Herndon Micromobility Feasibility Study

Prepared for:

TOWN OF
Herndon
VIRGINIA

Metropolitan Washington
Council of Governments

FOURSQUARE ITP
INTEGRATED TRANSPORTATION PLANNING

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Introduction

What Is Micromobility?

Micromobility is an umbrella term for a service that provides the public point-to-point transportation using personal shared-use vehicles that are either self-powered or electric-powered. In the Washington, DC region there are several examples of micromobility programs, including Capital Bikeshare, a publicly managed regional bike share program, and several dockless free floating e-scooter and electric-assist bike share services. Micromobility has boomed in popularity and in the last decade, micromobility programs have launched in over a hundred communities across the United States. Operators are continuing to test out different types of vehicles, from electric bicycles to mopeds and microcars.

Purpose of Study

At the time of writing, Herndon does not have a micromobility system operating within its borders, however Capital Bikeshare has stations in neighboring Reston and private dockless scooter and e-bike systems operate in several jurisdictions within the region. With the approaching opening of the Silver Line Phase II, now is an opportune time to explore the feasibility and implementation considerations around introducing micromobility into the town. The study explores a variety of topics, including:

- What is the state of micromobility today in the region?
- How could major trends in the micromobility industry impact Herndon in the future?
- What does the market for micromobility look like within the town? How would a system meet existing transportation needs and where do we anticipate the greatest demand for services?
- How much would a micromobility program cost?
- What are the Town's options for implementation?
- How should the Town manage the arrival of private dockless micromobility services?

The study was completed by Foursquare Integrated Transportation Planning (Foursquare ITP), a transportation planning consulting firm that specializes in micromobility feasibility and business planning, and was funded by the Metropolitan Washington Council of Government's (MWCOG) Transportation Land-Use Connections (TLC) program.

Industry Background

Who Operates Micromobility?

Micromobility services generally fall into two categories. First there are publicly or non-profit managed programs like Capital Bikeshare. These systems rely in part on a mix of public funding, user fees, grants, and private sponsorships to support their operations. The second category are private dockless micromobility services. Systems like Lime, Spin, and Bolt rely exclusively on user fees and private investment to support their operations and expansion.

Technology

Micromobility modes can be divided into two broad categories. **Docked** services like Capital Bikeshare utilize stations where users can pick-up and return bicycles. Most docked systems embed the digital hardware and locking mechanisms on the stations themselves.

Dockless, or free-floating systems, allow users to start or end a trip without the use of a station. Dockless systems embed digital hardware and the locking mechanism onto the vehicle itself. A user can merely end their trip in any permitted location.

Industry Trends

The micromobility industry is experiencing a great deal of competition, which both creates opportunities and challenges for jurisdictions. In the last five years, upwards of $2 billion in venture capital has entered the industry, allowing start-ups to rapidly expand in cities across the country. Communities today face a tension between encouraging these services to set up shop and regulating them effectively to ensure they are good stewards of public spaces. Due to the intense competition, there has been turn-over as new companies enter the market, and existing operators merge or exit the industry. While COVID-19 has dampened the rate of expansion, over the long term the industry is expected to grow considerably, especially in urban centers.

Capital Bikeshare and Private Dockless Services

While Capital Bikeshare and private dockless services do compete to some degree, they also serve different markets. Upwards of 70 percent of Capital Bikeshare riders are regular users who hold long-term memberships. These users rely on the system for day-to-day transportation, using it to access services, jobs, and public transit. Dockless systems generally follow a pay-per-minute fee structure and attract a more discretionary user. While short trips can be cheaper on dockless systems than Capital Bikeshare due to the fee structure, for most trips Capital Bikeshare is cheaper than dockless services, hence why it attracts so many regular users. In the Washington, DC region dockless micromobility services account for about two-thirds of micromobility trips, with Capital Bikeshare accounting for the remaining third.

Herndon's Market for Micromobility

Who Would Ride the Service in Herndon?

Several communities in the region with similar characteristics to Herndon in terms of land use and demographics already have some kind of micromobility system. These suburban communities generally have low to moderate ridership compared to Washington, DC and Arlington, where the majority of the region's micromobility trips start and end. Micromobility in Herndon would likely have to serve a wide range of trip types to generate adequate ridership. A system could serve leisure and recreation trips, notably along the W&OD trail. The service could provide additional mobility options for residents, notably people living in the more densely developed southern half of the town. Finally, micromobility could connect town residents and workers to the Metrorail, which is located beyond walking distance from much of Herndon.

Where would Micromobility Show the Most Promise?

The study team envisions that micromobility would be most successful along key corridors in Herndon, such as Elden Street, the W&OD Trail, and the Herndon Parkway and should aim to connect key destinations, recreational amenities, and job centers within Herndon. The demand for micromobility is likely greatest in the Town's southern half, where the majority of jobs and commercial development is located. Proximity to the Silver Line, Reston Town Center, and multifamily housing could also support demand.

How Large of a System in Appropriate for Herndon?

The study team envisioned that a Capital Bikeshare system serving the portion of the Town with moderate or high micromobility demand would require approximately 24 stations at full build out. A system could be phased in with fewer stations, however micromobility programs benefit from scale. A smaller system would still need to ensure enough stations to provide users several origins and destinations within biking distance. The study team recommends having no fewer than 10-12 stations at launch and have outlined a set of station siting principals to guide growth.

Implementation

Overview

The study team identified two paths to implementing micromobility in Herndon. These options are not mutually exclusive and could be pursued in tandem:

- Join Capital Bikeshare
- Attract and oversee a private dockless micromobility operator or several operators

Implementing Capital Bikeshare

The study team estimates that the cost to procure, install, and operate a 24-station system over a five year timeframe would total $2.8 million after accounting for user revenue. There are several avenues to fund such a program, from acquiring a regional sponsor to tapping into grant opportunities. At the time of writing, it is unclear whether such an expansion would need to be pursued independently by the Town or could be implemented as part of a wider expansion of Capital Bikeshare by Fairfax County.

Implementing Dockless Micromobility

While introducing dockless micromobility services into the Town of Herndon would not carry the same capital and operating costs as Capital Bikeshare, this option does raise a unique set of implementation considerations. The Town would have to dedicate resources to oversee and regulate a private operator. Most communities pursue dockless micromobility by either creating a permitting process or pursuing a request for proposals (RFP) where one or more vendors is selected to operate for a fixed period of time. Regardless of the approach, the Town would need to work through its operating requirements, which could include factors like where vehicles have to be parked, the minimum and maximum fleet size, and number of permitted vendors. Most jurisdictions in the region launched dockless micromobility as part of a pilot program; at the end of the pilot program, lessons learned were incorporated into the final permitting and regulatory structure.

1 STUDY INTRODUCTION
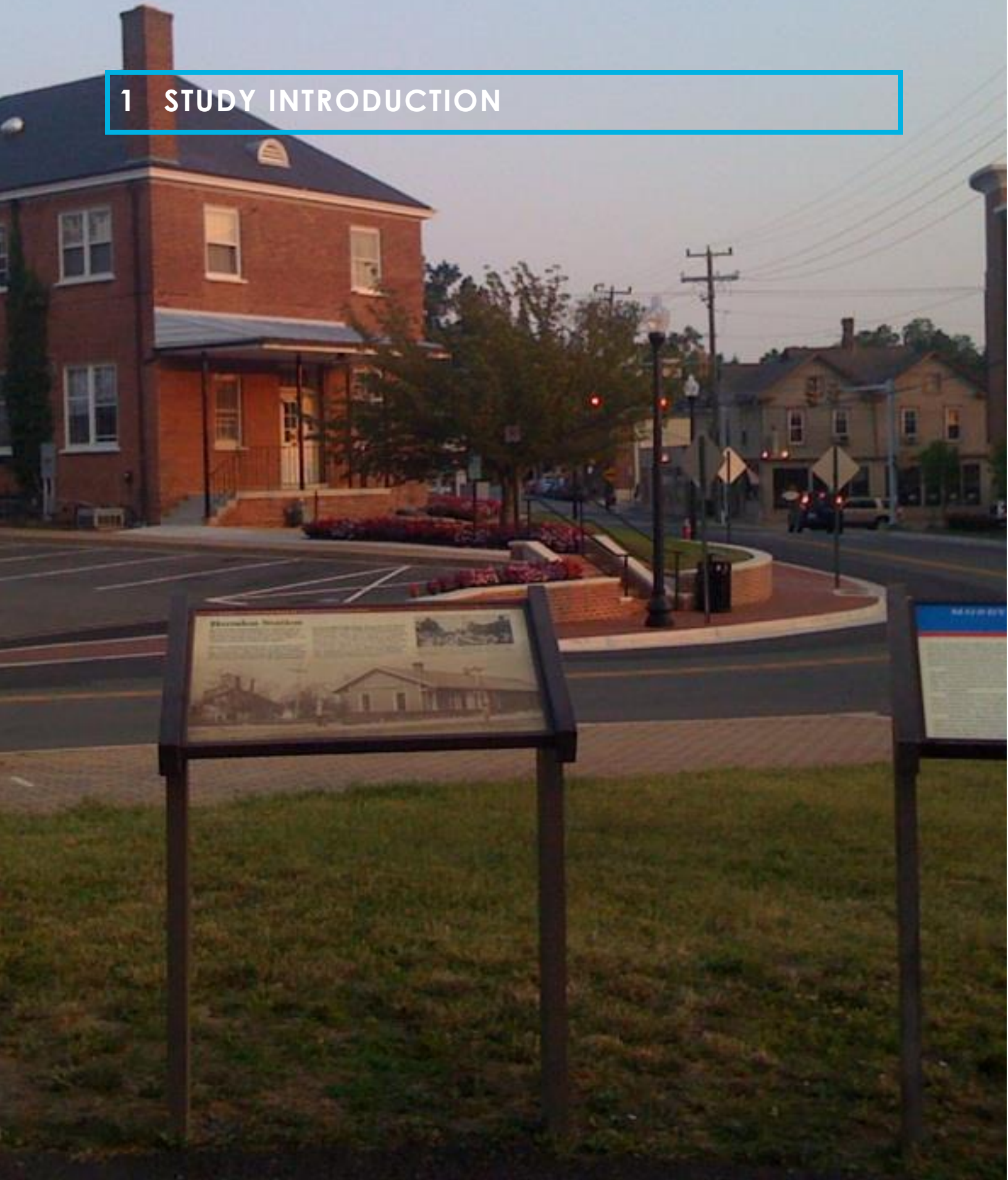
Over the last decade, micromobility has helped change how people get around in communities across the US. Services like bikeshare and e-scooters allow for convenient point-to-point transportation and are an environmentally friendly alternative to driving. The Washington, DC region has been a national leader in micromobility. The region is home to one of the oldest and largest bikeshare programs in the US, Capital Bikeshare, as well as a plethora of privately-funded dockless micromobility systems.

To-date, no micromobility services operate in Herndon, but Capital Bikeshare extends into nearby Reston. Moreover, other suburban jurisdictions in the National Capital Region have attracted investments from private dockless scooter and bikeshare programs.

The Herndon Micromobility Feasibility Study seeks to evaluate the feasibility and implementation of micromobility services in the Town of Herndon and is funded by the Metropolitan Washington Council of Government's (MWCOG) Transportation Land-Use Connections (TLC) program. With the opening of the Silver Line Phase II slated to occur within the next year, coupled with ongoing development and growth in the town, now is an opportune time to evaluate whether micromobility could serve Herndon's transportation needs.

1.1 Goals

As a starting point for the project, the study team drafted a set of goals intended to guide the planning, evaluation, and implementation of micromobility in Herndon. The goals capture the key motivations and desired outcomes for pursuing a micromobility system in the Town. They are especially important for guiding the determination of feasibility as goals help shape how one evaluates a potential micromobility system. Based on feedback from Town of Herndon staff, the project team drafted the five following goals:

What is Micromobility?
Shared-use personal transportation using small, lightweight vehicles that are either self-powered or rely on a small electric motor. Micromobility services are typically available on-demand and serve point-to-point trips. The most common form of micromobility is bikeshare and scooter share.

1. Micromobility **makes it easier to travel around Herndon without a car**, improving access to transit, reducing congestion, and alleviating parking constraints.
2. Micromobility services are **affordable, accessible, and equitable**, with programs designed to accommodate the needs of residents and visitors regardless of age, race, income, or ability.
3. Micromobility in Herndon functions as **part of the larger regional micromobility network**.
4. Micromobility is implemented in a **transparent and financially self-sustainable** manner.
5. Micromobility **encourages physical activity and supports the Town's public health objectives**.

1.2 Plan Organization

This study is divided into three components:

- **Background on the state of micromobility today:** This section provides Town leadership background on how micromobility operates within the region and nationwide.
- **Micromobility market assessment:** Analysis identifying the geographic and user market for micromobility in the Town. What size system is suitable to meet Herndon's needs? What kind of ridership would a program attract?
- **Implementation options for micromobility:** How could the Town support the implementation of micromobility? How much would a program cost? What kinds of regulations and oversight would be needed to effectively manage micromobility?

1.3 Local Context

While this is Herndon's first study focused on micromobility, there are several existing plans and studies that provide important local context. The study team reviewed a range of local planning documents to better understand how planned investments in the Town and its vicinity relate to any future micromobility program.

1.3.1 Existing Plans Related to Bikeshare

Herndon Bicycle Network Master Plan

The Herndon Bicycle Network Master Plan, completed by the Town of Herndon Department of Community Development in August 2019, is the first official plan dedicated to the development and maintenance of a comprehensive bicycle route network that serves the entire town.

The plan is a detailed set of strategies to meet the goal from the Town's 2030 Comprehensive Plan of providing safe streets that are friendly to bicycles and pedestrians. Objectives of the plan include improving bicycle safety and ridership within the town, improving connections to the regional bike network and transit stations, and increasing awareness of cycling within the town.

Strategies recommended in the plan include:

- A feasibility study of introducing Capital Bikeshare and/or other micromobility services, which this current study fulfills.
- A comprehensive bicycle network for the town, shown in Figure 1**. Table 1,** lists all the active bicycle infrastructure projects in Herndon.
- Increased implementation of transportation demand management programs to involve local business in promoting non-car transportation alternatives.
- Creation of a bicycle design guide and a reiteration of the Town's commitment to a Complete Streets policy.

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Figure 1: Recommended bicycle network. Source: Town of Herndon Bicycle Network Master Plan

Table 1: Active Bicycle Infrastructure Projects

ACTIVE PROJECTS
Last Updated: March 2021

Project Name	Project Location	Status	Notes
East Elden Street - Bicycle Lanes & Cycle Track	Between Fairfax County Parkway and Monroe Street	Design Completed.	Expected to begin construction in 2024. Town project.
Chandon Park - Mixed Use Trail	To connect with Worldgate Trail to Van Buren Street	Project Completed	
Herndon Parkway East - Cycle Track	From Spring Street to Van Buren Street	Planned and concept designed. Some segments completed. Some segments under construction.	Some areas *dependent on private development* Half-mile segment being built as part of East Spring Street Project.
Herndon Parkway West – Cycle Track	From Summerfield Drive to Elden Street	Planned and concept designed.	*Dependent on private development.* 700' to be built as part of Herndon Corporate Center redevelopment project.
Van Buren Street Phase I- Bicycle Lanes	From Spring Street to Herndon Parkway	Under construction	Town project.
Van Buren Street Phase II – TDB Facility Type	From Herndon Parkway to south town line and Spring Street to W&OD	Planned. Concept design on hold.	*Dependent on private development.*
Sterling Road – Bicycle Lanes	From Elden Street to Herndon Parkway	Planned and concept design in review.	Expected to begin construction in 2025. Town project.
Trails to Metro – Mixed Use Trail	From Worldgate Drive to Herndon Metrorail Station	Planned and fully designed.	Expected to begin construction in late 2021. Town project.
Folly Lick Regional Trail	From Herndon Parkway to Center Street	Planned and concept designed.	Dependent on land acquisition (as currently designed). Town project.
Station & Spring Streets - Sharrows	From Park Avenue to Van Buren Street	Planned and concept designed.	Expected construction 2021. Within existing right-of-way. Town project.
South Elden Street – Mixed Use Trail	From Sterling Road to Herndon Parkway	Planned and concept designed.	Expected to begin construction in 2027.

Town of Herndon Pedestrian Plan

The Herndon Bicycle Network Master Plan, completed by the Town of Herndon Department of Community Development in October 2019, is the Town's first pedestrian plan. The plan features a comprehensive analysis of town's pedestrian infrastructure and strategies to make walking in the town safer, more desirable, and more convenient.

The *Pedestrian Plan* identifies 40 specific improvements to the town's pedestrian network, mostly focused on filling gaps in the sidewalk network and improving crosswalks at intersections. Walkability is a key factor in

bikeshare feasibility, as most bikeshare trips include a pedestrian leg at the beginning and end of the trip. This current study should pay close attention to gaps in the sidewalk network when considering locations for bikeshare stations.

Herndon FY2020 – FY2025 Capital Improvement Program

The Town of Herndon FY2020 – FY2025 Capital Improvement Program (CIP) describes the Town's budget for infrastructure improvement projects over the next five years. Many bicycle and pedestrian network improvements are among those earmarked for funding in the CIP. Most of these improvements scheduled for early implementation improve connections to transit stations or the regional trail network.

In additional to trails to new Metrorail stations, the principal bicycle network connections included in the CIP are:

- Center Street (Station St to Alabama Dr)
- Dranesville Road (Park Ave to Madison St)
- Locust Street (Elden St to Center St)
- Station Street (Center St to Park Ave)
- Dranesville Road (Herndon Pkwy to North town line)
- Van Buren Street (W&OD Trail to Park Ave)

Should this current study recommend phased implementation of bikeshare stations, phasing should be coordinated in the Town's plans for implementation of major network improvements as described in the CIP.

Herndon Comprehensive Plan (2008, updated 2020)

The Herndon Comprehensive Plan (adopted 2008, updated 2020) guides the Town's decision-making for planning priorities including land use, transportation, historic preservation, and much more, as required by state law. The plan recommends strategies including promotion of pedestrian and bicyclist safety through infrastructure improvements and providing a useful bicycle and pedestrian network for the town. The Comprehensive Plan does not provide many specific tactics to implement these strategies, which are elaborated on in subsequent plans, such as the Town's Bicycle Network Master Plan and Pedestrian Plan.

Fairfax County Bicycle Master Plan (2014)

The *Fairfax County Bicycle Master Plan*, prepared in 2014, provides policies, programs, and physical facility recommendations that support and update the County's Comprehensive Plan. Bicycle network recommendations from this plan for the Town of Herndon are supplanted by the *Town of Herndon Bicycle Master Plan*. This plan does not address bikeshare, as Capital Bikeshare had not yet started operations in the county at the time of its adoption. The County is currently preparing a countywide active transportation plan called *ActiveFairfax* (expected completion in 2021 or 2022), as many of its recommendations no longer meet evolving Federal and Virginia Department of Transportation design standards.

1.3.2 WMATA Silver Line Extension

The WMATA Silver Line, slated to open in early 2022, will include a Metrorail station abutting the town's limits, along with new stations just beyond the town's borders at Reston Town Center and Innovation Center. The new rail connection will allow one-seat rides from Herndon to major employment and activity centers, such as Reston, Tysons, Falls Church, Arlington, and downtown Washington, DC to the east, and Dulles Airport and Ashburn to the west. The Fairfax County Department of Transportation is currently working on a major redesign of Fairfax Connector bus service in the Herndon area to coincide with the opening of the new Metro line. Micromobility could improve first/last mile connections between the Silver Line and destinations within Herndon.

This chapter summarizes the state of micromobility today in the Washington region and nationwide. It provides key background information that will lay the groundwork for subsequent analysis. The first section describes micromobility operations in the region today, including Capital Bikeshare and privately operated dockless services. The second section discusses the state of the micromobility industry and major trends.

2.1 Micromobility in the Region

The Washington, DC Metropolitan region is served by several micromobility systems, including Capital Bikeshare and numerous private dockless operators. While Fairfax County is only served by Capital Bikeshare, several jurisdictions in the region, including Arlington County, the District of Columbia, and Montgomery County are served by more than one micromobility service.

2.1.1 Capital Bikeshare

Launched in September 2010 in the District of Columbia and Arlington County, Capital Bikeshare was one of the nation's first large-scale bikeshare programs. Today, the Capital Bikeshare system operates more than 4,500 bikes (including 1,500 electric bikes) at over 500 stations in seven jurisdictions: Washington, DC; Arlington, VA; Alexandria, VA; Montgomery County, MD; Prince George's County, MD; Fairfax County, VA, and the City of Falls Church, VA.[1][2] Within these jurisdictions, the system operates in several suburban markets with similarities to Herndon, such as Reston, Falls Church, Rockville, Bethesda, Silver Spring, and Alexandria, as shown in **Figure 2**.

Unlike its dockless competitors, Capital Bikeshare is publicly owned. Each jurisdiction in the system owns its stations and a proportional share of the bicycle fleet. The system operations are contracted to a private vendor (Motivate, a subsidiary of Lyft), and the system is funded using a mix of user fees, advertising, and public sources.

Fairfax County owns 35 Capital Bikeshare stations, clustered in Reston, Tysons, and Merrifield. Several of Reston's 17 stations are within close proximity to the Town of Herndon; however, over five miles separate Reston's stations from the next closest cluster of stations in Tysons.

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[1] "About Capital Bikeshare," *Capital Bikeshare*, https://www.capitalbikeshare.com/about.
[2] Capital Bikeshare re-launched electric bikes in the spring of 2020. Unlike the system's conventional bikes, electric bikes are equipped with a lock that allows them to be locked to a public bike rack or a docking station. As such, trips on electric bikes can start and end at a Capital Bikeshare station but are not required to do so.

Figure 2: Capital Bikeshare Service Area
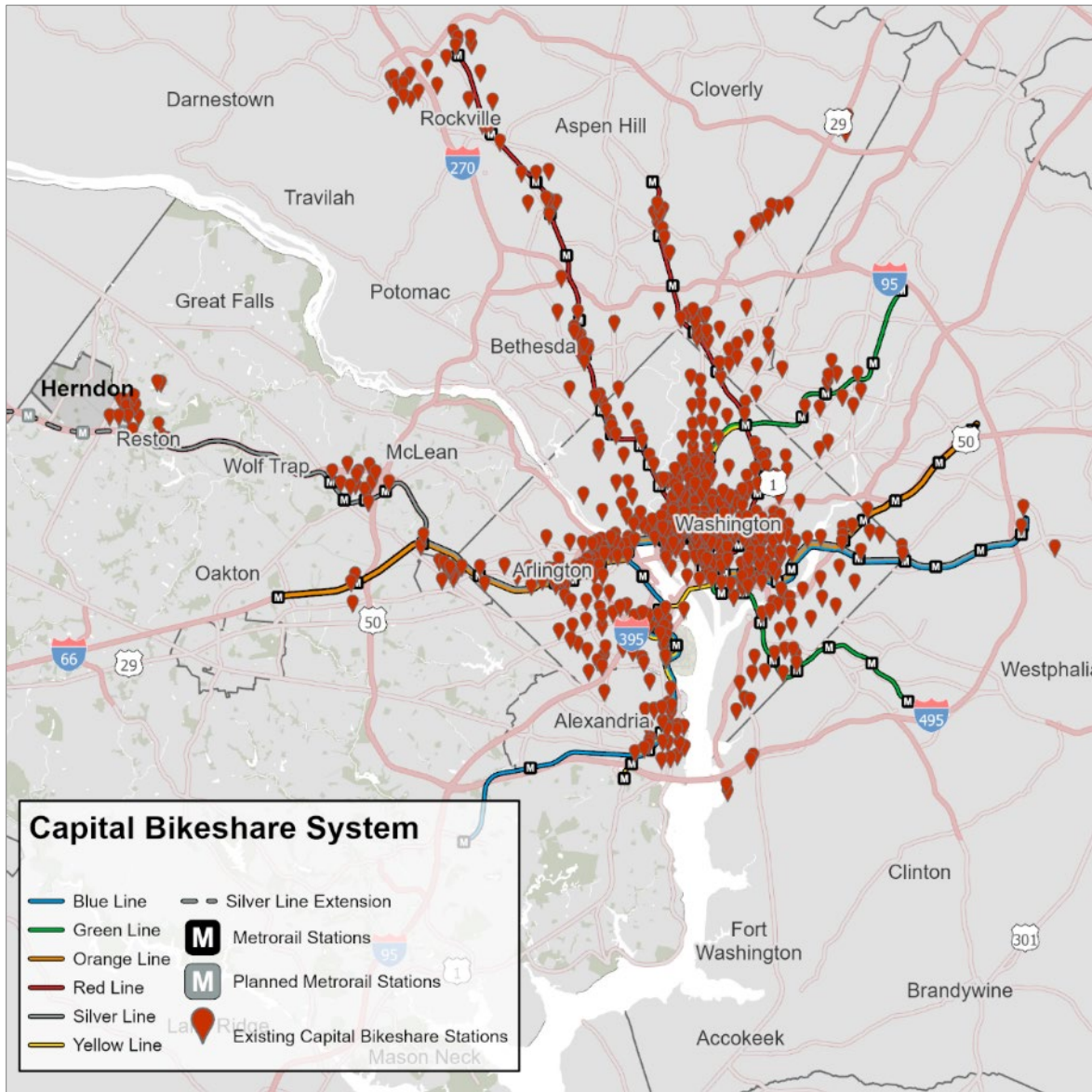
In the spring of 2020, Capital Bikeshare re-launched electric assist bicycles (e-bikes) after initially introducing them in a pilot program from September 2019 through April 2019. These bicycles include a small electric motor that provides the rider a boost while pedaling. Unlike conventional bicycles, e-bikes do not have to be locked at a bikeshare station. The e-bikes are owned by Lyft, not the member jurisdictions. Capital Bikeshare riders pay a $1 surcharge to unlock e-bikes and an additional $1 lock fee if the trip ends outside a station.

In 2020, 239,058 trips (11 percent) were by e-bike (includes all jurisdictions in the system). Even though users have the option to start or end a trip outside a station, the majority of e-bike trips utilize existing bikeshare stations. For example, only 35 percent of trips did not start at a station and 37 percent of trips did not end at a station.

Table 2 shows Capital Bikeshare ridership by jurisdiction between 2016 and 2020. The vast majority of trips occur in Washington, DC and Arlington. Of the trips in Fairfax County, about half of the trips started at one of

the 17 stations in Reston. In Reston, nearly 40 percent of all trips between 2016 and 2020 began at Reston Town Center Transit Station or Sunset Hills Road & Isaac Newton Square.

Table 2: Trips by Jurisdiction, 2016-2020[3]

	Alexandria	Arlington	Fairfax	Falls Church	Montgomery County (North)	Montgomery County (South)	Prince George's County	Washington, DC	Systemwide
2016	61,234	256,453	833*	-	6,630	47,247	-	2,956,236	3,328,633
2017	84,956	285,946	11,120	-	8,617	56,646	-	3,302,519	3,749,804
2018	76,081	257,178	11,600	-	14,630	44,884	1,226***	3,130,376	3,535,975
2019	65,683	258,681	15,778	3,924**	13,728	46,024	6,488	2,986,884	3,379,190
2020	45,514	181,924	9,904	4,094	9,208	37,015	16,003	1,798,964	2,187,259
Total	333,468	1,240,182	49,235	8,018	52,813	231,816	23,717	14,174,979	16,198,861

*Capital Bikeshare service began in November 2016.
**Capital Bikeshare service began in May 2019.
***Capital Bikeshare service began in June 2018.

Figure 3 shows monthly trips for the Capital Bikeshare system between 2016 and 2020. Ridership has been fairly consistent during this period until March 2020, when the COVID-19 pandemic resulted in a severe decline in year-over-year ridership. Note that bikeshare ridership is highly seasonal; ridership is highest during the peak season (April to October), with winter ridership typically half that of the average peak month.

Figure 3: Systemwide Monthly Trips, 2016-2020

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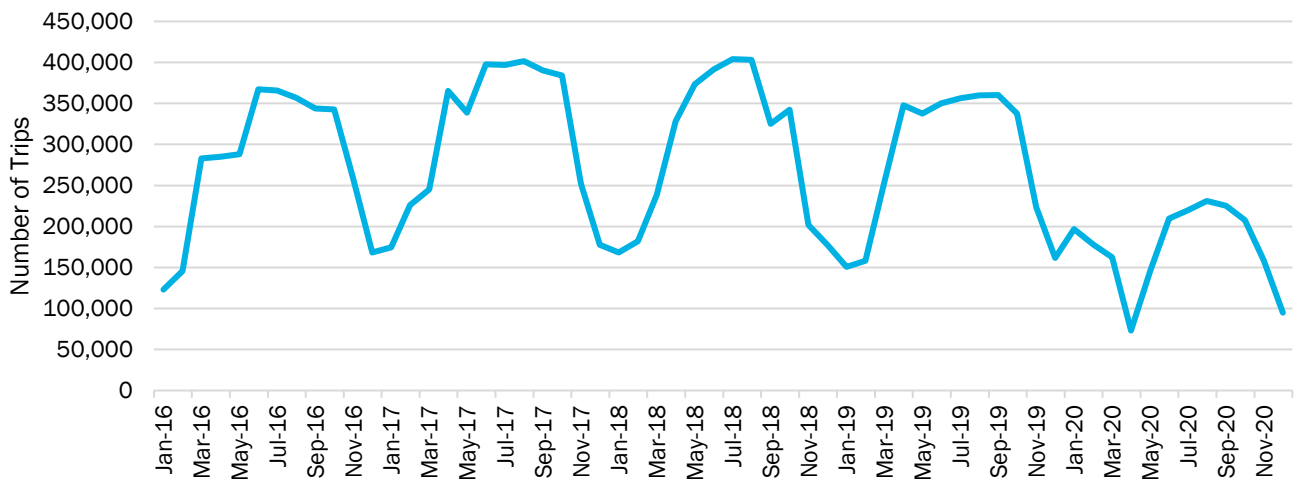
[3] Capital Bikeshare users took 239,058 electric bike trips in 2020. Of these trips approximately 84,633 trips did not start at a station. This accounts for 3.8 percent of all trips in 2020. These trips are included in the systemwide trip total for 2020, but they are not tied to any jurisdiction in the table.

Table 3 shows the average trips per bike per day (TpB) from 2016 to 2020 for the Capital Bikeshare system. Trips per bike per day is a common measurement of bikeshare productivity that controls for ridership growth due to system expansion. As the table shows, the TpB in Capital Bikeshare's urban markets is considerably higher than the TpB in the more suburban markets. At 0.17, the average TpB in Fairfax County is slightly lower than that of some of the other suburban jurisdictions in the Capital Bikeshare system.

The 17 stations located in Reston, which are closest to the Town of Herndon, have an average TpB of 0.15, slightly lower than the county average. While overall, the TpB at Reston's stations is lower than the TpB for all of Fairfax County, at the station level, the Reston Town Center Transit Station has an average TpB of 0.39 and the station located at Sunset Hills Rd & Isaac Newton Square has an average TpB of 0.53. These are the highest ridership stations in Reston and the land uses around these stations may provide guidance to determine possible future micromobility station locations in Herndon.

There are several reasons contributing to low ridership in suburban jurisdictions and Fairfax County, in particular. The suburban land-uses and comparably lower development densities suppress bicycle usage. Bikeshare systems enjoy a network effect where a higher density of stations and bicycles in turn contributes to greater ridership. Fairfax County's system today is split into several nodes, with the distances between nodes ensuring each part of the system functions largely independently of one another. Many other suburban bikeshare programs are impacted by the same factors, including other parts of the Capital Bikeshare system. E-bikes show some promise in helping to attract new suburban users as they enable riders to travel longer distances. The expansion of the Silver Line may also help increase bikeshare ridership, as many of the busiest bikeshare stations in the region are located at Metrorail stations.

Key Definitions:

Member: Rider with a monthly or annual membership. Members tend to ride frequently and utilize bikeshare as daily transportation.

Casual User: A non-member. More likely to use bikeshare infrequently or for leisure purposes.

Peak Season: April to October, when bikeshare ridership is at its highest.

Off-Peak Season: November to March, when bikeshare ridership is lowest.

TpB: Trip per bike per day. The standard measurement of *bikeshare productivity.*

Table 3: Trips per Bike by Jurisdiction, 2016-2020[4]

	Alexandria	Arlington	Fairfax County	Falls Church	Montgomery County (North)	Montgomery County (South)	Prince George's County	Washington, DC	Systemwide
TpB	0.65	0.92	0.17	0.22	0.14	0.28	0.22	2.53	1.57
TpB Member	0.46	0.69	0.10	0.15	0.10	0.20	0.07	1.97	1.20
TpB Casual	0.19	0.23	0.07	0.08	0.04	0.09	0.14	0.57	0.37
TpB Peak	0.79	1.11	0.21	0.27	0.18	0.34	0.29	3.00	1.87
TpB Off-Peak	0.43	0.61	0.10	0.14	0.09	0.19	0.10	1.84	1.12
TpB Member Peak	0.53	0.80	0.12	0.17	0.12	0.23	0.08	2.23	1.37
TpB Member Off-Peak	0.35	0.52	0.07	0.11	0.08	0.16	0.06	1.58	0.96
TpB Casual Peak	0.25	031	0.09	0.10	0.06	0.12	0.21	0.77	0.50
TpB Casual Off-Peak	0.08	0.09	0.03	0.04	0.01	0.03	0.04	0.27	0.17

2.1.2 Other Micromobility Operators:

In addition to Capital Bikeshare, the region is served by more than a half-dozen private micromobility services (**Table 4**). All of these services are dockless, meaning vehicles do not have to be picked up or returned to a station. With the exception of JUMP and HelBiz, which operates a fleet of e-bikes, all of the region's micromobility operators focus on electric scooters. Micromobility operations are subject to different permitting requirements in each jurisdiction they operate in. For example, the District of Columbia places requirements on operators that dictate the number and location of vehicles in operation at any one time.

Private operators do not publicly report ridership, and accurate information on fleet size is unavailable. Within DC alone, the District's micromobility operators were permitted to operate up to 12,450 vehicles in 2021. The District Department of Transportation reports that in 2019, over 5 million trips occurred by dockless scooter and e-bikes, compared to 3 million trips by Capital Bikeshare.

The price of dockless micromobility services differs substantially from Capital Bikeshare. While Capital Bikeshare does offer a pay-per-trip option, most users buy memberships of varying lengths that allow for unlimited trips of 30-minutes or less. Dockless micromobility operators charge per minute and generally do not offer subscriptions or passes for frequent users. The pricing model of dockless services means that short trips (<10 minutes) may be cheaper than Capital Bikeshare but become substantially more expensive for longer trips.

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[4] The TpB analysis is conducted at the station level. The 84,633 electric bike trips in 2020 that did not start at a station were excluded from the TpB analysis.

Today only a handful of micromobility services operate outside the District, with none currently in operation in Fairfax County.

Table 4: Pricing by Competitor Micromobility Providers[5]

Company	Mode	Unlock Fee	Cost per Minute	Cost of 20-Minute Ride	Prescence in Region
Bird	Scooter	$1	$0.39	$8.80	DC, Alexandria, Arlington, City of Fairfax, Montgomery County
Bolt	Scooter	None	$0.30	$6.00	DC
JUMP (acquired by Lime)	E-bike	None	$0.25	$5.00	DC
Lime	Scooter	$1	$0.24	$5.80	DC
Lyft	Scooters; E-bikes integrated into Capital Bikeshare	$1	$0.24	$5.80	DC, Montgomery County, Arlington, Alexandria
Razor	Scooters	$1	$0.24	$5.80	DC
Skip/Helbiz (recent acquisition)	Scooters & E-Bikes	$1	$0.25	$6.00	DC, Arlington, Alexandria
Spin	Scooters	$1	$0.25	$6.00	Alexandria, Arlington, Montgomery County
Capital Bikeshare	Bikes and E-Bikes	N/A; $1 fee for E-bikes.	N/A	$.064-$2.30[6]	DC, Arlington, Alexandria, Falls Church, Fairfax County, Montgomery County

[5] Source: DDOT Capital Bikeshare Development Plan Update (Table 19)
[6] Based on average utilization by pass type. Cost varies by pass type.

2.1.3 COVID-19 Impact on Micromobility

Micromobility services were, like most other transportation modes, impacted by COVID-19, with a significant decline in year-over-year ridership starting in March 2020.

Table 5, **Figure 4**, and **Figure 5** compare Capital Bikeshare ridership by month in 2019 and 2020, illustrating the impact that the pandemic has had on ridership by jurisdiction. Despite ridership increases compared to the previous year in January and February 2020, Capital Bikeshare ridership declined 36 percent between 2019 and 2020. Capital Bikeshare usage has bounced back more than other modes, such as transit. As is highlighted in **Figure 5**, the ridership trends in the suburban jurisdictions match those of the full system. In Fairfax County, ridership declined 37 percent year-over-year, with trips declining sharply in April 2020 before rebounding somewhat the following month.

Several possible reasons account for the resiliency of Capital Bikeshare during the COVID-19 pandemic. Chief among these reasons is that it is relatively easy to socially distance on a bicycle. This combined with the fact that bikeshare is an outdoor mode of transit likely meant travelers felt safer riding a bicycle than using other shared modes like transit or transportation network companies (TNCs), like Uber and Lyft. In addition, Capital Bikeshare provided essential workers with a free 30-day membership through July 31, 2020. This free membership could have encouraged essential workers to use Capital Bikeshare instead of an alternative mode.[7]

Table 5: Capital Bikeshare Trips by Select Jurisdiction by Month, 2019 versus 2020[8]

	Fairfax County		Falls Church		Montgomery County / North Rockville		Washington, DC		Systemwide	
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
Jan.	508	674	-	198	592	748	134,267	174,633	150,683	196,654
Feb.	534	584	-	228	557	537	141,339	158,481	158,051	177,869
March	823	740	-	312	993	595	225,556	139,468	253,705	162488
April	1,303	757	-	233	1,377	533	307,849	57,227	347,873	73,129
May	1,677	1,322	458	340	1,501	1,097	294,604	114,215	337,557	145,493
June	1,940	1,325	672	472	1,489	1,237	304,002	173,315	350,014	209,549
July	1,968	1,077	546	449	1,417	1,035	311,837	185,118	356,515	223,755
Aug.	2,049	1,079	593	487	1,484	1,113	314,534	196,594	359,938	247,022
Sept.	1,826	930	601	492	1,506	956	314,119	194,469	360,103	245,627
Oct.	1,695	708	496	377	1,398	701	295,951	181,357	337,439	226,021
Nov.	853	468	340	297	799	402	198,478	139,871	223,464	173,805
Dec.	602	240	218	209	615	254	144,348	84,216	161,848	105,827
Total	15,778	9,904	3,924	4,094	13,728	9,208	2,986,884	1,798,964	3,397,190	2,187,289

*Capital Bikeshare service began in May 2019.

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[7] Capital Bikeshare "Caring for the Capital Bikeshare Community," https://www.capitalbikeshare.com/blog/covid19.
[8] The 2020 systemwide total for June through December includes trips made on electric bikes that did not start at a station. These trips are not included in the monthly trip totals by jurisdiction.

Figure 4: Trips by Month, 2019 vs. 2020 (Full System)[9]

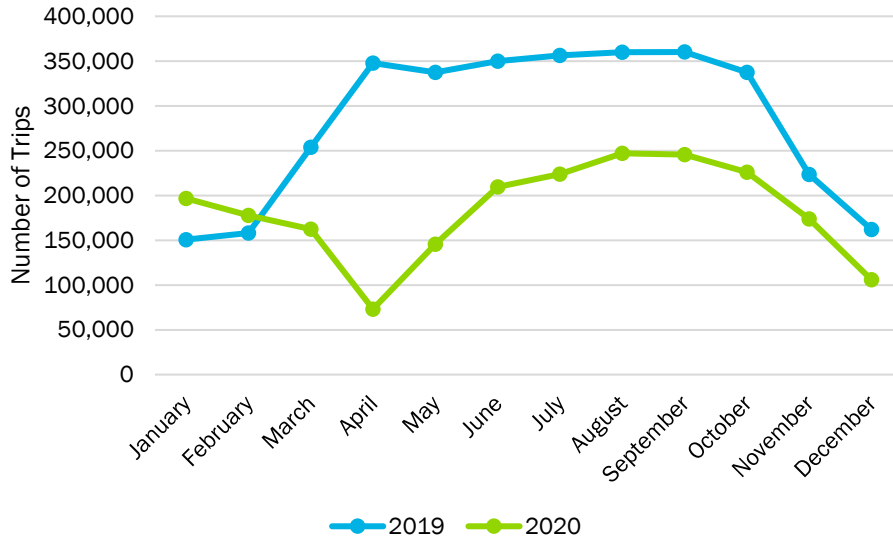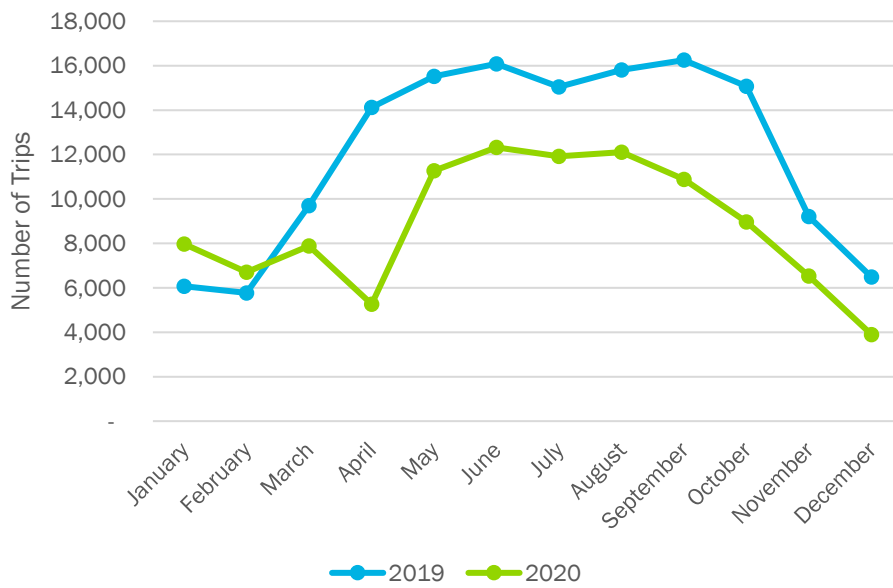

Figure 5: Trips by Month, 2019 vs. 2020 (Suburban Jurisdictions)[10]

[9] Source: Capital Bikeshare Trip History Data
[10] Chart excludes e-bike trips as they are not tied to a specific jurisdiction. Source: Capital Bikeshare Trip History Data

2.2 Micromobility Industry

2.2.1 Brief History of the Industry

Micromobility is a relatively new mode of travel. Montreal's BIXI was North America's first large-scale bikeshare program when it launched in 2008. Capital Bikeshare followed closely behind, launching in 2010, with the same equipment as BIXI. In its early years, bikeshare programs did not attract large-scale private sector investment. These early programs were typically owned by non-profits and local governments. Private firms focused on selling bikeshare equipment and operating service contracts, and only a handful of programs were operated on a for-profit basis.

By the late 2010s, the industry began to see a fundamental shift in its business model. Over $2 billion in venture-capital backed funding flooded into the bikeshare space. [11] Several start-ups launched dockless free-floating bikeshare programs. Unlike earlier systems, cities with dockless operators often had multiple services competing against one another. These firms began experimenting with alternative technologies such as dockless e-bikes and scooters. As bikeshare no longer described the range of modes operated by this budding industry, the term micromobility was coined.

Since 2017, the industry has been characterized by fierce competition, with start-ups focused on gaining market share. TNCs Uber and Lyft made major micromobility acquisitions, with an interest in cementing their respective apps as all-inclusive mobility as a service (MaaS) platforms.[12] The shift in the industry has had pros and cons for jurisdictions. Communities have struggled to update their regulations and oversight procedures at the same pace as new technologies and companies emerged. Jurisdictions that lacked funding to start or expand their own micromobility program could benefit from the new competition by partnering with private firms looking to expand market share.

Today, the industry is at a major inflection point. After years of rapid growth, firms are now feeling greater pressures to become profitable and are less willing to enter risky markets, including suburban communities and smaller cities that have lower demand. The COVID-19 pandemic impacted the industry, as lockdowns and public health concerns led to ridership declines and even the temporary suspension of some systems. Interestingly, micromobility ridership has rebounded faster than other public modes like transit. A recent report by McKinsey and Associates estimates that by 2030 the industry will be valued at over $300 billion.[13] The industry does not appear to be profitable and the question remains how many operators (and what consumer price points) will allow private micromobility become financially self-sustaining.

The state of the micromobility industry has several implications for Herndon:

- Can the Town attract a private micromobility operator? Will we see less aggressive system expansion in the coming years, with a focus on serving dense urban markets like Washington, DC?
- With less competition, will communities like Herndon have reduced leverage to negotiate with operators? Will the cost of micromobility services increase? Will operators be less willing to conform to local regulations?
- Will Capital Bikeshare continue to operate as a publicly owned system under joint regional management?

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[11] Eliason, Jason, Start it Up: The Future of Micromobility, Medium, January 15, 2021
[12] Teale, Chris Lyft's Motivate acquisition part of industry-wide move toward integrated transit options, Smart Cities Dive, July 5 2018
[13] The Future of Micromobility: Ridership and Revenue in Crisis, McKinsey and Associates, 2020

2.2.2 Technology

The definition of micromobility has evolved over time with the introduction of new modes and technology. Micromobility describes transportation services that operates shared-use, light-weight, personal use vehicles that are person-powered (e.g., bicycle), powered by a small electric motor, or a combination of the two. While programs like bikeshare have been around since the 1960s, modern micromobility services rely on a few key innovations:

- Automated management of vehicles, notably unlocking and locking of the vehicle.
- User account management, including automated payment and linking trips to users to discourage theft.
- Real-time (or near real-time) tracking of vehicles through either GPS tracking or connected stations.

Figure 6: Example of Docked Bikeshare System (Capital Bikeshare, 2020)

Docked and Dockless

Micromobility modes can be divided into two broad categories. **Docked** services like Capital Bikeshare utilize stations where users can pick-up and return bicycles. Most docked systems embed the digital hardware and locking mechanisms on the stations themselves.

Dockless, or free-floating systems, allow users to start or end a trip without the use of a station. Dockless systems embed digital hardware and the locking mechanism onto the vehicle itself. A user can merely end their trip in any permitted location.

Docked systems tend to be more expensive to implement and take up more space than dockless programs. Conversely, docked programs have lower rates of theft and vandalism and generally avoid issues with right-of-way infringement and the illegal parking of vehicles.

Vehicle Types

Figure 7: Dockless Scooters (Lime, 2020)

The two most common types of micromobility vehicles are **bicycles** (including conventional and e-bikes) and **electric scooters**. While bicycles have been around longer, scooters in recent years have emerged as a popular mode nationwide.

In 2018, scooters overtook bicycles as the most ridden micromobility mode;[14] however, it is unclear whether their popularity is due to a strong consumer preference for scooters or simply better availability of scooters, due to the sheer number of systems and vehicles deployed. In the Washington region there are twice as many dockless vehicles available than Capital Bikeshare bicycles during peak deployment; these dockless vehicles cover a smaller geographic area than Capital Bikeshare. While scooters and bikes account for the vast majority of micromobility vehicles on the streets today, several companies are experimenting with other types of vehicles. Small **electric mopeds** differ from e-bikes, as they are fully motorized and do not include pedals. These vehicles are typically larger than bicycles and able to travel at higher speeds. A few services blur the lines between carshare and micromobility by offering **lightweight electric microcars.** Due to their weight and size, these microcars are regulated like golf carts instead of passenger automobiles. Mobility company Free2Move plans to bring a fleet of Citroen Ami electric vehicles to

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[14] Shared Micromobility in the US: 2019, NACTO, August 2020

Washington, DC as a pilot. These two-seater electric microcars are powered by an eight horsepower engine and limited to speeds of 28 miles per hour.

Figure 8: Citroen Ami Microcar (Free2Move, 2021)

Electrification

One of the biggest trends in the industry has been the move to electrified vehicles since 2017. Riders show a strong preference in most markets for electric bicycles or scooters. Today, nearly all systems that operated dockless conventional bicycles have replaced them with scooters or e-bikes. Docked systems like Capital Bikeshare continue to offer conventional bicycles but have also introduced e-bike options. NACTO's annual State of Micromobility report helps illustrate the popularity of electric modes. Between 2018 and 2019, the number of annual electric scooter trips more than doubled while bikeshare trip growth was nearly flat (
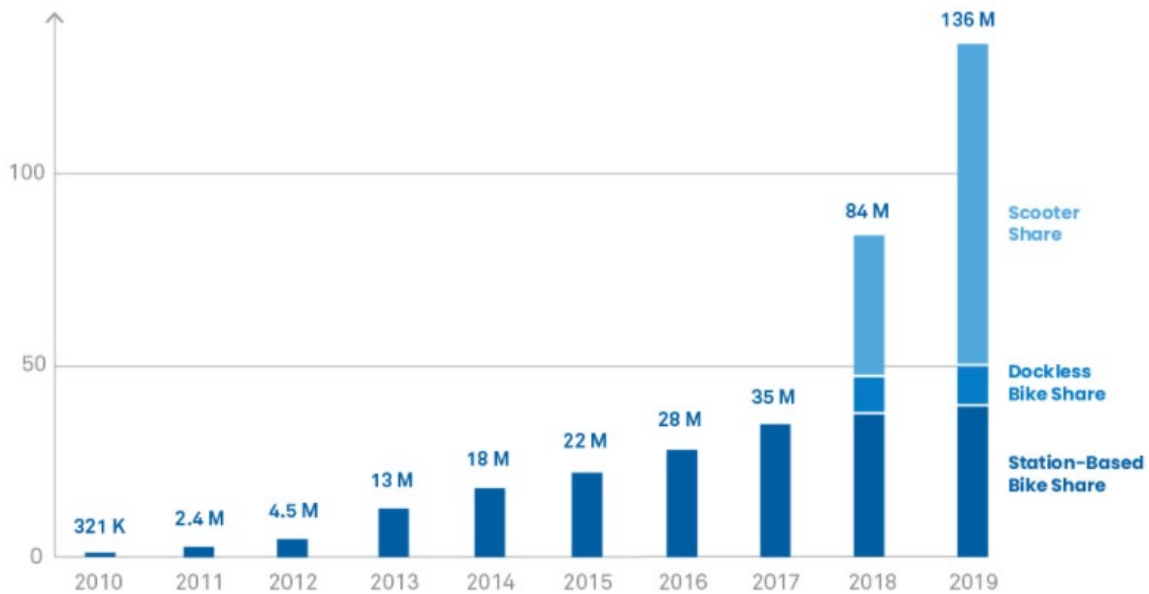
Figure 9).

Figure 9: Growth of Bicycle and Scooter Share - NACTO 2019 State of Micromobility Report[15]

SHARED MICROMOBILITY RIDERSHIP GROWTH FROM 2010–2019, IN MILLIONS OF TRIPS

Source: NACTO

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[15] [Shared Micromobility un the US: 2019](), NACTO, August 2020

2.2.3 Safety

Micromobility services bring with them a certain amount of risk for both users and other road and sidewalk users. Data shows that scooters have a higher rate of injury and fatalities than bikeshare. In the United States, dockless scooter services have a higher rate of industry and death than docked bikeshare; in 2019 there were 18 micromobility deaths on scooters compared to 2 on bicycles. A recent study by the CDC found that 48 percent of dockless scooter injuries sampled in Austin, Texas resulted in head trauma.[16] Low rates of helmet use contribute to high rates of head injury; a study of emergency room visits in Southern California found that of the 249 patients with injuries related to scooters, only 10 were wearing a helmet and 100 had sustained some head trauma.[17] There are a few possible reasons why scooters have a higher injury rate: the instability of the vehicles themselves, especially earlier models that had smaller wheels; the public's unfamiliarity with scooters (most bikeshare users know how to cycle prior to using bikeshare); and a lack of standard protocol for where scooters are ridden.

In addition to the safety of those riding a scooter or bicycle, there is a safety risk to pedestrians, especially with regard to dockless equipment. If parked improperly on a sidewalk or on a roadway, dockless scooters can block the public right of way and pose a safety hazard.

For Capital Bikeshare, a liability waiver releases the operator, sponsor, and host municipalities from all claims, placing all risk on the users (including responsibilities for damages or injuries caused to other people or property).[18] Micromobility operators, including Capital Bikeshare, hold their own insurance policies and indemnify their host communities from any liability related to the service.

2.3 Conclusion

The research in this section helps inform the analysis of the following chapter (**Chapter 3: Market Assessment**)

This section has several key findings which will influence upcoming analyses:

Key findings:

- Capital Bikeshare ridership and average trips per bike in Fairfax County is consistent with other suburban markets in the region, like Falls Church and Rockville, but substantially lower than urban markets like Washington, DC. Existing ridership rates suggest that micromobility services either cannot rely entirely on user fees to sustain operations or utilize an operating model with very low unit operating costs.
- While no dockless micromobility services operates today in Fairfax County, several companies operate systems in the region. There remain high levels of competition in the local micromobility market, with no dominant dockless provider.
- Capital Bikeshare remains the region's largest micromobility operator, but today accounts for fewer than half of micromobility trips in the region.
- COVID-19 impacted ridership in 2020, especially at the beginning of the pandemic, but Capital Bikeshare ridership recovered somewhat over the summer. It remains unclear whether micromobility ridership will return to pre-pandemic levels in 2021, but the market shows long-term growth potential.
- The micromobility industry is rapidly changing. In the short-term, the industry will likely see some consolidation due to overcapacity and the effects of the pandemic.

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[16] Dockless Electric Scooter Injury Study, Austin Public Health, 2018; Micromobility Products-Related Deaths, Injuries, and Hazard Patterns: 2017-2019, Consumer Protection Bureau, 2020
[17] Trivedi, Tarak K et al. Injuries Associated with Standing Electric Scooter Use, Journal of the American Medical Association, 2019; 2(1)
[18] Liability Waiver, Release, Indemnification, and Voluntary Assumption of Risk (the "Release"), Capital Bikeshare, 2021

- The micromobility market is moving toward electrification, with the majority of trips taken by electric scooter or e-bike. Companies will likely introduce additional modes in the region over the coming years such a e-mopeds.
- WMATA's Silver Line will improve transit access to Herndon. Micromobility could integrate with the Silver Line by facilitating first/last mile trips to transit.

3 MARKET ASSESSMENT

In this chapter, the study focuses on answering a fundamental question for Herndon: what does the market for micromobility in the town look like? To help answer this, the study team took a data-driven approach that looked at a variety of sources, from geospatial attributes that correlate with micromobility demand to an assessment of how micromobility performs in communities similar to Herndon. This section concludes with recommendations around the size and scope of micromobility within the Town's borders.

3.1 Comparison of Peer Markets in the Region

Herndon can learn a lot from observing how micromobility performs in other parts of the region. The study team identified communities in the region with Capital Bikeshare and looked at a range of basic statistics to understand how they compare to Herndon.

To compare population, job, and bikeshare station density of other jurisdictions in the region, the project team defined market areas within each jurisdiction, as opposed to using municipal or county boundaries. This avoided including the large parts of Fairfax, Montgomery, and Prince George's County without Capital Bikeshare service. These market area definitions were based off of a ¼-mile buffer around existing bikeshare stations, that were combined together manually to balance geographic compactness with the real-world bikeshare market. The resulting densities of this areas are compared to Herndon in **Table 6**, and a map of these market areas can be seen in **Figure 10**.

Herndon has comparable population and job densities to several places already served by Capital Bikeshare, including Falls Church, Prince George's County, and Reston. However, it is much less dense than both Washington, DC and Arlington County, the two jurisdictions that account for the vast majority of Capital Bikeshare ridership.

Table 6: Population, Job, and Station Densities in the Capital Bikeshare System Market Areas

	Alexandria, VA	Arlington, VA	Falls Church, VA	Montgomery County, MD	Reston, VA	Prince George's County	Fairfax County, VA (Tysons)	Washington, DC	Herndon
Population Density (mi²)	9,876	10,631	6,548	7,804	4,608	9,133	5,044	12,618	**5,738**
Job Density (mi²)	7,909	8,347	4,915	8,486	14,797	2,628	27,473	12,921	**3,715**
Density of Capital Bikeshare Stations (mi²)	4.10	5.07	5.89	3.37	4.52	1.54	2.23	5.89	-

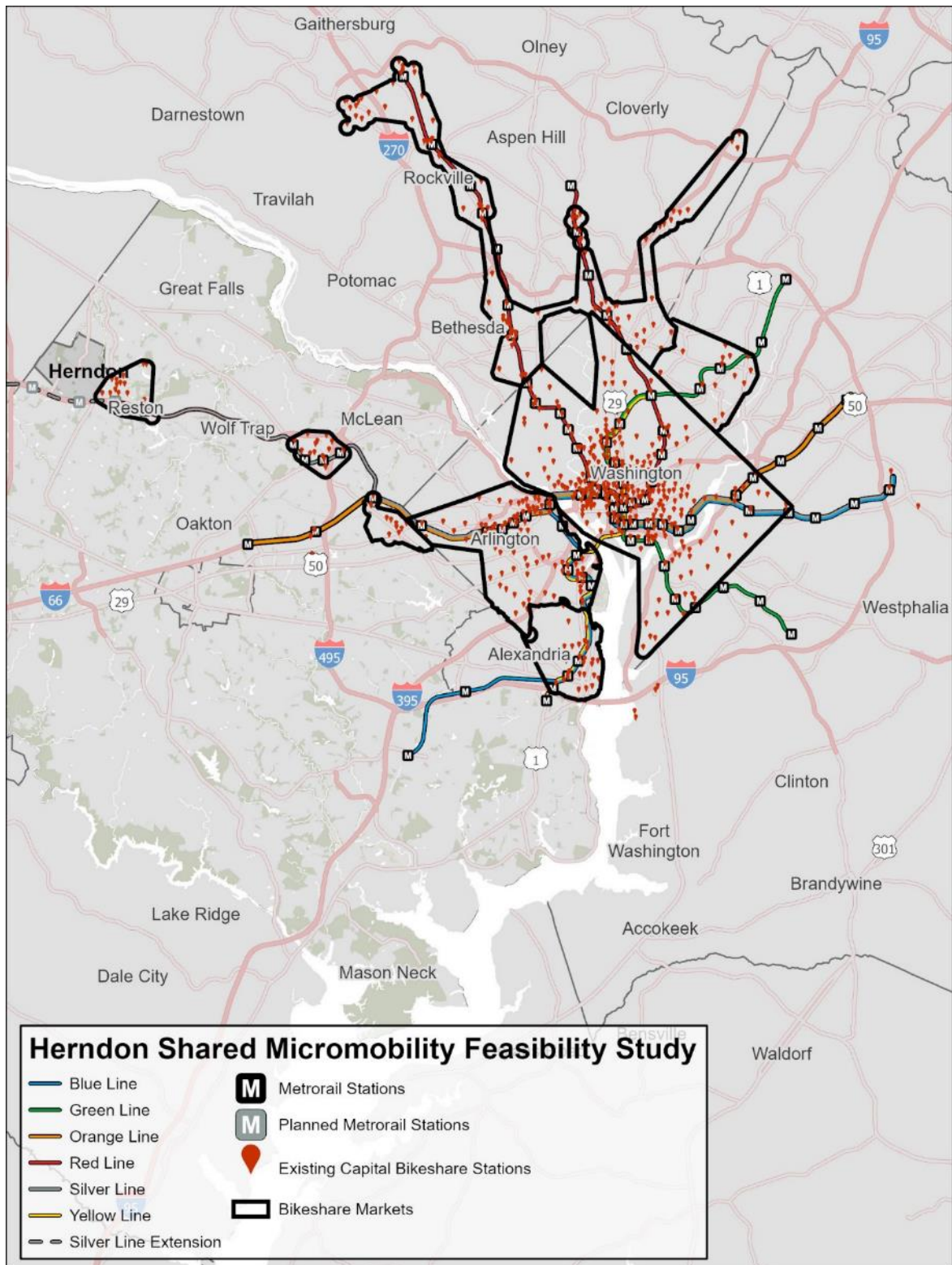*Figure 10: Capital Bikeshare Market Areas*

Table 7 highlights stations in peer jurisdictions with the lowest TpB. Examining where stations are used less frequently in peer jurisdictions can help shed light on the conditions that may make bikeshare less successful. Of the stations with the lowest TpB, about half are located in suburban jurisdictions, with the remaining half located in Washington, DC. However, across the system, most of the stations with the lowest TpB are somewhat isolated, both from other Capital Bikeshare Stations, but also from destinations. When considering where stations should be located, proximity to activity generators is key. The highest performing stations are located in mixed-use areas, with a large number of nearby destinations accessible by bikeshare.

Table 7: Stations with the lowest Trips per Bike Per Day (TpB)

Station	Region	TpB
Joliet St & MLK Ave SW / Bald Eagle Recreation Center	Washington, DC	0.02
Shady Grove Hospital	Montgomery County North	0.03
United Medical Center	Washington, DC	0.03
Campus Commons	Fairfax, VA	0.03
Southern Avenue Metro	Prince George's County	0.03
Reston Regional Library	Fairfax County	0.03
Traville Gateway Dr & Gudelsky Drive	Montgomery County North	0.03
37th & Ely Pl SE	Washington, DC	0.04
Mississippi Ave & 19th St SE / THEARC	Washington, DC	0.04
Montgomery College / W Campus Dr & Mannakee St	Montgomery County North	0.04

Table 8 compares several key demographics of Herndon with the demographics of peer cities in the region. Examining both equity and ridership indicators in the Town can help provide insights into who the target market will be for micromobility in Herndon.

Herndon is in the middle of the pack in terms of equity measures. Herndon's low-income population, measured as 150 percent above the federal poverty rate, is in line with peer jurisdictions. The Town's non-white population, as well as the population of people with limited English proficiency are slightly higher than average compared to the peer cities.

In terms of the ridership measures, Herndon's share of alternative mode commuters and zero- and one-car households is lower than peer cities, but the Town has fewer Metrorail connections and is more suburban than other jurisdictions. Young adults (ages 18-34) are a key rider demographic in other markets; Herndon's proportion of the population in this age bracket is similar to other suburban peers, with the exception of Arlington, where young adults make up a larger share of the population.

Table 8: Demographic Profile of Peer Cities

	Herndon, VA	Alexandria, VA	Arlington, VA	Fairfax, VA	Falls Church, VA	Montgomery County	Prince George's County
Equity Indicators							
Non-White Population	**55%**	45%	36%	47%	30%	52%	86%
Low-income Population	**11%**	15%	10%	10%	6%	11%	14%
Limited English Proficient	**18%**	11%	7%	13%	5%	12%	11%
Ridership Indicators							
Populated Aged 18 to 34	**24%**	28%	33%	22%	20%	21%	25%
Zero- and One- Car Households	**35%**	56%	52%	31%	45%	37%	44%
Alternative Mode Commuters	**14%**	25%	34%	12%	23%	18%	17%

3.2 Propensity Analysis

To identify where micromobility could be most successful in the Town of Herndon, the study team conducted a propensity analysis that aggregates a range of factors related to ridership demand and public need for bikeshare. This analysis focuses on the Town of Herndon and does not include areas outside of the town's geographical limits. The scoring of the propensity analysis is relative to other areas of Herndon.

3.2.1 Methodology

The propensity analysis includes a series of measures that relate to high micromobility demand, including employment density, population density, concentration of retail activity, existing mode share for bicycle commuters, and availability of bicycle infrastructure. Additional factors, such as the density of low-income and non-white populations, were also incorporated in accordance with the Town's goals.

Table 9 lists the 13 measures included in the propensity analysis, as well as the weighting of each measure used in the model. Certain measures were given a higher weighting, indicating the perceived importance of that measure. Population and employment density, for example, were assigned a higher weight than other factors because they are the factors most significantly correlated with higher bikeshare ridership.

The measures included in the propensity model have been normalized to a scale of zero to one, with one representing the maximum value and zero the minimum value. The measures used in this analysis are largely based on absolute numbers (e.g., the number of bicycle commuters, or low-income population per square mile) rather than percentages (e.g., proportion of a population that is low income). This approach was taken so that each measure gauges the total population impacted by bikeshare.

Table 9: Individual Propensity Measures and Weighting

Measure	Source	Weighting
Population density	American Community Survey (ACS) 2019 5-year averages	2
Density of population 150% of the federal poverty line (definition for low-income)	ACS 2019 5-year averages	1
Density of non-white population	ACS 2019 5-year averages	1
Employment density	Longitudinal Employer-Household Dynamics (LEHD) 2018	2
Density of retail and hospitality employment (proxy for retail activity)	LEHD 2018	1
Density of bicycle commuters	ACS 2019 5-year averages	1
Count of points of interest[19]	Fairfax County Open Data	1
Count of parks	Fairfax County Open Data	1
Density of bicycle infrastructure	Fairfax County Open Data	2
Distance to closest Metrorail station	Fairfax County Open Data	1
Density of new development	Town of Herndon Current Development Projects	1
Historic designation	Fairfax County Open Data	2
Change in elevation	United States Geological Survey	-1

3.2.2 Propensity Results

Figure 11 presents the results of the propensity analysis for Herndon, highlighting which areas in the town have comparatively the best conditions to support bikeshare. Each grid cell received a score ranging from 0.4 to 11.2, with a higher value reflecting a greater predicted demand for bikeshare.

Most of the southern portion of the town has a moderate to high propensity for bikeshare. This is the result of numerous factors, but is largely driven by the higher job and population density compared to other parts of Herndon. In general, the areas in the town with the highest propensity for micromobility have a density of retail activity, jobs and/or population.

The area with the highest propensity is the South Elden Street Corridor between Sterling Road and Herndon Parkway. Elden Street is a major commercial corridor in the town and separates areas of high population density from areas with high job density, which help drive activity on the corridor. The area east of Elden Street, just north of the Dulles Toll Road has moderate-high propensity. This area has a high density of jobs, with many office parks, as well as significant retail activity. Elden and Grove Streets, near Grant Street, also has moderate-high propensity. This area also has a concentration of retail activity and is proximal to both the W&OD Trail and Herndon's historic town center.

Additional areas in the town have moderate bikeshare propensity. These include Herndon's historic town center, along the Fairfax County Parkway (Herndon's border with Reston), and along the W&OD Trail. These areas do not have the same density of retail activity, jobs, or population that higher propensity areas in the

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[19] Points of interest include public schools (K-12), community centers, libraries, and shopping centers located within the Town of Herndon.

town have but have features that could drive micromobility demand. The W&OD Trail, for example, provides a safe place for cyclists to ride and also provides bicycle connections to the region as a whole.

Figure 11: Town of Herndon Propensity Results
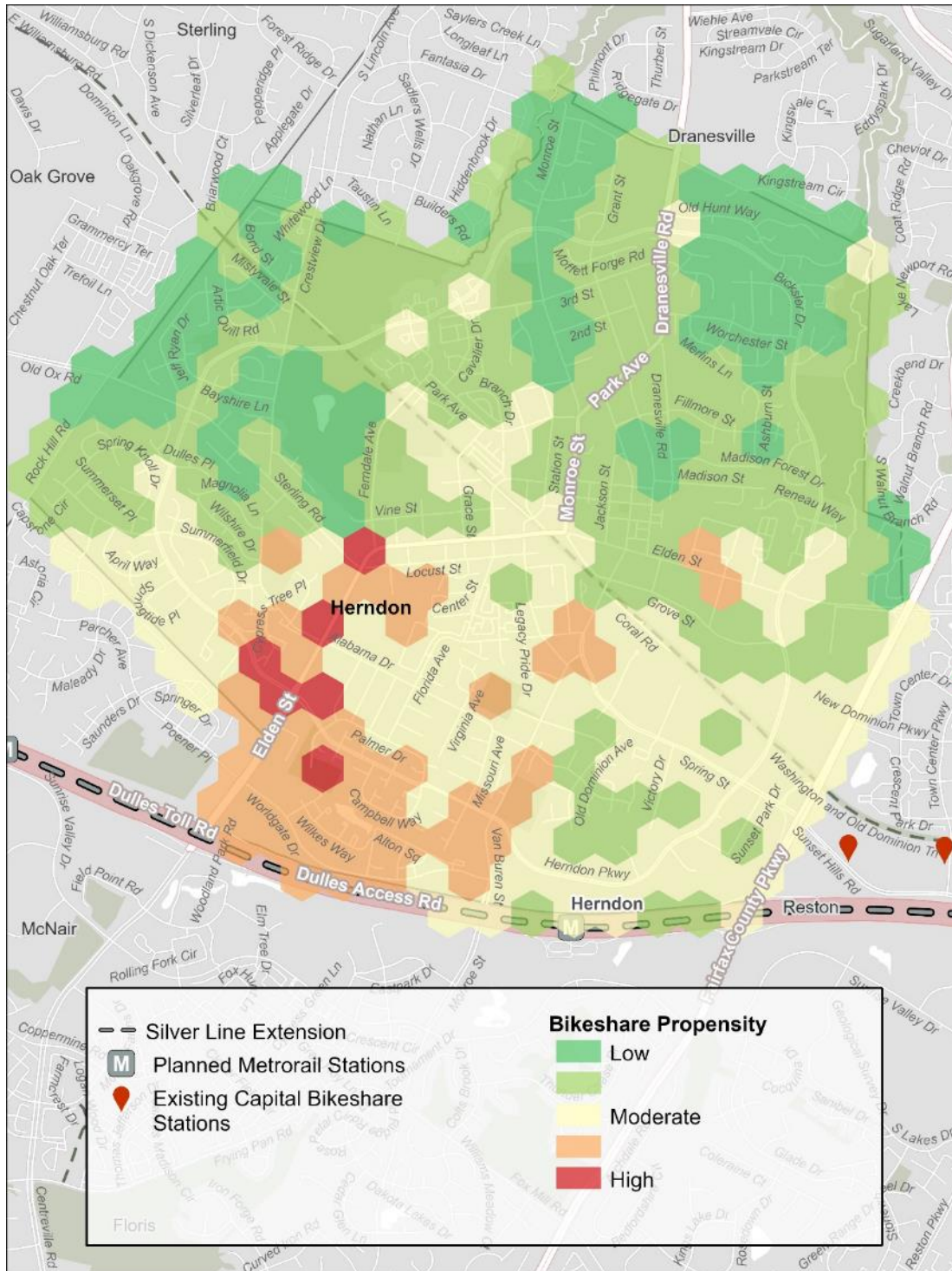
3.3 Key Destinations

Looking at demographics and bikeshare propensity only provide a partial picture of the demand for micromobility services. The study team inventoried key destinations to understand the types of major trip attractors within the town border. This information helps form a better understanding of who may use a micromobility service in the town and why.

3.3.1 Employment / Activity Destinations

Herndon is located along the Dulles Technology Corridor. While job densities are low compared to Reston, the town is home to several notable employment centers. With the arrival of Metrorail service with the completion of Silver Line Phase II, Herndon can expect continuing job growth at many of these locations.

- The Town is home to three concentrations of job centers:
    — **Herndon Parkway** between Van Buren Street and Elden Street
    — **Spring Street**
    — **Worldgate Drive**

Most retail destinations in Herndon are concentrated along Elden Street in many shopping centers, as well as in the town's historic Downtown. The Elden Street corridor is home to both low-wage jobs that would benefit from micromobility access and the types of leisure and retail destinations that can drive micromobiility demand.

The largest job center in the Reston-Herndon area, Reston Town Center, includes mixed uses of retail, offices, and residential less than a mile east of the town along the W&OD trail.

3.3.2 Recreational Facilities

Key recreational facilities in Herndon likely to generate demand for bikeshare include:

- **W&OD Trail** – Provides recreational opportunities and safe, comfortable long-distance bicycle connections to existing Capital Bikeshare networks in Reston, Falls Church, and Arlington. Also connects to Sugarland Run Trail.
- **Sugarland Run Trail** – Skirts the eastern edge of town and connects to the town's other two major recreational trails.
- **Folly Lick Run Trail** – Skirts the northern edge of town and connects to the Sugarland Run Trail. Planned extension from current terminus at Herndon Parkway to Downtown will create a full loop of off-street bike trails encircling much of the northern half of town.
- **Herndon Community Center** - The town's public recreational infrastructure is concentrated at the Herndon Community Center, including an indoor pool, athletic fields, tennis courts, and a golf course, with a direct off-street connection to the W&OD Trail.

3.3.3 High Density Residential Area

While Herndon lacks high-rise residential districts like those seen in portions of Reston, Tysons, and Arlington, the town does feature several higher density residential areas that feature multi-family and/or attached housing. These areas are natural fits for micromobility because of the greater concentration of residents in these areas.

- **Alabama Drive Park**
- **Center Street / Florida Avenue**
- **Park Avenue / Ferndale Avenue / Cavalier Drive**
- **Stuart Woods / Crestview**
- **Worldgate Drive**
- **Crestview Drive**

3.3.4 Public Transit

Finally, transit hubs are potential destinations for micromobility users. While Herndon will only have one Silver Line Metrorail station within its boundaries, the town is near two other under-construction stations.

- **Herndon Metro Station** – Currently the hub for most bus routes serving the town, once the Silver Line opens, the Herndon Metro station will also provide a rail connection to destinations throughout the region. Additional Fairfax Connector service to points south such as Chantilly, Centreville, and Fairfax, is planned to coincide with the start of rail service.
- **Innovation Center Metro Station** and **Reston Town Center Metro Station** – Within a mile of the town's borders, these two Metro stations will provide additional nearby access points to the Silver Line and connections to other Fairfax Connector routes serving the Reston-Herndon area and beyond.

3.4 Predicted User Base and Trip Patterns

The user base of the existing Capital Bikeshare network varies considerably depending on neighborhood and jurisdiction within the system. Users generally fall into two broad categories: regular, or registered, users, who hold an annual or monthly Capital bikeshare pass, and casual users, who do not hold a long-term membership. While registered users tend to incorporate bikeshare into their daily travel patterns, such as their commute mode or a first/last mile connection to transit, casual users tend to use bikeshare for leisure, sightseeing, or recreation/exercise purposes.

To understand the potential user base of bikeshare within Herndon, travel patterns at existing Capital Bikeshare stations in peer jurisdictions were examined. Peer jurisdiction's TpB, subscriber share, and Peak/Off-Peak ratio are presented in **Table 10**. Compared to the systemwide average, Herndon's closet peers (Fairfax, Falls Church, and Montgomery County) have a lower TpB and lower share of registered users to casual users. Compared to other jurisdictions in the region, like Washington, DC, Herndon's closest peers have a lower population density and more auto-oriented development patterns. Like its peers, Herndon is more suburban and auto oriented and has few transit commuters.

Table 10: TpB, Subscriber Share, and Peak/Off-Peak Ratio for Peer Jurisdictions[20]

	Systemwide	Alexandria, VA	Fairfax, VA	Falls Church, VA	Montgomery County, MD (North)	Montgomery County, MD (South)
Trips per Bike per Day	1.57	0.65	0.17	0.22	0.14	0.28
Subscriber Share	76%	71%	59%	65%	71%	69%

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[20] Capital Bikeshare Historic Trip Data, 2016-2020. The TpB analysis is conducted at the station level. The 84,633 electric bike trips in 2020 that did not start at a station were excluded from the TpB analysis.

Peak/ Off Peak Ratio	60%	54%	48%	52%	50%	56%

Based on average trip rates, the breakdown of users by membership type, and the season variation in ridership observed in peer areas served by Capital Bikeshare, the study team estimated potential Capital Bikeshare ridership for Herndon. These estimates are based on the system size envisioned in the following section (**Section 3.5**).

Table 11: Estimated Capital Bikeshare Ridership in Herndon

	Ridership
Registered Users	9,000 trips
Casual Users	4,000 trips
Total	**13,000 trips**

The results of the propensity analysis, town demographics, and inventory of key destinations, provide insight to how micromobility might be used in the town. Micromobility in Herndon would likely have to serve a wide range of trip types to generate adequate ridership. A system could serve leisure and recreation trips, notably along the W&OD trail. The service could provide additional mobility options for residents, notably people living in the more densely developed southern half of the town. Finally, micromobility could connect Town residents and workers to the Metrorail, which is located beyond walking distance from much of Herndon.

This need to serve a wide range of trip types simultaneously is not unusual for micromobility programs. While some parts of the region (e.g., the National Mall, Downtown, DC) could generate their ridership solely from one market segment like tourists or office workers, suburban communities like Herndon rely on serving a diverse set of trips. The need to serve several types of users will have an impact on the shape of Herndon's program, including:

■ Locating stations near a range of land uses and types of destinations.
■ Utilizing technology that is appealing to a range of users based on trip type, age, and ability.
■ Formulating a fare structure that can both attract frequent and infrequent users.

3.5 Proposed Extent of Micromobility System

3.5.1 Planning Criteria to Guide Station Siting

Station siting plays an important role in determining the effectiveness of bikeshare programs, and similarly, the concentration of shared micromobility vehicles in high ridership areas is important for the success of shared micromobility programs. Both bikeshare and shared micromobility services function as a network and the placement and density of vehicles closely impacts ridership. The following are key criteria the study team used to determine station location recommendations.

■ **Density:** Providing stations close together reduces the average time it takes a rider to walk to or from a station. A quarter mile is considered a typical walking radius for bikeshare stations. Denser stations also increase the total number of destinations accessible by bicycle. Ridership grows as the number of destinations within a bike-able distance increase. While density is important, stations should be spread out enough to not over saturate the market.

- **Station Size:** Bikeshare stations can be purchased with a varying number of docks, with the ability to expand stations in the future. Optimizing station sizing is important for the function of a bikeshare station; purchasing too small of a station can result in capacity constraints while too large of a station results in unnecessary additional cost. If demand exceeds supply, stations can be expanded over time with additional docks. While dockless micromobility services are not constrained by factors like dock size, they do benefit from adequately sized parking areas.

- **Maintain Capacity at Key Locations:** A large proportion of users will likely utilize bikeshare to access destinations outside of Herndon. Station capacity should be closely monitored at locations near key destinations. For example, the Town should work with Fairfax County to ensure adequate capacity at Reston Town Center or a future station at Innovation Station.

- **Visibility and Proximity to Destinations:** Stations should be placed in locations that are easily accessible to nearby destinations, like the new Silver Line Metrorail stations, Herndon's Historic downtown, major real estate developments, and retail corridors. For dockless micromobility, in lieu of stations, the Town could create dedicated parking areas with signage.

- **Accessible to Key Bicycle Routes:** While stations should not be sited solely based on the availability of bicycle infrastructure, stations should be placed in locations that are easily accessible from key bicycle routes, like the W&OD Trail.

3.5.2 Station Location Recommendations

Based on the findings from the market analysis, including the propensity analysis and other factors, as well as the station siting criteria, the study team identified a total of 24 potential station locations for Capital Bikeshare stations in Herndon, as shown in **Figure 12**. **Table 12** lists out the recommended station locations and justification for each station. These stations are built around key corridors in Herndon, such as Elden Street, the W&OD Trail, and the Herndon Parkway and aim to connect key destinations, recreational amenities, and job centers within Herndon. Note that should Herndon move forward with implementing Capital Bikeshare, the final location of stations will likely vary depending on factors such as future real estate developments, community feedback, and the availability of space for a bikeshare stations.

While **Figure 12** highlights potential locations for Capital Bikeshare stations, these station locations can also be applied to the best locations for dockless micromobility "hubs." Many jurisdictions are moving toward creating micromobility hubs and informal parking spaces for micromobility vehicles to manage their micromobility programs more easily and reduce dockless vehicle's negative impacts on the pedestrian environment. The suggested station locations can help lay the groundwork for where micromobility hubs be located.

Note that these represent just general station locations and specific sighting and system planning will have to occur with public input. The final station locations will be impacted by the availability of space for stations, a factor not considered in this assessment.

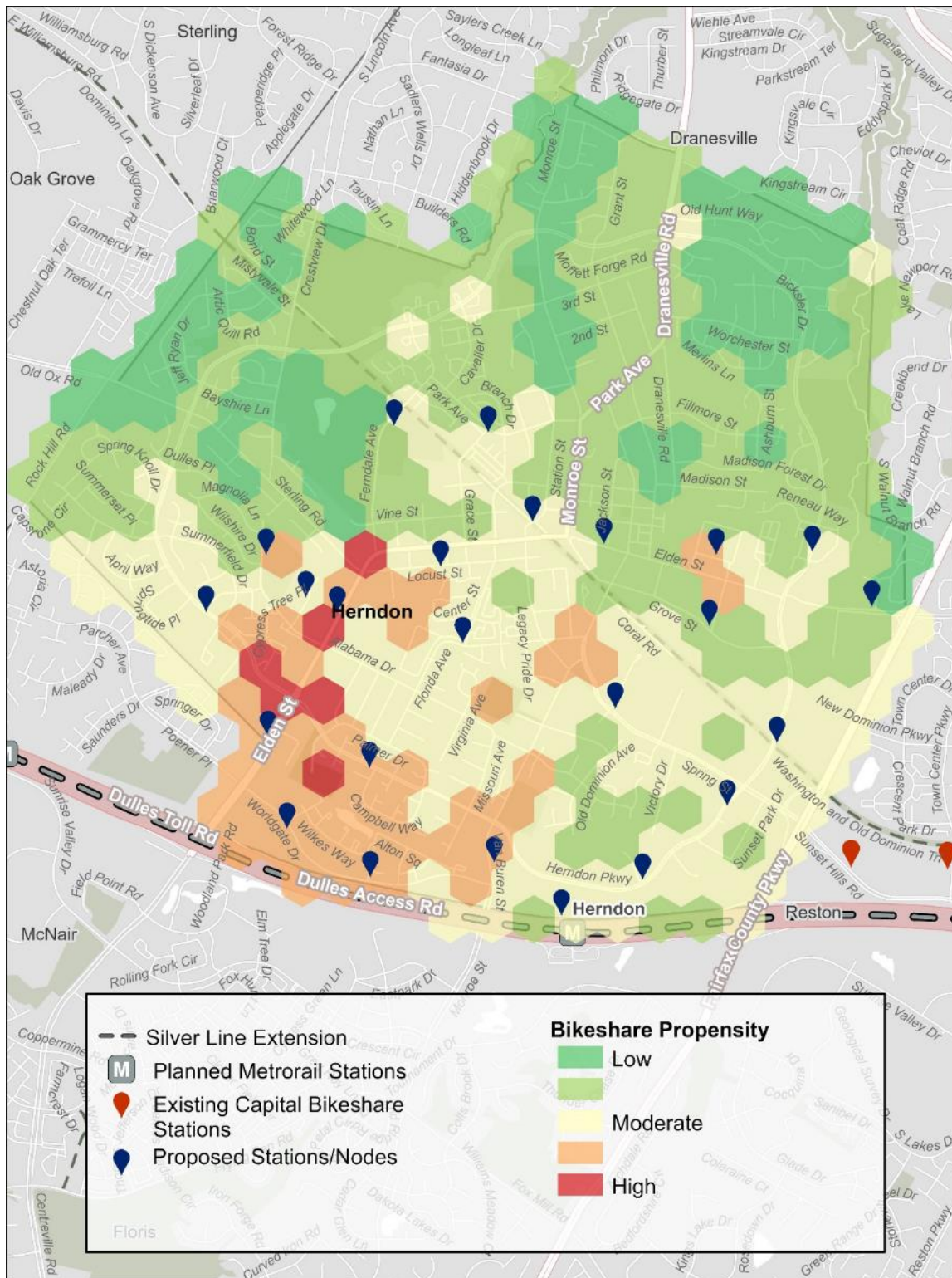*Figure 12: Proposed Capital Bikeshare/Micromobility Node Locations*

Table 12: Recommended Station/Micromobility Nodes

General Station Location	Justification
Herndon Middle School (Locust St & 5th St	Station is located off Elden Street, a major commercial thoroughfare and between recreation destinations.
Worldgate Dr & Wilshire Ct	Station is located off major thoroughfare, near numerous bus stops, offices, and shopping centers.
Worldgate Dr & Alton Square	Station is located off major thoroughfare, near numerous bus stops and offices.
Herndon-Monroe Park & Ride	Station will provide connections to/from transit and is located near numerous offices.
Herndon Pkwy & Exchange Pl	Station is located off major thoroughfare, near numerous bus stops and offices.
Herndon Pkwy & Spring St	Station is located off major thoroughfare, near numerous offices.
Herndon Pkwy & W&OD Trail	Station is located off major thoroughfare, near many offices and provides a connection to a major bike trail in the region.
Elden St & Laurel Way	Station is located on major commercial corridor, with connections to offices, multi-family homes, and the Fairfax County Parkway Trail.
Herndon Pkwy & Taramark Way	Station is located on major throughfare and is near businesses and dense multi-family housing. Station is also close to the Sugarland Run Trail.
Elden St & Post Dr	Station is located on major commercial corridor, near numerous businesses.
Elden St & Pastor Dr	Station is located on major commercial corridor, in close proximity to numerous businesses.
Elden St & Jackson St	Station is located on major commercial corridor, in close proximity to numerous businesses.
Station St & Lynn St	Station is located in Herndon's historic town center and provides connections to many businesses as well as the W&OD Trail.
Park Ave & Grace St	Station is located near multi-family housing and transit. It also provides connections to the W&OD Trail.
Herndon Community Center	Station is located at a recreational facility and provides connections to the W&OD trail.
Elden St & Alabama Dr	Station is located on major commercial corridor, near proposed new bicycle infrastructure and multiple bus stops.
Elden St & Herndon Pkwy	Station is located on major commercial corridor, near numerous bus stops and other destinations.
Herndon Pkwy & Summerfield Dr	Station is located on a major thoroughfare, near recreational destinations in the Town as well as dense housing.
Alabama Dr & Wilshire Dr	Station is located near recreational destinations in the town as well as dense housing.
Dulles Park Ct	Station is located near dense, multi-family housing and is near recreational and business destinations.

General Station Location	Justification
Herndon Pkwy & Campbell Way	Station is on major thoroughfare and near multiple bus stops and recreational destinations.
Van Buren St & Silverway Dr	Station is located near large commercial development with bicycle facilities. The station is also proximal to other offices as well as numerous bus stops.
Spring St & Adele Garden Way	Station is located near numerous office parks and is in good biking distance to the W&OD Trail as well as the new Silver Line Metrorail stations.
Florida Ave & Center St	Station is located in dense residential area and is located in good biking distance to the Elden St corridor.
Grove St & Post St	Station is located near large grocery store and office buildings. The station is also in good biking distance to new Silver Line Metrorail stations.

3.5.3 Phasing

While Herndon does not need to implement an entire 24-station system at once, bikeshare ridership benefits from scale. The fewer stations and vehicles, the fewer trips that can be served by a system. A smaller system with 10-12 stations could provide a minimum level of coverage, including stations at Metrorail, key job centers in South Herndon, along South Elden Street, and at the historic town center. Any expansion should strive to expand contiguously from the existing Capital Bikeshare network in Reston and maintain a distance between stations of no more than half a mile.

The following outlines a blueprint for implementing micromobility in the Town of Herndon to provide the town with the guidance needed to make an informed decision about implementing micromobility services. This blueprint details considerations for two potential pathways for implementing micromobility service: Joining the existing Capital Bikeshare system and implementing private micromobility in the town.

While this business plan discusses these two pathways separately, they are not mutually exclusive. That is: joining Capital Bikeshare does not preclude the Town of Herndon from also allowing private micromobility services in its borders and vice versa. Ultimately, the Town must determine the most appropriate micromobility offering based on strategic goals, financial constraints, and political realities.

The implementation plan begins with an overview of micromobility business plans, followed by an overview of implementing Capital Bikeshare in the town, and then a discussion of managing private micromobility in the town.

4.1 Overview of Implementation Process

This section provides high-level overview of how micromobility programs are typically implemented from initial plan to program launch:

Creating the Plan
This document represents the first step in implementing a micromobility program. Many successful micromobility programs begin with a fundamental planning process that identifies what the community hopes to achieve with micromobility, the market demand for such a system, and potential paths for moving forward.

Developing the Business Model
Before Herndon can move forward with implementing a system, it needs to first devise a business plan. There is great diversity in how micromobility systems are organized and operated. In simplest terms, any micromobility program must first identify the following basic components of the system's business model:

- **Ownership and Governance:** Who owns equipment and holds the financial risk; who is responsible for oversight and decision making, including system size, operating structure, and user costs; what ownership model will be used (for-profit, public, or non-profit); will the system be directly operated or contracted out to a third-party vendor?
- **Operations:** How are program operations structured? Is the program owner or a third-party responsible for operations?

Figure 13: Typical Steps in the Micromobility Planning Process

CREATING
THE PLAN

DEVELOPING
THE BUSINESS MODEL

IMPLEMENTING
THE BUSINESS MODEL

COUNTDOWN
TO LAUNCH

- **Technology:** What type of bicycles and stations will be used? What method is used by riders to access equipment? What kind of technology is used to monitor the program?
- **Funding:** How is the system funding operations and capital costs? What is the program funding needs?

Developing the business model for micromobility is often an iterative process that brings together local leadership and the public. Establishing a micromobility system often requires the participation of private-sector partners, and their interest and expertise will help shape the program.
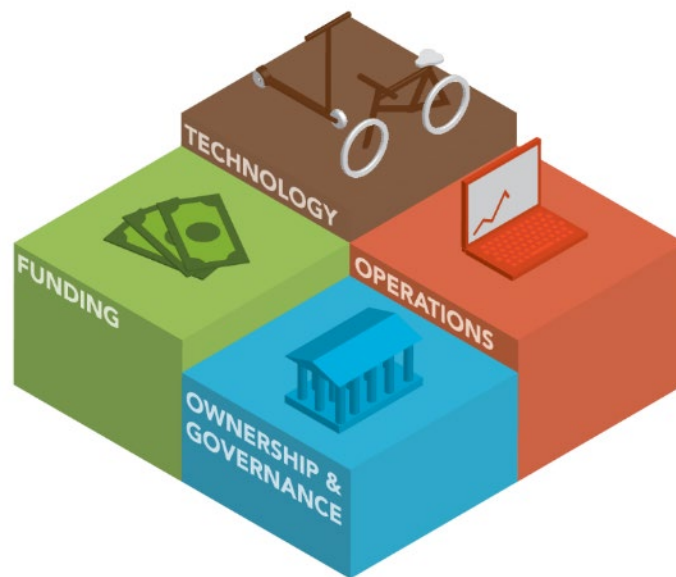
Implementing Business Model
The next step for Herndon would be to make the program's business plan a reality. The details of implementation vary considerably between communities. Jurisdictions looking to private dockless companies to operate the program will typically set up a permitting program that both enables and regulates micromobility operations. Communities with a publicly funded system will turn to a formal procurement process to acquire a micromobility operator and/or funding partner. For Herndon, we see two likely paths forward for the Town: joining Capital Bikeshare and attracting one or more private micromobility operators. As is the case in places like Washington, DC and Arlington County, both options could occur in tandem.

Countdown to Launch
The final step before implementation consists of a variety of activities that must occur before the program launches. Regardless of the model, this is the ideal time to initiate public education about micromobility and prepare both residents and businesses for the launch of a system. During this phase, the Town would make the necessary infrastructure investments. In the case of Capital Bikeshare, this would entail site planning and installation of stations. For dockless micromobility, updated signage and new micromobility and bicycle parking could be included.

4.2 Implementing Capital Bikeshare

Capital Bikeshare is the largest micromobility system in the region and as such the most likely scenario for Herndon if the Town wanted to pursue a publicly-funded bikeshare program. The following presents options for expanding the existing Capital Bikeshare system into the Town of Herndon. This section will provide information on a business model for the program, focusing on ownership and program governance, system site planning, funding, and marketing.

4.2.1 Ownership and Governance

Each of the seven jurisdictions currently participating in Capital Bikeshare directly contracts with Motivate, a third-party vendor that manages the day-to-day operation of the program across all jurisdictions. Stations and equipment, with the exception of e-bikes, are owned by individual jurisdictions, not collectively, and the user revenue is split between each jurisdiction based on a number of factors, including start location of trips, the billing address of the user, and each jurisdiction's share of systemwide docks. Lyft, which owns Motivate, owns

the e-bikes in Capital Bikeshare's fleet, and charges riders a small flat fee ($1) for every e-bike trip. The jurisdictions regularly convene a Capital Bikeshare board, and any decisions impacting the system are made jointly by representatives from all participating jurisdictions. Because of this governance structure and outward unity of the program, equipment flows between jurisdictions fairly freely. It is Motivate's responsibility to ensure minimum standards of bike to dock ratios are met in each jurisdiction, and it is the collective responsibility of the jurisdictions to ensure the bikes are well maintained across the service area.

Ownership and Governance Pathways for Herndon

To join Capital Bikeshare, the Town of Herndon has two pathways in terms of ownership and governance that each have their pros and cons. Because the Town is located in Fairfax County, it could potentially join the system under the County's current contract. Alternatively, the Town can enter into a contract with Motivate directly.

Currently, all of the Capital Bikeshare stations located in Fairfax County are owned by the County. While Motivate handles the day-to-day operations, the County is responsible for system oversight, station location planning, and funding capital costs or any operating shortfall. Formalizing an agreement with Fairfax County and joining the County's contract with Motivate will likely alleviate some of the financial pressure on the Town to operate the system. The County is already set up with Capital Bikeshare and has a staff member dedicated to shared-use mobility who manages bikeshare in the County. Start-up costs for implementing Capital Bikeshare average around $30,000, plus the capital investment, but Herndon could likely avoid start-up charges by joining onto the existing contract with the County.

Joining under the County's contract raises several issues that will need to be resolved.

- How would the County and Town share in the responsibility of system oversight? Would Herndon be responsible for functions normally handled by the jurisdiction holding the operating contract, such as program marketing, station site planning, and public engagement?
- Would Herndon be expected to contribute to the system's operating subsidy? If so, how will those costs be equitably calculated? While operating costs are based on the number of docks in a system, operating revenue is based on ridership and varies widely across the system. For residents of Capital Bikeshare jurisdictions, user revenue is split amongst the jurisdiction based on the billing zip code of a pass purchaser and the jurisdiction where the trip started. For non-residents of Capital Bikeshare jurisdictions, user revenue is split amongst the jurisdictions based on the percentage of docks each jurisdiction owns. Currently, revenue sharing is done at the county level. Because Herndon is located within Fairfax County and the boundaries of Herndon's zip code is larger than the town itself, fair and accurate revenue sharing may be difficult and will require a change in how revenue is allotted in the County.
- Fairfax County's operating revenue includes both revenues directly generated by bikeshare trips in the County as well as revenue apportioned through the regional bikeshare cost allocation agreement. For example, today a Herndon resident's membership to Capital Bikeshare would be credited to Fairfax County.
- If Herndon funded capital costs, would the Town retain ownership of the equipment?
- Would Herndon have representation on the Capital Bikeshare governance board? Currently, only jurisdictions that directly hold the contract participate.

4.2.2 Funding and Subsidy

Joining Capital Bikeshare is a large financial commitment and will require funding for both capital and operating costs. Operating costs for Capital Bikeshare include the administration of the Town's contract with Motivate, marketing and promotion costs, and general program administration costs. Capital costs include the

purchase of stations and bicycles, site planning and installation costs, replacement costs for stolen or vandalized equipment, and equipment at the end of their useful life.

Anticipated Program Costs

The following presents a cost estimate for expanding Capital Bikeshare to Herndon. These cost estimates were developed to provide the Town with a data driven understanding of the financial requirements for joining Capital Bikeshare and illustrates the total cost to the Town if they funded both operating and capital (joining Fairfax County's contract could lead to some cost savings such as the elimination of certain start-up costs). The financial plan assumes a system consisting of 24 stations, all of which will be installed in fiscal year 2023 and estimates the expected capital costs and operating revenue and costs over five years. The study team made several assumptions on capital and operating costs to develop this estimate; however, the study team used existing data from other jurisdictions that operate Capital Bikeshare as a starting point. These estimates are meant to be conservative and minor adjustments, such as adjusting the ratio of conventional bikes and e-bikes, could have a big impact on costs. Details on specific capital and operating inputs are included in **Appendix A**.

Implementing Capital Bikeshare in Herndon will require a significant capital investment. As shown in **Table 13**, building a 24-station system would cost $1 million. Over 90 percent of the initial capital costs will cover the cost to purchase equipment, including bikes and stations. The remainder will go towards installation and system startup. After new equipment is purchased and installed to launch the program, no new capital costs are expected within the five-year timeframe. The model assumes that half of the bikes purchased for Herndon will be e-bikes. These bikes are popular with system users, but they are more expensive than conventional bikes.

Table 13: Program Capital Costs ($1,000s)

	FY23	FY24	FY25	FY26	FY27
# of New Stations	24	0	0	0	0
# of New Conventional Bicycles	72	0	0	0	0
# of New E-Bikes	72	0	0	0	0
Equipment Purchases	$979	$0	$0	$0	$0
Installation Costs & Startup	$109	$0	$0	$0	$0
Cost Total	**$1,088**	**$0**	**$0**	**$0**	**$0**

The system is expected to generate approximately $526,000 in revenue over five years, all of which will be generated through user fees and memberships, as shown in

Table 14. System revenues could increase if the Capital Bikeshare jurisdictions reach an agreement with a title sponsor, which has been in process for several years. Operating costs for the system in Herndon are expected to total about $1.9 million over five years; this results in a cost recovery ratio of about 30 percent, and a per year operating subsidy need of $260,000 to $280,000. This cost recovery is consistent with other jurisdictions in the Capital Bikeshare system; currently no jurisdiction can fully cover its operating costs with system revenues alone and must rely on outside funding sources including public funds, station advertising, and sponsorships.

Table 14: Program Operating Costs and Revenue ($1,000s)

	FY23	FY24	FY25	FY26	FY27
Annual Ridership	13,000	13,000	13,000	13,000	13,000
User Revenue	$101	$101	$106	$106	$112
Advertising Revenue	$0	$0	$0	$0	$0
Title Sponsorship	$0	$0	$0	$0	$0
Station Sponsorship	$0	$0	$0	$0	$0
Operating Revenue Subtotal	**$101**	**$101**	**$106**	**$106**	**$112**
Contractor Operating Costs	$342	$349	$356	$363	$370
Marketing	$20	$20	$21	$21	$22
Operating Cost Subtotal	**$362**	**$369**	**$377**	**$384**	**$392**
Cost Recovery Ratio	28%	27%	28%	28%	29%
Operating Balance	**-$261**	**-$269**	**-$270**	**-$278**	**-$280**

Implementing Capital Bikeshare in Herndon would require a financial commitment of close to $3 million over five years, as shown in **Table 15**. This estimate includes the annual operating budget shortfall, which totals about $1.3 million over five years, the initial capital investment of about $1 million (paid all at once), and an additional $88,000 per year for state of good repair needs. While state of good repair costs are likely to be low until equipment begins reaching the end of its useful life, setting aside money annually makes equipment replacement more feasible when the time comes.

Table 15: Funding Need ($1,000s)

	FY23	FY24	FY25	FY26	FY27	5-Year Total
Operating Budget Shortfall	$261	$269	$270	$278	$280	$1,358
Expansion Capital	$1,088	$0	$0	$0	$0	$1,088
Annualized Capital Set-Aside	$88	$88	$88	$88	$88	$441
Total	**$1,438**	**$357**	**$359**	**$366**	**$368**	**$2,858**

Potential Funding Sources
Several potential funding sources exist that will help bridge the operating shortfall, as well as help cover the capital costs for implementing Capital Bikeshare. These sources, described in the following, include both public and private options.

Public Funding Sources

Several public funding sources exist that could be used to fund either the operating or capital costs of implementing Capital Bikeshare. **Table 16** summarizes public funding sources available to the Town to support the capital and operating costs associated with Capital Bikeshare.

Table 16: Potential Public Funding Sources

Funding Source	Description	Considerations
Commercial and Industrial Tax for Transportation	Levied by Fairfax County, the Commercial and Industrial Tax for Transportation provides transportation funding in the County through a 12.5 cent tax per $100 of assessed value of commercial and industrial real estate.[21]	Fairfax County funds the operation of Capital Bikeshare through proceeds from this tax. If Herndon join's the County's existing contract with Motivate, Capital Bikeshare operations in the town could be funded through this tax. If Herndon enters into its own agreement with Motivate, proceeds from this tax could potentially apply to operations in Herndon, but it would likely require a memorandum of understanding between the Town and the County.
Northern Virginia Transportation Authority (NVTA) 30% Local Distribution Funds	Under Virginia House Bill 2313, NVTA is required to distribute 30 percent of its revenues to member localities to fund additional urban or secondary road construction, capital improvements that reduce congestion, other transportation capital improvements that have been approved by the most recent long-range plan, or other transportation purposes. [22]	Through this program, Herndon received between $700,000 and $800,000 annually; however, the funds are already programmed for other transportation projects in the town for the next several years. However, other Capital Bikeshare jurisdictions have used these funds to support capital investments and operations, so this could be a funding source in the future.
Commuter Choice	Commuter Choice invests toll revenues in public transit and other multimodal projects along the I-66 and I-395/95 corridors. Selection criteria for grants include a project's ability to move more people, support diverse travel choices, and enhance transportation safety and travel reliability.[23]	Commuter Choice grants can be used for both capital and operating costs associated with Capital Bikeshare, and multiple jurisdictions in the Capital Bikeshare system have used these funds. For example, Falls Church received $500,000 in FY 2017-2018 to support operating and maintenance of Capital Bikeshare.[24] Some of the grant requirements, however, may make it challenging to apply funds in Herndon. Herndon's distance from both I-395/95 and I-66 may make it difficult to demonstrate that Capital Bikeshare in the town is reducing single occupancy vehicle trips on those interstates.
Transportation Alternatives (TA) Set Aside	Part of the FAST Act, the Transportation Alternatives Set-Aside funds projects focused on providing pedestrian and bicycle facilities, community improvements, and	The City of Fairfax used this funding to purchase and install bikeshare stations between George Mason University and Fairfax Circle. These funds do not cover operating costs.[26]

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[21] Bryan J. Hill (May 11, 20202). *Adoption of the FY 2021 Budget Plan*. [memorandum] County of Fairfax Virginia. https://www.fairfaxcounty.gov/budget/sites/budget/files/assets/documents/fy2021/fy-2021-adopted-package.pdf.
[22] Northern Virginia Transportation Authority (2018). "30% Local Projects." https://thenovaauthority.org/programming/30-local-projects/.
[23] Northern Virginia Transportation Commission, https://novatransit.org/.
[24] Northern Virginia Transportation Commission and Commuter Choice (2020). "Access to Transit Projects." https://commuterchoicear.org/access-to-transit-projects/.
[26] Virginia Department of Transportation (2020). "FY21/22 Transportation Alternatives Program Selections." http://www.ctb.virginia.gov/resources/2020/september/resol/3_tap_attachment.pdf.

Funding Source	Description	Considerations
	mitigating the impact of the highway system.[25]	
Congestion Mitigation and Air Quality Improvement (CMAQ) Program	Administered through the Federal Highway Administration, CMAQ funds are available to state and local governments for transportation projects that help meet the requirements of the Clean Air Act by reducing congestion and improving air quality. [27] Eligible programs include pedestrian and bicycle projects, transit improvement programs, congestion reduction and traffic flow improvements, and funding for transportation demand management programs.	CMAQ is a well-established Federal program; however, only capital investments for bikeshare are eligible. Capital Bikeshare has a history of using CMAQ funding; in 2010, the District received a $6.4 million grant in CMAQ funding to purchase 1,500 bikes and 169 stations, which enabled the initial launch of the program.[28]

Private Funding Sources

Private funding can come from a number of sources, such as advertising, sponsorship agreements, and charitable donations. The largest potential source of private funding for Capital Bikeshare in Herndon is a **title sponsor**. A title sponsor would pay to have their branding and name on bicycles and stations. Most large systems have title sponsors, such as New York's CitiBike (Citi Bank), Philadelphia's Indego (Independence Blue Cross) and Portland's Biketown (Nike). Capital Bikeshare does not currently have a title sponsor, yet the jurisdictions are actively seeking such an agreement. A title sponsor will provide funding for the Capital Bikeshare system as a whole and funds will be divided amongst the jurisdictions based on a yet-to-be-determined basis. A regional sponsor could generate over $2 million a year in revenue for Capital Bikeshare based on sponsorship revenue obtained by other large systems.

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[25] Virginia Department of Transportation (2021). "Transportation Alternatives (TA) Set-Aside." http://www.virginiadot.org/business/prenhancegrants.asp.
[27] Federal Highway Administration, "Congestion Mitigation and Air Quality Improvement Program." https://www.fhwa.dot.gov/fastact/factsheets/cmaqfs.cfm.
[28] National Park Service, "Congestion Mitigation and Air Quality Improvement (CMAQ) Program," https://www.nps.gov/orgs/1548/upload/CMAQ_FactSheet_2018.pdf.

Figure 14: Examples of Title Sponsorships in Portland and Philadelphia (TriMet 2016; Independence Blue Cross Blue Shield 2015)

Title sponsorship agreements last for multiple years; however, they require a certain degree of branding exclusivity, with stations and bicycles featuring a company logo or color scheme. Companies may be attracted to title sponsorships as a philanthropic investment or as a means to increase brand exposure in a market.

Station sponsorships are another common type of sponsorship agreement. With a station sponsorship, an organization may agree to fund the capital and/or operating costs of a new bikeshare location. In general, most exposure for station sponsorships is limited to the map panel of the station, so it does not clash with the title sponsor or systemwide branding. Some systems also allow organizations to **sponsor bicycles** with the sponsor logo/branding places somewhere on the bicycle.

Figure 15: Example of a Station Sponsorship (Harvard Gazette, 2017)

In addition to sponsorships, some bikeshare systems (including Capital Bikeshare in Washington, DC) generate private funding through advertising on stations and/or bikes. Station advertising is not a feasible revenue source for Herndon due to existing outdoor advertising restrictions. Stations and bicycle sponsorships are a possible strategy to work around existing advertising restrictions.

4.2.3 Technology

The micromobility industry is changing rapidly, and, as a result, new technology for bikeshare regularly enters the market. Since its inception, Capital Bikeshare's technology has undergone minimal changes, yet technology advancements in the industry will allow for more flexibility in how and what services Capital Bikeshare will offer in the future. For Herndon, joining Capital Bikeshare means that technology adoption must move in lockstep with what is happening systemwide.

New bikeshare technology falls into two broad categories: (1) innovations to the physical equipment and (2) IT improvements to make bikeshare usage more seamless for customers. IT improvements include integration with multi-modal smart phone apps to make trip planning easier, integration with transit smart cards, and integration with open payment standards. Innovations to equipment include the implementation of dockless and hybrid bikeshare systems and e-bikes.

Technology Considerations for Herndon
For Herndon, the biggest technology consideration in joining Capital Bikeshare are e-bikes. For most bikeshare systems, riders gravitate to e-bikes when they are available. In 2019, it is estimated that for every trip per vehicle-day traveled by a conventional pedal bike, bikeshare systems saw an average of 1.7 trips per day per bike by an e-bike.[29] E-bikes allow for, faster, less exertive, and longer trips.

Currently, Lyft owns all of the e-bikes in Capital Bikeshare's system and as a result there is no process set up for jurisdictions to purchase e-bikes. However, it is likely that in the future this e-bike ownership structure will change for Capital Bikeshare. Fairfax County does not currently have a contractual mechanism to purchase e-bikes, but the County is in the process of pursing a new Invitation for Bids (IFB) to allow for the purchase of e-bikes. This IFB will also leave the door open for the County to purchase tricycles and other bike types currently unavailable in the Capital Bikeshare fleet. Regardless of the pathway Herndon takes in implementing Capital Bikeshare, the Town will need to consider the purchase of e-bikes in their fleet.

4.2.4 Marketing

Marketing is key to building a ridership base for Capital Bikeshare in Herndon. As an established program, Capital Bikeshare already has some name recognition, but the long-term success of the program in Herndon will require continued marketing. Beyond encouraging more people to use the system, marketing can contribute to system equity. Word of mouth marketing often means that familiarity with bikeshare follows existing social networks and may lead to under-awareness of bikeshare in some communities. Other systems have used a range of strategies, from traditional marketing to community engagement and ambassadors to help attract people to the system. For example, MoGo in Detroit has a Youth Ambassador program to make bikeshare more accessible to young people as well as a Neighborhood Ambassador program, with ambassadors who share information throughout their communities.[30] The financial model estimates that marketing activities will make up approximately five percent of the annual program operating costs.

Some options are available for marketing activities. Motivate, the program operator for Capital Bikeshare, could be paid to provide additional marketing and promotional support. Alternatively, the Town could rely on existing community organizations and TDM programs for marketing. In Washington, DC Capital Bikeshare was formerly promoted through goDCgo, the District's transportation demand management (TDM) program (see example in **Figure 16**), before being incorporated into Lyft's current contract. goDCgo continues to operate the Capital Bikeshare Community Partners Program (CPP), a community engagement program that seeks to increase the number of people from historically underserved communities who used Capital Bikeshare. CPP

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[29] North American Bikeshare Association (2021). *State of the Industry: 2019*. https://nabsa.net/about/industry/.
[30] Mogo (2021). *Neighborhood Ambassadors.* https://mogodetroit.org/mogo-for-all/neighborhood-ambassadors/. And Mogo (2021). *Youth Ambassadors. https://mogodetroit.org/mogo-for-all/youth-ambassadors/.*

works with a range of non-profit organizations across the District to achieve this goal.[31] Similarly, Capital Bikeshare is also advertised through Fairfax County Commuter Services, the County's TDM program.[32] If the Town joins Capital Bikeshare, it could consider building on the work already being done by Fairfax County Commuter Services, by working with Herndon.

Figure 16: Examples of Micromobility and Personal Biking Informational Flyer by goDCgo (DDOT 2021)

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[31] goDCgo (2021). *Ready, Set.. Bike.* https://godcgo.com/bike/.

[32] Fairfax County, Virginia (2021), *Active Transportation Program*. https://www.fairfaxcounty.gov/transportation/bike-walk.

4.3 Managing Dockless Micromobility Services in Herndon

Capital Bikeshare is not the only option the Town has to implementing micromobility. Several micromobility providers operate within the Washington, DC region (although none currently operate in Herndon). The Town could work to attract and regulate these private operators either as a compliment to Capital Bikeshare or in-lieu of Capital Bikeshare. Introducing private-micromobility to Herndon raises several regulatory questions that must be addressed. The following will provide guidance to help the Town make informed regulatory and policy decisions about micromobility operation. It will cover a discussion of a regulatory framework for micromobility, strategies for right-of-way management, and approaches to program oversight and enforcement.

4.3.1 Background

During its 2019 session, the Virginia General Assembly Passed HB 2752, which authorizes localities in the state to regulate the operation of companies providing motorized skateboards, scooters, and other similar vehicles (like bicycles) for hire. HB 2752 standardizes operational requirements for these vehicles, prohibits speeds of more than 20 miles per hour for these vehicles, and allows localities to regulate the operation of companies providing these vehicles for hire.[33]

Following the passage of HB 2752, cities and counties across Virginia established their own ordinances to regulate shared mobility devices and began establishing shared mobility pilot programs. For example, Fairfax County established a Shared Mobility Device Program in November of 2019 that regulates fleet size, limits speed of vehicles, and sets other regulations.[34] Other Virginia jurisdictions with established shared mobility device programs include Alexandria, the City of Fairfax, and Arlington County.[35] These existing programs in nearby jurisdictions as well as programs across the county can serve as a guide for Herndon for developing its own micromobility program.

4.3.2 Regulatory Framework

The following highlights key regulatory considerations for implementing private micromobility services in Herndon. It will cover numerous topics including, operator permits, system governance, system size, oversight and enforcement, technology limitations, data requirements for providers, and a request for proposal (RFP) strategy. It will also highlight some key considerations for a pilot program specifically.

System Size
Determining the right system size for dockless devices is an important factor in developing a micromobility program. The market analysis conducted for this report provides some insights for the number of vehicles that would be appropriate for Herndon, based on peer jurisdictions and expected demand. Both over- and under-saturating the market with vehicles come with their own risks. To be successful, there must be a balance between supply and demand. While the Town may not be able to entirely control how many vehicles a micromobility company places in each market, it can dictate a minimum and/or maximum number of vehicles available. During the pilot programs for the City of Fairfax, the City of Alexandria, and Arlington County, the total fleet of shared micromobility vehicles ranged from 160 vehicles in operation per day to over 1,000 vehicles in operation per day. Fairfax County's shared mobility program suggests an initial fleet size of 300 vehicles for any permitted company, with an option to increase the fleet size up to 600 vehicles. Given Herndon's smaller

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[33] State of Virginia (2019). *HB 2752 Motorized skateboards or scooters; operation; local authority.* https://lis.virginia.gov/cgi-bin/legp604.exe?191+sum+HB2752.
[34] Fairfax County, Virginia (2020). *Shared Mobility Devices in Fairfax County.* https://www.fairfaxcounty.gov/cableconsumer/csd/shared-mobility.
[35] City of Alexandria, Virginia (2021). *Dockless Mobility.* https://www.alexandriava.gov/DocklessMobility; City of Fairfax, Virginia (2021). *Dockless Mobility*, https://www.fairfaxva.gov/government/public-works/transportation-division/dockless-mobility; Arlington, Virginia (2021), *Shared Micro-Mobility Devices.* https://transportation.arlingtonva.us/scooters-and-dockless-bikeshare/.

geographical size and population, an initial fleet closer to 150 vehicles in operation per day (figure outlined in the Market Analysis) is likely most appropriate, but the Town's micromobility program should be flexible enough to allow operators to increase their fleets if warranted by demand.

Once a micromobility program is established, the Town could consider dynamic fleet caps, which would allow the Town to increase or decrease the minimum or maximum number of permitted vehicles allowed for a provider based on specified performance metrics. For example, the Town could adjust fleet size for a provider based on their compliance with regulations or if a provider includes adaptive vehicles in their fleet. Alternatively, fleet size could be based on performance. If an operator meets a specified trips per vehicle per day threshold, the Town could increase their fleet size due to high demand.[36]

The Town should also be explicit with operators with regard to what vehicles are counted in the calculation of the system size. That is, does the permitted number of vehicles allowed to operate include just those available to the public, or does it also include vehicles that are out of service and require maintenance?[37]

Operator Permits

Permits are an important tool for jurisdictions to introduce regulatory structures and ensure that micromobility equipment is deployed in a controlled fashion. In addition to considerations like system size, technology allowed, and right of way requirements, which can be regulated through a permit, there are other specific considerations related to the permits themselves.

Caps on the Number of Operators

The Town has the power to place a cap on the number of operators that are allowed within town boundaries through a permitting process. No cap on permits creates an open marketplace that is easier for small companies to navigate and reduces the burden on the jurisdiction to thoroughly vet applications to select only a few operators. However, no cap can lead to an overwhelming influx of operators.[38] Many jurisdictions have shown a preference for fewer well-vetted operators over a loosely regulated market with many operators.

Most peer cities in the region permit more than one private micromobility operator to serve their jurisdiction. For example, in 2021, three operators are permitted in Alexandria and eight operators are permitted in Washington, DC.[39] Allowing more than one operator may be wise, especially given the volatility of the micromobility market; however, too many operators could oversaturate the market or pose regulatory burdens on the Town. Cities like Dallas, Texas struggled with an initial influx of operators, some of which quickly shut down. In considering a cap on providers, the Town should also consider the total fleet size desired. Fleet sizes for individual operators could be adjusted to reach a desirable total system size.

Permit Fees

Another key consideration with permits is the permit fee. These fees, paid directly to a jurisdiction by the micromobility operator, are intended to help cover the administrative costs borne to the jurisdiction for having the program. Some jurisdictions also earmark revenues earned from

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[36] National Association of City Transportation Officials (2019). *Guidelines for Regulating Shared Micromobility.*, https://nacto.org/sharedmicromobilityguidelines/.
[37] National Association of City Transportation Officials (2019). *Guidelines for Regulating Shared Micromobility.*, https://nacto.org/sharedmicromobilityguidelines/.
[38] Transportation For America (2021). *Shared Micromobility Playbook,* https://playbook.t4america.org/.
[39] District Department of Transportation (2021) *Dockless Vehicle Permits in the District*, https://ddot.dc.gov/page/dockless-vehicle-permits-district; City of Alexandria, Virginia (2021) *Dockless Mobility*, https://www.alexandriava.gov/DocklessMobility.

micromobility permit fees to help fund infrastructure such as bike lanes and micromobility vehicle parking corrals.[40]

Across the country, permit fees have become standard practice, often in combination with per vehicle or per trip charges to operators. Within the region, permit fees range in cost substantially. Alexandria charged operators a $5,000 permit fee during its Phase I pilot program with an additional $5,000 extension fee.[41] Fairfax County's regulations call for an annual permit fee of $1,000 per operator plus an annual fee of $28 per vehicle, as well as a $100 application fee.[42] The City of Fairfax charged a $5,000 permit fee during its pilot program plus a $0.05 per trip fee for use of the right of way.[43] Finally, Washington, DC charges a $75 application and technology fee, a $250 initial permit fee (with annual an $100 permit renewal fee), and a $60 per vehicle monthly fee.[44]

There are pros and cons to the various types of fees at the Town's disposal.

- A flat permit fee, for example, both ensures that private micromobility companies are committed to operating and provides up front funding; however, these fees could limit the ability of smaller or less well established micromobility operators from servicing the Town.
- A per vehicle fee ensures that fees scale with fleet size, but the added cost may make operators hesitate to scale up.
- A per trip fee provides added revenue to a jurisdiction if a micromobility program is successful, but because a jurisdiction's revenues are tied to the success of a program, an unsuccessful program means lower revenues.[45] Moreover, a trip-based fee causes the largest data collection burden of the three options, as the Town would have to actively track ridership.

Overall, an operator's willingness to absorb fees is indirectly related to expected ridership. Micromobility providers in dense urban centers like Washington, DC are willing to pay higher fees because of ridership demand. Herndon should be careful not to overprice their permit fees compared to peers in the region as doing so will effectively dissuade an operator for launching in the Town.

Technology
Micromobility technology is rapidly changing, and a number of micromobility vehicles are on the market. Vehicles which could be operated within a shared micromobility system include conventional bikes, e-scooters, e-bikes, mopeds, and cars. The pros and cons of the vehicle that will most likely be used in Herndon are detailed in **Table 17**.[46]

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[40]National Association of City Transportation Officials (2019). *Guidelines for Regulating Shared Micromobility.,* https://nacto.org/sharedmicromobilityguidelines/.

[41] City of Alexandria, Virginia (2021). *Dockless Mobility.* https://www.alexandriava.gov/DocklessMobility

[42] Fairfax County, Virginia Municipal Code (2020). *Chapter 86 – Shared Mobility Devices.* https://library.municode.com/va/fairfax_county/codes/code_of_ordinances?nodeId=THCOCOFAVI1976_CH86SHMODE

[43] City of Fairfax, Virginia (2021). *Dockless Mobility.* https://www.fairfaxva.gov/government/public-works/transportation-division/dockless-mobility.

[44] District of Columbia Municipal Regulations and District of Columbia Register (2021). *Dockless Vehicle Sharing,* https://dcregs.dc.gov/Common/DCMR/SectionList.aspx?SectionNumber=24-3314.

[45] Transportation For America (2021). *Shared Micromobility Playbook,* https://playbook.t4america.org/.

[46] Transportation For America (2021). *Shared Micromobility Playbook,* https://playbook.t4america.org/.

Table 17: Pros and Cons of Micromobility Vehicle Types

Vehicle Type	Pro	Con
Conventional Bike	• Easy to deploy • Low barrier to entry • Health benefits of riding • Does not require charging • Can include storage basket	• Take up more space than scooters when parked • Not as fast or easy to use as e-bikes or e-scooters • Requires physical exertion, which can be difficult for some riders • Lower vehicle ridership rates compared to e-bikes and e-scooters
E-Bike	• Easier to ride than a pedal bike • Can include storage basket • Comfortable for longer trips	• More expensive and heavier than conventional bikes and e-scooters • Requires regular charging
E-Scooter	• Inexpensive • Per vehicle ridership higher than conventional bikes • Faster than conventional bikes • Lightweight and simple to ride	• Requires regular charging • Confusion from riders on where to ride and store safely • No cargo capacity
Adaptive	• Creates additional mobility for individuals with differing abilities • Available in a variety of vehicle types	• More expensive than traditional bicycles • May require additional safety features • May be difficult to establish useful, widely available network

As mentioned in **2.2 Micromobility Industry**, the micromobility market has moved toward fleet electrification, with most of the private dockless micromobility providers focusing resources on E-Scooters and, to a lesser extent, E-Bikes.

Right of Way Requirements

Under Virginia law, shared micromobility vehicles are allowed to operate anywhere that a bicycle operates. This means that in Herndon, shared e-scooters and e-bikes can be operated on sidewalks and roads. However, any micromobility program the Town implements can set limitations on where riding shared micromobility vehicles is acceptable, as State regulations allow local governing bodies to prohibit the use of shared mobility vehicles on designated sidewalks and requires that use of shared mobility vehicles on sidewalks not unreasonably interfere with pedestrians use of sidewalks.[47] To preserve sidewalk space for pedestrians and ensure that motorized vehicles are not leading to unnecessary conflicts on sidewalks, it may be appropriate to limit the operation of scooters to roadways and bike lanes. However, limits should also be in place for operation on limited access and high-speed roadways that do not offer protection to cyclists and scooter users. Peer jurisdictions have regulated where scooters can be operated in a variety of ways. For example, in its Phase II pilot program, the City of Alexandria explicitly banned riding scooters on any sidewalk in the City after the

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[47] State of Virginia (2019). § 46.2-904. Use of roller skates and skateboards on sidewalks and shared-use paths; operation of bicycles and certain motorized and electric items and devices on sidewalks, crosswalks, and shared-use paths; local ordinances. https://law.lis.virginia.gov/vacode/title46.2/chapter8/section46.2-904/.

feedback the City received from their Phase I pilot program indicated that sidewalk riding compromised other people's comfort or use of the sidewalk.[48]

In addition to mandating where micromobility vehicles can operate, the Town can also dictate the speeds at which micromobility vehicles can operate. General guidance suggests speeds for micromobility vehicles should range based on where the vehicle is operating and can range from less than one mile per hour to 15 miles per hour.[49] Virginia's legislation limits the speed of e-scooters and e-bikes to 20 miles per hour, but jurisdictional policies have limited the speed further. To address concerns over speed, micromobility operators also have begun using advanced geofencing technology to help control vehicle speeds based on location. As this technology advances, operators will have the ability to better manage vehicle speeds based on the location of vehicles.

Jurisdictions in the region have set speeds for vehicles ranging from less than 10 miles per hour up to the state mandated limit of 20 miles per hour. Fairfax County's program sets a speed limit of 10 miles per hour on all surfaces for micromobility vehicles.[50] Arlington County's program limits e-scooter speed to 15 miles per hour on roadways and trails (e-bikes allowed to go up to 20 miles per hour) and six miles per hour on sidewalks. Under Arlington's agreements with private micromobility operators, vehicles speeds are limited, so available vehicles in the county are not able to reach speeds above the designated speed limit.[51] Active enforcement is still necessary in Arlington to enforce additional speed restrictions on sidewalks. Micromobility operators in the County do not have advanced enough GPS to differentiate speeds on roadways versus sidewalks.[52]

Distribution and Availability Requirements
The market analysis provides a picture of where micromobility is likely to be most successful in the Town of Herndon, and **4.3.3 Right of Way Management** will provide details on strategies for managing micromobility hubs; however, through regulatory processes, the Town can dictate the distribution of vehicles.

The Town may want to consider using distribution requirements to ensure that the goals of the micromobility program are met. Both jurisdictions and the micromobility operators want to provide mobility options to the public. However, jurisdictions may want to prioritize equitable distribution of vehicles in all areas of a jurisdiction or concentrate vehicles near transit nodes, while micromobility operators may want to prioritize areas most likely to generate the most revenue. As such, jurisdictions can institute policies to ensure that distribution addresses its goals and does not reinforce existing transportation inequities.[53]

These policies can come in a few different forms. For example, micromobility operators may be required to rebalance vehicles daily, with a minimum and/or maximum number of vehicles allowed within certain areas of a jurisdiction. Some jurisdictions require that a certain percentage of an operator's fleet must be distributed within designated high priority areas, which could include central business districts or areas that address equity goals. In Washington, DC for example, a minimum of six vehicles must be available in each of the

[48] City of Alexandria, Virginia (2021) *Dockless Mobility*, https://www.alexandriava.gov/DocklessMobility.
[49] National Association of City Transportation Officials (2019). *Guidelines for Regulating Shared Micromobility.*, https://nacto.org/sharedmicromobilityguidelines/.
[50] Fairfax County, Virginia (2020). *Shared Mobility Devices in Fairfax County*, https://www.fairfaxcounty.gov/cableconsumer/csd/shared-mobility.
[51] Arlington, Virginia (2021). *Shared Micro-Mobility Devices.*https://transportation.arlingtonva.us/scooters-and-dockless-bikeshare/.
[52] Arlington County, Virginia (2019). *County Board Agenda Item*, https://arlington.granicus.com/MetaViewer.php?view_id=2&event_id=1374&meta_id=189874.
[53] National Association of City Transportation Officials (2019). *Guidelines for Regulating Shared Micromobility.*, https://nacto.org/sharedmicromobilityguidelines/.

District's eight wards at 6:00 a.m. each day to help ensure a more equitable distribution of vehicles.[54] While rebalancing and distribution requirements are a useful tool, because private micromobility systems are generally dockless, the jurisdiction has less control over where vehicles end up as compared to a docked system.

Data Requirements

In order to effectively regulate the system and make informed decisions about the program, it will be important for Herndon to have access to the data generated by the use of private micromobility vehicles. Jurisdictions can require that private micromobility operators provide trip level data at a level of detail and frequency that allows them to determine permit compliance and evaluate system performance.

Reporting Requirements

There are two widely used data formats that jurisdictions use for micromobility datasets: General Bikeshare Feed (GBFS) and Mobility Data Specification (MDS). Modeled after the General Transit Feed Specification and developed by the North American Bikeshare Association, GBFS "defines a common format to share the real-time status of a shared mobility system," with the express purpose to enable clear information exchange between multiple parties. GBFS is intended to be accessible to the public and can be used to aid in traveler trip planning.[55] MDS, developed by the Open Mobility Foundation, is a digital tool intended to help cities manage transportation in the public right of way by standardizing communication and data-sharing between public entities and private micromobility operators. Through APIs, MDS helps private shared mobility companies share real-time and historic vehicle data with cities, which helps inform policy decisions.[56] Notably, to be compliant with MDS specifications, private micromobility operators must publish a publicly available GBFS feed.[57]

Across the country, micromobility reporting requirements vary significantly. Some jurisdictions require monthly reports, while others require GBFS and/or MDS compatible APIs. The Town should consider how the data will be used, as well as the level of detail necessary. For example, what data will be used to evaluate the program; does the town need real-time data; is historical data necessary; what data would the town make available to the public; and how will data sharing requirements protect user privacy? Determining answers to these questions can help shed light on specific data requirements the Town should require from micromobility providers.

Data Privacy

Another key consideration with regard to data is privacy. Trip data can easily become personally identifiable, and, as such, it is imperative that micromobility operators have clear privacy policies in place that comply with state and federal law. The Town should consider what data privacy requirements are necessary for micromobility operators. Any existing data governance policies adopted by the Town or county provide a good starting point for developing data privacy requirements around micromobility. Example requirements include defined limitations on collection, storage, and usage of personal data, protocols for who has access to data, and protocols for record retention.[58]

Procurement Process

There are two general approaches to bringing in dockless micromobility providers: creation of an open permitting process or releasing of Request for Proposals/Request for Qualifications (RFP/RFQ). A permitting

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[54] National Association of City Transportation Officials (2019). *Guidelines for Regulating Shared Micromobility.*, https://nacto.org/sharedmicromobilityguidelines/.
[55] North American Bikeshare Association (2021). *GBFS & Open Data*. https://nabsa.net/resources/gbfs/.
[56] Open Mobility Foundation (2020). *About MDS,* https://www.openmobilityfoundation.org/about-mds/.
[57] Open Mobility Foundation (2020). *FAQs.* https://www.openmobilityfoundation.org/faq/.
[58] National Association of City Transportation Officials (2019). *Guidelines for Regulating Shared Micromobility.*, https://nacto.org/sharedmicromobilityguidelines/.

process can be run on a rolling basis; if Herndon has a cap on the number of vehicles or operators, it can pause permitting additional operators when existing operations meet or exceed the cap. RFP/RFQ's typically require all the interested operators to apply at the same time and gives the Town the opportunity to evaluate bidders all together instead of merely permitting operations that meets minimum permit requirements on a first-come-first-served basis.

Jurisdictions can also use pilots and demonstration projects to regulate private micromobility. Pilots, and demonstration projects would allow the Town to develop and refine its permitting structure. Herndon could allow an interested operator (or operators) to provide micromobility services for a fixed trial period, after which the Town would establish a formal permitting and regulatory structure.

While the format of regulation may vary, the pieces of the framework incorporated into an RFP, permit, or pilot program are fairly standard. The following provides a high-level overview of the elements that can be included in an RFP or permit.

Private Micromobility Operator Responsibilities
If Herndon decides to evaluate potential micromobility providers in a competitive RFP/RFQ process, they should require bidders to detail their capabilities and commitments to engaging in the following functions associated with daily operations, such as field inspections, rebalancing of vehicles, performance tracking, and crisis management.

- Maintenance and support for all equipment.
- Management of back-end systems, such as IT and payment platform.
- Development and maintenance of a website.
- Customer support call-center.
- Liability insurance coverage for the program.
- Equipment installation.

To ensure bidders have the capability to deliver high-quality micromobility services, the Town could ask providers to share qualifications that demonstrate expertise in micromobility operations and management.

Service Metrics
Service metrics are important to help Herndon evaluate and track performance of micromobility operators. While there are a wide range of potential service metrics, the list below provides some common types of metrics used to oversee operations:

- **Rebalancing requirements:** Rebalancing of vehicles to ensure supply is available across the system. For dockless systems that is accomplished by requiring operators maintain a minimum number of vehicles by geography. In the District of Columbia, dockless operators are required to have vehicles deployed in all eight council wards of the City. Due to the size of Herndon, rebalancing requirements can be fairly high level (e.g., ensure availability of micromobility vehicles within 600 yards of Herndon Metrorail station at all times).

- **Fleet deployment:** Deployment standards provide guidelines for maximum and minimum fleet sizes. Standards also ensure that operators are utilizing their fleet apportionment. For example, Herndon would not want a provider to "occupy" a permit while providing very limited micromobility service, especially if their permit blocks a competing provider from operating in the Town.

- **Inspection and maintenance:** Contracts should stipulate how often vehicles are inspected. Typically, vehicles are required to be inspected within a certain number of hours of a complaint. All

vehicles, regardless of whether they received a complaint, need to be inspected at regular intervals; the most common standard among bikeshare systems is every 30 days.

- **Customer service standards:** Contracts could stipulate quality of service standards including call center wait times and customer satisfaction ratings. These standards are more typically seen in private-public micromobility partnerships like Capital Bikeshare and are not included in the typical micromobility permit due to the difficulty of tracking and enforcing these standards.

- **Liability and Insurance Requirements:** Micromobility operators should be required to meet minimum insurance levels and indemnify the Town from any liability related to their operations. In addition to proof of insurance, the town could consider a performance bond to ensure compliance.

Recommended Reporting Requirements

Herndon, through its contract or permitting structure, should outline what data micromobility operators are required to provide to the Town. The following is a list of types of data commonly requested from operators:

- Ridership and usage:
  - Daily, monthly, and annual ridership
  - Trips per vehicle
  - Anonymized trip start and end points
- Fleet data:
  - Vehicle type
- Operations and maintenance
  - Rebalancing activity
  - Service disruptions or suspensions
  - Number of vehicles in the fleet and in service
  - Collision summary

The Town should also consider how standard data formats, such as GBFS and MDS, can be incorporated into reporting requirements.

Contract or Permit Length

The ideal length for a contract or permit vary. Permits tend to be shorter than contracts gained through a more formal bidding process. In general, a permit to operate micromobility is issued for six to 12 months with a requirement for companies to re-apply for renewal each time the permit expires.

Micromobility Pilot Program

Before implementing a permanent micromobility system, the Town can implement a pilot program to test its regulatory framework. A pilot program can help set the Town up for success of an eventual permanent micromobility program and will allow the Town to evaluate the impact of micromobility vehicles on the community. Implementing a pilot program does require some additional legwork for the Town. Importantly, the Town must determine the length of the pilot and how it will be evaluated; other pilot considerations should be covered within the regulatory framework at large.

Pilot Duration

An important piece of setting up a pilot program is determining the program's length. A pilot should be long enough that the Town can get a good sense of the impact of micromobility on the community, including the benefits and shortfalls of allowing such vehicles to operate. Too short and there may not

be sufficient data to develop recommendations for a permanent program; too long and it may limit Herndon's ability to make adjustments down the road.

Other jurisdictions in Virginia have taken a varied approach to pilot program length, however, most initial pilots in the immediate vicinity are between six months and one year, with many jurisdictions extending the pilot period after it expires. Arlington County initially set up a nine-month pilot program, but it was extended an additional six months, for a total of 15 months. This extension allowed County staff time to fully evaluate the program and make recommendations.[59] Similar to Arlington County, the City of Alexandria initially set up a nine-month dockless mobility pilot program. Following its conclusion, Alexandria set up a Phase II pilot program, which will operate for approximately 24 months. This second pilot program will allow the City to evaluate if their adjustments to the Phase I pilot are effective.[60] Ultimately the pilot program should be flexible enough that the duration can be adjusted once vehicles are on the ground and Town officials have a better sense of operation and are able to conduct outreach with residents.

Pilot Evaluation

The Town should consider how it wants to evaluate the pilot program. To evaluate the program, the Town could conduct outreach with the community to better understand their concerns as well as any positive feedback. In addition, the Town could use data provided by the provider itself to understand trip patterns as well as usage. In Alexandria, for example, the City used a combination of data from the scooter operators and information gathered through community outreach to evaluate their initial pilot program. The City also looked at leading practices across the region and the county to understand how peer cities are handling issues.[61] Once an evaluation is completed, the Town should consider who will be able to view it. That is, will the evaluation be an internal document used for planning purposes only, will it be a formal report that is presented to the Town Council, or will it be shared with the public in any way?

4.3.3 Right of Way Management

An important factor when implementing a shared micromobility program is designating where the program will operate. Key considerations for where on the public right of way customers are legally allowed to operate shared micromobility vehicles are discussed in

As mentioned in 2.2 Micromobility Industry, the micromobility market has moved toward fleet electrification, with most of the private dockless micromobility providers focusing resources on E-Scooters and, to a lesser extent, E-Bikes.

Right of Way Requirements**;** however, questions regarding right of way management remain, largely centered around the service area for micromobility and micromobility parking.

Micromobility Service Area

A key consideration is the micromobility service area in the town. For Herndon, this means determining if micromobility vehicles can be used anywhere in the town or will be limited to a specified zone. In addition to the consideration of where trips start and stop within Herndon, the Town should also consider if and how it wants to coordinate with neighboring jurisdictions that also operate shared micromobility.

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[59] Mobility Lab (2019). *Arlington County Shared Mobility Devices (SMD) Pilot Evaluation Report,* https://arlingtonva.s3.amazonaws.com/wp-content/uploads/sites/19/2019/11/ARL_SMD_Evaluation-Final-Report-1112.pdf.
[60] City of Alexandria, Virginia (2021). *Dockless Mobility*. https://www.alexandriava.gov/DocklessMobility
[61] City of Alexandria, Virginia (2021). *Dockless Mobility*. https://www.alexandriava.gov/DocklessMobility

Micromobility Parking

Beyond the service area, another key consideration for right of way management is vehicle parking and storage. One of the biggest challenges with managing a dockless micromobility system is ensuring that vehicles are stored properly and do not pose a safety threat to pedestrians and other road users. Increasingly, jurisdictions have begun promoting the use of designated shared micromobility parking zones, also referred to as corrals or hubs. Designating corrals gives both jurisdictions and the micromobility operators an added layer of control over where trips start and reduces vehicles' encroachment onto the public right of way.[62] Corrals do, however, take some of the freedom away from dockless mobility. Further, they are not a perfect solution, and, even with corrals, some vehicles will still encroach on the public right of way.[63] The Town should consider if it wants to install corrals or if micromobility vehicle parking will be allowed anywhere in the public right of way that is not explicitly banned. Should the Town decide corrals are worth investing in, the results of the market analysis provide a starting point for where these corrals could be located. Unlike Capital Bikeshare stations, which require a large capital investment, micromobility corrals are a smaller investment, and are often simply designated with paint or a sign. Examples of micromobility parking are show in **Figure 17**.

Figure 17: Examples of Micromobility Parking (Shared-Use Mobility Center 2021, Medium 2020, DDOT 2021, Spin, 2021)
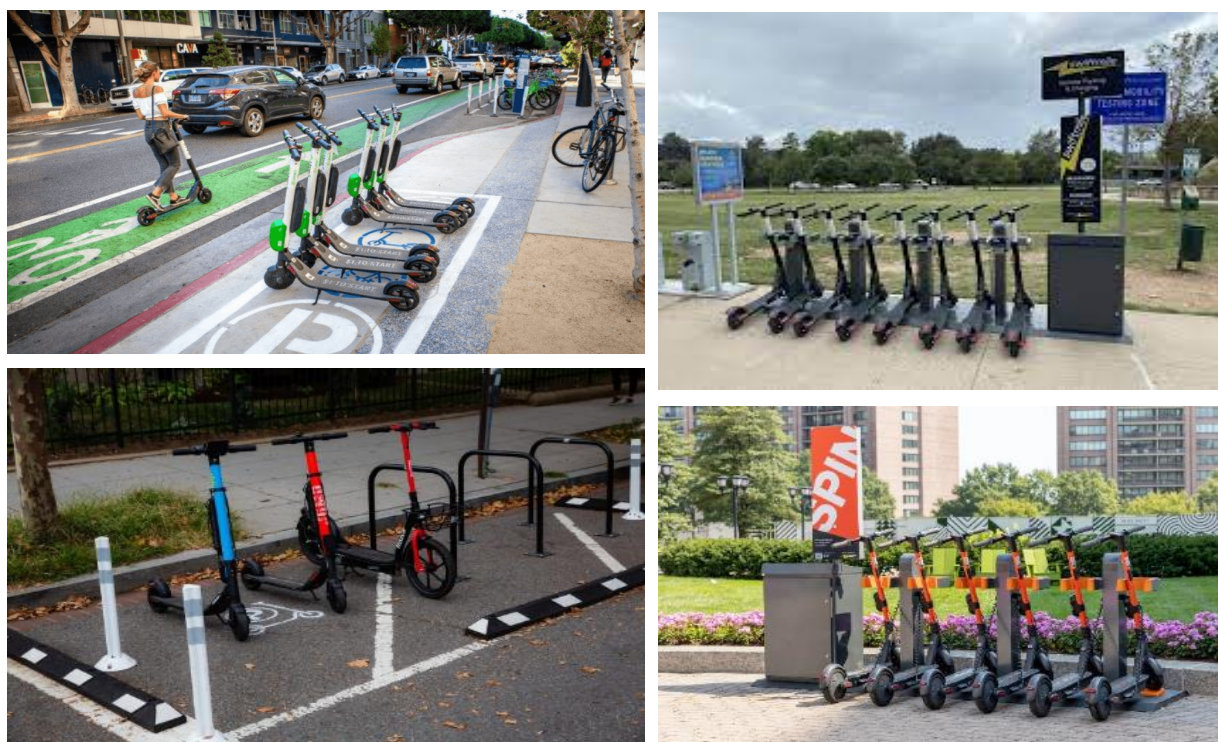
Jurisdictions in the region have approached parking in a variety of ways, but all provide some guidance to micromobility customers about where to park and where not to park. The City of Fairfax, for example, has parking resources on its website, which include a description of the dos and don'ts of parking as well as information on how to report improperly parked vehicles. The City has also begun installing sidewalk decals that indicate preferred parking areas.[64] In Alexandria, parking corrals were installed in high-ridership areas to

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[62] National Association of City Transportation Officials (2019). *Guidelines for Regulating Shared Micromobility.,* https://nacto.org/sharedmicromobilityguidelines/.

[63] Transportation For America (2021). *Shared Micromobility Playbook,* https://playbook.t4america.org/.

[64] City of Fairfax, Virginia (2021). *Dockless Mobility.* https://www.fairfaxva.gov/government/public-works/transportation-division/dockless-mobility.

move parking off the sidewalk and onto the street. In addition, the City instituted a no-park zone at its waterfront. With georeferencing technology, vehicles were banned from parking in the no-park zone.[65]

4.3.4 Oversight and Enforcement

Program oversight and enforcement must be considered when developing a regulatory framework for shared micromobility. Clear guidelines and standard operating procedures for micromobility operators are imperative for ensuring a safe and successful shared micromobility program. While operators play an active role in program oversight and enforcement, the jurisdiction is ultimately responsible for both setting regulations and ensuring that those regulations are met by the private micromobility operators.

Through a regulatory framework and the permitting process, a jurisdiction can set clear guidelines for micromobility operation and set standards. Standards include minimum/maximum fleet sizes for operators, rebalancing requirements, moving improperly parked vehicles, and removing unsafe or inoperable vehicles. In general, it is the responsibility of the operator to comply with standards set by a jurisdiction, and operators are usually responsible for fixing any issues that arise. Setting this clear guidance upfront sets expectations and gives jurisdictions weight in enforcement, should micromobility operators fail to comply with regulations.[66]

Program Oversight
Once a regulatory framework is set, it is the responsibility of the jurisdiction to monitor the program and provide oversight. In general, program oversight requires both digital and manual compliance checks. Data sharing between a jurisdiction and the micromobility operators is an important tool for checking compliance. The system data provided by a micromobility operator can be used by a jurisdiction to ensure that fleet minimums and/or maximums as well as rebalancing and distribution requirements are met.

In addition to data sharing, another important tool for program oversight for jurisdictions are manual spot checks. While data is useful, it is also important to monitor micromobility vehicles in the field. Jurisdictions can do random spot sampling and compliance checks on an ongoing basis to help monitor the program. These spot checks can provide a jurisdiction with insights on its micromobility program that cannot necessarily be captured in data reports, such as parking compliance or vehicle upkeep.

Beyond regular spot checks, many jurisdictions with micromobility programs provide information on their websites about how to report complaints. In doing so, the jurisdictions have another means of collecting information. The information gathered through public complaints can help jurisdictions track issues and can highlight problem areas in the public right of way that require extra monitoring.
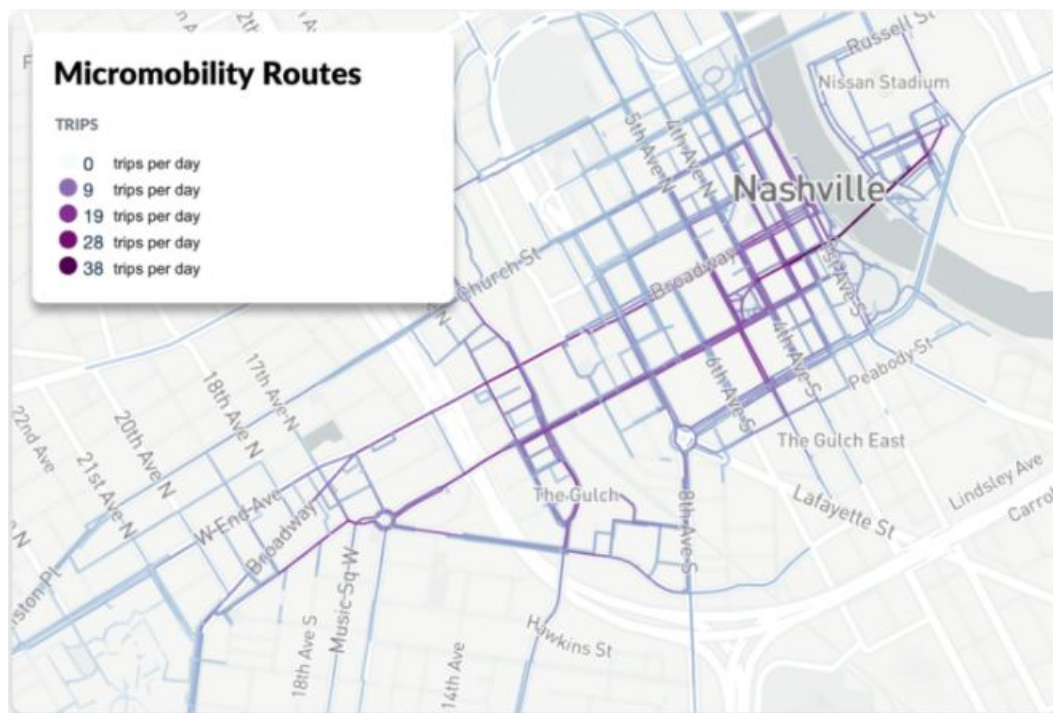
A number of third-party tools are available to jurisdictions to monitor and manage micromobility operations. Populus, for example, is a platform for cities to manage mobility data and can be used for evaluating trip patterns and where micromobility vehicles are parked (**Figure 18**).[67] Swiftmile is largely focused on parking and charging infrastructure for micromobility vehicles and works with jurisdictions and private micromobility operators to provide mobility hubs as well as data on energy use and other metrics.[68]

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[65] City of Alexandria, Virginia (2021). *Dockless Mobility*. https://www.alexandriava.gov/DocklessMobility
[66] National Association of City Transportation Officials (2019). *Guidelines for Regulating Shared Micromobility.*, https://nacto.org/sharedmicromobilityguidelines/.
[67] Populus (2021). https://www.populus.ai/.
[68] Swiftmile (2021). https://swiftmile.com/.

Figure 18: Populus Interface (Populus 2021)[69]

Program Enforcement

While program oversight is important, it is also important that a jurisdiction enforces the regulations laid out in its micromobility regulatory framework. Enforcement can come in a variety of forms and can include a system of escalation, where the number or frequency of violations can increase the severity of a penalty. Many jurisdictions lay out penalties for failure to comply to regulations. These penalties can include a temporary permit suspension, fleet size reductions, and fines. Some jurisdictions also ban operators from picking up impounded vehicles from an impound lot for two to three days to help incentivize compliance. Jurisdictions can also include language into their permit application or ordinance that reserves the right to withdraw a permit due to non-compliance with regulations. [70]

In addition to penalties, jurisdictions may require a performance bond be paid by any private micromobility operator who is permitted to operate within the jurisdiction. Jurisdictions levy this bond either as a lump sum, (typically around $10,000) or as a per vehicle fee (typically ranging from $20/device to $100/device). This bond is essentially used as a security deposit and aims to help incentivize private operators into compliance and to protect public property.[71]

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[69] Populus (2021). *Micromobility Manager,* https://www.populus.ai/products/mobility-manager.
[70] National Association of City Transportation Officials (2019). *Guidelines for Regulating Shared Micromobility.,* https://nacto.org/sharedmicromobilityguidelines/.
[71] National Association of City Transportation Officials (2019). *Guidelines for Regulating Shared Micromobility.,* https://nacto.org/sharedmicromobilityguidelines/.

4.4 Conclusions

Through micromobility services, the Town can offer the public a new, environmentally friendly mode of transportation. Several suburban communities in the Washington, DC region already have micromobility programs, including Capital Bikeshare and dockless e-scooter and e-bike systems. Within Herndon, such a service could help connect the Town to the Silver Line Metrorail stations and destinations both within the town and elsewhere in Fairfax County. A micromobility system could also provide a recreational amenity to the town by connecting residents to local parks and trails, notably the W&OD Trail that runs through the heart of Herndon.

This business plan provides the Town with the information necessary to make an informed decision about implementing micromobility in Herndon. There are two primary pathways forward: expanding Capital Bikeshare into Herndon and permitting private micromobility operators in the town. The pros and cons of each pathway are summarized in **Table 18**.

Table 18: Pros and Cons of the Micromobility Pathways

	Pros	Cons
Capital Bikeshare	• Established system with a ridership base in the region • Program is public • Herndon will be part of a regional bikeshare network • Requirements for discounted fares and cardless payment options already established	• High program costs, both for capital investments and operation • Complicated regional governance system • Decisions and advancements must be made in lockstep with other jurisdictions
Private Micromobility Operators	• Low-cost investment that has the potential to generate revenues for the Town • Systems are entirely privately funded • Technology is dynamic and can be changed	• Private micromobility market is volatile • Relying on private companies to provide a public good • Town must create a new regulatory framework • Guaranteeing equitable implementation and access may be challenging

Either implementation pathway will require the Town to commit resources to micromobility. Capital Bikeshare operates at a loss across the region, and jurisdictions fund a portion of the system's operations and capital expenses (as is the case with other modes of public transportation). While dockless micromobility services are fully private and do not require public funding, local governments commit resources to such programs in the form of system oversight and enforcement. Ultimately, both Capital Bikeshare and private micromobility services could occur in tandem in Herndon as they do in many other jurisdictions in the region. The final form of micromobility in the Town will depend on Herndon's public policy priorities, regulatory concerns, and available funding.

APPENDIX A

Financial Model Assumptions

To develop the baseline financial model, the study team made a series of assumptions. Some of these (e.g., revenue per user, ridership) are based on historical data from Capital Bikeshare peer jurisdictions. Other future-year assumptions, such as maintenance costs, are forecasts based off limited end-of-life data and are at this time merely a best estimate. All operating and capital costs have been inflated to year of expenditure dollars at a two percent annual rate.

Ridership and User Revenue

Ridership
Capital Bikeshare's projected ridership per bicycle in Herndon is projected to remain flat between FY 2023 when the service is implemented and FY 2027. Ridership across the system has remained fairly flat for the past several years. A zero percent assumption was considered a conservative estimate. The peak versus off-peak ridership assumptions is shown in **Table 19**.

Table 19: Ridership Assumptions

Typology	Trips per Day/Bike		Registered User Share	
	Peak	Off-Peak	Peak	Off-Peak
Base	0.30	0.15	66%	85%

Revenue
User revenue is generated through membership fees and trips lasting longer than 30 minutes. User revenue was calculated based on historical ridership by member and season types in Capital Bikeshare peer jurisdictions. Historical revenue data was used to identify the user fees that an average rider incurs for both registered and causal users. Annual and monthly memberships were combined to generate approximately $112 on average annually while causal members generate approximately $1.49 annually. Based on the trip data from peer jurisdictions, registered members generate approximately $0.16 in user fees per trip and casual users generate approximately $2.42 in user fees per trip.

Currently Capital Bikeshare has no title sponsorship or advertising revenue, so no non-user revenues were included in the model.

Operating Costs
Operating cost assumptions are based on data from other Capital Bikeshare jurisdictions. Operating costs are calculated based on a per dock fee of $99. In addition to this fee, Capital Bikeshare jurisdictions spend about $20,000 annually on administrative and marketing costs.

Capital Assumptions

Equipment Costs
Equipment costs include basic components of a bike share system: station fixed costs, like the kiosk and solar array; station variable costs, such as docks and base plates; and the bicycles, both conventional and electric.

The equipment costs in the budget were based on current and historical equipment costs borne by Capital Bikeshare peer jurisdictions. Based on this data, the model assumes an average cost for new stations of $12,000. The estimated cost of a conventional bike is $1,200 and the cost of an e-bike is $2,400.

Installation

The capital cost estimates assume that each station will incur installation fees. This cost is based on installation and site planning costs for Capital Bikeshare peer jurisdictions. The estimated base installation cost is $3,300 per station. The capital costs also assume $30,000 for system start-up, to be paid in the first year of operation.

State of Good Repair

The model takes into account long-term state of good repair (SGR) costs and assumes that equipment has a certain probability of replacement in any given year. Equipment is expected to be replaced in total at the end of its useful life. The model assumes that conventional bicycles need to be replaced every six to eight years. E-bikes are assumed to have a shorter life span and are estimated to be replaced every five to seven years; however, historical data on e-bikes is limited. Stations are assumed to need replacement every eight to 11 years. **Table 20** shows the breakdown of life cycle assumptions by equipment type.

Table 20: Equipment Life Cycle Assumptions

Conventional Bicycles				
Years After Initial Deployment	6	7	8	9
Proportion of Fleet	35%	50%	15%	-
E-Bikes				
Years After Initial Deployment	5	6	7	8
Proportion of Fleet	35%	50%	15%	-
Stations				
Years After Initial Deployment	8	9	10	11
Proportion of Stations	15%	25%	45%	15%