WECC

Process for Updating the GIS data for the WECC Map of Principal Transmission Lines

Chelsea Andrews
October 12, 2026

The WECC Map of Principal Transmission Lines exists as four Esri ArcGIS feature-class files: a line file for transmission lines, a point file for substations, a second point file for AC-DC-AC intertie locations, and a third point file for phase shifter locations, which are co-located with their corresponding substations. One set of feature classes is contained in a standard file geodatabase, and another set exists as stand-alone shapefiles.

The non-geographically accurate, or "schematic," aesthetic of the transmission lines and substations in the Map of Principal Transmission is intentional. The purpose of the map is to show the overall network of lines and basic information about those lines, not the real-world locations of facilities. This design should remain foremost when submitting updates to the map.

Policy

Entities will submit their updates to the geography and attribute table data in their part of the interconnection for each feature class using Geographic Information Systems (GIS) software. Entities should also include a written summary, as either a Word document or PDF, explaining changes made to the GIS data. These summaries will help prevent accidental deletion of data or other errors in the data.

WECC will merge the changes in each submitted feature class, which it will then use to create the 2027 Map of Principal Transmission Lines.

Entities that do not have GIS capabilities can make annotations to the PDF map from the previous year. Entities only need to provide updates in one format. An entity that submits updated GIS data does not need to make changes to the PDF.

Transmission lines and substations captured in the Map of Principal Transmission Lines will be those deemed significantly important to the Western Interconnection by the submitting entities. These are generally Bulk Electric System (BES) facilities of 115 kV or 138 kV and above, depending on each entity's substations and transmission network.

Only transmission lines and substations set to be "in service" at the time of the data request should be included in any update to the map. Any future transmission lines and substations beyond 2026 should be submitted in a separate data request for the Planned Facilities Map.

A draft version of the map may be posted on the Map Data Team site once all submissions have been incorporated. There will be a short review period to correct any errors, then the final version of the map will be closed to updates and sent to the publisher.

Data Location

The Map Data Team site folder "2026 Principal Transmission Map" contains the GIS data used to create the 2026 Map of Principal Transmission Lines in the following formats:

File Geodatabase—"Principal Transmission Map Data 2026.gdb," containing four feature classes:

- Principal_Transmission_2026FINAL
- Principal_Substations_2026FINAL
- ACDC_Ties_2026FINAL
- Phase_Shifters_2026FINAL

Zipped folder—"Principal Transmission Map 2026 Data," for entities that prefer shapefiles, containing the same feature classes as the file geodatabase as four separate shapefiles:

- Principal_Transmission_2026FINAL.shp
- Principal_Substations_2026FINAL.shp
- ACDC_Ties_2026FINAL.shp
- Phase_Shifters_2026FINAL.shp

Excel Spreadsheet—"2026_Principal_MapDataTables," contains the table information extracted from the GIS data files. If you are an entity that does not have GIS capabilities and are updating your information by drawing on the PDF, use this Excel spreadsheet to update the necessary facility attributes.

Instructions

You must download the feature classes or shapefiles and make a copy with your organization's abbreviation and date of revision in the new file name. The date format is YYYYMMDD.

Example: "Principal_Substations_BPA_20261020." Make edits to this file.

WECC GIS data uses the following coordinate systems for the Map of Principal Transmission. Use this coordinate system for all submitted data:

Geographic Coordinate System: GCS_North_America_1983

Datum: D_North_America_1983

Projected Coordinate System: USA_Contiguous_Albers_Equal_Area_Conic_USGS_version

You must submit data only for your system unless you have made an agreement with another entity regarding your submittal.

You may then upload edited data to the Map Data Team site folder "**2027 Principal Transmission Map Data Submissions**" as zipped file geodatabases, zipped shapefiles, or complete map packages.

Please make note of any addition, deletion, or modification in the legend of owners/operators in the written summary document submitted with any data.

Substations and AC-DC Ties

You may make changes to existing substations in the substation GIS feature class using ArcGIS desktop software editing tools.

You may create new substation features individually or by appending or merging existing feature classes to the WECC data. Data to be merged or appended must first be projected to match the coordinate system of the WECC data as stated above. You may also delete substations that do not exist or are erroneous condensations of multiple substations.

New substations may be geolocated as accurately as possible when there is enough room on the map, and existing substations can be moved to better represent real-world locations. However, if the density of new and existing substations is such that labels cannot be placed with clarity, substations may be moved to locations that are not geographically accurate to allow for labeling. If you use GIS, we encourage you to use your best judgement and check the PDF version of the map from the previous year when referencing label density.

The substation feature class attribute table fields are structured as follows:

OBJECTID: ArcGIS generated field, do not alter.

SHAPE: ArcGIS generated field, do not alter.

WECC ID: WECC-assigned unique identifier. Do not change WECC ID for changes applied to existing facilities. WECC will create IDs for new additions, so you can leave them blank.

Standardized Substation Name: Preferred name of substation. **Please fill out using all-caps, and do not leave blank**. There is a 50-character limit. Standardized names will be used to generate the labels on the printed map. We encourage you to check the spelling of existing substations.

Display Name: Standard substation name used for customized labeling and web mapping labels. Generated from the Standardized Substation Name but does not need to be in all caps.

Facility Name: Long format name of facility (if applicable). We encourage you to fill in blanks with available information. You may provide the substation name if longer than the 50 characters of the Standardized Substation Name or provide clarifying information about the substation, e.g., “Tap,” “shared with…,” “DC converter station.”

BA: Balancing Authority. The standard abbreviated name for the Balancing Authority responsible for the substation. **New additions cannot be left blank**. We encourage you to fill in blanks.

Maximum Voltage: The maximum voltage of the substation. **Cannot be left blank**. If above 100 kV, it must be labelled as one of four categories:

- 100–199
- 200–299
- 300–399
- 400–599

If below 100 kV, you may fill out the exact voltage of the substation. For simplicity, high-voltage DC substations fall in the 400–599 category.

Longitude: Longitude of substation. New tabular additions must be projected into correct coordinate system before being added to existing data.

Latitude: Latitude of substation. New tabular additions must be projected into correct coordinate system before being added to existing data.

Data Source: The source of data. **Cannot be left blank**. New additions should include the abbreviation of your organization and one of the following source categories:

TABLE: For new additions via merged GIS data or tabular data.

MANUAL: For individual, manual additions to the data.

OTHER: Other addition methods.

Edits to existing data should not alter the Data Source field. The field should be filled out as follows: “BPA_TABLE,” “LDWP_MANUAL,” etc.

Revision Date: The date on which new data is added. Format is MM/DD/YYYY.

Comment: Any comments about the feature from the submitting entity.

Transmission Lines

Changes to the transmission line feature class can be made using ArcGIS desktop software editing tools to modify existing lines or create new line features individually.

New or relocated transmission lines must be drawn in a way that does not conflict with other map information and should match the existing schematic aesthetic. We encourage you to check the PDF version of the map from the previous year when referencing line spacing and overall design.

Lines should be snapped to a substation’s location or endpoints of other lines as appropriate. Avoid using pseudo-nodes in new lines if possible. You may delete erroneously connected transmission lines.

Transmission line attributes should be populated to the greatest extent possible, with special regard for the “To” and “From” substation names. WECC places high value in maintaining these relationships between substations. The attribute table fields are structured as follows:

OBJECTID: ArcGIS generated field, do not alter.

SHAPE: ArcGIS generated field, do not alter.

Line Layer: Derived from original CAD data correlated to transmission line voltage. Necessary for print map. **Cannot be left blank**. Categories are as follows:

ORANGE—correlates to “+500 kV DC”

RED—correlates to “500 kV”

GREEN—correlates to “345–360 kV”

BLUE—correlates to “230–287 kV”

LINES—correlates to “Lower Voltages”

Line Text: Code for transmission operator of line. Used for annotation along line in print map and provides colorblind readability. Necessary for print map. **Cannot be left blank**. Existing format is to list the number of multiple lines (if applicable), the color of the line(s), and the legend code of the operator in parentheses. Example: 2B(25). 2 lines, both BLUE, operator 25 (Idaho Power Company). Lines with voltages below 230 kV do not need a color. Multiple line operators should be listed as comma-separated numbers within the parentheses, e.g., (26, 48). Some exceptions do occur for operators that are not listed in the legend. In such a case, please list the name of the operator in parentheses.

“From” Substation: The name of the substation as it appears in the Standardized Substation Name field in the substations feature class for one endpoint of the line. Should not be left blank, as most completed lines should terminate and snap to a substation.

“To” Substation: The name of the substation as it appears in the Standardized Substation Name field in the substations feature class at the other endpoint of the line. Should not be left blank, as completed lines should terminate and snap to a substation

> **Note**: “To” and “From” directions have been arbitrarily selected and do not reflect actual power flow.

Voltage Class: Voltage classification of the line. Derived from the CAD data classifications. **Cannot be left blank**. Line must be categorized as one of the following:

- ±500 kV DC
- 500 kV
- 345–360 kV
- 230–287 kV
- Lower Voltages

TLine ID: Unique ID of the line generated by WECC for GIS data management purposes. Leave blank for new line additions. Do not alter ID in applying changes to existing lines.

SubConnect: The names of the substations at the start and end of line; derived from the From Substation and To Substation fields by WECC. Can be left blank.

Company Name: Name of the company or companies that operate the line. **Cannot be left blank**. Must correlate to existing operator codes found in legend and in Line Text field. Multiple companies are separated by commas. Operators who are not in the legend but are submitting data should still appear in the Company Name field. For lines with multiple operators, each operator should appear individually in these five fields:

- **Company_1:** Field for first operator of a line.
- **Company_2:** Field for second operator of a line.
- **Company_3:** Field for third operator of a line.
- **Company_4:** Field for fourth operator of a line.
- **Company_5:** Field for fifth operator of a line.

Comments: Any comments about the feature from the submitting entity. Any line operators that cannot be listed in the five available fields should appear here.

We strongly encourage you to review your part of the Western Interconnection in all existing data for accuracy.

Written Summary of Changes

A written document of changes made must be included with every submission. Include elements that have been added, deleted, edited, or moved. Every single change made should be in the summary document. Upload the document in the submissions folder with your edited data.