# Planning for Electric Vehicles

## in Montgomery County


Photo credit: Glenn McNichol, DVRPC

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# Executive Summary

*Planning for Electric Vehicles in Montgomery County* was created to guide investment in public electric vehicle (EV) chargers by examining the feasibility and usefulness of installing chargers at county owned facilities in Montgomery County, Pennsylvania.

**Chapter 1 describes the existing conditions** in Montgomery County, which is a primarily suburban area with some urban centers and rural communities as well. As with other higher-income suburbs in the DVRPC region, municipalities in the eastern portion of the county, such as Lower Merion Township, already have comparatively high concentrations of EVs and privately-owned chargers. However, as EVs become more affordable and public and private investments in chargers, also known as electric vehicle service equipment (EVSE), become more widespread, it is likely that there will be a growing number of EVs and corresponding need for EVSE in areas where EV adoption has been slower.

**Chapter 2 describes the methodology** used to screen the list of 65 locations provided by Montgomery County for conduciveness to EVSE installation. Each location was scored based on their proximity to retail, multifamily residences, current EV registrations, and Census Block Group-level predictions of workplace charging demand. The predictions of workplace charging demand come from a model created in partnership with the Plug-In & Hybrid Electric Vehicle Research Center at UC Davis. Locations were also awarded points for being over a mile from the nearest existing charger. Using the scores, 18 sites were selected for further analysis using aerial imagery.

**Chapter 3 details the results of the site analysis** of the 18 best scoring county facilities. During the analysis, aerial imagery and other resources were used to manually evaluate the feasibility and utility of installing EVSE at each location. Special attention was paid to the presence of multifamily homes and other residences without driveways or garages where the parking situation could present an obstacle to a resident charging an EV. Pedestrian connections to retail, transit, and other destinations were also considered.

**Chapter 4 includes the recommendations for the examined sites**. In total, 14 of the 18 sites were recommended for new EVSE. Two sites were already found to have municipal-owned chargers, and two others were found to have constraints that could make installation difficult. The recommended sites were further categorized into three categories based on priority:

- The two recommended sites in Pottstown and the Montgomery County Offices in Norristown should be the highest priority due to the lack of existing EVSE, high density of people and businesses, and presence of multifamily housing.
- Six libraries in the suburban areas of Ardmore, Bryn Mawr, Glenside, Jenkintown, Hatboro, and Elkins Park were identified as high priority sites because their proximity to retail, workplaces, and residences in walkable contexts would make EVSE located there useful to a variety of users. Even though public charger demand from residents is expected to be less in areas where most people have a private garage or driveway where they can charge an EV, public charging still plays a critical role in providing redundancy for residents especially in areas with higher EV adoption rates.
- Two sites in suburban areas were identified as feasible but lower priority because their locations would likely not serve the number or variety of users as the other sites.

**Chapter 5 describes grant opportunities** available to help pay for EVSE installation and purchasing EVs for municipal fleets. **Chapter 6 describes the most important details to consider** when evaluating EV infrastructure projects and the typical order in which they are decided including what level of charger will be used and how power lines will reach the charger. **Chapter 7 discusses various pricing strategies** used to collect fees for using EVSE.

# Introduction

According to Pennsylvania's Climate Action Plan, the transportation sector accounts for 24 percent of greenhouse gas emissions in the Commonwealth.[1] Traditional internal combustion engines emit a variety of chemical compounds that impact public health, damage vegetation, degrade water quality, and contribute to climate change. Since electric vehicles have no tailpipe emissions, they can provide a pathway to cleaner air and a mechanism to help slow climate change.

State, county, and local governments all play a role in preparing the commonwealth to support the growing numbers of EVs by strategically supporting charging infrastructure that will help relieve range anxiety and make the electrification of the transportation system practical, reliable, and convenient for EV users.

The Delaware Valley Regional Planning Commission (DVRPC) has partnered with the University of California, Davis (UC Davis) to identify where plug-in electric vehicles (PEVs) are located, where they are expected to be, and where the demand for workplace charging is expected to grow. DVRPC will use these tools, along with other available data, to identify opportunities to fill the gaps in public charging infrastructure.

County-owned parking lots provide opportunities for EV charging that are accessible to the traveling public and possibly to EV owners who face challenges charging at home. This report will review the availability of electric vehicle service equipment (EVSE) in relation to county facilities, multifamily housing developments, retail centers, and census block groups (CBGs) where there are existing PEV owners, and projected workplace charging events to gauge the need and utility of EVSE hosted at these sites.

## Glossary of Terms

Electric vehicle terminology can be confusing and inconsistent in its usage. This section provides an overview of common terms related to electric vehicles. Definitions are provided by the U.S. Department of Energy and other sources referenced in the appendix to this report.

**BEV:** Battery Electric Vehicle. A plug-in electric vehicle that uses only a battery and electric motor to power the EV. Current examples include the Nissan LEAF, the Ford F-150 Lightning, or any of the Tesla models.

**DCFC:** Direct Current Fast Charging station. A charging station that converts high-voltage alternating current (AC) to direct current (DC). DCFC can generally charge a battery to 80 percent in 20–30 minutes.

**EV:** A generic term for a vehicle that gets some or all of its power from an electric motor. Sometimes used to mean PEV, BEV, All-Electric Vehicle, Fuel Cell Electric Vehicle (FCEV), and occasionally Hybrid Electric Vehicle.

**EVSE:** Electric Vehicle Supply Equipment. These are the charging stations that charge the batteries in electric vehicles. There are currently three levels of charging stations, generally known as Level 1, Level 2, and DCFC. The amount of power required, cost, amount of time to charge the vehicle, and needed infrastructure vary.

**ICE:** Internal Combustion Engine. Traditional gasoline and diesel cars and trucks use an internal combustion engine to convert fuel to the motion that moves the vehicle. Propane or compressed natural gas is used in some ICE vehicles as well.

**PEV:** Plug-In Electric Vehicle. An EV that plugs in to an external source to charge an on-board battery that provides the electricity for the electric motor. Some EVs, such as trolleys, subways, trains, and trolley buses, are powered by electricity from overhead wires or a track. FCEVs are powered by a fuel cell.

[1] Pennsylvania Department of Environmental Protection. *Pennsylvania Climate Action Plan*. September 2021.

**PHEV:** Plug-In Hybrid Electric Vehicle. PHEVs use both an ICE and an electric motor with a battery that recharges by plugging into an external source. Depending on its exact configuration, the PHEV's battery can either assist the ICE or fully power the vehicle until the battery has been discharged, at which time the vehicle continues to operate as a Hybrid Electric Vehicle. Current examples include the Toyota Prius Prime and the Chrysler Pacifica Hybrid.

## Charging Station Terminology

Charging stations for electric vehicles (EVs) are also known as EVSE. Different types of chargers are appropriate for various needs when considering the amount of charging needed, where the vehicle will charge, the amount of time the vehicle can stop at a charging station, and the electrical wiring available to install charging equipment. There are three types of charging stations: Level 1, Level 2, and Direct Current Fast Charging (DCFC) stations. Charging time depends on the size of the vehicle's battery and the level of charger being used, but general ranges are listed in Figure 1.

Level 1 charging involves simply plugging a vehicle into a standard home outlet using a charging cord that typically comes with the vehicle; this is the cheapest type of charging station in terms of upfront investment. The power use of Level 1 charging is like running a hairdryer. A Level 1 charger would likely be sufficient for charging a vehicle that travels between 30 and 40 miles daily. Level 1 purchase costs for a public charger range between $596 to $813 and installation costs will vary depending on the site.

Level 2 charging requires higher voltage and an EVSE unit to facilitate the charging. The power use of a Level 2 charger is like that of an electric stove with all the burners turned on. Level 2 chargers generally provide two charging ports for each charger, allowing one charging station to serve two vehicles. Purchasing a Level 2 charger for public use ranges between $938 and $3,127 with higher costs for networked stations and pedestals with one charger vs. two chargers. According to the U.S. Department of Energy, the installation of a Level 2 charger costs around $3,000 with an installation cost variability of up to 50 percent depending on the number and location of chargers.[2]

DCFC stations convert high-voltage AC power to DC power so that the power can be stored in compatible EV batteries. DCFC stations have three types of connectors (CHAdeMO, CCS, or Tesla) and are used most often in public charging stations along long-distance high-volume traffic corridors. Tesla operates a global network of DCFC "Supercharger" stations that use a proprietary connector incompatible with non-Tesla EVs. Tesla Destination chargers, which provide Level 2 charging capability, also use proprietary connectors, but unlike Superchargers, aftermarket adapters exist to allow use by non-Tesla EVs.[3] Tesla chargers are not generally discussed in this document because of their compatibility issues with non-Tesla EVs. However, Tesla vehicles can access the other types of chargers by using an included adapter.

Installation costs of electric vehicle chargers varies widely depending on the site location, existing wiring and electrical upgrades required, permitting, trenching, type and number of chargers, geographic location, and labor costs. Labor is typically the largest expense when installing EVSE, accordingly, per charger cost goes down on larger EVSE installation projects.[2]

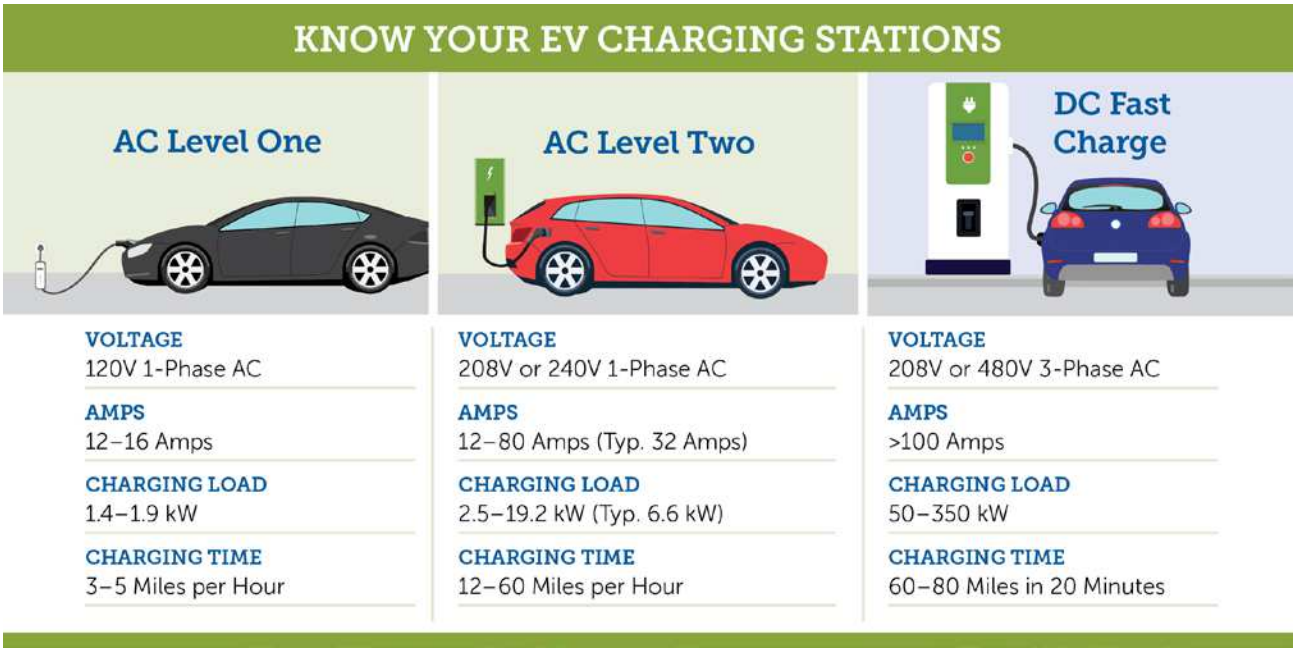
Public DCFC cost between $28,000 and $140,000 with higher costs for networked stations and pedestals with one charger versus two chargers. Installation of DCFC costs range between $18,000 and $66,000.[2] DCFC charging costs more than Level 2 charging. According to *U.S. News and World Report,* depending on

[2] "Alternative Fuels Data Center," U.S. Department of Energy, accessed April 28, 2022, afdc.energy.gov/. All cost information referenced on the webpage is from the International Council on Clean Transportation's 2019 publication on charging infrastructure costs across major U.S. metropolitan areas

[3] Ganz, Andrew. "Tesla Destination Charging vs Supercharging." Autotrader. May 2022. www.autotrader.com/car-shopping/tesla-destination-charging-vs-supercharging

gasoline prices and the fuel economy of the vehicle, public fast charging may cost more than gasoline per vehicle mile of range.[4] Not all EVs are able to use DCFCs, although most new models can access DCFCs.

### *Figure 1: Charging Station Types*




*Source: Advanced Energy (www.advancedenergy.org)*

[4] Vincent, John. "How Much Does It Cost to Charge an Electric Car?" *U.S. News and World Report*. August 2021, cars.usnews.com/cars-trucks/electric-car-charging-costs

Chapter 1:

# Existing Conditions

Montgomery County is the third most populous county in the Commonwealth of Pennsylvania. As one of the four Pennsylvania counties that surround the City of Philadelphia, much of its built environment is suburban in nature but ranges from dense and historic boroughs like Norristown and Pottstown along the Schuylkill River to rural communities in the north and west of the county. PEV registrations are mostly concentrated in the suburbs near the Philadelphia border in the south and east of the county. As shown in Figure 2, public EVSE is mostly concentrated in retail areas in or near these suburbs. Most of the DC fast chargers in the county are concentrated along a few key highway corridors such as Interstate 76. The largest gap in EVSE is in the mostly rural north of the county including communities in the Perkiomen Valley.

## Charging Infrastructure

The U.S. Department of Energy maintains a database of EVSE that was used to retrieve the locations of EVSE in Montgomery County and the surrounding area. There are over 300 public charging connections in Montgomery County.

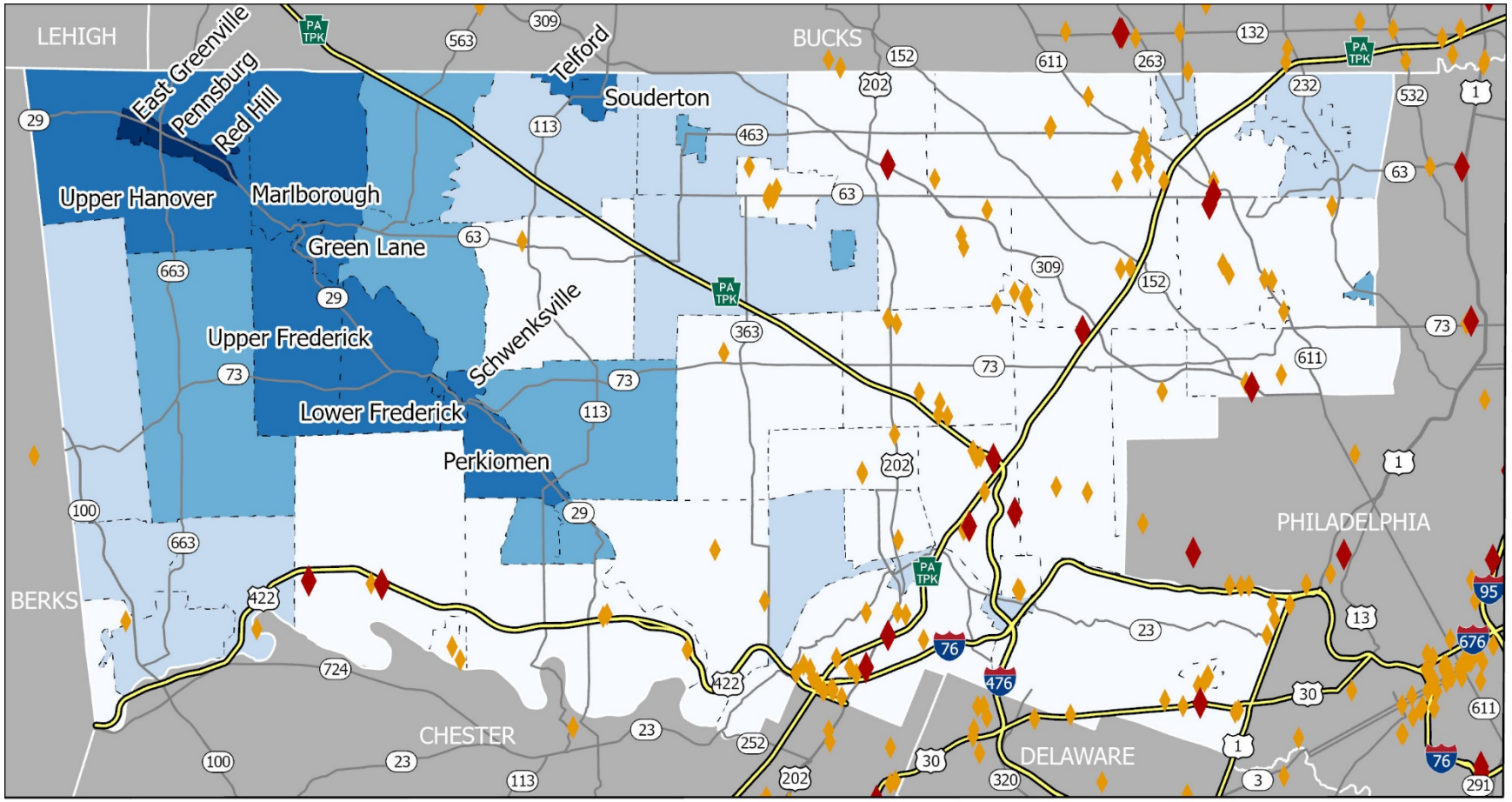
Table 1 shows the number of EVSE connections in Montgomery County by municipality, capability (Level 1, Level 2, or DC Fast Charge), connector type (Tesla or non-Tesla), and access type (public or private). This table shows five municipalities are collectively home to about half the public chargers in the County. Figure 2 shows the location of these chargers and each municipality's distance from the nearest one. Tesla chargers are listed separately in the table and excluded from the map because they use a proprietary connector and are not available for use by all EV owners, although Tesla is exploring adapters that would open their network to other models of PEVs. Most of the chargers are in clusters in the Southern and Eastern areas of the County close to major highways. Notable clusters of EVSE include: King of Prussia near the interchange of I-76, I-276, and US 422; Plymouth Meeting near the interchange of I-276 and I-476; along PA 611 especially near the interchange with I-276; the Boroughs of Ambler and Lansdale; and along US 30 and US 1 near the Philadelphia border. Although not in Montgomery County, it is also worth noting the large number of chargers accessible within a few miles of the county line in Chester County along US 30 and I-76. Car dealerships account of 6 of the 9 charging locations not accessible to the general public, 2 are at a multi-unit dwelling in Jenkintown, and 1 is located in the Valley Forge National Historic Site.

### *Table 1: Existing PEV Charging Infrastructure*

| | Non-Tesla Public | | | Tesla Public | | | |
|---|---|---|---|---|---|---|---|
| **Municipality (Top 5 Shown)** | **L1** | **L2** | **DCFC** | **Destination (L2)** | **Supercharger (DCFC)** | **Total Public** | **Private (All L2)** |
| Upper Merion Township | | 38 | 6 | | 16 | **60** | 1 |
| Horsham Township | | 35 | | | | **35** | |
| Conshohocken Borough | | 30 | | | | **30** | |
| Plymouth Township | | 19 | 7 | 2 | | **28** | 1 |
| Whitpain Township | | 16 | | 2 | | **18** | |
| **County (All Municipalities)** | **6** | **262** | **34** | **6** | **24** | **332** | **9** |

*Source: U.S. Department of Energy (December 2022)*

*Figure 2: Existing Public Level 2 and DCFC EVSE in Montgomery County*



## Current EV Registrations

DVRPC used 2021 vehicle registration data provided by the Pennsylvania Department of Transportation (PennDOT) to map registered PEVs in the region at the Census Block Group (CBG)-level to determine the areas with existing demand for at- or near-home EV charging. This data, along with data from the U.S. Census, was used as an input into the DVRPC/UC Davis Electric Vehicle Planning Toolkit to project the location of future PEVs.

Figure 3 shows the distribution of the 3,660 PEVs registered in Montgomery County at the time of analysis. Tables 2 and 3 list the top five municipalities in Montgomery County ranked by percent and total number of PEVs, respectively. Since the DVRPC/UC Davis Electric Vehicle Planning Toolkit assigns vehicle registrations at the CBG level, municipal-level figures were calculated by combining one or more CBGs.[5]

***Table 2: Top Five Municipalities (by Percentage) in Montgomery County for PEVs***

| Municipality | Total Number of Passenger Vehicles | Current Number of PEVs | Current Percentage of Vehicles that are PEVs |
|---|---|---|---|
| Lower Merion Township | 40,473 | 818 | 2.02% |
| Lower Gwynedd Township | 8,814 | 116 | 1.32% |
| Narberth Borough | 2,838 | 33 | 1.15% |
| Bryn Athyn Borough | 874 | 9 | 1.08% |
| West Conshohocken Borough | 1,149 | 10 | 0.90% |

*Source: DVRPC, 2022*

[5] Only one block group was found to extend across multiple municipalities (Norristown, East Norriton, and West Norriton). For the purposes of Table 2, it was counted as part of Norristown since the portion of the block group located in East and West Norriton was mostly parkland.

### *Table 3: Top Five Municipalities (by Total Numbers) in Montgomery County for PEVs*

| Municipality | Total Number of Passenger Vehicles | Current Number of PEVs | Current Percentage of Vehicles that are PEVs |
|---|---|---|---|
| Lower Merion Township | 40,473 | 818 | 2.02% |
| Upper Merion Township | 22,887 | 182 | 0.79% |
| Upper Dublin Township | 20,275 | 169 | 0.83% |
| Abington Township | 39,574 | 161 | 0.41% |
| Montgomery Township | 20,526 | 142 | 0.69% |

*Source: DVRPC, 2022*

## Multifamily Housing

Figure 4 shows the location of multifamily housing units in Montgomery County listed in the COSTAR property database as of September 2021. Multifamily housing units, also known as multi-unit dwellings (MUDs), are highlighted because their parking situation may create an obstacle to residents charging an EV at home that public EVSE can help address. Some boroughs along the Schuylkill River such as Norristown, Pottstown, and Conshohocken have high densities of MUDs throughout them. In other places, such as Lower Merion Township, MUDs are concentrated along certain corridors like Lancaster and City Avenues. Another notable corridor of MUDs is PA 611 which travels through Cheltenham, Abington, and Upper Moreland Townships, as well as the boroughs of Jenkintown and Hatboro. Smaller clusters of MUDs are present in boroughs throughout the County, for example: Lansdale, Souderton, and Ambler.

*Figure 3: Current PEV Registrations*

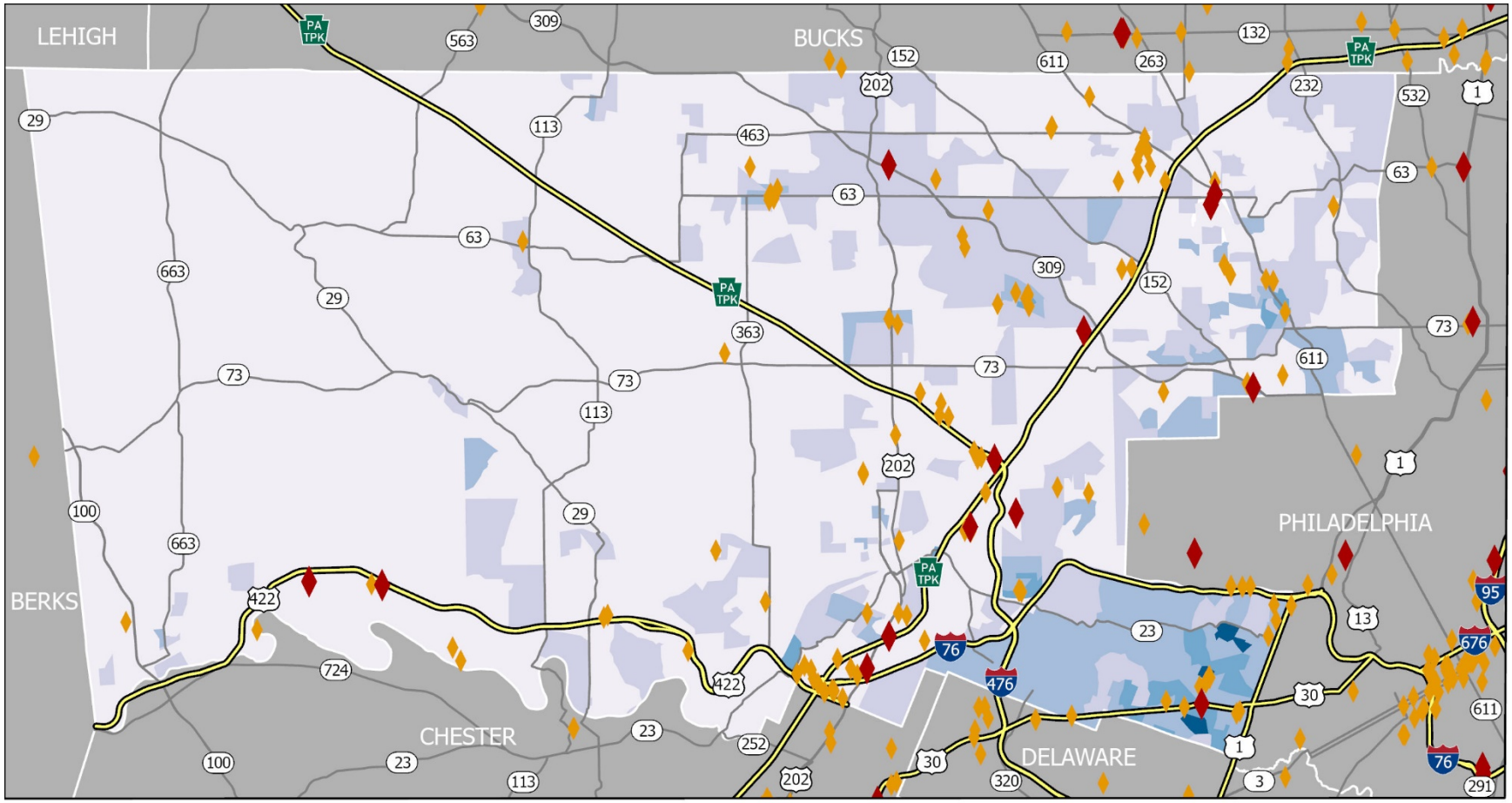
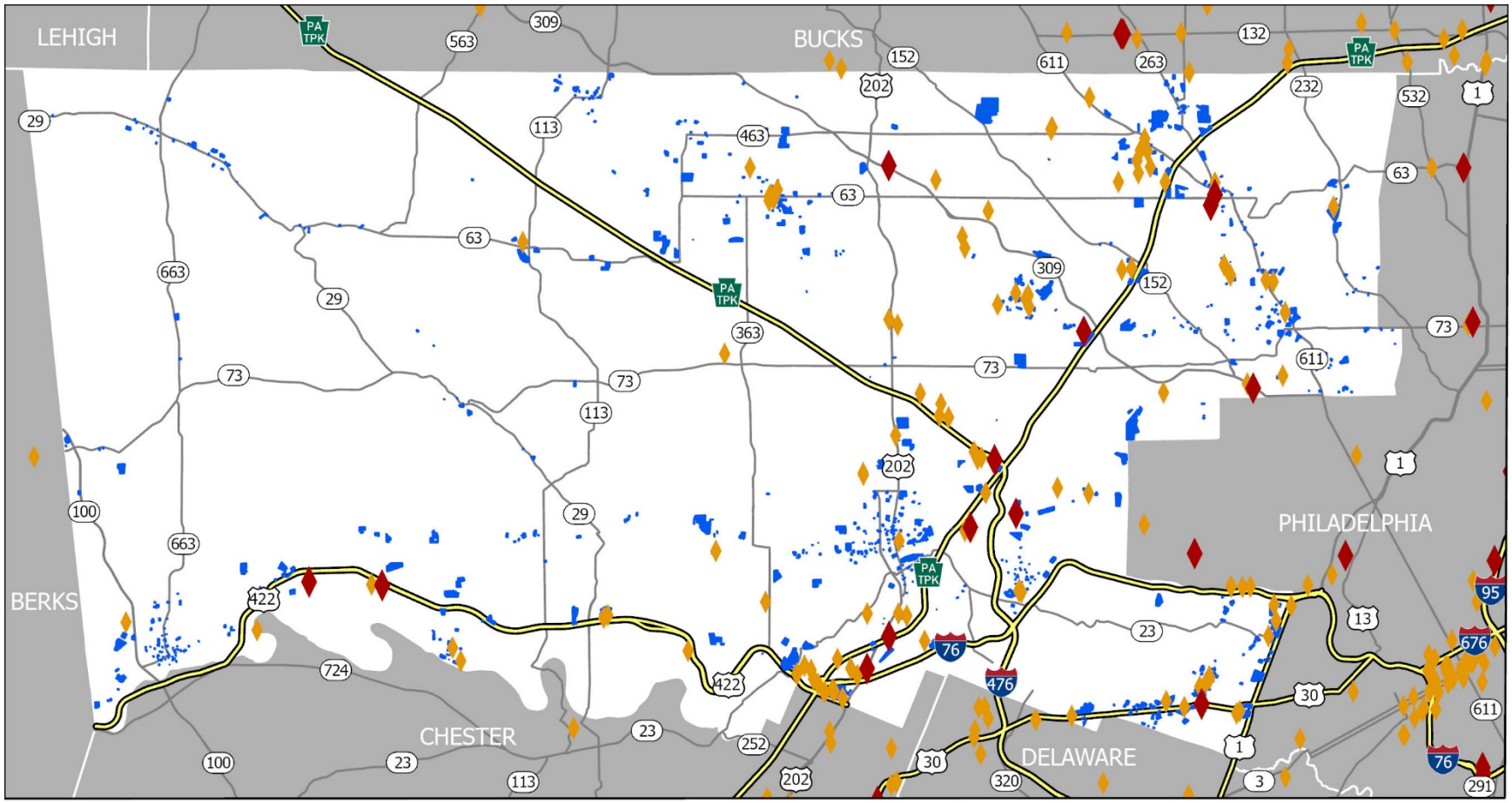


*Figure 4: Existing EVSE and Multifamily Residential Area*



Chapter 2:

# Methodology

## Projecting Demand for EVs

According to the International Center for Clean Transportation, the vast majority of EV charging in the United States currently occurs at the owner's home or workplace, and this trend is expected to continue as EV use increases. To better understand the trends in demand for public charging, DVRPC has partnered with Plug-In & Hybrid Electric Vehicle Research Center at UC Davis to provide Census Block Group (CGB)-level projections of where EV owners will live and how much demand there will be for workplace charging when about 5 percent of all passenger vehicles are PEVs. These projections are based on the 2021 distribution of PEV registrations supplied by PennDOT; demographic data from the 2015–2019 American Community Survey five-year summaries; commuting data from Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics (LODES), version 7; and commuting distances between block groups from DVRPC's Travel Demand Model. The model uses regression analysis to correlate current PEV ownership with demographic characteristics to identify areas where future PEV purchases are most likely to occur. Using additional data on commuting patterns in the region, the model projects those areas where PEV owners are likely to work and proportionately assigns PEVs to their workplace CBG. Using information on commuting distance, user-specified battery capacity, tolerance for charge depletion, and mix of all-battery and PHEVs, the toolkit predicts the number of workplace charging events and kilowatt hours (kWh) of demand in a CBG. The model assumes employees park at the workplace charger for seven hours. This model is not predictive regarding the year in which the number of vehicles projected will be reached. It is, however, a useful tool for determining the likely spatial distribution of vehicles given a specified number of PEVs in the DVRPC region.

## Proximity Analysis

Montgomery County provided DVRPC a list of 65 county facilities that could potentially serve as host sites for EVSE. DVRPC mapped these facilities and performed a proximity analysis to screen for facilities that would be most appropriate for EVSE. The proximity analysis was used to create a short list of higher potential sites for EVSE. These were reviewed in a site analysis to create an even shorter list of recommended sites to deploy EVSE. The proximity analysis assumes that people will comfortably walk up to one half-mile to access transportation or an amenity. This walking distance would indicate that the public could use public EVSE to charge if they had challenges charging at home (MUD residents) or while they were visiting retail centers. The analysis evaluated a site's location in relation to existing chargers, multifamily homes, retail properties, EV registrations, and predicted demand for paid charging. This analysis relied on inputs from the U.S. Department of Energy's list of EVSE, September 2021 COSTAR data on multifamily residential units and retail properties, and the DVRPC/UC Davis CBG-level projections. A point-based system with six criteria was used to rank the sites. A site could receive up to a point in each criterion, up to a maximum site score of six. Points were awarded for:

1) Being more than one mile from the closest public EVSE: This criterion was chosen to select locations that were beyond comfortable walking distance from existing EVSE. The National Renewable Energy Lab (NREL) also assumes in its modeling that non-residential Level 2 charging stations are generally used for charging within walking distance of a destination due to the longer charge time of these stations.

2) Proximity (within 0.5 miles) to multifamily residential areas: This criterion was selected to identify where EVSE may serve residents that face challenges charging at home because they do not have garages or driveways where they can charge a PEV.

3) Proximity (within 0.5 miles) to a CBG that has greater than 20 registered PEVs per square mile: This number is greater than approximately 80 percent of CBGs regarding the number of registered PEVs per square mile as calculated from the DVRPC/UC Davis Electric Vehicle Planning Toolkit. This criterion was selected to identify areas where there is an existing density of PEVs.

4) Proximity (within 0.5 miles) to a CBG that has more than 40 projected workplace charging events per day: This number is greater than approximately 75 percent of CBGs with regard to workplace charging events per day as calculated from the DVRPC/UC Davis Electric Vehicle Planning Toolkit. This criterion was selected to identify areas where there is projected demand for charging near where PEV owners are working. Research from the NREL suggests that workplace charging demand is roughly twice the demand for public EVSE.

5) Proximity to a retail center as defined by COSTAR property data: 1 point was awarded for sites within 0.25 miles of a center, and 0.5 points was awarded for sites within 0.5 miles. Retail centers are defined as places where multiple businesses occupy the same property and often share a building or parking facilities, such as a strip mall.

6) Proximity to retail in terms of rentable business area (RBA). A site was awarded a point if the sum of the RBA for all retail properties within a half-mile was greater than 1,000 square feet. Rentable business area, also known as gross leasable area, is a measure of how much floor space in a building is able to be rented by a commercial tenant. The two retail definitions were used to account for differences in land use patterns between areas and ensure that areas with many small and separate properties, such as traditional main streets, were not overlooked in favor of retail developments with a few large properties.

Chapter 3:

# Results of Site Analysis

Using the results of the proximity analysis, 18 of the top scoring sites were selected for further analysis using aerial photos for obvious factors that may impact suitability for hosting EVSE. DVRPC reviewed county-owned facilities for suitability to host publicly accessible EVSE based on proximity to retail, multifamily residential areas, existing PEV ownership, areas where workplace charging is anticipated to be high, and distance from existing chargers. This review was then used to make recommendations for each site. Of the 18 sites examined, two were not recommended due to site constraints. Furthermore, two other sites were found to already be served by municipally managed chargers. The remaining 14 county-owned facilities were identified as being conducive to public investment in EVSE. Facilities in urban areas accounted for six of 14 recommended sites but were consolidated into three areas due to some of their proximities to one another. The eight suburban sites were further classified as either high priority or lower priority.

Table 4 details the 18 sites that scored high enough on the proximity analysis to be evaluated using aerial analysis. A full list of county facilities, including those that did not did not score high enough to move on to the aerial analysis step, is available in Appendix A.

***Table 4: Results of Proximity Analysis***

| Facility | Greater than 1 Mile from Existing Level 2 EV Charging Stations | Within 0.5 Miles of Multifamily Units | Within a Half-Mile of Block Group with Over 20 Registered Electric Vehicles Per Square Mile | Within a Half-Mile of Block Group with Over 40 Expensive Workplace Charging Events Per Square Mile | Within 0.5 miles of 1,000 sq. ft Rentable Building Area (RBA) | Within 0.5 miles of Retail Center | Total |
|---|---|---|---|---|---|---|---|
| **Elkins Park Free Library** | 1 | 1 | 1 | 1 | 1 | 0.5 | 5.5 |
| **Glenside Free Library** | 1 | 1 | 1 | 1 | 1 | 0.5 | 5.5 |
| **Adult Probation Center** | 0 | 1 | 1 | 1 | 1 | 1 | 5 |
| **Ardmore Free Library** | 0 | 1 | 1 | 1 | 1 | 1 | 5 |
| **Court House** | 0 | 1 | 1 | 1 | 1 | 1 | 5 |
| **Jenkintown Library** | 0 | 1 | 1 | 1 | 1 | 1 | 5 |
| **Ludington Public Library** | 0 | 1 | 1 | 1 | 1 | 1 | 5 |
| **Montgomery County Warehouse** | 1 | 1 | 1 | 1 | 1 | 0 | 5 |
| **One Montgomery Plaza** | 0 | 1 | 1 | 1 | 1 | 1 | 5 |

| Facility | Greater than 1 Mile from Existing Level 2 EV Charging Stations | Within 0.5 Miles of Multifamily Units | Within a Half-Mile of Block Group with Over 20 Registered Electric Vehicles Per Square Mile | Within a Half-Mile of Block Group with Over 40 Expensive Workplace Charging Events Per Square Mile | Within 0.5 miles of 1,000 sq. ft Rentable Building Area (RBA) | Within 0.5 miles of Retail Center | Total |
|---|---|---|---|---|---|---|---|
| **Pottstown Health Center** | 1 | 1 | 1 | 1 | 1 | 0 | 5 |
| **Pottstown Public Library** | 1 | 1 | 1 | 1 | 1 | 0 | 5 |
| **Penn Wynne Library** | 1 | 1 | 1 | 1 | 0 | 0 | 4 |
| **Lansdale Community Connections** | 0 | 1 | 1 | 1 | 1 | 0.5 | 4.5 |
| **Montgomery County: Norristown Public Library** | 0 | 1 | 1 | 1 | 1 | 0.5 | 4.5 |
| **Narberth Community Library** | 0 | 1 | 1 | 1 | 1 | 0.5 | 4.5 |
| **Pottsgrove Manor Park** | 1 | 1 | 0 | 1 | 1 | 0.5 | 4.5 |
| **Union Library Company, Inc. of Hatboro** | 1 | 1 | 0 | 1 | 1 | 0.5 | 4.5 |
| **East Cheltenham Free Library** | 1 | 1 | 0 | 1 | 0 | 0.5 | 3.5 |

*Source: DVRPC, 2022*

## Recommended Sites in Urban Areas

### Pottstown Public Library and Pottstown Health Center

The Pottstown Public Library and Pottstown Health Center are located within 1,000 feet of each other on High Street and King Street respectively. Both are close to the numerous shops and restaurants in Pottstown's historic core but not a consolidated retail center. Both locations got points for being less than a half-mile away from Census Block Groups with high levels of EV registrations and paid charging events while being over a mile from the nearest existing charger. Both sites are also within a half-mile of multifamily housing units that lack private driveways. Pottstown's dense and walkable main street would both compliment and benefit from destination charging opportunities. A charger at either location would serve visitors and residents in Pottstown and be the first within the borough's boundaries. Both facilities have small parking lots of their own, and there are municipally-owned lots nearby that might be able to host chargers as well.

### Pottsgrove Manor Park

Pottsgrove Manor Park is a historic mansion located on King Street across the Manatawny Creek from Pottstown's traditional center. The site is surrounded by numerous recreational opportunities including: the Pottstown skatepark, a BMX track, a trailhead of the Schuylkill River Trail, a splash park, and numerous baseball diamonds. To the west of the site, PA 100 provides motorists with a connection to US 422 about halfway between Reading and King of Prussia. The site is also located between two contrasting retail clusters. A short walk to the east is Pottstown's High Street, a commercial corridor which is home to many small stores and restaurants in a dense and walkable context. To the west, suburban-style big box stores and an industrial park flank PA 100. The site received points for being over a mile away from existing public EVSE, its proximity to areas with a high density of paid charging events, and its location near retail. Points were also earned because the site is within a half-mile of some small multifamily homes, although most of residential in the vicinity appears to have private driveways or garages. A charger at Pottsgrove Manor Park would serve drivers traveling to the many opportunities for recreation and shopping in the vicinity.

### Montgomery County Offices in Norristown

As the county seat of Montgomery County, the downtown area of Norristown is home to several county offices including the Court House, One Montgomery Plaza, and the Adult Probation Center. Since these three buildings are located close to each other on a few blocks between Main and Airy streets, they scored identically using the proximity-based metrics and will be described together in this report. This grouping is also useful because the three buildings each have little to no parking of their own and share two multi-level parking facilities: The Main Street and Cherry Street garages. If the site is chosen for EV infrastructure investment, these garages would likely be the actual location of EVSE rather than the offices themselves.

The county offices did not score points for distance from existing chargers because a Level 2 charger, the only one currently in Norristown, is located at the Norristown Police Station on Airy Street, about a quarter-mile away. The facilities did score points for both retail categories and would be well located to serve the various storefronts that line Norristown's walkable Main Street corridor. It is worth noting that the site is within a half-mile of three Regional Rail stations on SEPTA's Norristown Line, including Norristown Transportation Center—which is also the terminus of the Norristown High Speed Line and several bus routes. However, transit riders may be better served by EVSE located at the Norristown Transportation Center which has a large parking garage of its own.

Consistent with the concentration of jobs in the surrounding government offices, the site scored a point for being in a block group with a high density of demand for paid charging. The site also scored a point for being within a half-mile of a block group with a high density of EV registrations, but subsequent analysis found that the block group barely overlapped with the half-mile buffers and the area immediately surrounding the site did not have a high density of EV registrations. However, the site is surrounded by multifamily properties that range from residential conversions with a few units each to a low-rise apartment complex with over 80 units.

Many of the nearby multifamily residences appear to rely on a mix of on- and off-street parking which may not be sufficient for reliably charging an increasing number of EVs.

Overall, EVSE is recommended at this location because it would help ensure local residents reliably have access to charging, provide workplace charging options for numerous government and other employees, and have convenient access to the stores and offices of downtown Norristown.

## High Priority Sites in Suburban Areas

### Elkins Park Free Library

The Elkins Park Free Library is located just off Old York Road (PA 611) near several retail centers and the Cheltenham Township Public Works Facility. It is surrounded by a sidewalk network that connects it to the Elkins Park Regional Rail Station, local businesses, and at least three multifamily housing developments that appear to lack private driveways. The site received a point for being over a mile from the nearest Level 2 charger. It also scored well due to being near a high density of EV registrations, paid charging events, and retail properties. Locating EVSE here would serve to fill in gaps in the existing community charging network, provide charging opportunities for residents in nearby condominiums who might otherwise not have one within walking distance. Investments in charging infrastructure near the library could benefit from coordination with the Cheltenham Township Department of Public Works who controls an adjacent parking lot and may have fleet charging needs in the future.

### Glenside Free Library

The Glenside Free Library is located in Cheltenham Township two blocks from Easton Road, Glenside's walkable commercial corridor anchored by a Regional Rail station. It is across Waverly Road from a community pool and several sports fields. The site received a point for its proximity to multifamily housing units, and although the closest of these properties are relatively small and may have private garages, the larger Rosemore Garden Apartments located on Easton Road are about a half-mile away from the library and do not have a closer public charger. The site also scored points for its proximity to high densities of EV registrations, paid charging events, and retail properties as well as being over a mile from the nearest public charger. A charger located at the library would be convenient for those visiting the nearby pool and ballfields and would be the closest public EVSE for many businesses and residents in Glenside.

### Union Library of Hatboro

The Union Library of Hatboro is situated on Hatboro's main street, York Road, a short walk from the borough's Regional Rail station. There are several multifamily developments in the vicinity of the library that range from high-rises to attached townhomes. Two of the taller buildings are located directly adjacent to the train station and are surrounded by parking lots that appear to serve not just residents, but also businesses along York Road. The lower density multifamily buildings also have parking arrangements that may be limiting for tenants trying to charge an EV. The library earned a whole point for being within a half-mile of at least 1,000 square feet of retail space, but only a half point proximity to a retail center. The site is also within a CBG with a high density of paid charging events but is not proximate to a high density of EV registrations. The library earned a point for being over 1 mile from the nearest existing charger. The Pennsylvania Turnpike passes within a mile of the site; however, it is about a 2-mile drive to the nearest exit, the Willow Grove interchange with PA 611. Since there are numerous existing chargers along PA 611, including some DCFC in Willow Grove, the location of the Union Library of Hatboro is not particularly well suited to serve long-distance travers on the Turnpike, but would be conducive to destination charging for those living, working, and shopping in Hatboro.

### Ardmore Free Library

The Ardmore Free Library is located along Ardmore Avenue where the commercial area centered on Lancaster Avenue interfaces with a higher-density residential section of Lower Merion Township. The site earned maximum points in all categories except distance from an existing charger. The library is close to numerous multifamily homes ranging from mixed-use properties with a few units each to purpose-built low-rise buildings such as the Suburban Court apartments with 95 units. Most notably, Ardmore House, a subsidized 64-unit apartment building for seniors is located across the street from the site. The most of area within a half-mile of the site has high densities of EV registrations and predicted paid charging events. This is consistent with numerous workplaces and EV-owning households along the Main Line suburban corridor that follows SEPTA's Paoli/Thorndale Line, and US Route 30, locally known as Lancaster Avenue. The library has its own surface parking lot where public access is appears feasible and has adequate sidewalk connections to destinations such as Haverford College, the Ardmore Avenue Community Center, Ardmore Plaza Shopping Center, and Ardmore station that is served by both SEPTA and Amtrak trains. In summary, The Ardmore Free Library is highly recommended for EVSE due to its location among high densities of land uses supportive of public EV charging.

### Jenkintown Library

Jenkintown's Library is located on the borough's historic main street, York Road (PA 611), among a variety of businesses in a walkable context. The area is served by two trains stations: Jenkintown-Wyncote, which is about 0.8 miles away from the library and is served by three Regional Rail Lines, and the slightly closer Noble station which is only served by the West Trenton Line. The Jenkintown Library earned maximum points in all categories except distance from an existing charger. Currently, the only charger in Jenkintown is hosted by the Jenkintown Police Department about 0.3 miles south of the library. Two chargers, both located at car dealerships in Abington Township, are located just north of Noble Station about 0.6 miles from the library. The Census Block Group containing the site has high densities of both EV registrations and predicted demand for paid charging. Aerial analysis confirmed the presence to numerous retail destinations in the vicinity. As for multifamily housing, a 62-unit apartment building is less than a block away from the site although most of the other residences in the area appear to be single-family homes. In conclusion, the Jenkintown Library's location, as well as its decently sized parking lot, make it conducive to public charging.

### Ludington Library

The Ludington Library is located on Lancaster Avenue (US 30) in Lower Merion Township near the Bryn Mawr station on SEPTA's Paoli/Thorndale Line. Many amenities surround the site: storefronts and restaurants line the walkable commercial area on Lancaster Avenue, and the Bryn Mawr Community Center is located behind the library. Bryn Mawr Hospital, several other healthcare services, and a station on the Norristown High-Speed Line are also within a half-mile of the site. Given its surroundings, it is not surprising the Ludington Library earned maximum points in all categories except distance from an existing charger. There is currently only one public charger, located in Rosemont, that is within a mile of the library. This number could be considered low considering the surrounding residential areas have some of the highest EV ownership rates in the region and there is high predicted demand for workplace charging in the area as well. There are several multistory apartment blocks within a half-mile of the site, most of which are situated across the train tracks from the library but are still accessible by pedestrians. The library itself has parking lot of decent size that it shares with some of the other civic institutions nearby. Overall, chargers located at the Ludington Library in Bryn Mawr would serve to expand public charging capacity in an area with significant demand and support the customers and employees of the numerous nearby businesses and healthcare facilities. Assessing and addressing EV charging needs could also benefit from consultation with local institutions such as Bryn Mawr College, the Township of Lower Merion, Bryn Mawr Hospital, and SEPTA.

## Lower Priority Sites in Suburban Areas

### East Cheltenham Free Library

The East Cheltenham Free Library and the attached Rowland Community Center are in a mostly residential portion of Cheltenham Township near its border with Philadelphia. The site earned a point for being over a mile from an existing charger but did not perform as well in other categories. While it received a point for proximity to multifamily housing, aerial analysis showed these units were few in number and mostly attached to other buildings with private driveways. Similarly, the Library earned a point for being within a half-mile of a block group with a high density of EV registrations, but further inspection found that the portion of that block group within a half-mile of the library was small and mostly parkland. The site received a half of a point because it is about 0.35 miles from a strip mall but did not reach the 1,000 sq ft threshold for rentable business space. This is reflective of the light intensity of the few retail properties close to the site. However, the destinations that are within a half-mile of the library, which include the Cheltenham Station on SEPTA's Fox Chase Line and a post office, are fairly well connected via sidewalks, and the moderately-sized parking lot that is shared with the Community Center could be conducive to charging infrastructure.

In summary, despite scoring well, EVSE located at the East Cheltenham Free Library would have limited usefulness outside of providing redundancy for some local residences, so it should be considered as a feasible but low priority site for public investment in EV infrastructure.

### Penn Wynne Library

The Penn Wynne Library is situated in an area of Lower Merion Township that is almost entirely comprised of single-family homes. The library appears to share a public parking lot with the few other non-residential land uses in the area including a church and a commercial building with storefronts facing Manoa Road. The parking lot's location surrounded with existing buildings and small size could pose a barrier to the installation of EV chargers and associated infrastructure. The site earned a point for being over a mile away from existing chargers, but there are two chargers 1.1 miles away in the parking garage of the Lankenau Medical Center. Similarly, the site earned a point for being within a half-mile of multifamily units, but further analysis found that this was only because of a single property with four units that appears to have a garage for parking. The site did not score points in either of the retail categories and the only CBG within a half-mile with a high density of predicted paid charging events was the one that contained Lankenau Medical Centers and its existing chargers. The only metric the site scored representatively well on is the high density of EVs registered in the Block Groups around the site. In Summary, an EV charger located at the parking lot used by the Penn Wynne Library would likely not see as much use as one located at the other sites examined and may be practically difficult.

## Sites with Existing Municipal Charging Networks

### Lansdale Community Connections

The Lansdale location of the Montgomery County Office of Community Connections is located on Main Street about 0.15 miles from the Lansdale Regional Rail station. Like most of the other sites situated on a borough's walkable main street, the Office of Community Connections location in Lansdale has several indicators of high demand for public charging including: access to retail, higher than average EV registrations, and predicted demand for workplace charging. Unfortunately, aerial analysis shows the office has a narrow parking lot between it and another building that could pose a significant challenge to the installation of EVSE, so it is not recommended at this particular site. However, unlike many other areas in the region, Lansdale already has a municipally operated network of chargers at five locations throughout the borough including three within a quarter-mile of the site. This presents a unique opportunity to evaluate the performance of existing chargers and use real world data and experience to develop recommendations for future community charging programs. It is recommended that the County consult with Lansdale to use community feedback and utilization data from the existing chargers to inform decisions about where and when to expand the number of charging stations or increasing capacity at existing ones.

### Narberth Community Library

The Narberth Community Library was found to already have a municipally installed EV charger on site. The Borough of Narberth should use the lessons learned from the installation and utilization of the current chargers when considering future expansion or capacity improvements.

## Sites Not Recommended due to Feasibility Concerns

### Montgomery County Warehouse

The Montgomery County Warehouse is located on the corner of Washington and Buttonwood Streets where a small industrial area along the Schuylkill River interfaces with a residential area of Norristown that is mostly composed of rowhomes with backyard garages. The Warehouse is two blocks south of Main Street where there are a few stores, but no prominent retail centers. About a half-mile away across Main Street, there are several apartment buildings that lack private driveways. The site scored points for being within a half-mile of CBGs with high densities of EV ownership and paid charging demand as well as being over a mile from the nearest existing charger. A charger at the Warehouse lot on Buttonwood could serve some Norristown residents, but the usefulness of the site is hurt by its location on a dead-end street that lacks access to the nearby Schuylkill River Trail and its relatively small parking lot that may not always be publicly accessible due to a gate. The community charging needs of Norristown may be better served by EVSE closer to Main Street and the apartment complexes.

### Norristown Public Library

The Norristown branch of Montgomery County Public Libraries is in a mostly residential area of Norristown that has some multifamily units and small retail properties throughout. Also, several of the nearby CBGs have a high density of either PEV registrations or predicted paid charging events. Overall, the neighborhood in which the Norristown Library is located could benefit from EVSE to ensure residents have access to charging opportunities. However, the particular parking arrangement at the library may not be conducive to serving this need because the lot is gated and closed outside of library hours. Therefore, the Norristown Public Library is not recommended to host public EVSE due to access constraints that could limit its usefulness.

Chapter 4:

# Recommendations

This chapter includes general recommendations to prepare for the charging needs of EVs and site specific recommendations for EVSE deployment in Montgomery County.

## General Recommendations

County and municipal governments should:

- **Transition public fleets to EVs** as a first/early course of action. Public facilities can serve the dual purpose of providing charging infrastructure for both government-owned fleets and the traveling public.

- **Incorporate charging into their existing planning activities** by monitoring the adoption of EVs and installation of EVSE in their communities while working with partners to address coverage and capacity concerns. Planners should use community input as well as local knowledge of parking, housing, economic, and other conditions to inform infrastructure decisions amidst an evolving electric vehicle landscape. County governments should also continue to share data and experiences with DVRPC and surrounding counties to support regional planning efforts and EV adoption.

- **Charge an appropriate fee for using EVSE**. The EVSE should be networked to collect usage data, and the fee should offset the network and energy costs. Charger locations should be reported to the Alternative Fuel Data Center and have a display identifying the costs for charging. FHWA Infrastructure Investment and Jobs Act guidance for EVSE funding provide useful requirements for EVSE infrastructure.[6]

- **Seek additional funding opportunities** to deploy EVSE at recommended sites.[7]

## Site Recommendations

In this study, DVRPC reviewed county-owned facilities for suitability to host publicly accessible EVSE based on proximity to retail, multifamily residential areas, existing PEV ownership, areas where workplace charging is anticipated to be high, and distance from existing chargers. This review was then used to make recommendations for each site. Of the 18 sites examined, two were not recommended due to site constraints. Furthermore, two other sites were found to already be served by municipally managed chargers. The remaining 14 county-owned facilities were identified as being conducive to public investment in EVSE. Facilities in urban areas accounted for six of 14 recommended sites but were consolidated into three areas due to some of their proximity to one another. The eight suburban sites were further classified as either high priority or lower priority.

Figure 5 shows the recommendation for each of the county facilities and their location in relation to multifamily residential areas. Sites that did not score high enough on the proximity analysis are shown as “Criteria Not Met.” Figure 6 shows the same site recommendations in the context of the predicted paid charging events and current EV registration density data used in the proximity analysis. A detailed list of sites recommended for new EVSE is included later in this chapter.

[6] FHWA NEVI Funding Guidance: www.fhwa.dot.gov/environment/alternative_fuel_corridors/nominations/90d_nevi_formula_program_guidance.pdf

7 Several grant opportunities are identified in Chapter 5 of this report.

*Figure 5: Facility Recommendations and Multifamily Residential Areas*

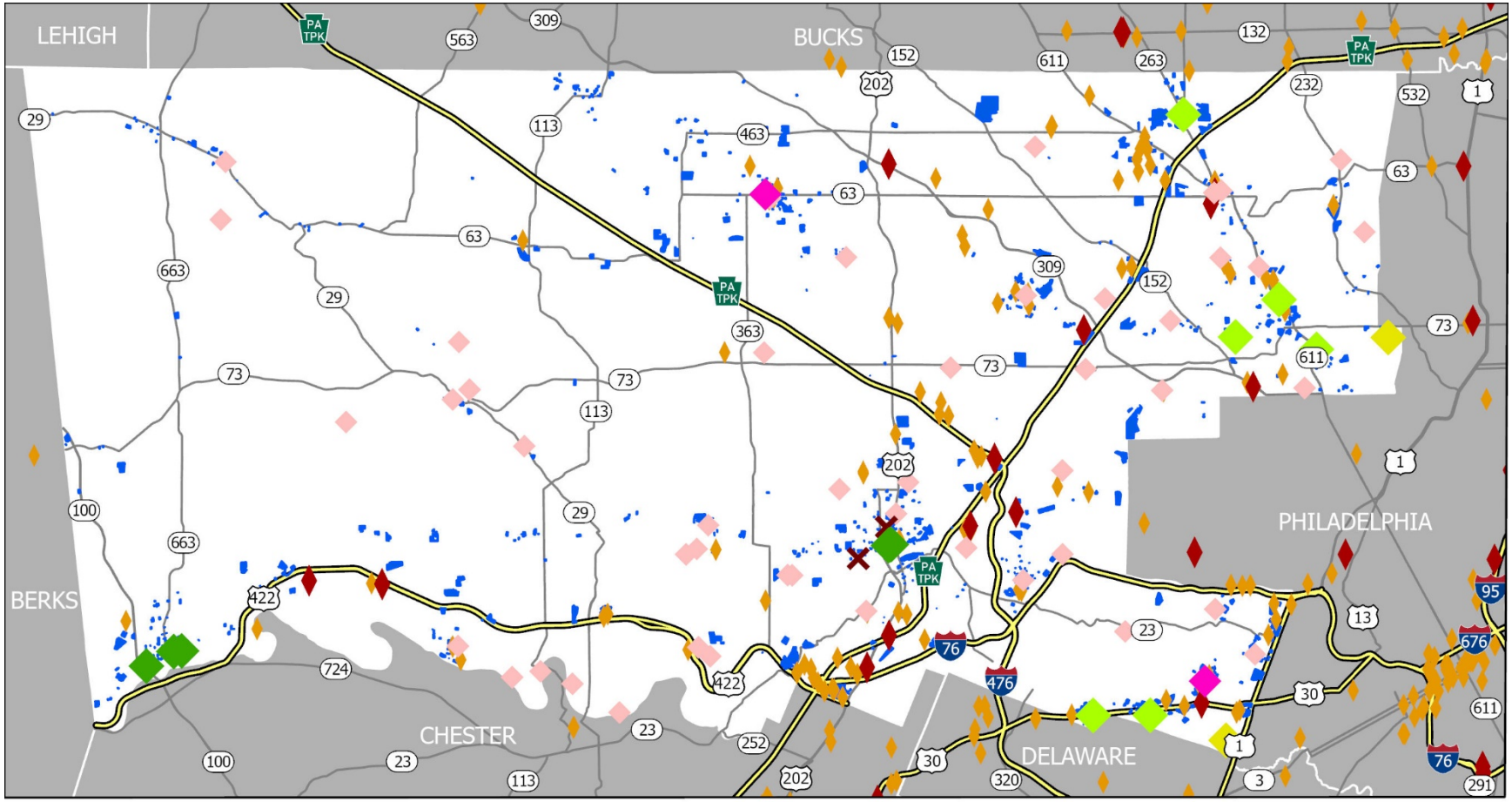
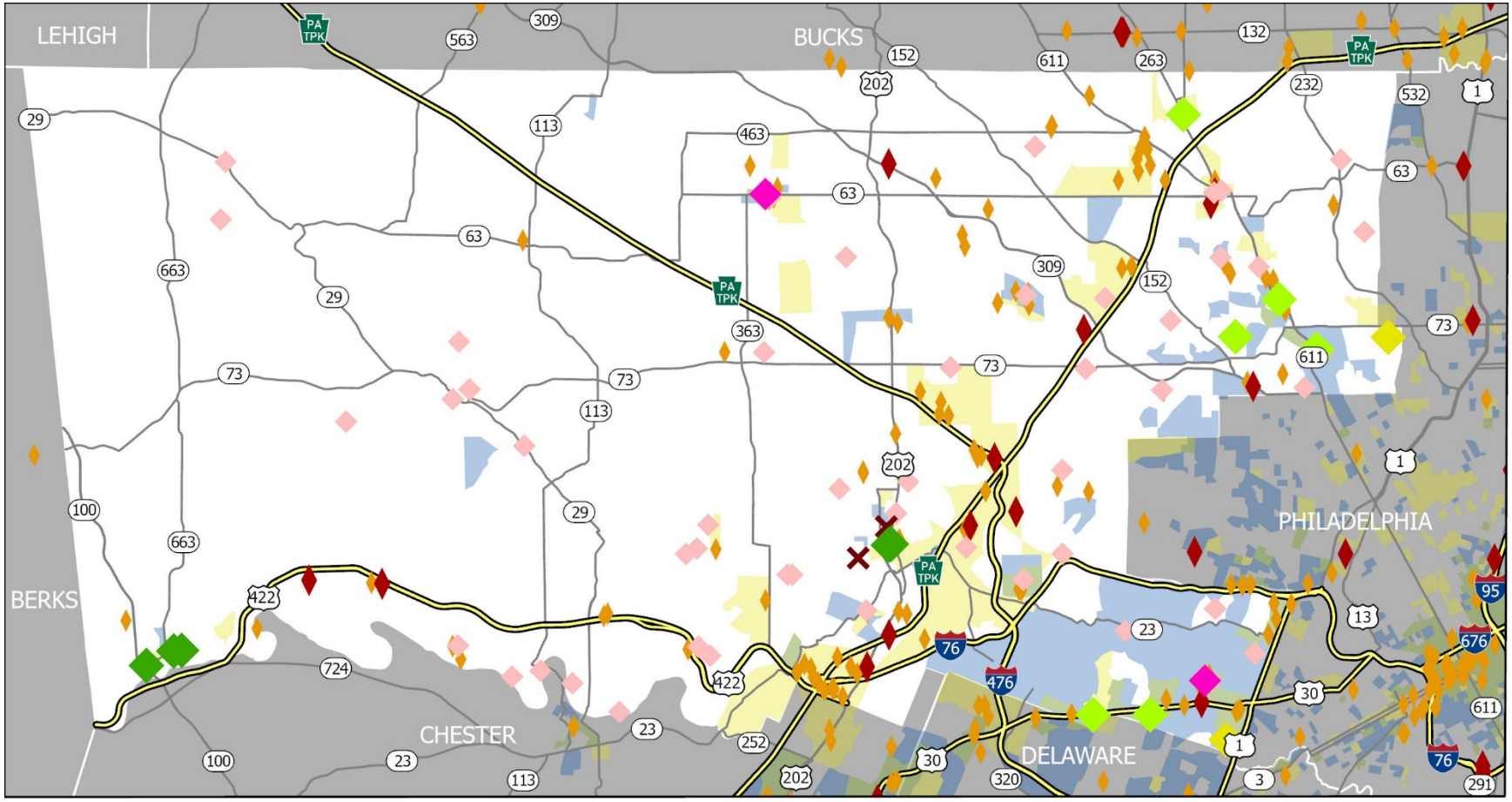


*Figure 6: Facility Recommendations, Current EV Registrations, and Projected Paid Charging Events*



## Recommended Sites in Urban Areas

Norristown and Pottstown are small cities and have unique needs and challenges for public EV charging. These areas tend to have lower rates of EV adoption and few existing chargers, but high overall density of people, including many that live in multifamily homes without private parking spaces. The lower rates of EV ownership may be in part due to the lack of places to charge, but socioeconomic factors play a large role as well, so public investment in these areas will be critical to ensuring equitable access to charging as EVs become financially viable for more households. Chargers also serve to support local employment and retail clusters by providing an attractive amenity for visitors and employees. The following county facilities would be well situated to host public EVSE:

- **Montgomery County Offices in Norristown:** EVSE is recommended in downtown Norristown to serve the various government offices in the area including the Montgomery County Court House, One Montgomery Plaza, and Adult Probation Center. Since the individual buildings have little to no parking themselves, chargers could be installed at one or both of the shared parking facilities: The Main Street and Cherry Street garages. The area also has a high density of commercial activity and multifamily housing.

- **Pottstown Public Library and Health Center:** A charger at either facility in the core of Pottstown would be the first within the borough's boundaries and could serve visitors to the shops and restaurants on Pottstown's historic High Street corridor in addition to residents in nearby multifamily housing units. Existing municipally-owned public parking lots could also host EVSE nearby.

- **Pottsgrove Manor Park** is located across a creek from downtown Pottstown but is still walkable to many of the businesses on High Street. The park itself also has numerous recreational amenities and could be a useful site for DCFC due to its location near PA 100 and US 422.

## High Priority Sites in Suburban Areas

Public charger demand from residences is expected to be less in areas where most people have a private garage or driveway where they can charge an EV. However, public charging still plays a critical role in serving businesses and other workplaces as well as providing additional capacity and redundancy for residents. All the following recommended sites in suburban areas are libraries near their respective community's main street. Most are also close to a SEPTA Regional Rail station and among high densities of EV registrations. In particular, suburbs along the Main Line, including Ardmore and Bryn Mawr, have some of the highest EV ownership rates in the region in addition to high concentrations of jobs and homes which makes them very well suited for EV chargers. However, the obvious suitability in these areas means that public and semi-public chargers installed by private entities often already exist nearby. In these cases, public investment in EVSE should serve to fill gaps in coverage and ensure adequate capacity.

- **Ardmore Free Library** (in Ardmore, Lower Merion Township): A charger located at this library would help meet the high anticipated public charging demand from businesses along Lancaster Avenue and nearby residences with high rates of EV ownership. There are also several multifamily residences in the vicinity including Ardmore House, a subsidized 64-unit apartment building for seniors across the street from the library, that would benefit from a charger in walking distance.

- **Ludington Library** (in Bryn Mawr, Lower Merion Township): EVSE is recommended here to expand public charging capacity in an area with significant demand and support the customers and serve employees of the numerous nearby businesses and healthcare facilities. Assessing and addressing EV charging needs could also benefit from consultation with local institutions such as Bryn Mawr College, the Township of Lower Merion, Bryn Mawr Hospital, and SEPTA.

- **Glenside Free Library** (in Glenside, Cheltenham Township): A charger located at this library is recommended because it would be the closest public EVSE for many businesses and residents in Glenside and would be convenient for those visiting the nearby pool and ballfields.

- **Jenkintown Library** (in Jenkintown Borough) The Jenkintown Library is located on the borough's historic main street, York Road, and close to a 62-unit apartment building. Its location, as well as its decently sized parking lot, make this library conducive to hosting public chargers.

- **Union Library of Hatboro** (in Hatboro Borough): Although EVSE exists in neighboring municipalities, especially around the Pennsylvania Turnpike, there are currently no chargers in Hatboro proper. The Union Library of Hatboro is well situated to fill that gap by hosting Level 2 chargers that would serve the Borough's businesses and residents, especially those living in one of the nearby apartment buildings.

- **Elkins Park Free Library** (in Elkins Park, Cheltenham Township) The Elkins Park Branch of the Cheltenham Township Library System is located just off Old York Road near several retail centers and a public works facility. Locating EVSE here would serve to fill in gaps in the existing charging network and provide charging opportunities for residents living in the nearby condominiums who might otherwise not have any within walking distance. Investments in charging infrastructure near the library could benefit from coordination with the Cheltenham Township Department of Public Works who controls an adjacent parking lot and may have fleet charging needs in the future.

### Lower Priority Sites in Suburban Areas

The following two facilities are considered a lower priority for public investment in EVSE because they are expected to serve fewer people than the other suburban sites. In both cases, these are libraries in primarily residential areas without much retail or other drivers of demand for public charging close by. However, EVSE here may still serve library patrons and employees and provide redundancy for local residents.

- **East Cheltenham Free Library** (in Cheltenham Village, Cheltenham Township): EVSE located here could serve the East Cheltenham Free Library and the attached Rowland Community Center as well as a nearby park. The residential area around the library comprised mostly of single-family homes that have private driveways that could be used to charge EVs.

- **Penn Wynne Library** (in Penn Wynne, Lower Merion Township): The public parking lot that serves the Penn Wynne Library is small and surrounded with existing buildings which could pose a barrier to the installation of EV chargers and associated infrastructure. However, if installed, EVSE here could serve nearby households and the handful of small businesses on Manoa Road.

### Sites with Existing Municipal Charging Networks

Where they already exist, the municipal government should maintain their chargers and use data and feedback from the existing sites to inform expansion decisions. Existing municipal sites include:

- Lansdale Community Connections Office

- Narberth Community Library

Chapter 5:

# Funding Sources

Various grant programs from government agencies and other sources exist to assist both government and non-government entities in building charging stations and electrifying fleet vehicles. In Pennsylvania, Driving PA Forward is a set of programs that aims to address emissions, particularly oxides of nitrogen (NOx) from on- and off-road diesel sources. It is administered by the Pennsylvania Department of Environmental Protection (DEP) to allocate funds entrusted to the Commonwealth as part of its legal settlement with Volkswagen regarding the carmaker's emissions cheating scandal. Other programs are funded by the U.S. Department of Transportation. These can be administered directly by the Federal Highway Administration (FHWA) or indirectly by state departments of transportation, such as PennDOT, or by metropolitan planning organizations like DVRPC.

## Funding Sources for EV Charging Stations

### Level 2 EV Charging Rebate Program

The Level 2 EV Charging Rebate Program, part of Driving PA Forward, funds Level 2 chargers at publicly accessible locations, locations that serve workplace or fleet charging needs, and multi-unit dwellings. The program is accepting applications from public and private entities and will continue to do so until funds run out. More information is available on the Driving PA Forward webpage.

### Community Charging and Fueling (CFI) Program

The CFI Program is a competitive grant program administered by FHWA to funding supporting infrastructure for EVs as well as other alternative fuel vehicles. The CFI Program's funds are split into two categories: the Corridor Program which funds EVSE within a mile of federally designated Alternative Fuel Corridors (AFCs) and the Community Program which funds projects at other publicly accessible locations. According to FHWA, all CFI applications will be considered for both programs to the extent possible. County, municipal, and other government entities are eligible to apply, but recipients of the Corridor Program must contract with a private entity for the acquisition and installation of the infrastructure. Contracting with a private entity is allowed but not required for the Community Program. For information about application requirements and upcoming deadlines, visit the CFI page on Grants.gov.

### National Electric Vehicle Infrastructure (NEVI) Formula Program

The NEVI Formula Program provides federal funding, through states, to install EV Chargers beginning with DC Fast Chargers along key corridors. Within Pennsylvania, the Department of Transportation (PennDOT) is soliciting applications and administering the grants in multiple rounds over five years. In accordance with federal regulations, funds must be used on Fast Chargers along federally designated Alternative Fuel Corridors (AFCs) until the state's AFCs have been fully built out. The AFCs that serve Montgomery County include all the Interstate Highways and US Routes 1, 30, and 422. For more information, including application deadlines and prioritized corridors, visit the NEVI page on PennDOT's website.

### PECO

PECO, the local electric utility, is piloting two programs to help offset the cost of EVSE for non-residential customers. The Level 2 charger program offers rebates of up to $3000 per port to industrial, commercial, and government PECO customers. For customers installing DC fast chargers, PECO is offering a 50 percent discount on distribution charges for up to 36 months after installation. For more information about incentives from PECO, visit their EV Savings and Benefits page.

### Congestion Management and Air Quality (CMAQ) Program

CMAQ is a federally-funded, regionally-administered reimbursement program for projects that demonstrably reduce air pollution emissions and help the region meet the federal health-based air quality standards

including EVs and charging structure. In our region, DVRPC solicits applications and awards funds. For more information about eligible projects and when the next round of applications will be accepted, visit the CMAQ page on the DVRPC website.

### Carbon Reduction Program (CRP)

CRP is a new program established by the Bipartisan Infrastructure Law to fund projects that reduce carbon emissions from the transportation sector. Once available, CRP funds in our region will be administered by DVRPC. These funds can be applied to projects that support the deployment of alternative fuel vehicles, including the acquisition, installation, or operation of publicly accessible electric vehicle charging infrastructure or hydrogen, natural gas, or propane vehicle fueling infrastructure. For more examples of eligible projects and additional information about the program see the FHWA website.

## Funding Sources for EV Purchases

### Alternative Fuels Incentive Grant Program (AFIG)

AFIG is a competitive grant program administered by DEP that provides funding for purchasing or retrofitting vehicles with alternate fuel sources and associated fueling infrastructure. The program is not limited to EVs—vehicles that run on hydrogen, natural gas, and other fuel sources are also eligible. Counties, municipalities, school boards, businesses, and incorporated nonprofits are all eligible to apply. For more information, visit the AFIG page on the DEP website.

### MHD-ZEV Fleet Pilot Grant Program

The Medium- and Heavy-Duty Zero-Emissions Fleet (MHD-ZEV) Pilot Grant Program is being administered as part of DEP's Driving PA Forward Initiative to assist government and non-government entities in replacing their aging diesel fright trucks with ZEVs. More information is available on the Driving PA Forward webpage.

### Truck and Bus Fleet Program and Onroad Rebate Program

The Truck and Bus Fleet and Onroad Rebate Programs are both part of DEP's Driving PA Forward Initiative that award rebates for replacing or repowering diesel fleets. Trucks and buses from before model year 2009 operated by public and private entities are eligible for funding. Replacement vehicles can be newer diesel models, electric vehicles, or use another alternative fuel source. The Trucks and Bus Fleet Program is for fleets of six or more vehicles, while the Onroad Rebate Program is intended for fleets of five or fewer vehicles. The final application periods for both are expected to open in June 2023. More information is available on the Driving PA Forward webpage.

Chapter 6:

# Best Management Practices for Preparing for EV Infrastructure

This chapter provides a guide for local governments who have identified locations conducive to hosting EV chargers and want to move forward with installing EVSE. It describes the most important details to consider when evaluating EV infrastructure projects and the typical order in which they are decided.

### EVSE Installation Order of Operations

**Select the type of charging most beneficial for the site.** Level 1, Level 2 Networked, Level 2 Non-Networked, or DCFC? What types of destinations does the charger serve, and how long do vehicles park there?

**Select the electrical meter the EVSE will be connected to.** Consider the amount of usage and number of available circuits. How will adding EVSE to the meter impact the electrical demand costs? Does it make sense to install a dedicated meter?

**Select the location for the charging equipment on the site.** Location should be as near the electrical service as is convenient, remembering to take accessibility into consideration.

**Seek out incentives.** There are many incentives offered for EV charging. See Chapter 6 of this report for a listing of current offerings.

*Source:* NJ DEP, NJ DCA, NJ BPU, *Charge Up Your Town: Best Management Practices to Ensure Your Town is EV Ready*, 2022

## Decision-Making Criteria

### Charger Considerations

- Charger Requirements
  - How will the electric supply line reach the charger?
- Selecting Charger Type
  - What types of drivers will need to charge at this station?
    - A traveler on a long distance trip may be in more immediate need of charging than an employee with a short commute.
  - How long do vehicles usually park there?
    - Charging speed is important at destinations where people typically spend a short time.
- Number of Chargers
  - How many vehicles need to charge at the station?
    - One charger per vehicle is preferable.
    - Level 2 chargers usually have two charging ports per charger, so one charging station can serve two vehicles.
- Site Amenities
  - Think about lighting, signage, and any parking spot painting.

### Electrical Panel Considerations

- Selecting an Electrical Panel
  - PEVs use about 7,000 watts when connected to a Level 2 charger and about 1,400 watts when connected to a Level 1 charger.
- Distance from Panel

    - Installation is more expensive the farther the distance between the EV charger and the electrical panel to which it will be connected.
- In-Ground or Wall-Mounted Chargers
    - EV chargers can go directly onto a wall or onto a pedestal installed into the ground.
    - Wall-mounted chargers are generally cheaper. Pedestal installation can reduce cost by locating where the least pavement disruption is required.

### Networked or Not Networked

- Networked chargers allow municipalities to accept payment and track charging metrics but have a higher initial cost and an ongoing cost for service that may exceed the benefits. Most grants and incentives require that networked chargers and data be shared with the funding agency.

### Public versus Employee versus Fleet Charging

- The decision on where to locate the charger may depend on if the charger is intended for public use versus employee or fleet use.

Chapter 7:

# Pricing

The public charging ecosystem is rapidly changing with numerous pricing models for Level 2 EV charging. The costs associated with DCFC require payment for that level of charging. Federal and state funding mechanisms are offering incentives to move toward standardized and interoperable pricing systems. To be eligible for state and federal funding programs, EVSE must be networked, either via cellular networks or Wi-Fi, to provide data on equipment use and availability.

Connecting EVSE to Wi-Fi or cellular networks allows the EVSE owner to track and manage utilization of the station, collect fees for parking and station usage, and implement pricing strategies that encourage customer turnover and recoup operation costs for the owner. Networked EVSE can also share information about the costs and availability of charging stations.

## Usage Fees

### Free

Under the Free Charging Model, EV owners can park and charge in a parking spot for free. This model was popular for early EVSE sites to encourage EV ownership. Free charging can also be offered as a benefit by businesses to encourage EV owners to patronize the business or spend more time at the location. This model also allowed for non-networked charging stations and allowed the station owner to forgo the costs associated with collecting payment. Many publicly funded EVSE initially offered free charging to provide environmental benefits and encourage growth in EV market share.

Free charging is not recommended for the county hosted EVSE because of the associated energy costs and lack of incentive for drivers to make efficient use of EVSE and parking spaces

### Pricing Strategies

There are numerous strategies to collect fees for using EVSE, almost all of which require networked charging stations that also add costs to hosting EVSE. Charging strategies should reflect the goals and characteristics of the host site but generally share the purpose of incentivizing good charging behaviors, such as moving the vehicle once the charging session is completed and offsetting the cost of hosting EVSE.

The following descriptions of pricing strategies were provided by ChargePoint and are published in *Charge Up Your Town: Best Management Practices to Ensure Your Town is EV Ready*, published by the NJ DEP, New Jersey Department of Community Affairs (DCA), and New Jersey Bureau of Public Utilities in February 2022:

- **Per Hour/Time-Based Fee:** A time-based fee (e.g., hourly) is set for all charging regardless of time of day or vehicle type. Charging per hour sets a flat hourly rate for any vehicle whether it is charging or not. Because different vehicles receive electricity at different rates, the energy cost may vary widely by charging session. This is similar to how a parking meter fee works.

- **Flat Fee per Session:** The driver pays a set fee for the entire session. This is usually more appropriate for workplace charging or charging stations that have very short, regular sessions.

- **Per Unit of Energy (usually kWh):** The driver pays for the energy consumed on a per kWh basis. This accurately accounts for the true cost of electricity for the charging station owner (similar to a utility bill) since different makes and models charge at varying power levels, but it does not give an incentive for a car to leave the space once charging is complete.

- **Time-of-Use ("TOU") Price:** TOU pricing represents an opportunity to ensure that the increased energy use associated with the growing number of EVs can create value for all ratepayers and the grid, in addition to EV drivers. TOU pricing works by sending price signals to drivers: prices are lower during certain hours of the day and higher during others. EV charging operators can set TOU pricing to drivers regardless of whether they are enrolled in an electric utility's TOU electricity rate, which is tied to the operator's monthly utility bill. If an EV charging operator is enrolled in a utility's TOU electricity rate, they can choose whether and how to pass along a TOU price to drivers.

- **Minimum and/or Maximum Price per Session:** A **maximum price per session** would be a limit to the amount it costs each time a car plugs in (per session) or a limit per a certain number of hours, and a minimum price per session would be the amount it costs each time a car plugs in, regardless of the time length.

- **Length-of-Stay Price:** One price is charged during the first period of time, and another price displayed to drivers is charged for subsequent periods of time.

- **Combination Approach:** A combination of these approaches, such as charging a flat rate for the first two hours, then an increased time-based per-hour rate for longer sessions. This is a custom pricing strategy to encourage people to move their EV once charging is complete.

- **Driver Group Price:** Fees are set based on different classifications of drivers. For example, employees charging at their workplace or visitors could be offered a unique or reduced rate, which could be any of the options listed above.

### Charging Time Limits

In addition to pricing, time limits can promote the efficient utilization of EVSE. Many of the strategies used to encourage parking turnover are applicable for managing charging limits. These strategies can include tiered pricing that increases after a vehicle is done charging or placing limits on the amount of time a vehicle can remain connected to the charger. Enforcement of the rules will need to evolve as demand increases for EV charging.

# Appendices

A. County Facility Analysis

B. Reference Resources

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

# Appendix A: County Facility Analysis

| Facility | County Facility is Greater than 1 Mile from Existing Level 2 EV Charging Stations | County Facility is within 0.5 Miles of Multifamily Units | County Facility is within a Half-Mile Buffer of Block Groups with Over 20 Registered Electric Vehicles Per Square Mile | County Facility is within a Half-Mile Buffer of Block Groups with Over 40 Expensive Workplace Charging Events Per Square Mile | RBA Points | Retail Points | Total |
|---|---|---|---|---|---|---|---|
| Elkins Park Free Library | 1 | 1 | 1 | 1 | 1 | 0.5 | 5.5 |
| Glenside Free Library | 1 | 1 | 1 | 1 | 1 | 0.5 | 5.5 |
| Montgomery County Warehouse | 1 | 1 | 1 | 1 | 1 | 0 | 5 |
| Pottstown Health Center | 1 | 1 | 1 | 1 | 1 | 0 | 5 |
| Pottstown Public Library | 1 | 1 | 1 | 1 | 1 | 0 | 5 |
| Adult Probation Center | 0 | 1 | 1 | 1 | 1 | 1 | 5 |
| Ardmore Free Library | 0 | 1 | 1 | 1 | 1 | 1 | 5 |
| Court House | 0 | 1 | 1 | 1 | 1 | 1 | 5 |
| Jenkintown Library | 0 | 1 | 1 | 1 | 1 | 1 | 5 |
| Ludington Public Library | 0 | 1 | 1 | 1 | 1 | 1 | 5 |
| One Montgomery Plaza | 0 | 1 | 1 | 1 | 1 | 1 | 5 |
| Penn Wynne Library | 1 | 1 | 1 | 1 | 0 | 0 | 4 |
| Lansdale Community Connections | 0 | 1 | 1 | 1 | 1 | 0.5 | 4.5 |
| Montgomery County: Norristown Public Library | 0 | 1 | 1 | 1 | 1 | 0.5 | 4.5 |
| Narberth Community Library | 0 | 1 | 1 | 1 | 1 | 0.5 | 4.5 |
| Pottsgrove Manor Park | 1 | 1 | 0 | 1 | 1 | 0.5 | 4.5 |
| Union Library Company, Inc. of Hatboro | 1 | 1 | 0 | 1 | 1 | 0.5 | 4.5 |
| Bala Cynwyd Library | 0 | 1 | 1 | 1 | 1 | 0 | 4 |
| Conshohocken Free Library | 0 | 1 | 1 | 1 | 1 | 0 | 4 |
| Human Service Center | 0 | 1 | 1 | 1 | 1 | 0 | 4 |

| Facility | County Facility is Greater than 1 Mile from Existing Level 2 EV Charging Stations | County Facility is within 0.5 Miles of Multifamily Units | County Facility is within a Half-Mile Buffer of Block Groups with Over 20 Registered Electric Vehicles Per Square Mile | County Facility is within a Half-Mile Buffer of Block Groups with Over 40 Expensive Workplace Charging Events Per Square Mile | RBA Points | Retail Points | Total |
|---|---|---|---|---|---|---|---|
| Lansdale Public Library | 0 | 1 | 1 | 1 | 1 | 0 | 4 |
| East Cheltenham Free Library | 1 | 1 | 0 | 1 | 0 | 0.5 | 3.5 |
| Belmont Hills Public Library | 1 | 1 | 1 | 0 | 0 | 0 | 3 |
| Micrographics and Archives | 1 | 1 | 0 | 1 | 0 | 0 | 3 |
| Upper Moreland Free Public Library | 0 | 1 | 0 | 1 | 1 | 1 | 4 |
| Willow Grove Annex | 0 | 1 | 0 | 1 | 1 | 1 | 4 |
| Wissahickon Valley Public Library: Ambler Branch | 0 | 1 | 1 | 0 | 1 | 1 | 4 |
| LaMott Free Library | 0 | 1 | 1 | 0 | 1 | 0.5 | 3.5 |
| Lower Providence Community Library | 0 | 1 | 0 | 1 | 1 | 0.5 | 3.5 |
| Juvenile Probation | 1 | 0 | 0 | 1 | 1 | 0 | 3 |
| North Wales Memorial Free Library | 1 | 1 | 0 | 0 | 1 | 0 | 3 |
| Pennypacker Mills Park | 1 | 1 | 0 | 0 | 1 | 0 | 3 |
| Schwenksville Community Library | 1 | 1 | 0 | 0 | 1 | 0 | 3 |
| Upper Dublin Public Library | 1 | 0 | 0 | 1 | 1 | 0 | 3 |
| Central Perkiomen Valley Park | 1 | 1 | 0 | 0 | 0 | 0 | 2 |
| Gladwyne Free Library | 1 | 0 | 1 | 0 | 0 | 0 | 2 |
| North Hills Community Library | 1 | 1 | 0 | 0 | 0 | 0 | 2 |
| Spring Mill Park | 1 | 0 | 0 | 1 | 0 | 0 | 2 |
| Upper Merion Library | 0 | 0 | 1 | 1 | 0 | 0 | 2 |

| Facility | County Facility is Greater than 1 Mile from Existing Level 2 EV Charging Stations | County Facility is within 0.5 Miles of Multifamily Units | County Facility is within a Half-Mile Buffer of Block Groups with Over 20 Registered Electric Vehicles Per Square Mile | County Facility is within a Half-Mile Buffer of Block Groups with Over 40 Expensive Workplace Charging Events Per Square Mile | RBA Points | Retail Points | Total |
|---|---|---|---|---|---|---|---|
| Upper Perkiomen Valley Library | 1 | 1 | 0 | 0 | 0 | 0 | 2 |
| Wissahickon Valley Public Library | 1 | 0 | 0 | 1 | 0 | 0 | 2 |
| Abington Free Library | 0 | 1 | 0 | 0 | 1 | 0.5 | 2.5 |
| Roslyn Branch: Abington Library | 0 | 1 | 0 | 0 | 1 | 0.5 | 2.5 |
| Public Safety Training Campus | 0 | 0 | 0 | 1 | 1 | 0 | 2 |
| Royersford Free Public Library | 0 | 1 | 0 | 0 | 1 | 0 | 2 |
| Huntingdon Valley Library | 1 | 0 | 0 | 0 | 0 | 0.5 | 1.5 |
| Correctional Facility | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Free Library of Springfield Township | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Green Lane Park | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| John James Audubon Center at Mill Grove | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Lorimer Park | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Mingo Basin Park | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Norristown Farm Park | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Peter Wentz Farmstead | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Public Safety | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Schuylkill Canal Park | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Schuylkill Canal Park II | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Spring Mountain Preserve | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Sunrise Mill Park | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Upper Schuylkill Valley Park | 1 | 0 | 0 | 0 | 0 | 0 | 1 |

| Facility | County Facility is Greater than 1 Mile from Existing Level 2 EV Charging Stations | County Facility is within 0.5 Miles of Multifamily Units | County Facility is within a Half-Mile Buffer of Block Groups with Over 20 Registered Electric Vehicles Per Square Mile | County Facility is within a Half-Mile Buffer of Block Groups with Over 40 Expensive Workplace Charging Events Per Square Mile | RBA Points | Retail Points | Total |
|---|---|---|---|---|---|---|---|
| Wissahickon Valley Park | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Youth Center | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Lower Perkiomen Valley Park | 0 | 0 | 0 | 0 | 1 | 0.5 | 1.5 |
| Horsham Township Library | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| William Jeanes Memorial Library | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Source: DVRPC, 2022*

# Appendix B: Reference Resources

City of Boston's How-to Guide: Electric Vehicle Charger Installation

https://www.boston.gov/sites/default/files/file/2020/06/How%20To%20Install%20an%20EVSE%20.pdf

City of Philadelphia's Municipal Clean Fleet Plan (2021)

https://www.phila.gov/media/20211006130414/Philadelphia-Municipal-Clean-Fleet-Plan-202110.pdf

Cross County Connection's Electric Vehicle Primer (2021)

http://www.driveless.com/

DVRPC's Electric Vehicle Resource Kit for Municipalities

https://www.dvrpc.org/energyclimate/alternativefuelvehicles/evmuniresource

NJ DEP, DCA, and BPU's Charge Up Your Town: Best Management Practices to Ensure Your Town is EV Ready (2022)

https://dep.nj.gov/wp-content/uploads/drivegreen/pdf/chargeupyourtown.pdf

NJ DEP's Electric Vehicle Resources for Local Government (2021)

https://dep.nj.gov/wp-content/uploads/drivegreen/pdf/localresources.pdf

North Jersey Transportation Planning Authority's Alternative Fuel Vehicle Readiness: A Guidebook for Municipalities (2017)

https://dep.nj.gov/wp-content/uploads/drivegreen/pdf/alternativefuelvehicle.pdf

Sustainable Jersey's Alternative Fuel Vehicle Procurement Guide (2022)

https://www.sustainablejersey.com/fileadmin/media/Actions_and_Certification/Actions/Energy/Sustainable_Jersey_Alternative_Fuel_Vehicle_Procurement_Guide.pdf

# Planning for Electric Vehicles in Montgomery County

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**Key Words:**
County Libraries, DC Fast Charging, Electric Vehicle Charging Stations, Electric Vehicles, EVSE, Funding for EVSE, Multifamily Residential Areas, Plug-In Electric Vehicles

**Abstract:**
The Delaware Valley Regional Planning Commission analyzed the locations of county parks, libraries, and buildings in Montgomery County compared to existing electric vehicle charging stations (EVSE), registered electric vehicles, projected workplace charging demand, retail centers, and multifamily residential areas to recommend locations for future investment in EVSE. DVRPC has used this analysis to prioritize recommendations for county owned and affiliated properties that may beneficially host EVSE. This analysis establishes a template for the location of future EVSE siting based on different or changing priorities, such as neighborhoods with on-street parking, large apartment complexes or business parks.

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