

Arborist Survey of the Oakley Generating Station Project and Transmission Line Upgrade Route

PREPARED FOR: Contra Costa Generating Station LLC

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Introduction

This arborist survey was prepared for the Oakley Generating Station and Transmission Line Upgrade Project. The need for this survey was generated by requirements in the East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan (East Contra Costa County HCP/NCCP) and the Tree Ordinances of the City of Oakley and the City of Antioch.

Survey Methods and Applicable LORS

On February 17, 2010, CH2M HILL Staff Biologist Richard Crowe conducted an arborist survey of the proposed Oakley Generating Station project site and the associated transmission line corridor. A second arborist survey was performed on October 25, 2010, by Mr. Crowe and certified arborist G.O. Graening (Natural Investigations Co.).

Tree Inventory

Each tree to be removed within the proposed Oakley Generating Station (OGS) project site proper and each tree within the proposed transmission line upgrade corridor was inventoried and the following data taken:

1. Taxonomic identification (to species where possible)
2. Diameter at breast height (DBH) as measured at 4.5 feet above ground.
3. Height (visual estimate only, +/- 20 feet)
4. Condition and overall health
5. Photo

DBH for multi-stemmed trees or shrubs was determined by summing the individual DBHs of each stem into one aggregate DBH value. Each tree was given a unique number so that it could be readily identified in the future. Representative photos are included in Attachment 1.

Assumptions

The tree survey results were based on the assumption that all of the trees within the OGS permanent project site footprint would be removed, with the exception of the row of eucalyptus trees along the northern edge of the parcel. Only six of the eucalyptus trees will be removed to incorporate a roadway between the areas on either side of the row (Figure 1).

The proposed construction laydown area, construction parking, and stockpile areas are also located on the former DuPont manufacturing facility site. The proposed construction laydown area is located east of the proposed project site and consists of DuPont's former titanium dioxide disposal site, which is approximately 13 acres of barren ground and ruderal vegetation, and an existing 6.5 acre paved area. A row of mature eucalyptus trees is present along the southwest and southern boundaries of the paved area. Several eucalyptus trees are also present along the top of a berm near the eastern edge of the paved area. ESA and silt fencing will be installed around the row of eucalyptus trees and the group of trees growing in the ruderal grasslands. Therefore, no tree removal is expected as part of the preparation of the construction laydown area.

Soil from the project parcel will be temporarily stockpiled in three areas north of the project. Stockpile Area 1 will be located on an existing paved surface. Stockpile Areas 2 and 3 are located further north in ruderal areas on either side of a row of salt cedar trees. No tree removal is expected in the soil stockpile areas, with the exception of some tree trimming to gain access to Stockpile Area 3.

A dedicated project sanitary sewer force main will be constructed from the project site to an interconnection point in Main Street as part of the OGS project. The new sanitary sewer will extend south from an interconnection point in Bridgehead Road to Main Street. It will then turn east and run for approximately 0.1 mile to the interconnection point with Ironhouse Sanitary District's gravity main. The existing force main is located under the paved road surface. In addition to the ruderal herbaceous vegetation, several trees are present along the shoulders of Bridgehead Road, including interior live oak, almond, tree of heaven, and black walnut. The majority of these trees are less than 20 feet in height and there is evidence of routine trimming near the existing power lines that run adjacent to Bridgehead Road. No tree removal is expected as part of the force main installation.

For the transmission line upgrade route, the following assumptions were made:

1. Seventeen of the 18 existing lattice towers will be removed; the tower within Wetland E will remain.
2. Twenty new replacement monopole towers will be placed so that no additional trees will be affected. If it is determined after final transmission line design that additional trees may be affected, an additional inventory will be required.
3. The footprint of disturbance will be limited to 1 acre at each lattice tower for removal of the existing tower. (This equates to ± 17 acres of temporary impacts which is consistent with the stormwater pollution prevention plan [SWPPP] calculations.)
4. No grading will occur between each tower for access. Existing access is easily attained by surface streets, dirt roads, or bike paths.
5. The entire lattice tower and the upper portions of the cement footings will be removed.

Special-status Species

Although Northern California black walnut (*J. hindsii*) trees occur in the project area, they are not considered rare or endangered plants. There are only three locations where Northern California black walnuts are considered indigenous, and as such, a rare plant community. These locations are well outside of the project area (UC Berkeley, 2010).

City of Oakley Tree Ordinance

The City of Oakley's Tree Ordinance (Code sections 9.1.1112 et seq.; available on the Internet at <http://www.codepublishing.com/CA/Oakley>) defines and protects "Heritage Trees" and "Protected Trees." Heritage trees are defined as a tree 50 inches or more in circumference measured 4.5 feet above the natural grade or a tree determined to have a special significance to the community because of a unique quality, species, size, or historic or ecological value. Heritage trees are designated by the City Council.

On all properties within the City of Oakley, a "Protected Tree" is any one of the following: Where the tree to be cut down, destroyed or trimmed by topping is adjacent to or part of a riparian, foothill woodland or oak savanna area, or part of a stand of four or more trees, measures twenty inches or larger in circumference (approximately 6.5 inches in diameter) as measured four and one-half feet from ground level, or multi-stemmed tree with the sum of the circumferences measuring forty inches or larger (approximately 13 inches in diameter), measured four and one-half feet from ground level, and is included in the following list of indigenous trees: *Acer macrophyllum* (Bigleaf Maple), *Acer negundo* (Box Elder), *Aesculus californica* (California Buckeye), *Alnus rhombifolia* (White Alder), *Arbutus menziesii* (Madrone), *Heteromeles arbutifolia* (Toyon), *Juglans hindsii* (California Black Walnut), *Juniperus californica* (California Juniper), *Lithocarpus densiflora* (Tanoak or Tanbark Oak), *Pinus attenuata* (Knobcone Pine), *Pinus sabiniana* (Digger Pine), *Platanus racemosa* (California Sycamore), *Populus fremontii* (Fremont Cottonwood), *Populus trichocarpa* (Black Cottonwood), *Quercus agrifolia* (California or Coast Live Oak), *Quercus chrysolepis* (Canyon Live Oak), *Quercus douglasii* (Blue Oak), *Quercus kelloggii* (California Black Oak), *Quercus lobata* (Valley Oak), *Quercus wislizeni* (Interior Live Oak) *Umbellularia californica* (California Bay or Laurel).

The City of Oakley Municipal Code, Tree Ordinance has the following exceptions to the requirement of protection and mitigation of trees in utility to occur:

Permit Exceptions (Section 9.1.1114.e.1.f)

"Public Agencies/Utilities. Trimming and clearing within public agency or utility easements and rights-of-way for maintenance of easement or right of way will not require a tree permit. Lands owned by public utilities and used for administrative purposes or uses unrelated to the public service provided by the utility are not exempted under this provision."

City of Antioch Tree Ordinance

The City of Antioch Tree Ordinance is found in the City's Ordinances Title 9: Planning And Zoning, Chapter 5: Zoning, Article 2: Definitions, and Article 12: Tree Preservation and Regulation (available on the Internet at http://www.amlegal.com/antioch_ca/). The City of Antioch Tree Ordinance defines protected trees as any indigenous established tree, mature

tree, street tree, or landmark tree. An indigenous established tree has a diameter at breast height of at least 10 inches and is one of the following species: blue oak (*Quercus douglasii*); valley oak (*Q. lobata*); coast live oak (*Q. agrifolia*); canyon live oak (*Q. chrysolepis*); interior live oak (*Q. wislizeni*); California buckeye (*Aesculus californica*); or California bay (*Umbellularia californica*). A mature tree has a DBH of at least 26 inches. A street tree is “any tree planted within either the public right-of-way and/or tree planting easement, where applicable.” A landmark tree is any tree which is at least 48 inches in diameter and/or in excess of 40 feet in height.

Affected Trees

Oakley Generating Station Project Site

Eighteen trees were identified to be removed within the Oakley Generating Station project site. Table 1 summarizes the affected trees.

TABLE 1
Trees to be Removed at the Oakley Generating Station Project Site

Tree No.	Species	DBH	Est. Height	Health / Condition	Site Location	Habitat
1	Almond	24.2" (multi-stemmed)	17'	Excellent	Air cooled condenser (ACC)	Vineyard
2	Interior Live Oak	18.8"	24'	Excellent	ACC	Vineyard
3	Interior Live Oak	19."	22'	Excellent	ACC	Vineyard
4	Interior Live Oak	17.4"	23'	Excellent	ACC	Vineyard
5	Interior Live Oak	19.6"	27'	Excellent	ACC	Vineyard
6	Interior Live Oak	16.6"	26'	Excellent	ACC	Vineyard
7	Interior Live Oak	16.5"	26'	Excellent	ACC	Vineyard
8	Almond	9.6" (multi-stemmed)	13'	Excellent	Main access road	Ruderal
9	Almond	9.3" (multi-stemmed)	13'	Poor (numerous dead branches)	Main access road	Ruderal
10	Almond	6.5" (multi-stemmed)	12'	Healthy	Main access road	Ruderal
11	Almond	8.5" (multi-stemmed)	12'	Excellent	Main access road	Ruderal
12	Almond	17.2" (multi-stemmed)	14'	Excellent	Main access road	Ruderal
A1	Eucalyptus	43.6" (multi-stemmed)	30'+	Excellent	ACC	Ruderal/ Vineyard
A2	Eucalyptus	41.2" (multi-stemmed)	20'+	Fair (crowded)	ACC	Ruderal/ Vineyard
A3	Eucalyptus	31.8"	60'+	Excellent	ACC	Ruderal/ Vineyard

TABLE 1
Trees to be Removed at the Oakley Generating Station Project Site

Tree No.	Species	DBH	Est. Height	Health / Condition	Site Location	Habitat
A4	Eucalyptus	21.8" (multi-stemmed)	15'	Fair/poor (crowded, leaning)	ACC	Ruderal/Vineyard
A5	Eucalyptus	29.4" (multi-stemmed)	50'+	Excellent	ACC	Ruderal/Vineyard
A6	Eucalyptus	12.1" (multi-stemmed)	15'	Fair (crowded)	ACC	Ruderal/Vineyard

The OGS project site is located within the corporate boundary of the City of Oakley. According to the City of Oakley Tree Ordinance, six of the 18 trees identified are protected because they are part of a stand of native oaks and are larger than 6.5 inches in diameter: Tree Numbers 2, 3, 4, 5, 6, and 7. These six trees are interior live oaks (*Quercus wislizeni*), located in the former vineyard where the proposed air-cooled condenser would be located (Inset Map 1A). A tree permit and compensatory mitigation is necessary for these six trees.

A row of approximately 24 mature eucalyptus trees separates two portions of the proposed OGS project parcel. Approximately six of these trees (25 linear feet) would be removed to incorporate a roadway between the two areas on either side of the row: Tree Numbers A1 through A6 (Inset Map 1A). These trees are not protected under the City of Oakley Tree Ordinance because they do not meet the native species criterion.

No City of Oakley-designated heritage trees are known to be within or near the project area. No trees within the project area appear to be eligible for designation as a City of Oakley heritage tree because they are either non-indigenous/invasive, lack historical/ecological interest, are not rare or outstanding, or lack the size requirement (50 inches in diameter).

Transmission Line Upgrade Route

Ten trees in the vicinity of the existing transmission towers were identified as trees which would likely be removed as part of the transmission line upgrade. Table 2 summarizes the inventoried trees.

TABLE 2
Trees to be Removed along the OGS Transmission Line

Tree No.	Species	DBH	Height	Health	Site Location	Habitat
13	Ponderosa pine	15.7"	22'	Healthy	Tower #7	Vineyard
14	Almond	33.2" (multi-stemmed)	14'	Healthy	Tower #7	Vineyard
15	Almond	25.4" (multi-stemmed)	21'	Healthy	Tower #14	Vineyard

TABLE 2
Trees to be Removed along the OGS Transmission Line

Tree No.	Species	DBH	Height	Health	Site Location	Habitat
16	Interior live oak	23" (multi-stemmed)	21	Healthy	Tower #16	Ruderal remnant orchard
17	Almond	6.3" (multi-stemmed)	7'	Healthy	Tower #17	Ruderal remnant orchard
18	Interior live oak	3.2" (multi-stemmed)	6'	Unhealthy over half of branches dead	Tower #17	Ruderal remnant orchard
A7	Nor. Cal. Walnut <i>Juglans hindsii</i>	12.5" (multi-stemmed)	20'+	Fair (trimmed for utility clearance)	Bridgehead Road easement	Ruderal
A8	Arroyo willow <i>Salix lasiolepis</i>	24" (multi-stemmed)	10'		Bridgehead Road easement	Ruderal
A9	Walnut hybrid <i>Juglans nigra x hindsii</i>	24" (multi-stemmed)	20'+	Excellent	Bridgehead Road easement	Ruderal
A10	Interior live oak	14.1" (multi-stemmed)	20'	Fair / poor (trimmed for utility clearance)	Bridgehead Road easement	Ruderal

A portion of the transmission line upgrade route study area is within the corporate boundary of the City of Oakley (Tower #7 and the Bridgehead Road easement); the remaining portion of the study area is located within the corporate boundary of the City of Antioch.

According to the City of Oakley Tree Ordinance, Tree Number A10 (interior live oak) is protected because it is a native, multi-stemmed oak with a DBH greater than 13 inches. However, this tree is located within an electric utility easement, and is therefore exempt from the ordinance under permit exceptions (Code Section 9.1.1114.e.1.f). Certified Arborist Graening spoke with City of Oakley Community Development Department Director Rebecca Willis on February 3, 2011. Director Willis confirmed that this tree is exempt from the ordinance.

Tree Number 14 is not considered a protected "mature tree" because it does not have a single stem that is larger than 26 inches in diameter. The City of Antioch Tree Ordinance makes no mention of trees that are multi-stemmed in nature or whether an aggregate diameter method should be used. In fact, the City of Antioch Tree Ordinance emphasizes in its definition of a protected tree that it should be single stemmed. The ordinance states, "Tree: A usually tall woody plant, distinguished from a shrub by having a comparatively greater height and, characteristically, a single trunk rather than several stems."

Tree Number 16 is a protected interior live oak tree under the City of Antioch Tree Ordinance because it fits the species criterion and is larger than 10 inches in diameter. A tree permit and compensatory mitigation is necessary.

No heritage tree, street tree, or landmark tree is located within the OGS project site or along any linear features. As previously stated, it is assumed that grading will not be required between each tower along the transmission corridor. Therefore, no additional protected trees within the transmission corridor will be removed within the City of Oakley or the City of Antioch nor will grading occur within the drip line of the remaining protected trees.

Mitigation and Tree Appraisal

Mitigation for Trees Protected Under the City of Oakley Tree Ordinance

The City of Oakley Tree Ordinance specifies mitigation for removal of protected trees as follows: “The director shall grant or deny tree permits in accordance with this chapter and code. If a permit is granted, the director may attach conditions to insure compliance with this chapter and code. These conditions may include a requirement to replace any or all trees on a 3:1 ratio of either size or quantity or pay in-lieu fee on a per inch basis.”

A tree permit shall be obtained from the City of Oakley Community Development Department and one of the following mitigation options is required: three new trees of the same species shall be planted for each protected tree removed; or the total appraisal fee for the protected trees scheduled to be removed shall be paid to the Community Development Department; or a combination of replacement tree plantings and in lieu fee payments shall be made. Oak tree transplantation from construction areas to conservation areas onsite may also be considered in the final mitigation program to be approved by the City of Oakley. Flexibility in mitigation options is necessary to ensure the optimum program of native tree retention onsite. Note that onsite conservation areas that may receive transplanted trees, or replacement plantings of native trees, include Wetland E and the vegetative screen landscape area.

The City of Oakley Tree Ordinance allows the payment of a fee in lieu of the replacement of protected trees. The City of Oakley Tree Ordinance specifies that a certified arborist appraise the value of the protected trees to be removed using the tree industry’s standard appraisal methodology: the International Society of Arboriculture’s (ISA) Council of Tree and Landscape Appraisers (CTLA) 9th edition of the Guide for Plant Appraisal. Therefore, Certified Arborist Graening employed the CTLA’s standard appraisal method – the Trunk Formula Method (p. 70; CTLA, 2000).

Field observations consisted of the following variables: species, size, condition rating, and location rating. Size was measured as trunk cross-sectional area (square inches), calculated by $0.785 \times (\text{DBH})^2$; a circular cross section was assumed. For any tree larger than 30 inches DBH, the trunk area was modified using the adjusted trunk area (ATA) formula: $\text{ATA} = -0.335(\text{DBH})^2 + 167d - 7020$. The condition rating (0 to 100 percent) was determined from the condition of the roots, trunk, branches, and foliage/buds. The location rating (0 to 100 percent) was determined from the average of the site, contribution, and placement percentage ratings.

ISA Regional Plant Appraisal Committees provide values for other variables in the Trunk Formula Method: species rating, replacement tree size, replacement tree cost, installation cost, and unit tree cost (see Attachment 2). The ISA's Western Chapter (WC-ISA) published the regional supplement for California, and specifically, the Northern California Subregion (WC-ISA, 2004). The Species Rating (0 to 100 percent) for each tree species is assigned to a Northern California Subregion Species Group Number (1 = 90 percent; 2 = 70 percent; 3 = 50 percent; 4 = 30 percent; 5 = 10 percent)(WC-ISA, 2004). For the Northern California Subregion, a 24-inch box was the largest commonly available replacement tree size at an average cost of \$172.73 (WC-ISA, 2004). Replacement tree size was split into four Nursery Groups: 1 = 2.09 in²; 2 = 2.24 in²; 3 = 3.80 in²; 4 = 4.75 in². Nursery Group Number was determined for the "Nor. Cal. Coastal Influence" category; Table 3 summarizes these assignments by species.

According to WC-ISA (2004), installation cost was assumed to be equal to the wholesale replacement tree cost; the resulting total Installed Tree Cost is \$172.73 + \$172.73 = \$345.46. The Unit Tree Cost is the replacement tree cost (\$172.73) divided by the replacement tree size (in²), listed by Nursery Group: 1 = 82.82 \$/in²; 2 = 77.04 \$/in²; 3 = 45.46 \$/in²; 4 = 36.36 \$/in². The Appraised Tree Size Increase (in²) is the difference between the Adjusted Trunk Area and the Replacement Tree Size. The Basic Tree Cost is the sum of the Installed Tree Cost and the cost of the difference between the Adjusted Trunk Area and the Replacement Tree Size (Appraised Tree Size Increase multiplied by Unit Tree Cost). The Basic Tree Cost is then adjusted by the Species, Condition, and Location Ratings to obtain the Appraised Tree Value. The Appraised Tree Value equation is: Basic Tree Cost x Species Rating (%) x Condition Rating (%) x Location Rating (%).

The following table shows calculations and resulting replacement cost, according to CTLA's Trunk Formula Method.

TABLE 3
Tree Appraisal for Trees Protected Under the City of Oakley Tree Ordinance

Tag Number	DBH	Spe. Rating	Con. Rating	Loc. Rating	Appraised Size	Adj. Trunk Area	Replace. Tree Size	Appr. Trunk Increase	Unit Tree Cost	Basic Tree Cost	Appraisal Value
#	inch	%	%	%	in ²	in ²	in ²	in ²	\$/in ²	\$	\$
2	18.8	70	95	75	277	277	2	275	83	23,103	11,523
3	19.0	70	95	75	283	283	2	281	83	23,593	11,767
4	17.4	70	95	75	238	238	2	236	83	19,815	9,883
5	19.6	70	95	75	302	302	2	299	83	25,096	12,517
6	16.6	70	95	75	216	216	2	214	83	18,050	9,003
7	16.5	70	95	75	214	214	2	212	83	17,836	8,895

Thus, according to the CTLA Trunk Formula Method, the appraised value of the six trees is \$63,587.

Mitigation for Trees Protected Under the City of Antioch Tree Ordinance

The City of Antioch Tree Ordinance requires that legally removed protected trees be replaced at a ratio of two 24-inch box trees for each established tree and two 48-inch box trees for each mature tree. Penalties can also be assessed as follows: a tree 10 to 17 inches in diameter = \$1,000; 18 to 25 inches = \$2,000; 26 to 36 inches = \$3,500; 37 to 48 inches = \$5,000; and 48 inches and larger = \$10,000. Because Tree Number 16 is 23 inches in diameter, the penalty is \$2,000.

A tree removal permit shall be obtained from the Department of Parks, Leisure and Community Services, and the penalty of \$2,000 shall be paid to this Department.

Condition of Certification BIO-8: Protected Trees Mitigation Fees

To comply with various protected tree ordinances, the project owner shall pay mitigation fees for loss of protected trees based on the results of the applicant's arborist report. Fees will be assessed by the City of Oakley and City of Antioch based on review of the arborist report.

Verification: A copy of the receipt of payment to the City of Oakley and the City of Antioch, verifying that the protected tree mitigation fees have been paid, according to the conditions specified above, shall be provided to the CPM prior to tree removal.

Literature Cited

Council of Tree and Landscape Appraisers (CTLA). 2000. Guide for Plant Appraisal, 9th edition. International Society of Arboriculture, Champaign, Illinois. 143 pp.

University of California at Berkeley. 2010. Jepson Online Interchange for California Floristics. Jepson Flora Project, University Herbarium and Jepson Herbarium, University of California at Berkeley. Internet database available <http://ucjeps.berkeley.edu/interchange.html>.

Western Chapter of the International Society of Arboriculture (WC-ISA). 2004. Species Classification and Group Assignment – A regional supplement to the CTLA Guide for Plant Appraisal, 9th edition. 37 pp.

Qualifications of Consulting Arborist

Dr. G. O. Graening is a consulting arborist certified by the International Society of Arboriculture (Certification # WE-6725A) since 2003. Dr. Graening also holds a Ph.D. in Biology and a Master of Science degree in Biological and Agricultural Engineering, and is a California Registered Environmental Assessor I (DTSC License # 08060). Dr. Graening has 13 years of experience in environmental assessment and research, including the performance of numerous arborist surveys, appraisals, and design of tree mitigation plans.

Figures

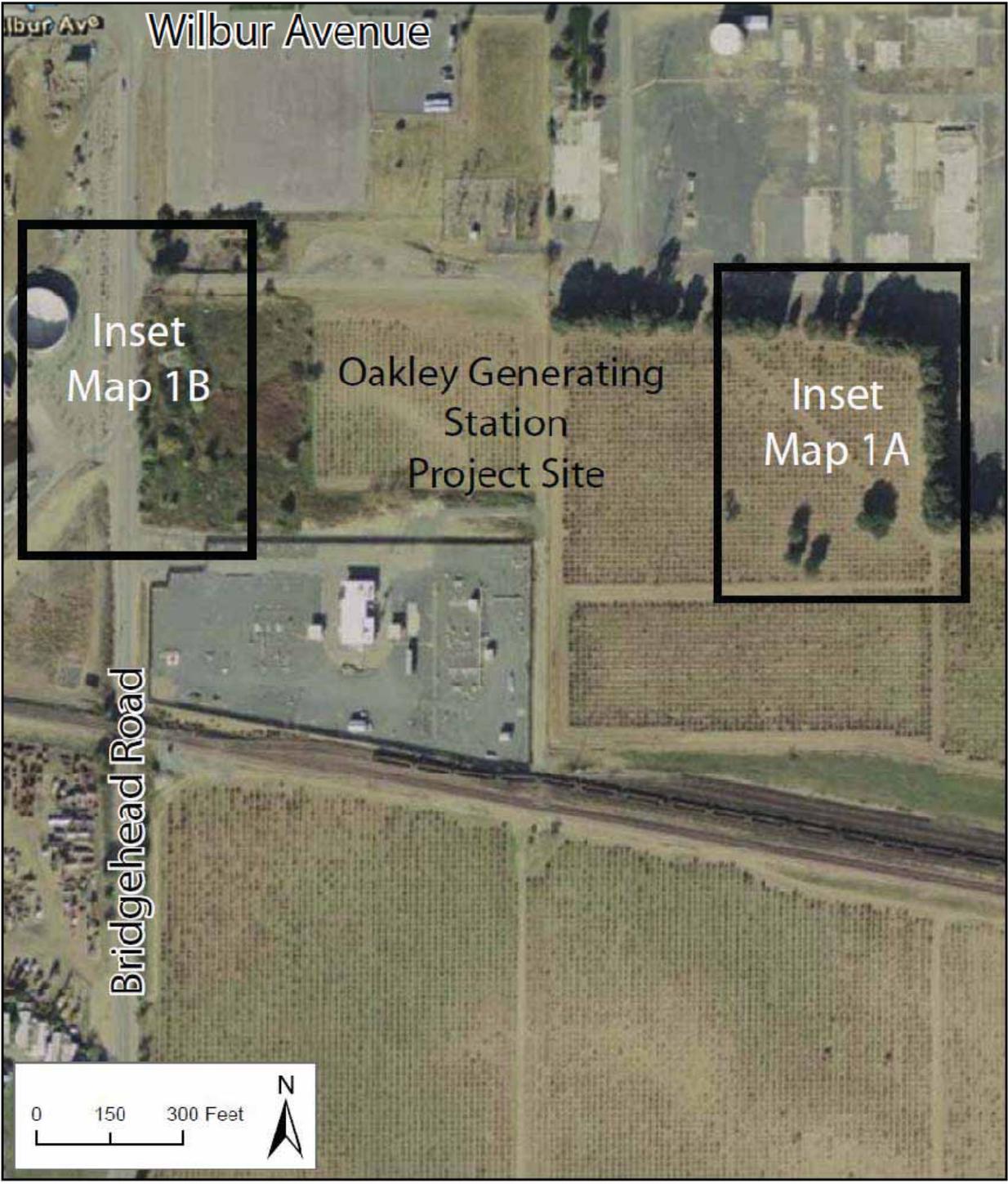
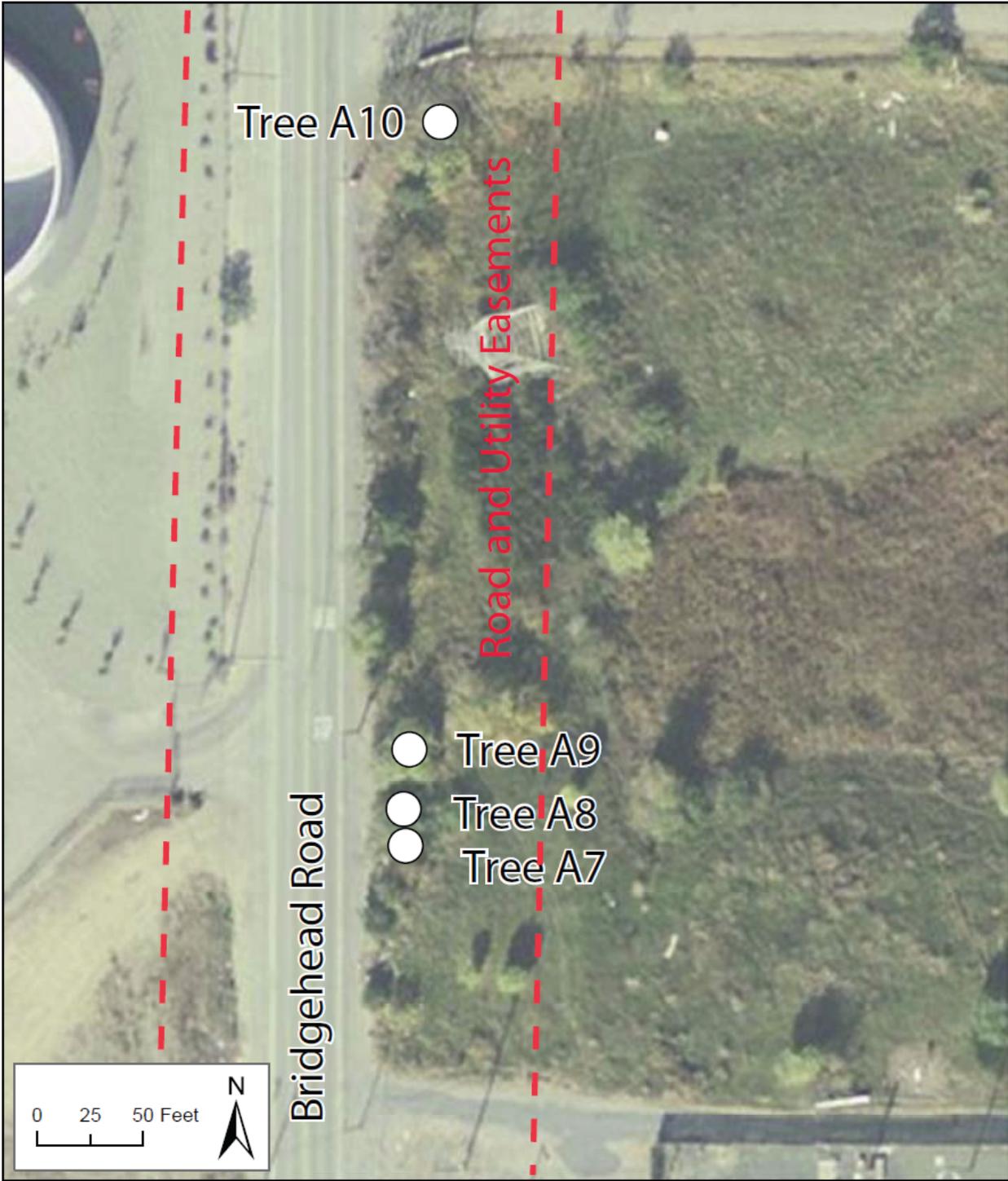


Figure 1: Overview Map of the Oakley Generation Station Project Site



Inset Map 1A: Locations of Tree Numbers 1 to 6 and A1 to A6



Inset Map 1B: Locations of Tree Numbers A7 to A10

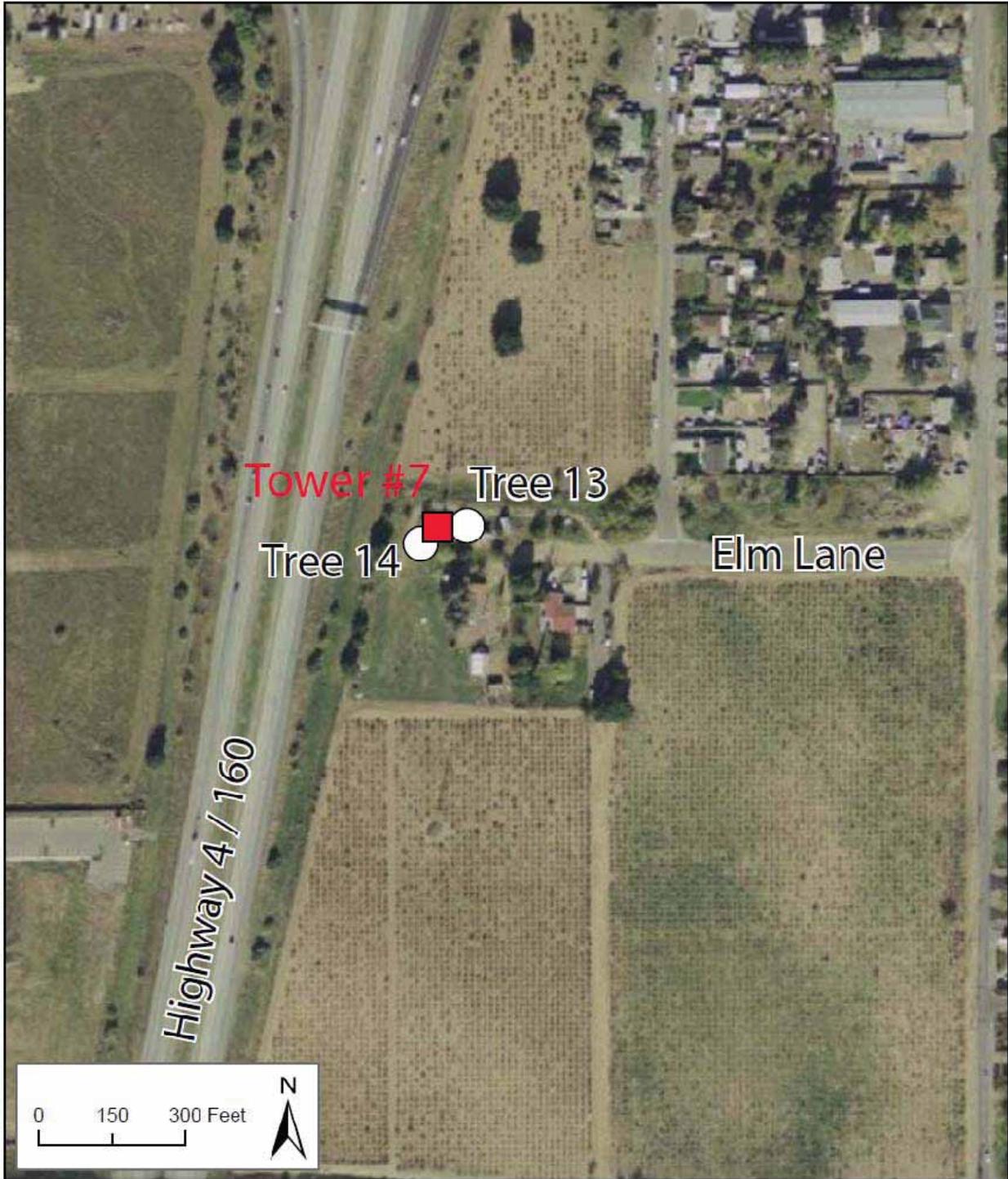


Figure 2: Locations of Tree Numbers 13 and 14 (Transmission Line Upgrade Project Area)

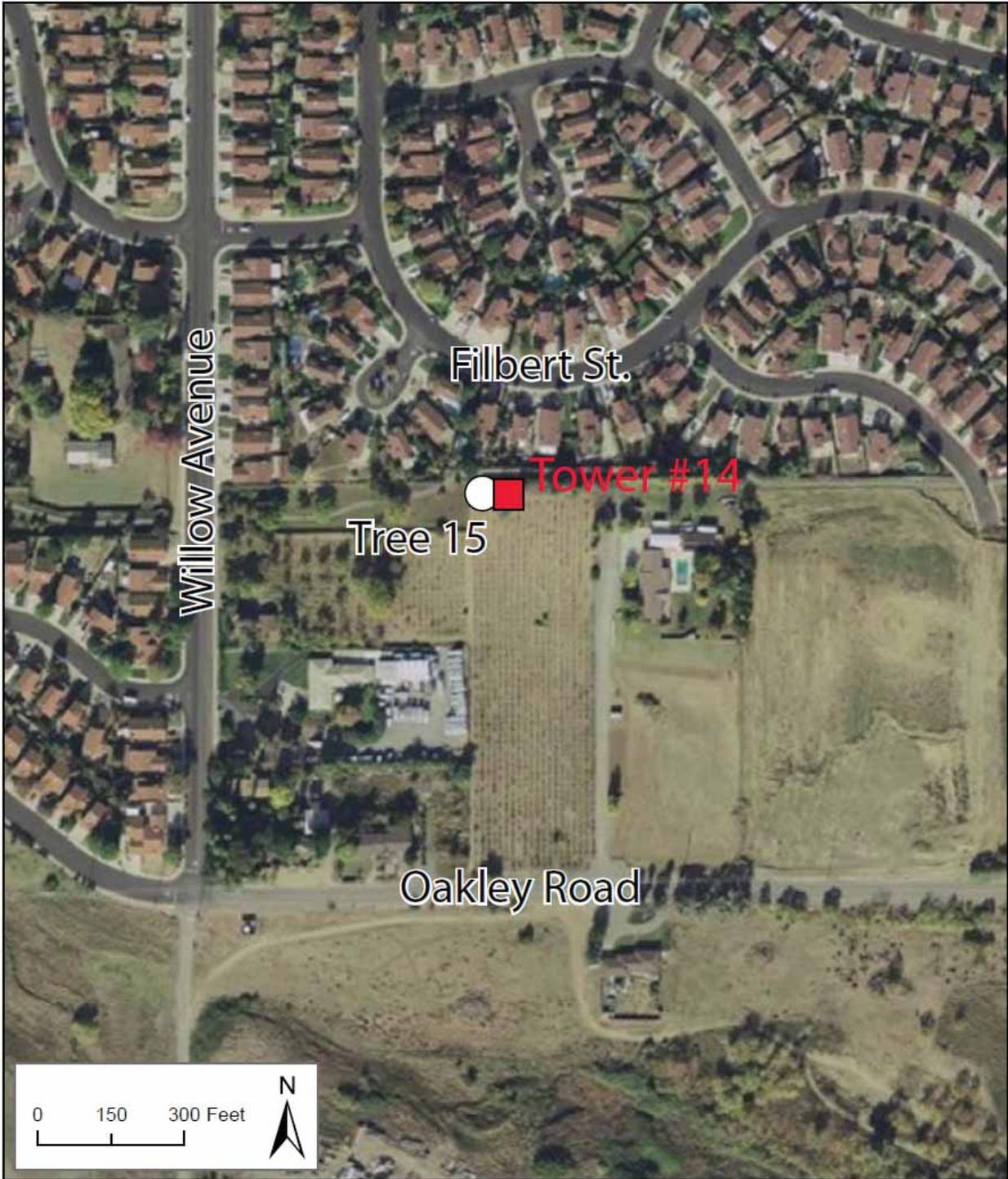


Figure 3: Location of Tree Number 15 (Transmission Line Upgrade Project Area)

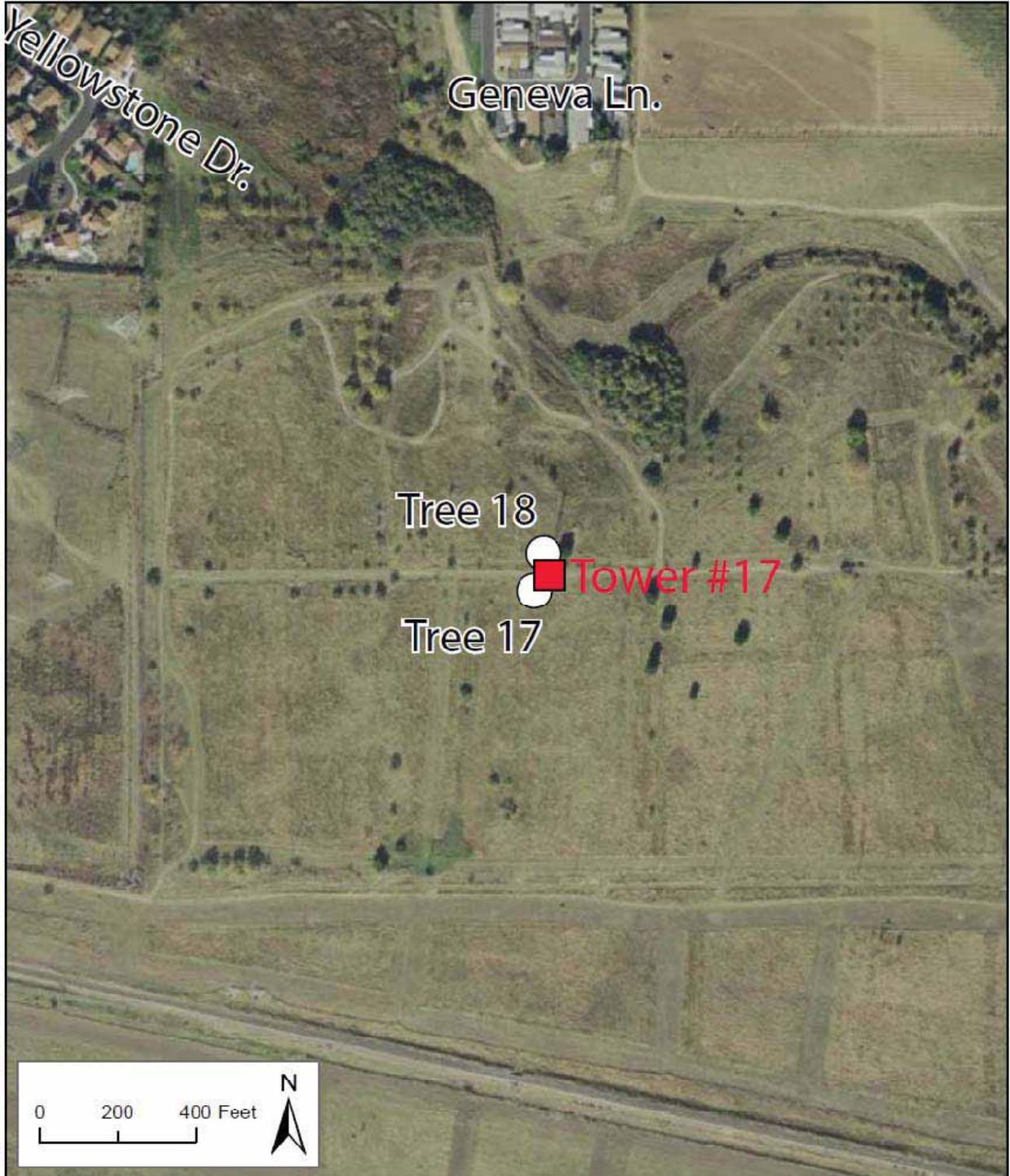
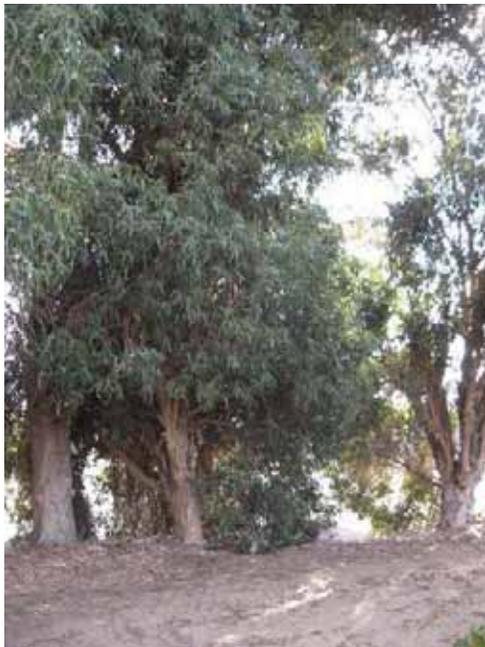


Figure 4: Locations of Tree Numbers 17 and 18 (Transmission Line Upgrade Project Area)

Attachment 1
Representative Photos of Tree Inventory



Photo of three of the six interior live oaks to be removed in ACC area, 2/17/10.



Photos of some of the six eucalyptus to be removed in ACC area, 10/25/10.



Photo of almond trees to be removed along future project access road, 2/17/10.

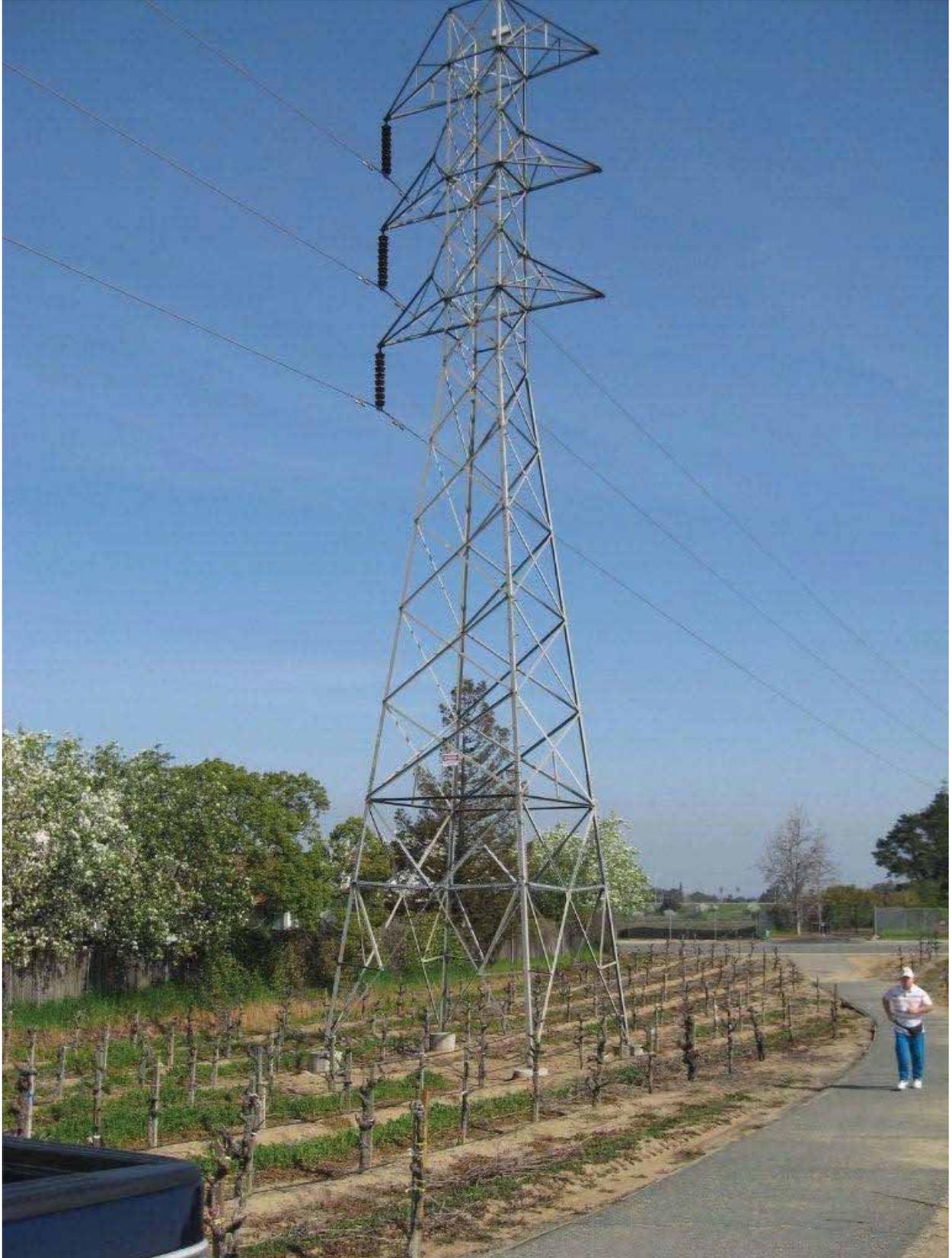


Photo of Tower #11 typical vineyard setting, 2/17/10.

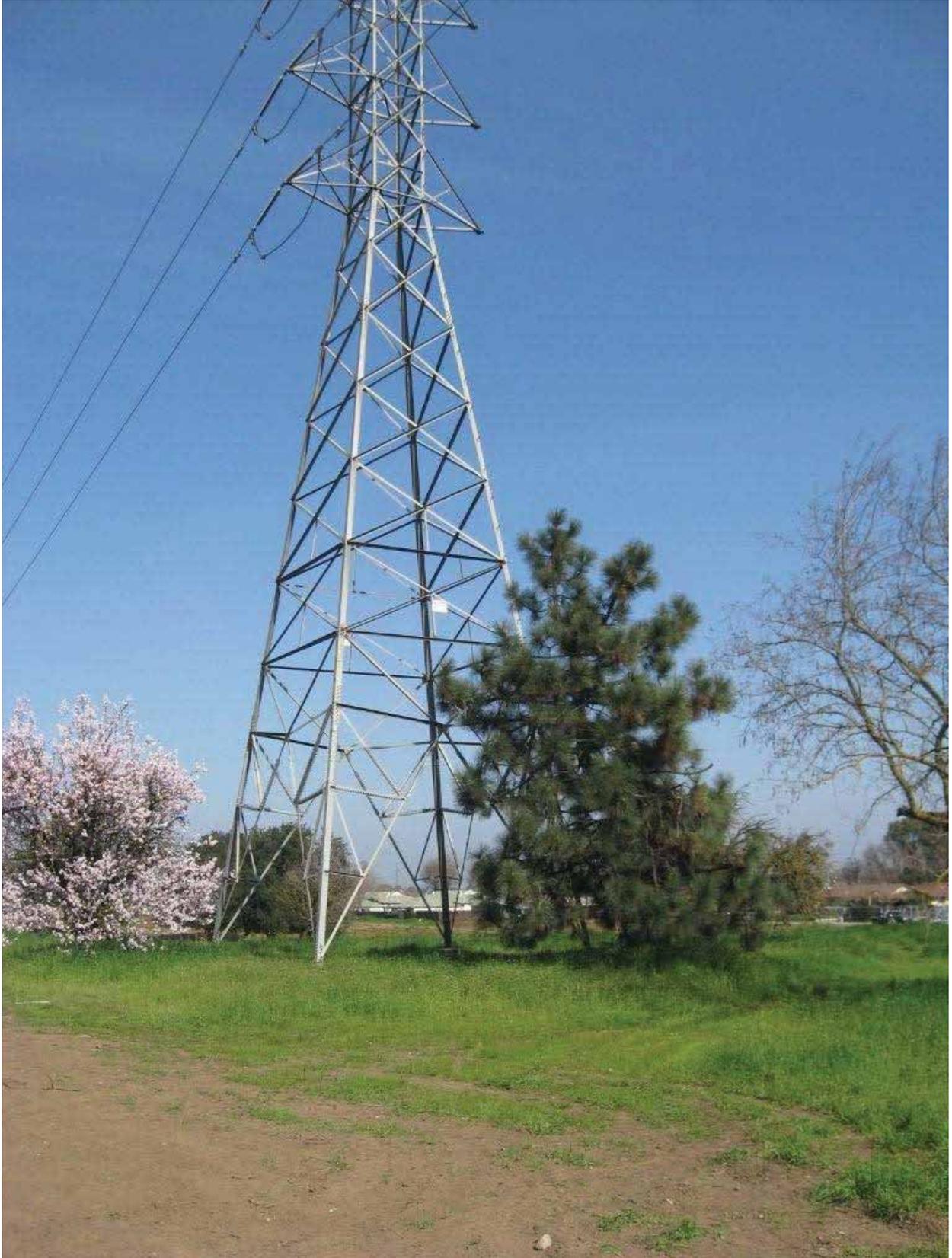
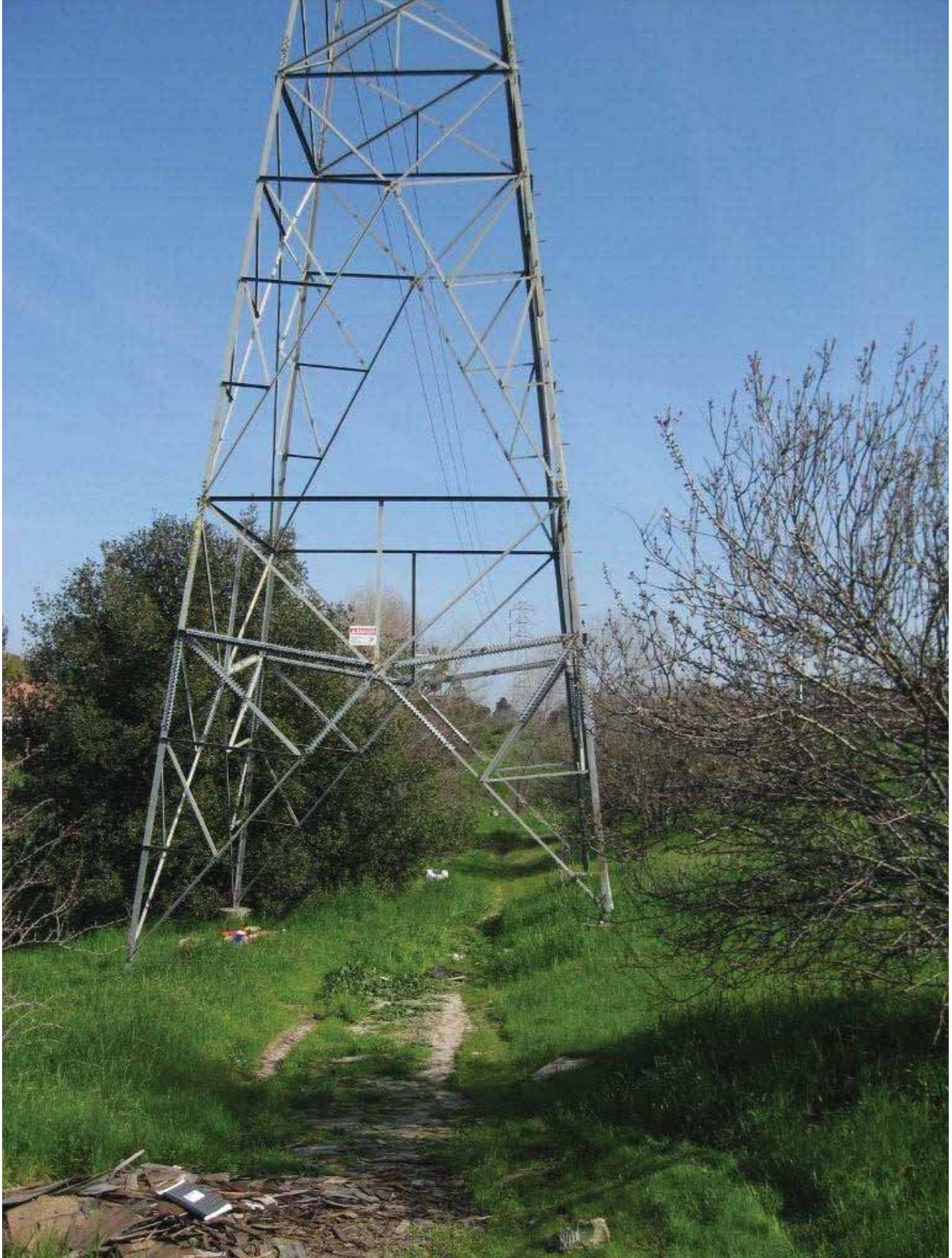


Photo of Tower #7 with ponderosa pine and almond tree that will be removed, 2/17/10.



Tower #16 with interior live oak to be removed, 2/17/10.

Attachment 2
Tree Appraisal Worksheets

Northern California Subregion (Table 11: page 2; WC-ISA, 2004)

Nursery Group #	Trunk Area	Basic Price (cost/trunk in2)
1	2.09	82.82
2	2.24	77.04
3	3.8	45.46
4	4.75	36.36

Northern California Group Species #	Species Rating
	%
1	90
2	70
3	50
4	30
5	10

24" box = largest commonly available replacement tree size
 \$172.73 = average cost of this tree

Species		Nursery Group #	Species Rating Group #
Quercus wislizenii	Interior live oak	1	2

(No. Cal. - coastal influence)