APPENDIX

T Health Impact Assessment

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Health Impact Assessment Report

Merritt Road Project

Niagara Region

Contents

Executive Summary

A Health Impact Assessment (HIA) is a combination of procedures, methods, and tools by which a policy, program, or project may be judged as to its potential effects on the health of a population. HIAs evaluate potential positive and negative public health impacts prior to the implementation of a project. Within Niagara Region, HIAs are part of the Health Equity-Informed Planning Project. The work of this project aligns with Niagara Region's Strategic Plan, and aims to address the unintended impacts on health and health inequities in non-health sectors.

Beginning in 2021, the Regional Municipality of Niagara initiated a Schedule C Municipal Class Environmental Assessment (EA) for Merritt Road and Rice Road in the Town of Pelham, City of Thorold and City of Welland. This study is building on the recommendations of the Transportation Master Plan, seeking to meet the needs of anticipated development in the area.

Within the scope of the HIA Assessment, the following project actions were considered: dedicated facility for active transportation; capacity improvements to existing road segments; creation of a key transportation link to Highway 406; and extension of Merritt Road through an unopened road allowance.

The HIA process was applied to the Merritt Road Project using five sequential steps: screening, scoping, appraisal (assessment), recommendations and monitoring. Following the HIA screening process, Merritt Road was identified as requiring a HIA. The goal of this project is to provide a standardized, evidence-informed means to understand potential health outcomes of the project actions that supplements the Merritt Road EA process and activities. The HIA process utilized best available data, relying on extensive internal staff support, supplementing with primary data collection where needed. Each step of the HIA process involved the Health Equity Informed Planning Lead, HIA coordinator, Project Manager and representatives from Public Works, Finance, Corporate Services and Public Health.

The HIA screening yielded a project score of 24, where the following determinants of health were seen to be impacted:

- Environment [air, noise, odor]
- Environment [water, soil, waste]
- Natural Environment
- Cultural Environment
- Transportation

- Neighbourhood Safety
- Housing
- Education
- Access to Public Services
- Built Environment
- Social Supports
- Economic Development

The following priority populations were selected for focus: Low Income; Rural Residents; Students; Sex and Gender.

Within the scope of the HIA, the following project actions were considered:

- Dedicated facility for bicycles and pedestrians to participate in active transportation
- Provide capacity improvement to existing sections of Rice Rd and Merritt Rd to meet transportation demands of development of 3 municipalities
- Creation of a key transportation link through direct access from Rice Road to Highway 406 via Merritt Road

After proceeding to the scoping phase, the project was seen to require an Intermediate level HIA. Based on discussions with the project team and internal staff, four determinants were selected to be the focus of the assessment: Environment: Natural Heritage, Transportation, Access to Public Services, and Built Environment. The associations between project actions, the selected determinants and potential health outcomes were addressed using a Logic Model. These linkages led to the focus on five short-term health outcomes: Collisions; Physical Activity; Access to Services; Accessibility; and Social Cohesion. For the purpose of the assessment, each project action was discussed as to how it impacts each health outcome.

The assessment process led to a ranking of the impacts of each project action on each health outcome, which formed the basis for the HIA recommendations. HIA recommendations were generated to address as many linkages as possible, and were themed into five categories: design, connectivity, accessibility, education & promotion, and partnership. Recommendation details including target audience, implementation considerations, impact and effort were provided to allow for prioritization. Key recommendations include the following:

- Physically separated active transportation facility is the best practice for reducing collisions (fully segregated cycle tracks or multi-use path). A combination of both facilities is recommended to best suit each road segment.

- Advocate for continuous sidewalk network within the area where cycle tracks are the selected cycling facility to prevent pedestrians from having to walk on roadways or within cycle tracks.
- Ensure adequate connection to and over the 406 to Kottmeier Road for improved access to and between new neighbourhood development (with AT facilities)
- Ensure sidewalk and AT network connects to Steve Bauer Trail as well as adjacent cycling and sidewalk facilities
- Consider a minimum width of 1,800 mm on both sidewalk and multi-use path to allow wheelchairs and scooters to pass when utilizing facility

Monitoring and evaluation are key components of the HIA process. A robust monitoring and evaluation plan was created focusing on three sub-steps: process evaluation, impact (implementation) evaluation and outcome evaluation. For each evaluation level relevant indicators, data sources, analysis procedures and time frames have been identified and included.

Introduction

What is a Health Impact Assessment

A Health Impact Assessment (HIA) is a combination of procedures, methods and tools by which a policy, program or project may be judged as to its potential effects on the health of a population. HIAs are most commonly used to assess proposals outside of the traditional health sector, which do not target health as their principal goal.

HIAs have many advantages, including to:

- Identify health-related harms and benefits of proposed projects that may not have been considered otherwise
- Reduce social inequities in health stemming from a project's action by implementing recommendations
- Enhance positive health outcomes and decrease unintended negative health outcomes
- Promote cross sectional cooperation; a collaborative approach and sustainable development
- Standardize a process of high consistency, neutrality and transparency

HIAs evaluate potential positive and negative public health impacts prior to the implementation of a project. They are built on the following key foundations:

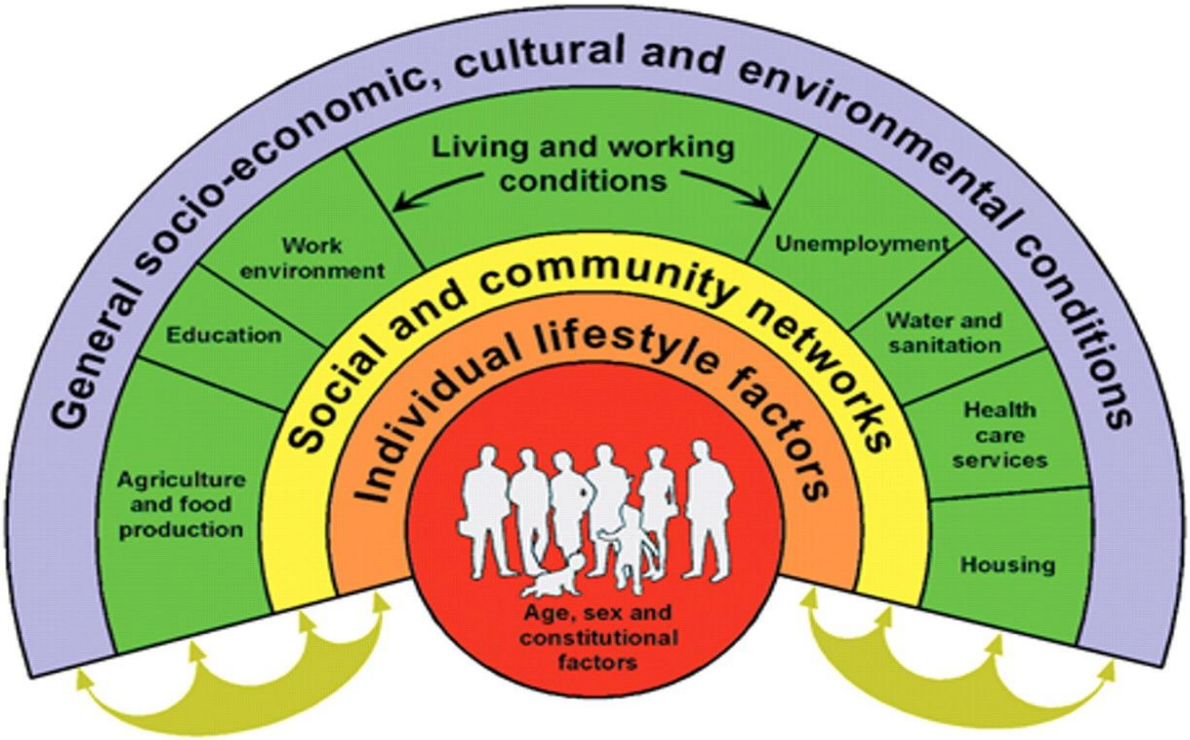
1. **Acting upon the social determinants of health**

- Aim to act before health outcomes occur to prevent illness or other health issues by influencing public policy or root causes of ill-health

2. **A shared responsibility for health**
   - Recognizes the importance of social, economic and cultural influences on population health
3. **Decision-making informed by reliable information**
   - Provides scientific evidence regarding mid and long term consequences of decisions made

Overall, HIAs are supported by the assumption that the health of a population is closely tied to the conditions in which people live, work, learn, and play. As such, all sectors share responsibility for the health of the population.

Figure 1. Social Determinants of Health[1]



Health Impact Assessments at Niagara Region

The HIA project falls within the Health Equity Informed Planning (HEIP) strategic project at Niagara Region. This project aligns with strategic priorities 2 and 4 within Niagara Region's Strategic Plan: Healthy and Vibrant Community and Sustainable and Engaging Government. Overall, the HIA project aims to address the unintended impacts on health or

health inequities that result when decisions are made outside of public health. The integration of the HIA into the project planning processes at the Region will work towards the goals and vision identified within the Strategic Plan.

The specific goals and objectives that this work seeks to fulfill is as follows:

Goal 1: Increase considerations of health and health equity during decision making and implementation in the Niagara region during 2019–2022

Objective 1: To incorporate HIAs into project planning processes at the Region by June 2022

Objective 2: To provide training for relevant staff on health equity, the SDOH, and Health Impact Assessments by December 2021

Goal 2: Advance Health Equity and social justice

Objective 3: To reduce the possible negative health effects, and increase the positive health effects of Regional projects through the HIA recommendations

Objective 4: To assess and prevent disproportionate health impacts on vulnerable populations

Project Summary

Background Information

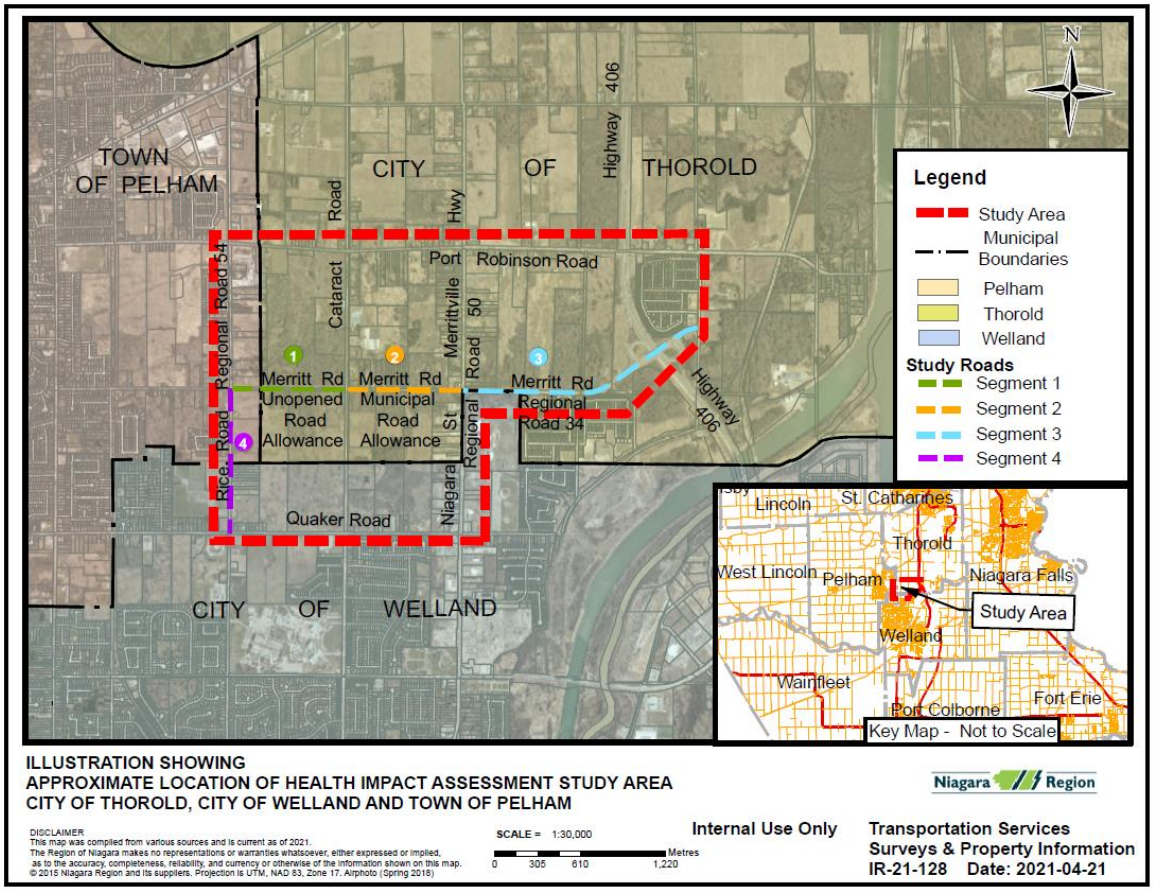
Niagara Region has retained Wood to complete a Municipal Class Environmental Assessment (EA) to address the long-term multi-modal transportation needs of Regional Road 37 (Merritt Road) between Regional Road 54 (Rice Road) and Highway 406 and Rice Road between Merritt Road and Quaker Road. A Schedule C project is in accordance with the requirements outlined in the Municipal Engineers Association Municipal Class Environmental Assessment Document, which is an approved process under the Ontario Environmental Assessment Act. This study is building on the recommendations of Niagara Region's Transportation Master Plan, including:

- Extension of Merritt Road between Rice Road and Cataract Road
- Capacity Improvements of Merritt Road from Cataract Road to Highway 406
- Capacity improvements to Rice Road from 200m north of Merritt Road to Quaker Road

Further, the project seeks to support anticipated development in the area, for three Secondary Plans (East Foothill, Port Robinson and Northwest Welland). As a result of the proposed development, the project aims to address traffic congestion due to future development, address active transportation connectivity issues and implement the

Complete Street theme. The study will be referred to within the report as Merritt Road. The study area is depicted below in Figure 2.

Figure 2. Project Boundaries



Methods

General HIA Process

Within a project lifecycle, HIAs are to be completed within the planning process. At the planning stage, the HIA may predict the potential affects of a policy proposal to make recommendations that limit negative health effects before a project starts. HIAs allow for a public health perspective and insight on project planning that may not be present otherwise. This brings information forward that may not generally be taken into account outside of the health sector. HIAs move through five sequential steps:

Table 1. HIA Process

HIA Step	Details
Step 1: Screening	• Screening is used to determine whether an HIA is appropriate, required, and feasible • Within this step, it is important to consider the main activities of the project and how they may impact health and priority populations
Step 2: Scoping	• Once it has been determined that an HIA is required, step 2 determines the scope of the assessment • This answers questions like: how detailed of an HIA is required, what level of involvement is required from stakeholders, and what level of community involvement is required • Within this step, a terms of reference and project charter are created to guide future work
Step 3: Appraisal (Assessment)	• The core of the HIA, this step involves appraising the positive and negative health impacts of the project • Within this step, it is important to understand the community your project will impact and collect assessment data to provide linkages to health outcomes.
Step 4: Recommendations	• This step details the results of the assessments, working to provide cost-effective and reasonable measures to maximize the positive health impacts and mitigate the negative impacts of the project
Step 5: Monitoring	• The last step focuses on measuring and monitoring whether the resulting changes in a project are having the intended health impact, and if the HIA made successful impacts within decision making processes. • Monitoring and evaluation activities will continue even after the HIA report and the project is complete

HIA Goals

The goal of the HIA process is to provide a standardized, evidence-informed means to understand potential health outcomes of projects and policies. The HIA process works alongside existing project processes, and offers a means to document work already being done in considering health in projects. HIAs synthesize best available data as it relates to the actions and needs of the project. This data is then used to create recommendations that maximize positive health impacts and/or mitigate negative health impacts. Recommendations are prioritized based on feasibility and resources needed for implementation.

Scope of Project

Following the HIA Screening & Scoping Processes, Merritt Road was identified as requiring an Intermediate HIA, consisting of a medium breadth exercise that leverages both existing and new data. The Merritt Road HIA is intended as a complement to the completed Merritt Road EA process and design activities. EA's provide recommendations to understand and mitigate environmental impacts. HIA's, as part of the corporate HEIP project, work to understand unintended positive and negative health impacts of a project. The Merritt Road HIA provides recommendations based on health literature, public health perspectives and stakeholder feedback to mitigate negative health impacts and maximize positive health impacts. Its activities leveraged data collected through the EA process, with additional data to supplement this. The final report is to be used to ensure final project decisions reflect health-related needs of the population.

Within the scope of the HIA, the following project actions were considered:

- Dedicated facility for bicycles and pedestrians to participate in active transportation
- Provide capacity improvement to existing sections of Rice Rd and Merritt Rd to meet transportation demands of development of 3 municipalities
- Creation of a key transportation link through direct access from Rice Road to Highway 406 via Merritt Road
- Environmental considerations of the project actions, including:
    - An extension of Merritt Road through an unopened road allowance, which has a 20m right of way and passes through a large wood lot
    - Project location is adjacent to delineated environmental conservation area and natural environment corridor

It is important to note that although project actions are discussed separately within the HIA Report, they are heavily intertwined and the completion of each action impacts the health of the surrounding population.

Project Methodology

As an intermediate level HIA, the Merritt Road HIA collected some primary data, and worked to leverage best available data. It utilized information collected as part of the EA process wherever possible, with qualitative primary data collection and secondary data synthesis used to compliment existing data. Intermediate level HIAs utilize staff support wherever possible, with very limited stakeholder involvement. Below, the methods used in each step of the HIA are discussed.

Screening

- The screening process was completed by Niagara Region staff, with representation from Public Health (Medical Division and Chronic Disease and Injury Prevention Division), Public Works (Transportation Division), Corporate Services (Finance Division) and Corporate Administration (Corporate Strategy & Innovation).

Scoping

- After the screening process, the team worked to identify the subset of health determinants of focus for the assessment moving forward.
- Based on score on the screening tool, the project proceeded to the scoping tool, where the score indicated that an Intermediate-level HIA.
- Within the scoping phase, project documentation, including a Terms of Reference and Project Charter, were created by the Medical Division in Public Health. They were signed and confirmed by the Project Manager responsible for the Merritt Road HIA.
- The logic model was created collaboratively by the HIA Coordinator, HEIP lead and Project Manager, with support from the Chronic Disease and Injury Prevention division in Public Health.

Assessment

- The assessment phase of the HIA consisted of a robust environmental scan of best practice grey literature and scientific literature related to the health outcomes of focus.
- To compliment this environmental scan, primary data was collected through the following avenues: attendance at EA Public Information Centers (PICs); attendance at EA Agency and Stakeholder Meetings; consultation with school health nurse in the area; consultation with area transportation committee members.
- Consultation with Public Health and the transportation departments yielded multiple resources for inclusion within the assessment phase.

- Further data was provided by Niagara Regional Police Service (NRPS) to provide context to area collisions.

Recommendations

- Recommendations were generated following the comprehensive review of literature completed in the assessment phase.
- Recommendations were co-created with support from Public Health and Transportation.
- Prioritization, theming and refinement occurred through multiple meetings and iterations based on feedback from these supports.

Evaluation

- The monitoring and evaluation plan for the Merritt Rd. HIA was created with support from Niagara Region Public Health's Program Evaluator
- The plan seeks to evaluate both the HIA process and impact, with outcome evaluation continuing into future years.

Screening

Screening Tool

Within the screening phase of the HIA, key project actions are assessed as to how they impact various social determinants of health. A score ranging from -3 (significant negative impact) to +3 (significant positive impact) was assigned for each variable. Based on the scores assigned to each determinant of health, the overall score of the HIA screening tool, 24, necessitated the project proceeding to the scoping tool to determine the level of HIA required. The determinants that the Merritt Road project actions were seen to impact are detailed below in Table 5. For each determinant, the description is given, as well as the score assigned. Further, the project was seen to have impacts on the following specific priority populations: *low income, sex and gender, students and rural residents*. Full screening details, including rationale can be found in: Appendix 1- Screening Tool

Table 2. Determinant of Health Scoring

Determinant	Description	Score
Environment	Air, noise, odour	-1
Environment	Water, soil, waste	2
Natural Environment	Climate change, land attributes and topography, habitat and animals, protected lands	-2
Cultural Environment	Natural Heritage (Archaeologically or Historically significant land, building or structures)	-1
Transportation	Active transportation, public transit, road safety	3
Neighbourhood Safety	Crime rates, Neighbourhood violence and drug use, Access to alcohol, tobacco, marijuana, and other substances	1
Housing	Access, healthiness, safety and others	1
Education	Access to education, level of education, skills development, literacy	1
Access to Public Services	Social services, emergency services, public works, Recreation/Community services & Access to Public Health and Health Services- primary and acute health care services, tobacco and alcohol cessation support, support for healthy eating and exercise, support for safe sexual behaviours, access to employment	2
Built Environment	Landscaping, urban design, green spaces, connectivity, safe environments, road networks	3
Social Supports	Social connection/ Community support, Community Structure, Self-esteem, Acculturation, Sense of security, Discrimination due to race, ethnicity, sexuality, gender, Others	1

Determinant	Description	Score
Economic Development	Job creation, Increased business, Distribution of wealth, Income and Income Distribution, Others	1

Populations Impacted

Based on the study area and project implications, three populations were identified as having substantial impacts stemming from the project:

- Low Income
  - Low income residents face greater barriers to automobile access. The addition of active transportation and sidewalk facilities within the study area helps to provide more equitable access to means of transportation.
- Rural Residents
  - Much of the study area is currently designated as rural at the time of this HIA Report. As such, the improvements made stemming from the project outcomes will positively impact the health of rural residents.
- Sex and Gender
  - Women face greater barriers to utilizing on-road active transportation facilities. By providing cycling and walking facilities that are well-lit and perceived to be safe by women, greater gender equity is seen.
- Students
  - The study area is adjacent to elementary and post-secondary schools, with bussing provided to other schools within a close distance. As such, improvements within the study area will impact the physical activity and transportation options for students.

These populations will be considered in the remainder of the assessment in order to minimize negative impacts and maximize positive impacts in all project recommendations. They will also be considered specifically within recommendations to ensure fulsome considerations.

Scoping

Following the screening process, the Merritt Road Project proceeded to the scoping tool to determine what level of HIA was required. The scoping tool consists of a series of six considerations. For each consideration a score is assigned between 0 and 5, which is then

entered into an equation to determine the required level of HIA. The scoping questions and assigned scores can be found below in Table 6.

Table 3. Scoping Scores

Scoping Question	**Assigned Score**	**Context of Score**
What is the estimated cost of the project?	4	A score of 4 indicates a cost of more than $1,000,000 but less than $10,000,000
What level of stakeholders are interested in the project?	5	A score of 5 indicates extensive stakeholder involvement where the majority of interest groups and politicians are interested
How extensive is the geographic extent of the project impacts?	4	A score of 4 indicates involvement of multiple cities and towns
How many people would be potentially impacted by the project?	4	A score of 4 indicates that more than 50,000 and less than 500,000 persons will be impacted by the project
To what extent would people be affected by the impacts of the project? (Health and Wellbeing)	4	A score of 4 indicates: - Significant reduction of injury risk - Significant improvement in physical or mental illness or chronic condition

Selecting Determinants

Based on discussions with the project team and internal staff to better understand the needs of the area and feasibility of recommendations, three determinants were selected to be the focus of the assessment. These determinants were identified to both have significant impacts on the health of the population and be able to be addressed at the stage of the Merritt Road project. The remainder of the assessment is focused on health outcomes that are associated with four determinants:

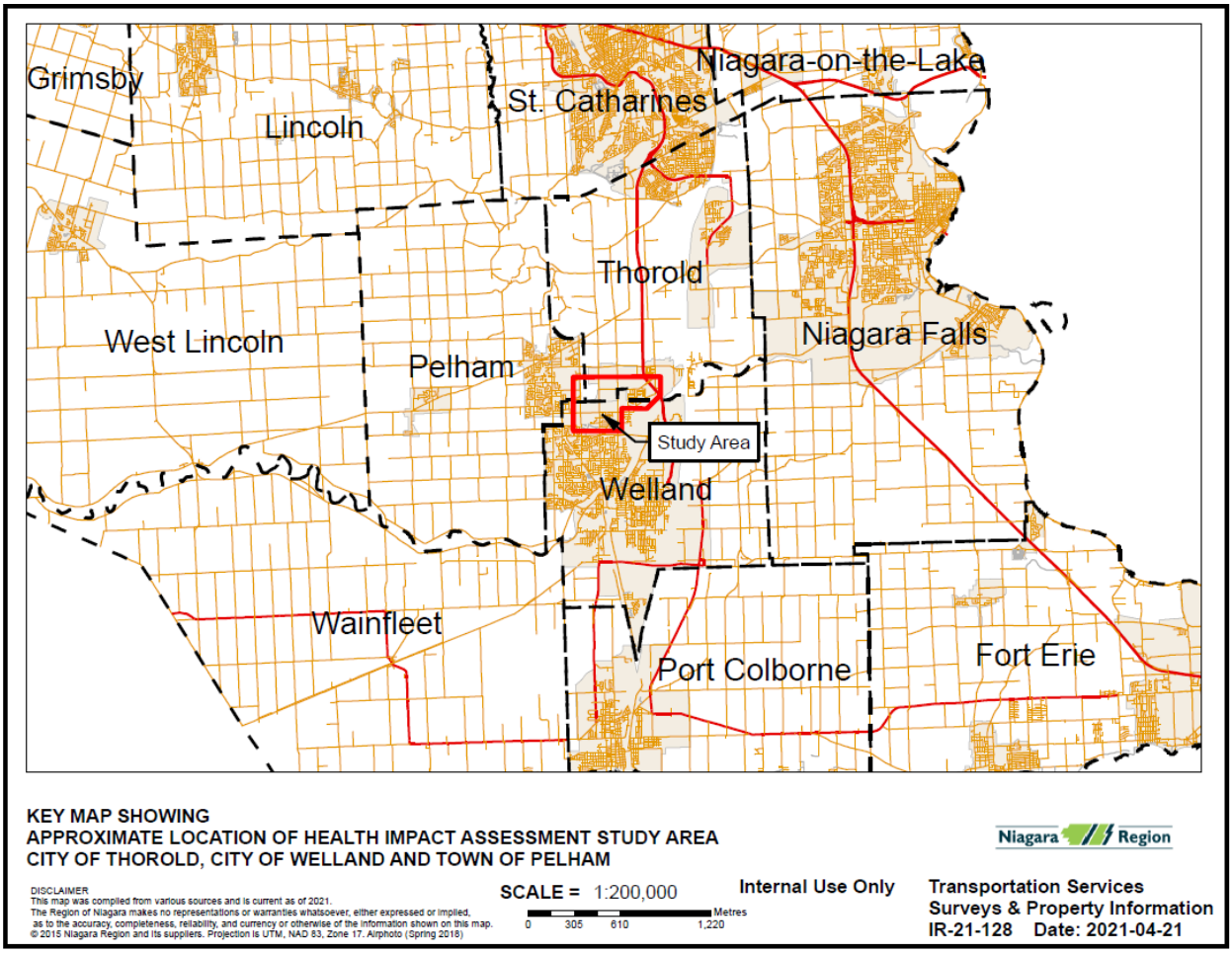
- **Environment: Natural Heritage**
- **Transport**
- **Access to Public Services**
- **Built Environment**

The association between project actions, the selected determinants and potential health outcomes can be found in: Appendix 2- Logic Model. Within this document, positive and negative associations are denoted by green and red linkages as described within the legend. This document allows for visualization of how different project actions impact the social determinants of health, and how these determinants impact proximal (short-term) and distal (long-term) health outcomes.

Community Profile

The project at hand seeks to make improvements to Merritt Road in order to meet the current and future needs of development. The study area crosses the boundaries of three municipalities: Town of Pelham, City of Thorold and City of Welland. The study area in relation to the municipalities involved, as well as the region of Niagara as a whole is presented below in Figure 3.

Figure 3. Study Area Key Map

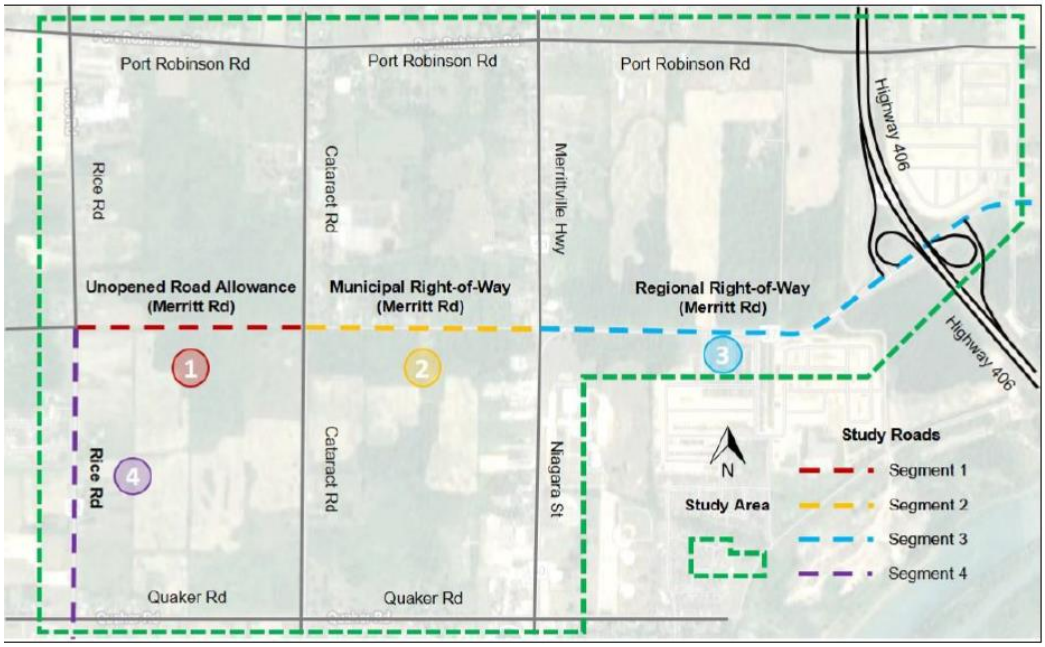


Building upon the recommendations of the Niagara Region Transportation Master Plan, this study will propose improvements and active transportation facilities to the following segments of Merritt Road and Rice Road:

- Segment 1 – Merritt Road between Rice Road and Cataract Road
- Segment 2 – Merritt Road between Cataract Road and Merrittville Highway / Niagara Street
- Segment 3 – Merritt Road between Merrittville Highway / Niagara Street and Highway 406
- Segment 4 – Rice Road between Merritt Road and Quaker Road

Figure 4 illustrates the location of these road segments.

Figure 4. Road Segments



Indigenous Peoples in the Area:

The perspectives of Indigenous Peoples in the area were considered as part of the EA process. The chart below details the number of residents in each municipality who identify as Indigenous. It is important to note that Indigenous peoples are likely underrepresented in the Census. They are less likely to participate in Census due to lack of trust of Canadian government, migration between geographical locations and unclear definitions of different

Aboriginal Identity Groups within the census. Please note, the use of the term Aboriginal is to reflect the terminology used within the 2016 Census.

Table 4. Indigenous Population

Municipality	Number of Residents Identifying as Aboriginal	% Aboriginal to municipality population
Niagara Region	**12,250**	**2.8%**
Welland	2,000	3.9%
Thorold	585	3.2%
Pelham	295	1.8%

As part of the EA process, Notice of Study Commencement letters were sent to Territorial First Nations within the Region. The project team responded to all inquiries received, and engagement occurred with the Six Nations of the Grand River (SNGR), Haudenosaunee Development Institute (HDI), and Mississaugas of the Credit First Nation (MCFN). Notice of Study Completion is to be sent following the EA process completion.

Demographic Information

The study area is located in the municipalities of Pelham, Welland and Thorold. Table 5 depicts demographic and economic indicators related to the area of study. Census dissemination areas containing any part of the study area were compiled and presented below, where data was available. Dissemination areas are small subsections of each municipality, composed of one or more neighboring dissemination blocks, with a population of 400 to 700 persons. This provides an understanding of the residents in the area directly adjacent to the study area.

Table 5- Demographic Information[2]

		Municipality		
	Study Area	**Pelham**	**Welland**	**Thorold**
Percentage of Residents Identified as Low Income (Based on LIM-AT Measure)	11.92%	5.4%	17.5%	14.7%
Percentage of Population who	1.43%	1.77%	3.88%	3.15%

		Municipality		
	Study Area	**Pelham**	**Welland**	**Thorold**
Identify as Indigenous				
Education Level: Less than High School	13.93%	13%	21%	20%
Education Level: High School Completed	30.02%	25%	33%	33%
Education Level: Post-Secondary	56.38%	62%	46%	47%
Percentage of Population Male & Female		49% Male; 51% Female	48% Male; 52% Female	50% Male; 50% Male
Percentage of Population who Identify as a Visible Minority	6.7%	4%	5%	10%
Median Age	45.8 years	50 years	46 years	41 years
Population Density	387.8/square km.	135.3/square km.	645.3/square km.	226.5/square km.
Renter Percentage	Not Available at the DA Level	10.99%	30.46%	27.64%
Sole Support Parents	Not available at the DA Level	9.82%	20.30%	18.22%
After Tax Median Family Income	Not Available at the DA Level	$95,154	$65,344	$72,038
Top 3 Visible Minorities	Not Available at the DA Level	South Asia, Latin America, Chinese	Black, Latin American, Chinese	Black, South Asian, Chinese
Employment	Not available at the DA Level	94% employed; 6% unemployed	91% employed; 9% unemployed	92% employed; 8% unemployed

In the municipalities of study, the average household sizes are: Pelham (3 people), Thorold (3 people), Welland (2 people); compared to a range of 2-3 people within the

study area. Within the study area, there are differences in multiple deprivation between each dissemination area. The multiple deprivation scale ranges from 5 (least deprived) to 1 (most deprived) and considers four dimensions of deprivation: residential instability, economic dependency, situational vulnerability and ethno-cultural composition[3]. This score helps understand inequalities in various measures of socio-economic characteristics for geographical area. Within the study area, two dissemination areas are a 3 and three dissemination areas are a 2[4]. This indicates a relatively unified level of deprivation within the study area.

Populations Impacted

Low Income

- In Niagara, 14.5% of residents are designated as low income based on living in a LIM-AT household[5]
    - In Welland, 17.5% of households are LIM-AT
    - In Thorold, 14.7% of households are LIM-AT
    - In Pelham, 5.4% of households are LIM-AT
- In Canada, income is considered one of the most important determinants of health due to its influence on all other living conditions. People who are living with low income or living in poverty often experience worse health.[6]
- In Canada, those who are low income[7]:
    - Experience living in housing below standard at a rate that is 7.4 times higher than those in the highest income quintile
    - Describe their perceived mental health as fair or poor at a rate that is 4.1 times higher than the highest income quintile
    - Are 1.33 times less likely to meet the moderate to vigorous physical activity guidelines than the highest income quintile.

Rural Residents

- Niagara Region has an overall population density of 241.5 people/square kilometer[8]
    - Welland has a population density of 645.3 people/square kilometer
    - Thorold has a population density of 226.5 people/square kilometer
    - Pelham has a population density of 135.3 people/square kilometer
- In Niagara, Welland, Thorold and Pelham each are experiencing a high need for physicians, as identified by the province of Ontario[9]
- In Canada, people who live in a rural area experience disproportionate poor health outcomes. People who live in rural areas may have difficulties in accessing health care, due to a lack of services, isolation or lack of mobility. Rural resident health outcomes include[10]:

- A 8.96 times higher risk of lung cancer mortality
- A 2 times higher rate of suicide
- A 3.5 times higher rate of being charged with a crime

Sex and Gender

- Sex refers to the biological status of a person: male, female or intersex[11]
  - In Niagara, 51.6% of the population is female and 48.4% is male
- In Canada, compared to women, men[12]:
  - Are expected to live 5 fewer years
  - Are charged with a crime 3.7 times more often
  - Experience suicide mortality 3.3 times more often
- In Canada, compared to men, women[13]:
  - Experience anxiety disorders 1.8 times more often
  - Live alone as seniors 2.1 times more often

Students

- The following information is based on data collected from Niagara's students in grades 7 through 12 through the Ontario Student Drug Use and Health Survey (OSDUHS) in 2019.
- Demographic Information[14]:
  - Compared to Ontario (56.9%), there are significantly more students who identify as White (81.0%) in Niagara
  - In Niagara, other than white, the ethno-racial background that is the most prevalent is Black, which is consistent with Ontario.
  - 81% of students in Niagara speak English the most often at home
  - 89.2% of students in Niagara have lived in Canada their entire life
- Health Information[15]:
  - 66.4% of elementary students and 59.9% of secondary students in Niagara rate their physical health as very good or excellent
  - There is a significantly higher proportion of students with "very good" or "excellent" mental health in Niagara that get 60 minutes of physical activity 5 or more times a week compared to those with "good" or lower mental health
  - There is a significantly higher proportion of male students (60.6%) that get 60 minutes of physical activity on most days compared to females (44.3%) in Niagara
  - There is a significantly higher proportion of elementary students (30.5%) that walk to school compared to secondary students (8.1%) in Niagara
  - Compared to 2015 (18.8%), there is a significantly lower proportion of secondary students in Niagara that walk to school in 2019 (8.1%)

- Students at Niagara College identified their transportation needs through the Students on the Move Report[16]
    - 34% of domestic and international students at the Niagara College Welland Campus live within Welland
    - 69% of students at the Niagara College Welland Campus have a Niagara Transit U-Pass
    - 22% of students have immediate access to a bicycle, but this did not translate into cycling as a common mode of transportation to school. This may be due to the lack of connected cycling path systems.
    - Students identified bus frequency, connectivity between transit systems, long durations for travel and a lack of connections to other modes of transportation as barriers to effective transit usage
    - Other transportation issues identified include a lack of perceived safety, lack of appropriate pedestrian facilities [i.e. lighting, benches, pedestrian crossings], lack of cycling infrastructure [i.e. cycling facilities, bikeshare]
- There are two schools in the area adjacent to the study area:
    - Quaker Road Public Elementary School
    - Niagara College
- Students at other schools in areas further than the study area may also be impacted as they may reside within the study area:
    - Glynn A. Green Public School
    - Gordon Public School [French Immersion]
    - Nouvel Horizon French Elementary School
    - École élémentaire catholique du Sacré-Coeur
    - Alexandra Kuska Catholic Elementary School
    - St. Kevin Catholic Elementary School
    - St. Alexander Catholic Elementary School
    - Notre Dame College School
    - E.L. Crossley Secondary School
    - Welland Centennial Secondary School [French Immersion & Regular Programming]
    - École Secondaire Catholique Saint-Jean-de-Brebeuf
    - École secondaire Franco-Niagara

Health Outcomes

Based on the results of the Logic Model, the following health outcomes were selected to be the focus of the Health Impact Assessment. Data regarding each outcome is presented within the assessment phase.

Table 6. Health Outcomes of Focus

Health Outcome	Details
Physical Activity	○ The planned addition of active transportation facilities and the potential addition of continuous sidewalks within the study area will greatly impact the opportunities for outdoor physical activity. ○ An increase in the level of physical activity is associated with a variety of distal health outcomes, including improved mental health, a reduction in chronic conditions and an increased life expectancy
Collisions	○ Current collisions within the study area are seen to occur most frequently during the late evening and early morning hours, and in poor weather conditions. Further, wild animals appear as another frequent cause of collision ○ The planned improvements to the road segments within the study are will lead to improvements in visibility and safety for automobile operators.
Social Connection and Cohesion	○ The addition of active transportation facilities and continuous sidewalks within the study area will offer opportunity for residents to connect with one another and connect with the spaces within the area. Providing a safe, well-lit and well-planned facility will allow users of all ages and abilities to spend time together and spend time exploring their neighbourhood.
Access to daily & emergency services *(such as education and daily needs)*	○ The addition of active transportation facilities, upgraded bus stops and continuous sidewalks foster improved access to services and daily needs for individuals that do not drive or do not have access to an automobile

Health Outcome	Details
	○ Improved road platforms and the addition of a more direct route via Merritt Road will improve access to emergency services for residents in the area.
Accessibility	○ The improvements to active transportation facilities in the area will allow for those with mobility limitations to utilize the road segments in a way that they currently cannot. ○ A focus on accessibility supports age and ability friendly design.

Assessment

Based on the linkages developed within the Logic Model, discussions with content experts and the project team lead to the focus on five proximal health outcomes: collisions, physical activity, access to services, accessibility, and social cohesion. In addition, the process considers the distal health outcomes of each of these outcomes, as illustrated below in Table 7.

Table 7. Proximal and Distal Health Considerations

Proximal Health Consideration	**Distal Health Outcome**
Collisions	Injury and Death
Physical Activity	Chronic Conditions; Mental Health, Stress & Cognitive Benefits
Access to Services	Emergency Service Access, Mental Health, Stress & Cognitive Benefits
Accessibility	Mental Health, Stress & Cognitive Benefits
Social Connection and Cohesion	Mental Health, Stress & Cognitive Benefits

For the purpose of the assessment, project actions were connected with respective determinants of health and health outcomes. Each health consideration is discussed narratively with respect to the project action that they are associated with using best available data and evidence. For the purpose of the assessment, two of the four project actions are being studied further. The other two project actions are adequately explored through the EA process. The two project actions of focus are described below:

Project Action: Dedicated facility for bicycles and pedestrians to participate in active transportation

- Addition of sidewalks throughout the study area, allowing for access to adjacent schools, businesses and other neighbourhoods
- Construction of cycling facilities throughout the four road segments that connect to other facilities and trails.
- Potential facility types explored through the EA process included bicycle lanes, paved shoulder, raised cycle track and multi-use path

Project Action: Creation of a key transportation link through direct access from Rice Rd. to Highway 406 via Merritt Rd.

- The creation of an unopened road allowance of Merritt Rd. between Rice Rd. and Cataract Rd. allows for a direct link to Highway 406 via Merritt Rd. This facilitates connection to and over the highway.

Physical Activity

Numerous studies and recent research from across Canada have linked the lack of physical activity as a key contributor to Canada's high (and growing) obesity rates. Studies show that 69% of Canadian adults and 91% of Canadian children and youth are not getting the recommended levels of daily physical activity. One in four Canadian adults are considered obese, along with about one in ten Canadian children and youth between the ages of 6 and 17.[17] Considering the well-documented benefits of physical activity, it is not surprising that the economic burden to the Canadian health care system, accounting for an estimated $6.8 billion in annual health care costs.[18]

Active transportation is one of the most cost-effective ways for an individual to become more physically active and remain healthy in the long-term[19]. If all Canadians engaged in 60 minutes of physical activity per day, 33% of all deaths related to coronary heart disease, 25% of deaths related to stroke, 20% of deaths related to Type 2 diabetes, and 20% of deaths related to hypertension could be avoided.[20] Active commuting that incorporates cycling and walking is associated with an 11 percent reduction in cardiovascular risk.[21] Biking and higher intensity walking for transportation significantly helps reduce the risk of premature death. The more active transportation is used, the lower the odds of being overweight or obese.[22]

Active transportation is also associated with substantial impacts to mental health. For those already active, reducing the amount of active transportation can increase the risk of developing depression. Those who drive to work are more likely to complain of poor sleep, higher stress, and rate their overall health as low compared to those who actively commute to work for less than 30 minutes [23] One study demonstrated that walking in particular can reduce anxiety and depressive symptoms in older women, and that walking was as effective as other forms of physical activity in reducing anxiety and depression.[24] Research also suggests that physical activity can improve mental health in people without specific disorders. There is evidence that increasing physical activity can improve multidimensional self-esteem improve mood, reduce stress, and enhance perceptions of happiness and satisfaction.[25]

Experiences for women utilizing active transportation are shaped by the historical and contemporary challenges to women's mobility. Historically, movement around cities was not considered to be appropriate for women.[26] During the day, only working class women peddlers would be found on the streets, while at night women walking the streets were considered prostitutes. Further, as public transit began to become more prominent, very few women appeared as riders, and those that did were not welcome.[27] In current times, women remain the primary caregivers for children and are mostly responsible for domestic chores. This impacts women's mobility as they reduce the amount of time for discretionary activities and increases trip chaining (travel between two anchors that has an intervening stop), which both reduce women's ability to utilize active transportation facilities.
[28] To address inequalities in mobility, gender-sensitive policies rooted in research are required to understand how to meet the varying needs of different groups of women. Further, design can also reduce inequalities through mixed-land uses, concentration of amenities at nodal points (to reduce multiple trips), centrally located childcare services and well-lit pedestrian facilities.[29]

Locally, paved trails have been seen to be the busiest recreation facilities in comparison to unpaved trails, as users feel safe. As such, the installation of multi-use path or fully segregated bike tracks will lead to an ease of use and sense of safety amongst residents.[30] In order to encourage physical activity amongst residents, it is suggested that active transportation facilities connect to other local trails, neighbourhoods and sidewalk networks. It is also suggested that connectivity be prioritized to local schools to encourage usage amongst students.[31]

Collisions

Annually, around 300 pedestrians are killed in Canada, which accounts for more than 15% of all road fatalities.[32] Providing walkways for pedestrians that are separated from the travel lanes could help to prevent up to 88 percent of these walking crashes. In

addition to reducing walking along roadway collisions, sidewalks reduce other pedestrian collisions, such as intersection collisions. Roadways without sidewalks are more than twice as likely to have pedestrian collisions as sites with sidewalks on both sides of the street.[33]

Further, safe conditions and infrastructure are key factors in not only preventing injuries and accidents, but also in influencing decisions to walk or cycle.[34] In many types of community settings, safety concerns keep one in five Canadians from using active transportation facilities. In order to mitigate this, design of streets, using traffic calming and separated bike lanes help to encouraging active transportation choices and preventing injuries and accidents. 82% of Canadians are willing to walk more if there is better infrastructure.

In North America, users of active transportation generally face greater risks from traffic collisions than users of other modes.[35] Although cycling comes with risks to participants, increasing the number of people walking and cycling may provide “safety in numbers” as motorists may be less likely to collide with a pedestrian or cyclist when there are more of them visible. However, the health benefits experienced by individuals who increase their physical activity through the use of active transportation greatly outweigh the risks by up to nine times. [36] Better design for active modes, such as walking and cycling, can greatly increase safety for all modes; increasing the proportion of trips made by walking and cycling can also independently lower collision and injury rate.[37]

The number of cyclist and pedestrian injuries and fatalities has fallen significantly over the last few decades. Despite the increasing number of cyclists on the roads, from 1984 to 2002, cycling fatalities in Canada fell by 50%, from 126 to 63, and injuries fell by 33%, from 11,391 to 7,596. [38] Further, fatalities fell by 61% in Ontario.[39] It can be assumed that this reduction is due to improved cyclist and pedestrian facilities, improved education for automobile operators and improved safety requirements (i.e. helmets).

Locally, the current state of active transportation facilities within the area leaves much to be desired with regards to safety. Speed is seen to be an issue within the road segments of study, which creates an unsafe environment for all road users. Further, the ditches alongside each road become quite full with water, leading to a potential drowning hazard for road users, specifically in the spring time. Lighting is another concern within the area, for both automobiles and active transportation users. It is noted that the area is used for students attending elementary, secondary and post-secondary institutions, leading to diverse safety needs of users.[40]

Social & Physical Connection and Cohesion

Social cohesion in the community refers to the quantity and quality of interactions between people in a community. This is illustrated by the degree to which residents know and care about one another, and the value provided by having friends and acquaintances within a neighbourhood.[41] Overall, community cohesion provides benefits such as a reduction in local crime and poverty, increased support and safety and a reduction in negative mental health outcomes.[42] People who have a stronger sense of community belonging tend to live healthier lives and have fewer challenges in their mental health than those with a weaker sense of community belonging. [43]

Transportation and land use planning decisions impact social cohesion within a community by influencing the location of activities and the quality of the public realm. In communities where there are increased opportunity for neighbours to meet and build positive relationships, there is increased social cohesion. Strategies to facilitate increased community cohesion aim to improve land use accessibility, affordability and transportation. The addition of active transportation and sidewalk facilities within the study area provide opportunities for this increased social cohesion and collective community identity.[44] Furthermore, social cohesion appears to be significantly associated with physical activity in that increases in social cohesion lead to increases in both individual rates of physical activity and ecological rates of physical activity.[45]

Social connection and cohesion leads to long term health benefits. According to a 2009 report from the Canadian Senate, approximately 10% of population health outcomes can be atrributed to our physical or built environment, with an additional 50% being related to social and economic determinants[46]. Transportation systems, including active transportation, are important components of the built environment. Transportation systems can support, or diminish, a sense of community by encouraging, or discouraging, social interaction and a sense of belonging. Car-dependent communities increase the physical and social distances between neighbours, amenities and workplaces.[47] Planning for active transportation can lead to increased social interaction when streets and public spaces are designed as comfortable places where people enjoy spending time. This influences the emotional and intellectual sense of home and neighbourhood[48]

There are further health benefits to social cohesion via active transportation among specific populations, like seniors and women. For example, walking to and visiting public locations allows older adults to feel like part of the broader community and that walking in a neighbourhood can help to create a sense of community by facilitating connections among neighbours.[49] Further, mothers spend nearly twice as much time as fathers providing transportation for family members. By shifting this movement to active transportation, mothers are able to better connect with their neighbourhood leading to improved gender equity.[50]

It is imperative that connectivity be prioritized when designing active transportation. When mobility is challenging, social participation is diminished amongst residents. As such, it is essential that active transportation leads users to destinations that benefit them from a social participation perspective.[51] Furthermore, for lasting impacts on social cohesion, active transportation facilities need to connect with other spaces for connection, such as schools, subdivisions, businesses and community centers. Connectivity between networks allows for meaningful and lasting interactions and connections.[52] It is suggested by local residents that social cohesion can be further strengthened by features throughout the active transportation facilities that highlight the area. For example, rest stops that highlight wildlife and heritage considerations are suggested to encourage discussion and connection to place.[53] When considering these connectivity additions, it is essential that accessibility is explicitly addressed, in order to ensure the benefits are realized by users of all ages and abilities.

Accessibility

It is imperative that facilities added within the study area meet the needs of all residents, regardless of age and ability. Having access to strong mobility options equates to having access to education, employment, and recreation opportunities. This ensures residents who are unable to operate an automobile due to age, disability, financial, or other reasons, are able to access the same services as those who have access to an automobile.[54] In Ontario, the Accessibility for Ontarians with Disabilities Act (AODA) aims to ensure that the province is completely accessible to people with disabilities by 2025. To facilitate this, accessible transportation is necessary to promote independence and allow true inclusion.[55] The integration of AODA principles expands active mobility options for residents, and allows for connections between traditional transportation means (i.e. public transportation) and home.[56] Locally, it is suggested that accessibility considerations are essential to ensure equity in usage of additional facilities.[57]

Access to Services

Investing in active transportation and creating an environments that allows for safe walking and cycling helps to ensure that activities and services are accessible to all members of society, regardless of income or physical disability.[58] Approximately 20-40% of Canadian households do not own a car due to income, ability or other reasons.[59] In addition, approximately 40% of the average Canadian's life is spent either as an older adult or as a child without a driver's license. Safe pedestrian access to transit is particularly important, as many residents simply do not have the option of driving. Prioritizing investments in active transportation, including neighbourhood walkability and

safe cycling facilities, is an important step in increasing the equity of a community's transportation system and the mobility of all Canadians.

Safe pedestrian access to transit is particularly important, as many residents simply do not have the option of driving. Prioritizing investments in active transportation, including neighbourhood walkability and safe cycling facilities, is an important step in increasing the equity of a community's transportation system and the mobility of all Canadians.[60] With a rapidly aging population, investments in active transportation today will also help ensure greater mobility for tomorrow's growing number of seniors. A continuous sidewalk network is part of a fulsome investment in a complete active transportation facility that meets the need of all users. Locally, it is ideal that active transportation facilities provide connection to and over Highway 406 to access the neighbourhood and services on the other side of the highway.[61]

Assessment Scoring

Assessment scores have been assigned based on the data presented above regarding the connections between project actions and health outcomes. The chart below, Table 8, summarizes the assessment scores for the impact of each project action onto each health outcome from low to high. This score takes into consideration both the likelihood of a positive impact occurring, as well as the significance of this potential impact.

Table 8. Assessment Scoring

	Health Outcomes				
Project Actions	Physical Activity	Collisions	Social Connection and Cohesion	Accessibility	Access to Services
AT Facilities- Multi-use Path or Fully Segregated Lane	High	Medium-High	Medium	Medium	Medium
AT Facilities- Sidewalks	Medium-High	Medium	Medium	Medium	High
AT Facilities- Paved Shoulder or Partially Segregated Lane	Low-Medium	Low	Low	N/A	N/A

	Health Outcomes				
Key Transportation Link	N/A	N/A	N/A	Medium	High

Recommendations

The HIA recommendations aimed to address the project actions seen to have the largest impact on health, based on the assessment scores illustrated in Table 8. As such recommendations are focused on addressing the following project and health linkages:

- AT Facilities- Physical Activity
- AT Facilities- Collisions
- AT Facilities- Social Connection and Cohesion
- AT Facilities- Accessibility
- AT Facilities- Access to Services
- Key Transportation Link- Accessibility
- Key Transportation Link- Access to Services

Recommendations were generated in a way to address as many linkages as possible, combining interventions to be multi-pronged when feasible. Recommendations are designed in a way to compliment planned or potential project actions in order to strengthen health considerations.

Recommendation Categorization

Recommendations are detailed below in Table 8. Recommendations are themed into four categories that represent both focus and timelines.

Design: recommendations focus on modifying decisions within project design and execution. Recommendations in the design category should be implemented ahead of project completion.

Connectivity: recommendations focus on promoting connectivity between the study area and adjacent neighbourhoods, roads and highways. Recommendations within this category should be implemented ahead of project completion.

Accessibility: recommendations focus on ensuring the project actions exceed accessibility mandates to meet the needs of all road users. Recommendations within this category should be implemented ahead of project completion.

Education & Promotion: recommendations focus on targeting populations to encourage behaviour change to help recognize the full health benefits of the project. Recommendations encouraging usage of new facilities and increasing project recognition. Recommendations in the education and promotion category should be implemented shortly before and following project completion.

Partnership & Community Engagement: recommendations focus on leveraging partnerships to best audiences impacted by the project. Partnerships should be established prior to project completion to ensure adequate time to prepare and execute the recommendations.

Table 9. Recommendations

Recommendation Category	Recommendations	Target Audience	Health Outcomes
Design	Physically separated active transportation facility is the best practice for reducing collisions (fully segregated cycle tracks or multi-use path). A combination of both facilities is recommended to best suit each road segment.	Project Manager (PM)/Consultant Team, Niagara Region	-Physical Activity -Collisions/Safety -Social Connection and Cohesion -Accessibility -Access to Services
Design	Advocate for continuous sidewalk network within the area where cycle tracks are the selected cycling facility to prevent pedestrians from having to walk on roadways or within cycle tracks.	PM/Consultant Team, Niagara Region	-Physical Activity -Collisions/Safety -Social Connection and Cohesion -Accessibility -Access to Services
Design	Proper signage and line painting denoting cycling lanes and/or multiuse path- visible to pedestrians, cyclists and motor vehicles	PM/Consultant Team, Niagara Region	-Collisions/Safety
Design	Ensuring appropriate signage for pedestrians and motorists at high-traffic zones (i.e. entrances to plazas, driveways, intersections)	PM/Consultant Team, Niagara Region, Local Area Municipalities (LAMs)	-Collisions/Safety
Design	Ensuring sidewalk network and AT network are well-lit, especially in cross-sections with driveways and plazas and intersections	PM/Consultant Team, Niagara Region, LAMs	-Collisions/Safety

Recommendation Category	Recommendations	Target Audience	Health Outcomes
Design	Ensure well-lit, fully paved and well maintained road platform to facilitate access to emergency services	PM/Consultant Team, Niagara Region	-Collisions/Safety -Access to Services
Design	Ensure transit stop and all future transit stops in area meets accessibility, lighting and signage guidelines. Consider a bus shelter to be added.	PM/Consultant Team, Niagara Region	-Accessibility -Access to Services
Connectivity	Ensure adequate connection to and over the 406 to Kottmeier Road for improved access to and between new neighbourhood development (with AT facilities)	PM/Consultant Team, Niagara Region, MTO, LAMs	-Collisions/Safety -Accessibility -Access to Services
Connectivity	Ensure sidewalk and AT network connects to Steve Bauer Trail as well as adjacent cycling and sidewalk facilities	PM/Consultant Team, Niagara Region	-Physical Activity -Social Connection and Cohesion -Accessibility -Access to Services
Connectivity	Install QR codes along the trail to encourage physical activity at accessibility landings (i.e. do x number of jumping jacks)	PM/Consultant Team, Niagara Region, Pedestrians	-Physical Activity -Social Connection and Cohesion
Connectivity	Install local history/environmental QR codes along path to facilitate education/discussion amongst users. Ensure consideration of language and	PM/Consultant Team, Niagara Region, Pedestrians	-Social Connection and Cohesion

Recommendation Category	Recommendations	Target Audience	Health Outcomes
	accessibility (i.e. brail) for signs and messaging		
Accessibility	Consider a minimum width of 1,800 mm on both sidewalk and multi-use path to allow wheelchairs and scooters to pass when utilizing facility	PM/Consultant Team, Niagara Region, LAMs	-Accessibility -Physical Activity
Accessibility	Accessible Pedestrian Signals at Street Crossings (Tones- different tones for north-south and east-west crossings, Countdown signals, Tactile mapping- provide a diagram on the pedestrian signal control showing the lane configuration of the roadway to be crossed)	PM/Consultant Team, Niagara Region	-Accessibility -Physical Activity -Collisions/Safety
Accessibility	Ensure entry points are free of potential obstructions (i.e. planters, poles, raised curbs) to facilitate accessibility for all users	PM/Consultant Team, Niagara Region	-Collisions/Safety -Accessibility
Accessibility	Provide landings with seating to allow users to stop and recover at regular intervals throughout path or sidewalk facilities	PM/Consultant Team, Niagara Region	-Accessibility

Recommendation Category	Recommendations	Target Audience	Health Outcomes
Accessibility	Use of textural and tonal contrast (with 70% or more contrast) on ground surfaces following urban braille guidelines. This will help to define primary routes and assist with wayfinding	PM/Consultant Team, Niagara Region	-Accessibility
Accessibility	Edge protection where a walkway is located next to an area which slopes down or is adjacent to a potential hazard- consider a curb at least 50mm high or another barrier (i.e. a handrail) to be used	PM/Consultant Team, Niagara Region	-Accessibility
Partnership & Community Engagement	Partner with active transportation advisory committees in Pelham, Thorold & Welland to introduce and promote use of sidewalk facilities	General Public, Existing AT Users	-Physical Activity -Access to Services -Collisions/Safety
Partnership & Community Engagement	Partner with schools adjacent to the study area to promote use of sidewalks as a means to walk, scoot, wheel or cycle to school	Elementary and Secondary Schools	-Physical Activity -Social Connection and Cohesion -Accessibility
Partnership & Community Engagement	Ensure area schools (elementary, secondary and Niagara College) and adjacent businesses have adequate bike racks	Elementary and Secondary Schools, Local Residents/Business Users	-Physical Activity -Access to Services -Social Connection and Cohesion

Recommendation Category	Recommendations	Target Audience	Health Outcomes
Partnership & Community Engagement	Continue to partner with active transportation network and committees to create strategies (education and promotion) that best meet the needs of targeted users	General Public, Existing AT Users	-Physical Activity -Social Connection and Cohesion -Access to Services
Partnership & Community Engagement	Connect with AT network and Public Health for youth engagement that facilitates social connections (i.e. AT scavenger hunt or bingo)	Youth	-Physical Activity -Social Connection and Cohesion
Education & Promotion	Incentivize use of active transportation facilities or sidewalks through social media promotion and contest- leverage LAM, Region and Active Transportation channels	General Public, Youth	-Physical Activity -Social Connection and Cohesion -Accessibility -Access to Services
Education & Promotion	Incorporate education campaigns as part of every new road build- use this as an opportunity to pilot this as a future standard recommendation	General Public	-Physical Activity -Collisions/Safety -Social Connection and Cohesion -Accessibility -Access to Services
Education & Promotion	Engage with Niagara College to encourage AT for students and meet demand- ensure adequate bike racks and promotion of new facilities for both cycling and walking to school	Niagara College	-Physical Activity -Collisions/Safety -Social Connection and Cohesion -Accessibility -Access to Services

Recommendation Category	Recommendations	Target Audience	Health Outcomes
Education & Promotion	Broad education on cyclist safety (i.e. requirements of lights, bell, reflective clothing) and sharing the roads and facility (pedestrians and cyclists)- leverage community partners (i.e. Heart Niagara)	General Public, Youth, Existing AT Users	-Collisions/Safety -Physical Activity
Education & Promotion	Promote linkages to community spaces (parks, Steve Bauer Trail etc.) and local events via multi-use path and/or sidewalk facilities	General Public	-Access to Services -Social Connection and Cohesion -Accessibility -Physical Activity

Recommendation Prioritization

Each respective recommendation has resource and implementation considerations. Based on these considerations, each recommendation was given an effort ranking ranging from easy to hard. This represents a summation of the cost, risk, time, and capacity considerations that accompany the recommendation. In addition to this, a score is given for overall impact of the recommendation on its respective health outcomes, ranging from low to high. Recommendations were ranked based on this impact score, with the first illustrating the largest potential health impact. All levels of impact have marked benefits on population health and should be considered in project execution. Table 10 illustrates the prioritization of each proposed recommendation.

Table 10. Recommendation Prioritization

#	Recommendations	Cost, Risk, Time, Capacity*	Implementation Considerations	Positive Impact Ranking (Low, Medium, High)	Effort Ranking (Low, Medium, Hard)
1	**Physically separated active transportation facility is the best practice for reducing collisions (fully segregated cycle tracks or multi-use path). A combination of both facilities is recommended to best suit each road segment.**	Cost- Additional cost of active transportation facility for construction and land acquisition Time- additional time needed to complete this type of facility versus a partially segregated facility	Provide Local Area Municipalities (LAMs) and Niagara Region (NR) Decision Makers with HIA Report findings to strengthen case for decision	High	Hard

#	Recommendations	Cost, Risk, Time, Capacity*	Implementation Considerations	Positive Impact Ranking (Low, Medium, High)	Effort Ranking (Low, Medium, Hard)
2	**Advocate for continuous sidewalk network within the area where cycle tracks are the selected cycling facility to prevent pedestrians from having to walk on roadways or within cycle tracks.**	Cost- additional cost for continuous sidewalk Time- additional time to build buy-in and ensure LAMs support this work Capacity- capacity limitations of LAMs to facilitate this work	Provide LAMs and NR Decision Makers with HIA Report findings to strengthen case for decision	High	Hard
3	**Ensure adequate connection to and over the 406 to Kottmeier Road for improved access to and between new neighbourhood development (with AT facilities)**	Cost- additional cost for continuation of AT facilities to and over the 406 Time- additional time to lobby all other parties (LAMs, MTO) for support Capacity- capacity limitations within scope of this project to facilitate this ask	Provide LAMs and NR Decision Makers with HIA Report findings to strengthen case for decision Leverage local feedback (residents, AT committees, school board travel planning) to strengthen case	High	Hard

#	Recommendations	Cost, Risk, Time, Capacity*	Implementation Considerations	Positive Impact Ranking (Low, Medium, High)	Effort Ranking (Low, Medium, Hard)
4	**Ensure sidewalk and AT network connects to Steve Bauer Trail as well as adjacent cycling and sidewalk facilities**	Cost- additional cost for sidewalks/paths to connect Capacity- potential capacity of LAMs to support this work	Provide LAMs and NR Decision Makers with HIA Report findings to strengthen case for decision Leverage local feedback (residents, AT committees) to strengthen case Potential to offset cost via development charges for developers of adjacent lands	High	Hard
5	**Consider a minimum width of 1,800 mm on both sidewalk and multi-use path to allow wheelchairs and scooters to pass when utilizing facility**	Cost- additional cost for wider sidewalks throughout area, including potential land acquisition costs	Provide NR Decision Makers with HIA Report findings to strengthen case for decision. Partner with Accessibility Lead and Accessibility Committee for their input into accessibility recommendations and to promote value of increased accessibility Explore potential grants/funding streams for accessibility work	Medium	Easy

#	Recommendations	Cost, Risk, Time, Capacity*	Implementation Considerations	Positive Impact Ranking (Low, Medium, High)	Effort Ranking (Low, Medium, Hard)
			Potential to standardize accessibility recommendations via engineering standards and complete streets design manual for LAMs		
6	**Ensure entry points are free of potential obstructions (i.e. planters, poles, raised curbs) to facilitate accessibility for all users**	Time- able to execute during design phase Cost- no additional costs known	Provide NR Decision Makers with HIA Report findings to strengthen case for decision. Partner with Steve Murphy (Accessibility Lead) to promote value of increased accessibility Explore potential grants/funding streams for accessibility work	Medium	Easy
7	**Proper signage and line painting denoting cycling lanes and/or multiuse path- visible to pedestrians, cyclists and motor vehicles**	Cost- additional cost of line painting/signage dependent on standard plans	Provide LAMs and NR Decision Makers with HIA Report findings to strengthen case for decision	Medium	Easy

#	Recommendations	Cost, Risk, Time, Capacity*	Implementation Considerations	Positive Impact Ranking (Low, Medium, High)	Effort Ranking (Low, Medium, Hard)
8	**Ensuring appropriate signage for pedestrians at high-traffic zones (i.e. entrances to plazas, driveways, intersections)**	Cost- additional cost of signage depending on standard plans	Provide LAMs and NR Decision Makers with HIA Report findings to strengthen case for decision	Medium	Easy
9	**Use of textural and tonal contrast (with 70% or more contrast) on ground surfaces will help to define primary routes and assist with wayfinding**	Cost- additional cost for design elements and materials to facilitate tonal contrast	Provide NR Decision Makers with HIA Report findings to strengthen case for decision. Partner with Accessibility Lead and Accessibility Committee to promote value of increased accessibility Explore potential grants/funding streams for accessibility work Partner with urban design team to co-create design features, urban braille and other accessibility considerations	Medium	Easy

#	Recommendations	Cost, Risk, Time, Capacity*	Implementation Considerations	Positive Impact Ranking (Low, Medium, High)	Effort Ranking (Low, Medium, Hard)
10	**Partner with schools adjacent to the study area to promote use of sidewalks as a means to walk, scoot, wheel or cycle to school**	Time- investment of time to foster partnerships and create collaborative goals Capacity- limits to capacity of School Health Nurses to support AST work	Connect with School Health Nurse for project area to broker relationship. Note, schools adjacent to study area: Quaker Rd. School, Glynn A. Green, E.L. Crossley Explore potential grant funding for an event to promote active transportation for schools (i.e. walking bus) Leverage existing AST programs in schools.	Medium	Easy
11	**Engage with Niagara College to encourage AT for students and meet demand- ensure adequate bike racks and promotion of new facilities for both cycling and walking to school**	Cost- additional costs for bike racks, paid promotion and communications campaign Capacity- capacity limitations at NC to promote new facilities Time- investment of	Provide HIA reports to strengthen case for bike racks and connectivity. Leverage existing connects with NC to broker conversations	Medium	Medium

#	Recommendations	Cost, Risk, Time, Capacity*	Implementation Considerations	Positive Impact Ranking (Low, Medium, High)	Effort Ranking (Low, Medium, Hard)
		time to build relationships with staff and students at NC			
12	**Accessible Pedestrian Signals at Street Crossings (Tones- different tones for north-south and east-west crossings, Countdown signals, Tactile mapping- provide a diagram on the pedestrian signal control showing the lane configuration of the roadway to be crossed)**	Cost- additional cost for accessibility upgrades Time- additional time needed to implement enhanced accessibility features	Provide NR Decision Makers with HIA Report findings to strengthen case for decision. Partner with Steve Murphy (Accessibility Lead) to promote value of increased accessibility Explore potential grants/funding streams for accessibility work	Medium	Medium
13	**Provide landings to allow users to stop and recover at regular intervals throughout path or sidewalk facilities**	Cost- additional cost for accessibility upgrades Time-additional time needed to implement enhanced accessibility features	Provide NR Decision Makers with HIA Report findings to strengthen case for decision. Partner with Steve Murphy (Accessibility Lead) to promote value of increased accessibility	Medium	Medium

#	Recommendations	Cost, Risk, Time, Capacity*	Implementation Considerations	Positive Impact Ranking (Low, Medium, High)	Effort Ranking (Low, Medium, Hard)
			Explore potential grants/funding streams for accessibility work		
14	**Ensuring sidewalk network and AT network are well-lit, especially in cross-sections with driveways and plazas and intersections**	Cost- additional cost for increased lighting Risk- environmental impacts of increased lighting	Provide LAMs and NR Decision Makers with HIA Report findings to strengthen case for decision	Medium	Medium
15	**Ensure well-lit, fully paved and well maintained road platform to facilitate access to emergency services**	Cost- additional cost for increased lighting	Provide LAMs and NR Decision Makers with HIA Report findings to strengthen case for decision	Medium	Medium
16	**Install QR codes along the trail to encourage physical activity at accessibility landings**	Cost- additional costs for posts and promotional material with QR codes	Partner with LAM parks and recreation departments and/or PH to create plan for QR code product	Medium	Medium

#	Recommendations	Cost, Risk, Time, Capacity*	Implementation Considerations	Positive Impact Ranking (Low, Medium, High)	Effort Ranking (Low, Medium, Hard)
	(i.e. do x number of jumping jacks)	Capacity- capacity limitations of LAM recreation departments to facilitate this			
17	**Ensure area schools (elementary, secondary and Niagara College) and adjacent businesses have adequate bike racks**	Cost- additional cost of bike racks Time- investment of time to foster partnerships and create collaborative goals Capacity- limits to capacity of School Health Nurses to support AST work	Connect with School Health Nurse for project area to broker relationship. Note, schools adjacent to study area: Quaker Rd. School, Glynn A. Green, E.L. Crossley Leverage existing AST programs in schools. Work to identify grants/funding for bike racks	Medium	Medium
18	**Continue to partner with active transportation network and committees to create strategies (education and promotion) that best**	Time- investment of time to foster partnerships and create collaborative goals Capacity- limits to capacity of advisory	AT connects in all three municipalities are engaged in the project- continue to foster these relationships throughout design and build process	Medium	Medium

#	Recommendations	Cost, Risk, Time, Capacity*	Implementation Considerations	Positive Impact Ranking (Low, Medium, High)	Effort Ranking (Low, Medium, Hard)
	meet the needs of targeted users	committees to support/promote facilities depending on timelines	Potential to connect with post-secondary programs to aid in this campaign		
19	**Connect with AT network and Public Health for youth engagement that facilitates social connections (i.e. AT scavenger hunt or bingo)**	Cost- additional cost for paid communications channels, potential cost to create campaign materials, cost for incentives Time- additional time needed to execute youth engagement Capacity- staff needed to promote and facilitate engagement	Potential to connect with Youth Engagement Specialist, Youth Advisory Committee and React (NRPH) to partner in create product Potential to connect with student councils of area schools	Medium	Medium
20	**Incentivize use of active transportation facilities or sidewalks through social media promotion and contest- leverage**	Cost- additional cost for paid communications channels, potential cost to create campaign materials, cost for	Project team could leverage LAM, Region and known Active Transportation channels to promote contest.	Medium	Medium

#	Recommendations	Cost, Risk, Time, Capacity*	Implementation Considerations	Positive Impact Ranking (Low, Medium, High)	Effort Ranking (Low, Medium, Hard)
	LAM, Region and Active Transportation channels	incentives/contest prizes Time- additional time needed to execute contest Capacity- staff needed to promote and monitor contest			
21	**Incorporate education campaigns as part of every new road build- use this as an opportunity to pilot this as a future standard recommendation**	Cost- additional cost to ingrain formal education as a function of transportation (potential cost to create a position, or include work as part of an existing position) Capacity- capacity of existing staff to ingrain this work Time- additional time needed to create education products to be	Ingrain education as a key function of all transportation projects- outline within project charter. Potential to ingrain into complete streets design guidebook	Medium	Medium

#	Recommendations	Cost, Risk, Time, Capacity*	Implementation Considerations	Positive Impact Ranking (Low, Medium, High)	Effort Ranking (Low, Medium, Hard)
		used as part of all projects			
22	**Edge protection where a walkway is located next to an area which slopes down or is adjacent to a potential hazard- consider a curb at least 50mm high or another barrier to be used**	Cost- additional cost for additional design elements to facilitate modifications	Provide NR Decision Makers with HIA Report findings to strengthen case for decision. Partner with Steve Murphy (Accessibility Lead) to promote value of increased accessibility Explore potential grants/funding streams for accessibility work	Low	Easy
23	**Partner with active transportation advisory committees in Pelham, Thorold & Welland to introduce and promote use of sidewalk facilities**	Time- investment of time to foster partnerships and create collaborative goals Capacity- limits to capacity of advisory committees to support/promote facilities depending on timelines	AT connects in all three municipalities are engaged in the project- continue to foster these relationships throughout design and build process	Low	Easy

#	Recommendations	Cost, Risk, Time, Capacity*	Implementation Considerations	Positive Impact Ranking (Low, Medium, High)	Effort Ranking (Low, Medium, Hard)
24	**Broad education on cyclist safety (i.e. requirements of lights, bell, reflective clothing) and sharing the roads and facility (pedestrians and cyclists)- leverage community partners (i.e. Heart Niagara)**	Capacity- potential limitations of Communications/public health to facilitate promotion Cost- additional cost for paid communications channels, potential cost to create campaign materials Time- time needed to create and communicate with target audiences	Leverage community organizations that provide cycling safety education (i.e. MTO- Lisa Thompson, Heart Niagara)	Low	Easy
25	**Promote linkages to community spaces (parks, Steve Bauer Trail etc.) and local events via multi-use path and/or sidewalk facilities**	Capacity- limitations of Communications staff (NR, LAMs, AT Networks) Cost- additional cost for paid communications Time- time needed to	Leverage community contacts and LAMs to promote linkages through their channels	Low	Easy

#	Recommendations	Cost, Risk, Time, Capacity*	Implementation Considerations	Positive Impact Ranking (Low, Medium, High)	Effort Ranking (Low, Medium, Hard)
		engage with audience and understand who potential AT users may be			
26	**Ensure transit stop and all future transit stops in area meets accessibility, lighting and signage guidelines. Consider a bus shelter to be added.**	Cost- additional cost to upgrade bus stop	Partner with NR Transit and Welland Transit	Low	Medium
27	**Install local history/environmental QR codes along path to facilitate education/discussion amongst users. Ensure consideration of language and accessibility (i.e. brail) for signs and messaging**	Cost- additional cost for posts and promotional materials with QR codes Capacity- capacity limitations of LAM recreation departments to facilitate this	Partner with LAM recreation departments, NPCA and/or PH to create plan for QR code product that highlights heritage and environment Partner with area schools to create materials	Low	Medium

*Cost, risk, time and capacity are considered on as needed basis for each recommendation

Monitoring and Evaluation

Monitoring and evaluation are key components of the HIA process. Laying the groundwork to evaluate success allows us to understand whether or not the HIA process is proceeding as intended, and whether or not drafted recommendations are having their desired effects on health-related outcomes. The activities outlined within this step will continue beyond the completion of the Merritt Road HIA. The HIA lead will continue to provide support in conducting these activities as detailed.

Monitoring and evaluation consists of three sub-steps: process evaluation, impact (implementation) evaluation, and outcome evaluation. Each phase of the evaluation plan has a distinct goal. Specific activities of each step are outlined below in Table 11.

1. **Process Evaluation**- aims to understand the success of the HIA process and to what extent the HIA process impacted the decision-making process
2. **Impact Evaluation**- aims to understand the implementation of the HIA process and recommendations into existing project processes
3. **Outcome Evaluation**- aims to understand the impact of the HIA recommendations on the social determinants of health and health outcomes

Process evaluation is to be conducted throughout the HIA process, and will be completed directly following the completion of the HIA report. Impact evaluation will occur directly following project implementation. Outcome evaluation will begin with the collection of “pre” state data before project implementation and will continue long-term beyond project completion.

Monitoring and Evaluation Framework

Table 11. Process Evaluation Framework

Theme	Evaluation Question	Measure/ Indicator	Data Source	Analysis Procedure	Time Frame/Resources Required	Lead
HIA Goals and Process	To what extent was the HIA part of the project's decision-making process?	Likert Scale [1= strongly disagree to 5=strongly agree] Were the goals and objectives of the HIA clearly stated? Did the process unfold as expected? Did the HIA process meet the agreed upon timelines? Were the operational objectives for the HIA met? Were all relevant parties included within the HIA	Planning Team	Narrative Hexagon diagram	During Reporting stage	Project Lead

Theme	Evaluation Question	Measure/ Indicator	Data Source	Analysis Procedure	Time Frame/Resources Required	Lead
		process? (internal staff and stakeholders) Were relevant resources available to facilitate the HIA process? (financial, temporal, human) Were you satisfied with the HIA process?				
System	Was the HIA part of a regulated assessment process or is it being done voluntarily?	Checklist Assessment • Regulated assessment: part of existing workflow • Voluntary: creating new workflow	Planning Team	Narrative	During Screening Process	Project Lead

Table 12. HIA Impact Evaluation Framework

Theme	**Evaluation Question**	**Measure/ Indicator**	**Data Source**	**Analysis Procedure**	**Time Frame/Resources Required**	**Lead**
HIA Implementation (Impact)						
Adoption (fidelity)	Were the HIA recommendations adopted as intended? And why? (i.e. limitations in resources, lack of political support etc.)	Checklist Assessment (Wismar et al., 2007) • Direct (*leads to changes in decision*) • General (*raises awareness but no specific changes are made in decision*) • Opportunistic (*favourable decision would have been made anyway*) • Ineffective (*HIA ignored in decision)*	Planning Team	Descriptive	During Monitoring and Evaluation Step	Project Lead

Theme	Evaluation Question	Measure/ Indicator	Data Source	Analysis Procedure	Time Frame/Resources Required	Lead
Implementation	What were the resources available to implement HIA recommendations? Including: funding, support, land limitations, zoning, etc.	Field Notes/ observations Asked with above (i.e. if a general or ineffective is selected skip logic to a secondary question discussing resources)	Planning Team	Narrative	During Monitoring and Evaluation Step	Project Lead

Table 13. HIA Outcome Evaluation Framework

Evaluation Question	**Desired Outcomes**	**Measures/ Indicators**	**Data Source**	**Baseline (if applicable)**	**Time Frame/Resources Required**	**Lead**
Project Outcome						
What was the Health Impact?	Increased access to services [education, employment, shopping, pharmacy, clinics, food, emergency services] facilitating increased connectivity	**Main Indicator:** Traffic counts of all modes of travel on roads (by pedestrians, cyclists, motor vehicles and public transportation) (pre/post) **Supplementary Indicators:**	TES Data (pre/post) -Pre: 6-12 months prior to construction -Post: 6-12 months following construction -note: pre and post data will be collected during the same month of year (I.e. June 2022 and 2024)	Baseline Data collected pre-construction	Required resources to collect data pre and post construction (cyclist, pedestrian and automobiles). Resources required to collect observational data (staff, vehicle, intercept questionnaire) pre and post construction EMS data to be received from EMS on an annual basis Resources required to create and distribute a	HIA Team with support from transportation services

Evaluation Question	Desired Outcomes	Measures/ Indicators	Data Source	Baseline (if applicable)	Time Frame/Resources Required	Lead
		Number of daily users of trail network through Steve Bauer Trail Number of daily bikes in bike racks at schools (Quaker Road, Niagara College, E.L. Crossley) Reduction in average EMS response times within the study area Increased number of bike racks at local businesses (adjacent to study area) Survey engagement with E.L. Crossley students [i.e. have the improvements to	Observational Data (pre/post)		survey to secondary school students	

Evaluation Question	Desired Outcomes	Measures/ Indicators	Data Source	Baseline (if applicable)	Time Frame/Resources Required	Lead
		sidewalks and bike lanes in the study area changed your habits in getting to and from school? i.e. do you walk or bike to school now] Intercept interviews with road users [i.e. why are you using the facility, what services are you accessing]				
	Increased physical activity	**Main Indicators:** Traffic counts of all modes of travel on roads (by pedestrians, cyclists, motor vehicles and public transportation) (pre/post) Hands up count (pre/post count of number of students	TES Data Hands Up Count (Active and Safe Routes to School Data)		Required resources to collect data pre and post construction (cyclist, pedestrian and automobiles). Hands up count data is contingent on approval from area school to participate in the program and	

Evaluation Question	Desired Outcomes	Measures/ Indicators	Data Source	Baseline (if applicable)	Time Frame/Resources Required	Lead
		who use AT means to get to/from school before and after campaign) **Supplementary Indicators:** Number of daily bikes in bike rack at area schools (pre/post) Long-term- OSDHUS data regarding travel to/from school Mode of travel for Niagara College students (counts of pedestrians, cyclists and motor vehicles)- leverage on the move report Survey engagement with E.L. Crossley	Observational Data (Pre/Post) OSDHUS Survey Data		support from Public Health Resources required to collect observational data (staff, vehicle, intercept questionnaire) pre and post construction Resources required to create and distribute a survey to secondary school students	

Evaluation Question	Desired Outcomes	Measures/ Indicators	Data Source	Baseline (if applicable)	Time Frame/Resources Required	Lead
		students [i.e. have the improvements to sidewalks and bike lanes in the study area changed your habits in getting to and from school? i.e. do you walk or bike to school now] Intercept interviews with road users [i.e. are you using the sidewalks and bike lanes more often]				
	Decreased collisions	**Main Indicator:** Reduction in number of collisions in the area. Types of collisions of interest include: - Lighting or visibility - Time of day	NRPS Collision Data		NRPS Data received on an annual basis	

Evaluation Question	Desired Outcomes	Measures/ Indicators	Data Source	Baseline (if applicable)	Time Frame/Resources Required	Lead
		- Turns into driveways and plazas - Pedestrian and cyclists - Animal-related collisions				
	Accessibility	**Proxy Indicator** Number of accessibility recommendations integrated into road design and AT design (above mandated recommendations)				
	Social Connection and Cohesion	TBD- Proxy Indicators (i.e. number of trail users, number of sidewalk users, number of QR codes installed/educational signs installed, use of QR codes, number of	TBD	TBD	TBD	TBD

Evaluation Question	Desired Outcomes	Measures/ Indicators	Data Source	Baseline (if applicable)	Time Frame/Resources Required	Lead
		informal community events within study area)				
	Decrease in chronic conditions	TBD- note proxy indicators discussed above	TBD	TBD	TBD	TBD
What was the Equity Impact?	Improved health equity - Older Adults - Youth and Childre n - Women - People with Disabilit ies	Recommendations were created to target each priority population of interest (i.e. school related campaigns to target youth and children). Care has been taken to ensure priority populations are given equitable access to the newly created road and services. Currently, a lack of data available with regards to equity and priority populations is				

Evaluation Question	Desired Outcomes	Measures/ Indicators	Data Source	Baseline (if applicable)	Time Frame/Resources Required	Lead
		a limiting factor to this analysis.				
What was the Community Impact?	Increased participatory and equitable decision-making Increase community awareness	Number of community members consulted in the planning process. Number of community members/community organizations involved in implementing recommendations. Number of awareness meetings/presentations conducted (i.e. PICs)	Observational Data	N/A	Targets to be established through HIA process	HIA Lead and Project Manager

Conclusion

The results presented within this HIA report will work to supplement the Merritt Road EA and support the EA documentation and additional studies. The HEIP Lead and HIA Coordinator will continue to support the PM to facilitate the implementation of the presented recommendations to meet appropriate timelines. The timelines of the HIA recommendations are dependent on the timelines and needs of the project itself, and thus implementation target dates are subject to change. The Merritt Road Project is one of the first projects to integrate the HIA into Regional planning processes for capital projects. Moving forward, the HEIP process will incorporate the use of Health Impact Assessments (HIAs) into program and project planning processes across the corporation to support Niagara to become one of the top 25 healthiest communities in Canada. The work of this project will result in changes to decision-making processes and support the implementation of other programs and projects across the corporation to enhance health and reduce health disparities between groups of people.

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Appendix A: Screening Tool

Screening Scale

-3	Significant	Bad
-2	Moderate	
-1	Minor	
0	None	
1	Minor	Good
2	Moderate	
3	Significant	

Rate each category based on the potential impacts your project may have, from a -3, is a significant negative impact, -2 is a moderate negative impact, -1 is a minor negative impact, 0 is no impact, 1 is a minor positive impact, 2 is a moderate positive impact and 3 is a signfiicant positive impact

Project Name	Merritt Rd.	**Project Manager**	Maged Elmadhoon

CAMRA Risk Categories	Determinants of Health	Score	Comments. Please provide further details if item scores a 3 or -3, or a -1
Natural Environment: The extent to which any change or disturbance to the natural environment is perceived to be either desirable or undesirable. Includes positive or negative impacts to soil, air or water, habitat and species of flora, fauna, or aquaculture, most especially endangered species or their habitats.	Environment - Air, Noise, Odour	71 -1	New area allocated as road allowance that will alleviate traffic from Highway 20, by establishing an alternate connection to Hwy 406 by utilizing RR 37 (Merritt Rd) in south. This will lead to some increase of noise/air pollution in the area, but the reduction of congestion is a positive impact on this area as a whole (i.e. the adjacent municipalities)
	Environment - Water, Soil, Waste	2	Currently the area experiences significant issues with drainage. The project will address the hydraulic capacity of roadside swales to facilitate better connection for drainage to MTO. Assessments to be completed for the entire area with regards to drainage and W/WW

	Natural Environment – Climate change, Land attributes and topography, Habitat and animals, Protected lands (i.e. wetlands)	-2	Road reconstruction will remove trees and greenspace; project area is adjacent to wetlands
	Cultural Environment- Natural Heritage (Archeologically or historically significant land, buildings or structures)	-1	Unopen road allowance is adjacent to wetlands and natural heritage land/environmental lands- construction will impact these lands
Health & safety: Principles intended to keep people safe from injury, disease and mental distress, and health and safety impacts to the public and staff	Transport - Active transport, Public transit, Road safety, Others	3	Addition of active transportation lanes for cycling and walking; decrease of speed; formal speed limit for the whole section of roads; potential for segregated AT facilities throughout
	Housing - Access, Healthiness, Safety, Others	1	Implications for both secondary plans (East Foothill and Port Robinson)- road faciltiates transit for this proposed housing development . City of Thorold has approved the Port Robinson Secondary Plan that is expected to generate approximately 12,500 population and jobs. Town of Pelham has approved the East Foothill Secondary Plan with proposed over 131,000 sq. meter gross floor area inclusive of 536 residential units. Traffic from these two developments need to be serviced using an arterial connection with the Hwy 406

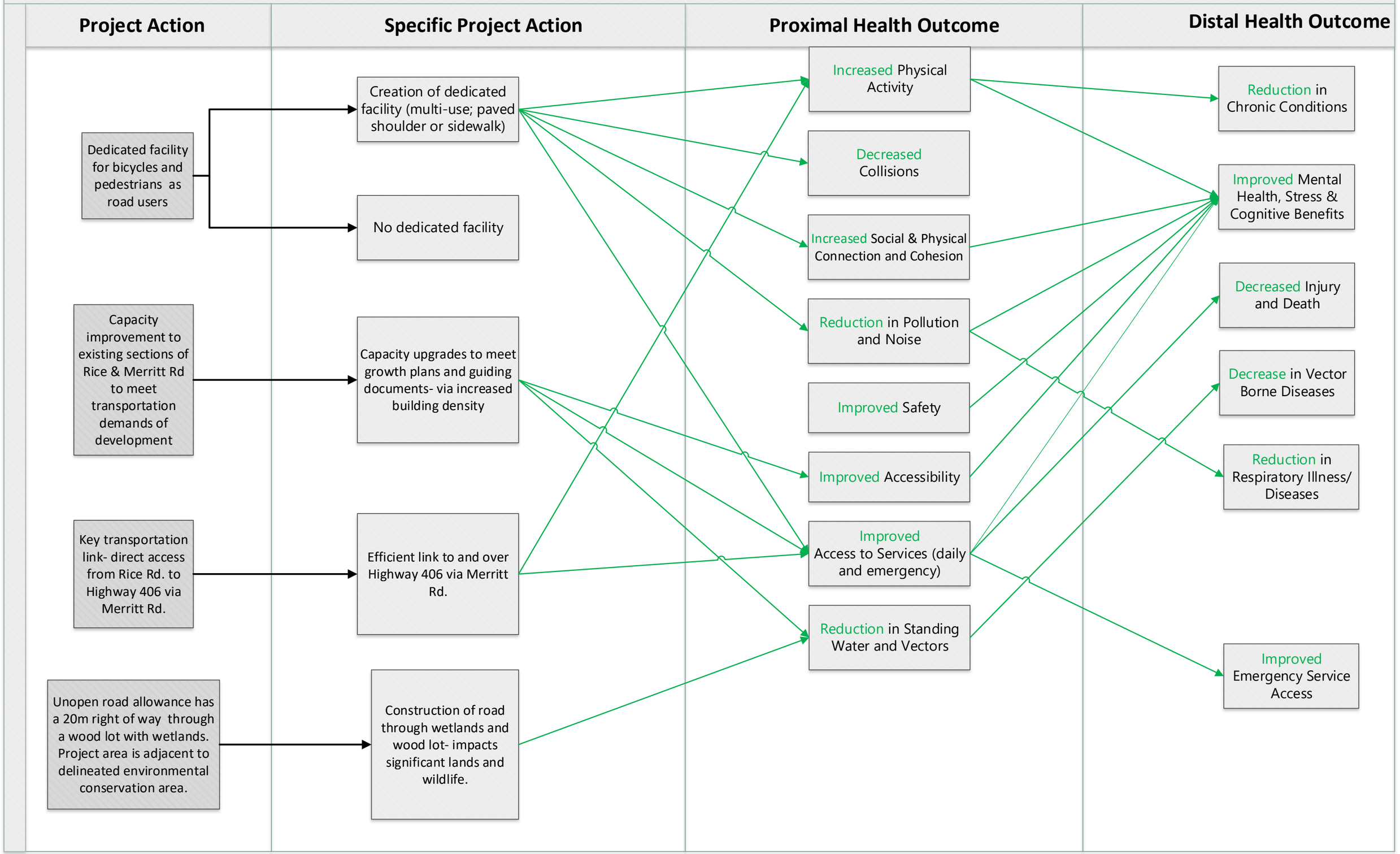
	Working conditions - Physical and/or mental conditions of existing or new employment	0	
	Neighbourhood safety - Crime rates, Neighbourhood violence and drug use, Access to alcohol, tobacco, marijuana, and other substances	1	Area will be better enforced, well-lit and more organized. Safety increased through visibility and police presence (i.e. driving impairment)
Well Being: Refers to perspectives of health, quality of life and prosperity, and continuity of service delivery including or especially social and health equity programs, and all as not otherwise considered elsewhere in other criteria	Education - Access to education, Level of education, Skills development, Literacy, Others	1	Better accessibility to G.A.G- reduction in traffic around this school zone (diversion)- improved access to NC and Brock
	Access to public services - Social services, Emergency services, Public works, Recreation, Community services & Access to Public Health and Health Services- Primary and acute health care services, Tobacco and alcohol cessation support, Support for healthy eating and exercise, Support for safe sexual behaviours	2	New addition of Merrit Rd. road allowance (cataract to Rice)- improves connectivity to these services
	Built environment – Landscaping, Urban design, Green spaces, Connectivity, Safe environments, Road networks, Others	3	Improved connectivity for pedestrians, cyclists, vehicles etc., improved road networks, safe environments

	Social supports - Social connection/ Community support, Community Structure, Self-esteem, Acculturation, Sense of security, Discrimination due to race, ethnicity, sexuality, gender, Others	1	Connectivity to social networks/community organizations is improving; active transportation further facilitates connectivity with social support networks
	Familly- Child development, Family ties, Work-life balance, Support services, Others	0	
	Food security - Access to healthy and nutritious food choices, Others	0	
	Economic development - Job creation, Increased business, Distribution of wealth, Income and Income Distribution, Others	1	Secondary Plan activities- aiming for job creation, Merrit Rd. will help facilitate this
All - Populations	Considering all the determinants of health, are there health impacts that may be greater for disadvantaged groups (for example: Low income, new Immigrants, Indigenous peoples, LGBTQ2S+, Migrant workers, Older adults, Persons with disabilities, People who are racialized, Rural residents, Women, Youth/Children, Other populations not listed)	1	Low income (ability to use active transportation); rural residents; Students; Sex and Gender

Screening Tool

Total -3	0	
Total -2	1	
Total -1	2	
Total 0	3	
Total 1	6	
Total 2	2	
Total 3	2	
Total Score	**24**	Score below 12 no HIA recommended. Score between 13 and 18 rapid HIA recommended. Score of 18 or more, HIA recommended- proceed to scoping.
Is it recommended that this project completes an HIA? (Yes/No)	**Yes**	

Appendix B: Merritt Rd. Logic Model



Appendix B: Merritt Rd. Logic Model