

SCE'S RESPONSES TO WSD'S GIS DATA & SCHEMA QUESTIONS FOR ELECTRICAL CORPORATIONS ARE PROVIDED BELOW IN BLUE. FOR TRACKING PURPOSES, SCE IS LABELING THIS DATA REQUEST SET AS WSD-SCE-004.

1.0 INTRODUCTION

The list of questions and requests contained in this document are intended to guide electrical corporations in preparing for meetings with the WSD on GIS data and related data topics. It is the WSD's expectation that electrical corporations will prepare a presentation, lasting no more than 90 minutes, to address and present all the information requested below. To the extent that the time restriction does not allow for sufficient coverage or discussion of all items in this document, the WSD may issue verbal data requests during the meeting with the expectation of receiving responses to those requests from electrical corporations no later than three business days after the meeting. The WSD welcomes electrical corporations to submit narrative responses to the below questions or provide requested information in advance of the scheduled meeting to limit the need for follow on data requests post-meeting.

2.0 QUESTIONS & REQUESTS TO ALL ELECTRICAL CORPORATIONS

2.1. GIS Data Communications

a. Identify a primary and secondary point of contact (POC) for future correspondence related to GIS data.

- Primary GIS POC: Michael Hinton; Michael.Hinton@sce.com; (714) 414-9162
- Secondary GIS POC: Sergio Lopez; Sergio.Lopez@sce.com; (909) 274-3774

b. Provide the contact information for both primary and secondary GIS data POCs.

[See SCE's response to Question 2.1.a above.](#)

c. Identify preferred protocols for correspondence with GIS data POCs.

[In order to manage and track all WMP-related requests, SCE prefers all WMP-related GIS data requests be sent to Ryan Stevenson \(\[ryan.stevenson@sce.com\]\(mailto:ryan.stevenson@sce.com\)\). GIS-related questions should also copy the POCs identified above. SCE supports direct contact with our GIS experts to discuss clarifying items, whether by phone or email. SCE also supports ongoing collaboration with WSD and our GIS experts and welcomes regular meetings/calls, working groups, and the like to improve understanding, transparency, and sharing of data.](#)

2.2. Asset Data – General

a. Which database format(s) (e.g. Esri geodatabases, Oracle, Access, etc.) is used to store and manage this data?

[GIS data is stored in Oracle Spatial and AGOL. SCE's main asset management system uses SAP HANA. Other databases are described in related responses below.](#)

b. How is it structured (i.e. groupings, hierarchies, related tables, attributes collected, etc.)?

[Data is structured using related tables \(i.e. relational database structure\).](#)

c. What is the current size and annual projected growth of this database?

Asset related data is about 1 TB is expected to grow at 50 – 100 GB per year.

d. Provide an extract, transform, load (ETL) workflow detailing the processes involved in data creation/input, transfer, storage, and report generation.

See attachment entitled “CONFIDENTIAL_WMP Data Dissemination.”

e. Provide an entity relationship diagram (ERD) for the data.

See attachment entitled “CONFIDENTIAL_Asset & Connectivity ERD.”

f. What aspects of this data, if any, are considered confidential?

All information is confidential unless classified as public. The data may also be subject to specific handling classification like Critical Energy Infrastructure Information (CEII). In general, database structures and ERD diagrams are confidential per our cyber security policy. See attachment entitled “2020WMP_GISLayerList” that identifies the GIS layers provided for the 2020 WMP and confidential treatment.

g. Identify all asset types for which GIS data exists.

Asset types include, for example, Automatic Recloser, Buried Splice, Branch Line Fuse, Burd, Circuit, Conductor, Fault Interrupter, Manhole, Meters, Overhead Distribution Switches, Overhead Transformers, Pad, PE Gear Switch, Pole, Sectionalizer, Substations, Tower, Transmission Pole, Transmission Switch, Underground Distribution Switches, Underground Transformers, Vault, Voltage Regulators, and Weather Stations.

h. How is asset age data tracked?

For point assets, asset age is not stored in GIS but is available in our asset management system, i.e., SAP. For linear assets, asset age can be derived from associated pole data.

i. Identify all asset types for which age data is tracked?

Distribution Equipment:

- Branch Line Fuse
- Buried UG
- Capacitor
- Circuit
- Fuse Cabinet
- Handhole
- Lamp
- Manhole
- Network Protector
- Oil Fuse Cut Out
- Recloser
- Regulator
- Remote Switch Actuator

- Pole Top Substation
- Gs Switch
- Trench
- Tunnel
- Pad
- Pole
- Vault
- Transformer

Transmission

- Circuit
- FAA Light Control Box
- FAA Tower Light
- Pothead
- Remote Transmission Switch
- Switch
- Tower
- Vault
- Pole

ii. If age data records are not available, what is the process for estimating asset age?

For wires, the age is derived based on average age of the poles associated to the segment.

i. Is asset health recorded in GIS data? If so, identify all asset types and classes (i.e. transmission or distribution) for which asset health is tracked.

SCE does not track asset health data on distribution or transmission assets in GIS. SCE's inspection programs record and monitor general asset health-related information in SCE's asset management system. General distribution and transmission asset information includes, for example, age, date of last inspection, and repair notifications. SCE's inspection programs monitor and assess asset health for distribution and transmission assets. SCE's inspection programs are further described in our 2020 WMP. For substation class transformers and circuit breakers, we have health indices for each asset that are generated from SCE's maintenance decision tool (MDT). However, this data is not in SCE's GIS platform.

i. For each asset type identified above explain how asset health is determined and how frequently it is updated.

See SCE's Response to Question 2.2.i above.

ii. Do processes for assessing asset health differ for different asset types? If so, explain those differences.

See SCE's Response to Question 2.2.i above.

iii. What factors are considered?

See SCE's Response to Question 2.2.i above.

iv. What measurements are taken?

See SCE's Response to Question 2.2.i above.

v. How are these factors and measurements used to assess asset health?

See SCE's Response to Question 2.2.i above.

vi. What units of measure are used to evaluate asset health?

See SCE's Response to Question 2.2.i above.

2.3. Asset Data – Lines (i.e., conductors)

a. Is GIS line data consistently split or otherwise distinguished at all locations where lines convert between overhead and underground?

Yes, GIS line data stops and starts at transition points between overhead and underground lines.

i. What asset types are used to define the points at which line segments transition between overhead and underground?

Equipment and junctions, which are both point features.

b. Are unique IDs assigned to line segments within the same circuit? If so, explain how this is done.

Yes, the line segments are automatically assigned a system generated ID, sequentially, by the GIS application at time of creation.

c. Is splice data tracked? If so, explain how this is done.

Yes, this is tracked through the placement of a point feature to denote the location of the splice data.

i. What data attributes related to splices are tracked?

The following data attributes are tracked:

- FID
 - Description: A unique Feature ID which is automatically assigned, sequentially, by the GIS application at time of creation
- Junction Type
 - Description: Attribute field utilized to capture type. The selected values will indicate what occurs at that point, i.e., Buried Splice, Material Change, Wire Size Change, Terminating Point, Transition from OH to UG
- Category Type
 - Description: Attribute type that describes the system based on voltage, i.e., Transmission / Subtransmission / Distribution.
- State
 - Description: Attribute type that describes the state of the point feature, i.e., existing / abandoned
- FID Structure
 - Description: Unique feature ID field utilized to associate the Junction Point Feature to the closest structure / asset, i.e., pole

- Orientation
 - Description: Symbol rotation field
- OH UG
 - Description: Display model field
- Feature Status
 - Description: Status field that describes the state of the feature based on what stage the work request data was received at, i.e., Planned / Energized / As-Built
- Remarks
 - Description: Open text field, utilized to capture notes
- In-service Date
 - Description: Date attribute field, utilized to capture the completion date that construction work was finalized
- Modified By
 - Description: Username field, system generated with name of user who makes data update into GIS application
- Modified Date
 - Description: Date field, system generated with date when data is updated into GIS application

ii. How is the data spatially represented (i.e. an attribute of line data, a point asset with unique ID, etc.)?

Data is spatially represented with a Point Feature with unique ID.

d. Is connector data tracked? If so, explain how this is done.

No.

i. What data attributes related to splices are tracked?

N/A

ii. How is the data spatially represented (i.e. an attribute of line data, a point asset with unique ID, etc.)?

N/A

2.4. Asset Data – Points

a. Are assets and equipment defined separately in your GIS data or is equipment considered an asset type?

Yes, assets and equipment are captured differently as structure and equipment types within unique feature classes.

i. If defined separately, explain what differentiates an asset from equipment and provide a list of all items considered to be equipment.

Within GIS data, the structure / asset is where the equipment will be attached to or reside within the structure / asset.

Equipment list includes, for example, Automatic Recloser, Buried Splice, Branch Line Fuse, Fault Interrupter, Overhead Distribution Switches, Overhead Transformers, PE Gear Switch, Sectionalizer, Transmission Switch, Underground Distribution Switches, Underground Transformers, and Voltage Regulators

b. Are all electric customer meters geolocated to parcel polygons?

Yes, most meters are mapped at the centroid location of the parcel polygon. Where we have additional information to the exact location of the meter, we show at those exact locations (non-centroid).

i. If not, are there plans for doing this?

No

ii. If planning to do this, what is the approach for accomplishing this effort?

N/A

iii. If planning to do this, what is the expected timeframe for completing this effort?

N/A

iv. If planning to do this, what is the status of this effort?

N/A

c. What data attributes are collected for wildfire cameras?

We do not collect data attributes for wildfire cameras; however, the following fields are available from the service:

- OBJECTID
- ID
- Tower Name on Proxy
- Latitude
- Longitude
- Status
- Install Month
- Camera name on public site – alertwildfire.org
- Geographical name followed (OC)
- URL Name
- Public Livestream URL
- Private Livestream URL
- Multiple Camera URL
- Public Page URL
- County
- CongressDist
- StSenateDist
- StAssemblyDist

- SupervisoryDist
- MeanElevationMeter
- MeanElevationFeet
- GlobalID
- X
- Y

i. Is field-of-view analysis conducted for wildfire cameras? If so, explain how this is done.

Camera field of view is only for display purposes.

2.5. Outage Data

a. Which database format(s) (e.g. Esri geodatabases, Oracle, Access, etc.) is used to store and manage this data?

SCE's Outage Management System (OMS) is a traditional Oracle RDBMS used for processing and storing outage events. For Bulk Transmission lines (> 220 kV) and substations, outage events are stored in Lotus notes.

b. How is it structured (i.e. groupings, hierarchies, related tables, attributes collected, etc.)?

A reportable outage is set of data that identifies which customers, devices (transformers), isolation points, and circuits that were affected, at what time(s), and the duration of each incremental restoration step.

Reportable outages are defined at this time as unplanned outage events that occur at the distribution primary voltage level. Planned outages, secondary and service outages are not captured and validated with the same level of scrutiny as outlined below.

Data elements and relationships to be shown in more detail below.

c. What is the current size and annual projected growth of this database?

Current size is approximately 380 GB with annual growth projected at approximately 20 GB.

d. Provide an extract, transform, load (ETL) workflow detailing the processes involved in data creation/input, transfer, storage, and report generation.

Please refer to attachment entitled "CONFIDENTIAL_WMP Data Dissemination." Outages are detected by processing three types of incoming indicators:

- Smart meter last gasp messages (Power Outage Notifications)
- Customer calls
- SCADA device operations

Additional manual switching operations generate data to indicate incremental isolation and restoration points.

The OMS users (primarily trouble dispatchers and system operators) process the outage in near real time. After the outage is complete, the outage is again reviewed to ensure accuracy. Any missing restoration steps as reflected in switching logs or other notes are inserted, appropriate Cause Codes are recorded, and the outage is marked as Approved (validated). Reports are generated to ensure that all likely eligible outages are identified and are either validated or otherwise coded as not reportable.

After that, twice a day, the validated outages are extracted from OMS and transferred to the Outage Data and Reliability Metrics system (ODRM) through an automated ETL process. Data anomalies preventing the ETL process from processing successfully are reported to the business owners for correction and processing in subsequent ETL cycles.

Additional validation is performed, and attributes are added in ODRM. As further described below, related transmission and substation outages are connected to the distribution outage in ODRM. ODRM is the system of record for outage reporting.

e. Provide an entity relationship diagram (ERD) for the data.

See attachment entitled, "CONFIDENTIAL_Outage ERD."

f. What aspects of this data, if any, are considered confidential?

Please refer to SCE's response to Question 2.2.f above.

g. Are outages on the distribution system tracked differently than those on the transmission system? If so, identify all differences and provide the information requested in 2.5a-2.5f for both outage classes.

Transmission and substation outages are recorded directly in Interruption Log Sheet (ILS) in Lotus Notes and tracked in ODRM. Once all outage information is recorded into ILS, the outage information is transferred to ODRM by the system operator. If a distribution outage was caused by, or otherwise related to a transmission or substation outage, the outages are connected in ODRM once the distribution outage has been extracted from OMS into ODRM.

h. Identify all supplemental investigations or reviews conducted for certain outage types (i.e. vegetation-caused outages, wire down events, near-ignition events, etc.)?

SCE outage investigations are generally initiated at the onset of circuit or circuit segment interruptions. This typically includes operation of a device such as a Circuit Breaker, Automatic Recloser, or Fuse. For distribution voltages, these device operations also commonly include customer outages and initiate SCE circuit patrols to review the cause of the outage and in some cases a fault condition can be identified such as a vegetation contact or wire down event. Supplemental investigations into what caused the outage may occur in some outage situations such as with SCE's Material Performance Failure Reporting (MPFR) process where equipment is evaluated following an event. Another example of a supplemental investigation related to an outage is related to reports of fire ignitions events which are close in time to outages, and in some cases without outages, to determine if SCE facilities may have been involved. These ignition events are reported as part of annual reporting processes for reportable ignition events to the CPUC. Whenever a circuit interruption is identified as being caused by vegetation, SCE performs a

site visit to validate and collect additional details about the tree(s) involved and other conditions that are documented in a separate database.

i. Provide all information requested in 2.5a-2.5f for each supplemental investigation or review identified.

SCE tracks investigations of ignition events in an Access Database. We also track and investigate Wire Down events in an Access Database. Vegetation outage information is available in OMS and investigate events that result in an ignition.

ii. Are outage events the only trigger for the identified supplemental investigations or reviews? If not, identify all other manners in which an identified supplemental investigation or review is initiated.

No, wire down and ignition notifications are also a trigger for an investigation to start. MPFR investigations may be initiated outside of outage situations. For example, these investigations may be initiated from equipment defects found during inspection of SCE warehouse inventory, during installation of new equipment or during inspection of existing facilities. Ignition investigations also occur outside of outages where SCE facilities are in close proximity to an ignition site as ignitions may still be related to SCE facilities without an outage or where SCE facilities are damaged due to a third-party caused ignition. Ignition reviews initiated based on reported fire events and circuit interruptions are part of the investigation process for identifying reportable ignition events. Additional review may also occur outside of formal processes mentioned previously where conditions or situations on the system are identified and peer review, supervisor review, or other subject matter experts are requested to assist with investigation or review.

i. Is the operation of expulsion fuses tracked? If so, provide the following:

Expulsion fuse operations are not directly tracked; however, cause codes indicating that the upstream source of the outage was due to fuse operation, and the likely cause of that fuse operation, are available to the OMS users.

i. How is this done?

Fuse operations, in general, are related to SCE tracking of “area out” outage events. Area out events may be related to expulsion fuses, current limiting fuses, or liquid fuses as typical causes for interruption events. Please see SCE’s response to 2.5.h above.

ii. Where is this information stored?

ODRM tracks area out events but does not track specific events based on expulsion fuse operations.

iii. What data attributes related to the event are tracked?

Date, start time, end time, location (structure number), total customer minutes of interruption, outage cause (using standard cause codes), and notes in some cases.

iv. Is expulsion fuse operation always associated with an outage?

No, there are many situations where expulsion fuses operate and customer outages do not occur. However, it is rare that a fuse would operate and that a portion of the circuitry or equipment would not be interrupted. For example, distribution capacitor banks commonly

utilize expulsion fusing. In general, fuse operations related to capacitors banks interrupt the capacitor bank operation but do not produce customer outages.

2.6. PSPS Data – Events

a. Which database format(s) (e.g. Esri geodatabases, Oracle, Access, etc.) is used to store and manage this data?

ArcGIS Online and Outage Maps.

b. How is this data spatially represented (i.e. points, lines, polygons)?

Polygons that represent the approximate outage area.

i. Can PSPS event line data be provided for specific line segments, if a PSPS event only impacts a portion of a circuit? If so, how are circuit segments identified?

Outage boundaries are currently at the circuit level. We are working towards outage boundaries at the segment level. Outage boundaries will be identified by the circuit name and isolation devices used for de-energization.

ii. What is the process for updating PSPS scoping polygons (i.e. areas that could potentially be impacted by a PSPS event) to reflect the actual areas impacted by the PSPS event? How long does this take?

PSPS outage boundaries are approximate locations of impacted areas. This is a rigorous manual process to update the boundaries and customer counts.

iii. Can you produce post-PSPS event polygons in accordance with the parcel boundaries impacted by the PSPS event?

Yes, we could produce post PSPS event polygons at the parcel level. Information is stored in separate systems and would have to be aggregated.

c. How is it structured (i.e. groupings, hierarchies, related tables, attributes collected, etc.)?

Feature class with associated attributes.

i. How are shutoffs occurring at different times during a single PSPS event identified spatially (i.e. polygons representing each phase of event)?

Circuit polygons with PSPS status (Monitored / De-Energized) are published to AGOL. PSPS events are aggregated at the circuit level and per event for a duration of time.

d. What is the current size and annual projected growth of this database?

Current Size is approximately 500 KB and annual growth is projected at approximately 1%.

e. Provide an extract, transform, load (ETL) workflow detailing the processes involved in data creation/input, transfer, storage, and report generation.

See attachment entitled “CONFIDENTIAL_WMP Data Dissemination.”

f. Provide an entity relationship diagram (ERD) for the data.

See attachment entitled "CONFIDENTIAL_PSPS ERD."

g. What aspects of this data, if any, are considered confidential?

Please refer to SCE's response to Question 2.2.f above.

2.7. PSPS Data – Damages

a. Which database format(s) (e.g. Esri geodatabases, Oracle, Access, etc.) is used to store and manage this data?

During an event, PSPS damages are stored in Excel files in SharePoint; however, from a work management standpoint this information is maintained in SCE's Asset Management System (SAP EAM).

b. How is it structured (i.e. groupings, hierarchies, related tables, attributes collected, etc.)?

This data is structured by related tables.

c. What is the current size and annual projected growth of this database?

PSPS damages trackers are approximately 100 MB and projected to grow at 50 MB per year. SAP EAM is approximately 5 TB and is projected to grow at 500-700 GB per year.

d. Provide an extract, transform, load (ETL) workflow detailing the processes involved in data creation/input, transfer, storage, and report generation.

Please refer to attachment entitled "CONFIDENTIAL_WMP Data Dissemination."

e. Provide an entity relationship diagram (ERD) for the data.

SCE does not have an ERD for the Excel files.

f. What aspects of this data, if any, are considered confidential?

Please refer to SCE's response to Question 2.2.f above.

g. Does the business process/protocol for collection of PSPS damage data require accompanying photographs?

As part of enhanced business processes, photographs will be captured on all Priority 1 notifications. However, there are exceptions where a significant safety risk may prevent photos from being taken.

2.8. Vegetation Inspection Data

a. Which database format(s) (e.g. Esri geodatabases, Oracle, Access, etc.) is used to store and manage this data?

Database formats include Esri Geodatabase, Oracle Spatial, SQL Server and SAP Hana.

b. How is it structured (i.e. groupings, hierarchies, related tables, attributes collected, etc.)?

Related tables. The three main data entities are: Trees, TreeInspections and WorkPoints. Each of these entities has a corresponding table to store images. Trees are central entities for our vegetation management program. A WorkPoint entity contains the collection of all vegetation treatment tasks/activities.

c. What is the current size and annual projected growth of this database?

Current size of our main vegetation management database is approximately 20 GB with an anticipated annual growth of 3 GB.

d. Provide an extract, transform, load (ETL) workflow detailing the processes involved in data creation/input, transfer, storage, and report generation.

Please refer to attachment entitled “CONFIDENTIAL_WMP Data Dissemination.”

e. Provide an entity relationship diagram (ERD) for the data.

Please refer to attachment entitled “CONFIDENTIAL_Vegetation Management ERD.”

f. What aspects of this data, if any, are considered confidential?

Please refer to SCE’s response to Question 2.2.f above.

g. Is an inventory of trees maintained?

Tree inventory is maintained and each tree is associated with an identifier and inspection/trim activities are tracked based on the tree ID.

i. What criteria is used to determine whether a tree is an inventory tree and needs to be tracked?

Two factors are used to determine whether a tree is an inventory tree:

- Any tree that requires work is placed in the inventory (if not already there).
- Patrol inspections can result in identification of trees that may require future attention and as a result would be placed into the Tree inventory collection.

For SCE’s HTMP, all subject trees (trees and proximity of overhead lines that have the capacity to strike the facilities) are inventory trees.

ii. Are inventory trees assigned unique IDs?

Yes, all trees are assigned universal unique identifiers generated by ArcGIS and Fulcrum. In addition, SCE also assigns a unique identifier to track tree features across data migrations.

h. How is vegetation inspection data spatially represented (i.e. points, lines, polygons)?

SCE’s service territory is divided into Grids (polygons). Each Grid contains a collection of Trees. All tree inspections are represented as GIS points in the TreeInspections point feature layer.

i. Identify all programs under which vegetation inspections take place.

SCE's vegetation management programs/efforts include inspection activities and are described in our 2020 WMP. These include our distribution and transmission vegetation management plans (DVMP and TVMP) requiring annual inspections. Additionally, inspections are performed for the following programs/efforts: DRI / Bark Beetle; HTMP; Pole Brushing; Storm support; and other efforts that include Weed Abatement, Canyon Patrols, Summer Readiness, At-risk Circuit Patrols, and Operation Santa Ana. LiDAR inspections are also conducted.

i. Identify all types of vegetation inspections performed.

See SCE's Response to Question 2.8.i above.

j. How are the results and findings of vegetation inspections scoped into vegetation treatment projects?

- DVMP / TVMP – compliance to regulatory minimum and recommended clearance drives the vegetation treatment of inspected trees
- HTMP – risk calculations are performed to direct the vegetation treatment of trees
- DRI – health of trees (i.e., dead/dying/diseased) drives the treatment
- Pole Clearing – brush near the pole drives the treatment to ensure 10-foot radius clearance at the base of the pole
- Supplemental risk-based programs – SCE looks for potential encroachments and mitigates those risks accordingly

2.9.Vegetation Treatment Project Data

a. Which database format(s) (e.g. Esri geodatabases, Oracle, Access, etc.) is used to store and manage this data?

Please see SCE's Response to Question 2.8.a.

b. How is it structured (i.e. groupings, hierarchies, related tables, attributes collected, etc.)?

Please see SCE's Response to Question 2.8.b.

c. What is the current size and annual projected growth of this database?

Please see SCE's Response to Question 2.8.c.

d. Provide an extract, transform, load (ETL) workflow detailing the processes involved in data creation/input, transfer, storage, and report generation.

Please see SCE's Response to Question 2.8.d.

e. Provide an entity relationship diagram (ERD) for the data.

Please see SCE's Response to Question 2.8.e.

f. What aspects of this data, if any, are considered confidential?

Please refer to SCE's Response to Question 2.2.f.

g. Are all vegetation treatment projects (i.e. trims, removals, brush clearance, etc.) related to vegetation inspections?

While a majority of vegetation treatment activities are related to vegetation inspections, there are a few treatment programs that don't have inspection as a pre-requisite. Programs described below are not triggered by vegetation inspections:

- Weed Abatement Program – work is typically scheduled as a result of customer complaints
- District Work Orders – vegetation-related work from Districts is not preceded by vegetation inspections
- Customer Driven Requests –When a customer complains about tree-related issues in proximity to power lines, a trouble order is created and dispatched for vegetation inspection.
- Notifications – Vegetation-related work can be the result of assets inspections
- Storm/Emergency Support – Vegetation-related work is identified after an emergency event
- TCCI (Tree cause circuit interruptions) – TCCIs are investigated and inspected in the field for follow up work.

i. If not, identify all other business practices/operations that trigger the initiation of vegetation projects and explain the process by which a vegetation treatment project is created for each identified business practice/operation.

N/A

h. Are before and after photographs required for grid hardening projects? If so, identify the types of grid hardening projects that pictures are required for.

The table below identifies the vegetation programs requiring pictures and the programs where pictures are optional or not required.

Program	Photos required
DVMP / TVMP	Before and after pictures required only for P1 trees. Pictures are optional for all other trees
DRI / Bark Beetle	Before and after pictures required
HTMP	Before and after pictures required
Canyon Patrols and Summer Readiness program	Not mandatory. Photos may be taken to assist with locating vegetation for treatment/remediation. No after photos required
Pole Brushing	Before and after pictures required
Notifications	Pictures are optional
Storm/Emergency Support	Pictures are optional if using Fulcrum app
Weed Abatement	No pictures required
Customer Driven Requests	No pictures required
TCCI	No pictures required

2.10. Asset Inspection Data

a. Which database format(s) (e.g. Esri geodatabases, Oracle, Access, etc.) is used to store and manage this data?

- Aerial Distribution: Esri Geodatabase hosted in ArcGIS Online
- Aerial Transmission: Esri Geodatabase hosted in ArcGIS Online

- Distribution Ground: SQLServerDb using Google Maps in Azure (Inspect app)
- Transmission Ground: Esri Geodatabase hosted in ArcGIS Online
- Generation: Esri Geodatabase hosted in ArcGIS Online
- Telecommunication: Esri Geodatabase hosted in ArcGIS Online
- PSPS Pre-Patrol: Esri Geodatabase hosted in ArcGIS Online
- PSPS Live Field Observation: Esri Geodatabase hosted in ArcGIS Online
- Weather Station Installations/Inspection: Esri Geodatabase hosted in ArcGIS Online

b. How is it structured (i.e. groupings, hierarchies, related tables, attributes collected, etc.)?

Please see attachment entitled “CONFIDENTIAL_Consolidated_Inspection_DataDictionaries.xlsx” for further details.

- Aerial Distribution: Main structure is point feature with related inspection point feature, related notification point feature, and related photos table.
- Aerial Transmission: Main structure is point feature with related inspection point feature, related notification point feature, and related photos table.
- Distribution Ground: Main structure is point feature with related inspection point feature, related notification point feature, and related photos table.
- Transmission Ground: Main structure is point feature with related inspection point feature, related notification point feature, and related photos table.
- Generation: Main asset is point feature with related inspection point feature, related notification point feature, and related photos table.
- Telecommunication: Main structure is point feature with related inspection point feature, related notification point feature, related cable name table and related photos table.
- PSPS Pre-Patrol: Pre-patrol point feature with related photo table.
- PSPS Live Field Observation: Live Field Observation point feature.
- Weather Station Installation/Inspection: Main structure is point feature with related photo table.

c. What is the current size and annual projected growth of this database?

Please note that the database sizes, below, are approximate and reflect the size without photo attachments. Additionally, the annual projected growth of each database is dependent on the amount of photos and the amount of scope for each year.

- Aerial Distribution: Current Size - 440 MB
- Aerial Transmission: Current Size - 145 MB
- Distribution Ground: Current Size – 500 MB (annual growth expected, 1.1 TB/yr)
- Transmission Ground: Current Size - 145 MB
- Generation: Current Size - 1.50 MB
- Telecommunication: Current Size - 575 MB
- PSPS Pre-Patrol: Current Size - 920 KB
- PSPS Live Field Observation: Current Size - 730 KB
- Weather Station Installation/Inspection: Current Size - 1.5 MB

d. Provide an extract, transform, load (ETL) workflow detailing the processes involved in data creation/input, transfer, storage, and report generation.

Please refer to attachment entitled “CONFIDENTIAL_WMP Data Dissemination.” Please also refer to attachment entitled “CONFIDENTIAL_ETL_InspectionGISProcess.pdf” for further details.

- Aerial Distribution: Receive inspection scope list from Asset Management Team, retrieve structure information from cGIS/SAP for spatial location, create local file geodatabase to contain structure locations, creation of Survey123 form/schema in Survey123 Connect, structures loaded into schema hosted on ArcGIS Online using ArcPro append tool. Operational Dashboards created for inspection summary reporting. Daily CSV extracts provided for other business reporting needs.
- Aerial Transmission: Receive inspection scope list from Asset Management Team, retrieve structure information from cGIS/SAP for spatial location, create local file geodatabase to contain structure locations, creation of Survey123 form/schema in Survey123 Connect, structures loaded into schema hosted on ArcGIS Online using ArcPro append tool. Operational Dashboards created for inspection summary reporting. Daily CSV extracts provided for other business reporting needs.
- Distribution Ground: For Distribution in 2020, our scope was determined based on the structure-level probabilities of ignition (failure) and REAX+ (consequence) creating a risk matrix which informed the necessary inspection frequency (5-year compliance, bi-annual or annual). Based on these frequencies the scope (structure, risk “bucket” and frequency) for 2020 was provided to the Distribution planning team. For those assets not within a frequency-based SAP maintenance plan, assets were loaded into ArcGIS Online where groupings were created in alignment with the aforementioned work order structure within the grid, i.e., superior FLOC(asset) boundaries. These groups were exported, quality reviewed, and loaded into SAP. Once in SAP, work was tactically scheduled with ClickSchedule and subsequently ingested the InspectApp for enhanced data capture. The InspectApp maintained the work orders in an Azure environment. An operational dashboard was built in SAS and later PowerBI to aggregate inspection records and equipment-level measurement documents as well as the enhanced inspection data.
- Transmission Ground: Receive inspection scope list from Asset Management Team, retrieve structure information from cGIS/SAP for spatial location, create local file geodatabase to contain structure locations, creation of Survey123 form/schema in Survey123 Connect, structures loaded into schema hosted on ArcGIS Online using ArcPro append tool. Operational Dashboards created for inspection summary reporting. Daily CSV extracts provided for other business reporting needs.
- Generation: Receive inspection scope list from Generation lead, retrieve asset information from Generation database, create local file geodatabase to contain asset locations, creation of Survey123 form/schema in Survey123 Connect, assets loaded into schema hosted on ArcGIS Online using ArcPro append tool. Operational Dashboards created for inspection summary reporting. Weekly CSV extracts provided for other business reporting needs.
- Telecommunication: Receive inspection scope list from Asset Management Team, retrieve structure information from cGIS/SAP for spatial location, create local file geodatabase to contain structure locations, creation of Survey123 form/schema in Survey123 Connect, structures

loaded into schema hosted on ArcGIS Online using ArcPro append tool. Operational Dashboards created for inspection summary reporting. Weekly CSV extracts provided for other business reporting needs.

- PPS Pre-Patrol: Program uses field collection, there is no initial data load or refresh. PPS ACE Team specifies an area for patrolling based on current PPS event.
- PPS Live Field Observation: Program uses field collection, there is no initial data load or refresh. PPS ACE Team specifies an area for patrolling based on current PPS event.
- Weather Station Installation/Inspection: Receive station installation structure location from business, retrieve structure information from cGIS/SAP for spatial location, create local file geodatabase to contain structure locations, creation of Survey123 form/schema in Survey123 Connect, structures loaded into schema hosted on ArcGIS Online using ArcPro append tool.

e. Provide an entity relationship diagram (ERD) for the data.

Please see attachment entitled "CONFIDENTIAL_ERD_EntityRelationshipDiagram.pdf."

f. What aspects of this data, if any, are considered confidential?

Please refer to SCE's response to Question 2.2.f above.

g. How is asset inspection data spatially represented (i.e. points, lines, polygons)?

- Aerial Distribution: Points
- Aerial Transmission: Points
- Distribution Ground: Points
- Transmission Ground: Points
- Generation: Points
- Telecommunication: Points
- PPS Pre-Patrol: Points
- PPS Live Field Observation: Points
- Weather Station Installation/Inspection: Points

i. Does this differ for different types of inspections? If so, explain.

SCE is still assessing this question. Preliminarily, we do not believe there are differences with other types of transmission and distribution asset inspections.

h. Identify all programs under which asset inspections take place.

See SCE's response to Question 2.10.h.i. immediately below.

i. Identify all types of asset inspections performed.

- Distribution: Overhead Detail Inspections (Risk and Non-Risk)
- Distribution: Annual Grid Patrol
- Distribution: Aerial Inspections
- Distribution: Infrared Inspections
- Poles: Intrusive Pole Inspections
- Distribution: Underground Pole Inspections

- Streetlight Inspections
- Transmission: Ground Patrol Inspections
- Transmission: High Fire Risk Informed Inspections
- Transmission: Aerial Inspections
- Transmission: Corona/IR
- Substation Inspections
- Quality assurance/quality control inspections
- Generation Inspections

ii. Are the asset inspection types identified above inclusive of all asset inspections discussed in the electrical corporation's 2020 WMP? If not, identify any such asset inspection types.

No, Inspections not mentioned in the WMP include:

- Distribution: Underground Detail Inspection
- Transmission: Underground Detail Inspections
- Transmission: Telecom Inspections

i. Are evaluations of pole loading considered asset inspections?

No, SCE pole loading evaluations are not considered an asset inspection.

i. If not, why, and how is this data tracked?

Pole loading evaluations are performed to determine the pole load calculation for transverse (often referred to as "bending or wind loading"), vertical load, and guy adequacy safety factor calculations in advance of constructing new and replacement poles or as part of our Pole Loading Program. The three main inspection types generally performed in SCE's maintenance and inspection program includes Patrol, Detailed, and Intrusive, where pole loading evaluation is not considered an asset inspection. The pole load data is tracked via SPIDAMin once it is calculated in SPIDACalc.

ii. If so, is data collected or produced from pole loading assessments incorporated into an asset inspection database? Identify the databases.

SCE's primary system of record is SAP for asset inspections. SCE's pole load data is tracked via SPIDAMin software and measurement documents for these pole loads are generated in SAP.

2.11. Grid Hardening Project Data

a. Which database format(s) (e.g. Esri geodatabases, Oracle, Access, etc.) is used to store and manage this data?

Grid Hardening project tracking is managed in Access files in SharePoint; however, supporting information is stored in SAP EAM, Design Manager (home grown app on Oracle), ClickSchedule, Scope and Cost Management Tool, Scope Mapping Tool, MAP3D and CGIS (Oracle).

b. How is it structured (i.e. groupings, hierarchies, related tables, attributes collected, etc.)?

Related tables / collection of attributes.

c. What is the current size and annual projected growth of this database?

- Grid Hardening Project Trackers are approximately 100 MB and projected to grow at 50 MB per year
- SAP EAM is approximately 5 TB and is projected to grow at 500-700 GB per year
- SCE Design Manager is approximately 240 GB and is projected to grow at 400 GB per year

d. Provide an extract, transform, load (ETL) workflow detailing the processes involved in data creation/input, transfer, storage, and report generation.

Please see attached file entitled “CONFIDENTIAL_WMP Data Dissemination.”

e. Provide an entity relationship diagram (ERD) for the data.

SCE does not have an ERD for project tracking data.

f. What aspects of this data, if any, are considered confidential?

Please refer to SCE’s response to Question 2.2.f above.

g. How is the status of a grid hardening project determined and measured (i.e. percent complete)?

Spreadsheets are used to track percent complete.

h. Are before and after photographs required for grid hardening projects? If so, identify the types of grid hardening projects that pictures are required for.

No, before and after pictures are not typically captured for grid hardening projects.

2.12. Weather & Model Data

a. Which database format(s) (e.g. Esri geodatabases, Oracle, Access, etc.) is used to store and manage data collected from weather stations?

Data is received from SCE Pole Top Weather stations through Western Weather API and shall be stored in enterprise data warehouse (Hadoop).

i. How is it structured (i.e. groupings, hierarchies, related tables, attributes collected, etc.)?

Data is structured using related tables. See attachment entitled “CONFIDENTIAL_Weather data model” for illustration of related tables.

ii. Provide an extract, transform, load (ETL) workflow detailing the processes involved in weather data creation/input, transfer, storage, and report generation.

See attachment entitled “CONFIDENTIAL_WMP Data Dissemination.”

b. Identify all proprietary models and indices (e.g. fire potential index, outage producing winds, etc.) which leverage or rely on weather data.

See responses below.

i. For each model/index identified, indicate whether the model/index relies on measured or modeled weather data.

SCE's weather forecast modelling vendor, Atmospheric Data Solutions downloads the Global Forecast System (GFS) and the North American Model (NAM) models twice-daily, and downscales both using the Weather Forecasting and Research (WRF) model which has been configured specifically for SCE's service territory. This downloading and downscaling process gives SCE 5-day forecasts of multiple weather and vegetation moisture variables which are used to produce the Fire Potential Index (FPI). The FPI is calculated on a grid covering the entire SCE service territory at a 2km by 2km horizontal resolution.

ii. For each identified model/index, explain how outputs are produced, grouped/categorized, and leveraged for operational decision-making.

There are two report types containing two products each which are published by Weather Services daily (originating from a circuit level forecast provided by Atmospheric Data Solutions). The reports are used by various PSPS stakeholders throughout the PSPS phases to make informed decisions associated with PSPS IMT activations and de-energization of SCE electric circuits during active PSPS events. The two reports are as follows:

1. Fire Weather Threat Report
 - Moderate Fire Weather Threat
 - Operating Restrictions
2. Elevated Fire Weather Threat Report
 - Monitored Circuit List
 - Period of Concern List

The criteria for all Fire Weather Threat levels are as follows:

Fire Weather Threat Level	Criteria	Incident Commander Approval
Moderate Fire Weather Threat	FPI ≥ 9 AND Sustained OR Gust \geq Threshold	Not Required
Operating Restrictions	FPI ≥ 11 AND Sustained OR Gust \geq Threshold	Not Required
Elevated Fire Weather Threat	FPI ≥ 12 AND Sustained OR Gust \geq Threshold) OR (FPI ≥ 15)	Required
Extreme Fire Weather Threat	FPI ≥ 15 AND Sustained OR Gust \geq 99th percentile	Required

Moderate Fire Weather Threat: The Moderate Fire Weather Threat report classifies Work Restrictions that will be in effect for the day that the list is published. The circuits listed in this tab of the Fire Weather Threat Report are published by Weather Services once daily. The report is then distributed to field personnel with jurisdictional responsibility of identified circuits via dedicated SharePoint site.

Operating Restrictions: The Operating Restrictions report classifies the circuits that will meet specified criteria initiating the blocking of reclosers and the implementation of fast curve settings for the next five

days. The circuits listed in this tab of the Fire Weather Report require a field patrol if a circuit relays while Operating Restrictions are in effect. Once finalized, Weather Services drops the report into a secured folder to be used by the Grid Control Center (GCC) to implement the Operating Restrictions that Weather Services has provided. A copy is placed on the designated SharePoint site for use by ACE Team, Grids, Districts, and Switching Centers. If any concerns arise, the GCC is to contact Weather Services.

Monitored Circuit List: The Monitored Circuit List classifies circuits that will meet the specified criteria for activating a PSPS IMT. This document displays in depth information on the circuits in scope including assigned weather stations, thresholds, and the max forecast for the day(s) in question. Once finalized, Weather Services sends out a Circuit Summary Report (as needed) and if there is a threat determined within the next five days, a discussion is had with the on-duty Business Resiliency Duty Manager (BRDM) and the on-duty Incident Commander (IC) to move forward with any necessary actions.

Period of Concern: The Period of Concern classifies circuits that will meet the specified criteria for activating a PSPS IMT. This document displays three-hour time periods in which all circuits listed in the Monitored Circuit List are in scope and subject to Live Field Observation (LFO). Once finalized, Weather Services sends out a Circuit Summary Report (as needed) and if there is a threat determined within the next five days, a discussion is had with the on-duty Business Resiliency Duty Manager and the on-duty Incident Commander to move forward with any necessary actions.

c. Provide an explanation of how the 2020 WMP Guideline parameter of RFW-Circuit mile days was calculated in the electrical corporation's 2020 WMP.

As explained in our 2020 WMP, the RFW circuit-mile days are based on all overhead distribution and transmission circuits that traverse through the National Weather Service (NWS) Fire Weather Zone (FWZ)¹² from a 2015-2019 historical database of RFW events from the NWS. The overhead lengths of distribution and transmission circuits are calculated within each FWZ polygon (area divided geospatially into over approximately 1,000 space areas). All circuit lengths within that FWZ polygon are then multiplied by the number of days (or fraction of days) that a particular polygon had an RFW in effect.

SCE recommends the Commission consider using the National Fire Danger Rating System (NFDRS), which all fire agencies use to determine daily fire danger risk, instead of RFW data. NFDRS is a system that allows fire managers to estimate today's or tomorrow's fire danger for a given area. It combines existing and expected states of selected fire danger factors into one or more qualitative or numeric indices that reflect an area's protection needs. Fire danger ratings are typically reflective of the general conditions over an extended area, often tens of thousands of acres, where a possible wildfire could start. Fire danger ratings describe conditions that reflect the potential, over a large area, for a fire to ignite, spread and require suppression action.