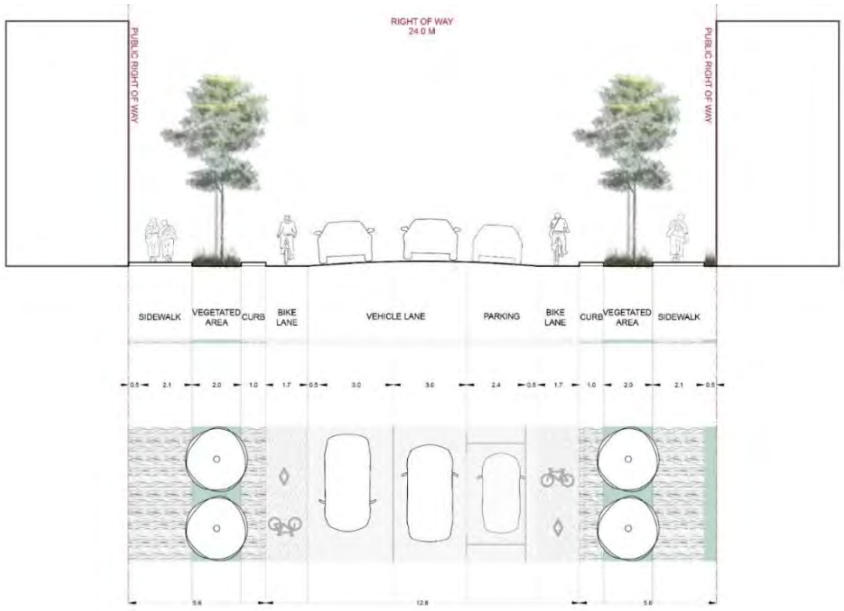

Figure 5-8: Existing Mixed-Use Neighbourhood Complete Street Cross-Section

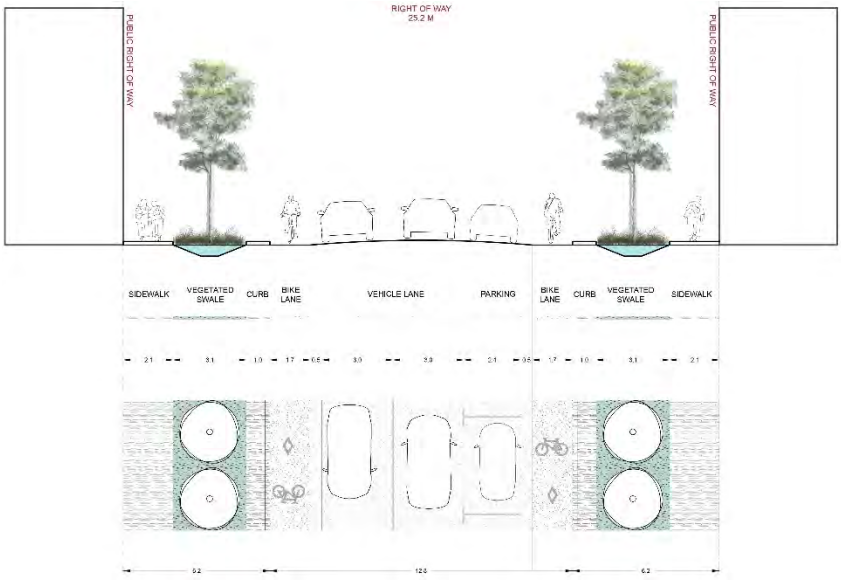

Figure 5-9: Optimized Mixed-Use Neighbourhood Complete Street Cross-Section

Table 5-2: Mixed-Use Neighbourhood Complete Street Right-of-Way Specifications

	Width (m)		
	Planted Area Width per Side	ROW Total Width, No Consolidation	ROW Total Width, with Consolidation
Complete Street Guide	2.0	24.0	24.0
Proposed Optimization	3.1	26.2	25.2
Ratio of Increase	55%	9%	5%

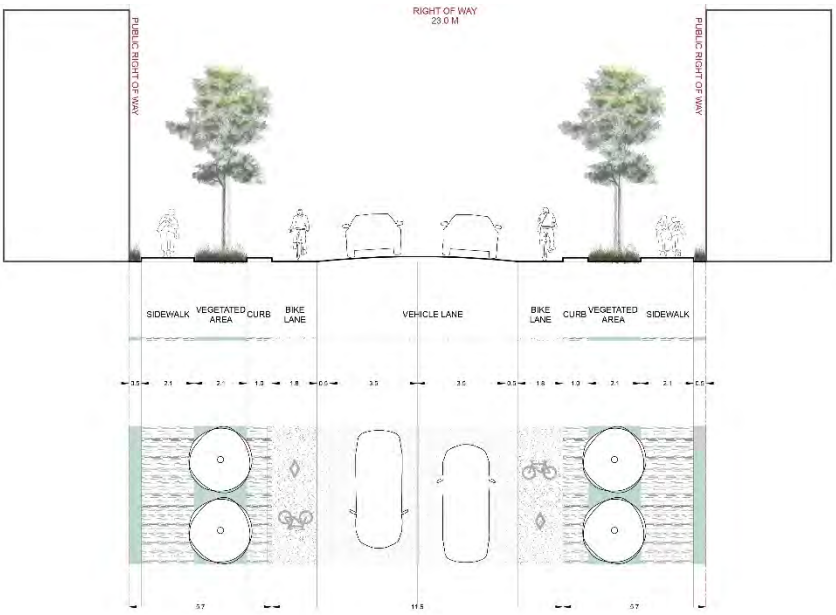

Figure 5-10: Existing Local Employment Complete Street Cross-Section

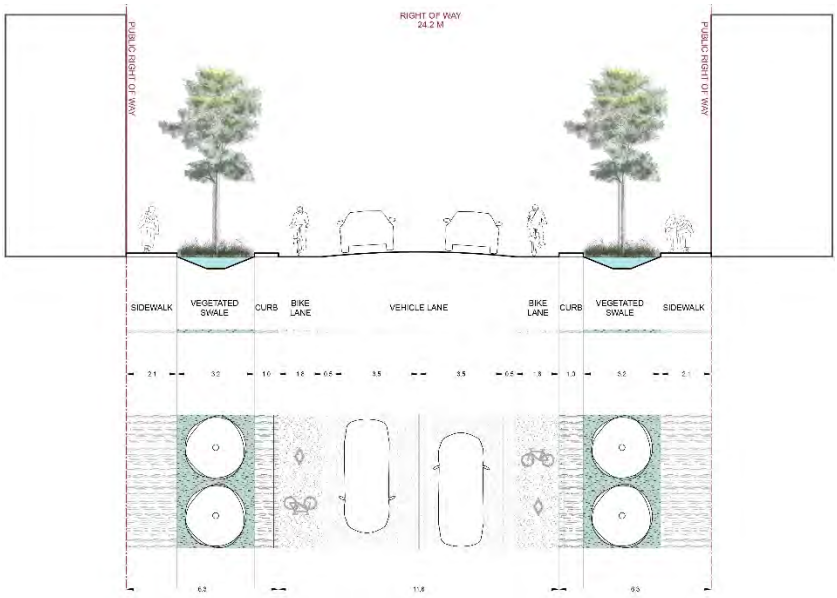

Figure 5-11: Optimized Local Employment Complete Street Cross-Section

Table 5-3: Local Employment Complete Street Right-of-Way Specifications

	Width (m)		
	Planted Area Width per Side	RoW Total Width, No Consolidation	RoW Total Width, with Consolidation
Complete Street Guide	2.1	23.0	23.0
Proposed Optimization	3.2	25.2	24.2
Ratio of Increase	52%	10%	5%

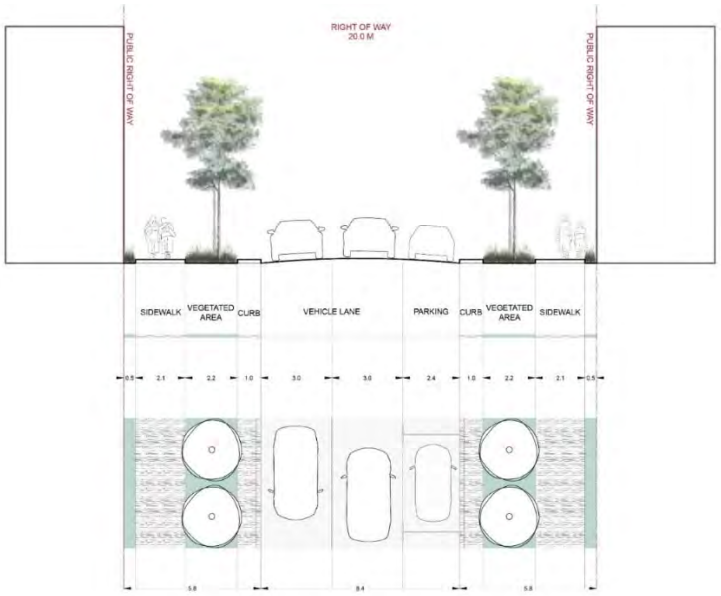

Figure 5-12: Existing Local Residential Complete Street Cross-Section

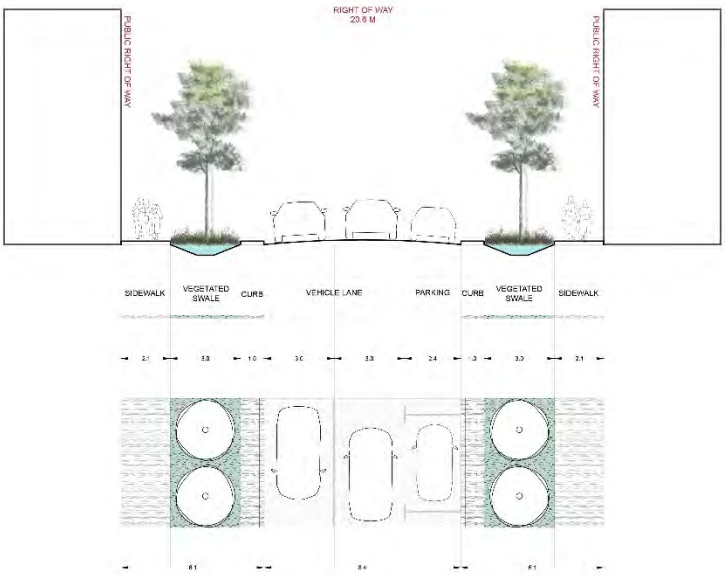

Figure 5-13: Optimized Local Residential Complete Street Cross-Section

Table 5-4: Local Residential Complete Street Right-of-Way Specifications

	Width (m)		
	Planted Area Width per Side	ROW Total Width, No Consolidation	ROW Total Width, with Consolidation
Complete Street Guide	2.2	20.0	20.0
Proposed Optimization	3.0	21.6	20.6
Ratio of Increase	36%	8%	3%

6. Application of Integrated Approach

The integrated approach described in the preceding section was applied to the 12 in-scope MTSAs to identify refinements to the transportations network, recommendations for stormwater management, and appropriate secondary-plan policies. The application of the integrated approach is catalogued in the following sections, which are repeated for each MTSA.

- **Existing conditions**: An overview of each MTSA's existing land use, transportation networks, and stormwater conditions.
- **Community objectives**: A review of the community objectives for each MTSA gathered through City-led focus-group sessions held in early 2023.
- **City of Brampton proposed area plan**: An overview of the City's preliminary area plans for each MTSA. These plans have been revised since the initial versions used for public engagement, but do not yet incorporate Arup's recommended refinements.
- **Recommendations for network refinements**: A description of recommendations for transportation network refinements, identified through an iterative analysis of demand and circuity conditions.
- **Analysis of proposed conditions**:
  - **Transportation**: An analysis of future demand per mode per street segment and of walk and bike catchment areas. The general steps of the analysis include: 1) identifying the number of trips expected to leave / arrive at each building during the PM peak hour; 2) routing pedestrian, cyclist, and vehicle trips between origins and destinations (buildings and the nearest transit stops for pedestrians and cyclists, buildings and TAZ centroids for vehicles); 3) joining anticipated demand to each route; 4) aggregating routes to calculate demand per street segment per mode; and 5) calculating 500m walk and bike catchment areas for each transit station. A detailed description of the methodology employed to identify the number of trips expected to leave and arrive at each building in the PM peak hour is included in Appendix A.
  - **Stormwater**: A comparison of post-pre-development peak flows (determined and pre-development peak flow, calculated and summarized in the Master Servicing Existing Conditions report issued on November 30th 2022) and post-development peak flows calculated for this analysis, elaborated to verify the necessity of stormwater management for each MTSA. The general steps of the analysis include: 1) Identifying new streets that are planned to open in each MTSA; 2) Evaluate the increase in peak flow that the new streets would generate at each sewershed outfall established in the previous report; 3) Determine the magnitude of volume required for stormwater detention at the source to limit the expected peak flow; 4) Compare this volume requirement to the available volume available within the new streets calculated using the optimized proposed complete streets. Note: This analysis assumes that developers will be responsible for maintaining pre- to post-development flows on private parcels. It therefore focuses on expected changes in publicly managed stormwater, i.e., within city-owned rights of way.
- **MTSA policy recommendations**: A description of policies recommended for potential inclusion within MTSA secondary plans, including policies to address residual network concerns, stormwater management, and broader city objectives.

NOTE: Maps and figures have been rotated to show Queens Street horizontally to align with proposed area plans. References in the text to cardinal directions refer to the "paper" orientation.

6.1 MTSA 01 – Brampton Innovation District GO

The Brampton Innovation District GO MTSA sits within Downtown Brampton and features residential, commercial, and institutional areas. It includes several cultural heritage resources and has a distinctive historic character. It is bordered to the east by the natural heritage system surrounding the Etobicoke Creek. The Brampton GO MTSA is centred around a commercial area situated near the intersection of Queen Street West and Main Street. Several important institutional uses are located in and around the commercial area, including Brampton City Hall, the Brampton Library Four Corners Branch, the Grace Place Community Resource Centre, and the Central Public School Community Centre.

Three higher-order transit corridors are planned to serve the MTSA, including the Kitchener GO corridor, the Hurontario LRT, and the Queen Street BRT. As the Brampton GO MTSA will be served by a GO station and is in an Urban Growth Centre, it has a density target of 200 residents and jobs combined per hectare. To support the increased density proposed in this MTSA, a range of street-network refinements have been identified. These include street extensions and mid-block connections proposed by the City in their land use plan, bike facilities identified in the Active Transportation Master Plan, and further recommendations flowing from the transportation analysis described herein. Key refinements include the addition of new vehicular crossings over the rail corridor and the addition of new east-west active connections.

The increase in density is predicted to cause substantial increase in peak flow released into the stormwater network at three outfalls located in the eastern part of the MTSA. The increase could be mitigated with a proper management of extra stormwater at the source. Retention swales of three meters wide will potentially be sufficient to manage this increase as presented in this section. These increases can be mitigated with at-source control interventions. In this analysis, 3-metre-wide retention swales were determined to be sufficient to manage this increase.

6.1.1 Existing Conditions

The majority of the MTSA’s land is dedicated to residential uses; high-density residential uses are scattered throughout the eastern half of the MTSA, while medium-density residential areas predominate in the west. Open spaces surround the Etobicoke Creek and the decommissioned Orangeville Brampton Railway. There are multiple listed and designated heritage buildings within the Brampton GO MTSA.

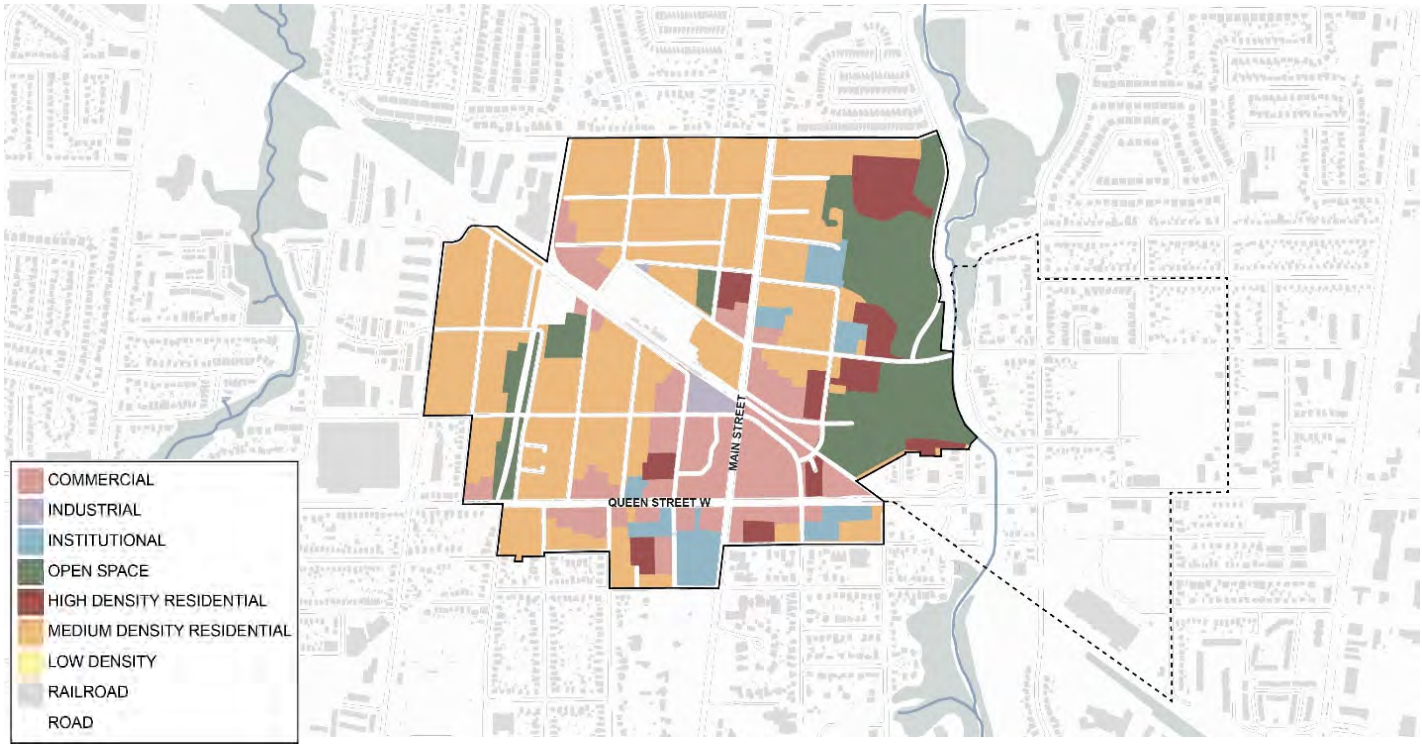

Figure 6-1: Brampton GO Existing Conditions Land Use Map

The Brampton GO MTSA is bisected by two rail corridors – the GO corridor and the decommissioned Orangeville Brampton Railway – both of which serve as barriers to movement. Many local streets in the MTSA dead-end at these rail corridors and at the natural heritage area to the east of the MTSA. Queen Street and Main Street North are the major vehicular thoroughfares; Mill Street and Union Street also provide vehicular and active connections over the GO rail corridor.

Main Street and Queen Street function as key transit corridors serving local and GO buses. Local bus service is also provided along McMurchy Avenue, Railroad Street, and Vodden Street. The Downtown Brampton Transit Hub initiative will address future transit needs and integrate the Hurontario LRT, GO service, and the Queen Street BRT.

There is a natural heritage system on the east flank of the MTSA. The regulated floodplains supplied by TRCA and CVC is also shown to illustrate areas subject to flood-related regulations. Further investigations should be conducted in these areas to ensure that conservation authorities' regulations are taken into account for all proposed changes within MTSA.

There are several planning policies which intersect with the Brampton GO MTSA, including:

- The **Downtown Brampton Secondary Plan**, which seeks to enable intensification in commercial areas and selected residential areas in a manner that is sympathetic to the area's historic character; to preserve and protect cultural heritage resources; to protect watercourses and the valley system, including the floodplain; to provide greenspace linkages to the surrounding open space system, incorporating pedestrian and bicycle trails; and to improve the local road network and enhance public transit to facilitate development/redevelopment.
- The **Downtown Brampton Special Policy Area (SPA)**, which includes certain restrictions on development and redevelopment due to potential flooding in a major storm event. Studies are underway to determine the feasibility of eliminating the flood hazard and unlocking the land covered by the SPA for more development.
- The **Riverwalk Area Urban Design Master Plan**, which is an open space master plan that developed concepts for the open space system along the valley; the treatment of the flood infrastructure; the integration of active transportation, sustainability, resilience, and public health; and preliminary programming of public spaces.
- The **Main Street North Development Permit System**, which aims to protect and enhance the character of the district and to encourage its transition into a diverse, liveable, safe, thriving, and attractive component of the historic Downtown precinct and the City as a whole.

Additional ongoing initiatives within the Brampton GO MTSA include:

- The **Centre for Innovation**, which is envisioned as an iconic landmark building potentially featuring a new central library, office space, and postsecondary institutions.
- The **Downtown Brampton Transit Hub**, which will address future transit needs and integrate the Hurontario LRT, GO service, the Queen Street-Highway 7 BRT, and the Downtown Revitalization Program.
- **Activate Downtown Brampton**, a series of installations and activations in Downtown Brampton's laneways and other public sites.
- The **Integrated Downtown Plan**, which coordinates Downtown's many ongoing initiatives and infrastructure projects through 2051.

Figure 6-2: Brampton GO Existing Conditions Map

6.1.2 Community Objectives

The Brampton GO preliminary land use plan was discussed during a public focus-group session held on May 11, 2023. In general, the discussion centred around four points: 1) what is working in the MTSA; 2) what is not working in the MTSA; 3) what is missing in the MTSA; and 4) how could the MTSA be improved. The attendees were satisfied with access to transit in the Brampton GO MTSA. They also believed that the scale of streets and development supports pedestrians. The group expressed concerns about the high number of electric bikes (e-bikes) that create safety issues for pedestrians and cyclists and identified that the area is missing east-west connections. Some discussion also concentrated on whether Queen Street would be able to accommodate the planned BRT, bike lanes, and vehicles within its ROW.

The group noted a lack of shops and restaurants and expressed interest in more specialty stores. They noted that the MTSA could be improved by adding dedicated bike lanes, widening sidewalks, and reducing the number of vehicles. They discussed widening Nelson Street, extending the LRT north to the Brampton GO station, and adding dedicated bus lanes on Main Street North. Attendees also expressed interest in additional government facilities and an increase in density to help sustain businesses.

Furthermore, attendees noted a desire to preserve the “brick façade feeling” and heritage attributes in the MTSA. The group also discussed the addition of a potential transit mall on Main Street between Wellington Street and Nelson Street, ground-floor commercial space, the effects of building heights, the lack of efforts to reduce traffic entering the city from the north, as well as parking minimums and parking demand.

A complete summary of the focus-group session is included in Appendix D.

6.1.3 City of Brampton Land-Use Plan

The final land-use plan for the Brampton GO MTSA was approved by Brampton City Council in October 2023 as part of the update to the city’s Official Plan. The approved land use plans were the result of iterative refinements based on qualitative and quantitative analyses of preliminary land use plans conducted by Arup over the course of this engagement and community engagement.

The approved land-use plan aims to meet intensification objectives while adding a mix of uses, mobility connections, public service facilities, parks, active places, and streetscapes. The plan aligns with the Downtown Brampton Secondary Plan, which seeks to enable intensification in commercial areas and selected residential areas in a manner that is sympathetic to the area’s historic character; to preserve and protect cultural heritage resources; to protect watercourses and the valley system, including the floodplain; to provide greenspace linkages to the surrounding open space system, incorporating pedestrian and bicycle trails; and to improve the local road network and enhance public transit to facilitate development/redevelopment.

The plan includes:

- **Downtown Mixed Use 1** areas clustered around the station area and to the southeast of the MTSA, generally bound by the rail corridor and George Street;
- **Downtown Mixed Use 2** (high-rise) areas primarily located to the immediate west and southwest of the Brampton GO Station;
- One building of **high-rise residential** located on the block bound by Queen Street, Main Street, John Street, and Chapel Street;
- **Downtown Mixed Use 3** (mid-rise) areas spread around the southwest quadrant of the MTSA, bordering the Downtown Mixed Use 2 areas and the Downtown Mixed Use 1 areas;
- Several parcels along Queen Street and one on Nelson Street designated as **low-rise mixed use**;

- **Low-rise residential areas** primarily located north of the rail corridor in the area generally bounded by the decommissioned Orangeville Brampton Railway corridor, Rosedale Avenue West, Isabella Street / Thomas Street, and Church Street West / Joseph Street and the lots off Alexander Street, Ellen Stret, William Street, and Sproule Drive;
- **Development Permit System (DPS)** areas which include all parcels off Main Street N north of Church Street and all parcels on the east side of Thomas Street and Isabella Street;
- A new **proposed open space** located along the decommissioned Orangeville Brampton Railway corridor;
- **Institutional uses** such as Brampton City Hall, Central Public School, the Brampton YMCA, and St. Andrews Presbyterian Church, many of which are on the east side of the MTSA; and
- Several **existing parks** located on the east side of the MTSA.

This MTSA sits at the confluence of several key higher-order transit corridors, including the Queen Street BRT corridor, the Hurontario LRT corridor, and the Kitchener GO corridor. In addition to these transit corridors, key mobility elements of the proposed land use plan (which incorporates facilities planned in the Active Transportation Master Plan) include:

- Several east-west mid-block connections proposed in the southwestern corner of the MTSA;
- A proposed road connection linking Ken Whillans Drive and Nelson Street East;
- Possible connections (assumed for the purposes of this analysis to accommodate all modes) including the extension of Isabella Street south to Joseph Street, the extension of Union Street north to Sproule Drive, the linking of Mill Street North on either side of Rosedale Avenue, the linking of McMurchy Avenue North and Pleasantview Avenue; and a diagonal connection between Mill Street South and Mill Street North;
- Proposed shared street designations for Mill Street, Rosedale Avenue/Sproule Drive, and McMurchy Avenue;
- Proposed bike lanes on Wellington Street, Queen Street, Main Street, and Church Street; and
- Proposed multi-use paths on Mary Street and on the proposed road extension between Nelson Street and Ken Whillans Drive.

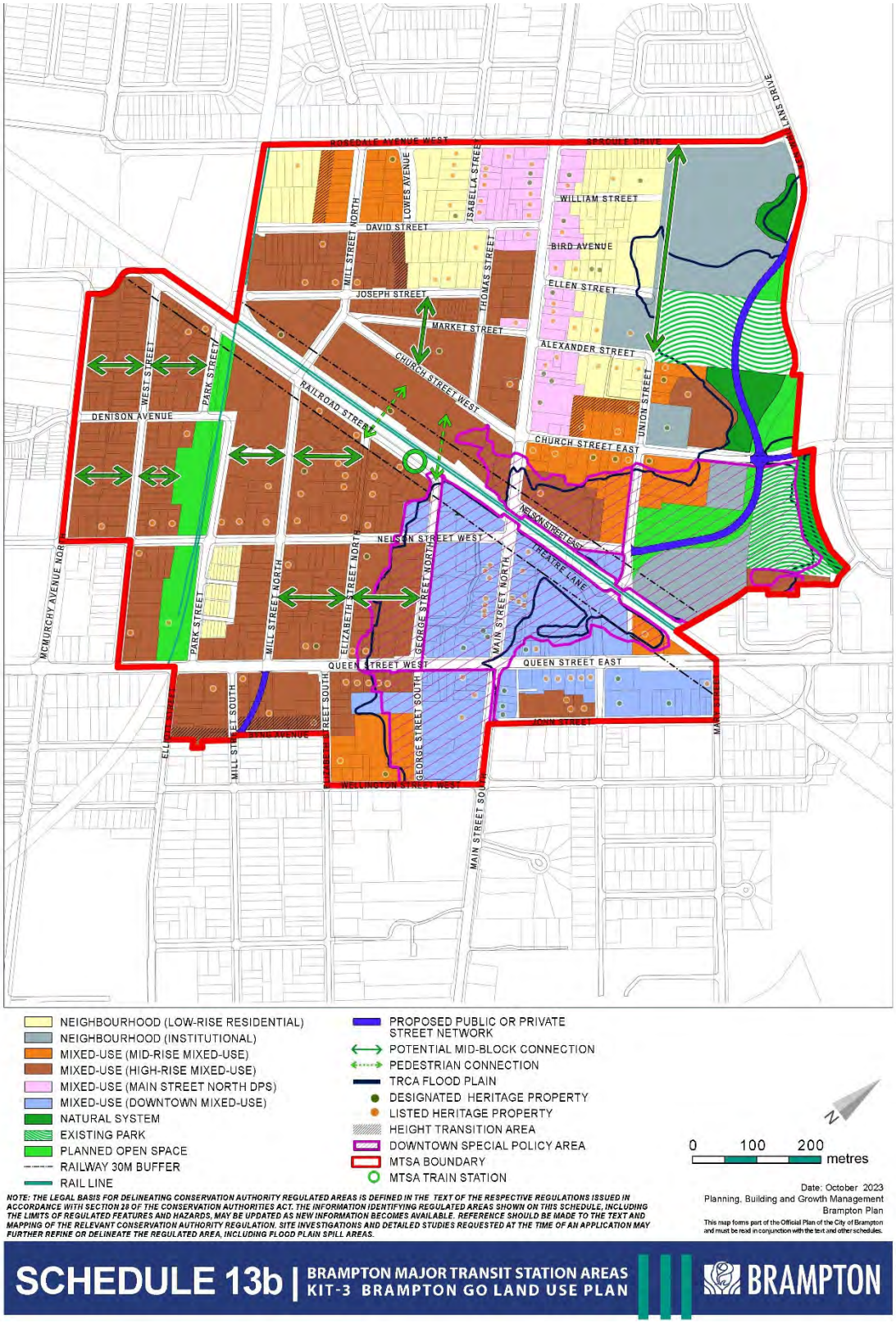

Figure 6-3: Brampton GO Proposed Land Use Plan (City of Brampton)

6.1.4 Analysis of Proposed Conditions

The analysis illustrated in the following subsections considers estimated travel demand and network characteristics, as well as stormwater flow conditions assuming the implementation of the final council-approved land-use plans.

6.1.4.1 Transportation Analysis of Future Conditions

The future-conditions transportation analysis considers the expected distribution of relative travel demand with respect to the existing and future street network; identifies potentially high-demand bike and pedestrian routes between future development and the closest transit stop to assist in prioritizing active-travel-infrastructure investments; and points to areas within the vehicular network that may require additional study or intervention.

Travel Demand Distribution

Demand per street segment is largely driven by the size and type of developments anticipated for each block. As shown in Figure 6-4 areas of high demand tend to be clustered close to the rail corridor, along Main Street North, or along Queen Street. (Note: Demand for the Brampton GO MTSA is illustrated at the block centroid because conceptual building footprints had not been established for this MTSA at the time of publication). Areas of lower demand are located farther from the GO station, close to Rosedale Avenue / Sproule Drive and West Street.

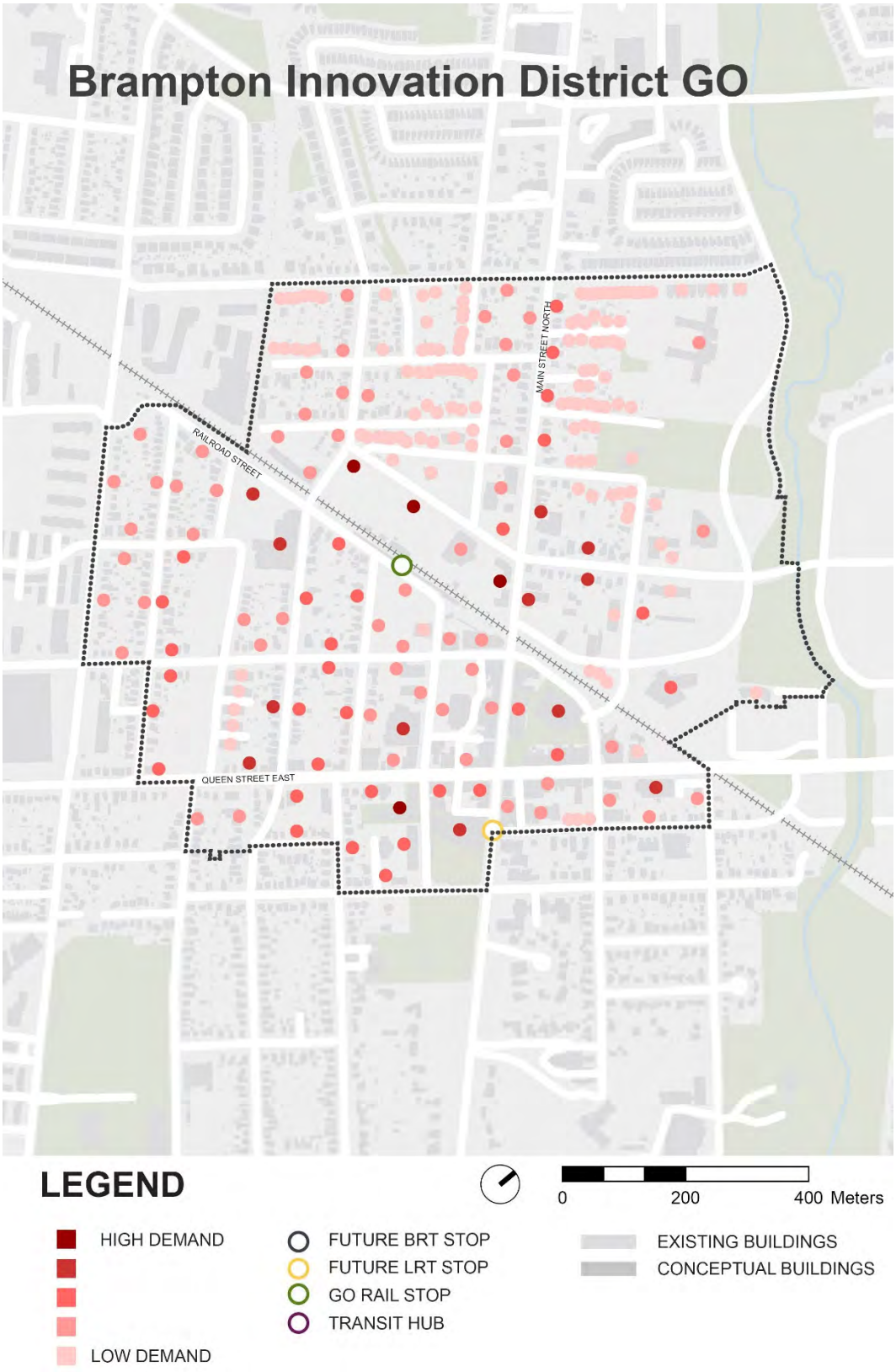

Figure 6-4: Brampton GO Building Travel Demand Aggregation – Vehicle and Transit Demand

Active Travel Between Development and Transit

Figure 6-5 shows aggregated bike demand per street segment in the PM peak hour in the future condition. Demand levels are high along Railroad Street, Mill Street, John Street, Queen Street, and portions of Church Street. Main Street shows limited levels of use, despite the dedicated bike infrastructure proposed.

In this analysis, bike lanes were included on Queen Street, as proposed in the preliminary land-use plan, and on Nelson Street, as recommended by Arup to reduce the number of modes competing for space on Queen Street. It is clear that Queen Street is the preferred route for bike trips, likely due to the direct access it provides to the BRT stop at Centre Street.[10] However, were the bike lanes to be removed from Queen Street, Nelson Street may show more use by cyclists. This change may also increase the number of cyclists using the bike lanes on Wellington Street.

It is also clear that the recreational path proposed for the decommissioned Orangeville rail corridor would play a key role in facilitating trips to and from the GO station, particularly for trips coming from the north.

[10] In this analysis, bikes and pedestrians were routed to the nearest transit stop, regardless of what MTSA it is in. As such, some cyclists coming from the Brampton GO MTSA were routed to the Centre St. BRT stop. Future analyses should ensure all active travelers originating in Brampton GO are routed to the Brampton GO station, since it is the only station providing access to the Kitchener GO line.

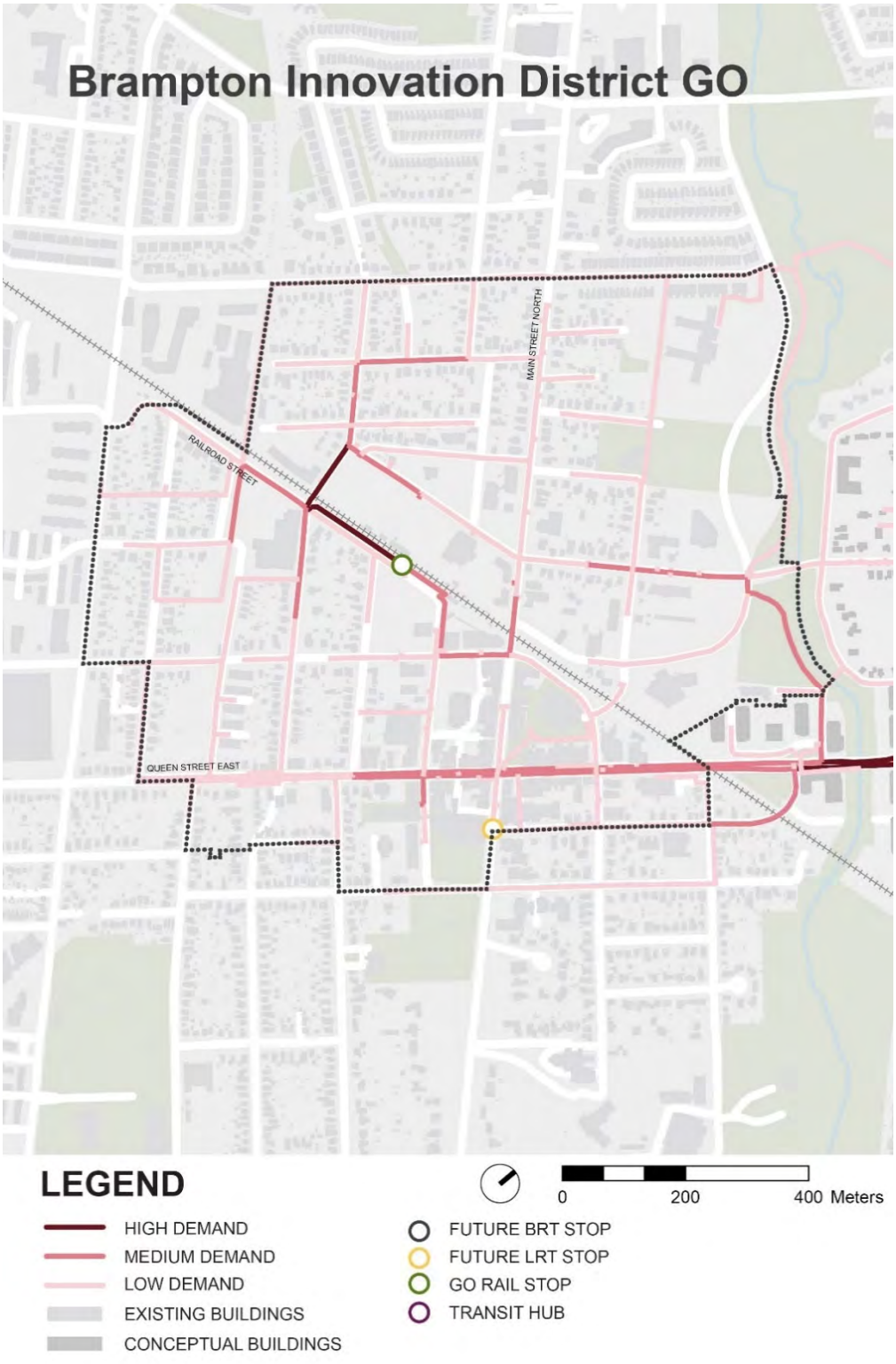

Figure 6-5: Brampton GO Aggregation of Bike Demand to and from the Nearest Transit Stop

Walk demand to and from the nearest transit stop is concentrated along Railroad Street, Mill Street, George Street North, and Main Street North. The high level of demand on Railroad Street demonstrates the importance of adding the missing sidewalk on the north side of the road. Ensuring a crossing over Railroad Street at Elizabeth Street will provide multiple routes for pedestrians accessing the GO station from the south. The proposed active connections through the current GO parking lot are shown to be useful for accessing the GO station as well. These routes should include clear signage and other pedestrian amenities such as lighting and seating.

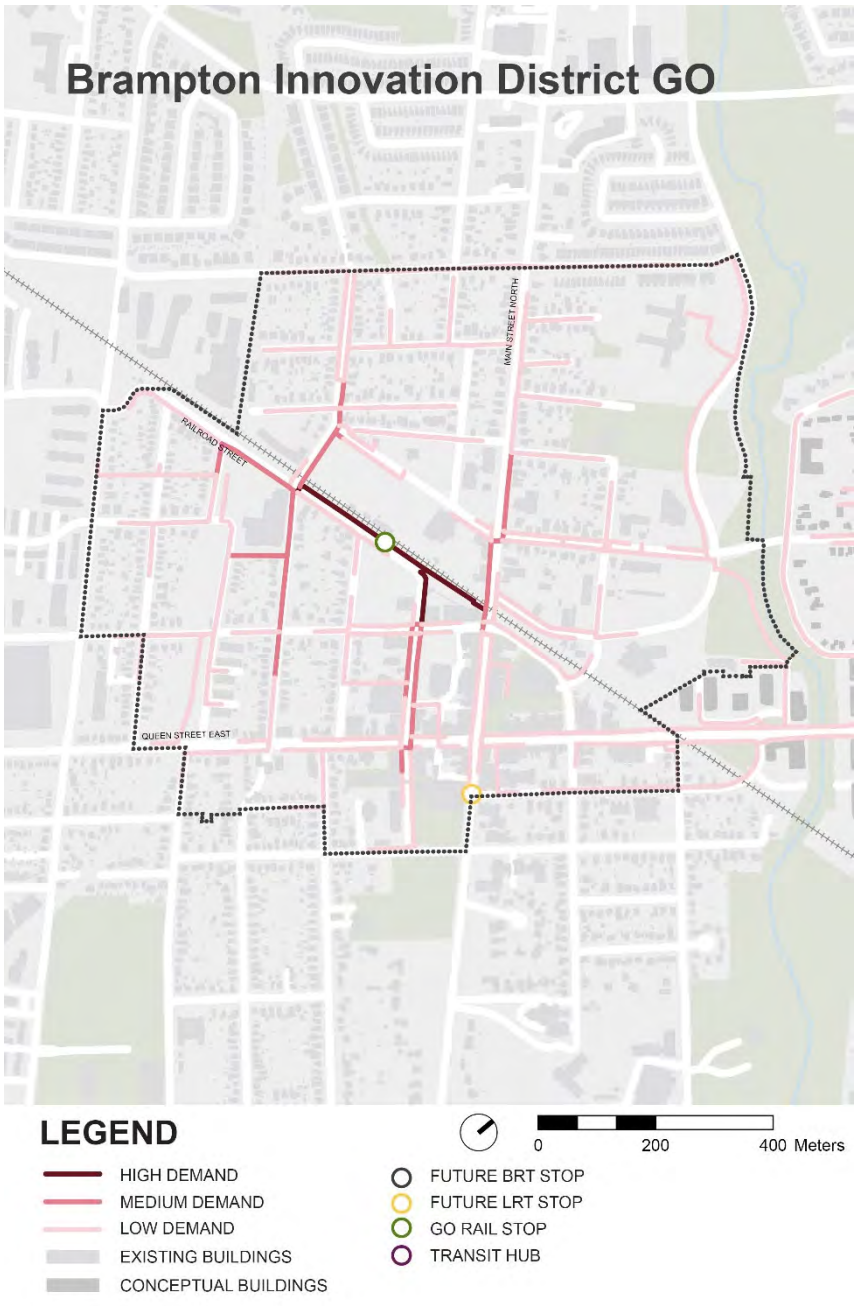

Figure 6-6: Brampton GO Aggregation of Walk Demand to and from the Nearest Transit Stop

Accessibility to Local Bus and ZÜM services [Intentionally omitted]

Proposed building footprints were not prepared for the Brampton Innovation District GO MTSA and the analysis of transit accessibility for this MTSA was therefore not conducted.

Vehicle Demand

Roads that may warrant additional investigation due to vehicle demand are highlighted in Figure 6-7. This map is not meant to identify street segments that *will* be overcapacity, but rather to identify some street segments that fall on key shortest-path routes and therefore may experience high levels of demand. For the purposes of this review, all proposed streets were expected to accommodate bi-directional traffic, with one lane in each direction. Some key links flagged in this review include:

- The four north-south links over the rail corridor (Union Street, Main Street, Mill Street, and the McMurchy Avenue extension)
- Queen Street East
- Nelson Street
- Mill Street North

Intensification therefore must be coupled with travel demand management strategies to promote even higher rates of sustainable modes and limit traffic congestion. Furthermore, consideration should be given to deterring through-traffic from using local neighbourhood streets (including the proposed street connections included in this MTSA) to reduce congestion in these areas. Potential strategies include reduced speed limits, chicanes, and speed humps/tables. Other development-based strategies could include reduction or elimination of parking minimums to encourage alternative modes and promoting the creation of car-share programs with accompanying facilities.

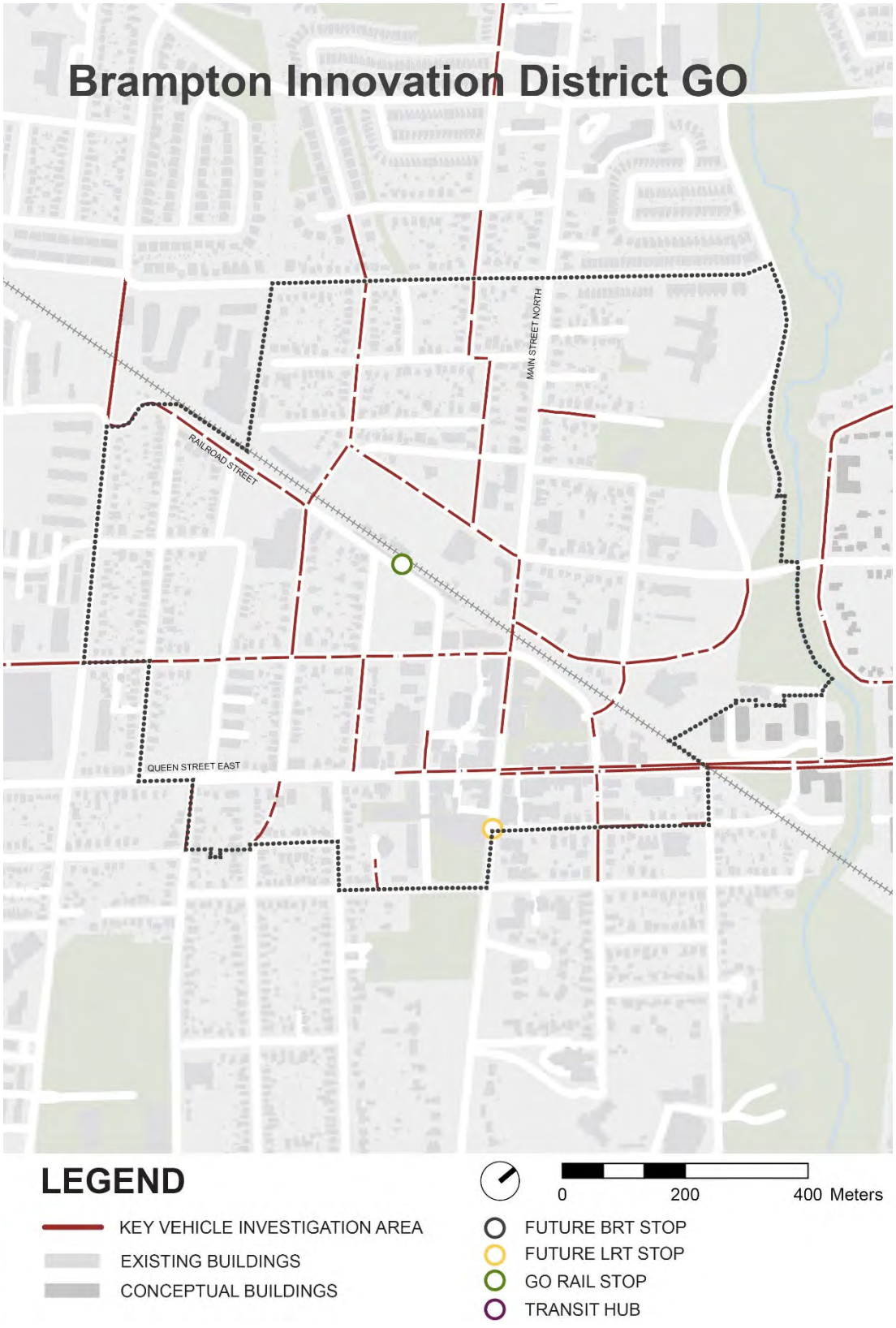

Figure 6-7: Brampton GO Vehicle Network Assessment

6.1.4.2 Stormwater Analysis of Future Conditions

The Brampton GO MTSA is a 92-ha site that that lies within the jurisdiction of the TRCA and within the Etobicoke West Branch subwatershed in the Etobicoke watershed, with some of its sewersheds draining towards the Fletcher's Creek subwatershed in the Credit Valley watershed, under jurisdiction of the CVC.

Brampton GO is already characterized by a significant level of density and development. Introducing additional streets in areas that are already developed is not anticipated to have a substantial impact on the stormwater network. The only potential area where the introduction of new streets could pose a challenge is the eastern side of the MTSA, as it has a higher coverage of vegetation.

As outlined in the transportation analysis section, there are plans to introduce two distinct types of streets within the Brampton GO MTSA: Local Residential (Type 4) and Downtown Street (Type 1). Should the City proceed with the construction of these streets as detailed in the preceding chapter (including retention swales), surplus stormwater generated by these new streets should not lead to an additional influx in the existing network.

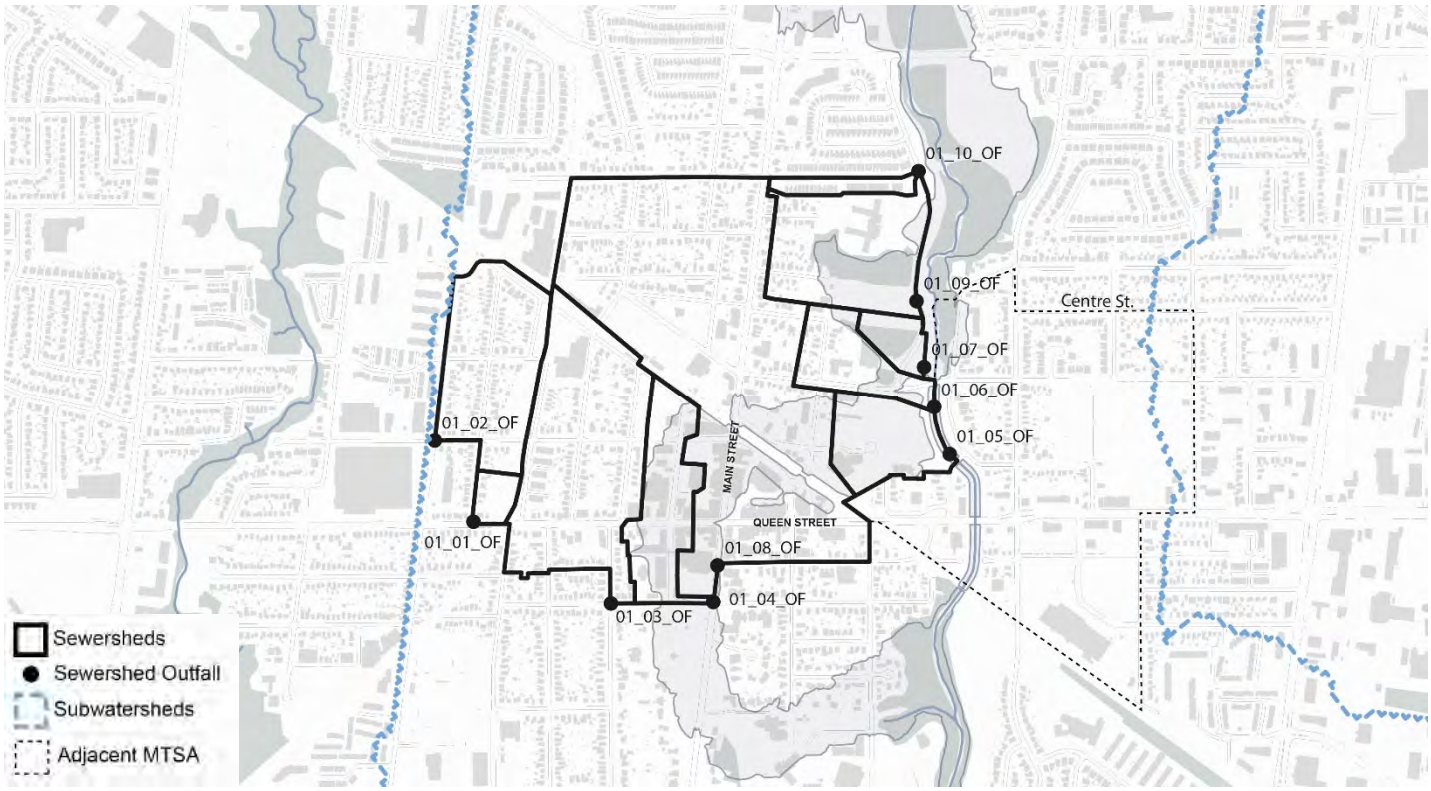

Figure 6-8: Brampton GO Sewersheds and Outfalls

Table 6-1 illustrates the increased flow surge at the outfall for each sewershed, should the new streets be constructed in accordance with the comprehensive Complete Street Guidelines presented in the preceding sections of this report. Specifically, the analysis reveals a significant uptick in flow for sewershed 01_05, registering a 40% increase in peak flow. This surge can primarily be attributed to the construction of the new local residential street on an existing greenfield site. Elevated flow rates can also be expected in sewersheds 01_09 and 01_06, although these increases are more modest, hovering around 5%. Stormwater management strategies applied at-source are recommended to manage this observed surge in peak flows. The required detention volume calculated for each sewershed is provided in the table.

Table 6-1: Brampton GO – Comparative Analysis of Existing and Proposed Conditions, 100-year Peak Runoff

Sewershed	Existing Peak Runoff (L/s)	Proposed Peak Runoff (L/s)	Difference (%)	Required Detention (m^3)
01_01	306	306	0%	-
01_02	1526	1525	0%	-
01_03	1819	1826	0%	-
01_04	1061	1056	0%	-
01_05	235	323	38%	246
01_06	520	545	0%	-
01_07	34	34	0%	-
01_08	4765	4765	0%	-
01_09	879	879	0%	-
01_10	164	164	0%	-

Table 6-2 identifies the potential volume of stormwater that could be managed by the new streets if they were to be built with retention swales as recommended in the preceding sections.

Table 6-2: Brampton GO – Available Detention Volume per Street Type

Sewershed	Length of New Streets (m)	Volume Available in Retention swales (m^3)	
	Type 2	Type 2	Total
01_01	-	-	-
01_02	-	-	-
01_03	115	113	113
01_04	-	-	-
01_05	214	209	209
01_06	74	73	73
01_07	134	131	131
01_08	-	-	-
01_09	214	210	210
01_10	-	-	-

Table 6-3 presents the potential adjusted peak runoff that could be effectively managed by the new streets, provided they are constructed with retention swales. In this case, the retention swales are anticipated to be sufficient to manage all the additional runoff resulting from the opening of new streets. They are also expected to reduce the peak flow in certain areas as they will replace, in some cases, grey and totally impervious land uses. A marginal increase of outflow of 0.8% can be perceived in sewershed 01_06; however, due to the scale of the analysis, this increase is considered to fall within the range of expected variability. Furthermore, the reduction of peak flow in sewersheds 01_05, 01_09 and 01_10 that outfall to the same creek would likely balance the impact on the watercourse.

Table 6-3: Brampton GO – Adjusted Peak Runoff with Implementation of Retention swales within Complete Streets' ROW

Sewershed	Existing Peak Runoff (L/s)	Adjusted Proposed Peak Runoff (L/s)	Difference	Detention Deficit (m^3)	Outcome
01_01	306	-	-		
01_02	1526	-	-	-	
01_03	1819	-	-	-	
01_04	1061	-	-	-	
01_05	235	250	15 L/s (6%)	133	Increase in peak flow rate
01_06	532	524	-8 L/s (-1.5%)	-	Slight improvement in flow rate.
01_07	34	3	-31 L/s (-91%)	-	Improvement in flow rate.
01_08	4765	-	-	-	
01_09	943	914	-37 L/s (-3%)	-	Slight improvement in flow rate.
01_10	164	-	-	-	

6.1.5 Summary of Servicing Observations

The Region of Peel separately commissioned studies of potable water and wastewater/sanitary sewerage servicing on an MTSA-by-MTSA basis. Details from these studies with relevance to planning activities are summarized here solely for the convenience of the reader and to facilitate consideration of implications for MTSA network planning. Arup assumes no liability for the accuracy of those analyses and reports or the completeness of the summary. The Peel Region reports were based on preliminary land use plans and build-out projections provided by the City of Brampton directly to the Region of Peel in 2022. Some adjustments have occurred to land-use plans and build-out projections, which may alter some of the reports' conclusions.

6.1.5.1 Water

The following information is drawn from the report titled "Water and Wastewater Servicing Study MTSA Lands – Contract 1, Water Report," dated April 23, 2024 and prepared by GM BluePlan, hereinafter (GMBP Wastewater Report – Contract 1). The report concludes that all service criteria levels (pressure; velocity, and fire-flow availability can be satisfied under the growth scenario. Nevertheless, some aging watermains of less than 300 mm in diameter may need to be replaced to meet Region of Peel standards.

6.1.5.2 Sanitary/Wastewater

The following information is drawn from the report titled "Water and Wastewater Servicing Study MTSA Lands – Contract 1, Wastewater Report," dated April 23, 2024 and prepared by GM BluePlan, hereinafter (GMBP Wastewater Report – Contract 1). According to the report, a trunk-level sanitary-sewer upgrade will be required to accommodate projected growth to 2051. The report notes that "significant capacity limitations [] would restrict flows from leaving" the MTSA. The report further notes that "all flows from the MTSA currently unit at Queen St. and discharge through George St., thus causing severe stress at the downstream end of the MTSA." Even assuming a twinning of the trunk sewer from the southern portion of the MTSA to Highway 407, significant surcharging and back-ups are expected because of projected growth. The report identifies surcharging in the following areas:

- Rosedale Ave in the NW corner of the MTSA, resulting from projected growth inside and outside the MTSA boundaries.
- Church Street at the Brampton GO Station
- Main Street at the railroad crossing due to growth in the northern areas of the MTSA.
- Denison Avenue to Railroad Street due to growth in the southern areas of the MTSA
- Various segments at the southwest corner of the MTSA, along Queen, West, Mill, Elizabeth and Nelson streets due to proposed development.

The report proposes five potential alternatives to address constraints. The preferred alternative described by the report contemplates diverting the major flows to the west to Fletcher's Creek and east to the Etobicoke Trunk, coordinating upgrades to Church Street east of Main with an existing water project, using the abandoned Orangeville-Brampton Rail corridor, and sending the remainder of the wastewater demand growth through the traditional drainage routes. In total, the preferred alternative contemplates $40.61 million in wastewater upgrades.

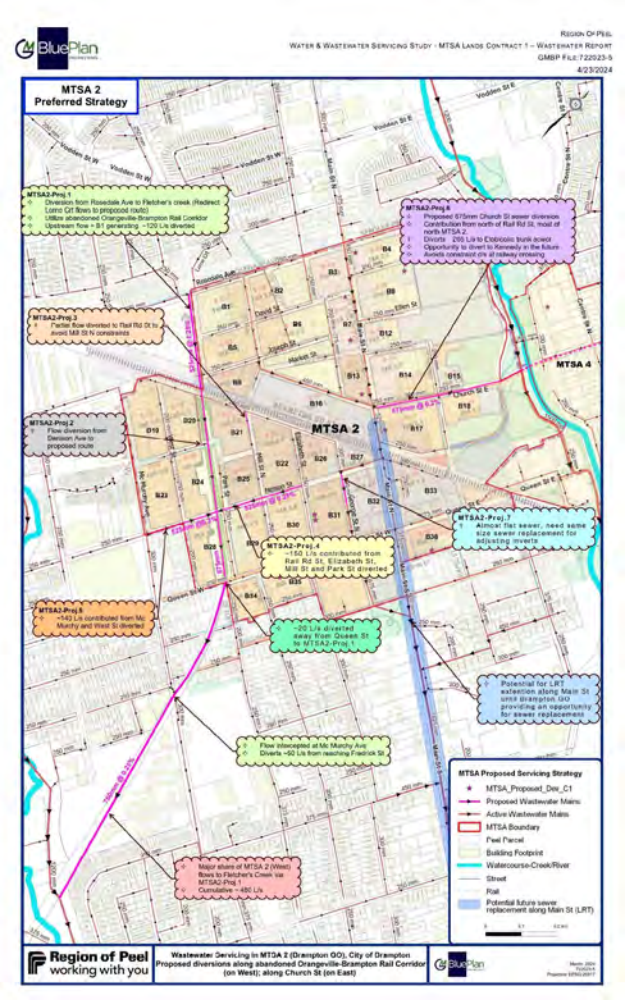

Figure 6-9: GMBP Preferred Wastewater Alternative (Brampton GO)

The report describes a series of upgrades for the preliminary preferred strategy, along with a high-level cost estimate and development triggers.

Table 5: High Level Cost Estimate for Preliminary Preferred Strategies – MTSA2

System Upgrade ID (Complexity)	Project Description	Rationale / Reason for Upgrade	Assumed Sewer Size (mm)	Length (m)	System Upgrade Cost Estimate ($)
MTSA2 - Proj.1 Medium High	Sewer along Orangeville-Brampton Rail corridor	Divert upstream and MTSA W flows	525 750	620 1200	3.09 M 16.45 M
MTSA2 - Proj.2 Low	Denison Ave to Rail Corridor	Avoid Railroad constraint	250	20	0.03 M
MTSA2 - Proj.3 Low	Mill St to Rail Rd St	Avoid Mill St constraint	250	50	0.07 M
MTSA2 - Proj.4 Medium	Nelson St upgrades (Elizabeth St to Rail Corridor)	Avoid Queen St upgrades	525	250	4.72 M
MTSA2 - Proj.5 Medium	Nelson St upgrades (Mc Murchy to Rail Corridor)	Reduce downstream McMurchy constraints	525	210	3.39 M
MTSA2 - Proj.6 High	Church St diversion to Etobicoke Trunk sewer	Avoid Railroad/Main St upgrades	675	450	10.35 M
MTSA2 - Proj.7 Medium	George St same size replacement	Flat sewer	600	100	2.51 M
Total for Projects within MTSA 2 $					**40.61 M**

Figure 6-10: GMBP Cost Estimate for Upgrades (Brampton GO)

Table 6: Capacity Upgrade Triggers MTSA 2

System Limitation (as per Section 6.3)	Growth Area that Causes the Limitation	MTSA Population of the Growth Area	Approx. Trigger Population	Notes
Rosedale Ave A.ID: 230058	Upstream + B1	~620	Existing constraint	Upgrade: Project 1 No available capacity to handle growth; Need upgrade prior to B1 growth or a more temporary solution (Upstream is approx. bounded by W: Etobicoke Trunk; E: Isabella St; N: Rosebud Ave; S: Rosedale Ave)
Church St W A. ID: 431180	Upstream +B(1+2+3+5+6+7+9 +13+16)	~10200	~6900	Upgrade: Project 1 Upstream is approx. bounded by W: Etobicoke Trunk; E: Main St; N: Rosebud Ave; S: Rail Rd St
Denison Ave A.ID: 228658	B(20+19+23+24)	~ 2200	~1200	Upgrade: Project 2
Mill St A.ID: 919184	B(21+22+25+29+30)	~7300	~1600	Upgrade: Project 3 & Project 4
Queen St A.ID: 485694	B(23+24+21+22+25 +28+29+30+34+35) +Upstream	~14000	Existing constraint	Upgrade: Project 1 & Project 4 Upstream is approx. bounded by W: Rail route; E: Mill St; N: Byng Ave; S: Fleming Ave

For the above table, please refer to the following MTSA 2 preferred strategy map to understand the growth area notation. In the above table, all the upstream flows due to 2051 growth are considered and removed from the limiting sewer's available capacity. Thus, the trigger population is the capacity available for MTSA growth inside the boundary.

For example, the Rosedale Avenue sewer is showing as an existing constraint since it was already >85% use prior to the MTSA growth. As such, the B1 sub-block of MTSA 2 would, in theory, not be able to progress until the "MTSA 2 - Project 1" upgrade (or the Rosedale Avenue upgrade) was completed to alleviate the restriction.

As a second example, the Church St sewer receives growth flows from a large portion of MTSA 2 (sub-blocks 1,2,3,5,6,7,9,13 &16) and areas upstream of the MTSA. The upstream growth is already subtracted from the available capacity, so the remaining capacity is calculated as trigger population within the MTSA. In this case, the total MTSA projection for these sub-blocks totals ~10,200, but the trigger or limiting capacity available in the existing Church Street sewer is only 6,900. Therefore, once the combined growth from any developments within MTSA 2 (sub-blocks 1,2,3,5,6,7,9,13 &16) exceeds 6,900, then the Church Street West upgrade would be needed in order to support the growth.

Figure 6-11: Wastewater project triggers (Brampton GO)

6.1.6 Proposed Street Classifications and Stormwater Interventions

6.1.6.1 New Link Proposed Complete Street Classifications

Two new streets fall within the Brampton GO MTSA boundaries. The Mill Street connection and the connection between Nelson Street East and Church Street have been classified as a local residential street.

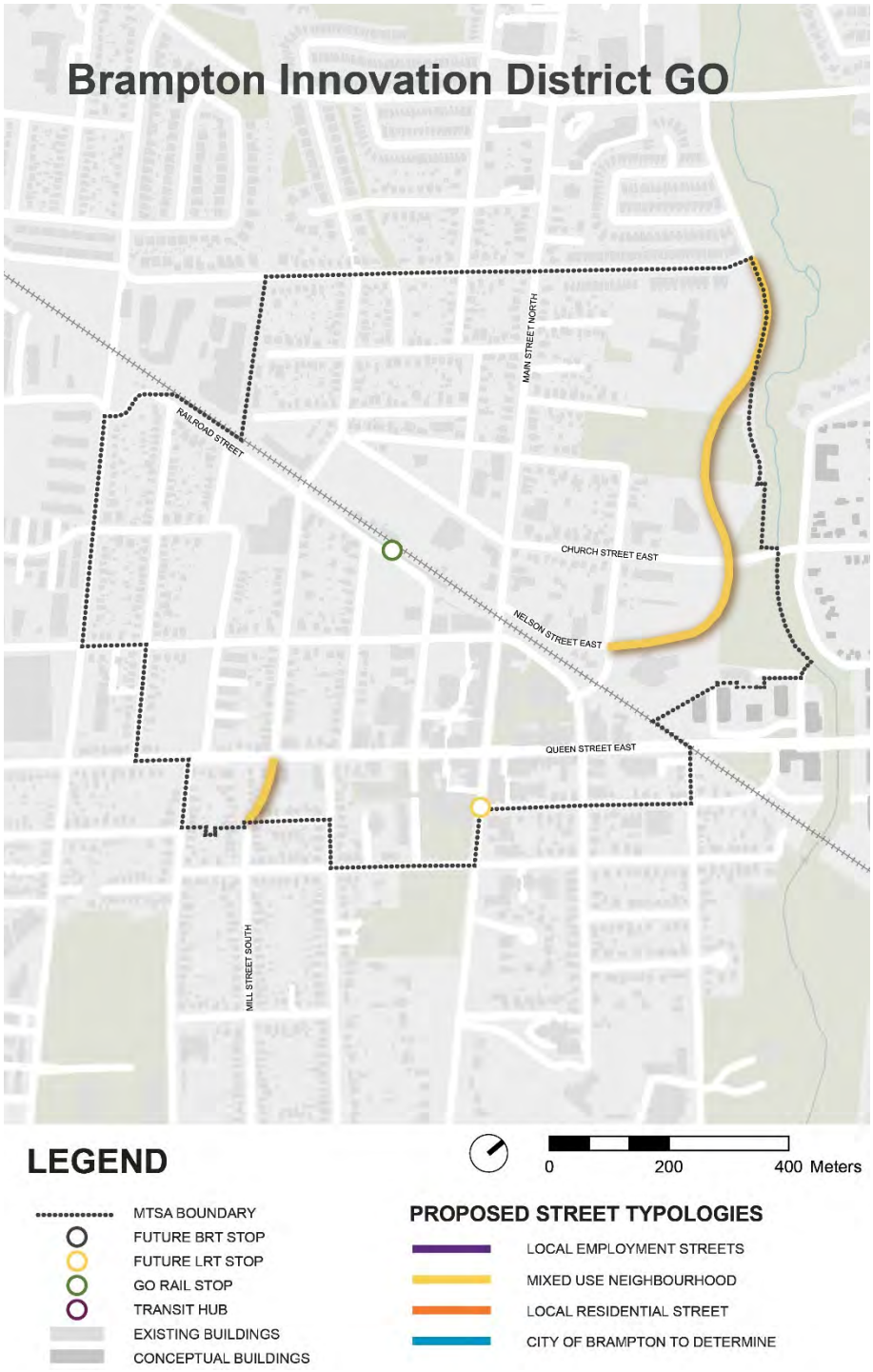

Figure 6-12: Brampton GO Proposed Complete Streets Classification

6.1.6.2 Stormwater Management Interventions

Figure 6-13 illustrates the final proposed transportation network and stormwater management interventions.

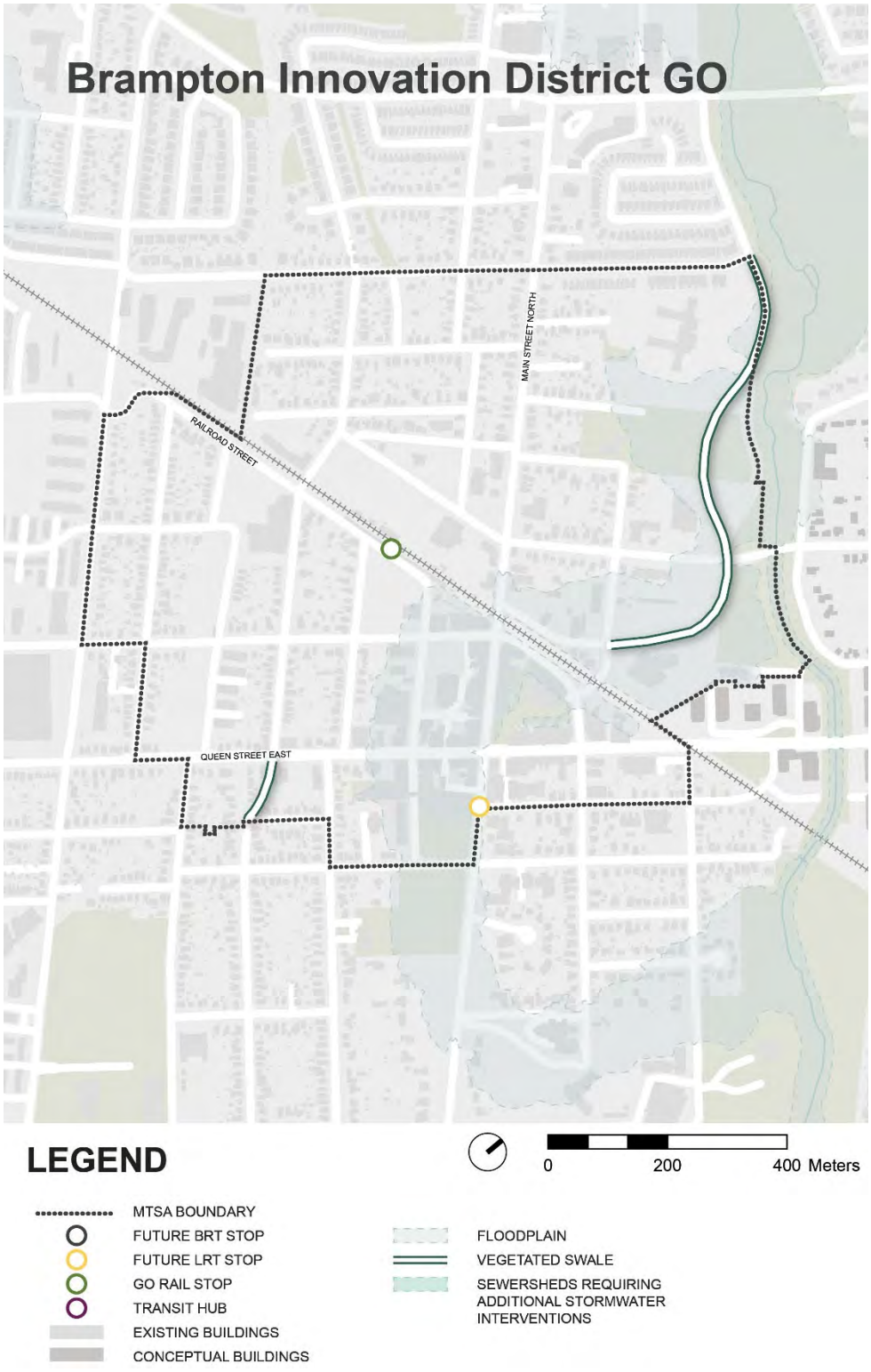

Figure 6-13: Brampton GO Combined Transportation Network and Stormwater Interventions

6.1.7 MTSA-Specific Policy Recommendations

Several objectives in the Brampton GO MTSA are best met through the application of general and location-specific policies in addition to the proposed network adjustments. Policies that should be considered for this MTSA are listed below. Parenthetical information provides rationale for specific policies.

- **General transport network enhancements:**
  - Road and active-transport infrastructure should be provided to support comfortable, direct, and safe travel for sustainable modes and bolster transit ridership.
- **Roads:**
  - Three new street alignments are proposed to create a finer-grain network:
    - The extension of Union Street to Sproule Drive;
    - A connection linking Ken Whillans Drive and Nelson Street East; and
    - A connection linking Mill Street North and Mill Street South.
  - The City of Brampton should work with developers through the planning approval process to secure rights of way with sufficient width to accommodate revised complete streets typologies, including proposed green infrastructure to address publicly managed stormwater flows. Final widths and alignments will be determined through future detailed studies.
  - Traffic-calming measures should be leveraged on local or neighbourhood roads to reduce cut-though traffic on streets that are meant to provide access to residences or businesses or roads that play a major role in pedestrian and bike connectivity. Potential strategies include reduced speed limits, chicanes, and speed humps or tables. These strategies should be considered for Nelson Street, Union Street, Thomas Street, Isabella Street, Church Street, Mill Street, and the proposed road connecting Ken Whillans Drive and Nelson Street.
- **Active travel:**
  - Sidewalks and/or other appropriate pedestrian facilities should be provided along both sides of all new and existing streets. (Certain streets in the Brampton GO MTSA currently lack pedestrian facilities. On some streets, such as Railroad Street, the lack of pedestrian infrastructure directly impacts access to the GO station. A policy which ensures that all future streets include pedestrian facilities on both sides, and that all existing streets are upgraded to add this infrastructure where missing, is critical for the development of a safe and convenient pedestrian network.)
  - Bike infrastructure (including, but not limited to, recreational trails, multi-use paths, bike lanes, and protected bike lanes) should be provided in accordance with the Active Travel Master Plan. Additional infrastructure should be implemented where needed to promote network connectivity and reduce circuity of protected bike trips to the Brampton GO station. (Within the proposed network, cyclists travelling to the Brampton GO Station will experience more circuitous routes than pedestrians. Where possible, the City of Brampton should work with developers to identify additional mid-block connections that serve cyclists, as well as pedestrians.)
  - The provision of new bike lanes and multi-use paths must be complemented by the installation of bike parking at key destinations, such as the Brampton GO station, the Queen Street BRT station, and the Hurontario LRT station.
  - New developments should be designed to minimize walking distance to transit or other key destinations through the inclusion of mid-block connections.

- New neighbourhood parks and other open spaces should include dedicated pedestrian and bike infrastructure to enhance connectivity.
- Active-transport facilities, including street furniture and tree planting, or Complete Streets upgrades should be prioritized for Railroad Street, Mill Street, John Street, Main Street North, and George Street based on expected active demand.
- New active crossings over the planned BRT and LRT corridors should be provided to enhance pedestrian and bike connectivity. To reduce negative travel-time impacts on the planned transit service, consideration should be given to crossings that do not require transit vehicles to stop, including overpasses, underpasses, or unsignalized transit-lane crossings.
- Pedestrians and cyclists should be prioritized at high-demand intersections, such as Church Street / Mill Street North, Railroad Street / Mill Street North, Main Street North / Church Street, Main Street North, / Nelson Street East, Main Street North / Nelson Street West, and Main Street / Queen Street. Consideration should be given to including operational modifications or design treatments that prioritize active travel users include pedestrian-scramble signal phases, pedestrian head starts, no right turns on red, raised crosswalks or intersections, and protected intersections.

- **Collaboration:**
  - The City of Brampton should work with Metrolinx to enhance direct active access to the Brampton GO Station from areas north and south of the rail alignment. (Analysis shows high demand for enhanced pedestrian and bike access from Church Street across the existing Church Street West parking lot to the station. This connection should be protected for as Metrolinx seeks opportunities to redevelop station-area lands.)
- **Building servicing**:
  - Vehicular access to buildings that front onto major streets, such as Queen Street and Main Street North in the Brampton GO MTSA, should be provided via local back streets or service lanes. (This will help maintain traffic flow on the major roads while also providing uninterrupted active-travel facilities for pedestrians and cyclists.)
- **Travel-demand management**:
  - Travel-demand strategies for new development should be emphasized for developments expected to contribute vehicular traffic to Queen Street, especially within areas south of the GO rail alignment between Railroad Street and Queen Street. (Intensification in the MTSA must be coupled with a range of travel demand management strategies that promote the use of active modes and transit over cars in order to reduce congestion and promote sustainable travel.)
- **Stormwater:**
  - All new developed streets should be designed according to the proposed enhanced complete street guidelines. Exact retention swales dimensions should be calculated for each new street to ensure that the new streets do not cause increase in peak flow for each applicable design storm (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms).
  - Developments within the MTSA shall be required to implement stormwater management techniques required to provide post to pre control for all storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms), as required by CVC and TRCA.

6.1.8 Recommendations for Further Transportation Network Enhancements

Many recommendations identified through the iterative analysis of the preliminary land use plans were incorporated into the final council-approved land use plans. This section describes additional recommendations for refining the street network in the Brampton GO MTSA, which were identified through the analysis of the final land use plans. Some of the key refinements include:

- Upgrading the shared-street-bicycle designation along Mill Street to buffered/designated bike lanes (A1);
- Adding new active connections linking dead-end streets to the future Orangeville Brampton Railway trail (A2);
- Adding a new east-west connection between Thomas Street and Main Street North (A3);
- Creating three active connections through the existing GO parking lot: two that align with the underpasses and a third that connects to the intersection of Main Street North and Church Street (A4);
- Adding a pedestrian facility along the north side of Railroad Street (A5). The City of Brampton continues to work with Metrolinx on the eventual configuration of this area. Even if the street itself is decommissioned to accommodate a third track, pedestrian facilities will be important given expected demand;
- Adding crosswalks enabling active modes to cross Railroad Street at Elizabeth Street North (A6);
- Adding a new active connection between Maple Avenue and the proposed road extension between Ken Whillans Drive and Nelson Street East (A7);
- Adding new active connections between Ellen Street / Alexander Street and the trails along Etobicoke Creek (A8);
- Providing bike facilities along Mill Street (A9) and Railroad and Church streets (A12). The existing right of way may be insufficient to accommodate wholly separate bike facilities, however, given potential bike demand alternatives should be explored;
- Creating an east-west bike connection on Nelson Street both east and west of Main Street (A10). The right of way may not be sufficient to allow for dedicated street bike lanes for the entire alignment and could enter into conflict with the proposed BRT along this area. Alternatives should therefore be considered;
- Upgrading existing shoulders on Pleasantview Avenue to designated cycling lanes (A11); and
- Upgrading intersections of roads with bicycle infrastructure to high quality intersections (protected) (A13).

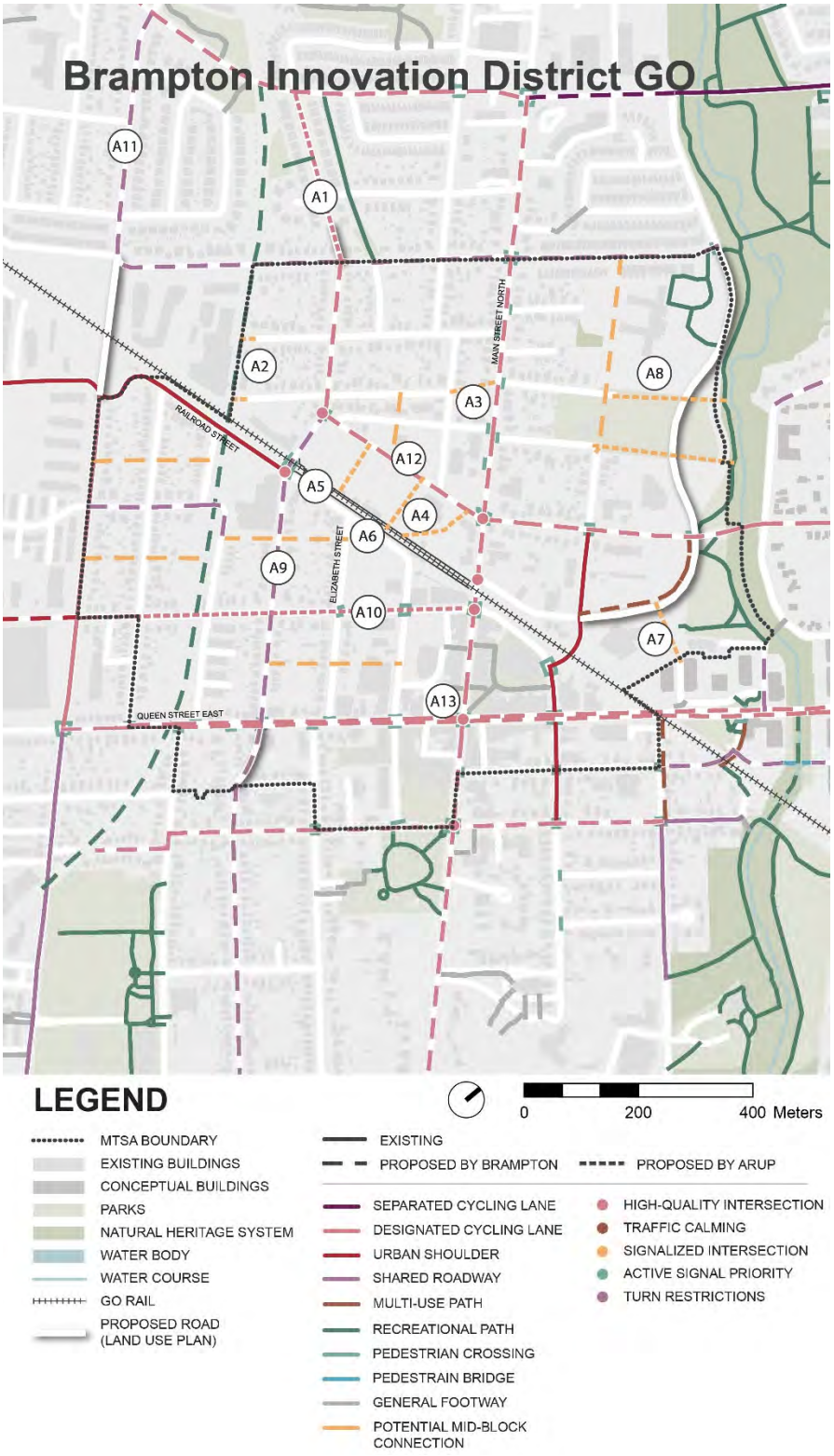

Figure 6-14: Brampton GO Potential Transportation Network Refinements

6.2 MTSA 02 – Centre Street

The Centre St. MTSA is divided through the centre by a commercial area that runs east-west along Queen Street East. The area south of Queen Street East is primarily dominated by the Peel Memorial Centre for Integrated Health and Wellness. A large cemetery is located on the north side of the MTSA. The MTSA includes several cultural heritage resources which are generally clustered close to its border with the Brampton GO MTSA.

The Queen Street BRT will provide the primary higher order transit service in the MTSA. As the Centre St. MTSA will be served by a BRT station, it has a density target of 160 residents and jobs combined per hectare. To support the increased density proposed in this MTSA, a range of street-network refinements have been identified. These include street extensions and mid-block connections proposed by the City of Brampton in their land-use plan and bike facilities identified in the Active Transportation Master Plan. Key refinements include the addition of protected/painted bike lanes on Queen Street East, Centre Street, and Church Street, and the addition of a proposed street connection between Wilson Avenue and Beech Street.

The increase in density is predicted to cause substantial increase in peak flow released into the stormwater network at two outfalls located in the eastern part of the MTSA. The increase could be mitigated with a proper management of extra stormwater at the source. Retention swales of three meters wide will potentially be sufficient to manage this increase as presented in this section. These increases can be mitigated with at-source control interventions. In this analysis, 3-metre-wide retention swales were determined to be sufficient to manage this increase.

6.2.1 Existing Conditions

The Centre St. MTSA sits to the east of Downtown Brampton and is planned to include high-rise and mid-rise mixed-use areas, mid-rise and low-rise residential areas, and key institutional spaces. Residential land-uses in the MTSA are primarily medium-density, with some high-density parcels located on the west side of the MTSA. The Etobicoke Creek and its associated natural heritage area runs along the west side of the MTSA.

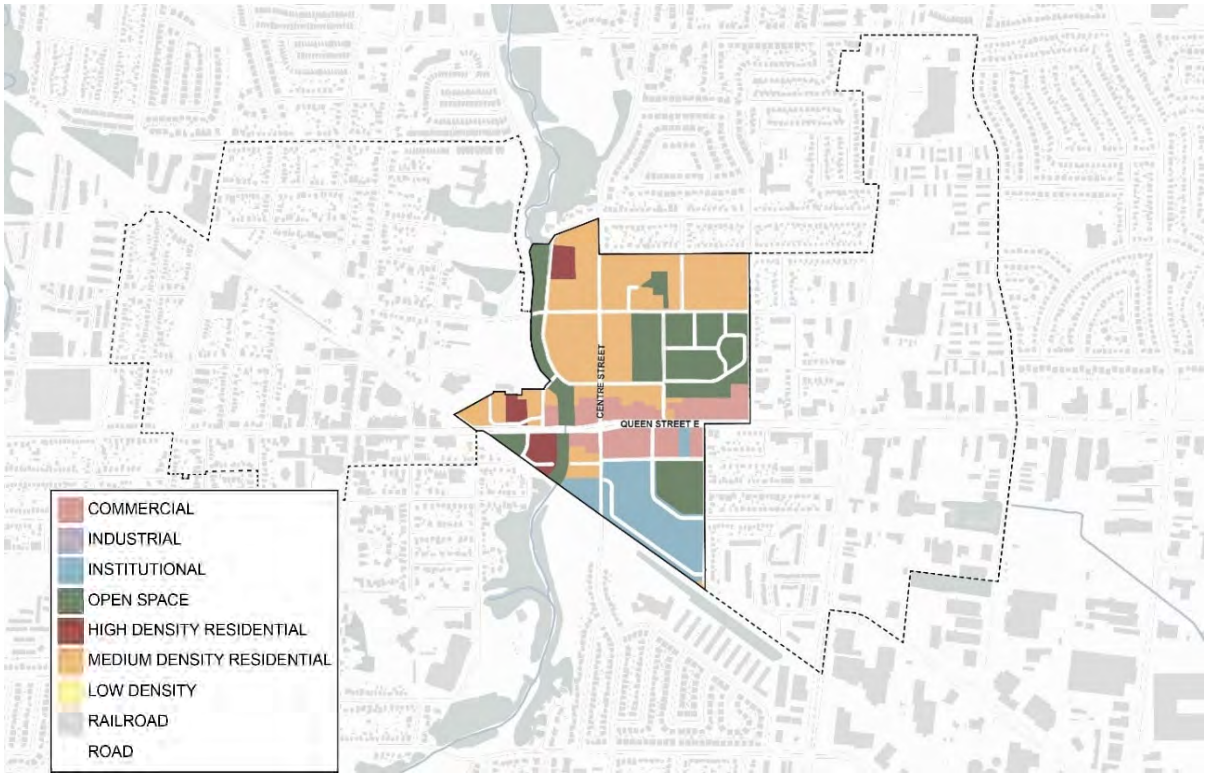

Figure 6-15: Centre St. Existing Conditions Land Use Map

Figure 6-16: Centre St. Existing Conditions Map

Queen Street East and Centre Street North function as major vehicular thoroughfares within the MTSA. The GO rail corridor serves as the southern boundary of the MTSA. In addition to being served by the future Queen Street BRT, the Centre St. MTSA is currently served by local buses on Centre Street, Queen Street East, and Lynch Street. The closest GO bus stops to the Centre St. MTSA are located to the west in the Brampton GO MTSA.

The natural heritage system surrounding the Etobicoke Creek is on the west flank of the MTSA. A small area in the west corner of the MTSA is situated within a regulated floodable plain of the Etobicoke Creek.

6.2.2 Community Objectives

The preliminary land-use plan for the Centre St. MTSA was discussed in a public focus-group session held on March 23, 2023. The discussion of the Centre St. MTSA land use plan was bundled with the discussions of the Kennedy and Rutherford MTSA land use plans. In general, the discussion centered around four points: 1) what is working in the MTSA; 2) what is not working in the MTSA; 3) what is missing in the MTSA; and 4) how could the MTSA be improved. The participants noted that these three MTSAs benefit from frequent bus service, however they expressed concern that transit is over-capacity, intersections do not work well, and that the area is unpleasant for pedestrians. Participants felt that the MTSAs are missing family-sized apartments and daycare facilities.

Thoughts about improving the MTSAs included extending mixed-use space north and south on major corridors rather than a linearly concentrating it exclusively on Queen Street. Attendees also noted the need to ensure that transit stations are surrounded by ground-floor commercial areas with direct access paths. Additional suggestions included planning protections for low-income communities, affordable housing, community benefit charges to increase bus capacity, scramble crossings at major intersections, and reducing parking restrictions and phasing development for surface parking that can be transitioned into new developments after transit is implemented.

A complete summary of the focus-group session is included in Appendix D.

6.2.3 City of Brampton Land-Use Plan

The final land-use plan for the Centre St. MTSA was approved by Brampton City Council in October 2023 as part of the update to the city's Official Plan. The approved land use plans were the result of iterative refinements based on qualitative and quantitative analyses of preliminary land use plans conducted by Arup over the course of this engagement and community engagement.

The approved land-use plan for Centre St. MTSA concentrates high-rise mixed-use space along the Queen Street East corridor. To the north, the high-rise mixed-use space transitions to mid-rise mixed-use areas and then to low-rise residential areas. There is a pocket of high-rise residential space in the northwest corner of the MTSA where an existing condo building is located. The northern portion of the MTSA also includes a large cemetery. The majority of the MTSA south of the high-density Queen Street corridor is dedicated to the Peel Memorial Centre for Integrated Health and Wellness.

This MTSA is located on the Queen Street bus rapid transit corridor. In addition to the BRT corridor, key mobility elements of the proposed plan include:

- A proposed street connection between Wilson Avenue and Beech Street
- A proposed multi-use path on James Street;
- Proposed protected bike lanes or cycle tracks on Queen Street east of Centre Street;
- Proposed bike lanes on Church Street East, Centre Street, and Queen Street East west of Centre Street;
- Proposed shared roadways on John Street, Trueman Street and Scott Street;

- A proposed recreational trail along a small portion of the Etobicoke Creek; and
- A mid-block connection between Queen Street and the proposed street connection between Wilson Avenue and Beech Street.

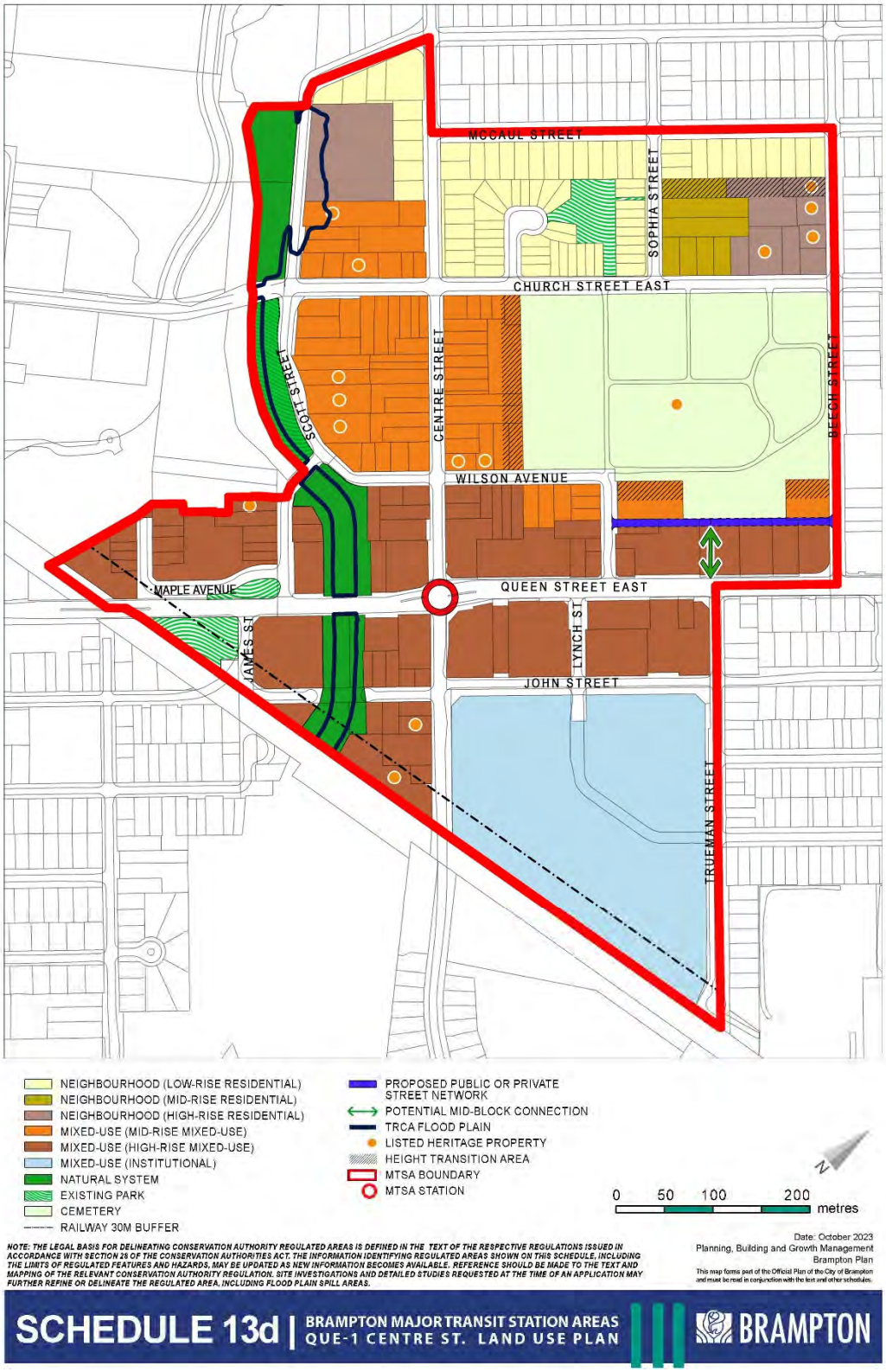

Figure 6-17: Centre St. Proposed Land Use Plan (City of Brampton)

6.2.4 Analysis of Proposed Conditions

The analysis illustrated in the following subsections considers estimated travel demand and network characteristics, as well as stormwater flow conditions assuming the implementation of the final council-approved land-use plans.

6.2.4.1 Transportation Analysis of Future Conditions

The future-conditions transportation analysis considers the expected distribution of relative travel demand with respect to the existing and future street network; identifies potentially high-demand bike and pedestrian routes between future development and the closest transit stop to assist in prioritizing active-travel-infrastructure investments; and points to areas within the vehicular network that may require additional study or intervention.

Travel Demand Distribution

Demand per street segment is largely driven by the size and type of developments anticipated for each block. Areas of high demand tend to be clustered close to Queen Street East, coincident with the areas expected to redevelop in the future. Areas of lower demand are located to the north closer to McCaul Street.

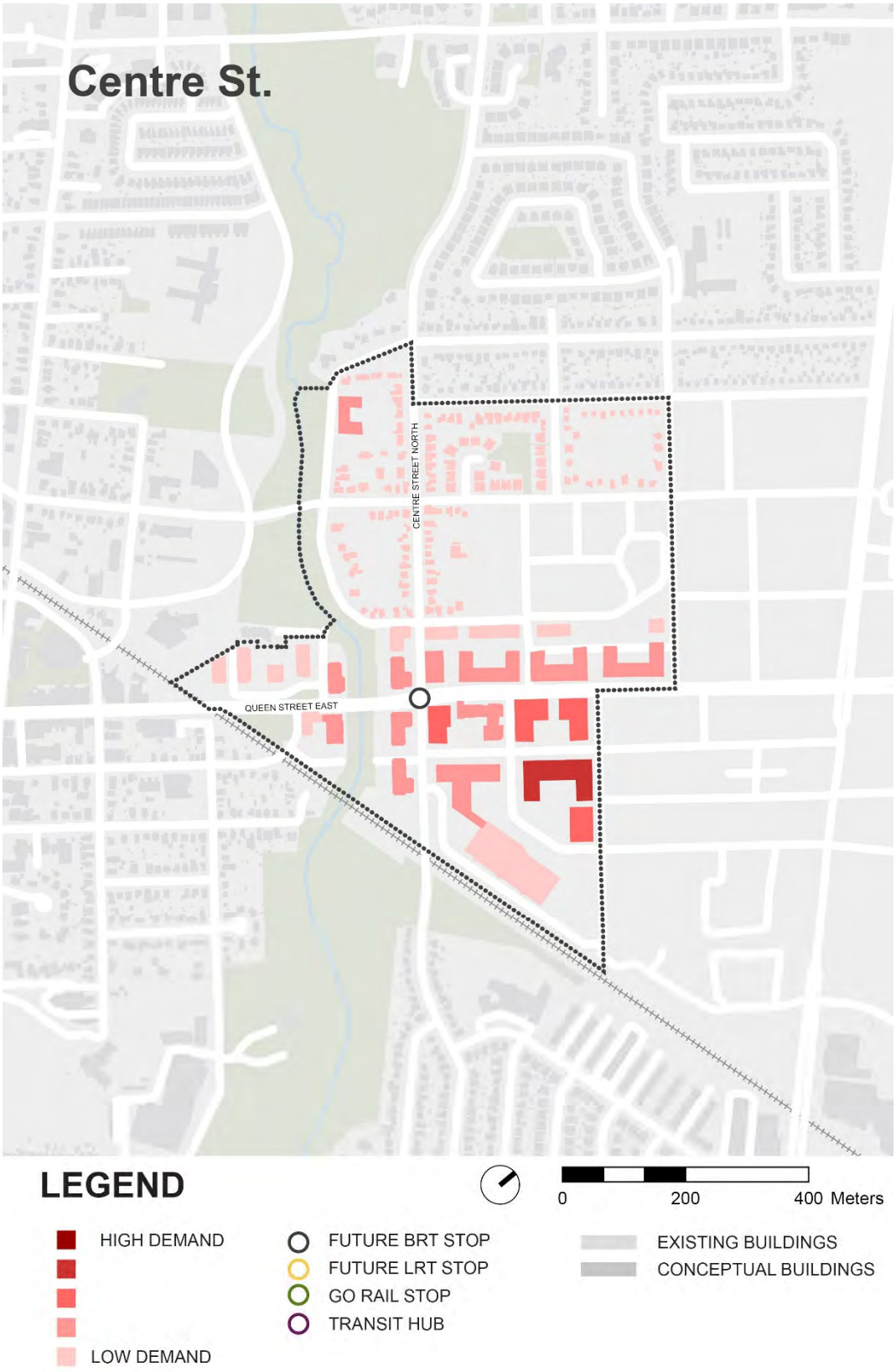

Figure 6-18: Centre St. Building Demand Aggregation – Vehicle and Transit Demand

Active Travel Between Development and Transit

Figure 6-19 shows aggregated bike demand per street segment in the PM peak hour in the future condition. Demand levels are highest along Queen Street East, Centre Street, James Street, and Lynch Street. Bike lanes are either already in place or are proposed for each of these streets.

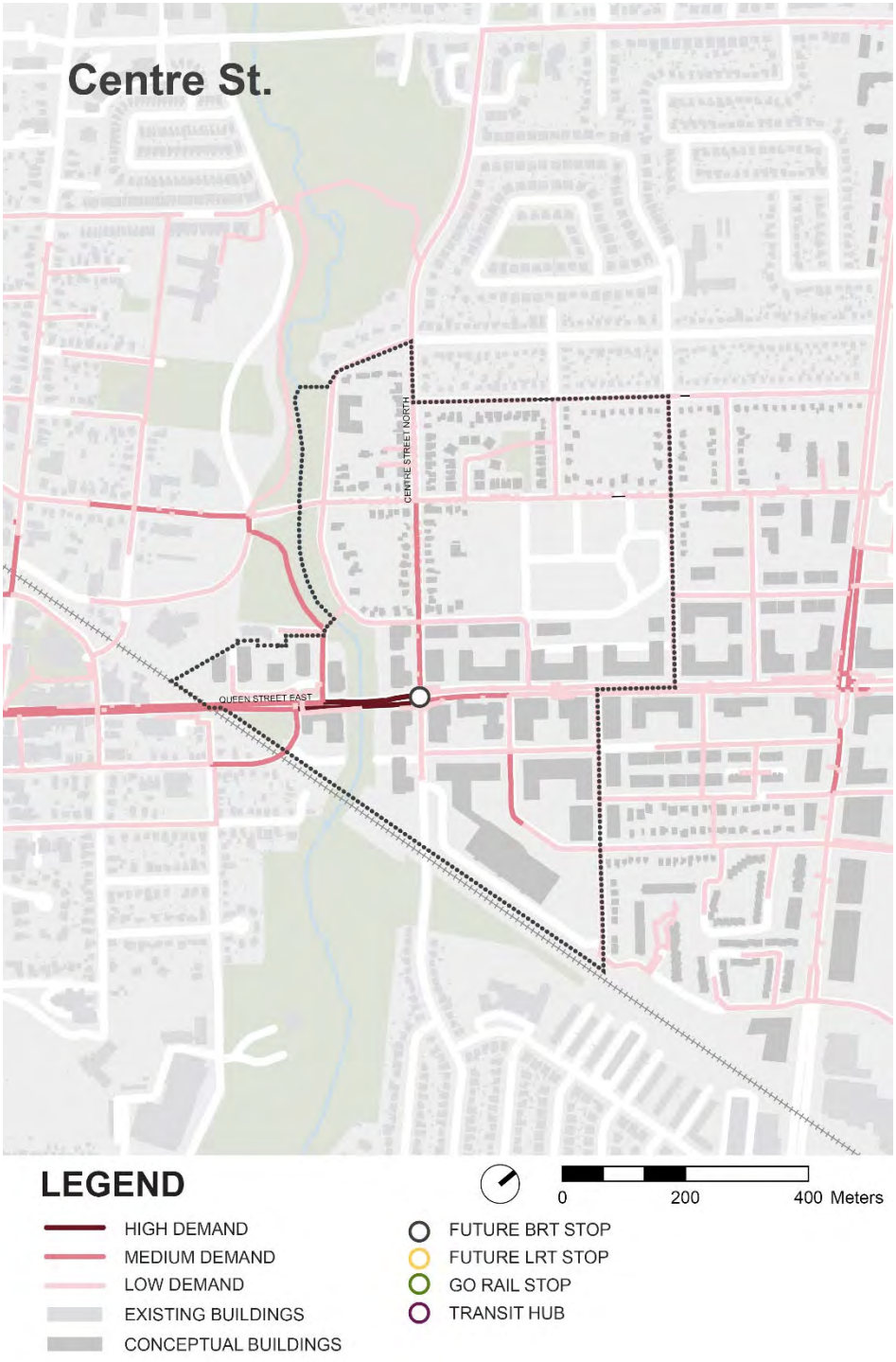

Figure 6-19: Centre St. Aggregation of Bike Demand to and from the Nearest Transit Stop

Walk demand in the Centre St. MTSA is spread fairly evenly across the street network. Some concentration of demand is shown on John and Lynch streets to the south of Queen Street East due to the location of large demand generators in that area. These streets should be prioritized for complete-street upgrades, such as the addition of street furniture or lighting.

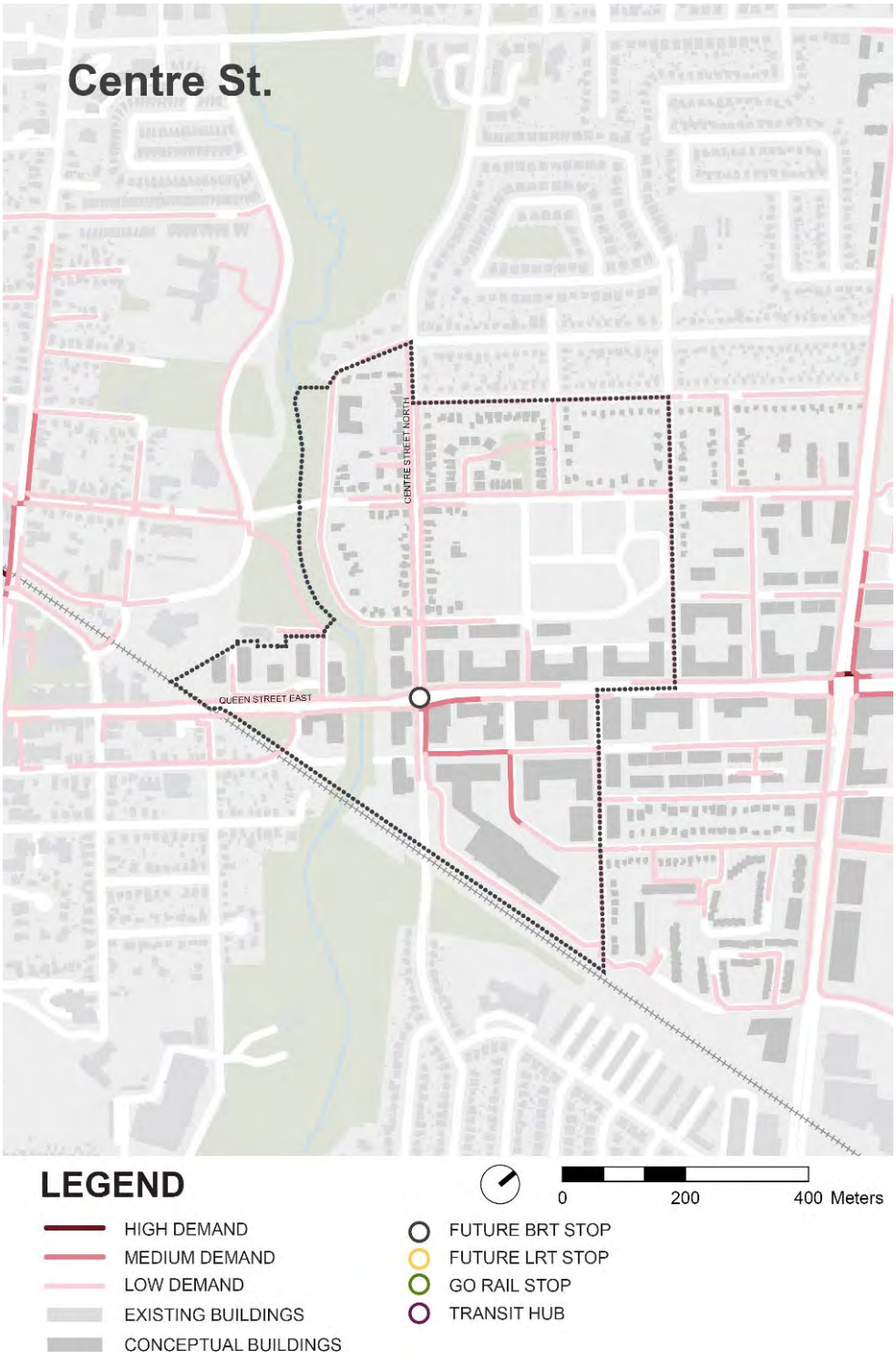

Figure 6-20: Centre St. Aggregation of Walk Demand to and from the Nearest Transit Stop

Accessibility to Local Bus and ZÜM services

Figure 6-21 shows the number of local bus stops that an individual can access within a 400 m walk from a building starting point. The proposed conceptual buildings of the Centre St. MTSA would be well served by the City of Brampton existing local bus service.

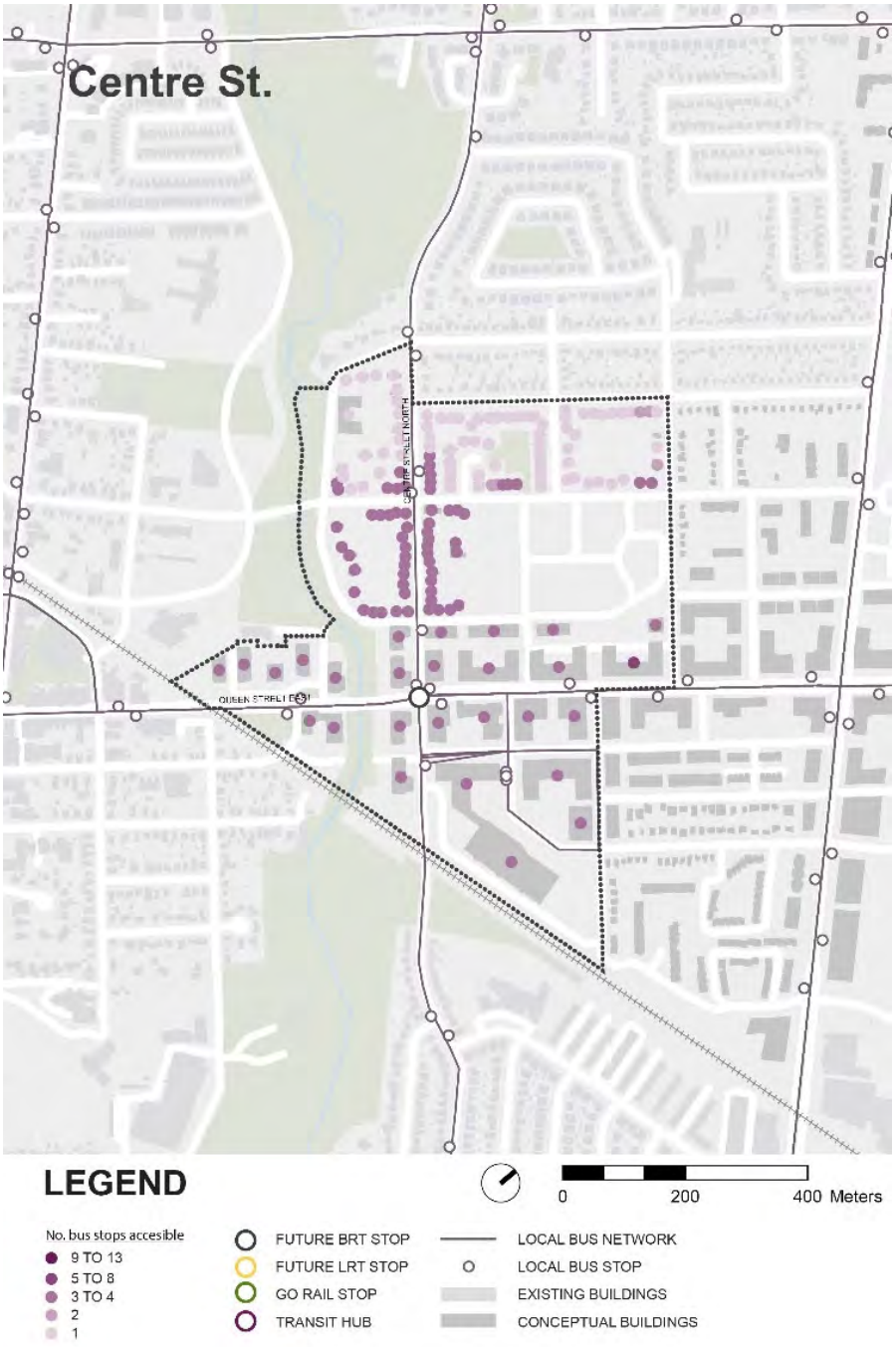

Figure 6-21: Access to local bus service at a 400 m walking distance within the Centre St. MTSA

Figure 6-22 shows the number of higher-order transit bus stops, which includes ZÜM, that an individual can access within an 800 m walk from a building starting point. The proposed conceptual buildings of the Centre St. MTSA would be well served by the City of Brampton higher-order transit service.

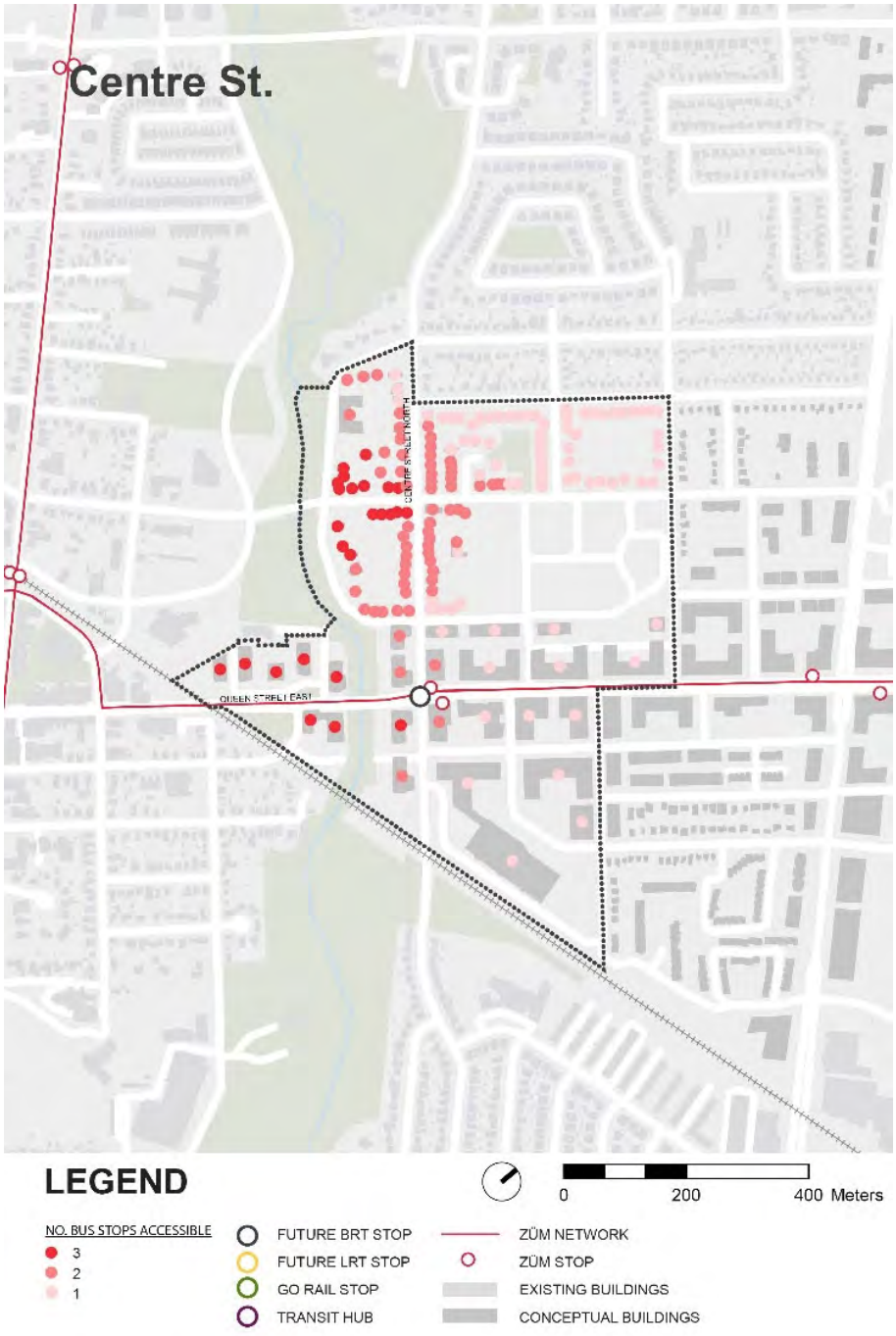

Figure 6-22: Access to higher-order transit service at an 800 m walking distance within the Centre St. MTSA

Vehicle Demand

Roads that may warrant additional investigation due to vehicle demand are highlighted in the Figure 6-23. This map is not meant to identify street segments that *will* be overcapacity, but rather to identify some street segments that fall on key shortest-path routes and therefore may experience high levels of demand. For the purposes of this review, all proposed streets were expected to accommodate bi-directional traffic, with one lane in each direction. Some key links flagged in this review include:

- Queen Street East
- John Street
- Beech Street

Intensification therefore must be coupled with travel demand management strategies to promote even higher rates of sustainable modes and limit traffic congestion. Furthermore, consideration should be given to deterring through-traffic from using local neighbourhood streets to reduce congestion in these areas. Potential strategies include reduced speed limits, chicanes, and speed humps/tables.

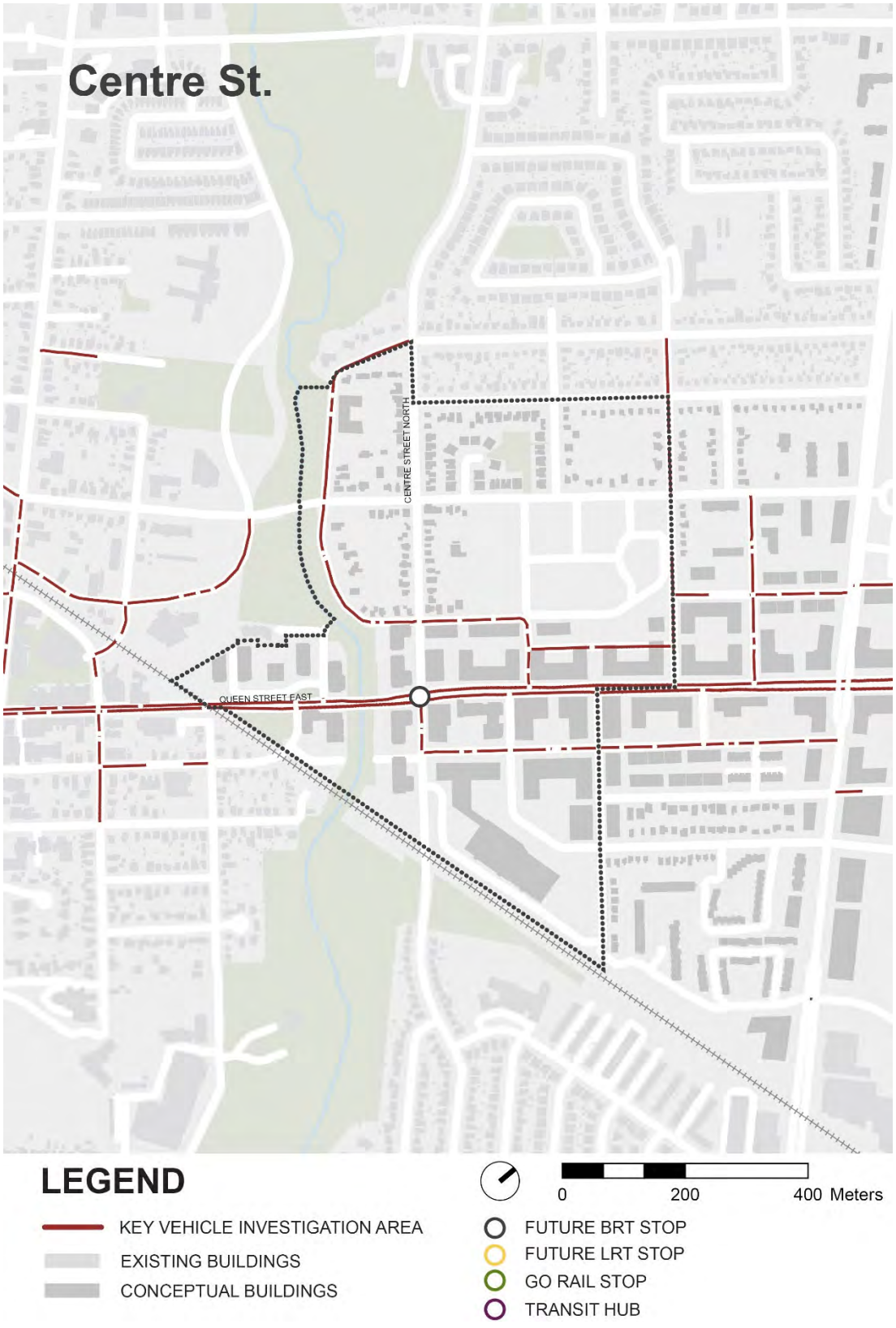

Figure 6-23: Centre St. Vehicle Network Assessment

6.2.4.2 Stormwater Analysis of Future Conditions

As presented in the existing conditions report, almost one quarter of the Centre St. MTSA is occupied by green open space. Only one new street is suggested for implementation within this MTSA. This street is designated as a local residential road that traverses two sewersheds: 02_03 and 02_07.

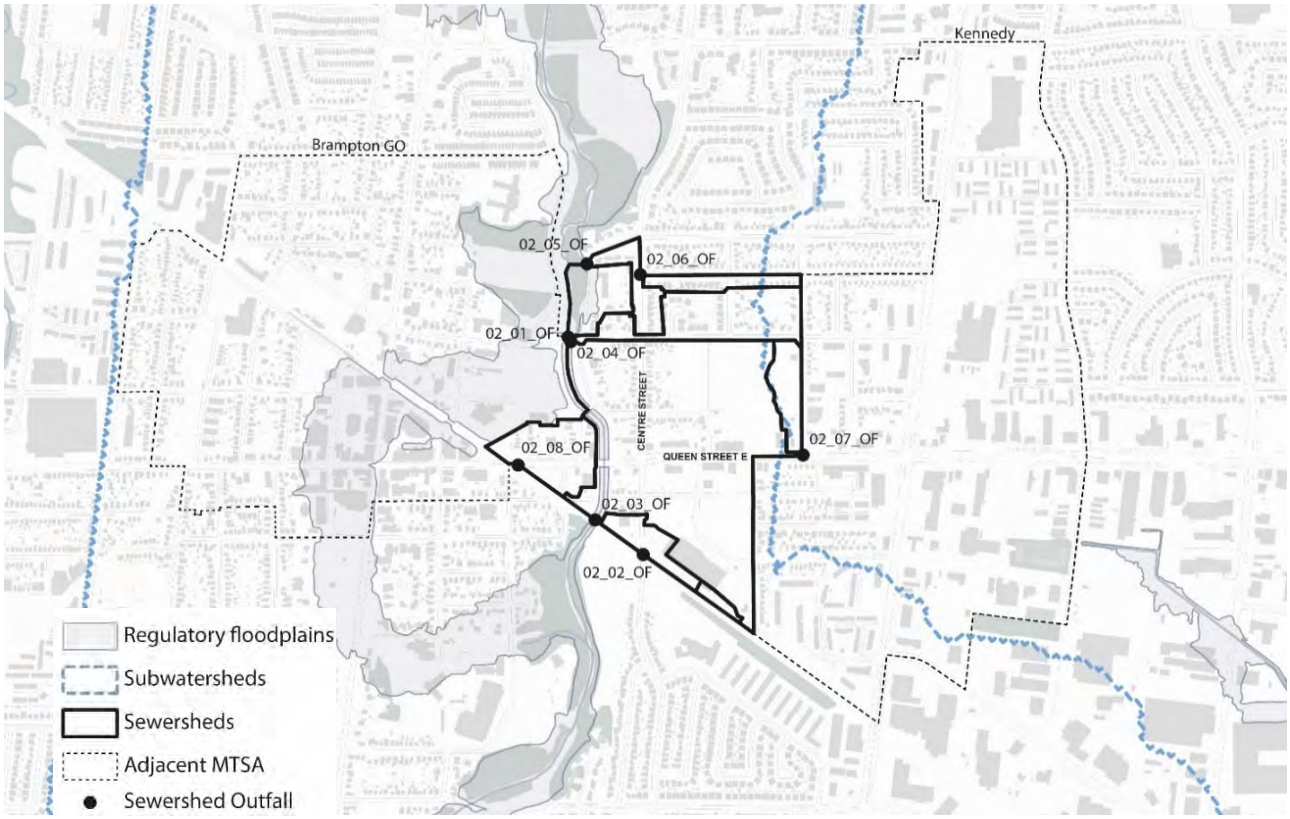

Figure 6-24: Centre St. Sewersheds and Outfalls

Table 6-4 illustrates the differences in peak flow pre- and post-development of the new street at the outfall for each sewershed if the new street is built in accordance with the comprehensive Complete Street Guidelines outlined in the preceding sections. Within this MTSA, no significant rise in peak flow is anticipated at any outfall. A minor increase of 2% is projected in sewershed 02_03, while a slight improvement is observed in sewershed 02_07. These variations are considered negligible given the level of precision achievable within the scope of this analysis.

Table 6-4: Centre St. – Comparative Analysis of Existing and Proposed Conditions, 100-year Peak Runoff

Sewershed	Existing Peak Runoff (L/s)	Proposed Peak Runoff (L/s)	Difference (%)	Required Detention (m^3)
02_01	305	305	-	-
02_02	378	378	-	-
02_03	3242	3297	2%	428
02_04	779	779	-	-
02_05	266	266	-	-
02_06	202	202	-	-
02_07	224	222	-1%	-
02_08	579	579	-	-

Table 6-5 identifies the potential volume of stormwater that could be managed by the new street if it were to be built with retention swales as presented in preceding sections. One local residential street approximately 260m in length is planned to open in the eastern part of the MTSA. According to the analysis, around 300m^3 of stormwater could be detained along the length of this street.

Table 6-5: Centre St. – Available Detention Volume per Street Type

Sewershed	Length of New Streets (m)	Volume Available in Retention swales (m^3)	
	Type 4	Type 4	Total
02_01	-	-	-
02_02	-	-	-
02_03	210	243	243
02_04	-	-	-
02_05	-	-	-
02_06	-	-	-
02_07	52.5	61	61
02_08	-	-	-

Integrating retention swales into the planned residential street will serve as an effective stormwater management solution to offset the rise in peak flow resulting from the street's development. A minor uptick of less than 2% can be anticipated at the outfall of sewershed 02_03. Nevertheless, this increment is deemed negligible. Moreover, considering this outfall is situated in a creek, a marginal increase of less than 200 m^3 is not projected to impact the overall flow.

Table 6-6: Centre St. – Adjusted Peak Runoff with Implementation of Retention swales within Complete Street's ROW

Sewershed	Existing Peak Runoff (L/s)	Adjusted Proposed Peak Runoff (L/s)	Difference	Detention Deficit (m^3)	Outcomes
02_01	305	-	-	-	-
02_02	378	-	-	-	-
02_03	3242	3294	52 L/s (1.6%)	185	This difference of less of 2% in peak flow is considered insignificant as the analysis does not provide such precision due to its scale.
02_04	779	-	-	-	-
02_05	266	-	-	-	-
02_06	202	-	-	-	-
02_07	224	210.5	-13.5 L/S (-6.0%)	-	Improvement of flow conditions
02_08	579	-	-	-	-

6.2.5 Summary of Servicing Observations

The Region of Peel separately commissioned studies of potable water and wastewater/sanitary sewerage servicing on an MTSA-by-MTSA basis. Details from these studies with relevance to planning activities are summarized here solely for the convenience of the reader and to facilitate consideration of implications for MTSA network planning. Arup assumes no liability for the accuracy of those analyses and reports or the completeness of the summary. The Peel Region reports were based on preliminary land use plans and build-out projections provided by the City of Brampton directly to the Region of Peel in 2022. Some adjustments have occurred to land-use plans and build-out projections, which may alter some of the reports' conclusions.

6.2.5.1 Water

The following information is drawn from the report titled "Water and Wastewater Servicing Study MTSA Lands – Contract 1, Water Report," dated April 23, 2024 and prepared by GM BluePlan, hereinafter (GMBP Water Report – Contract 1). The report concludes that all service criteria levels (pressure; velocity, and fire-flow availability can be satisfied under the growth scenario except for new local servicing for future streets. Nevertheless, some aging watermains of less than 300 mm in diameter may need to be replaced to meet Region of Peel standards.

6.2.5.2 Wastewater/Sanitary

The following information is drawn from the report titled "Water and Wastewater Servicing Study MTSA Lands – Contract 1, Wastewater Report," dated April 23, 2024 and prepared by GM BluePlan, hereinafter (GMBP Wastewater Report – Contract 1). The report recorded potential surcharging at Queen Street and Centre Street, associated with backflow from inside and outside the MTSA. The report notes that a required upgrade is already under consideration by the Region and observes that an immediate action plan is necessary to avoid challenges with growth is added to the service area.

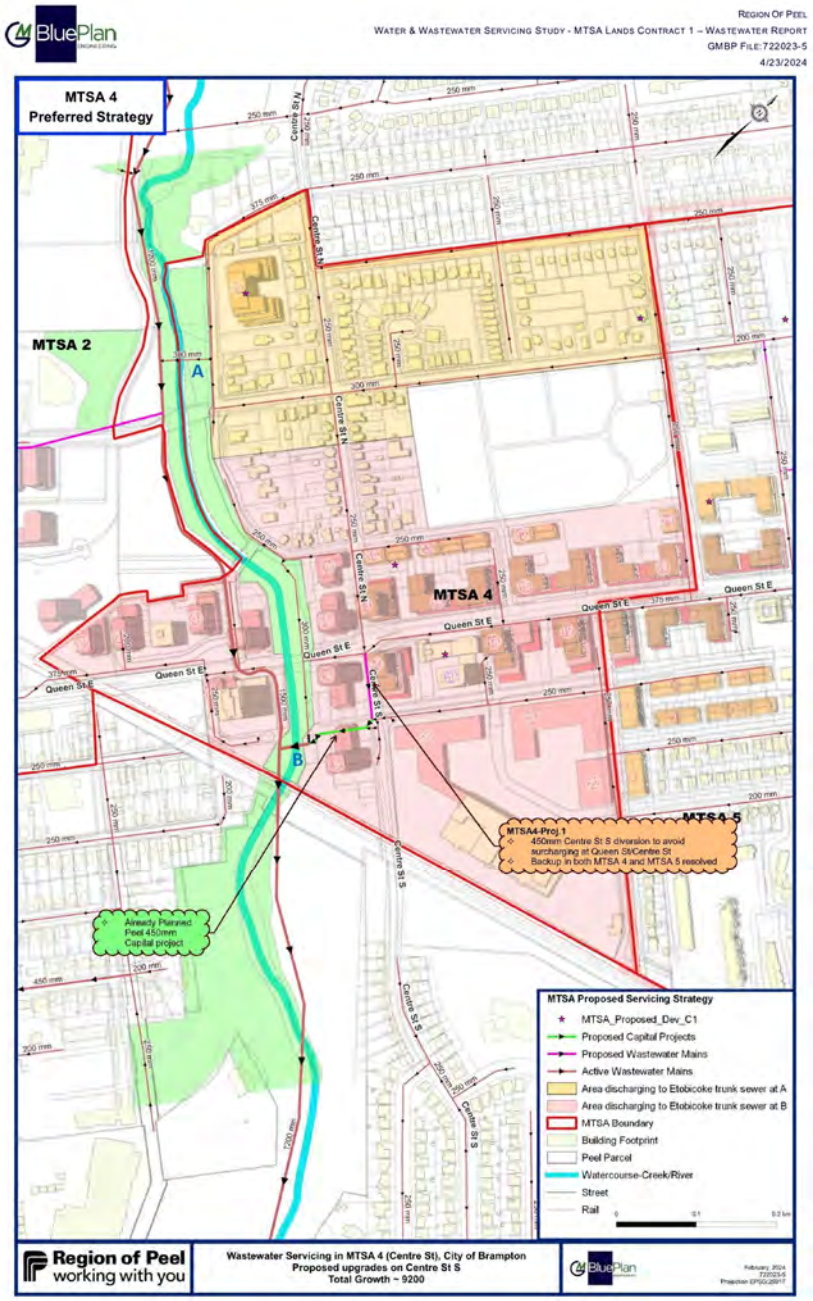

Figure 6-25 GMBP Preferred Strategy (Centre)

Table 7: High Level Cost Estimate for Preliminary Preferred Strategy

System Upgrade ID (Complexity)	Project Description	Rationale / Reason for Upgrade	Assumed Sewer Size (mm)	Length (m)	System Upgrade Cost Estimate ($)
MTSA4-Proj.1 Low	450mm Centre St S diversion between Queen St and John	Avoid Queen St/Centre St limitation	450	100	1.08 M
Total for Projects within MTSA 4 $					**1.08 M**

Figure 6-26 GMBP High-Level Cost Estimate for Preferred Strategy

6.2.6 Proposed Street Classifications and Stormwater Interventions

6.2.6.1 New Link Proposed Complete Streets Classification

The proposed street connection between Wilson Avenue and Beech Street in the Centre St. MTSA has been classified as a local residential street.

Figure 6-27: Centre St. Proposed Complete Streets Classification

6.2.6.2 Stormwater Management Interventions

Figure 6-28 illustrates the final transportation network and stormwater management proposals for the Centre St. MTSA.

Figure 6-28: Centre St. Combined Transportation Network and Stormwater Interventions

6.2.7 MTSA-Specific Policy Recommendations

Several objectives in the Centre St. MTSA are best met through the application of general and location-specific policies in addition to the proposed network adjustments. Policies that should be considered for this MTSA are listed below. Parenthetical information provides rationale for specific policies.

- **General transportation network enhancements:**
  - Road and active-transport infrastructure should be provided to support comfortable, direct, and safe travel for sustainable modes and bolster transit ridership.
- **Roads:**
  - One new street alignment is proposed between Wilson Avenue and Beech Street immediately north of Queen Street East to create a finer-grain network.
  - The City of Brampton should work with developers through the planning approval process to secure the rights of way with sufficient width to accommodate revised complete streets typologies, including proposed green infrastructure to address publicly managed stormwater flows. Final widths and alignments will be determined through future detailed studies.
  - Traffic-calming measures should be leveraged on local or neighbourhood roads to reduce cut-though traffic on streets that are meant to provide access to residences or businesses or roads that play a major role in pedestrian and bike connectivity. Potential strategies include reduced speed limits, chicanes, and speed humps or tables. These strategies should be considered for John Street and Beech Street.
- **Active travel:**
  - Sidewalks and/or other appropriate pedestrian facilities should be provided along both sides of all new and existing streets. (A policy which ensures that all future streets include pedestrian facilities on both sides, and that all existing streets are upgraded to add this infrastructure where missing, is critical for the development of a safe and convenient pedestrian network.)
  - Bike infrastructure (including, but not limited to, recreational trails, multi-use paths, bike lanes, and protected bike lanes) should be provided in accordance with the Active Travel Master Plan. Additional infrastructure should be implemented where needed to promote network connectivity and reduce circuity of protected bike trips to the Centre St. BRT stop. (Within the proposed network, cyclists travelling to the Centre St. BRT stop will experience more circuitous routes than pedestrians. Where possible, the City of Brampton should work with developers to identify additional mid-block connections that serve cyclists, as well as pedestrians.)
  - The provision of new bike lanes and multi-use paths must be complemented by the installation of bike parking at key destinations, such as the Centre St. BRT stop and the Peel Memorial Centre for Integrated Health and Wellness.
  - New developments should be designed to minimize walking distance to transit or other key destinations through the inclusion of mid-block connections.
  - Active-transport facilities, including street furniture and tree planting, or Complete Streets upgrades should be prioritized for Queen Street East, Church Street, and John Street based on expected active demand.
  - New active crossings over the planned BRT corridor on Queen Street East between Wilson Avenue and Kennedy Road should be provided to enhance pedestrian and bike connectivity. To reduce negative

travel-time impacts on the planned transit service, consideration should be given to crossings that do not require transit vehicles to stop, including overpasses, underpasses, or unsignalized transit-lane crossings.

  - Pedestrian and cyclists should be prioritized at high-demand intersections, such as Queen Street East / Centre Street. Consideration should be given to including operational modifications or design treatments that prioritize active travel users include pedestrian-scramble signal phases, pedestrian head starts, no right turns on red, raised crosswalks or intersections, and protected intersections.

- **Building servicing**:
  - Vehicular access to buildings that front onto major streets, such as Queen Street East in the Centre St. MTSA, should be provided via local back streets or service lanes. (This will help maintain traffic flow on the major roads while also providing uninterrupted active-travel facilities for pedestrians and cyclists.)
- **Travel-demand management**:
  - Travel-demand strategies for new development should be emphasized for developments expected to contribute vehicular traffic to Queen Street, John Street, and Beech Street. (Intensification in the MTSA must be coupled with a range of travel demand management strategies that promote the use of active modes and transit over cars in order to reduce congestion and promote sustainable travel.)
- **Stormwater:**
  - All new developed streets should be designed according to the proposed enhanced complete street guidelines. Exact retention swale dimensions should be calculated for each new street to ensure that the new streets do not cause increase in peak flow for each applicable design storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms)
  - Developments within the MTSA shall be required to implement stormwater management techniques required to provide post to pre control for all storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms), as required by CVC and TRCA.

6.2.8 Recommendations for Further Transportation Network Enhancements

One recommendation for refining the street network in the Centre St. MTSA was identified through the transportation analysis conducted as part of this study. Specifically, the need for an active connection linking John Street over the Etobicoke Creek (C1) was identified.

Although there are challenges associated with bridging the creek valley, the City's Riverwalk plan is considering a more intuitive active crossing.

We also recommend upgrading intersection of roads with bicycle infrastructure to high quality intersections (protected) (C2)

Figure 6-29: Centre St. Preliminary Transportation Network Refinements

6.3 MTSA 03 – Kennedy

The Kennedy MTSA sits between Downtown Brampton and Highway 410 and is planned to include high-rise and mid-rise mixed-use areas, mid-rise and low-rise residential areas, a school, and industrial areas. The Queen Street BRT will provide the primary higher order transit service in the MTSA. As the Kennedy MTSA will be served by a BRT station, it has a density target of 160 residents and jobs combined per hectare.

To support the increased density proposed in this MTSA, a range of street-network refinements have been identified. These include street extensions and mid-block connections proposed by the City in their land use plan, bike facilities identified in the Active Transportation Master Plan, and further recommendations flowing from the transportation analysis described herein. Key refinements include the addition of proposed street connections to break up large blocks in the eastern half of the MTSA; mid-block active connections linking these new street connections; and bike facilities on Queen Street East, Eastern Avenue, Church Street, and Orenda Road.

Due to the already developed state of the MTSA, the addition of new streets will not have an adverse impact on peak flows at any of the identified outfalls in the MTSA. In fact, adding new streets with vegetated areas, such as retention swales, will contribute to an overall reduction of peak flows in the affected sewersheds.

6.3.1 Existing Conditions

The Kennedy MTSA includes a range of land uses. Medium- and high-density residential areas are largely clustered in the western half of the MTSA, with some smaller neighbourhoods of medium-density residential on the east side. Commercial areas are primarily located along Queen Street East and Kennedy Road. A school is located in the northern part of the MTSA off Kennedy Road, and an industrial area is located in the southeastern quadrant.

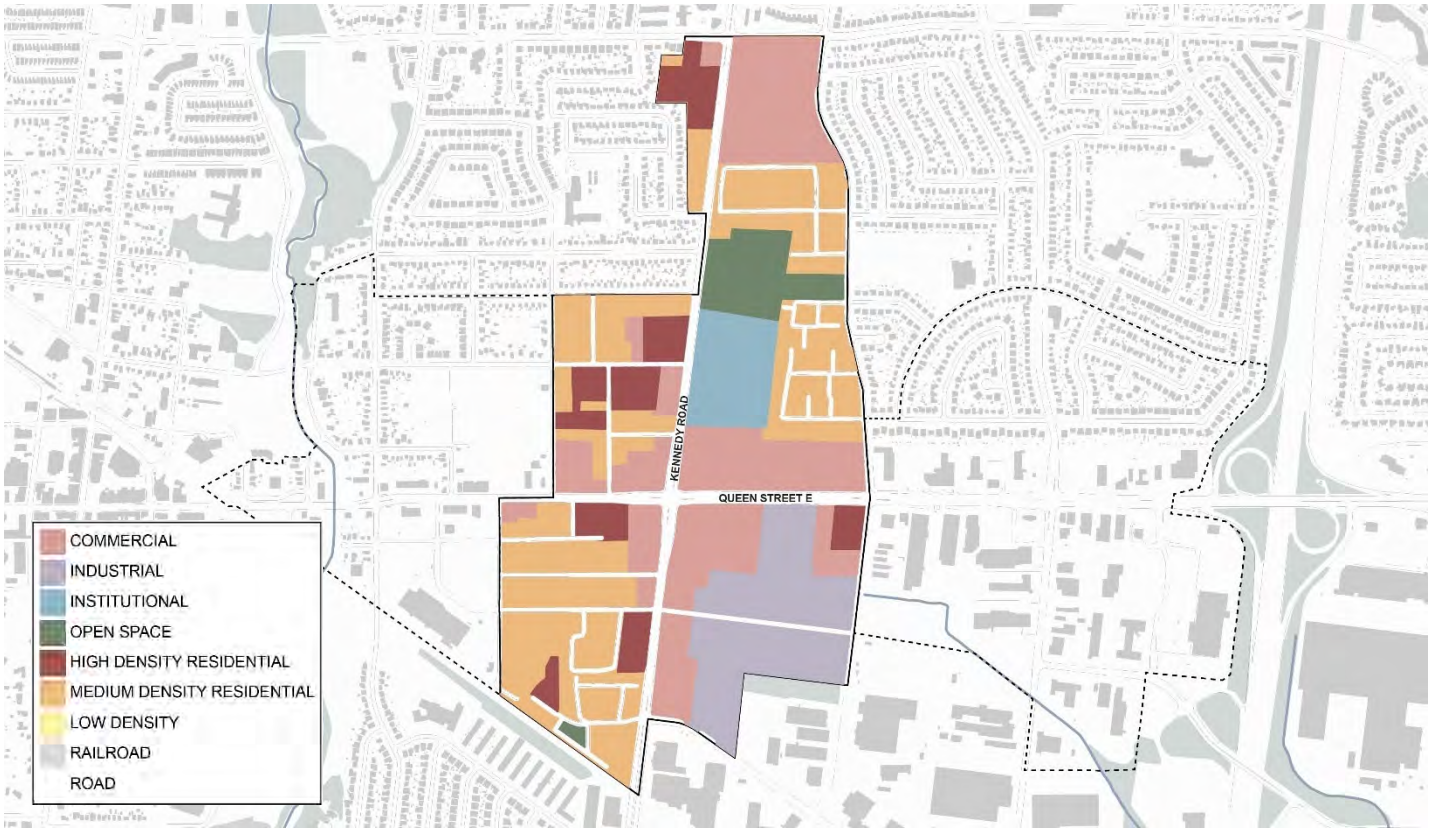

Figure 6-30: Kennedy Existing Conditions Land Use Map

Queen Street East and Kennedy Road North function as the major vehicular thoroughfares in the MTSA. The western portion of the MTSA is generally characterized by a fine-grain street network whereas the eastern portion is characterized by larger lots and fewer roads. The GO rail corridor runs along the southern boundary of the MTSA. The Kennedy MTSA is served by local buses running along Queen Street East, Kennedy Road, and Vodden Street East.

The MTSA does not include any natural heritage areas or regulatory floodplains.

Figure 6-31: Kennedy Existing Conditions Map

6.3.2 Community Objectives

The preliminary land use plan for the Kennedy MTSA was discussed in a public focus-group session held on March 23, 2023. The discussion of the Kennedy MTSA land-use plan was bundled with the discussions of the Centre St. and Rutherford MTSA land-use plans. In general, the discussion centered around four points: 1) what is working in the MTSA; 2) what is not working in the MTSA; 3) what is missing in the MTSA; and 4) how could the MTSA be improved. The participants noted that these three MTSAs benefit from frequent bus service, however they expressed concern that transit is over-capacity, intersections do not work well, and that the area is unpleasant for pedestrians. Participants felt that the MTSAs are missing family-sized apartments and daycare facilities.

Thoughts about improving the MTSAs included extending mixed-use space north and south on major corridors rather than a linearly concentrating it exclusively on Queen Street. Attendees also noted the need to ensure that transit stations are surrounded by ground-floor commercial areas with direct access paths. Additional suggestions included planning protections for low-income communities, affordable housing, community benefit charges to increase bus capacity, scramble crossings at major intersections, and reducing parking restrictions and phasing development for surface parking that can be transitioned into new developments after transit is implemented.

A complete summary of the focus group session is included in Appendix D.

6.3.3 City of Brampton Land-Use Plan

The final land-use plan for the Kennedy MTSA was approved by Brampton City Council in October 2023 as part of the update to the city's Official Plan. The approved land use plans were the result of iterative refinements based on qualitative and quantitative analyses of preliminary land use plans conducted by Arup over the course of this engagement and community engagement.

The approved Kennedy MTSA land-use plan concentrates high-rise mixed-use space along the Queen Street East corridor. Building heights and densities reduce as you move north and south from Queen Street East. North of Queen Street East, there is a range of existing and low-rise and mid-rise residential and mixed-use spaces and an existing secondary school. In some areas with existing condos, redevelopment potential is limited due to challenges associated with securing agreement among condo owners to redevelop. The southwest corner of the MTSA includes several existing mid-rise residential areas and mid-rise mixed-use areas. The southeast corner includes high-rise mixed-use areas and existing industrial lands. A portion of the industrial lands in this area are covered by a Special Policy Area which restricts sensitive land uses due to proximity to the industrial lands south of Eastern Avenue. Several existing large blocks in this MTSA are broken up by new proposed pedestrian connections.

This MTSA is located on the Queen Street bus rapid transit corridor. In addition to the BRT corridor, key mobility elements of the proposed plan include:

- Proposed street connections between:
  - Trueman Street and Orenda Court,
  - Beech Street and June Avenue,
  - The current eastern terminus of John Street and Kennedy Road South,
  - Kennedy Road North and Queen Street East,
  - Queen Street East and Eastern Avenue,
  - Eastern Avenue and Orenda Road,
  - Kennedy Road South and Hansen Road South,

  - Kennedy Road North and Queen Street East and Hansen Road North.
- A proposed multi-use path along Eastern Avenue;
- Proposed protected bike lanes along Queen Street East and Orenda Road east of Kennedy Road South;
- Proposed bike lanes along Church Street;
- Proposed shared roadways along Trueman Street, Orenda Court west of Kennedy Road South, and Eastern Avenue west of Kennedy Road South;
- Proposed mid-block connections between:
  - Queen Street East and the landscape buffer to the north,
  - Queen Street East and the proposed connection to the north,
  - Queen Street East and the proposed connection to the south, both east and west of the proposed connection between Queen Street East and Eastern Avenue,
  - Kennedy Road South and the proposed connection between Queen Street East and Eastern Avenue,
  - Hansen Road South and the proposed connection between Queen Street and Eastern Avenue.

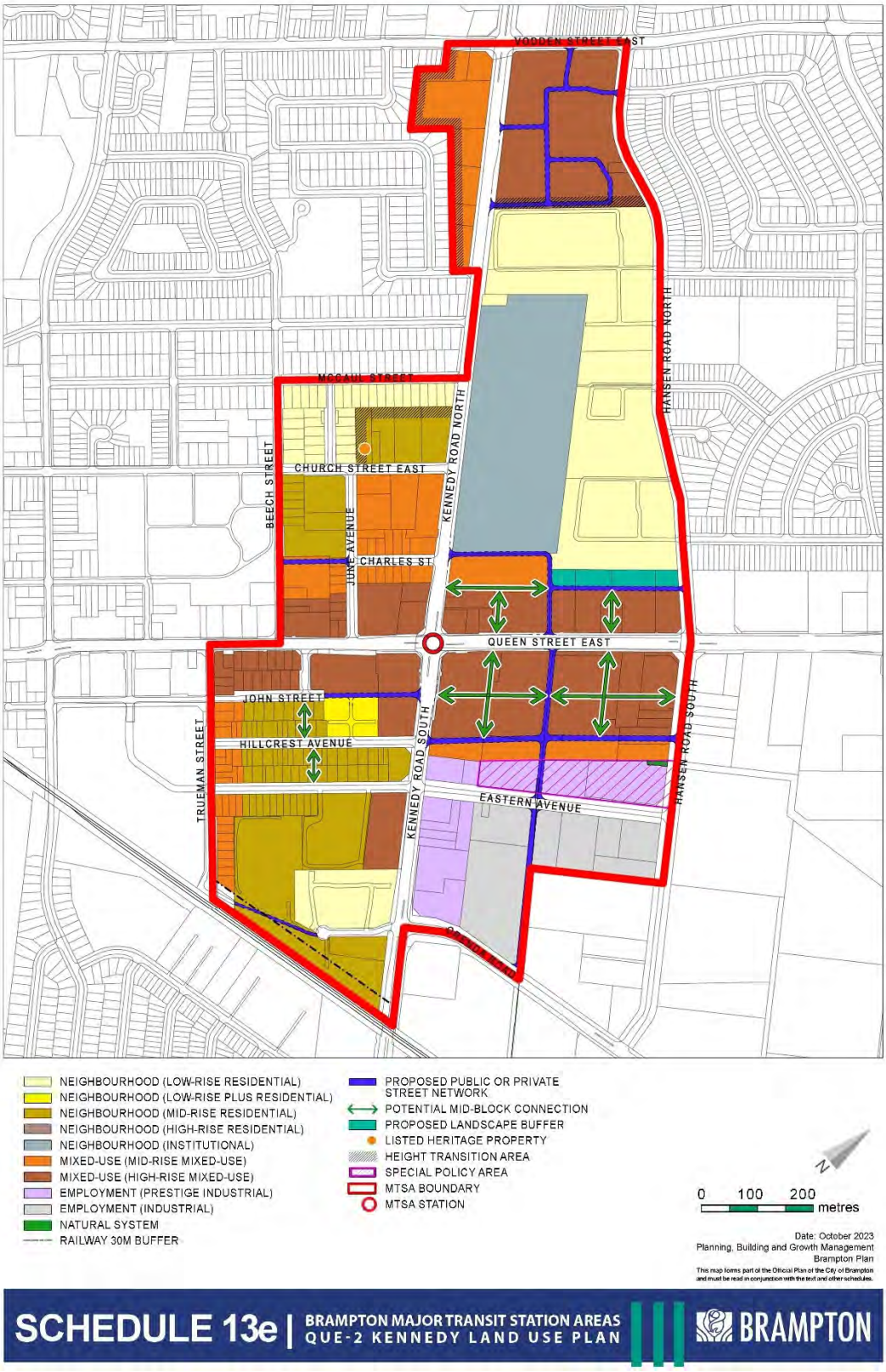

Figure 6-32: Kennedy Proposed Land Use Plan (City of Brampton)

6.3.4 Analysis of Proposed Conditions

The analysis illustrated in the following subsections considers estimated travel demand and network characteristics, as well as stormwater flow conditions assuming the implementation of the final council-approved land-use plans.

6.3.4.1 Transportation Analysis of Future Conditions

The future-conditions transportation analysis considers the expected distribution of relative travel demand with respect to the existing and future street network; identifies potentially high-demand bike and pedestrian routes between future development and the closest transit stop to assist in prioritizing active-travel-infrastructure investments; and points to areas within the vehicular network that may require additional study or intervention.

Travel Demand Distribution

Demand per street segment is largely driven by the size and type of developments anticipated for each block. Areas of high demand tend to be clustered close to Queen Street East, coincident with the areas expected to redevelop in the future. The anticipated redevelopment at the north of the MTSA as well as the existing school are also large trip generators. Areas of lower demand are located in the northwest corner, the southwest corner, and in the multi-family housing areas surrounding the school.

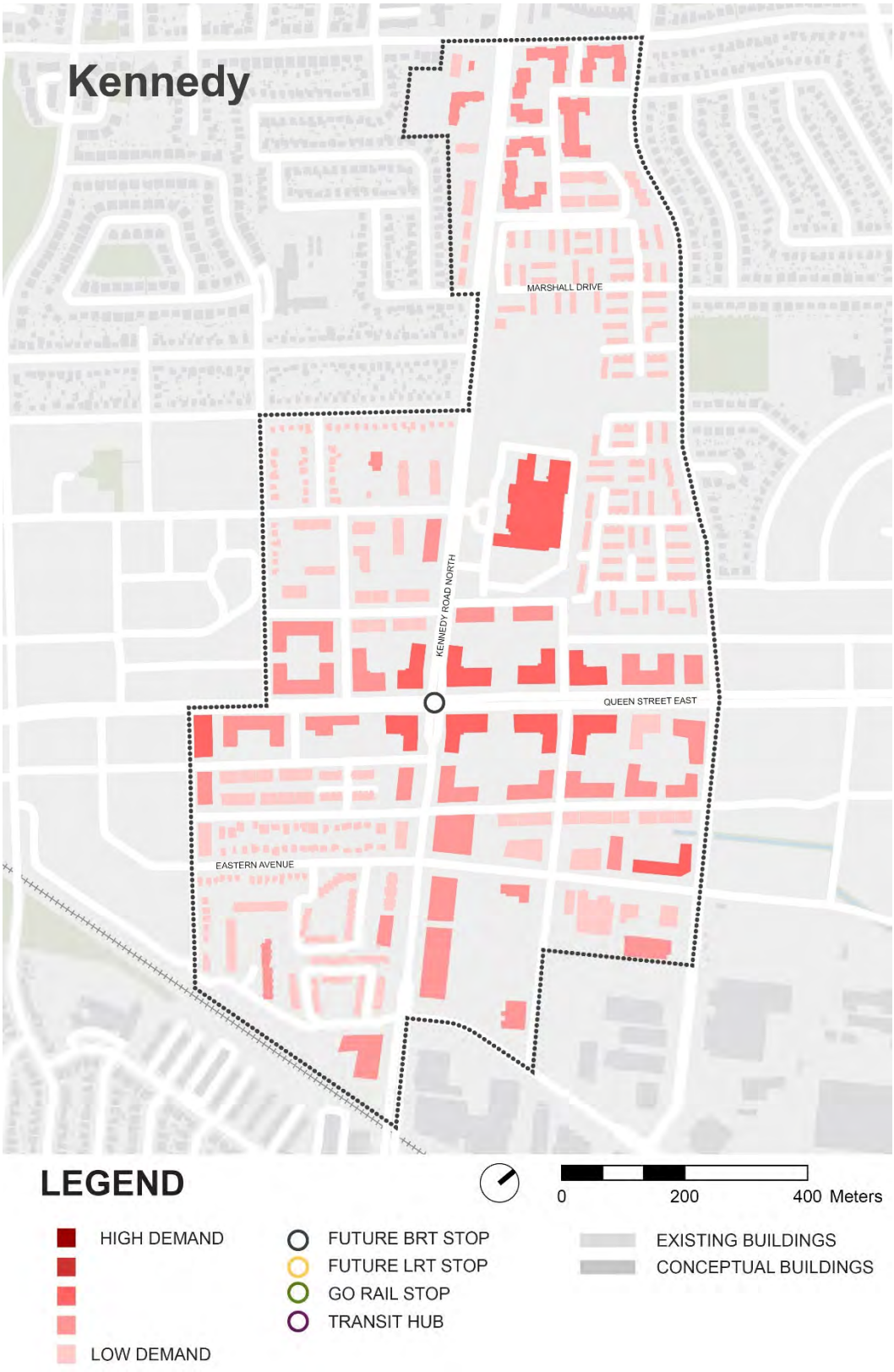

Figure 6-33: Kennedy Building Travel Demand Aggregation – Vehicle and Transit Demand

Active Travel Between Development and Transit

The table below shows aggregated bike demand per street segment in the PM peak hour in the future condition. Demand levels are highest along Queen Street East and Kennedy Road. Given that there are no bike facilities planned for Kennedy Road, consideration will need to be given to either directing cyclists to nearby bike facilities or ensuring comfortable passage on Kennedy Road.

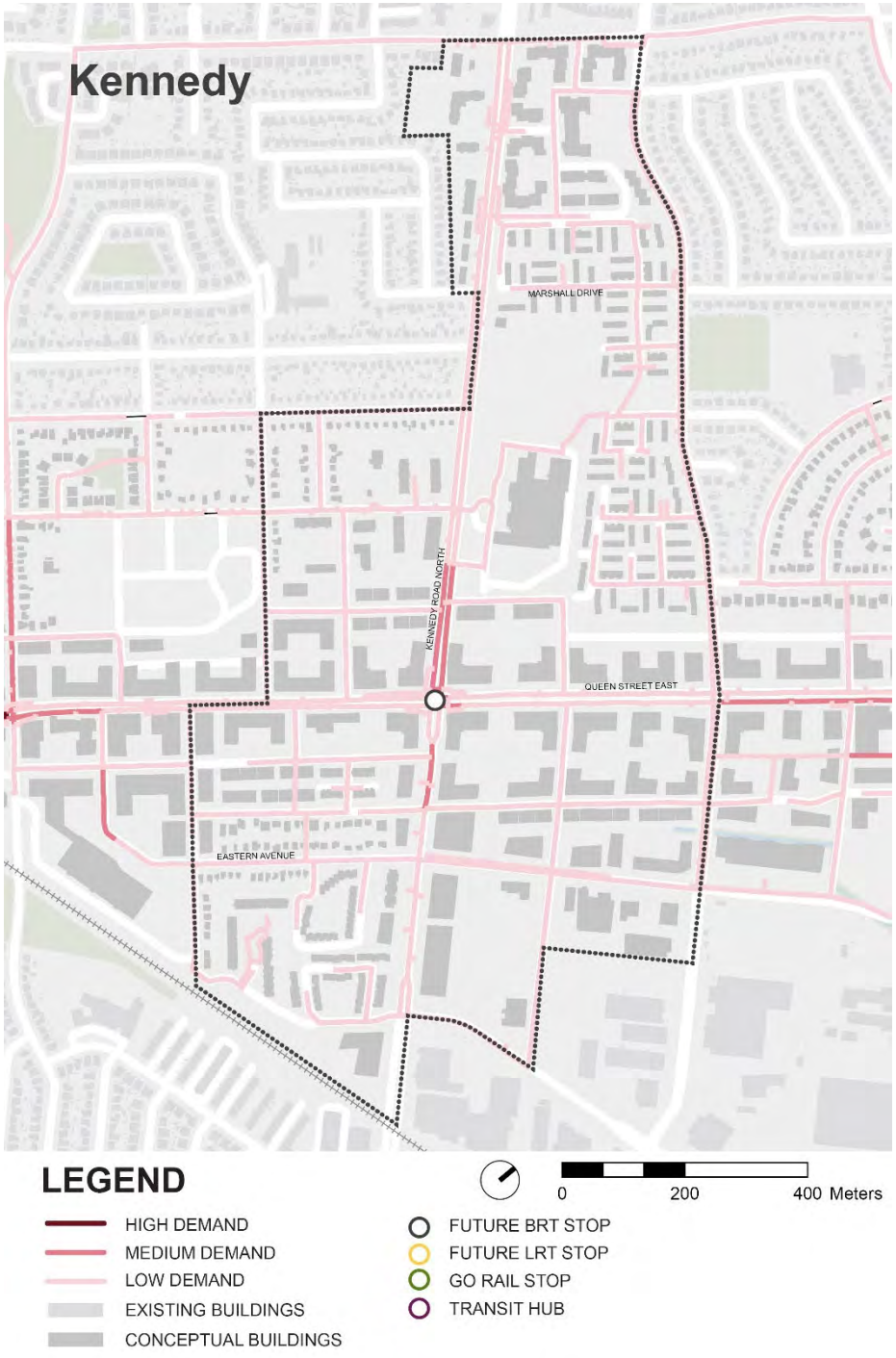

Figure 6-34: Kennedy Aggregation of Bike Demand to and from the Nearest Transit Stop

A significant amount of the walk demand in the Kennedy MTSA approaches the BRT stop from the north. As such, Kennedy Road should provide a high-quality public realm, particularly the stretch between Queen Street East and Central Peel Secondary School. Several of the mid-block active connections are used to access the transit station, demonstrating their importance for reducing trip circuity. While not used to access the transit station, the active connections around the school will play a key role in increasing permeability to surrounding residential neighbourhoods for school-based trips.

Figure 6-35: Kennedy Aggregation of Walk Demand to and from the Nearest Transit Stop

Accessibility to Local Bus and ZÜM services

The figure below shows the number of local bus stops that an individual can access within a 400 m walk from a building starting point. The proposed conceptual buildings along Queen Street East and in the southwest quadrant of the Kennedy MTSA would be well served by the City of Brampton local bus service. However, the conceptual buildings within the southeast quadrant could benefit from new local bus service that would provide a west-east connection along Eastern Avenue.

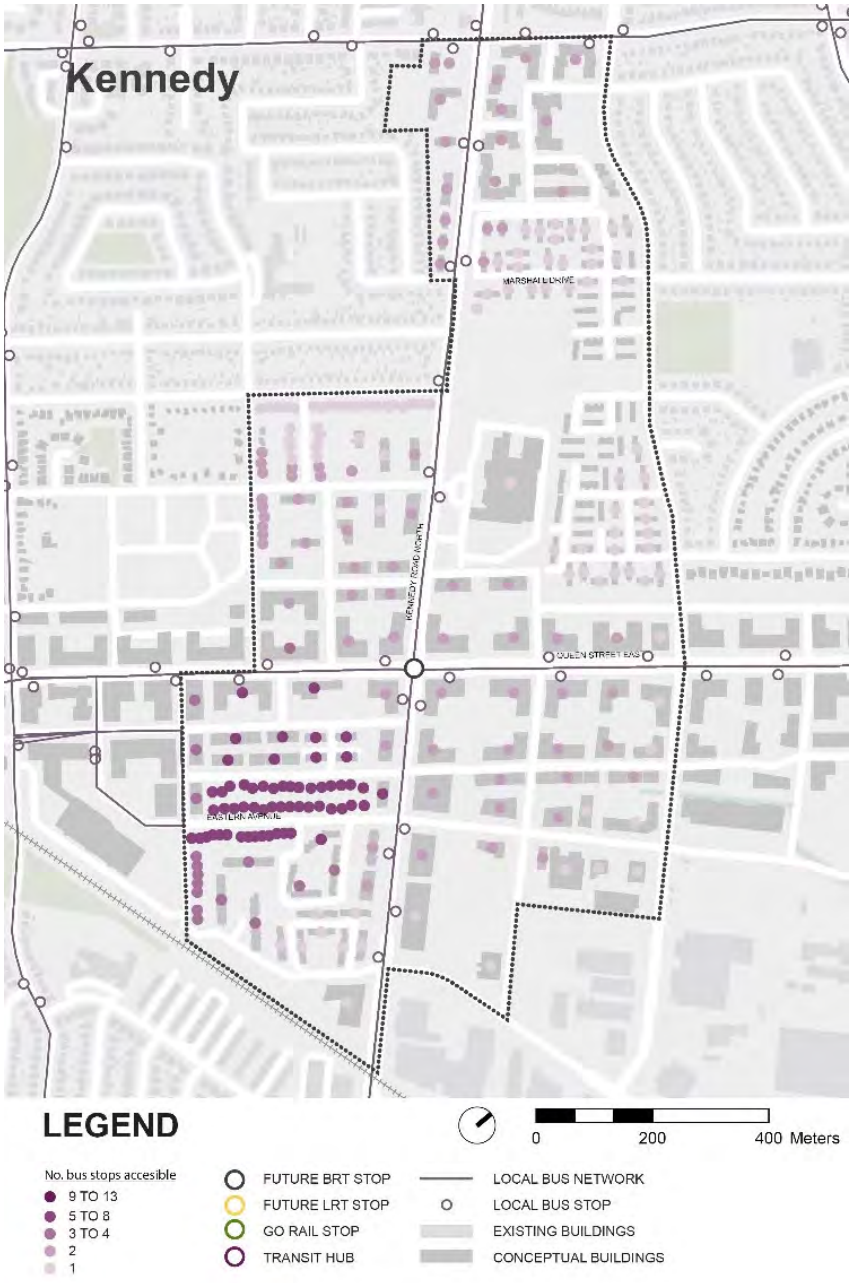

Figure 6-36: Access to local bus service at a 400 m walking distance within the Kennedy MTSA

The figure below shows the number of higher order transit bus stops, which includes ZÜM, that an individual can access within an 800 m walk from a building starting point. In general, the proposed conceptual buildings of the Kennedy MTSA are well served by the City of Brampton higher-order transit service, except for the area north of Marshall Drive, which does not have any high-order transit stops within a 10 minute walk. Although this area is well served by local transit, the absence of nearby higher order transit may require the city to consider more Within this area, the City may wish to consider pursuing additional travel-demand-management strategies within new proposed development to support sustainable mode-shift goals and reduce automobile dependency.

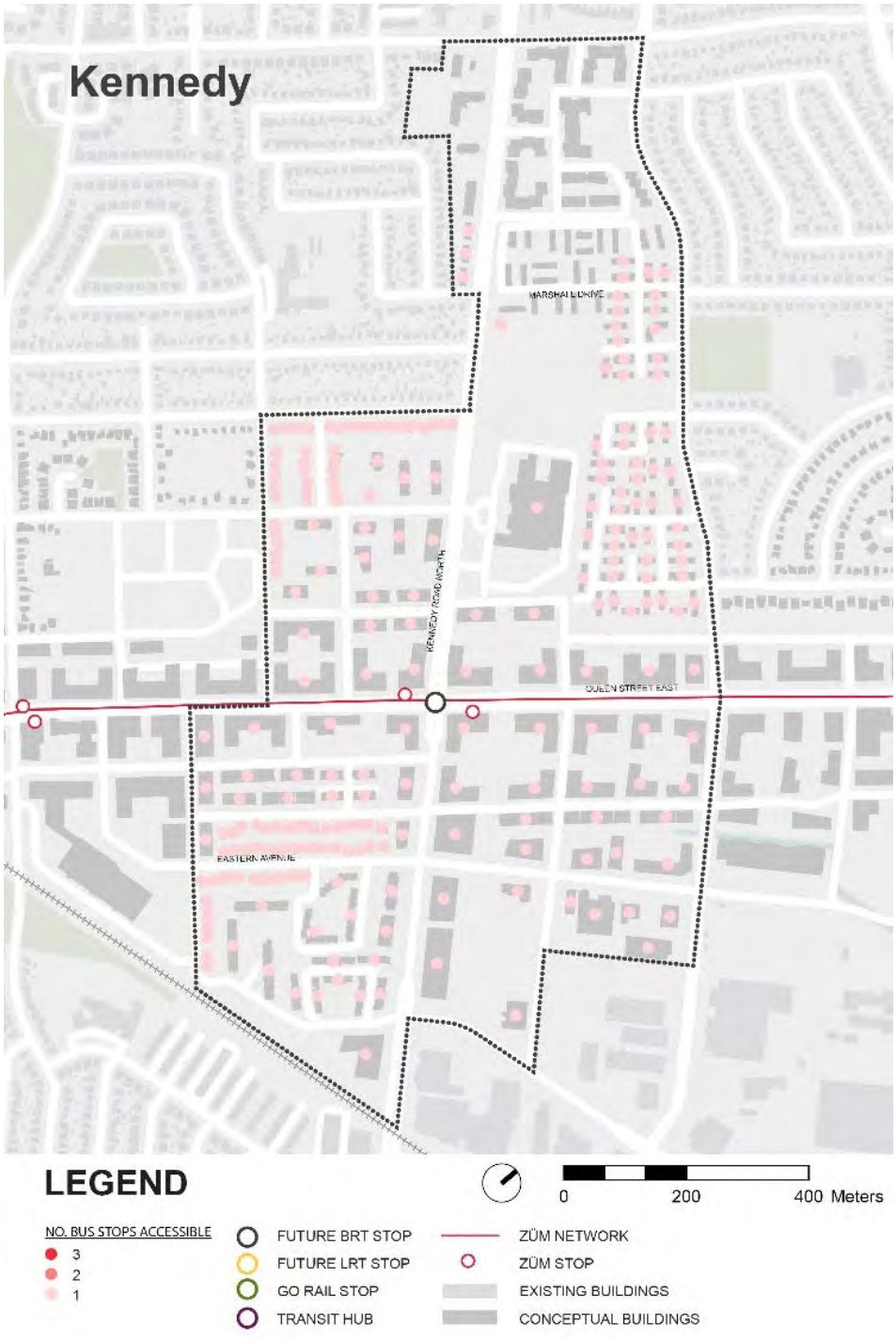

Figure 6-37: Access to higher-order transit service at an 800 m walking distance within the Kennedy MTSA

Vehicle Demand

Roads that may warrant additional investigation due to vehicle demand are highlighted in the figure below. This map is not meant to identify street segments that *will* be overcapacity, but rather to identify some street segments that fall on key shortest-path routes and therefore may experience high levels of demand. For the purposes of this review, all proposed streets were expected to accommodate bi-directional traffic, with one lane in each direction. Some key links flagged in this review include:

- Hansen Road
- Eastern Avenue
- John Street
- Queen Street
- June Avenue
- Several proposed street connections in the eastern portion of the MTSA

Intensification therefore must be coupled with travel demand management strategies to promote even higher rates of sustainable modes and limit traffic congestion. Furthermore, consideration should be given to deterring through-traffic from using local neighbourhood streets (including the proposed street connections included in this MTSA) to reduce congestion in these areas. Potential strategies include reduced speed limits, chicanes, and speed humps/tables.

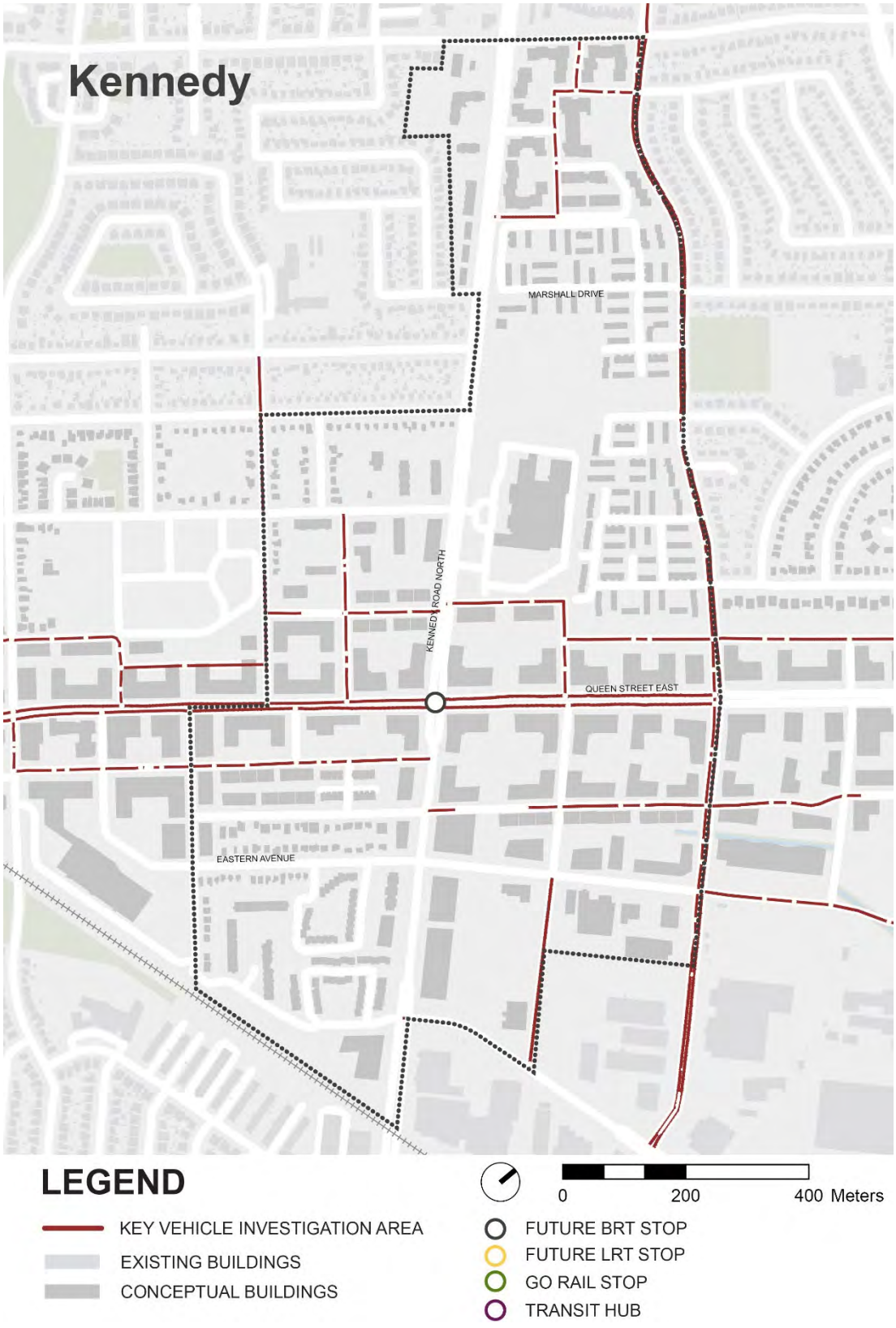

Figure 6-38: Kennedy Vehicle Network Assessment

6.3.4.2 Stormwater Analysis of Future Conditions

In the Kennedy MTSA, open space comprises only 5% of its total area. As indicated in the existing condition report, the MTSA already has a high overall imperviousness of 79%. Given the already substantial level of imperviousness within the MTSA, it is anticipated that the introduction of new streets will not have a negative impact on the existing stormwater network.

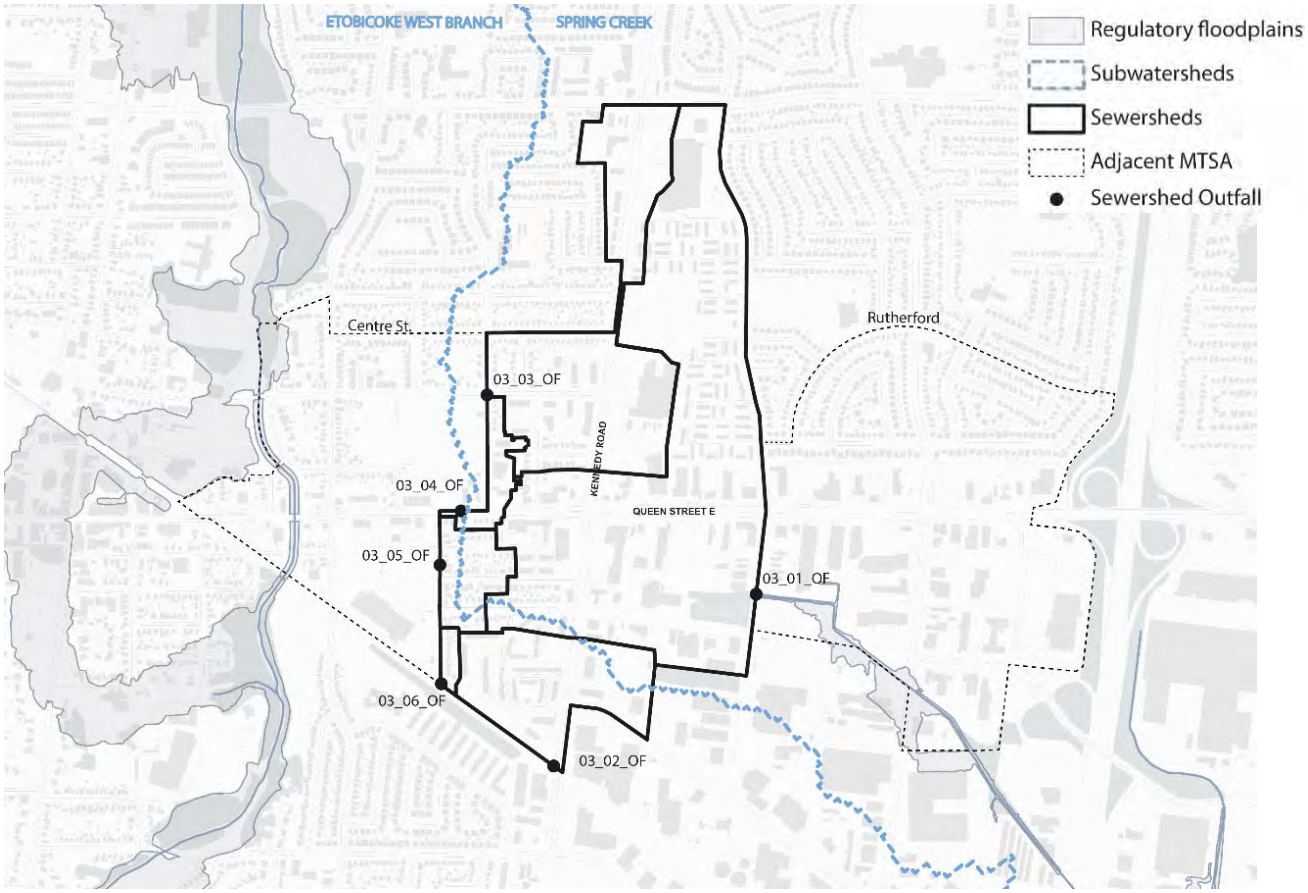

Figure 6-39 : Kennedy Sewersheds and Outfalls

The City is planning on opening a considerable number of streets within this MTSA. These streets are anticipated to improve the peak flows as they will be adding vegetation to an existing grey landscape. The table below confirms the predicted results. No stormwater detention is therefore necessary to mitigate increases in peak flow.

Table 6-7: Kennedy – Comparative Analysis of Existing and Proposed Conditions, 100-year Peak Runoff

Sewershed	Existing Peak Runoff (L/s)	Proposed Peak Runoff (L/s)	Difference (%)	Required Detention (m^3)
03_01	9451	9307	-2%	-
03_02	2204	2082	-6%	-
03_03	3525	2600	-26%	-
03_04	497	444	-11%	-
03_05	717	717	0%	-
03_06	150	132	-12%	-

The new streets within this MTSA will span approximately 3,400 meters in length. All four types of street typologies are proposed in this area. If the City proceeds with the proposed optimized complete streets typologies and includes retention swales in those streets, up to 4,000 m³ of stormwater could be stored at source, resulting in a reduction in peak flow compared to the existing conditions for all the sewersheds where streets will be developed.

Table 6-8: Kennedy – Available Detention Volume per Street Type

Sewershed	Length of New Streets (m)				Volume Available in Retention swales (m³)				
	Type 1	Type 2	Type 3	Type 4	Type 1	Type 2	Type 3	Type 4	Total
03_01	212	892	396	912	244	1029	457	1052	2785
03_02	-	-	203	175	-	-	234	200	434
03_03	116	174	-	270	134	200.5	-	311.5	646
03_04	-	-	-	51	-	-	-	59	59
03_05	-	-	-	-	-	-	-	-	-
03_06	-	-	-	54	-	-	-	62	62

No peak flow increase resulting from the opening of new streets is expected in any sewershed. Integrating retention swales into the planned streets is therefore not necessary but, if integrated, they could help reduce the peak flows lower than in existing conditions the table below.

Table 6-9: Kennedy – Adjusted Peak Runoff with Implementation of Retention swales within Complete Streets' ROW

Sewershed	Existing Peak Runoff (L/s)	Adjusted Proposed Peak Runoff (L/s)	Difference	Detention Deficit (m³)	Outcome
03_01	9451	8890	-561 L/s (-6.3%)	-	Improvement of flow conditions
03_02	2204	2028	-176 L/s (-8.0%)	-	Improvement of flow conditions
03_03	3525	2438	-1087 L/s (-30.8%)	-	Improvement of flow conditions
03_04	497	436	-61 L/s (-12.7%)	-	Improvement of flow conditions
03_05	717	717	0%	-	-
03_06	150	120	-30 L/s (-20%)	-	Improvement of flow conditions

6.3.5 Summary of Servicing Observations

The Region of Peel separately commissioned studies of potable water and wastewater/sanitary sewerage servicing on an MTSA-by-MTSA basis. Details from these studies with relevance to planning activities are summarized here solely for the convenience of the reader and to facilitate consideration of implications for MTSA network planning. Arup assumes no liability for the accuracy of those analyses and reports or the completeness of the summary. The Peel Region reports were based on preliminary land use plans and build-out projections provided by the City of Brampton directly to the Region of Peel in 2022. Some adjustments have occurred to land-use plans and build-out projections, which may alter some of the reports' conclusions.

6.3.5.1 *Water*

The following information is drawn from the report titled "Water and Wastewater Servicing Study MTSA Lands – Contract 1, Water Report," dated April 23, 2024 and prepared by GM BluePlan, hereinafter (GMBP Water Report – Contract 1). The report concludes that all service-level criteria (pressure, velocity, and fire-flow availability) can be satisfied under the growth scenario, other than new local servicing.

Because no additional needs were identified in the GMBP Water Report – Contract 1, the report provides costs estimates for the already planned projects.

Identifier	Already Planned System Upgrade	Existing Source	Cost Estimate ($2020) as per 2020 DC Study
MTSA5-W-3	400mm Upgrade along Queen Street between Kennedy Road to Highway 410	Development Charges Study (Proj. # 251199)	Design: $429,800 Construction: $2,042,400

Figure 6-40 GMBP Cost-Estimate for Planned Projects

The report also identifies developer-driven water projects based on the conceptual proposed buildings and street layouts.

Identifier	Additional System Upgrade	Rationale	Assumed Watermain Size (mm)	Length (m)	Notes	System Upgrade Cost Estimate $2023
MTSA5-W-1	Various Local Upgrades along Future Streets in northeast corner of MTSA (Centennial Mall)	New local servicing on new ROWs	300	800	Local servicing upgrades in new ROWs	$3,600,000
MTSA5-W-2	Various Local Upgrades along Future Streets south east of Kennedy & Queen	New local servicing on new ROW	300	770	Local servicing upgrades in new ROWs	$2,500,000
	Total for New Projects within MTSA 5					**$6,100,000**

Figure 6-41: New local water servicing requirements

6.3.5.2 *Wastewater/Sanitary*

The following information is drawn from the report titled "Water and Wastewater Servicing Study MTSA Lands – Contract 1, Wastewater Report," dated April 23, 2024 and prepared by GM BluePlan, hereinafter (GMBP Wastewater Report – Contract 1). The report notes that the Kennedy and Rutherford MTSAs are tightly linked and that strategies to address wastewater constraints will need to be developed simultaneously. The report notes numerous existing and future constraints based on the future growth scenarios, including:

- Surcharging on Church Street west of Kennedy Road, caused by local growth.

- Surcharging on several sections of Hansen Road, primarily due to growth in the northeast area of the Kennedy MTSA.
- Capacity constraints on Kennedy Road North because of upstream growth
- Constraints on Queen Street within the Rutherford MTSA because of growth from new developments along and south of Queen Street
- Surcharges along Archedekin and downstream sewer on Rutherford North and Heartlake Road because of upstream growth. This was already identified as an existing issue.

The GMBP Wastewater Report – Contract 1 proposes two alternatives to address the identified wastewater constraints. The preferred alternative includes a potential deep sewer along Queen Street to support transfer across to a future Kennedy trunk. The solution, however, was noted to be a long-term upgrade and will requiring more detailed assessment. Details for both options are included within the GMBP Wastewater Report.

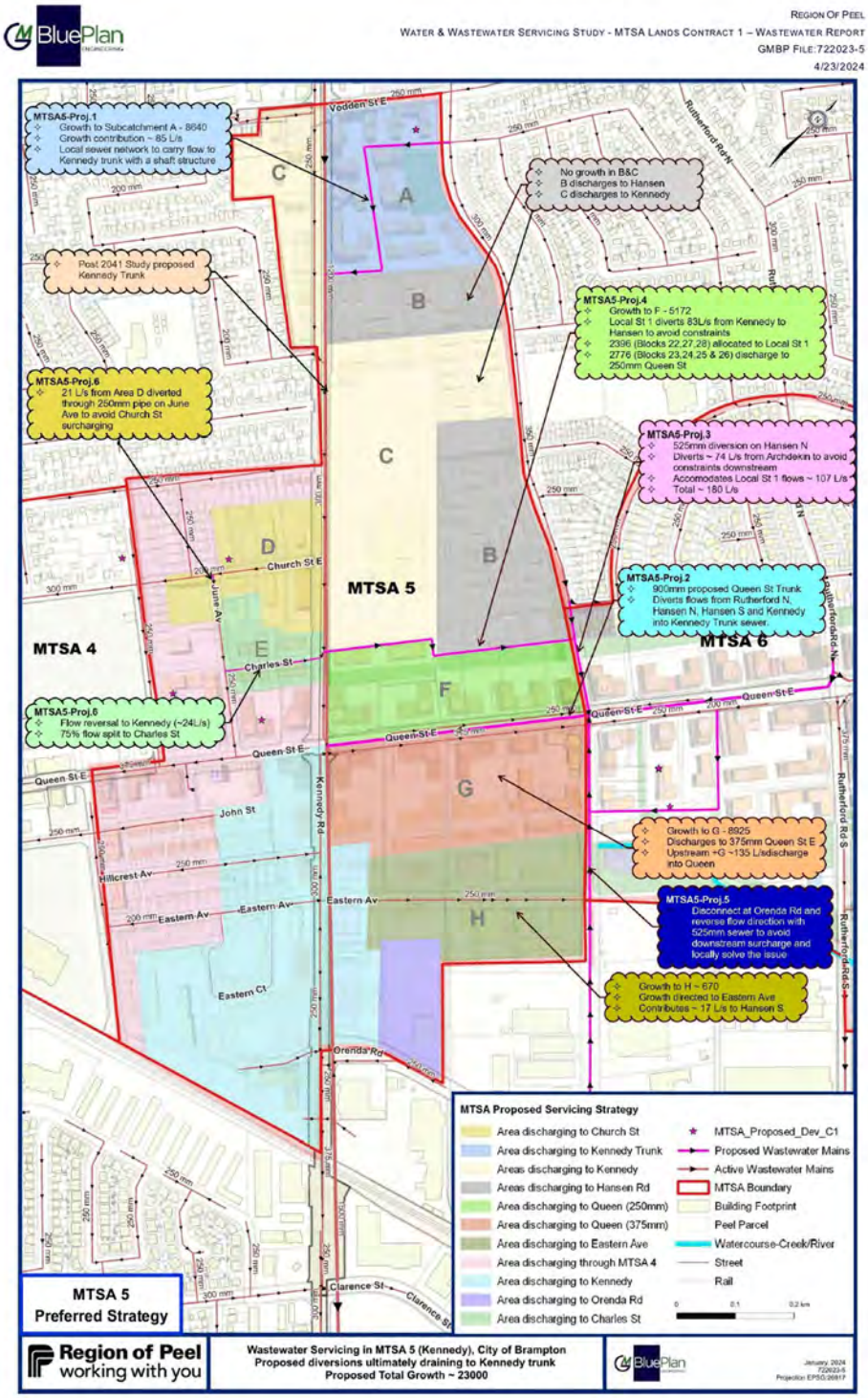

Figure 6-42: GMBP preliminary preferred strategy

The report provides a high-level cost estimate for the preliminary preferred option.

Table 10: High Level Cost Estimate for Preliminary Preferred Strategy

System Upgrade ID (Complexity)	Project Description	Rationale / Reason for Upgrade	Assumed Sewer Size (mm)	Length (m)	System Upgrade Cost Estimate ($)
MTSA5-Proj.1 Medium	Diversion from Hansen/Sutherland to Kennedy Trunk	Support new growth with new local street network	450	435	5.75 M
MTSA5-Proj.2 High	Queen St trunk diversion connecting to Kennedy trunk	Divert most of MTSA 5&6 flows to Kennedy trunk	900	900	26.84 M
MTSA5-Proj.3 Medium	Diversion from Hansen/Archdekin to 900mm Queen trunk	Avoids d/s surcharging	525	200	3.26 M
MTSA5-Proj.4 Medium	Diversion from Kennedy/Charles to Hansen Rd N	Avoid Kennedy constraints	450	450	0.77 M
MTSA5-Proj.5 Medium	Reversed sewer along Hansen connecting to proposed Queen St trunk	Avoids d/s surcharging	525	700	8.45 M
MTSA5-Proj.6 Medium	Diversion (Church St to June Ave) & 300mm diversion (Charles St to Kennedy)	Avoids Church St constraints	250	200	0.77 M
MTSA6-Proj.1	Diversion from Queen, east of Hansen towards Kennedy @ Hillcrest	Avoids Local Queen St E. constraints	450	400	0.69 M
MTSA6-Proj.2	Rutherford Road North Upsizing, north of Queen Street	Avoids Rutherford St. constraint	525	100	1.21 M
MTSA6-Proj.3	New Local Sewer, east of Rutehrford, north of Clark	Local servicing need	300	200	0.30 M
Total for Projects within MTSA 5&6 $					**48.0 M**

Note that project costs are high level and subject to change with detailed analysis and decision on final strategy.

Figure 6-43: GMBP high-level cost estimate for preliminary preferred option

Although the precise timing for development within the MTSA is unknown, the report outlines potential capacity triggers for required upgrades to the wastewater system.

Table 11: Capacity Upgrade Triggers MTSA 5&6

System Limitation (as per Section 8.4)	Growth Area that Causes the Limitation	MTSA Population of the Growth Area	Approximate Trigger Population	Notes
Hansen/Sutherland A.ID: 216875	A + Upstream	8640	1600	Upgrade Needed to Resolve = Project 1 (Upstream bounded by W: Kennedy; E: Rutherford N; N: Williams Pky; S: Vodden St)
Charles St A.ID: 223295	D	1310	200	Upgrade Needed to Resolve = Project 6 (Upstream bounded by W: Kennedy; E: Rutherford N; N: Williams Pky; S: Vodden St)
Archdekin Rd A.ID: 216362	A+B+part of A1+Upstream	8800	3000	Upgrade Needed to Resolve = Project 3 (Upstream bounded by W: Kennedy; E: Rutherford N; N: Williams Pky; S: Madoc Dr)
Rutherford N A.ID: 216398	A+B+A1+Upstream	9200	Existing constraint	Upgrade Needed to Resolve = Project 2 (Upstream bounded by W: Kennedy; E: Highway 410; N: Williams Pky; S: Madoc Dr)

For the above table, please refer to the following MTSA 5 & 6 preferred strategy maps (on subsequent pages) to understand the growth area notations. In the above table, all the upstream flows due to 2051 growth are considered and removed from the limiting sewer's available capacity. Thus, the trigger population is the capacity available for MTSA growth inside the boundary.

For example, the Archdekin Rd sewer receives growth flows from upstream areas (outside the MTSAs), as well as growth from some areas within the MTSAs. The upstream growth is already subtracted from the calculation, so the remaining capacity is mentioned as a trigger population within the MTSA's associated area. In this example, the growth areas within the MTSA that impact the need for this upgrade are marked as Area "A", Area "B" and Area "A1" from the two subsequent maps of the Preferred MTSA 5 & 6 Strategies. The total MTSA growth for these areas reaches ~ 8800. However, the trigger or limiting capacity available for that sewer is estimated as closer to ~3000. As such, once there are developments, within those areas, that reach 3000 then the upgrade need would be triggered.

Each of the proposed upgrades and the sub-blocks are provided in the following summary graphics for MTSA 5 & MTSA 6, respectively.

Figure 6-44: GMBP wastewater capacity-triggers for upgrades

6.3.6 Proposed Street Classifications and Stormwater Interventions

6.3.6.1 New Link Proposed Complete Street Classification

The proposed street connections in the Kennedy MTSA have been assigned the following classifications:

- Between Trueman Street and Orenda Court: mixed-use neighbourhood street;
- Between Beech Street and June Avenue: mixed-use neighbourhood street;
- Between the current eastern terminus of John Street and Kennedy Road South" mixed-use neighbourhood street;
- Between Kennedy Road North and Queen Street East: mixed-use neighbourhood;

- Between Queen Street East and Eastern Avenue: local employment street;
- Between Eastern Avenue and Orenda Road: local employment street;
- Between Kennedy Road South and Hansen Road South: mixed-use neighbourhood street;
- Between the proposed connection between Kennedy Road North and Queen Street East and Hansen Road North: mixed-use neighbourhood street.

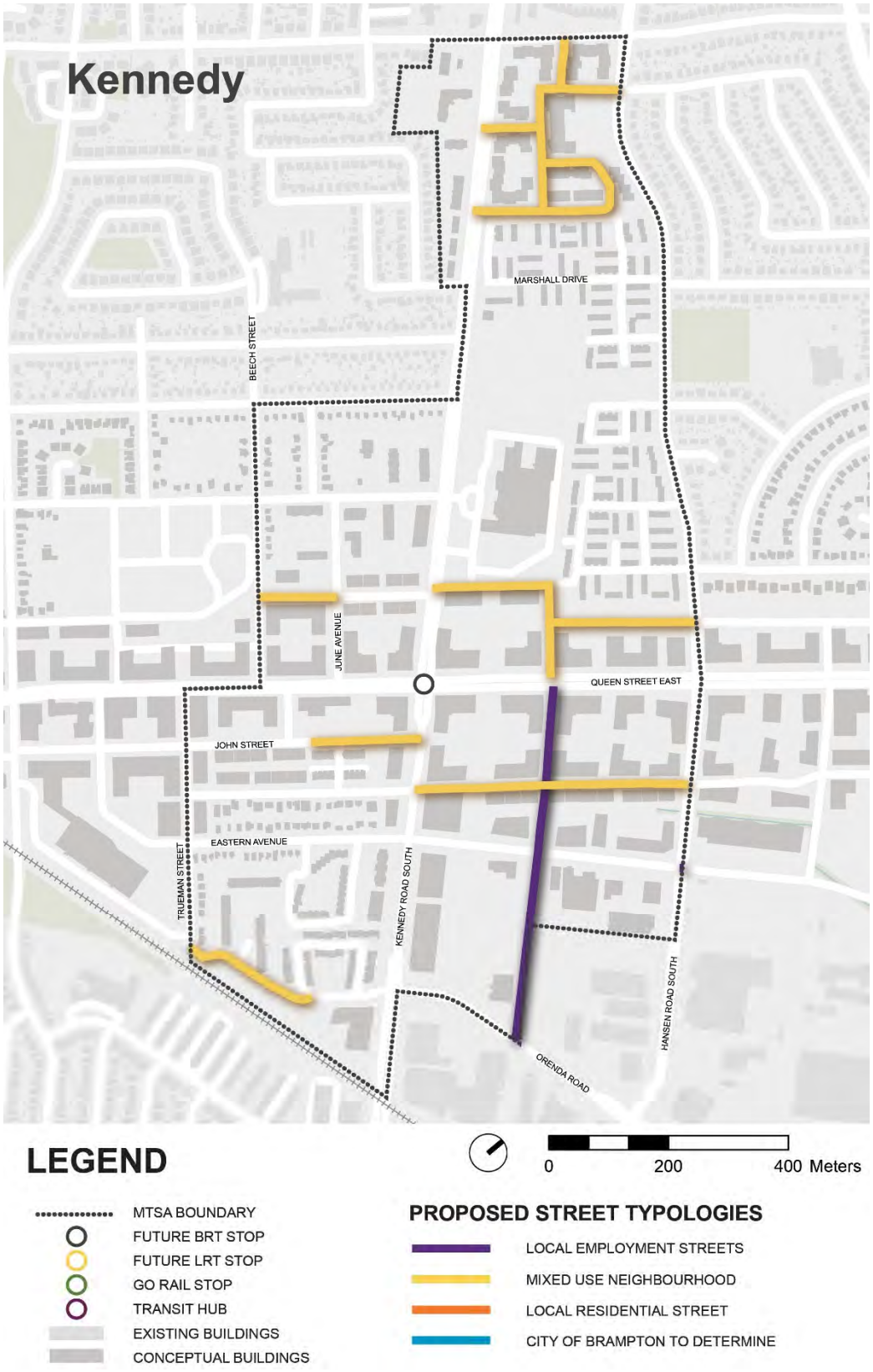

Figure 6-45: Kennedy Proposed Complete Streets Classification

6.3.6.2 Stormwater Management Interventions

The figure below illustrates the final transportation network and stormwater management proposals for the Kennedy MTSA. It includes the proposed transportation network refinements identified in the City's preliminary land use plans as well as those identified through the transportation analysis.

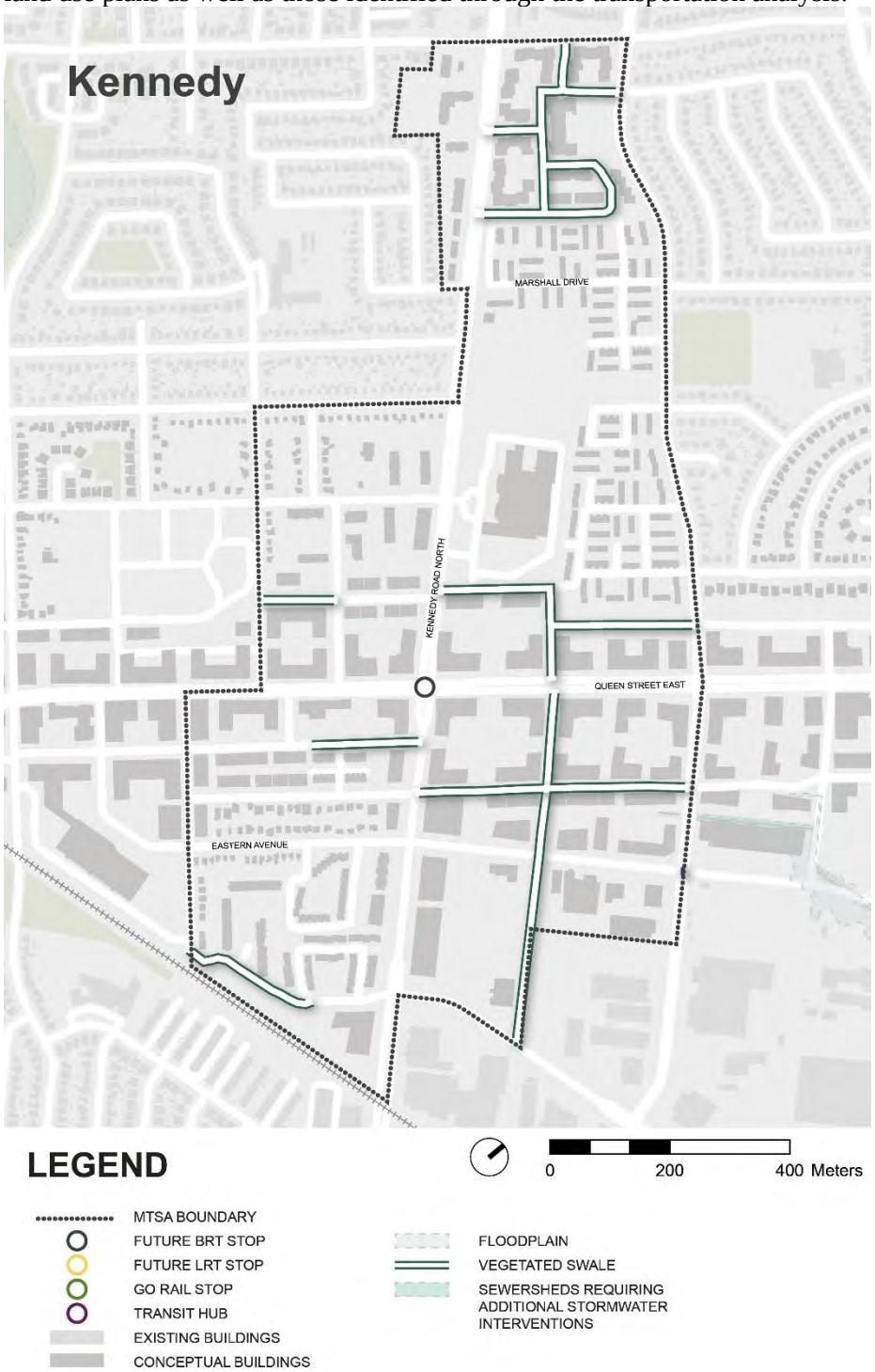

Figure 6-46: Kennedy Combined Transportation Network and Stormwater Interventions

6.3.7 MTSA-Specific Policy Recommendations

Several objectives in the Kennedy MTSA are best met through the application of general and location-specific policies in addition to the proposed network adjustments. Policies that should be considered for this MTSA are listed below. Parenthetical information provides rationale for specific policies.

- **General transportation network enhancements:**
  - Road and active-transport infrastructure should be provided to support comfortable, direct, and safe travel for sustainable modes and bolster transit ridership.
- **Roads:**
  - To create a finer-grain network, several new street alignments are proposed between:
    - Trueman Street and Orenda Court;
    - Beech Street and June Avenue;
    - The current eastern terminus of John Street and Kennedy Road South;
    - Kennedy Road North and Queen Street East;
    - Queen Street East and Eastern Avenue;
    - Eastern Avenue and Orenda Road;
    - Kennedy Road South and Hansen Road South; and
    - The proposed connection between Kennedy Road North and Queen Street East and Hansen Road North.
  - The City of Brampton should work with developers through the planning approval process to secure rights of way with sufficient width to accommodate revised complete streets typologies, including proposed green infrastructure to address publicly managed stormwater flows. Final widths and alignments will be determined through future detailed studies.
  - Traffic-calming measures should be leveraged on local or neighbourhood roads to reduce cut-though traffic on streets that are meant to provide access to residences or businesses or roads that play a major role in pedestrian and bike connectivity. Potential strategies include reduced speed limits, chicanes, and speed humps or tables. These strategies should be considered for John Street, Eastern Avenue, June Avenue, and the proposed connection between Hansen Road North and the proposed connection between Kennedy Road North and Queen Street East.
- **Active travel:**
  - Sidewalks and/or other appropriate pedestrian facilities should be provided along both sides of all new and existing streets. (A policy which ensures that all future streets include pedestrian facilities on both sides, and that all existing streets are upgraded to add this infrastructure where missing, is critical for the development of a safe and convenient pedestrian network.)
  - Bike infrastructure (including, but not limited to, recreational trails, multi-use paths, bike lanes, and protected bike lanes) should be provided in accordance with the Active Travel Master Plan. Additional infrastructure should be implemented where needed to promote network connectivity and reduce circuity

of protected bike trips to the Kennedy BRT stop. (Within the proposed network, cyclists travelling to the Kennedy BRT stop will experience more circuitous routes than pedestrians. Where possible, the City of Brampton should work with developers to identify additional mid-block connections that serve cyclists, as well as pedestrians.)

  - The provision of new bike lanes and multi-use paths must be complemented by the installation of bike parking at key destinations, such as the Kennedy BRT stop and Central Peel Secondary School.
  - New developments should be designed to minimize walking distance to transit or other key destinations through the inclusion of mid-block connections.
  - New neighbourhood parks and other open spaces should include dedicated pedestrian and bike infrastructure to enhance connectivity.
  - Active-transport facilities, including street furniture and tree planting, or Complete Streets upgrades should be prioritized for Queen Street East and Kennedy Road based on expected active demand.
  - New active crossings over the planned BRT corridor on Queen Street East between Wilson Avenue and Kennedy Road, and between Kennedy Road and Hansen Road should be provided to enhance pedestrian and bike connectivity. To reduce negative travel-time impacts on the planned transit service, consideration should be given to crossings that do not require transit vehicles to stop, including overpasses, underpasses, or unsignalized transit-lane crossings.
  - Pedestrian and cyclists should be prioritized at high-demand intersections, such as Queen Street East / Kennedy Road, Church Street / Kennedy Road, and Hansen Road / Queen Street East. Consideration should be given to including operational modifications or design treatments that prioritize active travel users include pedestrian-scramble signal phases, pedestrian head starts, no right turns on red, raised crosswalks or intersections, and protected intersections.

- **Building servicing**:
  - Vehicular access to buildings that front onto major streets, such as Queen Street in the Kennedy MTSA, should be provided via local back streets or service lanes. (This will help maintain traffic flow on the major roads while also providing uninterrupted active-travel facilities for pedestrians and cyclists.)
- **Travel-demand management**:
  - Travel-demand strategies for new development should be emphasized for developments expected to contribute vehicular traffic to Queen Street, John Street, and Eastern Avenue. (Intensification in the MTSA must be coupled with a range of travel demand management strategies that promote the use of active modes and transit over cars in order to reduce congestion and promote sustainable travel.)
- **Stormwater:**
  - All new developed streets should be designed according to the new complete street guidelines. Exact retention swales dimensions should be calculated for each new street to ensure that the new streets do not cause increase in peak flow for each applicable design storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms).
  - Developments within the MTSA shall be required to implement stormwater management techniques required to provide post to pre control for all storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms), as required by CVC and TRCA.

6.3.8 Recommendations for Further Transportation Network Enhancement

Several recommendations for refining the Kennedy MTSA's street network were identified through the transportation analysis conducted as part of this study. Key refinements include:

- The addition of active connections to improve connectivity to and around Central Peel Secondary School (K1);
- The addition of an active connection along the north side of the rail line and stairs connecting to Kennedy Road South (K2).
- The addition of a bicycle infrastructure connection between Queen Street East and Vodden Street East to address the potential demand for active travel along Kennedy Road North. (K3)
- Upgrading intersections of roads with bicycle infrastructure to high quality intersections (protected) (K4)
- Adding an east-west local bus connection along Eastern Avenue to improve accessibility to bus service (K5)
- The addition of active connections linking the neighbourhood south of Centennial Mall to the future streets proposed on the Centennial Mall lot (K6); and
- Formalizing the connection between Eastern Court and the pathways near the Brampton Village Apartments (K7);

Upon reviewing these recommendations, the City noted that K6 and K7 as they included modifications to already existing developments. As such, these connections are excluded from the final transportation network and stormwater management recommendations. However, we do recommend that even though K2 and K3 are within private developments that should be secured through negotiation between the private developer and the City.

Figure 6-47: Kennedy Preliminary Transportation Network Refinements

6.4 MTSA 04 – Rutherford

The Rutherford MTSA sits immediately west of Highway 410 and is planned to include high-rise and mid-rise mixed-use areas, low-rise residential areas, industrial areas, and a fire station. The Queen Street BRT will provide the primary higher order transit service in the MTSA. As the Rutherford MTSA will be served by a BRT station, it has a density target of 160 residents and jobs combined per hectare.

To support the increased density proposed in this MTSA, a range of street-network refinements have been identified. These include street extensions and mid-block connections proposed by the City of Brampton in their land-use plan, bike facilities identified in the Active Transportation Master Plan, and further recommendations flowing from the transportation analysis described herein. Key refinements include the addition of proposed street connections to break up large blocks in the southern half of the MTSA; mid-block active connections linking these new street connections to each other and to existing streets; bike facilities on Queen Street East, Eastern Avenue, and Rutherford Road; and a pedestrian bridge providing a connection to the Laurelcrest MTSA.

Due to the already developed state of the MTSA, the addition of new streets will not have an adverse impact on peak flows at any of the identified outfalls in the MTSA. In fact, adding new streets with vegetated areas, such as retention swales, will contribute to an overall reduction of peak flows in the affected sewersheds.

6.4.1 Existing Conditions

The Rutherford MTSA primarily consists of commercial and industrial areas which are concentrated to the south of the MTSA. The northern portion of the MTSA primarily includes medium-density residential areas. There is a fire station located off Rutherford Road South.

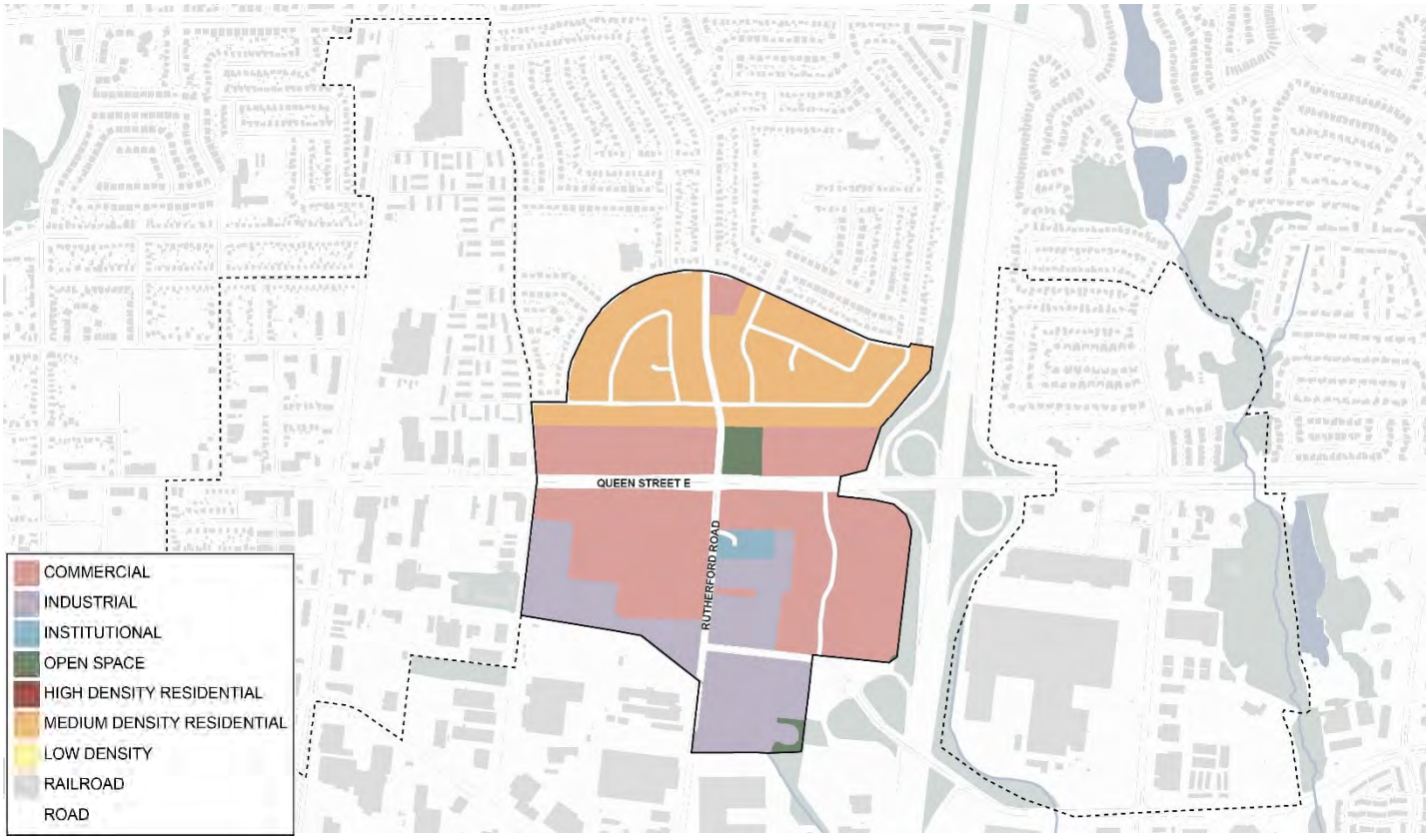

Figure 6-48: Rutherford Existing Conditions Land Use Map

The northern portion of the MTSA is generally characterized by a fine-grain street network while the southern portion of the MTSA is generally characterized by a larger grid network. Queen Street East and Rutherford Road North are the major vehicular thoroughfares. Highway 410 runs along the east side of the MTSA and a highway interchange is located on Queen Street East immediately to the east of the MTSA. In addition to being served by the future Queen Street BRT, the Rutherford MTSA is also served by local buses running along Queen Street East and Rutherford Road North.

A watercourse traverses the south end of the MTSA. A small regulatory floodplain surrounds a portion of the watercourse.

6.4.2 Community Objectives

The preliminary land-use plan for the Rutherford MTSA was discussed in a public focus-group session held on March 23, 2023. The discussion on the Rutherford. MTSA land-use plan was bundled with the discussions on the Kennedy and Centre St. MTSA land-use plans. In general, the discussion centered around four points: 1) what is working in the MTSA; 2) what is not working in the MTSA; 3) what is missing in the MTSA; and 4) how could the MTSA be improved. The participants noted that these three MTSAs benefit from frequent bus service, however they expressed concern that transit is over-capacity, intersections do not work well, and that the area is unpleasant for pedestrians. Participants felt that the MTSAs are missing family-sized apartments and daycare facilities.

Thoughts about improving the MTSAs included extending mixed-use space north and south on major corridors rather than a linearly concentrating it exclusively on Queen Street. Attendees also noted the need to ensure that transit stations are surrounded by ground-floor commercial areas with direct access paths. Additional suggestions included planning protections for low-income communities, affordable housing, community benefit charges to increase bus capacity, scramble crossings at major intersections, and reducing parking restrictions and phasing development for surface parking that can be transitioned into new developments after transit is implemented.

A complete summary of the focus-group session is included in Appendix D.

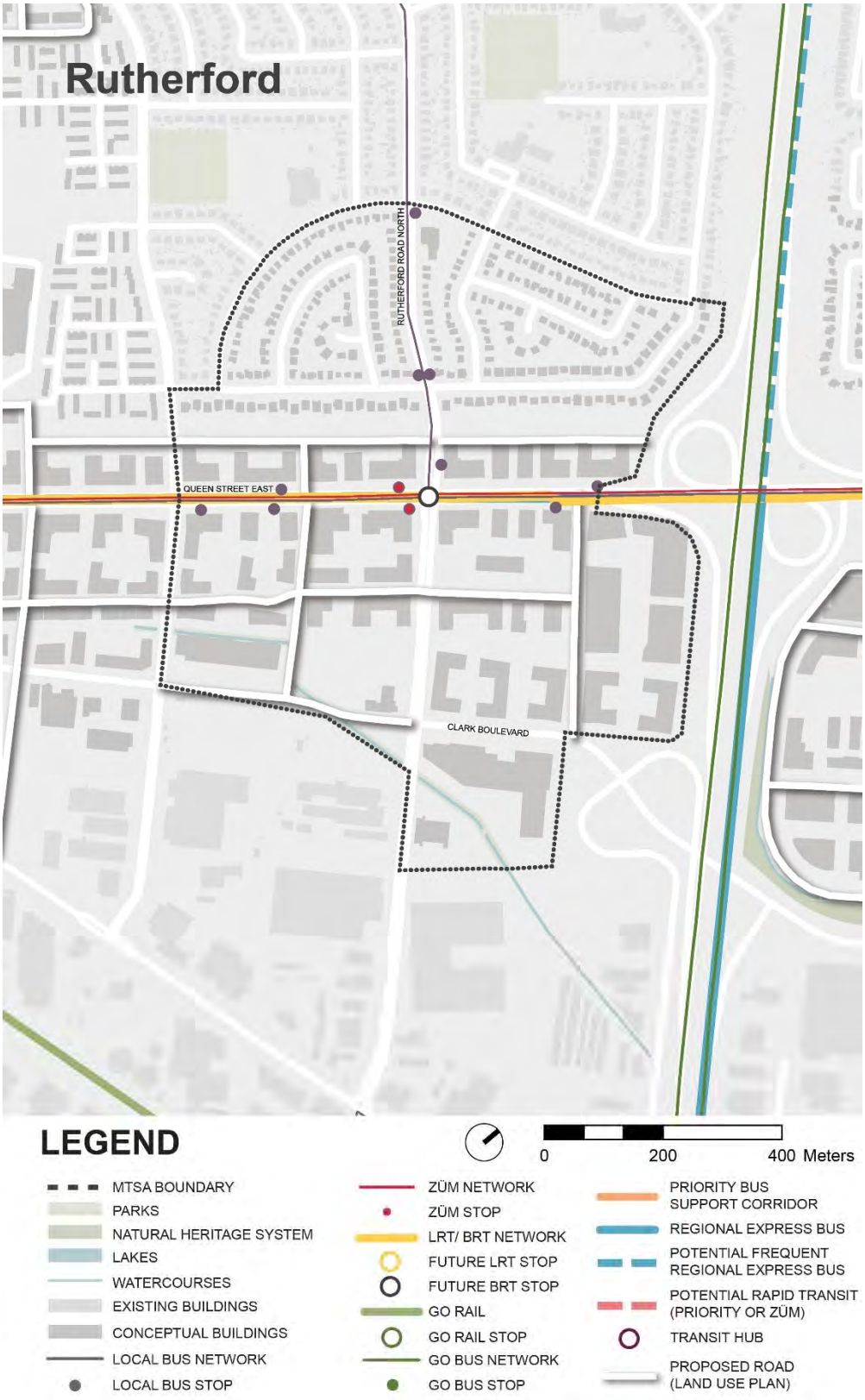

Figure 6-49: Rutherford Existing Conditions Map

6.4.3 City of Brampton Land-Use Plan

The final land-use plan for the Rutherford MTSA was approved by Brampton City Council in October 2023 as part of the update to the city's Official Plan. The approved land use plans were the result of iterative refinements based on qualitative and quantitative analyses of preliminary land use plans conducted by Arup over the course of this engagement and community engagement.

The approved Rutherford MTSA land-use plan concentrates high-rise mixed-use space along the Queen Street East corridor. To the north, there is an established low-rise residential area. A road and linear park / landscaped buffer separates the high-rise corridor and the established low-rise neighbourhood. As there is a desire to remove vehicle access to buildings off Queen Street, this proposed road will play an important role in providing vehicles access to developments that front on Queen Street. To the south, the high-rise corridor is adjacent to mid-rise mixed-use areas. The southernmost part of the MTSA features prestige industrial space. Additionally, a community hub and neighbourhood park are planned for the southeast corner of the MTSA, and the fire station is planned to be relocated to the southwest corner.

This MTSA is located on the Queen Street bus rapid transit corridor. In addition to the BRT corridor, key mobility elements of the proposed plan include:

- Proposed road connections between:
  - Hansen Road North and Rutherford Road North,
  - Rutherford Road North until just west of Highway 410,
  - Queen Street East and the proposed road connection to the north, both east and west of Rutherford Road North,
  - Hansen Road South and Rutherford Road South, linking Orenda and Eastern Avenue,
  - Hansen Road South and Rutherford Road South, to the north of the connection linking Orenda and Eastern Avenue,
  - Queen Street East and the new connection linking Orenda and Eastern Avenue,
  - Queen Street East and Eastern Avenue, east of Rutherford Road South,
  - A U-shaped road connecting to the proposed road connecting Queen Street East and Eastern Avenue.
- Mid-block connections between:
  - Archdekin Drive and the proposed connection to the south, both east and west of Rutherford Road North,
  - Queen Street East and the proposed connection to the north, both east and west of Rutherford Road North,
  - Queen Street East and the proposed street connection to the south (west of Rutherford Road South),
  - Hansen Road South and the proposed street connection to the east,
  - Rutherford Road South and the proposed street connection to the west,
  - Rutherford Road South and the proposed street connection to the east (times three),
  - Queen Street East and the proposed active connection to the south (east of Rutherford Road South),
- A proposed multi-use path along Eastern Avenue and the proposed road connection linking Eastern Avenue and Orenda;

- A proposed multi-use path along Rutherford Road South;
- Proposed protected bike lanes along Queen Street East;
- A proposed shared roadway on a portion of Madoc Drive;
- A proposed pedestrian bridge connecting the Rutherford and Laurelcrest MTSAs.

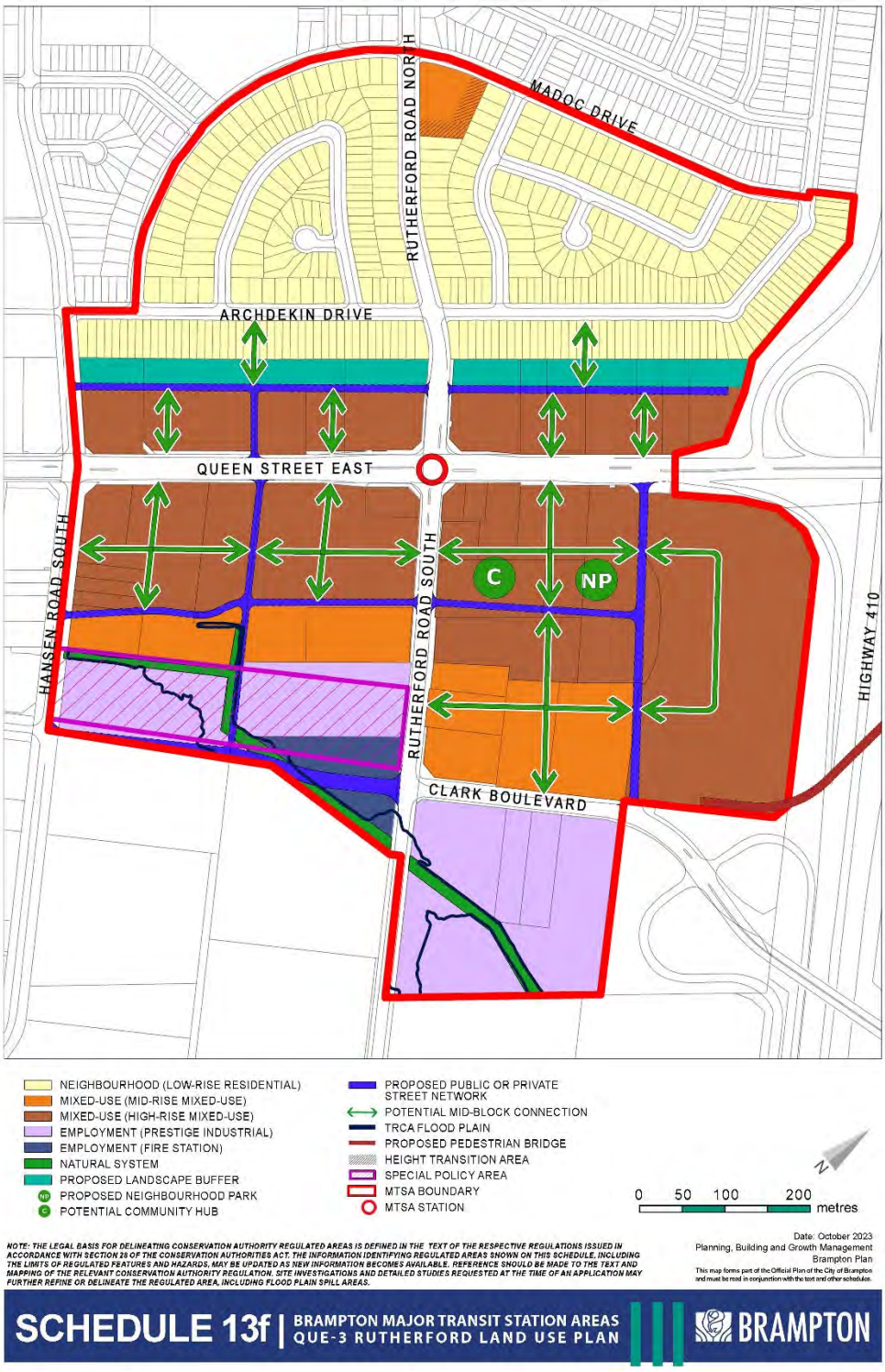

Figure 6-50: Rutherford Proposed Land Use Plan (City of Brampton)

6.4.4 Analysis of Proposed Conditions

The analysis illustrated in the following subsections considers estimated travel demand and network characteristics, as well as stormwater flow conditions assuming the implementation of the final council-approved land-use plans.

6.4.4.1 Transportation Analysis of Future Conditions

The future-conditions transportation analysis considers the expected distribution of relative travel demand with respect to the existing and future street network; identifies potentially high-demand bike and pedestrian routes between future development and the closest transit stop to assist in prioritizing active-travel-infrastructure investments; and points to areas within the vehicular network that may require additional study or intervention.

Travel Demand Distribution

Demand per street segment is largely driven by the size and type of developments anticipated for each block. The areas of highest demand are clustered in the southeast corner of the MTSA adjacent to Highway 410. The majority of buildings along Queen Street East are relatively large trip generators as well. Given the neighbourhood to the north of Archdekin Street is almost entirely comprised of single-family houses, this area generates the least demand.

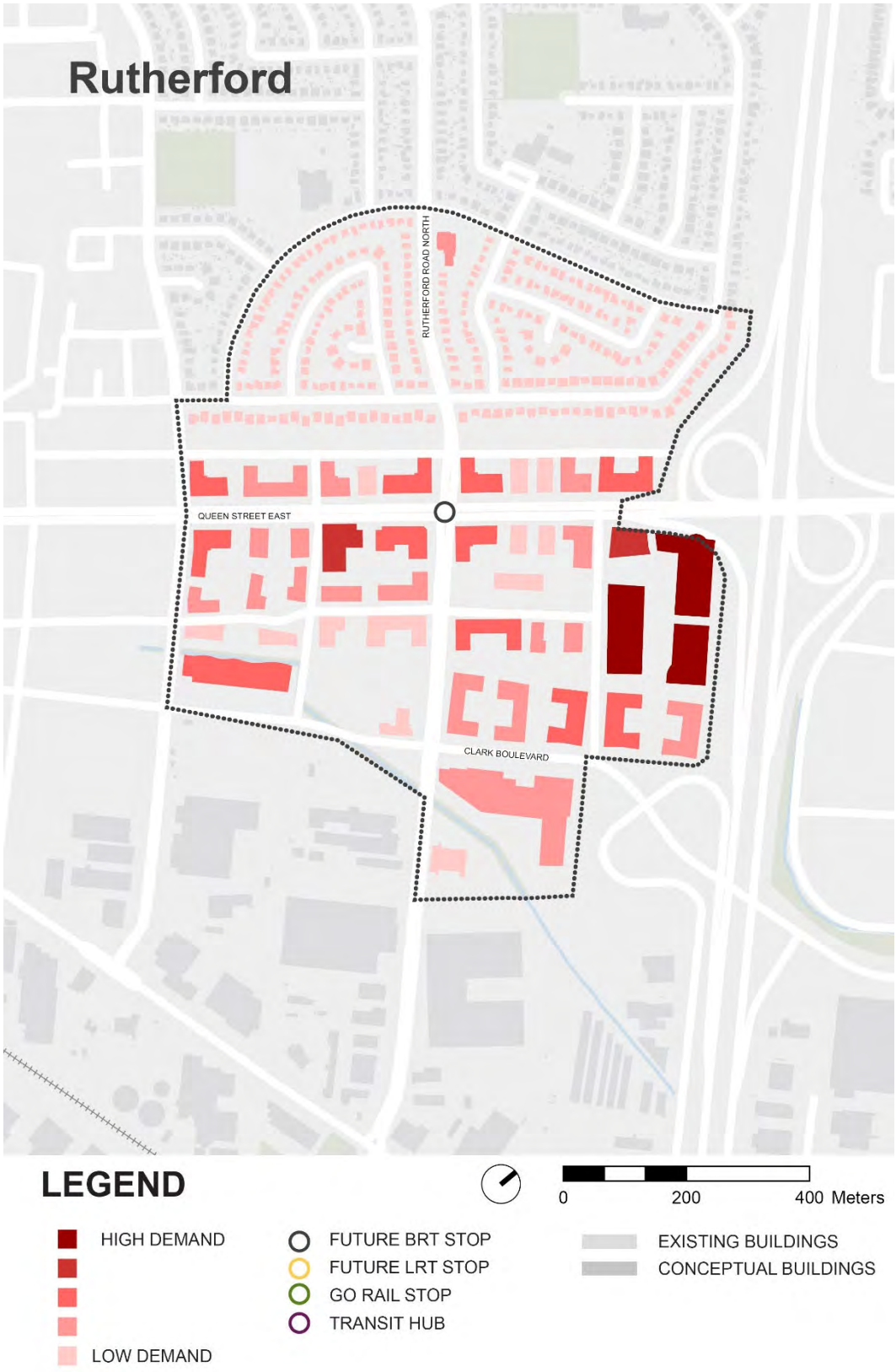

Figure 6-51: Rutherford Building Travel Demand Aggregation – Vehicle and Transit Demand

Active Travel Between Development and Transit

The figure below shows aggregated bike demand per street segment in the PM peak hour in the future condition. Demand levels are highest in the southeast quadrant of the MTSA. The proposed bike lanes along the northern potion of the U-shaped road as well as those on Queen Street East provide safe facilities for the high demand on streets in these areas. The multi-use path on Rutherford also accommodates some of this demand. In general, the high number of active connections south of Queen Street East help provide convenient and safe routes to and from the transit station.

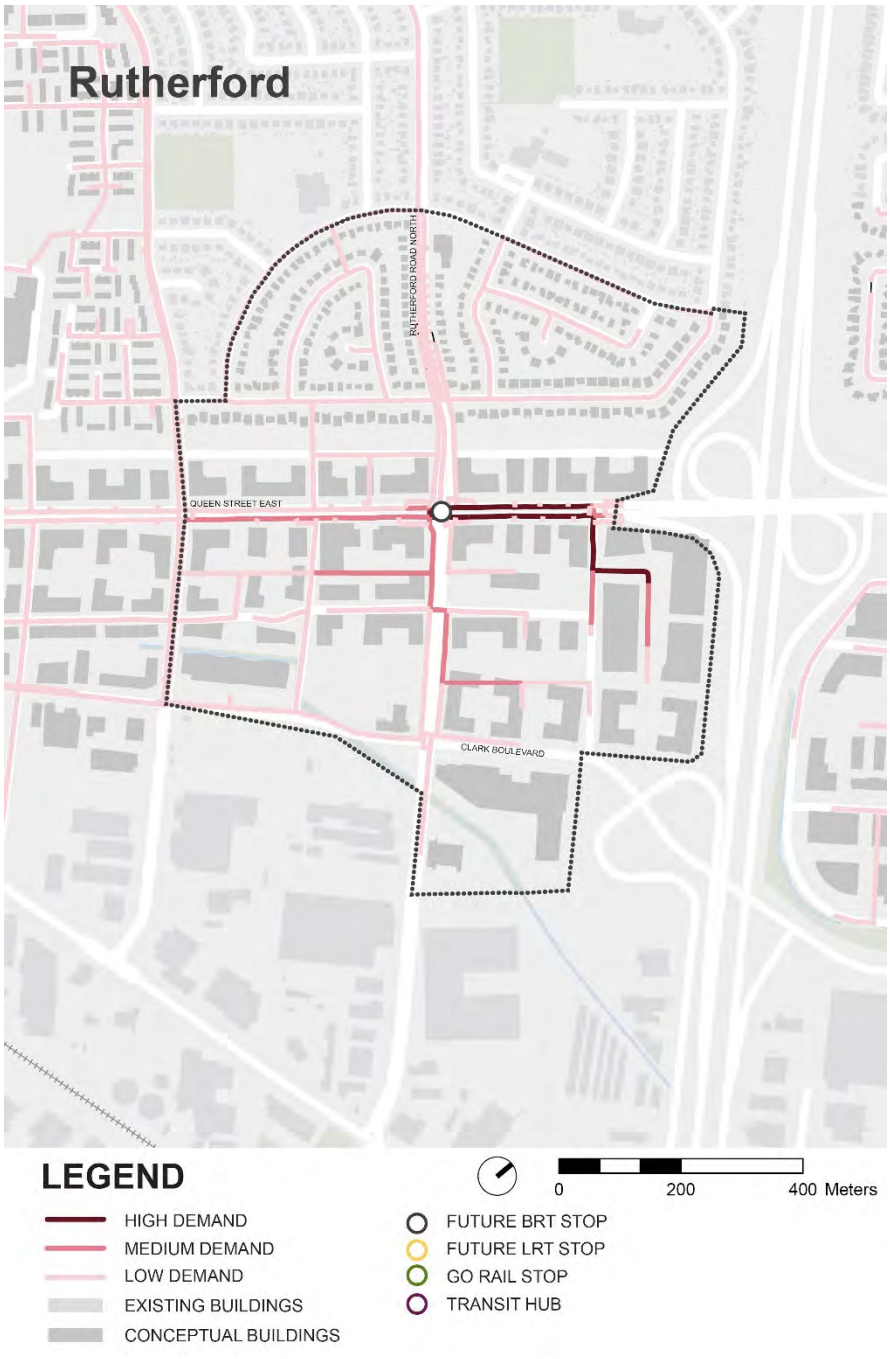

Figure 6-52: Rutherford Aggregation of Bike Demand to and from the Nearest Transit Stop

Walk demand in the Rutherford MTSA is also concentrated in the southeast. As Queen Street East accommodates a lot of demand in this MTSA, it should feature wide, comfortable pedestrian facilities.

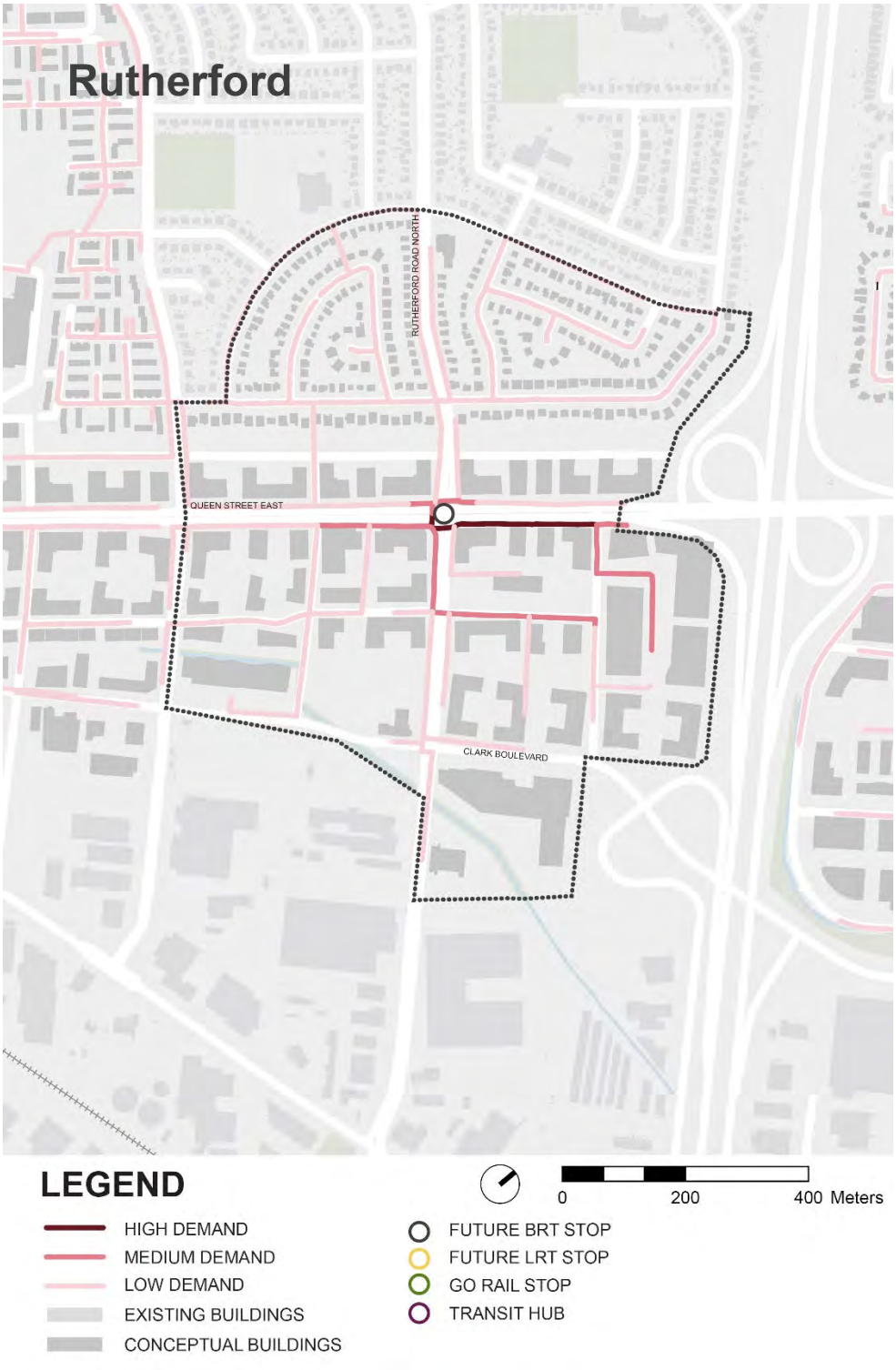

Figure 6-53: Rutherford Aggregation of Walk Demand to and from the Nearest Transit Stop

Accessibility to Local Bus and ZÜM services

The figure below shows the number of local bus stops that an individual can access within a 400 m walk from a building starting point. The conceptual buildings along the southern edge of the MTSA could benefit from an additional local bus service that would provide a west-east connection along Clark Boulevard.

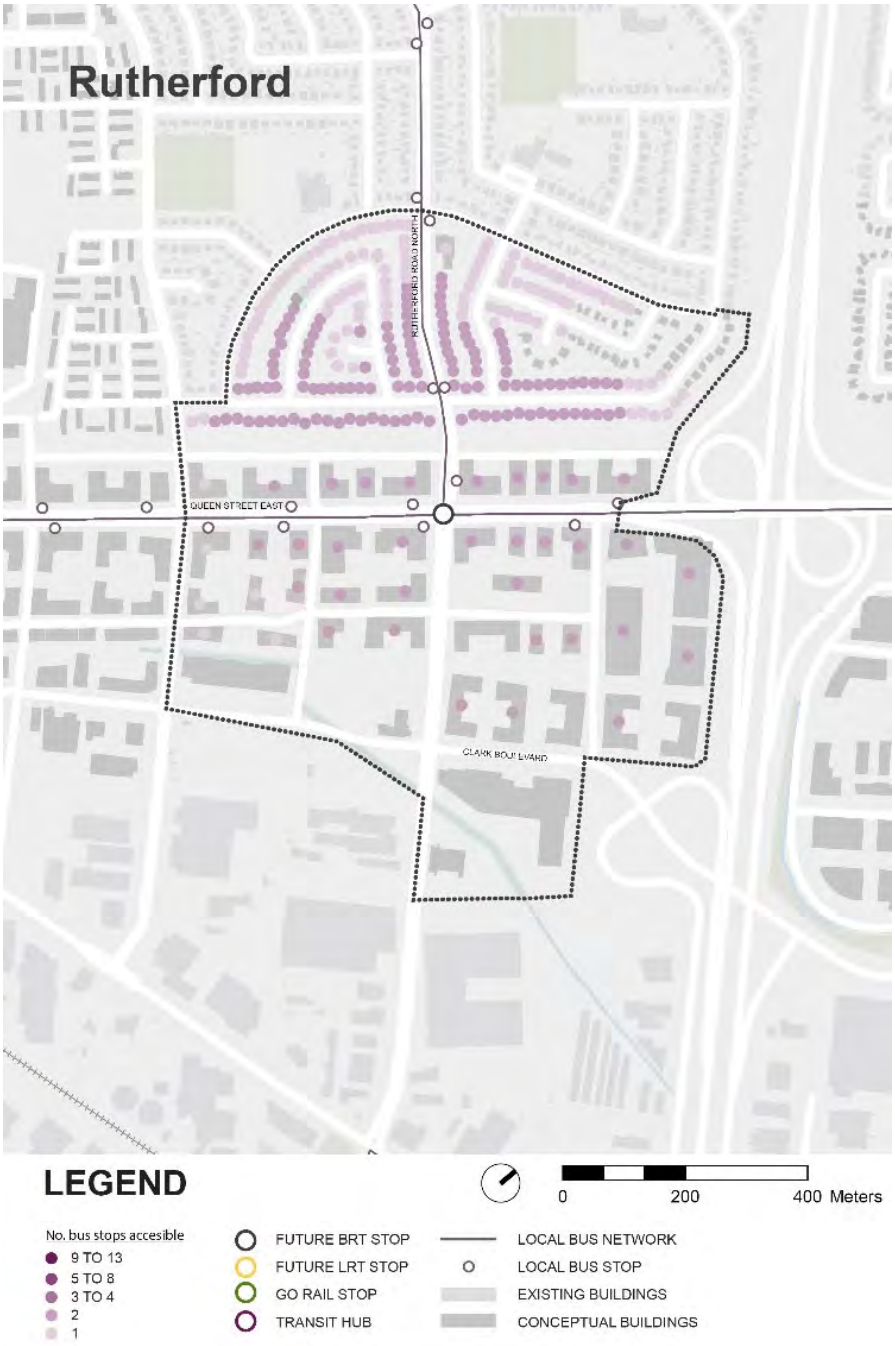

Figure 6-54: Access to local bus service at a 400 m walking distance within the Rutherford MTSA

The figure below shows the number of higher order transit bus stops, which includes ZÜM, that an individual can access within an 800 m walk from a building starting point. The proposed conceptual buildings of the Rutherford MTSA would be well served by the City of Brampton higher-order transit service.

Figure 6-55: Access to higher-order transit service at an 800 m walking distance within the Rutherford MTSA

Vehicle Demand

Roads that may warrant additional investigation due to vehicle demand are highlighted in the figure below. This map is not meant to identify street segments that *will* be overcapacity, but rather to identify some street segments that fall on key shortest-path routes and therefore may experience high levels of demand. For the purposes of this review, all proposed streets were expected to accommodate bi-directional traffic, with one lane in each direction. Some key links flagged in this review include:

- Hansen Road
- Eastern Avenue and its extension
- The proposed street connection between Hansen Road North and Rutherford Road North
- The proposed street connection between Hansen Road South and Rutherford Road South
- The proposed street connection between Queen Street East and Clark Boulevard, west of Rutherford Road South

Intensification therefore must be coupled with travel demand management strategies to promote even higher rates of sustainable modes and limit traffic congestion. Furthermore, consideration should be given to deterring through-traffic from using local neighbourhood streets (including the proposed street connections included in this MTSA) to reduce congestion in these areas. Potential strategies include reduced speed limits, chicanes, and speed humps/tables.

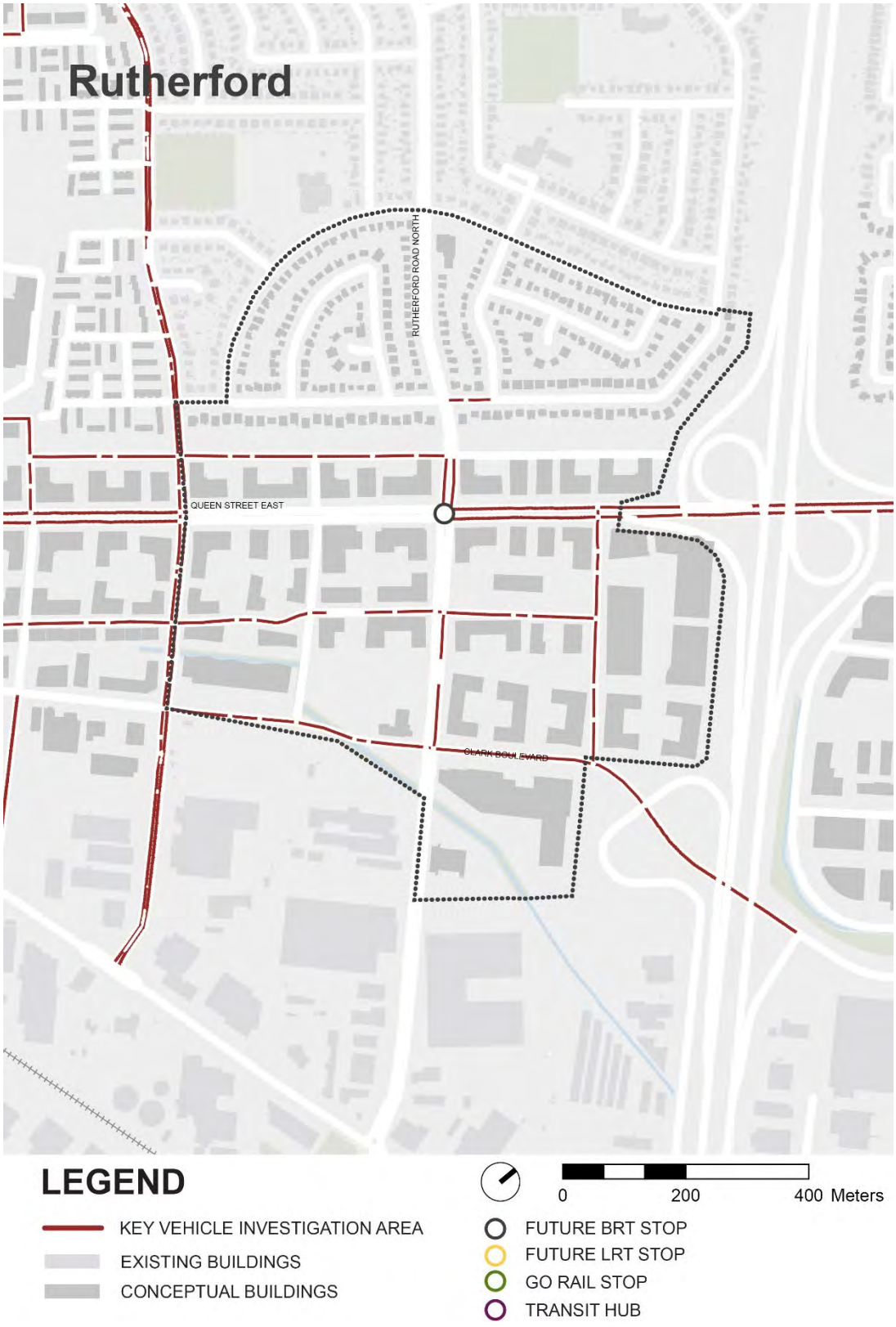

Figure 6-56: Rutherford Vehicle Network Assessment

6.4.4.2 Stormwater Analysis of Future Conditions

The Rutherford MTSA allocates just 2% of its total area for open space. According to the existing condition report, the MTSA presently exhibits a high overall imperviousness of 86%. Due to this already significant imperviousness within the MTSA, it is expected that the addition of new streets will not adversely affect the existing stormwater network relative to existing conditions.

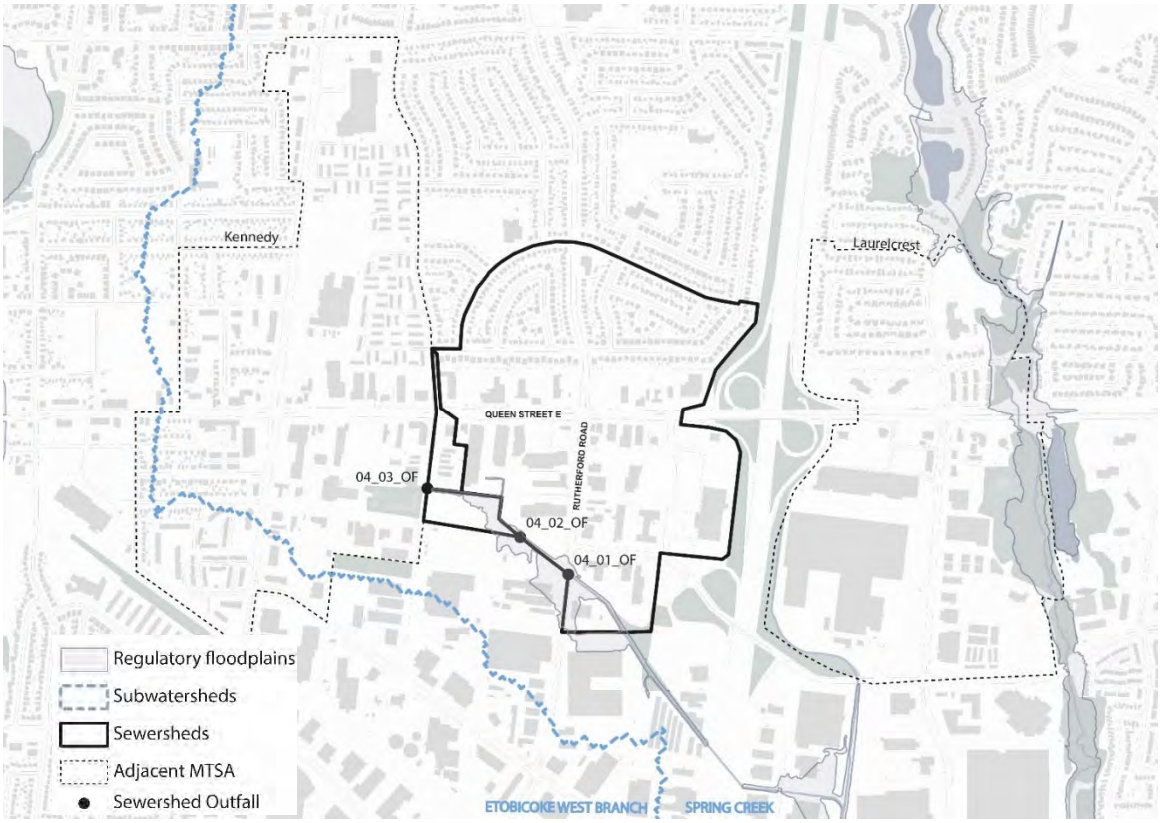

Figure 6-57: Rutherford Sewersheds and Outfalls

The City intends to open a significant number of streets within Rutherford MTSA. These new streets are expected to lower actual peak flows by introducing vegetation to the current predominantly impervious landscape. The table below validates the projected outcomes. Consequently, there is no need for water storage to offset an increase in peak flow.

Table 6-10: Rutherford – Comparative Analysis of Existing and Proposed Conditions, 100-year Peak Runoff

Sewershed	Existing Peak Runoff (L/s)	Proposed Peak Runoff (L/s)	Difference (%)	Required Detention (m^3)
04_01	9968	9925	-0.4%	-
04_02	455	453	0%	-
04_03	412	410	0%	-

Almost 3 kilometers of new streets are planned to be open in this MTSA. If the City proceeds with the proposed complete streets typologies and includes retention swales in those streets, up to 3244 m^3 of water could be stored at the source which will result in a reduction in peak flow compared to the existing conditions for all the sewersheds where streets will be developed.

Table 6-11: Rutherford – Available Detention Volume per Street Tyle

Sewershed	Length of New Streets (m)		Volume Available in Retention swales (m3)		
	Type 2	Type 4	Type 2	Type 4	Total
04_01	1082.5	1301.5	1250	1504	2754
04_02	-	311	-	359	359
04_03	100	13.5	115	16	131

Table 6-12: Rutherford – Adjusted Peak Runoff with Implementation of Retention swales within Complete Streets' ROW

Sewershed	Existing Peak Runoff (L/s)	Adjusted Proposed Peak Runoff (L/s)	Difference	Detention Deficit (m^3)	Outcome
04_01	9968	9245	-723 L/s (-7.3%)	-	Improvement of flow conditions
04_02	455	365	-90 L/s (-19.8%)	-	Improvement of flow conditions
04_03	412	392	-20 L/s (-4.8%)	-	Improvement of flow conditions

6.4.5 Summary of Servicing Observations

The Region of Peel separately commissioned studies of potable water and wastewater/sanitary sewerage servicing on an MTSA-by-MTSA basis. Details from these studies with relevance to planning activities are summarized here solely for the convenience of the reader and to facilitate consideration of implications for MTSA network planning. Arup assumes no liability for the accuracy of those analyses and reports or the completeness of the summary. The Peel Region reports were based on preliminary land use plans and build-out projections provided by the City of Brampton directly to the Region of Peel in 2022. Some adjustments have occurred to land-use plans and build-out projections, which may alter some of the reports' conclusions.

6.4.5.1 Water

The following information is drawn from the report titled "Water and Wastewater Servicing Study MTSA Lands – Contract 1, Water Report," dated April 23, 2024 and prepared by GM BluePlan, hereinafter (GMBP Water Report – Contract 1). The report concludes that all service-level criteria (pressure, velocity, and fire-flow availability) can be satisfied under the growth scenario, other than new local servicing.

The report identifies already planned water upgrades.

Identifier	Already Planned System Upgrade	Existing Source	Cost Estimate ($2020) as per 2020 DC Study
MTSA6-W-4	400mm Upgrade along Queen Street between Kennedy Road to Highway 410	Development Charges Study (Proj. # 251199)	Costs previously identified under MTSA 5
MTSA6-W-5	400mm watermain replacement on Clark, between Rutherford and Highway 410	State of Good Repair Program	n/a Costs from Peel's SOGR Team
MTSA6-W-6	400mm watermain replacement on Rutherford, north of Archdekin	State of Good Repair Program	n/a Costs from Peel's SOGR Team

Figure 6-58: GMBP planned water upgrades

The report also identifies developer-driven water servicing that will be required for new buildings and streets.

Identifier	Additional System Upgrade	Rationale	Assumed Watermain Size (mm)	Length (m)	Notes	System Upgrade Cost Estimate $2023
MTSA6-W-1	Various Local Upgrades along Future Streets south of Queen (between Hansen and Rutherford)	New local servicing on new ROWs	300	780	Local servicing upgrades in new ROWs	$2,500,000
MTSA6-W-2	Various Local Upgrades along Future Streets south east of Rutherford & Queen	New local servicing on new ROW	300	1700	Local servicing upgrades in new ROWs	$5,300,000
MTSA6-W-3	Local watermain extension (future Clark ROW) between Hansen and Rutherford	New local servicing on new ROWs	300	450	Project also seems to have a placeholder in the DC Study (Proj. #201157)	$1,900,000
	Total for New Projects within MTSA 6					**$9,700,000**

Figure 6-59: GMBP local water servicing upgrades

6.4.5.2 Wastewater/Sanitary

The following information is drawn from the report titled "Water and Wastewater Servicing Study MTSA Lands – Contract 1, Wastewater Report," dated April 23, 2024 and prepared by GM BluePlan, hereinafter (GMBP Wastewater Report – Contract 1). The report notes that the Rutherford and Kennedy MTSAs are tightly linked and that strategies to address wastewater constraints will need to be developed simultaneously. The report notes numerous existing and future constraints based on the future growth scenarios, including:

- Surcharging on Church Street west of Kennedy Road, caused by local growth.

- Surcharging on several sections of Hansen Road, primarily due to growth in the northeast area of the Kennedy MTSA.
- Capacity constraints on Kennedy Road North because of upstream growth
- Constraints on Queen Street within the Rutherford MTSA because of growth from new developments along and south of Queen Street
- Surcharges along Archedekin and downstream sewer on Rutherford North and Heartlake Road because of upstream growth. This was already identified as an existing issue.

The GMBP Wastewater Report – Contract 1 proposes two alternatives to address the identified wastewater constraints. The preferred alternative includes a potential deep sewer along Queen Street to support transfer across to a future Kennedy trunk. The solution, however, was noted to be a long-term upgrade and will requiring more detailed assessment. Details for both options are included within the GMBP Wastewater Report.

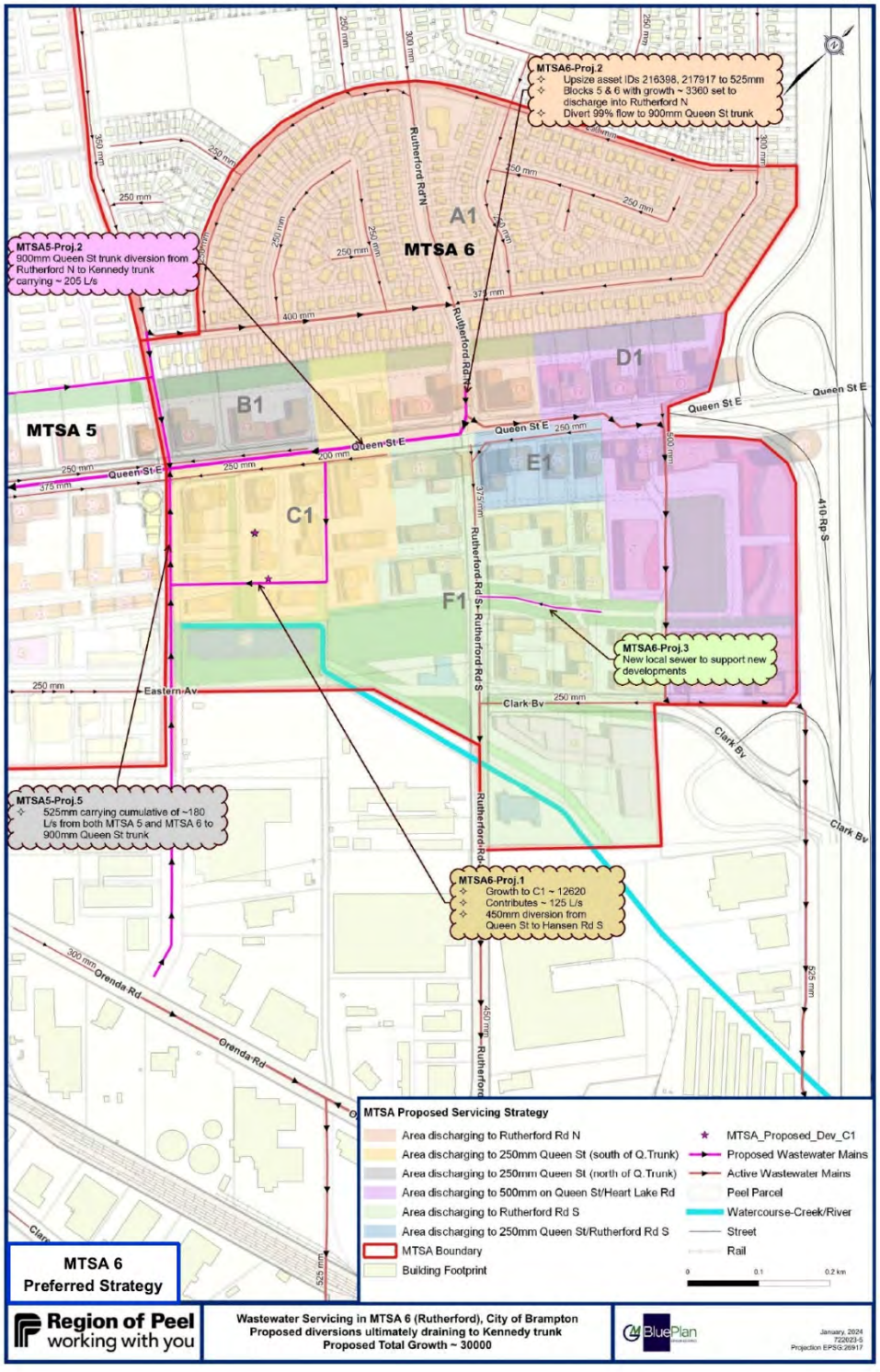

Figure 6-60: GMBP preliminary preferred strategy

The report provides a high-level cost estimate for the preliminary preferred option.

Table 10: High Level Cost Estimate for Preliminary Preferred Strategy

System Upgrade ID (Complexity)	Project Description	Rationale / Reason for Upgrade	Assumed Sewer Size (mm)	Length (m)	System Upgrade Cost Estimate ($)
MTSA5-Proj.1 Medium	Diversion from Hansen/Sutherland to Kennedy Trunk	Support new growth with new local street network	450	435	5.75 M
MTSA5-Proj.2 High	Queen St trunk diversion connecting to Kennedy trunk	Divert most of MTSA 5&6 flows to Kennedy trunk	900	900	26.84 M
MTSA5-Proj.3 Medium	Diversion from Hansen/Archdekin to 900mm Queen trunk	Avoids d/s surcharging	525	200	3.26 M
MTSA5-Proj.4 Medium	Diversion from Kennedy/Charles to Hansen Rd N	Avoid Kennedy constraints	450	450	0.77 M
MTSA5-Proj.5 Medium	Reversed sewer along Hansen connecting to proposed Queen St trunk	Avoids d/s surcharging	525	700	8.45 M
MTSA5-Proj.6 Medium	Diversion (Church St to June Ave) & 300mm diversion (Charles St to Kennedy)	Avoids Church St constraints	250	200	0.77 M
MTSA6-Proj.1	Diversion from Queen, east of Hansen towards Kennedy @ Hillcrest	Avoids Local Queen St E. constraints	450	400	0.69 M
MTSA6-Proj.2	Rutherford Road North Upsizing, north of Queen Street	Avoids Rutherford St. constraint	525	100	1.21 M
MTSA6-Proj.3	New Local Sewer, east of Rutehrford, north of Clark	Local servicing need	300	200	0.30 M
Total for Projects within MTSA 5&6 $					**48.0 M**

Note that project costs are high level and subject to change with detailed analysis and decision on final strategy.

Figure 6-61: GMBP high-level cost estimate for preliminary preferred option

Although the precise timing for development within the MTSA is unknown, the report outlines potential capacity triggers for required upgrades to the wastewater system.

Table 11: Capacity Upgrade Triggers MTSA 5&6

System Limitation (as per Section 8.4)	Growth Area that Causes the Limitation	MTSA Population of the Growth Area	Approximate Trigger Population	Notes
Hansen/Sutherland A.ID: 216875	A + Upstream	8640	1600	Upgrade Needed to Resolve = Project 1 (Upstream bounded by W: Kennedy; E: Rutherford N; N: Williams Pky; S: Vodden St)
Charles St A.ID: 223295	D	1310	200	Upgrade Needed to Resolve = Project 6 (Upstream bounded by W: Kennedy; E: Rutherford N; N: Williams Pky; S: Vodden St)
Archdekin Rd A.ID: 216362	A+B+part of A1+Upstream	8800	3000	Upgrade Needed to Resolve = Project 3 (Upstream bounded by W: Kennedy; E: Rutherford N; N: Williams Pky; S: Madoc Dr)
Rutherford N A.ID: 216398	A+B+A1+Upstream	9200	Existing constraint	Upgrade Needed to Resolve = Project 2 (Upstream bounded by W: Kennedy; E: Highway 410; N: Williams Pky; S: Madoc Dr)

For the above table, please refer to the following MTSA 5 & 6 preferred strategy maps (on subsequent pages) to understand the growth area notations. In the above table, all the upstream flows due to 2051 growth are considered and removed from the limiting sewer's available capacity. Thus, the trigger population is the capacity available for MTSA growth inside the boundary.

For example, the Archdekin Rd sewer receives growth flows from upstream areas (outside the MTSAs), as well as growth from some areas within the MTSAs. The upstream growth is already subtracted from the calculation, so the remaining capacity is mentioned as a trigger population within the MTSA's associated area. In this example, the growth areas within the MTSA that impact the need for this upgrade are marked as Area "A", Area "B" and Area "A1" from the two subsequent maps of the Preferred MTSA 5 & 6 Strategies. The total MTSA growth for these areas reaches ~ 8800. However, the trigger or limiting capacity available for that sewer is estimated as closer to ~3000. As such, once there are developments, within those areas, that reach 3000 then the upgrade need would be triggered.

Each of the proposed upgrades and the sub-blocks are provided in the following summary graphics for MTSA 5 & MTSA 6, respectively.

Figure 6-62: GMBP wastewater capacity-triggers for upgrades

6.4.6 Proposed Street Classifications and Stormwater Interventions

6.4.6.1 New Link Proposed Complete Streets Classification

The proposed street connections in the Rutherford MTSA have been assigned the following street classifications:

- Between Hansen Road North and Rutherford Road North: mixed-use neighbourhood street;
- Between Rutherford Road North until just west of Highway 410: mixed-use neighbourhood street;
- Between Queen Street East and the proposed road connection to the north, west of Rutherford Road North: mixed-use neighbourhood street;
- Between Queen Street East and Clark Boulevard; mixed-use neighbourhood street

- Between Hansen Road South and Rutherford Road South, linking Eastern Avenue and Clark Boulevard: street classification to be determined by City of Brampton;
- Between Hansen Road South and Rutherford Road South, to the north of the connection linking Eastern Avenue and Clark Boulevard: mixed-use neighbourhood street;
- Between Queen Street East and the new connection linking Easter Avenue and Clark Boulevard: local employment street;

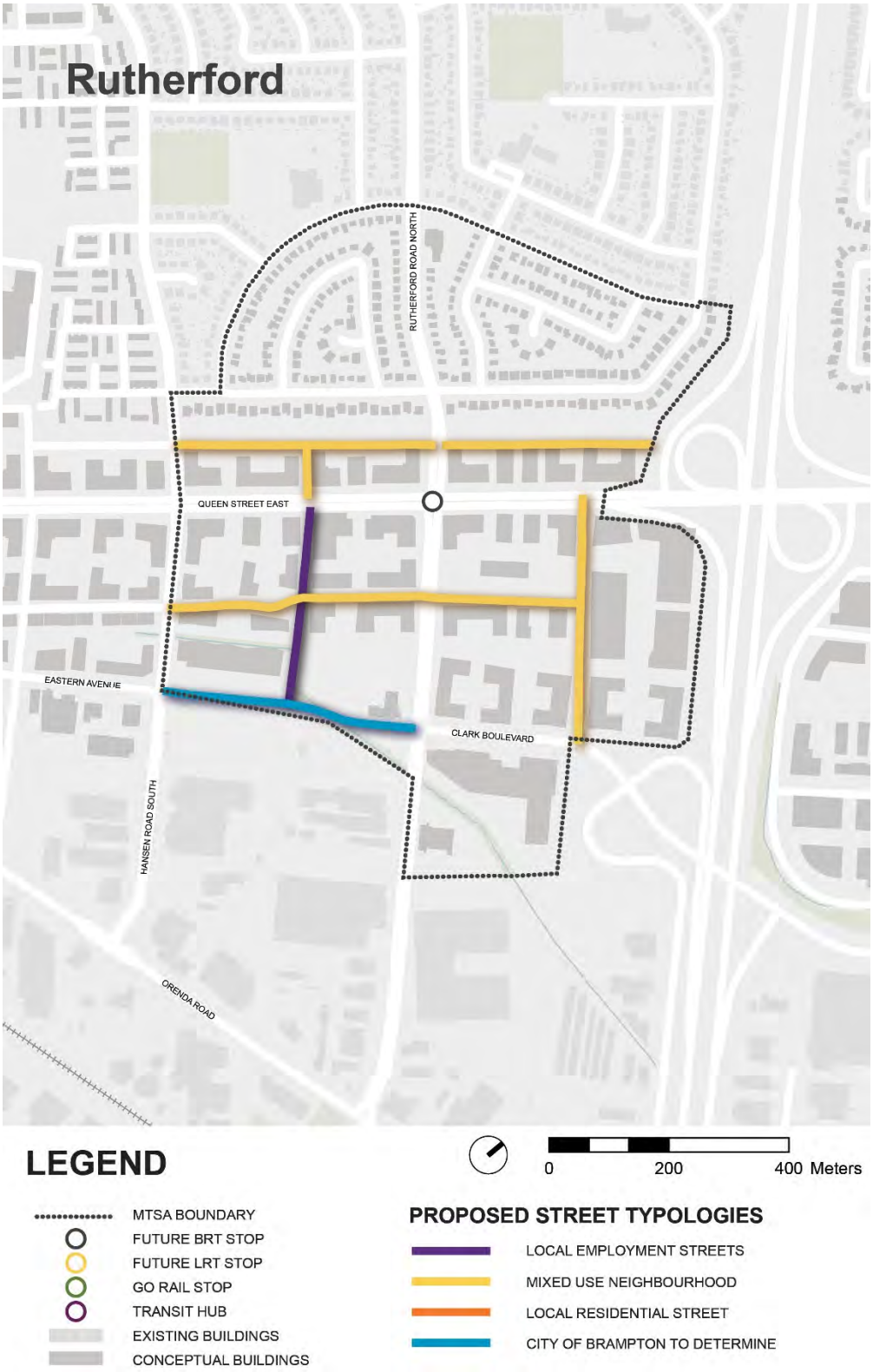

Figure 6-63: Rutherford Proposed Complete Streets Classification

6.4.6.2 Combined Transportation Network and Stormwater Management Recommendations

The figure below illustrates the final transportation network and stormwater management proposals for the Rutherford MTSA. It includes the proposed transportation network refinements identified in the City's preliminary land use plans as well as those identified through the transportation analysis.

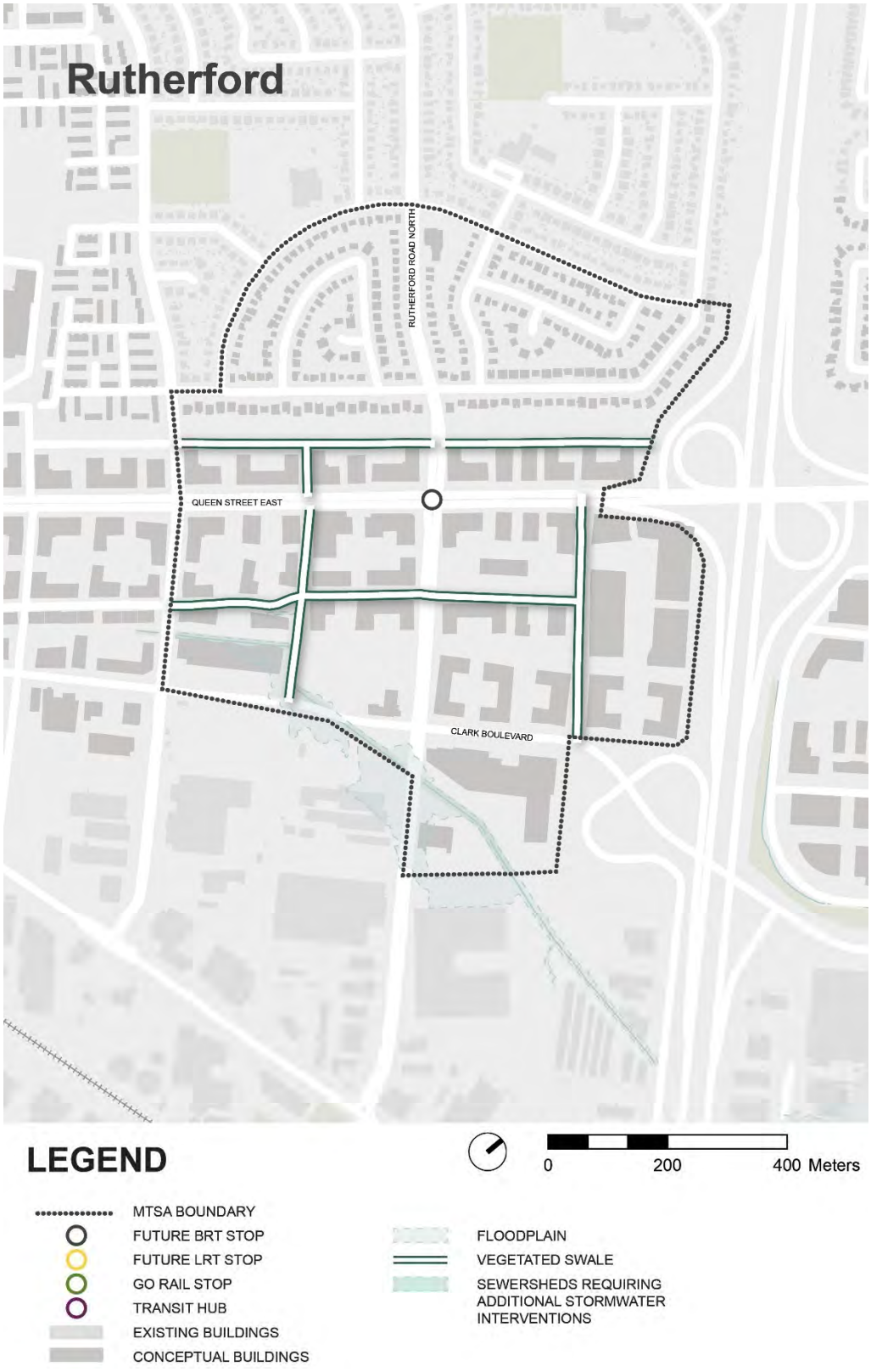

Figure 6-64: Rutherford Combined Transportation Network and Stormwater Interventions

6.4.7 MTSA-Specific Policy Recommendations

Several objectives in the Rutherford MTSA are best met through the application of general and location-specific policies in addition to the proposed network adjustments. Policies that should be considered for this MTSA are listed below. Parenthetical information provides rationale for specific policies.

- **General transportation network enhancements:**
  - Road and active-transport infrastructure should be provided to support comfortable, direct, and safe travel for sustainable modes and bolster transit ridership.
- **Roads:**
  - To create a finer-grain network, several new street alignments are proposed between:
    - Hansen Road North and Rutherford Road;
    - Rutherford Road North until just west of Highway 410;
    - Queen Street East and the proposed road connection to the north, both east and west of Rutherford Road North;
    - Hansen Road South and Rutherford Road South, linking Orenda and Eastern Avenue;
    - Hansen Road South and Rutherford Road South, to the north of the connection linking Orenda and Eastern Avenue;
    - Queen Street East and the new connection linking Orenda and Easter Avenue;
    - Queen Street East and Eastern Avenue; and
    - A U-shaped road connecting to the proposed road connecting Queen Street East and Eastern Avenue.
  - The City of Brampton should work with developers through the planning approval process to secure rights of way with sufficient width to accommodate revised complete streets typologies, including proposed green infrastructure to address publicly managed stormwater flows. Final widths and alignments will be determined through future detailed studies.
  - Traffic-calming measures should be leveraged on local or neighbourhood roads to reduce cut-though traffic on streets that are meant to provide access to residences or businesses or roads that play a major role in pedestrian and bike connectivity. Potential strategies include reduced speed limits, chicanes, and speed humps or tables. These strategies should be considered for Hansen Road, Eastern Avenue, Orenda Road, the proposed street connection between Hansen Road and Rutherford Road North, and the proposed street connection between Queen Street East and Clark Boulevard.
- **Active travel:**
  - Sidewalks and/or other appropriate pedestrian facilities should be provided along both sides of all new and existing streets. (A policy which ensures that all future streets include pedestrian facilities on both sides, and that all existing streets are upgraded to add this infrastructure where missing, is critical for the development of a safe and convenient pedestrian network.)
  - Bike infrastructure (including, but not limited to, recreational trails, multi-use paths, bike lanes, and protected bike lanes) should be provided in accordance with the Active Travel Master Plan. Additional infrastructure should be implemented where needed to promote network connectivity and reduce circuity of protected bike trips to the Rutherford BRT stop. (Within the proposed network, cyclists travelling to the Rutherford BRT stop will experience more circuitous routes than pedestrians. Where possible, the

City of Brampton should work with developers to identify additional mid-block connections that serve cyclists, as well as pedestrians.)

- The provision of new bike lanes and multi-use paths must be complemented by the installation of bike parking at key destinations, such as the Rutherford BRT stop and Madoc Drive Public School.
- New developments should be designed to minimize walking distance to transit or other key destinations through the inclusion of mid-block connections.
- New neighbourhood parks and other open spaces should include dedicated pedestrian and bike infrastructure to enhance connectivity.
- New active crossings over the planned BRT corridor on Queen Street East between Hansen Road and Rutherford Road should be provided to enhance pedestrian and bike connectivity. To reduce negative travel-time impacts on the planned transit service, consideration should be given to crossings that do not require transit vehicles to stop, including overpasses, underpasses, or unsignalized transit-lane crossings.
- Pedestrian and cyclists should be prioritized at high-demand intersections, such as Queen Street East / Rutherford Road and Queen Street East / Hansen Road. Consideration should be given to including operational modifications or design treatments that prioritize active travel users include pedestrian-scramble signal phases, pedestrian head starts, no right turns on red, raised crosswalks or intersections, and protected intersections.
- The stretch of Queen Street East over Highway 410 should be made more comfortable and safe for pedestrians through the implementation of wider sidewalks and demarcated crosswalks.

- **Building servicing**:
  - Vehicular access to buildings that front onto major streets, such as Queen Street in the Rutherford MTSA, should be provided via local back streets or service lanes. (This will help maintain traffic flow on the major roads while also providing uninterrupted active-travel facilities for pedestrians and cyclists.)
- **Travel-demand management**:
  - Travel-demand strategies for new development should be emphasized for developments expected to contribute vehicular traffic to Hansen Road, Eastern Avenue, Orenda Road, the proposed street connection between Hansen Road and Rutherford Road North, and the proposed street connection between Queen Street East and Clark Boulevard. (Intensification in the MTSA must be coupled with a range of travel demand management strategies that promote the use of active modes and transit over cars in order to reduce congestion and promote sustainable travel.)
- **Stormwater:**
  - All new developed streets should be designed according to the new complete street guidelines. Exact retention swales dimensions should be calculated for each new street to ensure that the new streets do not cause increase in peak flow for each applicable design storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms).
  - Developments within the MTSA shall be required to implement stormwater management techniques required to provide post to pre control for all storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms), as required by CVC and TRCA.

6.4.8 Recommendations for Further Transportation Network Enhancement

Several recommendations for refining Rutherford MTSA's street network were identified through the transportation analysis conducted as part of this study. Key refinements include:

- Adding an active connection following the stream south of Queen Street East (U1);
- Formalizing the existing service road running parallel to Highway 410 as an active connection (U2), which may require discussions with MTO
- Adding a public or private street south of Queen Street East to service the conceptual buildings (U3)
- Providing a separated cycling lane on Hansen Road and improve the pedestrian connection (U4)
- Adding a connection link between Clark Boulevard and proposed road to the north(U5)
- Upgrading intersection of roads with bicycle infrastructure to high quality intersections (protected) (U6)
- Adding a local bus service that runs east west on Clark Boulevard to improve accessibility to transit (U7)

Figure 6-65: Rutherford Preliminary Transportation Network Refinements

6.5 MTSA 05 – Laurelcrest

The Laurelcrest MTSA is sandwiched between Highway 410 to the west and a series of parks forming a natural heritage area to the east. The MTSA is planned to include high-rise and mid-rise mixed-use areas; high-rise, mid-rise, and low-rise residential areas; industrial areas; a new park; and a school. The Queen Street BRT will provide the primary higher order transit service in the MTSA. As the Laurelcrest MTSA will be served by a BRT station, it has a density target of 160 residents and jobs combined per hectare.

To support the increased density proposed in this MTSA, a range of street-network refinements have been identified. These include street extensions and mid-block connections proposed by the City of Brampton in their land-use plan, bike facilities identified in the Active Transportation Master Plan, and further recommendations flowing from the transportation analysis described herein. Key refinements include the addition of a new street network in the southern half of the MTSA; mid-block active connections linking these new street connections to each other and to existing streets; bike facilities on Clark Boulevard, West Drive, and Laurelcrest Street; and a pedestrian bridge providing a connection to the Rutherford MTSA.

The implementation of more than 3.5 km of new streets in the Laurelcrest MTSA is predicted to cause a slight increase in peak flow released in the stormwater network at two outfalls of the MTSA. The increase could be mitigated with a proper management of extra storm water at the source. Retention swales of around three meters wide will potentially be sufficient to manage this increase and even reduce the peak flow lower than the existing one, as presented in this section.

6.5.1 Existing Conditions

The Laurelcrest MTSA includes medium- and high-density land uses to the north and commercial and industrial land uses to the south. The MTSA also includes a school, as well as some natural heritage areas along the eastern edge.

Figure 6-66: Laurelcrest Existing Conditions Land Use Map

The northern portion of the MTSA is generally characterized by a fine-grain street network while the southern portion of the MTSA has a larger grid due to the mix of commercial and industrial uses. The major north-south road in the MTSA is Laurelcrest Street / West Drive and the major east-west road is Queen Street East. Highway 410 runs along the western side of the MTSA and a highway interchange is located immediately to the west of the MTSA. In addition to being served by the future Queen Street BRT, the Laurelcrest MTSA is also served by local buses running along Queen Street East, West Drive, and Clark Boulevard.

There is a natural heritage system on the east flank of Laurelcrest MTSA. A small portion of a watercourse traverses the southwest end of the MTSA.

Figure 6-67: Laurelcrest Existing Conditions Map

6.5.2 Community Objectives

The preliminary land-use plan for the Laurelcrest MTSA was discussed in a public focus-group session held on January 19, 2023. In general, the discussion centered around four points: 1) what is working in the MTSA; 2) what is not working in the MTSA; 3) what is missing in the MTSA; and 4) how could the MTSA be improved. During the workshop, attendees noted that the MTSA benefits from the presence of nature trails, different services and amenities, and the industrial area which provides jobs. They also noted some concerns, including dangerous intersections, a disconnected trail system with narrow trails and inadequate lighting, and portions of roadways that are unsafe for pedestrians. Furthermore, the attendees noted that the MTSA is missing banks, public washrooms, garbage cans, green spaces, good access to the recreation centre, and accessible trail connections. Thoughts about improving the MTSA included adding wider trails with lighting and garbage cans, making Queen Street East more pedestrian friendly, redevelopment that includes smaller block sizes, and improving traffic flow on West Drive / Laurelcrest Street.

A complete summary of the focus-group session is included in Appendix D.

6.5.3 City of Brampton Land-Use Plan

The final land-use plan for the Laurelcrest MTSA was approved by Brampton City Council in October 2023 as part of the update to the city's Official Plan. The approved land use plans were the result of iterative refinements based on qualitative and quantitative analyses of preliminary land use plans conducted by Arup over the course of this engagement and community engagement.

The Laurelcrest MTSA land-use plan has a large portion of land dedicated to the natural heritage system along its eastern edge. There is a development of single-family homes north of Queen Street with limited development potential. Most of the Laurelcrest MTSA's development potential is concentrated south of Queen Street. The highest density uses are concentrated along Queen Street, with mid-rise and industrial uses located farther south. An east-west landscape buffer is proposed to separate the industrial areas from mixed-use areas. A natural systems buffer, in the southwest quadrant, runs north-south along the western edge of the MTSA and separating it from Highway 410

This MTSA is located on the Queen Street bus rapid transit corridor. In addition to the BRT corridor, key mobility elements of the proposed plan include:

- A new network of streets south of Queen Street East, including a C-shaped street west of West Drive, a north-south connection between Queen Street East and Clark Boulevard east of West Drive, and several internal connections;
- Several active connections linking the new proposed streets south of Queen Street East to Queen Street East, West Drive, and Clark Boulevard;
- A proposed pedestrian bridge between Rutherford and Laurelcrest MTSAs;
- A proposed multi-use path on Clark Boulevard; and
- Proposed protected bike lanes on Laurelcrest Street / West Drive.

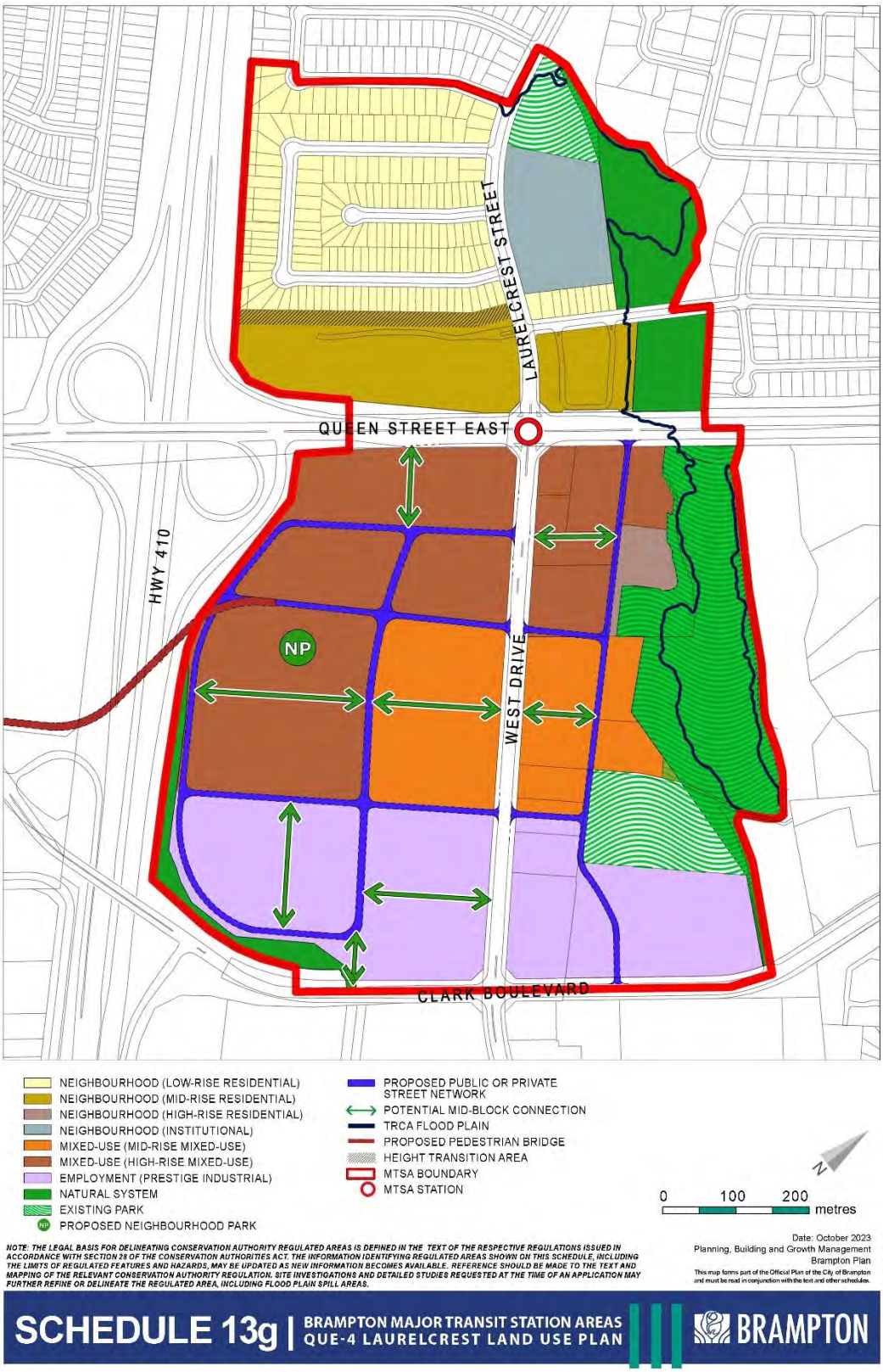

Figure 6-68: Laurelcrest Proposed Land Use Plan (City of Brampton)

6.5.4 Analysis of Proposed Conditions

The analysis illustrated in the following subsections considers estimated travel demand and network characteristics, as well as stormwater flow conditions assuming the implementation of the final council-approved land-use plans.

6.5.4.1 Transport Analysis of Future Conditions

The future-conditions transportation analysis considers the expected distribution of relative travel demand with respect to the existing and future street network; identifies potentially high-demand bike and pedestrian routes between future development and the closest transit stop to assist in prioritizing active-travel-infrastructure investments; and points to areas within the vehicular network that may require additional study or intervention.

Travel Demand Distribution

Demand per street segment is largely driven by the size and type of developments anticipated for each block. The areas of highest demand are clustered in the southwest corner of the MTSA adjacent to Queen Street East. Generally speaking, the southern half of the MTSA (where most of this MTSA's redevelopment will occur) generates more demand than the northern half of the MTSA, which primarily consists of single-family dwellings.

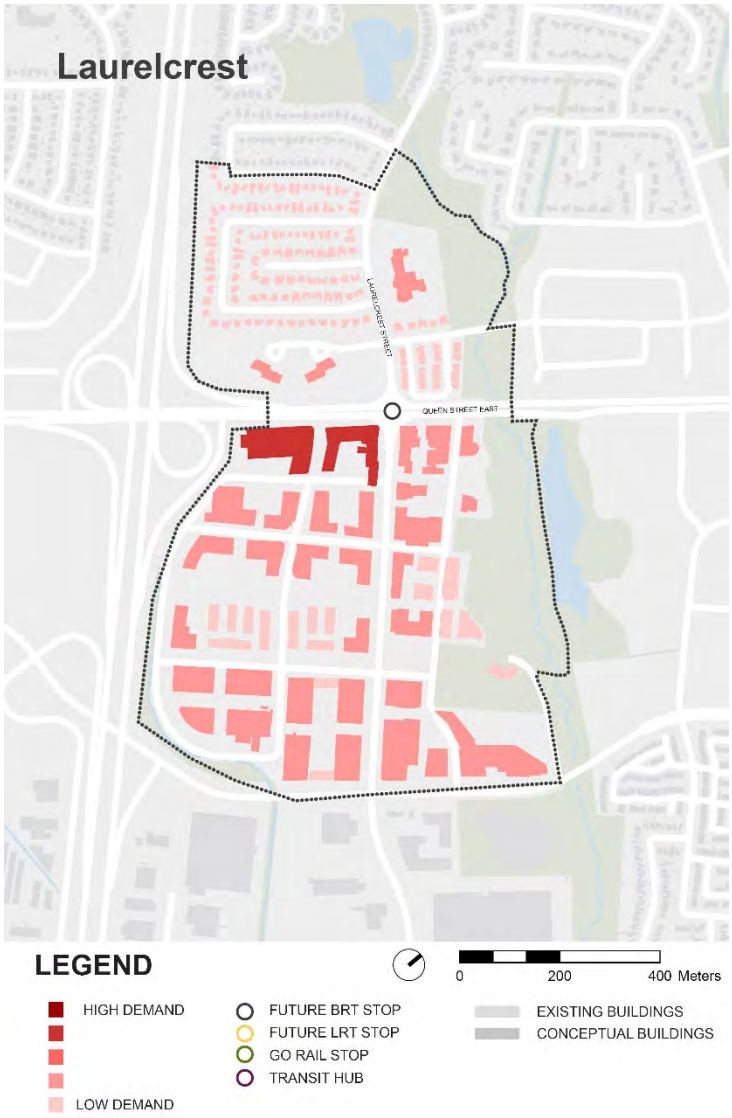

Figure 6-69: Laurelcrest Building Demand Aggregation – Vehicle and Transit Demand

Active Travel Between Development and Transit

The figure below shows aggregated bike demand per street segment in the PM peak hour in the future condition. Demand levels are highest in the southern portion of the MTSA. West Drive, in particular, sees high levels of use indicating that the proposed protected bike lanes on this street are well placed.

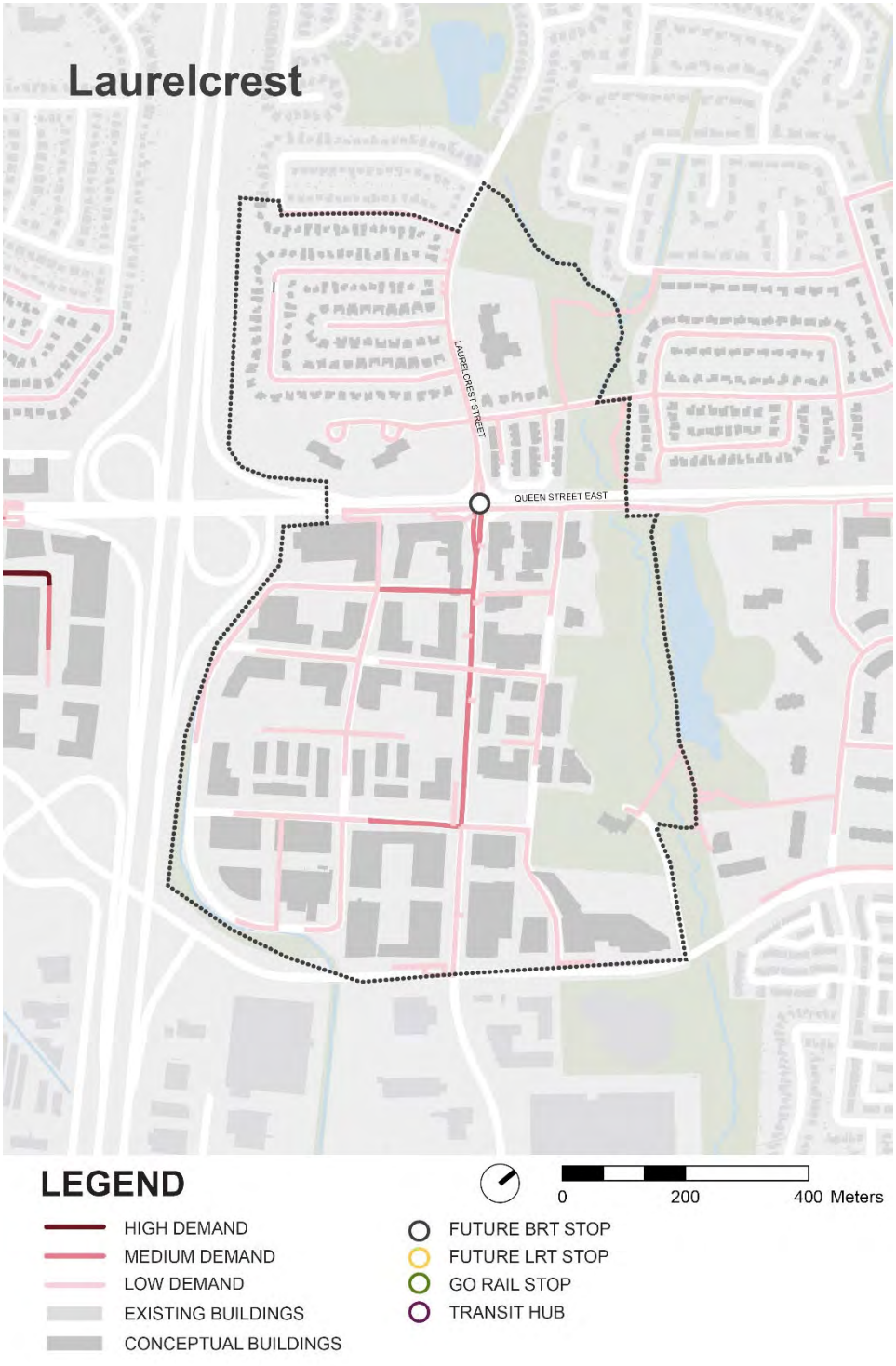

Figure 6-70: Laurelcrest Aggregation of Bike Demand to and from the Nearest Transit Stop

Walk demand in the Laurelcrest MTSA is concentrated in the southwest quadrant. Both West Drive and the proposed street and active connection immediately to the west shoulder a lot of this demand. The mid-block active connections play a key role in getting people to and from the transit station. The streets and active connections south of Queen Street East should be designed to include street furniture and other pedestrian amenities to ensure pedestrian comfort during trips to and from the BRT stop.

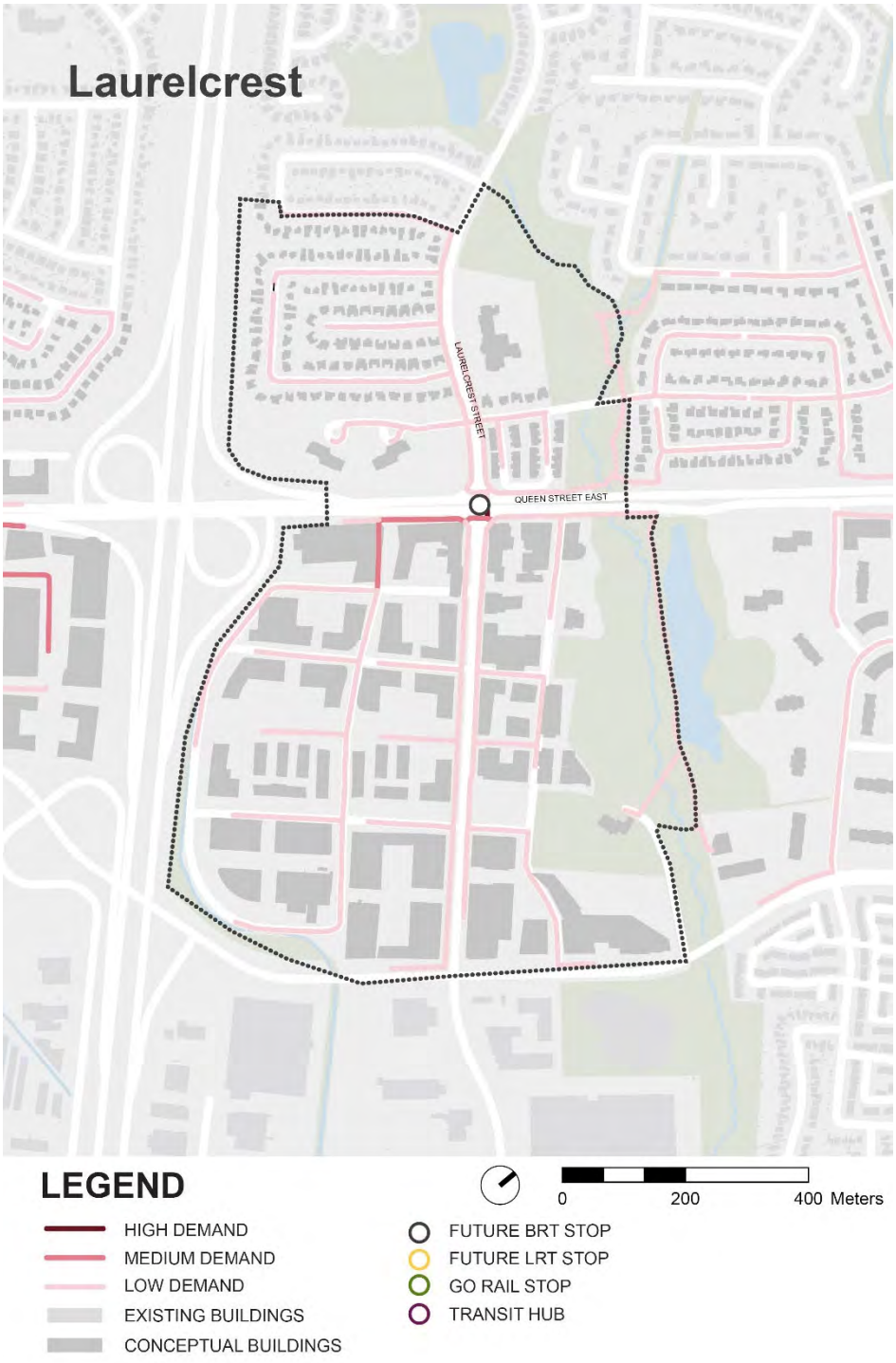

Figure 6-71: Laurelcrest Aggregation of Walk Demand to and from the Nearest Transit Stop

Accessibility to Local Bus and ZÜM services

The figure below shows the number of local bus stops that an individual can access within a 400 m walk from a building starting point. The proposed conceptual buildings along Queen Street East and Laurelcrest Street South are well served by the City of Brampton local bus service. However, the area adjacent to Highway 410 in the southwest quadrant of the MTSA could benefit from an additional local bus or high-frequency bus service that provides a west-east connection along Clark Avenue.

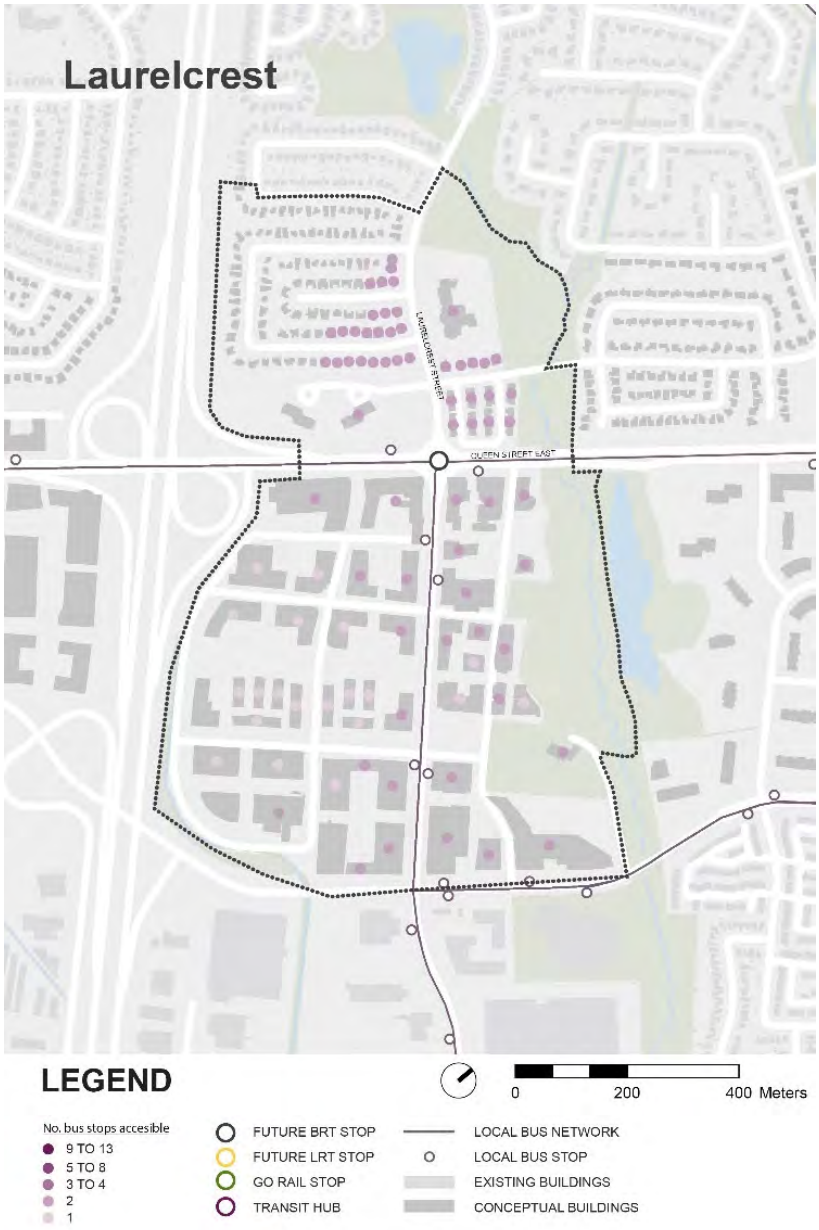

Figure 6-72: Access to local bus service at a 400 m walking distance within the Laurelcrest MTSA

The figure below shows the number of higher order transit bus stops, which includes ZÜM, that an individual can access within an 800 m walk from a building starting point. In general, the proposed conceptual buildings of the Kennedy MTSA are well served by City of Brampton higher-order transit service. However, the area along Clark Avenue in the southern part of the MTSA could benefit from an additional local bus or high-frequency bus service that provides a west-east connection along Clark Avenue.

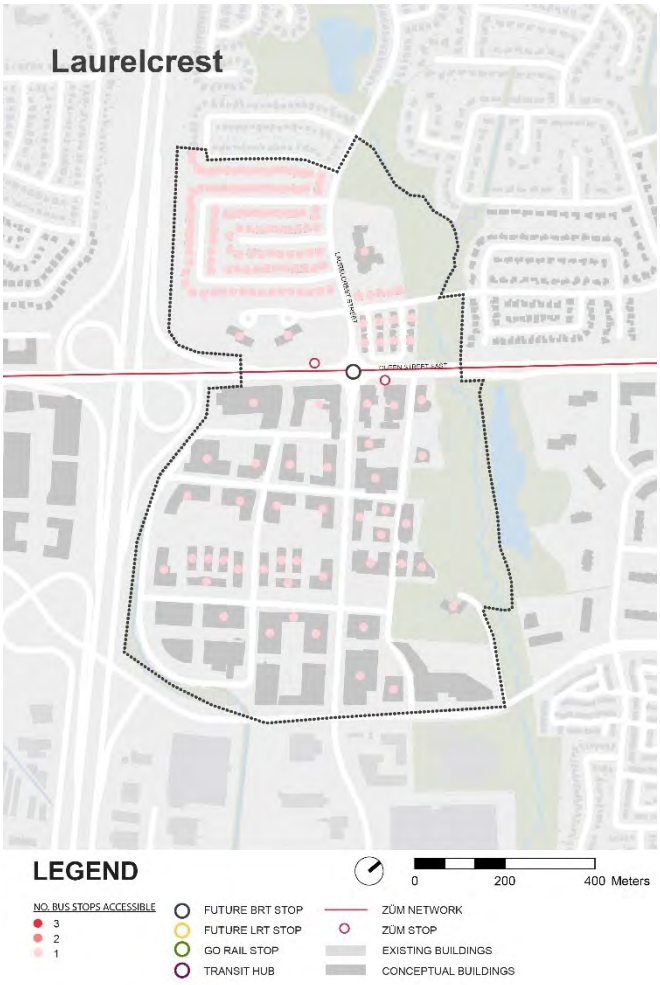

Figure 6-73: Access to higher-order transit service at an 800 m walking distance within the Laurelcrest MTSA

Vehicle Demand

Roads that may warrant additional investigation due to vehicle demand are highlighted in the figure below. This map is not meant to identify street segments that *will* be overcapacity, but rather to identify some street segments that fall on key shortest-path routes and therefore may experience high levels of demand. For the purposes of this review, all proposed streets were expected to accommodate bi-directional traffic, with one lane in each direction. Some key links flagged in this review include:

- Queen Street East
- Lambeth Street

Intensification therefore must be coupled with travel demand management strategies to promote even higher rates of sustainable modes and limit traffic congestion. Furthermore, consideration should be given to deterring through-traffic from using local neighbourhood streets (including the proposed street connections included in this MTSA) to reduce congestion in these areas. Potential strategies include reduced speed limits, chicanes, and speed humps/tables.

Figure 6-74: Laurelcrest Vehicle Network Assessment

6.5.4.2 Stormwater Analysis of Future Conditions

The new local residential street opening in the south of the MTSA will be drained towards sewershed 05_06. This is considered extra runoff for this sewershed since the area on which part of the street will be built on a parcel of land that, in the existing conditions was draining somewhere else. For this reason, sewershed 05_06 and 05_07 are merged and the entirety of this new merged sewershed is expected to be drained towards outfall 05_06.

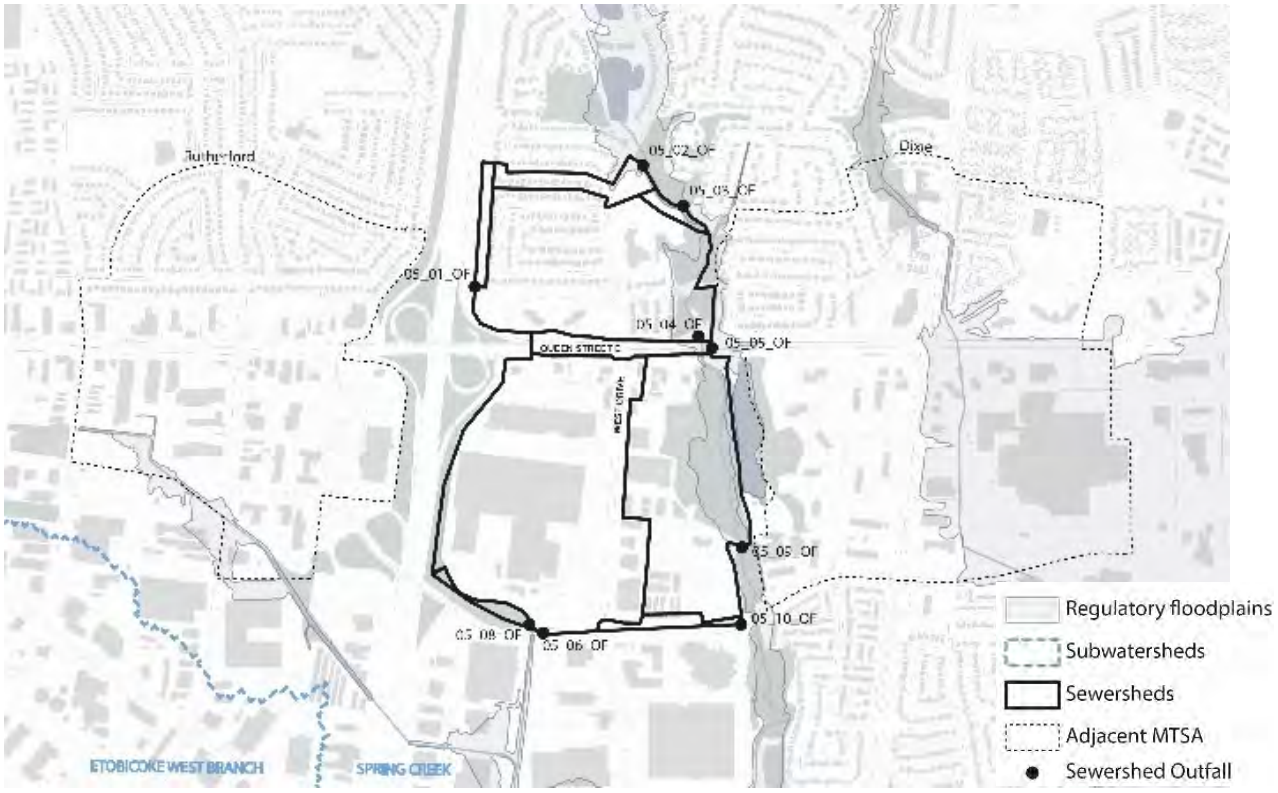

Figure 6-75: Laurelcrest Sewersheds and Outfalls

Slight increases in peak flows can be expected in some sewersheds as the majority of the proposed streets are located in the south part of the MTSA, the part that is less developed at the moment and contains few open spaces.

Table 6-13: Laurelcrest – Comparative Analysis of Existing and Proposed Conditions, 100-year Peak Runoff

Sewershed	Existing Peak Runoff (L/s)	Proposed Peak Runoff (L/s)	Difference	Required Detention (m^3)
05_01	136	136	0%	-
05_02	248	248	0%	-
05_03	39	39	0%	-
05_04	2411	2411	0%	-
05_05	374	374	0%	-
05_06	5543	5633	2%	567
05_07	8	0	-100%	-
05_08	19	19	0%	-
05_09	2100	2121	1%	218
05_10	199	199	0%	-

The new streets within this MTSA will span on approximately 3,600 meters. Streets of 3 types will be implemented in this area. If the City proceeds with the proposed complete streets typologies and includes retention swales in those streets, up to 4380 m^3 of water could be stored at the source. The implementation of retention swales in the new developed streets will result in a reduction in peak flow compared to the existing conditions for all the sewersheds where streets will be developed.

Table 6-14: Laurelcrest – Available Detention Volume per Street Type

Sewershed	Length of New Streets (m)			Volume Available in Retention swales (m^3)			
	Type 2	Type 3	Type 4	Type 2	Type 3	Type 4	Total
05_01	-	-	-	-	-	-	-
05_02	-	-	-	-	-	-	-
05_03	-	-	-	-	-	-	-
05_04	-	-	-	-	-	-	-
05_05	-	-	-	-	-	-	-
05_06	1341.5	751	752	1550	997	866	3413
05_07	-	-	-	-	-	-	-
05_08	-	-	-	-	-	-	-
05_09	805	-	-	928	-	-	928
05_10	37.5	-	-	43	-	-	43

Table 6-15: Laurelcrest – Adjusted Peak Runoff with Implementation of Retention swales within Complete Streets' ROW

Sewershed	Existing Peak Runoff (L/s)	Adjusted Proposed Peak Runoff (L/s)	Difference	Detention Deficit (m^3)	Outcome
05_01	136	-	-	-	-
05_02	248	-	-	-	-
05_03	39	-	-	-	-
05_04	2411	-	-	-	-
05_05	374	-	-	-	-
05_06	5543	4610	-933 L/s (-16.8%)	-	Improvement of flow conditions
05_07	8	-	-	-	-
05_08	19	-	-	-	-
05_09	2100	1945	-155 L/s (-7.4%)	-	Improvement of flow conditions
05_10	199	193	-6 L/s (-3.0%)	-	Improvement of flow conditions

6.5.5 Summary of Servicing Observations

The Region of Peel separately commissioned studies of potable water and wastewater/sanitary sewerage servicing on an MTSA-by-MTSA basis. Details from these studies with relevance to planning activities are summarized here solely for the convenience of the reader and to facilitate consideration of implications for MTSA network planning. Arup assumes no liability for the accuracy of those analyses and reports or the completeness of the summary. The Peel Region reports were based on preliminary land use plans and build-out projections provided by the City of Brampton directly to the Region of Peel in 2022. Some adjustments have occurred to land-use plans and build-out projections, which may alter some of the reports' conclusions.

6.5.5.1 Water

The following information is drawn from the report titled "Water and Wastewater Servicing Report – TSA Lands, East of Highway 410 – Contract 2" dated April 19, 2024 and prepared by Stantec Consulting Ltd, hereinafter (Stantec Water and Wastewater Report – Contract 2). The report concludes that all service-level criteria (pressure, velocity, and fire-flow availability) can be satisfied under the growth scenario, with the exception of some instances where the pressure is < 40 psi, which exist solely on larger existing Zone 4 Central Transmission System and Zone 3 East Transmission System mains. Assessing transmission main issues is outside of the scope of study.

The report identifies already planned water upgrades and shows a map of the proposed water servicing strategy for Laurelcrest.

Table 5-1: Laurelcrest Proposed Water Alignments

Alignment #	Description	Project Type (DC vs Local)	Length (m)
1	300 mm connecting from west of West Dr (300 mm connection) along new local road to Clark Blvd (400 mm connection)	Local	810
2	300 mm connecting from east of existing 300 mm line to east of West Dr (300 mm connection)	Local	632
3	Two 150 mm looped services where they both connect into the new 300 mm backbone and the southern looping connects again onto West Dr (300 mm connection)	Local	1,461

Figure 6-76: Stantec Planned Water Upgrades (Laurelcrest)

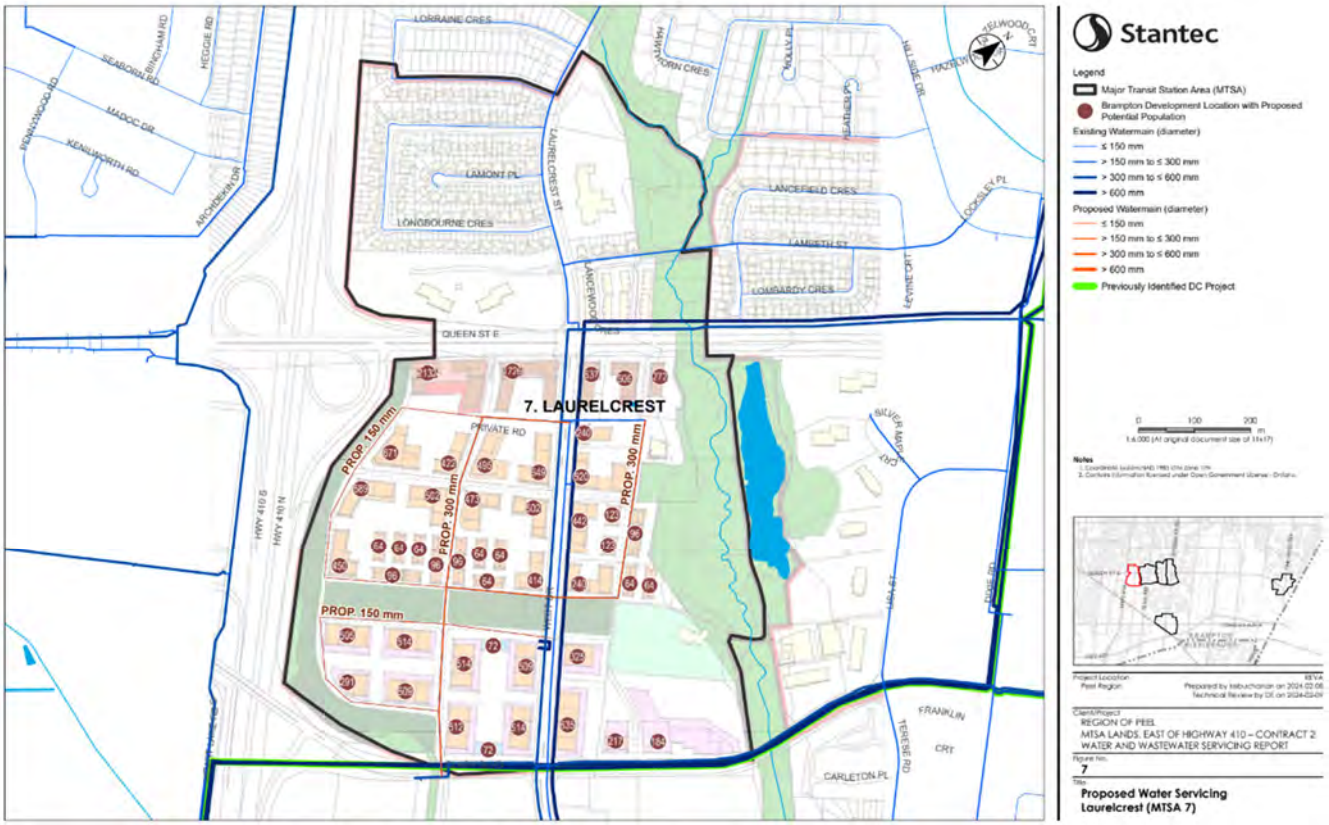

Figure 6-77: Stantec Proposed Water Servicing Strategy (Laurelcrest)

The report presents the breakdown of costs for the preferred water solution.

Table 5-4: Opinion of Probable Costs - Laurelcrest Water Servicing

Pipe Details	Diameter (mm)	Length (m)	Cost
Total DC Projects (≥ 400 mm)	-	-	-
Local Developer-Funded Projects < 400mm	150	1,461	$1,462,576
	300	1,441	$1,494,785
Total Developer-Funded Projects		**2,902**	**$2,957,361**

Figure 6-78: Stantec Cost-Estimate Local Water Servicing Upgrades (Laurelcrest)

6.5.5.2 Sanitary/Wastewater

The following information is drawn from the report titled "Water and Wastewater Servicing Report – TSA Lands, East of Highway 410 – Contract 2" dated April 19, 2024 and prepared by Stantec Consulting Ltd, hereinafter (Stantec Water and Wastewater Report – Contract 2). In this report, the Dixie, Central Park, and Bramalea MTSAs were evaluated as one due to the many overlapping services. According to the report, significant growth in Peel along with intensification puts a strain on existing water and wastewater systems, especially where capacity shortfalls already exist.

The report identifies that pipes have capacity to handle additional flows as a result of development and population growth in the area.

The report proposes recommended wastewater servicing strategy with a proposed wastewater alignment.

Table 5-5: Laurelcrest Proposed Wastewater Alignments

Alignment #	Description	Project Type (DC vs Local)	Length (m)
1	450 mm and 525 mm upgrades on West Dr	DC	1026 (includes upgrades slightly downstream of Laurelcrest on West Dr)
2	Adjust inverts of 250 mm pipe on Clark Rd connecting to 525 mm upsized pipe on West Dr	Local	72
3	250 mm pipe connecting on the east side of West Dr	Local	281
4.1	250 mm pipes connecting to the new 375 mm (to West Dr)	Local	602
4.2	375 mm connecting to West Dr from the west side	DC	189
5	250 mm pipes connecting directly to West Dr (west side)	Local	426

Figure 6-79: Stantec Local Wastewater Servicing Upgrades (Laurelcrest)

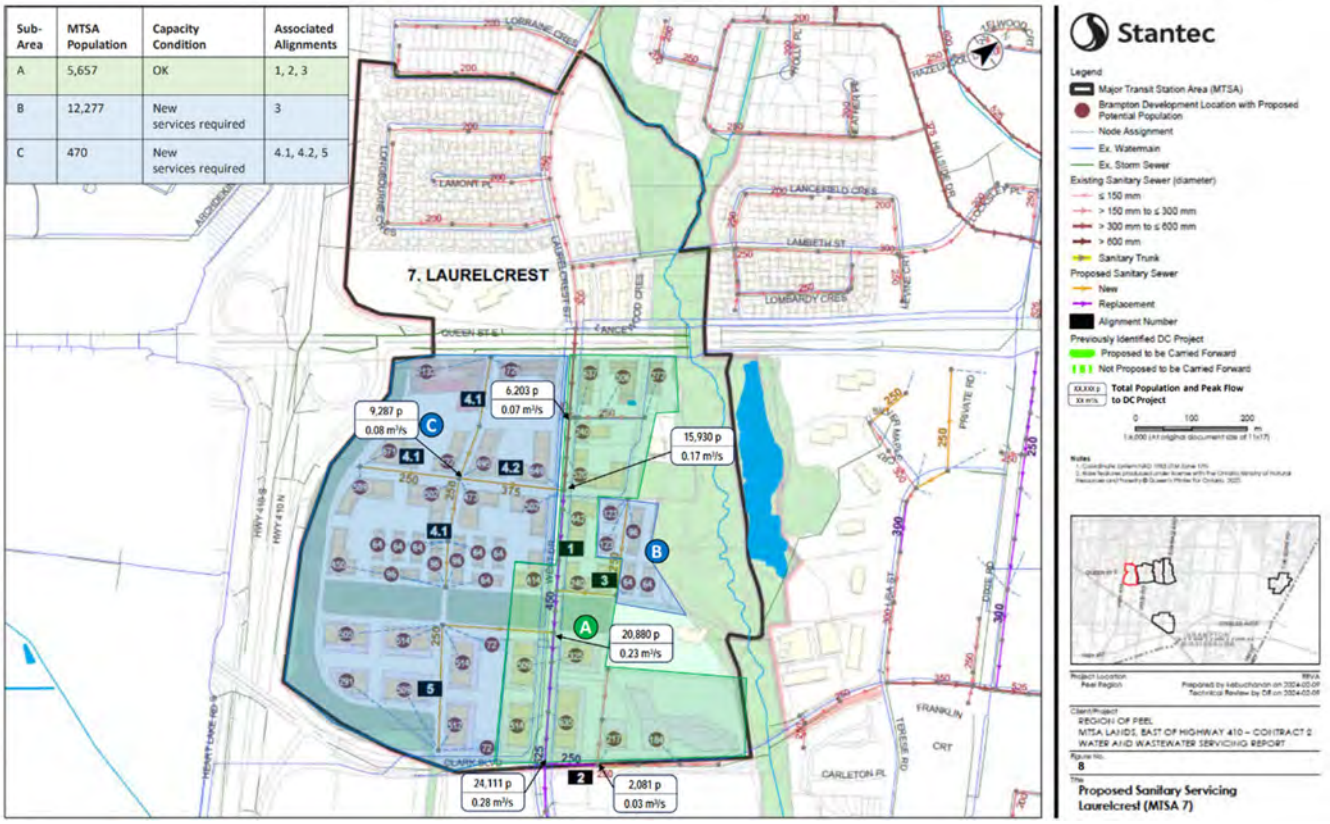

Figure 6-80: Stantec Preferred Wastewater Alternative (Laurelcrest)

The report identifies Clark Blvd as a potentially problematic area, and the strategy avoids work on Clark Blvd altogether. Furthermore, the greenspace noted to exist in future conditions west of West Dr remained untouched in the event future work has to be done. The proposed network also follows the alignment of future proposed roads.

The report also indicates additional future upgrades. West Dr downstream of Laurelcrest was identified as having capacity issues. In this study, only upgrades/services within the Laurelcrest MTSA boundary were proposed, however West Dr downstream upgrades should be assessed in detail as part of future work for the area. A second future upgrade that is highlighted is on Laurelcrest St within the pipe network north of Queen St E. Since no development is expected in this area, the servicing north of Queen St E was assumed to remain the same, however, capacity issues in these pipes should be further assessed if this area is to experience further growth (although currently unexpected).

The report describes a series of upgrades for the preliminary preferred strategy, along with a high-level cost estimate and development triggers.

Table 5-6: Opinion of Probable Costs - Laurelcrest Wastewater Servicing

Pipe Details	Diameter (mm)	Length (m)	Cost
DC Projects ≥ 375mm	375	189	$ 393,882
	450	399	$ 905,817
	525	628	$ 1,543,492
Total DC Projects		**1,216**	**$ 2,843,191**
Local Developer-Funded Projects < 300mm	250	1,309	$ 2,312,863
Total Developer-Funded Projects		**1,309**	**$ 2,312,863**

Figure 6-81: Stantec Cost Estimate for Upgrades (Laurelcrest)

6.5.6 Proposed Street Classifications and Stormwater Interventions

6.5.6.1 New Link Proposed Complete Street Classifications

The new street connections proposed for the Laurelcrest MTSA have been classified as follows:

- The two southernmost east-west connections have been classified as local employment streets.
- The two northernmost east-west and the two eastern north-south connections have been classified as mixed-use neighbourhood streets.
- The westernmost north-south connection has been classified as a mixed-use neighbourhood street
- The easternmost north-south connection has been classified as mixed-use neighbourhood street.

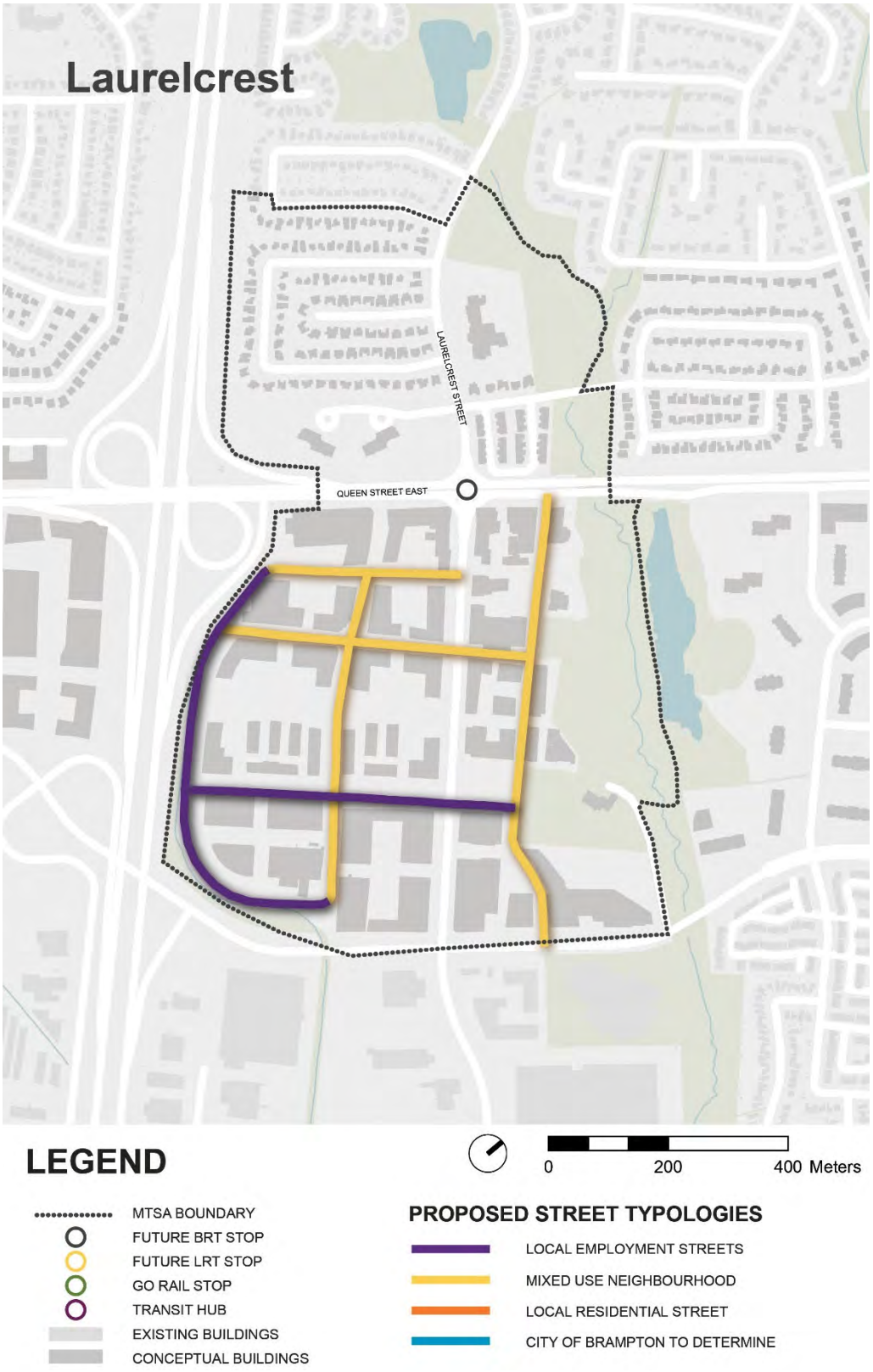

Figure 6-82: Laurelcrest Proposed Complete Streets Classification

6.5.6.2 Combined Transportation Network and Stormwater Management Recommendations

The figure below illustrates the final transportation network and stormwater management proposals for the Laurelcrest MTSA. It includes the proposed transportation network refinements identified in the City's preliminary land use plans as well as those identified through the transportation analysis.

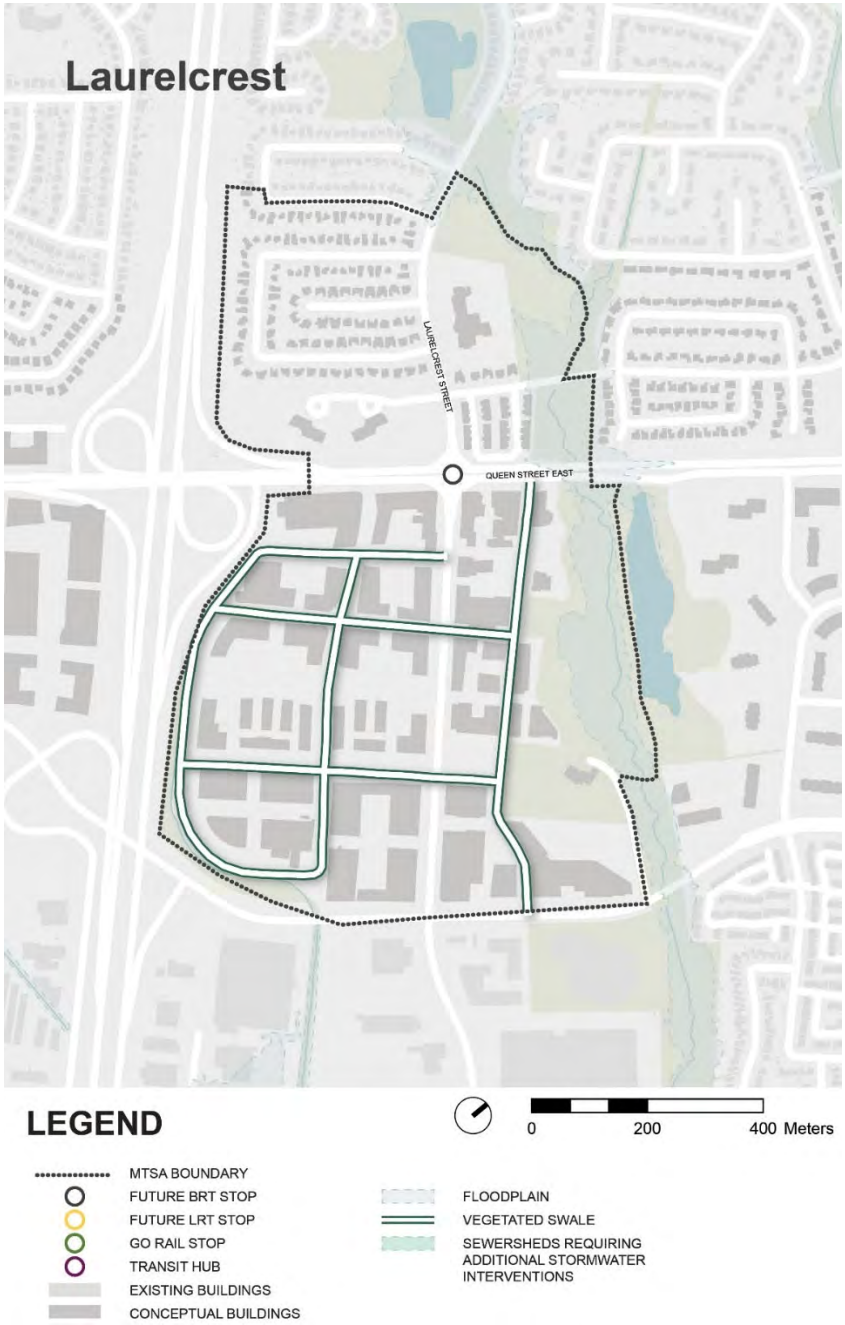

Figure 6-83: Laurelcrest Combined Transportation Network and Stormwater Interventions

6.5.7 MTSA-Specific Policy Recommendations

Several objectives in the Laurelcrest MTSA are best met through the application of general and location-specific policies in addition to the proposed network adjustments. Policies that should be considered for this MTSA are listed below. Parenthetical information provides rationale for specific policies.

- **General transportation network enhancements:**
  - Road and active-transport infrastructure should be provided to support comfortable, direct, and safe travel for sustainable modes and bolster transit ridership.
- **Roads:**
  - To create a finer-grain network, several new street alignments are proposed including a new network of streets south of Queen Street East, including a C-shaped street west of West Drive, a north-south connection between Queen Street East and Clark Boulevard east of West Drive, and several internal connections
  - The City of Brampton should work with developers through the planning approval process to secure rights of way with sufficient width to accommodate revised complete streets typologies, including proposed green infrastructure to address publicly managed stormwater flows. Final widths and alignments will be determined through future detailed studies.
  - Traffic-calming measures should be leveraged on local or neighbourhood roads to reduce cut-though traffic on streets that are meant to provide access to residences or businesses or roads that play a major role in pedestrian and bike connectivity. Potential strategies include reduced speed limits, chicanes, and speed humps or tables. These strategies should be considered for Queen Street East and Lambeth Street.
- **Active travel:**
  - Sidewalks and/or other appropriate pedestrian facilities should be provided along both sides of all new and existing streets. (A policy which ensures that all future streets include pedestrian facilities on both sides, and that all existing streets are upgraded to add this infrastructure where missing, is critical for the development of a safe and convenient pedestrian network.)
  - Bike infrastructure (including, but not limited to, recreational trails, multi-use paths, bike lanes, and protected bike lanes) should be provided in accordance with the Active Travel Master Plan. Additional infrastructure should be implemented where needed to promote network connectivity and reduce circuity of protected bike trips to the Laurelcrest BRT stop. (Within the proposed network, cyclists travelling to the Laurelcrest BRT stop will experience more circuitous routes than pedestrians. Where possible, the City of Brampton should work with developers to identify additional mid-block connections that serve cyclists, as well as pedestrians.)
  - The provision of new bike lanes and multi-use paths must be complemented by the installation of bike parking at key destinations, such as the Laurelcrest BRT stop, Ste-Jeanne-d'Arc Catholic Elementary School and Norton Place Park Community Centre.
  - New developments should be designed to minimize walking distance to transit or other key destinations through the inclusion of mid-block connections.
  - New neighbourhood parks and other open spaces should include dedicated pedestrian and bike infrastructure to enhance connectivity.

- Active-transport facilities, including street furniture and tree planting, or Complete Streets upgrades should be prioritized for Queen Street East, West Drive, and the north-south road extending south from Queen Street East west of West Drive based on expected active demand.
- New active crossings over the planned BRT corridor on Queen Street East between Highway 410 and West Drive and between West Drive and Dixie Road should be provided to enhance pedestrian and bike connectivity. To reduce negative travel-time impacts on the planned transit service, consideration should be given to crossings that do not require transit vehicles to stop, including overpasses, underpasses, or unsignalized transit-lane crossings.
- Pedestrian and cyclists should be prioritized at high-demand intersections, such as Queen Street East / West Drive, Laurelcrest Street / Longbourne Crescent, and Laurelcrest Street / Lamont Place. Consideration should be given to including operational modifications or design treatments that prioritize active travel users include pedestrian-scramble signal phases, pedestrian head starts, no right turns on red, raised crosswalks or intersections, and protected intersections.
- The stretch of Queen Street East over Highway 410 should be made more comfortable and safer for pedestrians through the implementation of wider sidewalks and demarcated crosswalks.[11]
- Add direct connections between Queen Street East and existing high-rise developments north of Queen Street East to reduce the length of the trip to the BRT stop. (There are several condos and other housing developments that back onto the north side of Queen Street East, but that require a circuitous trip to the BRT stop currently due to the lack of a direct connection.)

- **Building servicing**:
  - Vehicular access to buildings that front onto major streets, such as Queen Street in the Laurelcrest MTSA, should be provided via local back streets or service lanes. (This will help maintain traffic flow on the major roads while also providing uninterrupted active-travel facilities for pedestrians and cyclists.)
- **Travel-demand management**:
  - Travel-demand strategies for new development should be emphasized for developments expected to contribute vehicular traffic to Queen Street East and Lambeth Street. (Intensification in the MTSA must be coupled with a range of travel demand management strategies that promote the use of active modes and transit over cars in order to reduce congestion and promote sustainable travel.)
- **Stormwater:**
  - All new developed streets should be designed according to the new complete street guidelines. Exact retention swales dimensions should be calculated for each new street to ensure that the new streets do not cause increase in peak flow for each applicable design storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms).
  - Developments within the MTSA shall be required to implement stormwater management techniques required to provide post to pre control for all storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms), as required by CVC and TRCA.

[11] Note that this is being addressed in the ongoing Queen Street BRT Study.

6.5.8 Recommendations for Further Transportation Network Enhancements

Several recommendations for refining Laurelcrest MTSA's street network were identified through the transportation analysis conducted as part of this study. Key refinements include:

- Enhancing the stretch of Queen Street over Highway 410 to improve walkability (L1)[12];
- Adding new active connections to the existing community centre in the southeast corner of the MTSA (L2);
- Providing small connections between condos/neighbourhoods and Queen Street East to increase access to the BRT (L3);
- Adding new active connections to the natural heritage system running along the eastern edge of the MTSA (L4).
- Upgrading intersection of roads with bicycle infrastructure to high quality intersections (protected) (L5)
- Adding a recreational path crossing Clark Boulevard (L6)
- Adding a local or high frequency bus service that runs east west on Clark Boulevard to improve accessibility to transit (L7)

Upon reviewing these recommendations, the City noted that L1 would be better addressed through general transport policies than location-specific refinements. Additionally, they noted that L3 would not be feasible as it would involve modifications to an existing development. As such, these refinements are excluded from the final transportation network and stormwater management recommendations.

[12] Note that this is being addressed in the ongoing Queen Street BRT study.

Figure 6-84: Laurelcrest Preliminary Transportation Network Refinements

6.6 MTSA 06 – Dixie

The Dixie MTSA is located east of Highway 410 in the area of the current Bramalea City Centre. The MTSA is planned to include high-rise and mid-rise mixed-use areas; high-rise and low-rise residential areas; new parks; and a school. The Queen Street BRT will provide the primary higher order transit service in the MTSA.

As the Dixie MTSA will be served by a BRT station, it has a density target of 160 residents and jobs combined per hectare. To support the increased density proposed in this MTSA, a range of street-network refinements have been identified. These include street extensions and mid-block connections proposed by the City of Brampton in their land-use plan, bike facilities identified in the Active Transportation Master Plan, and further recommendations flowing from the transportation analysis described herein. Key refinements include the addition of a new street network in the southeastern portion of the MTSA; mid-block active connections linking these new street connections to each other and to existing streets; bike facilities on Clark Boulevard and Hanover Road, and a pedestrian underpass below Queen Street East.

Due to the already developed state of the MTSA, the addition of new streets will not have an adverse impact on peak flows at any of the identified outfalls in the MTSA. In fact, adding new streets with vegetated areas, such as retention swales, will contribute to an overall reduction of peak flows in the affected sewersheds.

6.6.1 Existing Conditions

The Dixie MTSA has a large commercial area occupied by the Bramalea City Centre in the southeast corner of the MTSA. High-density residential areas are located in the southwest corner and northeast corner of the MTSA, while low-density residential areas are located in the northwest and northeast. There are several institutional areas as well, including the Bramalea Baptist Church and Hanover Public School. There is a natural heritage system along the west side of the MTSA and some smaller open spaces throughout the rest of the MTSA.

Figure 6-85: Dixie Existing Conditions Land Use Map

Dixie Road and Queen Street East are the major vehicle thoroughfares in the Dixie MTSA. The local streets in the MTSA are generally disconnected and circuitous. In addition to being served by the future Queen Street BRT, the Dixie MTSA is also served by local buses running along Queen Street East, Dixie Road, Hanover Road, Howden Boulevard, and Clark Boulevard.

There is a natural heritage area along the western edge of the MTSA. The majority of the southwest corner of the MTSA is covered by a regulatory floodplain.

Figure 6-86: Dixie Existing Conditions Map

6.6.2 Community Objectives

The preliminary land-use plan for the Dixie MTSA was discussed in a public focus-group session held on January 19, 2023. In general, the discussion centered around four points: 1) what is working in the MTSA; 2) what is not working in the MTSA; 3) what is missing in the MTSA; and 4) how could the MTSA be improved. During the workshop, attendees noted that the MTSA benefits from the presence of nature trails, a well-used bus system, and the presence of different services and amenities. They also noted some concerns, including inefficient transit, poor traffic flow, oversized and unsafe intersections, and high levels of truck and traffic noise. Furthermore, the MTSA is missing some sidewalks and has an uninviting pedestrian environment along Queen Street East. Bike-lane safety was also noted as a concern. Attendees mentioned that the Dixie MTSA is missing sports facilities, daycares, more opportunities for seniors, and more uses at the Civic Centre and library. Thoughts about improving the MTSA included installing cameras at transit stations to ensure people feel safe, developing small parks and open spaces, adding recreational opportunities for all ages, and transforming Queen Street East into a more multi-use and hospitable street.

A complete summary of the focus-group session is included in Appendix D.

6.6.3 City of Brampton Land-Use Plan

The final land-use plan for the Dixie MTSA was approved by Brampton City Council in October 2023 as part of the update to the city's Official Plan. The approved land use plans were the result of iterative refinements based on qualitative and quantitative analyses of preliminary land use plans conducted by Arup over the course of this engagement and community engagement.

The Dixie MTSA land-use plan clusters most redevelopment south of Queen Street. High-rise residential areas are located southwest of Queen Street and Dixie Road. Mid- and high-rise mixed-use areas are located southeast of Queen Street and Dixie Road. In particular, the land use plan contemplates the eventual transition of the area currently occupied by the Bramalea City Centre shopping mall into a combination of high-rise development with corresponding street and active connections.

The areas north of Queen Street primarily include neighbourhoods of single-family houses with pockets of institutional, mid-rise mixed-use, and high-rise residential areas.

This MTSA is located on the Queen Street bus rapid transit corridor. In addition to the BRT corridor, key mobility elements of the proposed plan include:

- Proposed street connections:
  - Between Queen Street East and Lisa Street,
  - Between Lisa Street and Dixie Road,
  - Between Hanover Road and Queen Street East, and
  - In the southeast quadrant of the MTSA, in the area of Bramalea City Centre;
- Proposed active connections in the southeast quadrant of the MTSA, connecting the proposed street connections in this area;
- A proposed multi-use path on Clark Boulevard west of Dixie Road;
- Proposed protected bike lanes on Clark Boulevard east of Dixie Road;
- Proposed bike lanes on Hanover Road; and
- A proposed pedestrian bridge connecting the north and south sides of Queen Street East.

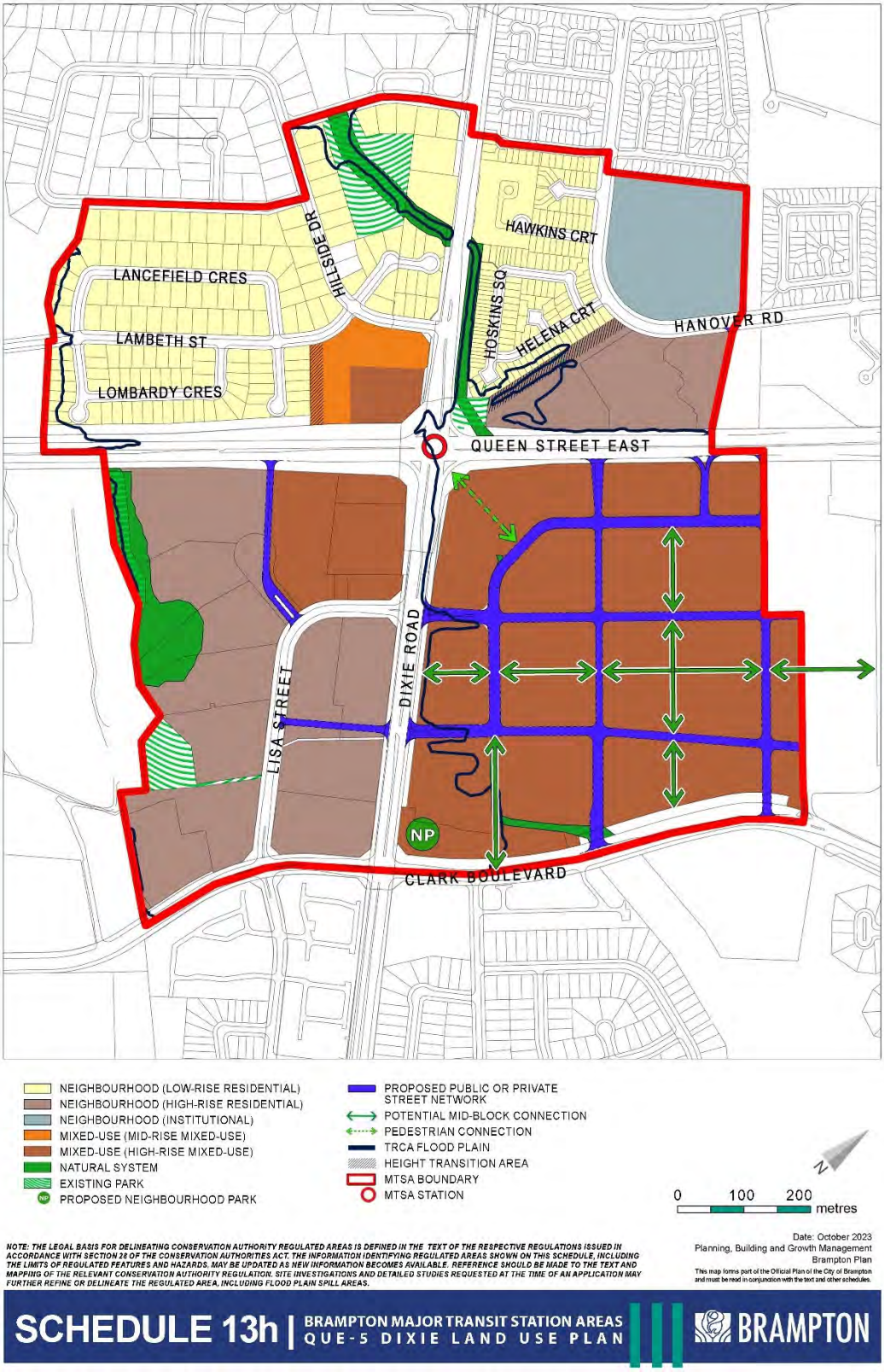

Figure 6-87: Dixie Proposed Land Use Plan (City of Brampton)

6.6.4 Analysis of Proposed Conditions

The analysis illustrated in the following subsections considers estimated travel demand and network characteristics, as well as stormwater flow conditions assuming the implementation of the final council-approved land-use plans.

[NOTE: This section reflects new proposed vehicular and active connections within the area currently occupied by the Bramalea City Centre shopping mall. Earlier demand estimates, based on prior land use plans that do not reflect the redevelopment of the existing mall into residential and mixed-use conditions, have however been retained. Large-scale commercial uses are generally associated with higher trip generation, meaning that absolute demand may be overestimated for this area if it eventually transitions to mixed-used residential development. As such, this section is subject to revision based on revised demand estimates.]

6.6.4.1 Transportation Analysis of Future Conditions

The future-conditions transportation analysis considers the expected distribution of relative travel demand with respect to the existing and future street network; identifies potentially high-demand bike and pedestrian routes between future development and the closest transit stop to assist in prioritizing active-travel-infrastructure investments; and points to areas within the vehicular network that may require additional study or intervention.

Travel Demand Distribution

Demand per street segment is largely driven by the size and type of developments anticipated for each block. The majority of the demand is concentrated in the Bramalea City Centre area in the southeast quadrant of the MTSA. Demand north of Queen Street is significantly lower as the northern part of the MTSA is primarily comprised of single-family houses.

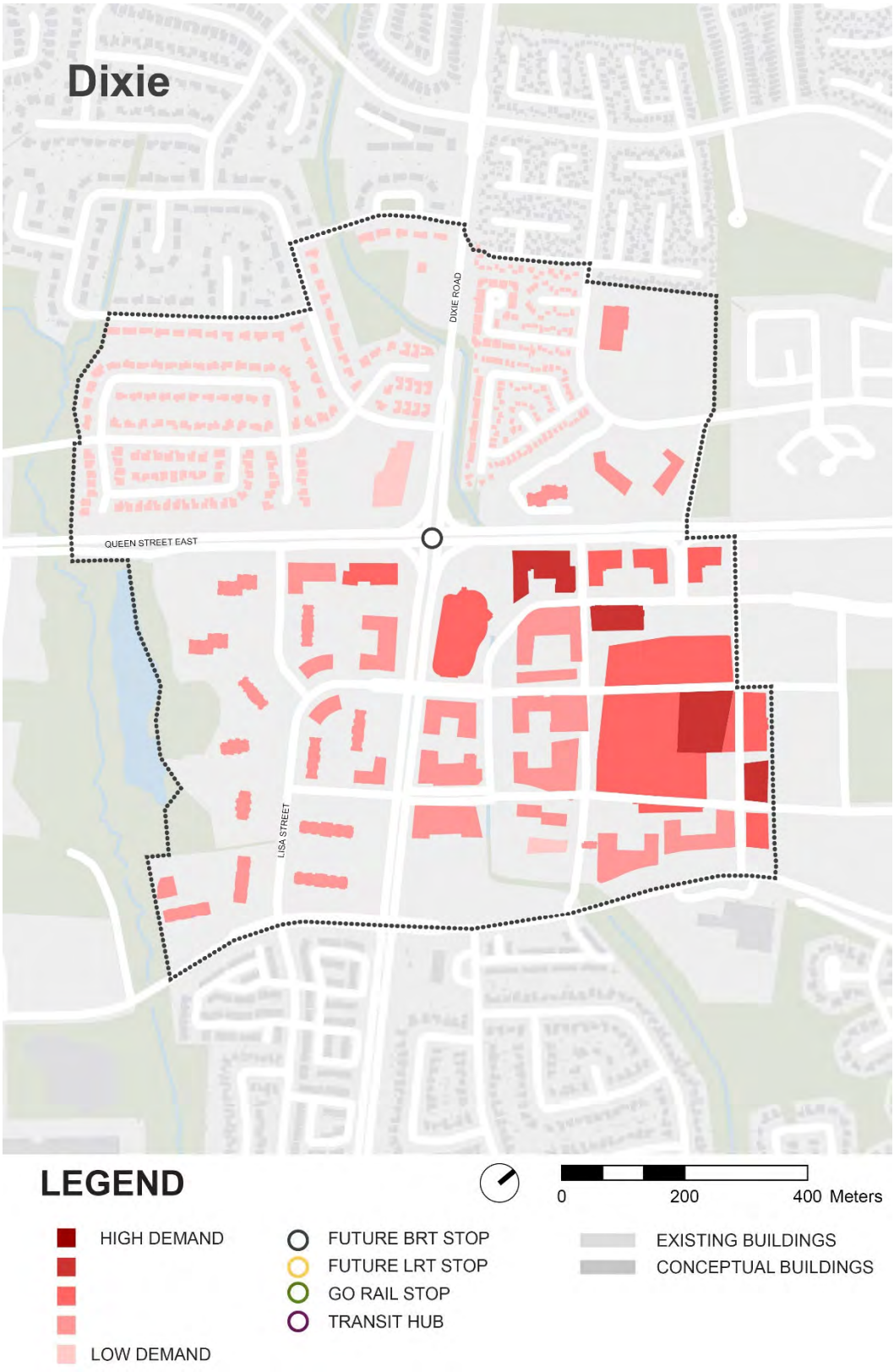

Figure 6-88: Dixie Building Travel Demand Aggregation – Vehicle and Transit Demand

Active Travel Between Development and Transit

The figure below shows aggregated bike demand per street segment in the PM peak hour in the future condition. Demand levels are highest in the southeastern portion of the MTSA, leading to Bramalea City Centre. The diagonal connection southeast from the Queen Street East / Dixie Road intersection sees particularly high levels of demand, suggesting that this was a useful connection to add into the network.

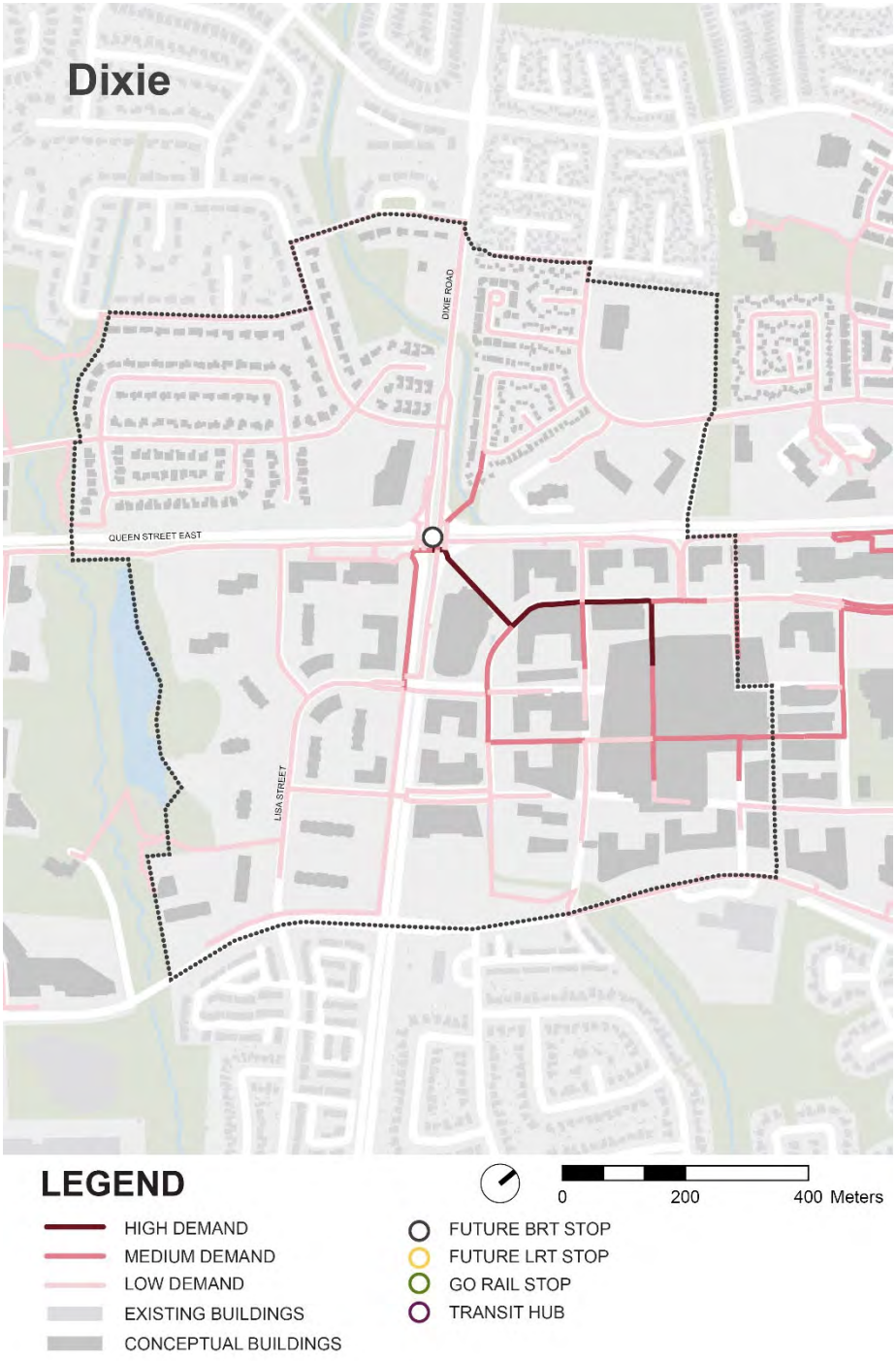

Figure 6-89: Dixie Aggregation of Bike Demand to and from the Nearest Transit Stop

Walk demand in the Dixie MTSA is similarly concentrated in the southwest. Once again, the diagonal connection southeast from the Queen Street East / Dixie Road intersection sees particularly high levels of demand. This network link should be designed to accommodate high levels of cyclists and pedestrians simultaneously.

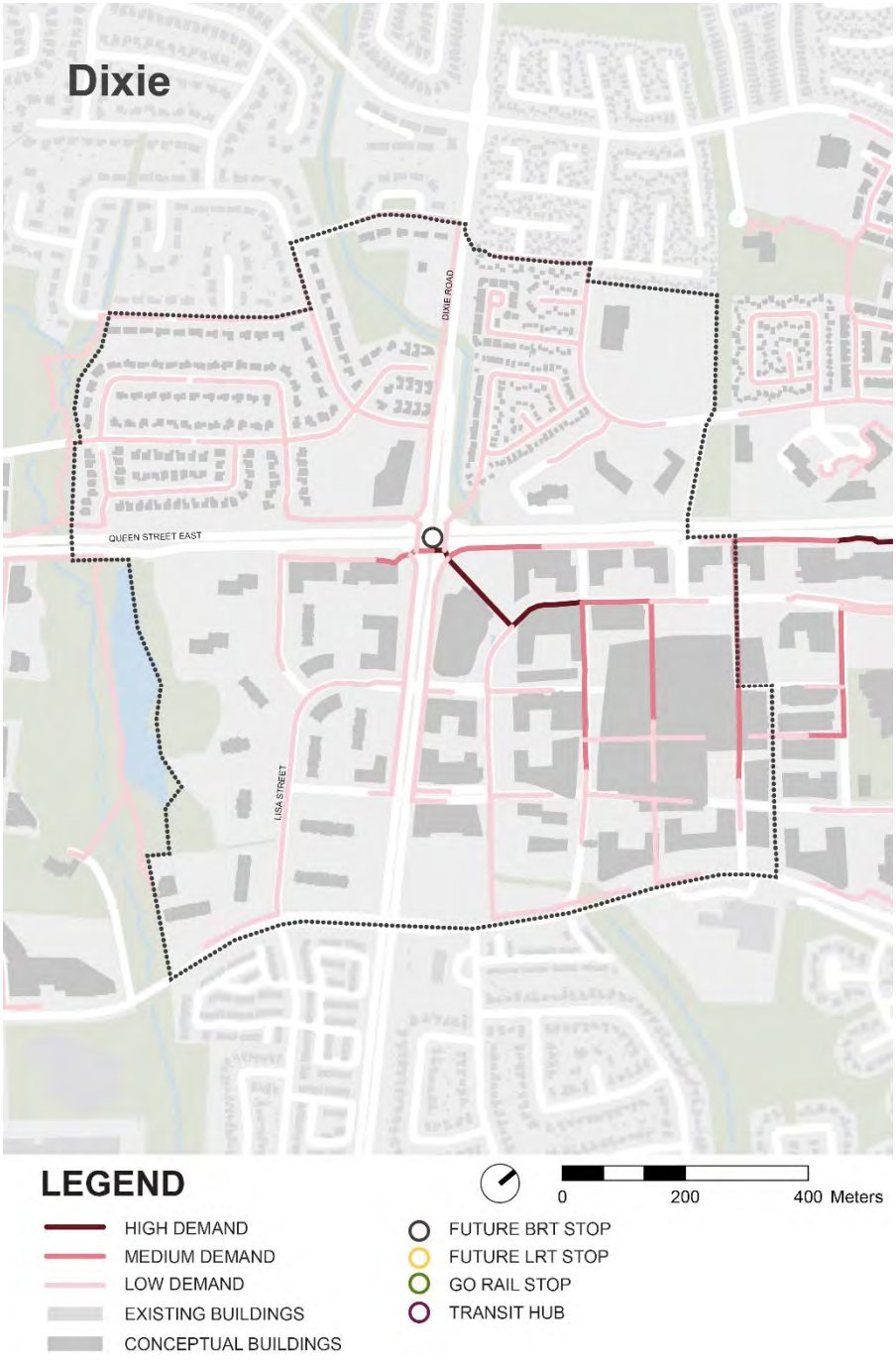

Figure 6-90: Dixie Aggregation of Walk Demand to and from the Nearest Transit Stop

Accessibility to Local Bus and ZÜM services

Figure 6-91 shows the number of local bus stops that an individual can access within a 400 m walk from a building starting point. The proposed conceptual buildings east of Dixie Road are best served by local public transit. Many of the existing residences in the northwest quadrant of the MTSA, however, possess limited access to transit within a 400 m walking distance. Ensuring the provision of additional active walking connections to Dixie Road and Queen Street could enhance directness and allow residents to reach more transit service.

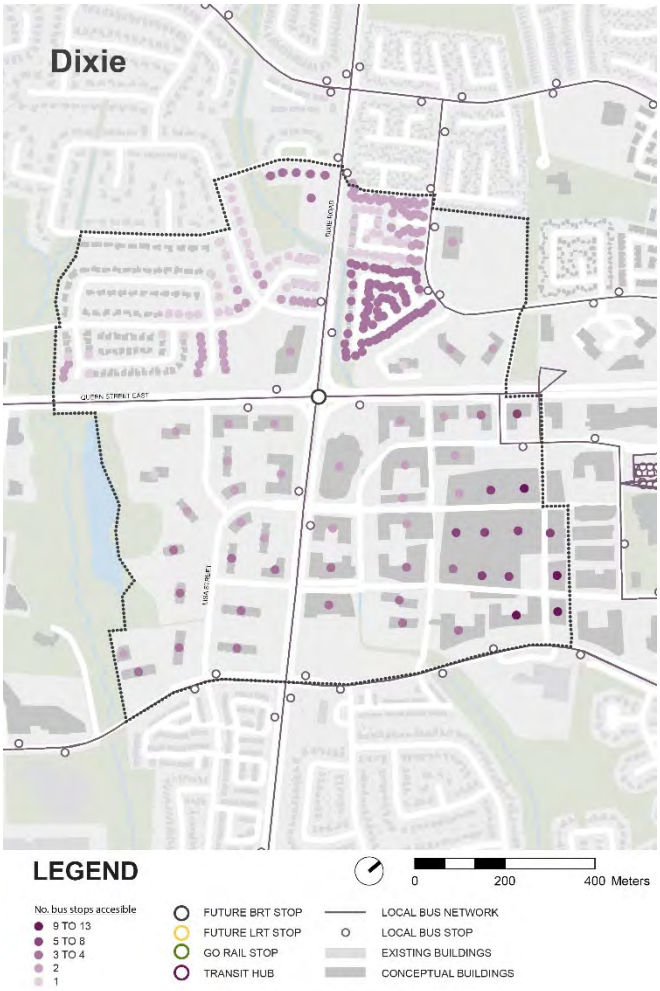

Figure 6-91: Access to local bus service at 400m walking distance within the Dixie MTSA

shows the number of local bus stops that an individual can access within a 400 m walk from a building starting point. The proposed conceptual buildings east of Dixie Road are best served by local public transit. Many of the existing residences in the northwest quadrant of the MTSA, however, possess limited access to transit within a 400 m walking distance. Ensuring the provision of additional active walking connections to Dixie Road and Queen Street could enhance directness and allow residents to reach more transit service

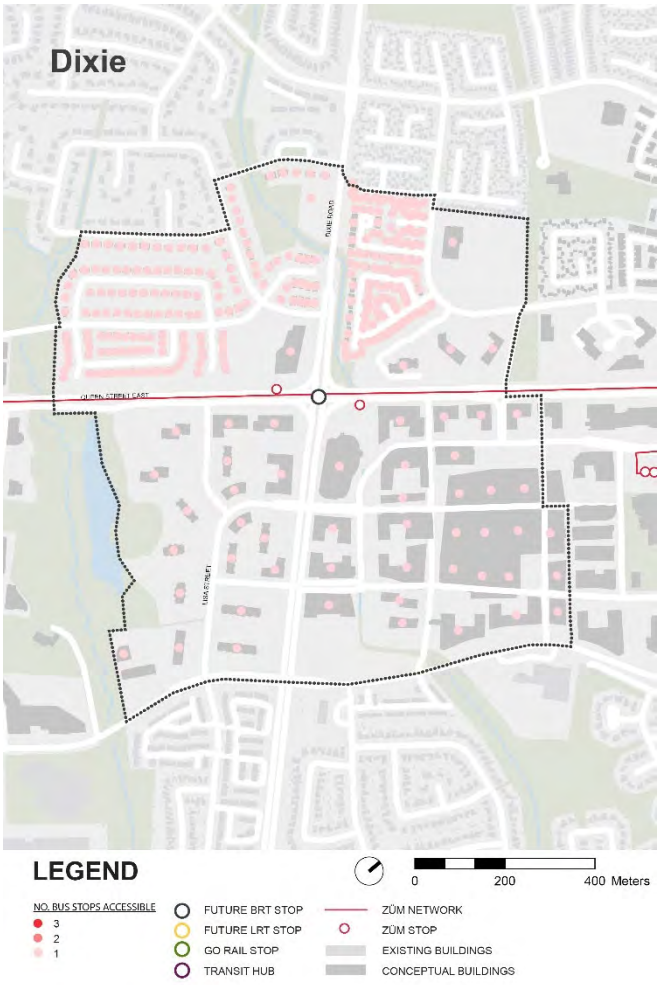

Figure 6-92: Access to higher order transit service at 800 m walking distance within the Kennedy MTSA

Vehicle Demand

Roads that may warrant additional investigation due to vehicle demand are highlighted in the figure below. This map is not meant to identify street segments that *will* be overcapacity, but rather to identify some street segments that fall on key shortest-path routes and therefore may experience high levels of demand. For the purposes of this review, all proposed streets were expected to accommodate bi-directional traffic, with one lane in each direction. Some key links flagged in this review include:

- Queen Street East, primarily west of Dixie Road
- Portions of Hanover Road
- Various pieces of the new street segment proposed for the Bramalea City Centre area

Intensification therefore must be coupled with travel demand management strategies to promote even higher rates of sustainable modes and limit traffic congestion. Furthermore, consideration should be given to deterring through-traffic from using local neighbourhood streets (including the proposed street connections included in this MTSA) to reduce congestion in these areas. Potential strategies include reduced speed limits, chicanes, and speed humps/tables.

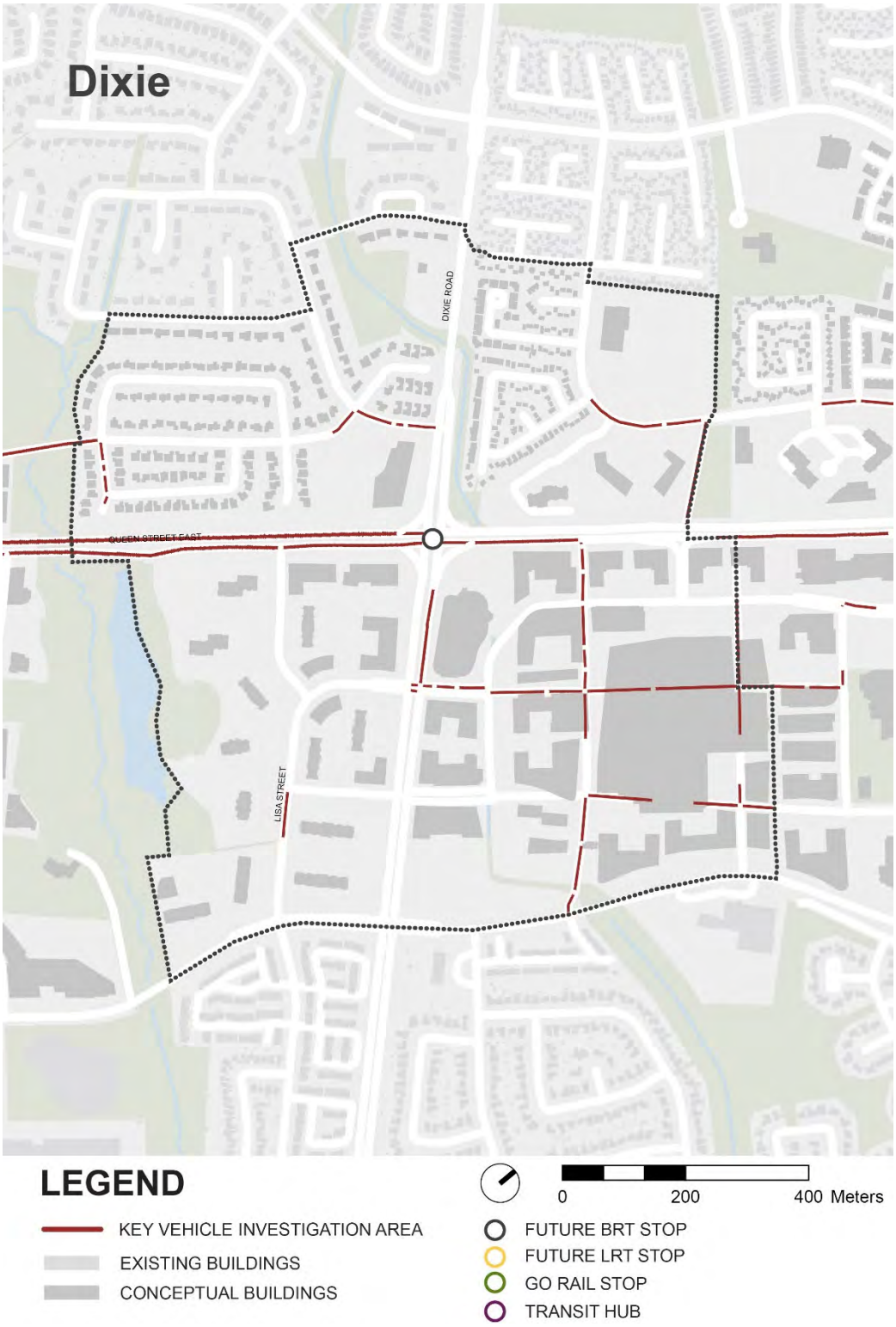

Figure 6-93: Dixie Vehicle Network Assessment

6.6.4.2 Stormwater Analysis of Future Conditions

The Dixie MTSA is already highly developed. Introducing additional streets in areas that are already developed is not anticipated to have a substantial impact on the stormwater network. Most of the new proposed streets in the Dixie MTSA will be located on the Bramalea City Center, an area already entirely paved and impervious. In fact, as presented in the existing conditions report, the sewershed number 7, shown below, in which the majority of the streets will be developed, has a runoff coefficient of 0.86.

The table on the following page illustrates the increased flow surge at the outfall for each sewershed, should the new streets be constructed in accordance with the current comprehensive street guidelines presented in the previous section. The addition of new streets, even with no integrated retention swales, in this MTSA is not predicted to negatively affect the peak flow at any outfall.

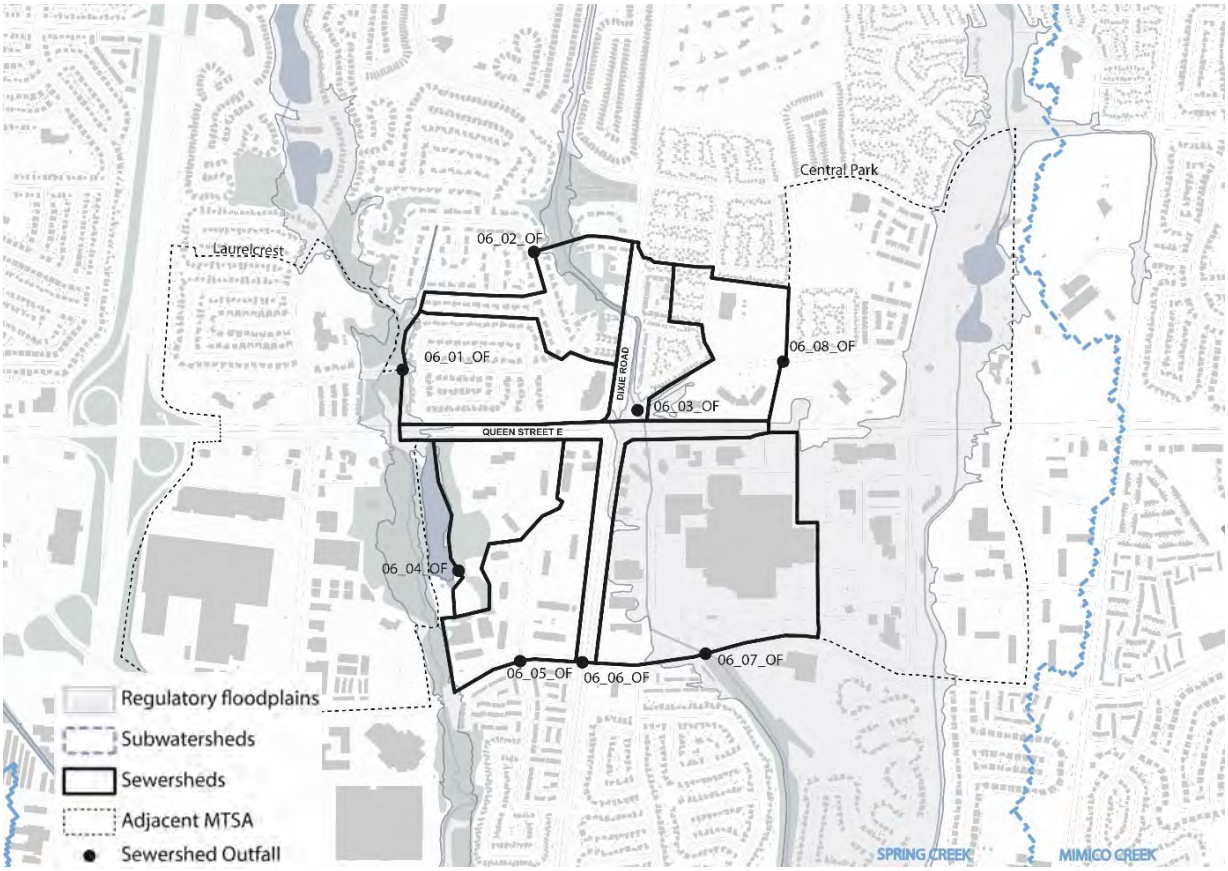

Figure 6-94: Dixie Sewersheds and Outfalls

As predicted, no considerable increase in peak flows is expected in any sewersheds of the MTSA with the opening of new streets. A slight increase can be seen observed in sewershed 04, however an increase of 1% is considered negligeable due to the large scale of this analysis.

Table 6-16: Dixie – Comparative Analysis of Existing and Proposed Conditions, 100-year Peak Runoff

Sewershed	Existing Peak Runoff (L/s)	Proposed Peak Runoff (L/s)	Difference (%)	Required Detention (m^3)
06_01	1440	1440	0%	-
06_02	905	905	0%	-
06_03	1052	1052	0%	-
06_04	882	893	1%	-
06_05	2107	2112	0.5%	-
06_06	1180	1178	0%	-
06_07	5753	5687	-6%	-
06_08	1231	1236	0%	-

Even if no stormwater management is required in this MTSA to manage extra runoff, implementing retention swales in the new streets could help reduce existing flows. The tables above and below show the potential decrease in peak flows that retention swales can achieve.

Table 6-17: Dixie – Available Detention Volume per Street Type

Sewershed	Length of New Streets (m)		Volume Available in Retention swales (m^3)		
	Type 2	Type 4	Type 2	Type 4	Total
06_01	-	-	-	-	-
06_02	-	-	-	-	-
06_03	-	-	-	-	-
06_04	-	243	-	281	281
06_05	-	170	-	197	197
06_06	41	53	48	61	109
06_07	1744	668	2020	774	2794
06_08	-	-	-	-	-

Table 6-18: Dixie – Adjusted Peak Runoff with Implementation of Retention swales within Complete Streets' ROW

Sewershed	Existing Peak Runoff (L/s)	Adjusted Proposed Peak Runoff (L/s)	Difference	Detention Deficit (m^3)	Outcome
06_01	1440	-	-	-	
06_02	905	-	-	-	
06_03	1052	-	-	-	
06_04	882	840	-42 L/s (-5%)	-	Improvement of flow conditions
06_05	2107	2090	-17 L/s (-0.8%)	-	Slight improvement of flow conditions
06_06	1180	1160	-20 L/s (-1.7%)	-	Slight improvement *of* flow conditions
06_07	5753	5000	-753 L/s (-13.1%)	-	Improvement of flow conditions
06_08	1231	-	-	-	

6.6.5 Summary of Servicing Observations

The Region of Peel separately commissioned studies of potable water and wastewater/sanitary sewerage servicing on an MTSA-by-MTSA basis. Details from these studies with relevance to planning activities are summarized here solely for the convenience of the reader and to facilitate consideration of implications for MTSA network planning. Arup assumes no liability for the accuracy of those analyses and reports or the completeness of the summary. The Peel Region reports were based on preliminary land use plans and build-out projections provided by the City of Brampton directly to the Region of Peel in 2022. Some adjustments have occurred to land-use plans and build-out projections, which may alter some of the reports' conclusions.

6.6.5.1 Water

The following information is drawn from the report titled "Water and Wastewater Servicing Report – MTSA Lands, East of Highway 410 – Contract 2" dated April 19, 2024 and prepared by Stantec Consulting Ltd, hereinafter (Stantec Water and Wastewater Report – Contract 2). In this report, the Dixie, Central Park, and Bramalea MTSAs were evaluated as one due to the many overlapping services. The report concludes that all service-level criteria (pressure, velocity, and fire-flow availability) can be satisfied under the growth scenario, other than one instance of the minimum pressure being below 40 psi under both existing and proposed conditions. However, this location is also along a Zone 4 Central Transmission System and will not be used to service the proposed developments, and the deficiencies will not affect the servicing strategy.

Since the servicing strategy in the Dixie, Central Park, and Bramalea MTSAs are to use entirely existing infrastructure, there are few considerations to be aware of. Nevertheless, some aging watermains of less than 300 mm in diameter may need to be replaced to meet Region of Peel standards.

The report shows the proposed water servicing strategy in the Dixie, Central Park, and Bramalea MTSAs

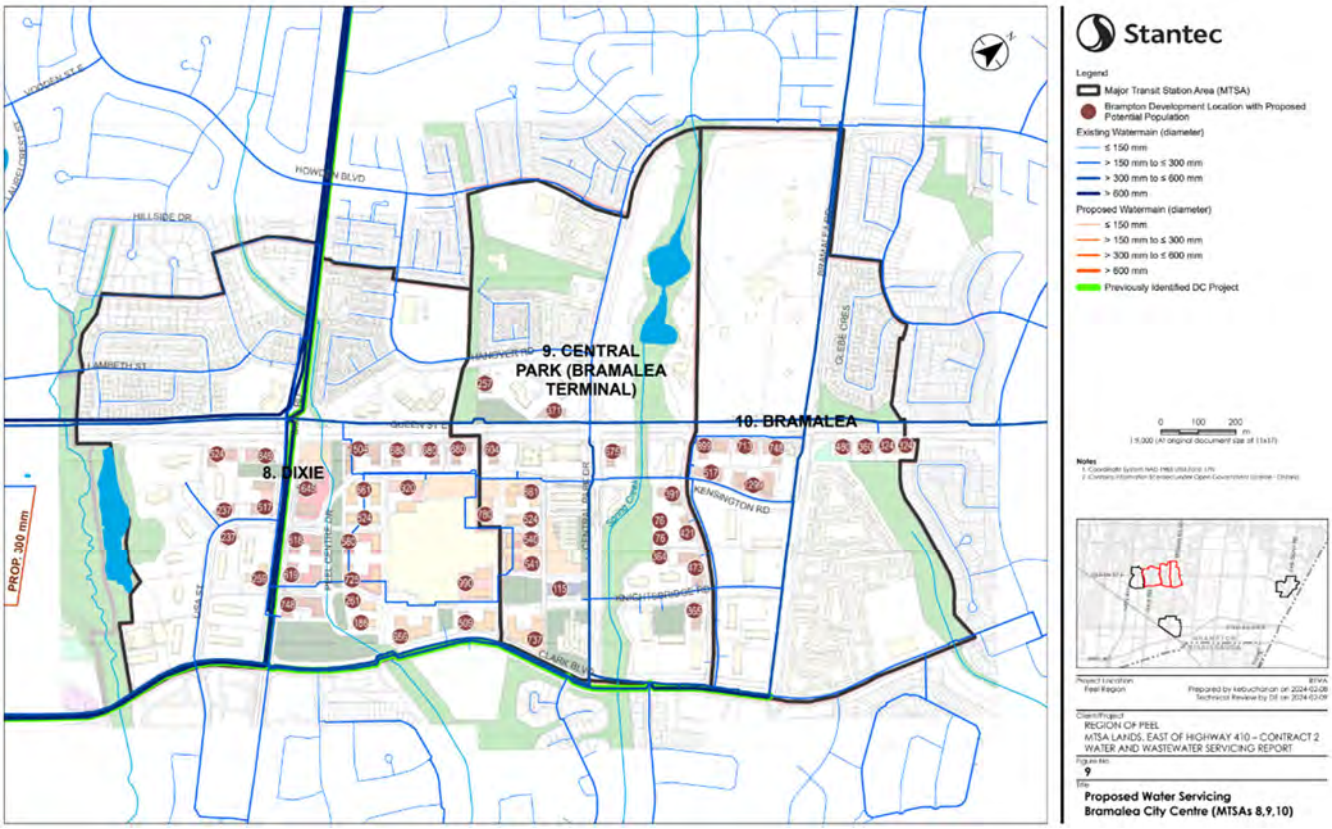

Figure 6-95: Stantec Proposed Water Servicing Strategy (Dixie, Central Park, and Bramalea)

The report also indicates there are no water servicing upgrade costs.

Table 6-3: Opinion of Probable Costs - BCC Water Servicing

Pipe Details	Diameter (mm)	Length (m)	Cost
DC Projects ≥ 400mm	400	-	-
Total DC Projects		-	-
Local Developer-Funded Projects < 400mm	150	-	-
Total Developer-Funded Projects		-	-

Figure 6-96: Stantec Local Water Servicing Upgrades (Dixie, Central Park, and Bramalea)

6.6.5.2 Sanitary/Wastewater

The following information is drawn from the report titled "Water and Wastewater Servicing Report – MTSA Lands, East of Highway 410 – Contract 2" dated April 19, 2024 and prepared by Stantec Consulting Ltd, hereinafter (Stantec Water and Wastewater Report – Contract 2). In this report, the Dixie, Central Park, and Bramalea MTSAs were evaluated as one due to the many overlapping services. According to the report, significant growth in Peel along with intensification puts a strain on existing water and wastewater systems, especially where capacity shortfalls already exist.

The report identifies that the proposed alignments satisfy system requirements and that surcharge state ranges from 0.10-2.00, which is the same as existing conditions. Deficiencies in the systems that are outside the MTSA

are flagged, including a constraint at the Spring Creek Trunk sewer, which receives flow from both Bramalea GO and the combined Dixie, Central Park, and Bramalea MTSAs.

The report proposes recommended wastewater servicing strategy considerations to address constraints. This sewer has restricted capacity in Ultimate conditions, independent of the MTSA change in growth, and therefore, its remediation is tied to the growth in the MTSA. As a result of future growth in Dixie, Central Park, and Bramalea MTSAs, an additional 0.316 m3/s of flow will enter Spring Creek Trunk. Previously, Clark Blvd was mentioned as an area to avoid construction due to the business of the streets and potential servicing conflicts, however upgrades to the pipes connecting into Clark Blvd are required with the only reasonable outlet for certain new pipes on Clark Blvd, therefore work on Clark Blvd is unavoidable.

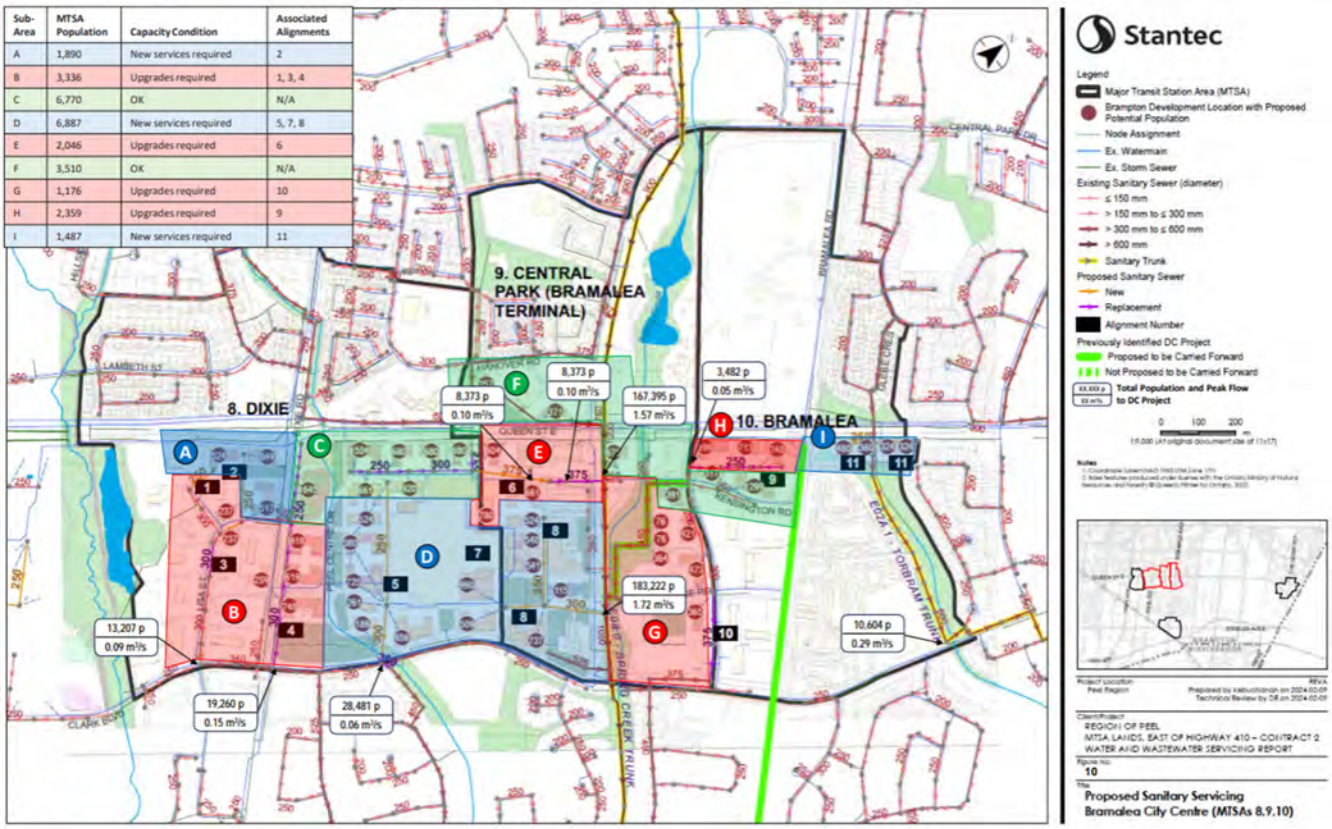

Figure 6-97: Stantec Preferred Wastewater Alternative (Dixie, Central Park, and Bramalea)

The report describes a series of upgrades for the preliminary preferred strategy, along with a high-level cost estimate and development triggers.

Table 6-5: BCC Flows Entering Spring Creek Trunk

Location	Ultimate Flow to Spring Creek Trunk (m^3/s)	Existing Flow to Spring Creek Trunk (m^3/s)	Additional Flow to Spring Creek Trunk in Ultimate (m^3/s) (Ultimate – Existing)
North of Hanover Rd	0.022	0.023	-0.001
Queen St E	0.452	0.349	0.103
Kensington Rd	0.018	0.009	0.009
Peel Centre Dr	0.095	0.023	0.072
Knightsbridge Rd (east side)	0.113	0.064	0.049
Knightsbridge Rd (west side)	0.078	N/A	0.078
North of Clark Blvd	0.017	0.011	0.006
Total Flow (m^3/s)	**0.795**	**0.479**	**0.316**

Figure 6-98: Wastewater project triggers (Dixie, Central Park, and Bramalea)

Table 6-6: Opinion of Probable Costs - BCC Wastewater Servicing

Pipe Details	Diameter (mm)	Length (m)	Cost
DC Projects ≥ 375mm	375	446	$927,662
Total DC Projects		**446**	**$927,662**
Local Developer-Funded Projects < 300mm	250	1,470	$2,597,510
	300	598	$1,132,692
Total Developer-Funded Projects		**2,068**	**$3,730,201**

Figure 6-99: Stantec Cost Estimate for Upgrades (Dixie, Central Park, and Bramalea)

6.6.6 Proposed Street Classifications and Stormwater Interventions

6.6.6.1 New Link Proposed Complete Street Classifications

The proposed street connections in the Dixie MTSA have been assigned the following street classifications:

- Between Queen Street East and Lisa Street: mixed-use neighbourhood street;
- Between Lisa Street and Dixie Road: mixed-use neighbourhood street;
- Between Hanover Road and Queen Street East: mixed-use neighbourhood street;
- New streets in the southeast quadrant of the MTSA, in the area of Bramalea City Centre: mixed-use neighbourhood streets.

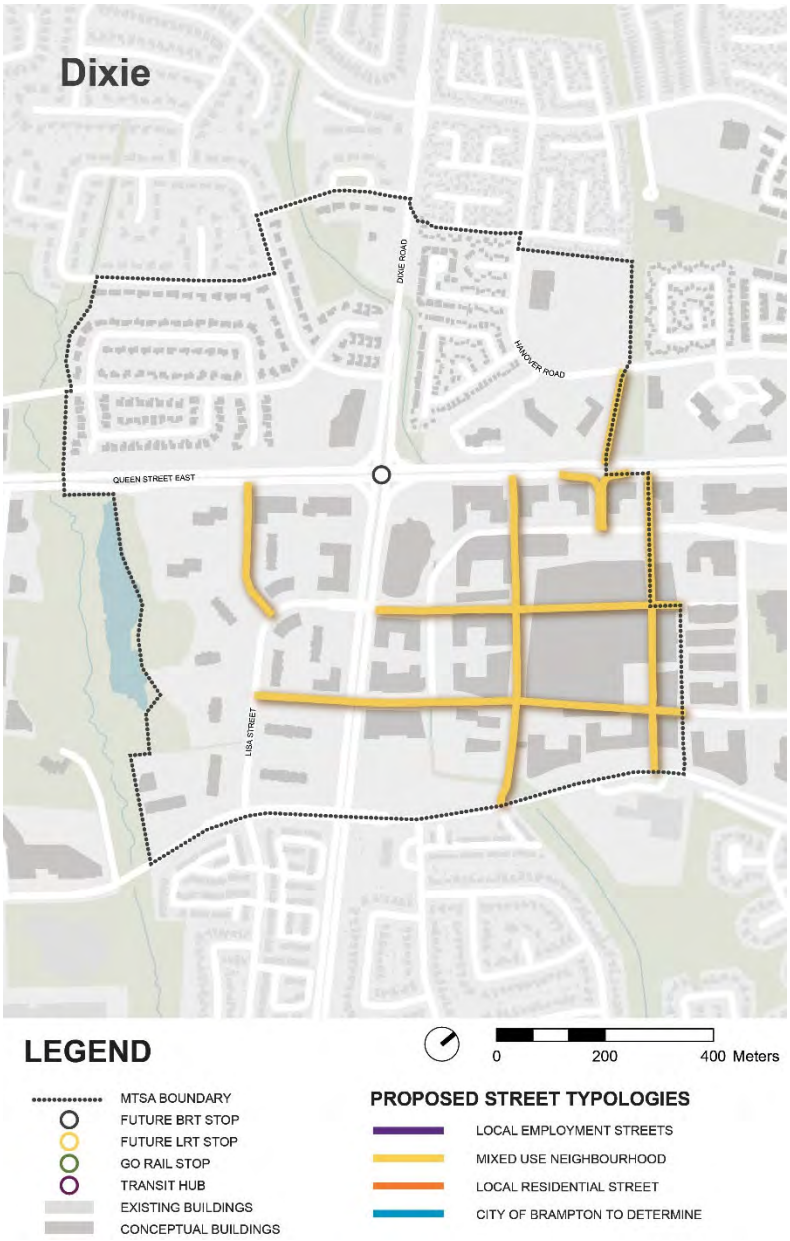

Figure 6-100: Dixie Proposed Complete Streets Classification

6.6.6.2 Combined Transportation Network and Stormwater Management Recommendations

The figure below illustrates the final transportation network and stormwater management proposals for the Dixie MTSA. It includes the proposed transportation network refinements identified in the City's preliminary land use plans as well as those identified through the transportation analysis.

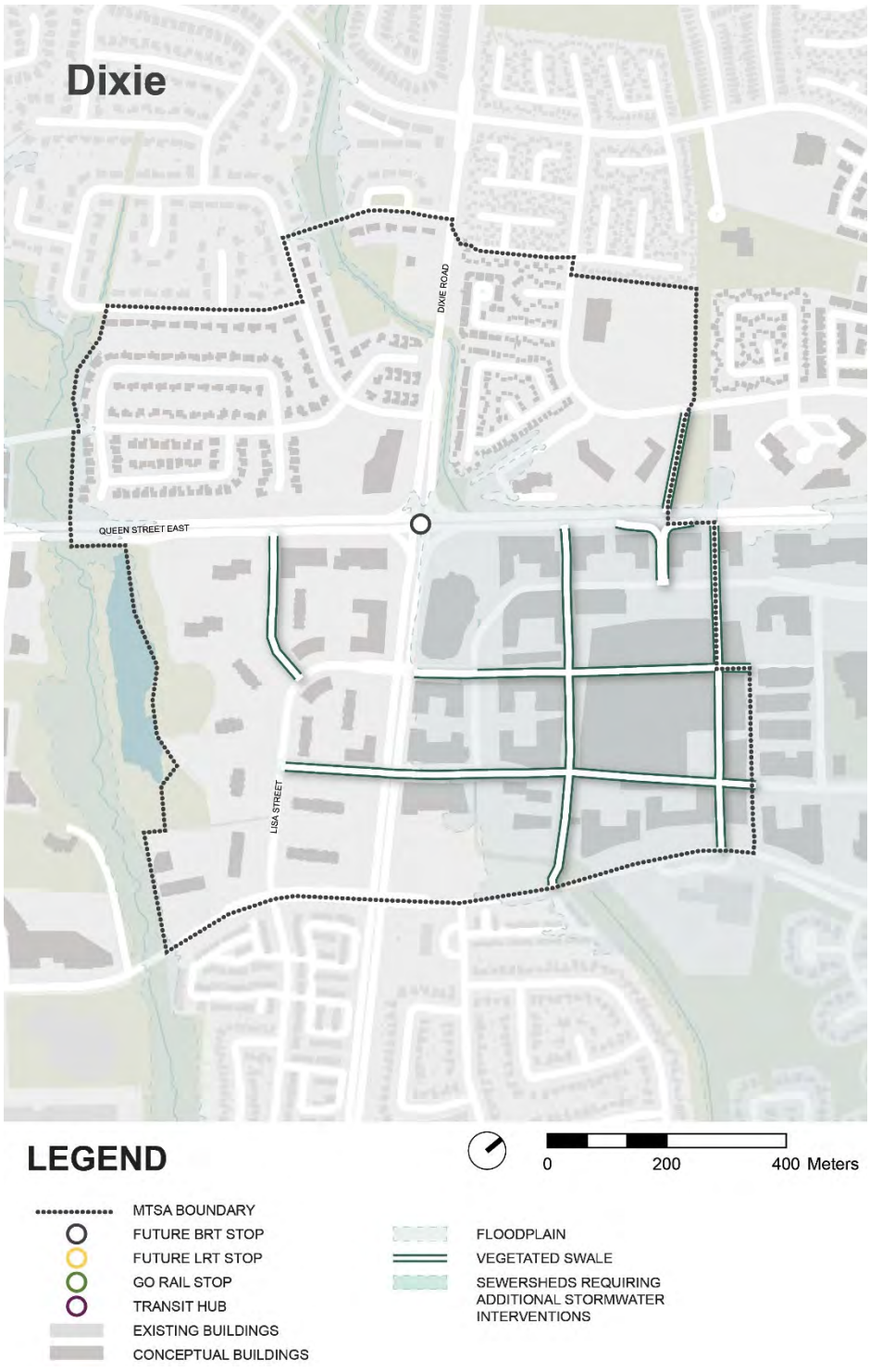

Figure 6-101: Dixie Combined Transportation Network and Stormwater Interventions

6.6.7 MTSA-Specific Policy Recommendations

Several objectives in the Dixie MTSA are best met through the application of general and location-specific policies in addition to the proposed network adjustments. Policies that should be considered for this MTSA are listed below. Parenthetical information provides rationale for specific policies.

- **General transportation network enhancements:**
  - Road and active-transport infrastructure should be provided to support comfortable, direct, and safe travel for sustainable modes and bolster transit ridership.
- **Roads:**
  - To create a finer-grain network, several new street alignments are proposed:
    - Between Queen Street East and Lisa Street;
    - Between Lisa Street and Dixie Road;
    - Between Hanover Road and Queen Street East; and
    - In the southeast quadrant of the MTSA, in the area of Bramalea City Centre.
  - The City of Brampton should work with developers through the planning approval process to secure rights of way with sufficient width to accommodate revised complete streets typologies, including proposed green infrastructure to address publicly managed stormwater flows. Final widths and alignments will be determined through future detailed studies.
  - Traffic-calming measures should be leveraged on local or neighbourhood roads to reduce cut-though traffic on streets that are meant to provide access to residences or businesses or roads that play a major role in pedestrian and bike connectivity. Potential strategies include reduced speed limits, chicanes, and speed humps or tables. These strategies should be considered for Queen Street East, primarily west of Dixie Road and the new street segment proposed for the Bramalea City Centre area.
- **Active travel:**
  - Sidewalks and/or other appropriate pedestrian facilities should be provided along both sides of all new and existing streets. (A policy which ensures that all future streets include pedestrian facilities on both sides, and that all existing streets are upgraded to add this infrastructure where missing, is critical for the development of a safe and convenient pedestrian network.)
  - Bike infrastructure (including, but not limited to, recreational trails, multi-use paths, bike lanes, and protected bike lanes) should be provided in accordance with the Active Travel Master Plan. Additional infrastructure should be implemented where needed to promote network connectivity and reduce circuity of protected bike trips to the Dixie BRT stop. (Within the proposed network, cyclists travelling to the Dixie BRT stop will experience more circuitous routes than pedestrians. Where possible, the City of Brampton should work with developers to identify additional mid-block connections that serve cyclists, as well as pedestrians.)
  - The provision of new bike lanes and multi-use paths must be complemented by the installation of bike parking at key destinations, such as the Dixie BRT stop.
  - New developments should be designed to minimize walking distance to transit or other key destinations through the inclusion of mid-block connections.

- New neighbourhood parks and other open spaces should include dedicated pedestrian and bike infrastructure to enhance connectivity.
- Active-transport facilities, including street furniture and tree planting, or Complete Streets upgrades should be prioritized for Queen Street East, Helena Court, and the street network planned for the Bramalea City Centre area based on expected active demand.
- New active crossings over the planned BRT corridor on Queen Street East between West Drive and Dixie Road should be provided to enhance pedestrian and bike connectivity. To reduce negative travel-time impacts on the planned transit service, consideration should be given to crossings that do not require transit vehicles to stop, including overpasses, underpasses, or unsignalized transit-lane crossings.
- Pedestrian and cyclists should be prioritized at high-demand intersections, such as Queen Street East / Dixie Road and Lisa Street / Dixie Road. Consideration should be given to including operational modifications or design treatments that prioritize active travel users include pedestrian-scramble signal phases, pedestrian head starts, no right turns on red, raised crosswalks or intersections, and protected intersections.
- Add direct connections between Queen Street East and existing high-rise developments north of Queen Street East to reduce the length of the trip to the BRT stop. (There are several condos and other housing developments that back onto the north side of Queen Street East, but that require a circuitous trip to the BRT stop currently due to the lack of a direct connection.)

- **Building servicing**:
  - Vehicular access to buildings that front onto major streets, such as Queen Street in the Dixie MTSA, should be provided via local back streets or service lanes. (This will help maintain traffic flow on the major roads while also providing uninterrupted active-travel facilities for pedestrians and cyclists.)
- **Travel-demand management**:
  - Travel-demand strategies for new development should be emphasized for developments expected to contribute vehicular traffic to Queen Street East and to the new street network planned for Bramalea City Centre. (Intensification in the MTSA must be coupled with a range of travel demand management strategies that promote the use of active modes and transit over cars in order to reduce congestion and promote sustainable travel.)
- **Stormwater:**
  - All new developed streets should be designed according to the new complete street guidelines. Exact retention swales dimensions should be calculated for each new street to ensure that the new streets do not cause increase in peak flow for each applicable design storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms).
  - Developments within the MTSA shall be required to implement stormwater management techniques required to provide post to pre control for all storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms), as required by CVC and TRCA.

6.6.8 Recommendations for Further Transportation Network Enhancements

Several recommendations for refining the Dixie MTSA's street network were identified through the transportation analysis conducted as part of this study.

Key refinements include:

- Adding a new crossing to connect the trails on the north and south side of Queen Street East (D1);
- Adding active connections to the trails in the natural heritage system on the western edge of the MTSA (D2);
- Adding service roads to ensure buildings along Queen Street can be adequately serviced (D3);
- Reconfirming the location of truck routes on roads that may play an important role in facilitating active travel, including Clark Boulevard (D4);
- Finding a proper alignment for the proposed road that bypasses an existing building (D5)
- Adding bicycle infrastructure on Lisa Street (D6)
- Upgrading intersection of roads with bicycle infrastructure to high quality intersections (protected) (D7)
- Adding a high-quality (protected) intersection that that accommodates cyclists using the recreational path south of Clark Boulevard (D8)

Upon reviewing these recommendations, the City recommended that D1 not be carried forward for future analysis. As such, this refinement is excluded from the final transportation network and stormwater management recommendations. It nevertheless may represent an important connection and should be explored.

Figure 6-102: Dixie Preliminary Transportation Network Refinements

6.7 MTSA 07 – Central Park

The Central Park MTSA includes the eastern portion of the current Bramalea City Centre and the western portion of Chinguacousy Park. The MTSA is planned to include high-rise and mid-rise mixed-use areas; high-rise and low-rise residential areas; and a university. The Queen Street BRT will provide the primary higher order transit service in the MTSA. As the Central Park MTSA will be served by a BRT station, it has a density target of 160 residents and jobs combined per hectare.

To support the increased density proposed in this MTSA, a range of street-network refinements have been identified. These include street extensions and mid-block connections proposed by the City of Brampton in their land-use plan, bike facilities identified in the Active Transportation Master Plan, and further recommendations flowing from the transportation analysis described herein. Key refinements include the addition of a new street network in the southwestern portion of the MTSA and bike facilities on Clark Boulevard, Howden Boulevard, Hanover Road, and Central Park Drive.

The new proposed streets that will be implemented in the Central Park MTSA are not expected to significantly affect the existent stormwater network since they are planned to be developed in an already paved area of the MTSA. Moreover, if designed properly, retention swales in those streets could help reduce peak flows lower than at existing conditions at outfalls.

6.7.1 Existing Conditions

The Central Park MTSA is characterized by Chinguacousy Park in the northeast and the commercial areas of Bramalea City Centre to the southwest. The southeast corner of the MTSA includes high-density residential towers surrounded by open spaces. The northwest corner features high-density and medium-density residential areas. There are also several institutional areas spread throughout the MTSA, including a bus terminal, a church, the Bramalea Civic Centre, a recreation centre, and a school.

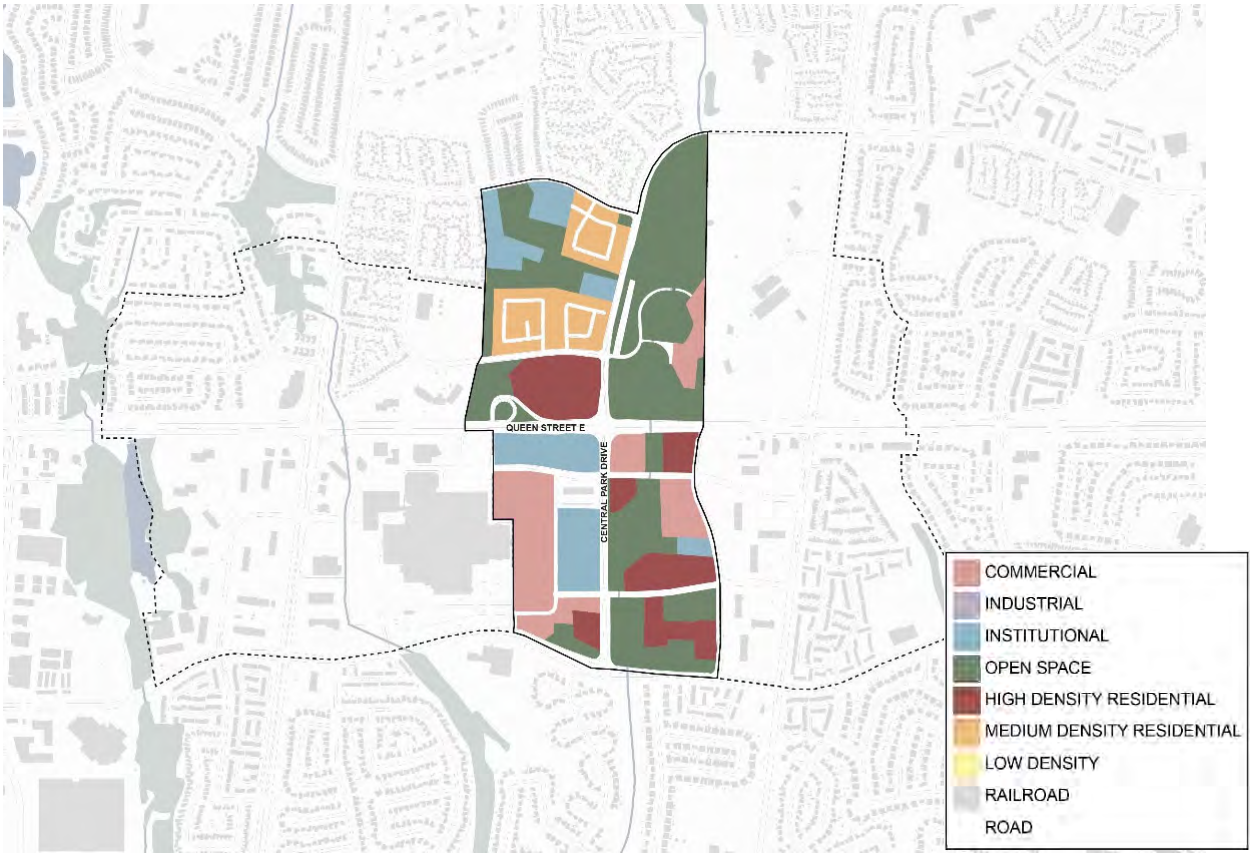

Figure 6-103: Central Park Existing Conditions Land Use Map

Central Park Drive and Queen Street East are the major vehicle thoroughfares in the Central Park MTSA. The local streets in the western half of the MTSA are generally disconnected and circuitous, while the local streets in the southeastern area are more grid-like. In addition to being served by the future Queen Street BRT, the Central Park MTSA is also served by local buses running along Queen Street East, Central Park Drive, Hanover Road, Howden Boulevard, Clark Boulevard, Kensington Road, and Knightsbridge Road. The Bramalea Terminal located in the southwest corner of the MTSA serves many local and GO buses. There are additional GO bus stops located in the MTSA at Clark Boulevard and Kings Cross Road.

There is a natural-heritage area running north-south through the MTSA. The majority of the southwest portion of the MTSA is covered by a regulatory flood plain.

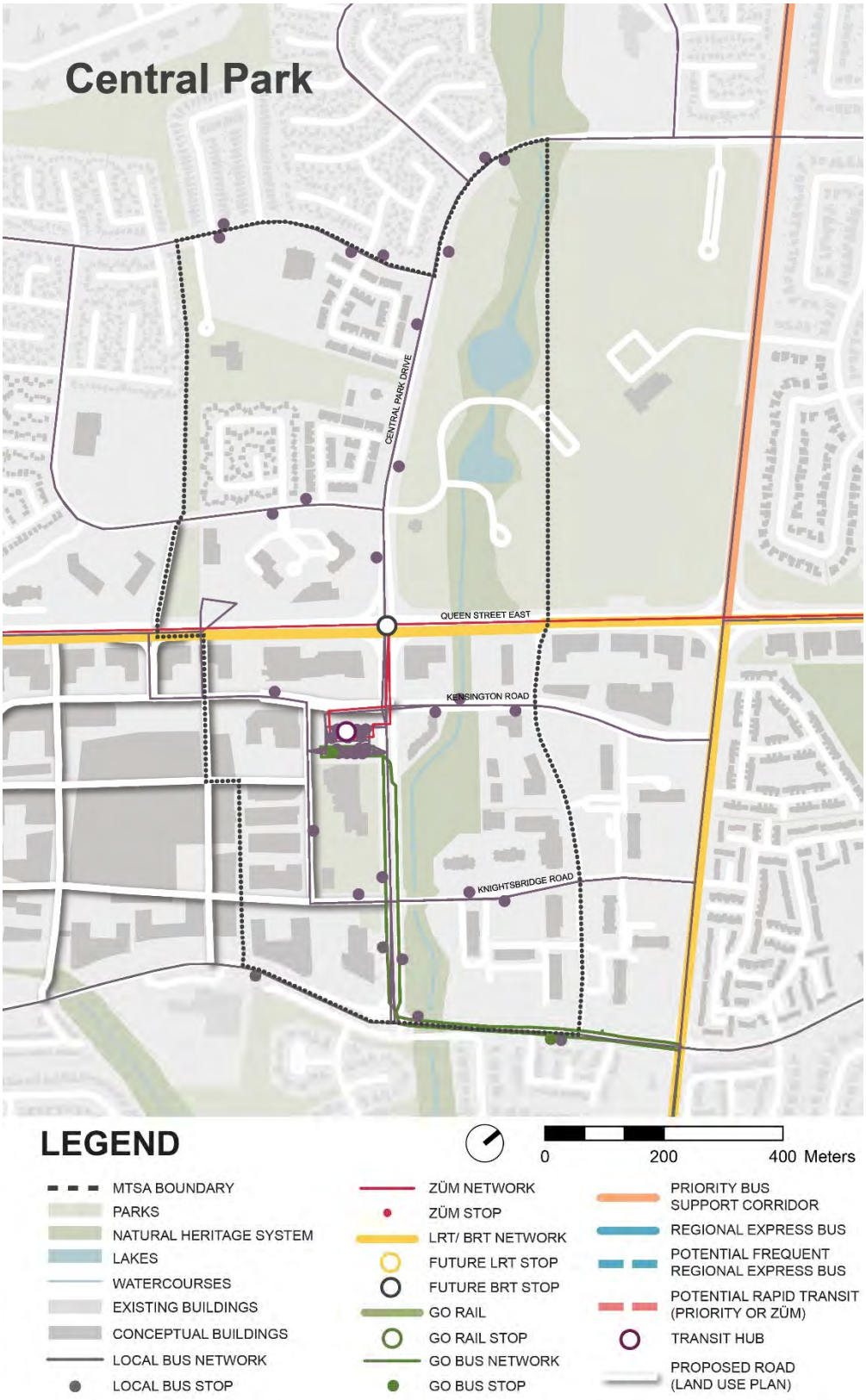

Figure 6-104: Central Park Existing Conditions Map

6.7.2 Community Objectives

The preliminary land-use plan for the Central Park MTSA was discussed in a public focus-group session held on January 19, 2023. In general, the discussion centred around four points: 1) what is working in the MTSA; 2) what is not working in the MTSA; 3) what is missing in the MTSA; and 4) how could the MTSA be improved. During the workshop, attendees noted that the MTSA benefits from the trail network, bus system, and various amenities. They noted that transit is inefficient, and that the MTSA lacks sidewalks, signed bike lanes and traffic lanes. They expressed safety concerns for cyclists and pedestrians at the Highway 410 exit ramps, as well as concerns for noise levels. They also noted that the mall is overcrowded and difficult to access for pedestrians. Participants noted that Central Park is missing uses at the Civic Center, opportunities for seniors, daycares, and sports facilities.

To improve the MTSA, it was suggested to transform Queen Street into a more multi-use and hospitable street, install cameras at transit centres to ensure safety[13], develop small parks and open spaces, and add recreational opportunities for people of all ages.

6.7.3 City of Brampton Land-Use Plan

The final land-use plan for the Central Park MTSA was approved by Brampton City Council in October 2023 as part of the update to the city's Official Plan. The approved land use plans were the result of iterative refinements based on qualitative and quantitative analyses of preliminary land use plans conducted by Arup over the course of this engagement and community engagement.

The Central Park MTSA land-use plan has high-rise mixed uses along Queen Street East. The northwest corner of the MTSA includes low-rise residential areas north of the high-rise residential space on Queen Street East. The southwest corner includes a pocket of mid-rise mixed-use space within the high-rise mixed-use space. The southeast corner of the MTSA contains existing high-rise residential areas south of the high-rise mixed-use areas on Queen Street East. The northeast corner of the MTSA contains the Chinguacousy Park. This MTSA also includes several important institutional features such as Region of Peel offices, Bramalea terminal, and the Chinguacousy Branch of the Brampton Library.

This MTSA is located on the Queen Street bus rapid transit corridor. In addition to the BRT corridor, key mobility elements of the proposed plan include:

- Proposed street connections in the southwest corner of the MTSA, in the area of the Bramalea City Centre
- A proposed active connection in the southwest corner of the MTSA, connecting the proposed street connections
- Proposed protected bike lanes on Central Park Drive and Clark Boulevard
- A proposed bus terminal at the western edge of the MTSA south of Queen Street East

[13] City staff have noted that security cameras and duress alarms are already installed at Terminals and Züm Stations. The BT Safe App can also be used to report safety concerns or suspicious activity.

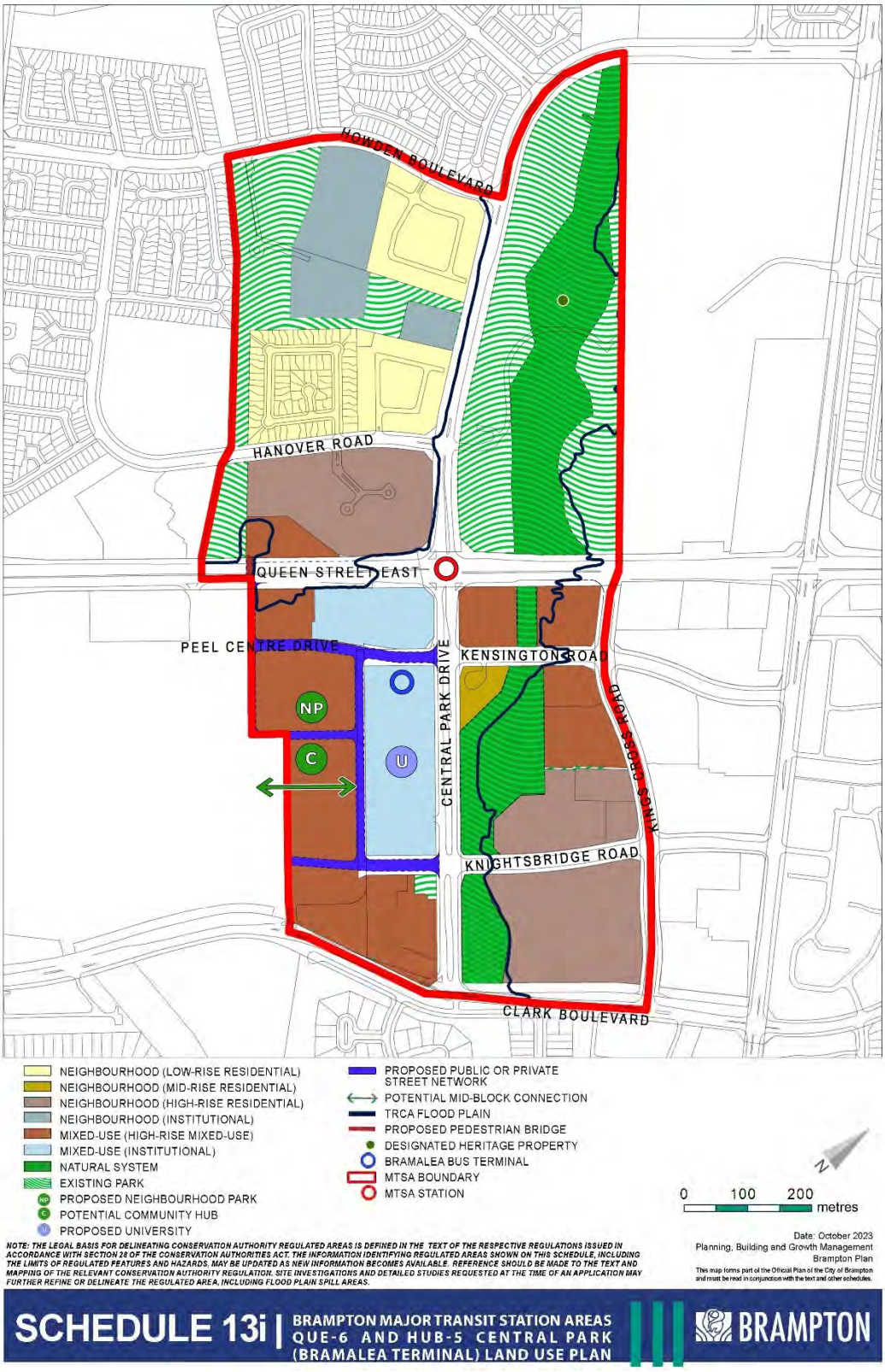

Figure 6-105: Central Park Proposed Land Use Plan (City of Brampton)

6.7.4 Analysis of Proposed Conditions

The analysis illustrated in the following subsections considers estimated travel demand and network characteristics, as well as stormwater flow conditions assuming the implementation of the final council-approved land-use plans.

[NOTE: This section reflects new proposed vehicular and active connections within the area currently occupied by the Bramalea City Centre shopping mall. Earlier demand estimates, based on prior land use plans that do not reflect the redevelopment of the existing mall into residential and mixed-use conditions, have however been retained. Large-scale commercial uses are generally associated with higher trip generation, meaning that absolute demand may be overestimated for this area if it eventually transitions to mixed-used residential development. As such, this section is subject to revision based on revised demand estimates]

6.7.4.1 Transportation Analysis of Future Conditions

The future-conditions transportation analysis considers the expected distribution of relative travel demand with respect to the existing and future street network; identifies potentially high-demand bike and pedestrian routes between future development and the closest transit stop to assist in prioritizing active-travel-infrastructure investments; and points to areas within the vehicular network that may require additional study or intervention.

Travel Demand Distribution

Demand per street segment is largely driven by the size and type of developments anticipated for each block. The areas of highest demand are clustered in the southwest corner of the MTSA in the Bramalea City Centre. Generally speaking, the southern half of the MTSA generates more demand than the northern half of the MTSA, which primarily consists of low- and medium-density housing. It should be noted that the park itself was not considered a trip generator for the purposes of this analysis.

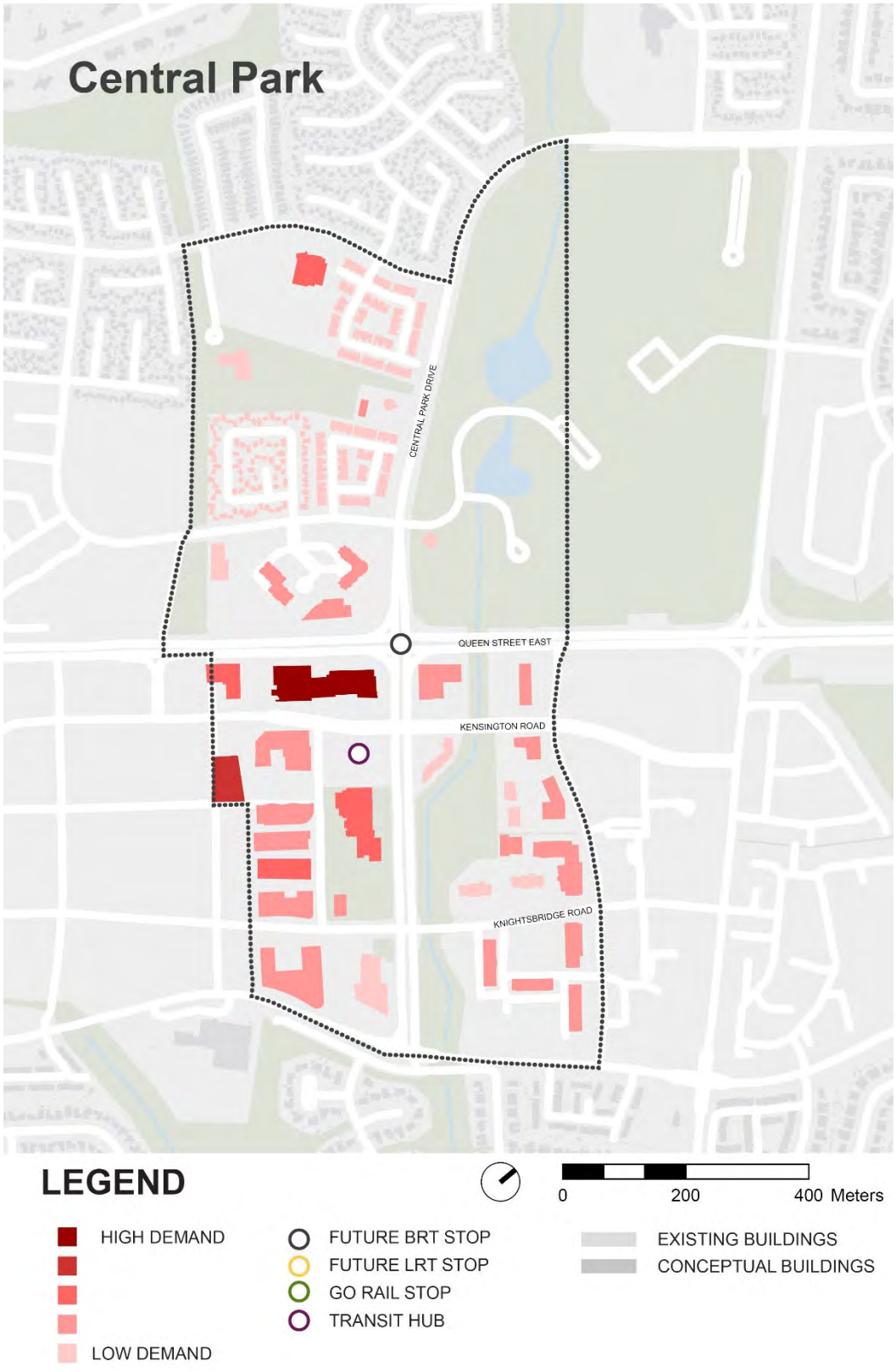

Figure 6-106: Central Park Building Travel Demand Aggregation – Vehicle and Transit Demand

Active Travel Between Development and Transit

The figure below shows aggregated bike demand per street segment in the PM peak hour in the future condition. Demand levels are highest in the southwestern portion of the MTSA, leading to Bramalea City Centre. In general, the western half of the MTSA sees higher levels of demand than the eastern half based on trips between the transit station and the buildings. However, Chinguacousy Park—which was not considered a trip generator in and of itself in the analysis—is expected to attract a high number of trips as well.

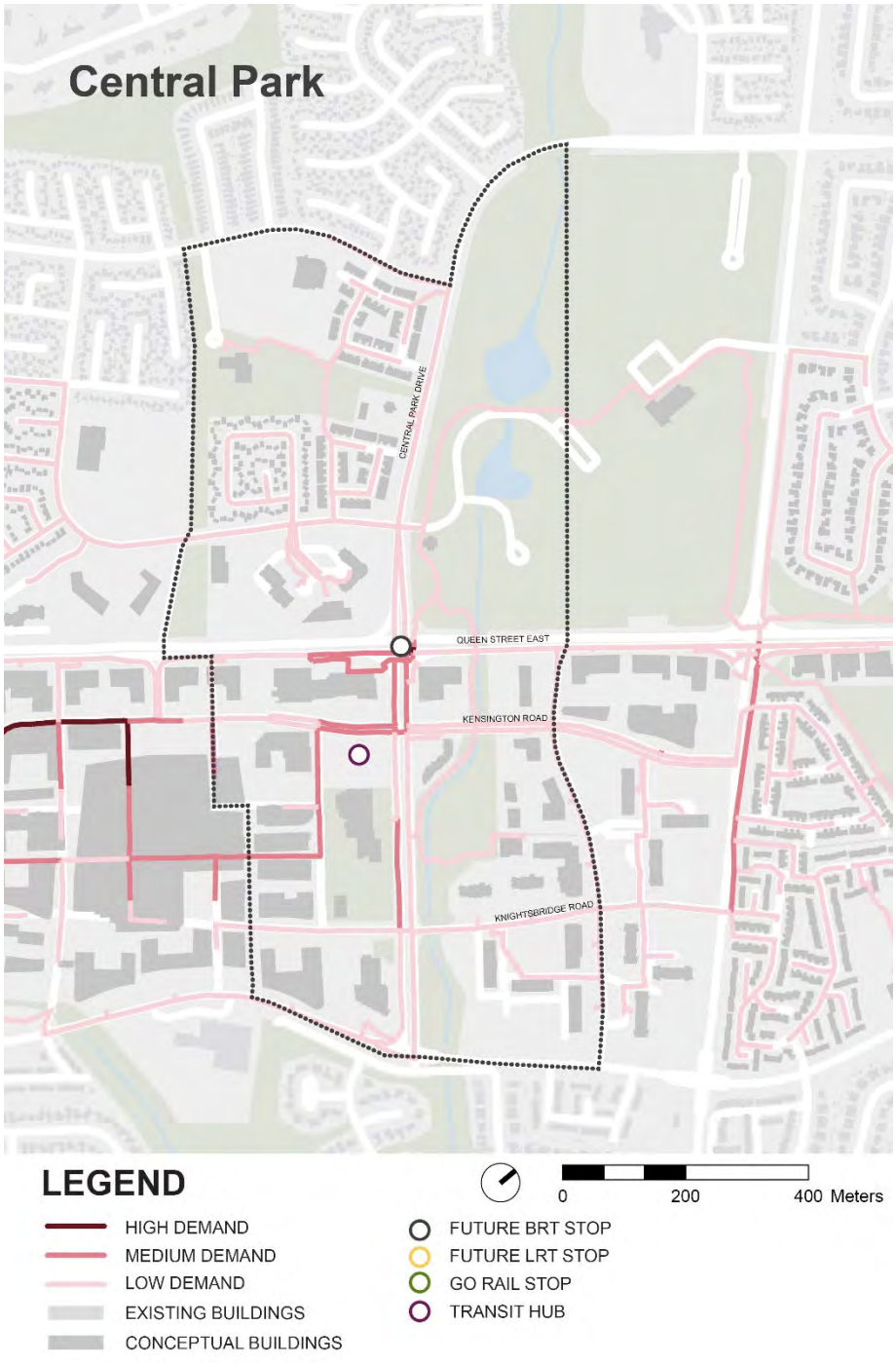

Figure 6-107: Central Park Aggregation of Bike Demand to and from the Nearest Transit Stop

Walk demand in the Central Park MTSA is also concentrated in the southwest corner of the MTSA by the Bramalea City Centre and the proposed university. The south side of Queen Street East lies along the shortest path between the transit station and the Bramalea City Centre and is expected to see high levels of use.

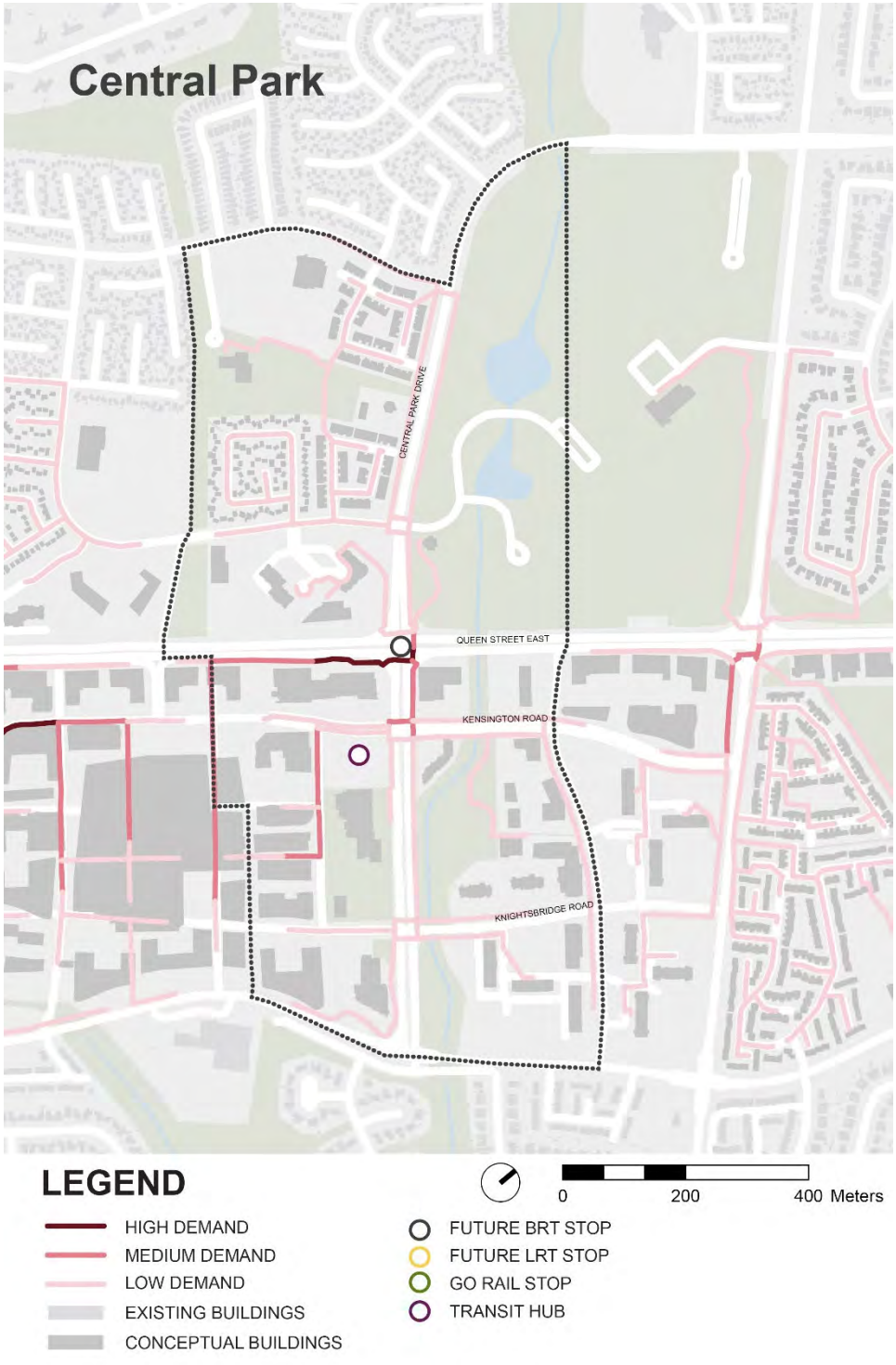

Figure 6-108: Central Park Aggregation of Walk Demand to and from the Nearest Transit Stop

Accessibility to Local Bus and ZÜM services

Figure 6-109 shows the number of local bus stops that an individual can access within a 400 m walk from a building starting point. Local bus access is generally good throughout the new proposed developments.

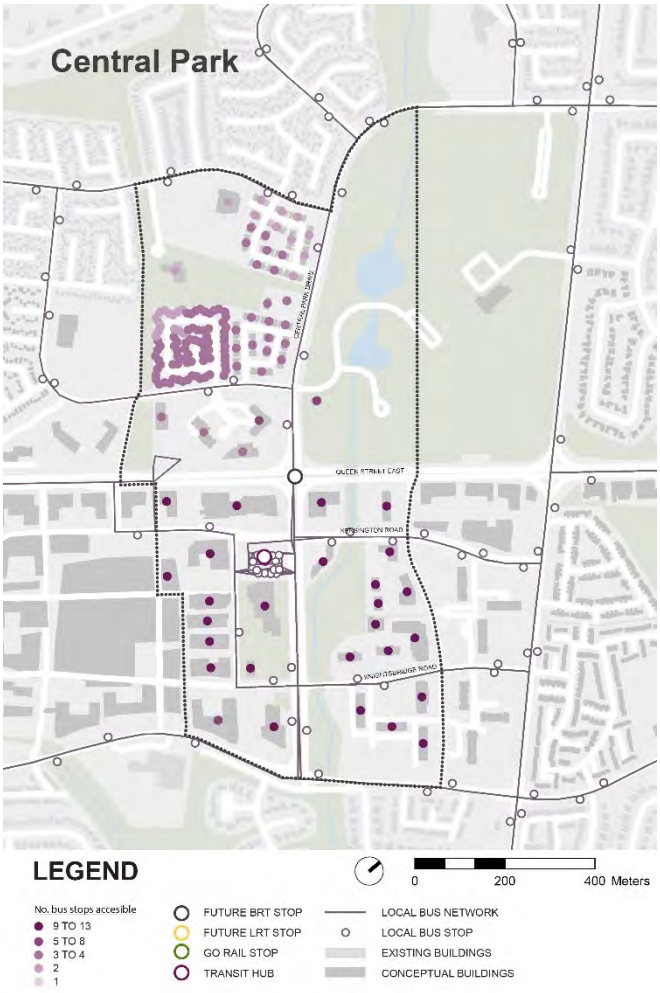

Figure 6-109: Access to local bus service at a 400 m walking distance within the Central Park MTSA

Figure 6-110 shows the number of higher-order transit stops that can be accessed within an 800 m walk of a building. Most buildings have at least one higher-order transit stop within walking distance.

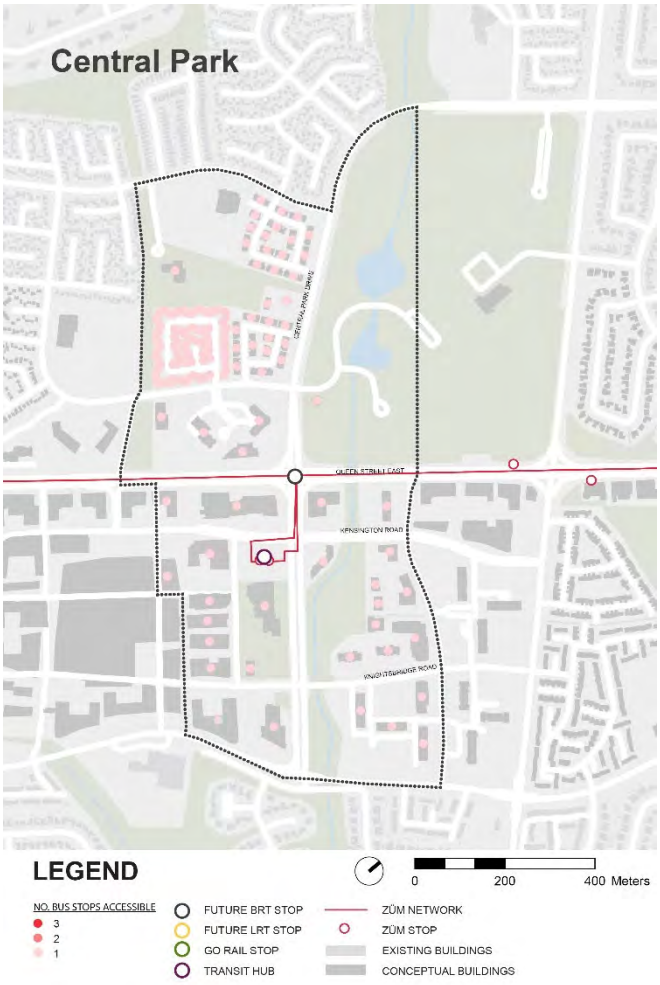

Figure 6-110: Access to higher-order transit service at an 800 m walking distance within the Central Park MTSA

Vehicle Demand

Roads that may warrant additional investigation due to vehicle demand are highlighted in the figure below. This map is not meant to identify street segments that *will* be overcapacity, but rather to identify some street segments that fall on key shortest-path routes and therefore may experience high levels of demand. For the purposes of this review, all proposed streets were expected to accommodate bi-directional traffic, with one lane in each direction. Some key links flagged in this review include:

- Eastbound Queen Street East
- Hanover Road
- Portions of the new street network proposed for the Bramalea City Centre

Intensification therefore must be coupled with travel demand management strategies to promote even higher rates of sustainable modes and limit traffic congestion. Furthermore, consideration should be given to deterring through-traffic from using local neighbourhood streets (including the proposed street connections included in this MTSA) to reduce congestion in these areas. Potential strategies include reduced speed limits, chicanes, and speed humps/tables.

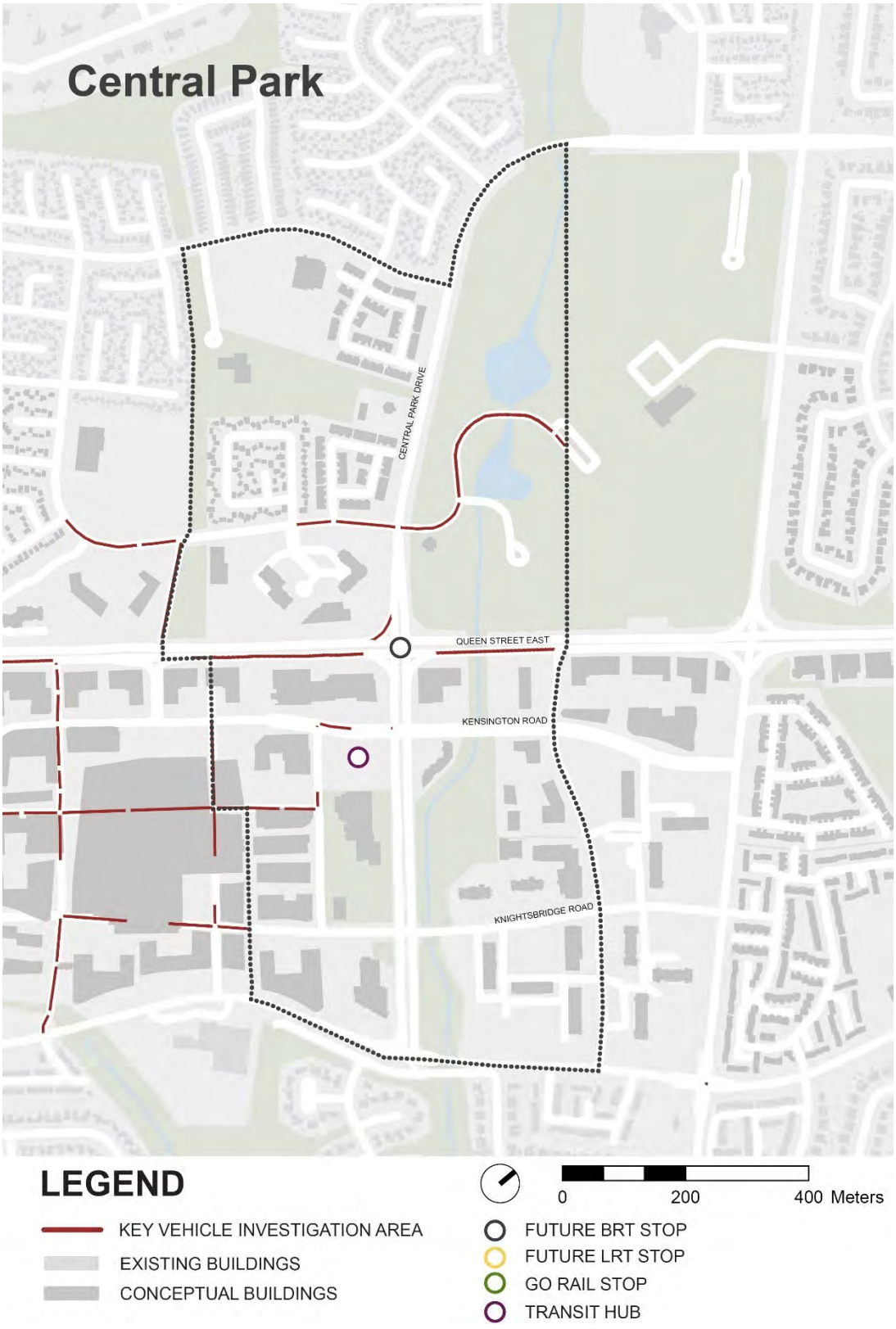

Figure 6-111: Central Park Vehicle Network Assessment

6.7.4.2 Stormwater Analysis of Future Conditions

Central Park is composed of 40% open space. In fact, as presented in the existing conditions report, the MTSA has an overall imperviousness of 60%. However, the new proposed streets are mainly planned to be located in the south-west corner of the MTSA which is actually the Bramalea Center. Given its land-use, this area already is highly impervious, the implementation of new streets will therefore not impact greatly the runoff peak flow.

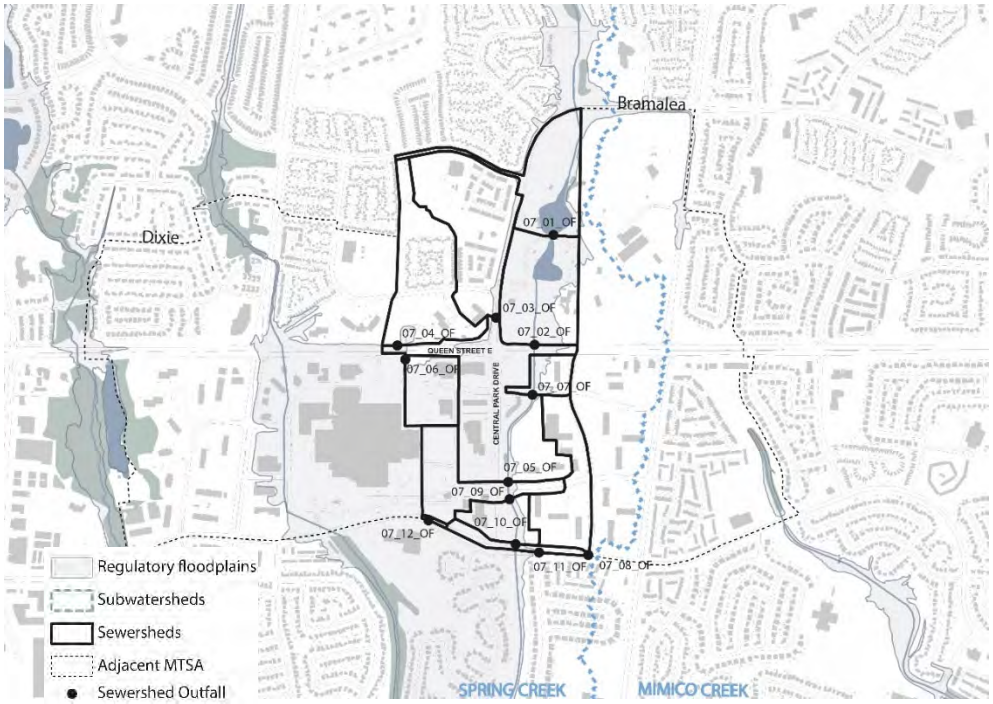

Figure 6-112: Central Park Sewersheds and Outfalls

As anticipated, no considerable increase in peak flows is expected in any sewersheds of the MTSA with the opening of new streets. A slight increase of 2.9% can be observed at sewershed 07_04, however the implementation of retention swales in the new streets will most likely resolve this increase.

Table 6-19: Central Park – Comparative Analysis of Existing and Proposed Conditions, 100-year Peak Runoff

Sewershed	Existing Peak Runoff (L/s)	Proposed Peak Runoff (L/s)	Difference (%)	Required Detention (m^3)
07_01	295	295	0%	-
07_02	605	605	0%	-
07_03	1477	1477	0.	-
07_04	1210	1245	2.9%	-
07_05	2225	2222	0%	-
07_06	825	814	-1.3%	-
07_07	314	314	0%	-
07_08	913	913	0%	-
07_09	1182	1167	-1.3%	-
07_10	253	253	0%	-
07_11	158	158	0%	-
07_12	24	24	0%	-

The opening of new streets will increase the street network of the MTSA by 1,750 meters. If the City goes forward with the integration of retention swales in those additional meters of streets, around 2,000 m^3 of water could be managed.

Table 6-20: Central Park – Available Detention Volume per Street Type

Sewershed	Length of New Streets (m)		Volume Available in Retention swales (m^3)		
	TYPE 2 - Mixed-Use	TYPE 4 - Local Residential	TYPE 2 - Mixed-Use	TYPE 4 - Local Residential	Total
07_01	-	-	-	-	-
07_02	-	-	-	-	-
07_03	-	-	-	-	-
07_04	-	167	-	193	193
07_05	-	177	-	205	205
07_06	185	381	214	441	655
07_07	-	-	-	-	-
07_08	-	-	-	-	-
07_09	197	668	228	773	1001
07_10	-	-	-	-	-
07_11	-	-	-	-	-
07_12	-	-	-	-	-

With the available water storage volume, the increase in peak flow that could be expected from the opening of new streets could be mitigated. Peak flows at the outfalls could even be reduced lower than the existing conditions' flows.

Table 6-21: Central Park – Adjusted Peak Runoff with Implementation of Retention swales within Complete Streets' ROW

Sewershed	Existing Peak Runoff (L/s)	Adjusted Proposed Peak Runoff (L/s)	Difference	Detention Deficit (m^3)	Outcome
07_01	295	-	-	-	-
07_02	605	-	-	-	-
07_03	1477	-	-	-	-
07_04	1210	1220	10 L/s (0.8%)	-	Slight increase in peak flow rate (<1%). This difference is considered insignificant as the analysis does not provide such precision due to its scale.
07_05	2225	2220	-5 L/s (-0.2%)	-	Slight decrease in peak flow rate (<1%). This difference is considered insignificant as the analysis does not provide such precision due to its scale.
07_06	825	650	-175 L/s (-21.2%)	-	Improvement of flow conditions
07_07	314	-	-	-	-
07_08	913	-	-	-	-
07_09	1182	920	-262 L/s (-22.2%)	-	Improvement of flow conditions
07_10	253	-	-	-	-
07_11	158	-	-	-	-
07_12	24	-	-	-	-

6.7.5 Summary of Servicing Observations

The Region of Peel separately commissioned studies of potable water and wastewater/sanitary sewerage servicing on an MTSA-by-MTSA basis. Details from these studies with relevance to planning activities are summarized here solely for the convenience of the reader and to facilitate consideration of implications for MTSA network planning. Arup assumes no liability for the accuracy of those analyses and reports or the completeness of the summary. The Peel Region reports were based on preliminary land use plans and build-out projections provided by the City of Brampton directly to the Region of Peel in 2022. Some adjustments have occurred to land-use plans and build-out projections, which may alter some of the reports' conclusions.

6.7.5.1 Water

The following information is drawn from the report titled "Water and Wastewater Servicing Report – TSA Lands, East of Highway 410 – Contract 2" dated April 19, 2024 and prepared by Stantec Consulting Ltd, hereinafter (Stantec Water and Wastewater Report – Contract 2). In this report, the Dixie, Central Park, and Bramalea MTSAs were evaluated as one due to the many overlapping services. The report concludes that all service-level criteria (pressure, velocity, and fire-flow availability) can be satisfied under the growth scenario, other than one instance of the minimum pressure being below 40 psi under both existing and proposed conditions. However, this location is also along a Zone 4 Central Transmission System and will not be used to service the proposed developments, and the deficiencies will not affect the servicing strategy.

Since the servicing strategy in the Dixie, Central Park, and Bramalea MTSAs are to use entirely existing infrastructure, there are few considerations to be aware of. Nevertheless, some aging watermains of less than 300 mm in diameter may need to be replaced to meet Region of Peel standards.

The report shows the proposed water servicing strategy in the Dixie, Central Park, and Bramalea MTSAs

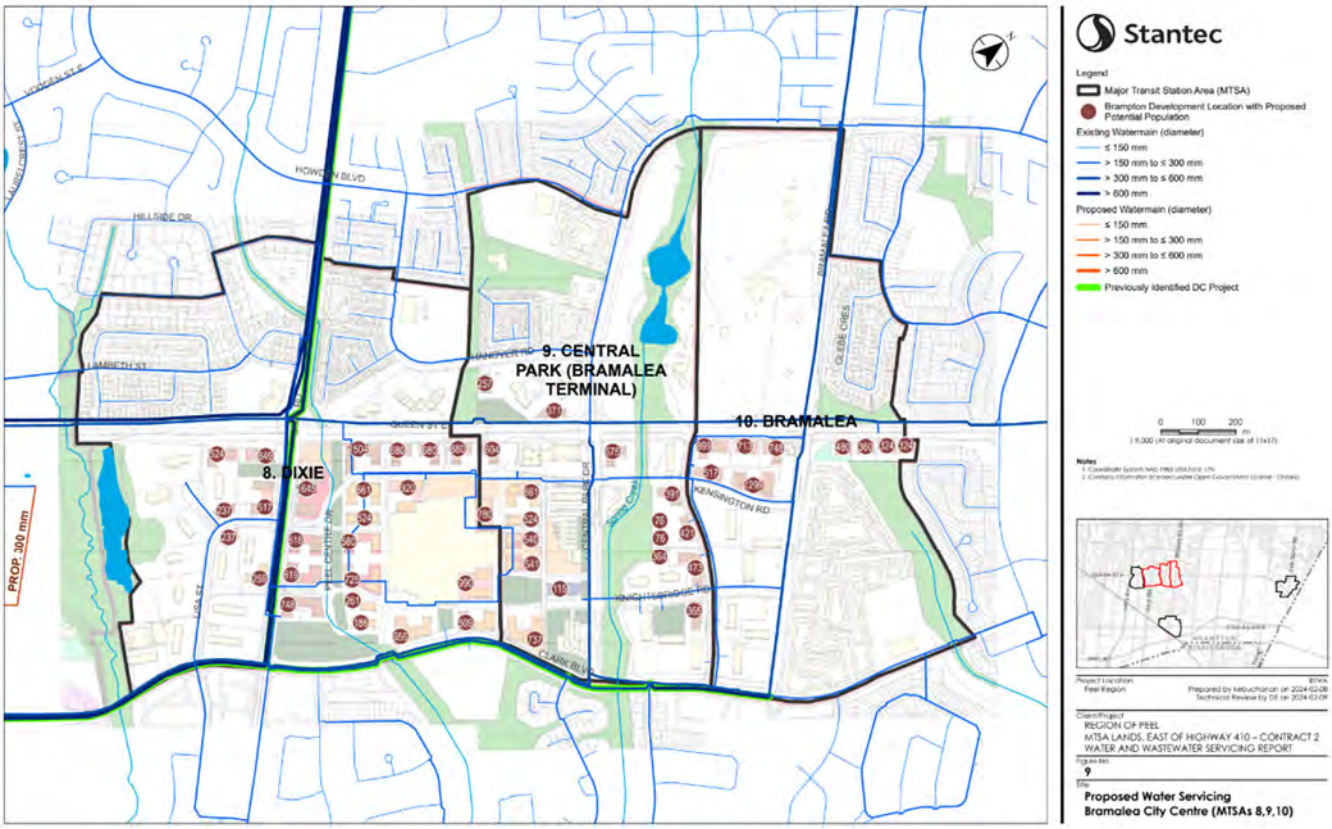

Figure 6-113: Stantec Proposed Water Servicing Strategy (Dixie, Central Park, and Bramalea)

The report also indicates there are no water servicing upgrade costs.

Table 6-3: Opinion of Probable Costs - BCC Water Servicing

Pipe Details	Diameter (mm)	Length (m)	Cost
DC Projects ≥ 400mm	400	-	-
Total DC Projects		-	-
Local Developer-Funded Projects < 400mm	150	-	-
Total Developer-Funded Projects		-	-

Figure 6-114: Stantec Local Water Servicing Upgrades (Dixie, Central Park, and Bramalea MTSAs)

6.7.5.2 Sanitary/Wastewater

The following information is drawn from the report titled "Water and Wastewater Servicing Report – TSA Lands, East of Highway 410 – Contract 2" dated April 19, 2024 and prepared by Stantec Consulting Ltd, hereinafter (Stantec Water and Wastewater Report – Contract 2). In this report, the Dixie, Central Park, and Bramalea MTSAs were evaluated as one due to the many overlapping services. According to the report, significant growth in Peel along with intensification puts a strain on existing water and wastewater systems, especially where capacity shortfalls already exist.

The report identifies that the proposed alignments satisfy system requirements and that surcharge state ranges from 0.10-2.00, which is the same as existing conditions. Deficiencies in the systems that are outside the MTSA

are flagged, including a constraint at the Spring Creek Trunk sewer, which receives flow from both Bramalea GO and the combined Dixie, Central Park, and Bramalea MTSAs.

The report proposes recommended wastewater servicing strategy considerations to address constraints. This sewer has restricted capacity in Ultimate conditions, independent of the MTSA change in growth, and therefore, its remediation is tied to the growth in the MTSA. As a result of future growth in Dixie, Central Park, and Bramalea MTSAs, an additional 0.316 m3/s of flow will enter Spring Creek Trunk. Previously, Clark Blvd was mentioned as an area to avoid construction due to the business of the streets and potential servicing conflicts, however upgrades to the pipes connecting into Clark Blvd are required with the only reasonable outlet for certain new pipes on Clark Blvd, therefore work on Clark Blvd is unavoidable.

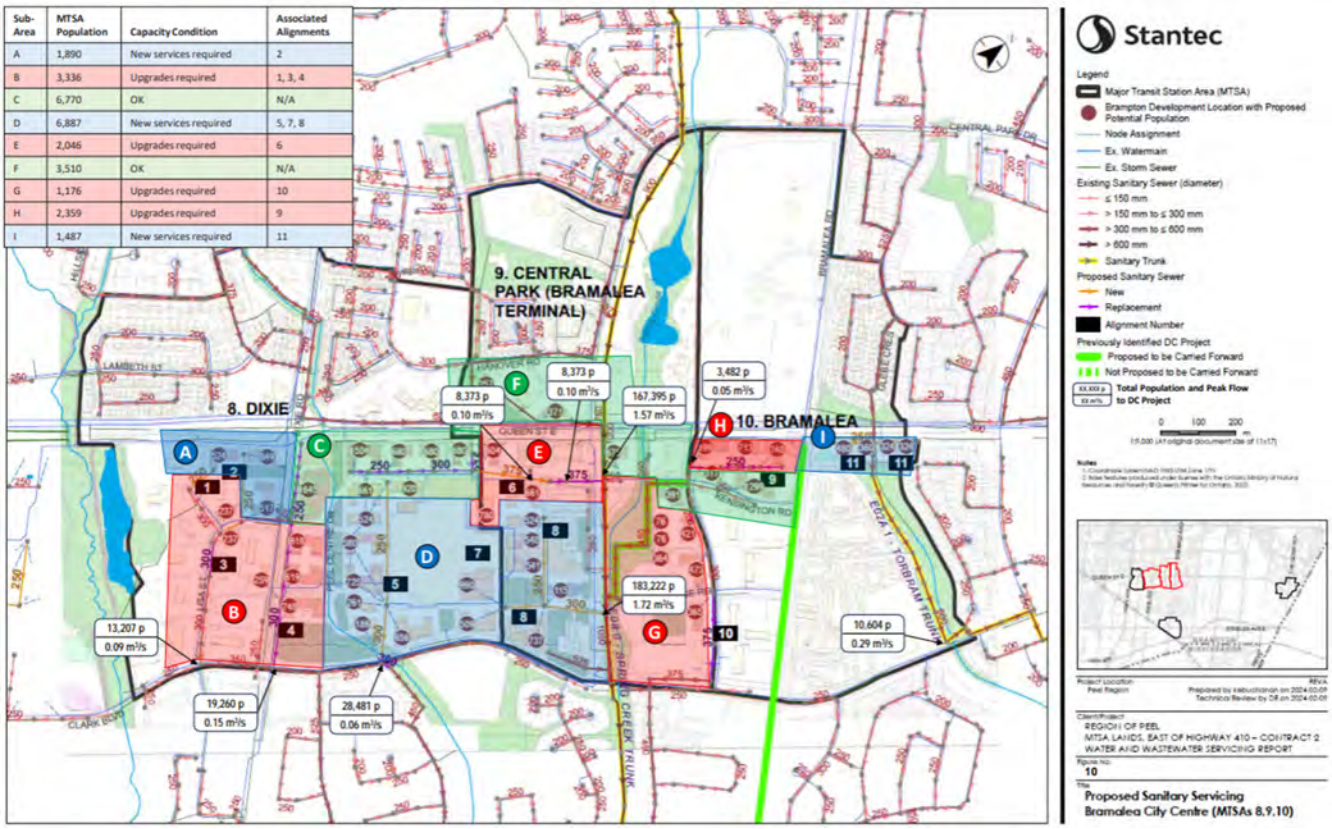

Figure 6-115: Stantec Preferred Wastewater Alternative (Dixie, Central Park, and Bramalea)

The report describes a series of upgrades for the preliminary preferred strategy, along with a high-level cost estimate and development triggers.

Table 6-5: BCC Flows Entering Spring Creek Trunk

Location	Ultimate Flow to Spring Creek Trunk (m^3/s)	Existing Flow to Spring Creek Trunk (m^3/s)	Additional Flow to Spring Creek Trunk in Ultimate (m^3/s) (Ultimate – Existing)
North of Hanover Rd	0.022	0.023	-0.001
Queen St E	0.452	0.349	0.103
Kensington Rd	0.018	0.009	0.009
Peel Centre Dr	0.095	0.023	0.072
Knightsbridge Rd (east side)	0.113	0.064	0.049
Knightsbridge Rd (west side)	0.078	N/A	0.078
North of Clark Blvd	0.017	0.011	0.006
Total Flow (m^3/s)	**0.795**	**0.479**	**0.316**

Figure 6-116: Wastewater project triggers (Dixie, Central Park, and Bramalea)

Table 6-6: Opinion of Probable Costs - BCC Wastewater Servicing

Pipe Details	Diameter (mm)	Length (m)	Cost
DC Projects ≥ 375mm	375	446	$927,662
Total DC Projects		**446**	**$927,662**
Local Developer-Funded Projects < 300mm	250	1,470	$2,597,510
	300	598	$1,132,692
Total Developer-Funded Projects		**2,068**	**$3,730,201**

Figure 6-117: Stantec Cost Estimate for Upgrades (Dixie, Central Park, and Bramalea)

6.7.6 Proposed Street Classifications and Stormwater Interventions

6.7.6.1 New Link Proposed Complete Streets Classification

All of the proposed streets in the Central Park MTSA have been classified as mixed-use neighbourhood streets.

Figure 6-118: Central Park Proposed Complete Streets Classification

6.7.6.2 Stormwater Management Interventions

The figure below illustrates the final transportation network and stormwater management proposals for the Central Park MTSA. It includes the proposed transportation network refinements identified in the City's preliminary area plan as well as those identified through the transport analysis.

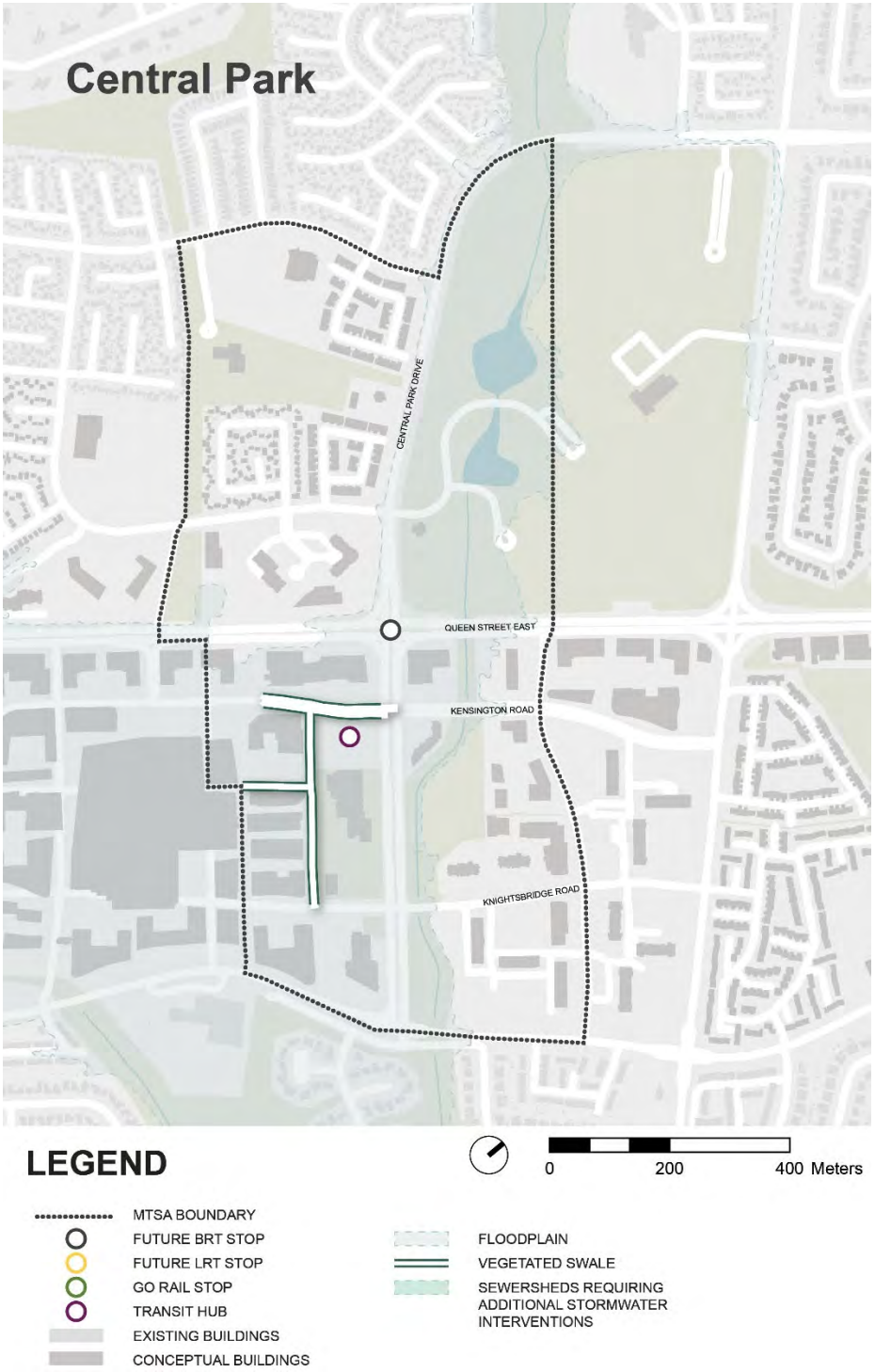

Figure 6-119: Central Park Combined Transportation Network and Stormwater Interventions

6.7.7 MTSA-Specific Policy Recommendations

Several objectives in the Central Park MTSA are best met through the application of general and location-specific policies in addition to the proposed network adjustments. Policies that should be considered for this MTSA are listed below. Parenthetical information provides rationale for specific policies.

- **General transportation network enhancements:**
  - Road and active-transport infrastructure should be provided to support comfortable, direct, and safe travel for sustainable modes and bolster transit ridership.
- **Roads:**
  - To create a finer-grain network, several new street alignments are proposed in the area of Bramalea City Centre.
  - The City of Brampton should work with developers through the planning approval process to secure rights of way with sufficient width to accommodate revised complete streets typologies, including proposed green infrastructure to address publicly managed stormwater flows. Final widths and alignments will be determined through future detailed studies.
  - Traffic-calming measures should be leveraged on local or neighbourhood roads to reduce cut-though traffic on streets that are meant to provide access to residences or businesses or roads that play a major role in pedestrian and bike connectivity. Potential strategies include reduced speed limits, chicanes, and speed humps or tables. These strategies should be considered for Hanover Road and the new street network proposed for the Bramalea City Centre.
- **Active travel:**
  - Sidewalks and/or other appropriate pedestrian facilities should be provided along both sides of all new and existing streets. (A policy which ensures that all future streets include pedestrian facilities on both sides, and that all existing streets are upgraded to add this infrastructure where missing, is critical for the development of a safe and convenient pedestrian network.)
  - Bike infrastructure (including, but not limited to, recreational trails, multi-use paths, bike lanes, and protected bike lanes) should be provided in accordance with the Active Travel Master Plan. Additional infrastructure should be implemented where needed to promote network connectivity and reduce circuity of protected bike trips to the Central Park BRT stop. (Within the proposed network, cyclists travelling to the Central Park BRT stop will experience more circuitous routes than pedestrians. Where possible, the City of Brampton should work with developers to identify additional mid-block connections that serve cyclists, as well as pedestrians.)
  - The provision of new bike lanes and multi-use paths must be complemented by the installation of bike parking at key destinations, such as the Central Park BRT stop and the future bus terminal.
  - New developments should be designed to minimize walking distance to transit or other key destinations through the inclusion of mid-block connections.
  - New neighbourhood parks and other open spaces should include dedicated pedestrian and bike infrastructure to enhance connectivity.

- Active-transport facilities, including street furniture and tree planting, or Complete Streets upgrades should be prioritized for Queen Street East, Central Park Drive, Team Canada Drive, Peel Centre Drive, and the north-south proposed street west of Team Canada Drive based on expected active demand.
- Pedestrian and cyclists should be prioritized at high-demand intersections, such as Queen Street East / Central Park Drive. Consideration should be given to including operational modifications or design treatments that prioritize active travel users include pedestrian-scramble signal phases, pedestrian head starts, no right turns on red, raised crosswalks or intersections, and protected intersections.
- Add direct connections between Queen Street East and existing high-rise developments north of Queen Street East to reduce the length of the trip to the BRT stop. (There are several condos and other housing developments that back onto the north side of Queen Street East, but that require a circuitous trip to the BRT stop currently due to the lack of a direct connection.)
- The connection between the BRT stop and the future bus terminal should be direct, clear, convenient, and provide a high-quality pedestrian experience.
- The Chinguacousy Trail underpasses should be upgraded and animated to enhance the user experience.

- **Building servicing**:
  - Vehicular access to buildings that front onto major streets, such as Queen Street in the Central Park MTSA, should be provided via local back streets or service lanes. (This will help maintain traffic flow on the major roads while also providing uninterrupted active-travel facilities for pedestrians and cyclists.)
- **Travel-demand management**:
  - Travel-demand strategies for new development should be emphasized for developments expected to contribute vehicular traffic to Queen Street East, Hanover Road, and the new street network proposed for the Bramalea City Centre. (Intensification in the MTSA must be coupled with a range of travel demand management strategies that promote the use of active modes and transit over cars in order to reduce congestion and promote sustainable travel.)
- **Stormwater:**
  - All new developed streets should be designed according to the new complete street guidelines. Exact retention swales dimensions should be calculated for each new street to ensure that the new streets do not cause increase in peak flow for each applicable design storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms).
  - Developments within the MTSA shall be required to implement stormwater management techniques required to provide post to pre control for all storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms), as required by CVC

6.7.8 Recommendations for Further Transportation Network Enhancements

Several recommendations for refining the Central Park MTSA's street network were identified through the transportation analysis conducted as part of this study. Key refinements include:

- Adding a crossing at Central Park Drive between Knightsbridge Road and Kensington Road (P1);
- Adding active connections between Central Park Drive and the neighbourhoods to the west (P2);
- Ensuring there is a clear pedestrian priority link between the BRT stop and the proposed location of Bramalea Terminal (P3);

- Enhancing the two underpass along the Chinguacousy Trail (P4); and
- Adding a crossing at Kings Cross Road between Knightsbridge Road and Kensington Road (P5)
- Adding a recreation path crossing over Central Park Drive (P6)
- Adding an intersection at Kings Cross Road and Queen Street East to facilitate active transportation connection to the park (P7)
- Adding a crossing to connect the reactional paths south and north of Knightsbridge Road (P8)
- Improving the intersection of Cloverdale Drive and Clark Boulevard, and Clark Boulevard and Central Park Drive to accommodate the Chinguacousy Trail connection for pedestrians and cyclists (P9)
- Adding cycling infrastructure and road diets on Kensington Road, Kingsbridge Road and Kings Cross Road (P10)

Upon reviewing these recommendations, the City recommended that P2 not be carried forward for future analysis. As such, this refinement is excluded from the final transportation network and stormwater management recommendations. Additionally, recommendations P3 and P4 have been included in the policy recommendations below.

Figure 6-120: Central Park Preliminary Transportation Network Refinements

6.8 MTSA 08 – Bramalea

The Bramalea MTSA is located along Queen Street East, east of Highway 410. The MTSA includes the eastern portion of Chinguacousy Park and is planned to include high-rise and mid-rise mixed-use areas; high-rise and low-rise residential areas; and a school. The Queen Street BRT will provide the primary higher order transit service in the MTSA. As the Bramalea MTSA will be served by a BRT station, it has a density target of 160 residents and jobs combined per hectare.

To support the increased density proposed in this MTSA, a range of street-network refinements have been identified. These include bike facilities identified in the Active Transportation Master Plan and recommendations flowing from the transportation analysis described herein. Key refinements include new active connections to reduce trip circuity to the transit station and bike facilities on Bramalea Road, Clark Boulevard, and Central Park Drive.

There are no specific stormwater management recommendations for the Bramalea MTSA since no new streets are being proposed.

6.8.1 Existing conditions

The Bramalea MTSA has a lot of park space, with Chinguacousy Park in the northwest and Fallingdale Park in the southeast. The southeast and southwest corners of the MTSA also include high-density residential towers surrounded by open spaces. The northeast corner features low-density residential areas. There is also a school at the southern edge of the MTSA.

Figure 6-121: Bramalea Existing Conditions Land Use Map

Bramalea Road and Queen Street East are the major vehicle thoroughfares in the Bramalea MTSA. The local streets in the eastern half of the MTSA are generally disconnected and circuitous, while the local streets in the

southwestern area are more grid-like. In addition to being served by the future Queen Street BRT, the Bramalea MTSA is also served by local buses running along Queen Street East, Bramalea Road, Central Park Drive, Clark Boulevard, Kensington Road and Knightsbridge Road. Additionally, there are GO bus stops located in the MTSA at Clark Boulevard and Kings Cross Road.

The Bramalea MTSA has existing open spaces in the northwest and southeast portions of the MTSA. There are also small regulatory flood plains throughout the MTSA.

Figure 6-122: Bramalea Existing Conditions Map

6.8.2 Community Objectives

The preliminary land-use plan for the Bramalea MTSA was discussed in a public focus-group session held on January 19, 2023. In general, the discussion centred around four points: 1) what is working in the MTSA; 2) what is not working in the MTSA; 3) what is missing in the MTSA; and 4) how could the MTSA be improved. During the focus-group session, attendees expressed discontent about disconnected bike paths, particularly near the Knightsbridge building; the lack of a bus stop area at Bramalea Road and Steeles Avenue which contributes to slow traffic north of Steeles; access to high density buildings from Queen Street; and dark paths. Furthermore, the group discussed the low transit use in the MTSA and high vehicle ownership, which consequently leads to high parking demand. They noted that the MTSA is currently missing crossing facilities on Queen Street, traffic movement measures, services to accompany high density, lighting, shade structures and public art.

Suggestions about improving the Bramalea MTSA included naturalizing green spaces, adding public park and recreation elements, programming for community spaces, a safe pedestrian overpass to Chinguacousy Park over Queen Street, access routes to high density areas to minimize traffic on Queen Street East and Bramalea Road, garbage bins, and community cleanups. They also mentioned the need to ensure that schools, which are already crowded, can accommodate new residents.

A complete summary of the focus-group session is included in Appendix D.

6.8.3 City of Brampton Land-Use Plan

The final land-use plan for the Bramalea MTSA was approved by Brampton City Council in October 2023 as part of the update to the city's Official Plan. The approved land use plans were the result of iterative refinements based on qualitative and quantitative analyses of preliminary land use plans conducted by Arup over the course of this engagement and community engagement.

The Bramalea MTSA land-use plan largely reflects existing uses north of Queen Street East. The southwest and southeast corners of Bramalea Road and Queen Street East are marked for high-rise mixed uses. The southwest portion of the MTSA includes a large number of existing condominiums that are unlikely to redevelop, in part, because of the difficulty of achieving unanimous agreement from existing owners. The southeast portion of the MTSA includes low-rise residential areas, open space, and a school.

This MTSA is located on the Queen Street bus rapid transit corridor. In addition to the BRT corridor, key mobility elements of the proposed plan include:

- Proposed multi-use path on Bramalea Road
- Proposed protected bike lanes on Clark Boulevard and on Central Park Drive

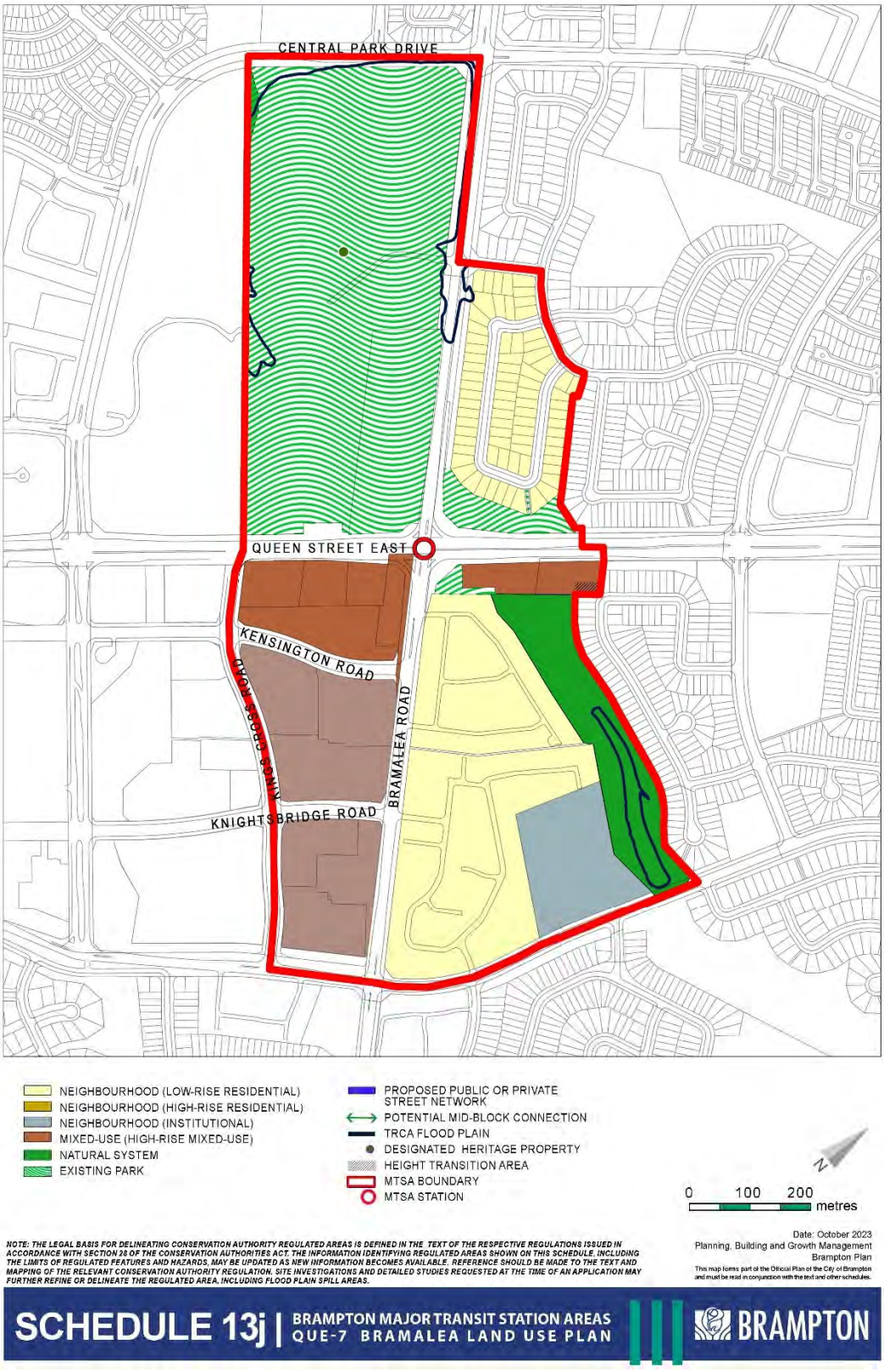

Figure 6-123: Bramalea Proposed Land Use Plan (City of Brampton)

6.8.4 Analysis of Proposed Conditions

The analysis illustrated in the following subsections considers estimated travel demand and network characteristics, as well as stormwater flow conditions assuming the implementation of the final council-approved land-use plans.

6.8.4.1 Transportation Analysis of Future Conditions

The future-conditions transportation analysis considers the expected distribution of relative travel demand with respect to the existing and future street network; identifies potentially high-demand bike and pedestrian routes between future development and the closest transit stop to assist in prioritizing active-travel-infrastructure investments; and points to areas within the vehicular network that may require additional study or intervention.

Travel Demand Distribution

Demand per street segment is largely driven by the size and type of developments anticipated for each block. The areas of highest demand are clustered in the southwest corner of the MTSA where there are some existing high-density residential buildings and planned high-density mixed-use areas. Generally speaking, the southern half of the MTSA generates more demand than the northern half of the MTSA, which primarily consists of open space and low-density housing. It should be noted that the park itself was not considered a trip generator for the purposes of this analysis.

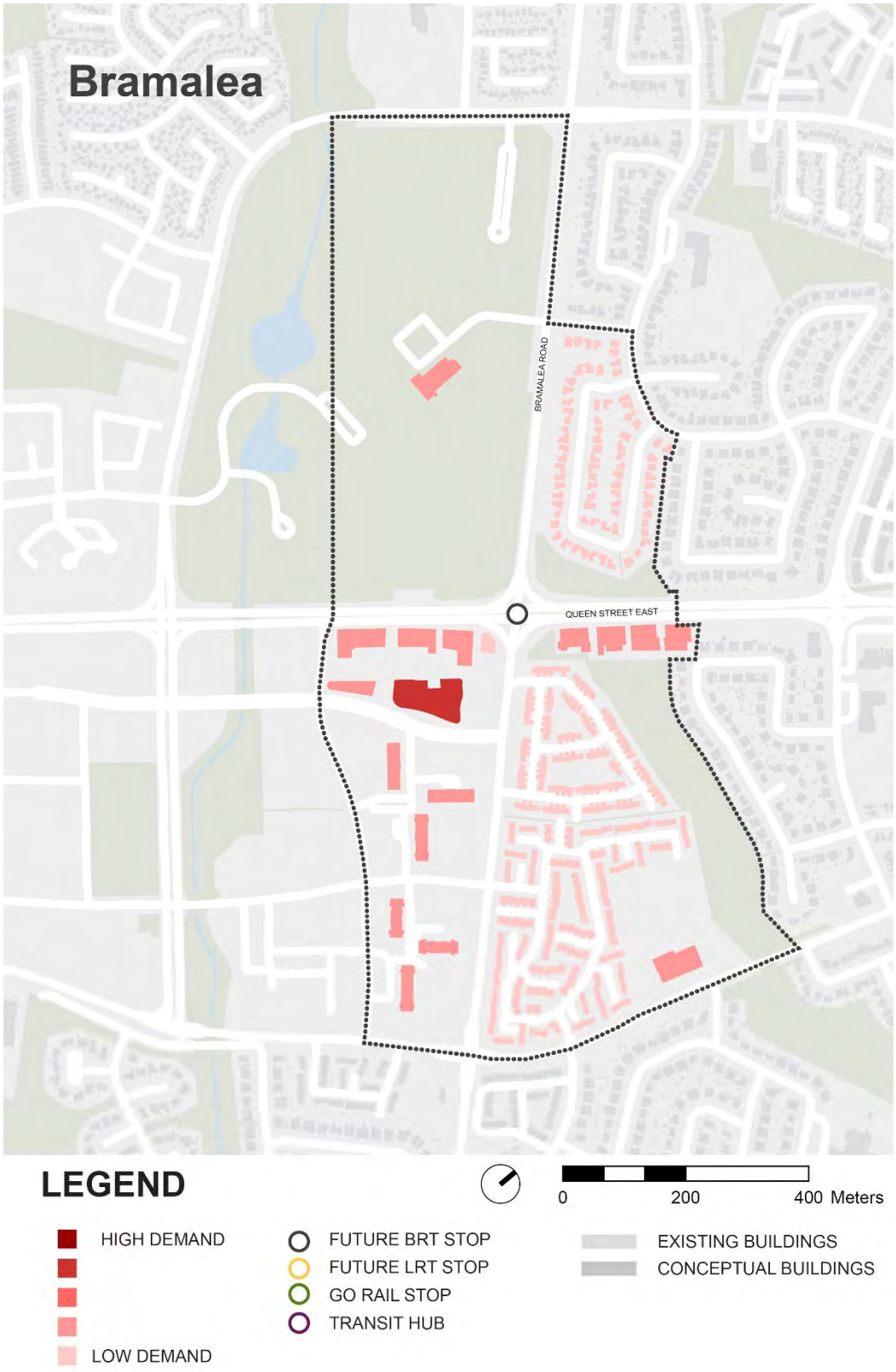

Figure 6-124: Bramalea Building Travel Demand Aggregation – Vehicle and Transit Demand

Active Travel Between Development and Transit

The figure below shows aggregated bike demand per street segment in the PM peak hour in the future condition. Demand levels are highest in the southwestern portion of the MTSA, where the high-density land uses are concentrated. Several active connections—including the diagonal connection extending southeast from the Queen Street East / Bramalea Road intersection, and the two connections between Queen Street East and areas south on either side of Bramalea Road—show particularly high levels of use.

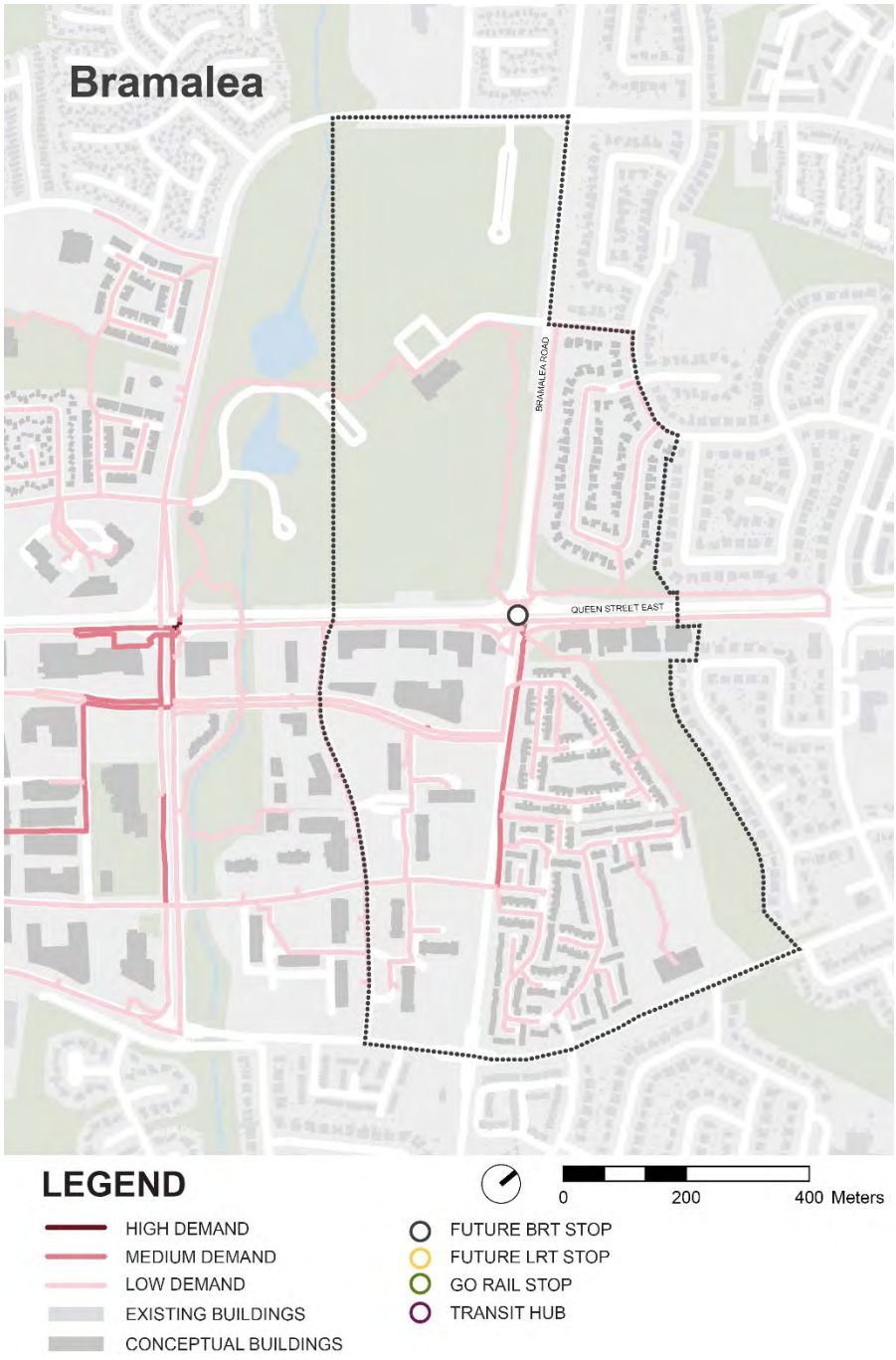

Figure 6-125: Bramalea Aggregation of Bike Demand to and from the Nearest Transit Stop

Walk demand in the Bramalea MTSA is also concentrated in the southwest corner of the MTSA. Bramalea Road plays an important role in connecting pedestrians travelling between the transit station and the high-density buildings to the south.

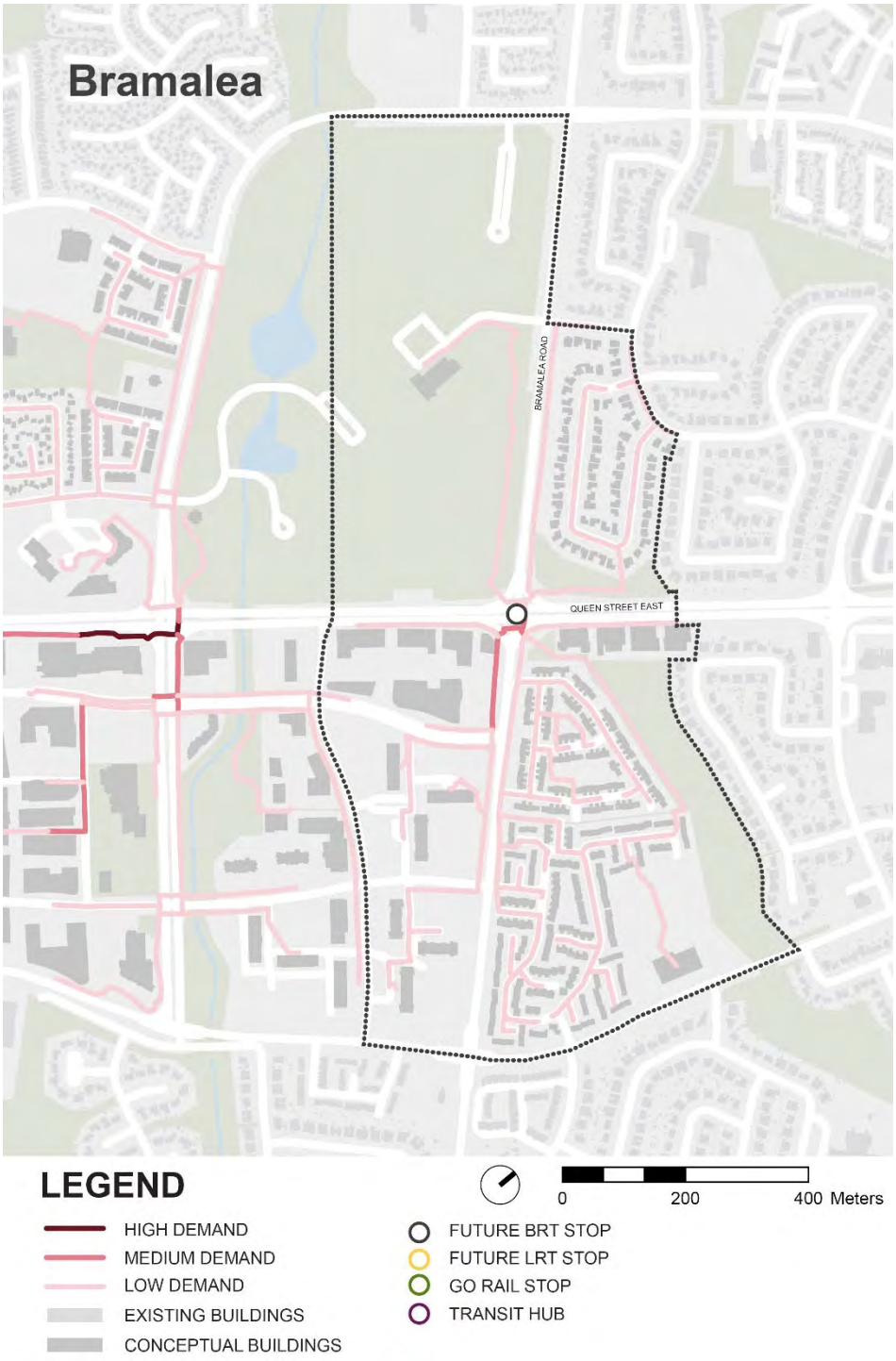

Figure 6-126: Bramalea Aggregation of Walk Demand to and from the Nearest Transit Stop

Accessibility to Local Bus and ZÜM services

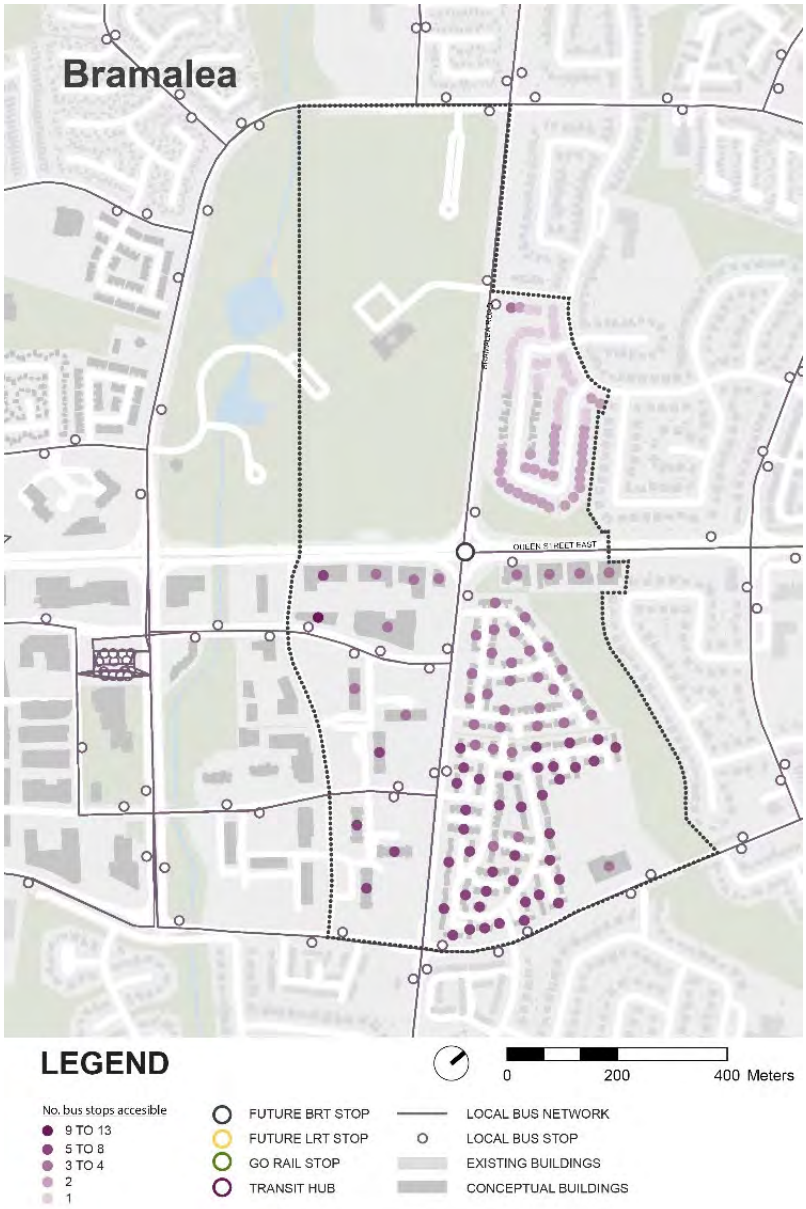

Figure 6-127: Number of local bus stops accessible within 400 m walking

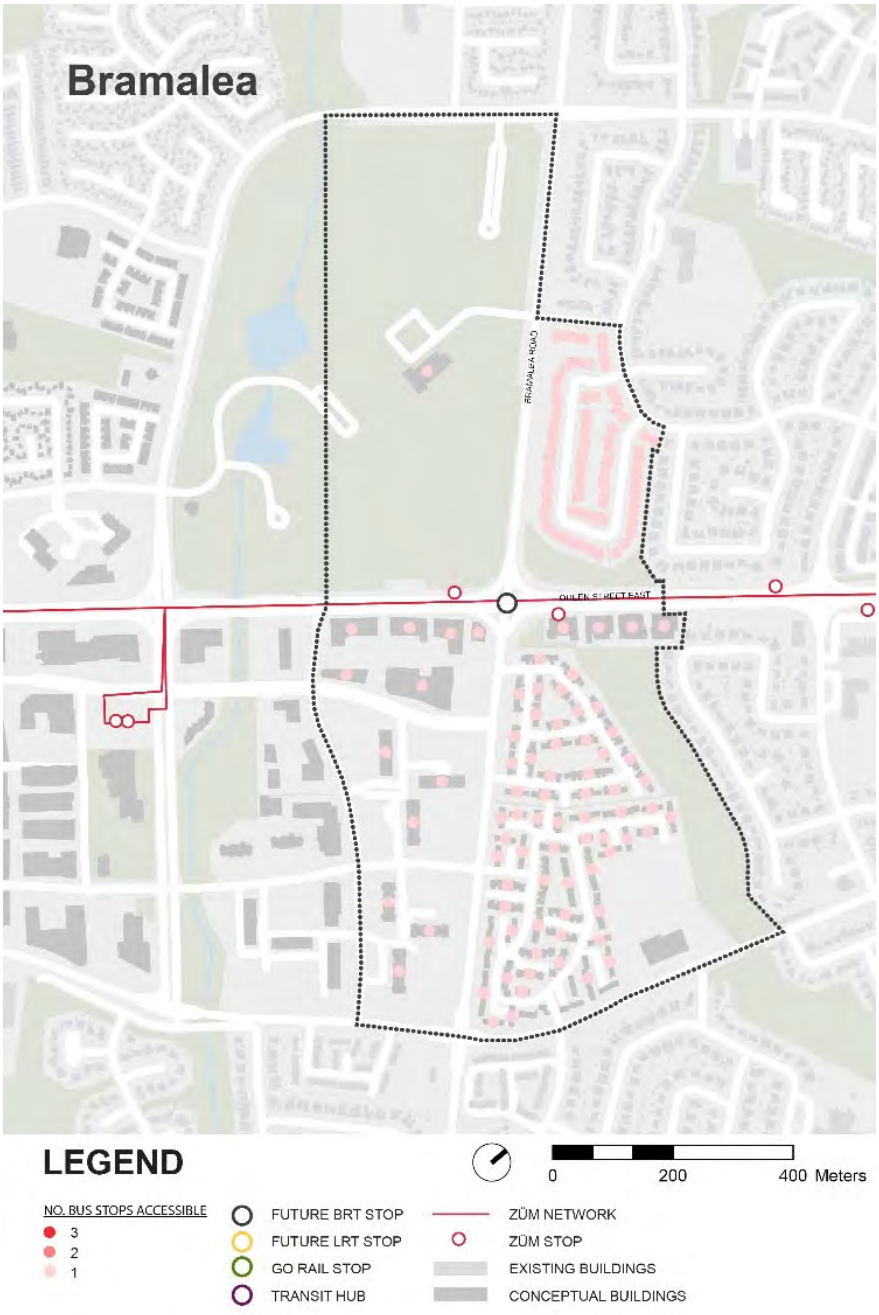

Figure 6-128: Number of higher-order transit stops accessible within 800 m walking

Vehicle Demand

Roads that may warrant additional investigation due to vehicle demand are highlighted in the figure below. This map is not meant to identify street segments that *will* be overcapacity, but rather to identify some street segments that fall on key shortest-path routes and therefore may experience high levels of demand. For the purposes of this review, all proposed streets were expected to accommodate bi-directional traffic, with one lane in each direction. Some key links flagged in this review include:

- Eastbound Queen Street east.

Intensification therefore must be coupled with travel demand management strategies to promote even higher rates of sustainable modes and limit traffic congestion. Furthermore, consideration should be given to deterring through-traffic from using local neighbourhood streets (including the proposed street connections included in this MTSA) to reduce congestion in these areas. Potential strategies include reduced speed limits, chicanes, and speed humps/tables.

Figure 6-129: Bramalea Vehicle Network Assessment

6.8.4.2 Stormwater Analysis of Future Conditions

No stormwater analysis was required for this MTSA since no new streets are planned to be opened in this.

6.8.5 Summary of Servicing Observations

The Region of Peel separately commissioned studies of potable water and wastewater/sanitary sewerage servicing on an MTSA-by-MTSA basis. Details from these studies with relevance to planning activities are summarized here solely for the convenience of the reader and to facilitate consideration of implications for MTSA network planning. Arup assumes no liability for the accuracy of those analyses and reports or the completeness of the summary. The Peel Region reports were based on preliminary land use plans and build-out projections provided by the City of Brampton directly to the Region of Peel in 2022. Some adjustments have occurred to land-use plans and build-out projections, which may alter some of the reports' conclusions.

6.8.5.1 Water

The following information is drawn from the report titled "Water and Wastewater Servicing Report – TSA Lands, East of Highway 410 – Contract 2" dated April 19, 2024 and prepared by Stantec Consulting Ltd, hereinafter (Stantec Water and Wastewater Report – Contract 2). In this report, the Dixie, Central Park, and Bramalea MTSAs were evaluated as one due to the many overlapping services. The report concludes that all service-level criteria (pressure, velocity, and fire-flow availability) can be satisfied under the growth scenario, other than one instance of the minimum pressure being below 40 psi under both existing and proposed conditions. However, this location is also along a Zone 4 Central Transmission System and will not be used to service the proposed developments, and the deficiencies will not affect the servicing strategy.

Since the servicing strategy in the Dixie, Central Park, and Bramalea MTSAs are to use entirely existing infrastructure, there are few considerations to be aware of. Nevertheless, some aging watermains of less than 300 mm in diameter may need to be replaced to meet Region of Peel standards.

The report shows the proposed water servicing strategy in the Dixie, Central Park, and Bramalea MTSAs

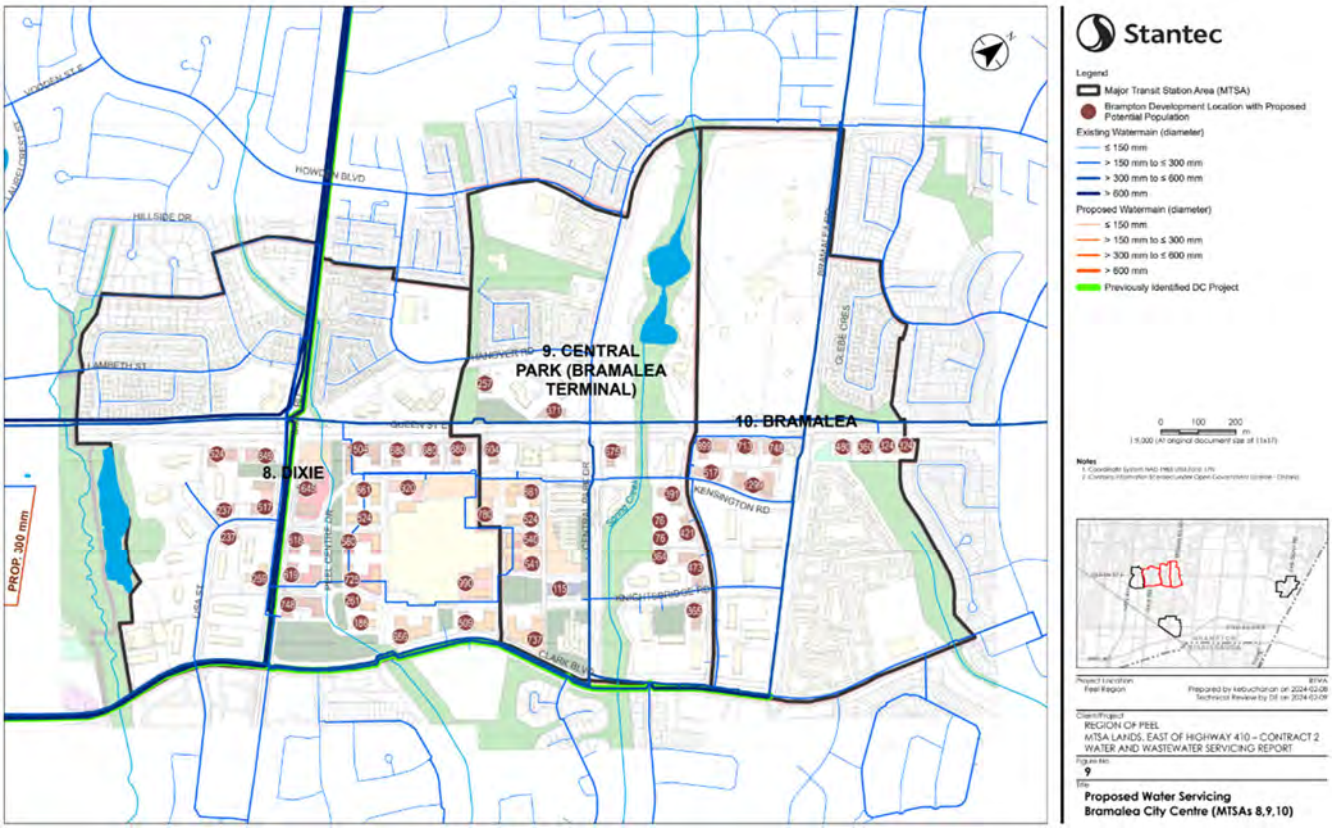

Figure 6-130: Stantec Proposed Water Servicing Strategy (Dixie, Central Park, and Bramalea)

The report also indicates there are no water servicing upgrade costs.

Table 6-3: Opinion of Probable Costs - BCC Water Servicing

Pipe Details	Diameter (mm)	Length (m)	Cost
DC Projects ≥ 400mm	400	-	-
Total DC Projects		-	-
Local Developer-Funded Projects < 400mm	150	-	-
Total Developer-Funded Projects		-	-

Figure 6-131: Stantec Local Water Servicing Upgrades (Dixie, Central Park, and Bramalea MTSAs)

6.8.5.2 Sanitary/Wastewater

The following information is drawn from the report titled "Water and Wastewater Servicing Report – TSA Lands, East of Highway 410 – Contract 2" dated April 19, 2024 and prepared by Stantec Consulting Ltd, hereinafter (Stantec Water and Wastewater Report – Contract 2). In this report, the Dixie, Central Park, and Bramalea MTSAs were evaluated as one due to the many overlapping services. According to the report, significant growth in Peel along with intensification puts a strain on existing water and wastewater systems, especially where capacity shortfalls already exist.

The report identifies that the proposed alignments satisfy system requirements and that surcharge state ranges from 0.10-2.00, which is the same as existing conditions. Deficiencies in the systems that are outside the MTSA

are flagged, including a constraint at the Spring Creek Trunk sewer, which receives flow from both Bramalea GO and the combined Dixie, Central Park, and Bramalea MTSAs.

The report proposes recommended wastewater servicing strategy considerations to address constraints. This sewer has restricted capacity in Ultimate conditions, independent of the MTSA change in growth, and therefore, its remediation is tied to the growth in the MTSA. As a result of future growth in Dixie, Central Park, and Bramalea MTSAs, an additional 0.316 m3/s of flow will enter Spring Creek Trunk. Previously, Clark Blvd was mentioned as an area to avoid construction due to the business of the streets and potential servicing conflicts, however upgrades to the pipes connecting into Clark Blvd are required with the only reasonable outlet for certain new pipes on Clark Blvd, therefore work on Clark Blvd is unavoidable.

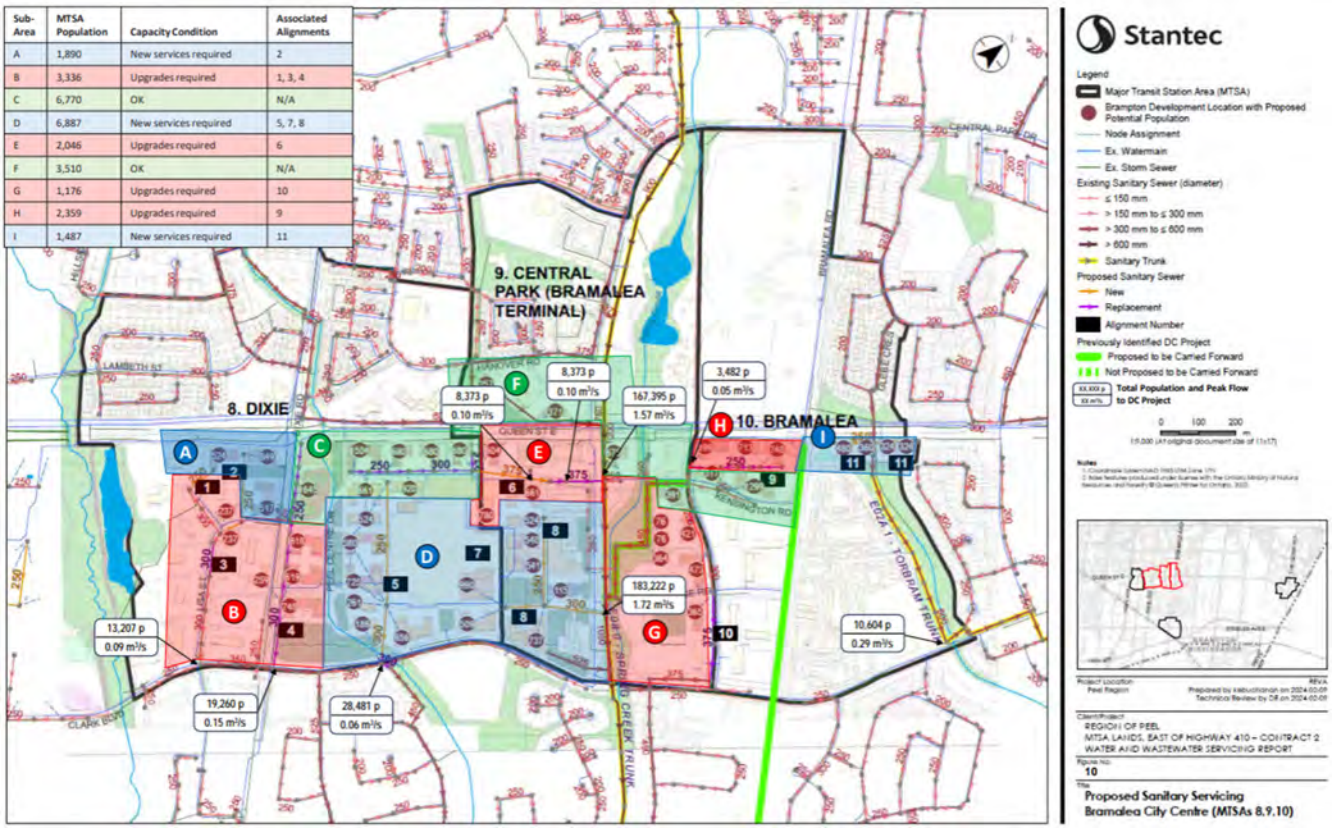

Figure 6-132: Stantec Preferred Wastewater Alternative (Dixie, Central Park, and Bramalea)

The report describes a series of upgrades for the preliminary preferred strategy, along with a high-level cost estimate and development triggers.

Table 6-5: BCC Flows Entering Spring Creek Trunk

Location	Ultimate Flow to Spring Creek Trunk (m^3/s)	Existing Flow to Spring Creek Trunk (m^3/s)	Additional Flow to Spring Creek Trunk in Ultimate (m^3/s) (Ultimate – Existing)
North of Hanover Rd	0.022	0.023	-0.001
Queen St E	0.452	0.349	0.103
Kensington Rd	0.018	0.009	0.009
Peel Centre Dr	0.095	0.023	0.072
Knightsbridge Rd (east side)	0.113	0.064	0.049
Knightsbridge Rd (west side)	0.078	N/A	0.078
North of Clark Blvd	0.017	0.011	0.006
Total Flow (m^3/s)	**0.795**	**0.479**	**0.316**

Figure 6-133: Wastewater project triggers (Dixie, Central Park, and Bramalea)

Table 6-6: Opinion of Probable Costs - BCC Wastewater Servicing

Pipe Details	Diameter (mm)	Length (m)	Cost
DC Projects ≥ 375mm	375	446	$927,662
Total DC Projects		**446**	**$927,662**
Local Developer-Funded Projects < 300mm	250	1,470	$2,597,510
	300	598	$1,132,692
Total Developer-Funded Projects		**2,068**	**$3,730,201**

Figure 6-134: Stantec Cost Estimate for Upgrades (Dixie, Central Park, and Bramalea)

6.8.6 Proposed Street Classifications and Stormwater Interventions

6.8.6.1 New Link Proposed Complete Street Classifications

There are no new streets proposed for the Bramalea MTSA.

6.8.6.2 Stormwater Management Interventions

The figure below illustrates the final transportation network and stormwater management proposals for the Bramalea MTSA. It includes the proposed transportation network refinements identified in the City's preliminary land use plans as well as those identified through the transportation analysis.

Figure 6-135: Bramalea Combined Transportation Network and Stormwater Interventions

6.8.7 MTSA-Specific Policy Recommendations

Several objectives in the Bramalea MTSA are best met through the application of general and location-specific policies in addition to the proposed network adjustments. Policies that should be considered for this MTSA are listed below. Parenthetical information provides rationale for specific policies.

- **General transportation network enhancements:**
  - Road and active-transport infrastructure should be provided to support comfortable, direct, and safe travel for sustainable modes and bolster transit ridership.
- **Active travel:**
  - Sidewalks and/or other appropriate pedestrian facilities should be provided along both sides of all new and existing streets. (A policy which ensures that all future streets include pedestrian facilities on both sides, and that all existing streets are upgraded to add this infrastructure where missing, is critical for the development of a safe and convenient pedestrian network.)
  - Bike infrastructure (including, but not limited to, recreational trails, multi-use paths, bike lanes, and protected bike lanes) should be provided in accordance with the Active Travel Master Plan. Additional infrastructure should be implemented where needed to promote network connectivity and reduce circuity of protected bike trips to the Bramalea BRT stop. (Within the proposed network, cyclists travelling to the Bramalea BRT stop will experience more circuitous routes than pedestrians. Where possible, the City of Brampton should work with developers to identify additional mid-block connections that serve cyclists, as well as pedestrians.)
  - The provision of new bike lanes and multi-use paths must be complemented by the installation of bike parking at key destinations, such as the Bramalea BRT stop, Fallingdale Public School, and Chinguacousy Park.
  - New developments should be designed to minimize walking distance to transit or other key destinations through the inclusion of mid-block connections.
  - New neighbourhood parks and other open spaces should include dedicated pedestrian and bike infrastructure to enhance connectivity.
  - Active-transport facilities, including street furniture and tree planting, or Complete Streets upgrades should be prioritized for Queen Street East, Bramalea Road, and Knightsbridge Road based on expected active demand.
  - New active crossings over the planned BRT corridor on Queen Street East between Central Park Drive and Bramalea Road and between Bramalea Road and Finchgate Crescent should be provided to enhance pedestrian and bike connectivity. To reduce negative travel-time impacts on the planned transit service, consideration should be given to crossings that do not require transit vehicles to stop, including overpasses, underpasses, or unsignalized transit-lane crossings.
  - Pedestrian and cyclists should be prioritized at high-demand intersections, such as Queen Street East / Bramalea Road and Clark Boulevard / Kings Cross Road. Consideration should be given to including operational modifications or design treatments that prioritize active travel users include pedestrian-scramble signal phases, pedestrian head starts, no right turns on red, raised crosswalks or intersections, and protected intersections.
- **Building servicing**:

  - Vehicular access to buildings that front onto major streets, such as Queen Street East in the Bramalea MTSA, should be provided via local back streets or service lanes. (This will help maintain traffic flow on the major roads while also providing uninterrupted active-travel facilities for pedestrians and cyclists.)

- **Travel-demand management**:
  - Travel-demand strategies for new development should be emphasized for developments expected to contribute vehicular traffic to Queen Street East. (Intensification in the MTSA must be coupled with a range of travel demand management strategies that promote the use of active modes and transit over cars in order to reduce congestion and promote sustainable travel.)

- **Stormwater:**
  - All new developed streets should be designed according to the new complete street guidelines. Exact retention swales dimensions should be calculated for each new street to ensure that the new streets do not cause increase in peak flow for each applicable design storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms).
  - Developments within the MTSA shall be required to implement stormwater management techniques required to provide post to pre control for all storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms), as required by CVC

- **Open space**:
  - Fallingdale Park should be enhanced through the addition of landscaping or other programming.

6.8.8 Recommendations for Further Transportation Network Enhancements

Several recommendations for refining the Bramalea MTSA's street network were identified through the transportation analysis conducted as part of this study. Key refinements include:

- Adding service roads parallel to Queen Street East to ensure adequate building servicing (B1);
- Adding a new active connection between Queen Street East and the trail in Fallingdale Park (B2);
- Ensuring adequate servicing for the buildings southeast of Queen Street East and Bramalea Road (B3); and
- Enhancing Falligndale Park through landscaping or programming (B4).
- Upgrading intersection of roads with bicycle infrastructure to high quality intersections (protected) (B5)

Upon reviewing these recommendations, the City recommended that B2 not be carried forward for future analysis. Instead, it has been included in the policy recommendations below, along with recommendations B4 and B5. As such, this refinement is excluded from the final transportation network and stormwater management recommendations. Additionally, the City recommended shifting the location of recommendation B3 slightly to the east.

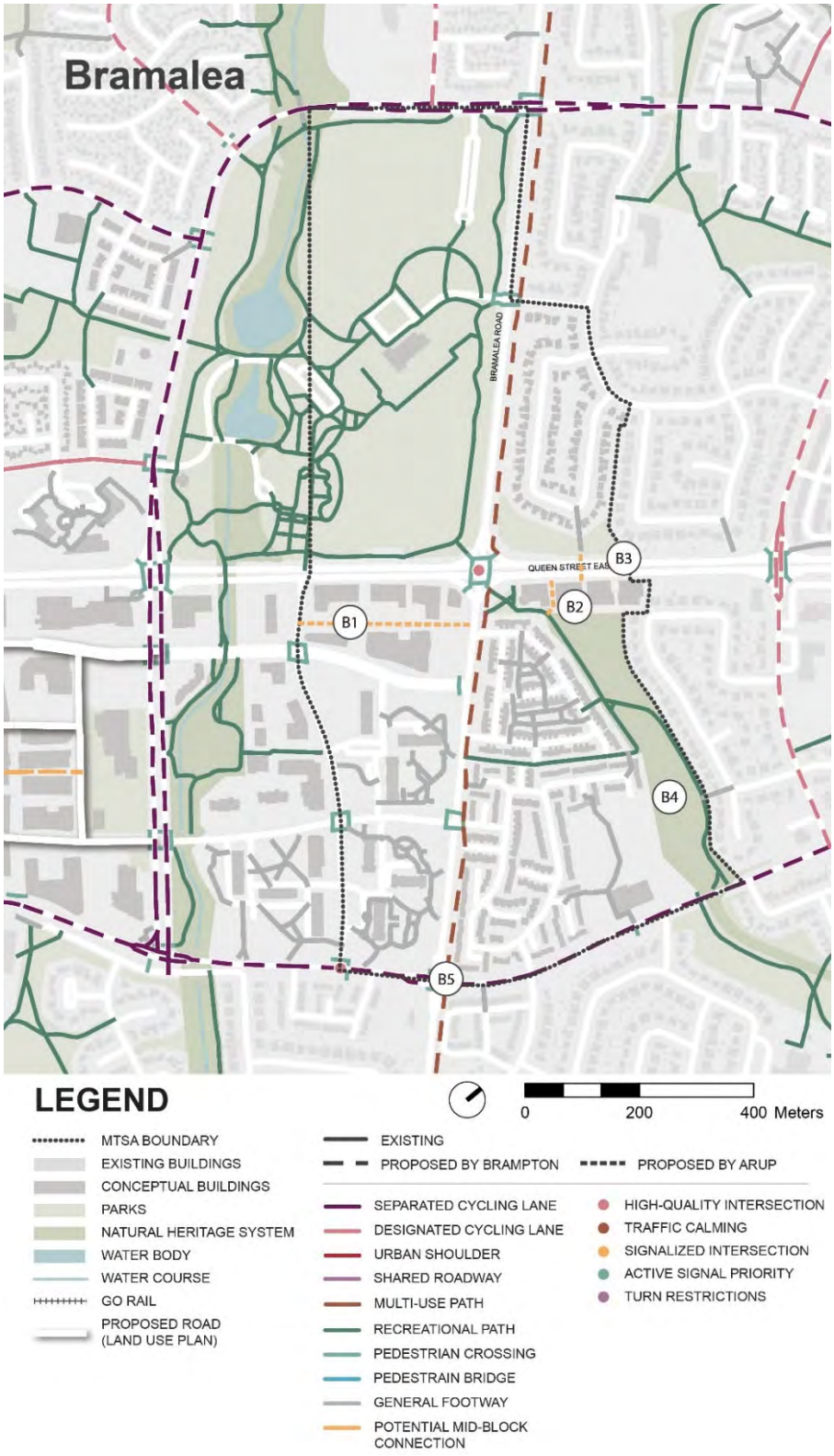

Figure 6-136: Bramalea Preliminary Transportation Network Refinements

6.9 MTSA 09 – Mount Pleasant GO

The Mount Pleasant GO MTSA is located in the northwest corner of Brampton. The MTSA is planned to include high-rise and low-rise mixed-use areas; mid-rise and low-rise residential areas; institutional areas, including a school and library, and new neighbourhood parks. The Kitchener GO line will provide the primary higher order transit service in the MTSA.

As the Mount Pleasant GO MTSA will be served by a commuter-rail station, it has a density target of 150 residents and jobs combined per hectare. To support the increased density proposed in this MTSA, a range of street-network refinements have been identified. These include street extensions and mid-block connections proposed by the City of Brampton in their area plan, bike facilities identified in the Active Transportation Master Plan, and recommendations flowing from the transportation analysis described herein. Key refinements include new streets in the southwestern portion of the MTSA; mid-block active connections linking these new street connections to each other and to existing streets; and bike facilities on Lagerfeld Drive, Commuter Drive, and Ganton Heights.

The Mount Pleasant GO MTSA is currently less developed in the south than in the north. Paving some areas in the south half, that is presently open space, by developing buildings and opening new streets can cause upticks in the stormwater network flows. To counter these increases and even ameliorate the peak flows, the city of Brampton should incorporate retention swales in the new streets. A more precise analysis should be done in the area of sewershed 09_10 to validate the accurate outfall location.

6.9.1 Existing Conditions

The Mount Pleasant GO MTSA contains high-density residential areas north of the rail corridor and large swaths of undeveloped land to the south, which are currently categorized as open space and industrial areas. In addition to high-density housing, the north side of the MTSA also includes an existing school and library.

Figure 6-137: Mount Pleasant GO Existing Conditions Land Use Map

Creditview Road and Bovaird Drive are currently the major vehicle thoroughfares through the Mount Pleasant GO MTSA. The local streets on the north side of the rail corridor are somewhat circuitous, as is common in suburban developments. There are limited roads south of the rail corridor, where the land is largely undeveloped. In addition to being served by the Kitchener GO line, the MTSA also has local bus service along Creditview Road, Ganton Heights, Commuter Drive, and Bovaird Drive. Additionally, there is GO bus service running along Bovaird Drive, with a stop at the Mount Pleasant GO rail station.

There is a natural heritage area that runs along the western side of the MTSA. Another natural-heritage area runs through the northern part of the MTSA west of the library and school.

Figure 6-138: Mount Pleasant GO Existing Conditions Map

6.9.2 Community Objectives

The Mount Pleasant GO MTSA was discussed by two groups during a focus-group session held on February 16, 2023. In general, the discussion centred around four points: 1) what is working in the MTSA; 2) what is not working in the MTSA; 3) what is missing in the MTSA; and 4) how could the MTSA be improved. The participants were content with the MTSA's green space, recreational areas, and trails; the pedestrian environment and shops north of the rail line; access to GO trains; the mix of housing types; and the library and live-work units which provide activities and amenities to the community. The participants expressed concerns about walkability in some areas, particularly road-crossing signals, times, and accessibility. They identified a lack of direct transit connections, a lack of working screens at GO stations, and overcrowded transit routes as concerns. Furthermore, they believe the MTSA is missing commercial areas, parks, recreational spaces, bike lanes, and bus shelters.

In the discussion about improving the Mount Pleasant GO MTSA, both groups suggested increasing ground-floor commercial spaces including restaurants, cafes, and farmers markets; improving weekend bus service, transit frequency and capacity; improving accessibility at intersections; and adding healthcare facilities and daycares, as well as recreational and entertainment facilities.

A complete summary of the focus-group session is included in Appendix D.

6.9.3 City of Brampton Land-Use Plan

The final land-use plan for the Mount Pleasant GO MTSA was approved by Brampton City Council in October 2023 as part of the update to the city's Official Plan. The approved land use plans were the result of iterative refinements based on qualitative and quantitative analyses of preliminary land use plans conducted by Arup over the course of this engagement and community engagement.

Key features of the Mount Pleasant GO MTSA land-use plan include high-rise mixed-use, mid-rise residential, and low-rise residential areas south of the rail line and low-rise residential and low-rise mixed-use areas north of the rail line. The north portion of the MTSA already includes an existing open space as well as some institutional uses (including a school and library). The south portion of the MTSA includes a planned neighbourhood park and new street connections.

This MTSA is located on the Kitchener GO line. In addition to the GO corridor, key mobility elements of the proposed plan include:

- The proposed extension of Lagerfeld Drive
- Four new proposed street connections between Lagerfeld Drive and Bovaird Drive West, two east of Creditview Road and two west of Creditview Road
- Proposed active connections in the area between Lagerfeld Drive and Bovaird Drive West
- A proposed multi-use path on Lagerfeld Drive with a connection north to the GO Station
- Proposed bike lanes on Salvation Road, Ganton Heights, and Commuter Drive

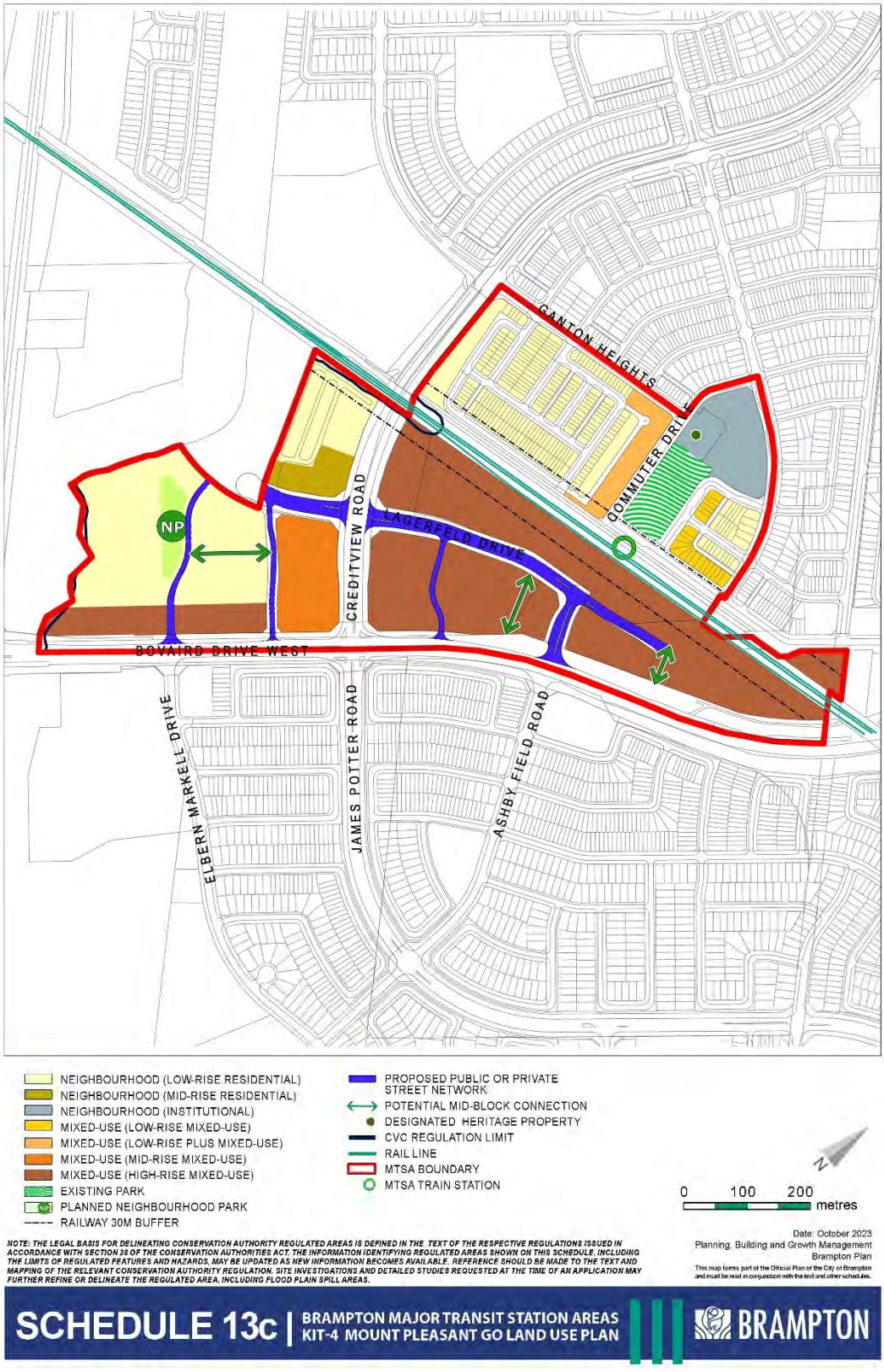

Figure 6-139: Mount Pleasant GO Proposed Land Use Plan (City of Brampton)

6.9.4 Analysis of Proposed Conditions

The analysis illustrated in the following subsections considers estimated travel demand and network characteristics, as well as stormwater flow conditions assuming the implementation of the final council-approved land-use plans.

6.9.4.1 Transportation Analysis of Future Conditions

The future-conditions transportation analysis considers the expected distribution of relative travel demand with respect to the existing and future street network; identifies potentially high-demand bike and pedestrian routes between future development and the closest transit stop to assist in prioritizing active-travel-infrastructure investments; and points to areas within the vehicular network that may require additional study or intervention.

Travel Demand Distribution

Demand per street segment is largely driven by the size and type of developments anticipated for each block. The areas of highest demand are generally concentrated south of the rail corridor, with the exception of the school and library to the north.

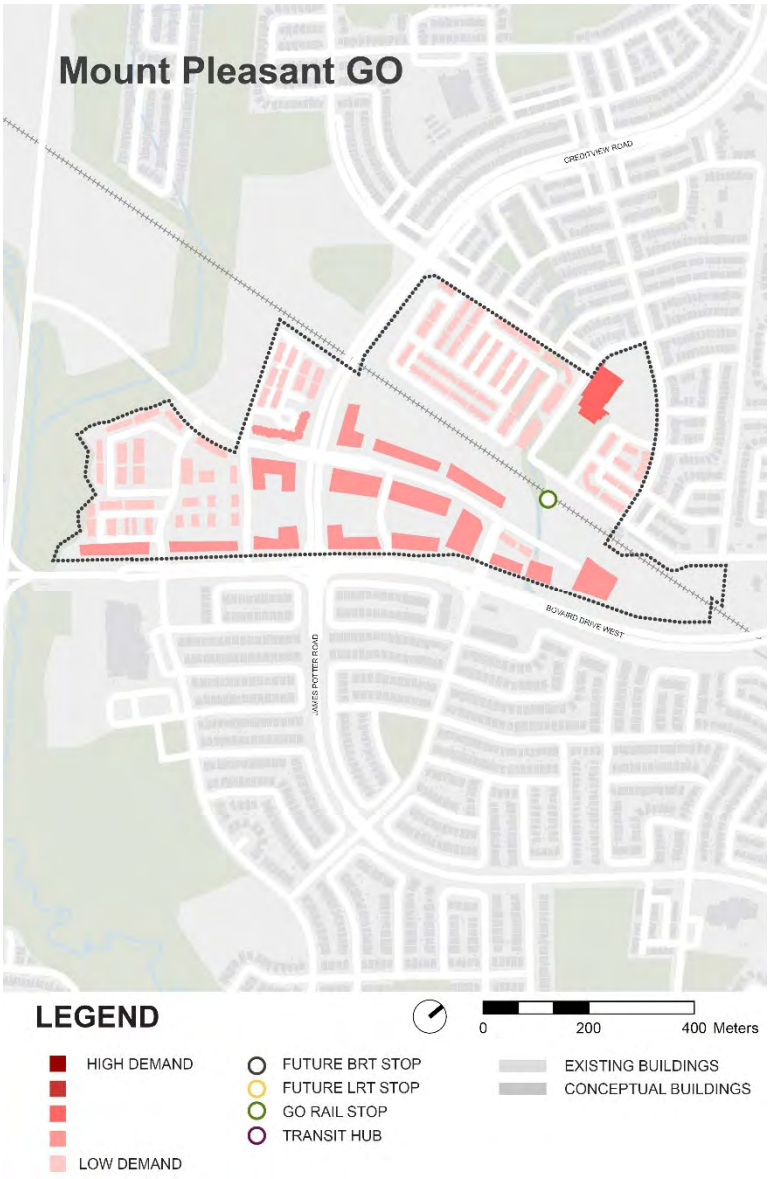

Figure 6-140: Mount Pleasant GO Building Travel Demand Aggregation

Active Travel Between Development and Transit

The figure below shows aggregated bike demand per street segment in the PM peak hour in the future condition. Demand levels are highest south of the rail corridor, with Lagerfeld Drive and Ashby Field Road accommodating a lot of cyclists. Portions of Bovaird Drive and Commuter Drive see high levels of use as well.

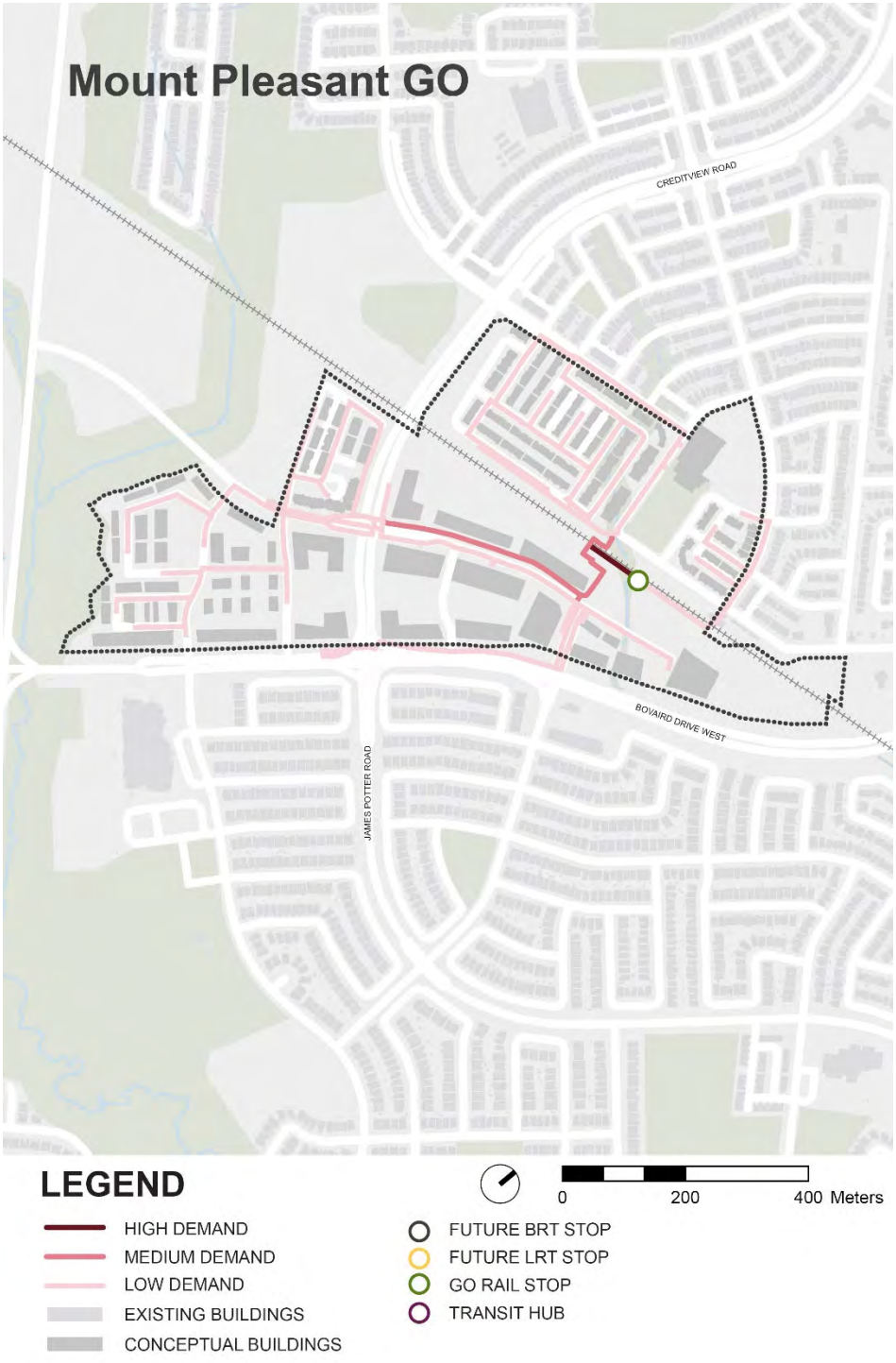

Figure 6-141: Mount Pleasant GO Aggregation of Bike Demand to and from the Nearest Transit Stop

Walk demand is high south of the rail corridor as well and is once again concentrated on Lagerfeld Drive, Asby Field Road, Bovaird Drive, and Commuter Drive.

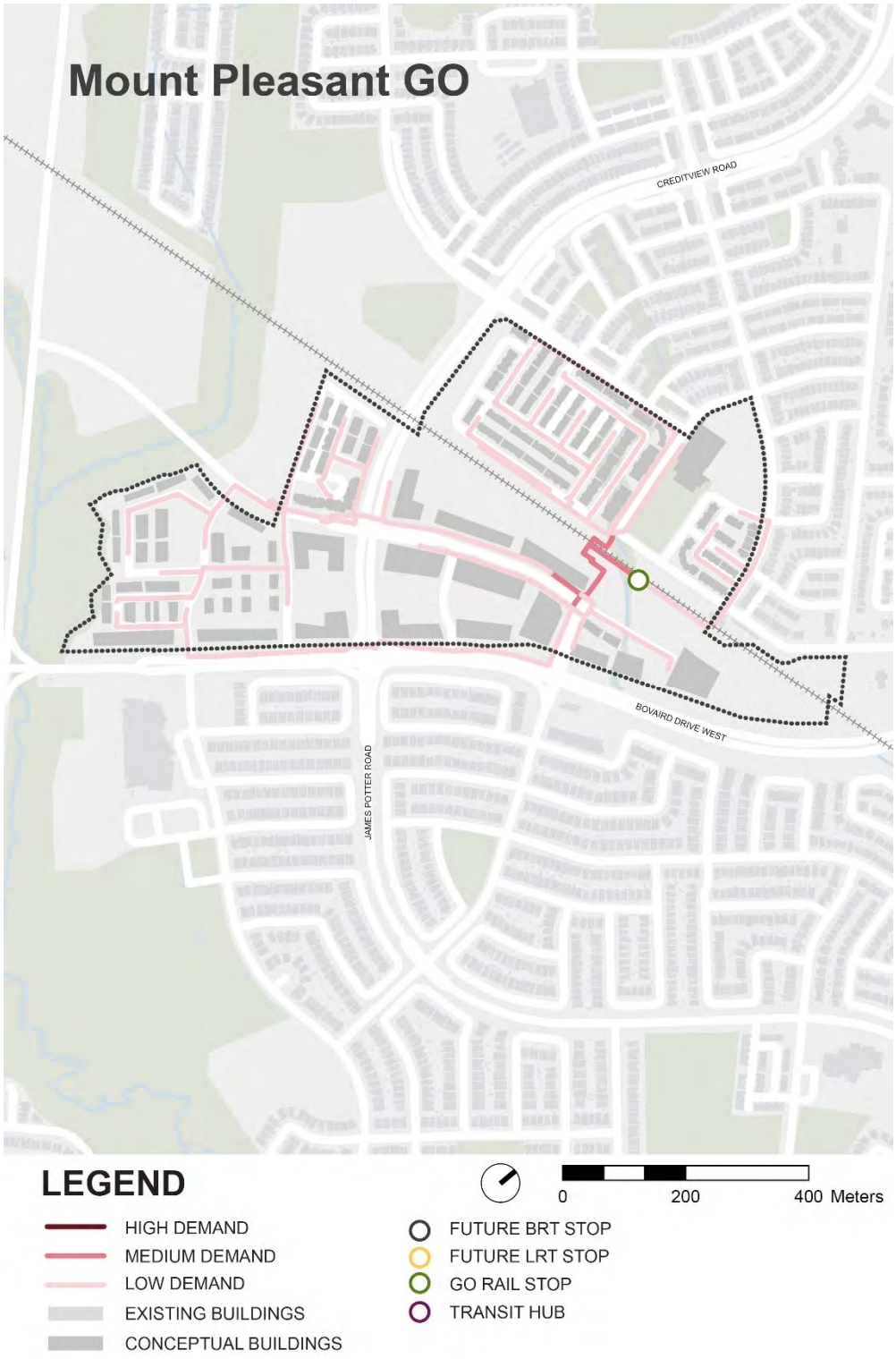

Figure 6-142: Mount Pleasant GO Aggregation of Walk Demand to and from the Nearest Transit Stop

Accessibility to Local Bus and ZÜM services

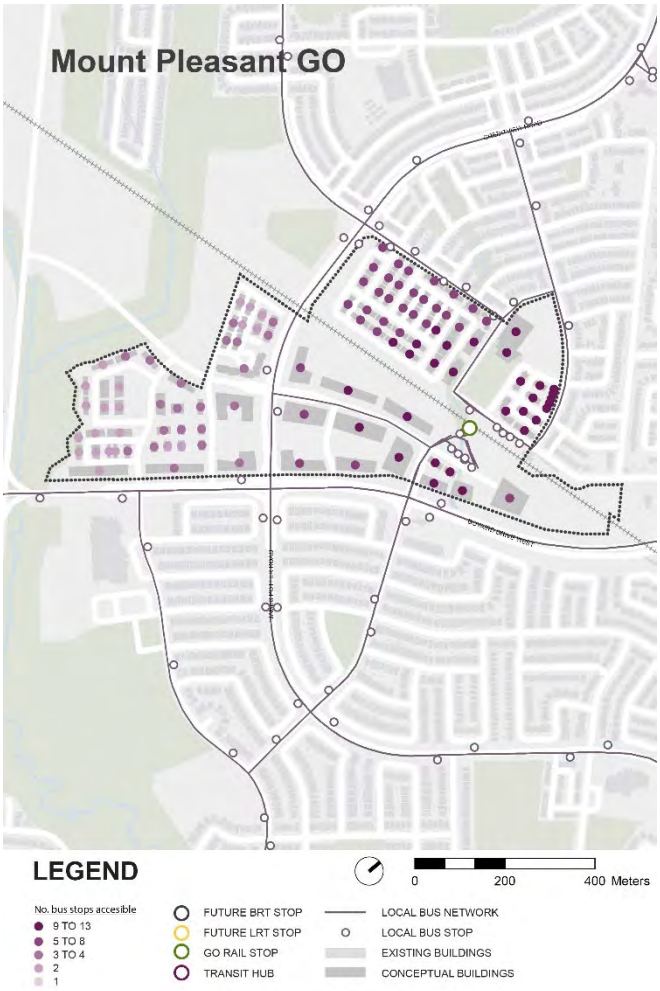

Figure 6-143: Access to local bus service at a 400 m walking distance within the Mount Pleasant GO MTSA

Figure 6-144: Access to higher-order transit at an 800m walking distance within the Mount Pleasant GO MTSA

Vehicle Demand

Roads that may warrant additional investigation due to vehicle demand are highlighted in the figure below. This map is not meant to identify street segments that *will* be overcapacity, but rather to identify some street segments that fall on key shortest-path routes and therefore may experience high levels of demand. For the purposes of this review, all proposed streets were expected to accommodate bi-directional traffic, with one lane in each direction. Some key links flagged in this review include:

- The western portion of Lagerfeld Drive
- Ganton Heights

Intensification therefore must be coupled with travel demand management strategies to promote even higher rates of sustainable modes and limit traffic congestion. Furthermore, consideration should be given to deterring through-traffic from using local neighbourhood streets (including the proposed street connections included in this MTSA) to reduce congestion in these areas. Potential strategies include reduced speed limits, chicanes, and speed humps/tables.

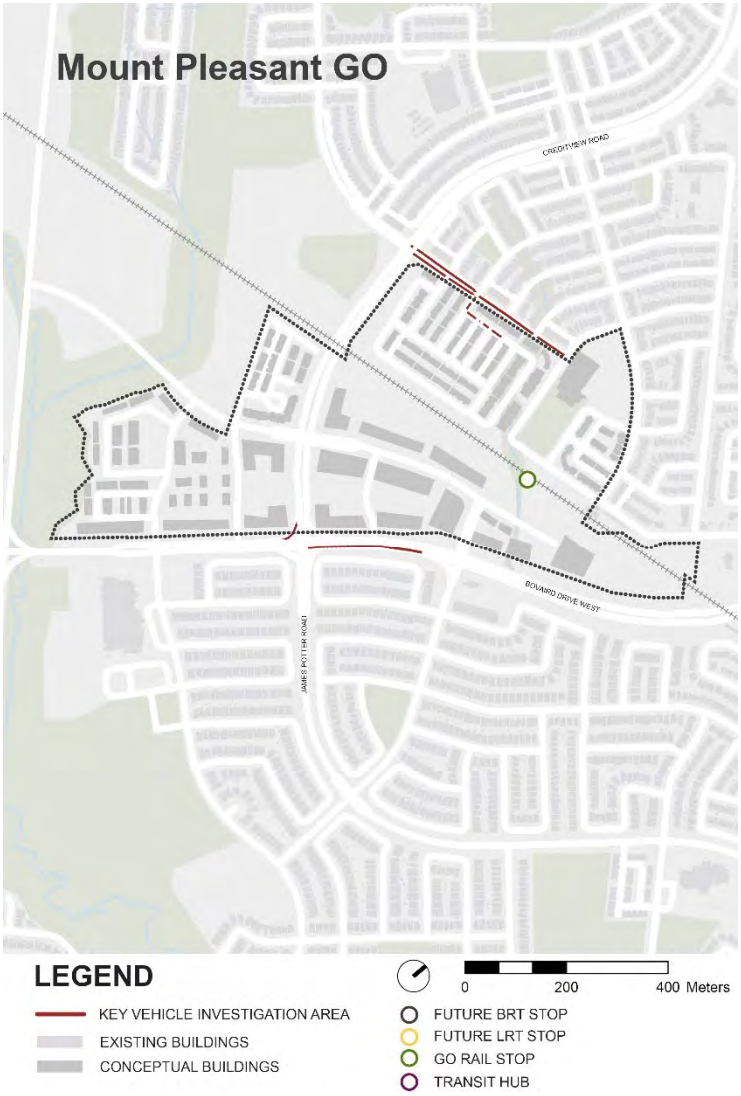

Figure 6-145: Mount Pleasant GO Vehicle Network Assessment

6.9.4.2 Stormwater Analysis of Future Conditions

Mount Pleasant Go MTSA is underdeveloped. The southern half of the MTSA predominantly consists of open space. Introducing additional developments in these vegetated areas could potentially pose challenges for the existing stormwater network. For this reason, effective stormwater management at the source will be crucial, particularly in the highlighted sewersheds.

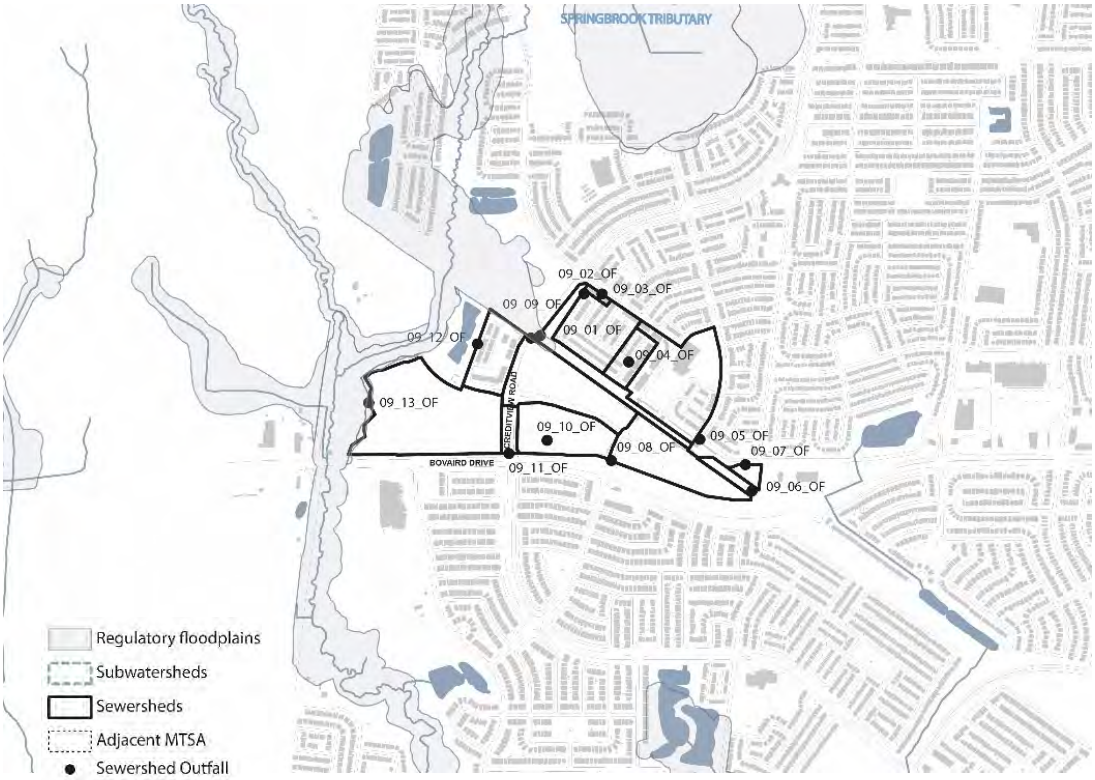

Figure 6-146: Mount Pleasant GO Sewersheds and Outfalls

For instance, for the existing conditions report, no outfall was identified for sewershed 09_10. After further investigations no clear outfall was identified. However, it is important to acknowledge that this assumption carries some uncertainty. Further in-depth investigations are imperative in this section to ensure that any new developments and streets do not lead to a significant surge in existing peak flow.

Sewersheds 09_10 and 09_13 are identified as potentially problematic. If the streets are developed with no retention swales, a potential increase in peak flows of 8% and 18% could be expected in respective sewersheds.

Table 6-22: Mount Pleasant GO – Comparative Analysis of Existing and Proposed Conditions, 100-year Peak Runoff

Sewershed	Existing Peak Runoff (L/s)	Proposed Peak Runoff (L/s)	Difference (%)	Required Detention (m^3)
9_01	397	397	0%	-
9_02	1178	1178	0%	-
9_03	86	86	0%	-
9_04	616	616	0%	-
9_05	1722	1722	0%	-
9_06	174	174	0%	-
9_07	206	206	0%	-
9_08	1176	1197	2%	176
9_09	1996	1981	-1%	-
9_10	838	925	10%	211
9_11	284	284	0%	-
9_12	784	796	2%	-
9_13	1831	2237	22%	790

Four residential streets will be opened in the southern part of the MTSA. Those streets will add around 1,600 meters of new paved street. With implemented retention swales, these new streets could store almost 1,900 m^3 of stormwater.

Table 6-23: Mount Pleasant GO – Available Detention Volume per Street Type

Sewershed	Length of New Steets (m)		Volume Available in Retention swales (m^3)		
	TYPE 2 - Mixed-use	TYPE 4 - Local Residential	TYPE 2 - Mixed-use	TYPE 4 - Local Residential	Total
9_01	-	-	-	-	-
9_02	-	-	-	-	-
9_03	-	-	-	-	-
9_04	-	-	-	-	-
9_05	-	-	-	-	-
9_06	-	-	-	-	-
9_07	-	-	-	-	-
9_08	173	-	170	-	170
9_09	397	-	390	-	390
9_10	153	-	150	-	150
9_11	-	-		-	-
9_12	137	-	134	-	134
9_13	486	633	476	620	1096

Adding retention swales in the new streets will help mitigate the potential increase in peak flows. As shown in the table below, the available water storage volumes are sufficient to reduce considerably the potential peak runoff for the 3 sewersheds that identified an increase in peak flows.

Table 6-24: Mount Pleasant GO – Adjusted Peak Runoff with Implementation of Retention swales within Complete Streets' ROW

Sewershed	Existing Peak Runoff (L/s)	Adjusted Proposed Peak Runoff (L/s)	Difference	Detention Deficit (m^3)	Outcome
9_01	397	-	-	-	-
9_02	1178	-	-	-	-
9_03	86	-	-	-	-
9_04	616.21	-	-	-	-
9_05	1722	-	-	-	-
9_06	174	-	-	-	-
9_07	206	-	-	-	-
9_08	1176	1180	4 L/s (0.3%)	-	Slight decrease in peak flow rate (<2%). This difference is considered insignificant as the analysis does not provide such precision due to its scale.
9_09	1996	1870	-171 L/s (-8.6%)	-	Improvement in flow conditions.
9_10	838	866	28 L/s (3 %)	-	No increase in runoff is expected in this sewershed if Brampton proceeds with integration of retention swales in the new streets. However, further investigations should be made to ensure that the existing outfall is the creek, as it is assumed for the analysis.
9_11	284	-	-	-	-
9_12	784	742	-42L/s (-5.4%)	-	Improvement in flow conditions.
9_13	1831	1550	-281 L/s (-15.3%)	-	Improvement in flow conditions.

6.9.5 Summary of Servicing Observations

The Region of Peel separately commissioned studies of potable water and wastewater/sanitary sewerage servicing on an MTSA-by-MTSA basis. Details from these studies with relevance to planning activities are summarized here solely for the convenience of the reader and to facilitate consideration of implications for MTSA network planning. Arup assumes no liability for the accuracy of those analyses and reports or the completeness of the summary. The Peel Region reports were based on preliminary land use plans and build-out projections provided by the City of Brampton directly to the Region of Peel in 2022. Some adjustments have occurred to land-use plans and build-out projections, which may alter some of the reports' conclusions.

The following information regarding water and wastewater servicing is drawn from the report titled "Water and Wastewater Servicing Study – MTSA Lands," prepared by Arcadis and dated May 2024 (hereinafter Arcadis Water and Wastewater Study).

6.9.5.1 Water

The Arcadis Water and Wastewater Study concludes that the existing water system is adequate to service the MTSA's expected growth. An extension of the local network will be necessary to provide service to the new construction. The preferred option for the extension includes a 300 mm watermain along the northwest extension of Lagerfeld Drive to coincide with a planned sanitary sewer installation. The report estimates the cost of the local network extension to be $2.6 million.

6.9.5.2 Wastewater/Sanitary

The report concludes that the existing sanitary network is sufficient to accommodate project MTSA growth. The report proposes a strategy that includes 180 m of new 250 mm sewer along Lagerfeld Drive at an estimated cost of $700,000.

6.9.6 Proposed Street Classifications and Stormwater Interventions

6.9.6.1 New Link Proposed Complete Street Classifications

The majority of new proposed streets in the Mount Pleasant GO MTSA have been classified as mixed-use neighbourhood streets. All Nations Drive and a newly proposed loop are classified as local residential streets.

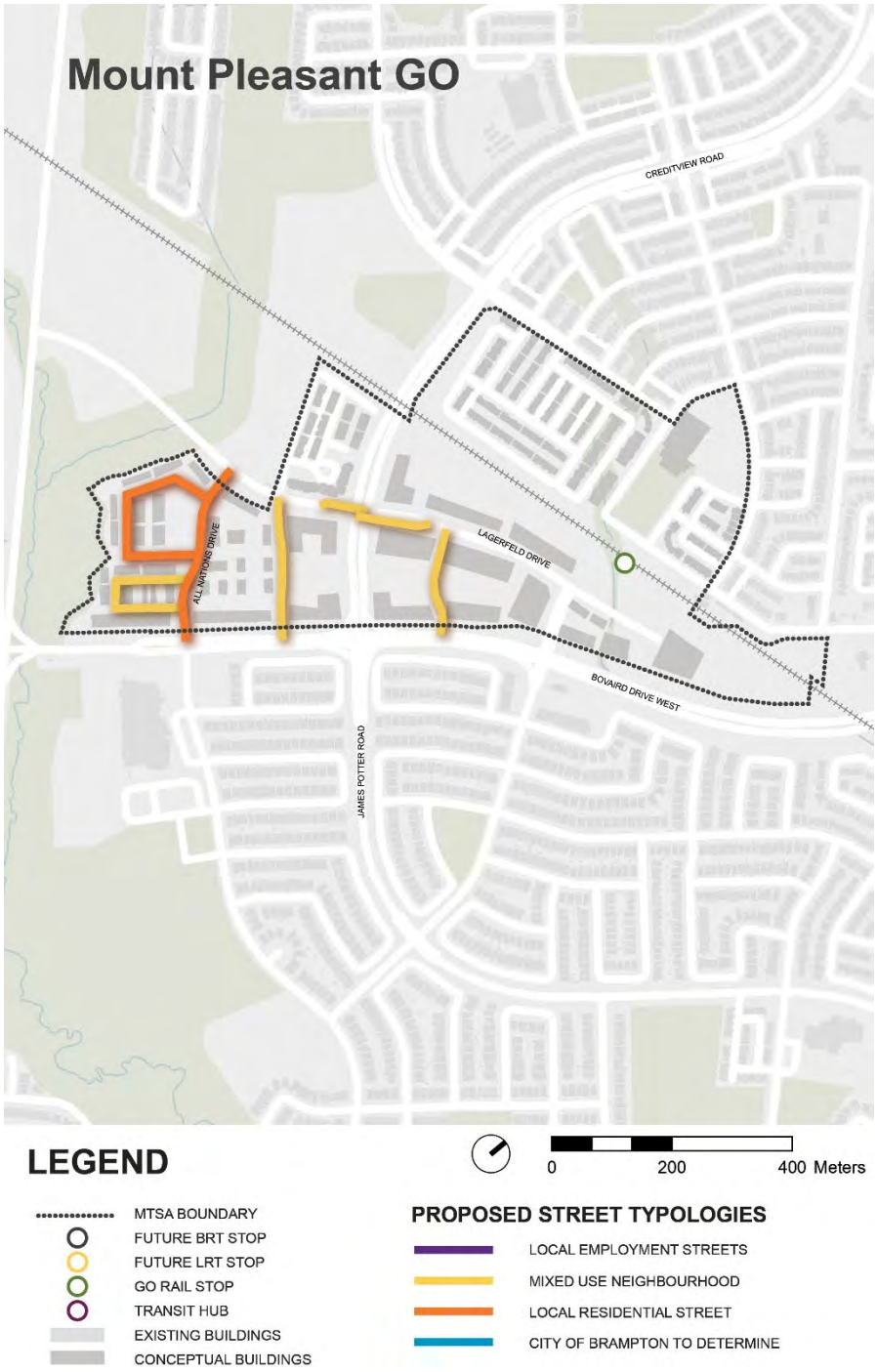

Figure 6-147: Mount Pleasant GO Proposed Complete Streets Classification

6.9.6.2 Stormwater Management Interventions

The figure below illustrates the final transportation network and stormwater management proposals for the Mount Pleasant GO MTSA. It includes the proposed transportation network refinements identified in the City's preliminary land use plans as well as those identified through the transport analysis.

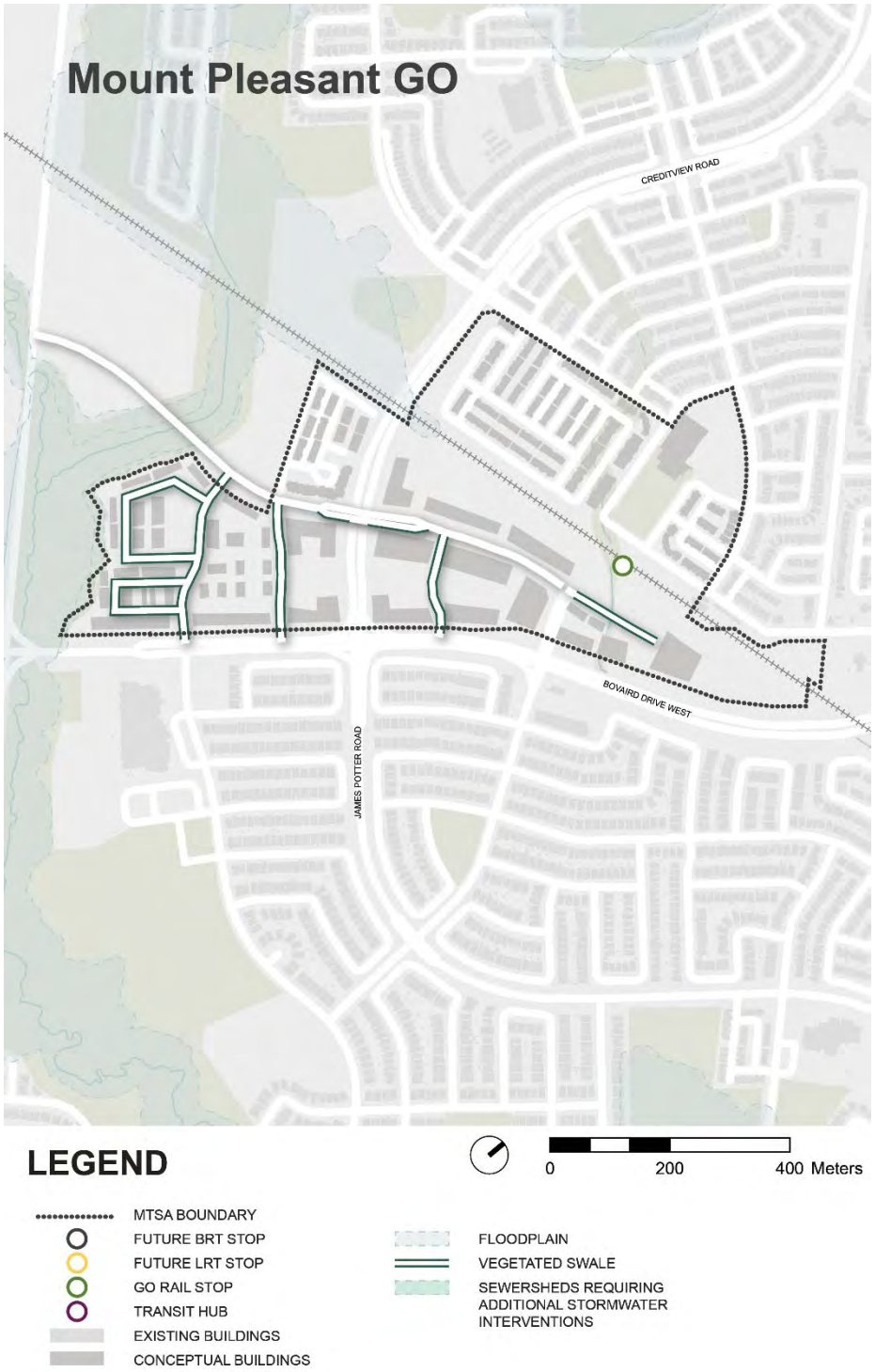

Figure 6-148: Mount Pleasant GO Combined Transportation Network and Stormwater Interventions

6.9.7 MTSA-Specific Policy Recommendations

Several objectives in the Mount Pleasant GO MTSA are best met through the application of general and location-specific policies in addition to the proposed network adjustments. Policies that should be considered for this MTSA are listed below. Parenthetical information provides rationale for specific policies.

- **General transportation network enhancements:**
  - Road and active-transport infrastructure should be provided to support comfortable, direct, and safe travel for sustainable modes and bolster transit ridership.
- **Roads:**
  - To create a finer-grain network, several new street alignments are proposed including:
    - The proposed extension of Lagerfeld Drive; and
    - Four new proposed street connections between Lagerfeld Drive and Bovaird Drive West, two east of Creditview Road and two west of Creditview Road.
  - The City of Brampton should work with developers through the planning approval process to secure rights of way in the alignments shown in the land use plan with sufficient width to accommodate revised complete streets typologies, including proposed green infrastructure to address publicly managed stormwater flows. Final widths and alignments will be determined through future detailed studies.
  - Traffic-calming measures should be leveraged on local or neighbourhood roads to reduce cut-though traffic on streets that are meant to provide access to residences or businesses or roads that play a major role in pedestrian and bike connectivity. Potential strategies include reduced speed limits, chicanes, and speed humps or tables. These strategies should be considered for Lagerfeld Drive and Ganton Heights.
- **Active travel:**
  - Sidewalks and/or other appropriate pedestrian facilities should be provided along both sides of all new and existing streets. (A policy which ensures that all future streets include pedestrian facilities on both sides, and that all existing streets are upgraded to add this infrastructure where missing, is critical for the development of a safe and convenient pedestrian network.)
  - Bike infrastructure (including, but not limited to, recreational trails, multi-use paths, bike lanes, and protected bike lanes) should be provided in accordance with the Active Travel Master Plan. Additional infrastructure should be implemented where needed to promote network connectivity and reduce circuity of protected bike trips to the Mount Pleasant GO Station. (Within the proposed network, cyclists travelling to the Mount Pleasant GO Station will experience more circuitous routes than pedestrians. Where possible, the City of Brampton should work with developers to identify additional mid-block connections that serve cyclists, as well as pedestrians.)
  - The provision of new bike lanes and multi-use paths must be complemented by the installation of bike parking at key destinations, such as the Mount Pleasant GO Station and the Mount Pleasant Village Public School.
  - New developments should be designed to minimize walking distance to transit or other key destinations through the inclusion of mid-block connections.

  - New neighbourhood parks and other open spaces should include dedicated pedestrian and bike infrastructure to enhance connectivity.
  - Active-transport facilities, including street furniture and tree planting, or Complete Streets upgrades should be prioritized for Lagerfeld Drive and Bovaird Drive.
  - New active crossings over Creditview Road near the rail corridor should be provided to enhance pedestrian and bike connectivity.
  - Pedestrian and cyclists should be prioritized at high-demand or key intersections, such as Mississauga Road / Bovaird Drive and Lagerfeld Drive / Ashby Field Road. Consideration should be given to including operational modifications or design treatments that prioritize active travel users include pedestrian-scramble signal phases, pedestrian head starts, no right turns on red, raised crosswalks or intersections, and protected intersections.

- **Building servicing**:
  - Vehicular access to buildings that front onto major streets, such as Bovaird Drive and Creditview Road in the Mount Pleasant GO MTSA, should be provided via local back streets or service lanes. (This will help maintain traffic flow on the major roads while also providing uninterrupted active-travel facilities for pedestrians and cyclists.)

- **Travel-demand management**:
  - Travel-demand strategies for new development should be emphasized for developments expected to contribute vehicular traffic to Lagerfeld Drive and Ganton Heights. (Intensification in the MTSA must be coupled with a range of travel demand management strategies that promote the use of active modes and transit over cars in order to reduce congestion and promote sustainable travel.)

- **Stormwater:**
  - All new developed streets should be designed according to the new complete street guidelines. Exact retention swales dimensions should be calculated for each new street to ensure that the new streets do not cause increase in peak flow for each applicable design storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms).
  - Developments within the MTSA shall be required to implement stormwater management techniques required to provide post to pre control for all storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms), as required by CVC

6.9.8 Recommendations for Further Transportation Network Enhancements

Several recommendations for refining the Mount Pleasant GO MTSA's street network were identified through the transportation analysis conducted as part of this study. Key refinements include:

- A recommendation to avoid classifying Lagerfeld as a truck route (M1; It is noted as a potential truck route in the Peel Strategic Goods Movement Study). Exploring the potential to reduce the right-of-way of Lagerfeld Road and provide multi-use paths on both sides.
- The addition of a multi-use path on Bovaird Drive west of Creditview Road to match the conditions east of Bovaird Drive (M2);
- The addition of an active connection between Trackside Lane and Commuter Drive (M3);
- The extension of Bovaird Drive's multi-use path farther east (M4);

- The addition of an active connection through the natural heritage system to the intersection of Bovaird Drive and Mississauga Road (M5); and
- The addition of bike facilities on Ashby Field Road (M6).
- Accommodating active transportation at the proposed mid-block connection crossing a with Bovaird Drive West (M7)
- Improving the intersection of James Potter Road and Bovaird Drive West to accommodate active transportation (M8)
- Improving the intersection of Lagerfeld Drive and Credit View Road (M9)
- Adding bicycle lanes on Asby Field, and upgrading the intersection at Bovaird Road and Ashby Field Road to a high-quality intersection (protected) (M10)

Upon reviewing these recommendations, the City of Brampton recommended that M4 not be carried forward for future analysis. Additionally, the City noted that the service roads (M2) should not be included in the network, but more generally advocated for in the policies section. As such, these refinements are excluded from the final transportation network and stormwater management recommendations.

Figure 6-149: Mount Pleasant GO Preliminary Transportation Network Refinements

6.10 MTSA 10 – Gateway Terminal

The Gateway Terminal MTSA is located south of Downtown Brampton along Main Street South / Hurontario Street. A large portion of the MTSA is currently occupied by the Shoppers World development. The MTSA is planned to include high-rise and mid-rise mixed-use areas; mid-rise residential areas; office mixed-use space, and a new community hub and neighbourhood parks. The Hurontario LRT line will provide the primary higher order transit service in the MTSA.

As the Gateway Terminal MTSA will be served by a LRT, it has a density target of 160 residents and jobs combined per hectare. To support the increased density proposed in this MTSA, a range of street-network refinements have been identified. These include street extensions and mid-block connections proposed by the City of Brampton in their land-use plan, bike facilities identified in the Active Transportation Master Plan, and recommendations flowing from the transportation analysis described herein. Key refinements include new streets throughout the existing Shoppers World development; mid-block active connections linking these new street connections to each other and to existing streets; and bike facilities on Main Street South / Hurontario Street, McMurchy Avenue, Malta Avenue, and Charolais Boulevard.

If not designed properly, the new planned streets in the southwest corner of the MTSA could increase the stormwater runoff at this location. They should be planned with retention swales that can manage the extra runoff caused by mineralizing an open space. The other proposed streets that will be implemented in the Gateway MTSA (in the north part of the MTSA) are not expected to significantly affect the existent stormwater network since they are planned to be developed in an already paved area of the MTSA. However, if designed properly, retention swales in those streets could help reduce peak flows lower than existing conditions at outfalls.

6.10.1 Existing Conditions

The majority of the Gateway Terminal MTSA is currently classified as industrial land. The MTSA also includes some high-density residential areas west of Shoppers World, commercial space east of Main Street South, and a large swath of open space south of Steeles Avenue.

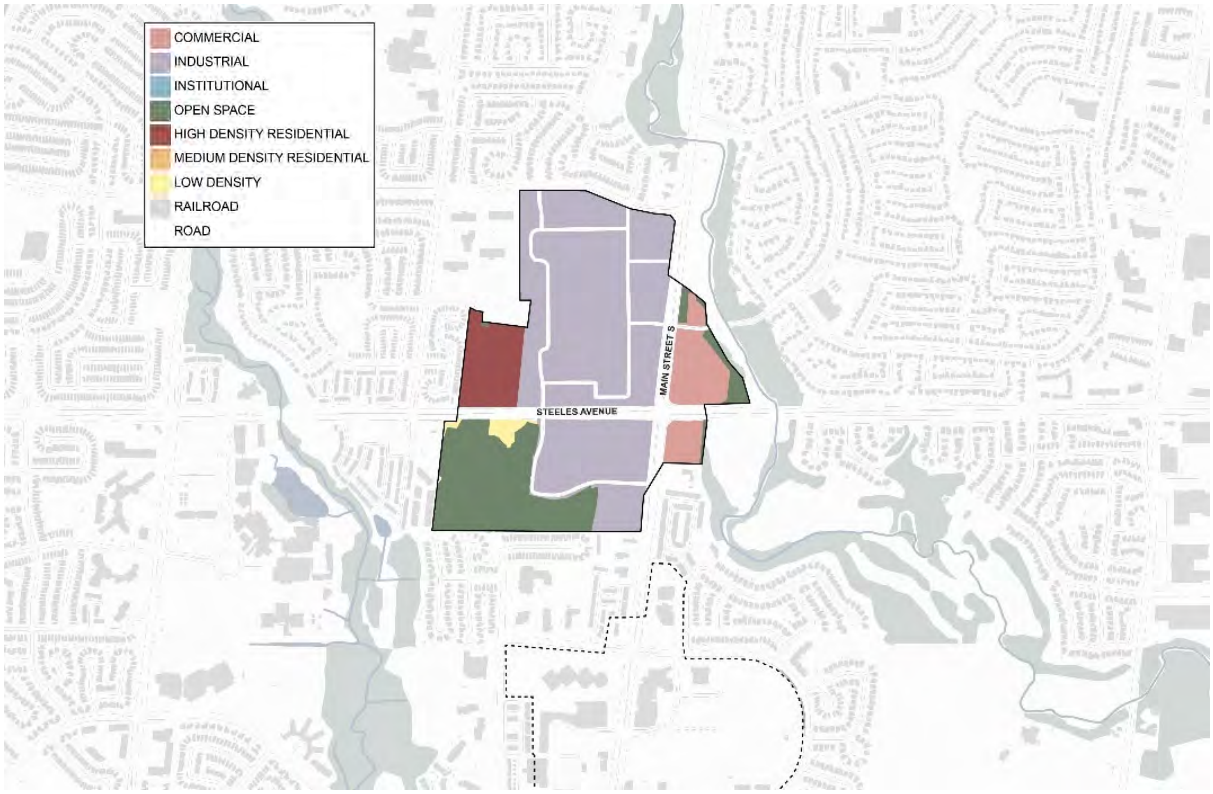

Figure 6-150: Gateway Terminal Existing Conditions Land Use Map

Main Street South / Hurontario Street and Steeles Avenue are the major vehicle thoroughfares in the Gateway Terminal MTSA. The MTSA currently features few other streets as it is dominated by large parcels with internal circulation lanes and parking lots. In addition to being served by the future Hurontario LRT, the Gateway Terminal MTSA is also served by local bus service along Main Street South / Hurontario Street, Steeles Avenue, Bartley Bull Parkway, and Charolais Boulevard. There is a large bus terminal (Gateway Terminal) located at the northwest corner of Main Street South and Steeles Avenue. Furthermore, there is GO bus service along Main Street South, with stops at Bartley Bull Parkway on Main Street South.

A natural heritage area runs along the east edge of the MTSA. A second natural heritage area passes just outside the southwest corner of the MTSA.

Figure 6-151: Gateway Terminal Existing Conditions Map

6.10.2 Community Objectives

The preliminary land-use plan for the Gateway Terminal MTSA was discussed in a public focus-group session held on February 8, 2023. In general, the discussion centered around four points: 1) what is working in the MTSA; 2) what is not working in the MTSA; 3) what is missing in the MTSA; and 4) how could the MTSA be improved. During the focus-group discussion, participants noted that the access to transit, natural spaces, the mix of uses and housing, and employment opportunities work well in the Gateway Terminal MTSA. They also noted that the MTSA has a poor streetscape, large rights-of-ways and lack of mid-block connections which create poor pedestrian experiences; too much parking; and high truck traffic on Steeles Avenue. They also noted that the MTSA lacks character and community services. They expressed that Gateway Terminal is missing east-west cycling connections, public art, mature trees, and open spaces, as well as higher densities and affordable housing. The discussion also included comments about the consequences of density and integration of the station into the surrounding area, especially in the northwest corner of the Gateway Terminal, and that transit, walking and biking should be prioritized.

A complete summary of the focus-group session is included in Appendix D.

6.10.3 City of Brampton Land-Use Plan

The final land-use plan for the Gateway Termina MTSA was approved by Brampton City Council in October 2023 as part of the update to the city's Official Plan. The approved land use plans were the result of iterative refinements based on qualitative and quantitative analyses of preliminary land use plans conducted by Arup over the course of this engagement and community engagement.

The approved Gateway Terminal MTSA land-use plan includes a high-rise mixed-use space, mid-rise mixed-use space, and an open space featuring a community hub and neighbourhood park. Both north and south of Steeles Avenue, mid-rise areas and mid-rise residential areas are used as a transition between proposed high-rise mixed-use areas and existing low-rise areas. A second neighbourhood park is proposed south of Steeles Avenue. New street connections proposed throughout the MTSA will break up large blocks.

This MTSA is located on the Hurontario LRT corridor. In addition to the LRT corridor, key mobility elements of the proposed plan include:

- A network of new proposed street connections in the northwest and southwest portions of the MTSA;
- Several proposed active connections in the southwest portion of the MTSA;
- Proposed active connections in the northeast portion of the MTSA;
- Proposed protected bike lanes on Main Street South, Hurontario Street, and Charolais Boulevard;
- Proposed bike lanes on McMurchy Avenue South and Malta Avenue;
- Proposed bike lanes on one of the new proposed street connections between Malta Avenue and Hurontario Street.

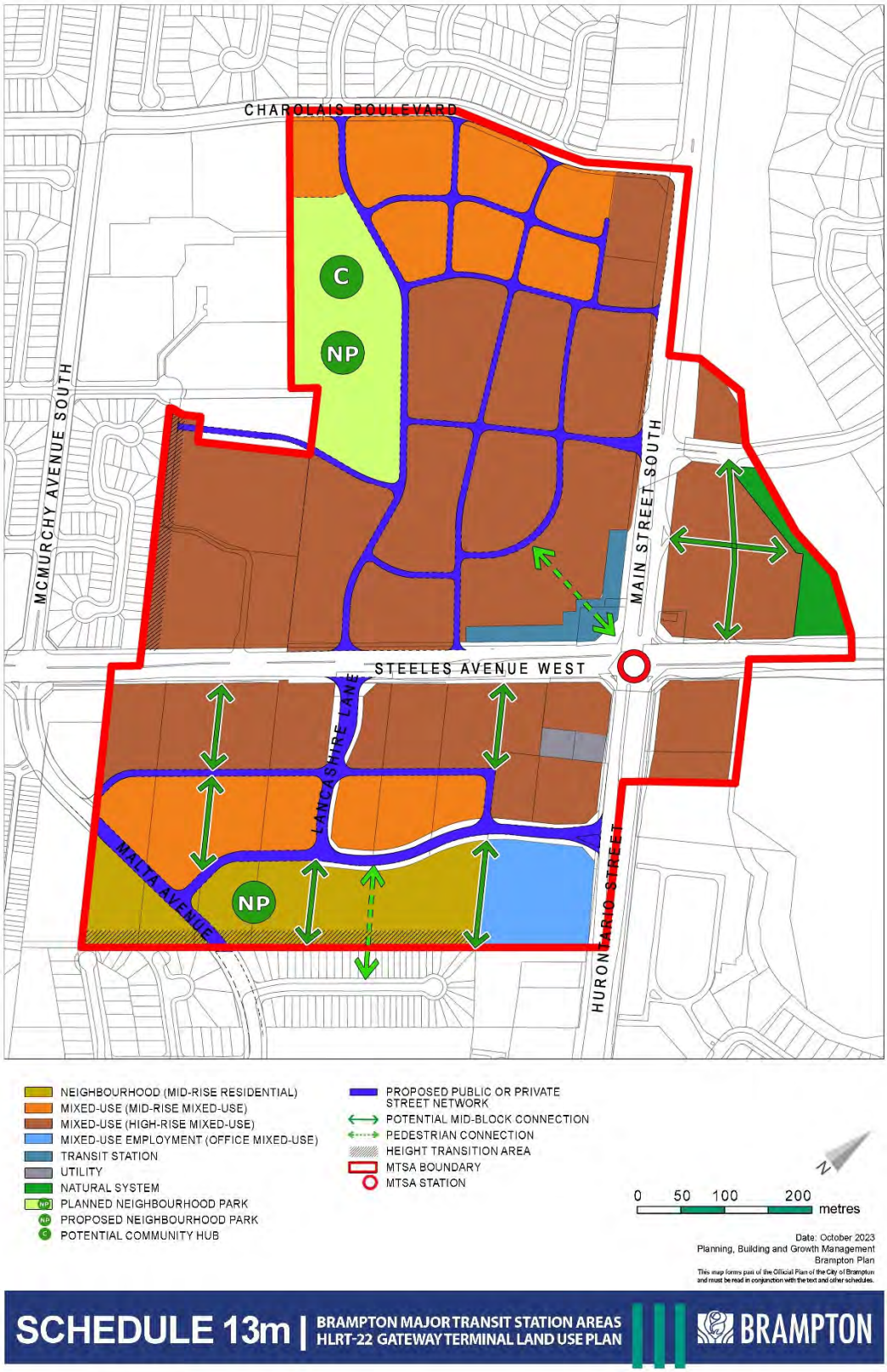

Figure 6-152: Gateway Terminal Proposed Land Use Plan (City of Brampton)

6.10.4 Analysis of Proposed Conditions

The analysis illustrated in the following subsections considers estimated travel demand and network characteristics, as well as stormwater flow conditions assuming the implementation of the final council-approved land-use plans.

6.10.4.1 Transportation Analysis of Future Conditions

The future-conditions transportation analysis considers the expected distribution of relative travel demand with respect to the existing and future street network; identifies potentially high-demand bike and pedestrian routes between future development and the closest transit stop to assist in prioritizing active-travel-infrastructure investments; and points to areas within the vehicular network that may require additional study or intervention.

Travel Demand Distribution

Demand per street segment is largely driven by the size and type of developments anticipated for each block. Buildings generating high demand are spread throughout the MTSA. Due to the number of buildings in the northwest corner of the MTSA, most of the demand will be travelling to and from this portion of the MTSA.

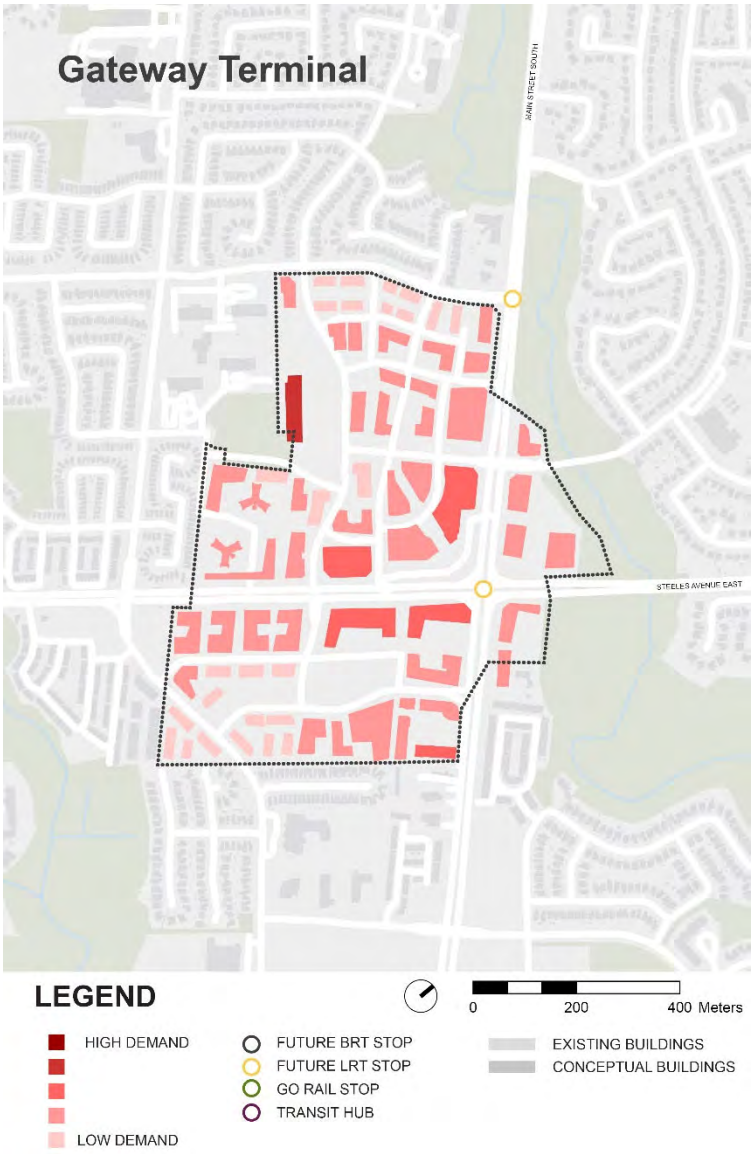

Figure 6-153: Gateway Terminal Building Travel Demand Aggregation – Vehicle and Transit Demand

Active Travel Between Development and Transit

The figure below shows aggregated bike demand per street segment in the PM peak hour in the future condition. The recommended diagonal connection extending northwest from the intersection of Steeles Avenue / Main Street South shows particularly high use, demonstrating the importance of adding this connection. High levels of demand are also seen on the streets near the proposed community hub, and the new street linking Malta Avenue and Main Street South.

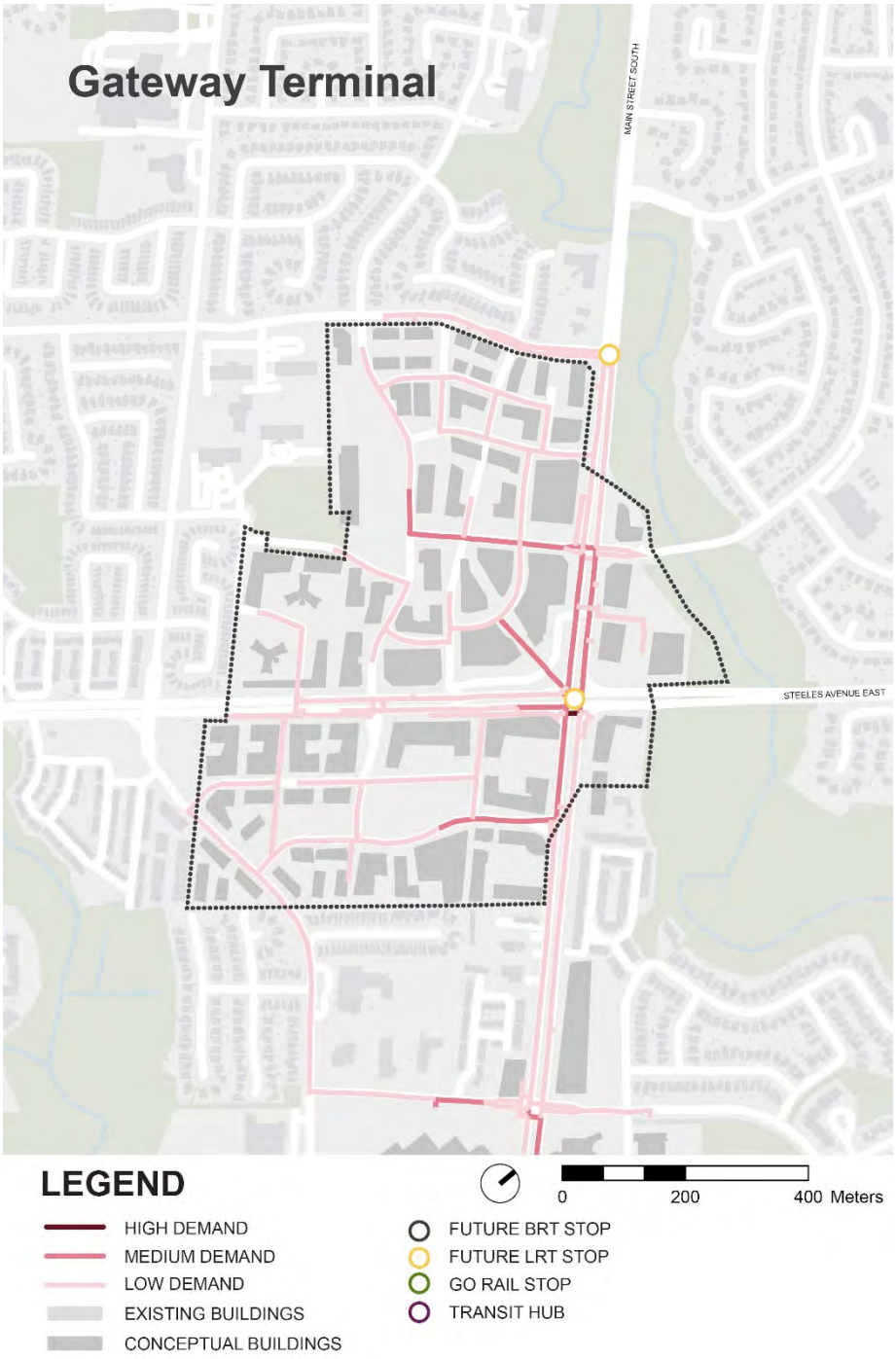

Figure 6-154: Gateway Terminal Aggregation of Bike Demand to and from the Nearest Transit Stop

Walk demand shows a similar pattern of distribution as bike demand. The diagonal connection, the western side of Hurontario Street, the streets around the proposed community hub, and the proposed street linking Malta Avenue and Main Street South all show high levels of use.

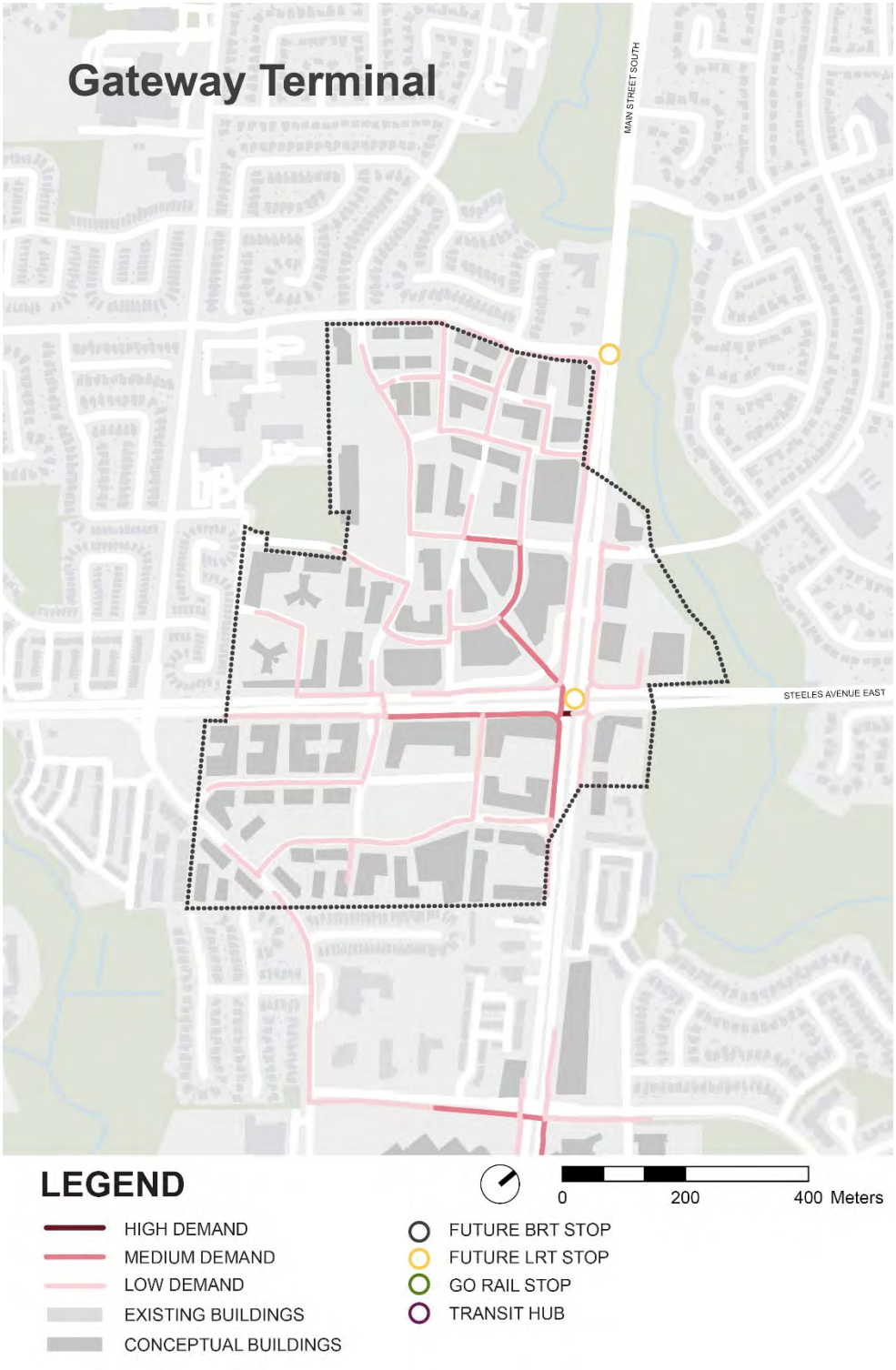

Figure 6-155: Gateway Terminal Aggregation of Walk Demand to and from the Nearest Transit Stop

Accessibility to Local Bus and ZÜM services

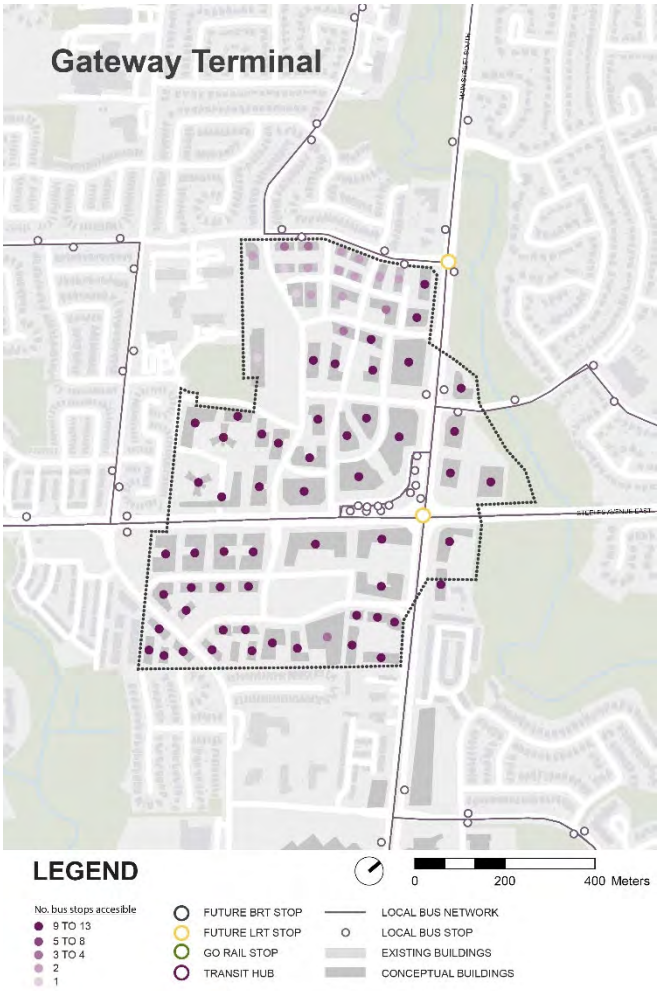

Figure 6-156: Access to local bus service at a 400 m walking distance within the Gateway Terminal MTSA

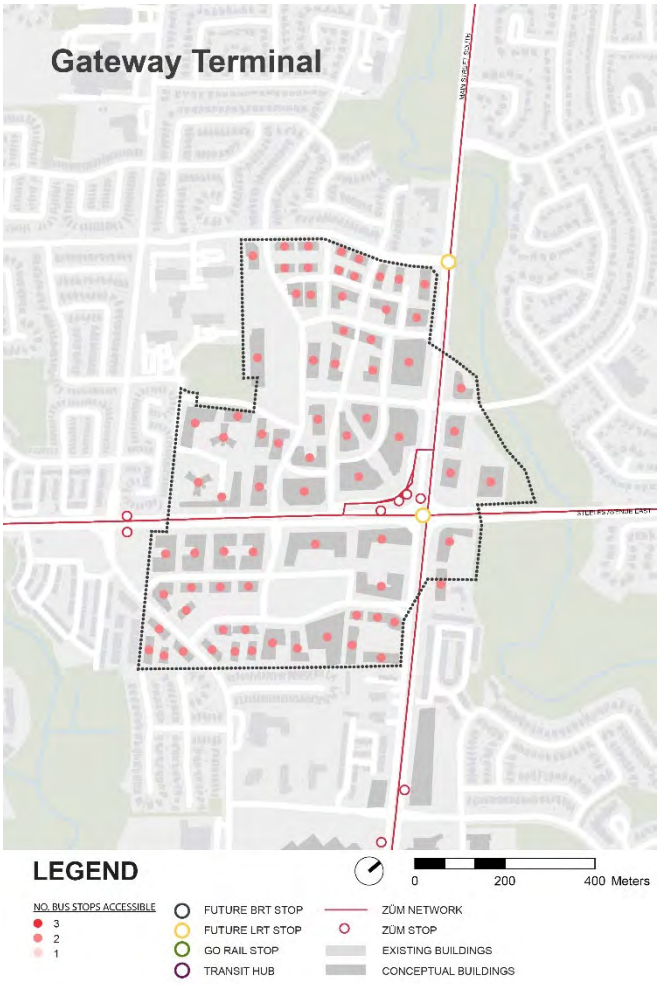

Figure 6-157: Access to higher-order transit service at an 800 m walking distance within the Gateway Terminal MTSA

Vehicle Demand

Roads that may warrant additional investigation due to vehicle demand are highlighted in the figure below. This map is not meant to identify street segments that *will* be overcapacity, but rather to identify some street segments that fall on key shortest-path routes and therefore may experience high levels of demand. For the purposes of this review, all proposed streets were expected to accommodate bi-directional traffic, with one lane in each direction. Some key links flagged in this review include proposed streets in the location of the current Shoppers World development.

Intensification therefore must be coupled with travel demand management strategies to promote even higher rates of sustainable modes and limit traffic congestion. Furthermore, consideration should be given to deterring through-traffic from using local neighbourhood streets (including the proposed street connections included in this MTSA) to reduce congestion in these areas. Potential strategies include reduced speed limits, chicanes, and speed humps/tables.

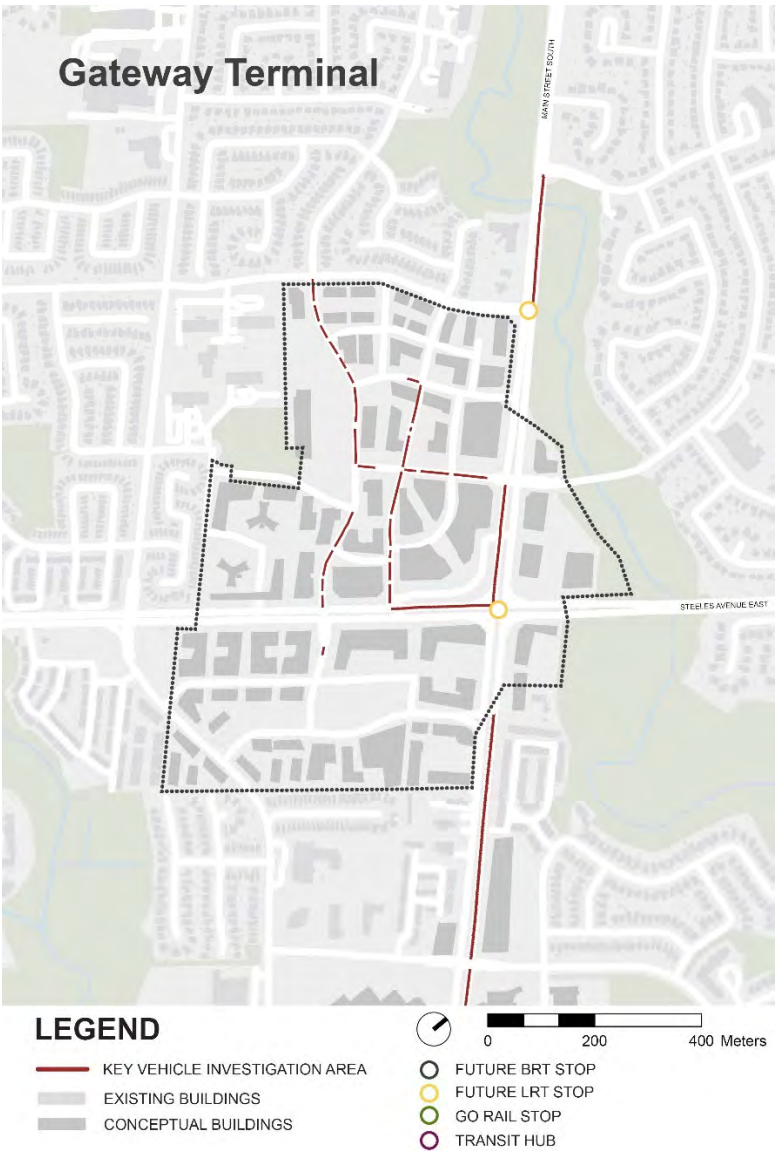

Figure 6-158: Gateway Terminal Vehicle Network Assessment

6.10.4.2 Stormwater Analysis of Future Conditions

Gateway MTSA area is presently mainly industrial-used. In fact, as stated in the existing conditions report, 52% of the MTSA is used for industrial purposes. The south-west corner of the MTSA is currently a vacant green field that is planned to be developed for mixed-use purposes. This area could end up being problematic due to the actual land use.

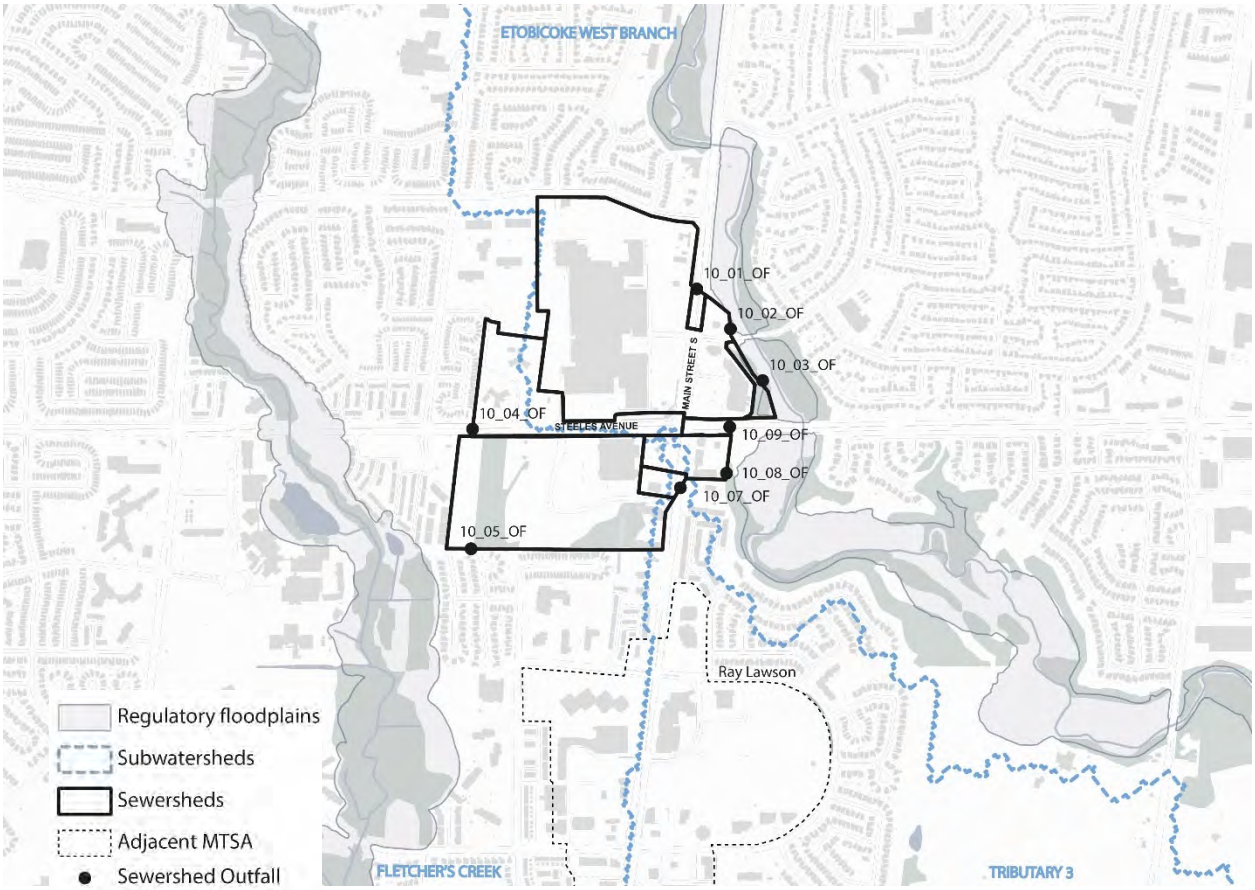

Figure 6-159: Gateway Terminal Sewersheds and Outfalls

The table below shows the potential increase in runoff peak flow that opening new streets in this area could create. An increase of 12% could be anticipated at the outfall of sewershed 5 if no stormwater management is implemented within the streets.

Table 6-25: Gateway Terminal – Comparative Analysis of Existing and Proposed Conditions, 100-year Peak Runoff

Sewershed	Existing Peak Runoff (L/s)	Proposed Peak Runoff (L/s)	Difference (%)	Required Detention (m^3)
10_01	80	80	0%	-
10_02	5148	5106	-1%	-
10_03	79	79	0%	-
10_04	1714	1711	0%	-
10_05	3325	3755	13%	1003
10_07	158	158	0%	-
10_08	501	501	0%	-
10_09	114	114	0%	-

•

Table 6-26: Gateway Terminal – Available Detention Volume per Street Type

Sewershed	Length of New Streets (m)	Volume Available in Retention swales (m^3)
	TYPE 2 - Mixed-Use	TYPE 2 - Mixed-Use
10_01	-	-
10_02	2830	2773
10_03	-	-
10_04	176	172
10_05	1493	1463
10_07	-	-
10_08	-	-
10_09	-	-

The table below presents the potential decrease in peak flow runoff that could be seen if stormwater management is integrated in new streets. A potential decrease of 22% in peak flows could be reached in sewershed 5 by only implementing retention swales. A decrease in peak flow of 14% could also be expected in sewershed 2.

Table 6-27: Gateway Terminal – Adjusted Peak Runoff with Implementation of Retention swales within Complete Streets' ROW

Sewershed	Existing Peak Runoff (L/s)	Adjusted Proposed Peak Runoff (L/s)	Difference	Detention Deficit (m^3)	Outcome
10_01	80	-	-	-	-
10_02	5148	4460	-688 L/s (-13.4%)	-	Improvement in flow conditions
10_03	79	-	-	-	-
10_04	1714	-	-	-	-
10_05	3325	2950	-375L/s (-11%)	-	Improvement in flow conditions
10_07	501	-	-	-	-
10_08	114	-	-	-	-
10_09	80	-	-	-	-

6.10.5 Summary of Servicing Observations

The Region of Peel separately commissioned studies of potable water and wastewater/sanitary sewerage servicing on an MTSA-by-MTSA basis. Details from these studies with relevance to planning activities are summarized here solely for the convenience of the reader and to facilitate consideration of implications for MTSA network planning. Arup assumes no liability for the accuracy of those analyses and reports or the completeness of the summary. The Peel Region reports were based on preliminary land use plans and build-out projections provided by the City of Brampton directly to the Region of Peel in 2022. Some adjustments have occurred to land-use plans and build-out projections, which may alter some of the reports' conclusions.

6.10.5.1 Water

The following information is drawn from the report titled "Water and Wastewater Servicing Study MTSA Lands – Contract 1, Water Report," dated April 23, 2024, and prepared by GM BluePlan, hereinafter (GMBP Water Report – Contract 1). The report concludes that all service-level criteria (pressure, velocity, and fire-flow availability) can be satisfied under the growth scenario, other than new local servicing.

The report identifies already planned upgrades.

Identifier	Already Planned System Upgrade	Existing Source	Cost Estimate ($2020) as per 2020 DC Study
MTSA19-W-3	600mm watermain along Hurontario Street from Steeles Avenue to County Court Boulevard	Development Charges Study (Proj. # 251199)	Design: $1,082,800 Construction: $5,146,900

Figure 6-160: GMBP planned water network upgrades

The report also identifies costs for developer-driven local upgrades to accommodate new buildings within the proposed street network.

Identifier	Additional System Upgrade	Rationale	Assumed Watermain Size (mm)	Length (m)	Notes	System Upgrade Cost Estimate $2023
MTSA19-W-1	Various Local Upgrades along Future Streets north of Steeles (within Shoppers World area)	New local servicing on new ROWs	300	2200	Local servicing upgrade	$4,100,000
MTSA19-W-2	Various Local Upgrades along Future Streets southwest of Steeles & Lancashire	New local servicing on new ROW	300	750	Local servicing upgrades in new ROWs	$1,400,000
	Total for New Projects within MTSA 19					**$5,500,000**

Figure 6-161: GMBP local water upgrades

6.10.5.2 Wastewater/Sanitary

The following information is drawn from the report titled "Water and Wastewater Servicing Study MTSA Lands – Contract 1, Wastewater Report," dated April 23, 2024 and prepared by GM BluePlan, hereinafter (GMBP Wastewater Report – Contract 1). The report notes there are numerous surcharges and back-ups throughout the system, driven by growth, including the redevelopment of the Shoppers World complex. The constraints are particularly acute at the Bartley Bull sewer.

The report proposes three alternative approaches for addressing constraints. For full details, consult GMBP Wastewater Report – Contract 1. The report identifies a preferred alternative that aligns with the Region of Peel's broader trunk strategy.

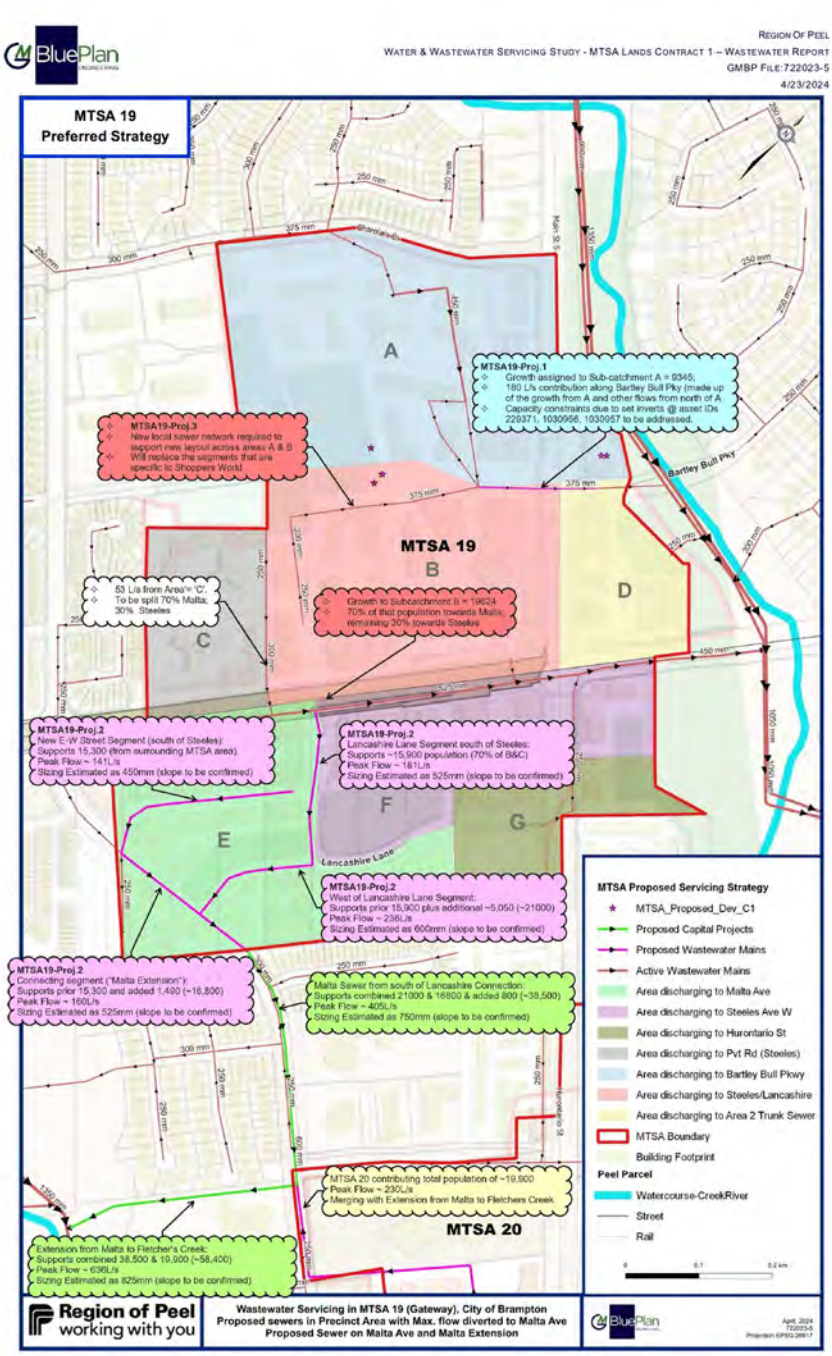

Figure 6-162: GMBP preferred alternative

GMBP Wastewater Report – Contract 1 provides a high-level cost-estimate of the preferred alternative.

Table 14: High Level Cost Estimate for Preliminary Preferred Strategy

System Upgrade ID (Complexity)	Project Description	Rationale / Reason for Upgrade	Assumed Sewer Size (mm)	Length (m)	System Upgrade Cost Estimate ($)
MTSA19-Proj.1 Medium	Twin / Upsize Bartley Bull	Service new growth	450	260	5 M
MTSA19-Proj.2 Medium	New network in Precinct Area including Lancashire Lane	Service new growth with new local network	525 600 450	430 175 285	1.70 M
MTSA19-Proj.3 Medium	New network above Steeles Ave	Service new growth with new local network	300	2200	3.23 M
Total for Projects within MTSA 19 $					**9.93 M**

Note that project costs are high level and subject to change with detailed analysis and decision on final strategy.

Figure 6-163: GMBP high-level cost-estimate for preliminary preferred alternative

Although the development timeline for this MTSA is not currently known, the report details wastewater capacity triggers for required upgrades.

Table 15: Capacity Upgrades and Triggers

System Limitation (as per Section 9.3)	Growth Area that Causes the Limitation	MTSA Population of the Growth Area	Approximate Trigger Population	Notes
Bartley Bull Ave A.ID: 229371	A (partial allocation of A)	9350 (~30%) (28969 – Full Area A)	6800	Upgrade Needed to Resolve = Project 1 Upsize Bartley Bull Pkwy
Pvt Rd to Steeles A.ID: 230703	C	3110	2600	Upsize Pvt Rd sewer, if required
Hurontario St A.ID: 223849	G	2700	1600	Load new sub-block (33) direct to Steeles
Steeles Ave A.ID: 221928	C+B+F+G	28560 = Full Area A (9000, when split)	24000	Upgrade Needed to Resolve = Project 2 Split flows to Lancashire and Steeles

Please refer MTSA 20 preferred strategy map for growth area notation; *Allocated growth in model according to propsoed strategy

Figure 6-164: GMBP capacity triggers for upgrades

6.10.6 Proposed Street Classifications and Stormwater Interventions

6.10.6.1 New Link Proposed Complete Street Classifications

The proposed streets in the Gateway Terminal MTSA have been classified as mixed-use neighbourhood streets.

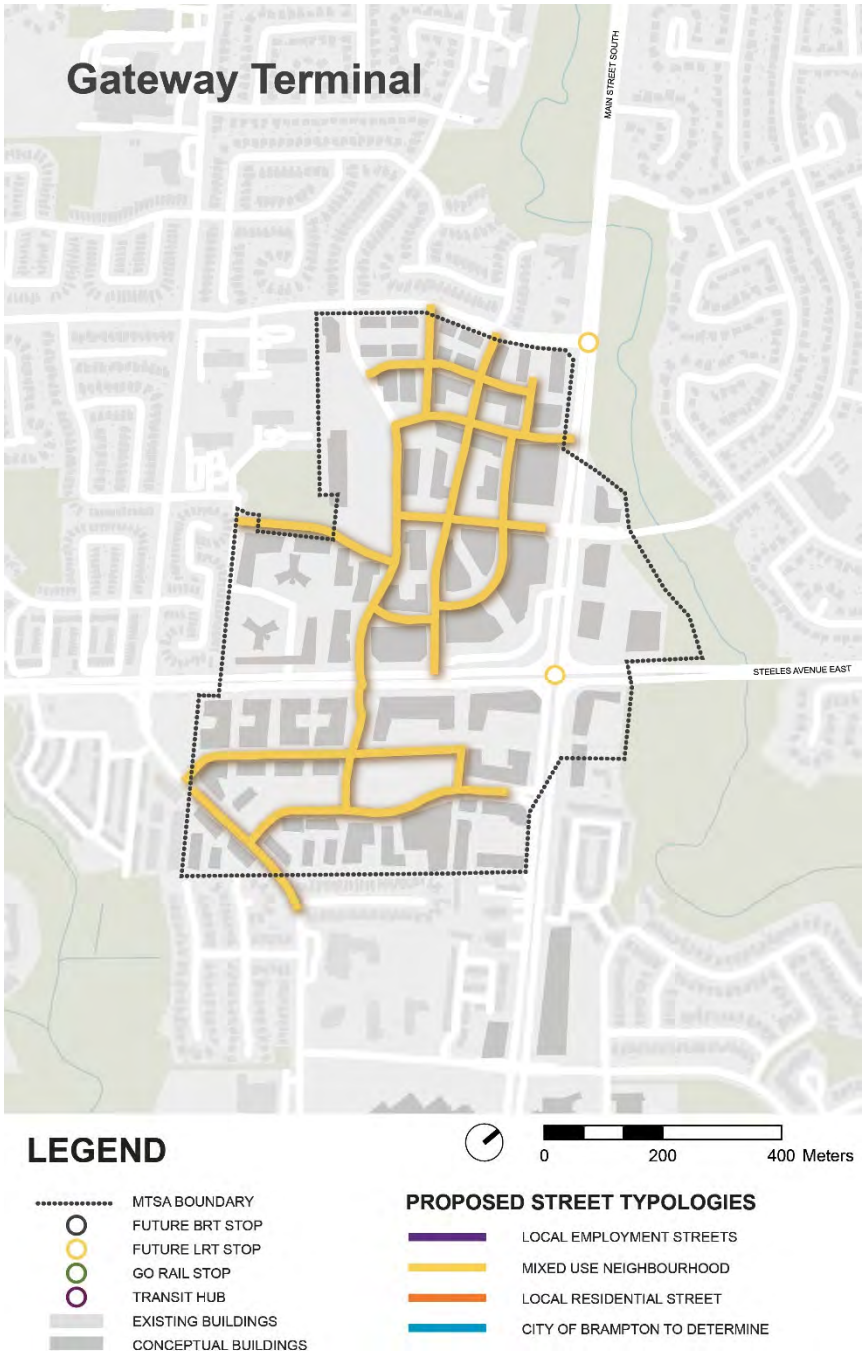

Figure 6-165: Gateway Terminal Proposed Complete Streets Classification

6.10.6.2 Stormwater Management Interventions

The figure below illustrates the final transportation network and stormwater management proposals for the Gateway Terminal MTSA. It includes the proposed transport-network refinements identified in the City's preliminary land use plans as well as those identified through the transport analysis.

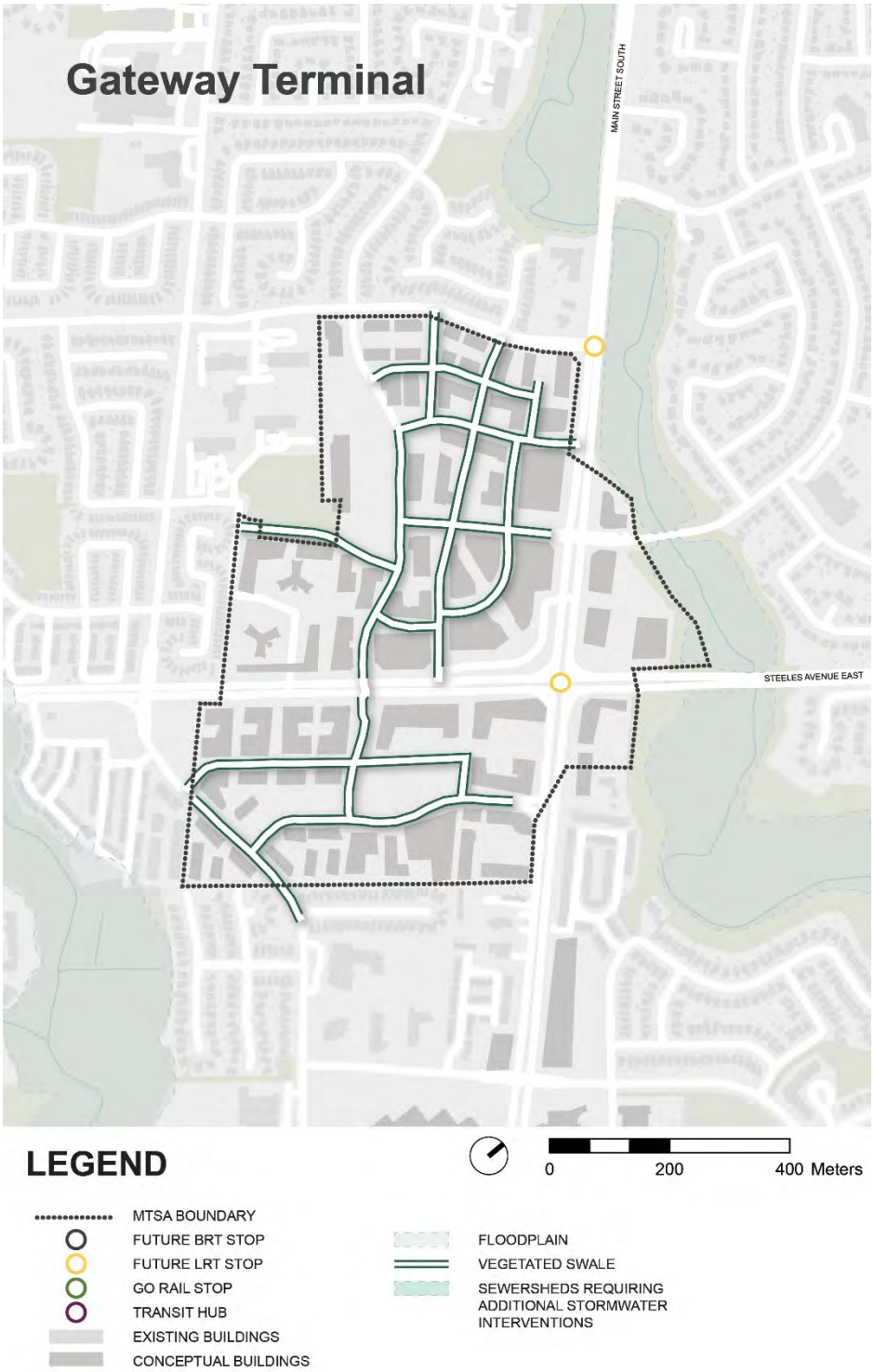

Figure 6-166: Gateway Terminal Combined Transportation Network and Stormwater Interventions

6.10.7 MTSA-Specific Policy Recommendations

Several objectives in the Gateway Terminal MTSA are best met through the application of general and location-specific policies in addition to the proposed network adjustments. Policies that should be considered for this MTSA are listed below. Parenthetical information provides rationale for specific policies.

- **General transportation network enhancements:**
  - Road and active-transport infrastructure should be provided to support comfortable, direct, and safe travel for sustainable modes and bolster transit ridership.
- **Roads:**
  - To create a finer-grain network, several new street alignments are proposed in the northwest and southwest portions of the MTSA, including the area currently occupied by Shoppers World.
  - The City of Brampton should work with developers through the planning approval process to secure rights of way sufficient width to accommodate revised complete streets typologies, including proposed green infrastructure to address publicly managed stormwater flows. Final widths and alignments will be determined through future detailed studies.
  - Traffic-calming measures should be leveraged on local or neighbourhood roads to reduce cut-though traffic on streets that are meant to provide access to residences or businesses or roads that play a major role in pedestrian and bike connectivity. Potential strategies include reduced speed limits, chicanes, and speed humps or tables. These strategies should be considered for the street network proposed for the Shoppers World Area.
- **Active travel:**
  - Sidewalks and/or other appropriate pedestrian facilities should be provided along both sides of all new and existing streets. (A policy which ensures that all future streets include pedestrian facilities on both sides, and that all existing streets are upgraded to add this infrastructure where missing, is critical for the development of a safe and convenient pedestrian network.)
  - Bike infrastructure (including, but not limited to, recreational trails, multi-use paths, bike lanes, and protected bike lanes) should be provided in accordance with the Active Travel Master Plan. Additional infrastructure should be implemented where needed to promote network connectivity and reduce circuity of protected bike trips to the Gateway Terminal Station. (Within the proposed network, cyclists travelling to the Gateway Terminal Station will experience more circuitous routes than pedestrians. Where possible, the City of Brampton should work with developers to identify additional mid-block connections that serve cyclists, as well as pedestrians.)
  - The provision of new bike lanes and multi-use paths must be complemented by the installation of bike parking at key destinations, such as the Gateway Terminal LRT stop.
  - New developments should be designed to minimize walking distance to transit or other key destinations through the inclusion of mid-block connections.
  - New neighbourhood parks and other open spaces should include dedicated pedestrian and bike infrastructure to enhance connectivity.
  - Active-transport facilities, including street furniture and tree planting, or Complete Streets upgrades should be prioritized for Main Street / Hurontario Street.

- Pedestrian and cyclists should be prioritized at high-demand or key intersections, such as Main Street / Steeles Avenue. Consideration should be given to including operational modifications or design treatments that prioritize active travel users include pedestrian-scramble signal phases, pedestrian head starts, no right turns on red, raised crosswalks or intersections, and protected intersections.

- **Building servicing**:
  - Vehicular access to buildings that front onto major streets, such as Main Street, Hurontario Street, and Steeles Avenue in the Gateway Terminal MTSA, should be provided via local back streets or service lanes. (This will help maintain traffic flow on the major roads while also providing uninterrupted active-travel facilities for pedestrians and cyclists.)

- **Travel-demand management**:
  - Travel-demand strategies for new development should be emphasized for developments expected to contribute vehicular traffic to the new street network proposed for the Shoppers World development. (Intensification in the MTSA must be coupled with a range of travel demand management strategies that promote the use of active modes and transit over cars in order to reduce congestion and promote sustainable travel.)

- **Stormwater:**
  - All new developed streets should be designed according to the new complete street guidelines. Exact retention swales dimensions should be calculated for each new street to ensure that the new streets do not cause increase in peak flow for each applicable design storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms).
  - Developments within the MTSA shall be required to implement stormwater management techniques required to provide post to pre control for all storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms), as required by CVC.

6.10.8 Recommendations for Further Transportation Network Enhancements

Several recommendations for refining the Gateway Terminal MTSA's street network were identified through the transportation analysis conducted as part of this study.

Key refinements include:

- The addition of service roads to enable adequate building servicing (G1);
- The addition of stairs linking Main Street South to the natural heritage system immediately to the east at Charolais Boulevard (G2);
- Connecting the proposed bike lanes on McMurchy Avenue and Malta Avenue (G3); and
- The addition of bike facilities on Steeles Avenue (G4).
- The addition of active transportation and wayfinding improvements at the Etobicoke Creek Trail over Steeles avenue West and replacing the bridge to accommodate active transportation (G5)
- It is important that the bicycle infrastructure is able to meet the future high demand on Main Street (G6)
- Upgrading intersection of roads with bicycle infrastructure to high quality intersections (protected) (G7)

Upon reviewing these recommendations, the City recommended that G4 not be carried forward for future analysis due to a limited right-of-way and high rates of heavy trucks on Steeles Avenue As such, this refinement is excluded from the final transportation network and stormwater management recommendations.

The following studies are ongoing within the Gateway Terminal MTSA:

1) Steeles Avenue Corridor Study (planned)
2) Uptown Brampton Urban Streetscaping Plan for Steeles Avenue (ongoing).

Figure 6-167: Gateway Terminal Preliminary Transportation Network Refinements

6.11 MTSA 11 – Ray Lawson

The Ray Lawson MTSA is located south of Downtown Brampton along Main Street South. The MTSA is planned to include high-rise and mid-rise mixed-use areas; low-rise residential areas; office mixed-use space, and institutional spaces. The Hurontario LRT line will provide the primary higher order transit service in the MTSA. As the Ray Lawson MTSA will be served by a LRT, it has a density target of 160 residents and jobs combined per hectare.

To support the increased density proposed in this MTSA, a range of street-network refinements have been identified. These include street extensions and mid-block connections proposed by the City of Brampton in their land-use plan, bike facilities identified in the Active Transportation Master Plan, and recommendations flowing from the transportation analysis described herein. Key refinements include new streets linking County Court Boulevard, Hurontario Street, and Ray Lawson Boulevard; mid-block active connections linking these new street connections to each other and to existing streets; and bike facilities on Hurontario Street, Ray Lawson Boulevard, Malta Avenue, and Sir Lou Drive.

The new proposed streets that will be implemented in the Ray Lawson MTSA are not expected to significantly affect the existent stormwater network since they are planned to be developed in already paved areas of the MTSA. Moreover, if designed properly, retention swales in those streets could help reduce peak flows lower than at existing condition.

6.11.1 Existing Conditions

The Ray Lawson MTSA is a mixed-use area that primarily includes industrial and commercial spaces. The MTSA also contains some major institutional spaces, including the Peel Regional Police and the Ontario Court of Justice. A small medium-density residential area is located southeast of Hurontario Street and County Court Boulevard. Additionally, a large open space with several sports fields is located in the east of the MTSA.

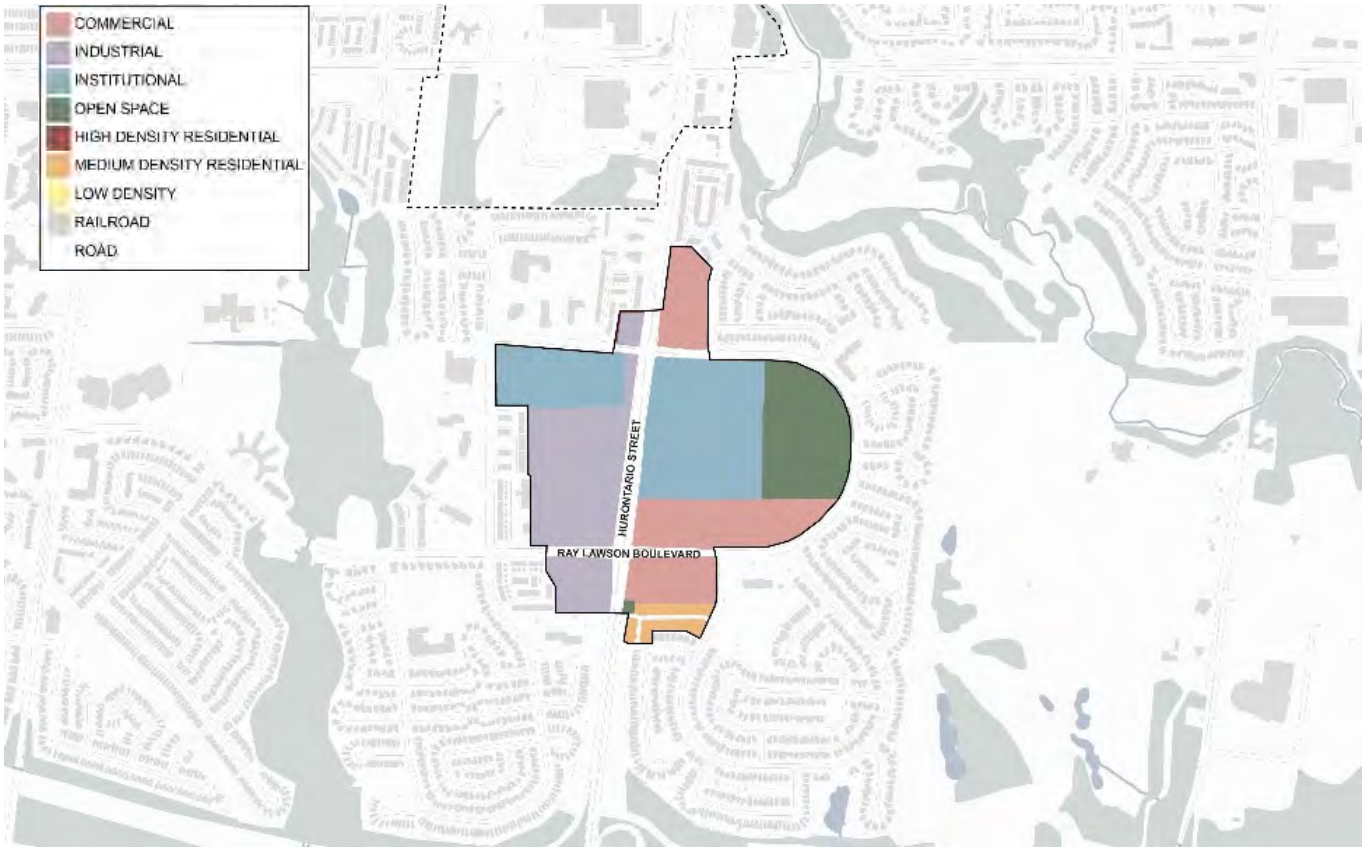

Figure 6-168: Ray Lawson Existing Conditions Land Use Map

Hurontario Street is the major vehicle thoroughfare within the Ray Lawson MTSA. County Court Boulevard, Sir Lou Drive, and Ray Lawson Boulevard also provide access to smaller local streets outside of the MTSA. There are few local streets within the MTSA, as the MTSA features a lot of large parcels without many bisecting streets.

The Ray Lawson MTSA is served by local bus service on County Court Boulevard, Hurontario Street, and Ray Lawson Boulevard. There is also GO bus service running along Hurontario Street, with two bus stops at Ray Lawson Boulevard and Sir Lou Drive.

There are no natural heritage areas in the Ray Lawson MTSA.

Figure 6-169: Ray Lawson Existing Conditions Map

6.11.2 Community Objectives

The preliminary land use plan for the Ray Lawson MTSA was discussed in a public focus-group session held on February 8, 2023. In general, the discussion centered around four points: 1) what is working in the MTSA; 2) what is not working in the MTSA; 3) what is missing in the MTSA; and 4) how could the MTSA be improved. During the focus-group discussion, participants noted that access to transit, natural spaces, the mix of uses and housing, and employment opportunities work well in the Ray Lawson MTSA. They noted that the MTSA has a poor streetscape, large rights-of-ways and a lack of mid-block connections which create poor pedestrian experiences, as well as too much parking and high truck traffic on Steeles Avenue. They also noted that the MTSA lacks character and community services. They noted that Ray Lawson is missing public art, mature trees, and open spaces, as well as higher densities and affordable housing. The discussion also included comments about the consequences of density; integration of the station into the surrounding area; and the importance of prioritizing transit, walking and biking. Furthermore, participants noted that the Ray Lawson MTSA is a major office node and should be maintained as such, even if some commercial and residential uses are added. Additionally, attendees noted that there are large parcels of provincially owned land serving institutional uses which make it hard to create permeability.

A complete summary of the focus-group session is included in Appendix D.

6.11.3 City of Brampton Land Use Plan

The final land-use plan for the Ray Lawson MTSA was approved by Brampton City Council in October 2023 as part of the update to the city's Official Plan. The approved land use plans were the result of iterative refinements based on qualitative and quantitative analyses of preliminary land use plans conducted by Arup over the course of this engagement and community engagement.

The approved Ray Lawson MTSA land-use plan includes several institutional uses (including court houses and a police station) that are expected to remain in the future condition. The area also includes an existing park with sports fields. The eastern portion of the MTSA includes office mixed-use areas and low-rise residential uses. On the west side of the MTSA, high-rise mixed-use areas are located near the planned transit stops. Mid-rise mixed-use areas serve as a transition between the proposed high-density areas and the existing low-rise areas farther west.

This MTSA is located on the Hurontario LRT corridor. In addition to the LRT corridor, key mobility elements of the proposed plan include:

- A proposed street connection between the C-shaped County Court Boulevard
- A proposed street connection between Hurontario Street and the proposed street connection linking County Court Boulevard
- A proposed L-shaped street connection between Hurontario Street and Ray Lawson Boulevard
- Proposed active connections linking existing and proposed streets in the northern portion of the MTSA
- Proposed protected bike lanes on Ray Lawson Boulevard and Hurontario Street
- Proposed bike lanes on Malta Avenue and Sur Lou Drive

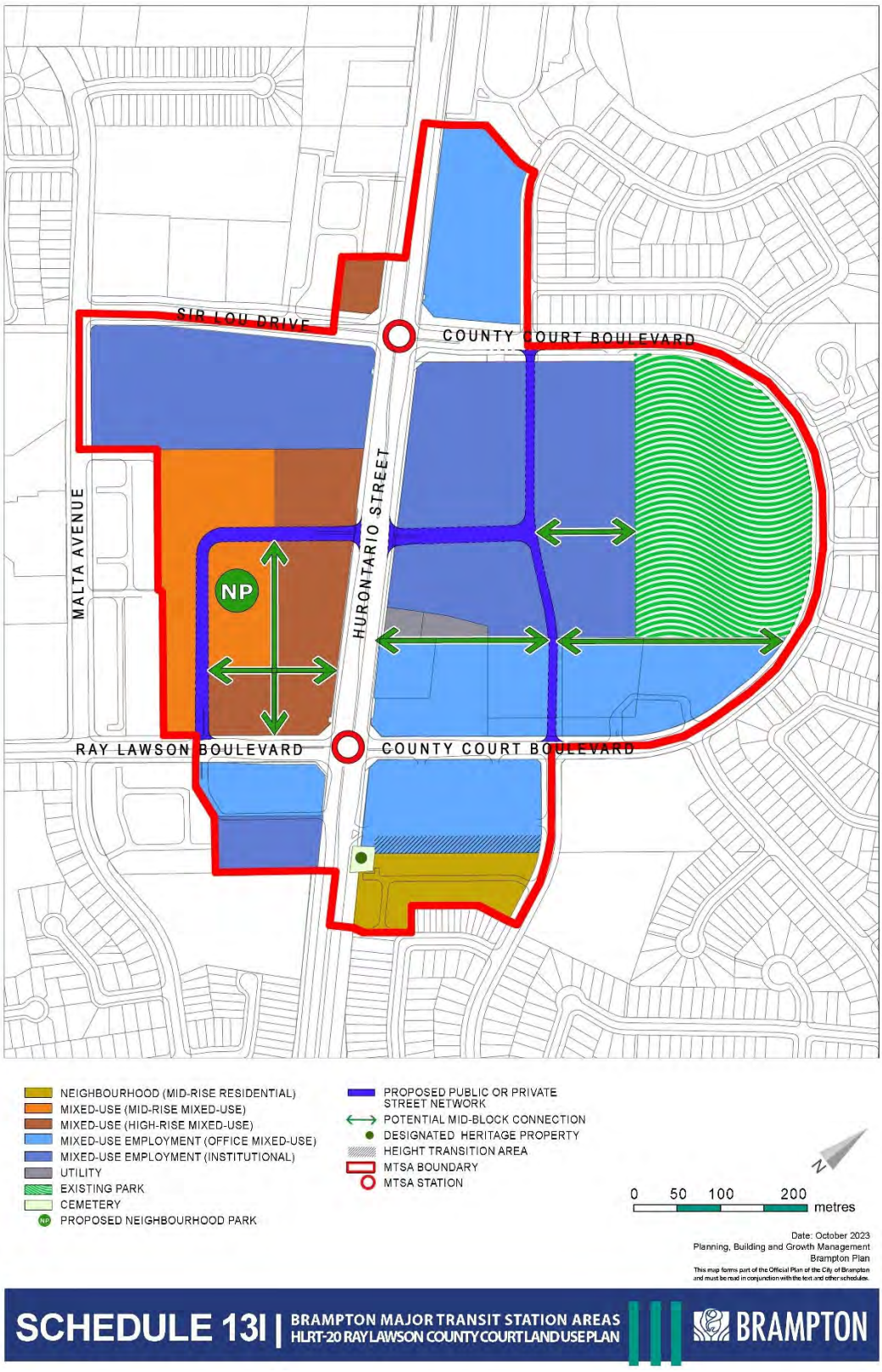

Figure 6-170: Ray Lawson Proposed Land Use Plan (City of Brampton)

6.11.4 Analysis of Proposed Conditions

The analysis illustrated in the following subsections considers estimated travel demand and network characteristics, as well as stormwater flow conditions assuming the implementation of the final council-approved land-use plans.

6.11.4.1 Transportation Analysis of Future Conditions

The future-conditions transportation analysis considers the expected distribution of relative travel demand with respect to the existing and future street network; identifies potentially high-demand bike and pedestrian routes between future development and the closest transit stop to assist in prioritizing active-travel-infrastructure investments; and points to areas within the vehicular network that may require additional study or intervention.

Travel Demand Distribution

Demand per street segment is largely driven by the size and type of developments anticipated for each block. Areas of high demand are located on either side of Hurontario Street. The police department and courthouse are the largest generators of demand. Areas of lower demand are located to the south in the low-rise residential area.

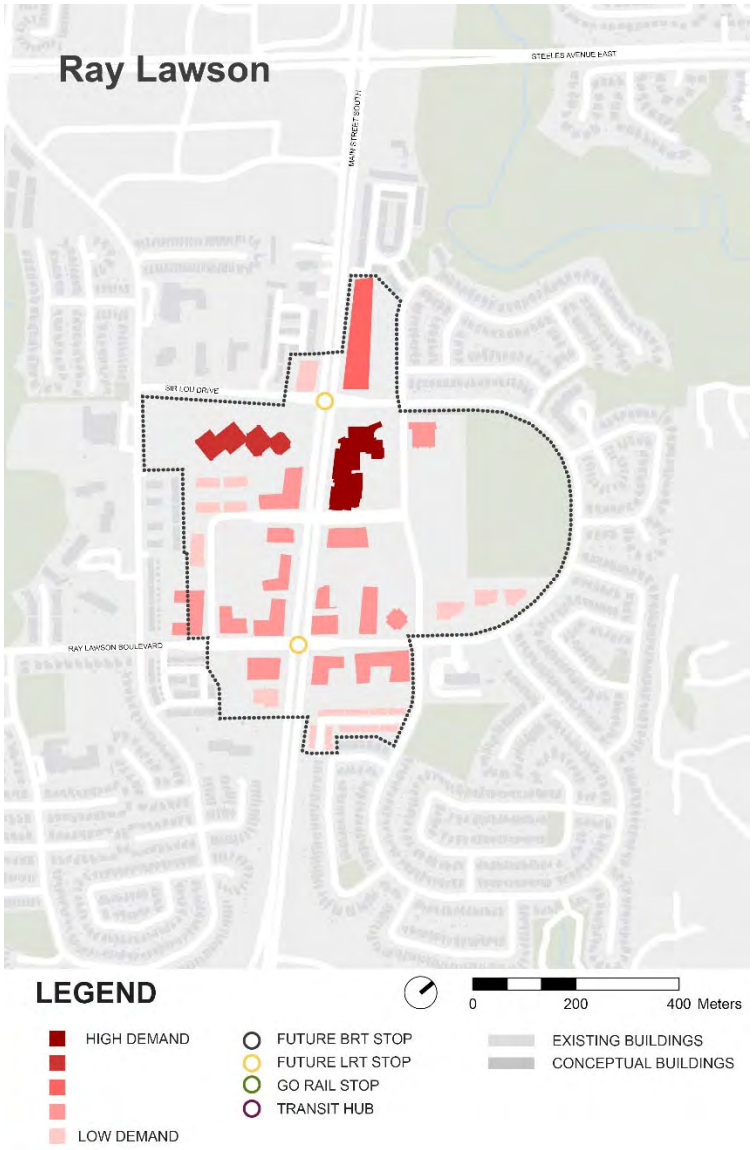

Figure 6-171: Ray Lawson Building Travel Demand Aggregation – Vehicle and Transit Demand

Active Travel Between Development and Transit

The figure below shows aggregated bike demand per street segment in the PM peak hour in the proposed condition. Demand levels are highest along Hurontario Street, suggesting the dedicated bike facilities along this street will be in high demand.

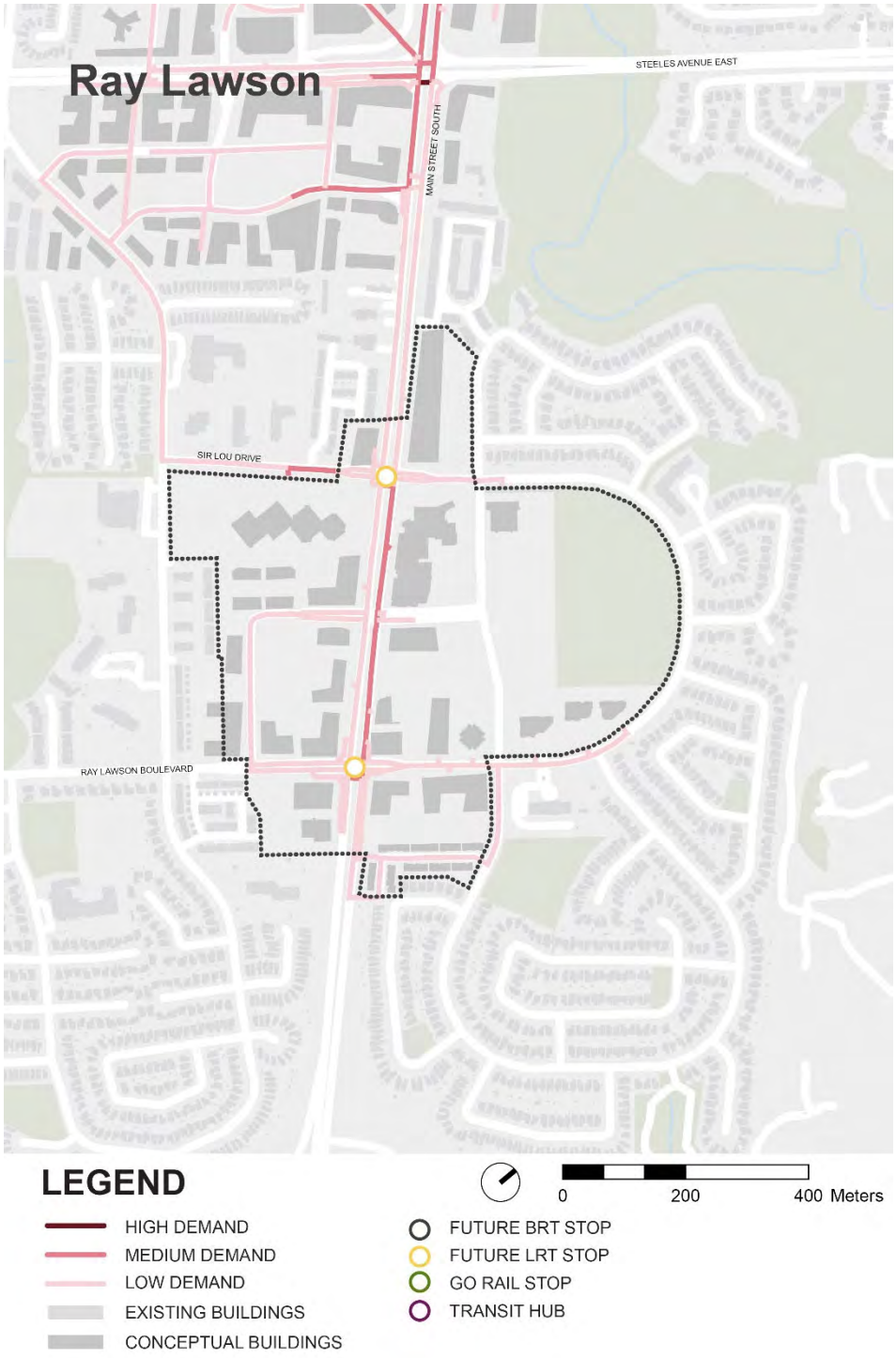

Figure 6-172: Ray Lawson Aggregation of Bike Demand to and from the Nearest Transit Stop

Walk demand in the Ray Lawson MTSA is also concentrated on Hurontario Street, suggesting that this street could benefit from an improved streetscape to enhance trip quality for pedestrians.

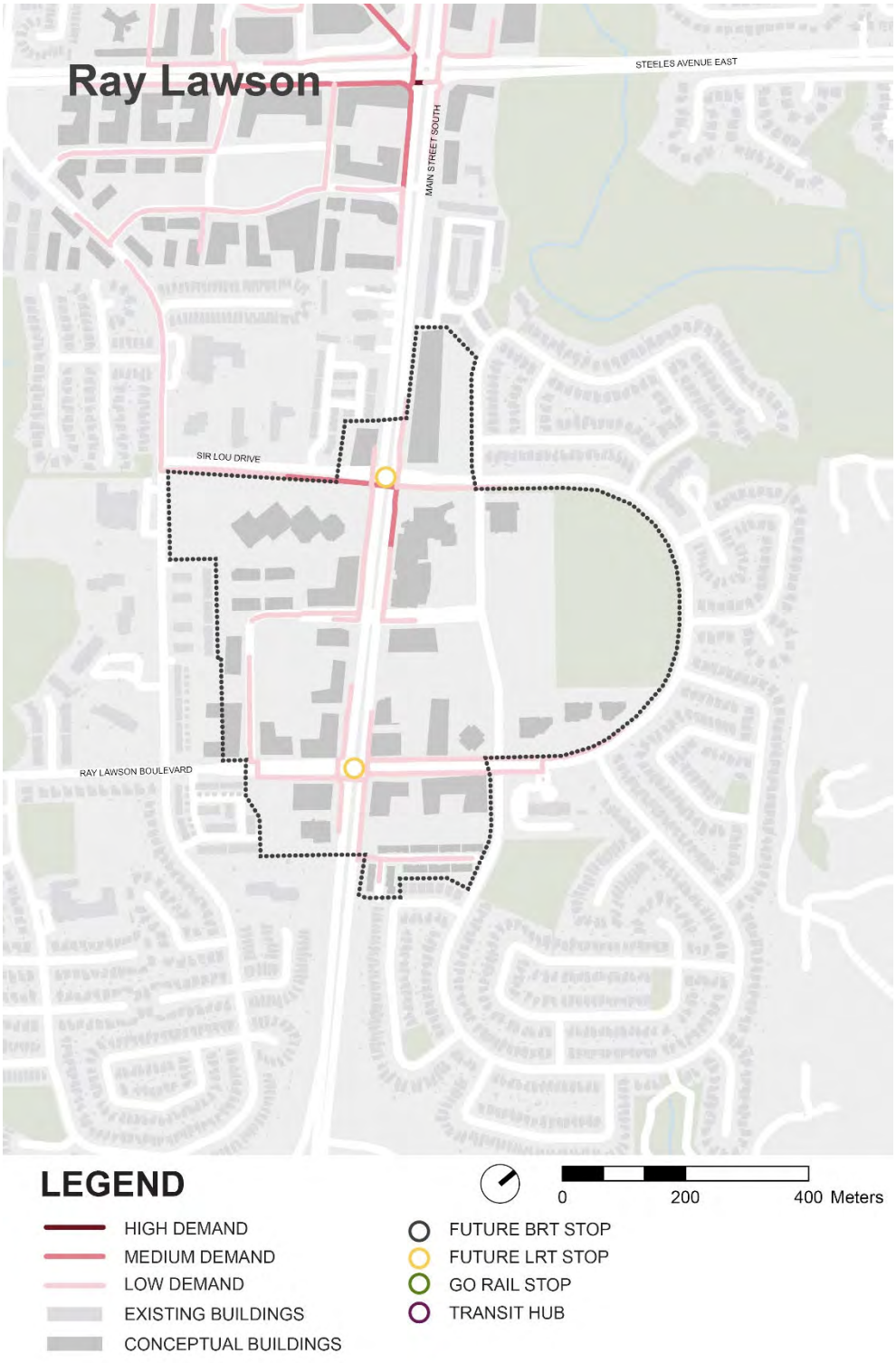

Figure 6-173: Ray Lawson Aggregation of Walk Demand to and from the Nearest Transit Stop

Accessibility to Local Bus and ZÜM services

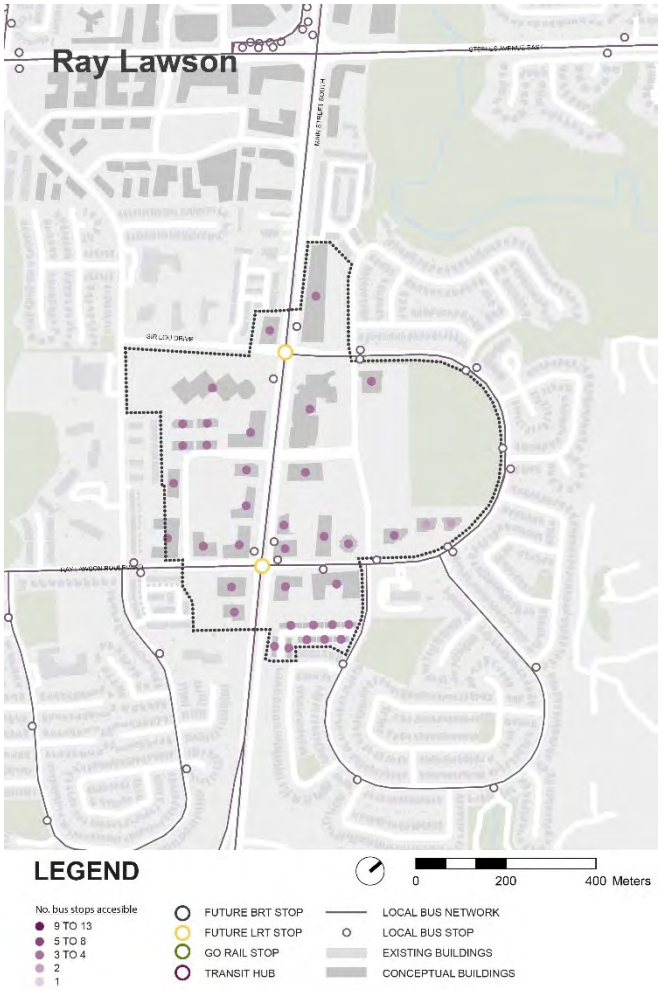

Figure 6-174: Access to local bus service at a 400 m walking distance within the Ray Lawson MTSA

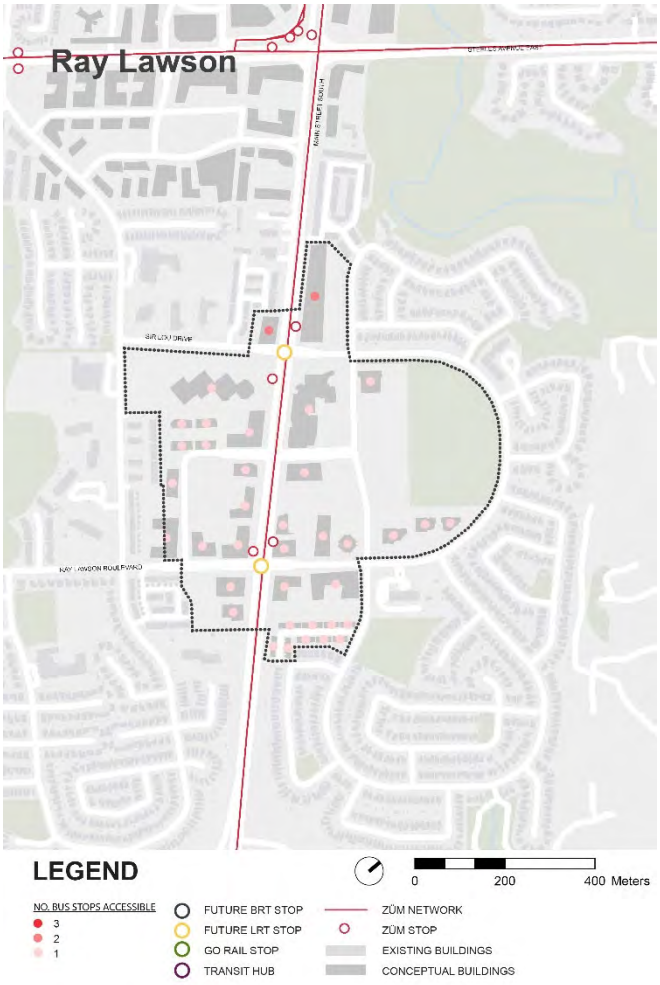

Figure 6-175: Access to higher-order transit service at an 800 m walking distance within the Ray Lawson MTSA

Vehicle Demand

Roads that may warrant additional investigation due to vehicle demand are highlighted in the figure below. This map is not meant to identify street segments that *will* be overcapacity, but rather to identify some street segments that fall on key shortest-path routes and therefore may experience high levels of demand. For the purposes of this review, all proposed streets were expected to accommodate bi-directional traffic, with one lane in each direction. Some key links flagged in this review include:

- Portions of Hurontario Street
- The proposed east-west street intersecting with Hurontario Street

Intensification therefore must be coupled with travel demand management strategies to promote even higher rates of sustainable modes and limit traffic congestion. Furthermore, consideration should be given to deterring through-traffic from using local neighbourhood streets (including the proposed street connections included in this MTSA) to reduce congestion in these areas. Potential strategies include reduced speed limits, chicanes, and speed humps/tables.

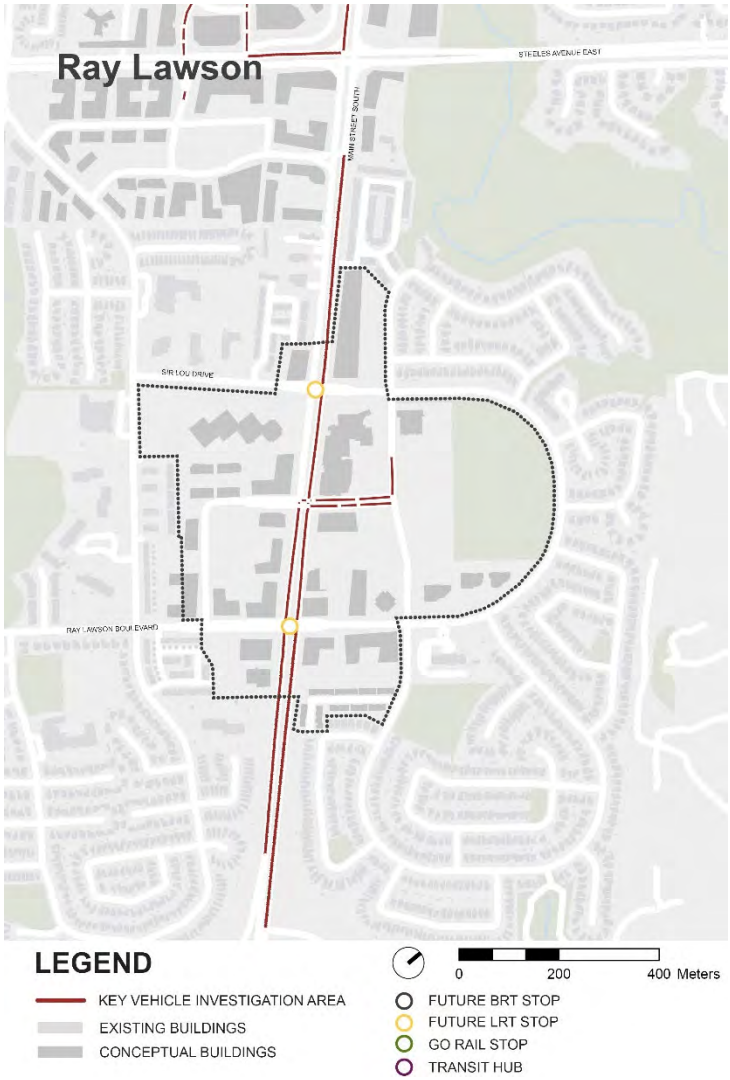

Figure 6-176: Ray Lawson Vehicle Network Assessment

6.11.4.2 Stormwater Analysis of Future Conditions

As presented in the existing conditions report, Ray Lawson is not a residential MTSA, only 2.6% of the area is used for residential purposes. Most of the area is used for commercial, industrial, and institutional purposes. A big park, the County court Park, is located in the north-east corner of the MTSA. The proposed streets are planned to be opened in the already paved area of the MTSA. For this reason, no significant increase in peak flow runoff is expected for this MTSA.

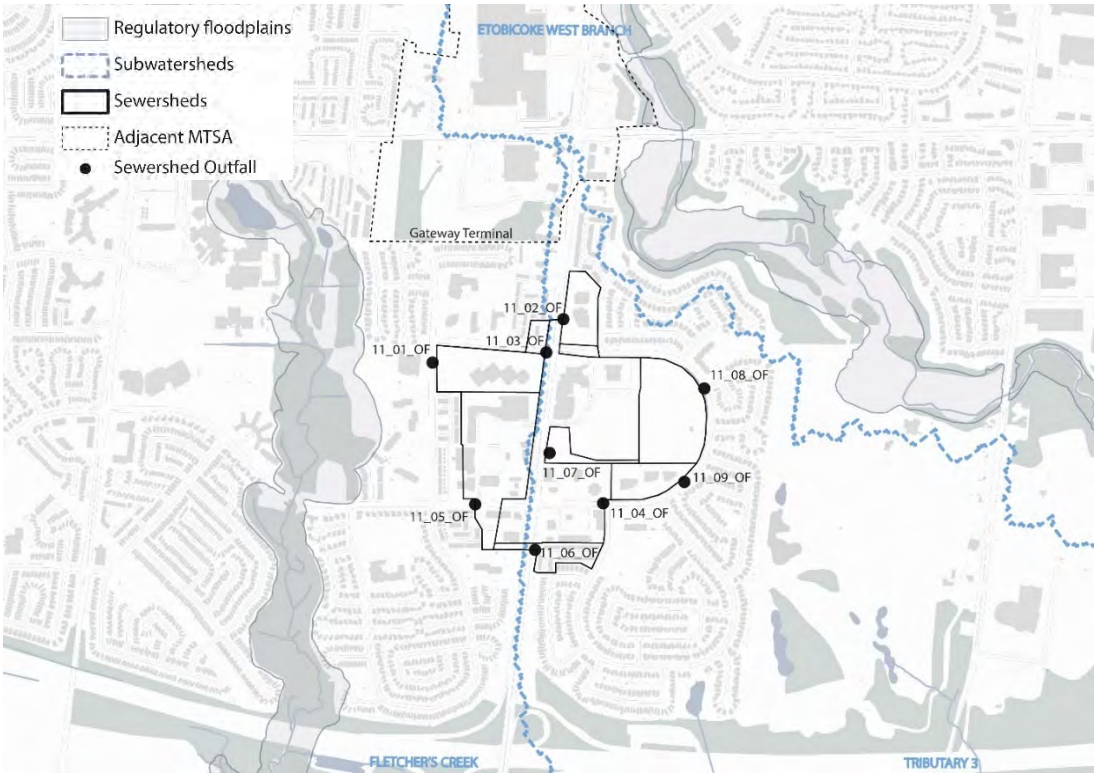

Figure 6-177: Ray Lawson Sewersheds and Outfalls

Additionally, the absence of proper streets in the western sewersheds introduces uncertainty regarding the actual stormwater flow direction. The introduction of streets and development will alter the direction of stormwater flow, as the new streets will gather and channel stormwater along their path. Consequently, two sewersheds, 11_04 and 11_08, required reconfiguration to account for the proposed new proposed local residential street.

Table 6-28: Ray Lawson – Comparative Analysis of Existing and Proposed Conditions, 100-year Peak Runoff

Sewershed	Existing Peak Runoff (L/s)	Proposed Peak Runoff (L/s)	Difference (%)	Required Detention (m^3)
11_01	1312	1312	0%	-
11_02	458	458	0%	-
11_03	121	121	0%	-
11_04	2187	2176	0%	-
11_05	2083	2094	1%	262
11_06	265	265	0%	-
11_07	201	201	0%	-
11_08	456	208	-54%	-
11_09	429	429	0%	-

A slight increase of 1 % in peak flow can be observed in sewershed 5. In this sewershed, 425 meters of street are proposed, within those meters of new almost 2000 m^3 of stormwater could be stored if the City implements retention swales in them. This quantity of stored water would be sufficient to mitigate the potential influx in runoff peak flow and even bring the future peak flow lower to the existing one.

Table 6-29: Ray Lawson – Available Detention Volume per Street Type

Sewershed	Length of New Streets (m)				Available Volume in Retention swales (m^3)				
	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 1	TYPE 2	TYPE 3	TYPE 4	Total
11_01	-	-	-	-	-	-	-	-	-
11_02	-	-	-	-	-	-	-	-	-
11_03	-	-	-	-	-	-	-	-	-
11_04	-	-	434	181.5	-	-	500	210	720
11_05	104	320	-	-	120	370	-	-	490
11_06	-	-	-	-	-	-	-	-	-
11_07	-	-	10.5	-	-	-	12	-	12
11_08	-	-	-	-	-	-	-	-	-
11_09	-	-	-	-	-	-	-	-	-

Table 6-30: Ray Lawson – Adjusted Peak Runoff with Implementation of Retention swales within Complete Streets' ROW

Sewershed	Existing Peak Runoff (L/s)	Adjusted Proposed Peak Runoff (L/s)	Difference	Detention Deficit (m^3)	Outcomes
11_01	1312	1312	-	-	-
11_02	458	458	-	-	-
11_03	121	121	-	-	-
11_04	2187	1985	-9%	-	Improvement in flow conditions
11_05	2083	1950	-6%	-	Improvement in flow conditions
11_06	265	265	-	-	
11_07	200	201	0.5%	-	Stormwater detention available in this sewershed is not enough to reduce the peak flow. The increase in peak flow is however considered insignificant due to the scale of the analysis.
11_08	456	208	-54%	-	Improvement in flow conditions due to the reconfiguration of the sewershed to account for new developments and streets
11_09	429	429	-	-	-

6.11.5 Summary of Servicing Observations

The Region of Peel separately commissioned studies of potable water and wastewater/sanitary sewerage servicing on an MTSA-by-MTSA basis. Details from these studies with relevance to planning activities are summarized here solely for the convenience of the reader and to facilitate consideration of implications for MTSA network planning. Arup assumes no liability for the accuracy of those analyses and reports or the completeness of the summary. The Peel Region reports were based on preliminary land use plans and build-out projections provided by the City of Brampton directly to the Region of Peel in 2022. Some adjustments have occurred to land-use plans and build-out projections, which may alter some of the reports' conclusions.

6.11.5.1 Water

The following information is drawn from the report titled "Water and Wastewater Servicing Study MTSA Lands – Contract 1, Water Report," dated April 23, 2024, and prepared by GM BluePlan, hereinafter (GMBP Water Report – Contract 1). The report concludes that all service-level criteria (pressure, velocity, and fire-flow availability) can be satisfied under the growth scenario, other than new local servicing.

The report details costs for already planned upgrades.

Identifier	Already Planned System Upgrade	Existing Source	Cost Estimate ($2020) as per 2020 DC Study
MTSA20-W-2	600mm watermain along Hurontario Street from Steeles Avenue to County Court Boulevard	Development Charges Study (Proj. # 251199)	Costs previously identified under MTSA 19
MTSA20-W-3	600mm watermain along County Court Boulevard from Hurontario and a future alignment of First Gulf Blvd	Development Charges Study (Proj. # 251199)	Design: $1,467,000 Construction: $6,974,000

Figure 6-178: GMBP planned upgrades

The report also provides estimates for local, developer-driven upgrades to the water network.

Identifier	Additional System Upgrade	Rationale	Assumed Watermain Size (mm)	Length (m)	Notes	System Upgrade Cost Estimate $2023
MTSA20-W-1	Local System Upgrade along Future Street northwest of Hurontario & Ray Lawson	New local servicing on new ROW	200	450	Local servicing upgrade	$800,000
	Total for New Projects within MTSA 20					**$800,000**

Figure 6-179: GMBP estimate of local, developer-driven upgrades

6.11.5.2 Wastewater/Sanitary

The following information is drawn from the report titled "Water and Wastewater Servicing Study MTSA Lands – Contract 1, Wastewater Report," dated April 23, 2024 and prepared by GM BluePlan, hereinafter (GMBP Wastewater Report – Contract 1). The report notes that under the growth scenario, constraints exist in several locations. These include:

- Surcharges within the local sewer network to the northeast of the MTSA and back-ups along Sir Lou Drive.
- Area 2 trunk capacity limitations in 2051 even before accounting for MTSA-driven growth
- Limitations along County Court Boulevard
- Surcharging and back-up on Ray Lawson toward Fletchers Creek

The report identifies three potential alternatives. The report describes a preferred alternative that will service new local streets and divert flows to Malta while leaving more existing infrastructure undisturbed.

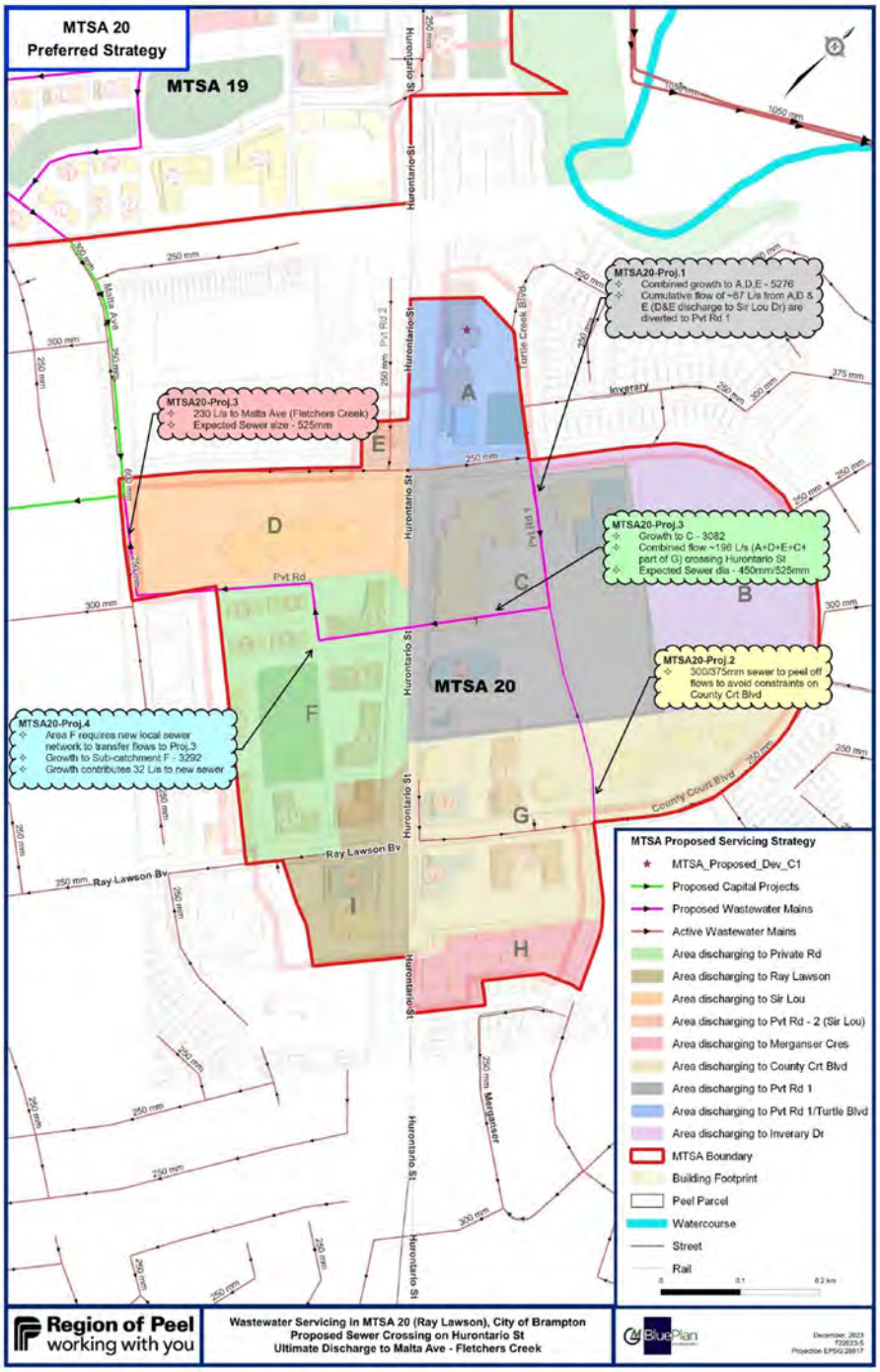

Figure 6-180: GMBP preferred alternative

The report provides a cost estimate for required upgrades in connection with the preferred alternative.

Table 18: High Level Cost Estimate for Preliminary Preferred Strategy

System Upgrade ID (Complexity)	Project Description	Rationale / Reason for Upgrade	Assumed Sewer Size (mm)	Length (m)	System Upgrade Cost Estimate ($)
MTSA20-Proj.1 Medium	Diversion from County Crt Blvd to Pvt Rd 1	Avoid Turtle Creek and Inverary Dr constraints; New local sewer	450	220	2.6 M
MTSA20-Proj.2 Medium	Diversion from County Crt Blvd into proposed local St	Avoid County Crt Blvd constraints; New local sewer	375	250	2.9 M
MTSA20-Proj.3 Medium	525mm sewer crossing Hurontario St to connect local streets and Malta CP sewer	New local servicing	525	650	9.8 M
MTSA20-Proj.4 Medium	New network to service area west of Hurontario and transfer flows to Pvt Rd	New local servicing	300	330	0.49 M
Total for Projects within MTSA 20 $					**15.8 M**

Note that project costs are high level and subject to change with detailed analysis and decision on final strategy.

Figure 6-181: GMBP high-level cost estimate for preferred alternative

Although precise timelines for development are unknown, the report provides an overview of potential capacity triggers for required upgrades.

Table 19: Capacity Upgrade Triggers for MTSA 20

System Limitation (as per Section 10.3)	Growth Area that Causes the Limitation	MTSA Population of the Growth Area	Approximate Trigger Population	Notes
Turtle Creek Blvd A.ID: 223850	A	4400	3050	System Upgrade Needed: Project 1
Inverary Dr A.ID: 216596	Upstream+E+D+C	3950	150	System Upgrade Needed: Project 1 (Upstream partially bounded by W: Malta Ave; E: Hurontario St; N: Tina Crt; S: Sir Lou Dr)
County Crt Blvd A.ID: 219108	Upstream+G	3400	2500	System Upgrade Needed: Project 2 (Upstream partially bounded by W: County Crt; E: Mirabell Crt; N: Amantine Cres.; S: Havelock Park)
Ray Lawson A.ID: 224024	Upstream+F+ I	4800	1600	System Upgrade Needed: Project 2 (Upstream partially bounded by W: Berkindale Crt; E: Hurontario St; N: btw. Sir Lou and RayLawson; S: Patricia Crt)

For the above table, please refer to the MTSA 20 preferred strategy map (on subsequent page) to understand the growth area notations. In the above table, all the upstream flows due to 2051 growth are considered and removed from the limiting sewer's available capacity. Thus, the trigger population is the capacity available for MTSA growth inside the boundary.

Figure 6-182: GMBP capacity triggers for required upgrades

6.11.6 Proposed Street Classifications and Stormwater Interventions

6.11.6.1 New Links Proposed Complete Street Classifications

The proposed streets in the Ray Lawson MTSA have been classified as mixed-use neighbourhoods.

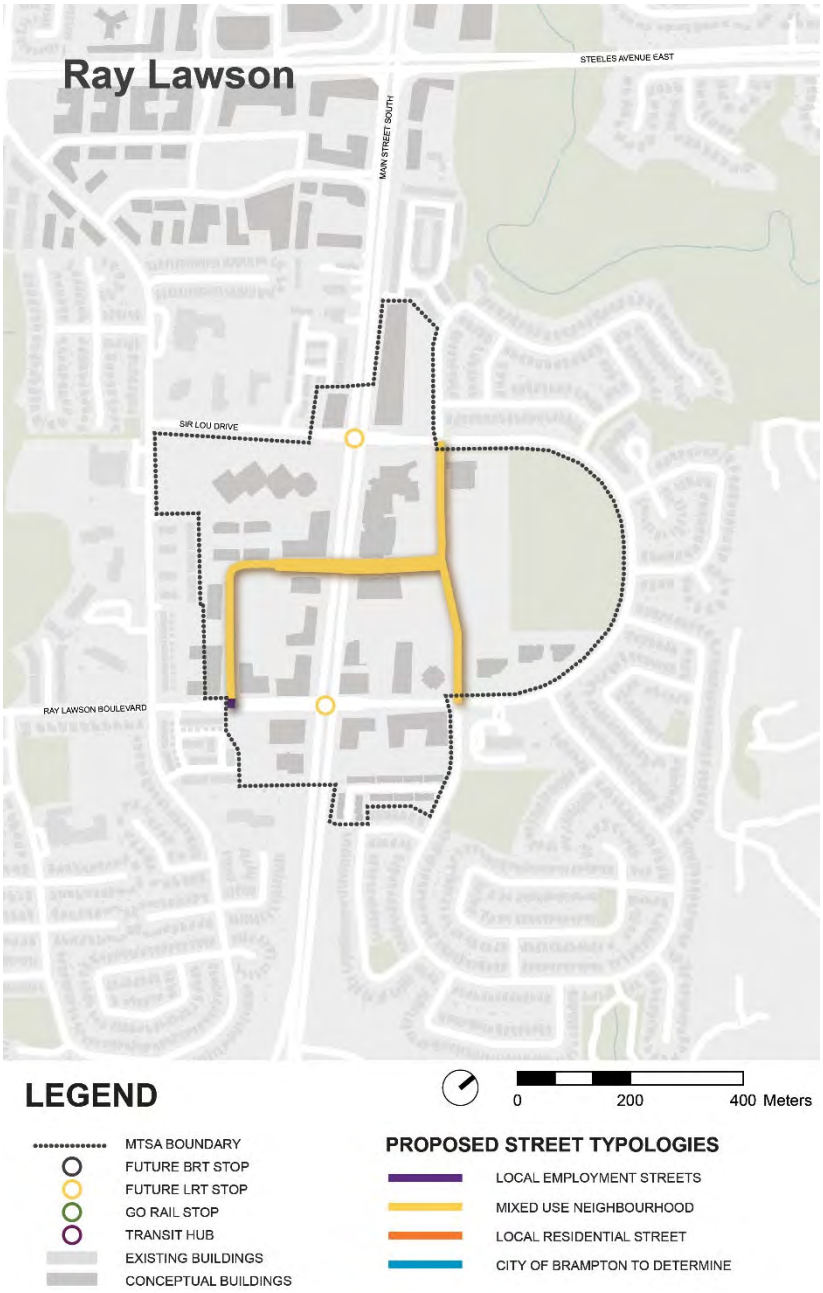

Figure 6-183: Ray Lawson Proposed Complete Streets Classification

6.11.6.2 Stormwater Management Interventions

The figure below illustrates the final transportation network and stormwater proposals for the Ray Lawson MTSA. It includes the proposed transportation network refinements identified in the City's preliminary land use plans as well as those identified through the transport analysis.

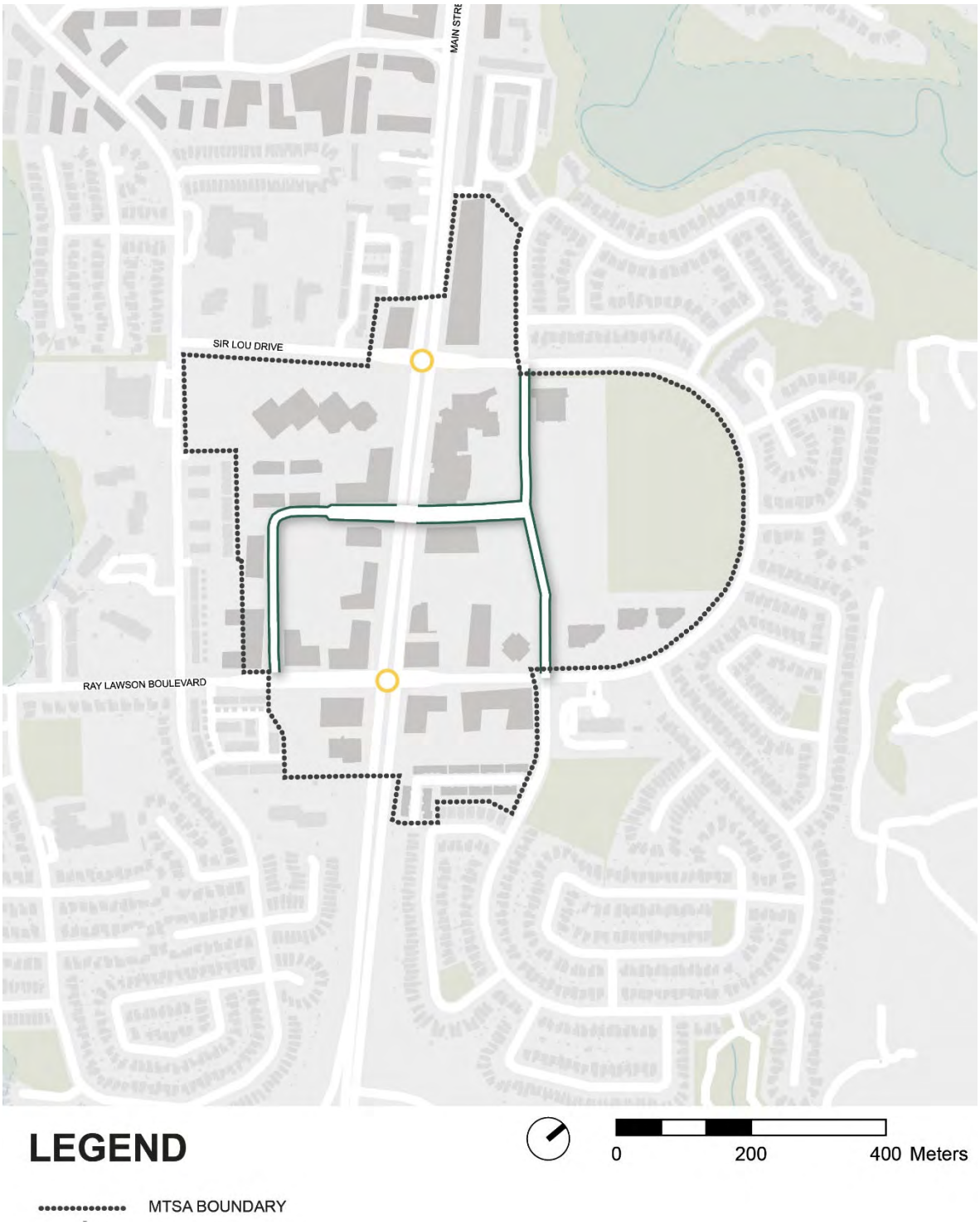

Figure 6-184: Ray Lawson Combined Transportation Network and Stormwater Interventions

6.11.7 MTSA-Specific Policy Recommendations

Several objectives in the Ray Lawson MTSA are best met through the application of general and location-specific policies in addition to the proposed network adjustments. Policies that should be considered for this MTSA are listed below. Parenthetical information provides rationale for specific policies.

- **General transportation network enhancements:**
  - Road and active-transport infrastructure should be provided to support comfortable, direct, and safe travel for sustainable modes and bolster transit ridership.
- **Roads:**
  - To create a finer-grain network, several new street alignments are proposed:
    - between the C-shaped County Court Boulevard;
    - between Hurontario Street and the proposed street connection linking County Court Boulevard; and
    - between Hurontario Street and Ray Lawson Boulevard.
  - The City of Brampton should work with developers through the planning approval process to secure rights of way with sufficient width to accommodate revised complete streets typologies, including proposed green infrastructure to address publicly managed stormwater flows. Final widths and alignments will be determined through future detailed studies.
  - Traffic-calming measures should be leveraged on local or neighbourhood roads to reduce cut-though traffic on streets that are meant to provide access to residences or businesses or roads that play a major role in pedestrian and bike connectivity. Potential strategies include reduced speed limits, chicanes, and speed humps or tables. These strategies should be considered for portions of Hurontario Street and the proposed east-west street intersecting with Hurontario Street.
- **Active travel:**
  - Sidewalks and/or other appropriate pedestrian facilities should be provided along both sides of all new and existing streets. (A policy which ensures that all future streets include pedestrian facilities on both sides, and that all existing streets are upgraded to add this infrastructure where missing, is critical for the development of a safe and convenient pedestrian network.)
  - Bike infrastructure (including, but not limited to, recreational trails, multi-use paths, bike lanes, and protected bike lanes) should be provided in accordance with the Active Travel Master Plan. Additional infrastructure should be implemented where needed to promote network connectivity and reduce circuity of protected bike trips to the Ray Lawson LRT stop. (Within the proposed network, cyclists travelling to the Ray Lawson LRT stop will experience more circuitous routes than pedestrians. Where possible, the City of Brampton should work with developers to identify additional mid-block connections that serve cyclists, as well as pedestrians.)
  - The provision of new bike lanes and multi-use paths must be complemented by the installation of bike parking at key destinations, such as the Ray Lawson LRT stop.
  - New developments should be designed to minimize walking distance to transit or other key destinations through the inclusion of mid-block connections.

- New neighbourhood parks and other open spaces should include dedicated pedestrian and bike infrastructure to enhance connectivity.
- Active-transport facilities, including street furniture and tree planting, or Complete Streets upgrades should be prioritized for Hurontario Street, Sir Lou Drive, and Ray Lawson Boulevard.
- New active crossings over County Court Boulevard Road should be provided to enhance pedestrian and bike connectivity.
- Pedestrian and cyclists should be prioritized at high-demand or key intersections, such as Hurontario Street / Ray Lawson Boulevard. Consideration should be given to including operational modifications or design treatments that prioritize active travel users include pedestrian-scramble signal phases, pedestrian head starts, no right turns on red, raised crosswalks or intersections, and protected intersections.

- **Collaboration:**
  - Work with the Peel Regional Police to identify opportunities for adding an active-travel connection through their parking lot to increase pedestrian and bike connectivity.
- **Building servicing**:
  - Vehicular access to buildings that front onto major streets, such as Hurontario Street in the Ray Lawson MTSA, should be provided via local back streets or service lanes. (This will help maintain traffic flow on the major roads while also providing uninterrupted active-travel facilities for pedestrians and cyclists.)
- **Travel-demand management**:
  - Travel-demand strategies for new development should be emphasized for developments expected to contribute vehicular traffic to Hurontario Street or the new proposed streets. (Intensification in the MTSA must be coupled with a range of travel demand management strategies that promote the use of active modes and transit over cars in order to reduce congestion and promote sustainable travel.)
- **Stormwater:**
  - All new developed streets should be designed according to the new complete street guidelines. Exact retention swales dimensions should be calculated for each new street to ensure that the new streets do not cause increase in peak flow for each applicable design storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms).
  - Developments within the MTSA shall be required to implement stormwater management techniques required to provide post to pre control for all storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms), as required by CVC

6.11.8 Recommendations for Further Transportation Network Enhancements

Several recommendations for refining the Ray Lawson MTSA's street network were identified through the transportation analysis conducted as part of this study. Key refinements include:

- The addition of a pedestrian connection through the Peel Regional Police lot (R1);
- The addition of service roads to ensure adequate building servicing (R2, R3, R4), which will require coordination with the Peel Regional Police department
- Brining the cycling lands on County Court Boulevard to the intersections with Main Street (R5)
- Upgrading intersection of roads with bicycle infrastructure to high-quality intersections (protected) (R6)

Upon reviewing these recommendations, the City recommended that R1, R3, and R4 not be carried forward for future analysis. As such, these refinements are excluded from the final transportation network and stormwater management recommendations. Given that recommendations R2, R5, and R6 concern the adequate provision of servicing roads, these recommendations have been included in the recommended policies section below.

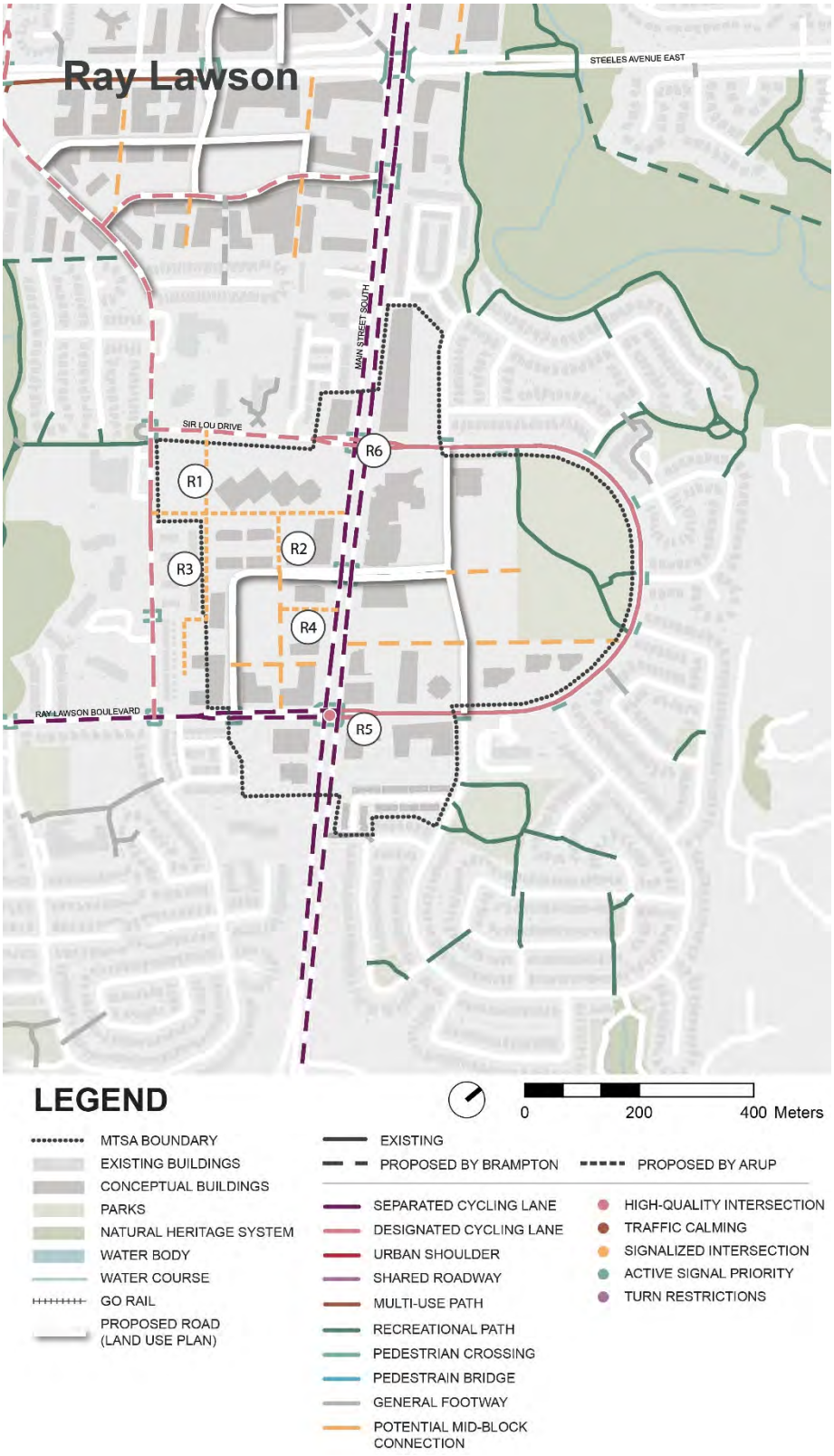

Figure 6-185: Ray Lawson Preliminary Transportation Network Refinements

6.12 MTSA 12 – The Gore

The Gore MTSA is located in eastern Brampton and is planned to include high-rise and mid-rise mixed-use areas; low-rise residential areas; office mixed-use space, light industrial mixed-use space, commercial space, and institutional space. The Queen Street BRT line will provide the primary higher order transit service in the MTSA.

As The Gore MTSA will be served by the Queen Street BRT, it has a density target of 160 residents and jobs combined per hectare. To support the increased density proposed in this MTSA, a range of street-network refinements have been identified. These include street extensions and mid-block connections proposed by the City of Brampton in their area plan, bike facilities identified in the Active Transportation Master Plan, and recommendations flowing from the transportation analysis described herein. Key refinements include new streets in the western portion of the MTSA; mid-block active connections in the northeastern portion of the MTSA; and bike facilities on Fogal Road, Palleschi Drive, Nexus Avenue, and Ebenezer Road.

The areas in which new streets are planned to be developed in the Gore MTSA are currently underdeveloped and under utilized. Opening new streets and creating developments in these open spaces will affect stormwater runoff directions and peak flows. For this reason, all new streets should be implemented with designed retention swales to manage the maximum extra runoff possible. At one location, sewershed 05, an additional stormwater management strategy should be considered to manage the totality of the extra runoff that the new streets will create. A floodable public space is proposed and explained in the stormwater analysis section.

6.12.1 Existing Conditions

The Gore MTSA contains a variety of land uses. South of Queen Street, industrial areas predominate. Farther north is a residential community with a range of densities. Medium-density residential areas are also located to the south and to the east of the MTSA. Commercial areas are located in the northeast of the MTSA and at the intersection of The Gore Road and Queen Street East. Several institutional uses, including religious organizations, are located throughout the MTSA. Several open spaces are spread throughout the MTSA as well.

Figure 6-186: The Gore Existing Conditions Land Use Map

The Gore Road and Queen Street East are the major vehicle thoroughfares in The Gore MTSA. Local roads in the MTSA tend to be circuitous and disconnected. The Gore MTSA is served by local buses on Queen Street East, The Gore Road, and Ebenezer Road. GO bus service is also provided on nearby Highway 50.

The Gore MTSA is sandwiched between two natural heritage areas to the east and to the west.

Figure 6-187: The Gore Existing Conditions Map

6.12.2 Community Objectives

The preliminary land-use plan for The Gore MTSA was discussed in a public focus-group session held on February 1, 2023. In general, the discussion centred around four points: 1) what is working in the MTSA; 2) what is not working in the MTSA; 3) what is missing in the MTSA; and 4) how could the MTSA be improved. During the public engagement, participants noted that The Gore contains a good mixture of uses, including medical facilities, offices, residential areas, and commercial areas. They are happy with the Clareville conservation area and the trails in the MTSA. They expressed concern with the narrow sidewalks on Queen Street East, a lack of safety, busy intersections, accidents, and crime rates in the MTSA. Participants noted that the area is missing bike and pedestrian infrastructure, office space, as well as a trail west of Highway 50 and south of Fogal Street.

The discussion about improving the Gore included adding active trails (especially to the natural heritage areas), landscaped parks, recreational facilities, entertainment, and restaurants. Attendees also discussed active frontage on The Gore, step-back buildings to minimize shadows, lighting, and high-rise development in the southwest portion of the MTSA.

A complete summary of the focus-group session is included in Appendix D.

6.12.3 City of Brampton Land-Use Plan

The final land-use plan for The Gore MTSA was approved by Brampton City Council in October 2023 as part of the update to the city's Official Plan. The approved land use plans were the result of iterative refinements based on qualitative and quantitative analyses of preliminary land use plans conducted by Arup over the course of this engagement and community engagement.

Key features of The Gore MTSA's approved land-use plan include mixed-use office areas immediately surrounding the intersection of Queen Street East and The Gore Road, a prestige-industrial area in the western portion of the MTSA, and mid-rise mixed-use areas north and south of Fogal Road / Attmar Drive. Existing low-rise residential areas will be maintained in the areas northwest and southeast of the intersection of The Gore Road and Attmar Drive / Fogal Road and south of the intersection of Queen Street East and The Gore Road. Several areas within this MTSA are already being redeveloped.

This MTSA is located on the Queen Street bus rapid transit corridor. In addition to the BRT corridor, key mobility elements of the proposed plan include:

- Proposed street connections in the area between Queen Street East, The Gore Road, and Attmar Drive
- A proposed street connection between Queen Street East and Brewster Road
- A proposed street connection between Queen Street East and Abacus Road
- Several proposed active connections between Ebenezer Road, The Gore Road, Fogal Road, and Nexus Avenue
- A proposed multi-use path on Ebenezer Road
- A proposed recreational trail in the natural heritage system along the eastern edge of the MTSA
- Proposed bike lanes on Palleschi Drive, Fogal Road, Nexus Avenue, and Alfonso Crescent

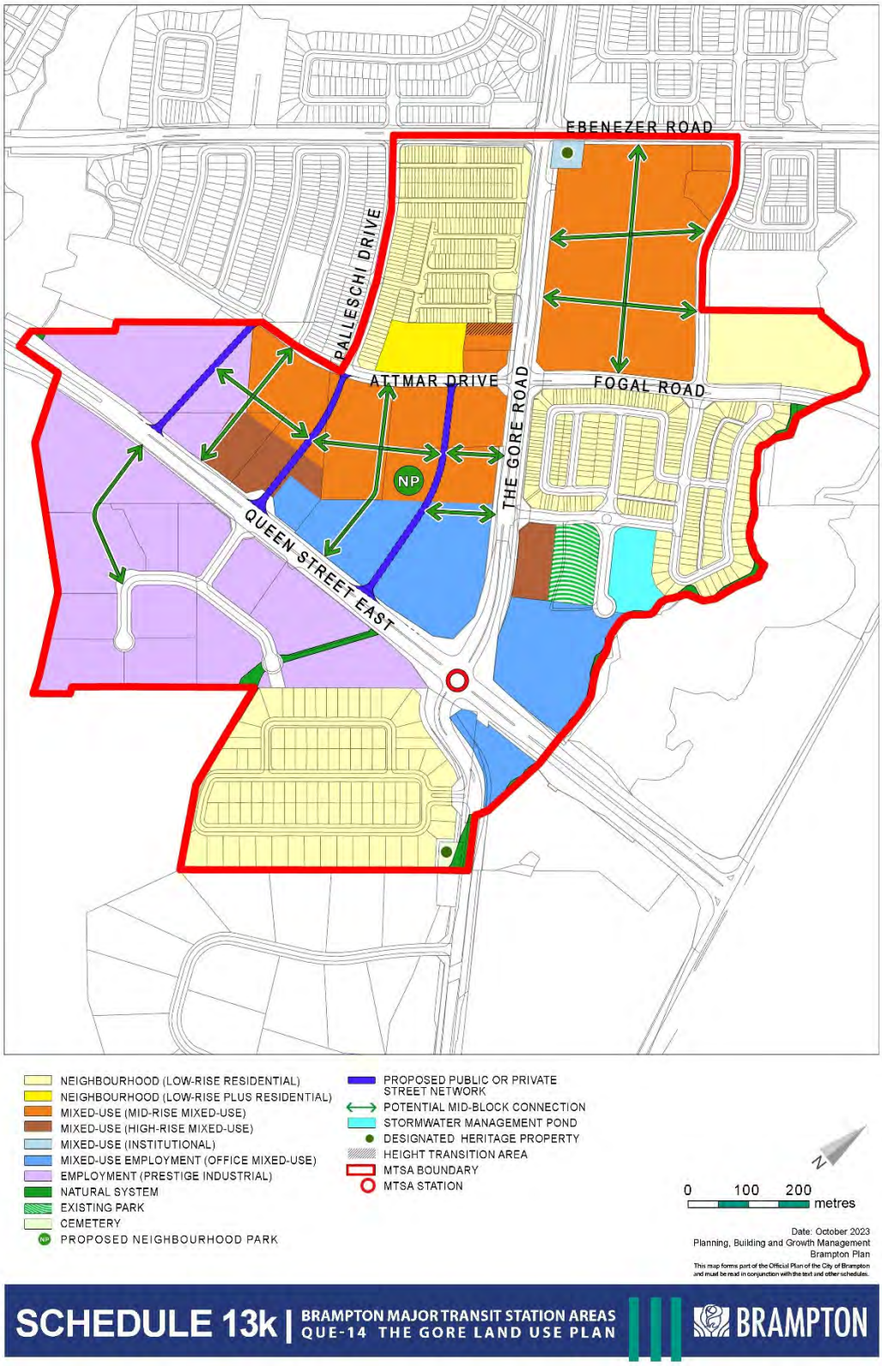

Figure 6-188: The Gore Proposed Land Use Plan (City of Brampton)

6.12.4 Analysis of Proposed Conditions

The analysis illustrated in the following subsections considers estimated travel demand and network characteristics, as well as stormwater flow conditions assuming the implementation of the final council-approved land-use plans.

6.12.4.1 Transportation Analysis of Future Conditions

The future-conditions transportation analysis considers the expected distribution of relative travel demand with respect to the existing and future street network; identifies potentially high-demand bike and pedestrian routes between future development and the closest transit stop to assist in prioritizing active-travel-infrastructure investments; and points to areas within the vehicular network that may require additional study or intervention.

Travel Demand Distribution

Demand per street segment is largely driven by the size and type of developments anticipated for each block. The areas of highest demand are clustered around the Queen Street East / The Gore Road intersection. This area will also be well-served by transit as it is where the future BRT stop is planned. The commercial and industrial-mixed use areas are also expected to generate a fair amount of demand.

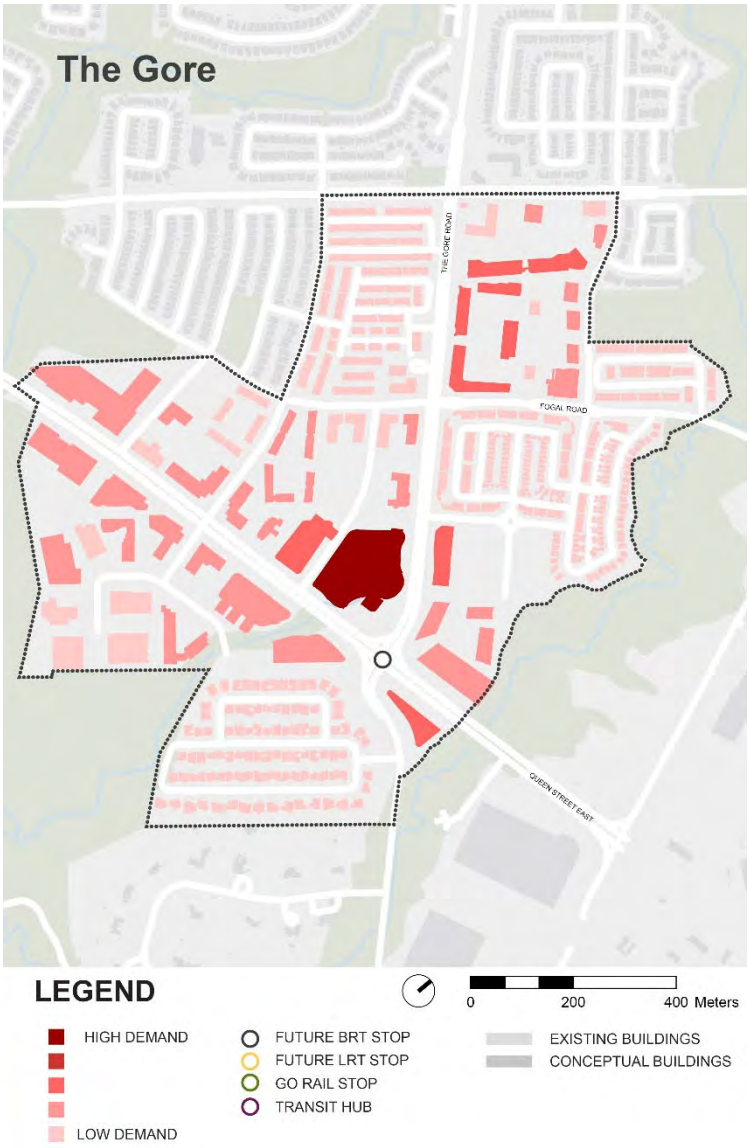

Figure 6-189: The Gore Building Travel Demand Aggregation – Vehicle and Transit Demand

Active Travel Between Development and Transit

The figure below shows aggregated bike demand per street segment in the PM peak hour in the future condition. Demand levels are highest along Queen Street East. The proposed recreational trail parallel to Highway 50 and the active connection linking it to Moorcroft Place also play a key role in moving cyclists to and from the transit station, demonstrating the importance of these links.

Figure 6-190: The Gore Aggregation of Bike Demand to and from the Nearest Transit Stop

Walk demand is primarily concentrated on Queen Street East and The Gore Road. As such, effort should be made to ensure these streets provide a high-quality pedestrian experience.

Figure 6-191: The Gore Aggregation of Walk Demand to and from the Nearest Transit Stop

Accessibility to Local Bus and ZÜM services

Figure 6-192: Access to local bus service at a 400 m walking distance within The Gore MTSA

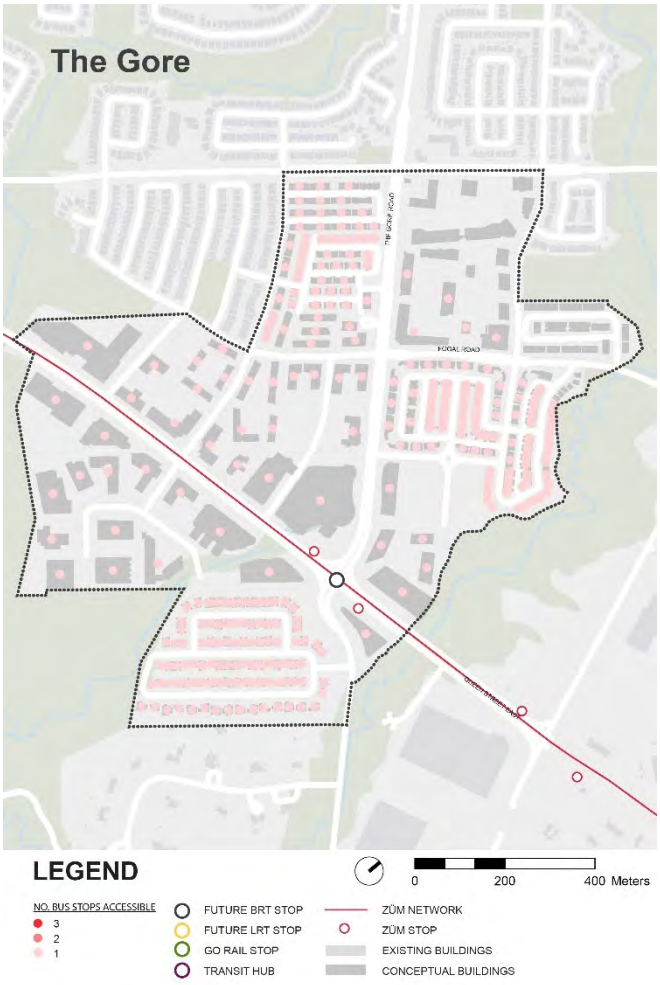

Figure 6-193: Access to higher-order transit at an 800 m walking distance within The Gore MTSA

Vehicle Demand

Roads that may warrant additional investigation due to vehicle demand are highlighted in the figure below. This map is not meant to identify street segments that *will* be overcapacity, but rather to identify some street segments that fall on key shortest-path routes and therefore may experience high levels of demand. For the purposes of this review, all proposed streets were expected to accommodate bi-directional traffic, with one lane in each direction. Some key links flagged in this review include:

- Skyridge Drive
- Ravenbury Street
- Portions of The Gore Road
- Several of the proposed streets west of The Gore Road

Intensification therefore must be coupled with travel demand management strategies to promote even higher rates of sustainable modes and limit traffic congestion. Furthermore, consideration should be given to deterring through-traffic from using local neighbourhood streets (including the proposed street connections included in this MTSA) to reduce congestion in these areas. Potential strategies include reduced speed limits, chicanes, and speed humps/tables.

Figure 6-194: The Gore Vehicle Network Assessment

6.12.4.2 Stormwater Analysis of Future Conditions

The Gore, currently a less developed MTSA, has currently 20% of the land as designated as open space, while 20% is for industrial use. Presently, only a quarter of the MTSA's land is allocated for residential purposes. Introducing streets under these circumstances is likely to heighten runoff peak flows. Additionally, the absence of developments and streets in the western sewersheds introduces uncertainty regarding the actual stormwater flow direction. The introduction of streets and development will alter the direction of stormwater flow, as the new streets will gather and channel stormwater along their path. Consequently, certain sewersheds, including numbers 5 and 8, required reconfiguration to account for the proposed new streets.

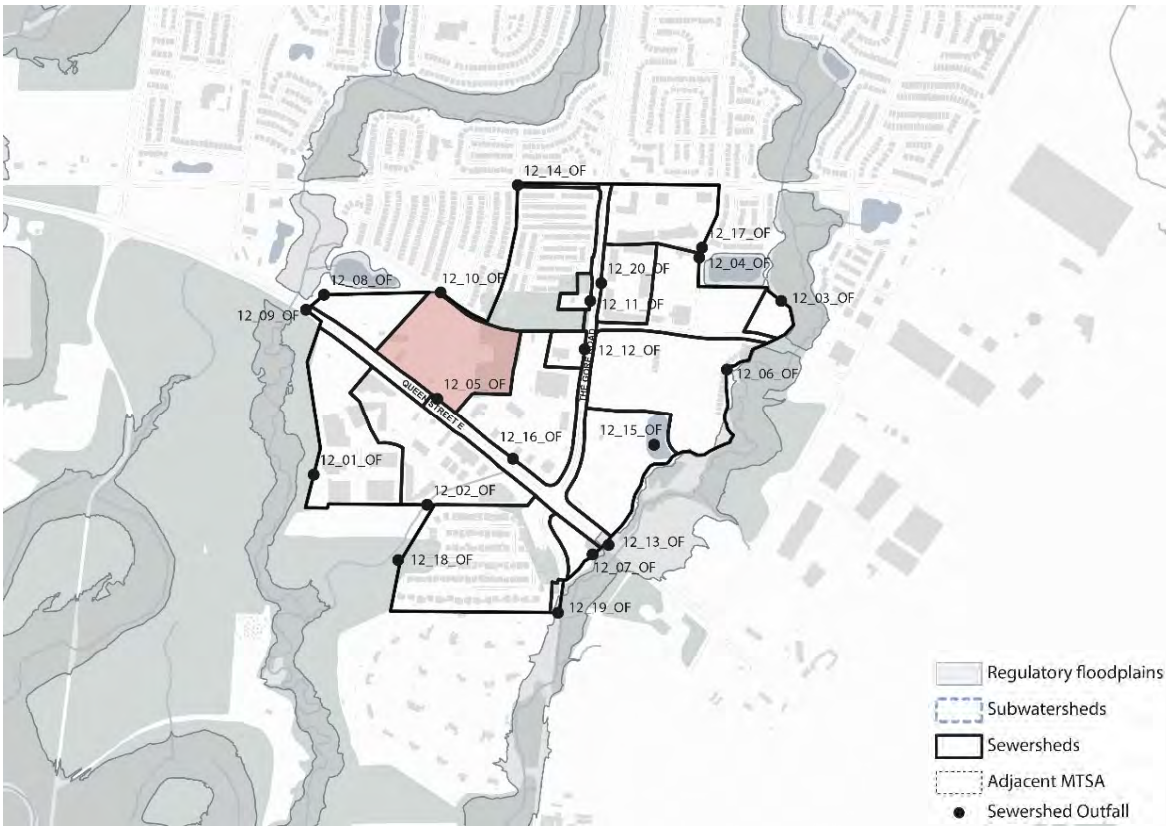

Figure 6-195: The Gore Sewersheds and Outfalls

Table 6-31: The Gore – Comparative Analysis of Existing and Proposed Conditions, 100-year Peak Runoff

Sewershed	Existing Peak Runoff (L/s)	Proposed Peak Runoff (L/s)	Difference (%)	Required Detention (m^3)
12_01	1518	1518	-	-
12_02	1787	1787	-	-
12_03	52	52	-	-
12_04	673	673	-	-
12_05	113	683	504%	1977
12_06	1413	1413	-	-
12_07	66	66	-	-
12_08	978	591	-39.6%	-
12_09	278	278	-	-
12_10	1395	1395	-	-
12_11	88	88	-	-
12_12	312	195	-37.5%	-
12_13	793	793	-	-
12_14	50	50	-	-
12_15	347	347	-	-
12_16	1045	1315	25.8%	859
12_17	1040	1040	-	-
12_18	1753	1753	-	-
12_19	38	38	-	-
12_20	184	184	-	-

As expected, potential increases in runoff in sewersheds 12_05 and 12_16 were found. The implementation of stormwater management at the source is required to minimize the impact of stormwater runoff on the existing runoff.

Table 6-32: The Gore – Available Detention Volume per Street Type

Sewershed	Length of New Streets (m)		Volume Available in Retention swales (m^3)		
	Type 2	Type 3	Type 2	Type 3	Total
12_01	-	-	-	-	-
12_02	-	-	-	-	-
12_03	-	-	-	-	-
12_04	-	-	-	-	-
12_05	258	270	253	227	480
12_06	-	-	-	-	-
12_07	-	-	-	-	-
12_08	-	-	-	-	-
12_09	-	-	-	-	-
12_10	-	-	-	-	-
12_11	-	-	-	-	-
12_12	99	-	97	-	97
12_13	-	-	-	-	-
12_14	-	-	-	-	-
12_15	-	-	-	-	-
12_16	100	170	98	143	241
12_17	-	-	-	-	-
12_18	-	-	-	-	-
12_19	-	-	-	-	-
12_20	-	-	-	-	-

With the sole implementation of retention swales most increase in outflows can be mitigated. Due to the updated geometry of sewershed 05 an uptick can be expected that cannot be managed by retention swales alone.

Table 6-33: The Gore – Adjusted Peak Runoff with Implementation of Retention swales within Complete Streets' ROW

Sewershed	Existing Peak Runoff (L/s)	Adjusted Proposed Peak Runoff (L/s)	Difference	Detention Deficit (m^3)	Outcome
12_01	1518	-	-	-	-
12_02	1787	1753	- 55 L/s (-3.1%)	-	Slight improvement of flow conditions
12_03	52	-	-	-	-
12_04	673	-	-	-	-
12_05	113	534	422 L/s (372%)	1497	Outfall 05 is anticipated to experience a significant rise in runoff even with the incorporation of retention swales in the new streets. In the event that more accurate calculations validate this substantial increase in runoff, it is advisable to contemplate an additional measure, such as a floodable park, within the sewershed.
12_06	1413	-	-	-	-
12_07	66	-	-	-	-
12_08	978	-	-	-	-
12_09	278	-	-	-	-
12_10	1395	-	-	-	-
12_11	88	-	-	-	-
12_12	312	178	-134 L/s (-43%)	-	Improvement of flow conditions
12_13	793	-	-	-	-
12_14	50	-	-	-	-
12_15	347	-	-	-	-
12_16	1045	1260	215 L/s (20.6%)	-	Outfall 16 is anticipated to experience a significant rise in runoff even with the incorporation of retention swales in the new streets. In the event that more accurate calculations validate this substantial increase in runoff, it is advisable to contemplate an additional measure, such as a floodable park, within the sewershed.
12_17	1040	-	-	-	
12_18	1753	-	-	-	
12_19	38	-	-	-	
12_20	184	-	-	-	

One conceivable supplementary stormwater management strategy to counteract the surge in runoff is the implementation of a floodable park. This approach involves designing a public space to intentionally flood during major storm events. The area can serve as a public park throughout the year, but during significant storm events, it will act as a water storage facility, with an average accumulation of 10cm, ranging from 0 to 60cm across the area.

In compliance with conservation authority regulations, the floodable area should have the capacity to handle the excess runoff that retention swales may not be able to manage during a 100-year storm. Based on earlier computations, this supplementary stormwater management approach is projected to handle approximately 1380 m^3 of stormwater.

With the hypothesis that the floodable area would, on average, accumulate 10 cm of water, each cubic meter of water in need of management would necessitate 10m^2 of surface area. For this reason, a park of around 1.38 hectares should be considered in the sewershed. Ideally, the floodable park should be situated at the lowest point of the sewershed to facilitate the flow of excess water towards this location, using the principle of communicating vessels.

The local low point of the MTSA has been identified with available contour lines. The figure below shows the possible location of the mentioned floodable park.

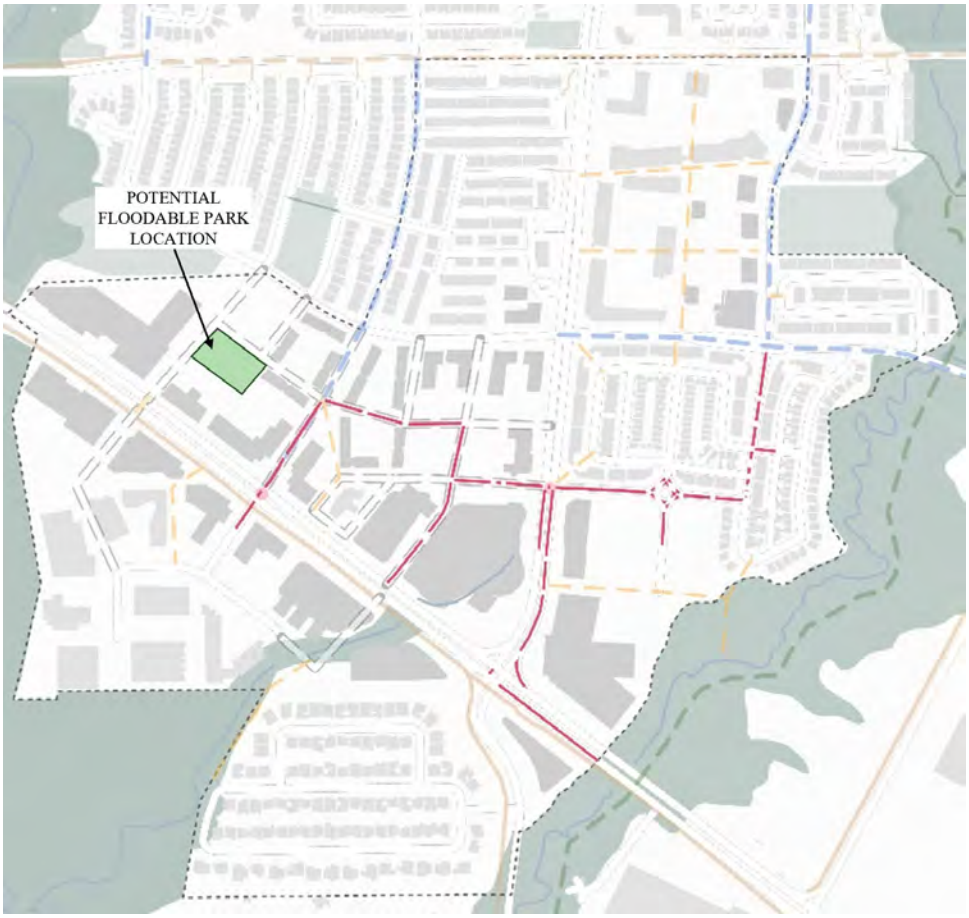

Figure 6-196: The Gore Proposed Floodable Park

6.12.5 Summary of Servicing Observations

The Region of Peel separately commissioned studies of potable water and wastewater/sanitary sewerage servicing on an MTSA-by-MTSA basis. Details from these studies with relevance to planning activities are summarized here solely for the convenience of the reader and to facilitate consideration of implications for MTSA network planning. Arup assumes no liability for the accuracy of those analyses and reports or the completeness of the summary. The Peel Region reports were based on preliminary land use plans and build-out projections provided by the City of Brampton directly to the Region of Peel in 2022. Some adjustments have occurred to land-use plans and build-out projections, which may alter some of the reports' conclusions.

6.12.5.1 Water

The following information is drawn from the report titled “Water and Wastewater Servicing Report – TSA Lands, East of Highway 410 – Contract 2” dated April 19, 2024 and prepared by Stantec Consulting Ltd, hereinafter (Stantec Water and Wastewater Report – Contract 2). The report concludes that all service-level criteria (pressure, velocity, and fire-flow availability) can be satisfied under the growth scenario, however, new infrastructure will be required to service the lands proposed for development. The Gore currently has planned water servicing infrastructure which includes connecting to existing infrastructure. The proposed infrastructure follows the alignment of the proposed roads such that the new developments can be adequately serviced

The report identifies already planned water upgrades and shows a map of the proposed water servicing strategy for the Gore.

Table 7-1: The Gore Proposed Water Alignments

Alignment #	Description	Project Type (DC vs Local)	Length (m)
1	300 mm from Queen St E (400 mm connection) to proposed 300 mm main	Local	354
2	300 mm main from Queen St E (400 mm connection) to Attmar Dr (300 mm connection)	Local	450
3	150 mm from proposed 300 mm to The Gore Rd (300 mm connection)	Local	321

Figure 6-197: Stantec Planned Water Upgrades (The Gore)

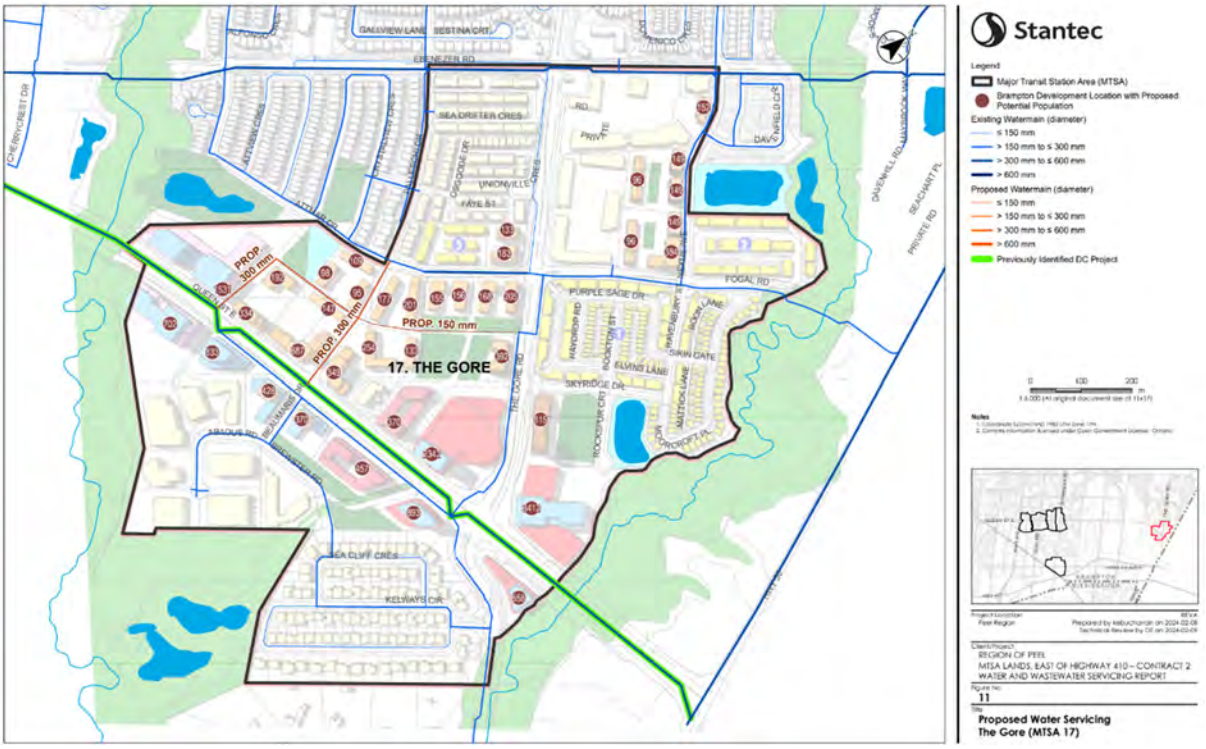

Figure 6-198: Stantec Proposed Water Servicing Strategy (The Gore)

The report highlights that the Queen St E tie in must be constructed prior to (or at the same time of) the proposed alignment. Furthermore, any existing watermains less than 300 mm may have to be replaced with 300 mm under future development works to meet the Region of Peel standards.

The report presents the breakdown of costs for the preferred water solution.

Table 7-5: Opinion of Probable Costs – The Gore Water Servicing

Pipe Details	Diameter (mm)	Length (m)	Cost
Total DC Projects	None	-	-
Local Developer-Funded Projects < 400mm	150	321	$321,248
	300	804	$833,878
Total Developer-Funded Projects		**1,125**	**$1,155,125**

Figure 6-199: Stantec Local Water Servicing Upgrades (The Gore)

6.12.5.2 Sanitary/Wastewater

The following information is drawn from the report titled "Water and Wastewater Servicing Report – TSA Lands, East of Highway 410 – Contract 2" dated April 19, 2024 and prepared by Stantec Consulting Ltd, hereinafter (Stantec Water and Wastewater Report – Contract 2). According to the report, as the development of the existing lands in The Gore is limited, the existing wastewater servicing is also quite limited, and infrastructure is required to support the proposed future developments.

The report identifies that pipes have capacity to handle additional flows as a result of development and population growth in the area.

The report proposes recommended wastewater servicing strategy with a proposed wastewater alignment.

Table 7-6: The Gore Proposed Wastewater Alignments

Alignment #	Description	Project Type (DC vs Local)	Length (m)
1	675 mm on The Gore Rd	DC	390
2	675 mm on Attmar Dr (from The Gore Rd to Crystalview Cres)	DC	465
3	750 mm on Attmar Dr (from Crystalview Cres to Ebenezer Rd)	DC	426
4	250 mm (from Queen St E to Attmar Dr)	Local	246
5.1	300 mm from Queen St E to new 375 mm (to Attmar Dr)	Local	57
5.2	375 mm (to Attmar Dr)	DC	264
5.2	250 mm (to 375 mm to Attmar Dr)	Local	134
6	375 mm (from Queen St E to The Gore Rd)	DC	413
7	375 mm upgrade on Nexus Ave	DC	323

Figure 6-200: Stantec Local Wastewater Servicing Upgrades (The Gore)

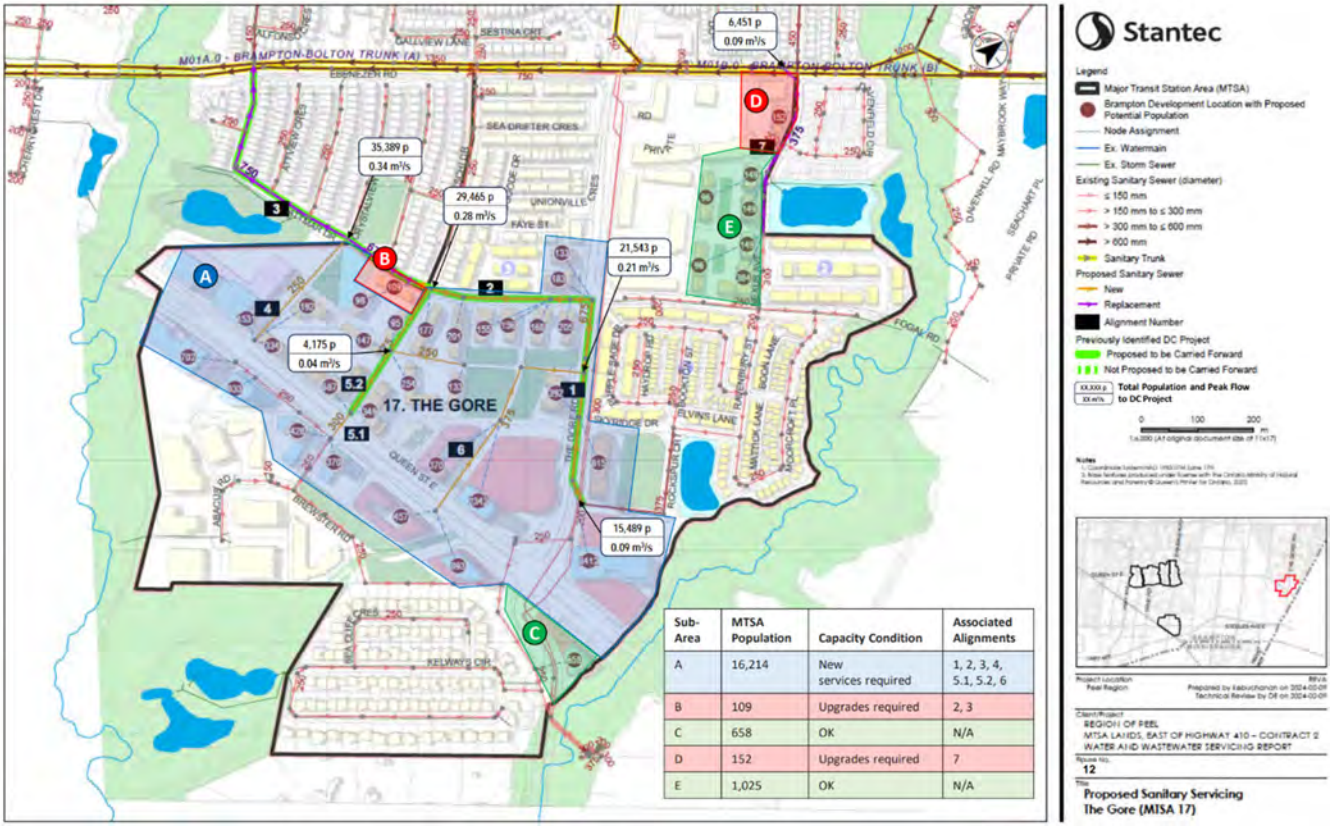

Figure 6-201: Stantec Preferred Wastewater Alternative (The Gore)

Per request of the Region of Peel, a separate analysis was completed on the area within the Gore with a population expected to double from approximately 3,500 to approximately 7,000 people. This resulted in further upgrades on Attmar Dr. The report also highlights that construction disturbances to Queen St E should be minimized as it experiences heavy traffic, and flags constructability challenges in the right-of-way on Attmar Dr.

The report also indicates additional future upgrades. The subdivision east of The Gore Rd is actively being constructed and the design of the sanitary servicing for this area is not included in the scope of work. It is suggested that the capacity and population contributing to the subdivision network be re-evaluated as part of future work. The pipe on Ebenezer Rd is surcharging under ultimate conditions, and upgrades to this pipe should be reviewed before development in the area is to take place.

The report describes a high-level cost estimate.

Table 7-7: Opinion of Probable Costs – The Gore Wastewater Servicing

Pipe Details	Diameter (mm)	Length (m)	Cost
DC Projects ≥ 375mm	375	1,000	$2,082,244
	675	855	$2,427,058
	750	426	$1,289,950
Total DC Projects		**2,281**	**$5,799.252**
Local Developer-Funded Projects < 300mm	250	380	$670,889
	300	57	$107,704
Total Developer-Funded Projects		**437**	**$778,593**

Figure 6-202: Stantec Cost Estimate for Upgrades (The Gore)

6.12.6 Proposed Street Classifications and Stormwater Interventions

6.12.6.1 New Link Proposed Complete Street Classifications

The proposed street connections in The Gore MTSA have been assigned the following classifications:

- Proposed street connections in the area between Queen Street East, The Gore Road, and Attmar Drive:, local employment street, and mixed-use neighbourhood street;

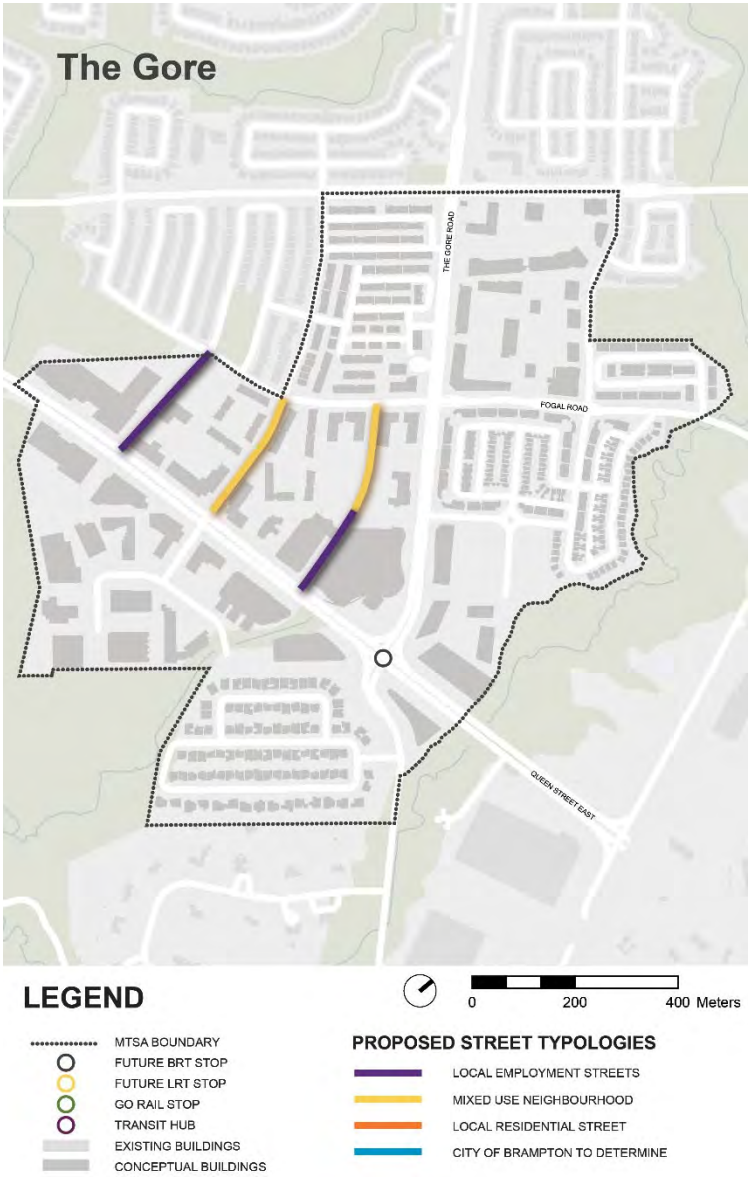

Figure 6-203: The Gore Proposed Complete Streets Classification

6.12.6.2 Stormwater Management Interventions

The figure below illustrates the final transportation network and stormwater management proposals for The Gore MTSA. It includes the proposed transportation network refinements identified in the City's preliminary land use plans as well as those identified through the transportation analysis.

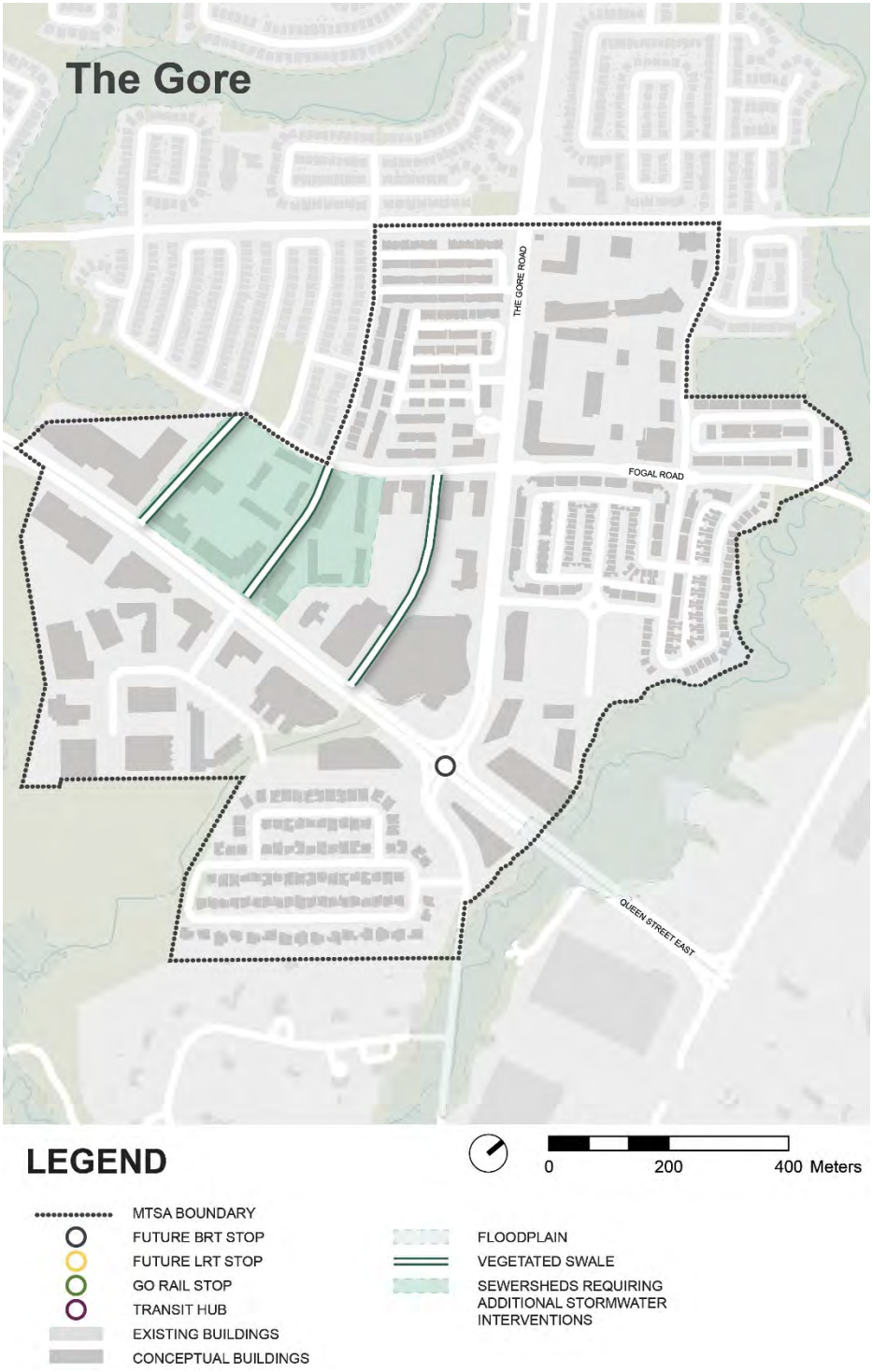

Figure 6-204: The Gore Combined Transportation Network and Stormwater Interventions

6.12.7 MTSA-Specific Policy Recommendations

Several objectives in The Gore MTSA are best met through the application of general and location-specific policies in addition to the proposed network adjustments. Policies that should be considered for this MTSA are listed below. Parenthetical information provides rationale for specific policies.

- **General transportation network enhancements:**
  - Road and active-transport infrastructure should be provided to support comfortable, direct, and safe travel for sustainable modes and bolster transit ridership.
- **Roads:**
  - To create a finer-grain network, several new street alignments are proposed, including:
    - Proposed street connections in the area between Queen Street East, The Gore Road, and Attmar Drive;
    - A proposed street connection between Queen Street East and Brewster Road; and
    - A proposed street connection between Queen Street East and Abacus Road.
  - The City of Brampton should work with developers through the planning approval process to secure rights of way with sufficient width to accommodate revised complete streets typologies, including proposed green infrastructure to address publicly managed stormwater flows. Final widths and alignments will be determined through future detailed studies.
  - Traffic-calming measures should be leveraged on local or neighbourhood roads to reduce cut-though traffic on streets that are meant to provide access to residences or businesses or roads that play a major role in pedestrian and bike connectivity. Potential strategies include reduced speed limits, chicanes, and speed humps or tables. These strategies should be considered for Skyridge Drive, Ravenbury Street, portions of The Gore Road.
- **Active travel:**
  - Sidewalks and/or other appropriate pedestrian facilities should be provided along both sides of all new and existing streets. (A policy which ensures that all future streets include pedestrian facilities on both sides, and that all existing streets are upgraded to add this infrastructure where missing, is critical for the development of a safe and convenient pedestrian network.)
  - Bike infrastructure (including, but not limited to, recreational trails, multi-use paths, bike lanes, and protected bike lanes) should be provided in accordance with the Active Travel Master Plan. Additional infrastructure should be implemented where needed to promote network connectivity and reduce circuity of protected bike trips to The Gore BRT stop. (Within the proposed network, cyclists travelling to The Gore BRT stop will experience more circuitous routes than pedestrians. Where possible, the City of Brampton should work with developers to identify additional mid-block connections that serve cyclists, as well as pedestrians.)
  - The provision of new bike lanes and multi-use paths must be complemented by the installation of bike parking at key destinations, such as The Gore BRT stop.
  - New developments should be designed to minimize walking distance to transit or other key destinations through the inclusion of mid-block connections.

- New neighbourhood parks and other open spaces should include dedicated pedestrian and bike infrastructure to enhance connectivity.
- Active-transport facilities, including street furniture and tree planting, or Complete Streets upgrades should be prioritized for The Gore and Queen Street East.
- New active crossings over The Gore Road between Queen Street East and Fogal Road and between Fogal Road and Ebenezer Road should be provided to enhance pedestrian and bike connectivity.
- Pedestrian and cyclists should be prioritized at high-demand or key intersections, such as The Gore Road / Queen Street East, The Gore Road / Fogal Road, and Queen Street East / Palleschi Drive. Consideration should be given to including operational modifications or design treatments that prioritize active travel users include pedestrian-scramble signal phases, pedestrian head starts, no right turns on red, raised crosswalks or intersections, and protected intersections.

- **Building servicing**:
  - Vehicular access to buildings that front onto major streets, such The Gore Road and Queen Street East in The Gore MTSA, should be provided via local back streets or service lanes. (This will help maintain traffic flow on the major roads while also providing uninterrupted active-travel facilities for pedestrians and cyclists.)
- **Travel-demand management**:
  - Travel-demand strategies for new development should be emphasized for developments expected to contribute vehicular traffic to Skyridge Drive, Ravenbury Street, The Gore Road, or the proposed streets west of The Gore Road. (Intensification in the MTSA must be coupled with a range of travel demand management strategies that promote the use of active modes and transit over cars in order to reduce congestion and promote sustainable travel.)
- **Stormwater:**
  - All new developed streets should be designed according to the new complete street guidelines. Exact retention swales dimensions should be calculated for each new street to ensure that the new streets do not cause increase in peak flow for each applicable design storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms).
  - Developments within the MTSA shall be required to implement stormwater management techniques required to provide post to pre control for all storms (i.e., 2-, 5-, 10-, 25-, 50-, and 100-year storms), as required by CVC.
  - A floodable public space shall be implemented in this MTSA to manage extra stormwater runoff. It should be approximately located as indicated in the location indicated in the above map.

6.12.8 Recommendations for Further Transportation Network Enhancements

Several recommendations for refining The Gore MTSA's street network were identified through the transportation analysis conducted as part of this study. Key refinements include:

- The addition of active connections to the Claireville Conservation Area (G1);
- The extension of Osgoode Drive to Attmar Drive (G2);
- The addition of service roads parallel to Attmar Drive (G3);

- The addition of active connections between The Gore Road, Rockspur Court, Moorcroft Place, and the trails in the adjacent natural heritage system (G4); and
- The addition of an active path along the stormwater management pond to the east of the MTSA (G5).
- Upgrading intersection of roads with bicycle infrastructure to high-quality intersections (protected intersections) (G6)
- Converting the local bus service on Ebenezer Road to a higher frequency or express service to better serve the proposed development (G7)

Upon reviewing these recommendations, the City of Brampton recommended that G1, G2, G3, and G5 not be carried forward for future analysis. As such, these refinements are excluded from the final transportation network and stormwater management recommendations.

Figure 6-205: The Gore Preliminary Transportation Network Refinements