

# APS North Gila to TS-8 to Yucca 230kV Transmission Project

## Open House

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# Project Need and Regional Information



# Common Electrical Terms

**Circuit** – Term used to define an electrical path (e.g., 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)** –  $1\text{kV} = 1,000$  volts or  $230\text{kV} = 230,000$  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 an average of 250 homes in the U.S.

**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

# Project Need

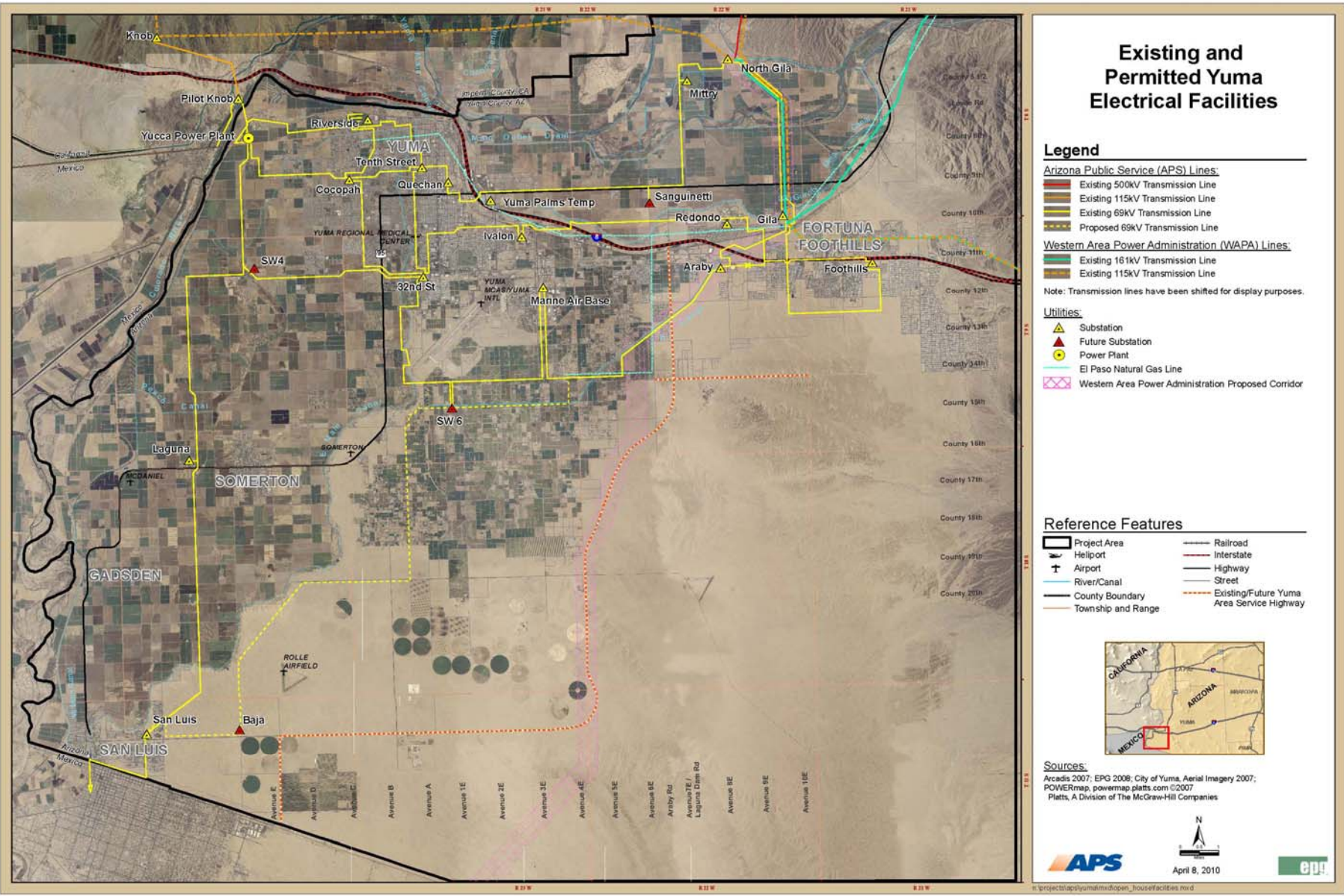
- Necessary supplement to the existing Yuma electrical system when the Palo Verde - North Gila #2 500kV line is in-service (proposed for 2014)
- Increases reliability and electric load serving capability in the Yuma area
- Provides opportunities to integrate regional renewable generation resources into the electric system

# Prior North Gila to TS-8 Project

- In 2007, APS conducted a year-long public line siting process, including the identification of preliminary APS route options
- Pursuit of a Certificate of Environmental Compatibility (CEC) was suspended in 2008 as a result of:
  - In-service date change for the Palo Verde - North Gila #2 500kV project
  - Slowing regional growth
  - Local Yuma area electrical upgrades

# APS Public Siting Activities in 2010

- Re-initiate public line siting activities for the North Gila to TS-8 230kV Transmission Project
- Re-evaluate route options identified in the previous line siting process
- Include the study of an additional segment from TS-8 to the Yucca Power Plant in the siting activities
- Conduct an extensive public outreach program to solicit input as part of the route identification process
- File a CEC application and other federal and state permits, as required



# Existing and Permitted Yuma Electrical Facilities

## Legend

### Arizona Public Service (APS) Lines:

- Existing 500kV Transmission Line
- Existing 115kV Transmission Line
- Existing 69kV Transmission Line
- - - Proposed 69kV Transmission Line

### Western Area Power Administration (WAPA) Lines:

- Existing 161kV Transmission Line
- Existing 115kV Transmission Line

Note: Transmission lines have been shifted for display purposes.

### Utilities:

- ▲ Substation
- ▲ Future Substation
- Power Plant
- El Paso Natural Gas Line
- - - Western Area Power Administration Proposed Corridor

## Reference Features

- Project Area
- Railroad
- Interstate
- Airport
- Highway
- River/Canal
- Street
- County Boundary
- Existing/Future Yuma Area Service Highway
- Township and Range



## Sources:

Arcadis 2007; EPG 2008; City of Yuma, Aerial Imagery 2007; POWERmap, powermap.platts.com ©2007; Platts, A Division of The McGraw-Hill Companies

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# Yucca Power Plant



- Began service in 1959
- Natural gas-fueled “peaking plant” operated by APS
  - 6 combustion turbines, capable of producing approximately 240 MW
  - APS added two new 48 MW units in 2008
  - Includes a 75 MW steam turbine and a 20 MW combustion turbine, both of which are owned by Imperial Irrigation District



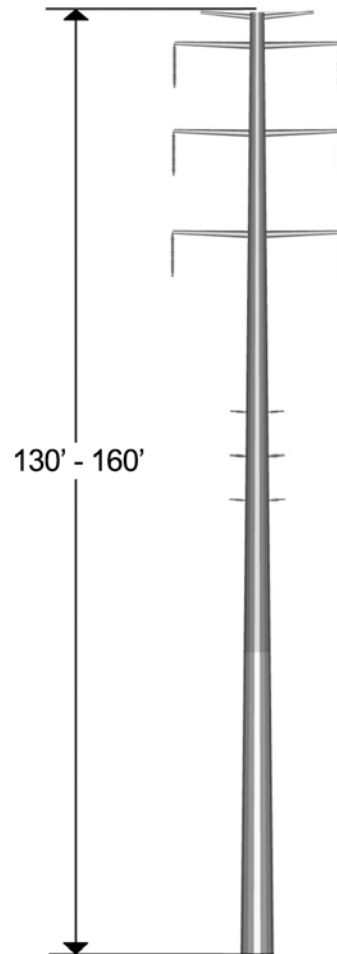
# Project Description and Design Considerations



# Project Description

- Double-circuit 230kV transmission line designed to accommodate the underbuild of existing and/or future 69kV circuits
- Interconnection facilities at North Gila, Yucca, and the new TS-8 Substation (location to be determined)
- Steel monopole structures, typically 130-160 feet in height
- Typical 100-foot wide right-of-way
- Project may be developed in phases depending upon system considerations

# Typical 230kV Structure



Double Circuit 230kV  
Transmission Structure  
with 69kV Underbuild

# 230kV Structure Examples



# Technical Considerations



# Electric and Magnetic Fields (EMF)

## Electric Field

Fields created by voltage on the transmission line that can cause an electric charge to build up on insulated objects near the line. This can create nuisance shocks (much like walking across carpet and touching a door handle) to individuals touching grounded objects near the line.

The standard for maximum electrical field value outside of the power line right-of-way is 5.0kV/m. The value calculated for this project is less than 0.5kV/m.

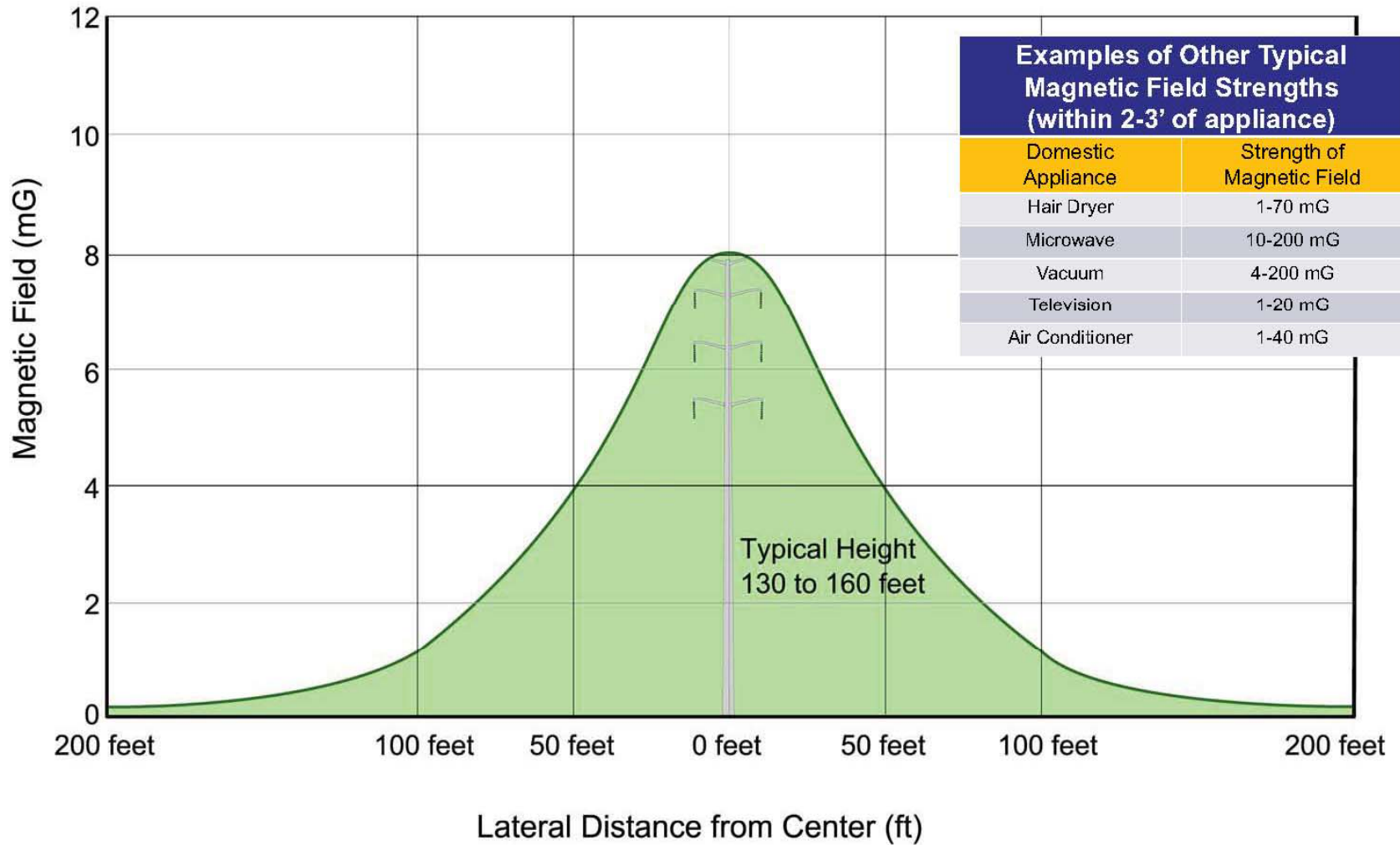
## Magnetic Field

Fields that are created by ALL devices which use, carry or generate electricity. Magnetic fields drop off dramatically as distance from the source increases. To date, no Federal or Arizona State standards have been established for magnetic field levels.

APS recognizes the public concern for magnetic fields and have included those considerations in the design of this project. For this project, the calculated value for magnetic field, at the edge of the right-of-way, is approximately 4mG.

***APS continues to monitor U.S. and international studies regarding EMF, and offers free in-home measurements of EMF levels to all APS customers***

# Magnetic Fields



# Noise and Communications

## Noise

High voltage transmission lines can emit audible noise. The noise is often times described as a “humming” or “crackling” sound. The audible noise, from a transmission line, is most affected by weather and the surrounding conditions.

The noise value calculated for this project is 8dB(A) for fair weather and 21dB(A) for rainy weather at 100 feet from the structure. Studies have shown customer complaints, regarding transmission line noise, typically occur when values exceed 52.5dB(A).

## Communications

High voltage transmission lines have been known to cause interference with radio and television transmissions. Calculated values for this project show some interference to AM radio stations may occur within 200 feet of the line. However, interference to FM radio, digital, satellite, or cable communications is not expected.



# Common Noise Levels

## Common Outdoor Noises



**Rock Band** at 15 Feet

Gas Lawn Mower at 3 feet

Diesel Truck at 50 feet

Typical Urban Daytime

Gas Lawn Mower at 100 Feet

**Heavy Traffic** at 300 feet

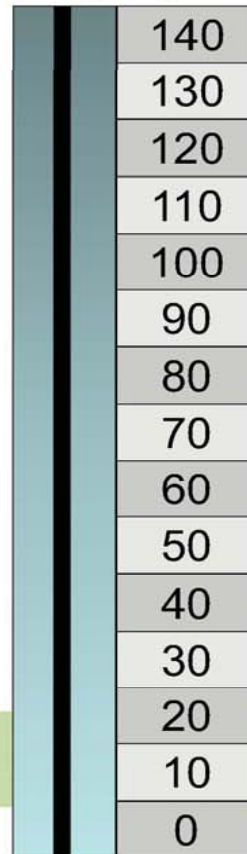


Urban Nighttime

Rural Nighttime

**Transmission Line at 100 feet**

Sound Level (dBA)



## Common Indoor Noises

Threshold of pain



**Food Blender** at 3 feet

Garbage Disposal at 3 feet

Vacuum Cleaner at 10 feet

Normal Speech at 3 feet

Dishwasher next room

**Library**



Threshold of hearing

**Note: Sound is perceived differently by every individual**

# Preliminary Route Identification



# Land Ownership and Jurisdictions

## Legend

### Ownership

- Bureau of Land Management
- Bureau of Reclamation
- Tribal Land
- Department of Defense
- State Land
- Private / Other

### Jurisdictional Boundaries

- City of San Luis
- City of Somerton
- City of Yuma

### Utilities

- Substation
- Future Substation
- Power Plant
- Existing 500kV Transmission Line
- Existing 161kV Transmission Line
- Existing 115kV Transmission Line
- Existing 69kV Transmission Line
- Proposed 69kV Transmission Line
- Western Area Power Administration Proposed Corridor

### Reference Features

- Project Area
- Helipoint
- Airport
- River/Canal
- County Boundary
- Township and Range
- Railroad
- Interstate
- Highway
- Street
- Existing/Future Yuma Area Service Highway

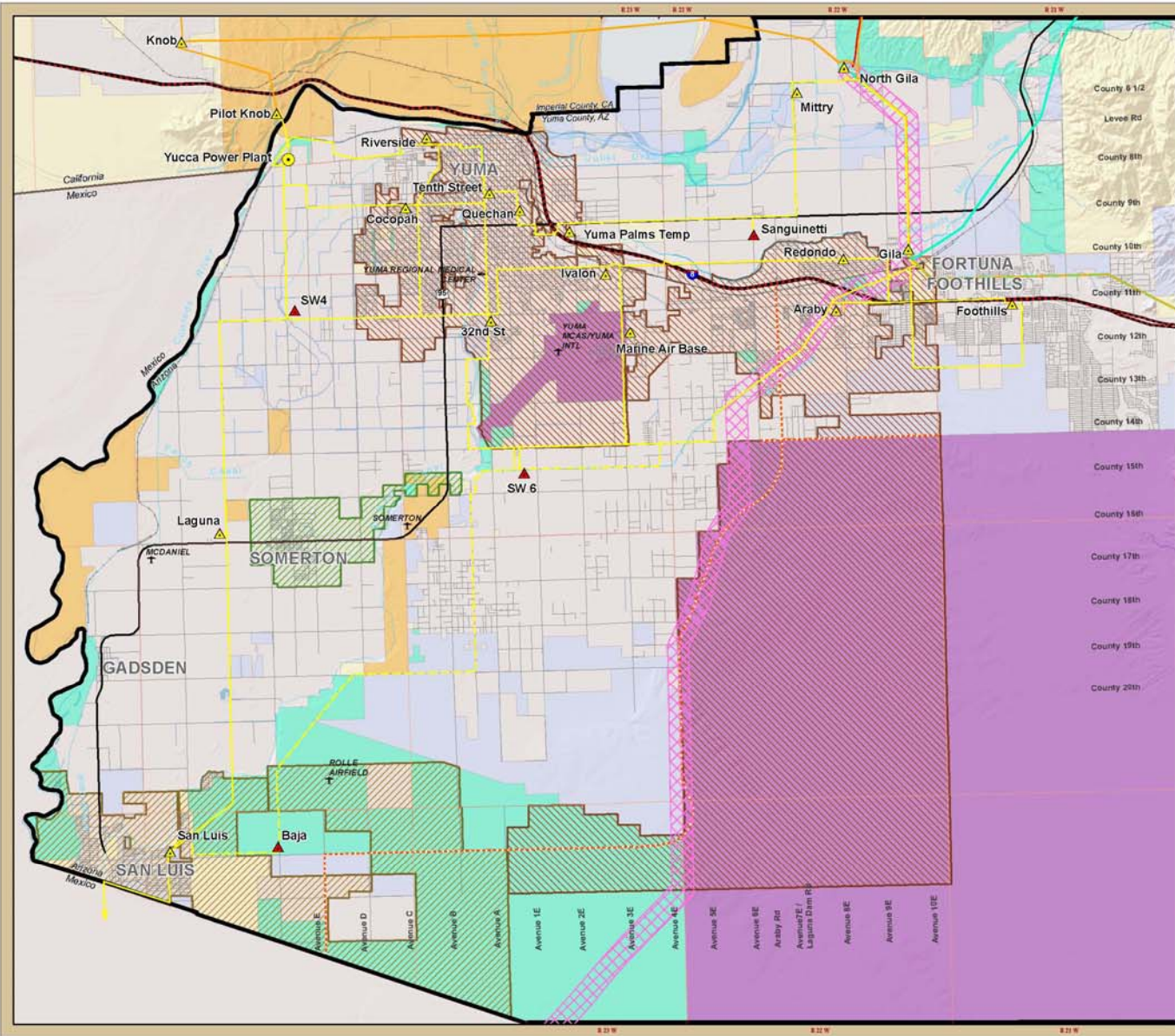


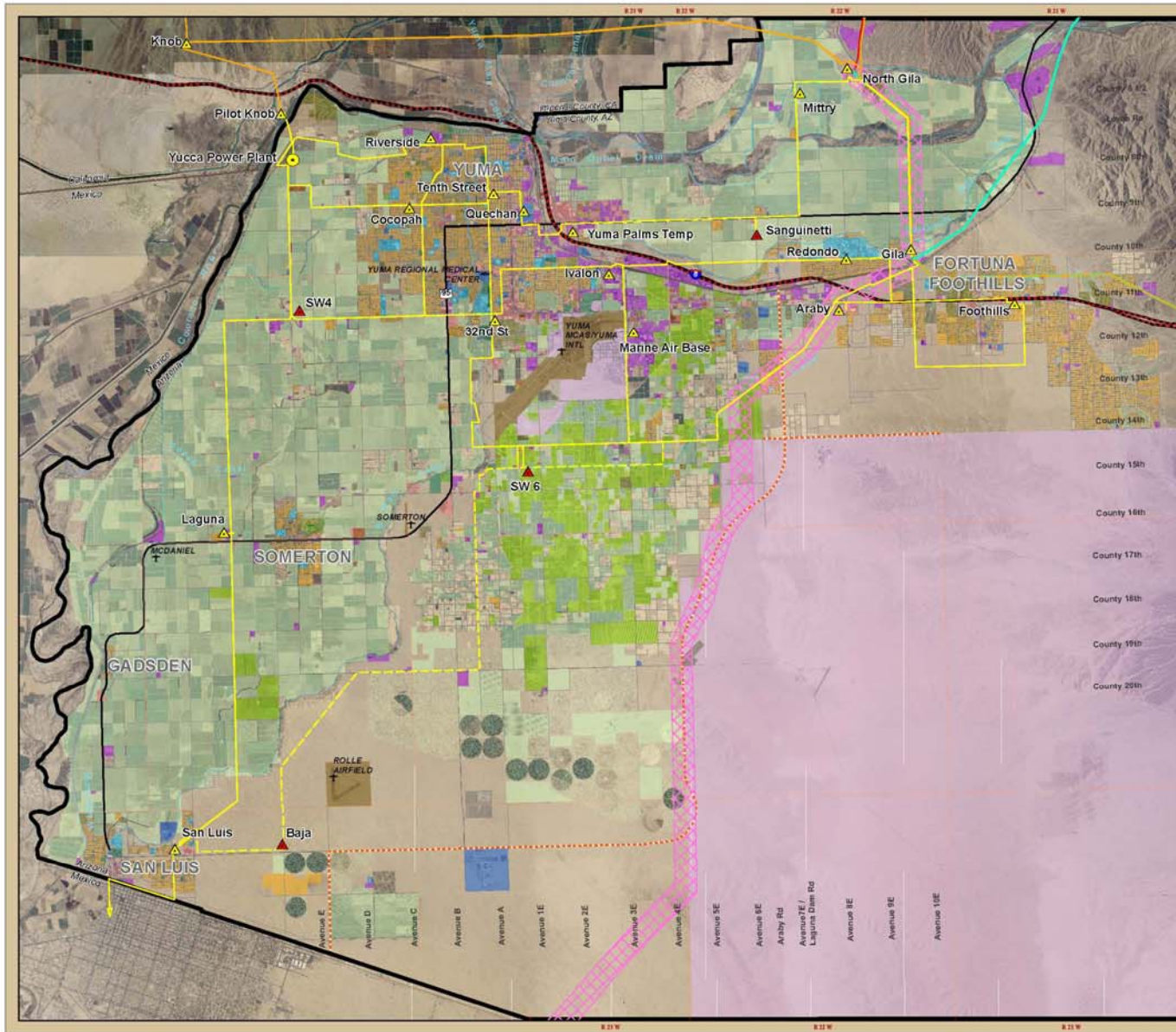
### Sources:

Arizona State Land Department 2007;  
 EPC 2008; ESRI Aerial Imagery 2008;  
 POWERmap; powermap.platts.com ©2007  
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## Existing Land Use

### Legend

- Land Use**
- Agriculture
  - Air Facilities
  - Commercial
  - Communication Facilities
  - Industrial
  - Military
  - Mixed Use
  - Open Space
  - Orchard
  - Parks/Preservation
  - Pivot Agriculture
  - Public/Quasi-Public
  - Recreation
  - Residential - High Density
  - Residential - Low Density
  - Residential - Medium Density
  - School/Educational Facilities
  - Transportation
  - Utility
  - Vacant
  - Water
- Utilities**
- Substation
  - Future Substation
  - Power Plant
  - Existing 500kV Transmission Line
  - Existing 151kV Transmission Line
  - Existing 115kV Transmission Line
  - Existing 69kV Transmission Line
  - Future 69kV Transmission Line
  - Western Area Power Administration Proposed Corridor

### Reference Features

- Project Area
- Helipoint
- Airport
- River/Canal
- County Boundary
- Township and Range
- Railroad
- Interstate
- Highway
- Street
- Existing/Future Yuma Area Service Highway



**Sources:**  
 Forest Service 2008; Imperial County 2005; Yuma County 2007;  
 City of Yuma/County of Yuma Joint Land Use Plan 2008;  
 City of Yuma Land Use 2008; City of Somerton Existing Land Use 2007;  
 EPG 2008; ESRI Aerial Imagery 2008; POWERmap,  
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## Future Land Use

### Legend

#### Land Use

Agriculture	Parks/Preservation
Air Facilities	Public/Quasi-Public
BIA Lands	Recreation
BLM Lands	Residential
Commercial	Residential - High Density
Communication Facilities	Residential - Low Density
Industrial	Residential - Medium Density
Military	School/Educational Facilities
Mixed Use	Transportation
Mobile Home Park	Utility
Open Space	Water

#### Status (2009)

Final Plat	General Plan
Preliminary Plat	Existing
Approved Development	

#### Utilities

Substation	
Future Substation	
Power Plant	
Existing 500kV Transmission Line	
Existing 161kV Transmission Line	
Existing 115kV Transmission Line	
Existing 69kV Transmission Line	
Future 69kV Transmission Line	
Western Area Power Administration Proposed Corridor	

#### Reference Features

Project Area	Railroad
Helipoint	Interstate
Airport	Highway
River/Canal	Street
County Boundary	Existing/Future Yuma Area Service Highway
Township and Range	



#### Sources:

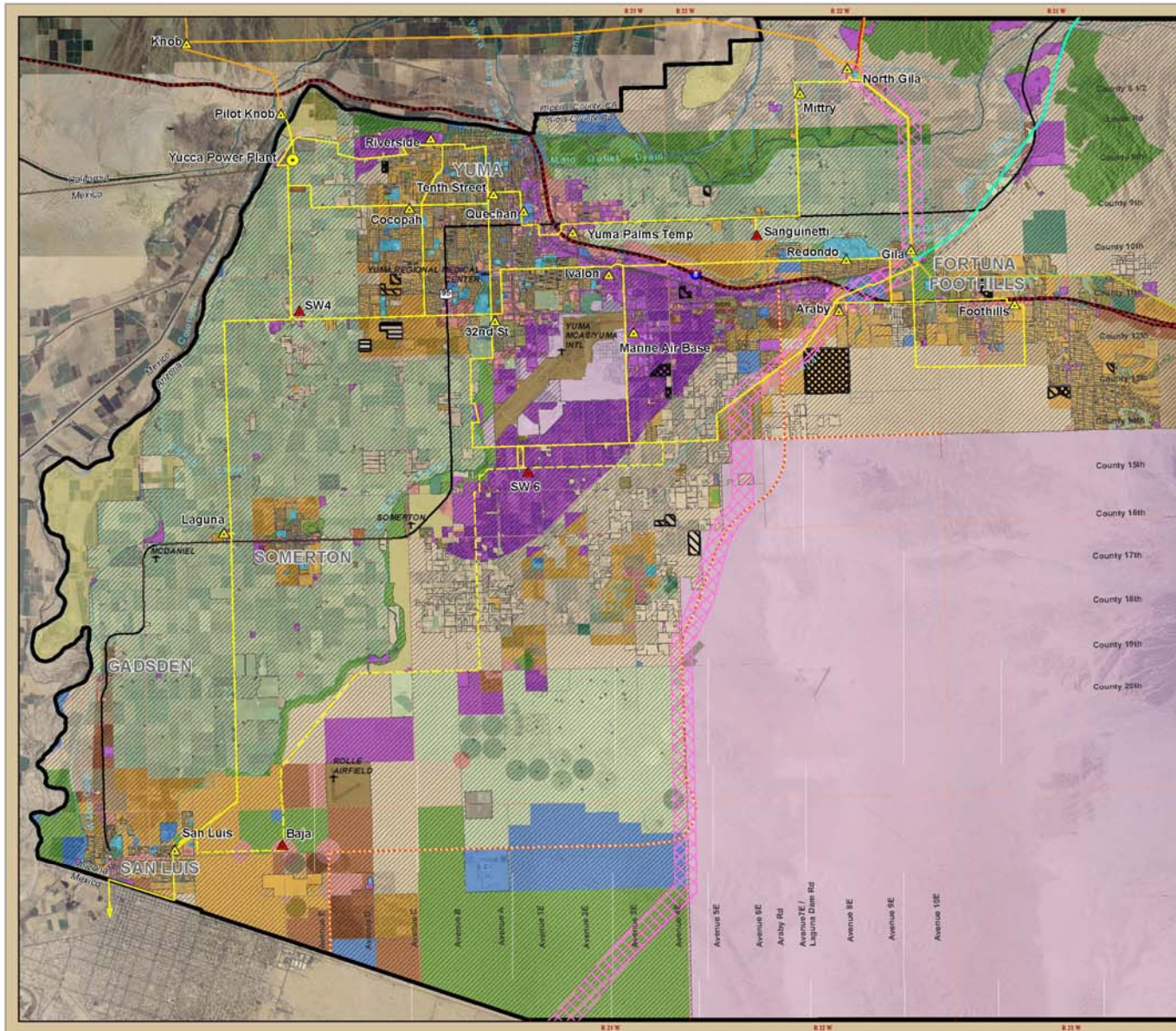
Imperial County General Plan 2004; City of Yuma Recent Activity Map 2008; Yuma County Comprehensive Plan 2007; Yuma County Comprehensive Plan Amendments 2008; City of Yuma/County of Yuma Joint Land Use Plan 2006; EPIC 2008; PWC/EMaps; powermap.platts.com ©2007 Platts, A Division of The McGraw-Hill Companies



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# Resource Sensitivity Levels

LOW	LOW-MODERATE	MODERATE	MODERATE-HIGH	HIGH	EXCLUSIONS
<p>Industrial</p> <p>Vacant</p> <p>Agriculture (fallow)</p> <p>Planned Commercial</p> <p>Planned Office/ Business Park</p> <p>Planned Industrial</p>	<p>Planned Developments: Approved/Conceptual</p> <p>Planned Residential</p> <p>Planned Open Space</p> <p>Special Recreation Management Area (SRMA)</p>	<p>MCAS Approach Zone – High Noise Zone</p> <p>Commercial</p> <p>Recreation</p> <p>Open Space</p> <p>Agriculture (irrigated)</p> <p>Planned Developments: Preliminary Plat</p> <p>Multi-Use Trails</p>	<p>MCAS Approach Zone – Zone 2</p> <p>National Register Districts</p> <p>Orchard</p> <p>Pivot Agriculture (irrigated)</p> <p>Planned Development: Final Plat</p> <p>Gateway Roads</p>	<p>MCAS Approach Zone – Zone 1</p> <p>Regional and Local Parks</p> <p>Residential</p> <p>Schools</p> <p>Cemeteries</p> <p>Endangered Species Habitat</p> <p>VRM Class II</p> <p>Cultural Sites</p> <p>National Historic Trails</p> <p>Military (within 1/4 mile of State Route 195/Yuma Area Service Highway)</p>	<p>MCAS Approach Zone – Clear Zone</p> <p>Airports/Heliports</p> <p>All Other Military Areas</p>

# Siting Opportunities

Primary Siting Opportunities
APS Transmission Lines (115kV and above)
APS Sub-transmission Lines (69kV and below)
APS Planned/Approved Power Lines (69 kV and above)
Designated Utility Corridors and Existing Rights-of-Way
Major Pipelines (diameter 6" and up)
Major Canals
Interstates, Highways (major transportation)
Railroads
Secondary Siting Opportunities
Non-APS Transmission Lines
Non-APS Sub-transmission Lines
Non-APS Planned/Approved Power Lines (69kV and above)
Canal Laterals
Western Area Power Administration Transmission Line Corridor
Planned Highways

# Opportunities and Composite Resource Sensitivities

## Legend

### Resource Sensitivity Level

- Exclusion
- High
- Moderate-High
- Moderate
- Low-Moderate
- Low

### Siting Opportunity Area

- Primary Opportunity
- Secondary Opportunity

### Utilities

- Substation
- Future Substation
- Power Plant
- Existing 500kV Transmission Line
- Existing 161kV Transmission Line
- Existing 115kV Transmission Line
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- Proposed 69kV Transmission Line
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### Reference Features

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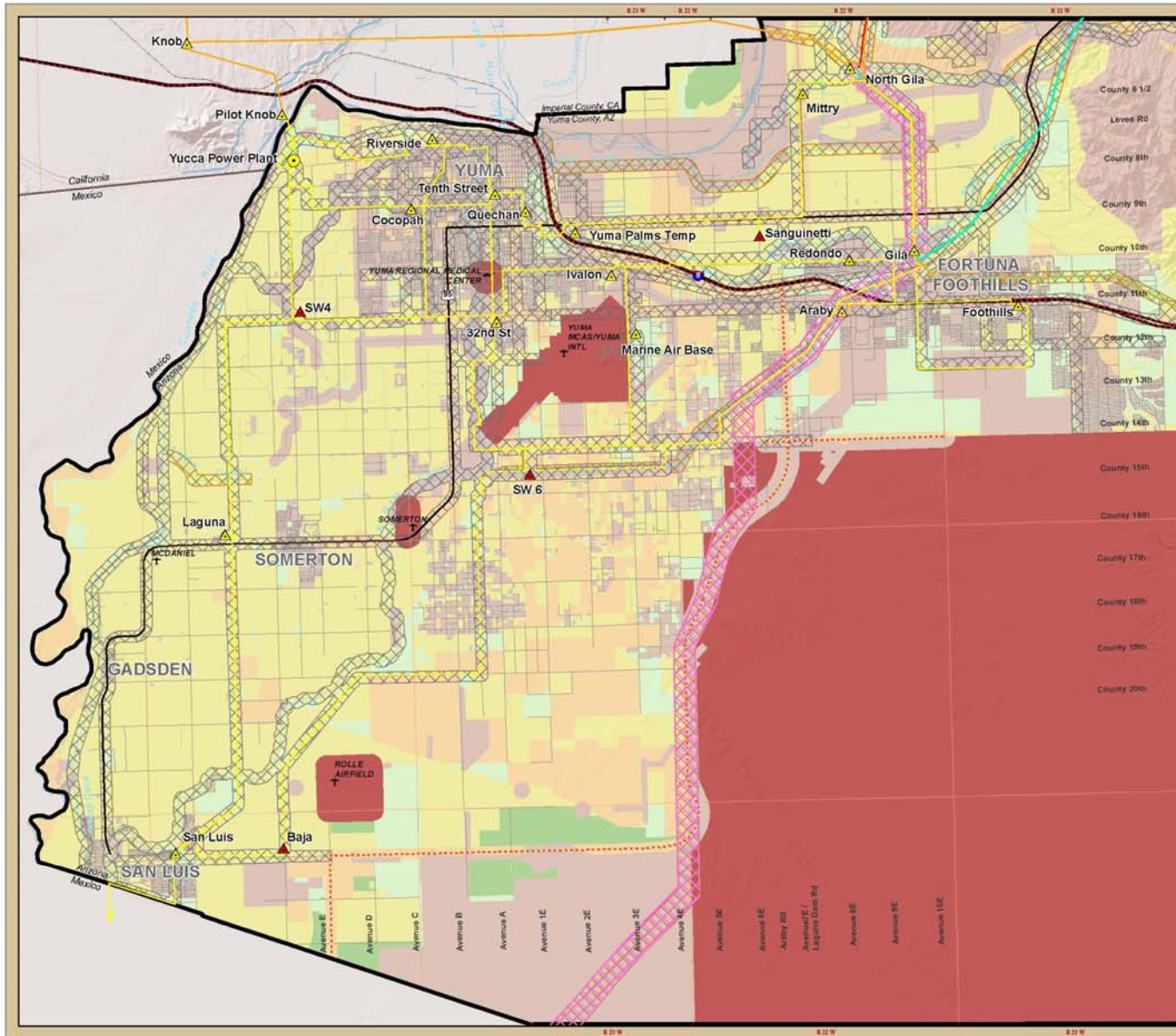


### Sources:

BLM, Yuma RMP; BLM 2008; EPG 2008;  
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# Factors Considered in Preliminary Route Identification

- Maximize use of siting opportunities
  - Parallel existing major power lines, pipelines, and other linear features
- Minimize impact to sensitive resource areas
  - Avoid highly developed areas
  - Airports, heliports, clear zones, etc.

# Preliminary Alternative Routes

## Legend

- Preliminary Alternative Route
  - Alternative Route Identified in 2007
- Ownership**
- Bureau of Land Management
  - Bureau of Reclamation
  - Tribal Land
  - Department of Defense
  - State Land
  - Private / Other
- Utilities**
- ▲ Substation
  - ▲ Future Substation
  - Power Plant
  - Existing 500kV Transmission Line
  - Existing 161kV Transmission Line
  - Existing 115kV Transmission Line
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## Reference Features

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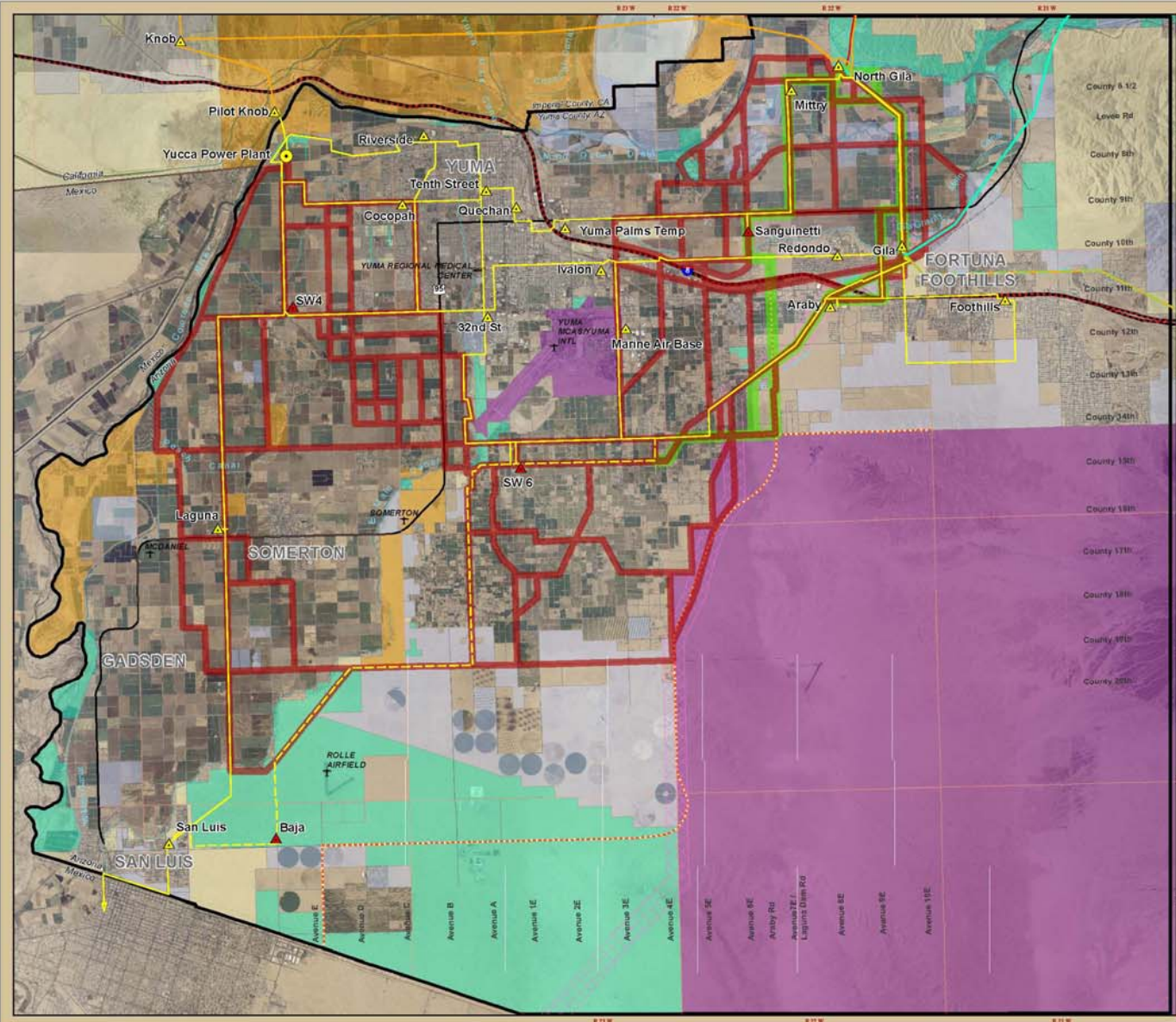
## Sources

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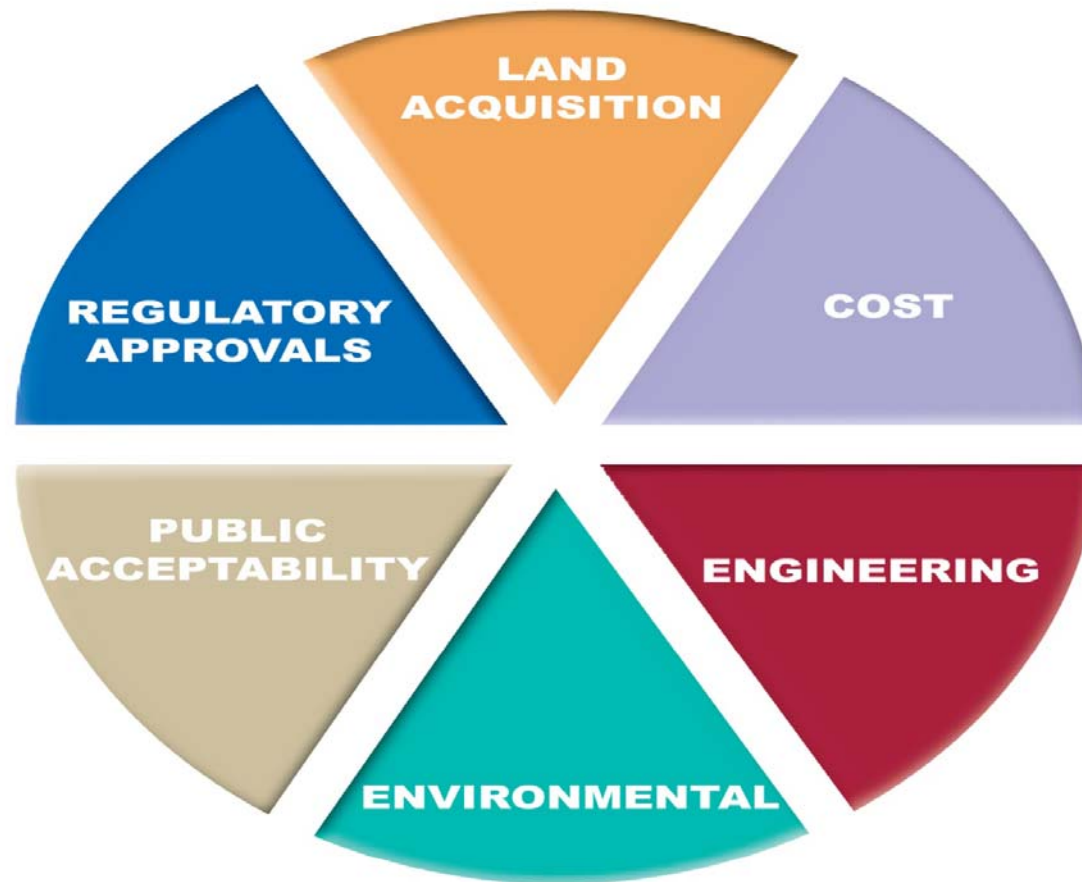




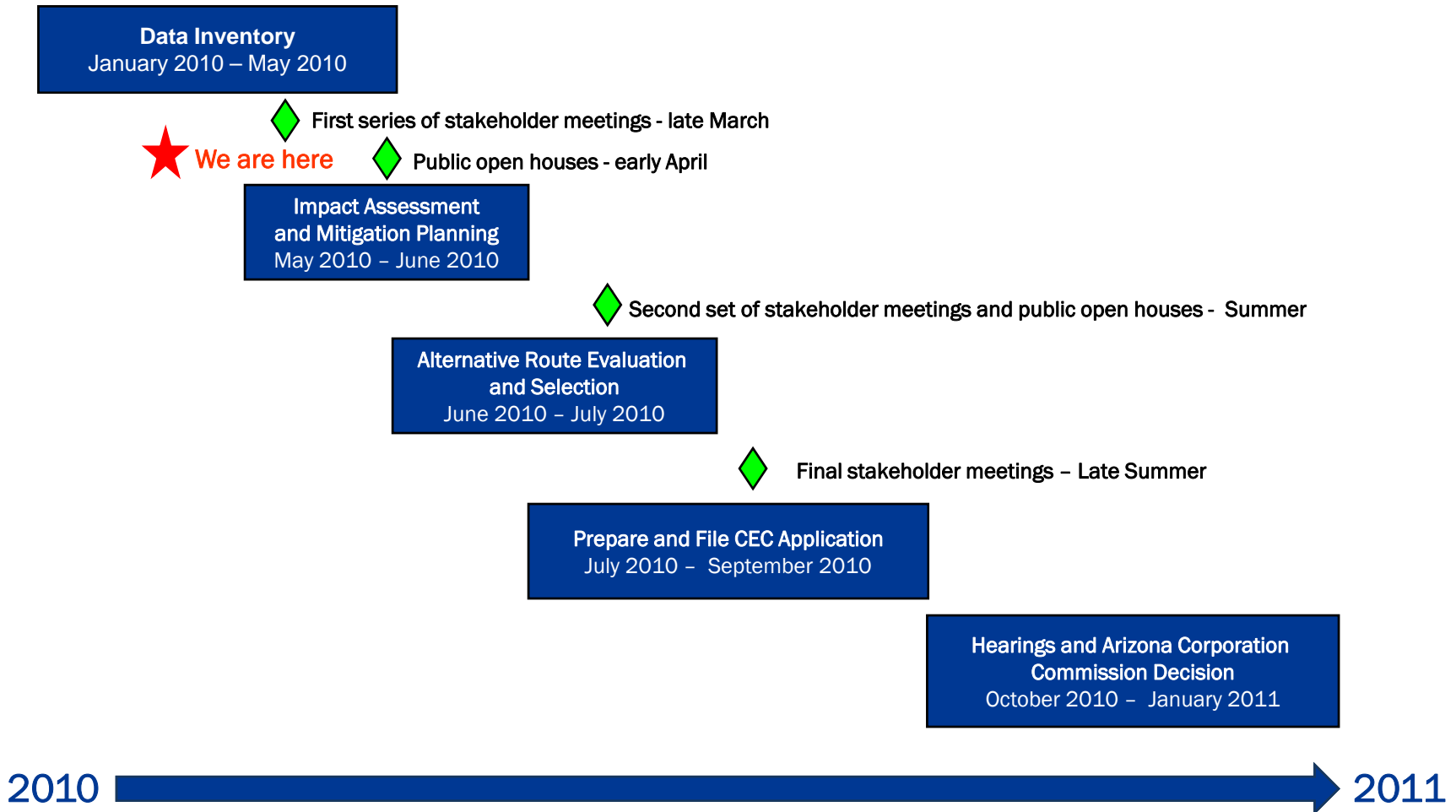
# Public Comments and Next Steps



# Transmission Line Siting Considerations



# Proposed Project Schedule



# Opportunities for Public Information and Comment

- Fill out and return a comment form tonight!
- Electronic comment forms and project updates available at:  
**[www.aps.com/siting](http://www.aps.com/siting)**  
(see North Gila to TS-8 to Yucca 230kV Project under “Current Projects”)
- APS Project Manager can be reached at:  
**1-866-472-4484 (Select Option 1)**
- Future project newsletter(s) will have updated information and opportunities for comment
- Arizona Power Plant and Transmission Line Siting Committee Hearings and ACC Open Meeting