

## **Approach to Public Electric Vehicle (EV) Charging to 2030**

Date: September 16, 2024

To: Infrastructure & Environment Committee

From: Executive Director, Environment and Climate

Wards: All

### **SUMMARY**

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Decarbonizing the transportation sector to meet the ambitious goals outlined in Toronto's TransformTO Net Zero Strategy (TTO NZS) will require a robust, convenient, and reliable public electric vehicle (EV) charging network that supports other established city-wide sustainable transportation initiatives.

The Approach to Public EV Charging presented in this report responds to the TransformTO Net Zero Strategy Short-term Implementation Plan (2022-2025) action: "The City will develop a strategy and plans to meet the 2025 targets in the EV Strategy for public charging infrastructure, and to ensure that sufficient public charging infrastructure will be in place to accommodate growth in EV ownership to 30 per cent of registered personal vehicles by 2030."

Toronto has started laying a foundation for its network by establishing zoning rules, parking regulations, and bylaws that help define the appropriate use of public space in relation to EV charging. Additionally, Toronto has installed EV charging stations at on-street parking spaces, in Green P parking lots, and at City facilities. The City also provides financing support to encourage charging in existing residential buildings through its BetterHomesTO program while requiring new residential and commercial buildings to install EV charging through the Toronto Green Standard (TGS).

In 2021, Environment and Climate (E&C) began work to understand how to increase EV uptake by directing its focus on identifying where publicly owned and operated EV charging would be needed to complement the existing privately operated and publicly accessible EV charging network and private at-home EV charging spots.

As of June 2024, Toronto had 30,505 registered EVs, roughly 2.8 per cent of the estimated 1.1 million registered passenger vehicles. With a goal of 5 per cent of all registered vehicles being EVs by 2025, the City will need to take a more proactive role in encouraging EV ownership.

This report presents an approach to growing Toronto's existing public charging network by the City through its Divisions, Agencies and Corporations (DACs), drawing from extensive research, data analysis, and stakeholder engagement completed in collaboration with several DACs to prepare for Toronto's public charging needs.

The Approach proposes a model of cross-corporate coordination to advance EV infrastructure asset planning until the year 2030 and clarifies the City's role with respect to EV infrastructure provision based on initial technical analysis.

### **The Approach to Public EV Charging to 2030 includes:**

- A City governance structure that optimizes City-owned assets (in the form of properties including lands and buildings) through a centralized approach led by the Environment and Climate Division (E&C), including financial planning of EV infrastructure assets.
- A technical projection of future needs from a “demand- and utilization-driven perspective” using currently established public charging network information at a ward level to determine the placement of EV chargers.
- A specific focus on equity through education and public charging station location prioritization of vehicle-for-hire (VFH) vehicles to ensure adequate and convenient access to public chargers for this industry.

While the City alone cannot be solely responsible for the robustness of the public EV charging network, nor can the City financially incentivize residents to purchase EVs, it can ensure that Toronto residents have reasonable access to charging with a consistent user experience. Relatedly, clear processes and communication on how residents can 'connect' to the EV charger whether a resident is a homeowner, renter, or condo dweller will also be critical for seamless operability. This includes minimizing barriers to access chargers by providing clear signage and wayfinding, advancing charger availability and reliability, and cost parity.

Government-led public EV charging programs around the world demonstrate that success in building robust and effective EV charging networks is achieved when collaboration with diverse stakeholders is at the core of this type of infrastructure development, saving time, money, and avoiding unnecessary duplication and stranded assets. Key international examples showcase partnerships with private businesses who supply charging infrastructure and the technology to support it, commercial businesses who allocate spots for their customers and employees to charge their vehicles either at or near their businesses, local utility companies who are a first contact and can provide reliable advice and orientation to what would work best for residents' needs, and intergovernmental alignment on goals and incentives. The City can also, through its processes, policies, and incentives, encourage private sector investment in growing the EV charging network. A robust public EV charging network must include investments from both the private and public sectors.

The City has a wide range of other transportation, city building, land use policies, programs, and infrastructure initiatives. These initiatives are either underway or planned to encourage and support the transition away from the use of fossil fuels and increase the use of more sustainable transportation modes such as public transit, walking and cycling, and zero emission vehicles, where required. This proposed approach supports the multiple options available to residents to travel carbon-free around the city now and into the future.

## **RECOMMENDATIONS**

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The Executive Director, Environment and Climate (E&C) recommends that:

1. City Council adopt the proposed governance approach as described on pages 9 through 11 of this staff report from the Executive Director, Environment and Climate.
2. City Council direct the Executive Director, Environment and Climate to develop and submit an annual public EV charging implementation and funding outlook for consideration as part of the annual City of Toronto Budget process.
3. City Council direct the Executive Director, Environment and Climate to establish and coordinate a City Asset Delivery Group which will include the President, Toronto Parking Authority, the General Manager of Fleet Services, the CEO of Toronto Transit Commission, and the President, Toronto Hydro, and other Divisions, Agencies and Corporations as appropriate to support the development of an annual three-year rolling public EV charging installation and funding plan, and to monitor the availability of home, workplace, and public charging in Toronto in order to coordinate the distribution of complementary public charging infrastructure and identify opportunities to coordinate bulk purchases of EV charging equipment and technology.
4. City Council direct the Executive Director, Environment and Climate to work with City DACs who manage City property, including Corporate Real Estate Management (CREM), Parks, Forestry & Recreation (PFR), the Toronto Transit Commission (TTC), the Toronto Public Library (TPL), CreateTO, Toronto Community Housing Corporation (TCHC), Exhibition Place, Toronto Zoo, and TOLive, in collaboration with Toronto Parking Authority (TPA) and Toronto Hydro, to identify opportunities to install EV chargers on City-owned public facing properties.
5. City Council direct the Executive Director, Environment & Climate Division and request the President, Toronto Parking Authority to establish a working group to share best practices and promote operational consistencies between how the City of Toronto and the Toronto Parking Authority operate and maintain their

publicly accessible EV charging infrastructure, including with respect to branding, payment, wayfinding, and availability.

6. City Council direct the Executive Director, Environment & Climate Division to provide information to Toronto Hydro to help support Toronto Hydro's development of a communication plan that directs building owners, including homeowners, and tenants in Toronto to only contact Toronto Hydro for information and guidance on the installation of a private EV charger.
7. City Council direct the Executive Director, Environment and Climate to request The Atmospheric Fund (TAF) to take the lead on engaging with public and private stakeholders and the development of an integrated, actionable, and resourced plan that complements the City-operated charging network to accelerate the rollout of public EV charging on non-City public and private sector properties and share information with TAF to support the development of the plan.
8. City Council direct the Executive Director, Environment and Climate to provide information to the Toronto Parking Authority regarding City priorities for EV parking and charging, including information that could support the coordination of investments to meet city-wide needs.
9. City Council direct the Executive Director, Environment and Climate to work with the General Manager, Transportation Services to investigate use of the established Transportation Innovation Zones and Transportation Innovation Challenge Program for trialing emerging EV charging technologies and processes, to advance understanding of the feasibility and effectiveness of different EV charging technologies in the city.

## **FINANCIAL IMPACT**

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With a mandate that has grown to include responsibility for the operation, maintenance and continued expansion of EV infrastructure, TPA has invested \$21.2 million in expanding EV charging opportunities in the City since 2021. This investment was funded through a combination of TPA's retained earnings of \$19.0 million and \$2.2 million in funding provided by NRCan through the ZEVIP.

On June 26, 2024, City Council approved a Net Income Share Agreement between the City of Toronto and the Toronto Parking Authority (TPA). Through this agreement, the City is providing capital funding of \$33.9 M over three years (2024-2026) directly to TPA to fund the capital expansion of its off-street EV charging program.

Currently the TPA receives approximately \$0.5 million in revenue from EV charging. This revenue will be used for the state of good repair, maintenance, repairs, and upgrades to existing EV infrastructure owned and maintained by TPA.

It is expected that with the roll out of EV charging infrastructure described in this report that the Toronto Parking Authority will need to identify in its future year budget submissions, any operating requirements, including staffing needed to support additional responsibilities of the delivery, operation, and maintenance of publicly accessible EV chargers outside of TPA off-street facilities, for consideration.

To reflect future additional responsibilities identified in the governance structure detailed in this report as it pertains to public EV charging infrastructure, it will also be necessary for the City Manager to work with the President, Toronto Parking Authority, to report back to City Council any necessary updates to the City of Toronto – Toronto Parking Authority Relationship Framework and authorities delegated by Council under Chapter 179, Parking Authority.

The Chief Financial Officer and Treasurer has reviewed this report and agrees with the financial impact information.

## **EQUITY IMPACT STATEMENT**

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Toronto has many diverse neighbourhoods with different charging needs influenced by many factors including access to at-home parking, housing type and age, household income, proximity to transit, and parking allocation, all of which inform public charging infrastructure needs across the city.

Feedback from internal and public consultations, and lessons learned from existing EV infrastructure programs indicate that the leading barriers to EV adoption include:

- Cost (vehicle purchase price, cost of installing charger if applicable).
- The availability of charging infrastructure (accessibility, and convenience or proximity to EV charging).
- User experience (reliability, ease of use, and safety/amenities).

To match the speed and level of ambition outlined in the TTO NZ target of “30 per cent of registered vehicles be electric by 2030” and Toronto’s goal of “100 per cent zero emission vehicle-for-hire by 2030”, favours a pathway for EV infrastructure which focuses in areas where EV adoption is certain to grow. Currently, the highest EV ownership in the city is found in neighbourhoods with above the median Toronto household income and the highest levels of home ownership.

**Cost of an EV:** EV ownership will result in a lower total cost over the lifespan of a vehicle through fuel savings and reduced maintenance costs and therefore, identifying pathways for equity deserving groups to benefit from these long-term cost savings is critical. Opportunities to reduce costs in any part of the EV purchase price, including infrastructure installation, should be a consideration as the Approach to Public EV Charging is implemented.

**Availability of Charging Infrastructure:** Approximately 40 per cent of available chargers are presently located in two wards – Spadina-Fort York and Toronto Centre, Approach to Public Electric Vehicle Charging to 2030

both in the city's downtown area. Many equity deserving groups especially those of low income may not live in these areas. Furthermore, low-income residents may also live in older building stock and therefore will face challenges finding available charging within or near their residences as the buildings' electrical system may not be sufficiently powerful or because they may be located far from other amenities (shopping complexes) that could supply opportune charging. Locating public EV charging close to older multi-unit residential buildings (MURBs) where charging is not currently abundant, should be a key consideration to encourage uptake in these neighbourhoods.

City-provided chargers can also be provided 24/7, while some non-City provided chargers have limited hours of operation.

Equity and inclusivity can be supported through continuously monitoring EV sale trends throughout the wards, particularly in the Neighbourhood Improvement Areas (NIAs), and identifying how to meet the needs of diverse communities.

**User Experience:** Equity is also linked to cost, safety, and user experience by reducing charger access barriers through approaches such as:

- Defining standards of charger equipment, adequate room in parking spaces, good lighting, and clear signage to ensure that residents of all abilities can access charging.
- Ensuring a seamless and consistent user experience including type of chargers, method of payment, and easy to use apps which can be used to locate chargers and purchase charging sessions.
- Ensuring cost parity across public chargers.
- Ensuring adequate customer service is offered to support the users especially when chargers may be out of order.
- Ensuring chargers are installed in highly visible, well-lit areas where users feel safe charging and leaving their vehicle.
- Reducing opportunities for theft and vandalism of charging equipment.

**Air Quality Impacts:** In 2017, Toronto Public Health found that levels of traffic-related air pollution (TRAP) were higher along the inner-city highways and major arterial roads in Toronto. People who live, work, learn, or play near these roads are at greatest risk of adverse health outcomes associated with TRAP. Residents who live close to these traffic corridors are predominantly low income or racialized groups. Increased EV uptake will reduce transportation-related tailpipe emissions, thus improving local and city-wide air quality.

## **DECISION HISTORY**

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On October 11 and 12, 2023, City Council adopted the Transitioning the Vehicle-for-Hire Industry to Net Zero Emission by 2030 report.

<https://secure.toronto.ca/council/agenda-item.do?item=2023.EC6.6>

On May 10, 11, and 12, 2023 City Council received report on installing private EV charging on public streets to meet the needs of residents without access to at-home charging.

<https://secure.toronto.ca/council/agenda-item.do?item=2023.IE3.6>

On March 29, 30, and 31, 2023, City Council adopted the Relationship Framework of the City with Toronto Parking Authority, amending to include that the Executive Director, Housing Secretariat and Chief Executive Officer, CreateTO to identify underutilized parking facilities and parking facilities within Protected Major Transit Station Areas for the purpose of redevelopment and supporting plans for redevelopment of parking facilities that prioritize the provision of new affordable housing. An additional amended directions detailed the Toronto Parking Authority should do everything practicable to assist the City to reach net-zero climate pollution by 2040, in a manner consistent with TransformTO.

<https://secure.toronto.ca/council/agenda-item.do?item=2023.EX3.4>

On March 3, 2023, a presentation was provided to the Board of Directors of Toronto Parking Authority on the 2023 On-street EV Charging Station Program, which included details on current and planned future deployment of public EV charging infrastructure at on-street and off-street locations.

<https://www.toronto.ca/legdocs/mmis/2023/pa/bqrd/backgroundfile-234724.pdf>

On January 30, 2023, the Infrastructure and Environment Committee requested the Director, Environment and Energy, in collaboration with Transportation Services, Toronto Hydro, and the Toronto Parking Authority, to report back to the April 26, 2023 meeting of the Infrastructure and Environment Committee on options, if any, for permitting private installation of EV charging infrastructure on public streets, including any necessary conditions to protect the public interest.

<https://secure.toronto.ca/council/agenda-item.do?item=2023.IE1.12>

On December 12, 2022, the Toronto Parking Authority presented their Electric Vehicle Charging Deployment Update 2022-2024 to the Toronto Parking Authority Board of Directors including Councillor Bradford and Councillor Moise, both appointed on November 2022.

<https://secure.toronto.ca/council/agenda-item.do?item=2023.PA1.7>

On July 19, 20, 21, and 22, 2022, City Council adopted an update to the EV Strategy directed the General Manager of Transportation Services to review planned locations for EV charger installation, considering current and future cycling infrastructure. Council also directed the General Manager of Transportation Services to ensure that electric micromobility was considered by the EV Working Group.

<https://secure.toronto.ca/council/agenda-item.do?item=2022.IE31.17>

On June 15 and 16, 2022, City Council adopted the staff report On-street EV Charging Stations - Pilot Conclusion and Next Steps, which provided details on the pilot and noted that 32 additional on-street public EV charging stations will be installed in 2022. City Council directed the Toronto Parking Authority to work with the General Manager, Transportation Services, Toronto Hydro, and relevant stakeholders to install a minimum

of 50 on-street EV chargers by the end of 2023.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2022.IE30.11>

On February 2 and 3, 2022, City Council directed Transportation Services in consultation with Toronto Hydro and the Toronto Parking Authority to commence the expansion of the City's On-street EV Charging Program, including siting criteria, costs, and any other requirements to ensure a successful roll-out and future expansion. Existing and future charging stations to be transferred to the responsibility of TPA in 2023. City Council also approved the extension of the Downtown and Residential EV Charging Station pilots by eight months until May 31, 2022.

<https://secure.toronto.ca/council/agenda-item.do?item=2022.IE27.7>

On December 15, 16, and 17, 2021, City Council endorsed the targets and actions outlined in the TransformTO Net Zero Strategy and approved a target to reach net zero GHGs by 2040. The Net Zero Strategy includes a target that by 2030, 30 per cent of registered vehicles in Toronto are electric. The Net Zero Strategy's Short-Term Implementation Plan (2022-2025) includes actions to help ensure that Toronto is on track to meeting its 2030 and 2040 targets for EV adoption.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2021.IE26.16>

January 29, 2020, City Council approved the EV Strategy which highlights 10 actions organized under four areas of opportunity: charging availability, cost and convenience, education and advocacy and economic opportunities. Council directed Environment and Climate to work with the EV Working Group to oversee effective engagement, implementation, and evaluation of widescale EV rollout, including the On-street Charging Pilot and Residential On-street Charging Station Pilots.

<https://secure.toronto.ca/council/agenda-item.do?item=2020.IE11.17>

On October 2, 2019, City Council declared the Climate Emergency and Accelerating Toronto's Climate Action Plan.

<https://www.toronto.ca/legdocs/mmis/2019/mm/bgrd/backgroundfile-138112.pdf>

On July 4, 5, 6, and 7, 2017, City Council unanimously adopted TransformTO. TransformTO aims to reduce city-wide emissions by 80 per cent by 2050. TransformTO detailed three acceleration campaigns, including a Prepare for Electric Mobility campaign which focused on developing an EV transition strategy for Toronto.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.PE19.4>

On November 7, 8, and 9, 2017, City Council approved the Prepare for Electric Mobility Campaign to support the implementation of Residential On-street EV Charge Station pilot, a collaboration between Toronto Hydro and the City.

<https://secure.toronto.ca/council/agenda-item.do?item=2017.PW24.7>

On September 27, 2016, the Public Works and Infrastructure Committee requested the Transportation Services and Environment & Energy Divisions report back on expanding EV charging stations in Toronto.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.PW15.9>



On September 11, 2012, City Council approved the designation of five EV charging station parking areas for the exclusive use of EV charging for a one-year pilot project, on Ed Mirvish Way, Elizabeth Street, and Wellington Street West.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2012.TE18.68>

On July 11, 12 and 13, 2012, City Council approved a one-year pilot project to provide curbside charging stations for EV.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2012.PW16.4>

## COMMENTS

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The City of Toronto has set ambitious targets to decarbonize the transportation sector as part of the work to achieve its TTO NZS targets. A key act in decarbonization is to replace internal combustion engine (ICE) vehicles with zero emission vehicles (ZEV) at their point of replacement. Electrification of fuels is aligned with the long-term direction of the TTO NZS. Conversion of ICE vehicles to ZEVs requires supporting the growth of charging infrastructure.

This Approach draws from extensive research, data analysis, and stakeholder engagement completed in collaboration with several City DACs. It proposes a model of cross-corporate coordination which will advance continued planning and growth activities to support Toronto's EV charging network.

### **The Public EV Charging Approach includes:**

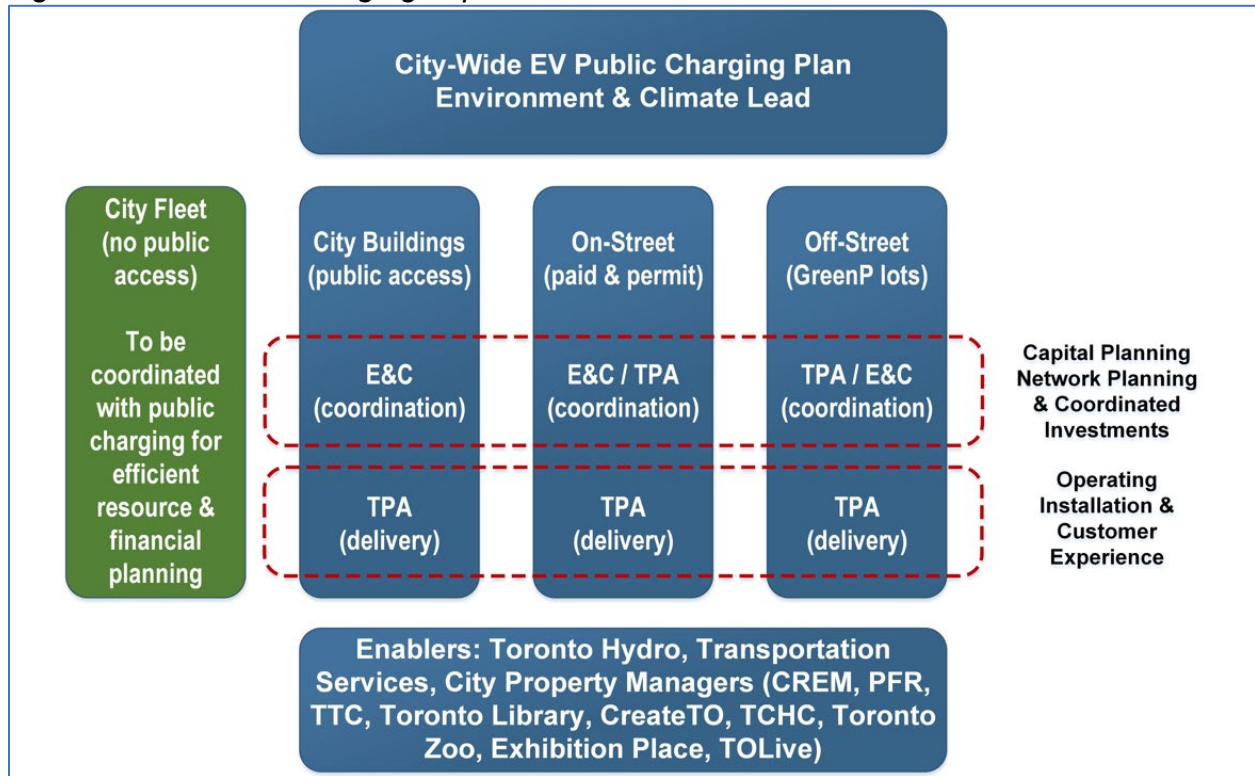
- A City governance structure that optimizes City-owned assets (in the form of properties including lands and buildings) through a centralized approach led by the Environment and Climate Division (E&C), including financial planning of EV infrastructure assets.
- A technical projection of future needs from a “demand- and utilization-driven perspective” using currently established public charging network information at a ward level which considers multiple transportation emission reduction initiatives already underway in each ward.
- A specific focus on equity through education and public charging station location prioritization of vehicle-for-hire (VFH) vehicles to ensure adequate and convenient access to public chargers for this industry.

### **Proposed Governance Structure**

Because of the critical role that Divisions, Agencies and Corporations (DACs) play in the future deployment of EV infrastructure, a clearly defined governance structure should be in place to support their involvement in infrastructure planning.

The below *Public EV Charging Implementation Plan Governance Structure (Figure 1)* reflects many elements of stakeholder feedback (internal and external) that will advance the planning and management of City-owned EV charging assets.

*Figure 1: Public EV Charging Implementation Plan Governance Structure*



As shown in Figure 1, this report recommends that E&C be responsible for defining the strategy for the continued expansion of public EV charging and that funding (both capital and operating) for this expanded city-wide network be secured by E&C through the annual budget process. This approach will also apply to EV chargers at City facilities.

TPA is a self-sustaining agency of the City of Toronto that provides on and off-street parking, EV charging and bike sharing services. Revenues generated by TPA are used to fund TPA’s operating and capital expenses with the remainder provided to the City through a net revenue sharing agreement to fund other municipal programs and services. The organization has taken a leadership role in the EV charging space and operates a City-wide network of EV charging stations at its off-street and on-street parking facilities. TPA’s focus has been on its off-street Green P facilities, where charging hubs drive incremental charging and parking revenues.

To date, 407 EV chargers have been deployed by the TPA . TPA’s off-street EV implementation approach is consistent with its mandate and supports continued growth and improved productivity of its off-street commercial parking assets.

Fleet Services is responsible for the development and management of the City's corporate EV charging network that will enable and support accelerated transition of

City Fleets to zero emission vehicles. The network will also enable the expansion of the City's workplace charging program and where feasible, may be made available for public EV charging purposes.

CREM is the City's major building asset holder who will work alongside other DACs to install EV charging at City buildings.

As the overall lead, E&C will:

- Establish and coordinate a City Asset Delivery Group to monitor the availability of home, workplace, and public charging in Toronto and ensure equitable distribution of public charging equipment, coordinate bulk purchases of EV charging equipment and technology, and submit bundled annual budget requests on behalf of DACs commensurate with the City's goals for EV uptake.
- Work with TPA and City DACs who are currently property managers, in collaboration with Toronto Hydro, to install EV chargers on City-managed public facing properties by establishing partnerships that ensure consistency of user experience including signage, wayfinding, availability, reliability, and cost parity across the City.
- As part of forthcoming TransformTO report, provide status updates on implementation, technology trends, relevant market factors, as well as external influences and barriers.
- Work with Toronto Hydro to establish a clear process whereby homeowners, apartment/condo dwellers, and residents without access to at-home parking will be directed to Toronto Hydro as the first and single contact organization that will orient, advise, and provide education on the best options for Toronto residents to plug in their EVs at home or workplace.
- Support Toronto Hydro in the development of their system-wide mapping tool which will help Toronto Hydro customers check the capacity to connect their solar, storage, or electrification project. This visualization of available capacity will assist customers in planning their electricity-based projects while allowing the utility to optimize planning, costs, and lead time for renewables and load growth. Toronto Hydro is planning to launch an initial hosting capacity address lookup tool in Q1 2025.
- Design policies that encourage and where feasible require or incentivize the private sector to provide public EV charging.
- Collect and share data, information, and tools that facilitate public EV charging planning and deployment.

It should also be noted that the City is not the only actor whose contributions are key to a successful and robust EV charging network. The City must continue to plan, involve, and lay the groundwork for other actors, such as the private sector who are keenly interested in contributing their own capital investments to the EV network.

In a separate but complementary process, The Atmospheric Fund (TAF) will seek the input of other non-City public and private stakeholders to develop a specific, actionable and resourced plan to align with the City's activities on public EV charging in Toronto. TAF will lead a series of bilateral engagement and multilateral convening exercises with private sector entities (e.g., charging network operators, automakers, vehicle-for-hire

companies, financiers) and public sector entities (e.g., key City Divisions, Agencies and Corporations, other major public landowners such as school boards).

## **Guiding Considerations**

The identified City roles and investment in the provision of public charging will also be guided by the following:

Public charging in Toronto should:

- Not encourage, support, or prioritize the use of personal vehicles above active transportation or transit;
- Increase equitable access to affordable low-carbon transportation options;
- Be deployed at charging hubs where installation costs per charger can be reduced through economies of scale;
- Be deployed with flexibility to easily relocate where there is potential for redevelopment of the site within the next five years;
- Be safe, accessible, convenient, and reliable; and
- Not be deployed at on-street locations where there is planned or potential implementation of transit or active transportation infrastructure or routes within the next five years.

The City-provided network of chargers should:

- Be assessed against other key City's corporate priorities of financial sustainability and administering a well-run city, and other City's key strategies and initiatives;
- Deliver higher social value than alternative investments with specific attention to City's policy objectives of reducing carbon emissions through sustainable transportation, walking, cycling and public transit;
- Complement commercially and privately provided charging networks
- Act as an amenity for clients, and/or residents of sites and facilities managed by the City, including its DACs.

## **Key Considerations for EV Purchase and Corresponding Projection of Infrastructure Needs and Interests**

### **Expected Range of an EV**

Range anxiety is one of the most significant barriers to EV adoption. Range anxiety is the concern that an EV will not have sufficient battery charge to complete its trip. It is important that Toronto residents be adequately informed on the charging capabilities of EVs to put into perspective how much charging an EV might need on any given trip on any given day.

Like internal combustion (ICE) vehicles, EVs do not need to be fueled/charged daily. When fully charged, an average EV has a range of 200 to 400 km depending on the weather conditions, varying battery models, and battery degradation (Plug n' Drive,

2024). With range optimizing features, such as regenerative braking systems and localized heating options, range can be extended, even while the vehicle is being driven. The average daily distance traveled by light-duty vehicles in Toronto is 45 km or less (Clean Air Partnership, 2021). Therefore, charging a vehicle daily is not required.

## Charging Options

**Level 1:** Level 1 charging, or a 120-volt outlet, can be readily used in most homes depending on the location of the outlet. All EVs available on the current market are sold with a 120-volt adapter to charge their vehicle at a slow or “trickle charge” rate, which takes approximately 24 hours for a full charge (110 volts/15 amps) with approximately 8 km range per hour of charging. A certified electrician is recommended to inspect electrical wiring before beginning to charge a vehicle.

**Level 2:** Level 2 charging is suitable for residents with high-speed charging needs and those with a parking spot at home. Level 2 chargers use a 240-volt outlet, like the outlet that stoves and dryers use and require a licensed electrician to install this wall-mounted charger. Level 2 chargers will charge a vehicle in approximately 8 hours (240 volts/30 amps) with approximately 35 km range per hour of charging. With respect to public charging, this type of charging can be affixed to hydro poles.

**Level 3:** Generally, Level 3 chargers also referred to as direct current fast chargers (DCFC) can only be found at commercial or public charging stations because of the size, high load, safety requirements, and significant infrastructure upgrades required to install these chargers, resulting in a high price tag for installation. Level 3 fast charging is most suitable for commercial vehicles, VFH drivers, visitors, and ‘top up’ charging. Level 3 chargers are best suited in high-traffic areas like parking lots that are subject to parking restrictions and parking intended for short-term stays.

For most EV users, at-home charging will be the most convenient form of charging. However, at-home charging is not an option for the 65 per cent of Toronto households who live in MURBs and 2 per cent of Toronto residents who rely on on-street parking for their vehicles (2021, Census Data).

Under the Toronto Green Standard (2022), new-build residential units are required to build 100 per cent of dwelling units with a residential parking spot to have an energized outlet or equipped with an EV charger and 25 per cent of new non-residential parking spaces are required to have energized outlets intended for EV chargers or EV chargers installed and ready for use. Existing buildings, especially MURBs, pose a variety of challenges when it comes to upgrades which may prove difficult and expensive to equip for EV charging.

There is no one-size-fits-all approach to EV charging in Toronto, therefore, a combined approach that considers the unique makeup and needs of the neighbourhoods, as well as existing private and public EV charging options will ensure that residents who cannot charge at home can feel comfortable relying on the network of public EV chargers to meet their daily needs.

## Current and Projected State of EVs

In 2023, 7.73 per cent of new vehicle registrations in Ontario were EVs, slightly lower than the 11 per cent average nationwide which is primarily driven by higher uptake in British and Quebec, with 22.91 and 20.44 per cent respectively. British Columbia and Quebec are the only two Canadian provinces to offer a subsidy currently.

EV adoption in Toronto has been rising rapidly from 6,345 vehicles in 2018 to 30,505 registered EVs in 2024 due to the declining purchase price of EVs and the increase of EV driving ranges due to improvements in battery and charging technologies.

While the number of EVs has increased each year, EVs remain a small fraction (2.8 per cent) of total passenger vehicles registered in Toronto (1.1 million). With a goal of 5 per cent of registered vehicles being EVs by 2025, the City will need to take a more proactive role in encouraging EV ownership

To inform the Approach to Public EV Charging, E&C worked with a consultant to forecast future uptake of EVs by ward based on current and forecasted trends of EV purchase. Table 1 below shows these projections through to 2030.

To reach TTO NZS 2030 goal of having 30 per cent of all registered vehicles in Toronto as EVs, total of 343,789 EVs would need to be registered.

*Table 1: Current and Forecasted EV Registrations to 2030*

Registered Electric Vehicles (EV)	Current: June 2024	2025 Projection		2030 Projection	
		Low	High	Low	High
Beaches-East York	1,233	1,522	2,577	3,198	14,730
Davenport	483	523	885	1,099	5,064
Don Valley East	1,045	1,114	1,887	2,341	10,786
Don Valley North	1,410	1,515	2,565	3,182	14,659
Don Valley West	2,678	3,505	5,935	7,364	33,921
Eglinton-Lawrence	1,574	2,009	3,401	4,220	19,439
Etobicoke Centre	1,701	2,010	3,404	4,224	19,456
Etobicoke North	1,864	1,882	3,186	3,954	18,213
Etobicoke-Lakeshore	2,028	2,501	4,234	5,254	24,201
Humber River-Black Creek	399	413	700	868	3,999
Parkdale-High Park	1,449	1,841	3,118	3,869	17,821
Scarborough Centre	668	630	1,066	1,323	6,095
Scarborough North	953	923	1,563	1,940	8,937
Scarborough Southwest	888	962	1,629	2,021	9,311
Scarborough-Agincourt	552	551	933	1,157	5,331
Scarborough-Guildwood	338	363	615	764	3,518
Scarborough-Rouge Park	1,367	1,586	2,686	3,333	15,352

Spadina-Fort York	1,672	1,944	3,291	4,085	18,817
Toronto Centre	1,060	1,025	1,735	2,152	9,915
Toronto-Danforth	1,050	1,212	2,052	2,546	11,727
Toronto-St. Paul's	1,094	1,485	2,515	3,120	14,374
University-Rosedale	1,713	2,317	3,923	4,868	22,425
Willowdale	1,609	1,794	3,037	3,769	17,360
York Centre	1,117	1,273	2,156	2,677	12,332
York South-Weston	560	620	1,050	1,304	6,006
<b>Total</b>	<b>30,505</b>	<b>35,520</b>	<b>60,143</b>	<b>74,632</b>	<b>343,789</b>

\*More detailed ward profile information is included in “Appendix 5: Ward Profiles”.

Source: MTO, June 2024 / AECOM, 2021

As of June 2024, Don Valley West ward accounts for the largest number of registered EVs in Toronto, representing 8.8 per cent of all registered EVs. This is followed by Etobicoke-Lakeshore at 6.6 per cent, and Etobicoke North at 6.1 per cent. These wards and University-Rosedale ward are projected to lead the EV adoption in Toronto to 2030.

Although the number of EVs are projected to increase at different rates across the city, public charging will be determined by the utilization of public charging and not necessarily by the projected number of EVs. For instance, in Don Valley West, many people will have home access to charging and therefore, public charging will be strategically located to augment other private charging.

### **Toronto's Current Public EV Charging Network**

As of August 2024, there were a total of 2,545 public Level 2 chargers and 190 public Level 3 chargers in Toronto, located at shopping malls, grocery stores, car dealerships, commercial parking facilities, office buildings, gas stations, health care centres, colleges and universities, recreation facilities, tourist attractions, on-street parking spaces, and other locations. Of these, 407 chargers are City-owned and operated by the TPA. The City of Toronto, through the TPA, is the largest municipally owned operator of EV chargers in Canada.

Between 2019 and 2023, Toronto’s public charging network rapidly expanded with Level 2 and Level 3 chargers, with the number of Level 2 chargers growing by 43 per cent and the number of Level 3 chargers 24 per cent per year on average, respectively. These chargers are installed and operated by a wide range of private and public sector organizations including the City of Toronto and are publicly accessible. Often, a property owner will contract with an EV charging provider to provide public charging on their property. Currently, 16 different EV charging networks operate in Toronto with some networks having only few charging stations in operation while others have hundreds of public charging stations in operation.

*Table 2: Current and Future Projected Number of Level 2 and Level 3 Chargers through 2030*

Public EV Chargers (all providers)	Current		2025				2030			
	L2 Charg ers	L3 Charg ers	L2 Chargers		L3 Chargers		L2 Chargers		L3 Chargers	
			Low	High	Low	High	Low	High	Low	High
Beaches-East York	72	0	91	155	5	9	192	884	13	59
Davenport	30	4	31	53	2	3	66	304	4	20
Don Valley East	42	18	67	113	5	8	140	647	9	42
Don Valley North	87	31	91	154	6	10	191	880	13	59
Don Valley West	71	2	210	356	13	22	441	2,036	30	137
Eglinton-Lawrence	16	0	120	203	8	14	253	1,165	17	77
Etobicoke Centre	34	21	120	204	8	14	253	1,167	17	77
Etobicoke North	114	10	113	191	8	13	237	1,093	16	72
Etobicoke- Lakeshore	139	4	150	254	10	17	315	1,452	21	96
Humber River- Black Creek	6	0	24	41	2	4	52	240	3	15
Parkdale-High Park	109	15	111	188	8	13	232	1,069	15	71
Scarborough Centre	17	2	37	63	2	4	79	366	5	23
Scarborough North	18	4	55	94	3	5	116	536	8	36
Scarborough Southwest	17	2	57	97	4	6	121	558	8	37
Scarborough- Agincourt	2	0	33	56	2	4	69	320	5	21
Scarborough- Guildwood	32	0	22	37	2	3	46	211	3	14
Scarborough- Rouge Park	83	10	95	161	6	10	200	921	13	62
Spadina-Fort York	675	24	116	197	8	13	245	1,128	17	76
Toronto Centre	273	21	62	105	5	9	129	595	8	39
Toronto-Danforth	64	12	73	123	5	9	153	704	10	47
Toronto-St. Paul's	86	2	89	151	6	10	187	863	13	58
University- Rosedale	347	5	140	237	9	16	292	1,347	20	90
Willowdale	116	1	107	182	7	12	226	1,041	15	69
York Centre	76	0	77	130	5	9	161	741	11	50
York South-Weston	19	2	37	63	2	4	78	360	5	24
Toronto	2,545	190	2,128	3,608	141	241	4,474	20,628	299	1,371



Source: NRCan, August 2024 / AECOM

\*More information on how the above estimates were derived can be found in “Appendix 2: Highlights of Modelling Methodology – EV Infrastructure Planning”.

The range of building types and higher levels of permit parking will require a variety of approaches to EV infrastructure placement, including off and on street EV charging, to serve both low rise residential and MURB residents.

407 of all Toronto public chargers are City-owned and operated by the TPA, the largest municipally owned operator of EV chargers in Canada.

Table 3 below shows the number of public EV chargers currently owned and operated by the TPA by ward. TPA is also undertaking site selection of over 100 potential on-street EV charging locations with design and implementation subject to further definition of on-street EV charging prioritization through the Approach to Public EV Charging to 2030.

*Table 3: TPA Managed Infrastructure (updated as of July 2024)*

Public EV Chargers (Provided by City/TPA)	Off-Street			On-Street		Total		
	Sites	L2	L3	Sites	L2	Sites	L2	L3
Beaches-East York	3	14	0	12	21	15	35	0
Davenport	2	24	4	1	2	3	26	4
Don Valley North	1	10	0	0	0	1	10	0
Etobicoke North	1	4	1	0	0	1	4	1
Etobicoke-Lakeshore	1	6	1	3	4	4	10	1
Humber River-Black Creek	0	0	0	1	2	1	2	0
Parkdale-High Park	2	14	3	7	14	9	28	3
Spadina-Fort York	9	109	8	4	8	13	117	8
Toronto Centre	3	26	4	2	2	5	28	4
Toronto Danforth	2	12	6	12	24	14	36	6
Toronto St. Paul's	5	49	1	1	2	6	51	1
University-Rosedale	5	50	2	4	8	9	58	2
Willowdale	0	0	0	3	6	3	6	0
York South-Weston	0	0	0	2	2	2	2	0
<b>Total</b>	<b>34</b>	<b>318</b>	<b>30</b>	<b>52</b>	<b>95</b>	<b>86</b>	<b>413</b>	<b>30</b>

Source: Toronto Parking Authority (July 2024)

### **Demand- and Utilization-driven Technical Projections**

In the early years of establishing EV networks, public charging requirements are broadly shaped by EV owners’ ability to charge at home (Natural Resources Canada). Toronto’s

model uses this assumption to forecast EV uptake in areas where home charging is challenging with the view that changes in EV adoption will take place over time as the market matures and vehicle and charger technologies evolve. While EV early adopters will likely have access to at-home charging, as EV markets mature, it is anticipated that increasing number of EV owners will not have access to home charging infrastructure (Natural Resources Canada). This method of planning for EV infrastructure is sometimes referred to as a “demand- and utilization-driven projection”.

The methodology (see Appendix 2 Highlights of Modelling Methodology – EV Infrastructure Planning) projects numbers of EVs from 2025-2040 in two scenarios – a “business as usual” scenario which uses current sales rates and a “100 per cent EV Sales by 2035” rate which matches the [federal government's EV sales mandate](#). The quantitative examination of public EV charging demand in Toronto has been developed through a staged process that has utilized existing baseline data to forecast adoption, public charging demand and subsequent charging infrastructure needs.

The results show that in the most ambitious scenario (100 per cent of EV Sales by 2035) by 2030, that 30 per cent of registered vehicles in Toronto would equate to 343,794 EVs. The projections also anticipate that 87 per cent vehicle sales will be electric by 2030 which is about 66,184 EVs.

*Table 4: Forecasted EV Registrations and Charging Infrastructure*

<b>Business as Usual</b>	<b>2025</b>	<b>2030</b>
EV Sales	6,280 (8 per cent)	8,760 (11 per cent)
EV Pop.	35,520 (3 per cent)	74,630 (6 per cent)
Public Level 3 Charging Ports	142	298
Public Level 2 Charging Ports	2,128	4,472
<b>100 per cent EV Sales 2035</b>	<b>2025</b>	<b>2030</b>
EV Sales	24,676 (32 per cent)	66,184 (87 per cent)
EV Pop.	60,144 (5 per cent)	343,794 (30 per cent)
Public Level 3 Charging Ports	241	1,371
Public Level 2 Charging Ports	3,608	20,628

Source: AECOM, 2021

Estimates of the volumes of chargers needed to ensure there is a network of chargers to support the above number of EVs in 2030, suggest that 20,689 public Level 2 chargers and 1,379 Level 3 chargers will be required. More detailed analysis will be undertaken on an annual basis alongside monitoring EV purchase at a ward level basis as part of the Approach implementation following adoption of this report.

## Jurisdictional Scan

Municipalities play a crucial role in public charging development because they manage the built environment and deliver public infrastructure. Municipalities have the challenging task of facilitating economic activity and supporting community development in an equitable and fiscally responsible manner. While upholding these responsibilities, City-provided charging should not expect a profit or a complete return on investment in their charging networks.

With specific reference to EVs, some key functions include:

- **Building codes and regulations:** Implement bylaws that mandate new buildings (residential and commercial) to support EV charging and adoption.
- **Permitting and approvals:** Streamline the permitting process for anyone looking to install charging stations. This reduces barriers to EV adoption and encourages investment in public charging infrastructure. Permitting processes should be examined to determine if it creates any barriers EV adoption.
- **Strategic placement on municipally owned properties:** Identify and invest in installing charging stations in select strategic public locations such as public parking lots, parks, and community centres. This expands accessibility and encourages residents who do not have private parking to consider EVs.
- **Leading by example:** Transition City fleet vehicles to electric models sends a strong message of commitment to sustainability and reduces local emissions directly. It can also help stimulate increased private sector participation over time (C40, 2023).
- **Creating financial and non-financial incentives:** Incentives to catalyze growth of the EV charging infrastructure for private and public operation and use will benefit all EV users. Boston and Vancouver, for example, encourage and ease the process for commercial businesses, organizations, and residents to install EV chargers in front or near their property. Other examples include incentivizing charger installation along major corridors, including gas stations.
- **Public education and awareness:** Play a role in educating residents on the benefits of EVs, charging options, and available rebates and incentives. Addressing misinformation, such as range anxiety and the need for exclusive at-home charging through educational campaigns and strategic partnerships.

To complement the city-provided network of public EV chargers, major cities have created public-private programs that allow third-party licensees to install and operate EV charging infrastructure on city streets: New York City (Plug NYC), Boston (License the Right-of-Way approach), Vancouver (The Commercial Curbside Electric Vehicle Charging Program), and Washington D.C. (The EV Charging Station Program). The

approach increases EV charging infrastructure through a cost-offsetting or a “no-cost to the city” model that de-risks local government and shifts the capital costs for installation and maintenance onto an external partner.

The approach increases EV charging infrastructure through a cost-offsetting or a no-cost to the city model, aside from the use of public right-of-way.

Common to all cities is the positive effect that collaboration with a diverse group of stakeholders has on building a robust and effective network. Examples of key stakeholders include utility companies, other levels of government, internal municipal departments, and commercial businesses however, consistently, the most important relationship has been with the local utility company or electricity provider.

Of the cities reviewed, charging networks initiated by local governments that had strong relationships with their utility provider appeared the most advanced in establishing their networks. Cities such as Montreal (Hydro Quebec), Vancouver (BC Hydro), Chicago (ComEd), and New York City (Con Edison) saw close cooperation and in some cases, co-delivery of programs:

- **New York:** Con Edison provided funding to New York City’s Curbside Level 2 Charging Project.
- **Vancouver:** The City of Vancouver better integrated their permitting process with their utility provider and lowered permitting costs. The impact of the more integrated and connected permitting process will have a positive impact for business owners, contractors, and reducing the City of Vancouver’s overhead costs. BC Hydro operates public chargers in Vancouver.
- **Montreal:** Hydro Quebec owns the EV charger network called the Electric Circuit and owns Level 3 chargers, some of which have been installed on City of Montreal properties. Hydro Quebec shares its contract for EV chargers with the City of Montreal, with uniform branding and infrastructure these chargers become a part of the Electric Circuit network.

However, it should be noted that in the examples cited above, the utilities are managed differently than in Toronto. For instance, Montreal and Vancouver have provincially owned utilities and New York City have utility companies that serve larger regions beyond the subject cities. Larger utility providers that are managed at the province- or state-level typically have more resources to contribute to a municipal-managed EV charging network.

Other successful partnerships have helped to address inequities. Some cities have formed partnerships with carshare services to promote the use of EVs. Carshares and rentals tend to be a more affordable option for low- and medium-income households who cannot afford a car nor have a dedicated parking spot. The City of Denver and County of Denver partnered up with a non-profit carsharing organization and the local housing authority to bring electric carshare vehicles to low- and medium-income multifamily public housing properties (Joint Office of Energy and Transportation, 2024).

## **Stakeholder and Public Consultation**

Stakeholder engagement was a key component that informed the direction of the Approach to Public EV Charging. From April 2022 to March 2024, Environment & Climate undertook a multi-phase stakeholder engagement consultation process. A diverse group of stakeholders were consulted, including gas station operators, residential properties, commercial and retail property sector, EV charging companies, NGOs, healthcare institutions, municipalities, fleets, and vehicle-for-hire operators. Internal consultation with over 18 City DACs were held, along with an inter-divisional working group and meetings to provide input on the development of the pathway forward and to coordinate roles and responsibilities.

The public consultations took place in September 2023 and were comprised of four in-person public meetings, two virtual public meetings, and an online survey that was open from September 1 to 30 (2,728 surveys were completed). The focus was on understanding the links between geographic location of respondents, the respondents' relationship to EVs (owner, prospective owner, or car share), housing type (apartment, townhouse, detached, etc.), and whether the respondent lives in a co-op, co-housing, rental property, or owned property.

More details on stakeholder engagement process is included in Appendix 4.

## **Public Charging Prioritization for the Vehicle-For-Hire Industry**

In October 2023, the City adopted a net zero by 2030 requirement for the vehicle-for-hire (VFH) industry except for wheelchair accessible vehicles and stretch limousines. The VFH industry consists of taxis, limos, and private transportation companies (PTCs), such as Uber and Lyft. The VFH industry contributes 4 to 6 per cent of the city's total transportation emissions and VFH operators travel three to four times more than passenger vehicles annually.

A substantial proportion of the VFH industry consists of lower-income individuals, and individuals who identify with equity-seeking groups.

Shifting to ZEVs creates a unique opportunity for the VFH industry to be highly visible leaders in working towards Toronto's climate action goals. Thus, the Approach to Public EV Charging to 2030 will consider the charging needs of the VFH industry as it moves to ZEVs by 2030. Key considerations that will be included for consideration will be the prioritization of Level 3 charging in the downtown area as approximately 60 per cent of VFH drivers do not live in the Toronto, which means drivers will be relying on fast chargers to minimize driver downtime.

Through the new governance structure proposed in this report staff from the City will have a dedicated focus to support the VFH industry shift to ZEVs.

## **CONCLUSION**

This Approach presents a governance structure and detailed information regarding the amount and type of EV charging that is projected to meet the needs of Toronto

residents until 2030. E&C will lead the overall strategy for continued expansion of Toronto's public EV charging network in collaboration with DACs and external partners as outlined in the *Public EV Charging Implementation Plan Governance Structure* discussed in this report.

Pending approval, E&C will initiate discussions with DACs to advance the next stages of implementing the Approach using the projections derived from technical modelling. Included as part of these discussions will be an evaluation of the costs of different levels and types of chargers corresponding to a neighbourhood's needs.

The City has a wide range of transportation, city building, land use policies, programs, and infrastructure initiatives. These initiatives are either underway or planned to encourage and support the transition away from the use of fossil fuels and increase the use of more sustainable transportation modes such as public transit, walking and cycling, and zero emission vehicles, where required. This proposed Approach supports the multiple options available to residents to travel carbon-free around the city now and into the future.

To ensure the Approach remains flexible and adaptable to constantly evolving technology and market conditions, updates will be highlighted as part of annual implementation updates.

## **CONTACT**

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## **SIGNATURE**

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## **ATTACHMENTS**

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Appendix 1: Overview of City of Toronto Strategies, Policies, Programs, and Initiatives  
Appendix 2: Highlights of Modelling Methodology – EV Infrastructure Planning  
Appendix 3: Electric Vehicle Strategy Objectives (adopted 2020)  
Appendix 4: Stakeholder and Public Engagement  
Appendix 5: Ward Level Profiles