

STUDY ASSUMPTIONS

- A WECC 2009 base case was used in this study, with northern NM loads were adjusted to reflect a 2010 peak summer time frame
- PNM's Rio Puerco Stage 2 project was assumed in service. This includes a new 345 kV station at Rio Puerco, looping the existing San Juan – BA and BA –West Mesa 345 kV lines, and a new 345/115 kV transformer at Rio Puerco.
- Transmission system upgrades were added to maintain acceptable N-1 system performance with respect to facility flow ratings. A limited set of northern NM contingencies were evaluated in this study.
- Only thermal (temperature/sag) emergency ratings were considered in the contingency analysis. Transmission upgrades required to mitigate voltage, short circuit and transient stability issues were not studied. All costs shown in this document are, therefore, preliminary.
- Southern New Mexico Interface (SNMI) was assumed to be 300 MW in the import direction. Sensitivity studies were conducted with SNMI at 800 MW in the import direction.
- Incremental generation in New Mexico were displaced throughout the Southwest. System impacts and transmission constraints beyond the PNM system in Northern New Mexico have not been evaluated.
- Generation, PST schedule and path flow combinations that were not considered in this study have the potential to cause other transmission system constraints.
- Although there are other possibilities, it was assumed that 345 kV system would be ultimately pursued to integrate with the existing backbone system in New Mexico. A 345 kV system would integrate best with the existing backbone transmission system in east-central New Mexico, and could be integrate with regional transmission projects such as High Plains Express and SunZia if they materialize. These projects are assumed to have longer in-service dates.
- Transmission development Stages consist of the transmission system expansion scenario that would generally result in lowest overall cost for a certain level of incremental generation. The Stages evaluated could occur in a different order, depending on generation commitments and in-service dates.
- This study does not address feasibility, interconnection cost, or cost allocation for any particular proposed generation project project. Such determinations can only be made in the context of interconnection studies pursuant to the most current OATT that PNM has filed with FERC.

Stage 0

Maximize use of existing transmission system

Total Wind

Guadalupe: **750 MW**
Willard/Duran: **100 MW**

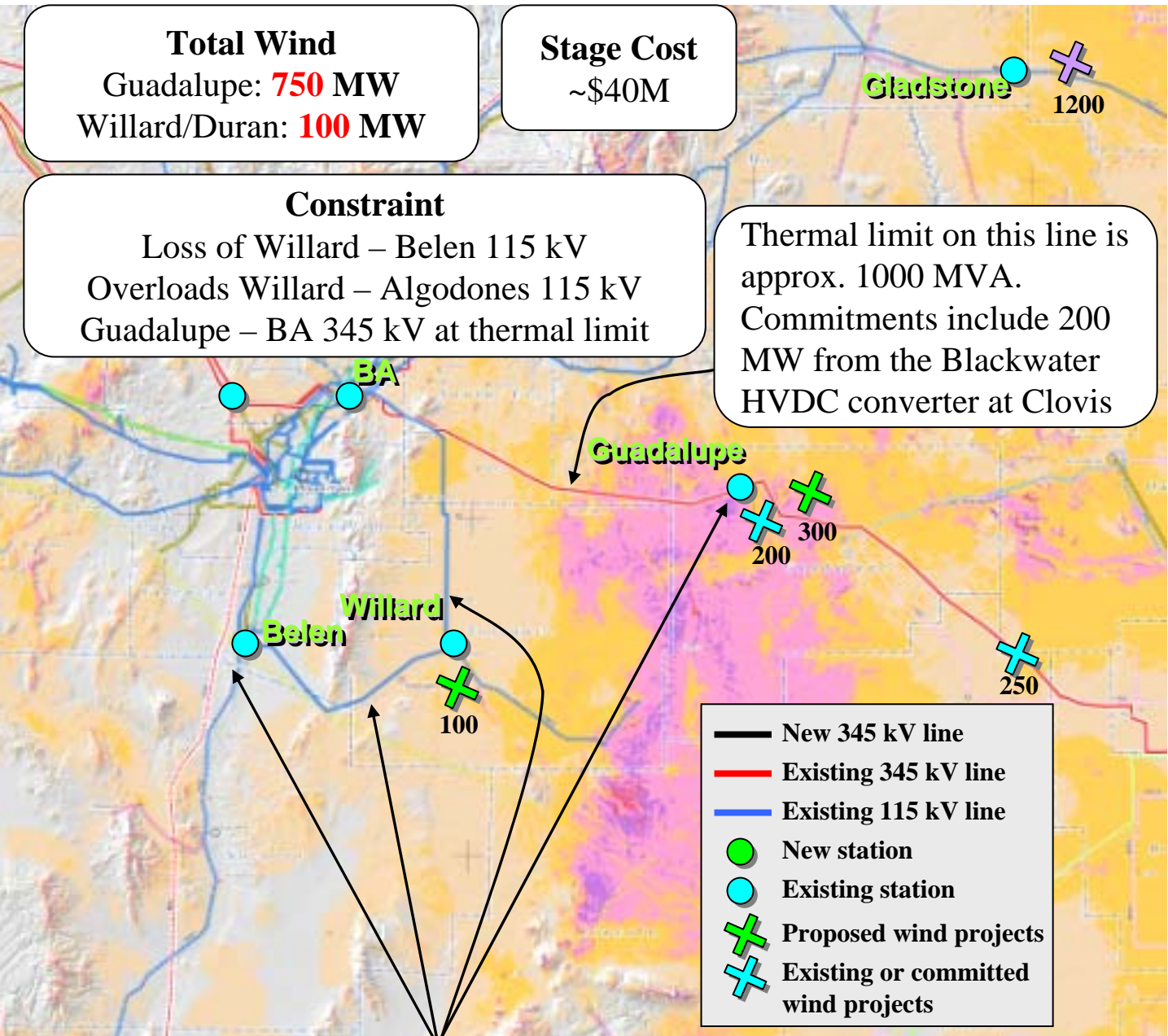
Stage Cost

~\$40M

Constraint

Loss of Willard – Belen 115 kV
Overloads Willard – Algodones 115 kV
Guadalupe – BA 345 kV at thermal limit

Thermal limit on this line is approx. 1000 MVA.
Commitments include 200 MW from the Blackwater HVDC converter at Clovis



- Expand Willard 115 kV and Guadalupe 345 kV stations
- Rebuild Willard – Belen 115 kV (50 mi.)
- Upgrade Willard – Algodones 115 kV line (70 mi.)
- Install 115 kV series reactors on Belen – Socorro 115 kV line
- Add reactive compensation (SVC) on BB line

Stage 4

Continue transmission expansion into wind resource zones
Complete wind collector system for up to 2400 MW

Total Wind
Guadalupe/Willard/Duran:
2450 MW

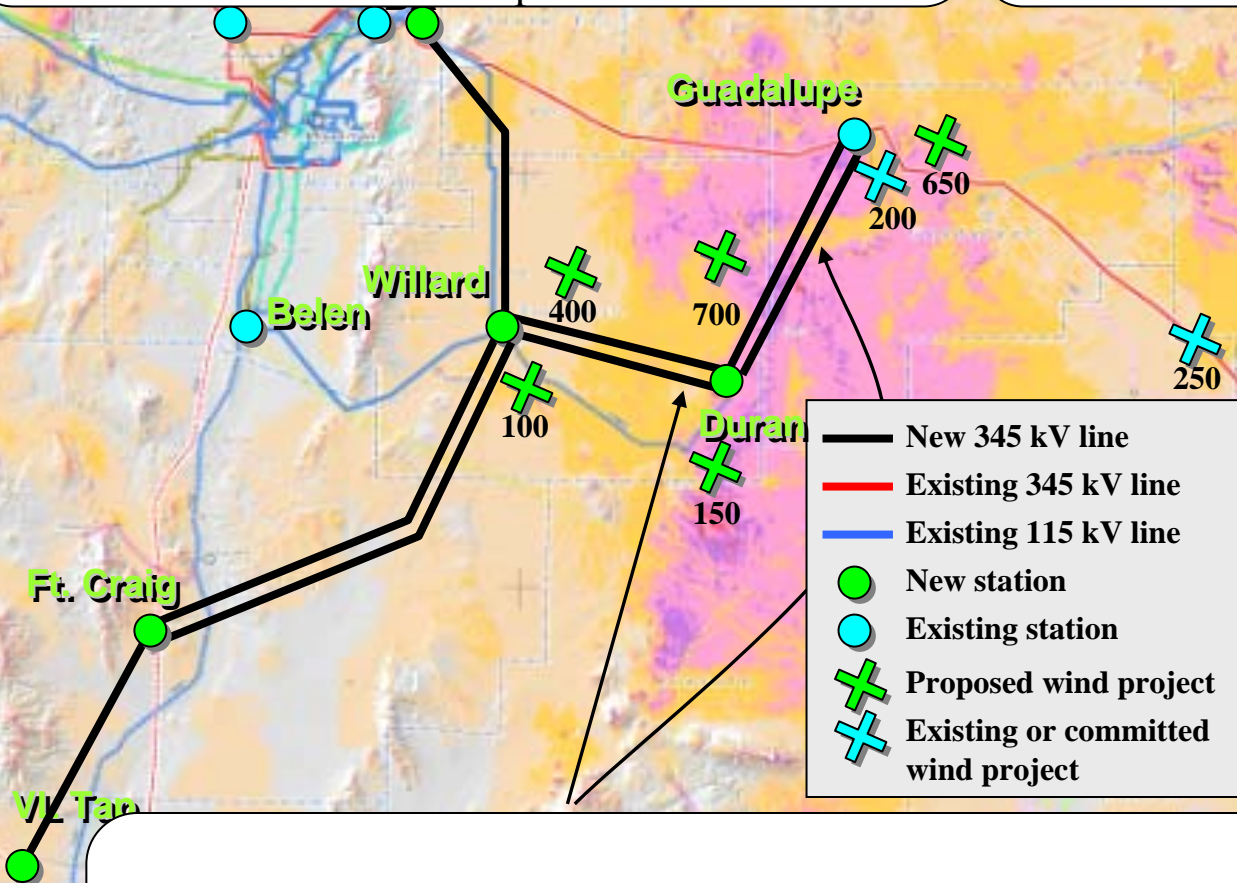
Stage Cost
~\$170M

Gladstone 1200

Constraint

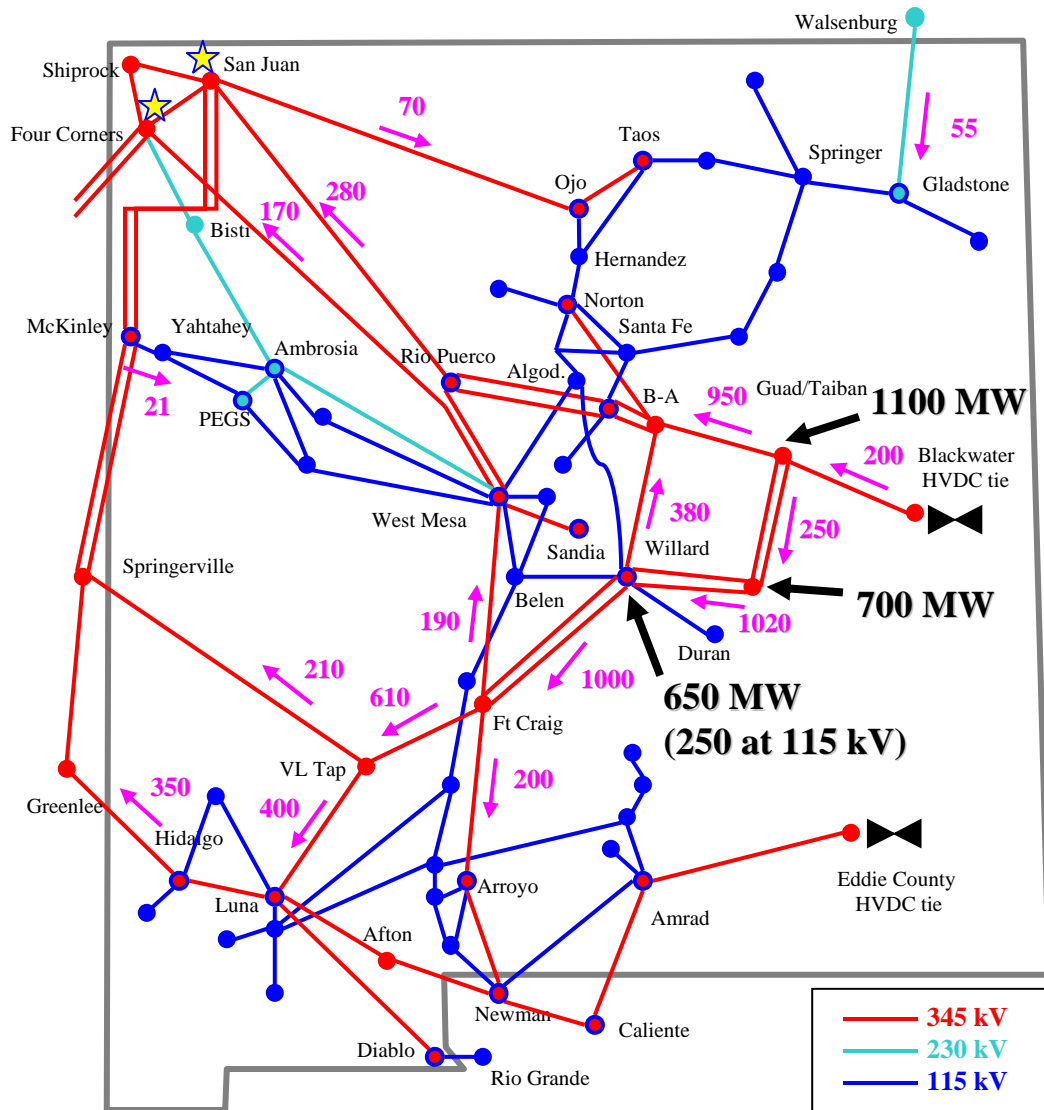
Loss of Ft Craig – VL Tap
Causes Arroyo PST flow > 400 MVA (if in service)
Loss of Willard – BA2
Overloads Guadalupe – BA2 line

Total Cost for Stages 0-4:
~\$670M



- Expand Willard, Duran and Guadalupe 345 kV stations
- Build Duran – Guadalupe 345 kV (two lines) (55 mi)
- Build Willard – Duran 345 kV (second line) (50 mi)

N-0 Flows with 2400 MW of wind generation (Stage 4)



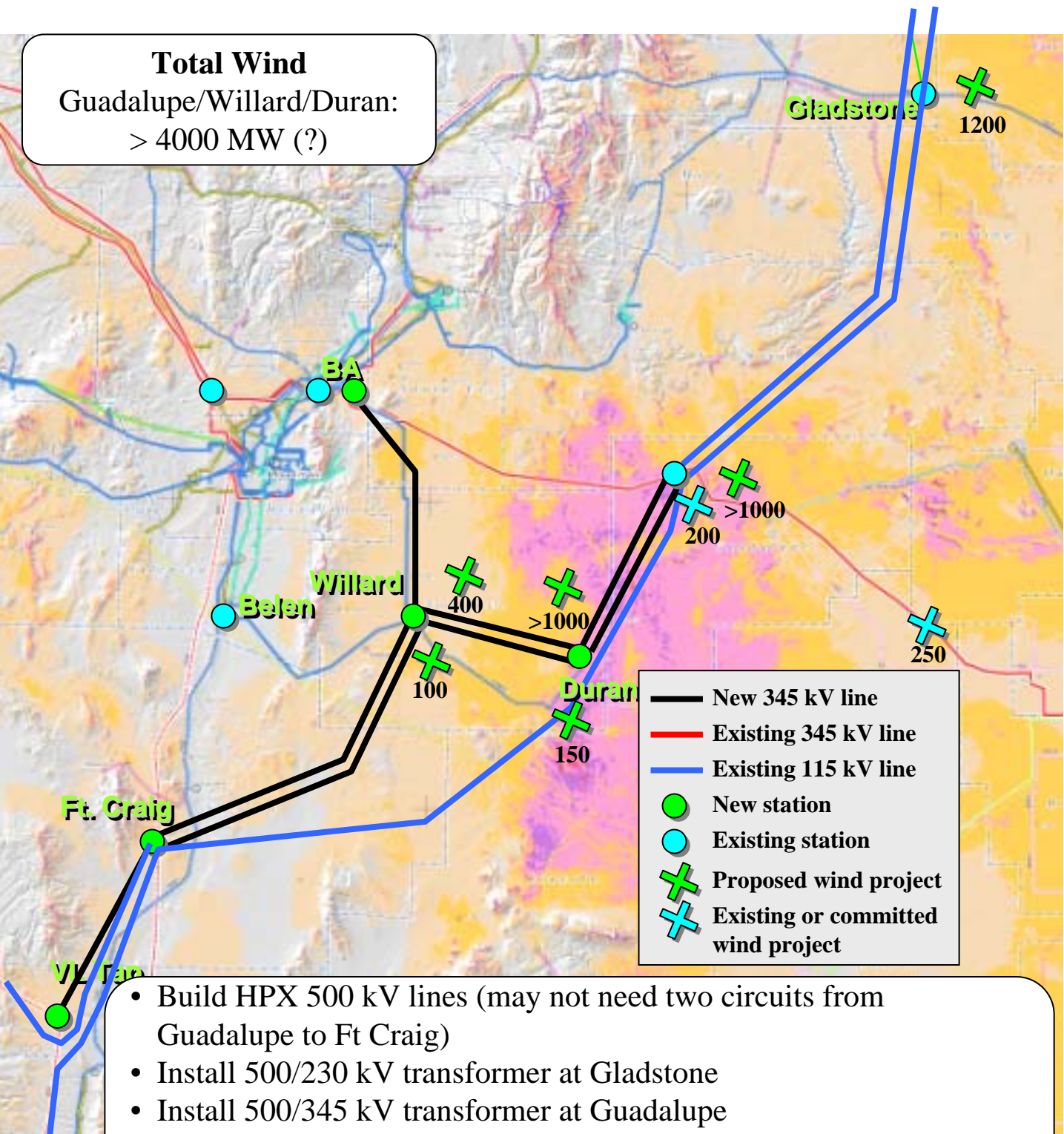
- Arroyo PST controlling flow at 200 MW south
- All facilities are within rating for N-0 and N-1 conditions (only a limited set of northern outages were considered)
- Note that Path 47 and Path 48 are in the export direction (wind + load-side generation > load)

NM Wind Collector Concepts

- Staging can be in other orders
- Cost and segment information can be used to estimate other scenarios
- Additional studies:
 - HPX Integration in Central NM
 - Consideration of Willard-Amrad segment
 - Consideration of Guadalupe-Gladstone segment
 - Integration with SunZia or SATS components

Stage 5+

Integration with High Plains Express



- Build HPX 500 kV lines (may not need two circuits from Guadalupe to Ft Craig)
- Install 500/230 kV transformer at Gladstone
- Install 500/345 kV transformer at Guadalupe
- Install 500/345 kV transformer Ft Craig
- Install 500/345 kV transformer at Duran

Potential Future Study Work

