Appendix A

Whistler Electric Vehicle Strategy

June 2022

Resort Municipality of Whistler
whistler.ca

WHISTLER

ACKNOWLEDGEMENTS

We would like to acknowledge the individuals who participated in the public survey and the following organizations who participated in an interview as part of the development of this Plan.

- Tourism Whistler
- Whistler Blackcomb
- Whistler Housing Authority
- Whistler Hotel Association
- Nineteen Mile Creek Strata Council
- WCS Engagement and Planning
- Spinal Cord Injury BC
- RMOW Accessibility department

This report was prepared by the Community Energy Association.

LIST OF ABBREVIATIONS

EV	Electric vehicle
BEV	Battery electric vehicle
PHEV	Plug-in hybrid electric vehicle
HEV	Hybrid electric vehicle
ICE	Internal combustion engine
KWh	Kilowatt hour
AC	Alternating current
DC	Direct current
DCFC	Direct current fast charger
EVSE	Electric vehicle supply equipment
L2	Level 2
MURB	Multi-unit residential building
SUVI	Specialty use vehicle incentive
ZEV	Zero emission vehicle

Contents

1 INTRODUCTION

1.1 The Role of Electric Vehicles in Climate Action

In December 2020, the Resort Municipality of Whistler (RMOW) Council adopted Whistler's 2020 Climate Action Big Moves Strategy and new climate target of reducing Whistler's greenhouse gas (GHG) emissions by 50 % below 2007 levels by 2030. Personal vehicle transport is Whistler's largest source of GHG emissions, accounting for 54% of Whistler's community-wide emissions in 2019 and 40% in 2020 due to reduced mobility because of the Covid pandemic restrictions. (Figure 1). Moving towards low carbon transportation is a key opportunity to reduce Whistler's community-wide GHG emissions and achieve its climate targets.

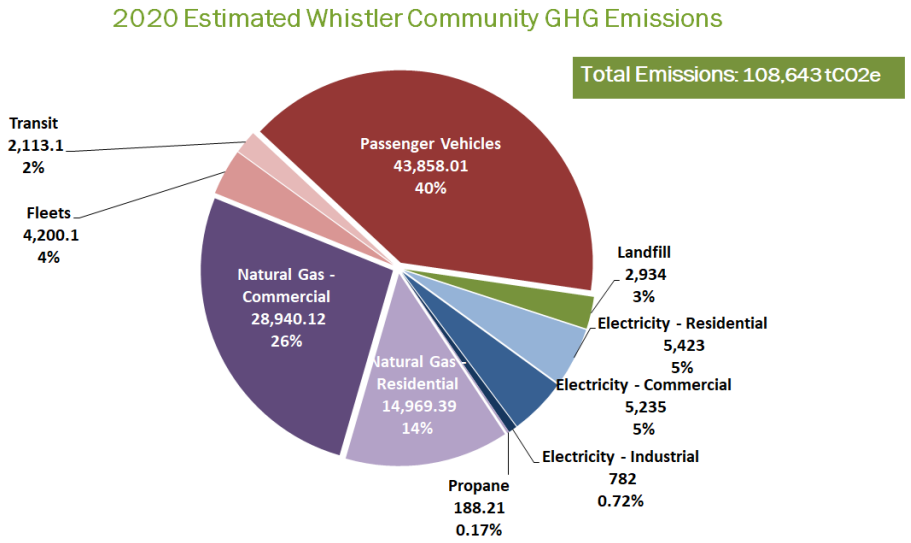


Figure 1: 2020 Estimated Whistler Community GHG Emissions

Whistler's approach to personal transport as stated in the transportation chapter of the Official Community Plan is to prioritize walking, cycling, transit, and other preferred modes over the single occupant vehicle and private automobile (OCP goal 11.4). Consequently, the first Big Move is to 'Move Beyond the Car' with the goal that by 2030 half of all trips within Whistler are done by active transport or public transit. Even with many initiatives underway that are focused on reducing reliance on passenger vehicles by encouraging residents to walk, cycle, and take transit for local trips, it will not be possible for all car journeys to be replaced by active transportation and transit. As such, private vehicles are expected to continue to be an integral part of Whistler's transportation network for the foreseeable future. The second Big Move, 'Decarbonize Passenger and Commercial Transport' encourages the replacement of traditional internal combustion engine vehicles with electric vehicles. A strategic and coordinated approach is necessary to decarbonize and electrify these remaining passenger vehicles in the context of prioritizing active modes of transportation and transit.

1.2 The Purpose of the Electric Vehicle Strategy

The purpose of this strategy is to identify actions the municipality can take to achieve the Big Move #2 goal that by 2030, 50% of all motor-vehicle km travelled are in zero-emission vehicles. This includes actions for residents, commuters and visitors, since all three groups contribute to the kilometers driven on Whistler's roads, and associated emissions. The strategy recognizes the unique needs and challenges faced by each group, and all three groups were included in the engagement process.

1.3 Methodology and Engagement

The engagement process consisted of targeted interviews and surveys. Ten stakeholders were identified for interview, eight of which were available to participate

- Tourism Whistler
- Whistler Blackcomb
- Whistler Housing Authority
- Whistler Hotel Association
- Whistler Chamber (unavailable)
- Nineteen Mile Creek Strata Council Representative
- WCS Engagement and Planning
- Spinal Cord Injury BC
- RMOW Accessibility department
- WRM Strata Management and Real Estate Services (unavailable)

A survey was launched by the RMOW and by Tourism Whistler and promoted via their usual channels to Whistler resident and visitors, respectively. The survey received 240 responses through the RMOW channels and 1200 responses through the Tourism Whistler channels. Survey respondents identified themselves as either a resident, commuter, or visitor, based on defined criteria, and were subsequently directed into the appropriate stream of the survey. Further details of the engagement process and a summary of survey results can be found in Appendix A.

Key findings from the engagement process were as follows.

- Residents who live in a strata (owners and renters) cited concerns around lack of access to home charging, and barriers to retrofit their building. Strata councils, property managers, and strata residents need education and support to navigate the EV charging retrofit process.
- Residents who rent their accommodation (strata or otherwise) cited concerns around lack of access to home charging.
- Residents, commuters and visitors all cited the need for more public charging. They want to see an increase in both Level 2 and DC fast charging stations.
- There is currently no accessible EV charging in Whistler. This must be addressed.
- Overnight visitors would like to charge their EV at their hotel, but hotel operators face many challenges when installing EV charging.
- Businesses and fleet operators need education and support to transition to EV's, and fleet charging needs must be addressed.

The scope of the strategy development included residents, commuters and visitors who drive passenger vehicles. Commercial vehicles and fleets are not the main focus of the strategy, however some recommendations are made. Other electric mobility options, such as electric bikes were outside the scope of this strategy,

2 ELECTRIC VEHICLES 101

2.1 What Are Electric Vehicles?

An electric vehicle (EV) is a vehicle that uses an electric motor as a source of propulsion.[1] This is in contrast to traditional vehicles which utilise an internal combustion engine (ICE). There are three main types of electric vehicles.

1. **Battery electric vehicles (BEV)** rely completely on the electric battery and motor to propel the vehicle. These vehicles store electricity onboard with battery packs. The battery is charged from an external source by plugging in to an outlet or charging station. A BEV does not use any gasoline or diesel and requires very little maintenance. New BEV's in 2022 typically have a driving range of 300 – 500 km on a single charge. Examples of a BEV's include the Nissan Leaf and all Tesla models.
2. **Plug-in hybrid electric vehicles (PHEV)** are equipped with electric battery and motor, in addition to an internal combustion engine. New PHEV's in 2022 typically have an electric-only range of about 30 – 80 km on a single charge, and will automatically convert to running on the internal combustion engine on longer journeys. A PHEV still uses gasoline or diesel, meaning that it is subject to all the maintenance required of an ICE vehicle (e.g. oil changes etc.). An example of a PHEV is the Mitsubishi Outlander.
3. **Hybrid electric vehicles (HEV)** have an internal combustion engine and charge a battery via the alternator or regenerative braking. These vehicles do not plug-in to charge. HEV's still use gasoline or diesel as their primary fuel source and therefore the vehicle is subject to similar maintenance as a traditional ICE vehicle. An example of a HEV is the Toyota Prius.

Will an EV battery need replacing, and if so, what happens to it?

Many EV manufacturers guarantee their batteries for at least 70% capacity remaining after 8 years (e.g., https://www.tesla.com/en_CA/support/vehicle-warranty). For an EV with a 450-500km range, that equates to a remaining capacity of 315 – 350 km. For many drivers, this reduced battery capacity will not warrant a replacement battery, as the range will still meet their daily or weekly driving needs. Some drivers, however, may choose to replace the battery at some point, which leads us to wonder what happens to the battery.

EV batteries can be repurposed for stationary applications, such as grid back-up. Alternatively, EV batteries can be recycled. Both established companies and start-ups are expanding business activities into recycling EV and other lithium ion batteries, with up to 95% material recovery (e.g., https://li-cycle.com/).

[1] https://pluginbc.ca/wp/wp-content/uploads/2018/10/Residential-EV-Charging-A-Guide-for-Local-Governments.pdf

2.2 How Are Electric Vehicles Charged?

Currently, there are three commonly used types of charging infrastructure, or electric vehicle supply equipment (EVSE). Electric vehicles have on-board equipment that converts alternating current (AC) to direct current (DC) for the batteries, which enables the use of Level 1 and Level 2 EVSE.

1. **Level 1 (AC) charging** uses a standard house plug (120V) and provides the slowest charging. It can be used for overnight charging or all-day charging at work. When charging overnight (8–10 hours), Level 1 EVSE can fully recharge most PHEVs and "top up" a BEV from a typical work commute.
2. **Level 2 (AC) charging** uses a dedicated 208V or 240V circuit like those used for clothes dryers. In addition to workplace installations, Level 2 chargers are generally the preferred option for home charging. Level 2 is also appropriate in public locations where cars generally park for one or more hours, which allows EV owners to top up their charge while shopping, recreating, or working.
3. **Direct current fast charging (DCFC)**, sometimes referred to as Level 3 charging, can provide about an 80% charge in 30 – 60 minutes[2]. Direct current fast charging is generally not considered suitable for residential installations due to the high cost of equipment, installation, and power requirements. Not all electric vehicles can plug into a DCFC charger. Additionally, different charging protocols exist, meaning one model of DCFC may not be accessible to all vehicles. An examples would be Tesla Superchargers, which are proprietary to Tesla vehicles.

[2] While DC fast chargers "fill" batteries rapidly at the beginning of a charging session, the rate of charge then tapers off. An 80% charge is therefore a normal charge to achieve at a DCFC station.

Benefits of EVs

1. You'll save on fuel costs
Electricity is not only cleaner than gas, it's also cheaper. Especially when you charge at home.

2. You'll save on maintenance
EVs have far fewer moving parts than gas vehicles, so there's a lot less that can go wrong. No transmission or exhaust system to maintain and no more oil changes!

3. You'll love driving it
Driving an EV is fun, fast and QUIET.

4. Breathe clean air
With no exhaust system, you won't be filling the air with pollution. Better for you and better for the planet.

5. Enjoy some perks
If you own an EV in BC you can apply for a HOV lane/EV permit and decal. This allows you to drive in HOV lanes even if it's just you.

5. Showcase your values
There are other social benefits to driving an EV. You're signaling that you and/or businesses value sustainability and this can inspire others to make low carbon choices too.

3 ELECTRIC VEHICLE MARKET TRENDS AND ELECTRIC VEHICLES IN WHISTLER

3.1 Electric Vehicle Market Trends

The Province of British Columbia passed the Zero Emission Vehicles Action (ZEV Act) in 2019. The ZEV Act requires automakers to meet an escalating annual percentage of new light-duty ZEV sales and leases[3]. The Act required 10% by 2025, 30% by 2030 and 100% by 2040. ZEV's accounted for 9.4% of sales in 2020, almost achieving the 10% target 5 years early. As such, the CleanBC Roadmap to 2030[4] detailed new light-duty ZEV sales targets; 26% by 2026, 90% by 2030, and 100% by 2035. The Roadmap also detailed plans for expanding BC's public charging network and bringing in "right to charge" legislation. In June 2021, the Government of Canada set a mandatory target for all new light-duty cars and passenger trucks sales to be zero emission by 2035, accelerating Canada's previous goal of 100 percent sales by 2040.

Whilst EV's are currently still more expensive to purchase then their ICE counterparts, Federal and Provincial rebates exist. The Provincial Clean BC Go Electric Program offers up to $3,000 and the Federal iZEV Program offers up to $5,000, therefore a total of $8,000 is available in rebates. In April 2022, the iZEV Progam's manufacturer's suggested retail price (MSRP) maximums increased, which increased the number of makes and models of eligible vehicles. An additional $500 rebate is available from SCRAP-IT, if your old ICE vehicle is scrapped. The purpose of these rebates is to narrow the gap between the cost of an EV and an equivalent ICE vehicle. The cost of an EV battery is rapidly decreasing, and as such, price parity may be reached in the next couple of years. At this point, rebates may no longer be offered.

The variety of EV models is rapidly expanding[5], and now includes trucks and SUV's. These are popular vehicle types with Sea to Sky drivers, and as such, may lead to an even greater EV adoption rate.

3.2 Electric Vehicles in Whistler

Whistler is a drivable market to regions of BC with the highest EV adoption rates. Driving distance from the lower mainland is approximately 120 – 160 km one way. This means charging infrastructure needs to be designed with pressures of visitor use, the commuter workforce needs, as well as resident access where at home charging is not available. *Figure 2* shows the growth in EV registrations in Whistler from 2016 to 2021. The decrease in registrations from 2020 to 2021 is believed to be an anomoly, since EV registrations in Metro

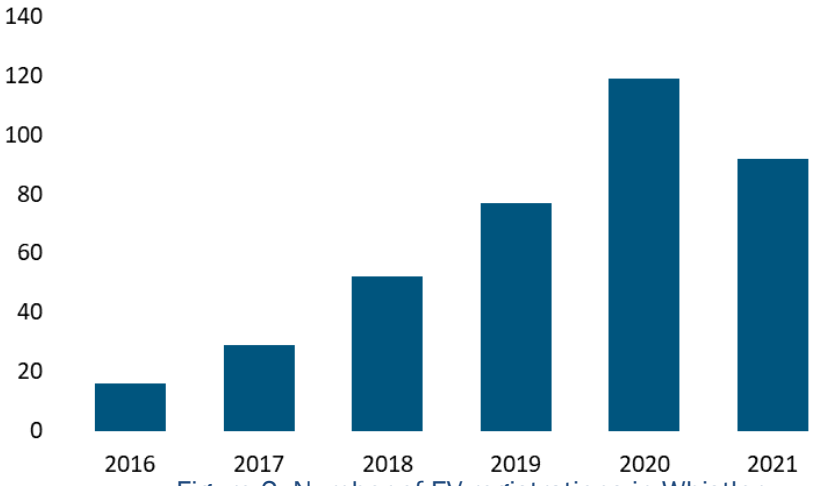


Figure 2: Number of EV registrations in Whistler

[3] https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/clean-transportation-policies-programs/zero-emission-vehicles-act

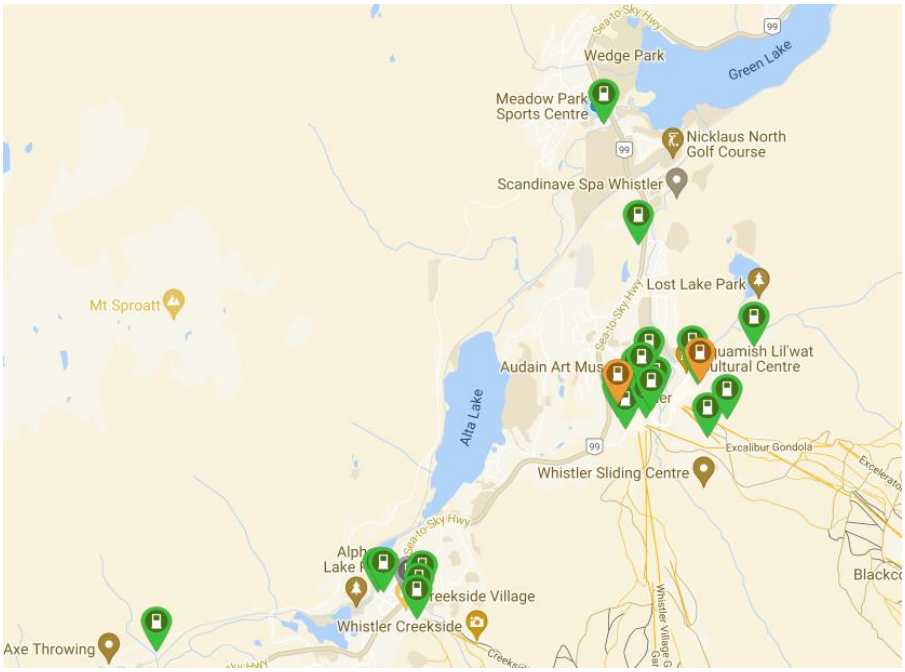
[4] https://www2.gov.bc.ca/assets/gov/environment/climate-change/action/cleanbc/cleanbc_roadmap_2030.pdf

[5] https://www.emotivebc.ca/library/

Vancouver increased from 27,329 to 40,694, a 49% increase over the same period[6].

3.3 Current Public Charging Infrastructure in Whistler

The RMOW currently owns and operates 18 networked Level 2 charging stations, with a total of 35 charging ports[7]. These are located in Day Lots 1, 2 and 4, as well as the Conference Centre underground and surface lot, Municipal Hall and the Public Works Yard. More details on charger locations and an analysis of current usage trends can be found in Appendix D.



Approximately 20 Level 2 charging ports are available at hotels in Whistler. BC Hydro owns and operates 2 DC fast charging ports in the Conference Centre underground parkade. The image is taken from plugshare.com and shows the locations of existing charging stations in Whistler.

3.4 Anticipated Future Public Charging Infrastructure Needs in Whistler

Whistler is a four-season resort that receives over 3 million visitors annually. It is also home to a year-round resident population of approximately 14,000 who live in a variety of accommodation types. Whistler's visitation is not evenly distributed throughout the year, nor by day of the week. Traffic count data indicates that peak levels are typically reached on Saturdays, Sundays and public holidays during the summer. This makes estimating future charging needs complex. Charging needs will need to be met by a combination of municipal infrastructure and third party providers such as Electrify Canada, Tesla, BC Hydro, and others, and also by accommodation and activity providers e.g. hotels and Whistler Blackcomb.

Appendix C – Future Charging Infrastructure Needs details the methodology used to estimate the number of EV chargers needed to meet demand in future years. Projections show that by 2025, an average of 1,000 EV's per day will travel in Whistler, with this number reaching 4,000 in 2030. By 2040, almost 100% of light-duty vehicles

[6] https://public.tableau.com/app/profile/icbc/viz/VehiclePopulationIntroPage/VehiclePopulationData

[7] https://rmow.maps.arcgis.com/apps/webappviewer/index.html?id=3177989c617e48c2865c3a3bff328ead

on Whistler's roads are expected to be electric. To meet the charging needs of these vehicles, it is estimated that Whistler will need either 178 public Level 2 charging ports, or 44 public DC fast chargers in 2025, rising to 348 Level 2 charging ports, or 87 DC fast chargers. As previously stated, charging stations may be provided by the RMOW, third party providers such as Electrify Canada, Tesla, BC Hydro, as well as hotel and activity providers.

4 KEY ACTIONS

4.1 Increase Access to Charging at Home

The process of charging up an EV is very different to refuelling an ICE vehicle. A driver can quickly top-up at a DC fast charger, plug-in at a Level 2 station for a few hours whilst shopping or skiing, or charge at home. Charging at home is typically the most convenient and cheapest option. Lack of access to home charging can be a barrier to EV adoption. Figure 3 shows the proportion of different housing types in Whistler[8]. Single family (and semi-detached) homes account for only 38% of Whistler's housing stock, with townhouses and apartments making up the other 62%. Most townhouses and apartments are part of a strata, and as such, it can be challenging to install EV charging. The following actions are designed to enable more residents to charge at home.

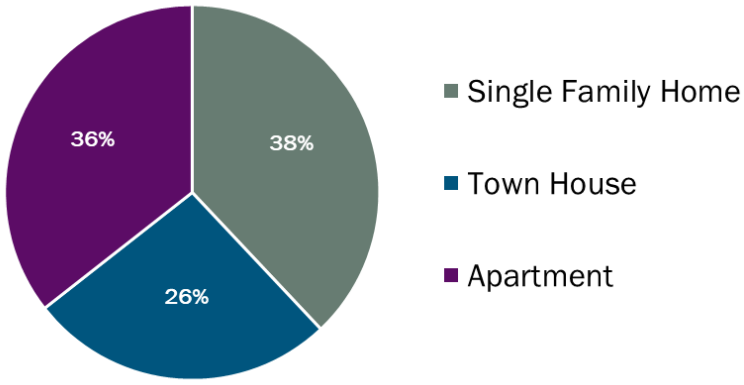


Figure 3: Proportion of Housing Types in Whistler

Timeframe: Short (initiated by end of 2023), Medium (initiated by end of 2025), Long (initiated 2026 or after)

Cost: $ (less than $10,000), $$ ($10,000 - $50,000), $$$ (more than $50,000)

	Initiative	Time-frame	Cost	Lead Department(s)	Partners
1.1	**Implement EV-Ready requirements in all new residential buildings** Require 100% of parking stalls in all new residential buildings (e.g. single-family, duplexes, townhomes and multi-unit residential buildings) to include an energized electrical outlet capable of minimum Level 2 charging. Investigate implementation by amending	Short	$	Planning	N/A

[8] https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/index-eng.cfm

	parking stall design standards[9] in Part 6 of Zoning and Parking Bylaw No. 303, 2015. Include requirements for universal design.				
1.2	**Provide EV charging infrastructure education for existing residential buildings** • Collaborate with partners (e.g. Plug-In BC) to bring awareness to occupants, strata councils, and property managers of the process to retrofit existing MURB's to provide energized electrical outlets in parking stalls capable of minimum Level 2 charging, including accessible stalls • Provide information to strata councils regarding EV charging reporting requirements pertaining to the Low Carbon Fuel Standard (LCFS), and the potential financial benefit of sale of credits. • Provide information to owners of single-family homes regarding the process to install Level 2 charging at home.	Short/ Ongoing	$	Climate Action, Communications	Plug-in BC, Emotive
1.3	**Promote and top-up provincial incentives** • Promote existing provincial incentives for the installation of EV charging in single-family homes, MURB's, and workplaces. • Explore topping-up incentives towards EV Ready Plans for existing MURB's. • Continue topping-up incentives towards the installation of EV charging in existing MURB's.	Short/ Ongoing	$ - $$$	Climate Action, Communications	BC Government through CleanBC communication channels
1.4	**Advocate for right to charge legislation** EV owners in MURB's with strata corporations are often refused when they ask to have charging infrastructure installed. To address this, advocate for 'right to charge' legislation at the Provincial level. An amendment of the BC Strata Property Act would require strata councils to accommodate reasonable requests from residents for EV charging infrastructure.	Medium	$	Climate Action	BC local governments

[9] Section 525 of the Local Government Act allows the municipality to set "design standards" for required parking spaces, "including standards respecting the size, surfacing, lighting and numbering of the spaces".

1.5	**EV car share in MURB's** Investigate opportunities to require an electric car-share vehicle in new MURB's, to reduce the need for second-vehicle ownership, and to provide access to low-carbon transportation for all income levels. Initiate conversations with car-share providers.	Short	$	Planning	Modo, Evo, etc.
1.6	**Enable affordable and equitable access to EV charging for all residents** Provide affordable access to publically available EV charging for renters, residents of strata corporations, and others without access to at-home charging. Access to municipally-owned public charging stations is enabled through the RMOW EV charger user fee strategy[10] by incentivizing turnover while keeping fees affordable.	Short	$	Climate Action	Daylot operating committee
1.7	**Provide training and capacity building for electricians** Through collaboration and partnerships, provide training opportunities for electricians to close knowledge gaps around EV charging. In particular around future proofing for load management and bi-directional charging.	Long	$	Climate Action	E.g., Power Pros Electrical

4.2 Expand the Public Charging Network

Whistler's visitors and commuters need access to public EV charging. Visitors from the lower mainland typically drive 120 - 150 km to reach Whistler and will therefore want to recharge before returning home. Commuters typically drive 35 – 70 km to reach Whistler and may also want to recharge. Residents of Whistler that lack access to home charging also rely on the public charging network. The Zero Emissions Vehicle (ZEV) Act requires the following light-duty ZEV sales as a percentage of total sales; 26% by 2026, 90% by 2030, and 100% by 2035. As such, Whistler can expect an exponential growth in EV charging demand between now and 2030. The following actions are designed to accelerate the expansion of the public charging network.

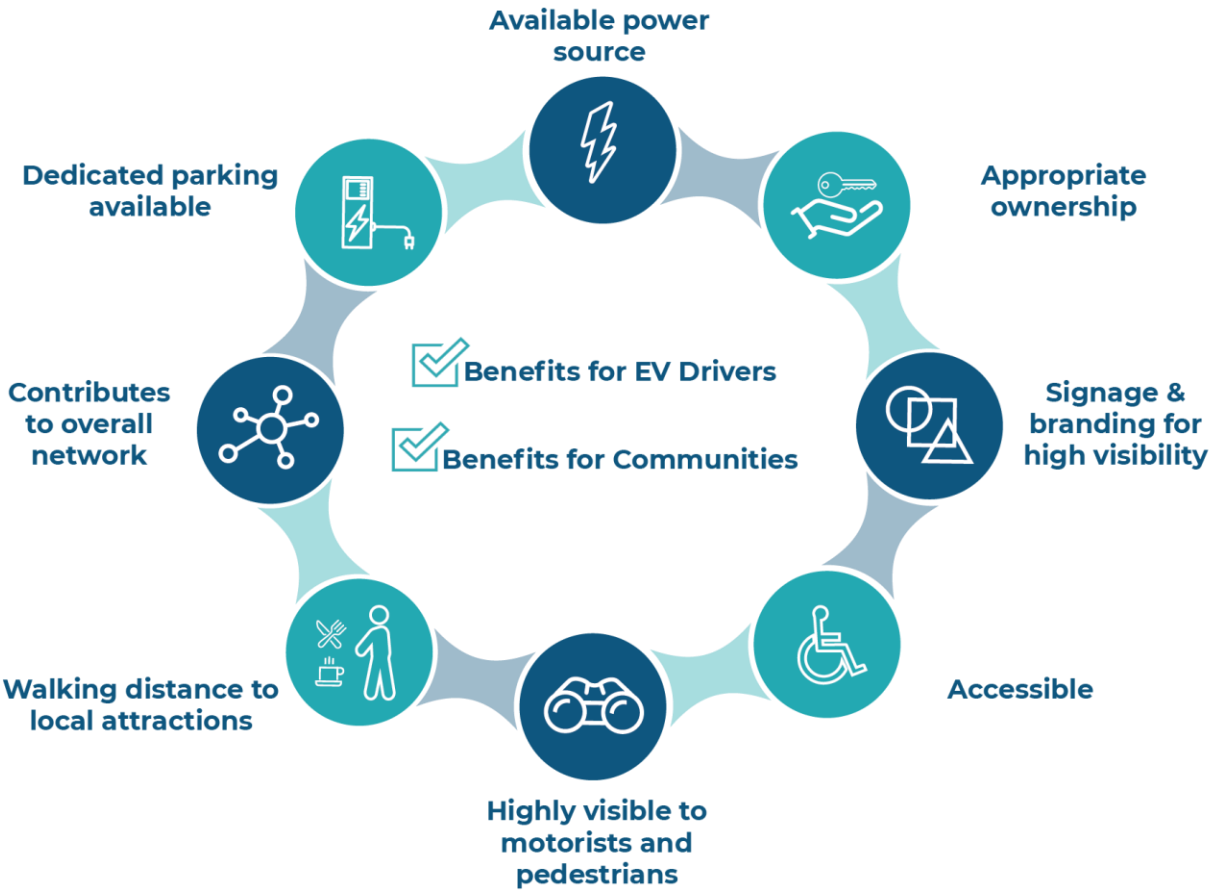
	Initiative	Time-frame	Cost	Lead Department(s)	Partners

[10] https://www.whistler.ca/climate-action/big-moves/2-decarbonize-passenger-and-commercial-transport

2.1	**Expand the municipal charging network** • Continue to add to the municipal charging network. Specifically, finalize the scan and mapping exercise to identify strategic locations for future Level 2 and DCFC stations (current location analysis in Appendix D) • Track and analyse usage data of charging stations to better understand demand and plan expansion. • Investigate implementing a bylaw to enforce proper use of charging stations (e.g. non-EV's in EV charging stalls). • Complete an analysis on the economic impact and opportunity presented by the Low Carbon Fuel Standard.	Short	$$$	Facility Construction Management, Climate Action	N/A
2.2	**Partner with utilities and private sector to expand the DC fast charger network** • Partner with third party providers to bring DC fast charging to Whistler. Consider issuing an RFP. • Work with BC Hydro to identify locations to expand their network.	Short	$	Planning	Tesla, Chargepoint, Electrify Canada, Flo, BC Hydro
2.3	**Require new gasoline service stations to provide alternative fueling options** Require new service stations to provide alternative fueling options, such as DC fast chargers or hydrogen fueling stations. Investigate appropriate approach, e.g. amending Zoning bylaw definition of a 'service station'. Alternative fuelling options should be universally designed.	Medium	$	Planning	N/A
2.4	**Implement EV-ready requirements in new non-residential buildings** Require a certain percentage (e.g. 10% to 40%) of parking stalls in all new institutional, commercial and industrial developments to include an energized electrical outlet capable of minimum Level 2 charging. Investigate implementation by amending the parking stall design standards in Part 6 of Zoning and Parking Bylaw No. 303, 2015. Include requirements for universal design.	Short	$	Planning	N/A

2.5	**Collaborate to expand the public charging network regionally** Partner with neighboring communities such as District of Squamish, Village of Pemberton, Squamish and Lil'wat Nation to expand and strengthen the regional charging network.	Medium	$$$	Climate Action	Local, regional governments, First Nations in the Sea to Sky corridor
2.6	**Collaborate with hotels to strengthen charging network** Partner with the Whistler Hotel Association and Plug-In BC to facilitate knowledge sharing and education around the installation of charging infrastructure in hotels.	Medium	$	Climate Action	Whistler Hotel Association
2.7	**Include EV charging in all new and existing municipal facilities** All new municipal facilities with parking should include a provision for EV charging.	Ongoing	$ - $$	Facility Construction Management, Fleet management	N/A
2.8	**Install accessible charging that adheres to best practice standards** Ensure equitable access to EV charging by adhering to best practice standards for accessible charging for new installations, for both municipally- owned and third-party stations.	Short	$$	Climate Action, Accessibility	Spinal Cord Injury BC, Rick Hansen Foundation

EV Charger Siting Criteria



4.3 Accelerate Electrification of Municipal and Commercial Fleets

The RMOW can demonstrate leadership by being an early adopter of fleet electrification, and encourage other fleet operators to do the same. The following actions are designed to accelerate the electrification of municipal and commercial fleets.

	Initiative	Time-frame	Cost	Lead Department(s)	Partners
3.1	**Develop a zero emissions municipal fleet strategy** • Consider adopting a fleet replacement policy that includes carbon tax and lifecycle cost analysis. • Increase the visibility of municipal electric vehicles. • Increase EV awareness of municipal staff	Short	$	Fleet management / Climate Action	N/A
3.2	**Increase EV awareness and adoption of local businesses and fleet managers** • Collaborate with partners (e.g. Plug-In BC) to bring awareness to local businesses and fleet managers of the opportunities presented by EV's. Promote incentives such as the Specialty Use Vehicle Incentive https://pluginbc.ca/suvi/ • Facilitate a local EV peer network of fleet operators to share resources and knowledge. Develop case studies highlighting local success stories from early adopters. • Encourage the electrification of taxis and ride-hailing companies.	Short	$	Climate Action	WB, Whistler Chamber, Whistler Hotel Association
3.3	**Conduct a feasibility study for fleet charging infrastructure** • Engage local businesses and fleet operators to understand future charging needs. Investigate opportunities for DC fast charging hubs for municipal and commercial vehicles. • Engage with BC Hydro on grid optimization and load management opportunities. Explore	Medium	$$	Climate Action	WB, Whistler Chamber, Whistler Hotel Association

	how to future-proof fleet charging facilities to ensure V2B[11] capabilities.				
3.4	**Support the electrification of school and transit buses** Engage School District 48 and BC Transit on the subject of electrification of buses.	Long	$$	Climate Action	School district
3.5	**Advocate for high-impact senior government policies** Advocate for high-impact senior government policies, programs and regulations aimed at medium-duty and heavy-duty ZEV's, and other low carbon options.	Long	$	Climate Action	N/A

4.4 Accelerate Individual Adoption of EV's

While over 90 Whistler residents have already embraced the transition to EV's, others may have lingering doubts about the technology. Big Move #2 targets 50% of all km travelled to be by zero emission vehicles by 2030. The following actions are designed to increase awareness of EV's and accelerate individual adoption.

	Initiative	Time-frame	Cost	Lead Department (s)	Partners
4.1	**Advocate to provincial and federal governments to maintain EV incentive programs** Advocate for maintaining EV incentive programs until there is price parity with ICE vehicles.	Ongoing	$	Climate Action	Province of BC
4.2	**Increase EV awareness** • Increase resident and commuter awareness of EV's through a comprehensive awareness campaign. Continue to share case studies of local 'EV ambassadors' through workshops and social media.	Ongoing	$	Climate Action	Plug-in BC, Emotive

[11] Vehicle to Building (V2B) and Vehicle to Grid (V2G) technology enables bi-directional charging, i.e. an EV can be used to power a building, or supply electricity to the grid.

	• Partner with Tourism Whistler to bring awareness of EV's to regional visitors.				
4.3	**Increase charging station visibility** Increase the visibility of local charging stations through signage and celebrate the installation of new charging infrastructure through media channels. Partner with the Whistler Hotel Association and Plug-In BC to increase visibility of charging infrastructure in hotels.	Medium /Long	$$	Climate Action, Communications	Plug-in BC
4.4	**Track and communicate relevant metrics** Track key performance indicators (KPI's) and report to Council and communicate to the public.	Ongoing	$	Climate Action	N/A
4.5	**Partner with dealerships and Emotive to bring EV test drives to local events** Nothing beats the first-hand experience of driving an EV. Partner with dealerships in the region, and Emotive, to bring EV test drives to local events. Invite local early adopters and host a high profile technology familiarization event.	Medium	$	Climate Action	Emotive, Car dealerships

5 IMPLEMENTATION AND MONITORING

The following table provides a description of key performance indicators and data sources. Annual progress reporting should be planned.

	Indicator	Measures of Success	Data Source	2030 Goal	Current state (2020)
1.	Number of public EV charging stations	Increase in number of L2 and DCFC charging stations	Websites e.g. https://www.plugshare.com/	348 Level 2 or 87 DC fast chargers, or an equivalent combination.	35 RMOW (networked) 3 RMOW (not networked) 2 BC Hydro DCFC
2.	Average daily utilization of chargers	Public charging availability is balanced with demand	Usage data of RMOW owned and operated chargers. Consider requiring third party/commercial charging stations to share this data with the RMOW as part of the operating agreement.	All chargers are in use on average between 40 % and 75% of the daytime, i.e. 8am to 5pm.	September 2021 – January 2022 Lot 1 – 35% Lot 2 – 26% Lot 4 – 55% Lot A – 19% Municipal Hall – 13% Public Works Yard – 19%
3.	Availability of chargers on weekends – Percentage of chargers in day lots available at 10am on a Saturday	Sufficient charging stations to meet the needs of visitors and commuters during peak times	Usage data of RMOW owned and operated chargers	35% average availability at 10am on Saturdays	January 2021: 30% average availability at 10am on Saturdays
4.	Availability of chargers mid-week – Percentage of chargers in day lots available at 10am on a Wednesday	Sufficient charging stations to meet the needs of visitors and commuters during non-peak times	Usage data of RMOW owned and operated chargers		January 2021: 66% average availability at 10am on Wednesdays
5.	Number and percentage of passenger EV registrations	Increase in number and percentage	ICBC data	50% of all vehicles registered in Whistler are EV	Number: 121 Percentage: 1.8%

	Indicator	Measures of Success	Data Source	2030 Goal	Current state (2020)
6.	Number of MURB's that have retrofitted EV charging	Increase in MURBs with EV charging	Rebate top-ups provided by the municipality	100% of strata units have undergone an EV ready plan	1 strata has prepared the plan
7.	GHG emissions from passenger vehicle traffic in Whistler	Decrease in GHG emissions	RMOW traffic counter data and vehicle type data from Statistics Canada	50% reduction in GHG emissions from passenger vehicles compared to 2007 35,400 tCO_2e	43,858 tCO_2e

APPENDIX A – PUBLIC AND STAKEHOLDER ENGAGEMENT

Stakeholder Engagement

Interviews were conducted with the following organizations to inform elements of the strategy.

- Tourism Whistler
- Whistler Blackcomb
- Whistler Housing Authority
- Whistler Hotel Association
- Nineteen Mile Creek Strata Council Representative
- WCS Engagement and Planning
- Spinal Cord Injury BC
- RMOW Accessibility department

Whistler Chamber were contacted, but no response was received. WRM Strata Management and Real Estate Services were also contacted, but were unavailable for interview.

Public Engagement

The public were engaged via a survey, during the months of December 2021 and January 2022. Residents, commuters, and visitors were engaged via a survey hosted by the RMOW, which received 240 responses. Respondents identified themselves as either a residents, commuter or visitor according to the following definitions. A parallel survey was hosted by Tourism Whistler, aimed at visitors only, which received 1200 responses.

Resident – Lives in Whistler full time or has a secondary residence in Whistler

Commuter – Commutes to Whistler for work (e.g. from Mount Currie, Pemberton, or Squamish)

Visitor – Visits Whistler (e.g. weekly, monthly, or annually) for tourism and recreation

Residents, commuters and visitors were asked about their priorities for future charging stations in Whistler. The data in the following table demonstrates that there is not a strong preference for either Level 2 or DC fast charging, rather a preference to increase the number of both proportionately.

	Resident	Commuter	Visitor
Prioritize Level 2 chargers	18%	29%	16%
Prioritize DC fast chargers	28%	17%	23%
Increase the number of Level 2 and DC fast chargers proportionately	37%	50%	38%
Don't know/No preference	17%	4%	23%

The following tables present a summary of responses to open-ended questions from the public survey.

Residents

People living in strata: Real or anticipated challenges associated with charging at home	# of comments
Issues with electrical capacity & electrical service to a parking spot	28
High cost of charging infrastructure	12
Difficult to get support from strata owners (esp. non EV drivers)	8
No place to put charging infrastructure and/ or parking spaces far from building	8
EV charging is currently being researched or worked on at residents' stratas	8
Difficulty with who pays charging costs (when plug-ins aren't associated with living unit)	4

Owners of strata do not have technical knowledge associated with EV charging	3
Need policy at municipal level to incentivize EV charging stations in stratas	2
There is a lack of parking space (especially in winter)	2
Need approvals from municipality	2
There may be stranded assets if charging technology changes	1
There are not enough public chargers to supplement at-home EV charging	1
Potential for charger damage from snow or plowing	1
People living in rental units: Real or anticipated challenges associated with charging at home	**# of comments**
No access to EV charging at rental unit	3
No individual parking for unit where resident can charge EV	3
Landlord will not install charger/ does not allow EV charging	3
Difficulty with who pays charging costs (when plug-ins aren't associated with living unit)	2
Issues with electrical capacity & electrical service to a parking spot	2
There are not enough public chargers to supplement at-home EV charging	1
There is a lack of parking space (especially in winter)	1
All residents: Comments on benefits and challenges of EV ownership, and how charging options could be improved	**# of comments**
Need more public chargers in Whistler	21
Need more fast chargers in Whistler	20
Charging fees at public charging stations disincentivize EV use	10
Need funding for retrofits and education about charging infrastructure for strata and rental owners	7
Cost of EV is prohibitive, especially when paired with high cost of living in Whistler	6
EV performance in winter is a worry (not enough clearance and battery range in cold temps)	5
Municipality should not subsidize any EV costs (e.g. charging) & EV ownership should not be incentivized	5
Need for chargers in stratas/ rentals	5
Issue with having to pay for parking in addition to charger use	4
Happy owner of EV	4
There should be increased charging capacity at Meadow Park	4
Need for incentives to increase EV ownership (such as prioritized/ free parking)	3
Need to stop EVs from parking at charging stations once charge is complete	3
Need policy to include charging stations in new builds	2
Range anxiety	2
Need public charging in Cheakamus/ Function	2
EV drivers should not have to pay full price when two cars are charging at once because amps are cut in half	1
Overall electric capacity in Whistler is an issue	1
Lack of EV repair and maintenance options	1
Increased supply needed - waitlists, especially for AWD	1
Whistler could use EV car sharing service	1

Commuters

Commuters: All Comments	# of comments

EV drivers should not have to pay full price when two cars are charging at once because amps are cut in half	1
Make sure public charging rates don't increase	1
Upfront cost (to purchase EV) is prohibitive	2
Need more public chargers in Whistler	2
Meadow Park needs more charging capacity	2
Need more fast chargers in Whistler	1
Employers should have charging stations	1
Chargers didn't work in cold/ winter conditions	1
Can aging multi-level parking infrastructure handle weight of electric vehicles?	1
Range anxiety	1

Visitors

Visitor priorities and concerns focussed on charging. Many visitors felt that there is not enough charging in Whistler, both in parking lots and in hotels. Whilst some visitors want to see more DC fast charging, many said that charging at a Level 2 station for several hours whilst skiing was convenient. There did however seem to be some confusion around the length of time that an EV could be left charging at a Level 2 station in the Day Lots. Some visitors believed that they would have to return to their vehicle part way through the day to move it, and they saw this as a barrier.

Whilst some visitors already owned an EV, or planned to purchase an EV for their next vehicle, there were some misconceptions around EV's. Misconceptions included cost to charge, battery range, and recycling of batteries. Some visitors had concerns regarding the cost to purchase an EV compared with an ICE vehicle.

APPENDIX B – ANALYSIS OF CURRENT CHARGING STATION USAGE

The RMOW currently owns and operates 18 networked Level 2 charging stations, with a total of 35 charging ports. All stations are dual port, with the exception of one station at the Conference Centre surface lot, which has a single port. There are 3 additional charging ports at Meadow Park sports centre, however, they are not networked. The following table summarises the networked municipal charging infrastructure. None of the existing municipal public EV charging stations are accessible.

Location	Charging Station Name	Dual or Single Port	Accessible
Day Lot 1	LOT 1-UNIT 1	Dual	No
	LOT 1-UNIT 2	Dual	No
	LOT 1-UNIT 3	Dual	No
	LOT 1-UNIT 4	Dual	No
Day Lot 2	LOT 2-UNIT 1	Dual	No
	LOT 2-UNIT 2	Dual	No
	LOT 2-UNIT 3	Dual	No
	LOT 2-UNIT 4	Dual	No
Day Lot 4	LOT 4-UNIT 1	Dual	No
	LOT 4-UNIT 2	Dual	No
	LOT 4-UNIT 3	Dual	No
	LOT 4-UNIT 4	Dual	No
Conference Centre Surface Lot	LOT A-UNIT 1	Dual	No
	LOT A-UNIT 2	Dual	No
	LOT A-UNIT 3	Single	No
	LOT A-UNIT 4	Dual	No
Municipal Hall	MUNICIPAL HALL	Dual	No
Public Works Yard	MUNICIPAL YARD1	Dual	No

To analyse the use of the existing RMOW charging infrastructure, two key performance indicators were identified and defined.

Daytime utilization – is defined as the average percentage utilization of chargers between 8am and 5pm over a defined period of time e.g. three months.

Peak time availability – is defined as the number and/or percentage of chargers available at a specific time of day e.g. 10am on Saturdays.

The following table shows the average daytime utilization (8am to 5pm) between September 16th 2021 and January 30th 2022. The data is aggregated by location, and shows that chargers in Lot 4 had the highest utilization rate over that period.

Location	Average Daytime Utilization of Chargers (8am to 5pm)
Lot 1	35%
Lot 2	26%
Lot 4	55%
Lot A	19%
Municipal Hall	13%
Public Works Yard	19%

The following table shows the availability of charging ports in the Day Lots (1, 2 and 4) at 10am on a Saturday. As can be seen, existing charging infrastructure was almost at full capacity on Saturday mornings in January 2022.

Date	Number of ports available in Day Lots at 10am on Saturdays	Percentage of ports available in Day Lots at 10am on Saturdays
18th December 2021	11	46%
25th December 2021	16	67%
1st January 2022	15	63%
8th January 2022	10	42%
15th January 2022	7	29%
22nd January 2022	6	25%
29th January 2022	6	25%

The following table shows the availability of charging ports in the Day Lots (1, 2 and 4) at 10am on a Wednesday. As can be seen, existing charging infrastructure was sufficient to meet demand on Wednesday mornings in December 2021 and January 2022.

Date	Number of ports available in Day Lots at 10am on Wednesdays	Percentage of ports available in Day Lots at 10am on Wednesdays
15th December 2021	12	50%
22nd December 2021	9	38%
29th December 2021	11	46%
5th January 2022	13	54%
12th January 2022	18	75%
19th January 2022	16	67%
26th January 2022	16	67%

APPENDIX C – FUTURE CHARGING INFRASTRUCTURE NEEDS

Whistler is a four-season resort that receives over 3 million visitors annually. It is also home to a year-round resident population of approximately 14,000 who live in a variety of accommodation types. Whistler's visitation is not evenly distributed throughout the year, nor by day of the week. Traffic count data indicates that peak levels are typically reached on Saturdays, Sundays and public holidays during the summer. This makes estimating future charging needs complex. Charging needs will not only be met by municipal infrastructure, but also by third party providers such as Electrify Canada, Tesla, BC Hydro, and others, and also by accommodation and activity providers e.g. hotels and Whistler Blackcomb.

Modelling Methodology

The annual average numbers of electric vehicles (EVs) and maximum number of EVs per day were estimated based annual projections for traffic in Whistler (see Figure *4*)[12]and taking into account the ZEV sales targets outlined in the CleanBC roadmap to 2030[13]. The projections show in 2025 an average of over 1,000 EVs per day drive within Whistler[14] and over 4,000 by 2030. By 2040, almost 100% of light-duty vehicles on our roads are expected to be electric.

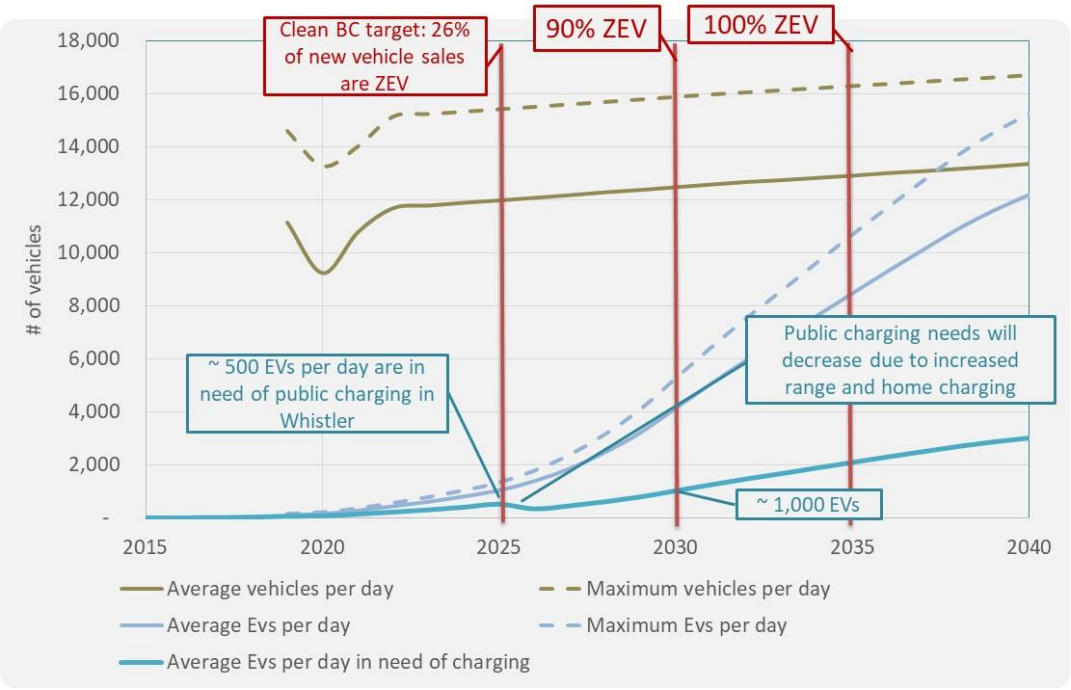


Figure 4: Estimated average daily amount of vehicles and electric vehicles coming to Whistler (solid lines), estimated maximum daily amount of vehicles and electric vehicles coming into Whistler (dotted lines), and estimated average number of electric vehicles in need of charging per day from years 2019 to 2014.

While many of these EVs will be charging at home and at other locations along the way, it can be expected that a large proportion will be in need of a full charge or a small top-up. In fact, it is expected that in 2025, about 500 EVs per day will be in need of public charging, assuming that 50% of EVs coming into Whistler will require at least a top-up. After year 2025, it is assumed that the percentage of EVs in need of charging decreases to 25% due to increased range and home charging capabilities. However, even with the increased range and home charging capabilities, over 1,000 EVs are expected to require public charging by 2030.

The anticipated public charging demand can be met by both Level 2 and DC fast chargers. While Level 2 chargers are more economical to install and operate, DCFC's can accommodate up to 4 times as many EVs. Figure 5 shows the estimated amount of publically available Level 2 or DCFC chargers needed to meet future public charging demand. Realistically, a combination of Level 2 and DCFCs will need to be installed.

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[12] These traffic projections are based on a population projection of visitors and residents given the approved bed unit capacity per the latest OCP. If the OCP is revised to allow for more development, we would likely see an increase in the amount of visitors and residents, resulting in even more traffic! It also assumes no major changes to transit uptake or sea-to-sky transit options (train, bus, etc.), or visitation behaviours (i.e. the amount of days people stay in whistler on average).

[13] https://www2.gov.bc.ca/assets/gov/environment/climate-change/action/cleanbc/cleanbc_roadmap_2030.pdf

[14] Data taken from the traffic counter at Brio.

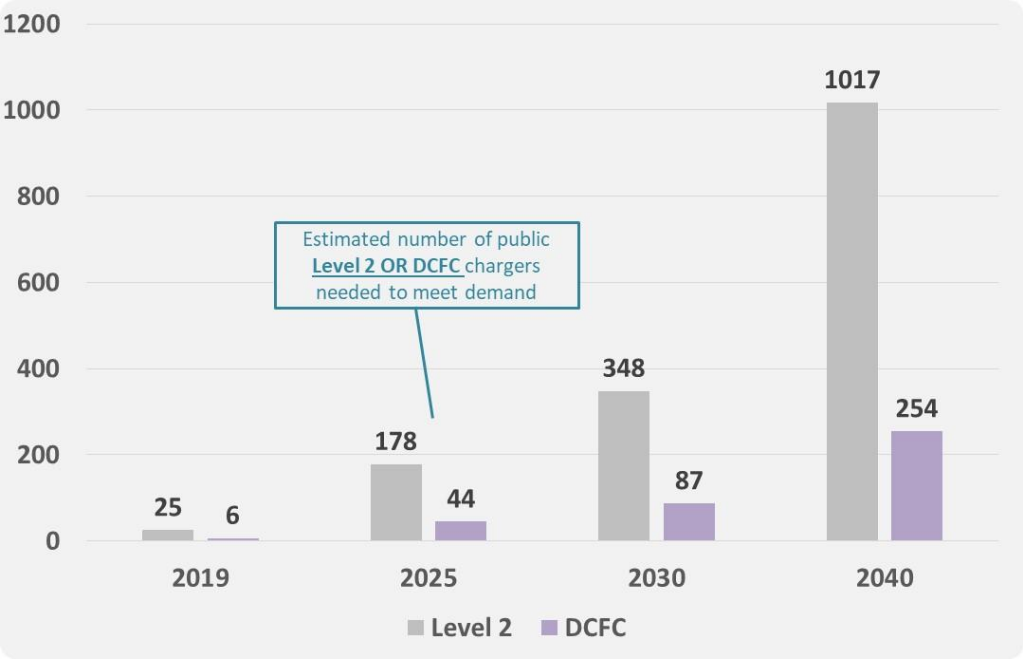


Figure 5: Estimated number of EV charging stations required by year

Further Considerations

The growth in demand for public charging is likely to be driven by visitors arriving by personal vehicle from the lower mainland. Day visitors will want to charge between 8am and 4pm, leaving charging stations vacant in the evenings. The charging infrastructure could therefore be optimized by incenting local residents to charge outside of peak visitation (i.e. after 5pm and/or during the week), to alleviate pressure at peak times.

Whistler's charging infrastructure needs cannot be considered in a vacuum. Squamish is a strategic location for EV charging, as it is about halfway from Vancouver to Whistler. Visitors may choose to top-up at a DC fast charger in Squamish on their way back to the lower mainland, rather than in Whistler.

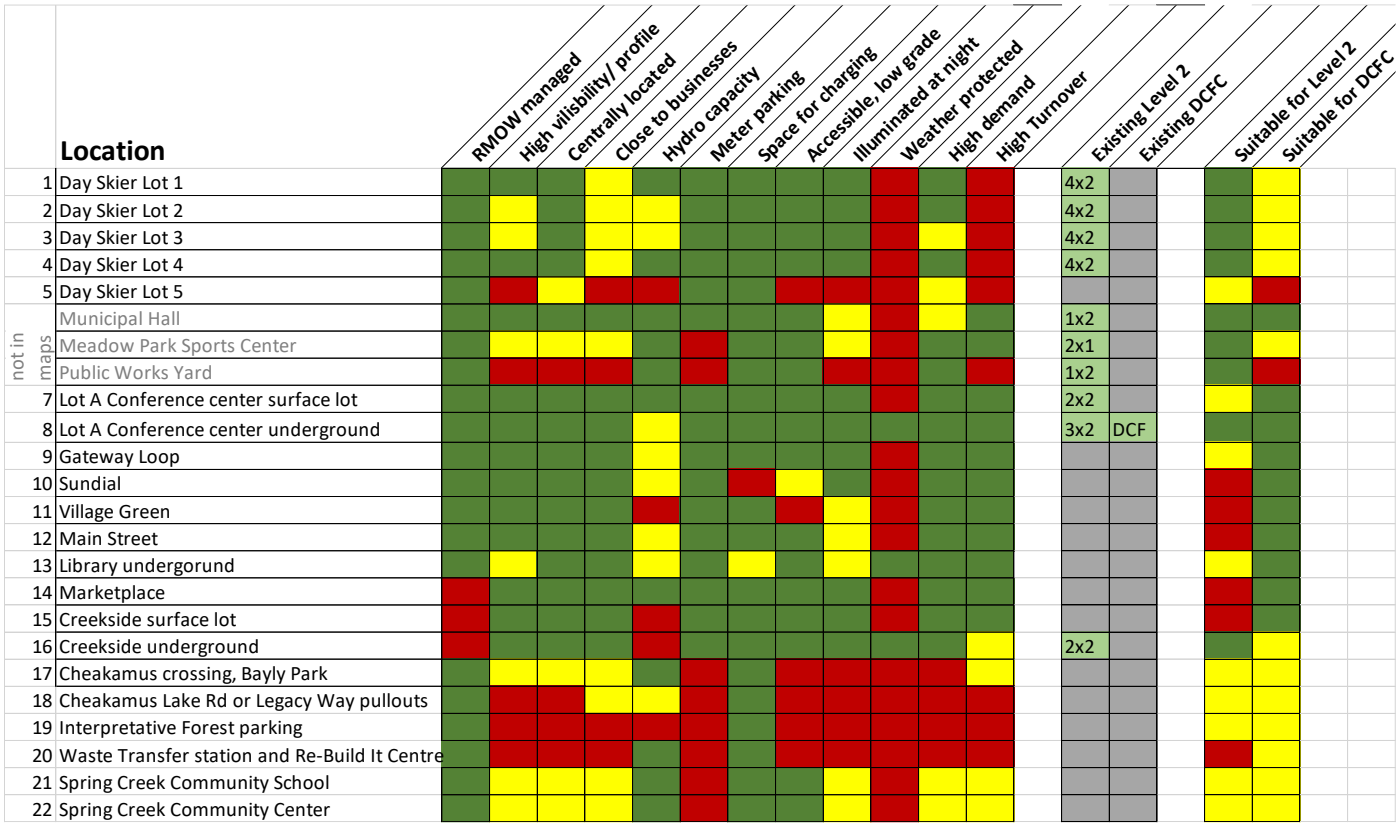
A practical approach to expanding charging infrastructure, is to closely monitor current charging usage and plan accordingly. Looking at overall monthly usage is not granular enough. Monitoring usage at peak times, e.g. Saturdays during the winter or summer season, is essential in order to understand if the current charging infrastructure is sufficient. Another approach to planning for future charging infrastructure is to recognise that historically, the number of EV's in the lower mainland has doubled every 1 – 2 years, and therefore it may be reasonable to assume that the number of EV charging stations in Whistler will need to double every 1 – 2 years, at least until home charging is more prevalent and vehicle range is greater.

APPENDIX D – PROPOSED LOCATIONS FOR NEW CHARGERS

An EV charging station location analysis was performed to identify strategic and suitable locations to expand Whistler's publically accessible Level 2 and DC Fast chargers. Criteria such as central location, accessibility, high demand, and turnover were taken into account to evaluate what type of charger is best suited for the proposed locations.

Below is a table of all locations that were part of the evaluation. Maps identifying the location number are provided with location markers.

Table 1: Location analysis to identify suitable locations for future charging needs in Whistler



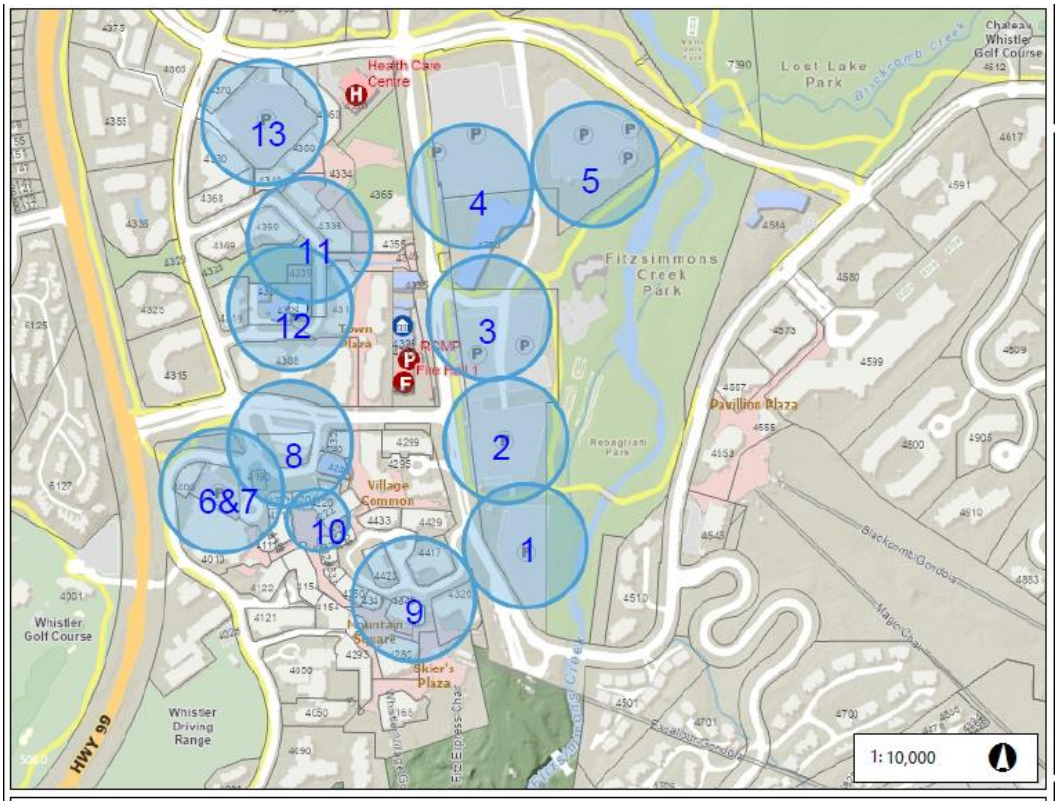


Figure 6: EV charger location analysis in the Whistler Village (numbers refer to location numbers in the table above)

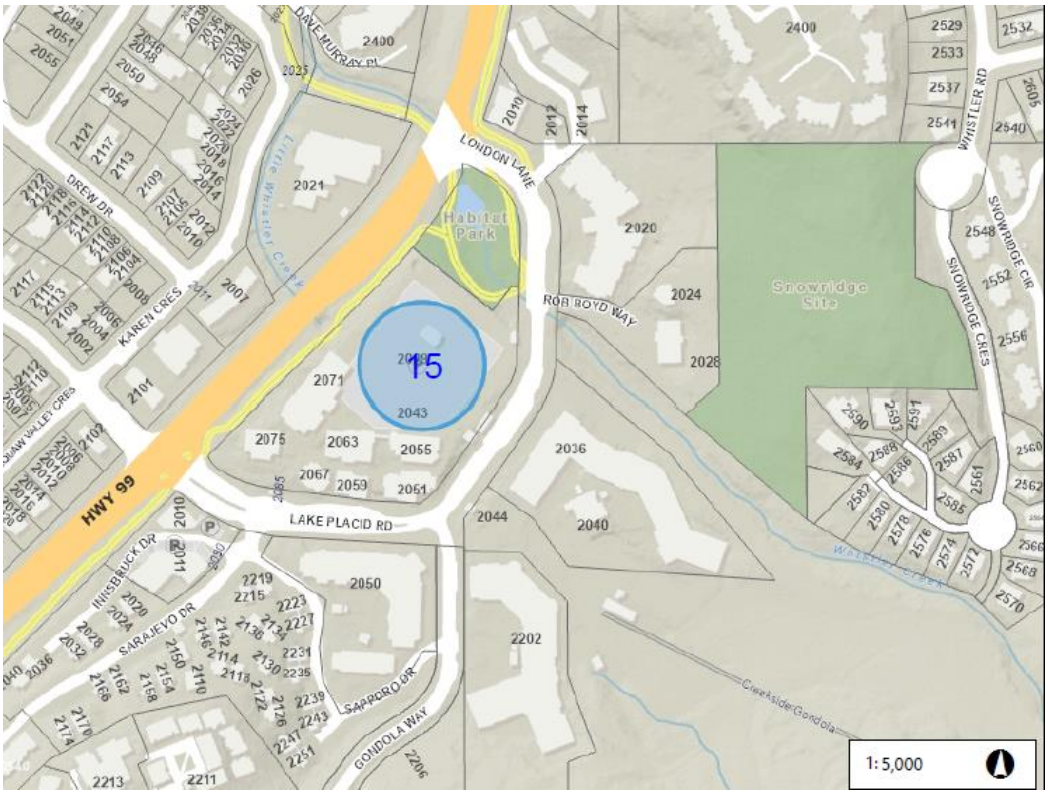


Figure 7: EV charger location analysis in Creekside (numbers refer to location numbers in the table above)

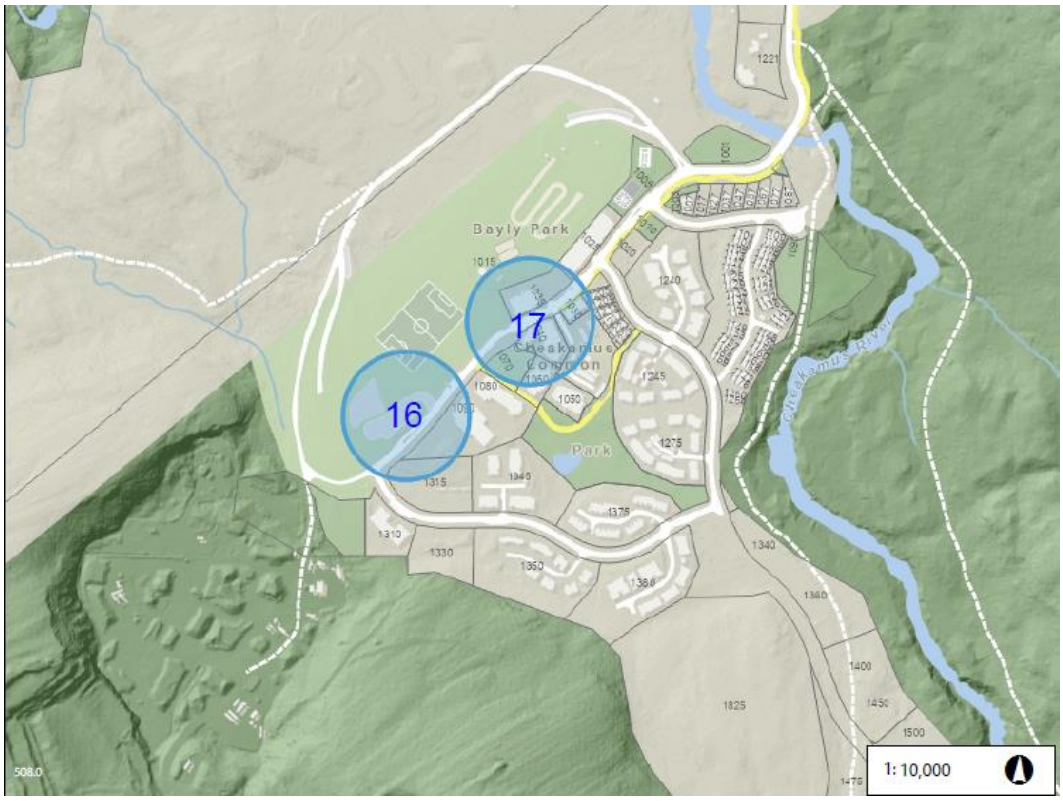


Figure 8: EV charger location analysis in Cheakamus (numbers refer to location numbers in the table above)

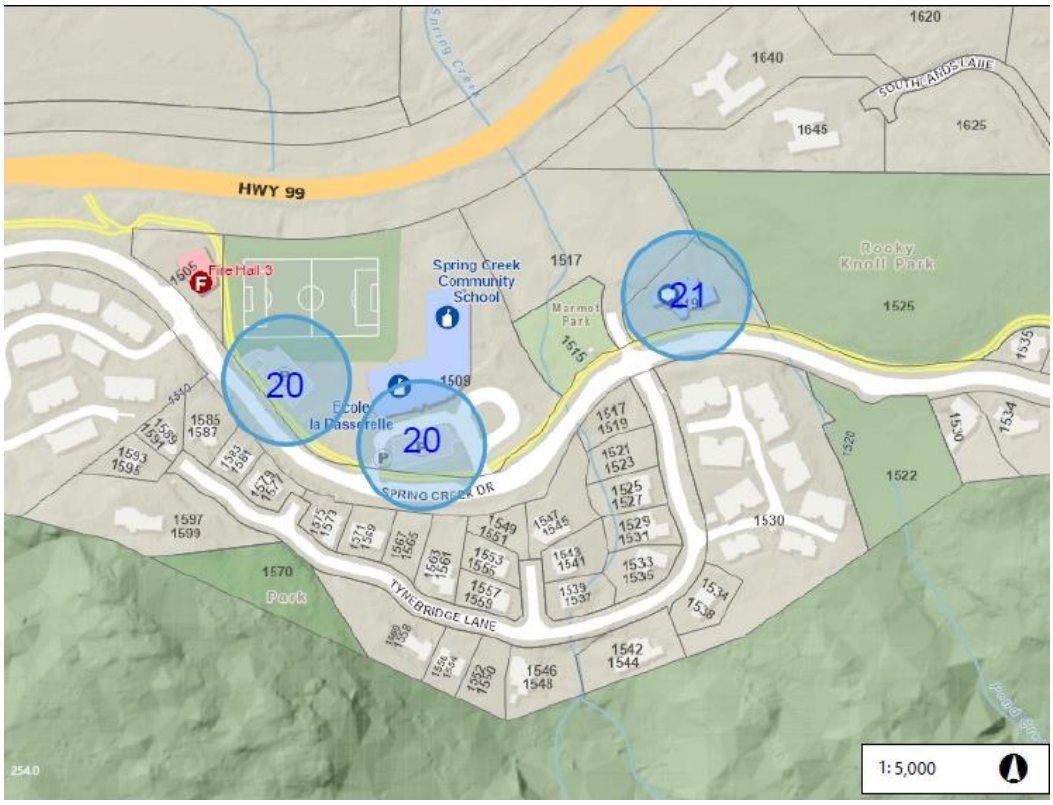


Figure 9: EV charger location analysis in Spring Creek (numbers refer to location numbers in the table above)

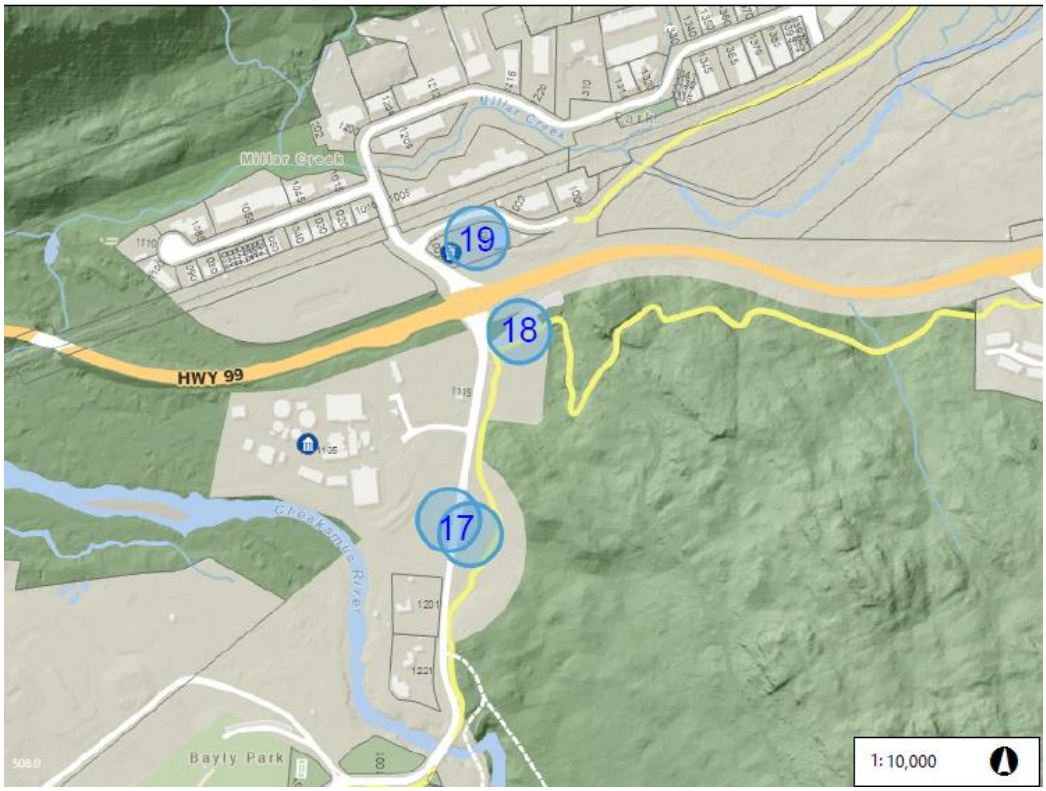


Figure 10: EV charger location analysis in Function Junction (numbers refer to location numbers in the table above)

APPENDIX E – ACCESSIBILITY BEST PRACTICES FOR EV CHARGING STATIONS

A publication by BC Hydro in 2021 'EV Fast Charging: Design and Operational Guidelines for Public DCFC Stations in British Columbia'[15] includes accessibility guidelines. The 'Focus on barrier-free and accessible station design elements' includes the following recommendations.

- **Bollards** A distance of about 1.2 metres (4 feet) to 1.7 metres (5.5. feet) between bollards should protect the charger from damage and allow for access to station. Also ensure there is enough space around the charger to be able to manoeuvre a wheelchair, for example.
- **Surface** The parking stall surface and the area around the charger should have a firm, slip-resistant and level surface using concrete or asphalt. Do not use gravel.
- **Grade** Ensure the entire area, including the charger, is on grade. Some drivers might experience difficulty transporting the charging cable even if there is a minor slope.
- **Concrete pad** When using a precast concrete pad for a fast charger, the pad should be elevated flush with grade so as to not make it difficult to reach the screen or charging cables. If the concrete pad cannot be flush with the grade, consider an access ramp.
- **Signage** All signage and instructions for using the charger should use a clear and easy-to-read font.
- **Accessible stall dimensions** If you have the space, ensure the stall is at least 3.7 metres (12 feet) wide which includes at least 1.5 metres (5 feet) for entering and leaving a vehicle. This will provide adequate space for parking and an access aisle for reaching the charger. Even if your stall is an accessible one, it is not necessary to paint an "accessibility parking space marking" in the stall. This way, the charging stall will remain open to all drivers wanting to charge.
- **Charger** Purchase a charger that meets US ADA requirements of placing the screen, holster and cables at a more accessible height
- **Cable management** Charging cables can be damaged by drivers who do not put them away properly. And when left on the ground, they can pose a tripping hazard. Cables also need to be long enough to reach an electric vehicle's charge port which adds weight to the cable. Cables will also get heavier with higher-powered charging stations. This creates challenges for drivers who struggle with the weight of the cables or those who use mobility aids. Prolonging the life of cables and improving user experience can be addressed by installing a cable management system, like the ones at certain gas stations where the cable retracts when not in use.

A representative from Spinal Cord Injury BC shared the following thoughts on accessible charging.

- All EV charging stations should meet minimum accessibility standards, thereby eliminating the need for designated accessible EV charging stations.
- An access aisle of 1.5m is necessary. Two spaces can share this access aisle. Access aisles should clearly be marked to discourage parking in them.
- The access aisle should join an accessible route.
- The slope of accessible parking spaces and access aisles should be a maximum of 1 degree in all directions, with a compact or firm surface.

[15] https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/power-smart/electric-vehicles/BCHydro-EV-Fast-Charging-Guidelines.pdf

- The ability to plug in power mobility devices would be of huge benefit, particularly at inner-community charging stations

The RMOW Accessibility Coordinator shared the following thoughts on accessible charging.

- All accessible/ UD should include surface painting as well as sign at head of charging station location, with signage explaining that the accessible charging station is available to everyone if all other chargers are in use.
- Accessible EV charging stations should include a curb cut/ramp if required to change grades between parking surface and surface where EV charger located.
- Accessible EV charging stations should be provided at a ratio of 1:25. A minimum of one accessible EV charge station should be required in any parking facility that is required to have one electric vehicle parking space
- Consider canopies or heat tracing on at least a portion of accessible EV charge stations as per Electric Vehicle Charging Station Guidebook
- Consider retractable cables for accessible EV stations.
- Avoid cables blocking pedestrian paths,
- Investigate the potential use of wireless charging via inductive technology in winter environments. This would remove the requirement to interact with heavy cables or poorly designed EV charge stations