Sundance to Pinal South 230kV Transmission Project Open House

Welcome

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Project Need and Regional Information

Sundance to Pinal South 230kV Project

- **Project Need**
  - Increase local capacity, which will improve the reliability and continuity of service for the electrical load in the area
  - Allow APS to schedule the full output capability of the Sundance facility, currently estimated at 420 megawatts during peak summer conditions
  - Economically provide a new 230kV path for existing and potential future generation at the Sundance facility

A Little Bit About Sundance

- Plant began Service in Summer of 2002
- Acquired by APS in Spring of 2005
- Natural gas-fueled “peaking plant”
  - 10 quick-start turbines
  - capable of producing approximately 450 MW
- APS owns approximately 300 acres around the Sundance facility (current plant operations occupy about 45 acres)

Key Electrical Terms

Circuit – term used to define an electrical path (Ex: 230kV circuit)

Conductor – another name for the wire that carries the electricity. Each conductor may actually be a bundle of several wires necessary for a complete 230kV circuit

Kilovolt (kV) – 1,000 volts 230kV = 230,000 volts

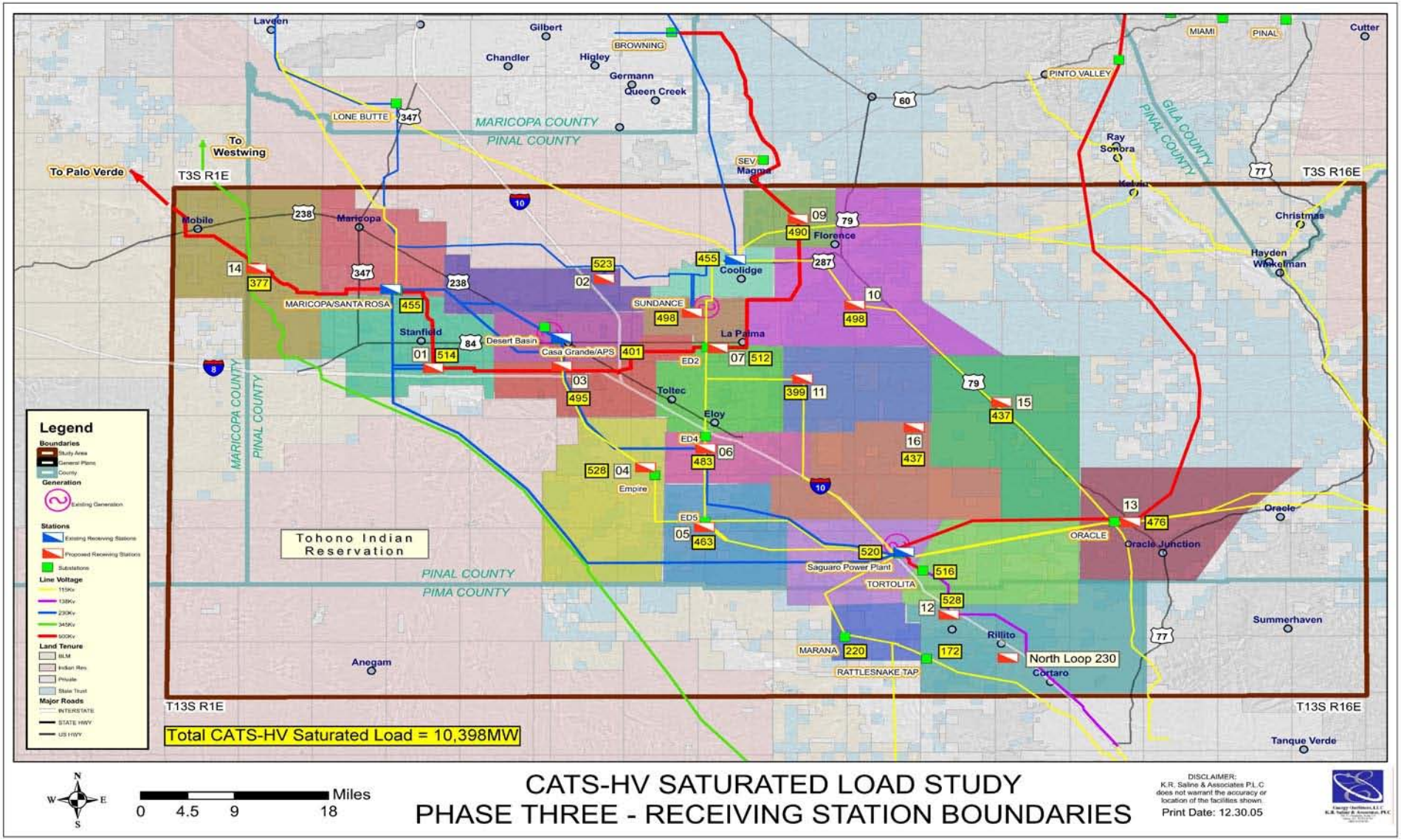
Monopole – a type of structure that supports electrical lines consisting of a single steel pole

Megawatt (MW) – one million watts. Referenced as a unit of measure for the output capacity of a power plant. Typically 1 MW can power up to 250 average US homes

Right-of-Way – the land rights that APS must acquire to safely construct, operate, and maintain a power line

Span – the distance between two supporting structures

Substation – an electrical facility that serves as a point of interconnection for transmission and/or distribution lines where power is transformed for regional transport across the electric grid



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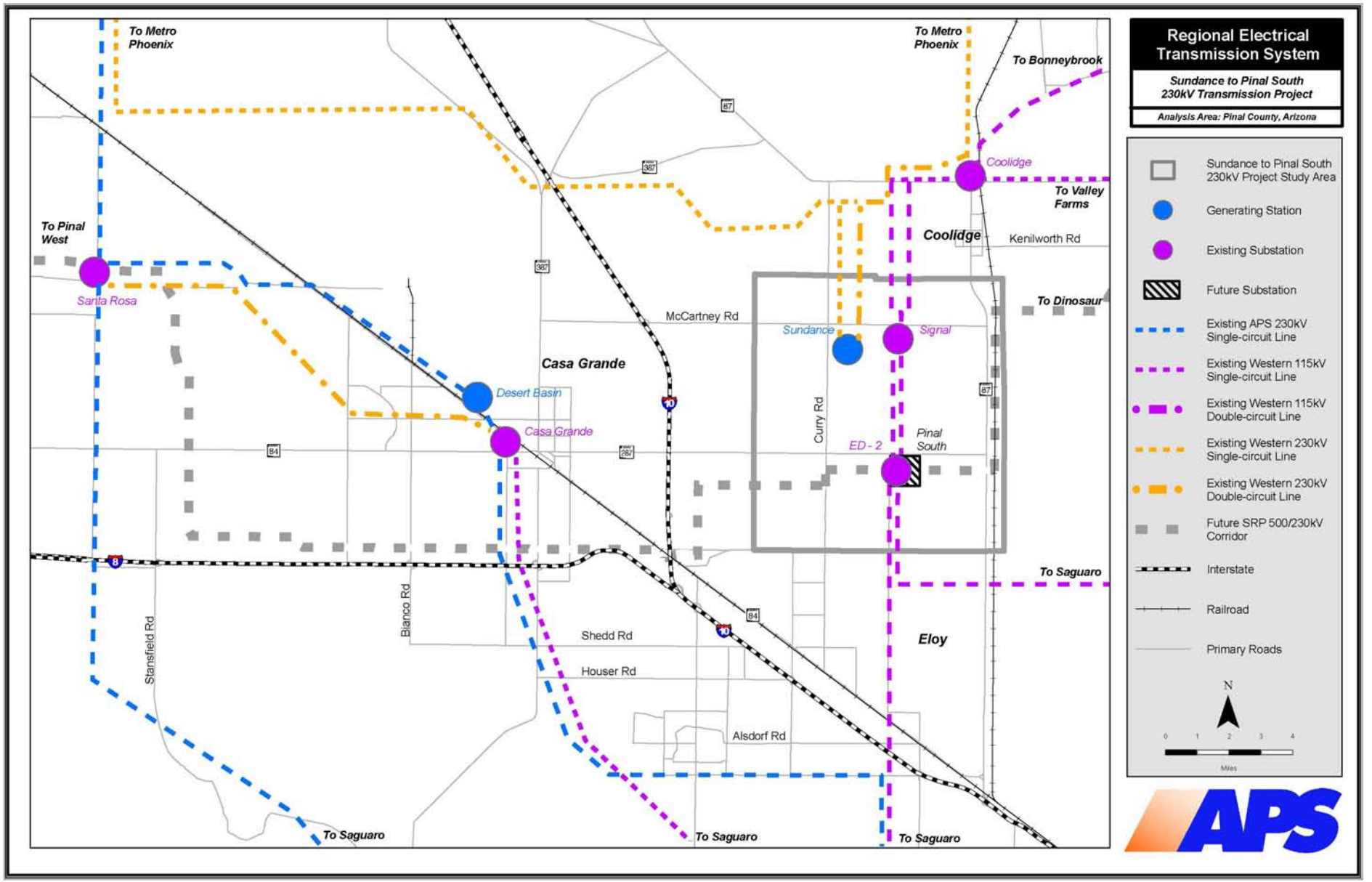
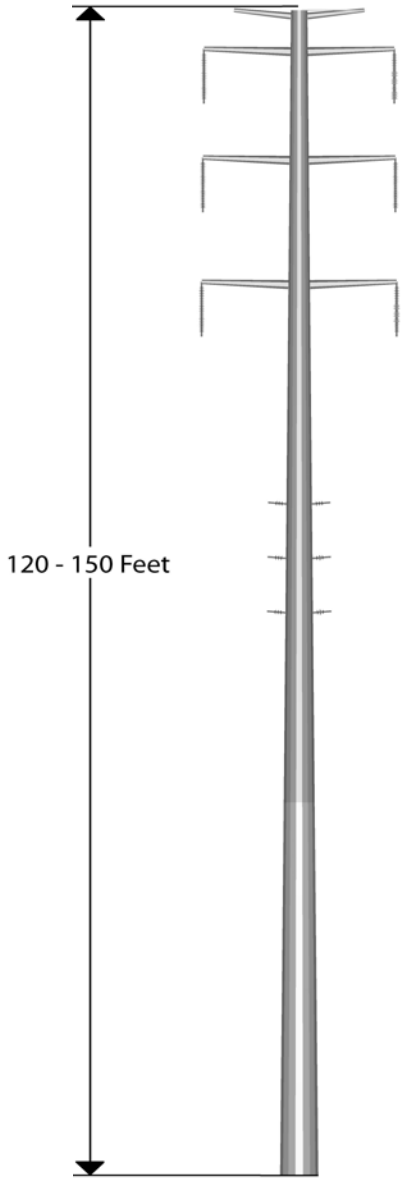


Sundance to Pinal South 230kV Transmission Project

Project Description and Design Considerations

Sundance to Pinal South 230kV Project

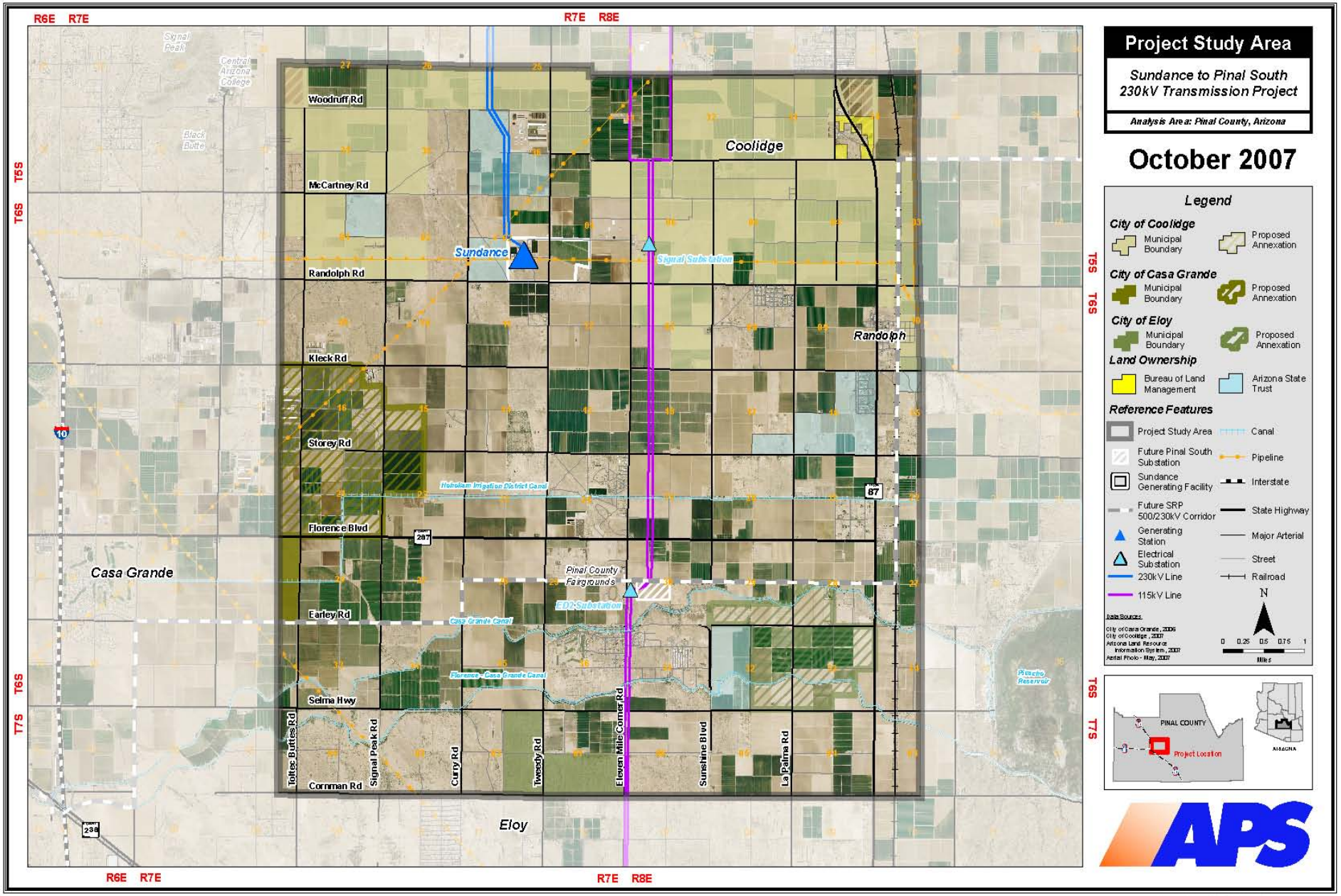
- **Project Description**
  - Double-circuit 230kV transmission line, designed to accommodate double-circuit 69kV underbuild
  - Tie-in and substation at Sundance and interconnection facilities at Pinal South
  - Steel monopole structures
  - Average structure height of 120 to 150 feet
  - 100 to 130 feet of right-of-way
  - Transmission line in-service, Summer 2011
    - *Right-of-way acquisition, followed by design, and then construction, would initiate after receipt of the CEC*



Double-Circuit 230kV Transmission Structure with Double-Circuit 69kV Underbuild

Sundance to Pinal South 230kV Transmission Project

Study Area and Resource Data Collected



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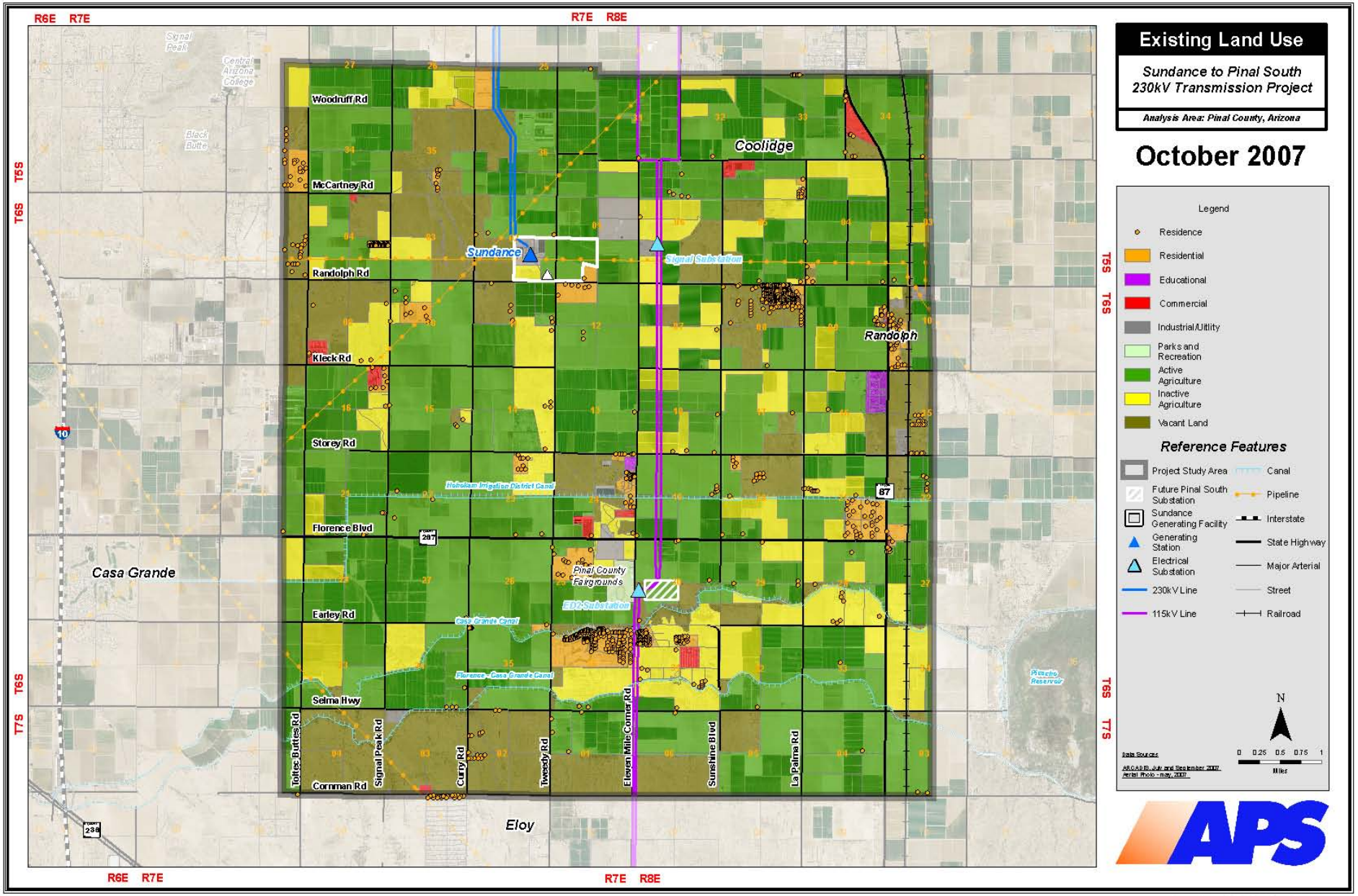

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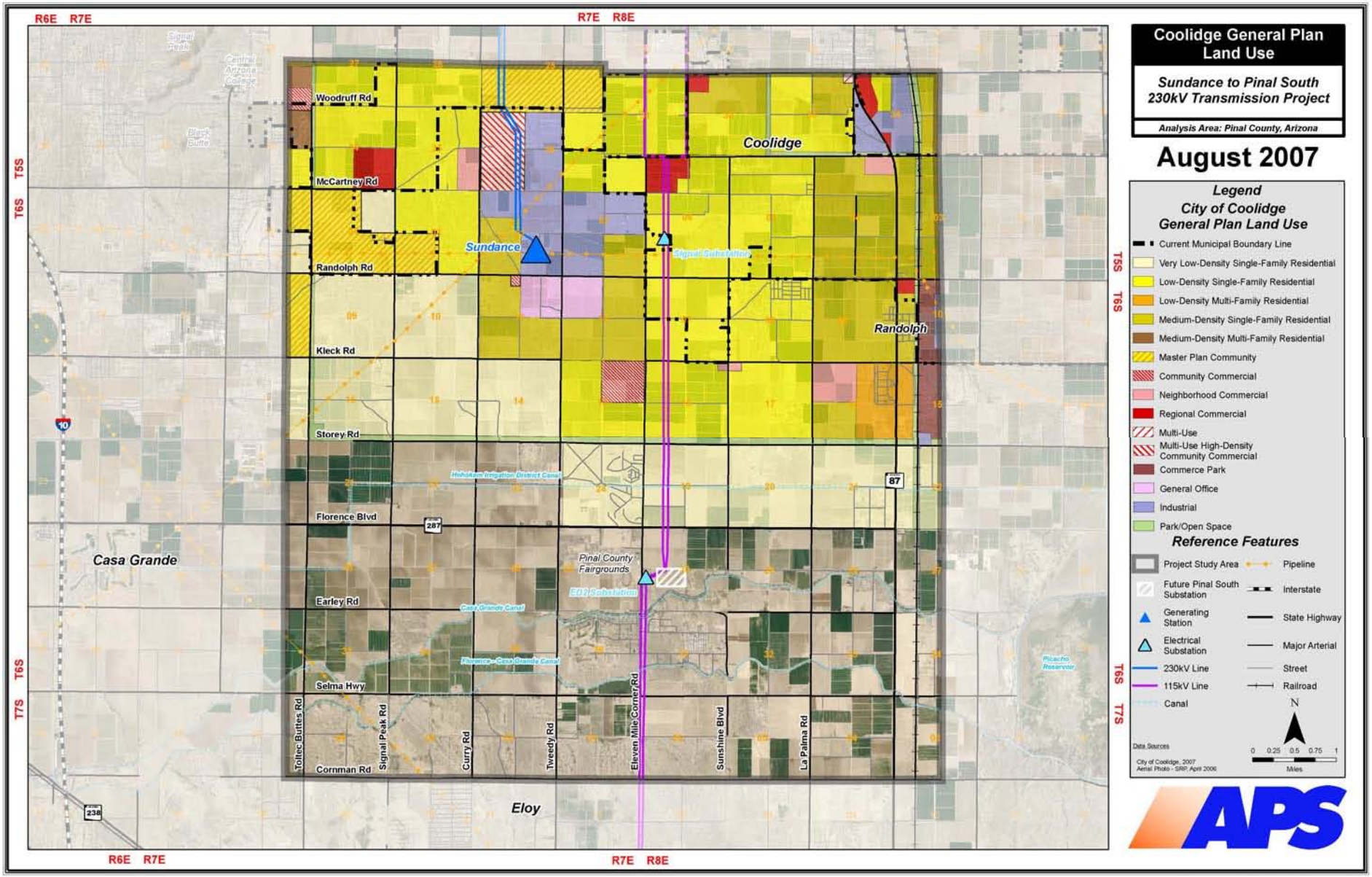

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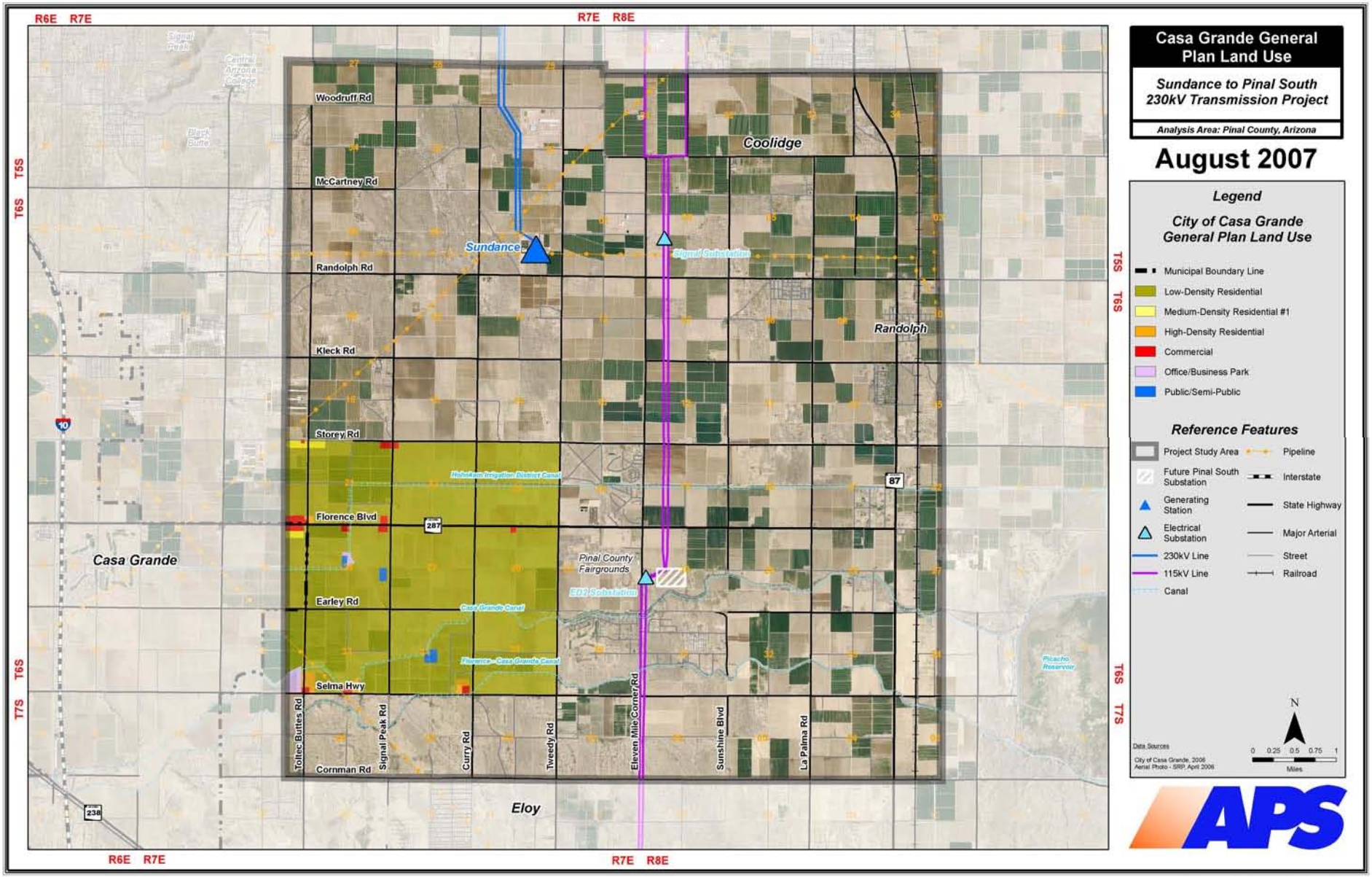

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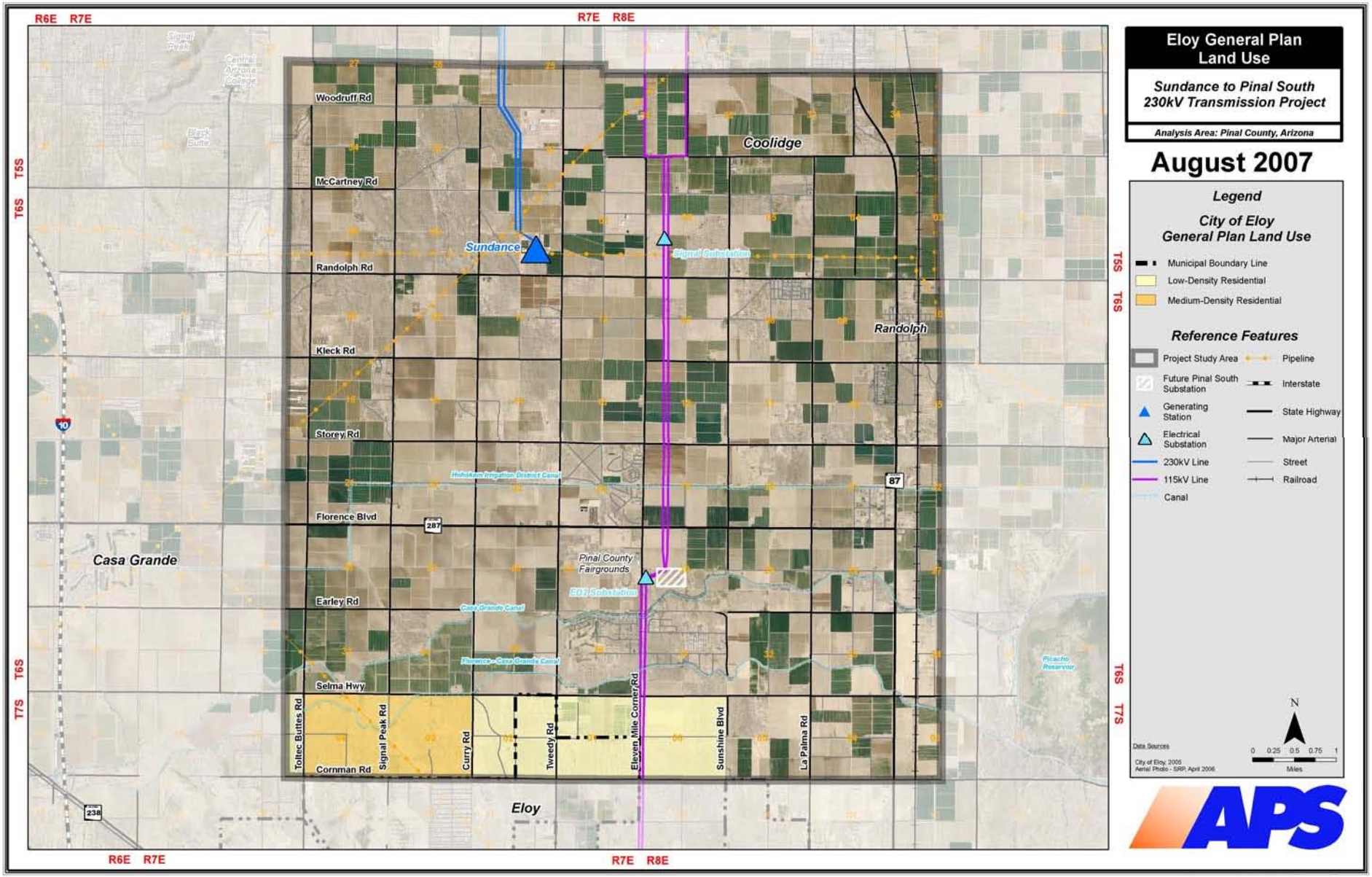

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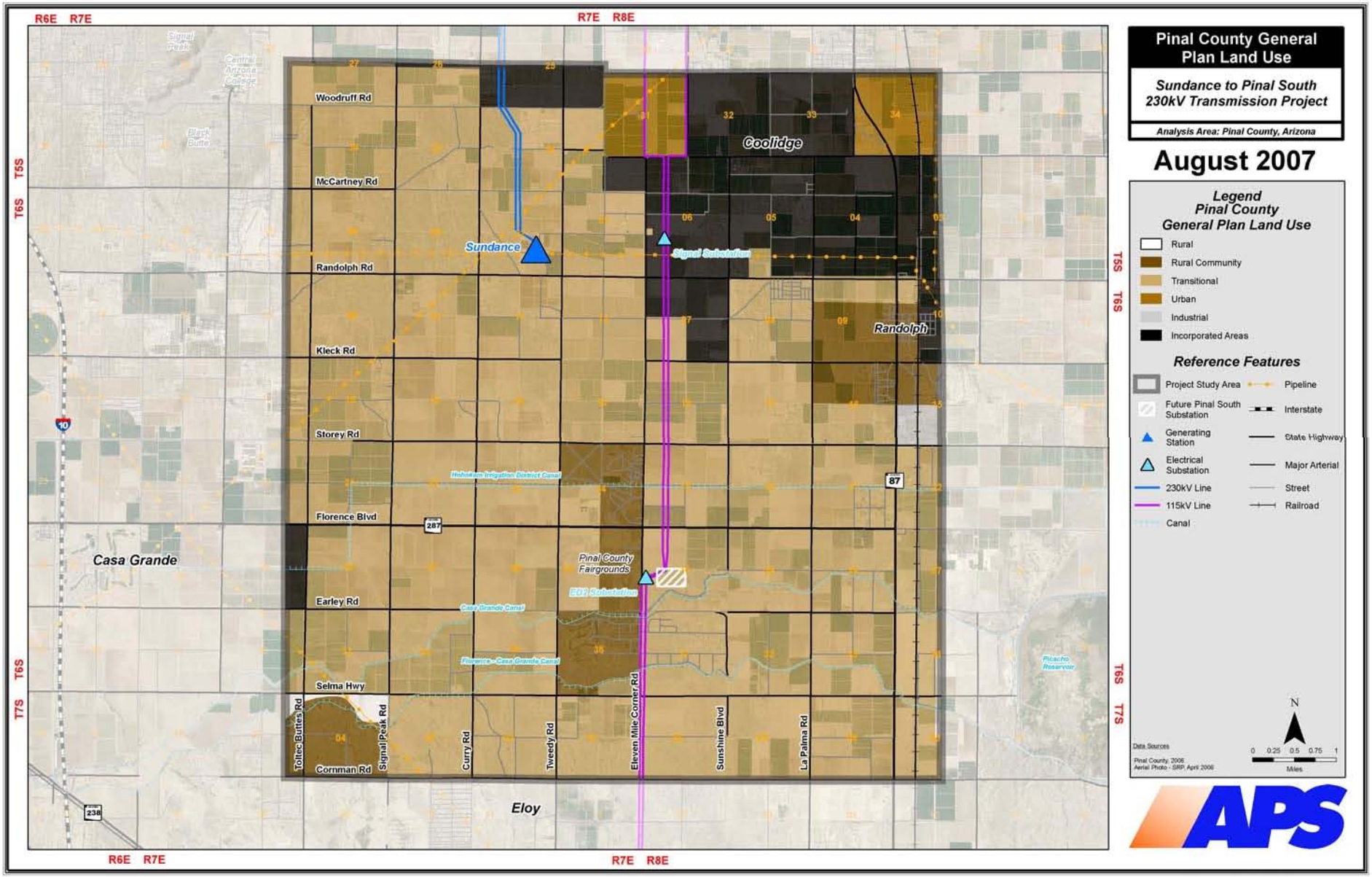

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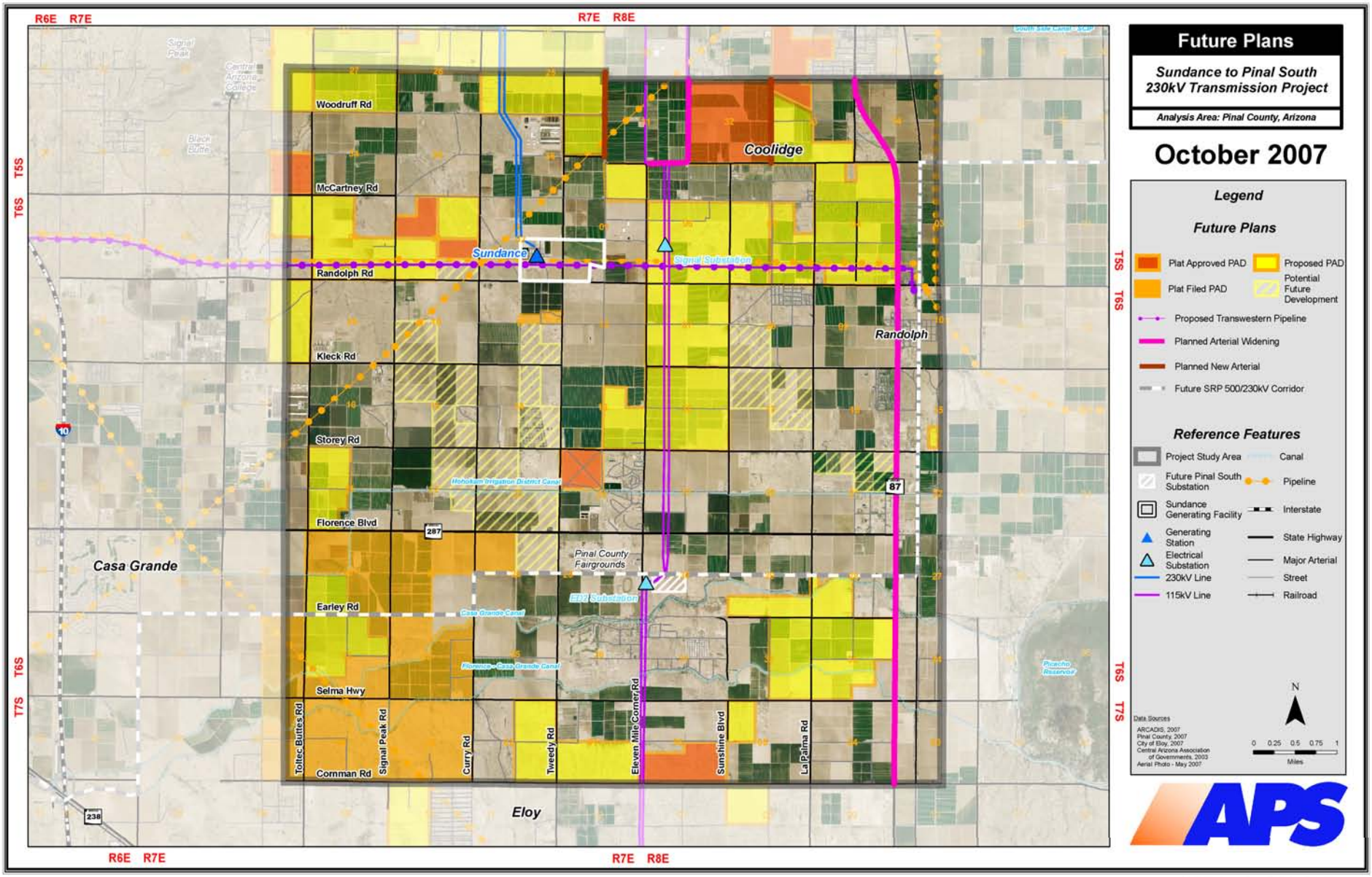
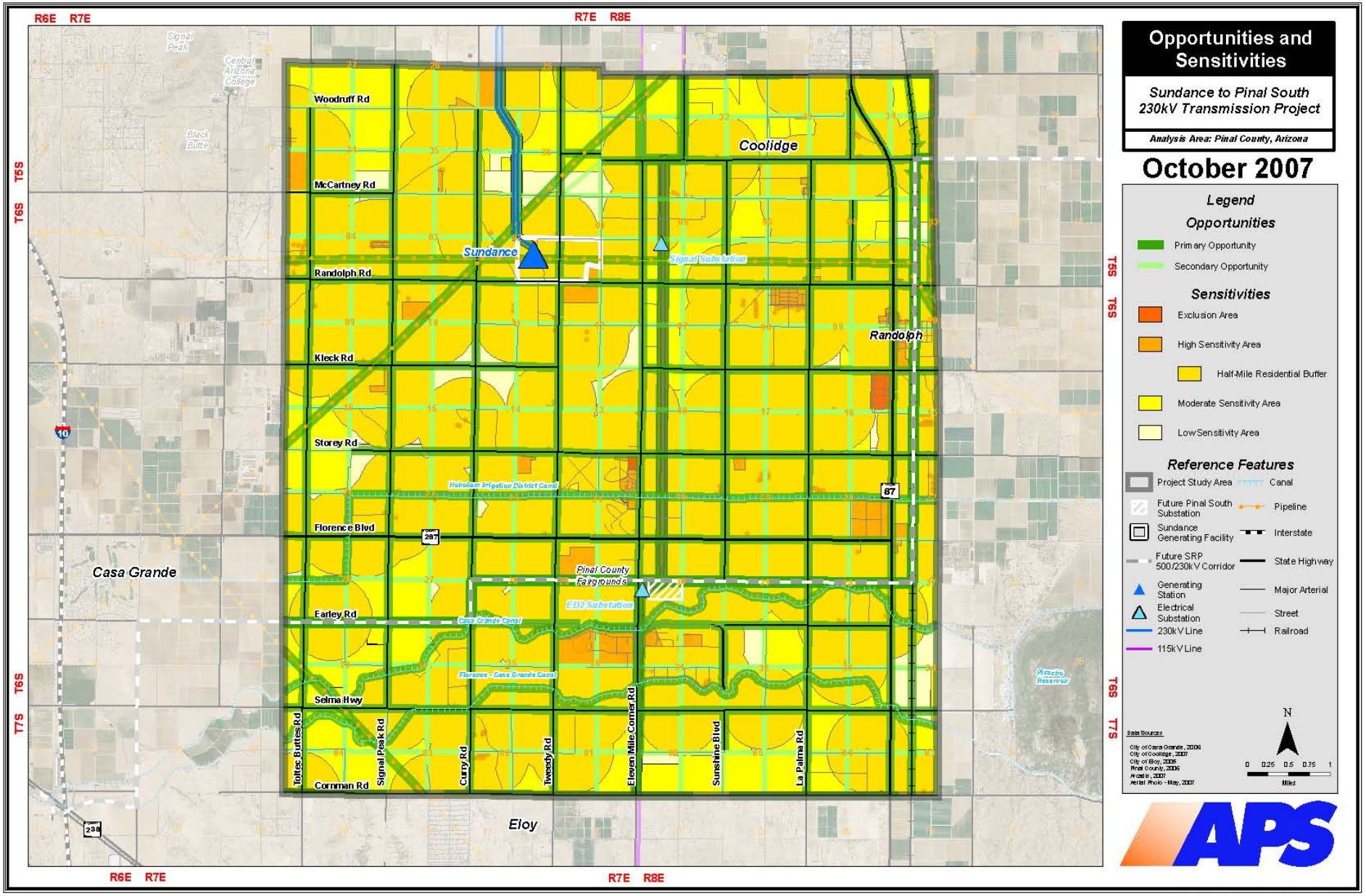


Areas noted as "Potential Future Development" are based on information provided to APS as part of this line siting process. There may be other properties with future development plans in addition to those illustrated on this map.

Sundance to Pinal South 230kV Transmission Project

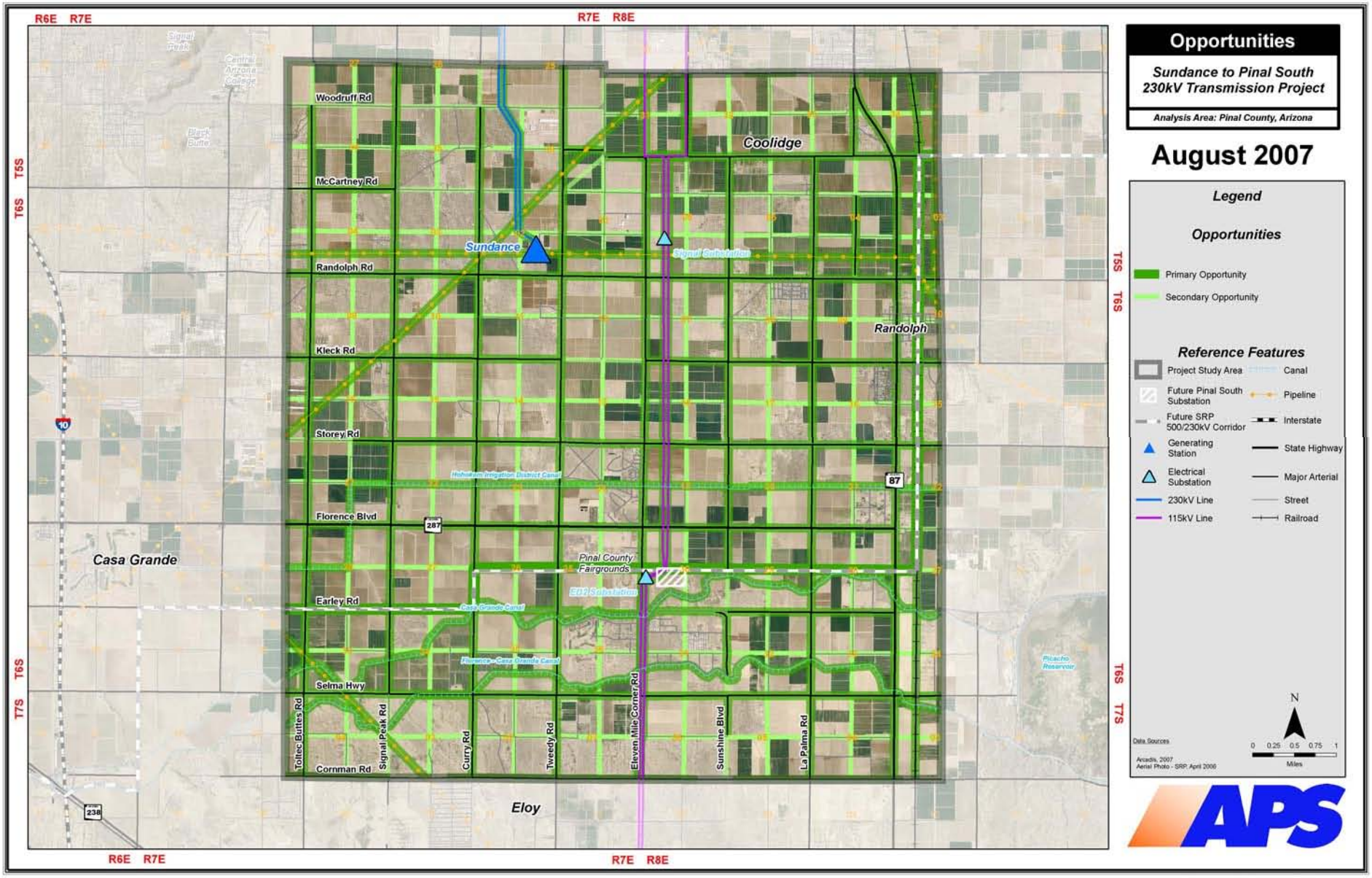
Route Identification and Screening



Sundance to Pinal South 230kV Transmission Project

Siting Criteria / Opportunities

Primary	Designated Utility Corridors
	Existing Transmission Lines and Rights-of-Way
	Existing Canals
	Existing Railroads
	Existing Roads / Highways (County Road Level or Greater)
	Existing Pipelines
	Future Approved Utilities (Transmission Lines, etc.)
	Developed Section Lines / Major Property Lines / County Dedicated Roads
Secondary	Existing Small Canals and Drainage Features
	Undeveloped Section and Half-Section Lines



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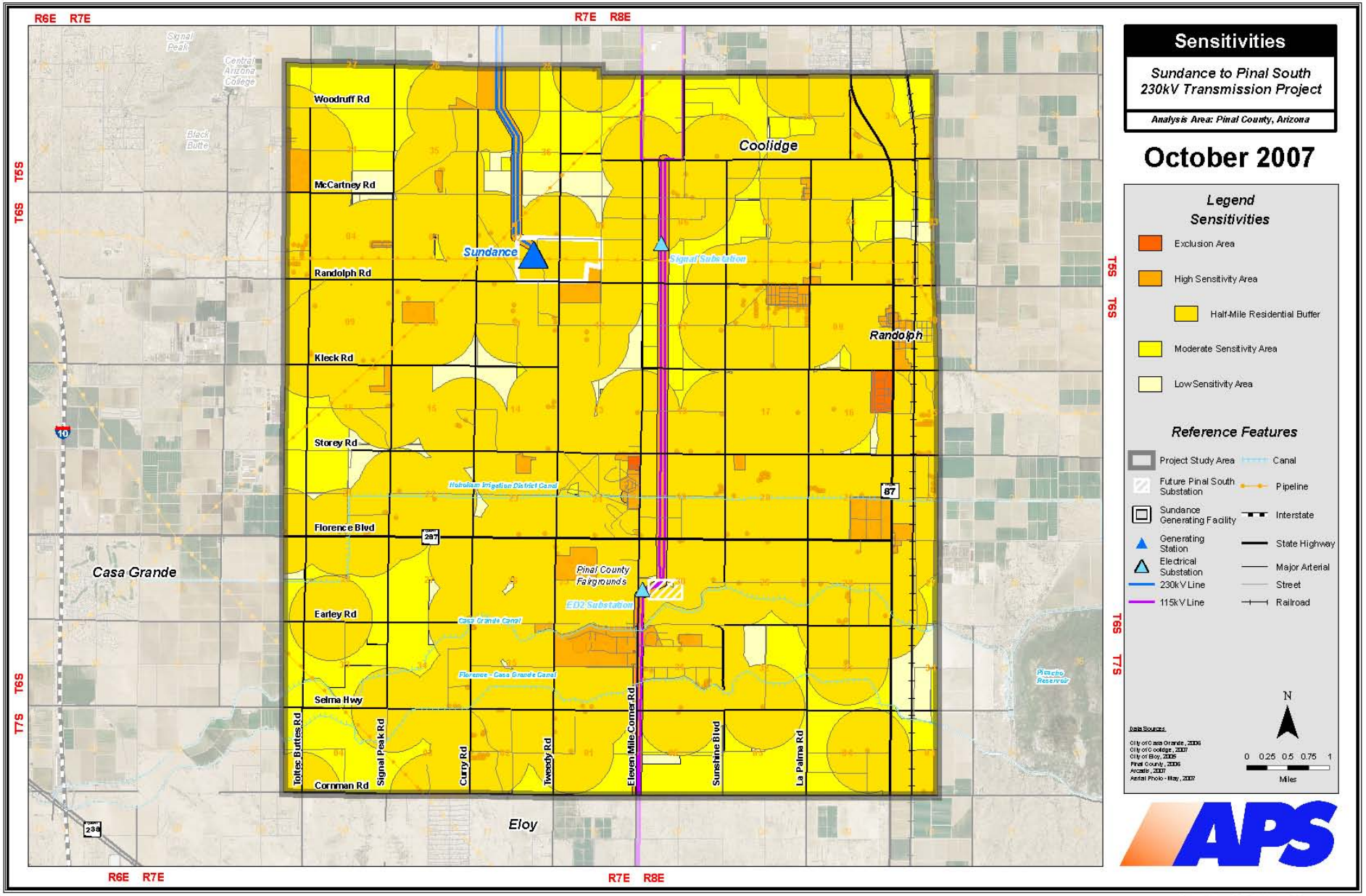

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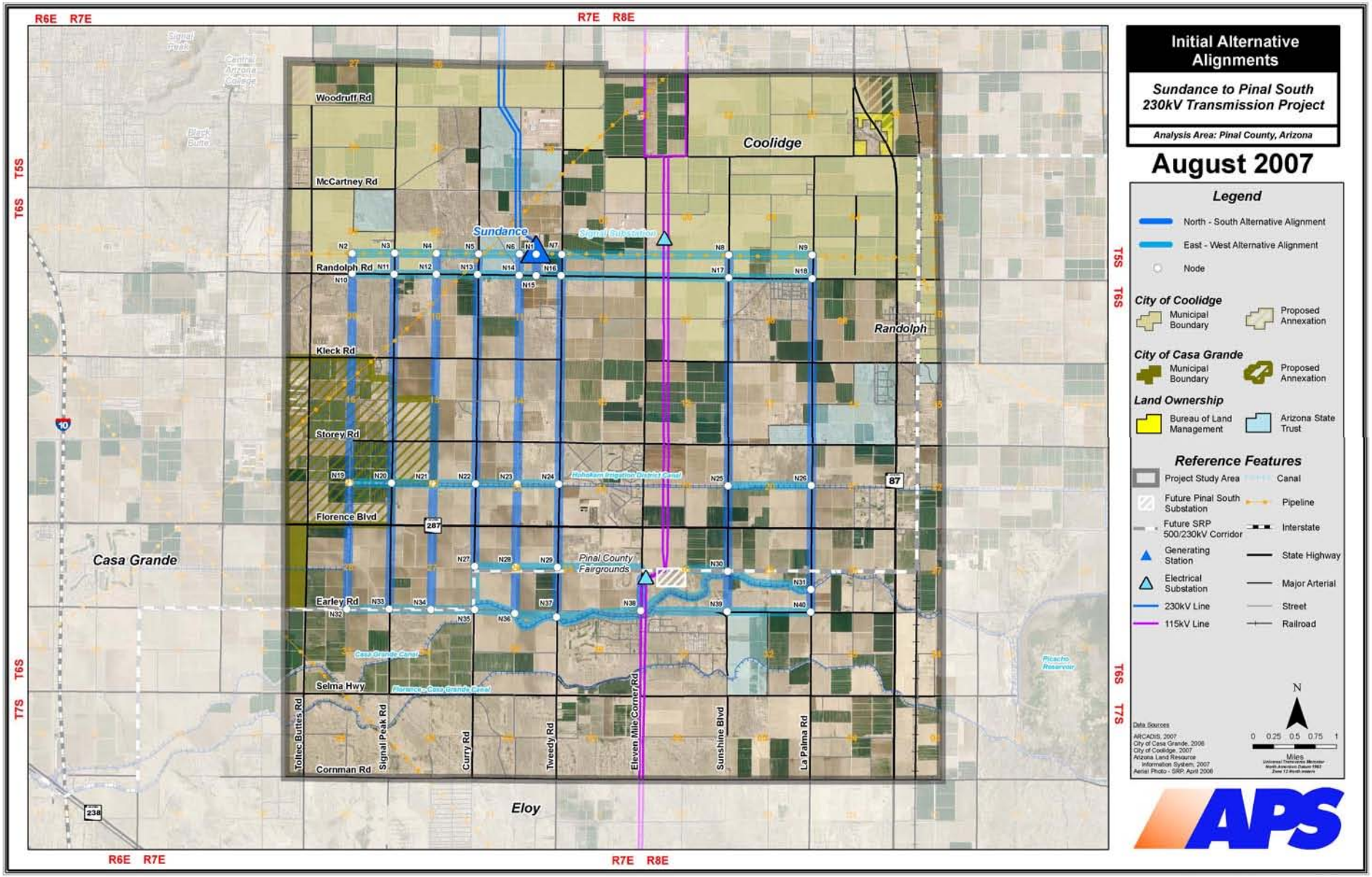
Areas of Sensitivity / Constraints

Exclusion	Educational Facilities
High	Existing Residences and Residential Developments (half-mile buffer)
	Regional Parks and Recreation Facilities
	*Constrained Transmission Line Corridors
Medium	Agricultural Areas (Active)
	Biological Sensitive Areas
	Commercial Land Uses
	Public/Quasi-Public Land Uses
	Planned Area Developments
Low	General Plan Land Uses
	Industrial and Utility Land Uses
	Vacant Land or Inactive Agricultural Areas

*A "**constrained transmission line corridor**" is an area with existing transmission lines where the addition of a new line (or lines) could negatively impact system reliability



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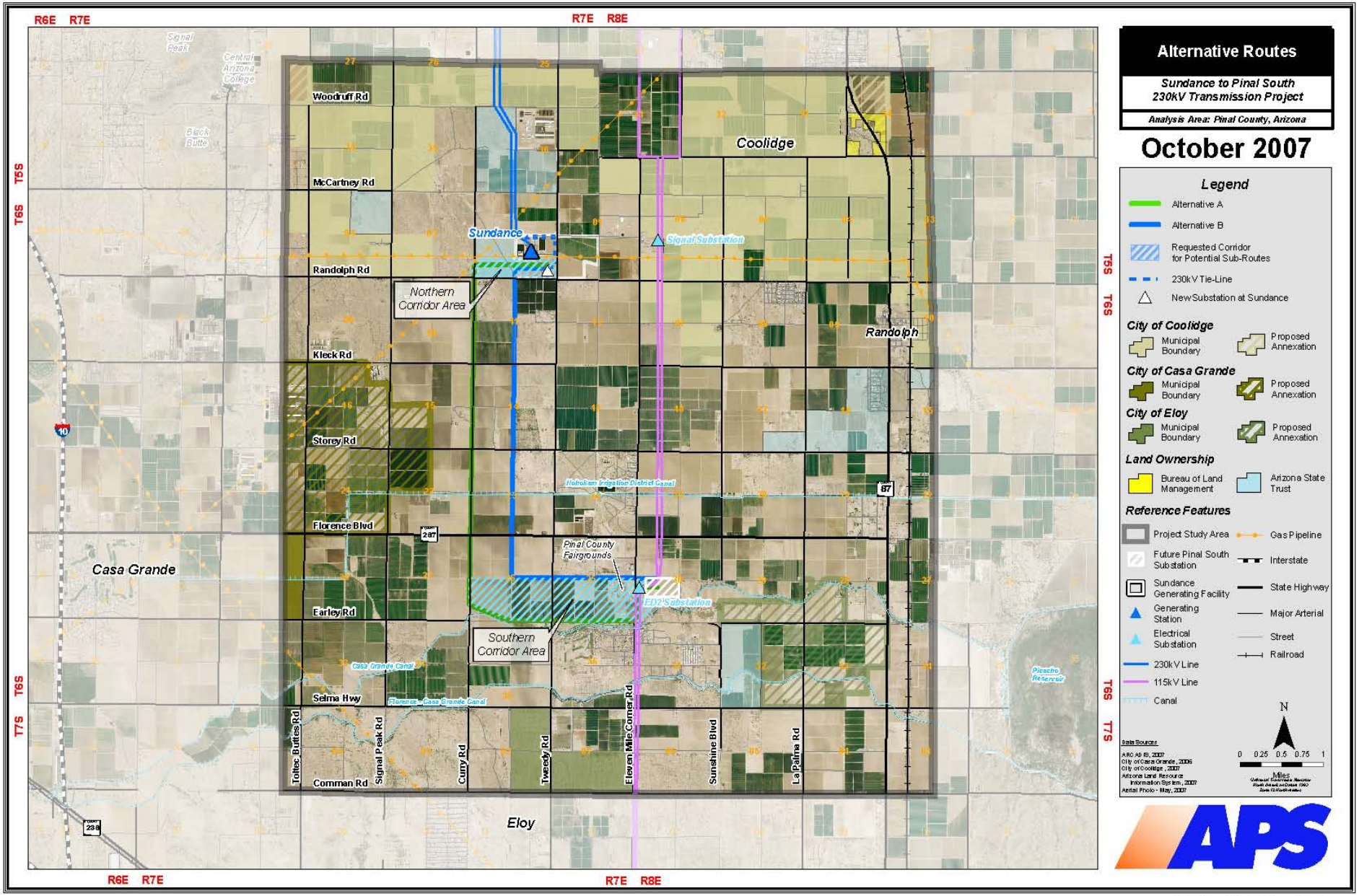

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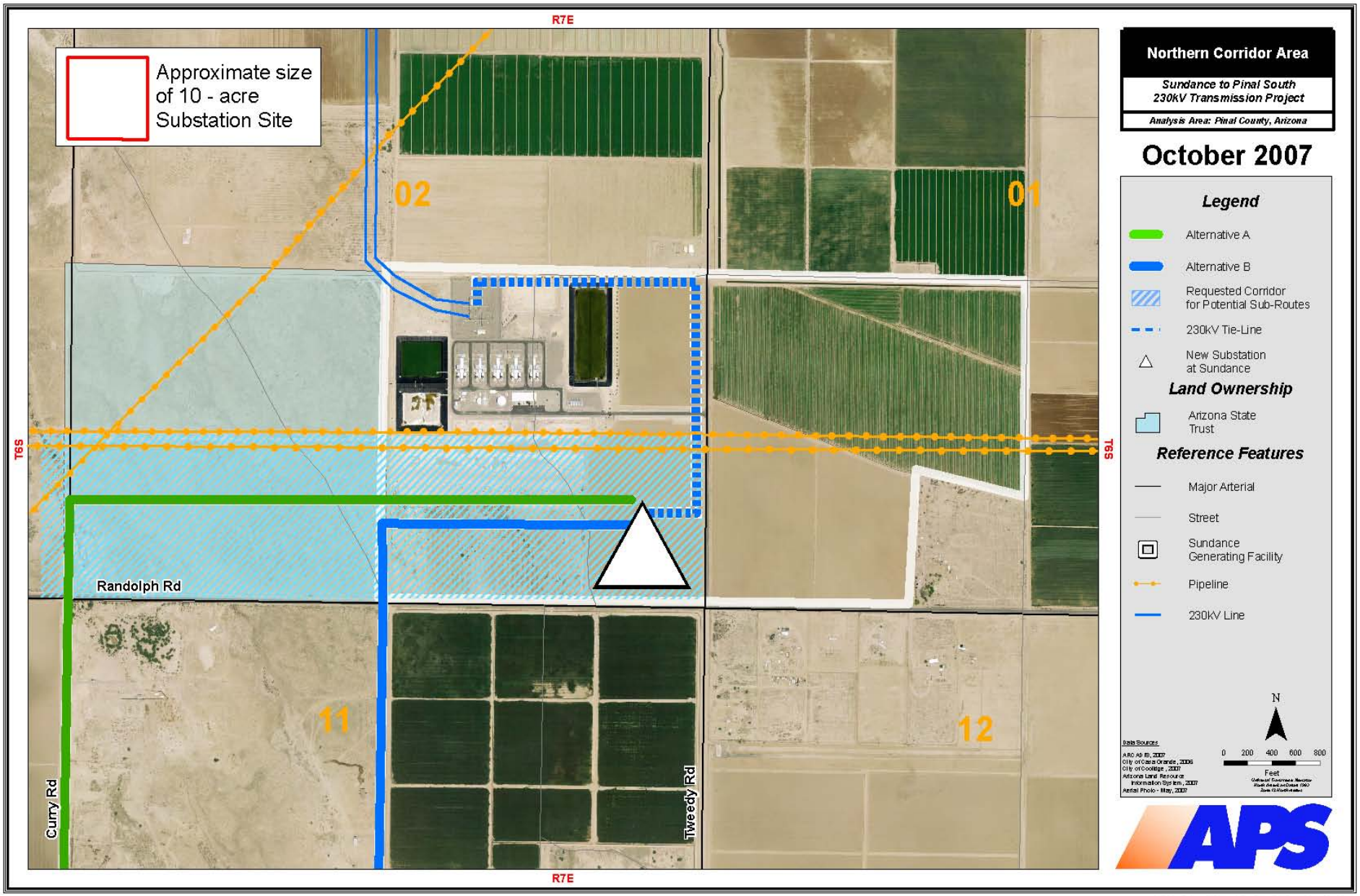

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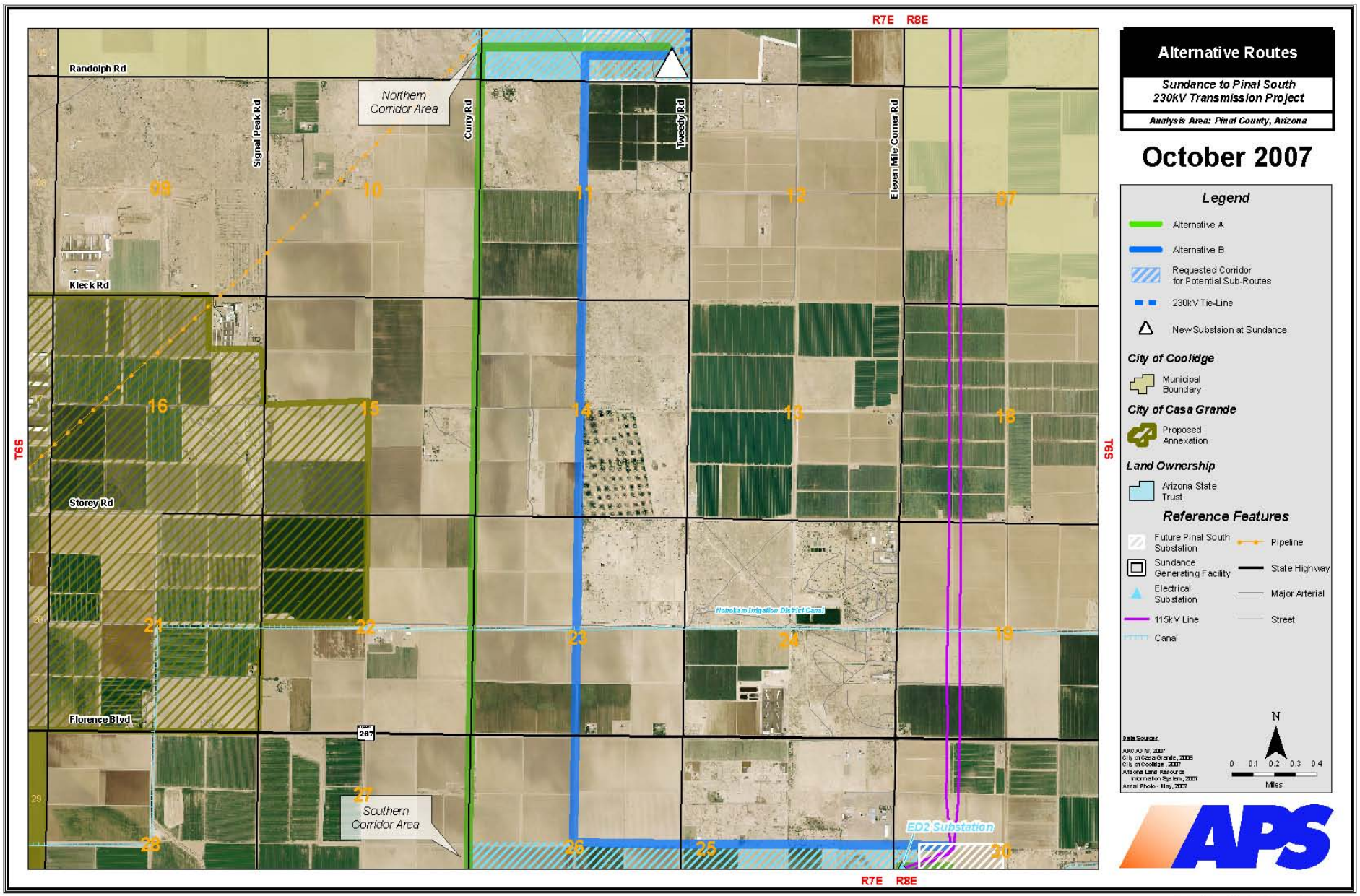

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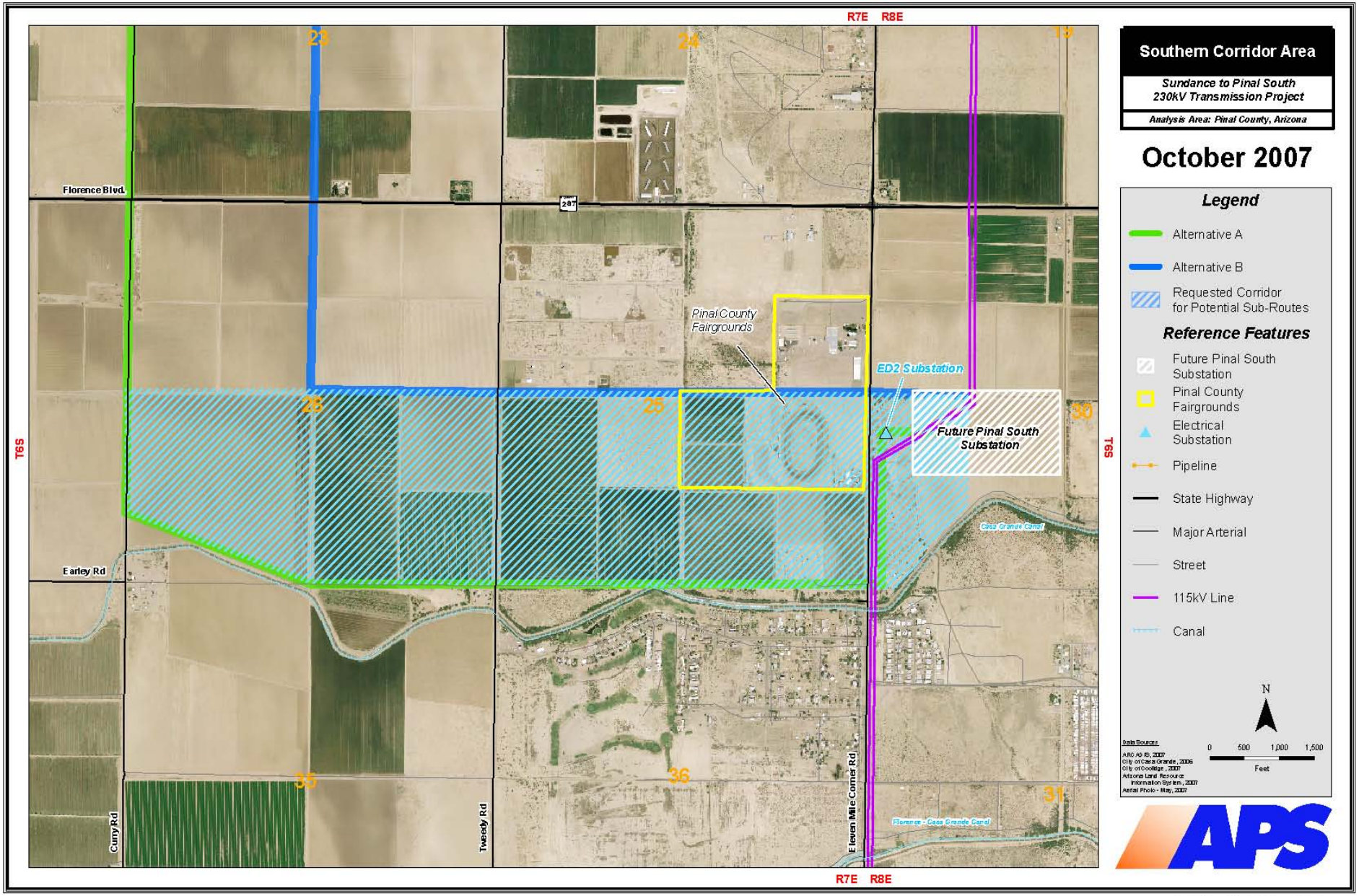

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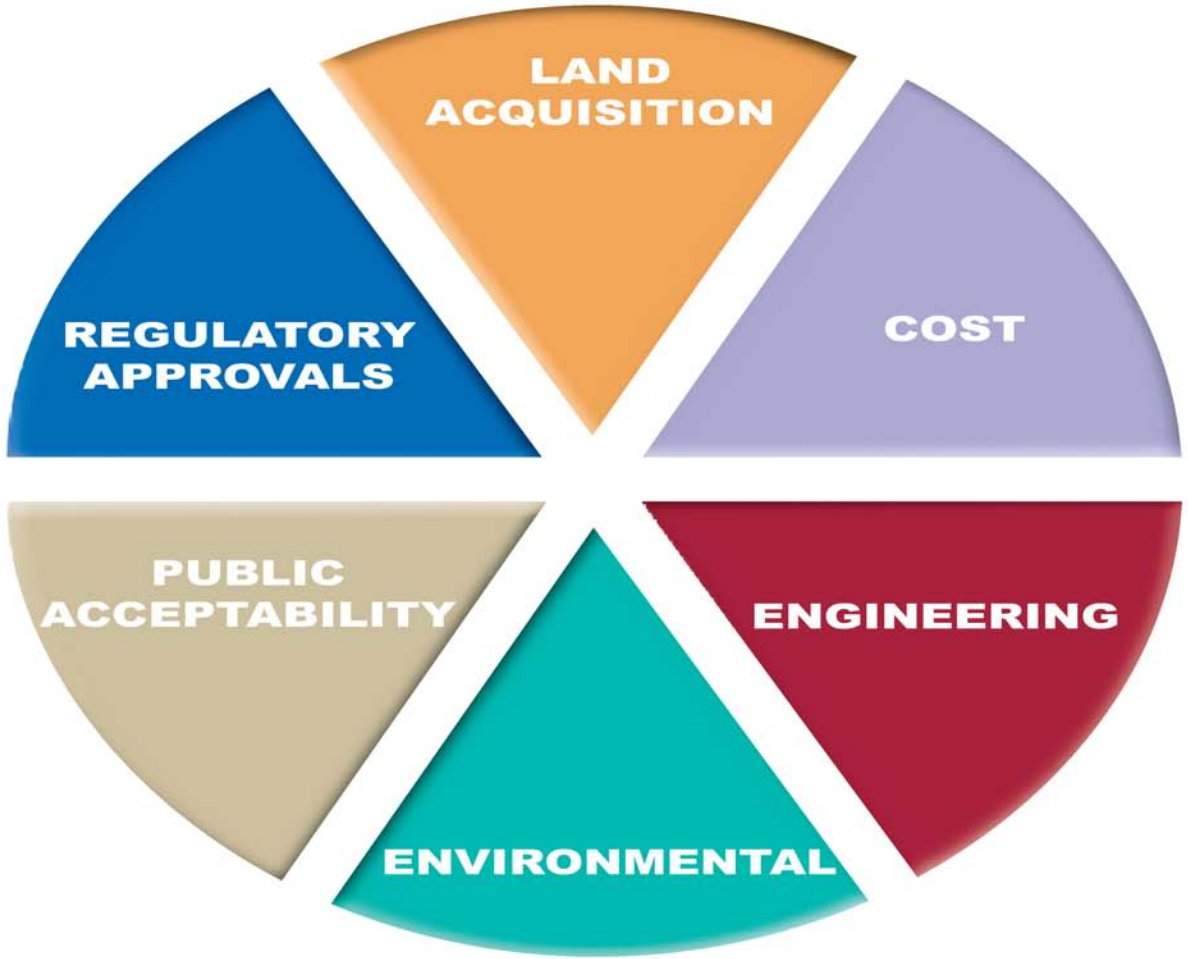
Sundance to Pinal South 230kV Transmission Project

Transmission Line Siting Considerations



Siting Project Schedule

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Sundance to Pinal South 230kV Transmission Project

Technical Considerations

EMF
(Electric and Magnetic Fields)

- APS recognizes the public concern for EMF and have included EMF considerations in the design of this project

- Typical magnetic field calculations for this project

  (based on expected 2011 flows)*

  Inside the Right-of-Way < 5 (mG)

  – 50 feet from the structure 3.5 (mG)

  – 100 feet from the structure < 2 (mG)

  **Magnetic field calculations may vary based on the ultimate line configuration and the amount of electric load carried by the lines*

- Additional information and research
  – World Health Organization (**http://www.who.int/en/**)
  – National Institute of Environmental Health Sciences (**http://www.niehs.nih.gov/**)

EMF
(Electric and Magnetic Fields)

- EMF's are produced by **ALL** devices which use, carry, or produce electricity
- EMF strength drops off dramatically as distance from the source increases
- Research on EMF began in the 1970's and continues today
- To date, no Federal or Arizona State standards have been established for EMF levels or exposure
- APS continues to monitor U.S. and international studies regarding EMF and offers free in-home measurements of EMF levels to all APS customers

Electric Fields

- Electrostatic induction can occur with insulated objects near the transmission line. This can result in nuisance shocks to individuals touching a grounded object under or near the line

- IEEE standard for electric field values (max):
  - Outside of the Right-of-Way 5.0 kV/m
  - Inside of the Right-of-Way 10.0 kV/m

- Calculated values for this project:
  - Outside of the Right-of-Way < 0.5 kV/m
  - Inside of the Right-of-Way < 1.1 kV/m

Communications

- Transmission lines have been known to cause interference with radio and TV transmissions
- Calculated radio noise levels (at 100 feet from conductor):
  25.1 dB(A) fair weather (try to keep below 40 dB(A))
- Based on interference studies, no interference is expected with digital, satellite, or cable television

Corona

- Corona is defined as the breakdown of air into charged electrical particles. The amount of corona for a transmission line is a function of several things including:
  - Engineering Design
  - Voltage
  - Phase spacing and geometry
  - Weather conditions

- Effects of Corona are:
  - Audible Noise
  - Radio and TV interference

Audible Noise

- Created by Corona discharge along the line and the frequency and voltage level of the line
- Transmission line noise can be described as humming or crackling
- Noise Levels (at 100 feet from the structure) for this project are expected to be:
  - Fair Weather 11 dB(A)
  - Wet Weather 23 dB(A)
  - Ldn (Weighted Avg.) 17 dB(A)
- Suggested Levels (100 feet from the structure):
  - EPRI studies re: customer complaints 52.5 dB(A)
  - EPA recommended Ldn level 55.0 dB(A)
- Other common levels
  - Busy Traffic 70 dB(A)
  - Moderate Rain 50 db(A)

Noise levels on this project are expected to be less than the suggested levels

Opportunities for Public Information and Comment

Fill out and return a comment form tonight!

Electronic comment forms and project updates available on the

Project Web site: **www.aps.com/siting** (see Sundance to Pinal South 230kV under “Current Projects”)

Greg Bernosky, APS Project Manager can be reached at 1-866-472-4484 (Select option 2)

Future project announcements will have updated information and opportunities for comment

Arizona Power Plant and Transmission Line Siting Committee Hearings

Interactive GIS