Siting of Electrical Infrastructure

What is Siting?

The identification, screening, evaluation, and selection of preferred and alternative sites/routes for an electrical infrastructure project.

- A formal siting process seeks the best fit for the project given the physical, natural, and community setting:
  - Provides input to engineering and design
  - Develops information needed to submit applications and seek authorization from the various agencies (e.g. land/resource management, public utilities commission, energy planning commission)
  - Collects data needed by agencies to meet requirements for evaluation of potential impacts to environmental and cultural resources
  - Fosters defensible decisions and proactively identifies potential concerns to allow timely action

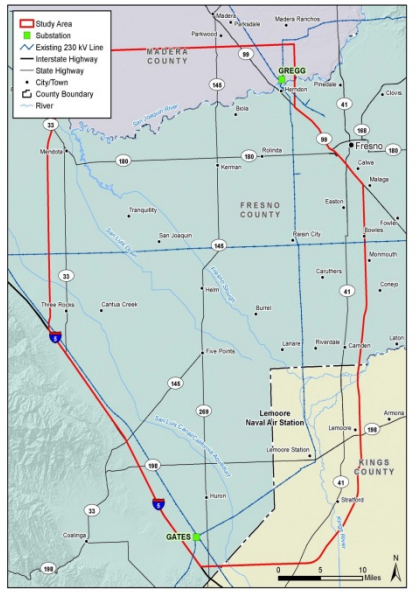
What is involved in the Siting Process?

The process is divided into four steps:

1. Opportunities, Concerns & Constraints Analysis (Information Gathering, Mapping)
2. Site Evaluation
3. Preferred Route Evaluation
4. Selection of Preferred and Alternative Sites and Routes

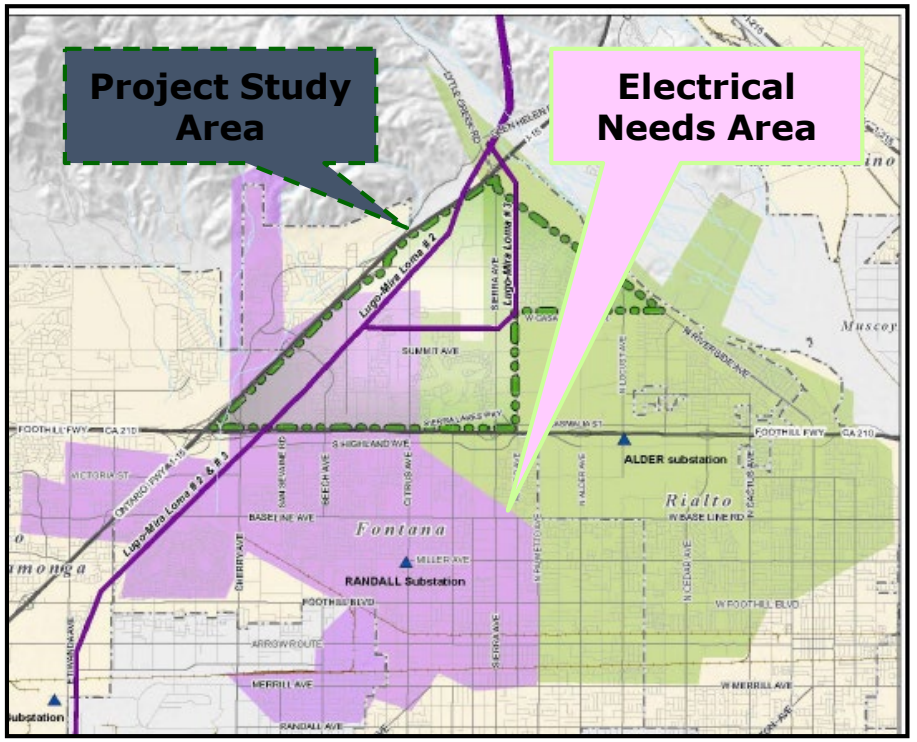
Prepare to Move Swiftly: Project Planning & Initiation

1. Set Dates and Key Decision Points
2. Identify and lock-in a “Dedicated” Team
3. Lock-in basic engineering & construction requirements
4. Identify tools
   - Google Earth
   - GIS layers
5. Identify Study Area
6. Public Affairs contacts stakeholder agencies & elected officials. Emphasis is to understand potential opportunities and constraints.
   - Be aware of things outside of the footprint – cumulative impacts/community sensitivity
7. Prepare OCC maps and conduct OCC evaluation with project team
8. Identify conceptual site/corridors/route segments with desktop tools
9. Launch Notifications ASAP



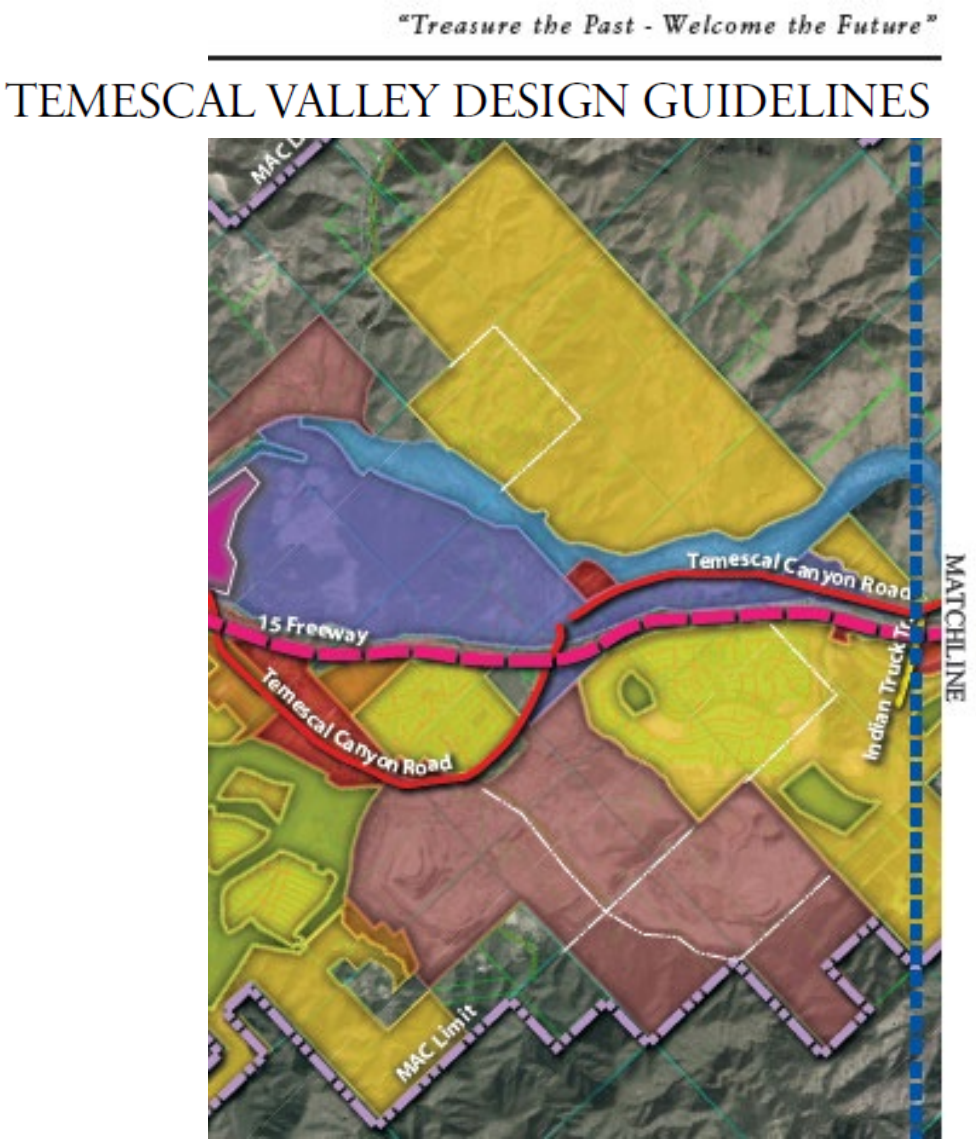
Inputs to the Opportunities, Concerns and Constraints Analysis

- Characterize the project
  - Identify and digitize the electrical needs area and the project study area
  - Define the needed facilities (e.g., 3-5 acres, 2 source lines) and decision rules (e.g., no criteria violations)
- Characterize the study area
  - Identify existing facilities, subject-matter databases, previous studies/projects in the area, local and regional plans
  - Apply GIS tools such as map checklist, standardized color schemes and legends, version controls

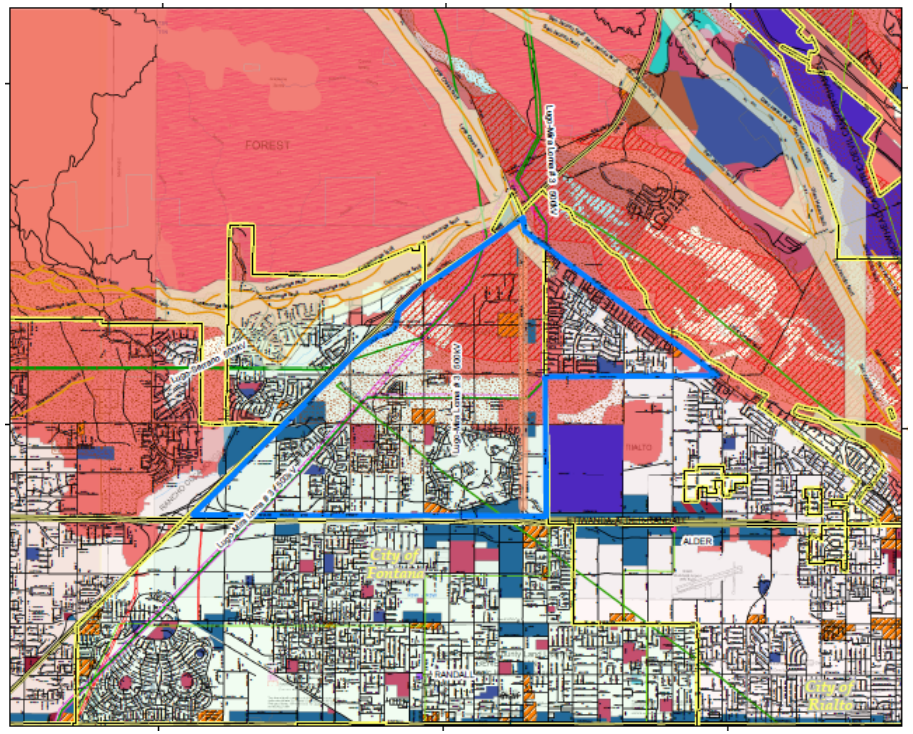


Inputs to the Opportunities, Concerns and Constraints Analysis (cont'd)

- Characterize the community
  - Collect secondary data: demographic information, plans, community websites
  - Collect local knowledge: public affairs managers and other contacts
  - Identify: community leaders, local stakeholders, resource agencies, environmental stakeholders, land interests for public involvement planning



Opportunities, Concerns, Constraints Process Outputs



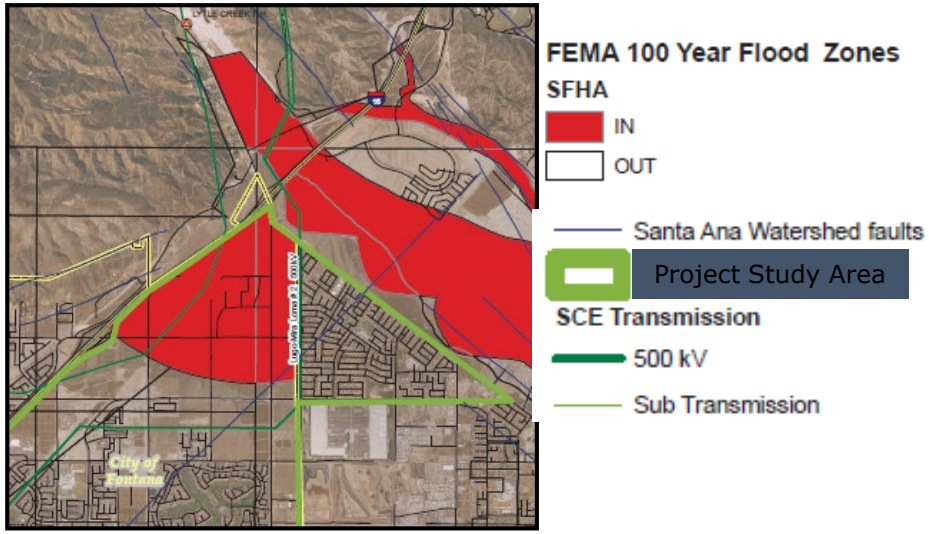
Selected Concerns

- Local Landfill
- Retail Land Use
- FEMA Flood Zones
- Historic Faults

- Summarize results
  - Prepare separate maps to represent the areas identified as opportunities, constraints and concerns
  - Finalize the suitability matrix with all subject matter expert input
  - Document the workshop results
- Collaborate with business units that will identify sites and/or routes
  - Discuss priority area for Real Properties to identify sites and/or for Transmission organizations to develop routes
  - Agree on the most helpful format for the OCC Report

Analysis of a Project Study Area

- Data review and assessment
  - Iteratively review and update maps
  - Evaluate data for accuracy and currency
  - Identify suitability criteria for the project
- OCC Workshop
  - In-person team meeting to review each map /subject area and the community assessment
  - Discuss and document subject area input in the suitability matrix
  - Agree on the following areas:
    - Opportunities: land/community features that are compatible with the proposed project
    - Concerns: land/community features that might pose difficulties for the proposed project
    - Constraints: land/community features that are incompatible with the proposed project



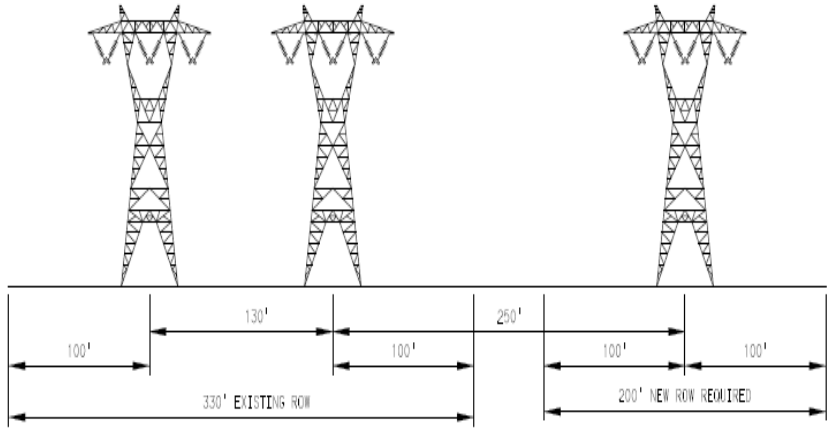
		NORTHERN CORRIDOR		
	SUBJECT AREA	Constraints	Opportunities	Concerns
1	Overview maps for electrical needs and engineering considerations			
2	Hazards maps			
3	Biology maps			
4	Land use maps			

Field Work/Ground Truthing

1. See, flyover, feel, touch, hear, and smell for details
2. Confirms or adapts original assumptions vs. “on the ground” reality
3. Encourages team consensus building
4. Pre-plan for effective field visit
   a) Include or notify local public affairs
   b) Don’t get lost: itinerary and maps, walkie talkies, GPS units, etc.
   c) Ensure field permissions & avoidance areas
   d) Conduct environmental and safety tailboard
   e) Bring siting tools: mobile GIS data gathering and scoring forms
5. Prepare for a labor intensive process
6. Return to office with validated information and new questions

Technical Evaluation Mode

1. Estimate regulatory requirements
   A. How much engineering? And when?
   B. How much $ spent on each alternative?
   C. Flexible design due to variance process
      - Avoid the variance process – Identify larger/more staging, work pads, helo sites, temporary/permanent work areas…
      - Cons - overestimate of compensatory mitigation requirements, cost of additional engineering & surveys
2. Develop environmental scope & schedule
3. Launch consultant RFP immediately
4. What to build: OH or UG; private or street?



Prepare Site/Route Study

1. Identify all possible alternatives
2. Identify matrix for fair scoring
3. Second contact with stakeholder agencies & elected officials & public. Emphasis is to understand their concerns with each alternative.
4. Manage consultant analysis
5. Facilitate & document team’s selection of alternatives
6. Obtain buy-in from all other stakeholders
7. Obtain sign off by team

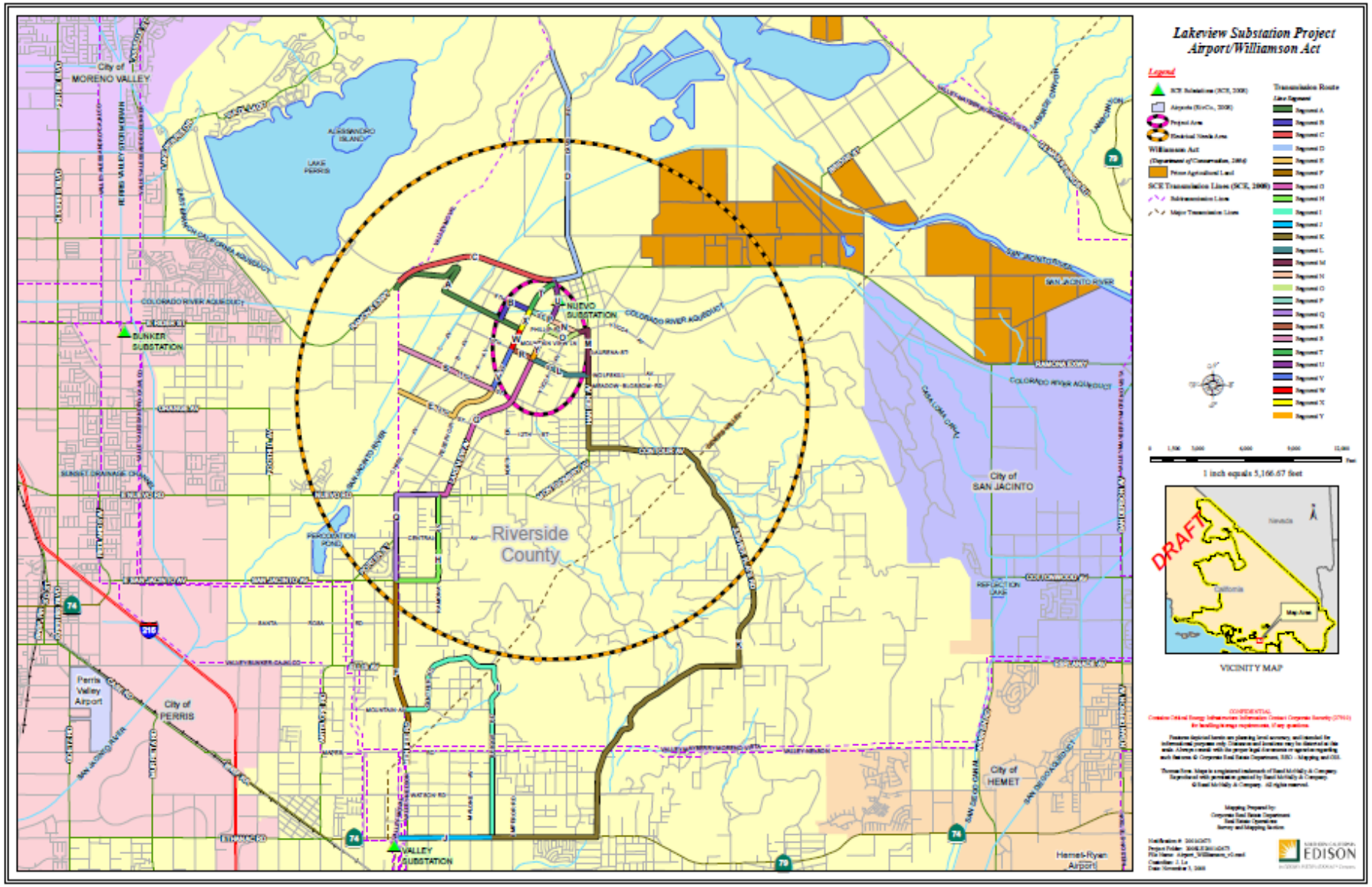
Prepare Site/Route Study

PROJECT NAME:						
Wtd. Score Sheet - Substation						
Date of Site Scoring/SME Visit	1/1/01					
			Segment A	Segment AA	Segment B	Segment BB
AESTHETICS	Factors	Weights				
	Visual Character / Quality	0.75	0.00	0.00	0.00	0.00
	Locally-Valued Places	0.50	0.00	0.00	0.00	0.00
	Impacts to Scenic Vistas	1.00	0.00	0.00	0.00	0.00
	Scenic Highways	1.00	0.00	0.00	0.00	0.00
	Aesthetics Wtd. Score		0	0	0	0
BIOLOGY	Factors	Weights				
	Wildlife Corridors	0.25	0.00	0.00	0.00	0.00
	Avian Collision	0.50	0.00	0.00	0.00	0.00
	Permitting Time Required	0.50	0.00	0.00	0.00	0.00
	Water Bodies	0.75	0.00	0.00	0.00	0.00
	Special Status Species	1.00	0.00	0.00	0.00	0.00
	Biology Wtd. Score		0	0	0	0
COMMUNITY	Factors	Weights				
	Potential Route Segment-Specific Stakeholders (schools, churches, community centers, etc.)	0.75	0.00	0.00	0.00	0.00
	Community Development Guidelines	0.50	0.00	0.00	0.00	0.00
	Current / Past Controversy Along or Near the Route Segment	0.50	0.00	0.00	0.00	0.00
	Planned Future Development Near the Route Segment	0.50	0.00	0.00	0.00	0.00
	Community Wtd. Score		0	0	0	0

Nearly contiguous Creosote Bush Scrub; potential for Mojave Monkeyflower, Mohave Ground Squirrel, is within a DWMA and within the Ord-Rodman Desert Tortoise Critical Habitat Unit.

			Site 1	Site 2	Site 3	Site 4	Site 5
GEOLOGY / GEOTECHNICAL	Factors						
	Adverse Soil Conditions		1	1	1	1	1
	Erosion Potential		1	1	2	1	1
	Flooding Potential		1	1	2	1	1
	Slope Stability/Landslide Hazards		1	1	1	1	1
	Liquefaction Potential		1	1	1	1	1
	Fault Rupture Hazard Zones		1	1	1	1	1
	Soil Contamination		1	1	1	1	1
		Geologic Hazards Raw Score	7	7	9	7	7
IT / TELECOM	Factors						
	Cable Distance to Existing Telecom Facilities		5	5	5	5	5
	Telecommunications Permitting Requirements (ROW, easements, franchise, etc.)		4	3	4	4	4
	Telecom Construction Surrounding the Site		3	1	1	3	1
		Telecom Raw Score	12	9	10	12	10
LAND ACQUISITION	Factors						
	Ownership		2	2	3	2	2
		Land Acquisition Raw Score	2	2	3	2	2
LAND USE	Factors						
	Zoning / General Plan Land Use on the Site		4	5	4	4	4
	Zoning / General Plan Land Use(s) Surrounding the Site		4	5	4	4	5
	Existing Land Use(s) on the Site (Physical)		1	1	1	1	1
	Existing Land Use(s) Surrounding the Site (Physical)		4	4	4	4	4
	Special Districts, Specific Plans, Redevelopment Project Area		4	4	4	4	4
	Farmland / Agricultural Conservation		1	1	1	1	1
	Airport Land Use Plan		2	1	1	2	2
	Grading Permit & Additional Improvements		4	4	4	4	4
		Land Use Raw Score	24	25	23	24	25

Create and Utilize Specialized Maps



Inputs to the Siting Process

- Identify site and route alternatives
  - Avoid constraints & minimize concerns
  - Meet project requirements (size & shape of parcel, location relative to existing infrastructure and need area, etc.)
- Specify criteria to evaluate impacts to/from the study area, including:
  - Electrical needs and project objectives
  - Engineering requirements
  - Environmental considerations
  - Community & stakeholder priorities
  - Local land uses and area plans

FACTOR:		SPECIAL DISTRICT; SPECIFIC PLAN;REDEVELOPMENT PROJECT AREA		
Scoring Scale	1			
	2	Area Plan		
	3	Specific Plan		
	4	Special District; Overlay Zone, Redevelopment Plan Area		
	5	Airport Hazard Zone		
Circle and Name:		_____ Specific Plan	_____ Area Plan	_____ Airport Hazard Zone
		_____ Special District	_____ Redevelopment Project Area	_____ Overlay Zone

Analysis of Sites and Routes

- Field Visits with Subject Matter Experts
  - Validate data and findings
  - Document observations
- Additional Data Gathering & Due Diligence
  - Continue collecting stakeholder input
  - Request rights information for existing ROWs
  - Meet with agencies potentially involved (e.g. resource agencies, railroad, Caltrans, etc.)
- Site/Route Evaluation Workshop(s)
  - In-person team meeting(s) to review site and route scoring results
  - Narrow site and route pool to include feasible alternatives with fewer impacts

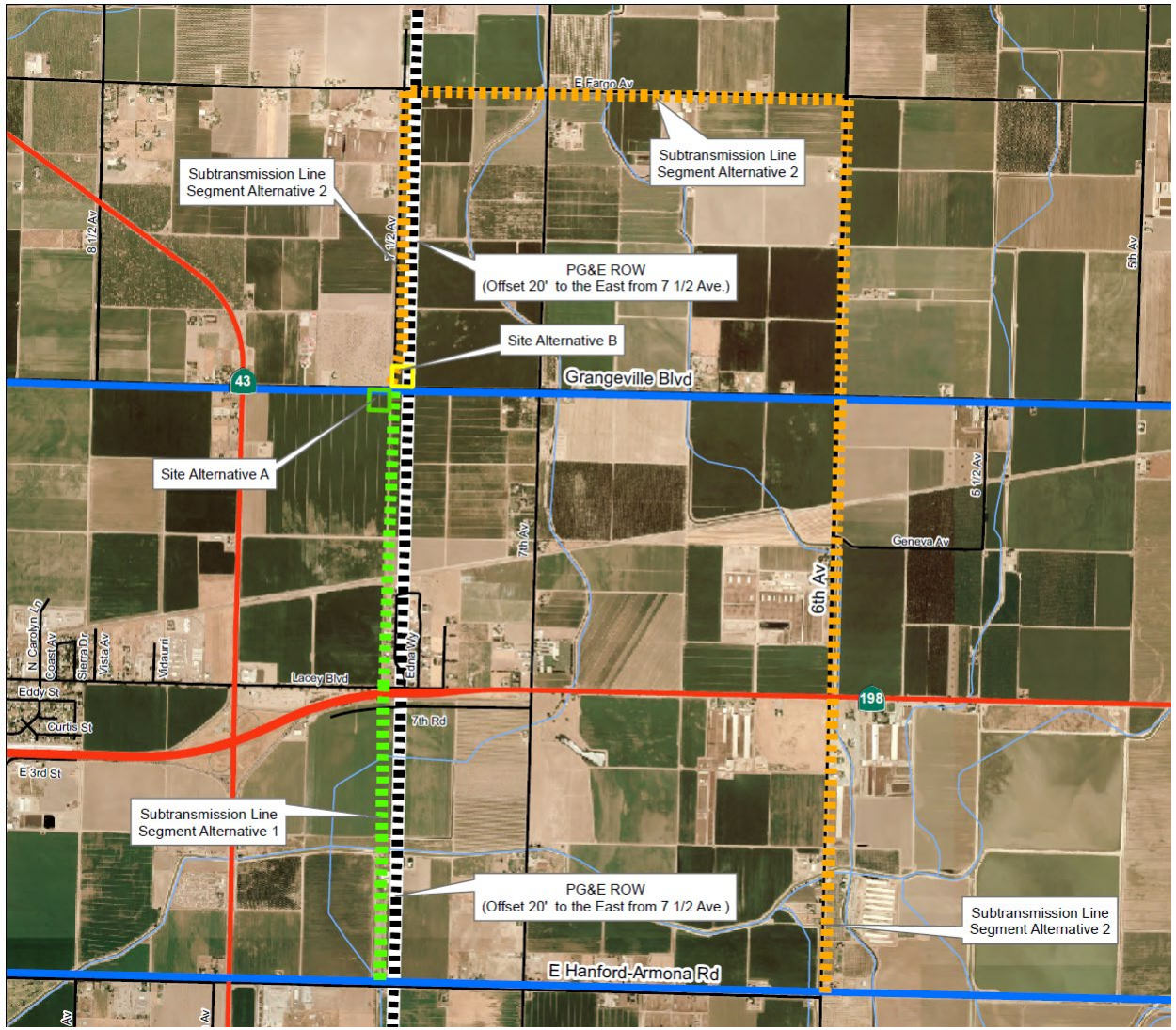
Site #1

Aesthetics	Site is in a light indstrial area on an arterial and adjacent to the freeway (below the grade of the site). Minimal landscaping in the area but sidewalks are present. Some homes located across the freeway to the North at the same elevation as the site. Drive-by traffic on Magnolia Ave.
Biology	Orange-throated whiptail potential. Graded lot with some native vegetation regrowth.
Community	Possible objections near the freeway. City supports growth. Business next to the site may have an interest.
Cultural	Area is highly disturbed but an archeo site was recorded about 300 M west of site. Native American sacred lands file search will be required but low potential for N.A. issues. Paleo assessment needed.
Electrical Needs	Right against freeway. Limits getaway options. Approximately 9000-feet to nearest existing SCE 66 kV line. Good industrial - commercial site. Difficult 66 kV line routes into location.

Siting Process Outputs

- Documented results
  - Update maps with preferred and alternative project
  - Finalize documentation of all subject matter input
  - Document the evaluation workshop results
  - Submit selected project and alternatives for management review
- Data collection and documentation for licensing
  - Provide detailed report with data, maps, field visit notes, and decision meeting documentation to the project environmental coordinator for preparation of the application to the agency(ies)
  - Prepare maps for stakeholder and public outreach activities
  - Maintain documentation for response to future data requests

Project Alternatives Map



- Identifies both proponent's preferred project and potential alternatives that meet project need
- Incorporates information from needs analysis, engineering design, OCC analysis, stakeholder meetings, geophysical setting, local community land use plans
- Will need to be updated as surveys for environmental and cultural resources are performed

Typical Delay Pitfalls

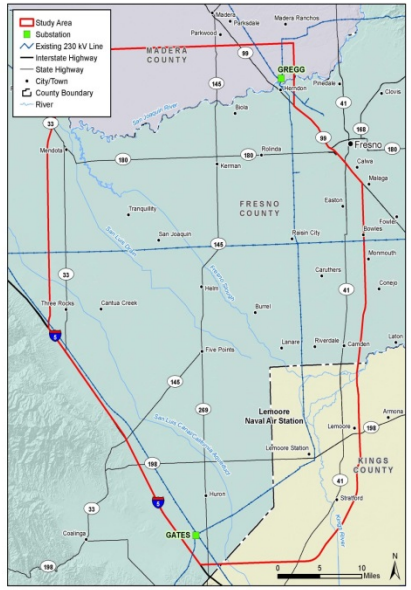
1. Staff schedules
2. Lack of effective desktop tools
3. Internal process for obtaining support
4. Inadequate access rights
5. Design uncertainty / Change in Scope
6. Identifying fatal flaws late in process
7. Iterative nature of the process (addressing new information from multiple stakeholders, changing conditions due to passage of time, survey data, etc.)
8. Difficulty in defining constraints vs fatal flaws
9. Identify compensatory mitigation land

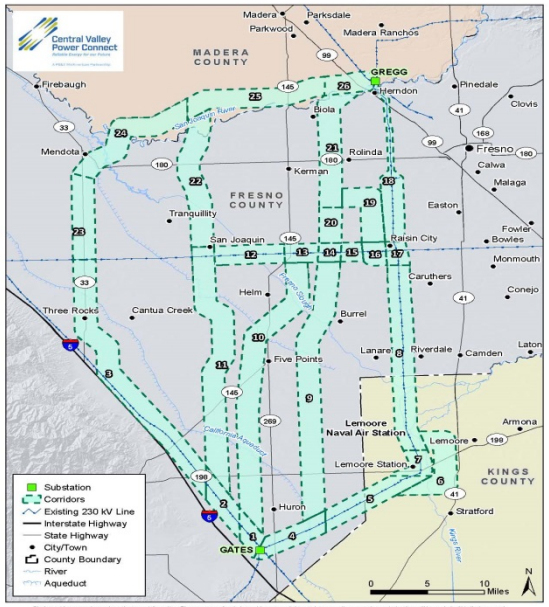
Summary

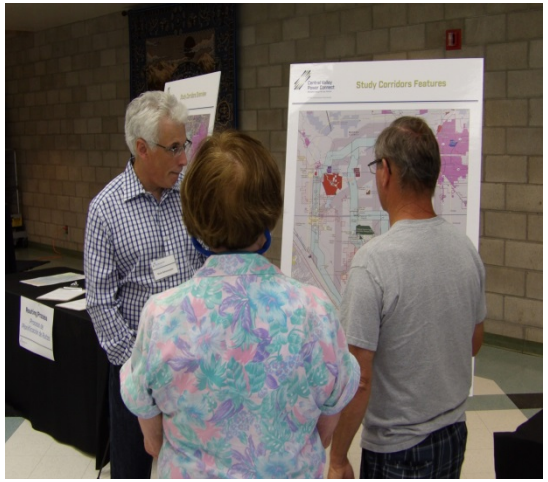
- Prepare to move swiftly- Dedicated Team
- Field work – Time consuming but valuable for building consensus?
- Technical Evaluation Mode –Take away? Development of Project Strategy
- Routing Study –Determine scoring matrix? Obtain Team Consensus on preferred alternative

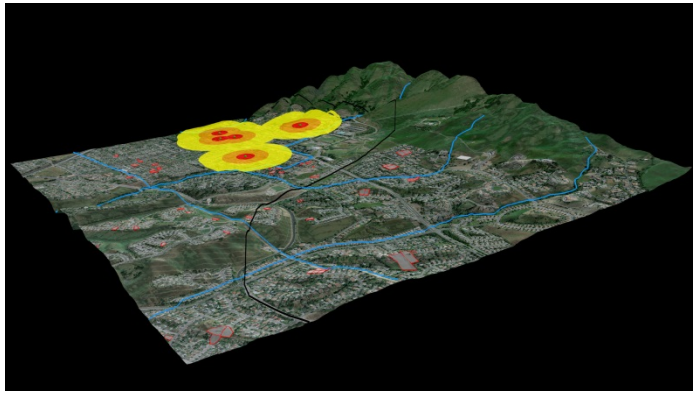
Back-up

Prepare to Move Swiftly
Project Planning & Initiation









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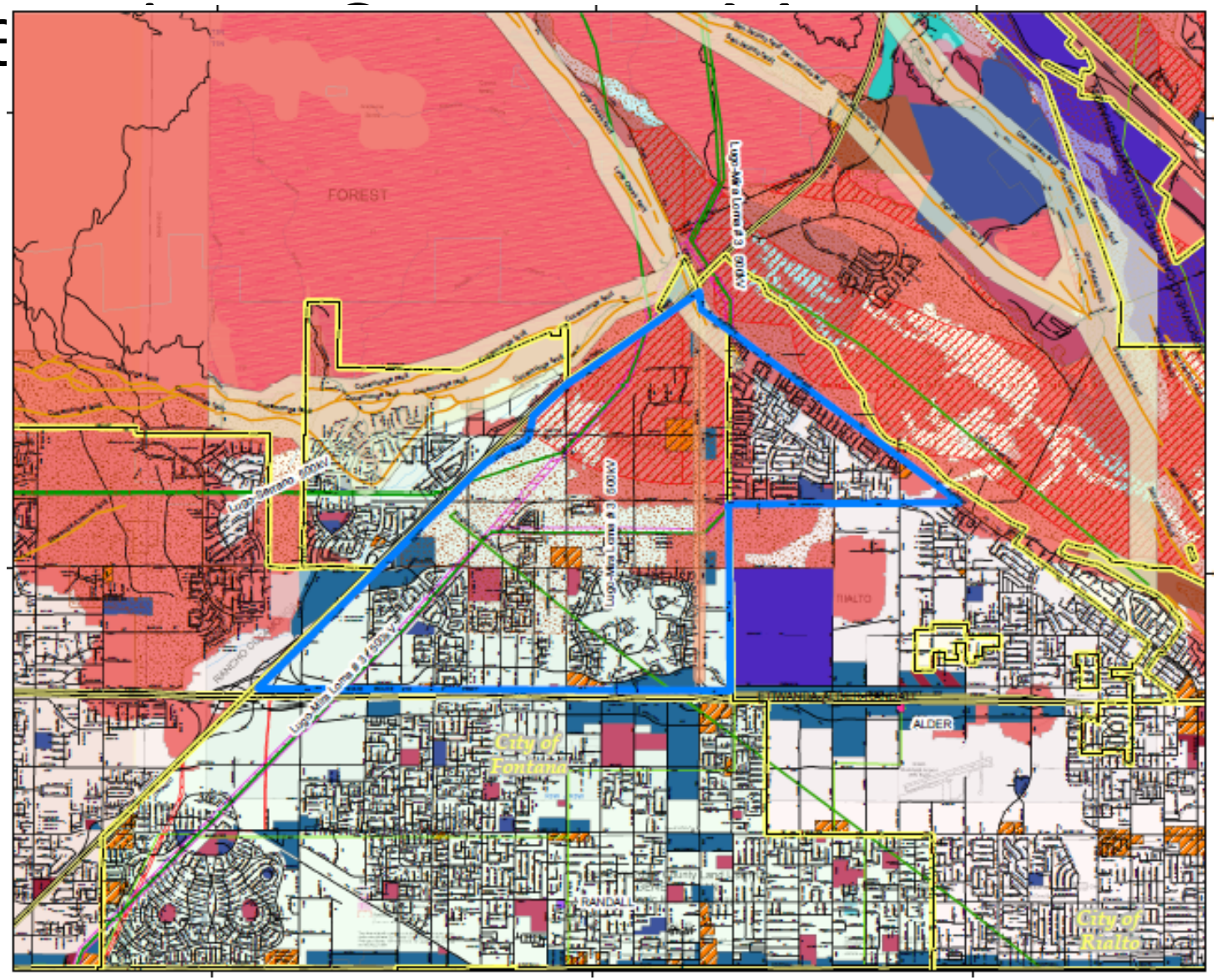
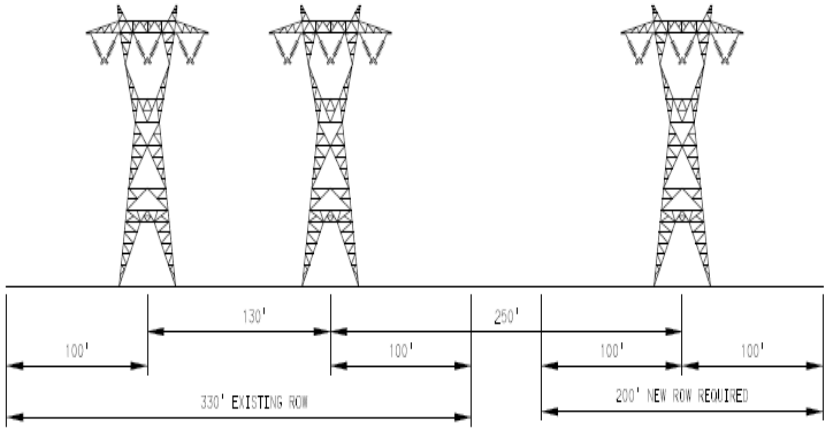


Selected Concerns

- Local Landfill
- Retail Land Use
- FEMA Flood Zones
- Historic Faults

Field Work/Ground Truthing

Technical Evaluation Mode



Typical Delay Pitfalls

Utility Operations and Maintenance Activities on US Forest Service Managed Lands

Outline

- *****FILL IN ONCE DETAIL AND SLIDE ORDER ARE COMPLETE****

Utility Infrastructure

- Provides uninterrupted, **reliable** power to the public
- Provides **safe** transmission and distribution of power along existing power line infrastructure
- Provides protection of property and resources

Operations and Maintenance Activities

- Ensure that property and equipment are kept in reliable working condition
- Dictated by the inspection and maintenance requirements of the utility and/or other State or Federal governing bodies (i.e. CAISO)
- Require utilities to have boots on the ground or eyes on equipment on a regular basis
- Can be scheduled or unscheduled
- Fall into general levels or classes based on timing an work type

Types of Power Line Maintenance

- Aerial patrols / inspections
- Ground patrols / inspections
- Routine line maintenance
- Emergency line maintenance
- Vegetation management (*separate module*)

Patrols and Inspections

Routine Patrols

- Aerial inspections
- Ground patrols

Inspections

- Internal communications equipment
- Towers, poles, and equipment
- Wood poles
- Sections of conductors, cables, and wires
- Substations

Patrol / Inspection Schedules – Factors to Consider

When establishing inspection schedules, utilities often consider:

- Age of infrastructure
- Construction type / material
- Number and types of customers on the circuit
- Surrounding geography
- Environmental constraints
- Accessibility
- Site conditions (i.e. level of vandalism, weather)
- Impact of a failure on the network/grid
- Operation history

Aerial Patrols

- Performed in helicopter or fixed wing aircraft
- Hover or fly over 50 to 200 feet above lines
- Identify maintenance needs and unsafe conditions
- Frequency depends upon utility
- Patrol periods determined by seasonal issues (hunting season, weather, conservation measures)
- Some utilities are evaluating the use of drones

Ground Patrols

- Performed by vehicle or on foot on roads, routes or foot trails
- Visually inspect structures, lines, hardware, foundations and vegetation
- Frequency depends upon utility
- Patrol periods determined by seasonal issues (weather, conservation measures)

Wood Pole Inspection

- Conducted on wood poles
- Involves:
  - Visual safety inspection
  - Partial excavation if decay is found
  - Drilling into pole
  - Sounding pole with hammer
  - Wrapping pole as needed
  - Plugging holes
- Frequency is usually every 10 years; utility dependent

Climbing or Climb and Shake Inspections

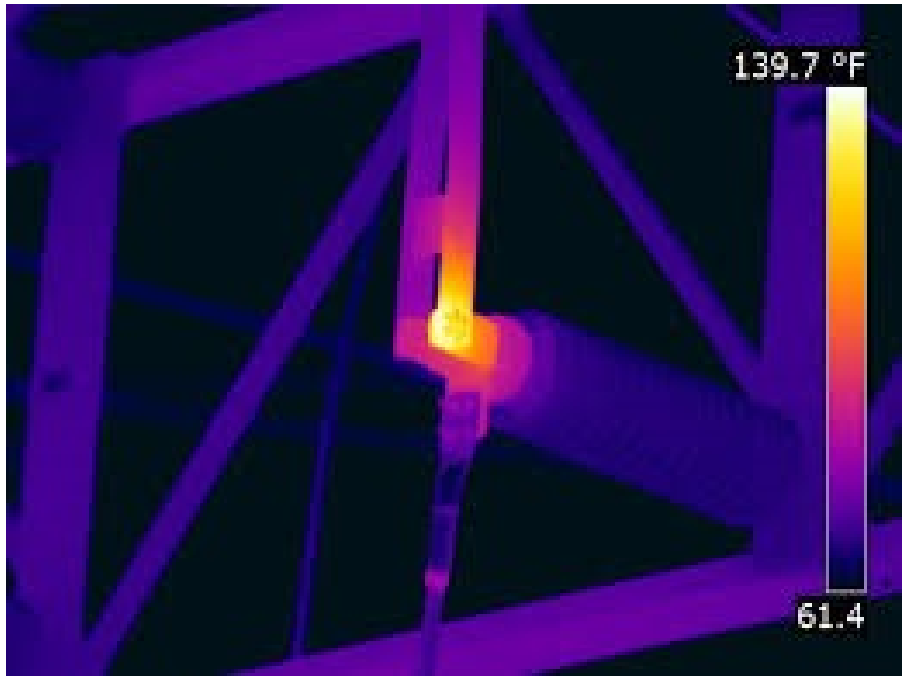
- Conducted on lattice towers
- Specifically-trained transmission linemen climb the tower to record findings
- Some utilities use helicopters to allow linemen to access towers other utilities have linemen climb the tower from the ground
- Frequency every 10 years; utility dependent

Erosion Control Inspection

- Check terrain around all towers and poles for signs of erosion

Infrared Inspection

- Infrared (thermographic) inspections find hot spots caused by defects in connects and components
- Conducted on overhead, normally-closed switches and pole risers
- Typically done during summer months



Electrical Resistance Inspection

Examples of Problems Identified During Inspection / Patrol

- Flashed or broken insulators
- Loose or missing hardware
- Damaged conductor
- Broken or loose ground wire
- Vandalism
- Debris / foreign objects
- Access issues
- Encroachment

Line Maintenance Activity Types

- Line maintenance work generally falls into three different types/classes/levels:
  1. De Minimis line maintenance
  2. Routine line maintenance
  3. Emergency line maintenance
- Can be scheduled or unscheduled
- Line maintenance activities outside the above categories are often considered projects
- Projects may be broader in scope, scale, or encompass areas outside the permitted boundary

De Minimis Line Maintenance Activities

- Lack significance (de minimis)
- Do not warrant in-depth analysis
- Routine activities with minimal to no ground disturbance and environmental impact

Examples of de Minimis Line Maintenance Activities

- Land surveys
- Pole/tower clearing and limbing/pruning
- Minor road maintenance
- Anchor/guy wire replacements
- Re-secure ground wire
- Cross arm / cross bracing replacement
- Insulator replacement
- Repair lightning arrestors
- Transformer replacement
- Removal of foreign objects from line
- Minor conductor repairs
- Small re-conductoring
- Replacement of damaged hardware
- Adding pole numbers to asset

Routine Line Maintenance

- Scheduled after an inspection
- Each Utility has priority level and timeframe for completion
- Considers many variables such as:
  - Access (by foot, ATV/UTV, truck, line truck, helicopter)
  - Weather (maintenance will not be performed when roads are impassable or where serious damage may occur)
  - Laydown or staging areas
  - Outages

Examples of Routine Line Maintenance Activities

- Pole / tower replacements
- Underground re-conductoring
- Medium re-conductor project
- Annual vegetation management notification
- Utility communication line maintenance
- Shoo-fly installation / interest installation
- Routine road maintenance

Emergency Line Maintenance

- Immediate action required
- Usually involves infrastructure failure, safety hazard, or power outage
- Possible causes are:
  - Weather (i.e. lightening or wind)
  - Fire
  - Vehicle (car or aircraft)
  - Debris / foreign objects

Access Routes

- Safe and reliable access to facilities is required for operation and maintenance
- Access is often obtained via a system of existing roads, ATV/UTV routes and foot trails
- Some access routes may not be officially documented by Utility or Agency

Examples of Typical Access Route Repair

- Removing and replacing traffic control structures/barriers (e.g., signs, dips, berms, large boulders)
- Grading/smoothing ruts in existing routes
- Repairing minor erosion to allow for safe vehicle access
- Removing displaced rocks, fallen trees, and other displaced objects from access routes to provide safe access
- Prune minor amounts of vegetation (alive or dead) or remove small trees or vegetation from access routes

Typical Vehicles Used in Maintenance Work

- Bucket truck
- 4x4 truck
- Crane
- Specialized extra-long reach bucket trucks
- Trailers
- Backhoe
- Other specialized vehicles as needed

Typical Structure Life Span

- Steel poles and towers = 80 years
- Wood poles = 50 to 60 years as determined by regular wood pole inspections and environmental conditions

O&M Challenges

- Addition of, or improvements made to, access routes
- Inability to share detailed GIS information with Federal Agencies
- Outage scheduling often depends upon customers, load and weather
- Lead time to order materials
- Specialized equipment rental / scheduling requirements
- Historic process of working directly with District Rangers is no longer the process for getting maintenance work reviewed and approved
- Change-over in agency staff

O&M Challenges Continued

- Timing restrictions / constraints for sensitive species, nesting, etc. limit the window of time available to do work
- Cultural resource issues (i.e. transmission towers that require maintenance work are historic structures)

Questions?

Vegetation Management by Electric Utilities

Vegetation Management Objectives

- Objectives of vegetation management:
  - Improve and maintain safety and reliability of electrical system
  - Reduce the risk to human and environmental communities from the inadvertent contact between foreign objects i.e. vegetation and electric systems
- Great Northeast Blackout of 2003
  - Largest power outage in North American history
    - 8 northeastern states and southeast Canada
  - August 14, 2003 shortly after 2 pm Eastern
  - Roughly 50 million people lost power for up to 2 days
  - 11 deaths
  - ~$6 billion cost
  - Cause: multiple contacts of sagging high voltage lines contacting overgrown trees

Vegetation Management Objectives *need national statistics*

- Causes of unplanned outages:
  1. Storms
  2. Trees
  3. Vehicles
  4. Earthquakes
  5. Animals
  6. Lightning
  7. Excavation digging
  8. High power demand

- *Insert graphic with national statistics*

Examples of Applicable Regulations & Standards
(does not include all vegetation management requirements)

- North American Electric Reliability Council (NERC)
  - FAC-003-01:Transmission Vegetation Management
  - FAC-003-02: Minimum clearance requirements for ≥230 kV/critical lines (as of 3/23/2013)
    - Establishes clearance standards between conductors and vegetation for 230 kV lines and higher and for certain other lines identified as NERC critical
    - Standards allow removing hazards due to trees that may fall on power lines
    - Zero tolerance for any vegetation encroachment into the minimum clearance zone due to risks associated with cascading outages
- National Electric Safety Code: 218, 232, 233, and 234: Clearance
- Institute of Electrical and Electronics Engineers
- American National Standards Institute (ANSI) A300 *confirm which parts are used*
  - Part 1 Pruning
  - Part 2 Soil Management
  - Part 6 Planting and Transportation
  - Part 7 Integrated Vegetation Management
  - Part 8 Root Management Standard
  - Part 9 Tree Risk Assessment

Omnibus Act of 2017 Public Law 115-141

Added Section 512 to FLPMA Vegetation Management, Facility Inspection, and Operation and Maintenance Relating to Electric Transmission and Distribution Facility Rights of Way

- Requires Secretary of Interior and Secretary of Agriculture to issue guidance to ensure provisions are developed and implemented for utility vegetation management, facility inspection, and operation and maintenance of rights-of-way.
- Guidance intended to:
  - Enhance the reliability of the electric grid
  - Reduce the threat of wildfire damage to or caused by vegetation-related conditions

Omnibus Act of 2017 Public Law 115-141 (contd.)

- Definitions:
  - Hazard Tree: “any tree or part thereof (whether located inside or outside a right-of-way) that has been designated, prior to tree failure, by a certified or licensed arborist or forester under the supervision of the Secretary concerned or the owner or operator of a transmission or distribution facility to be –
    A. Dead, likely to die within the routine vegetation management cycle, or likely to fail within the routine vegetation management cycle, and
    B. If the tree or part of the tree failed, likely to –
       i. Cause substantial damage or disruption to a transmission or distribution facility, or
       ii. Come within 10 feet of an electric power line”
  - Plan: “a vegetation management, facility inspection, and operation and maintenance plan that –”
    A. Is prepared by the owner or operator of electric transmission/distribution facilities
    B. “Provides for the long-term, cost-effective, efficient, and timely management of facilities and vegetation within the width of the right-of-way and abutting Federal land, including hazard trees, to enhance electric reliability, promote public safety, and avoid fire hazards.”

Omnibus Act of 2017 Public Law 115-141 (contd.)

- "(e) EMERGENCY CONDITIONS.—If vegetation or hazard trees have contacted or present an imminent danger of contacting an electric transmission or distribution line from within or adjacent to an electric transmission or distribution right-of-way, the owner or operator of the electric transmission or distribution lines—

  "(1) may prune or remove the vegetation or hazard tree—

    "(A) to avoid the disruption of electric service; and

    "(B) to eliminate immediate fire and safety hazards; and

  "(2) shall notify the appropriate local agent of the Secretary concerned not later than 1 day after the date of the response to emergency conditions.

Agency and Industry Collaboration

- On 9/21/2016, various Federal agencies entered into a Memorandum of Understanding on Vegetation Management for Powerline Rights-of-Way with the Edison Electric Institute (EEI) and the Utility Arborist Association
- Federal agencies include:
  - U.S. Dept. of Interior (NPS, FWS, BLM)
  - U.S. Dept. of Agriculture (FS)
  - U.S. Environmental Protection Agency
- Utility representatives
  - EEI representing all U.S. investor owned utilities, 70 international electric owned utilities, and 250 industry suppliers and related organizations
  - Utility Arborist Association represents ~3000 members
- https://www.eei.org/issuesandpolicy/environment/land/Documents/EEI_MOU_FINAL_Signed_09.29.16.pdf

2016 Federal Agencies - EEI MOU

- Intended to improve coordination and cooperation between relevant Federal agencies and member companies to
  - Enhance electric transmission reliability
  - Increase maintenance of efficiencies
  - Reduce management costs
  - Prevent the spread of invasive plants
  - Reduce fuel loads
  - Minimize other potential environmental and cultural resource impacts and human safety risks
- Roles and responsibilities
  - Comply with all applicable federal, tribal, state, and local laws/regulations/etc
  - Utilities: develop vegetation management plans
  - Agencies: evaluate land use authorizations and perform programmatic environmental analysis for utility vegetation management plans
  - Work with Association of Fish and Wildlife agencies on separate MOUs to facilitate cooperation and coordination within and immediately adjacent to existing and future powerline ROWs and associated facilities on federal, state, and private properties.

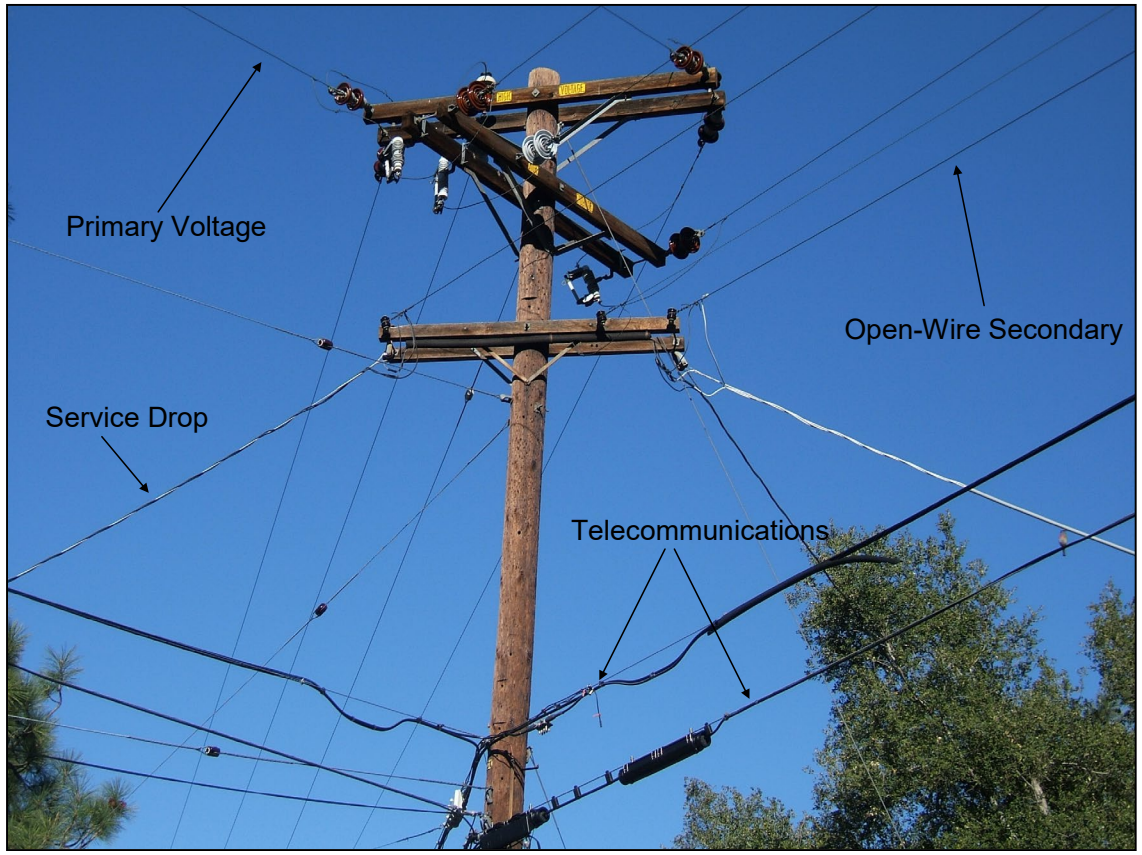
What is vegetation management

- Inspections/patrols
- Mechanical methods
  - Cutting/trimming/limbing/pruning
  - Mowing vegetation
  - Brushing to facilitate equipment inspection
- Herbicides
  - Controlled, regular application of herbicides/fungicides
  - Can require applicator obtain Pesticide Use Permit
- Integrated vegetation management (IVM)
  - Promotes desirable, stable, low-growing plant communities that resist invasion by tall growing tree species through the use of appropriate, environmentally sound, and cost effective control methods
  - Standards outlined in ANSI A300 Part 7 and best management practices compiled by the International Society of Arboriculture
  - Methods include adaptive, site-specific combination of chemical, biological, cultural (plant selection), mechanical, and/or manual treatments

Inspections/Patrols

Certified Arborists perform tree inspections.

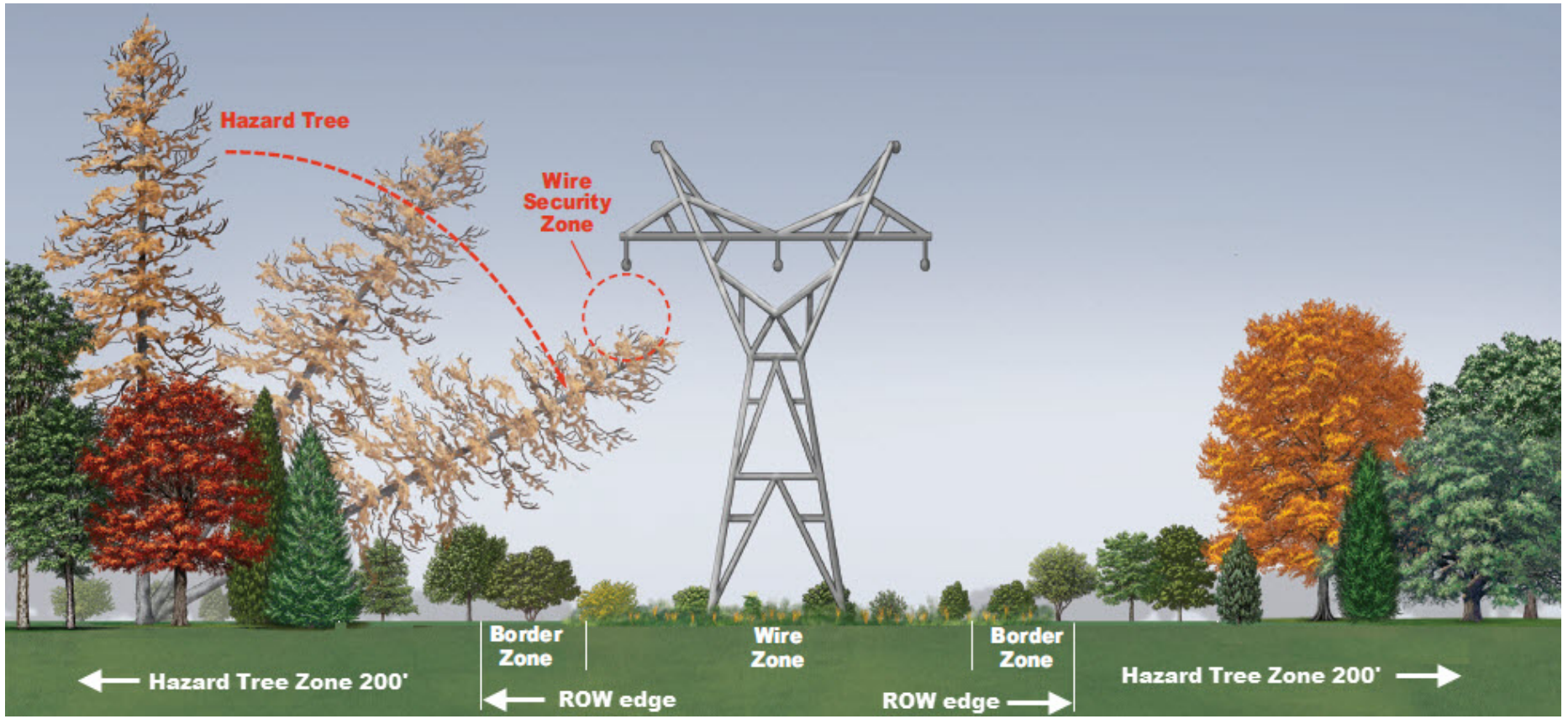
- Each span is patrolled annually to assess trees for safety and compliance.
- All inventory trees are inspected and updated each year to determine growth and hazard potential. Database contains inspection and pruning history of each tree.
- Hazard tree inspection includes assessment for dead, dying, diseased, and structurally defective trees.



Hazard Tree Removal O&M Activities

- Involves cutting or felling (or if appropriate, removing) dead, dying and diseased trees that may fall upon electric lines and telecommunication lines
- Hazard tree program ensures system reliability and protects the public and property from hazards associated with downed power lines, including the risk of fires and electrocution
- Overhead electric utility facilities are patrolled regularly at least annually and hazard trees are identified, tagged, felled and removed
- Training and monitoring programs ensure environmental measures are implemented
- Pre and/or post utility work may be necessary
  - Some hazard trees contain utility tree attachments (i.e., transformers, aerial cable, secondaries, service drops, and in some cases, guy wires)

ANSI A-300 Wire Zone – Border Zone Diagram



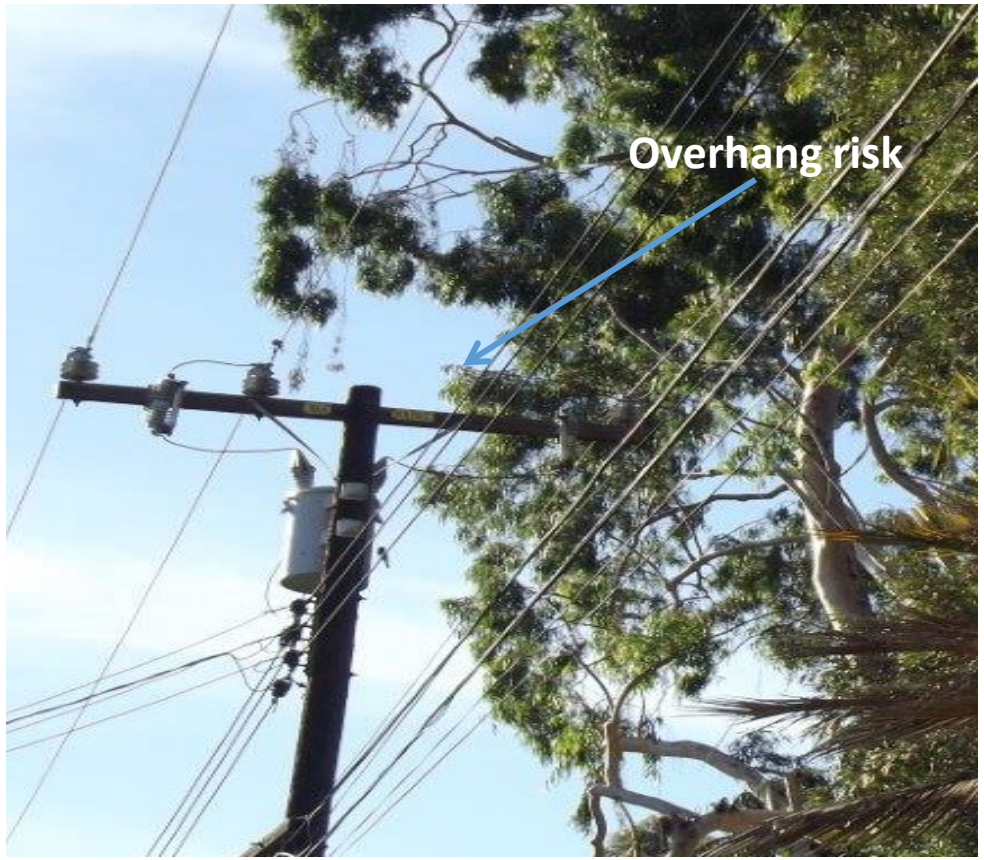
ANSI A-300 Wire Zone – Border Zone depiction

Vegetation Management practices

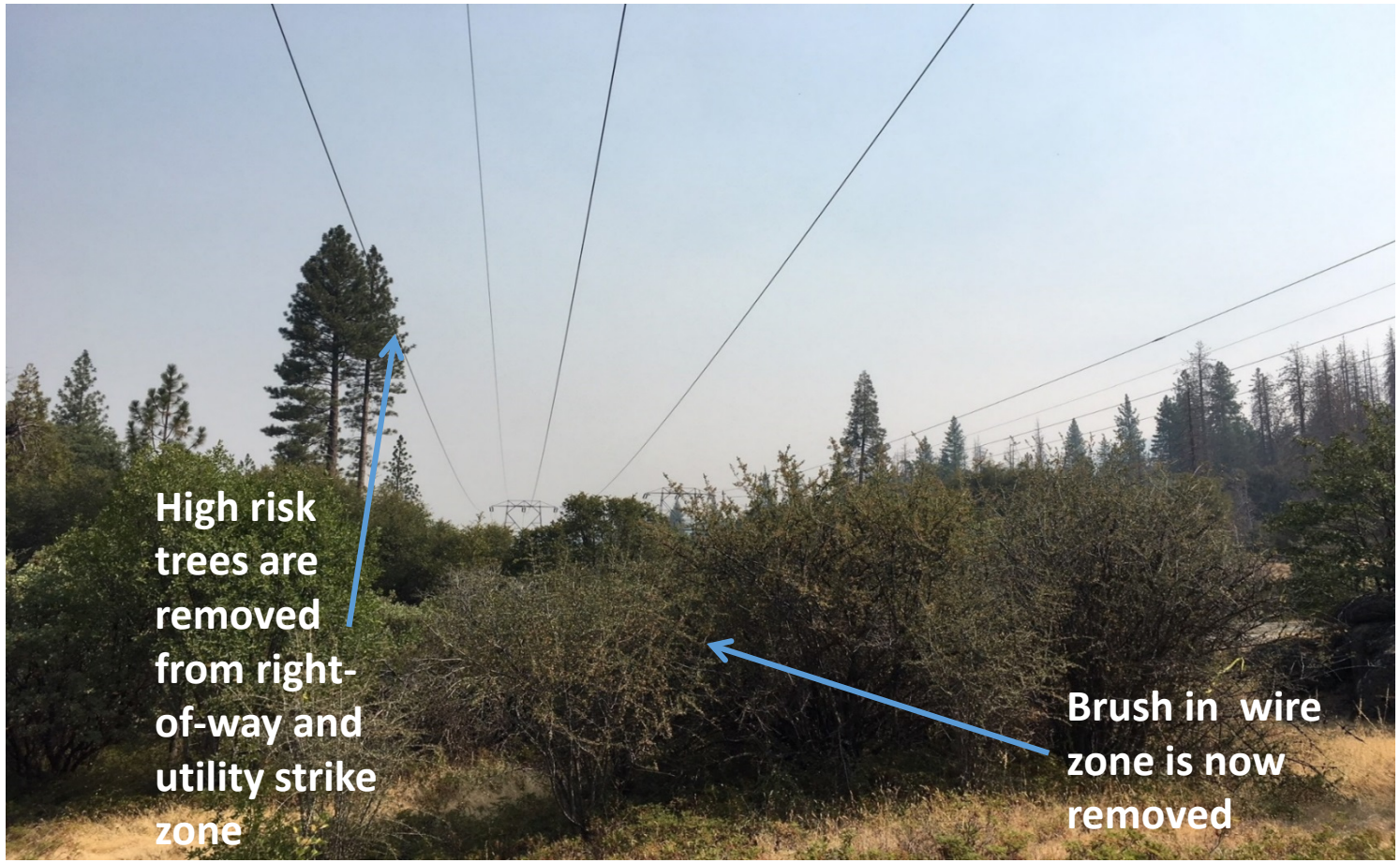
Need pictures and talking points depicting work in the field

- San Diego Gas & Electric
  - Urban- Rural pole brushing https://youtu.be/h7jYNIGdUNY
  - Lattice tower https://youtu.be/JYRoRx3nVms

Vegetation Management Example 1



Vegetation Management Example 2



Vegetation Management Example 3

Vegetation Management: Best Management Practices

- Nest surveys and biological monitoring as needed
- Seasonal restriction (i.e., avoid or minimize impacts to riparian areas during nesting season)
- Annual environmental training for vegetation management groups with topics such as:
  - Awareness of endangered, threatened, and special status species; nesting birds; critical habitat; waters of the U.S. and State; public and tribal lands; etc.
  - Avoiding identified special-status species and other environmentally sensitive areas and checking for wildlife around equipment and vehicles
  - Keeping vehicles/equipment, activities, construction debris within designated project area and removing trash from jobsite
  - Situations when to notify the utility environmental specialists including when sensitive resources are observed within the project area or a nest is detected

Minimizing Impact and Best Practices

Wildfire Risk

- Wildfires have become more frequent and result in more significant, extensive damage that previously experienced in recorded history
- Reducing risk to communities, both human and natural, is a priority for all stakeholders, including electric utilities, land and resource management agencies, and local governments
  - Requires collaboration and cooperation by all stakeholders
  - Increased inspections, data collection and analysis, and risk modeling
  - More extensive vegetation and tree management programs, including creation of defensible spaces
  - Mitigation measures
  - More robust incident management response
- Safety and reliability are paramount for utilities

Wildfire Risk

Back-up slides

State and Federal Regulations for Vegetation Management and Hazard Tree Removals

Regulation	Voltage of Utility Powerline					
	Less than 4 kV	**4 kV–21 kV**	**60 kV-70 kV**	**115 kV**	**220/230 kV**	**500 kV**
CPUC GO 95, Rule 35	No strain or abrasion	1.5 feet and hazard trees	1.5 feet and hazard trees	1.6 feet and hazard trees	2.6 feet and hazard trees	10 feet and hazard trees
Public Resources Code 4292	10 feet	10 feet	10 feet	10 feet	10 feet	10 feet
Public Resources Code 4293	--	4 feet and hazard trees	4 feet and hazard trees	10 feet and hazard trees	10 feet and hazard trees	10 feet and hazard trees
Utility Minimum Clearance Distance	No strain or abrasion	1.5 feet LRA, 4 feet SRA and hazard trees	4 feet and hazard trees	10 feet and hazard trees	10 feet and hazard trees	20 feet and hazard trees
NERC FAC-003-02 (formerly NERC FAC-003-01)	--	--	0.82 feet	1.41 feet at sea level	3.49 feet at 3,000 feet elev.	5.66 feet at 3,000 feet elev.

Notes:
1. **Refer to Appendix for summaries of each regulation**
2. **Distances indicate the clearance that must be kept between vegetation and trees and the utility powerlines, poles, and equipment**
3. **Regulations above also specify that hazard trees at risk of falling on the utility powerline, poles, and/or equipment, must be removed**
4. **kV indicate voltage of powerline in Kilovolts**

Type of Facility	Size of Facility	Maximum Facility Corridor Width (feet)	Buffer Area (feet)	Total Area (feet)
Electric transmission	500 kV	200	200	400
Electric transmission	230 kV	120	120	240
Electric transmission	60/70/115 kV	80	80	160
Gas transmission	All	150	150	300
All distribution facilities	All	25	25	50

Vegetation Management

O&M Activities

- Required to meet state and federal laws, rules, and regulations
- Crucial to safe and reliable service, especially in fire, drought, other severe weather, or disasters
- Patrolmen perform inspections routinely – quarterly or semiannually
- Typically remove encroaching vegetation plus 1 year's growth
- Majority of vegetation management activities result in little or no ground disturbance

Best Management Practices

- Perform nest surveys and biological monitoring as needed
- Establish seasonal restrictions
- Annual environmental training:
  - ✓ Awareness of endangered, threatened, and special status species; nesting birds; critical habitat; waters of the US; tribal lands, etc.
  - ✓ Avoiding identified special-status species and other environmentally sensitive areas
  - ✓ Checking for wildlife around equipment and vehicles
  - ✓ Keeping vehicles, equipment, activities, and debris within designated project area and removing trash from jobsite
  - ✓ Situations when environmental specialists need to be notified i.e. sensitive resources are observed within the project area or a nest is detected

(See Supplemental Information for applicable regulations)

California-Specific Regulations

Hazard Trees – History in California

Bark Beetle

- On March 7, 2003, Governor Davis issued a proclamation declaring a state of emergency in Riverside, San Bernardino, and San Diego counties due to imminent fire dangers caused by hazard trees
  - Los Angeles County was later included
- On April 3, 2003, the California Public Utilities Commission (CPUC) issued Resolution E-3824 directing electric utilities to
  - "take all reasonable and necessary actions to…mitigate the increased fire hazard by removing, dead, dying & diseased trees that could impact their distribution & transmission lines within their rights of way…"

Drought

- On January 17, 2014, Governor Brown declared a state of emergency where drought affected trees have created the potential for catastrophic forest fires
- On June 12, 2014, the CPUC issued Resolution ESRB-4 directing utilities to
  - "…take remedial measures to reduce the likelihood of fires started by or threatening utility facilities."

Several State and Federal Regulations Applicable to Electric Utilities *Distribution and Transmission Facilities (all voltages)*

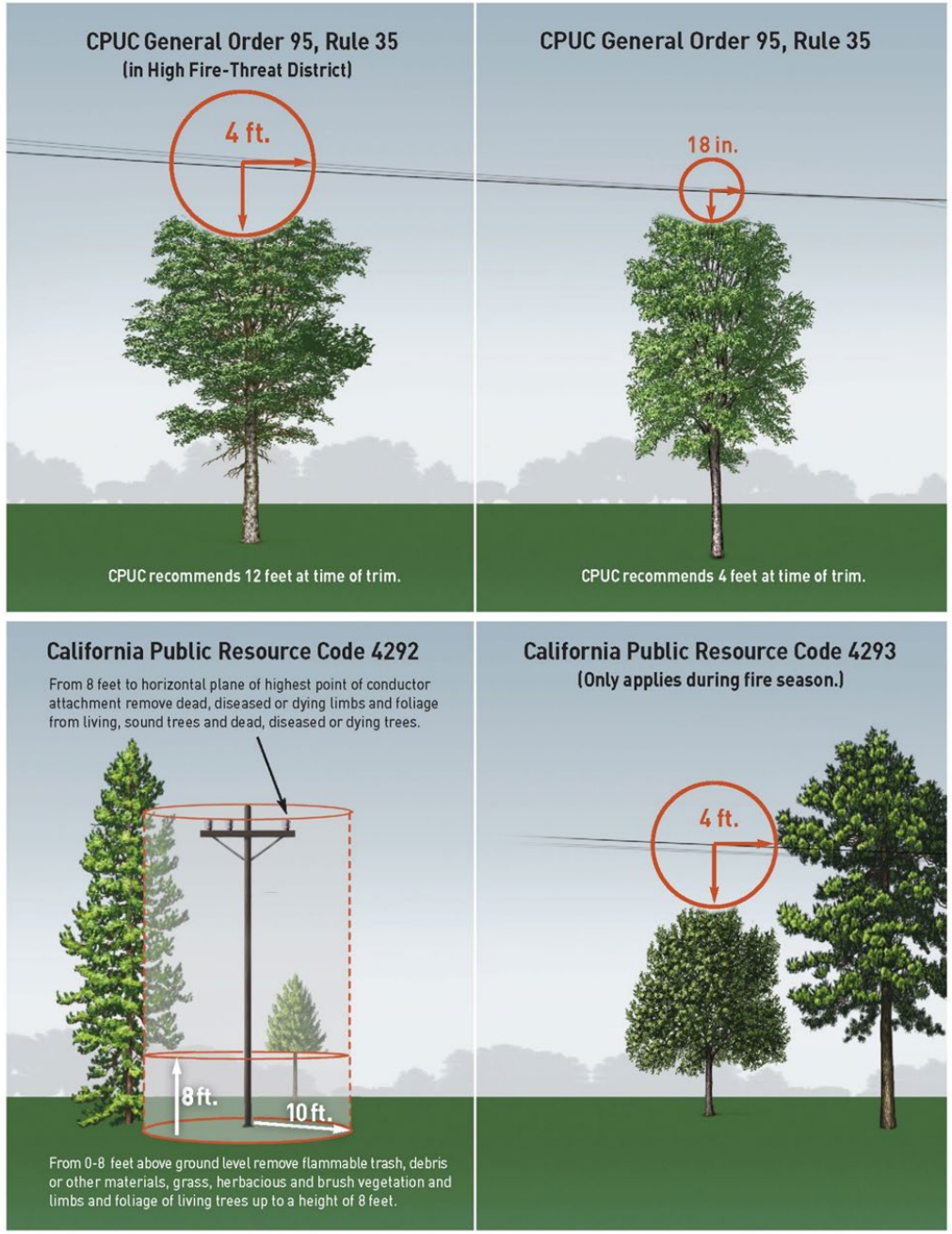
- **California Independent System Operator (CAISO) (100 kV and above)**
  - Transmission Owner Maintenance Practice standards specify maintenance practices to prioritize, inspect, and maintain transmission facilities
- **California Code of Regulations (CCR)**
  - Title 14, Section 895.1 defines *danger trees*
    - Hazard tree management
  - Title 14, Section 1254 further defines PRC 4292 vegetation clearance requirements
    - Vegetation clearance around certain poles and wires
- **California Public Resources Code (PRC)**
  - Sections 4292 and 4293 require minimum clearances between vegetation and electric facilities
    - Vegetation to conductor clearance requirements
    - Hazard tree management
    - Vegetation clearance around certain poles and wires

California Public Utilities Commission

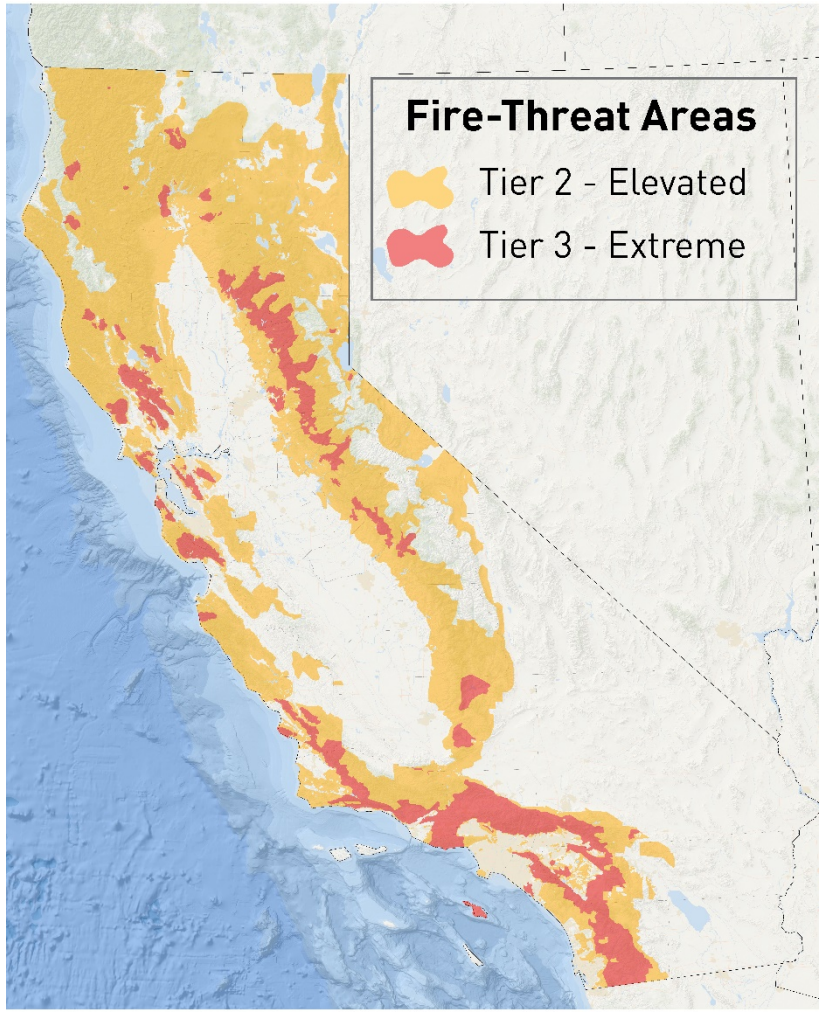
- General Order 131D (GO 131D): planning and construction of electric generation, transmission power/distribution
- General Order 95, Rule 18A requires an auditable maintenance and corrective action program for electric facilities and defines *safety hazard* and priority levels of a safety hazard
- General Order 95 Rule 35: Utility Vegetation Management – Tree Pruning/Removal
  - Maintain 18” clearance between trees and primary distribution power lines and 60/70 kV, up to 10 feet for higher voltages
  - Remove facility protection trees (as defined above)
  - Address trees that cause strain or abrasion on secondary conductors

- General Order 95, Rule 165
  - Details inspection cycles for electric distribution lines
- GO 95, Rule 166 specifies emergency and disaster preparedness standards

- CPUC Resolution ESRB-4
  - CPUC Electric Safety and Reliability Branch issued Resolution ESRB-4 on June 12, 2014
  - Directs utilities to “take remedial actions to reduce the likelihood of fires started by or threatening utility facilities”
    - Includes potential for fires due to the presence of hazard trees
  - Resolution builds upon Governor’s emergency declarations


CPUC General Order 95, Rule 35
(in High Fire-Threat District)
4 ft.
CPUC recommends 12 feet at time of trim.
CPUC General Order 95, Rule 35
18 in.
CPUC recommends 4 feet at time of trim.
California Public Resource Code 4292
From 8 feet to horizontal plane of highest point of conductor attachment remove dead, diseased or dying limbs and foliage from living, sound trees and dead, diseased or dying trees.
8 ft.
10 ft.
From 0-8 feet above ground level remove flammable trash, debris or other materials, grass, herbacious and brush vegetation and limbs and foliage of living trees up to a height of 8 feet.
California Public Resource Code 4293
(Only applies during fire season.)
4 ft.

2017-2018 CPUC Additional Fire Safety Regulations



Source: California Public Utilities Commission

On Dec. 14, 2017 the CPUC issued new fire safety regulations to help protect the public from potential fire hazards associated with overhead power line facilities and nearby aerial communication facilities. Electric utilities must:

- Prioritize correction of safety hazards based, in part, on whether the safety hazard is in a High Fire-Threat district
- Correct non-immediate fire risks:
  - ✓ Within 6 months for Tier 3 (extreme) areas
  - ✓ Within 12 months for Tier 2 (elevated) areas
- Maintain increased clearances from vegetation throughout the High Fire-Threat district
- Maintain more stringent wire-to-wire clearances for new and reconstructed facilities in Tier 3 areas
- Conduct annual patrol inspections of overhead distribution lines in rural areas of Tier 2 and Tier 3
- Prepare an annual fire prevention plan for overhead facilities in the High Fire-Threat district

The map can be accessed at cpuc.ca.gov/FireThreatMaps

Funding for Federal Agencies

U.S. Department of the Interior and Forest Service

- The US Forest Service
- Bureau of Land Management
- National Park Service
- Bureau of Indian Affairs
- Bureau of Reclamation

U.S. Department of Defense

- Army
- Navy
- Marine Corps
- Army Corps of Engineers
- Air Force

Cost Recovery Agreements

- Certain land agencies including the United States Forest Service (USFS), the Bureau of Land Management (BLM), and the National Park Service (NPS) require cost recovery to process and administer right-of-way grants or authorizations
  - 36 CFR § 251.58 stipulates that the USFS can assess fees to cover processing and monitoring costs for special use authorizations
  - 43 CFR § 2804.14 and § 2804.16, 43 CFR § 2884.12 and § 2885.24 require a project proponent reimburse the BLM for all reasonable costs of processing an application for grants, including renewals and grant amendments and for monitoring of proposed activities
  - 54 U.S.C § 103104, 16 U.S.C. § 3a, and Director's Order 53 allow the NPS to recover all agency costs for processing applications and monitoring the permitted activity
- Cost recovery can be used to reimburse the agency for time incurred by staff and/or its contractors/consultants

Funding or Cost Recovery Overview

- Utilities frequently establish a cost recovery agreement for each capital projects and/or routine operation and maintenance (O&M) requests
- Funding is typically used for reimbursement of existing local or regional staff time rather than to hire staff dedicated to the utility's requests
- Funding does not mean that the utility's requests are prioritized over other requests, especially O&M
- Advantages of the cost recovery or funding agreements for dedicated positions include:
  - Faster agency decisions on permit requests
  - Improved engagement and communications at staff and leadership levels
  - Ability to train dedicated agency staff on utility projects and impacts
  - Better opportunities for programmatic solutions and consistency among all agency field or regional offices
  - Better coordination for emergency work and other priorities

USFS

- Under 36 CFR 251.58, USFS can recover funds from a project applicant for:
  1. Application for use and occupancy that require a new special use authorization
  2. Changes to an existing authorization
  3. Agency actions necessary to issue a special use authorization and applications of issuance of a new special use authorization due to termination of an existing authorization, including:
     - ✓ Termination due to expiration of the authorization
     - ✓ Change in ownership or control of authorized facility, or
     - ✓ Change in ownership or control of the holder of the authorization
  4. Monitoring of authorizations issued or amended on or after March 23, 2006
- As utilities enter into authorizations that incorporate O&M activities, funding may be requested for review of pre-work notification requests and for monitoring as needed
  - At a minimum, permit administrator, archeologist, botanist, and specialist with a biological, wetlands, and/or water expertise reviews every request

BLM

- Under 43 CFR 2804.1 and 2804.16, and 43 CFR 2884.12 and 2884.11, and 43 CFR 2885.24, BLM can recover reasonable costs from a project or land use applicant for:
  1. Application for use and occupancy that require a new authorization
  2. Changes or amendments to an existing authorization
  3. Agency actions necessary to issue a special use authorization and applications of issuance of a new special use authorization due to termination of an existing authorization, including:
     - ✓ Termination due to expiration of the authorization
     - ✓ Change in ownership or control of authorized facility, or
     - ✓ Change in ownership or control of the holder of the authorization
  4. Monitoring of the construction, operation, maintenance, and termination of the project and protection and rehabilitation of public lands described in the authorization
- BLM has entered into Master Agreements with some utilities to fund dedicated staff positions and/or to hire consultants to assist the agency in performing the environmental analysis

NPS

- Under 52 USC §103104 and 16 USC § 3a, NPS can recover reasonable costs from a project or land use applicant for:
  1. All costs incurred in processing the application and, if the application is approved, monitoring the permitted activity
  2. Application for use and occupancy that require a new authorization
  3. Changes or amendments to an existing authorization
  4. Agency actions necessary to issue a special use authorization and applications of issuance of a new special use authorization due to termination of an existing authorization, including:
     - ✓ Termination due to expiration of the authorization
     - ✓ Change in ownership or control of authorized facility, or
     - ✓ Change in ownership or control of the holder of the authorization
  5. Monitoring of the construction, operation, maintenance, and termination of the project and protection and rehabilitation of public lands described in the authorization
- NPS cost reimbursement accounts cannot be carried over from one fiscal year to another. Unspent funds are non-refundable and are lost to the General Fund.

USFWS, USCOE, BOR

- Under 50 CFR § 29.21, FWS can recover fees from a project applicant for processing the application.
  - For linear facilities, the fee is based on the length of the project
  - For non-linear facilities, the fee is $250 for each 40 acres or a fraction thereof

- Under 33 CFR § 325.2, the Army Corps of Engineers charges fees for permits required under:
  - section 404 of the Clean Water Act
  - section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended and
  - Sections 9 and 10 of the Rivers and Harbors Act of 1899
  - Commercial/industrial uses: $100/
  - Non-commercial uses: $10/
  - No fees are assessed for transfers

- Under 43 CFR § 429, the Bureau of Reclamation charges $100 for initial review of an application and provides a cost estimate for processing during that review

Background Slides

U.S. Forest Service
Energy Rights of Way Training

Electric Transmission and Distribution Utility Industry

Environmental

U.S. Forest Service Energy Rights of Way

Environmental Module Overview

- Utility Screening Process
- Data sharing
    - Biological Resources
    - Cultural Recourses
    - GIS
    - Infrastructure
- Avian Protection Planning
- Cultural Resource protection
- Other agency requirements/approvals/permits

Electric Utility Screening Process

- Most utilities have developed some level of environmental review
  - Desktop Analysis Using Known Data Sets
    - Archaeological
    - Biological Hydrological
    - Federal/State Agency Databases
  - Project Specific Field Studies conducted by the Utility Consultant

Electric Utility Screening Process

- Add text on benefits or other examples of screening databases??
- Add text on lessons learned with screening process??

Environmental Data Sharing

- Resource Specific Protocols
  - Bio
  - Cult
- Resource Specific Data Formats
  - Letter Reports
  - GIS Attributes and Projections
- Non-Disclosure Agreements for Critical Infrastructure

Environmental Data Sharing

Avian Protection Guidelines

- Insert Rick’s Power Point Here

Cultural Resources Protection

Other Agencies

- Cooperating, Co-Leads, Responsible, Permitting
- Federal – USFWS, BIA, BLM, NPS
- State – Game & Fish, State Parks, Public Utility Commissions, DOTs
- Municipalities – Traffic Control, Noise Ordinances, Hazardous Materials Management, Water Supply

Other Agencies

- Utility Permits
  - Section 10’s/HCPS, Programmatic ACOE

Avian Protection Plans



Avian Power Line
Interaction Committee

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

Cooperative Utility/Agency Efforts to Reduce Bird Mortality and Improve Service Reliability

Background

- Encouragement of cooperative efforts between agencies and utilities
  - 1970s – collaborative workshops and identification of issue
  - 1980s – development of APLIC
  - 1990s – chapter on “Cooperative Management of the Electrocution Issue” in 1996 *Suggested Practices*

Avian Power Line Interaction Committee

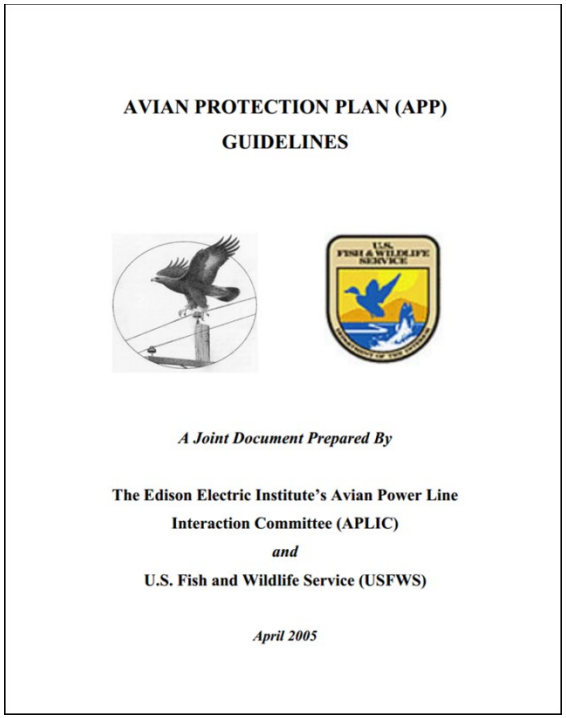
Background

- Memorandum of Understanding (MOU)
  - Used historically, particularly in enforcement cases
  - Required development of an Avian Protection Plan (APP)
- In 2005 the USFWS and APLIC released jointly-developed national APP Guidelines

Avian Power Line Interaction Committee

What are the APP Guidelines?

- Intended to help utilities manage avian/power line issues
- Voluntary
- Offer a “toolbox” of resources that utilities can use to create a specific program that meets their needs
- Includes 12 principles
- Available at www.aplic.org and www.fws.gov


AVIAN PROTECTION PLAN (APP)
GUIDELINES

A Joint Document Prepared By

The Edison Electric Institute’s Avian Power Line Interaction Committee (APLIC)
and
U.S. Fish and Wildlife Service (USFWS)

April 2005

Utility APPs

- Each utility's APP will be different based on risk, needs, scale, etc.
  - APPs intended to guide a utility's avian program
  - Common themes to all APPs→ reduce bird mortality and improve service reliability
- APPs are not intended to be project-specific (e.g., each new line does not require an APP)
- "Living documents" – modified and refined over time to improve effectiveness

APP Principles

1 . Corporate Policy

- Statement that identifies commitments
- Endorsed by management
- Provides employees with guidance on expectations and accountability

Avian Power Line Interaction Committee

APP Principles

2. Training
   - All appropriate personnel: managers, supervisors, line crews, engineering, dispatch, substations, vegetation management, etc.
   - Training on reporting, procedures, avian-safe design, nest management, etc.
   - APLIC-provided training: short courses, APP workshops, 2-hour course for APLIC-members

APP Principles

3. Permit Compliance
   - Identify required permits (state and federal) and measures for compliance
   - Examples: nest relocation, temporary possession, depredation, salvage

APP Principles

4. Construction Design Standards
   - Avian-friendly construction standards
     - Designing new facilities
     - Retrofitting existing facilities
   - Should meet or exceed APLIC recommendations (see 2006 *Suggested Practices)*

Rough-legged hawk

Avian Power Line Interaction Committee

APP Principles

5. Nest Management
   - Procedures and permits for addressing “problem” nests (those that pose safety, fire, or electrocution risks)
   - Training for field personnel (line crews, tree trimming crews, substation operations) on addressing active (eggs or young present) versus inactive nests

Avian Power Line Interaction Committee

APP Principles

6. Avian Reporting System
   - Reporting may be permit requirement
   - Utilities may document bird mortalities, nests, outages, remedial actions
   - USFWS online mortality reporting system for utilities

APP Principles

7. Risk Assessment Methodology
   - Identification of areas that pose greatest risk to migratory birds
   - Factors to assess: bird populations, historical mortalities, nests, habitats, prey populations, structure designs, outages

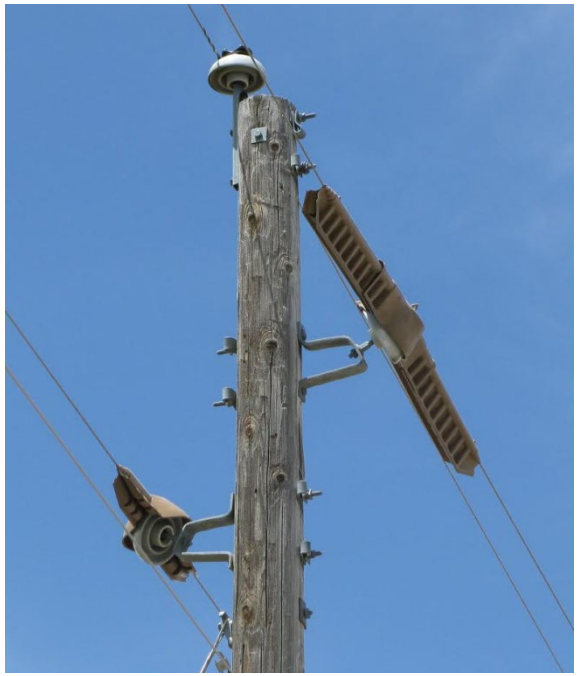
Bald eagle

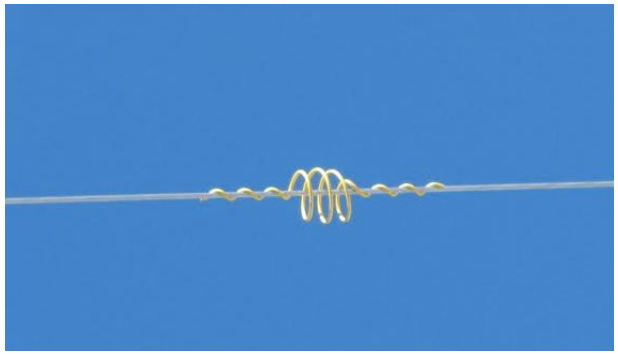
Turkey vulture

Ferruginous hawk

APP Principles

8. Mortality Reduction Measures
   - Can use risk assessment to identify areas to implement remedial actions





APP Principles

9. Avian Enhancement Options
   - Utility efforts to enhance populations and/or habitat
     - Examples: Installation of nest platforms or boxes; cooperative efforts with agencies or organizations; habitat management

Great blue heron nest platforms (UT)

Kestrel boxes (MN)

APP Principles

10. Quality Control
    - Review and update practices to ensure efficiency and effectiveness
    - Examples:
        - Effectiveness of retrofitting in reducing bird mortalities and associated outages
        - Effectiveness of training in improving employee awareness, processes, and accountability
        - Effectiveness of risk assessment in identifying high risk poles

APP Principles

11. Public Awareness
    - Educating public on avian/power line issues and utility efforts, successes

APP Principles

12. Key Resources
    - Internal and external resources
        - Engineers, biologists, standards, procurement, field operations (distribution, transmission, and substations)
        - State and federal agencies, universities, non-governmental organizations, consultants
        - Joint Ventures (e.g. IWJV)
        - APLIC, EEI, RUS, NRECA, CEC, EPRI, IEEE, AFWA/WAFWA
        - Manufacturers of avian protection products

APP Implementation

- Critical components to APP success
  - Management support
  - Agency involvement
  - Engineering and biological expertise (internal or external)
  - Funding
  - Documentation
  - Accountability and employee awareness
  - Involvement and endorsement of affected groups within utility

APP Implementation

- APPs will vary in extent due to:
  - Size of territory
  - Avian species in area
  - Frequency of avian/power line interactions

Avian Power Line Interaction Committee

Benefits of an Implemented APP

- Reduced bird mortality
- Improved service reliability
- Favorable public perception
- Positive working relationships with agencies

Bald eagle

Snowy owl

Questions?