

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

SUMMARY

This procedure provides the instructions and requirements for annual routine inspection of vegetation around PG&E electric transmission lines to ensure the safe and reliable operation of facilities.

This procedure also provides guidance for PG&E employees and contractors for meeting or exceeding the requirements of North American Electric Reliability Corporation (NERC) Standards for Vegetation Management, NERC FAC-003-4 Transmission Vegetation Management.

This procedure does not apply to orchards. For information on orchards, refer to TD-7103P-02, "Transmission Orchard Patrol Procedure."

Level of Use: Informational Use

TARGET AUDIENCE

Vegetation management (VM) operations personnel

Vegetation management planning personnel

Vegetation management contractors

- Pre-inspection (PI)
- Tree contractor (TC)
- Quality control (QC)

SAFETY

NA

BEFORE YOU START

1. Review [TD-7103S, "Transmission Vegetation Management Standard \(TVMS\)."](#)
2. Review [TD-7102P-06, "Inspection Mapping."](#)
3. Review the Definitions Section of this document.
4. Review the Electrical Vegetation Management Best Management Practices (BMPs) document located on the VM shared drive at:

[VM Environmental BMPs](#)

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

Table of Contents

Subsection	Title	Page1	Patrol / Ins
2	Prescriptions	7	
3	Refusal and Corrective Action	16	
4	Hazard Notifications and Imminent Threats.....	17	
5	Environmentally Sensitive Areas	17	
	Appendix A, Clearance Prescription Tables	22	
	Appendix B, Clearance Prescription Illustrations.....	26	

PROCEDURE STEPS

1 Patrol / Inspection

1.1 Inspection Frequency and Work Plan

1. Transmission PI must:
 - a. INSPECT NERC-lines every calendar year.
 - (1) NOTIFY supervising vegetation program manager (SVPM) prior to making any changes to the NERC inspection schedule.
 - (2) **Not** make schedule changes that result in a gap greater than 18 months between inspection cycles.
 - b. COMPLETE 100% of NERC work in the calendar year.
 - (1) SEND any variance from the plan to PG&E SVPM for approval.
 - (2) DOCUMENT variances in the Issue Tracking System (ITS).
 - (3) IF the variance is approved by the PG&E SVPM,
THEN DOCUMENT AND RECORD approval from PG&E SVPM in ITS.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

1.1 1 (continued)

- c. INSPECT non-NERC lines once per patrol cycle, starting Nov. 15 through Nov. 14 of the following year.
 - (1) **Not** deviate from the normal inspection cycle by more than two (2) months without variance documentation, and in no case by more than 18 months.
 - (2) DOCUMENT variances in ITS.
 - (3) IF the schedule variance is greater than two (2) months,

THEN DOCUMENT AND RECORD approval from PG&E SVPM in ITS.

1.2 Schedule Variance

1. IF inspection deviates from normal cycle by more than two (2) months,

OR the NERC Annual Work Plan will **not** be completed in the calendar year,

THEN transmission PI DOCUMENTS the variance to the Work Plan in ITS, using one of the following sub-types:
 - Change in expected growth rate / environmental factors
 - Circumstances that are beyond the control of an applicable transmission or generator owner
 - Rescheduling work between growing seasons
 - Contractor availability / mutual assistance agreements
 - Identified unanticipated high priority work
 - Weather conditions / accessibility
 - Permitting delays
 - Land ownership changes / change in land use by the landowner
 - Emerging technologies

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

1.3 Inspection Area

1. Transmission PI must:

- a. INSPECT all vegetation with the potential to grow, sway, or fall into PG&E's electric transmission conductors.
- b. INSPECT any distribution underbuild and any vegetation that could fall into any transmission structures, guys, or poles, regardless of right-of-way (ROW) or easement width.
- c. BEGIN inspections at substations, generation stations, or switchyards outside the fenced area, including portions of the transmission line span crossing the substation fence.
- d. IF you identify any vegetation inside the substation, generation substation, or switchyard that requires tree work,

THEN NOTIFY your PG&E supervisor.

1.4 Underbuild (UB)

1. Distribution PI must:

- a. INSPECT AND LIST tree work for underbuild spans in accordance with the requirements described in this procedure.
- b. RECORD on handheld device any prescribed work based on Transmission Routine Patrol Procedure.
- c. ISSUE a Work Request to the distribution tree contractor.
- d. DOCUMENT underbuild inspections in the spans tool in the Project Management Database (PMD).
 - (1) One inspection per cycle is required by the distribution PI contractor for 60/70kV underbuild spans.

2. For 115kV underbuild sections and System 60/70kV underbuild sections, the distribution PI contractor must INSPECT AND LIST tree work in accordance with the requirements described in this procedure.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

NOTE

Modified inspections are no longer necessary when the PI contractor is the same for the distribution and transmission underbuild span inspections.

- a. IF the distribution PI is different from the transmission PI,

THEN the transmission PI must PERFORM a modified inspection, which must include the following:
 - (1) Transmission PI must INSPECT the underbuild section in accordance with this procedure.
 - (2) Transmission PI must RESEARCH the distribution schedule, AND be aware of when the most recent distribution inspection occurred AND when the next distribution inspection will likely occur.
 - (3) IF the transmission PI identifies tree work that will not hold until the next distribution cycle inspection,

THEN the transmission PI DOCUMENTS the needed tree work using the form in [TD-7103P-01-F01, "Underbuild Location Form."](#)
 - (4) Transmission PI EMAILS the completed Underbuild Location Form to the distribution PI supervisor.
 - (5) Distribution PI CONFIRMS receipt of the email AND INCLUDES the location that requires underbuild tree work in the confirmation.
 - (6) Distribution PI EMAILS transmission PI when pending tree work has been generated to the distribution TC.
- b. Transmission PI must LIST tree work on portions of a transmission span that begin with underbuild and then diverge.

1.5 Lines Inspected as Corridors

1. Transmission PI must:
 - a. LIST all line segments included as a corridor in the spans tool in the PMD.
 - b. LIST all tower numbers in sequential order.
 - c. ENSURES that all lines within the corridor must have their tower (pole) numbers listed in the spans tool, including partial lines that enter and exit the corridor at varying locations.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

1.6 Idle, De-energized, and Lower Voltage Lines

1. Transmission PI must:
 - a. TREAT all idle lines, de-energized lines, and lines energized at a lower voltage as energized at the designed transmission voltage.
 - b. INSPECT AND PRUNE idle, de-energized, and lower voltage lines in accordance with Section 2.1 General Practice – All Lines,
 - c. DOCUMENT all exceptions to this requirement.
 - (1) DESCRIBE exceptions in PMD Project Comments dialogue box.
 - (2) DESCRIBE exceptions on circuit or T-line patrol map.
 - d. FORWARD all documentation for approval to the local vegetation program manager (VPM), the area T-line supervisor, and the transmission program manager (TPM).
 - e. FILE all documentation on idle, de-energized, and lower voltage lines in the circuit folder, AND RECORD on the patrol map(s) annually.

1.7 Non-PG&E Owned Transmission Lines

1. Transmission PI must:
 - a. IF compliance violations are observed on these lines during adjacent routine inspections,

THEN NOTIFY the VPM.
 - b. DOCUMENT AND FILE the location of non-PG&E owned lines in the circuit folder, and RECORD on the patrol maps.
 - c. INSPECT only those non-PG&E-owned transmission lines for which VM maintenance agreements exist.
2. VPM must:
 - a. INVESTIGATE transmission lines indicated as non-PG&E from the geographic information system (GIS) map or provided as a result of the annual verification process described in the [TD-7102P-14, "Project Management Database \(PMD\) Circuit and Line Verification Procedure"](#) during the annual planning period.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

1.7 2 (continued)

- b. CONTACT the Land Department to determine whether 3rd-Party Maintenance Agreements exist for the indicated non-PG&E owned transmission lines.
 - (1) IF a 3rd-Party Maintenance Agreement exists for the indicated non-PG&E transmission lines,

THEN INSTRUCT the PI to patrol the lines in accordance with this procedure AND the requirements of the 3rd-Party Maintenance Agreement.
 - (2) IF a 3rd-Party Maintenance Agreement does **not** exist for the indicated non-PG&E transmission lines, THEN
 - a) MAKE reasonable attempts to NOTIFY the property owner AND PG&E stakeholders of compliance status.
 - b) NOTIFY the appropriate regulatory agency, as deemed necessary by the SVPM.
- c. FILE all documentation regarding non-PG&E owned lines in the circuit folder and RECORD on the patrol map(s).
- d. FORWARD all Maintenance Agreement documentation to the TPM and SVPM.

2 Prescriptions

2.1 General Practice – All Lines

- 1. PI COMPLETES the following during annual routine inspections:
 - a. REMOVES trees with less than 24 inches diameter at breast height (DBH) in NERC corridors.
 - b. REMOVES (rather than prunes) all palm trees.
 - c. REMOVES all century plants (Agave spp.) located within or outside the transmission line easement that might pose a potential compliance violation at maturity.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

2.1 1 (continued)

- d. LISTS hazard trees for removal or facility protect.

NOTE

No overhangs are permitted above the conductors, and no bi-annual trees are permitted.

- (1) REMOVES OR MAKES facility safe all existing overhanging trees or limbs.
- a) INSPECTS and PRESCRIBES work to prevent overhanging limbs.
- (2) REMOVES all vegetation requiring bi-annual (twice yearly) pruning.
- e. PRESCRIBES an EPA-approved herbicide when removing re-sprouting species, unless specifically denied by the property owner, land manager, or regulation.
- f. PRESCRIBES pruning to maintain mandated clearances under all foreseeable conditions of wind, weather, line loading, line sag, line blow-out, and tree movement from wind (see Table 5. Sag and Blow-out Table in Appendix A, Clearance Prescription Tables).
- g. USE the blow-out distances for fresh gale winds (39 mph wind speed) whenever blow-out is estimated on NERC lines (see Table 5. Sag and Blow-out Table).
- (1) EXERCISE professional judgment based on site conditions and known wind directions to potentially reduce blow-out distances.
- (2) IF blow-out distance exceeds the documented easement width, resulting in the potential need to prescribe work outside the easement,
- THEN CONSULT with transmission VPM prior to prescribing work.

NOTE

Estimated blow out is 0 feet for a tree directly located under the wire where it attaches to the tower. Estimated blow out distances assume ACSS conductors @ 109 °F air temperature and full loading.

- (3) ESTIMATE the amount of blow-out when the tree is not exactly at the “quarter zone” or “mid span”.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

2.1 1 (continued)

- h. USE the sag distances whenever sag is estimated (see Table 5. Sag and Blow-out Table in Appendix A, Clearance Prescription Tables).
- (1) EXERCISE professional judgment to potentially reduce sag distances.
- IF using professional judgment,
THEN document reasoning in VMD comments field.

NOTE

Under normal operating conditions, the wire is not expected to sag below the minimum ground to conductor clearance.

- (2) ESTIMATE the amount of sag when the tree is not exactly at the “quarter zone” or “mid span;”
- i. PRESCRIBE pruning in accordance with the most current ISA, Best Management Practices – Utility Pruning of Trees – Special Companion Publication to the ANSI A300 Part 1 and Part 7 (IVM).

2.2 Prescription Using LiDAR Data

1. For NERC and non-NERC lines, the PI does the following:
- a. IF modeled LiDAR data is available,
THEN USE modeled data to determine the Minimum Ground to Conductor Clearance (MGCC) at any given point along the conductor.
- b. PRESCRIBE a tree for work if it has the potential to encroach within the maximum tree height prior to the next annual pruning cycle.
- c. For trees located within the wire zone (see Table 1. PG&E Clearance Requirements in Appendix A, Clearance Prescription Tables), PRESCRIBE a final tree height based on the modeled MGCC for the tree’s position that accounts for PG&E’s Minimum Clearance Requirement AND a minimum of 4 years’ worth of anticipated growth or 25’ (30’ for 500 kV), whichever is greater..
- (1) IF the calculated final tree height is less than 5ft,
THEN PRESCRIBE removal rather than pruning regardless of the tree DBH.
- d. INPUT comments to the VMD Location Comments field that MGCC LiDAR data was used to support inspection prescriptions.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

2.2 1 (continued)

- e. INPUT comments to the PDM Project Comments field that the MGCC LiDAR data was used to support inspection prescriptions, and include the cycle year.
- f. WHEN modeled LiDAR data or other engineering calculations are available to determine the MGCC of the line,

THEN APPLY those measurements to the maximum tree heights in Table 4. Maximum Tree Height Table in Appendix A, Clearance Prescription Tables by adding or subtracting the modeled MGCC from the CPUC General Order (G.O.) 95 Rule 37 General Order 95, Rule 37 MGCC AND applying the difference to the maximum tree height.

2.3 Even Ground Prescription (No LiDAR Available)

- 1. IF NERC lines have trees under conductors, THEN the PI does the following:
 - a. USES the Maximum Tree Height table, Table 4. Maximum Tree Height Table, in Appendix A, Clearance Prescription Tables, to determine the allowed maximum tree height along each 10% segment for the length of the conductor.
 - b. IF a tree has the potential to encroach within the maximum tree height prior to the next annual pruning cycle,

THEN PRESCRIBES the tree for work.

NOTE

The Maximum Tree Height table accounts for the MGCC, potential sag, and the PG&E Minimum Clearance Requirements (Table 1. PG&E Clearance Requirements in Appendix A, Clearance Prescription Tables).

- c. CALCULATES final tree height by subtracting four (4) years' worth of anticipated growth or 25' (30' for 500 kV), whichever is greater, from the maximum tree height (see Table 4. Maximum Tree Height Table in Appendix A, Clearance Prescription Tables).
 - (1) IF the calculated final tree height is less than 5ft,

THEN PRESCRIBES removal rather than pruning regardless of the tree DBH.
- 2. IF non-NERC lines are located under conductors, THEN the PI does the following:
 - a. USES Table 4. Maximum Tree Height Table to determine the allowed maximum tree height along each 10% segment for the length of the conductor.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

2.3 2 (continued)

- b. IF a tree has the potential to encroach within the maximum tree height prior to the next annual pruning cycle,

THEN PRESCRIBES the tree for work.
- c. CALCULATES final tree height by subtracting four (4) years' worth of anticipated growth or 25' (30' for 500 kV), whichever is greater, from the maximum tree height (see Table 4. Maximum Tree Height Table).
- d. IF the calculated final tree height is less than 5ft,

THEN PRESCRIBES removal rather than pruning regardless of tree DBH.
- e. For stand-alone non-NERC lines, PRESCRIBES a final tree height based on the potential line-sag, plus PG&E's Minimum Clearance Requirement, plus a minimum of four (4) years' worth of anticipated growth or 25' (30' for 500 kV), whichever is greater (see Table 1. PG&E Clearance Requirements and Table 5. Sag and Blow-out Table in Appendix A, Clearance Prescription Tables).

2.4 Prescription for Off-Set Belly (No LiDAR Available)

NOTE

Off-set belly occurs when a span has different tower heights due to topographical changes of the land and / or differing tower sizes, and the belly is not in the center of the span.

- 1. For NERC and non-NERC lines, the PI does the following:
 - a. DETERMINES the belly of the span by finding the lowest line height.
 - (1) DIVIDES each section on either side of the belly of the span into five (5) equal segments.
 - (2) IDENTIFIES the maximum tree heights for the equal segments (see Table 4. Maximum Tree Height Table in Appendix A, Clearance Prescription Tables, and **Figure 2. Offset Belly: NERC Wire Height at Tower < 20 ft.** in Appendix B, Clearance Prescription Illustrations).
 - b. IF a tree has the potential to encroach within the maximum tree height prior to the next annual pruning cycle,

THEN PRESCRIBES the tree for work.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

2.4 1 (continued)

- c. CALCULATES final tree height by subtracting four (4) years' worth of anticipated growth or 25' (30' for 500 kV), whichever is greater, from the maximum tree height (see Table 4. Maximum Tree Height Table).
 - d. IF the calculated final tree height is less than five (5) ft.

THEN PRESCRIBES removal rather than pruning regardless of tree DBH.
2. For NERC Off-Set Belly, the PI does the following:
 - a. IF the difference between line height at tower bells is less than 20 ft.

THEN USES Table 4. Maximum Tree Height Table to determine the maximum tree height allowed along each 10% segment for the length of the conductor.
 - b. IF a tree has the potential to encroach within the maximum tree height prior to the next annual pruning cycle,

THEN PRESCRIBES the tree for work.
 - c. CALCULATES final tree height by subtracting four (4) years' worth of anticipated growth or 25' (30' for 500 kV), whichever is greater, from the maximum tree height (see Table 4. Maximum Tree Height Table).
 - d. IF the calculated final tree height is less than 5 ft.

THEN PRESCRIBES removal rather than pruning regardless of tree DBH.
 - e. IF the difference between line height at tower bells is greater than 20',

THEN PRESCRIBES a final tree height based on the potential line-sag, plus PG&E's Minimum Clearance Requirement, plus a minimum of four (4) years' worth of anticipated growth or 25' (30' for 500 kV), whichever is greater (see Table 1. PG&E Clearance Requirements, Table 5. Sag and Blow-out Table, and **Figure 3. Offset Belly: NERC and Non-NERC Wire Height at Tower > 20 ft.**).
 3. For Non-NERC Off-Set Belly, the PI does the following:
 - a. IF a tree has the potential to encroach within the maximum tree height prior to the next annual pruning cycle,

THEN PRESCRIBES the tree for work.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

2.4 3 (continued)

- b. PRESCRIBES a final tree height based on the potential line-sag, plus PG&E's Minimum Clearance Requirements, plus a minimum of four (4) years' worth of anticipated growth or 25' (30' for 500 kV), whichever is greater (see Table 1. PG&E Clearance Requirements and Table 5. Sag and Blow-out Table in Appendix A, Clearance Prescription Tables, and **Figure 3. Offset Belly: NERC and Non-NERC Wire Height at Tower > 20 ft.**).

2.5 Prescription for Uneven Ground (NERC and Non-NERC Lines) for Spans Less Than 600' and Stand-Alone Non-NERC Lines

1. The PI does the following:
 - a. IF a tree has the potential to encroach within the maximum tree height prior to the next annual pruning cycle,
THEN PRESCRIBE the tree for work.
 - b. PRESCRIBES a final tree height based on the potential line-sag, plus PG&E's Minimum Clearance Requirement, plus a minimum of 4 years' worth of anticipated growth or 25' (30' for 500 kV), whichever is greater (see Table 1. PG&E Clearance Requirements and Table 5. Sag and Blow-out Table in Appendix A, Clearance Prescription Tables).

2.6 Edge of Right-of-Way (ROW) Prescription

1. For NERC and non-NERC Lines, the PI does the following:
 - a. PRESCRIBES a tree for work if it has the potential to encroach within PG&E's Minimum Clearance Requirements prior to the next annual pruning cycle.
 - b. For trees growing inside the easement, PRESCRIBES a final tree height that accounts for the potential blow-out during fresh gale conditions (39 mph wind speed), plus PG&E's Minimum Clearance Requirements, plus a minimum of 4 years' of anticipated growth (see Table 1. PG&E Clearance Requirements and Table 5. Sag and Blow-out Table in Appendix A, Clearance Prescription Tables).
 - c. For trees growing outside the easement, PRESCRIBES a final tree height that accounts for the potential blow-out during fresh gale conditions (39 mph wind speed), plus PG&E's Minimum Clearance Requirement, plus a minimum of 4 years' of anticipated growth (see Table 1. PG&E Clearance Requirements and Table 5. Sag and Blow-out Table in Appendix A, Clearance Prescription Tables).
 - (1) IF the blow-out calculation requires prescription work beyond the edge of the easement,

THEN CONTACTS the transmission area VPM for further guidance.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

2.6 1 (continued)

- d. **Does not** include sag.
- e. ENSURES that for Extreme or Very High Fire areas in Santa Barbara County, the prescribed clearance between the conductor and vegetation exceeds 6.5 ft. for 60/70 kV, AND 20 ft. for 115 kV and above.

2.7 Handheld Entry Prescription

- 1. Transmission PI must:
 - a. USE Trim Code Height Final Height (HFH) when entering data into the handheld device.
 - b. ENTER the anticipated height of the tree after work is complete, using Final Height and the number in the clearance field.

2.8 Prescriptions for Tower and Pole Clearing

- 1. IF the required vegetation work is for non-orchard tree species located in an orchard, THEN WHEN the orchard PI notifies the transmission PI about the non-orchard trees, the transmission PI confirms receipt of the notification of potential work.

NOTE

APPLIES to wood poles or metal structures 60kV or greater, including transmission structures with underbuild construction.

- 2. IF woody vegetation is in contact with the structure or pole, OR significantly interferes with the visual inspection of the tower or pole base or footings, THEN vegetation work is required as described below, AND PI must:
 - a. PRESCRIBE removal of vines and woody vegetation with a DBH less than 24" (preferred).
 - (1) Professional judgment may be exercised to prune or not work trees less than 24" DBH, depending on field conditions.
 - (2) Pruning must achieve a minimum of 10ft of clearance from any part of the structure.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

2.8 2 (continued)

- b. PRESCRIBE pruning of DBH greater than or equal to 24" (preferred).
 - (1) Professional judgment may be exercised to remove or not work trees greater than 24" DBH, depending on field conditions.
 - (2) Pruning must achieve a minimum of 10 ft. of clearance from any part of the structure.
- c. PRESCRIBE stump treatment when removing re-sprouting species.
- d. CREATE a separate location record for tower clearing work.
- e. INPUT "CC1A" into the SSD # field of the location record when prescribing tower or pole clear work.
- f. INPUT the tower or pole # in the location **Comments** field.

2.9 Prescriptions for Down Guy Clearing

- 1. IF the required vegetation work is for non-orchard tree species located in an orchard, THEN WHEN the orchard PI notifies the transmission PI about the non-orchard trees, the transmission PI confirms receipt of the notification of potential work.

NOTE

APPLIES to wood poles or metal structures 60kV or greater, including transmission structures with underbuild construction.

- 2. IF woody vegetation is in contact with the guy wire, at or above the insulator bob, THEN vegetation work is required as described below, AND transmission PI must:
- 3. PRESCRIBE removal of vines and woody vegetation with a DBH less than 24" (preferred).
 - a. Professional judgment may be exercised to prune or not work trees less than 24" DBH, depending on field conditions.
 - b. Pruning must achieve a minimum of 10ft of clearance from any part of the structure.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

2.9 (continued)

4. PRESCRIBE pruning of DBH greater than or equal to 24" (preferred).
 - a. Professional judgment may be exercised to remove or not work trees greater than 24" DBH, depending on field conditions.
 - b. Pruning must achieve a minimum of 10 ft. of clearance from any part of the wire.
5. PRESCRIBE stump treatment when removing re-sprouting species.
6. CREATE a separate location record for down guy clearing work.
7. INPUT "CC1B" into the SSD # field of the location record when prescribing down guy wire work.

2.10 INPUT the tower or pole # in the location **Comments** field.

2.11 Prescription for High Tree Count Projects

1. Transmission PI must:
 - a. NOTIFY the VPM when the tree count forecast on a NERC or non-NERC corridor is expected to exceed the forecast by more than 200%, AND the overall tree count is expected to be greater than 500 units.
 - b. ISSUE accelerate and immediate work to the TC on a priority basis.
 - (1) Immediate work must be issued within 24 hours of discovery,
 - (2) Accelerate work must be issued within 2 weeks of discovery, or as directed by the VPM.
 - c. ISSUE the remaining work to the TC after two (2) weeks from the notification date to the VPM.

3 Refusal and Corrective Action

3.1 Transmission PI must ENSURE a record is created in ITS when any of the following restrict, constrain, or otherwise interfere with the ability to meet the requirements of this procedure:

- Property owners
- Land managers
- Federal, State, or local agency policies
- Site conditions

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

3.1 (continued)

1. FOLLOW the requirements outlined in the [TD-7103P-07, "Transmission Vegetation Refusal Procedure."](#)
2. FOLLOW the requirements outlined in the [TD-7103P-08, "Transmission Vegetation Corrective Action Procedure"](#).
3. REPORT any refusal tree that is encroaching or likely to encroach within the PG&E Minimum Clearance Requirements to the area VPM.

3.2 VPM must TAKE the necessary action, in consultation with the transmission program manager, to avoid encroaching PG&E Minimum Clearance Requirements.

4 Hazard Notifications and Imminent Threats

4.1 The PI does the following:

1. IF any portion of a tree is at or approaching PG&E Minimum Clearance Requirements due to wind or growth (see Table 1. PG&E Clearance Requirements in Appendix A, Clearance Prescription Tables),

THEN FOLLOWS the [TD-7103P-09, 'T&D Hazard Notification Procedure'](#) at that location.
2. IF any portion of a tree, due to wind or growth, is at or approaching Minimum Vegetation Clearance Distance (MVCD), OR facility damage by tree failure is imminent (see Table 2. NERC Minimum Vegetation Clearance Distance (MVCD) in Feet in Appendix A, Clearance Prescription Tables)

THEN FOLLOWS the [TD-7103P-05, "Transmission Vegetation Management Imminent Threat Procedure"](#) at that location.

5 Environmentally Sensitive Areas

5.1 The PI does the following:

1. FOLLOWS VM procedures for environmental screening when performing work in riparian areas or other environmentally sensitive habitats.
2. REFERS to VM Bulletins and VM Best Management Practices when working in environmentally sensitive areas.

END of Instructions

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

DEFINITIONS

Aerial Patrol: Use of a helicopter or other aircraft, with or without LiDAR capacity, during the visual inspection of vegetation.

Belly: The lowest point in the span.

Blow-out: The maximum distance the conductors will move off-center in less than fresh gale conditions (39 mph wind speeds).

Corridor: The presence of one or more transmission lines located within easements or contiguous easements, or within close proximity of each other.

Distribution Underbuild: The presence of electric distribution lines located directly under and parallel with the transmission lines above, and attached to the same pole or structure.

Easement (or Right of Way): The as-built condition of a geographically described strip of land under a transmission line(s) upon which PG&E's electric transmission facilities are constructed, operated, and maintained. "Easement" refers specifically to the legal description of that corridor.

Even Ground: Where the elevation difference between two adjacent towers is less than 20 feet.

Hazard Trees

- **All lines:** Trees that are dead or show signs of disease, decay, or ground or root disturbance, which might fall into or otherwise impact the conductors, towers, or guy wires before the next inspection cycle.
- **NERC lines only:** In addition, trees within the easement with a likely potential to fail within the next two years (as assessed by the pre-inspector), which would pass within PG&E's Minimum Clearance Requirements.

Imminent Threat: A vegetation condition affecting NERC transmission lines where it has been identified and confirmed by PG&E personnel and/or contractors that the vegetation condition is likely to cause a fault at any moment. This condition can arise from within or outside the electric transmission right of way (ROW), and might be the result of tree growth, potential tree or limb failure, or line movement due to sag or sway.

Light Detection and Ranging (LiDAR): Technology used to determine vegetation conditions, particularly distances and clearances, in relation to the electric conductors and easement boundaries.

- **"As-Flown" LiDAR Data:** A "snap shot" of data that provides vegetation conditions, facility locations, span lengths, and conductor heights at the time of the LiDAR visual flight.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

DEFINITIONS (continued)

Low Lines: Transmission lines that are observed to be sagging below the Rule 37 MGCC distances.

Minimum Vegetation Clearance Distance (MVCD): Minimum vegetation clearance distance required to prevent Flash-over. However, prudent vegetation maintenance practices dictate that substantially greater distances will be achieved at time of vegetation maintenance.

Minimum Ground to Conductor Clearance (Rule 37 MGCC): The closest the lines can get to the ground. MGCC can be determined by performing a ground-based engineering analysis, using modeled LiDAR data or based on clearances listed in General Order 95, Rule 37.

Maximum Tree Height Allowed: MGCC minus the PG&E Minimum Clearance Requirement.

NERC-Regulated Transmission Lines (NERC lines): Transmission lines operated at 200kV or higher and certain sub-200kV lines that are elements of a Major Western Electric Coordinating Council (WECC) Transfer Paths.

Non-PG&E Owned Transmission Lines: Transmission lines connected to PG&E facilities.

Orchard: Any commercially-producing orchard; only includes trees that are part of the production crop.

Orchard Tree: Any commercial-producing fruit or nut tree that is part of the production crop.

Overhang: A tree and/or limb breaking the vertical plane of the outside conductor.

Professional Judgment: A process used to reach a well-reasoned conclusion that is based on the relevant facts and circumstances available at the time of the conclusion. A fundamental part of the process is the involvement of individuals with sufficient knowledge and experience. Professional judgment involves the identification, without bias, of reasonable alternatives; therefore, careful and objective consideration of information that might seem contradictory to conclusion is key to its application.

Right of Way: See Easement.

Underbuild: The presence of distribution construction directly under and parallel with transmission construction.

Wire Zone: For 60/70kV, the section of the corridor located between the outside conductors plus 10 feet on each side. For 115kV and 230kV, the section of the corridor located between the outside conductors plus 15 feet on each side. For 500kV, the section of the corridor located between the outside conductors plus 20 feet on each side.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

IMPLEMENTATION RESPONSIBILITIES

- The VM manager communicates this procedure to the VM stakeholders.
- The VPM communicates this procedure to the operational work teams.

GOVERNING DOCUMENT

[TD-7103S, "Transmission Vegetation Management Standard \(TVMS\)"](#)

COMPLIANCE REQUIREMENT / REGULATORY COMMITMENT

California Public Resource Code 4292

California Public Resource Code 4293

[CPUC General Order \(G.O.\) 95 Rule 35](#)

[CPUC General Order \(G.O.\) 95 Rule 37](#)

Federal Energy Regulatory Commission (FERC) Order No. 777

North American Electric Reliability Corporation (NERC) Standards for Vegetation Management, [NERC FAC-003-4 Transmission Vegetation Management](#)

REFERENCE DOCUMENTS

Developmental References:

[TD-7102P-06, "Inspection Mapping"](#)

[TD-7102P-14, "Project Management Database \(PMD\) Circuit and Line Verification Procedure"](#)

[TD-7103P-02, "Transmission Orchard Patrol Procedure"](#)

[TD-7103P-04, "Transmission Integrated Vegetation Management \(IVM\) Procedure"](#)

[TD-7103P-05, "Transmission Vegetation Management Imminent Threat Procedure"](#)

[TD-7103P-07, "Transmission Vegetation Refusal Procedure"](#)

[TD-7103P-08, "Transmission Vegetation Corrective Action Procedure"](#)

[TD-7103P-09, "T&D Hazard Notification Procedure"](#)

Supplemental References:

NA

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

APPENDICES

Appendix A, Clearance Prescription Tables

Appendix B, Clearance Prescription Illustrations

ATTACHMENTS

TD-7103P-01-F01, "Underbuild Location Form"

DOCUMENT REVISION

Transmission Routine Patrol Standard, Version 7, May 2011

DOCUMENT APPROVER

██████████ Manager, Vegetation Management, Transmission

DOCUMENT OWNER

██████████ Manager, Vegetation Management, Transmission

DOCUMENT CONTACT

██████████ Expert Program Manager, Vegetation Management, Transmission

REVISION NOTES

Where?	What Changed?
Entire document	Edited.
Summary section	Added reference and link to NERC FAC-003-4.
Definitions section	Added definition for MVCD.
Compliance Requirements/Regulatory Commitment section	Updated link to the FAC-003-4 version: North American Electric Reliability Corporation (NERC) Standards for Vegetation Management
Appendix A	Updated Table 2. NERC Minimum Vegetation Clearance Distance (MVCD) in Feet
Note under Table 1 in Appendix A.	Reference to FAC-003-3 updated to FAC-003-4 to match current version of Compliance Requirements document.
Appendix C: Underbuild Location Form	Moved into attachment: TD-7103P-01-F01, Underbuild Location Form. No change to content of form. Updated reference to Appendix C.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

APPENDIX A, CLEARANCE PRESCRIPTION TABLES

Page 1 of 4

Table 1. PG&E Clearance Requirements

Voltage	60/70kV	115kV	230kV	500kV
PG&E Minimum Clearance Requirement ⁽¹⁾	4 ft.	10 ft.	10 ft.	15 ft.

Note: PG&E defined minimum clearance is designed to meet or exceed all applicable regulatory requirements at all times including FAC-003-4.

Table 2. NERC Minimum Vegetation Clearance Distance (MVCD) in Feet

NERC Minimum Vegetation Clearance Distance (MVCD) in Feet				
Elevation (feet)	60/70kV	115kV	230kV	500kV
0 - 500	1.1	1.9	4	7
501 - 1000	1.1	1.9	4.1	7.1
1001 - 2000	1.1	1.9	4.2	7.2
2001 - 3000	1.2	2	4.3	7.4
3001 - 4000	1.2	2	4.3	7.5
4001 - 5000	1.2	2.1	4.4	7.6
5001 - 6000	1.2	2.1	4.5	7.8
6001 - 7000	1.3	2.2	4.6	7.9
7001 - 8000	1.3	2.2	4.7	8.1
8001 - 9000	1.3	2.3	4.8	8.2
9001 - 10000	1.4	2.3	4.9	8.3
10001 - 11000	1.4	2.4	5	8.5
11001 - 12000	1.4	2.5	5.1	8.6
12001 - 13000	1.5	2.5	5.2	8.8
13001 - 14000	1.6	2.6	5.3	8.9
14001 - 15000	1.6	2.7	5.4	9.1

Note: The maximum tree heights described in this procedure must always meet (or exceed) the NERC MVCD requirements described in this table.

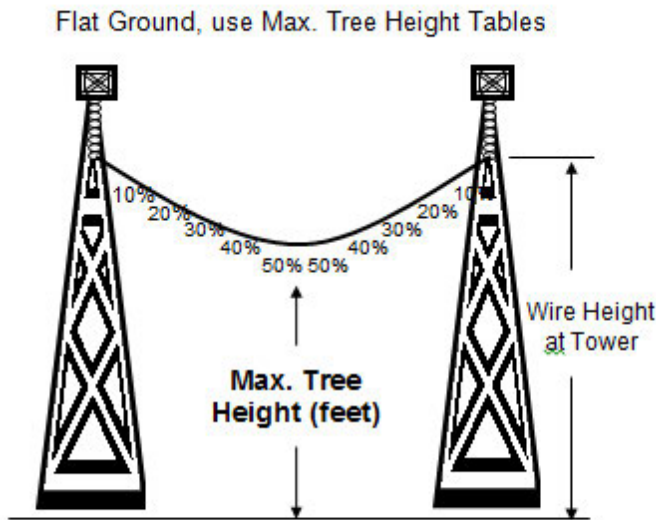
Transmission Non-Orchard Routine Patrol Procedure (TRPP)

Table 3. PG&E Clearance Prescription Guidelines for NERC and Non-NERC Corridors

PG&E Clearance Prescription Guidelines – Wire-Zone LiDAR is Available	<p>Applies to both NERC and non-NERC Corridors</p> <p>If modeled LiDAR data is available, use modeled data to determine the Minimum Ground to Conductor Clearance (MGCC) at any given point along the conductor. For trees located within the wire zone (see Figure 1. Even Terrain: NERC and Non-NERC), the inspector must prescribe a final tree height for that tree based on the MGCC for the tree's position, accounting for the PG&E minimum clearance requirement (Table 2) and a minimum of 4 years' worth of anticipated growth or 25' (30' for 500 kV), whichever is greater.</p> <p>In cases where the required clearance exceeds the MGCC, the tree must be removed.</p>
PG&E Clearance Prescription Guidelines – Wire-Zone LiDAR is NOT Available	<p>Applies to both NERC and non-NERC Corridors</p> <p>On Even Terrain (see Figure), use the Maximum Tree Height (Table 4) to determine the maximum tree height allowed along each 10% segment for the length of the conductor. Based on the maximum tree height allowed, the inspector must prescribe a final tree height accounting for a minimum of 4 years' worth of forecasted growth or 25' (30' for 500 kV); whichever is greater, from PG&E minimum clearance requirement (Table 2).</p> <p>In cases where the required clearance is greater than the current tree height, the tree must be removed.</p> <p>Applies to NERC corridors only:</p> <p>For trees on uneven terrain, (where difference between bells on towers or base of towers is >20'), or for trees impacted by topographical exclusions, or for NERC spans less than 600 ft. in length, or for all non-NERC corridors (even and uneven terrain), prescribe tree work that starts with the current conductor location height. The <u>inspector's prescription</u> must account for sag and blow-out (Tables 5), and the PG&E minimum clearance requirement (Table 2), and 4 years' worth of forecasted growth or 25', (30' for 500 kV), whichever is greater. Final clearance after tree work must achieve 4 years of forecasted growth (or 25ft, 30ft for 500kV) from both the conductor AND PG&E minimum clearance requirement (Table 2).</p>
Edge of ROW	<p>Applies to both NERC and non-NERC Corridors</p> <p>For trees located outside of the wire zone, the <u>inspector's prescription</u> must use the blow out (Appendix B) along with professional judgment to determine side clearances required to achieve a minimum of 4 years' worth of forecasted growth plus the minimum PG&E clearance requirement (Table 1) from the maximum blow out position of the conductor.</p> <p>Blow out clearances on routine work should not result in significant removals off-ROW. In cases where blow-out prescriptions are resulting in removal of R3 or R4 diameter trees or significant numbers of R1 and R2 diameter trees, inspector must review and justify the prescriptions with their supervisor, and if necessary a PG&E representative.</p>
Removals	<p>Applies to both NERC and non-NERC Corridors</p> <p>In NERC corridors, the PI must remove trees less than 24 inches DBH, palm trees, bi-annuals, century plants that could cause a compliance issue, and overhanging limbs.</p> <p>In non-NERC corridors, the PI must remove palm trees, bi-annuals, and overhanging limbs, and must remove century plants that could cause a compliance issue.</p> <p>In non-NERC corridors, the PI should remove trees less than 24 inches DBH.</p>

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

Table 4. Maximum Tree Height Table



May 2014

Wire Ht at Tower/Pole	10%	20%	30%	40%	50%	50%	40%	30%	20%	10%
30	25	24	23	23	23	23	23	23	24	25
40	31	28	25	24	23	23	24	25	28	31
50	38	31	27	24	23	23	24	27	31	38
60	44	35	28	25	23	23	25	28	35	44
70	51	38	30	25	23	23	25	30	38	51
80	57	42	31	26	23	23	26	31	42	57
90	63	45	33	28	23	23	28	33	45	63
100	70	49	35	27	23	23	27	35	49	70
115/230 kV Max. Tree Height										
Wire Ht at Tower/Pole	10%	20%	30%	40%	50%	50%	40%	30%	20%	10%
40	25	22	19	18	17	17	18	19	22	25
50	32	25	21	18	17	17	18	21	25	32
60	38	29	22	19	17	17	19	22	29	38
70	45	32	24	19	17	17	19	24	32	45
80	51	36	25	20	17	17	20	25	36	51
90	57	39	27	20	17	17	20	27	39	57
100	64	43	29	21	17	17	21	29	43	64
110	70	46	30	21	17	17	21	30	46	70
120	77	50	32	22	17	17	22	32	50	77
500 kV Max. Tree Height										
Wire Ht at Tower/Pole	10%	20%	30%	40%	50%	50%	40%	30%	20%	10%
40	22	19	17	16	16	16	16	17	19	22
50	28	23	19	17	16	16	17	19	23	28
60	35	26	21	17	16	16	17	21	26	35
70	41	30	22	18	16	16	18	22	30	41
80	47	33	24	18	16	16	18	24	33	47
90	54	35	25	19	16	16	19	25	35	54
100	60	40	27	19	16	16	19	27	40	60
110	67	41	29	20	16	16	20	29	41	67
120	73	47	30	20	16	16	20	30	47	73

Notes: When modeled LiDAR data or other engineering calculations are available to determine the MGCC of the line, apply those measurements to the maximum tree heights in the Max Tree Height Table (Table 4) above by adding or subtracting the modeled MGCC from the Rule 37 MGCC and apply the difference to the maximum tree height. For example, the rule 37 MGCC for a 230kV is 27'. If modeled LiDAR data confirms that the actual MGCC of a span is 30', then the difference is a positive 3' (30-27=3). So for the 40% zone trees of a 230kV with an 80' tower/wire connection, the new maximum tree height is 20'+3'=23'.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

Table 5. Sag and Blow-out Table

Span Length (feet)	600 ft.	800 ft.	1000 ft.	1500 ft.	2000 ft.
Sag					
Quarter Span (feet)	0	9	11	12	13
Mid span (feet)	0	12	14	16	17
Blow-out					
Quarter Span (feet)	0	5	9	20	36
Mid span (feet)	0	7	12	27	48

Notes:

- (1) Estimated sag distances assume ACSS conductors @ 109 °F air temperature and full loading. Under normal operating conditions, the wire is not expected to sag below the minimum ground to conductor clearance.
- (2) When applying Estimated Sag (and blow-out) the inspector is expected to estimate the amount of sag (or blow-out) when the tree is not exactly at the “quarter zone” or “mid span”.
- (3) Estimated sag is 0 feet for a tree directly located under the wire where it attaches to the tower.

Table 6. GO 95, Rule 35 Compliance Clearance Distance

Radial Clearance	60/70 kV	115 kV	230 kV	500 kV
Case 13	18”	1.6 ft.	2.6 ft.	10 ft.
Case 14	4 ft.	4 ft.	4 ft.	10 ft.

Note: Case 14 applies to extreme and high fire areas in Santa Barbara County.

Table 7. PRC 4293, Compliance Clearance Distance

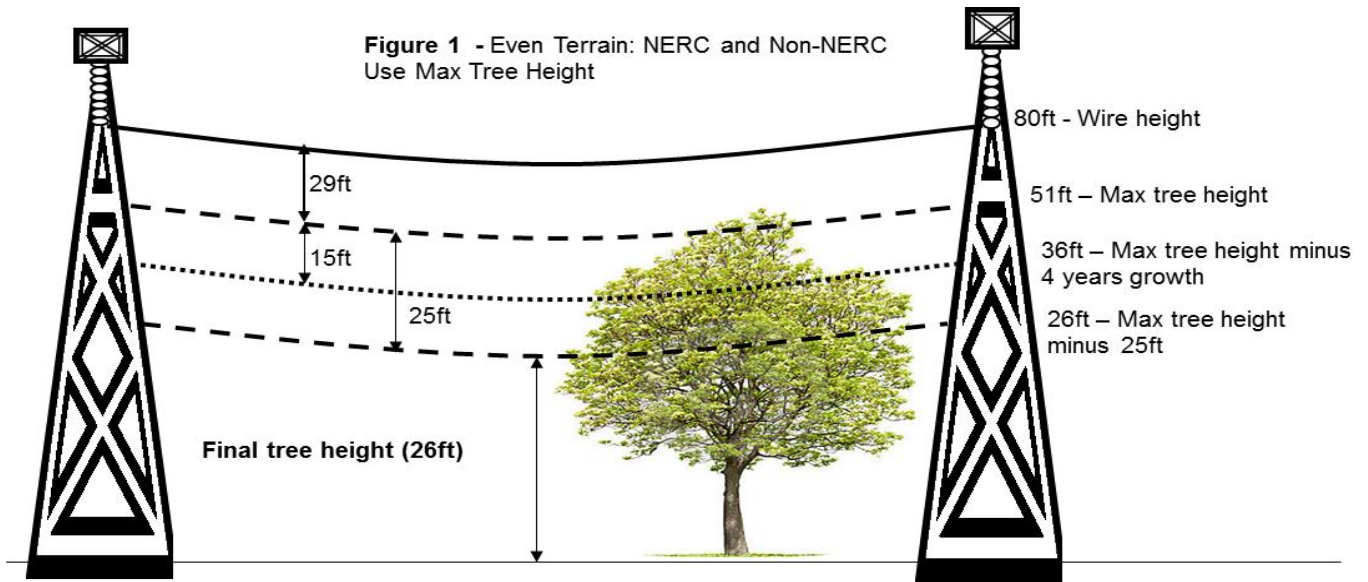
60/70 kV	115 kV	230 kV	500 kV
4 ft.	10 ft.	10 ft.	10 ft.

Note: PRC 4293 applies to SRA areas during fire season.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

APPENDIX B, CLEARANCE PRESCRIPTION ILLUSTRATIONS

Page 1 of 3



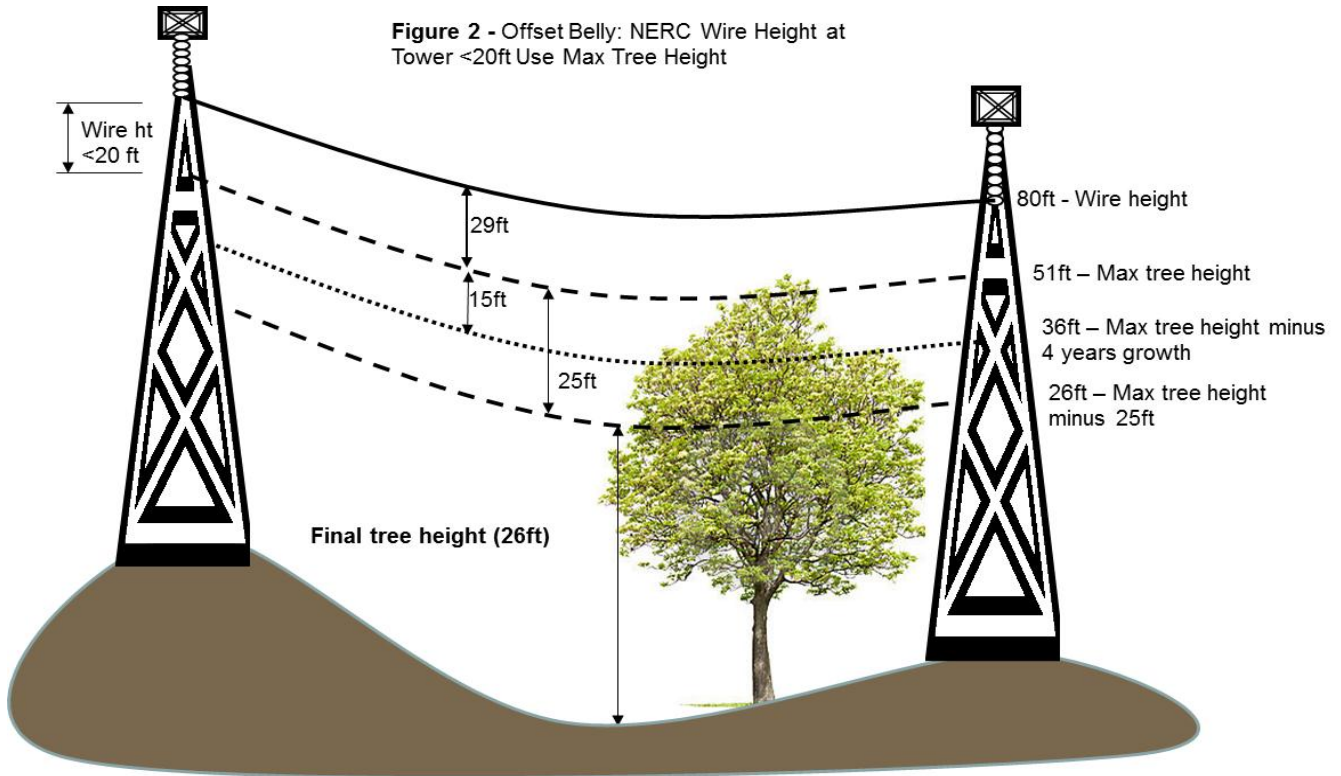
Note – This example assumes a 115/230 kV line with a wire height of 80', a tree located in the 10% zone, and 4 years of growth is 15'.

Not to scale – illustrative purposes only

Figure 1. Even Terrain: NERC and Non-NERC

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

Figure 2 - Offset Belly: NERC Wire Height at Tower <20ft Use Max Tree Height



Note – This example assumes less than 20' difference between wire height at each tower, a 115/230 kV line with a wire height of 80', a tree located in the 10% zone, and 4 years of growth is 15'.

Not to scale – illustrative purposes only

Figure 2. Offset Belly: NERC Wire Height at Tower < 20 ft.

Transmission Non-Orchard Routine Patrol Procedure (TRPP)

Figure 3- Offset Belly/Uneven Terrain: All Non-NERC and NERC Wire Height at Tower >20ft Calculate Final Tree Height

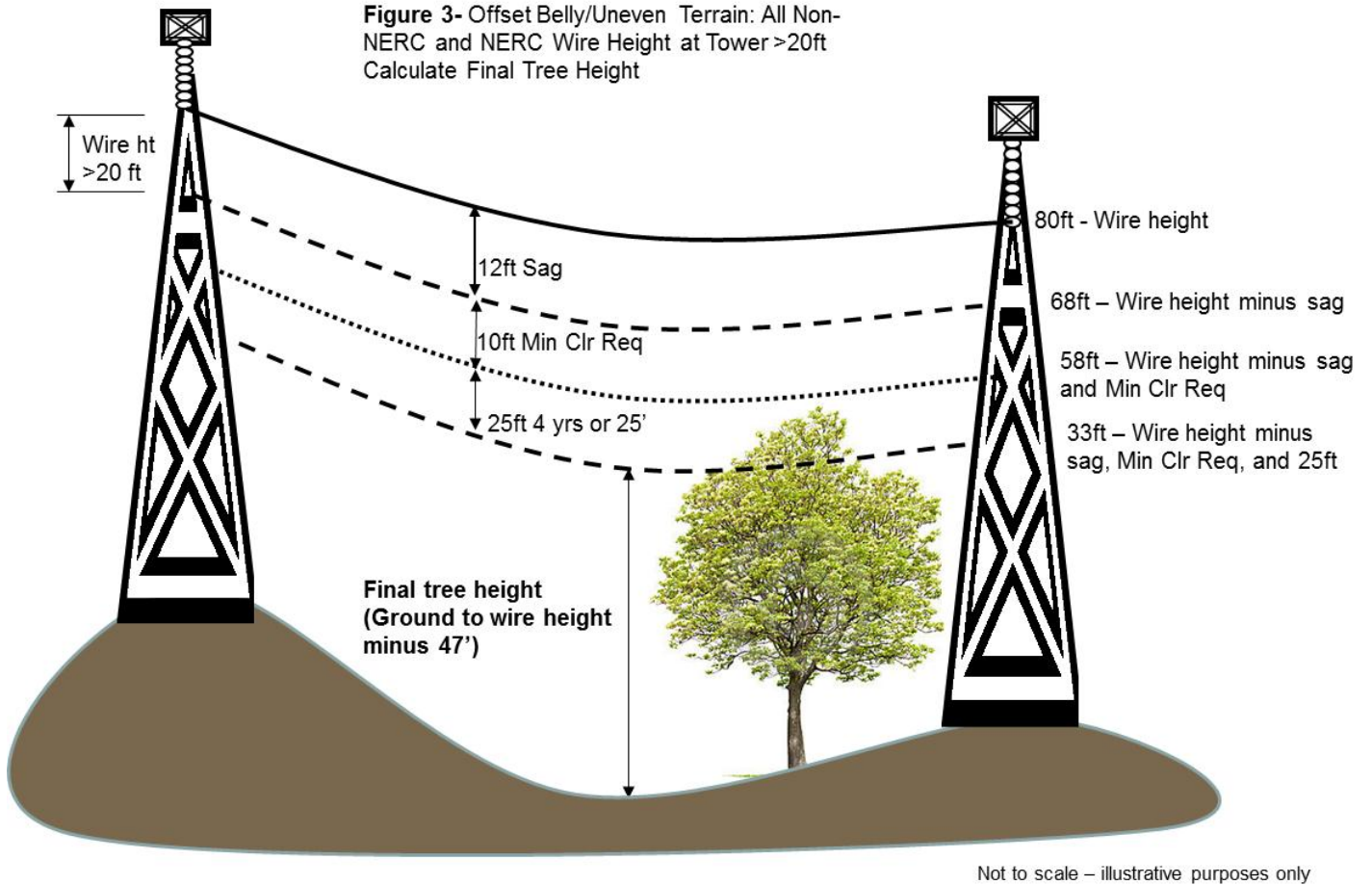


Figure 3. Offset Belly: NERC and Non-NERC Wire Height at Tower > 20 ft.