

*In motion we connect*

# City of Sarnia ACTIVE TRANSPORTATION MASTER PLAN

Active Transportation Network

December 2023



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# 1. Introduction



## INTRODUCTION: A WALKING AND CYCLING NETWORK FOR ALL SARNIANS

The overarching vision for Sarnia's active transportation network is to establish a seamless and interconnected network that encompasses both a walking and a cycling network.

The network was developed based on the opportunities and challenges identified in the Background report and the consultation and engagement activities carried out throughout 2023 with the citizens of Sarnia. In the development of the active transportation network, a workshop was held in collaboration with the Dutch Cycling Embassy (DCE), featuring presentations on the ATMP by Momentum and Dutch cycling principles by DCE experts. Information on the engagement activities is presented in Section 2.

Rooted in a commitment to health, safety, economic prosperity, equity, network efficiency, and environmental sustainability, the active transportation network is designed to amplify the benefits associated with active transportation. In line with the initial vision of reversing the transportation pyramid to place pedestrians first, the active transportation network section of the ATMP presents the walking network first. The ATMP vision is presented in Section 3.

The walking network, presented in Section 4, is based upon a detailed analysis of the existing walking infrastructure, identifying priority links with missing sidewalks, and highlighting proposals to improve the connectivity to public transit. Other projects such as pedestrianized streets and pilot projects are presented in this section, to improve the connectivity of the walking network with schools, downtown and commercial areas such as Mitton's Farmer's Market. The plan aims at redefining the urban experience in Sarnia, fostering walkable spaces that not only prioritize safety and convenience but also encapsulate the values and aspirations of the Sarnian community.

The cycling network, presented in Section 5, addresses connectivity gaps for commuting, leisure, shopping, accessibility for vulnerable populations, parks and public transit. By strategically designing pathways that serve these distinct functions and needs of the Sarnian population, the ATMP aims at promoting cycling as a versatile transport mode, responding to the variety of activities of day-to-day life to improve the overall quality of life of the city. This will in turn contribute to a seamless and interconnected transportation system.

To assess the feasibility and impact of the proposed cycling and walking network enhancements in Sarnia, urban design visuals of two proposed projects are presented in Section 6 illustrating the principles of an accessible and safe design for the active transportation network. These sketches integrate within the existing urban landscape, offering a before-and-after perspective and providing a design approach for future projects.

Finally, the active transportation glossary included in Section 7 serves as a technical guide for the infrastructure types presented in the walking and cycling networks.



Figure 1 : Pedestrian crossing in Sarnia



## 2. Engagement and Consultation

## PRESENTATION OF THE ENGAGEMENT STRATEGY

Engagement and consultation is a key part of the ATMP process and generated many of the ideas that have fed into the proposed active transportation network.

Part 1 of the Engagement Strategy was implemented to gain a comprehensive understanding of the current state of active transportation in Sarnia. An online survey and an interactive mapping tool were developed and published through SpeakUp Sarnia and collected responses from 151 participants, sharing their perspectives on various aspects of active transportation. Detailed results of this engagement phase are presented in the Background report.

Part 2 of the Engagement Strategy involved public engagement undertaken in Sarnia on May 15-16th, 2023. Through various interactive events, including outdoor pop-ups in two locations, an Open House, a session with the Great Lakes Secondary School, and cycling and walking tours, more than 80 residents provided their valuable input which informed the development of Sarnia's Active Transportation Master Plan. The input collected is presented in the Background report.

Part 3 of the Engagement Strategy involved a visit from the Dutch Cycling Embassy in Sarnia in August 2023. A workshop with internal and external stakeholders was held to integrate Dutch cycling best practices into the ATMP and collect feedback on the initial version of the proposed active transportation network. An overview of the activities held during the workshop on August 19th, 2023 is provided in this section.

Part 4 of the Engagement Strategy included an online presentation of the active transportation network published on SpeakUp Sarnia alongside an online mapping tool collecting feedback on the proposed cycling links and projects included in the ATMP. A total of 180 comments were collected and provided feedback which has been directly incorporated in this version of the ATMP.

Through this engagement process, Sarnians have been decisive stakeholders and participants of the development of the active transportation network which is presented in the Active Transportation Master Plan.



Figure 2 : Cycling tour held in May 2023



Figure 3 : DCE workshop held in August 2023



## DUTCH CYCLING EMBASSY ('DCE') WORKSHOP

The DCE visit in Sarnia included a cycle ride held on August 19th, 2023 and a stakeholder workshop on August 20th, 2023. The stakeholder workshop in collaboration with DCE aimed at integrating Dutch cycling best practices into the ATMP and collect feedback from key stakeholders in the city.

The cycle ride was attended by Margot Daris, Maurits Lopes Cardozo, and Martijn te Lintelo from DCE visiting from the Netherlands, Alister Brown and David Jackson from the City of Sarnia, Amelie Cosse and Alice Duperrey from the Momentum team. The group stopped and observed key locations as listed below. The cycle route is shown in Figure 5.

- Brock Street
- Cathcart Boulevard
- Cathcart Boulevard and Christina Street intersection
- Indian Road
- Errol Road
- Colborne Road
- Capel Street and Exmouth Street intersection
- Exmouth Street
- Mackenzie Street
- Wellington Street

The stakeholder workshop was held on August 20th, 2023 at the Clearwater Arena. The workshop included a presentation of the active transportation network by Amelie Cosse from Momentum. This was followed by a presentation by Martijn te Lintelo on developing cycling networks based on Dutch cycling principles, including road safety and user segregation, focusing on users' origins and destinations and prioritizing cycle lanes off of main traffic roads. The third presentation by Maurits Lopes Cardozo, founder of Bike-minded consultancy, presented safe cycling infrastructure examples from the Netherlands including Dutch roundabouts.

22 people attended the workshop. This included stakeholders from different departments at the City of Sarnia, the County of Lambton, Lambton College, NuSarnia, CLASS and other local organisations.

Two break out sessions were then organized with the group. The first break out session divided the participants

in two groups. Each group reviewed the proposed active transportation network and gave improvement recommendations. Participants were also asked to prioritize projects they would like to see implemented first.

Some of the recommendations included implementing cycle lanes on Wellington Street and Confederation Street rather than Kathleen Avenue and Campbell Street as these are destinations with commercial activity and improved cycling infrastructure would benefit low-income communities, students, and would create a link to the waterfront.

The second break out session divided the participants in five groups. Each group reviewed specific locations in Sarnia to propose walking and cycling design improvements applying Dutch principles. Outputs from this second break out session are presented in Figure 6 to Figure 10.

Some of the recommendations highlighted during the second breakout session that are incorporated in the ATMP are listed below:

- Unidirectional bike lane on both sides of Wellington Street
- Dutch roundabout on Christina Street and Cathcart Boulevard
- Prioritising connection to the waterfront (George Street, Wellington Street)
- East-west cycle lane on Maxwell Street
- Include quiet routes on residential streets
- Safer intersection designs for cycling
- Parents volunteering for school crossings
- Include new active transportation links ahead of the Development Area 2 completion
- Add link to train station and add sidewalks
- Add wayfinding strategy with signage throughout the city
- Add network layer for intermodality (VIA station, Bus terminals)
- Add tunnel cycle link at London line

These recommendations along with the Dutch cycling principles presented during the workshop have been taken into account in the final report of the ATMP.



Figure 4 : Cycle ride with DCE in August 2023.

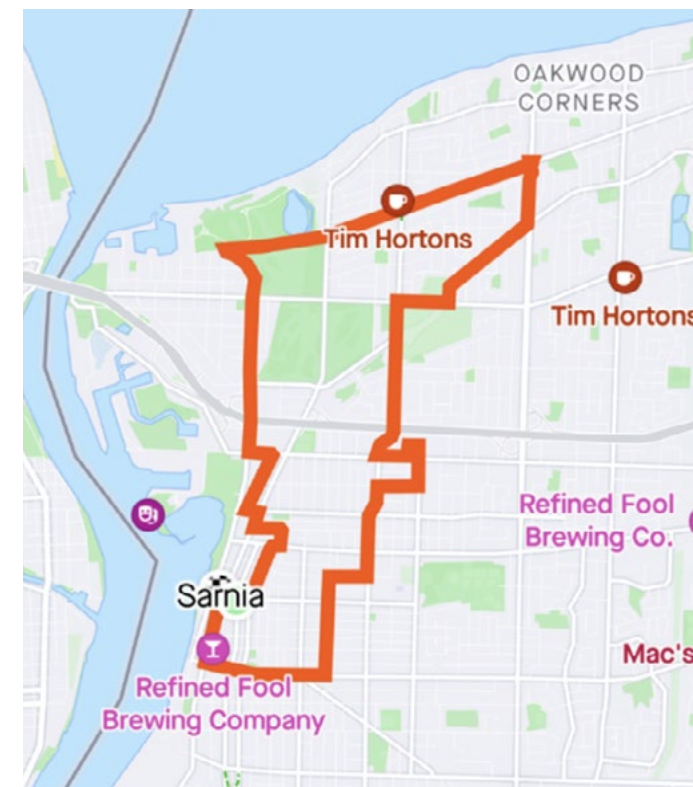


Figure 5 : Route of cycle ride with DCE in August 2023



Figure 6 : Workshop output for Brock Street and Vidal Street



## DUTCH CYCLING EMBASSY ('DCE') WORKSHOP

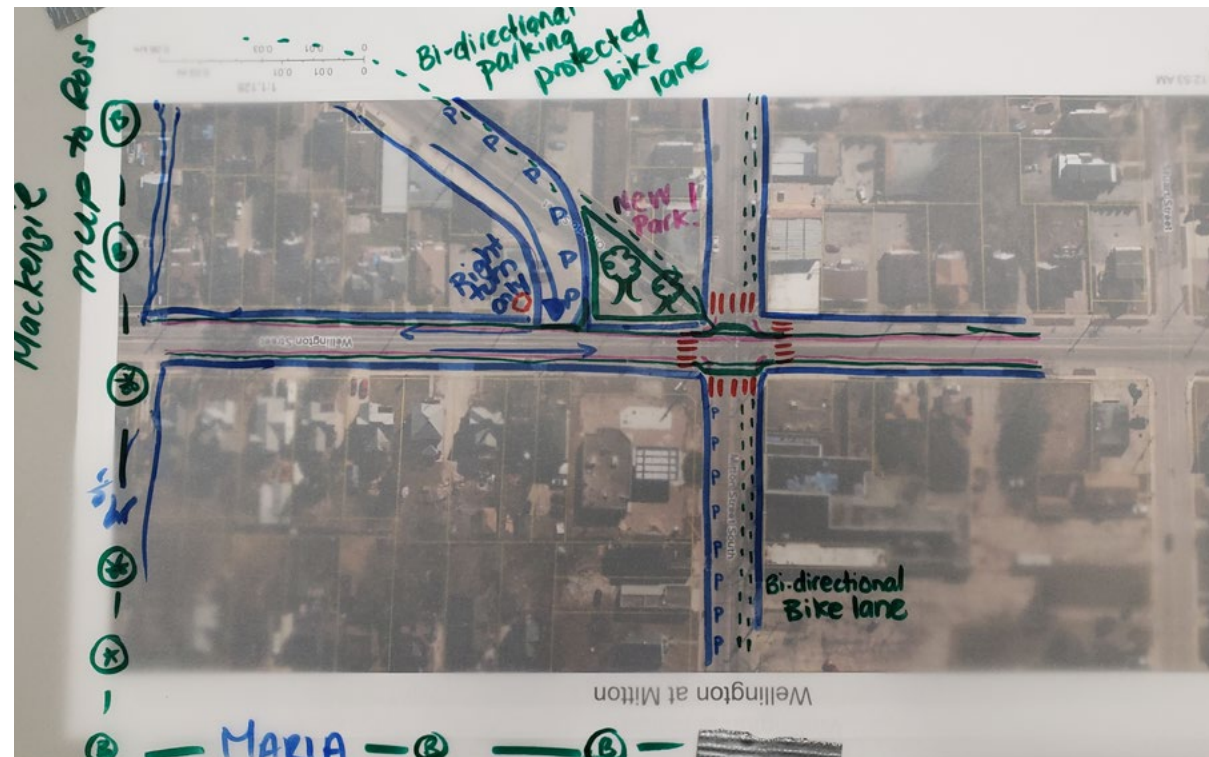


Figure 7 : Workshop output for the intersection of Wellington Street and Mitton Street

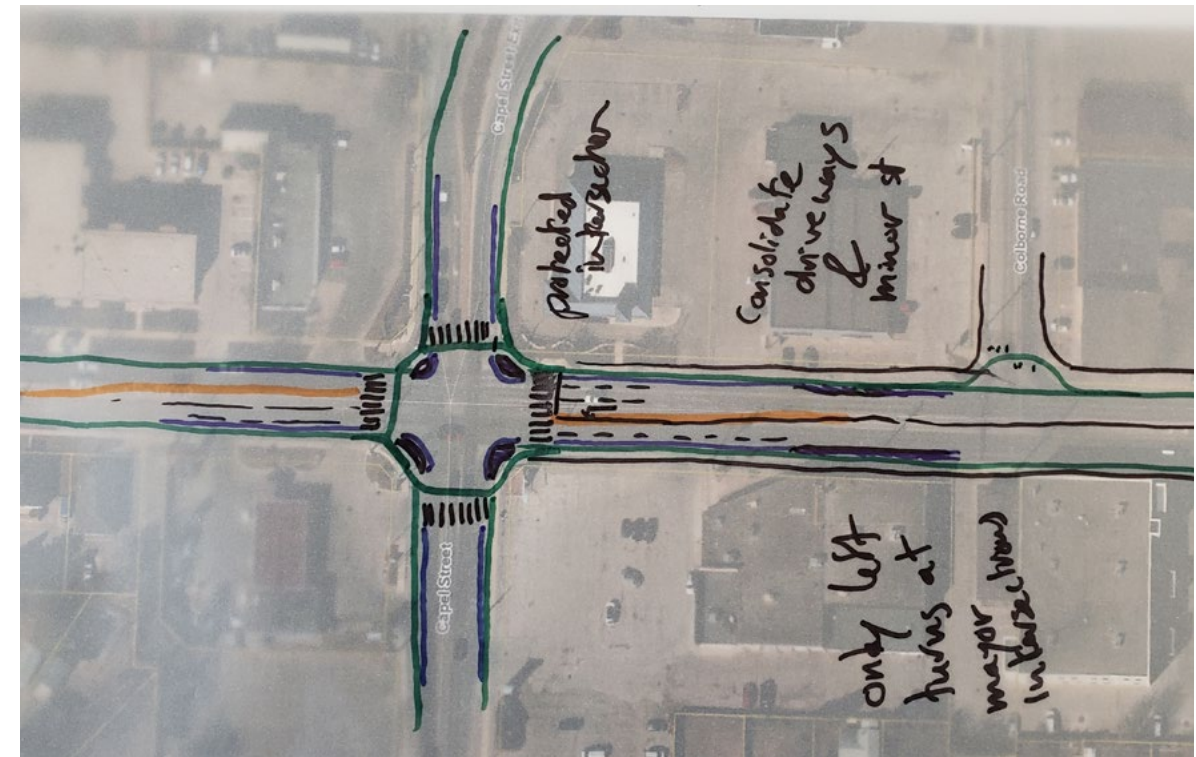


Figure 8 : Workshop output for the intersection of Capel Street and Exmouth Street

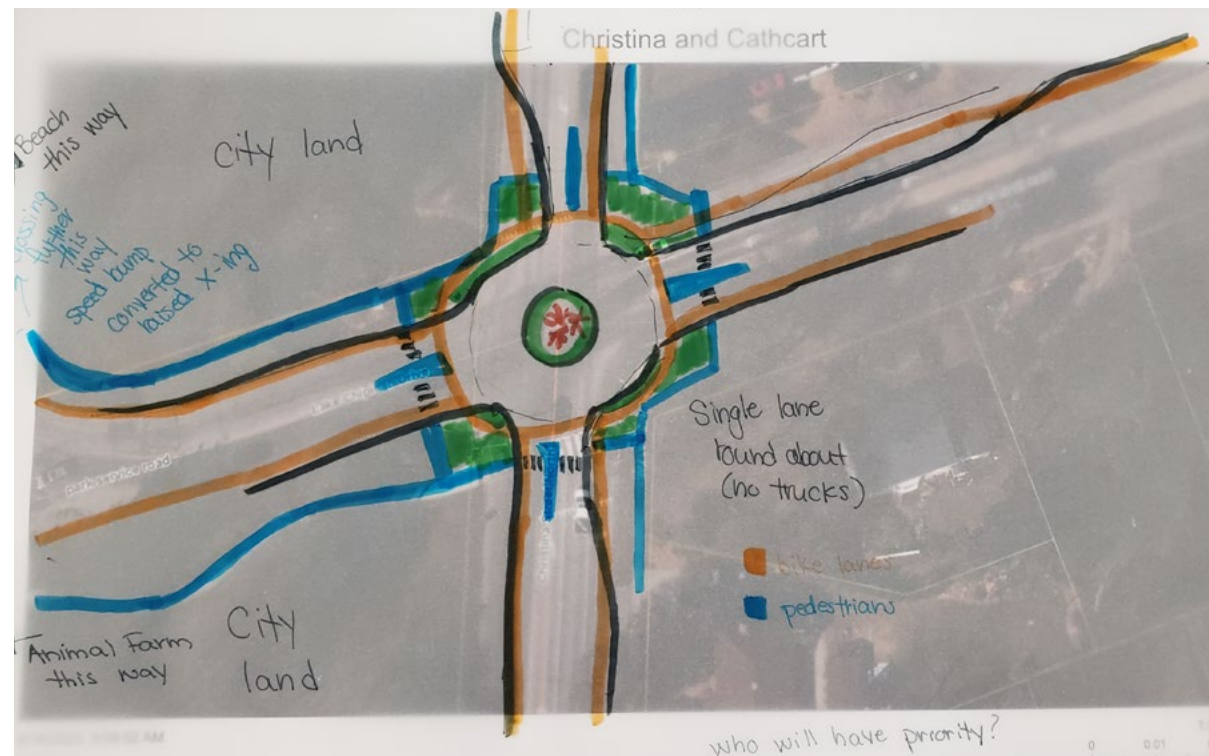


Figure 9 : Workshop output for the intersection of Cathcart Boulevard and Christina Street



Figure 10 : Workshop output for George Street

### 3. Vision of the ATMP



## VISION OF THE ACTIVE TRANSPORTATION MASTER PLAN

The vision for Sarnia’s ATMP was developed in Phase 3 of the ATMP and is based on both the analysis of the context of the city of Sarnia presented in the Background Report developed in Phase 1, and on comments from Sarnians collected during the consultation period in Phase 2. The ATMP vision emerged from a stakeholder workshop held in collaboration with the Dutch Cycling Embassy as well as an additional online consultation period in September 2023. Both these consultation activities have allowed to gather feedback from Sarnians and key stakeholders of the community and were included in the proposed active transportation network.

The ATMP vision is shaped by the benefits that active transportation can bring to Sarnians from all walks of life, and how each action implemented as a result of the ATMP should result in a direct impact on those benefits for the population of Sarnia.

The following section includes:

- An introduction to the ATMP vision based on benefits, objectives, actions, and targets.
- A presentation of the benefits of active transportation for Sarnians which shape the ATMP vision.
- An introduction to the action themes which frame the ATMP actions.

Figure 11 illustrates the vision for Sarnia’s ATMP showcasing the comprehensive approach aiming at a positive impact on the benefits of active transportation for Sarnians. The advantages derived from active transportation for Sarnians have been organised into six benefits:

- Health
- Safety
- Equity
- Network Efficiency
- Environment and Resilience
- Economic Prosperity

Four themes were identified to organize the vision to achieve the benefits of the plan, the themes are presented below:

- Infrastructure
- Planning
- Behavior Change
- Operations and Maintenance

The list of actions to achieve the targets of the plan are organized along those four themes. The detail of the actions can be found in the third report of Sarnia’s ATMP which constitutes the Action Plan and Implementation Strategy.

Measurable targets have then been designated for each action to ensure the implementation of these actions can participate in the fulfilment of the benefits for Sarnians. These targets aim at monitoring the successful implementation of each action.

### Sarnia ATMP Vision

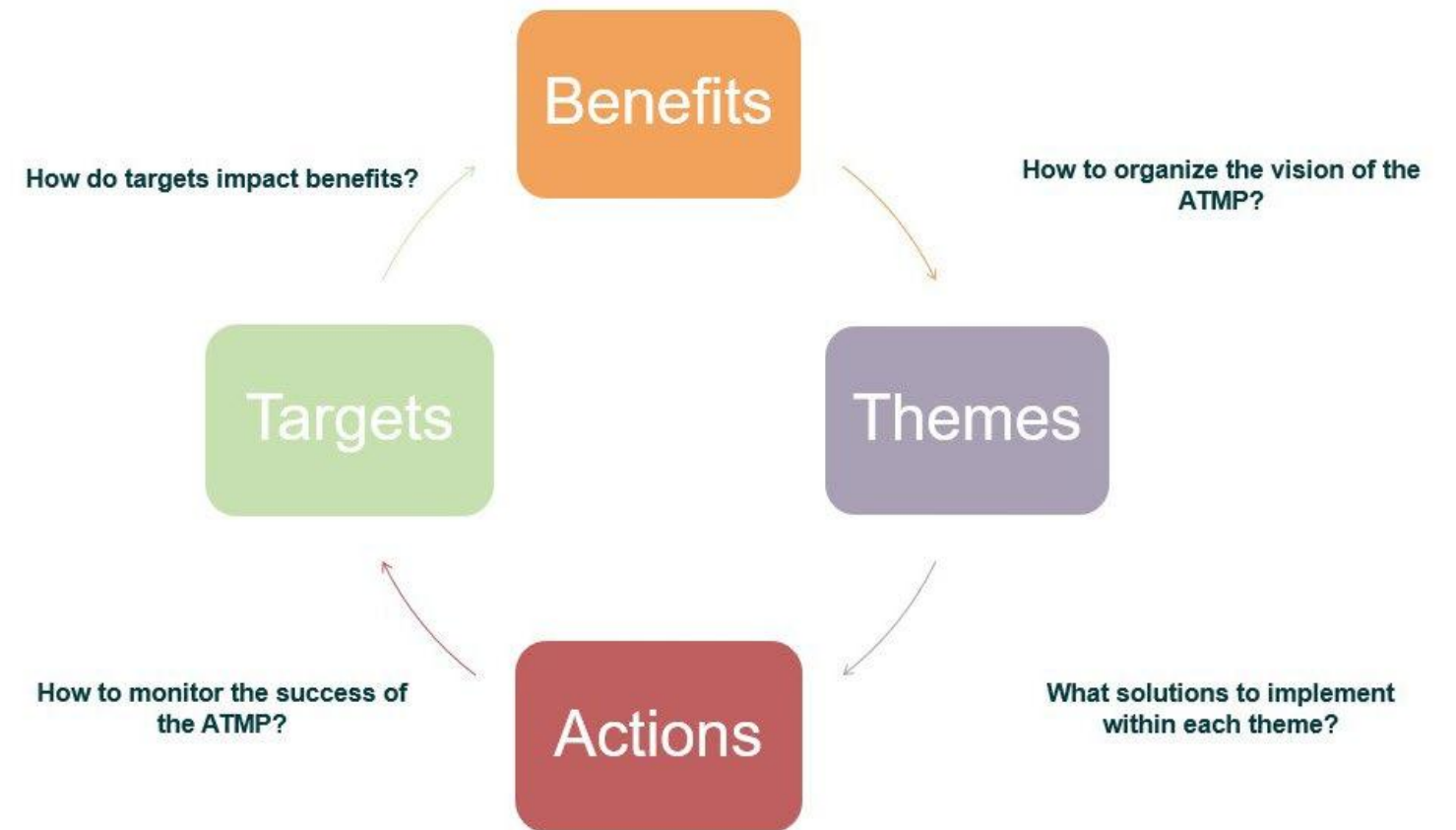


Figure 11 : ATMP Vision Scheme



## BENEFITS OF ACTIVE TRANSPORTATION



### Health

Increasing Sarnian's level of physical activity by walking and cycling can improve their physical health. The Canadian Public Health Association (CPHA) states that active transportation "can reduce the risk of over 25 chronic health conditions" and that "people who cycle three hours per week reduce their risk of an early death by 28%, while another found that those who walk 29 minutes per day, seven days per week, reduce their risk of an early death by 22%."<sup>1</sup> More physical activity through active transportation can also impact Sarnian's mental health by improving self-esteem, sleep and reducing depression, anxiety and stress<sup>2</sup>. The physical and mental health benefits of active transportation can help Sarnians' overall happiness and wellbeing as well as reducing obesity levels.

The improvements in active transportation infrastructure will make walking and cycling safer for children and encouraging them to navigate the city using active transportation modes from a young age can help ground children in their city's landscape and reduce health risks in the long term.

A further health benefit of increased walking and cycling levels is the reduction in air pollution and the associated health consequences of pollutants released from cars.



### Safety

The implementation of better active transportation infrastructure can improve safety for all road users in Sarnia, reducing the number of accidents and fatalities. More than 50% of road-based fatalities that occurred in Canada in 2021 involved drivers or passengers in motorized vehicles, while pedestrians made up 15% and cyclists 2.5%<sup>3</sup>. As such, improved active transportation infrastructure can encourage more people to choose active transportation options or combine them with public transit trips, which is also found to be safer than driving<sup>4</sup>.

It is also important for the infrastructure to protect its users. For cyclists, cycle lanes that are segregated from vehicle traffic significantly reduces the likelihood of collisions as cyclists do not need to directly interact with motorized vehicles. Segregated cycle lanes also provide a clear route and sense of safety, making cycling more accessible to different levels of cycling abilities.

Similarly for pedestrians, the provision of more cohesive intersections that improve visibility and follow key desire lines prioritize the movement of pedestrians and reduce overall vehicle speeds. In turn, these measures can also increase safety for car drivers and passengers as it becomes clearer where each road user is on the road and reduces conflict between user groups, which is a common cause of traffic collisions.

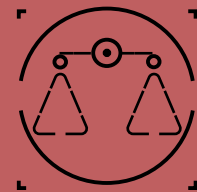
1. Active Travel Factsheet, Canadian Public Health Association, 2021 <https://www.cpha.ca/sites/default/files/uploads/resources/climateaction/hgjr-active-travel-factsheet-e.pdf>

2. Idem

3. Canadian Motor Vehicle Traffic Collision Statistics: 2021, Transport Canada, 2021, <https://tc.canada.ca/en/road-transportation/statistics-data/canadian-motor-vehicle-traffic-collision-statistics-2021>

4. The Incredibly Obvious Way to Reduce Road Deaths that Goes Ignored, Slate, 2022, <https://slate.com/business/2022/02/car-safety-department-of-transportation-transit-a-plea.html>

## BENEFITS OF ACTIVE TRANSPORTATION

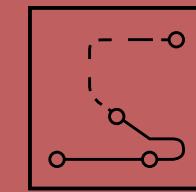


### Equity

Active transportation can improve the connectivity for the vulnerable population in Sarnia, allowing low-income communities that may not have access to a private vehicle to navigate Sarnia using active transportation modes safely and efficiently. As the cost of fuel continues to increase, it is important for Sarnians to have more affordable travel options available to them.

By improving the active transportation infrastructure in Sarnia, those that may have previously been deterred from cycling due to a lack of confidence would be more comfortable doing so, for example, by renting a bike through a bike sharing scheme or using a segregated cycle route to avoid having to cycle through motorized traffic.

The ATMP can also improve connectivity for Sarnians of all ages and abilities as well as participate in tackling gender inequalities. In 2022, fewer bike trips were recorded for women than men in Sarnia, for example on Lakeshore Road, where an average of 280 trips were recorded for women and up to 830 trips for men<sup>1</sup>. Making cycling more accessible for all journey types, including commuting and leisure but also school, health and grocery trips, can also reduce gender inequalities as women tend to undertake these trips more frequently than men. Further, better pedestrian infrastructure can improve the social mobility of younger and older populations that may not have access to private cars, making the city of Sarnia much easier to navigate for all age groups.



### Network Efficiency

Sarnia is known to have an efficient motorized vehicle traffic network and improving active transportation in the city can support and maintain the efficiency of the network.

This is recognized in the ATMP as the Master Plan aims at implementing active transportation infrastructure that is well integrated with other modes of transportation including the highway network and public transit.

By demarcating which parts of the road are for which user types, the priority of each user in time and space is clarified at key junctions and pedestrian/cycle crossing points.

Moreover, fewer cars on the road result in less chances of collisions and a more efficient network for all road users. For short distances, it can often be faster to walk, cycle or use public transportation compared to driving particularly during peak hours. Active transportation can also generate a gain in the time associated with looking for a parking space in busy parking areas. Removing these short distance motorized vehicle trips from the highway can further increase the efficiency of the road network and prioritize vehicle lanes for long distance trips out of the city that may be more challenging to access via active transportation modes.

## BENEFITS OF ACTIVE TRANSPORTATION



### Environment and Resilience

An increased uptake of active transportation can have positive environmental impacts primarily through the decarbonization of Sarnia's transportation sector by shifting some motorized vehicle trips to cycling and walking. One study found the carbon footprint of cycling to be less than a tenth of the emissions of driving<sup>1</sup>. As well as reducing air pollution, active transportation reduces noise pollution which in turn can improve Sarnia's biodiversity as animals are more likely to survive in the urban setting in protected green spaces.

Moreover, greater active transportation enhances the resilience of the city and its population by reducing pollution levels for young children who are more likely to suffer from the long-term consequences of carbon emissions resulting from high traffic levels.

As well as physical health resilience, the provision of green space in cities can play a central role in improving the mental health of Sarnians. During the Covid-19 pandemic, studies found that pandemic-related mental health impacts were less severe for those that had greater access and exposure to green space<sup>2</sup>. Similarly, more demand for walking and cycling encourages better connectivity between parks and other natural features of Sarnia. By preserving or creating new green spaces, the presence of trees and plants takes up carbon dioxide from the air and further improves air quality in the city.



### Economic Prosperity

An increase in walking and cycling in Sarnia can improve the city's economic prosperity by creating more attractive places to live, work and visit. A better quality of public amenities can encourage more people to visit the city for leisure or shopping opportunities; to locate their business in an area that provides a positive experience for employees and clients; and also, to live in the city for its improved sense of place and connectivity.

Furthermore, by improving the overall accessibility of Sarnia through active transportation measures, local services and shops benefit from increased footfall and visitors that may not have encountered the units if they were travelling in a car. This was observed on Avenue Mont-Royal in Montreal whereby the pedestrianization was linked to increased revenue across the stores and a reduced rate of store vacancies.<sup>3</sup>

Similarly, a study by Living Streets in the UK found that the pedestrianization of retail areas also increased the average dwell time which results in consumers spending more and contributing to the local economy<sup>4</sup>. This would be further facilitated by the increased provision of cycle parking which would allow Sarnians to visit local shops and restaurants with the assurance that they would be able to park their bikes. In addition, the delivery of the ATMP will enable Sarnia to continue to attract local and regional visitors, contributing to the city's tourism economy.

1. How Green is Cycling? Riding, walking, ebikes, and driving ranked, 2020, <https://www.bikeradar.com/features/long-reads/cycling-environmental-impact/>

2. Canadian green spaces during COVID-19: Public health benefits and planning for resilience, National Collaborating Centre for Environmental Health, 2022, <https://nccceh.ca/resources/evidence-reviews/canadian-green-spaces-during-covid-19-public-health-benefits-and>

3. Piétonnisation de l'Avenue Mont-Royal, Valérie Plante, 2023, [https://twitter.com/VaL\\_Plante/status/1677358816235515904?t=SCylE8mv7JhX9s6ss4lXFQ&s=19](https://twitter.com/VaL_Plante/status/1677358816235515904?t=SCylE8mv7JhX9s6ss4lXFQ&s=19)

4. The Pedestrian Pound, Living Streets UK, 2021, <https://www.justeconomics.co.uk/uploads/reports/Just-Economics-Pedestrian-Pound-Living-Streets.pdf>



## THEMES OF ACTIVE TRANSPORTATION ACTIONS



Offer inclusive and safe active travel connectivity

### Infrastructure

This theme groups actions that offer inclusive and safe active transportation connectivity in Sarnia. Active transportation infrastructure within Sarnia should be safe for all road-users, such as pedestrians, cyclists and motorized vehicles as well as being accessible to Sarnians from all ages and abilities with diverse mobility needs.



Integrate active travel throughout the planning framework

### Planning

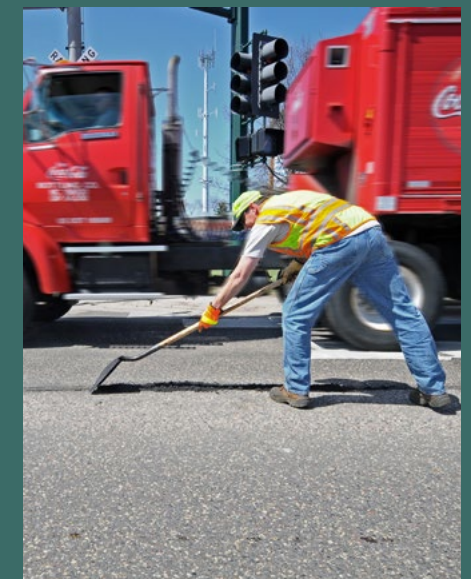
This theme regroups actions that integrate active transportation at Sarnia's planning level. Sarnia's planning framework should seamlessly integrate active transportation considerations to incorporate pedestrian and cyclist-friendly elements into land-use planning, bylaws, urban design, and transportation projects.



Lead behaviour and visibility of active travel in Sarnia

### Behavior Change

This theme regroups actions that participate in behavior change and the visibility of active transportation in Sarnia. The actions participate in a cultural shift towards embracing and choosing active transportation trips over car trips in Sarnia. This theme involves implementing awareness campaigns, educational initiatives, and community engagement programs to advertise the benefits of active transportation to Sarnians from all age, ability, and socio-economic background.



Guarantee reliability of active travel all year round

### Operations and Maintenance

This theme regroups actions that guarantee the reliability of active transportation all year round. Operations and maintenance of Sarnia's active transportation network ensures that Sarnians can comfortably get around the city using active transportation all year-round with reliable solutions. This theme includes implementing measures such as snow removal on walking and cycling paths, providing adequate lighting, and addressing seasonal challenges<sup>1</sup>.

1. Refer to Report 3 of the ATMP: Action Plan and Implementation Strategy, for more details.

## 4. Walking Network

# METHODOLOGY

## Introduction

Developing a robust walking network is decisive for the Active Transportation Master Plan in Sarnia, particularly in continuing the Walkway Infill Program which was commenced with the adoption of the TMP in 2014. The Walkway Infill Program specifically aims to fill gaps in the existing walking infrastructure by adding new sidewalks in the road network. Developing a comprehensive walking network aligns with the goals of this program, ensuring that residents have continuous and convenient pathways for walking throughout the city. A well-designed walking network contributes significantly to the overall success of active transportation initiatives.

## Existing Walking Network

The current walking network is based upon a database provided by the City of Sarnia identifying links where there is a sidewalk on one side, a sidewalk on both sides or no sidewalk at all. No recent update of the data was available therefore the addition of recent sidewalks is not reflected in the map. While some areas such as downtown and Mitton Village have connected sidewalks on both sides of the streets, the network is fractured and other areas in the North and South-East of Sarnia lack walking infrastructure.

## Analysis of the Walking Network

A GIS analysis was undertaken to assess the missing links of the existing walking network using five-minute walking catchments from schools, libraries, and parks, as well as a ten-minute walking catchment from downtown superimposed onto the existing sidewalk network. Streets within these areas which are not part of the existing network have been recommended as priority streets to include new sidewalks or sidewalks on both sides. This analysis and the proposed priority streets are shown in Figure 12.

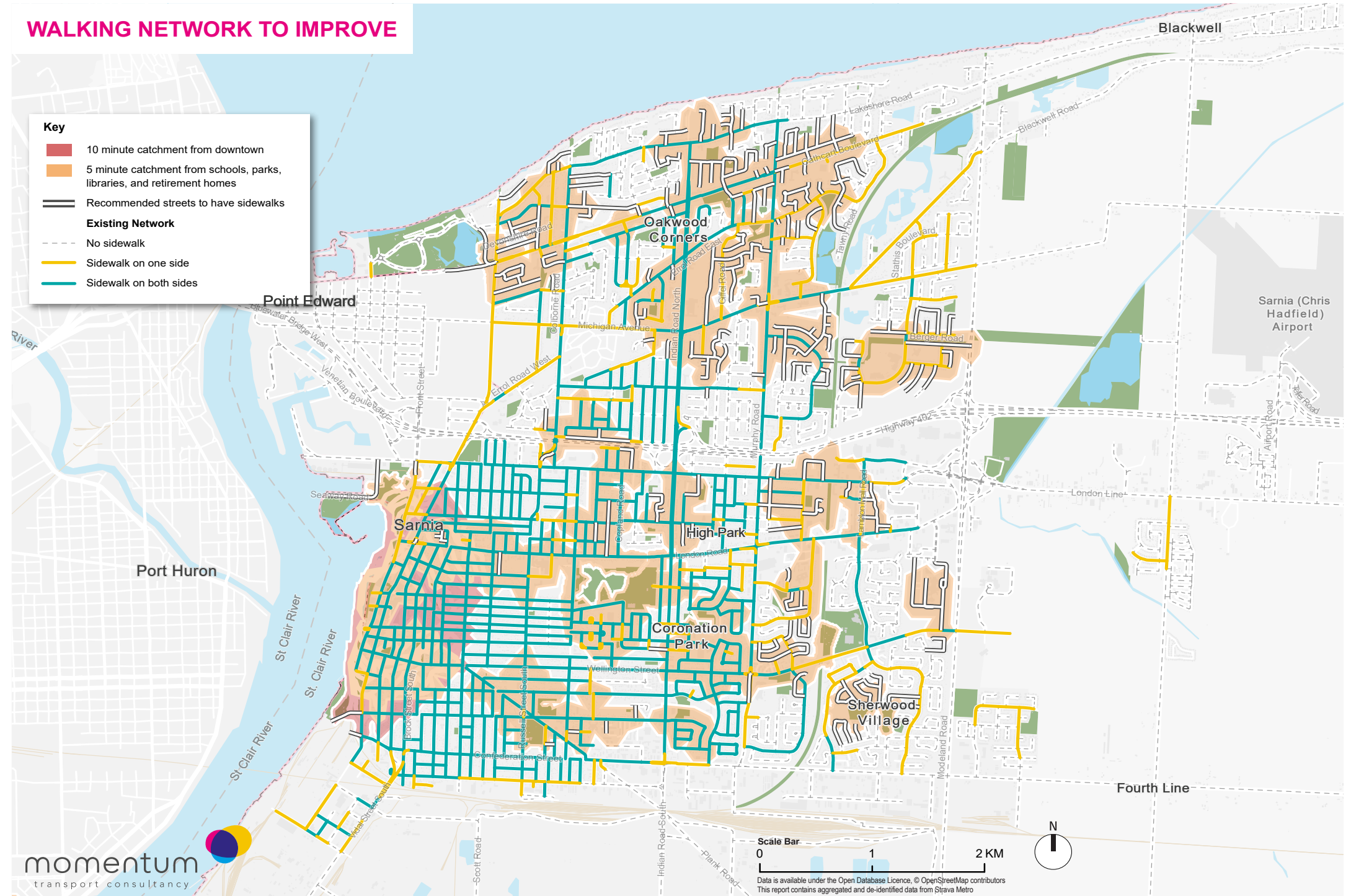


Figure 12 : Analysis of the existing walking network



# PROPOSED WALKING NETWORK

## Missing Links

The missing links on Figure 13 represent streets which are not within the priority catchment areas of downtown, school libraries or parks, but where the addition of sidewalks would ensure continuity of the walking network across the city. The extension of the walking network to these streets would improve pedestrian connectivity to various grocery stores, green spaces, and public transport links. For example, the addition of sidewalks along Tawny Road would improve connectivity to the Howard Watson Nature Trail, and the link along Modeland Road would connect residential areas to the bus line 5. The walking network was also compared to current bus routes, to include missing links to existing bus stops.

## Pedestrian Corridors and Intersections

Several pedestrian corridors have been identified along arterial or collector roads, where the need for pedestrian safety consideration is elevated. In addition to access to a sidewalk, it is recommended that there is an emphasis on pedestrian crossing safety along these routes, which signifies that the frequency of pedestrian crossings and the design of the intersections should also be revised.

Figure 13 indicates which intersections along these corridors are recommended for redesign measures, as well as intersections near other key pedestrian destinations in the city that have been identified as less safe for pedestrians. The higher priority intersections, where improvements will have a bigger impact on pedestrian safety, are presented on the map by larger symbols. These tend to be at intersections with more lanes and higher volumes of vehicular traffic, which means that a full traffic signal, IPS, or PXO Type 1 crossing are more likely to be appropriate than a PXO Type 2 crossing. The type of crossing used at each intersection can be assessed on an individual basis, following guidance from the Ontario Traffic Manual<sup>1</sup> and professional expertise.

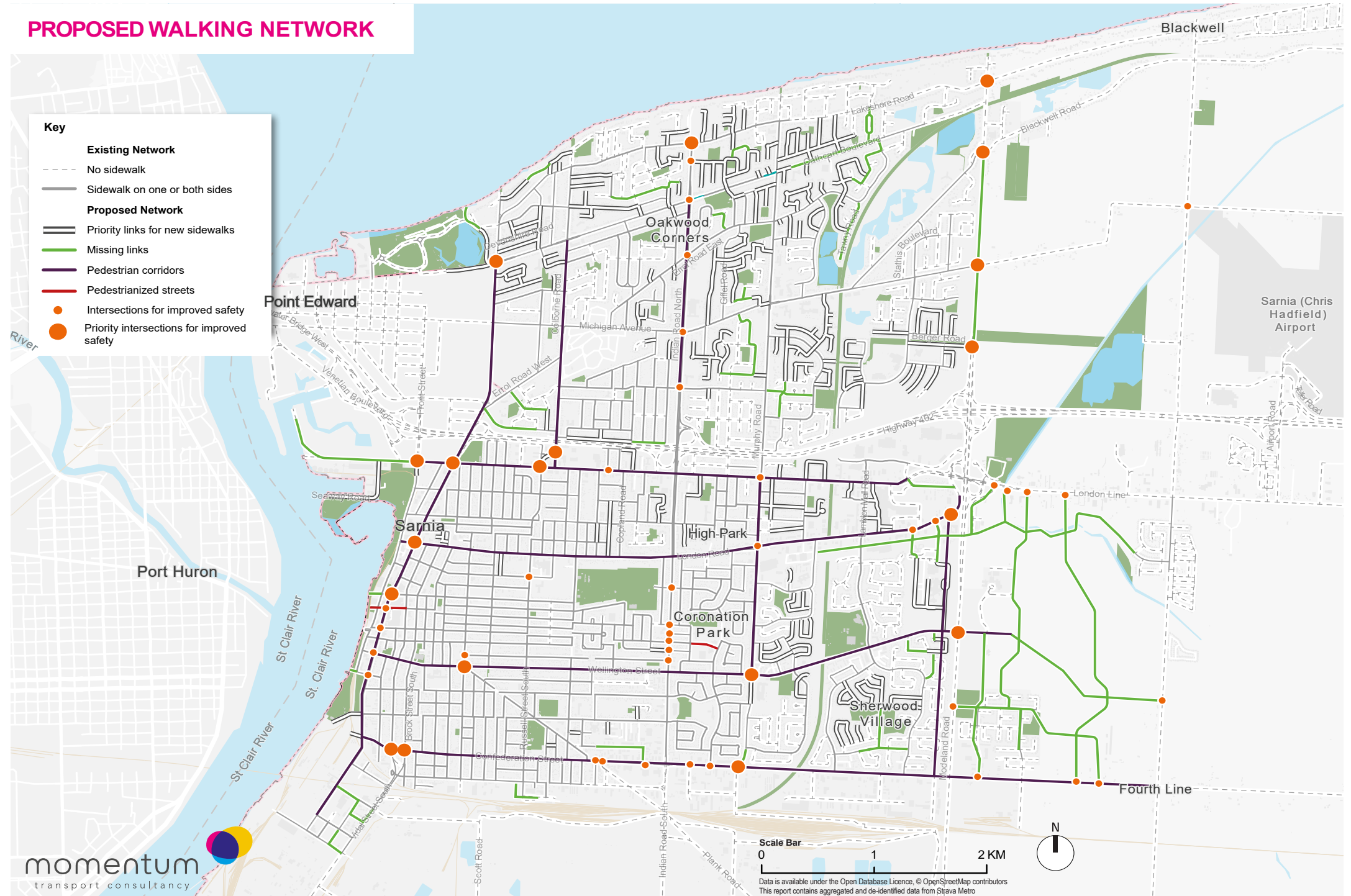


Figure 13 : Proposed walking network

1. Pedestrian Crossing Treatments, Book 15, Ontario Traffic Manual, 2016, <https://ontario-traffic-council.s3.amazonaws.com/uploads/2023/01/OTM-Book-15-Pedestrian-Crossing-Facilities.pdf>



## PROPOSED WALKING NETWORK

It is important to note that cyclists are prohibited by law to use pedestrian crossings in Ontario. Therefore, pedestrian crossings which intersect with cycle routes need to be designed in conjunction with cyclist crossing infrastructure. For example, pavement markings can indicate crossrides which provide a safe space for bicycles to cross adjacent to a pedestrian crossing,<sup>1</sup> or bike triggered crossings, such as those implemented in Edmonton, Alberta, can detect cyclists once they reach intersections, and trigger the traffic lights to permit safe passage.<sup>2</sup>

### Pedestrianized Streets and Pilot Projects

Figure 13 also presents the proposed locations for pedestrianized streets across the city. It is proposed that Lochiel Street, between the waterfront and Vidal Street, be closed on a permanent basis and used as a shared pedestrian and cycling route. Furthermore, it is recommended that Christina Street be closed on a seasonal or temporary basis, such as every weekend or over the summer season. This would follow on from the 2021 pilot project for the street's closure on weekends. A permanent scheme could be implemented in the long term.

The pedestrianization of these two streets in the downtown area would create a safer and more enjoyable environment for pedestrians, where the street evolves from a throughway for traffic to its own destination at the heart of the community. The street closures allow for restaurants to increase capacity by extending outside seating areas into the street, and increased foot traffic is likely to improve economic prospects for local businesses along the street.

Furthermore, it is also suggested that Old Lakeshore Road, between Pine Avenue and Penhuron Drive, is permanently closed to vehicular traffic. The route is used heavily by pedestrians and cyclists and would provide a safer and more pleasant route for residents traversing the neighbourhood and accessing the beach. The road has been previously closed for special events and construction work along the shore, with little disruption to residents.

The pedestrianization of Oak Avenue, between Aberdeen Avenue and Lansdowne Avenue, could be piloted as a temporary school street project. The street, which runs between Holy Trinity Catholic School, London Bridge Early Childhood Learning Centre, and Queen Elizabeth II Public School, could be temporarily closed to vehicular traffic at the start and end of each school day. If this project proves successful, it is proposed that the street becomes permanently pedestrianized, with the installation of traffic barriers at each end of the street and the potential addition of pavement markings, street furniture and planters.<sup>3</sup>

Another proposed pilot project involves the construction of continuous sidewalks along Mitton Street, as the mixed residential and commercial use of the street makes it a key destination for pedestrians. The continuous sidewalks proposal would improve the pedestrian experience and safety and could be integrated as part of a larger roadway redesign. The widening of the sidewalks and the narrowing of the roadway would encourage the reduction in speed of motorized vehicles, further contributing to pedestrian safety. If successful, the pilot continuous sidewalk design could be implemented across other streets in Sarnia.



Figure 14 : Bike lane connecting to a train station in London, UK



Figure 15 : Pedestrian and cycle crossing at an intersection in Ottawa

1. Cycling Facilities, Book 18, Ontario Traffic Manual, 2021, OTM-Book-18-Cycling-Facilities.pdf.pdf (ontario-traffic-council.s3.amazonaws.com)

2. Cycling Infrastructure, Cycling in Edmonton, City of Edmonton, 2023, <https://www.edmonton.ca/transportation/cycling>

3. Designing Streets for Kids, Global Designing Streets Initiative, National Association of City Transportation Officials, 2020, <https://nacto.org/publication/designing-streets-for-kids/>



## PROPOSED WALKING NETWORK

### Best Practice Sidewalk Design

When designing the walking network, it is important to follow best practice in sidewalk design. It is recommended to implement minimum sidewalk widths of 1.85 m along local roads and 2.45 m along arterial and collector roads, following NACTO guidelines.<sup>1</sup> These widths provide more flexibility for users of wheelchairs or strollers in comparison to the 1.5 m width set out by the Ontarian standards for accessibility and allow for a 0.6 m buffer between pedestrians and vehicular traffic along busier roads. The 1.85 m clearance should not be obstructed by utility poles, trees, or other obstacles, and sidewalk design should include dropped curbs, tactile warnings, and a maximum slope of 1:20. These design features facilitate the use of the sidewalk by all members of the community, including those with limited sight or mobility.<sup>2</sup>



Figure 16 : Pedestrianized street in Montreal.

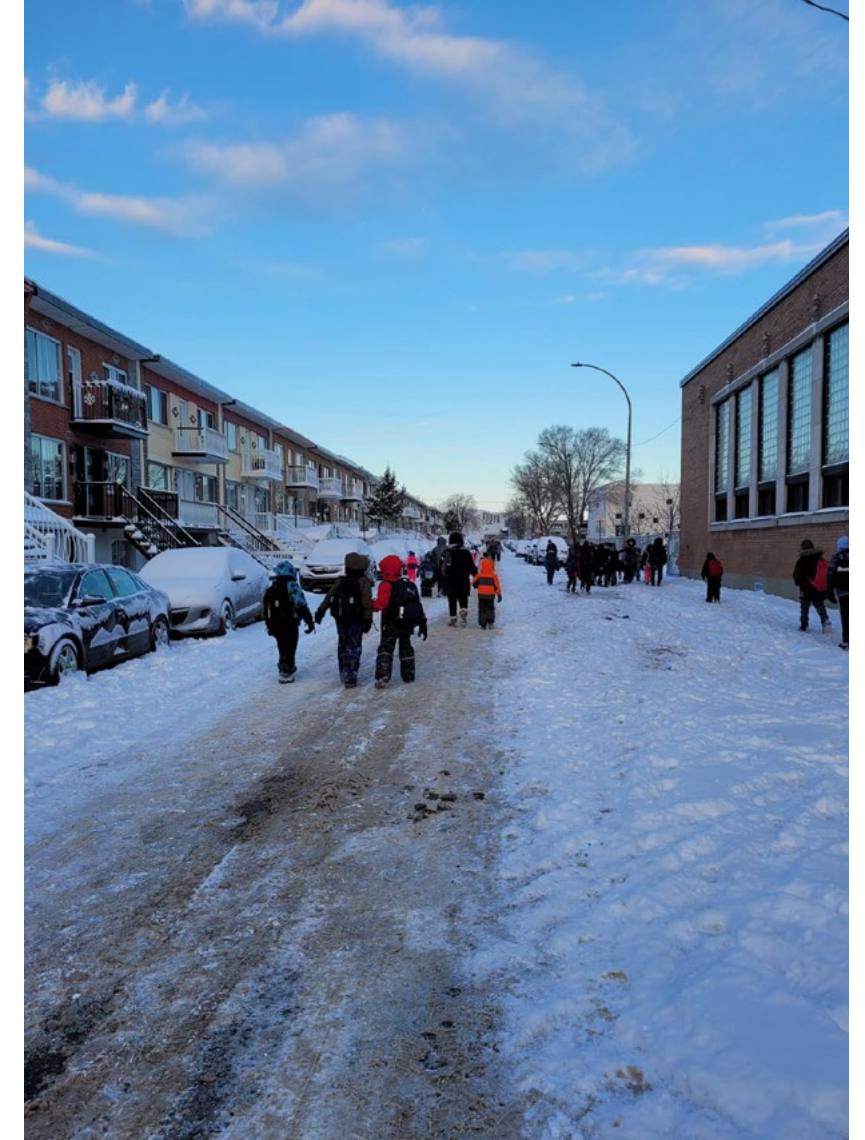


Figure 17 : School street in Montreal.

1. Sidewalk Design, Urban Street Design Guide, National Association of City Transportation Officials, 2013, <https://nacto.org/publication/urban-street-design-guide/street-design-elements/sidewalks/#footnotes>

2. Accessibility for Ontarians with Disabilities Act, Ontarian Regulation 413/12, 2005, <https://www.ontario.ca/laws/regulation/r12413>

## 5. Cycling Network



## METHODOLOGY

### Introduction

The ATMP builds upon the existing Transportation Master Plan (2014) and aims to reflect the current and future needs of the community. One of the key components of the ATMP is the proposed cycling network, which is looking to create a safe, convenient, and connected system of bikeways for cyclists of all ages and abilities.

The proposed cycling network will consist of different types of urban and rural bikeways, such as bike lanes, shared lanes, multi-use pathways, and paved shoulders. The cycling network will also link to the existing Bluewater Trails system, the Sarnia Transit system, and other destinations in the city and beyond. The City will further enhance the efficiency of the system with the installation of bike parking in commercial, commuting and recreational areas and with the development of a bike registration system to reduce bike theft incidents, which are part of the actions to be implemented that are detailed in the Action Plan and Implementation Strategy.

### Methodology

The Active Transportation Master Plan embraces a user-centric approach to the development of the cycling network, recognizing the diverse needs of the community. By categorizing users based on factors such as age, ability, and purpose (commuting, leisure, or shopping), the plan ensures inclusivity and responsiveness to the unique requirements of each group. This approach involved extensive community engagement to gather input and preferences, ensuring that the cycling network is not only comprehensive but also reflective of the community's values and aspirations.

In terms of the timeline, the plan indicates which projects can be implemented as a short-term quick win, a medium-term project, or a long-term permanent improvement. This phased approach will distribute the cost of cycling projects over the years and is also designed to create immediate impact where it is feasible to do so at a low-cost and easy implementation for the municipality. The initial implementation of quick wins and pilot projects showcases the benefits of the cycling network and is an opportunity to foster community buy-in and behavior change. This will generate both an increased demand for active transportation and lay the groundwork for the more substantial and permanent changes. This will also give the opportunity for more complex and high-cost projects to be incorporated within road resurfacing and sewer renewal capital projects.

For the budget, the costs of previous projects undertaken in Sarnia between 2020 and 2023 were used to estimate the costs of individual cycling projects. This includes the pricing of the proposed roundabout and pedestrian and cyclist crossings, as well as the costs of the proposed cycle routes which were derived from the cost per meter for completed projects such as the Confederation Street multi-use pathway and the Indian Road bike lane painting.

By leveraging the lessons learned from past projects, the plan seeks to optimize resource allocation and enhance the overall cost-effectiveness of the cycling network implementation.



Figure 18 : Cyclists on waterfront in Sarnia.



## CONNECTIVITY FOR COMMUTING

One of the objectives of the ATMP is the creation of a well-planned cycling network through the city, connecting residential neighborhoods to employment activities. Commuting trips constitute an essential part of the city's daily life as around 55% of the total population of Sarnia is employed<sup>1</sup>. The cycling network can reduce traffic congestion and pollution by encouraging more people to use a bike instead of a motorized vehicle when going to and coming back from work. Commuters can also save money by reducing their fuel costs and their parking fees, while reducing greenhouse gas emissions.

The network, presented in Figure 19, will be expanded by building and improving the cycling network on Christina Street, Brock Street and Vidal Street. A concept currently under consideration involves implementing unidirectional segregated cycle tracks with one direction on Brock Street and the other on Vidal Street<sup>2</sup>. In addition, it is proposed to expand the recent road diet on Indian Road, to implement unidirectional bike lanes on Michigan Avenue and Cathcart Boulevard, and to connect the residential areas in the northern part of the city to the main business districts downtown and in the petrochemical zone to the south.

The long-term plan for Cathcart Boulevard proposes a road diet to incorporate semi-raised cycle tracks and footways with a road platform reduction to 7m wide, to provide additional space for walking and cycling. Another long-term project would be to add several cycle routes to the East of Modeland Road which would connect the future residential uses in Development Area 2 to the broader cycling infrastructure.

Table 1 presents the proposed cycling routes for commuting, detailing the segment of the road concerned, the type of infrastructure proposed, the timeline and a high-level budget for the project.

Developing the cycling connectivity for commuting trips will not only enhance the Sarnians' health and wellbeing but also contribute to reduced traffic congestion, environmental sustainability, and cost savings.

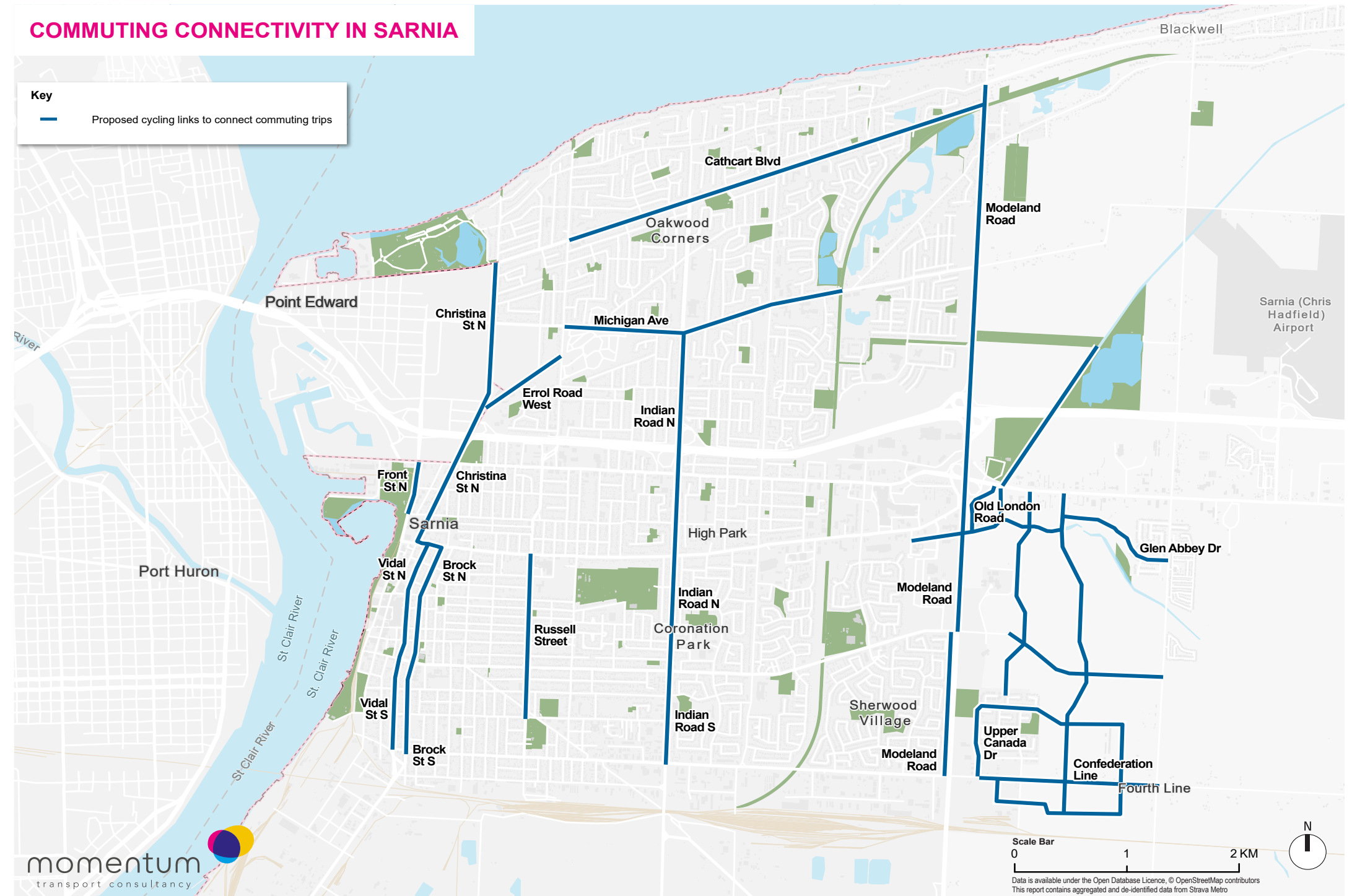


Figure 19: Proposed cycling links to connect commuting trips.

1. Canada Census 2021, StatCan, 2021, <https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/details/page.cfm?Lang=E&SearchText=Sarnia&DGUIDlist=2021S0504562&GENDERlist=1,2,3&STATISTIClist=1&HEADERlist=0>  
 2. See Section 6: Urban design approach for proposed projects

Table 1 : Proposed cycling routes for commuting connectivity

Route	Delimitations	Timeline	Infrastructure Type	Distance (km)	Estimated Cost (\$)
Russell Street	London Road / Devine Street	Quick win	Painted bike lane + flex posts	1.55	177,600
Russell Street	London Road / Devine Street	Medium term	Unidirectional segregated cycle track	1.55	1,136,700
Christina Street	Cathcart Boulevard / London Road	Quick win	Painted bike lane + flex posts	2.72	311,700
Christina Street	Cathcart Boulevard / London Road	Medium term	Unidirectional segregated cycle track	2.72	1,994,700
Brock Street	London Road / Confederation Street	Quick win	Painted bike lane + flex posts	2.11	241,800
Brock Street	London Road / Confederation Street	Medium term	Unidirectional segregated cycle track	2.11	1,547,300
Vidal Street	London Road / Confederation Street	Quick win	Painted bike lane + flex posts	2.11	241,800
Vidal Street	London Road / Confederation Street	Medium term	Unidirectional segregated cycle track	2.11	1,547,300
Front Street	Exmouth Street / Maxwell Street	Quick win	Painted bike lane + flex posts	0.5	57,300
Front Street	Exmouth Street / Maxwell Street	Medium term	Unidirectional segregated cycle track	0.5	366,700
Michigan Avenue	Colborne Road / Howard Watson Nature Trail	Quick win	Painted bike lane + flex posts	2.52	288,800
Michigan Avenue	Colborne Road / Howard Watson Nature Trail	Medium term	Unidirectional segregated cycle track	2.52	1,848,000
Cathcart Boulevard	Colborne Road / Modeland Road	Quick win	Painted bike lane + flex posts	3.93	450,400
Cathcart Boulevard	Colborne Road / Modeland Road	Long term	Unidirectional segregated cycle track	3.93	2,882,000
Errol Road	Christina Street / Colborne Road	Medium term	Painted bike lane + flex posts	0.83	95,100
Errol Road	Christina Street / Colborne Road	Long term	Unidirectional segregated cycle track	0.83	608,700
Indian Road	Michigan Avenue / Confederation Street	Long term	Buffered bike lane	4.02	92,800
Modeland Road	Lakeshore Road / Confederation Street	Long term	Multi-use pathway	6.48	4,752,000
Development Area (London Line)	Lambton College / London Line	Long term	Multi-use pathway + tunnel	4.78	N/A
Development Area (Confederation Line)	Upper Canada Drive / Blackwell Sideroad	Long term	N/A	1.6	N/A
Development Area	Heritage Park Drive	Long term	N/A	2.42	N/A
Development Area	Wellington Street / Blackwell Sideroad	Long term	N/A	1.51	N/A
Development Area	N/A	Long term	N/A	6.79	N/A



## CONNECTIVITY FOR LEISURE

The ATMP aims at improving the connectivity with leisure activities by providing a cycling network that connects parks, natural areas, and points of interest in the city and along the waterfront.

To enhance the leisure connectivity in Sarnia, the cycling network, presented in Figure 20, includes the addition of paved shoulders along the entire rural road network on the east side of Highway 40, as well as the extension of the St. Clair Parkway paved shoulders to Port Lambton, which will provide a scenic riverside route for cyclists. Cycle routes along Lakeshore Road and Blackwell Road are also proposed to provide recreational cyclists with designated routes but also contribute to the overall connectivity of residential areas that are a further distance from the centre of Sarnia, particularly towards Bright's Grove and the lakefront residences. cycling network. A segment of Old Lakeshore Road between Pine Avenue and Penhuron Drive is included as a pedestrianized shared street, to provide a dedicated walking and cycling access to the lakefront.

Table 2 presents the proposed cycling routes for leisure, detailing the segment of the road concerned, the type of infrastructure proposed, the timeline and a high-level budget for the project.

The routes identified in this section aim at making cycling for leisure purposes safe, more accessible and enjoyable for residents while fostering an improved connectivity between neighbourhoods and popular recreational destinations.

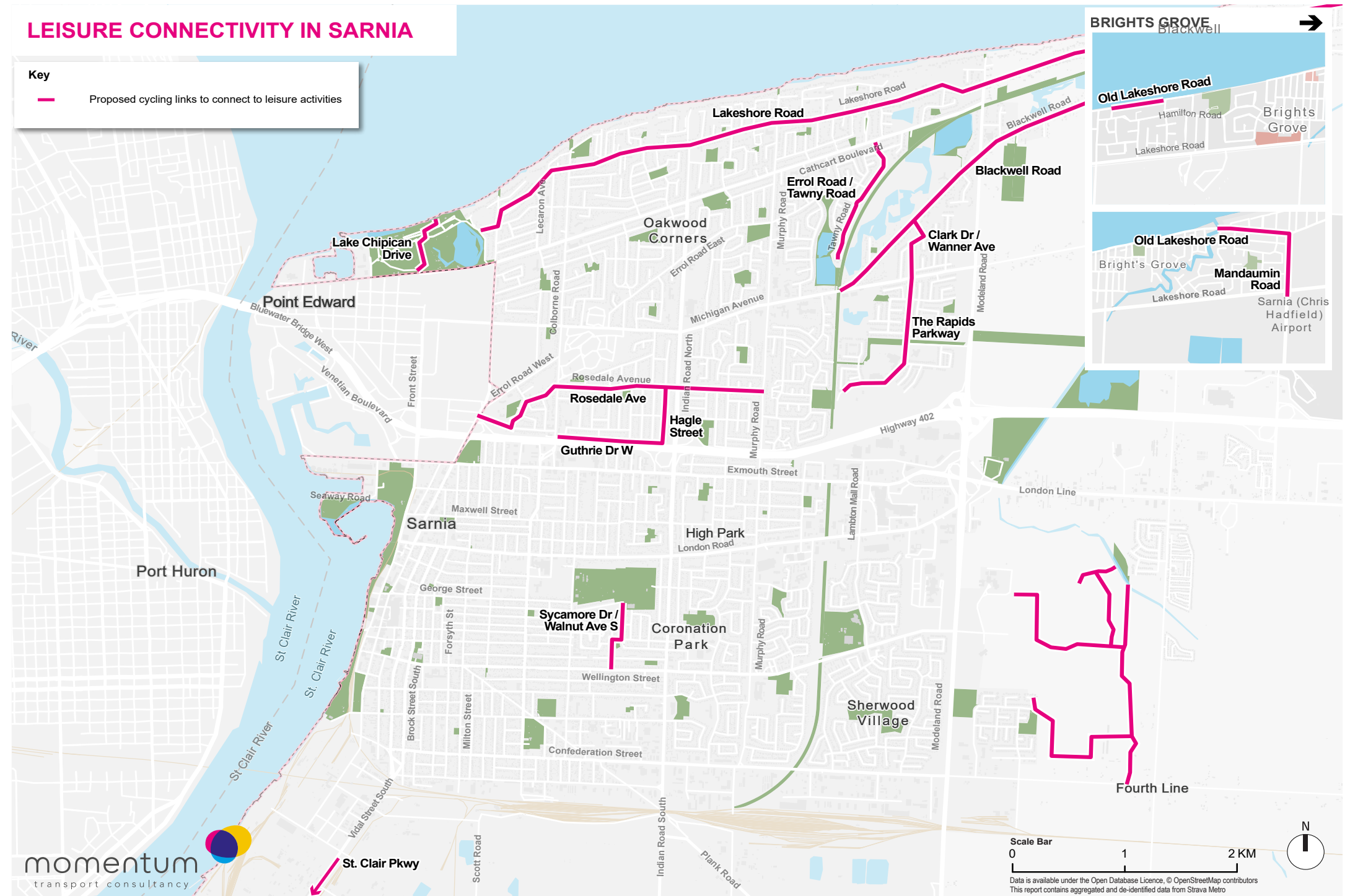


Figure 20: Proposed cycling links to connect to leisure activities

Table 2 : Proposed cycling routes for leisure connectivity

Route	Delimitations	Timeline	Infrastructure Type	Distance (km)	Estimated Cost (\$)
Lakeshore Road	Lake Chipican Drive/ Jamieson Lane	Quick win	Painted bike lane + flex posts	9.48	1,086,400
Lakeshore Road	Lake Chipican Drive/ Jamieson Lane	Long term	Unidirectional segregated cycle track	9.48	6,952,000
Rosedale Avenue	Christina Street / Murphy Road	Quick win	Painted bike lane + flex posts	2.79	319,700
Rosedale Avenue	Christina Street / Murphy Road	Long term	Unidirectional segregated cycle track	2.79	2,046,000
Guthrie Drive	Colborne Road / Rosedale Avenue	Quick win	Signed local street bikeway	1.46	33,700
Rapids Parkway	Blackwell Road / Meadowlark Lane	Quick win	Signed local street bikeway	2.04	47,100
Sycamore Drive	Germain Park / Wellington Street	Quick win	Signed local street bikeway	0.7	16,200
Errol Road E / Tawny Road	Cathcart Boulevard / Michigan Avenue	Quick win	Signed local street bikeway	1.4	32,300
Old Lakeshore Road	Pine Avenue / Penhuron Drive	Medium term	Pedestrianized shared street	0.47	178,500
Old Lakeshore Road	Cow Creek / Mandaumin Road	Medium term	Painted bike lane + flex posts	0.72	81,900
Mandaumin Road	Old Lakeshore Road / Howard Watson Nature Trail	Long term	Multi-use pathway	0.63	459,800
Blackwell Road	Michigan Avenue / Lakeshore Road	Long term	Multi-use pathway	4.24	3,109,300
Lake Chipican Drive	Beach / Canatara Park	Long term	Bidirectional segregated cycle track	0.65	476,700
Development areas	N/A	Long term	N/A	6.06	N/A

## CONNECTIVITY FOR SHOPPING

The ATMP also aims at improving the accessibility by bike for shopping and running errands by proposing additional cycling routes along commercial streets. This layer of the network is planned to connect residents to downtown and to the shopping areas along London Road, Exmouth Street, and Mitton’s Farmer’s Market.

As short-term actions of the cycling network presented in Figure 21, George Street is proposed as a painted bike lane, protected with flex posts, to improve the connectivity to downtown. In addition, signed local street bikeways are proposed on Southern Avenue, Maxwell Street, and Oxford Street, to facilitate access to commercial areas through quieter roads.

In the long-term, the complete redevelopment of London Road and Exmouth Street is proposed with a Complete Streets approach, aiming at rebalancing the allocation of space to vulnerable users, which are walking and cycling to shops. This corridor approach will aim at consolidating some of the vehicular access points to car parking areas, to reduce conflicts with pedestrians and cyclists, while maintaining other users.

Table 3 presents the proposed cycling routes for shopping, detailing the segment of the road concerned, the type of infrastructure proposed, the timeline and a high-level budget for the project.

Developing cycling routes for shopping and running errands will support economic activity and investment in the area; as safe bike lanes can increase the spending and frequency customers, especially as cyclists tend to spend more money locally and purchase more frequently than car drivers or public transit users<sup>1</sup>.

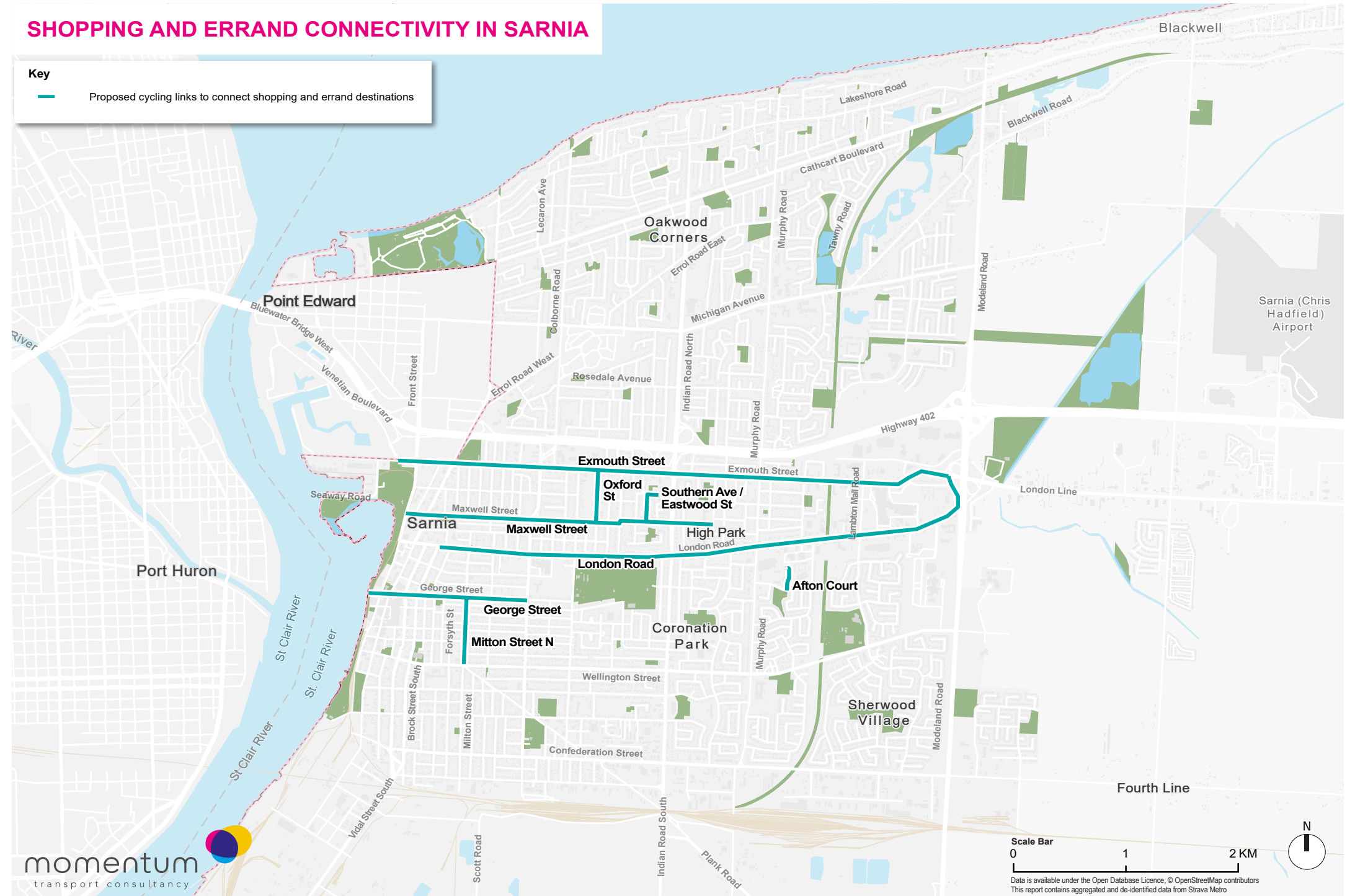


Figure 21 : Proposed cycling links to connect shopping and errand destinations

1. Six reasons to build cycle lanes, Cycling UK, 2023, <https://www.cyclinguk.org/article/six-reasons-build-cycle-lanes>



Table 3 : Proposed cycling routes for shopping connectivity

Route	Delimitations	Timeline	Infrastructure Type	Distance (km)	Estimated Cost (\$)
George Street	Bluewater Bike Path / Russell Street	Quick win	Painted bike lane + flex posts	1.4	160,400
George Street	Bluewater Bike Path / Russell Street	Long term	Unidirectional segregated cycle track	1.4	1,026,700
Southern Avenue	Maxwell Street / Centre Point Plaza	Quick win	Signed local street bikeway	0.36	8,300
Maxwell Street	Front Street / Kember Avenue	Quick win	Signed local street bikeway	2.75	63,500
Oxford Street	Exmouth Street / Maxwell Street	Quick win	Signed local street bikeway	0.49	11,300
Afton Court	London Road Shopping Centre / Afton Drive	Quick win	Signed local street bikeway	0.22	5,100
Mitton Street	George Street / Wellington Street	Medium term	Complete streets boulevard redevelopment	0.66	202,000
Exmouth Street	Venetian Boulevard / London Road	Long term	Complete streets boulevard redevelopment	4.92	1,505,500
London Road	Brock Street / London Line	Long term	Complete streets boulevard redevelopment	4.99	1,526,900

## CONNECTIVITY FOR THE VULNERABLE POPULATION

The ATMP aims at improving the connectivity for the vulnerable population by providing an inclusive and safe network that meets the diverse needs of Sarnians with limited mobility, low-income households, students, or First Nations communities. Low-income households and students may not own a motorized vehicle, which means they have a greater reliance on public transit, cycling or walking to get to work, university, to do groceries or access leisure activities. Offering a safe and well-connected cycling network particularly in the southern side of Sarnia and close to Lambton College will be key to improving connectivity for these communities.

As presented in Figure 22, the cycle routes along Confederation Street, Wellington Street and Murphy Road are proposed as medium-term unidirectional segregated cycle tracks for the safety of school children, while the signed local street bikeways proposed on Kember Avenue, O'Dell Street, Lecarone Avenue and Talfourd Street are complementary for continuity from the cycle routes to school entrances. A number of other roads have been highlighted for signed local street bikeways, to provide shortcuts on local streets within residential areas in order to avoid the busier roads. Sarnians have testified that these are quiet routes that they often use and could be better earmarked for others to access safe cycling routes in the city.

Other medium-term projects include the redevelopment of Mitton Street and Devine Street as Complete Streets, including traffic calming measures to reduce the traveling speed of motorized vehicles, dedicated bike lanes, raised intersections and planted bump-outs to improve the visibility over pedestrians. It is also proposed to implement continuous sidewalks on Mitton Street to provide priority for cyclists and pedestrians.

Table 4 presents the proposed cycling routes for the vulnerable population, detailing the segment of the road concerned, the type of infrastructure proposed, the timeline and a high-level budget for the project.

Improving the connectivity for vulnerable populations will help deliver benefits of physical and mental wellbeing for all Sarnians.



Figure 22 : Proposed cycling links to connect the vulnerable population



Table 4 : Proposed cycling routes for the vulnerable population

Route	Delimitations	Timeline	Infrastructure Type	Distance (km)	Estimated Cost (\$)
Confederation Street	Christina Street / McGregor Side Road	Quick win	Painted bike lane + flex posts	3.35	383,900
Confederation Street	Christina Street / McGregor Side Road	Medium term	Unidirectional segregated cycle track	3.35	2,456,700
Wellington Street	Front Street / Murphy Road	Quick win	Painted bike lane + flex posts	3.49	400,000
Wellington Street	Front Street / Murphy Road	Medium term	Unidirectional segregated cycle track	3.49	2,559,300
Oak Avenue	Aberdeen Avenue / Lansdowne Avenue	Quick win	School street pilot project	0.26	15,600
Oak Avenue	Aberdeen Avenue / Lansdowne Avenue	Long term	Pedestrianized shared street	0.26	98,700
Murphy Road (Cathcart Blvd)	Cathcart Boulevard / Rosedale Avenue	Medium term	Painted bike lane + flex posts	2.03	232,600
Murphy Road (Cathcart Blvd)	Cathcart Boulevard / Rosedale Avenue	Long term	Unidirectional segregated cycle track	2.03	1,488,700
Kember Avenue	Exmouth Street / London Road	Quick win	Signed local street bikeway	0.8	18,500
O'Dell Street	Cathcart Boulevard / Colborne Road	Quick win	Signed local street bikeway	0.35	8,100
Lambton Mall Road	Quinn Drive / London Road	Quick win	Signed local street bikeway	0.7	16,200
Finch Drive	London Road / Confederation Street	Quick win	Signed local street bikeway	2.6	60,000
Quinn Drive	N/A	Quick win	Signed local street bikeway	1.11	25,700
Lansdowne Avenue	London Road / Confederation Street	Quick win	Signed local street bikeway	2.08	48,000
Talfourd Street	Indian Road / Murphy Road	Quick win	Signed local street bikeway	0.79	18,200
Lecarone Avenue	Lakeshore Road / Cathcart Boulevard	Quick win	Signed local street bikeway	0.67	15,500
Champlain Road	Errol Road / Michigan Avenue	Quick win	Signed local street bikeway	0.75	17,000
McGregor Side Road	Confederation Street / Howard Watson Nature Trail	Quick win	Signed local street bikeway	0.38	8,800
Cambridge Crescent	Michigan Avenue / Wiltshire Drive	Quick win	Signed local street bikeway	0.56	13,000
Wiltshire Drive	Cambridge Crescent / Banbury Avenue	Quick win	Signed local street bikeway	0.46	10,600
Forsyth Street	George Street / Wellington Street	Quick win	Signed local street bikeway	0.64	14,800
Kensington Boulevard	Mayfair Drive / Murphy Road	Quick win	Signed local street bikeway	0.23	5,300
Mitton Street (Two sections)	London Road / George St and Wellington Street / Confederation Street	Medium term	Complete streets redevelopment	1.24	379,400
Devine Street	Christina Street / Russell Street	Medium term	Complete streets redevelopment	2.78	850,700
Murphy Road (Confederation St)	Kensington Boulevard / Confederation Street	Medium term	Multi-use pathway	1.87	1,371,300

## CONNECTIVITY FOR PARKS

Parks are gateways to Sarnians' leisure activities and provide access to natural features that are loved by residents. The cycling network therefore proposes to offer them convenient and direct routes to various parks and green spaces, fostering a healthier and more sustainable experience of getting to and from natural spaces.

The network, presented in Figure 23, aims at improving connections between existing and proposed cycle routes and Canatara Park, Centennial Park, Germain Park, the waterfront and the Howard Watson Nature Trail. This continuity in the cycling network will provide cyclists safety when accessing the city's green spaces, which will encourage both recreational and commuting use.

For example, a safe pedestrian and cycle crossing is proposed at the intersection of Venetian Boulevard and Centennial Park, as well as a multi-use pathway through Centennial Park, creating a new accessible route to the waterfront. The connectivity with the waterfront can also be improved with new routes from Maria Street and Johnston Street. Bike boxes are proposed at the intersection of Maria Street and Christina Street, to give priority to cyclists along the route connecting from the Midtown trail to the waterfront. Lochiel Street is proposed as a pedestrianized shared street to further expand the connectivity with the waterfront, downtown and residential areas in the southern part of Sarnia. The multi-use pathway along Banbury Avenue would ensure connectivity to the Howard Watson Nature Trail, and the proposed roundabout at the junction of Christina Street and Cathcart Boulevard will facilitate the entry to the park from the intersecting cycle routes, as Canatara Park is one of the most used parks in Sarnia.

Table 5 presents the proposed cycling routes for parks, detailing the segment of the road concerned, the type of infrastructure proposed, the timeline and a high-level budget for the project.

The cycle routes proposed will improve links between green spaces and residential areas, ensuring that community members can easily access parks without relying on motorized vehicles, reducing pressure on on-street and off-street parking near parks.



Figure 23 : Proposed cycling links to connect to parks and nature trails



Table 5 : Proposed cycling lanes for connectivity with parks

Route	Delimitations	Timeline	Infrastructure Type	Distance (km)	Estimated Cost (\$)
Canatara Park	Cathcart Boulevard / Christina Street	Medium term	Unidirectional segregated cycle track and roundabout	0.15	1,310,000
Canatara Park	Exmouth Street / Venetian Boulevard	Medium term	Multi-use pathway + safe pedestrian and bike crossing	0.42	338,000
Waterfront	Maria Street / Bluewater Bike Path	Medium term	Painted bike lane	0.28	6,500
Waterfront	Maria Street / Front Street Car Park	Medium term	Multi-use pathway	0.23	168,700
Waterfront	Bluewater Bike Path / Johnston Street	Medium term	Multi-use pathway	0.5	366,700
Lochiel Street	Bluewater Bike Path / Vidal Street	Medium term	Pedestrianized shared street	0.14	53,200
Banbury Avenue	Murphy Road / Howard Watson Nature Trail	Medium term	Multi-use pathway	0.64	469,300

## INTERMODAL CONNECTIVITY

The City of Sarnia is served by various bus routes and a Via Rail Station, providing accessible sustainable transit options to destinations within and beyond the city. It is important that these routes can be accessed via the cycling network.

The links between the proposed cycling network and public transit terminals, presented in Figure 24, were verified and one further missing link was identified to improve connectivity to the Via Rail Train Station, for users wanting to visit the train station by bike. A bidirectional segregated cycle track is proposed between Devine Street and the station, which will finalise the connectivity between the cycling and transport networks. A provision of secure bike parking at the station would further support the accessibility of regional trains by active transportation.

Table 6 presents the proposed cycling route for intermodal connectivity, detailing the segment of the road concerned, the type of infrastructure proposed, the timeline and a high-level budget for the project.

By strategically linking key transportation hubs such as the Via Rail Station, Bayside Terminal, Murphy Road Terminal, and Northgate Terminal through a comprehensive network of pedestrian and cycling routes, the ATMP aims at creating a seamless and sustainable transportation system, facilitating active travel around Sarnia and between neighbouring cities.

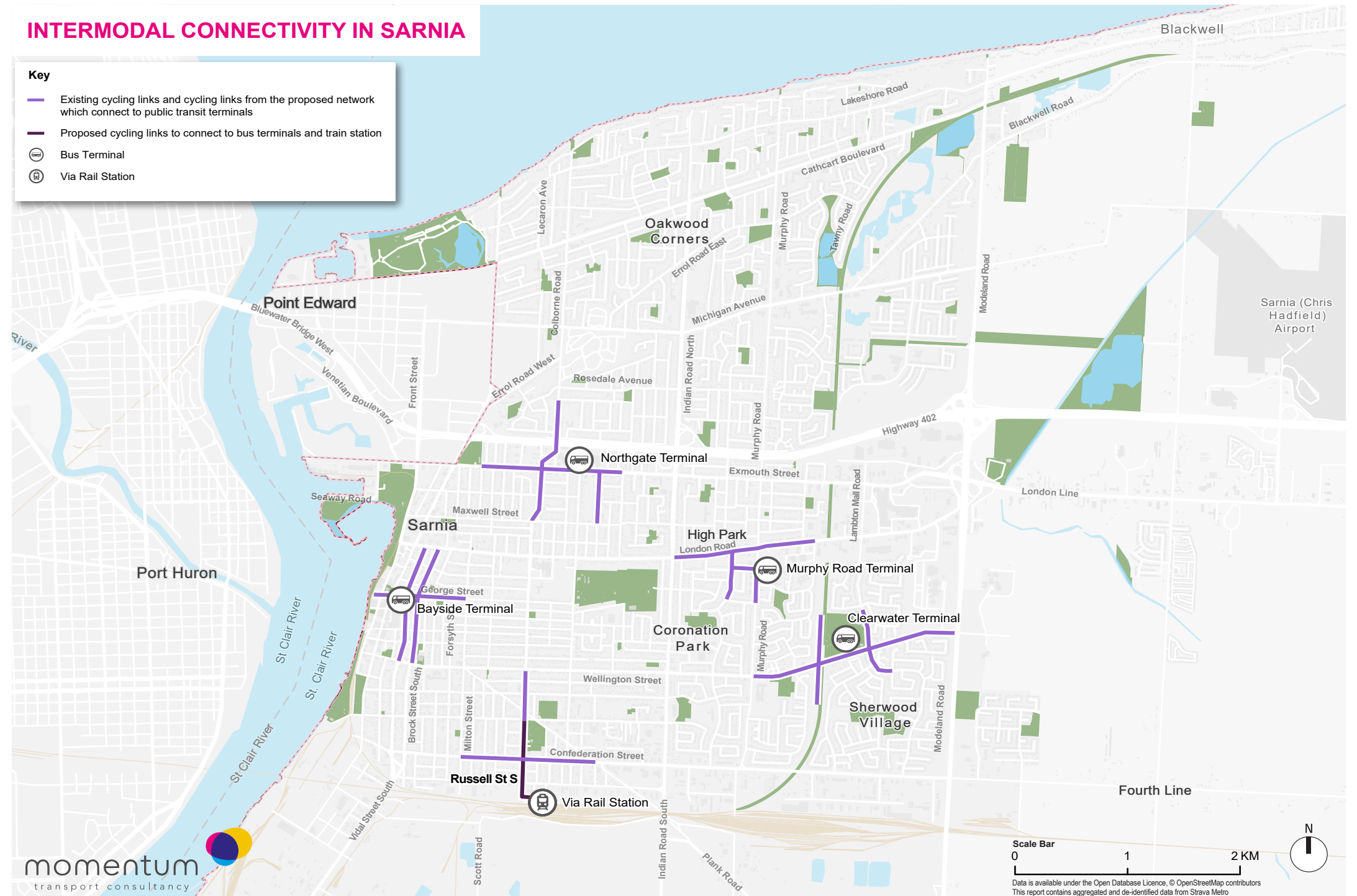


Table 6 : Proposed cycling route for intermodal connectivity

Figure 24 : Proposed cycling links to connect to public transit terminals

Route	Delimitations	Timeline	Infrastructure Type	Distance (km)	Estimated Cost (\$)
Russell Street	Devine Street / VIA Rail Train Station	Medium term	Bidirectional segregated cycle track	0.95	696,700



## COMBINED NETWORK

The Sarnia Active Transportation Master Plan introduces a comprehensive cycling network designed to address various connectivity needs within the community.

For the commuting connectivity, cycle lanes will be strategically implemented along major commuting routes. Leisure connectivity is a key focus, with multi-use pathways integrated into scenic areas, promoting a versatile and enjoyable experience for cyclists seeking recreational routes. The network also enhances shopping connectivity, allowing residents to easily access commercial areas by bike. Special attention is given to vulnerable populations, with the network incorporating measures to ensure their safety and accessibility, for example in school zones. The connectivity with parks is facilitated through designated cycle lanes connecting green spaces, contributing to a more environmentally-friendly and health-conscious community. Finally, the intermodal connectivity is a key aspect, integrating cycling and public transit routes, creating a seamless transition between different modes of transportation.

The comprehensive cycling network, presented in Figure 25, is a combination of these layers, adapting to the diverse needs of Sarnia's residents. The plan also places a strong emphasis on safe intersection design. This includes measures to ensure a continuity of cycle routes at intersections, enhancing overall safety and useability of the network.

The plan is structured as a long-term initiative, comprising of quick wins and phased short-term, medium-term, and long-term projects. This flexible approach allows the network to adapt to changing needs, behaviors, and capital project opportunities. As the city evolves, the cycling network will remain responsive, providing an evolving infrastructure that aligns with the community's values and aspirations for a sustainable and inclusive transportation system.

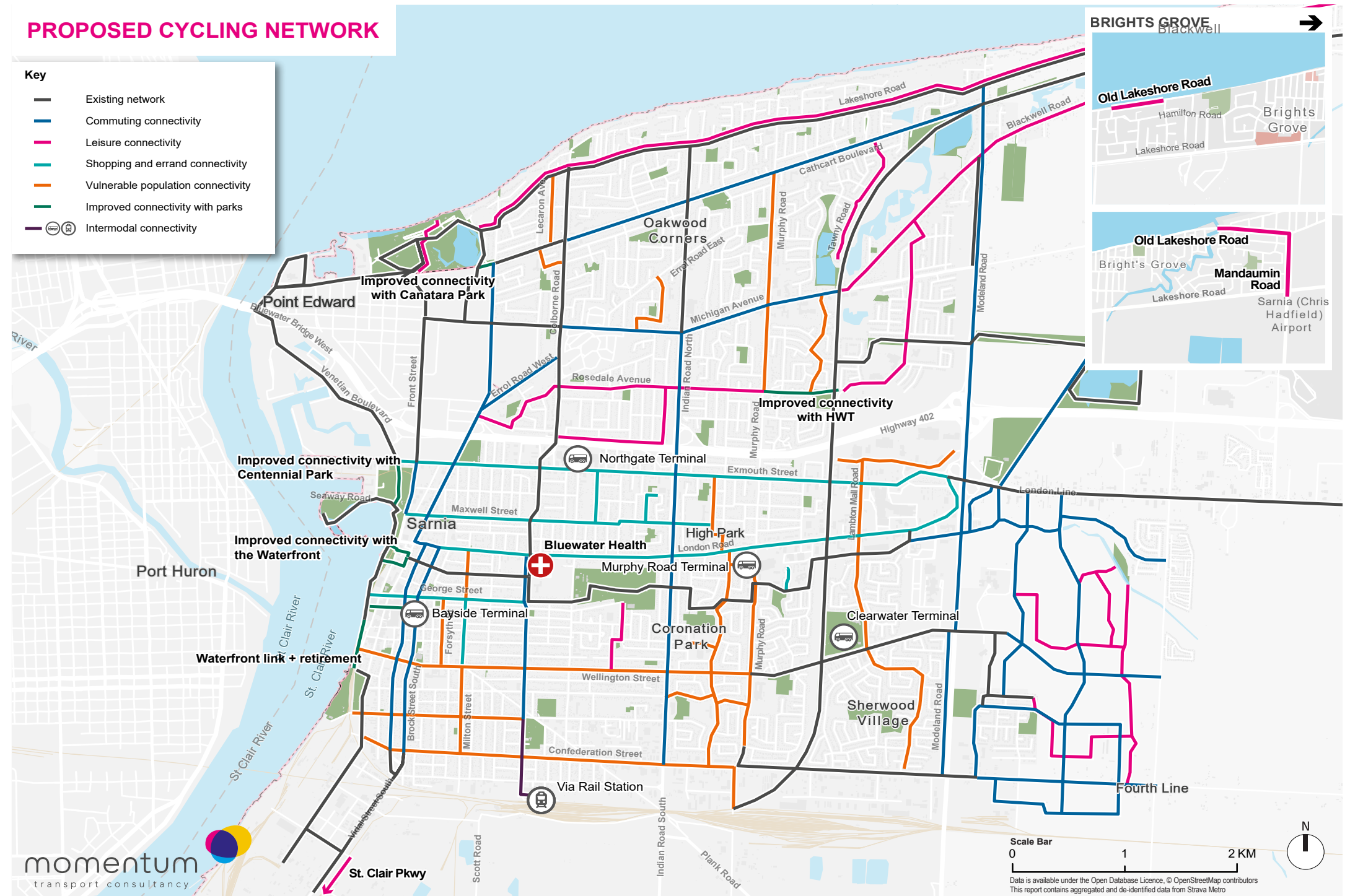


Figure 25 : Proposed cycling network

## 6. Urban Design Approach for Proposed Projects



## URBAN DESIGN APPROACH FOR PROPOSED PROJECTS

This section gives an initial overview of the urban design approach proposed for the active transportation projects included in the walking and cycling networks. Based on the stakeholder workshop held with the Dutch Cycling Embassy in August 2023, two locations that are priority projects in the proposed walking and cycling networks have been selected to present visuals of the projects proposed. These locations are:

- The priority intersection between Cathcart Boulevard and Christina Street which is the entrance to Canatara Park.
- The Brock Street and Vidal Street corridors where unidirectional cycle links are proposed.

It is important to highlight that the renders presented here are an initial sketch and not a finalized concept design. Further considerations are necessary if Sarnia intends to proceed with the implementation of these projects. Detailed design elements to be developed include: detailed geometric design, landscaping concepts, signs and marking requirements, lighting specifications, tender documents for construction, etc.

### Cathcart Boulevard and Christina Street Intersection

The project proposed at the intersection of Cathcart Boulevard and Christina Street is a roundabout, aiming at slowing down motorized vehicles while creating additional secure space for pedestrians and cyclists.

Figure 26 presents the existing configuration of the intersection, with wide vehicle lanes generating higher speeds and long distances to cross for pedestrians and cyclists. Figure 27 illustrates the roundabout concept proposed at this intersection.

The proposed Dutch roundabout concept at the intersection of Cathcart Boulevard and Christina Street in Sarnia is designed with a focus on enhancing safety, efficiency, and adding aesthetic appeal. Based on Dutch principles presented by the Dutch Cycling Embassy, a single lane roundabout can accommodate up to 25,000 AADT and would need an equally-distributed flow of traffic across the four approaches. Given the existing volume of traffic estimated around 2,000 AADT on Christina Street and 6,000 AADT on Cathcart Boulevard which are low traffic numbers to accommodate in this location, the geometry of a single-lane roundabout should be sufficient to accommodate the traffic flows at this location.

The roundabout concept emphasizes pedestrian safety and accessibility, with sidewalks on each side of the roads and a dedicated pedestrian crossing island at each approach of the intersection. Clear white road markings enhance visibility and guide drivers through the intersection seamlessly. The addition of Yield signs on the vehicle lanes approaching the roundabout further contributes to the overall safety of all users.

The central island is an opportunity to become a gateway to Canatara Park with greenery and public art connecting to the not-so-distant lakefront. Additionally, greening could be integrated within the islands separating the cycle lane and the road, which would contribute to reducing heat island effects. The inclusion of colored cycle lanes and segregation from vehicular traffic promotes a safer environment for pedestrians and cyclists.



Figure 26 : Before - Cathcart Boulevard and Christina Street intersection



Figure 27 : After - Cathcart Boulevard and Christina Street Intersection<sup>1</sup>

<sup>1</sup> It is important to highlight that the render is an initial sketch and not an engineering design. Further considerations are necessary if the City of Sarnia intends to proceed with the implementation of the project.



## URBAN DESIGN APPROACH FOR PROPOSED PROJECTS

### Brock Street and Vidal Street Corridor

The project proposed on Brock Street and Vidal Street is to add unidirectional cycle lanes following the direction of traffic on each street, providing a cycling connection through downtown Sarnia.

Figure 28 presents the existing configuration with three vehicle lanes, narrow sidewalks and little greenery on the corridor. Figure 29 illustrates the proposed project on the southbound section of Vidal Street at the intersection with George Street.

The project proposes a road diet from three to two southbound vehicle lanes accompanied by a dedicated cycle lane on the right. The reduction of the road platform to two vehicle lanes will be sufficient to accommodate the existing Annual Average Daily Traffic (AADT) of 5,000 to 6,000 on Brock Street and Vidal Street. The cycle lane is proposed to be separated from the vehicle lane by greenery and trees, providing both a visually appealing and secure space for cyclists. Meanwhile, this location illustrates a proposed design next to a bus stop as the adjacent site is planned to be redeveloped as a bus terminal. The bus stop is proposed to be equipped with benches and trees, creating a pleasant resting place for users and a pleasant area for pedestrians. Lampposts illuminate the sidewalks and the cycle lane, ensuring a well-lit environment.

A key highlight is the accessible bus stop design seamlessly integrated with a pedestrian crossing over the cycle lane to protect the boarding and unloading of bus users. This thoughtful design prioritizes pedestrian safety and convenience, exemplifying an urban space that harmoniously accommodates cyclists, pedestrians, and public transit users. This can be complemented by tactile paving to facilitate the transfer of people with sight loss.



Figure 28 : Before - Vidal Street and George Street Intersection



Figure 29 : After - Vidal Street and George Street Intersection<sup>1</sup>

1. It is important to highlight that the render is an initial sketch and not an engineering design. Further considerations are necessary if the City of Sarnia intends to proceed with the implementation of the project.



# 7. Active Transportation Glossary



## GLOSSARY<sup>1,2</sup>

This glossary serves as a comprehensive guide to the terminology associated with the Active Transportation Network. This glossary provides clarity on essential concepts that define the network and standardizes terminology across the whole plan.

### Buffered Bike Lane

A type of painted bike lane, where the bike lane and the motorized travel lane are separated by an area of painted diagonal or chevron hatching or a parking lane, creating more distance between vehicular and cycle traffic.

### Bump-out

The curb is extended into the roadway at certain sections, widening the sidewalk and narrowing the roadway. Vehicle speed along the roadway is reduced for motorized vehicles, and the distance of pedestrian crossings are shortened, both of which lead to increased safety for pedestrians.<sup>3</sup>

### Complete Streets

Streets that are designed for all users of all ages and all abilities, including pedestrians, cyclists and motorists. The design involves the integration of social, economic and environmental priorities. This involves ensuring that streets are accessible and sustainable, and contribute towards supporting the economic prosperity, vibrancy and livability of the surrounding areas. For example, this could be achieved through the installation of street furniture, sustainable drainage systems, or traffic calming mechanisms which contribute towards the safety of pedestrians and cyclists.<sup>4</sup>

### Continuous Sidewalks

A sidewalk where pedestrians and other users have an uninterrupted travel path, indicated by the fixed gradient and elevation of the sidewalk across intersections with roadways. Motorized vehicles access the sidewalk via a ramp from the roadway, which slows the speed of traffic and increases the visibility of users of the sidewalk.<sup>5</sup>



Figure 30 : Buffered bike lane in Montreal.



Figure 31 : Bump-out in Montreal.



Figure 32 : Complete Street in Montreal.



Figure 33 : Continuous sidewalks in London, UK.

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2. Toronto's Cycling Infrastructure, City of Toronto, 2023, <https://www.toronto.ca/services-payments/streets-parking-transportation/cycling-in-toronto/torontos-cycling-infrastructure/>

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## GLOSSARY

### Multi-Use Pathway ('MUP')

Two-way pathway which is shared by cyclists, pedestrians and other users. Pathways can be independent from the roadway, or simply segregated from motorized travel lanes by a physical barrier such as concrete curbs or planters.

### Painted Bike Lane

A lane along a roadway, used exclusively by cyclists, positioned between the motorized travel lane and the curb or the on-street parking lane. Routes can be identified by a painted line which separates vehicular and cycle traffic, and bicycle and diamond pavement markings along the lane.

### Paved Shoulder

A painted lane on the outer edge of a roadway without a curb, such as a rural road or a highway. The paved shoulder provides a designated space for cyclists but may also be used by motorized vehicles which need to pull off the road in emergency situations.<sup>1</sup>

### Pedestrianized Street

A street which is closed to vehicular traffic and can be used exclusively by pedestrians or can be shared with cyclists or other users. The street could be pedestrianized on a permanent or temporary basis, such as over the summer season or on weekends.<sup>2</sup>



Figure 34 : Multi-use pathway in Mirabel, Quebec.



Figure 35 : Painted bike lane in St Louis, Missouri, USA.



Figure 36 : Paved shoulder in San Francisco, California, USA.



Figure 37 : Pedestrianized street in Montreal.

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## GLOSSARY

### Pedestrian and Cycle Crossing

A section of the road where pedestrians and cyclists have the right-of-way to cross, which can be indicated by pavement markings, ground-mounted or overhead signs, illuminated beacons, and sometimes traffic control signals. The design of the pedestrian and cycle crossings depend on roadway width and traffic volume, and the details on the various designs can be found in the Ontario Traffic Manual.<sup>1</sup>

### Pilot Project

A temporary, small-scale project which is set up to test behaviour change before a permanent or more wide-spread implementation. The low-cost and non-resource-intensive nature of pilot projects lends them to their use in tactical urbanism, which promotes experimentation and change in urban design in a faster, citizen-led approach.<sup>2</sup> For example, the prioritisation of streetcars on Toronto's King Street was set up as a pilot project in November 2017, and following the project's success, was approved as a permanent project by the City Council in April 2019.<sup>3</sup>

### Safe Intersections

Intersections can be made safer for pedestrians and cyclists through design elements which may shorten the crossing distances, reduce the exposure of pedestrians to vehicular traffic, increase the visibility of pedestrians and cyclists, or improve the yielding behaviour by motorized vehicle drivers. Examples of these elements include protected corners, continuous sidewalks, or pedestrian or bike leading intervals at traffic lights.<sup>4</sup>

### School Street

A street outside a school's entrance which is closed off from vehicular traffic at the start and end of the school day. These streets become safe spaces for children to gather and play, encouraging the active mobility of school children while also permitting them to independently practice road safety in a safe and monitored environment.<sup>5</sup>



Figure 38 : Pedestrian and cycle crossing in London, UK.



Figure 39 : School street pilot project in Montreal.



Figure 40 : Raised crossing and extension of sidewalk at pedestrian crossing in New York, USA.



Figure 41 : School street in Paris, France.

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4. Protected Intersection Design Guide, City of Ottawa, 2021 [https://documents.ottawa.ca/sites/documents/files/protectedintersection\\_dg\\_en.pdf](https://documents.ottawa.ca/sites/documents/files/protectedintersection_dg_en.pdf)

5. School Streets Guide, Ontario Active School Travel, 2020 <https://ontarioactiveschooltravel.ca/schoolstreetsguide/>



## GLOSSARY

### Segregated Cycle Track

A roadway lane used exclusively by cyclists, which is segregated from both vehicular and pedestrian traffic by a vertical barrier, such as a raised median, curb, planters, or bollards. The cycle track can be unidirectional or bidirectional, and at the same elevation as the roadway, the sidewalk, or somewhere in between.

### Signed Local Street Bikeway

Quiet street cycling routes where cyclists share the roadway with motorists. Routes can be identified by wayfinding signage and pavement markings. Bicycles are given priority over motorized vehicles, and traffic calming elements, such as bump outs, can be used to restrict motorized vehicle speeds.

### Wayfinding Signage

Clear and consistent signs and pavement markings indicate the location of pedestrian and cycle routes. Signage should be clear and consistent across the network, placed at key decision points, and be maintained throughout the year, meaning that routes can be identified in all weather conditions, and pavement markings are repainted when necessary.



Figure 42 : Segregated bidirectional cycle track in Montreal.



Figure 43 : Signed local street bikeway in London, UK.



Figure 44 : Wayfinding signage in London, UK.

## 8. Conclusion



## CONCLUSION

This report constitutes the second of the three reports composing the Sarnia Active Transportation Master Plan. The report presents the proposed active transportation network developed in the ATMP.

The active transportation network is the direct result of the engagement and consultation activities held throughout the ATMP process, as well as the Background report which constitutes the first part of the ATMP.

The active transportation includes a walking network, presented first to position pedestrians at the heart of the active transportation approach proposed for Sarnia. The walking network targets the addition of safe and comfortable sidewalks and intersections at key missing links within the existing network.

The cycling network presents quick wins, medium-term and long-term projects. The cycling network can thus be used as a road map for guiding cycling projects, allowing more complex projects to be integrated with future capital projects, for a more efficient use of resources and budget.

Guidelines on the design approach to take for walking and cycling projects are provided through two examples of projects and the active transportation glossary, supported by photographs of inspirational projects in Canada and worldwide.

The active transportation network is complemented by the third report of the ATMP, the Action Plan and Implementation Strategy. Together, these two reports will give the city a pathway towards a well-connected, comprehensive and healthy transportation network, aiming at improving the quality of life of all Sarnians.



Figure 45 : Sarnia VIA Rail Station



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