


SCE	Legal, Regulatory, and Compliance	Transmission & Distribution Utility Vegetation Management (UVM)	Methodology	Doc. No.	UVM-02	 SOUTHERN CALIFORNIA <b>EDISON</b> <sup>®</sup> Energy for What's Ahead <sup>SM</sup>
				Version	5	
Effective Date		8/9/19				
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Transmission Vegetation Management Plan (TVMP)						

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WITH ERCP COMPLIANCE DOCUMENT REQUIREMENTS**

# UVM-02

## Utility Vegetation Management


### Transmission Vegetation Management Plan (TVMP)

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## 1. Introduction


### 1.1 Purpose

Southern California Edison (SCE) maintains a reliable electric transmission system by using a defense-in-depth strategy to manage vegetation located on and adjacent to transmission Rights-of-Way (ROW) in order to minimize the risk of encroachments into the specified clearance zones.

### 1.2 Objectives

The SCE Transmission Vegetation Management Plan (TVMP) is designed to comply with regulatory Compliance Requirements, such as the North American Electric Reliability Corp. (NERC) Reliability Standard FAC-003-4, California Public Utilities Commission (CPUC) General Order (GO) 95 requirements, Cal Fire Public Resource Codes (PRC), and Title 14, California Code of Regulations (CCR) while improving the reliability of SCE's transmission system by establishing maintenance and inspection procedures to:

- Manage vegetation to prevent vegetation encroachment into Clearance Zones stated in the following regulations, as applicable:
  - FAC-003-4
  - GO 95, Rule 35 (Case 13 and Case 14)
  - GO 95, Rule 37
  - PRC 4293
  - PRC 4292
  - Title 14 CCR Sections 1250-1258
- Document the maintenance strategies, procedures, processes and specifications used to manage vegetation to prevent the encroachment into the clearances described in the regulations noted above
- Include consideration of 1) conductor dynamics, 2) vegetation movement in high winds, and 3) the interrelationships between vegetation growth rates, control methods and inspection frequency
- Provide timely notification to the appropriate control center of vegetation conditions that could cause a flash-over or Fault at any moment
- Implement corrective actions to prevent the encroachment into the clearances described in the regulations noted above
- Inspect vegetation conditions annually
- Complete the annual work needed to prevent encroachments into the clearances described in the regulations noted above

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## 2. Applicability

### 2.1 Operating Units

This document is applicable to the OUs impacted by the Energy Regulatory Compliance Program (ERCP) compliance requirements related to Vegetation Management, including but are not limited to:

- Transmission and Distribution
- Generation

### 2.2 Facilities

#### 2.2.1 Transmission and Generation Facilities – NERC

The following language is from NERC Reliability Standard FAC-003-4: Transmission Facilities: Each overhead transmission line as defined below, located outside the fenced area of the switchyard, station or substation and any portion of the span of the transmission line that is crossing the substation fence and including, but not limited to, those that cross lands owned by federal, state, provincial, public, private, or tribal entities:

- Each overhead transmission line operated at 200kV or higher.
- Each overhead transmission line operated below 200kV identified as an element of an IROL under NERC Reliability Standard FAC-014 by the Planning Coordinator.
- Each overhead transmission line operated below 200kV identified as an element of a Major WECC Transfer Path in the Bulk Electric System (BES) by WECC.

Generation Facilities: Those lines as defined below including, but not limited to, those that cross lands owned by federal, state, provincial, public, private, or tribal entities.


- Overhead transmission lines that 1) extend greater than one mile or 1.609 kilometers beyond the fenced area of the generating station switchyard to the point of interconnection with a Transmission Owner's Facility, or 2) do not have a clear line of sight<sup>1</sup> from the generating station switchyard fence to the point of interconnection with a Transmission Owner's Facility and are:
  - Operated at 200kV or higher; or
  - Operated below 200kV and identified as an element of a Major WECC Transfer Path or an element of an IROL.

#### 2.2.2 Transmission Facilities – CPUC

The following language is from CPUC General Order 95, Rules 35 and 37.

Where overhead conductors traverse trees and vegetation, certain vegetation management activities are to be performed in order to establish necessary and reasonable clearances. The minimum clearances are set forth in Cases 13 and 14 and measured between line conductors and vegetation under normal conditions.

<sup>1</sup> "Clear line of sight" means the distance that can be seen by the average person without special instrumentation (e.g., binoculars, telescope, spyglasses, etc.) on a clear day.

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Transmission lines operated at 115kV to 500kV located in:

- Non-fire areas where GO 95, Rule 35 (Case 13) applies
- Extreme and Very High fire areas where GO 95, Rule 35 (Case 14) applies

### 2.2.3 Transmission Facilities – Cal Fire

The following language is from Cal Fire PRC 4293 and Related CCRs

Any person that owns, controls, operates, or maintains any electrical transmission or distribution line upon any mountainous land, or in forest-covered land, brush-covered land, or grass-covered land shall, during such times and in such areas as are determined to be necessary by the director or the agency which has primary responsibility for the fire protection of such areas, maintain a clearance of the respective distances in all directions between all vegetation and all conductors which are carrying electric current.

Transmission lines operated at 115kV to 500kV located in:


- Fire areas where PRC 4293 applies

The following language is from Cal Fire PRC 4292 and Related CCRs

Any person that owns, controls, operates, or maintains any electrical transmission or distribution line upon any mountainous land, or forest covered land, brush-covered land, or grass-covered land shall, during such times and in such areas as are determined to be necessary by the director or the agency which has primary responsibility for fire protection of such areas, maintain around and adjacent to any pole or tower which supports a switch, fuse, transformer, lightning arrester, line junction, or dead end or corner pole, a firebreak which consists of a clearing of not less than 10 feet in each direction from the outer circumference of such pole or tower.

Transmission lines operated at 115kV to 500kV located in:

- Fire areas where PRC 4292 applies

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### 3. Definitions

Refer to the NERC Glossary of Terms, the E&C Shared Services Glossary of Terms (ECSS-02), and UVM Program Glossary of Terms (UVM-16) for any capitalized terms used in this document.

### 4. Document Detail

#### 4.1 Encroachments

The language below is from the following Compliance Requirements:

- NERC Reliability Standard FAC-003-4 Requirements 1 and 2
- GO 95, Rule 35 and Rule 37
- PRC 4293

SCE or its approved contractor will manage vegetation to prevent encroachments into the Regulation Clearance Distance (RCD) of its applicable line(s), as described in Section 2, operating within their Rating and all Rated Electrical Operating Conditions of the types shown below<sup>2</sup>.

1. An encroachment into the applicable RCD<sup>3</sup>, observed in Real-time, absent a Sustained Outage<sup>4</sup>
2. An encroachment due to a fall-in from inside the ROW that caused a vegetation-related Sustained Outage<sup>5</sup>
3. An encroachment due to the blowing together of applicable lines and vegetation located inside the ROW that caused a vegetation-related Sustained Outage
4. An encroachment due to vegetation growth into the RCD that caused a vegetation-related Sustained Outage


<sup>2</sup> FAC-003-4 Requirements 1 and 2 do not apply to circumstances that are beyond the control of an applicable Transmission Owner or Generator Owner subject to this reliability standard, including natural disasters such as earthquakes, fires, tornados, hurricanes, landslides, wind shear, fresh gale, major storms as defined either by the applicable Transmission Owner or Generator Owner or an applicable regulatory body, ice storms, and floods; human or animal activity such as logging, animal severing tree, vehicle contact with tree, or installation, removal, or digging of vegetation.

<sup>3</sup> See Table 1 and Table 2.

<sup>4</sup> If a later confirmation of a Fault by the applicable Transmission Owner or Generator Owner shows that a vegetation encroachment within the RCD has occurred from vegetation within the ROW, this shall be considered the equivalent of a Real-time observation.

<sup>5</sup> Multiple Sustained Outages on an individual line, if caused by the same vegetation, will be reported as one outage regardless of the actual number of outages within a 24-hour period.

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## Measure

SCE will provide evidence to regulators upon request that it managed vegetation to prevent encroachments into the RCD as described above. Examples of acceptable forms of evidence may include dated attestations, dated reports containing no Sustained Outages associated with encroachment types 2 through 4 above, or records confirming no real-time observations of any RCD encroachments.

## Strategy and Supporting Documentation

In order to prevent an encroachment into the RCD, SCE or its approved contractor will inspect and manage all vegetation located within its ROWs or easements upon which the applicable lines are located. SCE will also manage all vegetation located outside the ROW or easement to prevent encroachment into the RCD. During the inspection and the completion of work, movement of the line conductors and vegetation growth will be taken into consideration<sup>6</sup>.

Evidence that SCE or its approved contractor managed vegetation to prevent encroachments into the RCD will include:

- Attachment B: Utility Vegetation Management (UVM) Inspection Report / Grid Cover Sheet
- Attachment C: UVM Post Work Verification Report

Transmission line vegetation maintenance shall be completed annually. SCE or its approved contractor will verify the completion of annual vegetation maintenance.

Oversight of Maintenance work will be provided pursuant to the UVM Post Work Verification and UVM Program Oversight Procedure (see UVM-07) to provide reasonable assurance work is completed in accordance with the work specification.

## 4.2 Maintenance Procedures


The following language is from Requirements: NERC Reliability Standard FAC-003-4 Requirement 3; GO 95, Rule 35 and Rule 37; PRC 4293

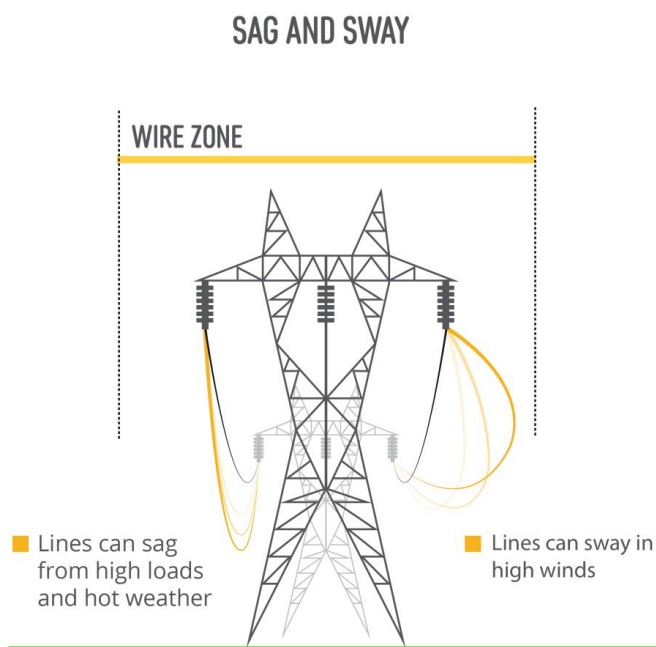
SCE shall have documented maintenance strategies or procedures or processes or specifications it uses to prevent the encroachment of vegetation into the RCD that accounts for the following:

- Movement of line conductors (sag and sway) under their Rating and all Rated Electrical Operating Conditions (See Figure 2).
- Inter-relationships between vegetation growth rates, vegetation control methods, and inspection frequency.

<sup>6</sup> See Paragraph 1.2. Maintenance Procedures



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## Measure

The maintenance strategies or procedures or processes or specifications provided demonstrate that SCE can prevent encroachment into the RCD considering the factors identified in the requirement.

## Strategy and Supporting Documentation

In order to prevent an encroachment into the RCD, SCE or its approved contractor will manage vegetation on ROWs according to the following specifications:

ROW widths, Maximum Line Sag, and Maximum Line Sway for lines that are subject to NERC Reliability Standard FAC-003-4 will be documented on a span by span basis. This data will be provided to internal personnel and/or contractors performing inspection work when Light Detection and Ranging (LiDAR) data is not used.

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ROW width, Sag and Sway data will allow field personnel to account for movement of the conductors under all Rated Electrical Operating Conditions when determining needed clearances or performing review. ROW width used for vegetation management may vary depending on site location, requirements, or restrictions. All lines subject to NERC Reliability Standard FAC-003-4 will meet ground clearance requirements, if possible, under all Rated Electrical Operating Conditions, as specified in General Order 95, Rule 37.

SCE performs a review of maintenance work as prescribed in the UVM Post Work Verification and UVM Oversight Procedure (UVM-07) to provide reasonable assurance work is completed according to the work prescription and required clearances.

SCE will document vegetation management elements related to its applicable lines as follows:

- Work methods (e.g., tree removal and pruning, herbicide application, brush removal, other vegetation management activities as described)
- Maintenance schedule
- Vegetation management inspection schedule (ground, aerial, LiDAR)
- Line inspection schedule (other than vegetation management inspections)
- Species specific growth rates, as applicable (may use fastest growing species on ROW as worst case growth rate)
- Clearances to be attained during vegetation management work are based on species specific growth rates or worst case species growth rate in a given span, as applicable (see Section 5, Tables 1 & 2)
- Clearances are to be maintained under all operating conditions and at all times, as applicable (see Section 5, Tables 1 & 2)

#### 4.3 Notification of Vegetation Threat


The following language is from NERC Reliability Standard FAC-003-4 Requirement 4

SCE, without any intentional time delay, shall notify the switching center for the associated applicable line when SCE has confirmed the existence of a vegetation condition that is likely to cause a Fault at any moment.

When SCE has a confirmed vegetation condition likely to cause a Fault at any moment it will retain evidence that it notified the switching center for the associated transmission line without any intentional time delay.

#### Strategy and Supporting Documentation

The Vegetation Threat Procedure (UVM-08), establishes and documents the processes to follow when an imminent threat, emerging threat, or low threat condition exists.

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#### 4.4 Constraints

Requirements: FAC-003-4 Requirement 5; GO 95, Rule 35 and Rule 37; PRC 4293

When SCE is constrained from performing vegetation work on an applicable line operating within its Rating and all Rated Electrical Operating Conditions, and the constraint may lead to a vegetation encroachment into the RCD prior to the implementation of the next annual work plan, then SCE shall take corrective action to ensure continued vegetation management to prevent encroachments.

##### Measure

SCE shall retain evidence of the corrective action taken for each constraint where an applicable transmission line was put at potential risk.

##### Strategy and Supporting Documentation

In the event that a property owner or jurisdiction refuses to allow SCE or its authorized contractor to complete vegetation work within the defined ROW on an applicable line, and the constraint may lead to a vegetation encroachment into the RCD prior to the implementation of the next annual work plan, then the following shall occur:


If the constraint was identified by an SCE employee/SSP, then:

- Manage Vegetation Threats in accordance with UVM-08, "Manage Vegetation Threats"
- Manage Customer refusals in accordance with UVM-14, "Manage Refusal Events."

If the constraint was identified by an SCE Vegetation Contractor, then the details of the constraint shall be documented in the: (1) Work Management System and; (2) Abnormal Field Condition Form (Attachment F). The Abnormal Field Condition form shall be provided to the applicable SSP for review and resolution.

##### Imminent Threat Condition

In the event that any imminent threat condition is observed, Vegetation Management Operations (VM) personnel, or the Grid Control Center (GCC) will be contacted without any intentional time delay and the steps outlined in UVM-08 will be followed.

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## 4.5 Inspections

Requirements: FAC-003-4 Requirement 6; GO 95, Rule 35 and Rule 37; PRC 4293

SCE shall perform a Vegetation Inspection of 100% of its applicable transmission lines at least once per calendar year and with no more than 18 calendar months between inspections on the same ROW<sup>7</sup>.

Measure

SCE shall retain evidence that it conducted Vegetation Inspections of the transmission line ROW for all applicable lines at least once per calendar year but with no more than 18 calendar months between inspections on the same ROW.

Strategy and Supporting Documentation

SCE or its approved contractor will inspect all vegetation located on and adjacent to the defined ROW of the applicable lines maintained by SCE as listed in the UVM Inspection Schedule at least once per calendar year and no longer than 18 calendar months between inspections.

Trees that may require additional maintenance throughout the year for any number of reasons (e.g., fast-growing species, thermal and physical loading) are identified as Exception Trees and may be inspected more frequently as needed.

## 4.6 Completion of Annual Work Plan


Requirements: FAC-003-4 Requirement 7; GO 95, Rule 35 and Rule 37; PRC 4293

SCE shall complete 100% of its annual vegetation work plan of applicable lines to ensure no vegetation encroachments occur within the RCD. Modifications to the work plan in response to changing conditions or to findings from vegetation inspections may be made (provided they do not allow encroachment of vegetation into the RCD) and must be documented. Examples of required modifications to the annual plan may include:

- Change in expected growth rate/environmental factors
- Force Majeure Events<sup>8</sup> that are beyond the control of a Transmission Owner or Generator Owner
- Rescheduling work between growing seasons
- Crew or contractor availability/mutual assistance agreements

<sup>7</sup> When the applicable Transmission Owner or Generator Owner is prevented from performing a Vegetation Inspection within the timeframe in R6 due to a natural disaster, the TO or GO is granted a time extension that is equivalent to the duration of the time the TO or GO was prevented from performing the Vegetation Inspection.

<sup>8</sup> Circumstances that are beyond the control of an applicable Transmission Owner or Generator Owner include but are not limited to natural disasters such as earthquakes, fires, tornados, hurricanes, landslides, ice storms, floods, or major storms as defined either by the TO or GO or an applicable regulatory body.

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- Identified unanticipated high priority work
- Weather conditions/accessibility
- Permitting delays
- Land ownership changes/change in land use by the landowner
- Emerging technologies

#### Measure

SCE retains evidence that it completed its annual vegetation work plan for applicable lines.

#### Strategy and Supporting Documentation


SCE or its approved contractor will complete its annual vegetation work plan on the applicable lines as listed in the UVM annual work plan on an annual basis.

The UVM annual work plan is created and approved by SCE management and communicated to internal employees and contractors prior to the start of each calendar year.

In addition to the documentation required above, the following information will also be retained related to the completion of the annual vegetation work plan, as applicable.

- Completed annual work plan (as finally modified)
- Annual work plan in its original form
- Explanation of all changes to the original annual work plan

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## 5. Clearance Requirements

### 5.1 Transmission Lines

Based on the conditions described below, the subsequent processes are used to establish the clearance requirements in the Wire Zone and Border Zone of the applicable Table 1 or 2:

Grid Resiliency Clearance Distances (GRCD) are established to mitigate fire risk and maintain compliance with applicable regulatory requirements.

- GRCD-A and GRCD-B are to be established at time of maintenance work based on line voltage
- Trigger Clearance Distance<sup>9</sup> (TCD) for UVM work to be initiated based on line voltage
- Compliance Clearance Distance<sup>10</sup> (CCD) to be maintained at all times based on line voltage

Refer to Table 1 for Fire Area clearances: FAC-003-4, PRC 4293, and GO 95, Rule 35 Case 14

Refer to Table 2 for Non-Fire Area clearances: FAC-003-4, and GO 95, Rule 35 Case 13

#### 5.1.1 Restricted Areas


Restricted Areas may result in conditions preventing the GRCD-A or GRCD-B, TCD or CCD for Tables 1 or 2 from being implemented. Examples include crops, orchards, environmentally sensitive areas or lack of easement rights.

When restricted areas are encountered and the clearances specified in Tables 1 or 2 cannot be achieved, then:

- GRCD-A or GRCD-B can be modified and documented in the work management system to address the specific circumstances or restrictions at that location
- Ensure sufficient clearance is achieved to maintain RCD for 18 months

<sup>9</sup> TCD = CCD + 3-feet

<sup>10</sup> CCD = RCD x 1.5 (Safety Margin) rounded up

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All Elevations in Fire Areas					
FAC-003-4, PRC 4293 and GO 95, Rule 35, Extreme and Very High Fire Areas (Case 14)					
Nominal Voltage <sup>11</sup>	Wire Zone/Sag - Clearance Distance at Time of Maintenance GRCD-A <sup>12</sup>	Border Zone/Sway - Clearance Distance at Time of Maintenance GRCD-B <sup>13</sup>	WZ / BZ Clearance Distance that Triggers Work TCD	WZ / BZ Clearance Distance to be Maintained for Compliance CCD	Regulation Clearance Distance RCD
500kV	30'	Clear to the greater of the following: (1) Defined ROW Boundaries or; (2) Maximum Blowout plus 30'	18'	15'	10.0'
230kV	30'		18'	15'	10.0'
161kV	30'		18'	15'	10.0'
115kV	30'		18'	15'	10.0'
69kV	12'	Clear to the greater of the following: (1) Defined ROW Boundaries or; (2) Maximum Blowout plus 12'	9'	6'	4.0'

**Table 1:** Clearance Distance –Fire Areas, FAC-003-4, PRC 4293, Rule 35 (Case 14)

The clearances in Table 1 must take into consideration maximum sag and sway under all Rated Electrical Operating Conditions and vegetation movement for lines subject to NERC Reliability Standard FAC-003-4.

<sup>11</sup> 161kV, 115kV, and 69kV Major WECC Transfer Path or IROL only. Reference Attachment A


<sup>12</sup> If GRCD-A recommended clearances cannot be achieved, required maintenance shall ensure RCD for 18 months

<sup>13</sup> If GRCD-B recommended clearance (2) cannot be achieved, required maintenance shall ensure RCD for 18 months

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Non-Fire Areas -Based on Elevations up to 8000' in					
FAC-003-4 and GO95 Rule 35 (Case 13)					
Nominal Voltage <sup>14</sup>	Wire Zone/Sag - Clearance Distance at Time of Maintenance GRCD-A <sup>15 16 17</sup>	Border Zone/Sway - Clearance Distance at Time of Maintenance GRCD-B <sup>18</sup>	WZ / BZ Clearance Distance that Triggers Work TCD	WZ / BZ Clearance Distance to be Maintained for Compliance CCD	Regulation Clearance Distance RCD
500kV	30'	Clear to the greater of the following: (1) Defined ROW Boundaries <u>or</u> ; (2) Maximum Blowout plus 30'	18'	15'	9.6'
230kV	30'		10'	7'	4.7'
161kV	10'	Clear to the greater of the following: (1) Defined ROW Boundaries <u>or</u> ; (2) Maximum Blowout plus 10'	8'	5'	3.2'
115kV	10'		7'	4'	2.2'
69kV	6'	Clear to the greater of the following: (1) Defined ROW Boundaries <u>or</u> ; (2) Maximum Blowout plus 6'	n/a	3'	1.5'

**Table 2:** Clearance Distances – Non-Fire Areas, FAC-003-4 and GO95 Rule 35 (Case 13)

The clearances in Table 2 must take into consideration maximum sag and sway under all Rated Electrical Operating Conditions and vegetation movement for lines subject to NERC Reliability Standard FAC-003-4.

<sup>14</sup> 161kV, 115kV, and 69kV Major WECC Transfer Path or IROL only. Reference Attachment A

<sup>15</sup> GO95 Rule 35 Appendix E Case 13 (non-Fire Areas) recommends 10' clearance for 110kV to 300kV

<sup>16</sup> Although GO95 Rule 35 Appendix E Case 13 (non-Fire Areas) recommends 4' clearance for 2.4kV to 72kV, SCE is adopting a 6' clearance


<sup>17</sup> If GRCD-A recommended clearances cannot be achieved, required maintenance shall ensure RCD for 18 months

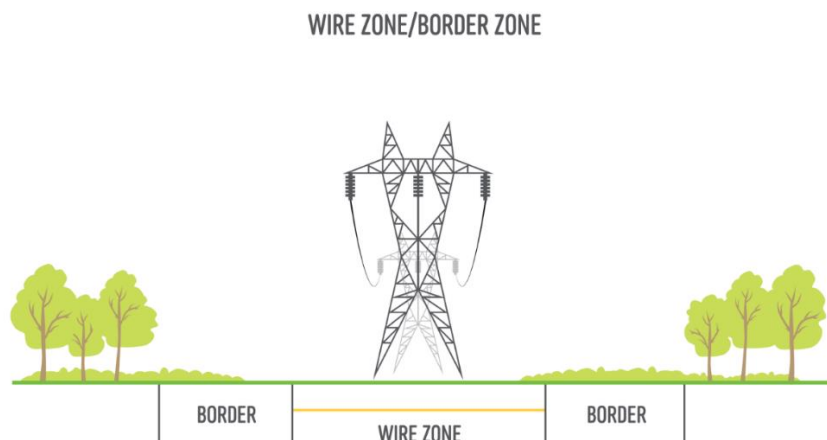
<sup>18</sup> If GRCD-B recommended clearance (2) cannot be achieved, required maintenance shall ensure RCD for 18 months

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**Figure 2: Wire Zone – Border Zone**

- Vegetation in the Wire Zone must be cleared, and maintained per the clearances noted in the Tables 1 and 2, as appropriate. Fast Growing Tree Species that are located in the Wire Zone shall be removed as appropriate<sup>19</sup>. The Wire Zone in Tier 2 and Tier 3 fire areas will contain only low-growing trees, shrubs, and grasses. All fast growing tree species are described in Attachment E: “Tree Species in SCE Service Territory.”
- Vegetation in the Border Zone will be pruned or removed to prevent encroachment into a Clearance Zone under all Rated Electrical Operating Conditions as documented on the Attachment B: “UVM Inspection Report / Grid Cover Sheet” and if applicable, on Attachment C: “UVM Post Work Verification Report” if corrective action is needed.
- Vegetation identified as a Hazard Tree will be mitigated in accordance with Procedure UVM-04, “UVM Hazard Tree Management Plan.”
- An Exclusion Zone is to be established and maintained under and around transmission towers. The Exclusion Zone is a clear area (bare ground) under the tower and measuring a minimum of 10’ out from the outside perimeter of the tower footings and a 20’ perimeter Exclusion Zone will be established where necessary for access and maintenance.
- If RCD plus 18 months growth clearance cannot be attained at the time of scheduled maintenance due to easements, other legal agreements, or regulations that restrict vegetation management practices, the maximum allowable amount of vegetation will be removed or otherwise controlled as appropriate. These Exception Tree(s) will be documented in the work management system and re-inspected as necessary throughout the year.

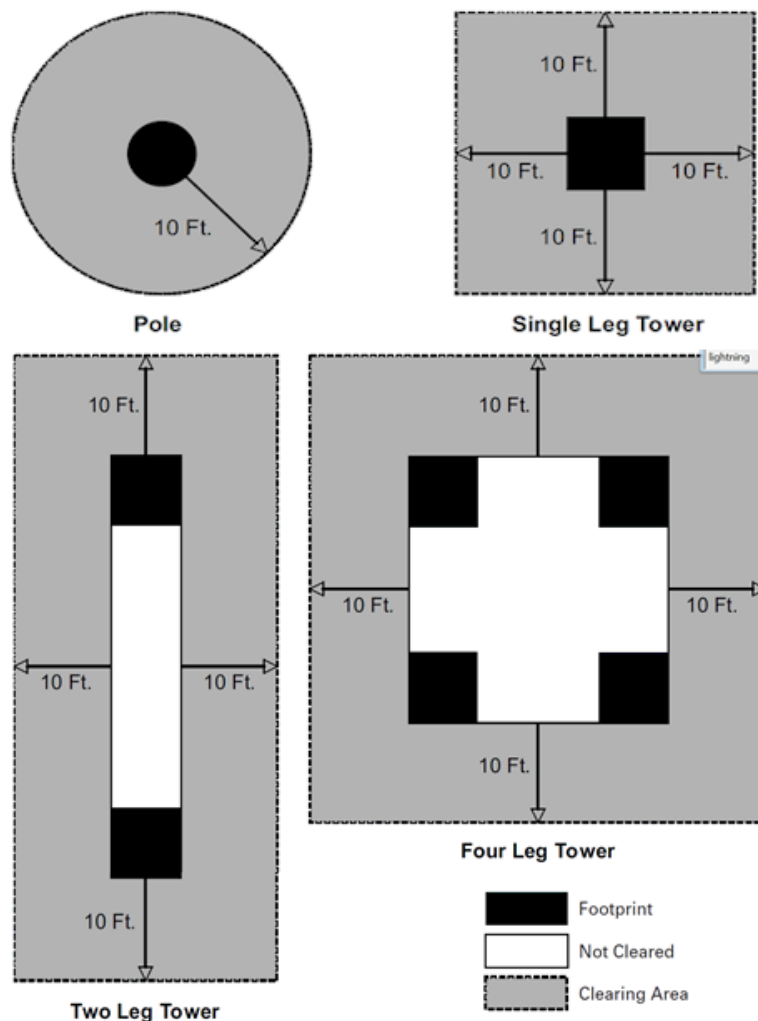
<sup>19</sup> Trees that have the capability to encroach into the clearance distances at maturity shall be removed

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### 5.1.2 Transmission Poles and Towers

The following clearances around transmission poles and towers are to be maintained as required in PRC 4292 and CCR 1254.

The 10 foot clearance for towers noted in Figure 3 may be increased to 20 feet when needed for vehicle access.



**Figure 3: Clearances around Poles and Towers**

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## 6. Other Program Elements

### 6.1 Inspection Types

#### 6.1.1 Pre-inspections

SCE conducts Pre-Inspections of applicable lines, to identify:

- Vegetation management work needed to maintain compliance with applicable regulations
- Potential CCD or RCD encroachments
- Hazard Trees (on-ROW and observable off-ROW trees)
- Exception Trees

#### 6.1.2 Supplemental Inspections

Supplemental inspections are performed by qualified Transmission Operations personnel throughout the year. Identified conditions requiring vegetation related work are recorded and reported to VM personnel for scheduling of remediation, as applicable.

### 6.2 Inspection Methods

#### 6.2.1 Ground Inspections

SCE performs inspections, for lines with identified vegetation, from vehicles or by foot from the source point to the end of line. For lines that are subject to NERC Reliability Standard FAC-003-4, ground inspections require the use of Sag and Sway table data to determine when pruning is required to maintain the required clearance. Ground inspections are necessary when LiDAR data is not available.


#### 6.2.2 LiDAR Inspections

LiDAR is a surveying method that measures distance to a target by illuminating the target with pulsed laser light and measuring the reflected pulses with a sensor. Differences in laser return times can then be used to make digital three-dimensional representations of the target. LiDAR data acquisitions are conducted via air patrol.

SCE uses LiDAR as an inspection and measurement tool to identify clearances between high-voltage lines and vegetation. This method of inspection and measurement is used on selected ROWs in the SCE system, and is employed when lines cannot be readily accessed by ground or the clearances between vegetation and conductors cannot be obtained both vertically and horizontally from an aerial patrol. Due to the increased accuracy and additional data obtained using LiDAR technology, LiDAR is the preferred method of inspection, when practical.

Vegetation concerns identified from evaluation of the LiDAR data will be supplemented by foot/ground patrols to validate concerns and/or other required information, as applicable.

Based on topography, line construction, and ecosystem type, the LiDAR inspection will be scheduled as needed. Refer to UVM-06, LiDAR Reference Guide.

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### 6.2.3 Ground Inspections Using Previously Acquired LiDAR Data

Slow-growing plant communities or Subject Trees near or beyond the Border Zone can have valid LiDAR data older than five years from the original LiDAR inspection detailed in section 6.2.2. In these instances, ground inspections using previously acquired LiDAR data can be used to identify changes/growth of vegetation and assessment of required pruning/maintenance to achieve required clearance. When using this method of inspection, the preinspector is required to inspect from the source point to the end of line.

### 6.2.4 Aerial Inspections

Where Line Clearance cannot be readily assessed from the ground but the horizontal and vertical clearance between the vegetation and conductors can be determined from an aerial inspection, then aerial inspections are acceptable. Aerial inspections are also an acceptable method for conducting post-storm/post-fire emergency inspections.

## 6.3 Abnormal Field Conditions

Inspections that cannot be completed due to inaccessibility or restrictions will be promptly reported to the VM Compliance and Support Event Expeditor for managing the condition in accordance with UVM-14. When these conditions are identified by SCE Vegetation contractors, the condition shall be documented on the Abnormal Field Condition Form (Attachment F) and provided to the applicable SSP for review and resolution of the identified condition.

## 6.4 ROW Width

ROW widths are established by engineering or construction standards as documented in either construction documents, pre-2007 vegetation maintenance records, or by the blowout standard in effect when the line was built.


## 6.5 Vegetation Control Techniques

SCE uses industry standard Integrated Vegetation Management (IVM) techniques to perform scheduled and required work. These techniques may include:

- Manual (Pruning and Removal)
- Chemical (Herbicides)
- Mechanical (Mowing, Mastication, Feller Bunchers, etc.)
- Other cultural and biological practices to promote desirable, stable, low - growing plant communities that will resist invasion by tall growing tree species

Prescriptions for required work are generally developed on a case by case basis and consider a myriad of local factors.

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## 6.6 Post Work Verification

VM SSPs perform a Post Work Verification after completion of contractor(s) work. The VM SSP reviews occur after the clearing work is completed. Review samples are selected in accordance with UVM-07, Post Work Verification and UVM Program Oversight.

## 6.7 Personnel Qualifications and Training

### 6.7.1 Utility Vegetation Management Personnel

The VM SSPs responsible for performing Post Work Verifications shall be qualified in accordance with Procedure UVM-11, "Qualification of UVM Senior Specialists." SSPs shall be Certified Arborists with the International Society of Arboriculture. SSPs are also trained to utilize transmission circuit maps; understand transmission and substation operations; recognize restricted areas; and are trained to understand all laws, regulations, and standards applicable to their work.

### 6.7.2 UVM Contractors

Contract personnel receive the majority of their training through their respective employers. This ongoing training is supplemented by SCE

Training provided by SCE to contract personnel includes, but is not limited to, the following:

- Regulatory Compliance Requirements (state and federal)
  - NERC Reliability Standard FAC-003, General Order 95, Public Resource Codes
- Imminent threat procedures (UVM-08, Vegetation Threat Procedure)
- Managing Refusal Events (UVM-14, Manage Refusal Events)
- Reporting inaccessible areas
- Environmentally sensitive habitat areas
- Avian restrictions
- SCE operations and contractual requirements


## 7. Outages

### 7.1 Outage Investigations

Sustained Outages are investigated by a qualified Transmission department employee and/or a qualified VM employee to determine the cause. This investigation is performed using a Tree Caused Circuit Interruption (TCCI) Investigations Log.

#### 7.1.1 Periodic Data Submittals

SCE will report vegetation related transmission outages to the Regional Entity pursuant to current Regional Entity's requirements under NERC Reliability Standard FAC-003-4. Outages will be reported using the following categories:

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1. Category 1A — Grow-ins: Sustained Outages caused by vegetation growing into applicable lines, that are identified as an element of an IROL or Major WECC Transfer Path, by vegetation inside and/or outside of the ROW
2. Category 1B — Grow-ins: Sustained Outages caused by vegetation growing into applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, by vegetation inside and/or outside of the ROW
3. Category 2A — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines that are identified as an element of an IROL or Major WECC Transfer Path, from within the ROW
4. Category 2B — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, from within the ROW
5. Category 3 — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines from outside the ROW
6. Category 4A — Blowing together: Sustained Outages caused by vegetation and applicable lines that are identified as an element of an IROL or Major WECC Transfer Path, blowing together from within the ROW
7. Category 4B — Blowing together: Sustained Outages caused by vegetation and applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, blowing together from within the ROW


## 8. Evidence

SCE shall retain data or evidence to show compliance with NERC Reliability Standard FAC-003-4, Requirements R1, R2, R3, R5, R6 and R7 for three calendar years unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

SCE shall retain data or evidence to show compliance with NERC Reliability Standard FAC-003-4, Requirement R4 for the most recent 12 months of operator logs or the most recent 3 months of voice recordings or transcripts of voice recordings, unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

## 9. Approvals

Program Manager	Signature	Date
Melanie Jocelyn, Principal Manager	<b>Melanie Jocelyn</b> / Approved by E-mail	8/7/19

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## 10. Revision History


Revision Number	Date	Description of the Revision	By	Next Review Date
1	7/1/18	Re-write to include the following enhancements: Clearing distances calculated based on additional factors such as sag and sway	UVM Build Team	2019
2	9/27/18	Updated to include all Vegetation Regulations – not just FAC-003	UVM Build Team	2019
3	2/1/19	Updated clearance distances in all tables	Bill Kotteakos	2019
4	5/17/19	General Document Refresh Deleted "ROW Width Table" from document and added to VM SharePoint site	Bill Kotteakos	5/17/20
5	8/9/19	Revised GRCD clearances and footnotes. Provided additional clarification for inspection methods	Bill Kotteakos	8/9/20

## 11. References

### External References

- ANSI A300: Standards that apply to professionals who provide or supervise the management of trees or woody landscape plants
- ANSI A300 (Part 1): Identifies written pruning performance standards for tree care
- ANSI A300 (Part 7): Integrated approach to management of vegetation on utility right-of-way



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- ANSI A300 (Part 9): Provides guidelines for the practice of tree risk assessment and standards for writing specifications
- ANSI Z 133.1: Applies to employers engaged in the business of pruning, maintaining, or removing vegetation and brush chipping
- NERC Glossary of Terms
- NERC Reliability Standard FAC-003-4 NERC Glossary of Terms  
[https://www.nerc.com/pa/Stand/Glossary%20of%20Terms/Glossary\\_of\\_Terms.pdf](https://www.nerc.com/pa/Stand/Glossary%20of%20Terms/Glossary_of_Terms.pdf)

### Internal References

- ECSS-02, E&C Shared Services Glossary of Terms
- UVM-06, LiDAR Reference Guide
- UVM-07, Post Work Verification and UVM Program Oversight
- UVM-08, Managing Vegetation Threats
- UVM-11, Qualification of UVM Senior Specialists
- UVM-12, Employee and Contractor Training
- UVM-14, Manage Refusal Events

## 12. Attachments

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Attachment A: WECC Transfer Paths and IROLs Under 200kV

Attachment B: UVM Inspection Report / Grid Cover Sheet

Attachment C: UVM Post Work Verification Report

Attachment D: Tree Species in SCE Service Territory

Attachment E: NERC Reliability Standard FAC-003 - Table 2, Minimum Vegetation Clearance Distances

Attachment F: UVM Abnormal Field Conditions


Attachment G: UVM Outage Investigation Report

## 13. Distribution and Data Retention

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The official his version of the document shall be stored on the Maintenance and Inspection server (\\sce\workgroup\TDBU20\ts compliance) while in effect and for at least seven (7) years thereafter.



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**Distribution List:**


- UVM Program Owner
- UVM Department Managers
- OU Touchpoints

## 14. Key Contacts

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UVM Senior Manager, Operations: Jeff Copeland, (310) 995-6178

UVM Senior Manager, Compliance & Support: Bill Kotteakos, (949) 379-9470

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**Attachment A**  
**WECC Transfer Paths and IROLs Under 200kV**

District	Line Designation	Line Voltage	Other Information as Needed
72	Ivanpah-Baker-Cool Water-Dunn-Siding-MT. Pass	115kV	
72	Kramer-Tortilla	115kV	
72	Cool Water-Segs 2-Tortilla	115kV	
73	Kramer-Victor	115kV	
79	Devers - Farrell – Windland	115kV	
79	Mirage-Santa Rosa-Tamarisk	115kV	
85	Control-Silver Peak "A" From PS 595 to Control	55kV	
85	Control-Silver Peak "C" From PS 594to Control	55kV	
85	Control-Haiwee-Inyokern	115kV	
87	Eagle Mountain-Blythe	161kV	

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**Attachment B**  
**UVM Inspection Report / Grid Cover Sheet**

Circle one: **DISTRIBUTION** or **TRANSMISSION**

Zone:  District:  Grid:  ISO:

Pre-Inspection		Tree Contractor		SCE Senior Specialist	
2018 Inventory		2018 Performed Trims		% GRCD Trims Achieved	
2018 Prescribed Trims		2019 Performed Trims		% Approved Exceptions	
2019 Inventory		2019 Performed Removals		% Unapproved Exceptions	
2019 Prescribed Trims		Total Hours Invoiced		Trim Refusals Pending	
2019 Prescribed Removals		Approved Exceptions		Removal Refusals Pending	
2019 Removals Approved		Unapproved Exceptions		P1 Not Permanently Res.	
Total Hours Invoiced		Priority 1 Permanently Res.		SCE Field Review	
Approved Exceptions		Additional Compliance			
Unapproved Exceptions		Add Locations			
Priority 1		Abnormal Field Conditions			
Additional Compliance					
Notification Consultant					

Company Name:	Notes:
Pre-Inspector:	
Start Date:	
Completion Date:	
I certify the work I performed within this grid to be accurate and in accordance with the applicable Statement of Work"	
Print/Signature:	

Company Name:	Notes:
VM Contractor GF:	
Start Date:	
Completion Date:	
I certify the work I performed within this grid to be accurate and in accordance with the applicable Statement of Work"	
Print/Signature:	

SCE Senior Specialist PI Review Date:	
SCE Senior Specialist TC Review Date:	
Senior Specialist Print/Signature (PI):	Senior Specialist Print/Signature (TC):

Date Received by SCE:	
Date Updated in Database:	

**EXAMPLE**




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## 2018 Quality Assurance Audit Report

<b>Note: Trees estimated to be less than 18 inches at time of review in a CPUC compliance area.</b>	
<b>Note: Trees estimated to be less than 48 inches at time of review in a High Fire designated area.</b>	
<b>Note: Trees located outside the conformance zone (more than 18 or 48 inches) at time of review. SCE approval required prior to work.</b>	
<b>Note: For contractor comments, identify date of trim or re-trim and any comments to validate trim/no trim decisions.</b>	
Updated 1/31/2017	
<b>Additional Comments:</b>	All trees clear of MYCD, PRC 4293, and GO 95 Rule 35 at time of inspection. Additional tree work required in 2018.


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**Attachment D**  
**Tree Species in SCE Service Territory**

<b>Species Name</b>	<b>Growth Rate</b>	<b>Species Name</b>	<b>Growth Rate</b>
Acacia-Blow	Medium	Cherry	Medium
Ailanthus	Fast	Chinaberry	Medium
Albizzia	Medium	Citrus	Slow
Alder, White	Medium	Coral	Medium
Almond	Medium	Cottonwood	Fast
Ash	Fast	Cow Itch	Slow
Aspen	Slow	Crape Myrtle	Slow
Athel	Medium	Cypress	Slow
Avocado	Medium	Deodara	Slow
Bamboo	Fast	Dogwood	Slow
Banana	Slow	Elder, Box	Medium
Bay	Slow	Elderberry	Medium
Birch	Slow	Elm	Fast
Bird of Paradise	Medium	Eucalyptus	Fast
Bottle	Slow	Eugenia	Medium
Bottlebrush	Slow	Ficus	Medium
Brisbane Box	Medium	Fig	Medium
Buckeye	Slow	Fir	Slow
Camphor	Medium	Floss, Silk	Medium
Carob	Medium	Ginkgo	Slow
Carrotwood	Medium	Golden Rain	Slow
Casuarina	Medium	Grevillea	Fast
Catalpa	Medium	Hackberry	Medium
Cedar	Slow	Jacaranda	Fast
Century Plant	Slow	Joshua	Slow

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**Attachment E**  
**NERC Reliability Standard FAC-003 - Table 2, Minimum Vegetation Clearance Distances**  
**(For Reference Only)**

**FAC-003 — TABLE 2 — Minimum Vegetation Clearance Distances (MVCD)<sup>17</sup>**  
**For Alternating Current Voltages (feet)**


(AC) Nominal System Voltage (kV)*	(AC) Maximum System Voltage (kV) <sup>18</sup>	MVCD (feet)	Over sea level up to 500 ft	MVCD (feet)	Over 500 ft up to 1000 ft	MVCD (feet)	Over 1000 ft up to 2000 ft	MVCD (feet)	Over 2000 ft up to 3000 ft	MVCD (feet)	Over 3000 ft up to 4000 ft	MVCD (feet)	Over 4000 ft up to 5000 ft	MVCD (feet)	Over 5000 ft up to 6000 ft	MVCD (feet)	Over 6000 ft up to 7000 ft	MVCD (feet)	Over 7000 ft up to 8000 ft	MVCD (feet)	Over 8000 ft up to 9000 ft	MVCD (feet)	Over 9000 ft up to 10000 ft	MVCD (feet)	Over 10000 ft up to 11000 ft	MVCD (feet)	Over 11000 ft up to 12000 ft	MVCD (feet)	Over 12000 ft up to 13000 ft	MVCD (feet)	Over 13000 ft up to 14000 ft	MVCD (feet)	Over 14000 ft up to 15000 ft
765	800	11.6ft	11.7ft	11.9ft	12.1ft	12.2ft	12.4ft	12.6ft	12.8ft	13.0ft	13.1ft	13.3ft	13.5ft	13.7ft	13.9ft	14.1ft	14.3ft	14.5ft	14.7ft	14.9ft	15.1ft	15.3ft	15.5ft	15.7ft	15.9ft	16.1ft	16.3ft	16.5ft	16.7ft	16.9ft	17.1ft	17.3ft	17.5ft
500	550	7.0ft	7.1ft	7.2ft	7.4ft	7.5ft	7.6ft	7.8ft	7.9ft	8.1ft	8.2ft	8.3ft	8.5ft	8.6ft	8.8ft	8.9ft	9.1ft	9.3ft	9.5ft	9.7ft	9.9ft	10.1ft	10.3ft	10.5ft	10.7ft	10.9ft	11.1ft	11.3ft	11.5ft	11.7ft	11.9ft	12.1ft	12.3ft
345	362 <sup>19</sup>	4.3ft	4.3ft	4.4ft	4.5ft	4.6ft	4.7ft	4.8ft	4.9ft	5.0ft	5.1ft	5.2ft	5.3ft	5.4ft	5.5ft	5.6ft	5.7ft	5.8ft	5.9ft	6.1ft	6.2ft	6.3ft	6.4ft	6.5ft	6.6ft	6.8ft	6.9ft	7.1ft	7.2ft	7.3ft	7.4ft	7.5ft	7.6ft
287	302	5.2ft	5.3ft	5.4ft	5.5ft	5.6ft	5.7ft	5.8ft	5.9ft	6.1ft	6.2ft	6.3ft	6.4ft	6.5ft	6.6ft	6.8ft	6.9ft	7.1ft	7.2ft	7.3ft	7.4ft	7.5ft	7.6ft	7.7ft	7.8ft	8.0ft	8.1ft	8.2ft	8.3ft	8.4ft	8.5ft	8.6ft	8.7ft
230	242	4.0ft	4.1ft	4.2ft	4.3ft	4.3ft	4.4ft	4.5ft	4.6ft	4.7ft	4.8ft	4.9ft	5.0ft	5.1ft	5.2ft	5.3ft	5.4ft	5.5ft	5.6ft	5.7ft	5.8ft	5.9ft	6.0ft	6.1ft	6.2ft	6.4ft	6.5ft	6.6ft	6.7ft	6.8ft	6.9ft	7.0ft	7.1ft
161*	169	2.7ft	2.7ft	2.8ft	2.9ft	2.9ft	3.0ft	3.1ft	3.2ft	3.3ft	3.3ft	3.4ft	3.5ft	3.6ft	3.7ft	3.8ft	3.9ft	4.0ft	4.1ft	4.2ft	4.3ft	4.4ft	4.5ft	4.6ft	4.8ft	4.9ft	5.0ft	5.1ft	5.2ft	5.3ft	5.4ft	5.5ft	5.6ft
138*	145	2.3ft	2.3ft	2.4ft	2.4ft	2.5ft	2.5ft	2.6ft	2.7ft	2.8ft	2.8ft	2.9ft	3.0ft	3.1ft	3.2ft	3.3ft	3.4ft	3.5ft	3.6ft	3.7ft	3.8ft	3.9ft	4.0ft	4.1ft	4.3ft	4.4ft	4.5ft	4.6ft	4.7ft	4.8ft	4.9ft	5.0ft	5.1ft
115*	121	1.9ft	1.9ft	1.9ft	2.0ft	2.0ft	2.1ft	2.1ft	2.2ft	2.2ft	2.3ft	2.3ft	2.4ft	2.4ft	2.5ft	2.6ft	2.7ft	2.8ft	2.9ft	3.0ft	3.1ft	3.2ft	3.3ft	3.4ft	3.6ft	3.7ft	3.8ft	3.9ft	4.0ft	4.1ft	4.2ft	4.3ft	4.4ft
88*	100	1.5ft	1.5ft	1.6ft	1.6ft	1.7ft	1.7ft	1.8ft	1.8ft	1.8ft	1.9ft	1.9ft	2.0ft	2.0ft	2.1ft	2.1ft	2.2ft	2.3ft	2.4ft	2.5ft	2.6ft	2.7ft	2.8ft	2.9ft	3.1ft	3.2ft	3.3ft	3.4ft	3.5ft	3.6ft	3.7ft	3.8ft	3.9ft
69*	72	1.1ft	1.1ft	1.1ft	1.2ft	1.2ft	1.2ft	1.2ft	1.3ft	1.3ft	1.3ft	1.4ft	1.4ft	1.4ft	1.5ft	1.5ft	1.6ft	1.7ft	1.8ft	1.9ft	2.0ft	2.1ft	2.2ft	2.3ft	2.5ft	2.6ft	2.7ft	2.8ft	2.9ft	3.0ft	3.1ft	3.2ft	3.3ft

\* Such lines are applicable to this standard only if PC has determined such per FAC-014

(refer to the Applicability Section above)

<sup>17</sup> Table 2 - Table of MVCD values at a 1.0 gap factor (in U.S. customary units), which is located in the EPRI report filed with FERC on August 12, 2015. (The 14000-15000 foot values were subsequently provided by EPRI in an updated Table 2 on December 1, 2015, filed with the FAC-003-4 Petition at FERC)

<sup>18</sup> The distances in this Table are the minimums required to prevent Flash-over; however prudent vegetation maintenance practices dictate that substantially greater distances will be achieved at time of vegetation maintenance.

SCE	Legal, Regulatory, and Compliance	Transmission & Distribution Choose a Program:	Methodology	Doc. No.	UVM-02	 <b>SOUTHERN CALIFORNIA EDISON®</b> Energy for What's Ahead™
				Version	5	
Effective Date		8/9/19				
Supersedes		Version 4				
<b>Transmission Vegetation Management Plan (TVMP)</b>						

## Attachment F UVM Abnormal Field Conditions Form

### Abnormal Field Conditions Form

#### General Information:

Date:	Reporter:	Inspector Name and Company:	Local TSP:	Transmission Supervisor:

#### Location Information:

Circuit ID#	
Circuit ID Name	
Substation Origin	
Substation Destination	
Line Voltage	
Location Address(es)	
Property Owner(s)	
Location Origin GPS Coordinates	
Location Destination GPS Coordinates	
Origin Tower	
Destination Tower	
Span or Partial Span Length	


#### Restrictions:

Weather Conditions:								
Access Restrictions:								
Biological /Archaeological Restrictions?	Y	N	If yes, explain:					
Previous Inspection Date:			Method:					
Refusal Location:	Y	N	What easement rights do we have?					
What is the ROW width at this location?			Maximum line sag for this span:		Maximum line sag for the location			
Tier 1 Imminent Threat Location:	Y	N	Tier 2 Emergent Threat Location:	Y	N			
How often does the location need to be re-inspected?								
Is this an orchard?	Y	N	Will there be crop lost?	Y	N	Should this location be considered for orchard?	Y	N


#### Comments:

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**EXAMPLE**

SCE	Legal, Regulatory, and Compliance	Transmission & Distribution Choose a Program:	Methodology	Doc. No.	UVM-02	 SOUTHERN CALIFORNIA <b>EDISON</b> <sup>®</sup> Energy for What's Ahead <sup>SM</sup>
				Version	5	
Effective Date		8/9/19				
Supersedes		Version 4				
<b>Transmission Vegetation Management Plan (TVMP)</b>						

## Attachment G UVM Outage Investigation Report


**SOUTHERN CALIFORNIA  
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**GP-4: Tree-Caused Circuit Interruption Fact-Finding Procedures**

**1.0 Purpose**  
This procedure provides the requirements for field review of tree-caused circuit interruptions (TCCIs) and validation of interruption causes.

**2.0 Policy Statements**  
It is a practice of the Vegetation Management department to review, validate, and document in the Vegetation Management database findings of known tree-caused circuit interruptions charged against the Vegetation Management Department. The Vegetation Management Department should maintain a listing of validated tree-caused circuit interruptions.

**3.0 References**

3.1 Grid Control Center (GCC) and T&D Joint Morning Reports

3.2 Vegetation Management Tree-Caused Circuit Interruption Report


**4.0 Operations**  
Reported tree-caused circuit interruptions should be reviewed by Vegetation Management Technical Specialists to determine cause, validity, and correction.

4.1 If the identified tree is determined not to be the actual cause of the circuit interruption, Vegetation Management Technical Specialists will notify the Distribution Operations Center (DOC) that the field review shows the identified tree as not being the cause of the reported interruption. The Vegetation Management Technical Specialists will request the cause code be changed from "Tree Caused" to "No Cause Found" or another cause code determined by the DOC.

4.2 If the tree is determined to be the reported cause of the circuit interruption, Vegetation Management Technical Specialists will create a Vegetation Management Interruption Data Report. The Vegetation Management Technical Specialists will identify all outage-related data. The Vegetation Management Interruption Data Report should contain the following:

- Work location
- Circuit name
- Date/time
- Number of operations
- Tree normally trimmed
- Determination of whether the outage was controllable
- Type of tree
- Name of investigator
- Tree location
- Determination of cause
- Action/remarks

4.3 The Vegetation Management Technical Specialists will schedule any required tree maintenance to correct the cause of the circuit interruption. This may include a request to trim/remove the identified tree.

EFFECTIVE DATE 6-1-2013	Tree-Caused Circuit Interruption Fact-Finding Procedures	GP-4
APPROVED 	Vegetation Management Operations Manual ► SCE Internal ◀	PAGE 1

### EXAMPLE