North Garland Reliability Infrastructure Project (N-GRIP)

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Garland Power and Light

- Locally owned and controlled not-for-profit municipal utility
- 69,000 customers
- Fourth largest municipal in Texas
- 41st largest in the nation
- Peak Load in 2015 was 473 MW

N-GRIP

GP&L ($56M)

1. Expand Lookout to accommodate in/out 345kV and two 600 MVA transformers

2. Build a 345kV line from Lavon to Lookout

3. Add second circuit from Lavon to Royse

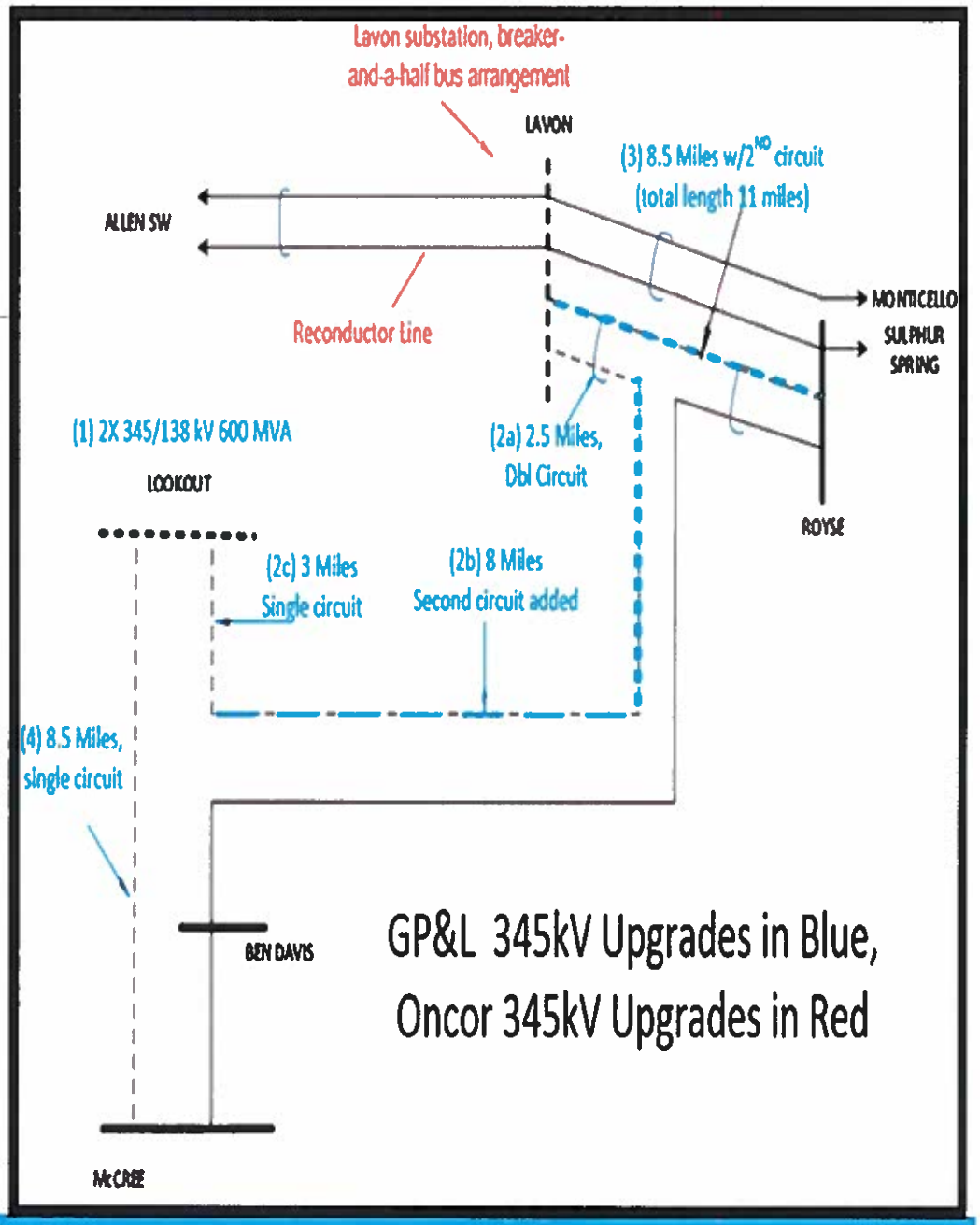
4. Build Lookout to McCree 345kV circuit

Oncor ($22M)

5. Build Lavon switching station

6. Reconductor Allen to Lavon

Total $78M (Tier 1)



Two Drivers for N-GRIP

✓ High load growth in the northern Garland area

- Area is undeveloped and near a large IT technical hub
- Prime location for future "Data Centers" , 100-120MW each (X 3)

✓ Reliability concern with Ben Davis Substation-Flooding

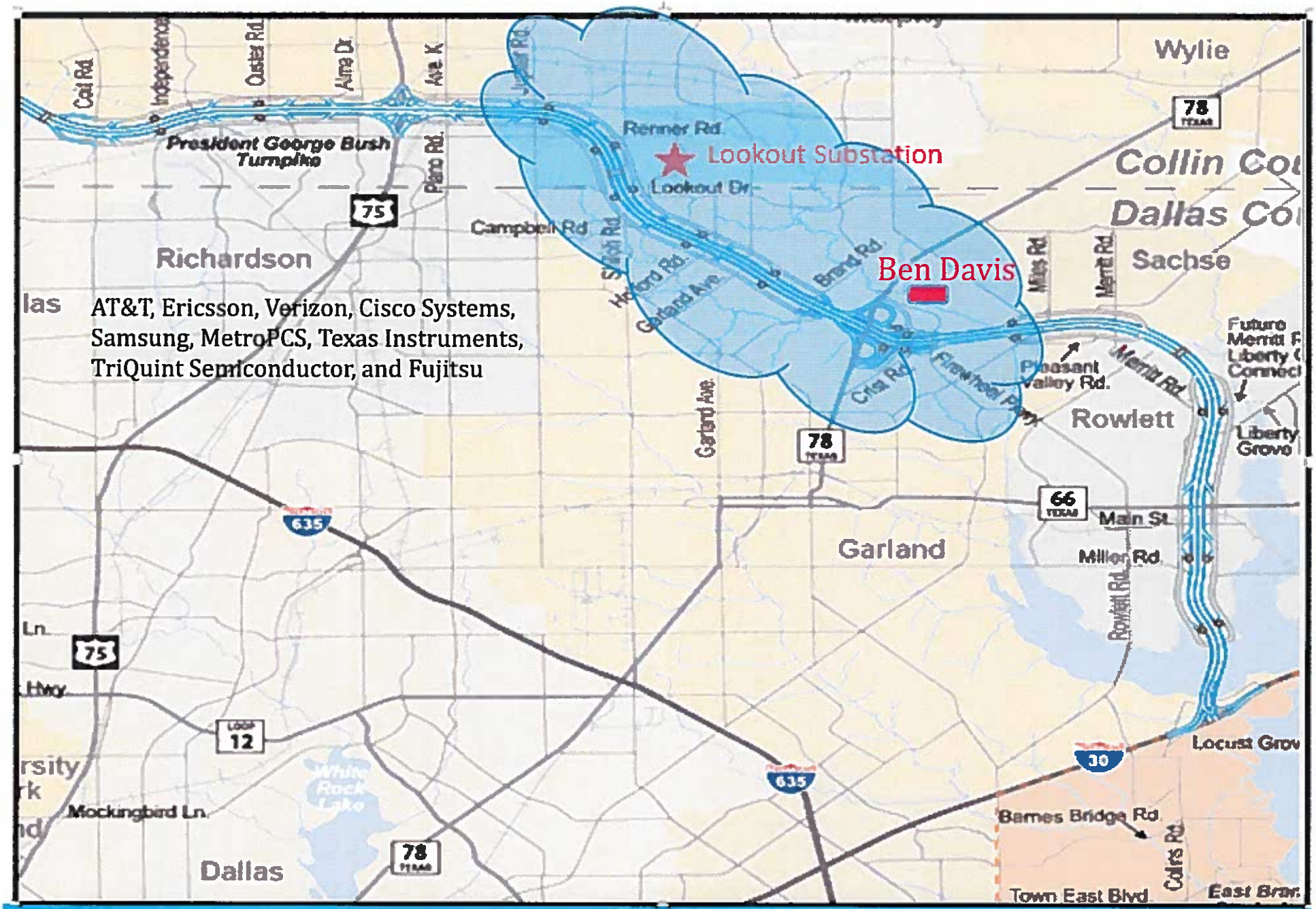
- One of two interconnect points that connect the Garland system to the 345kV network. (Critical substation for GP&L)
- FEMA - designated floodway.
- Development in the area will likely increase run-off
- Expanding substation would effect flood water way

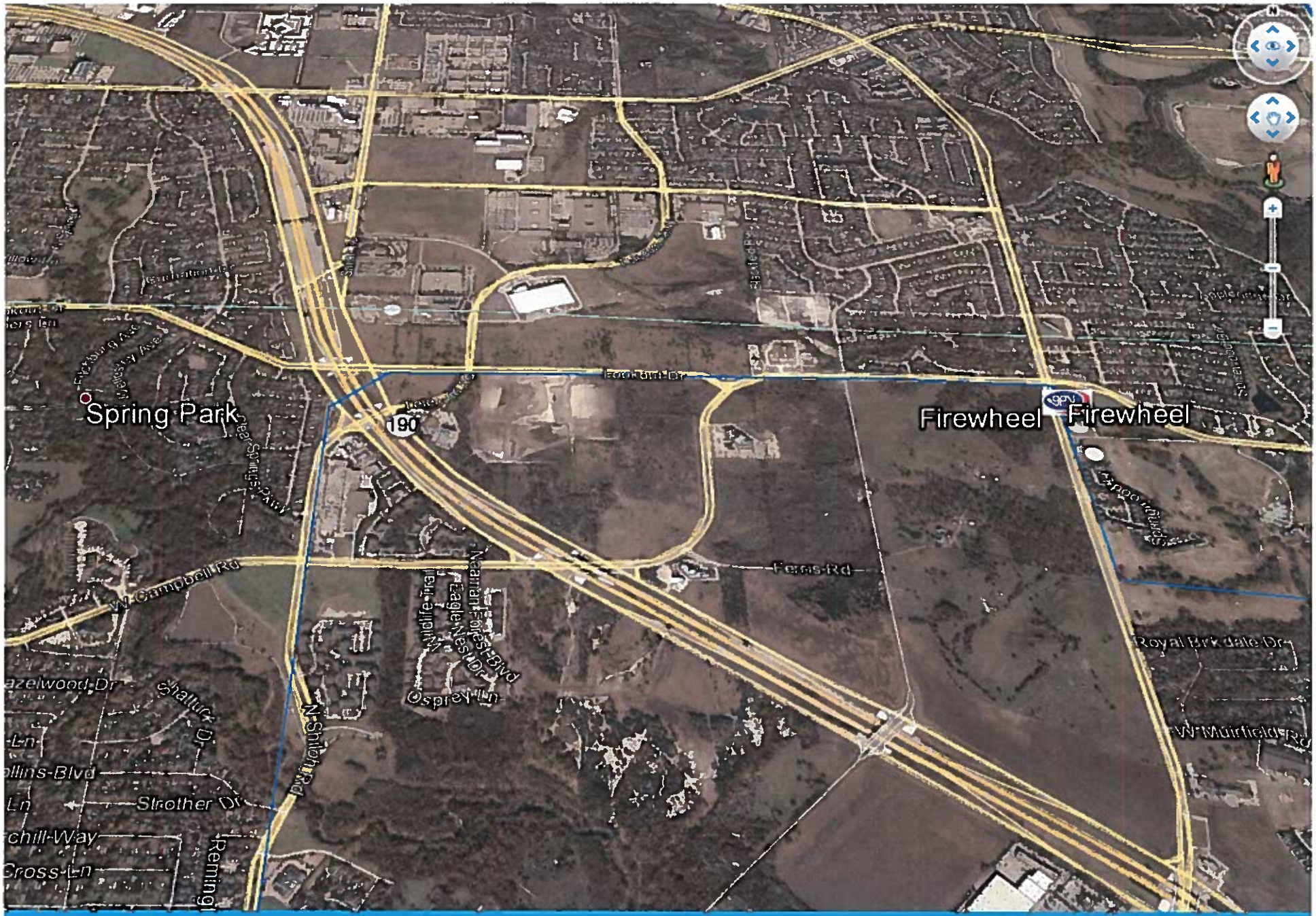
North Garland Study Area

- ✓Area is supported by a single 138kV transmission line.

  138kV from Olinger – Apollo – East Richardson

- ✓This transmission line was originally built using 795 ACSR with a thermal conductor rating of 218 MVA.
- ✓Typically load growth for this area has been below 1% annually.
- ✓This area is the last remaining undeveloped land in the city of Garland.
- ✓Load growth from the Richardson area has started to creep towards this under-developed area


Lookout Substation
Ben Davis
AT&T, Ericsson, Verizon, Cisco Systems, Samsung, MetroPCS, Texas Instruments, TriQuint Semiconductor, and Fujitsu
Wylie
Richardson
Sachse
Rowlett
Garland
Dallas
Renner Rd.
Lookout Dr.
Campbell Rd.
Brand Rd.
Garland Ave.
Pleasant Valley Rd.
Merritt Rd.
Main St.
Miller Rd.
Rowlett Rd.
Barnes Bridge Rd.
Town East Blvd
Mockingbird Ln.
President George Bush Turnpike
Coit Rd.
Independence
Custer Rd.
Alma Dr.
Ave. K
Jupiter Rd.
Plano Rd.
Shiloh Rd.
Holford Rd.
Garland Ave.
Miles Rd.
Merritt Rd.
Crisp Rd.
Firewheel Pkwy.
Future Merritt F
Liberty G
Connect
Liberty Grove
Locust Grov
Cullins Rd.
East Brar
78
75
635
66
30
12



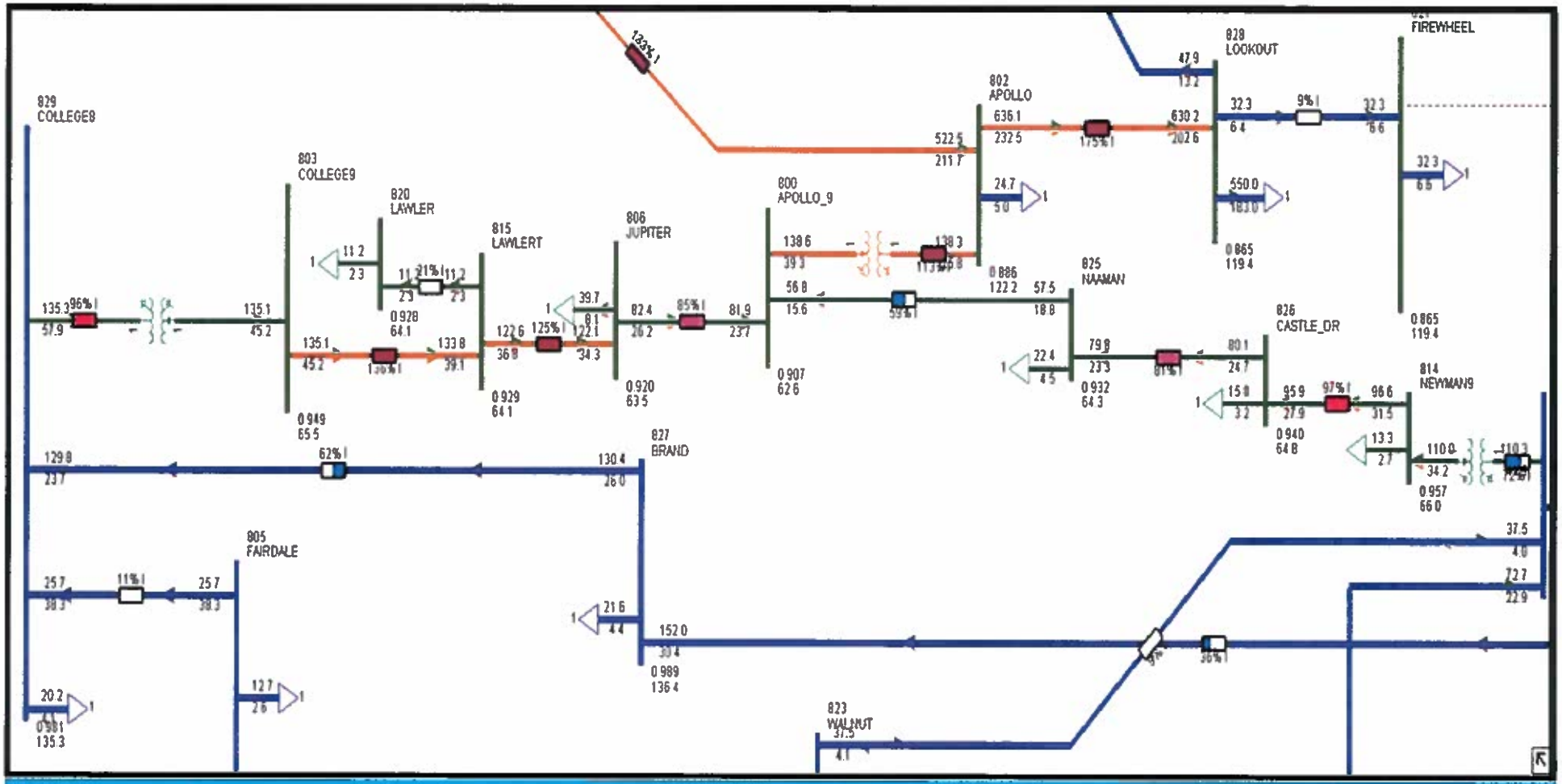
January 24, 2017


To Apollo
Substation
Lookout
Substation
To Firewheel
Substation
President George Bush Turnpike (Toll road)

Load Growth

Estimated North Garland Load Growth								
Lookout		2016	2017	2018	2019	2020	2025	2030
	Raging Wire	20	40	60	80	100	100	120
	Oncor	28.4	28.8	29.3	29.7	30.1	50.3	53.3
	GPL			10	15	20	45	50
	Total	48.4	68.8	99.3	124.7	150.1	195.3	223.3
Holford								
	Phase I		20	40	60	100	100	120
	Phase II			20	40	100	100	120
	Total	0	20	60	100	200	200	240
	Grand Total	48.4	88.8	159.3	224.7	350.1	395.3	463.3

Load growth modeled at 550MW (n-1) – Future Growth



Existing system

The existing system in North Garland is currently not designed to accommodate high load growth. There are numerous system concerns associated with new load growth in the next five years.

As a starting point studies assumed:

1) Convert 69kV transmission lines interconnecting Apollo-College and Apollo-Newman to 138kV.

2) Upgrade 138 kV conductor on existing transmission line from Richardson – Apollo – Wylie using Cumberland 1926 ACSS/TW conductor with a thermal rating of 495 MVA.

Study Results

None of the single line 138 kV alternatives studied were able to mitigate the overloads in the system and as such were not selected as viable solutions.

From a technical perspective, several 345kV options were reviewed and are available in the N-GRIP report. Part of this technical review considered expanding the Ben Davis substation. This was ruled out due to increased flooding concerns.

Details for alternatives can be found in the report.

Flood Video –Ben Davis 2015

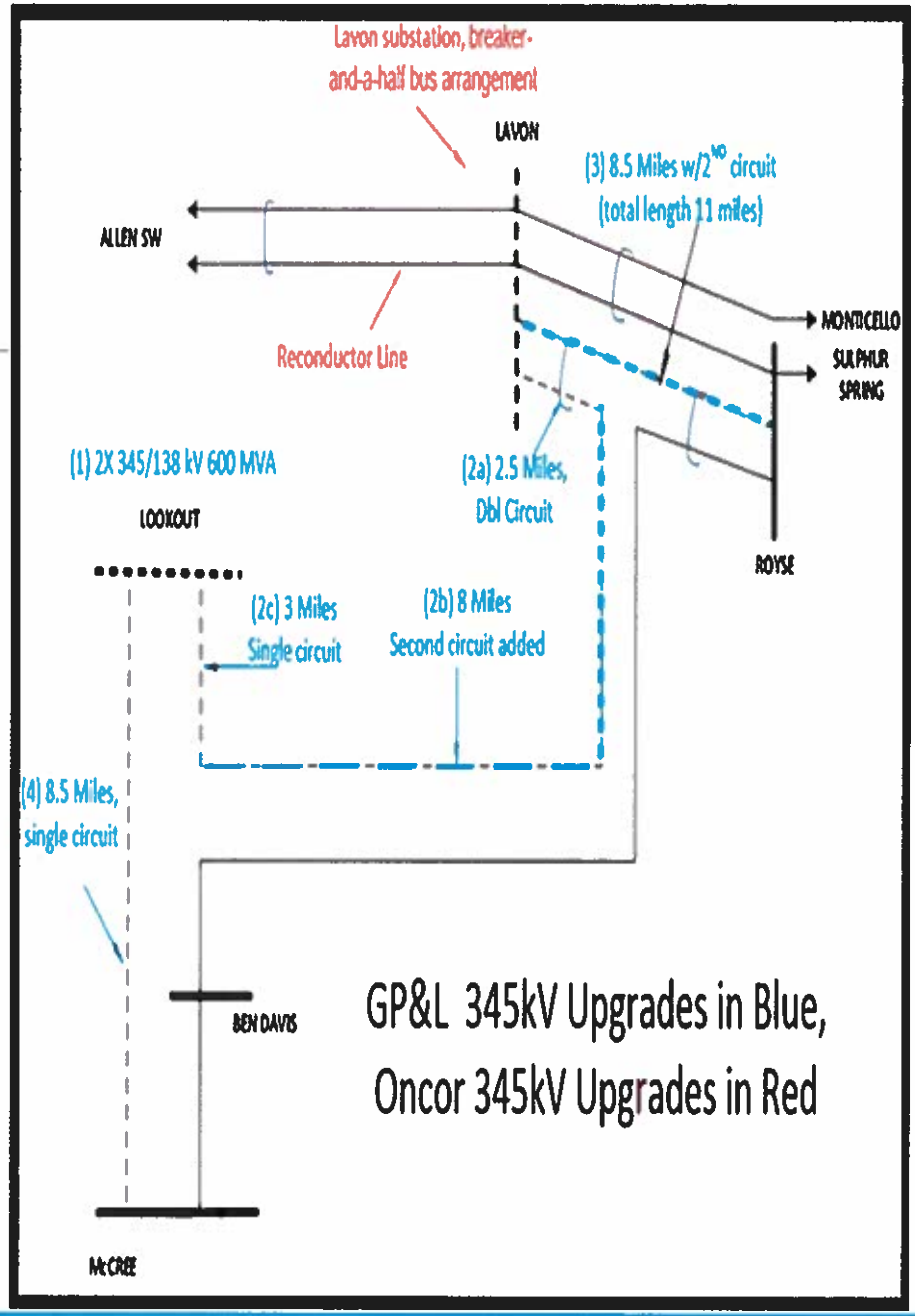
Flood Video –Ben Davis 2015

Summary

N-GRIP project meets expected extreme load growth in the North Garland area.

Supports multiple utilities and solves multiple system concerns.

Efficient use of existing ROW and substation land – minimum new ROW required



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