APS Transmission Zone M-3 Process
Ethel Springs – Bethlen 138 kV Network

Need Number: APS-2023-009

Process Stage: Solution Meeting – 10/20/2023

Previously Presented: Need Meeting – 4/21/2023

Project Driver(s):

- *Equipment material condition, performance and risk*
- *Operational Flexibility and Efficiency*

Specific Assumption Reference(s)

System Performance

- Network radial lines

Operational Flexibility

Problem Statement

The are two radial feeds: one to Bethlen and one to Ethel Spring.

A fault on the Loyalhanna - Social Hall 138 kV line will outage multiple 138 kV stations, which puts significant stress on the networked distribution system.

A fault on the Loyalhanna - Social Hall 138 kV line will outage radial load at Ethel Springs, and a fault on the Bethlen – Loyalhanna 138 kV line will outage radial load at Bethlen. Ethel Springs serves 6,105 customers and 14.43 MW, and Bethlen serves 5,110 customers and 11.76 MW.

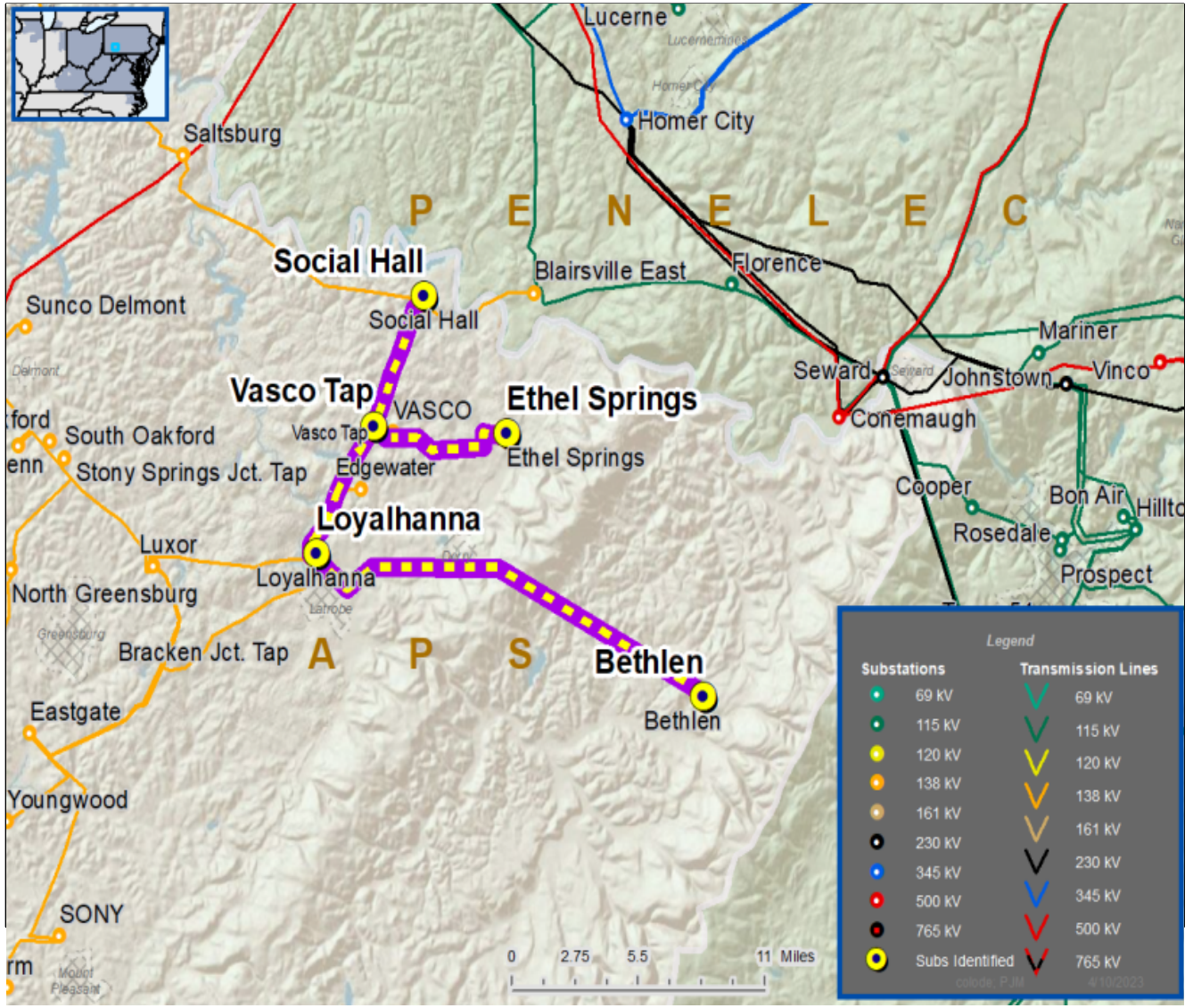
Transmission line ratings are limited by terminal equipment.

Vasco Tap – Social Hall 138 kV:

- Existing line rating: 225 / 287 MVA (SN / SE)
- Existing conductor rating: 297 / 365 MVA (SN / SE)

Bethlen – Loyalhanna 138 kV:

- Existing line rating: 205 / 242 MVA (SN / SE)
- Existing conductor rating: 309 / 376 MVA (SN / SE)



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Proposed Solution:

Construct a new 8-mile 138 kV line between Ethel Springs and Bethlen substations using 954 ACSR conductor. The following work will be performed at neighboring substations:

- At Social Hall:
  - Replace substation conductor, wave trap, and circuit breaker
- At Vasco:
  - Construct a 4-breaker 138 kV ring bus
- At Edgewater Tap:
  - Install (3) SCADA controlled switches
- At Loyalhanna:
  - Replace substation conductor on the Bethlen 138 kV line terminal
- At Ethel Springs:
  - Convert the 138 kV yard into a 4-breaker ring bus
- At Bethlen:
  - Convert the 138 kV yard into a 3-breaker ring bus

New line ratings:

- Vasco Tap – Social Hall 138 kV: 297 / 365 MVA (SN / SE)
- Bethlen – Loyalhanna 138 kV: 309 / 376 MVA (SN / SE)
- Bethlen – Ethel Springs: 308 / 376 MVA (SN / SE)

Alternatives Considered

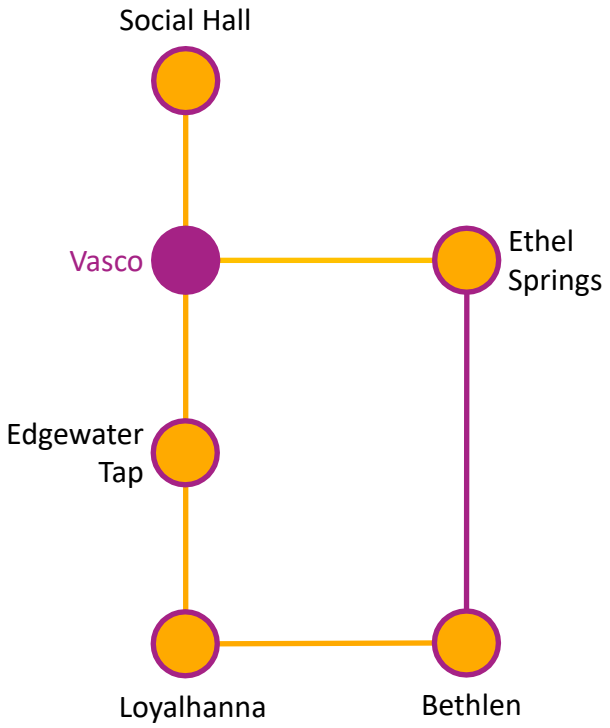
- Maintain line in existing configuration, putting distribution customers/load at risk

Estimated Project Cost: $59.6 M

Projected In-Service: 12/31/2025

Project Status: Conceptual

Model: 2022 RTEP model for 2027 Summer (50/50)



Legend	
500 kV	
345 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
34.5 kV	
23 kV	
New	