Springfield & Windsor Microtransit Study

Summary Memo

Southeast Vermont Transit (MOOver)

Final Report

May, 2022

Vermont Public Transportation Association

Prepared by Via Mobility, LLC

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Table of Contents

Executive Summary

This Existing Conditions Analysis was prepared for the Southeast Vermont Transit Agency(also known as MOOver). This report is part of a state-wide study evaluating microtransit in twelve different communities across the state. This document is focused on the communities of Springfield and Windsor, with populations of 9,000 and 3,400, respectively. In addition to documenting demographic and socioeconomic patterns in these towns, this report evaluates the ridership patterns of the Springfield In-Town and the Bellows Fall-Ludlow bus routes as well as the local demand-response services. Building on this analysis, microtransit alternatives were identified and evaluated with simulation technology. On the basis of this analysis and simulation work, conversations with MOOver and local stakeholders, and Via's experience with similar services around the United States and abroad, potential microtransit opportunities are identified for both Springfield and Windsor.

Area Overview and Study Opportunities

Springfield and Windsor have relatively low population density, with an average of fewer than 250 people per square mile in both towns. There are a limited number of denser areas in central and North Springfield and east-central Windsor. They sit on the northeastern boundary o MOOver's service area between White River Junction and Brattleboro.

Currently, MOOver operates two bus routes in Springfield. The Springfield In-Town route has about 650 passengers per month and provides local service every hour and 15 minutes. The Bellows Fall-Ludlow route offers three round trips per day, two in the morning and one in the late afternoon, connecting Springfield residents to nearby towns, including Rockingham and Chester. This route has 330 passengers per month. Both routes have relatively low productivity, which measures how efficiently the routes operate. The Springfield In-Town route has a productivity of 5 passengers per vehicle hour, while the Bellows Fall-Ludlow route has a productivity of 1.5 passengers per vehicle hour. Both routes are fare-free and operate during weekdays. There are no fixed-route buses operating within Windsor.

Key opportunities identified in this Study include:

- **Increase transit access to new areas.** While parts of Springfield are served by some fixed-route buses, the northern and southern areas have limited transit access. People in Windsor are even more limited and have to travel outside of the town to access regional bus connections. This requires many residents to use private vehicles or alternatives for their daily travel needs. Local microtransit can provide a flexible, locally-focused service that would give residents an alternative to traveling in private vehicles or relying on the restricted demand-response options.
- **Improve the quality-of-service for Springfield bus users.** The Springfield In-Town route operates every 75 minutes between 9:00 AM and 4:00 PM and limits riders to a set of stops mainly in downtown and North Springfield. A microtransit service would offer shorter wait times, journey

times, and walking requirements for passengers while also offering a broader range of travel destinations.

- **Consolidate Demand-Response Service Categories.** MOOver also offers demand-response services to residents of both towns. These trips are mostly Medicaid trips and about a third are E&D (ADA paratransit for people with disabilities or that are over the age of 60). MOOver serves about 360 monthly demand-response trips within Springfield and 40 monthly trips within Windsor. Across categories, demand-response service averages a productivity (trips per vehicle per hour) is about 2. MOOver may consider consolidating demand-response programs in these towns and more broadly in order to improve efficiency, potentially by delivering Medicaid, E&D, and other trips using the same fleet of vehicles. Note that microtransit cannot fully replace these services, as most demand-response trips serve destinations outside of the study area, but could serve as a suitable alternative for trips within the towns.

Summary of Results and Recommendations

Two zone alternatives were identified as opportunities for microtransit, the town of Springfield and the town of Windsor. For the Springfield zone, the predicted demand is expected to be between 50 and 125 daily passengers. For the larger Windsor zone, demand is predicted to be between 15 and 35 daily passengers. The simulations indicated that two vehicles during peak hours would be sufficient to deliver the anticipated medium demand in Springfield, and one vehicle would be sufficient to deliver the anticipated demand in Windsor. As the current Springfield In-Town bus route currently operates using a single vehicle, this service would require an additional vehicle and driver. However, this would likely enable a significant ridership to more than double, and service would be available for longer hours to more destinations. Launching a microtransit service in Windsor would expand transit access to a currently underserved area, but would also require additional funding. Depending on the level of community support and ridership in Windsor, a single vehicle may not be required during all times of day, although this would significantly limit the utility of the service for transit-dependent residents.

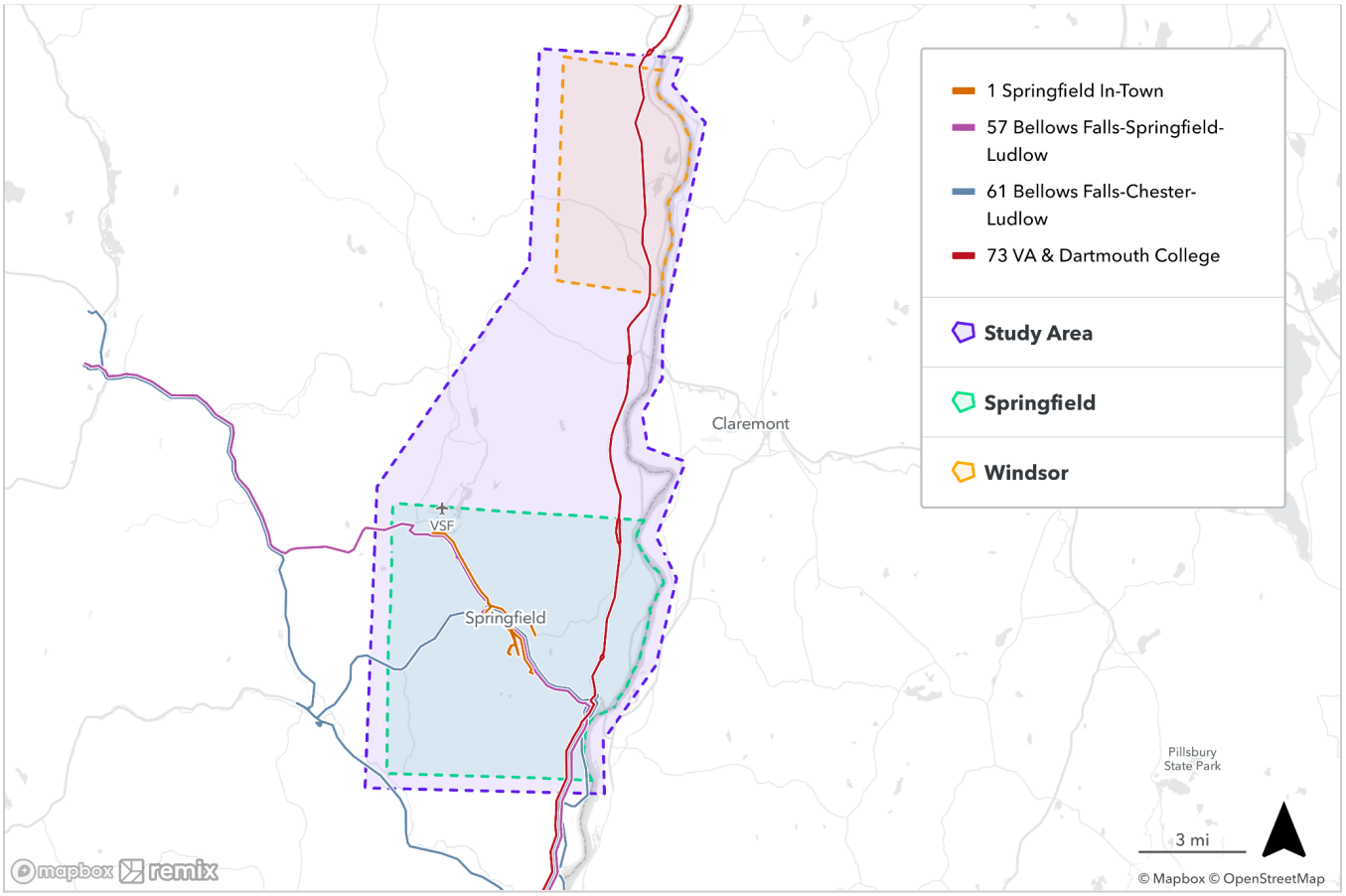
Service	**Windsor Demand-Response**	**Springfield Demand-Response**	**Springfield In-Town Bus**	**Springfield Microtransit**	**Windsor Microtransit**
Service Hours	Weekdays, 8:00 am - 4:30 PM		Weekdays, 9:00 am - 4:00 PM	Weekdays, 7:00 am - 6:00 pm	
Demand Scenario	Existing	Existing	Existing	Medium	Medium
Trips (boardings per weekday)	2	15	25 - 30	75	22

Vehicles Required at Peak (min. number of vehicles to accommodate demand)	-	-	1	2	1
Average Productivity (passengers/vehicle/hr)	2		5	3 - 5	2 - 3
Average Wait Time (minutes)	-	-	-	12 - 15	8 - 10
Average Trip Duration (minutes)	-	-	-	8 - 10	9 - 11
Average Total Walking Distance (meters)	-	-	-	120 - 140	100 - 130
Percent Shared Rides	-	-	-	25 - 35%	0 - 10%
Annual Passengers	500	4,320	7,800	20,000	5,700
Annual Revenue Hours	1,000	2,160	1,650	5,000	3,120

1. Existing Conditions Analysis

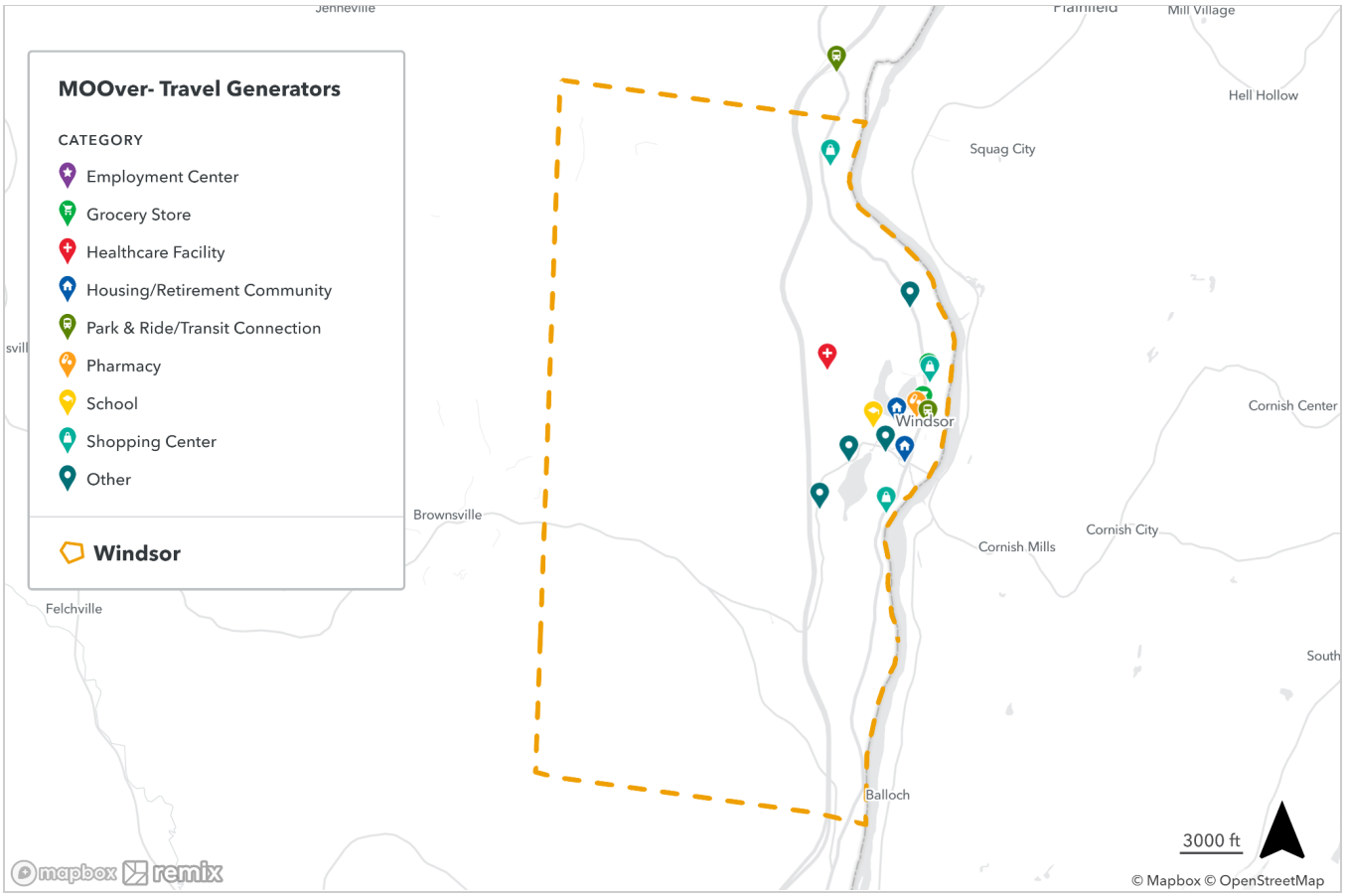
1.1. Study Area Overview

The study is focused on two areas. The first is the town of Springfield and the area around the Springfield In-Town bus route. The second is around the town of Windsor.



1.2. Area Travel Generators

In Springfield, most travel generators are along the Springfield In-Town bus route in central and North Springfield. These include medical facilities, social services, grocery stores, and affordable housing complexes. In Windsor, most travel generators are located on the easter side of the town. They include the same types of attractors as in Springfield, the Mt. Ascutney hospital, apartment complexes, and grocery stores. The Park & Ride at Interstate 91 Exit 7 is a point of interest in Springfield though located further southeast than the other points of interest. The Park & Ride stops at I-91 Exits 8 & 9 are located beyond the Windsor Town boundaries to the north and south.


MOOver- Travel Generators
CATEGORY
Employment Center
Grocery Store
Healthcare Facility
Housing/Retirement Community
Park & Ride/Transit Connection
Pharmacy
School
Shopping Center
Other
Windsor
Jenneville
Plainfield
Mill Village
Hell Hollow
Squag City
Windsor
Cornish Center
Brownsville
Cornish City
Cornish Mills
Felchville
South
Balloch
3000 ft
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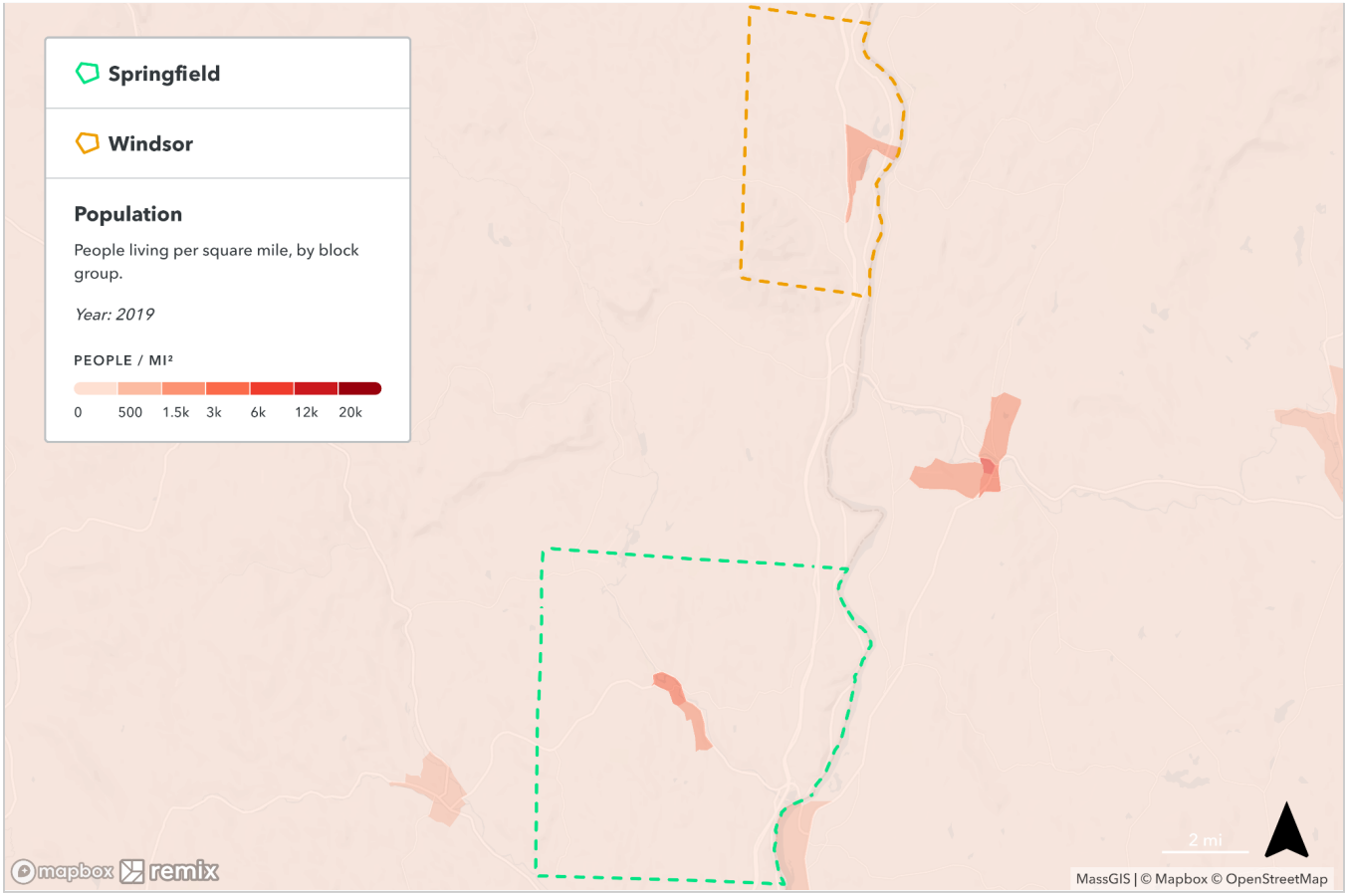
1.3. Demographic and Socioeconomic Factors

1.3.1. Population density

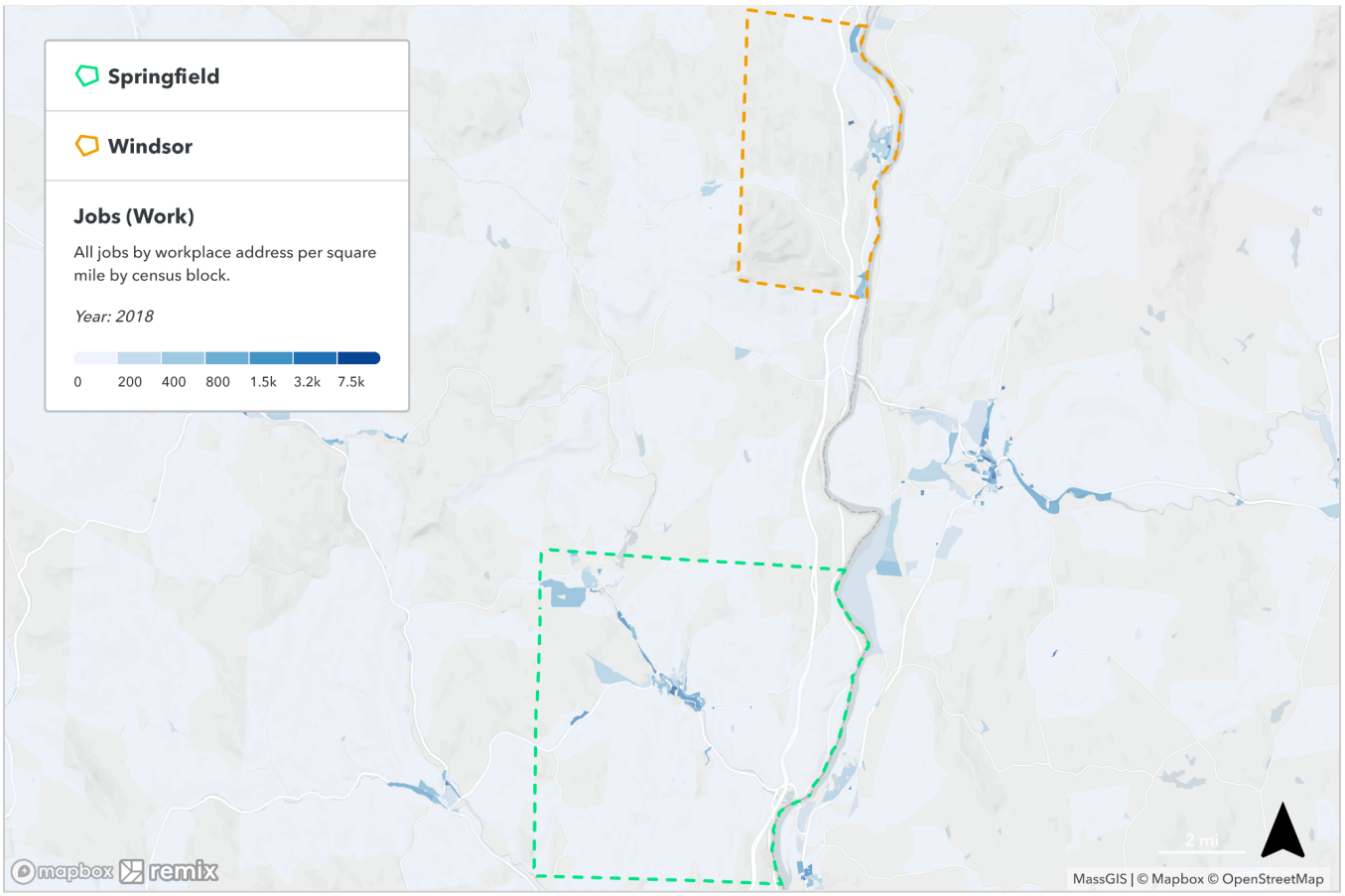
Populations in Springfield and Windsor are concentrated in a small area of the town's boundaries. The population in Springfield is 9,000 and is primarily focused around the center of the town and northeast Springfield area. Windsor's population is 3,400 and is concentrated in the center-west side of the town.



Source: US Census, 2020.

1.3.2. Job density

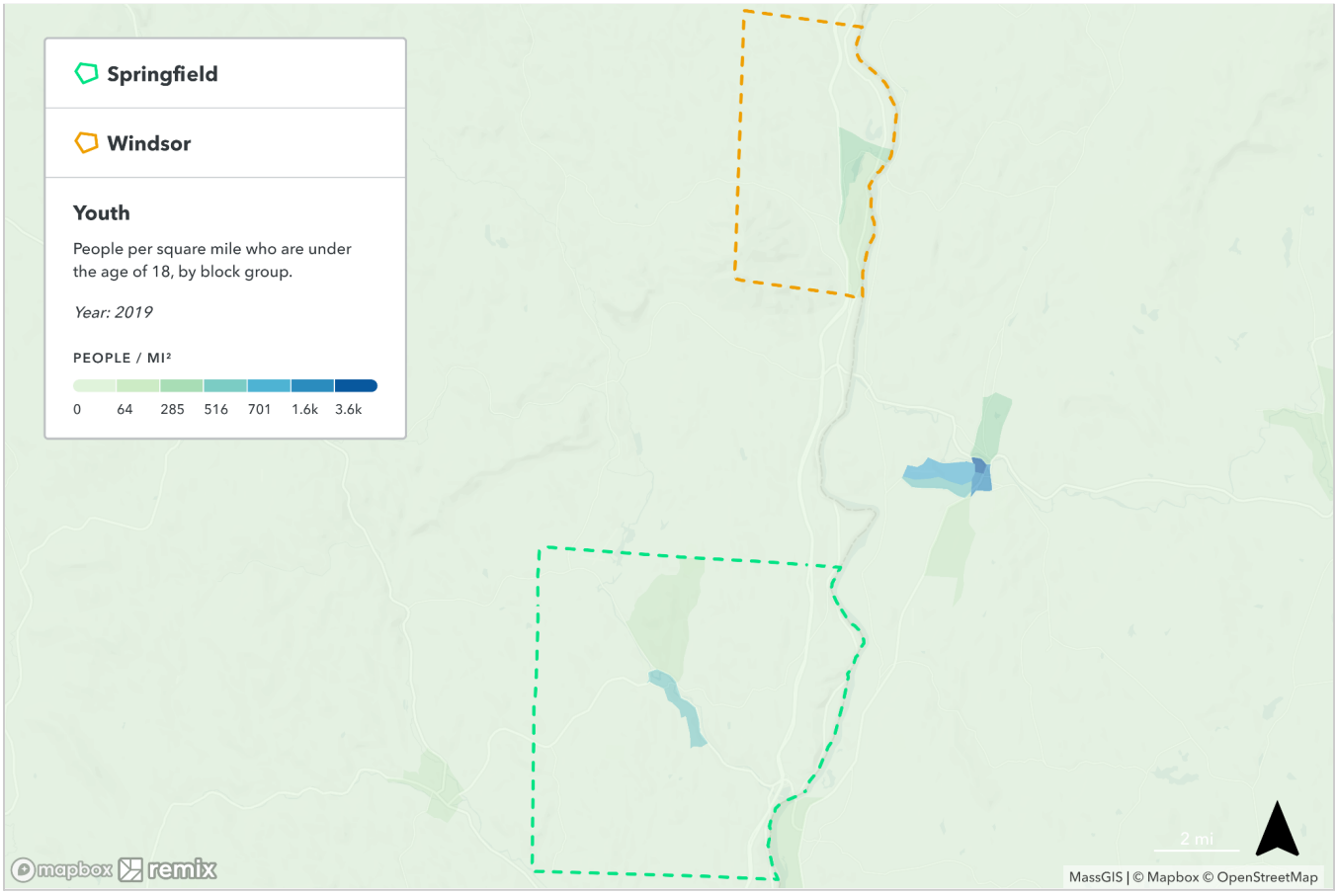
Employment density is an indicator of where people may travel to on a daily basis. Jobs in the towns are generally concentrated in the same areas as the population density. There are 4,100 jobs in Springfield and 1,500 in Windsor.



Source: Longitudinal Employer-Household Dynamics (LEHD) Jobs Data, 2018.

1.3.3. Youth population density

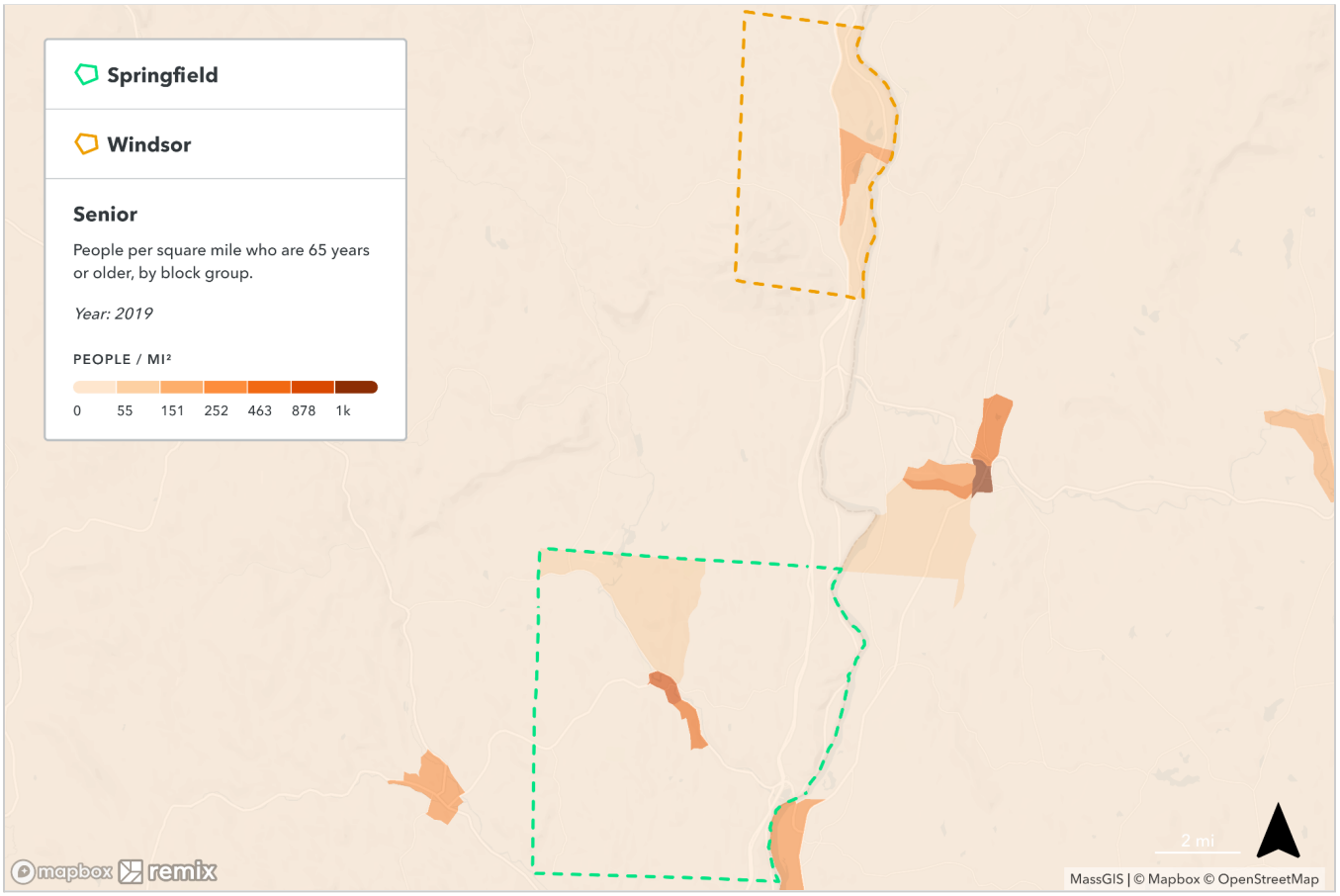
Youth are often frequent users of public transit as many are students and do not have access to a private vehicle. 17% of both Springfield and Windsor's populations are under 18.



Source: American Community Survey (ACS) 5-Year Estimates, 2019.

1.3.4. Older adult population density

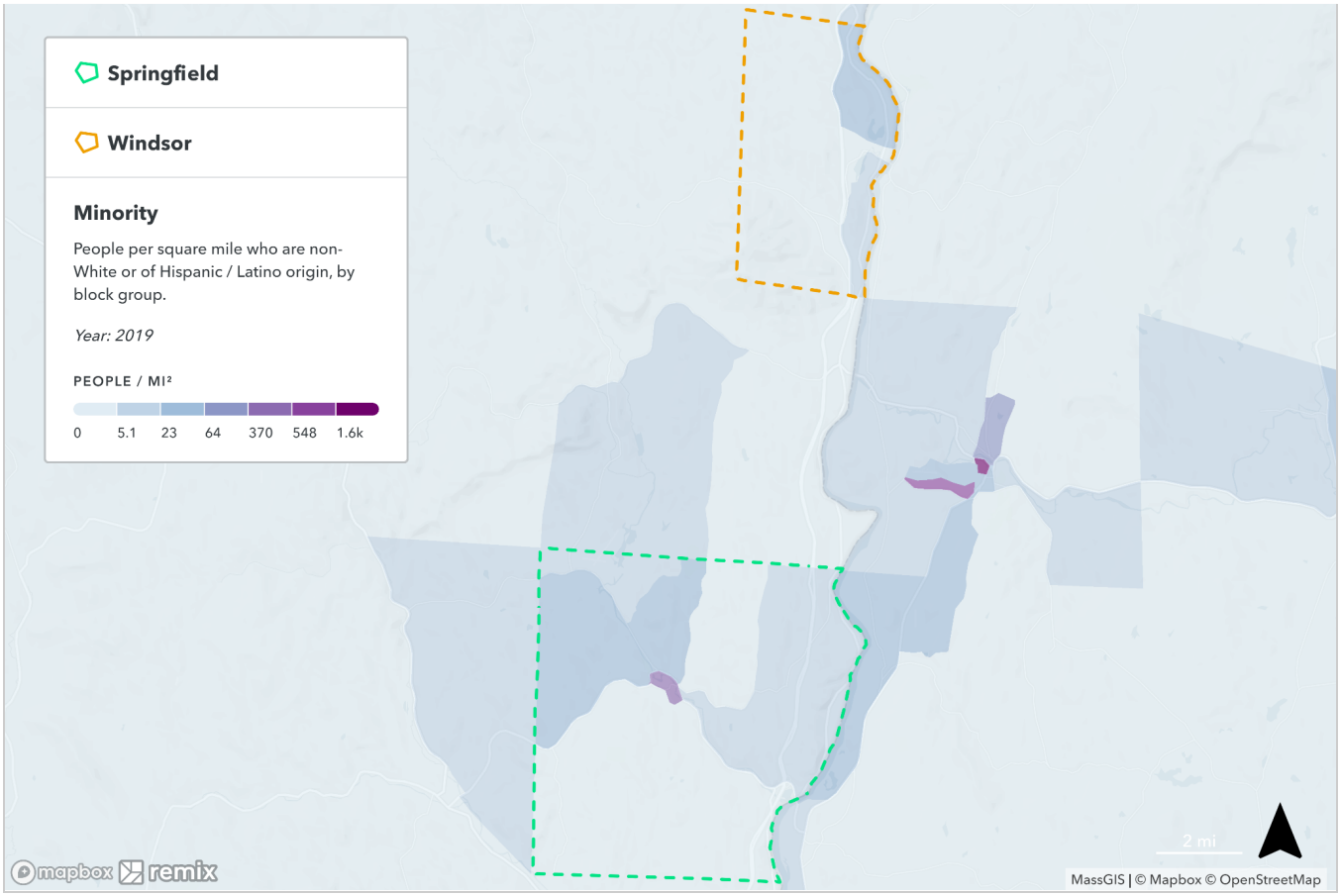
Older adults have a higher tendency to rely on public transit for many reasons, including lower incomes and lower rates of vehicle ownership and usage. 23% of Springfield's population is over 65; in Windsor, the rate of older adults is slightly lower at 21%, both slightly higher than the average for the state of Vermont at 20%.



Source: American Community Survey (ACS) 5-Year Estimates, 2019.

1.3.5. Minority population

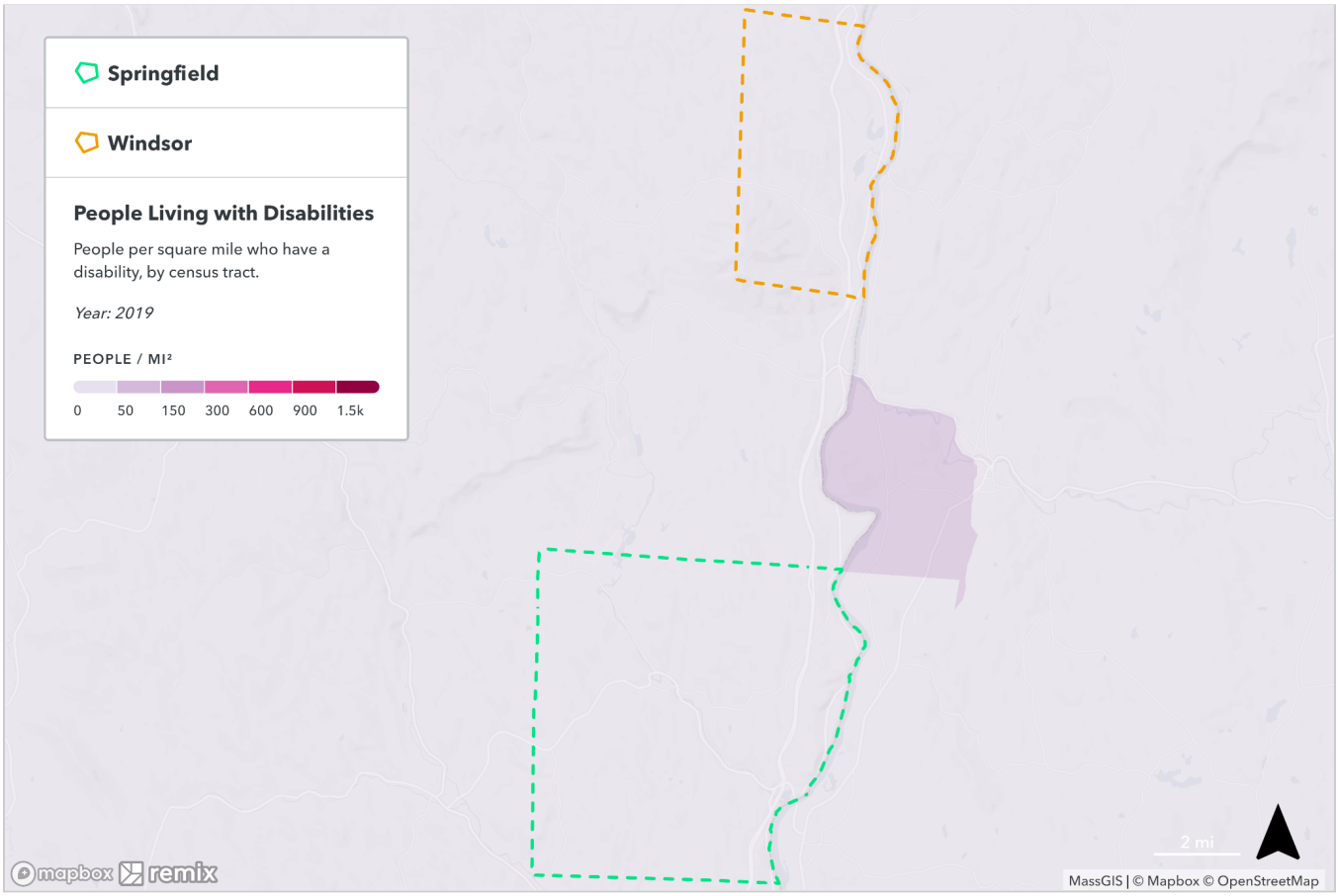
Nonwhite and Hispanic/Latino communities may have a higher tendency to use public transit, with lower incomes and rates of vehicle ownership than white residents in most of the US. In some instances, communities of color have historically faced disadvantaged access to public transit. In the 2020 U.S. Census, 9% of Springfield and Windsor residents identified as non-white or of Hispanic/Latino origin. This is slightly higher than the average for the state in which 8% of the population identify as non-white or of Hispanic/Latino origin.



Source: US Census, 2020.

1.3.6. People living with a disability

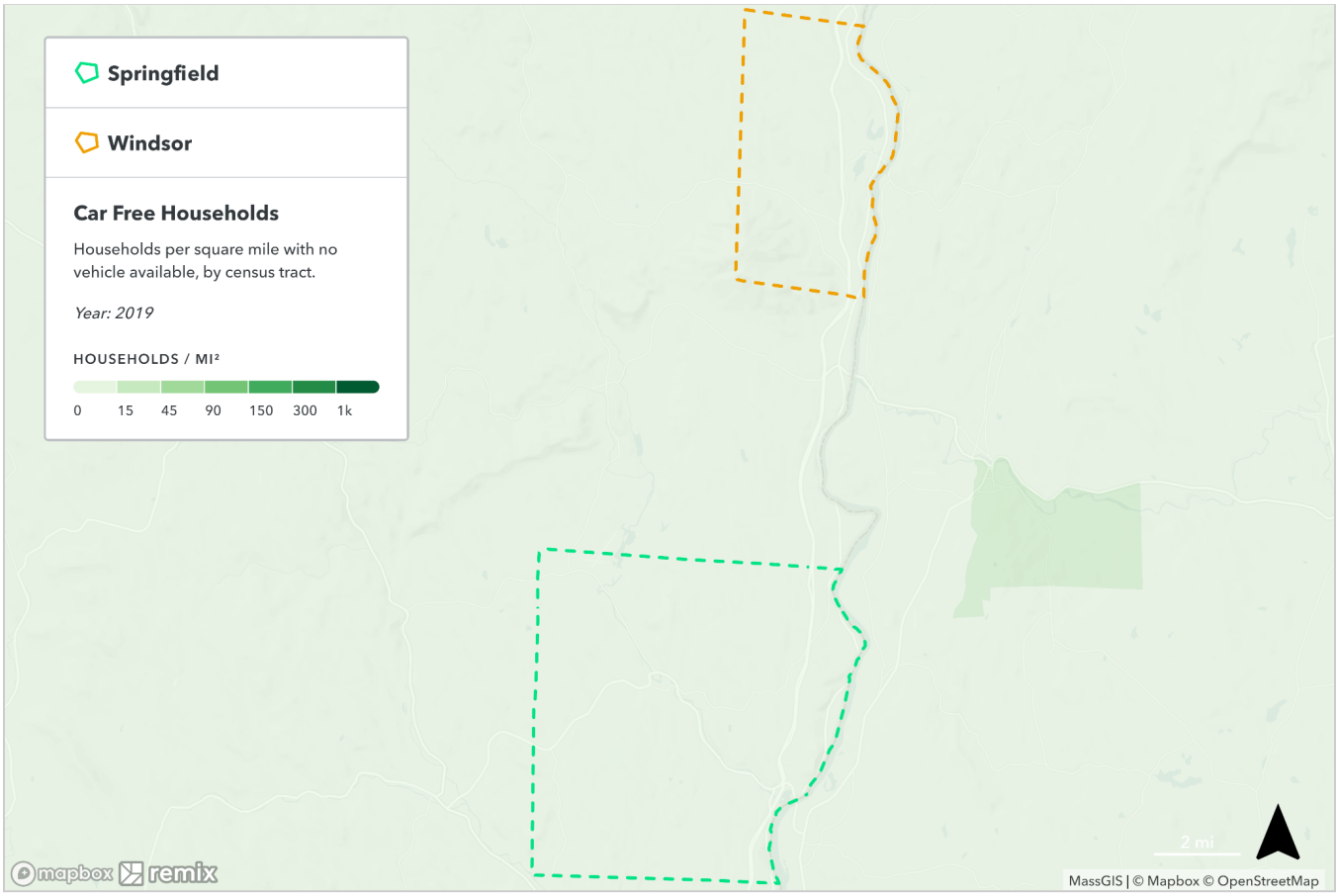
Many people with disabilities cannot drive themselves or afford a private vehicle and are more likely to rely on alternative forms of transportation, including public transit. In Windsor, individuals with disabilities are 13% of the total population; in Springfield, people with disabilities represent 21% of the total population.



Source: American Community Survey (ACS) 5-Year Estimates, 2019.

1.3.7. Car-free households

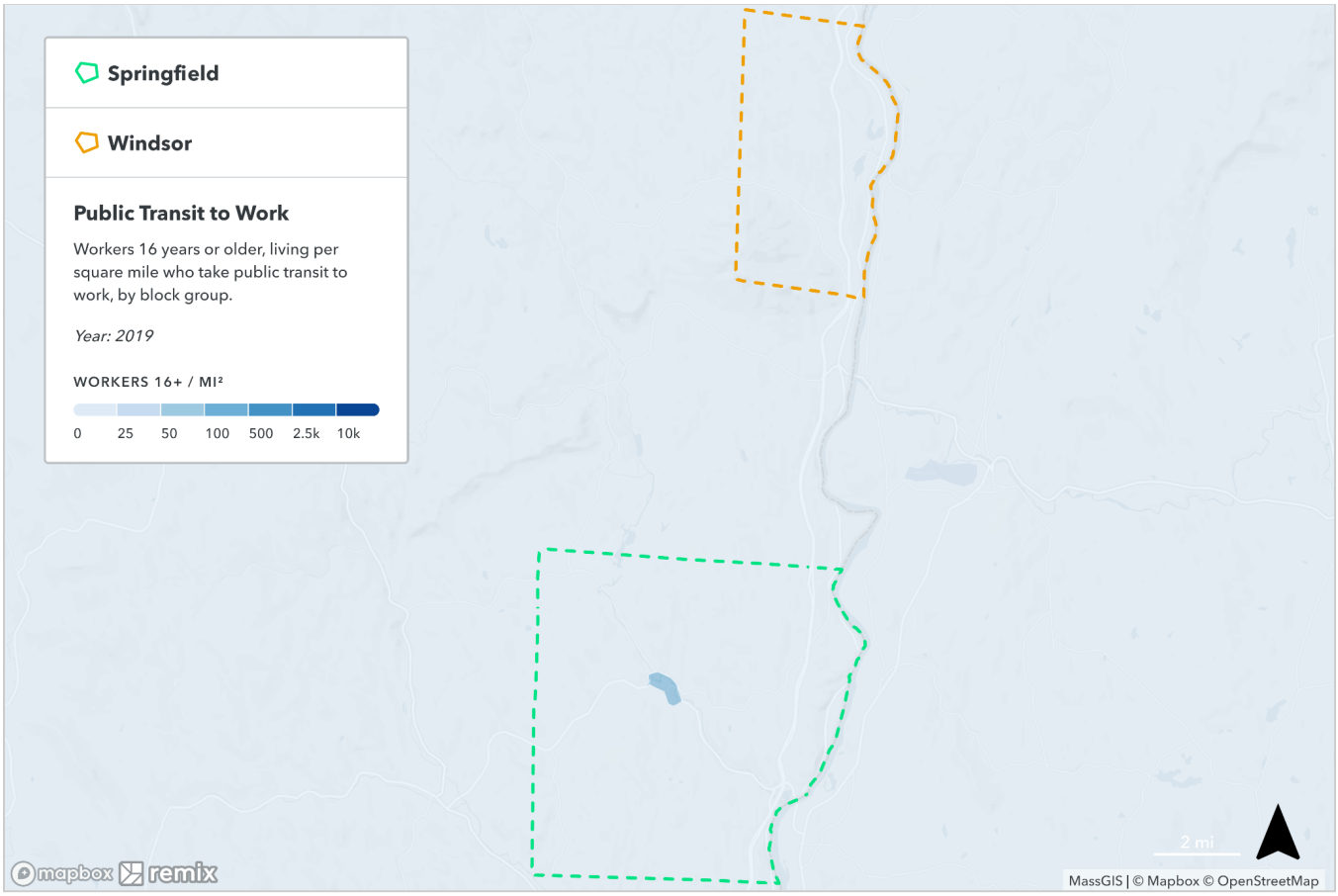
Households without access to a private vehicle are often more reliant on public transit than the general public. If public transit is not available, these households may rely on friends/family to drive them or have to take more expensive taxi services. If neither of those options are available, they may be unable to travel at all. In Springfield, 9% of households have zero-vehicles, and 45% have just one car. In Windsor, the rates are slightly lower, 6% and 40%, respectively.



Source: American Community Survey (ACS) 5-Year Estimates, 2019.

1.3.8. Public-transit commuters

As expected, the areas with the highest rates of public transit use are places where public transit operates. Very few people currently rely on public transit to commute to their jobs. About 2% of the Springfield population take transit to work, less than 1% of Windsor residents take public transit to work. As Windsor has no bus routes operating within the town, it is possible these residents are using a combination of private vehicle and public transit for their trip.



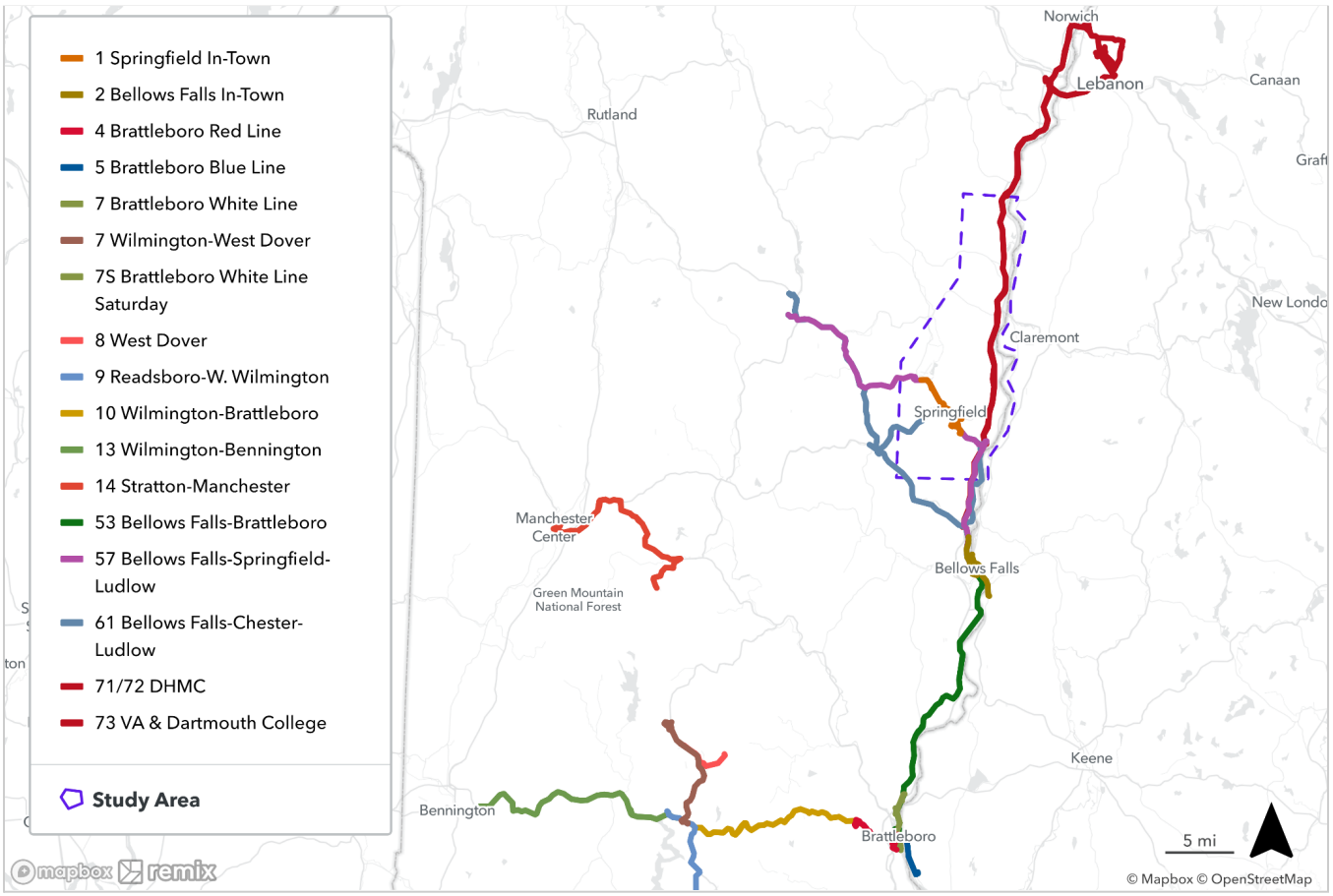
Source: American Community Survey (ACS) 5-Year Estimates, 2019.

1.4. Transit Review

1.4.1. Fixed-Route Review

MOOver System

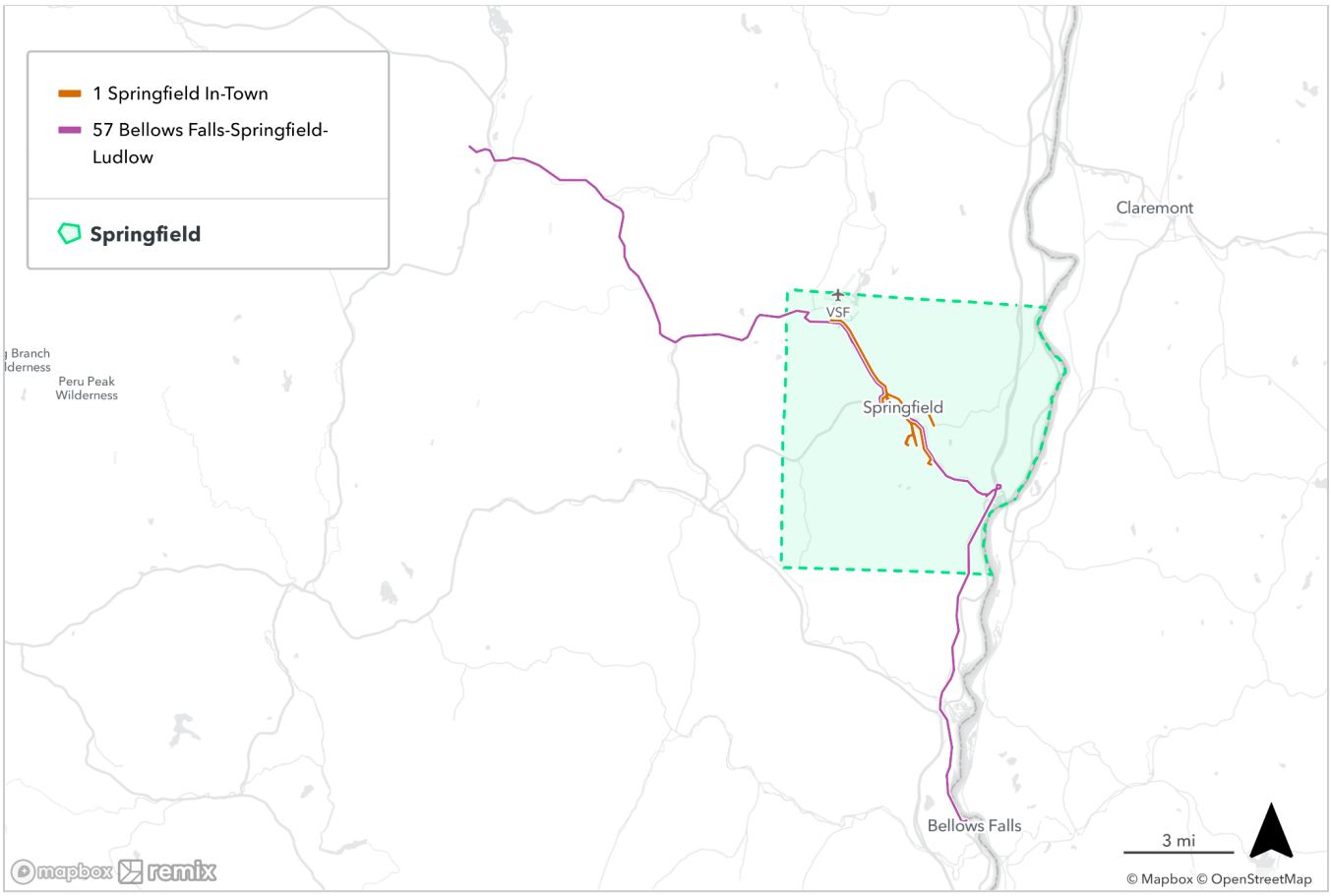
MOOver operates fixed-route service in the southeast region, including Windsor, Bennington, and Windham counties. There are 26 routes, 14 in the Wilmington System and 12 Southeast Vermont routes (formerly the Rockingham System). The routes cover both regional and local trips. The local routes are in Bellows Falls, Springfield, Brattleboro, and Dover, with connections extending to Wilmington, Bennington, Readsboro, Ludlow, and White River Junction. There is also a regional route connecting Manchester and Stratton. Some routes (not shown on the map below) run seasonally only during weekends and holidays. All MOOver routes are fare-free.



Fixed-Route Transit in the Study Area

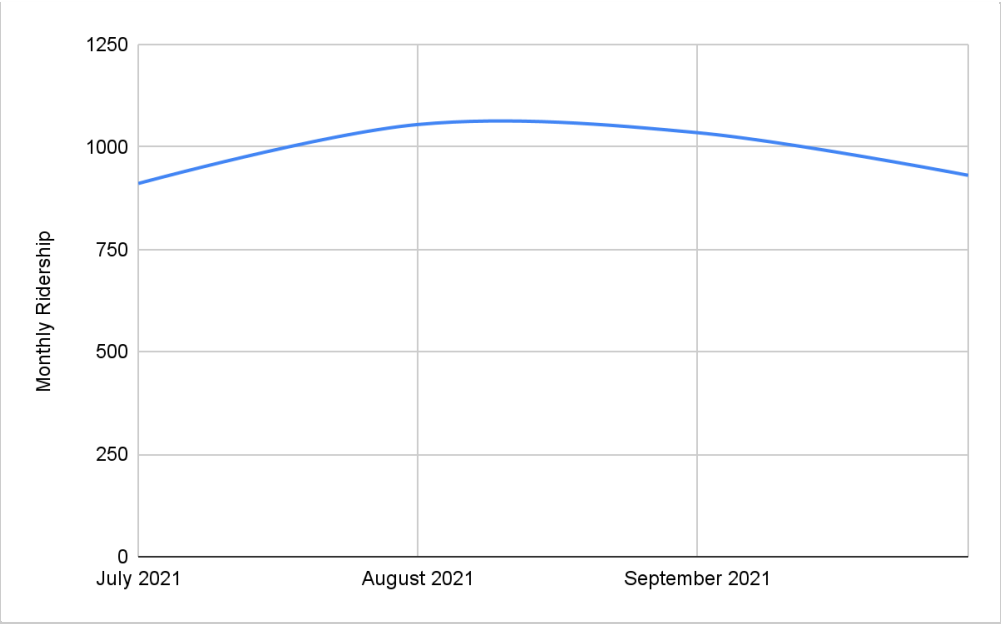
Two routes are relevant to the Springfield Study Area. They are the 1 Springfield In-Town route and the 57 Bellows Falls-Ludlow route. The Springfield In-Town route runs on weekdays between 9:00 AM and 4:00 PM every hour and 15 minutes and covers stops in downtown Springfield and the North Springfield area. Route 57 runs between Ludlow and Bellows Falls, with stops along the way in Springfield and North Springfield. It completes three round trips per weekday from 6:30 AM to 6:00 PM. Each one-way trip takes approximately an hour and 10 minutes. There are two round trips in the morning and one in the late afternoon with a break in service between 11:30 AM and 3:30 PM. Passengers can connect to other routes in Ludlow and Bellows Falls to get to Rutland and Brattleboro.

While there are no routes in Windsor, the 71/72/73 routes provide regional connections from slightly beyond the town boundaries to the north and south at two Park & Ride stops near exits 8 and 9 of Interstate 91.



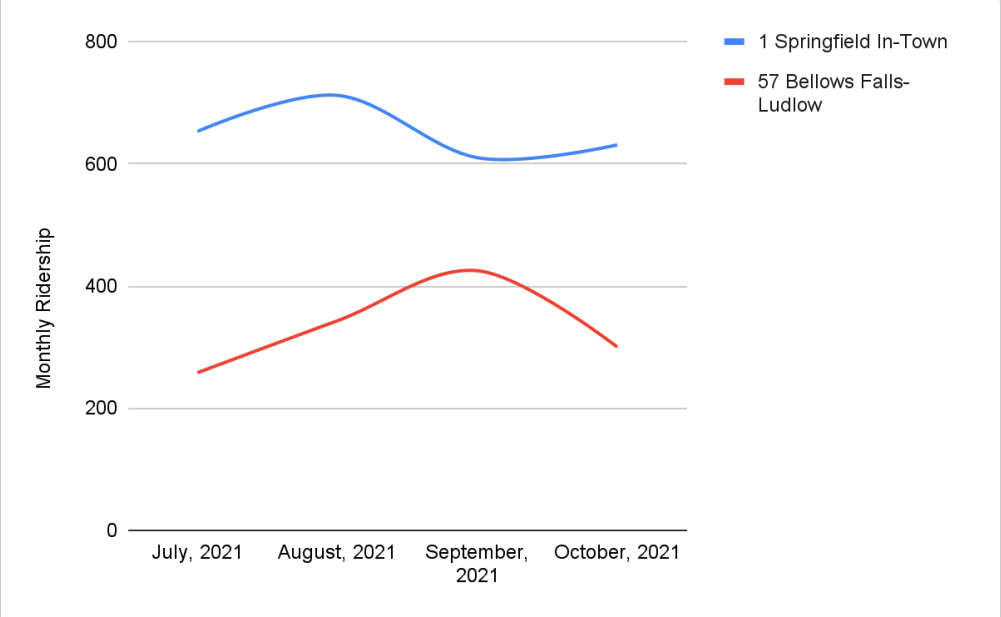
1.4.1.1. Monthly Ridership

This study looked at ridership from July 2021 through October 2021 for two routes, the Springfield In-Town and the Bellows Falls-Ludlow route. During this time the overall ridership was fairly consistent with a peak in August and an average around 1,000 riders over both routes per month.



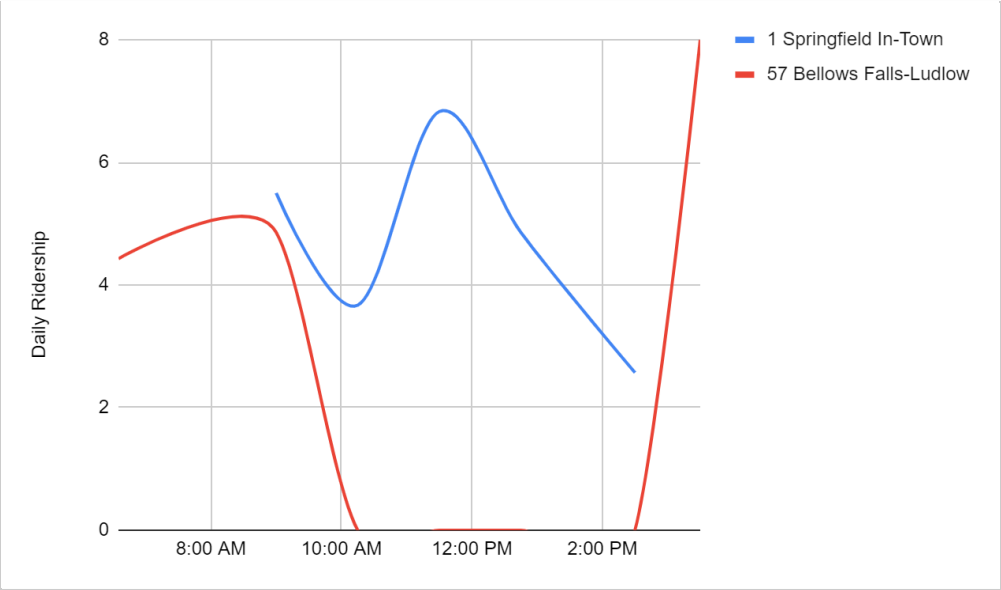
1.4.1.2. Ridership by Route

When looking at ridership by route, the Springfield In-Town service has a higher ridership with about 650 monthly trips, compared to the Bellows Falls-Ludlow route which averages 330 boardings per month.



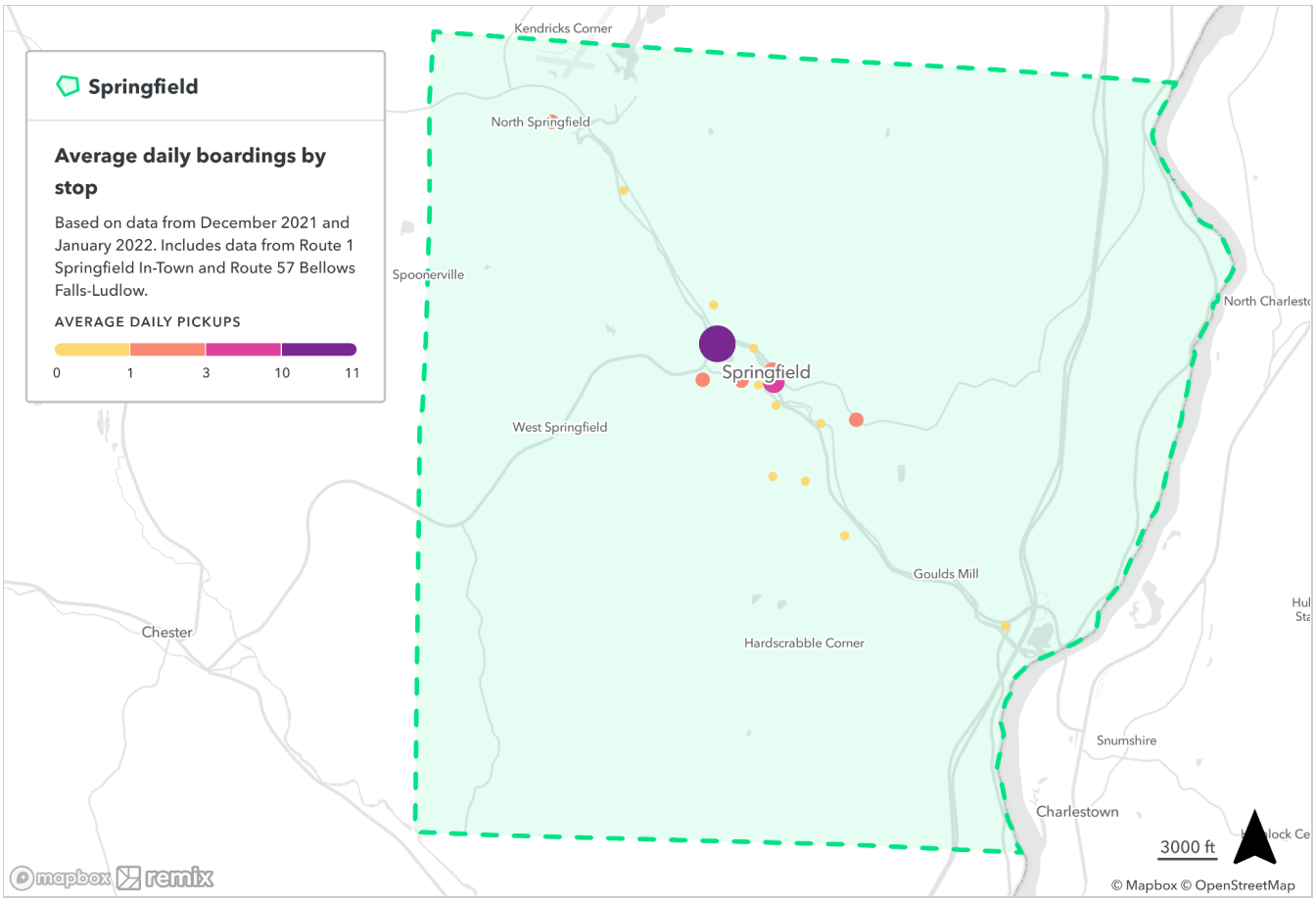
1.4.1.3. Ridership by Time of Day

Ridership on the Springfield In-Town Route is highest during the middle of the day. In contrast, the Bellows Falls-Ludlow route peaks in the mornings and afternoons, as reflected by the route's service hours. The chart below shows the average daily pickups across two weeks collected during December 2021 and January 2022. It is aggregated by run, where the start of each bus's run time is represented below (not actual pickup times by stop).



1.4.1.4. Stop-Level Ridership

The most popular stop is at Springfield Plaza, which includes a grocery store, pharmacy, and discount store. Other popular destinations include the Huber building stop (downtown Springfield) and the North Springfield Post Office. There is no fixed-route service in Windsor.



1.4.1.5. Productivity by Route

The chart below highlights the ridership and productivity (rides per vehicle hour) for each route. Ridership and productivity are both higher in the Springfield In-Town route; however, both routes have relatively low productivity.

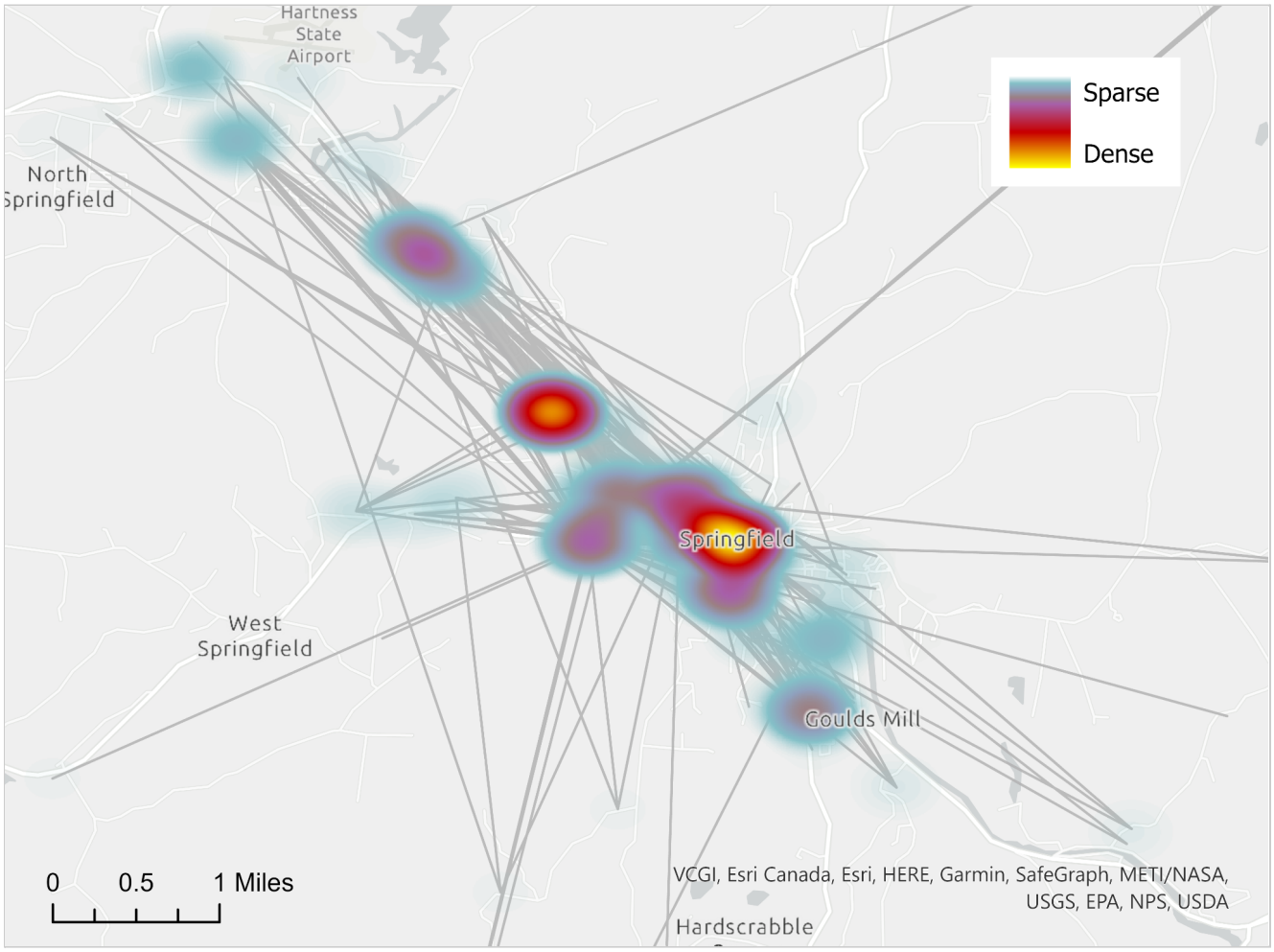
Route Name	Route Number	Schedule	Monthly Ridership	Productivity
Springfield In-Town	1	Weekdays	650	5
Bellows Falls-Ludlow	57	Weekdays	330	1.5

1.3.2. Demand Response Review

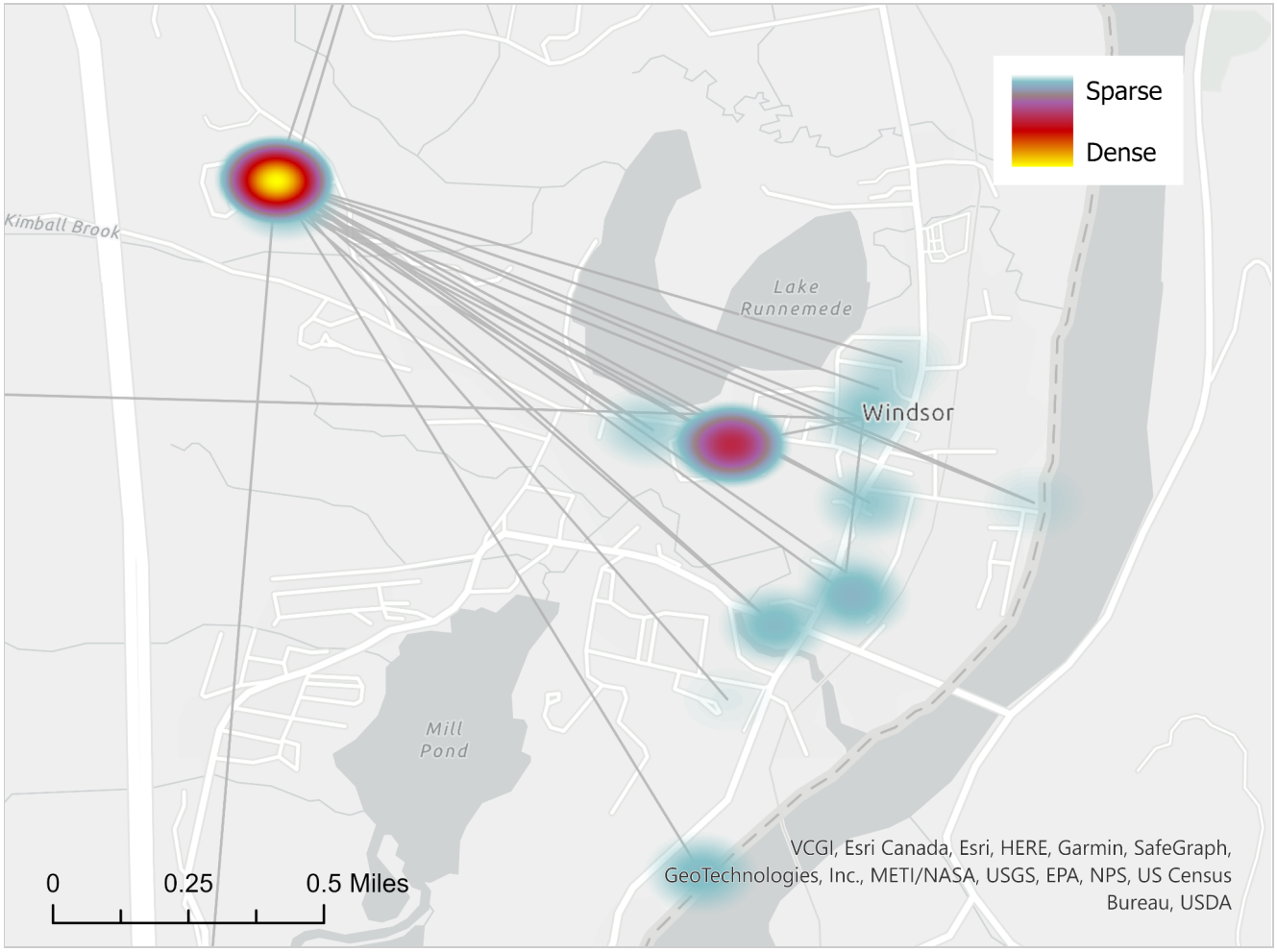
In addition to its fixed-route system, MOOver provides door-to-door transportation for riders over the age of 60 and for persons with ADA-defined disabilities. MOOver also provides Medicaid approved transportation for non-emergency medical appointments (NEMT) for those in Windham or southern Windsor County without access to a vehicle.

1.4.2.1. Heat Map of Ridership

Within Springfield, approximately 15 demand-response trips are completed per day, compared to about 2 per day within Windsor. In Springfield, the most popular trip requests are either to or from the Adult Day Center, Springfield Hospital, Springfield Health Center, and the Health Care & Rehabilitation Services center (HCRS). In Windsor, the most popular requests are to or from the Mt. Ascutney Hospital and Olde Windsor Village (senior living community). This analysis did not account for trips between Windsor and Springfield and other cities nor between the two towns of Springfield and Windsor.



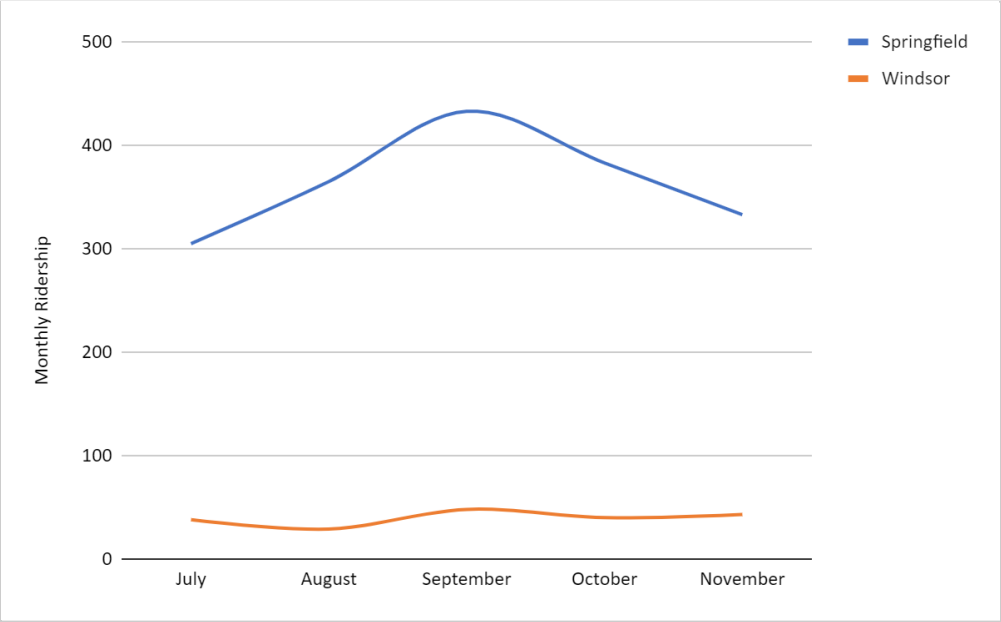
Heat Map of ridership for all demand-response service categories to or from Springfield. Gray lines represent links between origins and destinations.



Heat Map of ridership for all demand-response service categories to or from Windsor. Gray lines represent links between origins and destinations.

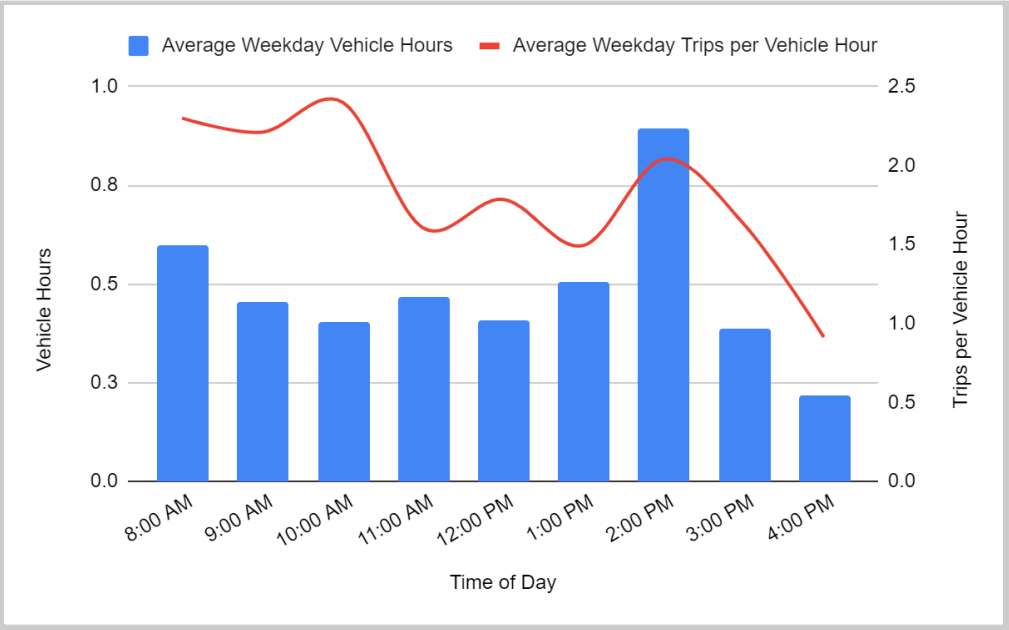
1.4.2.2. Ridership by Month

The data below shows the monthly trip patterns for demand-response trips in both Springfield and Windsor. Between July 2021 and November 2021, the average monthly ridership in Springfield is 360 trips per month, compared to 40 trips per month on average in Windsor. In both towns, the number of trips peaked in September. In Springfield, one-third of the trips are E&D, and two-thirds are Medicaid. In Windsor, only 24% are E&D, with the remaining 76% being Medicaid trips.



1.4.2.3. Revenue Hours and Productivity

The chart below shows the daily average revenue hours and productivity for both cities combined from July 2021 to November 2021. The revenue hours are highest around 2:00 PM, when there is also a peak in ridership. Productivity (measured by trips per revenue hour) fluctuates throughout the day for an average of about two trips per revenue hour. About four revenue hours serve the daily demand in both cities. This analysis does not include the time vehicles travel to and from the depots or between trip requests.



2. Alternatives Analysis

Via worked with MOOver and local stakeholders to select alternatives for modeling on the basis of our existing conditions analysis, and MOOver's goals for the service. In these discussions, two areas were identified as promising for a microtransit service. The first is the town of Springfield. Simulations for this zone would look at possible replacements for the Springfield In-Town bus route while expanding service to the entire town. The town of Windsor is the second zone. In this zone alternative, transit access would be expanded to an area that has no fixed-route service and minimal transit access. For each zone alternative, microtransit simulations were performed to measure expected service performance according to several Key Performance Indicators (KPIs). The following section outlines the methodology and parameters used to evaluate the two alternatives, a description of the service zones, predicted travel patterns, and the results of several simulations.

2.1. Methodology and Parameters

Microtransit simulations were performed at predicted levels of demand, and under assumed service parameters. Prior to performing simulations, we estimated demand and worked with MOOver to select simulation parameters designed to achieve certain quality-of-service targets. An overview of our approach to demand estimation and the parameters we considered can be found below.

2.1.1. Demand Estimate Methodology

It is important to estimate demand for a microtransit service to ensure that a sufficient number of vehicles are available to complete all trips during peak hours. Demand estimates represent expected ridership for a zone. Low, medium, and high demand estimates intend to provide a range of possible future ridership levels, where medium demand is the most likely case scenario. Depending on the level of marketing and community support, it is likely to take 6-12 months for ridership numbers to grow.

Demand estimates are based on Via's internal demand model, along with our analysis of existing transit in the zone. Our demand model compares these factors to other Via deployments in Vermont and globally, and compares factors such as restrictions on origins/destinations, zone size, setting (urban, suburban, rural), and density.

The estimated demand for both zone alternatives is shown below:

Zone	Area	Population (Census 2020)	Jobs (LEHD 2019)	Daily Demand Estimates		
				Low	Medium	High
Springfield	50 mi²	9,000	3,800	50	75	125
Windsor	20 mi²	3,400	1,500	15	22	35

2.1.2. Simulation Parameters

The simulations of each alternative allow for the identification of tradeoffs between quality-of-service (e.g., average wait time) and service efficiency. The simulations also predict the quality-of-service and

ridership capacity of a given fleet. To simulate the various zone and demand alternatives, there are several parameters that need to be set including:

- **Service hours**: the times during which a passenger can book a ride, which typically align with or expand upon the fixed-route bus schedule.
- **Maximum wait time**: the maximum time a passenger will be asked to wait for a vehicle from the time they request a ride. Longer wait times are common in rural areas while shorter wait times are common in urban areas or when a service is competing with private vehicle travel. The average wait time is significantly shorter than the maximum. For example, a 30 minute maximum wait time typically has an average wait time between 5 and 20 minutes depending on the time of day and passenger demand.
- **Stop types:** where vehicles stop to pick up passengers, which may include curb-to-curb service (where passengers are picked up and dropped off at the exact location of their request) or corner-to-corner, which asks passengers to walk to a nearby intersection in order to improve the overall efficiency of the service by minimizing detours.
- **Maximum detours**: the distance and length of time that a vehicle will detour from the direct route between a boarded passenger's origin and destination to serve additional customers. The standard setting for this parameter is 50% additional time or distance compared to the direct trip.
- **Maximum walking distance**: the maximum distance a passenger will be asked to walk to/from their origin/destination to meet their vehicle. Longer walking distances will increase the efficiency of a service by helping aggregate more passengers at fewer pickup and dropoff locations. Longer walks may negatively impact customer experience.

For each zone alternative identified and each demand scenario, two qualities of service were simulated. The parameters for each are outlined in the table below.

Parameter	Lower-Quality-of-Service	Higher-Quality-of-Service
Service hours	Weekdays, 7:00 AM - 6:00 PM	Weekdays, 7:00 AM - 6:00 PM
Maximum wait times	30 minutes	45 minutes
Stop types	Corner-to-Corner	Corner-to-Corner
Maximum detours	50% additional time or distance vs. direct route	50% additional time or distance vs. direct route
Maximum walking distances	.25 miles	.25 miles

Among the parameters listed above, maximum wait time has the most significant impact on service. Allowing longer waits typically increases the system's ridership capacity, and improves its ability to aggregate passengers.

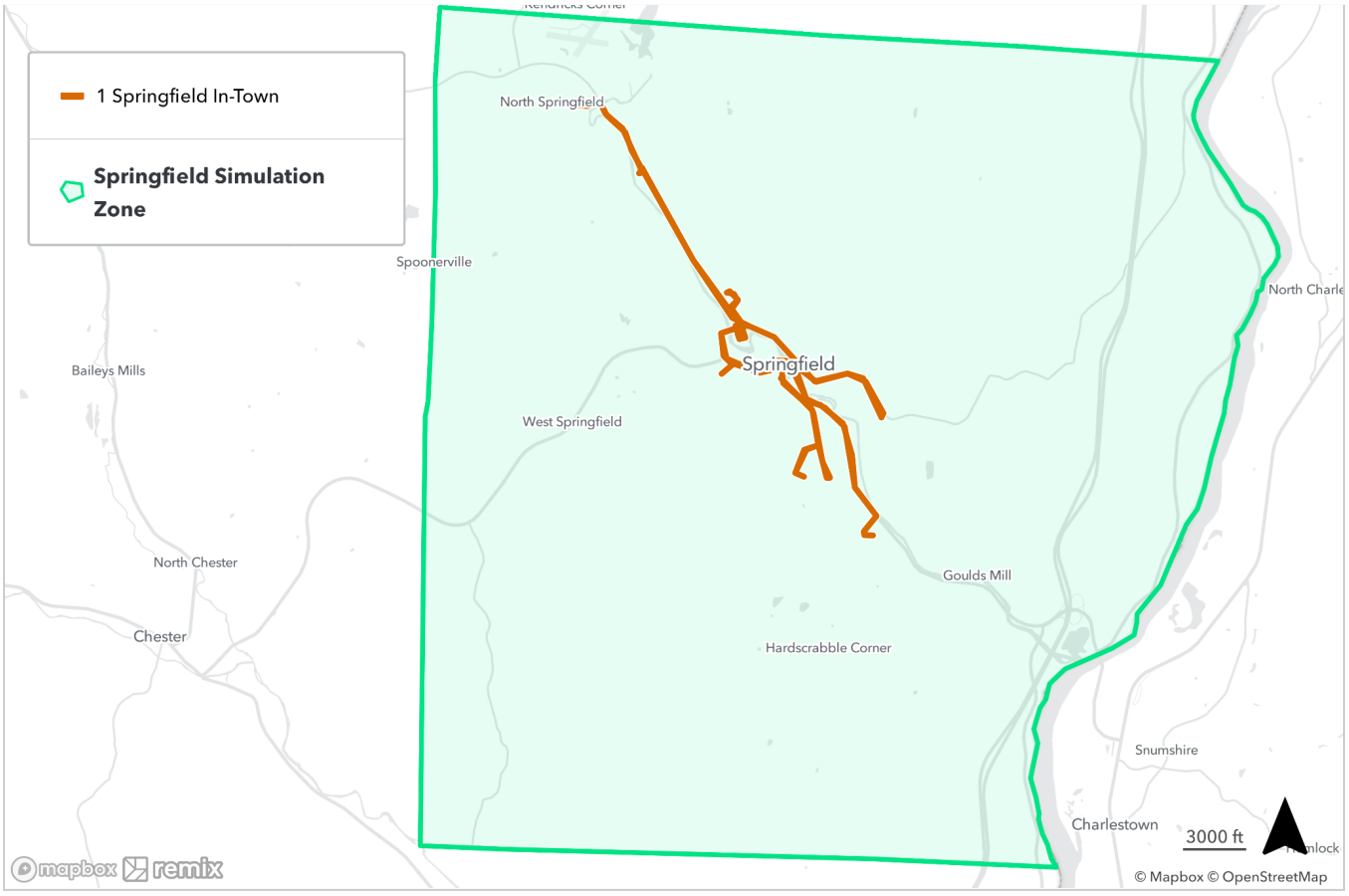
2.2. Simulation Alternatives and Results

Through conversations with MOOver and local stakeholders, two zones were identified for further evaluation. The first is the town of Springfield, which includes the area currently served by the Springfield In-Town bus route. These simulations are used to determine the costs associated with improving the quality-of-service for existing bus riders while growing ridership and increasing the locations people can travel to. The second zone is the town of Windsor. For this zone alternative, the goal was to evaluate the feasibility of expanding transit access to a new population that is currently underserved.

2.2.1. Springfield

2.2.1.1. Zone profile

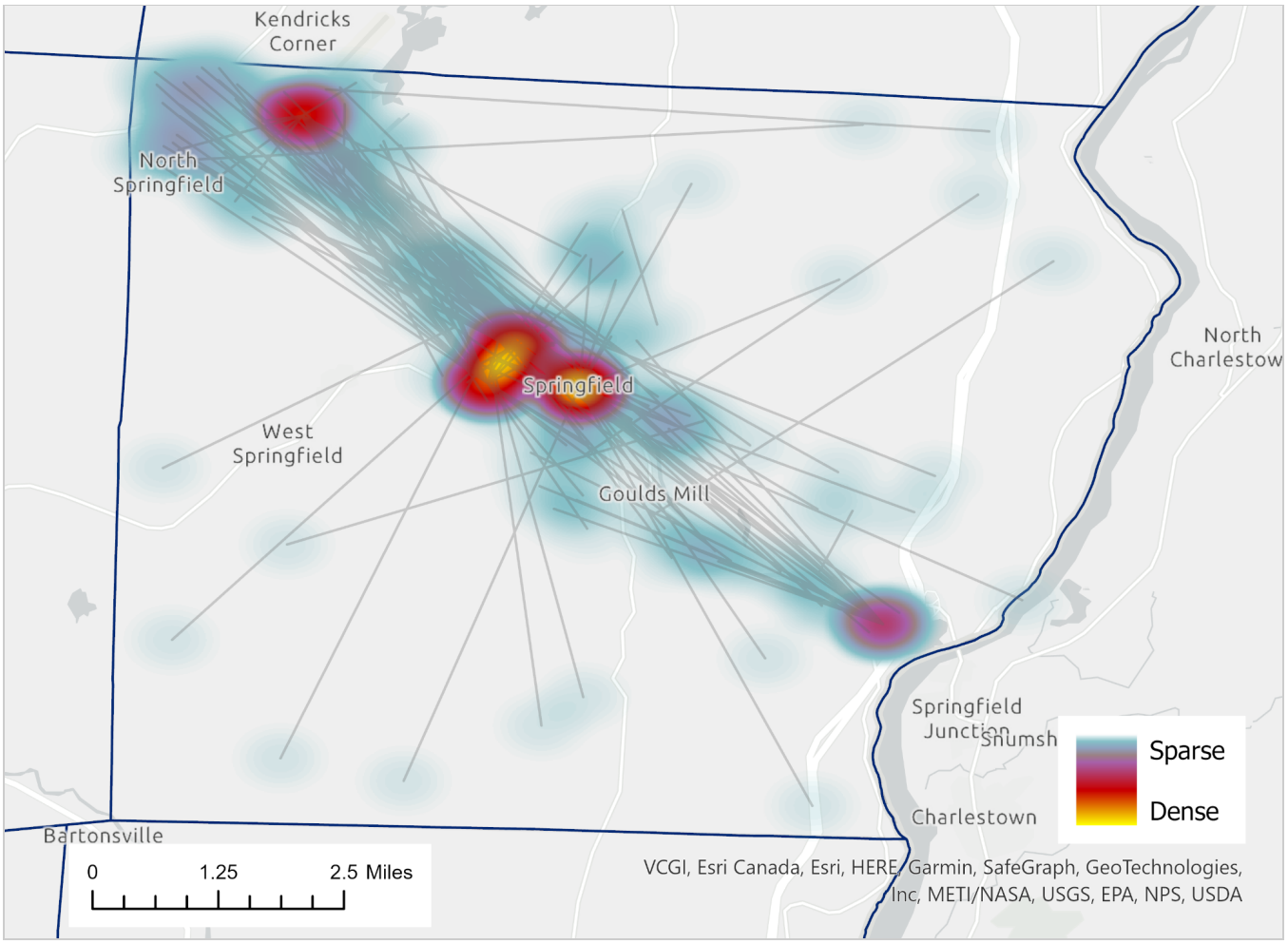
The map below represents the first zone alternative which covers the town of Springfield, including the current service zone of the Springfield In-Town bus. The zone has a population of 9,000 people and 3,800 jobs. There are about 180 people per square mile in the zone. It significantly expands access to transit beyond the current In-Town bus catchment.



2.2.1.2. Demand pattern

The predicted demand distribution is based on the stop-level ridership of the MOOver buses, the demand response travel patterns, and key points of interest identified in the Existing Conditions Analysis.

The heat map below represents the origins and destinations patterns used in the simulations. The brighter yellow and red areas represent relatively high demand and the blue areas represent relatively less demand. The grey lines show examples of origin and destination trip pairs but not the actual vehicle routing.



In this alternative, there is the most demand expected to/from downtown Springfield near the Huber building and town offices, the Springfield Shopping Plaza, Springfield Hospital, and some businesses in North Springfield.

2.2.1.3. Simulation Results

The table below displays the simulation results for the first zone alternative, Springfield at three levels of demand and two levels of quality-of-service.

Maximum Wait Time (minutes)	**30 (Higher-Quality-of-Service)**			**45 (Lower-Quality-of-Service)**		
Demand Scenario	**Low**	**Medium**	**High**	**Low**	**Medium**	**High**
Trips (boardings per weekday)	50	75	125	50	75	125
Vehicles Required at Peak (min.	1	2	2	1	2	2

number of vehicles to accommodate demand)						
Average Productivity (passengers/ revenue hr)	3 - 5	3 - 5	3 - 6	3 - 5	3 - 5	4 - 6
Average Wait Time (minutes)	15 - 20	7 - 10	8 - 12	15 - 20	12 - 15	13 - 16
Average Trip Duration (minutes)	8 - 10	8 - 10	9 - 11	8 - 10	8 - 10	9 - 11
Average Total Walking Distance (meters)	140 - 180	100 - 140	100 - 140	140 - 180	120 - 140	140 - 160
Percent Shared Rides	30 - 40%	25 - 35%	40 - 60%	30 - 40%	25 -35%	35 - 45%
Annual Passengers	12,500	20,000	32,000	12,500	20,000	32,000
Annual Revenue Hours	3,120	5,000*	6,250	3,120	5,000*	5,000*

*Assumes second vehicle is only in use during peak hours

The simulations indicated that two vehicles would be sufficient at the medium and high demand scenarios to deliver the anticipated demand in both the lower and higher quality-of-service scenarios. Reducing the quality of service by increasing wait times did not impact the required vehicles needed. However, at the medium demand and lower quality of service and high demand, you will likely only need the second vehicle during peak hours. Adjusting the quality-of-service parameters (increasing the maximum wait times from 30 minutes to 45 minutes) slightly increased the average weight times and average walking distances for the medium and high demand scenarios but had no impact on the average trip durations.

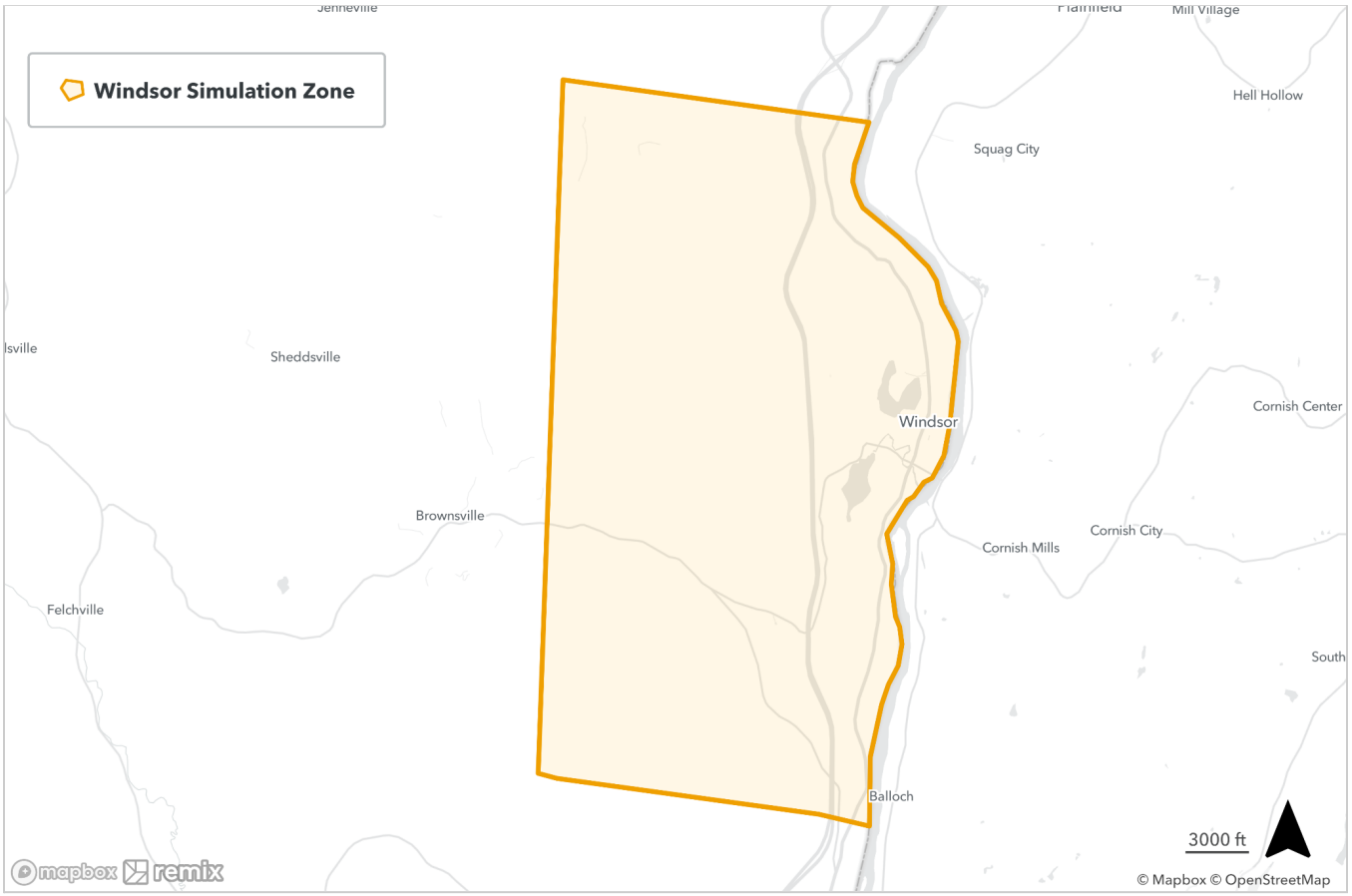
The efficiency of service can be measured by the number of boardings per revenue hour, known as the service's productivity. Overall the average productivity stayed constant between the low and medium demand scenarios but increased by one passenger per revenue hour between the medium and high demand scenarios. At their peak, the medium and high demand scenarios will have similar productivity to the existing fixed-route bus, around five boardings per hour. The two vehicle service would require more than double the vehicle hours than the current service but would provide service for longer hours and to a larger service area.

The simulations also indicate that this level of demand could be served with a vehicle with at least six seats, such as a minivan or cutaway bus. In the event of higher-than-anticipated demand, these challenges can be addressed by increasing vehicle supply, or changing (e.g. adjusting parameters, or restricting service to a subset of users) to ensure availability at target quality-of-service levels.

2.2.2. Windsor

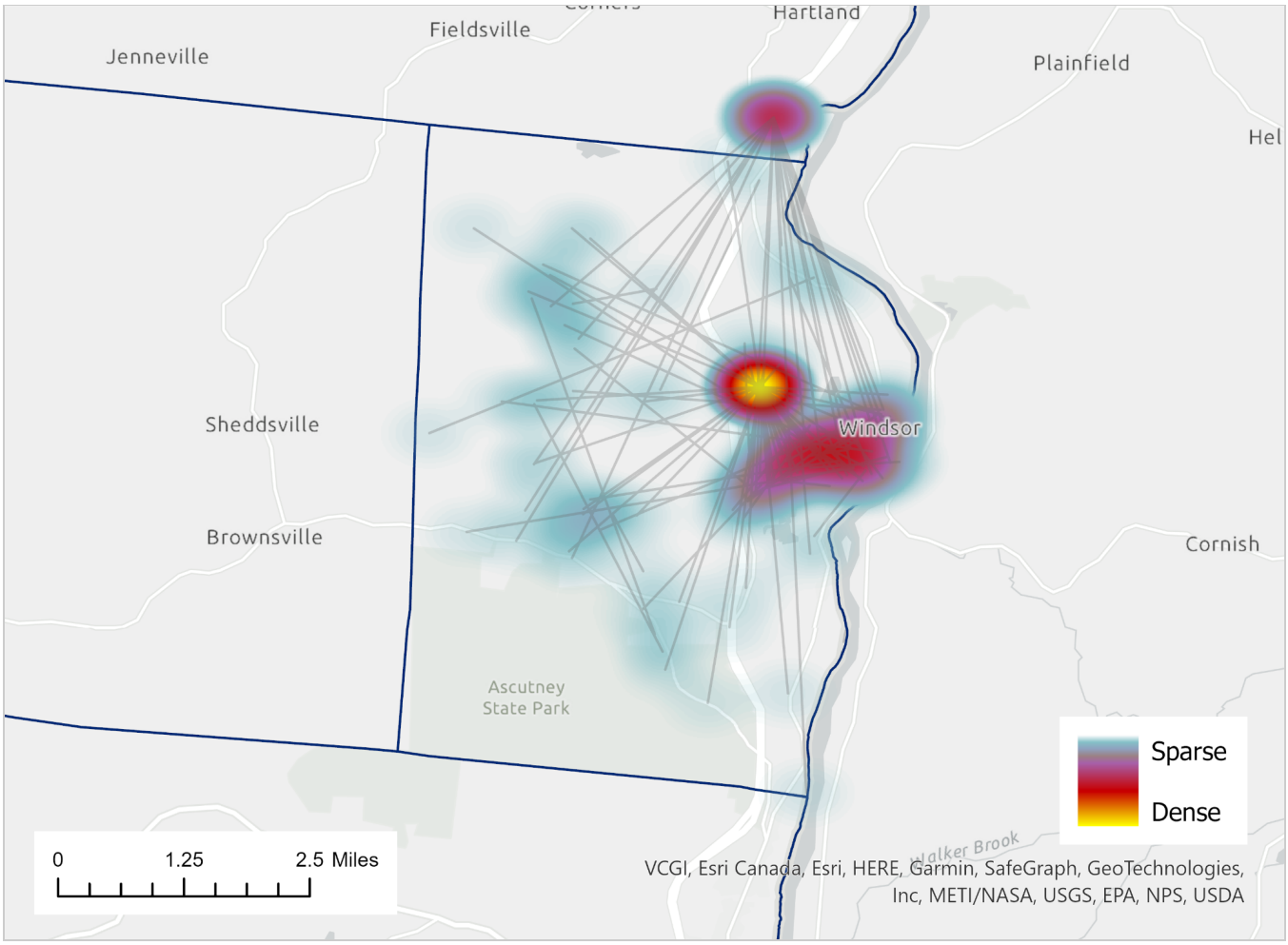
2.2.2.1. Zone profile

The map below shows the second zone alternative which covers the town of Windsor, an area with limited transit access. The zone has a population of 3,400 people and 1,500 jobs. There are about 170 people per square mile in the zone.



2.2.2.2. Demand pattern

The predicted demand distribution is based on the demand response travel patterns and key points of interest identified in the Existing Conditions Analysis. The heat map below represents the origins and destinations patterns used in the simulations. The brighter yellow and red areas represent relatively high demand and the blue areas represent relatively less demand. The grey lines show examples of origin and destination trip pairs but not the actual vehicle routing.



In this alternative, there is the most demand expected to/from Mt. Ascutney Hospital, shopping plazas and grocery stores in downtown Windsor, and the I-91 Exit 9 Park & Ride.

2.2.2.3. Simulation Results

The table below displays the simulation results for the second zone alternative, Windsor at three levels of demand and two levels of quality-of-service.

Maximum Wait Time (minutes)	**30 (Higher-Quality-of-Service)**			**45 (Lower-Quality-of-Service)**		
Demand Scenario	**Low**	**Medium**	**High**	**Low**	**Medium**	**High**
Trips (boardings per weekday)	15	22	35	15	22	35
Vehicles Required at Peak (min. number of vehicles to accommodate demand)	1	1	1	1	1	1
Average Productivity (passengers/ revenue hr)	1 - 2	2 - 3	2.5 - 3.5	1 - 2	2 - 3	2.5 - 3.5
Average Wait Time (minutes)	6 - 8	8 - 10	12 - 14	6 - 8	8 - 10	12 - 14

Average Trip Duration (minutes)	8 - 10	9 - 11	10 - 12	8 - 10	9 - 11	10 - 12
Average Total Walking Distance (meters)	70 - 100	100 - 130	110 - 140	70 - 100	100 - 130	110 - 140
Percent Shared Rides	0%	10%	20%	0%	10%	20%
Annual Passengers	3,900	5,700	9.200	3,900	5,700	9,200
Annual Revenue Hours	3,120	3,120	3,120	3,120	3,120	3,120

The simulations indicated that in all Windsor scenarios, one vehicle would be sufficient to deliver the anticipated demand in both the lower and higher quality-of-service scenarios. At the projected demand levels, adjusting parameters (changing quality-of-service) had no impact on projected performance and ridership capacity. Increasing maximum wait times to 45 minutes would still result in average wait times of 6 to 14 minutes, depending on the demand level.

The small size of the zone and relatively low projected demand resulted in relatively short walks and minimal sharing across all scenarios. As ridership increases, estimated productivity increases as the revenue hours are consistent across all scenarios. Like the Springfield zone, the simulations indicate the service could be delivered with a minivan or cutaway vehicle.

It is estimated that this service would require slightly more than three times the number of vehicle hours than are currently being used to serve Windsor's demand-response trips. However, this service increases transit access to the general public for other trip purposes that are not eligible for E&D or Medicaid-funded services. It would also allow passengers more flexibility with same-day bookings and longer service hours.

3. Summary and Recommendations

3.1. Cost Analysis

The table below breaks down the anticipated cost structure of microtransit service in Springfield and Windsor, based on average expenses in microtransit services. We estimated costs using fully-burdened rates which include admin and overhead, along with technology costs.

Cost Category	Inclusions	Percent of Total Costs
Driver	Wages, hiring, training, benefits	~40%
Vehicle	Leasing, insurance, maintenance, fuel, cleaning	~40%
Admin and Overhead	Administrative tasks, dispatching, customer support	~15%
Technology	Software development, maintenance, hosting costs	~5%

In both towns, we anticipate hourly microtransit costs will be about $60 - $80 per vehicle hour (based on NTD data, conversations with MOOver, and Via's experience with similar services around the United States).

Zone	Demand Scenario	Annual Ridership	Peak Fleet Required	Cost per Vehicle Revenue Hour	Annual Cost	Cost per Passenger
Springfield	Low	12,500	1	$60 - $80	$190,000 - $250,000	$15 - $20
	Medium	20,000	2		$300,000 - $400,000	$15 - $20
	High	32,000				$9 - $13
Windsor	Low	3,900	1	$60 - $80	$190,000 - $250,000	$48 - $64
	Medium	5,700				$33 - $44
	High	9,200				$20 - $27

3.2. Recommendations

3.2.1. Service Design

Based on the results of simulations, this memo includes preliminary recommendations specific to microtransit in Springfield and Windsor. Please note that recommendations will be elaborated in the statewide final report, which will include a set of recommendations broadly applicable for Vermont Transit providers. Preliminary recommendations include:

- **Replace the Springfield In-Town Bus with microtransit.** The simulated Microtransit service would provide additional flexibility to passengers, longer service hours, and shorter wait times. While

the medium and high demand scenarios require a second vehicle, these could be smaller vehicles and would serve a much higher ridership than is currently being served by the fixed-route bus. However, this will only be possible if funding is available, as it will require an additional vehicle and driver during certain hours.

- **Apply the lower quality of service parameters.** While the 45 minute maximum wait times made no difference in the Windsor simulations, for Springfield, it would allow enough flexibility to only require a second vehicle during peak hours at the highest demand. At lower demands, the algorithm would still provide a higher quality of service (short wait times and journey times) and allow for growth in ridership without adjusting the vehicle supply or service parameters. Given that the current Springfield In-Town bus operates every 75 minutes, even the high-end average wait times of 20 minutes would be a significant improvement for current riders.

- **Consider a phased approach to launching microtransit Windsor.** With low expected demand in Windsor, the cost per trip will be quite high compared to the Springfield service. However, the population in Windsor is high-need and currently receives no public transit services. If MOOver were to launch in Windsor, Via recommends considering a phased approach to the launch process. Initially, the service could start with a limited schedule and services hours could expand as demand and awareness of the service increase. Alternatively, the service could initially launch with a full span of service hours, and if ridership does not reach VPTA targets within roughly one year of operation, hours may be reduced to better match demand. Limited service hours will reduce the utility of the service, and require passengers to plan their trips around the service, meaning demand is likely to be lower. However, when funding is a constraint, limited service hours can reduce costs while still improving access for medical and grocery trips and providing relief to the existing demand-response and volunteer driver programs in Windsor.

3.2.2. Launch Planning

MOOver must take several steps prior to launching service. This process can be divided into three phases; preliminary service design, procurement, and launch preparation.

Phase 1: Preliminary Service Design. MOOver should make the following determinations prior to issuing a procurement for microtransit service:

- **Select an operating/contracting model.** MOOver can select between several operating models which best suit its budget, capabilities, and access to vehicles. Potential models generally include:
    - **Agency-operated service.** In this model, MOOver would procure a software platform for the operation of microtransit service, and delivers service using its own drivers, vehicles, and operations team. Partnerships of this nature may be described as Software-as-a-Service, or "SaaS". Software contracts may include ongoing customer support and service optimization services. An agency-operated service has the advantages of allowing MOOver to utilize its existing resources and assume a high level of control over service delivery. The primary disadvantage of an agency-operated

approach is that MOOver would be required to develop administrative and operational capacity in a potentially unfamiliar service category, which has the potential to create inefficiencies and higher costs as the agency works to develop expertise in this area (vs. a contracted operator with developed expertise in operating microtransit service). When procuring software, we recommend that MOOver require the following capabilities at minimum:

- Dynamic vehicle routing and passenger aggregation (shared rides)
- Customer mobile application (available for iOS and Android) providing trip booking and providing real-time estimated time to arrivals (ETAs) and other trip updates
- Driver mobile application for real-time transmission of routing and trip information
- Ability for administrators/schedulers to book trips on behalf of customers (so customers can book trips over the phone)
- Ongoing technical, operational, and marketing support

- **Turnkey purchased transportation (vendor-operated).** In this model, the vendor provides a solution which includes a microtransit software platform, along with the vehicles, drivers, and management services needed to operate service. This partnership model may be described as Transportation-as-a-Service, or "TaaS", and/or as a "turnkey" model. Turnkey services sometimes have lower operating costs and are typically easier to scale quickly when compared to agency-operated alternatives, as third-party vendors can typically flex vehicle supply or extend operating hours more easily than transit agencies. Turnkey models also ensure the operator and technology platform are designed to work interoperably and efficiently. Disadvantages of using a turnkey model include reliance on a vendor for all aspects of service delivery, and less direct agency control over operational decisions (potentially including vehicle make/model, driver recruitment and pay, and maintenance). However, a well-designed contract can address many of these concerns.
- **Non-dedicated transportation providers.** Rather than introducing microtransit as a dedicated service, MOOver can consider contracting with one or more local taxi/Transportation Network Companies (TNCs) on a non-dedicated, or trip-by-trip basis. Under this model, TNCs would deliver agency-subsidized trips alongside trips for private consumers. While such a model may be appropriate for services with notably low levels of ridership (i.e. a service with projected demand that would not require a single dedicated vehicle resource), we typically recommend against non-dedicated models. Disadvantages include limited oversight of operations, limited availability, higher costs per trip, and ineligibility for FTA funding (depending on whether the TNC is able to meet drug and alcohol testing requirements). Further, trips are typically harder to aggregate in a non-dedicated model, meaning costs increase linearly as demand grows (as compared to a shared-ride model, where cost per trip decreases as more customers are aggregated). This model may be applicable for Windsor, where demand is lower and might not be consistent throughout the day. In a phased approach for Windsor, MOOver could start with a non-dedicated service and then reevaluate whether or not

implementing a dedicated fleet would be more cost-effective. For Springfield, we would not recommend a non-dedicated model, as the predicted demand is likely high enough to make a dedicated fleet model cost-efficient.

- **Designate vehicles for service (if applicable)**. If directly operating service, prior to commencing operations, MOOver will need to designate a fleet of vehicles for the service. Based on the results of this study, MOOver will likely require 2 active vehicles for the Springfield service (in the medium demand scenario). It is recommended that at least one spare vehicle be available at all times. MOOver may need to procure new vehicles if none are available.

- **Secure Funding.** Once top-level service design and operating model have been chosen, MOOver can estimate the costs of launching a new microtransit service. Funding can be secured through a number of channels including federal grants, existing operating budgets, local ballot initiatives, or partnerships with local companies.

Phase 2: Procurement. Depending on the Agency's selected operating model, it will be necessary to procure either a software solution for MOOver's microtransit operations, or a turnkey software plus operations package. We advise that MOOver budget between 6 and 9 months (from publishing the procurement to launching service) for implementing services where vehicle procurement is unnecessary, and between 9 months and one year for implementing services which require vehicle procurement.

Phase 2: Launch Preparation. After a vendor or vendors have been selected, MOOver can take the following steps to prepare for launch:

- **Finalize Service Design.** MOOver will need to finalize high-level service parameters before implementing service. Primary service parameters consist of zone location and boundaries, service hours, fare structure, and target quality of service metrics. This should be done in partnership with the selected vendor to ensure the software is able to deliver all requirements.
- **Driver Training.** If MOOver proceeds with an operating model where its drivers will deliver service, drivers will need to be trained in delivering microtransit service, including how to use the software platform, best practices for service delivery, and best practices for customer service. For MOOver, microtransit will likely be new to most driver's and require specific training. In Springfield, if the microtransit replaces paratransit trips, MOOver should ensure driver's are trained specifically on how to provide accessible rides for people with disabilities.
    - For example, in Green Mountain Transit's (GMT) Montpelier "MyRide" microtransit service, which was introduced atop existing demand-response programs and is operated by experienced Agency drivers, drivers are often inclined to follow their preferred route rather than following directions provided through the microtransit app. While a driver's preferred route may be more direct for an individual customer, the microtransit system generates routes which consider *all* trips in the system, and allows the system to aggregate passengers traveling along a similar route. Non-adherence to routes limits the

system's ability to aggregate passengers, and can create downstream delays and errors for customers awaiting pickup. Driver training should ensure drivers understand how the microtransit system operates, and why adherence to directions provided by the system are important to follow.

- **Administrator Training.** MOOver's administrative staff (including dispatchers, schedulers, and customer service representatives) will need to be trained in the use of its selected microtransit platform. Depending on MOOver's selected operating model, administrative requirements may include supervision of live service and responding to issues when needed, booking trips for customers making reservations over the phone, and familiarity with microtransit performance indicators (in order to assess system performance over time). Services of this scale typically require the supervision of a single administrator/dispatcher.
- **Marketing and Rider Education.** Marketing and community engagement are important steps to inform the public about the new service, particularly in instances where existing services will be adjusted. Many potential customers will be unfamiliar with this type of public transit and will need to learn how to book rides and use the service. MOOver can do this in various ways, including creating a dedicated website for the service, developing informational videos, sharing information on social media channels, and meeting with local community organizations. Please find additional information in Section 3.2.3. Community Engagement & Marketing below.

3.2.3. Community Engagement & Marketing

We recommend that MOOver conduct parallel community engagement and marketing activities to ensure the microtransit service's success.

3.2.3.1. Community Engagement & Changes to Existing Service

The ability to move conveniently and affordably between homes, work, school, childcare, and healthcare is central to a community's ability to thrive. The transit systems that enable this movement play such a crucial role in people's everyday lives, and any changes to these systems — even positive ones — can naturally be a source of apprehension. Service changes have the potential to catch customers unaware, and some customers may even assume they are excluded from the new service offering. Service changes can be particularly fear-inducing for vulnerable populations, for whom public transit serves as a vital lifeline with no easy replacement. This will be particularly important in Springfield if MOOver chooses to use microtransit to replace the Springfield In-Town fixed-route bus.

Fears can be exacerbated by a lack of information regarding what changes to transit means for the community. Concerns about cost, access for those with accessibility needs and/or lack of technology, service coverage, and more, routinely create opposition to projects before they even get off the ground.

A high-touch and proactive approach to community engagement not only helps mitigate concerns but can turn those in the community who could potentially be opponents of change into advocates. When launching a microtransit service, support from the community is essential, both to ensure a smooth launch and to set the service up for continued success and growth.

Pre-Launch

Community engagement should begin several months before launch, giving MOOver sufficient time to incorporate feedback from stakeholders, and potentially to adjust service design. Starting community engagement early in the launch process also helps preempt passenger and stakeholder concerns through thorough education about service offerings. To start this process:

1. Identify subcommunities that may be sensitive to service changes, or might require personalized outreach in order to adapt service. As examples of communities which should play a central role in community engagement efforts:

Customers with High Barriers to Entry	Stakeholder Groups Sensitive to Service Changes
Seniors	Agency employees (drivers, call center staff, administrators)
Non-native English Speakers	Employee unions
Unbanked individuals, or those who prefer cash	Rider advocacy groups
Those without cellphones	Elected Officials
Homeless customers	Civic and business leaders
Customers with disabilities	Major local employers

   Once key stakeholders have been identified, steps can be taken to preemptively address their concerns. For example, if accessibility is an expected concern, educate customers about the wheelchair-accessible vehicles in the fleet and the ability to book door-to-door trips for mobility-impaired passengers.

2. Develop materials that engage with likely responses to the new service to proactively answer questions. These materials can include pamphlets, mailers, videos, or physical or digital advertisements. The materials should explain the mechanics of the service, how passengers will book trips, the service zone, and fare. Be sure to address how passengers in high-barrier groups will be able to access the service such as including information around phone booking, voucher payment, and accessibility features.

3. Speak with advocacy groups, elected officials, civic and business leaders, and major local employers as part of the broader community outreach.

Launch

Leading up to the launch of microtransit service, MOOver can continue its community engagement strategy through three channels:

- **Stakeholder Organizations.** As the Agency approaches launch and finalizes key service parameters, it should re-engage previously- contacted organizations to enlist their help in publicizing key information about the service. Helpful organizations may include libraries, health centers, care facilities, civic groups, and social services organizations. These organizations can help create informational materials that are relevant to the audiences they serve, and can help distribute these materials.
- **Customers with high barriers to entry.** MOOver can build a list of users who are likely to have trouble accessing service and conduct phone calls to help them create accounts, and alleviate any concerns they may have. This will be their first interaction with the service and can impact how much they promote the service to their peers, so it's important to keep the communication open and keep a detailed record of their feedback, both positive and negative.
- **The public.** MOOver should make information available to the general public by posting information about service changes as early as possible and in as many places as possible. Particularly in instances where microtransit is introduced alongside changes to MOOver's existing system, we recommend posting physical signage (e.g. at bus stops and aboard vehicles) to explain upcoming service changes, along with posting information digitally on local websites and social media.

Post-Launch

After microtransit service has been launched, community engagement activities can inform continuing improvements to the system. MOOver can re-engage stakeholder communities to see how service is going, and identify opportunities for improvement. Stakeholder organizations can also play a central role in continuing to promote service to their constituent communities.

3.2.3.2. Marketing Microtransit Service

Marketing is an important step to ensure the public is aware of the new microtransit service, both to ensure existing transit customers are prepared for changes to service, and to attract new customers to the system. Many potential customers will be unfamiliar with microtransit as a type of public transit and will need to learn how to book rides and use the service. Creating sustained awareness of the microtransit service prior to launch is essential, and some of the following strategies may be useful:

- **Webpage.** Create a dedicated website for the microtransit service with key service information.
- **Press release.** Develop a pre-launch press release for distribution in local media that directs readers to download the microtransit app.
- **How-to video.** Create a short informative video on how to use the service and share on the service website and social media.
- **Targeted outreach**. Targeted emails or print and social media advertisements. Targeted outreach including "how-to" instructions may be particularly useful for seniors and at retirement communities.

- **Community announcements.** Announce on-demand transport service in municipal communications, newsletters, social groups.

Encouraging awareness of microtransit through word of mouth is especially important. Generating awareness via word of mouth can be achieved through some of the following approaches:

- **Focus groups.** Engage directly with the public through virtual outreach, focus groups, or public meetings held via Zoom or other communication tools. Focus groups can serve as a good opportunity to instruct customers who may be in need of assistance using new technology, like seniors, unbanked customers, and nonnative English speakers
- **Street marketing.** Placing a wrapped microtransit vehicle at high foot traffic areas can increase awareness and encourage conversation about the service
- **Promotional fare discounts or free rides.** Offer reduced or promotional fares for new users.

MOOver can conduct marketing activities in phases to ensure success at each phase of the service's lifecycle:

	Pre-launch	Months 1-3	Months 4+
Focus	Establish marketing channels and develop materials	Promote service visibility and attract first-time riders	Continue attracting customers and retain customers with engagement promotions
Activities	• Design marketing materials • Begin pre-launch awareness: social media, local press, and local government outlets	• Digital (social media) and physical ads (flyers, direct mail, bus station signage). • Press releases • Events and direct public engagement	• Rider surveys and focus groups • Referral campaigns • Promotion of discounted tickets and referral campaigns • Outreach to specific communities

3.2.4. Accessibility

MOOver's microtransit system should prioritize accessibility to ensure all potential customers have access to service, including passengers with disabilities, and those without smartphones and credit cards. We recommend the following accessibility measures:

- **For customers with limited mobility**: Typically, services should include at least 20% wheelchair-accessible vehicles (WAV). Because the Springfield and Windsor services in this study require less than two vehicles, it is recommended that all vehicles be wheelchair accessible. As a point of comparison, around 3.5% of GMT MyRide trips are taken by customers using

wheelchairs (as of April, 2022). A fleet with 20% WAVs will ensure an equivalent quality of service can be offered for customers using wheelchairs. To make the booking process simple for passengers with disabilities, the software platform should remember a passenger's need for a WAV, and ensure that a WAV request is the default for future bookings. To avoid operational problems, the system should automatically assign passengers to vehicles with an available wheelchair position.

- **For customers with hearing, vision, or cognitive impairments:** Passengers should be able to indicate their disability status, either directly through the app or through notifying the customer service agent at the time of booking. This information can be used to modify the service to better adapt for their needs, whether it's through enabling point-to-point pick-up and drop-offs, concessionary pricing, or notification to the driver to provide additional assistance.
- **For customers without smartphones:** In addition to the smartphone app for booking trips, offering web-based and phone booking options can ensure passengers without smartphones (or those who prefer not to use an app) can access service. MOOver administrators should be able to easily book microtransit rides for customers calling in. MOOver can also partner with community organizations to train workers on how to book trips on behalf of passengers.
- **For customers without credit cards:** Unbanked or underbanked passengers should be able to pay for services with several different options, which may include physical or digital vouchers (purchased in cash at community centers, transit hubs, or other key locations), prepaid debit cards, and cash on board the vehicle.

3.2.5. Commingling Demand-Responsive Services

As an operator of ADA-accessible paratransit and NEMT services, MOOver manages multiple categories of demand-responsive service. These services are managed separately and use a separate fleet of vehicles than the fixed-route services. We recommend that MOOver consider the following:

- **Commingle existing demand-responsive services with microtransit.** Commingling microtransit and the exiting demand response trips can improve the overall efficiency of the demand-response service. Primarily, using the same vehicles to transport paratransit and microtransit customers can lead to higher levels of passenger aggregation, and improve the overall productivity of service. MOOver can likely deliver service with a smaller fleet of vehicles than would be needed to manage each service separately. Further, MOOver has the opportunity to streamline the administration of demand-response services, potentially using a single administrative structure and software platform to manage both services. Doing so could reduce the administrative burden of managing separate services.

3.2.6. Working with Volunteer Drivers

Vermont has a strong culture of volunteer-driven transit programs. Agencies utilize volunteer drivers in a range of service categories including ADA paratransit, Medicaid non-emergency transportation, elderly and disabled service, and more. Considering Vermont transit providers' experience working with volunteer drivers, these drivers may be able to deliver microtransit trips, or deliver trips through a microtransit platform in a commingled system. However, working with volunteer drivers poses several challenges:

- Vermont transit providers have faced increasing challenges recruiting and retaining volunteer drivers, which has been compounded by rising gas prices.
- Microtransit services generally require drivers to work shifts, rather than delivering trips on a one-off basis. This structure facilitates passenger aggregation, but does not align with how volunteer drivers currently deliver service.
- Microtransit trips are likely to be shorter in length than those currently delivered by many volunteer drivers. As drivers are compensated on a mileage basis, delivering microtransit trips may be financially unappealing to customers.

The Statewide microtransit study will consider how these challenges may be addressed, and will evaluate the possibility of working with volunteer drivers in microtransit and commingled demand-response services. Additional information will be provided in the statewide final report, to be delivered at the conclusion of all 12 microtransit studies.