

CONCEPT DEVELOPMENT FOR
SOUTHERN CHESTER COUNTY—NEW CASTLE COUNTY
TRANSIT SERVICE





The Delaware Valley Regional Planning Commission is dedicated to uniting the region's elected officials, planning professionals, and the public with a common vision of making a great region even greater. Shaping the way we live, work, and play, DVRPC builds consensus on improving transportation, promoting smart growth, protecting the environment, and enhancing the economy. We serve a diverse region of nine counties: Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer in New Jersey. DVRPC is the federally designated Metropolitan Planning Organization for the Greater Philadelphia Region — leading the way to a better future.



The symbol in our logo is adapted from the official DVRPC seal and is designed as a stylized image of the Delaware Valley. The outer ring symbolizes the region as a whole while the diagonal bar signifies the Delaware River. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey.

DVRPC is funded by a variety of funding sources including federal grants from the U.S. Department of Transportation's Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), the Pennsylvania and New Jersey departments of transportation, as well as by DVRPC's state and local member governments. The authors, however, are solely responsible for the findings and conclusions herein, which may not represent the official views or policies of the funding agencies.

The Delaware Valley Regional Planning Commission (DVRPC) fully complies with Title VI of the Civil Rights Act of 1964, the Civil Rights Restoration Act of 1987, Executive Order 12898 on Environmental Justice, and related nondiscrimination statutes and regulations in all programs and activities. DVRPC's website, www.dvrpc.org, may be translated into multiple languages. Publications and other public documents can be made available in alternative languages and formats, if requested. DVRPC public meetings are always held in ADA-accessible facilities and in transit-accessible locations when possible. Auxiliary services can be provided to individuals who submit a request at least seven days prior to a meeting. Requests made within seven days will be accommodated to the greatest extent possible. Any person who believes they have been aggrieved by an unlawful discriminatory practice by DVRPC under Title VI has a right to file a formal complaint. Any such complaint may be in writing and filed with DVRPC's Title VI Compliance Manager and/or the appropriate state or federal agency within 180 days of the alleged discriminatory occurrence. For more information on DVRPC's Title VI program, or to obtain a Title VI Complaint Form, please call (215) 592-1800 or email public_affairs@dvrpc.org.

CONTENTS

Executive Summary	1
Chapter 1: Introduction and Background	3
Project Purpose	3
Suburban Transit Literature	3
Related Studies	4
History of Service between Southern Chester and New Castle Counties.....	8
Chapter 2: Existing Conditions	11
Population and Employment Density	11
Land Use	11
Existing Transportation Network	14
Chapter 3: Transit Demand	17
Who Are the Potential Riders?	19
Where Do They Live?	19
Where Are They Going?	26
Conclusion	32
Chapter 4: Transit Alternatives	33
Fixed and Flexible Bus Service	33
Successful Transportation Alternatives	34

CONTENTS

Chapter 5: Conclusions and Recommendations45

- Conclusions45
- Recommendations46
- Next Steps50

Endnotes52

Appendix A A-1

Tables

- Table 2.1: DART and Amtrak Service within the Study Area 14
- Table 2.2: SEPTA and TMACC Service within the Study Area 16
- Table 3.1: Demographic Categories 22
- Table 4.1: Summary of the Navy Yard AT&T Loop Service 35
- Table 4.2: Summary of Pureland East-West Community Shuttle 36
- Table 4.3: Summary of DART Route 47 Service 37
- Table 4.4: Summary of CATACOMMUTE Vanpool Service 39
- Table 4.5: Summary of CommuteInfo Vanpool Service 40
- Table 4.6: Summary of Enterprise Rideshare Service 41

Figures

- Figure 1.1: Photos of Southern Chester County3
- Figure 1.2: Vision Plan: Mid Term–2030 for Chester County5
- Figure 1.3: New Vision of Commuter Service Model6

CONTENTS

Figures

Figure 1.4: WILMAPCO's Process to Efficiently Transport People	7
Figure 1.5: Former SEPTA Route 202 Schedule	8
Figure 1.6: History of SEPTA Service along the US 202 Corridor	9
Figure 2.1: Study Area Map	11
Figure 2.2: Projected Change in Population Density in the Study Area between 2010 and 2040	12
Figure 2.3: Projected Change in Employment Density in the Study Area between 2010 and 2040	13
Figure 2.4: Transportation Network in the Study Area	15
Figure 3.1: Existing Commute Flows in and out of Chester County	17
Figure 3.2: Key Destinations and Existing Transit Service	18
Figure 3.3: Trip and Passenger Types	19
Figure 3.4: Average Number of Visits to Longwood Gardens	20
Figure 3.5: Longwood Gardens Visitor Origins (2014-2015 Annual Average)	21
Figure 3.6: Weight Allotted to Each Demographic Category	22
Figure 3.7 (A and B): Where Would Local Riders Come From?	23
Figure 3.7 (C and D): Where Would Local Riders Come From?	24
Figure 3.8: Where Would Choice Riders Come From?	25
Figure 3.9: Where Would Non-Choice Riders Come From?	25
Figure 3.10: Analysis TAD and TAZ Boundaries	26
Figure 3.11: Travel Flow Analysis Example	27
Figure 3.12: Non-Choice and Choice Top Commuter Flows from the West Chester TAD	28

Figures

- Figure 3.13: Local, Non-Choice, and Choice Top Commuter Flows from the West Chester TAD29
- Figure 3.14: Top Choice and Non-Choice Commuter Flows from Northern New Castle County 30
- Figure 3.15: Commuter Flows by Direction31
- Figure 3.16: Park-and-Ride License Plate Survey Results, Fall 201532
- Figure 4.1: Krapf's Coaches Vehicle 34
- Figure 4.2: Navy Yard Shuttle Services 35
- Figure 4.3: Route Map for Pureland East-West Community Shuttle 36
- Figure 4.4: Route Map for DART Route 4737
- Figure 4.5: Advertisement for CATACOMMUTE39
- Figure 4.6: Savings Potential for Participating in CommuteInfo40
- Figure 4.7: vRide Vanpool Service Map.....41
- Figure 4.8: RideKC Vehicle42
- Figure 4.9: Bridj's Boston Zone Map42
- Figure 5.1: Potential Limited Stop Bus Service Pattern 47
- Figure 5.2: Potential Vanpool Service Patterns49

ACKNOWLEDGEMENTS

The Delaware Valley Regional Planning Commission would like to acknowledge the contributions made to this project by its stakeholder committee and partner agencies.

Marco Boyce, Planner III, New Castle County

John Calnan, Manager, Suburban Service Planning and Schedules, SEPTA (Former)

Mark Cassel, Manager, Suburban Service Planning and Schedules, SEPTA

Guy Ciarrocchi, Esq., President & CEO, Chester County Chamber of Commerce and Industry

Dominic D'Amico, Director of Transportation Services, Transportation Services Department, South Jersey Transportation Authority

William Deguffroy, AICP, Chester County Planning Commission

Dennis Fisher, CFO/Director of Administration, Longwood Gardens

Matthew George, CEO, Bridj

Robert Grabus, Development Advisor, Chester County Economic Development Council

Dave Gula, Principal Planner, Wilmington Area Planning Council (WILMAPCO)

Evan Horgan, Planner, Delaware Transit Corporation

Matt Hammond, PE, Chester County Planning Commission

Kevin Kerr, Chester County Planning Commission

Gary D. Krapf, President, Krapf's Coaches, Inc. / ROVER Community Transportation

Erin Matlack, Account Executive, Enterprise Rideshare

P. Timothy Phelps, Executive Director, Transportation Management Association of Chester County

Eric Pugliano, Transit Planner, DART First State (DelDOT)

Terri Quici, Commuter Services Manager, CATACOMMUTE Program

Joseph C. Scalise, Borough Manager, Borough of Kennett Square

Tony Scheivert, Township Manager, New Garden Township

Lisa Kay Schweyer, CommuteInfo Program, Southwestern PA Commission

Randy Waltermeyer, AICP, Transportation Services Director, Chester County Planning Commission (Former)

EXECUTIVE SUMMARY

Chester County, Pennsylvania, and New Castle County, Delaware, share the planning goal to move people throughout and between the counties efficiently and sustainably. To help achieve this goal, the counties, along with other local agencies and organizations, want to provide more and better opportunities for their residents and employees to use public transit. Previous studies have identified the potential of transit demand for people making trips between the two counties, specifically between West Chester and Kennett Square in Chester County and Wilmington in New Castle County. In the analysis completed for this study, limited stop bus service and vanpools are the recommended forms of public transit to be piloted for implementation.

This project aimed to examine the potential for public transit service in this area and develop concepts to work toward implementation. Part of the reason a transit gap exists in this area is the land use patterns. Southern Chester County is largely rural and suburban, with a few denser areas, specifically West Chester, and on a smaller scale, Kennett Square and Avondale Borough. New Castle County is largely suburban, with Wilmington and Newark serving as the urban attractions. Public transit is usually most successful in dense, urban areas where driving is difficult due to congestion and population (potential riders) is high. Providing public transit in suburban and rural markets likely requires additional investment (both dollars and time) and customization than what is typically implemented in an urban setting.

Past attempts to provide transit in the area have been inconsistent. Various traditional fixed-route service has been implemented along the US 202 corridor, and continually changed service patterns and schedules in an effort to boost ridership. Inconsistent service makes it difficult to maintain or continually attract riders, so ultimately, these services were discontinued.

In an effort to identify the best transit solution to fill the transit gap, Delaware Valley Regional Planning Commission (DVRPC) conducted a detailed analysis of who lives in the two counties, what areas they are coming from, and where they are going on their trips. The analysis revealed the following.

- Tourists tend to travel at different times than locals and commuters do.

- Those commuters who rely most heavily on transit as their only option tend to live farther from their destination than those who have access to a vehicle.
- Far more work trips are made from Chester County to New Castle County than from New Castle County to Chester County.

Since traditional fixed-route service has proven unsuccessful in the past, the project team researched alternative transit options. The project team selected a short list of options that showcased transportation alternatives in the Northeast and their unique reasons for success. The takeaways from these case studies can be used to assist the development of strategies to implement a new transit service between southern Chester County and New Castle County.

The team conducted interviews of transit operators and studied operations strategies for various alternatives, such as limited stop bus service, flexible-route bus service, shuttles, and vanpools. The short list was narrowed to two primary transportation alternatives the team believes are the most realistic to implement in the study area: limited stop bus service and vanpools. This selection was made primarily based on the travel demand research completed during this project.

Limited stop bus service minimizes the number of stops, shortening travel time for passengers making regional trips. **Vanpools** are often used to fill gaps in transit services by coordinating travel between groups of people with similar origins, destinations, and schedules.

This report contains information that interested members of the advisory committee can continue to reference while working together to implement a transit alternative in this area. The next critical step would be to identify whom the service is aiming to serve and what types of trips they are making. Then, the transit alternative can be selected and piloted if necessary.

CHAPTER 1: INTRODUCTION AND BACKGROUND

Traveling between Chester County and New Castle County has increasingly become a more prominent origin and destination pattern for commuters. While demand is apparent, the dispersed character of origins and destinations on both sides of the state line make it challenging to develop a transit service that is both cost effective to operate, and time competitive with the automobile.

Project Purpose

The purpose of this study is to develop service concepts and identify potential public or private implementing partners for new commuter-oriented bus service(s) between southern Chester County and New Castle County. The goal is to use this document to start the process for pilot-level implementation or funding solicitation. The team relied on a stakeholder committee to provide feedback during the project process. The committee was composed of representatives from the following firms and institutions: Chester County Chamber of Business & Industry, Chester County Economic Development Council, Chester County Planning Commission (CCPC) staff and board members, Delaware Area Regional Transit (DART), Kennett Square Borough, Longwood Gardens, New Castle County, New Garden Township, Southeastern Pennsylvania Transportation Authority (SEPTA), Transportation Management Association of Chester County (TMACC), and Wilmington Area Planning Council (WILMAPCO).

Suburban Transit Literature

Creating a successful public transit service in suburban and rural contexts typically has different goals and objectives than implementation in a dense urban environment. The photos in Figure 1.1 illustrate the various densities in Chester County, primarily rural and suburban with some village centers.

The DVRPC team used Transportation Cooperative Research Program (TCRP) Report 55¹ as a resource to understand some of the successful techniques in developing a service in a suburban context. The text discusses the major takeaways from 50 transit operators in 1999. Many transit operators used similar strategies, such as developing and operating services around dense suburban corridors with major focal points and generators in transit-dependent markets. The guidelines emphasized the importance of adapting these common themes to the

Figure 1.1: Photos of Southern Chester County



Source: DVRPC, 2015

appropriate local markets, vehicles, customer demand, and landscape. This background supported broadening the research, analysis, and recommendations beyond the traditional fixed-route local bus service.

The TCRP report stressed obtaining support from the private sector and the community as a priority. In putting together our stakeholder committee the team reached out to agencies, non-profits, membership organizations, politicians, and large private companies in both counties. Feedback from interested parties shed light on who might ride a new service.

CHAPTER 1: INTRODUCTION AND BACKGROUND

The report also discusses attributes to consider that would appeal to suburban residents. People living in the suburbs use their personal vehicles to make the majority of their trips. To entice potential suburban passengers to make more trips using public transit, amenities have to be comparable to their personal vehicle. All of this information was used by the DVRPC project team to inform discussion and research throughout this project.

Related Studies

The origin of this project stems from the findings in DVRPC's *Chester County Public Transportation Plan, Phase I*, and Chester County's adopted *Chester County Public Transportation Plan*. Both documents suggest that there is interest in and need to expand current service or create new service that would provide public transit between southern Chester County and New Castle County. In addition, the New Castle County Comprehensive Plan and WILMAPCO Long-Range Vision are referenced to support the research, analysis, and recommendations in this study.

CHESTER COUNTY PUBLIC TRANSPORTATION PLAN, PHASE I

Prior to the current 2016 study, DVRPC was asked to conduct two tasks in 2013 in preparation for the Chester County Public Transportation Plan.

- inventory existing public transit service in Chester County that could help identify priorities; and
- develop and manage public workshops to gather other transit needs or requests.

In completing the first task the project identified gaps in transit service. The relevant findings from this analysis are also recounted below.

- There are significant work trips from Southern Chester County into New Castle County and vice versa.
- There are opportunities for existing service to be improved and for new service to be developed, particularly between Chester County and New Castle County.

- One of the top 10 highest-ranked service gaps was between West Chester Borough and New Castle County.

For the 2013 study, the DVRPC team also held a public workshop. Participants were asked to identify their long-range ideas and thoughts about new connections and modifications to existing transit. The requests that were collected and are relevant for this 2016 study are also listed below.

- Connect high population centers with employment centers.
- North-south connection from West Chester and Kennett Square to Wilmington.

CHESTER COUNTY PUBLIC TRANSPORTATION PLAN: AN ELEMENT TO LANDSCAPES²

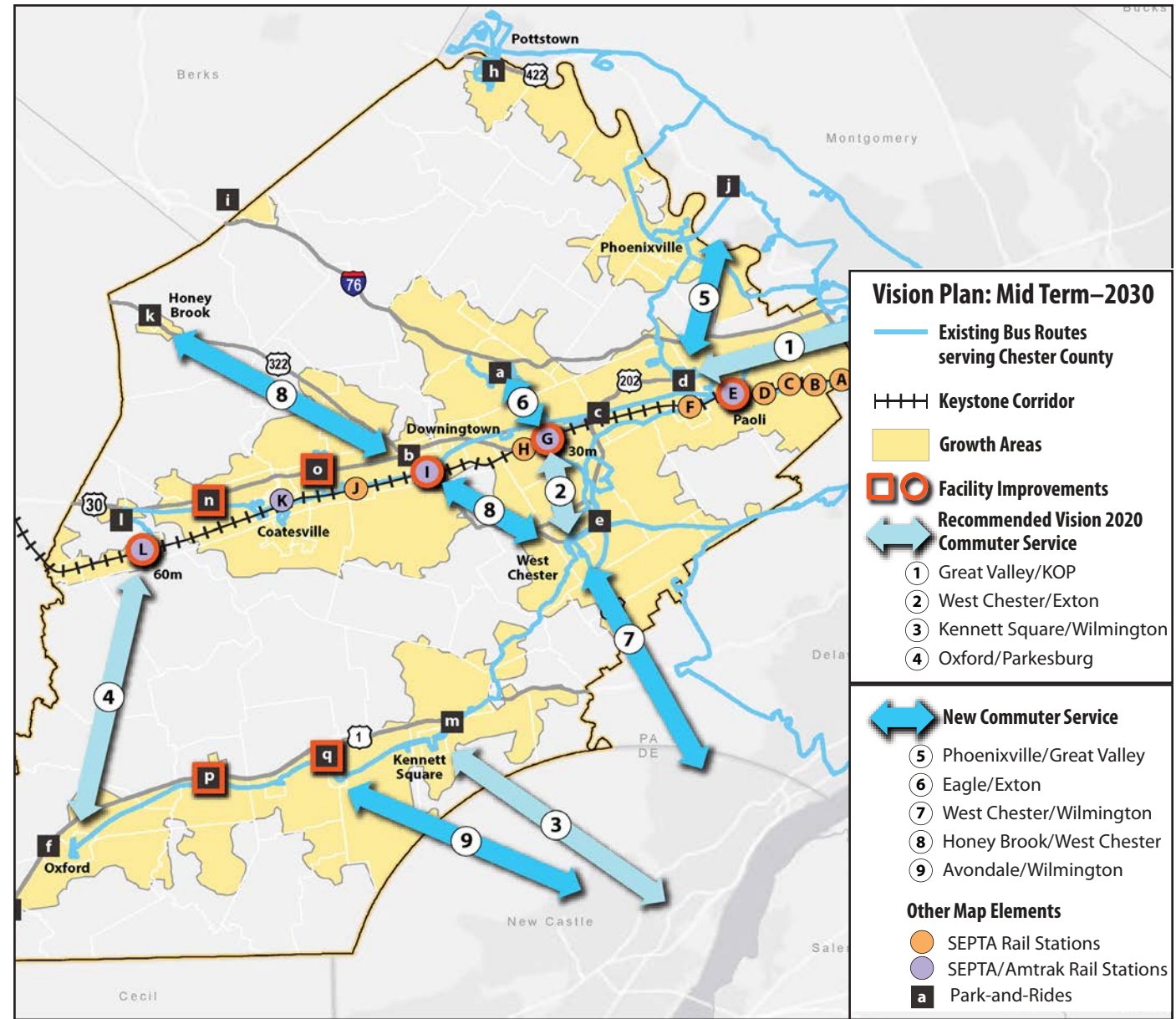
One of the fundamental goals in the Chester County plan is to “enhance access to and the use of transportation systems to reduce traffic congestion.” To achieve this goal the county commissioners set the following target: by 2019 there should be an increase to 15 percent of residents using modes other than their single-occupancy vehicles to commute to work.

The report further explains that to achieve this objective and reach their goal, the county will need to provide additional options or enhanced services to attract more residents to use public transportation.

Additionally, the document encourages growing municipalities to advocate for transit-oriented land uses or provide essential transit-related facilities. To address some of the lacking connections the county created visions for the future of transit service in years 2020, 2030 (shown in Figure 1.2), and 2040 that include major performance benchmarks.

By 2030 the vision shows three commuter service connections between southern Chester County and New Castle County. They are between Kennett Square and Wilmington, West Chester and Wilmington, and Avondale and Wilmington.

Figure 1.2: Vision Plan: Mid Term–2030 for Chester County



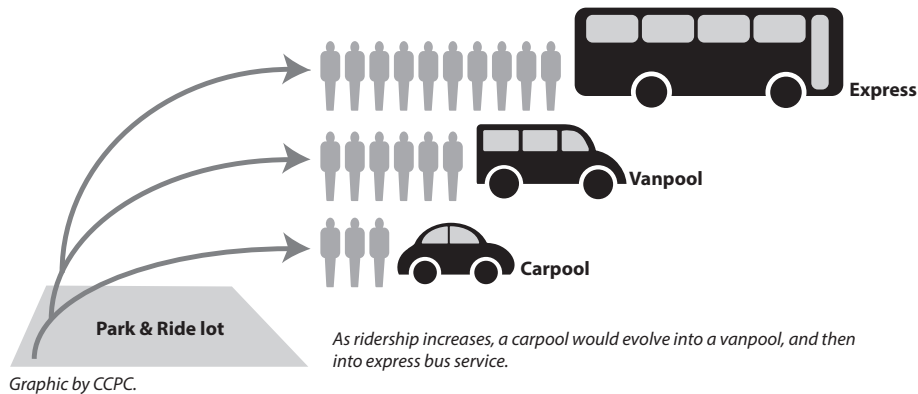
Source: Chester County Transportation Plan, 2014

CHAPTER 1: INTRODUCTION AND BACKGROUND

Finally, relevant to this study, the plan identifies a “new commuter service model” (shown in Figure 1.3) or a public transit service model that may be able to capture more Chester County residents. The service would provide transit connections from park-and-ride locations, and would begin by pairing passengers in carpools and vanpools together. If successful, this could evolve into an express bus service.

However, to make the service sustainable (retain ridership for an extended period of time) the service would likely need special amenities, such as more comfortable seating and wifi. The DVRPC team used the research, conclusions, and recommendations from the Chester County Public Transportation Plan to evaluate the type of service and possible trip pairs that could thrive, shown in Chapter 4.

Figure 1.3: New Vision of Commuter Service Model



Source: Chester County Public Transportation Plan, 2014

NEW CASTLE COUNTY COMPREHENSIVE PLAN

To provide the best public transit option for all stakeholders in New Castle County, the DVRPC team considered the county’s comprehensive plan goals, objectives, and strategies for both land use and transportation. DVRPC staff used the plan to ensure that the recommendations set forth in the current study were consistent with these ideals.

New Castle County is conscientious about sustainable development and tailoring growth zones to preserve vital resources in its comprehensive plan. To manage growth, the county wants to abide by Smart Growth Principles, encouraging higher densities and redevelopment along transit corridors, in neighborhoods within a quarter-mile from a transit station, and in areas with existing commercial and industrial uses.

The plan recommends developing mobility-friendly design standards, which are a “broad set of design solutions for maximizing the opportunities of all people to move within and between communities independently and safely.”² In addition, the County has adopted redevelopment incentives that encourage mixed-use, mobility-oriented growth in desired areas.

New Castle County’s comprehensive plan touches on the transportation issues challenging the county, these are listed below.

- Increases in overall population and vehicle miles traveled.
- A decrease in the percent of persons living within walking distance to a bus stop.
- A large percentage of public transit operational costs for the state being dedicated to paratransit, although the population using the service is a low percentage of the total transit ridership.
- A lack of government funding to support public transit.

To combat these challenges and the continued strain on the transportation network, the county has come up with objectives to relieve some of this congestion and provide more transportation options.

- As new development continues, the county will promote efforts to increase transportation opportunity and choice.
- To promote choice and other ways that residents can be less reliant on their personal vehicles, the county will continue to promote accessibility, mobility, and transportation alternatives.
- To satisfy the demand for sustainable and affordable transportation options, the county will encourage increased public transit usage by planning for new routes and stations.

Finally, the county came up with strategies to fulfill their transportation objectives. First, the county will continue efforts to improve walkability, improve interconnectivity, and support mobility-friendly development and design. Also, the county will continue to encourage the use of transit by coordinating with DeIDOT/DART to identify locations for bus stops and park-and-ride facilities in the development review process.

WILMAPCO 2040 REGIONAL TRANSPORTATION PLAN

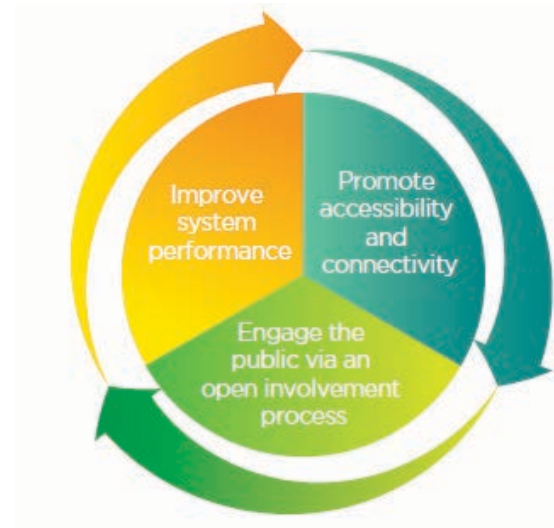
WILMAPCO updated their regional transportation plan in 2015, and have a similar vision to Chester County for the future of their transportation network. One of their primary goals is to “efficiently transport people.” The plan promotes improving system performance through reducing commuter bus travel times and increasing transit on-time performance. Figure 1.4 displays the process that the plan encourages to achieve this goal.

Also, the plan seeks to support such objectives as increasing the percentage of workers carpooling and using park-and-rides. Further, the plan “promote[s] accessibility and connectivity,” which they hope to do through funding strategic improvements to public transit. The DVRPC team referenced these goals and objectives when creating recommendations for this 2016 study.

SANTA CLARA VALLEY TRANSPORTATION AUTHORITY (VTA) SERVICE DESIGN GUIDELINES

The project team researched best practices in transit planning to help organize the project and guide their efforts. VTA of Santa Clara, California, operates a series of Community Bus lines. While the scale of VTA’s service is much greater than that required to fill the transit gap between southern Chester County and New Castle County, they have produced a Service Design Guideline document that outlines a comprehensive planning process. This clear and straightforward process can be adapted for any other transit concept developments, and was a great model for this study.

Figure 1.4: WILMAPCO’s Process to Efficiently Transport People



Source: WILMAPCO 2040 Regional Transportation Plan, 2015

History of Service between Southern Chester and New Castle Counties

The idea of creating a public transit connection between southern Chester County and New Castle County is not new. Initially the company Reeder purchased some of the route rights from the former Short Line Bus Company in the early 1970s, which became Routes 120, 121, and 122 that operated in southern Chester and New Castle counties.

Reeder leased SEPTA vehicles, and many of the Reeder routes were also funded by SEPTA. Limited service operated between West Chester, Concord Mall, and Northtowne Shopping Center in New Castle County, Delaware (not funded by SEPTA). This arrangement lasted until July 1982, and then Reeder sold their route rights to Krapf's Coaches.

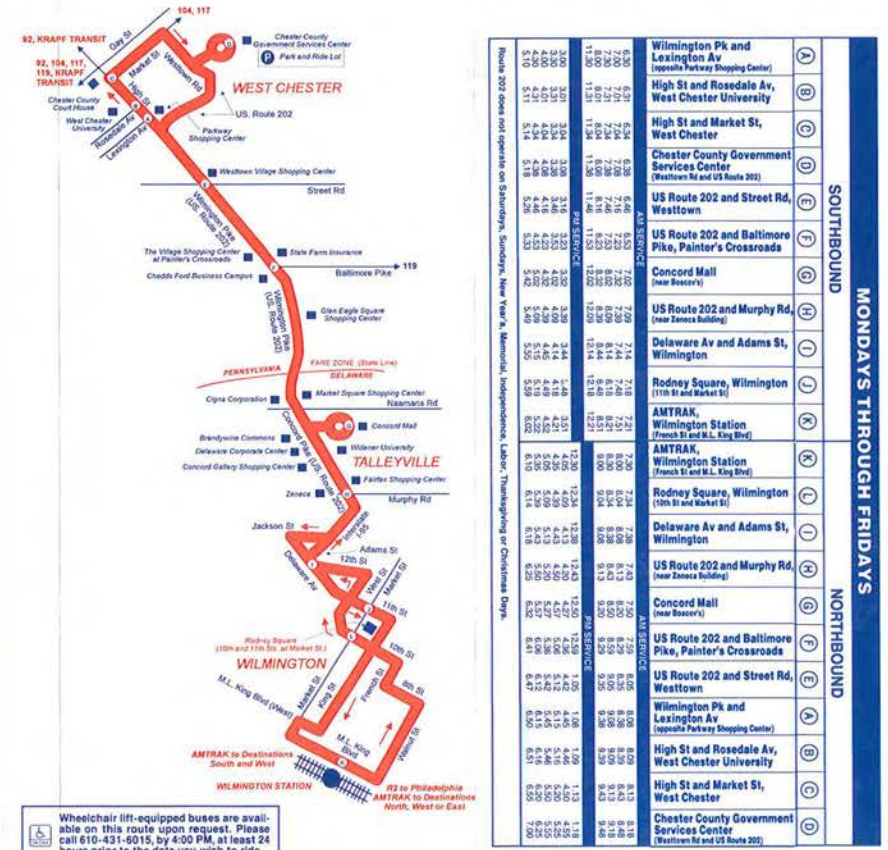
Krapf's Coaches redesignated Route 120 as Route "A." Krapf's never operated service into Delaware. Portions of Route 122 later became the SCCOOT route linking West Chester and Oxford via PA 52 and US 1.

SEPTA initiated service along US 202 with Routes 202, 306, and 314. These services ran from 1995 to 2013, and were all part of SEPTA's local bus network. Figure 1.5 shows a schedule from the Route 202 in 1995. The end-to-end travel time was just under one hour. Figure 1.6 shows the evolution of the three routes and connections with DART service. This route was partially funded by the Delaware Transit Corporation (DTC), but service was truncated to the Brandywine Town Center when funding was discontinued. This change created a two-seat ride from West Chester to Wilmington, which was not as attractive to commuters.

Route 306 was funded under a PennDOT highway construction project on US 202 in Great Valley, but was poorly used. People were not shifting from their personal automobiles to the bus within the construction zone, so it was not legitimate to continue a project that was not aligned with the purpose of the highway subsidy.

Route 314 also received support from Delaware and Chester counties at one time. However, in 2004, the Chester County funding was repurposed to support a Route 314 West Chester Circulator in conjunction with providing access to the county's suburban-located Government Services Center.

Figure 1.5: Former SEPTA Route 202 Schedule



Source: SEPTA, 1995

Since these routes changed frequently there was limited opportunity to develop a ridership base. This was due to funding streams that changed over time and a lack of local and municipal support. In addition, the routes were attempting to serve two trip purposes and two scales of service—non-work trips and work-trips—as well as regional and local trips. Trying to serve multiple trip and passenger types may have made it difficult to serve any passengers well.

Figure 1.6: History of SEPTA Service along the US 202 Corridor

SEPTA Bus Service History along US 202 Corridor

1995

New inter-state bus route (202) created between West Chester and Wilmington primarily along US 202.

1998

Route 202 revised to run between Brandywine Town Center and West Chester. DART service connected to points further south. Route 314 added between Larkin's Corner and West Chester.

2000

Route 202 discontinued.

2004

Route 314 revised to operate as the West Chester Circulator.

2007





Route 306 created to connect Brandywine Town Center with Corporate and Industrial centers north of West Chester.

2010

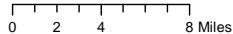

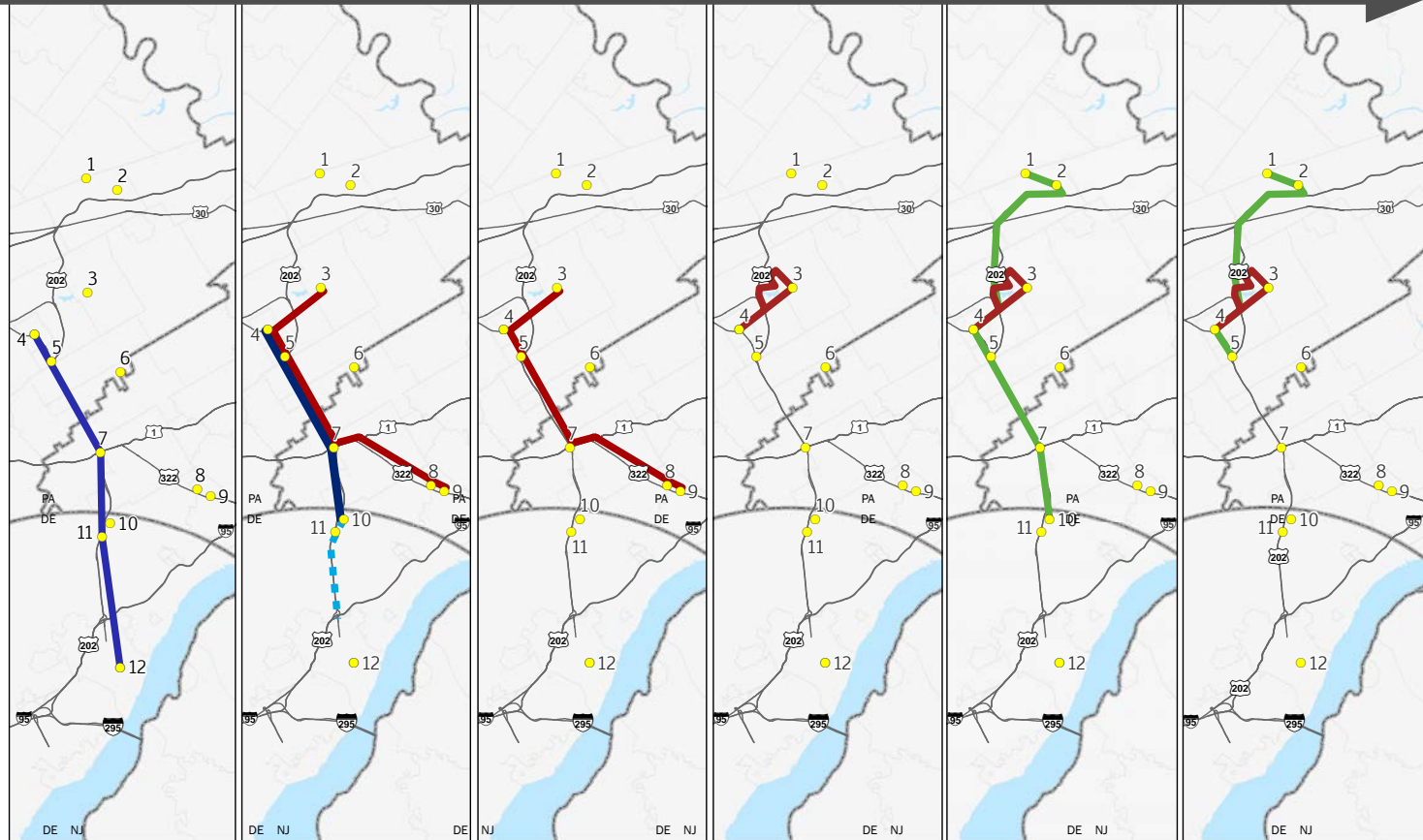
Route 306 shortened, eliminating service south of West Chester. 306 discontinued in 2011. 314 discontinued in 2013.

- Key Route Location
- 1. Main Line Industrial Park
- 2. Great Valley Corporate Center
- 3. Goshen Corporate Park
- 4. West Chester
- 5. Parkway Shopping Center
- 6. Cheyney University
- 7. Painters Crossing
- 8. Naamans Creek Business Center
- 9. Larkin's Corner
- 10. Brandywine Town Center
- 11. Concord Mall
- 12. Wilmington

General Service Route

-  202
-  306
-  314
-  Connecting DART Service

Source: SEPTA, DVRPC, 2016

CHAPTER 2: EXISTING CONDITIONS

The objective of this project is to find if and where there is demand for a new transit route that would provide service between southern Chester County and New Castle County. Research from earlier studies indicates that commuter flow between the two counties could be substantial enough to support public transit service. Prior to making any recommendations for expanded or additional transit in this area, the project team examined the existing demographics, land use, and transportation context.

As shown in Figure 2.1 the study area, in gray, includes municipalities in southern Chester County and northern New Castle County. In addition, some of the western municipalities in Delaware County were included to ensure consideration of the demographic and commuting patterns in the vicinity. The study area was based on the commuting patterns of residents in southern Chester and northern New Castle counties.

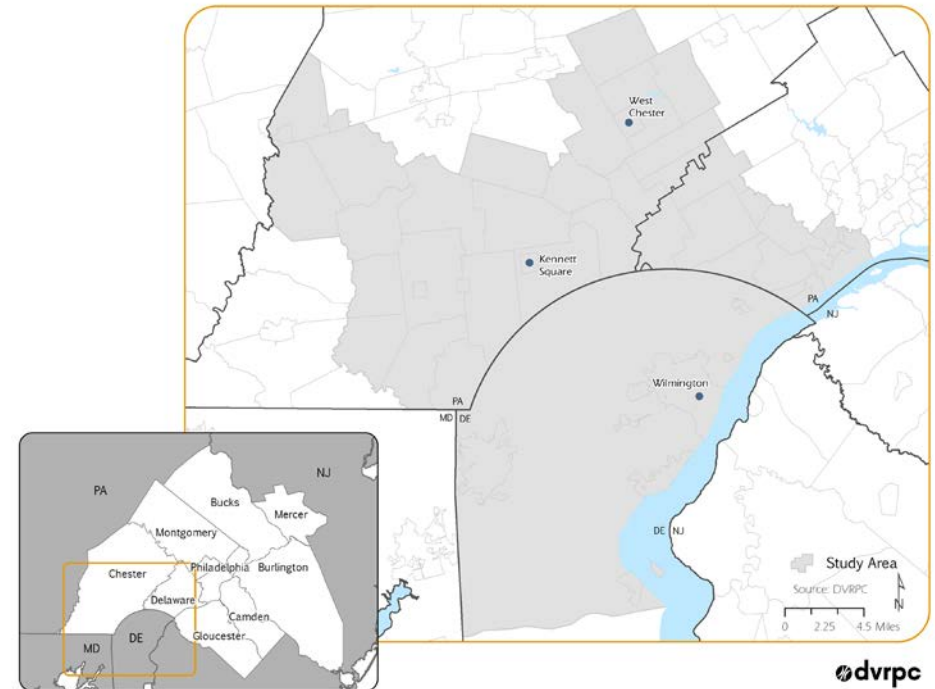
Population and Employment Density

Existing and projected population and employment density are important to understanding the current transit demand and to be able to predict where transit could serve the most people in the future. The maps used in this section subdivide the study area by Transportation Analysis Zones (TAZs), commonly used for this type of analysis.

Figure 2.2 shows the projected DVRPC model estimates for changes in population density between 2010 and 2040. The highest increases are in Kennett Square and West Chester. In addition, portions of the US 1 and US 202 corridors are also projected to become more densely populated. Conversely, parts of New Castle County, including Wilmington, are projected to lose population density over the next 30 years.

Figure 2.3 illustrates the projected changes in employment density between 2010 and 2040 for the study area. The highest increase is projected near Kennett Square and West Chester. In addition, employment density is expected to increase along the US 1, US 30, US 202, and I-95 corridors. Employment density in Wilmington is projected to decrease by 2040.

Figure 2.1: Study Area Map



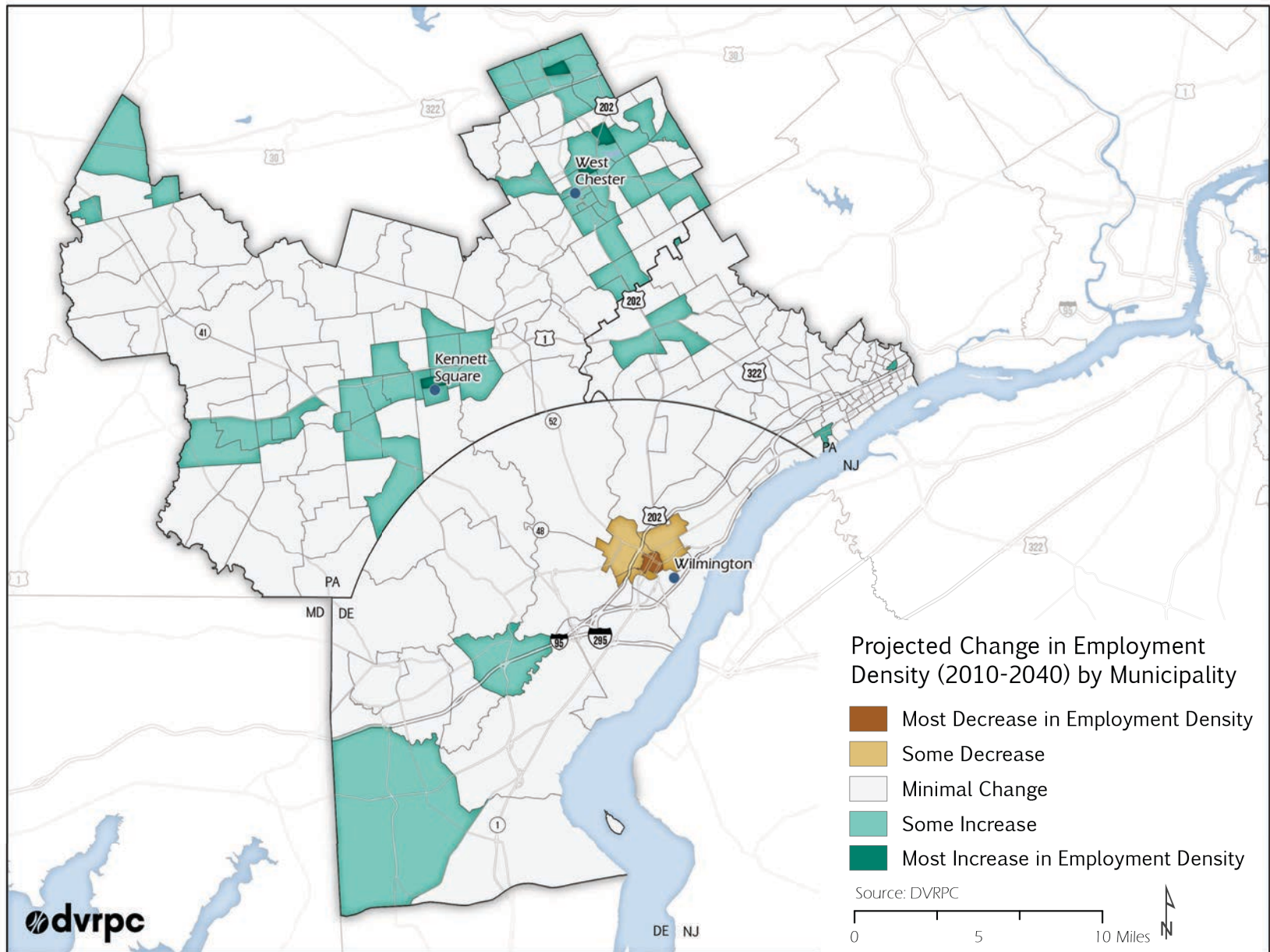
Source: DVRPC, 2016

Land Use

Land use in Chester County is primarily auto-centric. Buildings are set back from the roadway with parking lots in the front of buildings, and many streets lack pedestrian facilities, making it more difficult for potential passengers to access transit services. To counteract this, the Chester County Public Transportation Plan proposes to increase the percentage of growing municipalities to be served by transit.

Compared to Chester County, New Castle County has a wider variety of land uses. Wilmington and Newark are urban centers surrounded by suburban areas. In addition there are rural areas, such as the Brandywine district.

Figure 2.3: Projected Change in Employment Density in the Study Area between 2010 and 2040



CHAPTER 2: EXISTING CONDITIONS

Existing Transportation Network

This section reviews the existing public transit network in the study area. Figure 2.4 shows an inventory of public transit in the study area. While the map shows a substantial amount of existing service, there are no routes that cross state lines or provide service between southern Chester and New Castle counties. Tables 2.1 and 2.2 provide more detailed information about the existing services. From these tables it is clear that most of the services do not run at consistently high frequencies throughout the day.

DART AND SEPTA BUS SERVICE

There are five DART buses shown in Figure 2.4 and Table 2.1. DART Routes 10 and 20 provide access from Wilmington along major arterials (DE 48 and 52), terminating within one mile of the Chester County boundary. DART buses 2, 35, and 61 provide access along US 202 (Concord Pike) and also travel close to the Delaware County line. There are 12 SEPTA routes serving the study area, shown in Figure 2.4 and Table 2.2. The bulk of these buses provide service to and from Philadelphia via 69th Street Transportation Center. In addition, there is also service to suburban destinations, such as King of Prussia, Paoli, and West Chester. None of these SEPTA buses travel out of Pennsylvania.

Table 2.1: DART and Amtrak Service within Study Area

DART	Route Name	Major Destinations	Weekday Headways	Connecting Services
	DART Route 2	Wilmington Amtrak Station, Rodney Square, Concord Mall, Brandywine Commons, Brandywine Town Center Park-and-Ride	30–60 minutes	DART Routes 1, 6, 10, 11, 20, 21, 28, 33, 35, 38, 39, 40, 45, 48, 54, 55, 59, 301, 305, Amtrak, SEPTA Wilmington/Newark Line
	DART Route 10	Wilmington Amtrak Station, Rodney Square, Pennsylvania Ave and Rising Sun Lane, Centerville Kennett Park (limited)	20 minutes	DART Routes 1, 2, 6, 11, 20, 21, 28, 33, 35, 38, 39, 40, 45, 48, 54, 55, 59, 301, 305, Amtrak, SEPTA Wilmington/Newark Line
	DART Route 20	Wilmington Amtrak Station, Rodney Square, Wells Fargo Park-and-Ride (Old Lancaster Pike),	30–40 minutes (Peak hour only)	DART Routes 1, 2, 6, 10, 11, 21, 28, 33, 35, 38, 39, 40, 45, 48, 54, 55, 59, 301, 305, Amtrak, SEPTA Wilmington/Newark Line
	DART Route 35	Wilmington Amtrak Station, Chestnut Run, Rodney Square, Brandywine Town Center Park-and-Ride, ACE USA, Concord Mall, Brandywine Commons	30–60 minutes (Peak hour only)	DART Routes 1, 2, 6, 10, 11, 20, 21, 28, 33, 38, 39, 40, 45, 48, 54, 55, 59, 301, 305, Amtrak, SEPTA Wilmington/Newark Line
	DART Route 61	Claymont Train Station, Tri-State Mall, Trinity Presbyterian Park-and-Ride, Brandywine Town Center Park-and-Ride, Concord Mall, Brandywine Commons	60–120 minutes	DART Routes 1, 2, 21, 35, SEPTA Wilmington/Newark Line
Amtrak	Northeast Corridor	Wilmington, Philadelphia, and New York City	Approximately 1 hour	DART Routes 1, 2, 6, 10, 11, 20, 21, 28, 33, 35, 38, 39, 40, 45, 48, 54, 55, 59, 301, 305 SEPTA, and Amtrak Services

Source: SEPTA, DART, DVRPC, 2016

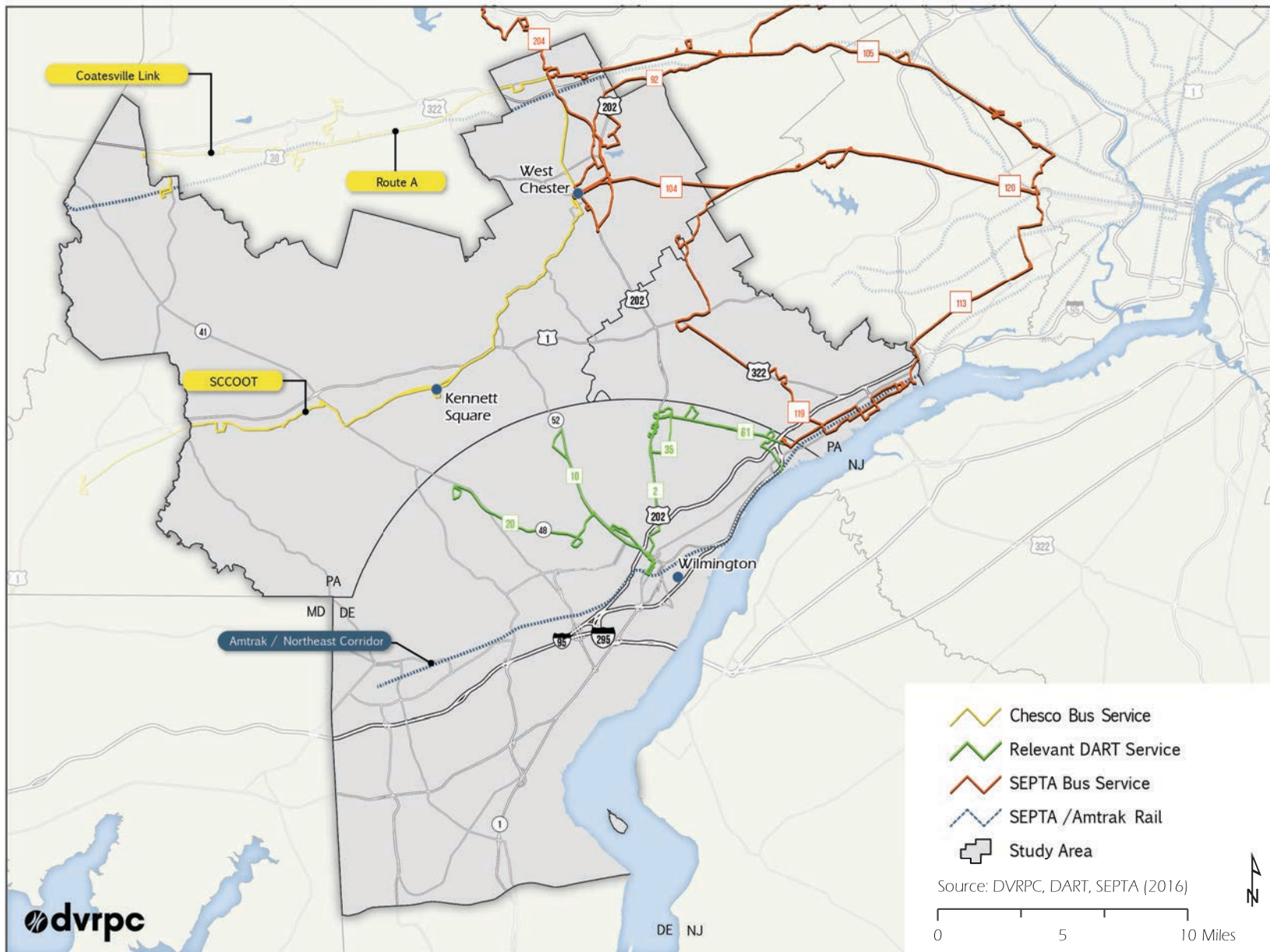
PASSENGER RAIL SERVICE

In addition to bus service, the study area is also served by passenger rail. There are two SEPTA Regional Rail lines: the Wilmington/Newark Line and the Paoli/Thorndale Line. Additionally there are two Amtrak lines: the Keystone and Northeast Corridor. These are all shown in Figure 2.4 and described in Tables 2.1 and 2.2.

ADDITIONAL TRANSIT SERVICES

TMACC manages the ChescoBus, which includes the SCCOOT and Coatesville Link services. Krapf's Coaches started operating as a subcontractor for SEPTA in 1994, and operates fixed-route transit throughout the tri-state area, such as Krapf's Coaches "A" Bus and paratransit. All public transit services offered through Krapf's are not for profit. Krapf's is also TMACC's vendor, operating the Coatesville LINK and SCCOOT bus services. The SCCOOT provides local service from Oxford to West Chester and throughout southern Chester County, Monday through Saturday.

Figure 2.4: Transportation Network in the Study Area



CHAPTER 2: EXISTING CONDITIONS

Table 2.2: SEPTA and TMACC Service within the Study Area

	Route Name	Major Destinations	Weekday Headways	Connecting Services
SEPTA	SEPTA Bus Route 92	West Chester, Exton, Malvern, Paoli, King of Prussia	Approximately 1 hour	Krapf's "A" bus, SCCOOT, UM Rambler, SEPTA Routes 99, 104, 105, 106, 123, 124, 125, 139, 204, 205, 206 and Amtrak/SEPTA's Exton, Malvern, Paoli
	SEPTA Bus Route 104	West Chester, Newtown Square, Havertown, 69th Street/Upper Darby	20-30 minutes	Krapf's "A" bus, SCCOOT, SEPTA Routes 92, 105, 106, 120, and 123 and 69th Street Transportation Center
	SEPTA Bus Route 105	Berwyn, Devon, Strafford, Ardmore, Overbrook, 69th Street/Upper Darby	Approximately 1 hour	SEPTA bus routes 92, 106, 120, 123, 204, 205, 206, Amtrak Paoli Station,
	SEPTA Bus Route 113	Tri State Mall (Delaware), Chester Transportation Center, 69th Street/Upper Darby	5-30 minutes	SEPTA Routes 11, 13, 68, 114, 115, and SEPTA's 69th Street Transportation Center
	SEPTA Bus Route 119	Cheyney University, Concordville, Boothwyn, Linwood, Marcus Hook, Trainer, Chester	Approximately 1 hour	SEPTA bus route 120 and SEPTA's Chester Transportation Center
	SEPTA Bus Route 120	Cheyney University, Newtown Square, Havertown, 69th Street/Upper Darby	Approximately 1 hour	SEPTA bus routes 92, 105, 106, 123 and SEPTA's 69th Street Transportation Center
	Wilmington/ Newark Regional Rail Line	Philadelphia, Newark, Wilmington	30 minutes	DART routes 1, 2, 6, 10, 11, 16, 20, 21, 28, 33, 35, 38, 39, 40, 45, 46, 48, 54, 55, 59, 61, 62, 301, 305, Cecil Transit 4, Amtrak, SEPTA Regional Rail, SEPTA Bus Routes
	Paoli/Thorndale Regional Rail Line	Paoli, Thorndale, and Malvern	30 minutes	Amtrak, SEPTA Regional Rail, SEPTA Bus Routes
Chesco Bus	SCCOOT	Oxford, West Grove, Avondale, Kennett Square, Longwood, West Chester	7 times per weekday	Krapf's Coaches "A" and SEPTA bus routes 92 and 104
	Krapf's Coaches "A" Bus	Coatesville, Thorndale, Downingtown, Exton, West Chester	Approximately 1 hour	LINK, SCCOOT, SEPTA bus routes 92, 104, 204, 205 and Amtrak/ SEPTA's Exton, Downingtown and Thorndale train stations
	Coatesville Link	Parkesburg, Sadsburyville, South Coatesville, Coatesville, West Brandywine	Approximately 1 hour	Krapf's Coaches "A"

Source: SEPTA, TMACC, DART, DVRPC, 2016

CHAPTER 3: TRANSIT DEMAND

The Chester County Public Transportation Plan found that less than 1 percent of Chester County residents use public transportation to get to work, suggesting the need for increased and improved service options. The plan identified one general area of the transit service gap to be between southern Chester County and Wilmington, in New Castle County. Figure 3.1 shows the commuter flows into and out of Chester County and the percentage of those commuters using public transit. The imbalance between commuters from Chester County to New Castle County and New Castle County to Chester, making it more difficult to create a cost-effective service model for public transit.

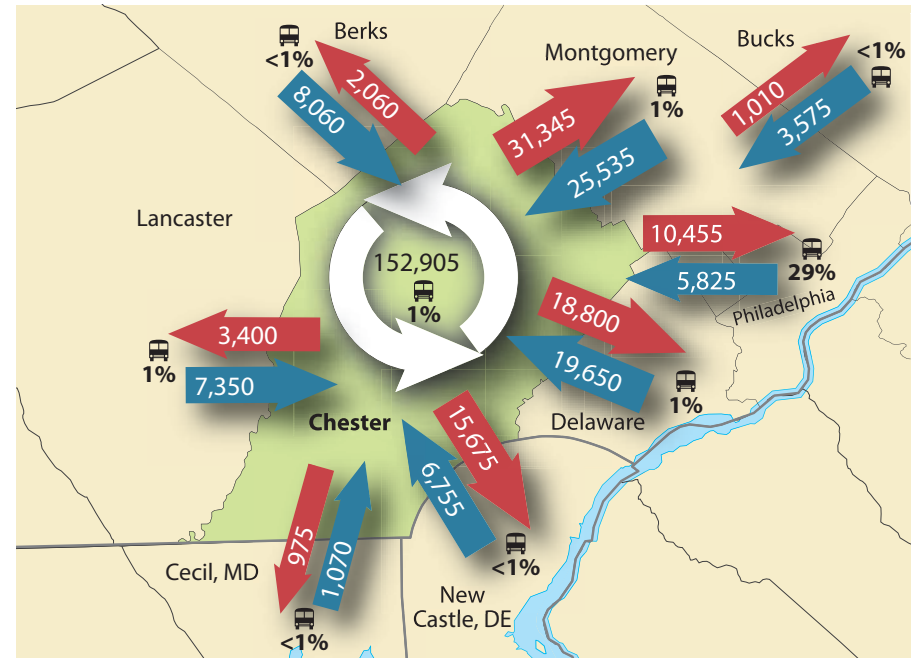
At the start of the project, the team developed a set of research questions to guide a more detailed analysis of transit demand and inform efforts to fill the service gap:

1. Who is there to serve?
2. Where do they live?
3. Where are they going?

The project team convened an advisory committee meeting to bring together public and private entities interested in planning and implementing a public transit service in this area. At one meeting, the team facilitated a discussion aimed at finding answers to these research questions. The discussion resulted in a list of possible destinations within Chester and New Castle counties that could be included in a new transit service. Figure 3.2 shows the location of those destinations and the existing transit routes in the study area.

To analyze the research questions, the project team identified types of potential riders. Census and travel survey data was used to find where these potential riders live and where they are going. This chapter details the data and methodology used in this analysis.

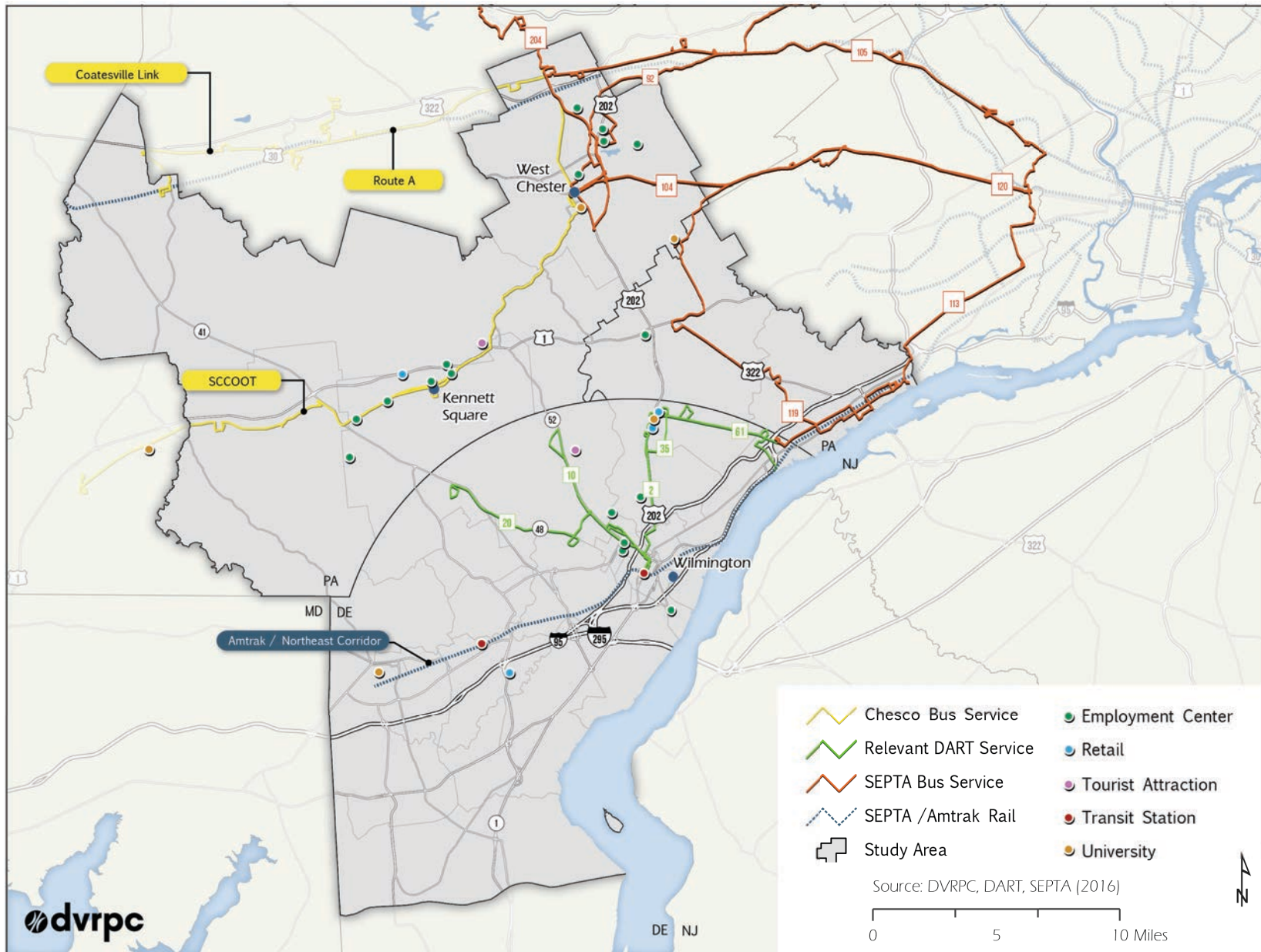
Figure 3.1: Existing Commute Flows in and out of Chester County



Source: Chester County Transportation Plan; ACS CTPP, 2006–2008; DVRPC, 2015

CHAPTER 3: TRANSIT DEMAND

Figure 3.2: Key Destinations and Existing Transit Service



Who Are the Potential Riders?

In an effort to identify potential transit riders, the project team examined two types of trips that a new transit service could accommodate: work trips and non-work trips. In each trip category, the team identified two types of potential riders that could make those trips. Identifying the distinction between rider types is an important part of choosing the appropriate service type and defining characteristics of the service. Knowing the target rider type also helps direct future marketing campaigns to attract riders.

Each trip type was broken down by the characteristics of riders who might make them, as shown in Figure 3.3. Non-work trips were divided into those made by tourists to reach such destinations as Longwood Gardens. Non-work trips are made by local residents to complete day-to-day activities, such as going to appointments or running errands. Work trips were divided into those made by Choice riders and those made by Non-Choice riders. This rider distinction is based on the transportation options available to that rider. Choice riders are those who typically have access to a personal vehicle. Conversely, Non-Choice riders likely rely heavily on transit and do not always have access to a personal vehicle.

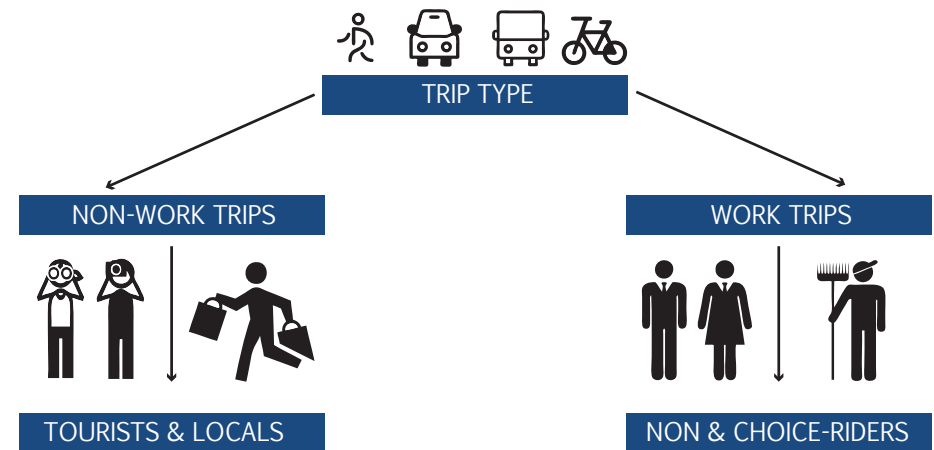
Where Do They Live?

The next step in understanding transit demand was to identify where these four rider types live, or where they would be most likely to start their transit trip. Of the four rider types (Tourists, Local, Choice, and Non-Choice), tourists are the most unique and were analyzed separately.

TOURISTS

Longwood Gardens and Winterthur are the largest tourist destinations in the study area, drawing visitors from across the country and internationally. Longwood Gardens consists of indoor and outdoor gardens designed to inspire “people through excellence in garden design, horticulture, education, and the arts” (longwoodgardens.org). Winterthur is the former home of horticulturalist and collector Henry Francis DuPont. It is now an estate museum displaying his collections and gardens. Figure 3.4 illustrates Longwood Gardens visitor trends based on attendance data from 2014 and 2015. One unique aspect of tourist travel is its temporal distribution.

Figure 3.3: Trip and Passenger Types



Source: Chester County Transportation Plan; ACS CTPP, 2006–2008; DVRPC, 2015

Figure 3.4 shows a strong weekend peak in visitation to Longwood Gardens, with the highest number of visitors on Sundays. Figure 3.4 also illustrates that there is a strong seasonal peak, with the holiday season (December) drawing about twice the number of visitors than the second highest month, May.

Identifying where tourists begin their trip, or their origin, is difficult, since out-of-town visitors may be staying in a nearby hotel or with family or friends. Longwood Gardens keeps detailed records about their visitors. Zip codes of residence for visitors in 2014 and 2015 were shared with the project team for origin analysis. The average annual number of visits from each zip code is shown in Figure 3.5. The darker the blue, the more visits were made by people living in that zip code.

CHAPTER 3: TRANSIT DEMAND

The highest number of visits are made by people living in zip codes that are close to and within the study area. While people travel from all over the country to visit Longwood Gardens, the vast majority are coming from nearby, with almost 70 percent residing in Pennsylvania. It is important to note that the abrupt end of the light blue on the map in Figure 3.5, does not mean that zero visitors came from beyond approximately 100 miles. The map includes the best available data to illustrate the important trends.

Since this analysis revealed that tourists have different peak travel days and times than typical commuters, there is potential for a shared service that could target different rider types at different times, while using the same vehicles.

Figure 3.4: Average Number of Visits to Longwood Gardens

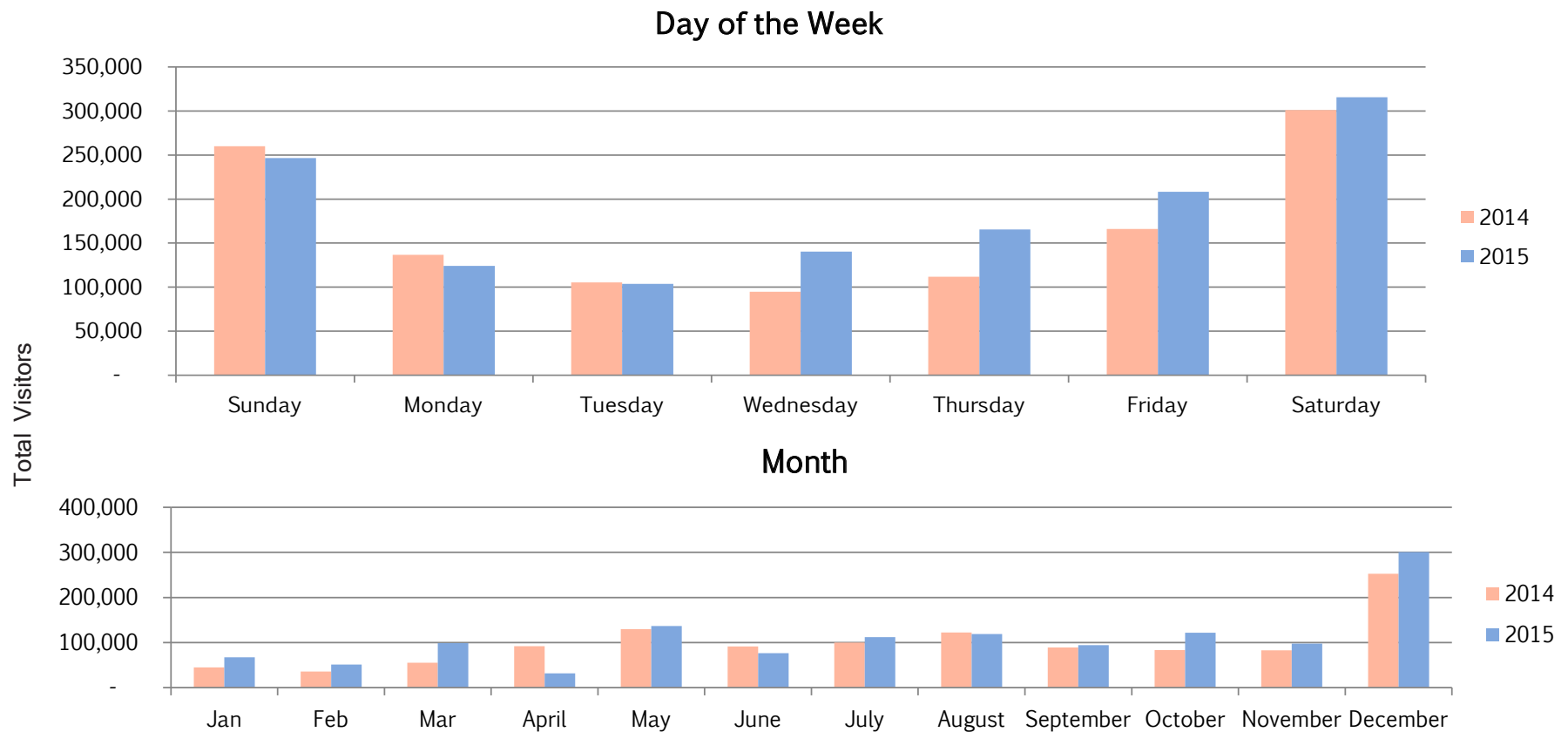
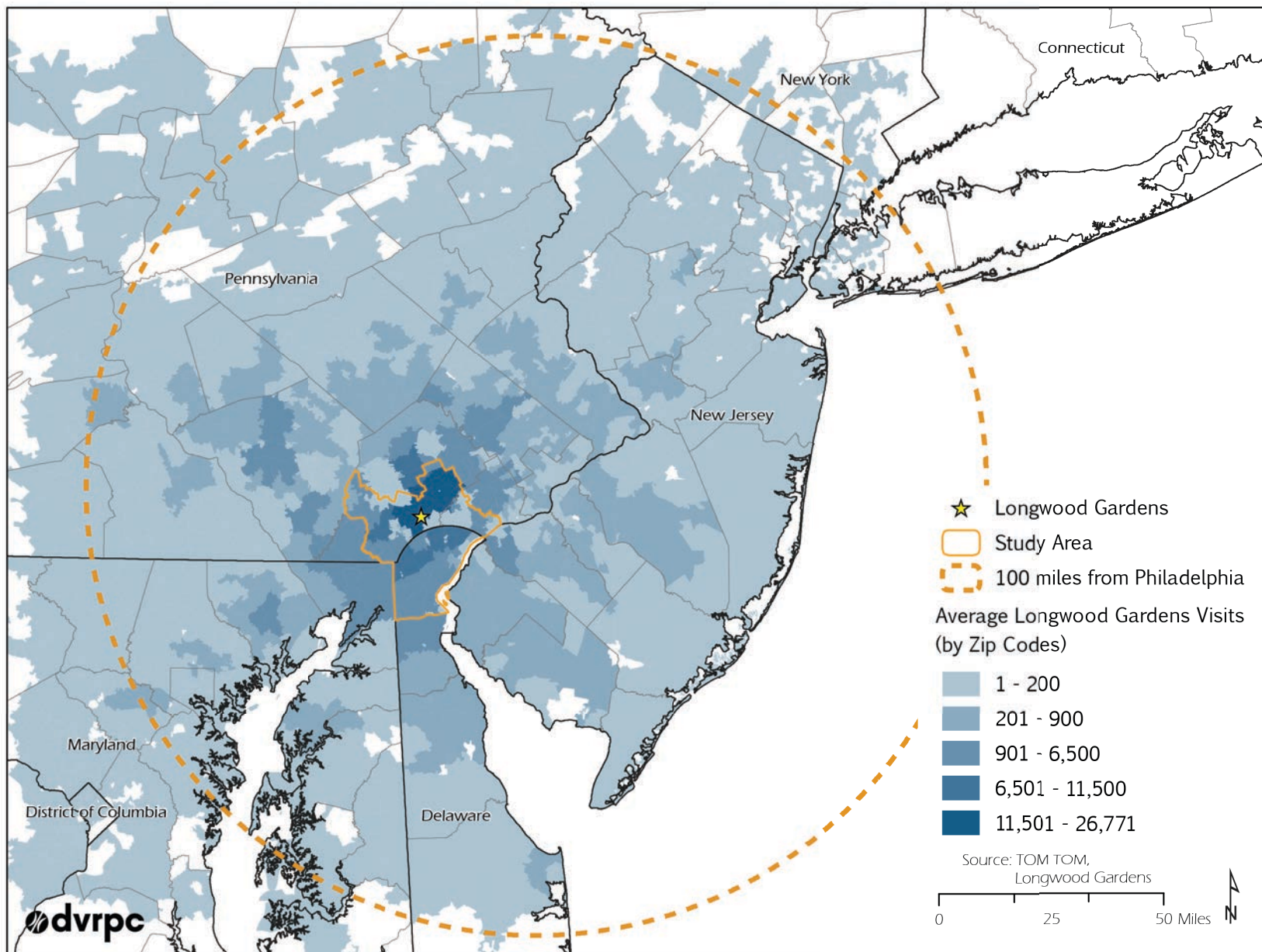


Figure 3.5: Longwood Gardens Visitor Origins (2014–2015 Annual Average)



CHAPTER 3: TRANSIT DEMAND

LOCAL, CHOICE, AND NON-CHOICE RIDERS

Local, Choice, and Non-Choice riders were analyzed using the same methodology. The Local rider type is used as an example in this section to discuss the methodology step-by-step. To determine where these riders live, the project team first identified the demographic characteristics that, for the purposes of this study, would together determine the makeup of each rider type. The three primary demographic characteristics analyzed were age, household income, and the number of vehicles available by household. Demographic characteristics are further subdivided to isolate each rider type, as described in Table 3.1.

Each rider type (Local, Choice, and Non-Choice) was assigned three of the subdivided demographic categories by the study team, as shown in Figure 3.6. The project team determined that these groupings would provide a reasonable indication of reliance on, and potential use of, public transit. The three rider types are described further below.







Local Rider - A person who needs to travel by public transit for necessities, such as food, and appointments. This passenger type includes the following demographic categories: people age 65+, people from households in the lower income category, and people with access to zero or one vehicles.

Choice Rider - A person who chooses to travel by public transit to get to work even though they have a vehicle available to them. This passenger type includes the following demographic categories: people age 25-65 (or typically of working age), people from households in the higher income category, and people with access to one or more vehicles.

Non-Choice Rider - A person who does not always have availability of a personal vehicle, and therefore needs to travel by public transit, walk, or bike for their work trip. This passenger type includes the following demographic categories: people age 25-65 (or typically of working age), people from households in the lower-income category, and people with access to zero or one vehicles.

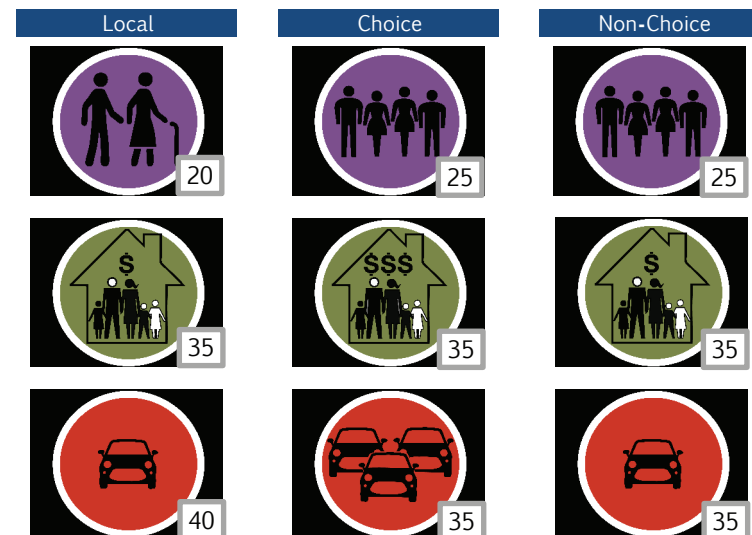
The project team believed that each characteristic affected a person's rider type differently, so the demographic categories within each rider type were weighted to reflect the importance of each characteristic (see Figure 3.6).

Table 3.1: Demographic Categories

Demographic Category	Icon
Household Income: Less than or Equal to \$35,000	
Household Income: Greater than \$35,000	
Age: 65+	
Age: 25-65 (working age)	
Number of Vehicles: 0 or 1	
Number of Vehicles 1 or more	

Source: DVRPC, 2016

Figure 3.6: Weight Allotted to Each Demographic Category by Rider Type



Source: DVRPC, 2016

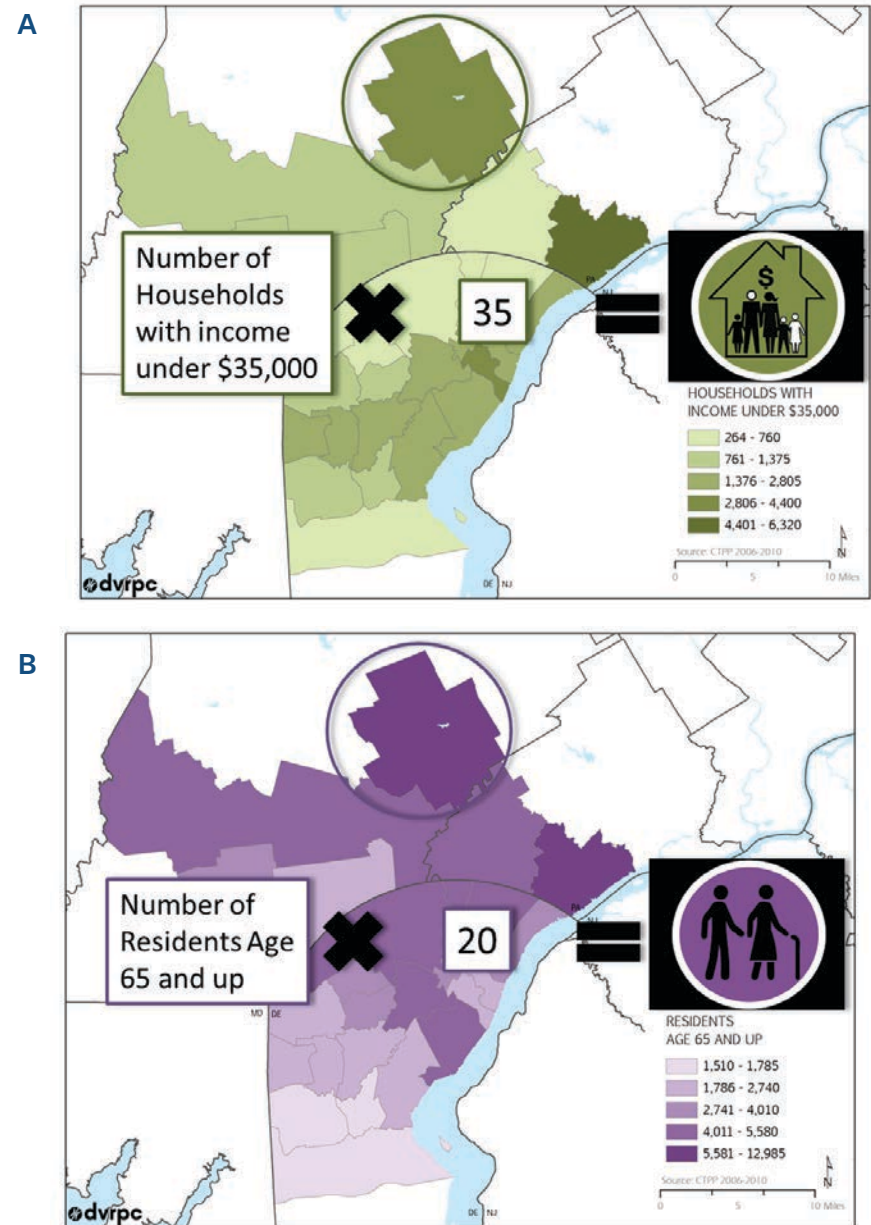
The study area was broken into Transportation Analysis Districts (TADs), a census-designated geography, for detailed analysis. Weights, as shown in the boxes in Figure 3.6, were multiplied by the number of people in each TAD that fell into that demographic category. The weighted values were then added together to identify the TADs most likely to produce riders of each type.

To explain this process visually, the series of graphics in Figure 3.7 illustrates the methodology for analyzing the question, “Where would Local riders come from?” The maps in the series show the study area divided into TADs. The darker the color of the TAD, the more residents of that TAD fall into the demographic category being analyzed. This step-by-step explanation uses the West Chester TAD as an example.

The dark green color of the West Chester area, circled in Figure 3.7A, represents the number of households in that TAD with income under \$35,000. That number was multiplied by the weight for local riders (35). The result was a weighted value, represented by the legend bins.

Similarly, the dark purple color of the West Chester TAD in Figure 3.7B represents the number of residents aged 65 and older. That number was multiplied by the weight, 20, to get a weighted value.

Figure 3-7 (A and B): Where Would Local Riders Come From?



Source: DVRPC, 2016

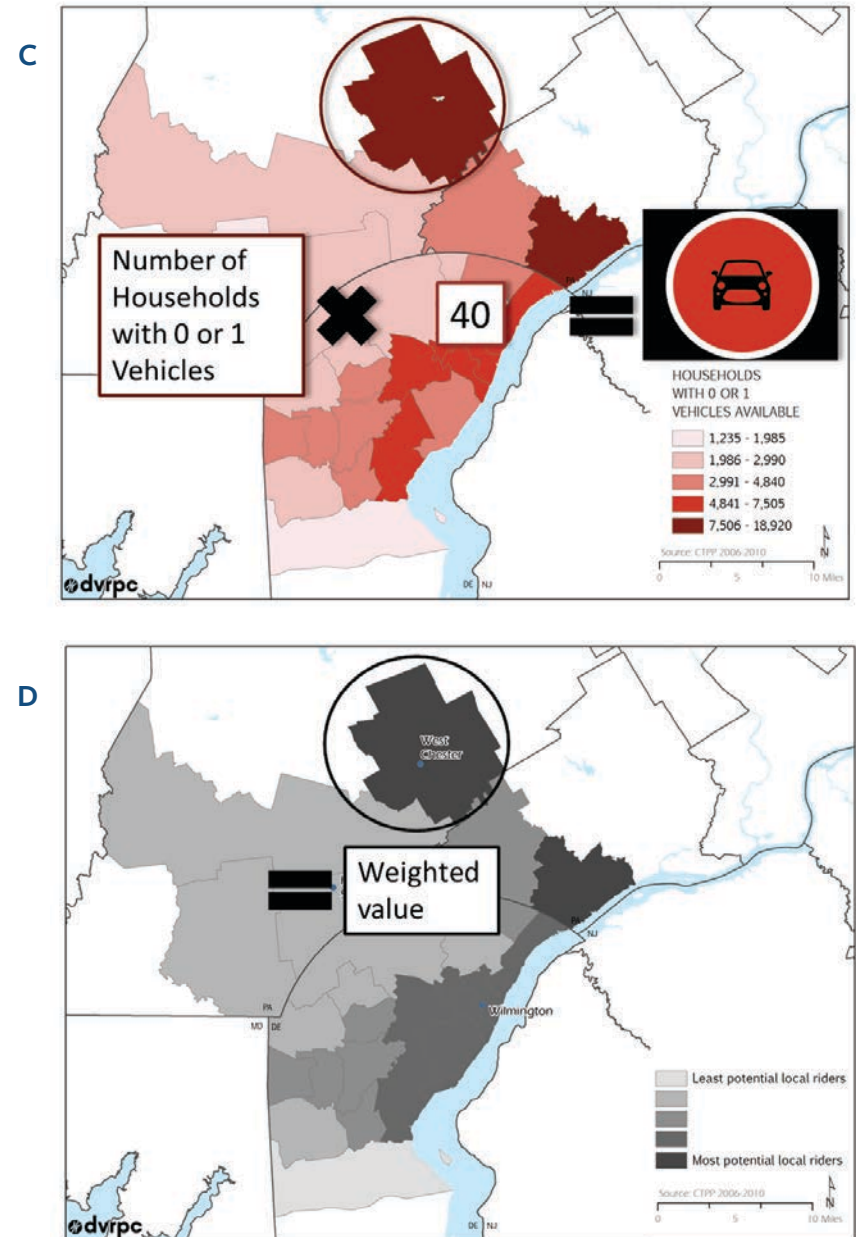
CHAPTER 3: TRANSIT DEMAND

The dark red color of the West Chester area in Figure 3.7C, represents the number of persons in households with zero or one vehicles available. That number was multiplied by the weight, 40, to get a weighted value.

Finally, the weighted values were added together to determine the total weighted value for the West Chester TAD, as shown in Figure 3.7D. The higher the weighted value, the more potential for that area to produce Local riders.

According to the results, the West Chester area has the highest potential for Local riders. Since this analysis is based on the number of people in each TAD that fall into certain demographic categories, it is logical that West Chester, the TAD with the highest population in the study area, has a high number of potential riders. Wilmington also has a relatively high potential for local riders. Northwestern New Castle County and the area around Kennett Square have the lowest potential for local riders.

Figure 3.7 (C and D): Where Would Local Riders Come From?



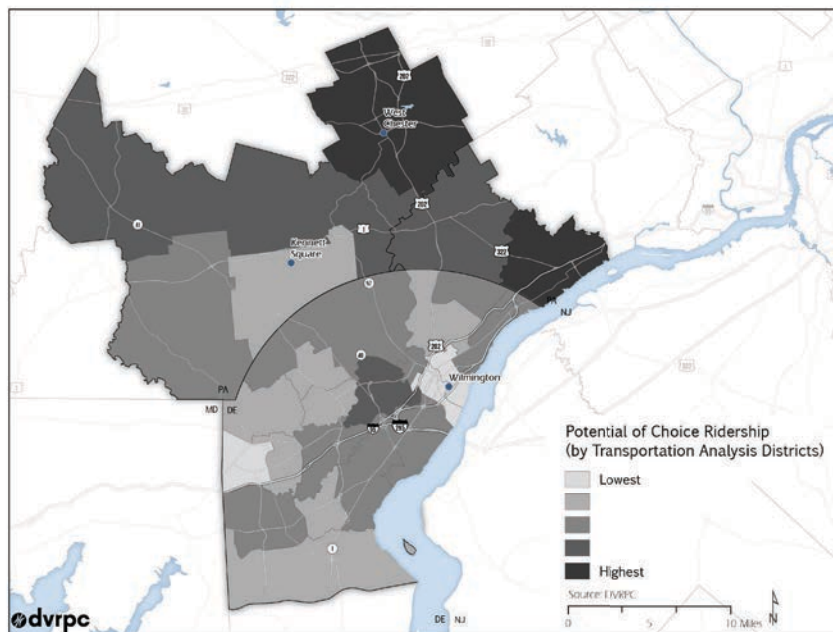
Source: DVRPC, 2016.

Figure 3.8 shows the results for Choice riders using the same method of analysis. In Figure 3.8, West Chester has the highest potential for Choice riders, but the rest of the study area looks quite different from the Local rider analysis. Specifically, Wilmington has a relatively low potential to produce Choice riders.

Finally, a look at where Non-Choice riders live: Figure 3.9 reveals that West Chester, again, has the highest potential for Non-Choice riders. The area south of Wilmington also has a high potential, while northwestern New Castle County has the lowest potential to produce Non-Choice riders.

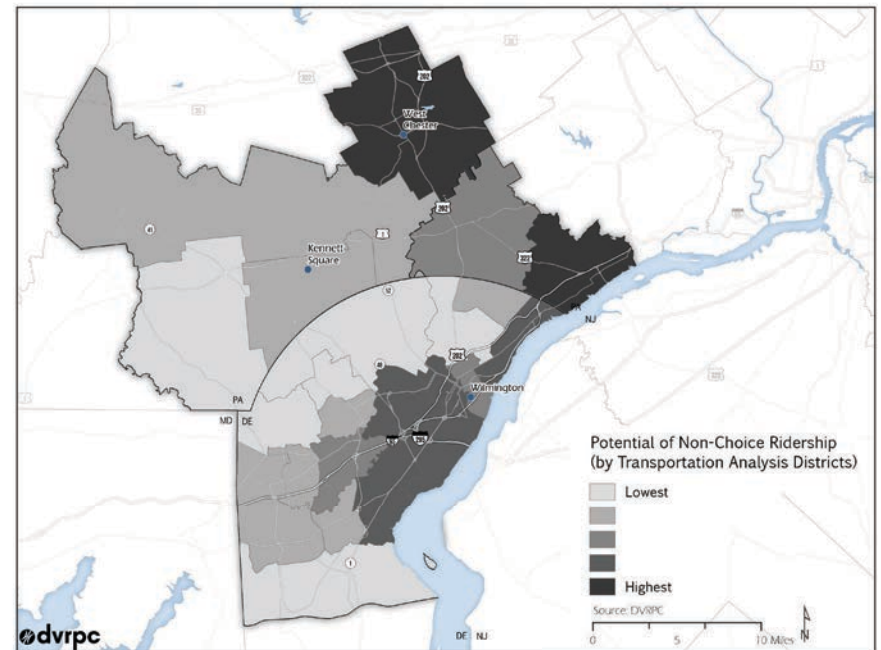
While there are high concentrations of both Choice and Non-Choice riders within the West Chester area, it is also the area that has been previously served and was not successful in sustaining high ridership.

Figure 3.8: Where Would Choice Riders Come From?



Source: DVRPC, 2016

Figure 3.9: Where Would Non-choice Riders Come From?



Source: DVRPC, 2016

Where Are They Going?

With an understanding of who could be served by a new transit service and where they would likely be coming from, the next step in determining demand was to explore where these riders would potentially be going. In the process of developing potential rider types, trips were divided into work trips and non-work trips. Fortunately, there are a variety of data sources available with information about work trips. The project team relied most heavily on Census Transportation Planning Products (CTPP) data from 2006-2010 for this analysis. The CTPP data contains journey-to-work information, including home and work locations, broken down by a variety of characteristics, such as mode of transportation and demographics. This work trip data was used to analyze where Choice and Non-Choice commuters were traveling and to visualize the highest-volume travel flows.

Unfortunately, the CTPP dataset does not include information about non-work trips. While work trips are the most consistently repeated, they do not represent the variety of trips made on a daily basis. The project team used the latest DVRPC Household Travel Survey (HTS), from 2012-2013, to analyze travel flows for non-work trips. Although the HTS had a relatively small sample size and only included the DVRPC region (not New Castle County), it was the best and most relevant data source available to allow for relative comparisons.

Travel flows for both trip types were analyzed at two geographic levels, as shown in Figure 3.10. The larger TAD (Transportation Analysis District) level was used for origins and the smaller TAZ was used for destinations. While choosing the smaller geography for destinations preserved useful detail, choosing the larger geography for the origins allowed for an aggregated visualization of trends without providing too much information and making the maps impossible to read. This section will use West Chester again as an example to explain the trends identified in the map analysis.

Figure 3.11 is an example of the travel flow maps analyzed by the project team. This map shows where Non-Choice riders from the West Chester TAD are traveling to for work. Similar maps were examined for each rider type (Local, Choice, and Non-Choice riders) and each origin TAD. This visual analysis revealed three major trends:

- Non-Choice riders make the longest trips.

- Local riders stay close to home.
- The difference in directional commuter flows between the two counties is significant.

The rest of this chapter discusses and illustrates these trends in greater detail.

Figure 3.10: Analysis TAD and TAZ Boundaries

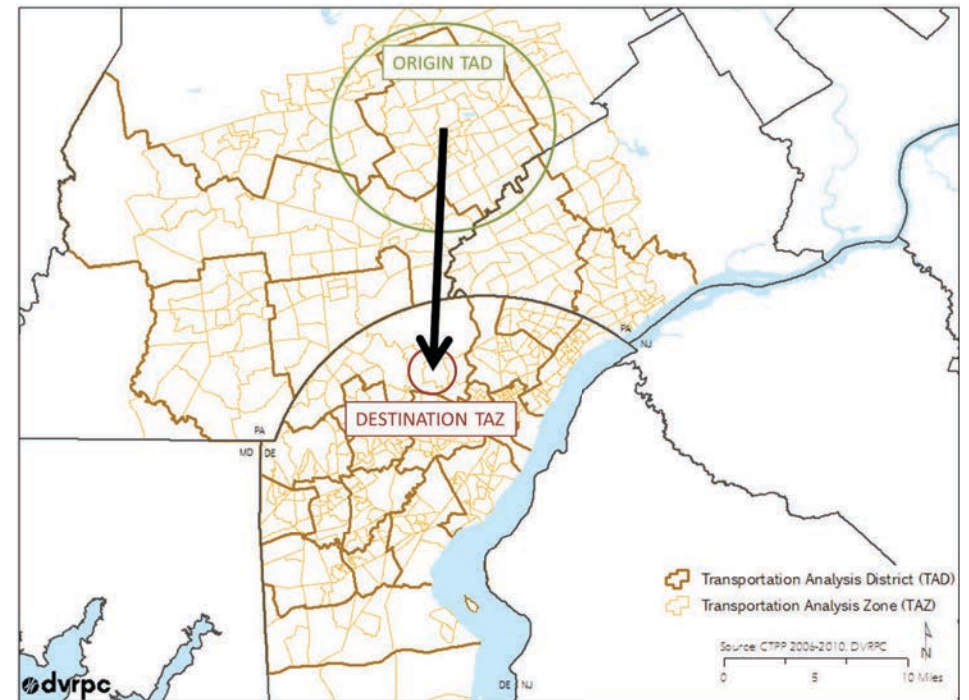
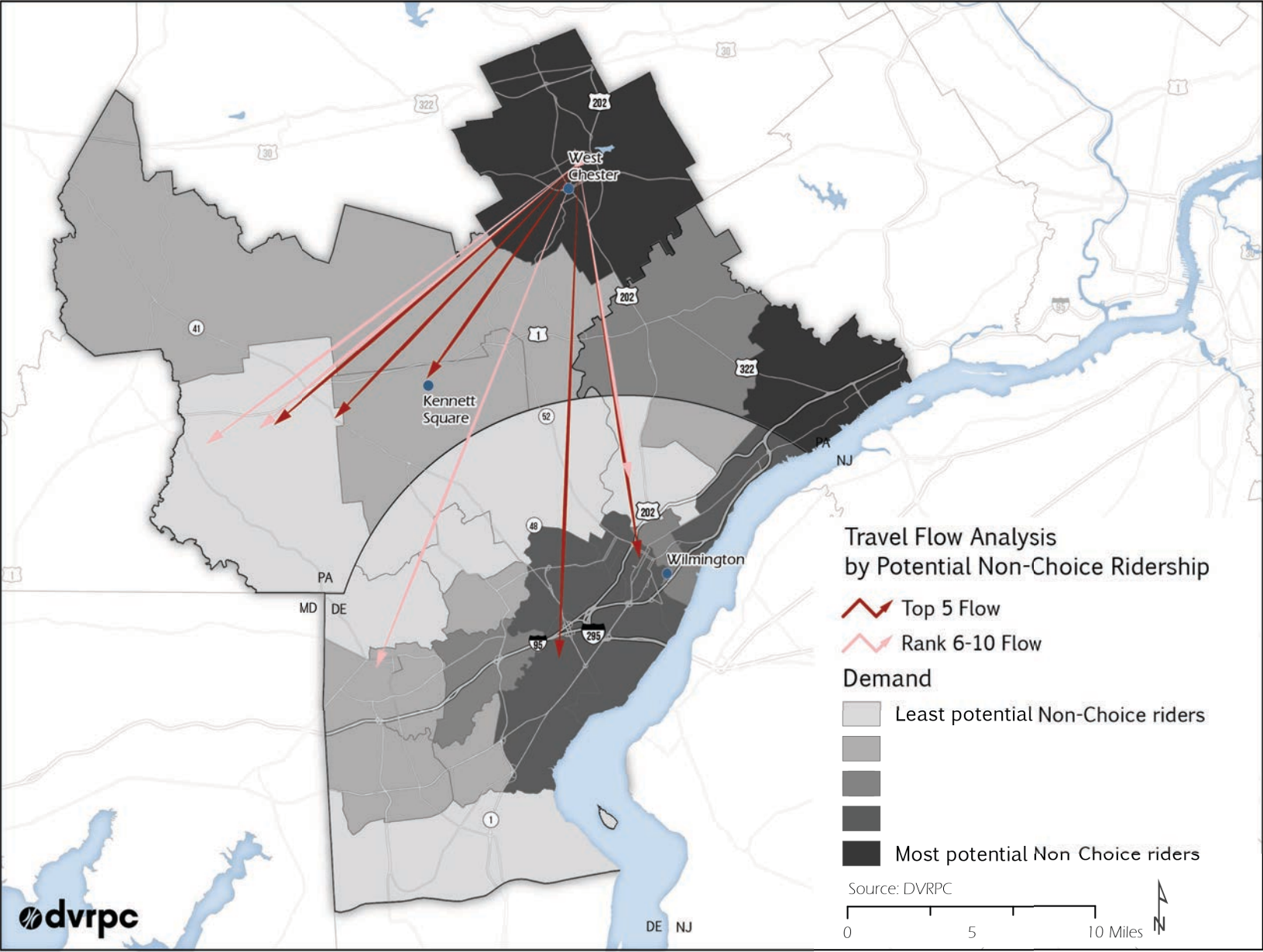


Figure 3.11: Travel Flow Analysis Example

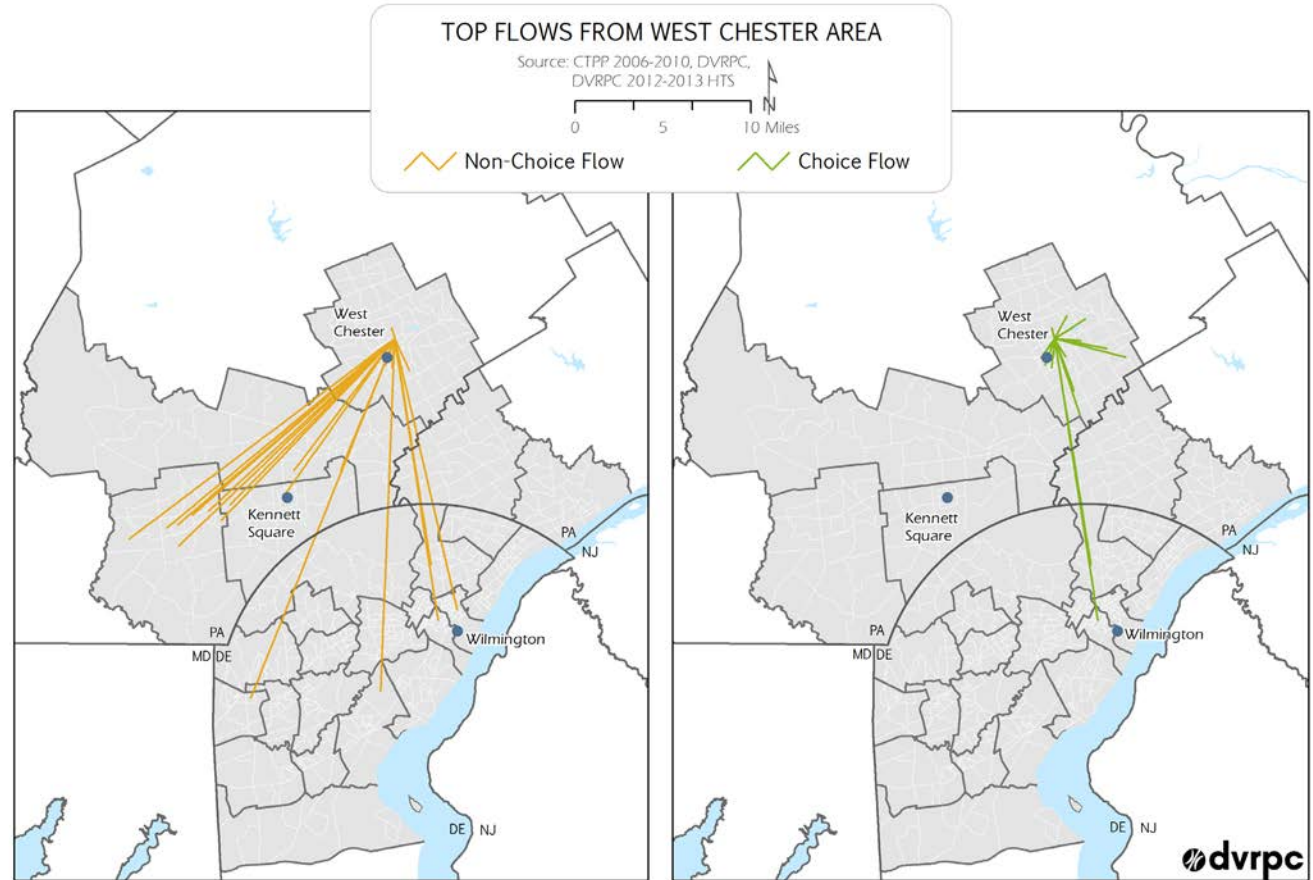


NON-CHOICE RIDERS MAKE THE LONGEST TRIPS

First, the analysis revealed that Non-Choice riders tend to travel farther for work than Choice riders do. However, Choice riders living in southern Chester County do make the long commute to the Wilmington area for work. These trends are evident in Figure 3.12.

The orange lines on the left represent the highest volume Non-Choice rider flows made by residents of the West Chester area TAD. The green lines on the right represent the most common Choice rider flows from the same area. Longer lines represent longer distances between residence and workplace. The flows on the maps clearly show that Non-Choice riders are traveling significantly farther for work, with the exception of Choice riders traveling to jobs in the Wilmington area. The Non-Choice flows exhibit the difficulty of providing transit service from West Chester to New Castle County, in that there are dispersed travel patterns. Additional maps comparing Non-Choice and Choice rider flows are found in Appendix A.

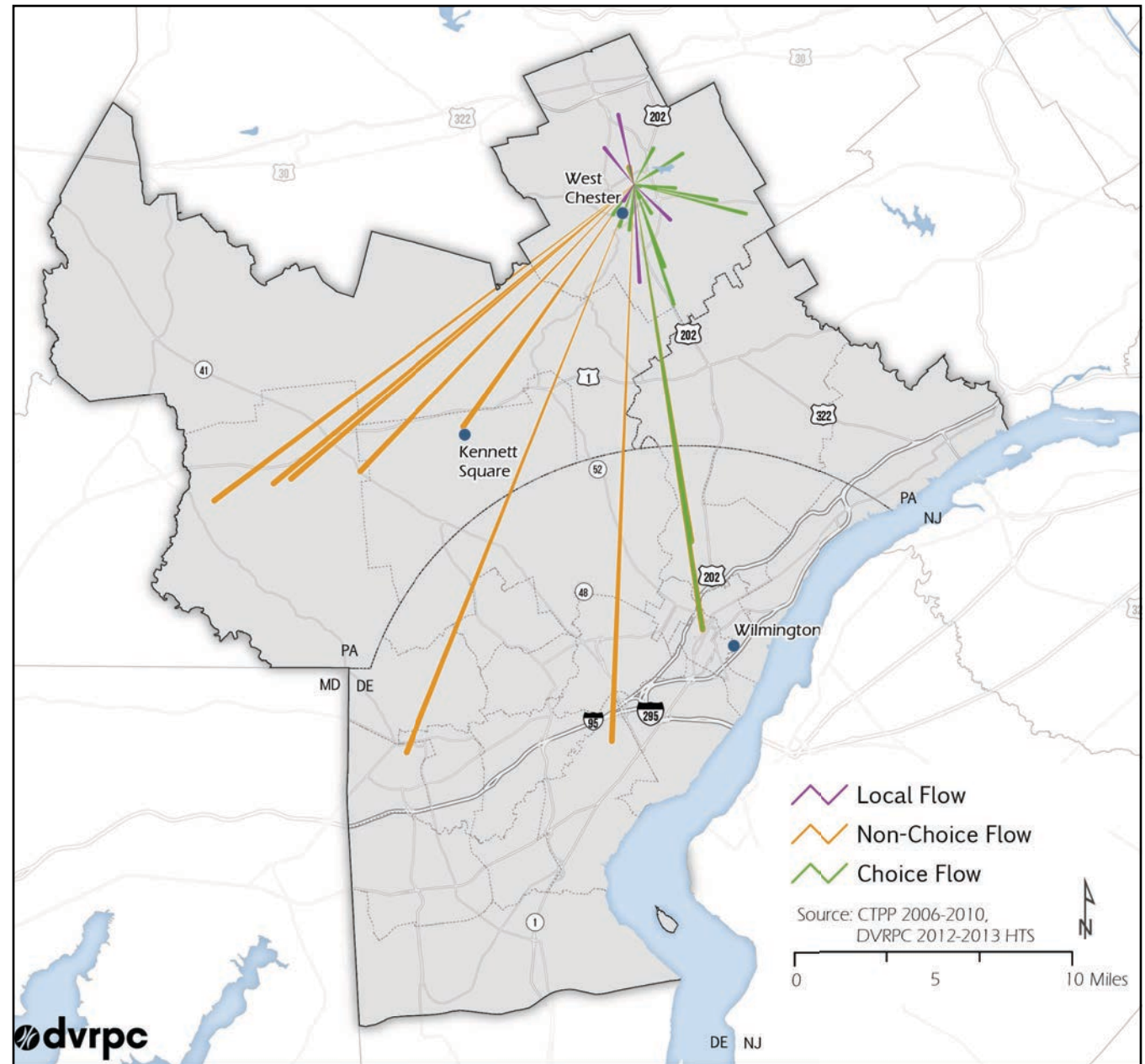
Figure 3.12: Non-Choice and Choice Top Commuter Flows from the West Chester TAD



LOCAL RIDERS STAY CLOSE TO HOME

Second, the map analysis highlighted that while Local riders live in areas similar to those of Non-Choice riders, they make much shorter trips. Using West Chester as an example again, Figure 3.13 shows that Non-Choice riders, in orange, made much longer trips than the Local riders, in purple. This is expected due to the demographic makeup and trip purposes of these two groups. Non-Choice riders are those making work trips while Local riders are those making non-work trips. Residents with limited access to vehicles are likely to plan errands and appointments close to home where they can be reached more easily. However, Non-Choice riders may not have the same options about the location of their employment, which could force them to travel farther for work.

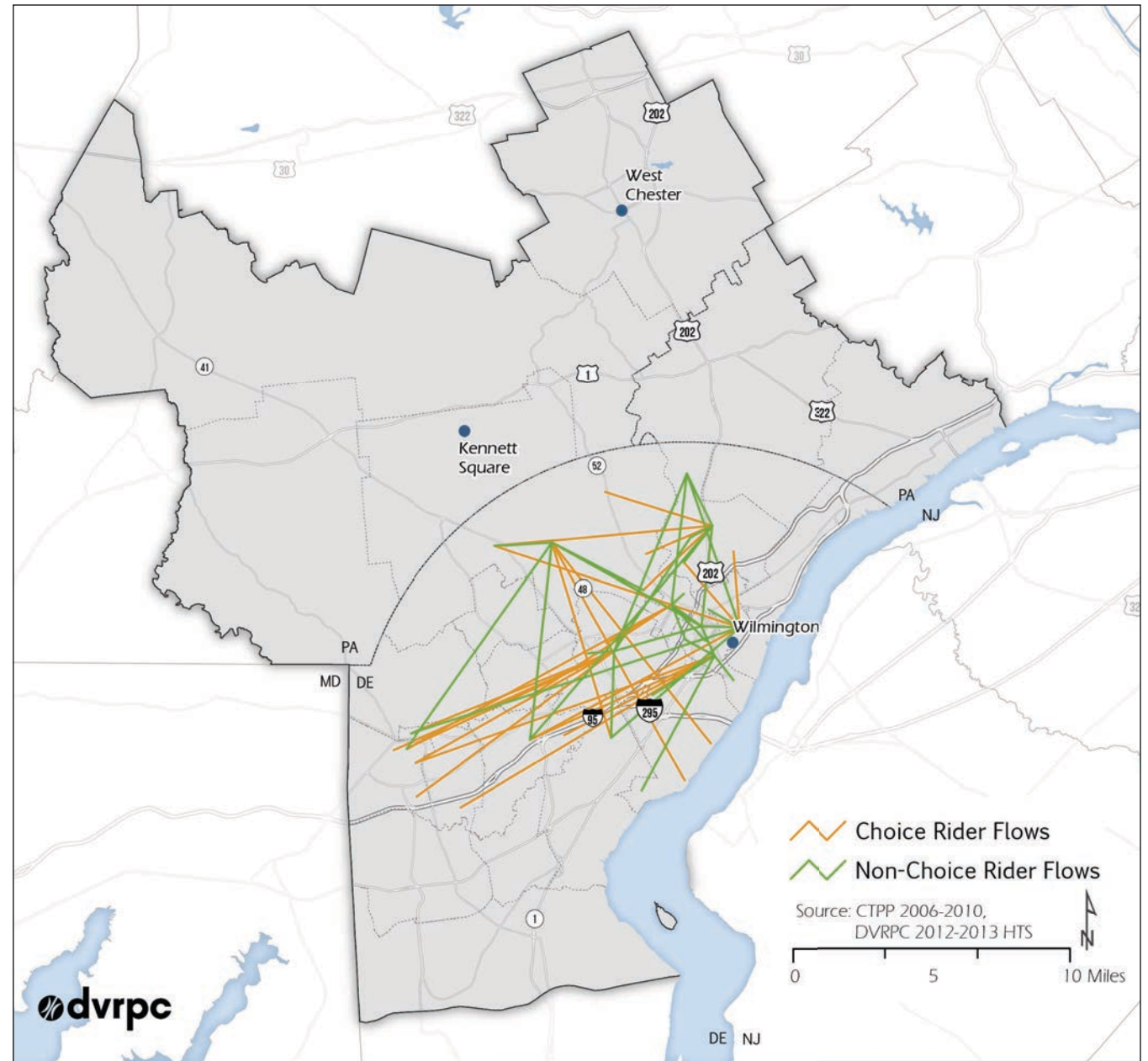
Figure 3.13: Local, Non-Choice, and Choice Top Commuter Flows from the West Chester TAD



DIFFERENCE IN DIRECTIONAL COMMUTER FLOWS

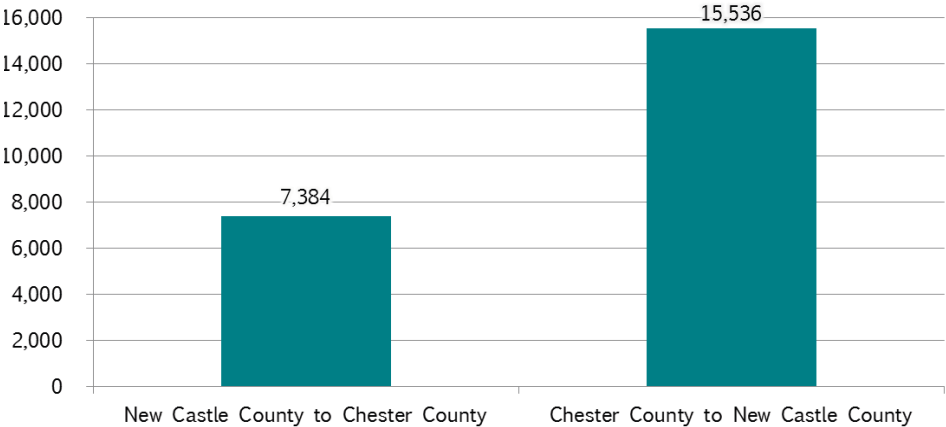
Figure 3.14 shows the highest-volume commuter flows for Choice and Non-Choice riders originating in six of the New Castle County TADs. The map is busy and individual lines are difficult to see, but it illustrates the point that none of the lines cross the state line into Pennsylvania. That does not imply that this type of inter-state trip does not exist; it is simply not one of the highest-volume travel flows from these areas.

Figure 3.14: Top Choice and Non-Choice Commuter Flows from Northern New Castle County



The travel flow analysis revealed the fact that there are almost twice as many work trips from Chester County to New Castle County than from New Castle County to Chester County. Figure 3.15 uses data from On the Map, another commuter flow data source, to show the difference.

Figure 3.15: Commuter Flows by Direction



Source: U.S. Census Bureau, 2016: OnTheMap Application, Longitudinal-Employer Household Dynamics Program, <http://onthemap.ces.census.gov/>

Figure 3.16 shows the results of a park-and-ride license plate survey conducted by the University of Delaware to see where lot users live. The size of the pie chart represents the number of cars parked in the lot while the darker color represents the portion of cars with Pennsylvania license plates. Some of the smaller lots farther south in Delaware do not draw any vehicles from Pennsylvania. Conversely, some of the larger lots and those closer to the Pennsylvania-Delaware border draw 25 percent or more cars from Pennsylvania. This map reiterates the fact that trips from Pennsylvania to New Castle County are occurring. A detailed table with the data visualized in this map is found in Appendix A.

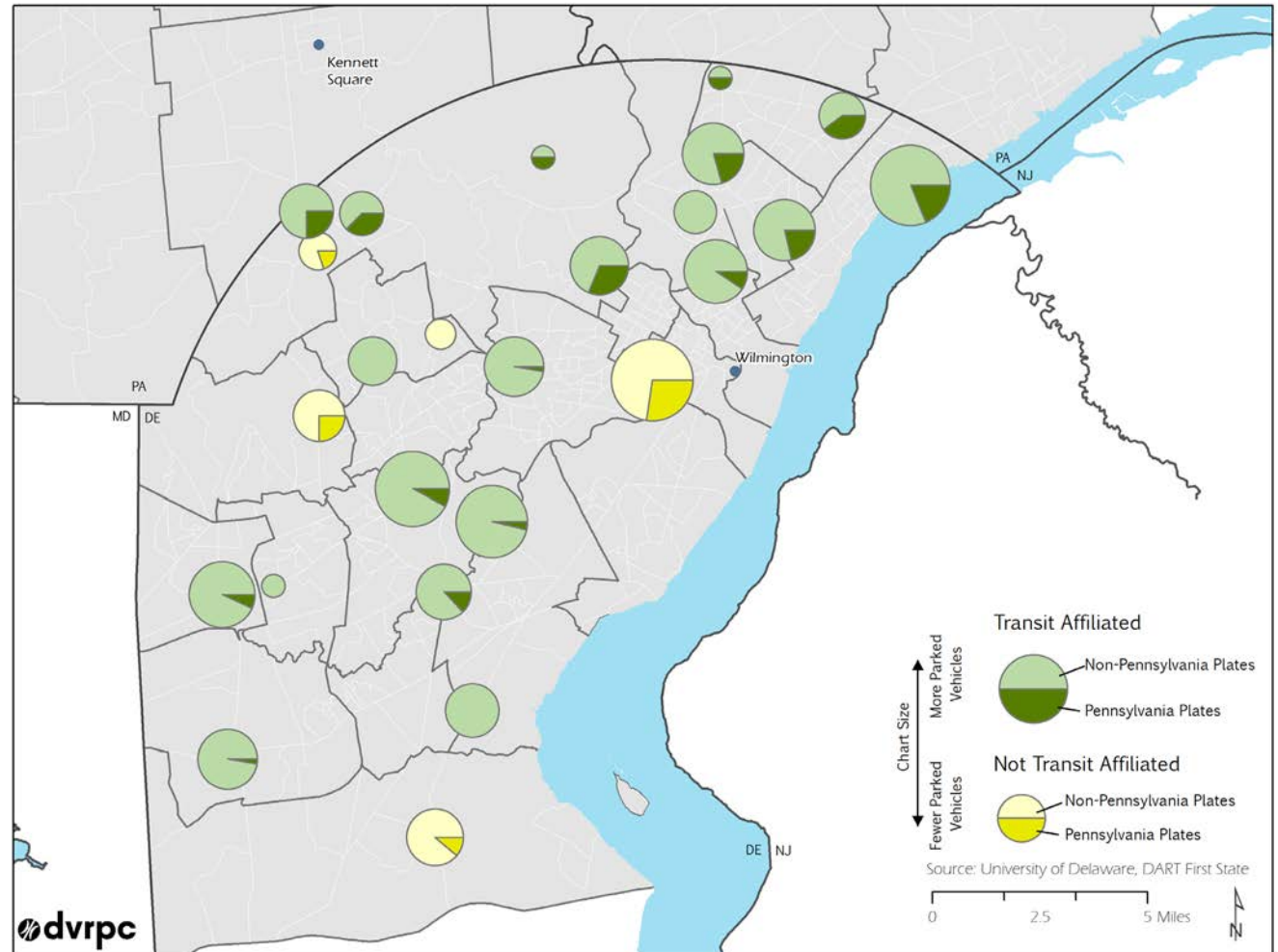
Conclusion

In summary, the transit demand analysis revealed that:

- Tourist trips to Longwood Gardens peak on the weekends, which is the opposite of the typical work trip peaks.
- Non-Choice riders make the longest trips while Choice commuters and Local riders stay close to home.
- Commuters do make trips from Chester County to Wilmington and New Castle County, but not nearly as many commute in the opposite direction.

Recommendations based on this analysis are found in Chapter 5.

Figure 3.16: Park-and-Ride License Plate Survey Results, Fall 2015



CHAPTER 4: TRANSIT ALTERNATIVES

In recent years, the transportation network has expanded to include new and advanced ways to call for, ride in, and pay for transit service. As these services evolve they are becoming cheaper and more convenient to use, and thus are incredibly popular. These services (also called Transportation Networking Companies [TNCs]) are being used by potential public transit passengers for work and non-work trips. These additional options have created challenges for typical local fixed-route bus service to compete for new passengers.

This chapter provides the definitions, advantages, and disadvantages of fixed and flexible bus service in response to the transit demand findings. DVRPC conducted interviews with transit providers in Pennsylvania, New Jersey, Delaware, and Boston, to further understand the complexities of implementing transportation alternatives. Specifically, shuttles, limited stop bus service, vanpools, and emerging on-demand services are explored further in this chapter. This research was compiled into case studies that highlight implementation strategies and techniques that could provide advice if and when a transit service is created between southern Chester County and New Castle County.

Fixed and Flexible Bus Service

The DVRPC team investigated the application of fixed- and flexible-route bus services for this study.

FIXED-ROUTE BUS SERVICE

Fixed-route bus service is when vehicles provide service along a set path with scheduled times and stops. All of the existing services offered by SEPTA, Amtrak, TMACC, and DART discussed earlier in this report (Chapter 2) are fixed route. Fixed-route service is generally successful in areas with high residential and employment density, with activity centers at stops along and at either end of the route. As people have moved farther from dense urban centers, it has become harder to provide public transit service that is time and cost competitive with a personal vehicle or localized transit service.

FLEXIBLE-ROUTE BUS SERVICE

Flexible-route bus service does not adhere to a set schedule, specific route, or set of stops. Typically, fixed- and flexible-route strategies are combined to create a flexible-route pattern.¹

Research about flexible-route service suggests that it is important to evaluate the reasons for implementation prior to altering an existing fixed-route service or creating a new service. TCRP Report 140 provides reasons to create flexible service:

- providing connections to other public transportation services in the area;
- providing basic mobility and travel options when demand is low; and
- introducing public transit to new users.

CHAPTER 4: TRANSIT ALTERNATIVES

Flexible-route service is typically more expensive to operate than fixed-route but less expensive than demand-responsive. Successful flexible-route service in suburban areas is typically a feeder to major transit connections and office campuses, the replacement of an unsuccessful local bus route, or a circulator for seniors or youth. When populations are less transit dependent or trip purposes are time sensitive, flexible public transportation service is not as successful. Other key takeaways that have been important for successful flexible transit service are listed below.

- Service should run at logical times, such as at 15, 30, and 60 minute frequency intervals.
- The service area should be no larger than four to 10 square miles.
- Service should include activity centers (transportation center, shopping center, etc.), specifically at the end-points of the line.
- Additional recovery time should be planned for so that the service can get back onto a schedule if need be.²

Successful Transportation Alternatives

This section provides an overview of active and successful case studies of transportation alternatives. Each case study includes research, key findings from staff interviews, and valuable statistics. This will be of value to any organization or group of organizations who are interested in the nuances of creating a small-scale suburban transit service.

SHUTTLE SERVICE

Shuttles are generally created to supplement the existing transit network, and often provide a tailored, high-quality service. The primary function of a shuttle is to make public transit a more feasible option for travelers. This differs from services that provide links to activity centers within the local community, or a circulator. Shuttle service can be implemented as a fixed- and flexible-route service. Shuttles typically provide trips between a rail or bus terminal and an employment center or between a residential area and a rail or bus terminal. Shuttle service is usually successful if it is designed to fill a niche transit demand or need in a community. Services implemented for general mobility purposes are less successful. The shuttles described in this section perform well because

of the efforts from many people and organizations.

The DVRPC team spoke with representatives from two transit providers that offer shuttle services. Both services are successful in filling in a missing link in the transportation network.

- Navy Yard Shuttle (Krapf's Coaches and Philadelphia Industrial Development Corporation [PIDC]), a public-private partnership in Philadelphia; and
- Pureland East-West Community Shuttle, a public-private partnership in Gloucester County, New Jersey.

Krapf's Coaches

In Chester County, Krapf's Coaches provides vehicles and manages operations for public transit and private shuttle services. The company told DVRPC staff during an interview that they rely on TMACC to connect them with employers who are interested in starting service. In addition, Krapf's explained that employers usually start shuttle services when there is a change in the company's location or because they are having difficulty attracting new or sustaining current employees. A "last-mile connection" may be needed because the company's location does not have direct public transit access. Krapf's also explained that shuttles do not typically last for an extended period of time due to their relatively high cost and low ridership. Figure 4.1 is a photo of one of the Krapf's vehicles used for their shuttle services.

Figure 4.1: Krapf's Coaches Vehicle



Source: Krapf's, www.krapfs.com, 2016

Navy Yard Shuttle (Krapf’s and PIDC)

PIDC manages the successful Navy Yard shuttle, with vehicles provided by Krapf’s Coaches. While this shuttle service may be difficult to emulate in a suburban setting, the design and success of these routes is so clear, concise, and resourceful that it is a useful reference as a test practice.

History: The Navy Yard is an ongoing project to infill, redevelop, and create an employment center in South Philadelphia. At this time there are approximately 12,000 employees, and this number continues to increase annually. Previously, SEPTA operated bus Route 71 between the Navy Yard and AT&T Station on SEPTA’s Broad Street Line. Ridership in 2011 was 430 riders over a 12-hour period. Transit mode share at the Navy Yard was below 10 percent.

Operations: Krapf’s vehicles provide two limited stop bus services: one that operates to the AT&T Station on the Broad Street Line (a local transit connection), shown in Figure 4.2, and another to Jefferson Station (a regional transit connection) and around Center City, Philadelphia. The shuttle to AT&T Station runs at 22-minute headways, while the shuttle going to and circulating within Center City has 10-minute headways. Table 4.1 illustrates a summary of the Navy Yard Loop Shuttle to AT&T Station.

Key Takeaways: Congestion Mitigation and Air Quality (CMAQ) 2016 funding was granted to PIDC to add an additional bus to the AT&T Navy Yard Shuttle service. With the new funds, PIDC plans to double the frequency of service. The addition of a second loop shuttle will provide a more convenient transit alternative to entice more Choice riders to a faster and more convenient travel option. The success of the Navy Yard shuttle is a step on the path to building and establishing a transit market to this area, which could lead to higher investment in transit service to the Navy Yard in the future.

High ridership is likely due to the frequent service and amenities, such as wifi, comfortable seating, high peak frequencies, and a phone app. Passengers of the Navy Yard shuttles and employees of the campus are surveyed often, bringing the needs of the riders to the forefront.

Figure 4.2: Navy Yard Shuttle Services



Source: thenavyyard.org 2016

Table 4.1: Summary of the Navy Yard AT&T Loop Service

Service Name	# of Persons per Vehicle	Cost	Weekday Ridership	Passenger Cost per Trip	Connecting Services
Navy Yard Shuttle	35-39	\$845,040 for one vehicle over four years	1,500 trips for the AT&T Loop	Free	SEPTA’s Broad Street Line

Source: CMAQ Applications, 2012 and 2016; thenavyyard.org, 2016; Krapf’s, 2015, 2016

CHAPTER 4: TRANSIT ALTERNATIVES

Pureland East-West Community Shuttle

The Pureland East-West Community Shuttle operates in New Jersey from the Avandale Park-Ride in Winslow Township, Camden County (a New Jersey Transit [NJT] Regional Bus Terminal), to the Pureland Industrial Center, a large employment center in Gloucester County. Although this service took significant time to implement, it is an example of how extensive efforts in planning and development created a successful transportation service.

History: Planning for this shuttle started over a decade ago by a transit committee who would oversee the service. With the assistance of many organizations on the transit committee, transit demand across Gloucester County was determined. The challenge was that no east-west public transit service was being provided, specifically none to the Pureland Industrial Center. Active members on the transit committee include: South Jersey Transportation Authority (SJTA), Cross County Connection TMA, The People for People Foundation of Gloucester County, Gloucester County Transportation and Economic Development, United Way, The Pascale Sykes Foundation, and NJT. Funding is provided by the Pascale Sykes Foundation, U.S. Department of Transportation, and New Jersey Job Access Reverse Commute Program (JARC) funds.

Operations: There are five trips per day per direction, with 10 stops, connecting to 11 NJT bus routes. The service has a reciprocal transfer agreement with NJT, which means NJT passengers get a free ride on the shuttle, and shuttle passengers get a free one-zone ride on connecting NJT bus routes. The shuttle route is shown in Figure 4.3, and is 50 miles round-trip. There are six vehicles used to provide service, all owned by SJTA. The shuttle program also has an internal shuttle that operates throughout the Pureland Industrial Center.

Key Takeaways: In 2015, \$400,000 in CMAQ funds were awarded to SJTA to buy four compressed-natural-gas-powered vehicles to use for the shuttle. Table 4.2 provides more detailed statistics about this service. Vehicles cost the group between \$60,000 and \$70,000 each.

After the first 12 months of operation (2015 to 2016) ridership has increased by over 200 percent. This is likely due to the efforts of the transit committee. The transit committee has a diverse set of professional backgrounds, specifically because it includes health and social services professionals in the transportation planning process. The following is a description of the role that some of the member organizations have.

- United Way of Gloucester County: This is the lead agency responsible for overseeing the program and also organizes volunteers to survey passengers on the shuttle.
- The People for People Foundation of Gloucester County: Creates a monthly newsletter that includes service changes.
- Cross County Connection TMA: A project partner that is responsible for advertising and marketing.
- SJTA: Provides vehicles and ridership statistics, and manages operations for the service.
- Gloucester County Transportation and Economic Development: Connects with employers and employment centers to make sure advertising and outreach is at the most useful locations.

Figure 4.3: Route Map for Pureland East-West Community Shuttle



Source: Pureland East-West Community Shuttle, 2016

Table 4.2: Summary of Pureland East-West Community Shuttle

Service Name	Persons per Vehicle	Operating Budget	Monthly Ridership*	Passenger Cost per Trip	Connecting Services
Pureland East-West Community Shuttle	Six 18–20 passenger buses	\$300,000–\$350,000 (depends on pay rates, fringe benefits, etc.)	1,100	Free for NJT passengers, \$1 for all others	NJT Bus Routes 313, 316, 400, 401, 402, 408, 410, 412, 459, 463, 551

Source: South Jersey Transportation Authority, 2016
*Ridership is only for the East-West Shuttle.

LIMITED STOP BUS SERVICE

An alternative to fixed-route local bus service is limited stop bus service. This is typically implemented as an adjustment to an existing local bus route that is under performing, to fill a void in the existing transportation network, or to provide a new transportation link for new development.

By keeping the number of stops along a route to a minimum, travel time remains shorter, likely allowing more passengers greater mobility to get to their destinations faster. However, by decreasing the number of stops, the route serves fewer local destinations, and creates a trade-off between travel time and local accessibility. Therefore, it is critical that a limited stop transit service connect to a local transit service. DVRPC spoke with DART to understand limited stop bus services further.

Delaware Transit Corporation (DART): Route 47

Route 47 is a limited stop service from Wilmington, Delaware, to Middletown, Delaware (a major Amazon Fulfillment Center). This route is another example of excellent coordination, this time between a large transit agency and a large employer.

History: In 2015, DART developed Route 47 for commuters, specifically for employees of Amazon.com in Middletown, Delaware.

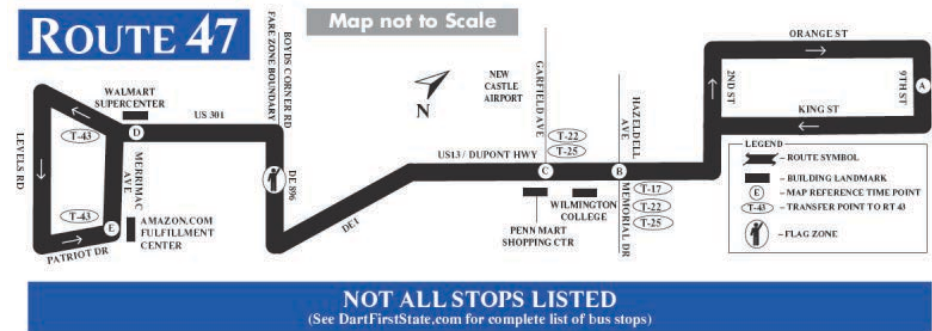
Operations: Route 47 operates from Wilmington’s Central Business District (CBD) at 9th and Market streets to US 13, with limited stops along Dupont Highway, and is express (no stops) along Delaware Routes 1, 896, and US 301. The route terminates in Middletown at the Amazon.com Fulfillment Center. The service map is shown in Figure 4.4.

Route 47 makes three roundtrips Monday through Saturday; three buses leave Wilmington and go to Amazon’s Fulfillment Center during the AM peak hours, and three buses leave Amazon’s Fulfillment Center in the afternoon going back to Wilmington. The schedule is based on the shift times of Amazon employees. In addition, there is a flag zone, where passengers can wave down the bus to stop along DE 896 (Boyd’s Corner Road) between Cedar Lane Road and Jamison Corner Road. This is one strategy of flexible bus service.¹

Table 4.3 shows additional facts about the DART Route 47.

Key Takeaways: To come up with a useful schedule (including the start time and stop location), DART staff partnered with Amazon HQ, Amazon PHL7 Fulfillment Center, and Integrity Staffing Solutions (who hires employees for Amazon’s Fulfillment Center). The team investigated transit demand, by acquiring such information as shift times and employee trip origins for current and prospective employees. The results found that many trip origins were from Wilmington and the US 13 corridor in New Castle.

Figure 4.4: Route Map for DART Route 47



Source: DART, 2016

Table 4.3: Summary of DART Route 47 Service

Service Name	# of Persons per Vehicle	Annual Cost	Monthly Ridership	Passenger Cost per Trip*	Connecting Services
DART Route 47	36	N/A	Average of 266 with a high peak during December	\$1.75 per zone, \$3.50 per trip or \$7.40 for a 2-Zone Daily Pass	DART Bus Routes: 17, 22, 25, and 43

Source: DART, 2016

*Cash Fare, this does not include a daily pass fare.

VANPOOLS

A vanpool is a collection of people who are interested in using transportation other than their personal vehicle and may not have access to public transit on one end of their trip. A public or private transit provider coordinates a group of potential passengers who have similar trip ends. The costs of commuting (gas, insurance, car maintenance, cost of a vehicle, tolls, and parking) are shared among the participants of the vanpool.

Vanpooling has the potential to save time, money, and provide additional time for riders to work or relax. Typically a vanpool is a group of co-workers or people who work together, or on the same campus, and live in proximate locations to one another. This makes deciding on pick-up and drop-off points easier to coordinate. Vanpools are typically designed to travel longer distances than circulators and shuttles. Vanpools tend to be cost effective if they travel between 15 to 40 miles.

While vanpools can be coordinated or paid for by employers or transit agencies, they are not usually managed by them. Instead, there is a designated vanpool coordinator who determines a convenient start date, meeting time, and number of pick-up points along the way. In addition, multiple members are designated drivers.

The DVRPC team spoke with representatives from three different transit providers that offer vanpool services:

- Centre Area Transportation Authority (CATA), a transit authority in the Penn State area;
- CommuteInfo, a program administered by the Metropolitan Planning Organization (MPO) in the Pittsburgh area; and
- Enterprise Rideshare, a private firm that coordinates vanpools for people throughout the country online.

Centre Area Transportation Authority (CATA)

CATA is the transportation authority in and around State College, Pennsylvania and where Penn State University is located. CATA COMMUTE is a program designed to assist commuters in getting to work if local public transportation does not serve their needs.

History: CATA COMMUTE’s vanpool program began in 2007 with six routes and was funded through a CMAQ grant, with maintenance funding coming from JARC. Currently, the program is searching for additional funding sources since the JARC program has changed.

Operations: The vanpool program assists commuters coming into State College and Bellefonte from the surrounding suburban and rural areas. There must be seven to 10 commuters to start a vanpool. The route usually starts at a group of homes or a prearranged meeting place and terminates at work, school, or another destination. A representative from CATA organizes, coordinates, and answers questions about the advantages and regulations of the program.²

For each vanpool CATA provides the van, insurance coverage, maintenance, and a fuel card. The participants of the vanpool share the cost of operation, which are determined by the total miles traveled that month. The vanpools are a month-to-month obligation, and a participant must give two-weeks’ notice to withdraw from the program.

Key Takeaways: Each participant is required to sign a contract that is a mechanism for CATA COMMUTE to make disciplinary actions if necessary. Vanpools are discouraged from providing door-to-door services or wait more than five minutes before continuing to their destination or the next stop. Table 4.4 provides additional insight into this program.

DVRPC discussed the vanpool program with CATA’s Commuter Services Manager. Targeted marketing and public outreach has clearly made the program the success that it is today; figure 4.5 is an advertisement from their website. In nine years the number of vanpools has increased by 34.

CATA emphasized the importance of understanding a target audience—in their case, transit-dependent commuters—and the type of incentives to get them to participate initially, and continue with the program.

The Commuter Services Manager held numerous small meetings with low-cost incentives, such as providing pizza and coffee, to entice people to come and discuss their transit needs.

Table 4.4: Summary of CATA COMMUTE Vanpool Services

Service Name	# of Persons per Vehicle	Annual Cost	Weekday Ridership	Passenger Cost per Trip	Connecting Services
CATA	Max 12	\$.73 per mile	Approx. 280-480	\$.30 per mile	Service varies by route

Source: CATA Representative, <http://catabus.com/ServiceSchedules/CATACOMMUTE/index.html>; , 2016

Figure 4.5: Advertisement for CATA COMMUTE



Source: CATA COMMUTE, <http://catabus.com/ServiceSchedules/CATACOMMUTE/index.html>, 2016

CHAPTER 4: TRANSIT ALTERNATIVES

CommutelInfo

CommutelInfo is a commuting resources program administered by the MPO in the Pittsburgh region. One of the commuting options that CommutelInfo offers is vanpools.

Operations: For this program, there are two volunteer drivers, and each vanpool group decides on seating arrangements, pick-up points, route, schedule, and how to share costs.

By completing a profile on the CommutelInfo website the organization can put a potential participant in touch with a vanpool that works for their commute or help them start one. In addition, like many vanpool services, CommutelInfo offers a way for a potential vanpooler to determine how much he or she could be saving. Figure 4.6 provides an example of how the calculator works using a 30-mile commute, using your personal vehicle and how much can be saved in gas by participating in a car or vanpool.

Vehicles are provided by CommutelInfo. Vanpool costs vary based on the length of the commute and the number of people in each van, as well as other fees the group may need to pay when getting to their destination, such as parking and tolls. The typical cost for CommutelInfo participants is between \$90 and \$110 per month. This cost includes a monthly contract for the use of the vehicle, maintenance, insurance, and vehicle replacement (in case one breaks down).³

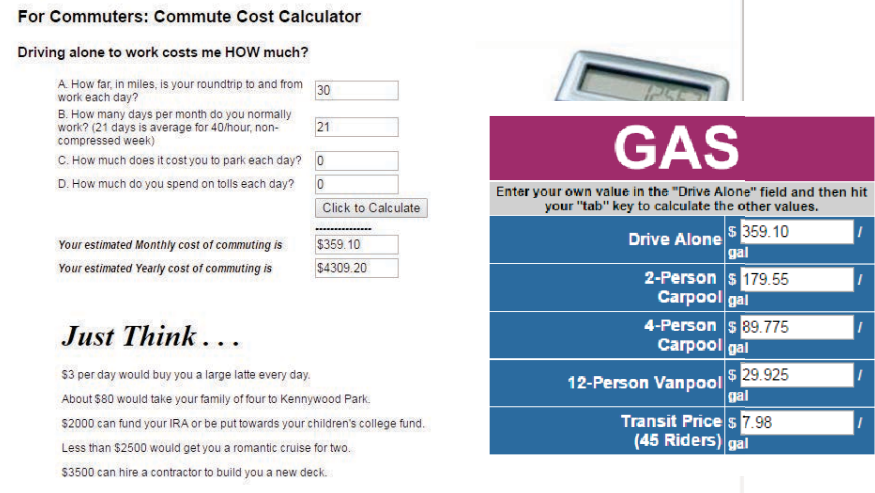
Key Takeaways: DVRPC spoke directly with CommutelInfo and were told that there is a total of 57 vanpools, with 1,400 trips and 700 participants. Vans travel into the CBD but also between suburban activity centers. Additional information can be found in Table 4.5.

CommutelInfo shared some insights and lessons learned from administering their program, which are listed below.

- A park-and-ride site can be a successful location for a pick-up site, but it should not be too close to the final destination.
- It is crucial to connect with employers to make a program like this work. Many companies are interested in sustainability engagement and creating a smaller carbon footprint.
- Funding is usually combined through a mixture of resources.

- Only introduce incentives that are clear, desirable, and can be maintained.

Figure 4.6: Savings Potential for Participating in CommutelInfo



Source: CommutelInfo, 2016

Table 4.5: Summary of CommutelInfo Vanpool Services

Service Name	# of Persons per Vehicle	Weekday Ridership	Passenger Cost per Trip	Connecting Services
CommutelInfo	Max 15	1,400 trips, and 700 participants	\$90-\$100 per month	Service varies by route

Source: CommutelInfo, 2016

Enterprise Rideshare and vRide

Enterprise Rideshare coordinates vanpool programs and commuter services for individuals and companies nationally. Similarly, vRide is a ride-sharing platform offering a way for individuals and companies to connect and create vanpools. Enterprise Rideshare recently acquired vRide, but both will continue to function as separate companies. Both programs function similarly to other vanpools: a group of people who are interested in sharing the costs of their commute is formed based on their origins and destinations.

The project team spoke directly with one of Enterprise Rideshare’s account executives. The company’s vanpooling program expanded to the DVRPC region in 2015. They have seen the most success in creating vanpools using an employer or employers who are close to each other, rather than matching individuals. Enterprise sees their role as a supplemental provider to the existing transportation network. They are interested in providing a last-mile connection, not a duplication of service.

How it works: To reach the most people possible, Enterprise staff visits large companies to educate employees and pitch vanpools as a transit alternative to using their personal vehicles. After Enterprise establishes if there is a demand for vanpool services they complete a zip code analysis to understand where employees live. Next the program is marketed to the employees, emphasizing the benefits for individuals and the entire company. Demand for their services in this region has been mostly suburban to suburban trip pairs, rather than into Center City, Philadelphia.

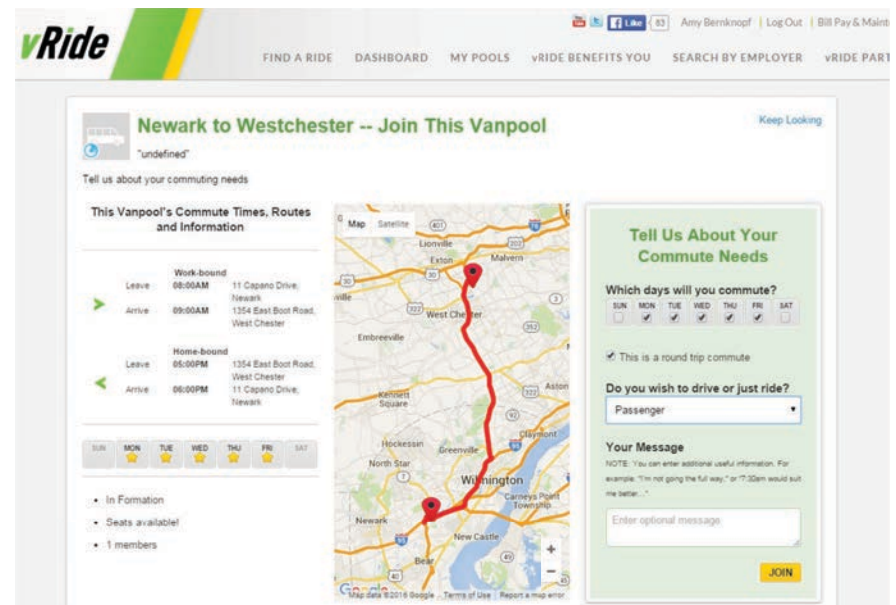
Key Takeaways: Enterprise Rideshare wants to change the mindset of the commuter and educate people so that they can see vanpools and other ride-sharing resources as an acceptable alternative to their personal vehicle. The ability to sign up and learn more about the services is simple and straightforward, and the company has used their website and name recognition to attract users. Between the two websites a potential user can pick a vehicle, calculate their cost savings, and find a specific route that could work for their trip (Figure 4.7). Table 4.6 illustrates some cost estimates from Enterprise RideShare to an interested employer to provide vanpool services running from Montgomery County to southern Chester County.

One of the challenges Enterprise Rideshare faces is a disconnect between the employer and the employee. Employers are not always

clear on the services that their employees need. This makes it difficult for employers to bring together their own successful vanpool services.

Enterprise Rideshare explained that with this recent merger they have more than doubled the number of vanpools they manage, from 4,000 to 9,000, and believe that vanpooling is a growing transportation mode. In addition, the company has seen success on the West Coast and is hopeful that vanpools will catch on in this region.

Figure 4.7: vRide Vanpool Service Map



Source: vRide, 2016

Table 4.6: Summary of Enterprise Rideshare Service

Service Name	# of Persons per Vehicle	Daily Cost	Connecting Services
Enterprise Rideshare and vRide	7	\$7-8 per day per passenger; does not include fuel cost	Service varies by route

Source: Enterprise Rideshare, 2016

CHAPTER 4: TRANSIT ALTERNATIVES

BRIDJ ON-DEMAND FLEXIBLE VANPOOL SERVICE

Bridj is a micro-transit ride-sharing service that allows a potential user to make an on-demand trip request. The service operates in Washington, DC; Boston; and Kansas City. In Washington, DC and Boston the service is a private entity and operates a commercial service. In Kansas City, Bridj works as a partner of The Kansas City Area Transportation Authority (KCATA). The goal is to provide a one-seat ride where there is a demand for that trip.

Operations: There are no routes or schedules. Passengers choose their origin and destination on a map, select the trip that meets their needs, purchases that trip in-app, and walks to the Bridj pick-up location. Pick-ups, drop-offs, and routing are based on demand. Bridj owns very few vehicles and partners with local transportation providers to use their vehicles.

How it works: The trip patterns are based on billions of data points gathered about potential passenger movements (cell phones and credit cards) and a mathematical prediction based on previous trips and predicted trips. They believe their system makes trips approximately 60 percent more efficient than traditional transit. At this time, a passenger has the ability to schedule a trip up to 24 hours in advance and know the fare; however, they believe that shortening this to a 10- to 15-minute advance window could make the service more efficient.

Bridj in Kansas City or RideKC: In Kansas City, RideKC is a one year pilot project, based on a public-private partnership between KCATA (providing the drivers and subsidizing the service), Bridj (providing the app), and Ford Motor Company (who supplied the shuttles shown in Figure 4.8). It is not clear if or how the service will be funded after the pilot. The group believes this partnership will provide a higher level of service with new technology at a lower cost for the provider. In Kansas City, service is available during peak commute periods, 6:30 to 9:30 AM and 3:30 to 6:30 PM.⁴

Bridj has determined that 11,000 people per square mile is their threshold to be able to provide viable privately funded service versus requiring a subsidy (as they do in Kansas City). With this pilot passengers who use RideKC get their first 10 rides free. Subsequently, they are charged a standard trip cost of \$1.50, the same as the local bus fare.

Bridj in Boston: Bridj rides in Boston cost between \$3 and \$6. This is based on the surge of requests, not on the distance of the trip, since most of the trips they offer are close to the same distance. The average time between requesting a pick-up and arriving at their destination is 11 minutes, with an average walk time of five minutes total. In Boston, passengers can only be picked up or dropped off at Massachusetts Bay Transportation Authority bus stops. Figure 4.9 displays the zones a passenger can travel to and from in Boston.⁵

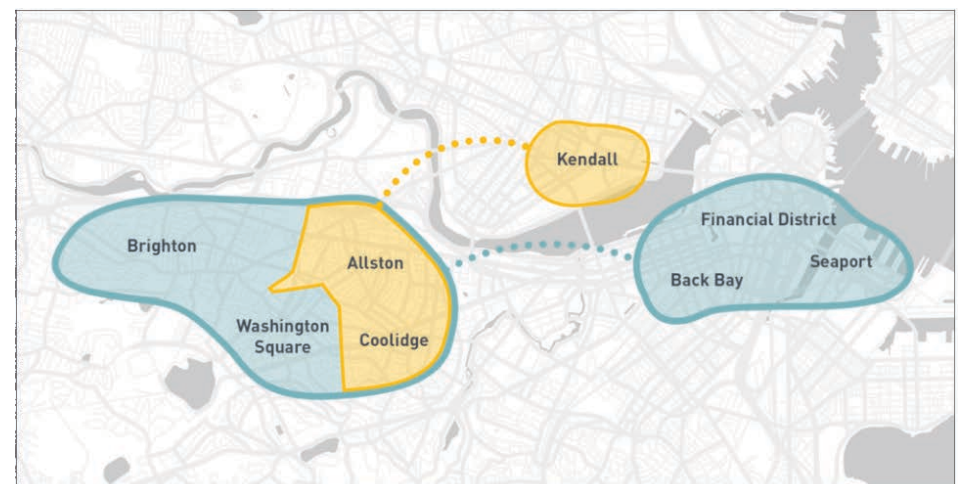
Figure 4.8: RideKC Vehicle



Source: Bridj teams with Ford for expansion into Kansas City, Boston Globe, 2016

Key Takeaways: Bridj service started in Boston in 2014 and has spread to Washington, DC, and Kansas City. In their commercial markets they seem to have kept costs lower than a taxi or other TNCs.

Figure 4.9: Bridj's Boston Zone Map



Source: Bridj, 2016

CONCLUSIONS

All of these case studies exhibit advantages and major success stories. The major takeaways applicable to all service types are listed below.

1. Identify transit demand locations (such as large employers, apartment clusters, office parks).
2. Start direct marketing throughout the study area.
3. Develop an education strategy.
4. Be open to new partnerships.
5. Use current technology as a resource.
6. Form clear communication with both an employer and the employees.
7. Develop a mechanism in the participant contract that allows you to do/make disciplinary actions (specific policies).
8. Create clear and desirable subsidies, if necessary.
9. Establish incentives that are sustainable.

CHAPTER 5: CONCLUSIONS & RECOMMENDATIONS

This chapter outlines conclusions, recommendations, and next steps based on research and analysis completed during this project. It includes major takeaways from previous public transit service in the area (Chapters 1 and 2), the demand analysis (Chapter 3), and the case studies summarized in Chapter 4.

Conclusions

Many of the case studies presented in this 2016 study emphasize the power of partnerships to create and sustain new forms of transit service. These small groups consistently had strong leaders, clear objectives, and goals that were formed during the initial stages of service planning. In addition, to create a successful transportation alternative to a typical public transit service, additional time investment and customization were required.

The DVRPC team believes by completing a comprehensive planning process that includes an existing service evaluation and a step-by-step plan for implementation, the most appropriate transportation service option will be established for the study area.

EXISTING SERVICE EVALUATION

The comprehensive planning process is divided into two parts: existing service evaluation and the implementation of new service.¹ Part one is an existing service evaluation, which includes the steps below.

1. Assess existing service versus established service standards (such as ridership and on time performance).
2. Devise and implement an improvement plan, if necessary.

Chapters 2 and 3 of this report, the Chester County Public Transportation Plan, and the New Castle County Comprehensive Plan, have closely examined existing service in the study area (Step 1 in the existing service evaluation). The assessments identified potential transit demand, along with a lack of transit connections between southern Chester County and New Castle County. This lack of service was the impetus for this project. Step 2 of the existing service evaluation was unnecessary because there is no existing inter-state service to improve.

IMPLEMENTATION OF NEW SERVICE

The majority of this study focused on steps toward implementation of a new service. Seven of the steps to reach successful implementation are from the VTA guidelines, and the other two were added by the project team.²

1. Conduct market demand research and estimate ridership and revenue potential.
2. Select a market to serve and identify the appropriate service type.
3. Establish funding sources and/or a transit operator.
4. Identify and design route alignments.
5. Establish bus stop locations.
6. Design stops, facilities, and street improvements.
7. Develop an operating plan and implementation schedule.
8. Develop a marketing plan and brand management strategy.
9. Monitor service performance.

MARKET DEMAND RESEARCH (STEP 1)

Chapter 3 of this report summarized the methodology used to understand the market demand for transit in the study area. The team relied on a variety of data sources to determine who lives and works in the study area that would potentially ride a new transit service. Four types of potential riders were examined: Tourists, Locals, Non-Choice riders, and Choice riders. The origins and destinations of these potential riders are as follows.

- Tourist trips to Longwood Gardens peak on the weekends, which is the opposite of the typical work trip commuting peaks.
- Non-Choice riders make the longest trips, while Choice commuters and Local riders stay close to home.
- Commuters do make trips from Chester County to Wilmington, but not nearly as many commute in the opposite direction.

With additional time and funding more research may be appropriate using a travel survey of tourists and people who live or work in the study area.

Recommendations

Following the completion of this study, the next step in the service implementation process would be to select the market (or rider type) to be served and identify the appropriate service type. During this study, the advisory committee agreed that the transit gap should be filled, however, there was no consensus as to whom the new service should aim to serve. Through the research and analysis completed during this study, the team believes limited stop bus service and vanpools are the most realistic transportation options for implementation.

FINDING THE MARKET AND SERVICE TYPE (STEP 2)

The project team examined a variety of service options and provided case studies, detailed in Chapter 4, for the stakeholder committee to consider. The case studies include the benefits of various service types and success stories. Based on the existing service evaluation and the market demand research (Step 1), the project team explored two service options further for possible implementation: limited stop bus service and vanpools. The team believes these two alternatives are the most realistic for implementation.

LIMITED STOP BUS SERVICE

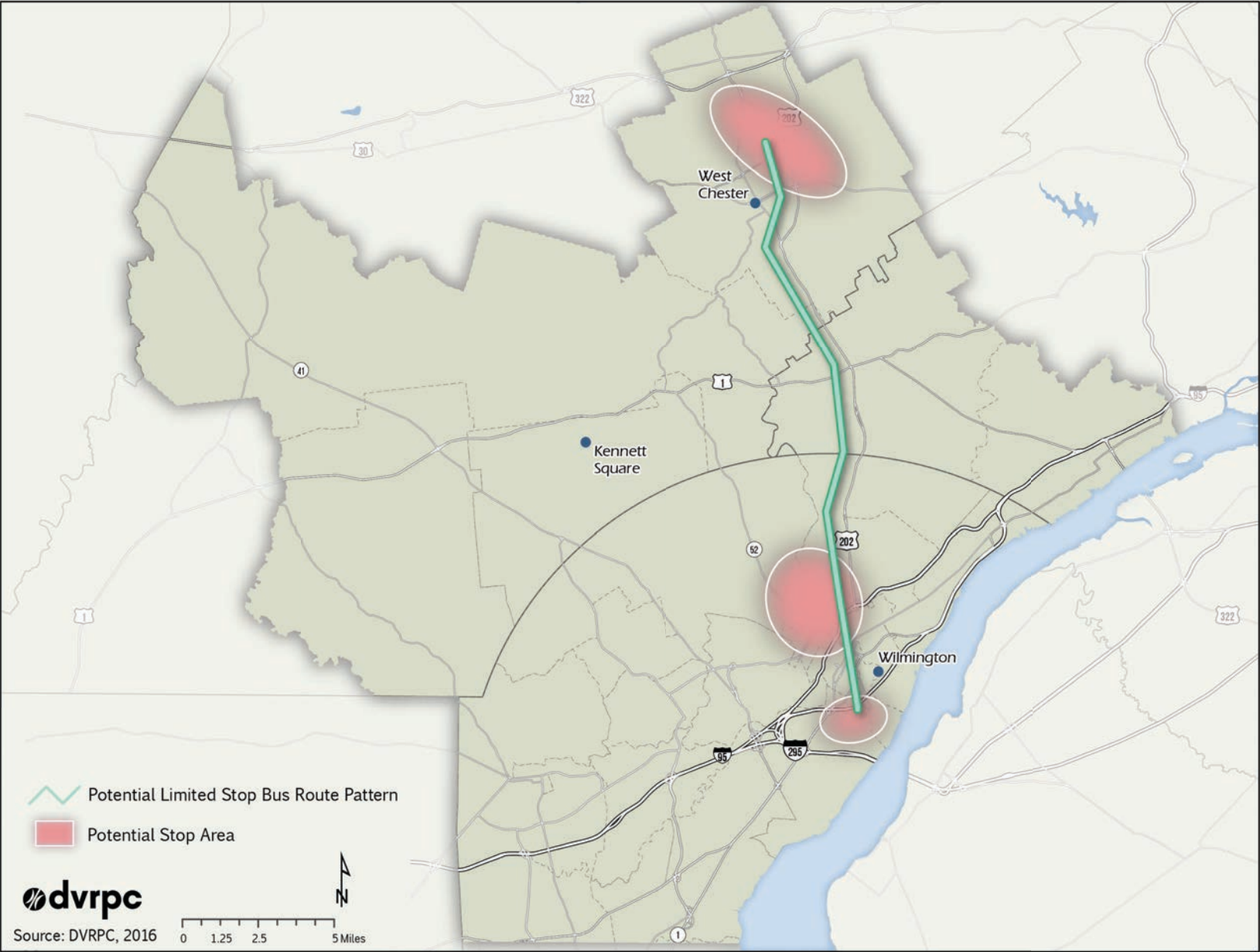
Between the 1970s and the 2010s local bus service was offered between southern Chester and New Castle counties (see map in Chapter 1). However, these routes proved unsuccessful and were discontinued. Any new service would need to be able to better capture the local demand. Limited stop bus service is a modified version of traditional fixed-route local bus service. Limited service minimizes the number of stops, which shortens travel time for passengers and creates a rapid regional service instead of a slower local service. However, fewer stops come at the expense of local accessibility since fewer local destinations are served. If selected to fill the transit service gap between Chester and New Castle counties, a limited stop bus service could serve both Choice and Non-Choice riders (see Chapter 3 for more detail).

If a limited stop service is selected for implementation, it could be branded and marketed as a regional service to ensure potential riders are aware of how it differs from traditional local bus service. The service should be piloted to test routing and stop locations.

Figure 5.1 shows a potential alignment for a Limited Stop Bus Service along the US 202 corridor between West Chester and Wilmington. The end-points for the proposed alignment were selected based on the high concentration of jobs, and thus potential riders. The map also shows key destination points in the study area. Areas where stops could be located are highlighted in pink in Figure 5.1. To increase local accessibility without requiring too many stops, the new route should be linked to shuttle or other transit services, such as the SEPTA Route 104 in West Chester and DART services in Wilmington. Since this would be a commuter service, the bus could be coordinated to run during the peak hours of the major employers in the area, and thus the vehicles could be shared with a tourist service during their peak weekend periods.

Another potential strategy for choosing the alignment of a limited stop bus service would be to partner with a large employer or a cluster of employers. The DART Route 47 case study, in Chapter 4, provides an example of this strategy.

Figure 5.1: Potential Limited Stop Bus Service Pattern



VANPOOL

A vanpool is a collection of people who are interested in sharing commuting costs and do not have sufficient access to public transportation. Vanpools are often used to fill gaps in transit service areas. Multiple case studies in Chapter 4 outline vanpool operations and describe their benefits, including cost efficiency and time savings. If the vanpool option is selected to provide service between Chester and New Castle counties it could potentially serve both Non-Choice and Choice commuters.

One important difference between limited stop bus and vanpool service is the order of implementation steps. A bus service is typically planned based on demand research and is sometimes piloted to see if it will attract riders.

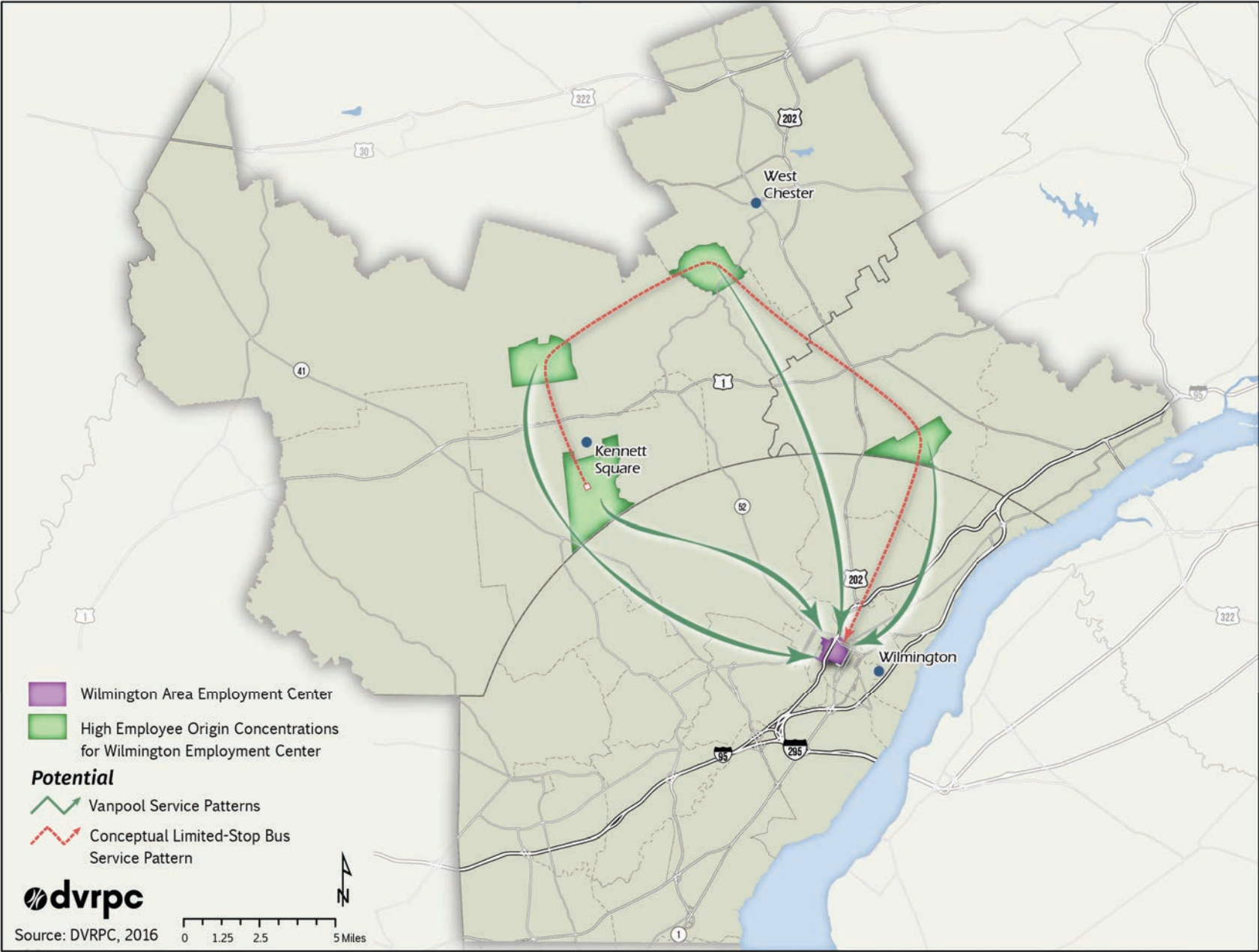
Vanpools are implemented after riders commit to participating. The most successful vanpools often begin with employers as partners. Vanpool operators work with employers to determine where employees live and what time they typically arrive at work. If enough interested employees live in the same area and have the same schedule, they can sign up to participate in a vanpool. Commuters typically pay for their own vanpool expenses, but employers can choose to subsidize the commuting costs for vanpoolers.

Figure 5.2 provides an example of the potential benefits of implementing vanpools in the study area. The area highlighted in purple contains a high concentration of large employers. If vanpool organizers worked with these employers to find out where employees live, hypothetically, they may find that high concentrations of employees live in the areas highlighted in green.

The vanpool flows show that more efficient trips can be accommodated to serve the areas with high concentrations of employees commuting to the major employment center in the study area. Initial efforts could be focused on coordinating through such organizations as TMACC and Rideshare Delaware. With their local knowledge these organizations may be able to identify employers, downtown locations, and park-and-ride locations that would be the best places to pilot a service.

On the other hand, implementing a limited stop bus service to connect all of these employee clusters to their employment location has the potential to be inefficient and expensive, as shown by the dashed red line on the map in Figure 5.2. Travel time would likely prevent many potential riders from using the service.

Figure 5.2: Potential Vanpool Service Patterns



Next Steps

Throughout the course of this study, two primary points continued to surface: (1) consistency and (2) continuity are critical in developing and sustaining a service connecting these two counties.

One way to ensure the best possible service is realized would be to launch a pilot or test service before full implementation. Pilot projects can be used to understand human behavior and public reception. Pilot projects also offer the opportunity for the public to give their opinion for improvements of before a service is implemented.

The DVRPC team advises that the following critical steps be taken first. The blue boxes are suggestions on how these steps could be taken.

1. Assemble a group of interested participants to act as the leaders to bring the project to fruition. Reach out to other public agencies and private employers to identify additional stakeholders.
2. Choose which rider type or types to provide service for.
3. Decide on the service type that would fit for land use context and rider type(s).
4. Determine if there should be a pilot.
5. Research funding resources.

Leaders Could Come From:
County Planning Commission
Boards, Commerce Departments,
Transit Agencies, Health
Departments, State DOTs

LOCAL, NON-CHOICE,
CHOICE, TOURIST,
or a combination.

Limited stop bus service,
vanpools, a combination
of fixed and flexible
services, etc.

Questions to think about...

- Is there enough evidence of demand to support a service?
 - Is there funding in place to support maintenance and operations for 3-5 years?
 - Would a pilot help to justify answers to these questions?

A place to start looking for funding...

CMAQ and Local Safe Roads and Walkable Communities

Next the group should approach and finalize the following.

- Determine which communities the new transit route will serve.
- Identify and design specific route alignments.
- Establish specific bus stop locations.
- Find grant opportunities and/or matching funds or partnerships for operations, maintenance, and capital costs to implement and continue the new route for five years or more.
- Design stops, facilities, and street improvements.
- Develop an operating plan and implementation schedule.
- Develop a marketing plan and brand management strategy.

Following the implementation of the service full-time there should be a program established to monitor service performance to determine if changes need to be made.

CHAPTER 1

¹ Transit Cooperative Research Program, The TCRP Report 55: Guidelines for Enhancing Suburban Mobility Using Public Transportation (Washington, DC: National Academy Press, 1999)

² New Castle County Comprehensive Plan (2012), www.nccde.org/350/Comprehensive-Plan

CHAPTER 2

¹ TCRP Report 140: A Guide for Planning and Operating Flexible Public Transportation Services, 2010

CHAPTER 4

¹ “DART Supports Economic Growth Just in Time for Holiday Rush with New Bus Service,” State of Delaware (press release, October 7, 2015), www.dartfirststate.com/dtc.ejs?command=PublicDTCPressReleaseDisplay&id=5735

² CATACOMMUTE Program (2016), www.catabus.com

³ CommuteInfo (2016), www.commuteinfo.org/

⁴ “Bridj Teams with Ford for Expansion into Kansas City”, Boston Globe, February 11, 2016, www.bostonglobe.com/business/2016/02/10/bridj-teams-with-ford-for-expansion-into-kansas-city/qCdJqWh3B8sSiJPzUeTJkl/story.html

⁵ Bridj (2016), www.bridj.com/#how

CHAPTER 5

¹ Santa Clara Valley Transportation Authority, Community Bus Service Design Guidelines, VTA Transit Sustainability Policy (San Jose, CA: VTA, 2007)


APPENDIX A

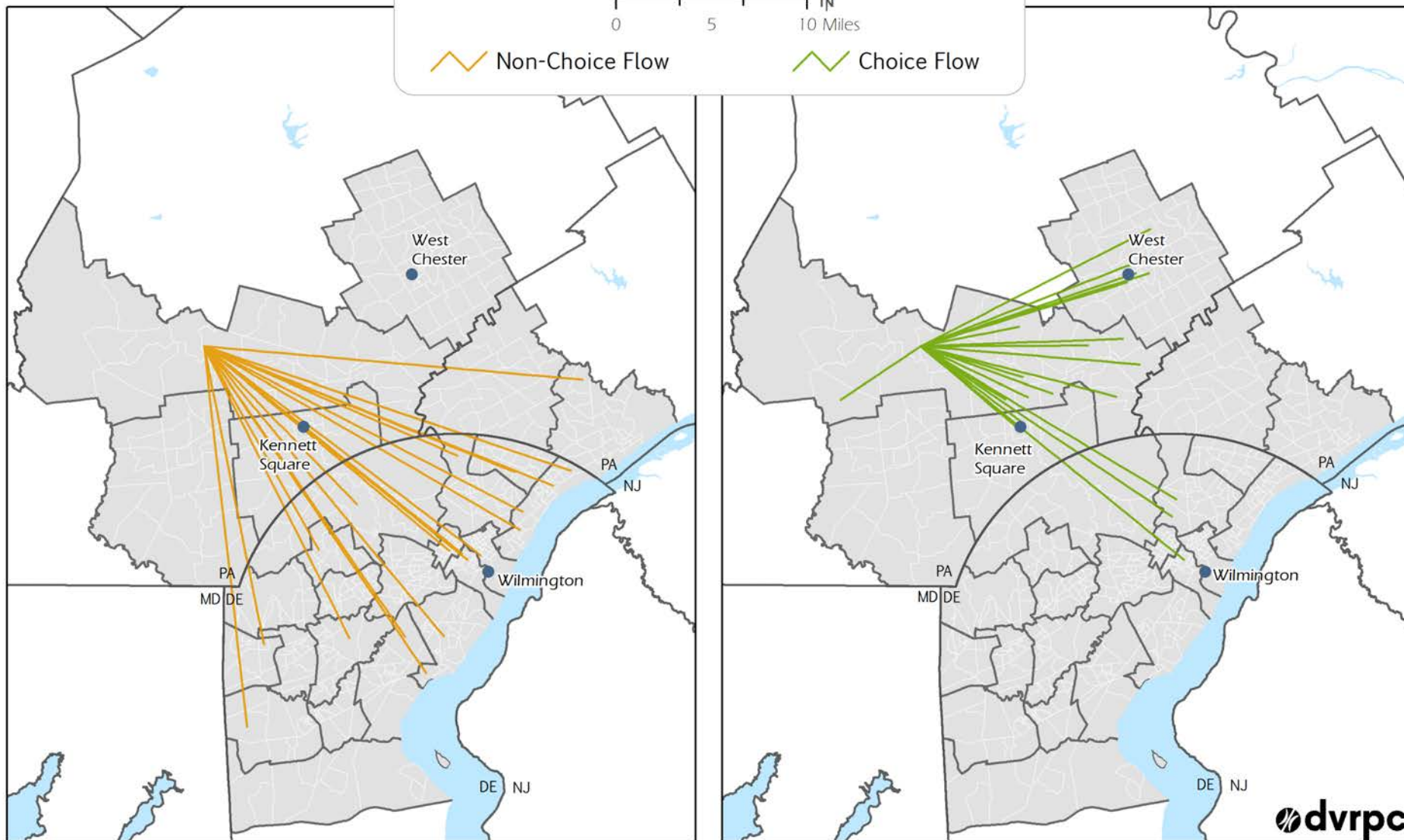
TOP FLOWS FROM E/W CR-926 AREA

Source: CTPP 2006-2010, DVRPC,
DVRPC 2012-2013 HTS



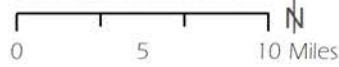
 Non-Choice Flow

 Choice Flow



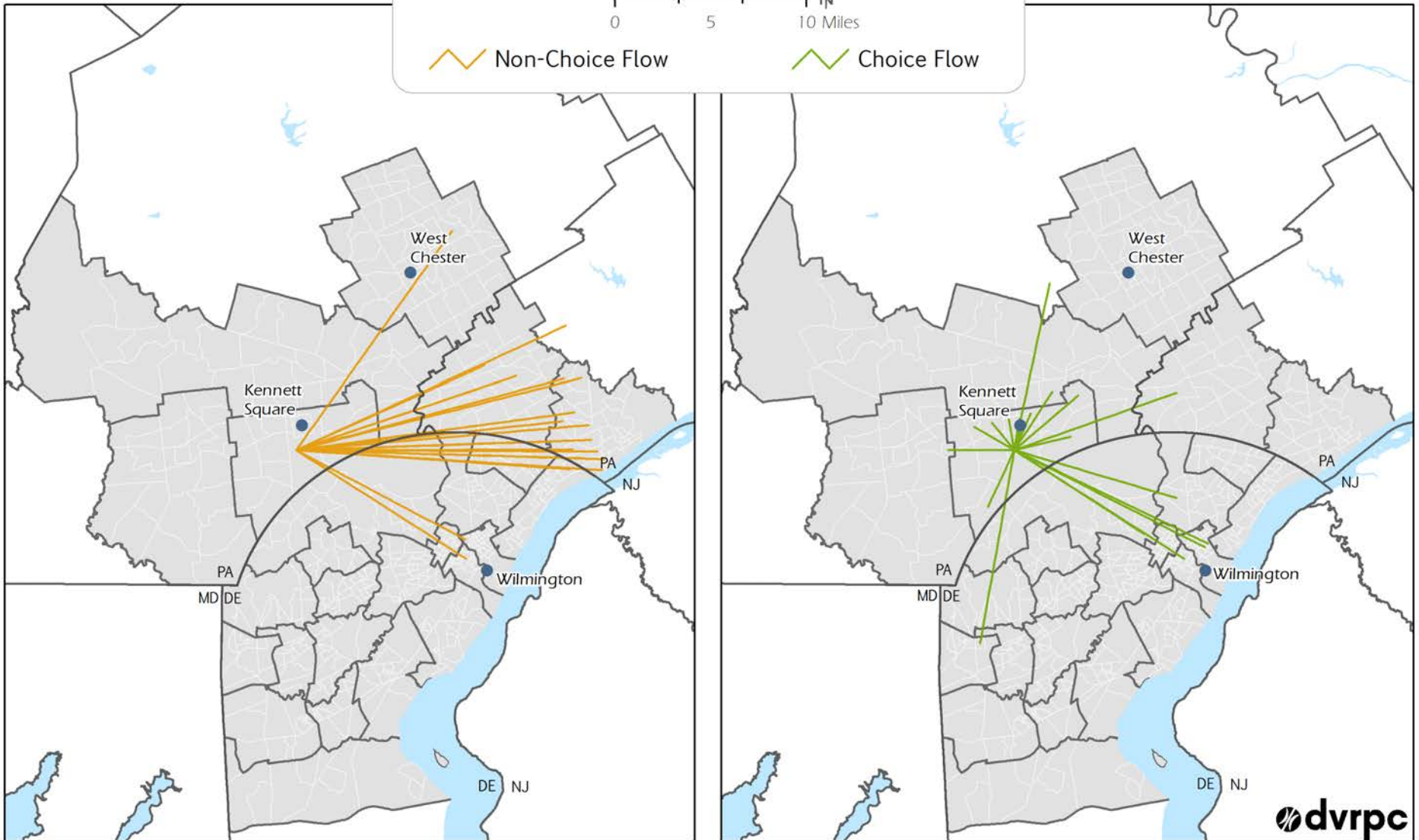
TOP FLOWS FROM KENNETT SQUARE AREA

Source: CTPP 2006-2010, DVRPC,
DVRPC 2012-2013 HTS



Non-Choice Flow

Choice Flow




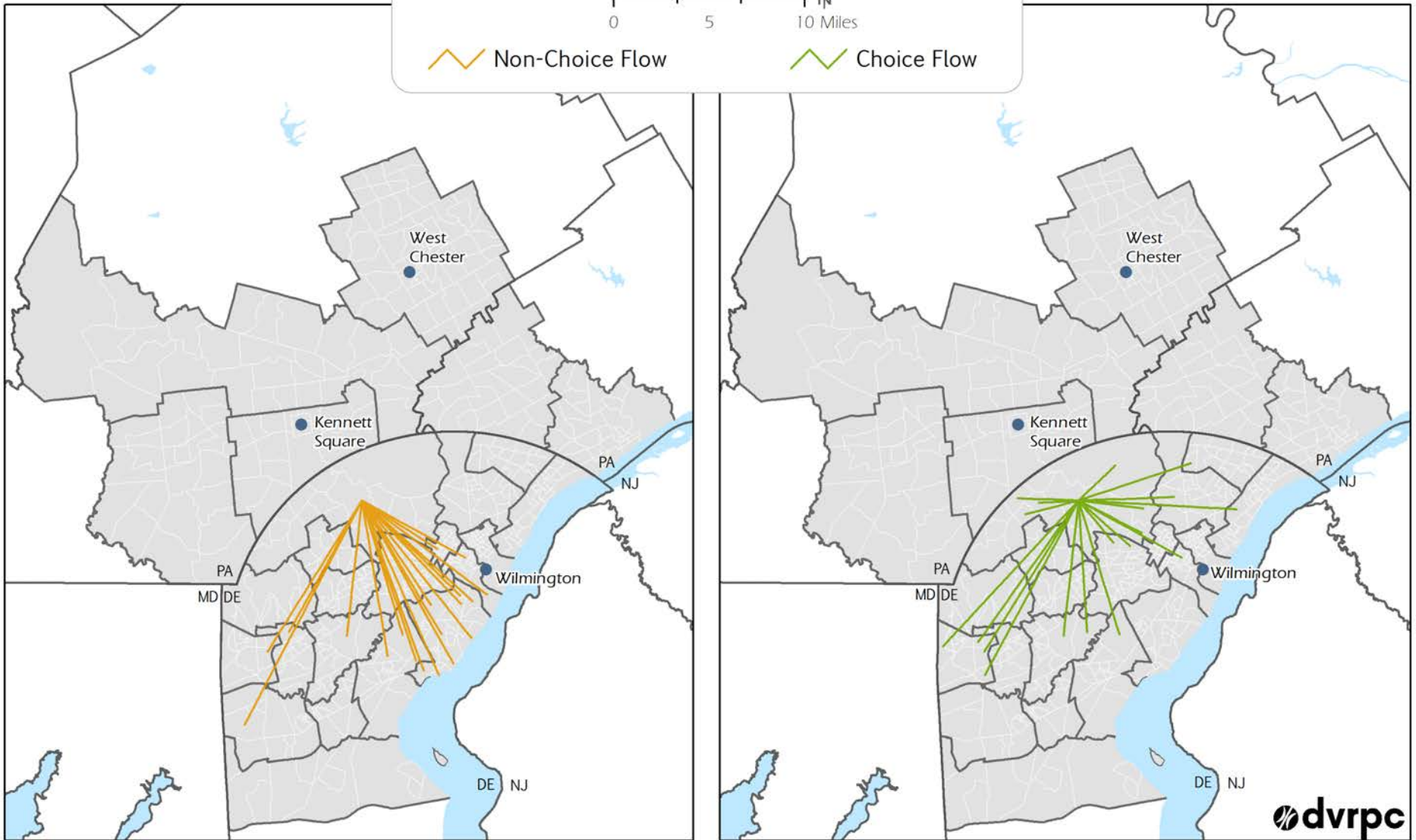
TOP FLOWS FROM GREENVILLE/CENTERVILLE AREA

Source: CTPP 2006-2010, DVRPC,
DVRPC 2012-2013 HTS



 Non-Choice Flow


 Choice Flow




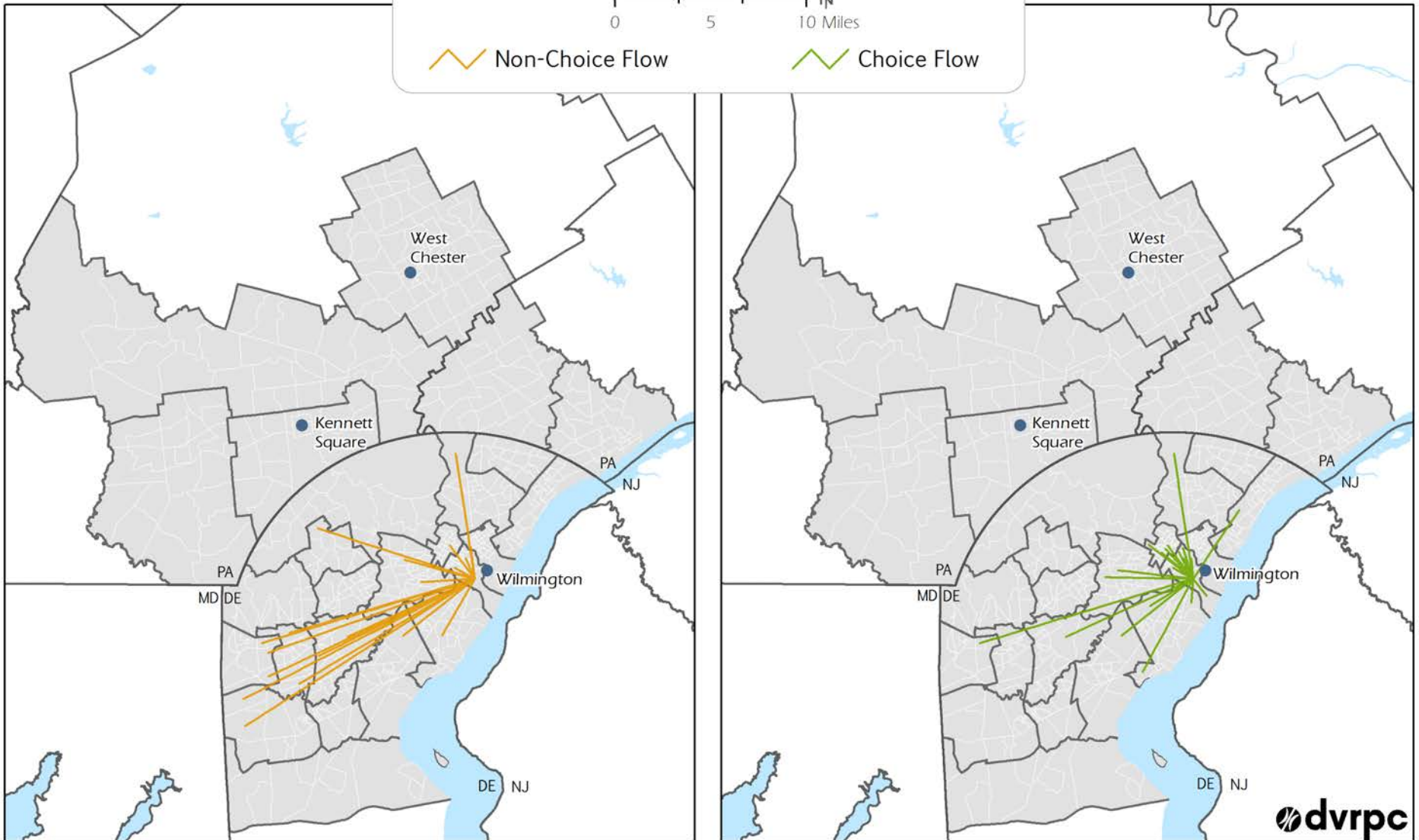
TOP FLOWS FROM CENTRAL WILMINGTON

Source: CTPP 2006-2010, DVRPC,
DVRPC 2012-2013 HTS



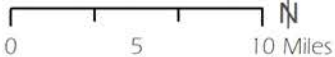
 Non-Choice Flow

 Choice Flow




TOP FLOWS FROM WEST CHESTER AREA

Source: CTPP 2006-2010, DVRPC,
DVRPC 2012-2013 HTS



 Non-Choice Flow

 Choice Flow



APPENDIX A

Park-and-Ride License Plate Survey Results (Fall 2015)

Park and Ride Facility	Transit Affiliated	Number of Cars Parked	Pennsylvania Plates	Percent Pennsylvania Plates
Aldersgate Church, 2313 Concord Pike	Yes	7	0	0%
Brandywine Town Center	Yes	2	1	50%
Christiana Mall, Newark, DE	Yes	139	5	4%
Claymont Train Station and Overflow Parking	Yes	388	73	19%
Concord Presbyterian, 1800 Fairfax Boulevard	Yes	53	5	9%
Faith Baptist, 4210 Limestone Road	Yes	12	0	0%
Faith Presbyterian, 700 Marsh Road	Yes	42	9	21%
Fairplay Station	Yes	191	15	8%
Hockessin Memorial Hall, Rte 41 and Yorklyn Rd.	Yes	20	5	25%
Lower Brandywine Presbyterian, Old Kennett Rd.	Yes	2	1	50%
Lutheran Church of the Good Shepard, Foulk Rd.	Yes	14	4	29%
Newark Train Station	Yes	247	51	21%
North Baptist, 3318 Silverside Road	Yes	44	9	20%
People Plaza, Rt 896 & 40	Yes	36	1	3%
Polly Drummond Shopping Center	No	16	4	25%
Prices Corner, Centerville Road	Yes	36	1	3%
DE 1 and Pole Bridge Rd. (New Boyd's Corner)	Yes	68	3	4%
Route 72 and Chestnut Hill Rd. Scottfield	Yes	2	0	0%
Wells Fargo, SR 41	Yes	8	3	38%
Route 52 and Route 100	Yes	32	10	31%
Route 896 and Route 4, Newark	Yes	72	5	7%
Route 7 and Route 273	Yes	23	3	13%
Smyrna Rest Stop US 13 & SR1	Yes	45	1	2%
Trinity Presbyterian, 112 Darley Rd.	Yes	10	4	40%
Tybouts Corner, Route 13 and Hamburg Road	Yes	19	0	0%
Odessa Park and Ride (DE 1 and DE 299)	Yes	70	2	3%
Brandywine Springs Park	No	1	0	0%
Delcastle Recreation Center	No	3	0	0%
Lantana Square, SR 7 and Valley Road	No	5	1	20%
Pine Tree Corner, Route 13, Townsend	No	11	0	0%
US 13/DTC Mid County	No	27	3	11%
Frawley Stadium	No	484	132	27%

Source: Institute for Public Administration, University of Delaware, (2015)

Concept Development for Southern Chester County— New Castle County Transit Service

Publication Number: 16037

Date Published: January 2017

Geographic Area Covered: Chester County, PA; New Castle County, DE; West Chester, PA; Kennett Square, PA; Wilmington, DE

Keywords: US 202, Limited Stop Bus Service, Vanpools, Shuttles, Partnerships, Transit Demand, Passenger Type

Abstract:

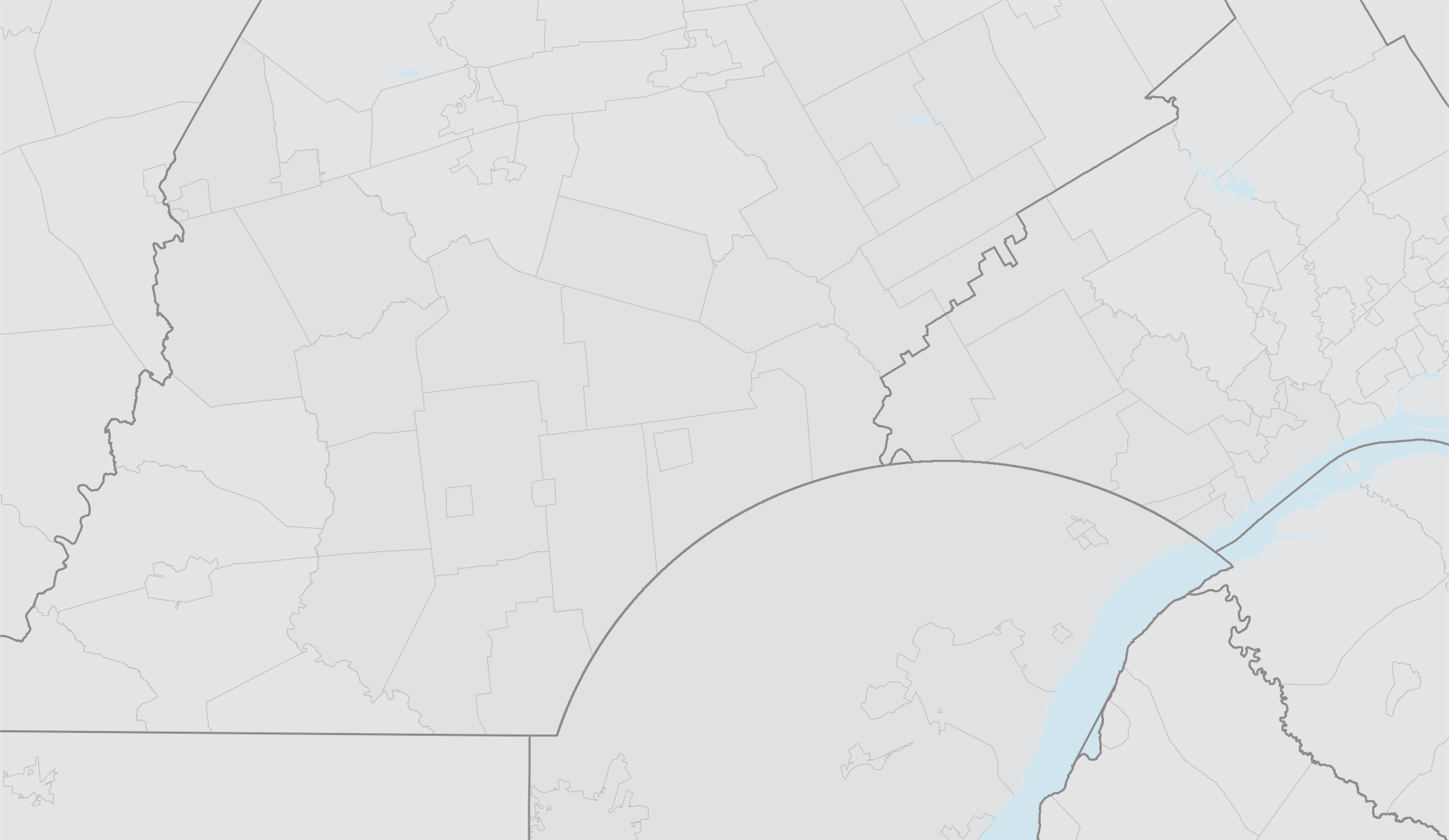
This project examines the potential for public transit service between southern Chester and New Castle counties, where there is currently a gap in public transit service. The project team developed two strategies that can be used to work towards implementing service in this area.

Staff Contact:

Amy Bernknopf
Senior Transportation Planner
(215) 238-2845
abernknopf@dvrpc.org



190 N. Independence Mall, West
8th Floor
Philadelphia, PA 19106
www.dvrpc.org



190 N. Independence Mall, West
8th Floor
Philadelphia, PA 19106
www.dvrpc.org