

Microgrids: Ramona Reservation Riverside County, California

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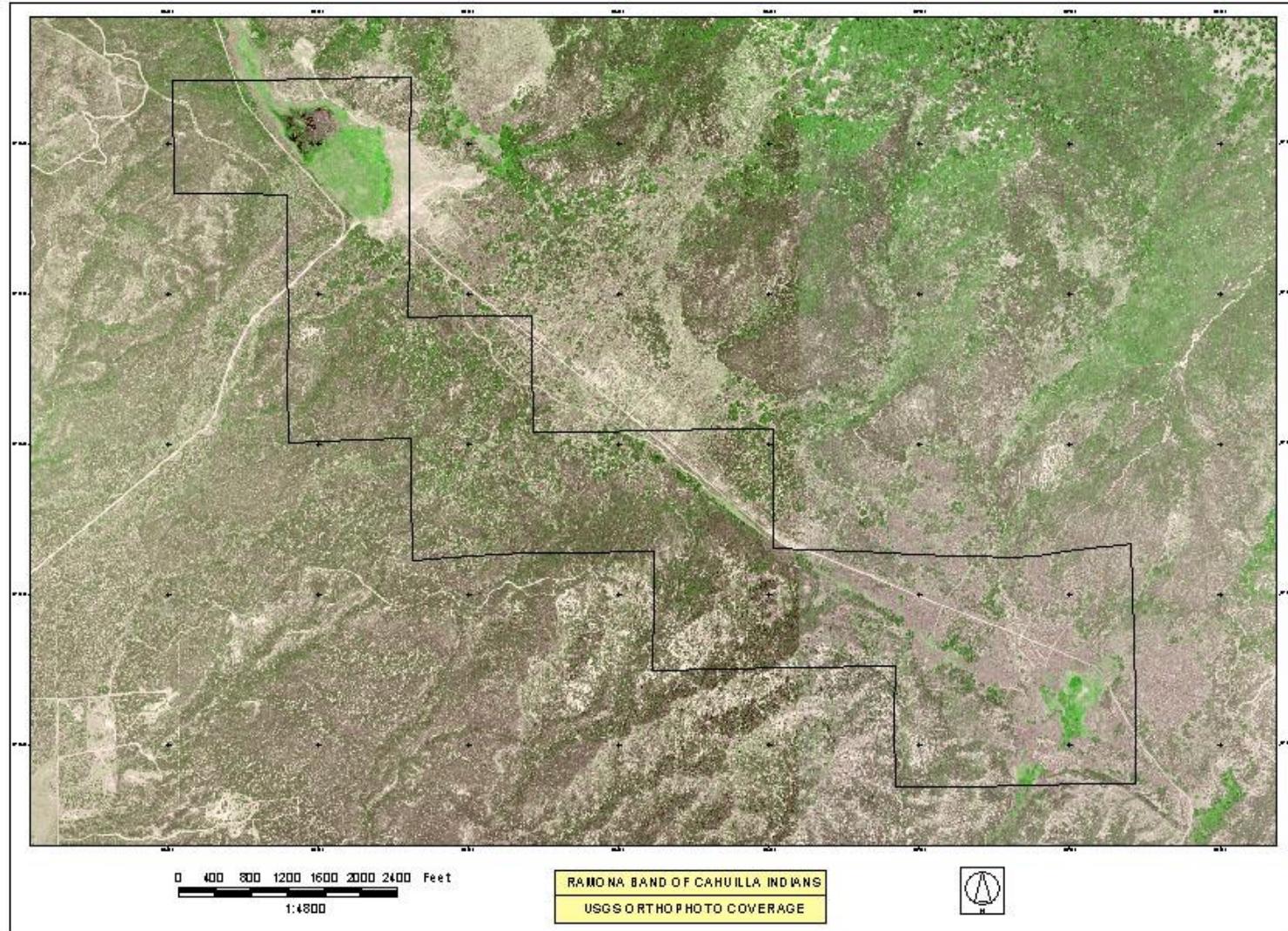
Ramona Band of Cahuilla

March 4, 2015

Regional Location



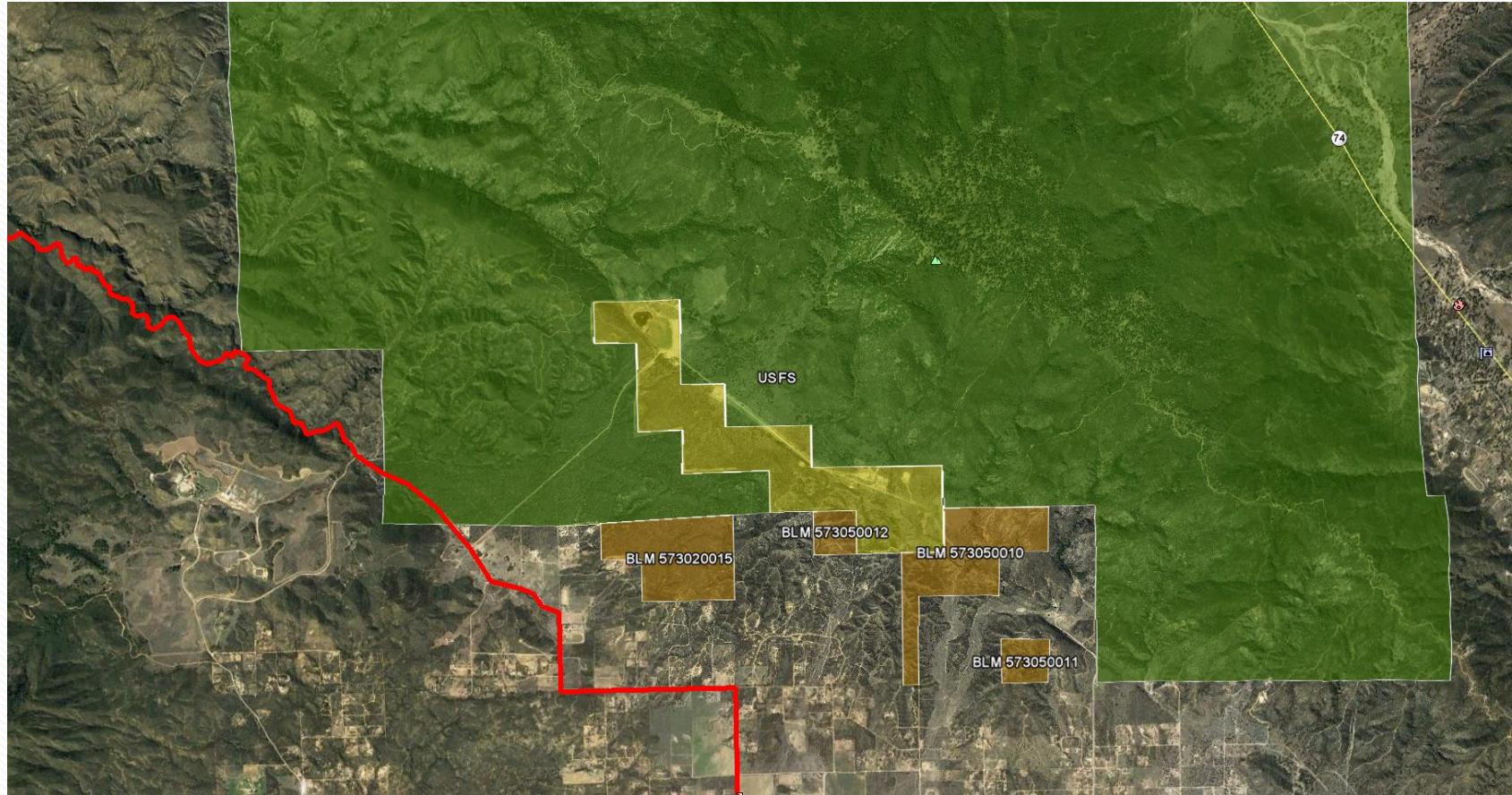
Ramona Location



Ramona Tribe – Overview

- First reservation to be completely off grid
- Present issues the tribe faces:
 - Remote and rural
 - Land Locked
 - Utility costs and infrastructure are prohibitive.
- Eco-Resort Project
- Tribal housing units
- Water Supply Wells

Land Locked: Electric Grid Access



Project Participants

- Agencies
 - Ramona Band of Cahuilla – Supplemental Funding
 - DOE – Eco-Resort and Housing power
 - USDA RD – Water well and solar power
 - U.S. Forest Service – Road Access

Ramona Reservation Power Systems

- Macro Grid Hybrid Power System: Eco-Resort
- Micro Grid Hybrid Power System: Housing Units
- Micro Grid Solar System: Water Well

Evergreen Solar Cedar Line Photovoltaic modules EC-100 Series



Macro-Grid Hybrid Power System

- 10kW Photovoltaic Array, 120 panels at 175W
- VRLA (Valve Regulated Lead Acid) Battery Banks
- 15kVA continuous inverter with 175A disconnect
- 60kW 3 Phase Diesel Generator
- Power Station Building 12' x 16'
- Monitoring System, Inverter, Breaker Box, Wiring, etc.
- Expandable depending on concept.

Power House: Front View



Power House: Side View



Absolyte IIP Batteries

- **Battery Output:** 10,800 Ah at 48 volts
- **Life Capacity:** up to 20 years
- **Weight:** 300 lbs per unit, 48 units in total.



Outback Inverters/Chargers

- 36 kW Inverters
- 120/240 Volts



Kohler 60hz Generator

- 60kW 3 Phase Generator.
- Used as a backup.



Housing Complex: Micro-Grid Hybrid System

- 2kW wind turbine capacity with wireless controls
- 6.3kW large photovoltaic modular array
- VRLA (Valve Regulated Lead Acid) battery banks
- 25kW Diesel generator

Wind Turbine and Solar Cells for Housing Complex, producing 8.3 kW



Power House (includes back-up propane/diesel generator, battery bank, and inverters/chargers)



Water Supply Well: Microgrid

- Previous well was poorly constructed.
- As a result, not enough water was supplied.
- Solution: Build another well.
- Power it with solar.



Water Well 3A

- 400 feet deep, 8 inch diameter.



Solar Application



Solar Components

- 51 Eoply Monocrystalline Solar Panels, 190W each, equaling ~9.6kW. 480V
- Backup Diesel Generator 25-40kW.
- Lorentz Solar Pump Control Model PS9k2 and Communicator.
- Variable Frequency Drive
- Double Throw Switch

Completed Array



Well Components



Water Storage Tanks

- Three 10,000 gallon storage tanks, for total of 30,000 gallons of water.
- Primary: Supplies the Maintenance Shop.
- Emergency water for disaster preparedness, such as fire and earthquakes.
- Also, better prepared for drought conditions.



Water Storage Tanks

- The center tank has float tree and measurement gage.
- Float tree communicates with the controller to turn on and off the well pump as needed.
- Mostly autonomous, except on cloudy days.



Continuing Work

- Find more grants related to energy.
- Complete the construction for the solar power supply.
- Add solar systems to water wells and to Tribal homes.
- Continue to be self-sufficient.

Contact Information

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