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1 OVERVIEW

The New Castle County Transit Origin-Destination Study will assist in better understanding the travel behavior of existing DART First State transit customers. In April 2013, the Delaware Department of Transportation (DelDOT) and the Delaware Transit Corporation (DTC) released a report prepared by the State Smart Transportation Initiative (SSTI) titled ***Reimagining a Legacy Transit System: Lessons from Wilmington, Delaware***. The SSTI report recommended that DTC and DelDOT improve the quality of transit data by completing an origin-destination study and a boarding and alighting survey. Both of these new data sets are presented in this report.

On-board surveys were completed from October 15 through November 22, 2013. 5,198 surveys were distributed and 4,490 completed surveys were returned, or an 86% return rate. All of the surveys were geocoded with successful origin-destination pairs for 2,394 surveys, or 53% of all returned surveys.

Some of the key findings include:

- Walking is the primary mode of access to the transit system with approximately 86% of all users walking to the bus.
- 41% of all riders transfer routes.
- 81% of DART First State riders travel to or from their HOME.
- Over 47% of riders commute to or from their WORKPLACE.
- Over 18% of riders use DART First State to travel to and from OTHER destinations.
- Roughly 12% of riders use DART First State as their transportation to or from SCHOOL.
- A subarea travel analysis generally using New Castle County planning areas and the 2,394 geocoded surveys was completed. Of these surveys, 48.5% had origins within the City of Wilmington and 51.5% had origins in other subareas.
- Of the Wilmington based trips, 46% traveled to destinations within the City of Wilmington while 54% traveled to destinations outside the City.
- Of the trips from all other subareas, 50% of the trips traveled to the City of Wilmington, 39% of the trips traveled to other subareas, and 11% of trips began and ended in the same subarea.
- Riders were asked for general comments about the transit service. 74% offered no comment, 16% suggested service improvements such as more frequent service on some routes, 5% identified service problems, and 3% expressed specific complaints.

As shown in Figure 1-1, the origin-destination study has yielded significant data to better understand transit customer behavior. Analysis of these data are on-going and will be presented in a later report.

Figure 1-1: Origin-Destination - All Trips - 2013

2 STUDY PURPOSE AND METHODOLOGY

The intent of the New Castle County Transit Origin-Destination Study is to understand the travel behavior of existing DART First State transit customers and to prepare and evaluate preliminary alternatives to the current hub-and-spoke transit system. In April 2013, the Delaware Department of Transportation (DelDOT) and the Delaware Transit Corporation (DTC) released a report prepared by the State Smart Transportation Initiative (SSTI) titled ***Reimagining a Legacy Transit System: Lessons from Wilmington, Delaware***. The SSTI report recommended that DTC and DelDOT improve the quality of the transit data used for short and long term decision making. An origin-destination study and a boarding and alighting survey were specific recommendations of the SSTI report. DelDOT, through an on-call planning contract, retained Whitman, Requardt & Associates, LLP (WR&A) to complete the origin-destination survey while DTC equipped some of its buses with automatic passenger counters to collect the boarding and alighting data. Both of these new data sets are presented in this report.

2.1 Participating Organizations and Consulting Team

DelDOT's Division of Planning managed the origin-destination (O-D) study. DTC's Planning and Operations staff assisted with the development and administration of the survey. A Project Steering Committee including representatives from DelDOT, DTC, the Wilmington Area Planning Council (WILMAPCO), the City of Wilmington, the City of Newark, New Castle County, and DTC riders assisted with the development of the survey and analysis of the survey results.

The O-D survey was completed by WR&A. Nectir Staffing Solutions provided the temporary staff that completed the on-board surveys, and Contemporary Analysis, Inc. (CAN) assisted with the survey development and analytics.

2.2 Survey Development and Administration

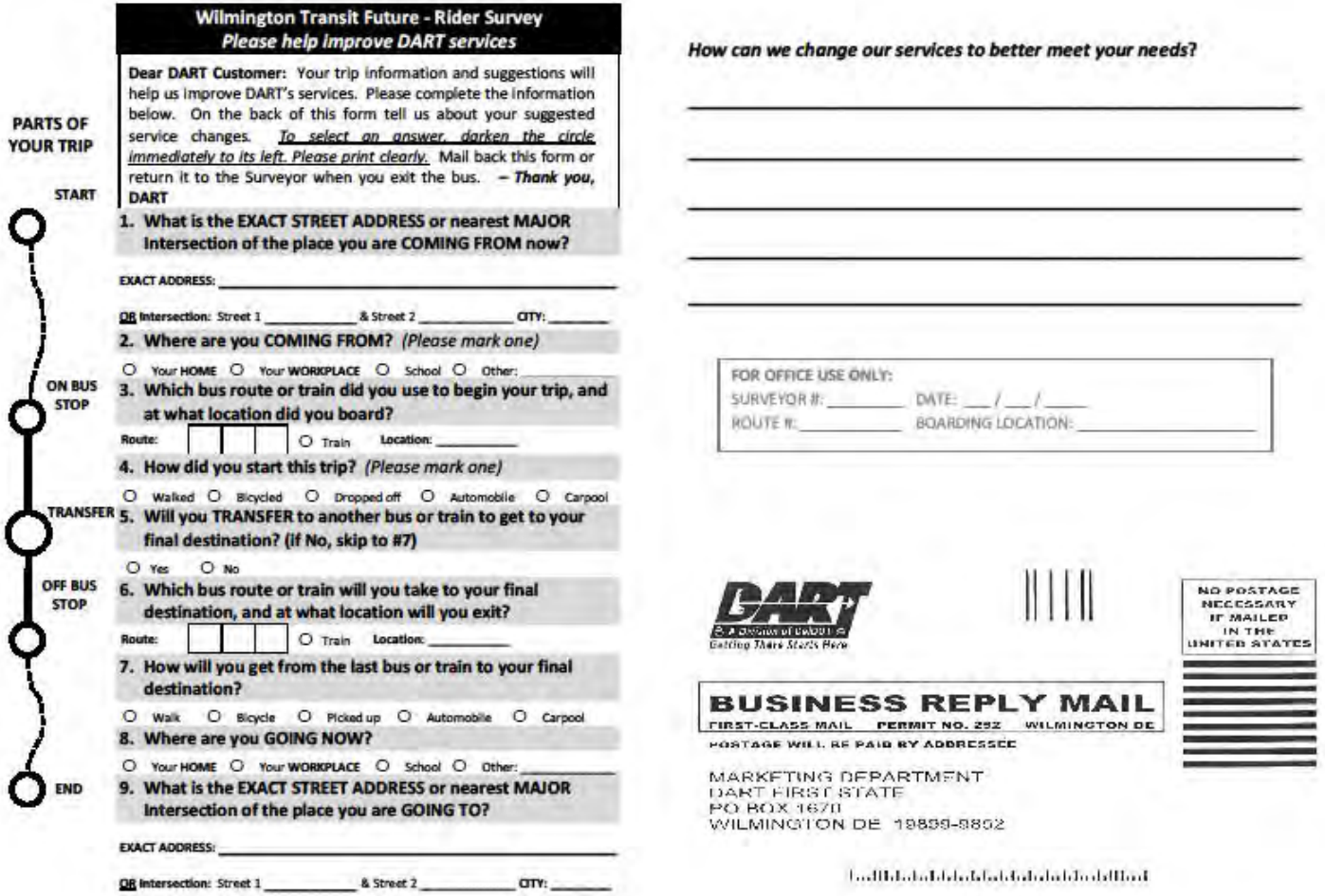
The consultant team, with the Project Steering Committee's assistance, developed a ½ page (front and back) survey instrument (Figure 2-1) to collect detailed trip information for a statistically significant sample size. The sampling plan established the sample size for each route and for the system's Wilmington-based transit routes collectively. The survey goal was to collect completed surveys of at least ten percent of the average weekday ridership of each New Castle County based transit route operated by DTC. On an average weekday, DART First State fixed-route buses carry approximately 32,000 passenger trips for an estimated 16,000 persons. Table 2-1 presents the sampling plan and results.

On-board surveys available in English and Spanish were completed from October 15 through November 22, 2013. Surveyors were instructed to ask customers to participate in the survey and hand each participating customer a small clipboard and survey so that the survey could be completed on-board the bus. Passengers were also permitted to mail back the survey or complete the survey online at the DART First State web site. 5,198 surveys were distributed and 4,259 completed surveys were returned to the surveyors. An additional 231 surveys were returned by mail or other methods for a total of 4,490 completed surveys, or an 86 % return rate. All of the surveys were geocoded. Successful origin-destination pairs were identified for 2,394 surveys, or 53% of all returned surveys.

Table 2-1: Sampling Plan and Completed Surveys

	May 2013		Target Surveys		Completed Surveys				
Route	Average Weekday Boardings	Estimated Riders (average/2)	Recommended Minimum Sample Size	% of Riders Completing Survey	Riders on Surveyed Trips	Surveys Distributed	% of Riders	Surveys Returned	% of Goal
1	3,153	1,576	158	10.0%	1728	429	27%	264	167%
2	1,028	514	51	9.9%	722	152	30%	121	237%
3	671	336	34	10.1%	280	143	43%	97	285%
4	2,108	1,054	105	10.0%	1546	375	36%	257	245%
5	2,810	1,405	141	10.0%	1436	397	28%	313	222%
6	2,804	1,402	140	10.0%	1194	301	21%	268	191%
7	106	53	25	47.0%	64	31	58%	31	124%
8	651	325	33	10.1%	259	87	27%	65	197%
9	1,004	502	50	10.0%	562	93	19%	87	174%
10	447	224	25	11.2%	240	80	36%	80	320%
11	892	446	45	10.1%	449	173	39%	122	271%
12	979	489	49	10.0%	507	139	28%	98	200%
15	1,824	912	91	10.0%	622	298	33%	297	326%
16	172	86	25	29.0%	122	80	93%	80	320%
17	620	310	31	10.0%	413	150	48%	144	465%
19	417	209	25	12.0%	299	67	32%	60	240%
20	321	161	25	15.6%	264	82	51%	80	320%
21	582	291	29	10.0%	184	108	37%	97	334%
22	1,335	667	67	10.0%	678	255	38%	199	297%
23	325	162	25	15.4%	187	73	45%	72	288%
24	1,799	900	90	10.0%	765	181	20%	133	148%
25	1,041	521	52	10.0%	596	262	50%	232	446%
28	283	142	25	17.7%	312	86	61%	72	288%
30	55	28	14	50.7%	39	28	101%	28	200%
32	60	30	15	50.0%	54	19	63%	17	113%
33	1,694	847	85	10.0%	926	321	38%	273	321%
34	313	156	25	16.0%	144	49	31%	42	168%
35	499	249	25	10.0%	172	79	32%	53	212%
36	372	186	25	13.4%	91	49	26%	42	168%
38	21	10	5	48.8%	21	11	107%	4	80%
39	144	72	25	34.6%	109	52	72%	50	200%
40	961	480	48	10.0%	554	111	23%	103	215%
41	241	121	25	20.7%	303	52	43%	25	100%
42	151	75	25	33.2%	95	60	80%	58	232%
45	121	61	25	41.2%	94	59	97%	59	236%
54	553	277	28	10.1%	131	67	24%	67	239%
55	638	319	32	10.0%	435	91	29%	65	203%
301	806	403	40	9.9%	210	108	27%	104	260%
Total	**32,004**	**16,002**	**1,784**	**11.1%**	**16,807**	**5,198**	**32%**	**4,259**	**239%**

Figure 2-1: On-Board Survey Form



Wilmington Transit Future - Rider Survey
Please help improve DART services

Dear DART Customer: Your trip information and suggestions will help us improve DART's services. Please complete the information below. On the back of this form tell us about your suggested service changes. *To select an answer, darken the circle immediately to its left. Please print clearly.* Mail back this form or return it to the Surveyor when you exit the bus. – ***Thank you, DART***

PARTS OF YOUR TRIP

START

1. What is the EXACT STREET ADDRESS or nearest MAJOR Intersection of the place you are COMING FROM now?

EXACT ADDRESS: _____

OR Intersection: Street 1 _____ & Street 2 _____ CITY: _____

2. Where are you COMING FROM? *(Please mark one)*

○ Your HOME ○ Your WORKPLACE ○ School ○ Other: _____

ON BUS STOP

3. Which bus route or train did you use to begin your trip, and at what location did you board?

Route: ☐☐☐ ○ Train Location: _____

4. How did you start this trip? *(Please mark one)*

○ Walked ○ Bicycled ○ Dropped off ○ Automobile ○ Carpool

TRANSFER

5. Will you TRANSFER to another bus or train to get to your final destination? (if No, skip to #7)

○ Yes ○ No

OFF BUS STOP

6. Which bus route or train will you take to your final destination, and at what location will you exit?

Route: ☐☐☐ ○ Train Location: _____

7. How will you get from the last bus or train to your final destination?

○ Walk ○ Bicycle ○ Picked up ○ Automobile ○ Carpool

8. Where are you GOING NOW?

○ Your HOME ○ Your WORKPLACE ○ School ○ Other: _____

END

9. What is the EXACT STREET ADDRESS or nearest MAJOR Intersection of the place you are GOING TO?

EXACT ADDRESS: _____

OR Intersection: Street 1 _____ & Street 2 _____ CITY: _____

Thank you for your participation.

How can we change our services to better meet your needs?

_____

_____

_____

_____

_____

FOR OFFICE USE ONLY:
SURVEYOR #: _____ DATE: ___ / ___ / ____
ROUTE #: _____ BOARDING LOCATION: _____

DART
Getting There Starts Here

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

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FIRST-CLASS MAIL PERMIT NO. 252 WILMINGTON DE
POSTAGE WILL BE PAID BY ADDRESSEE

MARKETING DEPARTMENT
DART FIRST STATE
PO BOX 1670
WILMINGTON DE 19899-9852

2.3 Data Analysis

Of the total 5,198 riders surveyed, 4,490 surveys were returned by riders, which equates to a response rate of 86%. The margin of error for the entire sample was +/- 1.24% at a 95% level of confidence assuming a two-tail normal distribution. The actual margin of error for individual questions varied based on the number of responses obtained and the unique answers received. The following margins of error were calculated based on the specific route corridors surveyed:

- Philadelphia Pike: +/- 3.84%
- Concord Pike: +/- 5.30%
- Pennsylvania Ave & Lancaster Pike: +/- 4.15%
- Kirkwood Highway: +/- 4.25%
- Maryland Ave: +/- 4.48%
- Market, Dupont and New Castle: +/- 2.60%
- Christiana Mall / Newark: +/- 3.72%
- Mid County: +/- 4.62%
- Downstate: +/- 6.30%

The above margins of error were calculated at a 95% level of confidence assuming a two-tail normal distribution. The actual margin of error for each corridor's individual questions varied based on the number of responses obtained and the unique answers received relative to each route group.

The data analysis has been completed using three data sets, including:

- Returned surveys – 4,490 completed surveys
- Surveys with valid O-D matches – 2,394 completed surveys
- Boarding and alighting counts from DTC

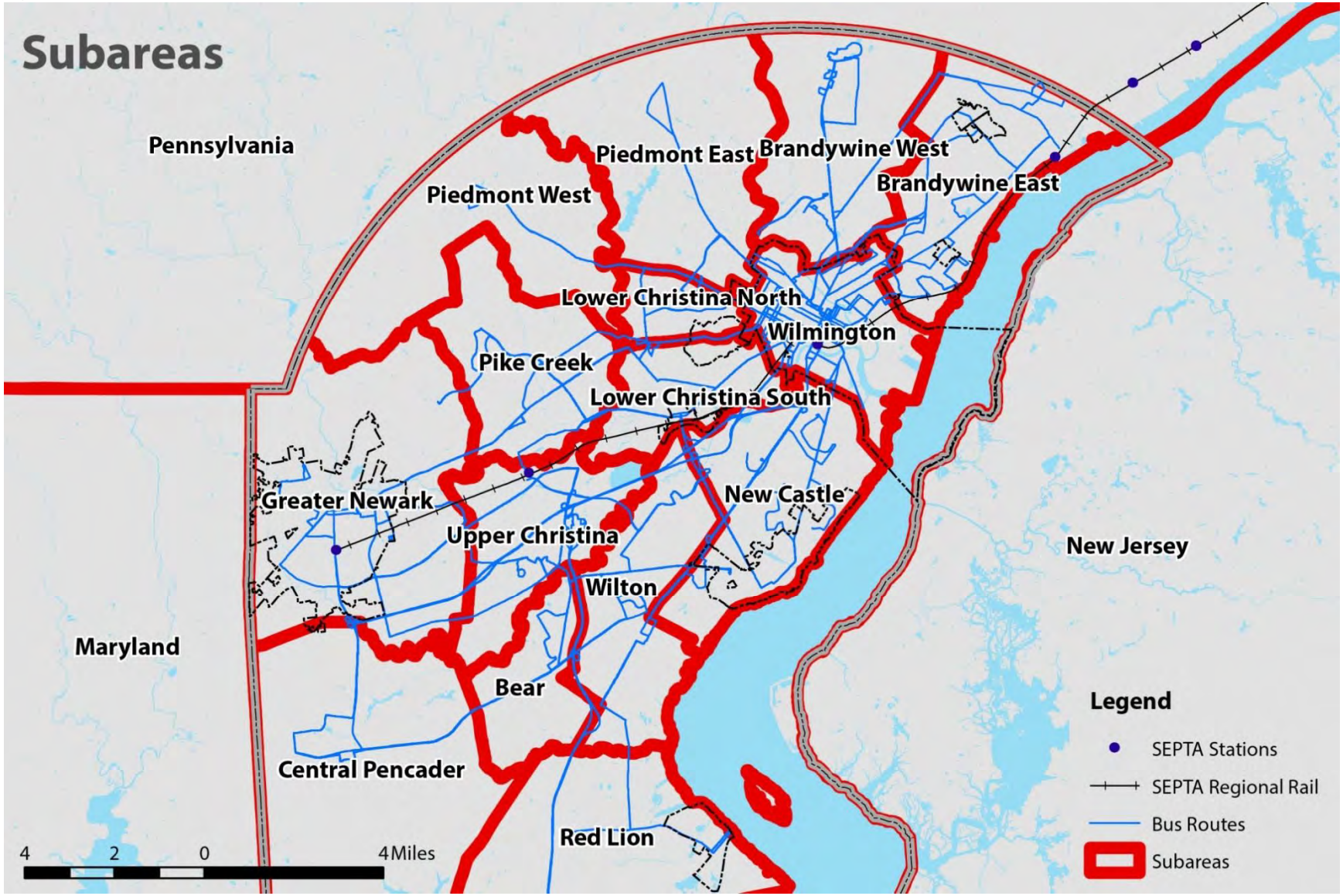
Three methods have been used in analyzing the data, including:

- System-wide, where all northern New Castle County routes are included.
- Transit corridors where the routes are grouped by corridor as shown in Table 2-2. The corridor grouping is based on historical route level data, and the corridors overlap, as some routes have crosstown service. Each route, however, is only assigned to one corridor. Table 2-2 also compares the May 2013 ridership by corridor with the actual surveys received by corridor.
- The subareas shown in Figure 2-2 have been developed utilizing a combination of New Castle County's comprehensive planning districts and the regional travel model's traffic analysis zones. This subarea framework will permit the estimation of unmet demand for transit services by comparing origin-destination data with regional travel forecast results.

Table 2-2: Transit Corridors and Comparison of May 2013 Ridership to Completed Surveys

Corridor	Routes	May 2013 Ridership	Percentage of May 2013 Ridership	Surveys with valid Route #	Percentage of Surveys
Philadelphia Pike	1, 3, 11, 12, 24, 38, 61	165,320	23.5%	909	20.9%
Concord Pike	2, 21, 28, 35	52,637	7.5%	269	6.2%
Pennsylvania Ave and Lancaster Pike	4, 10, 20	63,292	9.0%	407	9.3%
Kirkwood Highway	6, 19, 30, 36	80,268	11.4%	415	9.5%
Maryland Ave	5, 7, 9	86,252	12.3%	386	8.9%
Market, Dupont and New Castle	8, 15, 17, 22, 25, 32	121,673	17.3%	954	21.9%
Christiana Mall / Newark	16, 23, 33, 34, 55, 59, 65	72,273	10.3%	532	12.2%
Mid County	40, 41, 42, 54, 64	41,935	6.0%	325	7.5%
Downstate	45, 301, 305	20,439	2.9%	162	3.7%
Northern New Castle County		704,089	100%	4,359	100.0%

Figure 2-2: Subareas



3 DART FIRST STATE NEW CASTLE COUNTY TRANSIT SERVICES

3.1 Service Area Demographics

New Castle County is the most populous of Delaware's three counties, with an estimated 2010 population of 538,479 persons. Table 3-1 lists data from the 2010 US Census. The County is located within the Philadelphia Metro Urbanized Area, the fifth largest in the country, with a total urbanized area 2010 population of 5,965,343 persons. Fifteen incorporated cities and towns are located within New Castle County. Table 3-2 lists the County's incorporated areas and the percentage of the County's population in each area.

In 2010, Wilmington was the largest city in New Castle County, with 70,851 persons, while Newark was second largest city in the County, with 31,454 persons. 28% of the County's population resides in incorporated areas, while 72% live in unincorporated areas.

Figures 3-1 through 3-5 on the following pages illustrate demographic information that is useful in planning transit services.

Table 3-1: New Castle County, Delaware – 2010 Population Estimates

Population, 2010	538,479
% of Delaware Population	60.0%
Minority Population	185,524
% Minority Population	34.5%
Land area in square miles, 2010	426.29
Population Density, 2010	1,263.2 per square mile

Source: 2010 US Census

Table 3-2: New Castle County Incorporated Areas - 2010

New Castle County, Delaware	2010 Population	Percent of County Population
Arden Village	439	0.1%
Ardencroft Village	231	0.0%
Ardentown Village	264	0.0%
Town of Bellefonte	1,193	0.2%
Town of Clayton	2,918	0.5%
Delaware City	1,695	0.3%
Town of Elsmere	6,131	1.1%
Town of Middletown	18,871	3.5%
City of Newark	31,454	5.8%
New Castle City	5,285	1.0%
Town of Newport	1,055	0.2%
Town of Odessa	364	0.1%
Town of Smyrna	10,023	1.9%
Town of Townsend	2,049	0.4%
City of Wilmington	70,851	13.2%
Total population in incorporated areas	152,823	28.4%
Population in unincorporated areas	385,656	71.6%
Total County Population	**538,479**	**100.0%**

Source: 2010 US Census

Figure 3-1: Northern New Castle County Land Use

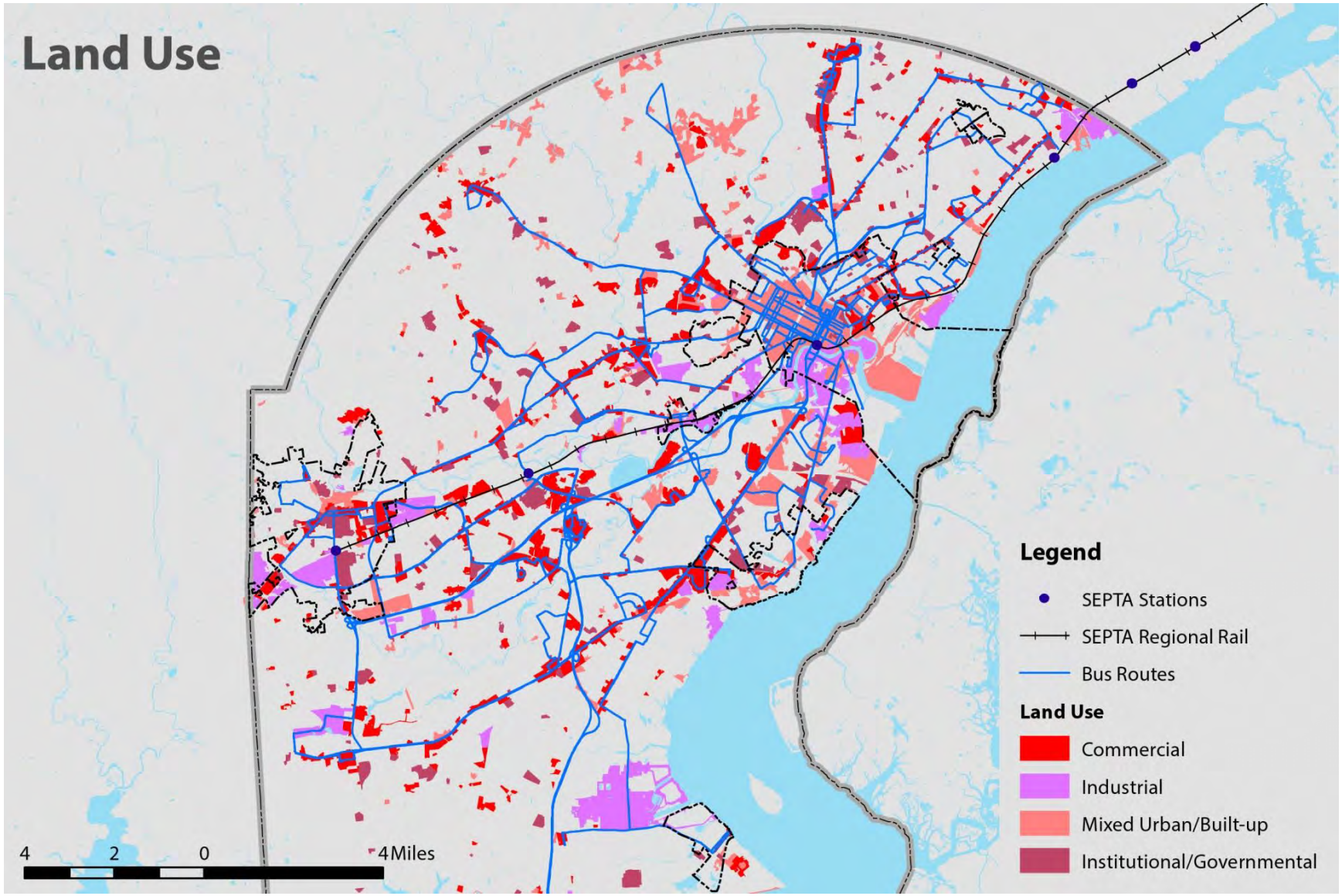


Figure 3-2: Northern New Castle County Census Tracts with Households below the Poverty Line

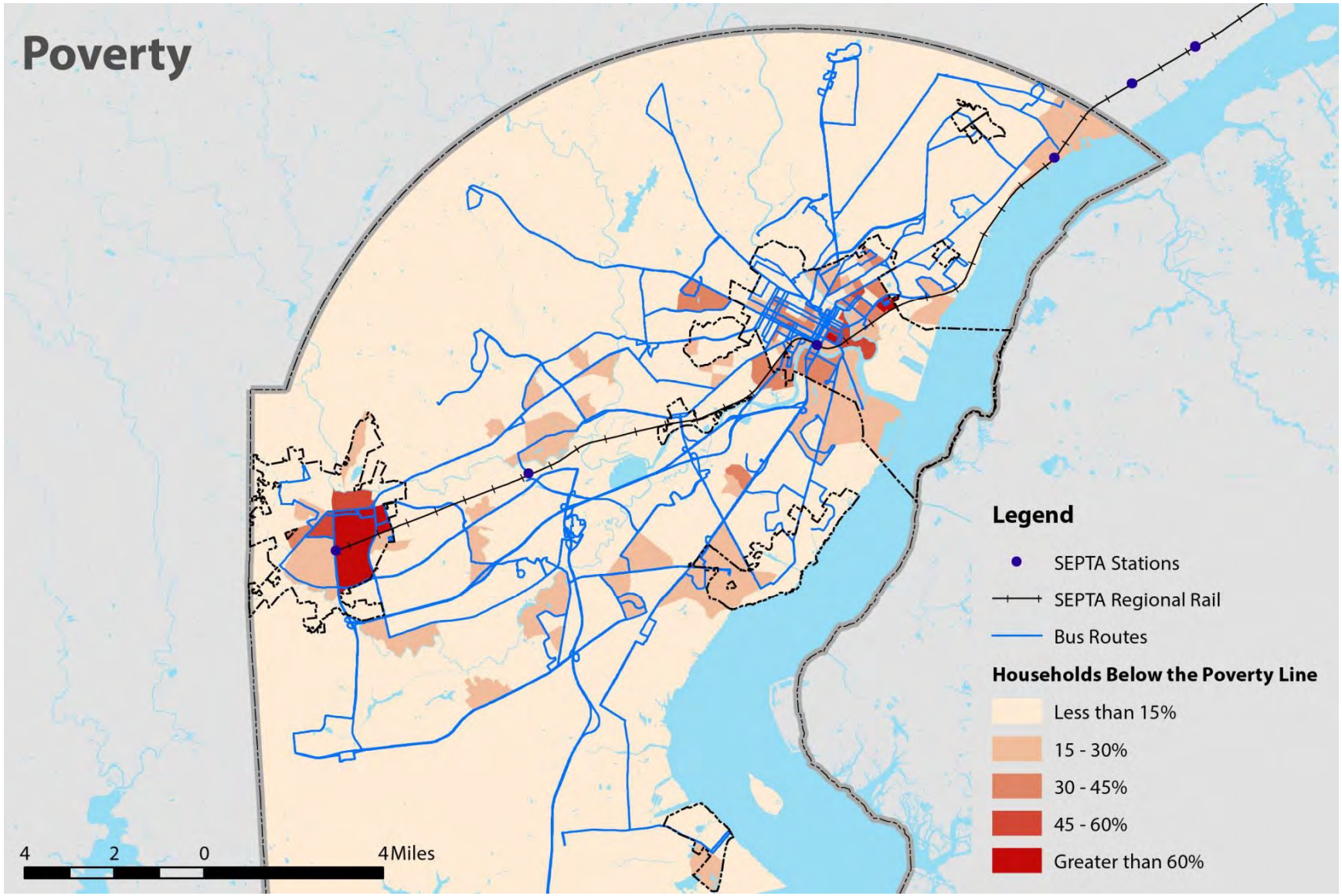


Figure 3-3: Northern New Castle County Census Tracts with Minority Concentrations

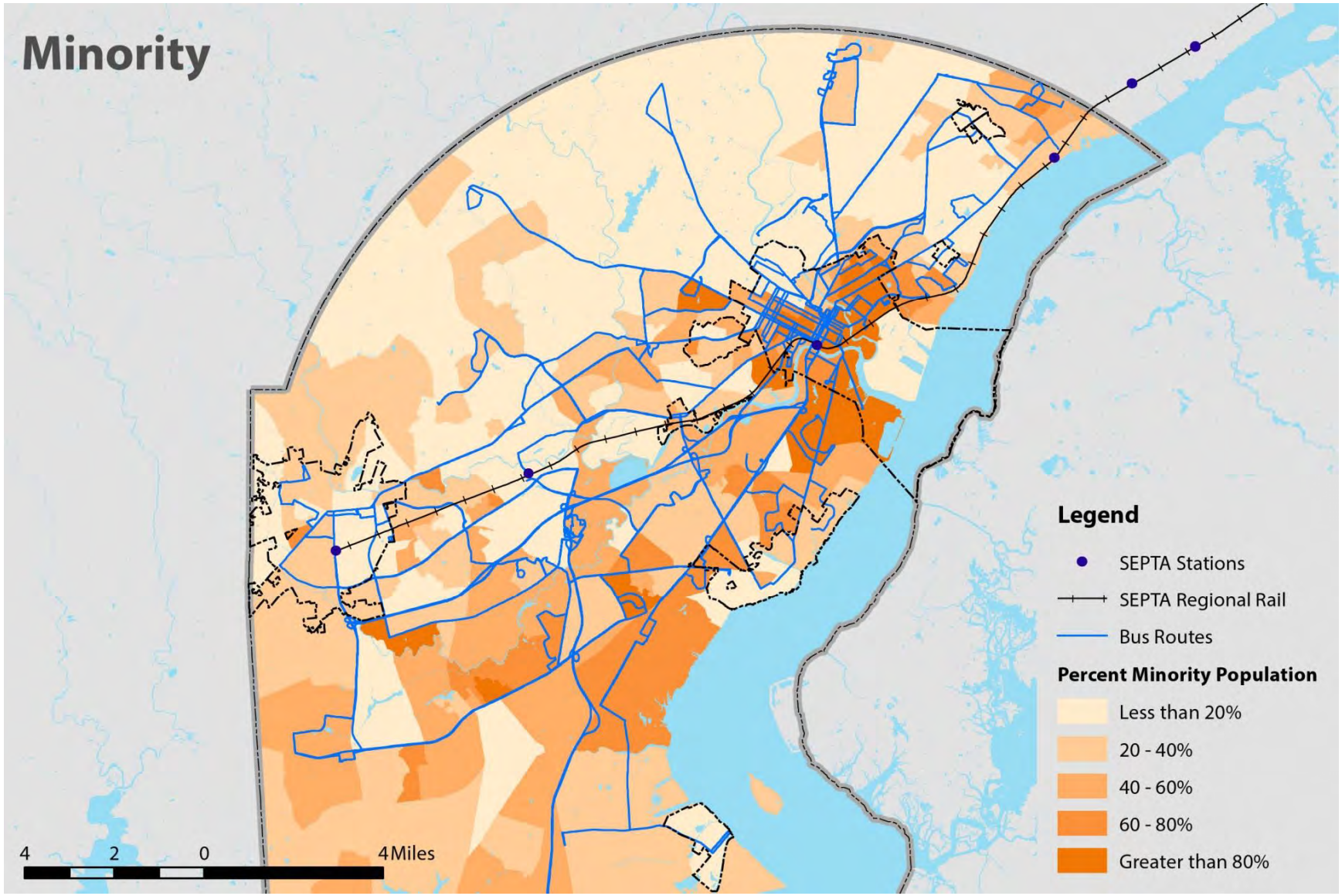


Figure 3-4: Northern New Castle County Subsidized Housing

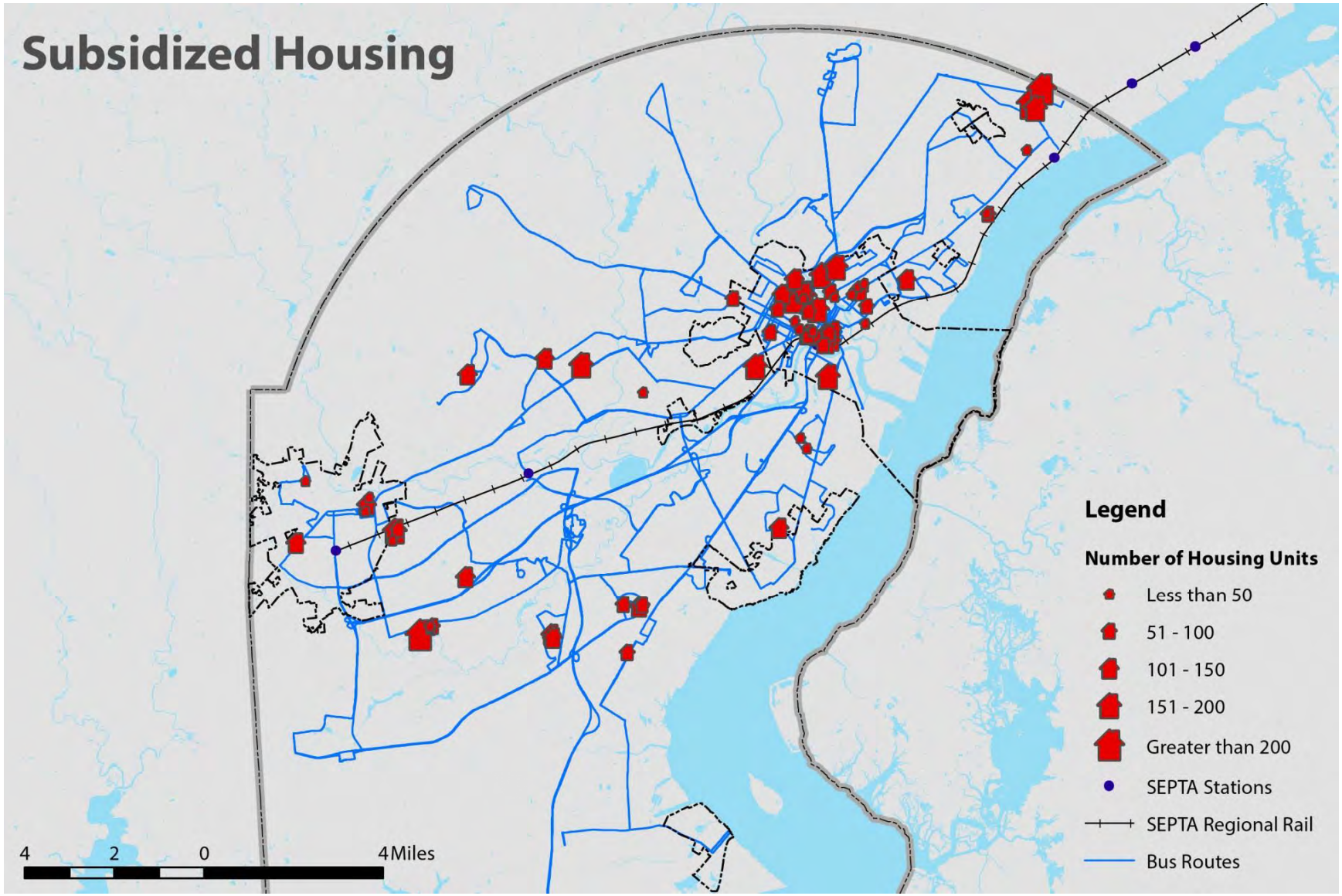
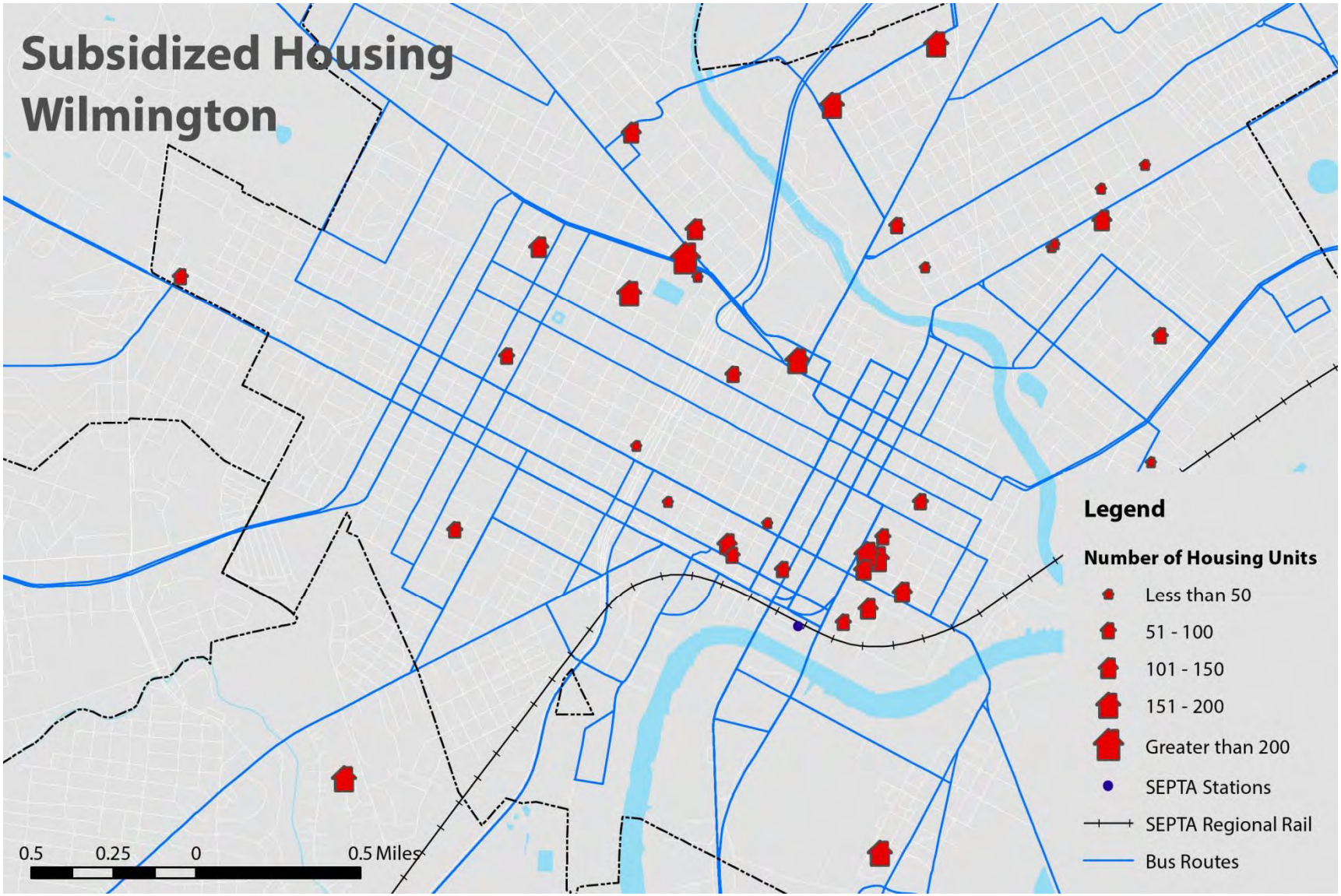


Figure 3-5: Subsidized Housing – City of Wilmington



3.2 Transit Service Summary

DART First State provides transit service for the entire State of Delaware and provided 10.2 million unlinked passenger trips during fiscal year (FY) 2013. As of September 2013, 42 DART First State transit routes serve New Castle County. During FY 2013 these routes provided 8,967,843 unlinked passenger trips in New Castle County, or 88 % of the statewide total. According to the DTC June 2013 operating results, the New Castle County transit services cost $47.6 million to operate during FY 2013. Table 3-3 lists the New Castle County routes with select operating data by corridor.

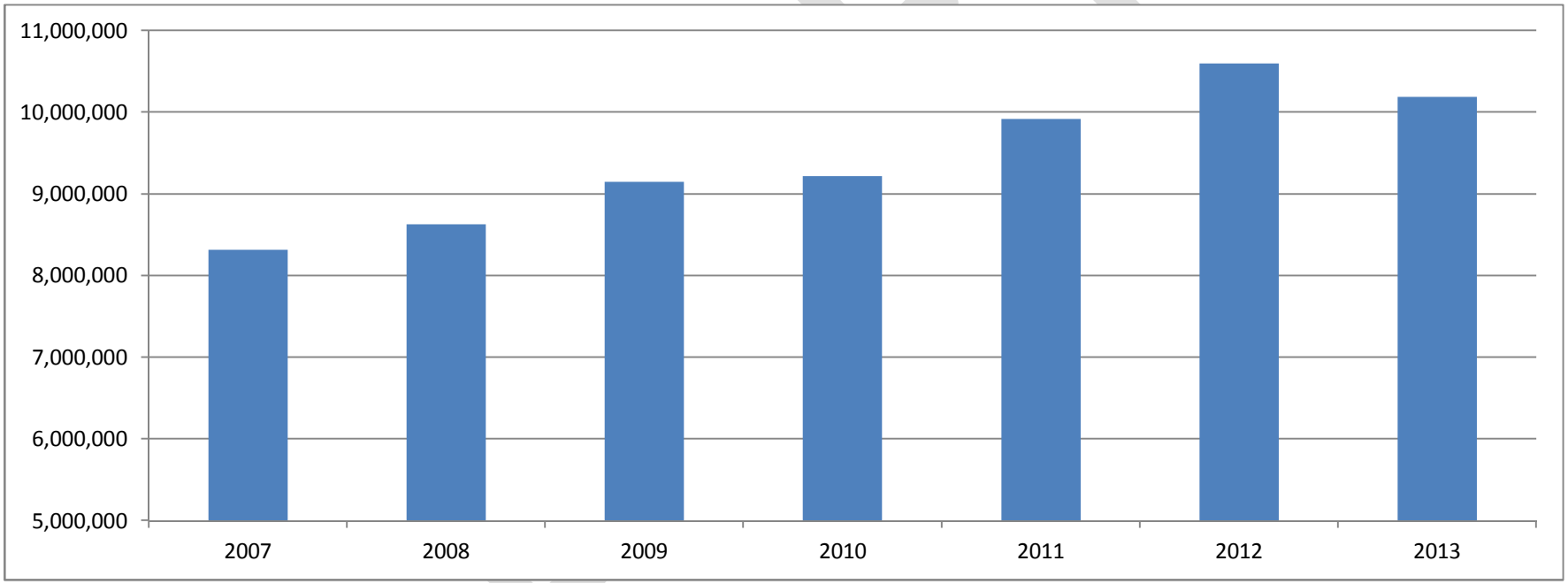
Table 3-3: Northern New Castle County Transit Operating Results by Corridor – May 2013

Corridor	Routes	Ridership	Hours	Net Cost	Net Cost per Rider	Recovery Ratio
Philadelphia Pike	1, 3, 11, 12, 24, 38, 61	165,320	5,719	$ 410,294	$ 2.48	19.1%
Concord Pike	2, 21, 28, 35	52,637	2,275	$ 180,717	$ 3.43	12.4%
Penn Ave & Lancaster Pike	4, 10, 20	63,292	2,314	$ 169,953	$ 2.69	16.5%
Kirkwood Highway	6, 19, 30, 36	80,268	3,459	$ 289,849	$ 3.61	14.6%
Maryland Ave	5, 7, 9	86,252	2,984	$ 243,922	$ 2.83	16.0%
Market, Dupont and New Castle	8, 15, 17, 22, 25, 32	121,673	5,565	$ 508,422	$ 4.18	12.0%
Christiana Mall / Newark	16, 23, 33, 34, 55, 59, 65	72,273	4,227	$ 462,508	$ 6.40	8.6%
Mid County	40, 41, 42, 54, 64	41,935	1,805	$ 200,657	$ 4.78	11.6%
Downstate	45, 301, 305	20,439	1,587	$ 218,972	$ 10.71	17.6%
Northern New Castle County		**704,089**	**29,935**	**$2,685,294**	**$ 3.81**	**12.9%**

3.3 Ridership and Service History

Transit operating statistics are reported annually by DTC to the National Transit Database. As shown in Figure 3-6, DART First State annual statewide unlinked passenger trips have grown from 8.3 million trips in FY 2007 to 10.1 million trips in FY 13. The growth in statewide unlinked passenger trips has averaged 3.45% per year over the period. Table 3-4 compares the ridership growth for Delaware's three counties since 2010. During that period New Castle County unlinked passenger trips have grown by more than 750,000 annual trips, or 2.97% average annual growth. Kent and Sussex County unlinked passenger trips have grown by 216,000 annual unlinked passenger trips, or 6.68% average annual growth.

Figure 3-6: DART First State Unlinked Passenger Trips



Source: National Transit Database and DART First State June 2013 Operating Data

Table 3-4: DART First State Unlinked Passenger Trips by County

County	FY 10	FY 11	FY 12	FY 13	Average Annual Change
New Castle	8,210,195	8,731,967	9,354,285	8,963,344	2.97%
Kent	576,034	687,333	741,714	739,176	8.67%
Sussex	433,162	500,913	505,326	486,045	3.91%
State Total	9,219,391	9,920,213	10,601,325	10,188,565	3.39%

Source: DART First State June 2013 Operating Data

National Transit Database information has been used to compare DART First State statewide annual change in ridership with other large transit services from Virginia to New Jersey. Table 3-5 compares data from FY 2007 to FY 2011 and demonstrates that, of these ten transit systems, only Harrisburg, PA had a higher average annual rate of ridership growth than DART First State.

Table 3-5: Average Annual Change in Unlinked Passengers - FY 07 to FY11

System	Annual Change
Port Authority of Allegheny County	-2.0%
Richmond, VA	-1.9%
Maryland Transit Administration	-0.8%
New Jersey Transit	-0.8%
Rockville, MD	-0.4%
WMATA	-0.3%
SEPTA	0.7%
Allentown, PA	1.7%
DART First State	**3.2%**
Harrisburg, PA	3.3%

Source: National Transit Database 2011 Time Series

Table 3-6 compares the annual rate of change since 2010 for the New Castle County transit corridors. The Downstate Express services had the highest rate of growth, followed by the Maryland Avenue and Christiana Mall / Newark corridors. The Pennsylvania Avenue & Lancaster Pike corridor was the only corridor to show a loss in ridership during the period.

Table 3-6: Average Annual Change in Ridership – FY 10 to FY 13

Corridor	2013 Weekday Riders	Average Annual Change
Philadelphia Pike	7,476	2.7%
Concord Pike	2,257	0.9%
Penn Ave & Lancaster Pike	2,846	-0.8%
Kirkwood Highway	3,699	2.3%
Maryland Ave	3,701	5.1%
Market, Dupont, New Castle	5,718	2.7%
Christiana Mall / Newark	3,514	4.6%
Mid County	2,071	3.6%
Downstate	949	6.7%
Total	32,232	2.8%

Source: DART First State June 2013 Operating Data

4 SYSTEM WIDE DATA ANALYSIS

4.1 Mode of Access

Survey respondents were asked how they began their trip and how they planned to arrive at their destination. For example, a rider could respond they began their trip by driving an automobile to a park-and-ride and then walking to their final destination after arriving at their last bus stop.

Roughly 75% of respondents indicated they walked to their bus stop and also planned to walk to their final destination. This was also the case for most corridors with the exception of Downstate. Most riders originating in the Downstate corridor used automobiles to arrive at their bus stop and then walked to their final destination.

Table 4-1: System Mode of Access

		Mode of Egress					
		Auto	Carpool	Kiss & Ride	Bike	Walk	Total
Mode of Access	Auto	130	1	3		223	357
	Carpool	6	3			14	23
	Kiss & Ride	68	6	7		14	95
	Bike	7	2		41	72	122
	Walk	217	7	12	12	3,350	3,598
	Total	428	19	22	53	3,673	4,195

4.2 Trip Type

Trip information includes rider responses to the following survey questions:

- Where they are coming from when they ride DART First State
- Where they go when they ride DART First State

Table 4-2: Trip Type

	# of Respondents	Percentage
Home to Work	2151	47.9%
Home to Other	813	18.1%
Home to School	382	8.5%
Home to Home	296	6.6%
Workplace to Other	265	5.9%
Workplace to Workplace	243	5.4%
Other to Other	184	4.1%
Workplace to School	90	2.0%
School to School	58	1.3%
School to Other	8	0.2%
Total	4,490	100.0%

The following points summarize the findings of this section:

- 81% of DART First State riders travel to or from their HOME.
- Over 47% of riders commute to or from their WORKPLACE to HOME using DART First State.
- Over 18% of riders use DART First State to travel to and from HOME to OTHER destinations.
- Roughly 12% of riders use DART First State as their transportation to or from SCHOOL.
- Nearly 6% of riders use DART First State to travel during their inter workday.
- The Downstate corridor is the heaviest user of DART First State for HOME-to-WORKPLACE, WORKPLACE-to-HOME trips.
- The Market, Dupont, and New Castle corridor tends to use DART First State more for non-work related trips relative to the other corridors.

"OTHER" Trip Purpose Analysis

Riders were asked whether they were heading to or from their HOME, WORKPLACE, SCHOOL, or OTHER destinations when riding DART First State. The purpose of this subsection is to summarize the types of OTHER destinations provided by riders. For simplicity, responses were categorized into eight groups. The list below describes what types of origins or destinations are inclusive within each of the groups. A miscellaneous category was also created for responses that couldn't be easily categorized.

The following were the top 3 OTHER destinations for DART First State riders:

- Shopping, Eating, Errands
- Medical Appointments
- Visiting Friends, Family

Definitions of "OTHER" origins and destinations

Shopping, Eating, Errands
Riders traveling to or from particular shops, grocery stores, shopping centers or malls, restaurants, banks, daycare, laundromats, etc.

Medical Appointments
Riders traveling to the hospital, clinic, or for doctor, dentist, or other appointments.

Friends, Family
Riders traveling to or from their friend's, significant other's, or family's households.

Library
Riders traveling to or from a local library.

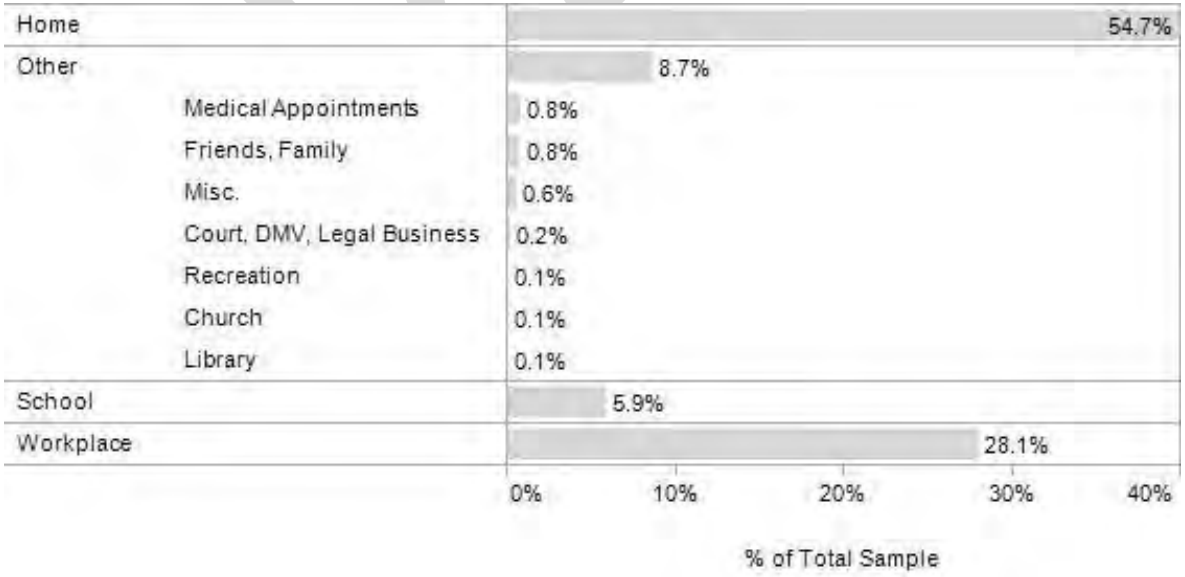
Court, DMV, Legal Business
Riders traveling to or from court hearings, the DMV, parole hearings, probation, rehab, unemployment office, welfare office, social security office, or any other federal building.

Church
Riders traveling to or from a church or to other destinations relating to religious organizations.

Recreation
Riders traveling to or from recreation destinations such as the gym, yoga studios, casinos, etc.

Miscellaneous
All other originations or destinations which are unclassifiable.

Figure 4-1: Trip Type



4.3 Transfer Analysis

System and corridor transfer analyses were completed. Customers were asked to state their starting route and the route they transferred to. Table 4-3 shows the transfer analysis for all of the New Castle County routes. Of the 4,490 surveys, 98 had either blank starting routes or SEPTA or Kent County routes outside the analysis area. Of the remaining 4,392 surveys, 2,581 did not require a transfer to complete their trip, while 1,811 transferred routes, or a transfer rate of 41.2%. The corridor transfer analysis is shown in Table 4-4. The Mid County corridor routes had the highest rate of transfers, at 50.2%, while the Downstate services had the lowest rate of transfers, at 27.8%.

Table 4-3: System Transfer Analysis

Surveys Returned	Blank or Invalid Routes	Surveys for Transfer Analysis	Did not Transfer	Transfer	% Transfer
4,490	98	4,392	2,581	1,811	41.2%

Table 4-4: Corridor Transfer Analysis

Corridor	Estimated Riders	# Surveys	# Transfers	% Transfer
Philadelphia Pike	3,757	909	415	45.7%
Concord Pike	1,196	269	94	36.8%
Pennsylvania Ave and Lancaster Pike	1,438	407	156	39.3%
Kirkwood Highway	1,824	415	147	35.4%
Maryland Ave	1,960	386	178	49.0%
Market, Dupont, New Castle	2,765	954	406	43.5%
Christiana Mall / Newark	1,643	532	191	37.0%
Mid County	953	325	162	50.2%
Downstate	464	162	43	27.8%
Train	-	33	19	57.6%
Total	**16,001**	**4,392**	**1,811**	**41.2%**

5 SUBAREA TRAVEL PATTERNS

The subarea travel analysis utilized the 2,394 surveys that were successfully geocoded with origins and destinations. Figure 2-2 shows the subareas. Table 5-1 compares the trips with origins in the City of Wilmington with the trips with origins in other subareas. Of the 2,394 total trips with valid O-D pairs, 45.8% had origins within the City of Wilmington and 51.5%had origins in other subareas. Of the Wilmington based trips, 46.0%traveled to destinations within the City of Wilmington while 54.0% traveled to destinations outside the City. Trips from all other subareas had 50.2% of trips traveling to the City of Wilmington, 38.8% of the trips traveling to other subareas, and 11.0% of these trips starting and ending in the same subarea.

Table 5-2 presents the origin-destination analysis for all other subareas. Brandywine West (the Concord Pike area) had the highest rate of travel to Wilmington, at 75.4 %.

Table 5-1: Wilmington Subarea Analysis.

Subarea	# Origin		Trips Within Subarea		Trips to Wilmington (excluding Wilmington)		Trips to other Subarea (except Wilmington)	
	#	%	#	%	#	%	#	%
Wilmington	1,162	48.5%	534	46.0%			628	54.0%
All others	1,232	51.5%	135	11.0%	619	50.2%	478	38.8%

Table 5-2: Subarea Analysis

Subarea (excluding Wilmington)	# Origin	Trips Within Subarea		Trips to Wilmington		Trips to other Subarea (except Wilmington)	
		#	%	#	%	#	%
Brandywine East	128	21	16.4%	66	51.6%	41	32.0%
Brandywine West	57	4	7.0%	43	75.4%	10	17.5%
Piedmont East	8	2	25.0%	3	37.5%	3	37.5%
Piedmont West	20	2	10.0%	15	75.0%	3	15.0%
Lower Christina North	46	1	2.2%	32	69.6%	13	28.3%
Lower Christina South	109	12	11.0%	50	45.9%	47	43.1%
New Castle	214	32	15.0%	100	46.7%	82	38.3%
Pike Creek	71	3	4.2%	40	56.3%	28	39.4%
Upper Christina	114	12	10.5%	49	43.0%	53	46.5%
Wilton	94	8	8.5%	54	57.4%	32	34.0%
Bear	57	2	3.5%	29	50.9%	26	45.6%
Greater Newark	162	26	16.0%	68	42.0%	68	42.0%
Central Pencader	60	6	10.0%	22	36.7%	32	53.3%
Red Lion	4	1	25.0%	1	25.0%	2	50.0%
Middletown	50	2	4.0%	33	66.0%	15	30.0%
Kent / Sussex	16	1	6.3%	4	25.0%	11	68.8%
Maryland	11	-	0.0%	4	36.4%	7	63.6%
Pennsylvania	11	-	0.0%	6	54.5%	5	45.5%
New Jersey	0	-	0.0%	-	0.0%	-	0.0%
Total	**1,232**	**135**	**11.0%**	**619**	**50.2%**	**478**	**38.8%**

6 TRANSIT CORRIDOR TRAVEL MAPS

Four maps are provided for each of the nine transit corridors including:

1. Boarding and alighting data collected by DTC
2. Trips within the corridor
3. Trips to the Downtown area
4. Trips outside the corridor and the Downtown area

Note that boarding and alighting data were not available for the Downstate corridor.

6.1 Philadelphia Pike

Figure 6-1: Boarding and alighting data collected by DTC for the Philadelphia Pike Corridor

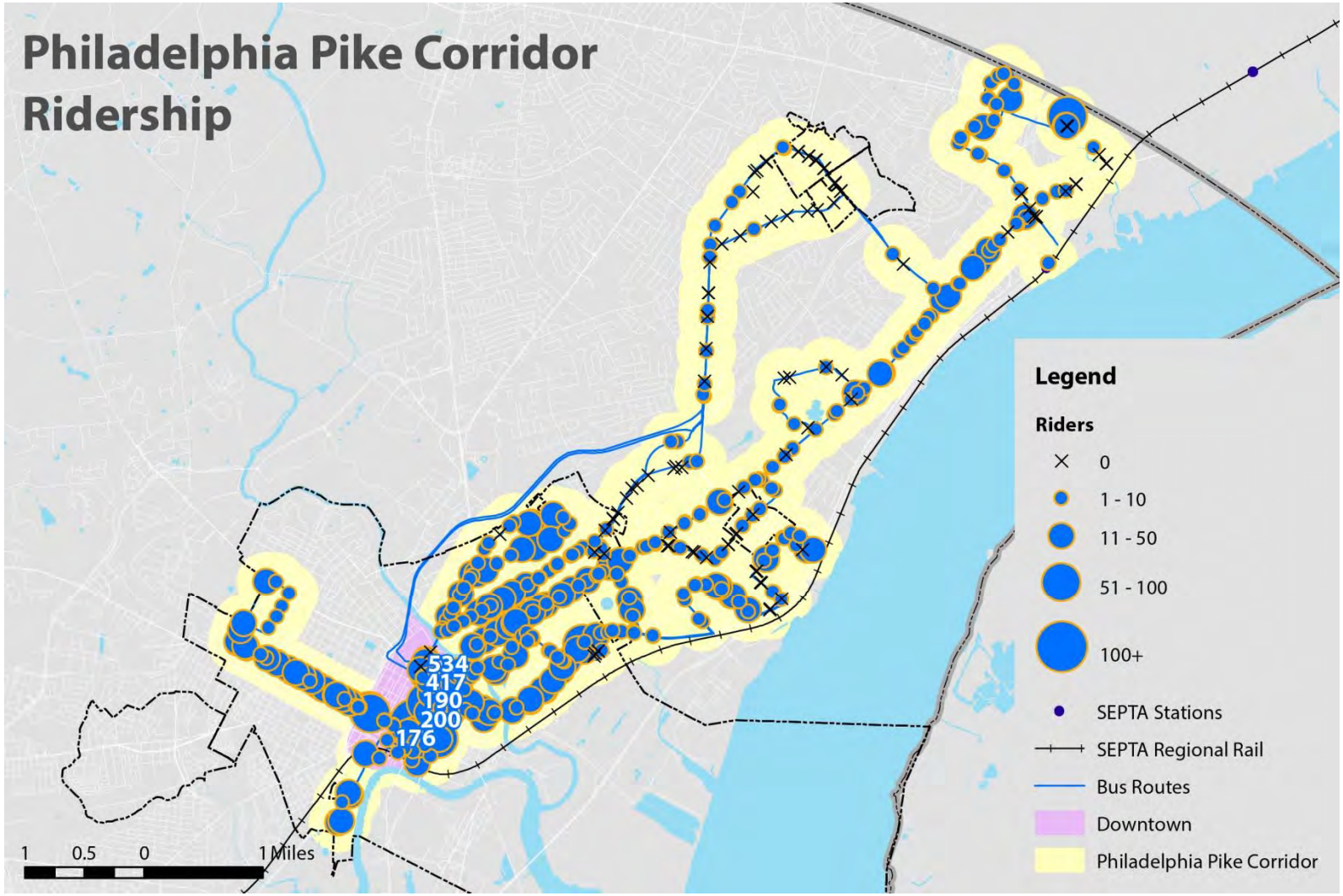


Figure 6-2: Trips within the Philadelphia Pike Corridor

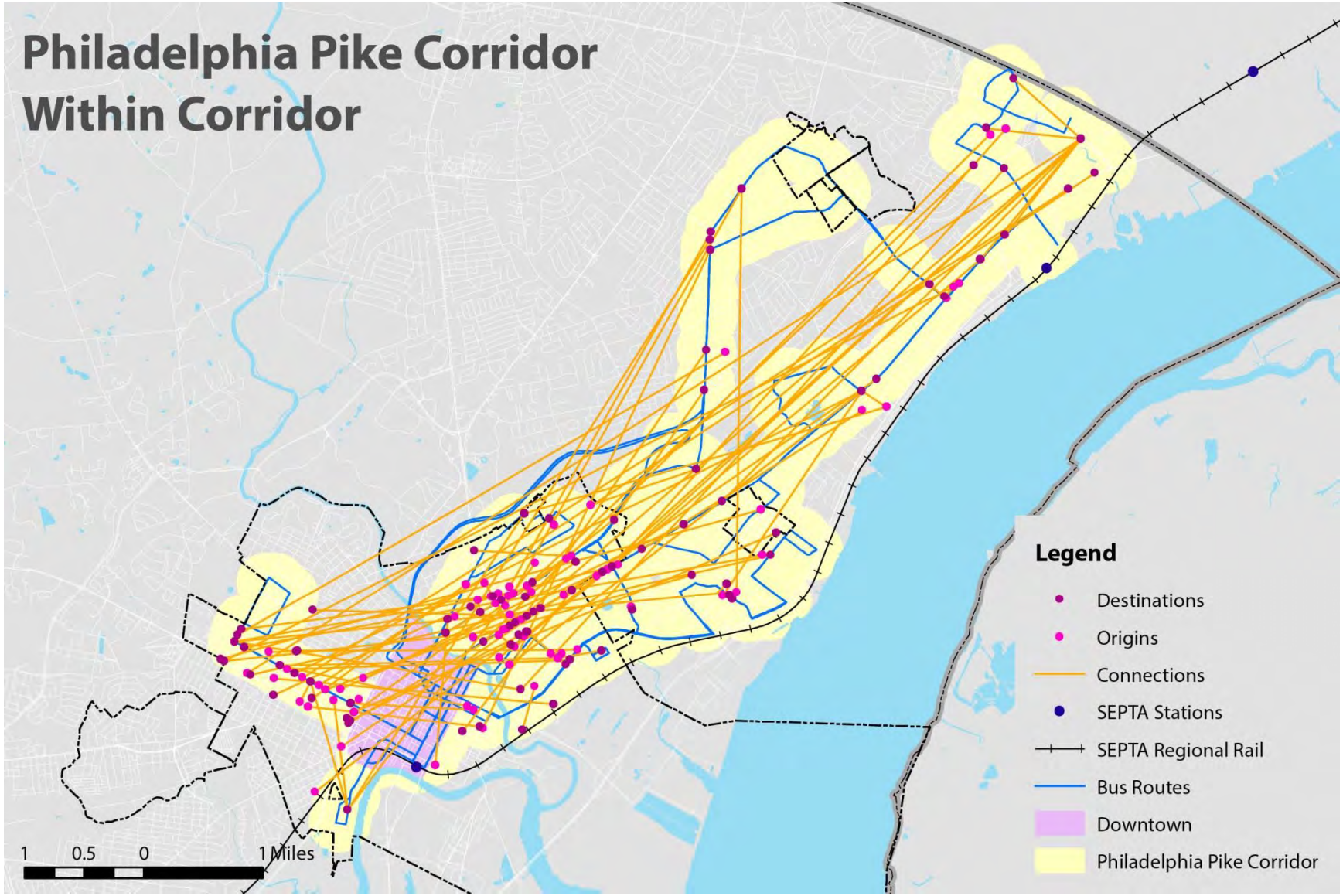


Figure 6-3: Trips from the Philadelphia Pike Corridor to the Downtown area

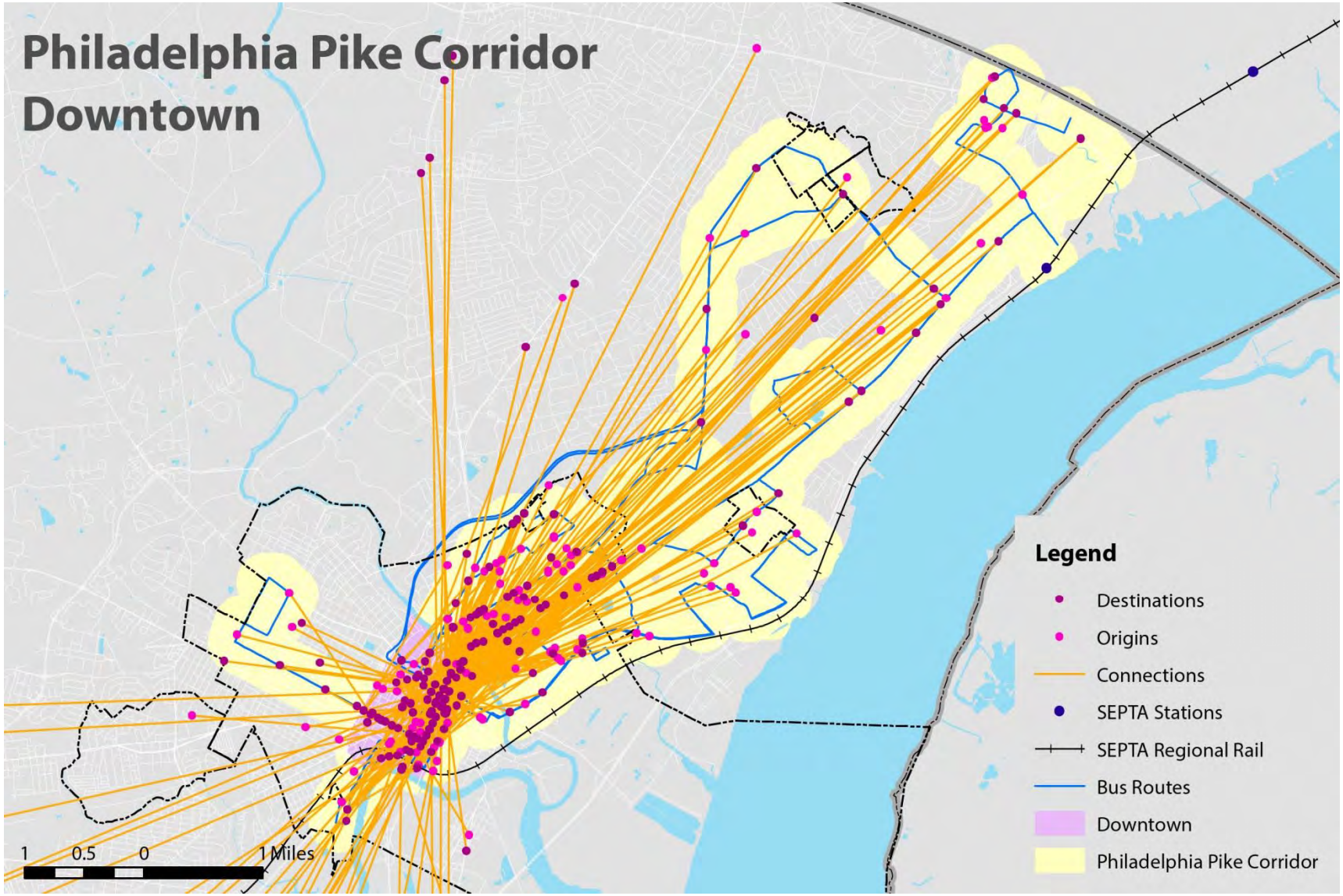
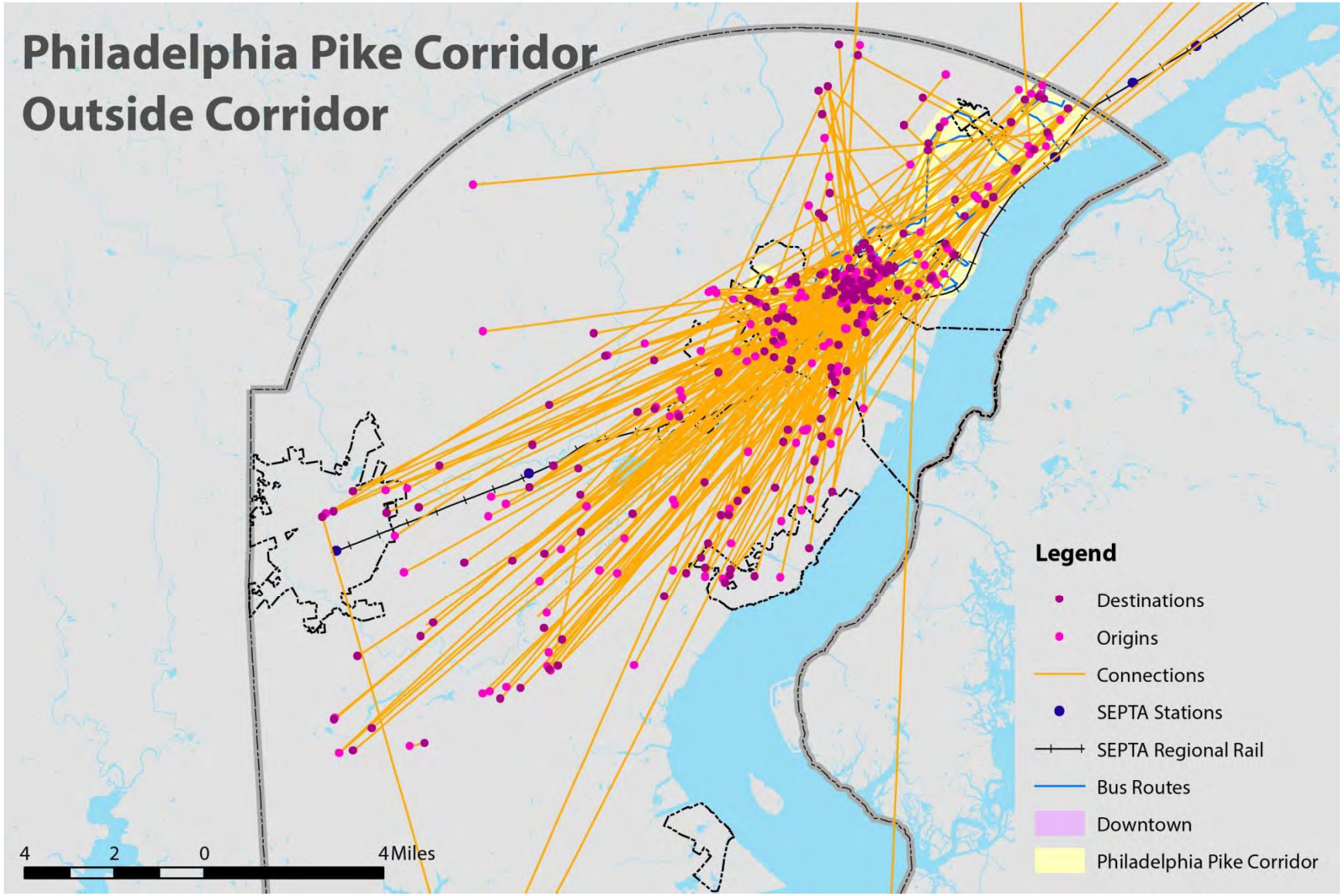


Figure 6-4: Trips outside the Philadelphia Pike Corridor and Downtown area



6.2 Concord Pike

Figure 6-5: Boarding and alighting data collected by DTC for the Concord Pike Corridor

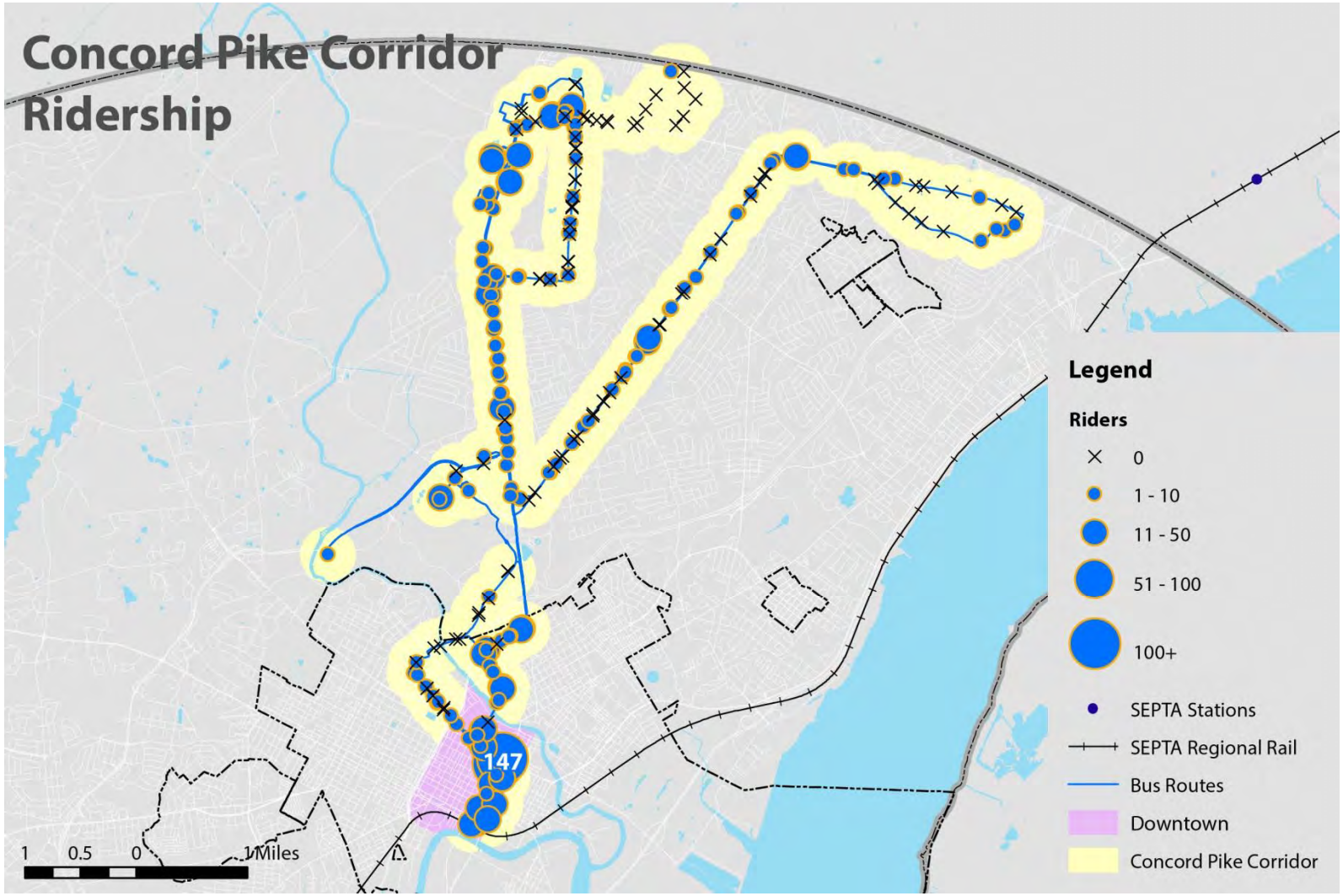


Figure 6-6: Trips within the Concord Pike Corridor

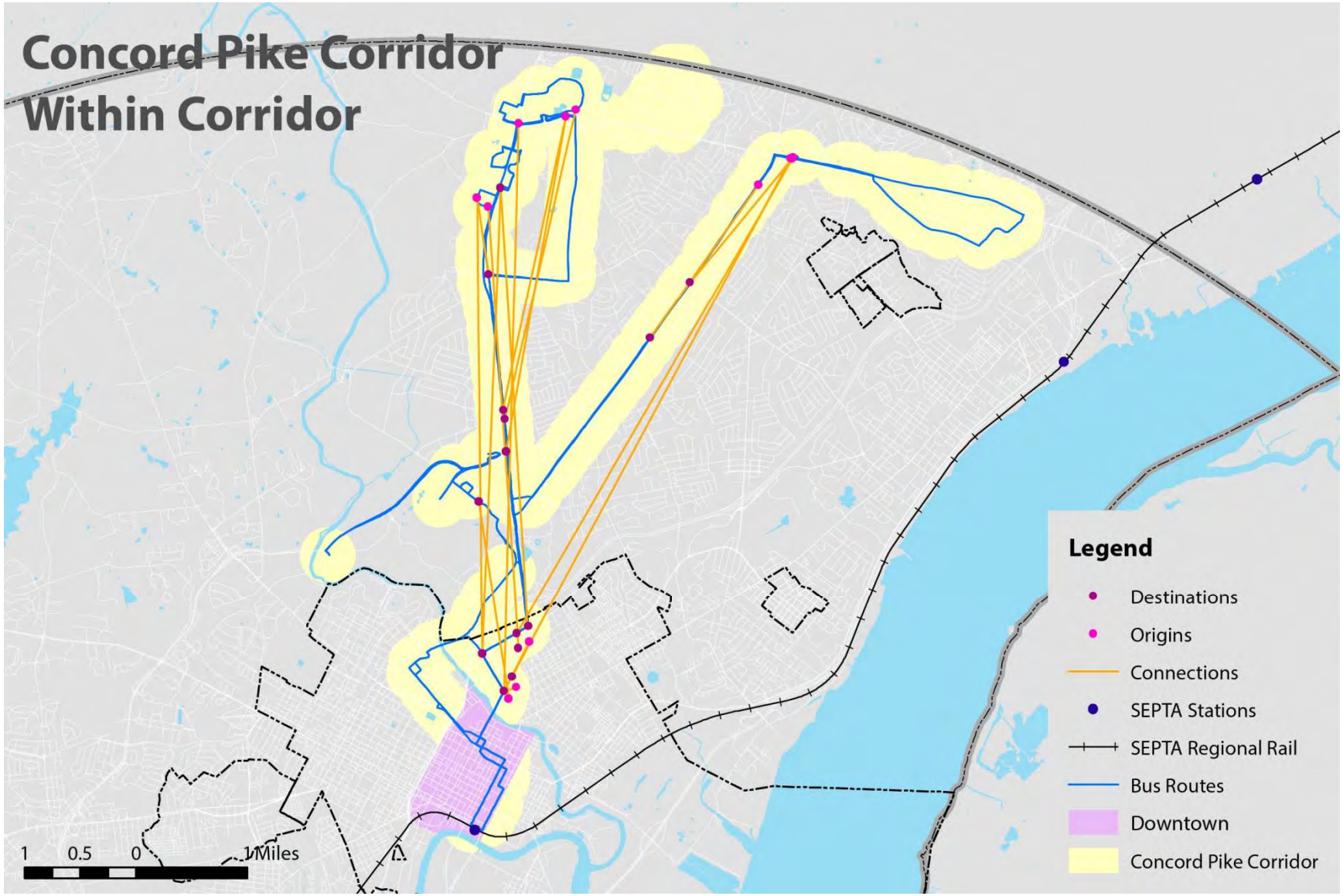


Figure 6-7: Trips from the Concord Pike Corridor to the Downtown area

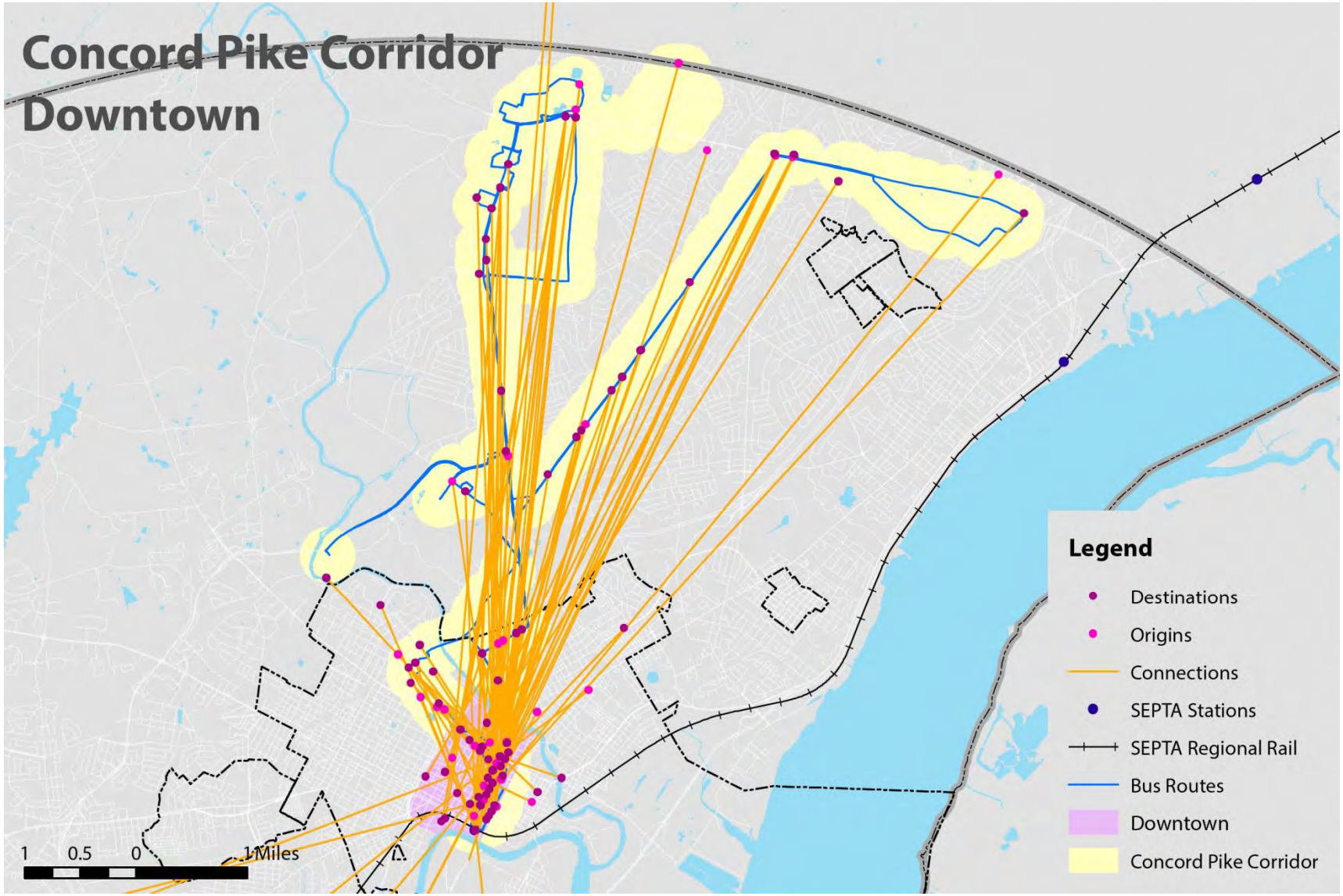
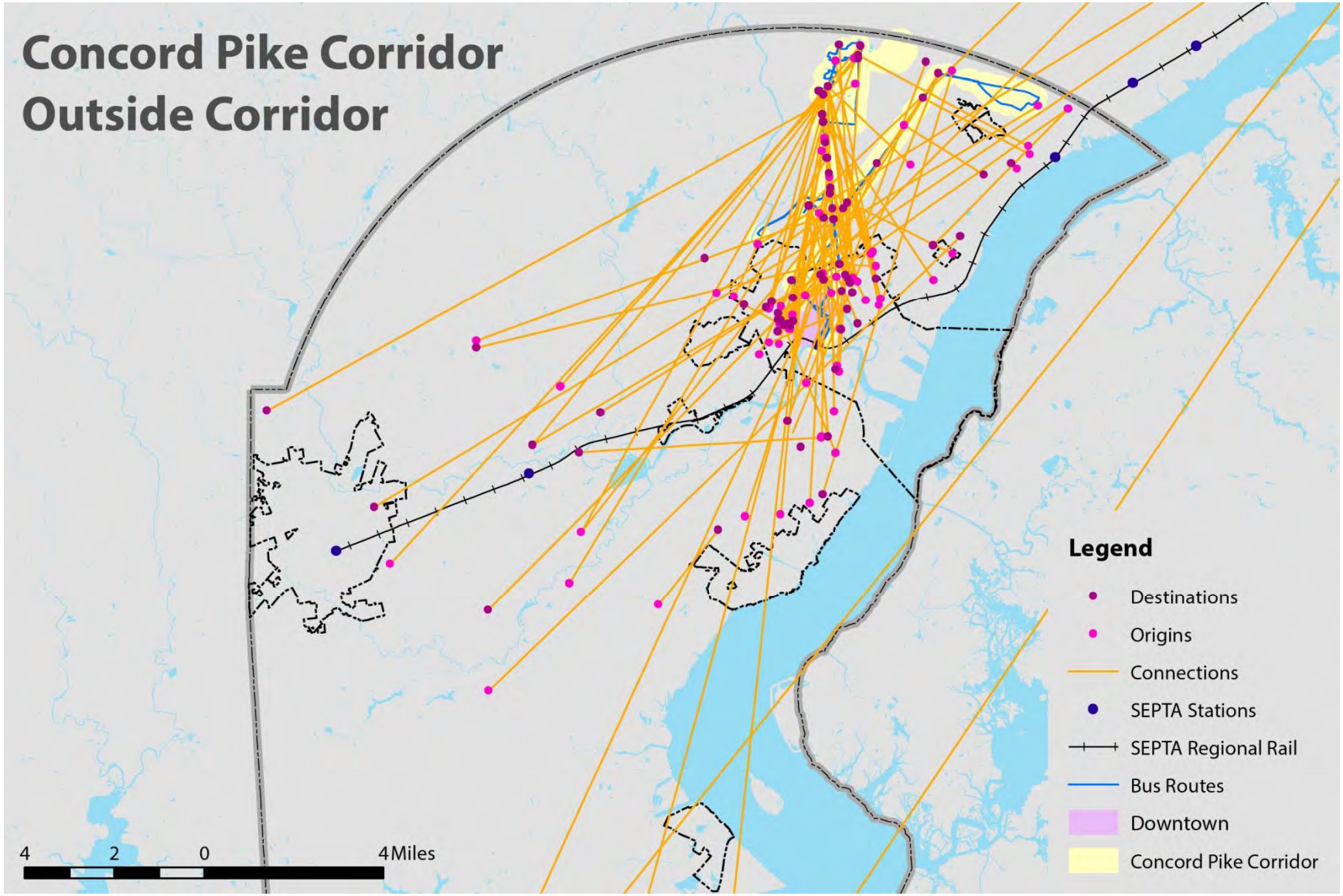


Figure 6-8: Trips outside the Concord Pike Corridor and Downtown area



6.3 Pennsylvania Avenue and Lancaster Pike

Figure 6-9: Boarding and alighting data collected by DTC for the Pennsylvania Avenue / Lancaster Pike Corridor

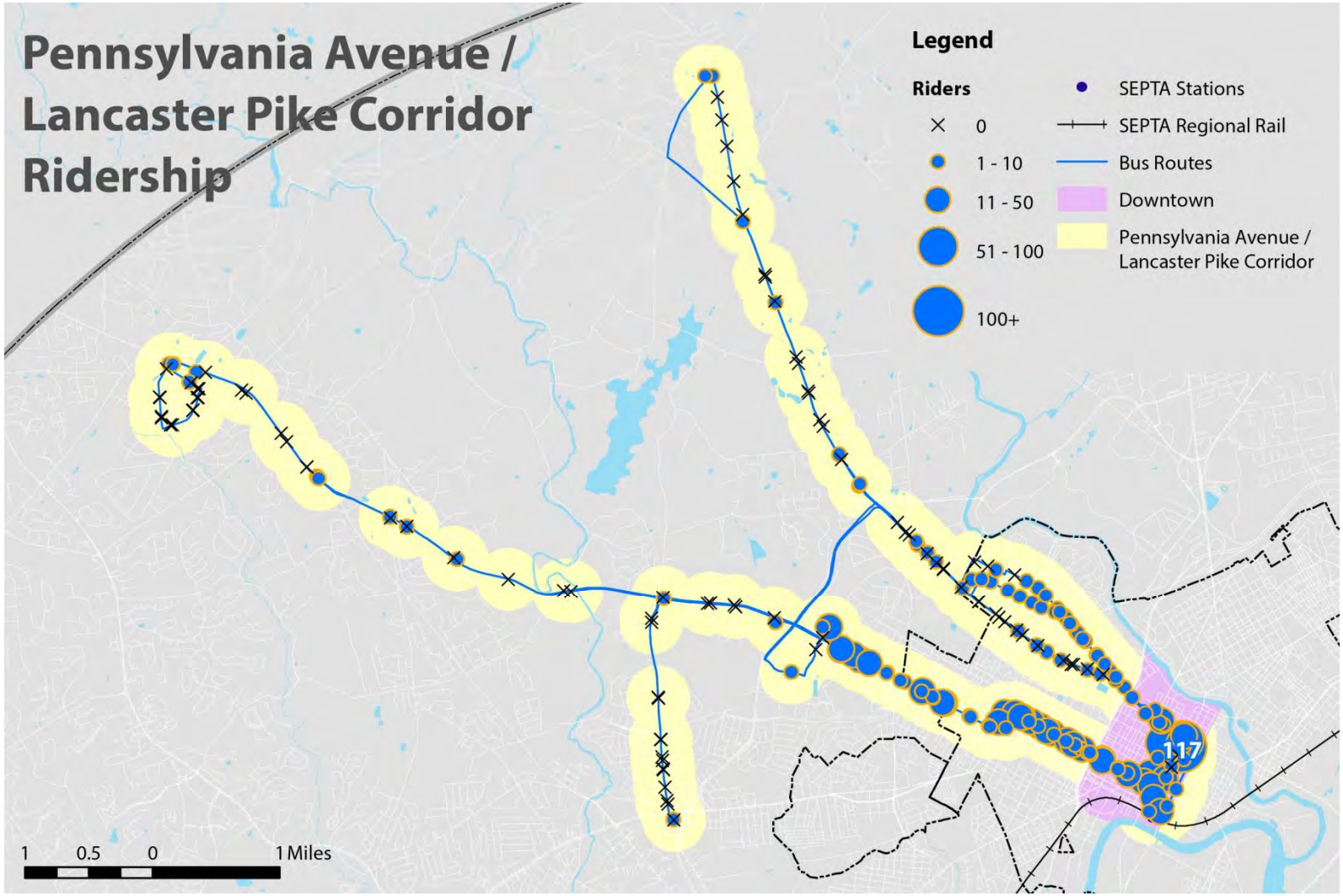


Figure 6-10: Trips within the Pennsylvania Avenue / Lancaster Pike Corridor

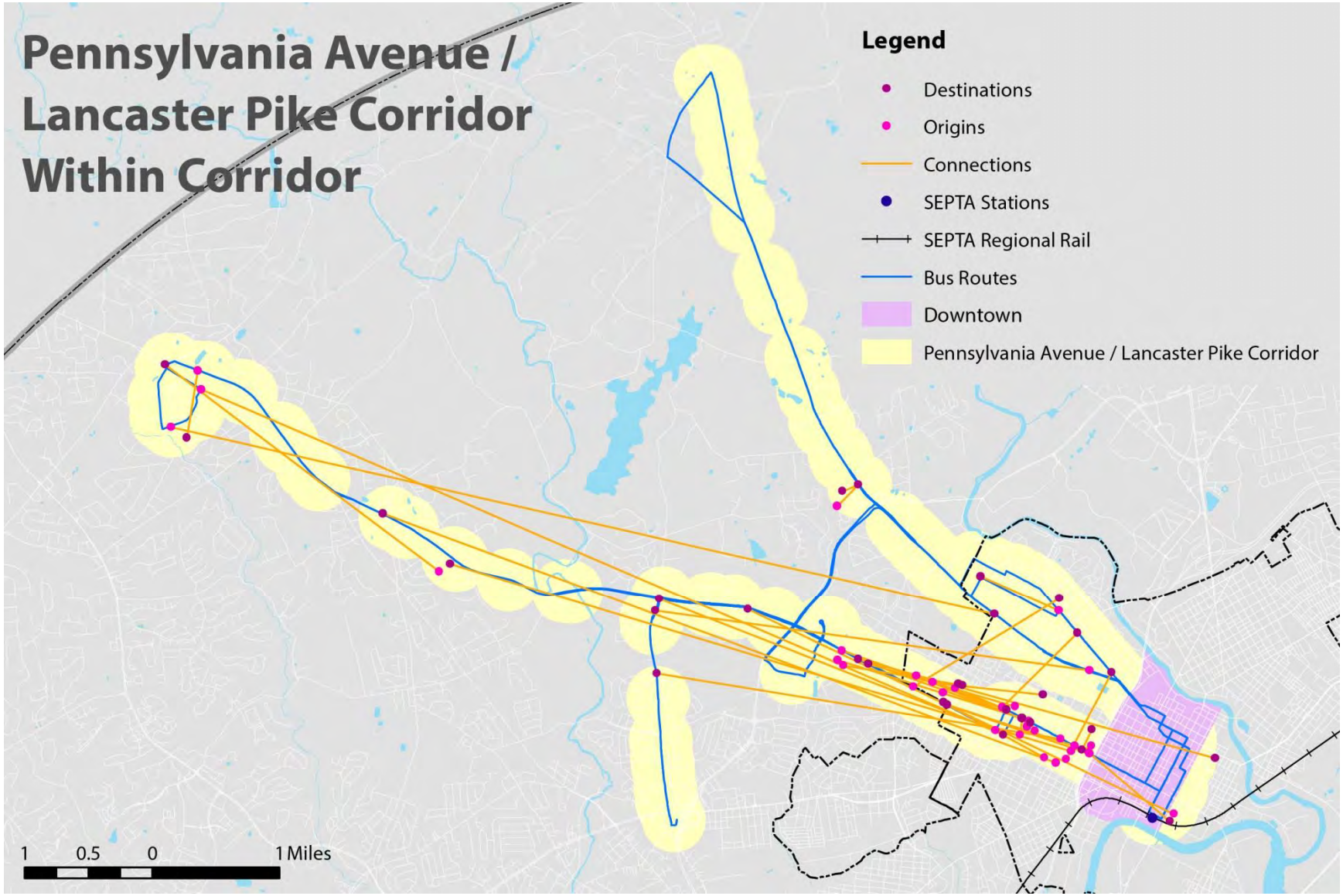


Figure 6-11: Trips from the Pennsylvania Avenue / Lancaster Pike Corridor to the Downtown area

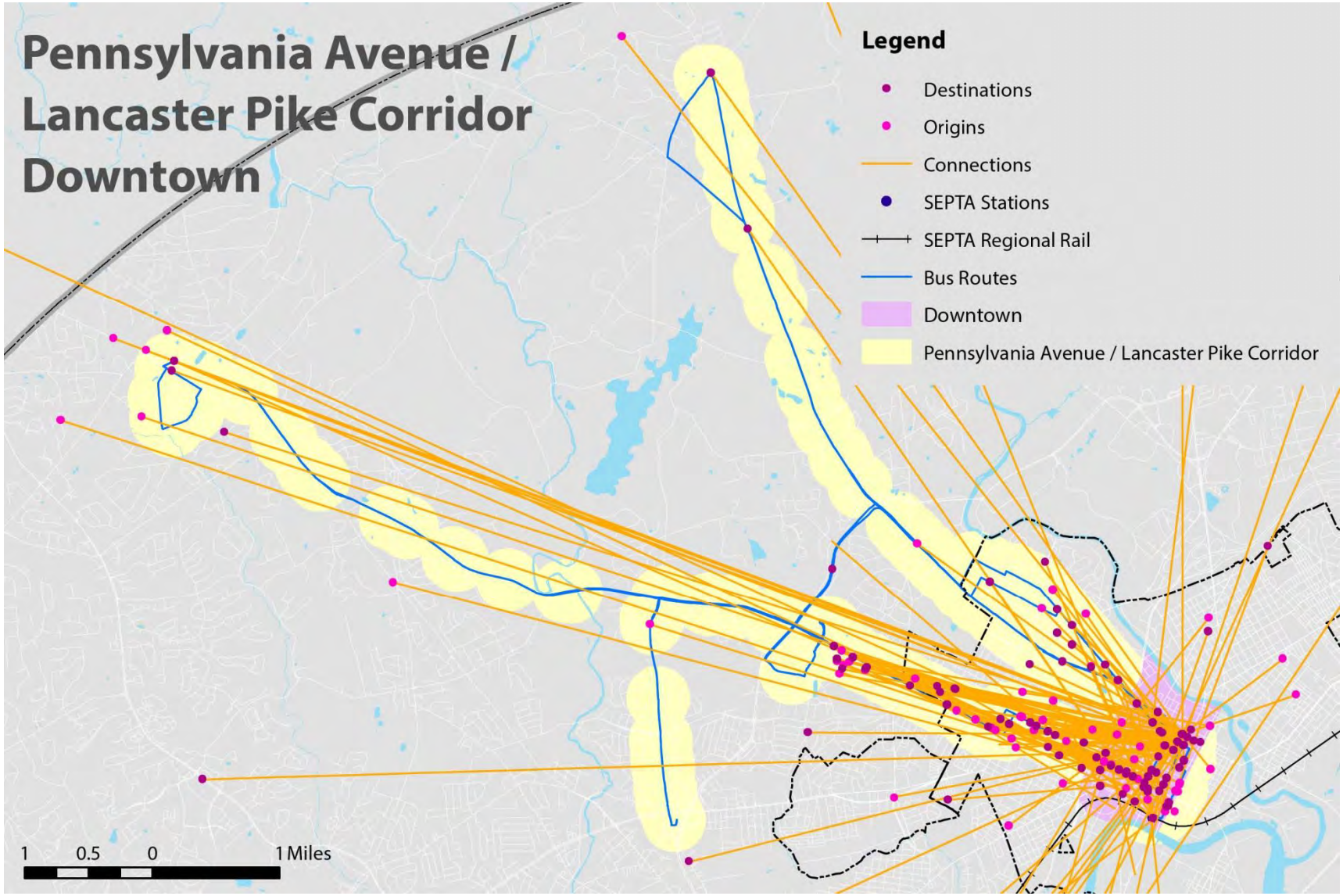
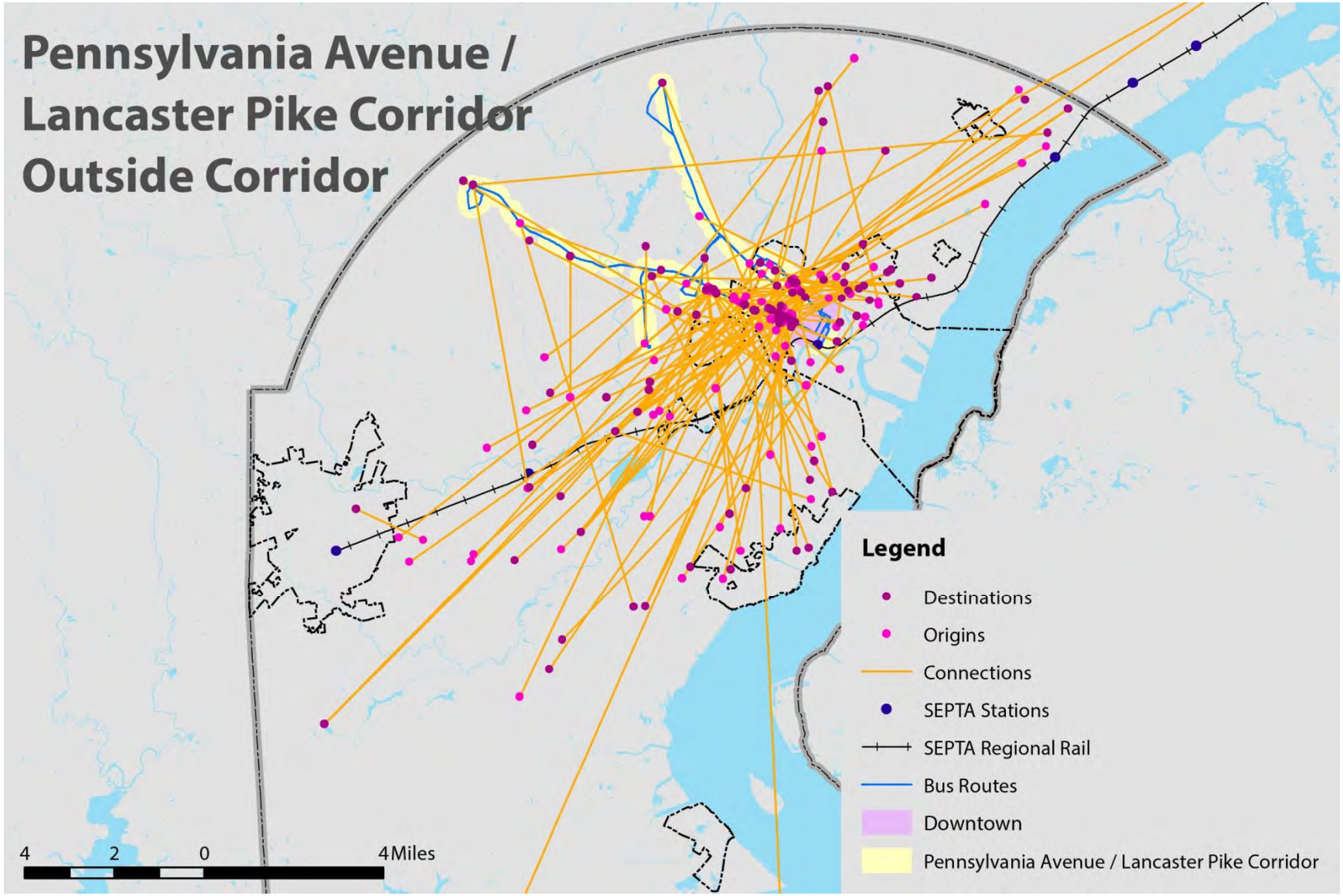


Figure 6-12: Trips outside the Pennsylvania Avenue / Lancaster Pike Corridor and Downtown area



6.4 Kirkwood Highway

Figure 6-13: Boarding and alighting data collected by DTC for the Kirkwood Highway Corridor

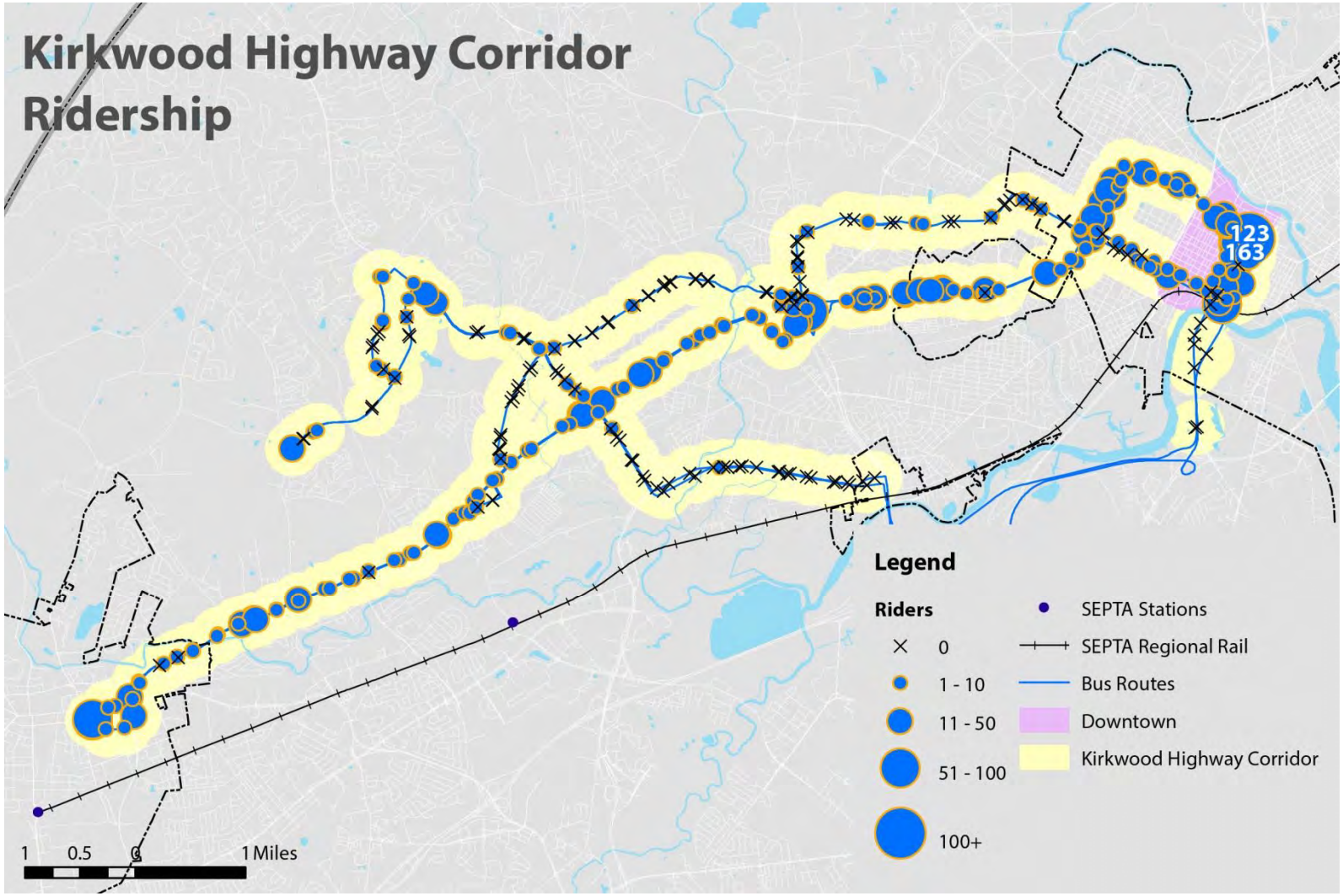


Figure 6-14: Trips within the Kirkwood Highway Corridor

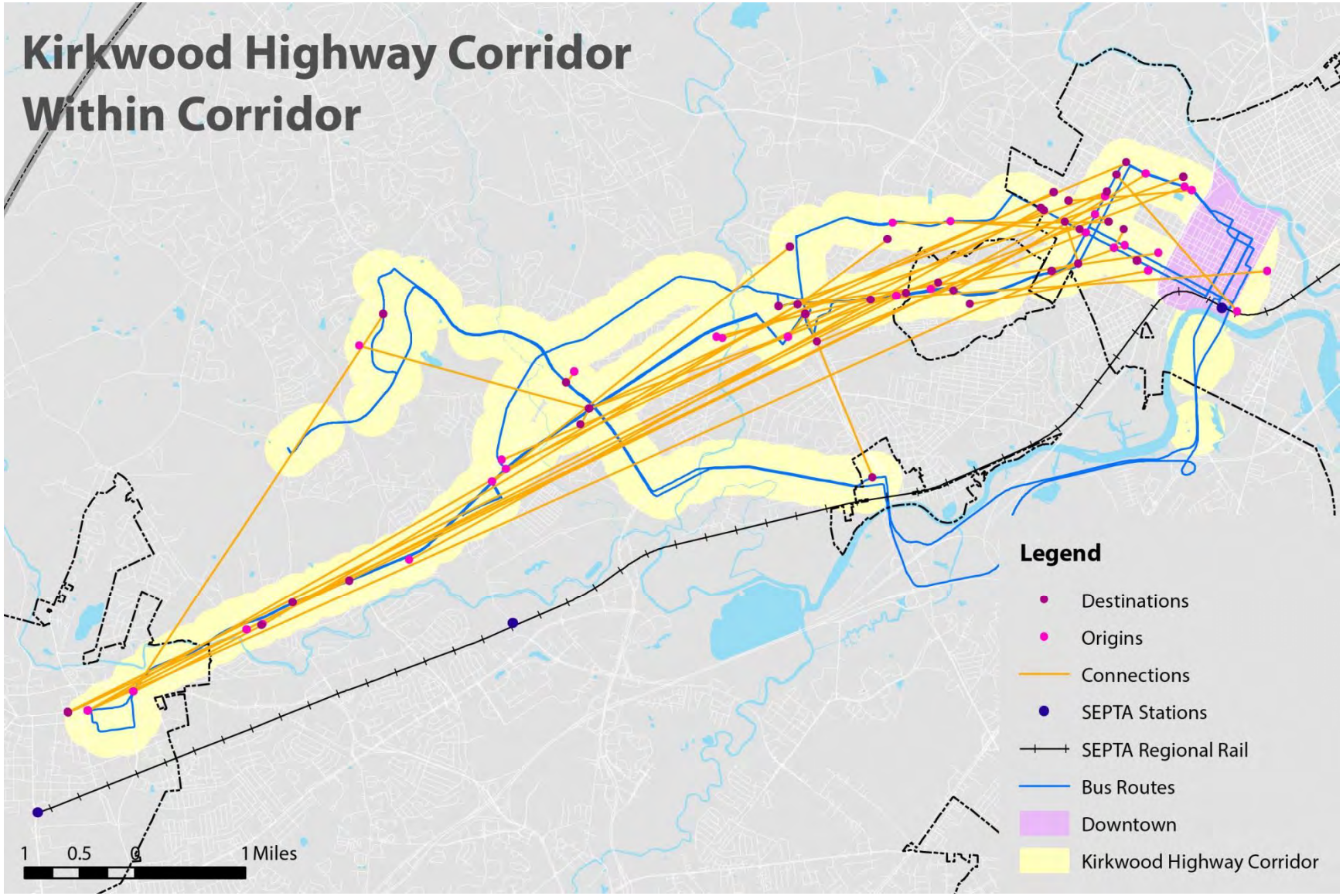


Figure 6-15: Trips from the Kirkwood Highway Corridor to the Downtown area

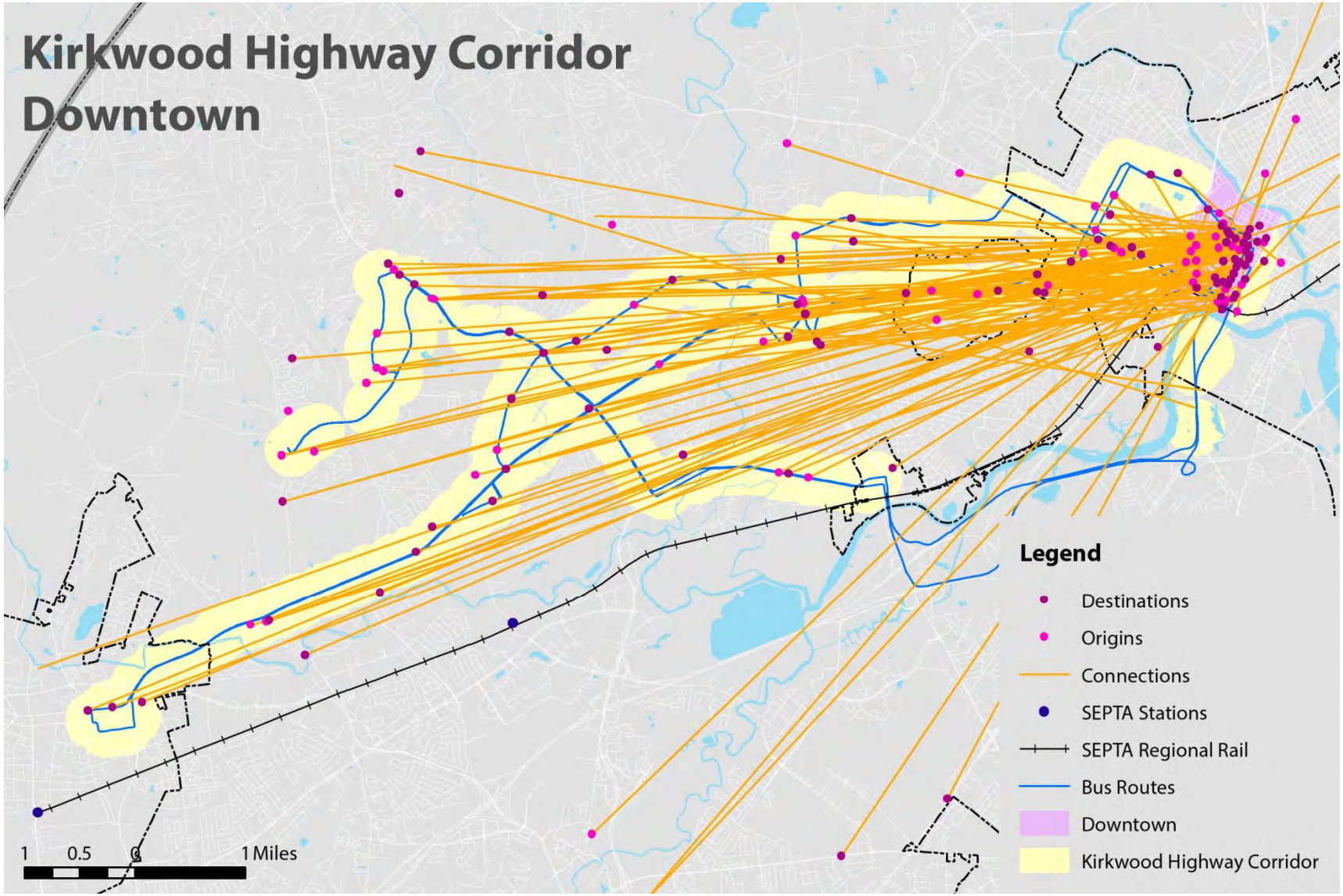
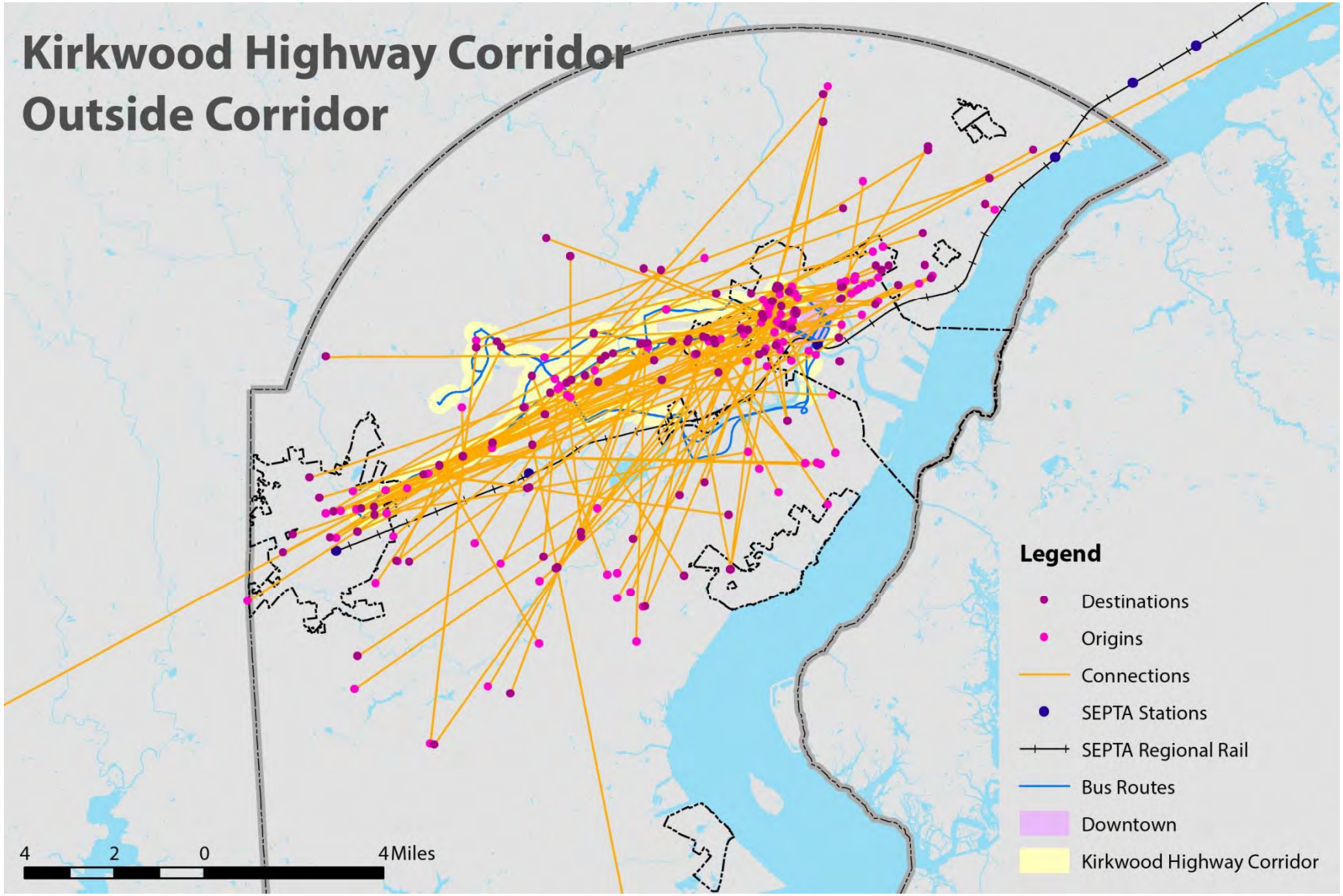


Figure 6-16: Trips outside the Kirkwood Highway Corridor and Downtown area



6.5 Maryland Avenue

Figure 6-17: Boarding and alighting data collected by DTC for the Maryland Avenue Corridor

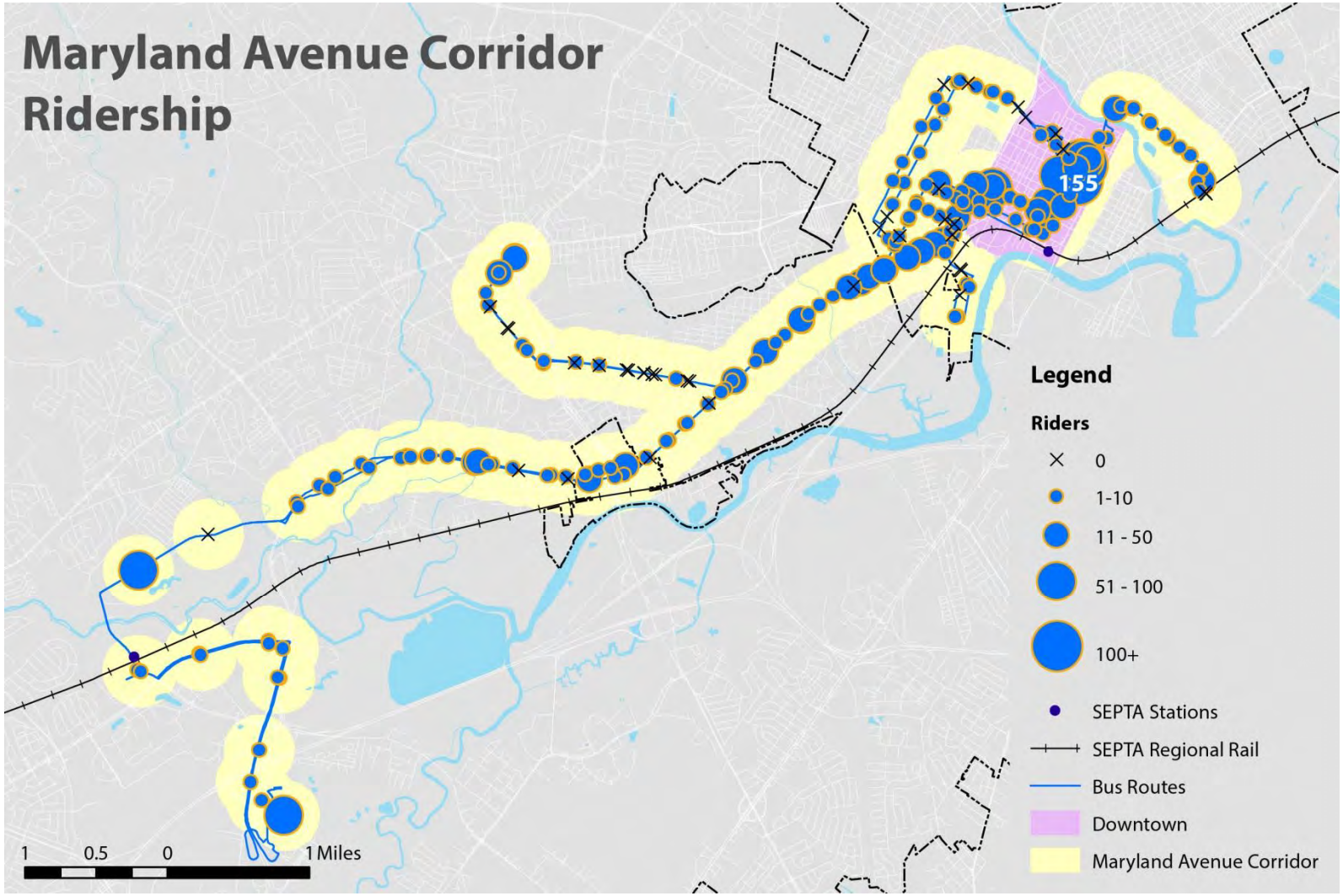


Figure 6-18: Trips within the Maryland Avenue Corridor

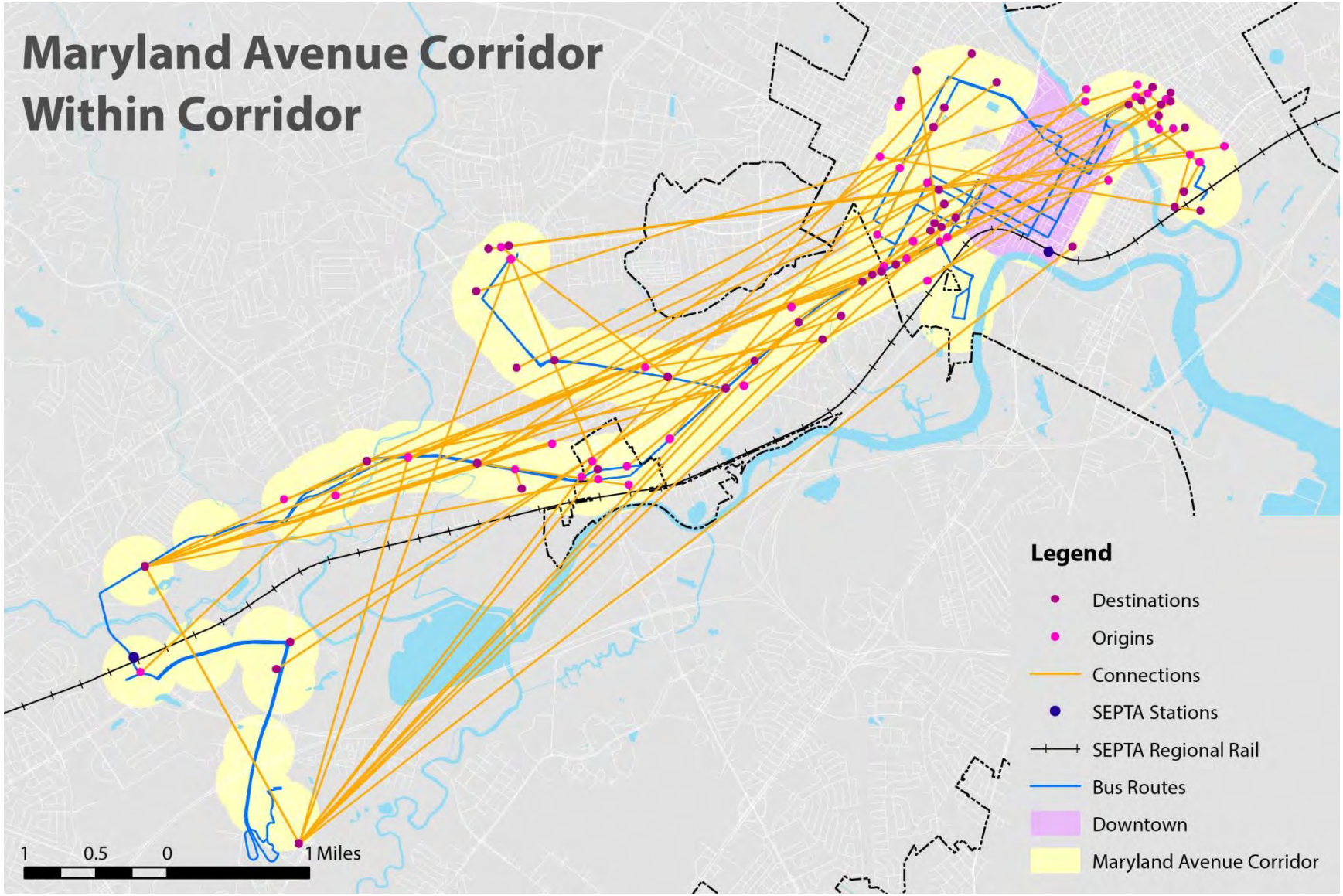


Figure 6-19: Trips from the Maryland Avenue Corridor to the Downtown area

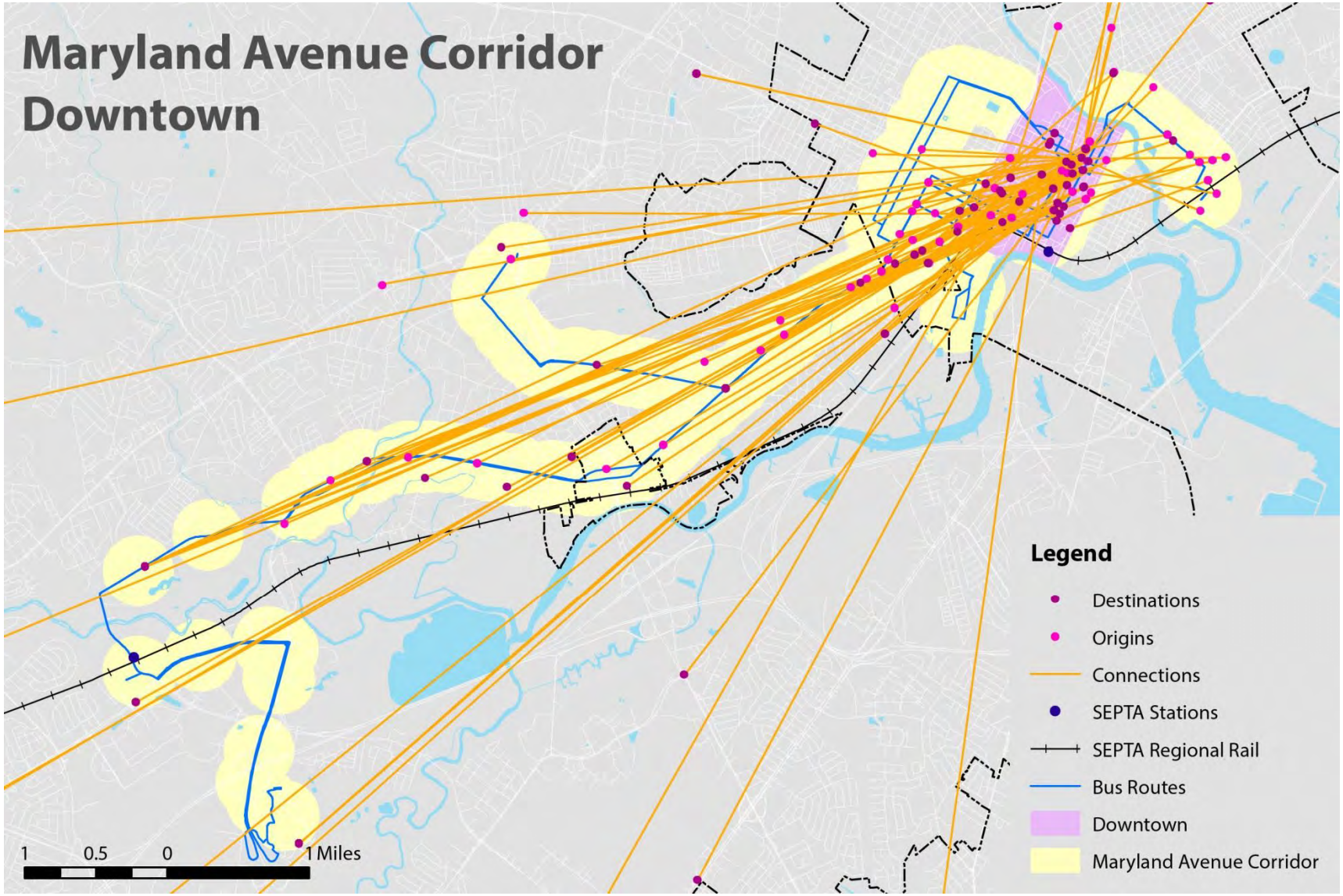
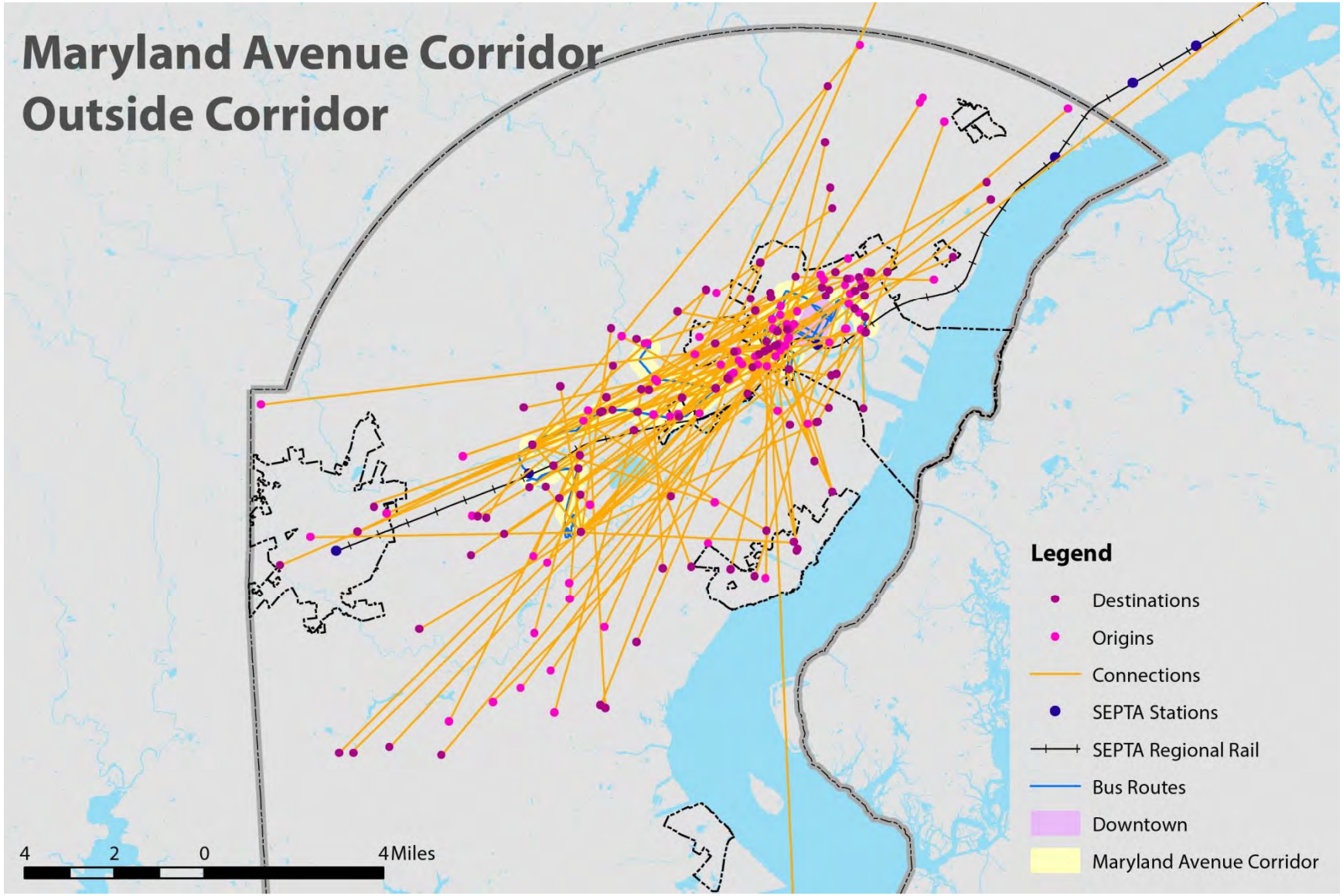


Figure 6-20: Trips outside the Maryland Avenue Corridor and Downtown area



6.6 Market, Dupont and New Castle

Figure 6-21: Boarding and alighting data collected by DTC for the Market, Dupont and New Castle Corridor

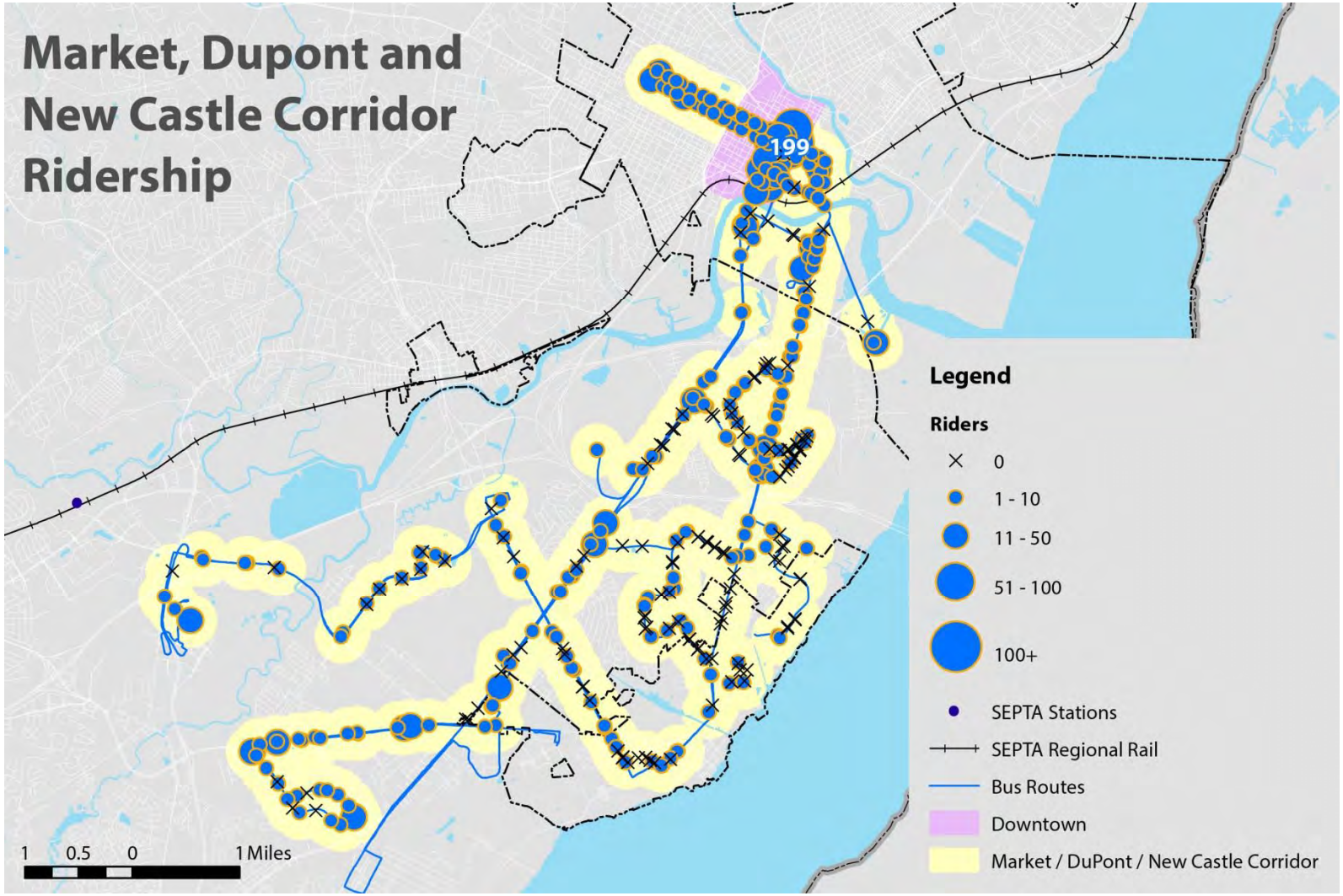


Figure 6-22: Trips within the Market, Dupont and New Castle Corridor

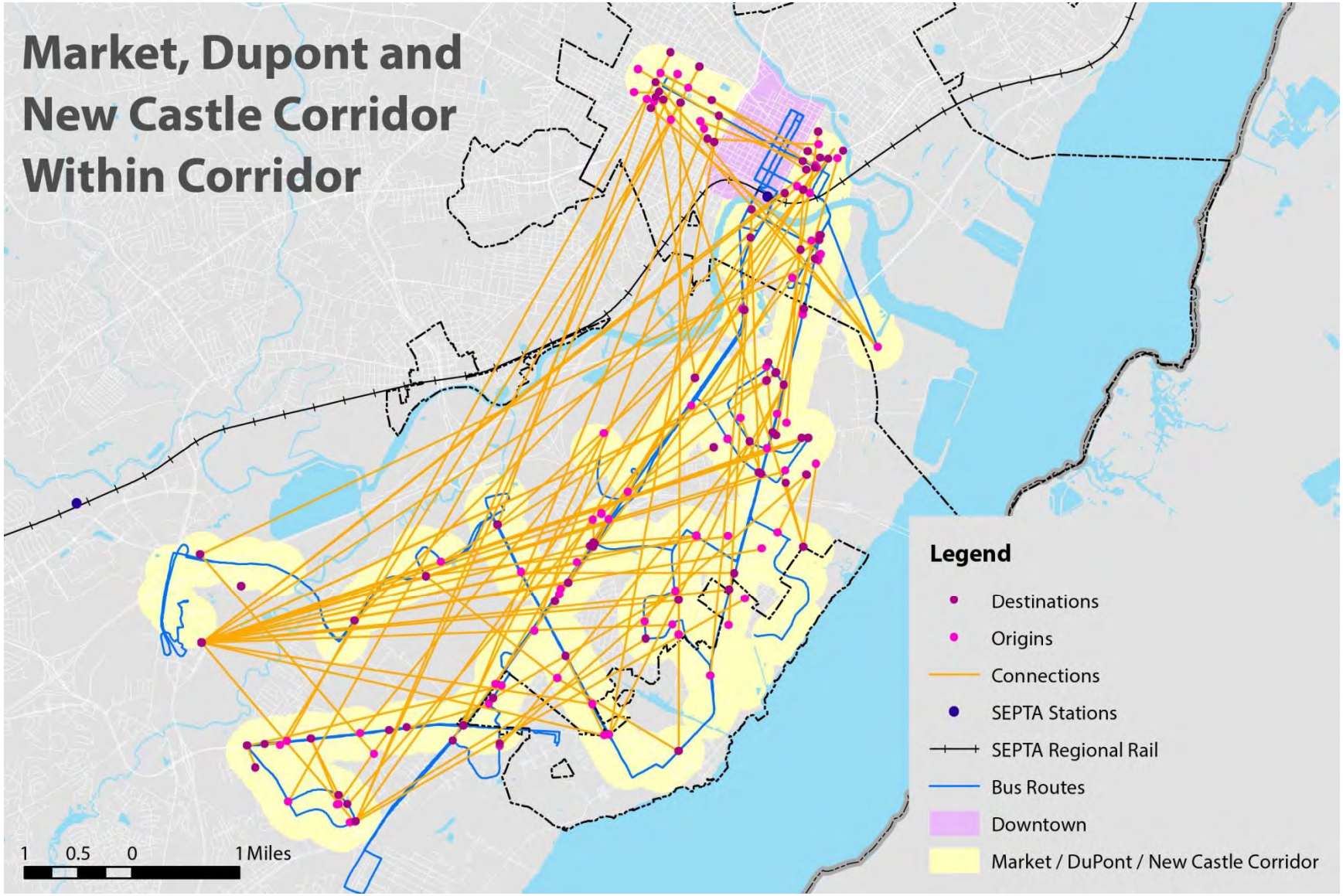


Figure 6-23: Trips from the Market, Dupont and New Castle Corridor to the Downtown area

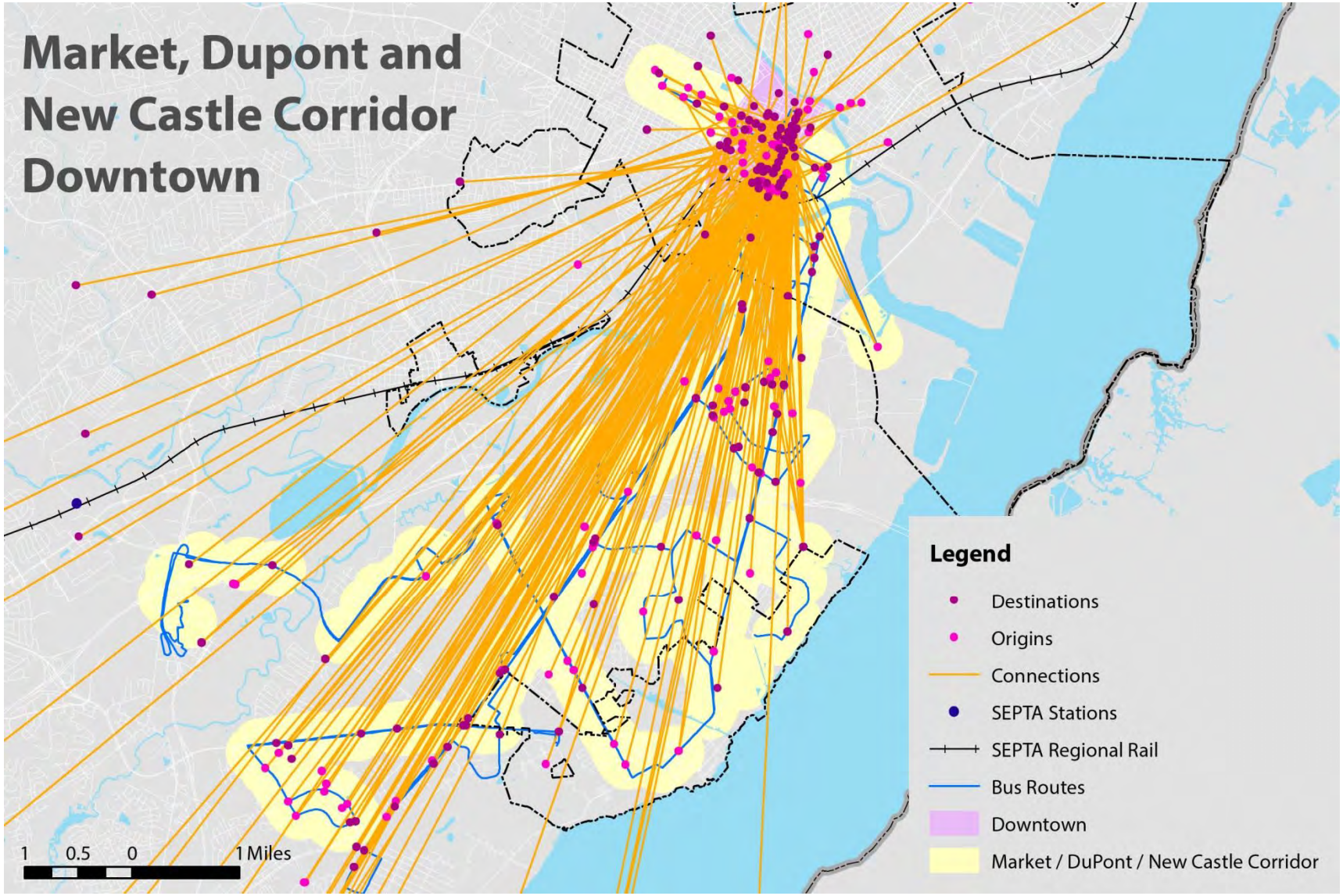
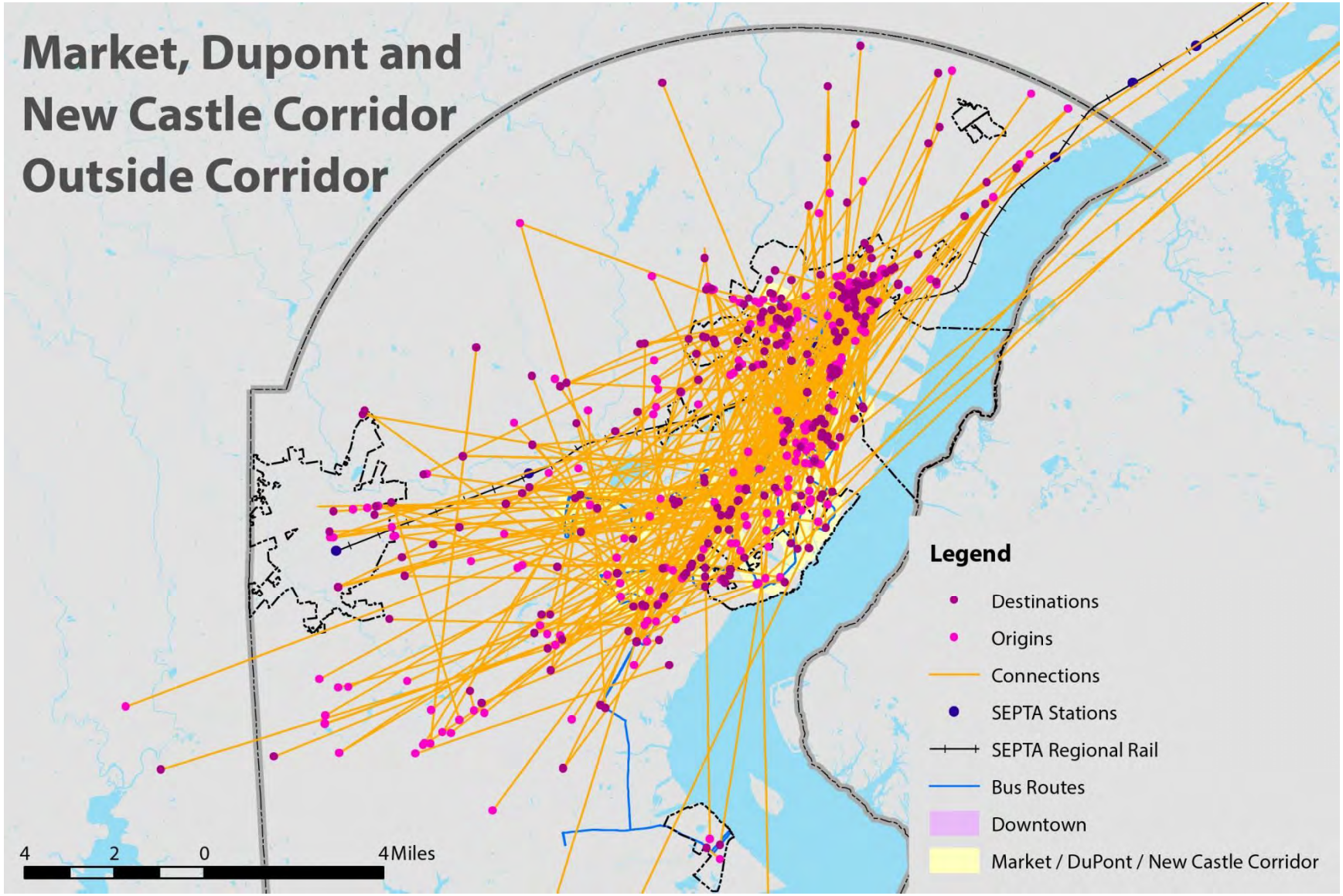


Figure 6-24: Trips outside the Market, Dupont and New Castle Corridor and Downtown area



6.7 Christiana Mall / Newark

Figure 6-25: Boarding and alighting data collected by DTC for the Christiana Mall / Newark Corridor

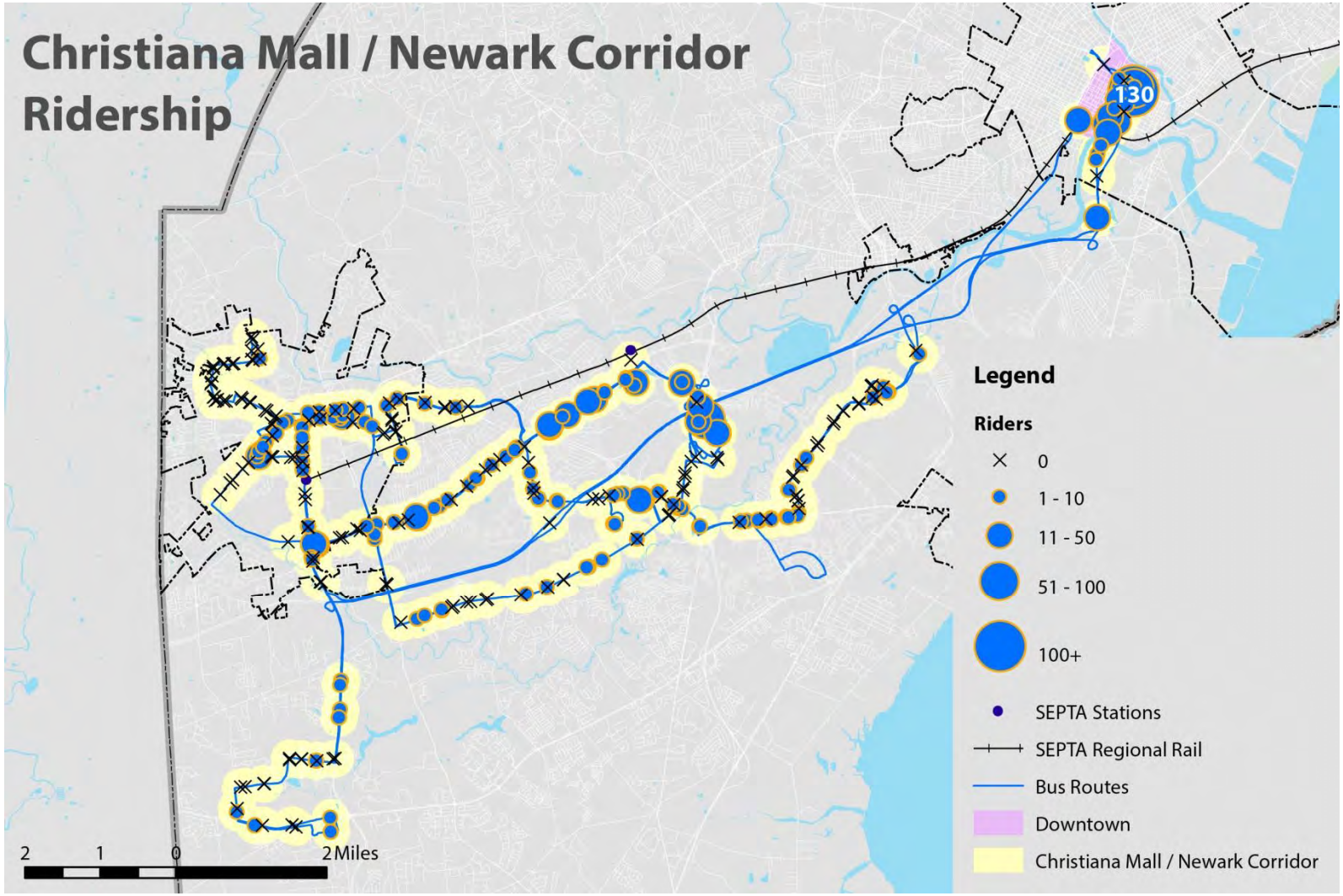


Figure 6-26: Trips within the Christiana Mall / Newark Corridor

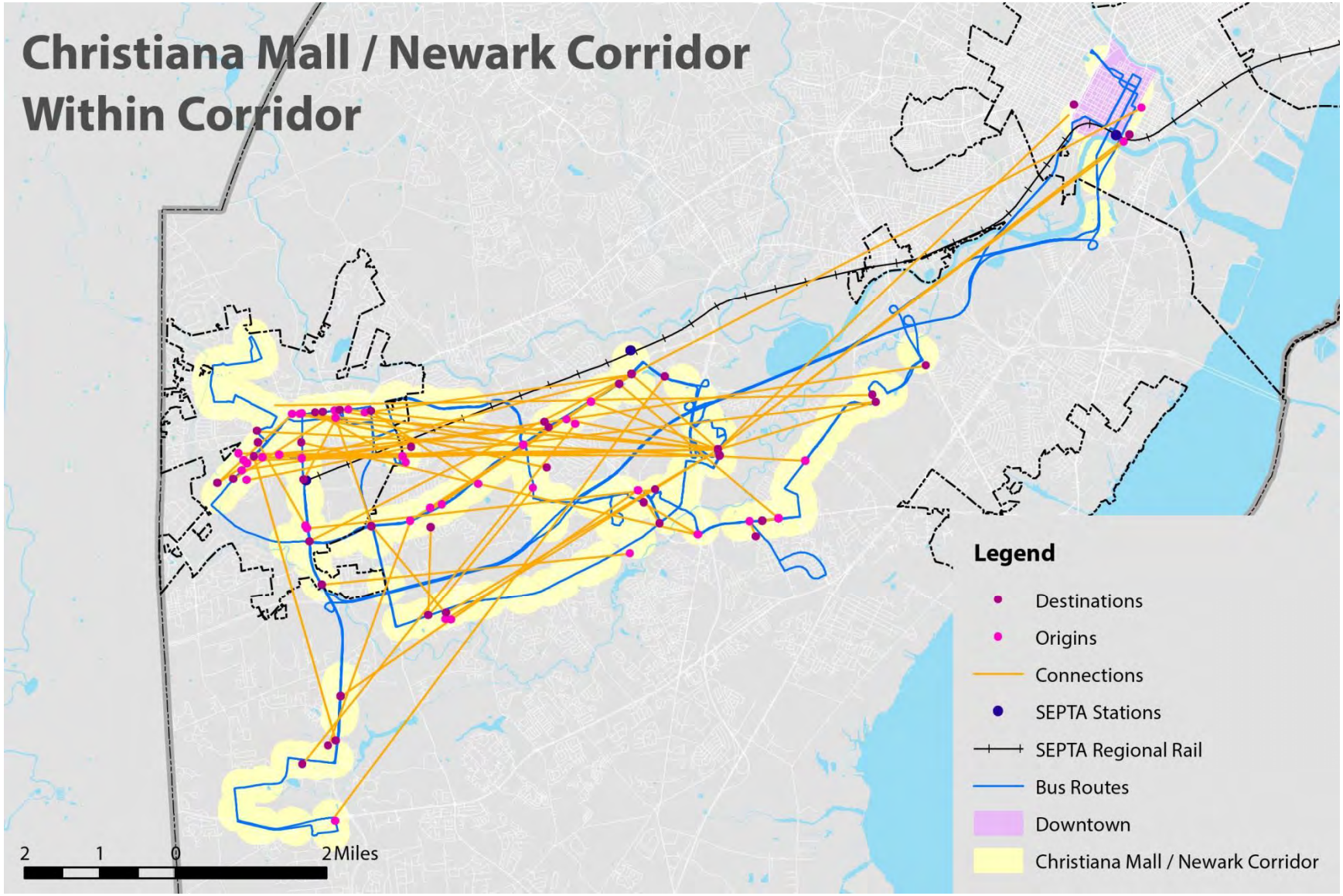


Figure 6-27: Trips from the Christiana Mall / Newark Corridor to the Downtown area

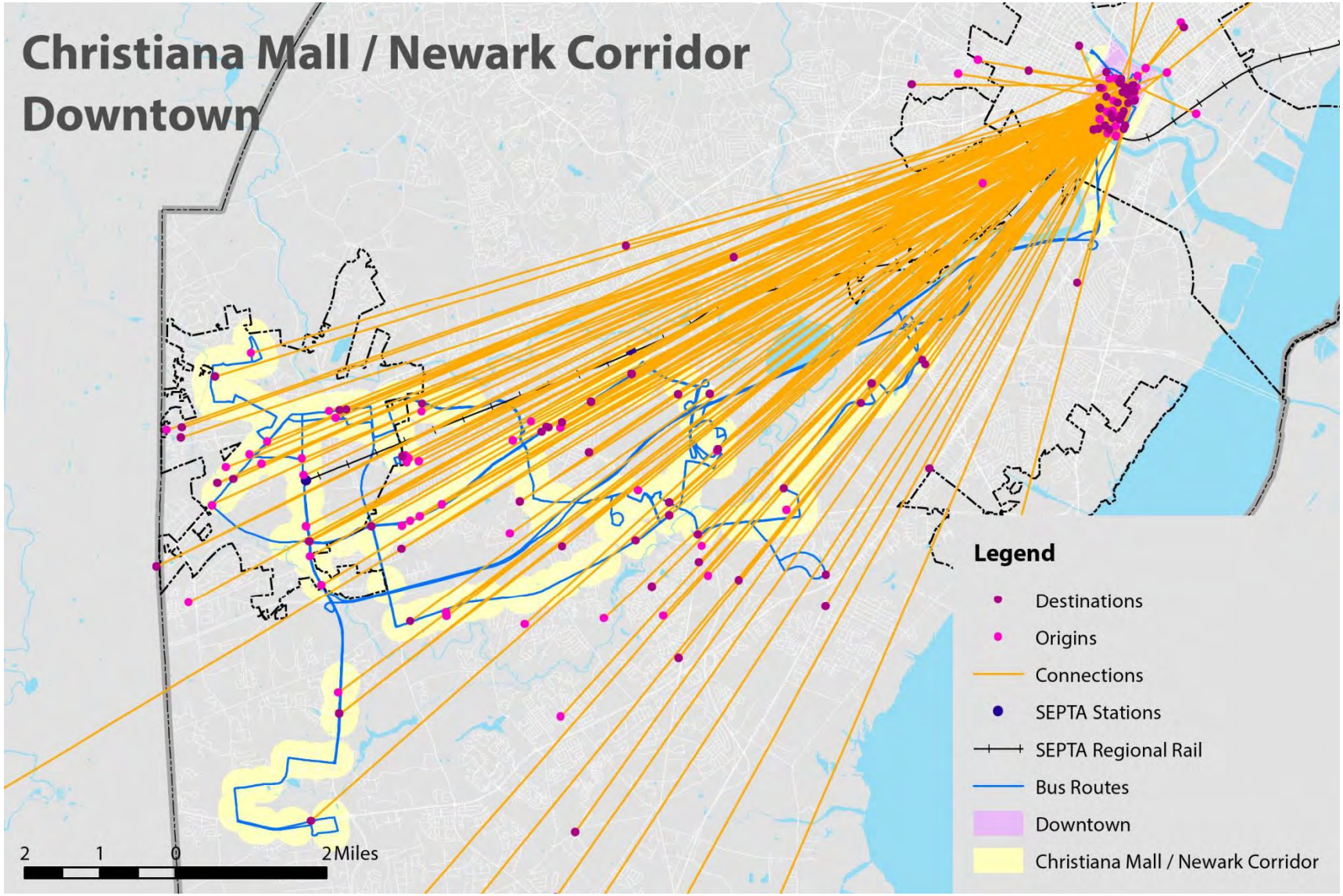
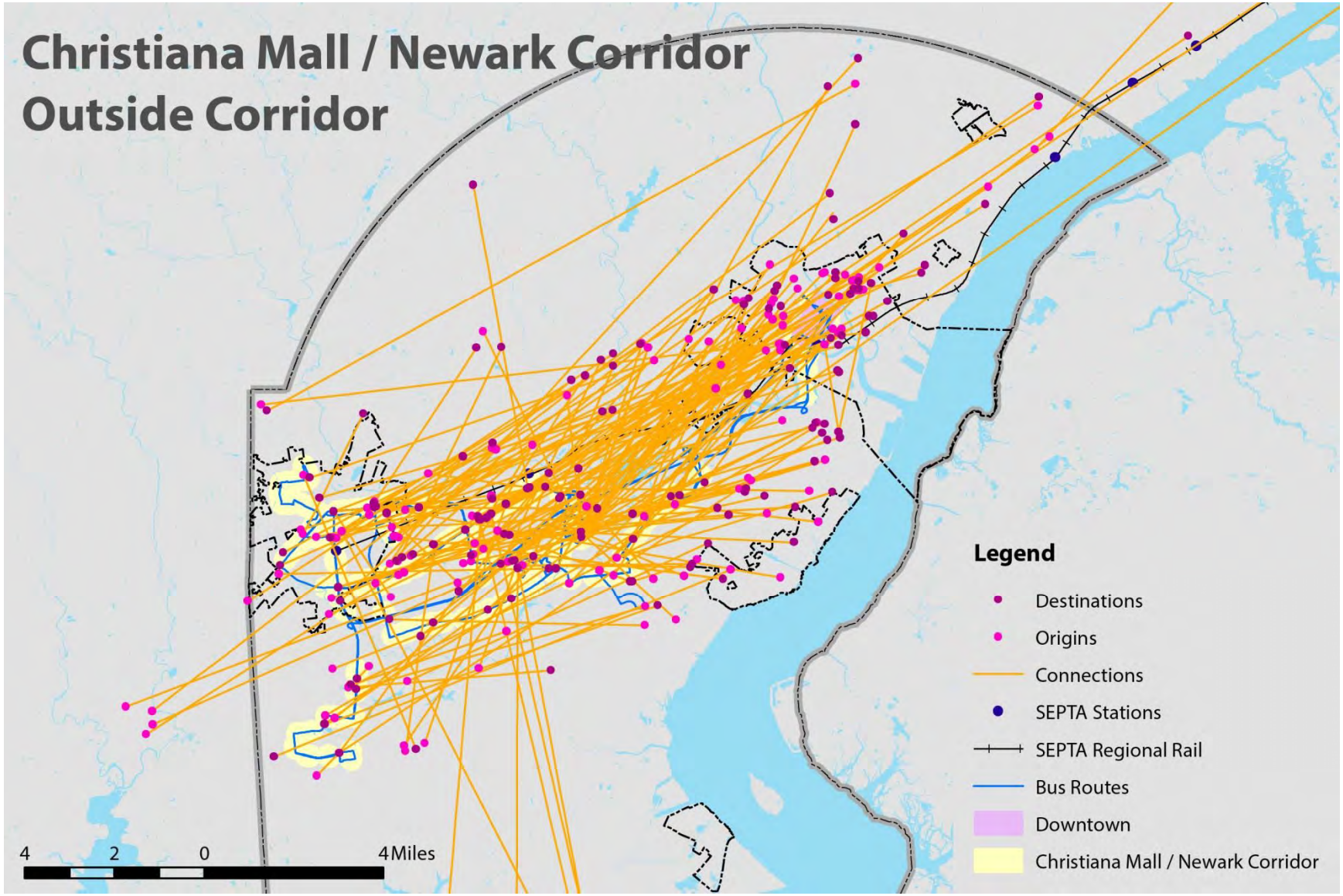


Figure 6-28: Trips outside the Christiana Mall / Newark Corridor and Downtown area



6.8 Mid County

Figure 6-29: Boarding and alighting data collected by DTC for the Mid County Corridor

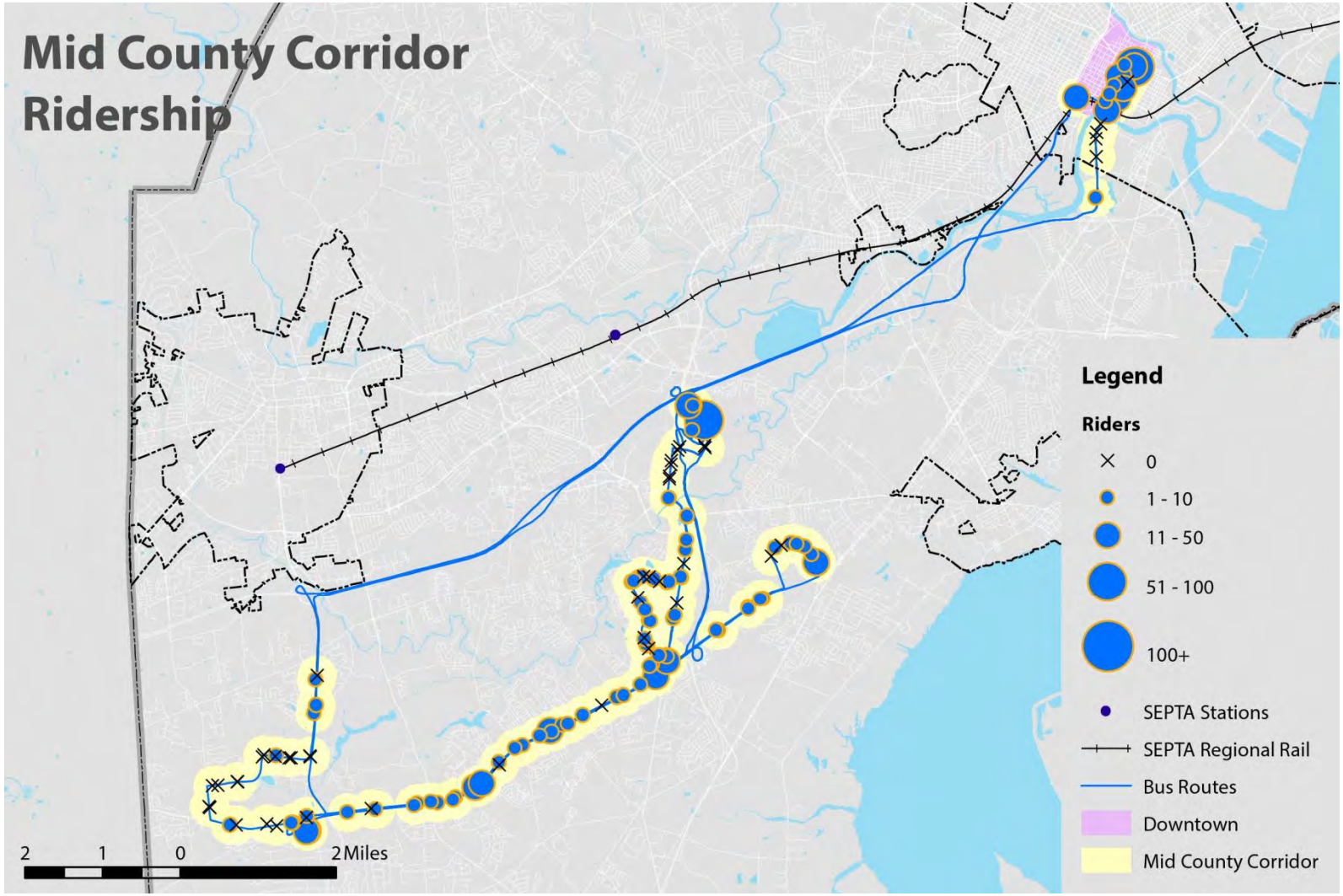


Figure 6-30: Trips within the Mid County Corridor

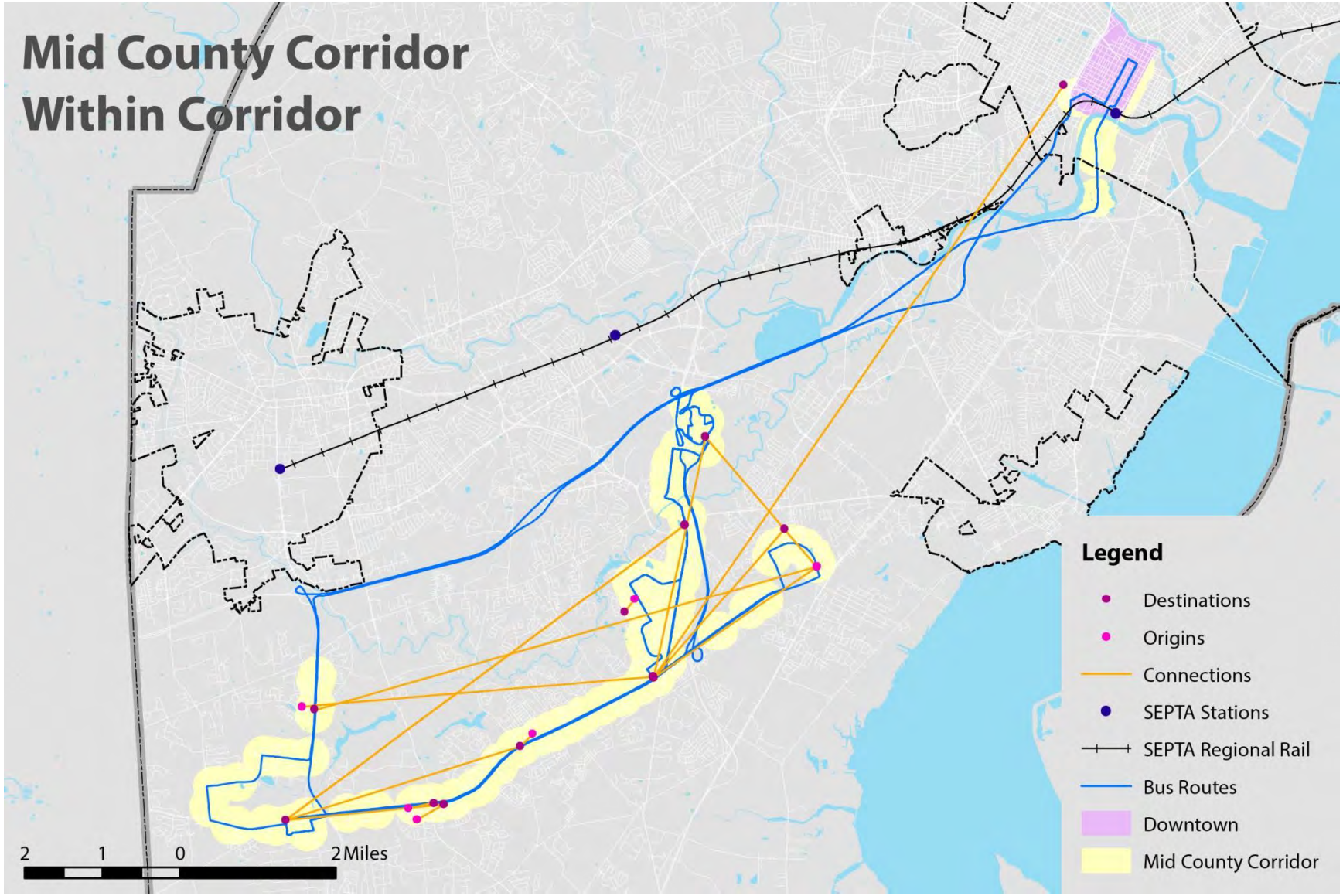


Figure 6-31: Trips from the Mid County Corridor to the Downtown area

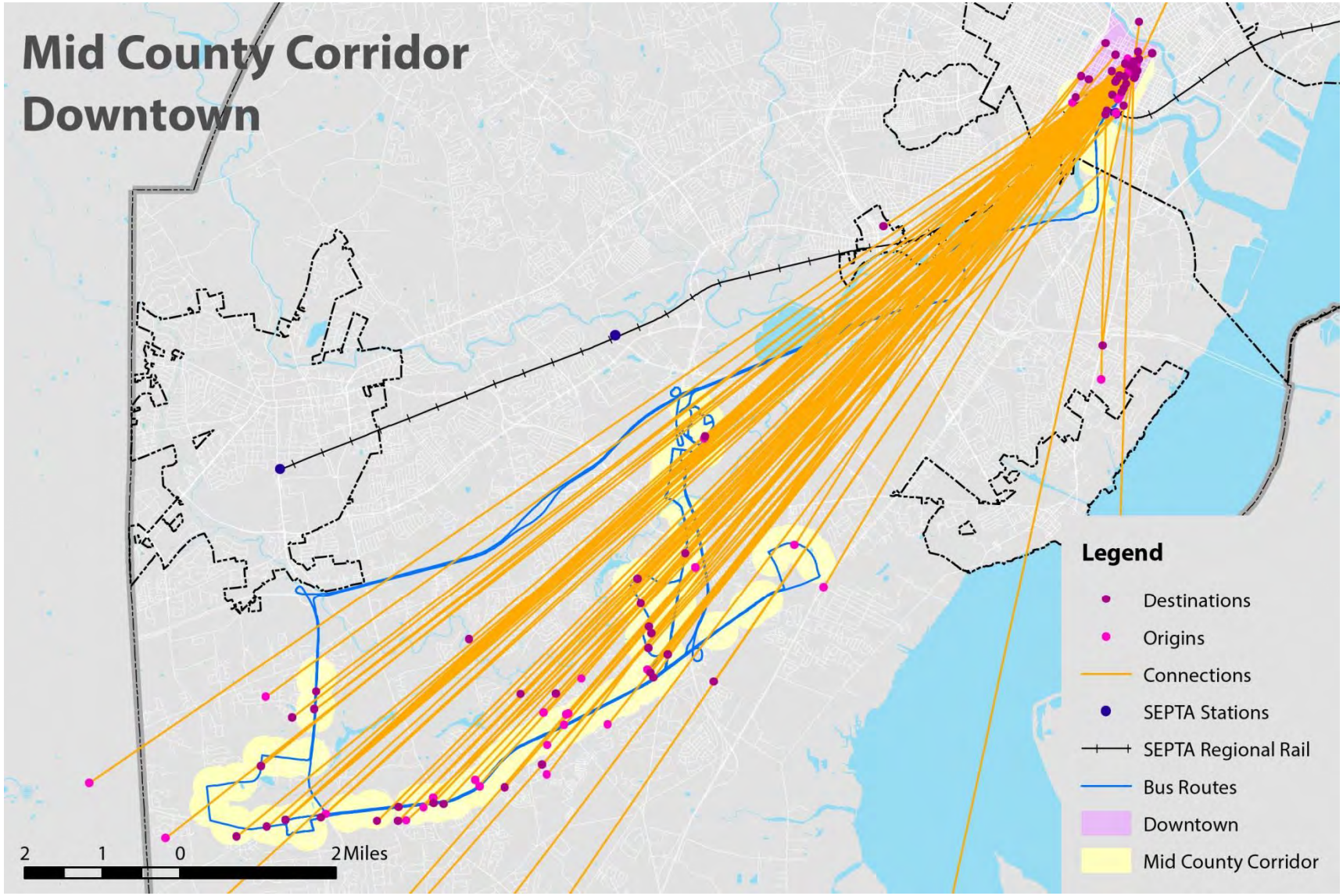
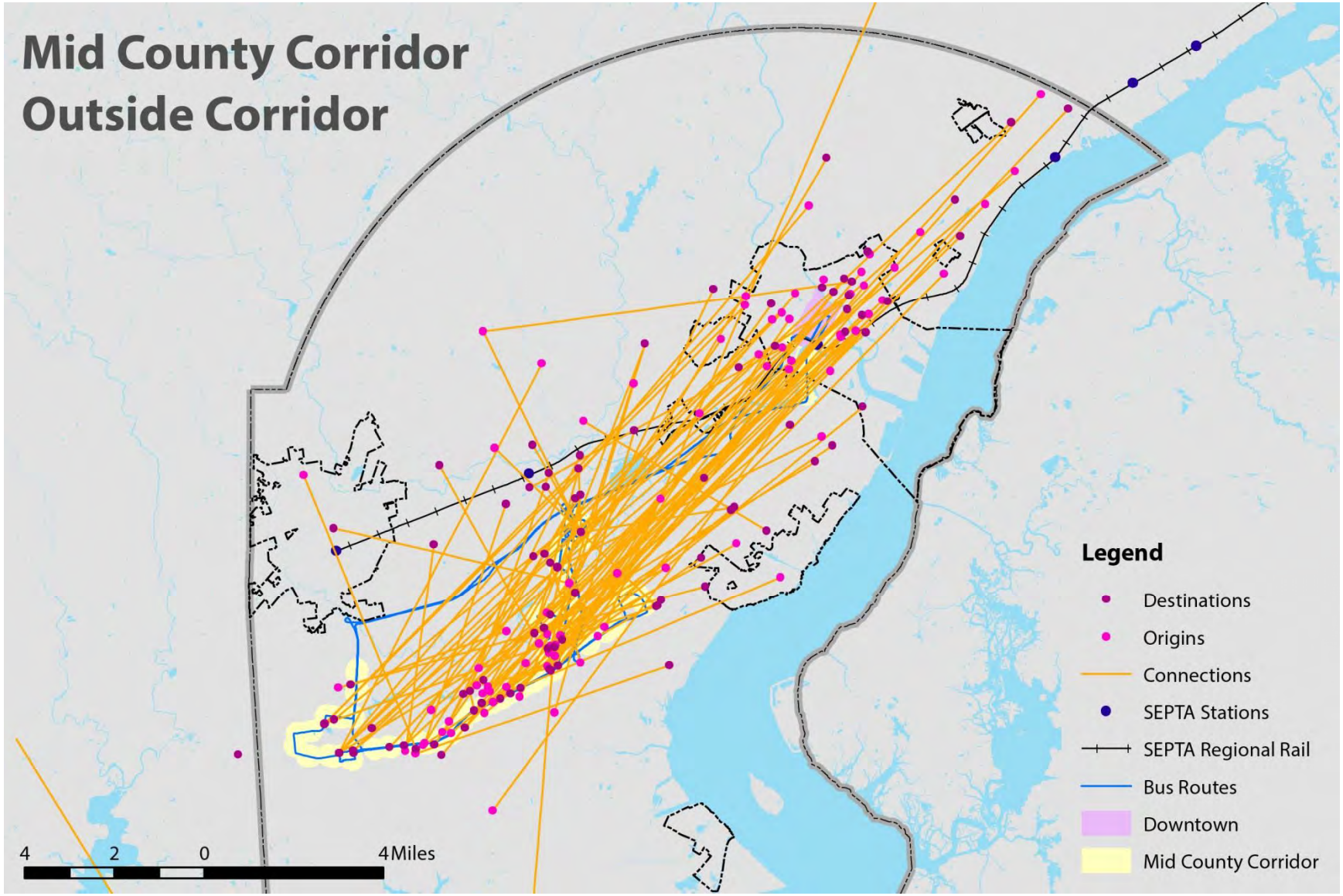


Figure 6-32: Trips outside the Mid County Corridor and Downtown area



6.9 Downstate

Figure 6-33: Trips within the Downstate Express Corridor

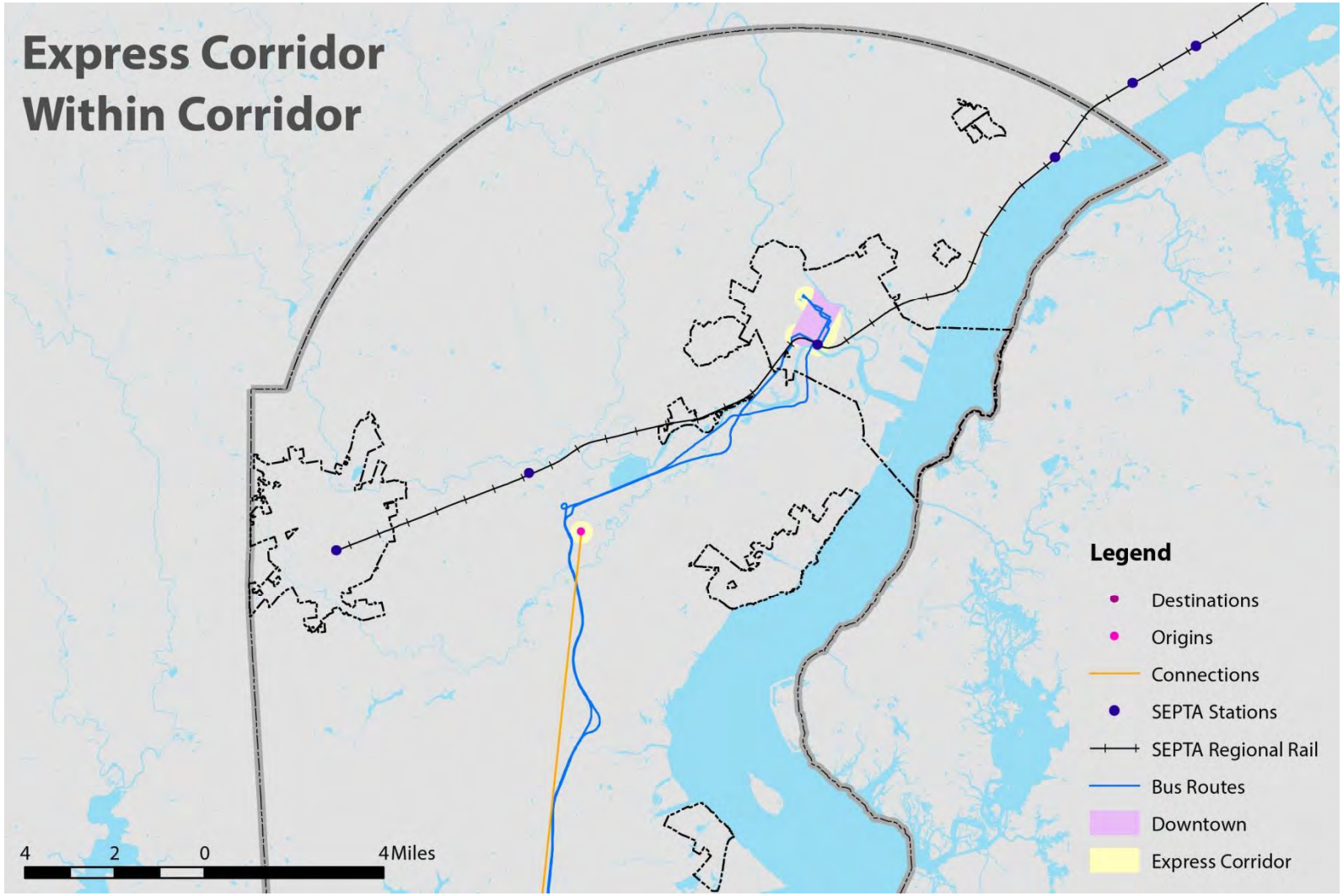


Figure 6-34: Trips from the Downstate Express Corridor to the Downtown area

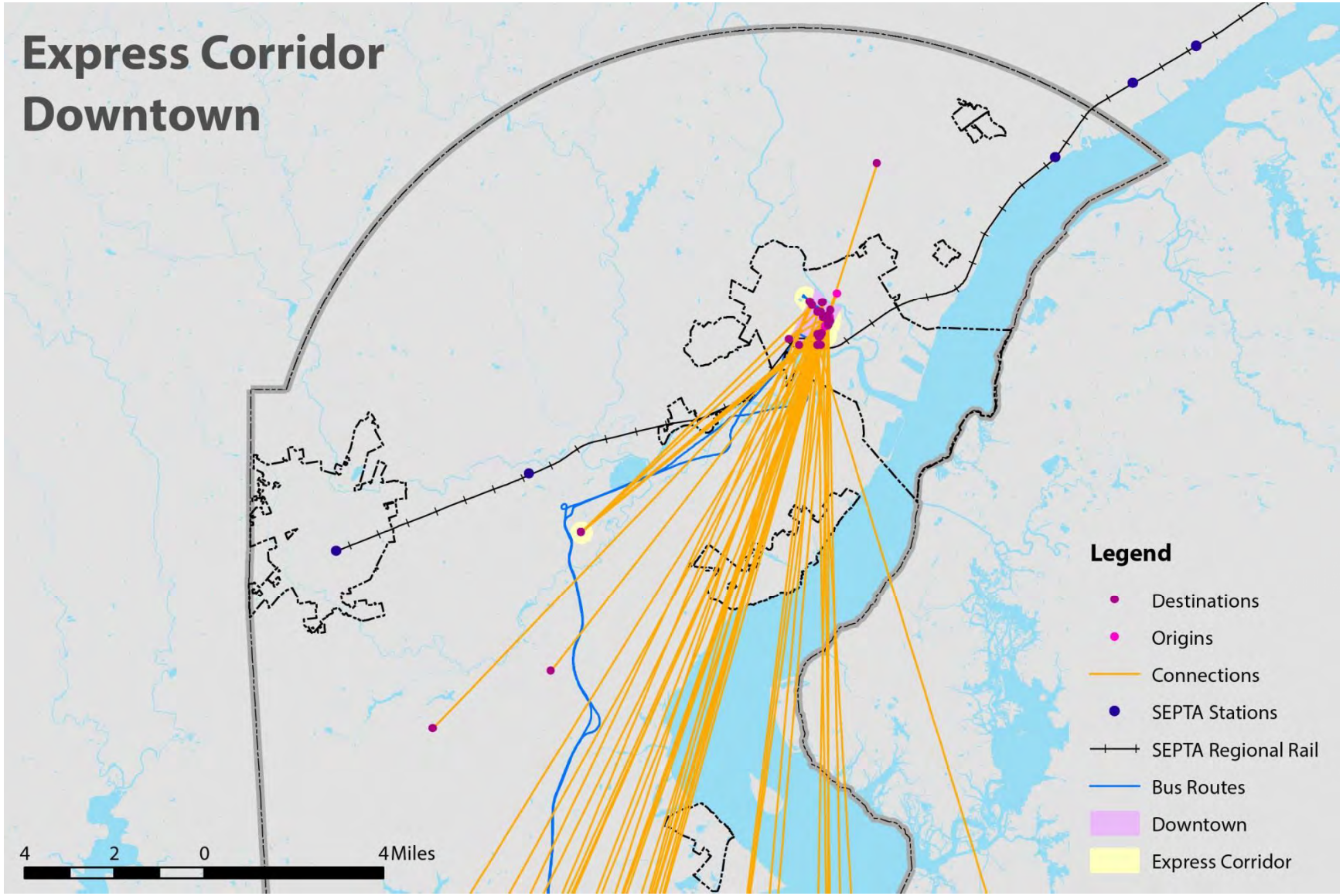
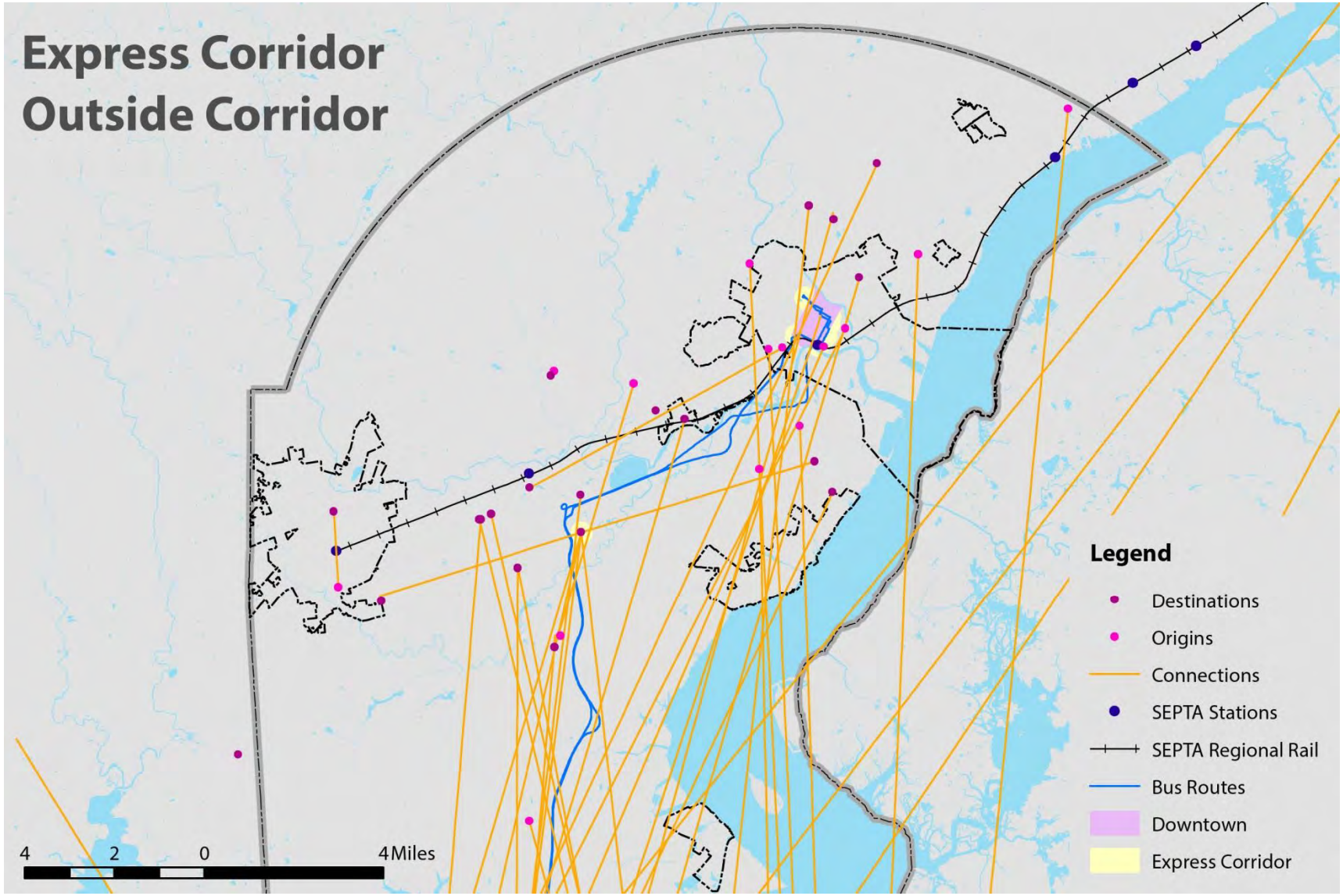


Figure 6-35: Trips outside the Downstate Express Corridor and Downtown area



APPENDIX A – MODE OF ACCESS BY CORRIDOR

Figure A-1: Trip Start, End Matrix – Mid County

	Trip End				
Trip Start	Automobile	Bicycled	Carpool	Dropped Off	Walked
Automobile	13				14
Bicycled		4			5
Carpool			1		
Dropped Off	7				28
Walked	18		1	1	218

Figure A-2: Trip Start, End Matrix – Christiana Mall / Newark

	Trip End				
Trip Start	Automobile	Bicycled	Carpool	Dropped Off	Walked
Automobile	19			1	27
Bicycled		9			6
Carpool			1		2
Dropped Off	7			1	32
Walked	29	1	1	2	345

Figure A-3: Trip Start, End Matrix – Concord Pike

	Trip End		
Trip Start	Automobile	Bicycled	Walked
Automobile	3		8
Bicycled	2	3	2
Dropped Off	7		13
Walked	18		212

Figure A-4: Trip Start, End Matrix – Downstate

	Trip End				
Trip Start	Automobile	Bicycled	Carpool	Dropped Off	Walked
Automobile	29			1	42
Bicycled		2			2
Carpool					1
Dropped Off	8			2	20
Walked	15		1		36

Figure A-5: Trip Start, End Matrix – Kirkwood Highway

	Trip End			
Trip Start	Automobile	Bicycled	Dropped Off	Walked
Automobile	20			26
Bicycled		1		5
Carpool	2			
Dropped Off	5			28
Walked	17		1	310

Figure A-6: Trip Start, End Matrix – Market, Dupont, and New Castle

	Trip End				
Trip Start	Automobile	Bicycled	Carpool	Dropped Off	Walked
Automobile	9				14
Bicycled	3	11			22
Carpool	1				4
Dropped Off	11			2	42
Walked	41	4	2	4	779

Figure A-7: Trip Start, End Matrix – Maryland Ave

	Trip End			
Trip Start	Automobile	Bicycled	Carpool	Walked
Automobile	3			4
Bicycled	1	1	2	5
Carpool				1
Dropped Off	6			22
Walked	10	1		328

Figure A-8: Trip Start, End Matrix – Penn Ave & Lancaster Ave

	Trip End			
Trip Start	Automobile	Bicycled	Carpool	Walked
Automobile	15			29
Bicycled		1		12
Carpool				1
Dropped Off	2		1	15
Walked	25	1		305

Figure A-9: Trip Start, End Matrix – Philadelphia Pike

	Trip End				
Trip Start	Automobile	Bicycled	Carpool	Dropped Off	Walked
Automobile	15				41
Bicycled	1	4			12
Carpool	1				4
Dropped Off	15		3	2	26
Walked	39	5	2	4	723

APPENDIX B – TRIP TYPE BY CORRIDOR

Figure B-1: Trip Type – Mid County

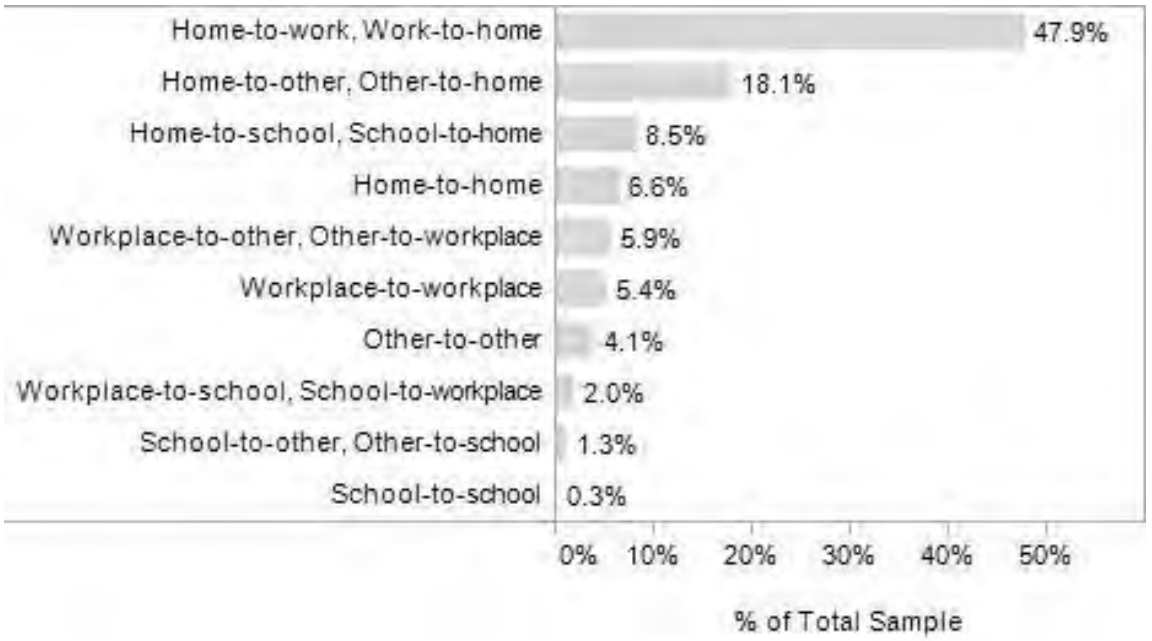


Figure B-2: Trip Type – Christiana Mall / Newark

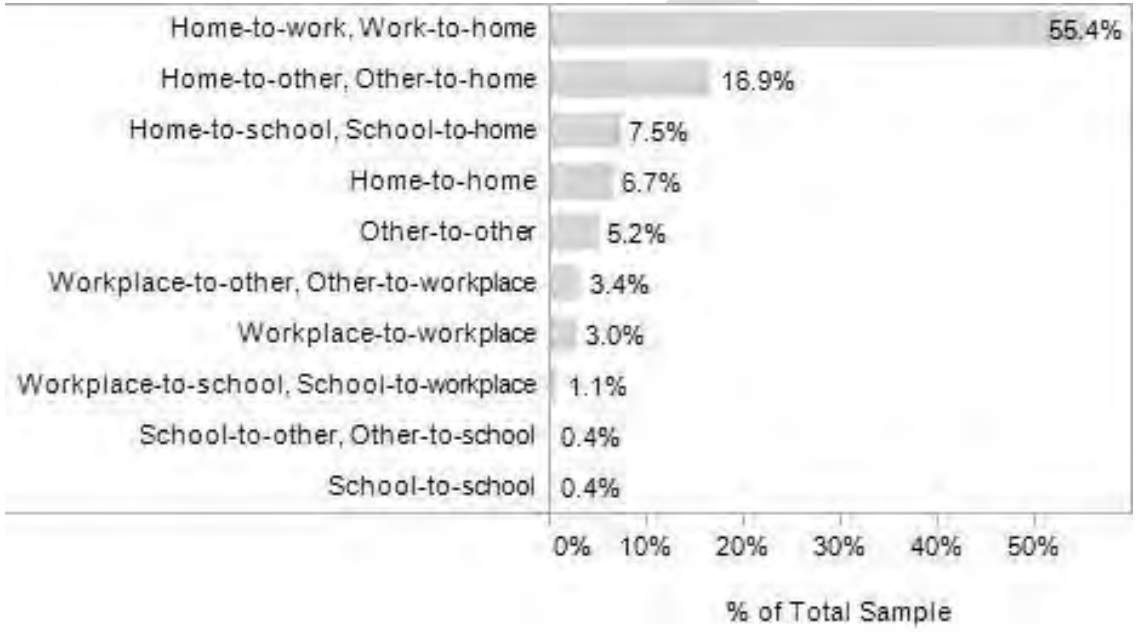


Figure B-3: Trip Type – Concord Pike

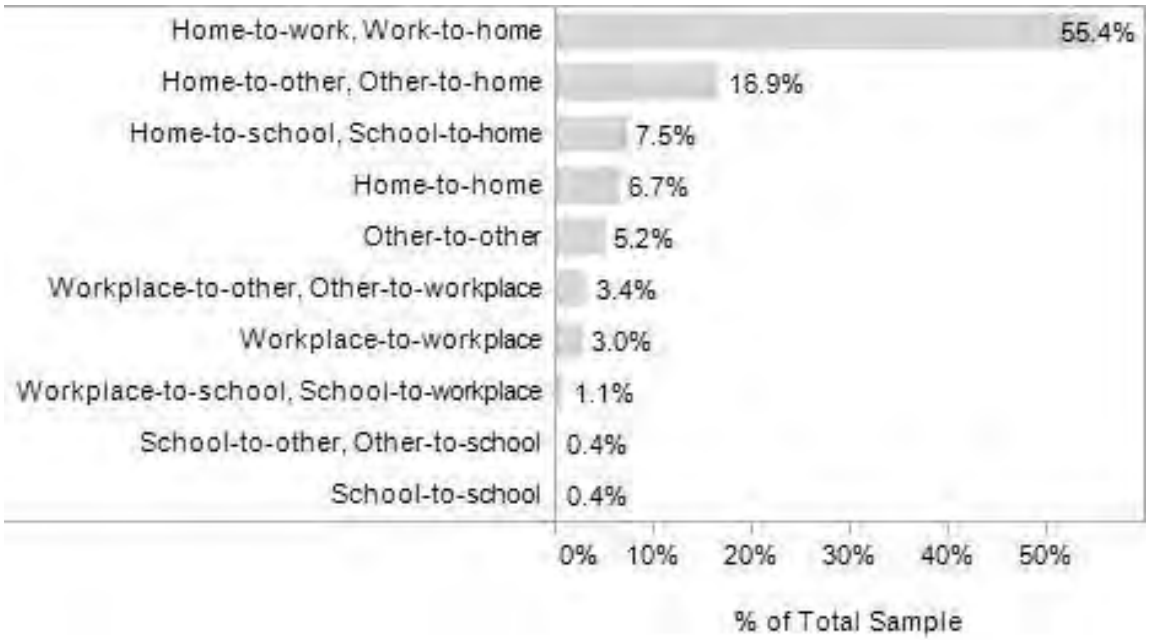


Figure B-4: Trip Type – Downstate

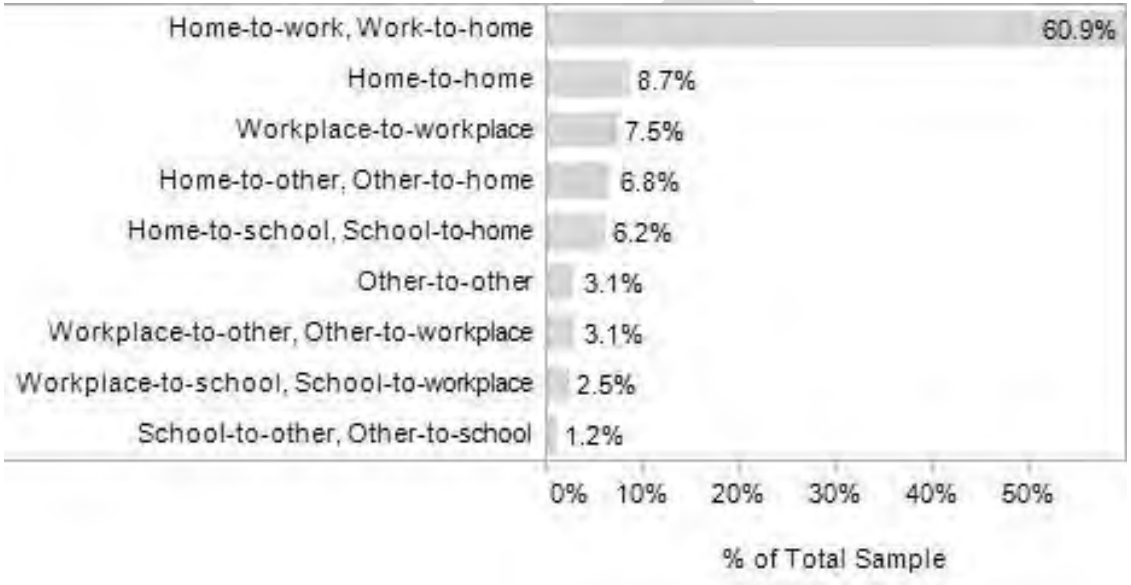


Figure B-5: Trip Type – Kirkwood Highway

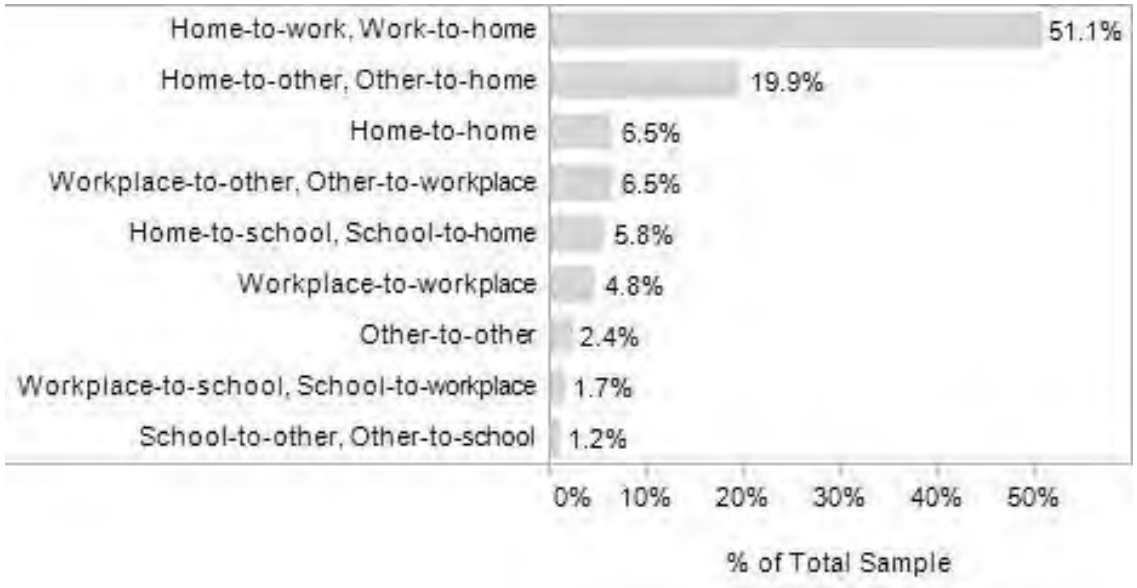


Figure B-6: Trip Type – Market, Dupont, and New Castle

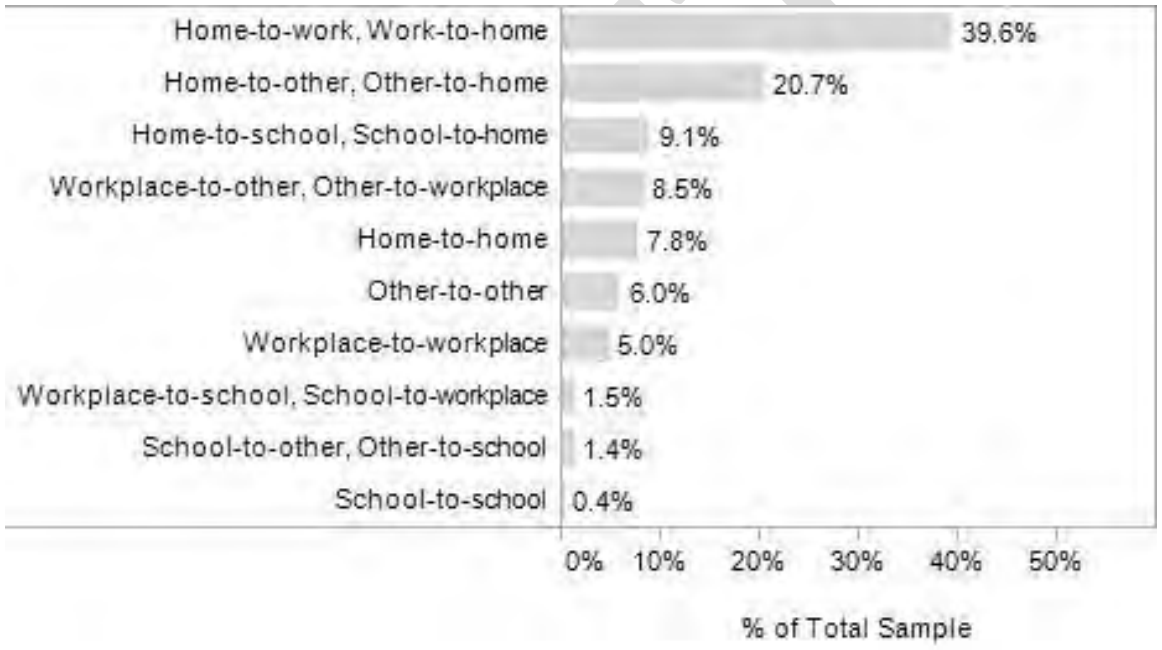


Figure B-7: Trip Type – Maryland Ave

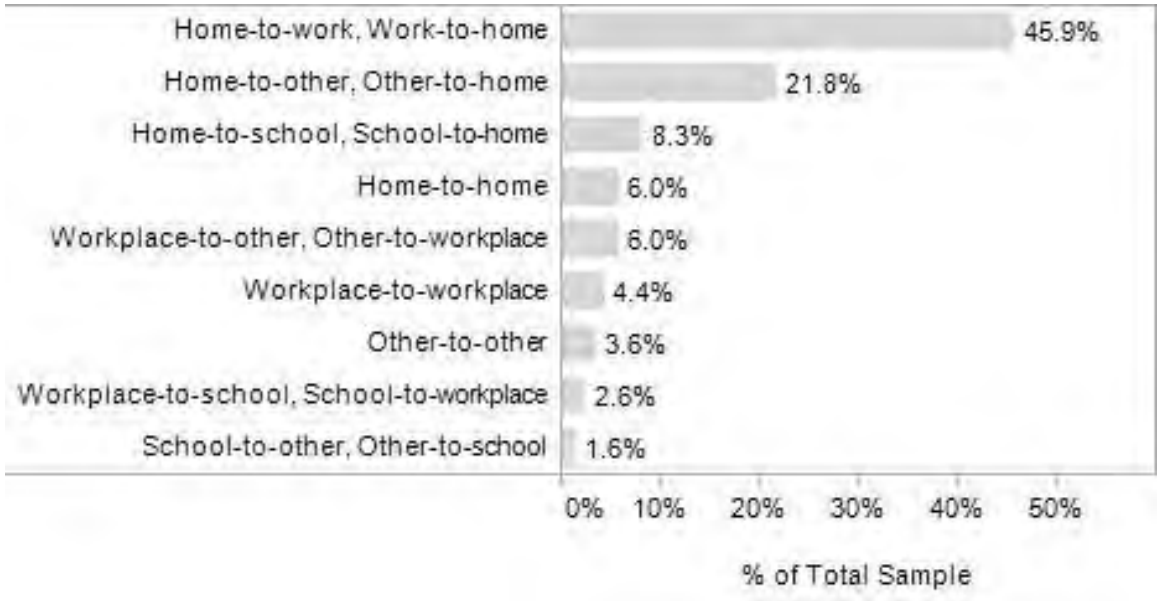


Figure B-8: Trip Type – Penn Ave & Lancaster Pike

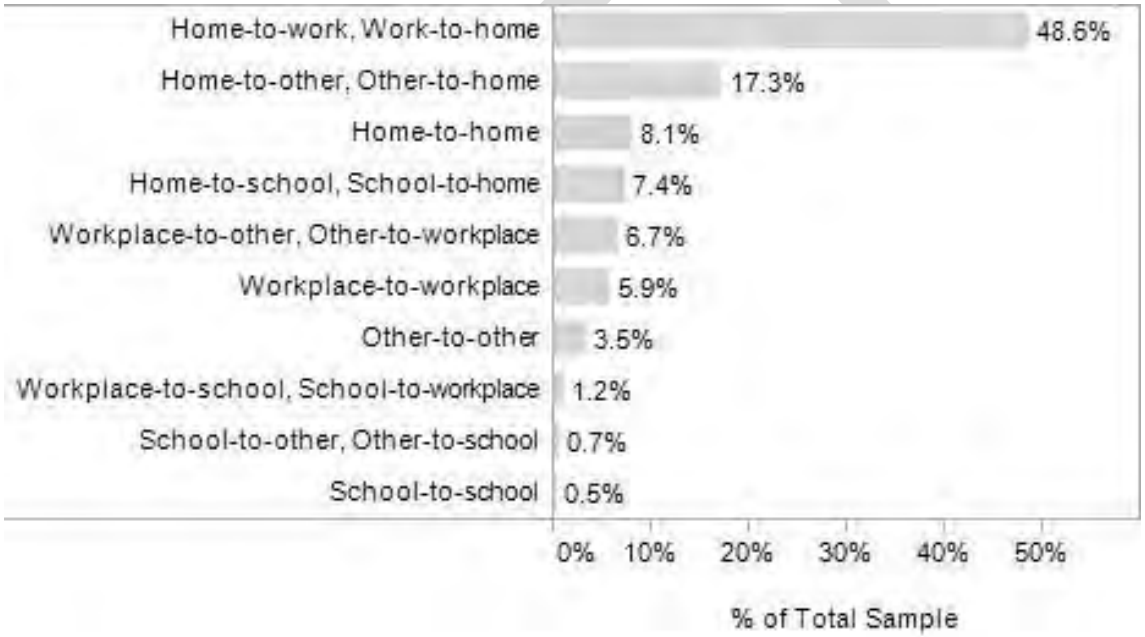
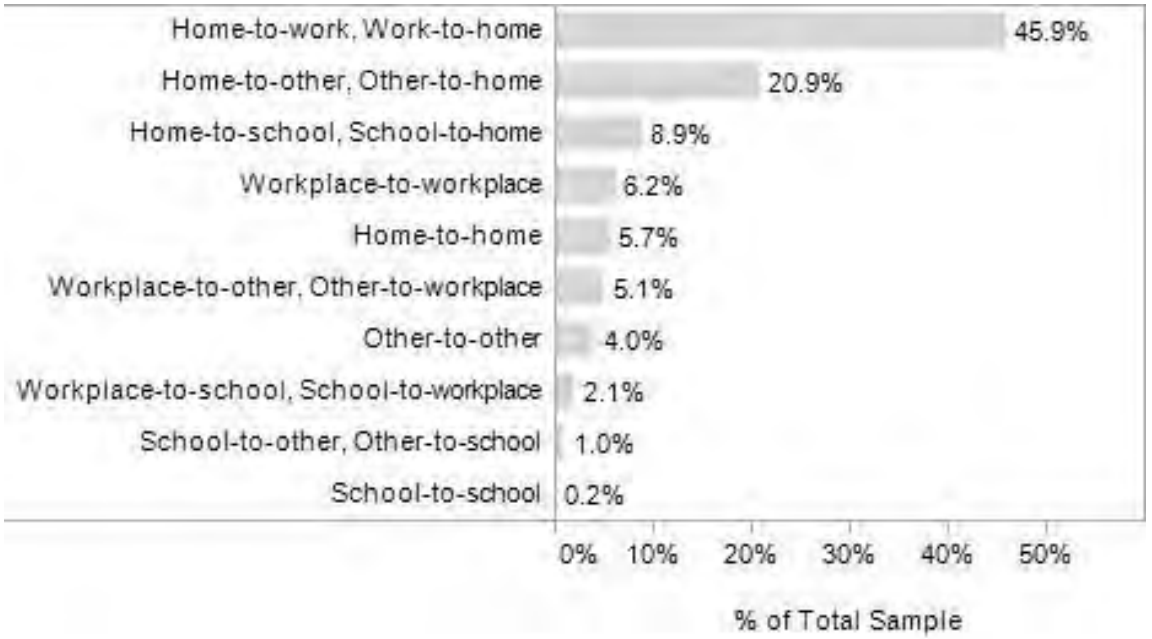


Figure B-9: Trip Type – Philadelphia Pike



APPENDIX C – CUSTOMER COMMENTS

At the end of the survey riders were asked to leave comments about suggested changes or improvements to the DART First State system. The customer comments have been organized into the categories shown in Table C-1. The categorization of comments is also shown in Figure C-1.

Table C-2: Customer Comments by Type

Type of Comment	Number of Respondents	Percentage of Respondents
No Comment	3,356	74.37%
Service Improvement	704	15.68%
Service Problem	212	5.08%
Complaint	141	3.14%
Positive Comment	78	1.74%

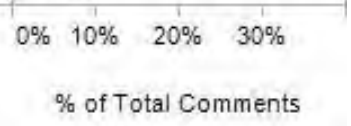
Comments were then processed and categorized into 15 groups. These 15 groups were developed using Natural Language Processing (NLP) methods where like responses were grouped together based on their meaning.

Examples of responses for each category follow.

Nearly a third of riders providing feedback (29%) indicated that there should be more buses on routes, as well as extended hours or 24-hour service, offered by DART First State in the future. Better weekend service or extended hours on the weekend, as well as buses not arriving on time, were the next most common responses from riders providing feedback. This was the case for all corridors except Maryland Avenue. The Maryland Avenue corridor cited the importance of having better weekend service above all other improvements. Most corridors also cited unfriendly drivers as one of their top qualms with their DART First State experience.

Table C-1: Customer Comments by Type

No Comment	No feedback provided	74.4%
Service Improvement	More buses on routes, extended hours or 24-hour service	7.1%
	Better weekend service, extended hours on weekends	4.1%
	Additional bus stops needed	1.2%
	Buses need interior updates, more cleaning, and more storage areas	0.8%
	Additional routes needed	1.0%
	Do not increase fares	0.6%
	Different DART payment methods	0.2%
	Better access to bus schedules; need a better way to track when/if buses are on time	0.7%
Service Problem	Buses aren't arriving on time, need better connection timing to other bus routes	3.9%
	Bus drivers need to wait and not leave passengers trying board busses	0.5%
	Buses are overcrowded	0.4%
	Buses tend to breakdown frequently, need more reliable buses	0.4%
Complaint	Bus drivers are unfriendly, don't provide a great experience, and periodically don't show up	2.3%
	Bus shelters need to be fixed or improved	0.5%
	DART customer service call center is not helpful	0.3%
Positive Comment	Positive feedback	1.7%



Comment Categories and Sample Responses

Sample responses for each of the comment categories are provided below.

More buses on routes, extended hours or 24-hour service

"Add more buses during the morning and evening hours and more during the hours of 2pm-3pm coming to Middletown"

"Add more runs in the afternoon"

"Buses every 30 minutes"

Better weekend service, extended hours on weekends

"Extend weekend hours to more frequently running more buses or bigger weekend buses"

"Increase weekend service"

"Longer times begin and end on weekends, A lot of people work on weekends"

Buses aren't arriving on time, need better connection timing to other bus routes

"Buses need more overlap time so we don't miss the second bus by minutes, Buses should never leave earlier then they should, I've seen some leave as early as 10-15 minutes before they should"

"Just by trying to have the buses arrive on time so I won't be late for work"

"More focus on connecting routes"

Bus drivers are unfriendly, don't provide a great experience, and periodically don't show up

"Train drivers to be more customer friendly"

"Some buses do not stop at the bus stops, some drivers just drive by"

"Adjustment of the temperature on the bus, More friendly when boarding the bus"

Additional bus stops needed

"Add bus 10 and 28 stop at Rodney Square and Delaware Ave"

"Amazon stop needs to go deeper into complex"

"DuPont Hwy does not have a safe crossing section to get on the other side, Safer way to catch the bus DuPont Hwy that goes for the 22 and the 25"

Additional routes needed

"Have the #11 go all the way to Naamans Rd, Have the #61 run on weekends"

"It would be much appreciated if service were provided to the new Middletown businesses from Rodney Square via DART First State"

"Need a bus route near Walmart on Centerville Rd"

Buses need interior updates, more cleaning, and more storage areas

"Outlets for phone chargers, wall chargers etc"

"Clean your buses"

"Cup holders, recliner chairs, more space for strollers, seatbelts, and more schedules on bus"

Better access to bus schedules; need a better way to track when/if buses are on time

"Bus alerts when the buses are running late"

"If you could get the I-phone app that tells us where the bus is on the route that would be so helpful"

"Is it possible to get text alerts to you if a particular route is delayed or on time? It's very beneficial when standing in the cold or rain to know how long it will be"

Do not increase fares

"Don't raise the fare"

"Keep prices down"

"The proposed increase should be implemented over 4-5 years"

Bus drivers need to wait and not leave passengers trying to board buses

"Buses should stop for passengers"

"Don't pull of on people when they are trying to run to catch the bus and their only 2 feet away"

"Wait for passengers to be seated before pulling off"

Bus shelters need to be fixed or improved

"Repair light fixture at the park and ride kiosk and at 52 and DuPont Rd"

"We need Plexiglas in all bus booths where glass has been broken out, thank you for time on this matter"

"Add a bus shelter to the fire hall stop"

Buses tend to break down frequently, need more reliable buses

"Lately the bus has broken down at People's Plaza so I suggest better buses"

"Retire buses that keep breaking down, Last week I had to wait because bus broke down on 2 different days"

"Have backup buses available, Many times 12 plus times over in the past 18 months buses just don't show up at all"

Buses are overcrowded

"Keep current driver, 42 express pm and larger bus, Tony Watson we have full capacity everyday"

"For the most part the bus is on time, #1 bus is too crowded"

"Stop overcrowding buses"

DART First State customer service call center is not helpful

"Train your customer service reps better, I have called several times and gotten incorrect information about Bus Times"

"Improve your customer service, answer emails, voicemails, and stop hanging up on customers when DART First State messes up"

"When calling complaints or concerns in have a return call made within 3 days, it's hard to follow up"

Different DART First State payment methods

"Better and more convenient in purchasing DART First State cards, allow other sales areas besides Acme"

"Have the pay box make change because I don't always have exact change"

"Have the 3 week any route pass available again, Details on how to get a yearly pass"