



ELECTRIC VEHICLE CHARGING INFRASTRUCTURE TRANSITION ROADMAP

CITY OF ADELAIDE

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EXECUTIVE SUMMARY

CONTEXT

As a result of aligned policy at all levels of government - electric vehicle (EV) uptake will increase exponentially over the coming 10 years, independent of the level of action taken by the CoA.

The CoA has a high population density, particularly those living in apartments, compared to other parts of the metropolitan area - as well as high job density. Both of these factors create demand for EV charging beyond what can be provided in private residences - which will require on-street and off-street charging solutions.

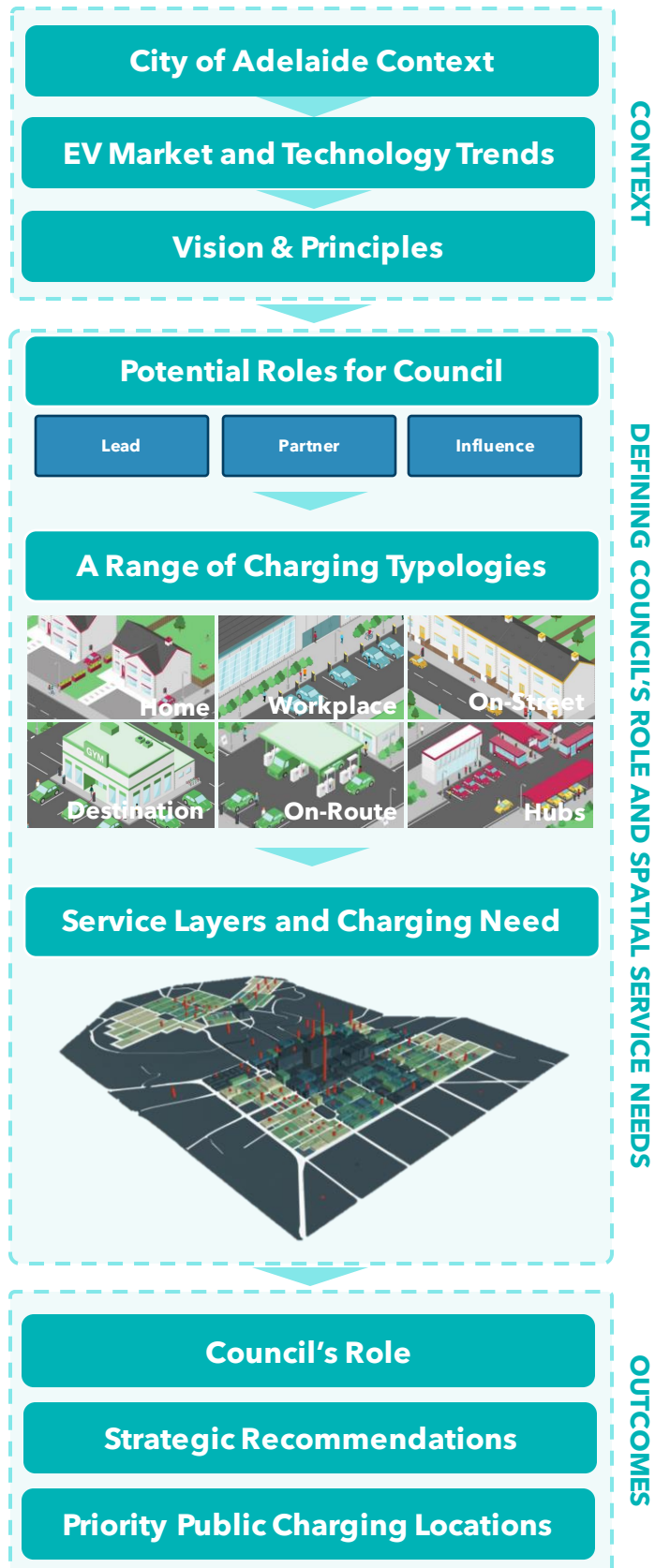
The most recent amendments to the National Construction Code (NCC) in Australia stipulate that starting from October 2024, 100% of car parking spaces in new apartment buildings must be EV-Ready (as well as 10% of office car parking and 20% of other commercial parking spaces), however publicly available solutions will still be needed as existing building stock is upgraded over time to support EVs.

With visitors continuing to bring their cars to the CBD and North Adelaide, accommodating EVs is important for the CoA in maintaining its attractiveness as a destination. Public charging solutions will be required to maintain the CoA as a preferred destination for visitors.

The city must determine how to effectively provide EV charging infrastructure in response to these requirements.

This document articulates council's role in facilitating the rollout of EV charging infrastructure, provides strategic recommendations for key steps in the short-term (1-3 years) and identifies priority charging locations across the CoA to respond to city user needs.

PROCESS FOR DEVELOPING THIS ROADMAP



EXECUTIVE SUMMARY

NETWORK VISION & PRINCIPLES

Based on the broader livability objectives of CoA combined with the growth in EV uptake, the CoA's overarching role should be to balance market demand for accessible EV charging infrastructure with broader built environment, land use and integrated transport outcomes.







The Vision and Network principles below provide guidance for the rollout of charging infrastructure.

In addition to these principles, there is an important integrated transport overlay that should also influence supply of charging infrastructure - discussed further in this section.

CoA should seek to strategically influence and implement charging infrastructure while facilitating liveable, healthy neighbourhoods.

EV CHARGING NETWORK VISION

Public EV charging infrastructure in the CoA is available for all user types who need it - catalysing the uptake of EVs in Adelaide. The city's EV charging network is developed such that it contributes to an overall sustainable transport system and maintains the city as an attractive place to live, work, and as an exciting destination for a range of visitor types - contributing to Adelaide becoming one of the world's first Carbon Neutral Cities.

	Driving a Carbon Neutral City	<ul style="list-style-type: none"> • Aligned to sustainability action plans and objectives • Powered by renewable energy • Integrated with active transport infrastructure
	Fosters attractive and competitive destinations	<ul style="list-style-type: none"> • Aligned to key destinations • Facilitates a range of visitor types across the Council area • Supports businesses, events, and visitations
	User-Oriented, convenient and consistent	<ul style="list-style-type: none"> • Interoperable, allowing charging for various vehicle types • Reliable and minimizes network downtime and disruption • Conveniently located to support city users
	Future-ready and innovative	<ul style="list-style-type: none"> • Seeks to leverage new technologies • Seeks opportunities for pilots and trials • Leverages digital technology for management
	Fair and equitable	<ul style="list-style-type: none"> • Meets the needs of all city user types, including residents • Equitable provision to support all levels of socio-economic status • Equitable provision to support businesses
	Leverages partnerships and collaboration	<ul style="list-style-type: none"> • CoA are active across advocacy, education, partnership and provision • Charging infrastructure is delivered in partnerships with the private sector where appropriate • Electric vehicle owners have access to information on latest trends and opportunities

EXECUTIVE SUMMARY

THE CITY OF ADELAIDE'S ROLE

It is recommended that CoA's overarching role should be to use its influence and market power to strike a balance between market demand for accessible EV charging infrastructure and broader integrated transport and city outcomes.

STRATEGIC RECOMMENDATIONS: 7 KEY ACTIONS		CoA ROLE
1	Facilitate the deployment of EV charging infrastructure within the CoA by establishing a clear framework for the rollout of EV chargers at strategic locations.	LEAD <i>Year 1</i>
2	Enable the market-led provision of on-street EV chargers in select locations which support the transition to EVs and minimise impacts on public realm.	LEAD <i>Year 1 - 3</i>
3	Work with private sector providers to lead on-street charging trials in residential areas with limited private off-street charging and constrained charging options.	LEAD <i>Year 1 - 3</i>
4	Partner with industry for the provision of destination charging within U-Park facilities.	PARTNER <i>Year 1 - 3</i>
5	Work with residential strata corporations to remove the barriers of installing EV charging infrastructure within multi-unit dwellings constructed prior to October 2024.	PARTNER <i>Year 1 - 3</i>
6	Advocate to the State Government for a coordinated approach to on-route and hub EV charging networks that considers the aspirations of the City of Adelaide for our community, environment, economy and places.	INFLUENCE <i>Year 1 - 3</i>
7	Advocate to the State Government for inclusion of EV charging provisions in legislation and statutory documents such as the Planning and Design Code and that pertain to EV parking for charging.	INFLUENCE <i>Year 1 - 3</i>

EXECUTIVE SUMMARY

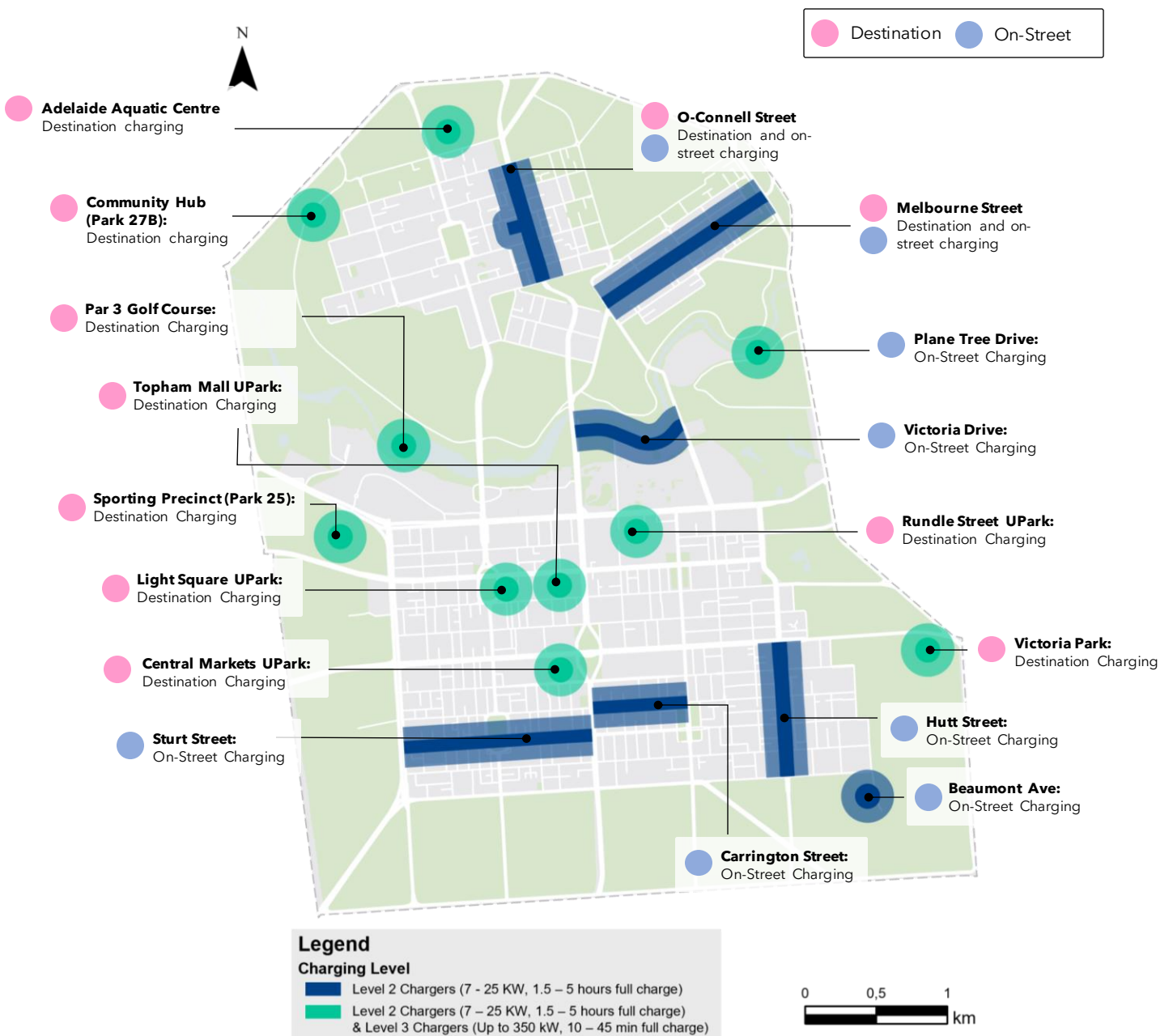
RECOMMENDED PRIORITY LOCATIONS

A summary of priority public charging projects is shown on the map below, represented by a combination of destination and on-street charging.

The public charging initiatives are prioritised based on the areas across the CoA with the highest density of relevant user types and resulting likely demand for EV chargers.

The implementation of on-street charging should be implemented to align with broader amenity and place objectives.

For example, while Hutt Street is identified as a priority location, charging may be provided around Hutt Street area to achieve the same objective if parking is reduced on the main street as part of main street upgrades.



CONTEXT

Relevant policy, existing situation and market trends.

CONTEXT

OVERVIEW

CoA aims to reduce carbon emissions, where transport contributes to 35% of the community's carbon footprint (City of Adelaide Climate Action Plan 2022-2025). Electrification of on-road transport is crucial in meeting the city's objectives outlined in the Climate Action Plan.

For CoA's vehicles, a three-stage rollout of EVs has been outlined in the Zero Emission Vehicle (ZEV) Plan 2019-2030, with the final stage targeting 100% adoption of ZEVs for cars, motorcycles, and buses, and over 50% adoption for light and heavy trucks by 2030.

The provision of charging infrastructure is vital for future-proofing the city and supporting residential, tourism, and business growth. Since 2018, 54 council owned EV chargers have been installed in the city. The demand for charging infrastructure is expected to surge as EV adoption grows.

Almost 90% of the CoA residential population live in medium and high-density housing, including apartments, townhomes, and character buildings (Profile ID). It poses technical and economic challenges to install EV charging infrastructure retrospectively on sites.

Emphasizing public charging infrastructure in the city's EV transition will contribute to its economic competitiveness and appeal to visitors for shopping, employment, tourism, and the Park Lands.

PURPOSE OF THIS DOCUMENT

This document provides recommendations as to the role of CoA in the provision and facilitation of EV charging across the city over the coming years.

The structure of this document is as follows:

- Policy, demographics and land use context relevant to EV adoption across the CoA.
- Market and technology overview, including potential growth scenarios in EV adoption over the coming 10 years.
- Vision and network principles for the rollout of EV charging infrastructure across the CoA, encompassing planning, infrastructure, and investment.
- A roadmap for the deployment of EV charging infrastructure in CoA.



Electric Vehicle Charging Infrastructure at the Joinery, Flinders Street (Source: City of Adelaide)

POLICY CONTEXT NATIONAL AND STATE

NATIONAL CONTEXT

In April 2023, the Australian Government released a National Electric Vehicle Strategy. The Strategy includes a focus on the following commitments:

- Reducing tax on the purchase of new EVs.
- Allocating funds for green car loans.
- Supporting EV adoption in multi-unit dwellings.
- Supporting the deployment of EV charging infrastructure.
- Providing subsidies for new battery electric and hydrogen fuel cell vehicles.
- Modernizing electricity grids to support EV charging demand.

Key initiatives to facilitate the rollout of EV charging infrastructure include:

- \$500 Million through the Driving the Nation Fund.
- \$20.5 Million to support EV uptake through the Clean Energy Finance Corporation.
- A national network of EV chargers on major highways at an average interval of 150km, delivered in partnership with NRMA, an Australian insurance organisation offering roadside assistance.
- A net zero Australian public service by 2030, including 75% low emissions vehicle for new Commonwealth fleet passenger vehicle purchases and leases by 2025.

STATE CONTEXT

Transport is the State's largest emitting sector (Australian Department of Climate Change, Energy, the Environment and Water). As such, the South Australian Government is committed to the electrification of on-road transport.

In 2020, the State Government released the Electric Vehicle Action Plan, which outlines their ambition to bring forward the adoption of EVs and achieve a 50% reduction in State greenhouse gas emissions by 2030 from 2005 levels. The Action Plan includes actions to make EVs the common choice for motorists by 2030, and the default choice by 2035.

Key South Australian targets include:

- All new car sales in the State are electric by 2035.
- By 2030, the government fleet, private taxi and rideshare vehicles will be electric and fully electric commercial fleets will be common.
- By 2030, an aim to have 170,000 EVs on South Australian roads and integrate 1 million EVs into the electricity system by 2040.
- By July 2027 or when EVs make up 30% of new car sales (whichever comes first), road users will be charged 2.5c/km for Battery Electric Vehicles (BEVs) and 2c/km for Plug-in Hybrid Electric Vehicles (PHEVs).

Key State initiatives to support the uptake of EVs in South Australia include:

- Subsidies of \$3,000 for up to 7,000 EVs, along with 3 years of free registration for vehicles first registered between October 2021-June 2025.
- A grant of \$12.4M to Royal Automobile Association (RAA) for a state-wide EV charging network with 530 chargers across 140 sites, over 75% of which are in rural areas. CoA has benefitted from this grant.
- Grant funding of \$3.2M for 9 trials aimed at generating and sharing knowledge about EV smart charging, including charging patterns and preferences.
- Delivering the EV Fleet Pledge Program: businesses shift to zero-emission EVs. CoA is a member of this program.

However, SA remains one of the few states without specific legislation to allow enforcement action against non-EVs parking in designated EV charging bays.

Incentives for Zero Emission Vehicle (ZEV) purchase in South Australia:

In South Australia, new light Zero Emissions Vehicles (ZEVs) are offered three years exemption from registration fees when purchased between 28 October 2021 - 30 June 2025. South Australia also offers a \$3,000 subsidy for the purchase of new light ZEVs valued (inc. retail price, import tariffs, delivery costs, GST and LCT) under \$68,750 - capped at 7,000 vehicles.

Nationally, there are also tax incentives associated with EV adoption - with Fringe Benefit Tax (FBT) waived for the lease of eligible EVs and associated car expenses.

In South Australia ZEVs for passengers (not commercial vehicles) incur the least expensive registration costs among both new and existing passenger vehicles. They fall into the same price bracket as vehicles with 1 to 4 cylinders. The annual registration cost for a passenger ZEV or a vehicle with 1-4 cylinders is less expensive than other vehicle types: \$145 less than the cost for a 6-cylinder passenger vehicle; up to \$455 less than the cost for a Ute or Van weighing more than 1.5 tonnes.

POLICY CONTEXT CITY OF ADELAIDE

A CARBON NEUTRAL AGENDA

The CoA is striving to become one of the world's first carbon-neutral cities. To accomplish this, the Council has developed a Carbon Neutral Strategy 2015-2025 and a Climate Action Plan 2022-2025. The Climate Action Plan specifically prioritises installing an additional 100 public EV and bicycle chargers between 2022 and 2025 in collaboration with partners. It also aims to certify U-Parks as a carbon-neutral service to offset customer emissions.

The Council has undertaken building energy retrofits, purchased EVs, installed PV solar systems, coordinated the procurement of 100% of its electricity from renewable sources and from 2020 has achieved Carbon Neutral certification through Climate Active. To support community emission reduction, CoA has implemented a fast-charging network for EVs that operates solely on renewables and supported over 700 community projects through the Sustainability Incentives Scheme SIS (over \$1.5M investment since 2015).

There are numerous benefits associated with public EV charging, including encouraging the uptake of EVs, ensuring the city remains an attractive and convenient place to visit for EV drivers, and providing alternative options for residents with difficulties charging at home.

The transition to EVs will be a major contributor to reducing carbon emissions in the CoA. The Council is focused on investing in and advocating for better transportation infrastructure to create a more efficient and sustainable transportation system. This will involve improving access and mobility throughout the city and North Adelaide, contributing to the Council's overarching goal of achieving carbon neutrality.

Existing key initiatives that have been implemented for EV charging infrastructure include:

The Sustainability Incentives Scheme:

- 50% up to \$250 - Electric bicycle charging station
- 50% up to \$1,000 - Electric vehicle one way charging station (7 kW to <50 kW)
- 25% up to \$2,000 - Electric vehicle 'smart'* charging station (7 kW to < 50 kW)

Electric Vehicle Demand Management Rebate:

- 25% up to \$1,000 Stand-alone system
- 50% up to \$10,000 Network-integrated system

The CoA is also an inaugural member of the South Australian Government's EV Fleet Pledge program and is implementing one of the 9 State Government funded Smart EV Charging Trials.

The CoA has published the Zero Emissions Vehicle Plan 2019-2030, outlining priority action plans, procurement strategies, and budget for the CoA's EV fleet. Through the second half of 2024 the Council will develop a Transport Strategy which will include the redistribution of car traffic in the city.

Electric Vehicle adoption is key to CoA's ambitions:

The uptake of EVs in the CoA is aligned to the city's key aspirations of being a sustainable, healthy and attractive place to live, work and play. Incentives and EV charging infrastructure are being implemented citywide, but a well-planned rollout is vital to accommodate anticipated EV uptake in the future.

CITY OF ADELAIDE RESIDENT PROFILE

DEMOGRAPHICS SUMMARY

As a capital city local government area, the CoA has a unique population and demographics profile relative to the broader Greater Adelaide metropolitan area. This creates specific implications for the rollout of EV charging infrastructure.

Compared with Greater Adelaide, the CoA has:

- A much higher population density, reflected in a much larger share of the resident population living in apartments – 53.8% compared with the Greater Adelaide average of 5.8%. As a result, a larger share of the city's existing residents are likely to face challenges relating to EV charging provision and space for off-street parking.
- A higher rate of residents that work in their own suburb census boundary (58.1% compared with 14.4% of the Greater Adelaide average), and a higher rate of residents who use active travel for their journeys to work (34.9% compared with 3.7%). As EV ownership grows in the city, there could be a higher proportion kept at home during the day as they are not needed for work travel.
- A lower rate of motor vehicle ownership. There is a much higher rate of dwellings without a motor vehicle (31.3%) compared to the Greater Adelaide average of 7.7%, with car-free and single car households totalling 80.9% of residences within the CoA.
- The high job density in the CoA combined with the much higher rate of car ownership and use for journeys to work in Greater Adelaide has implications for the city's visitor profile (next page) – the city has a large influx of workers each day from the broader Greater Adelaide region that use parking facilities throughout the day. As more vehicles electrify, parking facilities will need to be ready to support EV charging.

Table 1: CoA contextual statistics

Contextual Statistics	City of Adelaide	Greater Adelaide
Population-weighted population density*	144.6	24.2
Job-weighted job density**	543.7	126.2
Population growth (2011-2021)	+28%	+14%
Motor vehicles per adult resident	0.63	0.97
Change in motor vehicles per adult (2011-2021)***	+6.7%	+2.7%
Dwellings without a motor vehicle (%)	31.3%	7.7%
Single car households (%)	49.6%	37.2%
Residents who live in apartments (%)	53.8%	5.8%
Apartments as % of dwellings	59.6%	9.1%
Journey to work by private vehicle	46.5%	87.1%
Journey to work by public transport	17.7%	8.5%
Journey to work by active travel	34.9%	3.7%
% of residents that work in their own suburb	58.1%	14.4%
Index of Relative Socio-economic Advantage and Disadvantage Score	1058	983.4

The City of Adelaide's City Plan has an ambition for a 50,000 people to be living in the City of Adelaide by 2036.

* Population-weighted population density: Density of the population, with the density at each census meshblock weighted by the number of people in that meshblock. Meshblocks with more people are weighted higher, returning the population density at which the average resident lives.

** Same as above, but for jobs. Job density at which the average worker works.

*** Percentage change in total motor vehicles owned per capita (i.e. relative to the change in total number of adults).

CITY OF ADELAIDE CITY USER SURVEY

A DIVERSE CITY USER BASE

Tourism significantly boosts Adelaide's economy, contributing about one-fifth to total employment in South Australia (idcommunity, 2023). In 2021/2022, there were 125,000 international visitor nights and 4.2 million domestic visitor nights in CoA, resulting in roughly 1.3 million domestic day trips.

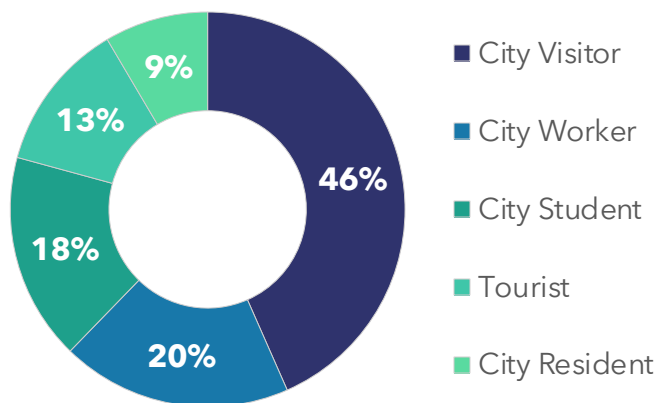
Survey responses from the City User Profile 2022 reveal various CoA user types. It should be highlighted that this survey was only carried out over a single day. The survey conducted in-person interviews with 2,028 city users to understand usage patterns, behaviors, and perceptions in the city.

46% of the people surveyed were classified as visitors (i.e., do not live in the city and come to the city for reasons other than work or study).

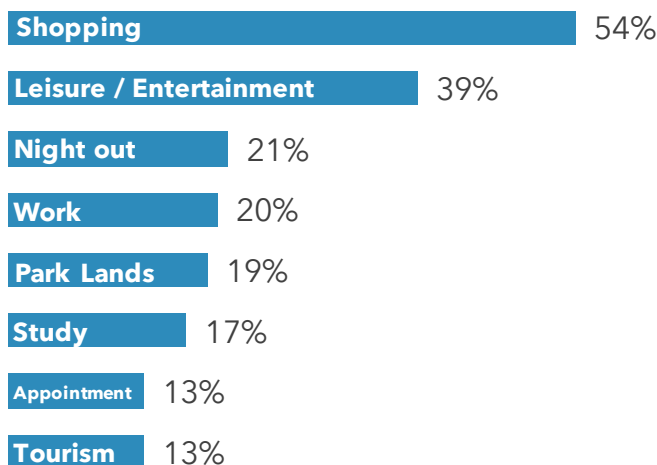
- Among user types, city workers stand out significantly (20%), reflecting the city's role as a thriving hub of employment and business in Greater Adelaide. Around 40% of city workers use public transport, and 40% rely on private vehicles to access jobs within the city - highlighting the influx of private vehicles due to CBD workers.
- Students make up a large proportion of the city's users, comprising 18% of the respondents. The travel mode data reveals that 59% of students prefer public transport, with only 20% driving to the city for education.
- Of the survey respondents, city residents comprise the smallest percentage (9%). Their preference for walking (65%) suggests vehicle owners leave them at home during the day.
- The diverse reasons for visiting the city reflect its dynamic nature - with shopping, work, entertainment, and dining as key motivations.
- The CoA attracts various users, with workers and students comprising the highest proportions - 72% and 56% respectively visiting daily/most days, whereas only 16% of total city visitors come at the same frequency.

The city's population increases significantly during the day due to its range of visitor types. A significant proportion of these people drive to the city. Considering to what extent the city should provide EV charging infrastructure to this cohort and for what purpose is an important policy question.

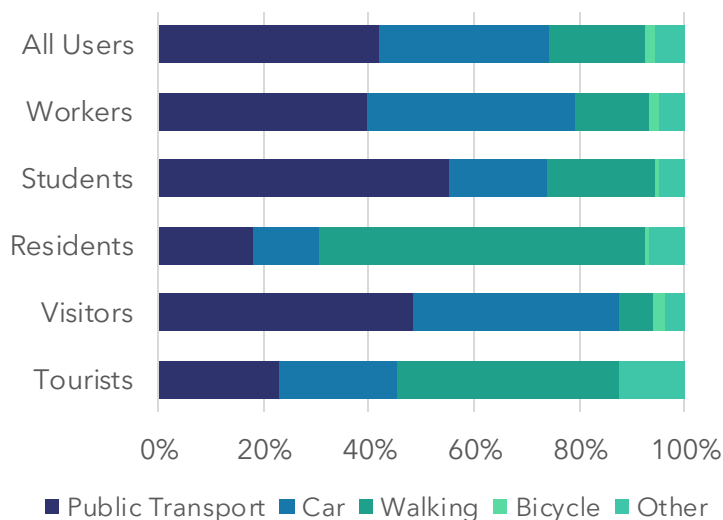
CITY OF ADELAIDE USER TYPES



REASONS FOR VISITING THE CITY OF ADELAIDE



TRAVEL MODE BY USER TYPE



Source: City User Profile 2022 (Self-Reported by Users)

CITY OF ADELAIDE LAND USE PROFILE

A DIVERSE LAND USE MIX

The CoA has a vibrant mix of land uses across its 16 square kilometres, creating a diverse mix of travel attractors for residents and visitors from across Adelaide.

Commercial and retail commercial areas occupy 7.9% and 5.6% of the CoA respectively (13.5% combined), while residential areas cover 12.2%. A large portion of the CoA is comprised of the Adelaide Park Lands.

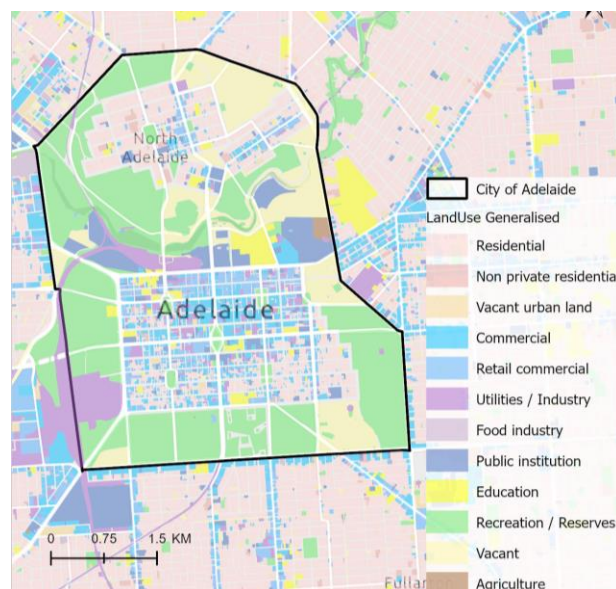
Utilities and industry make up 11.4% and public institutions account for 12.6% of the city's land.

Adelaide features iconic landmarks in the bustling Adelaide Central Activities District, renowned educational institutions, and healthcare facilities of regional significance. The city thrives culturally with attractions like the Adelaide Zoo, Adelaide Museum, and Art Gallery of South Australia. Adelaide's commitment to recreation is evident through the preservation of Adelaide Park Lands and Karrawirra Parri / River Torrens.

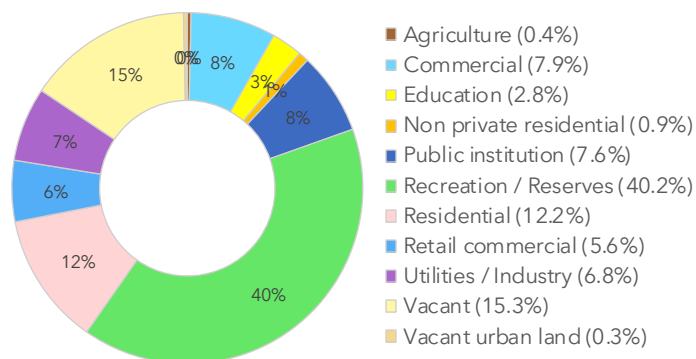
Thriving industries in the city, including accommodation and food services, retail trade, professional, scientific and technical services, and health care and social assistance, all contribute to attracting 315,000 daily visitors, 12,000 city businesses, and 130,000 city workers from across Greater Adelaide and South Australia more broadly.

The provision of EV charging across the CoA will need to consider a range of functions and typologies to serve the diverse land use mix that exists across the city. EV charging provision should be strategically planned to ensure the CoA retains its attractiveness as a place where people live and visit to work, shop and play.

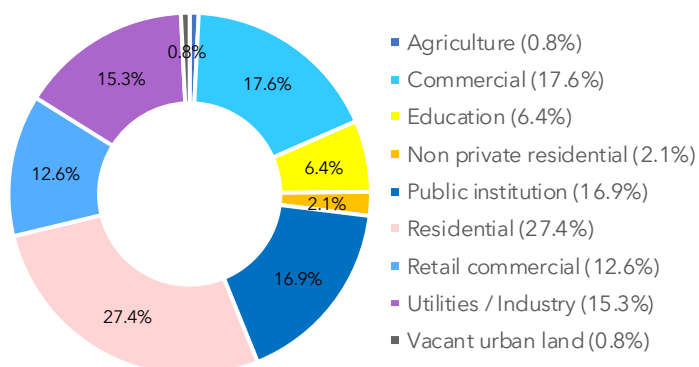
* This data is sourced from the Land Use Generalised Dataset from the Office of Valuer-General South Australia. This layer is a general parcel-based land use derived from the valuation information and land parcel boundaries. The categories are assigned based on economic use of the land, and the predominance of any activity on that land parcel to impart that characteristic on the parcel as a whole. It should be noted that while ~15.3% of the City of Adelaide is classified 'Vacant' - a large portion of this is Park Lands public space.



LAND USE COMPOSITION (INC. PARK LAND)*



LAND USE COMPOSITION (EX. PARK LAND & VACANT)



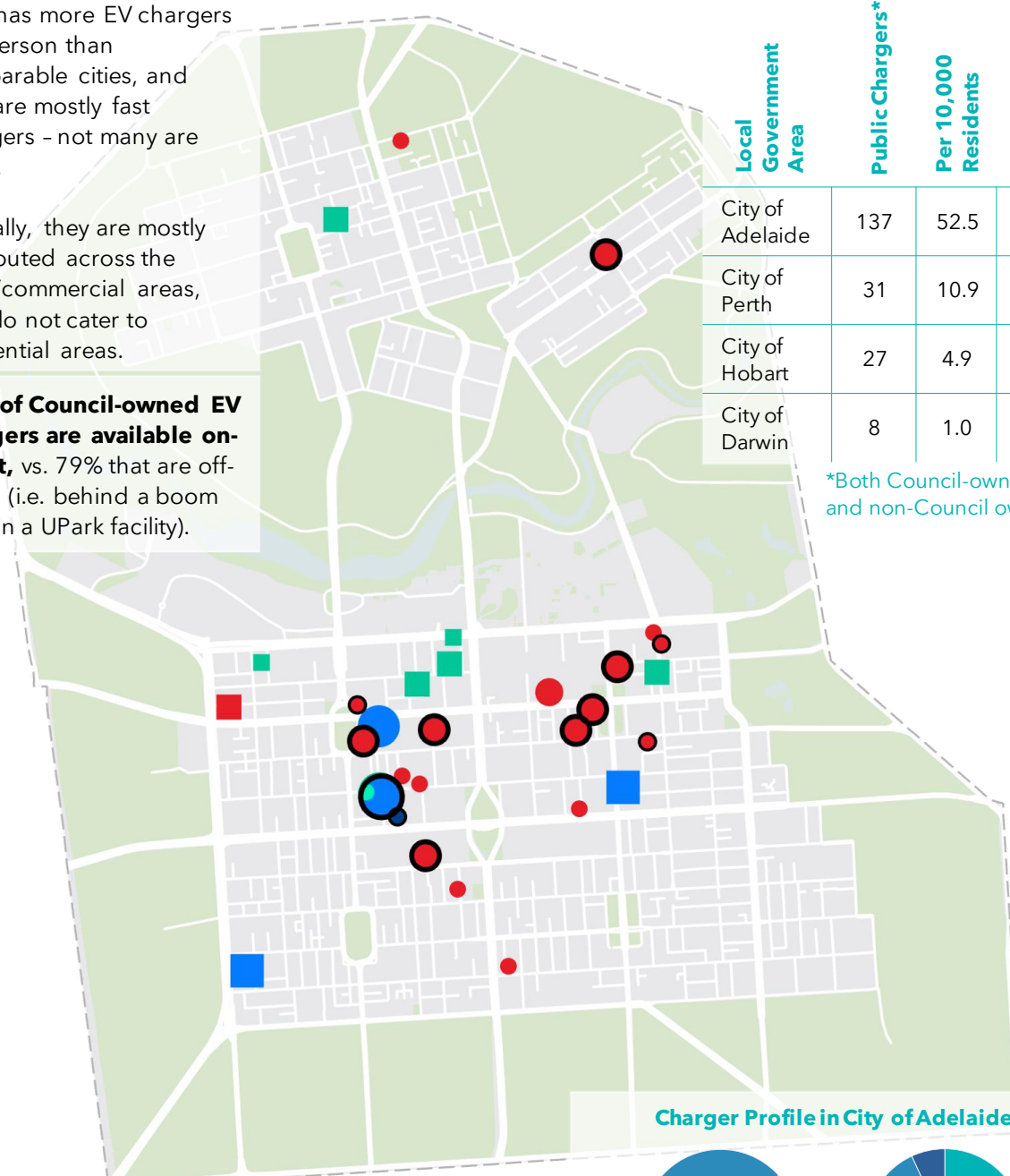
CHARGING INFRASTRUCTURE CURRENT PROVISION

EV CHARGERS ACROSS THE CITY OF ADELAIDE (COUNCIL AND PRIVATELY OWNED)

CoA has more EV chargers per person than comparable cities, and they are mostly fast chargers – not many are rapid.

Spatially, they are mostly distributed across the retail/commercial areas, and do not cater to residential areas.

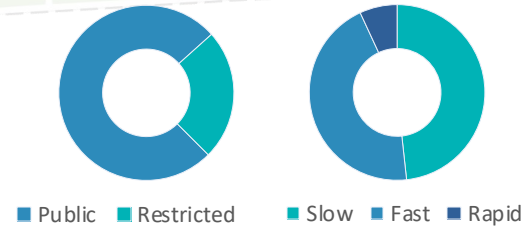
21% of Council-owned EV chargers are available on-street, vs. 79% that are off-street (i.e. behind a boom gate in a UPark facility).



Local Government Area	Public Chargers*	Per 10,000 Residents	Per 10,000 Jobs
City of Adelaide	137	52.5	10.5
City of Perth	31	10.9	1.8
City of Hobart	27	4.9	4.7
City of Darwin	8	1.0	1.6

*Both Council-owned (54) and non-Council owned

Charger Profile in City of Adelaide



Legend

Charging Capacity

- N/A
- 2.5 - 7 kW (Slow)
- 7 - 25 kW (Fast)
- 25 - 350 kW (Ultra Fast/ Rapid)

Owner (Outline)

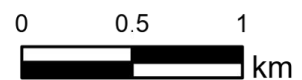
- Council
- Other

Charger Type

- Type 2
- J-1772
- J-1772 and Wall (NZ/AU)
- Tesla
- Type 2, CHAdeMO, and CCS/SAE

Status (Shape)

- Publicly Accessible
- Private



CITY OF ADELAIDE'S EV CHARGING USERS

USAGE OF EV CHARGERS IN THE CITY OF ADELAIDE

CoA's current charging network is internet-connected, allowing anonymised data to be collected about its usage. This data can help to understand the demands on the current network, and the differing demands from different user categories.

CHARGING PATTERNS

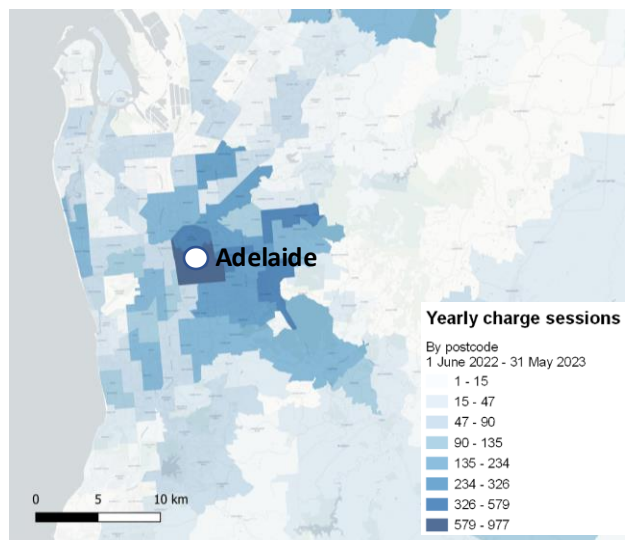
Over the last six years, the number of daily charging sessions in CoA has increased rapidly (right) as EV adoption continues to accelerate, and as CoA develops their charging provisions.

Breaking down charging sessions by driver postcode (right) shows that CoA residents account for approximately 12% of charging sessions - more than any other postcode area. Driver postcodes also reveal that those who live further from the city (and are therefore likely to be driving further) tend to use chargers for longer periods of time.

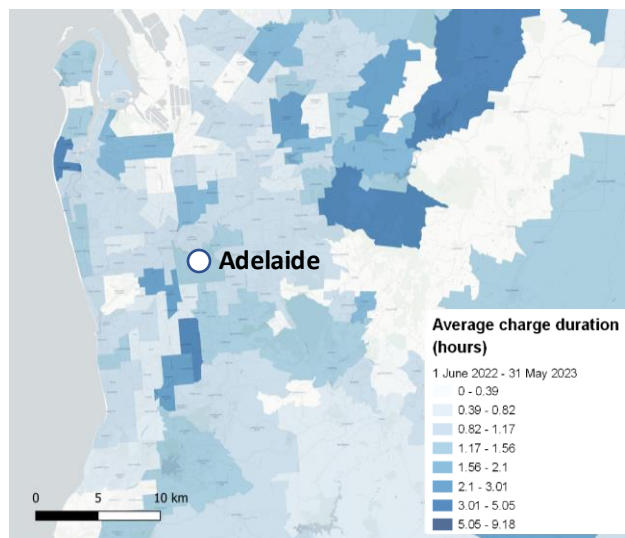
In summary:

- CoA residents account for more charging sessions in CoA than any other postcode area.
- Although CoA residents account for the most charging sessions, they don't charge for the longest periods.
- The overall usage of charging facilities is increasing, and the supply of EV chargers will need to also grow to keep pace with demand for EV charging.
- In 2023, 75 RAA chargers have been added to the local network, contributing to meeting the growing demand.

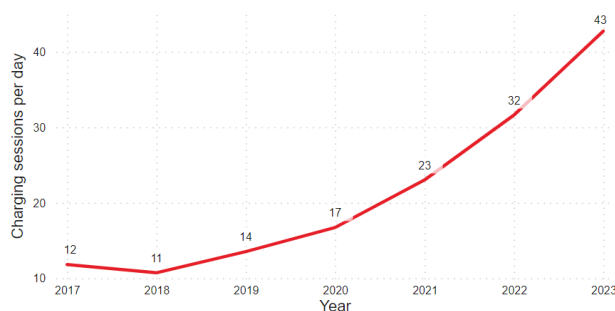
ANNUAL CHARGING SESSIONS BY HOME POSTCODE (JUNE '22 - MAY '23)



AVERAGE CHARGE DURATION BY HOME POSTCODE (JUNE '22 - MAY '23)



AVERAGE DAILY CHARGING SESSIONS



MARKET DEMAND EXISTING EV UPTAKE

CoA IS LEADING THE NATION

Vehicle ownership in the CoA indicates strong transition to low emissions vehicles (AAA EV Index):

- Battery Electric Vehicle (BEV) ownership in the CoA was 0.87% on January 31, 2023. This represents a BEV penetration rate higher than the South Australian and the Australian Capital LGA averages.
- There is a substantial update of hybrid and plug-in hybrid (PHEV) vehicles registered in the CoA, comprising 6.87% of registered vehicles in January 2023.
- By gross registrations, Adelaide (postcode 5000) has the highest number of BEVs and PHEVs in South Australia.
- Benchmarked against individual Australian capital cities, the CoA ranks 4th in terms of Battery Electric Vehicle (BEV) penetration rate and is leading the way in Hybrid/Plug-in Hybrid Electric Vehicle (PHEV) adoption.

Table 2: Low Emission Vehicle Adoption (AAA EV Index)

Adoption (Jan '23)	5000	5006
BEV Registrations	149	57
BEV Registrations Rank in SA	1	12
BEV Penetration	0.79%	1.21%
BEV Penetration Rank in SA	16	2
Hybrid/PHEV Registrations	1485	138
Hybrid/PHEV Reg Rank in SA	1	76
Hybrid/PHEV Penetration	7.85%	2.92%
Hybrid/PHEV Pen Rank in SA	2	20

Table 3: Low Emissions Vehicle LEV Adoption in LG Areas (AAA EV Index)

Penetration rates (Jan '23)	BEV	Hybrid/ PHEV
City of Adelaide Adelaide CBD (5000)	0.87% 0.79%	6.87% 7.85%
City of Melbourne Melbourne CBD (3000)	0.88% 1.14%	5.19% 7.31%
City of Sydney City of Sydney CBD (2000)	1.19% 1.37%	5.18% 7.91%
Brisbane City Council Brisbane CBD (4000)	0.72% 1.08%	3.22% 10.76%
City of Perth Perth CBD (6000)	0.63% 0.44%	3.81% 3.22%
City of Hobart Hobart CBD (7000)	0.93% 0.80%	2.64% 3.51%
City of Darwin Darwin CBD (800)	0.15% 0.16%	2.87% 5.36%



ALL FUELS



INTERNAL COMBUSTION



BEV



HYBRID/PHEV

	ALL FUELS	INTERNAL COMBUSTION	BEV	HYBRID/PHEV
City of Adelaide	23,640	92.3% (21,811)	0.87% (206)	6.87% (1,623)
Australian Capital LGAs	1,305,398	95.7% (1,249,040)	0.75% (9,788)	3.57% (46,570)
South Australia	1,433,444	97.9% (1,403,202)	0.23% (3,306)	1.88% (26,936)
Australia	38,530,710	97.7% (37,661,982)	0.38% (145,420)	1.88% (723,308)

MARKET DEMAND TRENDS

NEW EV SALES ARE INCREASING

In South Australia, new battery electric car sales surged 174% in the first quarter of 2023 compared to the same period last year.

The growth in sales is attributed to the increasing uptake of BEVs, with the sale of PHEVs remaining relatively consistent across the last year.

There has been a lagging supply of EVs relative to demand. However, a range of low cost BEVs are entering the Australian market in 2023, at a price of less than \$50,000.

This new, lower cost vehicle supply is likely to unlock latent demand for BEVs and as a result will result in further accelerated uptake in the immediate term.

BEV vehicle sales in South Australia surged by **174%** in the first quarter of 2023 compared to the same period last year, outpacing the national growth rate of 158% for new EV sales across Australia in the same period.

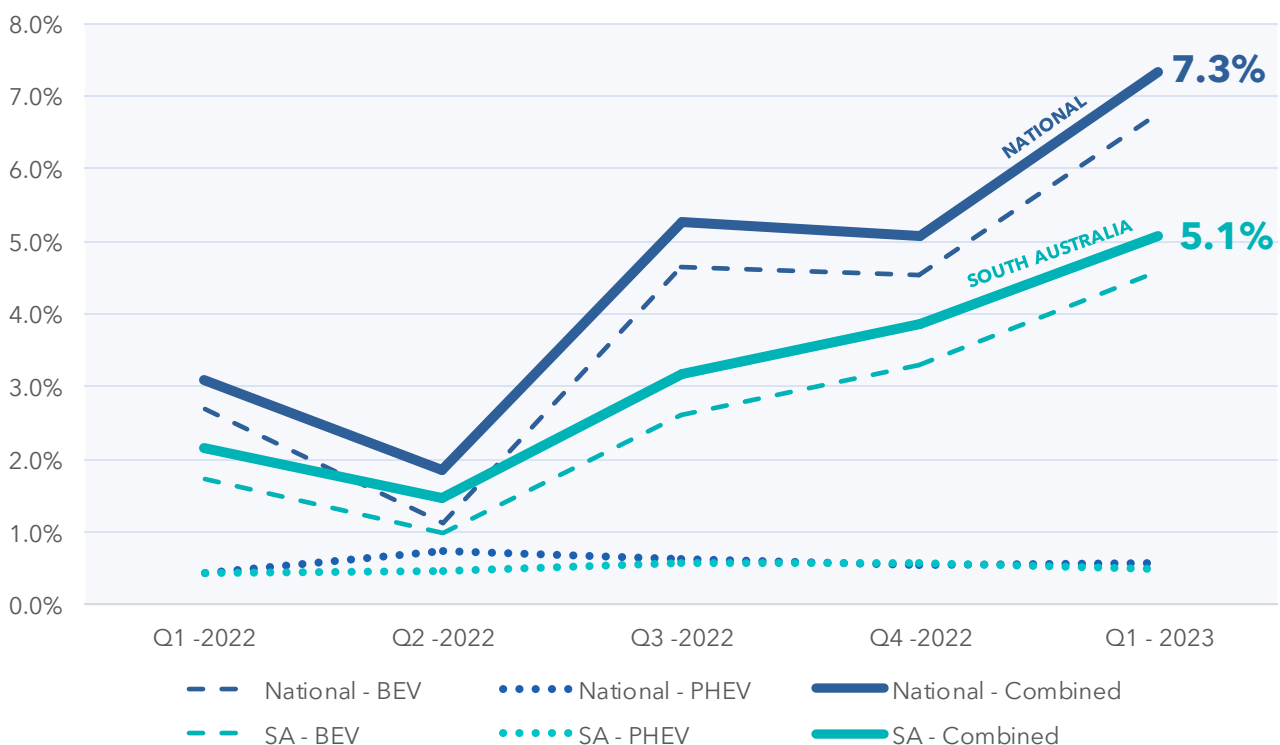
South Australia's share of national BEV sales has only slightly increased from 2.1% of total vehicle sales in Q1 2022 to 5.1% in Q1 2023. However, it still lags behind the nationwide share of 7.3%

South Australians have been more likely to purchase a new BEV and less likely to purchase a new PHEV compared to the national average.

While South Australia is catching up in EV sales, it still lags the national average for EV sales as a percentage of total new vehicle sales (shown below).

(Source: AAA EV Index)

BATTERY ELECTRIC AND PLUGIN HYBRID AS PERCENTAGE OF TOTAL VEHICLE SALES



(Source: AAA EV Index)

MARKET DEMAND POTENTIAL GROWTH

GROWTH FORECASTS

In November 2022, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) provided updated EV uptake projections to the Australian Energy Market Operator (AEMO). The projections comprised of four scenarios, which have been adopted for this study and are shown in the figure below.

Adopting these scenarios for the CoA, the uptake of hydrogen fuel cell vehicles (FCEVs) has not been considered as part of this analysis. Due to the high vehicle costs and refuelling infrastructure requirements, even under the 'hydrogen export' scenario FCEVs are not projected to achieve a significant share of the EV market, with only ~5% share assumed under the CSIRO modelling by 2050.

The growth projections for EVs in the CoA highlights the need to plan for, and facilitate the implementation of, EV charging infrastructure across the city. The four growth scenarios adopted by CSIRO projections for AEMO estimate that the EV market penetration (EV fleet share) will be between 13-39% by 2033.

All growth scenarios indicate an increase in demand for EV charging to varying degrees.

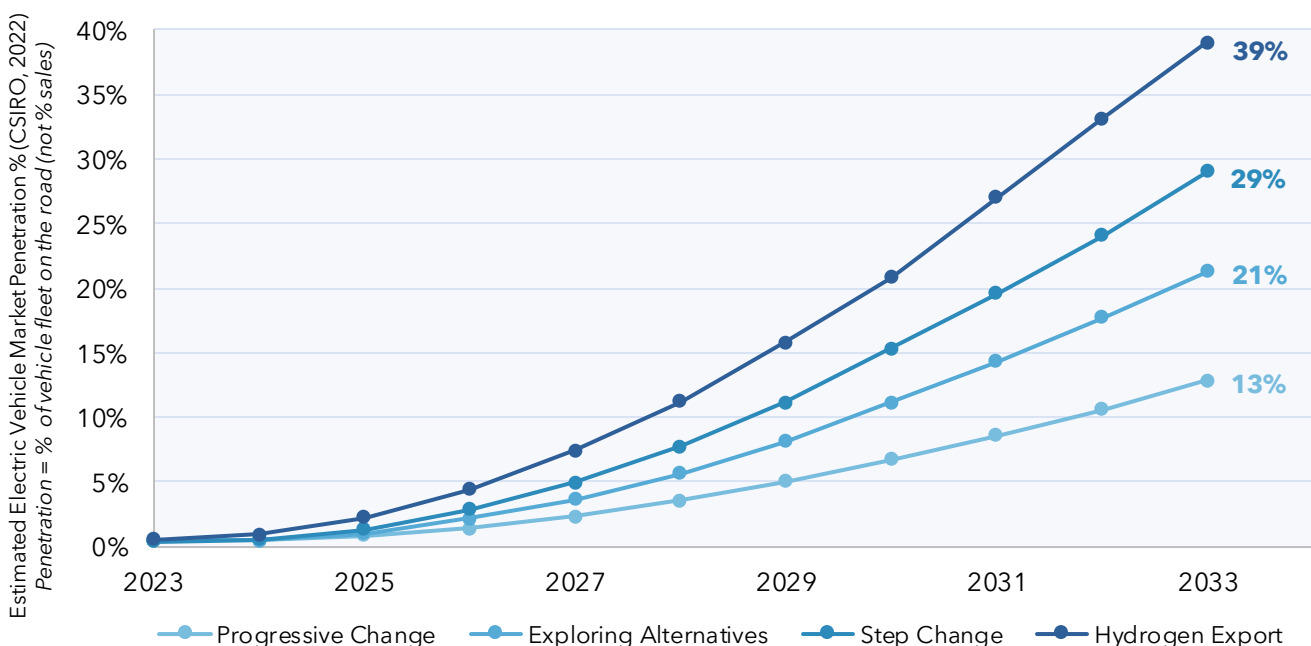
Based on a growth in jobs in the Adelaide CBD in conjunction with a shift towards sustainable modes of transport - if the average daily commuters driving to the CBD in 2033 remains relatively similar to today (50,000), this would equate to between 6,500 and 19,500 EVs entering CoA, per day, for work alone. This is in addition to resident owned EVs which would be permanently parked within CoA.

The CoA currently provides 18,300 parking spaces across the City and North Adelaide, including 3,000 paid on-street parking spaces and 6,000 paid off-street parking spaces.

Assuming that parking assets remain constant while jobs and population grow, and considering the EV market share projected by CSIRO, by 2033 EVs could occupy 13 to 39% of the parking space. However, it is expected that between 80-90% of EV drivers will charge their EVs at home.

While these forecasts are updated each year (and will not be exact), they do send a clear message that EV uptake will increase and that Council-owned assets will need to be EV-Ready to support the growing number of EVs.

POTENTIAL GROWTH SCENARIOS



CHARGING INFRASTRUCTURE TECHNOLOGY

OVERVIEW

EV charging infrastructure can be categorised by levels, modes and types. Average Modern EVs can travel 4.8 km per kWh. Very Efficient EVs achieve 6.4 km per kWh. Less Efficient EVs achieve 4 km per kWh. The most efficient EVs achieve ratings of ~6.7 km per kWh. Due to limitation in the size of the battery, this would translate to an average driving range of 300-600 km per charge for typical EVs. Based on commercial rates of between 32c and 68c per kWh (RAA charging network), a full charge for an EV with a typical 40 kWh battery would cost between \$13 and \$27.

EV user charging patterns vary based on multiple factors.

Research indicates shorter weekday driving distance, with morning and evening peaks in charging (University of Melbourne, 2022). On weekends, driving distances are often longer, indicating leisure or road trips. Home charging is the most preferred location, especially during evenings, and is favored by those with rooftop solar panels. Workplace charging is the second preferred location, while public charging is less prominent. Charging behavior often aligns with off-peak electricity rates, with high activity around 10:00 pm to 1:00 am. (University of Queensland, 2022)





Driving and charging patterns of PHEV owners vary from that of BEV owners, given that PHEVs are not purely reliant on charging.

CHARGING LEVELS

Slow Chargers (Level 1)

Level 1 Chargers are typically used in standalone domestic homes to 'top up' daily use of EVs. They use existing power points (10-15A, single phase), in combination with a special cable which connects from the vehicles to the wall. This method will add between 10-20km of range per hour when charged. Level 1 chargers are not commonly used to fully charge an EV overnight.

Typical Characteristics

-  2.5-7kW
-  8-12 hours full charge
-  At-home charging
-  Unearthed and AC household Outlet Type 1 & 2 plugs





Typical cost: <\$500 + installation

Fast Chargers (Level 2)

Level 2 Chargers are dedicated AC EV chargers up to 7kW (32A single phase) or 21kW (three-phase). These are typically installed in homes, apartment complexes, shopping centres and other locations where vehicles will be parked for a long period of time. This method will add up to 40km of range per hour and will deliver a full recharge overnight.

Typical Characteristics

-  7-25kW
-  1.5-5 hours full charge
-  At-work/ destination charging
-  Unearthed and AC with wall attachment Type 1 & 2 plugs







Typical cost: \$900 - \$3,000 + installation

Rapid / Ultra Rapid (Level 3)

Level 3 Chargers are fast and ultra-fast DC chargers, with power ranging from 25kW to 350kW (40-500 Amp, three phase). They are typically found at commercial locations like expressways, shopping centres, and hubs. At 350 kW, these chargers can deliver up to ~350km of range in 10 minutes, with a full charge only taking 10-15 minutes.

Typical Characteristics

-  25-350kW
-  10-45min full charge
-  On route charging/ charging hub
-  Tethered DC only All Plugs



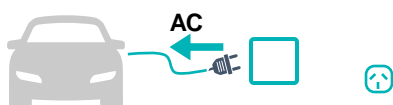
Typical cost: \$25,000 - \$150,000 + installation

CHARGING INFRASTRUCTURE TECHNOLOGY

CHARGING MODES

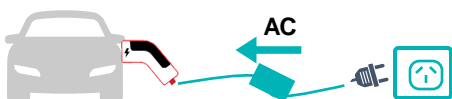
'Mode' refers to the electronic communication between the vehicle and the power source. Therefore, the mode determines the extent to which the charger can determine the percentage of charge, governed by four different modes. The purpose of this is to avoid overcharging and ensure batteries are charged in a safe and sustainable manner.

Mode 1



A **Mode 1** charger is directly connected from the vehicle to a standard at home socket without specialist safety systems. Their use has been banned in the US and UK over safety concerns. They are typically associated with Level 1 charging and are mostly used for scooters and electric bikes.

Mode 2



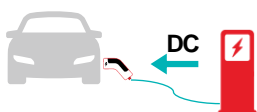
A **Mode 2** charger is a direct home socket to vehicle system, but unlike Mode 1 it has a control box safety system attached to the AC cable. These are commonly used in Level 1 charging and can support both simple and smart charging.

Mode 3



A **Mode 3** charger is permanently connected to the electricity network and is typically associated with Level 2 charging. They take the form of wall boxes, commercial charging points and automatic charging systems.

Mode 4



A **Mode 4** charger supplies DC power and is often called a rapid or super charger. It requires a current converter external to the vehicle to convert from AC to DC and can recharge vehicles much faster than the other three modes. They are associated with Level 3 charging.

CHARGING TYPES

'Type' refers to the model of plug associated with the charging cable and the vehicle inlet. There are two main plug types (Type 1 and Type 2) which are commonly used across different EV models and manufacturers, as well as some specialty plug types.



Type 1 plugs are single-phase plugs that allow for a charging power level of up to 7.4kW. These are typically used in residential charging settings and are also known as J1772 plugs. Type 1 plugs are typically associated with Level 1 charging.



Type 2 plugs are single-phase plugs with three-phase capabilities. When used in private bays, they have charging power levels of up to 22kW. In public charging stations, Type 2 plugs can have power levels of up to 43kW. Most public charging stations are equipped with Type 2 sockets, however EVs can typically be charged by both Type 1 and 2 plugs. *Type 2 plugs are typically associated with both Level 1 and 2 charging.*



Tesla superchargers are bespoke modified Type 2 plugs which can only be used by Tesla vehicles. By using two of the plug's pins for DC charging, *Tesla plugs are able to deliver significantly more power than standard Type 2 plugs of up to 120kW.*



CHAdeMO are plugs used at DC charging stations which can be installed as a second socket by vehicle manufacturers next to the AC charging socket on the EV. These plugs are typically associated with Level 3 charging.



Combined Charging system (CCS) Combo 1 and 2 are based on Type 1 and 2 plugs by adding two additional pins at the base. CCS's are made for DC fast charging. However, the connectors can be used for both AC and DC charging up to 350kW. CCS plugs are typically associated with Level 3 charging.

CHARGING INFRASTRUCTURE TECHNOLOGY

STANDARDS WILL BE NECESSARY

Leading jurisdictions have been considering the impacts and trends of EV uptake over the last few decades. By tailoring policies, incentives and regulations, global leaders have facilitated EV uptake, while minimising downstream costs and increasing charging convenience.

Consistent across geographies is the need to set clear targets for EV uptake over the coming years. Leaders have responded to EV targets by introducing incentives for EV purchasing in parallel with strict and ambitious regulation for charging infrastructure within buildings and in the public domain. Particularly for buildings, setting clear requirements for EV-Readiness provisions, sets the minimum compliance for developers to make their buildings accessible for EVs.

Minimum compliance is an influential tool, as it sets a baseline and ensures new buildings are future-proofed for growing EV uptake.

Regulating provisions during the design phase and before construction allows for a more affordable approach from the outset, while avoiding retrofit costs and additional costs down the line.

DEFINING EV-READINESS

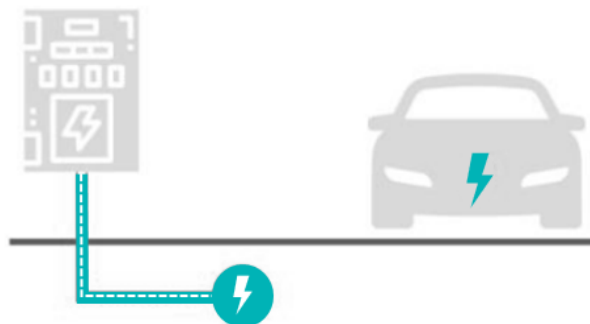
The international standard for EV-Readiness, in reference to an individual car parking bay, follows the three definitions of EV-Readiness: 'EV-Capable', 'EV-Ready' and 'EV-Installed' - each of which are shown on the right of this page.

Leading jurisdictions provide clear guidelines and standards on national or regional levels for EV-Readiness. Norway is largely regarded as the global leader in EV uptake since the emergence of the technology, however its new building regulations are not as strict as some measures in the United States (US) and the United Kingdom (UK).

The following page summarises international building codes, compared against Australia's newly introduced amendments to the National Construction Code to make provisions for EV-Readiness in new apartment, office and other commercial buildings.

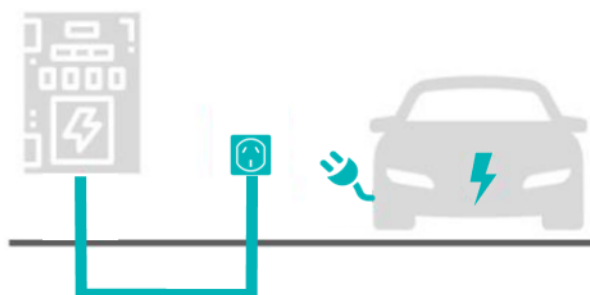
EV-Capable Parking Space

Install electrical panel capacity with a dedicated branch circuit and continuous raceway from the panel to the future EV parking spot.



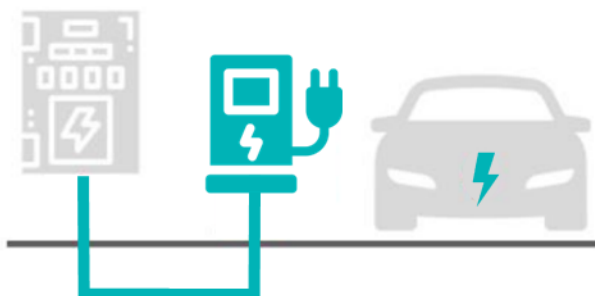
EV-Ready Parking Space

Install electrical panel capacity and raceway with conduit to terminate in a junction box or 240-volt GPO.



EV-Installed Parking Space

Install a minimum number of Level 2 EV charging stations.



CHARGING INFRASTRUCTURE STATUTORY PLANNING

AUSTRALIA HAS INTRODUCED STANDARDS

The provision of EV infrastructure relates to the proportion of total parking bays required within a building to allow the easy future installation of charging infrastructure. This includes the proportion of parking bays, the category of EV-Readiness provided and distinction between building types. A summary of the relevant requirements for EV-Ready Buildings across multiple international jurisdictions' building codes is supplied in Table 4 below.

In 2022, reform to the National Construction Code (NCC) in Australia saw the introduction of EV-Readiness requirements. SA has implemented a transitional extension and these will be in effect from October 2024.

While some international jurisdictions (Norway and San Francisco) have greater mandated requirements, the NCC amendments will facilitate the expansion of EV charging capabilities across new building types in the CoA.

Table 4: Provision of EV charging infrastructure - global standards (EV-I=EV-Installed; EV-R=EV-Ready; EV-C=EV-Capable)

Jurisdiction	Source	Detached dwelling	Apartment	Office	Destination
International	International Green Construction Code, 2021	-	20% EV-R (10< bays)	4% EV-R (20< bays) 8% EV-C 1 EV-I (10< bays)	4% EV-R (20< bays) 8% EV-R staff parking (20< bays)
European Union	Energy Performance of Buildings Directive, 2020	-	100% EV-C (10< bays)	20% EV-C, 1 EV-I (10< bays)	20% EV-C, 1 EV-I (10< bays)
United States					
California	CALGreen, 2020	-	10-20% EV-C	6-10% EV-C	6-10% EV-C
San Francisco, CA	Green Building Code, 2018	-	100% EV-R (developers can choose to voluntarily substitute five Level 2 EV-Installed/Ready/Capable bays with 1 rapid DC charging station)		
San Jose, CA	CALGreen, 2020	-	10% EV-I, 20% EV-R, 70% EV-C	10% EV-I, 40% EV-C	-
Canada					
Vancouver, BC	Building Code Bylaw 10908, 2019	1 EV-R bay	100% EV-R	10% EV-R	-
United Kingdom					
London	The London Plan, 2021	-	20% EV-R, remaining EV-C	10% EV-R, 10% EV-C (DC rapid chargers to be voluntarily provided on a case-by-case basis)	
Europe					
Oslo, NO	EVSE Building Regulation, 2017	-	50% EV-R	50% EV-R	50% EV-R
Australia					
Australia	National Construction Code, 2022		100% EV-R	10% EV-R	20% EV-R
South Australia	Planning and Design Code	<i>No current dedicated provisions within the Code relating to EV charging infrastructure for residential or commercial buildings.</i>			

SUMMARY

The CoA is the densest residential and employment centre in South Australia. This creates unique challenges and opportunities for the EV transition.

- National, State and local policy and planning is aligned to facilitate the decarbonisation of the economy - with transport being a major component in this transition (transport accounts for the highest percentage of South Australia's current emissions).
- The CoA has a high population density, particularly those living in apartments, compared to other parts of the metropolitan area - as well as high job density. Both of these factors create demand for EV charging beyond what can be provided in private residences - which will require on-street and off-street charging solutions.
- Compared with the Greater Adelaide average, the CoA has an environmentally sustainable resident transport profile - with only 46.5% of residents using private vehicles for journeys to work, with the remainder walking, cycling or using public transport. This likely results in a higher relative proportion of residential vehicles remaining in the city during the day, creating possible implications for off-peak charging load.
- Evidenced by the land use composition, the city has a diverse range of activity-generating land use, and subsequent visitors - making it a destination of choice for living, working, shopping, and recreation.
- While there remains a range of possible growth scenarios for EVs in South Australia, it can be expected that EV uptake will increase exponentially over the coming decade. Lower cost EVs entering the Australian market in 2023 are likely to unlock latent demand and drive uptake in the immediate term.
- The CoA owns and operates a large number of parking assets across the City and North Adelaide - equating to 6,000 paid off-street parks, and an additional 12,000+ on-street parks (both paid and unpaid). The City will need a clearly defined role in supporting the transition to EV's.
- CoA has demonstrated strong growth in BEVs and hybrids, demonstrating a community willingness for lower emissions vehicles. This suggests that if this position is retained then there could be even higher adoption in the CoA compared with the projected national average for 2033 of up to 39% of vehicles on the road.
- Amendments to the National Construction Code (NCC) in Australia will see 100% of car parking spaces in apartment buildings constructed from October 2023 be EV-Ready. Similarly, 10% of office car parking spaces and 20% of other commercial buildings will be EV-Ready.
- However, the above standards only apply to new builds. There are a large amount of apartment dwellings, or dwellings without off-street parking in the CoA that will require EV charging retrofit or access to a reliable EV charging network.

IMPLICATIONS FOR THE EV TRANSITION

The current policy environment and existing city context have a number of implications for the EV transition in the CoA:

- As a result of aligned policy at all levels of government - EV uptake will increase exponentially over the coming 10 years, independent of the level of action taken by the CoA. While forecasting EV growth based on demand, it is also important to consider strategies that might discourage car ownership or driving.
- Residential building stock in the CoA currently does not support high penetration of private charging infrastructure. Notably, the most recent amendments to the National Construction Code (NCC) in Australia stipulate that starting from October 2024, 100% of car parking spaces in apartment buildings must be EV-Ready.
- With workers and visitors continuing to use private vehicles to the CBD and North Adelaide, accommodating EVs is important. The updated NCC mandates 10% of office car parking spaces and 20% of other commercial buildings to be EV-Ready. Public charging solutions will be required to maintain the CoA as a preferred destination for visitors. The city must determine how to effectively provide EV charging infrastructure in response to these requirements.

In addition, current market and technology trends have the following implications for the EV transition in the CoA:

- EV uptake will grow among the CoA residents, business community workers and visitors. As a result, an increasing number of daily visitors using the city's parking assets will be driving EVs.
- Transitioning Council-owned parking assets to EV-Readiness may require additional electricity/switchboard capacities and other infrastructure works, however this does present an opportunity for the CoA.
- Given the CoA ambitions to be both a thriving community of residents but also of visitors, an equitable rollout of public charging that considers the diverse range of land use typologies that exist within the city is recommended.
- The adoption of EVs not only alters the facility requirements for parking buildings, but it also has implications for the structural integrity and design of the new buildings due to EVs being significantly heavier than internal combustion engine (ICE) vehicles.
- The additional weight of EVs also has implications for the structural integrity of existing multilevel U-Park facilities.

THE CITY'S ROLE & STRATEGIC RECOMMENDATIONS

Recommended role of the City of Adelaide in EV charging provision and associated strategic recommendations

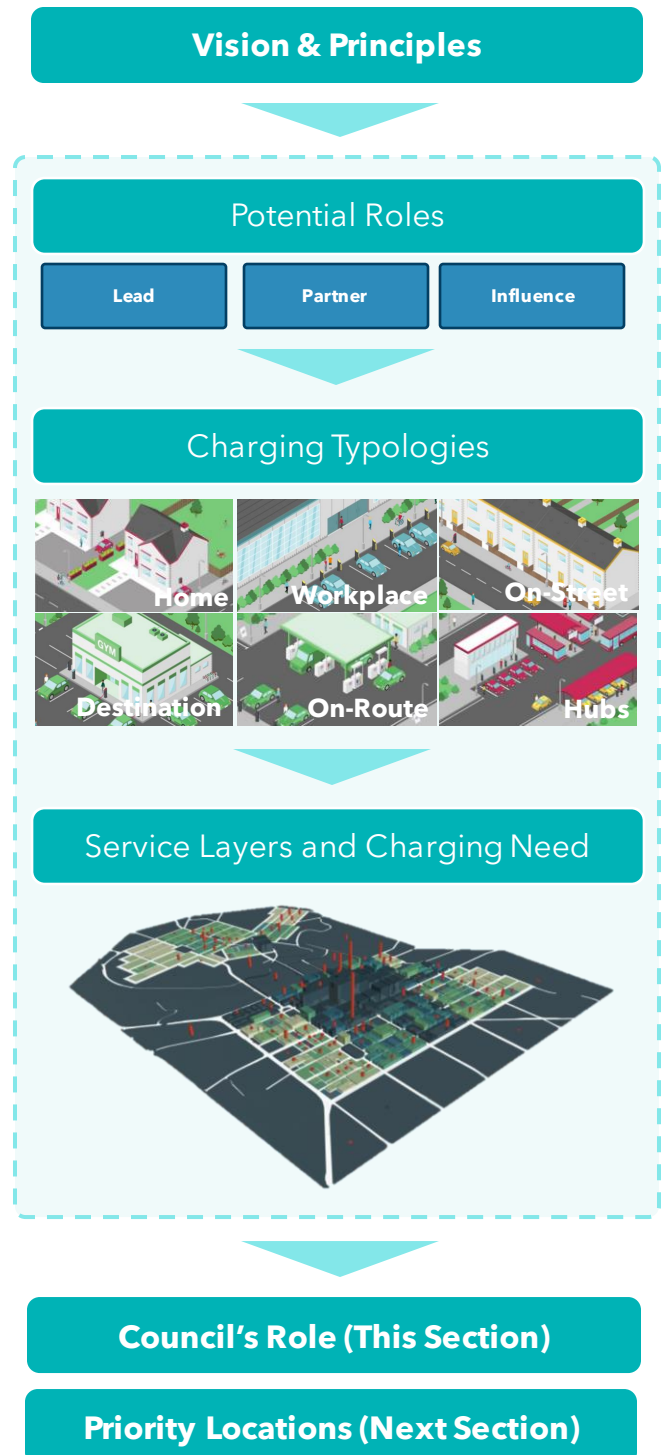
OVERVIEW

The CoA is positioned within the EV ecosystem with both a high level of vested interest in EV charging across the system and a high ability to influence the rollout of EV charging infrastructure over time.

The diagram to the right illustrates the process used to define Council's role in the rollout of EV charging infrastructure.

Key elements of this process are:

- **Vision-Led:** It is crucial that the EV charging network evolves in-line with the city's ambition and principles.
- **A Range of Potential Roles:** There are a range of potential roles that CoA could take within the EV charging ecosystem, ranging from investing or owning to partnering with third-party providers.
- **A Range of Charging Typologies:** There is a range of different charging typologies that are suited to differing user needs.
- **Spatial Charging Need:** It is important to understand charging needs spatially, define where certain charging typology types are suited and needed, and what Council's role should be in different contexts.
- **Council's Role and Initiatives:** This approach results in a place-based outcome whereby CoA's role is tailored to spatial contexts across the city (e.g. it may be different in dense urban activity centre vs. mixed use or residential - even for the same charging typology).



NETWORK VISION & PRINCIPLES

Based on the broader liveability objectives of CoA combined with the growth in EV uptake, the CoA's overarching role should be to balance market demand for accessible EV charging infrastructure with broader built environment, land use and integrated transport outcomes.







The Vision and Network principles below provide guidance for the rollout of charging infrastructure.

In addition to these principles, there is an important integrated transport overlay that should also influence supply of charging infrastructure - discussed further in this section.

CoA should seek to strategically influence and implement charging infrastructure while facilitating liveable, healthy neighbourhoods.

EV CHARGING NETWORK VISION

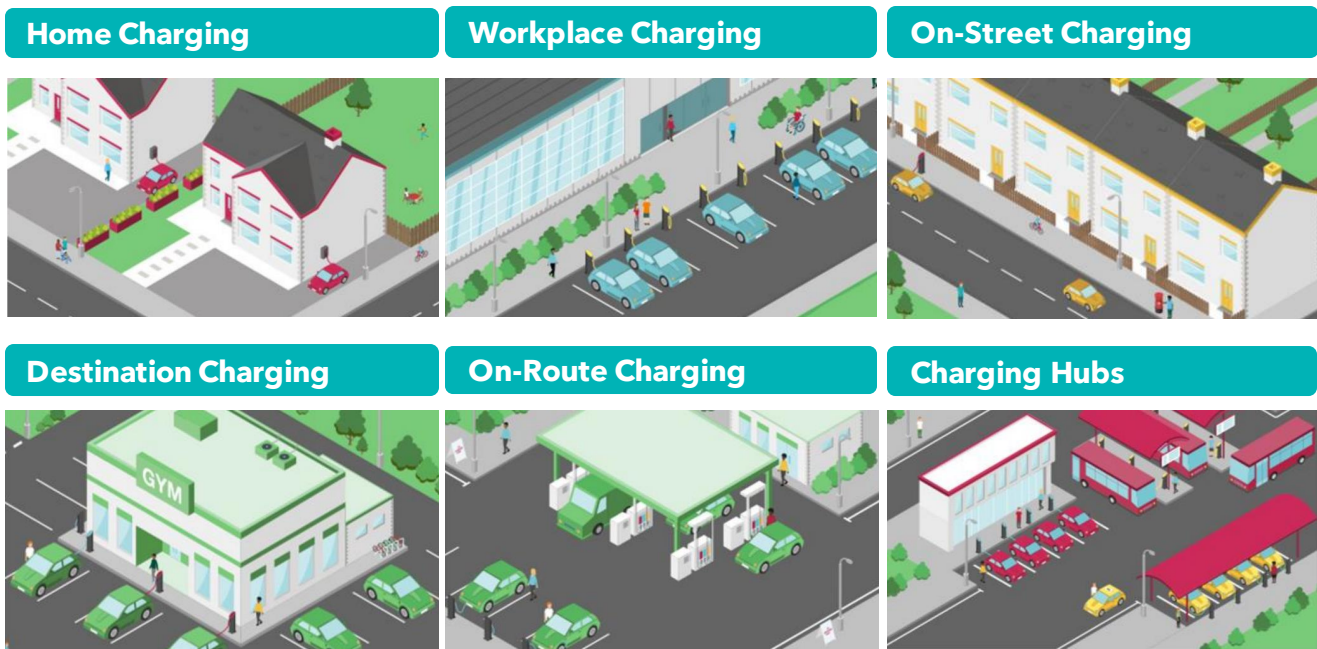
Public EV charging infrastructure in the CoA is available for all user types who need it - catalysing the uptake of EVs in Adelaide. The city's EV charging network is developed such that it contributes to an overall sustainable transport system and maintains the city as an attractive place to live, work, and as an exciting destination for a range of visitor types - contributing to Adelaide becoming one of the world's first Carbon Neutral Cities.

	Driving a Carbon Neutral City	<ul style="list-style-type: none"> • Aligned to sustainability action plans and objectives • Powered by renewable energy • Integrated with active transport infrastructure
	Fosters attractive and competitive destinations	<ul style="list-style-type: none"> • Aligned to key destinations • Facilitates a range of visitor types across the Council area • Supports businesses, events, and visitations
	User-Oriented, convenient and consistent	<ul style="list-style-type: none"> • Interoperable, allowing charging for various vehicle types • Reliable and minimizes network downtime and disruption • Conveniently located to support city users
	Future-ready and innovative	<ul style="list-style-type: none"> • Seeks to leverage new technologies • Seeks opportunities for pilots and trials • Leverages digital technology for management
	Fair and equitable	<ul style="list-style-type: none"> • Meets the needs of all city user types, including residents • Equitable provision to support all levels of socio-economic status • Equitable provision to support businesses
	Leverages partnerships and collaboration	<ul style="list-style-type: none"> • CoA are active across advocacy, education, partnership and provision • Charging infrastructure is delivered in partnerships with the private sector where appropriate • Electric vehicle owners have access to information on latest trends and opportunities

A RANGE OF POSSIBLE CHARGING TYPOLOGIES




There are a range of different charging typologies that have potential applications in different contexts across the city. Please refer to Appendix A for more details.

The role Council should ideally play in facilitating implementation will depend both on the charging typology, and the place-based context.



There are general trends in charging levels depending on typology (for example, lower charging level for home chargers vs. generally higher charging levels for short-term charging locations such as on-route or charging hubs).

However, specific charging levels provided may be specific to the location, it's urban context, infrastructure constraints and associated user preferences. An overview of general charging levels that are most common among the various charging typologies is shown below.

 SLOW Level 1 2.5-7kW 8-12 hours full charge	 FAST Level 2 7-22kW 1.5-5 hours full charge	 RAPID/ ULTRA-RAPID Level 3 25-350kW 10-45 minutes full charge
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Home	
Workplace	
On-Street	
Destination	
On-Route	
Charging Hub	

COUNCIL ROLES OWNERSHIP VS. PARTNERSHIP

With exponential growth expected in the EV market - the provision of EV charging infrastructure will change from what has up until now been in many cases supported by government to spur initial demand in the industry and convey sustainability objectives.

The EV charging market is now building momentum and will become a large-scale endeavor with a range of private entities seeking to supply charging to vehicle owners.

This maturing market may require government intervention in some cases - such as to ensure equitable distribution of EV charging for lower socio-economic groups.

However, as a capital city with significant demand drivers (e.g. population density, employment density and activity density) - significant market failure is unlikely and CoA are well positioned to partner for EV charging provision, particularly through more market-led models such as private ownership and operation.

	Invest, Own, Operate: <i>Council Owned, Council Operated</i>	Partner: <i>Council Owned, Privately Operated</i>	Partner: <i>Council Coordinated, Privately Owned and Operated</i>
Business Model	Council pays for contractors to install chargers and pays for the equipment and installation. Council then operates.	Council pays for contractors to install chargers, paying for the equipment and installation. Council then contracts Charge Point Operators to operate.	Council identifies charging opportunities/needs and seeks proposals from private sector operators to install and operate.
Organisational Change	Highest	Moderate	Lowest
Key Benefits	<ul style="list-style-type: none"> • Council maintains direct control. • High density of EV chargers through combined Council and private provision. • Additional revenue stream for Council. • Can spur initial growth. 	<ul style="list-style-type: none"> • Council does not bear the risk of building, operating and maintaining. • Council can receive a revenue stream from the operator (in addition to e.g. car parks). 	<ul style="list-style-type: none"> • Council does not bear the risk of building, operating and maintaining. • Council does not bear investment risk associated with technological change. • High density of EV chargers can be achieved in high activity areas (such as CBDs). • Potential revenue stream from permitting and licensing
Key Disbenefits	<ul style="list-style-type: none"> • Council carries significant technological risk. • Council carries financial risk. • Council is required to undergo significant organisational change. • Additional operating costs for Council (e.g. staffing). 	<ul style="list-style-type: none"> • Relies on Council capital outlay, asset management and renewal. • Council carries technological risk. • Revenue uncertainty. • Council still requires additional operational expertise to manage charging network. 	<ul style="list-style-type: none"> • Driven by commercial returns, there is a chance of inequitable provision if fully market-led. • Without regulation or subsidies charging could become expensive.
Suitability	As a capital city, most charging demand can likely be met by the market without the need for widespread Council ownership and operation. CoA is not a private business, and therefore alternative models (partnership) could effectively manage the associated risks.	While in theory this model avoids operational risk there is still ownership risk associated with changing technologies. Initial capital is required, and while funding from a granting body or the State Government is possible, it should not be assumed as the default. CoA can adopt this model in specific circumstances however private ownership is preferred to avoid key risks.	As a capital city, CoA has the opportunity to leverage the market to supply EV charging infrastructure while avoiding key risks. CoA can play a coordination role and provide incentives/subsidies in select cases if required to achieve equitable outcomes.

INCREASING SUITABILITY AS EV MARKET MATURES

COUNCIL ROLES OWNERSHIP VS. PARTNERSHIP

While Governments and Councils have invested, owned and operated EV charging infrastructure to spur initial supply and support the early adopters - there is increasing incentive for commercial charging providers to respond to increasing market demand, changing the role of government.

Instead, local government are opting to partner with private charging providers, while maintaining an overarching coordination role and ensuring charging supply meets broader city objectives, without needing to own and operate themselves.

This model is highly applicable for CoA as a centre of heightened demand in Adelaide.

- With technology changing rapidly, CoA can avoid technological risk associated with charging infrastructure that may be obsolete or outdated in 5-10 years.
- If CoA receives Government funding in targeted instances to support EV charging equity, it can partner with operators for operation similar to the current model employed by the CoA in some UPark destinations.
- Even under this model, there is still organisational change and capacity building needed to manage the Council-owned charging network.
- The exception to this would be investing in the installation of charging infrastructure for its own fleet, where Council can own and operate its own charging stations at its depot.
- As the EV market transitions from early adopters to a broader majority, the demand for EV charging will increase significantly and as such, there will be greater incentives for commercial EV charging suppliers to respond.
- As a capital city, there will be heightened market demand in CoA that is likely to incentivise private sector operators to provide charging infrastructure.
- Considering potential challenges like high installation costs, uncertainties in return on investment, usage rates, demand fluctuations, and risks of technology obsolescence and costly upgrades, CoA should prioritise partnerships with charging suppliers over investing and owning itself.
- Rather than owning infrastructure itself, CoA can form arrangements with private operators on a select basis where support is needed to achieve equitable provision across the city.
- Adopting a 'leadership' and 'partnership' role assumes no net additional operating cost of chargers to the CoA due to a private sector delivery and maintenance model.
- Providing EV charging facilities at UPark to maintain market share and competitiveness in the provision of parking.

COUNCIL ROLES LEAD, PARTNER AND INFLUENCE

Depending on the context and demand drivers specific to each location, the CoA may need to lead, partner or influence as appropriate.

The three roles for CoA are summarised below, which form the basis for the strategic recommendations forming the roadmap at the end of this section.

LEAD

Leadership by CoA does not need to involve investing, owning and operating charging infrastructure.

While Council already owns and operates a significant portfolio of parking assets across CoA, it is able to lead by preparing the necessary frameworks to enable the strategic and equitable rollout of EV charging across the city, as identified in the Recommended Locations section of this report.

Under this model Council would support a market-driven rollout of appropriately rated EV chargers by establishing a clear framework which defines Design and Operating Guidelines for public EV charging Infrastructure, pricing structures, signage and approach to parking enforcement, expression of interest procedures and potential incentive schemes.

Under a market-based provision model, this role would not require significant CoA operating resources for the charging infrastructure itself.

PARTNER

Under this role Council partners with private third parties who own EV chargers and manage charging services. The third-party is then responsible for installation, operation and maintenance of the charging infrastructure.

This does not mean CoA is foregoing revenue, as there are options for licence fees or lease of space for charging operators.

Specific agreements could vary, dependent on business models, noting current existence of advertising supported models.

Under this model, CoA would both partner to enhance the EV charging supply in existing U-Park facilities, as well as enabling strata corporations of multi-unit dwellings to meet National Construction Code EV Ready standards. CoA can play an active role in supporting this transition.

INFLUENCE

Under this role CoA plays an advocacy and influence role to facilitate the rollout of EV charging infrastructure.

This may include advocating to the South Australian Government for subsidies or support for EV charging suppliers (or residents, or strata communities).

It may involve advocating for broader State transport outcomes that influence the need for various charging typologies.

The CoA may advocate for a coordinated approach to the planning of on-route and charging hub charging typologies across Greater Adelaide, particularly in consideration of the city's aspirations for community, environment, economy and place.

COUNCIL ROLES LEAD, PARTNER AND INFLUENCE

In addition to leading on establishing the right frameworks before partnering for EV charging supply, CoA should play an active role in influencing and informing a range of stakeholders to both accelerate the EV charging transition and achieve its broader integrated transport objectives.

Influencing includes upwards through advocacy to the State Government, as well as influencing outcomes across the city by controlling locations and design outcomes of public charging. Information should be consistent across CoA and provide clear guidance on EV charging installation.

RECOMMENDED COUNCIL ROLES

LEAD AND PARTNER



- It is recommended that CoA leads and then partners with private sector companies for their expertise, experience, and efficiency in handling EV infrastructure.
- Council's primary role should be identifying land and parking spaces - where it can provide long term lease arrangements for private operators to provide infrastructure.
- Under this model, CoA does not take the technological and operational risk.
- It is important that clear agreements around maintenance are established up front so that charging stations are operational when users need them.
- Private sector involvement brings about innovation, competition, and diverse offerings in the EV charging market, leading to improved services and options for users.

INFLUENCE



- CoA should translate a clear policy direction into outcomes at a local level through aligning charging provision with broader city objectives and facilitating high-quality urban realm outcomes.
- CoA should advocate for ample State and Federal Government funding to back EV infrastructure, covering station installation, maintenance, upgrades, and expansion.
- Establishing clear State-level strategies is vital to manage congestion from future population growth.
- Promoting incentives and subsidies is necessary to boost EV adoption and drive the installation of charging infrastructure.

CASE STUDY EXAMPLES



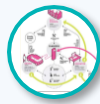
LEAD: Hornsby Shire Council

To ensure fair and unbiased charging practices, it is crucial to establish a strong framework encompassing site selection criteria, design considerations, parking configurations, charging technology, and leasing arrangements when entering a partnership.



PARTNER: Nottingham City Council

With a grant from the UK Government, NCC partnered for the installation and management of 400+ charging points across the Council area, as well as creating a package of measures to support businesses and residents to transition - including a business incentive scheme (up to 75% NCC matched funding).



PARTNER: Oxford City Council

While the Oxford City Council received a grant from the UK Government to invest in EV charging infrastructure - they still opted to contract out the operations of this infrastructure to the private sector. Commercial operators leased the charge points for up to eight years, handling maintenance, operations, and customer service.



PARTNER: Maribyrnong City Council

The Electric Vehicles Charging Infrastructure Policy specifies the consideration of EV charging in new developments, which has been aligned to the Sustainable Design Assessment in the Planning Process (SDAPP) Framework for sustainability assessment in the planning process.

SERVICE LAYERS OVERVIEW

DEFINING SERVICE LAYERS

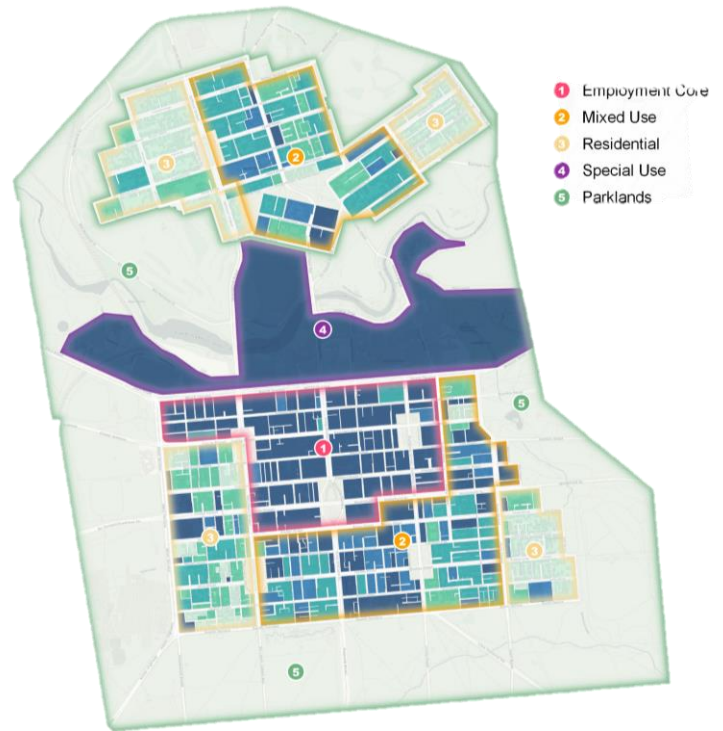
The urban composition and associated user types across the CoA varies, and as such different charging typologies will be required in different combinations depending on the urban context.

By defining broad 'service layers' across the CoA, charging typologies are considered with more nuance and distinctions as Council's role across these different areas is articulated.

Three core service layers are defined based on composition of employees and residents:



Two additional service layers are defined with unique characteristics - the Park Lands and Special Use Precincts.



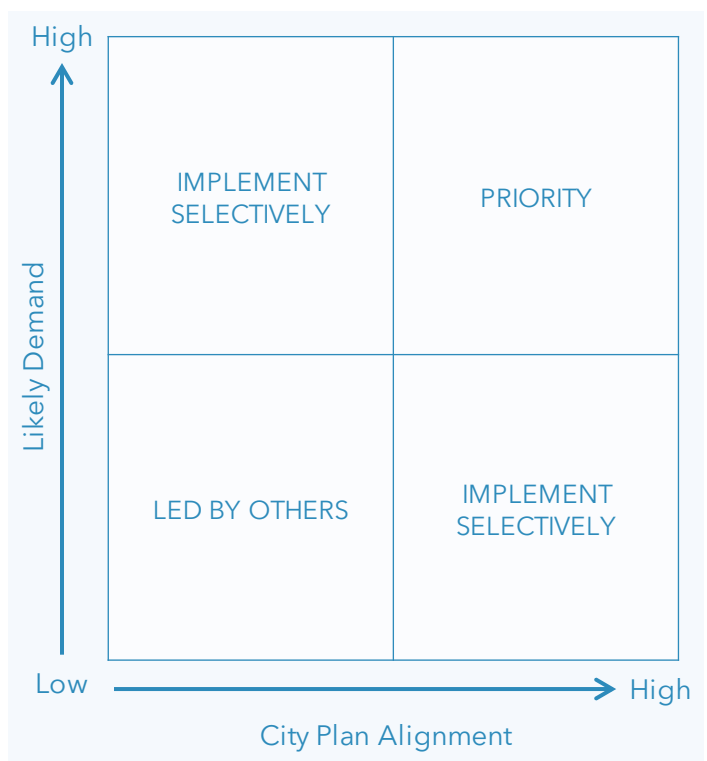
PRIORITISATION APPROACH

For each service layer, a prioritization approach has been applied to assess each charging typology against two factors:

- 1. Likely Demand:** Based on the composition of user types across this service layer, what is the likely demand for a given charging type?
- 2. City Plan Alignment:** What are the broader integrated transport principles that are emerging from the City Plan that influence how charging should be considered/applied/controlled in each distinctive service layer?

Each charging typology is assessed at service layer level using this prioritization matrix, highlighting priority charging types, those that should be implemented selectively, and those that should be discouraged or are not applicable.

The results of this process are summarized to define CoA's role in different contexts.



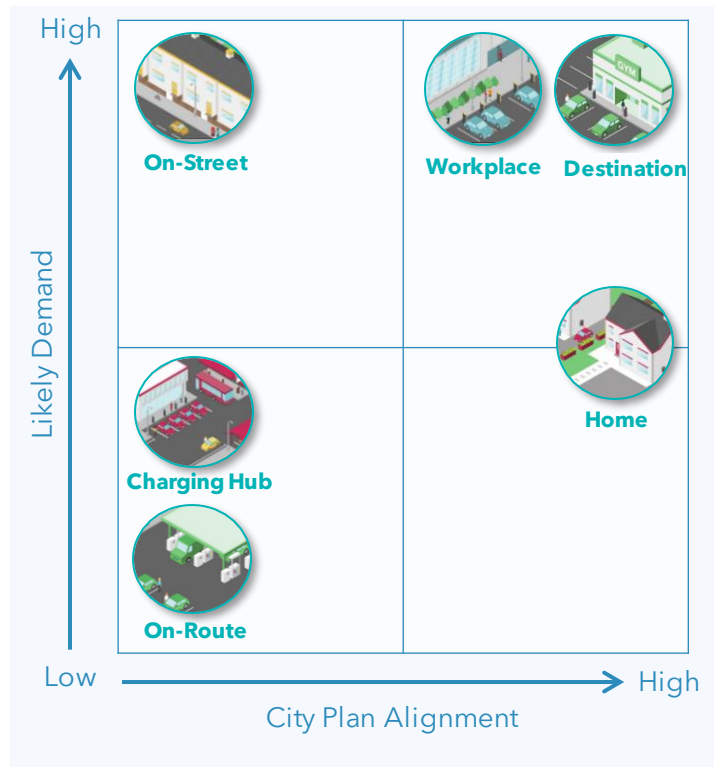
SERVICE LAYERS EMPLOYMENT CORE

DEMAND / NEED

- Highest employment density in the CoA
- Highest aggregation of destinations in the CoA
- Some residential however lower levels of residential density than other residential/mixed use areas.

CITY PLANNING PRINCIPLES

- Core employment centre with walking as the primary travel mode within the high-density precinct;
- Streets are pedestrian-oriented with high amenity (i.e. not cluttered);
- On-street parking spaces transition to higher value use (e.g. parklets); and
- Increasing public transport and active travel mode share for access to the service layer over time, and a shift away from private vehicles.



KEY CHARGING TYPOLOGIES - EMPLOYMENT CORE



Workplace

With the highest employment density across the CoA, private vehicles will undoubtedly make up some portion of the travel demand for employees, and as such businesses providing car parking will be expected to provide EV charging infrastructure over time.

Likely Charging Levels

Level 2 charging (7-25kW, 1.5-5 hours full charge)



Destination

With a range of destinations across the employment core, destination charging will be required to support visitors. To support integrated transport outcomes, destination charging should be prioritised off-street.

Likely Charging Levels

Mix of Level 2 and Level 3 charging (7-25kW chargers, 1.5-5 hours full charge / 25-350kW chargers, 10-45-minute full charge)



Home

There are a number of residents who live within the employment core. While residential density is lower across the general area than other parts of CoA, those residents that do live in this area are mostly living in apartment buildings. Those who own private vehicles will want/require charging solutions.

Likely Charging Levels

Level 1 charging (2.5-7kW, 8-12 hours full charge)

RECOMMENDED COA ROLE

Council informs and promotes the benefits of the EV transition to encourage businesses to install EV charging in their parking spaces or to have business EV fleets charge in UPark facilities.

Council partners with charging providers to facilitate the provision of EV charging in UPark facilities, and advocates to facilitate broader destination charging rollout.

Council considers intermediary solutions for apartment dwellers in setting up at-home charging and opportunities to support residents with EV charging in UPark facilities.

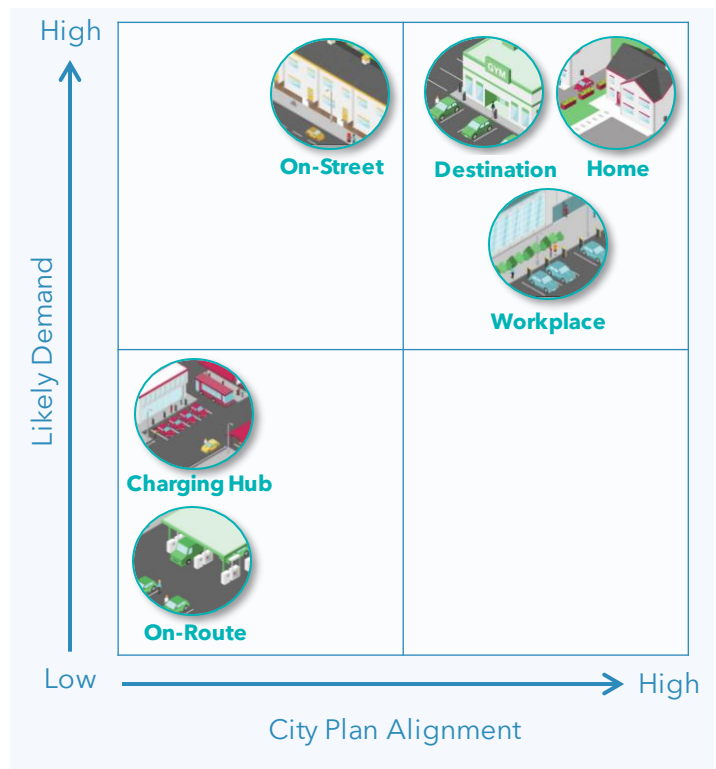
SERVICE LAYERS MIXED USE

DEMAND / NEED

- Combination of moderate to high employment density and moderate to high residential density.
- Relatively high aggregation of activity generating land use, such as restaurants, particularly on 'main streets' such as Melbourne Street and Hutt Street.
- Relatively high concentration of hotels.

CITY PLANNING PRINCIPLES

- Mixed use areas offer a diverse range of opportunities in close proximity to residents, with active travel prioritized for local movements.
- Residents have access to a diverse range of mobility options and are less reliant on private vehicles than Greater Adelaide generally.
- Residents who own private vehicles are not reliant on them for short distance local journeys.



KEY CHARGING TYPOLOGIES - MIXED USE AREAS



Home

Mixed use areas maintain a relatively high night-time residential population. Residents who own EVs in mixed use areas will want charging infrastructure, however many live in apartment dwellings making this more challenging at home. Yet, numerous reside in apartment buildings predating changes to the NCC, posing challenges for home EV charging.

Likely Charging Levels

Level 1 charging (2.5-7kW, 8-12 hours full charge)



Destination

These areas offer a high availability of purpose-built visitor parking, such as at the Central Market. EV charging infrastructure is likely to be considered on a case-by-case basis by the owner and operator.

Likely Charging Levels

Mix of Level 2 and Level 3 charging (7-25kW chargers, 1.5-5 hours full charge / 25-350kW chargers, 10-45-minute full charge).



Workplace

While not as dense as the employment core, there are a number of jobs throughout the mixed-use areas of the City and North Adelaide which will likely see employers under pressure to provide EV charging solutions.

Likely Charging Levels

Level 2 charging (7-25kW, 1.5-5 hours full charge)

RECOMMENDED COA ROLE

Council considers intermediary solutions for apartment dwellers in setting up at-home charging and opportunities to support residents with U-Parks with EV charging.

Council partners with charging providers to facilitate the provision of EV charging in U-Park facilities and advocates to facilitate broader destination charging rollout through change to the Planning and Design Code.

Council informs and promotes the benefits of the EV transition to encourage businesses to install EV charging in their parking spaces or to have business EV fleets charge in U-Parks.

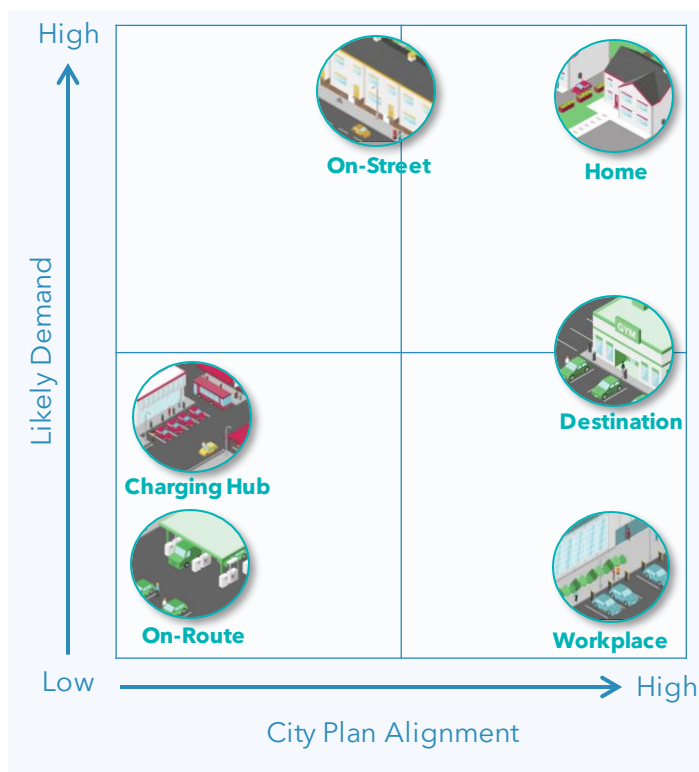
SERVICE LAYERS RESIDENTIAL

DEMAND / NEED

- Primarily residential land use with a mix of activity generating land uses throughout.
- Primary demand for charging from residents.
- Generally lowest levels of activity density.

CITY PLANNING PRINCIPLES

- Streets are walkable and cyclable, contributing to healthier communities and active travel to broader destinations within the CoA.
- Over time, residential areas (which do have some local amenities however generally lower than other areas of the City) will diversify in land use, with a growing number of supermarkets and other everyday destinations within walking distance of residents.



KEY CHARGING TYPOLOGIES - RESIDENTIAL AREAS



Home

At-home charging will be in demand for residents, including those in apartment dwellings without access to charging facilities, as well as those with and without off-street parking. Where possible, at-home charging should be encouraged over public infrastructure, reliance on which would impact city amenity.

Likely Charging Levels

Level 1 charging (2.5-7kW, 8-12 hours full charge)



Destination

These are purpose-built visitor parking areas that with EV charging infrastructure is typically evaluated individually by the owner and operator, especially in retail settings.

Likely Charging Levels

Mix of Level 2 and Level 3 charging (7-25kW chargers, 1.5-5 hours full charge / 25-350kW chargers, 10-45-minute full charge).



On-Street

On-Street charging risks negatively impacting residential amenity and therefore should be carefully applied only where truly needed, such as in locations where off street parking capacity is limited. Most suitable near adjacent local amenities (e.g. near Melbourne Street in North Adelaide).

Likely Charging Levels

Level 2 Charging (7-25kW chargers, 1.5-5 hours full charge).

RECOMMENDED COA ROLE

Council informs and considers opportunities to provide intermediary solutions for apartment dwellers while they arrange at-home charging solutions (e.g. through utilisation of nearby destination charging).

Council can leverage U-Parks and destination charging to support residents who may not have access to home chargers.

Council considers the provision of on-street charging only where no off-street alternative is available, and plays a coordination role in controlling urban realm outcomes to avoid oversupply in residential areas.

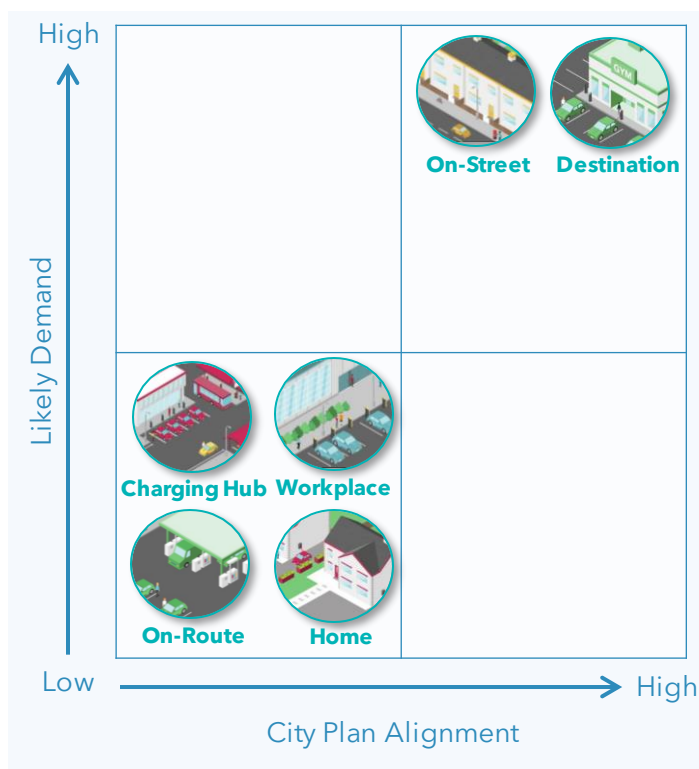
SERVICE LAYERS PARK LANDS

DEMAND / NEED

- Primarily comprised of open space, sporting and recreation destinations.
- Limited residential and employment density - primarily open space and spatially dispersed recreation/sporting destinations.
- EV charging in Park Lands should only be based on existing parking assets and aligned to key destinations.

CITY PLANNING PRINCIPLES

- The Park Lands are increasing in thriving activity, predicated around active transport (walking and cycling) throughout the Park Lands Trail which connects key recreational destinations across the Park Lands.
- Space is allocated to open space and recreational use rather than development structures or car parking.



KEY CHARGING TYPOLOGIES - PARK LANDS



Destination

There are a number of destinations within the Park Lands such as sporting and recreational venues that have dedicated parking spaces. These existing parking spaces will require EV charging over time. Decisions should be made in the overall context of reducing car parking in the Park Lands.

Likely Charging Levels

Mix of Level 2 and Level 3 charging (7-25kW chargers, 1.5-5 hours full charge / 25-350kW chargers, 10-45-minute full charge).



On-Street

Visitors attending events, playing sport or other recreational activities in the Park Lands, often park on the street, especially around Victoria Park and Beaumont Road. On-street parking comprises a major portion of parking for access to the Park Lands.

Likely Charging Levels

Level 2 charging (7- 25kW, 1.5-5 hours full charge)

RECOMMENDED
COA ROLE

Council considers the installation of EV charging at selected destinations in Park Lands, where opportunity exists.

Council considers the installation of on-street charging only where it supports the use of the Park Lands and minimizes impacts on the public realm.

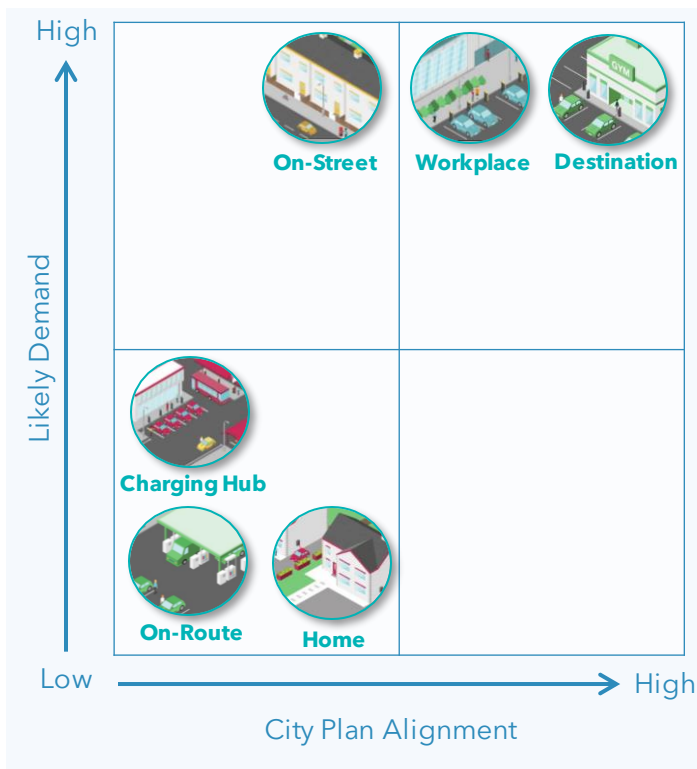
SERVICE LAYERS SPECIAL USE PRECINCTS

DEMAND / NEED

- Land uses such as hospitals, Adelaide Oval, the Botanic Gardens, are considered special use precincts and attract a range of visitors from across Adelaide and even South Australia more broadly.
- Charging demand will be higher as visitors are on average travelling further to access special use precincts.

CITY PLANNING PRINCIPLES

- Special use precincts generally have off-street parking provision or are well-supported by public transport.
- The precincts themselves are walkable and pedestrianized.
- During special events, where demand is increased, parking controls are introduced to encourage off-street parking and more efficient transport options (public transport and active travel).



KEY CHARGING TYPOLOGIES - SPECIAL USE PRECINCTS



Destination

Special Use Precincts draw visitors with specific purposes at these destinations (e.g. hospitals). Special use precincts may also attract a larger number of visitors for events (e.g. Adelaide Oval).

Likely Charging Levels

Mix of Level 2 and Level 3 charging (7-25kW chargers, 1.5-5 hours full charge / 25-350kW chargers, 10-45-minute full charge)



Workplace

Special Use Precincts are also often major employment hubs, whether this be hospitals or sporting venues. Employee parking spaces at these locations will require EV charging over time.

Likely Charging Levels

Level 2 charging (7- 25kW, 1.5-5 hours full charge)



On-Street

Some on-street parking spaces are provided for special use precincts however off-street parking is prioritised. On-street parking supports special events however can also be time-limited.

Likely Charging Levels

Level 2 & 3 charging (7- 25kW, 1.5-5 hours full charge, 25-350kW chargers, 10-45-minute full charge)

RECOMMENDED COA ROLE

Council advocates for the installation of EV charging at special use precincts to support visitors. Where assets are Council owned, Council seeks partnerships for EV charging provision.

Council advocates for the installation of EV charging at special use precincts to support employees. Where assets are Council owned, Council seeks partnerships for EV charging provision.

Council partners for the provision of on-street charging only where no off-street alternative is available, and plays a coordination role in controlling urban realm outcomes. Off-street charging is prioritised.

CITYWIDE SUPPORTING INITIATIVES

PARTNERSHIP REQUIREMENTS

Business Model Context

Revenue for charging operators can come from several sources, including:

- Per-session fees paid by users
- Time-based membership fees paid by users
- Advertising
- Grants and subsidies
- Co-location with a revenue-generating activity
- As a benefit related to the purchase of a vehicle or service.

The business model of an operator may influence the services they provide to the public, and their requests through contractual agreements.

Secondary Revenue Streams

Secondary revenue streams may allow charging to be delivered at a lower cost to the public but will often carry trade-offs that must be considered.

For example, advertising exclusivity that extends beyond one charging site may negatively impact unrelated advertising assets. Co-locating or sharing the space with other revenue streams may have implications on safety or land-use requirements. An operator's high reliance on grants and subsidies to run effectively may impact its ability to sustain operations long-term.

The CoA should ensure partner opportunities will align with broader Council goals and requirements.

Data and Privacy

Many charging operators provide integrated, internet-connected solutions that collect some level of customer data.

Operators' privacy and data collection policies should be vetted to ensure any operator partnering with the CoA has a strong commitment to protecting user data.

Simultaneously, the CoA may require a level of usage reporting from operators to help inform future decisions.

PARTNERSHIP OPPORTUNITIES

In the employment core:

- Partnership with charging providers and operators to increase EV charging capacity in Council UParks over the coming 10 years.

In mixed use areas:

- Partnerships with off-street parking operators would support EV charging infrastructure to predominantly be off-street.
- Partnering with charging providers to facilitate the provision of on-street charging in select locations.

In residential areas:

- Partnering with charging manufacturers for the provision of on-street charging infrastructure where required.
- Engage with residents on benefits and processes for EV charging installation.

Park Lands:

- Partnerships with charging manufacturers will allow EV charging to be provided in select off-street and on-street locations on Council land.

In the special use precinct:

- Partnerships with charging manufacturers and existing off-street parking operators may allow increased EV charging access without requiring on-street infrastructure.
- Engage with key building owners throughout special use precinct, such a hospital.

CITYWIDE SUPPORTING INITIATIVES

INFRASTRUCTURE REQUIREMENTS

Technical Standards

Charging infrastructure is subject to a range of standards, which are evolving as understanding of EVs improves. For example, IEC 61851 is an international standard which details requirements for EV charging systems. Construction codes may constrain or detail requirements for EV charging provisions. Standards and requirements around hardware and fire safety will need to be considered on a case-by-case basis.

Design Guidelines

The CoA has a vested interest in ensuring public spaces are safe, inviting, and accessible.

CoA has detailed standards and guidelines for street furniture and temporary footpath installations, but existing published documents do not cover EV charging infrastructure.

As with other types of street furniture and infrastructure, CoA should influence the design of EV charging infrastructure by providing minimum standards for providers to meet.

- **Pedestrian Access:** Particularly in the case of on-street charging, infrastructure must be designed to avoid obstructing pedestrian or cyclist movement or creating trip hazards.
- **Lighting and Night-time Safety:** The environments that chargers are placed in should encourage diversity and allow all users to feel safe, particularly at night. Perceptions of night-time safety can be drastically impacted by design factors such as lighting and visibility.
- **Materials and Space Design:** Ensuring EV charging infrastructure suits the heritage and character of the city will be important in larger-scale charger roll-outs. This may be particularly important for operators with advertising as a revenue stream.

Access to Chargers

Public chargers run in partnership with CoA should allow access to all residents and visitors with minimal prerequisites.

For example, a user's access to a charger should not be limited by vehicle brand, and access should not require the user to hold another service or membership.

FUNDING

State or Federal support may be available for some public charging networks.

Federal Government Funding

The Australian Renewable Energy Agency (ARENA) has previously funded projects based on their ability to accelerate innovation and address barriers around EV rollout.

Projects previously funded by ARENA include:

- **Metro Advertising Revenue Funded Electric Vehicle Charging Trial (South Australia, \$948k):** 21 EV charging stations, funded by advertising revenue, in car parks and public spaces across LGA areas in South Australia.
- **Chargefox Future Fuels Public Fast Charging (Adelaide & Perth, \$1.4m):** 16 fast (100kW) public charging stations across Adelaide and Perth, particularly in blackspots.
- **Ampol Addressing Blackspots Fast Charging (NSW, QLD, VIC & WA, \$7.05m):** 100 fast charging stations across four states in Australia as part of Ampol's branded retail network.

For an ARENA grant application to be successful, it will need to demonstrate its ability to accelerate innovation and understanding beyond simply providing access to charging infrastructure.

ARENA has run a series of EV charging rounds with different focusses. There isn't an open round aligned to the City of Adelaide's Roadmap currently however there could be a round in the future. It is recommended that the City of Adelaide meet with ARENA to present their plan and get guidance on how ARENA might fund part of their EV Roadmap implementation.

State Government Funding







The South Australian Government is currently investing in a state-wide EV charging network, and smart charging trials (including within the Adelaide CBD).

The South Australian Government is not currently offering subsidies to residents and businesses for installing on-site private charging. The CoA currently offers incentives for installing e-bike and EV charging stations.

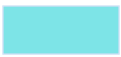

RECOMMENDATIONS THE CITY'S ROLE

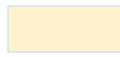
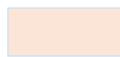
It is recommended that CoA's overarching role should be to use its influence and market power to strike a balance between market demand for accessible EV charging infrastructure and broader integrated transport and city outcomes.

RECOMMENDATIONS FOR COA'S ROLE BY TYPOLOGY ACROSS SERVICE LAYERS

	 Destination	 Workplace	 Home	 On-Street	 On-Route	 Charging Hub
Employment Core	L / P / I	I	P / I	L / I	I	I
Mixed Use	L / P / I	I	P / I	L / I	I	I
Residential	L / P / I	-	P / I	L / I	I	I
Park Lands	L / P / I	-	-	L / I	I	I
Special Use Precinct	L / P / I	L / P / I	-	L / I	I	L / I

L Lead
P Partner
I Influence

 Priority & CoA's most active role
 Priority

 Implement selectively
 Led by others

STRATEGIC RECOMMENDATIONS

Seven steps are recommended in the short term (1-3 years) which comprise of CoA leading, partnering and influencing for the provision of EV charging infrastructure across the city.

These steps relate to the recommended locations identified in the following section of this report and align with the targets set in the Climate Action Plan 2022-2025.

STEP 1 - Facilitate the deployment of EV charging infrastructure within the CoA by establishing a clear framework for the rollout of EV chargers at strategic locations.

CoA Role: **LEAD**

Timing:

Year 1

The framework should give regards to:

- Design and Operating Guidelines for public EV charging infrastructure (parking bay designs, safety, signage)
- Pricing (time of day, integrated tariffs, payment mechanisms)
- Signage and approach to parking enforcement
- Expression of Interest (EOI) process for manufacturers and operators.
- Consider incentives* for more rapid deployment.

* such as Sustainability Incentive Scheme (SIS).

STEP 2 - Enable the market-led provision of on-street EV chargers in select locations which support the transition to EVs and minimise impacts on public realm.

CoA Role: **LEAD**

Timing:

Year 1-3

Use the Framework, in particular the EOI, to deploy appropriately rated EV chargers at strategic on-street locations, identified on Page 56.

TARGET (Climate Action Plan 2022-2025)- Install an additional 100 public EV and bicycle chargers between 2022-2025 in collaboration with partners.

STEP 3 - Work with private sector providers to trial on-street charging in residential areas with limited private off-street charging and constrained charging options.

CoA Role: **LEAD**

Timing:

Year 1-3

Investigate and pilot innovative on-street charging models for areas with constrained charging options (refer Page 56).

This should only be considered where it does not result in negative impacts on the public realm including footpaths, verges, and street trees.

TARGET (Climate Action Plan 2022-2025)- Install an additional 100 public EV and bicycle chargers between 2022-2025 in collaboration with partners.

STRATEGIC RECOMMENDATIONS

STEP 4 - Partner with industry for the provision of destination charging within U Park facilities.

CoA Role:	PARTNER	Timing:	Year 1-3
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Provide additional off-street publicly accessible charging in Council-controlled car parks across the City and North Adelaide. This action should be preceded by a U-Park business case.

TARGET - (Climate Action Plan 2022-2025) - Install an additional 100 public EV and bicycle chargers between 2022-2025 in collaboration with partners.

STEP 5 - Work with residential strata corporations to remove the barriers of installing EV charging infrastructure within multi-unit dwellings constructed prior to October 2024

CoA Role:	PARTNER	Timing:	Year 1 - 3
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Work with strata corporations of multi-unit dwellings constructed prior to 2024 to identify the barriers and solutions to enable them to meet the National Construction Code EV Ready* development standards for new developments.

Work to deliver a pilot project for apartment residents by year three.

** All electrical infrastructure except the charger is installed.*

STEP 6 - Advocate to the State Government for a coordinated approach to on-route and hub EV charging networks that considers the aspirations of the City of Adelaide for our community, environment, economy, and places

CoA Role:	INFLUENCE	Timing:	Year 1 - 3
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Establish partnerships with key infrastructure providers, transport operators, ride share platforms, EV retailers and member-based organisations, including Department for Infrastructure and Transport (DIT), Department for Energy and Mining (DEM), South Australian Power Networks (SAPN), Ausgrid, Uber, taxi operators and the Royal Automobile Association (RAA).

STEP 7 - Advocate to the State Government for inclusion of EV charging provisions in legislation and statutory documents such as the Planning and Design Code and that pertain to EV parking for charging

CoA Role:	INFLUENCE	Timing:	Year 1 - 3
-----------	------------------	---------	-------------------

Seek opportunities to support the transition to EVs through the Planning and Design Code (in-line with the National Construction Code).

Advocate for legislation pertaining to enforcing EV parking for charging (signage, exclusive parking for charging and related expiation fees).

RECOMMENDED LOCATIONS

Council initiatives to support EV charging infrastructure rollout

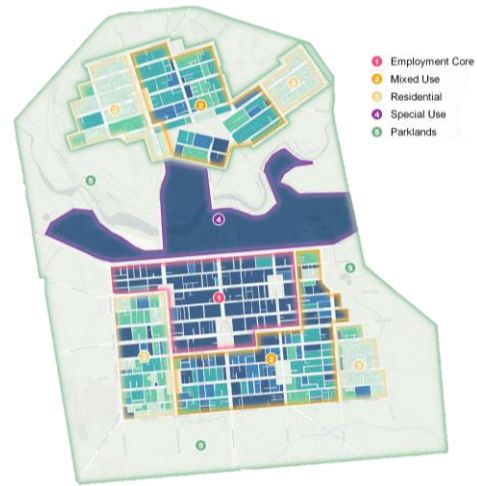
OVERVIEW

This section identifies a series of initiatives aligned to the service layer approach outlined in the previous section for the City's EV transition.

The section has the following components:

1. **Charging Need:** Identify charging need across the CoA based on key user types. These are the three primary user types that are of priority:
 1. Residents
 2. Employees
 3. Visitors
2. **Priority Initiatives:** Based on the areas of highest need, identify two categories of initiatives across CoA to drive the rollout of EV charging infrastructure:
 - a) **Public Charging Initiatives:** Where Council may be required to play it's most active role in partnering or facilitating the provision of public charging to support the EV transition.
 - b) **Broader Initiatives:** Initiatives to support the rollout of EV across the CoA by all stakeholders, including residents and businesses.

Service Layers



Charging Need



User types: Residents, Employees and Visitors

Priority Initiatives

The following two pages visualize four charging need indicators across the city that represent the three primary user types in the city.

By mapping these indicators spatially across the city, priority areas being to emerge. Charging responses may be different based on service layer - with initiatives identified across each service layer in the remainder of the section.

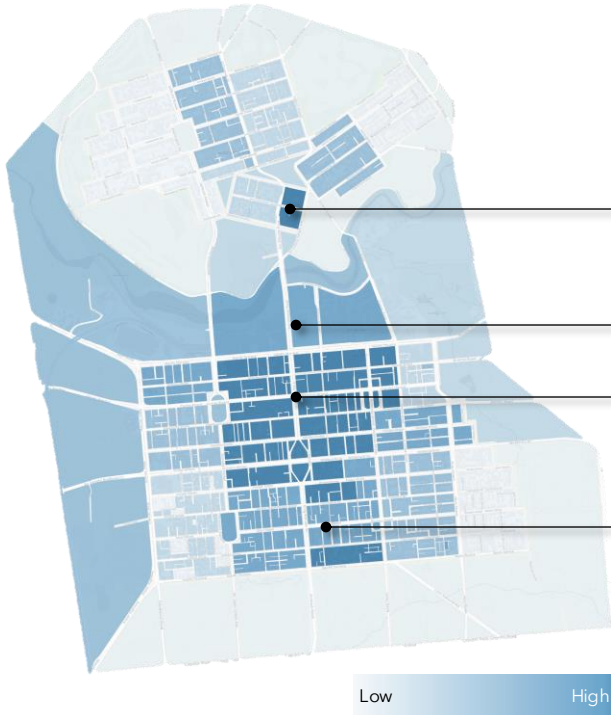
User type	Indicator
Residents	<ul style="list-style-type: none"> Residential density Apartment dwelling density
Employees	<ul style="list-style-type: none"> Employment density
Visitors	<ul style="list-style-type: none"> Activity density*

*Activity density is the density of activity-generating destinations (such as retail shops, medical, post offices, cafes, etc.)

CHARGING NEED USER-ORIENTED INDICATORS

EMPLOYMENT DENSITY

Key user types: Employees



North Adelaide has moderate employment density concentrated at key locations (Women’s and Children’s Hospital)

Universities and Royal Adelaide Hospital act as major employment hubs

Core employment area

Moderate employment density relative to the rest of the CBD

ACTIVITY DENSITY

Key user types: Visitors



Main Streets (Melbourne Street and O’Connell Street)

Rundle Street/Rundle Mall and North Terrace

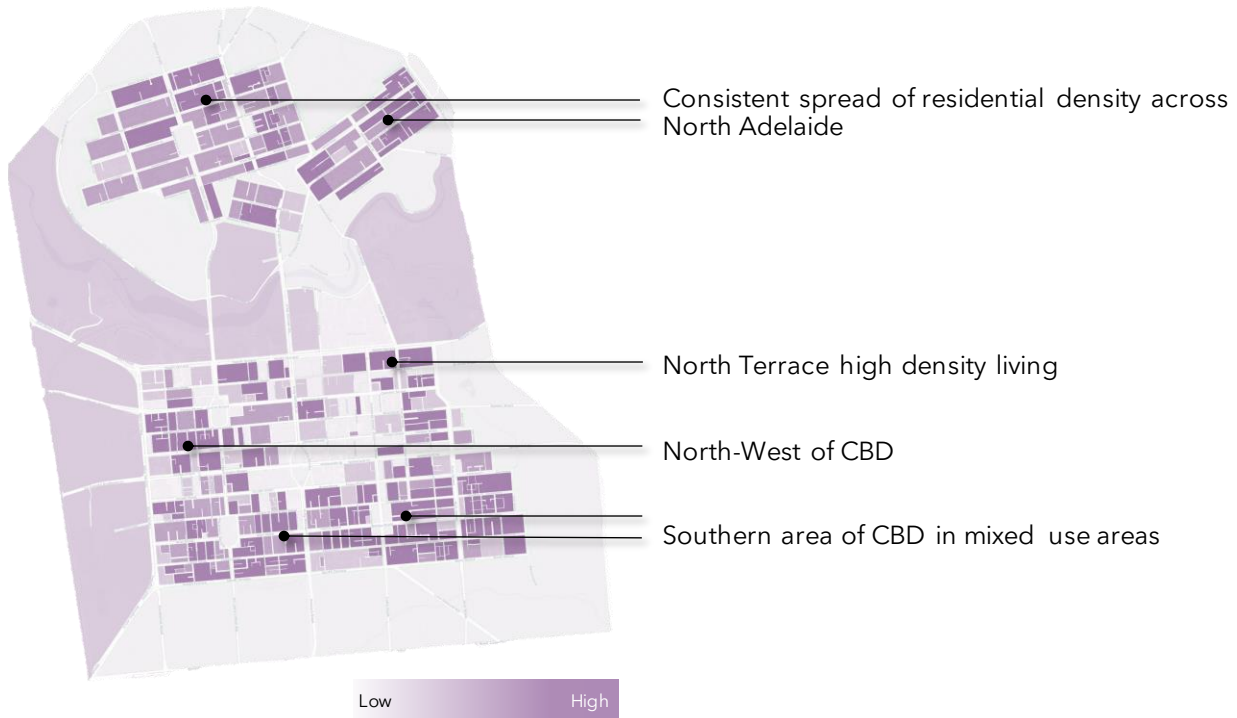
Adelaide Central Markets

Main Street (Hutt Street)

CHARGING NEED USER-ORIENTED INDICATORS

RESIDENTIAL POPULATION DENSITY

Key user types: Residents



APARTMENT DENSITY

Key user types: Residents



CHARGING NEED PRIORITY LOCATIONS

HIGHEST LIKELY DEMAND

To assist with prioritising locations where Council should consider intervening to support public charging infrastructure, City Blocks which sit within the highest 20% of one or more of the 4 charging need indicators have been identified.

Over time, the market will drive a distribution of EV charging across the CoA, however in the short term - the locations shown on the map below indicate where highest demand for EV charging is likely to be over the short to medium term.

As a result, they highlight where to start. The city can seek to actively facilitate EV charging in these locations.

The following pages identify priority locations for public charging infrastructure across the CoA based on user-oriented indicators, by again dividing the area into the distinct service layers identified.

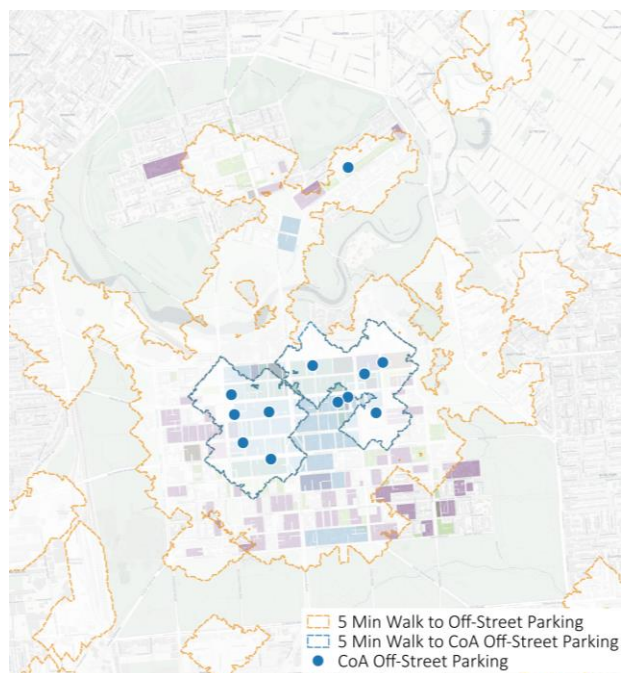
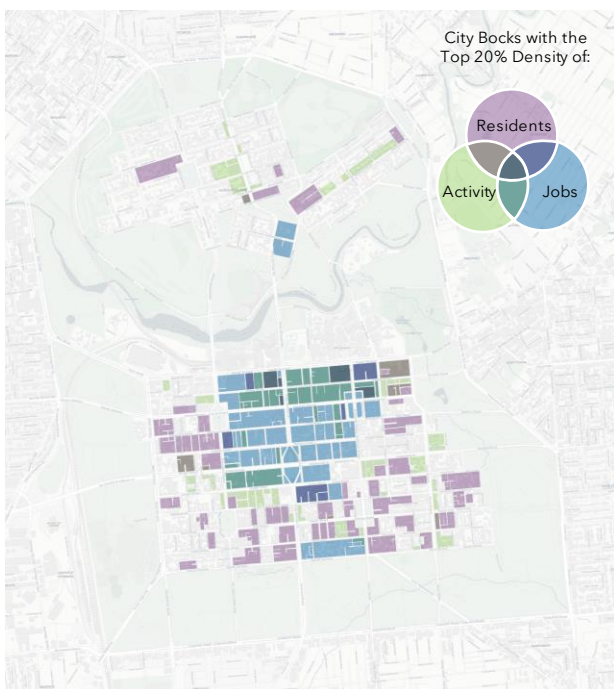
OFF-STREET PARKING GAP ANALYSIS

The previous chapter highlights that the city's role in facilitating the provision of on-street charging should focus on selective implementation. Where off-street parking is available, prioritising off-street charging is preferable.

The map below shows the 5-minute walk-shed boundary around existing CoA off-street parking supply, highlighting where coverage is good, and where gaps exist.

Almost all of the CBD, and much of North Adelaide is within a 5-minute walk of an off-street parking facility. Partnering with and incentivising the operators of these locations to support charging could allow much of the city's public charging needs to be handled by off-street destination charging, freeing streets and footpaths for other uses.

The key locations that may require on-street parking solutions due to a lack of coverage by off street facilities are the south end of Hutt Street and the north end of O'Connell Street.



EMPLOYMENT CORE PRIORITY LOCATIONS

AREA SUMMARY

Much of the anticipated charging demand in the employment core is likely to be met by businesses providing workplace EV charging allocation in existing on-site parking facilities.

Destination charging will be essential for both visitors and workers, especially in areas characterized by dense activity-generating destinations and employment hubs, such as the Rundle Mall precinct. Ride-share drivers will likely utilise some of this charging capacity.

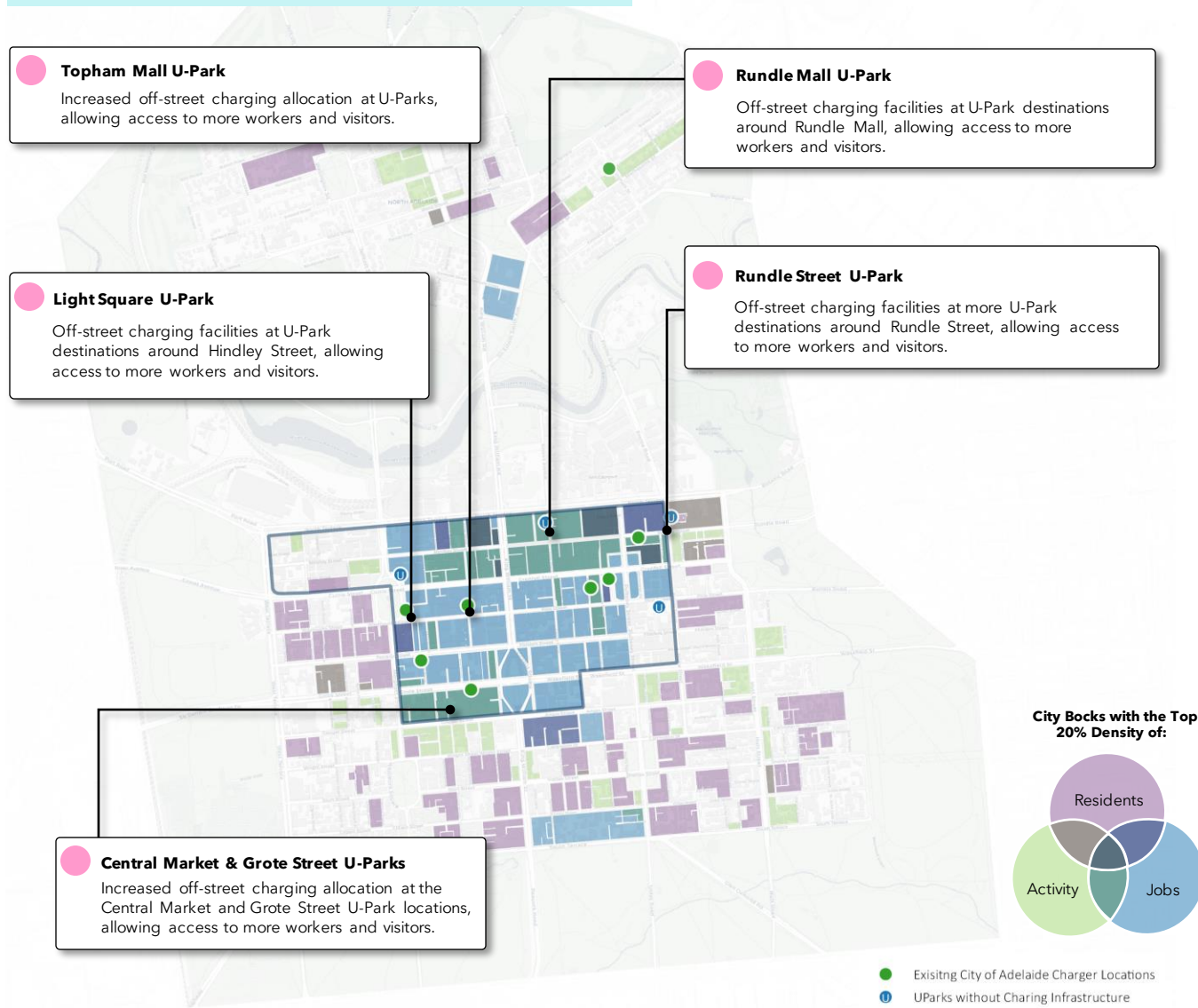
Facilitating installation of charging infrastructure in this area requires careful planning to ensure public transport remains a competitive option. Encouraging more private vehicle trips could increase congestion and parking needs.

KEY COUNCIL PUBLIC CHARGING INITIATIVES

The city already provides destination charging at a number of UPark facilities within the employment core. Future business plans should evaluate opportunities to implement EV charging in UPark facilities without or with limited existing infrastructure, and expand the charging offering in UParks with existing charging infrastructure.

PRIORITY PUBLIC CHARGING LOCATIONS

● Destination Charging



MIXED USE PRIORITY LOCATIONS

AREA SUMMARY

At-home charging will fulfil the needs of many residents (e.g. Flinders East, Halifax Street, and East End) but will require support from building owners and strata organisations. Off-street residential charging should be prioritised where possible.

A high number of jobs exist throughout the mixed-use area, with high concentrations on South Terrace and Angus Street. EV charging facilities in existing off-street workplace parking will be important.

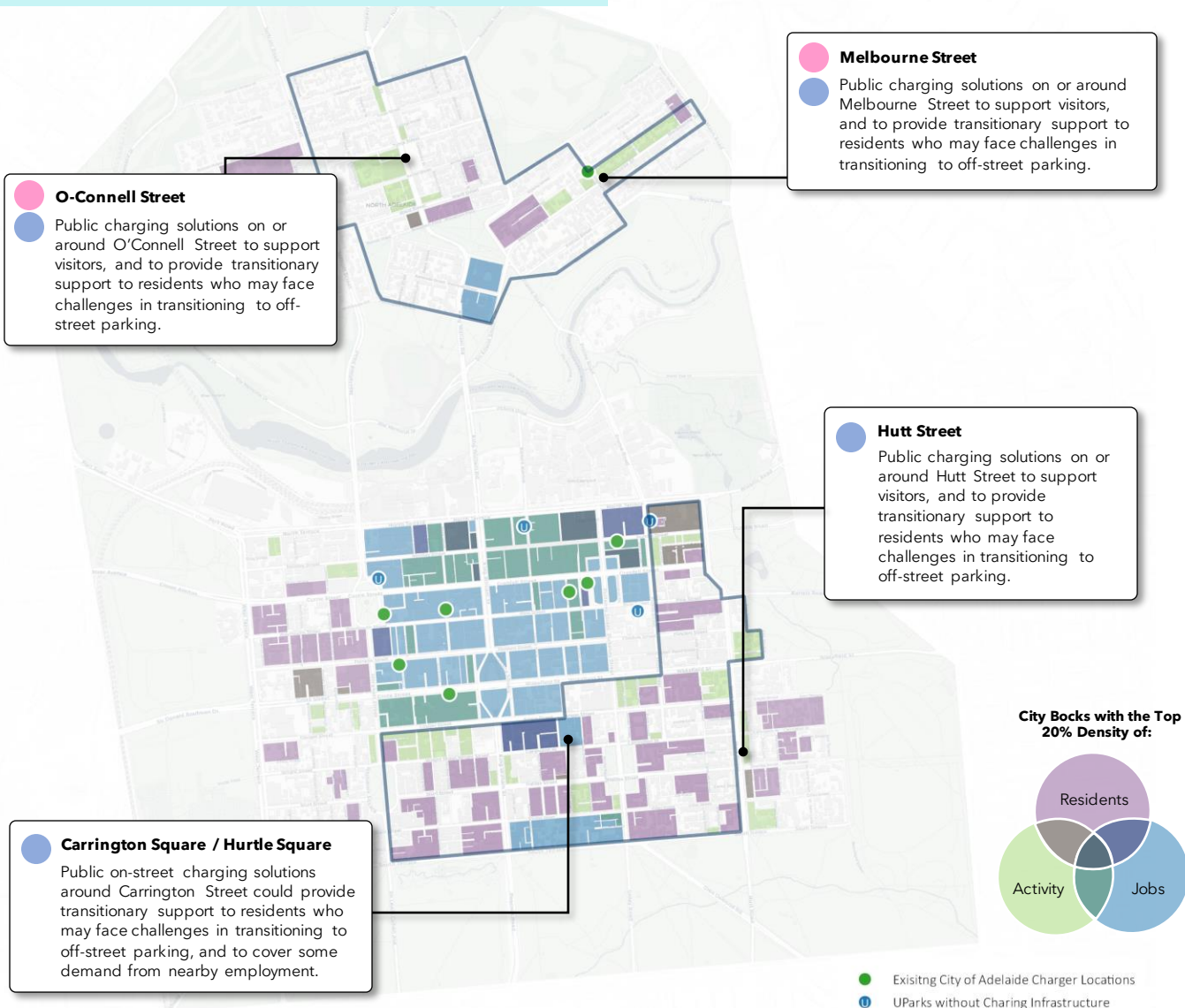
KEY COUNCIL PUBLIC CHARGING INITIATIVES

Some UPark locations (Frome Street and Pirie Flinders) can provide intermediary solutions for some apartment residents and visitors to activity-generating destinations.

EV charging infrastructure could be provided at existing on-street parking along selected main streets (O'Connell Street, Melbourne Street, and Hutt Street). Well considered time controls and pricing would allow this to meet the needs of visitors, as well as nearby residents, and should be considered on a case-by-case basis.

PRIORITY PUBLIC CHARGING LOCATIONS

● Destination Charging ● On-Street Charging



RESIDENTIAL PRIORITY LOCATIONS

AREA SUMMARY

Wherever possible, at-home charging should be encouraged over public charging infrastructure for residential use.

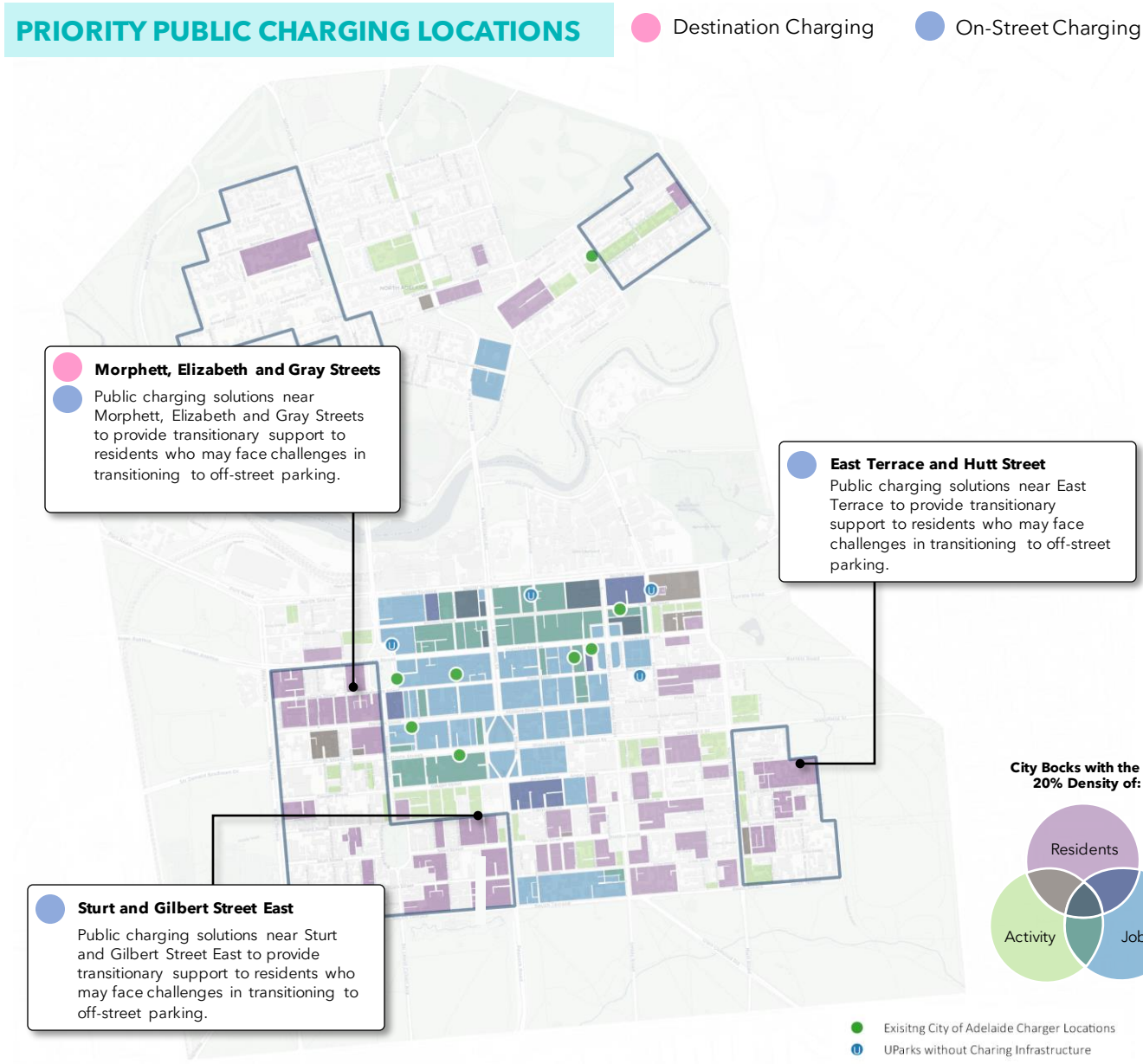
Much of the population within the city live in apartments or other high-density housing and may not have access to off-street charging where they live. Where possible, apartments and similar developments should be encouraged and incentivised to provide charging provisions for residents.

Placement, pricing and management of on-street charging should be considered carefully to ensure it does not displace installation of off-street and at-home charging facilities.

KEY COUNCIL PUBLIC CHARGING INITIATIVES

Three priority locations are identified where public off-street and on-street charging solutions may be required to support the residential transition to EVs in areas where there are high population/apartment dwelling densities:

1. Morphett, Elizabeth and Gray Streets
2. Sturt and Gilbert Street East
3. East Terrace.



PARK LANDS PRIORITY LOCATIONS

AREA SUMMARY

The Park Lands currently offer substantial destination parking facilities. This parking is attractive to users of the Park Lands' recreation and sporting facilities (particularly after-hours/weekends) as well as workers and other visitors whose ultimate destination is deeper within the CoA area.

If areas of the Park Lands are to remain as off-street parking locations, facilitating some level of EV charging will become needed over time.

Time limits and pricing could be especially important for these areas to avoid turning the Park Lands into a more attractive all-day parking and charging location for city workers, while ensuring charging facilities remain useful to recreational visitors.

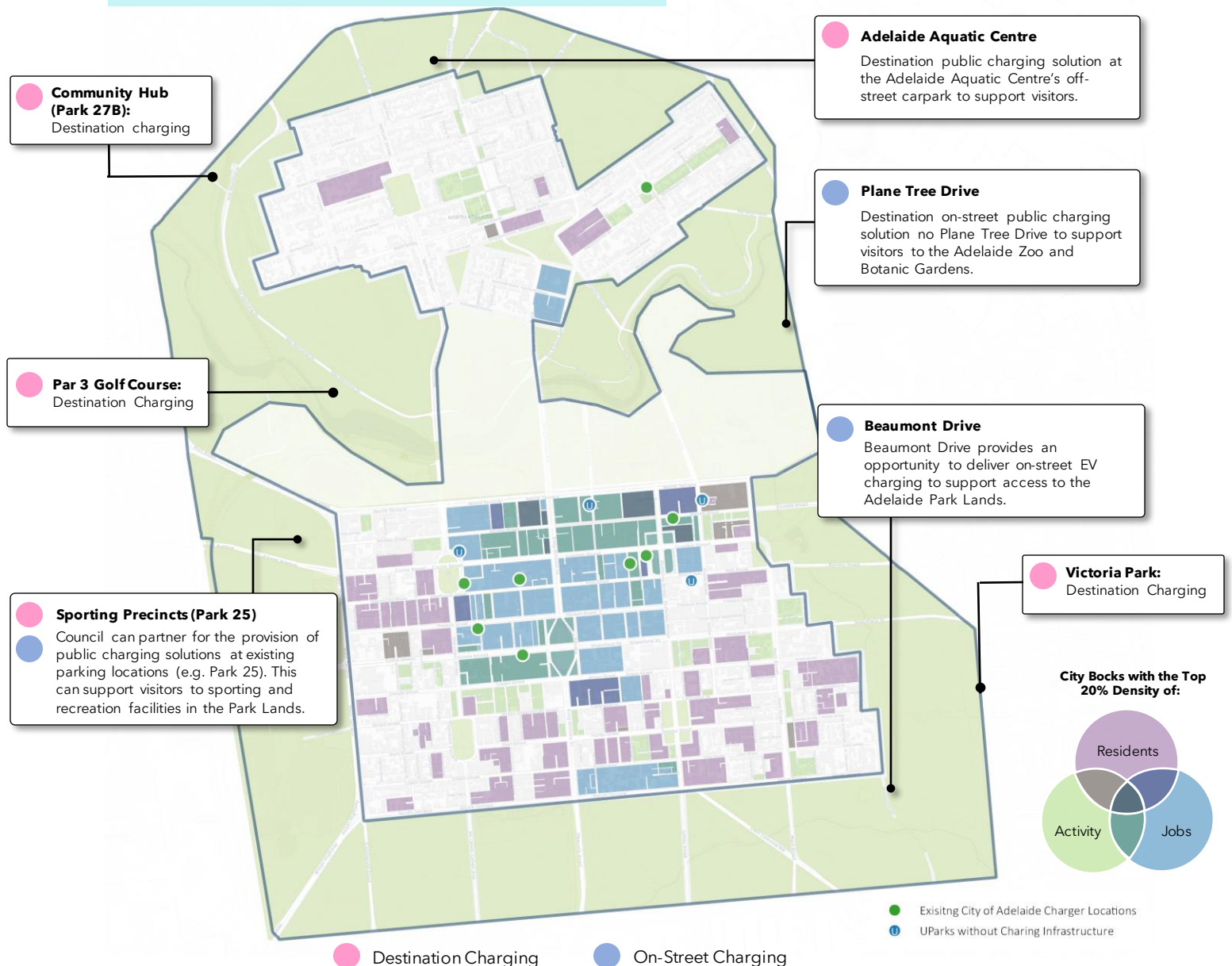
KEY COUNCIL PUBLIC CHARGING INITIATIVES

Priority areas should include on-street parking on Plane Tree Drive (for Adelaide Zoo and the Botanic Gardens) in partnership with State Government (owns/manages). Other on-street charging should be evaluated cautiously to maintain city amenity.

Off-street charging may be considered in other key areas where parking exists and is likely to remain. However, it should avoid inducing further demand for parking.

Future re-developments such as the Adelaide Aquatic Centre and Victoria Park should make provisions for EV charging.

PRIORITY PUBLIC CHARGING LOCATIONS



SPECIAL USE PRECINCT PRIORITY LOCATIONS

AREA SUMMARY

Significant quantities of off-street parking already exist throughout these areas (e.g. Festival Plaza, Adelaide Oval, Royal Adelaide Hospital, and the Adelaide Convention Centre).

Existing off-street facilities in these areas also provide significant parking capacity which supports other areas within the city. These off-street parking locations are not operated by CoA. Existing off-street parking locations will require a focus on EV charging facilities over time, and provision of EV chargers would be considered on a case-by-case basis by owners and operators.

Some on-street parking spaces are available in these areas, but have limited capacity compared to nearby off-street parking.

KEY COUNCIL PUBLIC CHARGING INITIATIVES

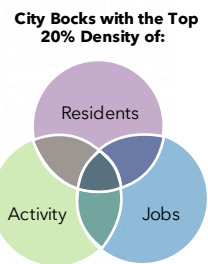
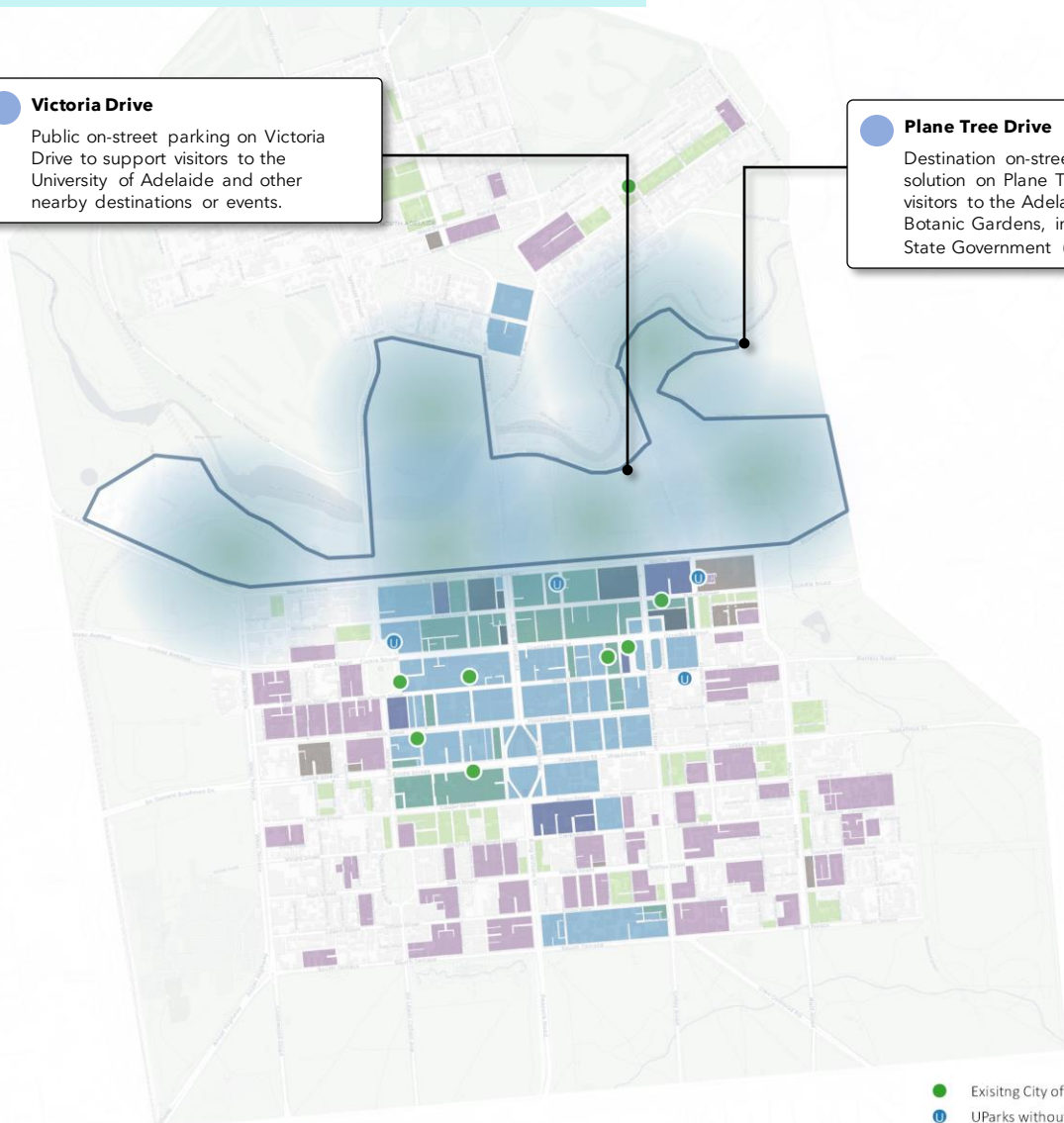
Some on-street parking spaces may be viable candidates for on-street charging facilities, particularly with strict time limits. In particular, Victoria Drive could provide access to EV charging for university employees, students, or visitors, and a small number of Adelaide Oval event patrons.

PRIORITY PUBLIC CHARGING LOCATIONS

● Destination Charging ● On-Street Charging

Victoria Drive
Public on-street parking on Victoria Drive to support visitors to the University of Adelaide and other nearby destinations or events.

Plane Tree Drive
Destination on-street public charging solution on Plane Tree Drive to support visitors to the Adelaide Zoo and Botanic Gardens, in partnership with State Government (owns/manages).



● Existing City of Adelaide Charger Locations
● UParks without Charging Infrastructure

POTENTIAL GRID IMPACTS

GRID IMPACTS SUMMARY

- On-site power requirements will need to be considered on a case-by-case basis in coordination with SAPN and the switchboard owner. Especially to support destination, apartment buildings and workplace charging typologies (likely Level 2), such as required within the employment core, mixed use and the Park Lands.
- Level 3 chargers within the employment core and mixed use areas are likely to trigger a switchboard upgrade through SAPN application.
- As the employment core and mixed use areas are predominantly situated in the core of the CBD, there currently sufficient short term grid capacity based on consultation with SAPN and review of power mapping. However, further detailed analysis is required over the medium- to long-term, as it is speculated that cumulative capacity may trigger grid augmentation.
- Some areas are likely to have relatively high concentrations of Level 2 and 3 chargers. This is particularly the case in the employment core and special use precincts.
- Home charging (Level 1) has relatively low power requirements compared to other charging infrastructure, minimising its overall grid impact. This is particularly relevant within the mixed use and residential areas.
- Within the residential areas grid impacts may be further mitigated by encouraging smart chargers, integrating homes with renewable energy sources, or implementing time-of-use tariffs in peak consumption times.
- Coordination with SAPN will be required for higher-powered charging at off-street or on-street locations within the residential and Park Lands areas.
- The Park Lands is more suited to faster destination charging (Level 2 or above), requiring high electrical capacity. It may also be possible to run connections from lighting poles
- Depending on location, electrical infrastructure in some areas may be limited - particularly for off-street parking within the Park Lands and the special use precinct and will need to be coordinated with SAPN.
- Areas within the special use precinct tend to have high electrical capacity, but locations will need to be considered on a case-by-case basis to ensure electrical infrastructure exists and has high enough capacity to support destination charging typologies.

SECTION SUMMARY

SUMMARY

Assessing EV charging needs across the CoA through a user-centric lens (focusing on three key city user types - residents, employees and visitors) highlights key priority locations across the city where Council can intervene to support the EV charging transition.

Public charging infrastructure in the CoA is recommended to either be 'destination charging' or 'on street charging'. As such, priority public charging responses of these typologies can be facilitated by CoA in these priority locations.

In defining where should take priority, the City Blocks with the highest 20% density of population, employment and activity (representing visitors) are prioritized across each of the service layers defined.

Destination and on-street charging will not be the only charging solution. The community will also play a role and as such Council should engage with residents, employers and asset owners in the city to influence and inform home charging, workplace charging, and private destination charging.

The next section summarises the priority public charging interventions and broader Council initiatives.

SUMMARY

Summary of transition initiatives.

PRIORITY PUBLIC CHARGING LOCATIONS

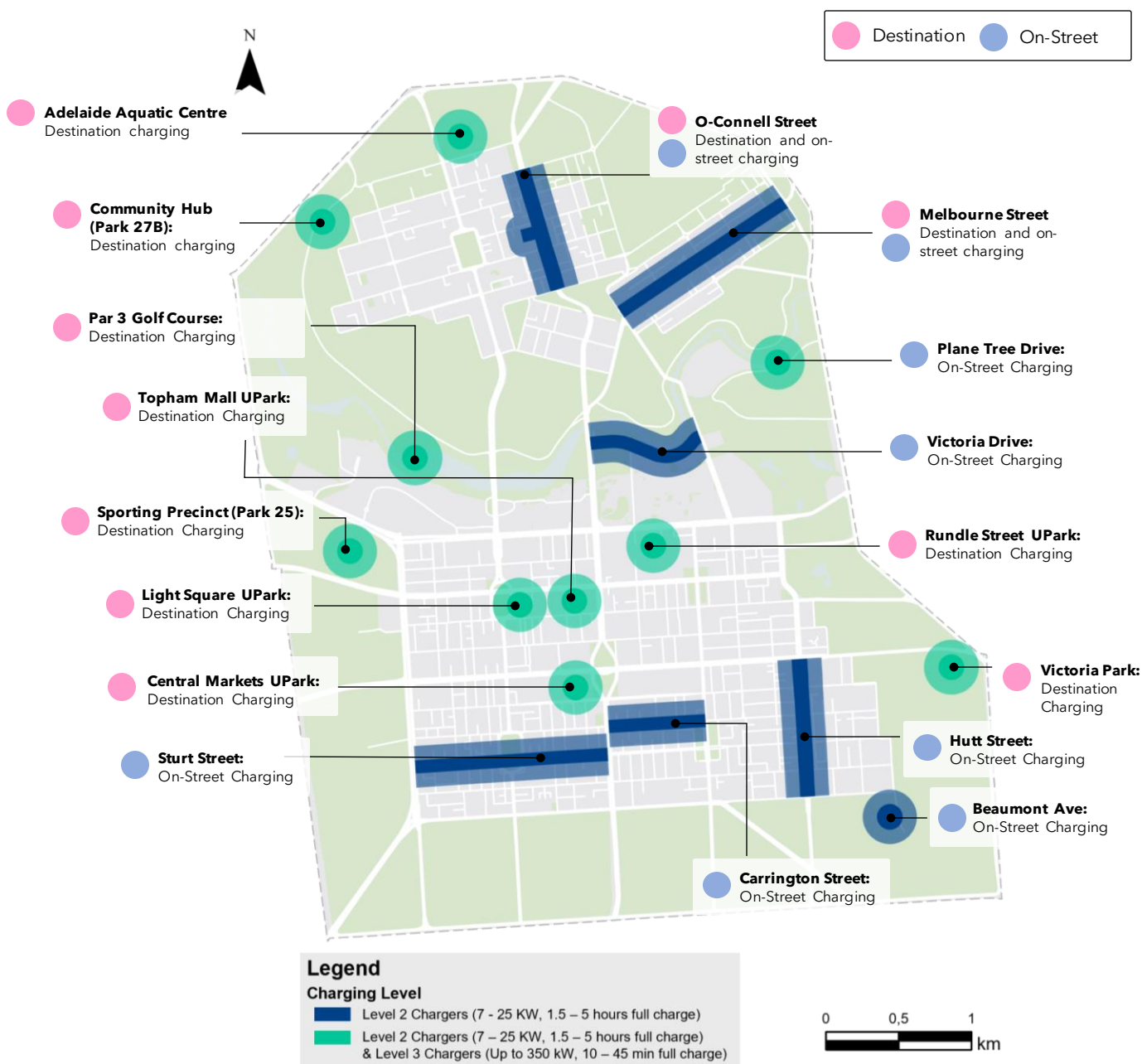
SUMMARY

A summary of priority public charging initiatives is shown on the map below, represented by a combination of destination and on-street charging. These are overlaid against a base map of existing charging infrastructure.

The public charging initiatives are prioritised based on the areas across the CoA with the highest density of relevant user types.

While destination and on-street charging make up the priority public charging typologies across CoA, residential and employment charging will make up an important part of the mix too.

Key initiatives to support the holistic rollout of the preferred charging typologies across CoA are detailed on the following pages.



STRATEGIC RECOMMENDATIONS

Seven steps are recommended in the short term (1-3 years) which comprise of CoA leading, partnering and influencing for the provision of EV charging infrastructure across the city.

These steps relate to the recommended locations identified in the following section of this report, and align with the targets set in the Climate Action Plan 2022-2025.

STEP 1 - Facilitate the deployment of EV charging infrastructure within the CoA by establishing a clear framework for the rollout of EV chargers at strategic locations.

CoA Role: **LEAD**

Timing:

Year 1

Prepare a Framework to support a market driven roll out of appropriately rated EV chargers at strategic locations identified on Page 61.

The framework should give regards to:

- Design and Operating Guidelines for public EV charging infrastructure (parking bay designs, safety, signage)
- Pricing (time of day, integrated tariffs, payment mechanisms)
- Signage and approach to parking enforcement
- Expression of Interest process for manufacturers and operators.
- Consider incentives* for more rapid deployment.

* such as Sustainability Incentive Scheme

STEP 2 - Enable the market-led provision of on-street EV chargers in select locations which support the transition to EVs and minimise impacts on public realm.

CoA Role: **LEAD**

Timing:

Year 1-3

Use the Framework, in particular the EOI, to deploy appropriately rated EV chargers at strategic on-street locations, identified on Page 61.

TARGET (Climate Action Plan 2022-2025)- Install an additional 100 public EV and bicycle chargers between 2022-2025 in collaboration with partners.

STEP 3 - Work with private sector providers to trial on-street charging in residential areas with limited private off-street charging and constrained charging options.

CoA Role: **LEAD**

Timing:

Year 1-3

Investigate and pilot innovative on-street charging models for areas with constrained charging options (refer Page 61).

This should only be considered where it does not result in negative impacts on the public realm including footpaths, verges, and street trees.

TARGET (Climate Action Plan 2022-2025)- Install an additional 100 public EV and bicycle chargers between 2022-2025 in collaboration with partners.

STRATEGIC RECOMMENDATIONS

STEP 4 - Partner with industry for the provision of destination charging within U Park facilities.

CoA Role:	PARTNER	Timing:	Year 1-3
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Provide additional off-street publicly accessible charging in council-controlled car parks across the City and North Adelaide (refer Page 61). This action should be preceded by a UPark business case.

TARGET - (Climate Action Plan 2022-2025) - Install an additional 100 public EV and bicycle chargers between 2022-2025 in collaboration with partners.

STEP 5 - Work with residential strata corporations to remove the barriers of installing EV charging infrastructure within multi-unit dwellings constructed prior to October 2024

CoA Role:	PARTNER	Timing:	Year 1 - 3
-----------	----------------	---------	-------------------

Work with strata corporations of multi-unit dwellings constructed prior to 2024 to identify the barriers and solutions to enable them to meet the National Construction Code EV Ready* development standards for new developments.

Work to deliver a pilot project for apartment residents by year three.

** All electrical infrastructure except the charger is installed.*

STEP 6 - Advocate to the State Government for a coordinated approach to on-route and hub EV charging networks that considers the aspirations of the City of Adelaide for our community, environment, economy, and places

CoA Role:	INFLUENCE	Timing:	Year 1 - 3
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Establish partnerships with key infrastructure providers, transport operators, ride share platforms, EV retailers and member-based organisations, including Department for Infrastructure and Transport (DIT), Department for Energy and Mining (DEM), South Australian Power Networks (SAPN), Ausgrid, Uber, taxi operators and the Royal Automobile Association (RAA).

STEP 7 - Advocate to the State Government for inclusion of EV charging provisions in legislation and statutory documents such as the Planning and Design Code and that pertain to EV parking for charging

CoA Role:	INFLUENCE	Timing:	Year 1 - 3
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Seek opportunities to support the transition to EVs through the Planning and Design Code (in-line with the National Construction Code).

Advocate for legislation pertaining to enforcing EV parking for charging (signage, exclusive parking for charging and related expiation fees).

PILOT PROJECT OPPORTUNITIES

OBJECTIVE

Pilot projects present the opportunity to test new technologies or solution concepts with users to validate them, facilitate learning among stakeholders, and if successful – scale up these solutions to address key needs across the CoA.

Pilot projects should involve users through the pilot process, seeking to understand their objectives and incorporate their feedback.

STRATEGIC FOCUS

Pilot projects can be considered to directly responds to key challenges in the CoA:

1. Supporting the transition to EV charging for apartment residents.
2. Provide on-street charging in select locations but while minimising any unintended amenity impacts.

POTENTIAL PILOT: TRANSITIONARY SOLUTION FOR APARTMENT RESIDENTS

Installing EV charging in apartment buildings has additional complexities for residents. Navigating strata corporations can take time, as approvals and permissions are required from strata committees or body corporates.

Due to the high number of apartment dwelling residents in the CoA – Council could consider piloting a ‘transitionary solution’ to support residents who have off-street apartment parking however are facing delays associated with installing EV charger due to these factors.

This solution would involve Council using its influence over U-Park charging and on-street charging to provide discounted access to public charging for residents who apply for a specific charging permit under these conditions.

CoA could also consider providing funding to assist charger installation.

Key elements of this possible pilot would be:

- Materials around benefits of installing EV charging infrastructure communicated to strata corporations.
- Public charging permits are issued to applicants who have off-street parking however require time to navigate their strata committee.
- Discounted charging can be provided by CoA, using public charging station (U-Park or on-street).
- The permit is time-limited, it expires after (e.g. ~12 months).
- May require evidence of strata application, such as copy of letter/proposal sent to strata committee.

POTENTIAL PILOT: INNOVATIVE TECHNOLOGY FOR ON-STREET PARKING

In priority areas where on-street charging is required, there is an opportunity to trial emerging on-street charging solutions that potentially avoid the need for complex public works.

One such example is the supply of on-street charging directly from light poles, utilising existing infrastructure and potentially avoiding the clutter that is associate with on-street chargers.

A possible location is around Hutt Street and East Terrace. These areas were highlighted in the prioritisation exercise as lacking public charging supply, while also not having any nearby off-street parking locations. Therefore, on-street charging will likely be part of the charging solution mix in this area.

Technological solutions should be assessed for their charging Level and cost to install vs. more traditional on-street chargers from private suppliers.

APPENDIX A

Description of key charging typologies, user group needs, and key considerations.

CHARGING TYPOLOGIES HOME

Home Charging

Home charging is the cheapest and most convenient option, typically done as slow charging overnight. Studies worldwide indicate it's the most preferred, with 50-90% of EV owners charging at home. (University of Melbourne, 2022)

LIKELY TARGET USERS

- Residents with off-street parking



USER GROUP NEEDS

- Easy installation and accessibility of charging equipment at residences.
- Availability of charging stations with different power levels (e.g., Level 1, Level 2) to accommodate various EV models and user preferences.
- Integration with renewable energy sources for eco-friendly charging options.
- Smart charging features, such as vehicle-to-grid (V2G), that allow users to schedule charging times and optimize usage. Additionally, these features also allow the city to optimize energy distribution according to demand, thereby reducing stress on the grid.
- Safety features, such as ground fault protection and thermal monitoring, to ensure safe charging at home.

TECHNOLOGY TYPES

- Primarily Level 1 chargers however may also be Level 2 Chargers depending on resident preferences

CITY IMPLICATIONS

- More challenging for high-density dwellings, including both apartments and single-story landed homes, given reduced number of residential parks per residence.
- Higher apartment dwellings in CoA will impact supply and create demand for public charging to support residents.
- Supports decarbonisation of resident-generated on-road transport in the CoA, reducing community transport emissions.
- Higher active travel and public transport journeys to work within CoA may result in higher energy demand during the day if vehicles stay at home to charge.

CONSIDERATIONS

- On existing properties, the onus is on the user to arrange installation.
- Challenges need to be addressed in terms of retrofitting existing high-density dwellings, including apartment buildings, and collaborating with strata community organisations.
- Clear and consistent information is needed to better support user uptake particularly in the earlier stages of EV adoption.
- Potential for grants to be made available by State and Federal schemes, however, there are currently limited in the Australian context.

CHARGING TYPOLOGIES WORKPLACE

Workplace Charging

Workplace charging is typically provided in private car parks. Charging can be slow or fast and offers a convenient way to recharge an EV for employees and business fleets.

LIKELY TARGET USERS

- Employees
- Business fleet users



USER GROUP NEEDS

- Sufficient charging stations to meet the demand of employees with EVs.
- Integration with employee parking systems for seamless access and utilization.
- Charging solutions that can accommodate both short-duration (e.g., during work hours) and long-duration (e.g., overnight) charging needs.
- Smart charging features, such as vehicle-to-grid (V2G), that allow users to schedule charging times and optimize energy usage.
- Management tools for employers to track energy usage and billing.
- Compatibility with different EV models and charging standards.
- Charging stations that are accessible for users with different levels of physical ability.

CITY IMPLICATIONS

- Additional energy demand during the day.
- Businesses within Adelaide contribute to lowering the overall community emissions of the transport sector.
- Risk being dispersed and not coordinated (driven by businesses who want to adopt).
- It is possible that this could create an incentive for workers to drive (rather than use public transport or active transport) to work, contributing to peak traffic congestion in the CoA.
- Employees without adequate parking space will require charging solutions at nearby parking facilities (CoA U-Park facilities and commercial parking facilities).

TECHNOLOGY TYPES

- Type 2 is increasingly recognised as the global norm, meaning that for charging stations lacking built-in cables, a Type 2 to Type 2 plug will be necessary.

CONSIDERATIONS

- Parking space availability at businesses vs. worker visitors to the CoA who drive and park in other parking facilities.
- Potential for grants to be made available by the City of Adelaide (through the Sustainability Incentive Scheme) or State and Federal schemes, however there are currently limited in the Australian context.

CHARGING TYPOLOGIES ON-STREET

On-Street Charging

Standalone pillars, typically 'fast' chargers provide on-street charging options. Kerbside charging points can avoid cables trailing across footpaths.

LIKELY TARGET USERS

- Business, retail and residential users, and visitors without off-street parking.



USER GROUP NEEDS

- Easy access and visibility of charging stations in public areas.
- Integration with parking management systems to ensure fair usage and availability.
- Robust and durable charging infrastructure to withstand outdoor conditions.
- Integration with navigation systems or mobile apps to locate and reserve charging spots.
- Fast charging options for efficient use of limited parking time.
- Real-time availability information to help users plan their charging stops.
- Charging stations that are accessible for users with different levels of physical ability.

CITY IMPLICATIONS

- Creates conflict between users who do/don't need EV charging due to often-limited on-street parking.
- May require additional parking enforcement to manage.
- It is possible that EV charging can create local benefits for adjacent businesses by attracting EV drivers.
- Can contribute to reduced public amenity and generate more private vehicle traffic on main streets and urban activity centres where charging off-street would otherwise be preferred from an urban realm perspective.
- Can create safety concerns (e.g. trip hazards for pedestrians) with insurance implications.

TECHNOLOGY TYPES

- On-Street charging is most likely to be Level 1 or Level 2, however may also be Level 3 in some cases as these charger types are often used over a shorter time period. However, it is important for the city to remain open to future technologies and be prepared for potential changes.

CONSIDERATIONS

- Parking management to ensure that users have access when they need it, and others don't block spaces when not charging.
- Funding and arranging installation can be time consuming, especially where the grid is constrained.
- Consider whether on-street parking should be provided in core walkable areas, or whether off-street parking should be prioritised.

CHARGING TYPOLOGIES DESTINATION

Destination Charging

Fast charging is provided at destinations where the user may park for several hours, e.g. shopping centres and public car parks.

LIKELY TARGET USERS

- Destination visitors.



USER GROUP NEEDS

- Sufficient charging infrastructure at or near destinations such as hotels, restaurants, and shopping centers.
- Charging solutions that cater to both short-duration (e.g., during meal breaks) and longer-duration (e.g., overnight stays) charging requirements.
- User-friendly payment options, including integration with loyalty programs or reservations.
- Charging stations located near amenities or services to enhance user experience.
- Compatibility with different EV models and charging standards.
- Charging stations that are accessible for users with different levels of physical ability.

CITY IMPLICATIONS

- Businesses may consider the provision of EV charging infrastructure as an attractor for customers.
- Could encourage private vehicle travel rather than more sustainable transport choices (i.e. public transport or active travel).
- Could be provided in an uncoordinated way across the Council area if independently rolled out by private sector.

TECHNOLOGY TYPES

- Destination Chargers are most likely Level 2 or Level 3 chargers.

CONSIDERATIONS

- Risk of uncoordinated rollout if not strategically planned or managed - based on individual investment decisions at destinations.
- Could be strategically implemented in Council UParks.

CHARGING TYPOLOGIES ON-ROUTE

On-Route Charging

On-route charging is used to top-up midway through a long journey, for example at highway service stations.

LIKELY TARGET USERS

- Business travel users.
- Private leisure users.
- Freight and logistics.



USER GROUP NEEDS

- Well-distributed charging infrastructure along expressways and major travel routes, especially catering to the needs of ride-sharing EV drivers.
- Fast charging stations to minimize charging time during long-distance travel.
- Clear signage and information about charging station locations and availability.
- Integration with navigation systems or mobile apps to plan and locate charging stops.
- Reliability and availability of charging stations, considering high demand during peak travel times.
- Ensure that charging stations are accessible for users with different levels of physical ability.

TECHNOLOGY TYPES

- Typically, Level 3 chargers to provide rapid charging for through traffic.

CITY IMPLICATIONS

- Likely to attract private vehicles to the CoA that may not have any other journey purpose (i.e. not contributing to the broader City economy).
- Negative transport outcomes for the city as whole if users are coming to the city only to use these chargers (without an actual trip purpose).
- If implemented, needs to be integrated with broader transport interventions, i.e. not hinder or negatively impact on cycleways.
- They could be strategically located near underutilized destinations to attract traffic to the area, boost the economy, and alleviate stress on high-density areas.

CONSIDERATIONS

- Market segmentation, resulting in incompatibility across charging equipment and payment and data infrastructure.
- Risk of attracting more vehicles to the CoA if not implemented with a broader transport strategy.
- Sufficient grid capacity must be available to accommodate high powered charging.

CHARGING TYPOLOGIES CHARGING HUBS

Charging Hubs

Charging hubs can be at centralised or out-of-town locations. Hubs can include different types of users, as part of a multi-modal transport strategy.

LIKELY TARGET USERS

- Individuals (business, visitors, etc.)
- Taxis, rideshare and public transport.
- Freight and logistics.



USER GROUP NEEDS

- A comprehensive charging infrastructure with multiple charging stations in one location.
- Charging solutions that cater to different types of users, including individual owners, fleet operators, and rideshare services.
- Integration with renewable energy sources and energy storage systems for a sustainable charging ecosystem.
- Access to amenities and services like toilets, food options, and entertainment to enhance the charging experience.
- Efficient management systems to monitor energy usage, billing, and station maintenance.
- Ensure that charging stations are accessible for users with different levels of physical ability.

CITY IMPLICATIONS

- Can contribute to broader economic activity of surrounding area.
- Could be strategically implemented in Council UParks.
- Can be implemented with other modes of transport, e.g. freight, logistics, taxis, buses.
- Likely to attract private vehicles to the CoA that may not have any other journey purpose (i.e. not contributing to the broader City economy).

TECHNOLOGY TYPES

- Typically, Level 2 and Level 3 chargers to cater for fast and rapid charging.

CONSIDERATIONS

- Land availability may be an issue to provide integrated charging offering (i.e. that includes public transport, private vehicles, etc.)
- Grid capacity given high aggregation of EV charging.
- Cross sector and multi-level of government integration is an opportunity – such as the integration of bus charging (local government, state government, industry).

APPENDIX B

Glossary and Acknowledgements

GLOSSARY

TERM	DEFINITION
Electric vehicle (EV)	An automobile that runs entirely or partially on electricity stored in rechargeable batteries, instead of relying solely on internal combustion engines powered by fossil fuels.
Battery electric vehicle (BEV)	An EV that runs solely on electricity stored in rechargeable batteries, producing zero tailpipe emissions.
Fuel cell electric vehicle (FCEV)	An EV that uses a fuel cell to generate electricity by combining hydrogen and oxygen, emitting only water vapor as a byproduct. It does not recharge via a dock like a battery-powered EV but needs refueling with hydrogen.
Hybrid electric vehicle (HEV)	An automobile that combines an internal combustion engine with an electric motor and battery pack. Unlike PHEVs, HEVs cannot be recharged externally and rely on regenerative braking and the internal combustion engine to recharge the battery while driving.
Internal Combustion Engine (ICE)	A vehicle that runs on a traditional internal combustion engine.
Regenerative braking	A technology capturing and storing kinetic energy during braking, converting it into electricity instead of dissipating it as heat.
Plug-in hybrid electric vehicle (PHEV)	A hybrid vehicle that combines an electric motor with an internal combustion engine, allowing for electric-only driving and extended range using gasoline.
Zero-emission vehicle (ZEV)	A vehicle that produces no pollutants during its operation. Both Battery Electric Vehicles (BEVs) and Fuel Cell Electric Vehicles (FCEVs) are examples of zero-emissions vehicles.

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- City of Charles Sturt
- City of Marion
- City of Burnside
- City of Norwood Payneham and St Peters
- City of Unley
- City of Prospect