ZEV Infrastructure Siting Analysis Tool

Quick Start Guide

ZEV READY
PLACER

Placer County
Transportation
Planning Agency

About Project

This tool is developed as part of the Placer County Zero Emission Vehicle (ZEV) Infrastructure Plan: https://www.pctpa.net/zev . The plan has the goal to provide strategic guidance for the deployment of electric vehicle (EV) charging and hydrogen refueling infrastructure across Placer County.

To support this, the tool is designed to help evaluate candidate sites (parcels) for ZEV public refueling infrastructure (EV charging or hydrogen refueling) for both light-duty and medium-/heavy-duty vehicles. The evaluation is based on multiple groups of siting criteria, including utilization, land availability, equity, grid capacity, and environmental conditions. Sites that do not meet minimum requirements (exclusionary criteria), such as insufficient land area or incompatible land use, are excluded from further analysis. All remaining parcels are scored on a 0–10 scale, with higher scores reflecting more favorable conditions. The map displays these parcel-level scores.

This tool is intended as a planning resource and does not prescribe where chargers or hydrogen stations should automatically be deployed. Parcel scoring provides a comparative evaluation but does not replace the need for site-specific assessments. Additional considerations such as detailed utility capacity assessments, permitting constraints, local community input and other local conditions will be necessary to be evaluated before making any siting decisions.
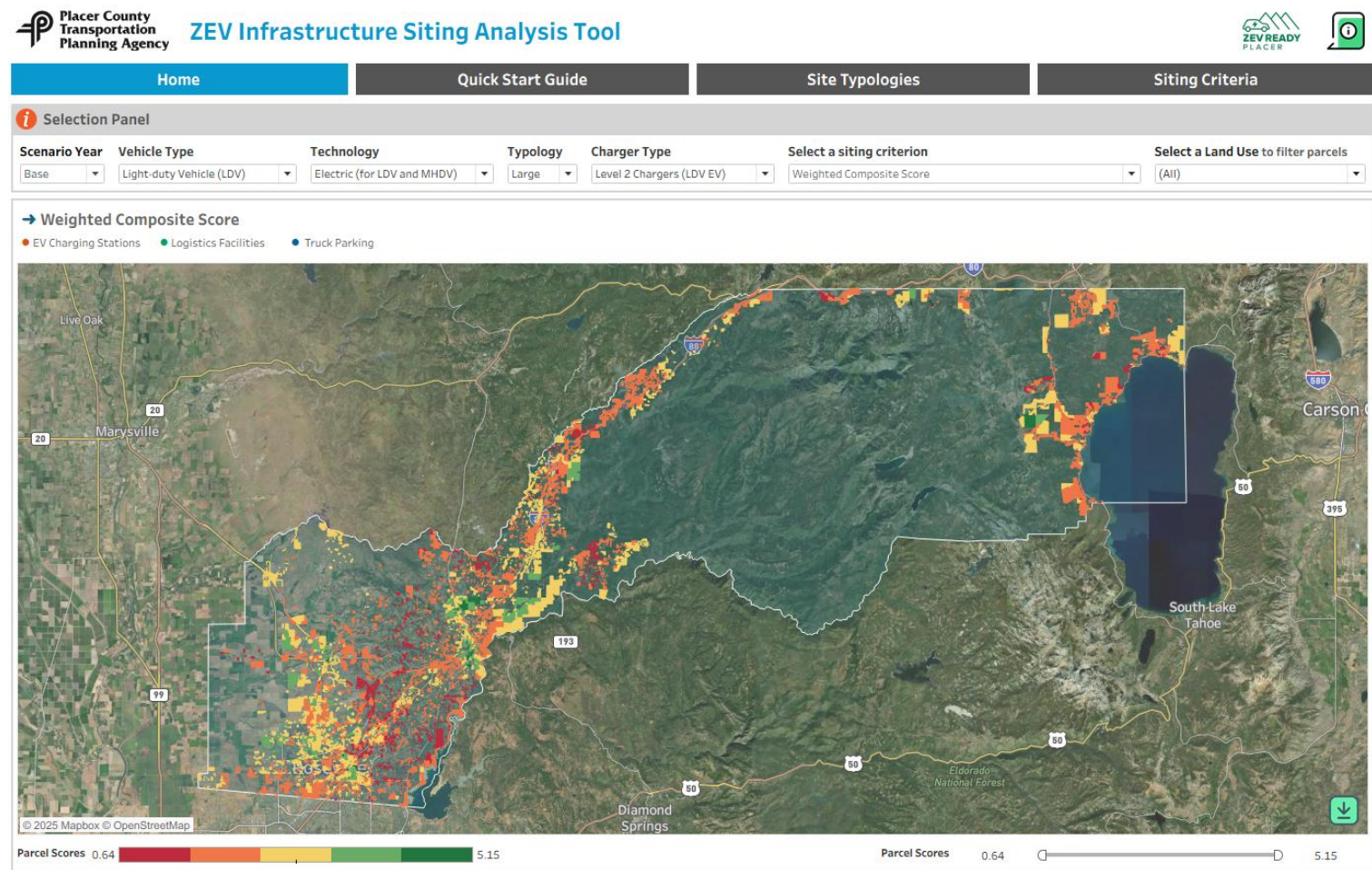
Welcome Page
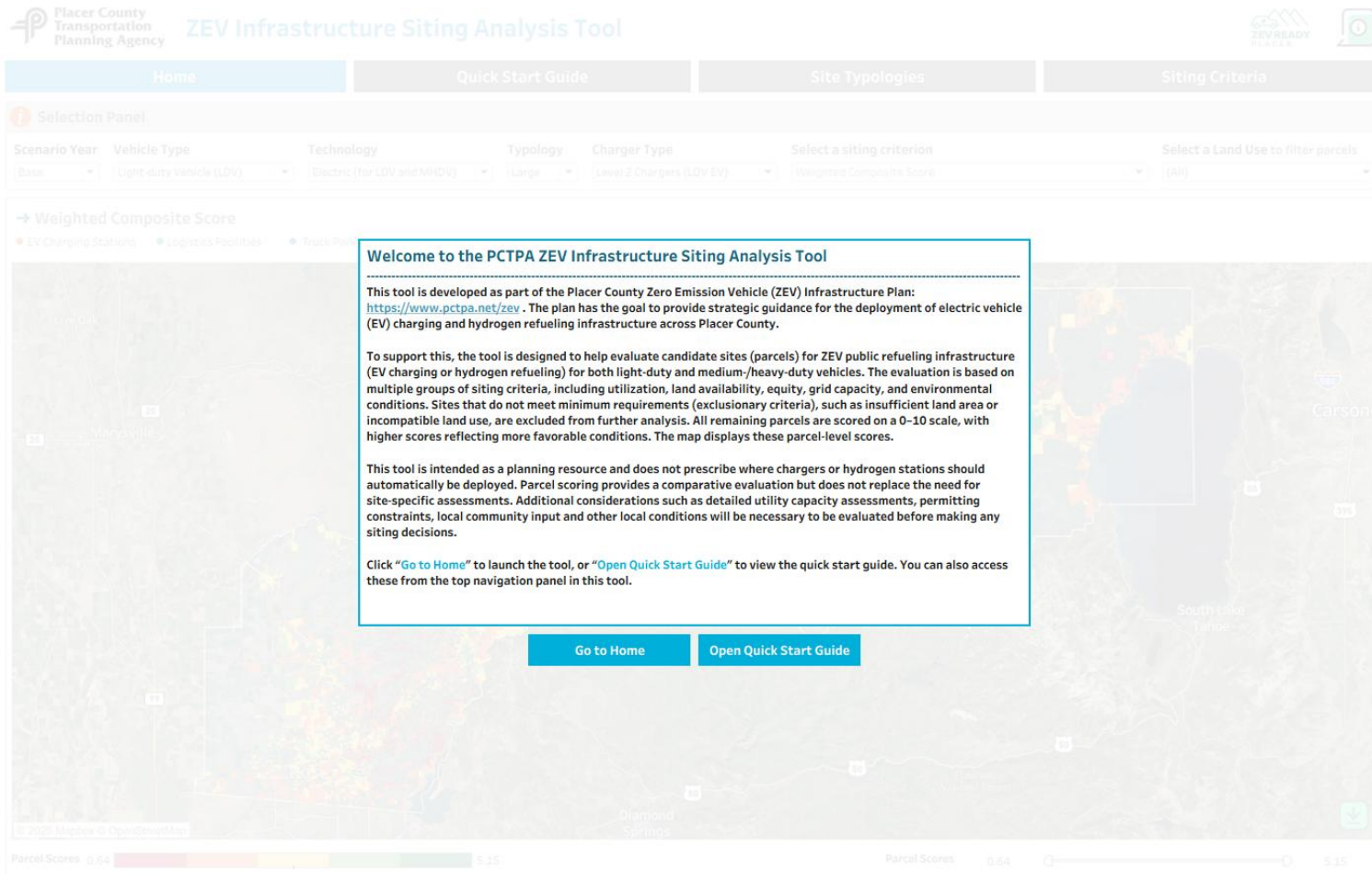
When the tool is first opened, the welcome page appears. It provides a pop-up window with an overview of the project and includes two navigation buttons:
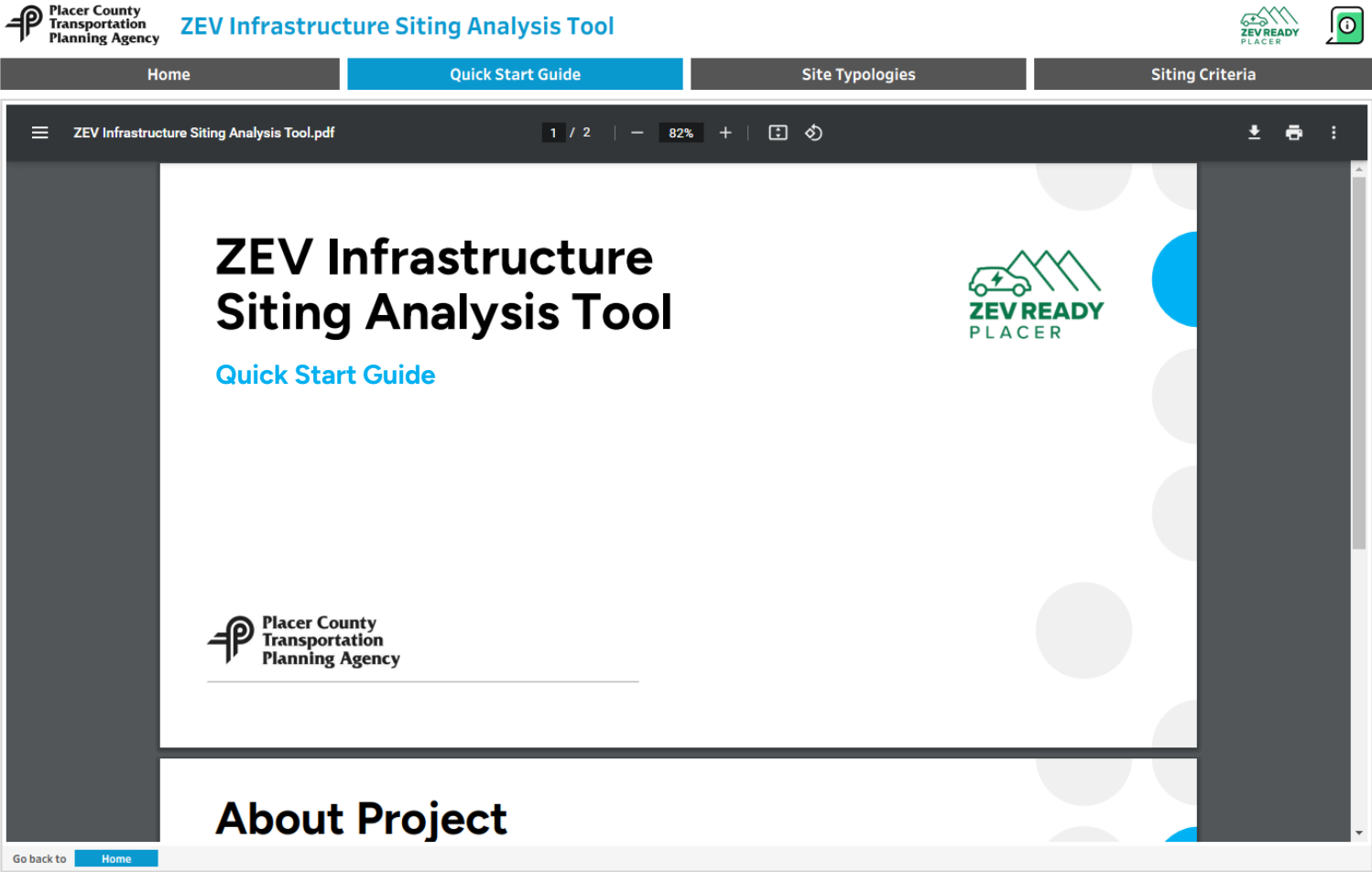
- **Go to Home:** to launch the tool
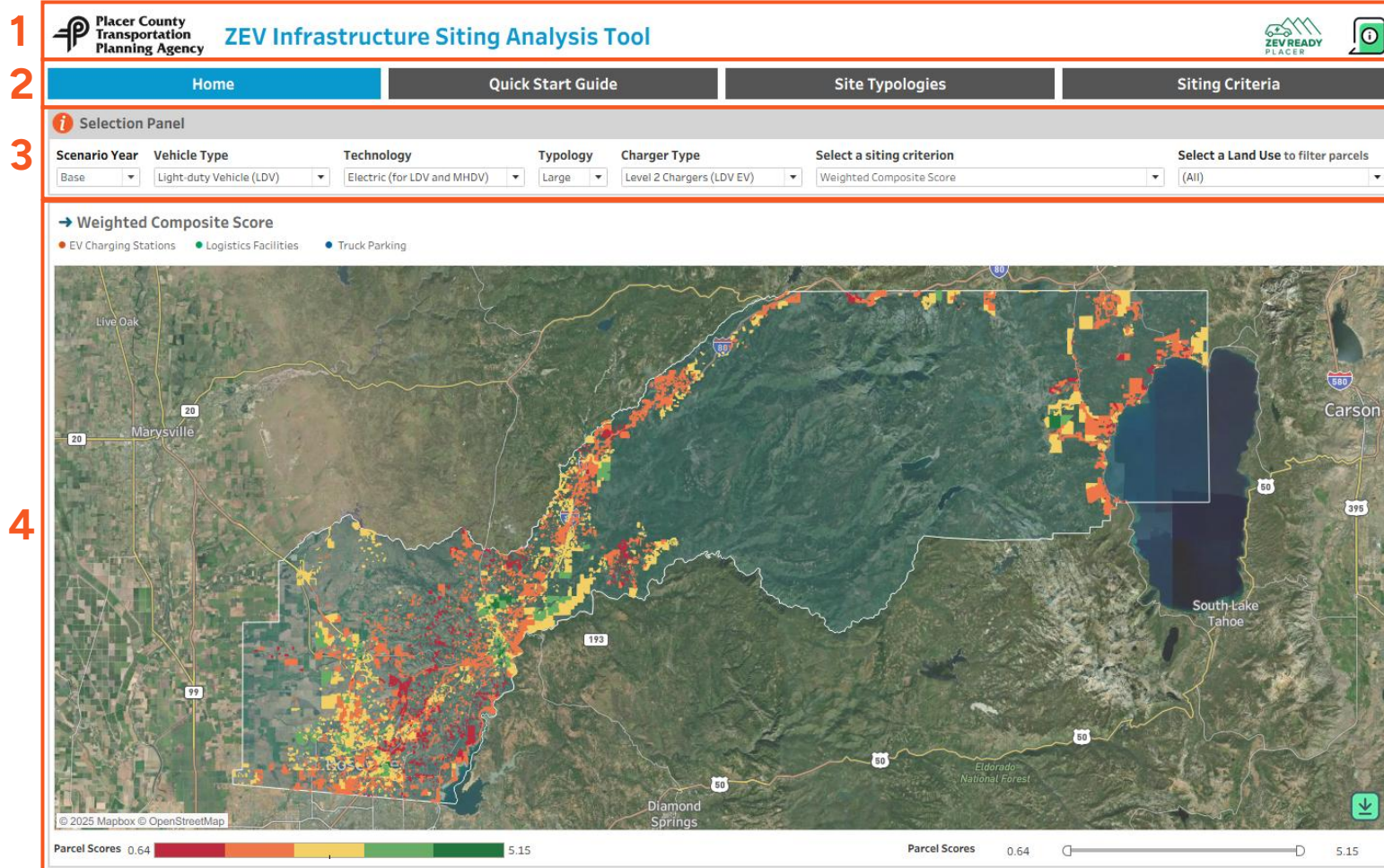- **Open Quick Start Guide:** to access the Quick Start Guide

Home Page

Selecting the **Go to Home** button redirects you to the main interface of the tool.

Quick Start Guide Page

Selecting the **Open Quick Start Guide** button redirects you to the quick start guide.

Tool Components

The main interface has several components:

1. **Dashboard Header:** Displays the title, branding, and project information.
2. **Navigation Panel:** Provides buttons to access different pages in the tool:
   - **Home:** The main tool interface
   - **Quick Start Guide:** A PDF guide to get started with the tool
   - **Site Typologies:** Details about the facility sizes for siting analysis
   - **Siting Criteria:** Details about the criteria and scoring framework for siting analysis
3. **Selection Panel**: Includes filters (scenario year, vehicle type, technology, typology, and charger type), and dropdowns to choose a siting criterion or weighted composite score and filter parcels by land use.
4. **Map:** A map showing parcel scores according to the selection in the **Select a siting criterion** dropdown.

Tool Components: Dashboard Header

The **Dashboard Header** includes the agency branding, tool title, project branding, and a **Project Details** button - .

Selecting the **Project Details** button opens a pop-up window with project information (as shown on the right). Clicking the button again closes the window.

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Click icon above to close this window.

Tool Components: Navigation Panel

The **Navigation Panel** enables users to move between different sections (pages) of the tool. When a button is selected, it turns blue to indicate the active section.
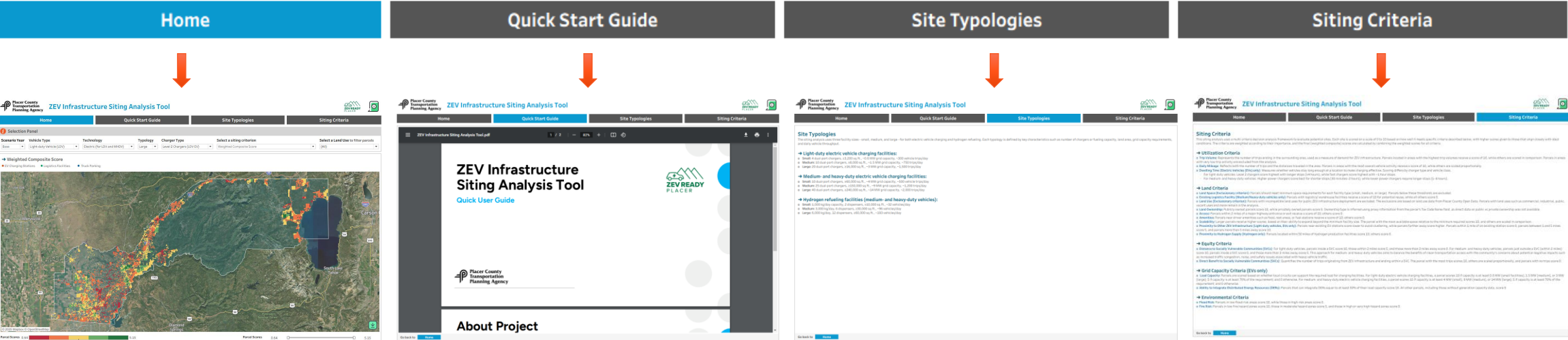
Clicking this button opens the main interface of the mapping tool.

Clicking this button opens a page with the quick start guide.

Clicking this button navigates to the page with details about the facility sizes.

Clicking this button takes users to the page with details about siting criteria and scoring approach.

Tool Components: Selection Panel

Selection Panel

Scenario Year	Vehicle Type	Technology	Typology	Charger Type	Select a siting criterion	Select a Land Use to filter parcels
Base	Light-duty Vehicle (LDV)	Electric (for LDV and MHDV)	Large	Level 2 Chargers (LDV EV)	Weighted Composite Score	(All)

Vehicle type

The user can choose the vehicle type they are interested in: light-duty or medium/heavy-duty vehicles. This selection determines which parcels appear on the map as candidates for zero-emission vehicle refueling and also influences the associated criteria scores.

Technology and Typology

The tool considers EV charging facilities (for both light-duty and medium-/heavy-duty vehicles) as well as hydrogen facilities (for medium-/heavy-duty vehicles).

Zero-emission vehicle refueling facilities are also classified into three size groups (small, medium, and large) to cover a broad spectrum of operational needs.

Light-Duty Electric Vehicle Charging Facilities
- Small: 4 dual-port chargers; ≥3,200 sq.ft.
- Medium: 10 dual-port chargers; ≥8,000 sq.ft.
- Large: 20 dual-port chargers; ≥16,000 sq.ft.

Medium- and Heavy-Duty Electric Vehicle Charging Facilities
- Small: 10 dual-port chargers; ≥60,000 sq.ft.
- Medium: 25 dual-port chargers; ≥150,000 sq.ft.
- Large: 40 dual-port chargers; ≥240,000 sq.ft.

Hydrogen Facilities (Medium- & Heavy-Duty Vehicles)
- Small: 1,000 kg/day; ≥10,000 sq.ft.
- Medium: 3,000 kg/day; ≥30,000 sq.ft.
- Large: 6,000 kg/day; ≥60,000 sq.ft.

Charger Type

This option is only available for electric vehicle charging facilities. The user can select the charger type of interest. The following options are considered:
Light-Duty Electric Vehicle Charging Facilities: Level 2, DC fast charging (DCFC)
Medium- and Heavy-Duty Electric Vehicle Charging Facilities: 150kW, 350kW

Click 🛈 icon above to close this window.

The **Selection Panel** provides all the filters and dropdowns needed to define a scenario and display siting scores on the map.

An information button - 🛈 is available to access additional details about the filtering criteria. Selecting this button opens a pop-up window containing explanatory information, as shown on the left. Clicking the button again closes the pop-up window.

Within this panel, you can define a scenario by selecting values from several dropdowns. The **Scenario Year** dropdown allows you to choose the analysis year. The **Vehicle Type**, **Technology**, **Typology**, and **Charger Type** (if applicable) dropdowns enable customization of the scenario parameters.

The **Select a siting criterion** dropdown provides options to choose either an individual siting criterion or the weighted composite score. The selected option determines what will be visualized on the map.

Additionally, the **Select a Land Use** dropdown allows users to filter parcels displayed on the map based on specific land use categories. This helps refine the visualization to focus on areas relevant to the selected scenario and criteria.

Tool Components: Map (1)
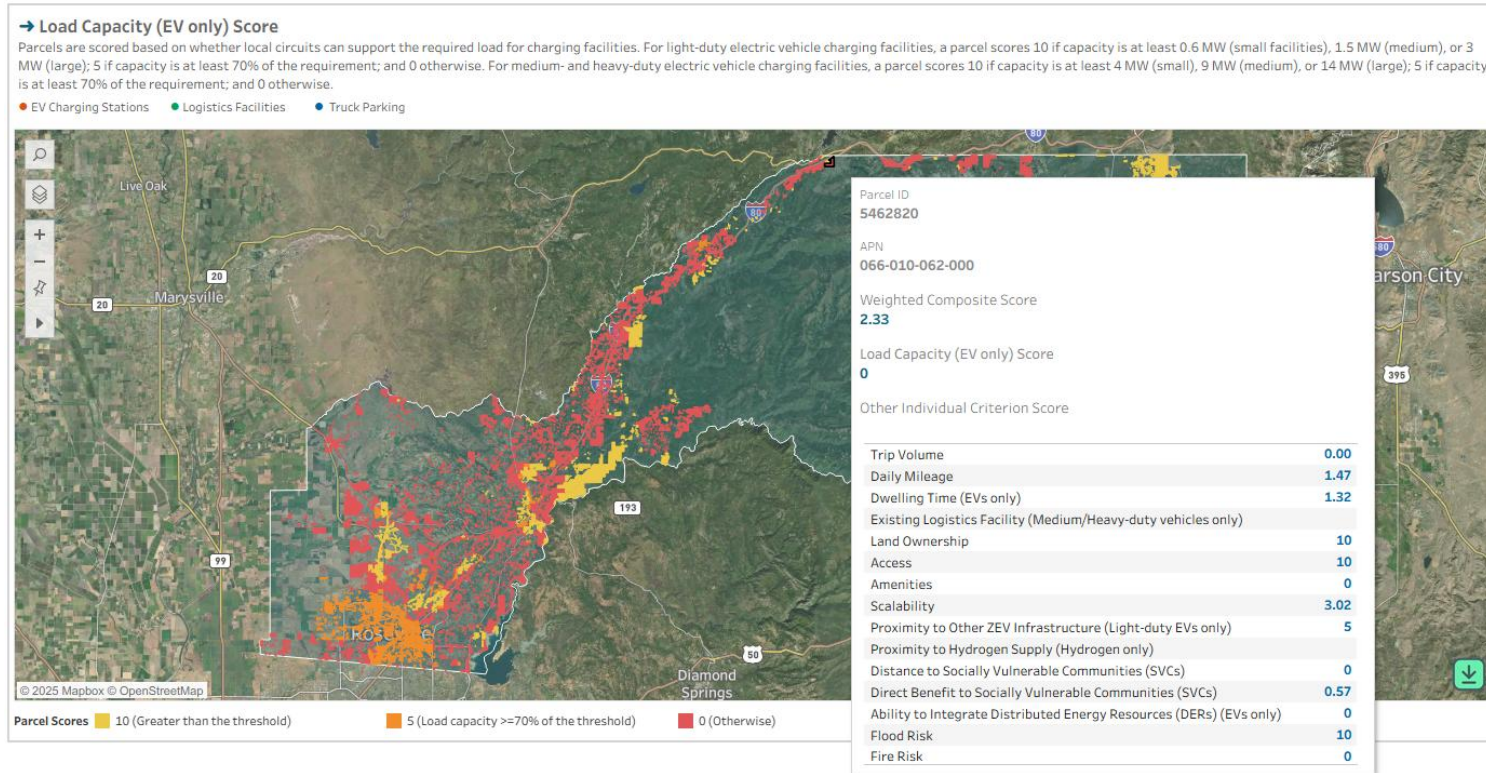
The **Map** section shows parcel scores based on the selection made in the filters and the **Select a siting criterion** dropdown.

At the top of this section, a title and brief description summarize the selected criterion and the corresponding scoring approach.

Below the description, the interactive map presents parcel-level scores. Each parcel polygon represents the parcel score for the chosen criterion. Hovering over a parcel reveals a tooltip containing detailed information, including individual siting criterion scores and the weighted composite score. These values are dynamically generated based on the scenario parameters selected in the **Selection Panel**.

Tool Components: Map (2)

Each map includes a legend that explains the scoring scale and color gradients/palettes used to represent parcel scores.
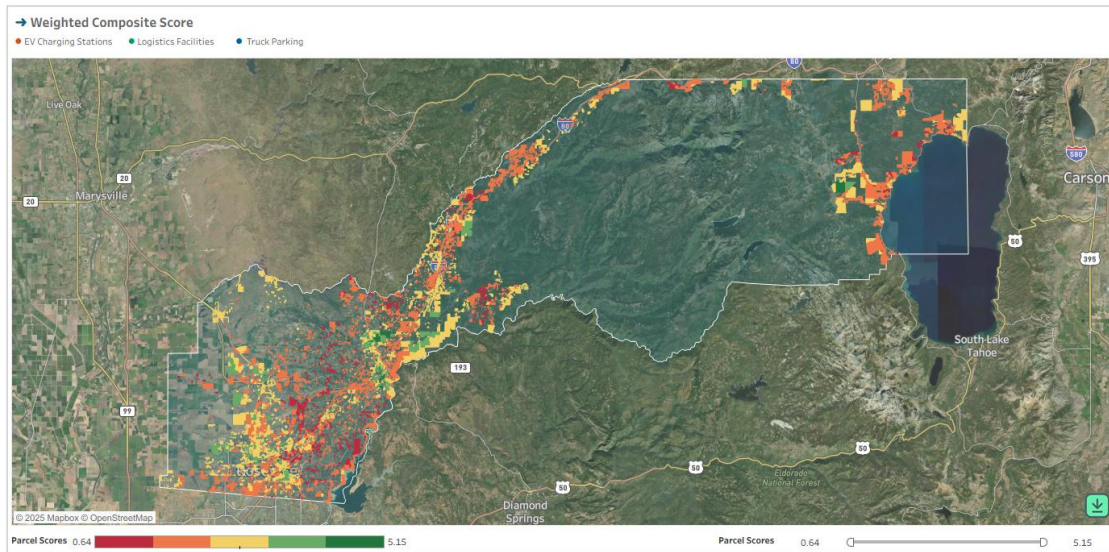
For criteria with continuous score values, an interactive slider is provided. You can adjust the slider to define a specific score range, allowing you to filter and highlight parcels on the map that fall within the selected range.
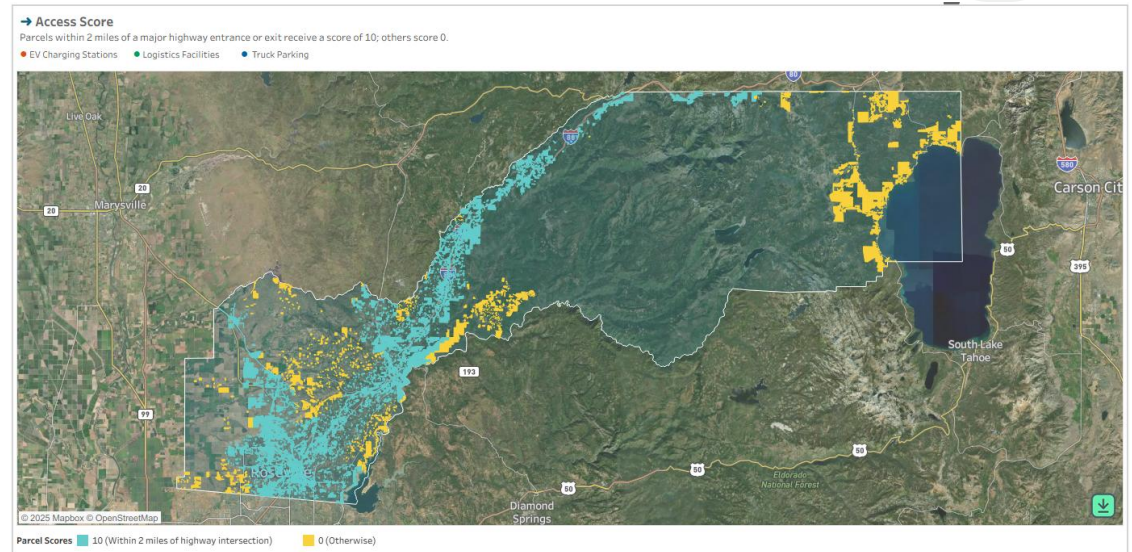
For discreate score values, you can click on the legend items directly to highlight the parcels with relevant scores. Click again to go clear the selection.

Tool Components: Map (3)

Each map includes three optional GIS layers — EV Charging Stations, Existing Logistics Facilities, and Truck Parking. These layers are turned off by default but can be enabled individually or together using the **Map Layer Control** feature.

To access the **Map Layer Control**, hover near the top-left corner of the map. A control panel will appear. Click the highlighted button shown on the right to open the layer control menu. From this menu, check or uncheck the boxes next to each layer name to display or hide those features on the map.

The legends for these GIS layers are included in the map title section for easy reference.
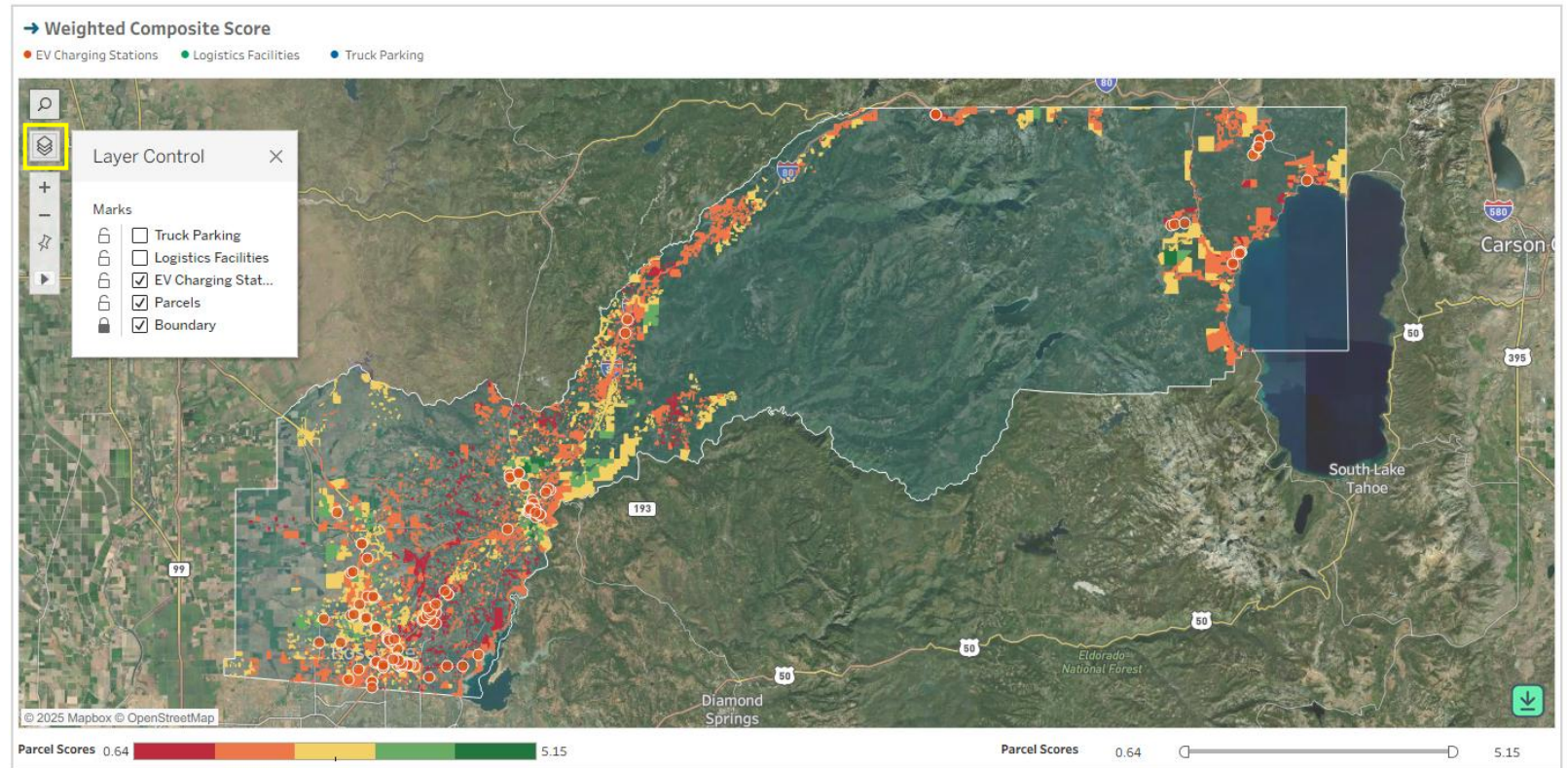
Tool Components: Map (4)
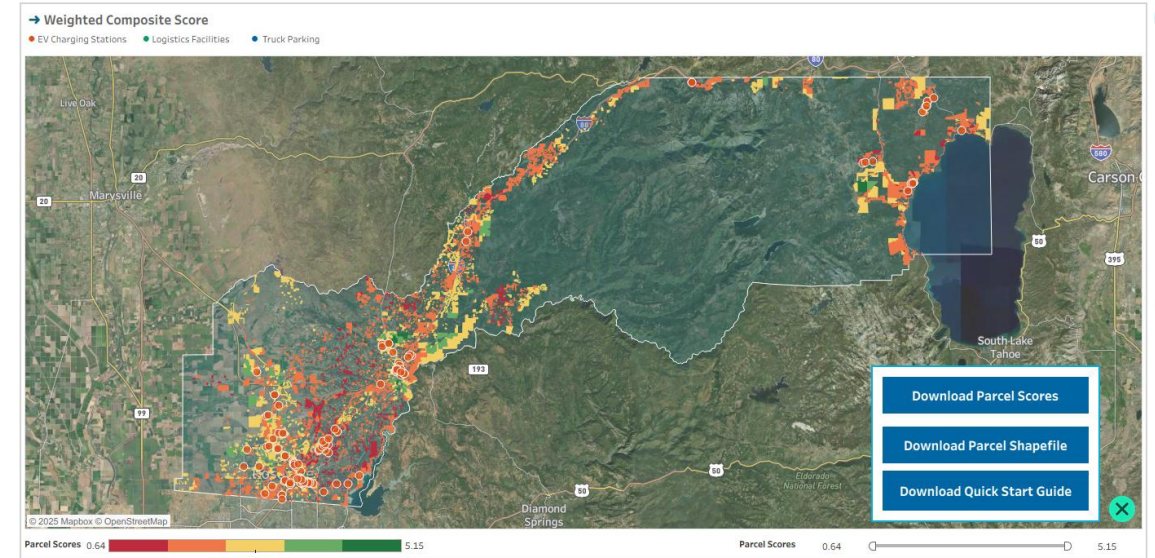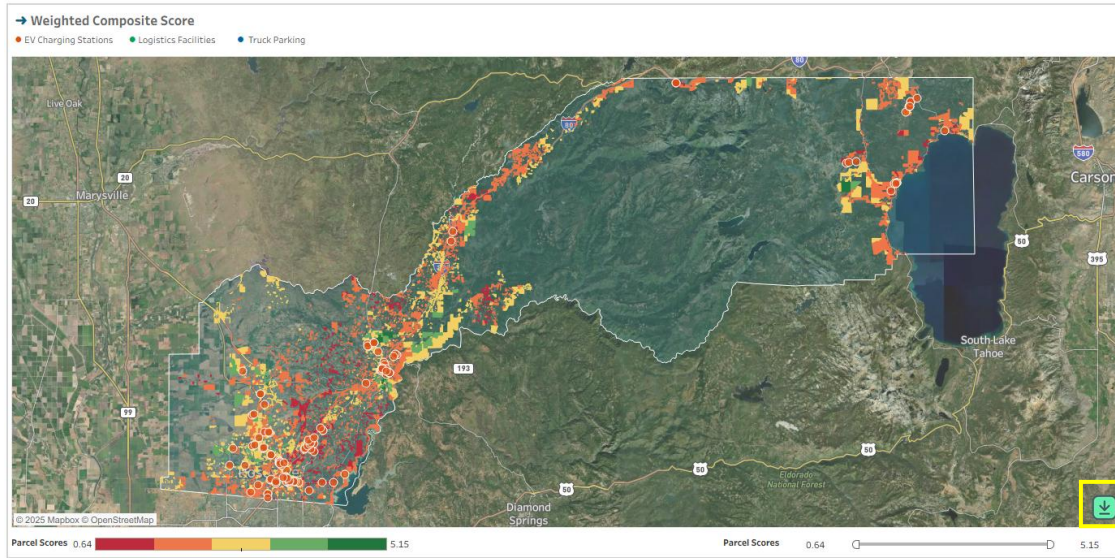
Each map includes a **Download** button (highlighted in the left image) and clicking this shows multiple export options (shown on the right).

Clicking the options, you can download:
- The underlying data — including weighted composite scores and individual criterion scores for each parcel — in an Excel worksheet format.
- A shapefile containing parcel polygons along with associated land use information (no scores are attached to the parcels).
- The **Quick Start Guide** in PDF format for easy reference.

Clicking this button again closes the download options.

Site Topologies

The **Site Typologies** section provides information on the criteria used to determine facility sizes, outlining the factors and parameters considered in defining each site typology.

Siting Criteria

The **Siting Criteria** section provides detailed information on each siting criterion used in the analysis, along with a description of the corresponding scoring methodology.

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Siting Criteria

This siting analysis uses a multi-criteria decision analysis framework to evaluate potential sites. Each site is scored on a scale of 0 to 10 based on how well it meets specific criteria described below, with higher scores given to those that align closely with ideal conditions. The criteria are weighted according to their importance, and the final (weighted composite) scores are calculated by combining the weighted scores for all criteria.

➜ Utilization Criteria

o **Trip Volume:** Represents the number of trips ending in the surrounding area, used as a measure of demand for ZEV infrastructure. Parcels located in areas with the highest trip volumes receive a score of 10, while others are scored in comparison. Parcels in areas with very low trip activity are excluded from the analysis.
o **Daily Mileage:** Reflects both the number of trips and the distances traveled in the area. Parcels in areas with the most overall vehicle activity receive a score of 10, while others are scaled proportionally.
o **Dwelling Time (Electric Vehicles (EVs) only):** Measures whether vehicles stay long enough at a location to make charging effective. Scoring differs by charger type and vehicle class.
  · For light-duty vehicles: Level 2 chargers score highest with longer stops (≥4 hours), while fast chargers score highest with ~1 hour stops.
  · For medium- and heavy-duty vehicles: Higher-power chargers score best for shorter stops (30 minutes–2 hours), while lower-power chargers require longer stays (1–4 hours).

➜ Land Criteria

o **Land Space (Exclusionary criterion):** Parcels should meet minimum space requirements for each facility type (small, medium, or large). Parcels below these thresholds are excluded.
o **Existing Logistics Facility (Medium/Heavy-duty vehicles only):** Parcels with logistics/ warehouse facilities receive a score of 10 for potential reuse, while all others score 0.
o **Land Use (Exclusionary criterion):** Parcels with incompatible land uses for public ZEV infrastructure deployment are excluded. The exclusions are based on land use data from Placer County Open Data. Parcels with land uses such as commercial, industrial, public, vacant uses and more remain in the analysis.
o **Land Ownership:** Publicly owned parcels score 10, while privately owned parcels score 0. Ownership type is inferred using proxy information from the parcel's Tax Code Name field, as direct data on public vs private ownership was not available.
o **Access:** Parcels within 2 miles of a major highway entrance or exit receive a score of 10; others score 0.
o **Amenities:** Parcels near driver amenities such as food, rest areas, or fuel stations receive a score of 10; others score 0.
o **Scalability:** Larger parcels receive higher scores, based on their ability to expand beyond the minimum facility size. The parcel with the most available space relative to the minimum required scores 10, and others are scaled in comparison.
o **Proximity to Other ZEV Infrastructure (Light-duty vehicles, EVs only):** Parcels near existing EV stations score lower to avoid clustering, while parcels farther away score higher. Parcels within 1 mile of an existing station score 0, parcels between 1 and 5 miles score 5, and parcels more than 5 miles away score 10.
o **Proximity to Hydrogen Supply (Hydrogen only):** Parcels located within 50 miles of hydrogen production facilities score 10; others score 0.

➜ Equity Criteria

o **Distance to Socially Vulnerable Communities (SVCs):** For light-duty vehicles, parcels inside a SVC score 10, those within 2 miles score 5, and those more than 2 miles away score 0. For medium- and heavy-duty vehicles, parcels just outside a SVC (within 2 miles) score 10, parcels inside a SVC score 0, and those more than 2 miles away score 5. This approach for medium- and heavy-duty vehicles aims to balance the benefits of clean transportation access with the community's concerns about potential negative impacts such as increased traffic congestion, noise, and safety issues associated with heavy vehicle traffic.
o **Direct Benefit to Socially Vulnerable Communities (SVCs):** Quantifies the number of trips originating from ZEV infrastructure and ending within a SVC. The parcel with the most trips scores 10, others are scaled proportionally, and parcels with no trips score 0.

➜ Grid Capacity Criteria (EVs only)

o **Load Capacity:** Parcels are scored based on whether local circuits can support the required load for charging facilities. For light-duty electric vehicle charging facilities, a parcel scores 10 if capacity is at least 0.6 MW (small facilities), 1.5 MW (medium), or 3 MW (large); 5 if capacity is at least 70% of the requirement; and 0 otherwise. For medium- and heavy-duty electric vehicle charging facilities, a parcel scores 10 if capacity is at least 4 MW (small), 9 MW (medium), or 14 MW (large); 5 if capacity is at least 70% of the requirement; and 0 otherwise.
o **Ability to Integrate Distributed Energy Resources (DERs):** Parcels that can integrate DERs equal to at least 50% of their load capacity score 10. All other parcels, including those without generation capacity data, score 0.

➜ Environmental Criteria

o **Flood Risk:** Parcels in low flood risk areas score 10, while those in high-risk areas score 0.
o **Fire Risk:** Parcels in low fire hazard zones score 10, those in moderate hazard zones score 5, and those in high or very high hazard zones score 0.

Go back to **Home**

Invalid Filter or Siting Criterion Selection

Please ensure that you use the filter dropdowns in the **Selection Panel** to create a valid combination of parameters defining a scenario.

Note that not all siting criteria are included in the weighted composite score for a certain scenario. If an invalid combination is selected, the tool will display a warning message (as shown on the right) with detailed guidance on how to correctly adjust the filters and siting criterion selections to display valid results on the map.

Warning: Invalid filter or siting criterion selection

You are trying to visualize Weighted Composite Score.

However, the selected filters are invalid, or the siting criterion is not applicable. Choose a compatible Vehicle Type, Technology, Typology, Charger Type, and a valid siting criterion.

First, select an appropriate combination of filters:

■ Light-duty Vehicle Type → Technology: Electric only
  ◆ Typology: Any (Small, Medium, Large)
  ◆ Charger Type: Level 2 Chargers or DC Fast Chargers

■ Heavy-duty Vehicle Type → Technology: Electric or Hydrogen
  ◆ Typology: Any (Small, Medium, Large)
  ◆ If Electric → Charger Type: 150kW Chargers or 350kW Chargers
  ◆ If Hydrogen → Charger Type: N/A (chargers apply to electric vehicles only)

Then check the options in the "Select a siting criterion" dropdown and ensure a valid siting criterion is selected according to your selected filter options.