



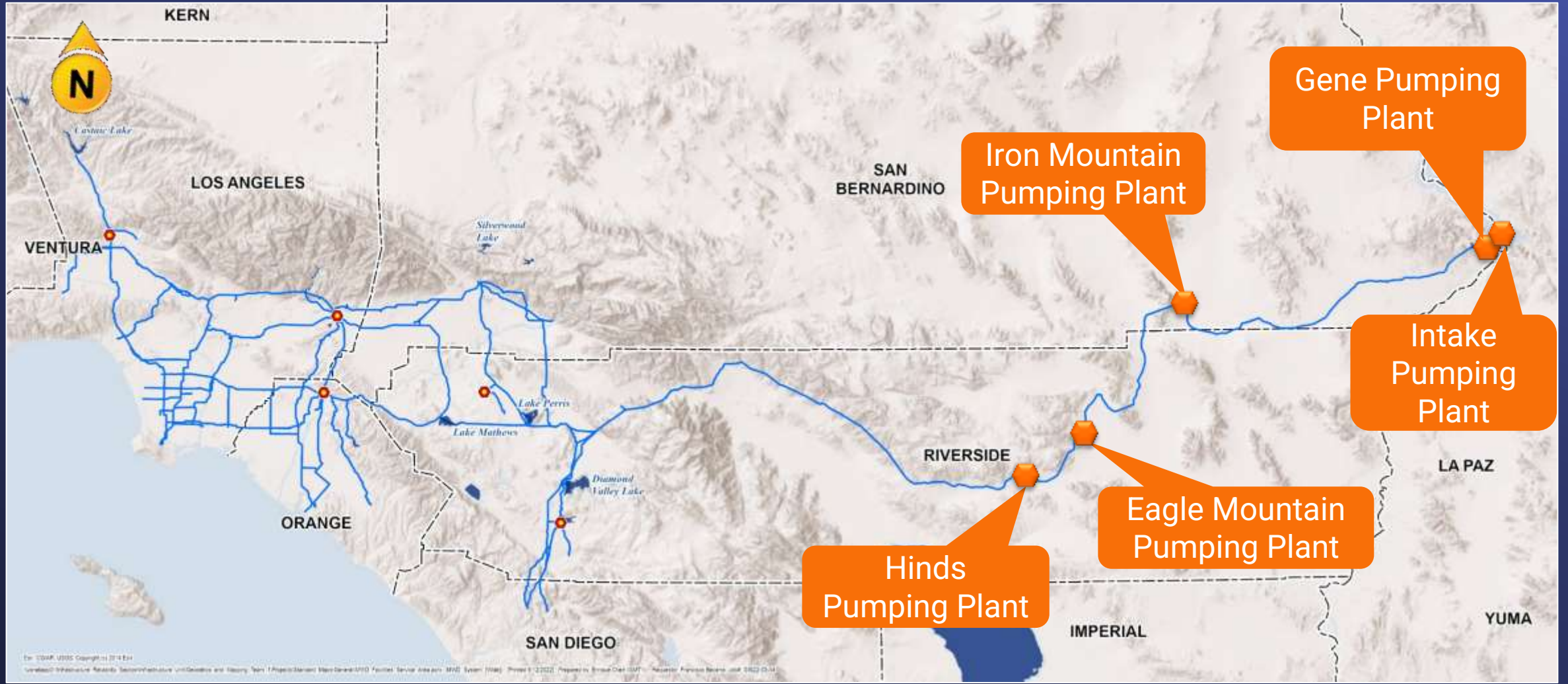
Engineering, Operations & Technology Committee

Update on Colorado River Aqueduct Electrical Upgrades

Item 7b

August 14, 2023

Location Map



Colorado River Aqueduct Electrical Reliability Update

CRA Electrical Reliability Goals

- Maintain reliability of CRA System
- Minimize single-point-of-failure risks
- Execute electrical capital improvements in cost-effective manner with minimal disruption to aqueduct operations
- Incorporate appropriate technology to enable cost-effective maintenance

Electrical Power System



Colorado River Aqueduct Electrical Reliability Update

Major Accomplishments

- High-Voltage System
 - Disconnect switches
 - Circuit breakers
 - Current limiting reactors
 - Lightning arresters
 - Protective relays
 - Transmission tower foundation rehabilitation



230 kV Circuit Breaker

Colorado River Aqueduct Electrical Reliability Update

Planned Work

- Medium & Low-Voltage Systems
 - 2.3 kV & 480 V switchgear
 - 2.3 kV Standby Generators at Iron Mtn., Gene & Intake PP's
 - Black Metal Mountain 2.3 kV
 - Gene communications
 - 6.9 kV Circuit Breakers
 - Auxiliary Power Systems
- Transformer Replacements



Typical Power Panel

1. Background – Switchracks Replacement

- 2.3 kV Switchracks built in 1939
- Central distribution center for low & medium voltage
 - Cooling, portable, & fire water pumps
 - Lubricating oil for pumps
 - Station lighting
 - Village housing
- Circuit breakers & protection relays – spare parts not available
- Unsheltered equipment difficult to maintain due to weather conditions



Existing 2.3 kV Switchrack (Iron Mtn.)

1. Improvements – Switchracks Replacement

- New climate-controlled concrete buildings
- Double-ended power system
- Replace 2.3 kV with 4.16 kV
- Meet current standards
- Basement with cable tray system



Conceptual Rendering

2. Background – Main Transformers Replacement

- Installed from 1939 to 1959
 - 35 Transformer Units
- Power source for all CRA pumping plants
- Exceeded typical life expectancy of 50-75 years



2. Improvements – Main Transformers Replacement

- Replace Transformers (Metropolitan Furnished Equipment)
 - Single-phase
 - Air-cooled
 - Less flammable K-class fluid
- Seismic upgrades to foundation
- Secondary containment structures
- Replacement of cranes & cart system
- Provide security enhancements



3. Background – Black Metal Mtn. Electrical Power Upgrades

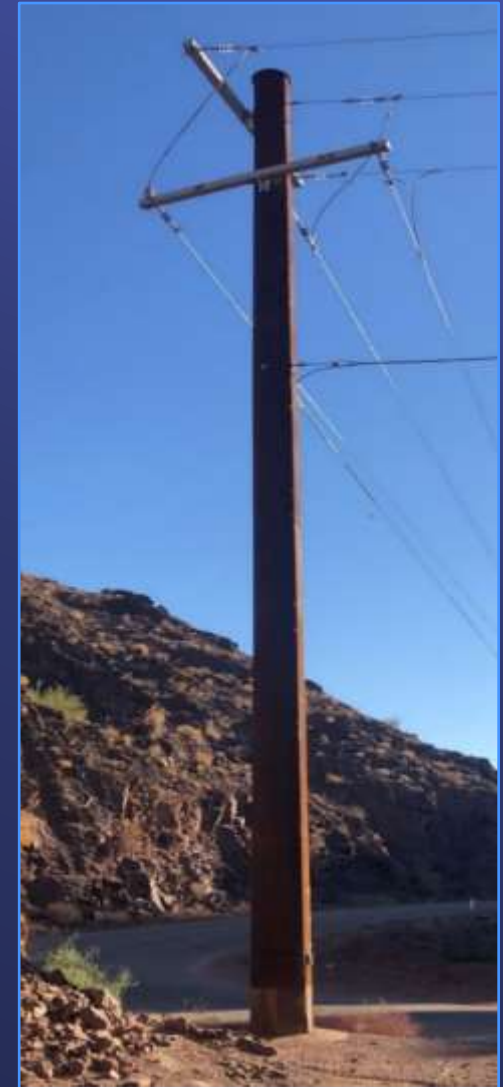
- Installed in the 1970s
- Critical link for Metropolitan's desert facilities
- Site leased to other government agencies
 - San Bernardino County Sheriff's & Fire Departments
 - California Highway Patrol
 - Caltrans
 - Federal Aviation Administration
- Increased power demand requires upgrades



Black Metal Mountain

3. Improvements – Black Metal Mtn. Electrical Power Upgrades

- Install one-mile-long power line
 - New steel poles
 - New larger electrical conductors
- Improve site access & power line maintenance roads
 - Reduce/stabilize road slopes
 - Improve drainage
 - Pave parts of the roadway for traction
 - Install guardrails



Light Duty Steel Pole

Colorado River
Aqueduct
Electrical
Reliability Update

Upcoming Board Actions

Project	Action
Gene Communication System Upgrades	Award of Construction Contract
CRA 69 kV & 230 kV Transformer Replacement	Award of a Procurement Contract & Award of Agreement for Final Design
Iron Mtn. PP 2.3 kV Switchrack Replacement	Award of Agreement for Final Design
Black Metal Mtn. 2.4 kV Power Upgrades	Award of Agreement for Final Design
Intake, Gene, Eagle Mtn. & Hinds PPs 2.4 kV Switchrack replacement	Award of Agreement for Preliminary Design

Colorado River Aqueduct Electrical Reliability Update

CRA Electrical Reliability

- Conclusion
 - Total expenditures since 2002: \$130 M
 - Planned work through 2035: \$280 M (approx.)
 - Benefits of following a long-term strategy
 - Flexibility to adjust schedules based on priorities & shutdown opportunities
 - Minimizes impacts to aqueduct operations
 - Proactive identification of work reduces risk of outages
 - Cost-effective project delivery
 - Integration of sustainability within future projects

