

Vegetation Management Transmission LiDAR Bulletin

SUMMARY

This document provides guidance for the vegetation management (VM) scope of work and patrol practices associated with patrolling transmission facilities using Light Detection and Ranging (LiDAR) technology.

This is a time-limited document expected to extend into late 2018.

Level of Use: Informational Use

AFFECTED DOCUMENTS

This bulletin affects the following documents:

[TD-7102B-003, "VELB Impacts Reporting Bulletin"](#)

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

[TD-7102P-16, "Riparian Review Procedure"](#)

[TD-7102P-19, "Migratory Bird Protection Procedure"](#)

[TD 7103B-001, "Transmission Patrol Procedure Bulletin - Tower Clear and Guy Wire Tree Work"](#)

[TD-7103P-01, "Transmission Routine Non-Orchard Patrol Procedure"](#)

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

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

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

TARGET AUDIENCE

Vegetation management (VM) governance and support

VM operations

PG&E contractors: pre-inspector (PI), tree crew (TC), quality control (QC)

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WHAT YOU NEED TO KNOW

1 LiDAR Data

- 1.1 Aerial LiDAR data was captured by the LiDAR vendor for 100% of the 60kV, 70kV, 115kV, 230kV, and 500kV Transmission Lines.
- 1.2 The LiDAR data provided is specific to a corridor width defined by voltage. REVIEW the following appendices before continuing to the next step.
 - [Appendix A, "LiDAR Detection Clearance Parameters"](#)
 - [Appendix B, "PG&E Vegetation Management Tree Clearance Parameters"](#)
 - [Appendix C, "Priority Detection Legend"](#)
- 1.3 Mobile platform and LiDAR vendors must deliver LiDAR data to PG&E personnel within 3 business days of the agreed upon delivery date. Any deviation from the contractual schedule requires PG&E approval.
- 1.4 PG&E personnel must make Aerial LiDAR-derived vegetation data available for downloading into the PG&E mobile platform no more than 2 business days after receipt from the vendors.

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2 PI Inspection

- 2.1 IF Aerial LiDAR information exists for a transmission line (T-line),
THEN the PI does **not** need to perform ground patrol of the entire line segment.
- 2.2 BEGIN inspections at substations, generation stations, or switchyards outside the fenced area, including portions of the transmission line crossing the substation fence.
IF any vegetation inside the substation, generation substation, or switchyard requires work,
THEN NOTIFY PG&E supervisor.
- 2.3 FIELD VERIFY vegetation detections provided in the mobile mapping application AND LIST tree and brush work per [TD-7103P-01, "Transmission Routine Non-Orchard Patrol Procedure."](#)
 1. Refer to [Appendix A, "LiDAR Detection Clearance Parameters."](#)
- 2.4 Where vegetation detections occur, INSPECT the entire span AND LIST tree and brush work per [TD-7103P-01, "Transmission Routine Non-Orchard Patrol Procedure."](#)
- 2.5 IF only vegetation detections VC2C and VC3C are present within a span AND do **not** result in tree work for the current cycle,
THEN CREATE a Vegetation Management Database (VMD) record for that span. Grouping trees is permissible.
 1. ENSURE that the following data fields are updated in the new VMD record:
 - Address
 - City
 - County
 - Directions
 - Circuit – Transmission Corridor Name
 - SSD Rte
 - Loc Rte
 - Line Name
 - Pole #
 - Location Comments – provide relevant information for specific location
 - Rx Comments – indicate why the detection does not require work
 - Tree Species
 - Quantity

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2.5 (continued)

- Trim Type
- Tree Comments – indicate the location of the tree
- Notification
- External Tree ID – copy and paste from PG&E mobile platform map

2.6 FIELD VERIFY the following DETECTIONS AND OBTAIN vegetation program manager (VPM) or supervising vegetation program manager (SVPM) approval if they are not listed for tree work:

- Priority 1, (VC1c_Urgent, AF)
- Priority 2, (VC1c_Urgent, MO)
- Priority 3, (VC1c_AF)
- Priority 4, (VC1c_MO)
- Priority 7, (VC2c_UH)
- Priority 8, (VC3c_UH)

1. FIELD VERIFY detections of all species, including almond and walnut (orchards).

2. IF an Aerial LiDAR detection does **not** need to be listed for work

AND the Priority is 1, 2, 3, 4, 7, or 8,

AND the Transmission Project has been completed,

THEN fill out one [TD-7103B-003-F01, "Unlisted Detection Approval \(UDA\) Form"](#) for each transmission project AND obtain VPM or SVPM approval to not list the tree for work, as follows:

a. OPEN the blank UDA Form by clicking on the following link:

[TD-7103B-003-F01, Unlisted Detection Approval \(UDA\) Form](#)

b. MAKE a copy of the blank UDA Form using the following filename convention:

Year_Division_Date_PMD Project Name

For example: 2018_Los Padres_20140419_Midway Corridor

AND SAVE it on your mobile device.

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2.6 (continued)

- c. COMPLETE the copy of the UDA Form. For instructions, see the last page of the UDA Form.
- d. SAVE the completed UDA Form on the VMShared drive in the appropriate division folder at:

[2018 Trans LiDAR UDA Form Storage](#)

- e. SUBMIT the completed UDA Form by email to the VPM.

2.7 DETERMINE whether work is required to mitigate a potentially hazardous tree by FIELD VERIFYING the following vegetation detections:

- Priority 5, VC1p_AF
- Priority 6, VC1p_MO
- Priority 9, North American Electric Reliability Corporation (NERC), VC2c_AF
- Priority 10, VC3c_AF

2.8 DETERMINE whether the polygons associated with Priority Codes 11(VC2p_AF), and 12 (VC3p_AF) are to be displayed on the map.

For examples of maps, see [Appendix D, "Mobile Platform Map Views."](#)

1. IF these polygons are to be displayed on the map,

THEN check the **VC3** check box in the upper-left corner of the mobile device application in the Map Filters section.

2.9 IF a tree needs to be added per [TD-7103P-01, "Transmission Routine Non-Orchard Patrol Procedure,"](#)

THEN perform the following tasks:

1. LIST the tree for work.
2. IF any of the following field conditions are true,
 - Facility Protect (FP) Work is needed this cycle AND a customer signature is **not** forthcoming.
 - The Bureau of Land Management (BLM) is the land manager.
 - The United States Forest Service (USFS) is the land manager.

THEN the PI must TAKE a picture of tree or brush work.

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NOTE

The possibility of false vegetation detections and/or the need to add trees exist due to the nature and potential noise in the Aerial LiDAR and ortho-imagery data.

- 2.10 IF the PI IDENTIFIES a false vegetation detection,
THEN NOTIFY the VPM.

3 Mobile Device Data Entry

- 3.1 For trees requiring work this cycle, the PI must ADD the Tree ID into the **External Tree ID** field in the tree record as follows:

1. SELECT the tree polygon on the map.
2. NAVIGATE to the **External Tree ID** field in the tree record.
3. SELECT **Paste**.

The latitude and longitude on the VMD tree record is automatically updated when the **External Tree ID** field is populated.

The screenshot displays the 'Tree Detail' form within the 'Vegetation Mapping for PI' application. The form is divided into several sections:

- Tree Info:** Includes fields for Tree Type (Cottonwood), Prop Own (Park), Spec (Cottonwood, Freemont), Qty (1), Tree (0.1 SPN:N/W SD/ O SMALL BRIDGE), and Comments.
- Work:** Includes fields for Work Req, Trim Code (TD), Qty (1), Clearance, Date, Crew, and Work Compl.
- Restrictions and Alerts:** Contains two tables: 'Restrictions' with columns Code, Restriction, and ITS#, and 'Alerts' with columns Code and Alert.
- Other Fields:** Includes Height (46), DBH (20), Clearance, Trans Line (TES 230Kv Tap), Prescription Comment, and Notification options (OK, Contact, Quarantine, Inventory, Refusal).
- External Tree ID:** A field at the bottom left of the form, highlighted by a blue callout bubble with the text 'Select Tree from Map and paste value here'. The Lat/Lon field next to it shows coordinates 37.766542, -121.956643.

Figure 1. Tree Record

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4 Project Management Database (PMD) Data Entry

4.1 WHEN there is one Aerial LiDAR data delivery per PMD project,

THEN the PI must USE the following guidance to UPDATE the PMD schedule in the PG&E mobile platform:

- PMD **PI Start Date** is the date of Aerial LiDAR delivery to the mobile platform.
- PMD **PI Close Date** is the date PI Field Verification is complete.
- PMD **TC Start Date** is the date tree work begins.
- PMD **TC Complete Date** is the date tree work is complete.

4.2 IF more than one Aerial LiDAR data delivery occurs for a given PMD project,

THEN the PI must UPDATE the PMD schedule using this guidance:

- PMD **PI Start Date** is the date of the first Aerial LiDAR delivery to the mobile platform.
- PMD **PI Close Date** is the date PI Field Verification is complete from the final delivery.
- PMD **TC Start Date** is the date tree work begins from the first delivery.
- PMD **TC Complete Date** is the date tree work is complete from the final delivery.

5 Flex Patrol

5.1 Inspection Frequency and Work Plan (from TRPP)

1. The transmission PI must perform the following tasks:

a. INSPECT NERC-lines every calendar year.

- (1) NOTIFY SVPM before 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 the 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 the PG&E SVPM in ITS.

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5.1 (continued)

- c. INSPECT non-NERC lines once per patrol cycle, starting Nov. 15 through Nov. 14 of the following year.
 - (1) Do **not** deviate from the normal inspection cycle by more than 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 2 months,

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

5.2 Schedule Variance (from [Utility Procedure TD-7103P-01, "Transmission Non-Orchard Routine Patrol Procedure \[TRPPI\]"](#))

1. IF inspection deviates from normal cycle by more than 2 months

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

THEN the transmission PI must DOCUMENT 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

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- 5.3 The PI must LIST non-compatible species when **all** of the following conditions occur:
- Prior approval for the scope of work must be granted from PG&E or a representative.
 - The customer is agreeable.
 - Tree removal is preferred.

6 Additional Patrol

- 6.1 At the direction of the SVPM, an additional PI patrol may be initiated.
- 6.2 IF an additional patrol is initiated,
THEN the PI company must follow the scope and timing the SVPM e-mails to PI companies.

7 Rapid Response Expectations

- 7.1 Rapid response scope of work applies to urgent critical detections only.
- 7.2 The PI must FIELD VERIFY NERC urgent critical detections within 2 business days of receipt from the Aerial LiDAR vendor.
- 7.3 The PI must verify non-NERC urgent critical detection within 10 business days following receipt from the Aerial LiDAR vendor.

<p style="text-align: center;">NOTE</p>
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<p>Urgent critical detections are included in pre-load work packets.</p>
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- 7.4 For urgent critical detections, the PI must perform the following steps:
1. IF rapid response detections meet Hazard Notification thresholds,
THEN FOLLOW [TD-7103P-09, "T&D Hazard Notification Procedure."](#)
 2. IF rapid response detections meet Imminent Threat thresholds,
THEN FOLLOW [TD-7103P-05, "Transmission Vegetation Imminent Threat Procedure."](#)

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7.4 (continued)

3. Whether tree work is needed or not, CREATE a location record using the values shown below by COPYING AND MODIFYING an existing record OR by CREATING a new one:

- **Tag Type:** LiDAR
- **Tag Number:** L1QSI xx (xx = the last two digits of the year)
 - Example: 2017 tags = L1QSI17
 - Example: 2018 tags = L1QSI18

NOTE

Rapid response tree work mitigation might include other vegetation detections in proximity to the VC1C detection(s), as directed by the VPM or SVPM.

4. Whether tree work is needed or not, UPDATE the following fields in the most recent tracking spreadsheet, located at: [Transmission LiDAR Tracking](#).

- **Field Response Date**
- **Action - Worked/Not Worked**
- **Date Corrected** (tree work date)
- **Comments** (any additional comments)

8 Controls

8.1 On an annual basis, within 30 days of final Aerial LiDAR data delivery, the LiDAR vendor must PROVIDE the PG&E VM electric transmission team with a list of transmission lines showing where Aerial LiDAR data was collected. The example below shows the desired information.

Tline Name	kV	Span Miles	Start Span	GPS coordinate of Start Span	End Span	GPS coordinate of End Span	Acquisition Date	Processing Date	Delivery Date	All detections delivered to PG&E?
Helms - Gregg	230	0.206	001/016		001/017		10/1/2017	3/1/2018	3/22/2018	Yes

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DEFINITIONS

False Detection: A detection provided by the LiDAR vendor that is classified incorrectly. An unhealthy tree tall enough to strike the facilities, but not requiring tree work this cycle, is **not** classified as a false detection.

The following are examples of false detection:

- Communication lines, guy wires, rocks, etc.
- Secondary wire

APPENDICES

[Appendix A, "LiDAR Detection Clearance Parameters"](#)

[Appendix B, "PG&E Vegetation Management Tree Clearance Parameters"](#)

[Appendix C, "Priority Detection Legend"](#)

[Appendix D, "Mobile Platform Map Views"](#)

ATTACHMENTS

[TD-7103B-003-F01, "Unlisted Detection Approval \(UDA\) Form"](#)

DOCUMENT APPROVER

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INCLUSION PLAN

This is a time-limited document, expected to extend into late 2018. The scope of this bulletin will be included in the following procedure:

[TD-7103P-01, "Transmission Routine Non-Orchard Patrol Procedure"](#)

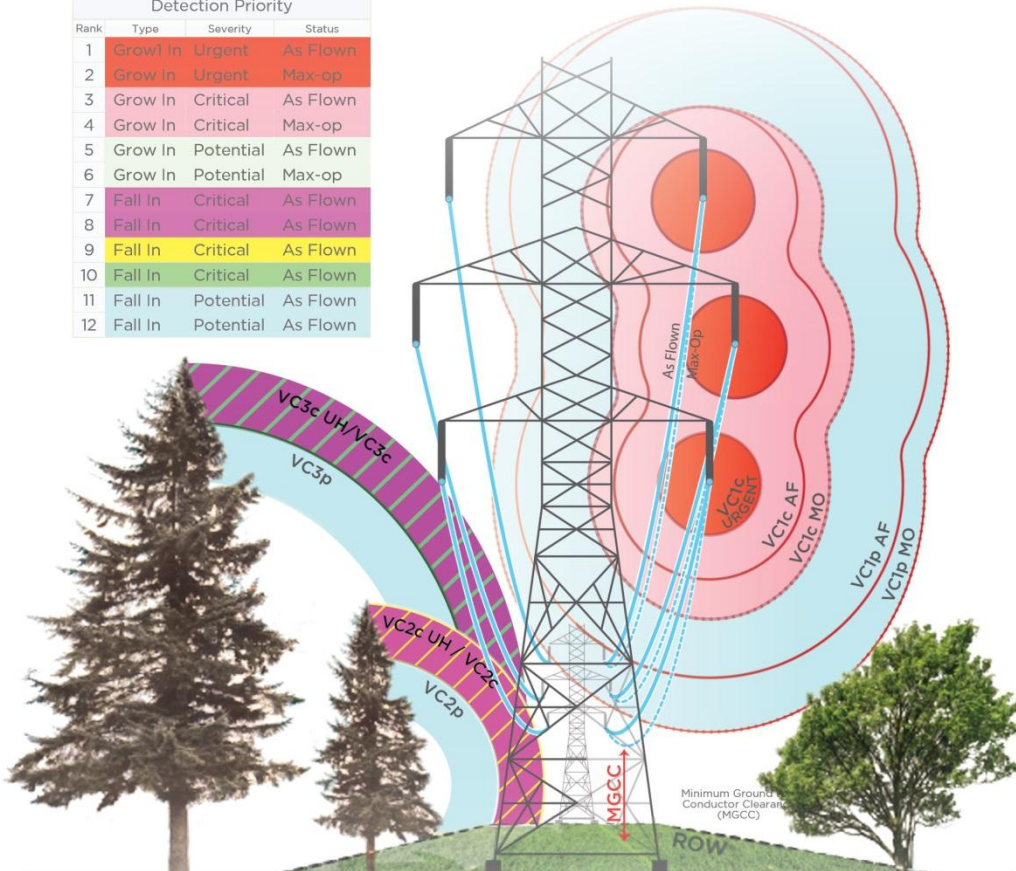
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Appendix A, LiDAR Detection Clearance Parameters Page 1 of 1



Clearance Detection Parameters

Detection Priority			
Rank	Type	Severity	Status
1	Grow In	Urgent	As Flown
2	Grow In	Urgent	Max-op
3	Grow In	Critical	As Flown
4	Grow In	Critical	Max-op
5	Grow In	Potential	As Flown
6	Grow In	Potential	Max-op
7	Fall In	Critical	As Flown
8	Fall In	Critical	As Flown
9	Fall In	Critical	As Flown
10	Fall In	Critical	As Flown
11	Fall In	Potential	As Flown
12	Fall In	Potential	As Flown



Fall In (Code: VC2/VC3) As Flown only ROW defined as x ft from transmission centerline							
Status	Critical				Potential		
	Code	VC2c UH	VC3c UH	VC2cAF	VC3cAF	VC2pAF	VC3pAF
Health*	Unhealthy				Healthy		Not Assessed
ROW	In	Out	In	Out	In	Out	
Distance	At or approaching striking distance						Within 6 ft
500 kV	60	>60	60	>60	60	>60	
230 kV	40	>40	40	>40	40	>40	
115 kV	25	>25	25	>25	25	>25	
60 kV	20	>20	20	>20	20	>20	

Grow In (Code: VC1) Vegetation at or approaching x ft of conductor						
Status	Urgent		Critical		Potential	
	Code	VC1c URGENT	VC1c URGENT MO	VC1cAF	VC1cMO	VC1pAF
Model**	AF	MO	AF	MO	AF	MO
500 kV	15	15	22	22	40	40
230 kV	10	10	12	12	17	17
115 kV	10	10***	12	12	17	17
60 kV	4	4***	6	6	10	10

* Unhealthy is defined: >33% canopy stressed. Critical Fall-ins assessed only
 ** Model Types: As-Flown (AF) and Maximum Operating Conditions (MO)
 *** NERC lines only

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Appendix B, PG&E Vegetation Management Tree Clearance Parameters

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PG&E Vegetation Management Tree Clearance Parameters												
PRIORITY	1	2	3	4	5	6	7	8	9	10	11	12
DESCRIPTION	Vegetation within X.ft. of conductor	Vegetation within X.ft. of conductor	Vegetation within X.ft. of conductor	Vegetation within X.ft. of conductor	Vegetation within X.ft. of conductor	Vegetation within X.ft. of conductor	Vegetation showing 30% or more stress located inside ROW (X.ft. from conductor) and is tall enough to strike the conductor (0 ft.)	Vegetation showing 30% or more stress located beyond ROW (> X.ft. from conductor) and is tall enough to strike the conductor (0 ft.)	Vegetation inside ROW (X.ft. from conductor) that is tall enough to strike the conductor (0 ft.)	Vegetation beyond ROW (>X.ft. from conductor) that is tall enough to strike the conductor (0 ft.)	Vegetation beyond ROW (>X.ft. from conductor) that is tall enough to strike the conductor (6 ft.)	Vegetation beyond ROW (>X.ft. from conductor) that is tall enough to strike the conductor (6 ft.)
500 kV*	15	15	22	22	40	40	60 / 0	>60 / 0	60 / 0	>60 / 0	60 / 0	>60 / 2
230 kV	10	10	12	12	17	17	40 / 0	>40 / 0	40 / 0	>40 / 0	40 / 0	>40 / 2
115 kV	10	10	12	12	17	17	25 / 0	>25 / 0	25 / 0	>25 / 0	25 / 0	>25 / 2
60 kV	4	4	6	6	10	10	20 / 0	>20 / 0	20 / 0	>20 / 0	20 / 0	>20 / 2

Priority 1 and 2 detections will result in immediate notification to PG&E













Max-op: Indicates

As Flown: Indicates the analysis has been performed using conductors which have been modeled to as-surveyed conditions at the time of the LiDAR flight.

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Appendix C, Priority Detection Legend

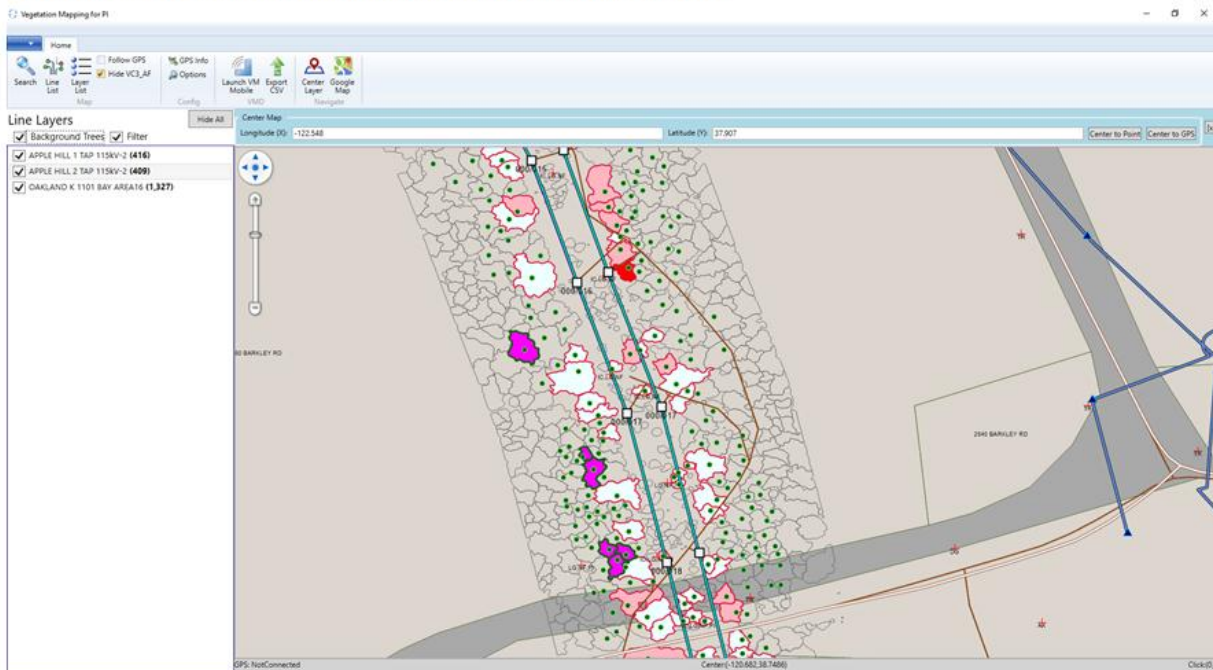
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DC_VENDOR Code(s)	Border Color	Border Width	Fill Color	Priority (1 = Highest)	Description	Sample
VC1c_URGENT	Crimson	2	Red	1	Urgent Grow In	
VC1c_URGENT_MO	Crimson	2	Red	2	Urgent Grow In	
VC1c_AF	Crimson	2	Light Pink	3	Critical Grow In	
VC1c_MO	Crimson	2	Light Pink	4	Critical Grow In	
VC1p_AF	Crimson	2	Azure	5	Potential Grow In	
VC1p_MO	Crimson	2	Azure	6	Potential Grow In	
VC2c_UH	Yellow	3	7	Critical Fall In Unhealthy		
VC3c_UH	Dark Green	3	Fuchsia	8	Critical Fall In Unhealthy Beyond ROW	
VC2c_AF	Dark Goldenrod	2	Yellow	9	Critical Fall In	
VC3c_AF	Dark Green	2	Light Green	10	Critical Fall In Beyond ROW	
VC2p_AF	Dark Goldenrod	2	Azure	11	Potential Fall In	
VC3p_AF	Dark Green	2	Azure	12	Potential Fall In Beyond ROW	

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Appendix D, Mobile Platform Map Views Page 1 of 1

Transmission corridor with background trees; Fall in polygons hidden



Transmission match to VMD location for selected tree

