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PLANNING FOR INTERCITY MOBILITY: A BUSINESS CASE FOR HIGH-FREQUENCY INTERCITY BUS SERVICES IN ONTARIO'S GREATER GOLDEN HORSESHOE

MAJOR RESEARCH PAPER

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Abstract

Like most metropolitan regions in North America, areas in southwestern Ontario suffer from auto dependency which results in congestion, negative environmental impacts, and limits on societal and economic well-being. This phenomenon, which is especially prevalent in the Greater Golden Horseshoe (GGH, the area surrounding the City of Toronto) is caused in part by the absence of high quality, attractive intercity public transportation.

This study provides a unique investigation of intercity commuting trends for the GGH region and addresses critical gaps in existing intercity public transit services. The research examines the costs and benefits of introducing high-frequency intercity bus services (IBS) in the GGH to support intercity commuters across the region with the introduction of a viable alternative to private vehicle travel. Unlike the traditional service models of intercity bus services, that appeal to the travel and tourism sector, this research proposes the use of intercity commuter bus services as a means to connect major urban and employment areas within the GGH region, that are currently underserved or not captured by existing intercity transit services. While existing transit agencies may not have the capacity to fund and operate these services, governments can consider innovative service models such as performance-based contracts with private bus companies to provide intercity bus services and fill critical service gaps between outer regions of the GGH.

In the GGH, the governance of transportation systems has been delegated in part to Metrolinx, a Government of Ontario Agency. As such, in this research the Metrolinx Business Case Framework is used to develop an Initial Business Case for a high-frequency, intercity bus service between Waterloo Region and Wellington County. A wide range of high-level assessments are conducted to identify current issues, evaluate a business-as-usual scenario, and determine the feasibility of multiple intercity bus service options. It concludes that there is a strong business case for governments to provide high-quality services along major corridors between the two regions. The Initial Business Case assessment develops a preliminary framework that can be replicated and used to assess similar intercity bus service opportunities among the outer regions of the GGH.

Introduction

Cities rely on transportation systems for their function – creating and maintaining economies and allowing societies to flourish. Transportation systems also can be effective in mitigating environmental impacts or, alternatively, can be primary sources of negative effects on ecosystems. The growth of cities is shaped by the dominant mode of transportation used for travel within and through a region. In the Greater Golden Horseshoe (GGH), the area surrounding the City of Toronto in southwestern Ontario, that mode is the private vehicle.

A primary component of regional travel is the journey-to-work trip, commonly referred to as "commuting," through which an employed person travels from their place of residence to their usual place of work (Statistics Canada, 2021). Intercity commuting refers to employed persons who regularly travel across one or more neighbouring cities or towns for work (Santos, 2023). The work trip is often the longest trip of the day, and the increasing time spent in travel to and from work influences the commuting mode share, as commuters typically opt for modes that minimize the total time and cost of their commute. As a result, the daily journey-to-work trip plays an important role in transportation planning and has significant influence over the design of transportation infrastructure and transit service planning (McGuckin & Srinivasan, 2005).

For the purpose of this research paper, intercity commuters within the GGH refer to employed persons that travel for work across one or more regions, or Census Divisions (CD), from their place of residence. Commuting patterns in the GGH have evolved and are shifting from a downtown-oriented system to a multi-destination network, with multiple nodes throughout the region. As urban centres expand and more businesses cluster in urban areas, workers are often left with longer commutes. Although commuting population is highest in the Greater Toronto and Hamilton Area (GTHA), this research paper addresses the large intercity commuting population among the outer regions of the GGH where critical gaps in existing intercity public transit services contribute to the growing problems of car-dependency, traffic congestion, greenhouse gas emissions, and environmental degradation.

Intercity bus services (IBS), also known as inter-regional or long-distance bus services, are characterized as regularly scheduled bus services that operate along fixed routes, with limited stops, connecting two or more cities over long distances. Although the IBS industry has faced many challenges over the past 100 years, it has remained a critical part of public transit services and has recently been experiencing considerable growth in numerous regions in the United States and Europe. In these regions, IBS offer several advantages to travelers, including competitive pricing, flexible schedules, and a viable alternative to private vehicles.

Frequent intercity bus services within the GGH can provide a low-cost transport option for intercity commuters and have the potential to introduce a viable alternative to private vehicle use. The addition of new, high-frequency, and low-cost intercity bus service options can also support several provincial and regional transportation and climate policy goals such as improving mode choice, reducing gridlock, reducing greenhouse gas emissions, and providing a

safe, inclusive, and interconnected transportation network (MTO, 2022) (MMAH, 2020) (Metrolinx, 2018). Moreover, because intercity bus services are typically owned and operated by private companies and utilize existing road infrastructure, minimal government investment is required compared to other modes.

Although existing studies and data on intercity commuting in the GGH are limited, patterns of growth and development across the region suggest that commuting patterns will become increasingly diverse, requiring more people to travel longer distances for work on a daily basis, and placing more pressure on the existing regional highway network. Through investments in frequent intercity bus services, governments can achieve their policy goals of more transportation choice, lower travel costs for residents, and reduced environmental impacts. In so doing, the GGH can remain economically competitive, while providing its residents with viable alternative mobility options for commuting across the region.

Background Context

The Greater Golden Horseshoe (GGH) region, located in southern Ontario, is the most populous and fastest growing mega-city regions in North America, and the economic engine of Ontario. The GGH accounts for about 55 percent and 21 percent of Ontario's and Canada's populations, respectively. Currently, the population of the GGH is approximately 10 million people and is expected to reach nearly 15 million by 2051 (MTO, 2022). The GGH region consists of 16 Census Divisions (CD), also referred to as counties or regions, and approximately 110 Census Subdivisions (CSD), or municipal jurisdictions (Allen & Campsie, 2013).



Figure 1 - Inner Ring and Outer Ring Municipalities in the GGH (Allen & Campsie, 2013)

As shown in **Figure 1**, the Cities of Toronto and Hamilton and the Regional Municipalities of Halton, Peel, York, and Durham are the largest, fastest growing, and most urbanized municipalities in the "inner ring," of the GGH. Municipalities in the "outer ring" are generally less urban, less dense, and less populated, and experiencing less growth pressure compared with the inner ring, with some important exceptions (Allen & Campsie, 2013). However, with population growth and rising housing and living costs within the inner ring, more residents are choosing to purchase homes in the outer rings and commuting to high quality labour markets within the inner ring municipalities.

Commuting patterns in the GGH have evolved for a variety of reasons, including changing business practices, urbanization, the availability of infrastructure, and personal and financial circumstances. In 2016, approximately 75% of commuters in the GGH travelled by car and an estimated 1.15 million GGH residents commuted to work outside of their region of residence (StatCAN, 2016). In 2021, due to the COVID-19 pandemic and subsequent health restrictions, the population of intercity commuters declined to roughly 720,000, while the proportion of car commuters increased to 83% (StatCAN, 2022). However, recent studies indicate that as of 2023 the total commuting population and proportion of car commuters across Ontario has surpassed levels recorded in 2016 (Statistics Canada, 2023b) (Statistics Canada, 2023c).

Across the GGH, excessive gridlock along critical road network impacts the freight and goods movement industry, delays trips for work and recreational activities, and also has social impacts. Evidence suggests that congestion produces negative physical and mental health impacts from sitting in traffic and people losing hours of their lives stuck in traffic, instead of at home with their families (MTO, 2022). The estimated annual social and economic costs of congestion to individuals in the GTHA has increased from $3.3 billion in 2018 (Urban Transportation Task Force, 2012), to approximately $11 billion in 2022 (MTO, 2022). Moreover, population growth projections for the GGH suggest that the daily number of commuters is expected to increase by 46%, representing an additional 2.9 million daily commuter trips (CANCEA, 2023). With the expected rise in population, daily commuter trips and car-dependency, there is growing concern of whether existing and planned public transit systems will have sufficient capacity to support the expected commuter volumes. If the transit system cannot attract sufficient volumes of commuters, due to a lack of competitive travel options, then more commuters will choose to travel by private vehicles, adding further congestion pressure on regional roads and highways.

Provincial transportation planning and climate policies emphasize the need to invest in sustainable transportation infrastructure and implement policies to reduce transport sector greenhouse gas emissions. The recent GGH Transportation Plan (2022) highlights provincial plans for investment in highway and public transit expansion projects valued at $21 billion and $61 billion, respectively, over the next decade (Carroll, 2022). However, public transit infrastructure improvement efforts prioritize GTHA regions, while most of the “outer ring” regions will continue to have limited intercity public transit service options. Moreover, the Plan expects 90% of Provincial GHG emission reductions will come from widespread adoption of low and zero emissions vehicles. However, efforts to relieve traffic congestion by expanding the highway network and promoting the transition to electric vehicles to achieve GHG emission reduction goals are, in effect, de facto supports for private vehicles as the primary mode of commuting across the region. There is a need to develop and implement attractive transportation options that will be effective in shifting commuters from private autos to low-impact modes, including public and private mass transportation systems serving intercity corridors across the GGH.

Research Questions

To address the intercity public transit service gaps in the GGH, this research attempts to address the following research questions:

1. Do existing and planned public transit services have the capacity to meet current and future intercity commuting demands in the Greater Golden Horseshoe?
2. How can the role of intercity bus services be redefined to support daily intercity commuting in mega-regions such as the Greater Golden Horseshoe?
3. How can investment in frequent intercity bus services facilitate provincial and regional transportation and climate policy goals?

Research Outline

To answer the proposed research questions, the remainder of the paper is organized as follows:

- → **Part I: Literature Review |** The literature review explores existing literature on the impacts of intercity commuting and the deregulation of intercity bus services and draws some preliminary conclusions that highlight the gaps in existing data collection and research and its implication for the Greater Golden Horseshoe.

- → **Part II: Greater Golden Horseshoe – Transportation System Overview |** This section provides a brief summary of the GGH transportation network and mode share assessment that was conducted for this study. The complete assessment can be found in **Appendix A**.

- → **Part III: Initial Business Case for Waterloo-Wellington Intercity Bus Services |** To assess the costs and benefits of an intercity bus service, this section introduces a potential system and evaluates its feasibility using the Metrolinx's Initial Business Case evaluation framework. The complete Initial Business Case assessment can be found in **Appendix B**.

- → **Part IV: Discussion & Recommendations |** Based on the research and assessments conducted in the previous sections, the results are discussed, and recommendations are proposed for policymakers to address critical gaps in existing intercity public transit services.

Planning Policy Framework

The Province, through the Ministry of Municipal Affairs and Housing (MMAH), develops legislation, regulations, policies, and plans that govern how land-use planning is to be conducted on private and municipal lands. In turn, these policies and plans establish provincial priorities and thresholds for growth. The following section provides a brief description of the planning policy framework that guides transportation and land use planning decisions in Ontario. This understanding is warranted such that the proposed IBS contemplated in this research can be situated relative to the region's overall planning direction.

The Planning Act – primary provincial legislation that sets the ground rules for how land use planning must be conducted in Ontario. The Planning Act is the ultimate source of planning policy administered through the Ministry of Municipal Affairs and Housing (MMAH) and the Provincial Policy Statement, issued from time to time by the minister (Ontario, 2023).

Provincial Planning Statement (2024) – sets the policy direction for regulating the development and use of land in Ontario. Municipal Official Plans are the vehicles for implementing the PPS and must identify provincial interests and subsequently set out appropriate land use designations and policies consistent with the PPS. The PPS 2024 includes policies that align with the goals of the proposed investment of intercity bus services, as follows:

Transportation Systems

1. Transportation systems should be provided which are safe, energy efficient, facilitate the movement of people and goods, are appropriate to address projected needs, and support the use of zero- and low-emission vehicles.
2. Efficient use should be made of existing and planned infrastructure, including through the use of transportation demand management strategies, where feasible.
3. As part of a multimodal transportation system, connectivity within and among transportation systems and modes should be planned for, maintained and, where possible, improved, including connections which cross jurisdictional boundaries. (PPS, 2024)

A Place to Grow – Growth Plan for the Greater Golden Horseshoe (2020) – a regional planning framework under the PPS that aims to direct and coordinate municipal planning decisions on a range of issues. The Growth Plan identifies the following transportation challenges that need to be addressed:

- Increased traffic congestion causing delays in the movement of goods and people across the GGH is costing billions of dollars lost in GDP every year.
- Unmanaged growth is degrading the region's air quality; water resources; and natural heritage resources.
- The impacts of globalization that are rapidly transforming the regional economy creating uncertainty in the long-term planning for employment.

- Rising public health issues are in part due to growing rates of inactivity linked to low-density and automobile dependent development patterns.
- By 2041, 25% of the population will comprise of individuals over the age of 60 and there is a need for more age-friendly development, including transportation options.
- The impacts of Climate Change require infrastructure that is more resilient and reduces greenhouse gas emissions across all sectors, especially the transportation sector.
  (MMAH, 2020)

The Growth Plan sets out general policy objectives that align with the proposed investment in intercity bus services as follows:

- Promote economic development and competitiveness in the GGH by planning to better connect areas with high employment densities to transit.
- Offering a balance of transportation choices that reduce reliance on automobiles and promote the use transit and active transportation.
- Be sustainable and reduce GHG emissions by encouraging the most financially and environmentally appropriate mode for trip-making.
- Offer multimodal access to jobs, housing, schools, cultural, and recreational opportunities, and goods, and services.

Connecting the GGH: A Transportation Plan for the Greater Golden Horseshoe (2022) – sets out a 30-year vision for mobility in the GGH region to guide and align transportation decisions and investments. Plan includes more than 100 immediate and near-term actions that fall under the following four interconnected themes:

- Fighting Gridlock and Improving Road Performance
- Getting People Moving on a Connected Transit System
- Supporting a More Sustainable and Resilient Region
- Efficiently Moving Goods

Overall, the plan sets out long-term visions and concrete actions and public investments that aim to improve travel mode choices to get around, reduce gridlock, reduce greenhouse gas emissions, and provide a safe, inclusive, and interconnected transportation system. Lastly, the Plan includes the following actions (5.3 Actions to Give Users More Choice) that align with the proposed investment in intercity bus services:

- Open up the intercommunity bus sector to improve transportation options, support economic recovery, and reduce red tape for business.
- Work with public transportation authorities, such as Metrolinx, to explore innovative service delivery models, and working with private carriers for the delivery of intercommunity passenger transportation services in the GGH. (MTO, 2022)

2041 Regional Transportation Plan (2018) – As an agency of the Ministry of Transportation, Metrolinx plays a critical role in shaping the region's mobility. The RTP outlines three overarching public transit service goals for the GGH:

- Strong Connections
- Complete Travel Experiences
- Healthy and Sustainable Communities
  (Metrolinx, 2018)

To achieve these goals, the 2041 RTP is organized around five key strategies that drive action. The proposed investment in intercity bus services can potentially align with four of these strategies, as follows:

- Connecting more of the region with Frequent Rapid Transit and provide an attractive alternative to driving.
- Optimizing the existing transportation system by making the most of what we have.
- Better integration of transportation systems and land use, particularly around transit stations and Mobility hubs.
- Facilitate regional coordination to produce a transportation system that is resilient to the impacts of climate change, including the transition to low-carbon transit vehicles to reduce GHG emissions (Metrolinx, 2018).

Policy Alignment with Proposed IBS Investment

As shown, provincial and regional governments have implemented policies and actions that aim to improve transit connectivity throughout the GGH, and Ontario. The proposed investment for intercity bus services across the GGH region strongly aligns with much of what is articulated in these plans. Public investment in a high quality, low cost, and frequent intercity bus services between major nodes and employment areas across the GGH region strongly aligns much of what articulated in these plans. It has the potential to address regional transportation challenges and facilitate a wide range of provincial and regional transportation policies and goals. The following is a summary of key elements of planning policies that can be supported by IBS:

Existing and Future Transportation Challenges – The Ontario Growth Plan and GGH Transportation Plan have identified significant transportation challenges that need to be addressed for the GGH such as population growth, increasing traffic congestion, degrading air quality, economic uncertainty, and an aging population.

Sustainable Transportation System – planning policies at all levels have highlighted the need for a sustainable transportation system that reduces transport sector GHG emissions and private vehicle dependency while encouraging alternative modes of travel.

Transportation Mode Choice – planning policies also highlight the need for improving transportation options for residents which can reduce the reliance on automobiles, while also increasing access to jobs, health services, schools, recreational opportunities, and more.

Part I: Literature Review

Commuting represents one of the most important daily activities in modern life and has a considerable influence on the formation of cities and urban clusters. Automobiles are the primary choice for daily work commutes across most of the developed world. As a result, many cities around the world are faced with excessively car-dominated daily travel patterns (Saeidizand, Fransen, & Boussauw, 2022). Continuous urban development and reliance on automobiles have led to an increase in both the number of commuting trips and the average time spent commuting. Additionally, factors such as car dependency, urban sprawl, and auto-centered transportation policies contribute to longer and more geographically diverse commuting patterns.

The following literature review describes the negative impacts of rising intercity commuting trends and explores intercity bus services as a potential alternative to private vehicle travel. Intercity bus services are regularly scheduled services that typically operate with limited stops over fixed, long-distance routes, connecting two or more urban areas (Woldeamanuel, 2012). Although the IBS industry has been in decline for several decades since the mid-20th century, deregulation of the industry and innovative business practices have led to its resurgence in many regions. New low-cost and efficient service models have quickly attracted passengers along highly travelled corridors, and increased competition among other modes such as air and rail travel. The growth of intercity commuting trends in the GGH and deregulation of the IBS market suggests an opportunity for Ontario transit agencies to explore investment in daily intercity commuter bus services among GGH regions.

Intercity Commuting

Commuting refers to the daily travel of an employed person from their place of residence to their usual place of work (Statistics Canada, 2021). Intercity commuting, also known as long-distance or interregional commuting, refers to employed persons that regularly travel across one or more neighbouring cities or regions for work (Santos, 2023). Commuting is regular in its frequency, time of departure, and destination, and is predominantly a weekday activity, tied to the morning and evening hours, which has historically defined peak travel demand (McGuckin & Srinivasan, 2005). Research on journey-to-work and intercity commuting has largely examined the relationship between trip length, urban form, and socioeconomic characteristics (Frank & Pivo, 1994) (Niedzielsk & Boschmann, 2014). These studies have shown that factors such as density, urban design, and functional diversity, as well as the characteristics of the transportation systems and individual socioeconomic characteristics of the population can have an impact on intercity commuting (Mendiola & González, 2018).

Since the beginning of the 20th century, urban sprawl, the rapid expansion of regional roads and highways, and widespread adoption of private vehicles have allowed more and more residents to live far from the urban centre for lower property prices at the cost of longer commuting distances (Mayer, 1945) (Mieszkowski & Mills, 1993).

Numerous studies have analyzed the links between land use planning and mobility patterns of large cities (Cervero & Seskin, 1995) (Badoe & Miller, 2000). Factors such as land use planning policies (Ogura, 2005), transportation policies (Cervero & Hansen, 2002), and individual economic incentives prompted by the housing and labour markets (Sandow & Westin, 2010), induce private vehicle dependency and intercity commuting.

While the personal automobile typically presents a set of attributes – autonomy over departure time, route choice, and personal comfort – that makes auto travel the preferred transport mode from a user's perspective, excessive auto-dependency and traffic congestion produce several negative externalities such as air pollution (Van Wee, 2014) (Zhang & Batterman, 2013), traffic accidents (González, Bedoya-Maya, & Calatayud, 2021), fuel waste (Tiwari, Singh, & Balwanshi, 2013), and negative impacts on physical and mental health of drivers (Chatterjee, et al., 2020) (Montazer & Young, 2024). For example, (Requia, Higgins, Adams, Mohamed, & Koutrakis, 2018) found that health and economic impacts of traffic congestion in the Greater Toronto and Hamilton Area (GTHA) is nearly 59 times higher during morning peak periods and estimates that traffic congestion causes approximately 325 deaths and an economic impact of over $2 billion, annually. Additionally, growth in long distance commuting trends, car dependency, and traffic congestion will require increased individual expenses for fuel, parking and tolls, and motor vehicle insurance, leading to higher average annual household transportation expenditures (Litman & Laube, Automobile Dependency and Economic Development, 2002).

Long-distance commuting constitutes a small portion of all passenger trips but contributes to a large share of kilometres travelled and transport sector carbon emissions, yet it receives little attention for traffic congestion relief and decarbonization efforts (Wadud, Adeel, & Anable, 2024) (Li, Kockelman, & Lee, 2022). Decarbonization efforts are often technologically focused, such as electrification and energy efficiency, however alternative solutions such as reducing passenger travel demand, changes in travel behaviour, and improving low-carbon public transport options are also needed to achieve a low carbon economy (Wadud, Adeel, & Anable, 2024).

Governments should prioritize public investment in intercity public transit systems, which can transport many passengers, with low energy consumption per capita, resulting in very low emissions per passenger-km relative to private vehicle travel (Litman, 2024). In addition to lower carbon emissions, public transit can have numerous benefits such as reducing inequities among under-represented communities, increasing access to employment, schools, and essential services, and addressing societal concerns such as rising fuel prices, increasing traffic congestion, aging population, changing consumer preferences, and increasing health and environmental concerns (Litman, 2024). Because commuting behavior is recurring – with typical departure times, fixed origins and destinations, and consistent value of time – there is a greater likelihood of commuters finding suitable alternatives by public transport than for more diverse trips. This observation leads to the discussion of Intercity Bus Services.

Intercity Bus Services (IBS)

Intercity bus services (also called interregional or long-distance bus or coach services) can be defined as, “regularly scheduled bus services for the public that operate with limited stops over fixed routes connecting two or more urban areas not in close proximity,” (Woldeamanuel, 2012). Unlike the city transit bus used for local services, long-distance bus operations typically use motorcoach buses, which are designed for longer journeys and a comfortable user experience.

Intercity bus travel is consistently recognized as one of the most sustainable modes of transportation, due to its low carbon footprint, lower operating costs, greater accessibility for marginalized communities, and wider economic benefits compared to other intercity transport systems, (Woldeamanuel, 2012). For instance, a UK-based study observed that coach buses have the third lowest carbon footprint of travel per kilometer, after high-speed rail and ferries (Ritchie, 2023). In the United States, coach buses typically used by IBS companies are found to be more fuel efficient and produce the lowest greenhouse gas emissions per passenger mile of any transportation mode (ABA Foundation, 2019) (Woldeamanuel, 2012). However, while Amtrak’s electric powered trains had previously used electricity generated by burning fossil fuels, it has been committed to reducing its fleet emissions by acquiring more energy efficient trains and currently procures most of the company’s electricity from carbon-free sources (Amtrak, 2024).

In addition to its environmental benefits, intercity bus services provide an affordable, equitable, and accessible transportation service that appeal to a wide range of passengers including those living in remote communities, different levels of household income groups, specific age groups such as young-adults and seniors, and those without access to a private vehicle (Javid & Sadeghvazir, 2022) (Woldeamanuel, 2012) (Sperry, Warner, & Pearson, 2014). For example, a survey of intercity bus passengers in Michigan found that the majority of passengers were low-income earners between the ages of 18 and 54, with females between the ages of 18 to 24 being the most prevalent (Sperry, Warner, & Pearson, 2014). Alternatively, a U.S.-based study surveyed IBS passengers about their intercity travel along the Northeast corridor and found that 31% of survey respondents earned greater than $80,000 per year (Klein, 2015).

Despite these benefits, Intercity bus services (IBS) are the most commonly neglected means of passenger transportation and, as a result, have not been implemented widely or effectively (Klein, 2009) (Litman, 2024b). This is because, while IBS falls under the provincial or state jurisdiction, it is often the most disregarded industry by regional transportation agencies due to a lack of clearly defined responsibilities for planning, operating, and funding, compared to other transportation systems (Litman, 2024b). Long-distance bus services are also the least glamorous part of the long-distance passenger transport system. Unlike rail and air transport, which are large infrastructures that tend to attract considerable political and media attention, long-distance bus services are less visible since they blend into the general traffic and do not require significant public investments (Van de Velde, 2010).

The grounds for inadequate public investment in IBS is often explained as a lack of demand for the service and as demand declines, transit agencies typically respond by reducing the frequency of their services or cutting routes entirely. However, where bus services are frequent, convenient, and affordable, they can achieve significant ridership, and approximately 10-30% mode shares (Litman, 2024b). Moreover, frequent intercity bus services perform best along long-distance routes connecting low-density regions (counties), where competition from other modes are limited (Liu, Chen, Chen, Chen, & Cheng, 2024). Intercity bus services are relatively easy to implement at a low cost, and service routes can be easily changed based on demand (Javid & Sadeghvazir, 2022). As a result, they are more accessible and affordable for users compared to other long distance transit modes, such as air and rail, which are bound by large airports and railway stations (Woldeamanuel, 2012). Despite its benefits, transit agencies generally underestimate intercity bus service demands and overlook benefits to servicing those demands. This leads to an underinvestment in intercity bus services creating disparities between drivers and non-drivers, income groups, age groups, and urban and rural areas (Litman, 2024b).

IBS and Commuting

Studies have shown that passengers primarily use IBS for leisure trips to visit friends and family, vacation trips, or business trips (Sperry, Warner, & Pearson, 2014) (Klein, 2015). However, the current business model of IBS companies, which primarily target the travel and tourism markets, is not ideal for daily intercity commuting trips. For example, due to the long-distance routes covered by IBS, buses typically depart a few times per day, or even a few times per week, which is not convenient for daily commuters. Also, while the cost of these services is considerably lower than air and rail travel, the cost of this service provision can result in fares that are prohibitive for daily commuting. Alternatively, a daily commuter intercity bus service typically connects outlying areas to large cities and share similarities with city transit services, where regular daily riders travel the same route at the same departure time (Valentine, 2016).

As a result, studies relating to the use of intercity bus services for daily commuting purposes are limited. An early study by (Daley & LaForge, 1982) attempted to analyze intercity commuter travel behaviour of faculty/administrators of a small university located approximately 100 miles from a major hub airport. The study confirmed that commercial bus services was the least used and least desirable option among all available modes, with approximately 95.5% of respondents indicated they have not used the service. Alternatively, private vehicles and commuter airlines were among the most used options, at roughly 92.1% and 70%, respectively (Daley & LaForge, 1982).

Deregulation of the IBS Sector and Modern Evolution

In early 20th century, the IBS industry was heavily regulated by governments, which impacted their ability to compete with private vehicles and heavily subsidized rail services and deregulated airline services (Heaver, 1991). The United States and United Kingdom were among the first to deregulate their IBS sectors in the 1980s, followed by several

other European countries in the late 1990s and early 2000s, such as Sweden (1998), Norway (2003), Germany (2013), France (2015), and Portugal (2019) (Asensio & Matas, 2023). After many years of declining operations, ridership, and finances, deregulation has led to a resurgence of the IBS industry and subsequent entrance of new bus companies introducing innovative business models.

Curbside bus service models were first introduced in the United States in the 1990s as "Chinatown buses," serving majority ethnic groups within "Chinatown" neighbourhoods (Klein, 2009) (Klein, 2015). Curbside bus companies quickly gained public attraction due to their steeply discounted fares, free wireless internet, and express services on routes that had not previously received service in decades (Schwieterman & Fischer, The Intercity Bus: America's Fastest Growing Transportation Mode, 2010). In 2003, Megabus was the first to adopt the low-cost carrier model, traditionally used by the airline industry, applying cost cutting methods such as curbside bus operations, online ticket sales, and double decker buses to transport more passengers per trip (Busbud, 2015). Alternatively, FlixBus, founded in Germany in 2011, applied a unique franchise business model, whereby FlixBus handles the technology development, network planning, operations control, and marketing and sales side of the business, and relies on trusted local partners to maintain the daily route operations (FlixBus, 2022).

Although the IBS industry was deregulated for several decades in the United States, the industry did not experience much growth until 2007, when private IBS companies began operating along major routes in Chicago, California, and the Northeast Corridor (Schwieterman & Fischer, 2010). At present, the IBS sector has reached an annual ridership of 62 million passengers, compared to 31 million served by Amtrak (U.S. DOT, Climate Change Center, 2024). Comparatively, after Germany liberalized its IBS sector in 2013, IBS ridership increased from 3 million in 2013 to 19.6 million by the end of 2014. By 2015, the market grew by 300% and frequency of services increased by approximately 700% (Knorr & Lueg-Arndt, 2016). Moreover, due to unreliability of railway services during this time, it was estimated that low-cost intercity bus operators offering significantly lower ticket prices on highly utilized routes had acquired nearly 20 percent of rail passengers, creating intermodal competition between rail and bus services (D'Inca & Wyman, 2015).

Through deregulation, the IBS market share has been thriving in the United States and many European countries, competing with air and railway and even driving down prices in some areas (Avenali, Gregori, & Reverberi, 2023). Although Europe has a comprehensive network of intercity high-speed railway services, studies report that, IBS maintains a strong competitive mode share among long-distance routes. For example, in Germany, since deregulation, between 15% to 55% of railway passengers were estimated to have switched from rail to IBS, forcing railway operators to reduce their rates to recover and maintain ridership levels (Avenali, Gregori, & Reverberi, 2023).

Free market competition incentivizes private IBS companies to provide high quality services, diversify their services, keep ticket prices low, maintain clean and safe buses and bus stops, and even establish corporate social responsibility

policies (Chang & Yeh, 2017) (Hoe, Siew, Beng, Yan, & I-Xin, 2021). However, due to the profit-driven business models of the private sector, private IBS operators prioritize profitable routes between large urban regions, while avoiding unprofitable intercity connections for low-density suburban and rural areas.

Competitive Tendering

While deregulation was effective in expanding markets and the efficacy of IBS in metropolitan regions, the corridors served tend to be high demand, high density locations. Meanwhile, other corridors within regions where demand is lower remained underserved or without IBS service at all. To address this concern, some governments have utilized competitive tendering to fill critical gaps for intercity services that are not financially motivating for private IBS companies. Competitive tendering, also referred to as service contracting, is a tool that governments often use to procure the services of a private firm through a competitive bidding process, whereby the public transit agency issues a request for proposals (RFP) to operate a specific service for a set timeline (Lotshaw, Lewis, Bragdon, & Accuardi, 2017). Service contracting can allow government agencies to focus on regional policy and planning, while private entities manage the day-to-day operations (Mcleod, 2022). Examples of competitive tendering for IBS can be found across both the United States and Europe (Mcleod, 2022) (Asensio & Matas, 2023).

In efforts to better serve their riders while working within tight budgets, several States in the U.S. have introduced branded, subsidized intercity bus services to fill critical intercity gaps in their regions including Colorado, Virginia, Ohio, Oregon, and Washinton State (Mcleod, 2022). For example, the Colorado Department of Transportation (CDOT) introduced “Bustang,” an interregional express bus service that transports long-distance commuters to and from Denver. Bustang is operated by a contracted coach bus company and runs during peak commuting hours Monday to Friday along busy highway corridors (Byars, Wei, & Handy, 2017). Bustang achieved a 50% increase in ridership by its second year of operations, followed by a 25% and 23% increase in year three and four (Mcleod, 2022). After a steep decline in ridership during the pandemic, the CDOT has invested in expanding Bustang’s services, and ridership reached 280,000 in 2023 (Katz, 2024). Similarly, the Virginia Department of Rail and Public Transportation (DRPT) launched “the Breeze,” in 2017, a four-line intercity bus system that connects major cities, universities, and other major destinations, with all lines leading to Washington D.C. The DRPT contracts with private operators for its routes, which is currently operated by Megabus. Unlike the Bustang in Colorado, the Virginia Breeze only runs one daily bus in each direction at higher fare ranges. After one year of operations, the service achieved an 81% farebox recovery rate for operations (Mcleod, 2022). The agency is currently conducting studies for a fifth route running east-west across the state (DRPT, 2024).

Intercity bus services play a critical role in facilitating urban mobility between low density and metropolitan areas. Within deregulated IBS markets, competitive tendering is an effective tool that is being increasingly used by governments to fill critical, long-distance service gaps. This allows public transit agencies to deliver efficient, safe,

sustainable, and affordable public transit services, while minimizing dependence on public financial resources to manage day-to-day operating costs. Studies have shown that competitive tendering of transportation services are more efficient, productive, and cost effective than services provided by solely public or private agencies (Zhan, Xiao, Liu, & Yu, 2018) (Iseki, 2010) (Sheng & Meng, 2020).

IBS in Ontario

In Canada, the Motor Vehicle Transport Act of 1985 designated intercity bus services under provincial responsibility resulting in these services being typically regulated by provincial motor or highway authorities, which owned and maintained highways (Heaver, 1991). The provinces sought to preserve a network of bus services, including services to small communities, by maintaining monopoly franchises and by regulating rates. As a result, routes were typically serviced by one carrier, or two carriers in rare instances, under a "closed-door policy," (Heaver, 1991).

In Ontario, intercity bus companies faced significant market-entry barriers which limited the number of bus companies that could service popular routes and often resulted in lower quality of service for passengers (Vincent, 2017). While bus companies generally blamed the regulations for declining services, public comments showed that people wanted to see more integration between travel modes, affordable bus services to help vulnerable groups access healthcare/services, and more general needs like frequency, cheaper tickets, and more comfortable experiences (Council of Ministers, 2010). In 2020, the Government of Ontario enacted Bill 213, *Better for People, Smarter for Business Act*, which would allow for economic deregulation of the intercity bus industry, removing the route protection barriers and create an open market. In 2021, The Ontario Highway Transport Board (OHTB) was dissolved, resulting in a significant deregulation of intercity passenger transportation. Since deregulation, new private intercity bus service companies, such as FlixBus and OnexBus, have entered the Ontario market to fill gaps and filled long-distance service gaps between major cities along southern Ontario, including Toronto, Guelph/Kitchener, Niagara, and Ottawa. However, IBS companies primarily service major destinations such as Toronto Union Station and Toronto Pearson Airport, while services between other regions in the GGH remain limited.

Understanding the Literature Review and Its Implications for the GGH

Ontario's deregulated IBS market is relatively young compared to other countries and will likely experience some barriers to market growth compared to more dense markets in the United States and Europe. Due to the lack of density among many parts of the GGH, there is little incentive for private IBS companies to introduce services between regions. Despite the advances in the IBS industry and the entrance of new companies in Ontario, there are still many gaps that remain, particularly within smaller communities where ridership is low (Transport Canada, 2023). It will take several decades before population growth among the outer regions can achieve sufficient density to generate high volumes of passenger ridership and attract private IBS companies. Therefore, it will be up to the Ontario government to invest in intercity bus services and improve accessibility among outer regions of the GGH.

Travel demand studies have shown that auto travel times and distance continue to increase in the GGH due to a combination of induced demand, population growth, and outward urban expansion (Kasraian, Raghav, Yusuf, & Miller, 2022). Moreover, despite increases in public transit improvements, public transit travel times remain substantially longer than auto travel, making transit an unviable alternative to driving in many areas (Kasraian, Raghav, Yusuf, & Miller, 2022). Lastly, (Pereira & Pereira, 2018) found that in Ontario, investment in public transit systems increased accessibility of the wider population to markets, which resulted in an increase in economic activity, while investment in highway and road infrastructure had little to no effect on output.

There is an opportunity for the Ontario government to explore investment in frequent and affordable intercity bus services to support daily intercity commuters across the GGH. Additionally, in order to implement a cost-effective, efficient, and viable service, the Ontario government and Metrolinx can consider engaging in service contracts with private companies to fill inter-regional service gaps throughout the Greater Golden Horseshoe region.

Part II: Greater Golden Horseshoe (GGH) Transit Network and Mode Share Analysis

Recall that the goals of this research include evaluating the potential for Intercity Bus Services (IBS) to address, in part, the challenges associated with the performance of the transportation system in the Greater Golden Horseshoe. To provide necessary context, this section provides a brief overview of the GGH transit network and mode share assessment; the interested reader can find a more detailed assessment of local mode shares in **Appendix A**. The purpose of the assessment is to describe the current intercity commuting trends among the outer regions of the GGH and highlight the gaps in existing public transit services to support daily commuting needs. Moreover, it establishes the foundation for the intercity bus service scheme developed for the Initial Business Case, in the following section.

Existing mobility trends and mode share in the GGH are analyzed using open data sources such as the 2016 and 2021 Census administered by Statistics Canada (StatCAN, 2016) (StatCAN, 2022), and the Transportation Tomorrow Survey (TTS) conducted by the University of Toronto, Data Management Group (University of Toronto, 2018). This study also draws upon work completed by other public and private sector entities, most notably the Canadian Centre for Economic Analysis, an independent analytics firm.

The transportation network across the GGH is constantly shaped by the ever-expanding road and highway infrastructure, and, as a result, the GGH is experiencing an increase in both the number of commuting trips and the average passenger kilometers travelled in journeys to work. This has been largely attributed to changes in urban growth patterns, housing and job location, growth in private vehicle travel, and continuous extension of the highway network. For example, between 2011 and 2019, commuting across the GGH has grown by 400,000 daily commuter trips (CANCEA, 2023). Moreover, the 2051 population and employment growth estimates suggest daily commute trips could increase by over 50%, while daily car commuters are expected to increase by 29%, reaching 4.6 million daily car trips by 2051 (CANCEA, 2023).

Although municipalities are implementing a wide range of public transit improvements and transit-oriented development (TOD) strategies that aim to shift travel behaviour from predominantly single occupant vehicle travel to more sustainable modes, these strategies are being implemented within municipal jurisdictions. Meanwhile, cross-regional public transit services, implemented by Metrolinx, prioritize improvements for the GTHA, leaving outer regions of the GGH without adequate intercity transit options. The review of the regional transportation network in **Appendix A** demonstrates that existing public and private intercity public transit services prioritize connecting major cities across the GGH to downtown Toronto, as follows:

- GO Rail network is designed as a unicentric, radial network, connecting outer regions of the GGH to the GTHA and Union Station in downtown Toronto. While some lines continue through downtown Toronto, many services are provided “inbound” in the morning peak and “outbound” in the evening peak.

- GO Bus services provide some alternative options for intercity commuters, but services are limited, and existing service routes are largely concentrated within the GTHA or provide connections between outer regions and the GTHA.
- Private intercity bus companies operate on select routes connecting a few medium-sized cities to downtown Toronto and large cities outside of the GGH such as Ottawa and Montréal.
- VIA Rail provides connections between select cities once per day on its way to and from Union Station and is not a viable option for daily commuting.

As a result, existing public transit options are limited and are not viable options for evolving intercity commuting needs within the GGH.

Mode Share and Intercity Travel Demand in the GGH

Like most mega-city regions, private vehicles are the dominant mode of transportation for journey-to-work trips (or commute trips) in the Greater Golden Horseshoe. Between 1986 to 2016, mode shares for morning commutes remained relatively constant with private vehicles being the overwhelming majority at approximately 74% (Ashby B. , 2018). During this time, public transit had the second largest commuting mode share ranging between 11-13%, and active modes such as walking and cycling ranged between 9-10% (Ashby B. , 2018). However, it's important to note that the public transit mode share is primarily for commuting within municipal jurisdictions, while the mode share for GO Transit, typically used for intercity commuting, has remained consistently low since 1986, at approximately 1-2% (Ashby B. , 2018). **Figures 2 and 3** compare 2021 regional data for Commuting Mode and Commuting Duration (StatCAN, 2022). Substantive variations exist in the proportion of commuters who experience travel times less than 30 minutes, between 30 and 59 minutes and 60 minutes or greater. Waterloo Region has the highest proportion of commutes shorter than 30 minutes of all the Regions plotted. This suggests that the Region may be well-positioned for inter-regional transit that serves relatively short destinations. Similarly, **Figure 3** shows that, outside of Toronto, many of the regions studied, have exceptionally low utilization of public transport or active modes. In Waterloo Region, about 90% of the commutes are made by private auto. Part of the challenge a proposed IBS will face in attracting passengers is to overcome the existing travel patterns of local residents.

Although commuting population declined by nearly 30% in 2021, over 2.5 million people (83%) continued to commute by private vehicles (StatCAN, 2022). Additionally, over 720,000 people (29%) travelled to work outside of their CD of residence, and over 336,000 people (11%) reported one-way commute times of 60 minutes or longer (StatCAN, 2022). The decline in daily commuters was short lived as recent reports indicate that the number of commuters in cities across Canada has since returned to pre-pandemic levels, and even surpassed levels recorded in 2016 (StatCAN, 2023a). As shown in **Figure 4,** the percentage of car commuters in Ontario increased from nearly 78% in 2016 to almost 83% in 2023.

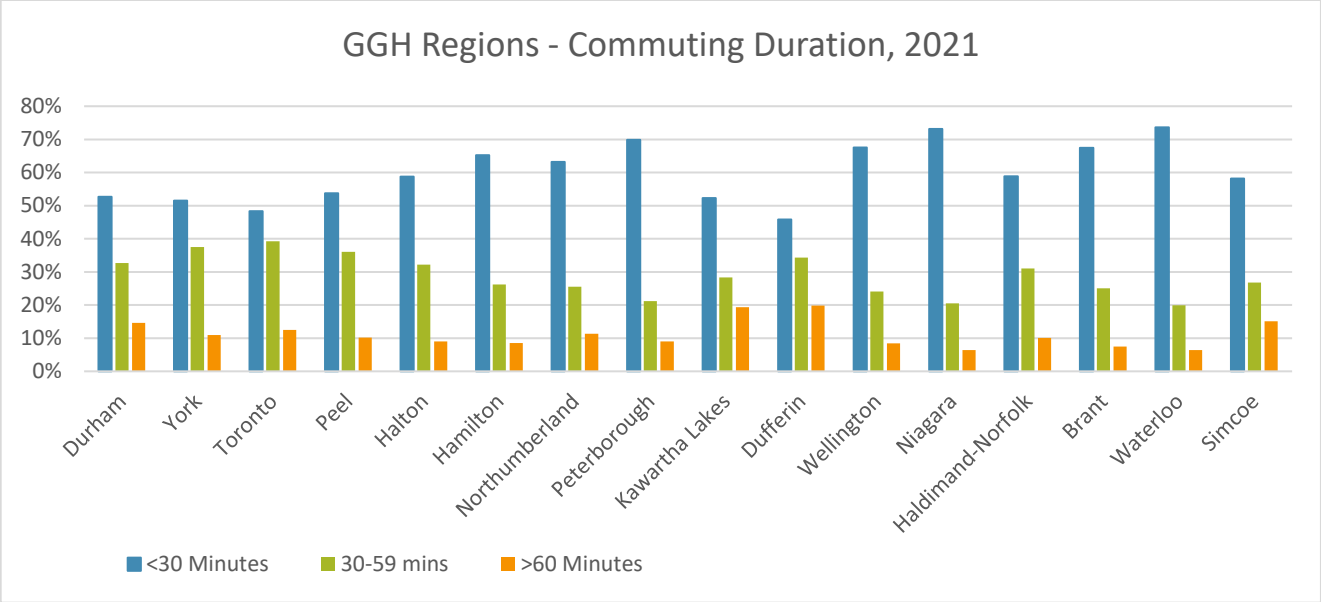


Figure 3: GGH Regions Commuting Duration (2021) (StatCAN, 2022)

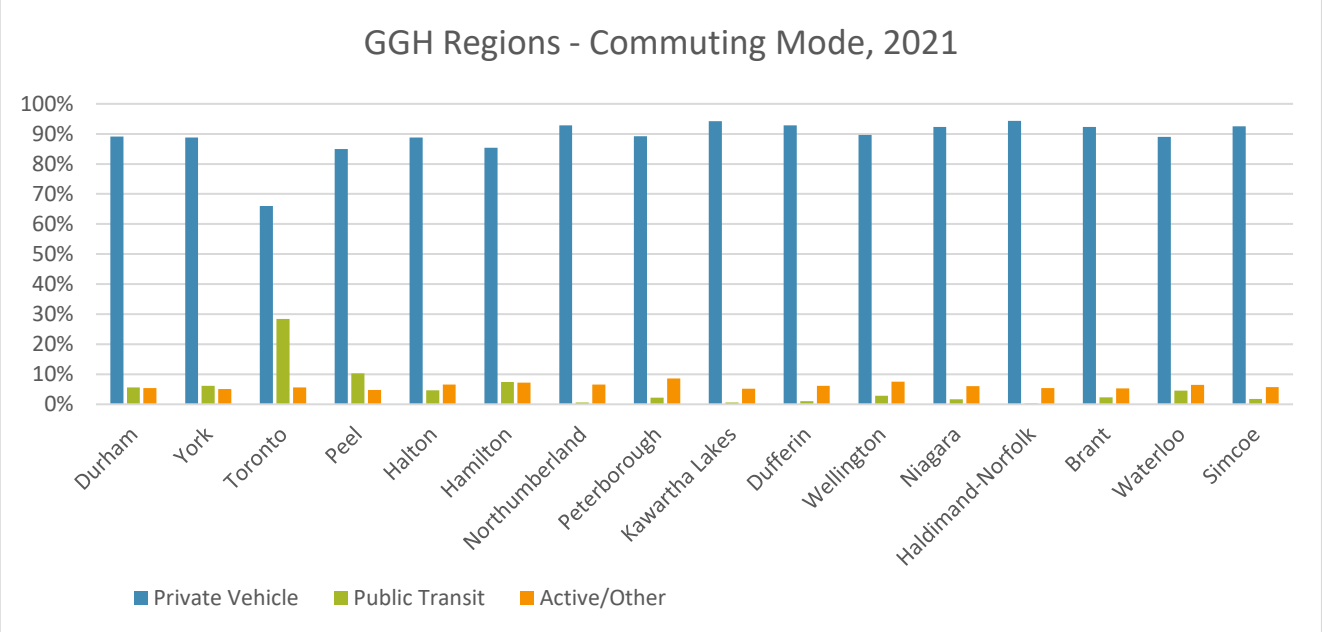
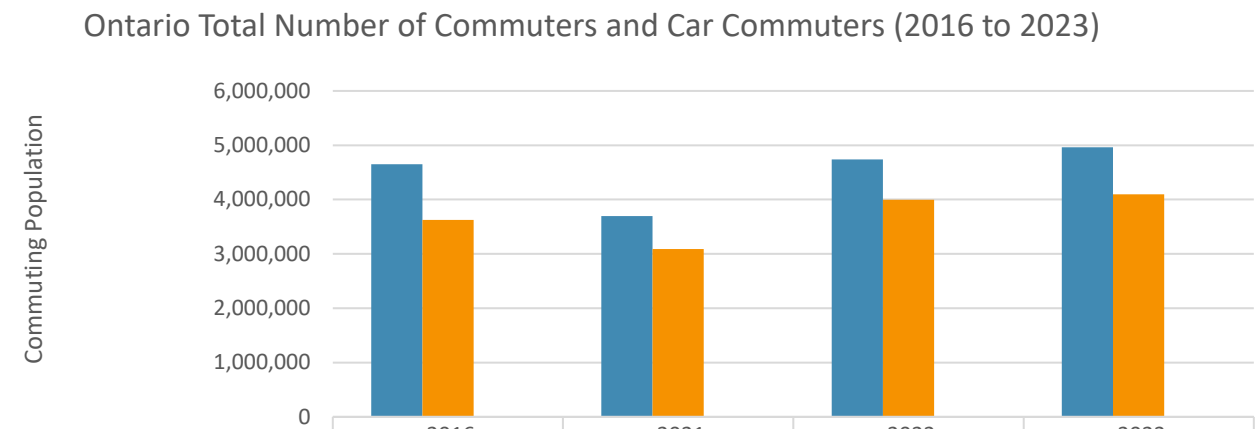


Figure 2: GGH Regions - Commuting Mode (2021) (StatCAN, 2022)



	2016	2021	2022	2023
Number of Commuters	4,652,145	3,693,950	4,738,600	4,965,300
Number of Car Commuters	3,624,021	3,088,142	3,994,640	4,096,373
Percentage of Car Commuters	77.9%	83.6%	84.3%	82.5%

Figure 4: Total Number of Commuters and Car Commuters in Ontario (2016 to 2023) (StatCAN, 2023b)

Workplace Destinations

The Figures below illustrate intercity commuting trends for the GGH region based the 2021 Census. In Ontario, regions are spatially defined as Census Divisions (CDs) – typically higher tier municipalities, with about 50 CDs in the Province. Census Divisions are further divided into Census Subdivisions (CSDs) that correspond to lower tier municipalities. For context, there are 585 CSDs in Ontario. **For this study, those commuting outside of their Census Division (CD) of residence, regardless of the total distance travelled, are considered intercity commuters.**

Figure 5 compares the percentage of the commuting population for each region that commutes within their Census Subdivision (CSD) of residence, a different CSD but within the same Census Division (CD) of residence, and a different CSD and CD of residence. It can be observed that there is a sizable proportion of intercity and long-distance commuters among the outer regions of the GGH. In many regions, nearly half of the commuting population work outside of their CD of residence which contribute to daily traffic congestion along regional roads and highways. In Waterloo Region and the County of Wellington, the focus of this study, the proportions of travelers commuting outside of the CD are approximately 18 and 28%, respectively. These intercity commuters are viable candidates for high quality and convenient intercity transit services.

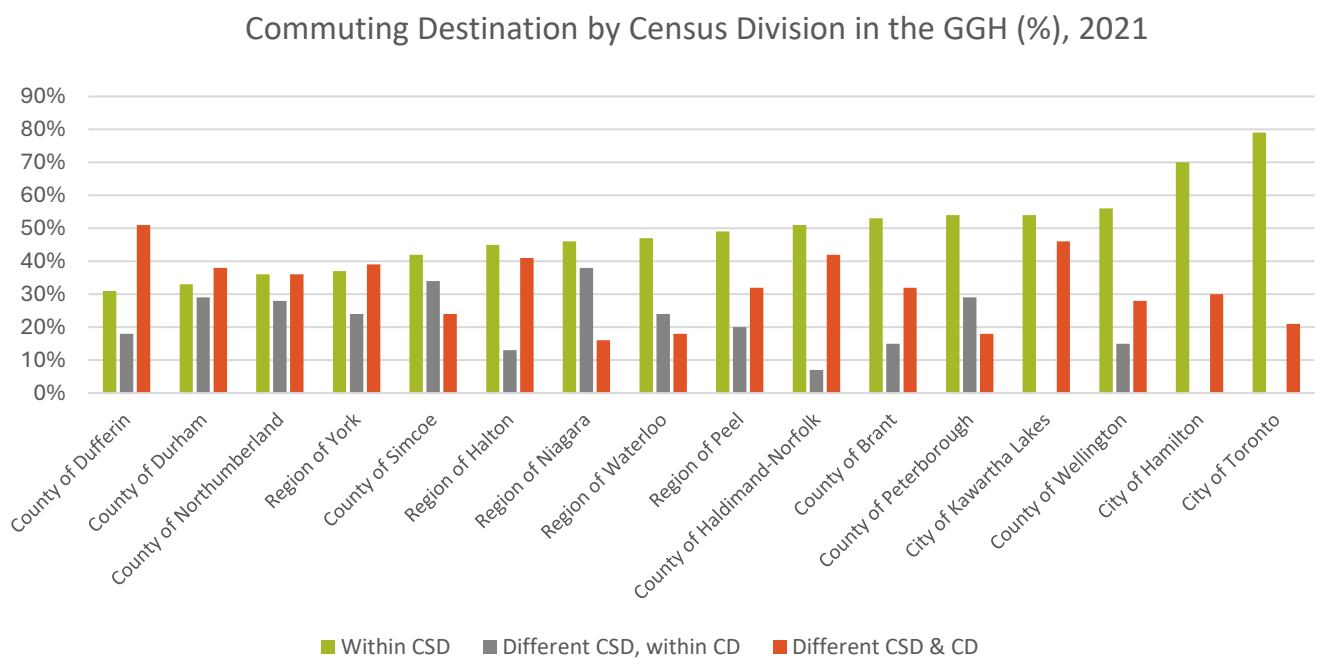


Figure 5: Commuting Destination by Census Division in the GGH, 2021 (StatCAN, 2022)

Figure 6 plots the percentage of those with commute times of 60 minutes or longer for each region as a function of the total commuting population, illustrating that long-distance commuting is more prevalent in outer regions such as Dufferin and Kawartha Lakes. The Figure also compares long-distance commuters between GTHA regions (red points) and outer regions (blue points), which shows that although GTHA regions have relatively average percentage of long-distance commuters, they still represent about 75% (250,000) of the long-distance commuting population. Assuming that individuals with commute times of 60 minutes or longer are intercity commuters, it can be estimated that about 47% of intercity commuters in the GGH had commute times of 60 minutes or longer (StatCAN, 2022).

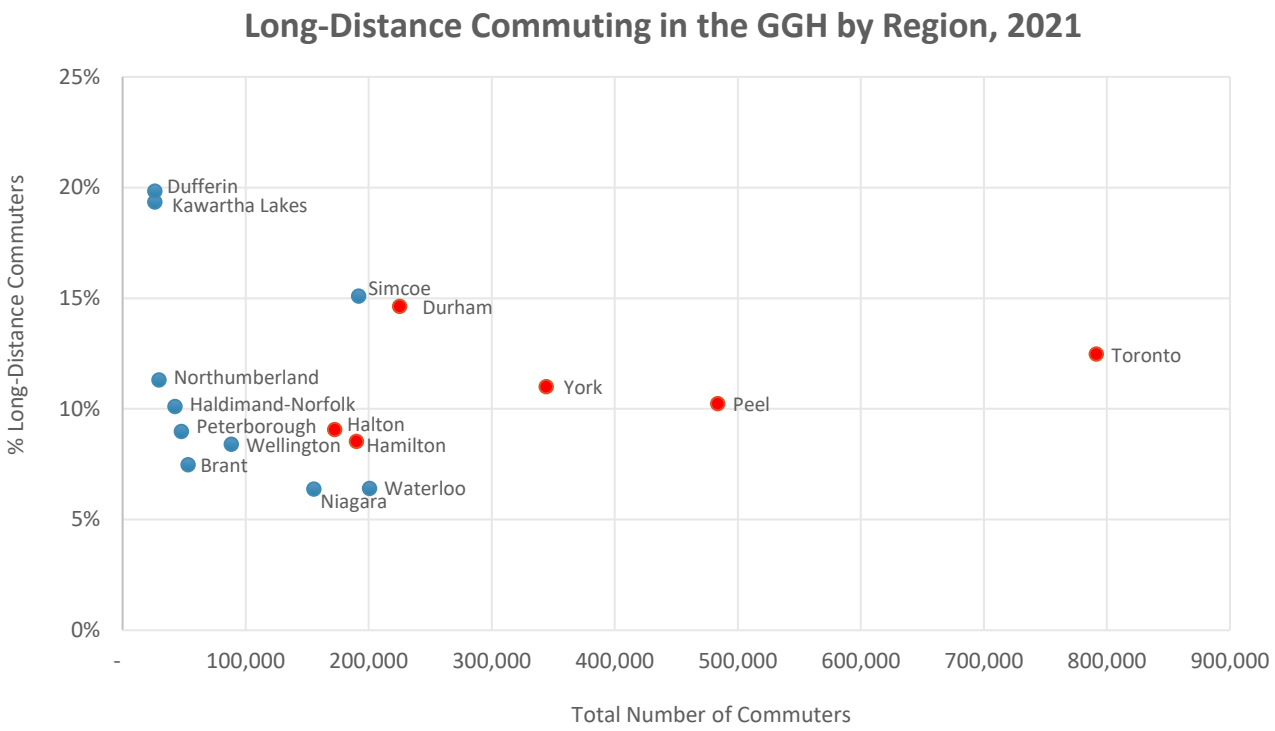


Figure 6: Long-Distance Commuting in the GGH by Region, 2021 (StatCAN, 2022)

Although Toronto remains the primary destination for daily work trips, other regions are also becoming significant workplace destinations for daily commuters. **Figure 7** compares intercity commuting data from the 2016 TTS and the 2021 Census, which includes the percentages of total intercity commuters, those commuting to Toronto, those commuting to the GTHA (excluding Toronto), and those commuting to the outer regions of the GGH. The data suggests that the proportion of individuals commuting to Toronto has declined, while the proportion of those commuting to the GTHA and outer regions has increased. However, it is important to note that the 2016 TTS survey only captures travel data from approximately 5% of the GGH population and does not include regions such as Northumberland and Haldimand-Norfolk (Rose, 2018). Moreover, due to the impacts of the COVID-19 pandemic, the 2021 Census data does not reflect current workplace commuting trends. As a result, these figures have likely increased and will continue to increase as commuting patterns return to pre-pandemic levels, and population growth increases daily commuter trips.

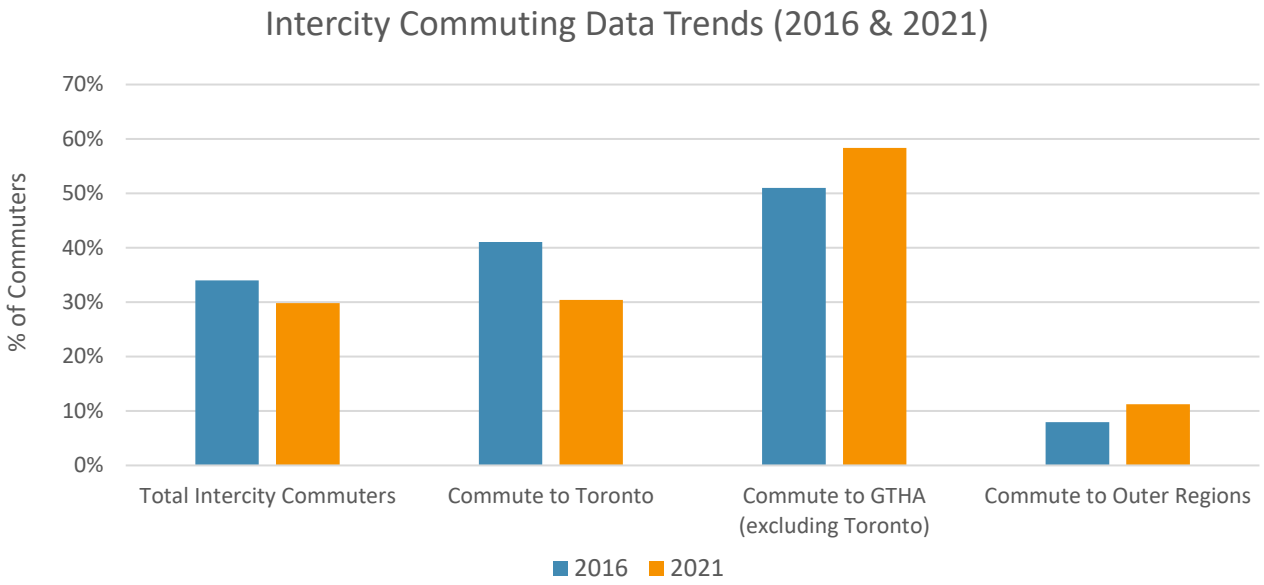


Figure 7: Comparing Intercity Commuting Trends in Ontario Between 2016 and 2021 (University of Toronto, 2018) (Statistics Canada, 2023)

Table 1 below summarizes the 2021 commuting flow data available for the GGH regions. The table shows the population of commuters from their Census Division (CD) of residence (Origin) to the CD of their workplace destinations (Destination) and highlights the diversity of intercity commuting patterns between GGH regions (Statistics Canada, 2023). Additionally, regions that are adjacent to the origin CD are highlighted in purple (GTHA regions) and orange (outer ring regions). In most cases, the greatest volume of intercity commuters is from neighbouring regions. For example, 40% of intercity commuters to Durham are residents of York Region and Kawartha Lakes, while nearly 70% of intercity commuters to Wellington County, are residents of Waterloo Region.

Table 1: GGH Regional Intercity Commuting Matrix (2021) (Statistics Canada, 2023)

	Inner Ring - GTHA						Outer Ring – Greater GGH									
Destination:	Hamilton	Halton	Peel	York	Toronto	Durham	Niagara	Haldimand-Norfolk	Brant	Waterloo	Wellington	Dufferin	Simcoe	Kawartha Lakes	Peterborough	Northumberland
Origin:																
Hamilton		94,965	6,265	770	4,290	95	3,210	1,165	2,950	2,120	1,160		70		15	
Halton	7,430		30,365	2,490	14,110	160	835	85	595	1,385	1,825	105	155		30	
Peel	1,940	21,965		23,170	69,390	630	415	75	200	1,400	1,280	1,090	1,085	15	85	35
York	365	1,205	16,010		83,055	3,895	150	20	40	405	290	135	3,430	95	85	80
Toronto	1,175	4,690	46,545	67,470		7,615	395	35	115	740	475	195	945	100	220	130
Durham	130	325	3,800	15,705	44,840		60	10	40	170	80	20	455	795	1,015	1,235
Niagara	10,220	3,860	1,965	385	1,775	130		970	250	365	115	15	90	15	20	15
Haldimand - Norfolk	5,090	110	315	65	250	35	1,425		3,370	535	110					
Brant	4,255	1,315	865	125	500	30	110	1,200		3,740	430		20			
Waterloo	1,625	3,035	3,685	545	1,865	105	165	125	2,350		13,580	30	40	20	30	15
Wellington	750	3,445	4,280	425	1,315	40	75	20	180	8,105		845	145	10	10	10
Dufferin	30	500	6,010	855	1,095	30	25			95	955		1,135			
Simcoe	140	400	9,835	15,960	8,795	515	75	20	25	140	190	710		115	65	
Kawartha Lakes	25	20	160	1,010	855	3,845				20	25		480		2,560	120
Peterborough	50	85	175	400	730	2,165	30	30		30	15		70	1,455		1,060
Northumberland	15	20	195	200	825	80	20		10		10		40	1,675	3,275	
Total	33,240	135,940	130,470	129,575	233,690	19,370	6,990	3,755	10,125	19,250	20,540	3,145	8,160	4,295	7,410	2,700

Based on the data provided in Table 1**, Figure 8** compares the population of commuters traveling to the outer regions of the GGH. However, these figures will have likely changed as commuting trends return to pre-pandemic levels. The estimates indicate that Waterloo Region and Wellington County, which are neighbouring regions, receive over 40,000 daily intercity commuters combined. This figure is likely to increase with the population and employment growth projections for the two regions.

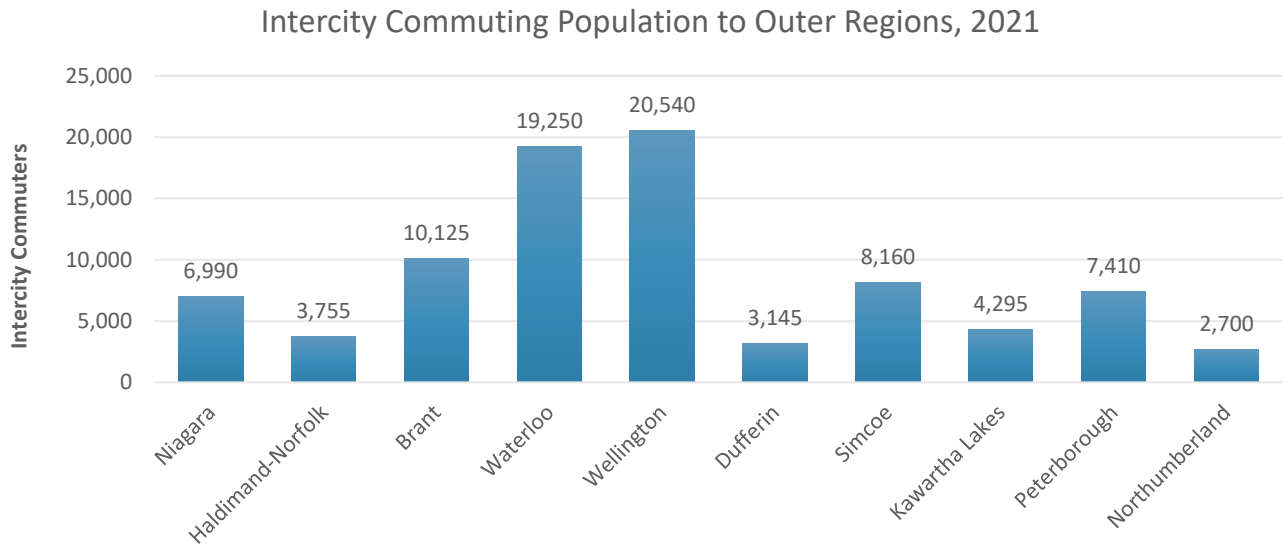


Figure 8: GGH Intercity Commuting Population to Outer Regions, 2021 (Statistics Canada, 2023)

Public Transit Service Gaps

Metrolinx is an agency of the Government of Ontario, under the "Metrolinx Act 2006," and was created to provide leadership in the coordination and integration of all modes of transportation in the Greater Toronto and Hamilton Area (GTHA) (Metrolinx, 2024). It currently operates major transit networks and services including GO Transit, UP Express, and PRESTO, but is also responsible for delivering several rapid transit projects across the GTHA (**Figure 9**).

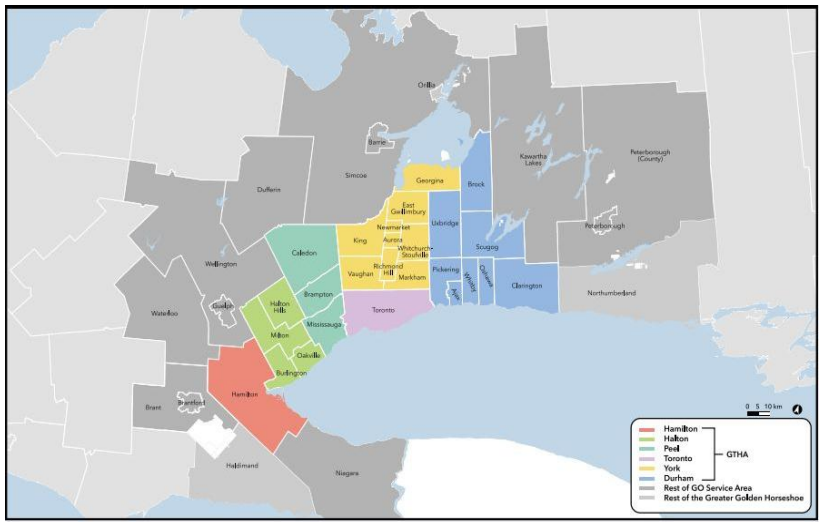


Figure 9 - Metrolinx GO Transit Service Area (Metrolinx, 2018)

The Metrolinx GO Expansion Program is one of the largest transportation initiatives in Canada and is comprised of multiple projects that aim to expand and improve service on the GO Rail network. Service improvements will result in faster and more efficient trains, two-way all-day services, accessible stations, and 15-minute or better services on core portions of the GO rail network. In addition to GO Transit improvements, Metrolinx is also responsible for delivering a series of light rail, bus rapid transit, and subway projects across the GTHA. All transit network projects proposed as part of the 2041 Strategic Plan combine to form a network of frequent and reliable transit services termed the "Frequent Rapid Transit Network," and represents the core of Metrolinx's regional transit system (Metrolinx, 2018). **Figure 10** illustrates all existing and planned systems and services of the Metrolinx Regional Transit Network.

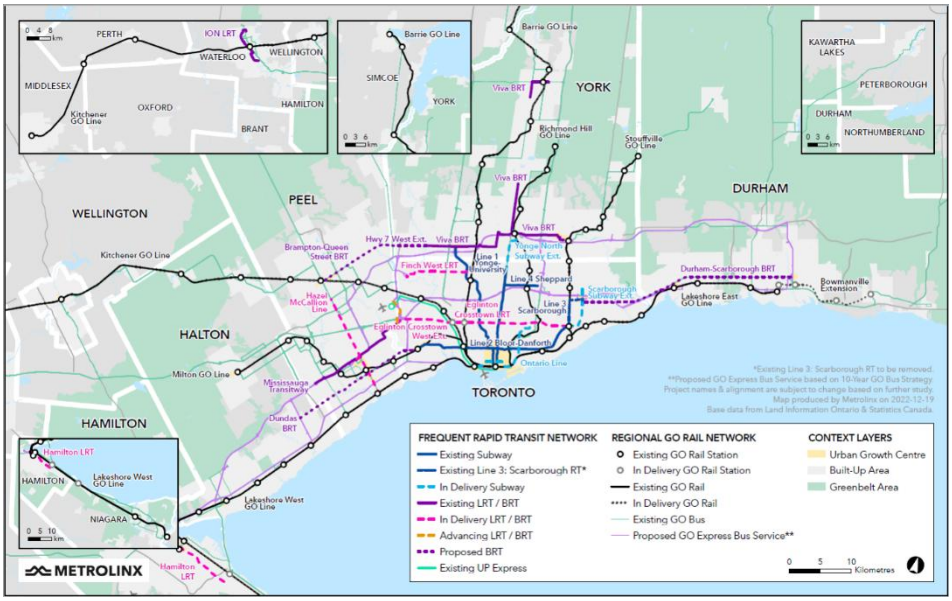


Figure 10 – Metrolinx Regional Transit Network Map (Metrolinx, 2024)

According to the "Metrolinx Act 2006," Metrolinx is responsible for promoting and facilitating coordinated decision-making and investment of an integrated transit network in the regional transportation area, which consists of all regions of the Greater Golden Horseshoe (GGH) (Government of Ontario, 2024). As such, it has the leading authority and financial means to generate connections between regions, both within and outside the GTHA. However, currently its mandate typically spans the GTHA and the GO Transit service area, with some service connections among the outer regions (Metrolinx, 2018).

Aside from Metrolinx, VIA Rail is the only other regional rail alternative. However, services typically operate once per day, are limited to specific regions, and ticket prices are significantly higher than other travel mode options, making VIA Rail an unviable option for daily intercity commuting within the GGH. Lastly, private intercity bus service (IBS) companies, such as Megabus and Flixbus, are providing much needed services between major cities in Ontario.

However, traditional IBS companies mainly focus their services on connecting distant cities, such as London, Toronto, Ottawa, and Montréal, and are typically used as a low-cost alternative to air and rail travel. Therefore, within the GGH, existing IBS services are limited to a few cities and primarily provide connections to Toronto Pearson Airport and Union Station in Toronto.

Intercity Transit Travel Time and Cost Estimates

To illustrate the severe gap in intercity public transit services across the GGH**, Table 2** presents the estimated time and cost of a one-way trip by intercity public transit services between regions. Travel time estimates were generated using Google Maps, while costs were estimated using GO Transit Fare calculators. Trips were selected based on a morning commute, with a departure time between 6AM and 7AM to arrive at a potential workplace destination around 9 AM. The Table includes the approximate travel time for each trip, the estimated cost, and the number of transfers required to complete the trip. Because GO Transit is the primary intercity bus service provider in the GGH, the origin-destination for each trip is generated between GO Transit stations, or major transit hubs, where GO stations do not currently exist. Moreover, where multiple travel options are available, GO Transit options are preferred over alternative options such as VIA Rail and private intercity bus service companies, unless only alternative options are available. It is important to note that the results are high-level estimates, based on Google Maps results, and may not accurately reflect the actual travel-times.

First, it can be seen that there are currently no intercity public transit options for residents of Kawartha Lakes and Haldimand-Norfolk, which currently have among the highest proportion of intercity and car dependent commuters. Moreover, intercity commuting to and from Northumberland is only possible using multiple transit modes that include VIA Rail, GO Transit, and private intercity bus services (IBS) such as MegaBus and FlixBus. Alternatively, intercity transit commute times between GTHA regions (top left corner of table) are considerably lower compared to the outer regions. Lastly, despite the presence of regional railway connections to a few outer regions, commute times by public transit are over 2 hours since railways primarily operate in peak-direction in the morning and evenings in these regions.

Overall, **Table 2** demonstrates the lack of public transit options for a large share of intercity commuters in the GGH. Of the 240 intercity trips that were analyzed, only 23% (55) of them had transit travel times of 2 hours or less. Meanwhile, over 77% (185) of these city pairs had either transit travel times of over 2 hours, required multiple mode transfers, no morning transit options, or no existing public transit options available. As a result, with the lack of viable intercity bus services among these regions, intercity commuters among the majority of GGH regions are forced to rely on private vehicles for their daily commuting needs.

With regards to the study area, there are close to 22,000 daily intercity commuters between Waterloo Region and Wellington County (Table 1). Due to the one-way, peak hour GO Train services, Waterloo residents can commute to

the Guelph GO station in Wellington in under 20 minutes. However, Wellington residents commuting to Waterloo in the mornings do not have the option to take GO train and instead must rely on GO Bus services that can take up to an hour and typically requires at least one transfer between GO Bus routes depending on their final destination. Additionally, services outside of peak-hours are severely limited and require longer travel times. Finally, a one-way trip by GO Transit can cost up to $10, which would require daily commuters to spend approximately $20 per day and up to $100 per week to commute by GO Transit. Comparatively, the typical commute time by private vehicle between the two regions can range from 30 to 50 minutes, and at a significantly lower daily cost, which makes public transit an unviable option for intercity commuters.

Table 2: Morning Peak Travel Time and Cost of Inter-Regional Public Transit Services in the GGH

TO: / FROM:	Hamilton	Halton	Peel	York	Toronto	Durham	Northumberland	Peterborough	Kawartha Lakes	Simcoe	Dufferin	Wellington	Waterloo	Brant	Haldimand-Norfolk	Niagara
Hamilton		40 mins - $8 1 Transfer	1 hr - $10	2 hrs - $15 1 Transfer	1.25 hrs - $12	2.5 hrs - $17 1 Transfer	VIA/GO/IBS 3.5 hrs	5 hrs - $30 3 Transfers		4 hrs - $20 2 Transfers	3 hrs - $15 4 Transfers	GO Bus 1.5 hrs - $13	GO Bus + Transit 2.25 hrs - $17	1 hr - $8 1 Transfer		2 hrs - $13 1 Transfer
Halton	1.5 hrs - $8 1 transfer		45 min - $7	2 hrs - $13	40 min - $10	2 hrs - $14	VIA/GO/IBS 4 hrs	3.5 hrs - $25 1 Transfer		3 hrs - $21 2 Transfers	3 hrs - $15 2 Transfer	2.5 hrs - $12 1 Transfer	3 hrs - $17 1 Transfer	2 hrs - $14 3 Transfers		2 hrs - $18 1 Transfer
Peel	1 hr - $10	40 min - $7		1 hr - $12 1 Transfer	1 hr - $10 1 Transfer	2 hrs - $14	VIA/GO/IBS 2-3 hrs	4 hrs- $22 2 Transers		2.5 hrs - $15 2 Transfers	2 hrs - $10 2 Transfers	1.5 hrs - $12	1.5 - $17 1 transfer	1.5 hrs - $16 1 Transfer		2.5 hrs - $20 1 Transfer
York	2 hrs - $14 1 transfer	1.5 hrs - $11 1 Transfer	45 mins - $9		30 min - $3 Local Transit	1 hr - $10	VIA/GO/IBS 2-3 hrs	3 hrs - $20 1 Transfer		3 hrs - $20 2 Transfer	3 hrs - $15 1 Transfer	2 hrs - $15 1 Transfers	2.5 hrs - $20 1 Transfer	2.5 hrs - $20 2 Transfers		3.5 hrs - $20 2 Transfer
Toronto	1.5 hrs - $12	45 mins - $10	1 hr - $10	30 min - $3 Local Transit		1 hr - $10	VIA/IBS 2 hrs	2.5 hrs - $20 1 Transfer		2.5 hrs - $16	2 hrs - $14 1 Transfer	2.5 hrs - $15 1 Transfer	2 hrs - $20 1 transfer	2.5 hrs - $16 1 Transfer		3 hrs - $21 1 Transfer
Durham	2.5hrs - $21	2 hrs - $14	2.5 hrs - $16 1 Transfer	2 hrs - $15 1 Transfer	1 hr - $10		VIA/GO/IBS 2-3 hrs	1.5 hrs - $14		4 hrs - $23 2-3 Transfers	3hrs - $17 2 Transfers	3.5 hrs - $20 1 Transfer	3 hrs - $23 2 Transfers	3.5 hrs - $25 2 Transfers		4 hrs - $25 1 Transfer
Northumberland	IBS-GO 3.5 hrs	IBS-GO 3 hrs	VIA/GO/IBS 2-3 hrs	VIA/GO/IBS 2-3 hrs	VIA/IBS 2 hrs	IBS-GO 3 hrs		VIA-GO Bus 3-4 hrs		GO - IBS 3-4 hrs	IBS - GO 6 hrs	IBS/GO/VIA 4 hrs	IBS-GO 4 hrs	IBS-GO 4 hrs		IBS-GO 4 hrs
Peterborough	5 hrs - $30 2 Transfers	4 hrs - $27 2 Transfers	4 hrs - $25 2 Transfers	3 hrs - $18 1 Transfer	3 hrs - $22 1 Transfer	1.5 hr - $16	VIA-GO Bus 3-4 hrs			5-6 hrs - $30 3 Transfers	7 hrs - $30 3 Transfers	5 hrs - $35 2 Transfers	5-6 hrs - $35 3 Transfers	6 hrs - $35 2 Transfers		5.5 hrs - $37 3-4 Transers
Kawartha Lakes																
Simcoe	3.5 hrs - $20 2 Transfers	3 hrs - $20 1 Transfer	3 hrs - $15 2 Transfers	3 hrs - $20 1 Transfer	2 hrs - $15	3 hrs - $20 1 Transfer	Transit - IBS 3 hrs	5 hrs - $35 2 Transfers			5 hrs - $25 2 Transfers	4 hrs - $25 2 Transfers	4 hrs $20 2 Transfers	5 hrs - $30 2 Transfers		5 hrs - $30 2 Transfers
Dufferin	3 hrs - $15 3 Transfers	3 hrs - $12 2 Transfer	2 hrs - $15 2 Transfer	3 hrs - $15 2 Transfer	2 hrs - $15 1 Transfer	3hrs - $17 2 Transfers	GO -Transit - VIA 6 hrs	6.5 hrs - $30 3 Transfers		5 hrs - $25 2 Transfers		3 hrs - $15 1 Transfer	3 hrs - $20 2 Transfers	5 hrs - $25 3 Transfers		5 hrs - $30 3 Transfer
Wellington	2 hrs - $13 1 Transfer	2 hrs - $12 1-2 Transfers	1.5 hrs - $12 1 Transfer	2 hrs - $17 1 Transfer	1.5 hrs - $15	3 hrs - $20 1 Transfer	GO/VIA 4 hrs	5 hrs - $30 2 Transfers		4 hrs - $25 3 Transfers	2.5 hrs - $15 1 Transfers		1 hr - $10 1 Transfer	3 hrs - $15 3 Transfers		4 hrs - $20 2-3 Transfers
Waterloo	2.5hrs - $15 1 Transfer	2.5 hrs - $17 1 Transfer	2 hrs - $15 1 Transfer	2.5 hrs - $20 2 Transfers	2 hrs - $18	3 hrs - $22 2 Transfers	GO/VIA/IBS 4 hrs	6 hrs - $35 2 Transfers		4 hrs $20 2 Transfers	2 hrs - $10 2-3 Transfers	20 min - $10		3.5 hrs - $30 3 Transfers		4.5 hrs - $30 3 Transfers
Brant	1 hr - $10 1 Transfer	2.5 hrs - $12 2 Transfers	2 hrs - $15 1 Transfer	3.5 hrs - $20 2 Transfers	2.5 hrs - $15 1 Transfer	4 hrs - $25 1-3 Transfers	VIA - GO 4 hrs	7 hrs - $40 3 Transfers		5 hrs - $30 2 Transfers	4 hrs - $25 3 Transfers	2 hrs - $15 1 Transfer	3.5 hrs - $20 2 Transfers			3.5 hrs - $18 2 Transfers
Haldimand-Norfolk																
Niagara	2 hrs - $12 1 Transfer	3 hrs - $12 2 Transfers	3 hrs - $15 1 Transfer	4 hours - $25 2 Transfers	3 hrs - $20 1 Transfer	4.5 hrs - $30 1 Transfer	GO/IBS/VIA 5 hrs	6 hrs - $40 2 Transfers		5.5 hrs - $30 3 Transfers	5 hrs - $30 3 Transfers	3 hrs - $20 2 Transfers	4.5 hrs - $30 2 Transfers	4 hrs - $17 2 Transfers		

Legend		# of Cells
	N/A	16
	No public transit options exist	58
	No morning transit options available	4
	Alternative Transit Options Only	26
	GO trips of 2 hours or longer	97
	GO trips between 1-2 hours	33
	GO trips of less than 1 hours	22
	Total City Pairs	256

Regional Transit
GO – GO Transit (Bus/Rail)
ONTC – Ontario Northland
Local Transit
Alternative Transit Services
VIA Rail
IBS – Private Intercity Bus Services

Origin-Destination by Region	
Hamilton	Hamilton Center GO
Halton	Oakville GO
Peel	Square One GO
York	Yorkdale GO
Toronto	Union Station
Durham	Oshawa GO
Peterborough	Peterborough Bus Terminal
Kawartha Lakes	N/A
Simcoe	Allandale GO
Dufferin	Orangeville
Wellington	Guelph Central GO
Waterloo	Kitchener GO
Brant	Brantford Bus Terminal
Haldimand-Norfolk	N/A
Niagara	Niagara Falls Bus Terminal

Notes:

- The departure time is Monday between 6 AM and 7 AM to arrive at a workplace destination around 9 AM.
- The origin-destination for each trip are primarily between GO Transit stations, or major transit hubs, where GO stations do not currently exist.
- For GTHA regions with multiple GO Transit stations, the largest stations in proximity to dense employment areas were selected.
- Where there are multiple trip options, the shortest and most convenient option was selected.
- GO transit trip options were selected over alternative options such as VIA Rail and private intercity bus services (IBS), unless only alternative options were available.

GIS Map Analysis

To augment the quantitative summary shown in **Figure 8**, GIS maps were created to provide geographical demonstration of intercity public transit service gaps in the GGH.

Figure 11 is a GGH Transit Network Map that illustrates the extent of the existing and planned intercity public transit network, including Metrolinx GO Transit, VIA Rail, major airports, and private intercity bus service stops for Megabus and Flixbus. The Metrolinx Regional Transit Network consists of existing GO Rail lines, GO Transit Expansion and Rapid Transit projects that are "in delivery," and the proposed Frequent Bus Rapid Transit network. As shown, the public transit network is primarily concentrated within the GTHA, with some connections to urban growth centers in outer regions such as Guelph, Waterloo Region, Simcoe County, and Niagara Region. However, there are significant gaps in services among the outer regions such as Brant, Dufferin, and Kawartha Lakes. Moreover, even large areas of the GTHA regions, such as Simcoe, Durham and Peel, have limited access to intercity transit services.

The GGH Intercity Commuting Trends Map (**Figure 12**) further illustrates employment and commuting trends for the region. The map includes employment density and percentage of intercity commuters for each region, provincially significant employment zones, urban growth centres, and the regional transit network. It can be seen that in outer regions that do not have a designated urban growth center have lower employment density and subsequently have a majority percentage of intercity commuters travelling to neighbouring regions for employment opportunities.

Summary of Transit Service Gaps

The assessment of intercity public transit services among the GGH regions has shown that that there are considerable service gaps, particularly among outer regions. As the regional transportation agency, Metrolinx continues to focus transit expansion projects within the GTHA regions, due to greater density and demand compared to the outer regions. The proposed Frequent Rapid Transit Network (as shown in Figure 10) is also limited to the GTHA, or within regional boundaries such as Waterloo Region and Guelph. The latest Transportation Plans published by Metrolinx and the Ontario Ministry of Transportation have not indicated any plans to invest in intercity public transit improvements. However, inadequate intercity public transit options limits accessibility for a considerable proportion of the GGH population and drives residents to become increasingly dependent on private vehicles. Moreover, the travel data used for this assessment was limited and outdated, and as a result, current travel patterns have likely changed drastically as commuting population returns to pre-pandemic levels as well as population growth over the past four years further exacerbates private vehicle use and traffic congestion throughout the region. For example, Statistics Canada estimates suggest that between July 2021 to July 2022, population growth in nine CMAs within the GGH increased by 209,000 (Clayton & Alphonso, 2023).

Population and employment growth estimates, coinciding with greenhouse gas emissions reduction goals over the next two decades suggests that alternative, low-carbon, transportation options are needed for daily commuters. There is an opportunity for public agencies, such as Metrolinx as well as regional transit agencies, to engage in public-

private partnerships with private IBS companies to provide short-distance, high-frequency, intercity bus services between major nodes across the GGH, and fill critical public transit service gaps. The next section in this research presents and evaluates a proposed intercity bus system for a high-demand corridor between Waterloo Region and Wellington County.

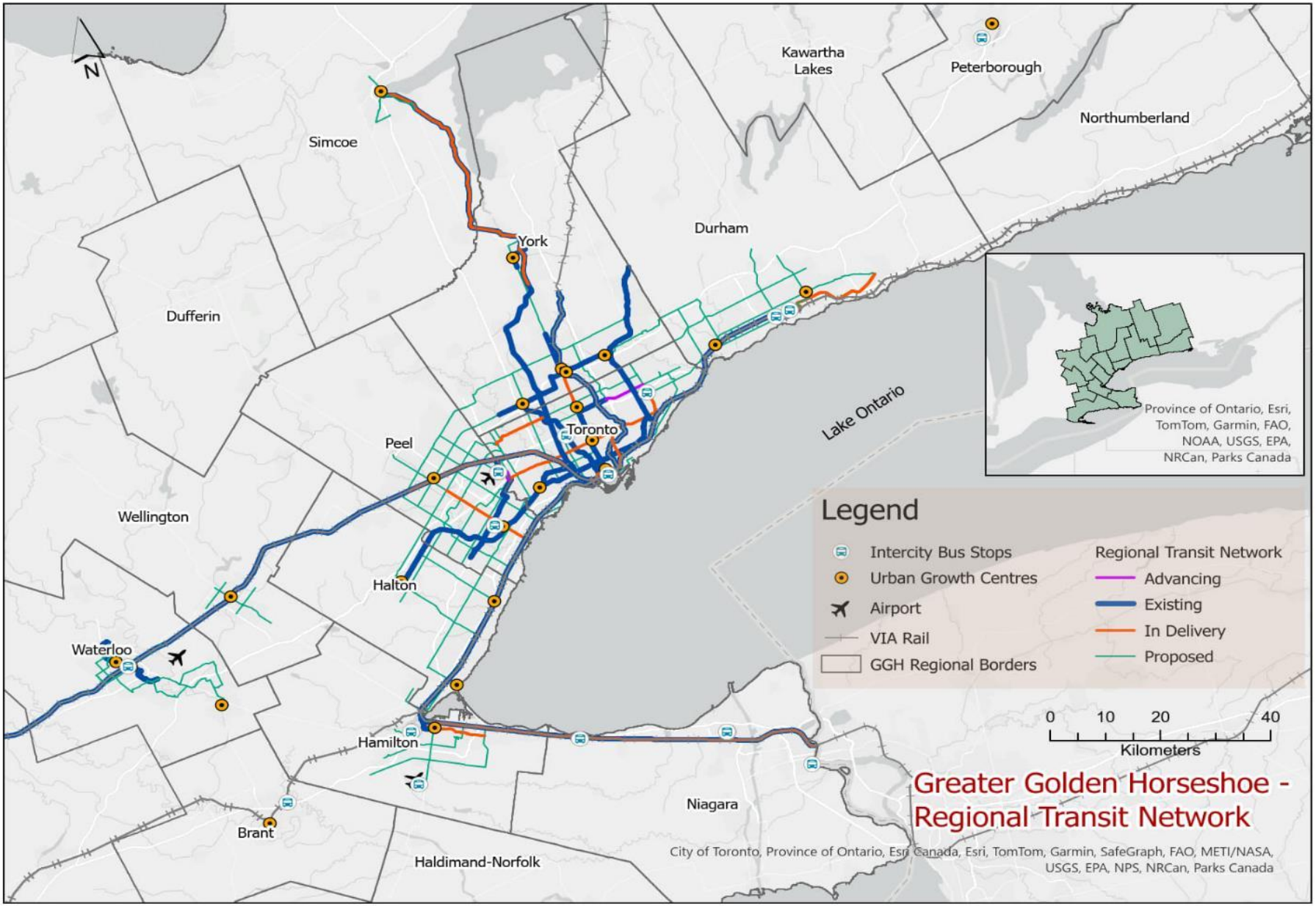


Figure 11: GIS Map of GGH Regional Transit Network

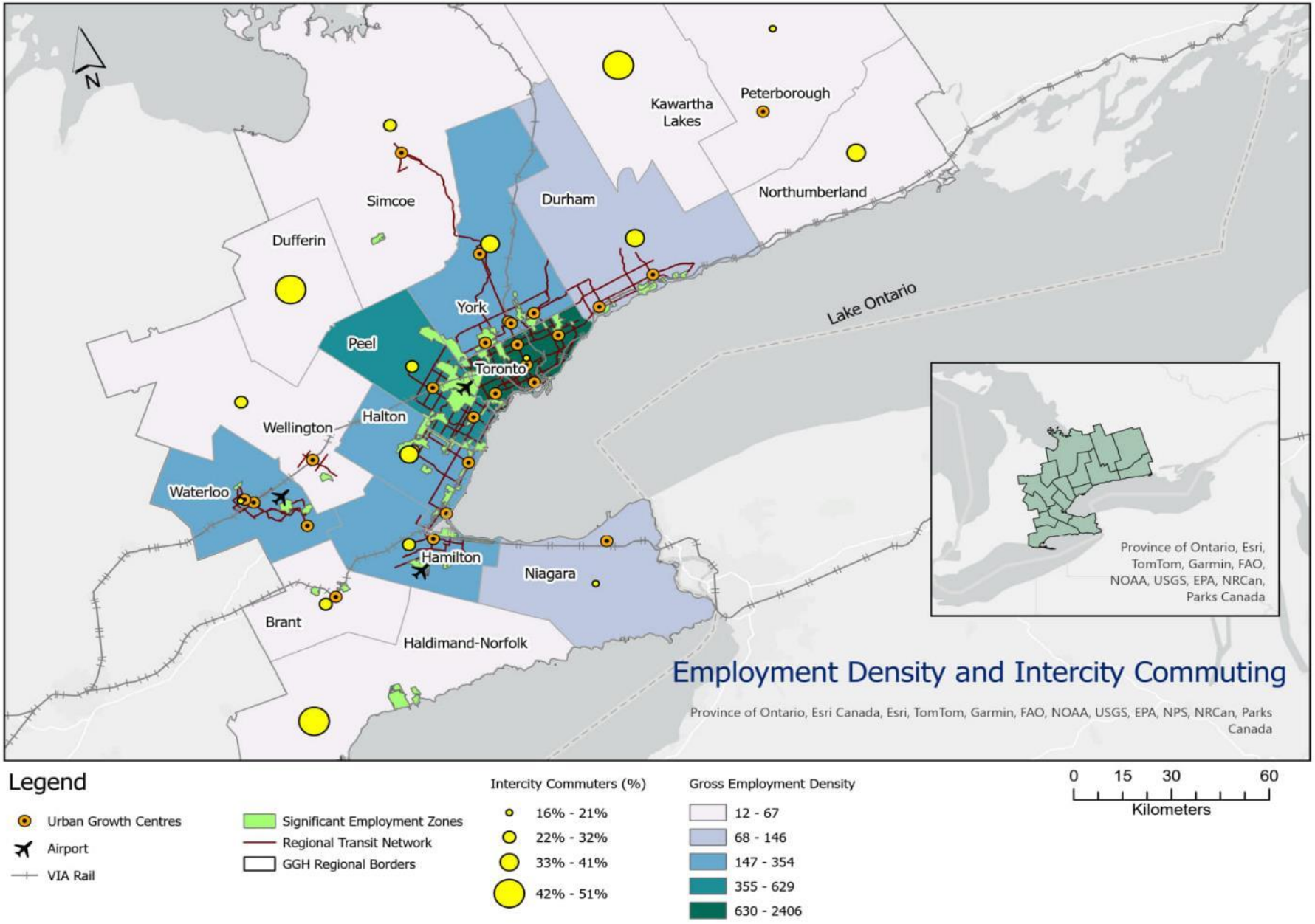


Figure 12: GIS Map of GGH Employment Density and Intercity Commuting

Part III: Initial Business Case for the Waterloo-Wellington Intercity Bus Services

Introduction

The previous section highlighted the large volume of daily intercity commuters in the Greater Golden Horseshoe (GGH) and the gaps in the existing intercity public transit system, which induces car dependency, resulting in traffic congestion and environmental problems. There is a need for public investment in intercity bus services across the GGH that offer a viable alternative for intercity commuters. This section introduces a potential system and evaluates its feasibility using a locally defined approach, known as an Initial Business Case.

An Initial Business Case is a comprehensive collection of evidence and analysis that sets out the rationale for why a problem or opportunity should be addressed and what the core requirements are for addressing it (Metrolinx, 2021). Given that this study is based within the Greater Golden Horseshoe (GGH) which is primarily served by Metrolinx, the study was conducted in general alignment with the Metrolinx Business Case Manual Volume 2: Guidance (Metrolinx, 2021b); however, this assessment does not represent a complete Initial Business Case, and further work would need to be conducted to explore the strategic, economic, financial, and operations and deliverability aspects of the business case assessment presented herein. While the following is a summary of the Initial Business Case, the complete assessment is provided in **APPENDIX B**.

Initial Business Case

The Initial Business Case (IBC) is the first phase of the Metrolinx Business Case development process in which investment options are reviewed at a high-level and assessed based on the proposed problem and/or opportunity the project aims to address. Several investment options are compared, and a preferred option is selected to progress towards further refinement and design in the following phases, as shown in **Figure 13** below. The results of the IBC are typically used to secure funding from the Province for planning and preliminary design. For this research paper, the Initial Business Case framework is used to assess the feasibility of an inter-regional bus service between Waterloo Region and Wellington County to fill the transit-related service gaps identified in the previous chapter.



Figure 13: Metrolinx Business Case Lifecycle (Metrolinx, 2021b)

The large volume of intercity commuters across the Greater Golden Horseshoe, coupled with the significant population and economic growth projections, reveals the increasing need for improved intercity public transit options. To better understand intercity commuting needs, this study attempts to analyze commuting behaviour between Waterloo Region and Wellington County and explore potential costs and benefits of implementing an intercity bus service. As such, this IBC aims to develop a case for public investment of an intercity bus service between Waterloo Region and Wellington County, Ontario. The findings, in turn, can be used to develop a preliminary framework that can be replicated and used to assess similar intercity bus service opportunities among the outer regions of the GGH.

The Initial Business Case uses data available through online resources to assess the current and future impacts of intercity commuting within a Business-As-Usual scenario, followed by a high-level cost-benefit analysis of proposed intercity bus service investment options.

Background

Waterloo Region is one of the fastest growing regions in Canada. The Waterloo-Wellington regions combined hold four urban growth centres, comprising prominent business, cultural, and educational institutions. Together the two regions are home to a diverse and growing population, with a dynamic and thriving economy. Collectively, the regions have emerged as a desirable place to live, work, study, and invest. Thus, the two regions are destined for considerable growth and require a robust transportation system to support diverse mobility needs.

As shown in Tabe 1 (Part II), nearly 68,000 people commute daily to and from the Waterloo-Wellington region, of which approximately 22,000 people commute between the two regions (Statistics Canada, 2023). However, due to insufficient intercity public transit options, private vehicles are the only practical mode of transportation for intercity commuters.

Waterloo Region

The Region of Waterloo is an upper-tier municipality located northwest of the Greater Toronto and Hamilton Area (GTHA), along the Highway 401 corridor. The Region is nearly 100 km away from the City of Toronto, which allows it to function as a self-contained economic region. Waterloo Region includes the Cities of Cambridge, Kitchener, and Waterloo, and the Townships of North Dumfries, Wellesley, Wilmot, and Woolwich (**Figure 14**). The Ontario Growth Plan identifies Uptown Waterloo, and Downtown Kitchener and Cambridge as Urban Growth Centres (UGCs) and mandates a minimum density target of 200 residents and jobs combined per hectare by 2031 for Waterloo and Kitchener, and 150 residents and jobs combined per hectare by 2031 for Cambridge (MMAH, 2020).

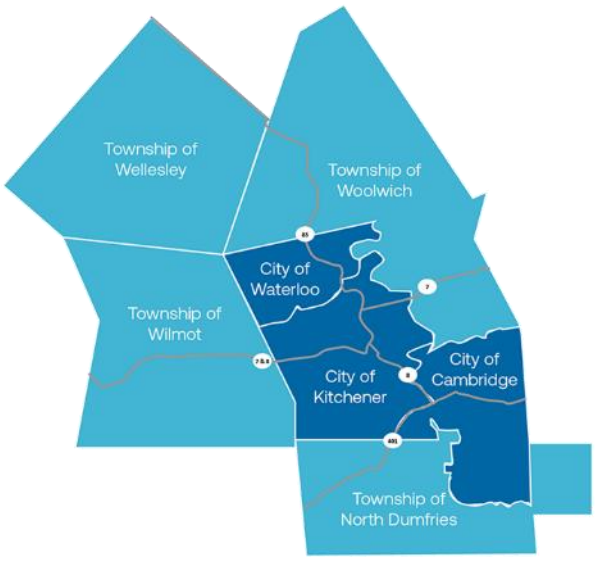


Figure 14: Waterloo Region Map Invalid source specified.

The Region is home to three major post-secondary institutions – the University of Waterloo, Wilfrid Laurier University, and Conestoga College, which attract over 100,000 students and staff annually, and continue to grow each year (University of Waterloo, 2024) (Wilfred Laurier University, 2024) (Conestoga College, 2024). Over the past few years, the region has been experiencing a multi-billion-dollar development boom and there have also been major expansion announcements from global firms like Google, Toyota, and SAP, as well as other fast growing tech companies in the region. The presence of such renowned companies in Waterloo has allowed the region to attract high-quality tech talent, which has led to a sizable number of local homegrown Canadian tech companies thriving in the region. Between 2017 and 2022, Waterloo Region had the third-highest tech job growth rate across Canada, at 52%, effectively attracting new migrants and immigrants due to its booming economy and the unique balance of urban and natural environments. (WaterlooEDC, 2023).

Transportation Systems

Waterloo Region has made substantial investments in rapid transit over the past ten years, mainly through the construction of the ION Light Rail Transit (LRT) system which opened in 2019, connecting major hubs in Kitchener and Waterloo, with plans to extend the service to Cambridge in the future. Metrolinx has also invested in direct connections to Waterloo Region with a GO Rail station in downtown Kitchener, offering peak hour, and peak direction passenger rail service to Union Station. **Table 3** briefly describes the region's primary transportation systems used by its residents. The primary transportation systems available for intercity commuters are provincial highways and GO Transit, while the remaining systems provide mobility within regional boundaries.

Table 3: Overview of Waterloo Region Transportation Systems

Transportation System	Description
Arterial Roads	Five provincial highways that run through the Region, including Highway 401, Highway 7, Highway 8, Highway 24, and Highway 85.
Grand River Transit (GRT)	A local public transit system that provides mobility throughout the cities of Waterloo, Kitchener, and Cambridge, and Townships of Woolwich and Wilmot.
ION Light Rail Transit (LRT)	Rapid transit system connecting three cities (Waterloo, Kitchener, Cambridge) in the Region with 22 stops along a 36-kilometre-long transit corridor. Phase One (Waterloo-Kitchener) began operation in 2019, and Phase Two (Kitchener-Cambridge) is currently in the design phase.
GO Transit	Five weekday peak hour trains leaving the Region in the mornings and leaving Union Station in the evening. GO Bus services are available to/from Mississauga (Square One) and Milton GO Station, which provides access to various locations in the GTHA.

Wellington County

Wellington County is located in south-western Ontario just over 100 kilometres west of the Greater Toronto Area, along Highway 401. The County is made up of seven member municipalities including the Towns of Erin and Minto, the Townships of Wellington North, Mapleton, Centre Wellington, Guelph/Eramosa, and Puslinch (**Figure 15**). The separated City of Guelph lies within County's southern boundaries and is the primary urban centre with higher population and employment densities compared to surrounding municipalities.

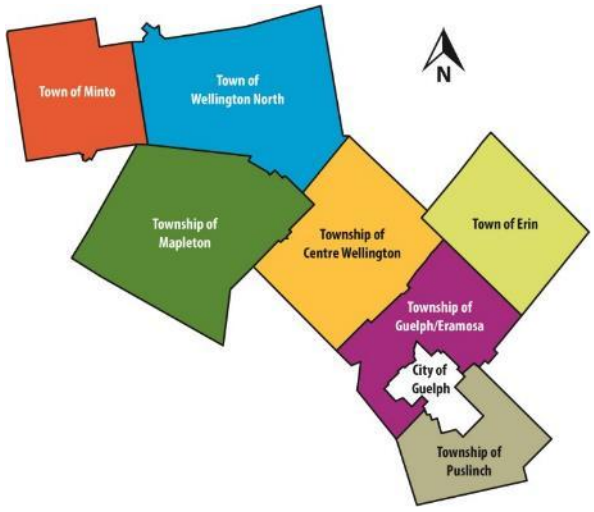


Figure 15: Map of Wellington County (GGG Community, 2024)

Although the City of Guelph is politically separate from Wellington County, Guelph is included as part of Wellington County for the purposes of this study. The population in the County was approximately 241,026 in 2021 (including City of Guelph) and the Ontario Growth Plan estimates the population to reach 363,000 by 2051. The Ontario Growth Plan also identifies Downtown Guelph as an Urban Growth Centre and mandates a minimum density target of 150 residents and jobs combined per hectare by 2031 (MMAH, 2020). The City of Guelph is home to the University of Guelph which attracts approximately 30,000 students annually (University of Guelph, 2022).

Outside of the City of Guelph, the remaining towns and townships largely consist of natural landscapes and rolling countryside, with small settlement areas dispersed throughout the region. While the population of the County is much lower than neighbouring regions, it provides unique attractions including heritage and cultural sites and festivals, locally grown and hand-made goods business sector, and an abundance of natural areas offering a wide range of recreational activities (Wellington County, 2024).

Transportation Systems

The primary mode of transportation available for intercity commuters in Wellington County is private vehicles and GO Transit, while other public transit systems provide basic mobility options within the City of Guelph and Wellington County. **Table 4** presents an overview of the transportation systems for Wellington County.

Table 4: Overview of Wellington County Transportation Systems

Transportation System	Description
Arterial Roads	Provincial highways crossing through the County include Highway 6, Highway 7, Highway 124, Highway 109, and a small portion of Highway 401 crossing along the southern point of the County.
Ride Well	An on-demand public transit service that offers door-to-door service to any address within the boundaries of Wellington County and to/from the City of Guelph. There are no fixed-route or schedules, instead service utilizes mobile-app technology to allow customers to plan, book, track, and pay for their ride in real-time. Ride Well is a pilot program and expected to end in 2025 (Wellington County, 2023).
Guelph Transit	Local public transit system that provides mobility throughout the City of Guelph, and some connections to surrounding regions of Wellington County.
GO Transit	Daily, peak-hour GO Bus and GO Train services to/from downtown Guelph.

Population and Employment Trends

Table 5 contains population estimates recorded by 2016 and 2021 Census Canada, as well as Ontario's Growth Plan population estimates for 2051. The populations for the local census metropolitan areas (CMAs) are also shown, as they represent a significant share of the region's population. CMAs are large, densely populated centres made up of one or more neighbouring municipalities (CSDs) that are economically and socially integrated. While CDs and CSDs are administrative areas defined by government statutes, CMAs are statistical areas, defined by CSDs, and primarily exist in areas with higher population densities (Statistics Canada, 2023).

The Kitchener-Cambridge-Waterloo CMA and Guelph CMA represent 98% and 70% of the regional population, respectively. Population growth rates in the CMAs have previously been higher than the region and are likely to be higher in the future due to the provincially designated Urban Growth Centres in cities of Waterloo, Kitchener, Cambridge, and Guelph. Based on the Ontario Growth Plan estimates, the two neighbouring regions are expected to reach a combined population of nearly 1.3 million people by 2051.

Table 5: Population Estimates for Waterloo Region and Wellington County (2016 and 2021) (StatCAN, 2016) (StatCAN, 2022)

	Region of Waterloo	Kitchener-Cambridge-Waterloo CMA	Wellington County	Guelph CMA
Population, 2016	535,154	523,894	222,726	151,984
Population, 2021	587,165	575,847	241,026	165,588
Population % Change, 2016 to 2021	9.7%	9.9%	8.2%	9%
Population Growth Estimate (2051)	923,000	904,540*	363,000	254,100*

**Estimates based 2021 population data*

With regard to employment, the latest Labour Force Survey estimates total jobs in the Kitchener-Cambridge-Waterloo CMA have reached 373,500, and in Guelph CMA total jobs have reached 103,800 (Statistics Canada, 2024). The Ontario Growth Plan anticipates employment to reach 470,000 in Waterloo Region, and 186,000 in Wellington County (including Guelph) by 2051 (MMAH, 2020).

Figure 16 below illustrates the percentage of employment by sector for both Waterloo Region and Wellington County. While Wellington County has a much smaller labour market compared to Waterloo Region, both regions generally attract employment opportunities for similar industries, with the largest markets being the sales and service sector, trades and transport sector, and business and finance sector.

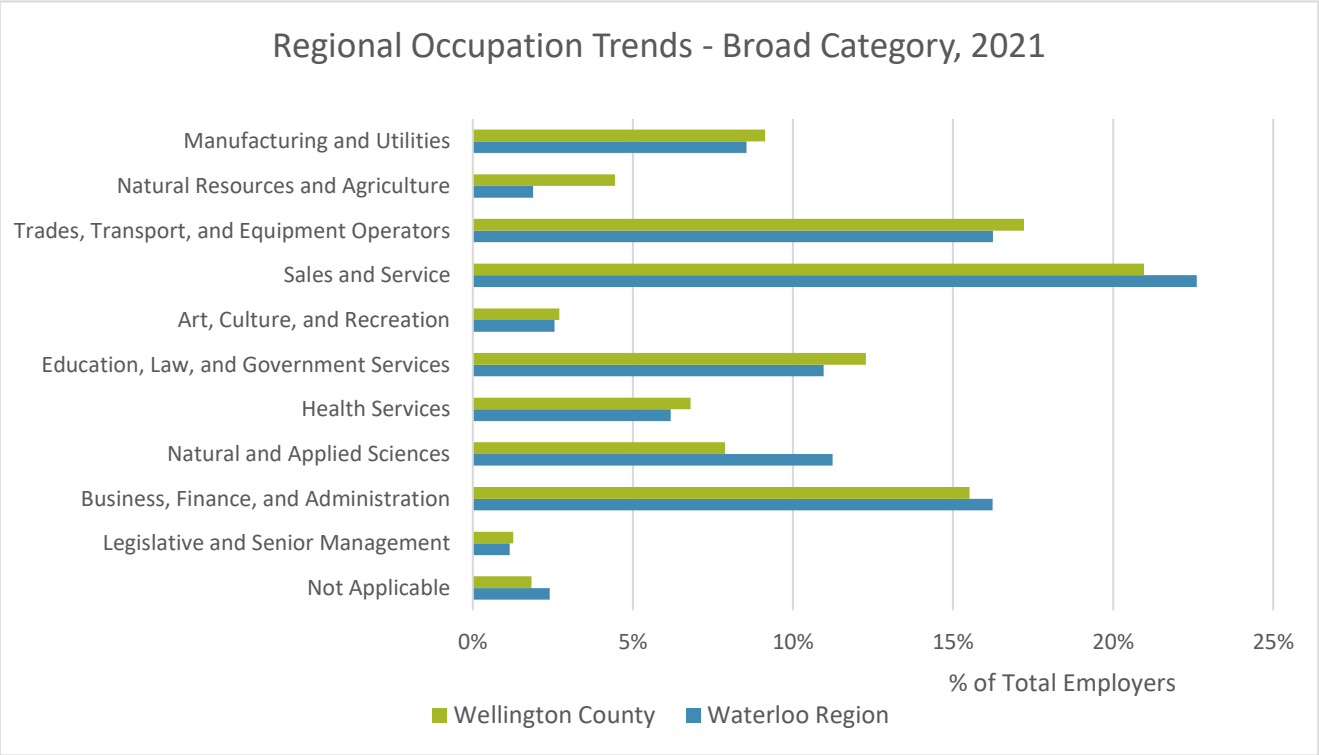


Figure 16: Waterloo-Wellington Regional Occupation Trends - Broad Category, 2021 (StatCAN, 2022)

Business Case Overview

The Metrolinx Business Case Analyses framework is used to develop the analysis and assess the potential viability of a high-frequency, intercity bus service between the two regions.

The Metrolinx Business Case structure typically consists of a four-case evaluation. The Strategic Case and Economic Case speak to the rationale for pursuing an investment, while the Financial Case and Deliverability and Operations Case, speak to the requirements for successful implementation of the investment (Metrolinx, 2021b). **Table 6** describes the content to be evaluated during the Initial Business Case phase of the business case lifecycle, as defined by Metrolinx.

Table 6: Initial Business Case Framework (Metrolinx, 2021b)

Context	Define the core problem and/or opportunity to be addressed by the proposed transportation investment and the types of benefits this investment can realize.
Investment Options	Define a set of investment options based on variations of the preferred option in the strategic business case.
Strategic Case	Detailed review of the strategic benefits of addressing a problem with a proposed investment.
Economic Case	Assessment of the investment options including user costs, external costs, and some wider benefits.
Financial Case	Assessment of investment implementation costs, including operation and maintenance costs, and revenue impacts.
Deliverability and Operations	High-level appraisal of risks and implementation requirements.

Case for Change

Despite the large volume of daily commuters between the two neighbouring regions, there are currently only two options for intercity commuters: private vehicles and GO Transit. GO rail services only operate in one direction during the morning and evening peak hours, mainly used by residents commuting to/from the GTHA. GO Bus services between the two regions are severely limited throughout the day, bus trips take close to 1.5 hours for a one-way trip and primarily serve connections between major universities. Therefore, private vehicles are the only practical mode of transportation for intercity commuters, which contributes to private vehicle dependency and severe traffic congestion on regional roads and highways.

Figure 17 below illustrates the proximity of major employment destinations and urban growth centres between the two regions. The distance between downtown Kitchener and downtown Guelph is approximately 25 kilometres, takes approximately 35 to 50 minutes by car depending on traffic conditions. It is roughly the same distance and time to drive from downtown Cambridge to downtown Guelph. Reasonable transit services currently exist between Cambridge and Kitchener, however, due to the lack of collaboration between the two regional governments, there is a discernible gap in public transit service connections between these cities and Guelph.

There is an opportunity to provide critical intercity public transit services that can mitigate automobile dependency and improve access to employment and education between the two regions. Implementing new intercity public transit service options between the two regions can improve connections between major employment areas and neighbourhoods, appealing to people and major employers throughout the regions. Lastly, expansion of the transit network can shape growth among these regions, encourage transit-oriented development, and improve overall mobility and quality of life.

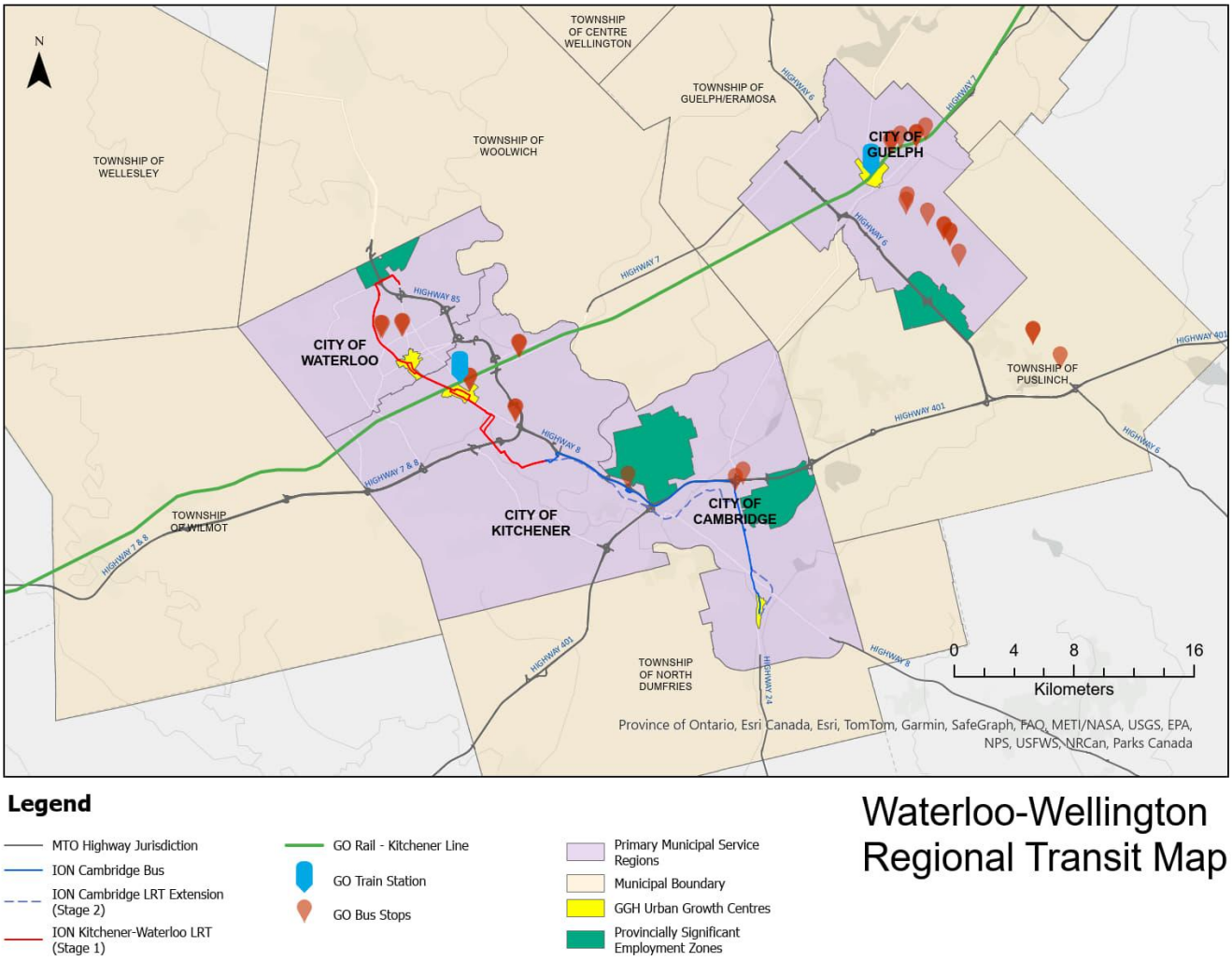


Figure 17: GIS Map of Waterloo-Wellington Regions and Major Intercity Transportation Networks

Problem Statement

By 2051, the combined population of the Waterloo-Wellington region is expected to increase by nearly 60% to 1.3 million people, and employment is expected to increase by 40% in Waterloo Region, and 8% in the City of Guelph. Without alternative, low-carbon options for intercity travel, the region will experience devastating impacts of auto dependency and traffic congestion. **Table 7** below summarizes three issues driving the problem of intercity commuting, which can be resolved through the proposed intercity public transit investment and will be discussed in more detail in the following sections.

Table 7: Key Problem Drivers for Intercity Commuting

	Issue	Overview
1.	**Existing transit services along the corridor cannot compete with auto travel**	The existing GO Transit services do not allow for efficient movement between the two regions. Services are limited depending on the time of day and direction of travel, providing higher frequency services in one direction during peak hours only. Existing transit travel times are not competitive against auto travel. Transit trips typically require more pre-planning than auto travel, reducing the attractiveness of transit compared to personal auto travel.
2.	**Rapid population and employment growth leading to higher intercity travel demand**	Urban growth centres and major employment areas in both regions attract thousands of intercity commuters for employment opportunities. Significant increases in population and employment are likely to lead to more automobile trips in the corridor and worsening congestion. Without alternative travel options, the planned growth may be inhibited by the worsening congestion and associated increases in travel time, which negatively impacts economic productivity.
3.	**Climate action plans to reduce GHG emissions do not address auto-dependency of intercity commuters.**	The transportation sector is the largest contributor to GHG emissions. Both regions have implemented climate policies and action plans to reduce community GHG emissions. Current action plans to reduce transportation sector emissions are dependent on the transition to electric vehicles and work-from-home trends. However, neither region have explored opportunities for reducing private vehicle dependency of intercity commuters.

Issue #1 – Transit services along the corridor cannot compete with auto travel

Issue 1 explores how travellers make use of the existing road and transit network and outlines key gaps in the future or planned network that contribute to the problem statement.

- **Highways** – Highway 6, Highway 7, and Highway 401 are the primary routes connecting the downtown Kitchener, Cambridge, and Guelph regions. Highways are available for automobiles, GO Buses, and freight traffic.
- **Regional GO Transit** – GO Bus and Rail services provide access to municipalities across the GGH but primarily concentrate services to the GTHA regions.
- **Local bus services** – Public transit services in Waterloo Region and City of Guelph operate within municipal boundaries, however they can provide transit connecting services to GO stations and stops.

Regional Public Transit System

Presently, regional public transit services do not provide continuous east-west services between Waterloo and Wellington, which impacts connectivity and accessibility for residents commuting between the two regions for work and school. **Table 8** below summarizes the current daily GO Transit services available to intercity commuters between major GO Stations.

Table 8: Current Daily GO Transit Services for Intercity Commuting

GO Transit Routes	Kitchener (30-31-33)				Waterloo/Hamilton (17)	
GO Transit Stops	Kitchener GO		Guelph GO		U of W	Guelph GO
GO Transit Service	GO Train	GO Bus	GO Train	GO Bus	GO Bus	GO Bus
Time of Day	Eastbound		Westbound		Eastbound	Westbound
Morning Peak Period (6:00 am to 9:00 am)	**7**	0	0	0	3	2
Afternoon Off-Peak (9:00 am to 3:00 pm)	2	0	2	0	5	5
Evening Peak Period (3:00 pm to 8:00pm)	0	0	**6**	0	5	5
Late Evening (8:00 pm to 12:00 am)	1	0	1	0	0	2

Although other GO stops exist throughout the region (shown in **Figure 17**), services are typically limited to a few times per day and generally support intercity trips to and from GTHA regions. Overall, it can be concluded that GO Transit is not a reliable option for commuters between Waterloo Region and Wellington County, with services limited as follows:

- GO Train services only operate in one direction and are limited to peak hour services.
- GO Bus connections are limited to university students and would require non-students to make multiple transit connections to reach their final destination.
- There are no direct GO Transit connections between cities of Cambridge and Guelph.

Despite the thousands of daily commuters that travel between the two regions, public transit services are limited and do not provide consistent and seamless connections between key activity and employment areas in either region. Such inadequate services decrease the attractiveness of public transit as potential option for commuters between the two regions.

Future Transportation Network Expansions

Highway Expansion

The most significant transportation system improvement project planned for the region is the construction of a new and expanded Highway 7, connecting Waterloo Region and Wellington County. In February 2024, the Ontario government announced that it has officially begun advancing construction of a new Highway 7 between Kitchener and Guelph (**Figure 18)**. The project will construct a new four-lane, 18-kilometre-long Highway 7 that is slightly north of the existing highway, connecting Highway 85 in Kitchener with Highway 6 in Guelph. The new highway is proposed as a solution to help fight gridlock on Highway 401, save travel time for commuters, and improve movement of goods between the fast-growing regions of Kitchener, Waterloo, and Guelph (Ontario Newsroom, 2024).



Figure 18: Proposed Alignment for New Highway 7 (Ontario Newsroom, 2024)

Metrolinx GO Expansion

As shown in **Figure 19**, Metrolinx GO Expansion currently prioritizes corridor improvements for the Kitchener rail line between Bramalea GO (Brampton) and Union Station (Toronto), as well as some upgrades to the Guelph GO station (Metrolinx, 2022) . However, Metrolinx GO Expansion plans will not significantly improve the remaining Kitchener GO corridor, and services will continue to be limited to peak hours only.

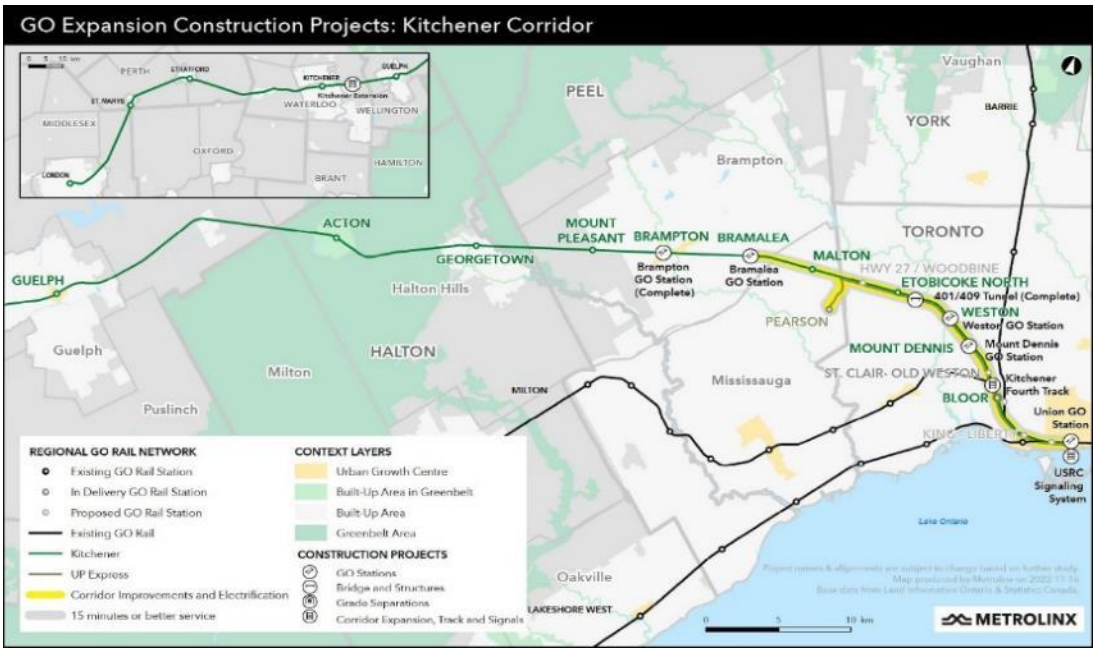


Figure 19: Metrolinx GO Expansion Plans for Kitchener Corridor (Metrolinx, 2022)

As shown in **Table 9** below, the Metrolinx GO Rail Station Access Report (2023) estimates a considerable increase in daily ridership at the Guelph GO station, while minimal growth is expected for the Kitchener GO station (Metrolinx, 2023). While both stations are expected to see a growth in daily ridership, Metrolinx anticipates that the role of the Kitchener GO station as a destination station is expected to decrease, while Guelph GO station will increase significantly.

Table 9: Metrolinx GO Rail Station Access Report Estimates (2023) (Metrolinx, 2023)

	Kitchener GO		Guelph GO	
	Current (2019)	Forecasted (2041)	Current (2019)	Forecasted (2041)
Daily Riders' Home Station	225	475	250	575
Daily Riders' Destination Station	75	50	75	625
Daily Total Footfall	675	975	600	2250

- **Daily Riders' Home Station** – Ridership expected to access the station.
- **Daily Riders' Destination Station** – Ridership expected to egress at the station.
- **Daily Total Footfall** – Total ridership (access and egress, all day) expected for the station, indicating overall ridership change.

Waterloo Region Transit Hub

Waterloo Region recently purchased land at the north-east corner of King and Victoria Streets in Kitchener for a regional transit hub. The transit hub is located next to the ION LRT – Central Station stop in Kitchener and will replace the existing Kitchener GO station (Region of Waterloo, 2019).

The new transit hub will function as a focal point for higher order transit service in the region and establishing a connection to the Toronto-Waterloo Innovation Corridor. The Region is working with Metrolinx to design and construct the transit hub. Construction of the transit hub is expected to begin Spring of 2024 and completed by end of 2027 (Region of Waterloo, 2023). The transit hub will offer access to multiple modes of transportation, including:

- ION light rail transit
- Grand River Transit
- Expanded GO train and bus service
- VIA Rail
- Inter-city bus service
- CarShare
- Pedestrians and cyclists

Issue #2 - Rapid population and employment growth leading to higher intercity travel demand.

Issue #2 describes existing intercity commuting trends for Waterloo and Wellington regions and anticipates how population and employment growth projections will impact the demand on the existing transportation systems.

Commuting Destination

Table 10 presents a summary of the commuting data for Waterloo and Wellington regions. In 2016, nearly 67,000 residents of the Waterloo-Wellington region travelled to work destinations outside of their region of residence. Despite the decline in the overall commuting population between 2016 and 2021 due to the COVID-19 pandemic, a significant percentage of the commuting population for both Waterloo Region (19%) and Wellington County (28%) continued to travel to work destinations outside of their region of residence.

Table 10: Comparison of Waterloo-Wellington Region 2016/2021 Census Commuting Data

2016/2021 Census Canada Data	Waterloo Region		Wellington County	
	2016	2021	2016	2021
Commuting Population	231,280	171,575	96,460	76,400
Commuting Destination				
Same Municipality (CSD)	109,495	81,150	52,965	42,870
Different Municipality, within (CD)	82,840	58,690	14,800	11,705
Different CSD and CD (in Ontario)	38,340	31,430	28,415	21,625
Commuting Mode Share				
Private Vehicle (Driver/Passenger)	88%	89%	88%	90%
Public Transit	6%	5%	5%	3%
Active/Other	6%	6%	8%	7%

Figure 20 further illustrates commuting trends for both regions and their respective CMAs and compares the number of people that commute within their Census Subdivision (CSD) of residence, a different CSD but within the same Census Division (CD) of residence, and a different CSD and CD of residence (intercity commuters). The figure demonstrates that the majority of the intercity commuting population live within the major cities of Kitchener, Cambridge, Waterloo, and Guelph, and thus, intercity public transit connections are essential within these cities.

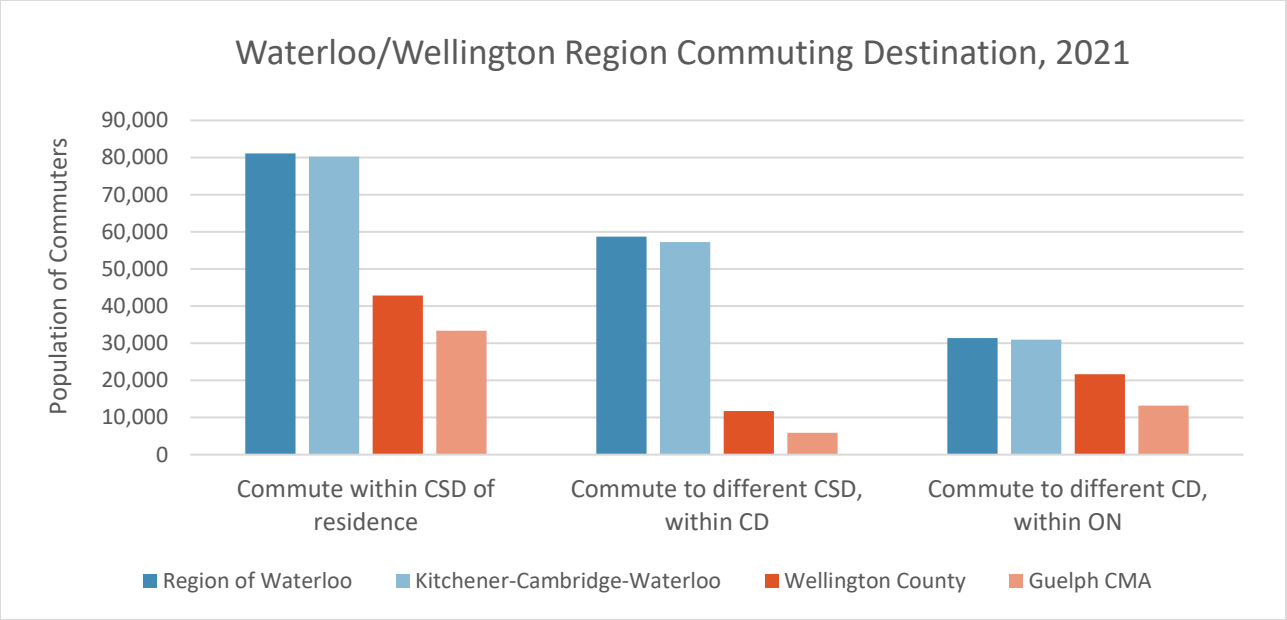


Figure 20: Comparison of Waterloo-Wellington Region Commuting Destination, 2021

Figure 21 recaps the combined volume of people commuting between Waterloo and Wellington region compared to those commuting to other regions within the GGH. The data suggests that there are close to 22,000 (33%) people commuting between the two regions, and that there is a need for improvements in intercity public transit service options between these two regions.

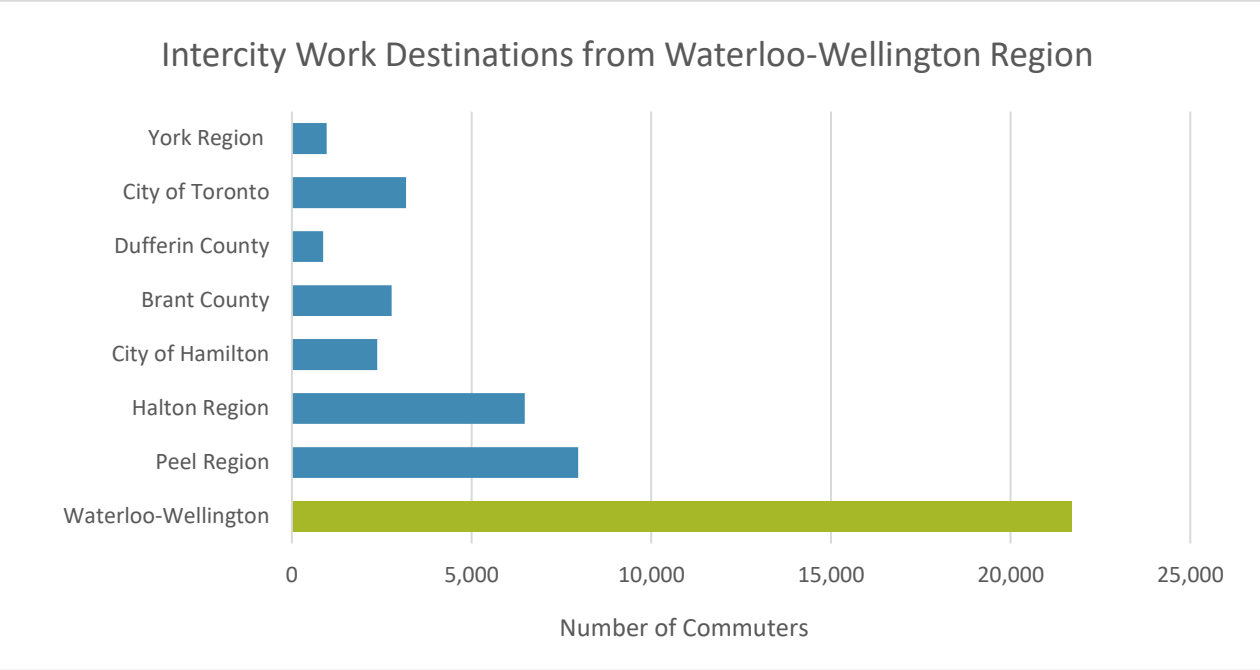


Figure 21: Intercity Commuting Destinations from Waterloo-Wellington Region, 2021

Intercity Transit Demand

The 2016 TTS data was used to assess intercity transit demand for the Waterloo-Wellington region (University of Toronto, 2019). According to the survey responses, approximately 2,800 GO Transit trips were made by residents between the two regions within a 24-hour period. When compared to the number of residents that commuted to work outside of their region of residence, it can be estimated that less than 4% of intercity commuters potentially used GO Transit for their commute. **Table 11** below summarizes the total trips made by GO Transit to and from Waterloo Region and Wellington within a 24-hour period.

Table 11: Waterloo-Wellington Region Intercity Commuting Data, 2016

	Waterloo Region	Wellington County	City of Guelph
Total number of persons who work or go to school outside of their region*	38084	26388	24897
Total number of trips made by residents with GO Transit	1440	470	858
Estimated percentage of intercity commuters using GO Transit	3.8%	1.8%	3.4%

***Includes persons who have no usual place of work.**

As shown in **Table 12**, morning and evening peak period travel data from the 2016 TTS suggests that GO Rail is primarily used by residents from both regions commuting outside of the Waterloo-Wellington regions in the morning (between 6 AM and 9 AM) and returning in the evening (between 3 PM and 6 PM). This is because there were no GO Rail trips recorded to the area in the morning and from the area in the evening, for either region.

Table 12: Waterloo-Wellington Region - Peak Morning and Evening Trips by GO Transit

	Waterloo Region	Wellington County	City of Guelph
Trips made TO the Area during morning peak periods (6am – 9am)			
Total Trips	247,519	16,891	71,681
Trips by GO Rail	0	0	0
Trips made FROM the area during morning peak periods (6am – 9am)			
Total Trips	253,313	26,326	66,041
Trips by GO Rail	181	111	250
Trips made TO the area during afternoon peak periods (3pm – 6pm)			
Total Trips	320,884	32,169	90,283
Trips by GO Rail	459	73	180
Trips made FROM the area during afternoon peak periods (3pm – 6pm)			
Total Trips	391,086	31,296	114,351
Trips by GO Rail	0	0	0

Issue #3 – Climate action plans to reduce GHG emissions do not address auto-dependency of intercity commuters.

All levels of government have implemented climate action policies and GHG emissions reductions goals to achieve net-zero emissions future by 2050. While climate goals are focused on reducing GHG emissions within regional boundaries, intercity public transit services are not often considered by municipal governments as potential opportunities to reduce private vehicle dependency.

As shown in **Figure 22**, for both Waterloo Region, Wellington County (not including City of Guelph), and the City of Guelph, the transportation sector is the largest contributor to community GHG emissions. Due to its larger population and economy, annual GHG emissions are significantly higher in Waterloo Region. However, Wellington County's transportation sector emissions are proportionately higher owing to the higher private vehicle dependency.

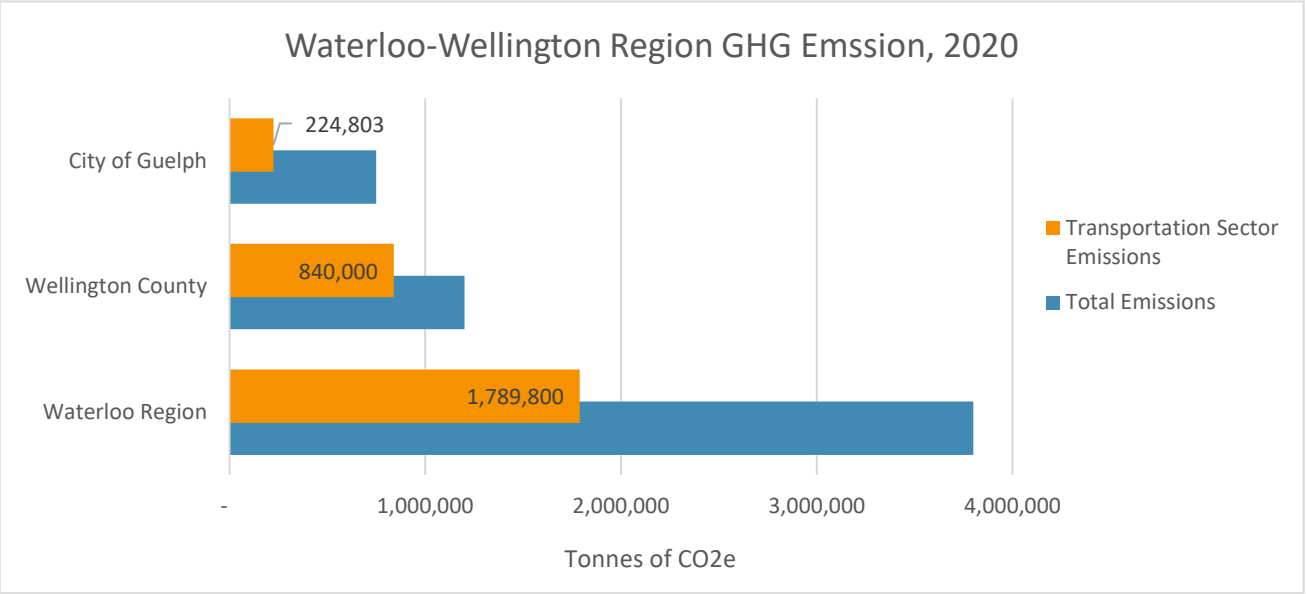


Figure 22: Estimated GHG Emissions for Waterloo-Wellington Region, 2020

Through their respective climate action plans, Waterloo Region, Wellington County, and City of Guelph, have indicated climate action goals that aim to reduce dependency on private vehicles and improve options for commuters to reduce GHG emissions. However, action plans and strategies to achieve these goals have not specifically addressed intercity commuting trips.

Additionally, all three regions expect transportation sector emissions will decrease significantly as more residents adopt zero-emission vehicles (ZEVs). However, studies have shown that there are notable physical and socio-economic barriers that make ZEV inaccessible to marginalized groups, and widespread ZEV adoption unviable (Qadir, Ahmad, Al-Wahedi, Iqbal, & Ali, 2024) (Ghosh, 2020). Without sufficient intercity public transit options, marginalized groups that cannot drive or afford to purchase a ZEV will have limited access to cross-regional employment opportunities. Moreover, although widespread ZEV adoption has the potential to significantly reduce transport sector GHG emissions, it will continue to exacerbate problems of auto dependency and traffic congestion.

Table 13 below summarizes regional GHG emissions reduction goals, and climate action strategies that potentially consider improving intercity commuting options as a means to reduce community GHG emissions.

Table 13: Summary of Regional Climate Action Strategies for Intercity Commuting

	Waterloo Region	Wellington County	City of Guelph
Percentage of Transport Sector GHG emissions, 2020 (%)	**47%**	**70%**	**30%**
Climate Action Plan	Transform WR – 30-Year Strategy	Future Focused (2022-2030)	2022 Environmental Sustainability Report
Transport Sector GHG Emissions Reduction Goals	Achieve 50% reduction (based on 2010 levels) by 2030, and 80% reduction by 2050. (ClimateActionWR, 2024)	Achieve a 6% reduction in community GHG emissions by 2030, and net-zero emissions by 2050. (County of Wellington, 2020)	Reduce community GHG emissions by 63% (against the 2018 baseline) by 2030. Become a net-zero carbon community by 2050. (City of Guelph, 2023)
Potential Action/Strategy for Intercity Commuters	Transformative Change #1 – By 2050, most trips are taken using active transportation, with the support of a robust public transit system. Make fewer trips, make shorter trips, and make lower energy trips.	Objective – Develop strategies to support options for commuters to reduce greenhouse gases. Promote the use of Regional Transit and address climate change in future transit planning	None.

Summary of Issues

There are critical issues with the existing transportation network and climate policy framework that do not consider the large volume of daily intercity commuters between Waterloo Region and Wellington County, and the negative impacts if these issues are not addressed.

- **Issue #1** provides an overview of existing transportation systems available to intercity commuters and highlights the fact that currently intercity public transit services are not a practical option for daily commuters, making private vehicles the only viable option for commuting between the two regions.
- **Issue #2** demonstrates current intercity commuting trends and how population and employment growth projections for the two regions can further impact intercity commuting demands. Without adequate public transit options, intercity commuting will place a greater demand on road infrastructure, while also limiting accessibility for marginalized groups that do not have access to private vehicles.
- Lastly, reducing transport sector emissions are critical to most climate action plans, however climate policies primarily focus on improving low-carbon mobility within municipal boundaries, but fail to address intercity commuting options. **Issue #3** stresses the need to reduce GHG emissions from intercity commuting and implement these strategies as part of regional and provincial climate policy goals.

Business As Usual Scenario

A Business As Usual (BAU) scenario provides a baseline comparison for the transit investment option being proposed. The BAU scenario assumes the continuation of current transit services in the region and includes approved transportation infrastructure projects within the region.

This analysis notes the following:

- Private vehicle is the dominant mode of travel for both Waterloo and Wellington regions, where in the BAU the majority of commuting trips will continue to be completed by private vehicles due to the limited intercity transit options.
- There are over 22,000 daily commuters travelling between Waterloo Region and Wellington County, and in the BAU scenario this figure will increase due to population and employment growth projections.
- Transportation network expansions are primarily focused on improving highway infrastructure to accommodate growth in daily commuters, while public transit improvements are limited to the GTHA.

Table 14: Key Population and Employment Insights

Region	Highlights
Waterloo Region	• 57% population growth between 2021 and 2051 • 41% employment growth between 2020 and 2051 • 98% of population resides in Kitchener-Cambridge-Waterloo CMA • Cities of Kitchener and Waterloo are designated as Urban Growth Centres
Wellington County	• 51% population growth between 2021 and 2051 • 70% of population resides in Guelph CMA • 8% employment growth between 2023 and 2051 (City of Guelph) • City of Guelph designated as Urban Growth Centre

Note: percentages are estimates based on Ontario Growth Plan forecasts and 2021 Census population and employment data.

Forecasting Intercity Commuting

Table 15 below summarizes population estimates for intercity commuters between Waterloo Region and Wellington County using the 2006-2016 TTS Origin-Destination Matrices (Ashby B. , 2018) and the 2023 Statistics Canada resources (Statistics Canada, 2023). Although the commuting population has declined slightly post-pandemic, this figure is likely to have increased and will continue to increase in the future.

Table 15: Waterloo-Wellington Region - Forecasting Intercity Commuting Trends

YEAR	Waterloo to Wellington/Guelph		Wellington/Guelph to Waterloo	
	Population	*Change Rate*	*Population*	*Change Rate*
2006[1]	7,900		5,300	
2011[1]	8900	13%	5,500	4%
2016[1]	10,900	22%	8,500	55%
2023[2]	13,580	25%	8,105	-5%

1. **(Ashby, 2018)**
2. **(Statistics Canada, 2023)**

Based on the estimates above, intercity commuting population growth forecasts were created using the **Excel Forecast** function to calculate future intercity commuting trends based on historical data. The forecasting function is a simplified way to calculate or predict future values using historical values. The predicted values are a continuation of the historical values within the specified target date (Microsoft, 2021). While the forecasted estimate is based on historical values, the high and low estimates consider external factors that can result in an increase or decline of the intercity commuting population, such as changes to work-from-home policies, regional migration trends, and population and employment growth trends.

Figures 23 and 24 below illustrate the results of the Excel Forecasting model, and high estimates suggests that daily commuting between the two regions could increase to nearly 40,000 daily vehicles on road by 2050. This estimate does not account for the thousands of post-secondary students that commute between the two regions, which may result in greater volumes of daily commuters.

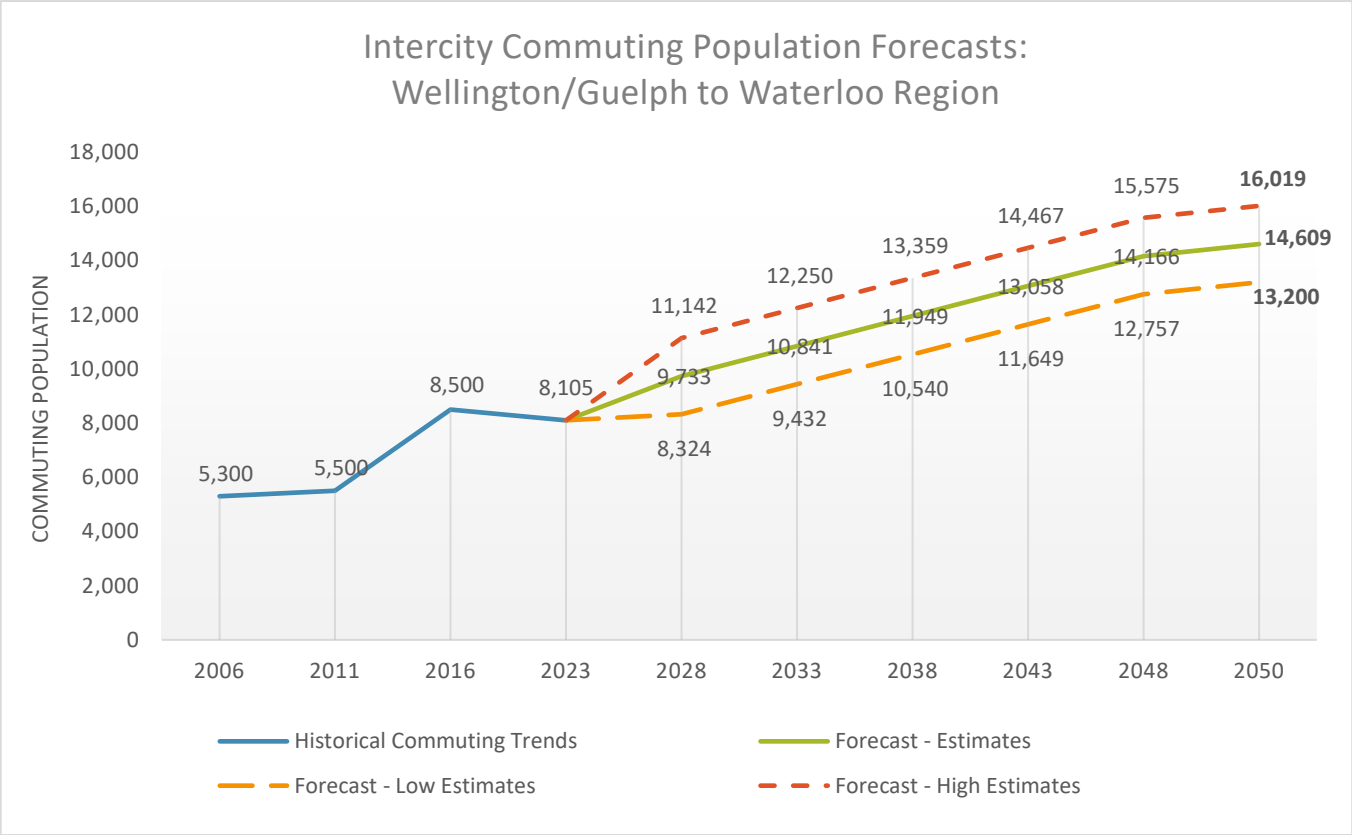


Figure 23: Intercity Commuting Population Forecasts: Wellington/Guelph to Waterloo Region

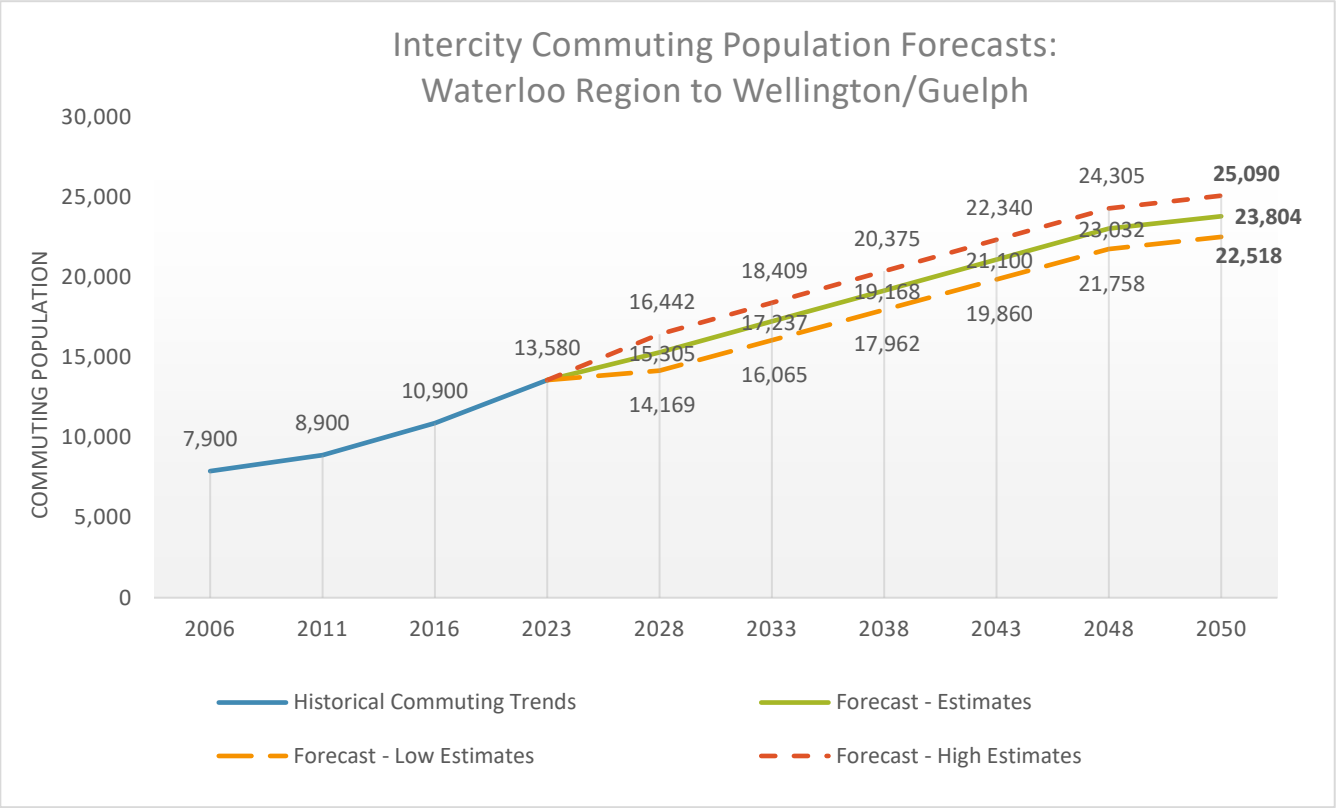


Figure 24: Intercity Commuting Population Forecasts: Waterloo Region to Wellington/Guelph

GHG Emissions Estimates

Greenhouse gases consist of a variety of gases that accelerate the warming of the earth's atmosphere. The main GHGs in the atmosphere are water vapour, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and ozone. Carbon dioxide CO_2 is the most common GHG emitted by human activities, in terms of the quantity released and the total impact on global warming. As a result, CO_2 is sometimes used as a shorthand expression for all greenhouse gases, which can lead to some confusion about the types of gases that are actually being released into the atmosphere (Brander, 2023). Because CO_2 is considered the most important greenhouse gas, emissions reports often do not consider the other greenhouse gases resulting in an understatement of the total global warming impact. Therefore, A more accurate way of referring to a number of GHGs collectively is to use the term "carbon dioxide equivalent" or "CO_2e" (Brander, 2023).

Based on the IEA's average Canadian vehicle consumption of 8.6 Lge/100km, the average carbon emissions per kilometer is approximately **200g CO_2/km** (IEA, 2021) (Marco, 2024). However, an annual Fleet GHG Performance report published by the Environment and Climate Change Canada (ECCC) estimates the fleet average carbon-related exhaust emission (CREE) value, expressed in grams of CO_2e per mile. For the 2020 mode year, the fleet average CREE is approximately **405 g/km CO_2e** (ECCC, 2020). The CREE value measures a variety of carbon-related combustion products including carbon dioxide (CO_2), carbon monoxide (CO), and Hydrocarbons (HC), and the final value is expressed in grams of CO_2e per mile.

Using these CO_2 and CO_2e figures, **Table 16** below estimates GHG emissions for daily round trips between Kitchener and Guelph, with an approximate distance of 55 kilometers. Moreover, the estimated daily intercity commuting population forecasted for 2050 is used to estimate the potential increase in daily and annual GHG emissions for the Waterloo-Wellington region. **Figure 25** illustrates the estimated GHG emissions based on the intercity commuting population forecasts for the Waterloo and Wellington Regions.

Table 16: CO2 and CO2e Emissions Estimates for Intercity Commuters between Waterloo and Wellington Regions

Current Commuting Data	Emissions Estimates	
	CO_2 (g/km)	CO_2e (g/km)
Estimated Total Commuters Between Regions[1]	22,000	22,000
Average Distance Travelled – Round Trip (km)	55	55
Total Kilometres Travelled Per Day (km)	1,210,000	1,210,000
Average Vehicle Emissions (g/km)	**200**	**405**
Estimated Daily CO2e Emissions – 1 Vehicle (g/day)	11,000	22,275
Annual CO2e Emissions – 1 Vehicle (g/year)	2,640,000	5,346,000
Estimated Daily CO2e Emissions – Total (g/day)	242,000,000	490,050,000
Annual Emissions – Total Commuters (g/year)[2]	**58,080,000,000**	**117,612,000,000**
Annual Emissions – Total Commuters (mt/year)[2]	**58,080**	**117,612**
2050 Commuting Growth Forecast – Emissions Estimates		
Estimated Number of Commuters (Waterloo-Wellington)	40,000	40,000
Estimated Daily Emissions – Total Commuters (g/day)	440,000,000	819,000,000
Annual Emissions – Total Commuters (g/year)[2]	**105,600,000,000**	**213,840,000,000**
Annual Emissions – Total Commuters (mt/year)[2]	**105,600**	**213,840**

1. Assumes 1 person per vehicle
2. Annual emissions estimates are based on vehicle travel for 5 days per week.

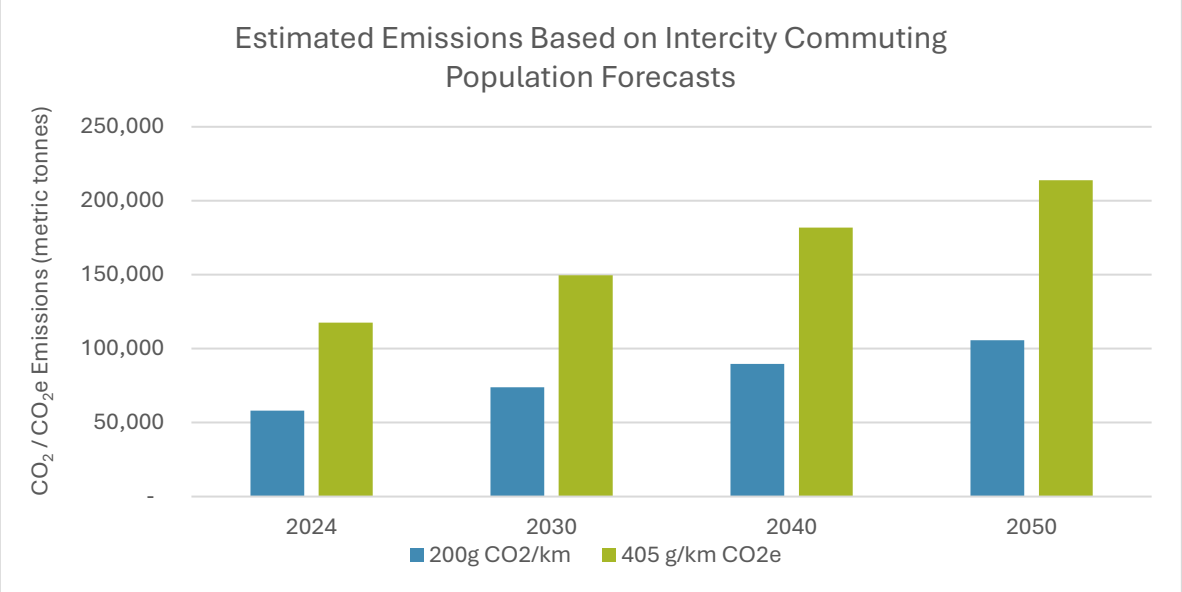


Figure 25: Estimated Emissions Based on Intercity Commuting Population Forecasts

What Happens if the Problem is Not Addressed?

Table 17 summarizes the potential risks for the Waterloo-Wellington region if the problem is not addressed.

Table 17: Summary of Potential Risks for Business-As-Usual Trends

Outcome	Impact
Transportation	The transport network will have decreased resilience and flexibility, resulting in: • Less reliable travel times • Less travel choices • Minimal network flexibility to meet growing demand
Quality of Life	An auto-dependent transport network will impact quality of life: • Increased risk of car accidents • Increased congestion, resulting in more time spent travelling to reach work and home destinations everyday. • Reduced likelihood of public transit use.
Economic Development	An auto-dependent transport network will adversely impact economic development: • Increased congestion means slower commute times, resulting in lost productivity. • Limited access to major employment hubs can result in curbed economic and urban development opportunities. • Increased congestion may deter impactful employers from choosing to locate in the region.
Environment	An auto-dependent transport network will adversely impact the environment: • Congestion and heavy auto use will lead to increased GHG emissions. • Heavy auto use will also lead to increased noise and air pollutants, which directly impact human health and environmental integrity.

Investment Options

The objective of this Initial Business Case is to explore public investment in an all-day, high-frequency, intercity bus service between the Region of Waterloo and Wellington County, providing a viable, low-carbon transport option for intercity commuters. The goal of the intercity bus service is to provide direct connections between key urban and employment centres across the Waterloo-Wellington region, thereby facilitating an increase public transit mode share, providing more affordable transportation options for commuters, reducing GHG emissions and improving local air quality, and increasing access to employment and education throughout the region.

To support the objectives of the intercity bus service (IBS), the following strategies are recommended:

- → The assessment only considers weekday services operations (Monday to Friday), to capture the majority of the intercity commuters. However, implementing weekend services should be explored at later stages of the project.
- → The intercity bus service should have minimal stops to minimize total commuting time as much as possible.
- → The assessment proposes strategic location of bus stops with efficient connections to local transit, as well as connections to major urban and employment areas between the two regions.
- → The intercity bus service will use existing public transit locations and operate curbside pickups, to minimize project costs and minimize boarding and alighting times,

Rational for IBS Route Options

Figure 26 and 27 below illustrates the commuting data obtained from the 2016 Transportation Tomorrow Survey (University of Toronto, 2019). Survey results indicate that the majority of people commuting for work and school between the two regions commute between the cities of Guelph, Kitchener, and Cambridge.

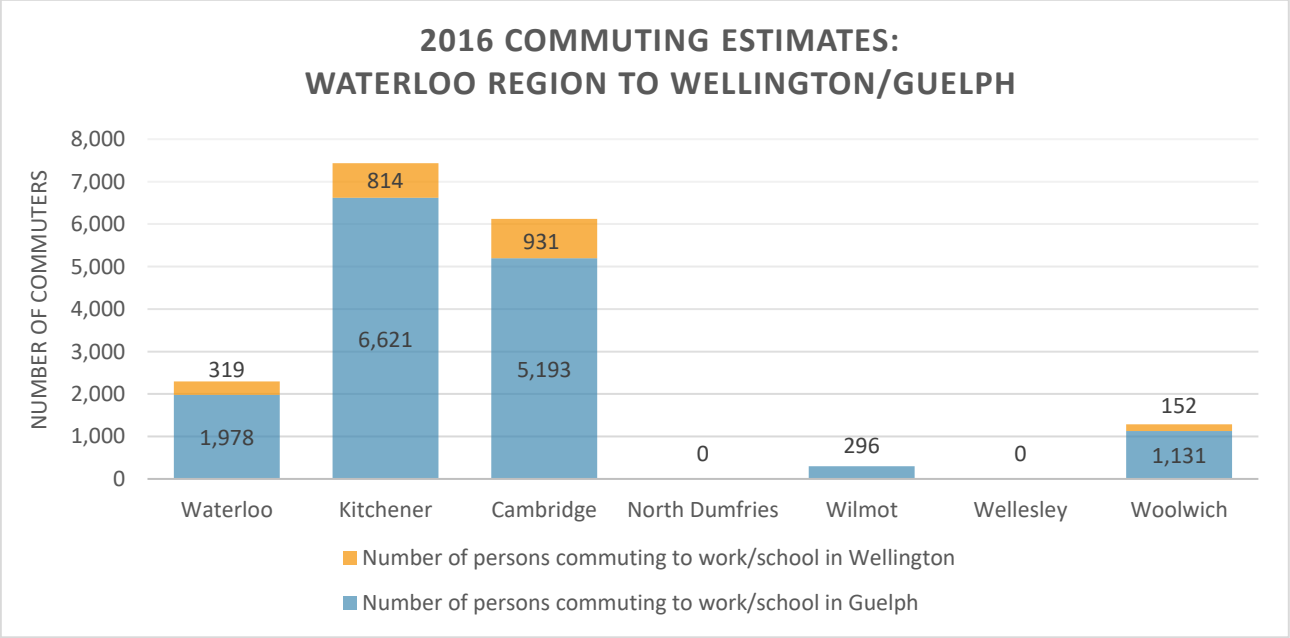


Figure 26: Intercity Commuters by Municipality, Waterloo Region to Wellington/Guelph (University of Toronto, 2019)

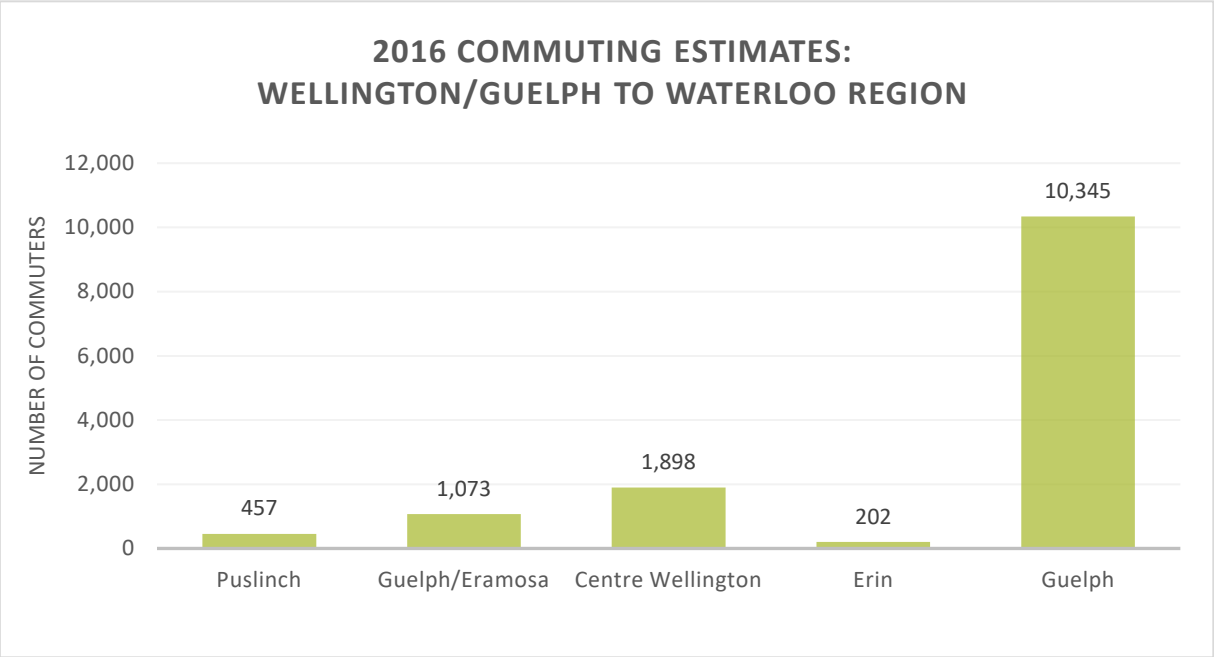


Figure 27: Intercity Commuters by Municipality, Wellington/Guelph to Waterloo Region (University of Toronto, 2019)

Primary Bus Stations

The primary bus stations are selected near major transit hubs, where transit users can utilize local transit connections to reach their final destinations. The following are proposed primary bus stop locations and rationale for each city.

- → **Kitchener** – **Central Station** is located on the ION LRT line, and this is also the location of the future Region of Waterloo Transit Hub. The bus stop is also located within the city's designated urban growth centre and major transit station area.
- → **Guelph** – the **Guelph Central Station** is the primary transit hub in the region, with majority of the transit routes starting, ending, or passing through the downtown hub and connecting to outer regions of the City and Wellington County. The station is also located within the city's designated urban growth centre and major transit station area.
- → **Cambridge** – the **Cambridge Bus Terminal** is considered the local transit hub and located within the city's designated urban growth centre and major transit station area. The ION LRT expansion into Cambridge will not begin for several years, however, it is expected to connect to the Cambridge Bus Terminal once completed.

Secondary Bus Stops

Because there are more people commuting to Guelph from Waterloo Region than vice-versa, the secondary stops have been proposed for employment areas within the Guelph region. Secondary stops are located within two significant employment areas to the northwest and southwest of Guelph municipal boundary, as shown in **Figure 28** below.

- → **North Guelph** – the northwest region of Guelph, near the intersection of Highway 7 and Highway 6, is designated as a significant employment area through Guelph's Official Plan.
- → **South Guelph** – the southwest region of Guelph, along Highway 6, is designated as a provincially significant employment zone that provides high economic output and reliable employment across the region.

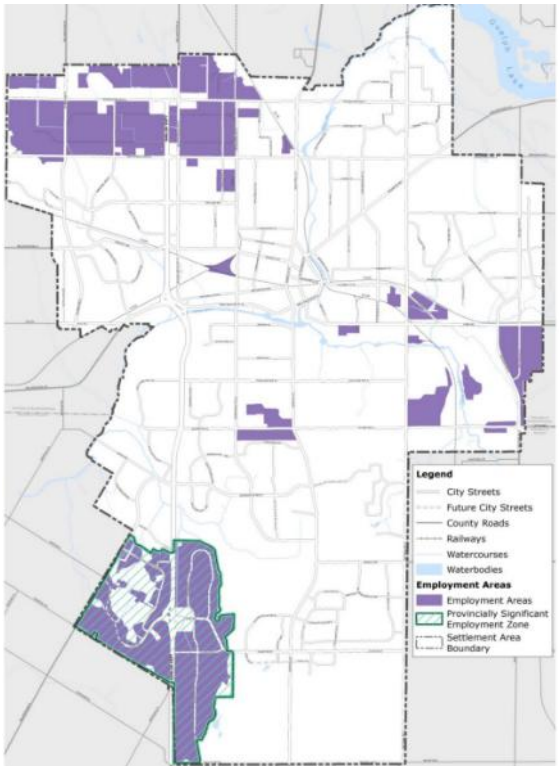


Figure 28: Guelph Major Employment Areas (City of Guelph, 2022)

Figure 29 below presents a GIS Map to illustrate the location of proposed intercity bus stations and stops in relation to Urban Growth Centres, local higher-order transit networks, regional highway networks, and provincially significant employment zones.

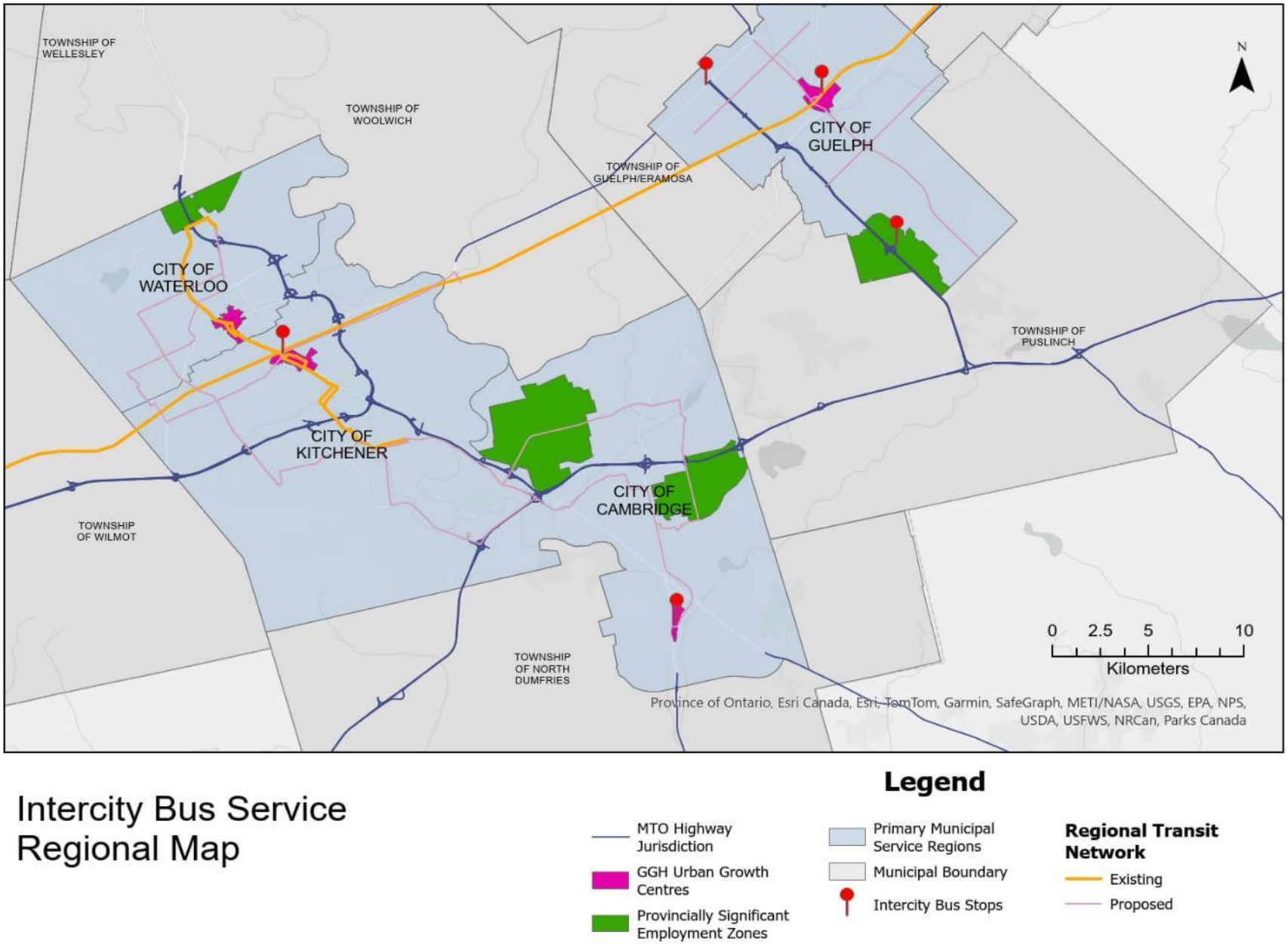


Figure 29: Bus Stations/Stops for Proposed Waterloo-Wellington Intercity Bus Service

Intercity Bus Route Options

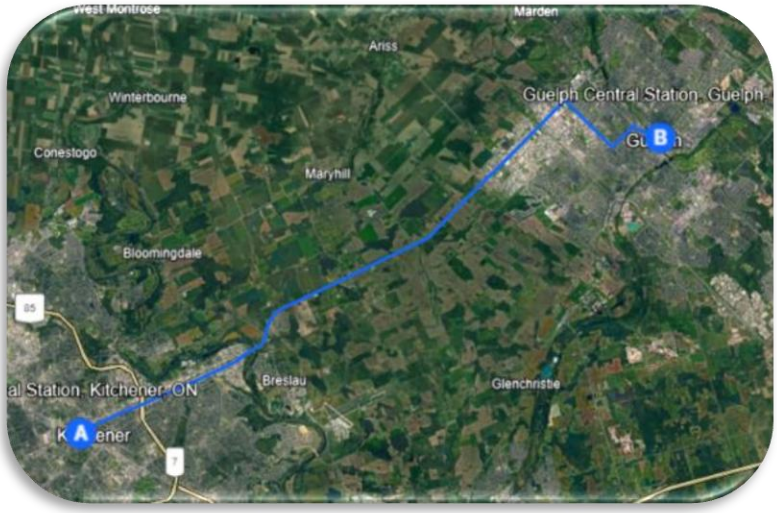
The route options presented below consist of an intercity, high-frequency bus service connecting the downtown nodes of Waterloo Region and Wellington County. The cities of Kitchener, Cambridge, and Guelph represent the largest population of commuters between the two regions and, as such, the route options will aim to connect these regions. To be considered as a viable alternative to private vehicles, all proposed Investment Options operate on a 15-minute headway during peak hour services (6AM to 10AM and 3PM to 7PM) and 30-minute headway during off-peak hours (10AM to 3PM and 7PM to 12PM).

Option 1: Kitchener – Guelph, Direct Service

Option 1 is a direct connection between downtown Kitchener and downtown Guelph, with no additional stops along the route. The route connects two provincially designated Urban Growth Centres and primarily operates along the Highway 7 corridor between the two regions.

A Central Station, Kitchener

B Guelph Central Station



Option 2: Kitchener – Guelph, Cambridge – Guelph, Direct Service

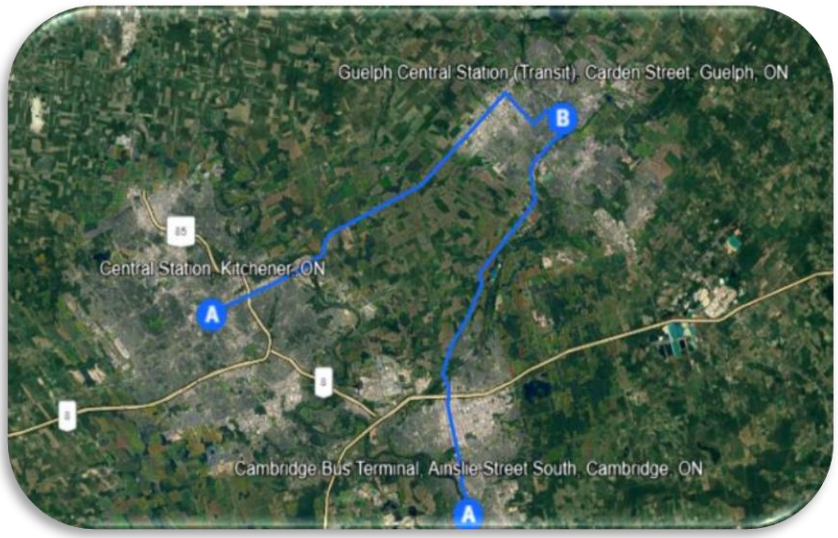
After Kitchener, Cambridge has the highest population of commuters to Guelph and Wellington County. Option 2 maintains the same direct connections between downtown Kitchener and downtown Guelph as Option 1 and adds an additional direct service between downtown Cambridge and downtown Guelph, with no additional stops along the way. The purpose of this option to overcome existing public transit gaps for residents commuting between these two cities. The route between Cambridge and Guelph is relatively the same distance as the route between Kitchener and Guelph and primarily uses a direct route along Hespeler Road and Wellington Road. However, buses can be re-routed to Highway 401 and Highway 6, depending on traffic conditions.

A Cambridge Bus Terminal

B Guelph Central Station

A Central Station, Kitchener

B Guelph Central Station



Option 3: Cambridge – Kitchener – Guelph, Two-Way Service

Option 3 proposes intercity bus services between Cambridge, Kitchener, and Guelph that operates as a loop, in **both directions**, and also includes two secondary stops at major Employment Areas within the City of Guelph, for a total of five stops. As a result, commuters in all three regions are provided with direct public transit services to primary destinations throughout the region. Although there are additional stops on the route compared to previous options, these are significant employment areas that are likely to attract more transit users over time. Additionally, Option 3 has an added benefit of providing direct connections between Cambridge and Kitchener, which currently requires transit interchanges.

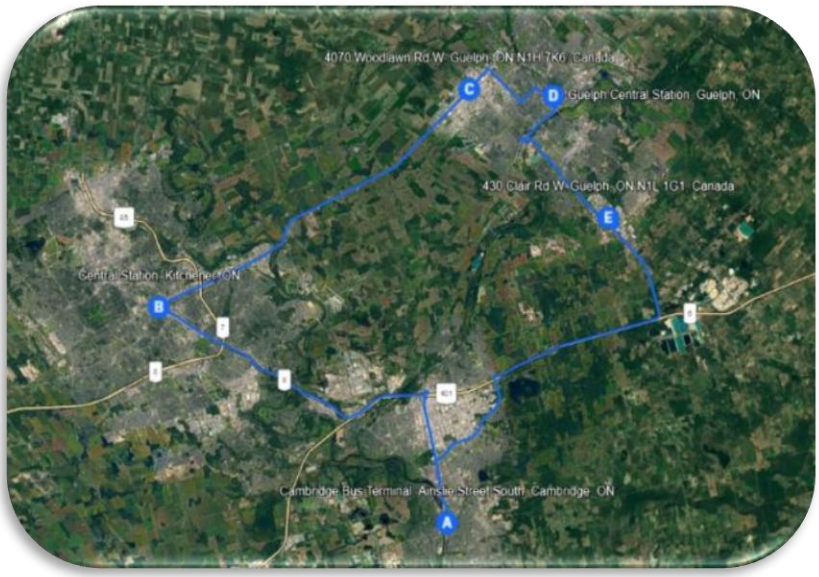
A Cambridge Bus Terminal

B Central Station, Kitchener

C Highway 7/ Highway 6

D Guelph Central Station

E Highway 6 / Laird Rd.



Investment Options Summary

Table 18 summarizes the approximate on-peak and off-peak bus operations for each investment option, including route travel time, headway, and total buses in operation. A detailed assessment of bus operation schedules for each Option is provided in **Appendix B**.

The "Total Buses in Operations" calculations were completed using the following formula:

$$N = \left(\frac{T}{h}\right)$$

Where: *N* is the number of buses necessary, *T* is the total route trip time, and *h* is the proposed headway. Because *N* must be an integer, the ratio of *T/h* is rounded up to the next whole number.

Table 18: Summary of Intercity Bus Service Operations for Proposed Investment Option

	Option 1	Option 2		Option 3
Regional Connections	Kitchener – Guelph	Kitchener – Guelph	Cambridge – Guelph	Cambridge – Kitchener – Guelph
Round Trip Travel Distance (km)	55	55	50	88
Number of Station Stops	2	2	2	3
Station Standing Time (10 min/stop)	20	20	20	30
On Peak Bus Operations (6AM to 10AM and 3PM to 7PM)				
Round Trip Time (min)	100	100	100	140
Total Route Trip Time (min)	120	120	120	170
Service Headway (min)	15	15	15	15
Total Buses in Operation	8	16		22
Off Peak Bus Operations (10AM to 3PM and 7PM to 12AM)				
Round Trip Time (min)	70	70	70	115
Station Standing Time (20 min/stop)	40	40	40	60
Total Route Trip Time (min)	110	110	110	175
Service Headway (min)	30	30	30	30
Total Buses in Operation	4	8		12

Investment Options – Operations Assessment

An IBS operations assessment was conducted for each proposed Investment Option to determine the number of buses in operation per day, total daily trips, total daily vehicle kilometers travelled (VKT), and daily passenger capacity. These figures facilitate assessments conducted for the Economic and Financial Cases in later sections.

Table 19 summarizes the daily trip estimates for the three proposed Investment Options.

- **Note 1:** One trip refers to a bus trip between primary bus stations (i.e., Kitchener, Cambridge, Guelph), and daily trips and VKT are estimated for each trip between stations.
- **Note 2:** The total distance and time of trips between Cambridge and Guelph is relatively the same as trips between Kitchener and Guelph. Therefore, bus operations analyses are also comparable.

- **Note 3:** Because the length of the morning and evening service hours for both on-peak (4 hours) and off-peak (5 hours) are the same, and would require the same bus service schedule, estimates are multiplied by two to account for both morning and evening services.

Table 19 - Daily Trip Estimates for Investment Options

	Option 1	Option 2		Option 3
	Kitchener – Guelph	Kitchener – Guelph	Cambridge – Guelph	Cambridge – Kitchener - Guelph
Trip Distance (km): Kitchener – Guelph	27	27		27
Trip Distance (km): Guelph – Cambridge			25*	35*
Trip Distance (km): Cambridge – Kitchener				26
Total Route Distance (km)	**55**	**55**	**50**	**88**
Number of Primary Station Stops	2	2	2	3
Number of Secondary Stops	0	0	0	2
On Peak Bus Operations (6AM to 10AM and 3PM to 7PM)				
Total Buses in Operation	8	8	8	22
Total Daily On-Peak Trips (AM/PM)	52	52	52	160
Total Daily On-Peak VKT (km)	1,404 km	1,404 km	1,300 km	4,680 km
Daily On-Peak Passenger Capacity (55 pass/bus)	2,860	2,860	2,860	8,800
Off Peak Bus Operations (10AM to 3PM and 7PM to 12AM)				
Total Buses in Operation	4	4	4	12
Total Daily Off-Peak Trips (AM/PM)	36	36	36	108
Total Daily Off-Peak VKT (km)	972	972	900	3,168
Daily Off-Peak Passenger Capacity (55 pass/bus)	1980	1980	1,980	5,940
Daily Bus Operations (6AM to 12AM)				
Total Daily Trips	88	176		268
Total Daily VKT (km)	2,376	4,576		7,848
Annual VKT (km)	570,240	1,098,240		1,883,520
Total Daily Passenger Capacity	4,840	9,680		14,740
Annual Passenger Capacity	**1,161,600**	**2,323,200**		**3,537,600**
Average Annual Passenger Load (75%)	871,200	1,742,400		2,653,200

* The difference in trip distance for Guelph-Cambridge is due to the route used: Option 2 takes a direct route via Hespeler Road and Wellington Road, while Option 3 operates along Highway 401 and Highway 6.

Strategic Case

The Strategic Case is the foundation of the Initial Business Case (IBC) and summarizes how the proposed investment, in this case a frequent intercity bus service, would support the provincial and regional strategic goals and outcomes for transportation and economic development. A more comprehensive review of assessments conducted for the Strategic Case can be found in the complete Initial Business Case (**APPENDIX B).**

The proposed investment should support the realization of key transportation and environmental policies. **Table 20** illustrates how the proposed investment of intercity bus services (IBS) aligns with provincial, regional, and local transportation planning policies and goals.

Table 20: Transportation Policy Alignment with Proposed Investment in IBS

Agency	Policy / Plan	Increase/ Improve Intercity Mobility Options	Reduce Transport Sector GHG Emissions	Reduced Private Vehicle Dependency and Traffic Congestion	Increase Public Transit Mode Share
Ministry of Municipal Affairs and Housing	Provincial Policy Statement (PPS 2020)	✓	✓	✓	✓
	Growth Plan for the Greater Golden Horseshoe (2020)	✓	✓	✓	✓
Ministry of Transportation	Transportation Plan for the Greater Golden Horseshoe (2022)	✓	✓	✓	
	Metrolinx - 2041 Regional Transportation Plan, 2018	✓			✓
Waterloo Region	Waterloo Region TMP, 2018			✓	✓
	TDM Program Plan 2017-2021	✓	✓	✓	
	Transit Strategy Report (2018)	✓			✓
Wellington County	Official Plan, 2019 Update	✓	✓	✓	
City of Waterloo	Transportation Master Plan, 2020 Update		✓	✓	✓
	Waterloo Official Plan, 2024 Update		✓	✓	✓
City of Kitchener	Kitchener Official Plan, 2024 Update		✓	✓	✓
City of Cambridge	Transportation Master Plan, 2020		✓	✓	✓
	Cambridge Official Plan	✓			✓
City of Guelph	Guelph Official Plan (2022)	✓		✓	✓
	Transportation Master Plan (2022)	✓			✓

Intercity Bus Service Stops

The primary IBS station stops are located within provincially designated urban growth centres (UGCs) and major transit station areas (MTSAs), where development plans for population and employment density, as well as investment in public transit services are highest (MMAH, 2020). This significantly increases accessibility for transit users and allows for easy transition to and from local transit networks. **Table 21** below summarizes the UGC and MTSA growth policies, as well as the local transit connections and major destinations accessible to passengers at each primary bus stop.

Secondary IBS stops are located in Guelph, near the Northwest Industrial Park and the Hanlon Creek Business Park, which are major employment zones, and potentially attract a large number of daily commuters from the Waterloo Region.

Table 21: Summary of IBS User Accessibility Options at Primary Stations

	Kitchener – Central Station	Cambridge Bus Terminal	Guelph Central GO Station
Urban Growth Centre Policies	200 residents and jobs combined per hectare by 2031.	150 residents and jobs combined per hectare by 2031	150 residents and jobs combined per hectare by 2031
Major Transit Station Area Policies	160 residents and jobs combined per hectare.	150 residents and jobs combined per hectare.	150 residents and jobs combined per hectare.
Local Transit Services	Grand River Transit ION Light Rail	Grand River Transit ION Bus	Guelph Transit
City/Town Connections	Kitchener, Waterloo, Cambridge, Elmira, St. Jacobs, and Wilmot	Kitchener, Waterloo, Cambridge, Elmira, St. Jacobs, and Wilmot	City of Guelph, Guelph-Eramosa, and Puslinch
Transit Connections – Direct Routes	6 – GRT Bus Routes GO Bus (Planned) GO Rail (Planned)	8 – GRT Bus Routes	13 – Guelph Transit Routes 3 – GO Bus 1 – GO Rail
Transit Connections – Secondary Routes	18 – LRT Stations 29 – GRT Bus Routes 3 – GO Bus 1 GO Rail	19 – LRT Station 24 – GRT Routes 2 – GO Bus	13 Guelph Transit Routes
Transit Fleet & Network Size	250 buses – 2,500 stops 50 Routes ION LRT – 17 km	250 buses – 2,500 stops 50 Routes ION LRT – 17 km	62 buses 35 Routes
Major Destinations	▪ Conestoga Mall ▪ Fairview Park Mall ▪ Grand River Hospital ▪ University of Waterloo ▪ Wilfred Laurier University ▪ Conestoga College ▪ Waterloo Public Square ▪ Downtown Kitchener ▪ Kitchener City Hall ▪ Market Square ▪ Concordia Club	▪ Conestoga College Cambridge ▪ Conestoga College Doon ▪ Cambridge Memorial Hospital ▪ Cambridge SmartCentre ▪ Sportsworld ▪ Downtown Cambridge ▪ Fairview Park Mall ▪ Waterloo Region International Airport	▪ University of Guelph ▪ Hanlon Industrial Park ▪ Northwest Industrial Park ▪ Guelph General Hospital ▪ Downtown Guelph ▪ Guelph SmartCentre
Planned Upgrades	New Waterloo Region Transit Hub		Expansion of Guelph Central Station, GO Rail track upgrades, and new two-story building

Strategic Benefits of the Waterloo-Wellington Intercity Bus Service Investment

Provincial and regional transportation policies can be organized into broad policy themes to support the strategic benefits of the proposed intercity bus service investment between Waterloo Region and Wellington County. **Table 22** below uses Benefits and Performance measures defined by Metrolinx to identify the potential strategic benefits for the proposed investment (Metrolinx, 2021b).

Table 22: Summary of Potential Strategic Benefits for Proposed Investment in Intercity Bus Service

Policy Theme	Definition		Benefit	Description of Benefit	Performance Measures
Transportation	Increasing efficiency, effectiveness, and resilience of the transportation system.	**1**	Increasing Transit Ridership	Provide a viable alternative option to private vehicles, thereby promoting increased ridership and reduced congestion in the region.	Transit ridership New Transit Users
		2	Improved Network Connectivity	The intercity bus service will provide critical connections to major transit hubs with multimodal connections that can be used to access various parts of the region.	Number of multimodal connections on the network. Number of terminals served by two or more modes.
Quality of Life	Making it easier for people to access the region with safe and convenient services.	**3**	Promoting Transit Equity	Intercity bus will provide new, integrated transit services that will open up accessibility to employment and education opportunities for marginalized communities that do not have access to a vehicle.	Transit accessibility for marginalized communities. Access to jobs for low-income persons.
Economic Prosperity	Fostering economic development by reducing commute times, connecting businesses, and supporting investment.	**4**	Connecting Commuters to Jobs	Improved public transit options through a new, reliable service that connects major economic and employment centres, leading to more people able to access jobs.	Change in travel time for commuters on transit. Number of jobs within accessible distance of transit stops.
		5	Employment Creation and Economic Impact	A high-frequency, cross-boundary transit service will help to catalyze economic development between the two regions through increased connectivity.	Model estimates of jobs and GDP impacts from investment
Environmental Benefits	Supporting sustainability by reducing the environmental impact of travel.	**6**	Reduced GHG Emissions	The intercity bus service will reduce the environmental impact currently caused by private vehicle dependency by promoting a modal shift away from cars to public transit.	Estimating changes in GHG or CO_2 emissions.

Economic Case

The Economic Case considers the overall costs and benefits to individuals and society that would be delivered through the proposed transportation investment. For this study, the Economic Case explores, at a high-level, the potential benefits of individual journey time and cost savings, greenhouse gas emissions cost savings, as well as the overall benefits to society for pursuing each investment option. A more comprehensive review of assessments conducted for the Economic Case, including Generalized Journey Cost assessment, environmental and social cost estimates, and external impact assessment, can be found in the complete Initial Business Case (**APPENDIX B).**

Generalized Journey Cost

Individuals typically decide how to travel based on their perception of the cost and time associated with doing so. For example, 20 minutes spent standing in a crowded bus will be perceived to take significantly longer than the same travel time completed in a less crowded vehicle. Since travel time typically represents the largest element of the "cost" of a journey, this "time" may be defined in terms of "generalized journey cost," with time (such as wait time and walk time) converted into a financial cost equivalent to using values-of-time (Metrolinx, 2021b).

For this Initial Business Case, a generalized journey cost (GJC) approach was used to estimate the total trip cost associated with current auto and public transit options under the BAU scenario and compared with the proposed investment options.

Assumptions

A series of assumptions were used to develop a generalized journey cost assessment for existing and proposed transportation options. The following are general assumptions used to conduct the high-level assessment of user costs and benefits:

1. Major transit stations were used as the origin and destination locations to estimate GJC for both auto and transit trips between each city-pair.
2. The generalized journey cost for existing public transit users and proposed investment options does not include the journey costs required to reach the origin stop (access time) and the time from the destination stations to the final workplace (egress time).
3. The values used to conduct the Generalized Journey Cost assessment are drawn from the Metrolinx Business Case Manual, Volume 2 (Metrolinx, 2021b), and are listed in **Table 23** below. While vehicle operating costs were also obtained from the Metrolinx Manual, these values were originally sourced from the Canadian Automobile Association (CAA).
4. The Reliability Ratio of 1.76 typically applied in Metrolinx Business Case assessments is not used in this assessment since the Waterloo/Wellington Region is relatively small and does not experience severe traffic congestion and delays that is prevalent in large urban areas of the GTHA.

Table 23: Values for Generalized Journey Cost Assessment (Metrolinx, 2021b)

Factor	Description	Assumption
Valuing User Impacts		
Value of Time (VOT)	Factor used to monetize changes in generalized time to determine the overall welfare benefit to transport network users.	$18.79
Travel Time Perception By Mode		
Auto and Bus In-Vehicle Time (IVT)	Weighting for time spent in-vehicle for both private vehicle and public transit trips.	1.0
GO Rail/LRT IVT	Weighting for time spent on GO Rail is typically faster and more convenient than other modes. Same weighting used for LRT.	0.85
Drive Access/Egress IVT	Weighting for access/egress time only.	2.48
Transit Inconvenience Factors		
Walk Time	Weighting for time spent walking to reach next transit connections.	2.0
Wait Time	Weighting for time spent waiting for transit connections.	2.5
Interchange Penalty	Weighting for number of transit connection interchanges.	5
Vehicle Operating Costs		
Fuel Consumption Costs	Estimated fuel consumption cost per km, sourced from the CAA.	$0.12 per km
Vehicle Maintenance Costs	Estimated maintenance cost per km, derived from the CAA.	$0.05/km
Vehicle Tire Costs	Estimated tire cost per km, derived from the CAA.	$0.02/km
Unperceived Auto Operating Costs	Marginal costs related to owning and using a vehicle that are not factored into day-to-day trip choices. Derived from the CAA.	$0.10/km
Transit User Costs		
GO Transit Fares	The GO Transit fares are obtained through the Metrolinx website.	Adult – PRESTO Rate
Local Transit Fare	Local transit fares are obtained through the Grand River Transit (EasyGO Fare Card) and Guelph Transit websites.	$3.00 GRT Transit $3.25 Guelph Transit
Note: All Assumption Values are obtained from the Metrolinx Business Case Manual, Volume 2 (Metrolinx, 2021b), with the exception of Local Transit Fares.		

GJC Calculation for Auto Users

The assessment considers the journey cost for auto users during on-peak travel times and uses the maximum time based on peak traffic delays. The distance between downtown Kitchener or Cambridge, to downtown Guelph is relatively the same at approximately 25 km, and it is assumed that travel times would be similar for commuters between the three cities. **Figure 30** illustrates the steps used to calculate the GJC estimates for auto users.

Step 1: $$Journey\ Travel\ Costs = \frac{Auto\ Travel\ Time\ (\text{min}) + Access\ \&\ Egress\ Time\ (\text{min})}{60\ minutes} \times VOT$$

Step 2: $$Total\ Out\ of\ Pocket\ Costs = Auto\ Distance\ (km) \times Auto\ Cost\ (\$)$$

Step 3: $$Generalized\ Journey\ Costs = Journey\ Travel\ Costs + Out\ of\ Pocket\ Costs$$

Example: Auto User commuting from Kitchener GO to Guelph GO

Step 1: $$Journey\ Travel\ Costs = \frac{50 + 2.48}{60} \times \$18.79 = \$16$$

Step 2: $$Total\ Out\ of\ pocket\ Costs = 25 \times 0.30 = \$7.50$$

Step 3: $$Generalized\ Journey\ Costs = \$16 + \$7.50 = \$24$$

Figure 30: Auto User GJC Calculation Steps

GJC Calculation for Transit Users

Generalized Journey Cost assessments for public transit users attempt to place a value on the inconvenience for the waiting and walking times between transit connections. The GJC estimates were calculated by multiplying transit in-vehicle time (IVT) and other components of the journey by the travel time perception factors. **Figure 31** illustrates the steps used to calculate the GJC estimates for transit users.

Step 1: $$Journey\ Travel\ Time = GO\ Rail\ LRT\ IVT\ (0.85) + Bus\ IVT\ (1.0) + Number\ of\ Interchanges\ (5) + Wait\ Time\ (2.5) + Walk\ Time(2.0)$$

Step 2: $$Journey\ Travel\ Cost = \frac{Journey\ Travel\ Time\ (minutes)}{60\ minutes} \times VOT$$

Step 3: $$Out\ of\ Pock\ Costs = GO\ Fare + Local\ Transit\ Fare$$

Step 4: $$Generalized\ Journey\ Cost = Journey\ Travel\ Cost + Out\ of\ Pocket\ Costs$$

Example: Transit User commuting from Guelph GO Station to Cambridge Bus Terminal

Step 1: $$Journey\ Travel\ Time = 0(0.85) + 63\ (1.0) + 2\ (5) + 40(2.5) + 0(2.0)$$
$$= 0 + 63 + 10 + 100 + 0 = 173\ minutes$$

Step 2: $$Journey\ Travel\ Cost = \left(\frac{173\ minutes}{60\ minutes}\right) \times \$18.79 = \$54$$

Step 3: $$Out\ of\ Pock\ Costs = \$10.50 + \$3 = \$13.50$$

Step 4: $$Generalized\ Journey\ Cost = \$54 + \$13.50 = \$68$$

Figure 31: Transit User GJC Calculation Steps

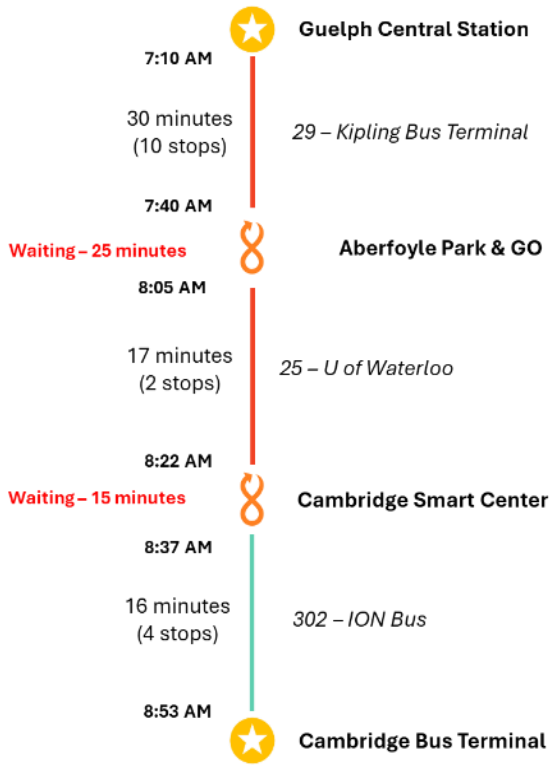


Figure 32: Diagram of Peak Morning Transit Trip from Guelph to Cambridge

Figure 32 illustrates the transit route and time used for calculating the GJC for morning commuters from Guelph to Cambridge.

Figure 33 presents the results of the GJC assessment for existing auto and transit users for each origin-destination (O-D) pair.

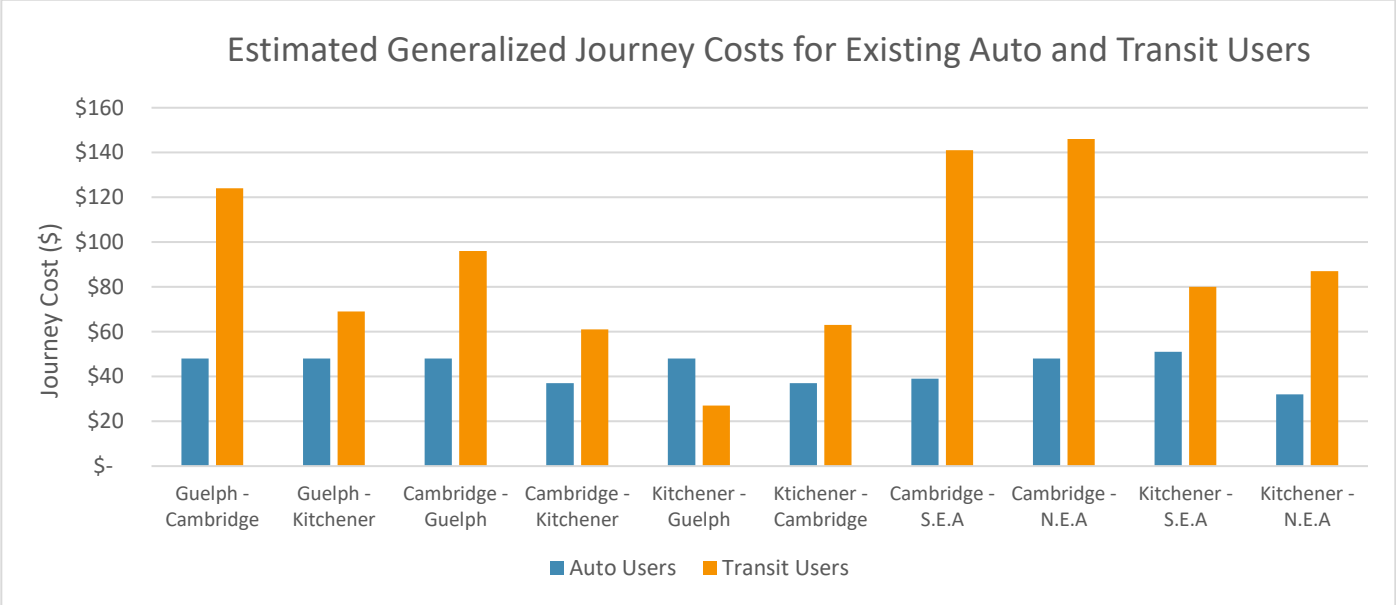


Figure 33: Summary of GJC Assessment for Existing Auto and Transit Users

IBS Investment Options – GJC Assessment

The Generalized Journey Cost estimates for each of the proposed intercity bus transit investment options are based on a 15-minute headway during morning peak hours. In order to represent a viable alternative to private vehicle travel, the new intercity bus service should cost equal to or less than $48 for daily trips between the three cities. Additionally, the cost should be competitive to GO Transit services, while also considering the added cost for providing a comfortable and convenient transit option for commuters. Therefore, a flat rate of $5 per trip is estimated for the out-of-pocket cost of the intercity bus service.

Table 24 presents an example of the GJC assessment conducted for Option 1, and similar assessments were applied for Options 2 and 3.

Table 24 - Option 1 Peak-Morning GJC Assessment Results

From:	WR Transit Hub		Cambridge Bus Terminal		Guelph Central GO	
To:	Guelph GO	CBT	WR-Hub	Guelph GO	WR-Hub	CBT
LRT IVT Weight (0.85)		18	20	20		18
IBS IVT Weight (1.0)	50			50	50	50
Bus IVT Weight (1.0)		33	35	35		33
Interchange Penalty (5.0)		5	5	10		10
Wait Time Weight (2.5)	12.5	12.5	25	25	12.5	37.5
Walk Time Weight (2.0)						
Total Journey Time (min)	62.5	68	85	140	63	148
Journey Travel Cost ($)	$20	$21	$26	$44	$20	$46
IBS Fare per Trip ($)	$5			$5	$5	$5
Local Transit Fare per Trip ($)		$3	$3	$3		$3
Total Out-of-Pocket Costs ($)	$5	$3	$3	$8	$5	$8
Generalized Journey Cost (One-Way)	$25	$24	$29	$52	$25	$54
Daily Generalized Journey Costs	$49	$49	$59	$103	$49	$109

Additionally, GJC estimates were also evaluated for the North Employment Area (N.E.A.) and South Employment Area (S.E.A.) in Guelph. **Figure 34** summarizes the GJC results for the Proposed IBS Investment Options.

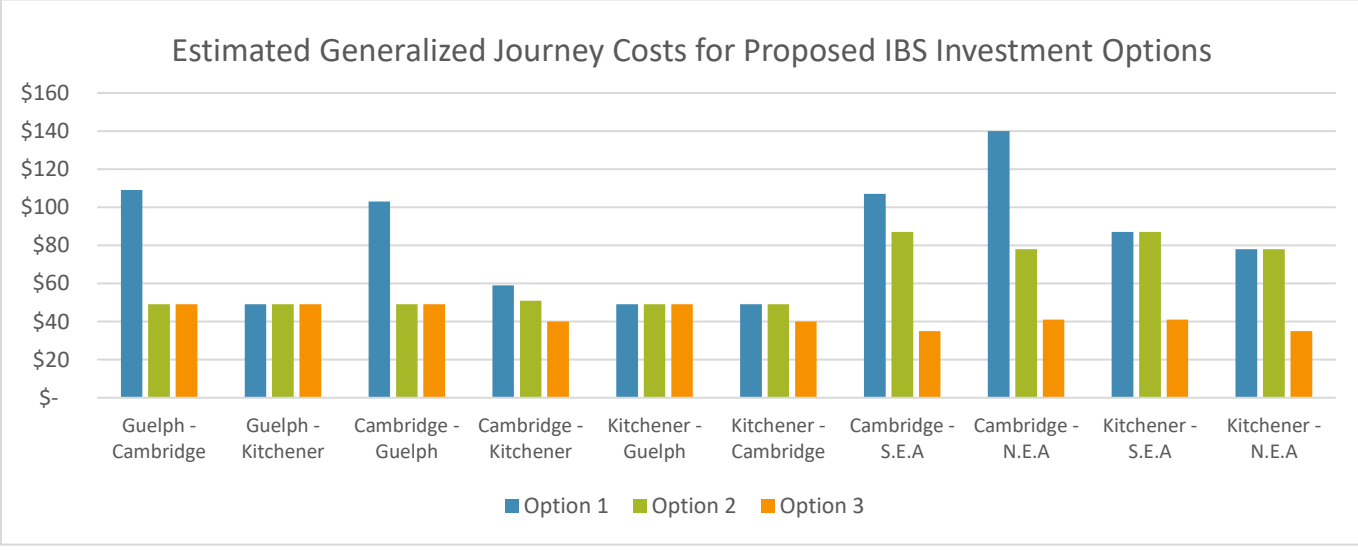


Figure 34 - Estimated GJC Results for Proposed IBS Investment Options

Summary of Generalized Journey Cost Assessment

The Figures below illustrate the results of the Generalized Journey Cost Assessment. **Figure 35** compares the peak-morning weighted journey times and **Figure 36** compares the daily journey costs for existing auto and transit users, and proposed investment Options. Lastly, **Table 25** presents a summary of the Generalized Journey Cost Assessment and results. Based on these estimates, Option2 and Option 3 have the potential to deliver greater transit service benefits due to faster journey times connecting major urban nodes and employment areas between the two regions, which in turn has the potential to attract new transit users.

The in-vehicle travel time for both auto users and the IBS services is assumed to be the same since they use the same road network. However, IBS users would typically require additional travel time to reach their final destinations. Although the IBS service would not result in time and cost savings for existing auto users, it has the potential to provide a viable alternative for daily intercity commuters.

Transit service times can be further reduced by using high-occupancy vehicle (HOV) lanes to avoid traffic congestion and delays. Implementing HOV lanes or dedicated bus lanes along Highway 6 and the new Highway 7 routes can help to further improve travel times, giving public transit a competitive advantage over private vehicle travel. As a result, the reduced travel times compared to private vehicles can potentially generate modal shifts from auto to public transit for intercity commuters.

It is important to note that these estimates do not consider the additional time and cost it would take for transit users to reach the IBS stations before and after their trip, which can increase the overall GJC estimate for transit users. Alternatively, multiple factors can also play a role in making IBS more attractive over cars such as increased comfort and reliability of the transit service, discounted transit fees subsidized by major employers that benefit from the added service and increasing traffic congestion and delays for drivers due to regional population and employment growth.

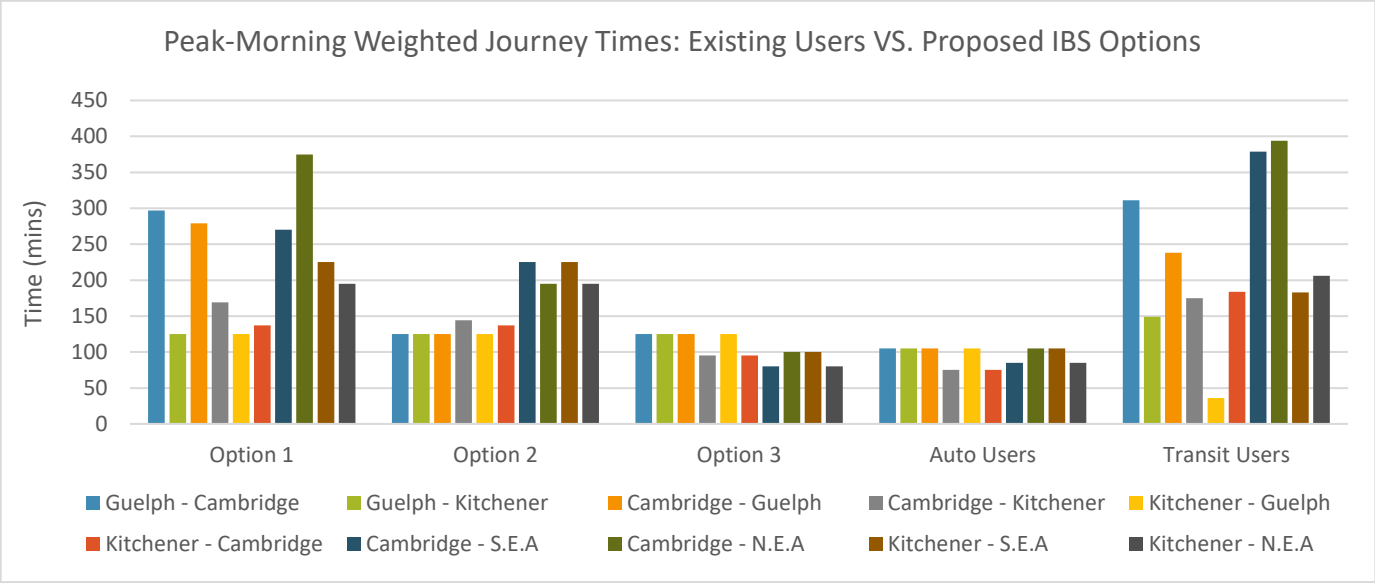


Figure 35: Peak-Morning Weighted Journey Times: Existing Users VS. Proposed IBS Options

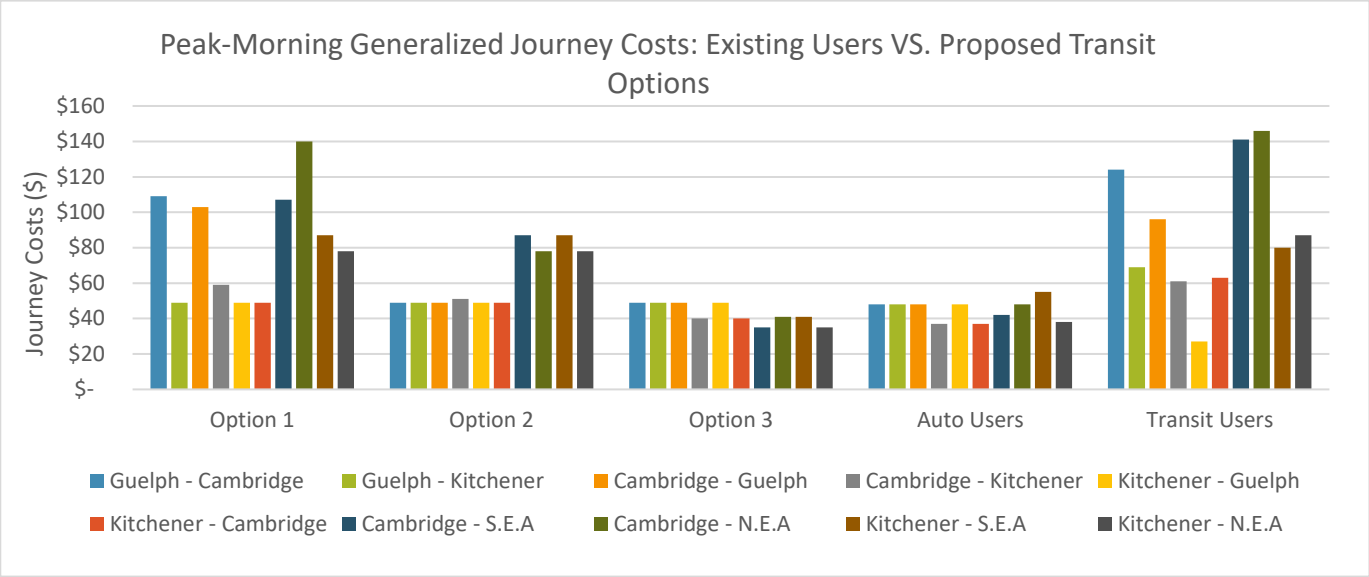


Figure 36: Peak-Morning Generalized Journey Costs: Existing Users VS. Proposed IBS Options

Table 25: Summary of Generalized Journey Cost Assessment Results

Business-As-Usual	
Existing Auto Users	The approximate distance between Kitchener or Cambridge to downtown Guelph is relatively the same, therefore the GJC for auto users was estimated to be $24 for a one-way trip and $48 for daily trips. The commute distance between Kitchener and Cambridge is shorter and estimated to cost $37 for daily trips. The GJC for commuting between Waterloo Region and major employment areas in Guelph can vary due to differences in distance and preferred routes taken for the journey.
Existing Transit Users	GO Rail transit users can benefit from competitive travel time savings, but are limited to Kitchener residents commuting to Guelph in the morning and returning in the evening during peak hour services. All other O-D pairs have limited public transit options and face many barriers, making existing intercity public transit services an inviable option for daily commuting needs.
Intercity Bus Service Investment Options	
Option 1	Residents commuting between Kitchener and Guelph can potentially achieve a comparable journey cost to private vehicle travel. However, transit users commuting between Cambridge and Guelph will only achieve a marginal improvement to journey times, and continue to face barriers.
Option 2	Option 2 has potential to generate significant improvement in journey time and costs between Kitchener and Guelph, and Cambridge and Guelph. However, transit connections between Cambridge and Kitchener will continue to face barriers.
Option 3	Option 3 generates journey time/cost savings between all O-D pairs, including improved connections between Cambridge and Kitchener. This can improve accessibility for Cambridge residents to major employers and institutions in Kitchener and Waterloo, as well as connections to GO Rail services at the new Waterloo Region Transit Hub. Option 3 also has the potential to generate journey time cost savings for commuters due to additional stops at major employment areas in Guelph.

Journey Cost Savings – Options Analysis

The results of the Journey Cost Savings for on-peak period commutes are summarized below. While the goal of the intercity bus service is to provide a viable alternative to private vehicles, it can be difficult to implement on-road transit services that offer a similar or greater convenience than auto travel. However, it is important to note that perceived transit travel time and costs can vary significantly depending on travel conditions and user preferences. For example, commuters may prefer a high-quality transit option even if it takes longer than driving since they can work or rest during their commute (Litman, Evaluating Public Transit Benefits and Costs, 2024).

Figure 37 summarizes potential annual journey cost savings for existing transit users for each O-D pair and **Figure 38** illustrates total annual savings for all O-D (auto and transit) pairs for the proposed investment Options as well as potential savings based on total daily trips for each Option (shown in log scale).

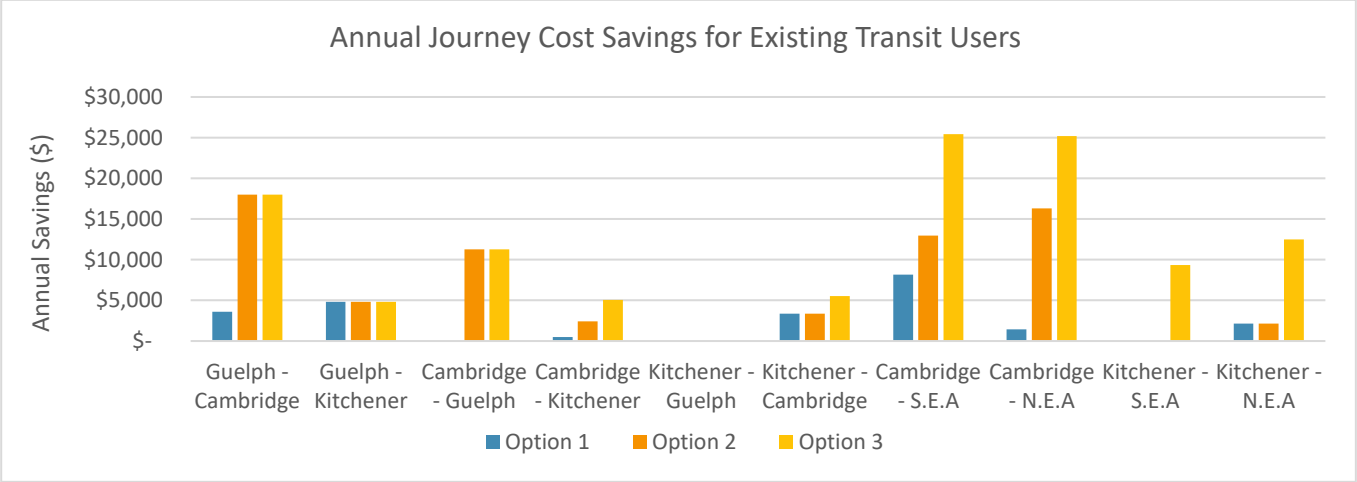


Figure 38: Estimated Annual Journey Cost Savings for Existing Transit Users

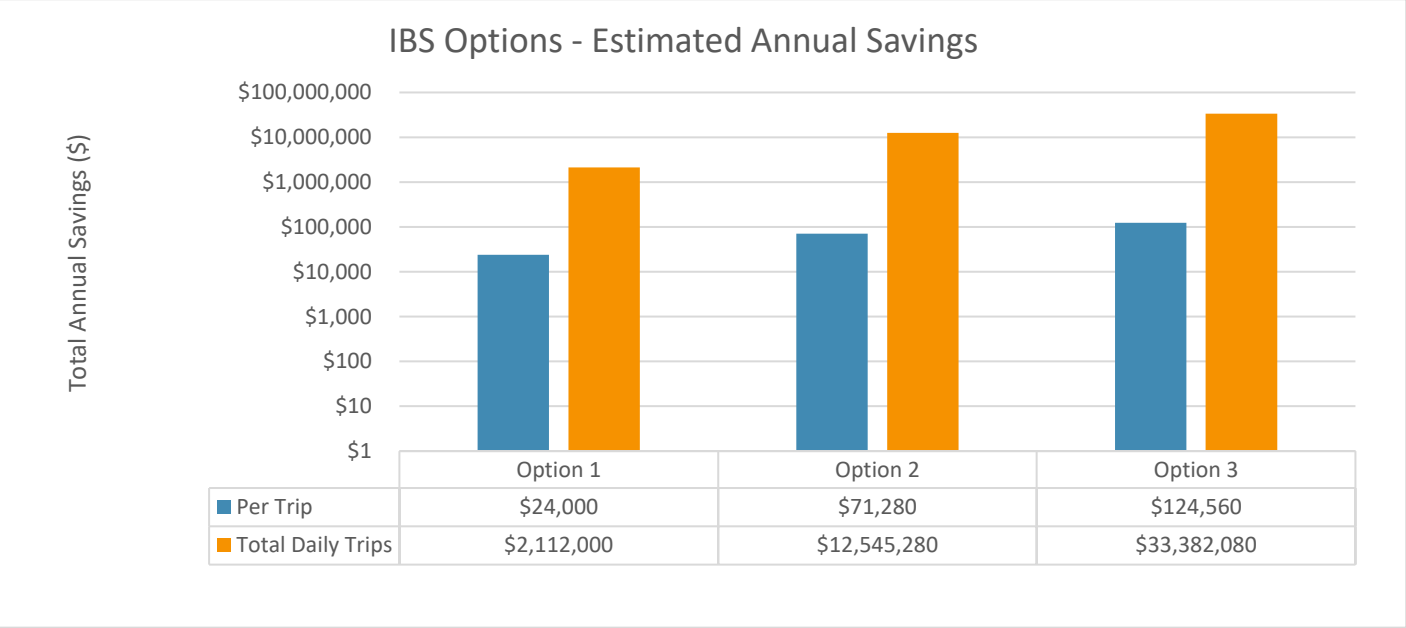


Figure 37: Summary of Total Annual Savings for IBS Investment Options

Economic Case – Investment Options Summary

Table 26 summarises the types of impact assessments conducted and is followed by **Table 27** which presents a comparison of the outcomes for each investment option. Details of assessments conducted for the Economic Case can be found in the complete Initial Business Case in **Appendix B**.

Table 26: Summary of Economic Case Assessment

User Benefits	All three proposed investment options have the potential to reduce journey time and costs for existing transit users, resulting in considerable annual cost savings and economic benefits for the two regions. For auto users, Option 3 has potential to provide a viable alternative for commuters between Waterloo Region and major employment areas in north/south Guelph. Option 3 has the greatest annual journey cost savings for commuters between all three cities and major employment areas in Guelph.
Environmental Costs	Environmental costs of the proposed investment Options increase based on the number of vehicles operating on a daily basis. However, GHG emissions and related costs are negligible when compared to daily auto travel. As a result, the investment Options can help to reduce current environmental and social costs of carbon emissions imposed on society. It is estimated that a modal shift of 2,500 daily passengers from auto travel to intercity transit services can reduce GHG emissions and subsequently save millions of dollars in GHG emissions related environmental and social costs.
Net Benefit	While higher journey cost savings are a positive impact, emissions costs, although lower than auto travel, are viewed as a negative impact, especially when compared to zero-emission vehicles. The net benefit is estimated by adding the positive impact costs and subtracting the negative impact costs. All three Options generate considerable net benefits; however, Option 3 offers the greatest journey cost savings for most of the O-D pairs.
External Impacts	It was found that transportation services that connect major employment areas can contribute to positive economic and land use development impacts. Option 1 and 2 primarily connect urban growth centres, which represent higher densities of residential and employment per hectare and have the potential to contribute to improving connections to major employers between the regions. However, Option 3 includes additional stops near major employment areas and is thus considered to have the greatest impact on facilitating land use efficiencies and agglomeration benefits.
Societal Benefits	With regards to potential societal benefits, Option 1 mainly benefits commuters between Kitchener and Guelph, while Option 2, benefits commuters between Kitchener and Guelph, and Cambridge and Guelph. Option 3 presents the greatest societal benefits as it connects all three cities, including Kitchener and Cambridge, as well as connections to significant employment areas, which can lead to economic and environmental benefits for individuals and cities as a whole.

Table 27: Economic Case Evaluation Results

Impact Category	Description	Option 1	Option 2	Option 3
User Impacts				
Generalized Journey Cost	Average journey cost for proposed transit investment option.	$83	$63	$43
Auto Users – Annual Journey Cost Savings	Changes in existing auto users' travel time costs.	$0	$0	$1,993,920
Transit Users – Annual Journey Cost Savings	Changes in existing transit users' travel time costs.	$2,112,000	$12,545,280	$31,388,160
Environmental Costs				
Annual CO2 Emissions (mt/year)	Estimated metric tonnes of CO_2 emissions per year.	592.5	1,141	1,957
Annual Emissions Costs	Estimated environmental cost of carbon emissions per year ($0.06/vehicle-km).	$34,200	$66,000	$113,000
Annual Social Cost of Carbon (SCC)	Estimated social cost of CO_2 and NOx emissions (2025).	$224,000	$431,000	$740,000
Net Benefits	Sum of positive and negative impact costs.	$ 1,853,800	$ 12,048,280	$ 30,529,080
External Impacts				
Agglomeration Benefits	Productivity gains due to more clustered, accessible land use patterns.	✓	✓	✓✓
Land Use Objectives	Supports land use objectives such as TOD, clustering, accessibility, and mixed land use.	✓	✓	✓✓
Societal Benefits				
Direct User Benefits	Direct benefits to users from increased mobility.	✓	✓✓	✓✓✓
Equity Benefits	Improvements to mobility that supports those who are economically, socially, or physically disadvantaged to be relatively better off.	✓	✓✓	✓✓✓
Option Value	Value of having mobility options available in case they are needed.	✓	✓✓	✓✓✓
Productivity	Increased individual productivity from improved access to education and jobs.	✓	✓✓	✓✓✓
Environmental Quality	Reduced energy consumption, and air, water, and noise pollution.	✓	✓✓	✓✓✓

Financial Case

The Financial Case focuses on the financial resources required to implement the proposed investment. Metrolinx Business Cases typically conduct financial models to determine year over year change in revenue and expenditure over the lifecycle of the investment. However, this IBC conducts a high-level financial assessment to determine annual operating and maintenance costs. The following is a brief summary of the financial assessments conducted for the study, and a more comprehensive review of the assessments can be found in the complete Initial Business Case **(APPENDIX B).**

Table 28 presents the assumptions that are used for the financial case assessments drawn from the Metrolinx Business Case Guidance, Volume 2 (Metrolinx, 2021b).

Table 28: Assumptions Used for Financial Case Assessments

Parameter	Description	Value
Financing Costs	For fiscal year 2016/17 and beyond – rate for any capital costs paid for by the Province of Ontario.	5.78%
Labour Benefits	Estimated salaries should include an uplift of 25% to account for employee benefits costs.	25% of salaries
Evaluation Period	5 to 60 years – depending on investment lifecycle/impacts	15 years

Financial Case – Investment Options Summary

The Financial Case assessed the financial requirements to successfully deliver the proposed transit investment options and included estimates of capital costs, operating and maintenance costs, and labour costs. The goal of the Financial Case is to communicate the overall financial impact of the investment.

Table 29 below summarizes the estimated annual operating costs for each of the proposed options and per passenger rate required to recover operating costs. As anticipated, Option 1 requires the lowest annual operating costs due to its limited service and route coverage compared to Options 2 and 3. Option 2 effectively doubles the services and subsequent passenger capacity of Option 1 and therefore total operating costs and revenues increase two-fold.

Alternatively, Option 3 has the greatest annual operating costs as it requires 22 motorcoaches in operation per day, however, because of the increased bus connections and two-way services, annual passenger capacity is greater than Option 2 and has the potential to generate the greatest amount in annual revenues.

Table 29: Summary of Financial Case Assessments for Proposed IBS Options

	Option 1	Option 2	Option 3
Number of Buses	8	16	22
Capital Costs - Vehicles	$7,200,000	$14,400,000	$19,800,000
Bus Model	MCI D4500	MCI D4500	MCI D4500
Fuel Type	Diesel	Diesel	Diesel
Fuel Economy	0.4 l/km	0.4 l/km	0.4 l/km
Annual Operating Costs			
Annualized Capital Costs	$730,710	$1,461,425	$2,009,460
Annual Maintenance Costs	$400,000	$800,000	$1,100,000
Annual Fuel Costs	$370,000	$711,660	$1,220,520
Annual Labour Costs	$936,000	$1,872,000	$2,664,000
Total Annual Costs	**$2,436,230**	**$4,845,100**	**$6,994,000**
Passenger Rate Assessment			
Total Annual Passenger Capacity	1,161,600	2,323,200	3,537,600
Average Annual Passengers (75% Capacity)	871,200	1,742,400	2,653,200
Minimum Passenger Fare Required	**$2.80**	**$2.80**	**$2.65**
Farebox Revenue Assessment			
Proposed Competitive Rate – $3.50	**$3,049,200**	**$6,098,400**	**$9,286,200**
Revenue after Operating Costs	$631,448	$1,253,316	$2,292,220
Proposed Flat Rate – $5	**$4,356,000**	**$8,712,000**	**$13,266,000**
Revenue after Operating Costs	$1,919,770	$3,866,916	$6,272,020

Deliverability and Operations Case

In the Metrolinx Business Case Framework, the Deliverability and Operations Case typically consists of technical and financial analyses for delivering the project from original concept through to planning, design, environmental assessment, stakeholder engagement, procurement, construction, and operations. However, this IBC conducts a high-level review of potential delivery strategies and considerations such as transit funding, regional policy and programs, and transit service delivery options. The following is a summary of the assessment conducted for the Deliverability and Operations Case, while a more comprehensive review can be found in the complete Initial Business Case **(APPENDIX B).**

Transit Service Delivery Strategy

To ensure intercity transit service investments are successful, it is essential that the two host regional municipalities support and cooperate in advancing the project, including future planning, management, delivery, and operations of the system, and for ownership and maintenance of certain project components. The economic and financial case assessments, as well as the delivery strategy assumes that fares for intercity bus services do not include local transit fares, however, there is an opportunity for transit agencies to implement a one-fare system between the IBS and local transit services. **Table 30** summarizes the potential strategies to implement the proposed intercity bus transit services.

Table 30: Summary of Deliverability and Operations Case Assessment for IBS Options

Transit Service Provider	Transit Service Delivery Strategy	Advantages/Disadvantages
Regional Transit Agencies	Grand River Transit and Guelph Transit agencies collaborate to implement intercity bus services between the two regions. Each transit agency can procure buses and launch services from their respective regions. This option would be best suited for implementing Option 1 or Option 2 type services where service routes are direct, and each agency would be required to purchase 3 to 7 transit buses.	By extending existing transit services, transit agencies can maintain a relatively low passenger fare for transit users by matching their existing fare structure. Municipal transit agencies typically operate city buses that don't offer the same level of comfort and convenience as motorcoach buses.
Metrolinx	Metrolinx to expand or revise existing GO Bus services to support high-frequency service requirements. This option would be best suited for implementing Option 2 or Option 3 type services, since they require cross regional services that Metrolinx typically operates.	Metrolinx could implement intercity services without requiring significant capital costs for new buses and maintenance facilities. In order to provide competitive rates for this service, Metrolinx may be required to reduce rates of other services in the region, which would impact their existing revenue models.
Private Bus Companies	Provincial government engages in service contracts with private bus companies to provide intercity bus services and fill service gaps between the two regions. Governments provide funding and oversight, while private companies manage the day-to-day operations. This option would be best suited for implementing Option 3 type services which requires a larger fleet of buses and more complex operating schedules to support high-frequency services.	Introducing a new branded intercity bus service can help to generate enthusiasm amongst commuters and employers as it aims to improve connections specifically for these groups. Publicly subsidized transit services prioritize high-quality, affordable, equitable, sustainable, and safe transit access, while private companies strive for profitability, which is a fundamentally different operating model.

Initial Business Case Summary

The Waterloo-Wellington region is expected to experience significant population and employment growth over the next two decades, which will result in a growth in intercity commuting throughout the region. To address the sizable population of intercity commuters between the two neighbouring regions, three options were proposed for intercity bus services. Each option presents unique transit service route strategies that establishes the groundwork for a more comprehensive assessment in the design and development phase. Based on existing commuting data, the options attempt to connect major nodes between the cities of Kitchener, Cambridge, and Guelph.

Option 1: Kitchener – Guelph

Option 1 presented the most basic service that can be implemented to initiate intercity bus service connections. The route was selected to support the large volume of intercity commuters between Kitchener and Guelph, while also connecting passengers to local transit services to reach their final destinations. Overall, the option has the lowest project cost but is not expected to generate significant economic and societal benefits due to the limited route service options.

Option 2: Kitchener – Guelph, Cambridge – Guelph

Option 2 builds on Option 1 and proposes a second direct service between Cambridge and Guelph. The two services operate independently and do not interact with one another. Because the route length and service frequency are the same, both routes require similar annual operating expenses. However, because Option 2 doubles the service capacity, it has the potential to generate greater fare revenues to ensure the project is a viable investment.

Option 3: Kitchener – Cambridge – Guelph

Option 3 proposes a more comprehensive service that connects all three cities as well as significant employment areas. The goal of the intercity bus service is to support intercity commuters and, as such, Option 3 provides direct services to major employment areas and minimizes journey times compared to the previous options.

To maintain the high frequency service during peak hours and provide services in both directions, this investment option requires a large number of vehicles in operation throughout the day, resulting in higher operating costs. However, more vehicles in operation results in increased daily passenger capacity and subsequent increase in potential fare revenues.

IBC - Key Findings

The key findings from each of the four cases are presented below in Table#. Based on the analysis conducted in each of the cases, all Options show a robust case for investment and demonstrate social, environmental, and economic benefits for introducing intercity services between Waterloo Region and Wellington County.

Strategic Case

All Options have the potential to support regional strategic goals and outcomes for transportation and economic development. However, it was found that Option 3 has greater potential to achieve regional transportation and climate goals more effectively, as well as the Metrolinx Regional Transit Service Goals:

- Strong Connections
- Complete Travel Experiences
- Healthy and Sustainable Communities

Options 1 and 2 can introduce an alternative to transit users and support equity benefits, especially for those who do not own a private vehicle. The high-frequency services connect major urban areas, offering a significant improvement to existing transit options between the two regions. However, because these services only connect major urban nodes, passengers will need to connect to local transit services to reach their final destinations.

Alternatively, Option 3 has greater potential to connect people to employment areas and increase economic opportunities for people between the two regions. The high-frequency service connects major urban areas and employment areas which can reduce transit travel time and provide a viable alternative to private vehicles. This can result in increased public transit use, while slowing the growth in private vehicle use among intercity commuters.

Economic Case

The Generalized Journey Cost assessment found that Option 2 and Option 3 have the greatest potential to reduce journey time and costs for existing auto and transit users. Moreover, Option 3 presents additional journey time and cost savings for individuals commuting to and from major employment areas in Guelph.

Environment and Social Cost assessments found that all Options will emit substantially lower annual GHG emissions compared to private vehicles. Moreover, if these services can prevent just 2,500 individuals from commuting by private vehicles, it can significantly reduce annual transport sector emissions. Lastly, Option 3 will emit more GHG emissions compared to other options due to the greater number of motorcoaches on the road, however it also has the greatest potential to attract existing or future auto users.

The Economic Case assesses the overall benefit to society for each investment. The Benefit Cost Ratio (BCR) is determined by dividing the total benefits by the total costs. If the BCR of the investment is greater than or equal to 1, it is considered economically viable (Metrolinx, 2021b). For this IBC, the benefits value consists of the total GJC savings for both auto and transit users and all O-D pairs. The total costs value consists of the environmental and social costs for the annual emissions. The Net Present Value (NPV) is determined by subtracting the total costs from the total benefits. For all three Options, the estimated annual GJC savings for passengers far outweigh potential costs in GHG emissions. However, Option 3 has greater potential to generate societal benefits such as equity benefits, option value, individual productivity, as well as economic development impacts such as increasing access to labour markets and other agglomeration benefits.

Financial Case

The Financial Case assesses the overall financial impact of the investment options. High-level estimates of the capital costs for acquiring motorcoaches, and annual operating and maintenance costs are estimated for each Option, based on the proposed service routes and strategies. Moreover, operating revenues for each Option were estimated based on 75% annual passenger capacity rate. To ensure that the cost of the service is affordable, it is recommended that passenger fares for the new service should be lower than existing GO Transit fares, but higher than local transit fares. A flat rate of $5 was proposed as a starting point, however this value is likely to change based on additional assessments in the design and development phase. The assessment found that a $5 per trip fee would allow all proposed Investment Options to be financially viable, while retaining sufficient net revenue to accommodate changes in ridership levels or additional operating expenses not accounted for in the initial assessment. The Farebox Recovery Ratio is calculated by dividing the total fare revenue by total operating expenses. A ratio above 1 indicates the transit system is financially viable, while a ratio below 1 indicates that the transit system needs to be subsidized.

As expected, Option 1 had the lowest annual operating expenses, while Option 2 and Option 3 had higher annual operating expenses due to the greater number of operating vehicles required for these options. However, greater number of buses in operation also increases the annual passenger capacity, which subsequently increases farebox

revenues. As a result, Option 3 can potentially serve the greatest number of people compared to other Options, and if implemented correctly, can generate sufficient revenue to maintain bus operations.

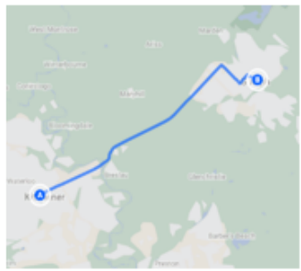
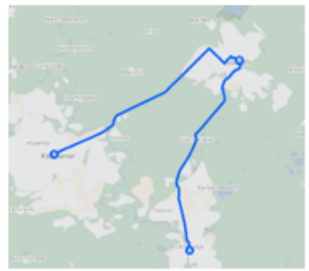
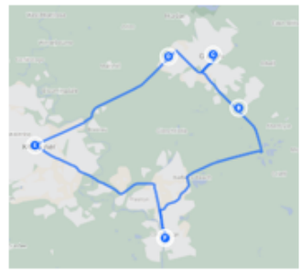
Deliverability and Operations Case

The Deliverability and Operations Case presents high-level recommendations to procure, deliver, and operate, the proposed investment Options.

Options 1 and 2 require lower operating cost and can be potentially implemented through existing transit service agencies. Local transit services provided by Grand River Transit (Waterloo) and Guelph Transit (Guelph) can be expanded to include inter-regional services through a collaborative program between the two agencies. Alternatively, as the primary inter-regional public transit agency, Metrolinx can implement the proposed intercity services by expanding or revising existing services.

As shown in previous case assessments, Option 3 has the greatest potential to improve intercity transit options for daily commuters while also increasing employment access to marginalized communities. However, due to the greater number of vehicles and financial resources required for Option 3, it is assumed that existing transit service agencies do not currently have the capacity to implement this level of service. Therefore, it is recommended that the provincial government explore opportunities to engage with private bus companies through third-party contract to fill this critical gap.

Business Case Summary Chart

Cases	Option 1	Option 2	Option 3
	Kitchener – Guelph	Cambridge – Guelph Kitchener – Guelph	Cambridge-Kitchener-Guelph
			
Strategic	Promotes strong connections between Kitchener and Guelph, but does not meet diverse needs of commuters or has potential to promote mode shift.	Potential to achieve transit service goals, with some improvements to mobility options in the region. Strong strategic performance but some service gaps remain.	Strongest potential to achieve transit service goals, improve mobility options and reduce emissions in the region as it fills many service gaps compared to other options.
Economic	**BCR:** 8.2 **NPV:** $1,853,800	**BCR:** 25 **NPV:** $12,048,280	**BCR:** 36.8 **NPV:** $30,535,160
Financial	**Annual Operating Cost:** $2,436,230 **Average Annual Passengers (75%):** 871,200 **Farebox Revenues ($5):** $4,356,000 **Farebox Recovery Ratio:** 1.78	**Annual Operating Cost:** $4,845,100 **Average Annual Passengers (75%):** 1,742,400 **Farebox Revenues ($5):** $8,712,000 **Farebox Recovery Ratio:** 1.81	**Annual Operating Cost:** $6,994,000 **Average Annual Passengers (75%):** 2,653,200 **Farebox Revenues ($5):** $13,266,000 **Farebox Recovery Ratio:** 1.9
Deliverability and Operations	Lowest cost to design and implement intercity services and can be implemented through existing transit service agencies such as Metrolinx.	Relatively low cost to design and implement intercity bus services with greater transit benefits compared to Option 1. Can also be implemented through existing transit service agencies such as Metrolinx.	Higher cost to design and implement intercity services but has greater potential to achieve transit benefits for intercity commuters compared to other options. Government-contracted services to support intercity public transit needs should be given priority to support benefits realisation in the region.

Recommendations for Future Stages of Work

Three potential intercity bus services were proposed and evaluated for this Initial Business Case. Options 1 and 2 offer direct services to support basic connections between the two regions. Alternatively, Option 3 offers a more comprehensive service to support more diverse commuting needs through Waterloo-Wellington region.

Based on this IBC study, Option 3 presents the most economically viable investment option, while also promoting meaningful societal benefits. Although Option 3 requires greater financial resources to operate, it represents a viable alternative to auto-travel and has the potential to generate significant ridership and revenue compared to other Options. Moreover, implementing a new "branded" intercity service through third-party contracts can provide additional social and economic benefits while also improving public transit mobility options for intercity commuters.

Following the Initial Business Case, the next phase of the Metrolinx Business Case Framework is the Preliminary Design Business Case. This next phase takes the recommended option of the IBC and reviews different approaches to refine and optimize it, which is then used to secure funding from the provincial government for procurement, construction, and implementation (Metrolinx, 2021b).

The next stages for the design and development of intercity bus services between Waterloo Region and Wellington County should consider the following key issues in greater detail:

- Recommend conducting surveys for residents and employers to collect more detailed information and data on current commuting trends, and major employment destinations for intercity commuters. The survey can also include questions that attempt to understand individual perceptions regarding existing public transit options and a new high-frequency, intercity bus service.
- Consider a phasing approach whereby services similar to Option 1 and Option 2 is introduced in the immediate future and then gradually scaling the services to reach Option 3 type services as passenger volumes increase and more financial resources are available.
- While Option 3 only includes stops in major employment areas in Guelph, it is recommended that additional stops in major employment areas in Cambridge and Kitchener are also included in the assessment during the design and development phase.
- Consider opportunities to implement a one-fare system and enable transit users to easily transition between intercity bus services and local transit systems.

Part IV: Discussion & Recommendations

This study was motivated by the release of the 2022 Ontario GGH Transportation Plan which emphasized significant investment in highway expansion and public transit infrastructure, within the GTHA, but failed to address the need for investment in viable intercity public transit options amongst the outer regions of the GGH. The GGH houses some of the largest transportation systems and hubs in Canada, yet daily intercity commuting options between regions remain limited. Additionally, Metrolinx GO Transit Expansion plans prioritize service improvements among GTHA regions, leaving outer regions in the GGH without adequate intercity transit options.

Research conducted for the Literature Review has shown that factors such as land use planning, transportation policies, and economic incentives prompted by the housing and labour markets, induce intercity commuting which leads to problems of auto dependency and traffic congestion. In other jurisdictions, deregulation of intercity bus services has helped to provide a low-cost alternative travel option and enable governments to engage in service contracts to fill critical intercity transit service gaps.

The assessment of GGH Intercity Transportation Systems confirmed that among the outer regions of the GGH, viable intercity public transit options are virtually nonexistent, even between neighbouring regions. As a result, more than 90% of the commuting population use private vehicles. Moreover, assessment of existing travel data for the GGH regions found that a sizable proportion of the commuting population commutes to workplace destinations outside of their region of residence and commute for durations of 60 minutes or longer. The volume of long-distance commuters is expected to have increased since the travel data was collected in 2021 and continue to increase with population and employment growth.

Lastly, the Initial Business Case assessment was developed to explore opportunities for public investment in intercity bus services connecting major urban nodes and employment areas between Waterloo Region and Wellington County. The assessment found that when implemented appropriately, intercity bus services have the opportunity to fill critical gaps in public transit services and produce a wide range of direct and indirect benefits for local communities. A similar high-level initial business case can be used to assess intercity bus service opportunities among other regions of the GGH.

Based on the research and analysis conducted for this major research paper, the following are three key recommendations for transportation planners and policymakers to address intercity public transit service gaps and improve mobility throughout the GGH region.

1.0 Regional Collaboration

Regional governments focus on improving public transit mode share within their respective regions, while the movement of individuals between regions is typically overlooked. As a result, interregional transit investments have been severely limited. Population and employment growth trends are leading to changes in travel behaviour across the GGH and call for an assessment of regional transit policies that address current and future intercity commuting behaviour. There is a critical need for collaboration among regional governments, as well as regional and provincial transit agencies to develop cross-regional transportation policies across all GGH regions. For example, the results of the business case indicate that a sizeable working population commuting between Waterloo Region and Wellington County, primarily commutes by private vehicle due to a lack of viable inter-regional transit options. This trend requires collaboration between the two regional governments to evaluate commuting trends and implement transport policies that aim to reduce auto use among intercity commuters and introduce more sustainable modes of transportation between the two regions.

2.0 Insufficient Intercity Travel Data

To assess intercity travel demand, this study used available travel data such as the 2016 and 2021 Census Profile and the 2016 Transportation Tomorrow Survey (TTS). It was found that there is a considerable gap in “journey to work” data, which is critical for effective planning of public transit services. The TTS collects detailed information on the real travel patterns of residents in the GGH and offers the most in-depth data currently available on intercity work commuting, including workplace trip destinations and modes of travel. Data from the TTS forms the basis of all travel and demand forecasting models, business cases, and transportation planning in the GGH, for roads, highways, transit, and active modes. As a result, provincial and municipal governments, as well as transit agencies, rely on this data to support and plan for multi-billion-dollar transportation projects and services throughout the GGH area (MTO, 2023).

Although the Transportation Tomorrow Survey (TTS) is a valuable source for collecting travel data in the GGH, the 2016 TTS survey only captured travel data from approximately 5% of the GGH population and is published every 5 years (Rose, 2018). The next survey results are expected to be released later this year (2024) and will be important for assessing the impacts of the COVID-19 pandemic and changes in commuting behaviour.

The GGH is expanding and changing rapidly, and to ensure public investment in transit services are meeting travel demands, it is recommended that provincial and regional governments explore opportunities to collect travel data more frequently for their respective regions. For example, Waterloo Region can collaborate with large employers to collect travel data and evaluate intercity commuting trends for the region. In turn, the travel data can be used by regional governments and transit agencies to address intercity transit service gaps.

3.0 Public Investment in Intercity Bus Services

The Ontario government has faced heavy criticism for the increasing costs of large-scale public transit infrastructure projects, which are inherently challenging to bring to fruition. Due to the low-density development patterns among the outer regions, large-scale public transit infrastructure projects that expand to the outer regions of the GGH are not a viable investment option. However, the GGH region continues to grow rapidly, and without sufficient public transit options, the problems of traffic congestion, increasing GHG emissions, and related external costs continue to rise throughout the region, and immediate solutions are needed.

Intercity bus services are relatively easy to implement at a low cost and also more accessible and affordable for users, compared to other transit modes. Moreover, to minimize dependency on public resources, the Provincial government can consider implementing service contracts with private intercity bus companies to ensure efficient service delivery. It is recommended that provincial and regional governments work with Metrolinx to explore opportunities for high-frequency, inter-regional bus services through GO Transit or third-party service contracts to fill critical transit service gaps between regions.

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Appendix A

Inter-Regional Transportation Systems in the Greater Golden Horseshoe

Introduction

The journey-to-work trip is commonly referred to as “commuting,” and involves the trip of an employed person from their place of residence to their usual place of work (Statistics Canada, 2021). Intercity commuting, or long-distance commuting, refers to employed persons that regularly travel across one or more neighbouring cities or regions for work (Santos, 2023). Commuting is regular in its frequency, time of departure, and destination, and is predominantly a weekday activity, tied to the morning and evening hours, which has historically defined peak travel demand (McGuckin & Srinivasan, 2005). The work trip is often the longest trip of the day, and the increasing time spent in travel to and from work influences the dominant mode of travel, as commuters typically opt for modes that minimize the total time and cost of their commute. As a result, the daily journey-to-work trip plays a vital role in transportation planning and has considerable influence over the design of transportation infrastructure. Journey-to-work trips are also critical to transit planning, as it helps to determine the corridors served and the levels of transit service available (McGuckin & Srinivasan, 2005).

Mega-city regions around the world are experiencing an increase in both the number of commuting trips and the average passenger kilometers travelled in journeys to work. This has been largely attributed to changes in urban growth patterns, housing and job location, growth in private vehicle travel, and continuous extension of the highway network. With rapid urbanization in mega-city regions, the need for sustainable urban transportation has gained importance, which promotes more sustainable forms of transport such as walking, cycling, and public transport, and a reduction of unsustainable transport modes such private vehicles.

The Greater Golden Horseshoe (GGH) is one of the fastest growing mega-city regions in North America and is the economic engine of Ontario. The GGH consist of 16 Census Divisions (CD), also referred to as counties or regions, and approximately 110 Census Subdivisions (CSD), or municipal jurisdictions. For the purpose of this assessment, intercity commuting within the GGH refers to employed persons that travel for work across one or more Census Divisions from their place of residence. According to Canada Census 2021, more than half of the commuting population in the Greater Golden Horseshoe travel to work outside of their municipality of residence, of which over 700,000 commuters travel outside of their Census Division. As a result, the number of commuters and the distances traveled by private vehicles contribute to daily traffic congestion on regional roads and highways.

Population Growth and Transportation Challenges in the GGH

The GGH is the most populous region in Canada, with a population of 10 million people and expected to reach nearly 15 million by 2051 (MTO, 2022). The City of Toronto is the largest city in Canada, with a population of 2.8 million people. Many of the municipalities within the GGH are among the top 25 most populous in the country including Mississauga, Brampton, Hamilton, Markham, Vaughan, Kitchener, and Oakville.

Although Toronto is the most populous city in the GGH, the surrounding municipalities have been growing rapidly. For example, from 2016 to 2021, several suburban municipalities surrounding Toronto produced among the highest growth rates in the country including, East Gwillimbury (44.4%), New Tecumseh (28.3%), Bradford West Gwillimbury (21.4%), and Milton (20.7%), while the City of Toronto only increased by 4.8 percent. Additionally, smaller areas within municipalities also experienced significant growth during this time, such as The Blue Mountains (33.7%), Thorold (26.7%), and Wasaga Beach (20.3%). Across Canada, the population of peripheral municipalities grew faster at 6.9% compared with central municipalities at 5.5% which represents urban spread (StatCAN, 2022). Finally, the Ontario Growth Plan, 2020, estimates that population in some of the surrounding regions, such as Halton and Durhan Region, are expected to experience a two-fold increase by 2051 (MMAH, 2020).

A report published by The Canadian Centre for Economic Analysis (CANCEA) estimates that, in the last decade, the Greater Golden Horseshoe (GGH) has seen an increase in population by about 1.2 million people, as well as an increase in the number of jobs by 470,000, which accounts for a 13.5% and 11% increase, respectively (CANCEA, 2023). Using the latest GGH growth projections, the study estimates that the number of daily commuters will increase by 46 percent by 2050. This represents an additional 2.9 million daily commuter trips, depending on factors such as immigration levels and remote work trends (CANCEA, 2023).

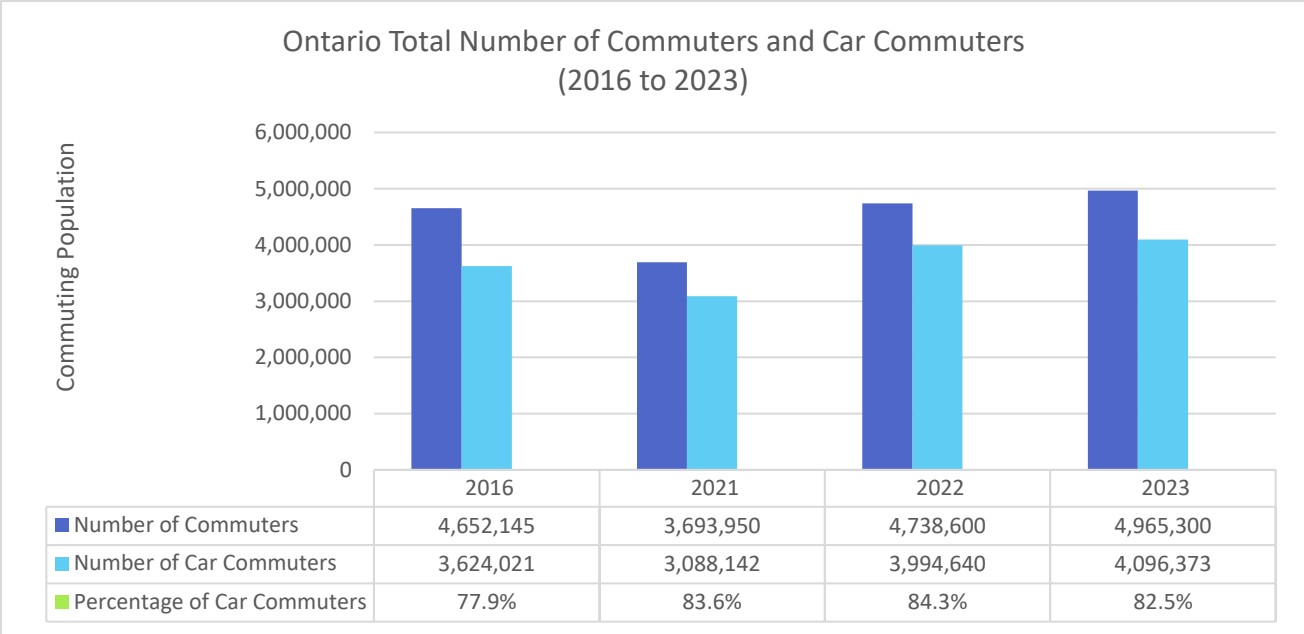
The Ministry of Transportation Ontario (MTO) reports that gridlock on the highways and roads currently costs more than $11 billion a year in productivity and continues to worsen (MTO, 2022). The expected rise in population and commuting population, raises the issue of whether the current and planned expansion of the transportation and transit networks across the GGH region will have sufficient capacity to manage the increase in expected commuter volumes. If the transit system cannot attract adequate volumes of commuters due to a lack of competitive travel options, then the result will likely be more commuters choosing to travel by private vehicles, adding further congestion pressure on regional highways and roads. Furthermore, mobility patterns across the region are changing. While transit projects in the past have focused on getting people to downtown Toronto, the latest GGH Transportation Plan suggests that the number of morning commuting trips to downtown Toronto from regions outside of Toronto is in decline, while commutes from Toronto to outer municipalities have increased (MTO, 2022).

Intercity Commuting and Mode Share in the GGH

Mobility trends and mode share data for the GGH are primarily collected and reported through open data sources such as the Canadian Census, administered by Statistics Canada, and the Transportation Tomorrow Survey (TTS) conducted by the University of Toronto, Data Management Group. Studies analyzing the transportation trends in the GGH indicate that between 1996 and 2006, mode shares for daily commuting have remained relatively constant with private vehicles being the overwhelming majority at approximately 66 percent. In 2006, public transit was the second largest commuting mode share at 17.7 percent, while active mode shares stayed constant at roughly 3.7 percent and 0.7 percent mode share for walking and cycling, respectively (Foth, Manaugh, & El-Geneidy, 2014). However, the majority of public transit mode share data represents commuting within municipalities, while public transit mode share for intercity commuting was primarily captured through GO Transit users, which as has remained low since 1986, at approximately 1-2 percent mode share (Ashby, 2018a).

In 2016, an estimated 31% of the commuting population in the Greater Golden Horseshoe, approximately 1.15 million people, travelled to work outside of their Census Subdivision (CSD) and Census Division (CD) of residence, contributing to the daily traffic congestion on local roads and regional highways (StatCAN, 2016). Moreover, nearly 650,000 commuters reported one-way commutes of 60 minutes or longer. Assuming that intercity commuters generally require longer commute times, then this suggests that approximately 56% of intercity commuters in the GGH had commute times of 60 minutes or longer.

Between 2020 and 2021, there was a noticeable decline in commuting across Canada due to the impacts of the COVID-19 pandemic and subsequent public health restrictions. While the total commuting population declined by nearly 30% in 2020, the percentage of people commuting by private vehicle increased by 10%, 75% (2016) to 85% (2021), and approximately 29% (~700,000) of the commuting population travelled to work outside of their CD of residence (StatCAN, 2022). However, as shown in **Figure 1** below, recent travel data estimates indicate that the number of commuters in cities across Ontario have surpassed the level recorded in May 2016. Moreover, Statistics Canada reported a 51.7% increase in the number of long-distance commuters (lasting 60 minutes or more) between May 2021 and May 2023, across Canada. This suggests that the population of intercity commuters in Ontario is likely to have increased and will likely surpass 2016 levels in the near future.



	2016	2021	2022	2023
Number of Commuters	4,652,145	3,693,950	4,738,600	4,965,300
Number of Car Commuters	3,624,021	3,088,142	3,994,640	4,096,373
Percentage of Car Commuters	77.9%	83.6%	84.3%	82.5%

Figure 1: Total Commuters VS. Car Commuters in Ontario (2016 to 2023) (StatCAN, 2023b)

Long-Distance Commuting Trends in the GGH

As mentioned previously, mobility patterns in the GGH are shifting from a downtown-oriented system to a multi-destinational network, with multiple nodes throughout the region. Commuting patterns in the GGH have evolved for a variety of reasons, including changing business practices, urbanization, the availability of commuting and transit infrastructure, and personal and financial circumstances (Statistics Canada, 2023). While regional transit projects had traditionally focused on getting people to work in the Toronto area, with the growth of urban areas outside of Toronto and the subsequent development of employment centre across the region, this approach no longer meets the needs of the region's commuting population today. For instance, it is estimated that the population of distant suburbs, located 30 minutes or more from downtown Toronto, grew by nearly 9.5%, while communities less than 30 minutes from the downtown area only grew between 0.5% to 1.7% between 2016 and 2021 (StatCAN, 2022). As a result, traffic and transit move in all directions at all times of day and night.

As urban centres across the region expand and more businesses cluster in urban areas, workers are often left with longer commutes. Moreover, the mega-region of the Greater Toronto Area has expanded to the Greater Toronto and Hamilton Area, and now growth in the region has expanded to the Greater Golden Horseshoe as ties between Toronto and outer regions like Waterloo have been critical to economic growth and development in the region. The Toronto-Waterloo Innovation Corridor is the largest tech cluster in North America, outside of Silicon Valley, home to more than 15,000 tech companies and more than 300,000 employees in high-tech industries and continues to attract

exceptional talent from around the world (WaterlooEDC, 2023). As such, the health and prosperity of this inter-regional corridor is dependent on strong transportation connections (Metrolinx, 2018).

Commuting is typically associated with costs, both financial and in terms of time spent commuting. Transportation is generally the second largest household expenditure after housing costs, across all income groups. Low-income families are often required to live further from job markets in order to balance housing costs with a longer commute. The cost of housing in the Greater Toronto and Hamilton Area have increased dramatically over the past decade, which has affected housing choice in the region, and travel and commuting patterns of residents. As a result, mid- to low-income families are being forced to relocate further away where housing is more affordable. However, lower-density suburban areas around the GTHA typically have poorer access to inter-city transit and are dependent on private vehicles to access job markets (Metrolinx, 2018).

Comparisons of the 2016 and 2021 Census of Population data suggests that intercity commuting from municipalities in the outer regions have increased. For example, between 2016 and 2021 the intercity commuting population from the Niagara Region increased from 13 percent to 16 percent, while intercity commuting population in Hamilton increased from approximately 28 percent to 30 percent (StatCAN, 2017) (StatCAN, 2022). **Figure 2** compares the percentage of the commuting population for each region that commutes within their Census Subdivision (CSD) of residence, a different CSD but within the same Census Division (CD) of residence, and a different CSD and CD of residence. In many regions, nearly half of the commuting population work outside of their CD of residence which contribute to daily traffic congestion along regional roads and provincial highways. These intercity commuters are viable candidates for high quality and convenient intercity transit services.

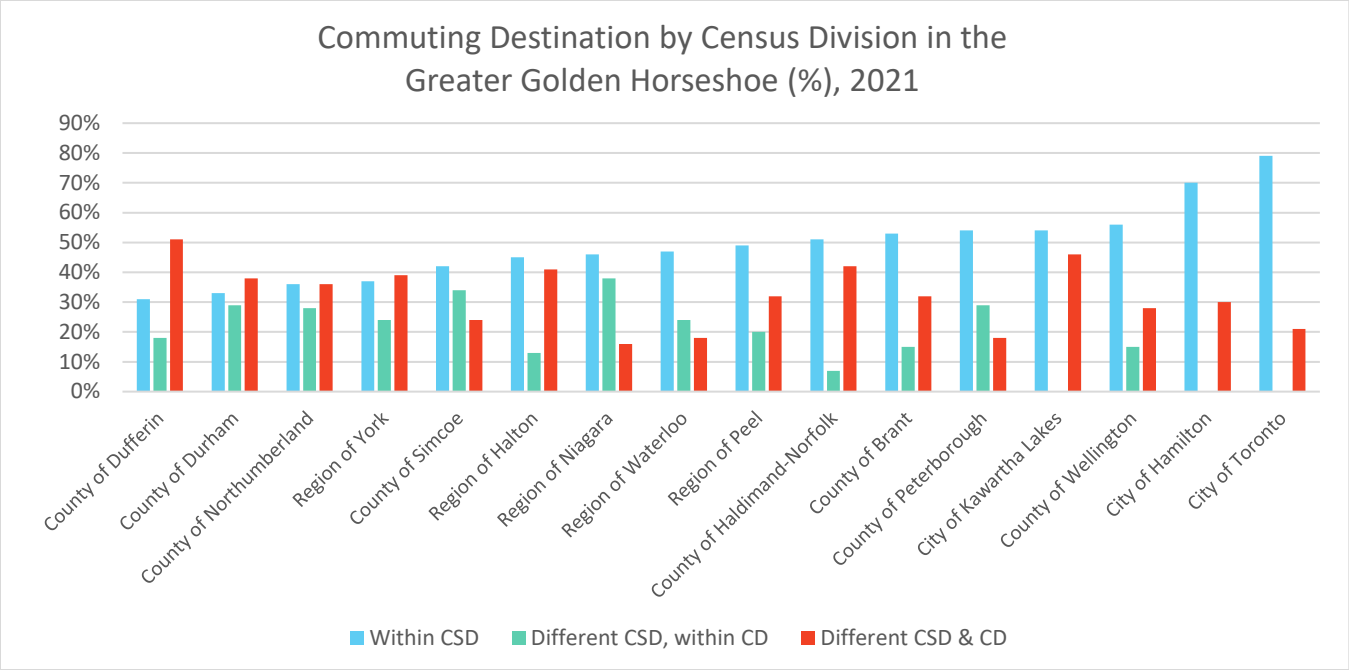


Figure 2: Commuting Destination by Census Division in the GGH (%), 2021 (StatCAN, 2022)

Traffic Congestion

Traffic congestion in the Greater Golden Horseshoe has persisted for several decades. In a 2008 analysis, conducted on traffic congestion in the Greater Toronto and Hamilton Area, Metrolinx estimated that the average travel time during rush hour is 63% longer than under free-flow conditions. Moreover, the study measured the cost to individual commuters and determined that social and economic costs of congestion in the GTHA were approximately $3.3 billion per year (Urban Transportation Task Force, 2012). This figure has increased to $11 billion, according to the most recent provincial transportation plan (MTO, 2022).

The Highway 401 that runs across the GGH is among the widest roads in the world, spanning 18 lanes at its broadest point. Despite this enormous supply, the demand still exceeds capacity, resulting in recurring daily congestion. This section of the highway, between Highway 427 and Highway 404, is the most travelled and critical piece of the network, carrying roughly 416,000 trucks and vehicles per day. A combination of workforce commuters, freight transport, and commercial fleets contributes to the daily traffic congestion on regional highways. The GGH Transportation Plan estimates that by 2051, travelling the 401 across the GGH will take over 90 minutes longer than it takes today (MTO, 2022). Excessive gridlock along this critical network impacts freight and goods movement industry, delays trips for work and recreational activities, and also has social impacts such as physical and mental health impacts of sitting in traffic and people losing hours of their lives stuck in traffic, instead of at home with their families (MTO, 2022).

GGH Transportation System Overview

Municipalities across the Greater Golden Horseshoe (GGH) are expecting significant population and employment growth over the next two decades, and travel demand is expected to increase by over 50% during this time. The Metrolinx 2041 Regional Transportation Plan estimates that 41% of the growth will occur within the Greater Toronto and Hamilton Area (GTHA), and approximately 25% of new population growth is projected to be in areas where the current transit mode share is below 5% (Metrolinx, 2018). Therefore, population growth and transit mode share estimates suggest that more public transit options are needed across the Greater Golden Horseshoe (GGH). In 2022, Ontario's Ministry of Transportation released the Transportation Plan for the Greater Golden Horseshoe (GGH) which outlined plans for transportation infrastructure, service improvements, and policies to be implemented over the next 30 years. The following section reviews the existing transportation network and public transit options available to intercity commuters in the GGH, as well as the current and planned transportation network expansion projects being implemented by Metrolinx.

Existing and Planned Transportation Network in the GGH

The Greater Golden Horseshoe is the economic centre of Canada, with a multimodal transportation system comprised of road, rail, air, bicycle, and pedestrian networks that moves people and goods throughout the region. The transportation system also includes hubs that function as transfers between modes and gateways to other parts of the GGH region and Ontario as a whole. The GGH houses some of Canada's largest transportation hubs and networks including:

- **Toronto Pearson International Airport** – located at the heart of the GGH and Canada's largest international airport.
- The **VIA Rail** Québec City – Windsor Corridor – consisting of nearly 96% of passenger trips booked with VIA Rail and 74% of passenger revenue (VIA Rail, 2023)
- **GO Transit** operates the largest public transit network in Canada.
- **Union Station** is Canada's busiest transportation facility with roughly 65 million passengers passing through it every year (Waterfront Toronto, 2024).
- Canada's busiest highway corridor, (**Highway 401** and connecting highways).

GGH Regional Highway Network

The primary mode of travel across the GGH is by roads and highways, which are becoming increasing congested during peak hours due to variables such as population growth, expansion of employment areas, and changes to commuting travel patterns. Highway 401, where it passes through the GGH, is considered the busiest highway in North America and among the top ten busiest highways in the world (Hocking, 2023). The section running through the Greater Toronto Area is among the widest roads in the world, spanning 18 lanes at its broadest point, and continues to experience daily traffic congestion. Several areas along major highways such as Highway 401, Highway 403, and Queens Elizabeth Way (QEW) experience bottlenecks in key areas which result in significant traffic congestion and subsequent issues of increased travel times, travel delays, and high emissions.

The 2022 GGH Transportation Plan includes new highway and expansion of existing highway projects (MTO, 2022). Highway 401 expansion projects will result in several sections of the highway to be expanded throughout the GGH, adding additional lanes and HOV lanes to support traffic congestion issues in key sections of the highway. Near the end of 2023, the provincial government completed the expansion of 8 kilometres of Highway 401 near Cambridge, Ontario. Additionally, 18-kilometres of the highway between Milton and Mississauga have also been expanded (MTO, 2022).

The provincial government has proposed the construction of two new highways including Highway 413 and the Bradford Bypass (**Figure 3**). The proposed Highway 413 consists of a 52-kilometer highway and transit way that will extend from Highway 400 in Vaughan westward crossing the northern parts of Brampton and then moving southward to connect to the Highway 401/407 ETR interchange area. The new highway will connect regions of York, Peel, and Halton, and expected to provide considerable traffic congestion relief along Highway 401. The highway will also include a separated transitway running alongside the highway dedicated exclusively for public transit such as busses or light rail transit. The proposed Bradford Bypass consists of a new 16.3-kilometer controlled access freeway extending from Highway 400 in Simcoe County, crossing a portion of King Township, and connect to Highway 404 in East Gwillimbury.



Figure 3 - Proposed Routes of Highway 413 and the Bradford Bypass (McIntosh, 2023)

Many have criticized the Highway 401 expansion projects and proposed new Highway 413 and Bradford Bypass projects, acknowledging that expanding highways results in "induced demand," and while there may be some initial relief in traffic congestion at first, but over time, the expansion will only further exacerbate the existing problems of automobile dependency, traffic congestion and greenhouse gas emissions (McIntosh, 2023). There have been many examples of highway expansion projects that resulted in more traffic congestion as a result of induced demand. For example, the Katy Freeway in the Houston metro has been expanded numerous times to alleviate traffic congestion in the area, with the most recent expansion totalling to 26 lanes at its widest point. Despite these expansion efforts, the highway continues to face heavy traffic congestion (Schneider, 2018). Additionally, there has been concerns regarding the environmental impacts of the new highways, especially the Bradford Bypass, as it passes through environmentally sensitive lands and pose impacts to local ecosystems, communities, and public health (Ecojustice, 2022).

Metrolinx

Metrolinx is the regional transportation agency responsible for coordination and integration of all modes of transportation in the Greater Toronto and Hamilton Area. It currently operates major transit networks and services including GO Transit, UP Express, and PRESTO, but is also responsible for delivering several rapid transit projects across the GTHA. The extent of the Metrolinx GO Transit Service Area is illustrated in **Figure 4**. Metrolinx currently manages approximately $25 billion in assets including 747 kilometres in railway tracks, 69 GO/UP facilities, 30 park and rides, 14 bus terminals, 4 station maintenance facilities, and 10 administrative sites. The rail fleet is comprised of 923 bi-level passenger coaches, 91 locomotives, 18 diesel multiple units, and two rail maintenance facilities. The bus fleet asset base includes 445 buses, 9 maintenance facilities, and over 300 on-road stops (Metrolinx, 2023).

Metrolinx's asset base is expected to increase to approximately $60 billion by 2030 as the agency is currently undertaking the largest transit expansion in North America including a mix of subway, light rail transit, bus rapid transit, and regional rail projects. A major component of this investment is the GO Expansion program, which involves a series of improvements to the region-wide GO Rail network, and promises to bring in faster, more frequent, all-day, two-way service along most corridors. The details of Metrolinx's existing transit network and GO Expansion Program are discussed in more detail below.

Metrolinx implemented a variety of promotions and campaigns to promote recover its ridership to pre-pandemic levels and increase service levels to meet customer demands. As a result, Metrolinx reported its ridership has increased substantially from 13 million in 2021 to 41.1 million in 2022 (Metrolinx, 2023). Metrolinx has also reported significant improvements in its services in the past two years, which has resulted in the increase in ridership during this time. Overall, Metrolinx 's On-Time Performance (OTP) achieved an annual average score of 96.6% based on the combined performance of GO Rail (94%), GO Bus (96.8%), and UP Express (98.2%). The OTP measure for GO Rail and

GO Bus is defined as within five and 15 minutes of scheduled arrival time, respectively, while OTP for UP Express is defined as within five minutes of targeted journey time (Metrolinx, 2023a).

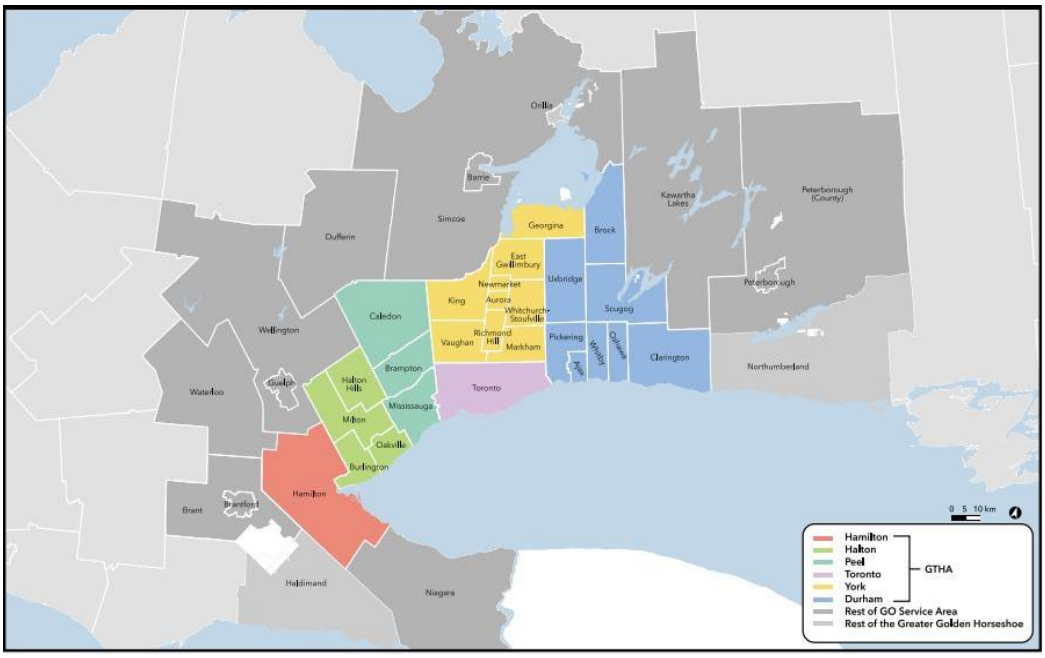


Figure 4: Metrolinx and GO Transit Service Area (Metrolinx, 2018)

Metrolinx – GO Expansion Program

The Metrolinx GO Expansion Program is one of the largest transportation initiatives in Canada and is comprised of multiple projects that aim to expand and improve service on the GO rail network. Service improvements will result in faster and more efficient trains, two-way all-day service, accessible stations, and 15-minute or better service on core portions of the GO rail network. Metrolinx also published the GO Rail Station Access Plan in 2023, which outlines plans for improvements to existing stations to support enhanced GO station access, improve options for customers, and increase the capacity of stations to accommodate ridership growth.

In addition to GO Transit improvements, Metrolinx is also responsible for delivering a series of light rail, bus rapid transit, and subway projects across the GTHA. All transit network projects proposed as part of the 2041 Strategic Plan combine to form a network of frequent and reliable transit services termed the "Frequent Rapid Transit Network," and represents the core of Metrolinx's regional transit system. The Frequent Rapid Transit Network is comprised of the following services:

- Frequent Regional Rail (GO RER) – minimum 15-minute headway all-day, two-way.
- Frequent Regional Express Bus – minimum 15-minute headway all-day.
- Rapid Transit (Subway, LRT, BRT, and Priority Bus) – minimum 10-minute headway all-day.

Figure 5 illustrates the existing and planned systems and services of the Metrolinx Regional Transit Network.

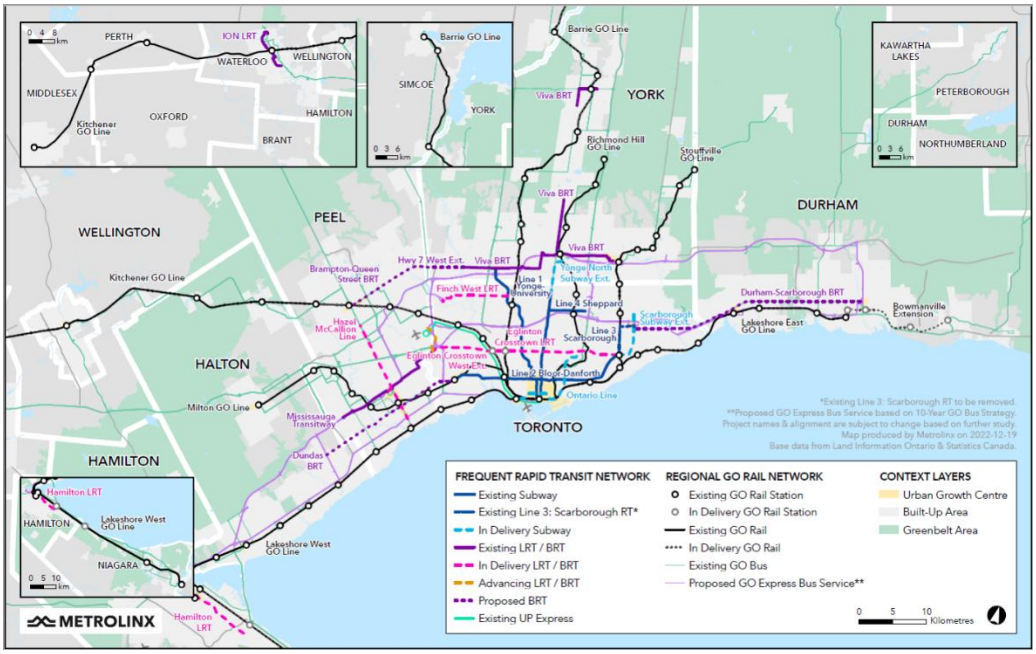


Figure 5 - Metrolinx Regional Transit Network Map (Metrolinx, 2024)

Rapid Transit Projects

To address population and employment growth projections and improve transportation, Ontario has prioritized several transit projects in the GGH. The Metrolinx 2041 RTP estimates that more than $30 billion is being invested in rapid transit infrastructure over the next 8-10 years. Metrolinx is currently in the process of completing several light rail transit and subway projects, which have made major strides over the past few years.

Table 1 below summarizes the rapid transit projects including the route length, service regions, and estimated project costs. Service Regions indicates the extent of the rapid transit network, and project costs are based on the most recent sources, which are often higher than initially estimated by Metrolinx, and may change as projects progress. **Figure 6** below illustrates the existing and planned LRT and subway networks within the GTHA.

Table 1: Summary of Metrolinx's Rapid Transit Projects

Transit Project	Route Length	Service Regions	Estimated Project Cost	Source
Light Rail Transit (LRT) Projects				
Eglinton Crosstown LRT	~19 km	Toronto	~ $13 billion	(Chan, 2024)
Finch West LRT	~10.3 km	Toronto	~ $3.4 billion	(Westoll, 2024)
Hazel McCallion Line	~18 km	Peel Region	~ $4.6 billion	(Peacock, 2024)
Hamilton LRT	~14 km	Hamilton	~ $3.4 billion	(Dongen, 2024)
Subway Projects				
Ontario Line	15.6 km	Toronto	~$27 billion	(Callan & D'Mello, 2024)
Yonge North Subway Extension	~8 km	Toronto – York Region	~ $5.6 billion	(Goodman, 2024)
Eglinton Crosstown West Extension	~14 km	Toronto – Peel Region	~ $ 4.7 billion	(Balintec, 2022)
Scarborough Subway Extension	~8 km	Toronto	~ $6 billion	(Brown, 2020)
Bus Rapid Transit (BRT) Projects				
Dundas Bus Rapid Transit	~48 km	Toronto – Peel – Halton	~$850 million	(Callan, 2020)
Queen Street-Highway 7 BRT	~24 km	Peel – York Region	~$500 million	(City of Brampton, 2024)
Durham-Scarborough BRT	~36 km	Toronto – Durham Region	~$585 million	(Durham Post, 2024)
~ = Estimated Cost/Length as of the Source Date (Note: Cost and Length of Transit Projects are subject to change)				

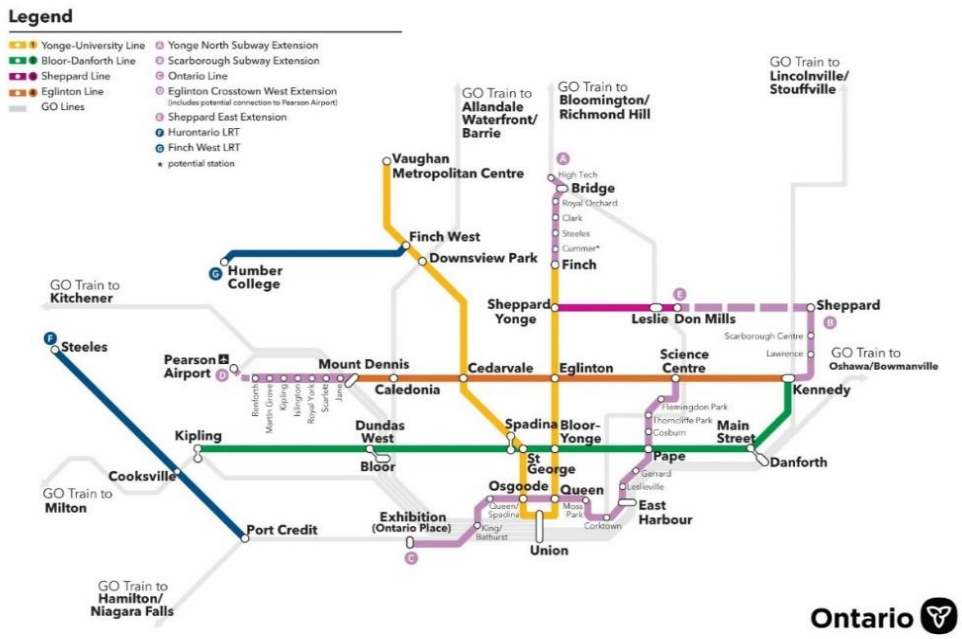


Figure 6 - Priority Transit Project in the Greater Toronto and Hamilton Area (MTO, 2022)

GO Transit

Since beginning operation in 1967, the GO Transit system has focused on the suburb-to-downtown commuter market, using diesel locomotives, and operating primarily in the peak period and in the peak direction. Over the following decades, the system has undergone incremental expansions in frequency, and extent of service, such as the introduction of 30-minute two-way all-day service along the Lakeshore lines in 2013 (Metrolinx, 2018). GO Transit services currently operate on specific schedules and routes with limited services throughout the day, depending on the corridor and time of day. For example, some routes only operate during rush hour, or on certain days of the week, while others operate daily with frequencies of 30 minutes to 1 hour. **Table 2** below summarizes the eight corridors and GO Expansion plans for each corridor.

GO Rail

GO Rail network consists of eight railway lines that radiate out from Toronto's Union Station and connect to major regions including Hamilton, Milton, Kitchener, Barrie, Richmond Hill, Lincolnville, Oshawa, and Niagara Falls. The GO Rail system has traditionally been a commuter rail system that largely serves trips in the peak period to and from downtown Toronto. Although GO Rail services are currently limited and mainly operate during rush hour periods, the GO Expansion Program will transform the network into a Rapid Rail system to support the projected growth in the GTHA. GO Expansion plans will include electrification of some railway lines resulting in faster and more efficient services. Frequent Regional Rail will consist of 15-minute, two-way, all-day services along several corridors. In addition to the improved service, Metrolinx has also initiated plans for new stations across the GO Rail network and extending services to Niagara, Kitchener, and Bowmanville (Lakeshore East).

GO Bus

The GO Bus network consists of more than 1,100 stops, 28 terminals, and 30 park and ride sites (Metrolinx, 2023a). The 2041 RTP established Metrolinx's plans for a Frequent Regional Express Bus Service that will provide long-distance transit services to underserved areas within the GTHA, that are part of the Frequent Rapid Transit Network (Metrolinx, 2018). However, Metrolinx's most recent GO Bus Strategy suggests that it that will restructure existing GO Bus operations to focus on higher frequency along fewer routes within the GTHA. The Regional Express Bus Network will consist of high-frequency (15 minute or less) services along higher-demand corridors, linking major employment and education centres, while expanding the broader regional rapid transit network. Between 2022 to 2023, Metrolinx implemented the first phase of the program, where select GO Bus services were streamlined and consolidated to improve reliability, simplify the bus network, and provide customers with faster and more consistent service patterns (Metrolinx, 2023a).

Table 2 – Summary of GO Rail Corridors and GO Expansion Plans

Corridor	Length (km)	First – Last Station	Existing Stations	Planned Stations	GO Expansion Plans
Lakeshore East (LE)	51	Union – Oshawa GO Station	10	**5**	Electrification of the railway between Union Station and Oshawa GO Station and increase services to 15-minute or less, two-way, all-day operations. Railway line expansion from Oshawa to Clarington.
Lakeshore West (LW)	132	Union – Niagara Falls GO Station	15	**1**	Electrification of the railway line between Union Station and Burlington GO Station and increasing the frequency of services that operate every 3.5 minutes during peak hours. Expansion plans also include increasing daily services to Niagara Falls.
Milton	50	Union – Milton GO Station	9		Due to high freight activity along these tracks, Metrolinx does not yet have plans to increase service frequencies along this line.
UP Express	23	Union – Pearson Airport	4		
Kitchener	103	Union – Kitchener GO Station	12	**3**	15-minute, all-day, two-way services between Union Station and Bramalea GO. New station planned between West and Bloor stations.
Barrie	101	Union – Allendale Waterfront GO Station	12	**2**	Two-way, all-day services from Union Station to Bradford GO Station. New station planned between Union and Downsview Park stations. Increase parking infrastructure at most stations along the corridor.
Richmond Hill (RH)	46	Union – Bloomington GO Station	7		No plans to increase service levels along the Richmond Hill corridor, as it is shared with CN Rail and experiences high freight activity along the route.
Stouffville (ST)	50	Union – Old Elm GO Station	10	**1**	15-minute, all-day, two-way services between Union Station and Unionville GO Station.

Metrolinx Funding

As the provincial transit agency, Metrolinx receives the bulk share of public transit funding from the Ontario government. **Figure 7** illustrates Metrolinx's budget sources for the 2022-23 fiscal year. The primary sources of revenue for Metrolinx are fare revenues and non-fare revenues, which covers approximately 30% of annual operating expenses. Remaining expenses are covered by the province through an operating subsidy to ensure Metrolinx has sufficient funds to operate its transit services, and implement commitments made under Metrolinx's 2041 RTP (Metrolinx, 2023).

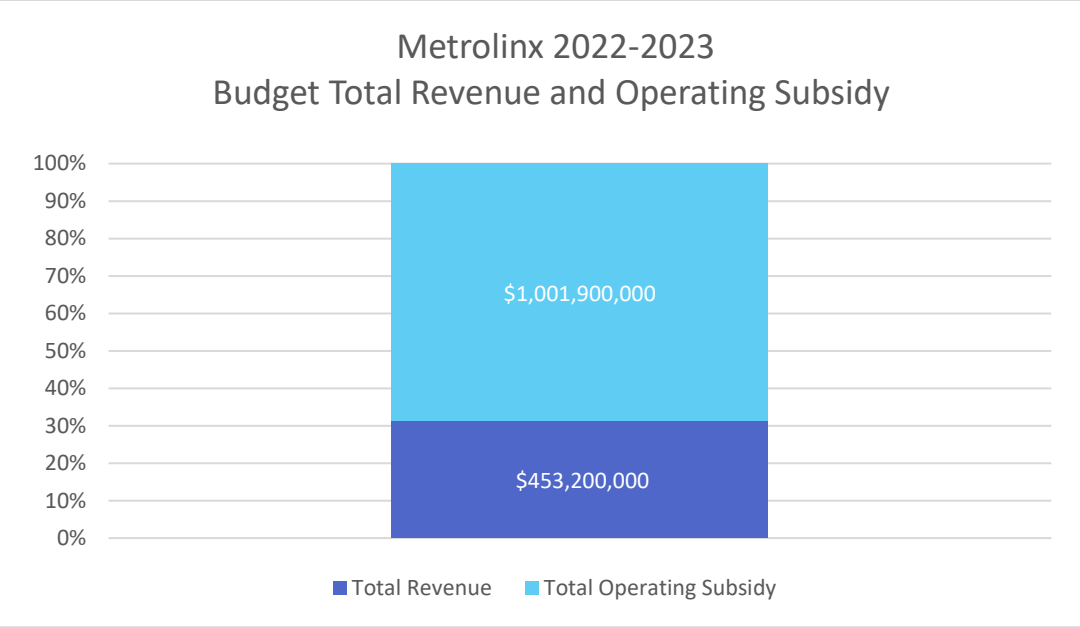
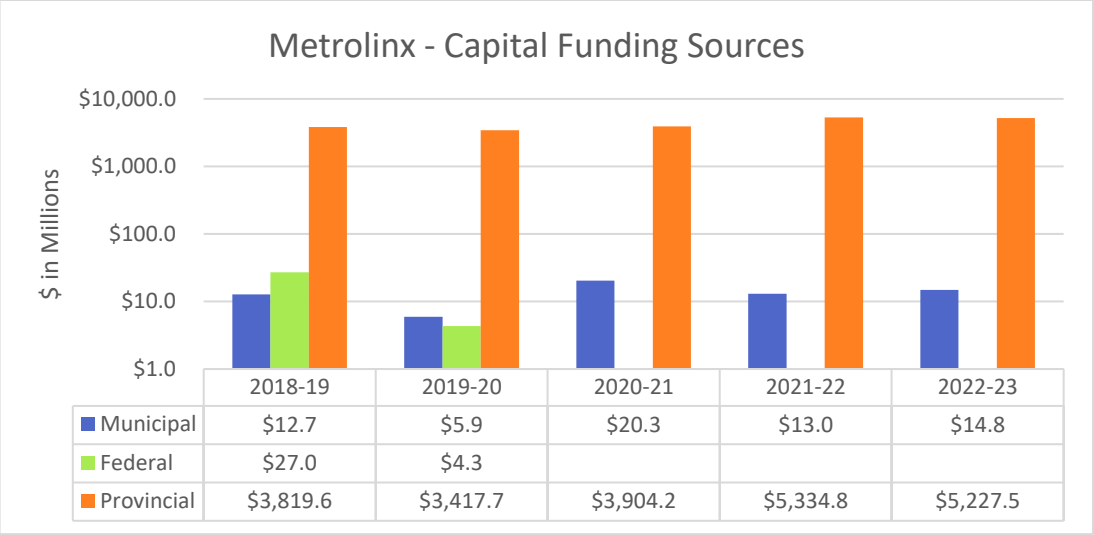


Figure 7: Metrolinx Total Revenue and Operating Subsidy, 2022-2023 (Metrolinx, 2023)

Capital funding for Metrolinx projects is also primarily provided by the provincial government, with some additional funding from municipal governments as contribution towards the GO Growth program. According to the Metrolinx 2022-2023 Annual Report, the transit agency received over $5 billion in capital funding from the Government of Ontario (Metrolinx, 2023). **Figure 8** further illustrates government funding received by Metrolinx to fund its capital projects and programs over the past five fiscal years.



	2018-19	2019-20	2020-21	2021-22	2022-23
Municipal	$12.7	$5.9	$20.3	$13.0	$14.8
Federal	$27.0	$4.3			
Provincial	$3,819.6	$3,417.7	$3,904.2	$5,334.8	$5,227.5

Figure 8: Metrolinx Capital Funding Sources (2018-2023)

VIA Rail

VIA Rail was formed in 1977 and is Canada's Crown corporation responsible for providing basic levels of passenger rail service across the country. The Windsor to Quebec City Corridor is VIA Rail's largest market providing intercity services between Canada's largest cities consisting of both business and leisure travel. The corridor occupies 96% of trips booked with VIA Rail which are mainly intercity trips, while the remaining trips are either Long-Distance (2%) or Regional trips (2%) (VIA Rail, 2021b). Prior to the COVID-19 pandemic, total passenger volumes reached over 5 million in 2019, before declining to nearly 1.2 million in 2020. Passenger levels have been increasing steadily over the past few years and reached 3.3 million passengers in 2022 (VIA Rail, 2023).

Since its inception, VIA Rail has struggled to maintain ridership and service quality, and has not managed to be financially self-sufficient, depending on federal subsidies to continue operations (Dupuis, 2015). The most significant issue that negatively impacts VIA services is that lack of control over on-time performance. VIA Rail owns a small segment of track infrastructure within the Windsor-Quebec City Corridor, while the majority of the rail infrastructure used by the company is rented from CN and CP freight rail companies. In Canada, there are currently no regulations that give passenger trains priority over freight trains and using freight rail infrastructure leads to significant delays for VIA Rail's passenger services as trains are required to "pull-over" to allow prioritized freight trains to pass (Dupuis, 2015). This has resulted in degraded service levels in recent years as VIA Rail's 2022 Annual Report estimates only 57% of trains arrived on time in 2022, compared to 72% in 2021 (VIA Rail, 2022). VIA Rail also operates like an airline service rather than a regional transit service, which makes it impractical for daily commuting. For example, VIA imposes weight

requirements for carry-on and checked baggage, charges fees for transporting bicycles, and requires passengers to line up prior to boarding (VIA Rail Canada, 2024).

Due to the large market share, infrastructure investments and upgrades are mostly centred within the Windsor – Québec City corridor. In 2019, the federal government began exploring VIA Rail's proposal for High-Frequency Rail (HFR) along the Toronto – Québec City Corridor and established VIA HFR – VIA TGF Inc., a wholly owned subsidiary of VIA Rail responsible for the development and implementation of the HFR project. The proposed network will be approximately 1,000 km in length, and run on mostly dedicated tracks at higher frequencies and higher speeds, connecting major cities including Toronto, Peterborough, Montreal, Trois-Rivieres and Québec City, and operating alongside existing VIA Rail Corridor services (Government of Canada, 2022).

Private-Sector Intercity Bus Services

Since the deregulation of the intercity bus industry in 2021, new mobility providers have surfaced in Ontario offering intercity bus services between Toronto, Guelph/Kitchener, Niagara, and Ottawa. Although Greyhound discontinued all Canadian services in 2021, new private intercity bus service companies have recently entered the Ontario market to fill the gaps and provide long-distance intercity travel services between major cities. However, some service gaps remain, particularly within smaller communities where ridership is low (Transport Canada, 2023). While there are many diverse types of intercity bus service companies operating in Ontario, the following section discusses two of the most popular intercity bus operators that provide some services within the Greater Golden Horseshoe (GGH).

Coach Canada/Megabus

Coach Canada is a subsidiary of Coach USA, which owns more than 25 bus carriers in North America, making it one of the largest transportation companies in North America. Coach Canada services include bus routes, motorcoach tours, charters, and city sightseeing tours.

Megabus was started by Stagecoach in the United Kingdom in 2003, who were one of the first to discover that the ultra low-cost airline model of aggressive cost cutting could be applied to the intercity bus market. Megabus uses cost cutting methods such as curbside bus operations, online ticket sales, and double decker buses to transport more passengers per trip. The ultra low pricing strategy is also part of Megabus' brand identity, as they were the first company to offer $1 bus tickets. The operator launches the first ticket for every trip at $1 and as demand for the bus trip increases and fewer seats are available, the company is able to adjust their prices accordingly (Busbud, 2015). The pricing structure considers the natural "peaks and valleys" of travel habits and is dependent on the customers' timing and demand for a specific route. Although such drastically low rates means that company can see losses on a day-to-day basis, the overall volume of tickets sold generates sufficient revenue in the long run (Ordoro, 2012). Megabus has

served more than 50 million customers and over 100 cities across North America. The motorcoaches are equipped with free wi-fi, at-seat plug ins, 3-point seatbelts, and panoramic windows.

Megabus, was introduced in Canada in August 2009 after it partnered with Coach Canada, however Megabus services increased significantly after the exit of Greyhound in 2021 and also secured a spot at Union Station Bus Terminal (Westoll, 2021). A quick online search through their website revealed that bus routes are mainly support long-distance trips between select cities in Ontario and Québec such as London, Toronto, Kingston, Ottawa, and Montreal, while connections between cities within the GGH are limited or non-existent.

FlixBus

FlixBus was founded in Germany soon after the intercity bus market deregulation in 2011. FlixMobility operates one of Europe's largest long-distance bus networks, and due to its unique business model and innovative technology, the company has expanded globally to North and South America. FlixBus has been operating in the North American market since 2018 and acquired Greyhound Lines Inc. in 2021, the largest provider of long-distance bus transportation in the United States (Rest, 2021).

FlixBus launched its Ontario network in April 2022, beginning with new connections between Waterloo-Toronto, Niagara Falls-Toronto, and an express route between Ottawa-Toronto (FlixBus, 2022). Soon after, FlixBus began cross-border services between the U.S. and Canada, such as the New York City – Toronto and Seattle-Vancouver routes (FlixBus, 2023). Within the GGH, FlixBus provides daily, direct services along the following routes:

- Niagara Falls – Toronto (Union Station and Pearson Airport)
- Hamilton (McMaster) – Toronto (Union Station)
- Kitchener – Toronto (Union Station and Pearson Airport)
- Whitby – Scarborough – Toronto (Union Station)

The FlixBus business model is unique to the intercity bus industry, as it resembles that of a franchise business model, while also incorporating innovative technologies. While FlixBus handles the technology development, network planning, operations control, and marketing and sales side of the business, it relies on trusted local partners to maintain the daily route operations (FlixBus, 2022). In Ontario, the entire FlixBus network is comprised of local bus partners, many of which are family-owned, resulting in revenues going back to local businesses and the communities they serve.

OnexBus

OnexBus is a family-owned intercity bus transportation company operating in Ontario and provides daily trips between select cities in the region. Unlike IBS companies previously discussed, OnexBus focuses on providing regional services and has been working to expand their business and fill service gaps. The Ontario Express Bus (OnexBus) route

operates between London – Stratford – Kitchener – Brampton – Pearson Airport – Downtown Toronto (OnexBus, 2024). However, some trips may require multiple stops and can be inconvenient for daily commuting needs. For example, a trip from Kitchener to Brampton, first drives out to Toronto Pearson Airport and Union Station, before reaching the final destination in Brampton.

Recently, OnexBus has teamed up with the City of Stratford to help connect locals with surrounding larger cities. After Metrolinx discontinued its GO Train service between London and Toronto, the City has been looking for new transportation solutions, while OnexBus was looking to expand its service routes. Beginning in January 2024, OnexBus began daily services between Stratford, London, Kitchener-Waterloo, Toronto Pearson Airport, and Downtown Toronto (Simmons, 2023).

TOK Coachlines

TOK Coachlines is a private company that provides a variety of motor coach services such as private bus rentals, and casino tours. A segment of its business includes scheduled bus routes operating 3 days a week (Monday, Wednesday, and Friday), between Port Elgin and Vaughan, via Pearson Airport (TOK Coachlines, 2024). The company previously had also operated a scheduled bus route between Haliburton to Toronto, serving the Haliburton, Kawartha, and Durham regions, however the company recently announced that this route would be discontinued as of January 31st, 2024, (TOK Coachlines, 2023).

Regional Commuting Trends

As discussed previously, there is a large share of individuals who are commuting long distances for work around the Greater Golden Horseshoe (GGH). According to the 2021 Census Profile, approximately 83% (over 2.5 million people) of the surveyed population commutes by private vehicles (as a driver or passenger), and nearly 30% (720,000 people) of the surveyed population commutes to work outside of their regional municipality (census division) of residence (StatCAN, 2022). As shown in **Figure 9**, private vehicle travel is the dominant mode of transportation in the Greater Golden Horseshoe. Also, in most regions, more people are commuting by active or "other" modes of transportation than taking public transit, except for the Cities of Toronto and Hamilton, and Peel Region, where public transit has a higher commuting mode share. Moreover, due to the limited regional transit options, it can be assumed that public transit commuters are mainly commuting to work within their city of residence (census subdivision). The duration of commutes is another indication of long-distance commuting. **Figure 10** illustrates the average commuting time by region and shows that there is a greater proportion of long-distance commuters in outer regions such as Kawartha Lakes, Dufferin, and Simcoe County. Lastly, **Figure 11** plots the percentage of the population with commuting durations of 60 minutes or longer relative to total commuting population for each region. This demonstrates that while GTHA regions have a generally average percentage of long-distance commuters, they represent about 75% (25,000) of the long-distance commuting population. Assuming that individuals with commute times of 60 minutes or longer are intercity commuters, it can be estimated that about 47% of intercity commuters in the GGH had commute times of 60 minutes or longer (StatCAN, 2022).

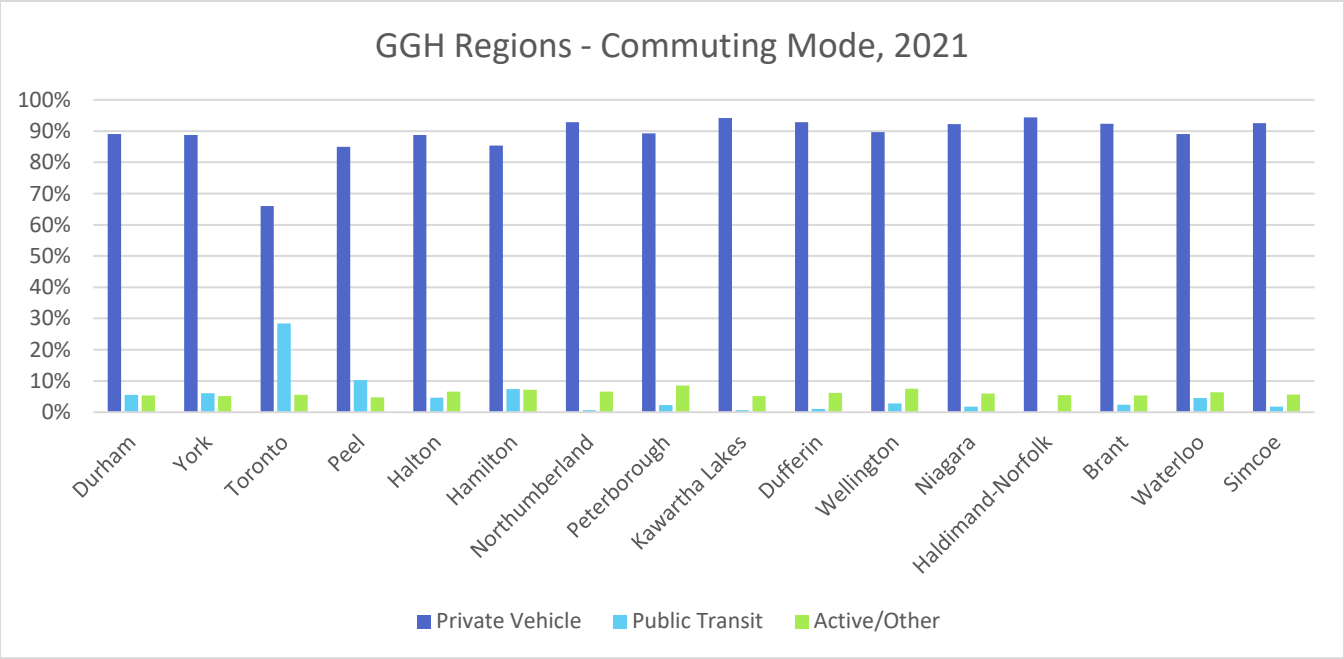


Figure 9: Commuting Mode for GGH Regions, 2021 (StatCAN, 2022)

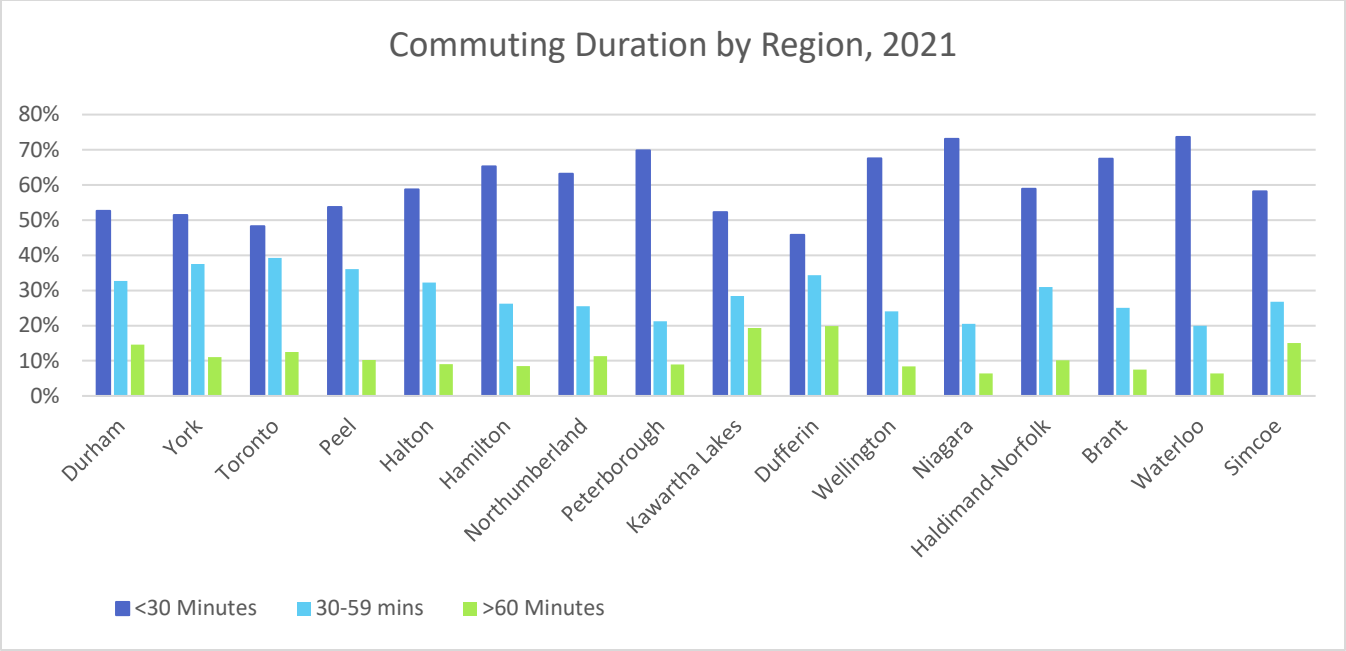


Figure 11: Long-Distance Commuting in the GGH by Region, 2021 (StatCAN, 2022)

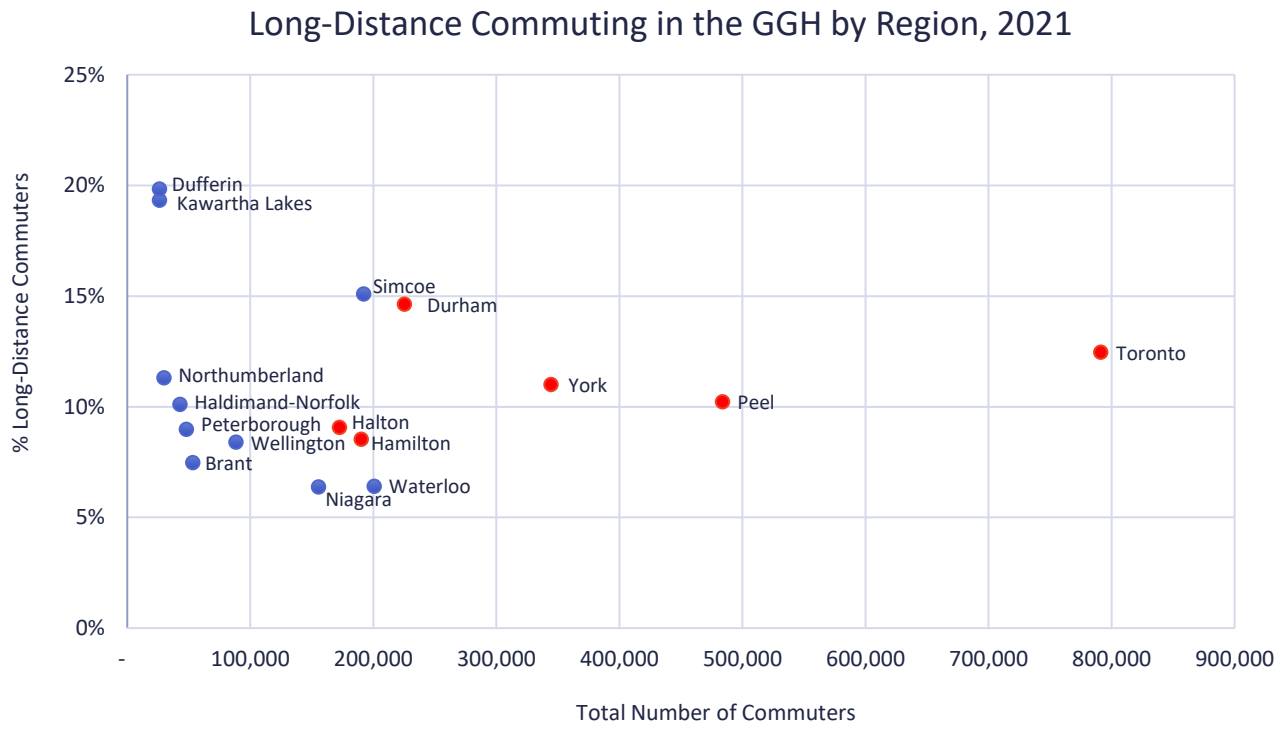


Figure 10: Commuting Duration for GGH Regions, 2021 (StatCAN, 2022)

Table 3 summarizes the 2021 commuting flow data available from Statistics Canada (Statistics Canada, 2023). The table shows the population of commuters from their Census Division (CD) of residence (Origin) to the CD of their workplace destinations (Destination) and highlights the diversity of intercity commuting patterns between GGH regions (Statistics Canada, 2023). Additionally, regions that are adjacent to the origin CD are highlighted in purple (GTHA regions) and orange (outer ring regions). In most cases, the greatest volume of intercity commuters is from neighbouring regions. For example, 40% of intercity commuters to Durham are residents of York Region and Kawartha Lakes, while nearly 70% of intercity commuters to Wellington County, are residents of Waterloo Region.

Table 3: GGH Regional Intercity Commuting Matrix (2021) (Statistics Canada, 2023)

	Inner Ring - GTHA						Outer Ring – Greater GGH									
Destination:	Hamilton	Halton	Peel	York	Toronto	Durham	Niagara	Haldimand-Norfolk	Brant	Waterloo	Wellington	Dufferin	Simcoe	Kawartha Lakes	Peterborough	Northumberland
Origin:																
Hamilton		94,965	6,265	770	4,290	95	3,210	1,165	2,950	2,120	1,160		70		15	
Halton	7,430		30,365	2,490	14,110	160	835	85	595	1,385	1,825	105	155		30	
Peel	1,940	21,965		23,170	69,390	630	415	75	200	1,400	1,280	1,090	1,085	15	85	35
York	365	1,205	16,010		83,055	3,895	150	20	40	405	290	135	3,430	95	85	80
Toronto	1,175	4,690	46,545	67,470		7,615	395	35	115	740	475	195	945	100	220	130
Durham	130	325	3,800	15,705	44,840		60	10	40	170	80	20	455	795	1,015	1,235
Niagara	10,220	3,860	1,965	385	1,775	130		970	250	365	115	15	90	15	20	15
Haldimand - Norfolk	5,090	110	315	65	250	35	1,425		3,370	535	110					
Brant	4,255	1,315	865	125	500	30	110	1,200		3,740	430		20			
Waterloo	1,625	3,035	3,685	545	1,865	105	165	125	2,350		13,580	30	40	20	30	15
Wellington	750	3,445	4,280	425	1,315	40	75	20	180	8,105		845	145	10	10	10
Dufferin	30	500	6,010	855	1,095	30	25			95	955		1,135			
Simcoe	140	400	9,835	15,960	8,795	515	75	20	25	140	190	710		115	65	
Kawartha Lakes	25	20	160	1,010	855	3,845				20	25		480		2,560	120
Peterborough	50	85	175	400	730	2,165	30	30		30	15		70	1,455		1,060
Northumberland	15	20	195	200	825	80	20		10		10		40	1,675	3,275	
Total	33,240	135,940	130,470	129,575	233,690	19,370	6,990	3,755	10,125	19,250	20,540	3,145	8,160	4,295	7,410	2,700

Intercity Transit Travel Time and Cost Assessment

As discussed previously, Metrolinx is the primary intercity public transit service provider in the GGH, and as such, it has the leading authority and financial means to generate connections between regions. However, currently its mandate typically spans the GTHA and the GO Transit service area, with some service connections among the outer regions (Metrolinx, 2018). Aside from Metrolinx, VIA Rail is the only other regional rail alternative. However, services typically operate once per day, are limited to specific regions, and ticket prices are significantly higher than other travel mode options, making VIA Rail an unviable option for daily intercity commuting within the GGH. Lastly, private intercity bus service (IBS) companies, such as Megabus and Flixbus, are providing much needed services between major cities in Ontario. However, traditional IBS companies mainly focus their services on connecting distant cities, such as London, Toronto, Ottawa, and Montréal, and are typically used as a low-cost alternative to air and rail travel. Therefore, within the GGH, existing IBS services are limited to a few cities and primarily provide connections to Toronto Pearson Airport and Union Station in Toronto.

To examine current gaps in intercity public transit services across the GGH, a high-level assessment of the travel time and cost for one-way trips between regions were searched and recorded in **Table 4**, based on the following:

- Travel time estimates were generated using Google Maps, while costs were estimated using GO Transit Fare calculators.
- Trips were selected based on a morning commute, with a departure time between 6AM and 7AM to arrive at a potential workplace destination around 9 AM.
- The origin-destination for each trip is primarily between GO Transit stations, or major transit hubs, where GO stations do not currently exist.
- For GTHA regions with multiple GO Transit stations, the largest stations in proximity to dense employment areas were selected.
- GO Transit trip options were selected over alternative options such as VIA Rail and private intercity bus services (e.g., FlixBus, Megabus), unless only alternative options were available.

Overall, **Table 4** reveals the serious lack of public transit options for a large share of intercity commuters in the GGH. Of the 240 intercity trips that were analyzed, only 23% (55) of them had transit travel times of 2 hours or less. Meanwhile, over 77% (185) of these city pairs had either transit travel times of over 2 hours, required multiple mode transfers, no morning transit options, or no existing public transit options available. As a result, with the lack of viable intercity bus services among these regions, intercity commuters among the majority of GGH regions are forced to rely on private vehicles for their daily commuting needs.

Table 4: Morning Peak Travel Time and Cost of Inter-Regional Public Transit Services in the GGH

TO:	Hamilton	Halton	Peel	York	Toronto	Durham	Northumberland	Peterborough	Kawartha Lakes	Simcoe	Dufferin	Wellington	Waterloo	Brant	Haldimand-Norfolk	Niagara
FROM:																
Hamilton		40 mins - $8 1 Transfer	1 hr - $10	2 hrs - $15 1 Transfer	1.25 hrs - $12	2.5 hrs - $17 1 Transfer	VIA/GO/IBS 3.5 hrs	5 hrs - $30 3 Transfers		4 hrs - $20 2 Transfers	3 hrs - $15 4 Transfers	GO Bus 1.5 hrs - $13	GO Bus + Transit 2.25 hrs - $17	1 hr - $8 1 Transfer		2 hrs - $13 1 Transfer
Halton	1.5 hrs - $8 1 transfer		45 min - $7	2 hrs - $13	40 min - $10	2 hrs - $14	VIA/GO/IBS 4 hrs	3.5 hrs - $25 1 Transfer		3 hrs - $21 2 Transfers	3 hrs - $15 2 Transfer	2.5 hrs - $12 1 Transfer	3 hrs - $17 1 Transfer	2 hrs - $14 3 Transfers		2 hrs - $18 1 Transfer
Peel	1 hr - $10	40 min - $7		1 hr - $12 1 Transfer	1 hr - $10 1 Transfer	2 hrs - $14	VIA/GO/IBS 2-3 hrs	4 hrs- $22 2 Transers		2.5 hrs - $15 2 Transfers	2 hrs - $10 2 Transfers	1.5 hrs - $12	1.5 - $17 1 transfer	1.5 hrs - $16 1 Transfer		2.5 hrs - $20 1 Transfer
York	2 hrs - $14 1 transfer	1.5 hrs - $11 1 Transfer	45 mins - $9		30 min - $3 Local Transit	1 hr - $10	VIA/GO/IBS 2-3 hrs	3 hrs - $20 1 Transfer		3 hrs - $20 2 Transfer	3 hrs - $15 1 Transfer	2 hrs - $15 1 Transfers	2.5 hrs - $20 1 Transfer	2.5 hrs - $20 2 Transfers		3.5 hrs - $20 2 Transfer
Toronto	1.5 hrs - $12	45 mins - $10	1 hr - $10	30 min - $3 Local Transit		1 hr - $10	VIA/IBS 2 hrs	2.5 hrs - $20 1 Transfer		2.5 hrs - $16	2 hrs - $14 1 Transfer	2.5 hrs - $15 1 Transfer	2 hrs - $20 1 transfer	2.5 hrs - $16 1 Transfer		3 hrs - $21 1 Transfer
Durham	2.5hrs - $21	2 hrs - $14	2.5 hrs - $16 1 Transfer	2 hrs - $15 1 Transfer	1 hr - $10		VIA/GO/IBS 2-3 hrs	1.5 hrs - $14		4 hrs - $23 2-3 Transfers	3hrs - $17 2 Transfers	3.5 hrs - $20 1 Transfer	3 hrs - $23 2 Tansfers	3.5 hrs - $25 2 Transfers		4 hrs - $25 1 Transfer
Northumberland	IBS-GO 3.5 hrs	IBS-GO 3 hrs	VIA/GO/IBS 2-3 hrs	VIA/GO/IBS 2-3 hrs	VIA/IBS 2 hrs	IBS-GO 3 hrs		VIA-GO Bus 3-4 hrs		GO - IBS 3-4 hrs	IBS - GO 6 hrs	IBS/GO/VIA 4 hrs	IBS-GO 4 hrs	IBS-GO 4 hrs		IBS-GO 4 hrs
Peterborough	5 hrs - $30 2 Transfers	4 hrs - $27 2 Transfers	4 hrs - $25 2 Transfers	3 hrs - $18 1 Transfer	3 hrs - $22 1 Transfer	1.5 hr - $16	VIA-GO Bus 3-4 hrs			5-6 hrs - $30 3 Transfers	7 hrs - $30 3 Transfers	5 hrs - $35 2 Transfers	5-6 hrs - $35 3 Transfers	6 hrs - $35 2 Transfers		5.5 hrs - $37 3-4 Transers
Kawartha Lakes																
Simcoe	3.5 hrs - $20 2 Transfers	3 hrs - $20 1 Transfer	3 hrs - $15 2 Transfers	3 hrs - $20 1 Transfer	2 hrs - $15	3 hrs - $20 1 Transfer	Transit - IBS 3 hrs	5 hrs - $35 2 Transfers			5 hrs - $25 2 Transfers	4 hrs - $25 2 Transfers	4 hrs $20 2 Transfers	5 hrs - $30 2 Transfers		5 hrs - $30 2 Transfers
Dufferin	3 hrs - $15 3 Transfers	3 hrs - $12 2 Transfer	2 hrs - $15 2 Transfer	3 hrs - $15 2 Transfer	2 hrs - $15 1 Transfer	3hrs - $17 2 Transfers	GO -Transit - VIA 6 hrs	6.5 hrs - $30 3 Transfers		5 hrs - $25 2 Transfers		3 hrs - $15 1 Transfer	3 hrs - $20 2 Transfers	5 hrs - $25 3 Transfers		5 hrs - $30 3 Transfer
Wellington	2 hrs - $13 1 Transfer	2 hrs - $12 1-2 Transfers	1.5 hrs - $12 1 Transfer	2 hrs - $17 1 Transfer	1.5 hrs - $15	3 hrs - $20 1 Transfer	GO/VIA 4 hrs	5 hrs - $30 2 Transfers		4 hrs - $25 3 Transfers	2.5 hrs - $15 1 Transfers		1 hr - $10 1 Transfer	3 hrs - $15 3 Transfers		4 hrs - $20 2-3 Transfers
Waterloo	2.5hrs - $15 1 Transfer	2.5 hrs - $17 1 Transfer	2 hrs - $15 1 Transfer	2.5 hrs - $20 2 Transfers	2 hrs - $18	3 hrs - $22 2 Transfers	GO/VIA/IBS 4 hrs	6 hrs - $35 2 Transfers		4 hrs $20 2 Transfers	2 hrs - $10 2-3 Transfers	20 min - $10		3.5 hrs - $30 3 Transfers		4.5 hrs - $30 3 Transfers
Brant	1 hr - $10 1 Transfer	2.5 hrs - $12 2 Transfers	2 hrs - $15 1 Transfer	3.5 hrs - $20 2 Transfers	2.5 hrs - $15 1 Transfer	4 hrs - $25 1-3 Transfers	VIA - GO 4 hrs	7 hrs - $40 3 Transfers		5 hrs - $30 2 Transfers	4 hrs - $25 3 Transfers	2 hrs - $15 1 Transfer	3.5 hrs - $20 2 Transfers			3.5 hrs - $18 2 Transfers
Haldimand-Norfolk																
Niagara	2 hrs - $12 1 Transfer	3 hrs - $12 2 Transfers	3 hrs - $15 1 Transfer	4 hours - $25 2 Transfers	3 hrs - $20 1 Transfer	4.5 hrs - $30 1 Transfer	GO/IBS/VIA 5 hrs	6 hrs - $40 2 Transfers		5.5 hrs - $30 3 Transfers	5 hrs - $30 3 Transfers	3 hrs - $20 2 Transfers	4.5 hrs - $30 2 Transfers	4 hrs - $17 2 Transfers		

Legend
N/A
No public transit options exist
No morning transit options available
Alternative Transit Options Only
GO trips of 2 hours or longer
GO trips between 1-2 hours
GO trips of less than 1 hours

Regional Transit
GO – GO Transit (Bus/Rail)
ONTC – Ontario Northland
Local Transit
Alternative Transit Services
VIA Rail
IBS – Private Intercity Bus Services

Origin-Destination by Region	
Hamilton	Hamilton Center GO
Halton	Oakville GO
Peel	Square One GO
York	Yorkdale GO
Toronto	Union Station
Durham	Oshawa GO
Peterborough	Peterborough Bus Terminal
Kawartha Lakes	N/A
Simcoe	Allandale GO
Dufferin	Orangeville
Wellington	Guelph Central GO
Waterloo	Kitchener GO
Brant	Brantford Bus Terminal
Haldimand-Norfolk	N/A
Niagara	Niagara Falls Bus Terminal

Regional Commuting Trends – Analysis and Discussion

GTHA Regions

The GTHA regions include regions of Durham, York, Toronto, Peel, Halton, and Hamilton, and are also referred to as the "Inner Ring." The regions of the GTHA consist of the highest population and employment densities throughout the GGH and are the primary focus for regional public transit infrastructure investment. **Figure 12** compares commuting trends for GTHA Regions, which shows that despite considerable investment in public transit services, the majority of the commuting population commute by private vehicles. Moreover, nearly 40% of commuters from Durham, York, and Halton commute to a different region for work, and average of 30% for the GTHA as a whole.

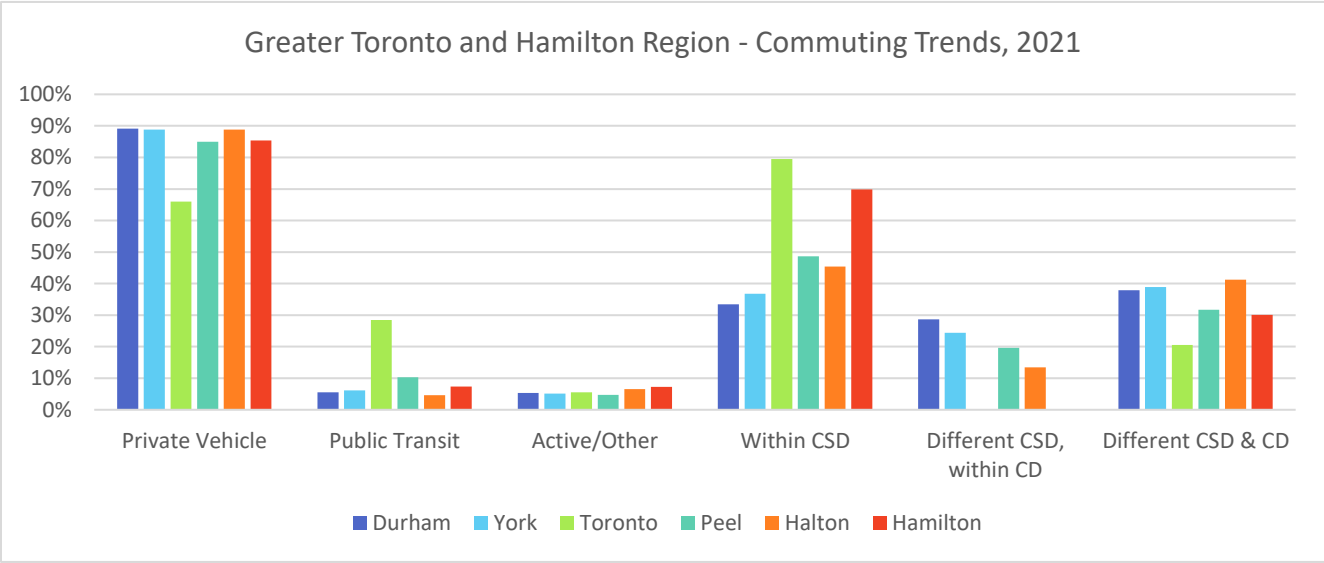
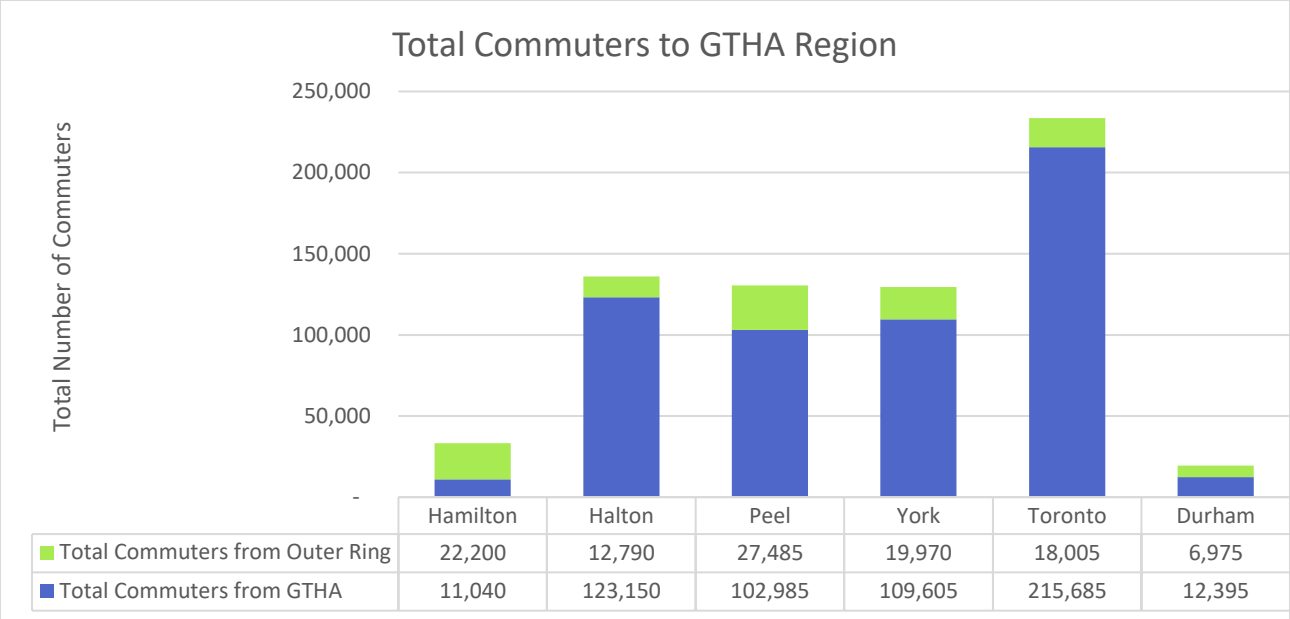


Figure 12: Comparison of GTHA Region Commuting Trends, 2021

In addition to GTHA residents commuting outside of their regions, there is also a significant population of residents commuting daily from the outer regions to the GTHA regions. For example, approximately 8,620 people commute daily from the Waterloo Region to Toronto, of which 93% commute by private vehicle (Statistics Canada, 2022b). **Figures 13** and **14** compares the total number of commuters to each of the GTHA regions from other GTHA Regions and Outer Regions. While some intercity commuters from GTHA Regions may potentially have access to public transit options, the data suggests that over 100,000 intercity commuters from the Outer Regions are commuting to GTHA Regions by private vehicles.



	Hamilton	Halton	Peel	York	Toronto	Durham
Total Commuters from Outer Ring	22,200	12,790	27,485	19,970	18,005	6,975
Total Commuters from GTHA	11,040	123,150	102,985	109,605	215,685	12,395

Figure 14: Comparison of Total Commuters to GTHA Regions (Statistics Canada, 2023)

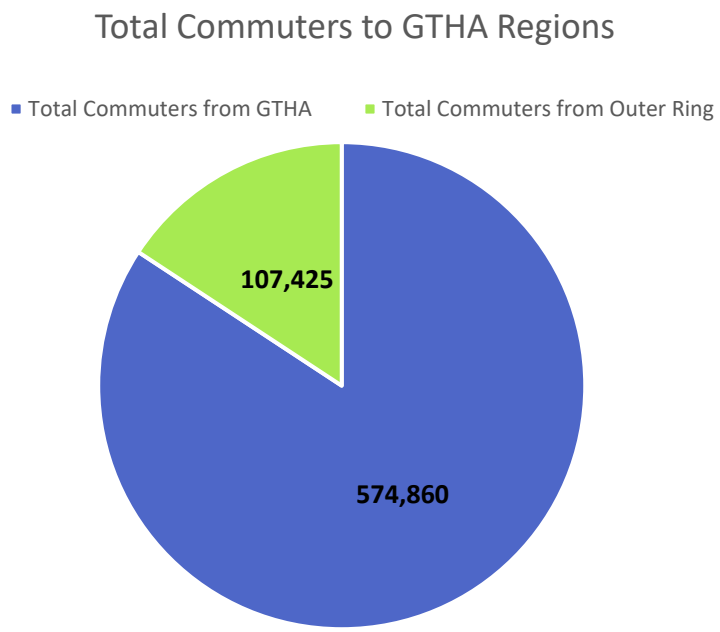


Figure 13: Total Commuters to GTHA Regions (Statistics Canada, 2023)

Due to the ongoing investment in public transit services within these regions, the travel time and cost to take public transit between these regions is lower compared to other regions. For example, as shown in **Table 4** commuting between Durham Region and Toronto takes approximately 1 hour and costs $10, while commuting to Niagara Region can take up to four hours. Moreover, public transit travel times and costs are expected to decrease within the GTHA as GO Expansion plans and Frequent Rapid Transit Network projects become operational over the next ten years (Metrolinx, 2018).

However, it is important to note that although travel times are lower within these regions, they are still not comparable to the low travel time and costs of travelling by private vehicle. The majority of the commuting population commutes by private vehicles within these regions, accounting for approximately 1.7 million people. The City of Toronto has the highest percentage of commuters using public transit, however public transit users mainly commute to destinations within the city.

Outer Regions

Outer Regions of the GGH include Northumberland, Peterborough, Kawartha Lakes, Simcoe, Dufferin, Wellington, Waterloo, Brant, Niagara, and Haldimand-Norfolk. Using the data provided in Table 3, **Figure 15** compares the population of commuters traveling daily to the outer regions of the GGH. The estimates suggest that Waterloo Region and Wellington County, which are neighbouring regions, receive over 40,000 daily intercity commuters combined (Statistics Canada, 2023). This figure is likely to have changed as commuting trends return to pre-pandemic levels and will continue to increase according to the population and employment growth projections for the two regions. **Figure 16** illustrates the total population commuting daily to Outer Regions and indicates that over 86,000 people commute to Outer Regions, of which 53,000 commute from GTHA regions (Statistics Canada, 2023). Moreover, because of the notable lack of intercity public transit services, it can be assumed that the majority of these trips are made by private vehicles.

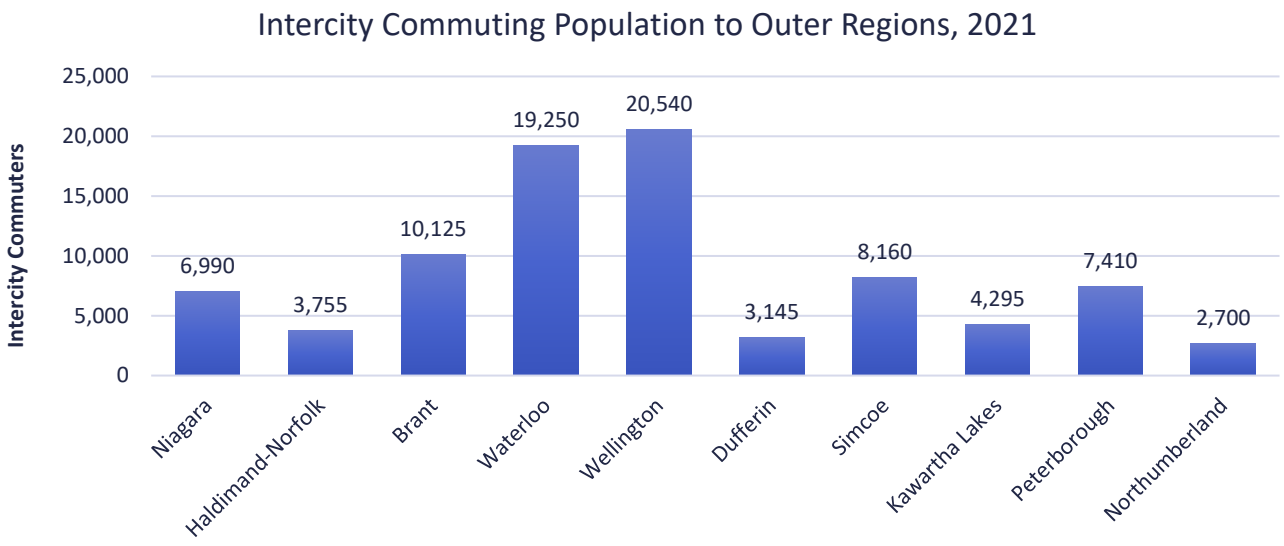


Figure 15: GGH Intercity Commuting Population to Outer Regions, 2021

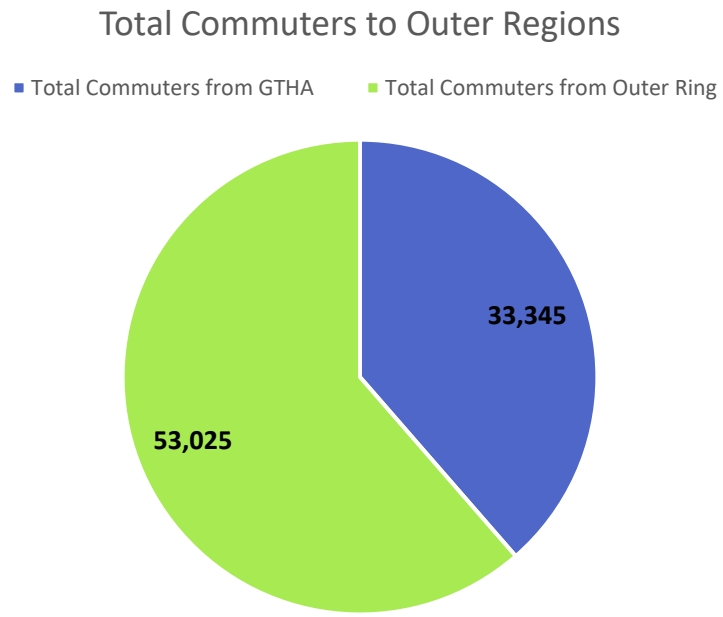


Figure 16: Total Commuting Population to Outer Regions

The intercity transit travel time and cost assessment (**Table 4**) demonstrates that intercity public transit options are severely limited among the Outer Regions. For instance, there are currently no intercity public transit options for residents of Kawartha Lakes and Haldimand-Norfolk, which currently have among the highest proportion of intercity and car dependent commuters. Moreover, intercity commuting to and from Northumberland is only possible using multiple transit modes that include VIA Rail, GO Transit, and private intercity bus services (IBS) such as MegaBus and FlixBus. Finally, there are virtually no viable inter-regional public transit connections to and from Dufferin and approximately 51% of daily commuters travel outside of the region. In some cases, such as in Waterloo Region and Niagara Region, the transit trip time and cost are lower between GTHA regions, while transit commute times to neighbouring regions of Brant and Wellington County are severely inadequate.

The assessment of intercity public transit services among the GGH regions has shown that that there are considerable service gaps, particularly among outer regions. In most cases, a viable intercity public transit option is virtually nonexistent, even between neighbouring regions. Meanwhile, as shown in **Figure 17**, the 2020 Ontario Growth Plan estimates that the majority of the Outer Regions are expected to see population increases of 40% or more (MMAH, 2020). Similarly, the CANCEA report estimates that daily commuter trips across the GGH will increase by an additional 2.9 million.

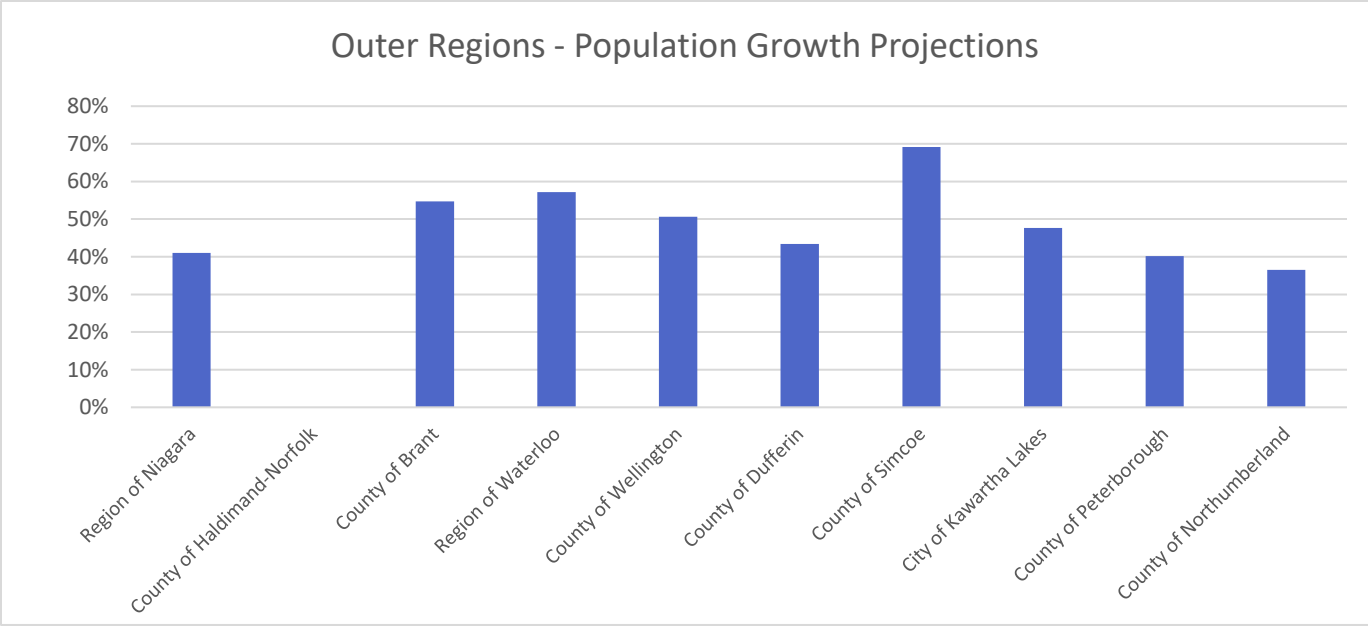


Figure 17: 2051 Population Growth Projections for Outer Regions (MMAH, 2020)

***Note:** Population Growth Projections were not available for the County of Haldimand-Norfolk as a whole, but population growth is expected for the region.*

GIS Map Analysis

To supplement the assessment of regional commuting trends, GIS maps were created to provide geographical demonstration of intercity public transit service gaps in the GGH.

GGH Transit Network Map

The GGH Transit Network Map (**Figure 18**) includes major regional transportation modes including VIA Rail, major Airports, the Metrolinx regional transit network, and major intercity bus service stops for Megabus and Flixbus. The Regional Transit Network consists of existing transit service lines, the GO Transit Expansion and Rapid Transit projects that are "in delivery," and the proposed Frequent Bus Rapid Transit network.

The map illustrates the extent of the existing and planned intercity public transit network and demonstrates the limitations of the network subsequent lack of connections to the outer regions. Regional Transit Networks that are proposed, advancing, or in delivery are primarily located within the GTHA or a single region, and would generally not benefit intercity commuters. Similarly, The locations of the intercity bus stops are also located along the existing transit network lines, with limited connections to the outer regions.

GGH Regional Transit Network Map - GIS Data Sources

- GGH Municipal Boundary Limits - (ESRI, 2023)
    - The boundary identifies upper-tier municipalities across the Greater Golden Horseshoe as identified by the Growth Plan for the GGH.
- Metrolinx – Frequent Rapid Transit Network - (Metrolinx, 2023)
    - The geospatial data illustrates existing and future transit network based on the 2041 Regional Transportation Plan and subsequent updates.
- VIA Rail Network - (VIA Rail Canada, 2024)
- Major Airports – Airport locations were added by using airport location coordinates obtained through Google Maps.
- Intercity Bus Service Stops – Location coordinates of IBS stops were collected via Megabus and FlixBus websites and then added manually to the map.

Employment Density and Intercity Commuting Map

Figure 19 presents a geographical assessment of employment density, significant employment zones, and urban growth centres in relation to the regional public transit network. The map includes major urban nodes as identified by the provincial Growth Plan, Provincially significant employment zones, gross employment density, and the percentage of commuters travelling outside of their region (Census division) of residence, according to the 2021 Census Profile.

The 2006 Growth Plan first identified 25 existing or emerging downtown areas as urban growth centres and established growth policies and minimum density targets to encourage their revitalization as vibrant, transit-oriented nodes. Although urban growth centres are identified spatially, the map shows UGS as points to highlight their location relative to the regional transit network.

Provincially significant employment zones (PSEZs) are areas designated for high economic output, and exclusively zoned for factories, warehouses, offices, big institutional employers, and commercial buildings. PSEZs were established through the Provincial Policy Statement and Growth Plan and considered as lands largely protected from conversion to non-employment uses. Although majority of the employment zones are located within the GTHA, there are employment zones that are not well connected by public transit in Haldimand-Norfolk Region, Waterloo Region, Wellington County, and Simcoe County.

Gross employment density is calculated by dividing the regional land area by the number of employed persons within the region, as per the 2021 Census Profile. As expected, most of the inner regions of the GTHA show higher employment densities. However, Waterloo Region and Niagara Region are the only outer regions that maintain a similar level of employment density as the GTHA.

The percentage of Intercity Commuters was calculated by dividing the population commuting to work outside of their region (Census Division) by the total number of commuters, as per the 2021 Census Profile. The results indicate that Dufferin has the highest percentage of its population commuting to a different region at 51%, followed by Kawartha Lakes at 46%, and Haldimand-Norfolk County at 42%.

The map also demonstrates that many of the outer regions that do not have a designated urban growth centre, also have lower employment density, and subsequently have a greater percentage of commuters travelling to neighbouring regions for employment opportunities.

Employment Density Map – GIS Data Sources

- Urban Growth Centres - (ESRI, 2022)
- Provincially Significant Employment Zones - (ESRI, 2022)

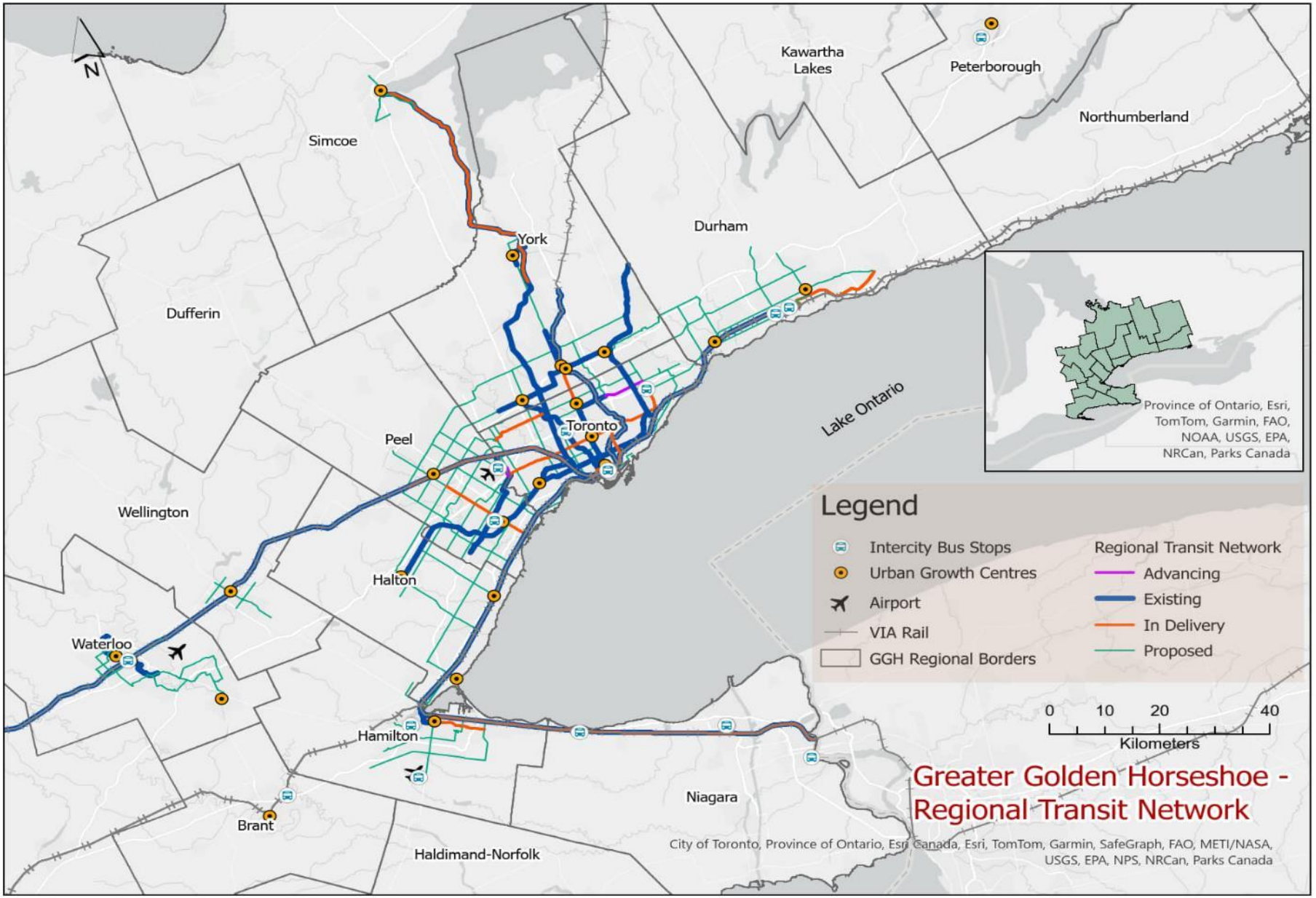


Figure 18: GIS Map of GGH Regional Transit Network

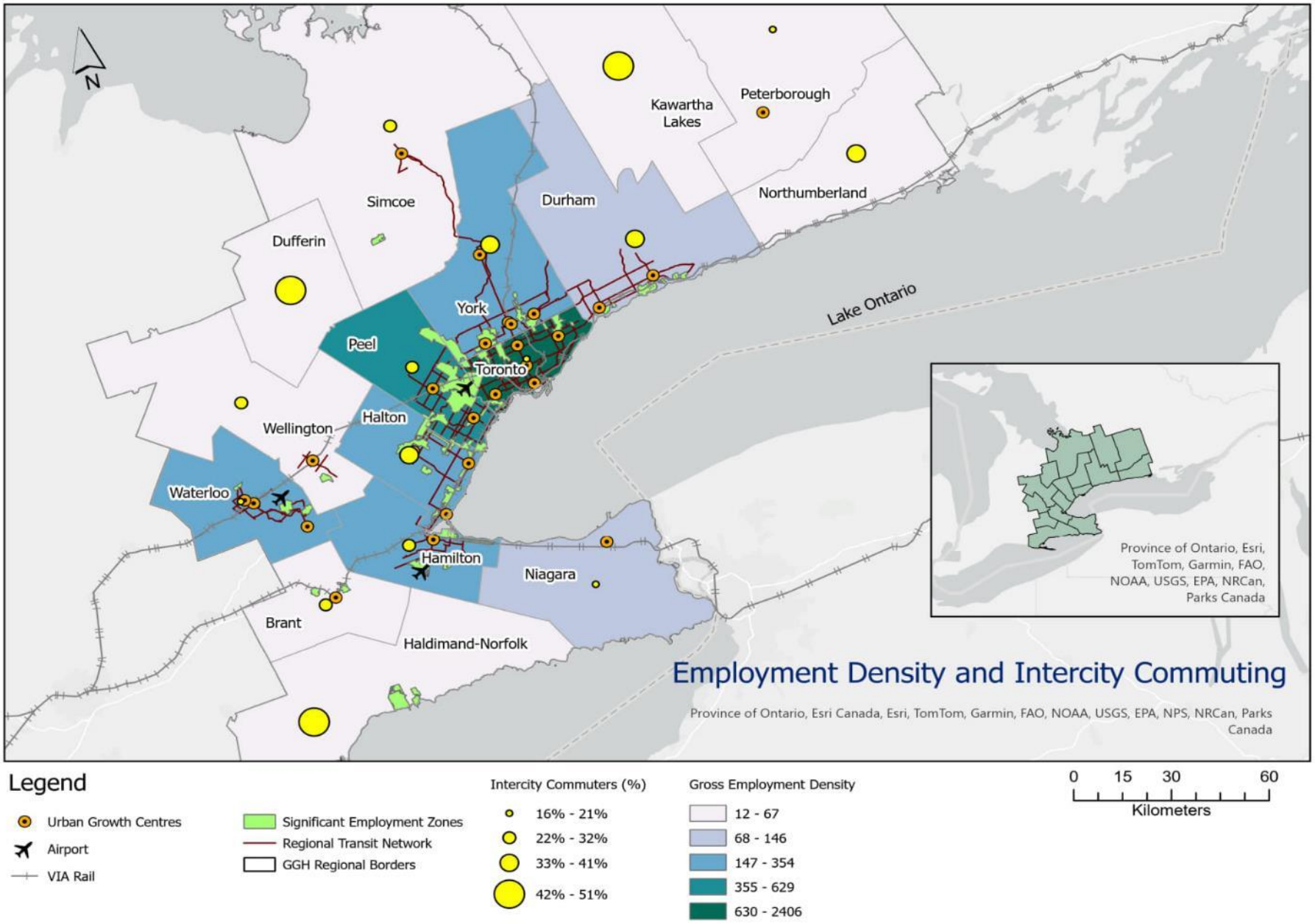


Figure 19: GIS Map of GGH Employment Density and Intercity Commuting

Section Conclusion and Discussion

The transportation networks across the Greater Golden Horseshoe (GGH) have been largely shaped by the ever-expanding road and highway infrastructure. Municipalities across the GGH are expecting significant population and employment growth over the next two decades and travel demand is expected to increase by over 50% during this time. As a result, municipalities are implementing a wide range of Transit-Oriented Development (TDM) strategies that aim to shift travel behaviour from predominantly single occupant vehicle travel to more sustainable modes. However, these strategies are being implemented within municipal jurisdictions, while cross-regional public transit services are mainly provided by Metrolinx.

While the GGH houses some of the largest transportation systems and hubs in Canada, travelling or commuting options within the region remain limited. Additionally, the GO Transit Expansion Plans and Frequent Rapid Transit Network plans are considered the largest transit infrastructure undertaking in Canada, yet these services remain limited to the GTHA, leaving outer regions in the GGH without adequate intercity transit options. Through the review of public transit services, it is evident that currently all public transit services are designed to connect major cities across the region to downtown Toronto:

- GO Rail services connect outer regions of the GTHA to Union Station in downtown Toronto.
- GO Bus services provide some alternative options for intercity commuters, but routes are largely concentrated within the GTHA.
- Intercity Bus companies operate on select routes connecting a few medium-sized cities to downtown Toronto.
- VIA Rail provides connections between select cities once per day on its way to and from Union Station.

As a result, existing public transit options are limited and are not viable options for evolving intercity commuting needs within the GGH. The following section briefly discusses some of the service and infrastructure investment gaps that limit public transit options for intercity commuters.

Regional Transit Service Gaps

Metrolinx is recognized as the regional transportation agency for the Greater Golden Horseshoe; however, its regional plans confirm that its mandate spans the Greater Toronto and Hamilton Area (GTHA) and the GO Transit service area. As a result, Metrolinx continues to focus on service improvements within the GTHA, while growing urban centres in Waterloo Region, Guelph, and Peterborough remain outside the reaches of the network. For example, new GO Rail Stations are planned along the existing network, while only new stations planned for Lakeshore East will

expand the network further outwards from Oshawa to Clarington, Ontario. Additionally, rather than expanding its GO Bus network, Metrolinx plans to reduce the number of bus routes and increase service frequencies within the GTHA.

Aside from Metrolinx, VIA Rail is the only other regional rail alternative in the region. Although VIA Rail has been investing heavily in service and infrastructure improvements along the Windsor-Québec City Corridor, it does not provide adequate intercity commuting services for residents within the Greater Golden Horseshoe. VIA Rail lines provide connections between major cities within the GGH such as Kitchener, Guelph, Brampton, and Toronto, as well as services between Niagara Falls, Brantford, Burlington, Oakville, and Toronto. However, daily trips are limited to once per day, while ticket prices are significantly higher than other travel mode options, making VIA Rail an unviable option for daily intercity commuting within the GGH.

Lastly, private intercity bus companies, such as Megabus and Flixbus, are providing much needed services between major cities in Ontario. Traditionally, an “Intercity Bus Service” is defined as buses that operate with limited stops over fixed routes, connecting two or more urban areas not in close proximity, and that has the capacity for transporting baggage carried by passengers (Law Insider, 2024). As such, intercity bus companies mainly focus their services on connecting distant cities such as London, Toronto, Ottawa, and Montreal, while services between major cities within the GGH remain limited. For example, there are no intercity bus services connecting Hamilton and Waterloo Region, which are two large urban centres, with three large universities and two major colleges between them, and just one hour apart from each other. There is an opportunity for intercity bus service companies to fill major gaps within the GGH by providing short-distance trips between major nodes in the region.

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APPENDIX B

Initial Business Case:
Waterloo – Wellington Inter-Regional Bus Services

Introduction

A business case is a comprehensive collection of evidence and analysis that sets out the rationale for why a problem or opportunity should be addressed and what the core requirements are for addressing it (Metrolinx, 2021). Given that this study is based within the Greater Golden Horseshoe (GGH) which is primarily served by Metrolinx, the study was conducted in general alignment with the Metrolinx Business Case Manual Volume 2: Guidance (Metrolinx, 2021b); however, this assessment does not represent a complete Initial Business Case, and further work would need to be conducted to explore the economic, financial, operations and deliverability aspects of the analysis presented herein.

The purpose of the Metrolinx Business Case Framework is to develop an evidence-based evaluation that informs investment decisions for transit projects exceeding $50 million (Metrolinx, 2021b). However, in addition to the Business Case, there are wider range of factors that are considered as part of the investment selection process, such as emerging trends and conditions, capacity to deliver the transit investment, feedback from public engagement, and policies and other investments that may impact the decision (Metrolinx, 2021b).

Initial Business Case

The Initial Business Case (IBC) is the first phase of the Metrolinx Business Case development process in which investment options are reviewed at a high-level and assessed based on the proposed problem and/or opportunity the project aims to address. Various investment options are compared, and a preferred option is selected to progress towards further refinement and design in the following phases, as shown in **Figure 1** below. The results of the IBC are typically used to secure funding from the Province for planning and preliminary design. For this research paper, the Initial Business Case framework is used to assess the feasibility of an inter-regional bus service between Waterloo Region and Wellington County.



FIGURE 1: METROLINX BUSINESS CASE LIFECYLE

IBC Scope and Objectives

The large volume of intercity commuters across the Greater Golden Horseshoe, followed by the significant population and economic growth projections reveals the increasing need for improved intercity public transit options. To better understand intercity commuting needs, this study attempts to analyze commuting behaviour between Waterloo Region and Wellington County and explore potential costs and benefits of implementing an intercity bus service. As such, this IBC aims to develop a case for public investment of an intercity bus service between Waterloo Region and Wellington County, Ontario. The findings, in turn, can be used to develop a preliminary framework that can be replicated and used to assess similar intercity bus service opportunities among the outer regions of the GGH.

The Initial Business Case uses existing data available through online resources to assess existing transportation trends and future demand projections. The data is used to assess the current and future impacts of intercity commuting within a Business-As-Usual scenario, followed by a high-level cost-benefit analysis of proposed intercity bus service investment options.

The 2016 and 2021 Census Profile was used to obtain high-level data regarding population, employment, income, and commuting trends. Additionally, the 2016 Transportation Tomorrow Survey (TTS) data provided more detailed information regarding travel mode, travel destination, and travel time. Although commuting trends may have changed since the release of the data sources, especially considering the impacts of COVID-19 pandemic, it can be assumed that population and employment growth followed by increases in commuting population post-COVID, have resulted in a higher volume of intercity commuters (Statistics Canada, 2023).

First, an overview of regional characteristics, transportation systems, and demographics presents the anticipated population and economic growth, which will impact transportation system demands. Second, the Business Case Overview introduces the Problem Statement and examines three key issues that can be addressed through the proposed investment. This includes a regional analysis that presents the current commuting demands between both regions and potential growth in future demands base on existing population, employment, income, and commuting trends. Third, a Business-As-Usual scenario is presented in which existing commuting trends and future demands are assessed based on current and planning transportation investments that support commuting between the two regions. Lastly, three proposed investment options are defined and explored following the Metrolinx Business Case Framework. The investment options are analyzed according to the four-case evaluation process described above to produce cost estimates, benefits, and potential implementation challenges.

The following **Table 1** describe the content to be evaluated during the Initial Business Case phase of the business case lifecycle, as defined by Metrolinx.

TABLE 1: INITIAL BUSINESS CASE FRAMEWORK **(METROLINX, 2021B)**

Context	Define the core problem and/or opportunity to be addressed by the proposed transportation investment and the types of benefits this investment can realize.
Investment Options	Define a set of investment options based on variations of the preferred option in the strategic business case.
Strategic Case	Detailed review of the strategic benefits of addressing a problem with a proposed investment.
Economic Case	Assessment of the investment options including user costs, external costs, and some wider benefits.
Financial Case	Assessment of investment implementation costs, including operation and maintenance costs, and revenue impacts.
Deliverability and Operations	High-level appraisal of risks and implementation requirements.

Background

The GGH is experiencing an increase in both the number of commuting trips and the average passenger kilometers travelled in journeys to work. With a rapidly growing population and economy, issues such as traffic congestion, GHG emissions, and lack of access to public transit in many parts of the region need to be addressed. Public investment in highway expansion projects to relieve traffic congestion continue to support an automobile-dependent transportation system. Meanwhile, government investments in public transit infrastructure projects are mainly within the GTHA, where multiple mode share options already exist. Lastly, the government estimates that 90% of the GHG emissions reductions in the transportation sector will come from the transition to electric vehicles (MTO, 2022), which does not address the issues related to increasing daily traffic congestion on regional roads and highways.

Outer regions are often overlooked for intercity public transit infrastructure projects due to lower population and density compared to regions of the GTHA. Metrolinx is investing more than $20 billion in the GO Expansion program to expand its rail system, with faster and high frequency trains and the capacity to move three times as many passengers by 2041 (Metrolinx, 2019). However, GO Transit services will continue to primarily serve regions within the GTHA, while outer regions, including Waterloo Region and Wellington County, will experience minimal service upgrades. As shown through the GGH Transportation Analysis, residents within outer regions typically travel longer distances for work and have the highest rate of auto-dependency. As a result, the lack of viable inter-regional public transit options among outer regions will continue to promote private vehicle dependency throughout the GGH and exacerbate the region's traffic congestion and GHG emissions problems.

To improve mobility within the GGH and achieve the GHG emissions reduction targets, investments in inter-regional public transit services are vital. While implementing public transit infrastructure in low density areas can be costly, implementing high-frequency, inter-regional bus services connecting major urban nodes and employment areas can provide a viable alternative mode of transportation for daily commuters.

Waterloo Region

The Region of Waterloo is an upper-tier municipality located northwest of the Greater Toronto and Hamilton Area (GTHA), along the Highway 401 corridor. The Region is nearly 100 km away from the City of Toronto, which allows it to be self-contained with its own economic region. Waterloo Region includes the Cities of Cambridge, Kitchener, and Waterloo, and the Townships of North Dumfries, Wellesley, Wilmot, and Woolwich (**Figure 2**). The Ontario Growth Plan identifies Uptown Waterloo, and Downtown Kitchener and Cambridge as Urban Growth Centres (UGCs) and mandates a minimum density target of 200 residents and jobs combined per hectare by 2031 for Waterloo and Kitchener, and 150 residents and jobs combined per hectare by 2031 for Cambridge (MMAH, 2020).

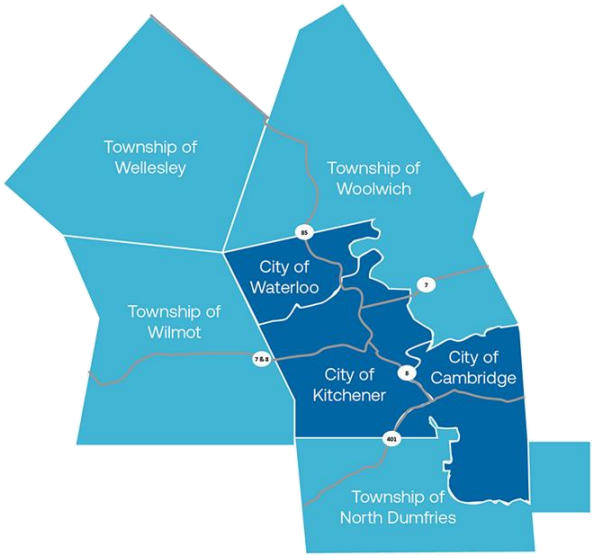


FIGURE 2 – WATERLOO REGION MAP **(WATERLOO EDC, 2024)**

The Region is home to three major post-secondary institutions – the University of Waterloo, Wilfred Laurier University, and Conestoga College, which attract over 100,000 students and staff annually, and continue to grow each year (University of Waterloo, 2024) (Wilfred Laurier University, 2024) (Conestoga College, 2024). The region also attracts new migrants and immigrants due to its booming economy, and the unique balance of urban and natural environments. Over the past few years, the region has been experiencing a multi-billion-dollar development boom and there have also been major expansion announcements from global tech giants like Google, Toyota, and SAP, as well as other fast growing tech companies in the region. The presence of such renowned companies in Waterloo has allowed the region to attract high-quality tech talent, which has led to a significant number of local homegrown Canadian tech companies thriving in the region. Between 2017 and 2022, Waterloo Region had the third-highest tech job growth rate across Canada, at 52% (WaterlooEDC, 2023).

Transportation Systems

Waterloo Region has made substantial investments in rapid transit over the past ten years, mainly through the construction of the ION LRT corridor, connecting major hubs in Kitchener and Waterloo since 2019, and plans to extend the service to Cambridge in the future. Metrolinx has also invested in direct connections to Waterloo Region with a GO Rail station in downtown Kitchener, offering peak hour, and peak direction passenger rail service to Union Station. The following **Table 2** briefly describes the region's primary transportation systems used by its residents. The primary transportation systems available for intercity commuters are provincial highways and GO Transit, while the remaining systems provide mobility within regional boundaries.

TABLE 2: OVERVIEW OF WATERLOO REGION TRANSPORTATION SYSTEM

Transportation System	Description
Arterial Roads	Five provincial highways that run through the Region, including Highway 401, Highway 7, Highway 8, Highway 24, and Highway 85.
Grand River Transit (GRT)	A local public transit system that provides mobility throughout the cities of Waterloo, Kitchener, and Cambridge, and Townships of Woolwich and Wilmot.
ION Light Rail Transit (LRT)	Rapid transit system connecting three cities (Waterloo, Kitchener, Cambridge) in the Region with 22 stops along a 36-kilometre-long transit corridor. Phase One (Waterloo-Kitchener) began operation in 2019, and Phase Two (Kitchener-Cambridge) is currently in the design phase.
GO Transit	Five weekday peak hour trains leaving the Region in the mornings and leaving Union Station in the evening. GO Bus services are available to/from Mississauga (Square One), and Milton GO Station, which provides access to various locations in the GTHA.

Wellington County

Wellington County is located in south-western Ontario just over 100 kilometres west of the Greater Toronto Area, along Highway 401. The County is made up of seven member municipalities including the Towns of Erin and Minto, the Townships of Wellington North, Mapleton, Centre Wellington, Guelph/Eramosa, and Puslinch (**Figure 3**). The separated City of Guelph lies within County's southern boundaries and is the primary urban centre with a higher population and employment density compared to surrounding municipalities.

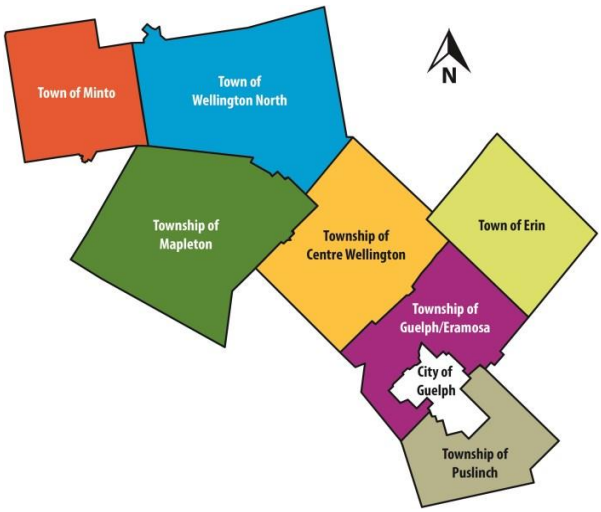


FIGURE 3: MAP OF WELLINGTON COUNTY **(GGG COMMUNITY, 2024)**

Although the City of Guelph is politically separate from Wellington County, Guelph is included as part of Wellington County for the purposes of this study. The population in the County was approximately 241,026 in 2021 (including City of Guelph) and the Ontario Growth Plan estimates the population to reach 363,000 by 2051. The Ontario Growth Plan also identifies Downtown Guelph as an Urban Growth Centre and mandates a minimum density target of 150 residents and jobs combined per hectare by 2031 (MMAH, 2020). The City of Guelph is home to the University of Guelph which attracts approximately 30,000 students annually (University of Guelph, 2022).

Outside of the City of Guelph, the remaining Towns and Townships largely consist of natural landscapes and rolling countryside, with small settlement areas dispersed throughout the region. While the population of the County is much lower than neighbouring regions, it provides unique attractions including heritage and cultural sites and festivals, locally grown and hand-made goods business sector, and an abundance of natural areas offering a wide range of recreational activities (Wellington County, 2024).

Transportation Systems

The primary mode of transportation available for intercity commuters in Wellington County is private vehicles and GO Transit, while other public transit systems provide basic mobility options within the City of Guelph and Wellington County. **Table 3** presents an overview of the transportation systems for Wellington County.

TABLE 3: OVERVIEW OF WELLINGTON COUNTY TRANSPORTATION SYSTEM

Transportation System	Description
Arterial Roads	Provincial highways crossing through the County include Highway 6, Highway 7, Highway 124, Highway 109, and a small portion of Highway 401 crossing along the southern point of the County.
Ride Well	An on-demand public transit service that offers door-to-door service to any address within the boundaries of Wellington County and to/from the City of Guelph. There are no fixed-route or schedules, instead service utilizes mobile-app technology to allow customers to plan, book, track, and pay for their ride in real-time. Ride Well is a pilot program and expected to end in 2025 (Wellington County, 2023).
Guelph Transit	Local public transit system that provides mobility throughout the City of Guelph, and some connections to surrounding regions of Wellington County.
GO Transit	Daily, peak-hour GO Bus and GO Train services to/from downtown Guelph.

Regional Demographic Analysis

The following section explores demographic and travel data for Waterloo Region and Wellington County and provides an overview of population and employment trends for the two regions. Data for the regional analysis was primarily obtained from the 2016 and 2021 Census of Population from Statistics Canada. However, other sources were also used for a more comprehensive analysis.

Demographic data, such as population, employment, and income, plays a critical role in planning transportation systems as each serves distinct aspects in the transportation planning process. The data that has been included for the study are considered as key factors for assessing the need for intercity bus transit services. Mode choice is highly dependent on personal characteristics such as income, unemployment rate, and age group.

Population

Population growth places increasing demand on regional transportation systems, and as a result is a critical driver for transportation planning initiatives. Population growth forecasts, including projected land uses in the region, help to identify major growth corridors, and subsequently transportation infrastructure and service needs. As cities continue to grow and urbanize, more transportation options will be required to meet the travel needs of a diverse population while minimizing pressure on dominant regional transportation systems such as roads and highways. For this study, population growth estimates will facilitate our understanding of how the expected increase in population and employment rates, will impact the growth of intercity commuters and subsequent demands on transportation systems between the two regions.

Both Waterloo Region and Wellington County hold unique characteristics that continue to attract people and employers, which is evident in their population growth rates records from previous years. As of 2023, Waterloo Region's population reached 674,000 people (Waterloo Region, 2023) and is consistently ranked among the top five fastest growing communities in Canada (WaterlooEDC, 2024). Between 2022 to 2023, the Waterloo Region's Kitchener-Cambridge-Waterloo census metropolitan area (CMA) had the fastest growth rate of 6.0%, over all CMAs in Canada (Statistics Canada, 2024). In Wellington County, the population is dispersed throughout the region in small settlements, while the City of Guelph maintains significant share of the population in the region. Guelph's population growth rate (9.1%) between 2016 and 2021 outpaced both provincial (5.8%) and national (5.2%) averages (McNaughton, 2022).

The following **Table 4** shows population estimates recorded by 2016 and 2021 Census Canada, as well as Ontario's Growth Plan population estimates for 2051. The population for the local census metropolitan areas (CMAs) are also shown, as they represent a significant share of the region's population. The Kitchener-Cambridge-Waterloo CMA and Guelph CMA represent 98% and 70% of the regional population, respectively. Population growth rates in the CMAs have previously been higher than the region and are likely to be higher in the future due to the provincially designated Urban Growth Centres in cities of Waterloo, Kitchener, Cambridge, and Guelph. Based on the Ontario Growth Plan estimates, the two neighbouring regions are expected to reach a combined population of nearly 1.3 million people by 2051.

TABLE 4: POPULATION ESTIMATES FOR WATERLOO REGION AND WELLINGTON COUNTY **(STATCAN, 2016) (STATCAN, 2022)**

	Region of Waterloo	Kitchener-Cambridge-Waterloo CMA	Wellington County	Guelph CMA
Population, 2016	535,154	523,894	222,726	151,984
Population, 2021	587,165	575,847	241,026	165,588
Population % Change, 2016 to 2021	9.7%	9.9%	8.2%	9%
Population Growth Estimate (2051)	923,000	904,540*	363,000	254,100*

**Estimates based 2021 population data*

Population Age Group

The population age group can be an important indicator for public transit use as different age groups have distinct transportation needs and preferences. For example, age groups between the ages of 20 to 64 years typically represent the most economically active range and are most likely to take part in the daily commutes to work and school. Young adults, under the age of 30, are more likely to use public transit than older adults due to various factors such as limited income, more time for traveling, and more freedom to engage in digital socializing while travelling (Ralph & Voulgaris, 2016). Alternatively, it can be assumed that older age groups, with higher incomes, are more likely to own one or more private vehicles and commute longer distances for work. As a result, understanding the travel needs of different age groups can play a vital role in developing an intercity public transit service that has potential to be a viable alternative to private vehicles. For this study, population age group characteristics helps to estimate the percentage of the population that is taking part in daily commuting, as well as the percentage of the population that is more likely to commute by private vehicle.

Figures 4 and **5** illustrate that for both Waterloo Region and Wellington County, the population is divided up relatively evenly across all age groups, with ages 20 to 64 years making up approximately 60% of the population. Therefore, it can be assumed that approximately 60 percent of the population take part in daily commuting for work and school purposes. Based on the 2021 population data, this results to nearly 486,000 daily commuters among the Waterloo-Well (Statistics Canada, 2023).

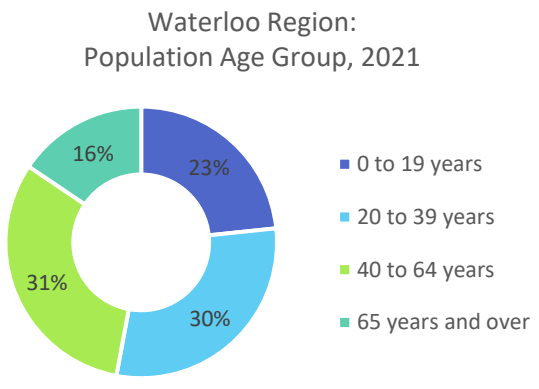


FIGURE 5: WATERLOO REGION POPULATION AGE GROUP, 2021

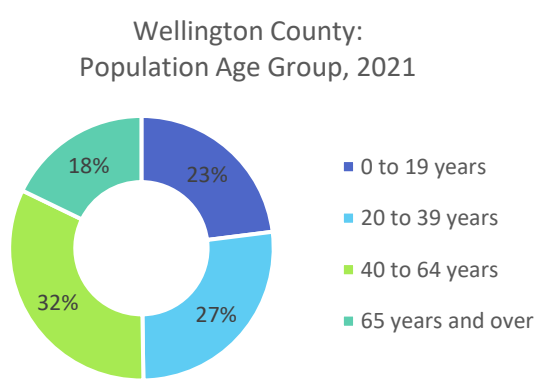


FIGURE 4: WELLINGTON COUNTY POPULATION AGE GROUP, 2021

Employment, Education, and Income

Regional information regarding employment, education and income can be good indicators for understanding commuting trends, automobile dependency, and demand for alternative transportation options.

The Ontario Growth Plan recognizes urban growth centres (UGC) as regional focal points for accommodating population and employment growth, as well as locations for cultural facilities, public institutions, and transit hubs (MMAH, 2020). As such, Kitchener, Waterloo, Cambridge, and Guelph, will continue to generate employment and education opportunities and attract commuters from surrounding regions, resulting in the growth of intercity commuters. Without adequate intercity public transit options, intercity commuters are dependent on private vehicles, creating traffic congestion issues and loss of productivity across the region.

Having access to a well-connected public transit system can have a considerable impact on accessing work and education opportunities. Alternatively, a lack of adequate intercity public transit services can create barriers to employment for those who do not or cannot drive. In many cities, areas with affordable housing are typically located far from major employment areas, resulting in a greater dependency on private vehicles to commute between home and work. The spatial mismatch can affect employment prospects for lower income groups as well as younger workers who are less likely to own cars. For example, owning and maintaining a reliable vehicle can be expensive for entry-level workers earning relatively lower wages (Brandtner, Anna, & Young, 2017).

For both regions, employment, education, and income data, acquired through the 2021 Census of Population, were used to make general assumptions regarding regional labour market demands, private vehicle ownership, and intercity commuting demands. For example, it can be assumed that groups higher education and income levels are more likely to commute long distances and by private vehicles, while groups of lower education and income levels are more likely to be limited to work within regional boundaries that can be accessed by local public transit services.

The Kitchener-Cambridge-Waterloo CMA has one of the strongest labour markets in Canada, ranking second in the country for highest employment rate at 67.3 percent in 2019. The CMA has seven sectors employing over 20,000 people, illustrating its diversified economy (Region of Waterloo, 2020). In 2019, the CMA employed approximately 302,100 people, an increase of nearly 10,000 people from 2018. This was primarily due to the significant increase in international students taking on part-time employment, as well as an increase in part-time jobs available in the technology and other sectors (Region of Waterloo, 2020). Wellington County has a much smaller labour market compared to Waterloo Region; however, they generally attract employment opportunities for similar industries such as the business and finance sector, sales and service sector, and the trades and transport sector.

Figure 6 below illustrates the breakdown of regional labour markets by sector for both regions obtained from the 2021 Census of Population. The location of urban growth centres in both regions will continue to attract more people and jobs to the region. The latest Labour Force Survey (February 2024) estimates total jobs in the Kitchener-Cambridge-Waterloo CMA has reached 373,500, and in Guelph CMA total jobs has reached 103,800 (Statistics Canada, 2024). The Ontario Growth Plan estimates employment to reach 470,000 in Waterloo Region, and 186,000 in Wellington County by 2051.

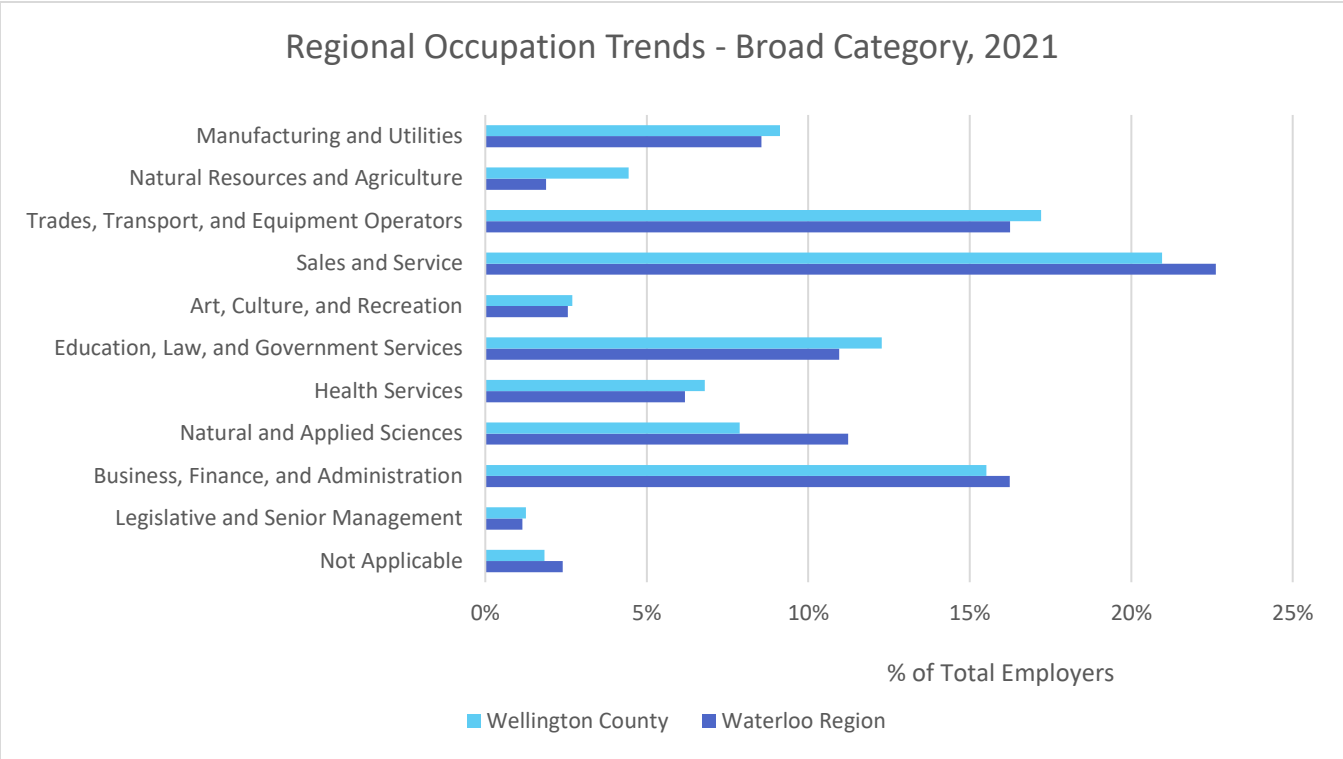


FIGURE 6: WATERLOO-WELLINGTON REGIONAL OCCUPATION TRENDS - BROAD CATEGORY, 2021

With regards to income, Wellington County had slightly higher median after-tax income levels in 2020, while both recorded higher levels compared to the provincial average (Statistics Canada, 2023). As illustrated in **Figure 7**, on average, individual after-tax income was around $40,000 and $38,4000 in Wellington County and Waterloo Region, respectively. Similarly, average household after-tax income was around $85,000 and $81,000 in Wellington and Waterloo, respectively (Statistics Canada, 2023).

After-tax income groups and education levels for both Waterloo Region (**Figure 8**) and Wellington County (**Figure 9**) are also similar. For Waterloo Region, the 2020 income data indicates that nearly 76% of residents in the Waterloo Region earned less than $60,000 after taxes, a decline from 81% in 2015. While the proportion of the population earning over $60,000 after taxes increased from 19% to 24%. Similarly, the proportion of the population with a college degree or higher level of education increased from 63% to 75% from 2015 to 2020 (Statistics Canada, 2021). For Wellington County, approximately 74% of the population has an after-tax income of less than $60,000, a decline from 80% in 2015. Similarly, the proportion of the population earning over $60,000 after taxes increased from 20% to 26% from 2015 to 2020 (Statistics Canada, 2021).

The positive changes in education and income earnings between 2015 and 2020 indicates that the population in these regions are becoming more educated and earning a higher income. As a result, both regions are experiencing economic growth, resulting in greater employment and income earning opportunities that attract long-distance commuters from surrounding regions. This also indicates that the higher education and income earning population in these regions are more likely to own one or more private vehicles. At the same time, despite the positive changes, the majority of the population earns less than $60,000 after taxes, which suggests that members of this income group, especially at the lower end, are either spending a higher proportion of their income on transportation expenses or rely on public transit services for their daily commutes to work.

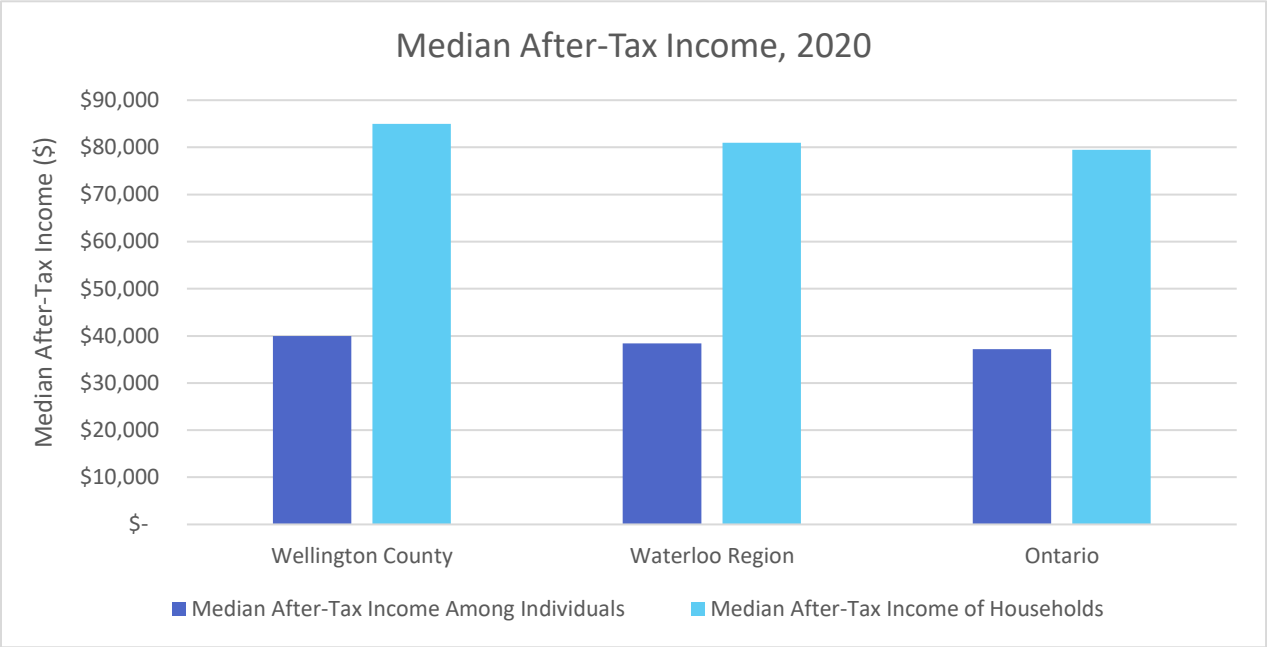


FIGURE 7: WATERLOO-WELLINGTON REGION MEDIAN AFTER-TAX INCOME, 2020

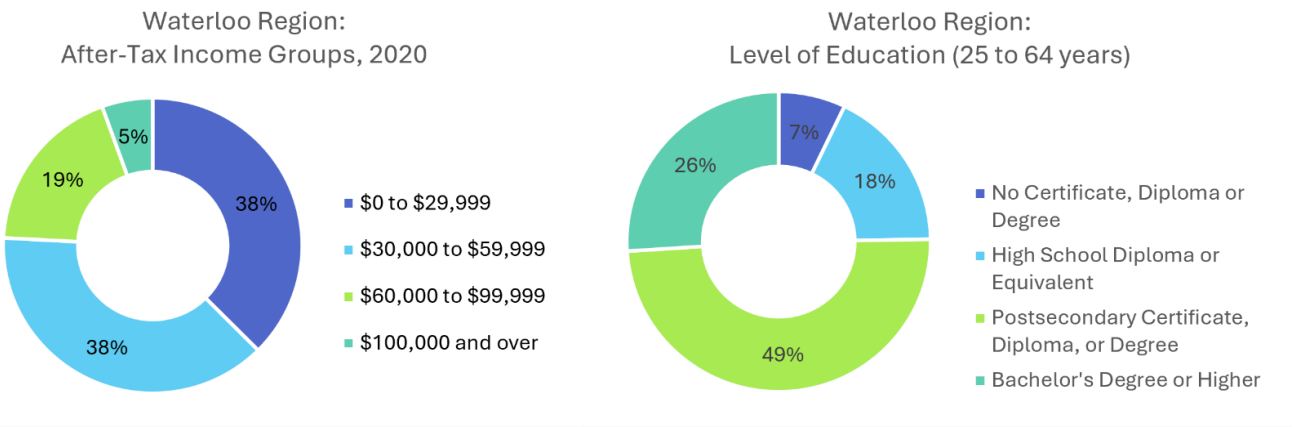


FIGURE 9: WATERLOO REGION AFTER-TAX INCOME AND LEVEL OF EDUCATION, 2020

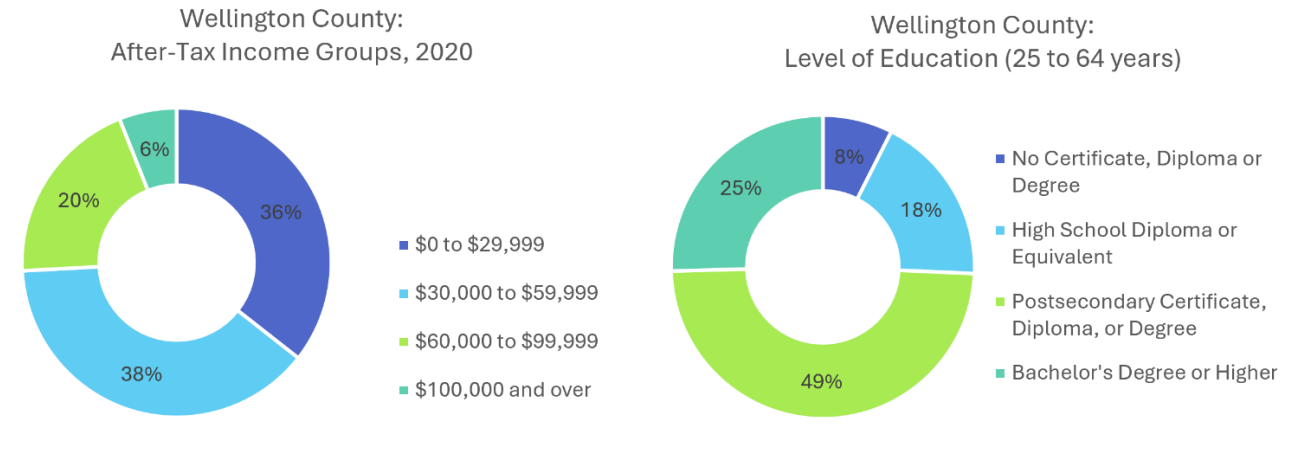


FIGURE 8: WELLINGTON COUNTY AFTER-TAX INCOME AND LEVEL OF EDUCATION GROUPS, 2020

Business Case Overview

The Metrolinx Business Case Analyses framework is used to develop the analysis and assess the potential viability of a high-frequency, intercity bus service between the two regions. The Initial Business Case (IBC) is the first of a four-stage business case assessment completed in an investment's lifecycle. Through the IBC, the proposed investment options, including the Business-As-Usual (BAU) scenario, are evaluated to select a preferred option for further refinement and design. The IBC develops high-level feasibility and options analysis that can be used to secure public funding for the next stage in the investment lifecycle.

The Metrolinx Business Case Structure typically consists of a four-case evaluation. The Strategic Case and Economic Case speak to the rationale for pursuing an investment, while the Financial Case and Deliverability and Operations Case, speak to the requirements for successful implementation of the investment (Metrolinx, 2021b). The general purpose and objective of each is described in the **Table 5** below.

TABLE 5: PURPOSE AND OBJECTIVE OF THE FOUR-CASE EVALUATION

Case Type	Purpose and Objective
Strategic Case	**How does the investment achieve strategic goals and objectives?** The purpose of the Strategic Case is to examine how the proposed investment options align with existing strategic plans, policies, and legislation. This can include, local and regional transportation plans, climate policy goals, as well as wider Provincial objectives. Forecasts of long-term ridership trends and other strategic information are provided to demonstrate how the proposed investment option can support existing and long-term policy goals.
Economic Case	**What is the investment's overall value to society?** The Economic Case presents potential economic, environmental, and social impacts of the investment option using qualitative and quantitative analysis. The results of the assessments are used to determine the extent to which a project's benefits outweigh its costs to individuals and society as a whole, in economic terms.
Financial Case	**What are the financial implications of delivering the investment?** The Financial Case section aims to describe the affordability of the project including capital costs, operating costs and revenues, and maintenance costs. Additionally, potential government funding options to support the proposed project are explored.
Deliverability and Operations Case	**What risks and requirements must be considered for delivering and operating the investment?** The Delivery and Operations Case section considers the different delivery options, and key requirements for successful implementation such as stakeholder and public engagement. Additionally, this section explores potential deliverability and operational risks the project as well as procurement strategies.

Case for Change

The Waterloo Region is one of the fastest growing regions in Canada, and the Waterloo-Wellington regions combined hold four urban growth centres, comprising of prominent business, cultural, and educational institutions. Together the two regions are home to a diverse and growing population, with a dynamic and thriving economy, and has emerged as a desirable place to live, work, study, and invest. Thus, the two regions are destined for considerable growth and requires a robust transportation system to support diverse mobility needs.

There are over 22,000 daily intercity commuters between Waterloo Region and Wellington County (Statistics Canada, 2023), as well as thousands of students that commute for school between the two regions. These estimates are expected to increase significantly due to the return of the commuting population to pre-pandemic levels, as well as population and employment growth projections. Additionally, close to 90% of the commuting population travel by private vehicle, while public transit users primarily commute within regional boundaries, further reinforcing private vehicle dependency and subsequent negative social and environmental impacts.

Despite the large volume of daily commuters between the two neighbouring regions, there are currently only two options for intercity commuters: private vehicles and GO Transit. GO Transit services between the two regions are severely limited with bus trips taking close to 1.5 hours for a one-way trip while GO rail only operates in one direction during the morning and evening peak hours, mainly used by residents commuting to/from the GTHA. Furthermore, Metrolinx's GO Expansion plans along the Kitchener GO Line will only improve services between Milton GO and Union Station, while service improvements between Waterloo and Guelph GO stations will remain limited to peak hours.

Due to the insufficient public transit options, private vehicles are the only practical mode of transportation for intercity commuters. As such, increasing volumes of intercity commuters and private vehicle dependency has resulted in severe traffic congestion on regional roads and highways. Highway 7 and Highway 401 are the primary vehicular routes connecting the two regions and experience heavy traffic congestion during peak hours. The Ontario government is currently investing the construction of a new, wider Highway 7 to accommodate the growing volume of commuters between the two regions and relieve traffic congestion. However, these improvements will continue to support an auto-dependent transportation system, resulting in more drivers on the road, which will subsequently lead to more congestion, longer commute times, and increasing local GHG emissions.

Figure 10 below illustrates the proximity of major employment destinations and urban growth centres between the two regions. The distance between downtown Kitchener and downtown Guelph is approximately 25 kilometres, and takes approximately 35 minutes by car, and up to 50 minutes during peak weekday hours depending on traffic conditions. It is approximately the same distance and time to drive from downtown Cambridge to downtown Guelph. However, due to the lack of collaboration between the two municipal governments, there is a discernible gap in public transit service connections between these cities.

There is an opportunity to provide critical intercity public transit services that can mitigate automobile dependency and improve access to employment and education between the two regions. Implementing new intercity public transit service options between the two regions can improve connections between major employment areas and neighbourhoods, appealing to people and major employers throughout the regions. Lastly, expansion of the transit network can shape growth among these regions, encourage transit-oriented development, and improve overall mobility and quality of life.

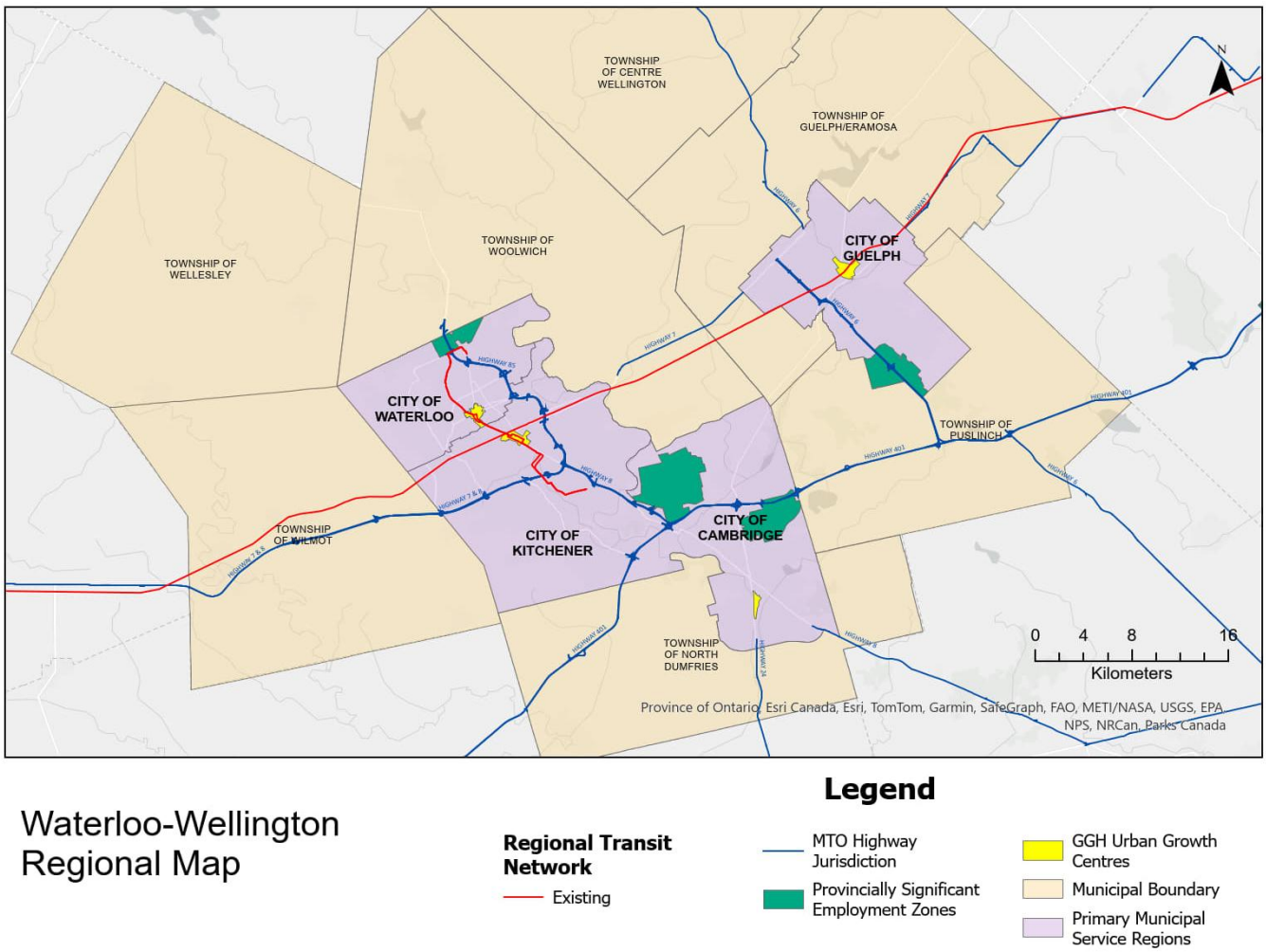


FIGURE 10: GIS MAP OF WATERLOO-WELLINGTON REGIONS AND MAJOR INTERCITY TRANSPORTATION NETWORKS

Problem Statement

The Waterloo-Wellington region has limited intercity travel alternatives to private vehicles, which leads to high auto dependency and congestion. The two regions are forecasted to see significant growth and development, making them one of the key areas for living and working in the GGH. By 2051, the combined population of the Waterloo-Wellington regions is expected to increase by nearly 60% to 1.3 million people, and employment is expected to increase by 40% in Waterloo Region, and 8% in the City of Guelph. Higher-order transit services that connect cross-regional destinations to one another are limited, leading to consistent congestion of key arterial routes on the road network, and subsequent negative impacts of traffic congestion and environmental pollution. Without improved transport alternatives, the overall livability and economic development potential of the corridor, including future developments, will be constrained. **Table 6** below summarizes three issues driving the problem of intercity commuter, and that can be resolved through the proposed intercity public transit investment to be discussed in more detail in the following sections.

TABLE 6: THREE KEY PROBLEM DRIVERS

	Issue	Overview
1.	**Existing transit services along the corridor cannot compete with auto travel**	The existing GO Transit services do not allow for efficient movement between the two regions. Services are limited depending on the time of day and direction of travel, providing higher frequency services in one direction during peak hours only. Existing transit travel times are not competitive against auto travel. Transit trips typically require more pre-planning than auto travel, reducing the attractiveness of transit compared to personal auto travel.
2.	**Rapid population and employment growth leading to higher intercity travel demand**	Urban growth centres and major employment areas in both regions attract thousands of intercity commuters for employment opportunities. Significant increases in population and employment are likely to lead to more automobile trips in the corridor and worsening congestion. Without alternative travel options, the planned growth may be inhibited by the worsening congestion and associated increases in travel time, which negatively impacts economic productivity.
3.	**Climate action plans to reduce GHG emissions do not address auto-dependency of intercity commuters.**	The transportation sector is the largest contributor to GHG emissions. Both regions have implemented climate policies and action plans to reduce community GHG emissions. Current action plans to reduce transportation sector emissions are dependent on the transition to electric vehicles and work-from-home trends. However, neither region have explored opportunities for reducing private vehicle dependency of intercity commuters.

Issue #1 – Transit services along the corridor cannot compete with auto travel

Issue 1 explores how travellers make use of the existing road and transit network and outlines key gaps in the future or planned network that contribute to the problem statement. The following transport options are available to Intercity commuters between Waterloo Region and Wellington County:

- **Highways** – Highway 6, Highway 7, and Highway 401 are the primary routes connecting the downtown Kitchener, Cambridge, and Guelph regions. Highways are available for automobiles, GO Buses, and freight traffic.
- **Regional GO Transit** – GO Bus and Rail services provide access to municipalities across the GGH but primarily concentrate services to the GTHA regions.
- **Local bus services** – Public transit services in Waterloo Region and City of Guelph operate within municipal boundaries, however they can provide transit connecting services to GO stations and stops.

Regional Road Network

The Ontario Ministry of Transportation (MTO) holds jurisdiction over all Provincial Highways, also known as King's Highways, threading throughout the province. The following **Table 7** summarizes the major highways connecting the two regions to each other and the rest of the GGH and the volume of daily vehicles.

TABLE 7: OVERVIEW OF WATERLOO-WELLINGTON REGIONAL HIGHWAY NETWORK

Highway 7	Highway 7 is the primary and most direct highway connecting downtown Kitchener (Waterloo Region) to downtown Guelph (Wellington County). It is among the busiest two-lane highways in Ontario, with an estimated **26,000 vehicles** travelling on it daily (Ontario Newsroom, 2024). Jurisdiction of the highway between Waterloo and Wellington is fragmented due to the fact that the highway becomes a local road within municipal boundaries, while the MTO has jurisdiction over the section of the highway from Fountain St. N (Waterloo) to Wellington Road 32, just outside the Guelph City boundary.
Highway 6	Highway 6 is the primary regional route connecting Highway 401 to Guelph and Wellington County. Highway 6 through Morriston is considered of the busiest two-lane highways in Ontario with average daily traffic volumes of up to **26,000 vehicles** per day (Ontario Newsroom, 2021). The provincial government has been investing in upgrades and expansion of various sections of the highway around Wellington County to accommodate increasing traffic demands, including: • Expansion of Highway 6 from North of Freelton to Maltby Road. • Upgrades to Highway 6 from Guelph north city limits to Wellington Road 7 (City of Guelph, 2024)
Highway 401	Highway 401 is the primary access route for drivers leaving and entering Waterloo Region and Wellington County. Over the past few years, the Waterloo Region has been consistently recognized as the fastest growing region in Canada, which has resulted in increasing traffic congestion along Highway 401. It is estimated that approximately **150,000 vehicles** travel between Highway 8 and Townline Road every day (Ontario Newsroom, 2023). In efforts to reduce gridlock and boost region's economy, the Ontario government has invested heavily in expanding the highway from 6 lanes to 10 lanes, including one HOV lane in each direction (Ontario Newsroom, 2023).

Regional Public Transit System

Presently, regional public transit services do not provide continuous east-west services between Waterloo and Wellington, which impacts connectivity and accessibility for residents commuting between the two regions for work and school. GO Transit is the only intercity public transit service available between the two regions, however, service schedules are severely limited and impractical for daily commuters. VIA Rail also operates between Kitchener GO and Guelph Central GO stations, however services are limited to once per day and not cost effective for daily commuters.

GO Transit services between Waterloo Region and Guelph on the Kitchener (30-31-33) route provides express services from Kitchener GO towards the GTHA. GO Train services are limited to commuters going eastbound in the morning and westbound in the evening. However, there are no direct GO Bus services between Kitchener GO and Guelph Central GO stations (Metrolinx, 2024).

The Waterloo/Hamilton (17) route provides daily bus services between University of Waterloo, University of Guelph, and Guelph Central GO station (Metrolinx, 2024b). The service is specifically designed for students commuting between University of Waterloo, Wilfred Laurier University, University of Guelph, and McMaster University. Between University of Waterloo (U of W) and Guelph Central GO, the GO Bus service operates approximately 14 buses daily in both directions however service schedules vary depending on the direction of the service. As a result, non-student commuters are required to alight at a stop outside of downtown Kitchener and use local transit connections to reach

their final destination. **Table8** below summarizes daily GO Transit services available to intercity commuters. It can be seen that public transit is not a reliable option for commuters between Waterloo Region and Wellington County, with services limited as follows:

- GO Train services only operate in one direction and are limited to peak hour services.
- GO Bus connections are limited to university students and would require non-students to make multiple transit connections to reach their destination.
- There are no direct GO Transit connections between cities of Cambridge and Guelph.

TABLE 8: CURRENT DAILY GO TRANSIT SERVICES FOR INTERCITY COMMUTING

GO Transit Routes	Kitchener (30-31-33)				Waterloo/Hamilton (17)	
GO Transit Stops	Kitchener GO		Guelph GO		U of W	Guelph GO
GO Transit Service	GO Train	GO Bus	GO Train	GO Bus	GO Bus	GO Bus
Time of Day	Eastbound		Westbound		Eastbound	Westbound
Morning Peak Period (6:00 am to 9:00 am)	**7**	0	0	0	3	2
Afternoon Off-Peak (9:00 am to 3:00 pm)	2	0	2	0	5	5
Evening Peak Period (3:00 pm to 8:00pm)	0	0	**6**	0	5	5
Late Evening (8:00 pm to 12:00 am)	1	0	1	0	0	2

Despite the thousands of daily commuters that travel between the two regions, public transit services are limited and do not provide consistent and seamless connections between key activity and employment areas in either region. Such inadequate services decrease the attractiveness of public transit as potential option for commuters between the two regions.

Future Transportation Network Expansions

Highway Expansion

The most significant transportation system improvement project planned for the region is the construction of a new and expanded Highway 7, connecting Waterloo Region and Wellington County. The Ontario government has been planning to expand Highway 7 since the early 2000s and has made incremental progress over the years including completion of environmental assessments, land acquisition, and upgrades to local infrastructure. In February 2024, the Ontario government announced that it has officially begun advancing construction of a new Highway 7 between Kitchener and Guelph. As shown in **Figure 11**, the project will construct a new four-lane, 18-kilometre-long Highway 7 that is slightly north of the existing highway, connecting Highway 85 in Kitchener with Highway 6 in Guelph. The new highway is proposed as a solution to help fight gridlock on Highway 401, save travel time for commuters, and improve movement of goods between the fast-growing regions of Kitchener, Waterloo, and Guelph (Ontario Newsroom, 2024).



FIGURE 11- PROPOSED ALIGNMENT FOR NEW HIGHWAY 7 **(ONTARIO NEWSROOM, 2024)**

Metrolinx GO Expansion

Metrolinx plans to increase the service frequency along the Kitchener line to two trains per hour (30-minute headways) during peak periods, and eventually provide all-day, two-way service between Kitchener and Union Station in Toronto. A new GO station on this line is also proposed for the community of Breslau, which would be located approximately 7km east of the Kitchener GO station. Finally, a portion of the Kitchener line, between Mount Pleasant (Brampton) and Union Station (Toronto), is planned to be electrified to improve services and reduce environmental impact of GO train services along the corridor. As shown in **Figure 12**, GO Rail service improvements on the Kitchener Line are currently limited to the GTHA. However, Metrolinx has been investing in railway infrastructure improvement between its Kitchener and Guelph stations, that will be critical to increasing GO Rail services between the two cities in the future (Metrolinx, 2024). By 2041, Metrolinx also plans to introduce a new Regional Express Bus routes that offer direct services between Cambridge, Brantford, Guelph, Hamilton, Kitchener, and Waterloo.

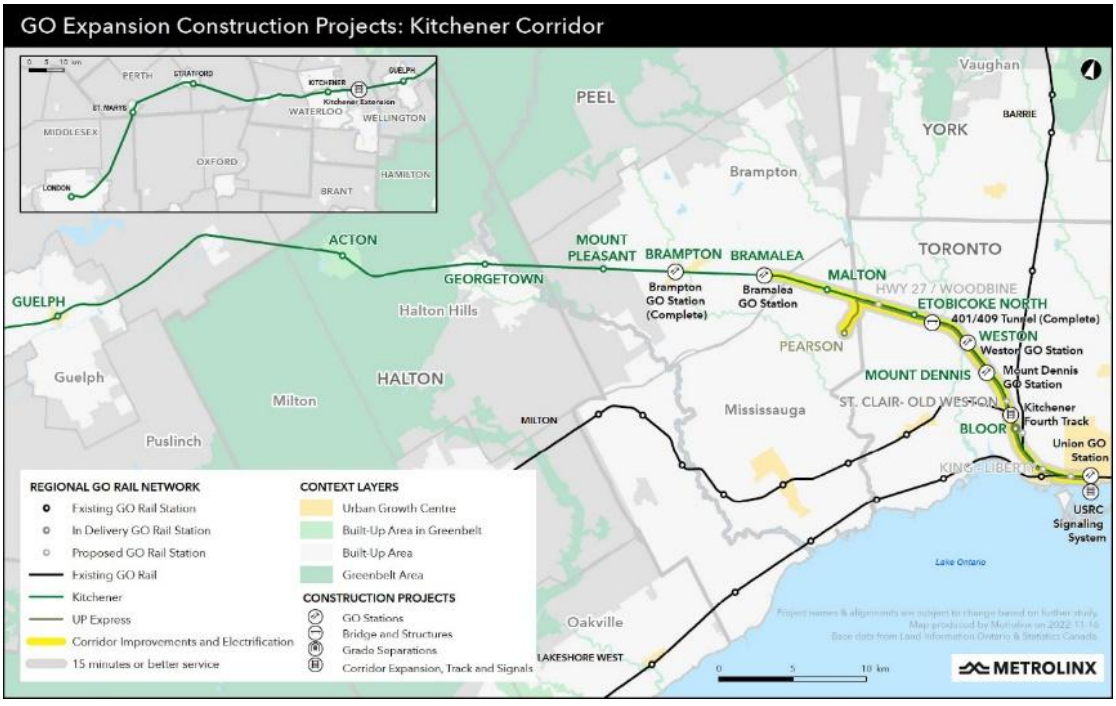


FIGURE 12: METROLINX GO EXPANSION CONSTRUCTION PROJECTS FOR KITCHENER CORRIDOR **(METROLINX, 2022)**

Waterloo Region Transit Hub

Waterloo Region recently purchased land at the north-east corner of King and Victoria Streets in Kitchener for a regional transit hub. The transit hub is located next to the ION LRT – Central Station stop in Kitchener and will replace the existing Kitchener GO station.

The new transit hub will function as a focal point for higher order transit service in the region and establishing a connection to the Toronto-Waterloo Innovation Corridor. The Region is working with Metrolinx to design and construct the transit hub. Construction of the transit hub is expected to begin Spring of 2024 and completed by end of 2027 (Region of Waterloo, 2023). The transit hub will offer access to multiple modes of transportation, including:

- ION light rail transit
- Grand River Transit
- Expanded GO train and bus service
- VIA Rail
- Inter-city bus service
- CarShare
- Pedestrians and cyclists

Issue #2 - Rapid population and employment growth leading to higher intercity travel demand.

As established through Issue #1, there are limited alternative transport options for intercity commuters, resulting in high private vehicle dependency. Issue #2 describes existing intercity commuting trends for Waterloo and Wellington regions and anticipates how population and employment growth projections will impact the demand on the existing transportation systems.

Intercity Commuting

Between 2006 to 2016, Waterloo Region experienced a gradual change in commuting destination trends, with the largest change being the increase in number of people who travelled outside of the region for work, which was 8,000 more than in 2006 (Region of Waterloo, 2016). In 2016, a combined total of nearly 67,000 people travelled to work destinations outside of their region of residence.

As shown in **Table 9**, the overall commuting population declined between 2016 and 2021 due to the COVID-19 pandemic and subsequent health and safety policies implemented by governments and employers. Even so, a significant percentage of the commuting population for both Waterloo Region (19%) and Wellington County (28%) travelled to work destinations outside of their region of residence. While the proportion of intercity commuters in Wellington County declined from 30% in 2016 to 28% in 2021, in Waterloo Region, the percentage of intercity commuters had increased from 17% in 2016, to 19% in 2021.

TABLE 9: COMPARISON OF WATERLOO-WELLINGTON REGION 2016/2021 COMMUTING DATA

2016/2021 Census Canada Data	Waterloo Region		Wellington County	
	2016	2021	2016	2021
Commuting Population	231,280	171,575	96,460	76,400
Commuting Destination				
Same Municipality (CSD)	109,495	81,150	52,965	42,870
Different Municipality, within (CD)	82,840	58,690	14,800	11,705
Different CSD and CD (in Ontario)	38,340	31,430	28,415	21,625
Commuting Mode Share				
Private Vehicle (Driver/Passenger)	88%	89%	88%	90%
Public Transit	6%	5%	5%	3%
Active/Other	6%	6%	8%	7%

Figure 13 below illustrates commuting trends for both regions and their respective census-metropolitan areas (CMAs) and compares the number of people that commute within their Census Subdivision (CSD) of residence, a different CSD but within the same Census Division (CD) of residence, and a different CSD and CD of residence (intercity commuters).

Waterloo Region and the Kitchener-Cambridge-Waterloo CMA have similar commuting population data, which illustrates that the majority of the region's commuting population lives within these three major cities, and intercity public transit connections are essential within these lower-tier municipalities. However, for Wellington County, the Guelph CMA figures are much lower, which suggests that a large share of the County's intercity commuting population lives outside of the Guelph CMA. More specifically, of the 21,625 intercity commuters, nearly 40% of this population resides outside of the Guelph CMA and improvements in connections to regions outside of the CMA are needed. Nonetheless, it can be seen that the majority of the intercity commuting population live within the major

cities of Kitchener, Cambridge, Waterloo, and Guelph, and thus, intercity public transit connections are essential within these cities.

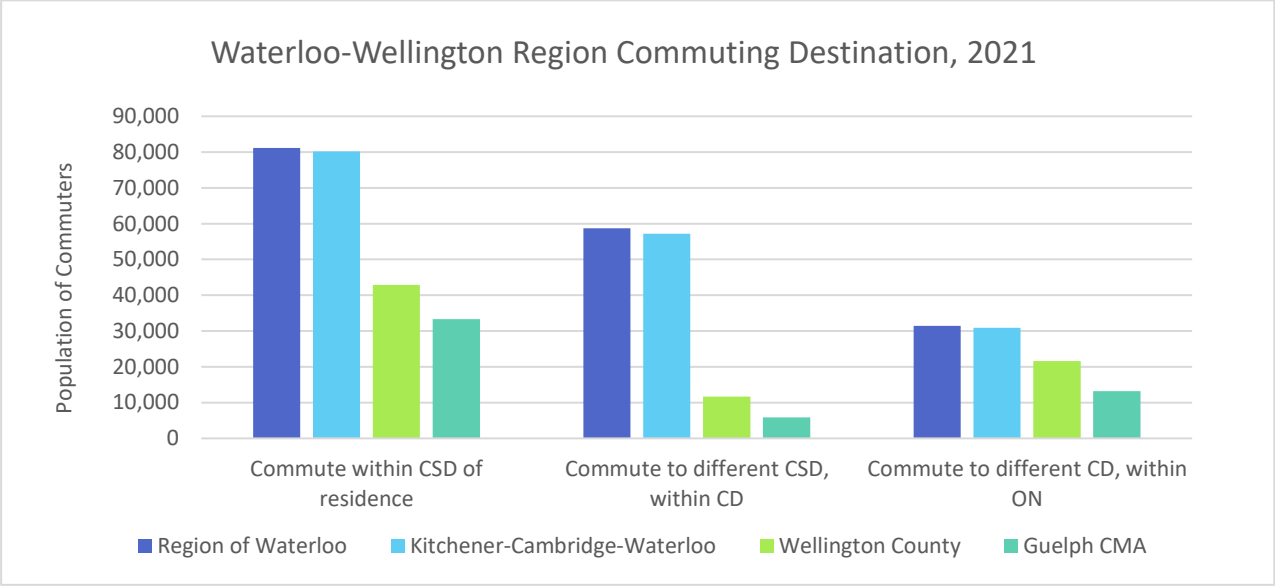


FIGURE 13: COMPARISON OF WATERLOO-WELLINGTON REGION COMMUTING DESTINATION, 2021

Commuting Destination

The latest intercity commuting flow data confirms that Wellington County and Waterloo Region is the most common workplace destination for commuters traveling to and from these regions. However, both regions attract many commuters to and from other regions such as Peel Region, Halton Region, and City of Hamilton (Statistics Canada, 2023). **Table 10** below provides the latest estimate on commuting flow from place of residence to place of work for both regions, acquired through Statistics Canada. While the table only includes specific regions with the highest volume of commuters, there are many residents among both regions that commute to and from more distant regions such as the Counties of Northumberland and Peterborough. **Figure 14** below further illustrates the combined volume of people commuting between Waterloo-Wellington compared to those commuting to other regions within the GGH. The data suggests that there are over 22,000 people commuting between the two regions daily, and that there is a need for improvements in intercity public transit services between these two regions.

TABLE 10: WATERLOO-WELLINGTON REGION INTERCITY COMMUTING DATA, 2021

	To Waterloo Region	From Waterloo Region	To Wellington County	From Wellington County
Waterloo Region			13,580	8,105
Wellington County	8,105	13,580		
Peel Region	1400	3685	1280	4280
Halton Region	1385	3035	1825	3445
City of Hamilton	2120	1625	1160	750
Brant County	3740	2350	180	430
Dufferin County	95	30	955	845
City of Toronto	740	1865	475	1315
York Region	405	545	290	425

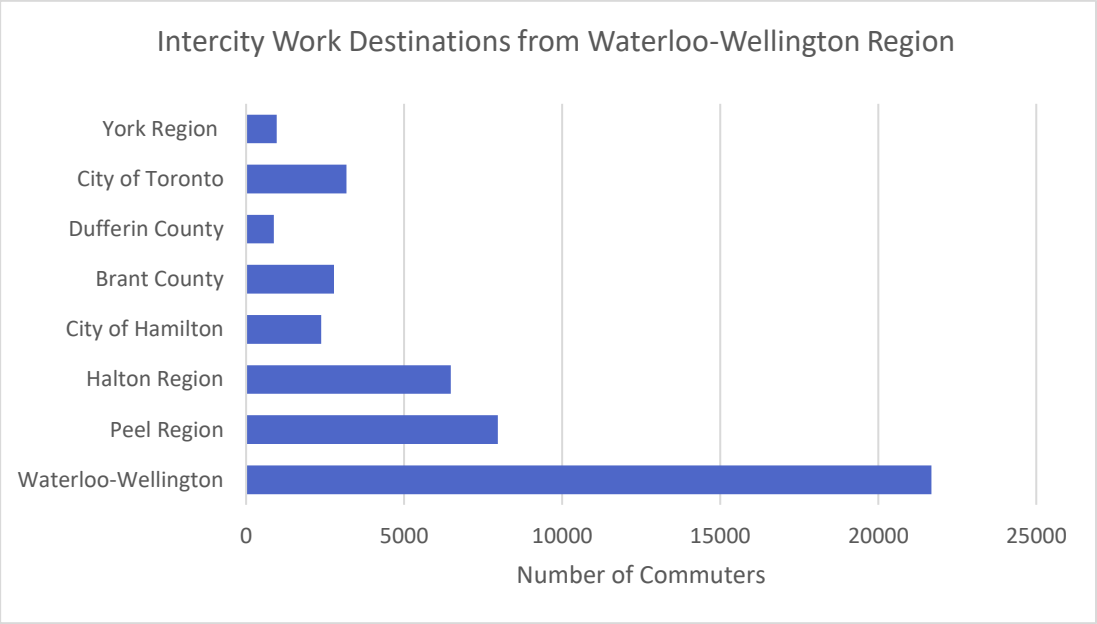


FIGURE 14: WATERLOO-WELLINGTON REGION INTERCITY COMMUTING DESTINATIONS, 2021

Waterloo-Wellington Inter-Regional Travel Demand

Figure 15 below illustrates intercity travel data obtained from the 2016 Transportation Tomorrow Survey (TTS). The 2016 TTS estimated that over 38,000 residents of Waterloo Region commuted for work and school outside of the region, while nearly 17,800 (47%) of these intercity commuters travelled to work and school in Wellington County, mainly the City of Guelph. Similarly, over 51,285 residents of Wellington County commuted for work and school outside of the region, and 14,200 (28%) of these intercity commuters travelled to work and school in Waterloo Region. As a result, approximately 32,000 residents commuted daily between the two regions for work or school in 2016.

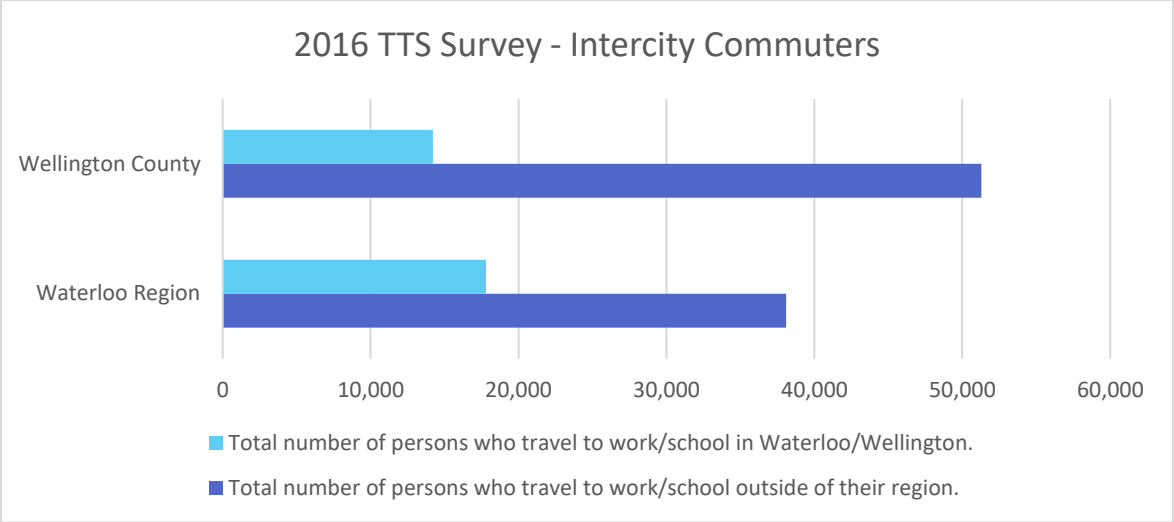


FIGURE 15: WATERLOO-WELLINGTON REGION INTERCITY COMMUTING TRENDS, 2016

Although commuting population has declined since 2020, these figures are rapidly returning to pre-pandemic levels. As shown in **Figure 16**, the latest Statistics Canada data suggests that the majority of intercity commuters travel to neighbouring regions of Waterloo Region and Wellington County. Based on these figures, it can be estimated that approximately 43% of intercity commuters from Waterloo Region work in Wellington County, and 37% of intercity commuters from Wellington County work in Waterloo Region.

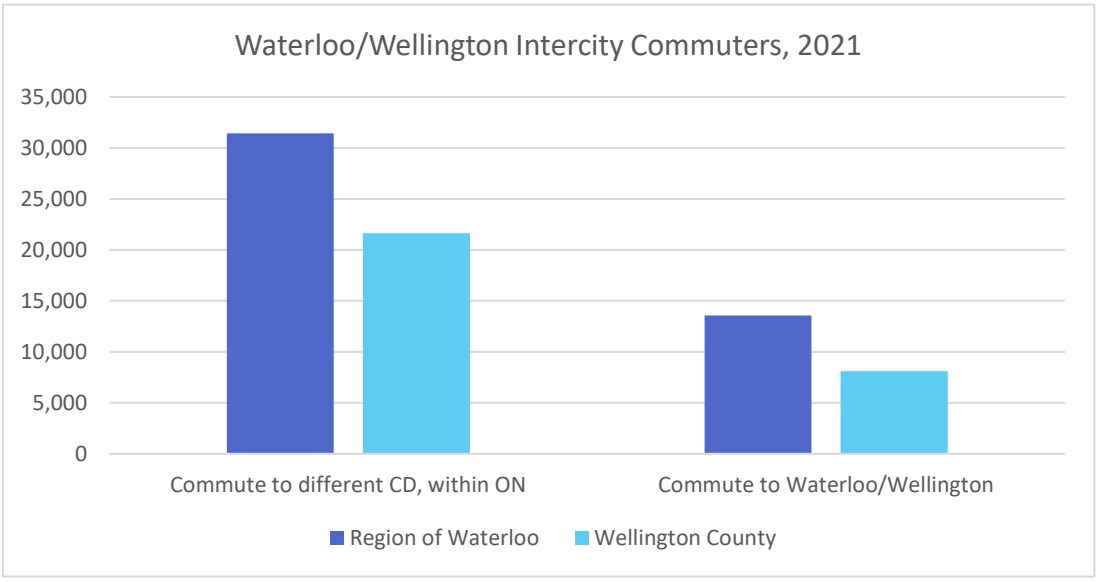


FIGURE 16: WATERLOO-WELLINGTON REGION INTERCITY COMMUTING TRENDS, 2021

Intercity Auto Demand

The 2021 Census indicates that like most of the GGH Region, private vehicles are the primary mode of transportation for commuters in both Waterloo Region (89%) and Wellington County (90%) (**Figure 17**). Similarly, for both regions, there are more people commuting via active transport and other modes than by public transit.

In Waterloo Region, public transit mode share is slightly higher at 5%, when compared to neighbouring regions. While this figure represents public transit mode share from 2020, public transit ridership has increased and has likely led to an increase in public transit mode share for the region. In 2023, Grand River Transit, achieved its highest annual ridership totalling 26.4 million, an increase of 48.3% over 2022 figures (Region of Waterloo, 2024). However, it is important to note that public transit users primarily commute to work destinations within the region, while intercity transit options remain limited.

For Wellington County, the share of transit and cycling/walking trips is primarily within the City of Guelph, while automobile driver and passenger trips exclusively from Wellington County would be higher due to the lack of public transit options and the long-distance nature of many trips (Wellington County, 2021). Within the City of Guelph, private vehicle mode share is lower at 79%, while transit mode share is higher at 7%. The city has set goals to increase mode shares of transit to 17%, while reducing private vehicle mode share to 58%, by 2051 (City of Guelph, 2022).

The growth in public transit ridership and municipal goals to improve public transit mode share suggests that both regions have adequate public transit services to support mobility within their respective boundaries. Therefore, establishing an intercity bus service that connects to local transit networks can ensure greater accessibility for intercity commuters.

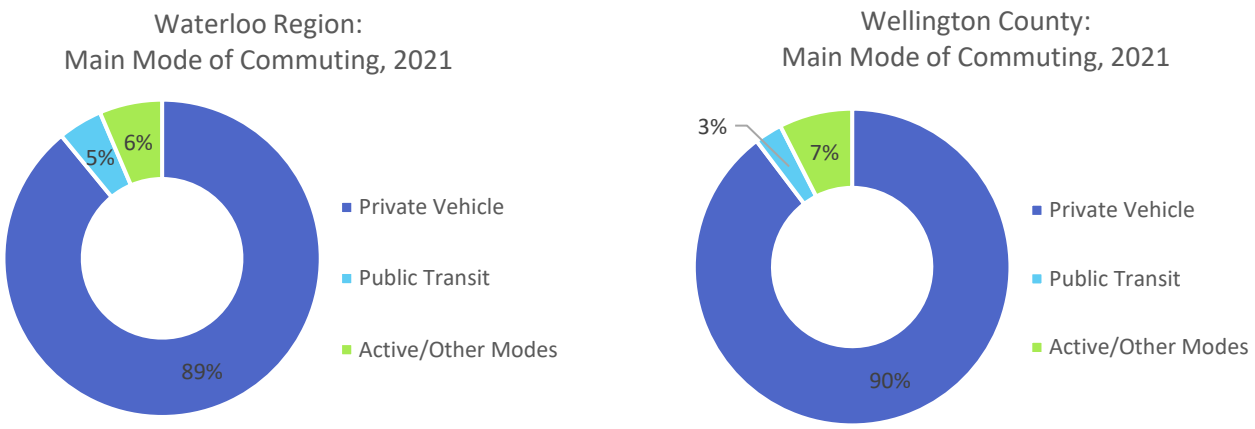


FIGURE 17: WATERLOO-WELLINGTON REGION COMMUTING MODE, 2021

Intercity Transit Demand

The 2016 TTS Survey suggests that intercity public transit usage among the two regions is considerably low when compared to the number of intercity commuters. As shown in **Table 11** below, the survey estimates that nearly 2,800 GO Transit trips were made by residents of Wellington County and Waterloo Region, within a 24-hour period. Based on the number of intercity commuters that work outside of their region of residence, it can be estimated that less than 4% of intercity commuters are using GO Transit from each region. **Figure 18** below further illustrates the total trips made GO Transit to and from Waterloo Region and Wellington County within a 24-hour period.

TABLE 11: WATERLOO-WELLINGTON REGION INTERCITY COMMUTING DATA, 2016

	Waterloo Region	Wellington County	City of Guelph
Total number of persons who work or go to school outside of their region*	38084	26388	24897
Total trips made by residents with GO Transit (24-hour period)	1440	470	858
Estimated percentage of intercity commuters using GO Transit	3.8%	1.8%	3.4%

*Includes persons who have no usual place of work.

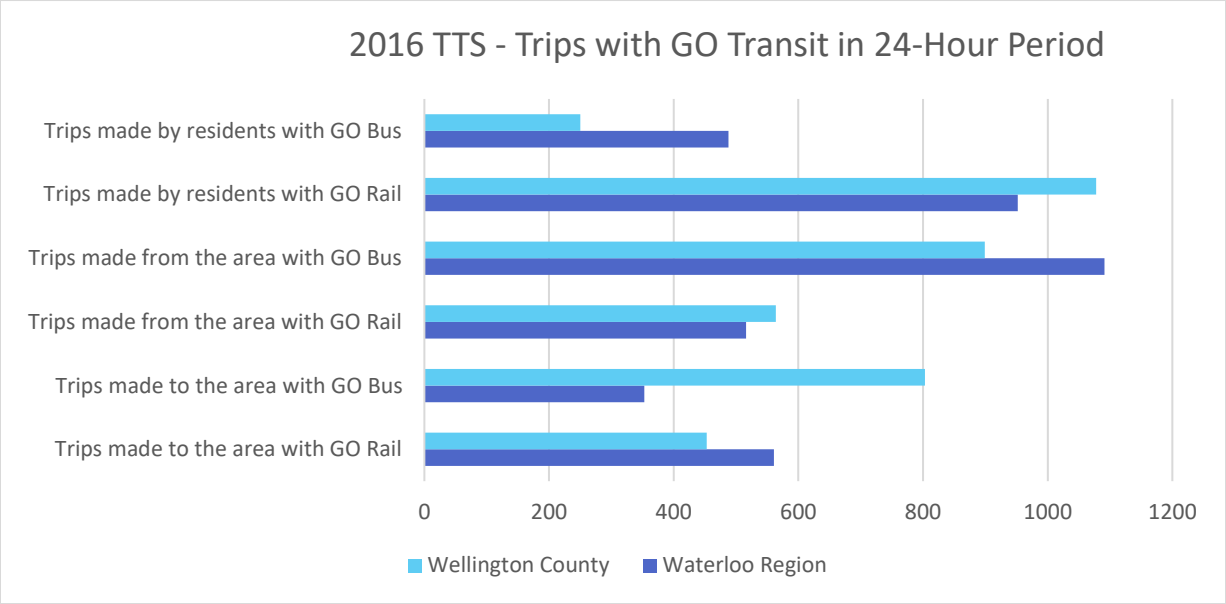


FIGURE 18: WATERLOO-WELLINGTON REGION TRIPS WITH GO TRANSIT IN A 24-HOUR PERIOD, 2016 TTS

Additionally, as shown in **Table 12** below, morning and evening peak period travel data indicates that GO Rail is primarily used by residents of both regions commuting to the GTHA in the morning (between 6 AM and 9 AM) and returning in the evening (between 3 PM and 6 PM) since no GO Rail trips were recorded to the area in the morning and from the area in the afternoon, for either region. This suggests that commuters travelling between the two regions are not using GO Rail for their daily work/school trips.

TABLE 12: WATERLOO-WELLINGTON REGION - PEAK MORNING AND EVENING TRIPS BY GO TRANSIT

	Waterloo Region	Wellington County	City of Guelph
Trips made TO the Area during morning peak periods (6am – 9am)			
Total Trips	247,519	16,891	71,681
Trips by GO Rail	0	0	0
Trips made FROM the area during morning peak periods (6am – 9am)			
Total Trips	253,313	26,326	66,041
Trips by GO Rail	181	111	250
Trips made TO the area during afternoon peak periods (3pm – 6pm)			
Total Trips	320,884	32,169	90,283
Trips by GO Rail	459	73	180
Trips made FROM the area during afternoon peak periods (3pm – 6pm)			
Total Trips	391,086	31,296	114,351
Trips by GO Rail	0	0	0

Issue 3 – Climate action plans to reduce GHG emissions do not address auto-dependency of intercity commuters.

Significant auto-dependency and expected growth in intercity commuting population can have negative economic, social, and environmental impacts for both regions. All levels of government have implemented climate action policies and GHG emissions reductions goals to achieve net-zero emissions future by 2050. While climate goals are focused on reducing GHG emissions within regional boundaries, intercity public transit services are not often considered by municipal governments as potential opportunities to reduce private vehicle dependency. Yet, investments in intercity public transit services can help to increase public transit mode share for long-distance commuters, and potentially reduce pollution and noise caused by traffic congestion on regional roads and highways, resulting in a range of environmental and health benefits for communities living within these regions.

Waterloo Region

In 2021, all 8 municipalities of Waterloo Region endorsed the GHG reduction target of 50% (based on 2010 levels) by 2030, and 80% reduction by 2050 (ClimateActionWR, 2024). In 2023, a community GHG emissions inventory confirmed that the region had decreased its GHG emissions by 14.4% in 2020. However, the significant reduction was largely due to the dramatic effects of the COVID-19 pandemic. Based on the 2019 Business-As-Usual projections, the region would not have likely achieved this target otherwise (ClimateActionWR, 2023).

As shown in **Figure 19** below, transportation sector is the largest contributor of regional GHG emissions at 47% and continues to increase despite improvements in fuel efficient vehicle technologies. Between 2019 to 2020, transportation sector emissions decreased by 15% due changes in travel behaviour prompted by the COVID-19 pandemic. However, despite the decline in emissions, the number of passenger vehicles on the road continues to increase, as well as larger sized, less efficient vehicles being purchased. For example, between 2010 to 2019, there has been a 62% increase in passenger light trucks, resulting in 32% increase in GHG emissions (ClimateActionWR, 2023).

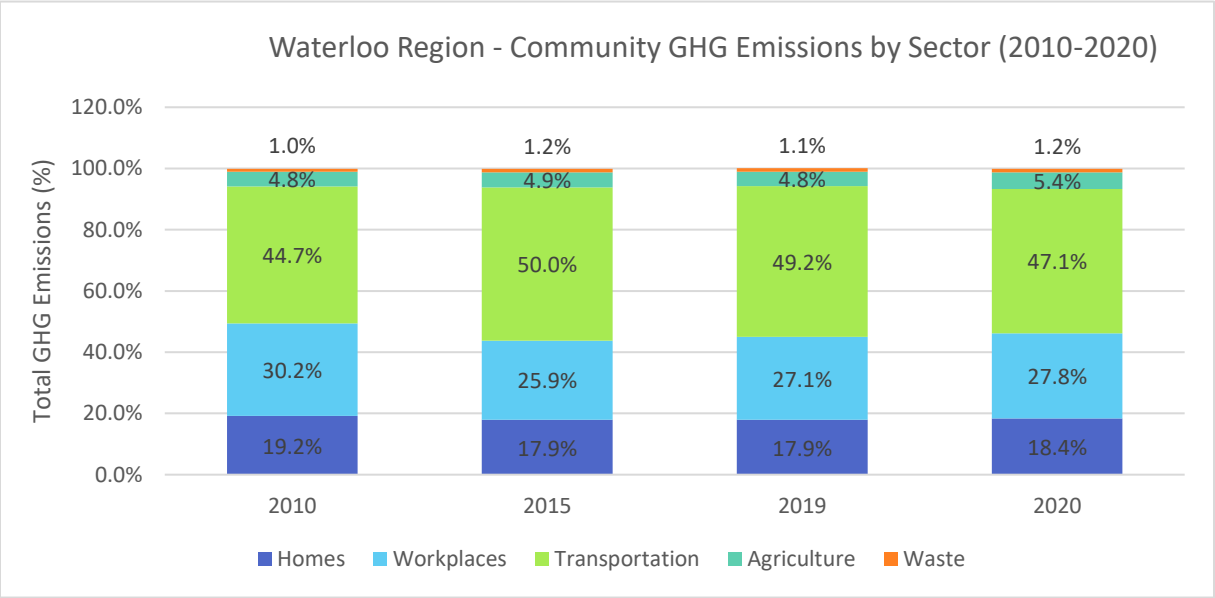


FIGURE 19: WATERLOO REGION COMMUNITY GHG EMISSIONS BY SECTOR (2010-2020)

The TransformWR Report is Waterloo Region's 30-year strategy to achieve its GHG reduction targets by 2050. The report establishes a series of "transformational change" goals with subsequent strategies and action items to transform the region to a resilient, low carbon community. By 2050, the Region expects to:

- Reduce commuting trips by 40% due to work-from-home options.
- 80% of trips are taken using active transportation, with the support of a robust public transit system.
- Remaining personal and commercial vehicles on the road are zero emission vehicles. (ClimateActionWR, 2021)

Wellington County

Wellington County has set a goal to achieve a 6% reduction in community GHG emissions by 2030, and an 80% reduction in emissions to achieve net-zero emissions by 2050 (County of Wellington, 2020).

Wellington County produces approximately 1.2 million tonnes of CO_2e (carbon dioxide equivalent) of GHG emissions from transportation, buildings, agriculture, and solid waste. Emissions from the burning of fossil fuels are contributed by Residential Buildings, Commercial/Industrial Buildings, and Transportation. Transportation is the largest source of Community GHG emissions from fossil fuels at 70%, and gasoline is the largest single source contributor at 44%,

followed by Diesel at 26% (County of Wellington, 2020). The high proportion of transportation emissions is reflective of the rural landscape of the County, where small towns and hamlets are separated by vast agricultural fields, and most amenities are accessed by vehicle. Furthermore, low population density also results in a greater reliance on personal vehicles for daily trips to run errands and commuting to work, either within the County or to neighbouring municipalities. For example, in 2019 the County estimated that over 20,000 daily trips were made from the County to Waterloo Region, while over 33,000 daily trips per day were made from Wellington County to the City of Guelph (County of Wellington, 2020).

Due to the high private vehicle dependency and lack of demand for public transit services, Wellington County expects that a large percentage of transportation sector emissions reductions can be achieved from public uptake of zero-emissions electric vehicles (County of Wellington, 2020).

City of Guelph

Because the City of Guelph is politically separate from Wellington County, the City implements its own GHG emissions inventory and climate action plans. In 2021, the City committed to the United Nations Race-to-Zero campaign, along with other GGH regions, and set the following targets:

- Reduce community GHG emissions by 63% (against the 2018 baseline) by 2030.
- Become a net-zero carbon community by 2050.

While Guelph's annual community emissions reduced significantly between 2019 and 2020, annual emissions increased by 3% in 2021. Similar to the other regions, transportation contributes the greatest share of community GHG emissions at approximately 30%, while other sectors such as residential, commercial, and industrial buildings are close behind at 21.7%, 23%, and 22%, respectively (City of Guelph, 2023). Through its 2022 Transportation Master Plan, the city has set mode share target of 42% non-auto trips to achieve an estimate 23% reduction in GHG emissions by 2051. These targets are primarily for trips within the city boundaries and do not consider intercity commuting trips. However, the City's climate action plan does not indicate any specific goals to reduce emissions of intercity commuting trips.

Climate Policy Summary

For both Waterloo Region and Wellington County (including City of Guelph), the transportation sector is the largest contributor to community GHG emissions. Due to its larger population and economy, annual GHG emissions are significantly higher in Waterloo Region. However, Wellington County's transportation section emissions are proportionally higher owing to the higher private vehicle dependency.

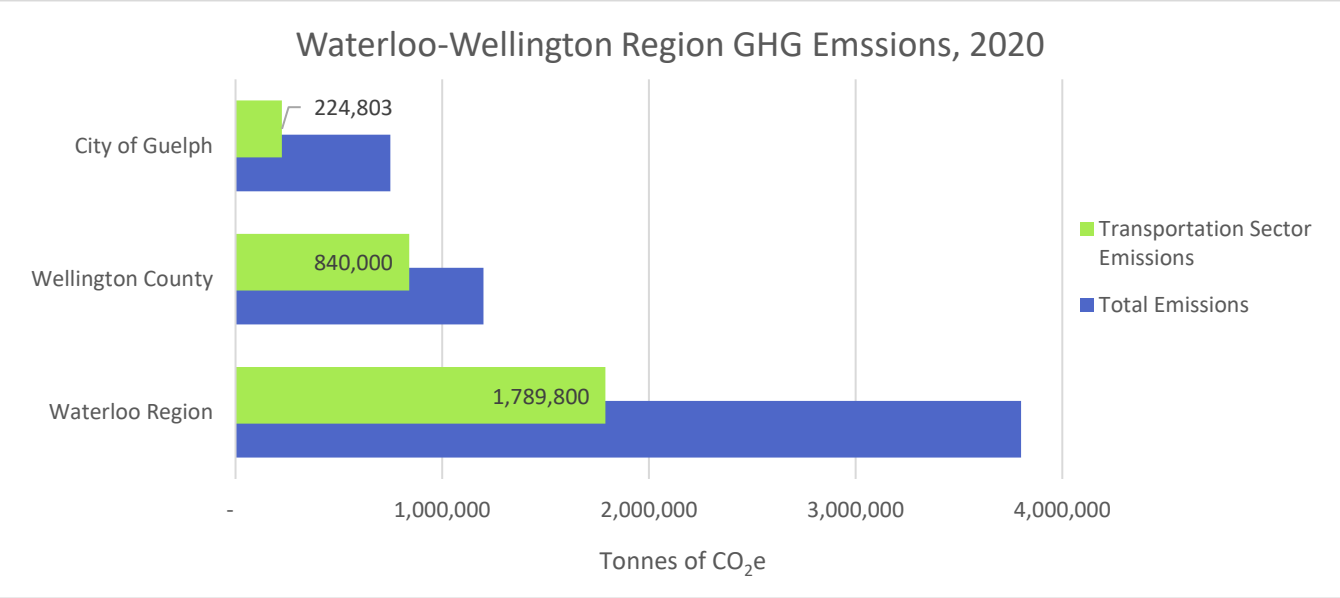


FIGURE 20: ESTIMATED GHG EMISSIONS FOR WATERLOO-WELLINGTON REGION, 2020

Through their respective climate action plans, Waterloo Region, Wellington County, and City of Guelph, have indicated climate action goals that aim to reduce dependency on private vehicles and improve options for commuters to reduce GHG emissions. However, action plans and strategies to achieve these goals have not considered intercity commuting trips. Waterloo Region expects a large share of commuting trips to be eliminated due to work-from-home options, however this does not consider various industries that do not typically have this option as well as the large share of employees that commute to the region for work. Similarly, City of Guelph establishes plans to support and encourage walking, cycling, carpooling, carsharing, and transit use within Guelph, but does not consider private vehicle dependency of intercity commuters.

Additionally, both regions expect transportation sector emissions will reduce significantly as more residents adopt electric vehicles. However, as discussed in the Literature Review section, there are significant physical and socio-economic barriers that will prevent widespread adoption of electric vehicles. As such, without adequate intercity public transit services, marginalized groups such as young adults and low-income earners that cannot afford to purchase electric vehicles will have limited access to employment opportunities. Moreover, although widespread ZEV adoption has the potential to significantly reduce transport sector GHG emissions, it will continue to exacerbate problems of auto dependency and traffic congestion.

Table 13 below summarizes regional climate action strategies that consider improving intercity commuting options as a means to reduce community GHG emissions.

TABLE 13: SUMMARY OF REGIONAL CLIMATE ACTION STRATEGIES FOR INTERCITY COMMUTING

	Waterloo Region	Wellington County	City of Guelph
Percentage of Transport Sector GHG emissions, 2020 (%)	**47%**	**70%**	**30%**
Climate Action Plan	Transform WR – 30-Year Strategy	Future Focused (2022-2030)	2022 Environmental Sustainability Report
Transport Sector GHG Emissions Reduction Goals	Achieve 50% reduction (based on 2010 levels) by 2030, and 80% reduction by 2050. (ClimateActionWR, 2024)	Achieve a 6% reduction in community GHG emissions by 2030, and net-zero emissions by 2050. (County of Wellington, 2020)	Reduce community GHG emissions by 63% (against the 2018 baseline) by 2030. Become a net-zero carbon community by 2050. (City of Guelph, 2023)
Potential Action/Strategy for Intercity Commuters	Transformative Change #1 – By 2050, most trips are taken using active transportation, with the support of a robust public transit system. Make fewer trips, make shorter trips, and make lower energy trips.	Objective – Develop strategies to support options for commuters to reduce greenhouse gases. Promote the use of Regional Transit and address climate change in future transit planning	None.

Summary of Issues

As shown, there are critical issues with the existing transportation network and climate policy framework that do not consider the large volume of daily intercity commuters between Waterloo Region and Wellington County, and the negative impacts if these issues are not addressed.

- **Issue #1** provides an overview of existing transportation systems available to intercity commuters and highlights the fact that currently intercity public transit services are not a practical option for daily commuters, making private vehicles the only viable option for commuting between the two regions.
- **Issue #2** demonstrates current intercity commuting trends and how population and employment growth projections for the two regions can further impact intercity commuting demands. Without adequate public transit options, intercity commuting will place a greater demand on road infrastructure, while also limiting accessibility for marginalized groups that do not have access to private vehicles.
- Lastly, reducing transport sector emissions are critical to most climate action plans, however climate policies primarily focus on improving low-carbon mobility within municipal boundaries, but fail to address intercity commuting options. **Issue #3** stresses the need to reduce GHG emissions from intercity commuting and implement these strategies as part of regional and provincial climate policy goals.

Business As Usual Scenario

A Business As Usual (BAU) scenario provides a baseline comparison for the transit investment option being proposed. The BAU scenario assumes the continuation of current transit services in the region and includes approved transportation infrastructure projects within the region.

This analysis notes the following:

- Private vehicle is the dominant mode of travel for both Waterloo and Wellington regions, where in the BAU the majority of commuting trips will continue to be completed by private vehicles due to the limited intercity transit options.
- There are over 22,000 daily commuters travelling between Waterloo Region and Wellington County, and in the BAU scenario this figure will increase due to population and employment growth projections.
- Transportation network expansions are primarily focused on improving highway infrastructure to accommodate growth in daily commuters, while public transit improvements are limited to the GTHA.

TABLE 14: KEY POPULATION AND EMPLOYMENT INSIGHTS

Region	Highlights
Waterloo Region	• 57% population growth between 2021 and 2051 • 41% employment growth between 2020 and 2051 • 98% of population resides in Kitchener-Cambridge-Waterloo CMA • Cities of Kitchener and Waterloo are designated as Urban Growth Centres
Wellington County	• 51% population growth between 2021 and 2051 • 70% of population resides in Guelph CMA • 8% employment growth between 2023 and 2051 (City of Guelph) • City of Guelph designated as Urban Growth Centre

Note: percentages are estimates based on Ontario Growth Plan forecasts and existing population and employment data.

Forecasting Intercity Commuting

Table 15 summarizes population estimates for intercity commuters between Waterloo Region and Wellington County using the 2006-2016 TTS Origin-Destination Matrices (Ashby, 2018) and the 2023 Statistics Canada resources (Statistics Canada, 2023). Waterloo residents commuting to Wellington and Guelph regions for work has increased consistently despite the impacts of the COVID-19 pandemic. Wellington and Guelph residents commuting to Waterloo for work increased considerably between 2011 and 2016. Although the population has declined slightly post-pandemic, this figure is likely to increase in the future. (Ashby, 2018)

TABLE 15: WATERLOO-WELLINGTON REGION - FORECASTING INTERCITY COMMUTING TRENDS

YEAR	Waterloo to Wellington/Guelph		Wellington/Guelph to Waterloo	
	Population	*Change Rate*	*Population*	*Change Rate*
2006[1]	7,900		5,300	
2011[1]	8900	13%	5,500	4%
2016[1]	10,900	22%	8,500	55%
2023[2]	13,580	25%	8,105	-5%

1. **(Ashby, 2018)**
2. **(Statistics Canada, 2023)**

Based on the estimates above, intercity commuting population growth forecasts were created using the **Excel Forecast** function to predict future intercity commuting figures based on historical data. The forecasting function is a simplified way to calculate or predict future values using historical values. The predicted values are a continuation of the historical values within the specified target date (Microsoft, 2021). While the forecasted estimate is based on historical values, the high and low estimates consider external factors that can impact growth trends for intercity commuting, such as changes to work-from-home policies, regional migration trends, and population and employment growth trends.

Figure 21 illustrates that the number of Waterloo residents commuting to Wellington and Guelph for work may increase to over 25,000 daily commuters by 2050. Similarly, **Figure 22** estimates that the number of Wellington/Guelph residents commuting to Waterloo Region for work may increase to nearly 15,000 daily commuters by 2050. Without the appropriate alternative transport options, this could result in nearly 40,000 daily vehicles commuting between the two regions. This estimate does not account for the thousands of post-secondary students that commute between the two regions, which may result in higher daily commuters.

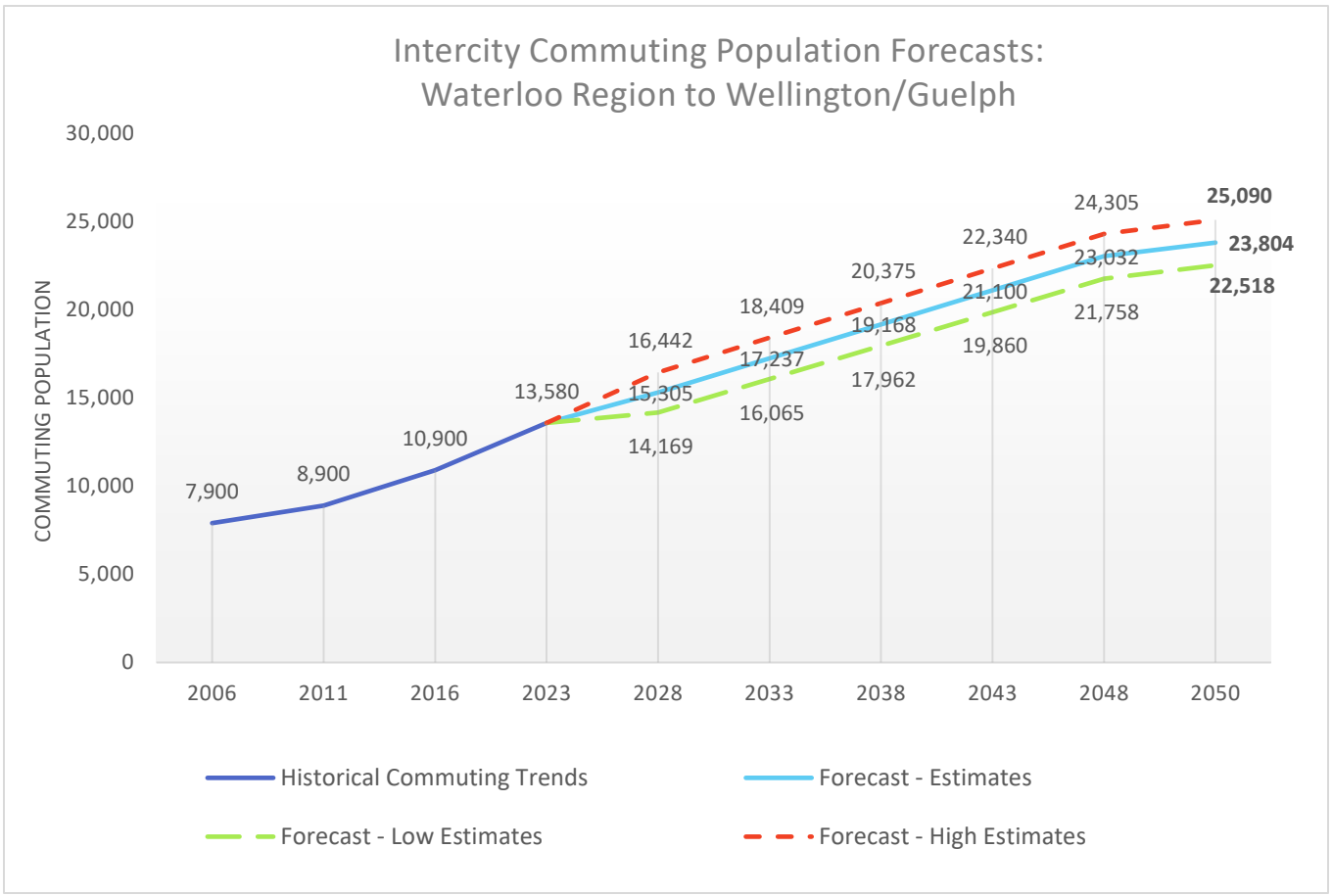


FIGURE 21: INTERCITY COMMUTING POPULATION FORECASTS: WATERLOO REGION TO WELLINGTON/GUELPH

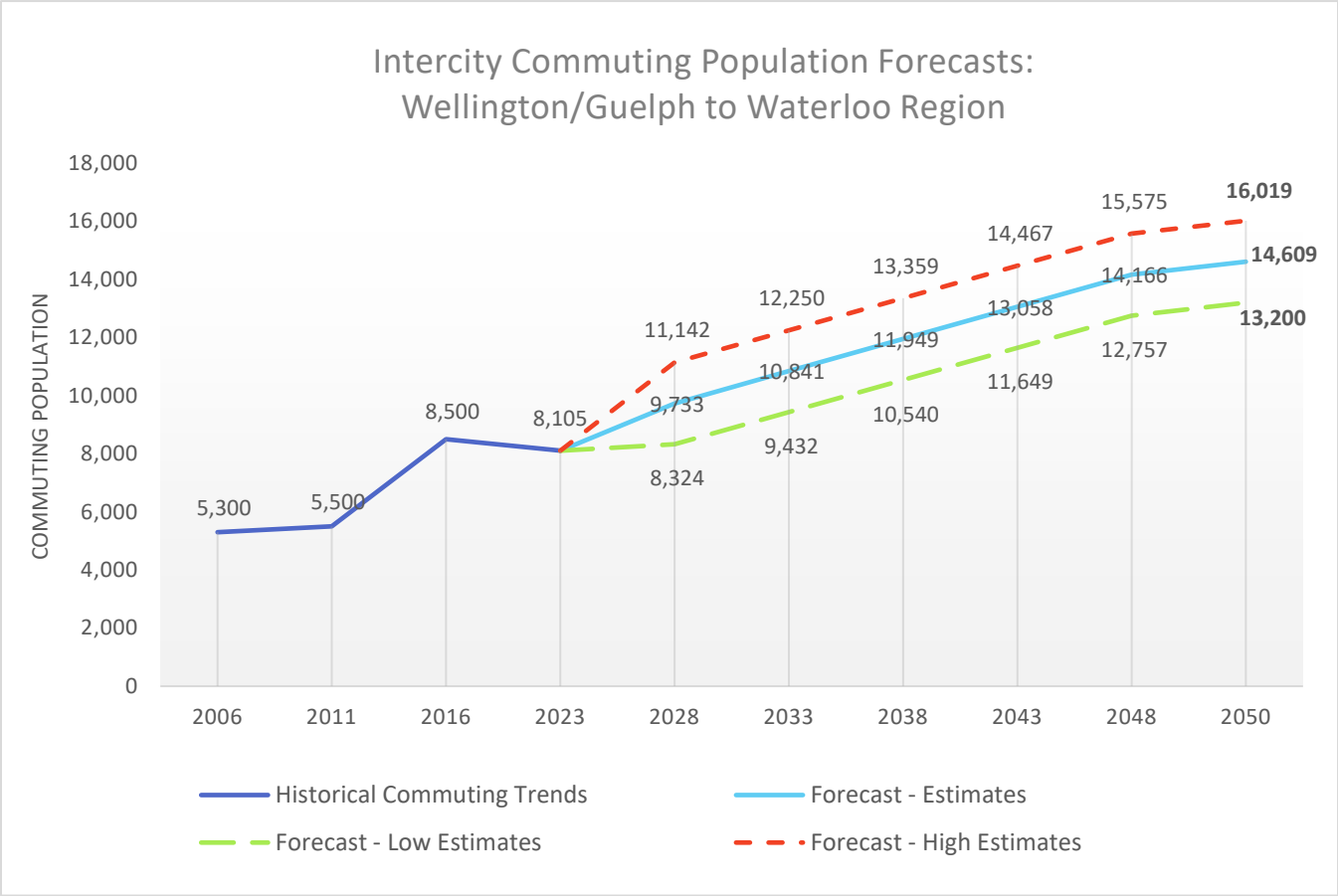


FIGURE 22: INTERCITY COMMUTING POPULATION FORECASTS: WELLINGTON/GUELPH TO WATERLOO REGION

Although the intercity commuting population is expected to increase, Metrolinx does not expect GO Rail ridership to increase significantly for the two regions. The Metrolinx GO Rail Station Access Report (2023) estimates a considerable increase in daily ridership at the Guelph GO station, while minimal growth is expected for the Kitchener GO station (Metrolinx, 2023). As shown in **Table 16**, while both stations are expected to see a growth in daily ridership, the role of the Kitchener GO station as a destination station is expected to decrease, while Guelph GO station will increase significantly. Additionally, Metrolinx GO Expansion plans will not significantly improve GO Rail services to Kitchener GO, and services will continue to be limited to peak hours only.

TABLE 16: METROLINX GO RAIL STATION ACCESS REPORT ESTIMATES, 2023

	Kitchener GO		Guelph GO	
	Current (2019)	Forecasted (2041)	Current (2019)	Forecasted (2041)
Daily Riders' Home Station	225	475	250	575
Daily Riders' Destination Station	75	50	75	625
Daily Total Footfall	675	975	600	2250

- **Daily Riders' Home Station** – Ridership expected to access the station.
- **Daily Riders' Destination Station** – Ridership expected to egress at the station.
- **Daily Total Footfall** – Total ridership (access and egress, all day) expected for the station, indicating overall ridership change.

Environmental Impacts

A report published by the International Energy Agency (IEA) established that Canadians buy and drive the most climate polluting vehicles (IEA, 2021). In 2019, nearly 2 million light-duty-vehicles (LDVs) were sold in Canada, with an average fuel consumption of 8.6 litres of gasoline equivalent per 100 kilometres (Lge/100km), which is higher than all other major LDV markets. As a result, Canada's LDV fuel consumption is almost 21% above the global average (IEA, 2021). According to the report, advanced economies with low population densities and low fuel prices tend to have a larger share of SUVs. Canada's high ranking in LDV fuel consumption is reflected in the growing share of SUV and Pick-Up Truck sales which increased from 33% of new LDV sales in 2005, to 67% in 2019 (IEA, 2021). A more recent report estimates this figure has increased to 79% in 2022 (GFEI, 2023). With SUVs and pick-up trucks being the dominant vehicle on Ontario highways, the projected increase in car commuters over the next 30 years will result in considerable traffic congestion along major roads and highways throughout the region.

Greenhouse gases consist of a variety of gases that accelerate the warming of the earth's atmosphere. The main GHGs in the atmosphere are water vapour, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and ozone. Carbon dioxide CO_2 is the most common GHG emitted by human activities, in terms of the quantity released and the total impact on global warming. As a result, CO_2 is sometimes used as a shorthand expression for all greenhouse gases, which can lead to some confusion about the types of gases that are actually being released into the atmosphere (Brander, 2023). Because CO_2 is considered the most important greenhouse gas, emissions reports often do not consider the other greenhouse gases resulting in an understatement of the total global warming impact. Therefore, A more accurate way of referring to a number of GHGs collectively is to use the term "carbon dioxide equivalent" or "CO_2e" (Brander, 2023).

The Environment and Climate Change Canada (ECCC) publishes an annual report of Greenhouse Gas Emissions Performance for model year light-duty vehicle fleet. For the 2020 Model Year, the average GHG emissions performance of all new passenger vehicles was 178g/mi, and for light trucks was 278g/mi (ECCC, 2020). However, these figures include the use of accumulated emission credits or purchasing credits from other companies in order to allow companies to remain in compliance with the vehicle emissions regulations. Companies used emissions credits to offset deficits accrued in the 2020 model year.

The carbon-related exhaust emissions (CREE) value is the sales-weighted average performance of a company in a given model year and represents the average carbon exhaust emissions from a company's total fleet of passenger vehicles and light trucks, expressed in grams of CO_2e per mile. The CREE value is measured using two emissions test procedures: the Federal Test Procedure (FTP), and the Highway Fuel Economy Test (HFET), also referred to as the city and highway tests, respectively (ECCC, 2020). These tests measure the products of carbon-related combustion including carbon dioxide (CO_2), carbon monoxide (CO), and Hydrocarbons (HC), and the final value is expressed in grams of CO_2e per mile. Finally, the company's CREE value is based on the sales weighted average of the combined test results for each model, and the number of vehicles manufactured or imported into Canada for the purpose of sale (ECCC, 2020). For the 2023 model year, the fleet average CREE was 274 CO_2e g/mi, or 170.3 CO_2e g/km.

Estimating GHG Emissions

Using the IEA's average Canadian vehicle consumption of 8.6 Lge/100km, an online conversion tool was used to determine the average carbon emissions per kilometer of approximately 200g CO_2/km (Marco, 2024). As a result, it can be estimated that one round trip from Kitchener to Guelph (55km) would result in 11,000 grams of CO_2 emissions released into the atmosphere. When accounting for the average 22,000 daily intercity commuters, this results in an estimated 242 million grams of CO_2 (or 242 tonnes) emissions per day, and nearly 58,080 tonnes of CO_2 emitted annually from commuters between the two regions alone. This figure is likely to be higher since it does not account for the thousands of students that also commute daily by private vehicles, as well as commercial vehicles that travel between the two regions.

Alternatively, when considering the average CREE values for 2020 fleet vehicles, the CO_2 equivalent (CO_2e) is higher as it includes emissions of various greenhouse gases. Assuming that all vehicles on the road are of the 2020 model year or later, the average CO_2e emissions of 405 g/km was used to estimate the CO_2e emissions for current and future commuting demands. Using this figure, a single vehicle round trip is estimated to emit over 22,000 grams of CO_2e emissions, resulting in total daily vehicle emissions to reach roughly 490 million grams of CO_2e, and annual emissions to reach 118,000 metric tonnes of CO_2e.

Based on the 2050 forecasted growth estimates above, intercity commuting population between the two regions could increase to nearly 40,000 people. In this scenario, annual passenger vehicle CO_2 emissions could increase to 105,600 metric tonnes and CO_2e emissions could increase to nearly 214,000 metric tonnes (**Figure 23).** The **Table 17** below provides a summary of the estimated CO_2 and CO_2e emissions for current and potential future commuting populations. With the expected population and employment growth projections, daily intercity commuters between Waterloo and Wellington County could increase to 40,000 vehicles per day, resulting in significant increases in daily and annual GHG emissions. Without appropriate alternative intercity transport options, the growth in the commuting population will result in significant regional environmental and health impacts. Therefore, climate action policies targeting intercity commuters are needed to reduce transport sector GHG emissions.

TABLE 17 - CURRENT AND FUTURE COMMUTING DATA - EMISSIONS ESTIMATES

Current Commuting Data	Emissions Estimates	
	CO_2 (g/km)	CO_2e (g/km)
Estimated Total Commuters Between Regions[1]	22,000	22,000
Average Distance Travelled – Round Trip (km)	55	55
Total Kilometres Travelled Per Day (km)	1,210,000	1,210,000
Average Vehicle Emissions (g/km)	**200**	**405**
Estimated Daily CO2e Emissions – 1 Vehicle (g/day)	11,000	22,275
Annual CO2e Emissions – 1 Vehicle (g/year)	2,640,000	5,346,000
Estimated Daily CO2e Emissions – Total (g/day)	242,000,000	490,050,000
Annual Emissions – Total Commuters (g/year)[2]	**58,080,000,000**	**117,612,000,000**
Annual Emissions – Total Commuters (mt/year)[2]	**58,080**	**117,612**
2050 Commuting Growth Forecast – Emissions Estimates		
Estimated Number of Commuters (Waterloo-Wellington)	40,000	40,000
Estimated Daily Emissions – Total Commuters (g/day)	440,000,000	819,000,000
Annual Emissions – Total Commuters (g/year)[2]	**105,600,000,000**	**213,840,000,000**
Annual Emissions – Total Commuters (mt/year)[2]	**105,600**	**213,840**

1. Assumes 1 person per vehicle
2. Annual emissions estimates are based on vehicle travel for 5 days per week.

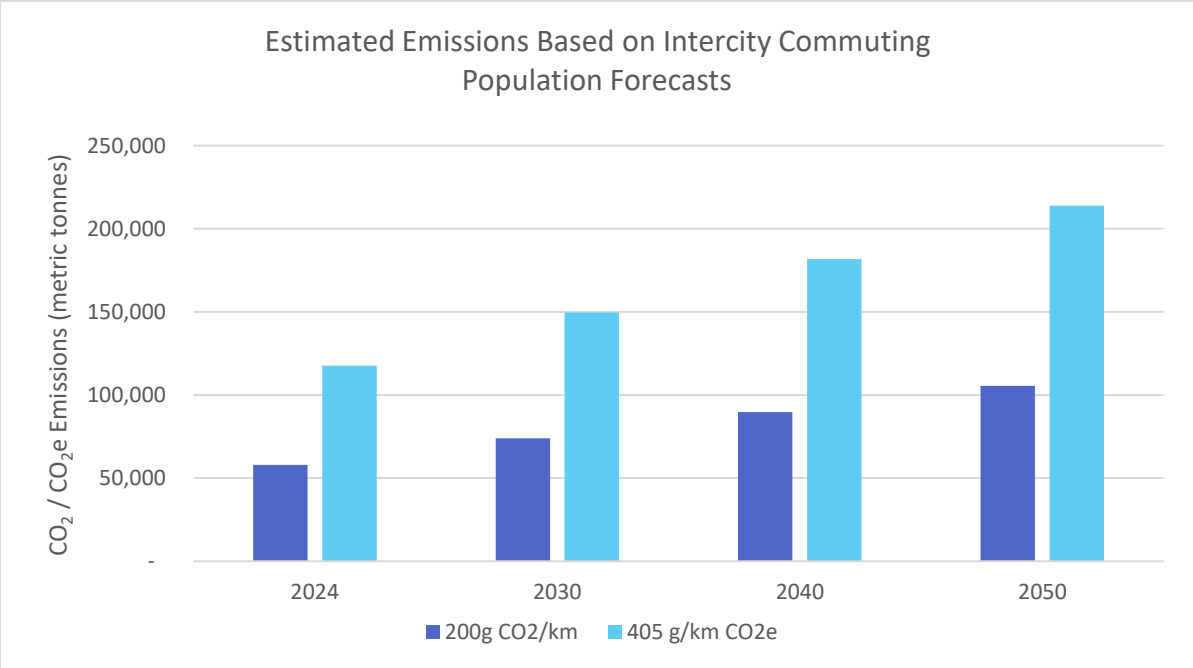


FIGURE 23: ESTIMATED EMISSIONS BASED ON INTERCITY COMMUTING POPULATION FORECASTS

What Happens if the Problem is Not Addressed?

Given that the two regions are forecasted to experience significant growth and development in the coming years, intercity commuting population trends is set to grow. The total number of commuters between the two regions could increase by over 50% by 2050. As a result, without the provision of a connected transit service, the overall livability and economic development potential of the region will be constrained. If the problem is not addressed, there are several risks associated with taking no action, summarized in **Table 18** below.

TABLE 18: SUMMARY OF POTENTIAL RISKS FOR BUSINESS-AS-USUAL TRENDS

Outcome	Impact
Transportation	The transport network will have decreased resilience and flexibility, resulting in: • Less reliable travel times • Less travel choices • Minimal network flexibility to meet growing demand
Quality of Life	An auto-dependent transport network will impact quality of life: • Increased risk of car accidents • Increased congestion, resulting in more time spent travelling to reach work and home destinations everyday. • Reduced likelihood of public transit use.
Economic Development	An auto-dependent transport network will adversely impact economic development: • Increased congestion means slower commute times, resulting in lost productivity. • Limited access to major employment hubs can result in curbed economic and urban development opportunities. • Increased congestion may deter impactful employers from choosing to locate in the region.
Environment	An auto-dependent transport network will adversely impact the environment: • Congestion and heavy auto use will lead to increased GHG emissions. • Heavy auto use will also lead to increased noise and air pollutants, which directly impact human health and environmental integrity.

Investment Options

Investment in a high-frequency, all-day intercity bus service between the Region of Waterloo and Wellington County can support the thousands of daily commuters between the two regions, by providing a viable alternative to private vehicle travel. The purpose of the intercity bus service is to provide direct connections between key urban and employment centres for the Waterloo-Wellington region and facilitate reduced private vehicle traffic congestion between the two regions, provide more affordable transportation options for commuters, reduce GHG emissions and improve air quality across the region, and increase access to employment and education throughout the region.

To support the objectives of the intercity bus service, the following strategies are recommended:

- → The assessment only considers weekday services operations (Monday to Friday), to capture the majority of the intercity commuters. However, implementing weekend services should be explored at later stages of the project.
- → The intercity bus service should have minimal stops to minimize commuting time as much as possible.
- → Strategic location of bus stops with efficient connections to local transit, as well as connections to major urban and employment areas between the two regions.
- → The intercity bus service will use existing public transit locations and operate curbside pickups, to minimize project costs and minimize boarding and alighting times,

The Metrolinx Business Case Manual recommends that a business case evaluate more than one option that could address the problem or opportunity presented above. This chapter describes three intercity bus service options to be evaluated for the proposed investment. For each option, quantitative analyses and qualitative discussions regarding the possible costs and benefits are divided into four traditional Metrolinx business cases: strategic, financial, economic, and deliverability & operations. Where possible high-level metrics are used to estimate the potential impacts of implementing an intercity bus service connecting Waterloo and Wellington regions.

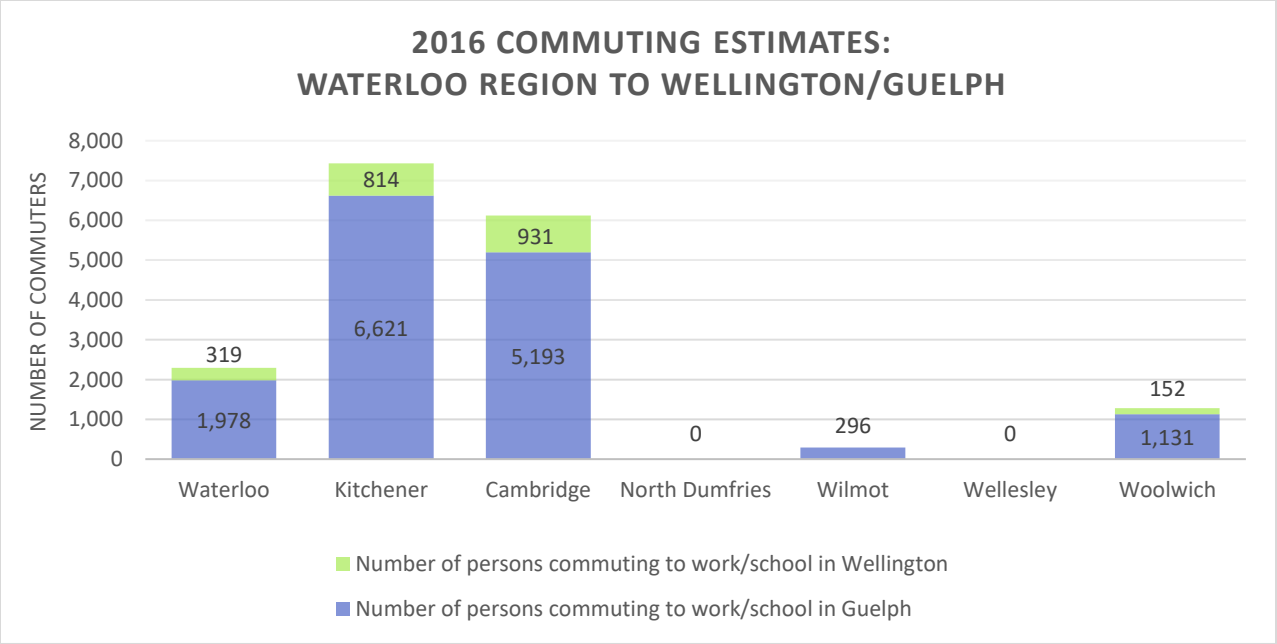


FIGURE 24: INTERCITY COMMUTERS BY MUNICIPALITY, WATERLOO REGION TO WELLINGTON/GUELPH

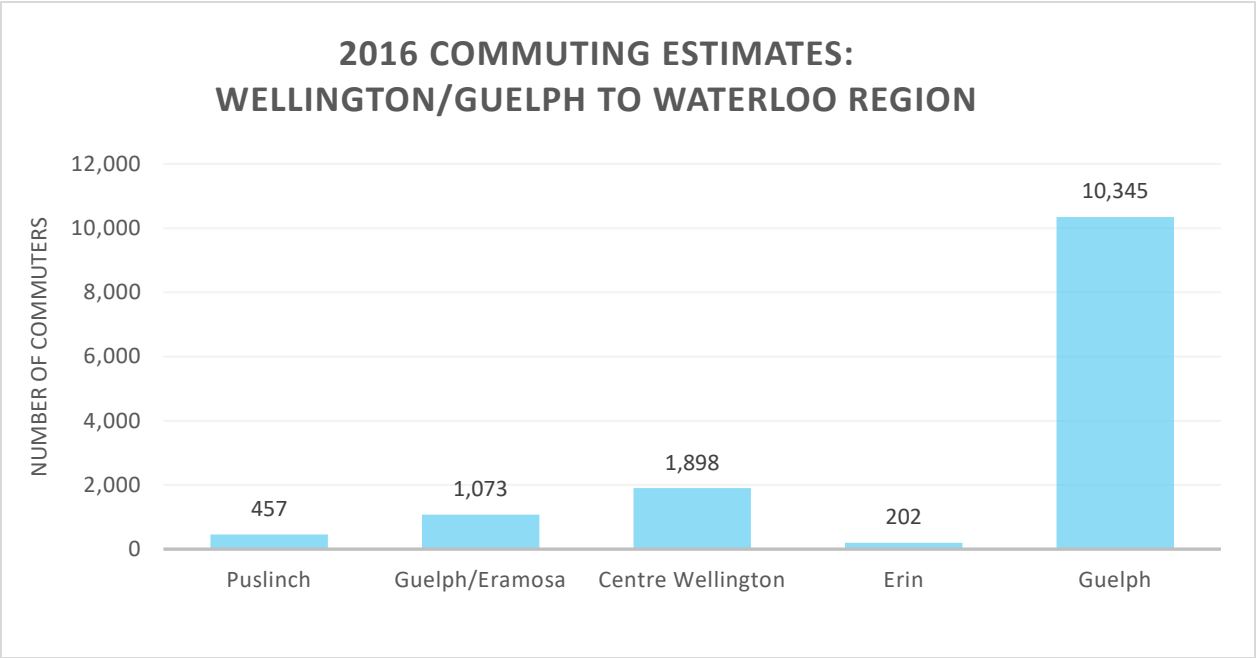


FIGURE 25: INTERCITY COMMUTERS BY MUNICIPALITY, WELLINGTON/GUELPH TO WATERLOO REGION

Route Option Development Rationale

The 2016 TTS Survey results indicated that the majority of Waterloo Region residents commuting to Guelph for work and school live in the City of Kitchener and City of Cambridge, while a smaller proportion of commuters live in Waterloo and Woolwich. Alternatively, City of Guelph represents the majority of residents commuting to Waterloo Region for work and school from Wellington County. This confirms that an intercity public transit connection is primarily needed between the cities of Kitchener, Cambridge, and Guelph.

The primary objective of the proposed intercity public transit service is to provide a frequent service that can be considered a viable alternative to private vehicles. To meet the needs of intercity commuters and ensure project success, the following strategies are recommended:

- → The assessment only considers weekday services operations (Monday to Friday), to capture the majority of the intercity commuters. However, implementing weekend services should be explored at later stages of the project.
- → The intercity bus service should have minimal stops to minimize commuting time as much as possible.
- → Strategic location of bus stops with efficient connections to local transit, as well as connections to major urban and employment areas between the two regions.
- → The intercity bus service will use existing public transit locations and operate curbside pickups, to minimize project costs and minimize boarding and alighting times,

Primary Bus Stations

To minimize private vehicle dependency and improve transit accessibility, primary bus stop locations were selected near major transit hubs where transit users can use local connections to reach their final destination. Both Waterloo Region and City of Guelph have sophisticated public transit systems within their respective regions which can be used to access the intercity bus service. The ION LRT currently extends between the cities of Waterloo and Kitchener and

will be expanded to include the City of Cambridge in the near future. Additionally, Waterloo Region is in the process of constructing a regional transit hub which will be the centre of all public transit connections throughout the region. Similarly, Guelph Central Station is the primary transit hub in the region with extensive public transit connections as well as plans to upgrade the station as part of the Metrolinx GO Expansion plans. As a result, it would be ideal to provide bus service connections to primary transit hubs that is accessible by local transit.

The following are proposed primary bus stop locations and rationale for each city:

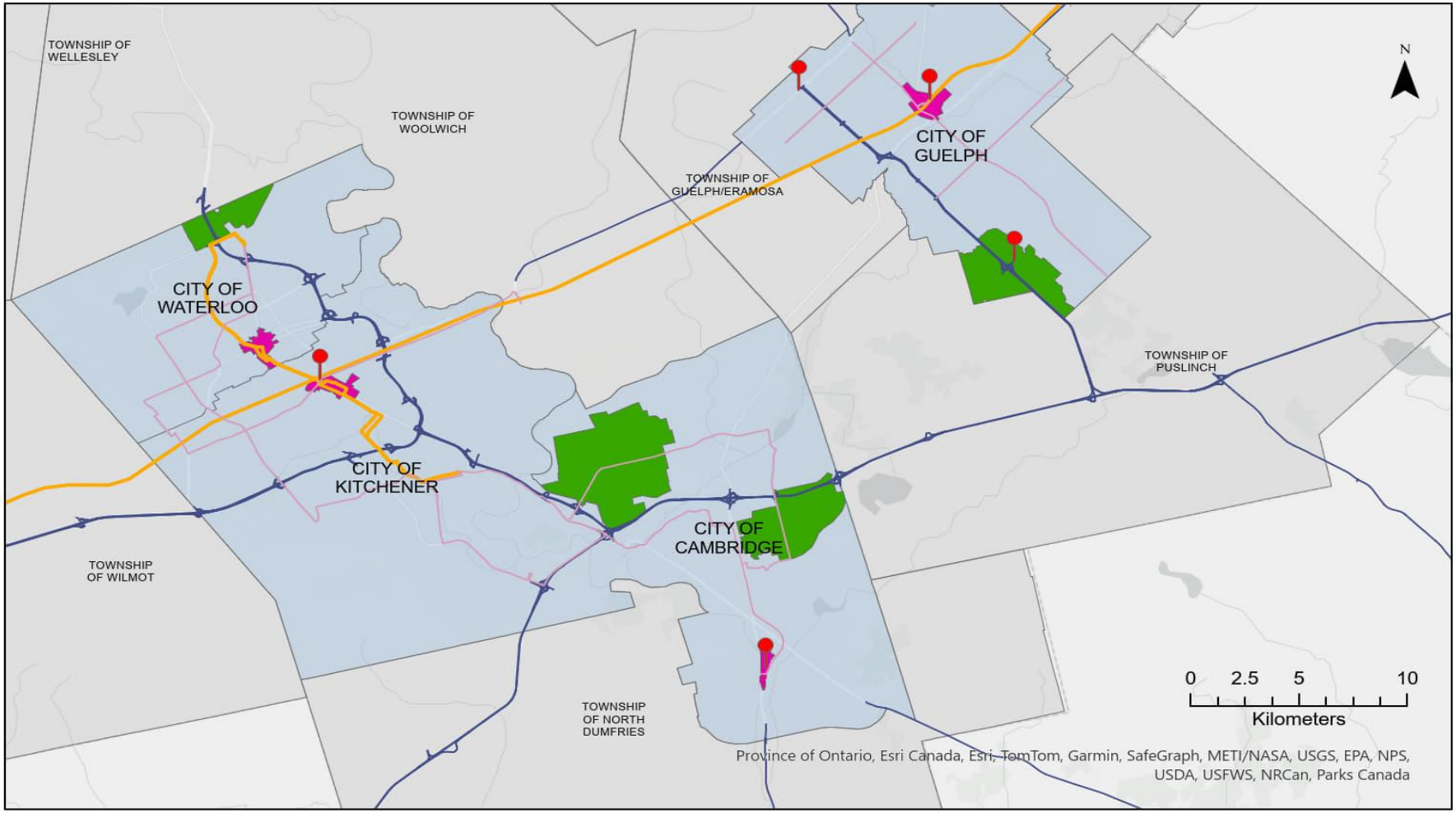
- → **Kitchener** – in Kitchener, the proposed bus stop is near **Central Station** since it is located on the ION LRT line, and this is also the location of the future Region of Waterloo Transit Hub. The bus stop is also located within the city's designated urban growth centre and major transit station area.
- → **Guelph** – in Guelph, the proposed bus stop is at **Guelph Central Station** because it is the primary transit hub in the region, with majority of the transit routes starting, ending, or passing through the downtown hub and connecting to outer regions of the City and Wellington County. The station is also located within the city's designated urban growth centre and major transit station area.
- → **Cambridge** – in Cambridge, the proposed bus stop is at the Cambridge Bus Terminal due to multiple local transit connections at the terminal. The ION LRT expansion into Cambridge will not begin for many years, however, it is expected to connect to the Cambridge Bus Terminal. The bus terminal also located within the city's designated urban growth centre and major transit station area.

Secondary Bus Stops

In addition to urban growth centres, the location of major employment areas throughout the region are also crucial factors impacting commuting behaviours. The proposed investment also explores options that include intermediate stops at major employment areas in Guelph. However, it is recommended that additional secondary stops are explored to connect major employment areas in the Waterloo Region in later stages.

The following are proposed secondary bus stop locations and rationale for each city:

- → **North Guelph** – the northwest region of Guelph, near the intersection of Highway 7 and Highway 6, is designated as a significant employment area through Guelph's Official Plan. The area consists of a mix of industrial, service commercial, and corporate businesses that attract a significant workforce throughout the region.
- → **South Guelph** – the southwest region of Guelph, along Highway 6, is designated as a provincially significant employment zone that provides high economic output and reliable employment across the region. The area primarily consists of industrial and corporate organizations attracting a considerable share of the workforce in the region.



Intercity Bus Service Regional Map

Legend

- MTO Highway Jurisdiction
- GGH Urban Growth Centres
- Provincially Significant Employment Zones
- Primary Municipal Service Regions
- Municipal Boundary
- Intercity Bus Stops

Regional Transit Network

- Existing
- Proposed

FIGURE 26 - INTER-CITY BUS SERVICE MAP - STATION STOPS

Investment Options Summary

During peak rush hours, all options are proposed to operate on a 15-minute headway, which means a bus will leave the primary bus stop every 15 minutes or 4 buses per hour. As a result, between 6 AM and 10 AM during the morning rush hours, and from 3 PM to 7 PM during the evening rush hours, the buses will operate on a 15-minute headway. Alternatively, during off-peak periods, between 10 AM to 3PM and from 7 PM to 11 PM, buses will operate on a 30-minute headway. Because the goal of the investment option is to provide a viable alternative to private vehicle travel, it was determined that high-frequency services would be preferred in order to reduce wait times between buses. Lastly, on-Peak trip time estimates are longer due traffic congestion conditions, while off-peak trip times assume the standard travel time without traffic congestion.

Table 19 summarizes the approximate on-peak and off-peak bus operations for each investment option, including route travel time, headway, and total buses in operation. The "Total Buses in Operations" calculations were completed using the following formula:

$$N = \left(\frac{T}{h}\right)$$

Where: *N* is the number of buses necessary, *T* is the total route trip time, and *h* is the proposed headway. Because *N* must be an integer, the ratio of *T/h* is rounded up to the next whole number.

TABLE 19 - SUMMARY OF INTERCITY BUS SERVICE OPERATIONS FOR PROPOSED INVESTMENT OPTIONS

	Option 1	Option 2		Option 3
Regional Connections	**Kitchener – Guelph**	**Kitchener – Guelph**	**Cambridge – Guelph**	**Cambridge – Kitchener – Guelph**
Round Trip Travel Distance (km)	55	55	50	88
Number of Station Stops	2	2	2	3
Station Standing Time (10 min/stop)	20	20	20	30
On Peak Bus Operations (6AM to 10AM and 3PM to 7PM)				
Round Trip Time (min)	100	100	100	140
Total Route Trip Time (min)	120	120	120	170
Service Headway (min)	15	15	15	15
Total Buses in Operation	**8**	**16**		**22**
Off Peak Bus Operations (10AM to 3PM and 7PM to 12AM)				
Round Trip Time (min)	70	70	70	115
Station Standing Time (20 min/stop)	40	40	40	60
Total Route Trip Time (min)	110	110	110	175
Service Headway (min)	30	30	30	30
Total Buses in Operation	**4**	**8**		**12**

Intercity Bus Route Options

The route options presented below consist of an intercity, high-frequency bus service connecting the downtown nodes of Waterloo Region and Wellington County. The cities of Kitchener, Cambridge, and Guelph represent the largest population of commuters between the two regions and, as such, the route options will aim to connect these regions. To be considered as a viable alternative to private vehicles, a 15-minute headway during peak hour services and 30-minute headway during off-peak hours is used for each of the proposed options.

Option 1: Kitchener – Guelph, Direct Service

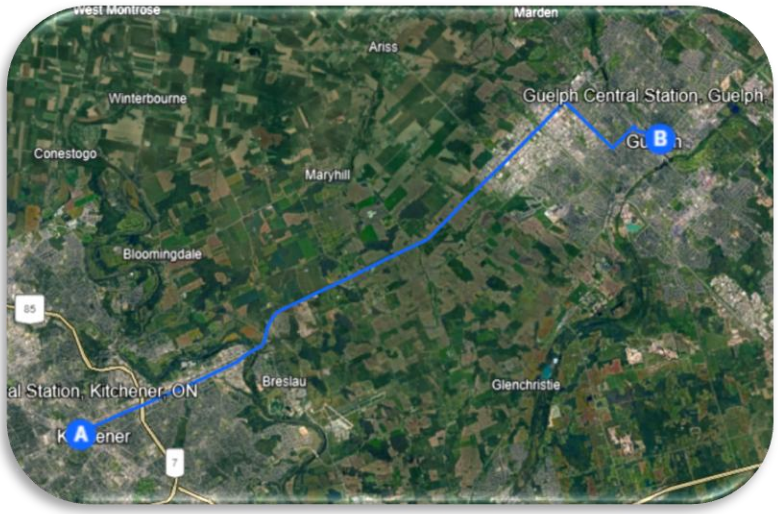
Option 1 is a direct connection between downtown Kitchener and downtown Guelph, with no additional stops along the route. The route connects two provincially designated Urban Growth Centres and primarily operates along the Highway 7 corridor between the two regions.

Service Frequency:

- **On-Peak Hours:** Every 15-minutes from 6AM to 10AM and 3PM to 7PM
- **Off-Peak Hours:** Every 30 minutes between 10AM to 3PM, and 7PM to 12PM

A Central Station, Kitchener

B Guelph Central Station



On/Off-Peak Bus Operating Schedules

Table 19 and Figure 27 demonstrates the bus service schedule for on-peak services operating on a 15-minute headway from 6 AM to 10 AM. A similar schedule would ensue for on-peak services between 3 PM and 7 PM in the evening. As shown, a total of 26 trips are completed between Kitchener and Guelph during the morning on-peak service hours, and a total of 52 trips are completed in during both morning and evening on-peak service hours.

TABLE 20 - OPTION 1: ON-PEAK BUS SCHEDULE (6 AM TO 10 AM)

Option 1: Kitchener - Guelph								
	Buses	Guelph	Kitchener	Guelph	Kitchener	Guelph	Kitchener	Total Trips
1	A		6:00	7:00	8:00	9:00	10:00	4
2	B		6:15	7:15	8:15	9:15		3
3	C		6:30	7:30	8:30	9:30		3
4	D		6:45	7:45	8:45	9:45		3
5	E	6:00	7:00	8:00	9:00	10:00		4
6	F	6:15	7:15	8:15	9:15			3
7	G	6:30	7:30	8:30	9:30			3
8	H	6:45	7:45	8:45	9:45			3
							Total:	**26**

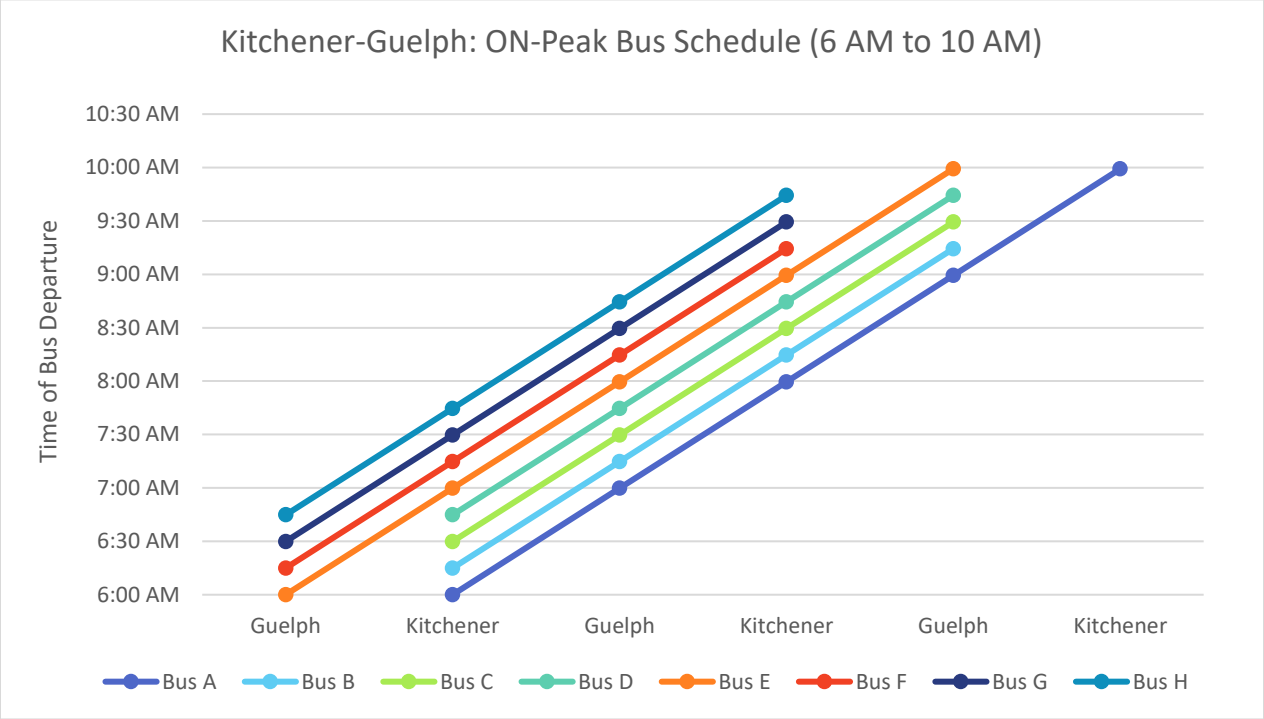


FIGURE 27 - OPTION 1 ON-PEAK BUS SCHEDULE (6AM TO 10AM)

Table 20 and Figure 28 illustrates the bus schedule for off-peak services operating on a 30-minute headway from 10 AM to 3 PM. A similar schedule would ensue for off-peak services between 7 PM and 12 AM in the evening. As shown, a total of 18 trips are completed between Kitchener and Guelph during the afternoon off-peak service hours, and a total of 32 trips are completed during both afternoon and evening off-peak service hours.

TABLE 21 - OPTION 1 OFF-PEAK BUS SCHEDULE (10 AM TO 3 PM)

Option 1: Kitchener – Guelph									
	Buses	Guelph	Kitchener	Guelph	Kitchener	Guelph	Kitchener	Guelph	Total Trips
1	A		10:00	11:00	12:00	13:00	14:00	15:00	5
2	B		10:30	11:30	12:30	13:30	14:30		4
3	C	10:00	11:00	12:00	13:00	14:00	15:00		5
4	D	10:30	11:30	12:30	13:30	14:30			4
								Total:	**18**

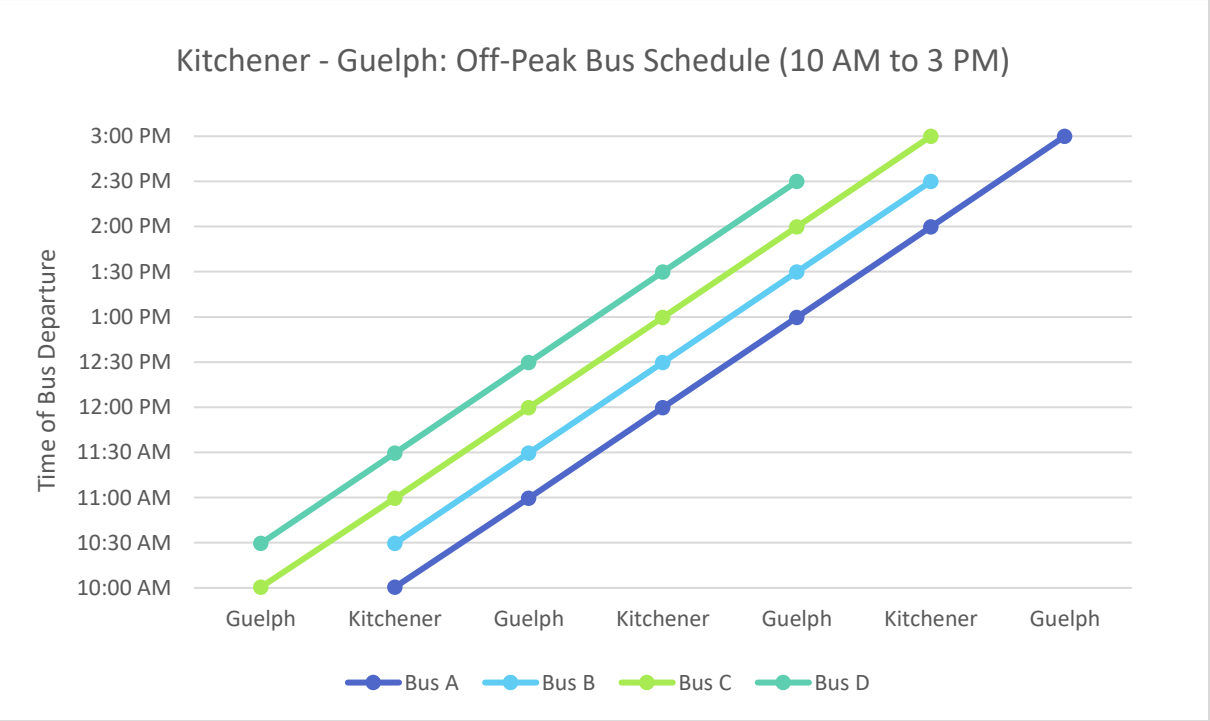


FIGURE 28 - OPTION 1 OFF-PEAK BUS SCHEDULE (10AM TO 3 PM)

Option 2: Kitchener – Guelph, Cambridge – Guelph, Direct Service

After Kitchener, Cambridge has the highest population of commuters to Guelph and Wellington County. Option 2 maintains the same direct connections between downtown Kitchener and downtown Guelph as Option 1 and adds an additional direct service between downtown Cambridge and downtown Guelph. The purpose of this option to overcome existing public transit barriers for residents commuting between these two cities. The route between Cambridge and Guelph is relatively the same distance as the route between Kitchener and Guelph and primarily uses a direct route along Hespeler Road and Wellington Road. However, buses can be re-routed to Highway 401 and Highway 6, depending on traffic conditions.

Service Frequency:

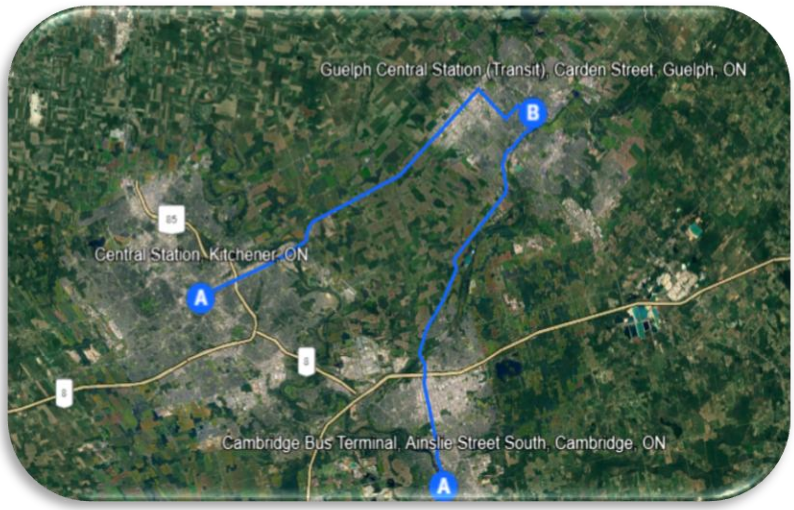
- → **On-Peak Hours:** Every 15-minutes from 6AM to 10AM and 3PM to 7PM
- → **Off-Peak Hours:** Every 30 minutes between 10AM to 3PM, and 7PM to 12PM

A Cambridge Bus Terminal

B Guelph Central Station

A Central Station, Kitchener

B Guelph Central Station



On/Off-Peak Bus Operating Schedules

The bus operating schedules for services between Kitchener and Guelph remain the same as Option 1 and below outlines the assessment for the secondary bus service between Cambridge and Guelph.

Table 21 and **Figure 29** demonstrates the bus service schedule for on-peak services operating on a 15-minute headway from 6 AM to 10 AM. A similar schedule would ensue for on-peak services between 3 PM and 7 PM in the evening. As shown, a total of 26 trips are completed between Cambridge and Guelph during the morning on-peak service hours, and a total of 52 trips are completed throughout both morning and evening on-peak service hours.

TABLE 22 - ON-PEAK BUS SCHEDULE FOR CAMBRIDGE-GUELPH (6 AM TO 10 AM)

Cambridge – Guelph								
	Buses	Guelph	Cambridge	Guelph	Cambridge	Guelph	Cambridge	Total Trips
1	I		6:00	7:00	8:00	9:00	10:00	4
2	J		6:15	7:15	8:15	9:15		3
3	K		6:30	7:30	8:30	9:30		3
4	L		6:45	7:45	8:45	9:45		3
5	M	6:00	7:00	8:00	9:00	10:00		4
6	N	6:15	7:15	8:15	9:15			3
7	O	6:30	7:30	8:30	9:30			3
8	P	6:45	7:45	8:45	9:45			3
							Total:	**26**

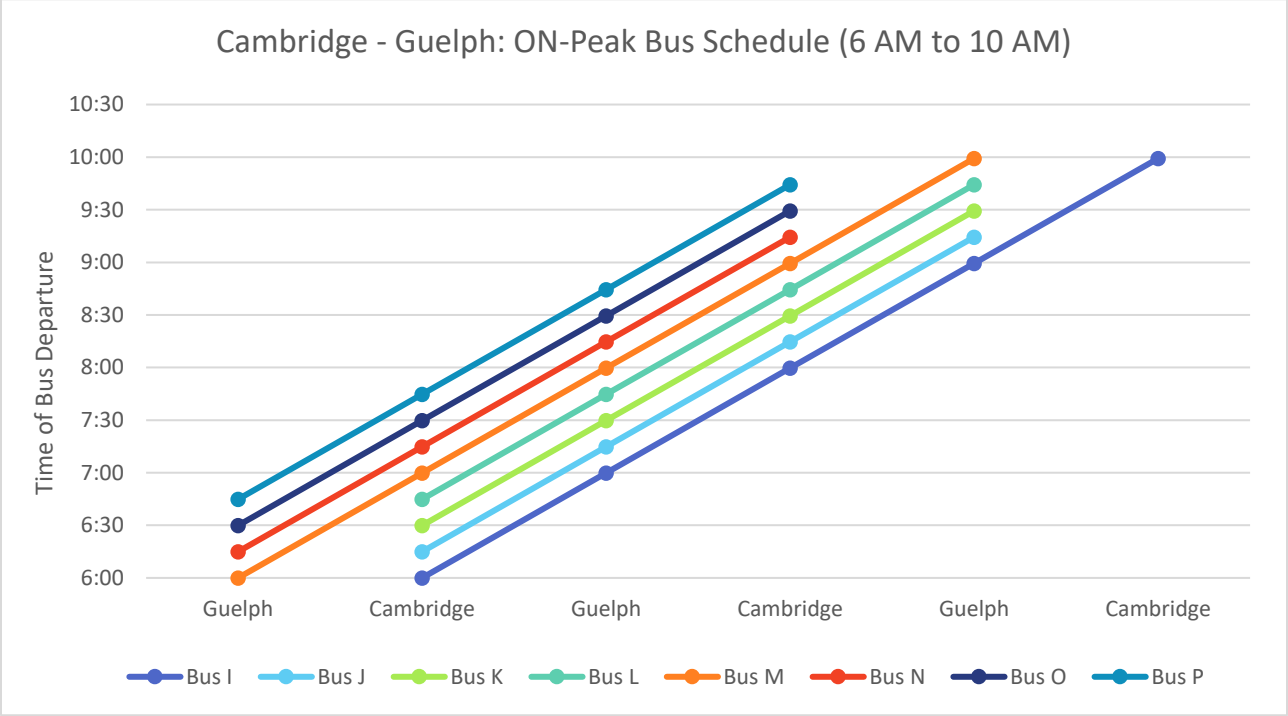


FIGURE 29 - CAMBRIDGE-GUELPH ON-PEAK BUS SCHEDULE (6AM TO 10 AM)

Table 23 and **Figure 30** illustrates the bus schedule for off-peak services operating on a 30-minute headway from 10 AM to 3 PM. A similar schedule would ensue for off-peak services between 7 PM and 12 AM in the evening. A total of 18 trips are completed between Cambridge and Guelph during the afternoon off-peak service hours, and a total of 32 trips are completed throughout both afternoon and evening off-peak service hours.

TABLE 23 - CAMBRIDGE-GUELPH OFF-PEAK BUS SCHEDULE (10 AM TO 3 PM)

Cambridge – Guelph									
	Buses	Guelph	Cambridge	Guelph	Cambridge	Guelph	Cambridge	Guelph	Total Trips
1	E		10:00	11:00	12:00	13:00	14:00	15:00	5
2	F		10:30	11:30	12:30	13:30	14:30		4
3	G	10:00	11:00	12:00	13:00	14:00	15:00		5
4	H	10:30	11:30	12:30	13:30	14:30			4
								Total:	**18**

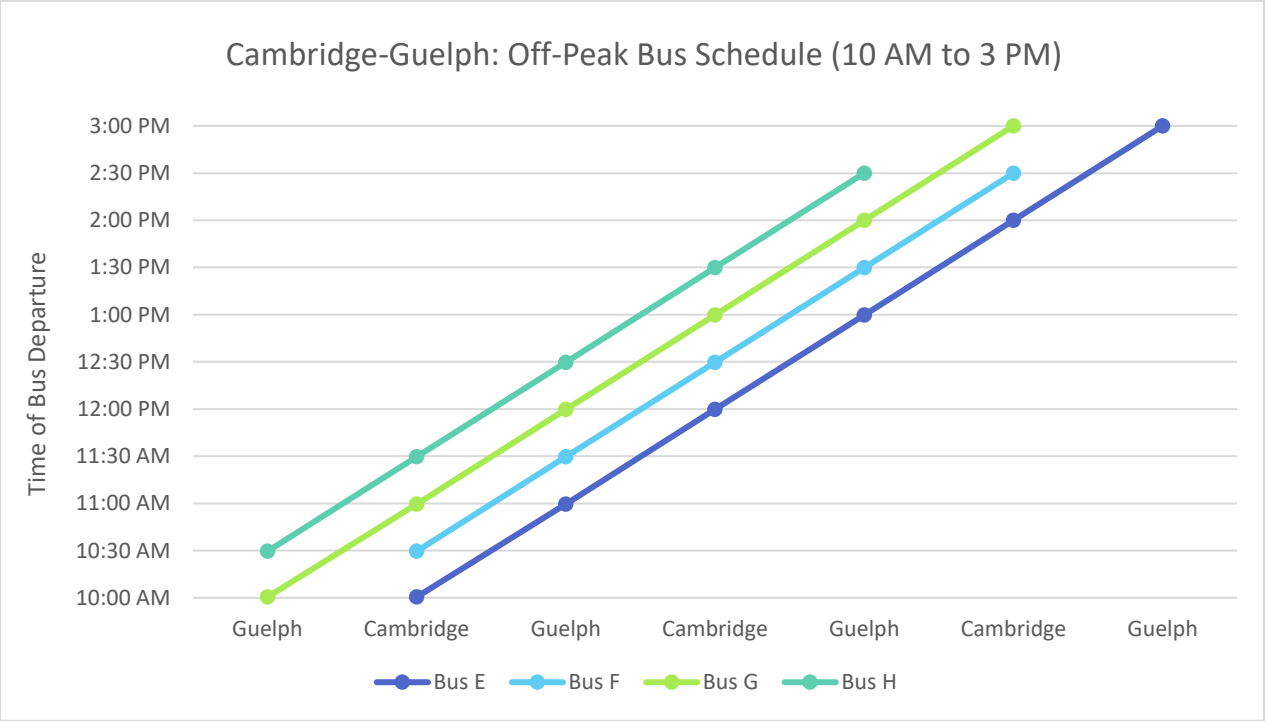


FIGURE 30 - CAMBRIDGE-GUELPH OFF-PEAK BUS SCHEDULE (10 AM TO 3 PM)

Option 3: Cambridge – Kitchener – Guelph, Two-Way Service

To provide intercity commuters with a viable alternative to private vehicles, bus services must also consider connections to major employment areas. Furthermore, as it has been established, there are more people commuting from Waterloo Region to Guelph, than vice versa, and the majority of these commuters originate from the cities of Kitchener and Cambridge. Therefore, Option 3 proposes continuous intercity bus services between Cambridge, Kitchener, and Guelph. Additionally, the service operates in both directions and also includes secondary stops at major Employment Areas within the City of Guelph. As a result, commuters in all three regions are provided with direct public transit services to primary destinations throughout the region. Although there are additional stops on the route compared to previous options, these are significant employment areas that are likely to attract more transit users over time. Additionally, unlike Option 2, the service has an added benefit of providing direct connections between Cambridge and Kitchener, which currently requires transit interchanges. Because Option 3 is proposed as a two-way service, the number of buses in operation was doubled to support synchronized east-west operations.

Service Frequency:

- → **On-Peak Hours:** Every 15-minutes from 6AM to 10AM and 3PM to 7PM
- → **Off-Peak Hours:** Every 30 minutes between 10AM to 3PM, and 7PM to 12PM

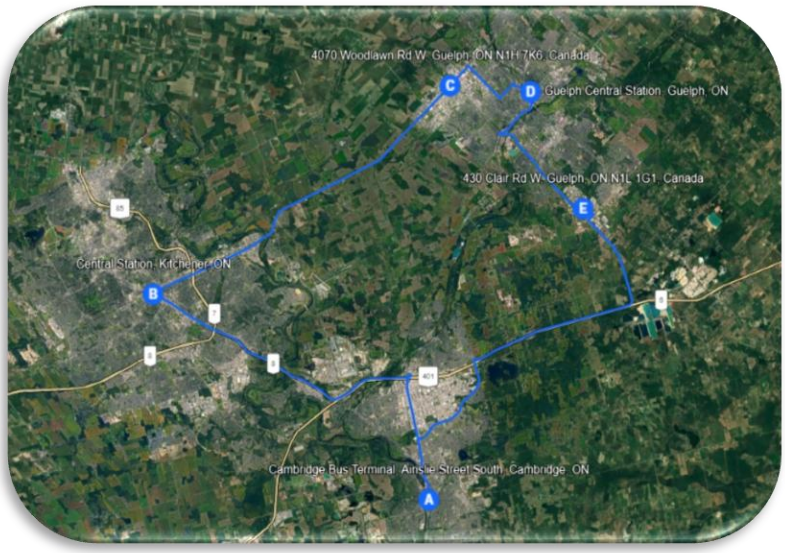
A Cambridge Bus Terminal

B Central Station, Kitchener

C Highway 7/ Highway 6

D Guelph Central Station

E Highway 6 / Laird Rd.



On/Off-Peak Bus Operating Schedules

Tables 24 and **25**, and **Figures 31** and **32**, illustrates the bus schedule for on-peak services operating on a 15-minute headway from 6 AM to 10 AM, in the clockwise (Table 24) and counterclockwise (Table 25) directions. A similar schedule would ensue for on-peak services between 3 PM and 7 PM in the evening.

Based on the assessment, a total of 80 trips are completed between Kitchener, Cambridge, and Guelph during the morning on-peak service hours, and a total of 160 trips are completed in during both morning and evening on-peak service hours.

TABLE 24 - OPTION 3 ON-PEAK SCHEDULE, CLOCKWISE (6 AM TO 10 AM)

Option 3: On-Peak Schedule (Clockwise)									
	Buses	**Guelph**	**Cambridge**	**Kitchener**	**Guelph**	**Cambridge**	**Kitchener**	**Guelph**	**Total Trips**
1	A			6:00	7:00	8:00	8:45	9:45	4
2	B			6:15	7:15	8:15	9:00	10:00	4
3	C			6:30	7:30	8:30	9:15		3
4	D		6:00	6:45	7:45	8:45	9:30		4
5	E		6:15	7:00	8:00	9:00	9:45		4
6	F		6:30	7:15	8:15	9:15	10:00		4
7	G		6:45	7:30	8:30	9:30			3
8	H	6:00	7:00	7:45	8:45	9:45			4
9	I	6:15	7:15	8:00	9:00	10:00			4
10	J	6:30	7:30	8:15	9:15				3
11	K	6:45	7:45	8:30	9:30				3
								Total Trips	**40**

TABLE 25 - OPTION 3 ON-PEAK SCHEDULE, COUNTER-CLOCKWISE (6 AM TO 10 AM)

Option 3: On-Peak Schedule (Counter-Clockwise)									
	Buses	**Guelph**	**Kitchener**	**Cambridge**	**Guelph**	**Kitchener**	**Cambridge**	**Guelph**	**Total Trips**
12	L			6:00	7:00	8:00	8:45	9:45	4
13	M			6:15	7:15	8:15	9:00	10:00	4
14	N			6:30	7:30	8:30	9:15		3
15	O		6:00	6:45	7:45	8:45	9:30		4
16	P		6:15	7:00	8:00	9:00	9:45		4
17	Q		6:30	7:15	8:15	9:15	10:00		4
18	R		6:45	7:30	8:30	9:30			3
19	S	6:00	7:00	7:45	8:45	9:45			4
20	T	6:15	7:15	8:00	9:00	10:00			4
21	U	6:30	7:30	8:15	9:15				3
22	V	6:45	7:45	8:30	9:30				3
								Total Trips	**40**

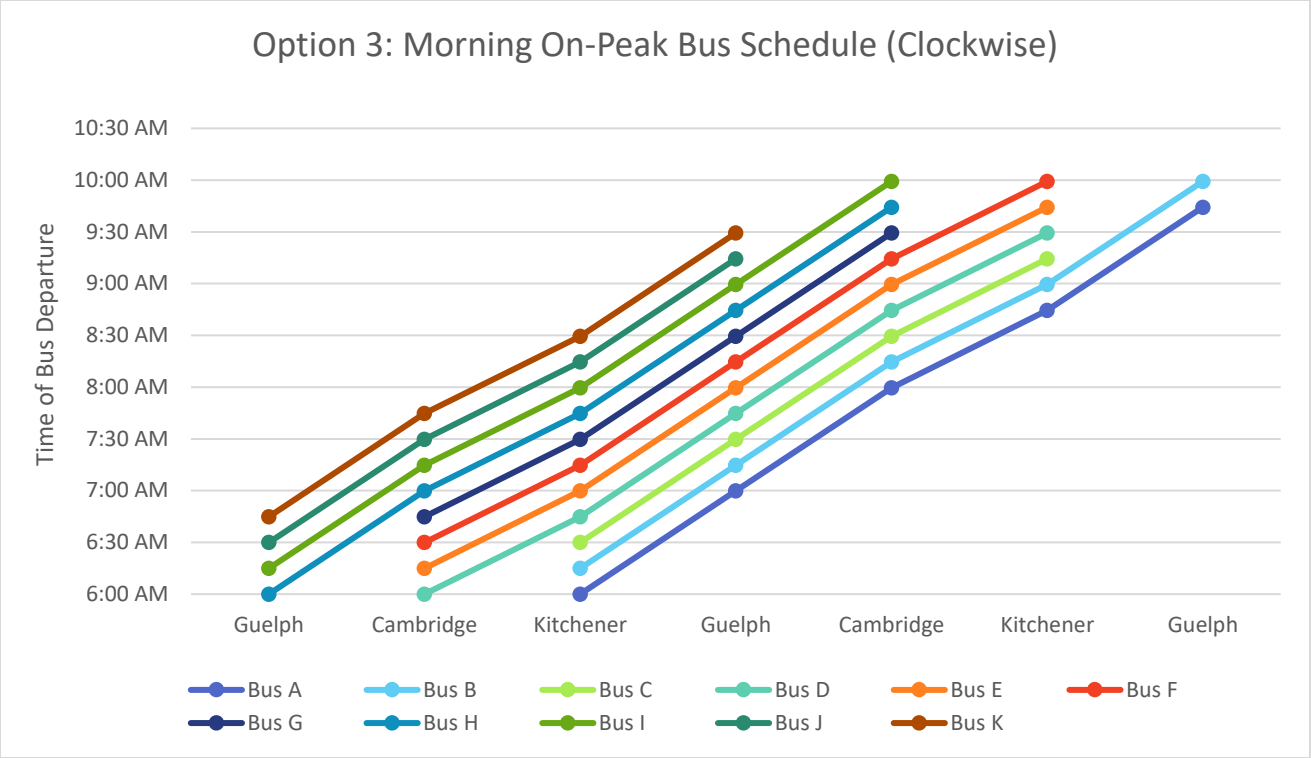


FIGURE 32 – OPTION 3 MORNING ON-PEAK BUS SCHEDULE, CLOCKWISE (6 AM TO 10 AM)

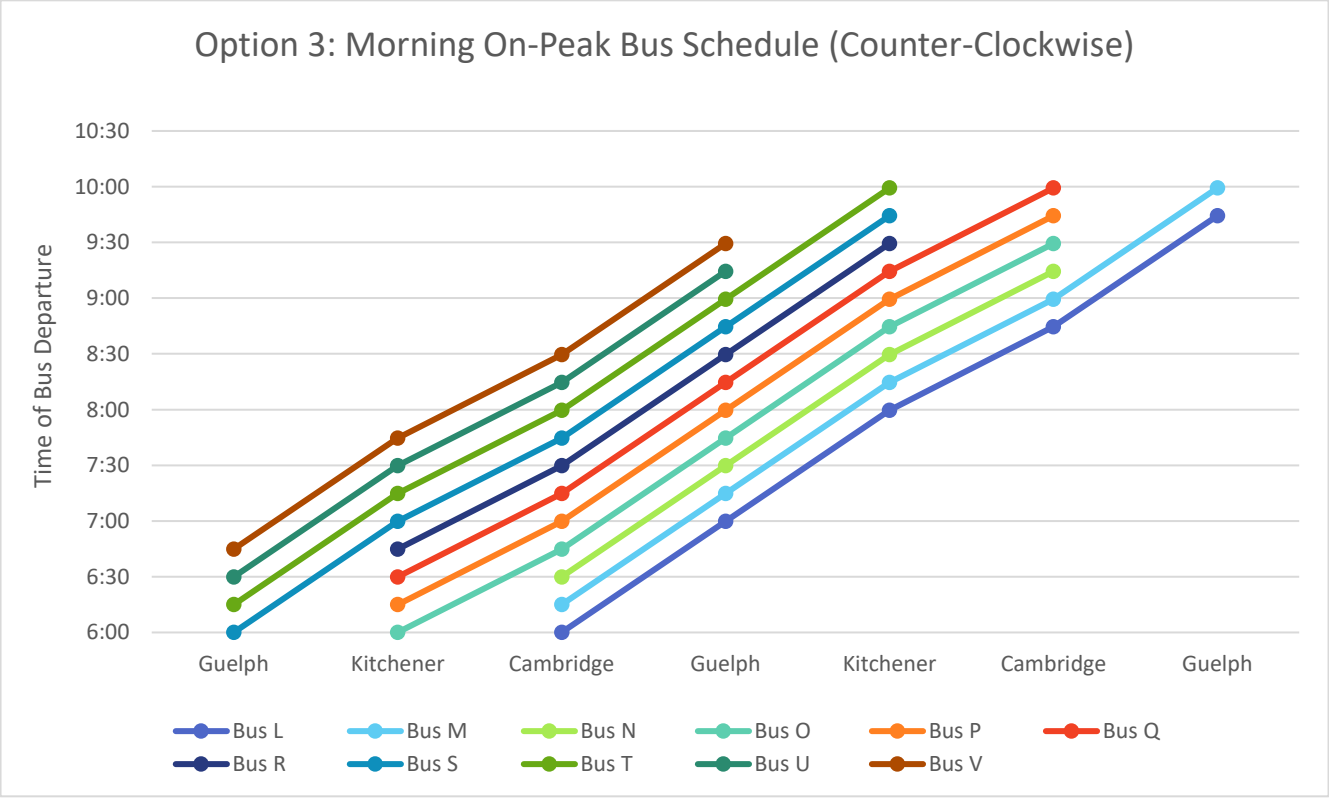


FIGURE 31 - OPTION 3 MORNING ON-PEAK BUS SCHEDULE, COUNTER-CLOCKWISE (6 AM TO 10 AM)

Tables 26 and **27**, and **Figures 33** and **34**, illustrates the bus schedule for off-peak services operating on a 30-minute headway from 10 AM to 3 PM, in the clockwise (Table 26) and counterclockwise (Table 27) directions. A similar schedule would ensue for on-peak services between 7 PM and 12 AM in the evening.

Based on the assessment, a total of 54 trips are completed between Kitchener, Cambridge, and Guelph during the morning off-peak service hours, and a total of 108 trips are completed during both morning and evening off-peak service hours.

TABLE 26 - OPTION 3 MORNING OFF-PEAK SCHEDULE, CLOCKWISE (10 AM TO 3 PM)

Option 3: Off-Peak Schedule (Clockwise)										
	Buses	Guelph	Cambridge	Kitchener	Guelph	Cambridge	Kitchener	Guelph	Cambridge	Total Trips
1	A			10:00	11:00	12:00	13:00	14:00	15:00	5
2	B			10:30	11:30	12:30	13:30	14:30		4
3	C		10:00	11:00	12:00	13:00	14:00	15:00		5
4	D		10:30	11:30	12:30	13:30	14:30			4
5	E	10:00	11:00	12:00	13:00	14:00	15:00			5
6	F	10:30	11:30	12:30	13:30	14:30				4
									Total Trips	**27**

TABLE 27 - OPTION 3 MORNING OFF-PEAK SCHEDULE, COUNTER-CLOCKWISE (10 AM TO 3 PM)

Option 3: Off-Peak Schedule (Counter-Clockwise)										
	Buses	Guelph	Kitchener	Cambridge	Guelph	Kitchener	Cambridge	Guelph	Kitchener	Total Trips
7	G			10:00	11:00	12:00	13:00	14:00	15:00	5
8	H			10:30	11:30	12:30	13:30	14:30		4
9	I		10:00	11:00	12:00	13:00	14:00	15:00		5
10	J		10:30	11:30	12:30	13:30	14:30			4
11	K	10:00	11:00	12:00	13:00	14:00	15:00			5
12	L	10:30	11:30	12:30	13:30	14:30				4
									Total Trips	**27**

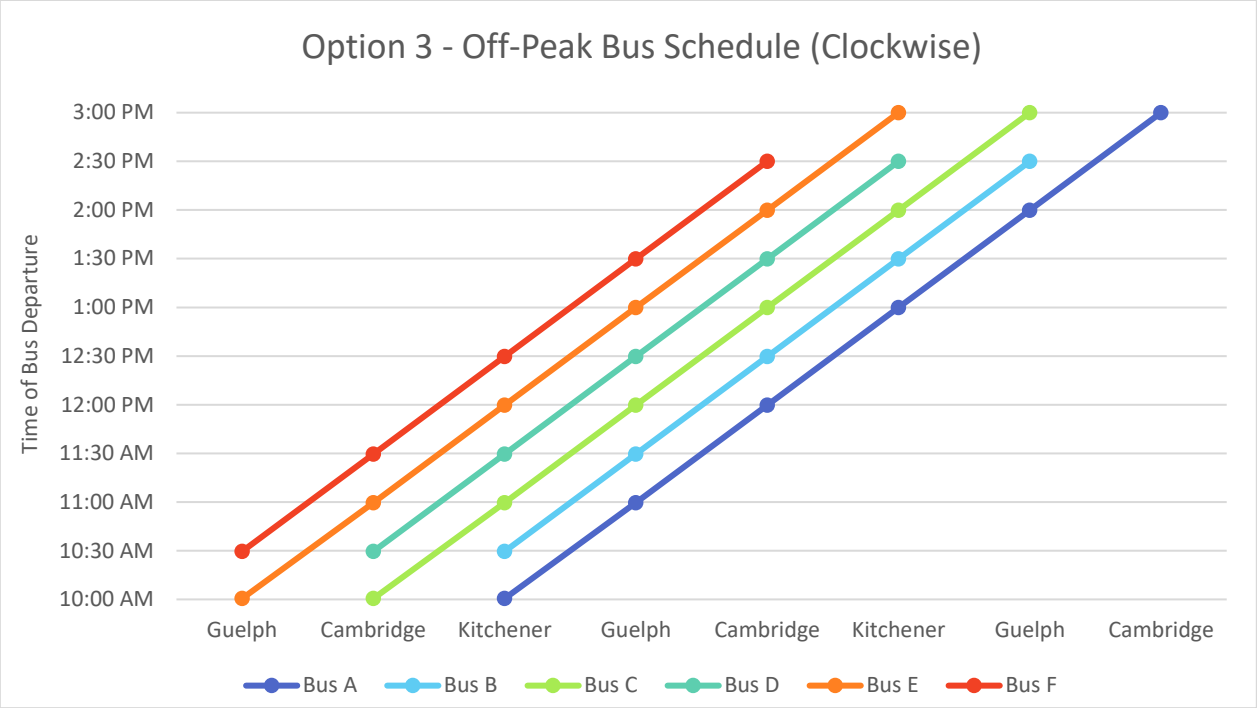


FIGURE 34 - OPTION 3 MORNING OFF-PEAK BUS SCHEDULE, CLOCKWISE (10 AM TO 3 PM)

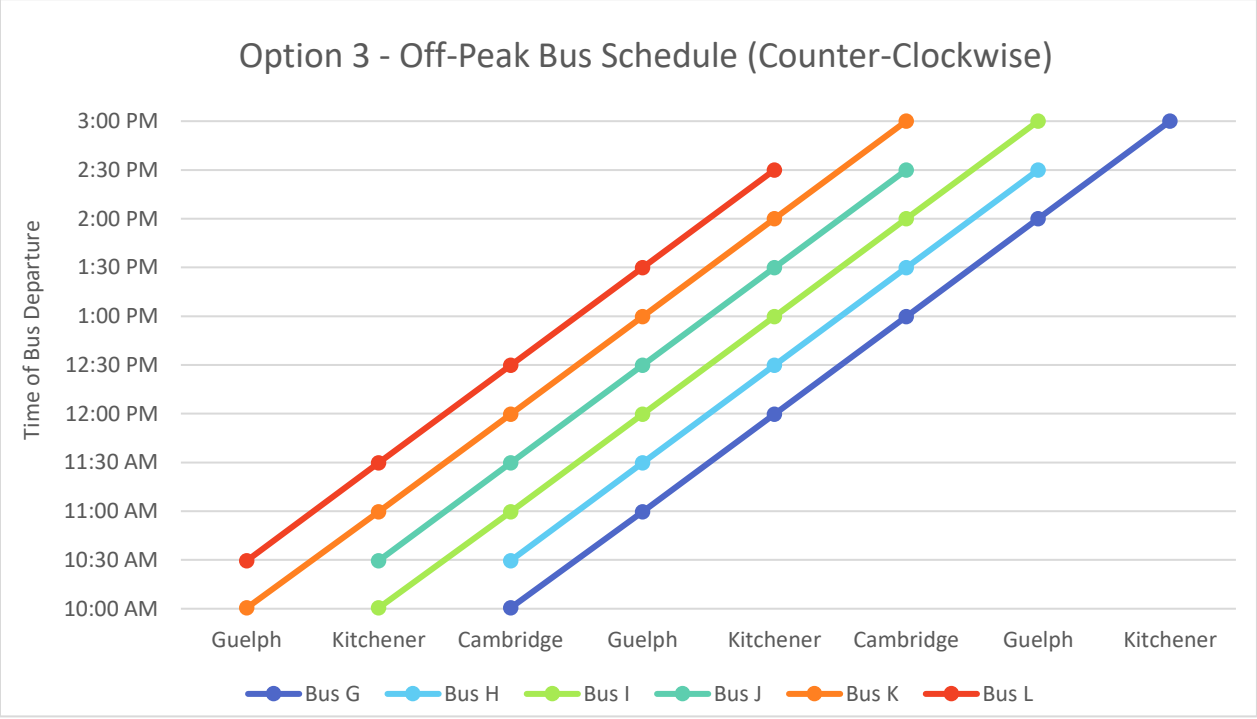


FIGURE 33 - OPTION 3 MORNING OFF-PEAK BUS SCHEDULE, COUNTER-CLOCKWISE (10 AM TO 3 PM)

Bus Operations Analysis

An IBS operations assessment was conducted for each proposed Investment Option to determine the number of buses in operation per day, total daily trips, total daily vehicle kilometers travelled (VKT), and daily passenger capacity. These figures facilitate assessments conducted for the Economic and Financial Cases in later sections.

Table 28 summarizes the daily trip estimates for the three proposed Investment Options.

- **Note 1:** One trip refers to a bus trip between primary bus stations (i.e., Kitchener, Cambridge, Guelph), and daily trips and VKT are estimated for each trip between stations.
- **Note 2:** The total distance and time of trips between Cambridge and Guelph is relatively the same as trips between Kitchener and Guelph. Therefore, bus operations analyses are also comparable.
- **Note 3:** Because the length of the morning and evening service hours for both on-peak (4 hours) and off-peak (5 hours) are the same, and would require the same bus service schedule, estimates are multiplied by 2 to account for both morning and evening services.

TABLE 28 - SUMMARY OF IBS OPERATIONS ANALYSIS

	Option 1	Option 2		Option 3
	Kitchener – Guelph	Kitchener – Guelph	Cambridge – Guelph	Cambridge – Kitchener - Guelph
Trip Distance (km): Kitchener – Guelph	27	27		27
Trip Distance (km): Guelph – Cambridge			25*	35*
Trip Distance (km): Cambridge – Kitchener				26
Total Route Distance (km)	**55**	**55**	**50**	**88**
Number of Primary Station Stops	2	2	2	3
Number of Secondary Stops	0	0	0	2
On Peak Bus Operations (6AM to 10AM and 3PM to 7PM)				
Total Buses in Operation	8	8	8	22
Total Daily On-Peak Trips (AM/PM)	52	52	52	160
Total Daily On-Peak VKT (km)	1,404 km	1,404 km	1,300 km	4,680 km
Daily On-Peak Passenger Capacity (55 pass/bus)	2,860	2,860	2,860	8,800
Off Peak Bus Operations (10AM to 3PM and 7PM to 12AM)				
Total Buses in Operation	4	4	4	12
Total Daily Off-Peak Trips (AM/PM)	36	36	36	108
Total Daily Off-Peak VKT (km)	972	972	900	3,168
Daily Off-Peak Passenger Capacity (55 pass/bus)	1980	1980	1,980	5,940
Daily Bus Operations (6AM to 12AM)				
Total Daily Trips	88	176		268
Total Daily VKT (km)	2,376	4,576		7,848
Annual VKT (km)	570,240	1,098,240		1,883,520
Total Daily Passenger Capacity	4,840	9,680		14,740
Annual Passenger Capacity	**1,161,600**	**2,323,200**		**3,537,600**
Average Annual Passenger Load (75%)	871,200	1,742,400		2,653,200

* The difference in trip distance for Guelph-Cambridge is due to the route used: Option 2 takes a direct route via Hespeler Road and Wellington Road, while Option 3 operates along Highway 401 and Highway 6.

Strategic Case

The Strategic Case is the foundation of the Initial Business Case (IBC) and summarizes how the proposed investment, in this case a frequent intercity bus service, would support the provincial and regional strategic goals and outcomes for transportation and economic development. First, the strategic case outlines how the proposed investment options support the three goals of 2041 RTP. Secondly, a brief overview of provincial, regional, and local policy and planning goals demonstrates their alignment with the proposed investment option, namely their objective to improve the quality of life and safety, guide economic growth and development, and achieve environmental sustainability throughout the region. Lastly, the locations of proposed bus stops are discussed to highlight the strategic benefits of connecting significant regions, followed by a Waterloo-Wellington Regional Map to illustrate the location of bus stops relative to the UGCs and major employment areas in the region.

Metrolinx Regional Transit Service Goals

The 2041 Regional Transportation Plan (RTP) presents a common vision for the region: "The GTHA will have a sustainable transportation system that is aligned with land use and supports healthy and complete communities. The system will provide safe, convenient, and reliable connections, and support a high quality of life, a prosperous and competitive economy, and a protected environment," (Metrolinx, 2018). This IBC aims to expand this vision for the rest of the Greater Golden Horseshoe (GGH) and uses the Metrolinx 2041 RTP and the Metrolinx Business Case Framework to develop a high-level business case for an intercity bus service between Waterloo Region and Wellington County. The following 2041 RTP goals are used to define three strategic outcomes for the proposed transit investment:

Goal 1: Strong Connections | Connecting people to the places that make their lives better such as homes, jobs, community services, parks and open spaces, recreation, and cultural activities.

A cross-boundary bus service would improve transit coverage and reduce barriers for people travelling between the two regions. The service aims to connect major urban and employment regions between Waterloo and Wellington, thereby increasing access to economic opportunities for people in the region and enhancing the synergy between the two neighbouring economies. Bus stops are strategically located near major urban and transit nodes to allow easy transition to and from local transit networks, enabling passengers to access greater parts of the region by public transit.

Goal 2: Complete Travel Experiences | Designing an easy, safe, accessible, affordable, and comfortable door-to-door travel experience that meets the diverse needs of travellers.

The introduction of a high-frequency, intercity bus service will improve the speed and reliability of public transit services between the two regions and provide a viable alternative to commuting by private vehicles. High frequency public transit connections between major transit station areas will improve the speed and reliability of transit services, thus reducing travel times and costs for existing transit users. Additionally, improvements in transit travel time and reliability can lead to increased public transit use and subsequent reduced traffic congestion benefits.

Goal 3: Healthy and Sustainable Communities | Investing in transportation for today and for future generations by supporting land use intensification, climate resiliency, and a low-carbon footprint, while leveraging innovation.

The implementation of a high-frequency intercity bus service will provide a low-carbon alternative for commuters. In so doing, the investment has the potential to facilitate the movement of more people, more quickly, using less energy by shifting new and existing trips to a more sustainable mode and reducing auto dependency and congestion.

Moreover, Bus transit projects have lower carbon emissions than other forms of transit infrastructure due to the lower construction and material requirements. Especially when considering the electrification of many bus fleets across the GGH, an intercity bus service program has the potential to attract significant new transit ridership while minimizing environmental impacts. The bus transit investment also supports local and regional transit-oriented development (TOD) goals such as promoting the use of public transit and reducing reliance on private vehicles for daily trips. An integrated, intercity public transit system between the two regions can help encourage more sustainable transportation behaviours and reduce dependency on private vehicles for daily commuting trips.

Provincial and Regional Transportation Policies and Objectives

The proposed investment should support the realization of key transportation and environmental policies. **Table 29** presents a summary of provincial, regional, and local transportation planning policies and goals that align with the recommended intercity bus service investment.

TABLE 29: SUMMARY OF PROVINCIAL AND REGIONAL TRANSPORTATION PLANNING POLICIES

Agency	Document/Policy	Relevant Transportation and Environment Policies
Ministry of Municipal Affairs and Housing	Provincial Policy Statement (PPS 2024)	Section 3.2 – Transportation Systems, states the need to develop Transportation Systems that are energy efficient and make efficient use of existing and planned infrastructure; are multimodal and offer connections that cross jurisdictional boundaries; and that support current and future use of transit and active transportation.
	Growth Plan for the Greater Golden Horseshoe (2020)	The Growth Plan sets out general policy objectives including: • Promote economic development and competitiveness in the GGH by planning to better connect areas with high employment densities to transit. • Offering a balance of transportation choices that reduce reliance on automobiles and promote the use transit and active transportation. • Be sustainable and reduce GHG emissions by encouraging the most financially and environmentally appropriate mode for trip-making. • Offer multimodal access to jobs, housing, schools, cultural, and recreational opportunities, and goods, and services.
Ministry of Transportation	Transportation Plan for the Greater Golden Horseshoe (2022)	The GGH Transportation Plan consists of over 100 actions organized under seven primary goals. Overall, the plan sets out long-term visions and concrete actions that aim to improve travel mode choices to get around, reduce gridlock, reduce greenhouse gas emissions, and provide a safe, inclusive, and interconnected transportation system. The Plan also includes actions to collaborate with the intercommunity bus sector and explore innovative service delivery models, such as working with private carriers for the delivery of intercity passenger transportation services in the GGH.

	Metrolinx 2041 Regional Transportation Plan, 2018	The following are key strategies that support regional transit service goals. • **Strategy 2** – Connect more of the region with frequent rapid transit. • **Strategy 3** – Optimize the transportation system and enhance the traveller experience through integrated mobility services and a barrier-free transportation system.
Waterloo Region	Waterloo Region TMP, 2018	The Region acknowledges that inter-regional travel is growing as well as a shift in the transportation infrastructure and services required by these travellers. The Region has also set goals to improve public transit mode share from 5% in 2018 to 15% in 2041 through investment in new public transit projects and improvements to existing services.
	Transit Strategy Report (2018)	By 2041, GO bus service between Kitchener and Guelph, and Kitchener and Cambridge will be upgraded to operate as regional express bus. Other regional express bus routes are planned to connect Cambridge with other regional destinations, including Guelph, Brantford, and Hamilton, in addition to existing destinations with in the GTA.
	TDM Program Plan 2017-2021	The TDM Plan identifies eight goals and subsequent actions to reduce single occupancy vehicle use and meet 2031 transit and active mode share targets. Goal #8 – Support the Delivery of Transportation Network Improvements and increase the competitiveness of sustainable modes of transportation. One of the ongoing TDM program initiative is to support the integration and promotion of intercity transportation.
Wellington County	Official Plan, 2019 Update	Wellington County acknowledges that although public transit is not currently a viable option (Not including City of Guelph), it will focus its planning efforts on supporting urban centres and downtowns so that public transit may become a viable option.
City of Waterloo	Transportation Master Plan, 2020 Update	Although the municipality is not responsible for public transit service delivery, the city promotes transit use by encouraging transit-supportive development and reduced private vehicle dependency through its Official Plan and zoning by-law regions.
	Waterloo Official Plan, 2024 Update	The City of Waterloo supports the wide use of public transit as a preferred form of travel. Rapid transit can used as a means of reducing traffic congestion, parking demands, air pollution, and energy consumption while proving opportunities to improve community livability and quality of life.
City of Kitchener	Kitchener Official Plan, 2024 Update	While the City of Kitchener is not responsible for public transit service delivery, the city establishes the following policies with regards to public transit: • Promote energy efficiency and improved air quality by maximizing opportunities to support the use of public transit and active transportation. • Encourage and foster the increased use of public transit while reducing dependency on private vehicle use.
City of Cambridge	Transportation Master Plan, 2020	Public transit in the City of Cambridge is provided by Waterloo Region's Grand River Transit. However, the City collaborates with the Region and Metrolinx to improve public transit services that support local residents and employees. Cambridge employs transit-supportive design policies and guidelines to improve access to transit in the City, encourage transit ridership, and improve pedestrian experience in key transit areas and notes.

	Cambridge Official Plan	The City supports coordinated, multi-modal approach to transportation, which includes a strong public transit system. The City will work with the Region and the Province to plan, improve, and promote public transit system as an alternative form of transportation within the city. The city also supports the additional of effective inter-municipal transit links including the extension of GO Transit services to Cambridge.
City of Guelph	Guelph Official Plan (2022)	The City establishes several objectives for planning a complete and healthy community, including supporting a multi-modal transportation network and efficient public transit that links the City's Urban Growth Centre to the rest of the community and surrounding municipalities. The City will develop and implement TDM policies to reduce trip distance and time and increase the modal share of alternatives to the automobile. Public transit will be the first priority for vehicular transportation infrastructure planning and transportation investments.
	Transportation Master Plan (2022)	The city is aiming for a modal shift within the next 30 years, including an increase in public transit mode share from 7% in 2016, to 17% by 2051. The City also recognizes the need to increase cross boundary transit trips and will continue to facilitate the development of two-way all-day GO Rail services between Guelph Central Station and Toronto Union Station.

Intercity Bus Service Stations

Based on a high-level assessment undertaken, the location of bus stops has been strategically selected based on provincial, regional, and local transportation and land use planning and development policies.

Urban Growth Centres

The Growth Plan identifies 25 Urban Growth Centres (UGCs) across the GGH region and sets density targets between 150 and 400 people and jobs per hectare by 2031 (MMAH, 2020). While the majority of the UGCs are located in the GTHA, eight of the UGCs are located in the Outer Regions, with four of them located between Waterloo Region and Wellington County. UGCs are typically located in city centres, where projections for population and employment density, as well as investment in public transit services are highest. The Ontario Growth Plan policies identify these areas to be planned as focus areas to serve as high-density major employment areas that will attract provincially, nationally, and internationally significant employment uses (MMAH, 2020). The Kitchener UGC is designated to achieve a density of 200 residents and jobs combined per hectare by 2031. While the Cambridge and Guelph UGCs are designated to achieve a density of 150 residents and jobs combined per hectare by 2031 (MMAH, 2020).

The 2023 Kitchener Growth Management Strategy Annual Monitoring Report estimates that the city is on track to achieve and even exceed its 2031 density target. Currently the number and jobs per hectare in Kitchener's UGC is 220, surpassing the provincially mandated target of 200 per hectare by 2031 (City of Kitchener, 2023).

The City of Cambridge has not yet achieved the same level of density as Kitchener; however, a recent study confirms that the city has sufficient inventory of designated lands to meet the provincial residential and employment density targets. Moreover, as part of Ontario's More Homes Built Faster Act, 2022, the City of Cambridge has pledged to build 19,000 homes by 2031 (City of Cambridge, 2023).

The City of Guelph represents over 70% of the total population within Wellington County, which indicates that the City of Guelph is the primary driver of population and economic growth within the County. In addition to the minimum density target of 150/ha by 2031, the city has set additional density targets to achieve 175/ha by 2041, and 200/ha by 2051 (City of Guelph, 2024). Similar to Cambridge, the City of Guelph has pledged to build 18,000 new homes by 2031.

Figure 35 illustrates the geographic location of Urban Growth Centres for the cities of Cambridge, Kitchener, and Guelph (Ontario MMAH, 2022).

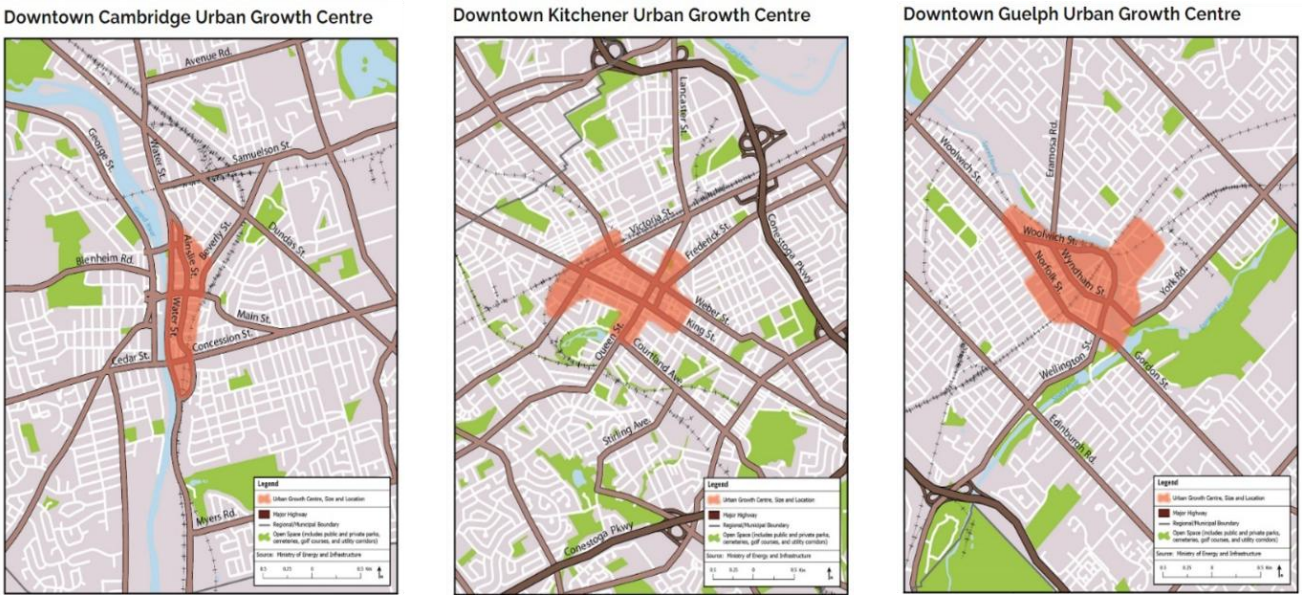


Figure 35: Designated Urban Growth Regions (Ontario MMAH, 2022)

Major Transit Station Areas

The Growth Plan defines major transit station areas (MTSAs) as lands within a 500- to 800-metre radius or 10-minute walk to higher order transit station, including subways, GO Transit, light rail, and bus rapid transit stations (MMAH, 2020). Intercity Bus Service stops are located within MTSAs to ensure users can easily connect to local transit networks to reach their final destinations. The Ontario Growth Plan requires MTSAs served by light rail to achieve a density of 160 residents and jobs combined per hectare, and MTSAs served by the GO Rail Transit network to achieve a density of 150 residents and jobs combined per hectare.

In Kitchener, the bus stop is positioned along the ION LRT network, which significantly increases its accessibility for Waterloo and Kitchener residents. The stop location, near the LRT's Central Station stop, is in proximity to the future Regional Transit Hub. The ION LRT currently operates along a 19 km line, serving nineteen stations along the route between Conestoga in Waterloo and Fairway in Kitchener. The Grand River Transit Business Plan, Station Profiles report, published in 2020, provided estimates of the population and employment density surrounding each of the ION LRT stations (Grand River Transit, 2020). Although most of these stations do not currently have the desired density,

these are anticipated to increase with urban and economic development and growth along the LRT corridor. The report indicates that Kitchener stations have among the highest density, some meeting and even exceeding the 160/hectares density requirements. Kitchener City Hall station has the highest density at 177/hectare (Grand River Transit, 2020). Additionally, in Waterloo, the LRT stops along major tech startup and research centres, the University of Waterloo, and the Innovation District, all representing key employment areas that can be accessed by the intercity bus service.

The Cambridge bus stop is located at the Cambridge Centre Bus Terminal, also known as Ainslie Terminal. After Kitchener, the largest volume of residents commuting to Guelph for work are coming from the Cambridge area. The City of Cambridge is located at the southern end of Waterloo Region, straddling Highway 401, with no connections to the GO Rail or VIA Rail network. Although the ION LRT will be expanded into Cambridge, this will take several years to be completed. As a result, the city currently has minimal intercity connections, and it is critical that intercity bus service connections are provided to Cambridge residents.

In Guelph, the primary bus stop is near the Guelph Central Station, which is a major transit station area located within the city's downtown area, providing both local and regional transit connections. The station is located in proximity to the University of Guelph, which is a 10-minute bus ride, or 30 minutes walk. Additionally, through its GO Expansion plans, Metrolinx is working to perform upgrades to the Guelph Central GO station in order to increase daily services.

Lastly, according to the Frequent Rapid Transit Network GIS data obtained through Metrolinx Open Data sources, there are priority bus routes being proposed within Waterloo Region and the City of Guelph (Metrolinx, 2023). However, there is no indication of a cross-boundary transit service to support intercity commuting. The only cross-boundary transit service that is currently available is the Metrolinx GO Rail network which operates one-way during the morning and evening peak-hours.

Table 30 presents a summary of the UGC and MTSA growth policies, as well as the local transit connections and major destinations that are accessible to passengers at each primary bus stop.

TABLE 30: SUMMARY OF GROWTH POLICIES AND ORIGIN-DESTINATION OPTIONS FOR IBS USERS

	Kitchener – Central Station	Cambridge Bus Terminal	Guelph Central GO Station
Urban Growth Centre Policies	200 residents and jobs combined per hectare by 2031.	150 residents and jobs combined per hectare by 2031	150 residents and jobs combined per hectare by 2031
Major Transit Station Area Policies	160 residents and jobs combined per hectare.	150 residents and jobs combined per hectare.	150 residents and jobs combined per hectare.
Local Transit Services	Grand River Transit ION Light Rail	Grand River Transit ION Bus	Guelph Transit
City/Town Connections	Kitchener, Waterloo, Cambridge, Elmira, St. Jacobs, and Wilmot	Kitchener, Waterloo, Cambridge, Elmira, St. Jacobs, and Wilmot	City of Guelph, Guelph-Eramosa, and Puslinch
Transit Connections – Direct Routes	6 – GRT Bus Routes GO Bus (Planned) GO Rail (Planned)	8 – GRT Bus Routes	13 – Guelph Transit Routes 3 – GO Bus 1 – GO Rail
Transit Connections – Secondary Routes	18 – LRT Stations 29 – GRT Bus Routes 3 – GO Bus 1 GO Rail	19 – LRT Station 24 – GRT Routes 2 – GO Bus	13 Guelph Transit Routes
Transit Fleet & Network Size	250 buses – 2,500 stops 50 Routes ION LRT – 17 km	250 buses – 2,500 stops 50 Routes ION LRT – 17 km	62 buses 35 Routes
Major Destinations	▪ Conestoga Mall ▪ Fairview Park Mall ▪ Grand River Hospital ▪ University of Waterloo ▪ Wilfred Laurier University ▪ Conestoga College ▪ Waterloo Public Square ▪ Downtown Kitchener ▪ Kitchener City Hall ▪ Market Square ▪ Concordia Club	▪ Conestoga College Cambridge ▪ Conestoga College Doon ▪ Cambridge Memorial Hospital ▪ Cambridge SmartCentre ▪ Sportsworld ▪ Downtown Cambridge ▪ Fairview Park Mall ▪ Waterloo Region International Airport	▪ University of Guelph ▪ Hanlon Industrial Park ▪ Northwest Industrial Park ▪ Guelph General Hospital ▪ Downtown Guelph ▪ Guelph SmartCentre
Planned Upgrades	New Waterloo Region Transit Hub		Expansion of Guelph Central Station, GO Rail track upgrades, and new two-story building

Significant Employment Zones

Because there are more people commuting to Guelph from Waterloo Region than vice-versa, the additional stops have been proposed for employment areas within the Guelph region. As a result, this study assumes that a sizable proportion of intercity commuters from Waterloo Region are commuting to the largest employment areas in the south and northwest regions. As such, secondary stops are strategically located near major employment areas within the region as they typically attract large volumes of the commuting population. **Figure 36** exhibits the major employment areas within the City of Guelph, as identified in the Guelph Official Plan (City of Guelph, 2022). As shown, there are two significant employment areas to the northwest and southwest of the city's boundary.

Northwest Industrial Park is the largest concentration of developed employment lands, which is approximately 90% built out, and accommodates a diverse range of employment sectors. Highway 7 is the primary access point for commuters coming in from Waterloo Region, resulting in significant traffic congestion on the two-lane highway. The planned new Highway 7 is expected to enhance regional highway access to the area (City of Guelph, 2020).

South Guelph Industrial Lands is a privately developed industrial park and home to large-scale tenants and is a provincially designated significant employment area. Development is relatively new compared to the northwest industrial park but has been experiencing significant industrial development over the past decade. However, there are still some large parcels of land available for future development (City of Guelph, 2020). This area is primarily accessed by Waterloo Region commuters through Highway 401 and Highway 6.

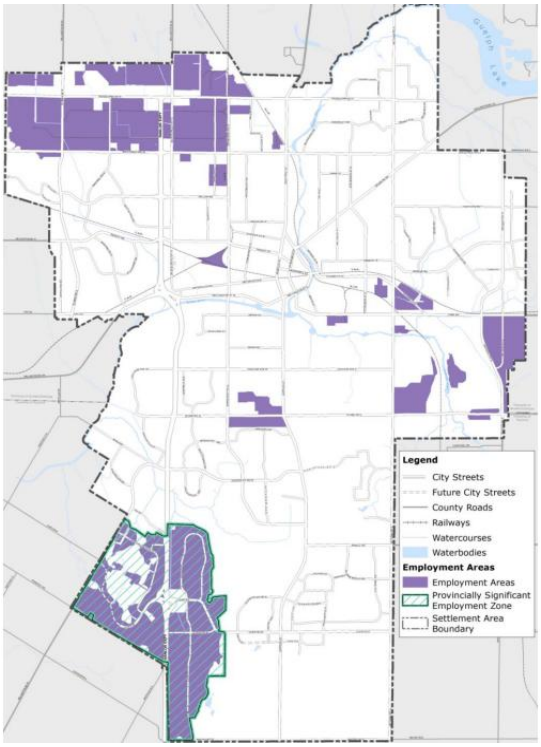


FIGURE 36: GUELPH MAJOR EMPLOYMENT AREAS (CITY OF GUELPH, 2022)

The proposed stop in South Guelph is designated a provincially significant employment zone. Provincially significant employment zones are a critical factor in determining commuting behaviour and trends between the two regions. Provincially significant employment zones are critical to the local and provincial economy and are strategically located to provide stable and reliable employment across the region (Ontario, 2023). Although the proposed stop in Northwest Guelph is not provincially designated, it is recognized as significant employment area through Guelph's Official Plan.

Strategic Benefits of the Waterloo-Wellington Intercity Bus Service Investment

Provincial and regional transportation policies can be organized into broad policy themes to support the strategic benefits of the proposed intercity bus service investment between Waterloo Region and Wellington County. **Table 31** below uses Benefits and Performance measures defined by Metrolinx to identify the potential strategic benefits for the proposed investment (Metrolinx, 2021b).

TABLE 31: SUMMARY OF POTENTIAL STRATEGIC BENEFITS FOR PROPOSED INVESTMENT IN INTERCITY BUS SERVICES

Policy Theme	Definition		Benefit	Description of Benefit	Performance Measures
Transportation	Increasing efficiency, effectiveness, and resilience of the transportation system.	**1**	Increasing Transit Ridership	Provide a viable alternative option to private vehicles, thereby promoting increased ridership and reduced congestion in the region.	Transit ridership New Transit Users
		2	Improved Network Connectivity	The intercity bus service will provide critical connections to major transit hubs with multimodal connections that can be used to access various parts of the region.	Number of multimodal connections on the network. Number of terminals served by two or more modes.
Quality of Life	Making it easier for people to access the region with safe and convenient services.	**3**	Promoting Transit Equity	Intercity bus will provide new, integrated transit services that will open up accessibility to employment and education opportunities for marginalized communities that do not have access to a vehicle.	Transit accessibility for marginalized communities. Access to jobs for low-income persons.
Economic Prosperity	Fostering economic development by reducing commute times, connecting businesses, and supporting investment.	**4**	Connecting Commuters to Jobs	Improved public transit options through a new, reliable service that connects major economic and employment centres, leading to more people able to access jobs.	Change in travel time for commuters on transit. Number of jobs within accessible distance of transit stops.
		5	Employment Creation and Economic Impact	A high-frequency, cross-boundary transit service will help to catalyze economic development between the two regions through increased connectivity.	Model estimates of jobs and GDP impacts from investment
Environmental Benefits	Supporting sustainability by reducing the environmental impact of travel.	**6**	Reduced GHG Emissions	The intercity bus service will reduce the environmental impact currently caused by private vehicle dependency by promoting a modal shift away from cars to public transit.	Estimating changes in GHG or CO2 emissions.

Economic Case

The Economic Case considers the overall costs and benefits to individuals and society that would be delivered through the proposed transportation investment. Costing models for the economic case can vary and can include estimates for user, accident, congestion, parking, road facilities and services, air pollution, water pollution, energy, and noise costs.

This Economic Case explores, at a high-level, the potential benefits of individual journey time and cost savings, greenhouse gas emissions cost savings, as well as the overall benefits to society for pursuing each investment option. In addition to the monetized benefits, qualitative user impacts and wider economic and societal benefits such as improved accessibility and reliability are also explored.

User Impacts

Improvements in public transportation services can lead to cost savings for existing and new public transit users as well as auto users. Existing transit users are expected to experience a benefit through travel time improvements due to a more enhanced high-frequency bus service. Additionally, users that transfer from auto to transit will do so to benefit from reduced travel time and cost savings as a result of their mode shift. Cost savings can include reductions in vehicle operating costs, including fuel, parking, toll, maintenance, and wear-and-tear expenses (Metrolinx, 2021b).

Improvements in public transit services may also lead to cost savings for private auto users by reducing excess fuel use incurred from driving in congested road conditions. Mode shift of commuters from auto to transit as a result of the new intercity bus service can potentially decrease congestion and thus improve travel times for the remaining highway users (Metrolinx, 2021b).

User impacts of a proposed transport investment project is typically determined by estimating the change in "generalized travel cost" for travellers. The generalized cost of a journey includes a range of factors such as travel time, mode reliability, user costs, and crowding, which reflect the perceived journey time and consequently influence whether or not a traveller chooses a given mode. As such, investments that improve these factors can also improve the welfare of travellers, as shown in **Figure 37** (Metrolinx, 2021b).

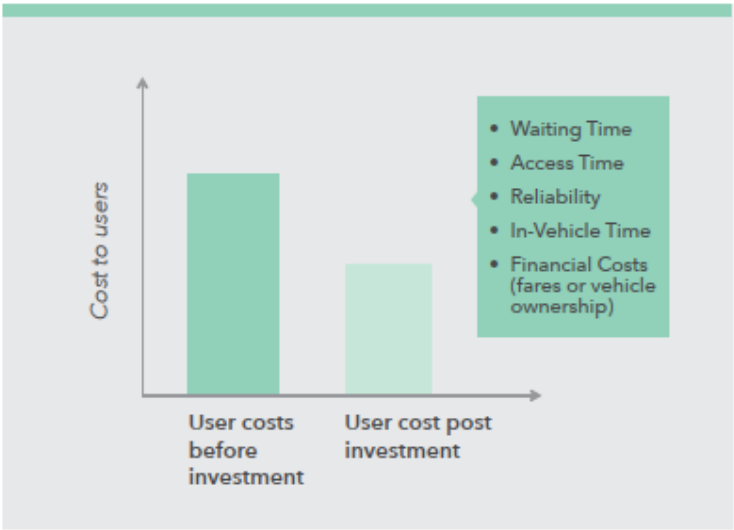


FIGURE 37: USER IMPACTS FROM TRANSPORT INVESTMENT (METROLINX, 2021B)

Generalized Journey Cost

Individuals typically decide how to travel based on their perception of the cost and time associated with doing so. For example, 20 minutes spent standing in a crowded bus will be perceived to take significantly longer than a less crowded one. The potential welfare benefits resulting from a transport investment are primarily captured through the reduction in this perceived "cost" of an individuals' journey – such as a faster journey time, reduced level of crowding, improved reliability, or reduction in wait time for transit (Metrolinx, 2021b).

Since travel time typically represents the largest element of the "cost" of a journey, this "time" may be defined in terms of "generalized journey cost," with time (such as wait time and walk time) converted into a financial cost equivalent to using values-of-time (Metrolinx, 2021b). For instance, Metrolinx uses a value of $18.79 as the monetary value for one hour of travel time. Generalized journey cost is typically used in transport models to represent the cost of travel and transport investments aim to change demand by changing the generalized cost of transport by either providing a new service or modifying an existing one (Metrolinx, 2021b).

For this Initial Business Case, a generalized journey cost approach was used to estimate the total trip cost associated with current auto and public transit options under the BAU scenario and compared with the proposed investment options.

Assumptions

A series of assumptions were used to develop a generalized journey cost assessment for existing and proposed transportation options. The following are general assumptions used to conduct the high-level assessment of user costs and benefits:

1. Major transit stations were used as the origin and destination locations to estimate GJC for both auto and transit trips between each city-pair.
2. The generalized journey cost for existing public transit users and proposed investment options does not include the journey costs required to reach the origin stop (access time) and the time from the destination stations to the final workplace (egress time).
3. The values used to develop the Generalized Journey Cost assessment are drawn from the Metrolinx Business Case Manual, Volume 2 (Metrolinx, 2021b), which are listed in **Table 32** below. While vehicle operating costs were also obtained from the Metrolinx Manual, which were originally sourced from the Canadian Automobile Association (CAA).
4. The Reliability Ratio of 1.76 typically applied in Metrolinx Business Case assessments is not used in this assessment since the Waterloo/Wellington Region is relatively small and does not experience severe traffic congestion and delays that is prevalent in large urban areas of the GTHA.

TABLE 32: VALUES FOR GENERALIZED JOURNEY COST ASSESSMENT (METROLINX, 2021B)

Factor	Description	Assumption
Valuing User Impacts		
Value of Time (VOT)	Factor used to monetize changes in generalized time to determine the overall welfare benefit to transport network users.	$18.79
Travel Time Perception By Mode		
Auto and Bus In-Vehicle Time (IVT)	Weighting for time spent in-vehicle for both private vehicle and public transit trips.	1.0
GO Rail/LRT IVT	Weighting for time spent on GO Rail is typically faster and more convenient than other modes. Same weighting used for LRT.	0.85
Drive Access/Egress IVT	Weighting for access/egress time only.	2.48
Transit Inconvenience Factors		
Walk Time	Weighting for time spent walking to reach next transit connections.	2.0
Wait Time	Weighting for time spent waiting for transit connections.	2.5
Interchange Penalty	Weighting for number of transit connection interchanges.	5
Vehicle Operating Costs		
Fuel Consumption Costs	Estimated fuel consumption cost per km, sourced from the CAA.	$0.12 per km
Vehicle Maintenance Costs	Estimated maintenance cost per km, derived from the CAA.	$0.05/km
Vehicle Tire Costs	Estimated tire cost per km, derived from the CAA.	$0.02/km
Unperceived Auto Operating Costs	Marginal costs related to owning and using a vehicle that are not factored into day-to-day trip choices (derived from the CAA)	$0.10/km
Transit User Costs		
GO Transit Fares	The GO Transit fares are obtained through the Metrolinx website.	Adult – PRESTO Rate
Local Transit Fare	Local transit fares are obtained through the Grand River Transit (EasyGO Fare Card) and Guelph Transit websites.	$3.00 GRT Transit $3.25 Guelph Transit
Note: All Assumption Values are obtained from the Metrolinx Business Case Manual, Volume 2 (Metrolinx, 2021b), with the exception of Local Transit Fares.		

Business-As-Usual

Under the Business-As-Usual (BAU) scenario, two modes of travel are available to intercity commuters: private cars and GO Transit. A high-level assessment of the generalized journey cost (GJC) is conducted for auto and transit users commuting during on-peak travel times. Major transit stations are used as the origin-destination between city pairs including Kitchener GO station, Cambridge Bus Terminal, and Guelph Central GO station. Travel time and cost estimates are based on travel data available through Google Maps and GO Transit Trip Schedules and Fares. Lastly, total values for journey time and costs were rounded to the nearest whole number for the assessment.

Auto Users

The assessment considers the journey cost for auto users during on-peak travel times and uses the maximum time based on peak traffic delays. The distance between downtown Kitchener or Cambridge, to downtown Guelph is relatively the same at approximately 25 km, and it is assumed that travel times would be similar for commuters between the three cities. The travel distance between Kitchener and Cambridge is slight lower at 23 km, resulting in less trave time and costs. The auto costs per trip is valued at $0.30/km, and includes vehicle operating and maintenance costs, as well as unperceived auto operating costs, on a per kilometre basis. Vehicle operating and maintenance costs include maintenance, tires, and fuel consumption, while unperceived costs include vehicle depreciation, insurance, and licensing costs (Metrolinx, 2021b).

GJC Calculation for Auto Users

The GJC estimates were calculated using the following steps.

Step 1: $$Journey\ Travel\ Costs = \frac{Auto\ Travel\ Time\ (\text{min}) + Access\ \&\ Egress\ Time\ (\text{min})}{60\ minutes} \times VOT$$

Step 2: $$Total\ Out\ of\ pocket\ Costs = Auto\ Distance\ (km) \times Auto\ Cost\ (\$)$$

Step 3: $$Generalized\ Journey\ Costs = Journey\ Travel\ Costs + Out\ of\ Pocket\ Costs$$

Example: Auto User commuting from Kitchener GO to Guelph GO

Step 1: $$Journey\ Travel\ Costs = \frac{50 + 2.48}{60} \times \$18.79 = \$16$$

Step 2: $$Total\ Out\ of\ pocket\ Costs = 25 \times 0.30 = \$7.50$$

Step 3: $$Generalized\ Journey\ Costs = \$16 + \$7.50 = \$24$$

Table 33 summarizes the GJC estimates for auto users commuting between Kitchener, Cambridge, and Guelph. It is assumed that both morning and evening peak hour auto commutes are similar in distance and time, and therefore the GJC will be the same for both directions. Daily GJC estimates are determined by multiplying results by 2.

TABLE 33: RESULTS OF GENERALIZED JOURNEY COST ASSESSMENT OF EXISTING AUTO USERS

To/From:	Kitchener GO	Cambridge Bus Terminal	Cambridge Bus Terminal
To/From:	Guelph GO		Kitchener GO
On-Peak Auto Travel Time (min)	50	50	35
Weight for Access/Egress Time (min)	2.48	2.48	2.48
Total Journey Travel Time (min)	53	53	38
Journey Travel Cost ($)	$16	$16	$12
Auto Travel Distance (km)	25	25	23
Auto Cost per Trip ($0.30/km)	$7.50	$7.50	$7
Generalized Journey Cost (One-Way)	$24	$24	$19
Daily Generalized Journey Cost	$48	$48	$37

Table 34 also estimates the GJC for commuting between downtown Kitchener and Cambridge to major employment areas in southeast and northeast Guelph. As shown, residents of Kitchener and Waterloo have a faster commute to the employment area in northeast Guelph, compared to southeast Guelph. Cambridge residents commuting to northeast Guelph area would need to take regional roads, which are typically characterized by single lanes and slower speeds compared to Highway 401. Alternatively, Cambridge residents commuting to the southeast employment area are likely to experience longer commute times due to peak hour traffic delays along Highway 401.

TABLE 34: RESULTS OF GJC FOR AUTO COMMUTES TO MAJOR EMPLOYMENT AREAS

	Kitchener GO		Cambridge Bus Terminal	
To/From:	North - Employment	South - Employment	North - Employment	South - Employment
On-Peak Auto Travel Time (min)	40	50	50	40
Weight for Access/Egress Time (min)	2.48	2.48	2.48	2.48
Total Journey Travel Time (min)	42	52	52	42
Journey Travel Cost ($)	$13	$16	$16	$13
Auto Travel Distance (km)	19	37	26	26
Auto Cost per Trip ($0.30/km)	$6	$11	$8	$8
Generalized Journey Cost (One-Way)	$19	$28	$24	$21
Daily Generalized Journey Cost	$38	$55	$48	$42

Transit Users

Generalized Journey Cost assessments for public transit users attempt to value the inconvenience for the wait and walking times between transit connections. These are accounted for by increasing the "weight" of the real wait and walking times, as well as interchange penalties, as they can increase the "perceived" travel time for user.

GJC Calculation for Transit Users:

The GJC estimates were calculated by multiplying the different components of the journey by the travel time perception factors (Metrolinx, 2021b). For example, in-vehicle time (IVT) can seem faster compared to time spent waiting or walking to the connecting transit mode. Moreover, the perception of time can also vary by the transit mode, whereby time spent in a light rail or subway system can seem faster than time spent on a bus.

Step 1: $$Journey\ Travel\ Time = GO\ Rail\ LRT\ IVT\ (0.85) + Bus\ IVT\ (1.0) + Number\ of\ Interchanges\ (5) + Wait\ Time\ (2.5) + Walk\ Time(2.0)$$

Step 2: $$Journey\ Travel\ Cost = \frac{Journey\ Travel\ Time\ (minutes)}{60\ minutes} \times VOT$$

Step 3: $$Out\ of\ Pock\ Costs = GO\ Fare + Local\ Transit\ Fare$$

Step 4: $$Generalized\ Journey\ Cost = Journey\ Travel\ Cost + Out\ of\ Pocket\ Costs$$

Example: Transit User commuting from Guelph GO Station to Cambridge Bus Terminal

Step 1: $$Journey\ Travel\ Time = 0(0.85) + 63\ (1.0) + 2\ (5) + 40(2.5) + 0(2.0)$$
$$= 0 + 63 + 10 + 100 + 0 = 173\ minutes$$

Step 2: $$Journey\ Travel\ Cost = \left(\frac{173\ minutes}{60\ minutes}\right) \times \$18.79 = \$54$$

Step 3: $$Out\ of\ Pock\ Costs = \$10.50 + \$3 = \$13.50$$

Step 4: $$Generalized\ Journey\ Cost = \$54 + \$13.50 = \$68$$

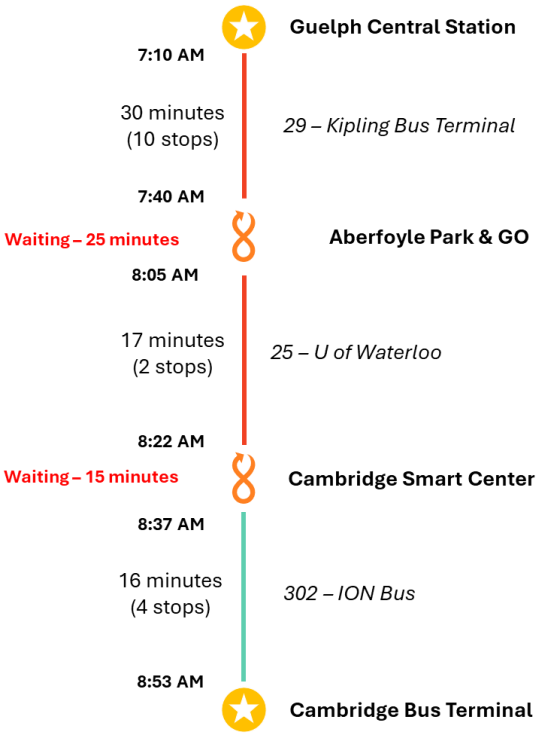


FIGURE 38: DIAGRAM OF PEAK MORNING TRANSIT TRIP FROM GUELPH TO CAMBRIDGE

Figure 38 illustrates the transit route and time used for calculating the GJC for morning commuters from Guelph to Cambridge.

GJC Assessment Results

The generalized journey costs for existing transit users were estimated using Google Maps and transit schedules and fare information available online. Time of departure for the assessment were based on arriving to work destination before 9 AM in the morning and leaving after 5 PM in the evening. Where multiple travel options were available, considerations for the shortest time, least number of interchanges, and least amount of walking were used to select the preferred option. Finally, the Daily Generalized Journey Cost was determined by adding the morning and evening costs for each city pair. For example, Daily GJC for commuters from Kitchener to Guelph in the morning and Guelph to Kitchener in the evening is approximately $27.

Table 35 below presents the GJC for existing transit users between the three cities based on available public transit services during the morning and evening peak hours. Kitchener residents commuting to Guelph in the morning and returning in the evening can benefit from the travel time savings achieved by the GO Rail transit service, which has a lower GJC than private vehicle travel. Alternatively, intercity commuters between Cambridge and Guelph face considerable barriers, making existing public transit services an inviable option for their daily commuting needs.

Although GO Rail services offers journey time benefits to transit users, travel data has shown that GO Rail services are not typically used by residents commuting between the two regions. This can be due to the excessive cost of $8 per one-way trip for commuting as well as the limited window that GO Rail services currently operate. Aside from the GO Rail services, intercity public transit options require significant journey times including wait times and multiple interchanges to travel approximately 25 km distances, resulting in significantly high generalized journey costs for transit users. For instance, commuting from Cambridge to Guelph via public transit can feel like a four-hour trip due to the multiple interchanges and wait times. The long journey times are not viable for the average commuter that would need to reach their work destinations before a certain time and do not have the luxury to spend hours in-transit to get to and from work.

TABLE 35: RESULTS OF GJC ASSESSMENT FOR EXISTING TRANSIT USERS

Morning On-Peak						
From:	Kitchener GO Station		Cambridge Bus Terminal		Guelph Central GO	
To	Guelph GO	CBT	Kitchener GO	Guelph GO	Kitchener GO	CBT
GO Rail/LRT IVT Weight (0.85)	18					
Bus IVT Weight (1.0)		53	64	74	34	63
Interchange Penalty (5.0)		5	5	10	5	10
Wait Time Weight (2.5)		15	20	27.5	20	100
Walk Time Weight (2.0)		10	10		10	
Total Journey Time (min)	18	83	99	112	69	173
Journey Travel Cost ($)	$6	$26	$31	$35	$22	$54
GO Fare per Trip – Presto ($)	$8			$8	$8	$10.50
Local Transit Fare per Trip ($)		$3	$3	$3	$3	$3
Total Out-of-Pocket Costs ($)	$8	$3	$3	$11	$11	$13.50
Generalized Journey Cost	$14	$29	$34	$46	$33	$68
Evening On-Peak						
From:	Guelph GO	CBT	Kitchener GO	Guelph GO	Kitchener GO	CBT
To:	Kitchener GO Station		Cambridge Bus Terminal		Guelph Central GO	
Generalized Journey Cost	$14	$34	$27	$51	$36	$56
Daily Generalized Journey Cost	$27	$63	$61	$96	$69	$124

In **Table 36**, the generalized journey cost for existing transit users is also estimated for trips from Kitchener and Cambridge to the North Employment Area (N.E.A) and South Employment Area (S.E.A) in Guelph. The GJC is estimated for morning commutes towards Guelph, and evening commutes towards Kitchener and Cambridge. Once again, commutes from Cambridge to Guelph in the morning and returning in the evening face the greatest barriers, making public transit and inviable option for daily commuting.

TABLE 36: RESULTS OF GJC ASSESSMENT OF TRANSIT USERS COMMUTING TO MAJOR EMPLOYMENT AREAS

	Morning On-Peak			
From:	Kitchener GO		Cambridge Bus Terminal	
To:	North - Employment	South - Employment	North - Employment	South - Employment
GO Rail/LRT IVT Weight (0.85)	18	18	18	
Bus IVT Weight (1.0)	30	30	81	60
Interchange Penalty (5.0)	5	10	15	15
Wait Time Weight (2.5)	25	37.5	62.5	50
Walk Time Weight (2.0)		10	30	10
Journey Travel Time Weight (1.76)	78	105	206	135
Journey Travel Cost ($)	$24	$33	$65	$42
GO Fare per Trip – Presto ($)	$8	$8	$8	$7
Local Transit Fare per Trip ($)	$3.25	$3.25	$3.25	$3.25
Total Out-of-Pocket Costs ($)	$11.25	$11.25	$13.25	$10.25
Generalized Journey Cost	$36	$44	$76	$53
	Evening On-Peak			
From:	North - Employment	South - Employment	North - Employment	South - Employment
To:	Kitchener GO		Cambridge Bus Terminal	
Generalized Journey Cost	$51	$36	$70	$88
Daily Generalized Journey Cost	$87	$80	$146	$141

Figure 39 and **Figure 40** presents a summary of the estimated daily "weighted" journey times and associated costs for existing auto and transit users during peak hours, accounting for both morning and evening commutes for each city-pair. As shown, perceived journey time and costs for transit users is considerably higher than auto users. In some cases, commuting by public transit can feel four times longer due to the multiple interchanges and wait times required. This assessment indicates that current transit services are not reliable for daily commuting needs.

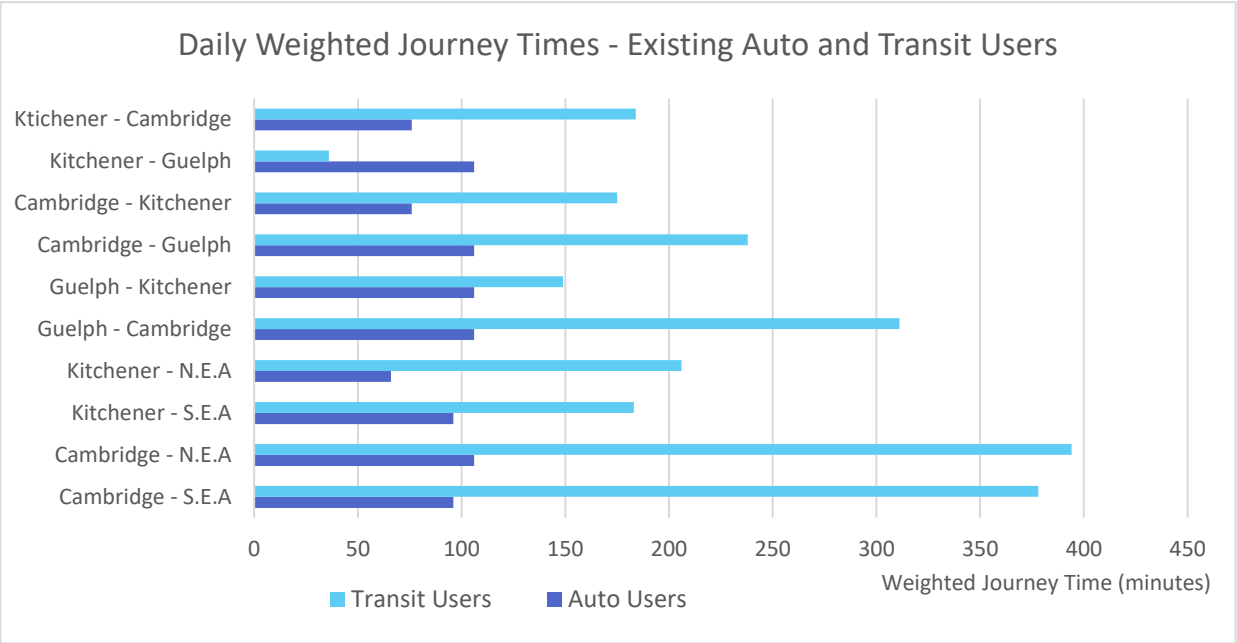


FIGURE 39: DAILY WEIGHTED JOURNEY TIMES FOR EXISTING AUTO AND TRANSIT USERS

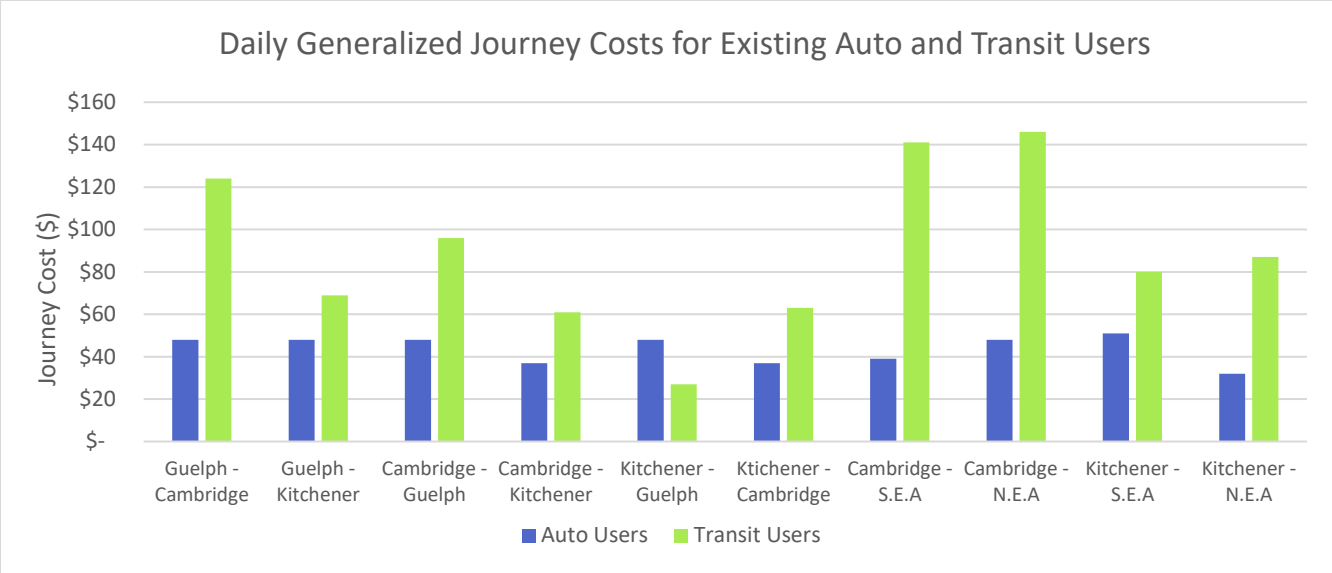


FIGURE 40: DAILY GENERALIZED JOURNEY COSTS FOR EXISTING AUTO AND TRANSIT USERS

Transit Investment Options – GJC Assessment Results

The Generalized Journey Cost for each of the proposed intercity bus transit investment options is presented below and includes estimates for on-peak services. Because buses are running on a 15-minute headway during on-peak hours, it is assumed that there will be minimal wait time of 5 minutes for the next bus stop. Moreover, because proposed transit options eliminate the need to use GO Transit services, return trip times and costs during evening peak hours is assumed to be the same as the morning commutes. Total values for journey time and costs were rounded to the nearest whole number for the assessment. Lastly, in-vehicle time (IVT) for intercity bus services (IBS) local transit buses are identified separately to illustrate the difference in reliance on local transit between the three options.

In order to represent a viable alternative to private vehicle travel, the new intercity bus service should cost equal to or less than $48 for daily trips between the three cities. The GJC assessment for the proposed investment options uses the same major transit station areas for the origin-destination, however, the location for the bus stop in Kitchener is relocated to Central Station along the ION LRT network, next to the future Waterloo Region Transit Hub. Additionally, for an intercity public transit service to be viable, the cost should be competitive to GO Transit services, while also considering the added cost for providing a comfortable and convenient transit option for commuters. Therefore, a flat rate of $5 per trip is estimated for the out-of-pocket cost of the intercity bus service.

Option 1: Kitchener – Guelph

For Option 1, the intercity bus provides a direct service between the ION LRT's Central Station in Kitchener and Guelph Central Station. **Table 37** summarizes the GJC assessment for Option 1. The results suggests that residents commuting between Kitchener and Guelph can potentially achieve a relatively similar journey cost compared to private vehicle travel. However, residents commuting between Guelph and Cambridge will continue to face barriers due the additional travel time needed to commute between Kitchener and Cambridge. For the trip between Cambridge and Kitchener, it was assumed that commuters would prefer to take the ION LRT between the Fairway Mall and Central Station stops, over taking a second bus, and as such it was included in the GJC evaluation.

TABLE 37: OPTION 1 DAILY GJC ASSESSMENT RESULTS

From:	WR Transit Hub		Cambridge Bus Terminal		Guelph Central GO	
To:	Guelph GO	CBT	WR-Hub	Guelph GO	WR-Hub	CBT
LRT IVT Weight (0.85)		18	20	20		18
IBS IVT Weight (1.0)	50			50	50	50
Bus IVT Weight (1.0)		33	35	35		33
Interchange Penalty (5.0)		5	5	10		10
Wait Time Weight (2.5)	12.5	12.5	25	25	12.5	37.5
Walk Time Weight (2.0)						
Total Journey Time (min)	62.5	68	85	140	63	148
Journey Travel Cost ($)	$20	$21	$26	$44	$20	$46
IBS Fare per Trip ($)	$5			$5	$5	$5
Local Transit Fare per Trip ($)		$3	$3	$3		$3
Total Out-of-Pocket Costs ($)	$5	$3	$3	$8	$5	$8
Generalized Journey Cost (One-Way)	$25	$24	$29	$52	$25	$54
Daily Generalized Journey Costs	$49	$49	$59	$103	$49	$109

Option 2 – Two Direct Services

In addition to the direct transit services between Kitchener and Guelph, Option 2 proposes a second direct service between Cambridge and Guelph. Because the distance between downtown Kitchener and Guelph, and downtown Cambridge and Guelph is relatively the same distance, the estimated travel time and subsequent GJC are the same for both morning and evening peak hour commutes. **Table 38** summarizes the GJC assessment for Option 2.

TABLE 38: OPTION 2 DAILY GJC ASSESSMENT RESULTS

From:	WR Transit Hub		Cambridge Bus Terminal		Guelph Central GO	
To	Guelph GO	CBT	WR-Hub	Guelph GO	WR-Hub	CBT
GO Rail/LRT IVT Weight (0.85)		18	20			
IBS IVT Weight (1.0)	50			50	50	50
Bus IVT Weight (1.0)		33	35			
Interchange Penalty (5.0)		5	5			
Wait Time Weight (2.5)	12.5	12.5	12.5	12.5	$12.5	$12.5
Walk Time Weight (2.0)						
Total Journey Time (min)	62.5	68	85	62.5	62.5	62.5
Journey Travel Cost ($)	$20	$21	$26	$20	$20	$20
IBS Fare per Trip ($)	$5			$5	$5	$5
Local Transit Fare per Trip ($)		$3	$3			
Total Out-of-Pocket Costs ($)	$5	$3	$3	$5	$5	$5
Generalized Journey Cost (One-Way)	$25	$24	$26	$25	$25	$25
Daily Generalized Journey Costs	$49	$49	$51	$49	$49	$49

Option 3: Cambridge – Kitchener – Guelph

Option 3 consists of two-way services between Kitchener, Cambridge, and Guelph, as well as two major employment areas in Guelph. Because this option eliminates the need to use local transit services, estimated travel time for both morning and evening commutes are assumed to be the same. In addition to direct connections to major urban and employment areas in Guelph, commuters between Cambridge and Kitchener can also benefit from the direct connections between downtown Cambridge and Kitchener. This can especially benefit commuters from Cambridge that require access to major employment areas and institutions in City of Waterloo and City of Kitchener, as well as connections to GO Transit services in Kitchener. **Table 39** summarizes the GJC assessment for Option 3.

TABLE 39: OPTION 3 DAILY GJC ASSESSMENT RESULTS

From:	WR Transit Hub		Cambridge Bus Terminal		Guelph Central GO	
To	Guelph GO	CBT	WR-Hub	Guelph GO	WR-Hub	CBT
Morning On-Peak						
GO Rail/LRT IVT Weight (0.85)						
IBS IVT Weight (1.0)	50	35	35	50	50	50
Bus IVT Weight (1.0)						
Interchange Penalty (5.0)						
Wait Time Weight (2.5)	12.5	12.5	12.5	12.5	$12.5	$12.5
Walk Time Weight (2.0)						
Total Journey Time (min)	62.5	47.5	47.5	62.5	62.5	62.5
Journey Travel Cost ($)	$20	$15	$15	$20	$20	$20
IBS Fare per Trip ($)	$5	$5	$5	$5	$5	$5
Local Transit Fare per Trip ($)						
Total Out-of-Pocket Costs ($)	$5	$5	$5	$5	$5	$5
Generalized Journey Cost (One-Way)	$25	$20	$20	$25	$25	$25
Daily Generalized Journey Costs	$49	$40	$40	$49	$49	$49

Secondary Stops

While previous Options connect major urban areas, commuters will likely need to transfer to local transit connections to reach their final destination for work, resulting in additional travel time and costs. The additional stops at major employment areas have the potential to reduce journey costs for morning commuters. Because proposed secondary stops are located near the largest employment areas in Guelph, and a significant percentage of intercity commuters travel from Kitchener and Cambridge to Guelph, it can be deduced that a sizable proportion of these commuters travel to one of the two destinations.

To assess the potential added benefit for transit users, **Table 40** and **Table 41** compares the Option 3 route journey costs of a one-way, morning trip with and without the secondary stops. The journey cost includes the cost for commuting via the intercity bus, plus the additional cost for travelling from the transit hub to the employment area. When secondary stops are not included, commuters are required to use local transit bus connections from Guelph Central Station to the respective employment area. Based on existing Guelph Transit bus service routes, there is a greater journey cost to get to the south employment area from Guelph Central Station, due to multiple bus transfers and wait times.

TABLE 40: OPTION 3 - GJC ASSESSMENT WITHOUT SECONDARY STOPS

From:	Kitchener – WR Transit Hub		Cambridge Bus Terminal	
To:	North - Employment	South - Employment	North - Employment	South - Employment
IBS IVT Weight (1.0)	50	50	50	50
Bus IVT Weight (1.0)	30	30	30	30
Interchange Penalty (5.0)	5	10	5	10
Wait Time Weight (2.5)	25	25	25	25
Walk Time Weight (2.0)				
Total Journey Travel Time (mins)	110	115	110	115
Journey Travel Cost ($)	$34	$36	$34	$36
IBS Fare per Trip	$5	$5	$5	$5
Local Transit Fare per Trip ($)	$3.25	$3.25	$3.25	$3.25
Total Out-of-Pocket Costs ($)	$8.25	$8.25	$8.25	$8.25
Generalized Journey Cost	$43	$44	$43	$44
Daily Generalized Journey Cost	$85	$89	$85	$89

TABLE 41: OPTION 3 - GJC ASSESSMENT WITH SECONDARY STOPS

From:	Kitchener – WR Transit Hub		Cambridge Bus Terminal	
To:	North - Employment	South - Employment	North - Employment	South - Employment
IBS IVT Weight (1.0)	40	50	50	40
Bus IVT Weight (1.0)				
Interchange Penalty (5.0)				
Wait Time Weight (2.5)				
Walk Time Weight (2.0)				
Total Journey Travel Time (mins)	40	50	50	40
Journey Travel Cost ($)	$13	$16	$16	$13
IBS Fare per Trip	$5	$5	$5	$5
Local Transit Fare per Trip ($)				
Total Out-of-Pocket Costs ($)	$5	$5	$5	$5
Generalized Journey Cost	$18	$21	$21	$18
Daily Generalized Journey Cost	$35	$41	$41	$35

Secondary Stops – Journey Cost Savings

The generalized journey cost of Option 3, both with and without the secondary stops, is compared in **Table 42** below and estimates potential annual GJC savings. **Table 43** also compares the Daily GJC of Option 3 with secondary stops to Daily GJC of existing transit users and estimates potential daily and annual cost savings.

When comparing GJC estimates for Option 3 for both with and without the secondary stops at major employment, it was found that including the secondary stops can reduce perceived travel costs by nearly $200 per day, and up to $47,000 per year. Moreover, although the new route option, without secondary stops, would be a lower journey cost compared to existing public transit options, it would not provide a viable alternative to drivers that commute to these employment areas and would limit opportunities to increase ridership.

TABLE 42: ESTIMATED ANNUAL GJC SAVINGS FOR OPTION 3 WITH SECONDARY

From:	Kitchener – WR Transit Hub		Cambridge Bus Terminal	
To:	North - Employment	South - Employment	North - Employment	South - Employment
Daily GJC Without Secondary Stop	$85	$89	$89	$89
Daily GJC With Secondary Stop	$35	$41	$41	$35
Daily GJC Savings	$50	$48	$44	$54
Monthly GJC Savings	$1,008	$951	$888	$1,071
Annual GJC Savings	$12,095	$11,407	$10,655	$12,847
Note: Monthly and Annual GJC Savings are based on vehicle travel for 5 days per week.				

TABLE 43: ESTIMATED ANNUAL GJC SAVINGS FOR EXISTING TRANSIT USERS

From:	Kitchener GO		Cambridge Bus Terminal	
To:	North - Employment	South - Employment	North - Employment	South - Employment
Daily GJC - Existing Transit Users	$87	$80	$146	$141
Daily GJC – Option 3	$35	$41	$41	$35
Daily GJC Savings	$52	$39	$105	$106
Monthly GJC Savings	$1,040	$780	$2,100	$2,120
Annual GJC Savings	$12,480	$9,360	$25,200	$25,440
Note: Weekly and Annual GJC Savings are based on vehicle travel for 5 days per week.				

Generalized Journey Cost Assessment – Results of Summary

The daily weighted time and generalized journey costs is estimated for each Origin-Destination (O-D) pair and includes both morning and evening commutes. For example, the **Guelph-Cambridge** values are based on individuals that commute from Guelph to Cambridge in the on-peak morning and return from Cambridge to Guelph in the on-peak evening. Alternatively, the **Cambridge-Guelph** values are based on individuals that commute from Cambridge to Guelph in the morning and return from Guelph to Cambridge in the evening. Commute time and costs from Kitchener and Cambridge to North Employment Area (N.E.A.) and South Employment Area (S.E.A.) in Guelph are also included for existing users and proposed Options. **Table 44** summarizes the results of the daily weighted time and generalized journey cost for each O-D pair.

TABLE 44: SUMMARY OF GJC ASSESSMENT RESULTS, EXISTING USERS AND PROPOSED IBS OPTIONS

O-D Pairs	Auto Users	Transit Users	Option 1	Option 2	Option 3
Guelph - Cambridge	105 mins	311 mins	297 mins	125 mins	125 mins
	$48	$124	$109	$49	$49
Guelph - Kitchener	105 mins	149 mins	125 mins	125 mins	125 mins
	$48	$69	$49	$49	$49
Cambridge - Guelph	105 mins	238 mins	279 mins	125 mins	125 mins
	$48	$96	$103	$49	$49
Cambridge - Kitchener	75 mins	175 mins	169 mins	144 mins	95 mins
	$37	$61	$59	$51	$40
Kitchener - Guelph	105 mins	36 mins	125 mins	125 mins	125 mins
	$48	$27	$49	$49	$49
Kitchener - Cambridge	75 mins	184 mins	137 mins	137 mins	95 mins
	$37	$63	$49	$49	$40
Cambridge - S.E.A.	85 mins	379 mins	270 mins	225 mins	80 mins
	$42	$141	$107	$87	$35
Cambridge - N.E.A.	105 mins	394 mins	375 mins	195 mins	100 mins
	$48	$146	$140	$78	$41
Kitchener - S.E.A.	105 mins	183 mins	225 mins	225 mins	100 mins
	$55	$80	$87	$87	$41
Kitchener - N.E.A.	85 mins	206 mins	195 mins	195 mins	80 mins
	$38	$87	$78	$78	$35

Journey Time Savings

The Generalized Journey Cost assessment suggests that improvements in intercity transit services between the three cities can generate notable travel time savings for existing and new transit users.

Transit users commuting from Kitchener to Guelph in the morning and returning in the evening, have the benefit of using GO Rail transit services, resulting in the lower daily travel time savings compared to both auto users and proposed IBS options. However, all other O-D pairs face many barriers and the proposed investment options can result in significant travel time savings for transit users.

Figure 41 below illustrates the weighted journey times provided in Table 44. Option 1 primarily benefits transit users commuting between Guelph and Kitchener, while only marginal improvements are made to journey times for transit users commuting between other O-D pairs. In comparison, Options 2 and 3 deliver the highest transit benefits due to the faster journey times offered by high-frequency services and greater connections between major destinations. In addition to the reduced journey times, these services connect major urban and employment areas between the two regions, which in turn has the potential to attract new transit users.

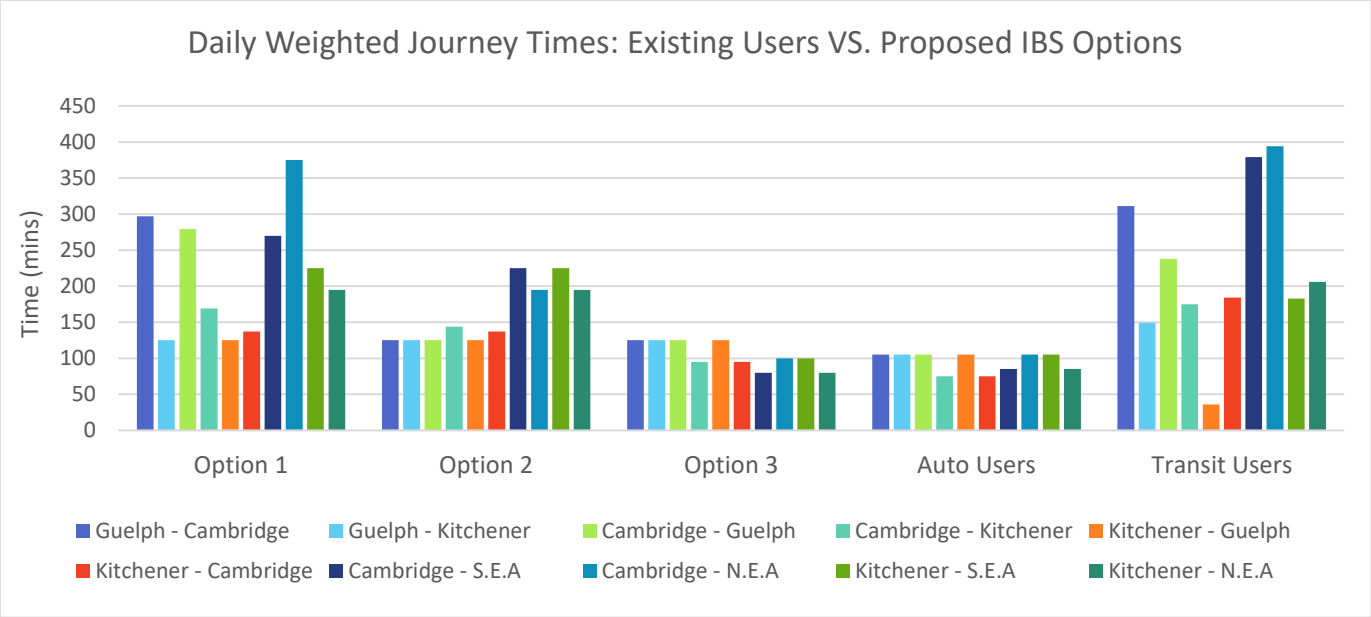


FIGURE 41: DAILY WEIGHTED JOURNEY TIMES: EXISTING USERS VS. PROPOSED IBS OPTIONS

The in-vehicle travel time for both auto users and the IBS services is assumed to be the same since they use the same road network. However, IBS users would typically require additional time to reach their final destinations. Although the proposed intercity bus service options do not result in lower travel times compared to auto users, Option 3 offers comparable travel times that can be considered a viable alternative for those without access to a private vehicle.

Intercity bus service times can be further reduced by using high-occupancy vehicle (HOV) lanes to avoid traffic congestion. There is currently a small segment of HOV lanes along Highway 401 between Waterloo Region and Wellington County that can be used to reduce travel times. However, implementing HOV lanes along Highway 6 and the new Highway 7 routes can help to further improve travel times, giving public transit a competitive advantage over private vehicle travel. As a result, the reduced travel times compared to private vehicles can potentially generate modal shifts from auto to public transit for intercity commuters.

Journey Cost Savings

The results of the Daily Generalized Journey Cost analysis (Table 44) for on-peak travel times are illustrated in **Figure 42**. Similar to the journey time estimates, it can be seen that all three proposed transit investment options result in journey time cost savings for intercity commuters. For existing transit users, Option 1 offers cost savings for commuters from Guelph to Kitchener, while cost savings for commuters between Cambridge and Guelph are minimal. Alternatively, Options 2 and 3 significantly reduces the estimated journey costs between all O-D Pairs.

For auto users, the reduced journey costs for Options 2 and 3 are comparable to vehicle travel costs and, as such, can be considered a viable alternative to private vehicles. Moreover, upgrades to local highway networks to include HOV lanes can further improve travel times for intercity bus services, leading to additional journey cost savings. Other factors can also play a role in making the intercity bus service more attractive over cars such as increased comfort and reliability of the transit service, discounted transit fees subsidized by major employers that benefit from the added service and rising traffic congestion and delays for drivers due to regional population and employment growth.

Alternatively, all Options present journey cost savings for existing transit users. While GO Rail users benefit from the reduced travel time and cost, the remaining O-D pairs currently face greater travel time and costs. Option 1 primarily benefits peak hour commuters from Guelph to Kitchener as well as commuters from Kitchener to Guelph travelling outside of peak hours. Options 2 and 3 offer considerable journey cost savings for commuters between all three regions.

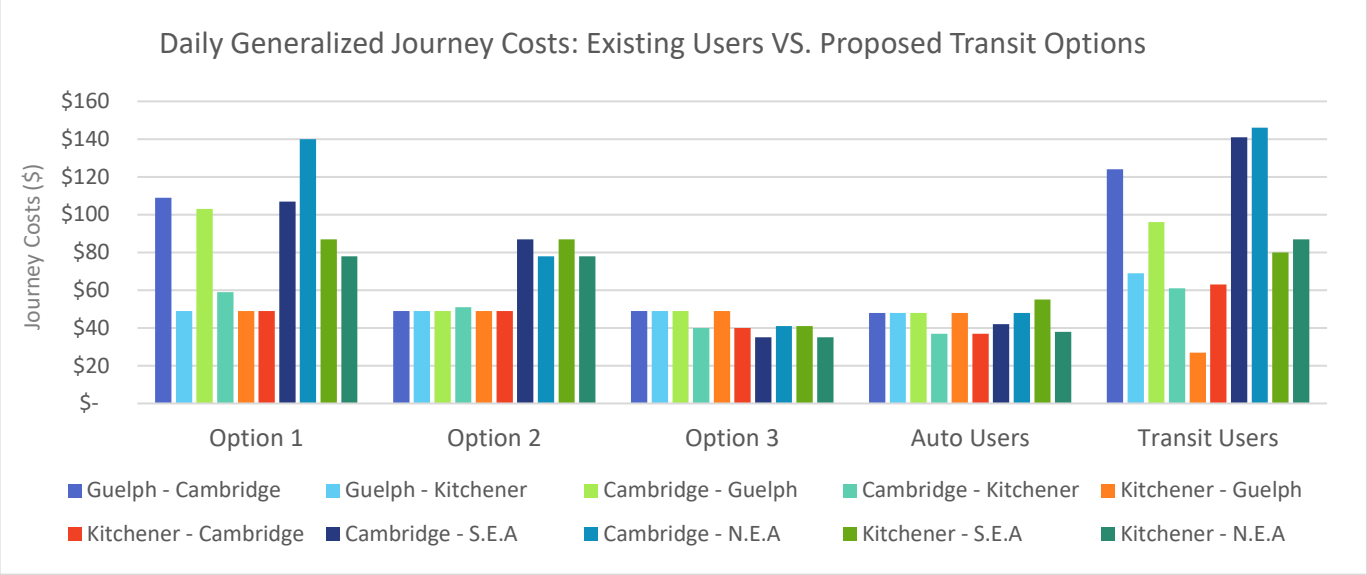


FIGURE 42: DAILY GENERALIZED JOURNEY COSTS: EXISTING USERS VS. PROPOSED IBS OPTIONS

Journey Cost Savings – Options Analysis

While the goal of the intercity bus service is to provide a viable alternative to private vehicles, it can be difficult to implement on-road transit services that offer a similar or greater convenience than auto travel. However, it is important to note that transit travel time and costs can vary significantly depending on travel conditions and user preferences. For example, commuters may prefer a high-quality transit option even if it takes longer than driving since they can work or rest during their commute (Litman, 2024).

For auto users, there are potential journey cost savings for commuters between the Waterloo Region and major employment areas in the north and south of Guelph. This is primarily due to the out-of-pocket costs for auto users applied in the GJC assessment, such as fuel and maintenance costs. However, the assessment does not include the additional time for IBS users to get to and from the bus stops, which would likely result in greater generalized journey costs compared to auto users. Nonetheless, Option 3 has the potential to generate comparable journey time and costs to private cars and offers an actual viable alternative for daily intercity commuting. Moreover, IBS journey times and costs can be further reduced through the use of HOV lanes and dedicated bus lanes on regional roads and highways, fast and efficient payment systems, and curbside pick-up and drop-off.

Figure 43 summarizes the potential annual cost savings for existing transit users. The proposed Options would not benefit commuters using GO Rail services from Kitchener to Guelph but have the potential to generate significant journey cost savings for the remaining O-D pairs. For example, for commuters travelling from Guelph to Kitchener, all three options can reduce the “perceived” journey time by nearly 3 hours per day, which would result in daily travel

cost savings of $20 and close to $3,600 savings annually. Option 3 has the potential to generate up to $25,000 of annual cost savings for transit users commuting from Cambridge to the North and South Employment Areas in Guelph. Lastly, **Figure 44** illustrates the annual cost savings for all O-D pairs for each investment Option as well as potential savings based on total daily trips for each Option.

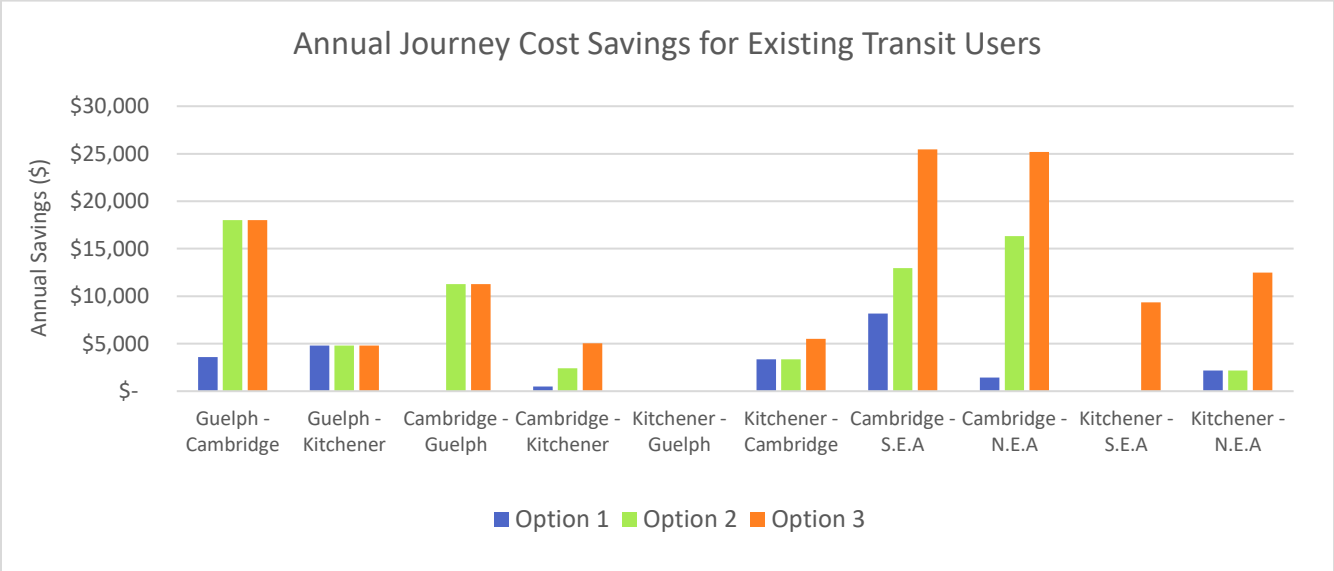


FIGURE 43: ESTIMATED ANNUAL JOURNEY COST SAVINGS FOR EXISTING TRANSIT USERS

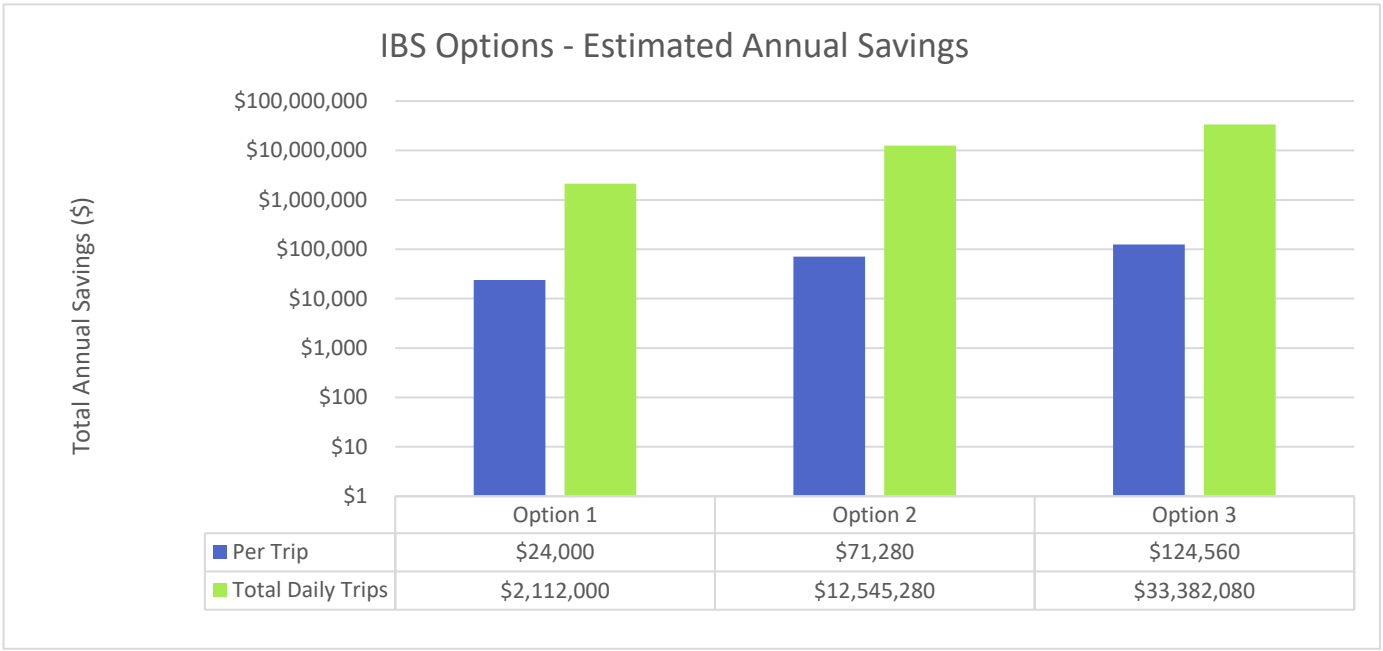


FIGURE 44: SUMMARY OF TOTAL ANNUAL SAVINGS FOR IBS OPTIONS

Environmental and Social Costs

The transportation sector constitutes a significant share of total energy consumption at the local, regional, and provincial levels. Addressing the challenges of depleting energy resources and escalating environmental impacts calls for a shift towards cleaner and more sustainable transportation options.

Each transport service has a social cost to society such as potential for collisions that result in injury or death; traffic congestion impacts that result in loss in economic productivity; GHG emissions resulting in health impacts; and climate change caused by environmental impacts.

Public transit cost benefit analyses have found that a variety of social and environmental cost benefits can result from improvements in public transit options that aim to reduce transportation costs and travel times. Benefits can include higher density of residential developments, business agglomeration benefits, and improvements in the livelihood of residents.

Greenhouse Gas Emissions

A 2023 study by the Texas A&M Transportation Institute (TTI, 2023) provides the most recent emissions data estimates for the motorcoach transportation service industry in the United States and Canada. The study found that on a passenger-mile per DGE (diesel gallons equivalent) basis, motorcoaches outperformed all other transportation modes modeled in terms of energy efficiency and had lower CO_2 emissions. Additionally, motorcoaches had the lowest PM emissions rates per 1,000 passenger-miles among all on-road transportation modes, and the lowest NOx emissions among diesel-powered modes. According to the MOVES4, gasoline-powered light-duty vehicles, manufactured in 2021 or later, emit less NOx than diesel-powered motorcoaches. However, as newer motorcoach vehicles are introduced, NOx and PM emissions are expected to decline (TTI, 2023).

The study also includes estimates of nitrogen oxides (NO_x) and particulate matter (PM_{10} and $PM_{2.5}$) emissions, as they are two pollutants emitted by internal combustion engines that are have severe environmental impacts. In the presence of sunlight, nitrogen oxides combine volatile organic hydrocarbons in the atmosphere to produce ground level ozone, also known as smog. Atmospheric particulate matter (PM) has also been shown to cause or exacerbate respiratory and cardiac disease and has been linked to an increased risk of lung cancer and premature mortality (ABA Foundation, 2019). The study uses emissions data obtained from EPA's Motor Vehicle Emissions Simulator (MOVES4) for the model year 2021 fleet rate (TTI, 2023). Because Canadian passenger fleet emissions regulations align with the U.S. EPA regulations (ECCC, 2020), it is assumed that these figures would be similar for the Canadian context.

For each proposed investment option, the total buses in operation and vehicle-kilometers travelled (VKT) were estimated to conduct a high-level assessment of potential GHG emissions. The following **Table 45** estimates annual CO_2, NO_x, PM_{10}, and $PM_{2.5}$ emissions for existing auto users and proposed Intercity Bus Service Options. Estimates have been converted to grams per kilometer and assume that all passenger vehicles on the road are from the 2021 model year or later.

TABLE 45: ESTIMATES OF GHG EMISSIONS FOR PROPOSED IBS OPTIONS

	Auto	Option 1	Option 2	Option 3
Vehicles per Day	22,000	8	16	22
Average Passengers per Vehicle	1.2	40	40	40
Average Daily Passengers	26,400	3,630	7,260	11,055
Average Annual Passengers	6,336,000	871,200	1,742,400	2,653,200
Annual VKT	290,400,000	570,240	1,098,240	1,883,520
GHG Emissions Estimates				
Vehicle Fuel Type	Gasoline	Diesel	Diesel	Diesel
Vehicle Fuel Efficiency (l/km)	0.086[1]	0.4	0.4	0.4
Vehicle CO_2 Emissions (g/km) [2]	200	1,039	1,039	1,039
Annual CO_2 Emissions (mt/year)	**58,080**	**592.5**	**1,141**	**1,957**
NOx Emissions (g/km)[3]	0.014	1.44	1.44	1.44
Annual NOx Emissions (mt/year)	**4.0**	**0.8**	**1.6**	**2.7**
PM_{10} Emissions (g/km)[3]	0.021	0.13	0.13	0.13
Annual PM_{10} Emissions (mt/year)	**6.01**	**0.07**	**0.14**	**0.24**
$PM_{2.5}$ Emissions (g/km)[3]	0.0034	0.02	0.02	0.02
Annual $PM_{2.5}$ Emissions (mt/year)	**1.0**	**0.01**	**0.02**	**0.035**

1. 2021 average Canadian LDV fuel consumption **(IEA, 2021)**
2. Estimated using online conversion tool **(Marco, 2024)**
3. Texas A&M Transportation Institute **(TTI, 2023)**

Based on historical data, it was estimated that the number of intercity commuters between the two regions could increase to nearly 40,000 by 2050, resulting in annual CO_2 emissions of over 105,600 metric tonnes. Options 2 and 3 can potentially service over 3,500 people daily. However, if just 2,500 daily commuters opt to commute using the new intercity bus service over private vehicles, this can potentially mitigate approximately 6,600 metric tonnes of CO_2 emissions, and 6 metric tonnes of NO_x emissions, annually.

Figure 43 below illustrates the annual CO_2 emissions of 2,500 vehicles compared to the annual CO_2 emissions of the proposed three IBS Investment Options. While an IBS can potentially carry hundreds of thousands of passengers annually, annual CO_2 emissions are considerably lower than private vehicle travel. Therefore, providing a viable service that can potentially attract 2,500 drivers to switch to public transit can have a positive impact on reducing regional GHG emissions.

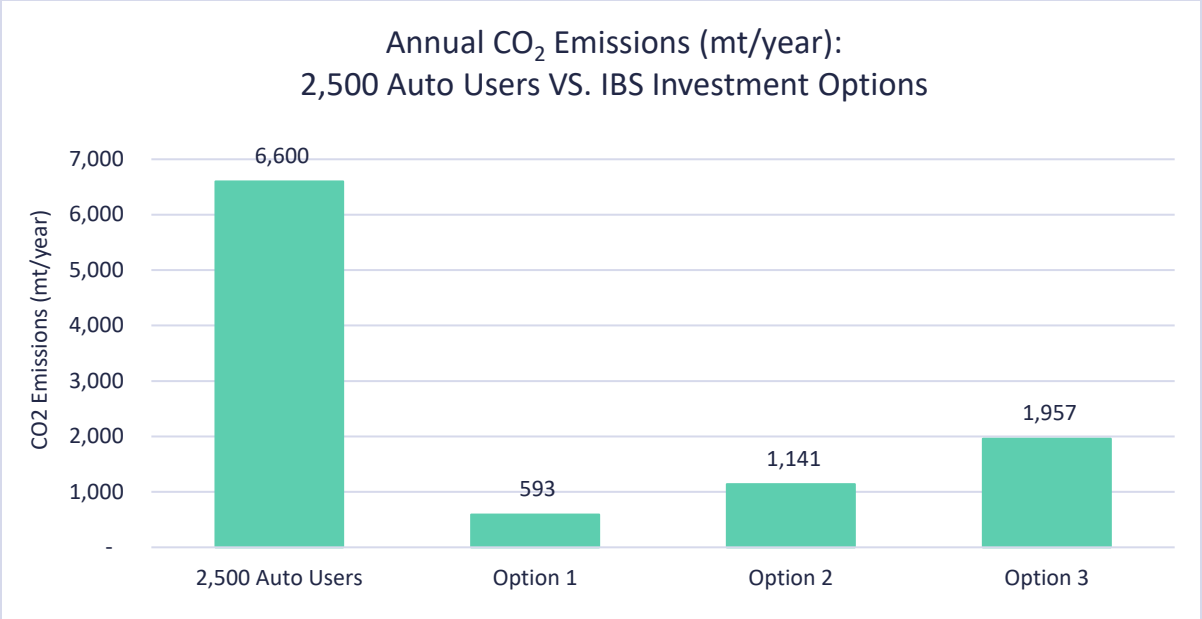


FIGURE 45: COMPARISON OF CO_2 EMISSIONS FOR AUTO USERS AND IBS OPTIONS

GHG Emissions Costs

Greenhouse gas emissions impose a cost on the environment and society as a whole. A variety of definitions and subsequent methods and models have been developed to estimate the potential cost of GHG emissions. Ultimately, the cost of carbon can be used to estimate in dollars all economic damage that would result from emitting one ton of carbon dioxide into the atmosphere.

One way that GHG emissions costs can be evaluated is based on direct environmental impacts such as air, noise, and water pollution costs. The public transit study by (Litman, 2024), estimates that the average pollution costs for the private vehicles is $0.06 per vehicle-mile ($0.04 per vehicle-km), and for new diesel buses is $0.10 per vehicle-mile ($0.06 per vehicle-km). The estimated value includes average energy, air, noise, and water pollution costs of vehicle modes. Using these figures, **Table 46** and **47** estimates potential GHG Emissions costs for existing auto users and the proposed investment options.

TABLE 46: ESTIMATED ANNUAL CO_2 EMISSIONS COSTS FOR AUTO USERS AND IBS OPTIONS

	Auto	Option 1	Option 2	Option 3
Vehicles per Day	22,000	8	16	22
Annual VKT	290,400,000	570,240	1,098,240	1,883,520
Emissions Cost Estimates				
Annual CO_2 Emissions (mt/year)	58,080	593	1,141	1,957
Average Emissions Costs (per vehicle-km)	$0.04	$0.06	$0.06	$0.06
Annual Emissions Cost	$11,616,000	$34,215	$65,895	$113,011

Once again, assuming that approximately 2,500 daily passengers opt to commute using the new intercity transit services over private vehicle use, this can lead to over $1.3 million reductions in annual GHG emissions related costs.

TABLE 47: ESTIMATED ANNUAL CO2 EMISSIONS COSTS FOR 2,500 AUTO USERS AND IBS OPTIONS

	Auto	Option 1	Option 2	Option 3
Vehicles per Day	2,500	8	16	22
Annual VKT	33,000,000	448,800	856,800	1,314,720
Emissions Cost Estimates				
Annual CO2 Emissions (mt/year)	6,600	593	1,141	1,957
Average Emissions Costs (per vehicle-km)	$0.04	$0.06	$0.06	$0.06
Annual Emissions Cost	$1,320,000	$34,215	$65,895	$113,011

Social Cost of Carbon

Emissions costs can also be evaluated based on the social cost of carbon (SCC), which aims to measure the monetized value of the damages to society caused by one metric tonne CO_2 emissions. Environmental Canada has developed the Social Cost of Greenhouse Gas Estimates which include dollar value estimates of carbon, methane, and nitrous oxide. The SCC is often used to help policymakers determine the costs and benefits of policies to curb climate change. It is assumed that the social cost of carbon will increase over time because the physical and economic systems will become more stressed as the impacts of climate change accumulate (ECCC, 2023).

The "global warming potential," (GWP) of a GHG indicates the amount of warming a gas can cause over a given period of time. CO_2 has a GWP index value of 1, while the GWP of all other GHGs is significantly higher. For instance, the social cost of nitrous oxide emissions is considerably higher than CO_2 emissions as it lasts longer in the atmosphere resulting in greater climate change impacts. Therefore, 1kg of NO_x causes 273 times more warming over a 100-year period compared to 1kg of CO_2 (Brander, 2023).

Based on the annual emissions estimated provided in the previous section, **Table 48** summarizes the potential annual social cost of CO_2 and NO_x emissions based on SCC figures provided through the ECCC. Currently, the annual social cost of carbon is nearly $16 million. However, based on the forecasted increase of intercity commuters, annual social costs of GHG emissions could increase to $43 million by 2050. Comparatively, **Table 49** estimates and compares the SCC for CO_2 and NO_x emissions for 2,500 private vehicles and the proposed intercity bus service options, providing the number of vehicles and subsequent annual vehicle-kilometers travelled does not change. For each of the options, potential social costs are significantly lower compared to vehicle travel. Similar to the environmental costs, a modal shift of approximately 2,500 vehicles from the road to public transit can reduce the annual social cost of carbon by over $2 million over the next thirty years. As a result, the proposed intercity bus transit service can support community GHG emissions reduction goals by providing intercity commuters a viable, low carbon, alternative to private vehicles. Moreover, as the region transitions to electric vehicles, marginalized groups without access to private vehicles can continue to access employment opportunities.

TABLE 48: ANNUAL SOCIAL COSTS OF CARBON FOR AUTO USERS, 2024 TO 2050

Year	SC-CO_2*	SC-N_2O*	Auto Commuters**	Estimated Emissions Costs
2025	$267	$69,230	22,000	$15,725,000
2030	$294	$84,903	28,000	$22,200,000
2040	$341	$100,866	34,000	$31,230,000
2050	$394	$118,919	40,000	$42,470,000

* C$2021, $/tonne of respective GHG
** Intercity Commuting Population Forecasts

TABLE 49: ANNUAL SOCIAL COST OF CARBON FOR 2,500 AUTO USERS AND IBS OPTIONS, 2024 TO 2050

Year	SC-CO_2*	SC-N_2O*	2,500 PVs	Option 1	Option 2	Option 3
Annual CO2 Emissions (mt/year)			6,600	592.5	1,141	1,957
Annual NOx Emissions (mt/year)			4.0	0.008	1.6	2.7
2025	$266	$77,066	$1,787,000	$224,000	$431,000	$740,000
2030	$294	$84,903	$1,980,000	$244,000	$470,000	$805,650
2040	$341	$100,866	$2,300,000	$285,000	$548,500	$941,000
2050	$394	$118,919	$2,655,000	$331,000	$637,500	$1,094,000

* C$2021, $/tonne of respective GHG

External Impacts

This section considers the wider social and economic impacts as a result of the intercity bus service investment. In addition to the monetized benefits, there are also qualitative user impacts such as improvements in accessibility and reliability that can attract new transit users as well as encourage existing auto users to switch to transit mode. As a result, the proposed transit service investment options can produce bother user and mobility benefits.

User benefits can result from improved convenience, speed, comfort, or financial savings to existing and new transit users. For instance, when public transit service is comfortable, convenient, and reliable, it can be less stressful and more enjoyable than auto travel, thereby reducing travel time unit costs. Alternatively, mobility benefits result from additional mobility options for people who are physically, economically, or socially disadvantaged. Improvements in transit services can help disadvantaged people to access public services, education, and employment opportunities.

Societal Benefits

Improvements in public transit services can have diverse impacts, both directly and indirectly. While direct impacts primarily affect transit users, impacts that are indirect and external affect people who do not use transit. According to (Litman, 2024), traditional transit investment evaluations fail to account for many of the societal benefits that they can generate and such evaluations should instead utilize accessibility indicators such as the number of jobs or services that can be reached, rather than mobility-based indicators such as travel time savings.

Moreover, as cities grow in size and density, improvements in transit options become more important to provide alternatives to private vehicle travel. Therefore, improvements in transit services can result in external benefits such as reducing traffic congestion on local and regional roads and promoting more efficient land use patterns (Litman,

2024). Using the results of the study by (Litman, 2024), **Table 50** summarizes potential societal benefits that can result from transit improvements proposed through the investment options.

TABLE 50: POTENTIAL SOCIETAL BENEFITS FROM PROPOSED IBS INVESTMENT OPTIONS

	Potential Societal Benefits	
Improved Transit Service	▪ Improved comfort and convenience for existing users. ▪ Equity Benefits – as existing users tend to be disadvantaged.	▪ Option Value – the value of having an option for potential future use. ▪ Improved operating efficiency. ▪ Improved security
Increased Transit Travel	▪ Mobility benefits to new users. ▪ Increased fare revenue. ▪ Increased public fitness and health.	▪ Increased security as more people ride transit and wait at stops and stations.
Reduced Automobile Travel	▪ Reduced traffic congestion. ▪ Road and parking facility cost savings. ▪ Consumer savings.	▪ Increased traffic safety. ▪ Energy conservation. ▪ Reduced air and noise pollution.
Transit-Oriented Development	▪ Additional vehicle travel reductions.	▪ Improved accessibility, especially for non-drivers.

Land Use Impacts

Vehicle travel imposes external costs such as parking and fuel production subsidies, congestion delays, crash risks imposed on other road users, and pollution emissions. One of the central external costs of vehicle travel are land use impacts.

Vehicle travel requires excessive land use to support private vehicle mobility, while transit can help to reduce the amount of land required for road and parking facilities (Litman, 2024). Regions across the GGH, including Waterloo Region and Wellington County, have implemented transit-oriented development (TOD) policies and goals which aim to create more resource efficient and accessible land use patterns. TOD can provide economic benefits by improving accessibility, reducing transport costs, and providing economies of agglomeration, described below. For this reason, transportation and land use planning decisions interact (Litman, 2024).

The following transit improvements typically have positive land use impacts:

- Transit programs that are part of a wider smart growth land use program.
- TOD programs that aim to integrate transit improvements with compatible land use development.
- Transit stations located at major commercial centers with large numbers of commuters.
- Transit improvements as an alternative to roadway capacity expansion.
  (Litman, 2024)

Economic case assessments typically include land use impact models to determine how a particular transit policy or investment will affect land use patterns, such as changes in the amount of land used for transport facilities, changes to development patterns, and changes in accessibility. Lastly, a monetary value is placed on these impacts to be included as part of the cost benefit analysis.

Economic Development Impacts

Transit can support economic development in many ways such as increased productivity, business activity, employment, income, property values, and tax revenue. High quality transit that results in reduced generalized cost of public transit services between major employment and urban areas can have important impacts on the labour market and increase regional productivity. For example, (Chatman & Noland, 2014) found that, in the case of central city employment density, a 10% increase in transit services can result in annual wage increases between USD $1.5 million to $1.8 billion, depending on the size of the metropolitan area.

According to the Metrolinx Business Case Framework, "an improvement in accessibility to major employment areas is equivalent to an increase in the effective return to labour and capital," (Metrolinx, 2021b). Transport services in proximity to clusters of employment areas reduces the cost/time to travel between locations, which in turn improves the perceived density of a region.

Reducing the 'costs' of commuting in terms of journey time, financial cost, and level of over-crowding or congestion, can change the supply of labour, as follows:

1. Inducing previously inactive individuals to join the labour market by increasing the perceived benefits of work versus non-work.
2. Inducing a change in the number of hours worked by existing active individuals within the labour market.
3. Making more distant (and potentially more productive and higher paying) jobs more accessible, resulting in a shift in employment towards more productive activity.
   (Metrolinx, 2021b)

By making employment more accessible for individuals, transit investments also facilitate the development of clustered and high-density employment areas known as agglomeration economies (Chatman & Noland, 2014). Businesses can take advantage of a number of efficiencies by being located in proximity to one another, and as a result, generate agglomeration benefits due to the potential productivity gains that result from employers being located close to one another within urban areas.

Agglomeration benefits can include:

- Increased competition amongst firms and suppliers, for both labour and products, placing additional incentives on firms to be more productive and innovative.
- Better access to larger, denser labour markets, resulting in an increased ability to better match people to jobs and fill vacancies with specific skills requirements.
- Greater specialization and division of labour, and enhanced economies of scale.
- Access to larger customer markets, increased 'knowledge spillovers,' and consequent exchange of ideas.
  (Metrolinx, 2021b)

Public transit investments can increase agglomeration and as a result generate additional productivity impacts through localization and urbanization effects, as follows:

- Static clustering impacts occur as the transport investment brings employers, people, and places closer together by reducing travel times between them.
- Dynamic clustering impacts refer to subsequent effects that attract more productive resources such as more employers or labour into the local economy.
  (Metrolinx, 2021b)

Economic Case – Investment Options Summary

The economic case for the proposed transit investment options conducted quantitative and qualitative assessments to illustrate the economic costs and benefits for existing transit users as well as the wider regional economy. **Table 51** summarises the types of impact assessments conducted and is followed by **Table 52** which presents a comparison of the outcomes for each investment option.

TABLE 51: SUMMARY OF ECONOMIC CASE ASSESSMENTS

User Benefits	All three proposed investment options have the potential to reduce journey time and costs for existing transit users, resulting in considerable annual cost savings and economic benefits for the two regions. For auto users, Option 3 has potential to provide a viable alternative for commuters between Waterloo Region and major employment areas in north/south Guelph. Option 3 has the greatest annual journey cost savings for commuters between all three cities and major employment areas in Guelph.
Environmental Costs	Environmental costs of the proposed investment Options increase based on the number of vehicles operating on a daily basis. However, GHG emissions and related costs are negligible when compared to daily auto travel. As a result, the investment Options can help to reduce current environmental and social costs of carbon emissions imposed on society. It is estimated that a modal shift of 2,500 daily passengers from auto travel to intercity transit services can reduce GHG emissions and subsequently save millions of dollars in GHG emissions related environmental and social costs.
Net Benefit	While higher journey cost savings are a positive impact, emissions costs, although lower than auto travel, are viewed as a negative impact, especially when compared to zero-emission vehicles. The net benefit is estimated by adding the positive impact costs and subtracting the negative impact costs. All three Options generate considerable net benefits; however, Option 3 offers the greatest journey cost savings for most of the O-D pairs.
External Impacts	It was found that transportation services that connect major employment areas can contribute to positive economic and land use development impacts. Option 1 and 2 primarily connect urban growth centres, which represent higher densities of residential and employment per hectare and have the potential to contribute to improving connections to major employers between the regions. However, Option 3 includes additional stops near major employment areas and is thus considered to have the greatest impact on facilitating land use efficiencies and agglomeration benefits.
Societal Benefits	With regards to potential societal benefits, Option 1 mainly benefits commuters between Kitchener and Guelph, while Option 2, benefits commuters between Kitchener and Guelph, and Cambridge and Guelph. Option 3 presents the greatest societal benefits as it connects all three cities, including Kitchener and Cambridge, as well as connections to significant employment areas, which can lead to economic and environmental benefits for individuals and cities as a whole.

TABLE 52: ECONOMIC CASE EVALUATION RESULTS

Impact Category	Description	Option 1	Option 2	Option 3
User Impacts				
Generalized Journey Cost	Average journey cost for proposed transit investment option.	$83	$63	$43
Auto Users – Annual Journey Cost Savings	Changes in existing auto users' travel time costs.	$0	$0	$1,993,920
Transit Users – Annual Journey Cost Savings	Changes in existing transit users' travel time costs.	$2,112,000	$12,545,280	$31,388,160
Environmental Costs				
Annual CO2 Emissions (mt/year)	Estimated metric tonnes of CO_2 emissions per year.	592.5	1,141	1,957
Annual Emissions Costs	Estimated environmental cost of carbon emissions per year ($0.06/vehicle-km).	$34,200	$66,000	$113,000
Annual Social Cost of Carbon (SCC)	Estimated social cost of CO_2 and NOx emissions (2025).	$224,000	$431,000	$740,000
Net Benefits	Sum of positive and negative impact costs.	$ 1,853,800	$ 12,048,280	$ 30,529,080
External Impacts				
Agglomeration Benefits	Productivity gains due to more clustered, accessible land use patterns.	✓	✓	✓✓
Land Use Objectives	Supports land use objectives such as TOD, clustering, accessibility, and mixed land use.	✓	✓	✓✓
Societal Benefits				
Direct User Benefits	Direct benefits to users from increased mobility.	✓	✓✓	✓✓✓
Equity Benefits	Improvements to mobility that supports those who are economically, socially, or physically disadvantaged to be relatively better off.	✓	✓✓	✓✓✓
Option Value	Value of having mobility options available in case they are needed.	✓	✓✓	✓✓✓
Productivity	Increased individual productivity from improved access to education and jobs.	✓	✓✓	✓✓✓
Environmental Quality	Reduced energy consumption, and air, water, and noise pollution.	✓	✓✓	✓✓✓

Financial Case

The Financial Case focuses on the financial resources required to implement the proposed investment. While the Strategic Case and Economic Case outline how an investment can achieve organizational goals and social value, the Financial Case focuses on the financial requirements to successfully deliver an investment (Metrolinx, 2021b).

Metrolinx Business Cases typically conduct financial models to determine year over year change in revenue and expenditure over the lifecycle of the investment. However, this IBC conducts a high-level financial assessment to determine annual operating and maintenance costs.

Table 53 presents the assumptions that are used for the financial case assessments drawn from the Metrolinx Business Case Guidance, Volume 2 (Metrolinx, 2021b).

TABLE 53: ASSUMPTIONS USED FOR FINANCIAL CASE ASSESSMENTS

Parameter	Description	Value
Financing Costs	For fiscal year 2016/17 and beyond – rate for any capital costs paid for by the Province of Ontario.	5.78%
Labour Benefits	Estimated salaries should include an uplift of 25% to account for employee benefits costs.	25% of salaries
Evaluation Period	5 to 60 years – depending on investment lifecycle/impacts	15 years

Capital Costs

Capital costs typically include all costs associated with the construction and acquisition of the infrastructure, revenue collection, vehicles, and maintenance facilities. Capital costs are fixed one-time costs incurred during the implementation of the investment and, for this IBC, are estimated at a very high-level for each of the proposed investment option.

Because the proposed transit investment options recommend implementing intercity bus services that use existing transit hubs and on-street passenger pick up locations, there are no major infrastructure costs, and this IBC only includes the cost of purchasing motorcoach vehicles.

Intercity Bus Vehicle Type

Commuter Buses operate within fixed-route systems that primarily connect major urban centres and operates with at least five miles of continuous close-door service. This service typical operates using motorcoaches (over-the-road buses), and usually feature peaking scheduling, multiple-trip tickets, and limited stops in the central city.

To provide a viable alternative to private vehicles, the vehicle used for intercity transit services should be a comfortable experience for daily commuters, much like the buses that are used by GO Transit services. Although city transit buses were found to be a lower cost compared to motorcoaches, they only include basic seating, but do not provide for a comfortable experience for long-distance travel. Coach buses are designed and built for comfortable transportation for longer journeys, which is ideal for intercity commuting.

Motor Coach Industries (MCI) is a subsidiary of NFI Group Inc, and a leading independent bus and coach manufacturer. The MCI D4500 clean diesel commuter coaches is widely used motorcoach sold in Canada and the United States (MCI, 2021). The MCI D4500 model is also primarily used by GO Transit since 2005 to present day.

Bus Vehicle Fuel Type

Diesel buses are the most common type of transit buses in North America. However, the introduction of climate change policies at all levels of government have led to Ontario regional municipalities gradually transitioning their transit fleet to hybrid or fully electric vehicles. Although there has been a growing interest in transitioning fleets to zero-emissions buses (ZEBs), these vehicles require significant investment in both ZEB vehicle technology and related charging infrastructure to support daily operations (Marcon, 2016). Additionally, although battery-electric buses (BEBs) generate lower long-term operating and maintenance costs, they have a shorter operating range than diesel buses, and therefore would require more frequent charging breaks between bus routes and/or require more BEBs in operation to provide the same level of service equivalent to diesel buses, resulting in higher capital costs (Marcon, 2016).

Hydrogen fuel cell electric buses (FCEBs) have also been gaining traction in the ZEB market with several pilot programs implemented by transit agencies across Canada. Hydrogen fuel has the potential to provide similar performance levels as diesel buses, however the energy is currently sourced from the production of methane from natural gas, which creates carbon dioxide as a by-product, and results in greater greenhouse gas emissions compared to diesel fuel. More importantly, the lack of existing delivery infrastructure for hydrogen fuel would result in many obstacles to access the fuel source for day-to-day operations (Quarles, Kockelman, & Mohamed, 2020).

Diesel-fueled bus technology has improved in recent years which have resulted in significantly lower GHG emissions compared to previous models. Although diesel-fuel buses generate carbon emissions, they are a significantly more sustainable option over private vehicle travel. According to United Motorcoach Association, motorcoaches are leaders in fuel conservation. Across the United States, motorcoaches have the lowest carbon footprint among 12 different modes of transportation including all types of automobiles, rail, and other bus models (UMA, 2019). Moreover, a study by the American Bus Association found that new motorcoach models manufactured in 2017 or later use the least amount of energy and produce the lowest carbon dioxide emissions per passenger mile of any of the transportation modes analyzed (ABA Foundation, 2019).

The overall goal of the high-frequency bus investment is to improve public transit options and reduce dependence on private vehicles, thereby potentially reducing GHG emissions from daily intercity commuting. Although there are many long-term benefits of using ZEBs, the initial capital and infrastructure costs are considerably high and would require extensive technical studies to determine program feasibility, making it difficult to implement. Therefore, it is recommended that the proposed investment consist of clean diesel bus technology. This would ensure that the overall cost of the investment remains low to ensure its implementation, while also ensuring fares remain low to encourage adoption of the new service. Moreover, potential GHG emissions reductions can be achieved through improved bus propulsion technology as well as reductions in private vehicle travel among intercity commuters.

Estimating Capital Costs

Based on the research conducted, recorded transaction of MCI D4500 coach bus purchases have been limited and often out-dated. The following **Table 54** lists the estimated CAD dollar values ($2024) of this specific model available online. The USD values were converted to CAD using the exchange rate of the purchase year (BOC, 2024), and then accounted for 2024 inflation rate (BOC, 2024). As shown, the typical cost of an MCI D4500 motorcoach can vary significantly depending on contract details. Therefore, an estimated value of CAD **$900,000** per bus is used for this assessment.

TABLE 54: ESTIMATED COSTS OF MCDI D4500 MOTORCOACHES

Transit Agency	Purchase Year	Estimated Cost of 1 Bus (CAD, $2024)
Metrolinx[1]	2012	$650,000
Yosemite Area Regional Transportation System (YARTS)[2]	2015	$980,000
New Jersey Transit[3]	2015	$830,000
YARTS[4]	2022	$1,200,000
Atlanta-Region Transit Link Authority (ATL Group)[5]	2022	$900,000 (2009 model)

According to Infrastructure Canada, the average expected useful life of new publicly owned public transit diesel buses in Ontario is 12 years (Infrastructure Canada, 2022). This is the typical service-life policy for transit agencies across North America. The U.S. Federal Transit Administration (FTA) also recommends 12 years or 500,000 miles (whichever comes first) for Heavy-Duty Large Buses 35 to 48 ft long. However, the actual timing of vehicle retirement can occur 1-4 years after the required minimum, depending on a range of factors (USDOT-FTA, 2007).

Table 55 presents a summary of annualized capital costs for each of the proposed investment options, assuming the cost of one bus, including vehicle customization, will be CAD $900,000. It is also assumed that buses will reach their life expectancy after 15 years of operation, at which point investment in new vehicles will be required.

TABLE 55: ANNUALIZED CAPITAL COSTS FOR PROPOSED IBS OPTIONS

	Option 1	Option 2	Option 3
Total Vehicles	8	16	22
Vehicle Capital Costs ($900,000/bus)	$7,200,000	$14,400,000	$19,800,000
Maturity (years)	15	15	15
Interest Rate	5.78%	5.78%	5.78%
Annualized Capital Costs	**$730,710**	**$1,461,425**	**$2,009,460**

Operation and Maintenance Costs

Once the transport investment is operational, there will be some level of costs associated with operating and maintaining it. In broad terms, maintenance covers the day-to-day requirements to maintain services.

O&M costs typically include:

- Staff – drivers, guards, station staff, maintenance, management.
- Materials and supplies – cleaning, maintenance, office.
- Energy – diesel, electricity, or other fuel sources.
  (Metrolinx, 2021b)

[1] Metrolinx Annual Report 2011-2012
[2] YARTS-Owned Fleet and Specifications
[3] The Free Press - MCI Inks Huge Deal with New Jersey Transit
[4] YARTS-MCAG – Press Release
[5] ATL Group Transit Asset Management Plan 2022-2026

Maintenance Costs

To determine potential maintenance costs, a variety of studies were evaluated to understand the general trends that affect maintenance costs. First, maintenance costs are dependent on multiple variables including vehicle age, bus type, operating environments, fleet maintenance practices and several other factors. Additionally, planned, and unplanned maintenance and repair costs do not occur linearly for individual vehicles and fluctuate by year and type of repairs made. Additionally, most transit buses typically have mid-life costs that require rebuilding or replacing major components within the 12-14 years they operate. In 2006, the cost of a mid-life overhaul cost approximately $110,000, which is roughly $162,000 in 2024 (USDOT-FTA, 2007). Over time, the per-km operating and maintenance cost (O&M) tend to increase and bus replacement becomes more cost effective than continuing to make repairs.

The Yosemite Area Regional Transportation System (YARTS) is a public transit agency that provides daily fixed-route service in the Yosemite region, providing an alternative to driving to over 120,000 riders per year. YARTS operates a fleet of 10 MCI D4500 coach buses, with each bus incurring an average of 38,700 miles (62,300 km) per year and spends approximately USD $3 million per year on operating costs (YARTS, 2021), which is estimated to $300,000 per bus per year. However, this figure includes variety of expenses such as training, office and administrative expenses, legal services, and more (YARTS, 2021). Alternatively, a more thorough report on annual costs for preventative bus maintenance inspections for the YART fleet estimates approximately USD $20,000 per bus (YARTS, 2018).

Table 56 below provides a summary of the studies that were reviewed to determine annual maintenance costs per bus, including approximately Canadian dollar values. As shown, US-based studies have typically estimated maintenance cost figures on a per mile basis when analyzing overall operating and fuel consumption costs of diesel buses compared to other fuel alternatives. Alternatively, a report comparing New York City Transit's current fleet of buses to electric buses estimated annual maintenance costs of $35,000 per bus.

TABLE 56: STUDIES REVIEWED FOR ANNUAL MAINTENANCE COSTS OF MOTORCOACHES

Study	Cost Estimate (USD)	Description
(Tong, Hendrickson, Biehler, Jaramillo, & Seki, 2017)	$0.85/mile (CAD $0.72/km)	Estimating life cycle ownership costs and environmental externalities caused by GHGs and air pollutants emitted from life cycle bus operations.
(Quarles, Kockelman, & Mohamed, 2020)	$0.631/mile (CAD $0.54/km)	Assessment of the costs and benefits of electrifying bus transit fleets compared to diesel buses.
(Holland, Mansur, Muller, & Yates, 2021)	$0.94/mile (CAD $0.80/km)	Assessment of the environmental cost and benefits of using electric buses compared to diesel or CNG for urban transit.
(Aber, 2016)	$35,000 /bus/year (CAD $48,000)	Costs include maintenance of the internal combustion engine and the associated powertrain including oil and filter changes, changing tires and brake pads, and other wear and tear items plus the occasional large break repair.

Based on these findings, the average maintenance cost of $0.70/km is over 55% higher compared to a fixed amount of $50,000 per bus per year. This figure is also comparable to annual maintenance costs reported by YARTS operating the same bus models. Additionally, because the intercity bus services will be commuting over a relatively shorter distance compared to traditional long-distance commuter buses, it is assumed that maintenance costs will initially be

on the lower end. Therefore, a standard rate of $50,000 per bus per year was applied to determine annual operating costs for this assessment. The following **Table 57** estimates the annual maintenance costs for each of the proposed investment options.

TABLE 57: ESTIMATED ANNUAL MAINTENANCE COSTS FOR IBS OPTIONS

	Option 1	Option 2	Option 3
Number of Buses	8	16	22
Annual Maintenance Costs ($50,000 per bus)	$400,000	$800,000	$1,100,000

Fuel Costs

The US Motorcoach Association (UMA) estimates that the average fuel efficiency of a motorcoach is 6.1 MPG (UMA, 2019), while the ABA study estimates approximately 6.41 MPG, based on an average passenger load of 44 people (ABA Foundation, 2019). A more recent study estimates 5.58 MPG for motorcoaches (TTI, 2023). Therefore, an average of 6 MPG is used to determine fuel costs for this study, which is roughly 2.55 km/L (or 0.392 L/km).

Table 58 and **Table 59** provides the fuel cost figures used for the assessment and a summary of the estimated annual fuel costs for each of the proposed investment options.

TABLE 58: FUEL COST VALUES FOR MCI D4500

Bus Model	MCI D4500
Fuel Tank Size[6]	620 L
Fuel Type	Diesel
Fuel Economy	0.4 L/km
Fuel Cost[7]	$1.62 / L*
Fuel Cost per KM	$0.65
*** June 24th, 2024**	

TABLE 59: SUMMARY OF ANNUAL FUEL COST ASSESSMENT FOR IBS OPTIONS

	Option 1	Option 2	Option 3
Number of Buses	8	16	22
Round Trip Distance (km)	55	105	88
Fuel Consumption (l/km)	0.4	0.4	0.4
Fuel Cost ($/km)	0.65	0.65	0.62
Fuel Cost – 1 Trip	$35.64	$68	$57
Daily VKT	2,376	4,576	7,848
Annual VKT	570,240	1,098,240	1,883,520
Daily Fuel Cost	$1,540	$2,970	$5,085
Annual Fuel Cost	**$370,000**	**$711,700**	**$1,220,500**

[6] MCI D4500 and D4000 Commuter Coach Specification Sheet
[7] Ontario Ministry of Energy – Motor Fuel Prices

Labour Costs

According to the Government of Canada Job Bank, Transit Operators within the Kitchener-Waterloo-Barrie Region can earn between $17.50 to $33.00 per hour (Government of Canada, 2024). Similarly, the 2021 Ontario Urban Transit Fact Book, estimates wage rates for operators was $27.68 per hour (CUTA, 2021). An hourly wage of $30.00 per hour is used to estimate potential labour costs for each of the proposed investment options. Additionally, the Metrolinx Business Case Manual assumes estimated salaries should include an uplift of 25% to account for employee benefits such as healthcare costs (Metrolinx, 2021b).

Table 60 summarizes the figures used to estimate annual labour costs for the proposed IBS investment options.

TABLE 60: ANNUAL LABOUR COSTS FOR IBS OPTIONS

	Option 1	Option 2	Option 3
Total On-Peak Hours	8	8	8
Buses in Operation (On-Peak)	8	16	22
Off-Peak Hours	10	10	10
Buses in Operation (Off-Peak)	4	8	12
Hourly Wage	$30.00	$30.00	$30.00
Estimated Annual Wages	$748,800	$1,497,600	$2,131,200
Total Wages + Employee Benefits (25%)	**$936,000**	**$1,872,000**	**$2,664,000**

Summary of Annual Operating Costs

Table 61 below summarizes the annual operating and maintenance costs that have been evaluated for the Financial Case and presents a total annual operating cost for each of the proposed options, rounded to the nearest thousand.

TABLE 61: SUMMARY OF ANNUAL OPERATING COSTS FOR IBS OPTIONS

	Option 1	Option 2	Option 3
Daily Vehicles	8	16	22
Annualized Capital Costs	$730,710	$1,461,425	$2,009,460
Annual Maintenance Costs	$400,000	$800,000	$1,100,000
Annual Fuel Costs	$370,000	$711,660	$1,220,520
Annual Labour Costs	$936,000	$1,872,000	$2,664,000
Total Annual Operating Costs	**$2,436,230**	**$4,845,100**	**$6,994,000**

Operating Revenues

To be considered viable for potential investment, the proposed options must generate sufficient revenue to cover annual operating expenses. Since there are no infrastructure investments that could generate revenue in other ways, the primary method of generating revenue is through passenger fares.

The motorcoach bus studies conducted by UMA and ABA estimates that one motorcoach carries an average of 36 to 43 people (ABA Foundation, 2019) (UMA, 2019). To assess the potential annual revenue that can be generated for each of the proposed options, the study assumes a 75% annual passenger capacity rate.

Additionally, as shown in the Generalized Journey Cost assessment (Economic Case), a flat rate of $5 was estimated for the proposed investment options. This dollar value was proposed as a more competitive rate compared to existing GO Transit services, while higher than the local transit rates due to the higher standard of service. As a result, a potential intercity commuter that commutes 5 days per week would spend approximately $200 per month on travel costs, in addition to any local transit connections that is required.

With a flat rate of $5 per passenger trip, each of the proposed investment options can generate sufficient revenue to maintain annual operating costs without the need for additional subsidies.

To further improve the competitive advantage of the transit service over private vehicle travel, and increase transit accessibility and equity opportunities, passenger rates can be further reduced to $3.50 per passenger trip. Lower passenger fares may attract more riders and offer a variety of social and economic benefits, and with sufficient ridership, operators will be able to cover the annual operating costs without the need for additional subsidies.

Table 62 presents the estimated passenger rate that could potentially cover annual operating expenses for each Option.

TABLE 62: ESTIMATED OPERATING REVENUES FOR PROPOSED IBS OPTIONS

	Option 1	Option 2	Option 3
Number of Buses	8	16	22
Annual Operating Costs	$2,436,230	$4,845,100	$6,994,000
Total Annual Passenger Capacity	1,161,600	2,323,200	3,537,600
Average Annual Passengers (75% Capacity)	871,200	1,742,400	2,653,200
Minimum Passenger Fare Required	**$2.80**	**$2.80**	**$2.60**
Farebox Revenue Assessment			
Proposed Competitive Rate – $3.50	**$3,049,200**	**$6,098,400**	**$9,286,200**
Revenue after Operating Costs	$631,448	$1,253,316	$2,292,220
Proposed Flat Rate – $5	**$4,356,000**	**$8,712,000**	**$13,266,000**
Net Revenue after Operating Costs	$1,919,770	$3,866,916	$6,272,020

Financial Case – Investment Options Summary Chart

The Financial Case assessed the financial requirements to successfully deliver the proposed transit investment options and included estimates of capital costs, operating and maintenance costs, and labour costs. The goal of the Financial Case is to communicate the overall financial impact of the investment.

The MCI D4500 clean diesel motorcoach bus model was selected as the preferred vehicle for the investment in order to provide a comfortable experience for daily commuters. Although these models typically require higher capital and daily operating costs compared to city transit buses, it was determined that a comfortable commuting experience can reduced perceived journey time and costs compared to private vehicle travel.

Table 63 below summarizes the estimated capital, operations, and maintenance costs, as well as the total annual costs for each of the proposed options and per passenger rate required to cover annual operating costs. As anticipated, Option 1 requires the lowest annual operating costs due to its limited service and route coverage compared to Options 2 and 3. Alternatively, Option 3 has the greatest annual operating expense as it requires 22 motorcoaches in operation per day, however, because of the larger service route and more station stops, the annual passenger capacity is significantly higher than Options 1 and 2, and therefore requires a lower passenger rate to cover operating expenses. As a result, Option 3 is more likely to generate ridership and maintain high service levels compared to the other Options.

TABLE 63: SUMMARY OF FINANCIAL CASE ASSESSMENTS FOR PROPOSED IBS OPTIONS

	Option 1	Option 2	Option 3
Number of Buses	8	16	22
Capital Costs - Vehicles	$7,200,000	$14,400,000	$19,800,000
Bus Model	MCI D4500	MCI D4500	MCI D4500
Fuel Type	Diesel	Diesel	Diesel
Fuel Economy	0.4 l/km	0.4 l/km	0.4 l/km
Annual Operating Costs			
Annualized Capital Costs	$730,710	$1,461,425	$2,009,460
Annual Maintenance Costs	$400,000	$800,000	$1,100,000
Annual Fuel Costs	$370,000	$711,660	$1,220,520
Annual Labour Costs	$936,000	$1,872,000	$2,664,000
Total Annual Costs	**$2,436,230**	**$4,845,100**	**$6,994,000**
Passenger Rate Assessment			
Total Annual Passenger Capacity	1,161,600	2,323,200	3,537,600
Average Annual Passengers (75% Capacity)	871,200	1,742,400	2,653,200
Minimum Passenger Fare Required	**$2.80**	**$2.80**	**$2.65**
Farebox Revenue Assessment			
Proposed Competitive Rate – $3.50	**$3,049,200**	**$6,098,400**	**$9,286,200**
Revenue after Operating Costs	$631,448	$1,253,316	$2,292,220
Proposed Flat Rate – $5	**$4,356,000**	**$8,712,000**	**$13,266,000**
Revenue after Operating Costs	$1,919,770	$3,866,916	$6,272,020

Deliverability and Operations Case

In the Metrolinx Business Case Framework, the Deliverability and Operations Case typically consists of technical and financial analyses for delivering the project from original concept through to planning, design, environmental assessment, stakeholder engagement, procurement, construction, and operations. However, for the purposes of this IBC, this is section will instead review high-level delivery strategies and considerations such as transit funding, regional policy and programs, and transit service delivery options.

The following are key assumptions that have been established through previous sections:

- The intercity bus service (IBS) will require purchasing a fleet of motorcoach buses that are operated with diesel-fuel efficient vehicle technology.
- IBS primary and secondary stops are located within urban growth areas, major transit station areas, and near major employment areas, with no additional stops along the route.
- Passenger fares should be a maximum of $5 or less to achieve journey cost savings and provide a viable alternative to private vehicles.

Delivery Strategy

To ensure intercity transit service investments are successful, it is essential that the two host regional municipalities support and cooperate in advancing the project, including future planning, management, delivery, and operations of the system, and for ownership and maintenance of certain project components. For instance, municipalities can support the project by implementing dedicated bus lanes within their respective regions (where possible) to improve travel times that could lead to an increase in passenger ridership and generate revenue. Host municipalities may also need to collaborate to obtain approvals for federal and provincial funding, such as the ICIP.

Transit Funding Opportunities

Given the inter-regional nature of the proposed investment options, it is assumed that provincial funding will be required, along with Metrolinx oversight. Therefore, the project would require Metrolinx's governance and approvals process as well as cooperation and agreement amongst the host municipalities to advance the project.

Federal or provincial funding resources can be accessed to procure buses for the proposed transit service. However, the more significant challenge will be to obtain sufficient funding to support operating costs for the first few years of service. Limited federal and provincial government funding to support ongoing operating costs have been a major barrier for municipal transit agencies, especially since the considerable decline in ridership during the pandemic resulting in reduced rates of cost recovery through fares (CUTA, 2024).

Provincial funding for municipal transit operating and service improvement is primarily delivered through the Gas Tax program. As shown in **Figure 46** below, the Gas Tax Program funding allocation for Waterloo Region has previously been close to $12 million, however this has increased to nearly $14 million for the 2023-2024 fiscal year. The City of Guelph has received approximately $3 million over the past three from the Gas Tax program (Ontario Newsroom, 2022) (Ontario Newsroom, 2023) (Ontario Newsroom, 2024). Although this is a potential source that can be used to fund annual operating costs, it is likely that both regions depend on these funds to manage existing services within their municipal boundaries. Moreover, while the intercity service has the potential to increase ridership, funding allocation is based on municipal boundaries and is not likely to increase to support intercity transit services.

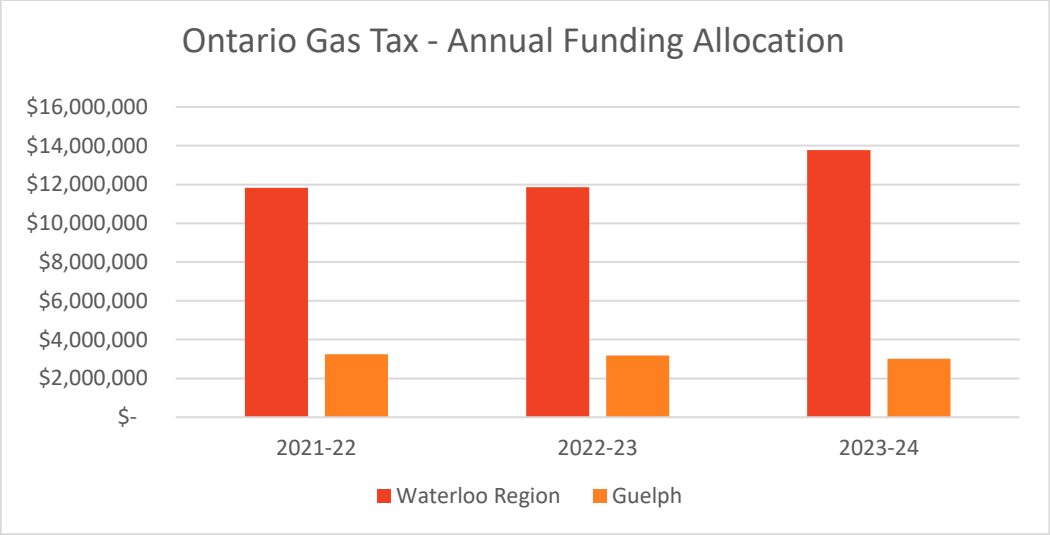


FIGURE 46: GAS TAX FUNDING ALLOCATION FOR WATERLOO REGION AND GUELPH, 2021-2024

Regional Policy and Programs

The primary goal of the proposed investment options is to provide alternative mode options for intercity commuters. There are regionally and provincially significant major employment areas that are assumed to attract a large share of commuters between the two regions. Both Waterloo Region and City of Guelph can seek opportunities to collaborate with major employers in the region to identify where their employees are commuting from. Regional governments can work with organizations to establish a workplace program that subsidizes the cost of the intercity bus service for their employees. Employees can benefit from reduced journey costs while minimizing private vehicle dependency. Reducing journey costs for employees can also in turn increase business productivity and lead to other agglomeration benefits for the employer.

The Waterloo Region currently promotes a workplace incentive program, TravelWise, that encourages employees to commute via low carbon transport modes such as transit, cycling, walking, or carpooling, as opposed to driving alone (Waterloo Region, 2024). The program engages with employers in the region that are looking for opportunities to enhance their corporate sustainability initiatives. When an organization becomes a TravelWise member, their employees can benefit from the Corporate Transit Pass Discount Program, as well as other services available through the program. The region can use this platform to promote the new intercity transit service for employees commuting to Guelph. Alternatively, the two regions can collaborate to develop a new program similar to TravelWise, and encourage participation of major employers in both regions, so that their employees can benefit from the Corporate Transit Pass Discount Program, or other transit discounts that can generate interest in the new intercity bus services.

Lastly, due to the high volume of intercity commuters and subsequent economic interdependency between the two regions, intercity transit services can play a vital role in supporting transportation and climate policies. Therefore, both regions should consider updating existing transportation and climate action plans to ensure that intercity transit services, specifically between Waterloo Region and Wellington County, are included as part of the region's long-term transportation and climate objectives.

Transit Service Delivery Options

The transit service provider for the proposed investment options would be responsible for the operations and maintenance of intercity services. Intercity bus services could be delivered through network and service expansion of the existing transit agencies in the region. Conversely, a unique third-party operator could be contracted to operate the service, while integrating fare policies with the existing agencies, and contracted service standards. There are three potential options for providing intercity transit services.

Metrolinx

As the primary intercity bus service provider across the GGH, Metrolinx would be able to implement services without requiring significant capital costs for new buses and maintenance facilities. The existing GO Bus services can be expanded or revised to implement the proposed intercity transit services including high-frequency services during peak hours. Metrolinx already operates the proposed motorcoach bus models and may have existing vehicles available to implement the services. This option would be best suited for implementing Option 2 or Option 3 type services, since they require cross regional services that Metrolinx typically operates.

A potential challenge for Metrolinx would be to implement a competitive rate for commuters. Currently GO Transit fees between the two are between $7 to 8, which would need to be reduced to generate journey cost savings for both auto and transit users. However, in order to provide competitive rates for this service, the transit agency may be required to reduce rates of other services in the region, which would impact their existing revenue models.

Regional Transit

A collaborative effort between regional transit agencies can facilitate the delivery of the proposed intercity bus services. Both Grand River Transit and Guelph Transit can share the responsibility over operations and maintenance, as well as the operations cost to implement the service. Each transit agency can procure buses for the new service and launch services from their respective regions. Additionally, the transit agencies can use their existing bus maintenance facilities and other resources to implement and maintain services. This option would be best suited for implementing Option 1 or Option 2 type services where service routes are direct, and each agency would be required to purchase 3 to 7 transit buses.

One of the benefits of this option is that by extending existing transit services, transit agencies can maintain a relatively low passenger fare for transit users by matching their existing fare structures or implementing a one-fare system to allow for easy transition between local and intercity transit services. This can significantly improve equity opportunities for low-income groups and enable them to reach cross-regional employment opportunities at a much lower cost.

Alternatively, one of the drawbacks of this option is that municipal transit agencies typically operate city buses that do not offer the same level of comfort and convenience as motorcoach buses. This may impact how commuters perceive the service and potentially hinder opportunities to increase transit mode share among intercity commuters.

Intercity Bus Service Contracts

The provincial government can consider engaging in service contracts with private bus operators to provide intercity bus services and fill service gaps between the two regions. Governments provide funding and oversight, while private companies manage the day-to-day operations. Intercity Bus Service Contracts can potentially require lower costs compared to alternative options, while creating a sense of ownership for governments. Lastly, because the proposed intercity bus service options are unique from existing transit services, it is recommended that governments introduce a new service with its own unique branding that allows it to stand out from local services (Mcleod, 2022). This option would be best suited for implementing Option 3 type services which requires a larger fleet of buses and more complex operating schedules to support high-frequency services across the Waterloo-Wellington regions.

While existing private IBS companies primarily service major economic regions, government-contracted services take a different approach to service planning and are able to implement service routes based on regional commuting trends or areas currently underserved by transit. Several U.S. states have been filling intercity service gaps by contracting private companies to provide branded, subsidized intercity bus services. The following are some examples of state-contracted services to support intercity public transit needs.

Bustang - Colorado

To transport long-distance commuters to and from Denver, the Colorado Department of Transportation funds and manages "Bustang," an interregional express bus service. Bustang, operated by a contracted coach bus company, runs during peak commuting hours Monday to Friday along busy highway corridors. The bus fleet is comprised of 13 coach buses servicing three main routes to connect the state's largest cities as well as other intercity routes connecting cities and major destinations (**Figure 47**) (Byars, Wei, & Handy, 2017).

Bustang was introduced in 2015 and by its second year of operations, it achieved a 50% increase in ridership, followed by a 25% increase in year three and 23% increase in 2018-2019. Like all transit services, COVID had devastated Bustang's performance as CDOT had temporarily discontinued services for the first three months of the pandemic to discourage travel. To help Bustang return to pre-pandemic performance levels, CDOT funding a three-year, $73 million pilot expansion program that aims to dramatically expand service while covering funding gaps from pandemic-related ridership challenges (Mcleod, 2022).



FIGURE 47: MAP OF BUSTANG INTERCITY EXPRESS BUS SERVICE ROUTES (MURRAY, 2019)

The Breeze - Virginia

In 2017, the Virginia Department of Rail and Public Transportation (DRPT) launched "the Breeze," a four-line intercity bus system connecting major cities, universities, and other major destinations through the commonwealth and Washington D.C. The service is administered by the Virginia DRPT and operated under contract by Dillon's Bus Service, a Maryland-based subsidiary of Coach USA (Mcleod, 2022).



FIGURE 48: VIRGINIA BREEZE BUS LINES ROUTE MAP (MCLEOD, 2022)

Unlike the Bustang services in Colorado, the Virginia Breeze intercity bus service only runs one daily bus in each direction at higher fare ranges. After one year of operations, the service achieved higher-than-expected ridership and farebox recovery, logging an 81% farebox recovery rate for operations. Moreover, due to the low annual operating costs, Virginia was able to quickly quadruple the number of lines in its system since in launched.

Travel Washington – Washington State

The Washington State Department (WSDOT) developed the first public/private partnership model in the U.S. for a rural intercity bus program, called Travel Washington. Today, the agency operates four intercity bus routes which connect rural parts of the state to the larger statewide intercity transportation networks (WSDOT, 2019).

WSDOT uses request for proposals to contract with private for-profit companies to operate the Travel Washington routes. Each of the four intercity bus lines operates on a four-year contract with WSDOT. The highest performing route is the Dungeness Line which provides connections between major cities such as Port Angeles and Seattle, and Sea-Tac International Airport. The route also provides links to major transit connections including Greyhound, Amtrack, and state ferries to Seattle and Victoria, B.C. Because the route serves a higher income area, has a major airport as the endpoint, allows riders to avoid transfers to/from ferries, and avoids urban congestion, the Dungeness line has a higher ridership, costs, revenues, and farebox recover compared to the other three lines (WSDOT, 2019). Overall, the Travel Washington program addresses unmet needs in areas where the private market does not provide bus services.

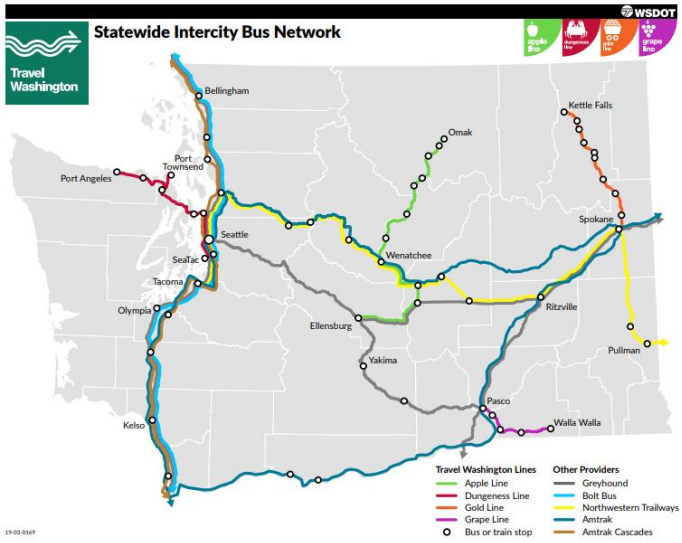


FIGURE 49: TRAVEL WASHINGTON INTERCITY BUS SERVICE ROUTES (WSDOT, 2019)

Project Delivery - Opportunities and Risks

Based on the high-level assessments of the investment options and proposed delivery strategies, this section discusses some key areas of opportunities and risks that require further consideration as the project develops. Opportunities emphasize areas that require further analysis to clarify the range of expected impacts, while Risks explore potential project risks that governments should be cautious of and attempt to mitigate risks accordingly.

Opportunities

The study has shown that there is a distinctive interregional dependency between Waterloo Region and Wellington County, and there is an opportunity for the two regions to collaborate on an intercity transit service project and address key transportation and climate related goals. Depending on the approach used to implement the transit service, it is recommended that the governance structure of the project, including roles and responsibilities, are clearly defined to ensure project success.

Additionally, there are opportunities for additional studies to determine intercity commuting trends and design optimal routes and bus stop options that can offer an improved service with higher financial performance. Furthermore, passenger fare estimates conducted in this study were based on high-level estimated annual operations cost and 75% passenger ridership. However, a more detailed study that include public transit investment modelling inputs are required to estimate annual operations cost and subsequent passenger rates.

Lastly, To implement a comprehensive intercity bus service that has the potential to provide a viable alternative to private vehicle travel, will require significant public investment. A comprehensive service will also require greater resources than is currently available through existing transit agencies. Therefore, it is recommended that the Ontario government and Metrolinx explore opportunities to work with private companies and establish intercity bus service contracts. Intercity bus service contracts have not yet been explored in Ontario and there is an opportunity to implement a unique service while minimizing government subsidy requirements to support ongoing operating costs. Introducing a new branded service can help to generate enthusiasm amongst commuters and employers as it aims to improve connections specifically for these groups. The following section summarizes key recommendations for successful implementation of IBS contracts.

Risks

Due to the entrenched automobile dependency across the two regions and currently lack of intercity transit services, it is likely that the project will take time to attract passenger traffic and generate sufficient farebox revenues to cover operating costs and ensure project viability. Therefore, it is important to consider the high financial risks associated with implementing a new service that is not currently available in the region. Moreover, although standard solutions to addressing the revenue gaps is to increase transit fares, it is critical that fares remain lower than GO Transit services to promote equity benefits and increase employment accessibility opportunities. As a result, the project is likely to be dependent on government operating subsidies in order to maintain low fares and achieve the individual and societal benefits discussed in previous cases.

Although it is recommended that governments explore contracting private bus companies to fill intercity service gaps, they can also present challenges and significant risk for governments if not approached correctly. Publicly subsidized

transit services prioritize high-quality, affordable, equitable, sustainable, and safe transit access, while private companies strive for profitability, which is a fundamentally different operating model.

In order to unlock its potential, public agencies must strongly align the private sector's profit motive with the public sector's goals by using financial incentives in contracts and market competition during the bidding process (Lotshaw, Lewis, Bragdon, & Accuardi, 2017). Contracting should be pursued strategically as a means to further the public interest and transit service goals, without assuming that private sector companies will uphold these interests and goals. Government agencies that engage in service contracts must clearly articulate their goals and set specific performance standards for private contractors to meet in order to profit from public investments (Lotshaw, Lewis, Bragdon, & Accuardi, 2017). Contracting is not a new concept for Ontario governments and transit agencies, as a large share of transportation infrastructure projects are delivered by private-sector contractors working for the government. However, intercity bus service contracts may require a different approach that require re-evaluating transit agency responsibilities (Lotshaw, Lewis, Bragdon, & Accuardi, 2017).

Table 64 summarizes the potential strategies for implementing the proposed intercity bus transit services.

TABLE 64 - SUMMARY OF DELIVERABILITY AND OPERATIONS CASE ASSESSMENT FOR IBS OPTIONS

Transit Service Provider	Transit Service Delivery Strategy	Advantages/Disadvantages
Regional Transit Agencies	Grand River Transit and Guelph Transit agencies collaborate to implement intercity bus services between the two regions. Each transit agency can procure buses and launch services from their respective regions. This option would be best suited for implementing Option 1 or Option 2 type services where service routes are direct, and each agency would be required to purchase 3 to 7 transit buses.	By extending existing transit services, transit agencies can maintain a relatively low passenger fare for transit users by matching their existing fare structure. Municipal transit agencies typically operate city buses that do not offer the same level of comfort and convenience as motorcoach buses.
Metrolinx	Metrolinx to expand or revise existing GO Bus services to support high-frequency service requirements. This option would be best suited for implementing Option 2 or Option 3 type services, since they require cross regional services that Metrolinx typically operates.	Metrolinx could implement intercity services without requiring significant capital costs for new buses and maintenance facilities. In order to provide competitive rates for this service, Metrolinx may be required to reduce rates of other services in the region, which would impact their existing revenue models.
Private Bus Companies	Provincial government engages in service contracts with private bus companies to provide intercity bus services and fill service gaps between the two regions. Governments provide funding and oversight, while private companies manage the day-to-day operations. This option would be best suited for implementing Option 3 type services which requires a larger fleet of buses and more complex operating schedules to support high-frequency services.	Introducing a new branded intercity bus service can help to generate enthusiasm amongst commuters and employers as it aims to improve connections specifically for these groups. Publicly subsidized transit services prioritize high-quality, affordable, equitable, sustainable, and safe transit access, while private companies strive for profitability, which is a fundamentally different operating model.

Business Case Summary

The Ontario government is currently investing in expanding Highway 7 due support the growth in commuters between Waterloo Region and Wellington County. As discussed previously, highway expansion inherently leads to additional vehicles on the road, causing increases in external costs such as downstream congestion, parking demand, traffic risk, and pollution emissions. Moreover, existing intercity transit services pose considerable barriers, making commuting by public transit virtually impossible. Although GO Rail transit services provide fast journey times between Kitchener and Guelph during morning and evening peak hours, remaining services are severely limited and primarily benefit university students commuting between universities in the region.

To address the vast population of intercity commuters between the two neighbouring regions, three options were proposed for intercity bus services. Each option presents unique transit service route strategies that establishes the groundwork for a more comprehensive assessment in the design and development phase. Based on existing commuting data, the options attempt to connect major nodes between the cities of Kitchener, Cambridge, and Guelph.

From the Regional Analysis it was found that the largest labour markets in the region are sales and service occupations, followed by trades, transport, and equipment operators. It can be assumed that industry operations and subsequent employee commuting trends may not follow the typical 9AM to 5PM working hours and instead vary throughout the day. For this reason, the proposed investment option offers high-frequency services during rush hour periods but also continues to operate consistently throughout the day to support intercity commuters that work outside of these hours.

Option 1: Kitchener – Guelph

Option 1 presented the most basic service that can be employed to initiate intercity bus service connections. The route was selected to support the large volume of intercity commuters between Kitchener and Guelph, while also connecting passengers to local transit services to reach their final destinations. Overall, the option has the lowest project cost but is not expected to generate significant economic and societal benefits due to the limited route service options.

Option 2: Kitchener – Guelph, Cambridge – Guelph

Option 2 builds on Option 1 proposes a second direct service between Cambridge and Guelph. The two services operate independently and do not interact with one another. Because the route length and service frequency are the same, both routes require similar annual operating expenses. However, because Option 2 doubles the service capacity, it has the potential to generate sufficient fare revenues to ensure the project is a viable investment.

Option 3: Kitchener – Cambridge – Guelph

Option 3 proposes a more comprehensive service that connects all three cities as well as significant employment areas. The goal of the intercity bus service is to support intercity commuters and, as such, Option 3 provides direct services to major employment areas and minimize journey times compared to the previous options. To maintain the high frequency service during peak hours and provide services in both directions, this investment option requires a larger number of vehicles in operation throughout the day, resulting in higher operating costs. However, due to high volume of buses and comprehensive service, this option can serve a large volume of passengers per hour and generate considerable revenues to ensure the project is viable and self-sufficient.

IBC - Key Findings

The key findings from each of the four cases are presented in the Business Case Summary Chart. Based on the analysis conducted in each of the cases, all Options show a robust case for investment and demonstrate social, environmental, and economic benefits for introducing intercity services between Waterloo Region and Wellington County.

Strategic Case

All Options have the potential to support regional strategic goals and outcomes for transportation and economic development. However, it was found that Option 3 has greater potential to achieve regional transportation and climate goals more effectively, as well as the Metrolinx Regional Transit Service Goals:

- Strong Connections
- Complete Travel Experiences
- Healthy and Sustainable Communities

Options 1 and 2 can introduce an alternative to transit users and support equity benefits, especially for those who do not own a private vehicle. The high-frequency services connect major urban areas, offering a significant improvement to existing transit options between the two regions. However, because these services only connect major urban nodes, passengers will need to connect to local transit services to reach their final destinations.

Alternatively, Option 3 has greater potential to connect people to employment areas and increase economic opportunities for people between the two regions. The high-frequency service connects major urban and employment areas which can reduce transit travel time and provide a viable alternative to private vehicles. This can result in increased public transit use, while slowing the growth in private vehicle use among intercity commuters.

Economic Case

The Generalized Journey Cost assessment found that Option 2 and Option 3 have the greatest potential to reduce journey time and costs for existing auto and transit users. Moreover, Option 3 presents additional journey time and cost savings for individuals commuting to and from major employment areas in Guelph.

Environment and Social Cost assessments found that all Options will emit substantially lower annual GHG emissions compared private vehicles. Moreover, if these services can prevent just 2,500 individuals from commuting by private vehicles, it can significantly reduce annual transport sector emissions. Lastly, Option 3 will emit more GHG emissions compared to other options due to the greater number of motorcoaches on the road, however it also has the greatest potential to attract existing and future auto users.

The Economic Case assesses the overall benefit to society for each investment. The Benefit Cost Ratio (BCR) is determined by dividing the total benefits by the total costs. If the BCR of the investment is greater than or equal to 1, it is considered economically viable (Metrolinx, 2021b). For this IBC, the benefits value consists of the annual GJC savings for both auto and transit users and all O-D pairs multiplied by total daily trips for each Option. The total costs value consists of the environmental and social costs for the annual carbon emissions. The Net Present Value (NPV) is determined by subtracting the total costs from the total benefits. For all three Options, the potential annual GJC savings for passengers far outweigh potential costs in GHG emissions. However, Option 3 has greater potential to generate societal benefits such as equity benefits, option value, individual productivity, as well as economic development impacts such as increasing access to labour markets and other agglomeration benefits.

Financial Case

The Financial Case assesses the overall financial impact of the investment options. High-level estimates of the capital costs for acquiring motorcoaches, and annual operating and maintenance costs are estimated for each Option, based on the proposed service routes and strategies. Moreover, operating revenues for each Option were estimated based on 75% annual passenger capacity rate. To ensure that the cost of the service is affordable, it is recommended that passenger fares for the new service should be lower than existing GO Transit fares, but higher than local transit fares. A flat rate of $5 was proposed as a starting point, however this value is likely to change based on additional assessments in the design and development phase. The assessment found that a $5 per trip fee would allow all proposed Investment Options to be financially viable, while retaining sufficient net revenue to accommodate changes in ridership levels or additional operating expenses not accounted for in the initial assessment. The Farebox Recovery Ratio is calculated by dividing the total fare revenue by total operating expenses. A ratio above 1 indicates the transit system is financially viable, while a ratio below 1 indicates that the transit system needs to be subsidized.

As expected, Option 1 had the lowest annual operating expenses, while Option 2 and Option 3 had higher annual operating expenses due to the greater number of operating vehicles required for these options. However, greater number of buses in operation also increases the annual passenger capacity, which subsequently increases farebox revenues. As a result, Option 3 can potentially serve the greatest number of people compared to other Options, and if implemented correctly, can generate sufficient revenue to maintain bus operations.

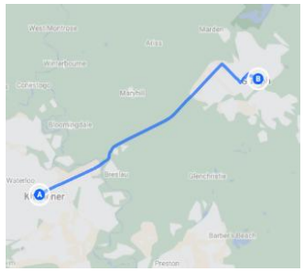
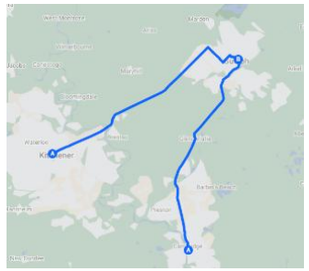
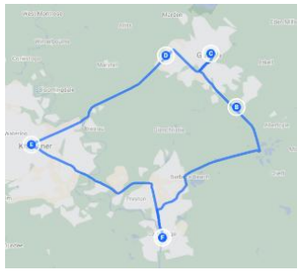
Deliverability and Operations Case

The Deliverability and Operations Case presents high-level recommendations to procure, deliver, and operate, the proposed investment Options.

Options 1 and 2 require lower operating cost and can be potentially implemented through existing transit service agencies. Local transit services provided by Grand River Transit (Waterloo) and Guelph Transit (Guelph) can be expanded to include inter-regional services through a collaborative program between the two agencies. Alternatively, as the primary inter-regional public transit agency, Metrolinx can implement the proposed intercity services by expanding or revising existing services.

As shown in previous case assessments, Option 3 has the greatest potential to improve intercity transit options for daily commuters while also increasing employment access to marginalized communities. However, due to the greater number of vehicles and financial resources required for Option 3, it is assumed that existing transit service agencies do not currently have the capacity to implement this level of service. Therefore, it is recommended that the provincial government explore opportunities to engage with private bus companies through third-party contract to fill this critical gap.

Business Case Summary Chart

Cases	Option 1	Option 2	Option 3
	Kitchener – Guelph	Cambridge – Guelph Kitchener – Guelph	Cambridge-Kitchener-Guelph
			
Strategic	Promotes strong connections between Kitchener and Guelph, but does not meet diverse needs of commuters or has potential to promote mode shift.	Potential to achieve transit service goals, with some improvements to mobility options in the region. Strong strategic performance but some service gaps remain.	Strongest potential to achieve transit service goals, improve mobility options and reduce emissions in the region as it fills many service gaps compared to other options.
Economic	**BCR:** 8.2 **NPV:** $1,853,800	**BCR:** 25 **NPV:** $12,048,280	**BCR:** 36.8 **NPV:** $30,535,160
Financial	**Annual Operating Cost:** $2,436,230 **Average Annual Passengers (75%):** 871,200 **Farebox Revenues ($5):** $4,356,000 **Farebox Recovery Ratio:** 1.78	**Annual Operating Cost:** $4,845,100 **Average Annual Passengers (75%):** 1,742,400 **Farebox Revenues ($5):** $8,712,000 **Farebox Recovery Ratio:** 1.81	**Annual Operating Cost:** $6,994,000 **Average Annual Passengers (75%):** 2,653,200 **Farebox Revenues ($5):** $13,266,000 **Farebox Recovery Ratio:** 1.9
Deliverability and Operations	Lowest cost to design and implement intercity services and can be implemented through existing transit service agencies such as Metrolinx.	Relatively low cost to design and implement intercity bus services with greater transit benefits compared to Option 1. Can also be implemented through existing transit service agencies such as Metrolinx.	Higher cost to design and implement intercity services but has greater potential to achieve transit benefits for intercity commuters compared to other options. Government-contracted services to support intercity public transit needs should be given priority to support benefits realisation in the region.

Recommendations for Future Stages of Work

Three potential intercity bus services were proposed and evaluated for this Initial Business Case. Options 1 and 2 offer direct services to support basic connections between the two regions. Alternatively, Option 3 offers a more comprehensive service to support more diverse commuting needs across regional boundaries.

Based on this IBC study, Option 3 presents the most economically viable investment option, while also promoting meaningful societal benefits. Although Option 3 requires greater financial resources to operate, it represents a viable alternative to auto-travel and has the potential to generate significant ridership and revenue compared to other Options. Moreover, implementing a new "branded" intercity service through third-party contracts can provide additional social and economic benefits while also improving public transit mobility options for intercity commuters.

Following the Initial Business Case, the next phase of the Metrolinx Business Case Framework is the Preliminary Design Business Case. This next phase takes the recommended option of the IBC and reviews different approaches to refine and optimize it, which is then used to secure funding from the provincial government for procurement, construction, and implementation (Metrolinx, 2021b).

The next stages for the design and development of intercity bus services between Waterloo Region and Wellington County should consider the following key issues in greater detail:

- Recommend conducting surveys for residents and employers to collect more detailed information and data on current commuting trends, and major employment destinations for intercity commuters. The survey can also include questions that attempt to understand individual perceptions regarding existing public transit options and a new high-frequency, intercity bus service.
- Consider a phasing approach whereby services similar to Option 1 and Option 2 is introduced in the immediate future and then gradually scaling the services to reach Option 3 type services as passenger volumes increase and more resources are available.
- While Option 3 only includes stops in major employment areas in Guelph, it is recommended that additional stops in major employment areas in Cambridge are also included in the assessment during the design and development phase.
- Consider opportunities to implement a one-fare system to allow transit users to easily transition between intercity bus services and local transit systems.

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