HALIFAX REGIONAL MUNICIPALITY FUTURE SERVICED COMMUNITIES – HIGHWAY 102 WEST CORRIDOR TRANSPORTATION PLAN

April 9, 2025
Final Report

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Halifax Regional Municipality

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The Halifax Regional Municipal Planning Strategy (Regional Plan) provides direction on how future settlement should take place in the Halifax Regional Municipality. The Regional Plan outlines the Urban Service Area boundary identifying areas that would be considered as potential Future Serviced Communities; Sandy Lake, Highway 102 West Corridor, Morris Lake Expansion, and the Westphal area.

The scope of work for each study area includes compiling detailed background information needed to inform future decisions about potential development, encompassing transportation infrastructure assets and constraints using multi-modal analysis. Analysis results in recommendations for each study area based on suitability of the study area for development and the feasibility of transportation network upgrades that are required to connect the study area to surrounding communities.

The draft Halifax Regional Municipal Planning Strategy presented to Halifax Regional Council on June 20, 2023, and now subject to public review, continues to identify the Highway 102 Corridor as a Future Serviced Community.

The Highway 102 Corridor study area focuses on lands owned by two major developers, B.D. Stevens Group and the Annapolis Group. The two landowners declared their intention to undertake major development on their property before Halifax Regional Municipality (HRM) issued the Request for Proposals for the Future Serviced Communities project.

2 Study Area Overview

2.1 Location

The Highway 102 West Corridor Study Area is located east of Birch Cove Lakes and west of Bicentennial Drive (Highway 102). Lacewood Drive forms the southern boundary, while Kearney Lake and Kearney Lake Road mark the northern edge (**Figure 1**). Several lakes, including Susies Lake, Birch Cove Lake, and Quarry Lake, are situated to the west of the study area and are prominent features of the Blue Mountain-Birch Cove Lakes regional park, which is currently being considered for development as a National Urban Park.

Source: Halifax Regional Municipality

Figure 1: Highway 102 West Corridor Study Area

2.2 Existing Land Use

The Study Area lies between Highway 102 and the Blue Mountain-Birch Cove Wilderness Area, featuring dense forest cover and natural wildlife habitat. Washmill Lake is entirely within the northern part of the Study Area, while small sections of Quarry and Susies Lakes touch its western boundary. The area remains undeveloped except for the former Gateway Materials Quarry in the northeast corner. A gated access driveway, Crusher Road, connects the quarry to Kearney Lake Road. B. D. Stevens, the current owner of the quarry, owns all property abutting Highway 102 between the northern and southern boundaries of the Study Area. The rest of the land is owned by the Annapolis Group, including the remainder of Quarry and Susies Lakes, as well as Fox Lake to the north and west.

The water level in Quarry Lake is regulated by a dam built in the early 20th century as part of an industrial hydro-powered turbine system spanning three lakes. Although no longer active in support of private industry, the dams continue to regulate lake water level. Previous studies have addressed dam maintenance to preserve recreational use of the lake system.

2.3 Adjacent Land Use

The Glenbourne neighbourhood is situated on the east side of Bicentennial Drive, opposite the Study Area. Mid-rise apartment buildings, including senior residences, typically occupy properties adjacent to Highway 102 in Glenbourne. Most of the apartment structures are accessed from Parkland Drive and include surface grade parking. Single family detached homes dominate, supported by public parks and schools. Glenbourne is part of Clayton Park West, extending to Dunbrack Street. Developed in the 1980s and 1990s, the area includes well-established communities like Sherwood Heights and Farnham Gate.

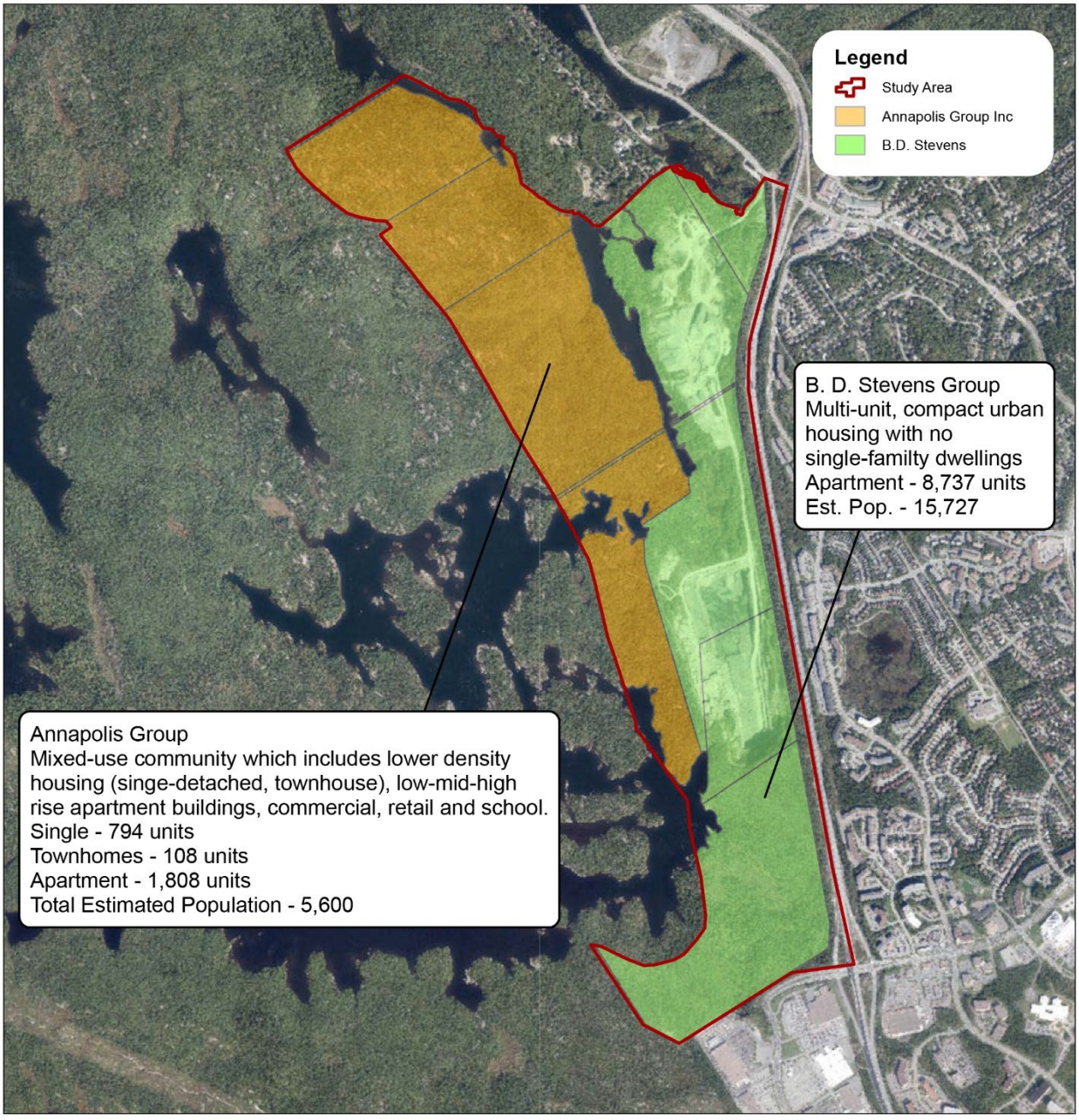
Lacewood Drive is the primary collector road serving lands in the area. Primary shopping and service areas frame the corridor. Substantial shopping centres can be found at the intersection of Lacewood Drive and Dunbrack Street. Lacewood Drive also provides access to the Keshen-Goodman Library, the Canada Games Centre, which offers a swimming pool, gym spaces, a track, and outdoor sports fields, and an important transit terminal all in close proximity.

West of Highway 102, and immediately south of the study area, Lacewood Drive becomes Chain Lake Drive as it enters the Bayer's Lake Business Park. The largest commercial area serving the Halifax Mainland, the business park offers a wide range of retail and service uses, including Costco Wholesale, Walmart Supercentre, Atlantic Superstore, restaurants, a movie theatre complex, and industrial operations such as HRM's Materials Recycling Facility.

Immediately to the north of the Study Area sits a residential community on the west side of Kearney Lake that is connected to Kearney Lake Road. The area is a mix of older seasonal residences and more recent year-round homes and is designated as Sub-area 11 in the Bedford West Secondary Planning Strategy. The area to the northeast of Kearney Lake Road, west of Highway 102 is designated as the Bedford West 10 Special Planning Area. Kearney Lake Road, which features an interchange with Highway 102, meets Larry Uteck Boulevard to the northwest.

2.4 Development Proposals

Proposed development plans aim to transform the Highway 102 West Corridor study area into a mix of residential, commercial, and open spaces (**Figure 2**). The proposals provide important context for the anticipated development, illustrating the scale and diversity of what is being proposed for the area.



Source: Halifax Regional Municipality

Figure 2: Highway 102 West Corridor Study Area – Land Ownership and Anticipated Development

The B.D. Stevens Group commissioned planning consulting firm Upland to produce a development concept plan for a high-density, mixed-use community to be known as The Lakes. The plan includes four-to-six-storey buildings with a variety of unit sizes designed to accommodate growing families. It also incorporates commercial spaces with ground-floor retail and office areas to promote a balance of employment and residential functions within the community.

The predominant character of the new development is multi-unit, compact urban housing. No single-detached dwellings are planned for the site. The development is divided into three distinct neighbourhood nodes located along a new collector road that connects Kearney Lake Road and Chain Lake Drive. Commercial services, small-scale office space, and transit nodes are concentrated in each neighbourhood within a five-minute walk from surrounding medium-density housing. The multi-unit housing configurations create informal public and semi-public open spaces between buildings expected to function as green space extensions into the neighbourhood.

Census of Canada 2021 figures of 1.8 persons in apartments (i.e., flats in duplexes and low- and high-rise apartments) and 2.6 persons per detached house or stacked townhouse inform anticipated population estimates for the The Lakes proposal and for all other development proposals considered for Future Serviced Communities studies. Per census estimates, 15,727 residents will occupy 8,737 units in The Lakes.

The concept plan calls for transit integration, an active transportation network, and a trail-linked system of natural areas. Integrating the concept of the five-minute neighbourhood, the development plan calls for a critical mass of density around three neighbourhood nodes that support transit and local services. Development concepts describe two major access points to the study area at Lacewood Drive/Chain Lake Drive in the south and at the convergence of Kearney Lake Road and the Highway 102 southbound access ramps in the north. A primary collector road connects the two access points through the Stevens lands. A branch collector fronts and connects to the Annapolis lands (**Figure 3**). The collectors support smaller secondary street networks at the northern and southern ends of the development area.

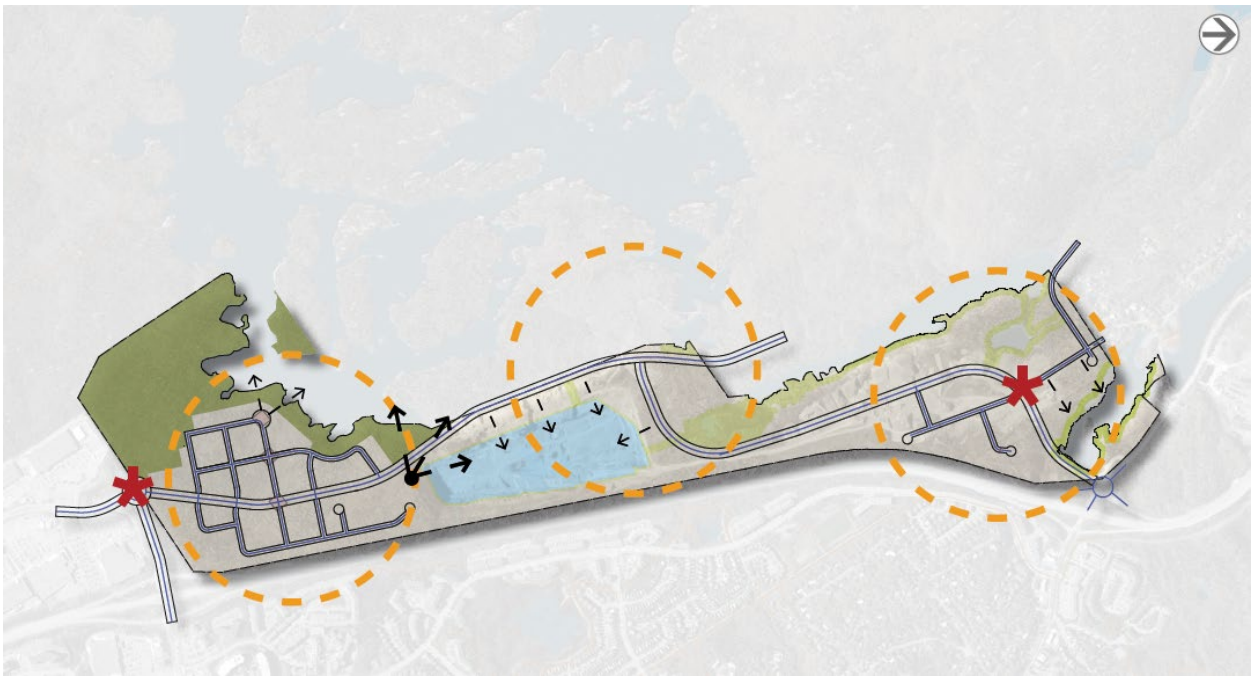


Figure 3: The Lakes (Stevens) Development Concept Circulation Plan

Commercial activity is concentrated in the southern portion of the site near Lacewood Drive (**Figure 4**). A neighbourhood centre featuring multi-storey housing and office space above retail uses, as well as larger-scale retailers will add to he established commercial activity of the Lacewood/Chain Lake Drive corridor.

The development area consists of approximately 65 acres set aside for potential contribution to the Regional Park. Access for visitors to the park will be provided via the entrance to the proposed development where Lacewood Drive meets Chain Lake Drive. Open space throughout the development is intended to transition to the new Regional Park. Commercial and residential uses in the proposed Stevens Group development will be connected to the park by a trail system.

Figure 4: The Lakes (Stevens) Development Mixed Use District Concept Plan

The Annapolis Group proposed another concept plan for approximately 965 acres (390 hectares) surrounding Susies Lake, Quarry Lake, and Fox Lake, located between the B.D. Stevens lands and the Blue Mountain Birch Cove Lakes Wilderness Area. Their plan proposes a mixed-use community that includes lower-density, ground-level housing, such as single-detached homes and townhouses, as well as low-, mid-, and high-rise apartment buildings. In addition, the development will feature retail space, commercial space, and a school (**Figure 5**). The community will be enhanced by riparian-buffered and other open lakeside frontage and Blue Mountain-Birch Cove Lakes Wilderness Area, which is proposed to become part of the BMBCL Regional Park.

A large portion of the Annapolis lands is outside the Study Area. The curved boundary of the Study Area follows the boundary between the Urban Settlement and Urban Reserve designations applied through the Regional Plan and Halifax Mainland LUB. Stantec reviewed the portion of Annapolis lands within the Highway 102 West study area to estimate added population. No commercial space is planned for the portion of the Annapolis plan located within the study area. The developer did not communicate estimates of dwelling units by type. The total number of units for each housing type was determined by analyzing the conceptual plan within Geographic Information System software. To maintain consistency within the study area and with the B.D. Stevens-owned property, occupancy estimates assume 1.8 persons per unit for multi-unit apartment and 2.6 persons per unit for ground level private dwellings per the 2021 Census of Canada. This methodology results in an estimate of 5,599 new residents contributed by the Annapolis Group's development proposal to the Highway 102 West study area.

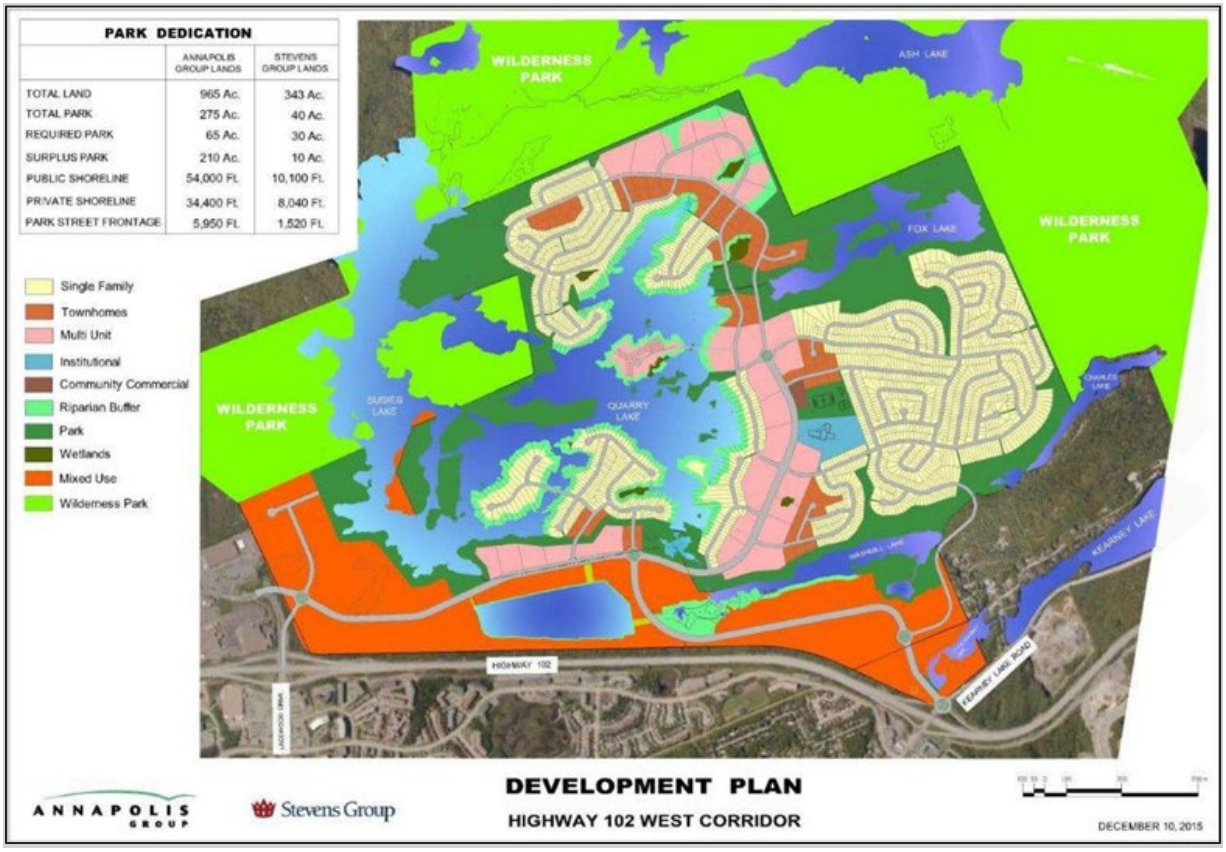


Figure 5: Highway 102 West Corridor Combined Development Plan

3 Transportation Policy Context

The 2017 Halifax **Integrated Mobility Plan (IMP)** is the foundation that seeks to inform municipal mobility and land-use planning and decision-making until 2031. The IMP provides policies and tools to enable the municipality, transportation authorities, developers, organizations, and community members to build an integrated mobility system that promotes sustainable growth. The IMP's guiding principles are structured into four core elements:

- **Foundational Strategies** provide objectives, policies and actions for integrated planning, land use, Complete Streets and Transportation Demand Management;
- **Mode-Specific Strategies** provide objectives, policies and actions for active transportation, transit, goods movement, the road network, and parking;
- **Monitoring and Evaluation** describes how projects will be evaluated and how the progress of the IMP will be monitored by municipal staff and Council; and
- **Implementation** includes an Action Plan to translate the IMP into practice and describes how the plan will be implemented.

The IMP contains strategies direction to facilitate the integration of mobility options, land use policy, and municipal departments. Its principles and guidelines directly inform subsequent transportation analyses pertaining to the study area such as the 2020 Rapid Transit Strategy. The Highway 102 West Corridor development site is in the Inner Suburban area which is identified as a priority area to provide: "safe and enjoyable active transportation connections to important destinations such as transit stops and terminals, employment districts, shopping, schools, service centres and other community amenities" with an emphasis on the role of transit in providing access to the downtown.

The **Active Transportation Priorities Plan**, a precursor to the IMP that proposed a vision for active transportation in 2026 and a broad set of priority initiatives for the years between 2014 and 2019, relevantly recommends that bicycle facility development outside the regional centre should focus on improved connections to local destinations such as schools, community centres, and transit hubs as well as completion of the greenway network and the addition of new bicycle lanes where identified.

The **Rapid Transit Strategy** is HRM's plan to realize a rapid transit system by 2030 that builds on the vision of the IMP, supporting population growth by investing in high-quality transit service. The Strategy proposes a Bus Rapid Transit (BRT) network, new ferry services, and a direction for land use policy to align with Rapid Transit. The proposed Green Line BRT offers a direct connection from the southern peninsula to Lacewood Terminal, while the proposed Purple Line BRT coneects Dartmouth and Burnside to the intersection of Kearney Lake Road and Parkland Drive, the nearest access points to the future rapid network from the Highway 102 West Corridor study area.

These prior plans inform the latest update to the **Regional Municipal Planning Strategy**, which frames the Future Serviced Communities designation and requirements in the process of defining long-range regional policies outlining expectations of future settlement and development. Its new community planning framework redefines major planning geographies, placing the Highway 102 West Corridor study

area in a newly defined Suburban Community area consisting of lands outside of the Regional Centre but within the Urban Settlement Designation.

Chapter 7 of the new Planning Strategy focuses solely on transportation and establishes objectives that aim to connect people, improve public health, support environmental responsibility, align capital investments, and allow for streets to perform multiple functions by facilitating sustainable choice in transportation and lifestyle. It establishes new mode share targets aligned with the planning geographies and provides guidance for planning the regional and community mobility networks. The Strategy links to the IMP and Active Transportation Priorities Plan by defining consideration criteria for active transportation projects, especially emphasizing transit connections.

More locally, a portion of the study area is within sub-area 11 of the **Bedford West Secondary Planning Strategy** (Secondary Plan). The Secondary Plan establishes policy related to development, servicing, environmental, and transportation factors for an area of approximately 2,600 acres of land along Kearney Lake Road. The terms of reference are to prepare conceptual community plans, a number of which encompass transportation-related policy:

- Anticipate future community needs having regard for trends in demographics, housing affordability, building technologies, economics and social issues with specific consideration given to how the community proposed could fulfill a role in responding to needs within a regional context;
- Integrate design with established neighbouring communities in terms of the natural and man made environment;
- Reduce travel time and energy requirements, encourage the use of public transit, pedestrian and cycling facilities and enhance public safety through innovative integration of land use components with the transportation and open space systems;
- Maintain adequate service levels for municipal infrastructure (sanitary sewer, storm drainage, potable water and road systems) both within the area of new development and off-site while minimizing costs to all parties;

Within the establishment of municipal services policies, the Secondary Plan contains transportation strategies to facilitate the safe and convenient movement of pedestrians and cyclists within the community and to surrounding neighbourhoods; to allow for a convenient and cost efficient public transit system that can provide a high level of service to residents in the community and which can integrate with the regional public transit system; to encourage synergy between land uses, lifestyle needs and transportation modes; to minimize motor vehicle traffic impacts on the regional transportation system; to preclude excessive traffic levels in residential neighbuorhoods; and to allow for efficient access to places of commerce and employment in the community. Policy BW-17 requires the development of a community street and trail system.

The **Bayers Lake Business Park Active Transportation Plan** project aims to create a functional plan to help guide the municipality in what active transportation facilities to consider building in the area immediately south of the Highway 102 West Corridor study area as streets are rehabilitated over the next 10 years. Considerations include how active transportation users want to travel to, from, and within the area, how they connect with existing Halifax Transit services, and how proposed active transportation facilities can improve connectivity between Bayers Lake Business Park and surrounding areas.

3.1 Site Relationship to Policy and Planning

The HRM Integrated Mobility Plan reiterates regional mode share targets originally established in the 2014 Regional Plan. To be achieved by 2031, the planning targets were only project to be achievable through incorporation of IMP recommendations. The IMP anticipates arrangements and behaviour in the various sub-areas of the region to contribute differently to overall regional goals. Within the Inner Suburban area, where the Highway 102 West Corridor study area is found, the 2031 targets seek at least 20% transit mode share and at least 6% for trips made solely by walking.

Implementation actions within the IMP define preferred approaches to meet planning targets. Individual approaches integrate and support foundational and mode-share specific policies described in the plan. Large-scale developments like the Highway 102 West Corridor study area present an opportunity to require the application of those approaches to contribute to the realization of regional goals.

The Active Transportation Priorities Plan recommends that bicycle facility development outside the regional centre should focus on improved connections to local destinations such as schools, community centres, and transit hubs as well as completion of the greenway network and the addition of new bicycle lanes where identified.

While the IMP does not characterize corridors in the immediate vicinity of the study area as transit priority corridors, it does identify the Lacewood Terminal as a potential Transit Oriented Community, and Lacewood Drive extending east from the terminal as a potential transit priority corridor. The 2020 Rapid Transit Strategy advances the importance of Lacewood Drive and the Lacewood Terminal by routing and terminating the proposed Green Line BRT 1.3 kilometres from the intersection of Lacewood Drive and Chain Lake Drive, connecting Clayton Park with the many hospitals and universities on the southern peninsula.

The Draft Regional Municipal Planning Strategy acknowledges the BRT routing along Lacewood Drive and further recognizes it as a Strategic Corridor. Strategic Corridors are designed to improve public safety, connect communities, and manage congestion by prioritizing sustainable modes of transportation over private motor vehicles, and are intended to integrate regional and community mobility connections with land use planning.

The Bedford Secondary Planning Strategy places a high priority on advancing active transportation through the development of community trail systems. According to the plan, these trails must comply with the Nova Scotia Trails Federation Guidelines, although exceptions may be granted by the Municipality. Moreover, flexibility in sidewalk specifications may be considered if a proposed trail improves pedestrian accessibility within the community.

As part of the Bayers Lake Business Park Active Transportation Plan initiative, public engagement survey participants declared their priorities and existing travel behaviours. Top active priorities included separating oneself from vehicle traffic, access to key destinations, and taking the fastest/shortest route possible while an 82 percent majority stated that they would feel uncomfortable cycling in mixed traffic. When presented with implementation alternatives, 60 percent stated a preference to replace sidewalks along Lacewood and Chain Lake Drives with a multi-use path though roughly half of that group would prefer separated walking and biking facilities.

4 Site Transportation Assessment

Identification of transportation system implications associated with new development requires a comprehensive assessment of prior transportation study related to the Highway 102 West Corridor development. Key assumptions underlying methodology are critically examined to ensure their validity and relevance. As prior traffic impact analysis may not reflect current development proposals for the Highway 102 West Corridor, we directly test trip generation values as they relate to operational performance of proposed infrastructure at site gateways. Examination of concept plans yields insight into proposed internal circulation networks and their interaction with existing surrounding active transportation and public transportation facilities and services.

4.1 Roadway Network Impacts

Development concepts and site plans propose roundabouts as functional gateways to the new development at the intersection of Lacewood Drive/Chain Lake Drive and where Kearney Lake Road intersects access ramps for southbound Highway 102, consistent with the conceptual improvements described in a pair of transportation impact assessments.

WSP completed the Susie Lake Developments Traffic Impact Analysis (TIA) letter in April 2019 to determine operational characteristics of a proposed intersection where Lacewood Drive meets Chain Lake Drive and the southern primary access road to the study area. The TIA describes access to the proposed development as an extension of Chain Lake Drive to the north, featuring a new three-legged multi-lane roundabout at its junction with Lacewood Drive.

Recognizing that this mixed-use development, comprising residential, retail, and office spaces, will be built out in multiple phases, the study outlined the following objectives:

- To develop projected 2018 future background weekday AM and PM peak hourly volumes for intersections adjacent to the study area.
- To estimate the number of weekday AM and PM peak hour trips that will be generated by the proposed development.
- To distribute and assign site-generated trips to study area intersections to estimate peak hourly volumes, including these trips.
- To evaluate the performance of adjacent intersections under the influence of site-generated traffic.

The study analyzed traffic operations at the Lacewood Drive and Chain Lake Drive intersections, designated as the primary access point for the development. Traffic data collected by HRM in September 2018 was grown by 10% to project the future background peak-hour volumes and analyze future total volumes, including development-generated traffic.

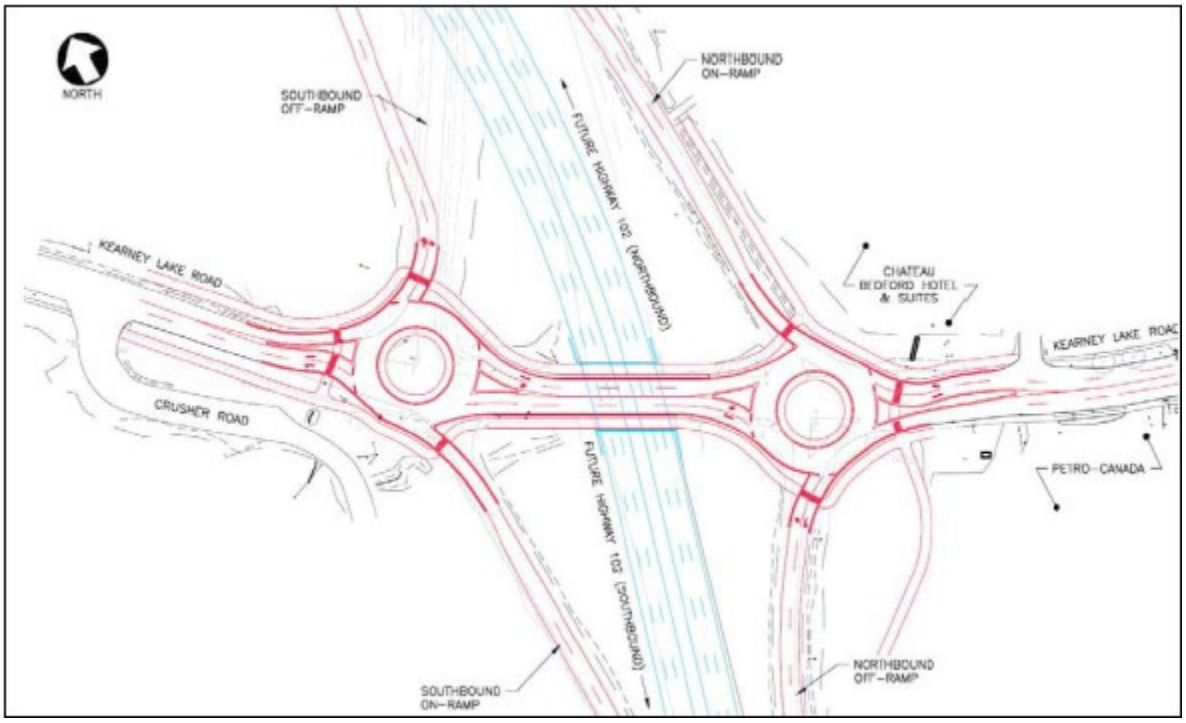
The study applied reduction factors to refine trip generation estimates, including adjustments for non-auto trips, internally captured trips within the development, and pass-by trips diverted from existing network traffic.

WSP completed another Traffic Impact Study (TIS) for Universal Realty Group to evaluate the traffic impacts of a proposed 155-unit high-rise residential development on the north side of Kearney Lake Road, approximately one kilometer west of the Highway 102 / Kearney Lake Road Interchange. The development is anticipated to be fully built out by 2026, with the study analyzing traffic operations for the 2031 horizon year, five years beyond the buildout date. The study outlined the following objectives:

- To develop projected 2031 background weekday AM and PM peak hourly volumes for the study intersections
- To estimate the weekday AM and PM peak hourly trips generated by the proposed development.
- To distribute and assign site-generated trips to the study intersections
- To evaluate the traffic operations at the study intersections under 2031 background volumes and future total volumes with the development-generated trips using Intersection Capacity Analysis (ICA).
- To conduct Signal and left-turn lane warrant analyses at the critical intersections
- To recommend mitigation measures to address the impacts of development-related traffic and evaluating the future total volumes with the proposed mitigations.

The traffic study includes a review and operational analysis of several intersections near the development site. Of particular interest to the Highway 102 West Corridor study area evaluation, the TIS examined Kearney Lake Road at the Highway 102 northbound and southbound ramps. The study states that design work for Highway 102/Kearney Lake Road interchange upgrades was underway at that time including replacement of the bridge structure, implementation of roundabouts at the ramp terminal, and an active transportation connection along Kearney Lake Road under Highway 102 (**Figure 6**).

The TIS determined AM and PM peak site trips using rates and equations from the Institute of Transportation Engineers' Trip Generation Manual, 11th edition without applying reductions. The analysis incorporated traffic data collected in October 2023 and applied an annual growth rate of 1.0% to project 2031 background traffic volumes. The TIS' operational analysis highlights required provisions for active modes as well as warrants for signals and left-turn lanes at studied intersections.



Source: Kearney Lake Road Development Traffic Impact Study, WSP

Figure 6: Kearney Lake Road at Highway 102 Interchange Concept Plan

4.1.1 TRANSPORTATION IMPACT ANALYSIS CONCLUSIONS

Based on anticipated land uses for the proposed development, the Susie Lake Developments TIA estimates external trips generated by the new uses. The study indicates that existing AM and PM peak hour two-way volumes along Lacewood Drive between Chain Lake Drive and Highway 102 of 1,475 and 3,115 vehicles per hour. Trip generation estimates attribute 1,106 two-way trips (476 entering, 630 exiting) during the AM peak hour and 2,234 two-way trips (1,088 entering, 1,146 exiting) during the PM peak hour to the development. The analysis concludes that the Lacewood Drive / Chain Lake Drive intersection as a three-leg multi-lane roundabout is expected to operate at a Level of Service B or better during the typical weekday AM and PM periods with the addition of trips generated by a previous understanding of proposed development.

Trip generation estimates in the Kearney Lake Road TIS are modest owning to the size of the proposed development. Estimates anticipate that the development will generate 53 two-way trips (14 entering and 39 exiting) during the AM peak hour and 63 two-way trips (39 entering and 24 exiting) during the PM peak hour. Operational analysis recognizes necessary provisions for active modes and transit. It cites safety concerns for pedestrians owing to a lack of sidewalk or multi-use path along Kearney Lake Road north of Hamshaw Drive and that a planned multi-use path should be implemented from Larry Uteck Boulevard to Hamshaw Drive. Halifax transit has also requested additional transit stops along Kearney Lake Road. The TIS further recommends that Nova Scotia Public Works consider modifying the traffic signal timings at the Highway 102 and Kearney Lake Road interchange as an interim measure to improve traffic operations until geometric modifications are constructed. Despite IMP targets for non-auto trips in the

Inner Suburban Region, no reduction was applied for non-auto trips generated by the Kearney Lake Road Development, per request of Nova Scotia Public Works.

4.1.2 VALIDATION OF TRIP GENERATION ASSUMPTIONS

At the core of the primary Traffic Impact Analysis were the assumptions and technical considerations used to determine future trip volumes. The Susie Lake Development TIA applied a 10% growth factor to the collected traffic volumes to account for increases in background traffic. However, the study did not explicitly specify the future year to which these volumes were grown. Upon reviewing the traffic data provided in the appendix, the calculated volumes suggested that the 10% growth represented an adjustment for one year, projecting 2019 volumes as the baseline to reflect existing conditions at the time the report was completed. Additionally, the study did not provide information about the timeframe for which the development's traffic impacts were evaluated. Failing to grow the background volumes to the buildout year and adding site-generated traffic to these volumes risked underestimating traffic conditions at the time of development occupancy. This approach may not have fully accounted for the combined effects of new development traffic, ongoing background growth, and future potential traffic contributions from other developments introduced before the completion of this project.

The Susie Lake Development TIA also applied a trip reduction factor of 25% to account for non-auto mode trips, reflecting a shift towards active transportation and transit use in alignment with HRM's Integrated Mobility Plan's objectives. However, the TIA placed limited focus on broader considerations, such as addressing existing gaps in active transportation and transit infrastructure or exploring large-scale transit solutions and opportunities to enhance multimodal connectivity, which are crucial for achieving the targeted non-auto mode share. Additionally, the study applied a 10% internal capture reduction, acknowledging that trips occurring within the development—such as those between residential, retail, and office spaces—would remain on-site.

The TIA assigned and distributed site-generated trips based on existing traffic patterns and the location of major travel routes in the area. The study assumed 65% of the trips would travel to and from the east on Lacewood Drive, reflecting the site's proximity to Highway 102 and the Clayton Park area as significant trip origins and destinations. The remaining 35% of the trips were assigned to Chain Lake Drive to the south, connecting to the Bayers Lake Business Park and other surrounding areas. Additionally, the study considered pass-by retail trips, estimating that 10% of the site retail traffic would consist of vehicles already on the existing road network "stopping by" while heading to their destination. The rationale aligned with the area's existing travel demand and network connectivity, ensuring accurate assignment of trips to study area intersections.

Most notably, development concept plans have been updated since 2019 to include more nearly four times as many residential units while reducing the amount of anticipated commercial space by two-thirds. Following the methodology of the Traffic Impact Analysis, the development would now be anticipated to generate 2,851 two-way trips during the AM peak hour and 3,777 two-way trips during the PM peak hour. While the proposed roundabout at Lacewood Drive / Chain Link Drive may experience increased traffic volumes, it is important to consider that an additional major access point to the site is planned at Kearney Lake Road, which would distribute traffic and mitigate the expected volume increase associated with the new scope of development.

4.2 Active Transportation

Planning context for the study area mainly describes its transportation spines, appointed to accommodates vehicles, bicycles, and pedestrians, while minimally discussing pathways network related to regional park access. When integrated into the existing transportation system, the proposed implementations are designed to enhance connectivity and accessibility for future residents, contributing to a more comprehensive local transportation network. Concurrently, an audit of the envisioned nearby active transportation network examines the quality of proposed new community facilities as it relates to the external proximity of services and daily needs. The analysis identifies potential deficiencies in access for future residents, informing strategies related to amenity location as well as transit vehicle routing.

4.2.1 NON-MOTORIZED MODES

Currently, active transportation facilities at each major roadway serving the study area are limited to sidewalks on one side of Lacewood/Chain Lake Drive and Kearney Lake Road. Kearney Lake Road hosts unbuffered painted bicycle lanes west of the northern study area gateway to Larry Uteck Boulevard. Given expected traffic volumes, speeds, and complexity of turning movements, especially at the Kearney Lake Road/Highway 102 interchange, fully separated facilities are in order, preferably with a significant buffer zone. Increasing the number and quality of active transportation options along these major routes would forge connections to neighbouring communities and commercial hubs that reduce vehicular traffic impact.

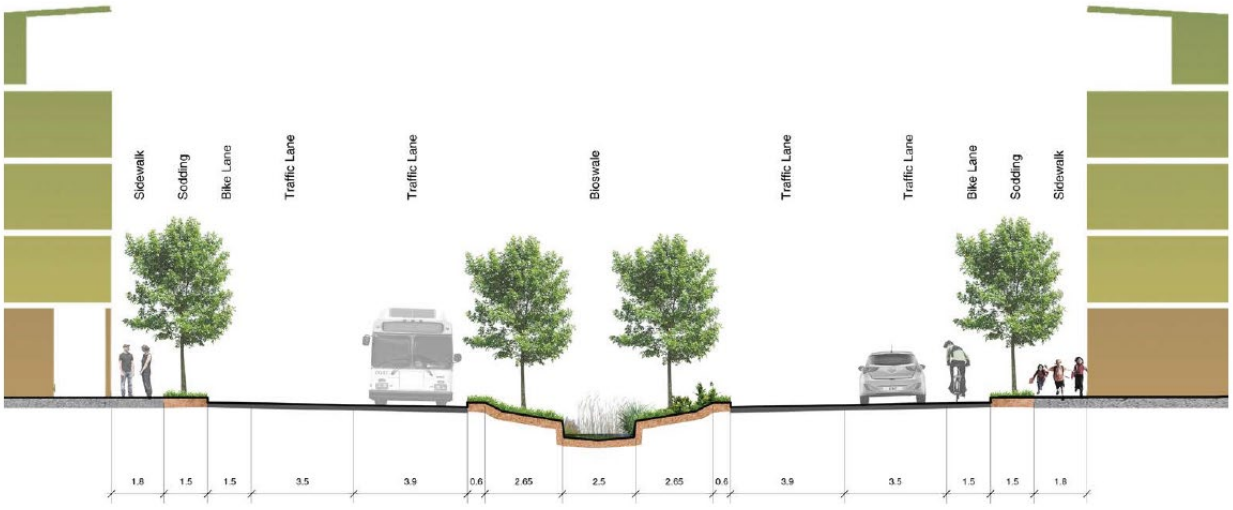
The Integrated Mobility Plan seeks to require developers to plan and implement pedestrian and cyclist facilities in early phases. The Plan states that a multi-connection pedestrian and bicycling network should be provided where topography and other environmental conditions allow that connects street and pathway networks with those of existing communities and neighbourhoods. The Active Transportation Priorities Plan indicates a desire for a bikeway of undetermined type parallel to the study area on the east side of Highway 102 connecting Kearney Lake Road and Lacewood Drive along the Parkland Drive corridor (**Figure 7**). Similar connectivity in a developed corridor west of Highway 102 would have great utility given the nearly three kilometre long barrier to east-west travel between communities embodied by the at-grade limited-access expressway.

Source: HRM – 2014-2019 Halifax Active Transportation Priorities Plan

Figure 7: Highway 102 West Corridor Study Area Candidate Bicycle Routes and Greenway Network

According to development concept plans, the Stevens development proposes transit integration and an active transportation network to support travel by foot, bike or bus as well as an interlinking green belt through the site to encourage biodiversity and wildlife cohabitation. The development concept further calls for a critical mass of densities around three neighbourhood nodes that support transit. Primary collector road design incorporates multiple purposes and modes of transportation as a four-lane boulevard with bicycle lanes and sidewalks (**Figure 8**).

As drawn however, some travel lane widths exceed the maximum dimensions for suburban minor collectors per the 2021 Municipal Design Guidelines update. The guidelines make clear that narrower lanes and roads are desirable, that wider dimensions within ranges are defaults, and that an adequate minimum lane width for roadways carrying transit vehicles is 3.3 metres.



Source: The Lakes Master Plan Development Concepts (December 2020)

Figure 8: The Lakes Collector Road Section – Urban Edge Condition

Dedicated bicycle-only facilities within the right-of-way enable cyclists to travel at greater speeds with lesser risk of dangerous interaction with pedestrians and greatly increase the usefulness, attractiveness, and safety of active transportation in reducing the number of internal and external vehicle trips. However, the primary function of dedicated bicycle facilities is to provide safe space for cyclists to operate outside of vehicular traffic lanes. Lacking any sort of separation from relatively wide travel lanes, the painted bicycle lanes portrayed in the concept plan are not compatible with HRM's emphasis on All Ages and Abilities cycling facilities. Any potential reconceptualization of the boulevard section should consider buffers for the bicycle lanes comprised of either physical installations or an on-street parking lane. Regardless of facility design and type, bicycle-only facilities must be supported through roadway intersections with a protected design.

Concepts plans do not describe bicycle facilities slated for local roads, which leaves a gap at the point of origin and destination for all trips. Assuming these roadways are meant to operate in a shared context, roadway designers should consider the level of traffic stress and target a design speed for vehicles in the 30 km/h operating range. Further opportunities related to convenient non-motorized last-mile access to transit remain to improve the quality of the proposed active transportation network within the development.

4.2.2 PUBLIC TRANSPORTATION

Lacewood Terminal features 12 bus loading platforms and indoor waiting facilities removed from Lacewood Drive. Bus only turning lanes provide access to and from the site located 1.3 kilometres east of the south gateway of the proposed Highway 102 West Corridor development. Halifax transit serves the terminal and its surrounding area with 12 bus routes (**Figure 9**).

A subset of routes fanning out from Lacewood Terminal provide direct access to study area gateways (**Figure 10**). Routes 21 and 28 travel west along Lacewood Drive before travelling south on Chain Lake Drive. The limited-service rural route 433 travels along Kearney Lake Road through its interchange with Highway 102. Additionally, Routes 30A, 30B, 138, and 196 serve the intersection of Kearney Lake Road and Parkland Drive just 300 metres from the proposed northern access to the study area as described by development concept plans. Express Route 196, which does not stop at the Lacewood Terminal operates two (2) buses on weekday mornings toward Downtown Halifax and two (2) buses on weekday afternoons toward Bedford.

Route	Route Type	Destination	Weekday Service Details	Saturday Service Details	Sunday and Holiday Service Details
2	Local	Water Street Terminal	30-minute intervals: 5:25 a.m. – 6:25 a.m., 6:27 p.m. – 12:27 a.m. 15-minute intervals: 6:25 a.m. – 6:27 p.m.	Service Start: 5:55 a.m. 15-minute intervals: 6:55 a.m. – 7:25 p.m. 30-minute intervals: 7:25 p.m. – 12:25 a.m.	Service Start: 6:05 a.m. 20-minute intervals: 8:00 a.m. – 5:40 p.m. 30-minute intervals: 5:55 p.m. – 11:55 p.m.
3	Local	Marketplace & Bancroft (Wright's Cove)	Service Start: 5:35 a.m. 15-minute intervals: 6:05 a.m. – 9:05 a.m., 3:05 p.m. – 6:35 p.m. 20-minute intervals: 9:05 a.m. – 3:05 p.m., 6:35 p.m. – 8:55 p.m. Service End: 12:38 a.m.	Service Start: 6:05 a.m. 30-minute intervals: 8:05 a.m. – 12:35 a.m.	Service Start: 6:05 a.m. 20-minute intervals: 9:05 a.m. – 11:45 a.m. 30-minute intervals: 11:45 a.m. – 5:25 p.m. 6:05 p.m. – 12:05 a.m.
4	Local	Dalhousie University	15-minute intervals: 5:45 a.m. – 7:15 a.m., 10:15 a.m. – 6:30 p.m.	Service Start: 6:05 a.m.	~30-minute intervals: 7:05 a.m. – 8:05 p.m.

Route	Route Type	Destination	Weekday Service Details	Saturday Service Details	Sunday and Holiday Service Details
			8-minute intervals 7:16 a.m. 10:04 a.m. 20-minute intervals: 6:30 p.m. – 9:50 p.m. Service End: 12:50 a.m.	30-minute intervals: 8:05 a.m. – 10:05 p.m. Service End: 12:05 a.m.	Service End: 12:05 a.m.
21	Local	Charles Road, Timberlea	~30-minute intervals: 5:35 a.m. – 8:31 a.m., 2:25 p.m. – 7:34 p.m. ~60-minute intervals: 8:31 a.m. – 2:25 p.m., 8:23 p.m. – 11:23 p.m.	~30-minute intervals: 6:25 a.m. – 11:30 p.m.	~60-minute intervals: 6:30 a.m. – 11:33 p.m.
28	Local	Mumford Terminal	~30-minute intervals: 6:20 a.m. – 7:50 p.m. 60-minute intervals: 7:50 p.m. – 11:50 p.m.	30-minute intervals: 6:20 a.m. – 12:10 a.m.	~60-minute intervals: 7:00 a.m. – 11:03 p.m.
30A/B	Local	Kearney Lake Road at Parkland Drive	30-minute intervals (each direction): 5:30 a.m. – 11:00 p.m. (5:45 a.m. – 11:15 p.m.)	30-minute intervals (each direction): 6:20 a.m. – 11:20 p.m. (6:05 a.m. – 11:05 p.m.)	~60-minute intervals (each direction): 6:02 a.m. – 11:03 p.m. (6:33 a.m. – 11:33 p.m.)
39	Local	Bridge Terminal	30-minute intervals: 6:07 a.m. – 6:37 p.m.	30-minute intervals: 6:04 a.m. – 11:04 p.m.	60-minute intervals: 6:05 a.m. – 9:05 p.m.

Route	Route Type	Destination	Weekday Service Details	Saturday Service Details	Sunday and Holiday Service Details
			60-minute intervals: 6:37 p.m. – 10:37 p.m.		
135	Express	IWK Health Centre	Seven (7) departures from Lacewood Terminal: 6:33 a.m. – 8:14 a.m. Seven (7) arrivals at Lacewood Terminal: 3:55 p.m. – 6:46 p.m.	No Service	No Service
136	Express	IWK Health Centre	Eight (8) departures from Lacewood Terminal: 6:26 a.m. – 8:17 a.m. Eight (8) arrivals at Lacewood Terminal: 3:47 p.m. – 6:41 p.m.	No Service	No Service
137	Express	IWK Health Centre	Six (6) departures from Lacewood Terminal: 6:28 a.m. – 8:17 a.m. Six (6) arrivals at Lacewood Terminal: 4:07 p.m. – 6:32 p.m.	No Service	No Service
138	Express	IWK Health Centre	Seven (7) departures from Lacewood	No Service	No Service

Route	Route Type	Destination	Weekday Service Details	Saturday Service Details	Sunday and Holiday Service Details
			Terminal: 6:12 a.m. – 8:05 a.m. Seven (7) arrivals at Lacewood Terminal: 4:12 p.m. – 6:56 p.m.		
433	Rural	Tantallon Park and Ride	Departures from Lacewood Terminal: 6:00 a.m., 6:47 a.m., 4:52 p.m., 5:52 p.m. Arrivals at Lacewood Terminal: 7:31 a.m., 8:20 a.m., 6:28 p.m., 7:18 p.m.	No Service	No Service

Figure 9: Lacewood Terminal Transit Service Characteristics

Source: Halifax Transit

Figure 10: Transit Routes Serving Lacewood Terminal

It is important to note that riders generally limit the distance they are willing to walk to reach transit services. Practical maximums are 400 metres for local service stops and 800 metres for express services. Without transit improvements, the densest areas of the new development would be located 2,500 to 4,000 metres from the Lacewood Drive Terminal, which is within a cycling distance (generally 2,500 metres) but lacks the cycling infrastructure to make that viable. Only Routes 21, 28, and the limited-service route 433 may be more easily accessible by foot for a portion of new development residents.

The proposed development area's street network has been planned to concentrate higher density residential and commercial development along the proposed main roads within the development. The configuration of the primary transportation corridor within the development, extending between Kearney Lake Road and Lacewood Drive parallel to Highway 102, creates an opportunity for transit routing through the development, bringing transit access well within 400 metres for a large percentage of new residents and employees.

Within this process, a clearer understanding of the new roadways will be required to properly plan for on-site routing. To accommodate potential increase of transit demand, the additional travel distances required by the transit services necessitate a routing that allows for minimal delay of movement through the community. Such movement may require transit priority infrastructure specifically when entering and existing the development site.

Consistent with the transit section of the Integrated Mobility Plan, the location of the Lacewood Terminal with respect to the study area creates a potential need for transit priority lanes along Lacewood Drive to position transit service as a competitive alternative to personal vehicle use for new area residents. Ideal routing includes linking development in this area to top regional destinations through the terminal.

5 Analysis and Considerations

5.1 Connectivity and Access Audit

Stantec developed a GIS-based analytical tool for examination of public and active transportation connectivity and levels of connectivity deprivation to inform investment in transportation infrastructure and services. The primary use of the tool is to determine the quality of pedestrian and transit access to key services and amenities from a neighbourhood in various scenarios. In this case, the tool was employed to identify connectivity deficiency for the future residents of the proposed Highway 102 development to predict and prevent access-related deprivation.

The connectivity tool assessed pedestrian and transit access to 14 key service and amenity categories for the entirety of Halifax roughly equivalent to the sum of the Regional Centre and Inner Suburban areas defined in the Integrated Mobility Plan.

A second evaluation scenario solely considers the Highway 102 study area and assigns it the approximately 21,000 new residents expected by developer requests. This scenario assesses future resident connectivity to health care (Hospital, Doctor, Pharmacy), transportation (Public Transport, Train Station), education (Primary Education, Higher Education), daily needs (Supermarket, Local Shops), leisure (Entertainment, Park Land, Natural Space, Sports), and places of worship if no other action is taken to diversify land use within the development site.

A third and final evaluation scenario adds new destinations and services to the future development area to determine relative connectivity improvements for the new population according to intentional land use decisions. The study area was subsequently reassessed with a public transit stop (route undefined), a doctor's office, a pharmacy, local shops, an entertainment venue, and a primary school included.

Macro level connectivity data from the connectivity tool indicates that if certain destination types are not located within the new development or served by frequent and rapid transit, that the entirety of the newly settled population would not be able to access emergency and specialized health care services or higher education opportunities via walking/public transit within 30 minutes (**Figure 11**).

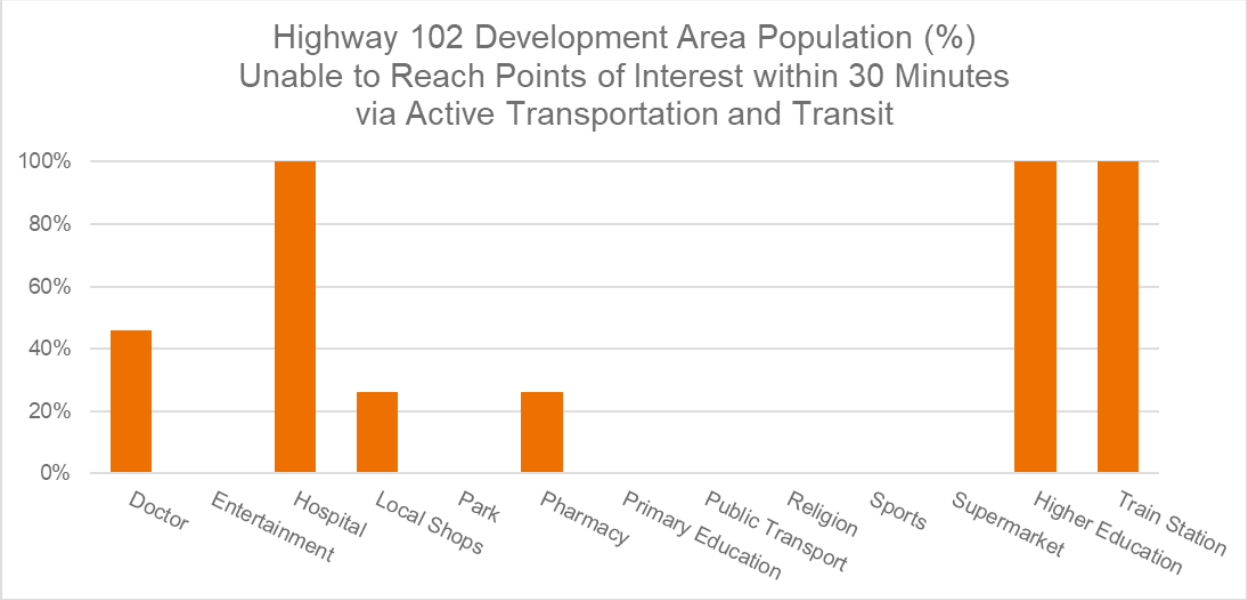


Figure 11: Connectivity Analysis – Undefined Development Site Destinations and Services

While some study area residents might have access to a subset of destinations in less than 30 minutes, average travel times often exceed 30 minutes as seen in the polar chart (**Figure 12**). Even destinations seemingly more accessible to more of the development population such as shopping centres along Kearney Lake Road and Chain Lake Drive require 30 minutes or greater to reach by foot dependent on the location of one's dwelling unit within the development.

Access issues can be mitigated from either the land use or transportation planning perspective. The third trend recalculates average active transportation access times if shopping and entertainment along with basic health care options are included in the commercial portions of the proposed development. This scenario improves missing connectivity. Average active transportation travel time to previously described destination types drop to 10-16 minutes for new development residents. Land use and siting decisions not only bring daily destinations closer to affected populations, but also reinforce the value of local active transportation networks for short trips.

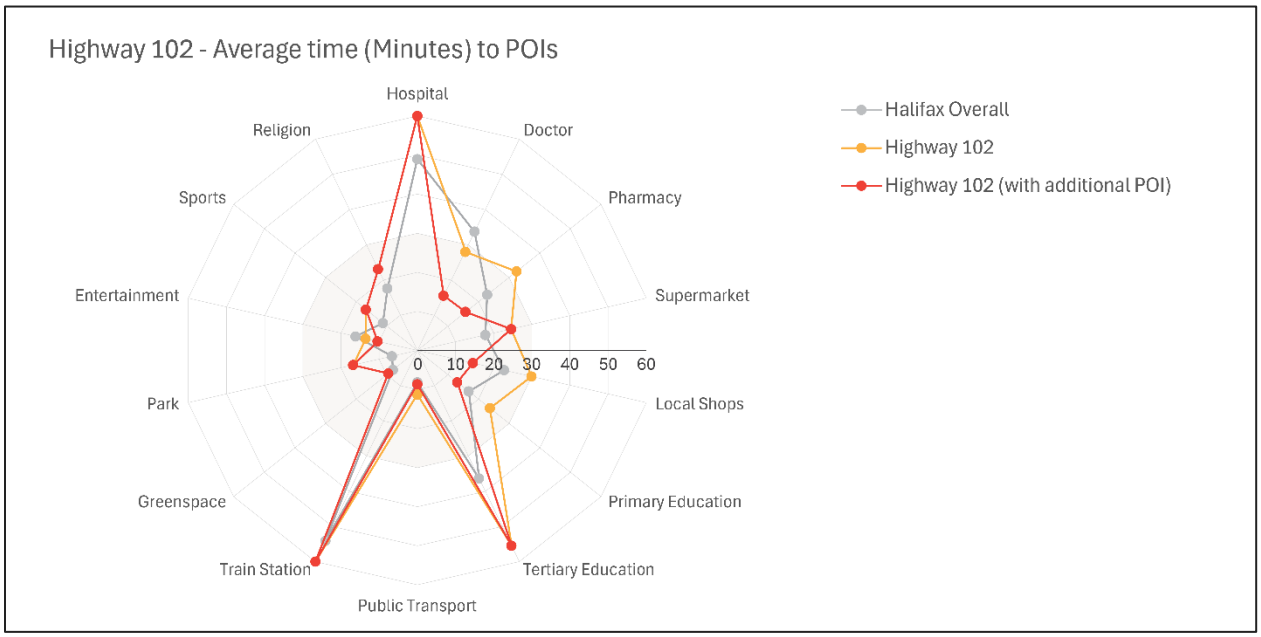


Figure 12: Connectivity Analysis – Associated Access Improvement (Sample On-Site Services)

The connectivity analysis outputs indicate that the greatest access benefits realized by the integration of commercial and service destinations within the development site are related to basic medical needs. Inclusion of a primary care physician and/or other medical or dental care offices in the site plan would reduce the average pedestrian/transit access time for a potential resident from 28 minutes to 16 minutes. Addition of an on-site pharmacy realizes even greater access benefits, a decrease in estimated active transportation travel time from 32 to 16 minutes.

5.2 Detailed Transportation Modeling

The JRTA and HRM (in partnership with WSP Canada and the University of Toronto) have completed a new activity-based travel demand model named the Joint Regional Transportation Simulator. The model provides the ability to interpret development impacts on the regional transportation network through the model's innovative Agent Based Model (ABM) process of simulating travel behavior (where, how, and when people travel), including trip generation, trip distribution, mode choice, and reassignment impacts. These processes are modeled using an ABM framework, which captures the behavior of individual agents, such as travelers or households, allowing for a more precise representation of travel demand and network effects at the regional level.

The ABM is a flexible, and policy-sensitive tool. A regional-scale travel demand model examines the interactions of population, employment, land use, and mobility options and allows the testing different possible futures, estimate the future need for travel, and assesses the impact and benefit of different modes of transportation that will be required to serve the region in the future.

In analyzing the transportation impacts of the Highway 102 West Corridor development, the ABM approach predicts how trips will be distributed to and from the development site. This process involves assigning each study area resident a Place of Work (POW) and, at the same time, matching the projected

Highway 102 West Corridor employment opportunities with potential residents. This allocation of trips is carried out using a gravity-based distribution model, which factors in both the distance between residential areas and employment centers, as well as the size and capacity of these employment areas. The model ensures a balance of trips by weighing the proximity of residents to available job spaces. In addition to work-related trips, the ABM also accounts for other tour-based travel patterns, such as school commutes and shopping trips. This approach provides a detailed distribution of trips to and from the development site.

However, the ABM process has limitations, particularly when a large development site is introduced. The model has sensitivity to shifts in existing travel demand, especially when assigning Place of Residence (POR) to POW connections. As new developments create a significant influx of residential and employment opportunities, the model can react to the POR-POW relationship by reallocating existing trips to the new site, therefore creating changes across the Halifax region.

Matrices visually illustrate the relationship between Place of Residence (POR) and Place of Work (POW) and how this relationship shifts across sectors when the proposed developments are introduced (**Figure 13**). The four development sites are represented at the bottom of the matrix. Compared to the scenario with no developments, all sectors show an increase in activity (highlighted in orange), while the introduction of the new development redistributes existing POW-POR relationships, shifting employment demand away from certain sectors and toward the newly developed site.

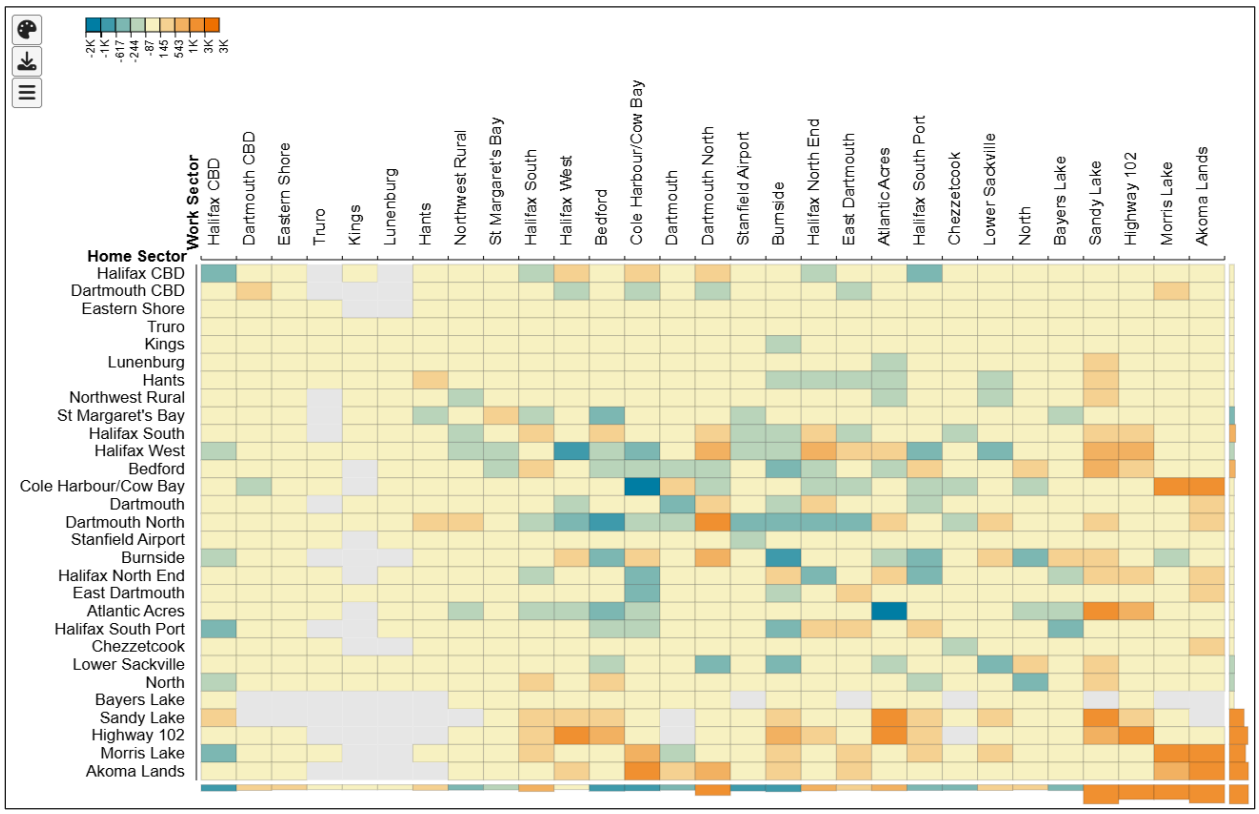


Figure 13: POR-POW – Shift Between 2031 No Dev – 2031 All Dev

Comparing trip length distributions between the development and no-development scenario illustrates that the shift in POW-POR relationships does not significantly alter the overall trip length distribution (**Figure 14**). The existing distribution, which was calibrated to census data for place of work, remains largely consistent despite the introduction of the new development.

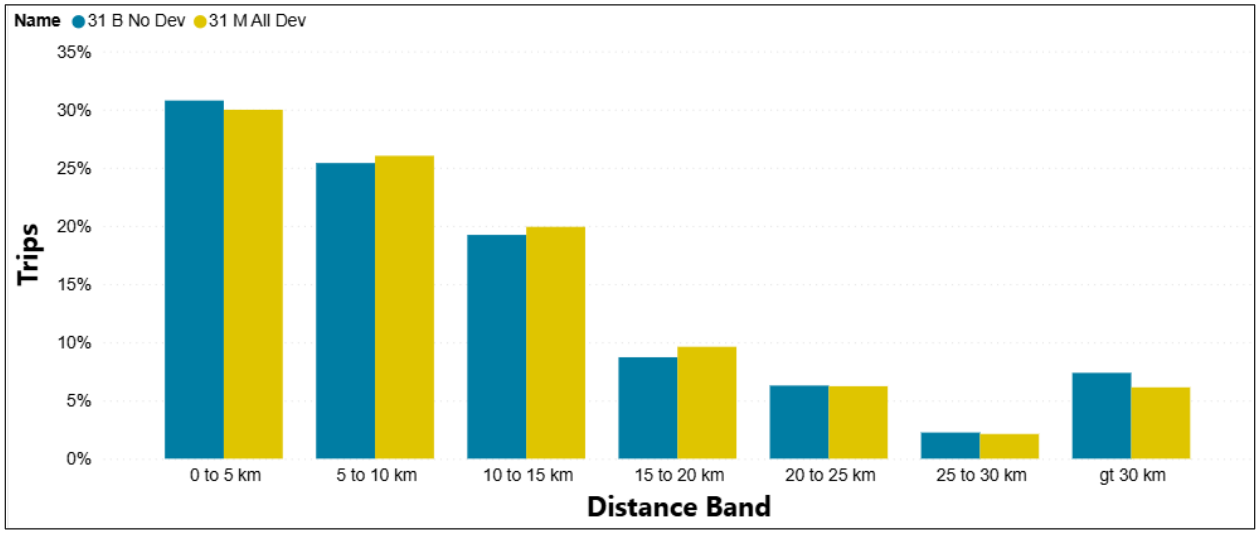


Figure 14: Trip Length Distribution Change between 2031 Baseline and Development Scenarios

Sensitivity testing was conducted to determine the most appropriate scenario to use and to better understand the HRM model's response to changes in travel demand. Several scenarios were tested, revealing that the POR to POW sensitivity was significantly higher when the Highway 102 West Corridor development was added to the 2045 forecast, compared to applying the same development to the 2022 base year. The logic supporting this concept follows the addition of population and accompanying increases in network congestion and travel time. The model showed increased sensitivity in areas far removed from the Highway 102 West Corridor in the 2045 scenario.

To investigate the cause of this sensitivity, additional sensitivity tests were performed to examine whether it was due to the higher levels of congestion in the 2045 model affecting the cost of travel, or whether the additional infrastructure in the 2045 network played a role. The results indicated that the sensitivity was not driven by congestion or network changes, even under extreme conditions such as closing major bridges between Halifax and Dartmouth. Instead, it stemmed from sensitivities in the 2045 POR-POW gravity model, which became more pronounced when the Highway 102 West Corridor was introduced, causing a ripple effect in trip assignments across the region.

To assess the infrastructure requirements for the Highway 102 West Corridor, an interim 2031 model has been developed as a baseline. The interim model provides a more focused assessment baseline, as the 2045 model incorporates a broader range of infrastructure schemes intended to support wider development, potentially overestimating infrastructure capacity and underestimating the impacts of the Highway 102 West Corridor development. This model includes a reduced level of committed infrastructure compared to the 2045 baseline model. Notwithstanding the reduced levels of traffic demand growth, the 2031 forecast year is still deemed as being highly sensitive in trip reassignment when adding the Highway 102 West Corridor development.

As such, two future scenarios have been created in order to benchmark the impact of the Highway 102 West Corridor development:

- **2031 Do Minimum Scenario (Baseline)**: This scenario assumes no new development or infrastructure beyond those already planned and committed. It serves as a baseline to understand the impact of maintaining the current trajectory without additional interventions. The 2031 scenario provides a midpoint between the model base year of 2022 and the end of the JRTA planning period in 2045. The Do Minimum model provides a high level of travel demand growth, corresponding to a regional population increase of approximately 50 percent. This scenario was created by interpolating population and employment inputs between 2022 and 2045.
- **2031 All Development Scenario**: This scenario builds upon the Do-Minimum scenario by incorporating all development, including the Highway 102 West Corridor, Sandy Lake, Westphal, and Morris Lake study areas. It considers the full build-out of these developments, including residential, commercial, and educational components, and aggregates all inter-related effects of their associated traffic generation. The network detail of the Highway 102 West Corridor development site includes connector links to represent access to and egress from the site, including through-routes across the development and incorporating existing bus services to access the site. The chosen transit routes were selected on the basis of immediate proximity to development site access points and include routes 21 and 28 from Lacewood Drive and route 433 from Kearney Lake Road.

5.2.1 MODEL APPLICATION

The HRM model provides a framework for analyzing the transportation impacts of the Highway 102 West Corridor development, covering key elements such as trip distribution, mode choice, and time-of-day travel patterns. These components allow the model to predict how trips will be generated, distributed, and assigned across the network, as well as the modal split between car, transit, and other forms of transportation. For this analysis, we have used the model's outputs to inform key aspects of the transportation impact assessment, such as traffic volumes, congestion hotspots, and transit demand, focusing on the outputs of the AM and PM Peak period models.

In order to inform and understand the transportation network impact of, and constraints posed by the Highway 102 West Corridor development, the following key metrics have been derived from the HRM Model:

- **Link Volume-to-capacity (V/C):** - This metric represents the capacity of the road network relative to total hourly vehicle demand. Any value exceeding 100% indicates that the road segment is over capacity and likely to experience congestion.
- **Mean Link Delay: –** This measures the delay per kilometer, capturing traffic slowdowns based on the relationship between link speed and traffic flow. Since delay increases with link length, the metric accounts for this by incorporating the length of each link in the calculation.

- **Transit Volume-to-Capacity: –** Calculated at link level (each road section) by using the transit frequency from the modelled headway and the capacity of each transit vehicle type to obtain an estimated capacity, then comparing against the calculated link transit person volume.

It should be noted that junction delay has not been simulated within this assessment. Within a modelled junction, turning movements are given a constant turn time independent of junction type (1 second for right turn, 10 seconds for left turn, and zero turn delay for through movements). This limitation means that the full impact of traffic congestion, particularly at critical junctions or high-traffic intersections, may be underestimated in the analysis.

Likewise, modelling may overestimate traffic growth in certain areas. In such cases, the model may predict higher traffic volumes than would realistically occur, as it assumes that the network can absorb large amounts of traffic, limiting the scale of potential behavioral changes, such as shifts in mode choice or reduced travel during peak times. To address this, professional judgment has been applied alongside the model outputs, ensuring a more balanced and accurate interpretation of potential transport impacts, especially in future-year scenarios (e.g., 2031). This approach allows for a realistic assessment of the effect of development in the Highway 102 West Corridor on the transportation network.

5.2.2 NETWORK IMPACTS

The application of the HRM Activity-Based Model contributes greatly to an assessment of the network impacts associated with the Highway 102 West Corridor development. Analysis has identified specific effects on traffic flow, congestion levels, and overall connectivity within the surrounding transportation network.

5.2.2.1 Future Do-Minimum Network Constraints

An analysis of forecasted transportation network constraints in a 2031 Do Minimum scenario identifies key areas of congestion before the Highway 102 West Corridor development is introduced. Volume-to-Capacity (V/C) plots (**Figure 15**, **Figure 16**) reveal a significant increase in existing congestion by the 2031 forecast year. Throughout the HRM region in the AM peak period, 15 percent of the 2031-modelled vehicle-kilometres are on roads with V/C values exceeding 85% of the road capacity, rising to 24 percent in the PM peak period, indicating severe levels of congestion.

Traffic congestion in the Do Minimum scenario is projected to be more severe during the PM peak period than the AM peak period. PM peak congestion is particularly visible along Highway 102 to the north of the study area on either side of the interchange with Hammonds Plains Road and along the Bedford Highway east of the study area. Further south along Highway 102, parallel to the study area, V/C plots show volume nearing capacity with the forecast background increase in population.

The most severe congestion in the region is projected on the MacKay and Macdonald Bridges, reflecting ongoing congestion issues in these areas. Modelling additionally shows pockets of high congestion at the Kearney Lake Road/Highway 102 Interchange, Lacewood Drive east of Dunbrack Street, and sections of Main Avenue.

Delay per kilometre plots (**Figure 17**, **Figure 18**) reinforce the V/C plots and reflect the same congestion areas. The two bridges show significant delay of greater than two minutes per kilometre. Segments previously described as nearing or exceeding capacity approach one minute of delay per kilometre.

In summary, the following roadway corridors experience high levels of congestion within the 2031 baseline:

- Highway 102 – Between the Highway 101 Interchange and Dunbrack Street
- Kearney Lake Road – Near Highway 102 Interchange
- Lacewood Drive – Between Dunbrack Street and Bayview Road
- Washmill Lake Drive/Main Avenue – Between Bently Drive and Hillcrest Street
- Bedford Highway – Between Dartmouth Road and Highway 111

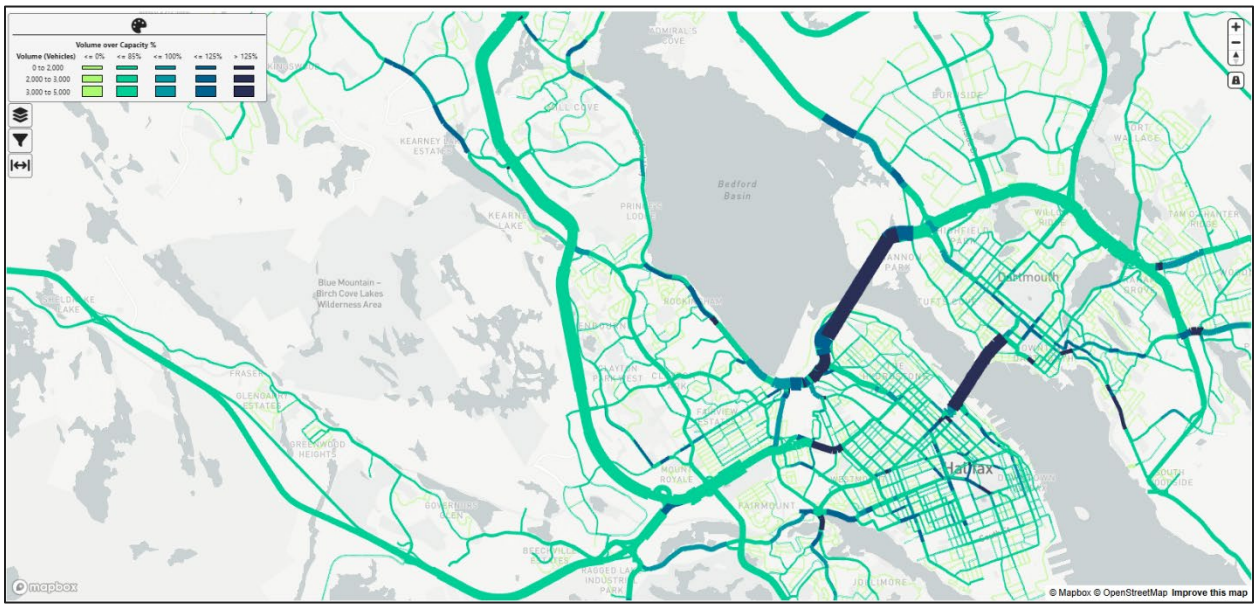


Figure 15: V/C Ratio – AM Peak – 2031 Do Minimum Scenario

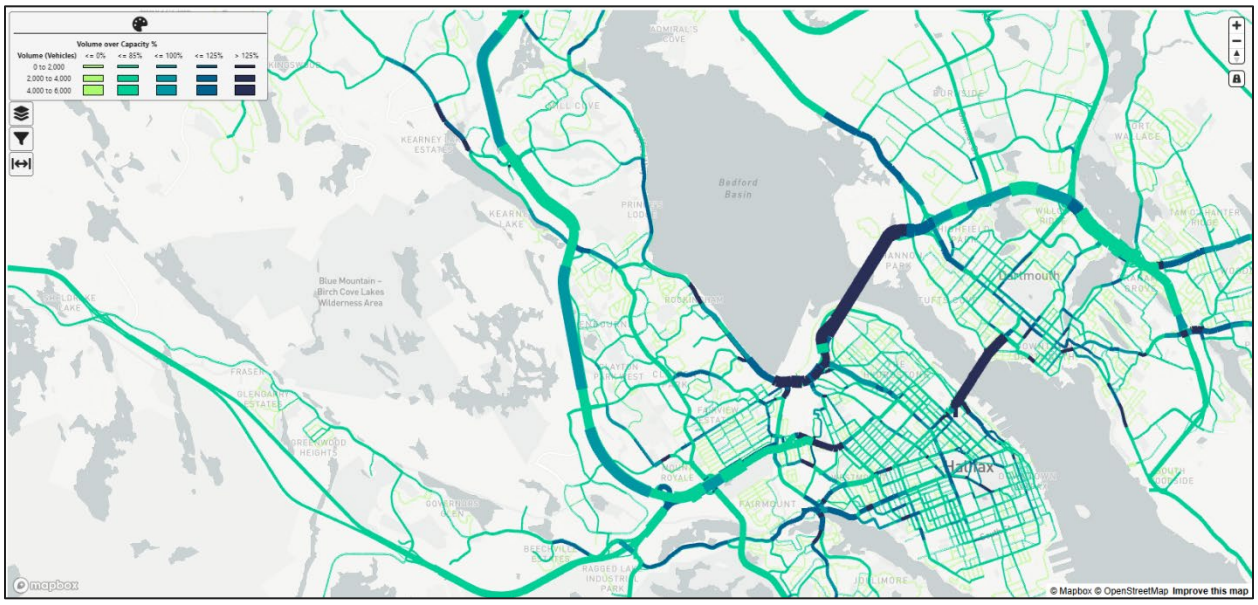


Figure 16: V/C Ratio – PM Peak – 2031 Do Minimum Scenario

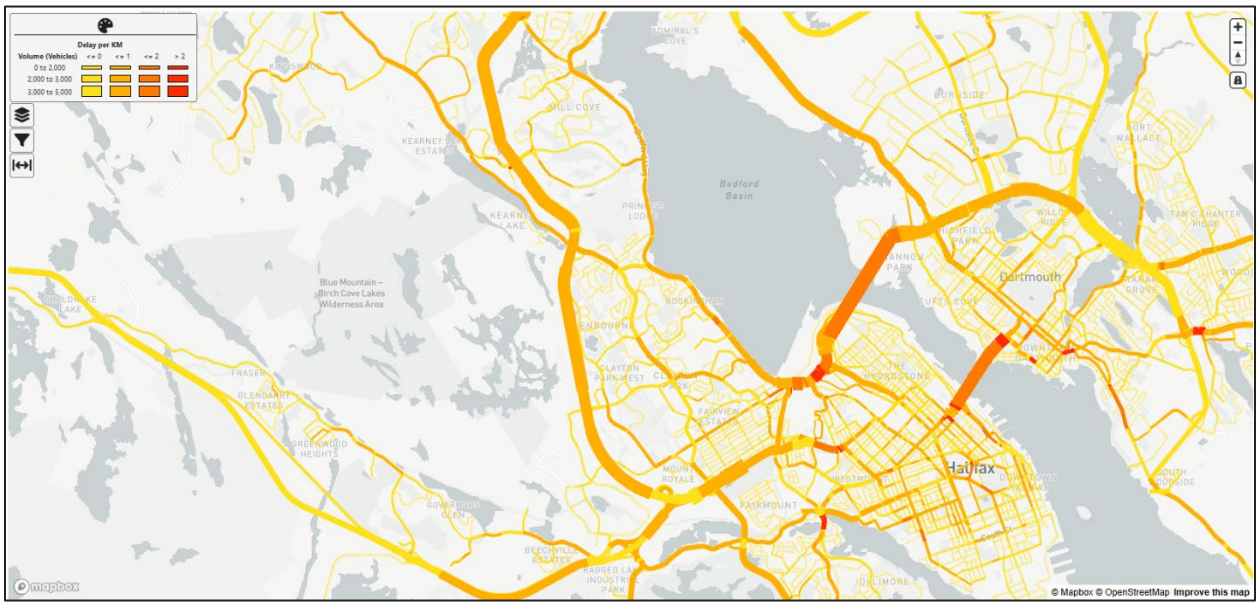


Figure 17: Travel Delay per km – AM Peak – 2031 Do Minimum Scenario

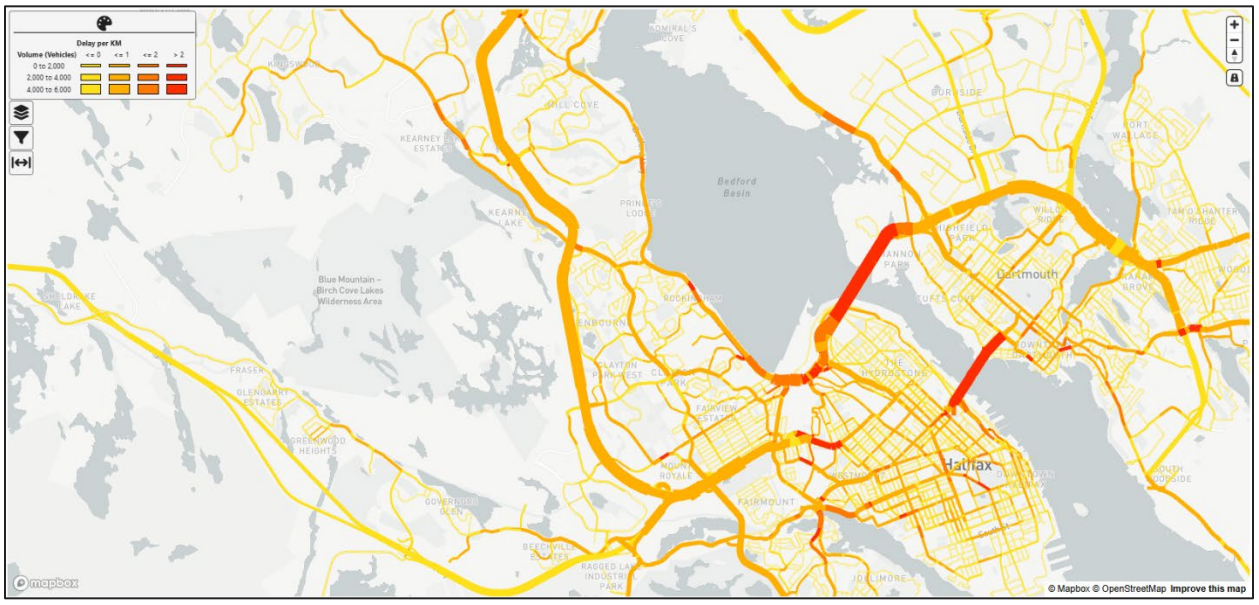


Figure 18: Travel Delay per km – PM Peak – 2031 Do Minimum Scenario

5.2.2.2 Existing Transit Constraints

With regards to the public transit network of the 2031 Do-Minimum scenario, it should be noted that the additional ferry routes from Mill Cove to Downtown Halifax are included within each modelled scenario while proposed Bus Rapid Transit routes are not included as they are not part of the projects list that informs the 2031 scenarios. Transit demand versus capacity maps of the HRM (**Figure 19**, **Figure 20**) highlight several routes that would already operate at or near capacity before the introduction of new developments, particularly in the central areas of Halifax and Dartmouth as well as along Washmill Lake Drive, Main Avenue, and Rosedale Avenue closer to the study area. This underscores that the projected population growth in the HRM will significantly strain existing transit services and much of the current available transit capacity is expected to be absorbed.

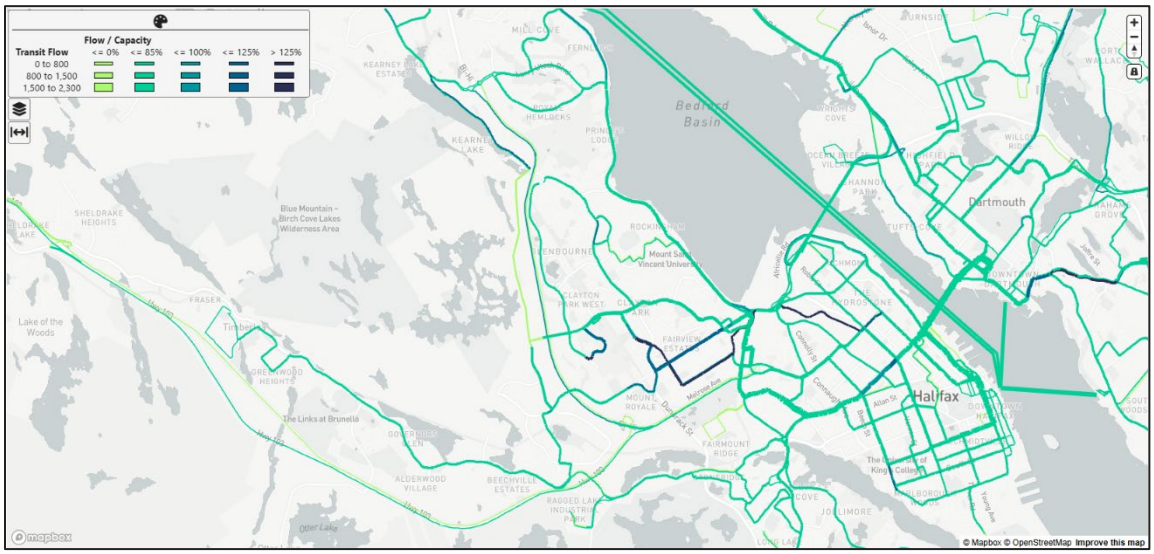


Figure 19: Transit Flow/Capacity Ratio – AM Peak – 2031 Do Minimum Scenario

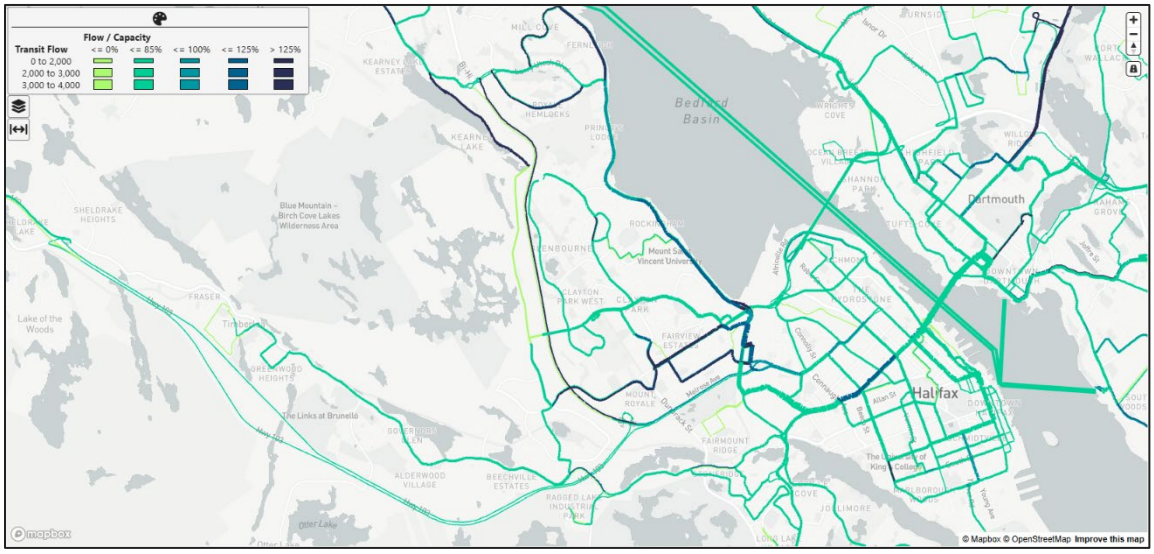


Figure 20: Transit Flow/Capacity Ratio – PM Peak – 2031 Do Minimum Scenario

5.2.2.3 Distribution of Study Area Travel Demand & Mode Share

Charts describe the External Only (**Figure 21**) and Internal Only trip mode share (**Figure 22**) for the development scenario and show the variance of mode share between internal and external travel demand projected through the HRM mode choice model. For example, walking trips comprise 21 percent of internally-generated trips with destinations within the Highway 102 West Corridor study area shown as compared with three percent of external trips. Non-auto mode share for external trips is notably lower than reduction factors applied in the Traffic Impact Study.

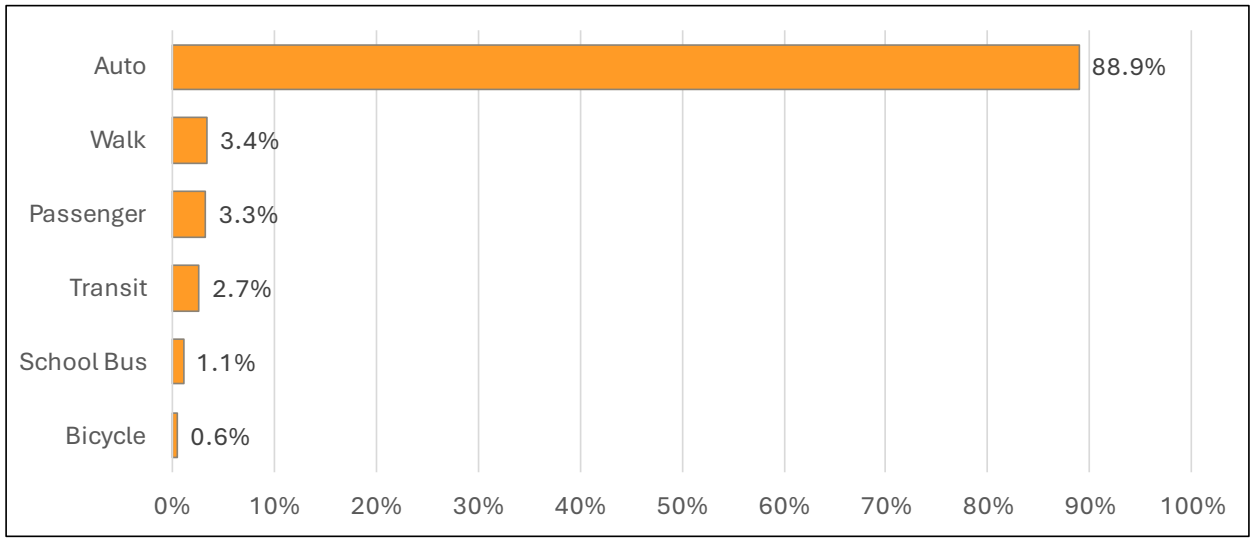


Figure 21: Highway 102 West Corridor Study Area 2031 Projected Mode Share – External Trips

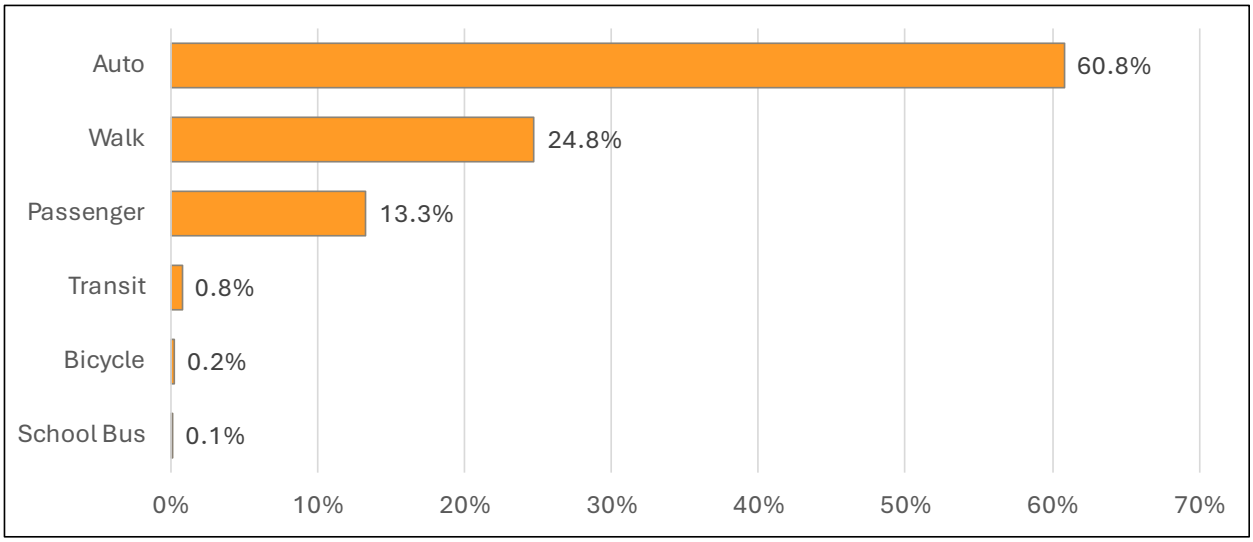


Figure 22: Highway 102 West Corridor Study Area 2031 Projected Mode Share – Internal Trips

Spatial visualization (**Figure 23**) and tabulation (**Figure 24**) of projected travel demand to and from the Highway 102 West Corridor development, for all motorized vehicles including both private auto and transit users, consists of all travel throughout the entire day and the other modelled time periods within the ABM,

including mid-day, evening, and overnight time periods. Nearly 4,000 projected internal vehicular trips, roughly 8 percent of all projected vehicle trips, are excluded from comparison of trip generation and attraction. To note, comparing to the wider region population growth of 285,000, the modelled Highway 102 West Corridor population increase of 17,000, slightly higher than development scenario estimates, equates to a small proportion of wider regional growth.

Per the Development Scenarios report, the concept plan devotes approximately 240,000 square feet (22,297 square metres) of gross leasable floor area. Using median floor space per worker ratios ranging from 21 square metres for small-format retail to 29 square meters for general office, the development concept would host 769 to 1,062 workers, below embedded model inputs (5,744). The practical implications of this difference are that future study area residents are more likely to travel outside of the development to reach places of employment or services than the model states while non-residents are less likely to travel to the Highway 102 West Corridor for the same purposes.

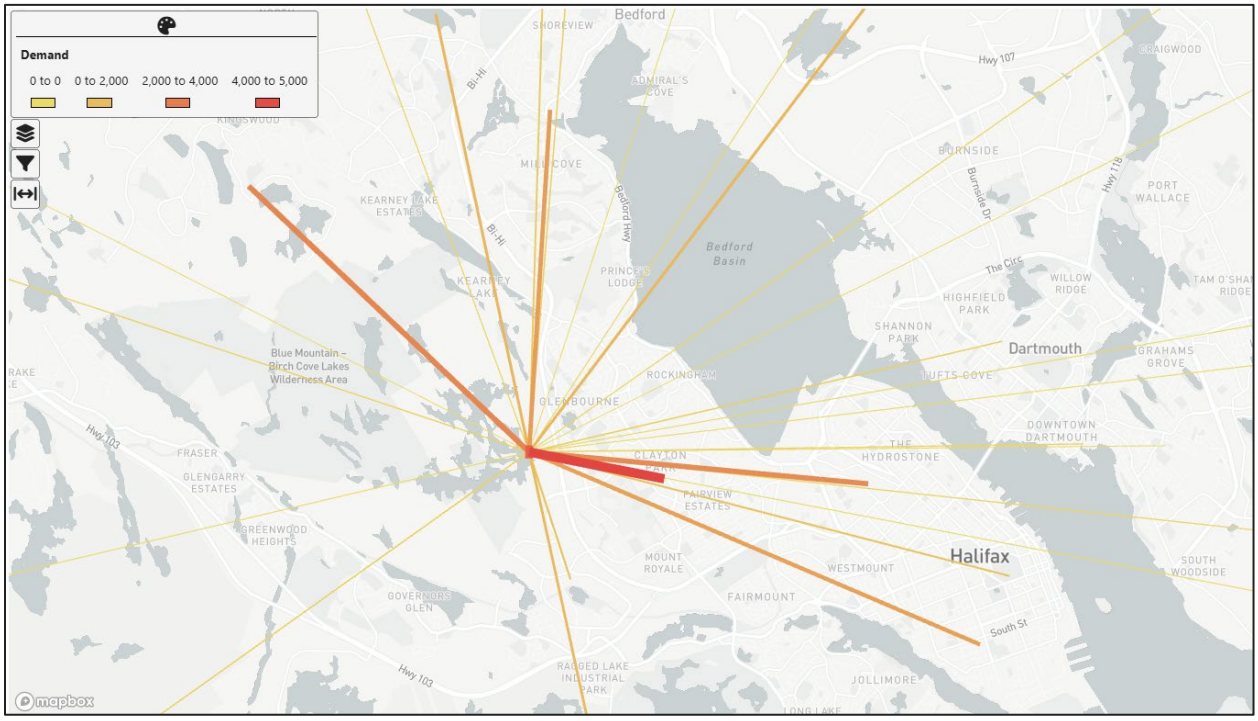


Figure 23: Visual Projected Trip Destination Demand from Highway 102 West Corridor Study Area

Destination	Demand	Percent	Origin	Demand	Percent
Halifax West	4,800	22.2%	Halifax West	4,700	21.7%
Atlantic Acres	2,709	12.5%	Atlantic Acres	2,850	13.2%
Halifax North End	2,519	11.7%	Halifax North End	2,522	11.7%
Bedford	1,993	9.2%	Bedford	2,037	9.4%
Halifax South Port	1,856	8.6%	Halifax South Port	1,753	8.1%
Sandy Lake	1,145	5.3%	Sandy Lake	1,277	5.9%
Burnside	1,130	5.2%	Halifax CBD	1,074	5.0%
Halifax South	1,048	4.9%	Halifax South	919	4.2%
Halifax CBD	733	3.4%	Burnside	805	3.7%
Bayers Lake	733	3.4%	Bayers Lake	672	3.1%
Lower Sackville	503	2.3%	Lower Sackville	505	2.3%
Dartmouth North	361	1.7%	Cole Harbour/Cow Bay	417	1.9%
North	322	1.5%	Dartmouth North	375	1.7%
St Margaret's Bay	286	1.3%	St Margaret's Bay	292	1.3%
Northwest Rural	268	1.2%	North	275	1.3%
Cole Harbour/Cow Bay	225	1.0%	Northwest Rural	245	1.1%
Dartmouth CBD	204	0.9%	Hants	187	0.9%
Hants	188	0.9%	Dartmouth CBD	177	0.8%
Stanfield Airport	135	0.6%	Stanfield Airport	123	0.6%
East Dartmouth	121	0.6%	Dartmouth	91	0.4%
Dartmouth	99	0.5%	East Dartmouth	90	0.4%
Akoma Lands	83	0.4%	Akoma Lands	79	0.4%
Lunenburg	41	0.2%	Lunenburg	48	0.2%
Kings	31	0.1%	Morris Lake	38	0.2%
Chezzetcook	26	0.1%	Kings	31	0.1%
Truro	24	0.1%	Chezzetcook	26	0.1%
Morris Lake	18	0.1%	Truro	21	0.1%
Eastern Shore	3	0.0%	Eastern Shore	5	0.0%
Total	**21,604**		**Total**	**21,634**	

Figure 24: Tabulated Projected Travel Demand to/from Highway 102 West Corridor Study Area

External trip distribution maps highlight the diffusion of auto trips on the highway network during the AM and PM modelled peak periods (**Figure 25**, **Figure 26**), reflecting the heavy demand to access the Highway 102 Corridor. Also noteworthy is sizable trip attraction to the Sandy Lake development area along Kearney Lake Road, Larry Uteck Boulevard, and Bluewater Road.

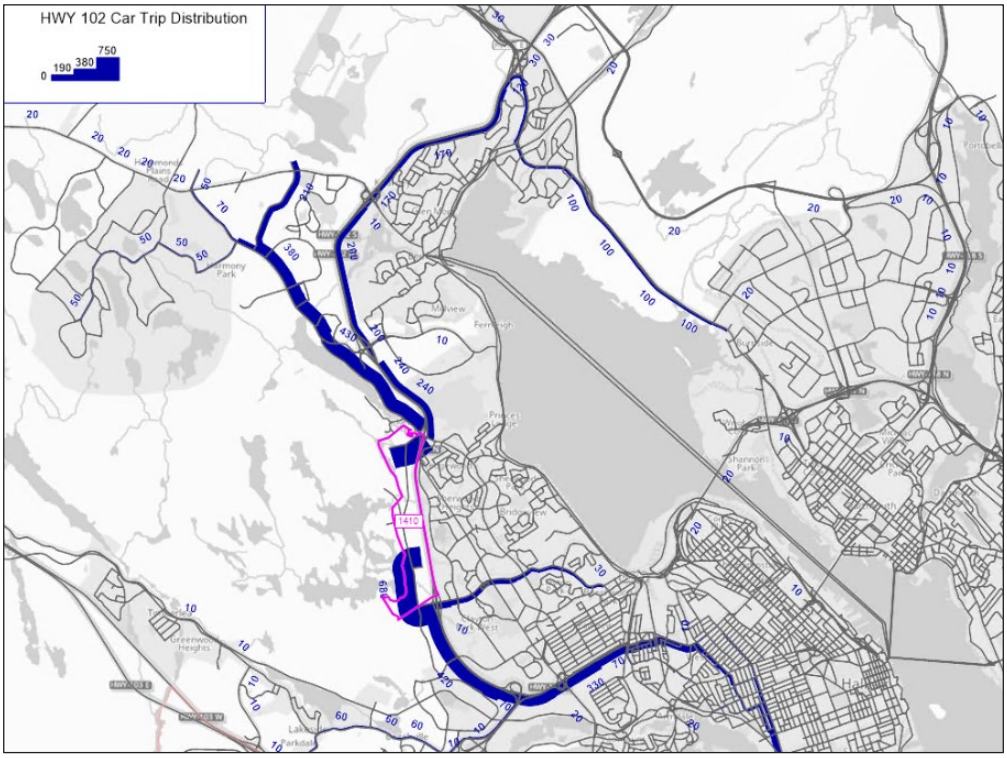


Figure 25: Projected Highway 102 West Corridor External Trip Distribution – AM Peak

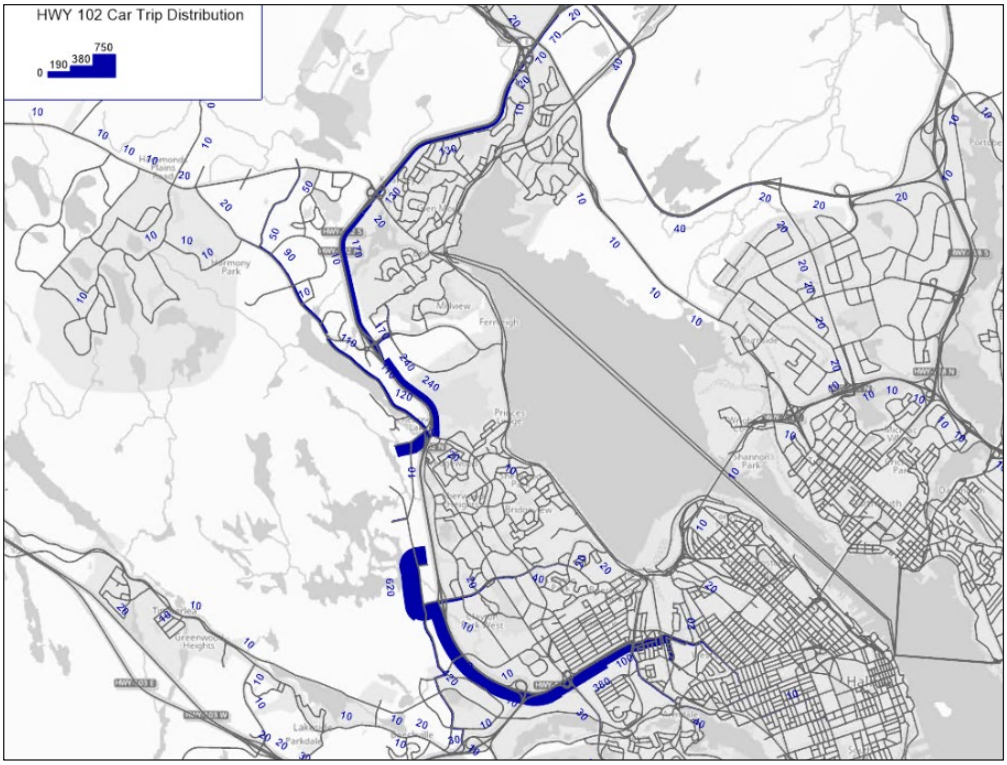


Figure 26: Projected Highway 102 West Corridor External Trip Distribution – PM Peak

5.2.2.4 Roadway Traffic Impacts

The new developments are expected to add to dominant traffic patterns on the surrounding highway network. As the Highway 102 West Corridor and Sandy Lake projects introduce new residential, commercial, and educational facilities, the resulting increase in travel demand will have direct implications for highway capacity, congestion and overall traffic flow. Detailed analysis of the projected highway traffic impacts focuses on key corridors and junctions that will experience the greatest shifts in volume.

Flow differential maps (**Figure 27**, **Figure 28**) highlight the distribution and impacts of car trips from the study area compared to the 2031 Do Minimum scenario. As expected, trends are similar to trip distribution plots. Consistent increases in area traffic volume are seen along Highway 102 north and south of the study area as well as Kearney Lake Road during both the AM and PM Peak periods. Lesser but noticeable increases are observed along portions of Dunbrack Street and Bedford Highway during the PM peak period.

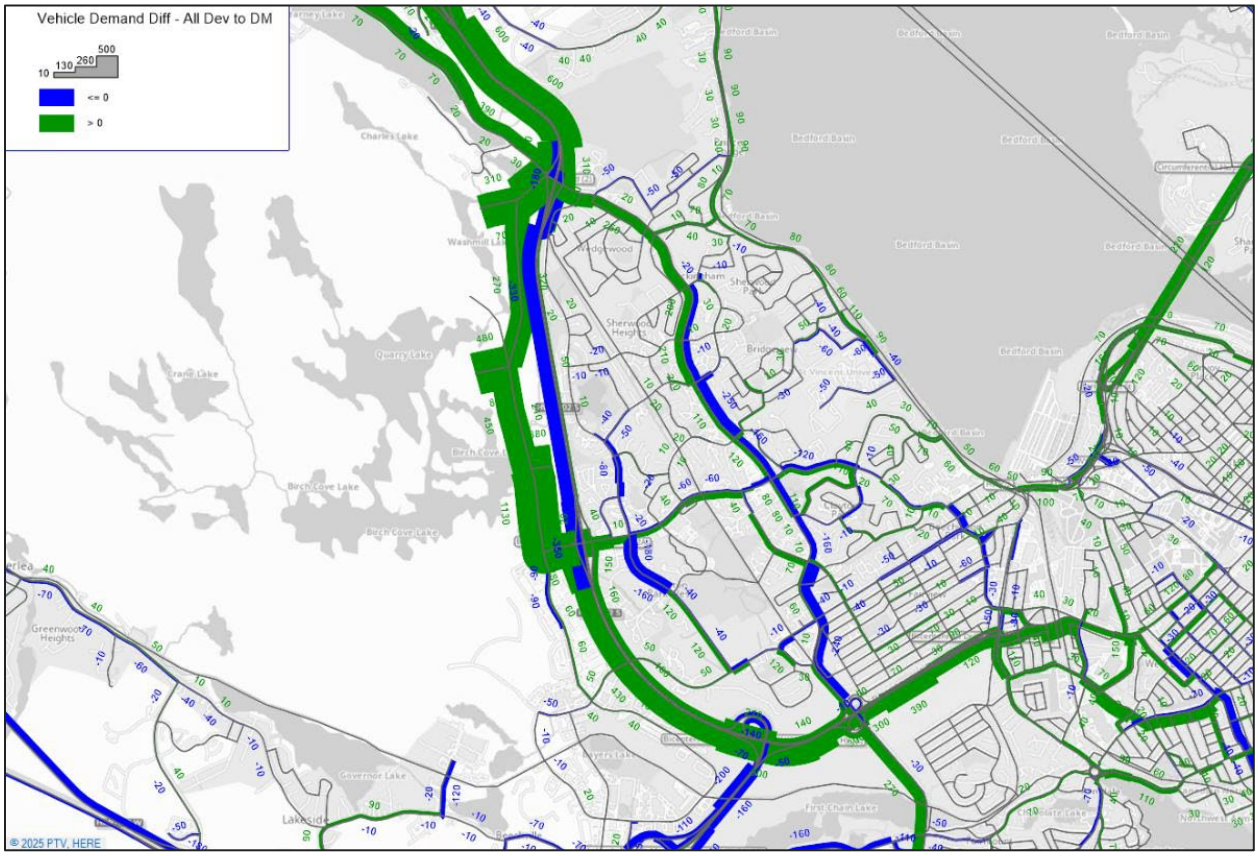


Figure 27: Trip Distribution Peak Flow Change – AM Peak – 2031 All Development Scenario

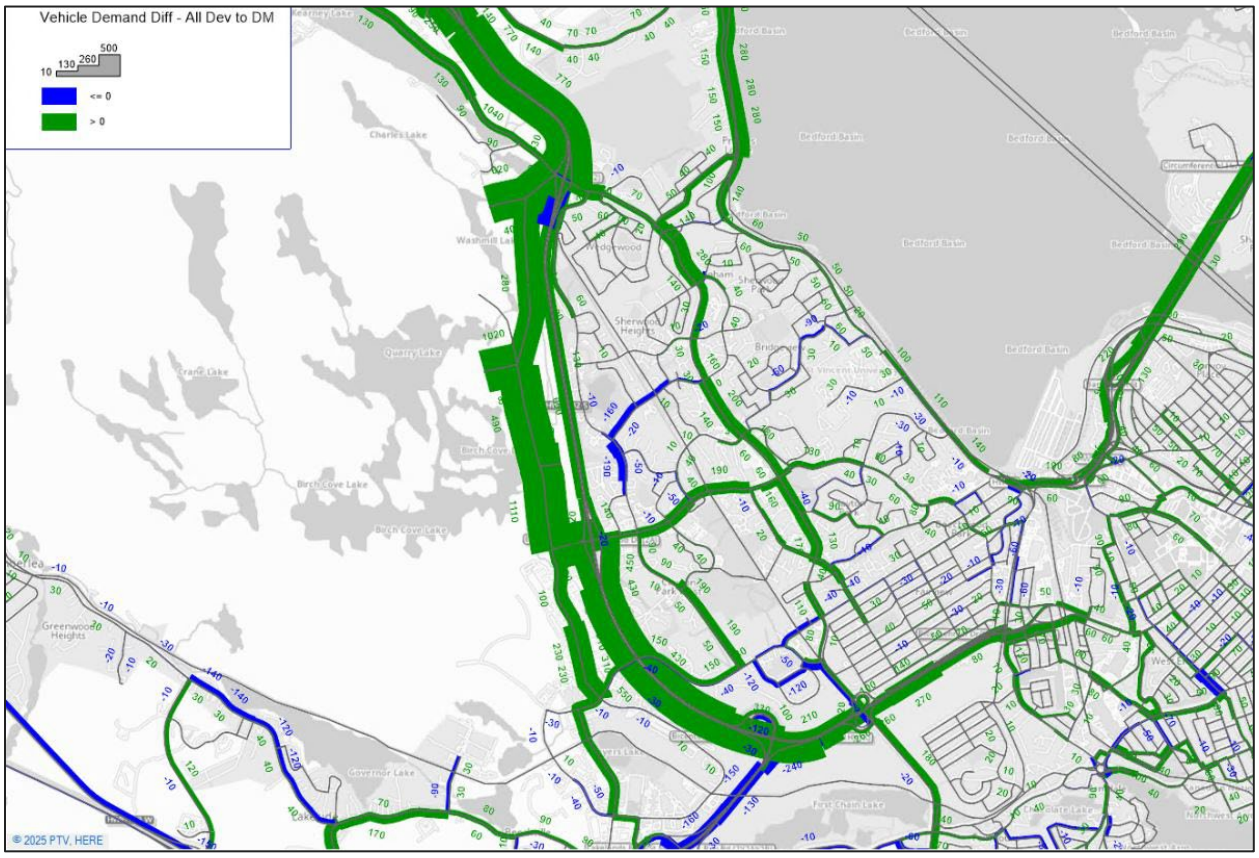


Figure 28: Trip Distribution Peak Flow Change – PM Peak – 2031 All Development Scenario

Apparent differential decreases are not related to re-routing of traffic demand onto newly created alternative corridors, but rather are indications of redistribution of trip patterns caused by the introduction of new developments. Assessment of link distribution north of the Kearney Lake Road interchange in the 2031 All Development Scenario reinforces that peak flow change diagrams do not represent travelers making use of the new roadway through the development to avoid highway congestion (**Figure 29**). Instead, relative reductions on facilities result from recalculation of the POR-POW relationship. In this example, trip destinations have changed. Where travelers using Highway 102 north of Kearney Lake Road once had an origin or destination south and east of the Highway 102 West Corridor development site, that has shifted to the newly developed area itself.

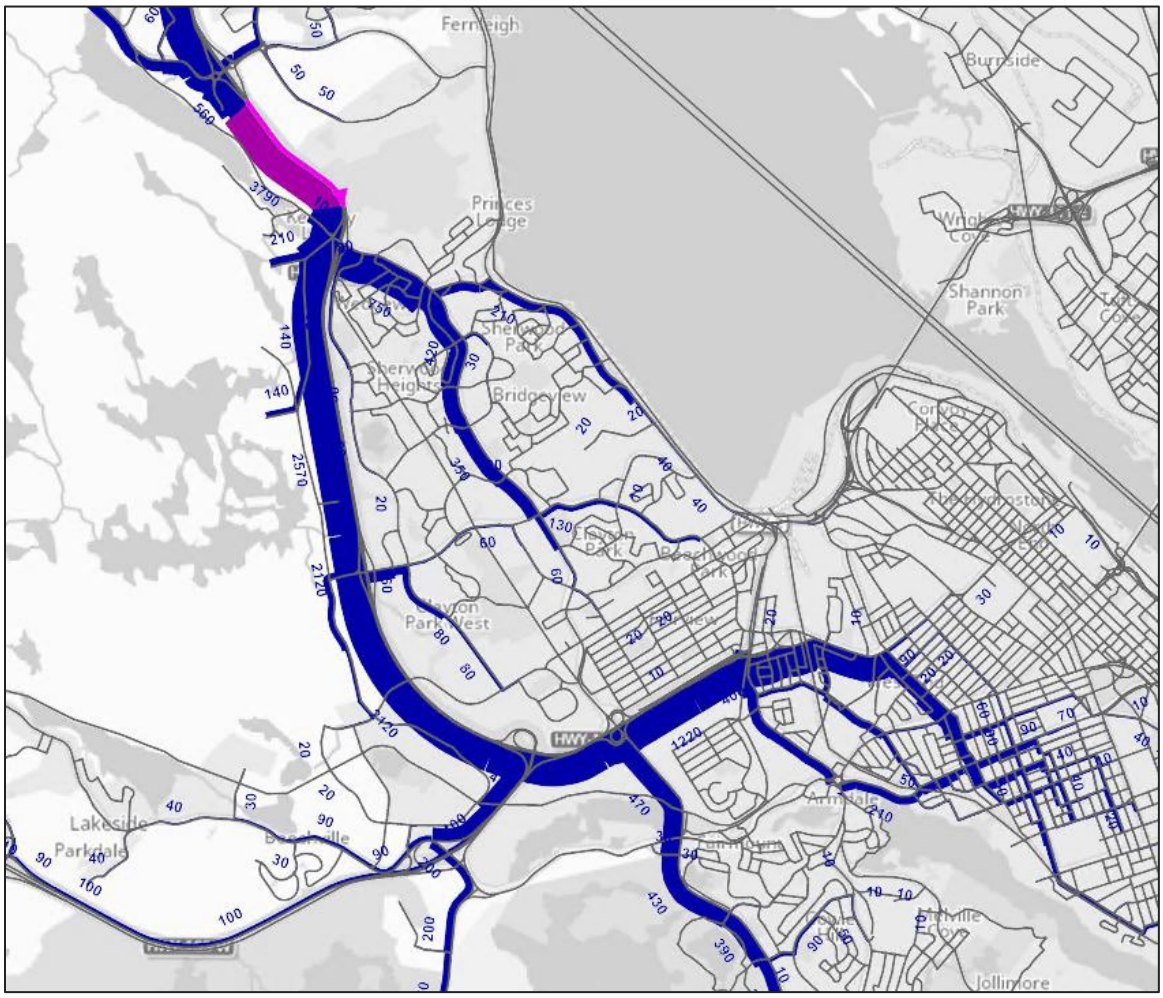


Figure 29: Projected Link Trip Distribution – AM Peak – 2031 All Development Scenario

Significant increases in peak period traffic demand are observed at the Lacewood Drive interchange with Highway 102 (**Figure 30**, **Figure 31**). This includes vehicles entering Highway 102 to travel southbound, as well as those attempting to reach the Highway 102 development site via the northbound off-ramps. During the AM peak hour, the development adds up to 780 vehicles to the southbound on-ramp, a single lane approach.

A notable proportion of the increased traffic also impacts the northern site access junction, with vehicles entering and exiting Highway 102 at the Kearney Lake Road interchange in different patterns depending on time of day. Modeling outputs show high V/C ratios and delay impacts on the northbound on-ramp and southbound off-ramp under the development scenario. Additionally, as the model does not account for junction delays in detail, actual conditions are likely to involve more significant delays at these interchanges than what is reflected in the outputs. Future junction analysis should assess the impact of anticipated increased volume at each branch of the Kearney Lake Road interchange in a dual roundabout configuration described in the Kearney Lake Road TIS combined with access to the northern end of the Highway 102 West Corridor development.

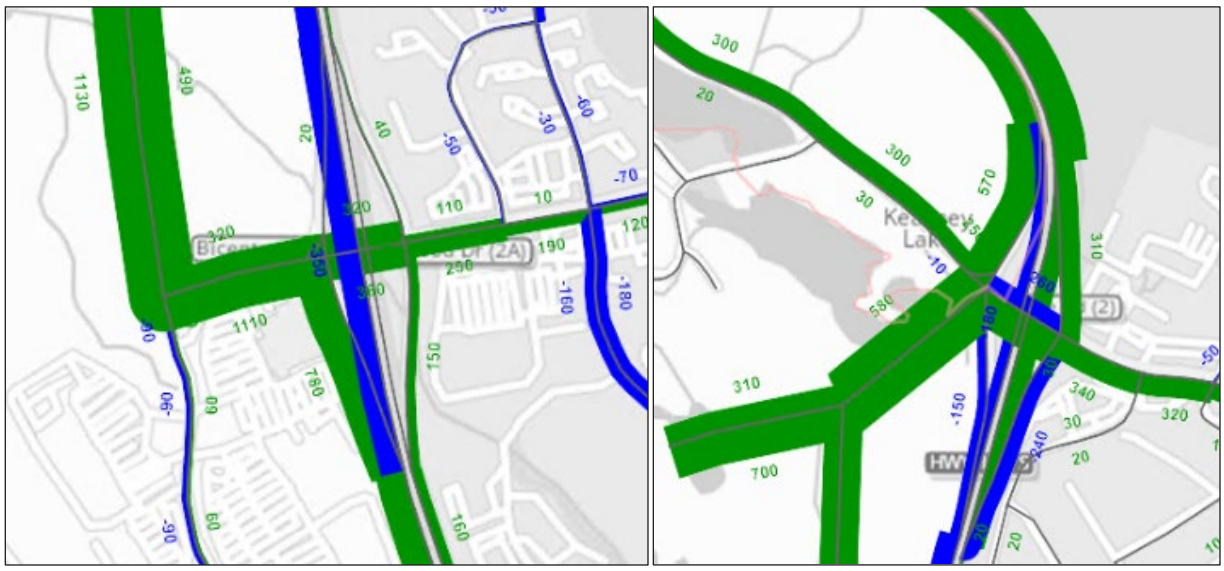


Figure 30: Trip Distribution Peak Flow Change – Lacewood Drive & Kearney Lake Road Interchanges – AM Peak – 2031 All Development Scenario

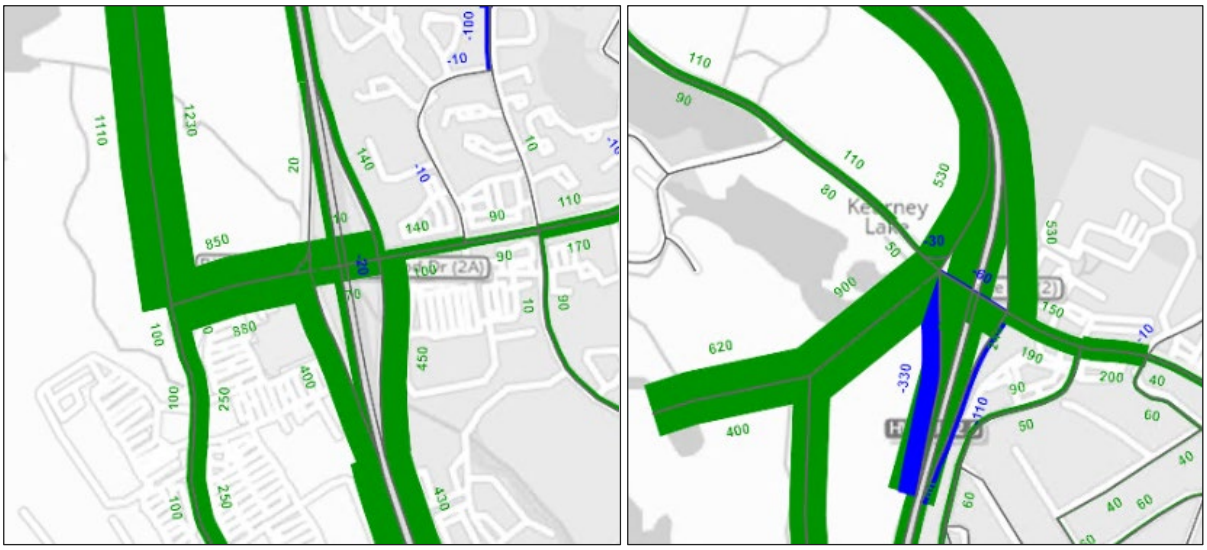


Figure 31: Trip Distribution Peak Flow Change – Lacewood Drive & Kearney Lake Road Interchanges – PM Peak – 2031 All Development Scenario

The bulk of V/C ratio increases attributable to volume generated by new development occur in the Highway 102 corridor, most acutely along access ramps and roadways linking the development site to the two primary expressway interchanges (**Figure 32**, **Figure 33**). Lesser increases take place along Lacewood Drive east of Highway 102 in the proximity of Lacewood Terminal.

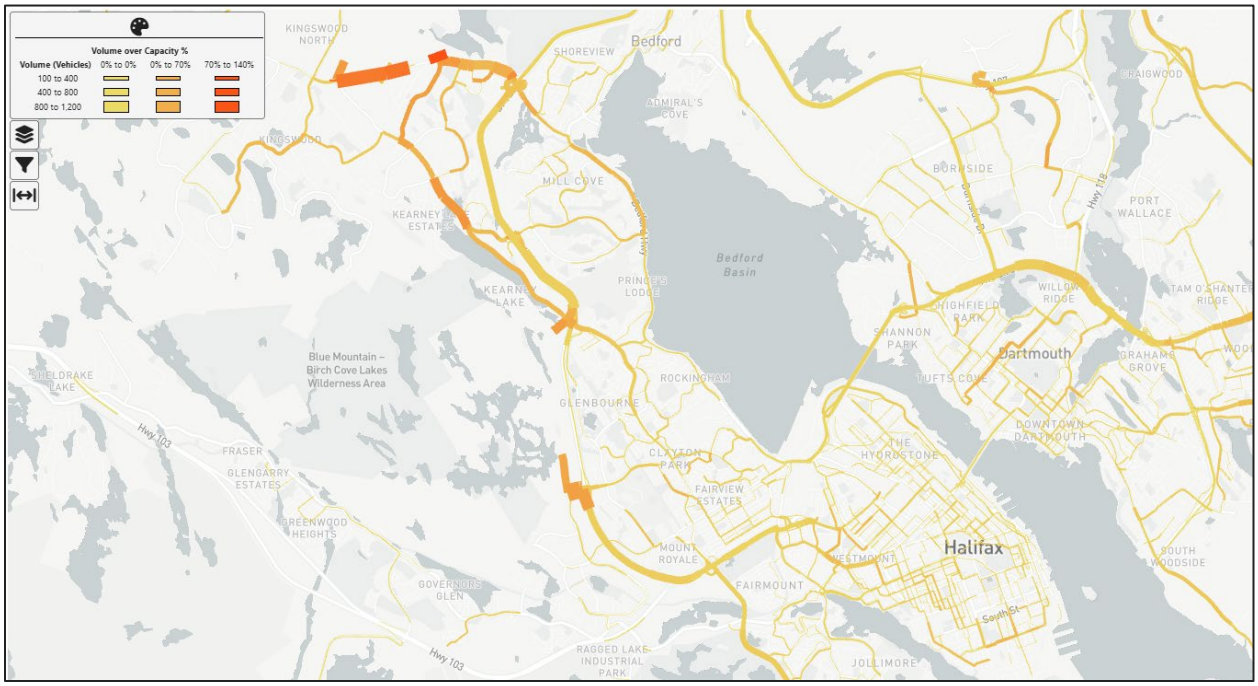


Figure 32: V/C Ratio Change – AM Peak – 2031 All Development Scenario

Figure 33: V/C Ratio Change – PM Peak – 2031 All Development Scenario

Overall, model results expect the nearby regional transportation network to function in a similar manner to the Do Minimum Scenario with a higher number of segments along Highway 102 as well as more of the Kearney Lake Road/Larry Uteck Boulevard corridor either approaching or exceeding capacity (**Figure 34**).

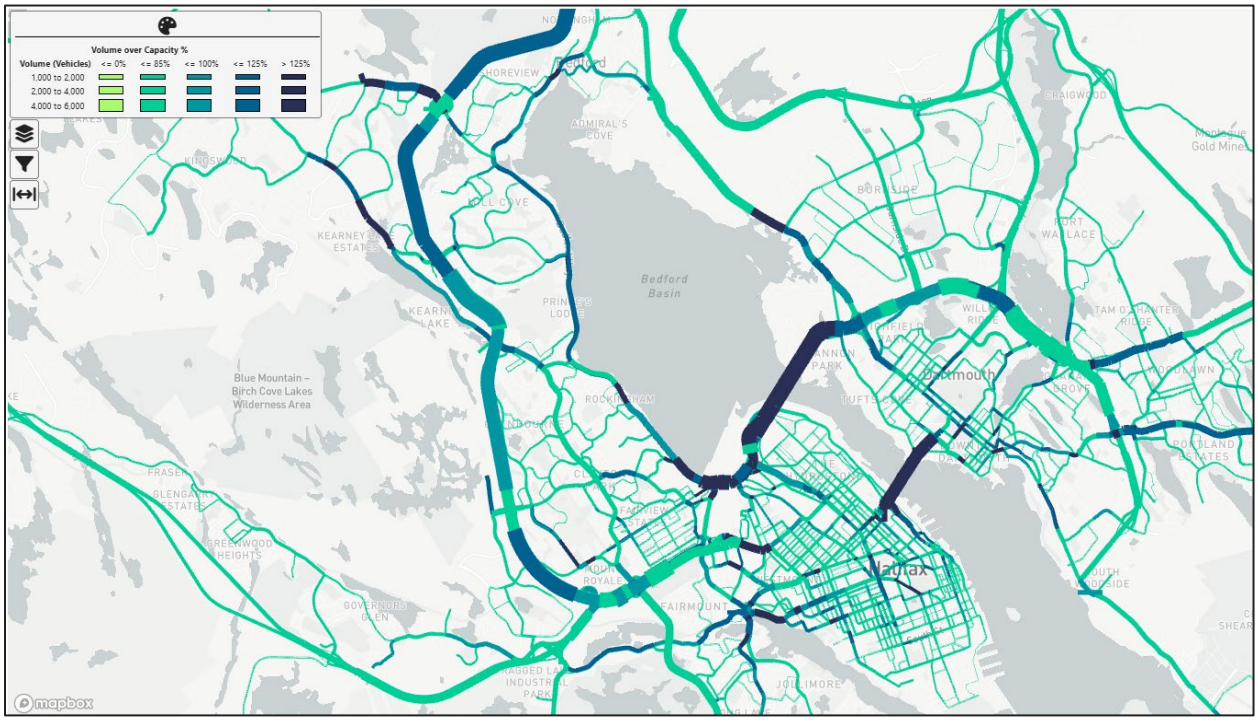


Figure 34: V/C Ratio – PM Peak – 2031 All Development Scenario

A 2009 Cost of Servicing Plan for the Highway 102 West Corridor identified an infrastructure requirement for a roadway link crossing Highway 102 between the Kearney Lake Road and Lacewood Drive interchanges. Modelled trip distribution for the new development does not indicate an intermediate destination immediately east of Highway 102 between interchanges. However, new demand converges toward the intersection of Lacewood Drive and Dunbrack Street (**Figure 27**, **Figure 28**). While the operational capacity of Lacewood Drive is more than adequate to absorb the additional demand, the aggregate demand of the demand scenario indicates capacity issues along Kearney Lake Road through the Highway 102 interchange extending to where it functionally becomes Dunbrack Street (**Figure 34**). At the southern end of the development, the primary on-site collector road appears to be over capacity during the PM peak period, which would impact the operation of the Lacewood Drive/Chain Lake Drive intersection.

These considerations suggest that an intermediate roadway link would provide value for the overall transportation network in the development area as it presents alternatives to easterly travel that would alleviate impacts on bottlenecks related to development site geography and reliance on two access points proximate to busy expressway interchanges. Final decisions require sensitivity analysis to better estimate travel utility followed by in-depth evaluation of localized community impacts, environmental impacts, cost of construction, ease of land assembly, and other factors. Any general traffic connection spanning

Highway 102 represents an opportunity to include active transportation facilities to reduce travel time and distance for non-motorized modes presented by the current inability to cross the limited-access highway.

Siting of a potential link requires further evaluation and faces many constraints related to the built environment and reserved natural areas on the east side of the expressway as well as the location of a rock quarry pit slated to become a lake within development concept plans. Noting that alignment with Farnham Gate Road would create the most natural travel link to Dunbrack Street, but acknowledging practical constraints, the 2009 Servicing Plan recommends that the link connect to the northernmost intersection of Parkland Drive and Heathside Crescent, currently a driveway for the Glenbourne Gardens apartments.

5.2.2.5 Transit Impacts

Modelled transit ridership and capacity impacts associated with the introduction of the Highway 102 West Corridor development indicate increases in demand originating from the development site during peak periods. Route 433, which travels along Kearney Lake Road and Dunbrack Street to the Lacewood Transit Terminal, has been adjusted to pass through the development site via the new primary road traversing the area from north to south. Additionally, Routes 21 and 28 have been modified to enter the development area from the south to a point near the centre of the site before returning to Lacewood and Chain Lake Drives.

Modelled transit distribution from the new development indicates that a significant portion of new ridership is destined to and returns from the east in the direction of the Lacewood Terminal, and more notably to an important transit system node at the Bayers Road Centre where multiple routes converge (**Figure 35**, **Figure 36**). The transit demand model attributes approximately 230 new boardings to the study area during each of the AM and PM Peak periods, with most of the activity attributable to Route 28, which serves both the Lacewood Terminal and the Bayers Road Centre.

Of note, the model indicates minimal transit demand to and from the north and west owing partially to the current day infrequency of rural commuter Route 433. While modelling vehicular travel patterns distribution suggest demand along the Kearney Lake Road corridor, the limited capacity of Route 433 impacts the modelled transit demand distribution due to limited attractiveness of the service.

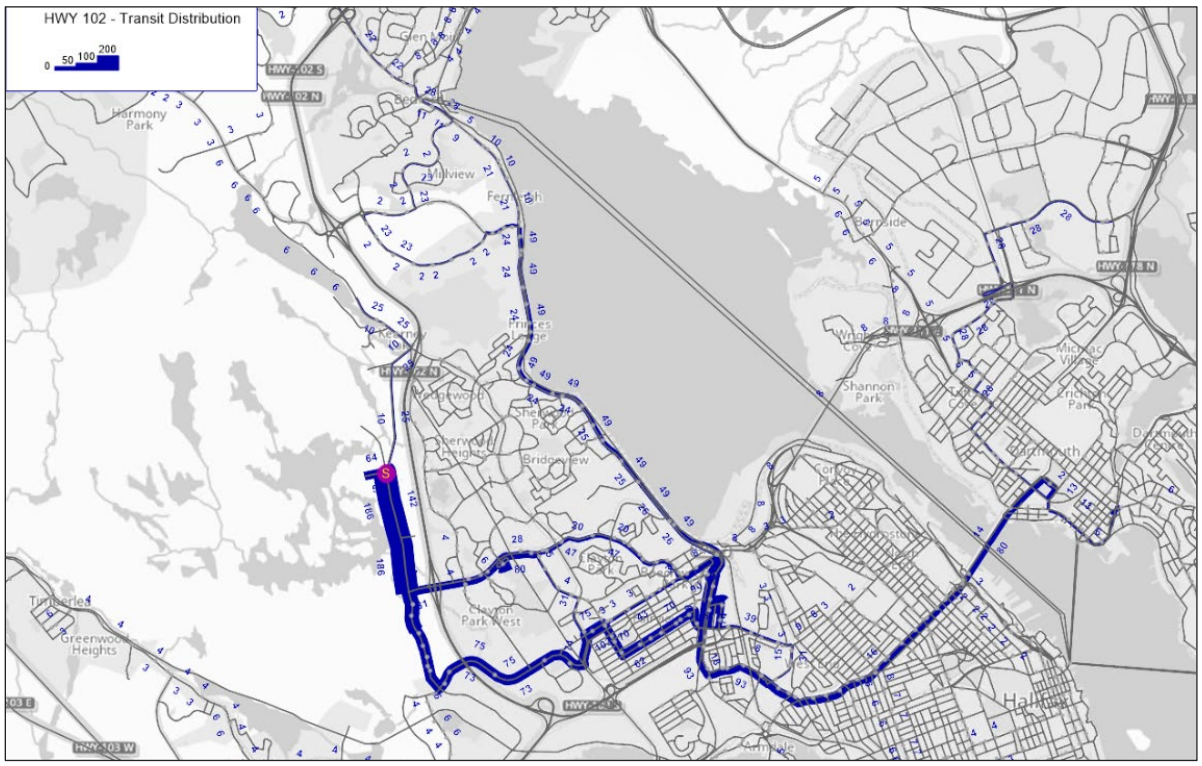


Figure 35: Projected Highway 102 West Corridor Transit Trip Distribution – AM Peak

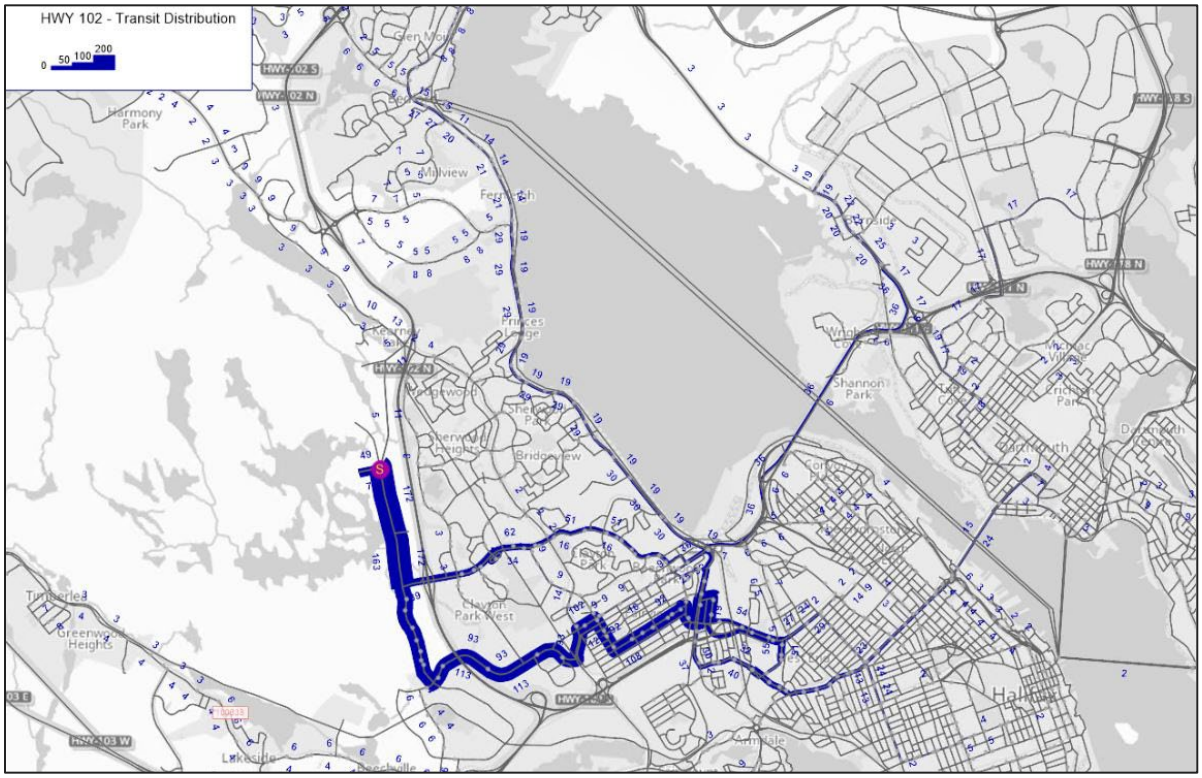


Figure 36: Projected Highway 102 West Corridor Transit Trip Distribution – PM Peak

Modelled transit flow-to-capacity information for the development scenario shows a future with transit demand above capacity in the Washmill Lake Drive, Main Avenue, and Rosedale Avenue corridors carrying increased demand for Routes 2 and 28 (**Figure 37**). Model results also display a large transit flow to capacity for the northern half of the primary development roadway due to the limited current capacity of Route 433, which operates only four times per day in each direction.

Recommendations for any transit service increases will focus on corridor level travel demand rather than route level projections. For example, Lacewood Drive between the study area and Lacewood Terminal retains capacity after absorbing anticipated increased subscription for its portions of Routes 21 and 28.

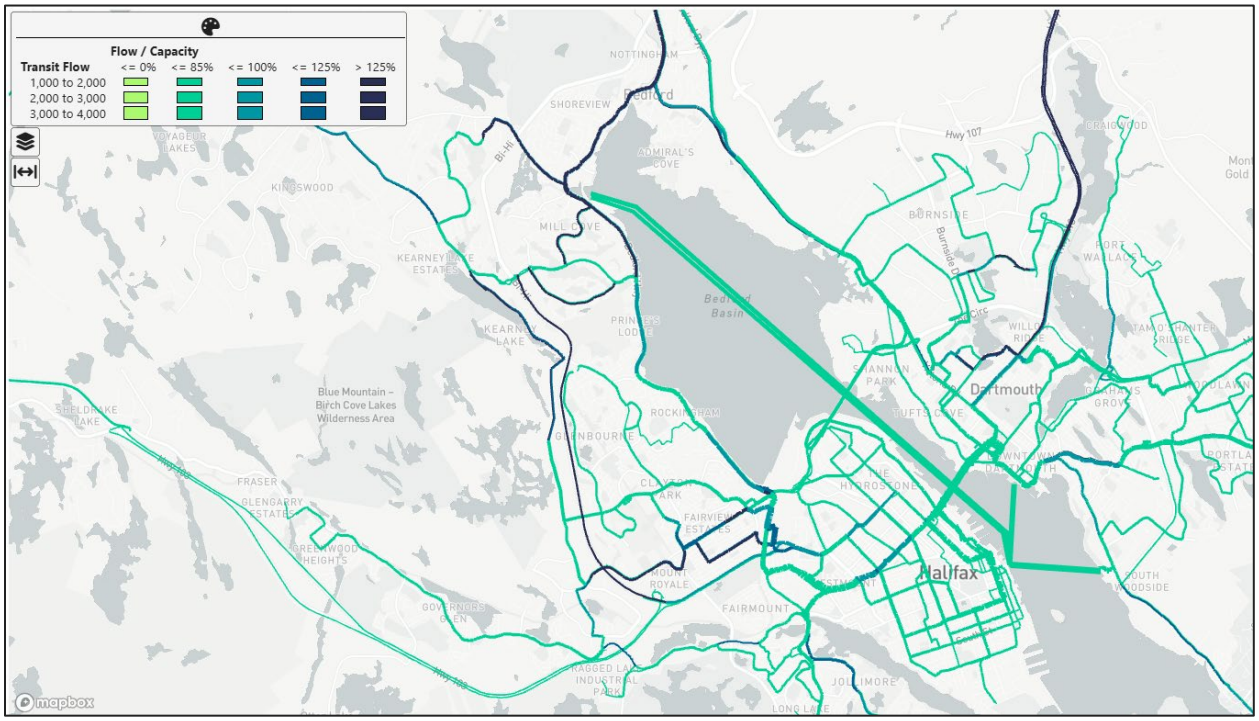


Figure 37: Transit Flow/Capacity Ratio – PM Peak – 2031 Highway 102 West Corridor Scenario

5.2.2.6 Active Transportation

Within the Highway 102 West Corridor development area, the model estimates that active mode trips (walking, cycling) comprise 25 percent of all internal trips, based on the HRM model's default algorithms and the established Place of Residence (POR) to Place of Work (POW) ratios (**Figure 22**). This approach results in a higher proportion of trips originating within the site, particularly for individuals walking to their workplace.

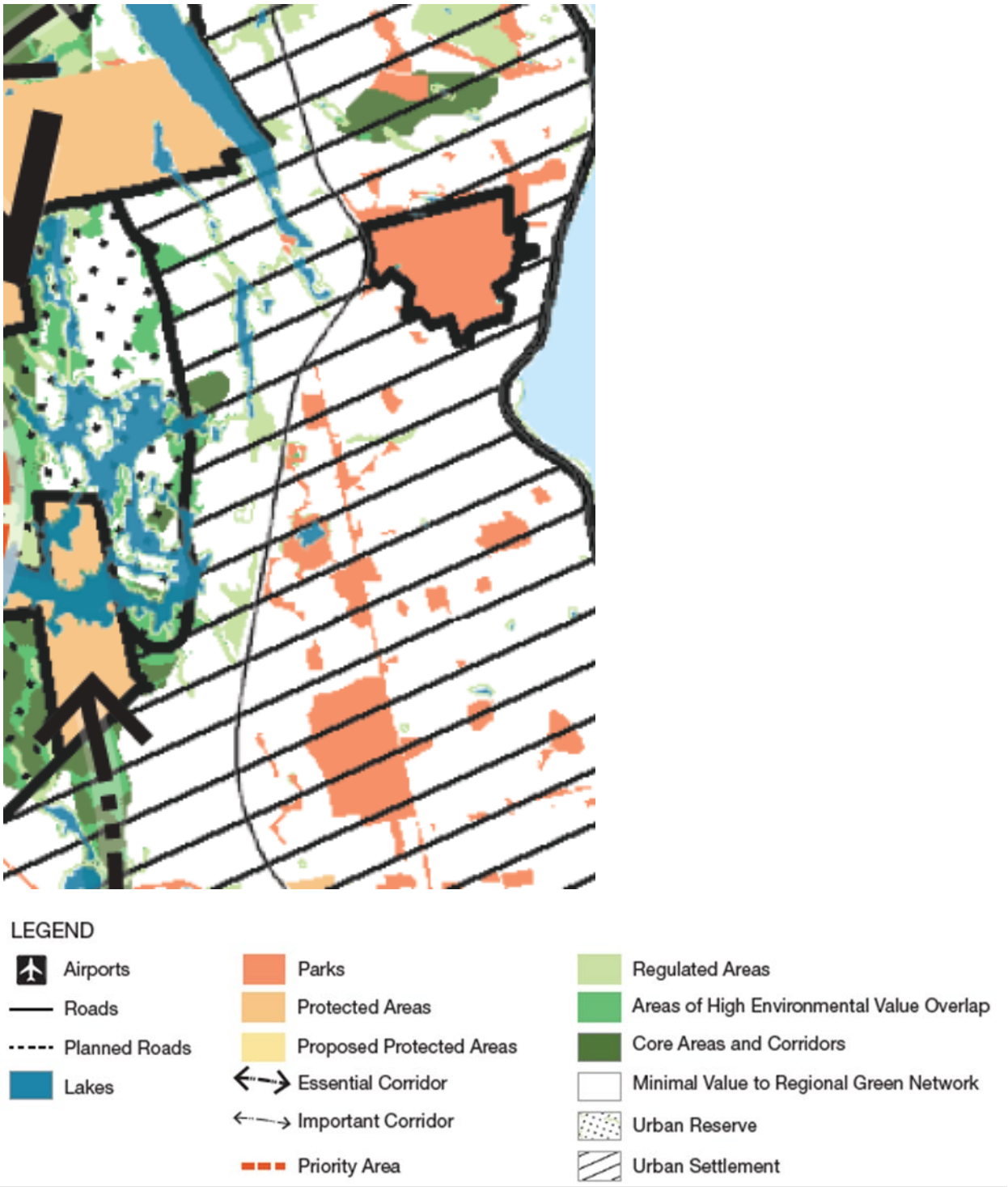
The HRM model predicts a regional mode share of 6.2 percent for walking and 0.2 percent for cycling. However, evaluation of external active transportation generated by the new development yields a lower active transportation mode share of only 4 percent (**Figure 21**). The disparity between internal and external active mode shares can largely be attributed to the significant barrier presented by the time and distance required to cross Highway 102 and the lack of accessible active transportation infrastructure connecting the development to the broader network.

5.3 Compatibility with Ecology

The Halifax Green Network Plan (GNP), released in 2018, defines an interconnected open space system, highlights ecosystem functions and benefits, and outlines strategies to manage open space. The GNP applies a variety of environmental values to each area within HRM. The plan identifies **Regulated Areas** as riparian buffers, large wetlands and wetland complexes and other land protected from development by Municipal or Provincial regulations and **Areas of High Environmental Value-Overlap** as high-valued areas whose loss would have a detrimental impact on ecological integrity. The Green Network Ecology Map in the GNP (**Figure 38**) identifies portions of the Highway 102 West Corridor development area as Regulated Areas and Areas of High Environmental Value-Overlap.

The concept plan for The Lakes development prioritizes environmental preservation by buffering watercourses and designating a core ecological area, including wetlands, around the northeastern neighbourhood. The former quarry pit will be transformed into a lake intended to improve water quality in wetlands located on-site that filter into Susie Lake. A bioswale system is proposed to intercept and clean stormwater runoff using biofiltration temporary held in the new quarry lake before discharge into Washmill Lake. Approximately 35-40 acres will be dedicated as parkland tied to the proposed Birch Cove Blue Mountain Regional Park. A portion of the development site would serve as a gateway and parking area to the regional park.

Analyses identified in the Watershed Study and Stormwater Management Plan determine the adequacy of this ecological mitigation approach and have been noted as a qualifying factor that may impact transportation solutions pending changes to the development proposal.



Source: HRM – Halifax Green Network Plan (2018)

Figure 38: Green Network Ecology Map

5.4 Coordinated Infrastructure – Bedford West Development Sub-Area 11

The Bedford West Secondary Planning Strategy defines Sub-Area 11, which borders the northern edge of the Highway 102 West Corridor study area. While the Strategy defines the sub-area boundaries in Schedule BW-6, the Strategy does not include a description of guidance specifically enabling development within the sub-area. It is only referenced along with the other eleven sub-areas in Policy BW-20, which, among other provisions, states "…approvals within Sub-Areas 1 to 12 will also be contingent upon availability of capacity within municipal service systems."

Additional development potential of sub-area 11 lands is unclear. While the bulk of developable land is owned by two development companies, the complexity of ownership and layout of the more fragmented Kearney Lake Park subdivision present impediments to development of the larger holdings.

Any development on sub-area 11 lands will rely on Kearney Lake Road and its interchanges with Highway 102 to access the regional road network. As such, the coordination of infrastructure with potential development may consider a roadway link that might increase person movement capacity for residents and visitors of the sub-area and adjacent sections of the proposed Highway 102 West Corridor development. Initial exploration of a link that would join Colins Road and Saskatoon Drive to provide a route parallel to Kearney Lake Road directly serving the sub-area encounters a number of complicating factors and is not supported by anticipated traffic demand increases.

The Nova Scotia Department of Natural Resources owns a 4,011-acre property that abuts the sub-area. The property is a major portion of the proposed Blue Mountain Birch Cove Lakes Wilderness Area and includes substantial waterfrontage on the southwest side of Kearney Lake. Immediately north of the Provincial land is an estate lot subdivision on Colins Road. To the east, lots are largely developed in the Kearney Lake Park Subdivision. Saksatoon Drive ends at the Maskwa Aquatic Club that operates on Kearney Lake. It is reasonable to expect opposition to joining roads across a defined Wilderness Area as well as resistance from residents on the two roads, who would likely be concerned with the encouragement of through traffic.

Extended consideration of what utility such a roadway might have in accessing a potential Highway 113 is tempered by preliminary travel demand modelling, which indicate small demand increases of 10 to 30 vehicles per hour attributable to development along Highway 103 west of Highway 102. However, the same modelling that incorporates attraction from the nearby Sandy Lake proposed development shows significant demand from residents of the Highway 102 West Corridor development for travel northwest along the Kearney Lake Road/Larry Uteck Boulevard corridor. Model outputs anticipate that Kearney Lake Road between Highway 102 and Larry Uteck Boulevard will approach capacity during peak periods while Larry Uteck Boulevard further northwest will exceed capacity. Exacerbating conditions is an approximately 1,300 unit development planned for Bedford West Special Planning Sub-Area 10 along the opposite side of Kearney Lake Road. Noting a desire to alleviate these conditions, a roadway along the south side of Kearney Lake that rejoins Larry Uteck Boulevard south of Blue Mountain would have little ability to reduce corridor congestion as the alternate route would simply encounter a congested condition upon rejoining at Belle Street/Abbington Avenue.

6 Limitations/Qualifications

Factors persist that limit or qualify the accuracy and value of analyses performed to date. As discussed previously regarding future connectivity analyses, future commercial and service offerings available within or near the development site change the perception of access for new development residents and are not precisely captured in available concept plans and impact analyses.

The planned extent and quality of the pedestrian network within proposed developments, especially within the Annapolis Group lands is unknown at this time. Beyond separated bicycle facilities and sidewalks along the primary corridors within the Stevens Group concept, network analyses depend on understanding all pedestrian access options. The location of all sidewalks and non-roadway adjacent paths should be known to ensure accuracy in connectivity analyses based on walking distance.

Available transportation impact studies do not comprehensively assess the scope and configuration of contemporary concept plans. The primary traffic impact analysis references an out-of-date development program in its initial trip generation estimates. This same analysis only assesses one of two primary access points to the study area.

6.1 Transportation Modelling

Junction delay was not simulated within the Joint Regional Transportation Simulator. While the model provides valuable data on link-level metrics, such as mid link volume-to-capacity ratios and travel demand distribution, it does not capture delays at intersections, particularly at signalized junctions. The absence of junction-level analysis means that the full extent of congestion, and its impact on network performance, are not reflected in the results. Thus, while general traffic patterns and transit demands can be assessed, the localized impacts of high-traffic intersections – key areas for congestion – may be underestimated.

6.2 Impact of Other Assessments

Parallel accompanying reports tasked with assessing development suitability based on environmental and servicing factors may impact the future scale of development as well as the provision and alignment of transportation infrastructure. Regulated constraints for development may result in modified development plans and thus, modified transportation recommendations.

- Land suitability analysis identifies which portions of the Study Area are most suitable for new community development based on an assessment of wetlands, watercourses, water quality, forest habitat, species-at-risk, surficial and bedrock geology, topography, and contaminated sites.
- In the absence of a full water service system model the effect of the proposed development on the level of service of the remaining system could not be assessed. The Highway 102 West Corridor Development Servicing Scenario report recommends that the level of service and distribution system requirements be reassessed during subsequent design stages including sizing and placement of regional water infrastructure.
- Preliminary watercourse sizing exercises could not be completed due to limited available peak flow for the watercourse and lake response data. Upstream dam structures on the outlet of

Quarry Lake, and its response under major storms is not well understood. Current development plans are directly over portions unnamed brooks, requiring accommodations in future design iterations to maintain watercourse connectivity to nearby lakes. Current development plans do not allow for a proposed lake outlet at the site of the decommissioned quarry. An outlet structure and channel must be designed and incorporated into the proposed development. The Highway 102 Corridor Stormwater Management Plan recommends that future refinement of the proposed development plan incorporates options to maintain connectivity of the existing watercourses and future waterbodies to their respective downstream waterbodies as well as grading considerations and setbacks to place development outside the preliminary flood limits.

7 Conclusions and Recommendations

7.1 Conclusions

The Highway 102 West Corridor development, like all Future Serviced Communities, should prioritize the creation of a well-connected multimodal and complete community to ensure its success. Our connectivity analysis has highlighted the necessity for a more integrated and cohesive community structure in terms of co-located daily needs. Embracing the principles of a complete community, which includes an idealized ratio of residential spaces, commercial spaces, and sustainable transportation modes will be necessary to realize a functional development that reduces the transportation burden of its residents. Macro level connectivity data demonstrates that if key destinations are not located within the new development or connected by frequent and rapid transit, a significant portion of the new population will be unable to access essential services on foot or by public transit within 30 minutes. Current conceptual plans include a low amount of commercial space relative to residential units, though proximity to Bayers Lake Business Park presents an opportunity to integrate additional destinations through transportation facility design and enhancement.

A deeper understanding of detailed development plans, particularly regarding the inclusion of commercial services, is of primary importance for accurately assessing the environmental and social impacts related to transportation access. Our connectivity analysis further showed that access issues can be mitigated from either the land use or transportation planning perspective. Incorporating shopping, entertainment, and basic healthcare options within the commercial areas of the proposed development reduces the average active transportation travel time for new residents to reach common destinations. Strategic land use and siting decisions not only bring daily destinations closer to the community, but also reinforce the value of local active transportation networks for short trips. Furthermore, a comprehensive understanding of vehicle parking, including inventory and utilization management, impermeable surface quantification, and an electric vehicle charging program have implications for achieving mode share targets and mitigating environmental impacts. Additional site plan detail also facilitates the evaluation of opportunities to efficiently implement shared mobility services. Micromobility options such as scooters, cargo bikes, golf carts, and shared car services not only provide localized access for neighbourhood residents, but also extend access and connectivity to and from adjacent neighbourhoods without requiring personal vehicle ownership.

Travel modelling indicates that the Volume-to-Capacity ratio on segments of Highway 102 into Halifax will exceed 100 percent by 2031, characterized by severe congestion before the Highway 102 West Corridor development is introduced. Mitigation measures for Highway 102 should ideally be implemented before or in parallel with the development of the study area to mitigate further negative effects of congestion. In addition to Highway 102 capacity additions to be examined through joint planning work underway between the Joint Regional Transportation Agency and the Department of Public Works, and efficiency adjustments slated for the Kearney Lake Road interchange (Exit 2), further junction upgrades are required to accommodate southbound movements generated by the new development at the Lacewood Drive interchange with Highway 102.

A number of converging development impacts present significant travel demands on the Kearney Lake Road corridor with limited relief potential from any coordinated parallel infrastructure through Bedford West Special Planning Sub-Area 11. The nearby Sandy Lake proposed development creates a trip attraction pair with new development in the Highway 102 West Corridor. Model outputs anticipate that Kearney Lake Road between Highway 102 and Larry Uteck Boulevard will approach capacity during peak periods while Larry Uteck Boulevard further northwest will exceed capacity, consistent with conditions identified and mobility enhancements recommended by the Sandy Lake Transportation Report. Capacity strains on other roadways near the development site appear to be of limited severity, such that additional bus service and strategic designation of transit priority lanes can compensate for person throughput deficiencies.

Effective on-site transit route planning will require that developers determine and specify the right-of-way dimensions of proposed roadways. Internal roads should be conceived and aligned to ensure that all new residents live within a 400-metre walk of a transit stop. Connectivity analysis outputs indicate that without bus service closely servicing the development, all new residents will struggle to access public transportation within 30 minutes on foot.

New on-road bicycle-only facilities described in the development concept plan must be supported through roadway intersections with a protected design. Any potential reconfiguration of the boulevard section should consider buffers for the bicycle lanes comprised of either physical installations or an on-street parking lane. Further, concept plans do not describe bicycle facilities slated for local roads, which leaves a gap at the point of origin and destination for all trips. Future plans should include greater detail related to pedestrian and path routing.

Creating external active travel connections from the development area to the Bayers Lake Business Park and the commercial areas along Kearney Lake Road east of Highway 102 would be highly beneficial. These connections could link the internal active travel infrastructure within the development to nearby destinations to support the usefulness of active transportation mode choices. Beyond access modelling challenges, the distance between crossings of Highway 102 creates a large practical barrier to the usefulness of active transportation. Future consideration should be given to the feasibility of non-motorized connections either above or below Highway 102 to promote a greater external active transportation mode share. Crossings could potentially link the new development to Parkland Drive, Langbrae Drive, all surrounding neighbourhoods, and an interconnected trail network anchored by the Mainland North Linear Parkway and Donaldson Greenway.

7.2 Recommendations

The needs summarized in the conclusions correspond to specific transportation infrastructure and service implementation recommendations. Transportation corridors that carry general traffic and transit vehicles, parallel active transportation opportunities, and highway interchanges expected to experience significant increases in use form a sub-network of routes and nodes that require enhancements (**Figure 39**). Class E construction cost estimates attempt to associate a preliminary, directionally accurate cost with recommendations as a function of corridor segment length, transit operating cost, or figures previously cited by other planning efforts (**Figure 40**).

7.2.1 ROADWAYS

Noting that current policy direction encourages investment in sustainable modes rather than additional vehicle capacity and based on the magnitude of predicted transportation network capacity stress, automobile system enhancement needs in the area of the Highway 102 West Corridor are mainly limited to provincial jurisdiction (Highway 102 and its interchanges) or previously scoped corridor improvement initiatives.

The sole recommended throughput enhancement with a potential physical roadway modification component would be the introduction of a transit priority lane on Kearney Lake Road starting at Parkland Drive, the planned terminus of the proposed Purple BRT Line. From Parkland Drive, the implementation would extend through the Highway 102 interchange and past the northern development access point to Larry Uteck Boulevard in manner similar to a Purple Line Extension option described in the Rapid Transit Strategy. As previously discussed, greater capacity constraints are predicted further north along the Larry Uteck Boulevard portion of the corridor. The Sandy Lake Transportation Plan identifies alternatives to address needs along these segments including extension of transit priority lanes to Hammonds Plains Road.

With or without the Highway 102 West Corridor development, predicted congestion is particularly visible along Highway 102 to the north of the study area on either side of the interchange with Hammonds Plains Road. Further south along Highway 102, parallel to the development site, volume approaches capacity in the 95-97 percent range simply due to the background increase in population. Introduction of the development creates a large change in volumes across multiple movements at the Exit 2 and Exit 2A interchanges with Highway 102. On October 24, 2024, the Nova Scotia Department of Public Works announced a suite of planned modifications to the Highway 102 corridor to ease traffic congestion and enhance safety.[1] Announced plans include interchange upgrades to improve efficiency and safety. The Lacewood Drive interchange, which is not part of the scope of this announcement, may require a capacity upgrade via lane reconfiguration along the southbound on-ramp currently characterized by a 7 metre wide travel lane and sizable shoulder.

Bedford Highway is an important link in the transportation network extending from the eastern edge of Clayton Park to both the Mill Cove and Larry Uteck Ferry terminals and beyond to Bedford and Highway 101. Baseline model results indicate a need for additional mobility capacity by 2031 for nearly the entirety of the corridor. The 2019 Bedford Highway Functional Plan examined this entire extent. Evaluation within the plan and consideration of public feedback chose a preferred corridor configuration option that provide continuous active transportation facilities, targeted transit priority improvements, and intersection reconfigurations to mitigate anticipated travel time increases.

A 2009 Cost of Servicing Plan for the Highway 102 West Corridor[2] identified an infrastructure requirement for a roadway link crossing Highway 102 between the Kearney Lake Road and Lacewood Drive interchanges. Modelled new demand from the development site converges toward the intersection of Lacewood Drive and Dunbrack Street. While the operational capacity of Lacewood Drive is more than

[1] Traffic Solutions, Safety Improvements for Major Highways | Government of Nova Scotia News Releases
[2] Cost of Servicing Plan – Regional Planning Greenfield Sites (2009)

adequate to absorb the additional demand, the aggregate demand of the demand scenario indicates capacity issues along Kearney Lake Road and at the southern end of the development's new primary collector, impacting the operation of the Lacewood Drive/Chain Lake Drive intersection.

Preliminary analysis suggests that an intermediate roadway link would provide value for the overall transportation network in the development area as it presents alternatives to easterly travel that would decrease reliance on access points proximate to busy expressway interchanges. Siting and implementation decisions require further sensitivity analysis along with in-depth evaluation of environmental, geotechnical, community, and fiscal impacts.

7.2.2 TRANSIT

An increase in regular bus frequency and implementation of transit priority measures in strategic locations represents a viable alternative to accommodating the anticipated increase in both transit and vehicular demand along certain area corridors. Projections tied to anticipated developments create need for additional mobility capacity along Kearney Lake Road. Absorbing the combination of increased transit demand and vehicular volume over capacity would require an investment in transit service expansion over what is currently provided by the existing rural and express routes that travel through the corridor. Needs skew toward the PM peak period, requiring 4-5 additional buses per hour along Kearney Lake Road between Highway 102 and Larry Uteck Boulevard. Further north as Kearney Lake Road becomes Larry Uteck Boulevard, the need to absorb predicted mobility demand is greater. The Sandy Lake Transportation Plan presents a BRT Purple Line extension to Hammonds Plains Road and necessary transit service frequency increases as mobility enhancement recommendations that may supercede capacity issues along common corridors closer to the Highway 102 West Corridor development area.

Modelled analysis of the 2031 background scenario identified needs to improve congestion and absorb extra transit demand along the Washmill Lake Drive / Main Avenue corridor as well as a transit demand split along Willett Street and Rosedale Avenue. These corridors host portions of Routes 2 and 28, which experience sizable ridership demand increases due to combined development. Combining the baseline with increased travel demand imposed on the network by new development indicates a level of need that can be accommodated through increases in transit service levels. Aggregate service along common corridors would require 5-6 additional buses per hour during the AM peak period, 4-5 additional buses per hour during the PM peak period, and 2-3 additional buses per hour during non-peak hours.

As modelling assigned many eastbound trips to Route 28, it did not indicate a great demand for people moving capacity in the Lacewood Drive corridor as it approaches and becomes Chain Lake Drive. However, the needs stated above may be considered a composite demand for service to the east and be satisfied by alternate means. Rerouting of Halifax Transit Routes 21 and 28, or other service introduced to the development site, will and must provide direct transit service from the Highway 102 West Corridor development to the Lacewood Terminal, and the future BRT Green line. While the anticipated implementation of Bus Rapid Transit would automatically provide a higher capacity option with transit priority, the corridor between the terminal and the development site should also be considered for increased levels of service to divert modelled travel demand from the Bayers Road Centre to a more proximate and convenient connection to enhanced transit services.

7.2.3 ACTIVE TRANSPORTATION

Consistent with the Active Transportation Priorities Plan, the study team identified a need for active transportation enhancements in the Kearney Lake Road corridor, especially bridging the divide between sides of Highway 102 through the Exit 2 interchange. The plan does not define the type of bikeway desired to complement existing sidewalks. As facilities along these corridors would be geared toward transportation functions more so than recreation, the ideal bicycle facility would be a uni-directional cycle track, a bike lane raised and curb separated from the roadway, parallel to, but separate from the pedestrian sidewalk. Technical and practical considerations related to existing bus bulbs, future BRT configuration, and other right-of-way reassignment factors may dictate a different facility selection.

Additionally, traffic impact studies for ancillary developments near the study area call for pedestrian accommodation to supplement on-road bicycle facilities along the portion of Kearney Lake Road north of Hamshaw Drive. Reconfiguration of the corridor to potentially include transit priority lanes creates options with respect to pedestrian facility selection and possible needs for reconfiguration of bicycle facilities, which should continue to emphasize a transportation function.

Per initial consultation and evaluation associated with the Bayers Lake Business Park Functional Active Transportation Plan, the eastern sidewalk along Chain Lake Drive becoming the southern sidewalk along Lacewood Drive should be modified to multi-use path standards to provide and important link for new development residents to use cycling to reach a broader array of commercial offerings and public transportation services at the Lacewood Terminal.

As previously noted, the greater than three-kilometre distance between development site access gateways greatly diminishes the utility and convenience for people walking or cycling to reach destinations to the east of Highway 102. Neighborhoods to the east feature high-quality trails, parks, and planned All Ages and Abilities protected cycling infrastructure along Dunbrack Street. Intermediate active transportation connections should be constructed to provide great time and access benefits to those on foot or on bike while simultaneously enhancing the viability of active transportation modes for new residents of the development. Precise siting of connections should consider the ease of connection to the Mainland North Linear Parkway, Donaldson Greenway, and park trails to facilitate access to the broader regional active transportation network. Note that any intermediate general traffic connection across Highway 102 determined to be suitable must incorporate sufficient width to accommodate separate facilities for people walking and cycling.

7.2.4 SHARED MOBILITY

Major new development should properly site a mobility hub to serve as a transportation anchor in a new community and offer a safe, comfortable, convenient, and accessible space to seamlessly transfer between different travel modes. Costs of mobility hubs are highly variable dependent on amenities provided and modes accommodated. Potential co-location at a commercial or transit centre within this and other Future Serviced Community development sites can centrally provide a mix of transportation options to users to reduce car dependence for internal trips within new neighbourhoods.

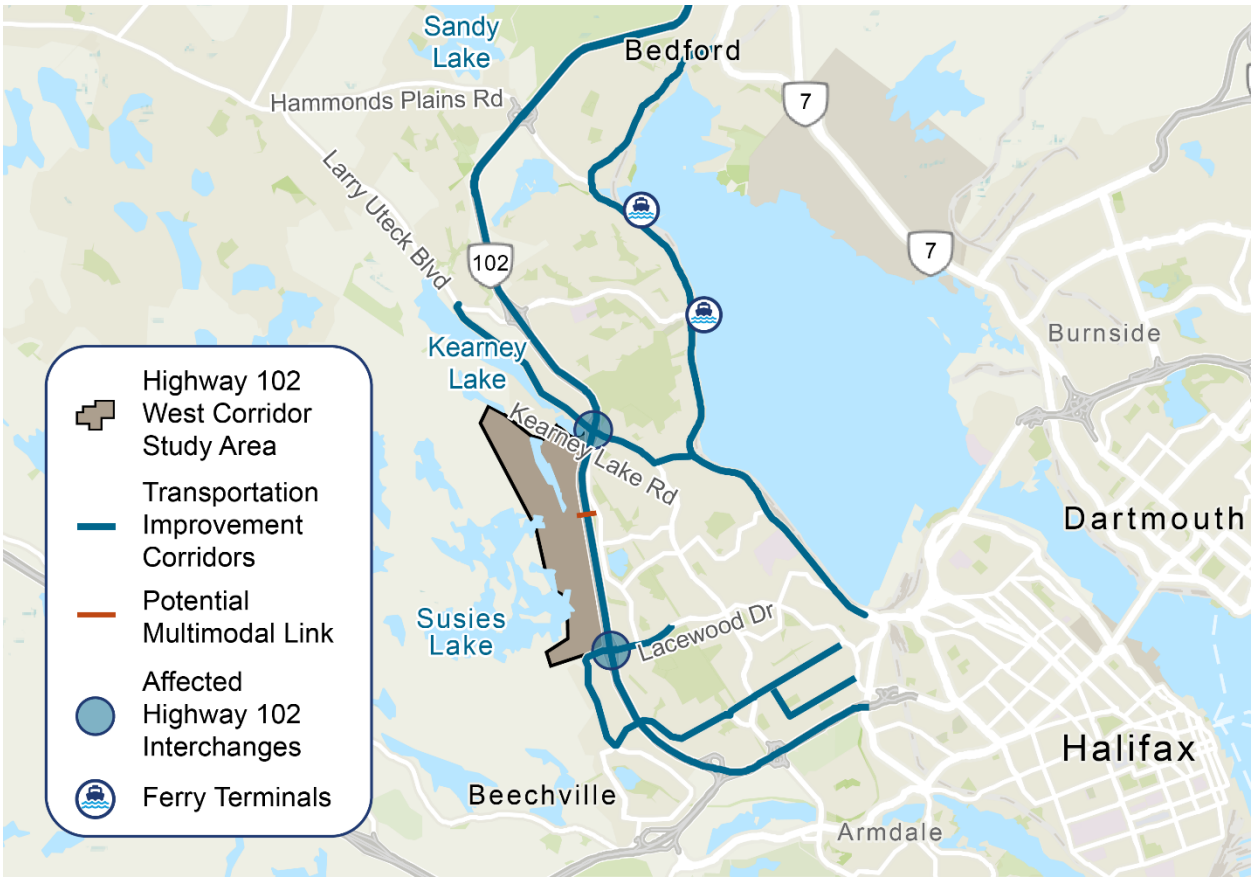


Figure 39: Spatial Recommendation Representation

Facility/ Service	Baseline 2031 Improvements	Class E Construction Cost Estimate	Highway 102 West Corridor Development-Specific Improvements	Class E Construction Cost Estimate
Roadway Infrastructure				
Highway 102 Capacity Enhancements	Per Provincial Announcement[3]	Requires further scoping		
Highway 102 Exit 2 (Kearney Lake Road)			Efficiency modifications per Provincial Announcement	Requires further scoping
Highway 102 Exit 2A (Lacewood Drive)			Capacity increases to southbound on-ramp	Requires further scoping
Kearney Lake Road			Transit priority lane designation from Parkland Drive to Larry Uteck Boulevard	Potential lane addition – $10.74 million based on $3,835,000 per linear kilometre
Bedford Highway	Increased person movement capacity from Union Street to Highway 111 per the Bedford Highway Functional Plan[4]	$35.1 million per Class D Plan estimates (2019)		

[3] Traffic Solutions, Safety Improvements for Major Highways | Government of Nova Scotia News Releases
[4] Bedford Highway Functional Plan | Shape Your City Halifax

Facility/ Service	Baseline 2031 Improvements	Class E Construction Cost Estimate	Highway 102 West Corridor Development-Specific Improvements	Class E Construction Cost Estimate
Highway 102 Crossing			Bridge across Highway 102 between Interchanges 2 and 2A to accommodate vehicular traffic including cycle tracks and sidewalks on both sides. No expressway ramps.	$25-35 million per bridge dependent on bridge length, design complexity, location, soil conditions, required foundation work, and necessary permits and approvals
Transit				
Kearney Lake Road			9-11 additional buses per hour during p.m. peak period 1-2 additional buses per hour before, after, between the PM peak period.	$0.57-1.06 million annual based on $100.85 operating cost per hour for new service
Eastern Connections (Lacewood Drive, Washmill Lake Drive / Main Avenue)			5-6 additional buses per hour during a.m. peak period 4-5 additional buses per hour during p.m. peak period 2-3 additional buses per hour before, after, between peaks.	$1.1-1.6 million annual based on $100.85 operating cost per hour for new service

Facility/ Service	Baseline 2031 Improvements	Class E Construction Cost Estimate	Highway 102 West Corridor Development-Specific Improvements	Class E Construction Cost Estimate
Development Site Primary Corridor			Routing through the development site + stops.	Pending future detailed transit analysis
Active Transportation				
Lacewood Drive / Chain Lake Drive	Multi-use path from Washmill Lake Drive to Lacewood Terminal	$1.03 – 1.21 million $400,650 (2.5m width) to $471,300 (3.0m width) per linear kilometre		
Kearney Lake Road	Pedestrian accommodation (multi-use path or sidewalk) from Hamshaw Drive to Larry Uteck Boulevard	Requires additional scoping and facility selection decisions		
	Bicycle accommodation (Buffered bicycle lane or uni-directional cycle track) from Crusher Road to Bedford Hwy.	Requires additional scoping and facility selection decisions		
Highway 102 Crossing			Bridge(s) across Highway 102 between Interchanges 2 and 2A to accommodate pedestrian/bicycle access	$13-17 million per bridge dependent on bridge length, design complexity, location, soil conditions, required foundation work, and necessary permits/approvals

Figure 40: Recommendation and High-Level Cost Estimate Summary Table

7.3 Follow-On Work Required

To adequately meet the mobility study goals of the Future Serviced Communities initiative, HRM and study area developers must perform further investigations, analysis, and planning. The Highway 102 West Corridor development, due primarily to its location immediately adjacent to a limited access highway and widely spaced access to the remainder of region, is expected to demonstrate a personal vehicle orientation. Additional efforts may be necessary to achieve the objectives of HRM policies supporting sustainable transportation modes.

- Connectivity analyses will require repetition as different assumptions, especially the inclusion of specific uses and destinations on site, become more concrete. These analyses should consider the distribution of residents throughout the development area and the cumulative effects of new commercial development in tandem with the existing commercial portions of the Bayers Lake Business Park.
- To fully understand traffic volume and congestion mitigation needs, supplementary analysis focusing on junction performance is necessary to ensure a more complete assessment of network impacts and potential bottlenecks. Transportation impact study should be revisited, including the northern development site access to Kearney Lake Road, updated housing and commercial space estimates, and contributions from the Annapolis Lands portion of the study area.
- More detailed transit demand modelling is required to more accurately predict transit mode share of the new development, the associated increased demand for service adjacent to the study area, and capacity needs for an on-site route. Needed adjustments relate to the physical arrangement of residential development and inclusion of an example route travelling along the development's primary transportation spine. Using a more detailed development plan, determine ideal on-site routing and stop siting for high quality transit service and other micromobility that links to regional destinations.
- Beyond more detailed and congestion-focused modeling, it would be prudent to explore variations in internalization of trips and travel distribution patterns. This would provide a clearer understanding of how active transportation can be further integrated within the development and its surrounding areas, potentially reducing reliance on car travel.
- The cost, technical feasibility, and optimal alignment of one or more active transportation connections from the development site to the east side of Highway 102 between major interchanges requires further detailed examination. Future work should also refine analysis of the utility and impact of an additional east-west general traffic link across Highway 102 in alleviating operational capacity constraints across the nearby transportation network.
- Current concept plans do not describe bicycle or pedestrian facilities slated for local roads and intra-development connections, which contributes to difficulties in routing and siting other transportation enhancements. Future plans should explicitly include intended pedestrian and bicycle circulation pathways.