

Green River Utah Area

Transmission and Distribution System – January 16, 2009

Discussion Items

- **Commission Questions**
- **Commission Rules**
- **Existing System**
- **Capacity**
- **Alternatives**

Q: Determine whether its facility records are correct.

A: Rocky Mountain Power inspected the electrical distribution system in the Green River area in 2007 and verified that the system is correctly mapped and recorded.

Q: How does Rocky Mountain Power assess the need for new or upgraded plant?

A: Rocky Mountain Power performs distribution and transmission planning studies to assess the need for new or upgraded plant. These studies assure the company that the existing customer base is adequately served and that the known projected loads are planned for.

- Last distribution study was completed in 2006.
- Last transmission study was completed in 2007.

Q: How are the engineering studies used to plan for plant construction?

A:

- From the engineering studies, discussed on the previous slide, new plant projects are developed and scoped.
- Projects are then prioritized and submitted for approval.
- After approval projects are given to project management for design and construction.

New Customer Load Requests

- Line extensions for new customer load requests are covered under Rocky Mountain Power's Electric Service Regulation No. 12, Line Extensions.



Commission Planning Rules

UTAH COMMISSION RULE 746-310-4B(1)

- “1. Unless otherwise directed by the Commission, the requirements contained in the 2006 edition of the American National Standard for Electrical Power Systems and Equipment-Voltage Ratings (60 Hz), ANSI C84.1-2006, incorporated by this reference, shall be the minimum requirements relative to utility voltages.” The steady state minimum is 95 percent of nominal service voltage.

ANSI C84.1 2006 edition

Table 1 - Service Voltage Ranges

Nominal Service Voltage	Range B Minimum	Range A Minimum	Range A Maximum	Range B Maximum
% of Nominal	91.7%	95%	105%	105.8%
Single-Phase				
120/240, 3 wire	110/220	114/228	126/252	127/254
Three-Phase				
240/120, 4 wire	220/110	228/114	252/126	254/127
208Y/120, 4 wire	191/110	197/114	218/126	220/127
480Y/277, 4 wire	440/254	456/263	504/291	508/293
2.4 to 34.5 kV % of Nominal	95%	97.5%	105%	105.8%
Above 34.5 kV	<i>See Engineering Handbook [1B.3.], Section 3.5</i>			

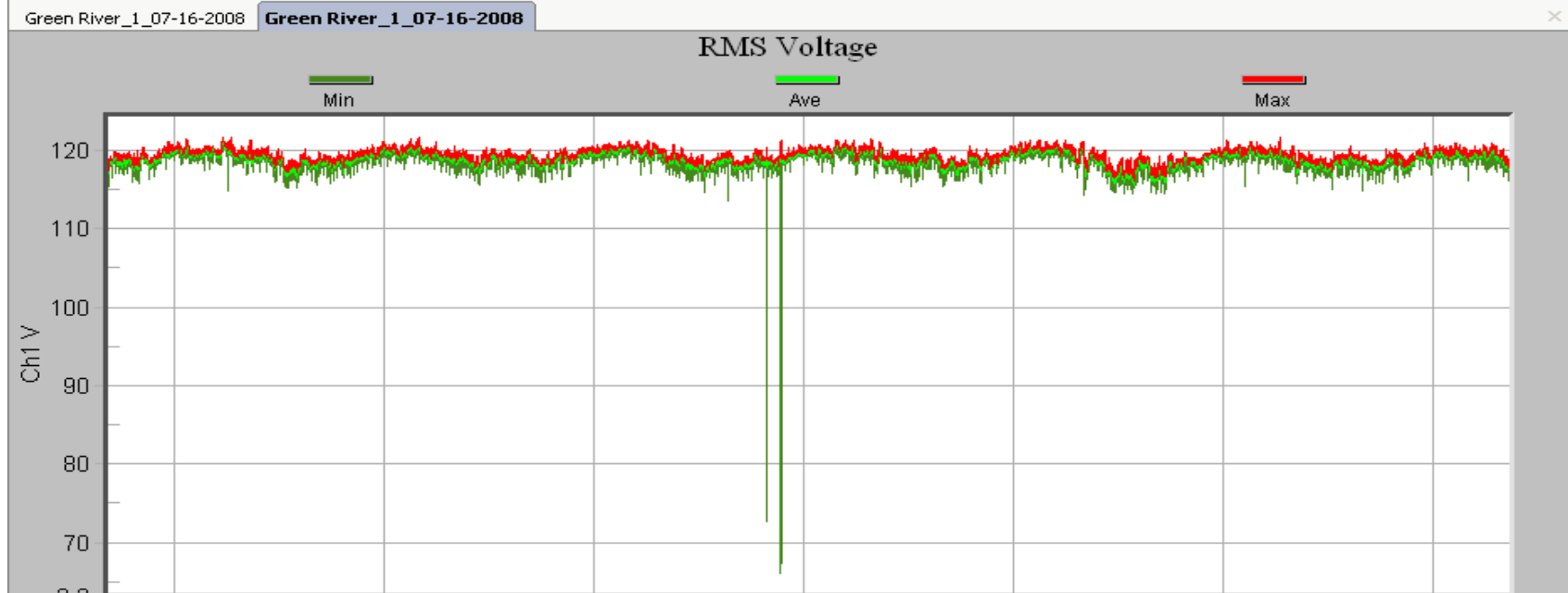


Utility Power Quality Standards

Other power quality standards that might be considered for adoption by the commission

- **Harmonic distortion:** IEEE 519 is the national standard that sets limits for the distortion allowed in the power system. We suggest adding 519 language in the Utah rules. Idaho's rules can be used as a template.
- **Fluctuating loads and voltages:** Voltage fluctuations are already covered by existing Utah rule 5.2(e). No change is needed.
- **Balanced loads and voltages:** Voltage imbalances are already covered by existing Utah rule 5.2(f) and ANSI C84.1, Annex D. No change is needed.
- **Disturbances:** When an unplanned upset occurs on the power system such as lightning hitting, a large generator unexpectedly tripping, or load-carrying equipment suddenly failing, we call this a disturbance. Where and when these occur are largely beyond the utility's control—and are usually caused by others—hence no proscriptive standards are appropriate. Many documents characterize them and address their mitigation.

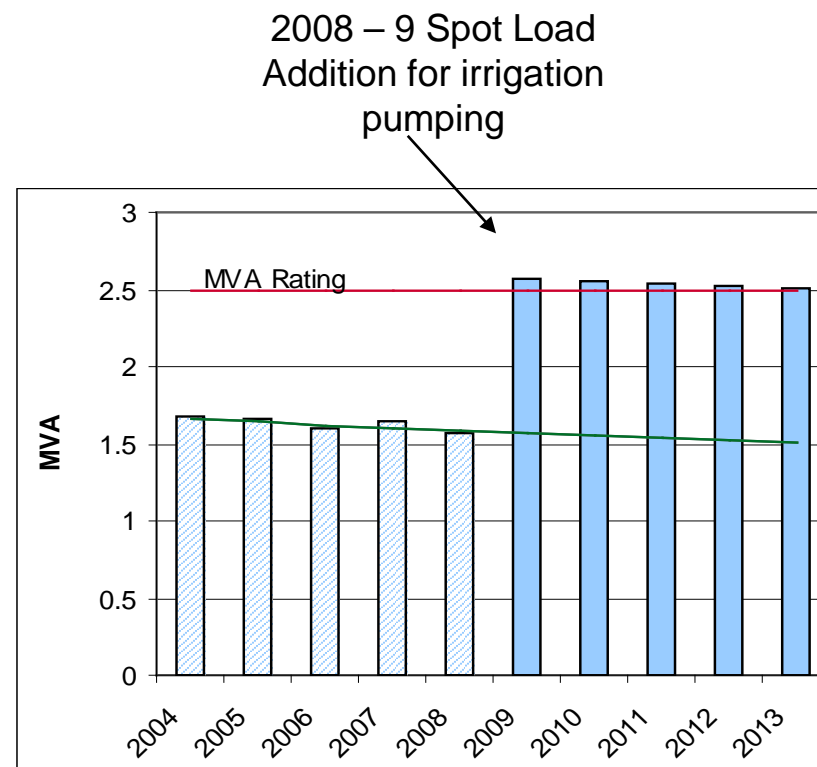
Green River 12 – City Customer Voltage During Week in mid July 2008



- Three voltages are shown: min, max, and average. Min includes sags due to transmission faults (shown in the middle) and motor starts.
- Average voltage (light green) is to be compared with ANSI C84.1 because that is the regulated voltage that doesn't change with disturbances.

Green River 46/12 kV #2 Substation Peak Load Data

SUMMER				
Year	MVA Load	MVA Capacity	Percent Capacity	Actual PF
2004	1.672	2.500	66.9	0.913
2005	1.656	2.500	66.2	0.924
2006	1.603	2.500	64.1	0.978
2007	1.643	2.500	65.7	0.957
2008	1.569	2.500	62.7	0.977
2009	2.570	2.500	102.8	0.977
2010	2.553	2.500	102.1	0.977
2011	2.537	2.500	101.5	0.977
2012	2.520	2.500	100.8	0.977
2013	2.504	2.500	100.2	0.977

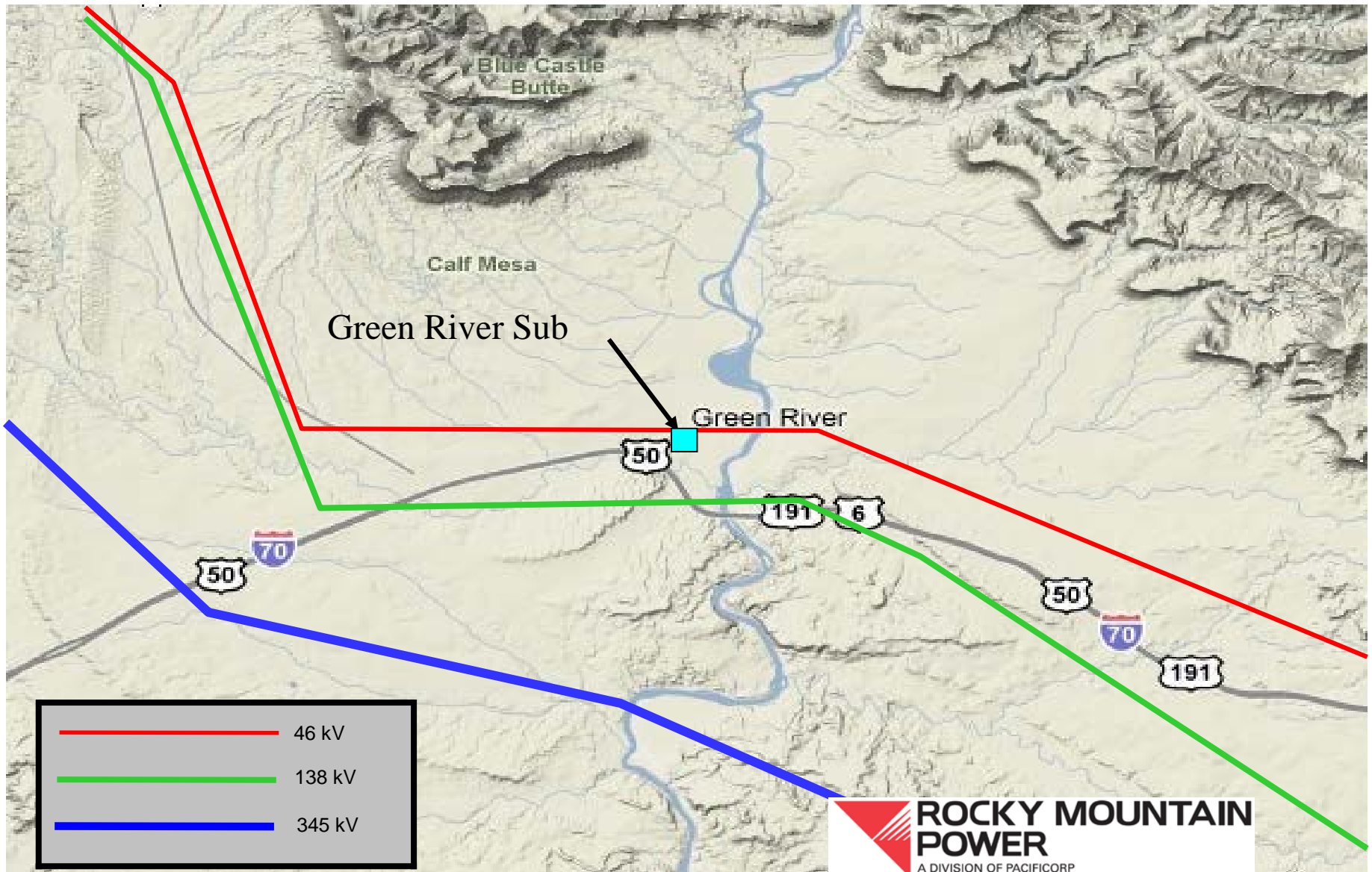


Straight Line R2 = 0.2096 - Ave. Hist. Ld. Growth - 1.05%

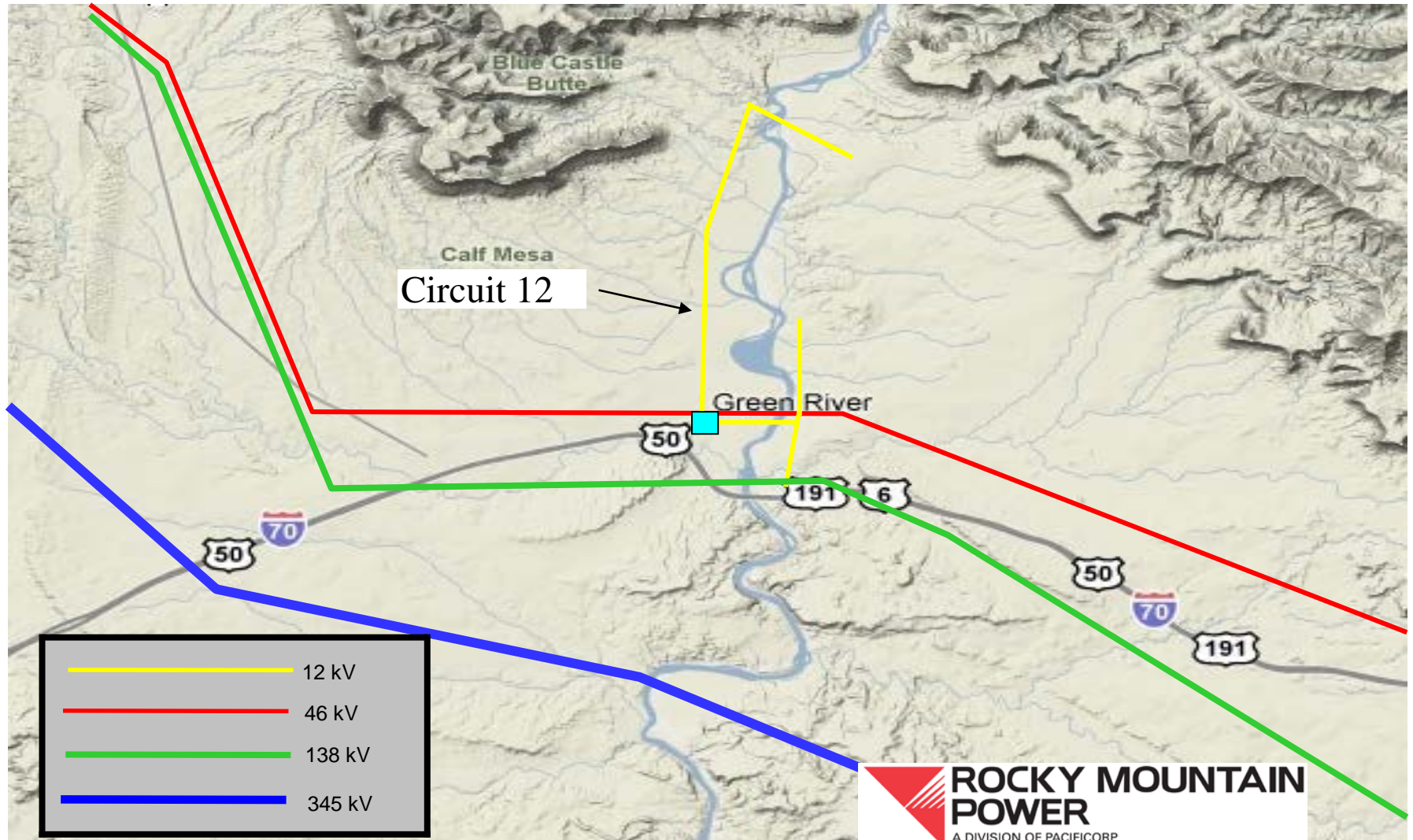
Exponential R2 = 0.2151 - Ave. Hist. Ld. Growth - 1.07%

The closer R2 is to 1.00 the better the curve fit.

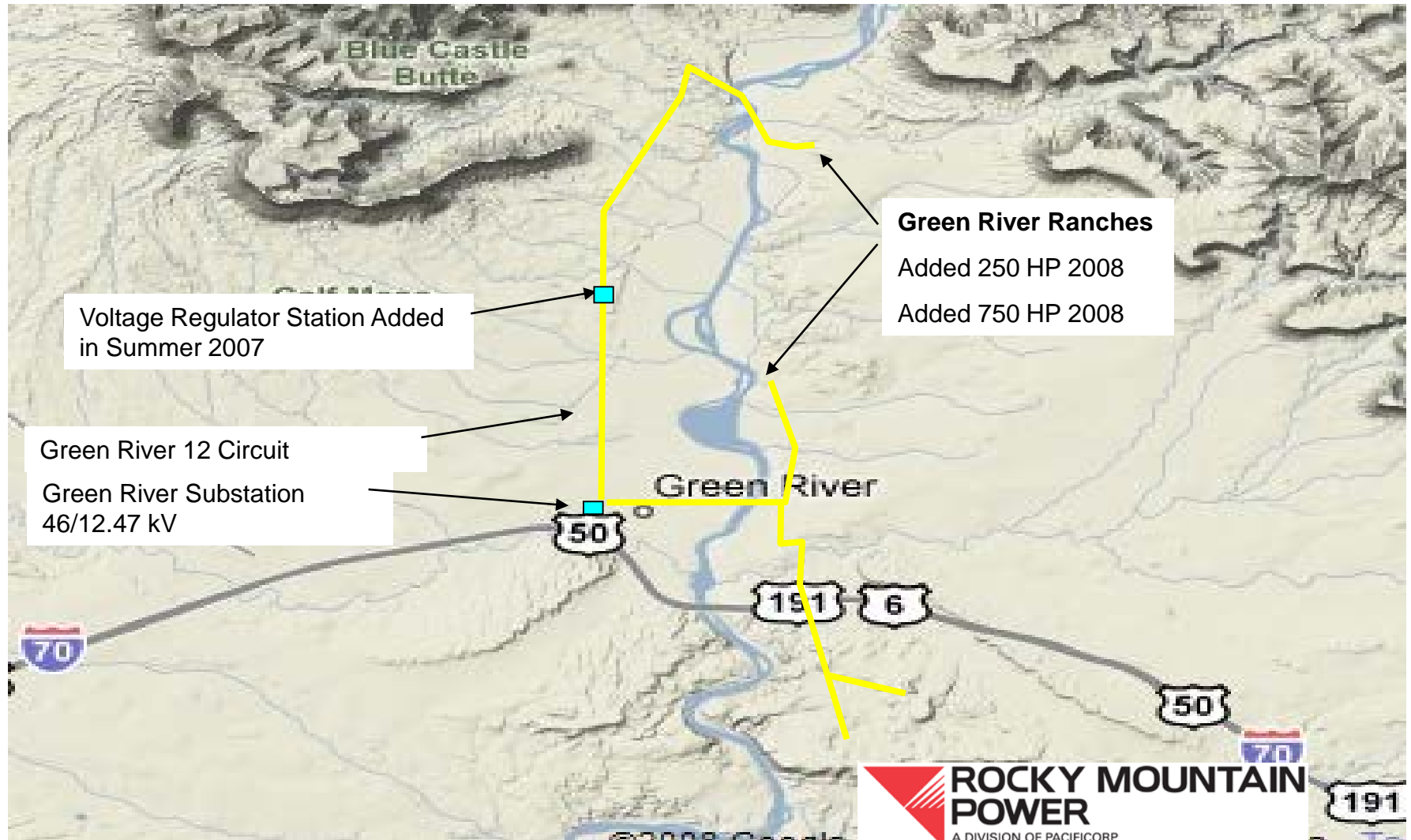
Transmission System as of September 2008



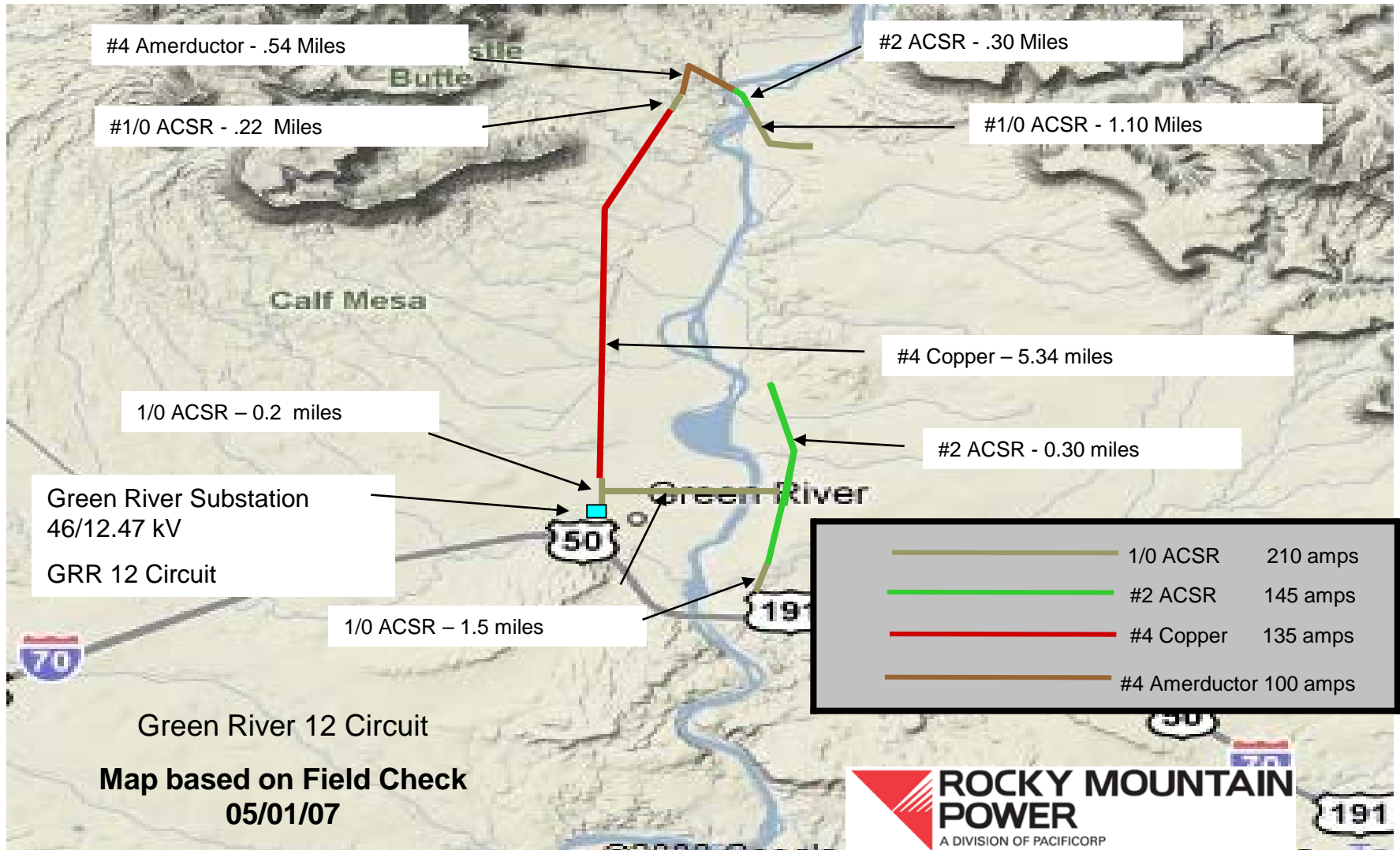
Transmission & Distribution System as of September 2008



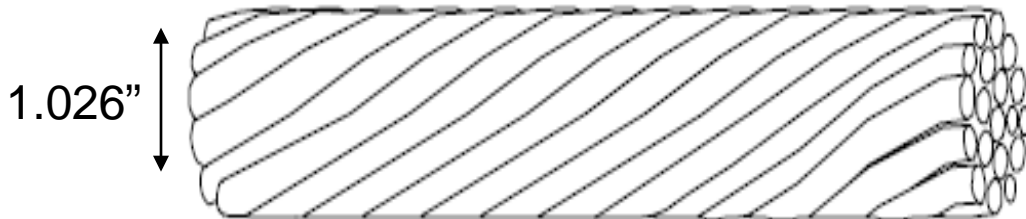
Distribution System (Existing) as of September 2008



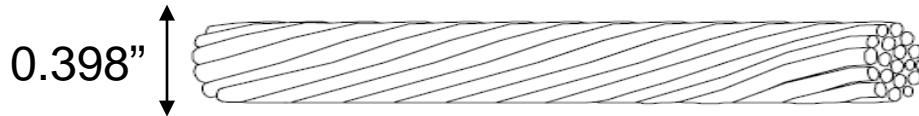
Distribution System Existing Conductors as of September 2008



Conductor Characteristics



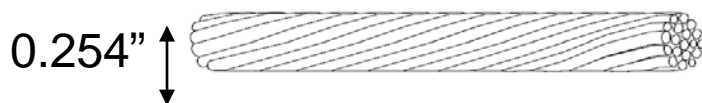
795 Aluminum Wire
16.3 MW @ 12.5 kV



1/0 Aluminum Wire
4.5 MW @ 12.5 kV

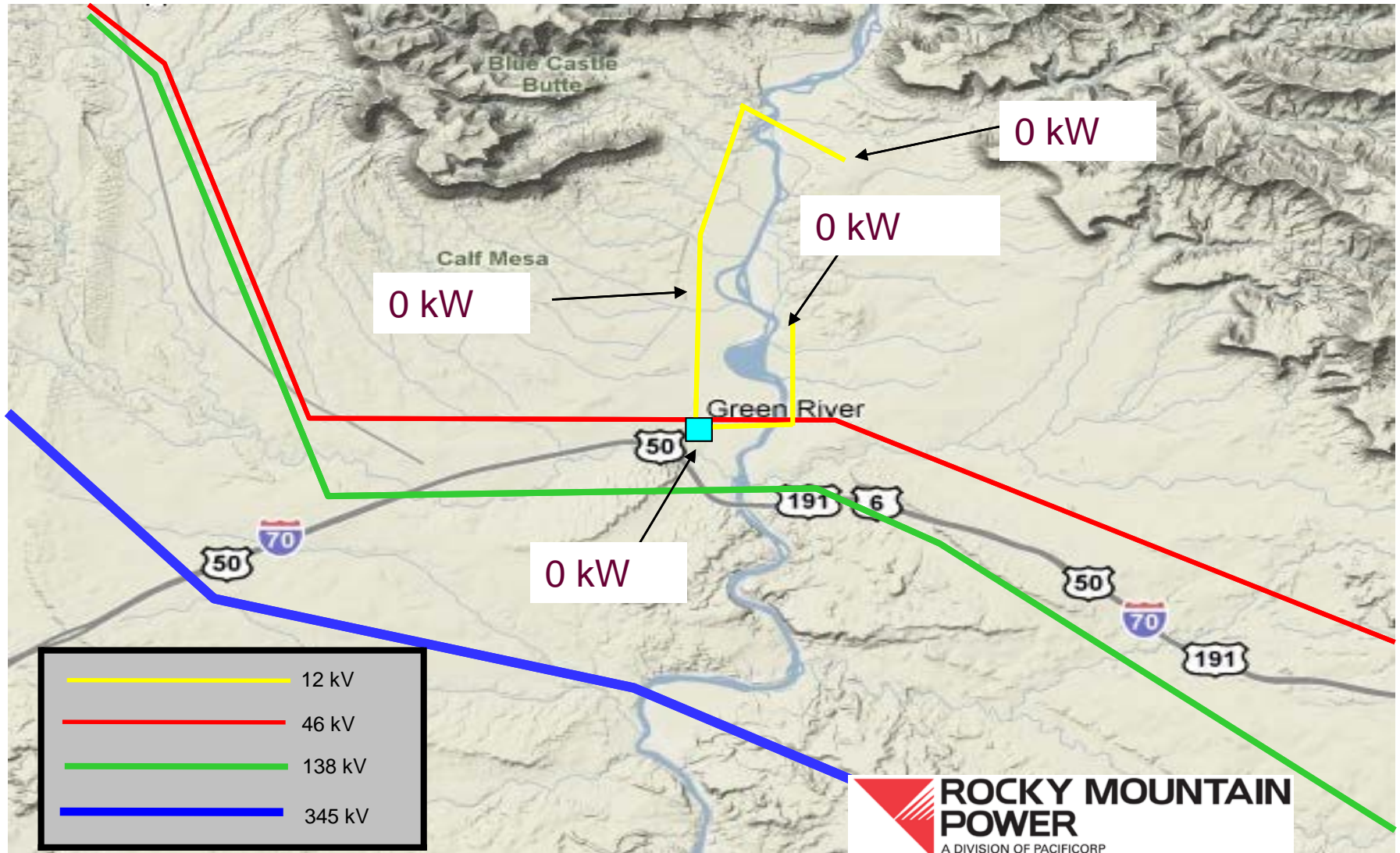


#2 Aluminum Wire
3.5 MW @ 12.5 kV

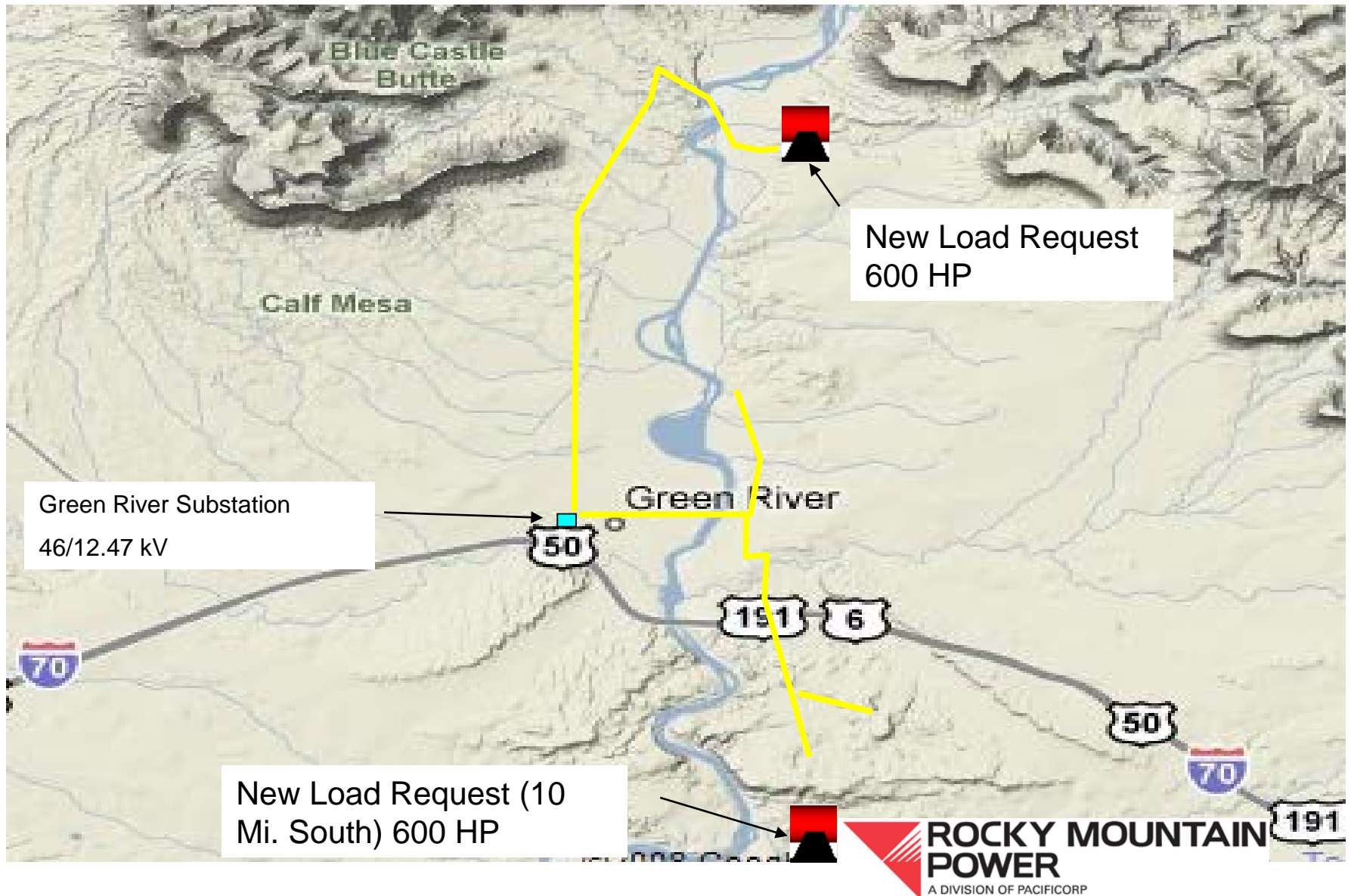


#4 Copper Wire
2.9 MW @ 12.5 kV

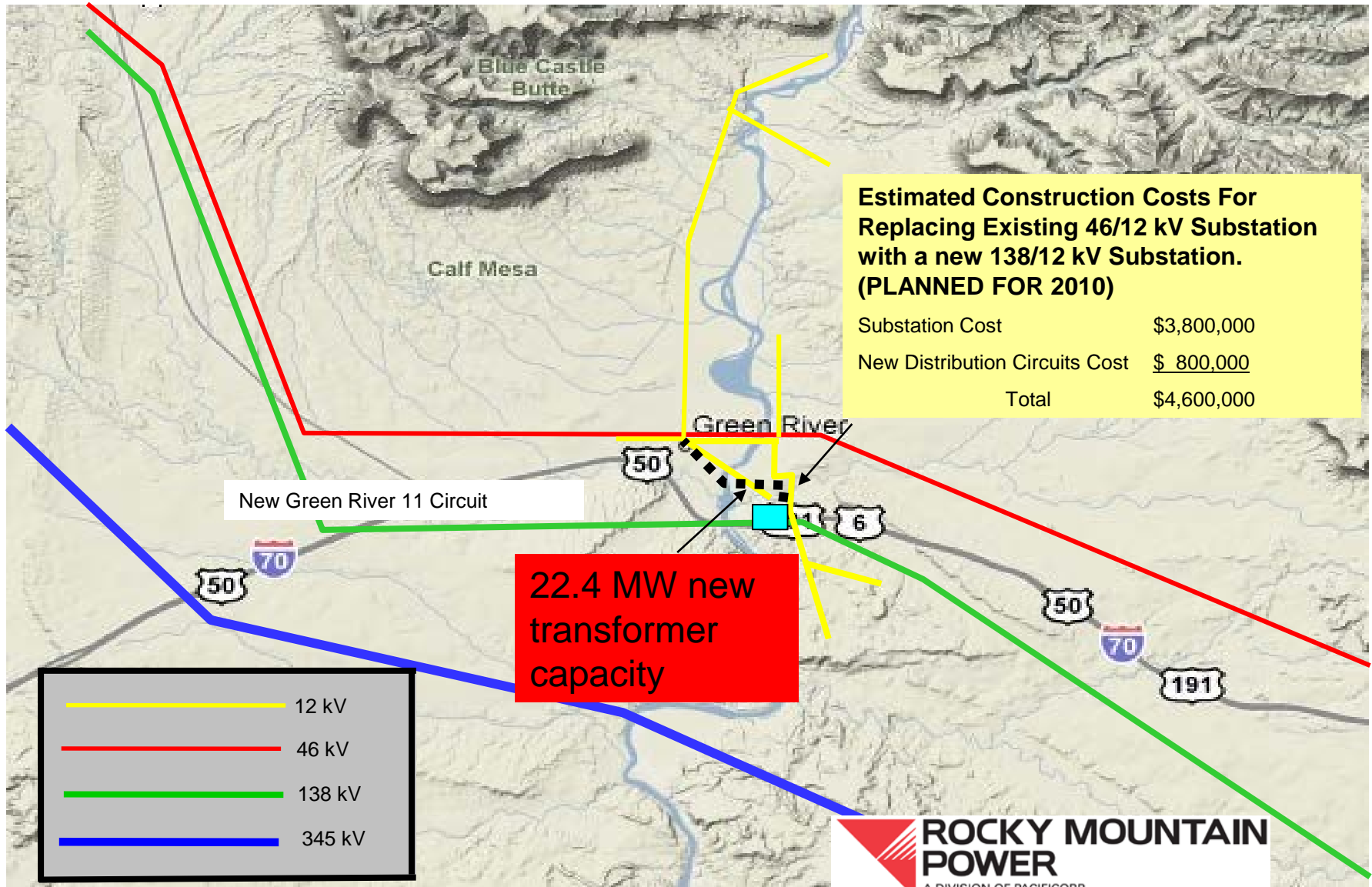
Transmission & Distribution uncommitted System Capacity Remaining as of September 2008



New Customer Requests as of November 2008

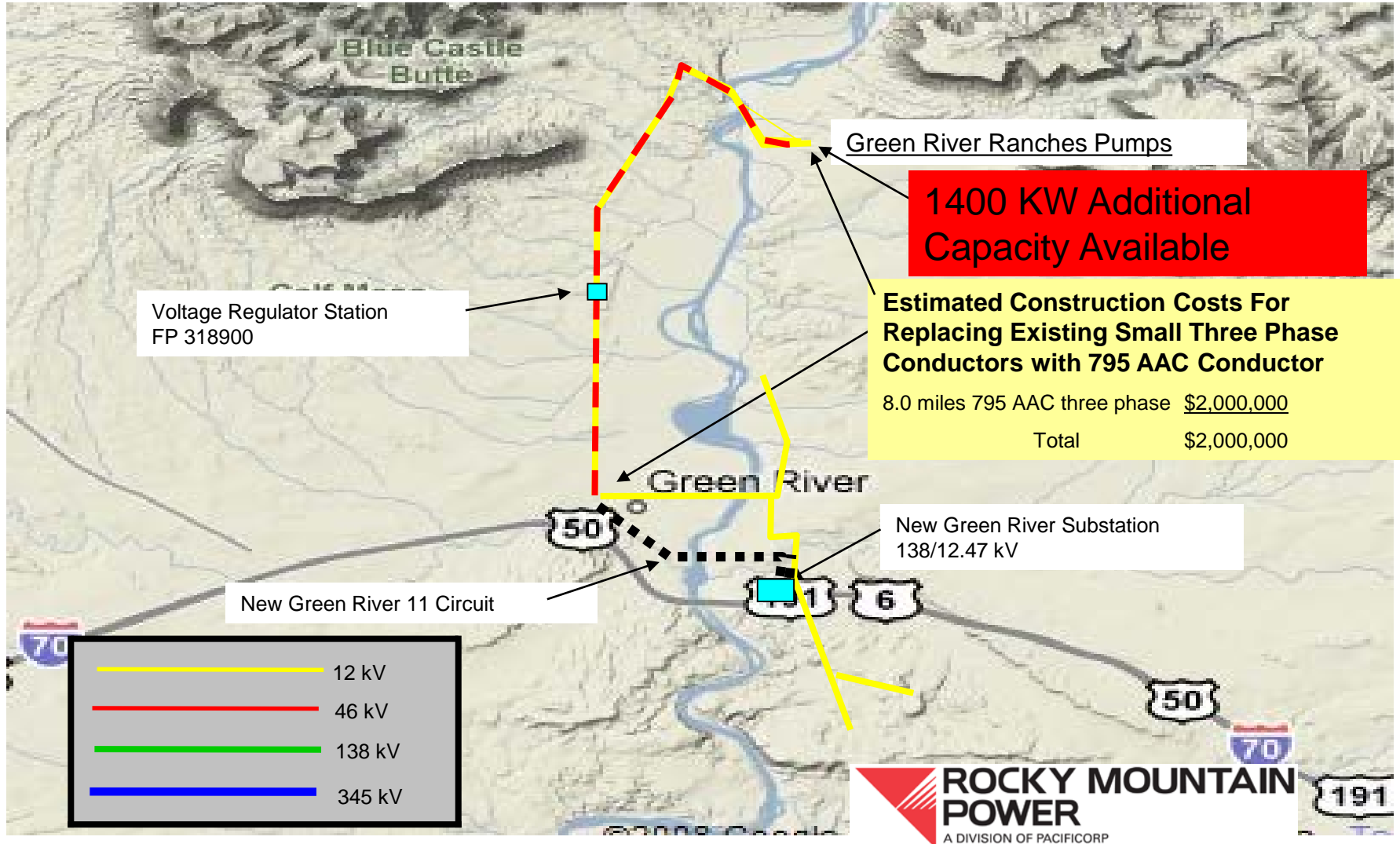


2010 Planned Capacity Increase



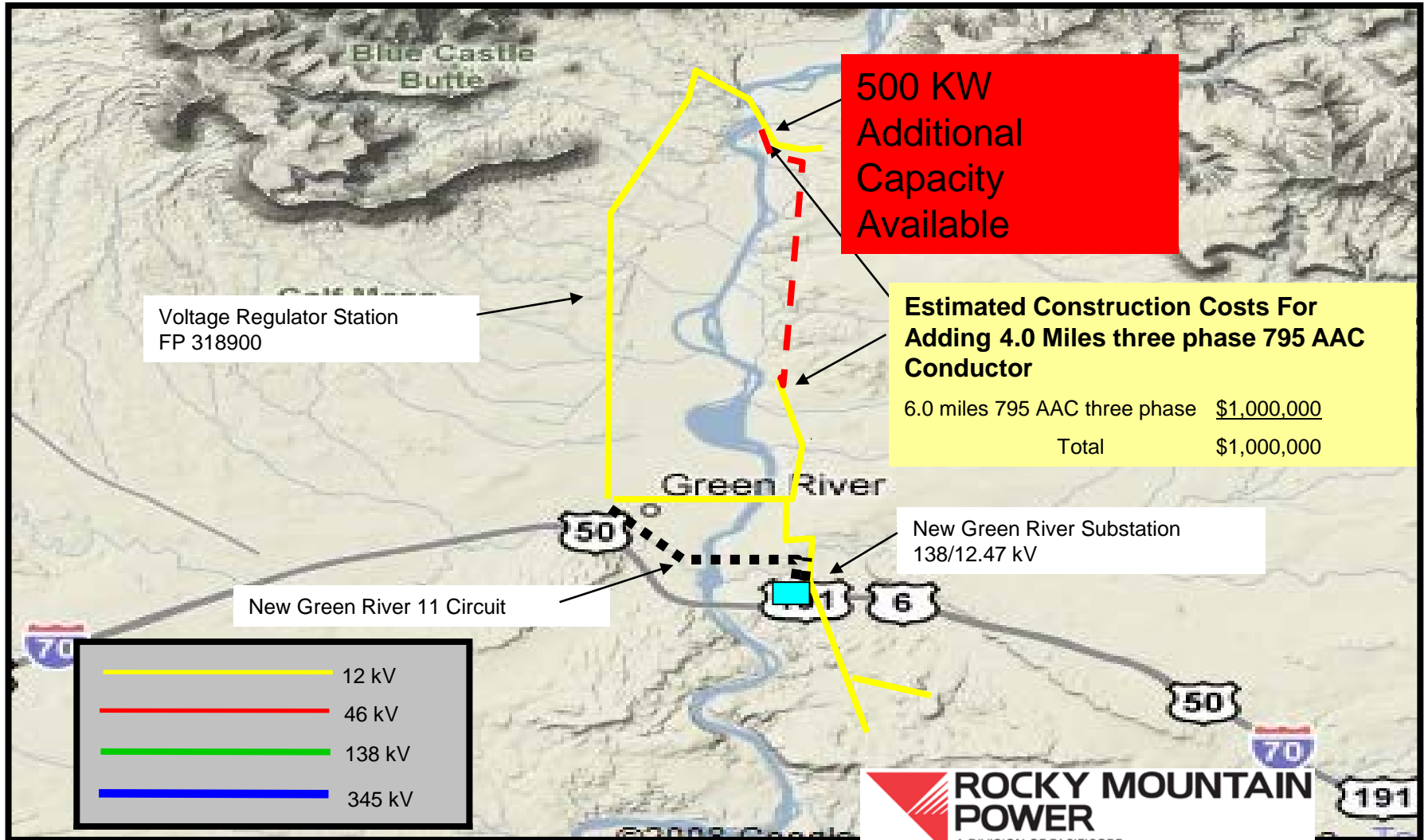
Distribution System Upgrades

Option 1: Re-conductor Existing Feeder



Distribution System Upgrades

Option 2: Extend Existing Feeder



Distribution System Upgrades

Option 3: Re-conductor Existing Feeder + Extension

