



Learning from a Decade of Charging Infrastructure & Design

Objective

The goal of Macassa's charging infrastructure strategy is to support efficient, reliable, and scalable electric vehicle operations underground. By optimizing charger placement, managing battery thermal conditions, and building internal maintenance capabilities, the site aims to extend battery life, reduce downtime, and improve operator adoption—all while adapting to physical and organizational constraints unique to brownfield mining environments.



Key Points

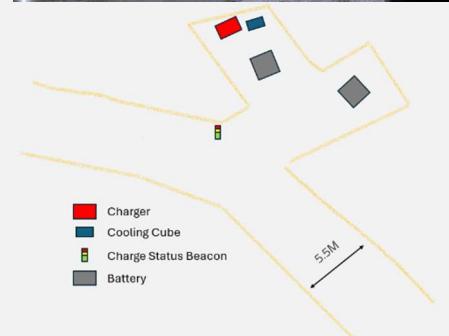
Geomechanics drove layout constraints.

The Y-shaped layout of the swapping station enables efficient battery swap logistics in a narrow heading but limits charger placement flexibility.



Single-side charger placement adds complexity.

Chargers are installed on one side of the station, with cables and cooling lines extended across the heading to the other side of the Y, using HVDC splitter boxes—a workaround developed in-house.



Battery cooling is essential but often missed.

Connecting the cooling lines from the cooling cube during charging can double or triple battery life, but it requires consistent operator attention.

Operator errors can erode performance.

Skipping steps—especially cooling—adds unproductive time and shortens battery lifespan, underscoring the importance of user-centered design and training.

Internal teams fill critical capability gaps.

A dedicated battery team manages diagnostics, fault tracking, and periodic maintenance. This internal ownership enables faster response and better data capture.

Visibility improves accountability.

Fault beacon lights near roadways help non-technical staff spot and respond to charging issues quickly.



Implementation

Macassa adapted an existing Y-shaped heading, originally built for refueling, to support BEV charging within the site's geomechanical constraints. With limited space for chargers, the team developed an internal solution using High Voltage DC splitter boxes and cable routing to service both sides of the station. Battery cooling was reinforced through operator training and procedural reminders to ensure glycol lines were connected during every charge. To improve fault response, beacon lights were added near roadways for increased visibility. Internal teams took ownership of battery lifecycle management, creating custom tracking tools and building in-house expertise to reduce dependence on suppliers.