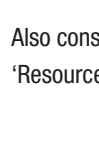## STATION LOCATION PROCESS
LEVEL 2 CHARGING

This document will guide you, the Local Authority, through the process of situating Level 2 Electric Vehicle Charging Stations in your local jurisdiction. During the process it will be beneficial to consult with interested Public and Private Proponents.

The process has been broken down into 5 steps to facilitate your work. The first step entails reviewing the Level 2 Framework, its objectives and priorities. In Step 2, a series of mapping exercises will guide you through selecting locations in your local jurisdiction. Step 3 provides instructions to narrow the selected locations to achieve an appropriate distribution. Step 4 provides instructions for identifying the best Charging Station sites within your selected locations. The Evaluation Flowchart in Step 5 is a tool for refining site selections should you identify multiple site options.

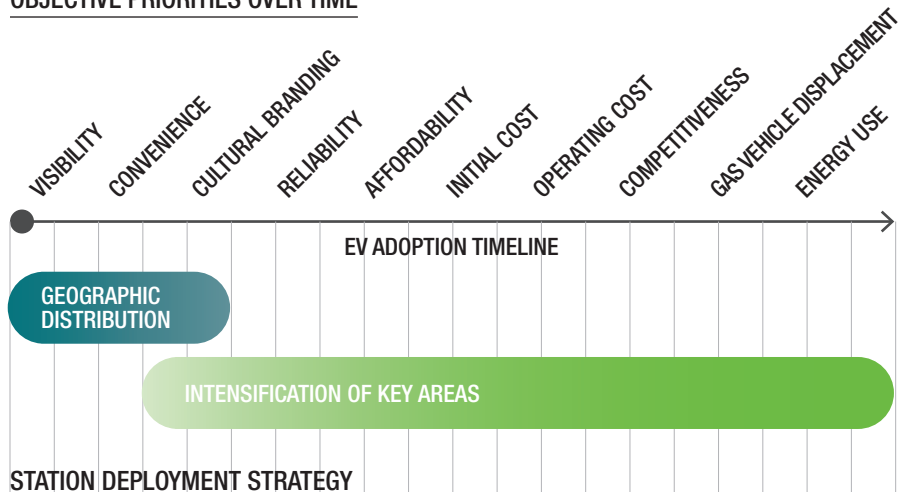| ACTION		OUTCOME
	1 REVIEW THE FRAMEWORK	UNDERSTAND PRIORITY OBJECTIVES AND DEPLOYMENT STRATEGY
	2 MAP TARGET LOCATIONS	DETERMINE POTENTIAL STATION LOCATIONS
	3 EVALUATE LOCATIONS	REFINE TARGET STATION LOCATIONS THROUGH ANALYSIS
	4 CONSIDER THE LOCATION TYPE	DETERMINE LOCATION TYPE AND IDENTIFY TARGET SITES
	5 EVALUATION FLOWCHART	REFINE TARGET SITES USING A SET OF DEFINED CRITERIA

As you move through the process, be sure to consult the *Guide to the Station Location Process* at the back of this document; it contains definitions and useful information that clarifies terminology, processes and considerations.

Also consult the B.C. Charging Infrastructure Guidelines, available at www.pluginbc.ca on the 'Resources' page, which provide detailed technical and siting information.

1 REVIEW THE FRAMEWORK

The framework for deploying Level 2 Electric Vehicle Charging Stations makes the equitable distribution of a network of stations across a local jurisdiction its foremost priority. Once distribution is achieved, the framework seeks to intensify EV charging access in busy areas in order to enhance visibility, convenience and cultural branding. The framework moves toward the goal of developing an omnipresent EV support system to encourage increased EV adoption and use.

OBJECTIVE PRIORITIES OVER TIME

VISIBILITY · CONVENIENCE · CULTURAL BRANDING · RELIABILITY · AFFORDABILITY · INITIAL COST · OPERATING COST · COMPETITIVENESS · GAS VEHICLE DISPLACEMENT · ENERGY USE

EV ADOPTION TIMELINE

GEOGRAPHIC DISTRIBUTION

INTENSIFICATION OF KEY AREAS

STATION DEPLOYMENT STRATEGY

2 MAP TARGET LOCATIONS

The process of mapping target locations for Level 2 Charging Stations is divided into five steps. Each step is described as well as applied to a fictional town called EVille to assist you through the process.

A. MAP POPULATION DENSITY

If available, map population density for your local jurisdiction. Population density will serve as a base comparison layer for other information and assist in determining the most suitable locations for Level 2 Charging Stations.
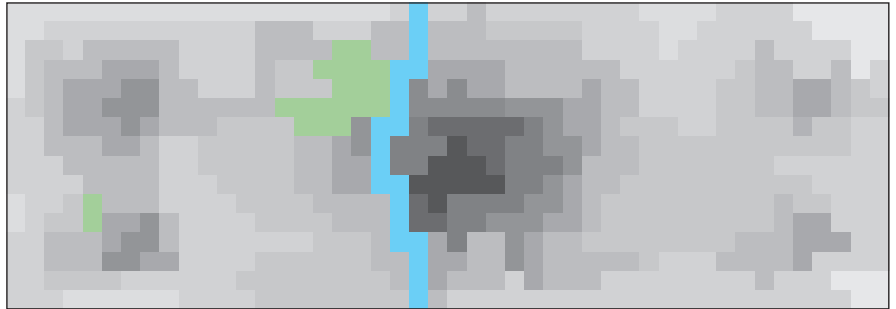
This is EVille, an example town with a population of 80,000 inhabitants roughly concentrated in six major neighbourhoods. It has a dense downtown with a large park northwest of the core and a major river that crosses the town North-South.

B. MAP COMMUNITY CENTRES

A Community Centre is a public location where members of a community gather for group activities. They are often equitably distributed and have dedicated parking, so they are excellent locations to accomplish geographic distribution of Level 2 Charging Stations. Sports facilities also belong in this category.
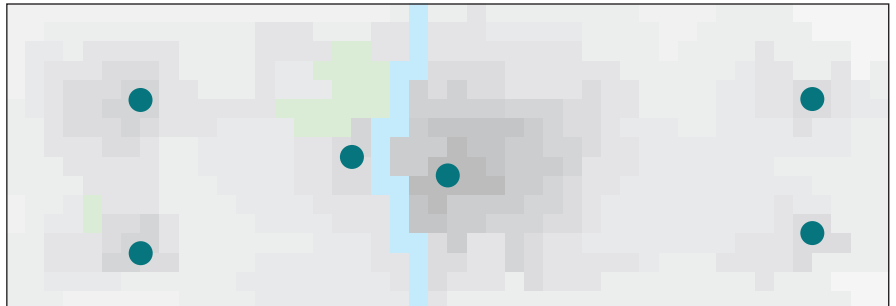
The Community Centres in EVille are located in each of the six neighbourhoods providing a well distributed starting point for the network.

C. MAP COMMERCIAL DISTRICTS / MALLS

Map commercial districts, malls and major shopping centres to identify potential areas of intensification. Commercial Districts are areas of high commercial activity recognized in your local jurisdiction. Malls and shopping centres are large groupings of commercial businesses, typically accompanied by extensive parking.
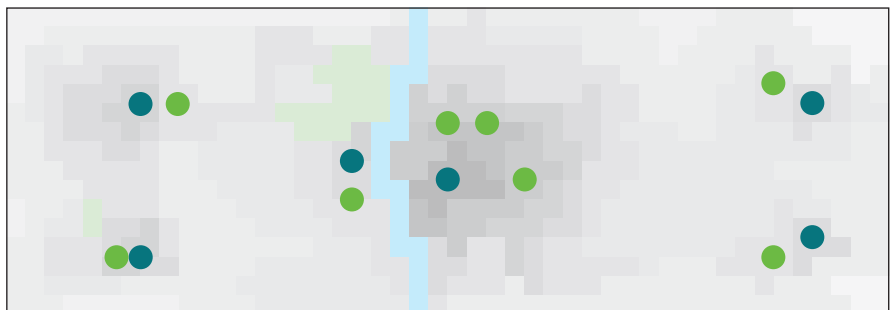
Each of the neighbourhoods has a main commercial street. Downtown has several major commercial districts.

D. MAP OTHER PUBLIC ATTRACTIONS, AMENITIES OR INSTITUTIONS, PARK AND RIDE LOCATIONS AND PUBLIC PARKADES
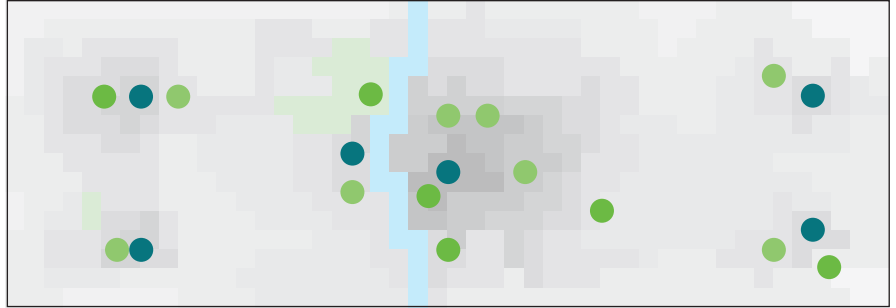
Public Attractions, Amenities or Institutions include city and town halls or libraries, museums, theatres, post-secondary institutions, hospitals and public recreation destinations such as parks or beaches. A Park and Ride is a civic parking location with the express purpose of connecting to public transportation systems. Any other transfer points between transportation modes (i.e. a light rail station) that may be relevant should also be mapped in this stage.

EVille has a major attraction in its largest park as well as several other prominent public attractions and institutions throughout the town.

E. MAP EXISTING EV CHARGING STATIONS

Only map existing EV charging stations that are publicly accessible during normal business hours.
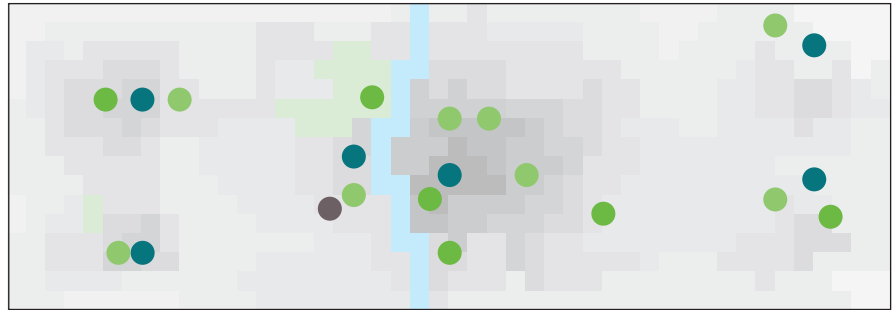
EVille has one existing EV charging station at a local grocer.

Proceed to Step 3 : Evaluate Locations

3 EVALUATE LOCATIONS

Prior to narrowing station locations bring relevant planning considerations to the discussion and assess whether, and in what capacity, any of the official plans for your community will affect station locations.

A. IDENTIFY CLUSTERS FOR EVALUATION

Identify clusters of stations that are too close to each other given the population density of the surrounding area.

B. PERFORM A COMPARATIVE ANALYSIS

Evaluate each cluster by assessing its locations against relevant municipal planning policy and the Desirable Criteria. Rank the locations to determine the strongest one within the cluster. A suggested guideline for frequency is 1 station for every 10,000 people. If your population is small but geographically dispersed, this frequency may increase.

C. CONSULT WITH STAKEHOLDERS

Approach owners and / or operators of the locations deemed desirable to determine their level of interest in partnering with you. A lack of interest may remove a location from consideration and require a return to Step B for reevaluation of the cluster locations.

D. REMOVE REDUNDANT LOCATIONS AND ENSURE DIVERSITY OF NETWORK

Remove the weakest candidates from each cluster until the appropriate location frequency is achieved. Try to maintain a diverse mixture of location types. Consider areas where multiple charging units would be useful. Remember that adding a second unit to one location will require removing one from another location. With the network of locations established, proceed to Step 4.

PLANNING CONSIDERATIONS

○ official community plan ○ transportation plan
○ sustainability plan ○ economic development plan
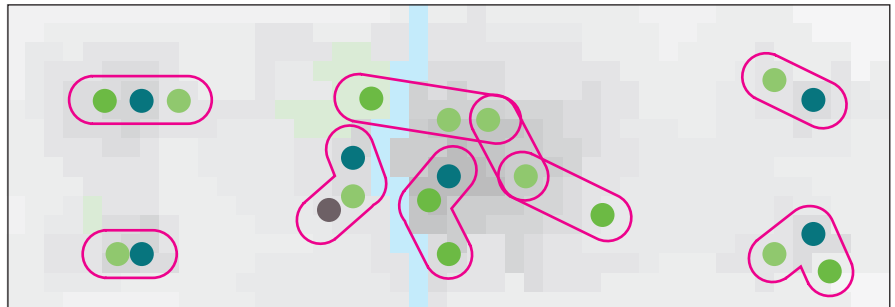
A series of clusters are identified in the EVille mapping. Some of the clusters overlap, requiring an informed discretionary decision as to how best to compare potential locations.

DESIRABLE CRITERIA

LEAST   MOST
0 1 2 3 4 5   intensity of use

0 1 2 3 4 5   visibility

0 1 2 3 4 5   economic development advantage directed to the desired sector

0 1 2 3 4 5   proximity to activities for charging duration (1 – 4 hours)

0 1 2 3 4 5   vehicle access to site

Reach out to owners and / or operators of the desirable locations
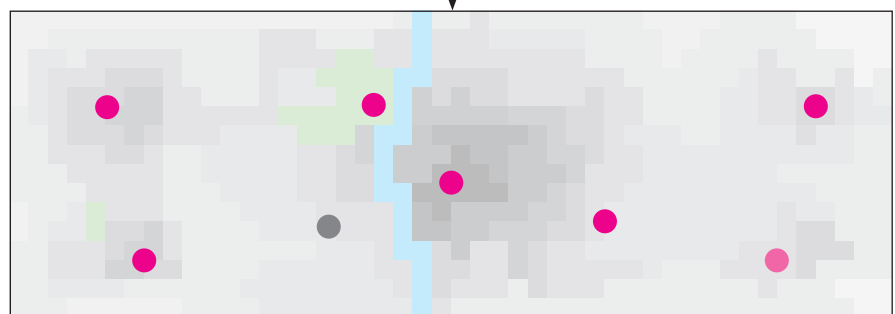
With EVille's population of 80,000 a total of 8 Level 2 Charging Stations are estimated to be required. Through analysis, a combination of Community Centres, Commercial Districts and Public Attractions and Institutions are selected as final locations.

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4 CONSIDER THE LOCATION TYPE

Once target locations have been identified for the deployment of Level 2 Charging Stations, use this flow chart to review directions for developing candidate sites. If at any time during the process multiple competing sites make selection difficult, submit the sites to the Evaluation Flowchart in Step 5 for clarification.

In the diagram below, the relationship between a location and its sites is clarified. The dashed circle indicates the location, for example, a Community Centre. Each of the black dots represents a target site, in this case, near a major entrance.
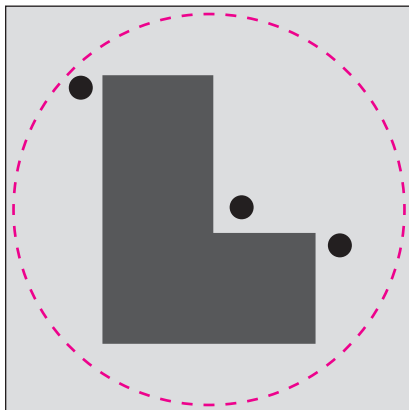
● Target site

– – Location boundary

For each candidate station location mapped in Step 3, follow this process:

What type of location is it?

COMMUNITY CENTRE	**Identify** target site(s) near a major entrance
COMMERCIAL DISTRICT	**Identify** target sites within the district
MALL OR SHOPPING CENTRE	**Identify** target site(s) near a major entrance with high pedestrian traffic
KEY ATTRACTIONS AND PUBLIC INSTITUTIONS	**Identify** target site(s) at the attraction or institution
STRIP MALL	**Identify** target site(s) within the parking lot
PARKS AND BEACHES	**Identify** target site(s) near services, facilities or key attractions
PARKADE	**Identify** target site(s) on the first level near a primary entrance
PARK AND RIDE	**Identify** target site(s) near the transit link

Proceed to Step 5: Evaluation Flowchart

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5 EVALUATION FLOWCHART

A. CRITICAL CONSTRAINTS

With a more defined site selected for the station, consider this series of critical constraints required for a functional station. It is vital that a candidate site meet all three constraints in the flowchart at right in order to be a suitable location.

If a target site does not meet the constraints, select a new site and come back to this step.

B. CONSIDER ECONOMICS

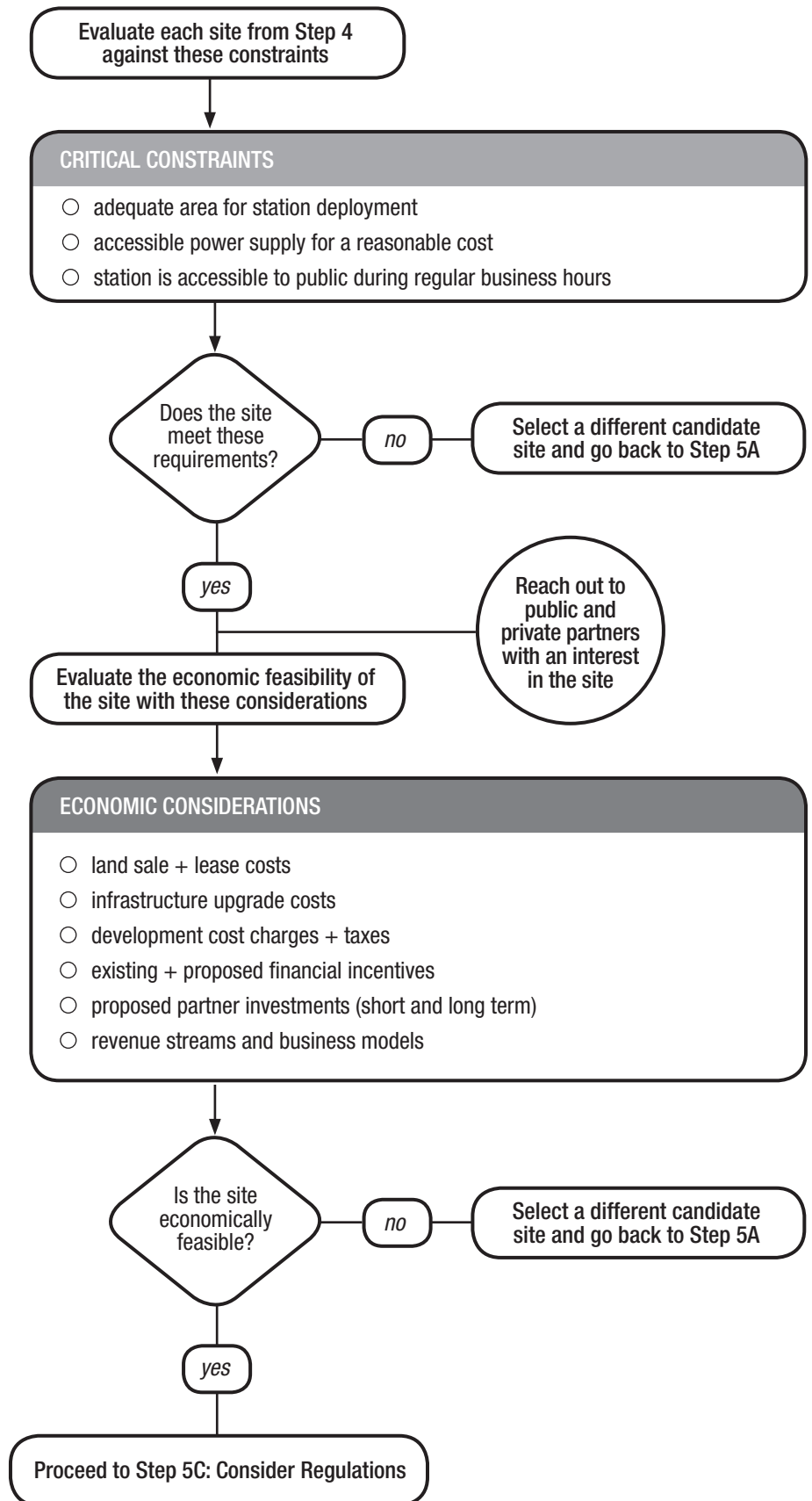If the site meets all three Critical Constraints, gauge the economic feasibility of the site, in light of your budget, using the considerations in the chart at right.

If a candidate site is not economically feasible, select a new site and return to Step 5A.

Evaluate each site from Step 4 against these constraints

CRITICAL CONSTRAINTS
- ○ adequate area for station deployment
- ○ accessible power supply for a reasonable cost
- ○ station is accessible to public during regular business hours

Does the site meet these requirements? — *no* → **Select a different candidate site and go back to Step 5A**

yes

Reach out to public and private partners with an interest in the site

Evaluate the economic feasibility of the site with these considerations

ECONOMIC CONSIDERATIONS
- ○ land sale + lease costs
- ○ infrastructure upgrade costs
- ○ development cost charges + taxes
- ○ existing + proposed financial incentives
- ○ proposed partner investments (short and long term)
- ○ revenue streams and business models

Is the site economically feasible? — *no* → **Select a different candidate site and go back to Step 5A**

yes

Proceed to Step 5C: Consider Regulations

Consider these planning aspects for
the station site from Step 5B

C. CONSIDER LOCAL REGULATIONS

Once the site has met all of the Critical
Constraints and has been identified as
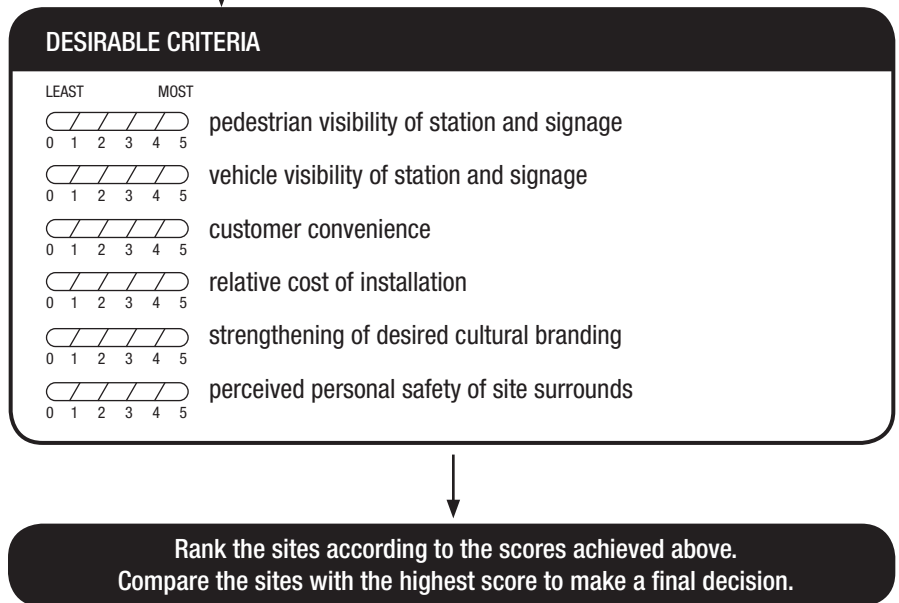economically feasible, Local Regulations
must be taken into account.

If the site is viable from a regulation
perspective, proceed to the final step
to Evaluate Desirability. If the site is not
viable, consider revising plans or bylaws to
allow the site to function.

LOCAL REGULATIONS CONSIDERATIONS

○ zoning bylaws
○ permitting
○ accessibility plan
○ neighbourhood plans (if applicable)

Is the site viable
from a planning
perspective?

no

Consider revising plans or bylaws
to ensure the site can function

yes

Evaluate the desirability of each site
using these criteria if required
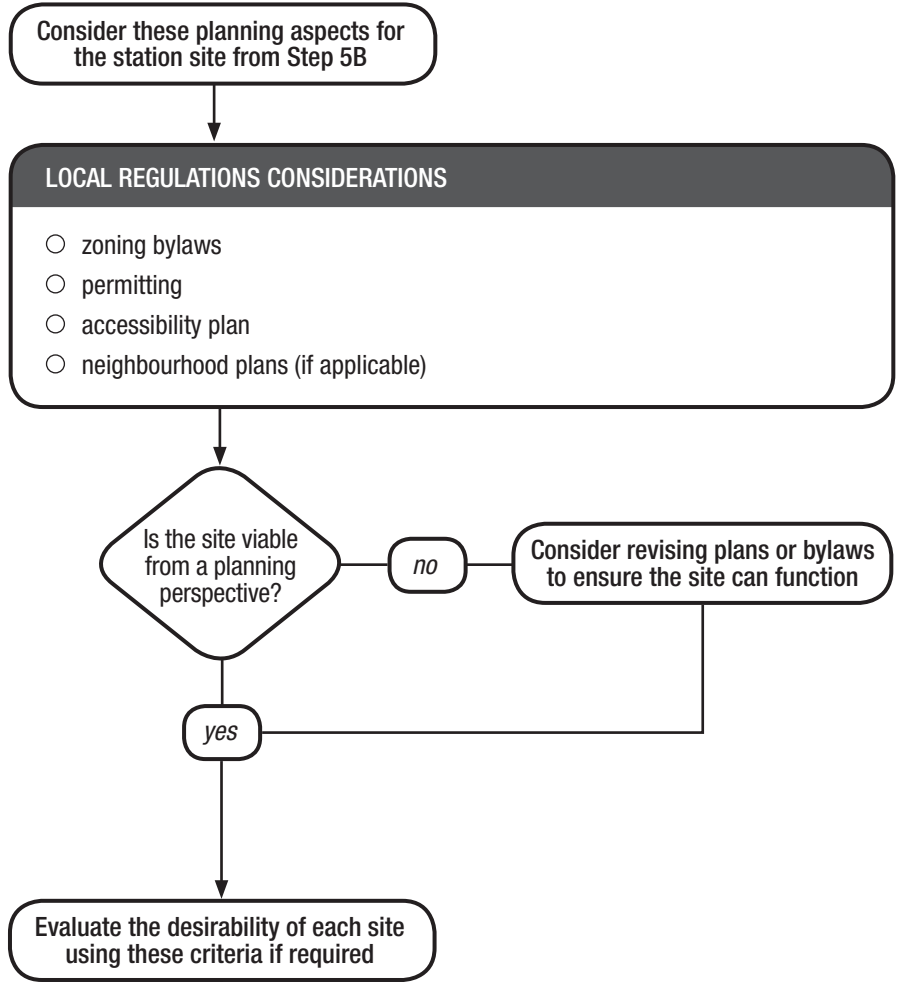
D. EVALUATE DESIRABILITY

Once a site has been specifically located
and meets all of the constraints and
considerations, it can be evaluated
according to its desirability in order to
place it in a priority ranking amongst your
candidate sites, if there is more than one.

Score the candidate sites based on the
Desirable Criteria. Rank the sites according
to the scores they attain and compare
those with the highest scores to reach final
decisions on implementation.

DESIRABLE CRITERIA

LEAST   MOST
0 1 2 3 4 5   pedestrian visibility of station and signage

0 1 2 3 4 5   vehicle visibility of station and signage

0 1 2 3 4 5   customer convenience

0 1 2 3 4 5   relative cost of installation

0 1 2 3 4 5   strengthening of desired cultural branding

0 1 2 3 4 5   perceived personal safety of site surrounds

**Rank the sites according to the scores achieved above.
Compare the sites with the highest score to make a final decision.**

GUIDE TO THE STATION LOCATION PROCESS

1 REVIEW THE FRAMEWORK

OBJECTIVES

The objectives for the Level 2 charging station network were derived through a planning and business lens, over a range of scales from the micro-urban scale of a parking space to the global scale of emissions reductions. These objectives attempt to address the concerns of all stakeholders, though some objectives may be more important to individual stakeholders over the course of the network deployment. The objectives and the roll out of the network is intended to follow and respond to the technology adoption curve which describe the way technology is adopted by the public. At first, for example, government incentives are required to encourage the rate of uptake and after a period of time, a critical mass of people have adopted EVs and the stations can function with a sustainable business model on their own. For the framework, the objectives have been prioritized over the course of deployment in the following order:

Visibility
Increase the public awareness and market profile of EVs, establish high-impact branding and contribute positive urban design in station locations.

Convenience
Provide service in obvious, well-signed locations, ensure short wait times, and provide a simple user interface .

Cultural branding
Position EVs as progressive, green, politically aware, and innovative, building on their ability to decrease GHG emissions and their appeal as a new technology.

Reliability
Provide robust maintenance and service support, prioritize consistency across different types of fast-charging stations.

Affordability (Consumer)
Maintain competitive rates through early phases of adoption, i.e. rates may fluctuate to remain competitive with gas prices.

Initial Cost (Utility, Service Provider, or Land Owner)
Minimize installation costs through pre-fabricated or mass-customized units and standardized installation methods, work with financial institutions to provide favourable terms.

Operating cost (Utility or Service Provider)
Minimize operating costs through vandal-resistant design, simple user interface, preferring automated stations over manned stations

Financial competitiveness (Land Owner)
Work towards financial performance on highly valuable urban land, prioritize deployment as an add-on to existing business, consider locating stations on under-utilized or under-performing sites.

Displacement of gas vehicles
Ensure network robustness so that EVs are a clear alternative to gas vehicles rather than an additional mode of transport, increase market share to at least 15% of total vehicles to have a measurable impact on the purchase of gas vehicles.

Energy use
Continue to increase EV market share to magnify the impact of EVs which are one-to-one more efficient than gas vehicles, promote efficient driving patterns through network deployment, reduce the need for single occupant vehicles (SOVs) with emphasis on other forms of electrified transport, i.e. buses, streetcars, light rail.

STATION OBJECTIVES OVER TIME

The general approach to locating stations and the phasing of stations has been considered as a tiered network that will serve evolving objectives over time. At the beginning of the process, the main goal is to enhance visibility of the EV charging stations and to provide a basic level of service in all areas. The goal of this is to introduce public confidence, reduce range anxiety, and show support for the EV. After this first phase, more objectives come into play to bolster consumer confidence through the reliability and affordability of the network. As the network matures, a densification in more targeted areas where use is likely to be higher will become the goal. These two stages have been designated Stage 1: Geographic Distribution, Stage 2: Intensification of Key Areas. Ultimately, the goal is to form a complete network with distribution in areas where stations are expected by the public and where they are most in demand.

2 MAP TARGET LOCATIONS

A. POPULATION DENSITY

Population density is one of the key indicators for where stations should be located. Mapping of density gives a basis for evaluating the final station network to assess if it is reaching your population base and if it targets the higher population areas.

B. MAP COMMUNITY CENTRES
Community Centre

A public location where members of a community gather for group activities, social support, public information, or other purposes. In many Canadian cities and towns, Community Centres are set up by municipal governments to reach their constituents and are equitably distributed throughout the local jurisdiction. They typically have closely associated parking infrastructure. Locating stations with these well distributed amenities ensures that all population has basic EV charging coverage.

C. MAP COMMERCIAL DISTRICTS / MALLS
Commercial District

A destination of high commercial activity recognized in your local jurisdiction.

Malls and Shopping Centres

Large groupings of commercial businesses, typically accompanied by extensive parking infrastructure.

Mapping commercial areas and malls is a way of identifying other destinations that people frequent where EV charging may be useful. This type of location will densify the charging options where they are more likely to be used and will give good visibility to the public, enhancing EV confidence. People will want to charge while doing their regular activities (e.g. groceries, errands, coffee, hikes, etc). Businesses who host charging stations will become choice destinations for the EV target market.

D. MAP OTHER PUBLIC ATTRACTIONS, AMENITIES OR INSTITUTIONS, PARK AND RIDE LOCATIONS AND PUBLIC PARKADES
Public Attraction or Institution

Civic buildings such as city and town halls or libraries, public bodies such as post-secondary institutions, and public recreation destinations such as parks, beaches or sports facilities.

Park and Ride

A civic parking location with the express purpose of connecting to multi-modal public transportation systems, or connecting to a prominent transportation gateway location.

Public Parkade

A civic parking location with a significant placement with the city or town. For a parkade to be considered a potential location for an EV charging station it mist be heavily frequented, highly visible and easily accessible.

Mapping key attractions, institutions and parking facilities is another way of intensifying the infrastructure where it is most useful. Key attractions and public institutions are intended to be places with a high public presence.

Park and Ride, or other intermodal transportation facilities may be good candidates for Level 2 charging if the lot's users travel a significant distance to reach the park and ride. If the distance travelled to the park and ride is short, the car will not typically need charging during the day and the owner will charge at home. In this case the target Park and Ride location would not be a good candidate

All locations should be accessible by the public during business hours.

E. MAP EXISTING EV CHARGING STATIONS

If any current charging stations exist in your jurisdiction, these should be mapped as well.

3 EVALUATE LOCATIONS

PLANNING

Prior to commencing location evaluation, any planning priorities should be considered that may influence target location decisions. This will vary from jurisdiction to jurisdiction.

A. IDENTIFY CLUSTERS FOR EVALUATION

Group target locations in close proximity which may be considered candidates for a that geographic area into clusters.

B. PERFORM A COMPARATIVE ANALYSIS

In this step, locations in clusters are compared in order to remove those that are geographically redundant. Perhaps in the future, all locations can be targeted and this planning exercise can be considered a first step in the process of installing a more extensive network. The value of 1 station per 10,000 population is a guideline which has been determined based on an analysis of population, estimates of future EV ownership, and a target provincial spread for the adoption timeline. It may be useful to note that private business interests may enhance the network in commercial regions by installing their own stations. Jurisdictions should be aware of any plans for EV infrastructure that private entities have installed or are going to install.

A list of desirable criteria for locations is included and each site can be evaluated relative to the others in a cluster by use of the table in this section. Safety at this scale will be taken into account by the visibility and intensity of use criteria.

C. CONSULT WITH STAKEHOLDERS

At this point you may wish to consult with stakeholders related to each location, including landowners of site locations, business owners who operate at those locations, or other municipal departments who are responsible for the locations. If the stakeholders are very interested in

installing a station and are willing to partner or provide funding, this may assist in deciding which location is chosen.

D. REMOVE REDUNDANT LOCATIONS AND ENSURE NETWORK DIVERSITY

In this step, stations are culled. Decisions are required about candidate locations relative to other locations. There may be more factors that the jurisdiction bring to this discussion and advantages and disadvantages across clusters to consider. In general a mix of use types is recommended in order to reach the broadest possible population range.

4 CONSIDER THE LOCATION TYPE

PROCESS

Sorting locations helps to narrow the site to a particular place. If there is ambiguity regarding what heading the location comes under, try each and see which one works best. If further analysis is required to narrow the target sites to a single site, use the Step 5 Evaluation Flowchart.

Community Centre
A public location where members of a community gather for group activities, social support, public information, or other purposes that typically have closely associated parking infrastructure.

Commercial District
A destination of high commercial activity recognized in your local jurisdiction.

Malls and Shopping Centres
Large groupings of commercial businesses, typically accompanied by extensive parking infrastructure.

Key Attractions and Public Institutions
These include city and town halls, libraries, museums, theatres, post-secondary institutions, hospitals and more.

Strip Mall
A destination of commercial activity organized in a linear fashion along a major thoroughfare with closely associated parking infrastructure.

Parks and Beaches
Public recreation destinations such as parks or beaches. Priority should be given to locations with amenities and parking infrastructure.

Public Parkade
A civic parking location with a significant placement with the city or town. For a parkade to be considered a potential location for an EV charging station it mist be heavily frequented, highly visible and easily accessible.

Park and Ride
A civic parking location with the express purpose of connecting to multi-modal public transportation systems, or connecting to a prominent transportation gateway location.

5 EVALUATION FLOWCHART

A. CRITICAL CONSTRAINTS

These constraints are an important first filter; if a candidate site fails to meet even one of these, it cannot be considered further. Although the goal is to arrive at a clear answer for each constraint, there is some ambiguity which is addressed here. Firstly, adequate area will depend on the size of station desired. The smallest area required would accommodate two cars side by side or two cars in a linear arrangement. Secondly, for power supply issues it is best to consult with your local utility to determine the distance to the type of supply required and an estimated cost to bring the supply to the desired site. Thirdly, public accessibility is required. This is defined as

publicly accessible during normal business hours in your jurisdiction. If it is not publicly accessible during business hours then it is likely an 'at work' site intended for an organization's own use and this flowchart does not apply.

B. CONSIDER ECONOMICS

After considering Critical Constraints, economic feasibility is the next most important step. At this stage it is critical to reach out to potential partners, both public and private, who may have a stake in the site, to determine whether a partnership with them might go forward. For example, if the parking lot of a particular business has been identified as a preferred site,

but the business has no interest in working with the municipality on this project, the site should be rejected. Furthermore, evaluating economic considerations will be most productive when compared against a defined budget. However, even if a budget has not yet been defined, it may be helpful to examine these economic considerations to evaluate multiple candidate sites against each other.

C. CONSIDER LOCAL REGULATIONS
Local regulations are unique, in that as the local authority, you are in the position to alter or amend plans and bylaws after reviewing them. For example, while the zoning bylaw may not currently permit the proposed mix of uses, you may make an amendment to the zoning bylaw with a general exception for an electric vehicle charging station. As such, a decision that the station does not meet local regulations may either negate the station as a candidate or you may take action to allow that station to be a candidate by modifying local regulations, if deemed desirable.

D. EVALUATE DESIRABILITY
After reviewing planning and economic considerations, it is necessary to make some qualitative judgments when comparing candidate sites. At this point, a scale is introduced to allow for the weighting of multiple criteria. The criteria included are weighted equally and in the assessment, it is the relative numbers from one station to the next one that is significant.

Visibility contributes to public awareness of EVs and demonstrates that they are robustly supported. It also serves a vital functional role in physically locating the station.

Customer convenience is a general term and may apply in different ways to the site. Different issues may come up for different sites but can be weighted relatively using judgement.

Relative cost of installation refers to the cost of one station as compared to the other candidate stations.

The 'desired cultural branding' criteria notes that attaching charging stations to various types of businesses or amenities could have significant implications for the business or facility in that the public's attitude toward the business may be influenced, especially related to sustainability and conversely, the attitude toward the infrastructure may change based on what business it is located with. It may be beneficial to attach the charging station to a business which is already perceived as 'green.' In the same vein, charging station siting can have a major impact on economic development. For example, if a charging station is located near local businesses, it may help them thrive, whereas a charging station located amongst chain development will have a very different impact on the local economy. In the end, all of these factors will require some degree of discretion. Ultimately, as the municipality, you should determine which sites which have made it this far in the process will be most beneficial to your desired direction of growth and development.