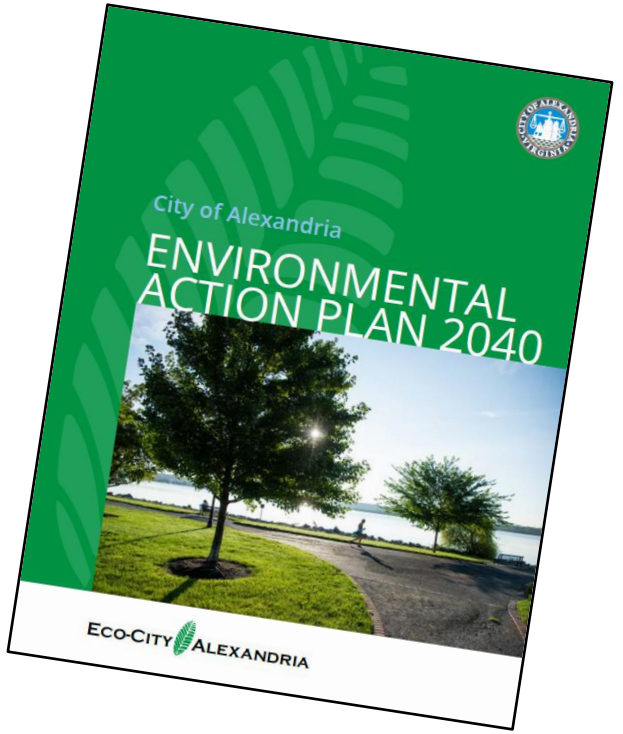
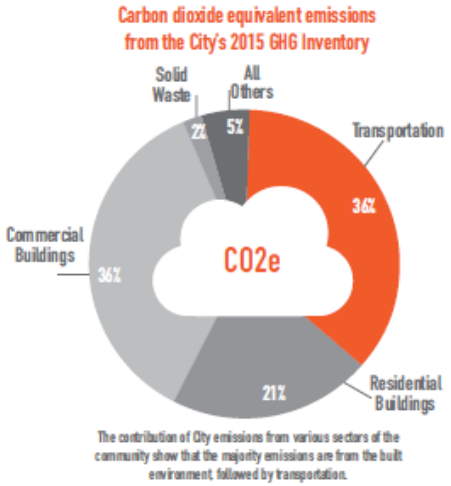
Electric Vehicle Charging Infrastructure Readiness Strategy (EVRS)

EVRS Motivations

Environmental Action Plan

- Action 2.3.3 – By FY2020, develop a strategy for community electric vehicle charging infrastructure.
- Action 2.3.6 - By FY2029, implement and support the implementation of a publicly-accessible electric vehicle charging infrastructure that is supported by renewable energy supply.





- Action 2.1.6 – By FY2040, implement electrification of all City non-electricity energy use (City facilities, operations, and vehicles).
- Action 2.2.1 –By FY2021, initiate electric passenger vehicle pilot programs for DASH, Alexandria City Public Schools, and the City vehicle fleet to evaluate costs, benefits, technical feasibility, and implementation opportunities to transition City fleet vehicles to electric vehicle technology, and install vehicle charging infrastructure at City facilities.
- Action 2.2.5 – By FY2024, implement electrification of, at minimum, 25 percent of applicable nonelectric passenger City fleet vehicles consistent with Fleet Replacement Plan criteria and scheduled replacement.
- Action 2.2.6 – By FY2028, implement electrification of, at minimum, 10 percent of DASH, rapid transit routes, and King Street Trolley buses. Provide necessary electric vehicle charging infrastructure at City facility locations.
- Action 2.2.8 – By FY2040, implement electrification of all non-electric City vehicle fleets and include ACPS, DASH, rapid transit routes, heavy-duty equipment and vehicles. Provide necessary electric vehicle charging infrastructure at City facility locations.

EVRS Motivations

36%
Percentage of Alexandria's greenhouse gas emissions from transportation (compared to 28% nationally)

53%
Percentage of residents without dedicated overnight parking

50%
Percentage of greenhouse gas reduction by FY 2030 as proposed by the City's Environmental Action Plan

100%
Percentage of renewable electricity in 2050, as proposed by VA legislature

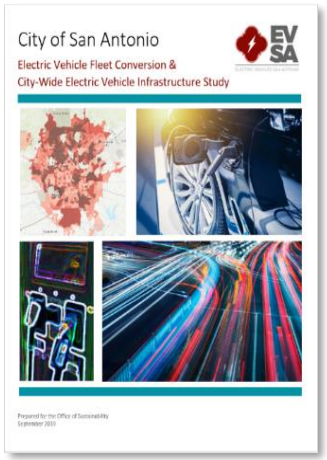
EVRS Objectives

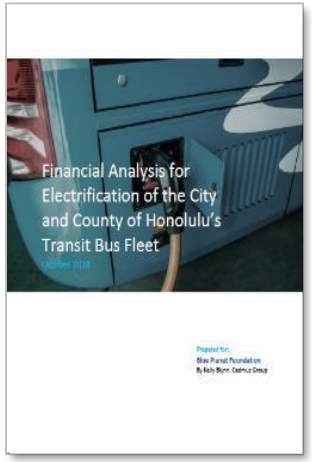
- Evaluate projections for current and future electric vehicle charging infrastructure needs
- Recommend locations for publicly accessible charging infrastructure with integration into a broader regional electric vehicle charging infrastructure network
- Recommend charging infrastructure options, including hardware, business ownership, operation models, interoperability, and operations and maintenance solutions
- Review the city's zoning, codes, permitting, and inspection codes, along with development processes and requirements, to recommend updated or new language to promote and anticipate electric vehicle charging needs
- Recommend policies, approaches, and synergies for locating electric vehicle charging infrastructure at businesses, multifamily dwellings (MFD), single-family homes, right-of-way (ROW) areas, and other locations

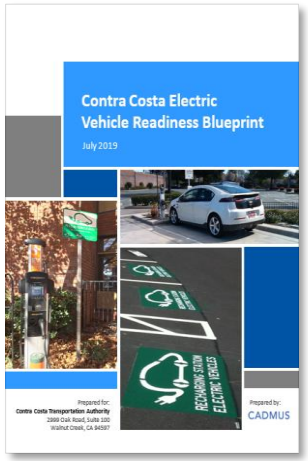
The EVRS also discusses synergies with other City plans and policies such as the Alexandria Mobility Plan, small area plans, and smart mobility goals.

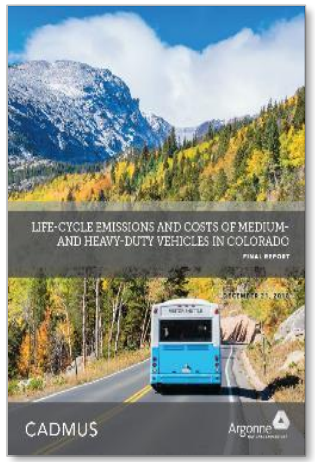
EVRS Partner

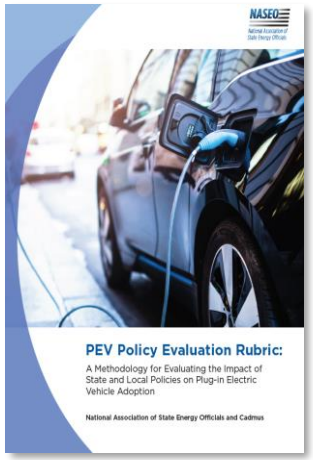
CADMUS

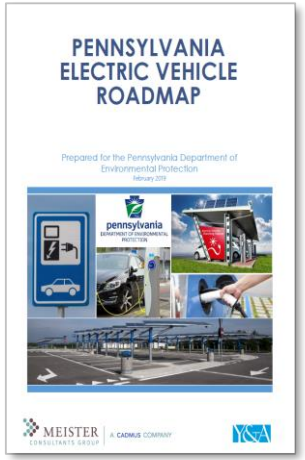


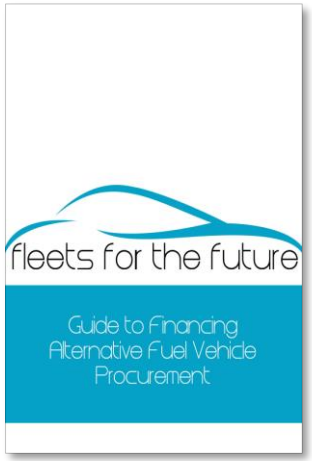


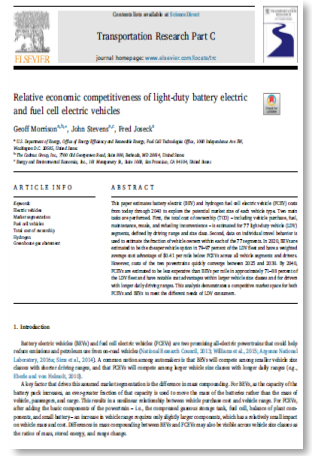




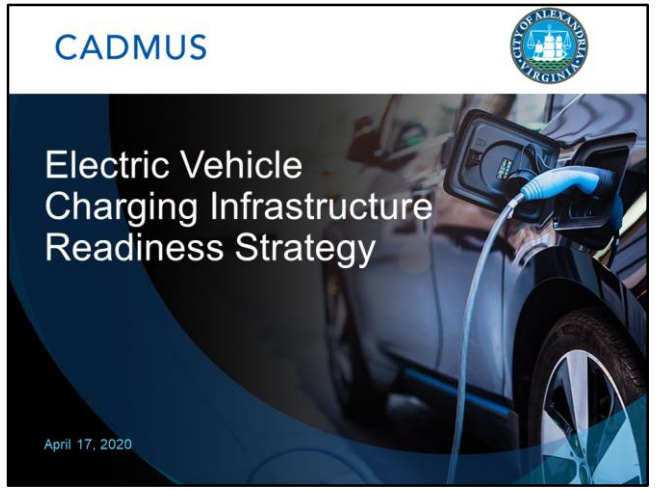








EVRS Development Timeline



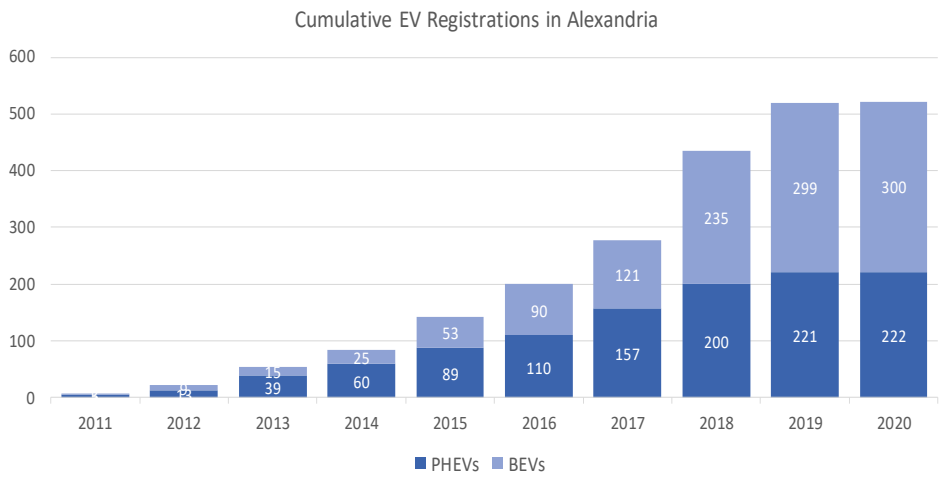
- February – March 2020
  - Engagement and input from City staff
  - Research and data collection on the City's existing policies, plans, and initiatives
- April – August 2020
  - Two virtual public engagement and input opportunities*
    - Pre-recorded presentation and online questionnaire to solicit public's EVRS priorities
    - Online questionnaire to evaluate charging needs and to help evaluate locations for publicly-accessible chargers
- September 2020 – February 2021
  - Preliminary Recommendations and Strategy development
  - Public presentations and public input
  - City staff reviews

*Due to COVID-19 and cancellation of non-essential in-person community meetings, City staff provided a pre-recorded presentation for public engagement and online questionnaires to solicit public input.

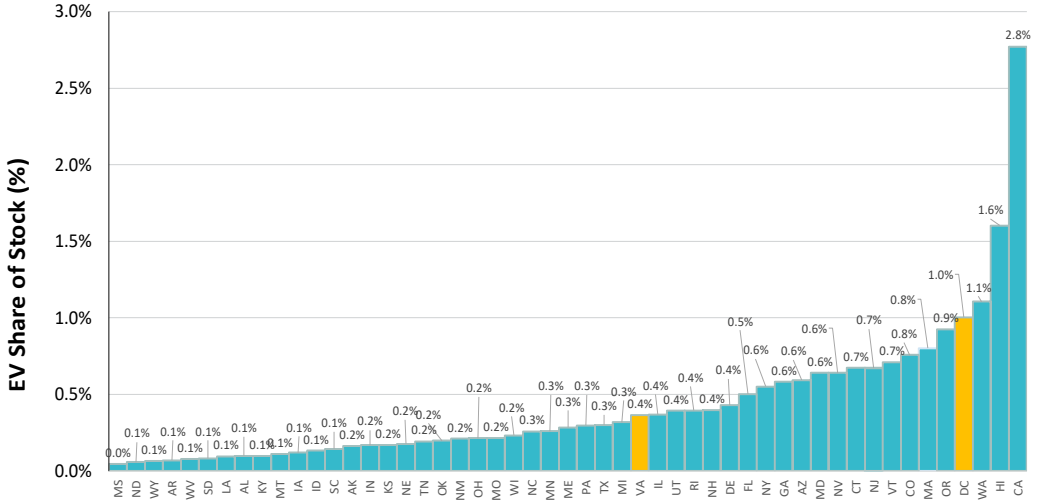
Challenges to Charging in Alexandria

- LIMITED OFF-STREET PARKING
- HIGH NUMBER OF MULTI-FAMILY DWELLINGS

Electric Vehicles in Alexandria



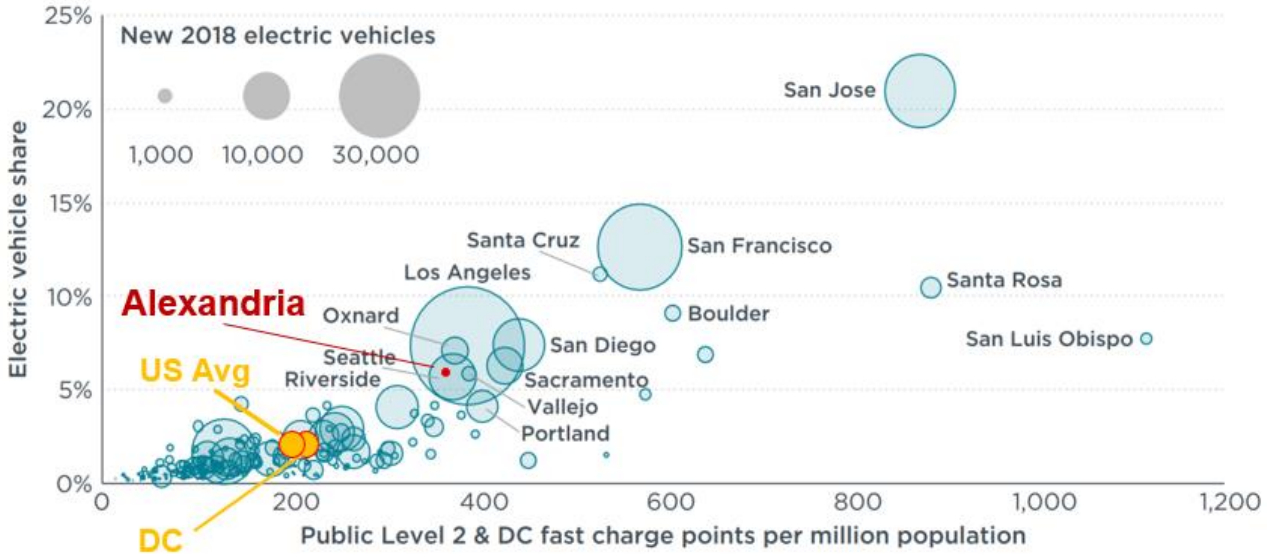
Cumulative PHEV and BEV registrations in Alexandria as of April 2020.



Share of ALL light-duty vehicles that are electric vehicle, by state, in 2020 (i.e., fraction of vehicle stock). Virginia ranks 22nd in electric vehicles.

Current Charging Availability in Alexandria

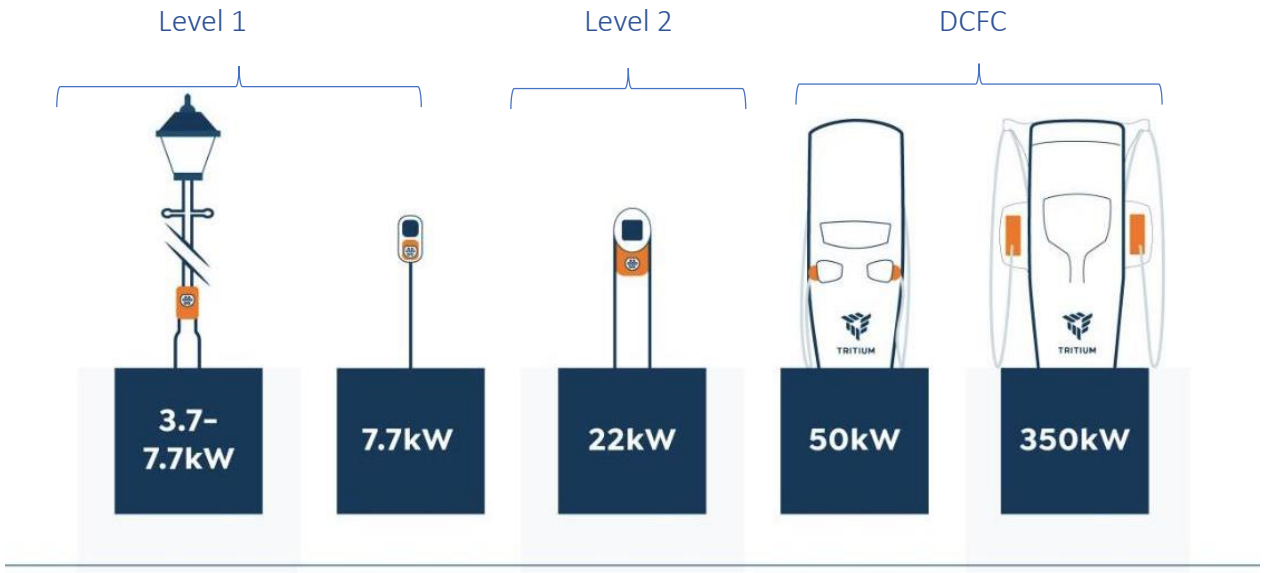
Map of shared EV charging stations in Alexandria. These include both publicly available and restricted access plugs.



EV share and public charging availability for U.S. cities.

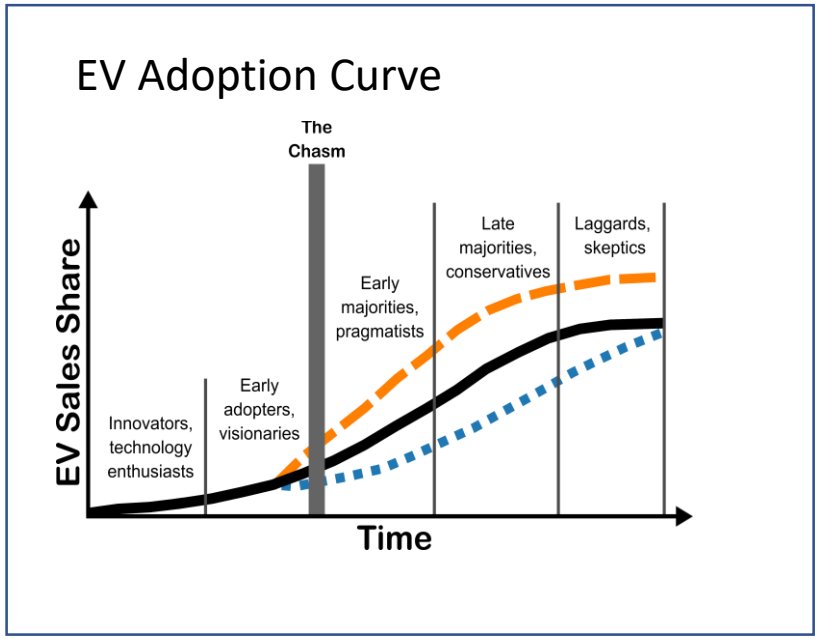
Types of Charging

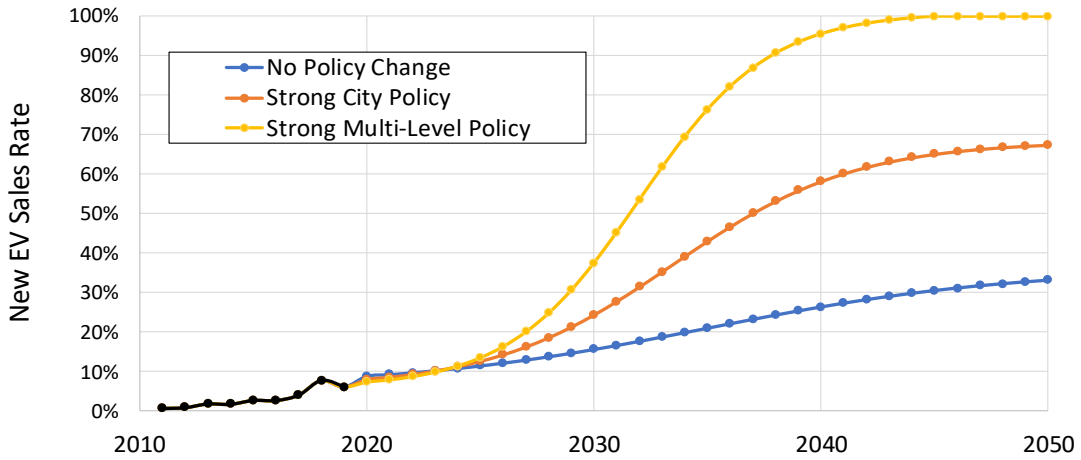
- Residential
- Workplace
- Publicly-accessible



Charging power levels and time to add range.

Increasing Electric Vehicle Adoption

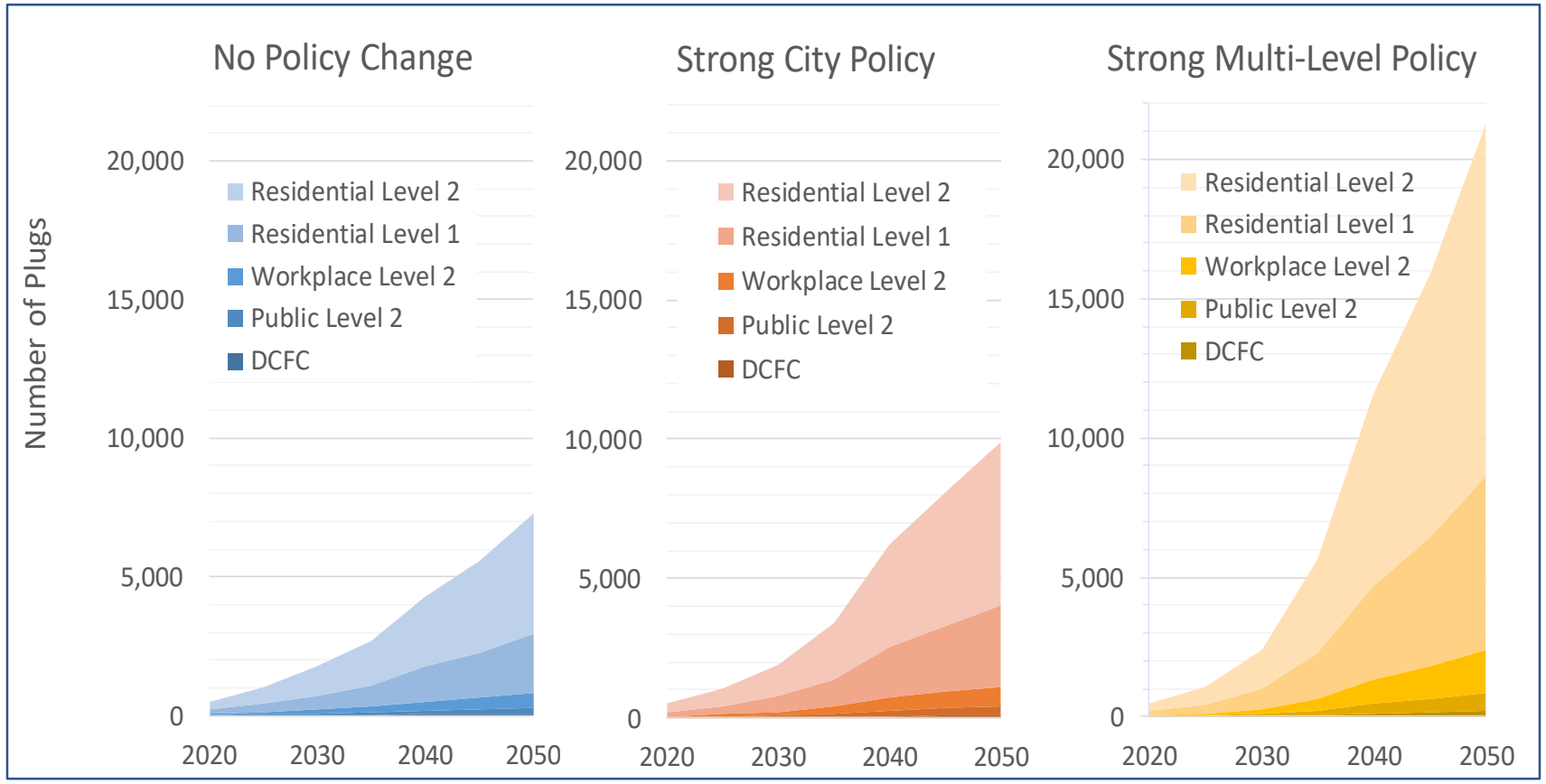




Three possible pathways for electric vehicle adoption.

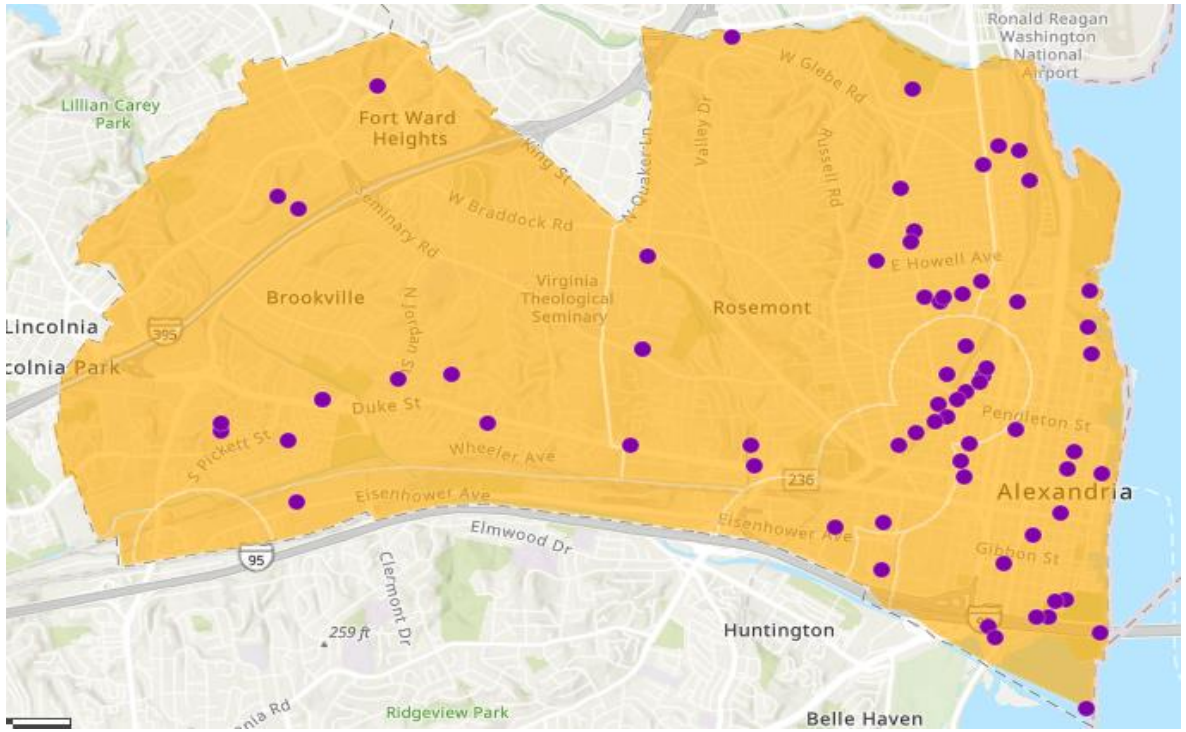
Scenario	Description	Why Scenario is Feasible
No Policy Change	Growth in electric vehicle adoption continues at historical rates.	Battery costs continue to decline and vehicles are nearing cost parity with ICEVs, suggesting that electric vehicle adoption will continue on its own, even without policy intervention.
Strong City Policy	The City of Alexandria implements a strong set of policies to support adoption of electric vehicles.	As witnessed in other cities, a strong role by municipal governments can impact electric vehicle ownership. The extent of the impact is highly uncertain.
Strong Multi-Level Policy	In addition to the City of Alexandria, federal and state governments are deeply involved in incentivizing electric vehicle adoption.	A strong environmental policy by all levels of government and by utilities could result in high levels of electric vehicle adoption.

Evaluating Charging Infrastructure Needs

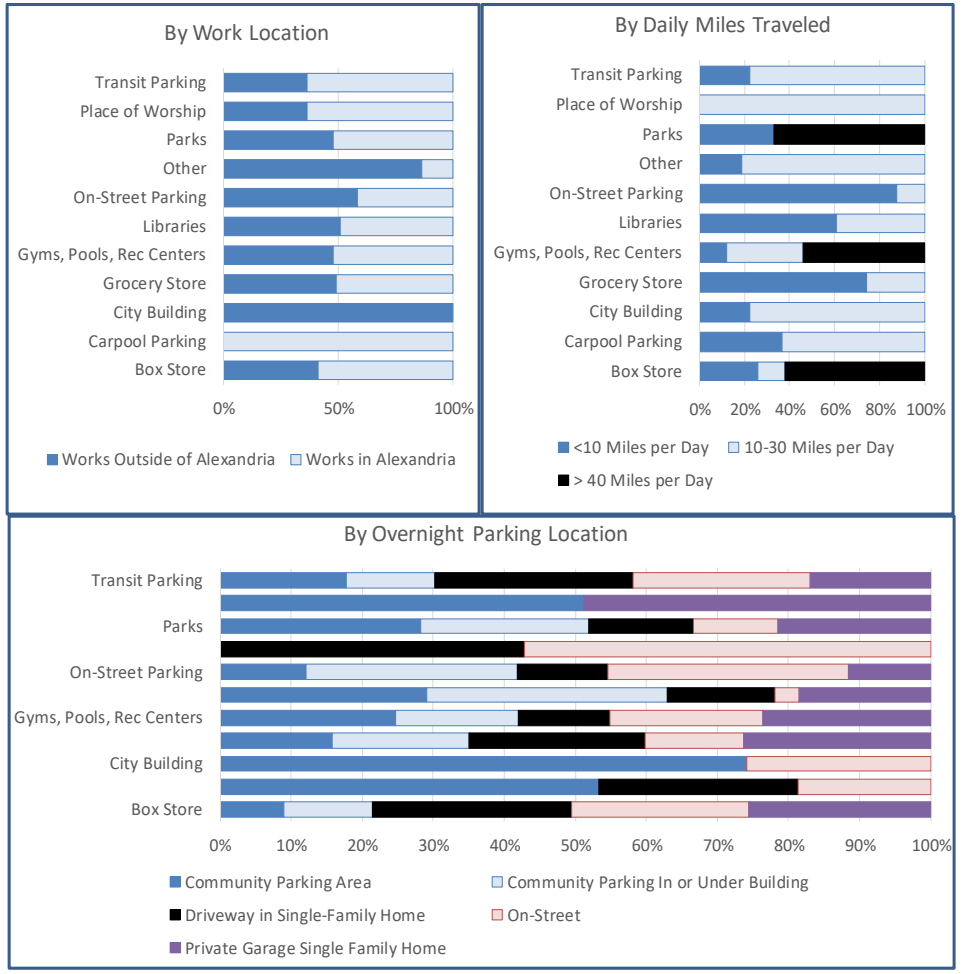


Needed number of plugs to support electric vehicles in three scenarios. See Appendix E for numerical values in graph.

Identifying Charging Location Opportunities

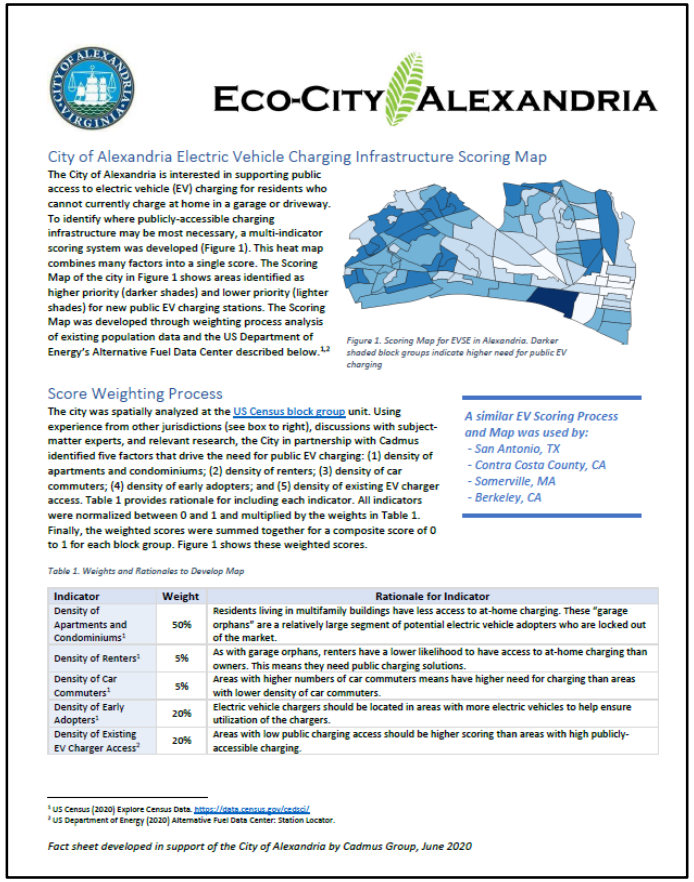


Results of survey question asking respondents to place a pin on desired charging location and a brief description of primary rationale for selecting that location.



Results of survey question asking respondents about their preferred charging station location. Responses are disaggregated by three segments.

Identifying Charging Location Opportunities



ECO-CITY ALEXANDRIA

City of Alexandria Electric Vehicle Charging Infrastructure Scoring Map

The City of Alexandria is interested in supporting public access to electric vehicle (EV) charging for residents who cannot currently charge at home in a garage or driveway. To identify where publicly-accessible charging infrastructure may be most necessary, a multi-indicator scoring system was developed (Figure 1). This heat map combines many factors into a single score. The Scoring Map of the city in Figure 1 shows areas identified as higher priority (darker shades) and lower priority (lighter shades) for new public EV charging stations. The Scoring Map was developed through weighting process analysis of existing population data and the US Department of Energy's Alternative Fuel Data Center described below.[1,2]

Score Weighting Process

The city was spatially analyzed at the US Census block group unit. Using experience from other jurisdictions (see box to right), discussions with subject-matter experts, and relevant research, the City in partnership with Cadmus identified five factors that drive the need for public EV charging: (1) density of apartments and condominiums; (2) density of renters; (3) density of car commuters; (4) density of early adopters; and (5) density of existing EV charger access. Table 1 provides rationale for including each indicator. All indicators were normalized between 0 and 1 and multiplied by the weights in Table 1. Finally, the weighted scores were summed together for a composite score of 0 to 1 for each block group. Figure 1 shows these weighted scores.

A similar EV Scoring Process and Map was used by:
- *San Antonio, TX*
- *Contra Costa County, CA*
- *Somerville, MA*
- *Berkeley, CA*

Table 1. Weights and Rationales to Develop Map

Indicator	Weight	Rationale for Indicator
Density of Apartments and Condominiums[1]	50%	Residents living in multifamily buildings have less access to at-home charging. These "garage orphans" are a relatively large segment of potential electric vehicle adopters who are locked out of the market.
Density of Renters[1]	5%	As with garage orphans, renters have a lower likelihood to have access to at-home charging than owners. This means they need public charging solutions.
Density of Car Commuters[1]	5%	Areas with higher numbers of car commuters means have higher need for charging than areas with lower density of car commuters.
Density of Early Adopters[1]	20%	Electric vehicle chargers should be located in areas with more electric vehicles to help ensure utilization of the chargers.
Density of Existing EV Charger Access[2]	20%	Areas with low public charging access should be higher scoring than areas with high publicly-accessible charging.

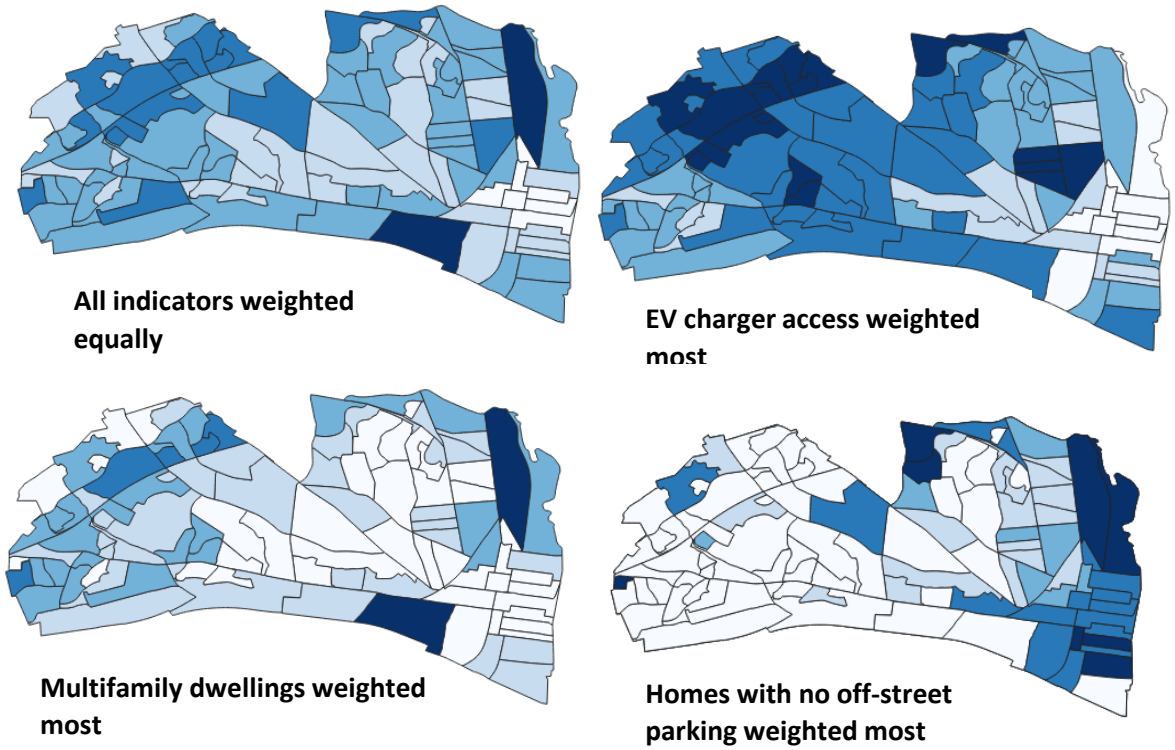
[1] US Census (2020) Explore Census Data. https://data.census.gov/cedsci/
[2] US Department of Energy (2020) Alternative Fuel Data Center: Station Locator.

Fact sheet developed in support of the City of Alexandria by Cadmus Group, June 2020

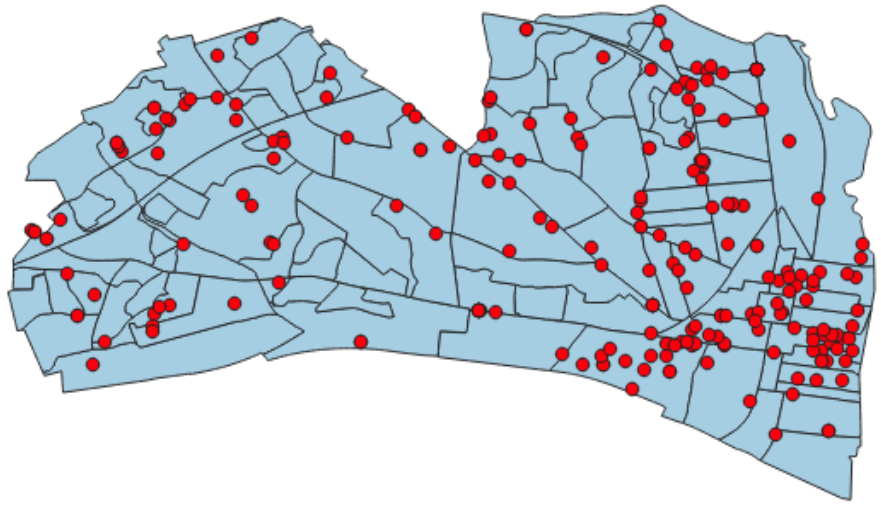
Density Factor	Rationale for Factor	Most Weighted Factor			All Weighted Equally
		Multifamily Dwellings	No Off-Street Parking	Charger Access	
Multifamily Dwellings [a]	Residents of MFDs have less access to at-home charging. These "garage orphans" are a relatively large segment of potential electric vehicle adopters who are locked out of the market.	50%	10%	10%	17%
Renters [a]	As with garage orphans, renters are less likely to have access to at-home charging than owners.	10%	10%	10%	17%
Car Commuters [a]	Areas with more car commuters have a higher need for charging than areas with a lower density of car commuters.	10%	10%	10%	17%
Early Adopters [a]	Electric vehicle chargers should be located in areas with more electric vehicles to help ensure charger use.	10%	10%	10%	17%
Existing Electric Vehicle Charger Access [b]	Areas with low public charging access should be higher scoring than areas with high public charging access.	10%	10%	50%	17%
Homes with No Off-Street Parking Access [c]	Areas of single-family homes with low driveway or alley access should be higher scoring than areas of single-family homes with high driveway or alley access.	10%	50%	10%	17%

[a] U.S. Census Bureau 2020c; [b] US DOE Station Locator; [c] City of Alexandria 2020

Identifying Charging Location Opportunities



Composite electric vehicle charging prioritization for Alexandria.



Red points indicate sites of interest in Alexandria that could be considered for electric vehicle charging infrastructure.

ALL Alexandria

EQUITY SOLUTIONS

The icon to the left is used to indicate opportunities for supporting equity opportunities in programming, policies, and planning. The Urban Sustainability Director's Network provides a guide for incorporating equity into municipal clean energy, sustainability, and climate action programs (see here). Many of the equity solutions align with the Greenlining Institute's Electric Vehicles for All: An Equity ToolKit. Also, the Greenlining Institute launched the Toward Equitable Electric Mobility (TEEM) Community of Practice in Virginia to expand equity opportunities into transition to electric transportation, which will provide additional opportunities for including equity into recommendations.

Opportunities to Expand Charging

Meeting Charging Demand	
A-1	Appoint an Electric Vehicle Navigator
A-2	Promote parking synergies for residents of multifamily dwellings
A-3	Consider right-of-way charging opportunities for residents lacking off-street parking
A-4	Serve as a clearinghouse of potential charging locations.
A-5	Create shared mobility hubs
A-6	Promote charging locations at grocery stores, parks, and retail stores
A-7	Promote DCFC stations near highway off-ramps
Enhancing Communications and Awareness	
B-1	Establish near- and medium-term targets for publicly accessible electric vehicle charging infrastructure
B-2	Establish a process to benchmark progress
B-3	Demonstrate community leadership
B-4	Champion charging infrastructure by electrifying the city fleet, as outlined in the EAP for 2040
B-5	Build and maintain internal competencies
B-6	Promote Alexandria as an Electric Vehicle Capital City
B-7	Utilize innovative pilot programs
Strengthening Zoning, Codes, and Permitting	
C-1	Amend zoning ordinance to include charging stations as a permitted accessory use
C-2	Establish electric vehicle installation checklist
C-3	Encourage electric vehicle charging in parking space requirements
C-4	Adopt curbside management policies to prioritize electric vehicle charging
C-5	Revise standard conditions to increase minimum requirements
C-6	Adopt design criteria related to electric vehicle charging stations
C-7	Consider appropriate standards for historic districts
C-8	Train local officials
C-9	Allow developers to use a transportation management plan (TMP) fund for electric vehicle infra.
Advocacy in State Government and with Dominion Energy	
D-1	Advocate for opportunities that accelerate charging station deployment
D-2	Advocate for opportunities that accelerate electric vehicle adoption
D-3	Advocate for continued, equitable decarbonization of electricity supply
Building Successful Business Models for Chargers	
E-1	Coordinate between parties interested in new charging stations
E-2	Develop dealership programs for offering chargers
E-3	Consider City investment to support publicly accessible charging
E-4	Develop City-owned charging stations as a last resort
Establishing an Inter-Departmental Implementation Working Group	
F-1	Establish Inter-Departmental Implementation Working Group

Limitations and Opportunities

- Limitations
  - Evolving technology, policy, program landscape and advancements
  - Precision of future trends
  - EVRS isn’t a stand-alone plan; include in context of other plans

- Opportunities
  - V-2-B and V-2-G
  - Local freight, delivery vehicles, emergency vehicles
  - Utility business models and rates

Implementation

- Inter-departmental Implementation Work Group
  - Prioritize recommendations
  - Identify lead and supporting departments
  - Develop resourcing and implementation plans
  - Monitor and report on implementation progress

- Where appropriate, include recommendations in other plans
  - Ex: Alexandria Mobility Plan, Small Area Plans, etc.