



# Appendix K

Transit Needs



BURNSIDE



Innisfil

# Appendix K – Transit Needs and Opportunities

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**Date:** June 8, 2022 **Project No.:** 300053011.0000  
**Project Name:** Innisfil Transportation Master Plan Update  
**To:** Town of Innisfil  
**From:** R.J. Burnside & Associates Limited

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## 1.0 Benefit of Effective Transit Systems

### 1.1 Support of Complete Communities

Innisfil “Our Place” Official Plan supports complete communities that are “age-friendly”. Completed communities are context-sensitive but can be defined as providing safe and healthily neighborhoods, accessible employment, with a sense of community and neighborhood-based cultural and recreational opportunities. Transit can be integral to creating communities that are more complete and sustainable.

### 1.2 Support Mobility Needs

Transit can provide reliable access from residential areas to employment opportunities and can be critical for those who face age or other barriers to mobility and can be age-friendly. Future transportation strategies should strive to improve accessibility for all people in the Town of Innisfil. Transit demand reflects the mobility needs for those who have limitations that restrict travel by private vehicle or other modes.

### 1.3 Supporting Sustainability Objectives

A sustainable community is one that can reconcile economic growth, environmental balance and social progress without compromising the planet. Convenient transit services can contribute to more sustainable transportation and reduce the impact on the environment. Active transportation and transit are explicitly supported in the Provincial Policy Statement (2022) and is supported as an important component of multimodal transportation systems. Transit solutions can also be a key element to climate change mitigation strategies.

### 1.4 Implementing Transit-Supportive Guidelines

The Ontario Ministry of Transportation developed Transit-Supportive Guidelines. The objective is to assist in creating an environment that is supportive of transit and developing services and programs to increase transit ridership. Key recommended metrics include the following:

- Basic transit service is defined as one bus every 20-30 minutes and frequent transit service is defined as one bus every 10-15 minutes.

- The spacing of arterials and collectors should support a maximum 400 m (5-minute) walk from the interior of a block to a local bus stop. For example, assuming that bus stops are spaced 200m apart along a set of parallel collectors, the collectors should be no more than 600m apart to satisfy this maximum walking distance.
- Space collectors at intervals of 400 m or less in designated nodes and corridors in order to facilitate higher levels of walking and cycling

## 2.0 Transit Models

There are several types of transit systems and this study focuses on two main types.

### Conventional Fixed Route

Conventional fixed routes have vehicles that operate on a predetermined route and schedule. Depending on the community, conventional fixed-route services may not always meet the needs of residents. Access to the bus stop may be difficult for residents who live far away from fixed bus stops.

### On-Demand Transit

On-demand transit have vehicles that operate on a flexible route and schedule. Individuals may use a subscription service, advance reservation, or real-time scheduling. Riders share a vehicle with others travelling in a similar direction. Riders can request the service through a mobile application or by phone. Depending on the vehicle, there are two types of on-demand transit:

- Non-dedicated: where vehicles that provide the service do not exclusively serve a particular transportation program. The provider has an option of serving unrelated contracts on the same vehicle at the same time.
- Dedicated: vehicles are dedicated exclusively to a transportation program during a specific period of time. On-demand transit can also be structured based on service delivery. There are three typical service delivery models:
- Origin to Hub (first-mile / last-mile): this service model connects customers to / from the closest fixed-route transit stop or transit hub. This model is typically implemented in lower density areas where there is no fixed-route transit.
- Origin to Destination: Riders can be picked up or dropped off at any location within a service area. This model is used in large low-density geographic areas where there is no fixed-route service.
- Flex-Route: this service allows for a fixed route and schedule to be extended beyond their predetermined route and schedule. This model allows for a larger coverage that may have limited demand.

## 3.0 Existing Transit Services

Currently, GO Transit bus service provides inter-regional connection with several stops within the Town. The Town's local transit is an on-demand service operated by Innisfil Transit, a partnership between the Town and Uber. Details for each are provided below.

### **3.1 Metrolinx GO Transit**

The Barrie GO line currently passes through the Town with no stops. During the weekday morning peak period, there are 5 southbound trains to Union Station with a 45-60 minute headway. During the afternoon peak period, there are 5 northbound trains from Union Station and has a 30-45 minute headway.

Barrie South GO Station is a scheduled fixed route commuter rail and bus station located north of Mapleview Drive and west of County Road 4. It is the closest station for most Innisfil commuters, approximately 1.5 km away from the north borders of the Town.

Barrie Transit also runs bus routes from Barrie South GO (routes 3A, 3B, 4A, 4B and 8B) connecting for much of the City of Barrie. Future opportunities will include service from the new GO rail station at 6th Line within the Orbit community in addition to links to Barrie Transit at the Barrie GO Station.

### **3.2 Ontario Northland Transportation Commission**

Ontario Northland Transportation Commission (Ontario Northland) is a Crown agency of the province providing transportation services for both passenger and goods in northern Ontario. Innisfil commuters can access the Route 1 (Toronto-Barrie-North Bay) and Route 2 (Toronto-Parry Sound-Sudbury) transit services through connections via Barrie Transit Terminal located 24 Maple Avenue. There is no direct access to/from Innisfil.

### **3.3 Simcoe County LINX Transit**

In addition to the GO Transit and Ontario Northland service, the existing conventional scheduled fixed route transit system includes the Simcoe County a LINX transit system. It is noted however, that the LINX does not currently provide convenient connections to Innisfil origins or destinations. The following are current LINX transit routes are as follows:

- Route 1: Penetanguishene/Midland to Barrie
- Route 2: Wasaga Beach to Barrie
- Route 3: Orillia to Barrie
- Route 4: Collingwood to Wasaga Beach
- Route 5: New Tecumseth to Bradford West Gwillimbury
- Route 6: Midland to Orillia

The existing LINX routes provide connections from major residential communities to both the City of Barrie and the GO rail and Ontario Northland Rail stations serving destinations to the south including the City of Toronto Union Station within the City's financial district.

Figure K- 1 is an excerpt from the County's Transportation Master Plan Update Phase 1: Needs and Opportunities (County TMP Phase 1), prepared by IBI Group, dated October 2021 and the LINX transit system are illustrated in dark blue. There is no direct LINX access to/from Innisfil.

### 3.4 Innisfil Transit

On May 1, 2017, the Town and Uber collaborated on an on-demand transit service called Innisfil Transit and that has been the option for those who have physical, financial or other barriers to use of a personal automobile for their mobility needs. This arrangement with Uber to provide on-demand services is Canada's first ridesharing and transit partnership. It provides on-demand ride hailing 24 hours a day / 7 days a week with selected fixed-fare destination within the Town and reduced fare trips that start and end trips in Town. The following discounted rates for any trip to / from these locations:

- Innisfil Recreational Complex and Town Hall area: \$4
- Innisfil ideaLAB and Library (Lakeshore branch): \$4
- South Innisfil Community Centre: \$4
- Innisfil Community Church or Innisfil Food Bank: \$4
- The closest GO transit bus stop along Yonge Street: \$5
- Barrie South GO train station: \$6
- Innisfil Heights Employment Area and Highway 400 carpool lot: \$6

As an incentive, the Town provides the following:

- A Fair Transit Program:
  - Established on October 22, 2019;
  - Provides 50% discount on all rides to eligible participants and
- An Essential Trips Assistance Program:
  - Established on March 20, 2020, to support residents during the COVID-19 pandemic;
  - Provides riders with a \$20 monthly voucher to redeem towards any Innisfil Transit Trips, and
  - This program also offers 2 free monthly trips to /from essential locations identified on their website.

Overall, the partnership showcases an innovative way of catering to specific transportation needs within the Town and the flexibility of ride-share services. A surveyed conducted in 2019 by the Town had indicated that over 70% of the users were “happy” or “very happy” with the Innisfil Transit Service. This result is consistent with the surveys in the previous years – 2017 and 2018.

### Figure K- 1: LINX Transit Routes

Source: Exhibit 8.11 from the County of Simcoe Transportation Master Plan Update Phase 1: Needs and Opportunities, prepared by IBI Group, dated October 2021.



## **4.0 Current Transit Ridership and Performance Measures**

Transit use within the Town represents a small percentage of trips. The 2016 Transportation Tomorrow Survey indicates that transit trips (including GO transit) represent 1% of AM and PM peak period trips.

### **4.1 Rail Transit – Barrie GO Station**

A review of the 2019 Innisfil Transit Community Engagement Results had indicated that 276 residents take Innisfil Transit to and from the Barrie South GO Station.

### **4.2 On-Demand Transit – Innisfil (Uber) Transit**

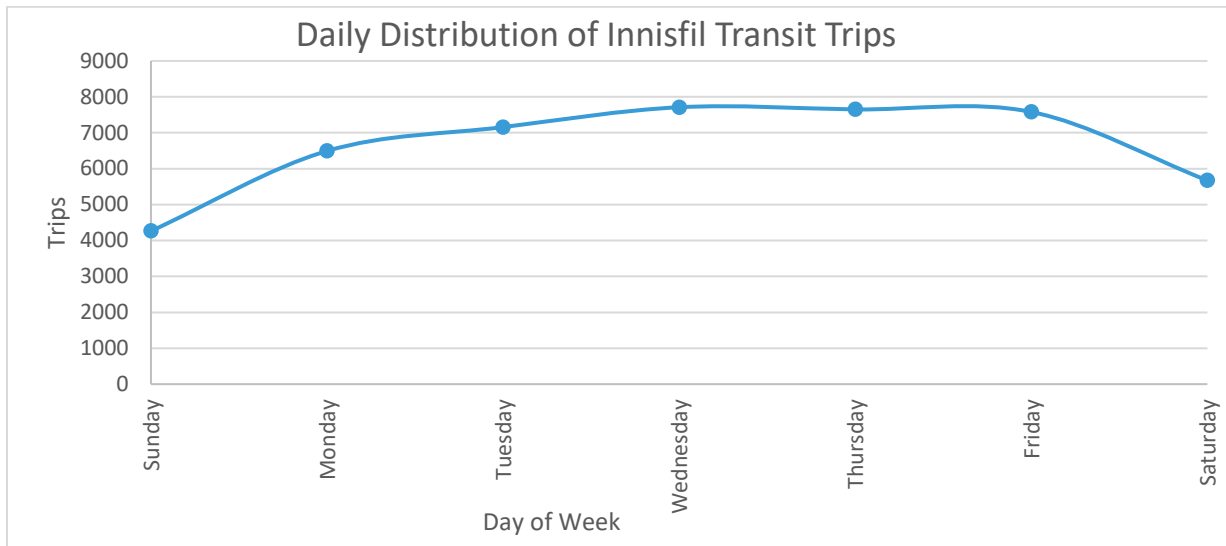
There are some initial findings published in the Innisfil Transit System Performance Final Report (Innisfil Transit Performance Report), prepared by Ryerson University and Transform, dated January 12, 2021. This study reviewed Uber data between May 2017 and February 2020 (i.e., prior to the COVID-19). Some key findings from the Innisfil Transit Performance report included:

- Approximately 220,000 trips made equivalent to an annual ridership of 80,000 users.
- Average trips were 9 km in length and 11 minutes in duration and with 6 minutes of wait time.
- Urban neighborhoods have highest demand, highest services levels and lowest trip cost.
- 60% of the trips took place during time period outside of typical weekday commuting times of 6:00AM to 9:00AM and 2:00PM to 6:00 PM.
- 36% of the trips were destined to destinations that do not have flat rates.
- It appears the highest ridership levels are associated with the highest population densities.

The Town had provided Burnside more recent Uber data, dated September 2020 to June 2021. The data captured trips made during the COVID-19 pandemic, which likely understates travel demand and may not fully reflect typical origins and destinations. This data, however, provides a general understanding of travel patterns.

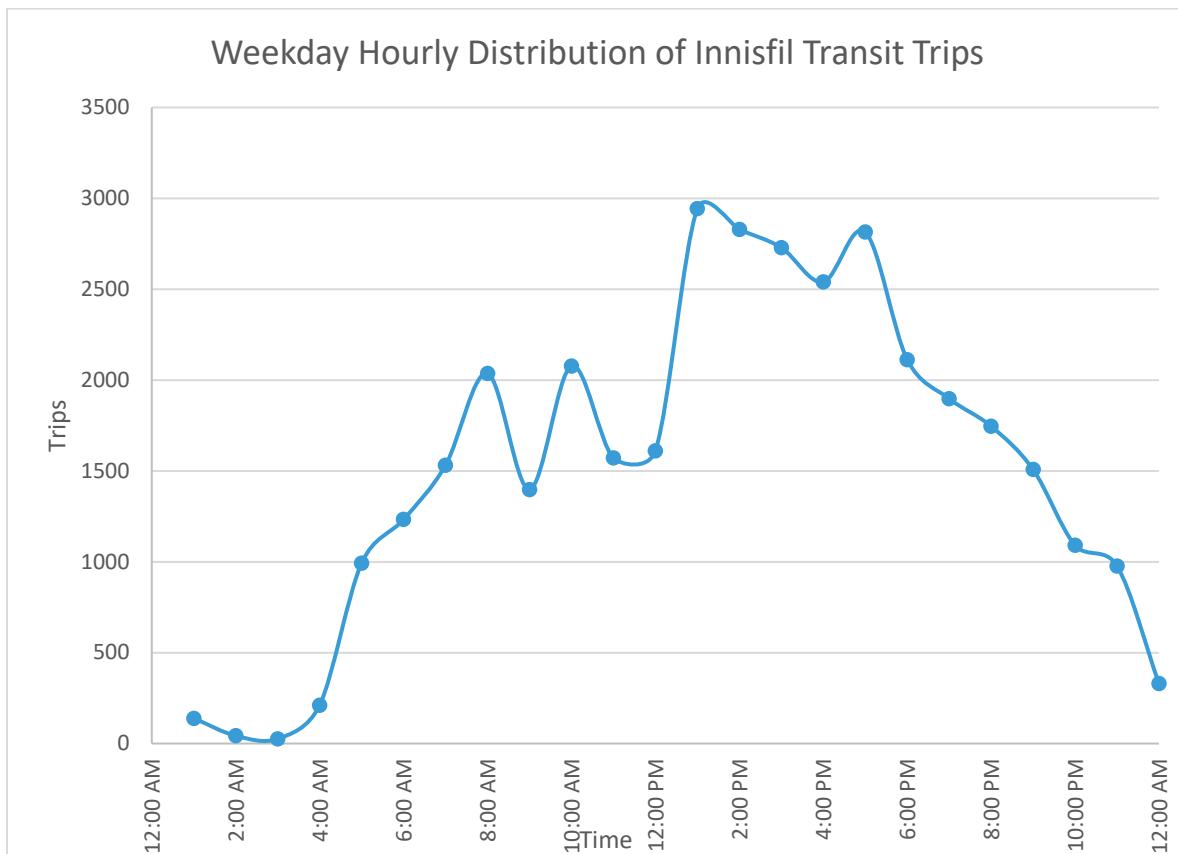
There was a total of 46,530 trips between September 2020 to June 2021, of which approximately 80% occurred during a weekday and 20% during a weekend. The daily trips are illustrated in Figure K- 2. The Wednesdays, Thursdays and Fridays generated approximately the same number of trips.

**Figure K- 2: Daily Distribution**



The hourly distribution of a weekday and weekend are summarized in Figure K- 3 and Figure K- 4 respectively. During a weekday, the peak travel occurs between 1:00 PM and 5:00 PM and during a weekend, the peak occurs from 3:00 PM to 6:00 PM.

**Figure K- 3: Hourly Distribution for Weekday**





**Figure K- 4: Hourly Distribution for Weekend**

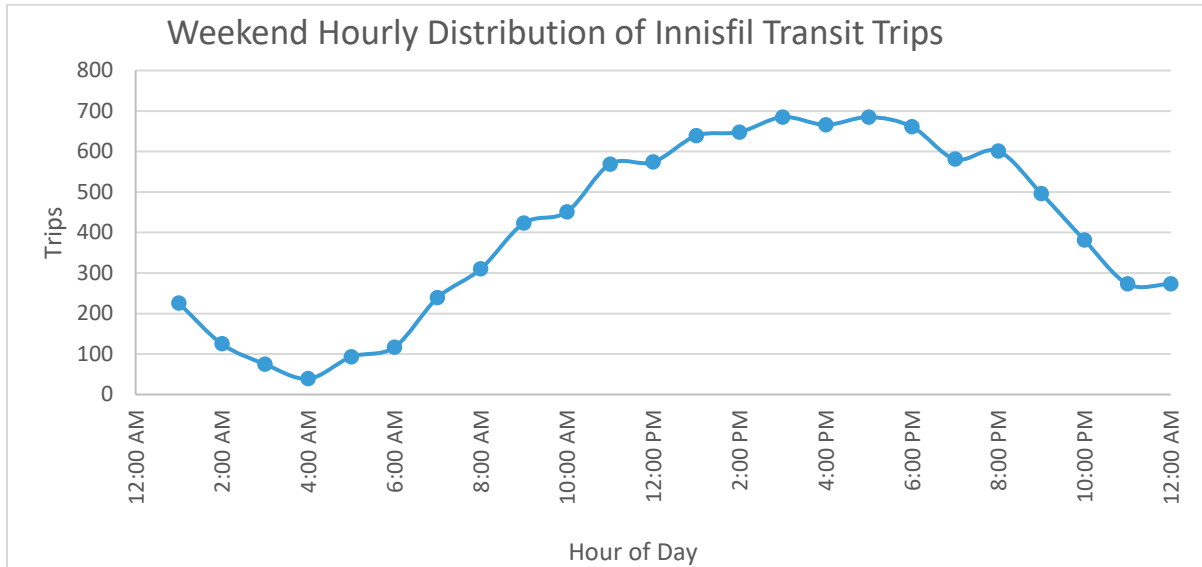


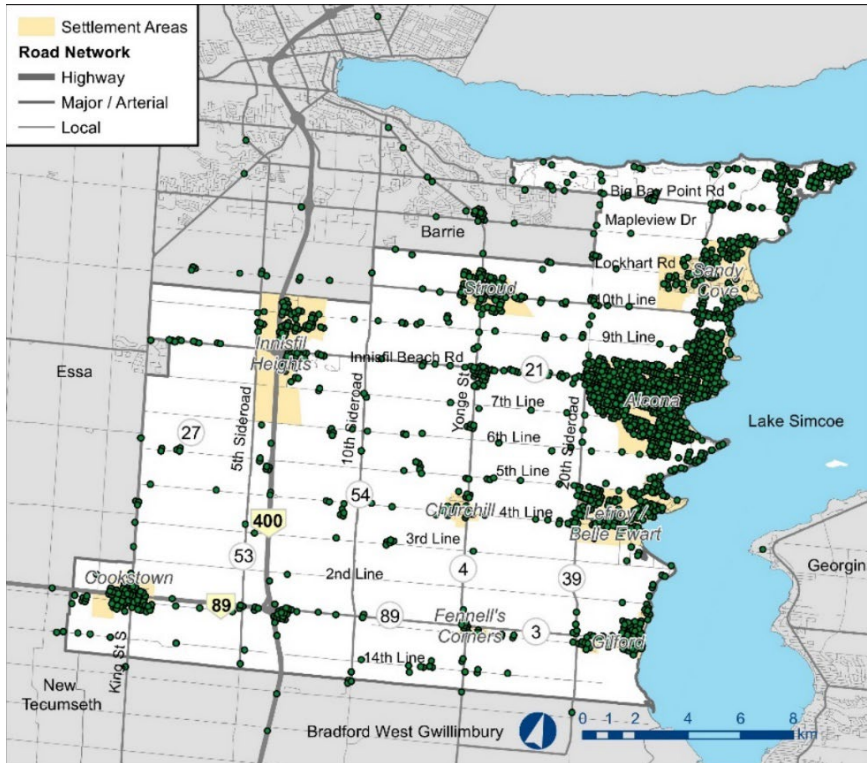
Table K- 1 summarizes the total number of trips made.

**Table K- 1: Travel Demand (Total Trips)**

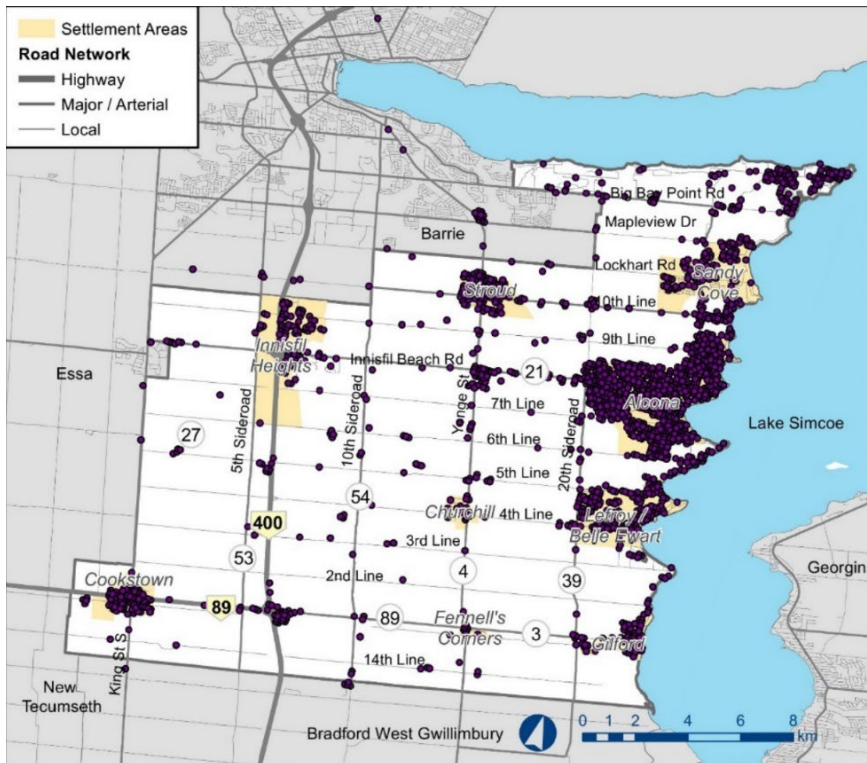
Location	Trips (%)	
	Origin	Destination
Stroud	559 (1%)	710 (2%)
Sandy Cove	818 (2%)	857 (2%)
Cookstown	1,734 (4%)	1,797 (4%)
Lefroy / Belle Ewart	2,456 (5%)	2,148 (5%)
Innisfil Heights	2,587 (6%)	2,884 (6%)
Barrie South GO Station	5,732 (12%)	5,572 (12%)
Alcona	23,482 (50%)	22,609 (49%)
Other	9,163 (20%)	9,954 (20%)

Figure K- 5 and Figure K- 6 indicate that service is provided throughout Innisfil including nonurbanized areas and the density of trips roughly reflect the level of development throughout the Town. Most trips originated and were destined in Alcona.

**Figure K- 5: Uber Pick-up Locations**



**Figure K- 6: Uber Drop-off Locations**



A review was conducted for the weekday AM and PM travel patterns including a review of origin and destination. A large percentage of trips (62%) had either an origin or destination at either the Alcona community or the Barrie South GO station. Weekday morning AM peak period (6:00 AM to 10:00 AM) and afternoon PM peak period (1:00 PM to 5:00 PM) trip distribution patterns were summarized for major trip generators as presented in Table K- 2 and Table K- 3.

**Table K- 2: Weekday PM Peak Origin-Destination**

Origin	Destination							
	Innisfil Heights	Barrie South GO	Alcona	Lefroy / Belle Ewart	Cookstown	Sandy Cove	Stroud	Other
Alcona	22%	18%	42%	2%	1%	0%	3%	11%
Barrie South GO	8%		58%	5%	5%	0%	1%	24%

**Table K- 3: Weekday PM Peak Origin-Destination**

Origin	Destination							
	Innisfil Heights	Barrie South GO	Alcona	Lefroy / Belle Ewart	Cookstown	Sandy Cove	Stroud	Other
Alcona	4%	9%	51%	4%	3%	4%	2%	23%
Barrie South GO	1%		63%	3%	10%	1%	0%	23%
Innisfil Heights		4%	67%	19%	0%	0%	0%	10%

The trip tables indicate defined patterns between Alcona and Barrie South GO, Alcona and Innisfil Heights and between Lefroy / Belle Ewart and Innisfil Heights.

We acknowledge that there are some challenges with the Uber data as the data reflected pandemic conditions:

- **Slightly lower number of ridership:** A comparison was made to the Innisfil Transit Performance Report which indicated approximately 220 daily trips. The pandemic data had approximately 155 daily trips. The Town had provided many incentives during the course of the pandemic such as additional vouchers and discounts to help residents get to and from essential locations. As a result, the reduction may not have been as significant as what it could have been.
- **Availability of drivers:** this resulted in some challenges to match riders with drivers, though average wait times for completed trips generally stayed below 10 minutes.
- **Capacity restrictions on local businesses / restaurants:** there were numerous of provincial restrictions such as capacity limits, take-out only at restaurant which potentially would have impacted the businesses and operations at local businesses / restaurants.
- **Change in travel patterns:** with individuals working from home, the travel pattern will be different. Based on the data above, it appears majority of individual are using Uber to stay within the Alcona area.

## 4.3 Current Service Performance Measures

### 4.3.1 Factors Affecting Transit Use

Transit level of service can be assessed by the degree to which transit is a viable alternative mode of travel to the automobile, where travel time and convenience are significant criteria (along with comfort and cost). Transit services are typically provided by a municipality for areas within its jurisdiction to reflect the needs and expectations of the community. These services are assessed based on the following analysis measures:

- **Proximity** to a higher order transit station or a conventional transit stop (and average distance to a transit stop), based on the number and percent of population and jobs in its vicinity.
- **Connectivity** of the transit system between key trip origins and destinations.
- **Serviceability** (scheduled service hours of operation and reliability).
- **Frequency** (headway and wait time) of service along transit routes.
- **Travel time** (operating speed, number of stops, dwell time) along transit routes.

### 4.3.2 Comparison Benchmarking

To better gauge the magnitude of future transportation improvements including cost and operations, a comparison of transit statistics was conducted based on available data from the Canadian Urban Transit Association's (CUTA's) Canadian Conventional Transit Statistics – 2018 Operating Data. This data is summarized in Table K- 4 and lists jurisdictions of similar population and in close proximity.

The Town of Innisfil transit ridership is lower per capita compared to most benchmarked fixed route transit systems. Innisfil Transit on-demand wait times are approximately one third to one quarter of the average headway of fixed route scheduled service; this is comparable to the walk time for a bus stop 400 metres away.

One notable difference between the Town of Innisfil and most benchmark municipalities is the much larger geographic area of the Town of Innisfil. The urbanized area of the community of Alcona, however, is approximately 10 km<sup>2</sup>, which is comparable to the smallest benchmark municipalities.

**Table K- 4: Transit Statistics for Other Jurisdictions<sup>1</sup>**

Municipality	Service Area Population	Service Area Size (km <sup>2</sup> )	Ridership	Weekday Headway		No. of Bus		2018 or 2019 Data			
				Weekday Headway	Routes	Total	During Peak	Revenue Vehicle KM	Total Operating Cost	Cost per km	Revenue / Cost Ratio
Innisfil Transit (Uber On-Demand) <sup>2</sup>	36,566	262.7	52,065	On-Demand (6-minute average wait)	N/A	N/A	N/A	998,072	\$1,448,023	\$1.45	39%
Barrie	137,819	113	3,250,007	< 16 min 16-30 min > 30 min	- 8 3	48	37	3,439,859	\$18,946,156	\$5.28	34%
Bradford West Gwillimbury	32,207	17.3	40,982	< 16 min 16-30 min > 30 min	- - 2	4	2	101,038	\$654,871	\$6.48	9%
Cobourg	10,741	13	101,172	< 16 min 16-30 min > 30 min	- - 2	5	2	190,260	\$834,987	\$4.39	17%
Cornwall	46,000	61.5	843,018	< 16 min 16-30 min > 30 min	- 10 -	15	10	761,951	\$4,429,299	\$5.81	26%
Stratford	32,500	27.6	595,212	< 16 min 16-30 min > 30 min	- - -	12	10	625,335	\$2,998,266	\$4.79	28%
Wasaga Beach	11,560	18.4	83,060	< 16 min 16-30 min > 30 min	- - -	4	2	241,800	\$600,822	\$2.48	23%
Welland	48,000	86	935,373	< 16 min 16-30 min > 30 min	- 8 -	28	20	693,459	\$4,951,701	\$7.14	30%

Source: 1. Canadian Conventional Transit Statistics – 2018 Operating Data, provided by the Canadian Urban Transit Association (CUTA)

2. Canadian Conventional Transit Statistics – 2020 Operating Data, provided by the Canadian Urban Transit Association (CUTA)

## 5.0 Transit Opportunities

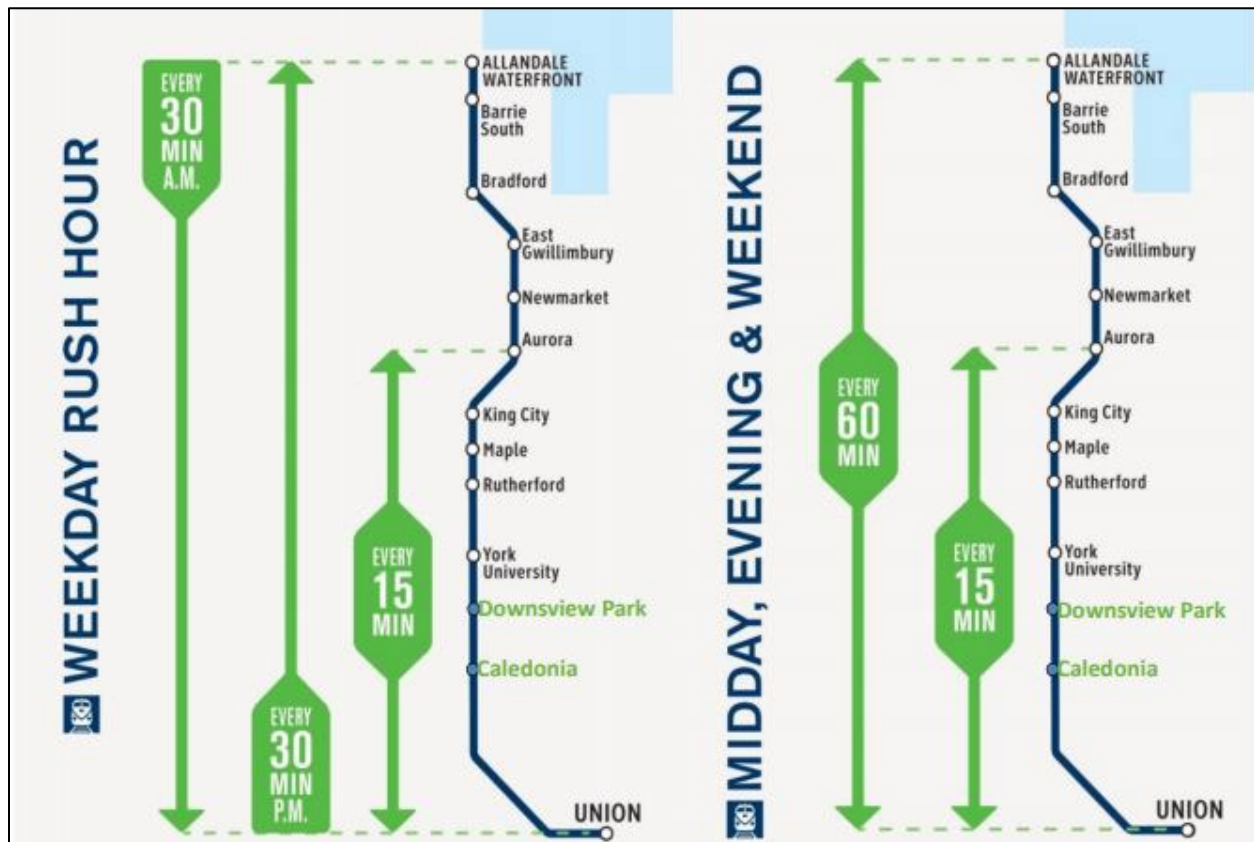
### 5.1 Metrolinx / GO Transit Planned Improvements

It has been noted that the current transit trips (including GO transit) represent 1% of AM and PM peak period trips. The feasibility of achieving a higher non-auto mode split is dependent in part on implementing new transit infrastructure and services, such as early implementation of the future Innisfil GO Station.

Currently, the planned Innisfil GO Station and Barrie line improvements represent significant changes to the provincial transit system affecting transit opportunities in Innisfil. As part of the GO Transit's Regional Express Rail (RER) expansion program, the rail services along the Barrie line will be upgraded to a two-way and all-day rail services. This service will operate along the entire Barrie line from Union Station in the City of Toronto to Allandale Waterfront GO Station, in the City of Barrie. Figure K- 7 summarizes the anticipated services.

**Figure K- 7: Barrie GO Line Services**

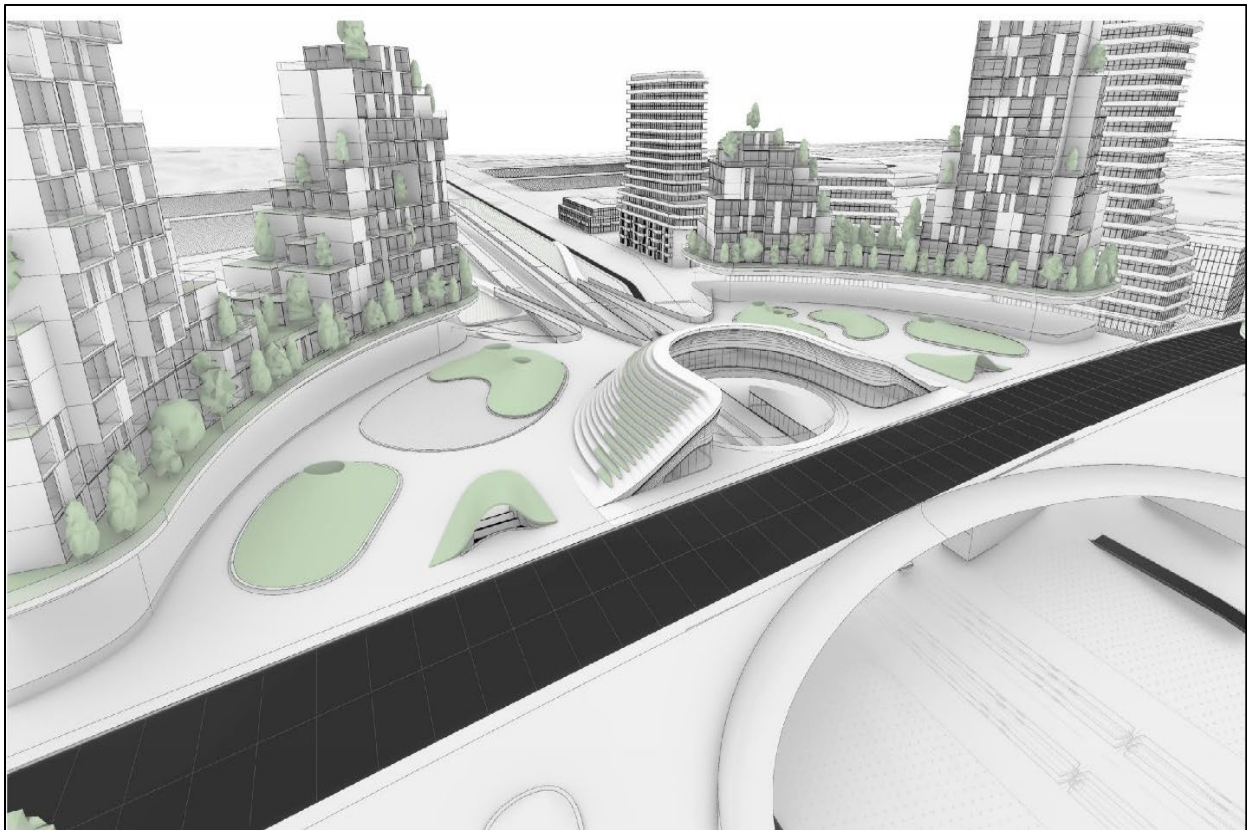
Source: *Barrie Rail Corridor Expansion Project Transit Project Assessment Process Public Meeting #2*, dated November 2016.



In addition, as part of the RER expansion program, there are plans for an Innisfil GO Station to be located on 6<sup>th</sup> Line, east of 20<sup>th</sup> Sideroad. The Town envisions an urban community situated around a new GO Station called The Orbit. Enhanced pedestrian and cycling infrastructure is proposed to connect to the GO Station becoming a one-stop point for multimodal system. It is to become a sustainable, complete and mixed-use transit-oriented community.

Council endorsed the preliminary design of the station and the possible phasing on July 15, 2020. A conceptual design is illustrated in Figure K- 8.

**Figure K-8: Draft Design of Innisfil GO Station**



The station design concept included input from residents, businesses, community stakeholders, professionals, Town and Council. Due to the scale of the project, it will be phased in order to ensure adequate financial flows, meet market demands and the set visions are achieved. There will be check points to evaluate the design and modifications could be made depending on operational, financial and constructional needs. The Town will continue to work with Province, County, Metrolinx and the developer of The Orbit, the Cortel Group Inc., to facilitate the design and construction of the station by 2023. The potential phases are summarized in Figure K- 5.

**Table K- 5: Phasing of the Station**

Phase	Description
1	Development of the Orbit Potential and Innovation Plan (OPIP) Assemble an expert team that include professionals in traffic, rail/transit, parks, placemaking, economics, employment, architecture, housing, servicing, environment, safety, technology and many other disciplines to research for OPIP Secondary Plan.
2	Design and Construction of the Station Currently underway.
3	Supporting Residential and Mixed-Use Development Will occur concurrently with the Design and Construction of the Station. Support Phase 4 and 5 of the Sleeping Lion Development and the minority landowners within the Orbit.
4	Additional Growth to Fund Station Assistance from private investment to help fund the GO station and the Orbit. Discussion with the Province and County on ways to facilitate the project.
5	Build-out of the IMO Vision Development of policies to address the future needs of the Orbit. While the Orbit maybe the focal point of growth and intensification, a balance will be needed with other intensification along the main streets of the other settlement areas.

The Barrie GO rail line and planned Innisfil GO rail station will serve as a transit spine for inter-municipal transit and provide an improved transit connection to the Toronto area. The new station will change travel patterns shifting current trips from the Barrie South GO rail station to the new Innisfil GO rail station. There are opportunities for the Town to enhance transit through connections to the new station.

## 5.2 On-Demand Transit Opportunities

Currently (2022) Ryerson University is continuing to assist the Town to understand the different transit options such as fixed route, on-demand transit and / or hybrid options for future implementation. Based on Ryerson’s and Laboratory of Innovations in Transportation’s (LiTrans) recent study, Exploring On-demand Transit Options for the Town of Innisfil (On-Demand Transit Study), dated March 28, 2022, four alternatives were explored:

- Option 1: Current Innisfil Transit Uber (non-dedicated fleet on-demand transit).
- Option 2: Dedicated fleet on-demand transit (ODT) services.
- Option 3: Hybrid – Fixed Route and Uber services.
- Option 4: Hybrid – On-demand transit and Uber services.



## **6.0 Fixed Route Scheduled Bus Transit Opportunities**

As the Town's population is forecast to nearly double by 2051, incorporating a conventional fixed-route service would help provide additional opportunities to connect settlement areas, support businesses and major employment nodes, and to provide residents a wide array of mobility options helping to achieve the Town's transit mode share target of 20% of all trips.

### **6.1 Simcoe County LINX Transit Opportunities**

The County's Transit Feasibility and Implementation Study (County Transit Feasibility 2015 Study), prepared by Steer Davies Gleave, dated September 2015 helped launch the current LINX transit routes. These routes included key destinations within the Town such as Alcona, future Innisfil GO station, Innisfil Heights, Cookstown and Sandy Cove.

### **6.2 Innisfil Fixed Route Transit Opportunities**

As demands grow, there may be opportunities to convert high demand Uber routes to scheduled transit routes. The Town transit system can long-term (2041 and 2051) transit system will have needs similar to other urbanized municipalities providing regular reliable fixed routes. A conventional fixed-route service will be important for serving key trip origins and destinations in urban areas. Fixed routes can provide connections for regular commuter travel including home-to-work travel in a predictable and reliable manner, supporting businesses, addressing resident barriers to travel and to achieve long-term transit mode share objectives.

## **6.3 Localized Transit Needs and Opportunities**

### **6.3.1 Micromobility and Needs and Opportunities**

Micromobility is the ability of movement through minimalistic means on short distances (usually within 10 kilometers) using lighter vehicle mode such as bicycle and scooters. Micromobility services often complement first-mile/last-mile needs associated with fixed route scheduled transit.

It is noted that the COVID-19 pandemic accelerated the shift in preference for this method of transportation; with fewer points of contact and ease of maintaining physical distancing, it is considered the less risky mode of travel. Two options considered for this study include bike-share and scooter-share.

### **6.3.2 Autonomous and Connected Vehicle Needs and Opportunities**

Vehicle automation will drastically reshape and redefine the transportation systems and travel behaviour. The Canadian Government has established several projects funded by the Program to Advance Connectivity and Automation in the Transportation System.

One of the notable projects in the GGHA is the West Rouge Automated Shuttle Trial in the City of Toronto. It is a partnership between the City, the TTC and Metrolinx. The program is free

shuttle services taking riders to and from the Rouge Hill GO station, West Rouge Neighborhood, Rouge Community Centre and Rouge National urban Park. The shuttle is self-driving with fixed stops; however, a human attendant will be on-board in case of emergency. The shuttle vehicle would drive with local traffic. During the weekday, the shuttle will operate with 30 minutes frequency from 6:00AM to 9:00AM and 3:30Pm to 6:30PM. During the weekend, the shuttle will also operate with 30 minutes frequency from 9:00AM to 11:00AM and 1:00PM to 3:00PM. The first shuttle was launched October 2021 and was tested for two months. Figure K- 9 illustrates the type of shuttle bus used.

**Figure K- 9: West Rouge’s Route and Automated Shuttle**

Source: <https://www.toronto.ca/services-payments/streets-parking-transportation/transportation-projects/automated-vehicles/automated-vehicles-pilot-projects/automated-shuttle-trial/>



There is an opportunity for the Town and/or private sector partners to consider a similar shuttle service and fleet. Automated vehicle can assist in addressing mobility needs providing service to elderly / disable residents and young residents. Potential routes were considered that can meet technological limitations (grade, distance, traffic volume and conflicts, vulnerable road users); options include:

- Circulation Shuttles to/from Friday Harbour.
- Circulation Shuttle around the Orbit community.

## 6.4 Electric Bus Fleet Opportunities

Clean fuel transit strategies represent a municipally controlled initiative toward sustainability objectives. Starting in 2021, the federal government had established the Zero Emission Transit Fund, which is a \$2.75 billion dollar program to offer support to public transit and school bus operators across Canada to electrify their fleets over the next five years. Also, the funding will help with purchasing 5,000 zero emissions buses. This goal is a step to reduce greenhouse gas emission and is part of the climate change strategy.

With the incentive and support, Canadian municipalities and transit operators are contributing to the largest battery-powered electric bus fleet in North America based on a study conducted by California's Clean Transportation Technology Industry (Calstart). There are several cities currently exploring the use of electric buses and this includes:

- Toronto Transit Commission (TTC): There are plans to purchase over 900 electric buses and no more diesel or hybrid buses will be purchased after 2024. TTC is working with Toronto Hydro on power storage to reduce the cost of charging.
- Guelph Transit: Guelph Transit purchased four electric buses which will be running by summer 2022. The plan is to have 65 electric buses added to the fleet by 2028 and reach 100% renewable energy use by 2050.
- Brampton Transit: As part of the Pan-Canadian Battery Electric Bus Demonstration and Integration Trail, the City had eight electric buses deployed in May of 2021.
- Société de Transport de Montreal: A pilot program for electric fleet conversion was started and involved 40 electric buses. There are also plans of stopping the purchase of diesel buses by 2025.
- TransLink, Metro Vancouver: TransLink is operating 262 electric trolley buses and has signed the C40 Fossil Fuel Free Street Declaration and will not be buying any diesel buses after 2025.

The deployment of electric bus requires careful consideration of the associated type of charging method. Based on the above, there are currently two known types used in Canada plug-in charging and overhead conductive charging illustrated in Figure K- 10 and Figure K- 11, respectively.

**Figure K- 10: TTC Depot Charging**

Source: <https://www.cbc.ca/news/science/electric-buses-transit-1.5823166>



**Figure K- 11: Brampton Overhead Charge**

Source: <https://www.nrcan.gc.ca/science-and-data/funding-partnerships/funding-opportunities/current-investments/brampton-transit-electric-bus-demonstration-integration-trial/22242>



The plug-in charging is typically installed at the transit depot or garage and allow for charging overnight. The charge type is AC or DC with 40 to 120kW power. Depending on the charge power and battery pack, it can take up to 8 hours. The TTC example above has a charging time of approximately 3 to 4 hours and covers 200 to 250 km.

Overhead charge consists of an automated connection using an overhead conductive coupler. This is typically installed on route or where layovers occur. It can also be installed at the transit depot or garage. This is mainly use for bus with smaller battery packs and less range. The charge type is DC with 175 to 450 kW. The recharge time is 5 to 20 minutes. The Brampton example above has a charging time of approximately 3 to 7 minutes.

The Transit cooperative Research Program (TCRP) Synthesis 130 – Battery Electric Buses – State Practice (TCRP 130) describes the advantages and disadvantages to the two methods. This is summarized in Table K- 6.

**Table K- 6: Charging Methods Advantages and Disadvantages**

Charging Method	Advantages	Disadvantages
Plug-in	Minimal infrastructure and installation requirement Lower cost per charger Charging overnight allows for the use of off-peak electricity rate More flexibility if route changes	Bus must be taken out of service Larger and heavier battery pack required (may reduce efficiency and passenger capacity) Manual process Slower Charging may require a lot of power
Overhead Charging	Buses are smaller and lighter Fast charge Can support 24-hour bus operation	Higher cost of infrastructure, equipment and civil work Potentially high operation cost as charging may occur during the peak Fixed infrastructure and may limit route changes or costly to relocate As it is an overhead system, it may require specific road clearance

In general, there are several advantages to electric buses including reduction of fuel, maintenance cost, emissions and noise. However, there are some challenges with the deployment. Electric bus generally cost more than an average diesel bus. However, this cost can be offset by lower fuel cost and maintenance cost as discussed above. With technology improvements, the cost could potentially be reduced. Another challenge is the implementation of charging infrastructures. This will require strategic planning and evaluation of which charging method is most appropriate. How, when and where these buses get charge needs to be carefully considered.

There are upfront capital costs with electrifying a transit system; however, long-term wise this could be beneficial. With support and availability of from Federal, Provincial and local funding it can help offset the capital cost. Table K- 7 summarizes the upfront cost of electric bus procurement based on the findings in the TCRP 130.

**Table K- 7: Capital Cost of Electric Bus**

	<b>Minimum</b>	<b>Average</b>	<b>Maximum</b>
Per Bus	\$730,000	\$1,100,000	\$1,500,000
Per Depot Charger (equipment + installation)	\$5,000	\$85,000	\$200,000
Per On-Route Charger (equipment + installation)	\$479,000	\$880,000	\$1,300,000

The operational cost and maintenance cost based on TCRP 130 are summarized in Table K- 8 per kilometer. The cost of electricity may vary.

**Table K- 8: Operation Cost of Electric Bus**

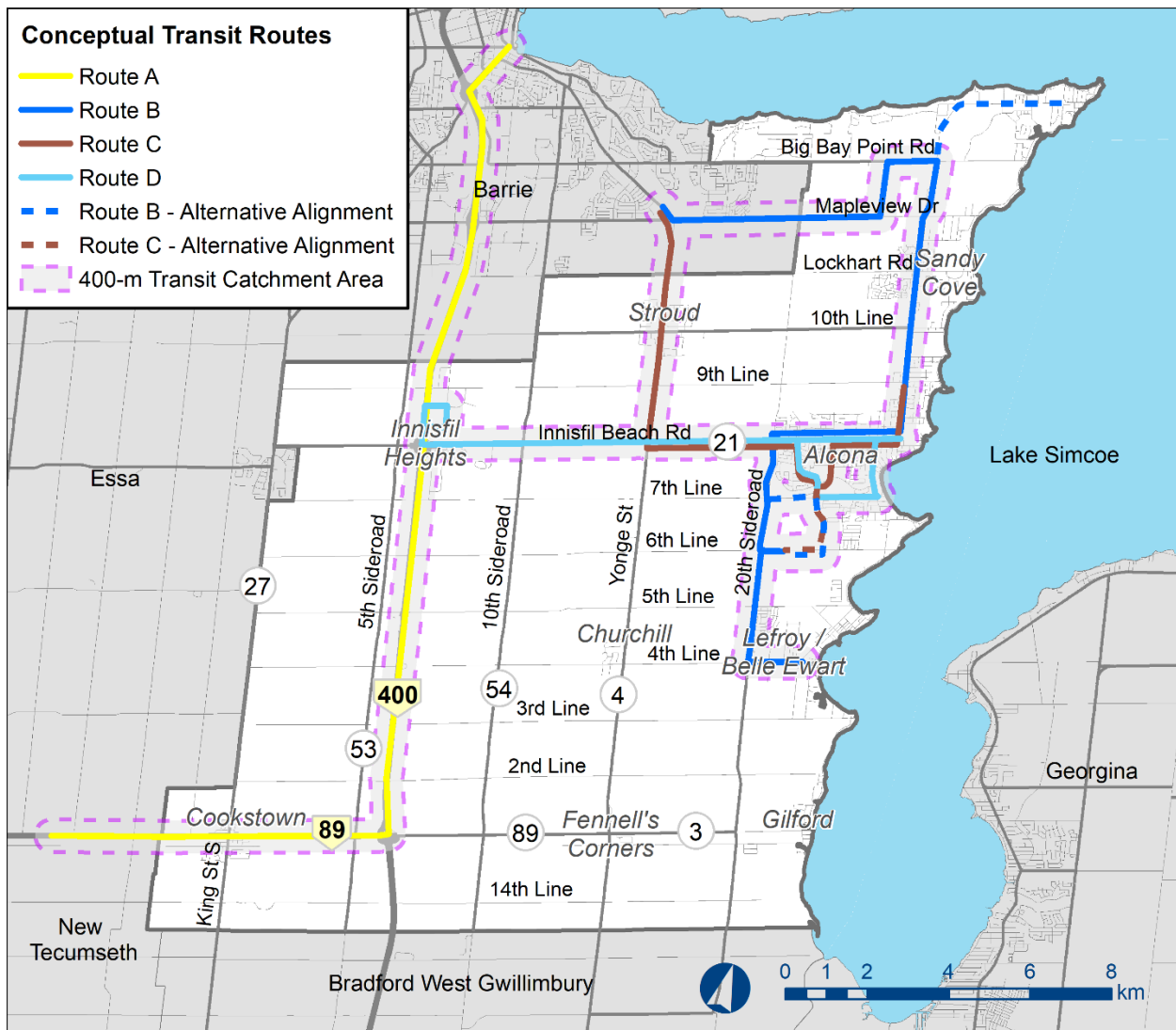
<b>Per km</b>	<b>Minimum</b>	<b>Average</b>	<b>Maximum</b>
Schedule Maintenance	\$0.07	\$0.28	\$0.72
Unscheduled Maintenance	\$0.07	\$0.22	\$0.43
Electricity	\$0.12	\$0.28	\$0.70

A further review will be needed to determine how to achieve and maximize the benefits of each method including cost.

## 7.0 Assessment of Alternative Transit Strategies

However, if demands grow, there will be opportunities to convert high demand ridesharing routes to scheduled transit routes or ODT. Given that fixed routes will not be able to accommodate all areas of the Town and ride-sharing routes or other local transit solutions discussed above can then be used as a first-mile / last-mile connection and can be used to address service gaps during the day. It will be a complimentary service to a fixed transit system providing a connection from suburban areas to bus stops and / or key destinations. Four potential routes are summarized in Figure K- 12.

**Figure K- 12: Summary of the Four Fixed Routes and Alternative Alignments**



A set of evaluation criteria, consistent with the Transportation Master Plan Vision, were developed to compare alternative transit strategies. The evaluation criteria used to assess how well each alternative would address the identified issues is as follows.

## Criteria #1: General Operations

- Potential ridership.
- Fare structure.
- Service hours.
- Number of buses.

## Criteria #2: Level of Service

- Accessibility: measured by service area population within 400 m of the transit route.
- Reliability: measured by average wait time.
- Equity: measured by assessing service to the different transit-equity seeking groups.

## Criteria #3: Financial Cost

Preliminary high level capital costs and annual operating costs were estimated in order to develop draft cost estimates for the transit service alternatives. The assumptions made to estimate net costs are described below.

- Preliminary capital costs:
  - For on-demand transit, the cost was based on the Ryerson study.
  - For routes A to D, the capital cost in the table consists of the following:
    - New conventional bus cost which was based on data from City of Barrie Transit Asset Management Plan (Barrie Transit Asset Management Plan), prepared by Dillon Consulting Limited, dated April 2019;
    - Bus shelter cost which includes the shelter, a concrete pad, a bench and a bus sign mount. Unit cost for these were based on Barrie Transit Asset Management Plan and the size of concrete pad is from the typical bus pad from the Ontario Provincial Standard Drawing (OPSD); and
    - Maintenance facility cost was not included as part of capital cost. It was assumed that the Town can use the County / City of Barrie's facilities. Depending on the number of added buses, expansion to the facility may be required.
  - For the bikes and scooters, the capital cost includes:
    - It was assumed that the 12 bicycles from the ShareCycle program will not be reused, but the same quantity will be repurchased. The cost of the bicycles was based on the Hamilton SoBi System taken from the Windsor Bike Share Feasibility Study, prepared by Urban Systems, dated March 12, 2019.
    - It was assumed that the same amount of scooters will be needed as bicycles for the share program. The cost of scooters including application, vehicle and communication fees was based on City of Ottawa Transportation Committee *2020 Electric Kick Scooter Strategy and Pilot Report*.
  - For the autonomous vehicles, the capital cost will consist of:
    - Cost of the fleet was based on information from the City of Toronto's West Rouge project.
- Preliminary annual operating cost:



- Fixed routes operation cost includes fuel, cost associated with transportation operations and general administration based on information from Barrie Transit Asset Management Plan.
- Bike operation costs were based on City of Hamilton’s Functional Analysis for Hamilton Bike Share Transit System Report, dated August 2012 and Windsor Bike Share Feasibility Study, prepared by Urban System, dated March 12, 2019.
- Revenue, grants and fundings:
  - There are several Federal, Provincial and local support includes and not limited to Investing in Canada Infrastructure Program, MTO Gas Tax Funds, Reserve Funds from DC and Tax Capital.
- The revenue for the ODT is based on different projected ridership levels in 2031, 2041 and 2051.
- The revenue for the fixed route is based on different headways including 20 minutes, 30 minutes and 60 minutes and the projected ridership levels in 2031, 2041 and 2051.
- Estimated net costs (difference between expenditures and revenues).

Table K- 9 provides a comparison of the on-demand transit alternatives, Table K- 10 provides a comparison of fixed bus routes, and Table K- 11 provides a comparison of micromobility routes. Table K- 12 provides a summary of the evaluation of all transit options.

**Table K- 9: Evaluation of On-Demand Alternative Solutions**

Alternative Transit System	General Operations				Level of Service			Financial Costs (\$000's) <sup>1</sup>			
	Potential Ridership	Fare Structure	Fleet Size	Service Hours	Accessibility (% of Innisfil)	Reliability (average wait time)	Equity	Capital Cost 3	Annual Operation Cost	Revenue + Grants / Funding	Estimated Net Cost
Option 1: Current Service Model – Non-Dedicated ODT	80,000 (Estimate)	Fixed Fare and rebate	5 veh/ hour	24 hours, 7 days a week	All	6 mins	Inclusive of all ages and abilities.	\$0	\$695	Varies	\$695
Option 2: Dedicated Fleet ODT	2031: 113,500 2041: 159,600 2051: 220,200	Fixed Fare \$4.00	3 veh / hr	24 Hours, 7 days a week	All	13.2 mins	Inclusive of all ages and abilities.	\$246	\$2,533	2031: \$454 2041: \$638 2051: \$880	2031: \$45 2041: \$139 2051: \$381
Option 3: Hybrid – Dedicated Fleet + Non-Dedicated ODT	2031: 166,800 2041: 234,500 2051: 323,500	Fixed Fare \$4.00	Dedicated 3 veh/hr Non-dedicated 5 veh/hr	Dedicated 14 hours, 7 days a week  Non-dedicated 24 hours	All	8.17 mins to 8.72 mins	Inclusive of all ages and abilities.	\$246	\$3,228	2031:\$667 2041: \$938 2051: %1,294	2031: \$168 2041: \$439 2051: \$795
Option 4: Hybrid – Fixed Route + Non-Dedicated ODT	2031: 144,300 2041: 200,900 2051: 280,000	Fixed Fare \$4.00	Fixed Route: 3 Non-dedicated 5 veh/hr	Fixed Route: 7:00 AM to 9:00 PM  Non-dedicated 24 hours	All	5.1 mins to 6.88 mins	Provides inter-municipal connections and connects to the Barrie GO Stations, which is a gateway into the Regional transit network.	\$82	\$1,066	2031: \$577 2041: \$803 2051: \$1,120	2031: \$78 2041: \$304 2051: \$621

Source: 1. Based on the On-Demand Transit Study.

**Table K- 10: Evaluation of Fixed Route Alternative Solutions**

Alternative Transit System		General Operations				Level of Service			Financial Costs (\$000's) 1			
		Potential Ridership	Fare Structure	No. of Buses	Service Hours	Accessibility (% of Innisfil)	Reliability (average wait time)	Equity	Capital Cost 3	Annual Operation Cost	Revenue + Grants / Funding	Estimated Net Cost
Non-Dedicated ODT	Current Service Model	80,000 (Estimate)	Fixed Fare and rebate	-	24 hours, 7 days a week	All	6 mins	Inclusive of all ages and abilities.	\$0	\$695	Can vary	Can vary
Fixed Route Scheduled Transit (Diesel fleets)	Route A	2031: 147,092 2041: 243,736 2051: 365,185	\$4.00	<b>2031</b> 20 min headway: 11 buses <b>2041</b> 30 min headway: 4 buses <b>2051</b> 60 min headway: 7 buses	Mon to Fri 6:00AM to 7:42PM	4%	20 mins to 60 mins	Conventional buses can be equipped with features to make them fully accessible. However, additional specialize transit service may be needed. Provides inter-municipal connections and connects to Tanger Outlet Mall, which is a major employment node, and Innisfil Heights, a provincially designated employment area.	From \$3,077 to \$7,627 Avg \$5,027	From \$1,469 to \$4,040 Avg \$2,571	<b>2031</b> From \$2,547 to \$4,367 Avg \$3,327 <b>2041</b> From \$2,993 to \$4,753 Avg \$3,713 <b>2051</b> From \$3,419 to \$5,239 Avg \$4,199	<b>2031</b> From \$1,999 to \$7,301 Avg \$4,271 <b>2041</b> From \$1,613 to \$6,914 Avg \$3,885 <b>2051</b> From \$1,127 to \$6,428 Avg \$3,399
	Route B	2031: 72,700 2041: 106,715 2051: 150,877	\$2.00	<b>2031</b> 20 min headway: 7 buses <b>2041</b> 30 min headway: 5 buses <b>2051</b> 60 min headway: 2 buses	Mon to Fri 6:00AM to 7:42PM	28%	20 mins to 60 mins	Provides inter-municipal connections and connects to Friday Harbour, which is a major employment node, and the future Innisfil GO station and the Barrie GO Station, which are gateways into the Regional transit network.	From \$1,928 to \$5,178 Avg \$3,878	From \$734 to \$2,571 Avg \$1,836	<b>2031</b> From \$1,644 to \$2,944 Avg \$2,492 <b>2041</b> From \$1,712 to \$3,012 Avg \$2,492 <b>2051</b> From \$1,800 to \$3,100 Avg \$2,580	<b>2031</b> From \$1,018 to \$4,805 Avg \$3,290 <b>2041</b> From \$950 to \$4,737 Avg \$3,222 <b>2051</b> From \$862 to \$4,648 Avg \$3,134
	Route C	2031: 174,168 2041: 307,082 2051: 476,913	\$2.50	<b>2031</b> 20 min headway: 5 buses <b>2041</b> 30 min headway: 3 buses <b>2051</b> 60 min headway: 2 buses	Mon to Fri 6:00AM to 7:42PM	24%	20 mins to 60 mins	Provides inter-municipal connections and connects to the Barrie GO Stations, which is a gateways into the Regional transit network.	From \$1,777 to \$3,727 Avg \$2,427	From \$734 to \$1,836 Avg \$1,102	<b>2031</b> From \$1,874 to \$2,654 Avg \$2,134 <b>2041</b> From \$2,206 to \$2,986 Avg \$2,466 <b>2051</b> From \$2,631 to \$3,411 Avg \$2,891	<b>2031</b> From \$637 to \$2,909 Avg \$1,395 <b>2041</b> From \$305 to \$2,577 Avg \$1,062 <b>2051</b> From \$118 to \$2,153 Avg \$638

Alternative Transit System		General Operations				Level of Service			Financial Costs (\$000's) 1			
		Potential Ridership	Fare Structure	No. of Buses	Service Hours	Accessibility (% of Innisfil)	Reliability (average wait time)	Equity	Capital Cost 3	Annual Operation Cost	Revenue + Grants / Funding	Estimated Net Cost
Route D	2031: 64,161	\$2.50	<b>2031</b> 20 min headway: 7 buses	Mon to Fri 6:00AM to 7:42PM	26%	20 mins to 60 mins	Connects to Innisfil Heights, which is a provincially designated employment area.	From \$2,053 to \$5,303 Avg \$4,003	From \$734 to \$2,571 Avg \$1,836	<b>2031</b> From \$1,709 to \$3,009 Avg \$2,489	<b>2031</b> From \$1,078 to \$4,865 Avg \$3,350	
	2041: 96,876		<b>2041</b> 30 min headway: 5 buses							<b>2041</b> From \$1,791 to \$3,091 Avg \$2,571	<b>2041</b> From \$997 to \$4,783 Avg \$3,269	
	2051: 134,439		<b>2051</b> 60 min headway: 2 buses							<b>2051</b> From \$1,885 to \$3,185 Avg \$2,665	<b>2051</b> From \$903 to \$4,689 Avg \$3,175	

Source: 1. For Route A and B, the cost and revenue will be shared with the County. Details split between the Town and County can be determined in a future study.

2. Annual operation cost is based on the 2018 CUTA data for Barrie Transit

3. Excludes subsidies

**Table K- 11: Evaluation of Micromobility Alternative Solutions**

Alternative Transit System		General Operations				Level of Service			Financial Costs (\$000's) 1			
		Potential Ridership	Fare Structure	# of Fleets	Service Hours	Accessibility (% of Innisfil)	Reliability (average wait time)	Equity	Capital Cost 3	Annual Operation Cost	Revenue + Grants / Funding	Estimated Net Cost
Non-Dedicated ODT	Current Service Model	80,000 (Estimate)	Fixed Fare and rebate		24 hours, 7 days a week	All	6 mins	Inclusive of all ages and abilities.	\$0	\$695	Can vary	\$695
Micromobility Local Transit	Bikes	-	\$3.50 per trip	12	24 hours, 7 days a week	Within Alcona area	varies	Provides active transportation options for those who do not own bicycles or scooters.	\$24	\$13.8	-	-
	Scooters	-	\$20 / hr	12	24 hours, 7 days a week	Within Alcona area	varies	Provides active transportation options for those who do not own bicycles or scooters.	\$36	\$36	-	-
	Autonomous Pilot	-	\$2.50		Weekday morning and afternoon peak periods Weekend midday	Within Orbit + Friday Harbour	60 mins	Inclusive of all ages and abilities. The intent would be to provide a reliable and affordable service for employees and younger students to reach major employment nodes without a personal vehicle.	\$ 125 per bus	\$540 per bus	-	-

**Table K- 12: Summary of Evaluation**

Alternatives	Level of Service			Financial Cost		Recommendation
	Access	Reliability	Equity	Cost	Revenue	
Non-Dedicated ODT						
ODT services						
Fixed Route A						
Fixed Route B						
Fixed Route C						
Fixed Route D						
Bikes & Scooters						
Autonomous Pilot						
<b>Understanding the Rating System</b>						
Least Preferred to Most Preferred			Recommended Alternative to move forward			
			Recommended Strategy			
			Interim or Pilot Strategy			

Based on the evaluation above the ultimate preferred transit strategy is a combination of regularly scheduled Fixed Routes, similar to routes A, B, C and D along with on-demand transit services. A subsequent transit route planning study may be required to confirm implementation.

In addition, there may be opportunities for Bike & Scooter or Autonomous Pilot programs as solutions to the first-mile / last-mile needs of key employment or intensification areas such as

the Orbit community, Friday Harbour or Innisfil Heights. Coordination with potential partners would be required.

## **8.0 Funding the Town's Transit System**

Transit planning, maintenance, and operations are complex and expensive. All the transit systems presented in Figure K- 12 have a revenue-to-cost ratio of less than 100%. The remainder of the costs are usually covered by either municipal reserve funds or higher levels of government funding. Funding from other governments is necessary because addressing mobility needs and transit equity, as described in Section 1.2, and supporting sustainability objectives, as described in Section 1.3, are important public interest objectives, and the financial burden should not solely be placed upon the Town. Several programs are listed below, which, at the time of writing this memorandum, are available. Understandably, these initiatives may not be available at the time of further transit planning and implementation but are documented to provide an understanding of the level and magnitude of government funding for transit at this time.

### **Investing in Canada Infrastructure Program, Federal, Over \$33-billion**

The Investing in Canada Infrastructure Program (ICIP) provided long-term, stable funding delivered by Infrastructure Canada to: Help communities reduce air and water pollution, Build strong, dynamic, and inclusive communities, and Ensure Canadian families have access to modern, reliable services that improve their quality of life.

The Public Transit stream of the ICIP aimed to invest in the construction, expansion, and improvement of public transit infrastructure for projects that:

- Improve the capacity of public transit infrastructure.
- Improve the quality or safety of existing or future transit systems.
- Improve access to a public transit system.

### **Rural Transit Solutions Fund, Federal, \$250 million**

This Fund supported locally-driven transit solutions for rural and remote communities with flexibility for different local transit system innovations from fixed route to on-demand services to ride-shares. Eligible participants could have applied for grants up to \$50,000 in support of planning and design projects; up to \$3 million to help cover capital costs (e.g., purchase of a vehicle or digital platforms); and up to \$5 million to support zero-emission transit solutions.

### **Zero Emissions Transit Fund, Federal, \$2.75 billion**

This Fund offered support to public transit and school bus operators who are electrifying their fleets. There were two types of projects which could be funded. Planning projects include studies, modelling, and feasibility analysis that will support the development of future larger scale capital projects. Capital projects include buses, charging and refueling infrastructure, and other ancillary infrastructure needs.

## **Provincial Gas Tax, Provincial, \$376 million**

The Ontario government provided \$376 million to help municipalities across the province operate and improve local transit. The funding can be used to extend service hours, buy transit vehicles, add routes, improve accessibility or upgrade infrastructure.

## **9.0 Conclusion and Recommendations**

Since May 2017, the Innisfil transit system, in collaboration with Uber, has been able to provide residents with a mobility option that did not include a personal vehicle. This innovative solution was Canada's first ridesharing and transit partnership. This transit system has been able to enhance the Town's identity as a livable community by providing more options to connect to and from residential areas, employment opportunities and with adjacent municipalities like the City of Barrie. This system also helped increase accessibility to community centres, government services at Town Hall, and connect to other fixed route transit by providing subsidies to the closest GO transit bus stop or the GO train station.

As the future population grows to approximately 100,000 people and 28,000 jobs, there is a need to ensure the Town's transit system can keep up with the expected growth in transit demand. The planned transit improvements by Metrolinx within the Town of Innisfil is the construction of the Innisfil GO and the expansion of the Regional Express Rail program which will provide two-way all-day rail services. Simcoe County LINX Transit does not operate in the Town of Innisfil and there are currently no plans to expand to the Town. However, through the draft 2022 Simcoe County Transportation Master Plan, which at the time of writing this report is on-going, the County has recommended a consolidation of all local lower-tier transit systems to LINX so that a single County transit system is developed. Through collaborations with the County in this consolidation process, the Town should continue to advocate to expand LINX into the Town of Innisfil.

The existing Uber partnership has negligible capital costs, is flexible to meet demands for origins and destinations that are not in urban areas and provides for trip making during off-peak times. Monitoring of wait times and driver availability is recommended to assess the effectiveness of recent driver incentives. This service is currently effective and is expected to continue to be part of the transit solution.

A Dedicated ODT is seen as a potential immediate option to supplement the existing Uber transit partnership. A benefit-cost assessment would be required to confirm the size of fleet, hours of operation, geographic scope of service, ownership model (Town owned or third-party provider) that was acceptable to Town council.

Fixed Routes, providing service similar to routes A, B, C and D will provide a reliable service to in support of existing employers, future development and the planned GO rail station. It can provide a cost-effective service for priority routes as a logical expansion of the County LINX transit service. A subsequent transit route planning study may be required to confirm





- This TMP recommends that the transit-specific study investigate potential capital and operating funding programs from higher levels of government.
- The TMP recommends continual partnerships with Universities and on-demand transit providers to further develop the Town's transit system.