PJM Identified Issues and Planned Solutions Near the MISO Seam

4th Quarter Review - 2021

February 17, 2022

- This slide deck provides a summary of significant transmission projects near the PJM – MISO seam which have been added or modified in 2021
  - **It is not a comprehensive review of all planned projects**

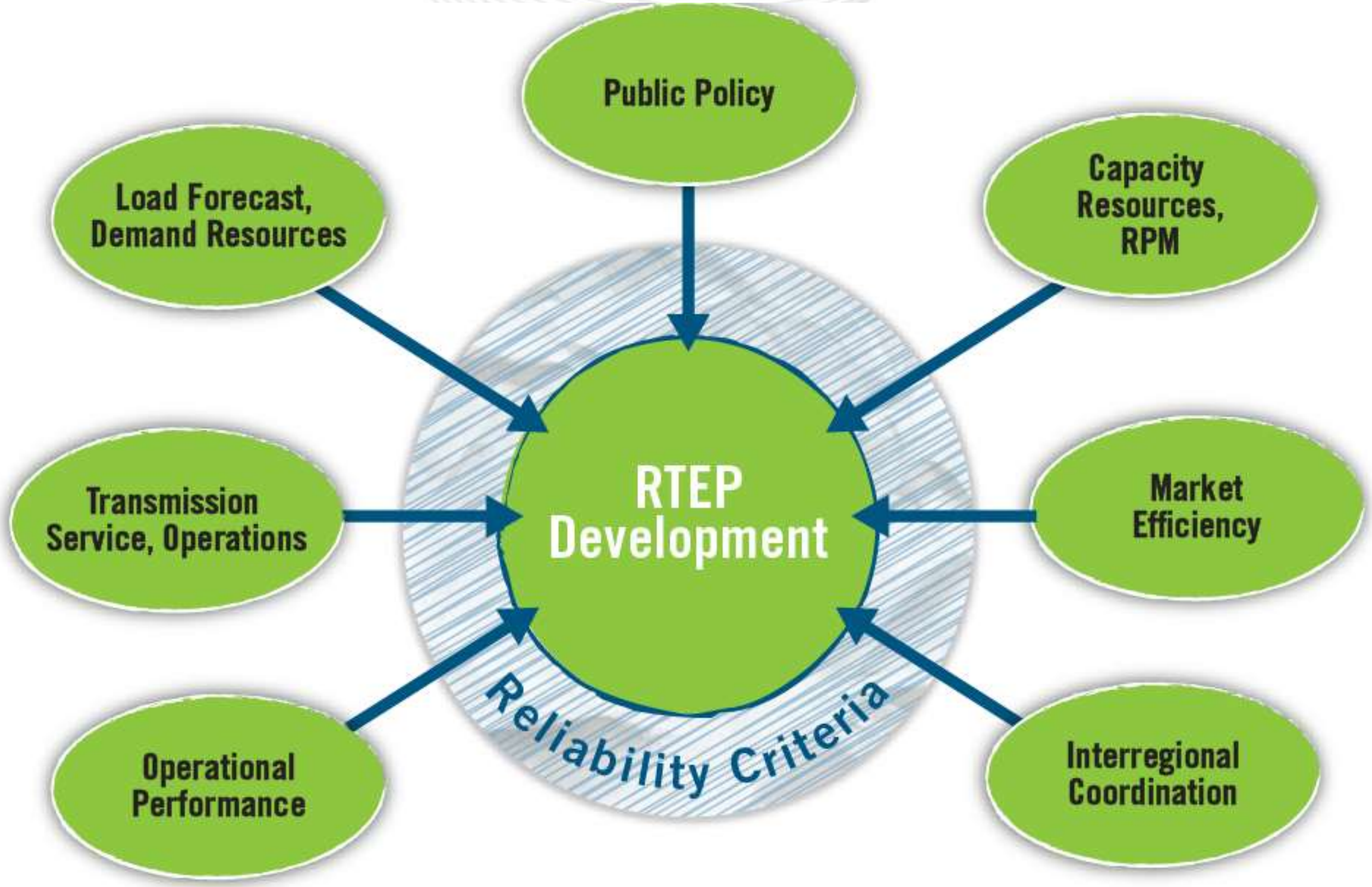
- Where projects were presented on multiple occasions, efforts were made to only include the latest information

- For additional information:
  - TEAC: http://pjm.com/committees-and-groups/committees/teac.aspx
  - Subregional RTEP Committee – Western: http://pjm.com/committees-and-groups/committees/srrtep-w.aspx

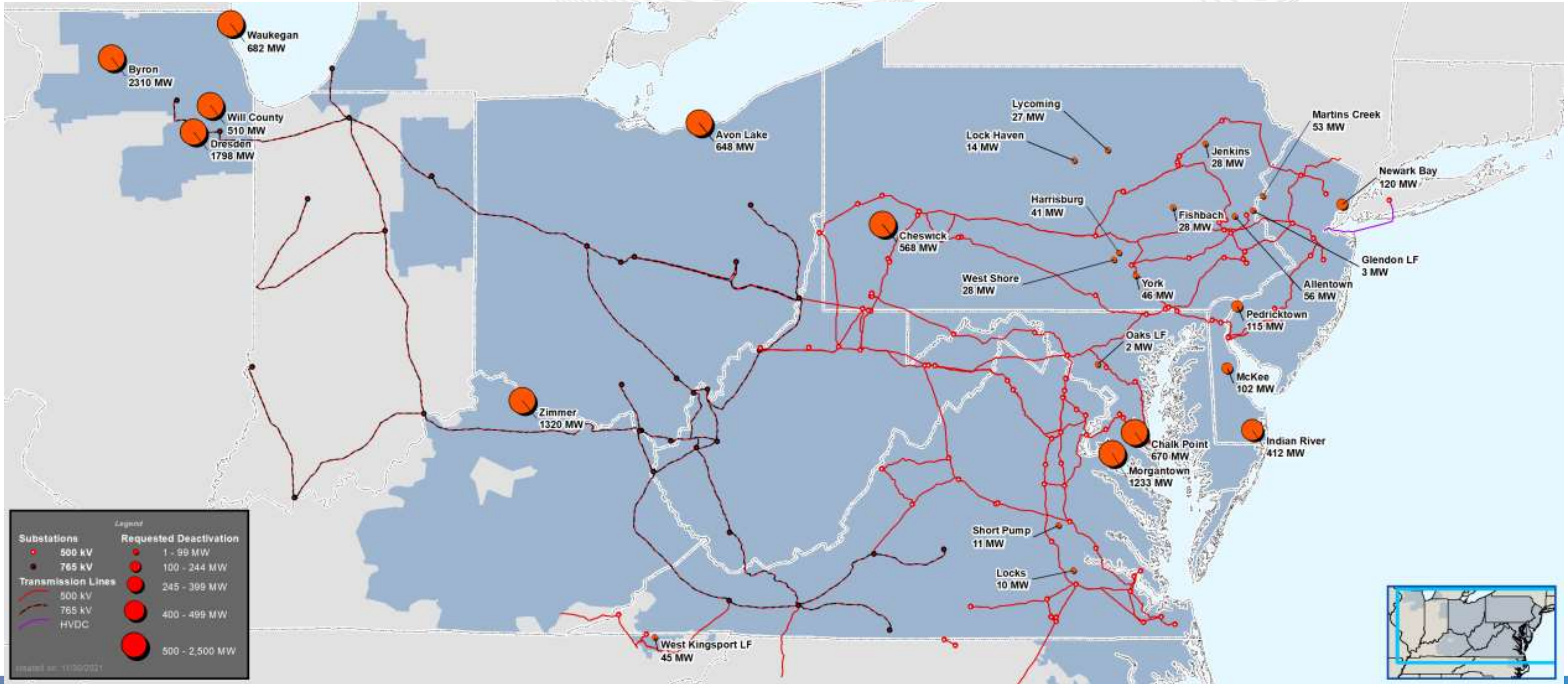
Links for Various Information related to PJM Planning

- Transmission Expansion Advisory Committee (TEAC)/PJM RTEP Windows
  - http://www.pjm.com/committees-and-groups/committees/teac.aspx
- Interregional Planning
  - http://www.pjm.com/planning/interregional-planning.aspx
- Queue (future) Generation
  - https://pjm.com/planning/services-requests/interconnection-queues.aspx
- Generation Deactivation
  - http://www.pjm.com/planning/generation-deactivation.aspx
- Competitive Planning Process
  - https://www.pjm.com/planning/competitive-planning-process.aspx

System Expansion Drivers for RTEP



Generation Deactivation Notification Update (Between 4/1/2021 and 11/1/2021)



Waukegan
682 MW
Byron
2310 MW
Will County
510 MW
Dresden
1798 MW
Avon Lake
648 MW
Lycoming
27 MW
Lock Haven
14 MW
Martins Creek
53 MW
Jenkins
28 MW
Newark Bay
120 MW
Harrisburg
41 MW
Fishbach
28 MW
Cheswick
568 MW
Glendon LF
3 MW
West Shore
28 MW
York
46 MW
Allentown
56 MW
Pedricktown
115 MW
Oaks LF
2 MW
McKee
102 MW
Zimmer
1320 MW
Chalk Point
670 MW
Indian River
412 MW
Morgantown
1233 MW
Short Pump
11 MW
Locks
10 MW
West Kingsport LF
45 MW
Legend
Substations
500 kV
765 kV
Transmission Lines
500 kV
765 kV
HVDC
Requested Deactivation
1 - 99 MW
100 - 244 MW
245 - 399 MW
400 - 499 MW
500 - 2,500 MW

Deactivation Status

Unit Name	Capacity (MW)	Fuel Type	Transmission Zone	Requested Deactivation Date	PJM Reliability Status
Allentown CT1, CT2, CT3 and CT4	56	Oil	PPL	6/1/2022	Reliability analysis complete; no impacts identified
Fishbach CT1 and CT2	28	Oil	PPL	6/1/2022	Reliability analysis complete; no impacts identified
Harrisburg CT1, CT2 and CT3	41.1	Oil	PPL	6/1/2022	Reliability analysis complete; no impacts identified
Jenkins CT1 and CT2	27.6	Oil	PPL	6/1/2022	Reliability analysis complete; no impacts identified
Lock Haven CT1	14	Oil	PPL	6/1/2022	Reliability analysis complete; no impacts identified
Martins Creek CT1, CT2 and CT3	53.3	Oil	PPL	6/1/2022	Reliability analysis complete; no impacts identified

Deactivation Status

Unit Name	Capacity (MW)	Fuel Type	Transmission Zone	Requested Deactivation Date	PJM Reliability Status
West Shore CT1 and CT2	28	Oil	PPL	4/1/2022	Reliability analysis complete; no impacts identified
Williamsport-Lycoming CT1 and CT2	26.6	Oil	PPL	4/1/2022	Reliability analysis complete; no impacts identified
DINWIDDIE 1CT	3	Diesel	Dominion	6/1/2023	Reliability analysis complete; no impacts identified
Lanier 1 CT	7	Diesel	Dominion	6/1/2023	Reliability analysis complete; no impacts identified
Rockville CT	4	Diesel	Dominion	6/1/2023	Reliability analysis complete; no impacts identified
Weakley CT	7	Diesel	Dominion	6/1/2023	Reliability analysis complete; no impacts identified

Deactivation Status

Unit Name	Capacity (MW)	Fuel Type	Transmission Zone	Requested Deactivation Date	PJM Reliability Status
Glendon LF	2.9	Methane	ME	6/1/2022	Reliability analysis complete; no impacts identified
Zimmer 1	1320	Coal	DEOK	5/31/2022	Reliability analysis complete and upgrades expected to be completed in time for unit to deactivate as scheduled.
New Bay Cogen CC	120.2	Natural Gas	PSEG	5/31/2022	Reliability analysis complete; no impacts identified
Pedricktown Cogen CC	115.3	Natural Gas	AEC	5/31/2022	Reliability analysis complete; upgrades expected to be completed in future, but interim operating measures identified and unit can deactivate as scheduled
Avon Lake 10	21	Oil	FirstEnergy	4/1/2022	Reliability analysis complete and upgrades expected to be completed in time for unit to deactivate as scheduled.
Avon Lake 9	627	Coal	FirstEnergy	4/1/2022	Reliability analysis complete and upgrades expected to be completed in time for unit to deactivate as scheduled.

Deactivation Status

Unit Name	Capacity (MW)	Fuel Type	Transmission Zone	Requested Deactivation Date	PJM Reliability Status
Cheswick 1	567.5	Coal	DL	4/1/2022	Reliability analysis complete and upgrades expected to be completed in time for unit to deactivate as scheduled.
Indian River 4	411.9	Coal	DPL	5/31/2022	Reliability issue identified
Waukegan 7 & 8	682.4	Coal	ComEd	5/31/2022	Reliability analysis complete; no impacts identified
Will County 4	510	Coal	ComEd	5/31/2022	Reliability analysis complete; no impacts identified
Morgantown Unit 1 & 2	1232.7	Coal	PEPCO	5/31/2022	Reliability analysis complete and upgrades expected to be completed in time for unit to deactivate as scheduled.

Deactivation Status

Unit Name	Capacity (MW)	Fuel Type	Transmission Zone	Actual Deactivation Date	PJM Reliability Status
York Generation Facility	46.2	Natural Gas	ME	9/20/2021	Reliability analysis complete; no impacts identified
Oaks Landfill	2.2	Methane	PEPCO	7/1/2021	Reliability analysis complete; no impacts identified
Chalk Point Unit 1 & 2	670.3	Coal	PEPCO	6/1/2021	Reliability analysis complete; no impacts identified
McKee 3	102	Natural Gas	DPL	6/1/2021	Reliability analysis complete; no impacts identified
West Kingsport LF	45	Biomass	AEP	5/31/2021	Reliability analysis complete; no impacts identified

Deactivation Status

Unit Name	Capacity (MW)	Fuel Type	Transmission Zone	Withdrawn Deactivation Date	PJM Reliability Status
Byron 1 & 2	2310	Nuclear	ComEd	9/15/2021	N/A
Dresden 2 & 3	1798	Nuclear	ComEd	9/15/2021	N/A

Generation Deactivation link:
https://www.pjm.com/planning/services-requests/gen-deactivations

No Identified Issues: Operational Performance

PJM 2021 RTEP Update

- The 2021 RTEP Assumptions were presented at the February 9, 2021 PJM TEAC meeting. Refer to https://www.pjm.com/-/media/committees-groups/committees/teac/2021/20210209/20210209-item-09a-2021-rtep-assumptions.ashx
- Baseline Projects –Projects that are driven by reliability criteria violations, operational performance issues, congestion constraints and public policy.
- Supplemental Projects – Projects that are not required to address system reliability, Operational performance or economic criteria. Supplemental projects are planned according to the Tariff Attachment M-3 process.

- Per the PJM Operating Agreement, multiple proposal windows were conducted for all reliability needs that were not Immediate Need reliability upgrades or were otherwise ineligible to go through the window process.
- 5 Order 1000 proposal windows opened during the 2021 RTEP cycle
  - Proposal Window No.1 Long-Term - 120 day window
  - Proposal Window SAA – 120 day window
  - Proposal Window No.1 - 60 day window
  - Proposal Window No.2 - 30 day window
  - Proposal Window No.3 – 30 day window

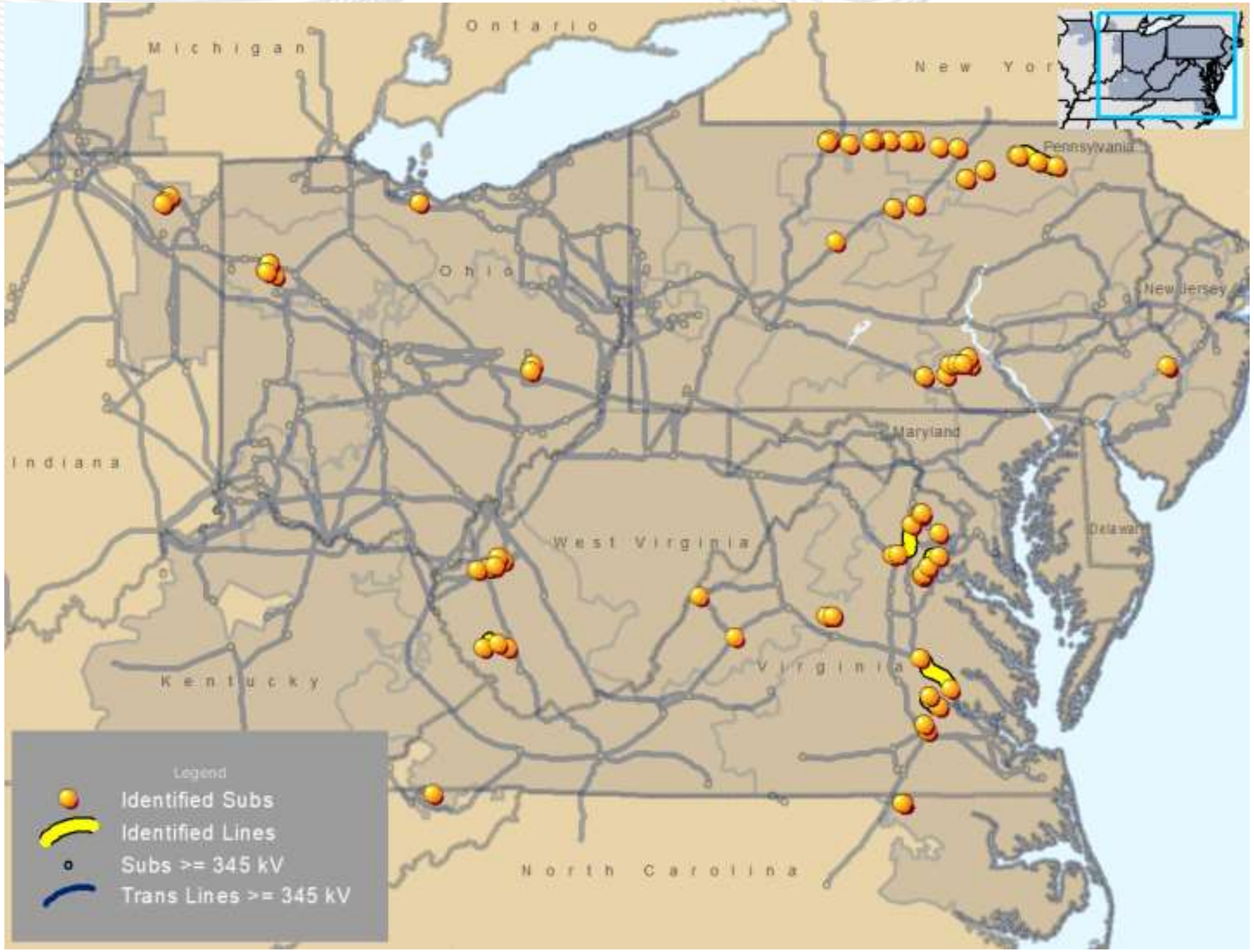
2021 RTEP Window 1 Update

- PJM as part of the annual Regional Transmission Expansion Plan conducted studies and originally identified 402 flowgates. 159 of those flowgates were eligible for competition, where 243 of the flowgates were excluded from the competition for various reasons.
  – Window opened on 7/02/2021
  – Window closed on 8/31/2021

Analysis of 2026 – Violations

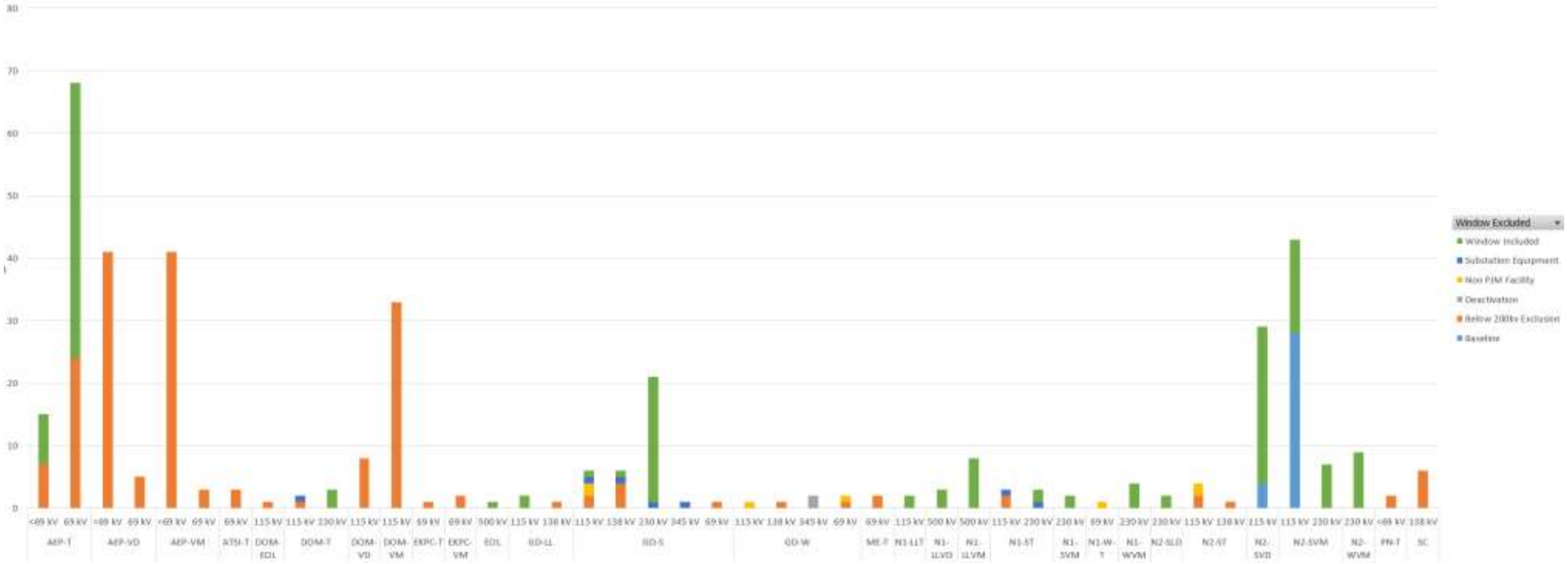
Overview of 2026 Results
Total of 402 flowgates identified

- 159 flowgates are eligible
  - 72 in the PJM Mid-Atlantic Region
  - 33 in the PJM Southern Region
  - 54 in the PJM Western Region
- 243 flowgates excluded
  - 195 due to the below 200kv exclusion
  - 7 due to Substation Equipment Exclusion
  - 32 existing baseline fixes
  - 7 Non PJM Facility
  - 2 Invalid due to recent Deactivation



2026 Analysis Violations

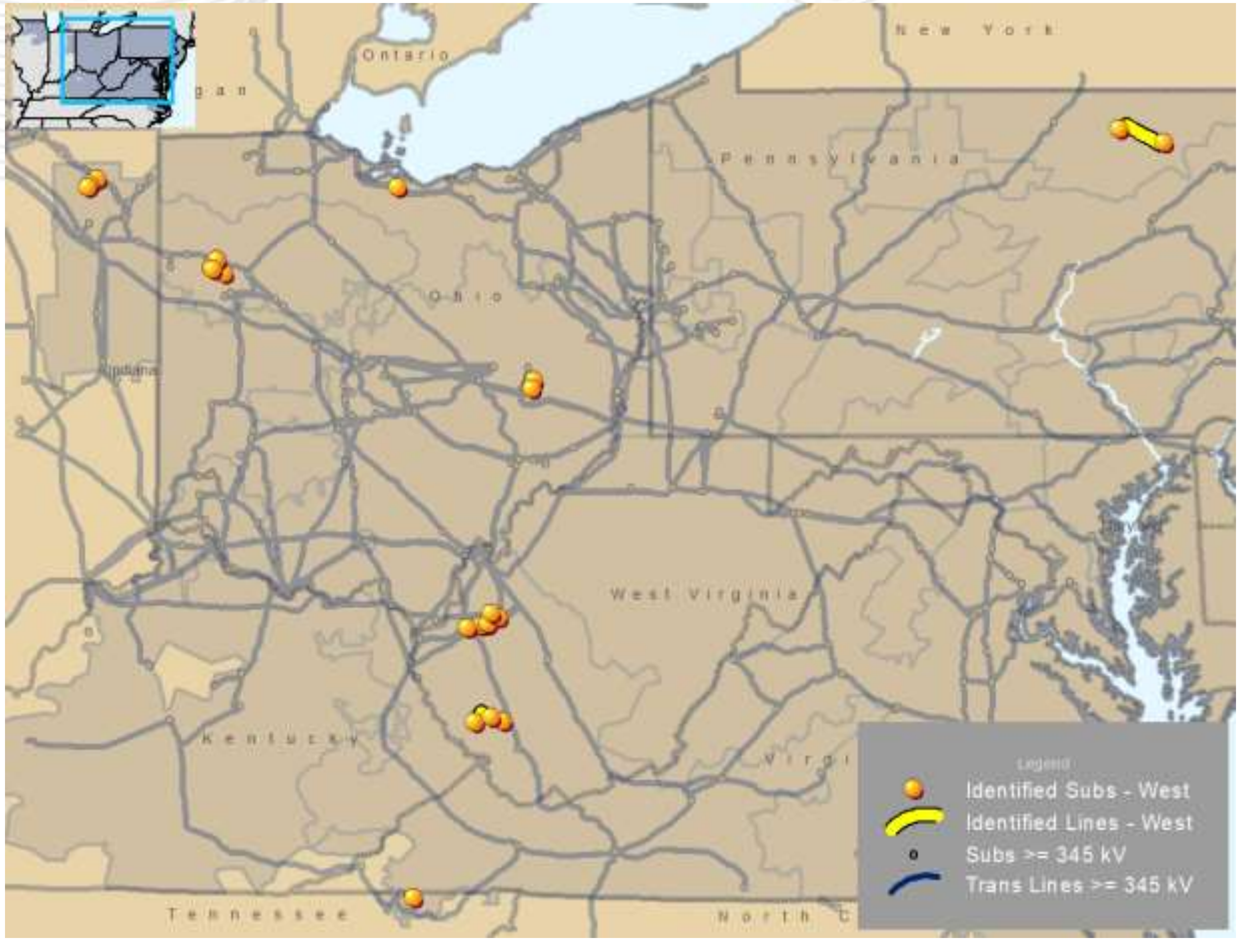
Voltage	Window Excluded: Baseline	Window Excluded: Below 200kv Exclusion	Window Excluded: Deactivation	Window Excluded: Non PJM Facility	Window Excluded: Substation Equipment	Window Included	Grand Total
<69 kV		91				8	99
69 kV		42		2		44	88
115 kV	32	49		5	3	45	134
138 kV		13			1	1	15
230 kV					2	49	51
345 kV			2		1		3
500 kV						12	12
Grand Total	**32**	**195**	**2**	**7**	**7**	**159**	**402**



2021 RTEP Proposal Window 1 – West Results

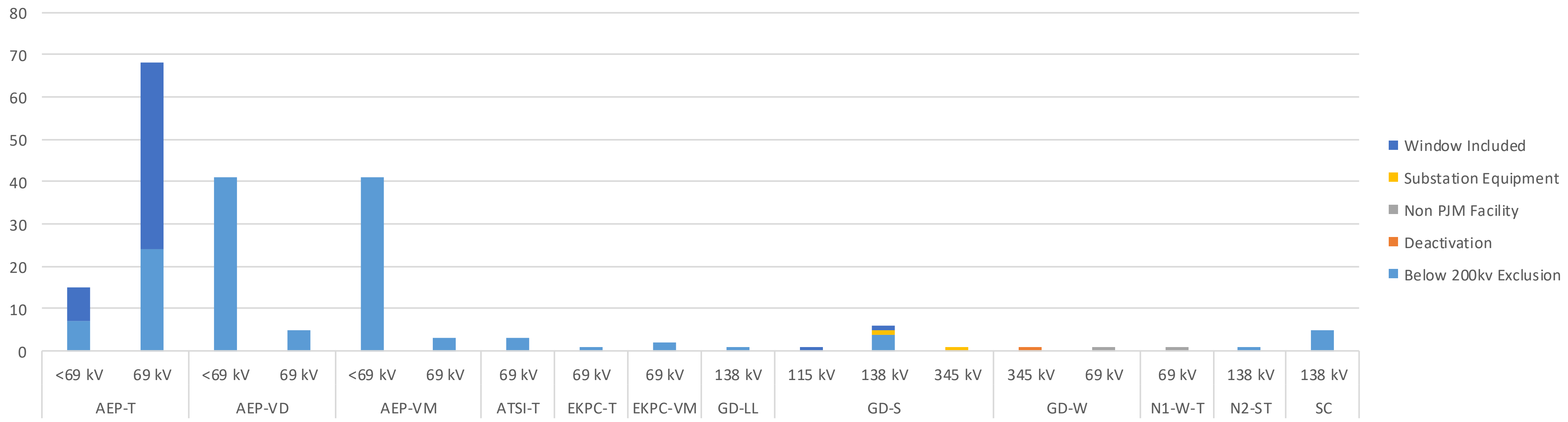
- 54 Eligible Flowgates
  - 52 FERC 715 Thermal
  - 2 Generation Deliverability

- 143 Flowgates Excluded from Window
  - 132 below 200kv
  - 2 Substation Equipment Exclusions
  - 2 Non PJM Facilities
  - 1 Deactivation
  - 1 Light Load
  - 5 Short Circuit



2021 RTEP Proposal Window 1 – West Results

Voltage	Window Excluded				Window Included	Grand Total
	Below 200kv Exclusion	Deactivation	Non PJM Facility	Substation Equipment		
<69 kV	89				8	97
69 kV	38		2		44	84
115 kV					1	1
138 kV	11			1	1	13
345 kV		1		1		2
Grand Total	**132**	**1**	**2**	**2**	**54**	**197**



- For this Window, PJM sought technical solutions, also called proposals, to resolve potential reliability criteria violations on facilities identified in accordance with all applicable planning criteria (PJM, NERC, SERC, RFC, and Local Transmission Owner criteria).
- 57 total proposals submitted from 10 different entities (see https://www.pjm.com/-/media/committees-groups/committees/teac/2021/20211005/20211005-item-09-reliability-analysis-update.ashx)
  - 21 Greenfield
  - 36 Upgrades
- Cost Estimates: Approximate range from $600k to $136M
- 15 Proposals identified with Cost Containment
- 22 proposals selected

2021 RTEP Re-tool

- PJM has reviewed changes which have occurred since the original 2021 RTEP violations were identified
- The significant changes include, deactivations, withdrawal of deactivations, and execution of Interconnection Service Agreements by Interconnection Customers
- The re-tool has resulted in some changes to results, reducing and eliminating the violations previously identified – all changes have been posted in an update on the Competitive Planning page
- Additional changes resulted in the need to open another Order 1000 proposal window (Window 2 – briefly discussed later in this presentation)

2021 RTEP Window 2 Update

- ComEd Transmission Zone: 2026 Winter Sensitivity
- FGs GD-W193 and GD-W194 were placed on hold in the 2021 Window 1 as generator deactivations in ComEd not originally included in the 2026 case would relieve the overloads
- PJM ran generator deliverability test using the revised 2026 winter case, and the table below shows facilities now overloaded in the updated case:

Fr Bus	Fr Name	To Bus	To Name	CKT	kVs	Areas	ContType	Rate B (MVA)	Rate C (MVA)	Final DC %LD	Final AC %LD	AC Final Flow
274750	CRETE EC ;BP	255112	17STJOHN	1	345	217/222	Single	1557	1772	114.3	118.08	1838.4
270716	DRESDEN ; B	275179	DRESDEN ;1M	1	345/138	222	Breaker	480	530	114.54	117.3	563
275179	DRESDEN ;1M	271337	DRESDEN ; R	1	138	222	Breaker	480	530	114.51	115.13	552.6

- PJM opened a window to address these issues on November 3, 2021 and closed the window on January 12, 2022 (Greater than 60 days due to holiday time period)

2021 RTEP Window 2

- 10 total proposals submitted from 3 different entities
  - 4 Greenfield
  - 6 Upgrades
- Cost Estimates: Approximate range from $4.2M to $62M
- 2 Proposals identified with Cost Containment
- PJM performing performance reviews and will contact MISO following completion of these initial assessments

Competitive Planner Contact Information

- If you have any questions related to Competitive Planning Process and Competitive Planner Tool, please contact ProposalWindow-Admin@pjm.com
- If you need an assistance with registration to Competitive Planner Tool, please contact AccountManager@pjm.com
- PJM Competitive Planning Process Webpage

  https://www.pjm.com/planning/competitive-planning-process.aspx
- Access Competitive Planner tool through PJM Planning Center Webpage

  https://www.pjm.com/markets-and-operations/etools/planning-center.aspx
- Competitive Planner Tool Updates at Tech Change Forum

  https://www.pjm.com/committees-and-groups/tech-change-forum.aspx

Planned Projects: Baseline Reliability

Generation Deactivation: Baseline Reliability
West Region

APS Transmission Zone

Problem Statement: Generation Deliverability – Cheswick Deactivation

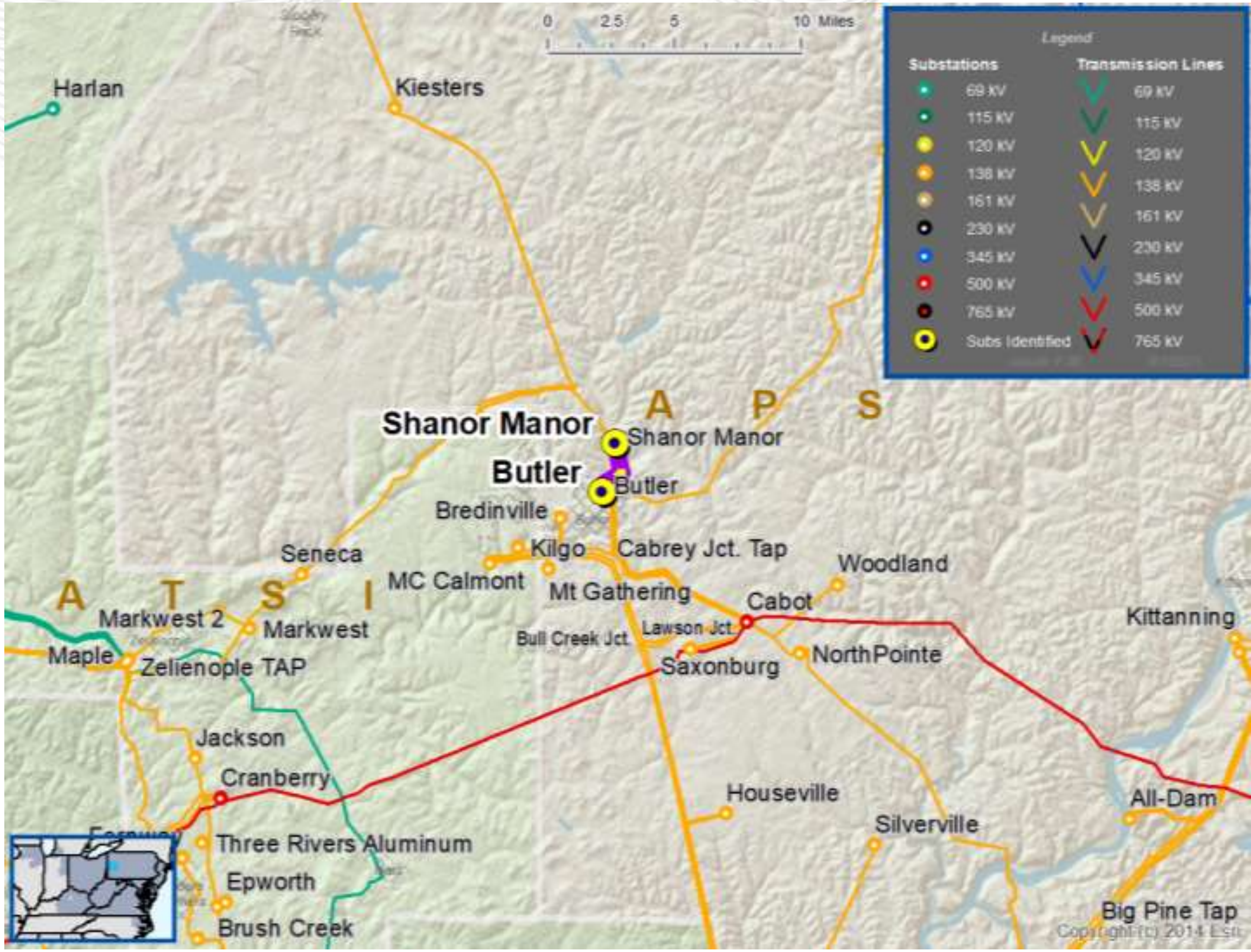
- Thermal violation: Shanor Manor - Butler 138 kV line.
- Contingency: N-1

Recommended Solution:

- New baseline b3318 – Reconductor the small section of Shanor Manor – Butler 138 kV line with replacement of circuit breaker at Butler 138 kV.
- Current Rating: 370 MVA SN/ 452 MVA SE
- New Rating: 425 MVA SN/ 522 MVA SE

Estimated Cost: $ 1.5M
Required IS Date: 06/01/2022
Projected IS Date: 12/31/2022

* Operating measures identified to mitigate reliability impacts in interim.



APS Transmission Zone

Problem Statement: Generation Deliverability – Cheswick Deactivation

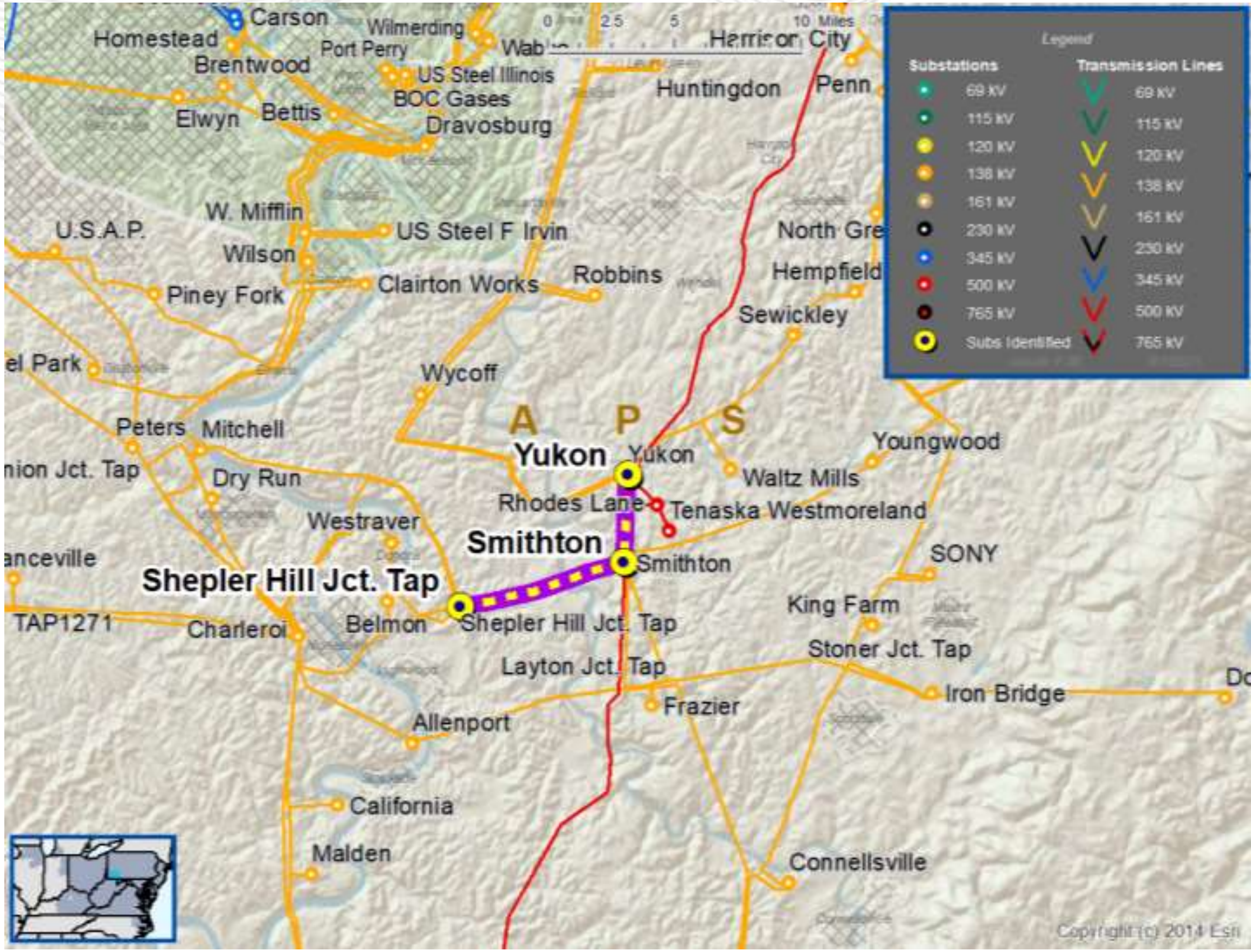
- Thermal violation: Yukon - Smithton #62 - Shepler Hill Jct 138 kV lines
- Contingency: N-2

Recommended Solution:

- Existing baseline **b3214** - Reconductor the Yukon – Smithton – Shepler Hill Jct 138 kV Line. Upgrade terminal equipment at Yukon and replace line relaying at Mitchell and Charleroi.

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2023
Previous TEAC Date: 06/02/2020

* Operating measures identified to mitigate reliability impacts in interim.



APS Transmission Zones

Problem Statement: Generation Deliverability and N-1-1 thermal – Cheswick deactivation

- Thermal violation: Wylie Ridge – Smith 138 kV
- Contingency: N-2, and various N-1 combinations

Recommended Solution:

- Existing baseline **b3156 -** Replace line relaying and fault detector on the Wylie Ridge terminal at Smith 138 kV Substation

Required IS Date: 06/01/2022
Projected IS Date: from 06/01/2024 to 06/01/2022
Previous TEAC Date: 01/17/2020

Duquesne Transmission Zone

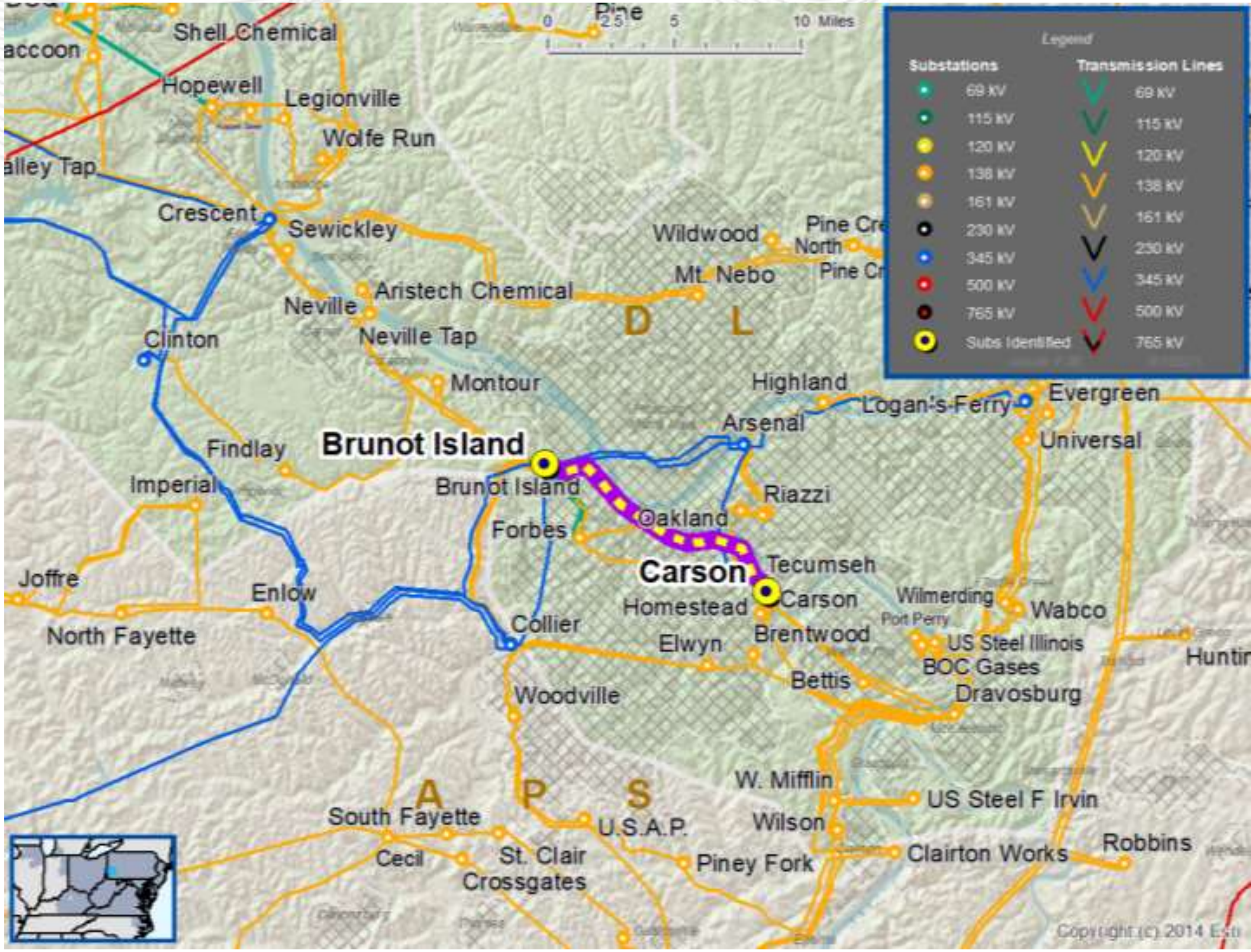
Problem Statement: FERC 715 –Cheswick deactivation
- Thermal Violation: Brunot Island – Carson 345 KV
- Contingency: N-2 – underground common trench failure (FERC 715)

Recommended Solution:
- New baseline b3319 – Add forced cooling to increase the normal rating of the Brunot Island-Carson (302) 345kV High Pressure Fluid Filled (HPFF) underground cable circuit.

- Current Rating: 492 MVA SN/ 696 MVA SE
- New Rating: 675 MVA SN/ 718 MVA SE

Estimated Cost: $22M
Required IS Date: 06/01/2022
Projected IS Date: 12/31/2024

* Operating measures identified to mitigate reliability impacts in interim.



Problem Statement: Generation Deliverability – Avon Lake 9 and 10
- Thermal violation: Marquis 345/138 kV #3 transformer
- Contingency: N-2

Recommended Solution:
- New baseline b3320 – Replacing relay at Marquis 345 kV
- Current Rating: 463 MVA SN/ 463 MVA SE
- New Rating: 501 MVA SN/ 564 MVA SE

Estimated Cost: $ 500K
Required IS Date: 06/01/2022
Projected IS Date: 06/01/2022

APS Transmission Zone

Problem Statement: Generation Deliverability – Byron Deactivation

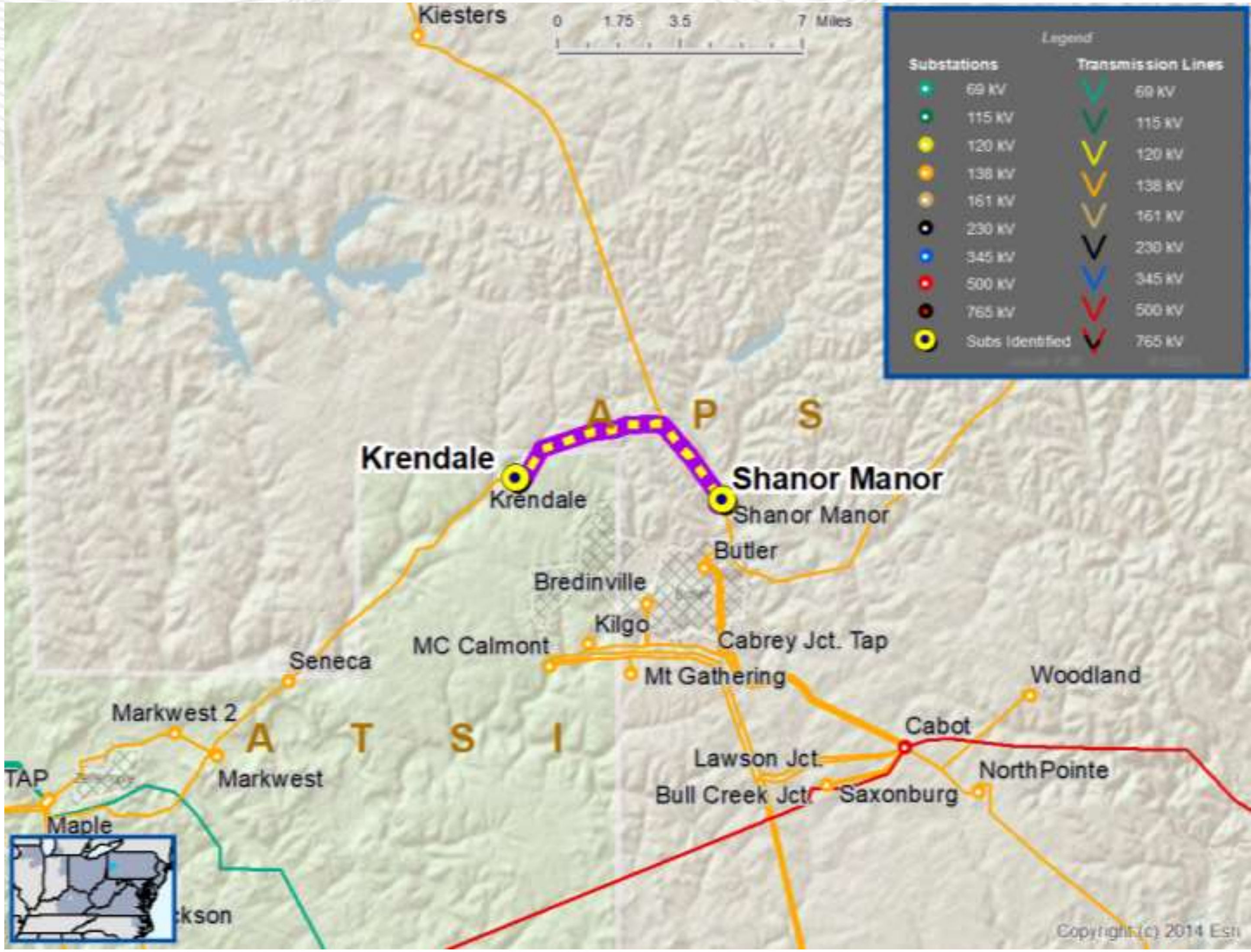
- Thermal violation: Shanor Manor - Krendale 138 kV line.
- Contingency: N-1

Recommended Solution:

- New baseline b3322 – Reconductor the small section of Shanor Manor – Krendale 138 kV line with relay replacement at Butler and Krendale.
- Current Rating: 370 MVA SN/ 452 MVA SE
- New Rating: 425 MVA SN/ 522 MVA SE

Estimated Cost: $1.75M
Required IS Date: 06/01/2022
Projected IS Date: 06/01/2024

* Operating measures identified to mitigate reliability impacts in interim.



ATSI Transmission Zone

Problem Statement: Generation Deliverability – Byron Deactivation

- Thermal violation: Leroy Center - Pinegrove 138 kV line.
- Contingency: N-2

Recommended Solution:

- New baseline b3323 – Reconductor Leroy Center - Pinegrove 138 kV line.
- Current Rating: 148 MVA SN/ 151 MVA SE
- New Rating: 252 MVA SN/ 291 MVA SE

Estimated Cost: $16M
Required IS Date: 06/01/2022
Projected IS Date: 06/01/2024

* Operating measures identified to mitigate reliability impacts in interim.

ATSI Transmission Zone

Problem Statement: Generation Deliverability – Byron Deactivation

- Thermal violation: Leroy Center - Pawnee 138 kV line.
- Contingency: N-2

Recommended Solution:

- Existing baseline b3152 – Reconductor the 8.4 mile section of the Leroy Center - Mayfield Q1 line between Leroy Center and Pawnee

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2023
Previous TEAC Date: 12/12/2019

* Operating measures identified to mitigate reliability impacts in interim.

Problem Statement: Generation Deliverability –Waukegan and Will County deactivations

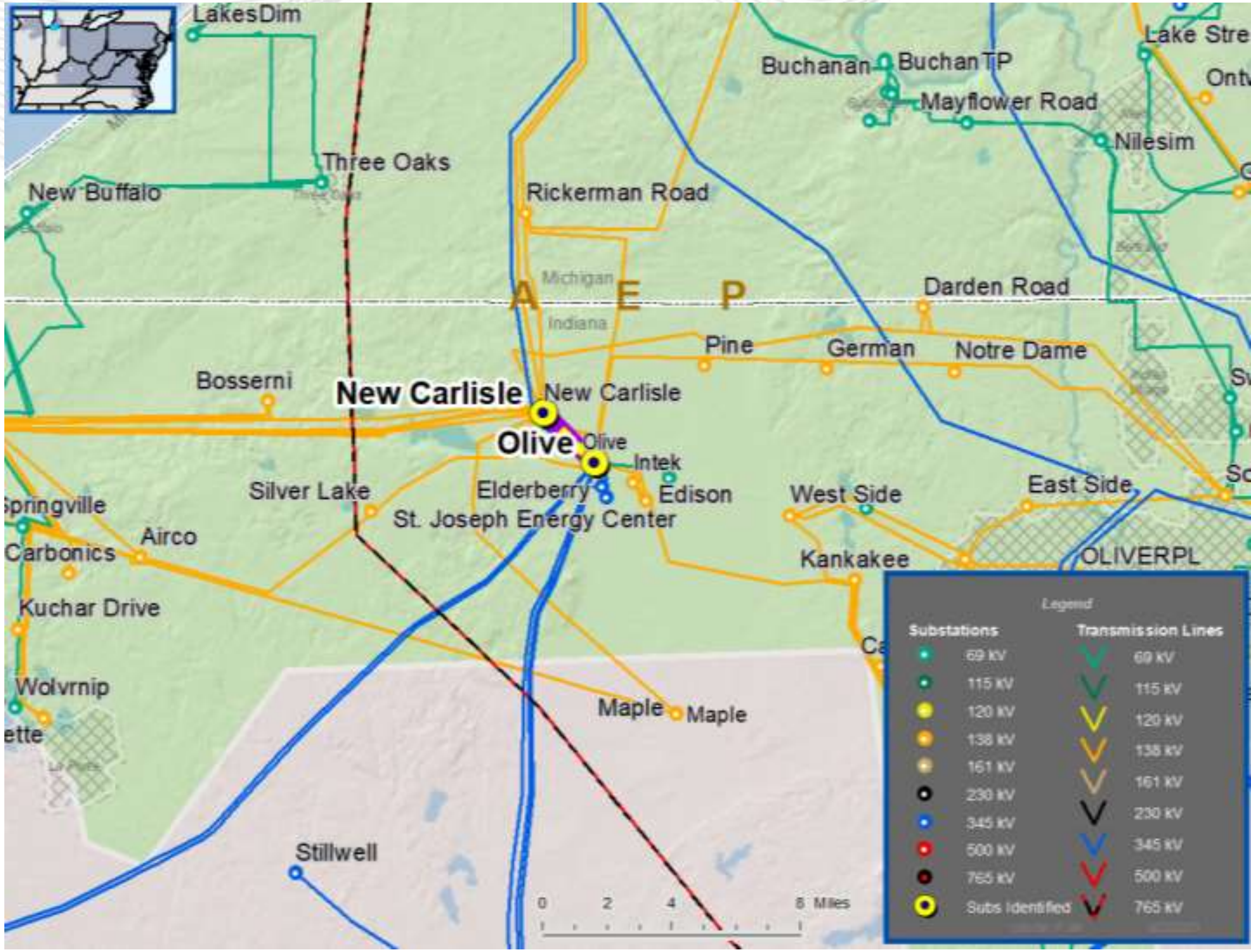
- Thermal violation: Olive – New Carisle 138 kV line.
- Contingency: Various N-2

Recommended Solution:

- New baseline b3324 – Replace the bus section at Olive.
- Current Rating: 287 MVA SN/ 337 MVA SE
- New Rating: 335 MVA SN/ 392 MVA SE

Estimated Cost: $ 0.1M
Required IS Date: 06/01/2022
Projected IS Date: 12/31/2022

* Operating measures identified to mitigate reliability impacts in interim.



Problem Statement: Generation Deliverability –Waukegan and Will County deactivations

- Thermal violation: Charleroi – Union 138 kV line.
- Contingency: N-2

Recommended Solution:

- New baseline b3325 – Reconductor the Charleroi – Union 138 kV line and upgrade terminal equipment at Charleroi.
- Current Rating: 296 MVA SN/ 302 MVA SE
- New Rating: 308 MVA SN/ 376 MVA SE

Estimated Cost: $11M
Required IS Date: 06/01/2022
Projected IS Date: 06/01/2023

* Operating measures identified to mitigate reliability impacts in interim.

Problem Statement: Generation Deliverability Violation – Zimmer Deactivation

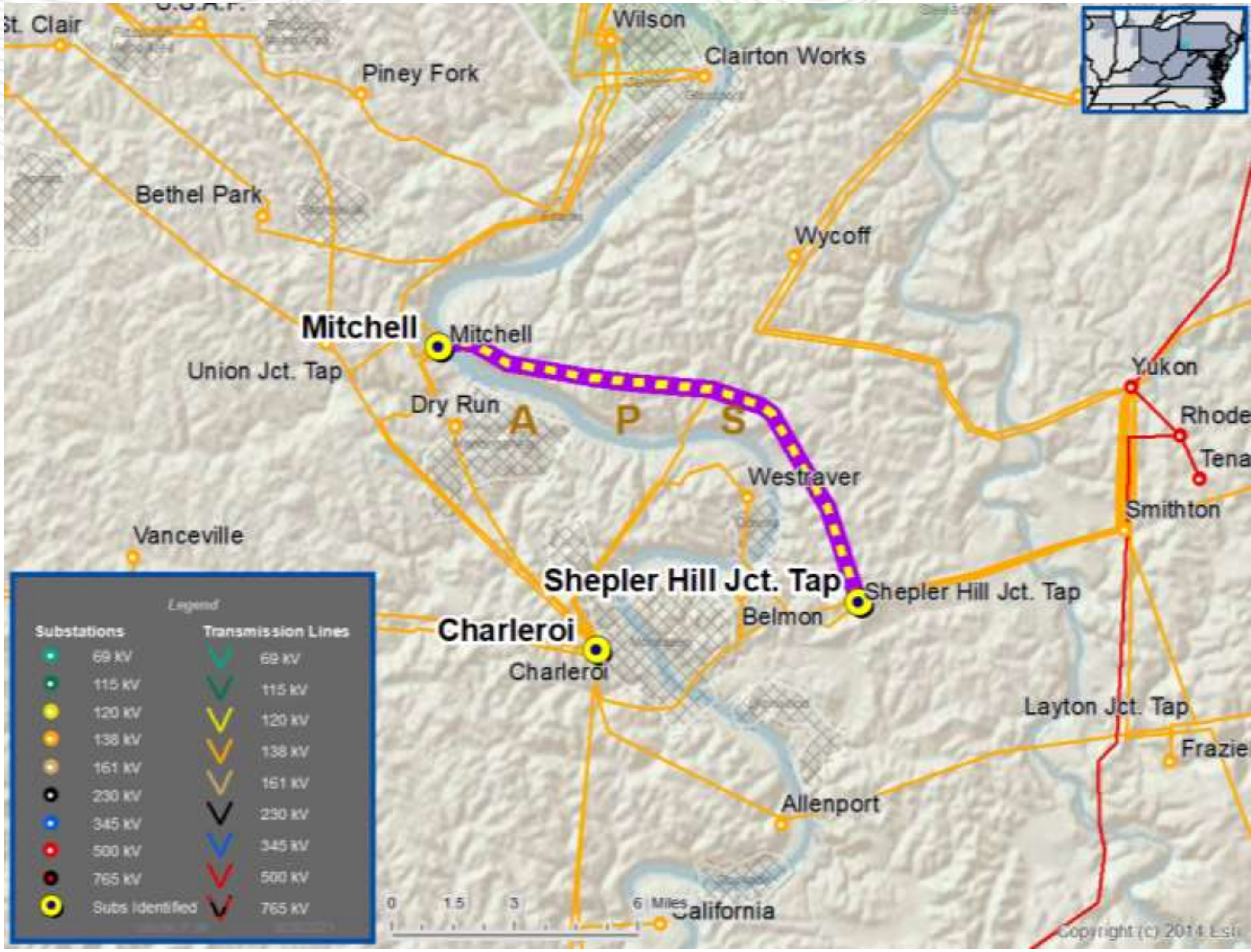
- Thermal violation: Shepler Hill Jct – Mitchell 138 kV line
- Contingency: N-2

Recommended Solution:

- Existing b3214 - Reconductor the Yukon – Smithton – Shepler Hill Jct 138 kV Line. Upgrade terminal equipment at Yukon and replace line relaying at Mitchell and Charleroi.

Required IS Date: 06/01/2022
Projected IS Date: 06/01/2023
Previous TEAC Date: 06/02/2020

* Operating measures identified to mitigate reliability impacts in interim.



AEP Transmission Zone

Problem Statement: Generation Deliverability Violation – Zimmer Deactivation

- Thermal violation: Benton – Riverside 138 kV line
- Contingency: N-2

Recommended Solution:

- New baseline b3336 – previously known as S1622.2: Rebuild Benton Harbor-Riverside 138kV double circuit extension (6 miles).
- Current Rating: 136 MVA SN/ 167 MVA SE
- New Rating: 187 MVA SN/ 240 MVA SE

Estimated Cost: $14.9M
Required IS Date: 06/01/2022
Projected IS Date: 11/01/2021
Previous TEAC Date: 05/21/2018

DEOK Transmission Zone

Problem Statement: Generation Deliverability Violation – Zimmer Deactivation

- Thermal violation: Miami Fort – Hebron Tap 138 kV line
- Contingency: N-2

Recommended Solution:

- New baseline b3334 – Rebuild the section of Miami Fort - Hebron Tab 138 kV
- Current Rating: 238 MVA SN/ 238 MVA SE
- New Rating: 301 MVA SN/ 301 MVA SE

Required IS Date: 06/01/2022
Projected IS Date: 11/30/2026

Operating measures identified to mitigate reliability impacts in interim.

Problem Statement: Generation Deliverability Violation – Zimmer Deactivation

- Thermal violation: Miami Fort – Hebron Tap 138 kV line
- Contingency: N-2

Recommended Solution:

- New baseline b3334 – Rebuild the section of Miami Fort - Hebron Tab 138 kV
- Current Rating: 238 MVA SN/ 238 MVA SE
- New Rating: 301 MVA SN/ 301 MVA SE

Estimated Cost: $44.3M

Required IS Date: 06/01/2022

Projected IS Date: 06/01/2025

Operating measures identified to mitigate reliability impacts in interim.

Update for Existing Projects

Baseline Reliability Projects

Problem Statement:

Increased customer load expectations connected to the Waldo Run 138 kV substation are causing several Gen Deliv, N-1 Thermal, and N-1 low voltage violations in the vicinity of Waldo Run, Oak Mound, Pruntytown and Fairview.

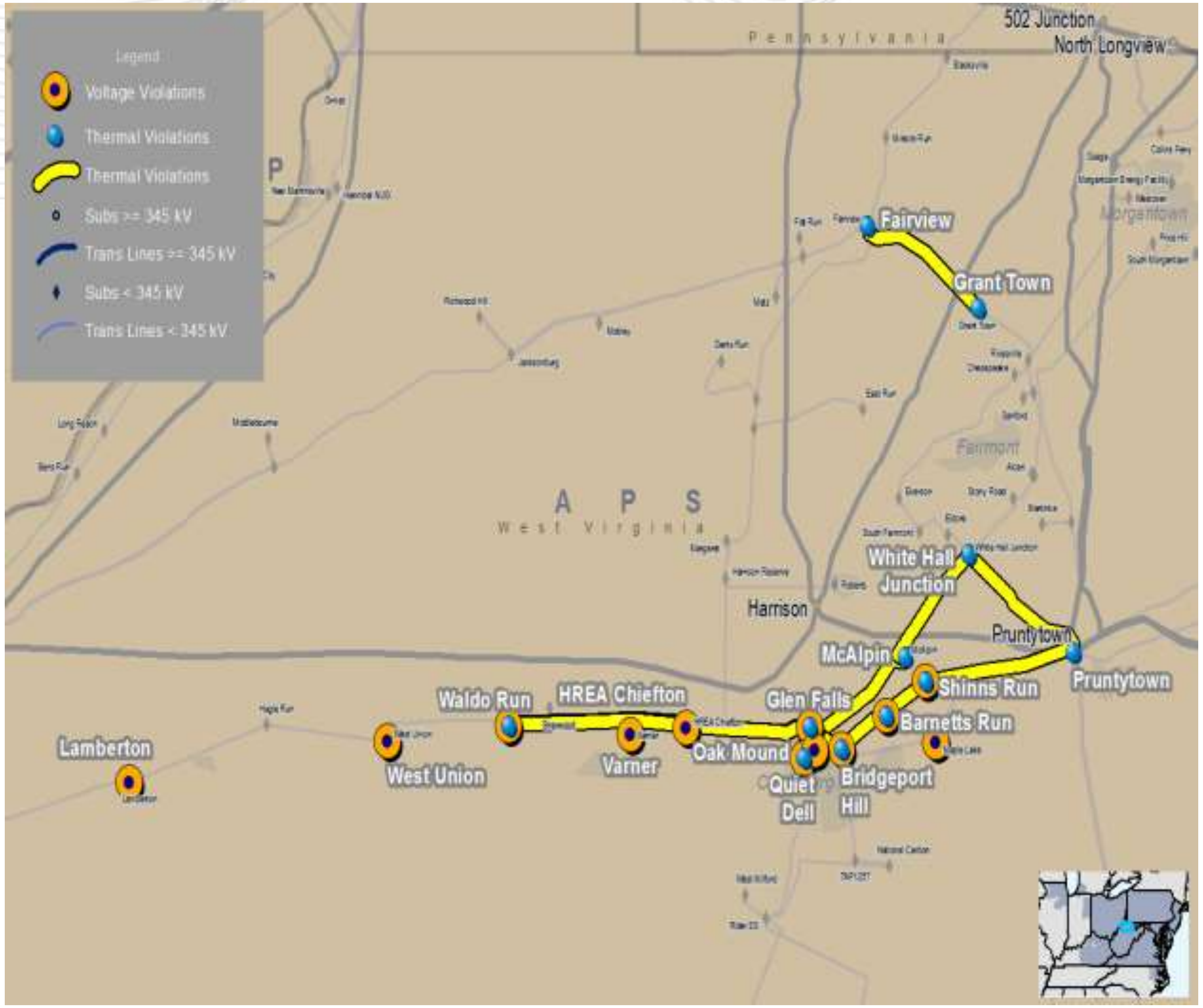
Immediate Need:

Due to the immediate need, the timing required for an RTEP proposal window is infeasible. As a result, the local Transmission Owner will be the Designated Entity.

Alternatives considered:

1. Reconductor/rebuild overloaded 138 kV facilities with VAR support near the load – est. cost **$160M**
2. Install new Pruntytown-Oak Mound 138 kV line, reconductor two 138 kV lines, and add VAR support near the load – est. cost **$198M**
3. Construct a new 500/138 kV substation to provide EHV source to the Marcellus shale load growth area – est. cost **$142M**

By injecting the 500/138 kV source into the area expecting Marcellus shale load growth, we are designing the BES to withstand additional load requests in the area. The alternative solutions apply a temporary resolution at a higher cost to resolve expected load concerns, with no room for growth. The gas industry is greatly expanding in the Doddridge County area of WV, and the recommended solution allows for future support.



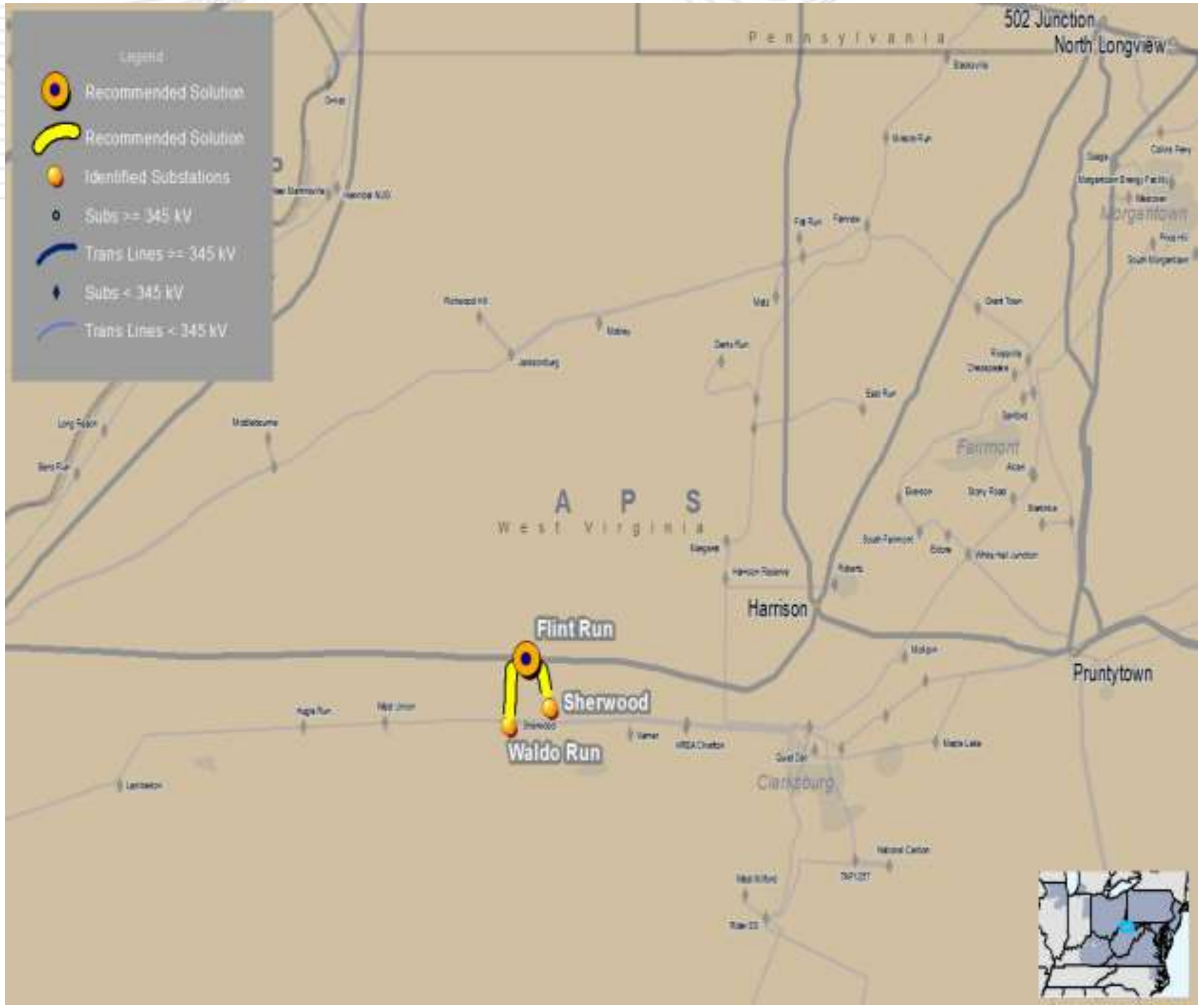
APS Transmission Zone: Baseline
Flint Run 500/138 kV Substation

Potential Solution:

Construct a new 500/138 kV substation as a four-breaker ring bus with expansion plans for double-breaker-double-bus on the 500 kV bus and breaker-and-a-half on the 138 kV bus to provide EHV source to the Marcellus shale load growth area. Projected load growth of additional 160 MVA to current plan of 280 MVA, for a total load of 440 MVA served from Waldo Run substation. Construct additional three-breaker string at Waldo Run 138 kV bus. Relocate the Sherwood #2 138 kV line terminal to the new string. Construct two single circuit Flint Run - Waldo Run 138 kV lines using 795 ACSR (approximately 3.7 miles). After terminal relocation on new 3-breaker string at Waldo Run, terminate new Flint Run 138 kV lines onto the two open terminals.(b2996.1) **$125.3M**

Loop the Belmont-Harrison 500 kV line into and out of the new Flint Run 500 kV substation (less than 1 mile). Replace primary relaying and carrier sets on Belmont and Harrison 500 kV Remote End Substations.(b2996.2) **$16.6M**

Upgrade two (2) existing 138 kV breakers (Rider 50 and #1/4 transformer breaker) at Glen Falls with 63 kA, 3000 A units. (B2996.3) **$1.5M**



Total Cost: $143.4

Required IS Date: ~~12/1/2021~~ 06/01/2019

Projected IS Date: 12/1/2021

Project Status: Under Construction

APS Transmission Zone: Baseline Flint Run 500/138 kV Substation

Increased cost of ~$102M primarily due to:

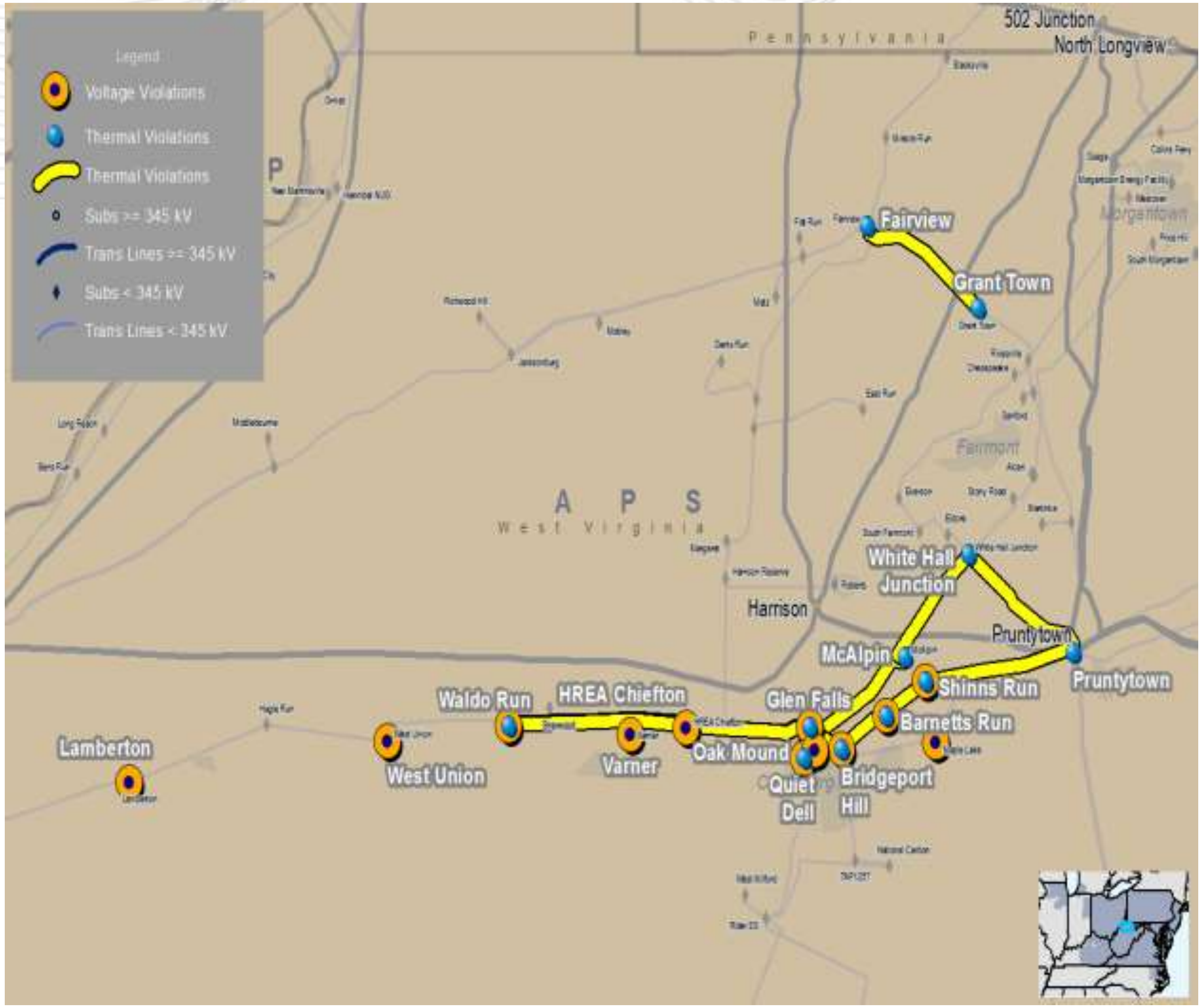
- 138 kV line work increased **$43M**
  - Design changed to steel poles
  - Line length increased 0.7 mile
  - Access roads
  - Vegetation control
- Substation location change increased **$41M**
  - Additional civil and environmental engineering/construction
  - Real estate costs
- Other cost increases **~$10M**
  - Retaining wall at Waldo Run Substation
  - Additional Engineering, Project Management, etc.

Terrain of 138 kV double circuit

APS Transmission Zone: Baseline Flint Run 500/138 kV Substation

Increased cost of alternatives primarily due to:

1. Reconductoring alternative was a desktop estimate. No detail from original estimate.
   - More refined estimate prepared for this update
   - Increased cost of $104M based on present estimating information for reconductoring
2. New Pruntytown-Oak Mound line increased $156M
   - Additional reconductoring project identified on double circuit 138 kV line ($78M)
   - Access road costs ($48M)
   - Change in line design ($16M)



- The upgrades listed below were initially identified during the Beaver Valley 1 & 2 deactivation study. Subsequently, Beaver Valley 1 & 2 withdrew the deactivation requests and it was determined that the upgrades which follow were no longer needed to address base line reliability concerns. However, the base case used to perform New Services Queue studies included those upgrades, and as a result the status of the upgrades were put on hold. Per the latest study, these upgrades are no longer needed for New Services Queue and will be canceled

Baseline upgrade Cancelation

Upgrade Id	Description
b3012.2	Construct two new ties from a new First Energy substation to a new Duquesne substation by using two separate structures - Duquesne portion.
b3012.4	Establish the new tie line in place of the existing Elarama - Mitchell 138 kV line
b3015.1	Construct new Elrama 138 kV substation and connect 7 138 kV lines to new substation
b3015.3	Reconductor Dravosburg to West Mifflin 138 kV line. 3 miles
b3015.4	Run new conductor on existing tower to establish the new Dravosburg-Elrama (Z-75) circuit. 10 miles
b3015.7	Reconductor Wilson to West Mifflin 138 kV line. 2 miles. 795ACSS/TW 20/7
b3061	Reconductor the West Mifflin - Dravosburg (Z-73) and Dravosburg - Elrama (Z-75) 138 kV lines
b3062	Install 138 kV tie breaker at West Mifflin
b3063	Reconductor the Wilson - Dravosburg (Z-72) 138 kV line (~5 miles)
b3064	Expand Elrama 138 kV substation to loop in the existing USS Steel Clariton - Piney Fork 138 kV line
b3065	Install 138 kV tie breaker at Wilson

Cancelation: ATSI Transmission Zone

- **<u>Reason for cancellation:</u>** Updated analysis show voltage levels within acceptable range due to shift in flows caused by an upgrade on the Leroy Center – Mayfield 345 kV line (B3152).

- **Original recommendation from 9/10/2015:**

- **Baseline Voltage Violation (FG# N1-VM2 - VM13, N1-VD2 and VD3):**
- Voltage magnitude and drop violation on the Dobbins, Ellwood, Lincoln Park, Lowellsville and Pennant 138 kV substations for several contingencies.

- **Alternatives considered:**
  - 2015_1-4B ($1.015 M)
  - 2015_1-8AA ($12 M)
  - 2015_1-8AB ($6 M)
  - 2015_1-8AC ($6 M)

- **Recommended Solution:**
  - Install 26.4 MVAR capacitor and associated terminal equipment at Lincoln Park 138 kV substation. (2015_1-4B)

    (B2675)

- **Estimated Project Cost:** $1.015 M

- **Required IS Date:** 6/1/2020

Cancellation: APS Transmission Zone

Reason for cancellation: This project is being cancelled as the violations will need to go through the competitive window. The violations will be posted in the 2021 Window 1 (B3229).

Process Stage: First Review

Criteria: APS N-1-1 Voltage Drop Criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP Winter

Problem Statement: In the 2020 RTEP 2025 Winter N-1-1 analysis the loss of the Milesburg - Moshannon 230 kV line followed by the loss of the Shingletown #82 230-46 kV transformer results in a voltage drop violation at the Shingeltown 230 kV bus of 12.5%.

Violations were posted as part of the 2020 Window 1: FG# APS-VD45, APS-VD46

Existing/Proposed Facility Ratings:

(SN/SE/WN/WE)	Dale Summit - Shingletown	Lewistown-Shingletown	Shawville-Shingletown
Before	489/554/558/612	520/621/619/710	489/554/558/612
After	617/754/699/894	546/666/619/790	546/666/618/790

Proposed Solution:
At Shingletown Substation (APS Zone) convert the 230 kV station to a six breaker ring bus. Re-use and re-install the existing capacitor. Install SCADA control. Install new wave traps on Shawville and Dale Summit line exits.

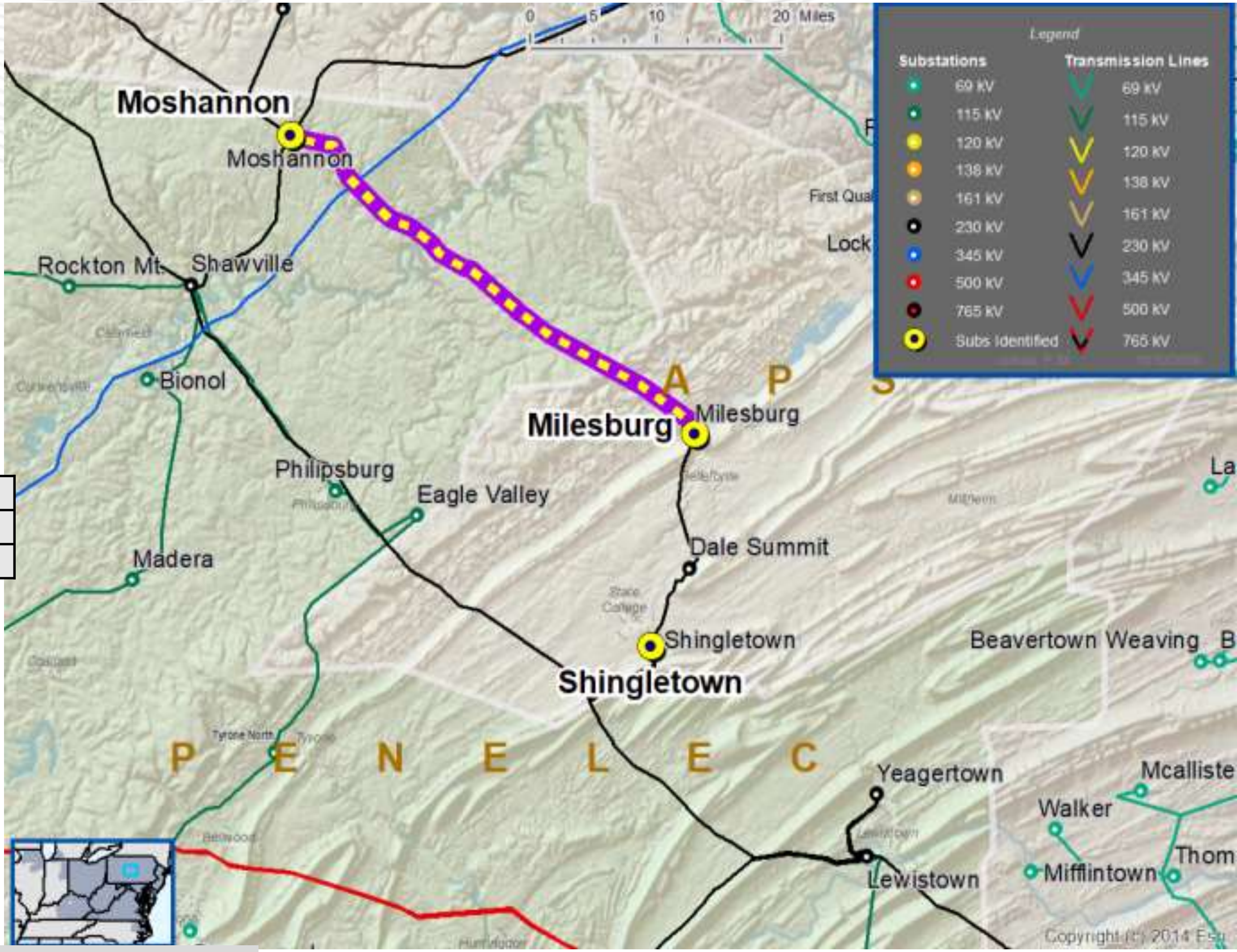
At Shawville Substation (PN Zone) replace the wave trap and substation conductor.

At Lewistown Substation (PN Zone) install direct transfer trip relaying to be compatible with the new Shingletown ring bus relaying.

Estimated Cost: $12.2 M

Alternatives: N/A

Required In-Service: 12/31/2025



SN / SE / WN / WE: Summer Normal / Summer Emergency / Winter Normal / Winter Emergency

Additional Scope for B2668 (Presented in 9/10/2015 TEAC)

B2668 was in 2015 window #1. It was proposal 2015_1-2K, reconductor Dequine to Meadow Lake 345 kV circuit #1 utilizing dual 954 ACSR 54/7 cardinal conductor, which was the lowest cost proposal received to address the Dequine to Meadow Lake 345 kV circuit #1 overload. B2668 TEAC cost is $5.1M

All the proposals submitted for the violation in 2015 Window #1:

– 2015_1-2G ($25.6 M)

– 2015_1-2I ($27.5 M)

– 2015_1-2J ($26.6 M)

– 2015_1-2K ($5.1 M)

– 2015_1-7A ($34.2 M)

Additional Scope Needed: Replace the bus/risers at Dequine 345kV station (**B2668.1**).
Estimated Cost: $2.3M

Reasons for the additional scope: During detailed engineering, AEP discovered that the bus/risers at Dequine station would limit the line after the reconductor project was completed on the Meadow Lake 1 and 2 circuits, which makes the line rating still lower than the required rating. With B2668.1, the total cost is still the lowest comparing other proposals for the cluster.

Total Estimated Cost: $7.4M

Required IS date: 6/1/2020

Projected IS date: 2/28/2022

ATSI Transmission Zone: Baseline Abbe-Johnson #2 69 kV line upgrade

Process Stage: First Review

Criteria: First Energy 715 Criteria

Assumption Reference: 2026 RTEP assumption

Model Used for Analysis: 2026 Summer RTEP case

Proposal Window Exclusion: Below 200 kV Exclusion

Problem Statement:

FG: ATSI-T1, ATSI-T2 and ATSI-T3

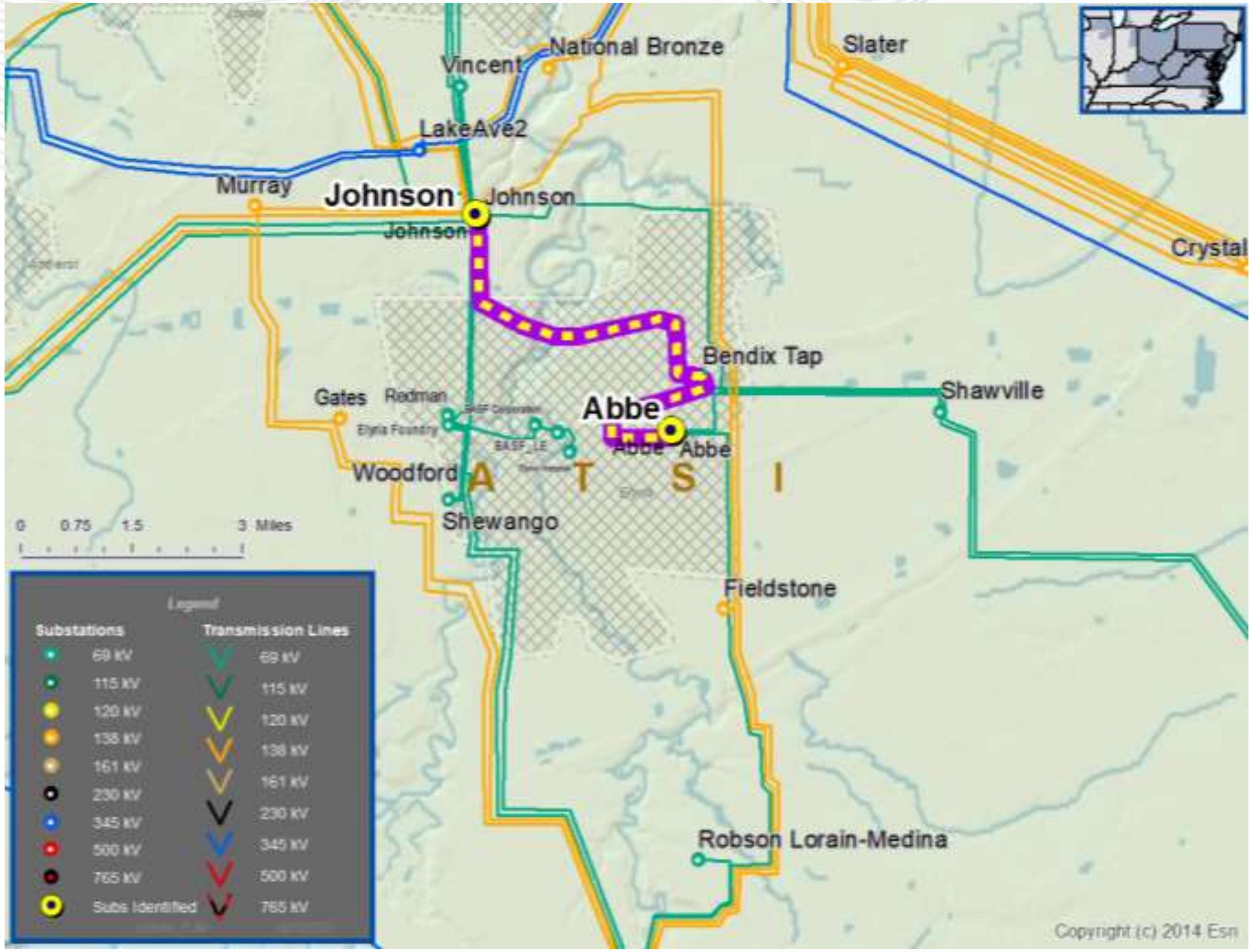
In 2026 Summer RTEP case, multiple segments along the Abbe – Johnson # 2 69 kV line are overloaded due to due to N-1.

Recommended Solution:

Rebuild the Abbe-Johnson #2 69 kV line (5.75 miles). Upgrade switches and disconnects.

Total Estimated Cost: $13.2 M

Reason for Cancellation: The overload isn't observed in the retool 2026 Summer RTEP case.



Recommended Solution

Baseline Reliability Projects
West Region

APS Transmission Zone: Baseline

Process Stage: Recommended Solution

Criteria: APS N-1-1 Voltage Drop Criteria

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP Winter

Problem Statement: In the 2020 RTEP 2025 Winter N-1-1 analysis the loss of the Milesburg - Moshannon 230 kV line followed by the loss of the Shingletown #82 230-46 kV transformer results in a voltage drop violation at the Shingeltown 230 kV bus of 12.5%.

Violations were posted as part of the 2020 Window 1: FG# APS-VD45, APS-VD46

Existing/Proposed Facility Ratings:

(SN/SE/WN/WE)	Dale Summit - Shingletown	Lewistown-Shingletown	Shawville-Shingletown
Before	489/554/558/612	520/621/619/710	489/554/558/612
After	617/754/699/894	546/666/619/790	546/666/618/790

Recommended Solution:
At Shingletown Substation (APS Zone) convert the 230 kV station to a six breaker ring bus. Re-use and re-install the existing capacitor. Install SCADA control. Install new wave traps on Shawville and Dale Summit line exits. (**B3229.1**)

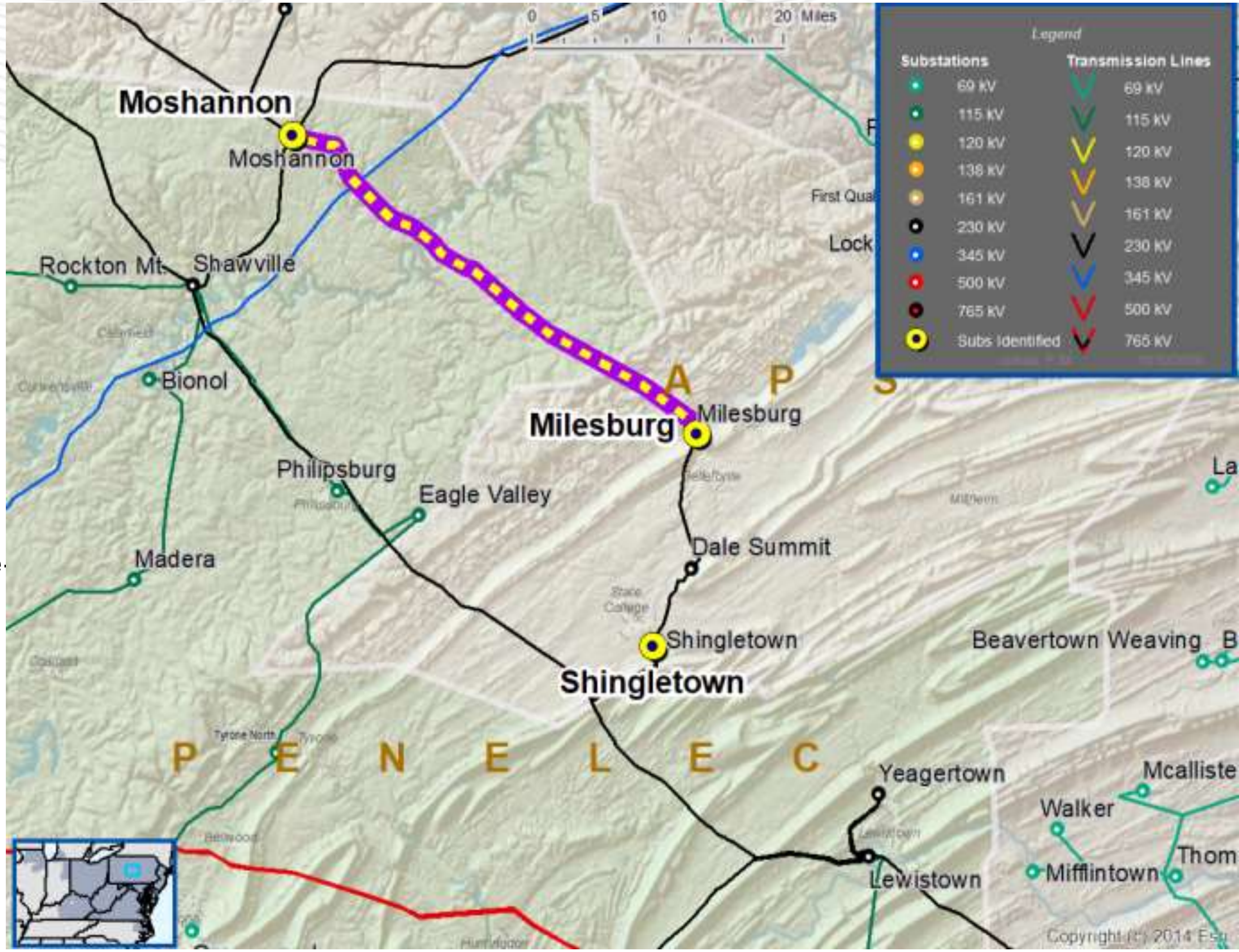
At Shawville Substation (PN Zone) replace the wave trap and substation conductor. (**B3229.2**)

At Lewistown Substation (PN Zone) install direct transfer trip relaying to be compatible with the new Shingletown ring bus relaying. (**B3229.3**)

Estimated Cost: $12.2 M

Alternatives: N/A

Required In-Service: 12/31/2025



SN / SE / WN / WE: Summer Normal / Summer Emergency / Winter Normal / Winter Emergency

ATSI Transmission Zone: Baseline Greenfield 69 kV Substation

Process Stage: Recommended Solution

Criteria: Short Circuit

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 RTEP cases

Proposal Window Exclusion: Below 200 kV

Problem Statement:

FG: ATSI-SC100

In the 2020 RTEP 2025 FERC 715 analysis breaker 501-B-251 at Greenfield substation was identified as over its Short Circuit capability

Proposed Solution: Replace the existing breaker 501-B-251 with a new 69 kV breaker with a higher (40 kA) interrupting capability **(B3260)**

Estimated Cost: $0.86M

Alternatives: N/A

Required In-Service: 12/1/2021

Previously Presented: 12/18/2020

DLC Transmission Zone: Baseline
Cheswick 138kV Breaker "Z-53 LF_3" Replacement

Process Stage: Recommended Solution

Criteria: Over Duty Breaker

Additional Benefits: N/A

Assumption Reference: 2026 RTEP Assumption

Model Used for Analysis: 2026 short circuit model

Proposal Window Exclusion: Below 200 kV

Problem Statement: Flowgate SC-1

Cheswick 138kV Substation:

In 2026 RTEP short circuit model, One (1) Cheswick 138kV breaker is over duty: "Z-53 LF_3"

Recommended Solution:

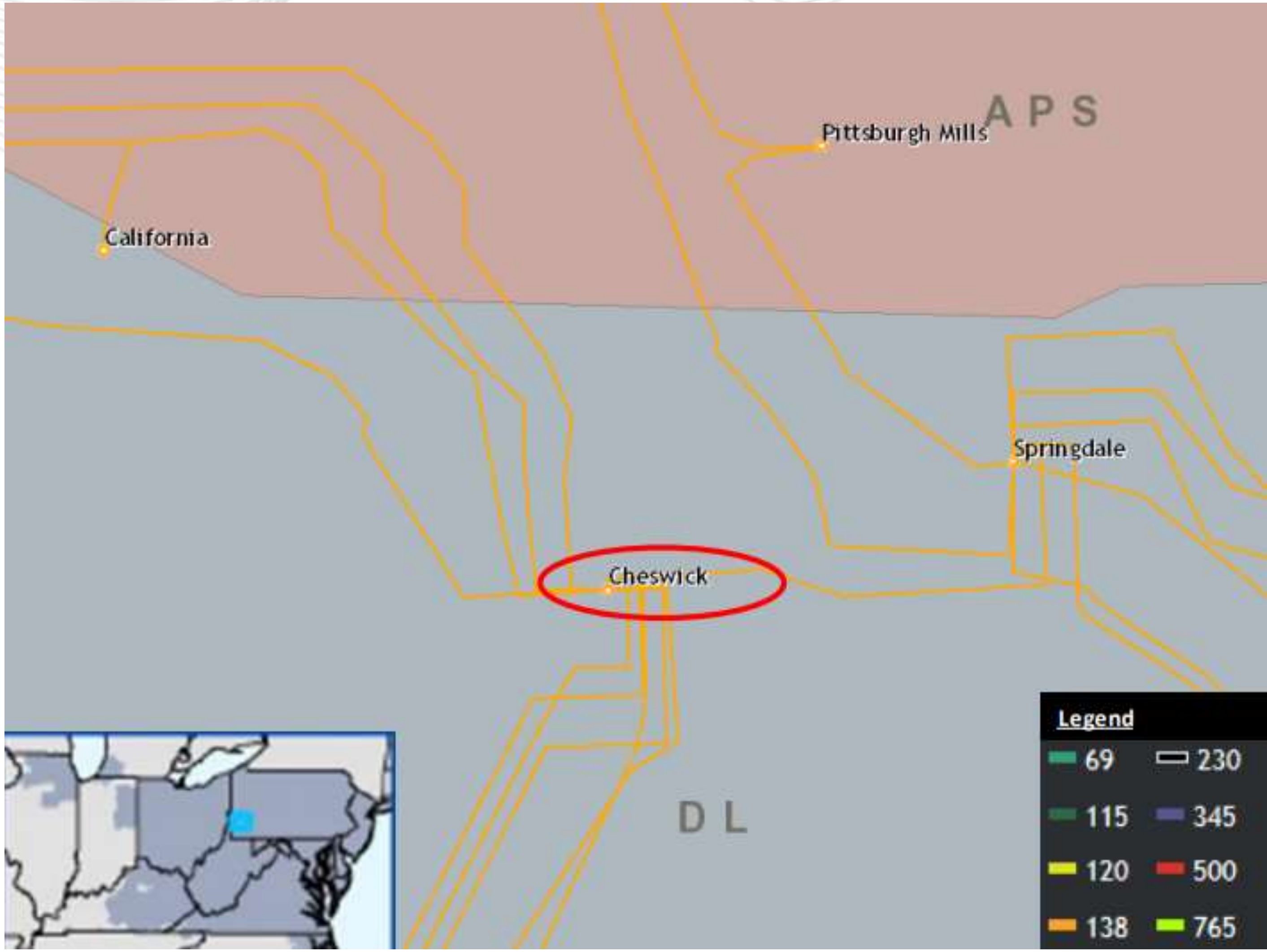
Replace one (1) Cheswick 138kV breaker with a 3000A, 63kA breaker: "Z-53 LF_3" . (**B3340**)

Estimated Cost: $0.35 M

Required In-Service: 6/1/2026

Projected In-Service: 6/1/2026

Previously Presented: 9/17/2021



ComEd Transmission Zone: Baseline
Line 0108 LaSalle-Mazon 138 kV

Process Stage: Recommended Solution

Criteria: Generator Deliverability

Assumption Reference: 2026 RTEP assumption

Model Used for Analysis: 2026 Light Load RTEP case

Proposal Window Exclusion: Below 200 kV Exclusion

Problem Statement:

FG: GD-LL36

In 2026 Light Load RTEP case, the LaSalle-Mazon 138 kV line is overloaded for an N-2 outage.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
LASCO STA; B-MAZON ; B 138 kV	173/223/213/253
MAZON ; R-4CORBIN 138 kV	173/223/213/253

Line 0108 LaSalle-Mazon 138 kV

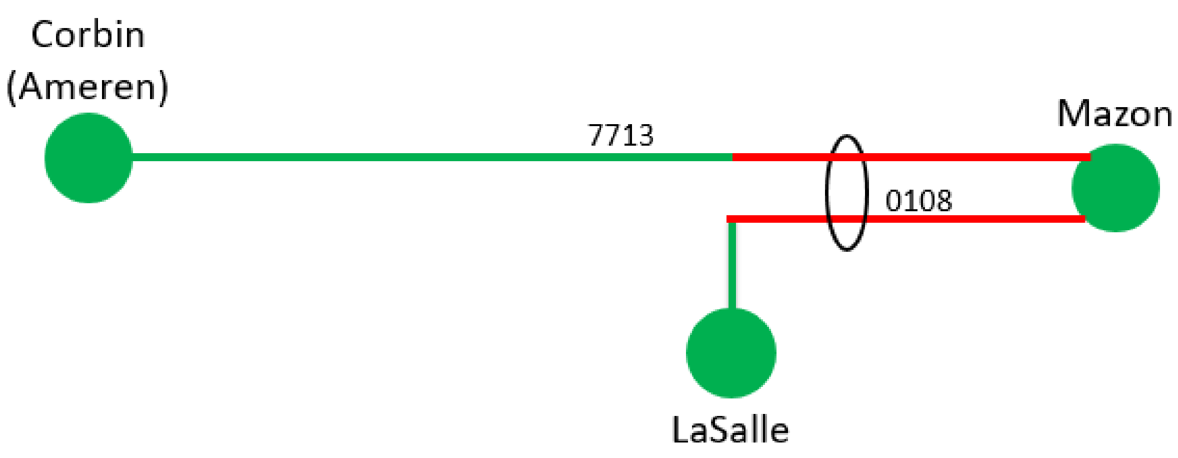
Recommended Solution:

Rebuild a 13 mile section of 138 kV line 0108 between LaSalle and Mazon with 1113 ACSR or higher rated conductor. **(b3677)**

Transmission Estimated Cost: $42.06 M

Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
LASCO STA; B-MAZON ; B 138 kV	351/442/421/472
MAZON ; R-4CORBIN 138 kV	210/223/252/262



Ancillary Benefits:

Conductor and towers that are 94 years old will be replaced. A portion of line 7713 from Oglesby (future Corbin) to Mazon which shares these double circuit towers will be reconductored due to the rebuild, replacing all of the 94 year old 300 cu conductor on that line.

Required IS date: 11/1/2026

Projected IS date: 12/31/2024

Previously Presented: 10/15/2021

ATSI Transmission Zone: Baseline Galion 138 kV Reactor

Process Stage: Recommended Solution

Criteria: First Energy 715 Criteria

Assumption Reference: 2026 RTEP assumption

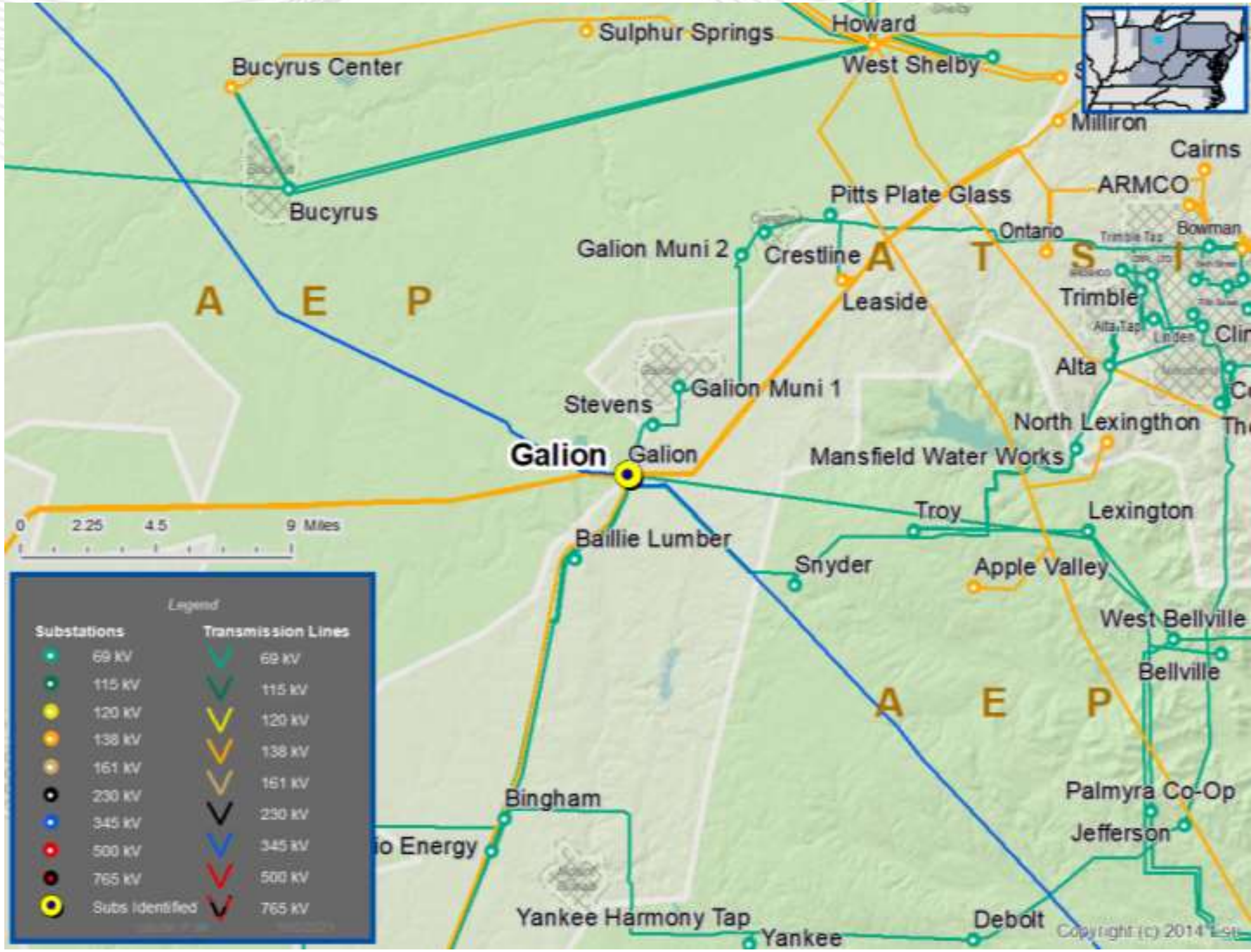
Model Used for Analysis: 2026 Light Load RTEP case

Proposal Window Exclusion: Below 200 kV Exclusion

Problem Statement:

FG: ATSI-VM1

In 2026 Light Load RTEP case, high voltage is observed at Galion 69 kV substation due to N-1.



Planned Projects: Supplemental

Solutions of the M-3 Process (West Region)

Solutions

Stakeholders must submit any comments within 10 days of this meeting in order to provide time necessary to consider these comments prior to the next phase of the M-3 process

Need Number: NEET-2021-01

Process Stage: Solutions Meeting 05/11/2021

Previously Presented: Solutions Meeting 03/09/2021; Needs Meeting 02/09/2021

Project Driver:
Equipment Material Condition, Performance and Risk

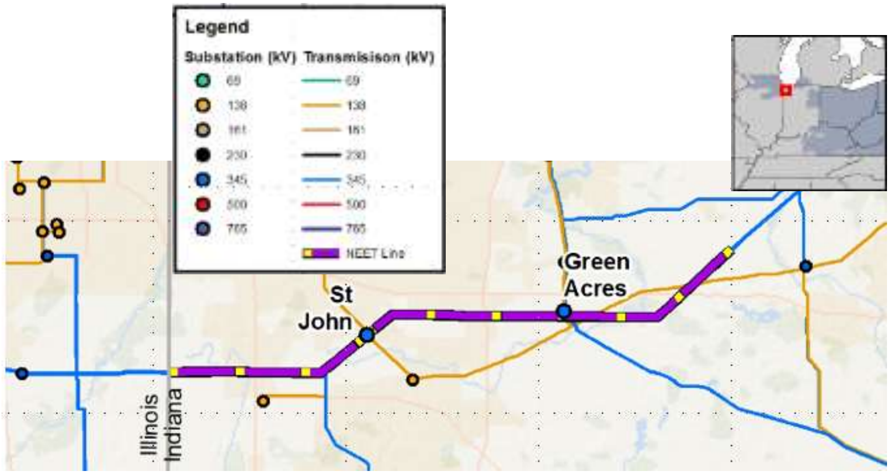
Specific Assumption Reference:
NEET MA IN 2021 Annual Assumption and
Asset Management Strategy
EOL/Condition/Obsolescence

Problem Statement:

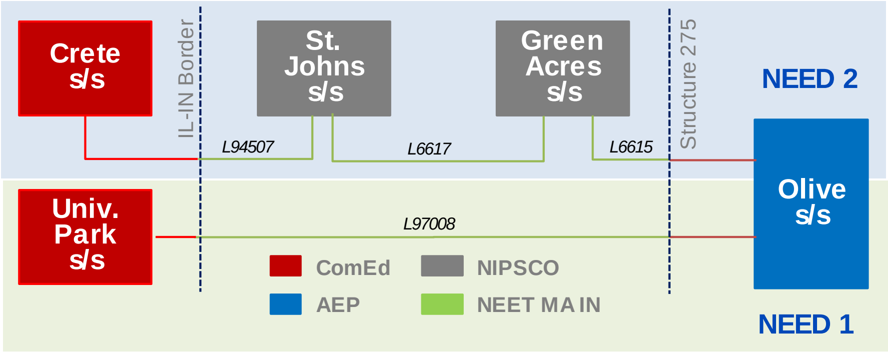
NEET MidAtlantic IN 345kV (double-circuit) transmission line assets are ~20 miles representing four segments. Asset represents 115 galvanized steel lattice structures:

University Park to Olive (L97008)

- Transmission lines were built in 1958 and are over 60 years old. Reliability concerns with increased failure probability is expected as components have exceeded the industry recommended service life
- The existing 1414 kCMIL (62/19) paper expanded conductor is obsolete and no longer manufactured
- Structural components are exhibiting significant deterioration
  - Structural corrosion, insulator EOL, foundation wear, lack of cathodic protection, missing structural components and section loss, etc.



SPLITTING OF NEEDS



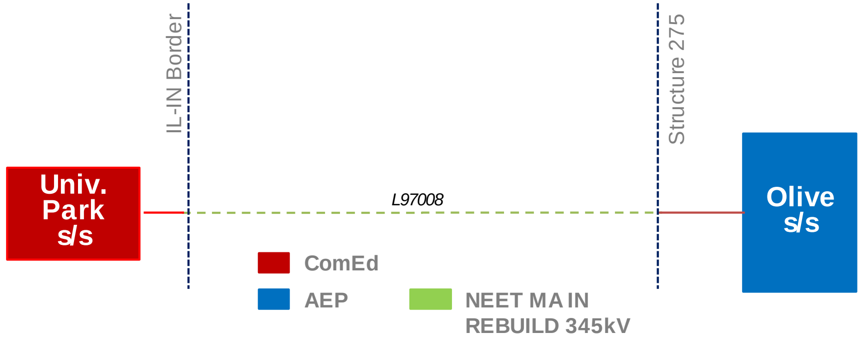
Need Number: NEET-2021-01

Process Stage: Solutions Meeting 05/11/2021

Potential Solution:

Rebuild the (L97008) of the ~20 mile double-circuit line with monopoles and new conductor utilizing existing ROW:

- Facility Before: 1414 ACSR Paper Expanded Conductor
- Facility After: 2 x 1033.5 ACSS "Curlew" Conductor
- The Circuit Rating is limited by Substation Equipment



Estimated Project Cost: ~~$63.4M~~ ~$51.9M[1]

Alternatives Considered:

- Do Nothing: Maintain existing condition with elevated risk of failure (Not Feasible)
- Partial Remediation: Reconductor transmission line, strengthen towers, remediate critical components, and defer the plan to replace other ageing components at future date.
    - Not Feasible: Uneconomic and Does not Address EOL Criteria Violation

Projected In-Service Date: 1/1/2023

Project Status: Conceptual

Model: 2025 RTEP

Footnote 1 – Continuous Extended Double-Circuit Outage; includes AFUDC; Nominal Dollars, Assumes Scope of Work performed to address Needs (NEET-2021-01 and NEET-2021-02) is addressed simultaneously for efficient cost management.

Need Number: NEET-2021-02

Process Stage: Solutions Meeting 08/10/2021

Previously Presented: Needs Meeting 02/09/2021, 05/11/2021

Project Driver:
Equipment Material Condition, Performance and Risk

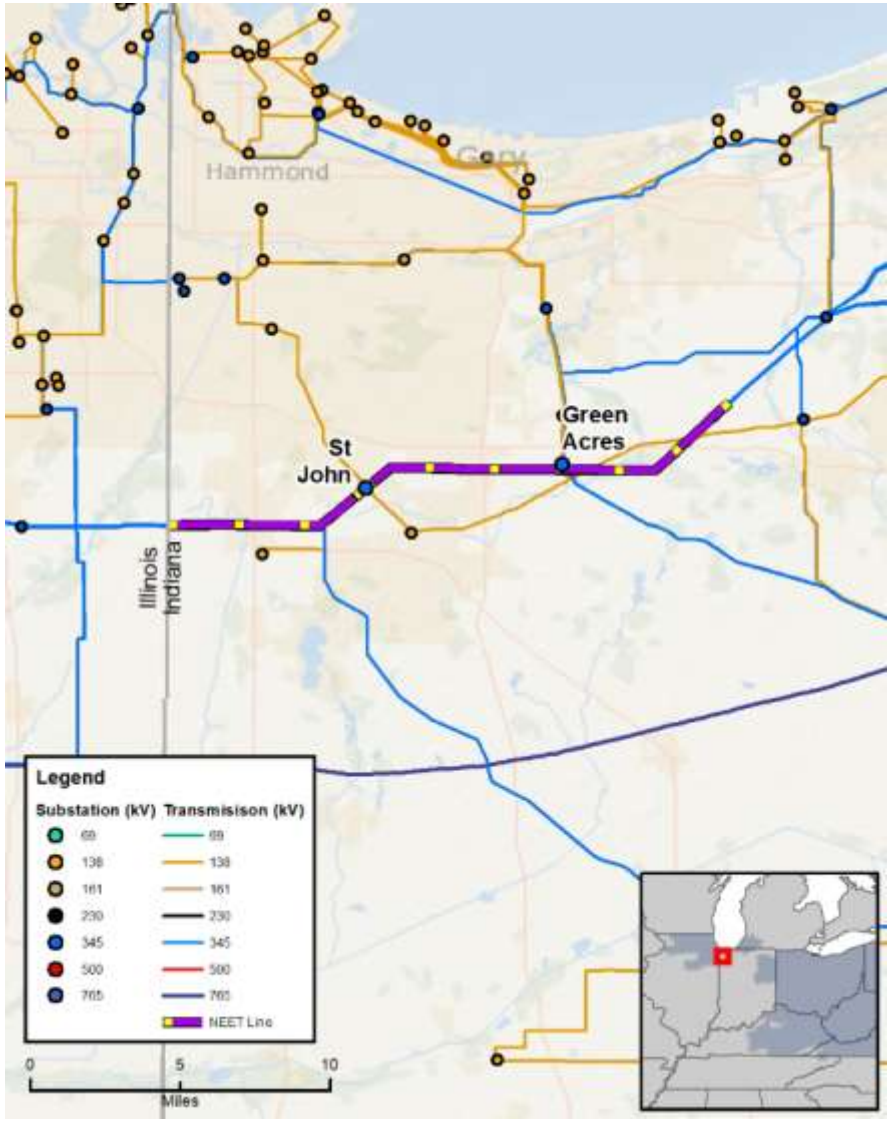
Specific Assumption Reference:
NEET MA IN 2021 Annual Assumption and
Asset Management Strategy
EOL/Condition/Obsolescence

Problem Statement:

NEET MidAtlantic IN 345kV (double-circuit) transmission line assets are ~20 miles representing four segments. This project is for three of the four segments.

Circuit 1: Crete-St.Johns-Green Acres-Olive (L94507, L6617, L6615)

- Transmission conductor is over 60 years old. Reliability concerns with increased failure probability is expected as components have exceeded the industry recommended service life
- The existing 1414 kCMIL (62/19) paper expanded conductor is obsolete and no longer manufactured
- Components are exhibiting significant deterioration



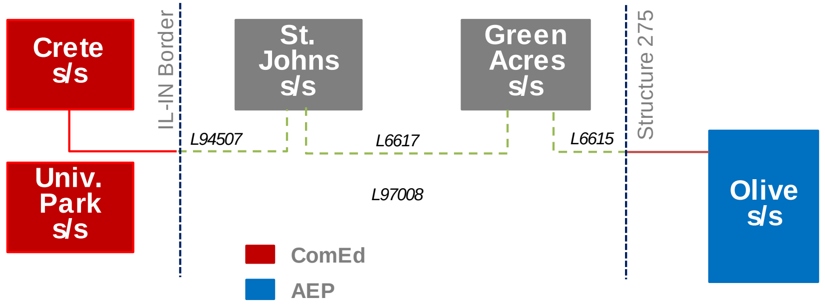
Need Number: NEET-2021-02

Process Stage: Solutions Meeting 08/10/2021

Potential Solution:

Reconductor Circuit 1 of the ~20 mile double-circuit lines from Crete-St.Johns-Green Acres-Olive (L94507, L6617, L6615) with new conductor:

- Facility Before: 1414 ACSR Paper Expanded Conductor
- Facility After: 2 x 1033.5 ACSS “Curlew” Conductor
- The Circuit Rating is limited by Substation Equipment



Estimated Project Cost: ~$11.5M[1]

Alternatives Considered:

- Do Nothing: Maintain existing condition with elevated risk of failure and limited options for repair during an event due to obsolesce of conductor (Not Feasible)

Projected In-Service Date: 6/1/2023

Project Status: Conceptual

Model: 2025 RTEP

Footnote 1 – Continuous Extended Double-Circuit Outage; includes AFUDC; Nominal Dollars

Need Number: AEP-2020-IM019

Process Stage: Solutions Meeting 2/17/2021

Previously Presented: Need Meeting 9/11/2020

Project Driver:
Equipment Condition/Performance/Risk

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

Wes Del 138/12kv station

- 138/69/12 kV Transformer #1
  - Unit failed in February 2020, station currently served by mobile unit
  - 1968 vintage
- Line MOABs X & Y
  - Configuration of switches on non-standard structure makes them impossible to maintain without a transformer outage.
  - Due to switch operating condition and length of operating pipe, motor operators cannot be properly adjusted to attain full open/close position.
  - Switches were manufactured in 1969
  - Neither switch will fully close after operation without assistance.

Need Number: AEP-2020-IM019

Process Stage: Solutions Meeting 2/17/2021

Proposed Solution:

Wes Del will now be connected to the Deer Creek – Desoto 138 kV circuit due to its location. It is easier access to it and avoids line crossings.

Install a 138 kV box bay with 138 kV 3000 A Moab switches towards Desoto and Deer Creek via Gaston.

Cost Estimate: $0.88 Million

Reterminate the existing Desoto – Deer Creek – Delaware 138 kV line into the new station bays at Wes Del station with 0.2 miles of 636 ACSR 26/7. Remove 0.1 miles of the Desoto – Deer Creek – Delaware 138 kV line to accommodate the new connection of Wes Del to the Deer Creek – Desoto 138 kV circuit.

Cost Estimate: $0.51 Million

Total Transmission Cost: $1.39 Million

Ancillary Benefits:

Connecting Wes Del to the Deer Creek – Desoto 138 kV circuit will make it safer and easier to maintain given the proximity to the circuit. It is difficult for construction and design to bring a circuit under another circuit(south to north in this case). The station is north of the line so it is easiest and safer to energize and maintain the station from the northern circuit.

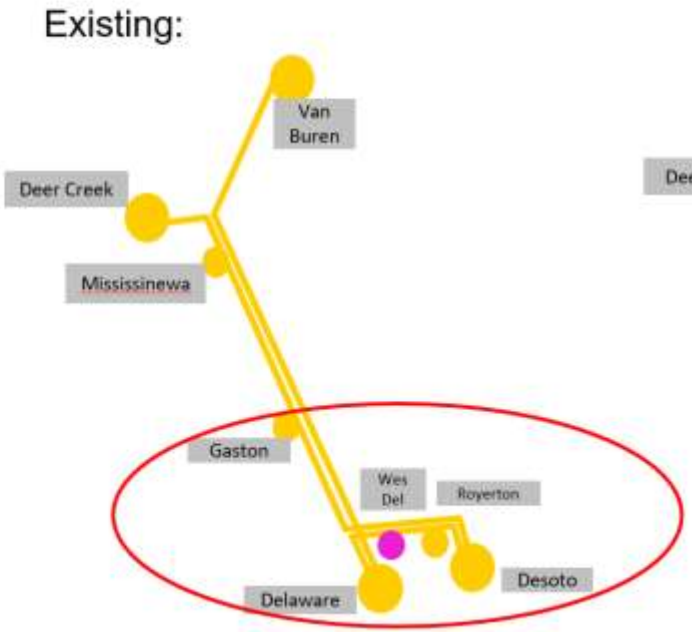
Alternatives Considered:

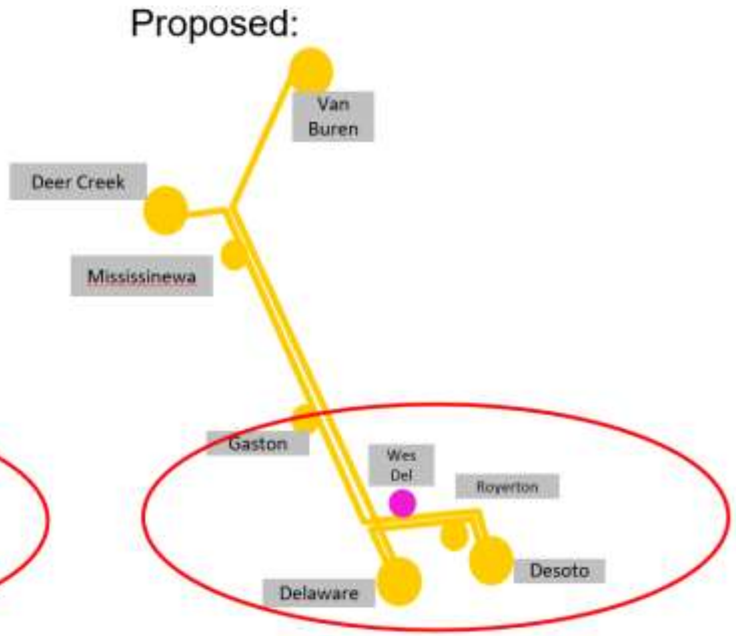
1. Upgrade the Wes Del 138 kV Moab switches towards Delaware and Desoto and leave it connected to the Delaware – Desoto 138 kV circuit. With the current configuration it is difficult for construction and maintenance due to the line crossing. The station is north of the line so it is easiest and safest to energize the station and maintain from the northern circuit.

Alternative Cost estimate: $1.48 Million

Projected In-Service: 1/2022

Project Status: Engineering





Need Number: EKPC-2021-004

Process Stage: Solutions Meeting – March 19, 2021

Previously Presented:
Needs Meeting 2/17/2020

Supplemental Project Driver:
Equipment Material Condition, Performance and Risk
Customer Service

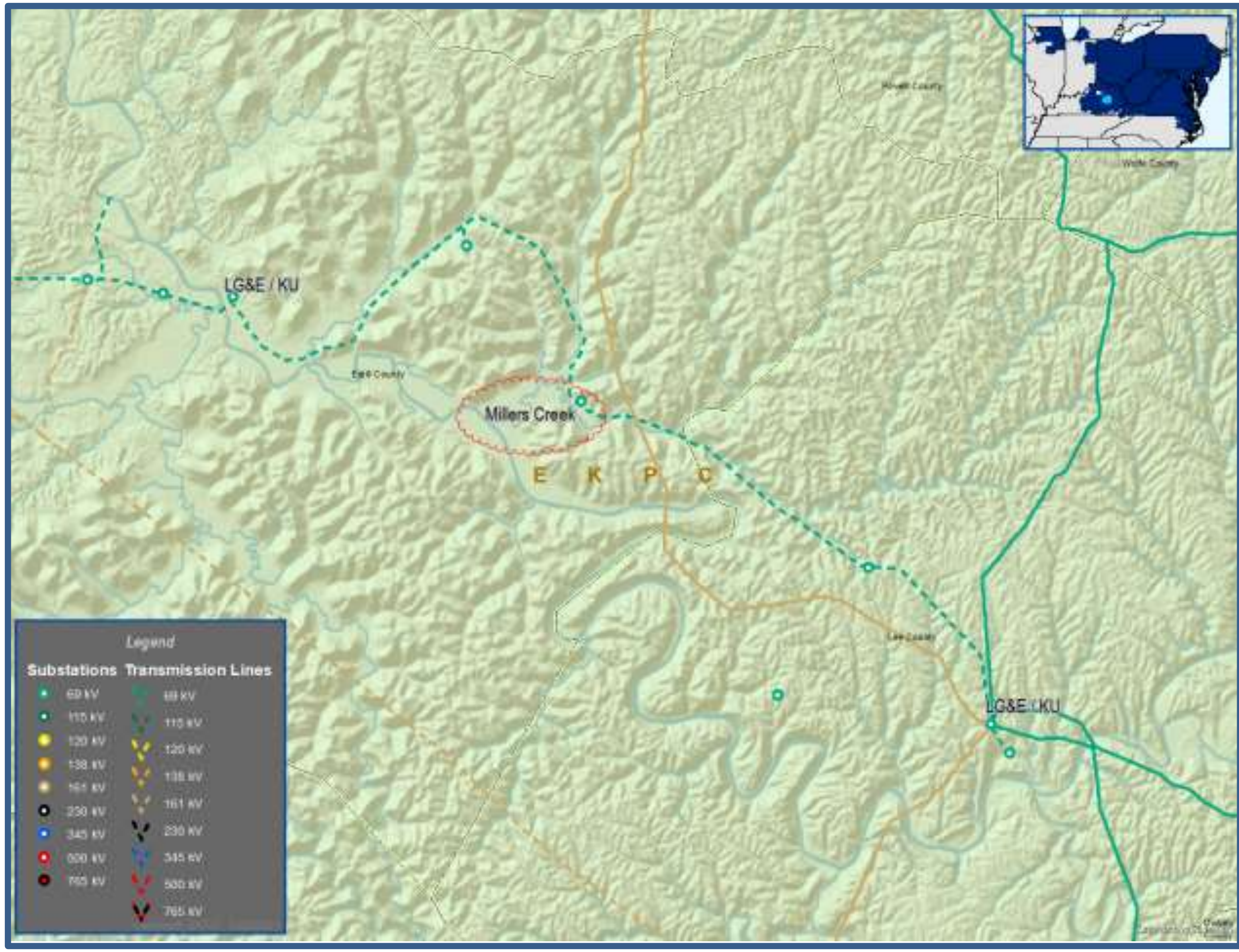
Specific Assumption Reference:
EKPC Assumptions Presentation Slide 12 & 14

Problem Statement:

The Millers Creek substation was built in 1965. It has continued to show up on EKPC's list of Worst Performing areas for several years, and it is currently the #2 worst performing location. It is served on the LG&E/KU 69 KV transmission line between Beattyville and West Irvine. This substation had 12 transmission related outages for the 2015-2019 period.

The substation has multiple issues related to poor site access, degraded condition, safety, and obsolete design. Degradation issues include failing fence and erosion around the perimeter of the substation. There is an atypical metering structure with no bypass capability making maintenance more difficult. Regulators are under the low bay structure and are difficult to remove in the event of a failure. Regulator bypass switches and energized feeders have spacing and clearance issues and there is no bypass bus.

Model: N/A



Need Number: EKPC-2021-004

Process Stage: Solutions Meeting March 19, 2021

Proposed Solution:

Build a new Millers Creek 161-25 KV distribution substation and associated 0.16 mile 161 kV tap line to the EKPC Beattyville – Powell County 161 kV transmission line. A 3-way MOAB switch will be added at the tap point and the existing distribution substation will be retired.

Distribution Cost: $3.71M
Transmission Cost: $400K

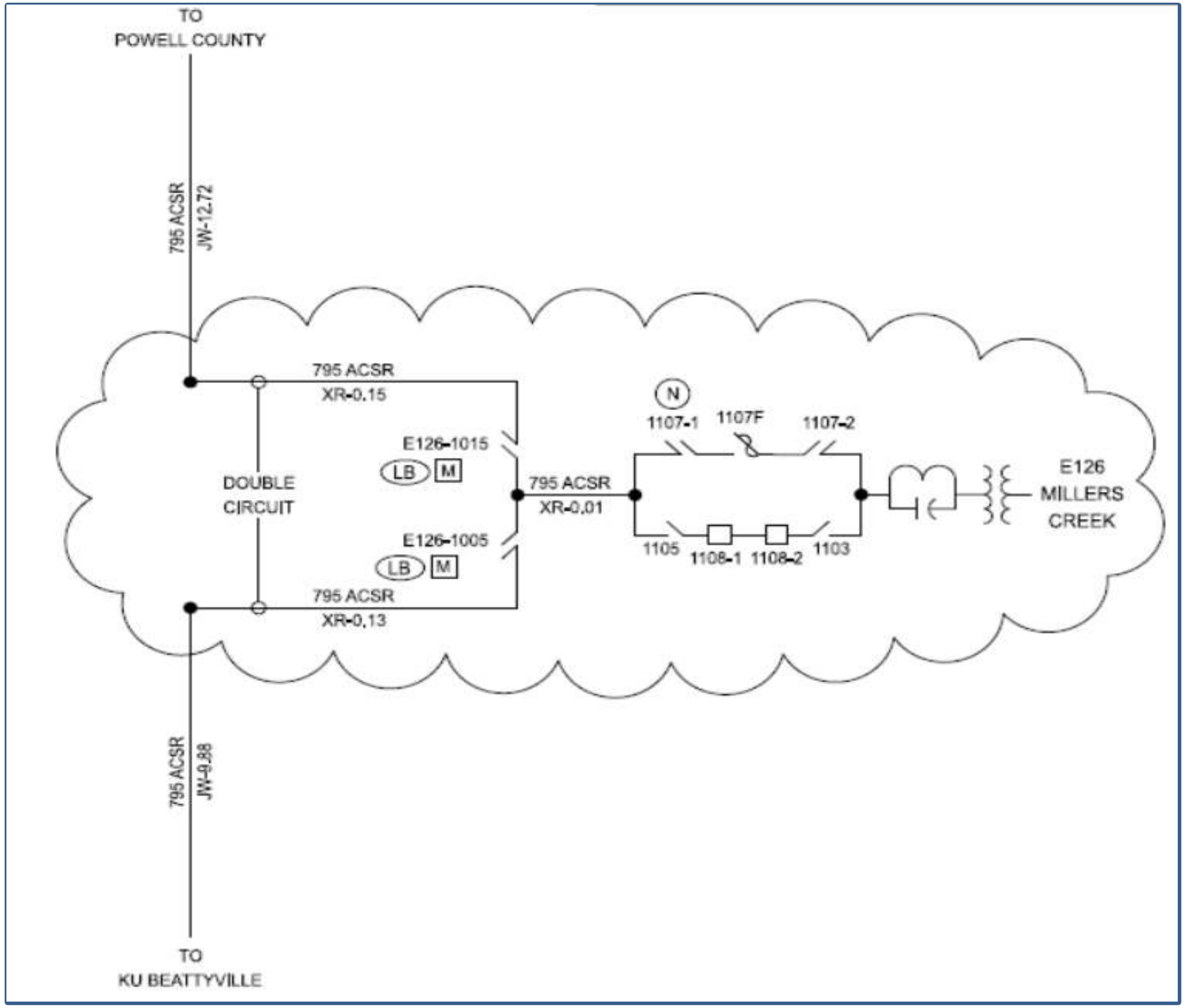
Ancillary Benefits:

- Millers Creek load served from EKPC system
  - Outside entity is not involved in service restoration
- Savings in NITS

Alternatives Considered:
No feasible alternatives

Projected In-Service: 12/1/2021

Project Status: Engineering



Need Number: AEP-2020-IM018
Process Stage: Solutions Meeting 04/16/2021
Previously Presented: Needs Meeting 05/22/2020
Supplemental Project Driver: Equipment Material/Condition/Performance/Risk/Operational
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)
Problem Statement:

Van Buren 138/69/12kv station

- 138/69/12 kV Transformer #1
    - 1967 vintage
    - Elevated moisture levels
    - Increased cost of maintenance due to leaking
    - Increased levels of decomposition of the paper insulating materials, leading to increased risk of failure
- Breaker B 69kV
    - 1964 vintage oil filled, CF-type breaker.
    - This type is oil filled without oil containment. Oil filled breakers have much more maintenance required due to oil handling that their modern, vacuum counterparts do not require.
    - Finding spare parts for these units is not possible due to these models no longer being vendor supported
- Van Buren is part of a three-terminal line configuration with the Delaware – Sorenson 138kV circuit.

AEP Transmission Zone M-3 Process
Van Buren Supplemental

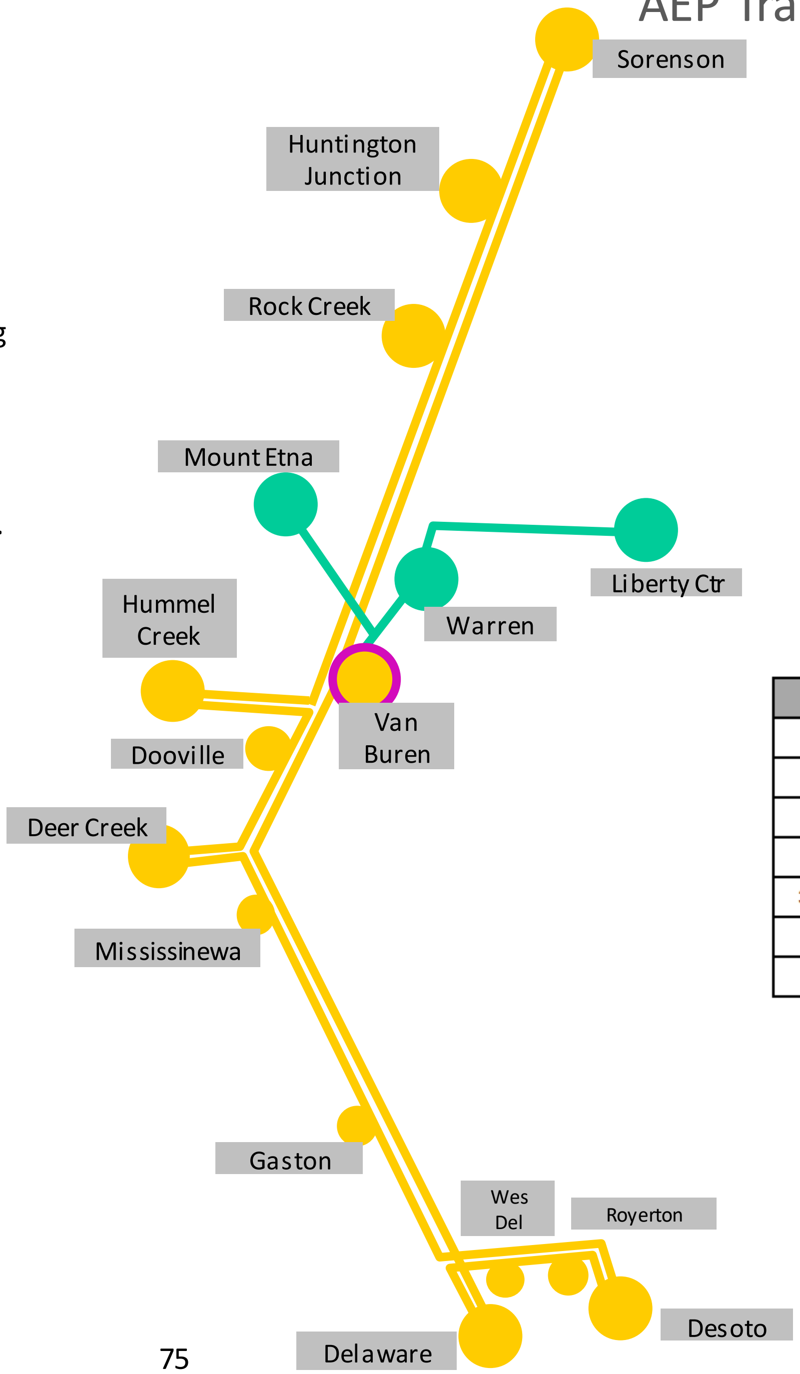
Need Number: AEP-2020-IM018
Process Stage: Solutions Meeting 04/16/2021

Proposed Solution:

Expand and upgrade Van Buren station to a 3 138kV breaker ring bus to accommodate 3 elements (2 transmission lines and 1 transformer) and eliminate the three-terminal line. Replace 138/69/12kV transformer with separate 138/69kV and 69/12kV transformers to separate the Distribution load from the Transmission transformer's tertiary winding. Replace 69kV CB B.
Estimated Cost: $9.1M

Alternatives Considered:
Considering the availability of space in and around the station to expand and the customers and 69 kV network served from the station, no additional alternates were identified.

Projected In-Service: 09/01/2022
Project Status: Scoping



Legend	
500 kV	
345 kV	
138 kV	
69 kV	
34.5 kV	
23 kV	
New	

Need Number: DEOK 2021-004

Process Stage: Needs Meeting 03-19-2021

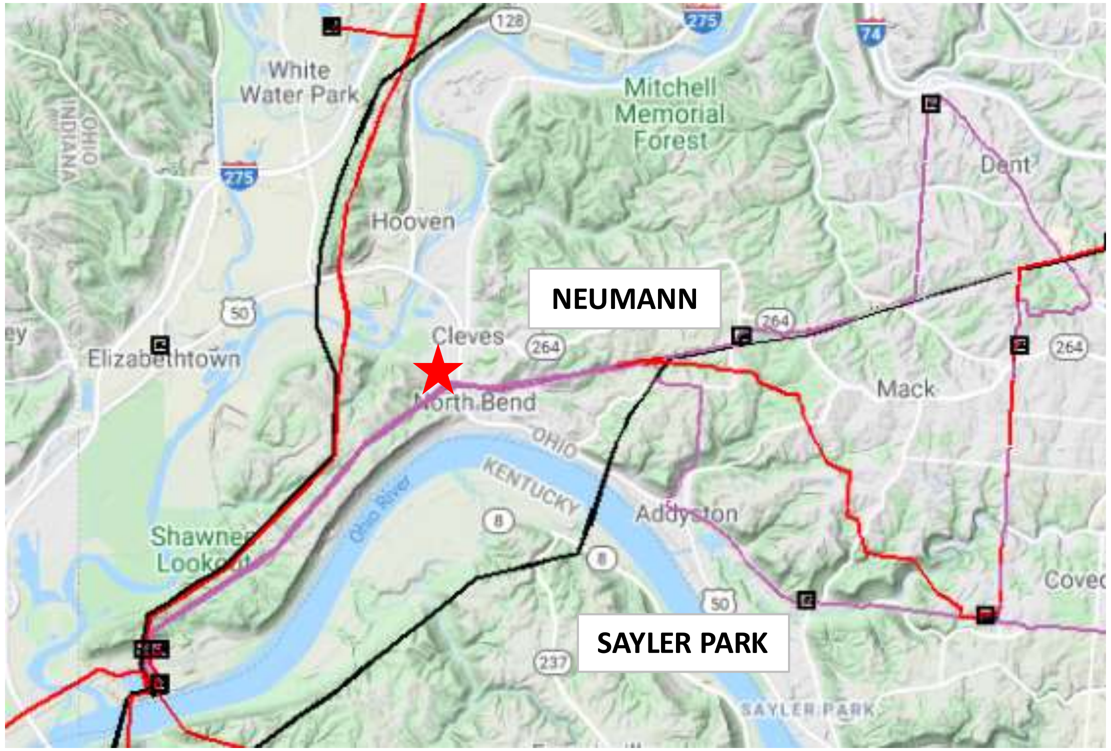
Project Driver: Customer Service

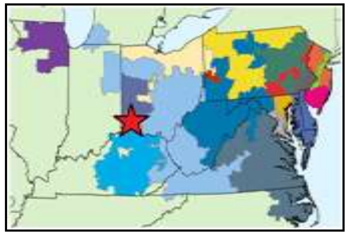
Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 9

Problem Statement:

Duke Energy Distribution has asked for a new delivery point in North Bend, OH. The distribution transformers that serve this area from Neumann and Sayler Park are peaking at 100% of rated capacity. Several large residential developments are planned or are currently under construction in this area.





345kV
138kV
69kV

DEOK Transmission Zone M-3 Process
North Bend

Need Number: DEOK 2021-004

Process Stage: Solutions Meeting 04-16-2021

Previously Presented: Needs Meeting 03-19-2021

Project Driver: Customer Service

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 9

Potential Solution:

Install a new substation, North Bend. Loop the nearby Miami Fort – Midway 138 kV feeder through North Bend switch connecting the feeder to the bus. Install a 138 kV circuit switcher, a 138/13 kV 22 MVA transformer, a 13 kV circuit breaker for the low side of the transformer, and 13 kV bus work with circuit breakers for two distribution line exits. Reconfigure distribution lines in the area to include the new capacity available from North Bend substation.

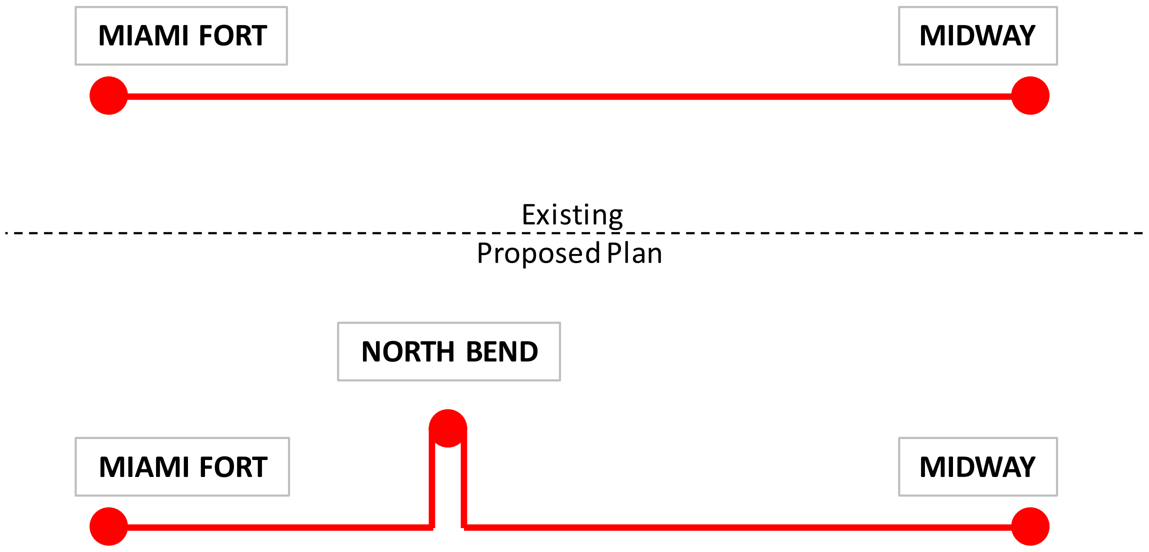
Alternatives: none

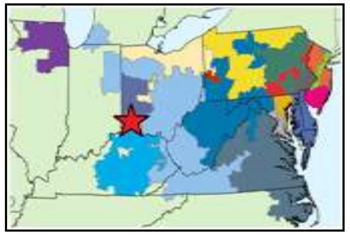
Transmission Cost Estimate: $7.2M

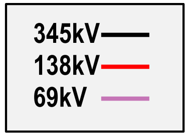
Proposed In-Service Date: 12-01-2023

Project Status: Scoping

Model: 2020 RTEP







EKPC Transmission Zone M-3 Process
Speedwell Road New Customer Load

Need Number: EKPC-2021-007

Process Stage: Solutions Meeting – April 16, 2021

Previously Presented:
Needs Meeting 3/19/2021

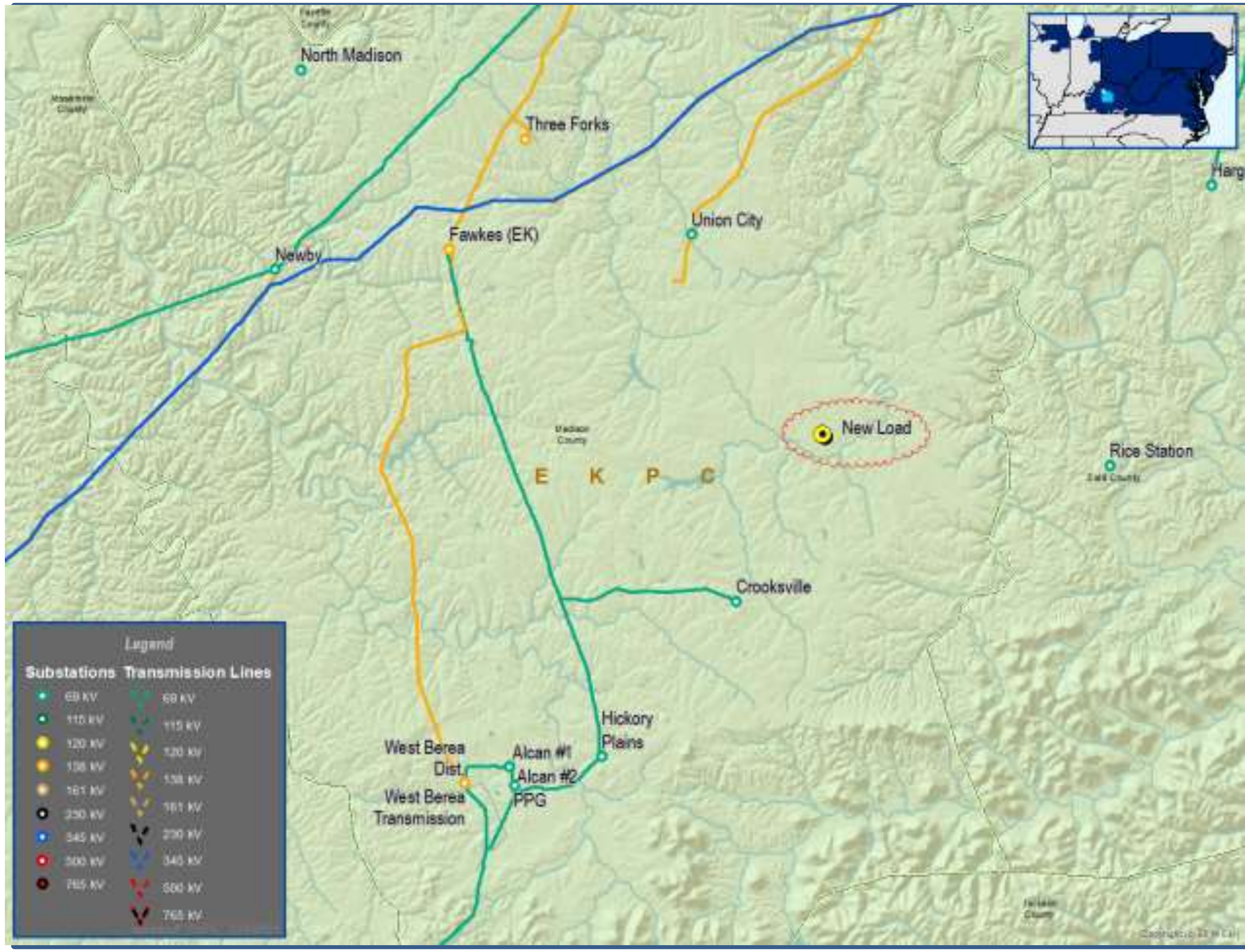
Supplemental Project Driver:
Customer Service

Specific Assumption Reference:
EKPC Assumptions Presentation Slide 14

Problem Statement:

A new customer has requested a new delivery point for a winter peak demand of 28.5 MW and 1.5 MW summer peak by 7/1/2022. The new delivery point is located in Madison Co, KY approximately 5.5 miles northeast from EKPC's Crooksville distribution substation. The existing distribution infrastructure is not capable of serving this request.

Model: N/A



EKPC Transmission Zone M-3 Process
Speedwell Road New Customer Load

Need Number: EKPC-2021-007

Process Stage: Solutions Meeting April 16, 2021

Proposed Solution:

Construct new 69kv-25kv 18/24/30 MVA distribution substation and associated 4.79 Mile Tap from the EKPC Crooksville's 69 KV tap line. Upgrade the existing West Berea 138/69 KV 100 MVA to 150 MVA. Add a 2000 A 138 KV breaker to the 138 KV tie line between the EKPC Fawkes switching station and the LG&E/KU Fawkes stations.

Distribution Cost: $7.2M
Transmission Cost: $2.4M

Ancillary Benefits:

None

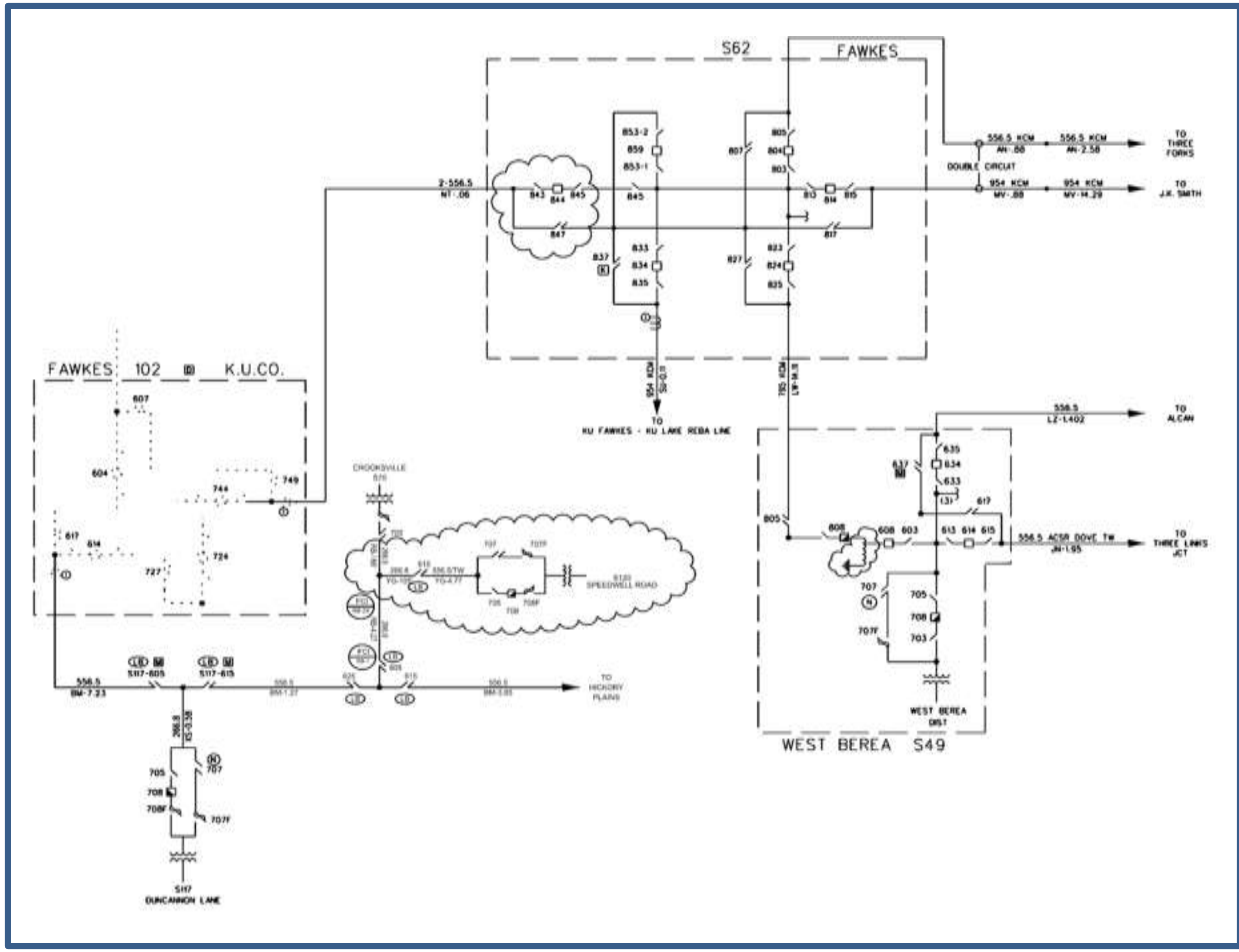
Alternatives Considered:

Serve load from nearby foreign utility.

Projected In-Service: 7/1/2022

Project Status: Engineering

Model: N/A



Need Number: EKPC-2021-008

Process Stage: Solutions Meeting – April 16, 2021

Previously Presented:
Needs Meeting 3/19/2021

Supplemental Project Driver:
Equipment Material Condition, Performance and Risk

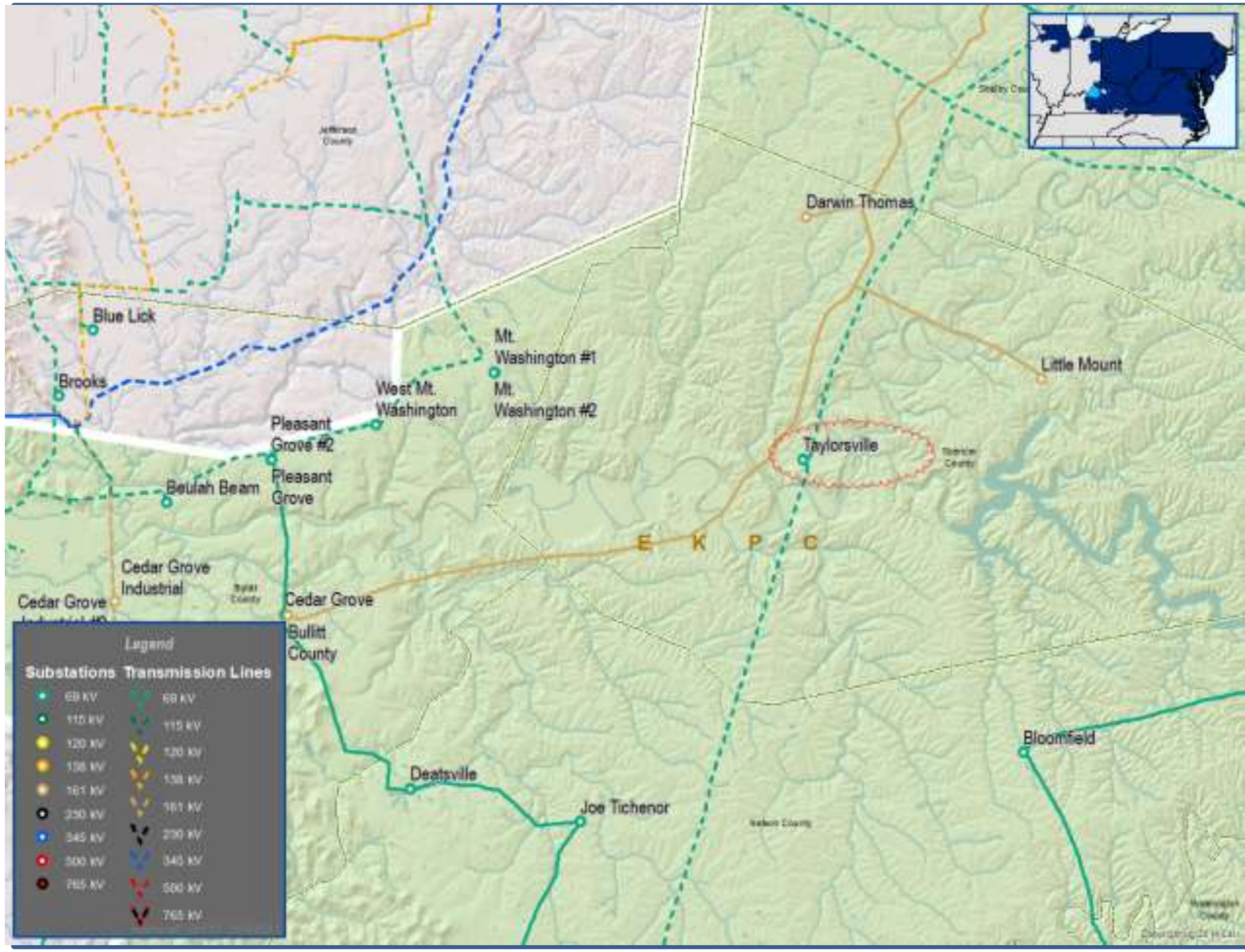
Specific Assumption Reference:
EKPC Assumptions Presentation Slide 12

Problem Statement:

The Taylorsville distribution substation was built in 1946. This station is currently served from LG&E/KU's Bardstown-Finchville 69 KV transmission circuit.

This station has numerous issues associated with aging/condition, site location, and accessibility. The station has a narrow driveway with a 90 degree turn. Extremely small station footprint with minimal space to maneuver around the equipment. High side switch and porcelain lightning arrestors are at end of life. There is no metering bypass, or bypass buss in the low bay, which prolongs restoration. The distribution transformer is inconveniently located under the high side bus which creates prolonged maintenance outage time.

Model: N/A



Need Number: EKPC-2021-008

Process Stage: Solutions Meeting April 16, 2021

Proposed Solution:

Rebuild and relocate the Taylorsville distribution substation. Build a new Taylorsville 161-25 KV distribution substation looping into the Bullitt Co-Little Mount 161 KV line section. The existing distribution substation will be retired.

Distribution Cost: $2.4M
Transmission Cost: $1.73M

Ancillary Benefits:

- Taylorsville load served from EKPC system
    - Outside entity is not involved in service restoration
- Savings in NITS

Alternatives Considered:

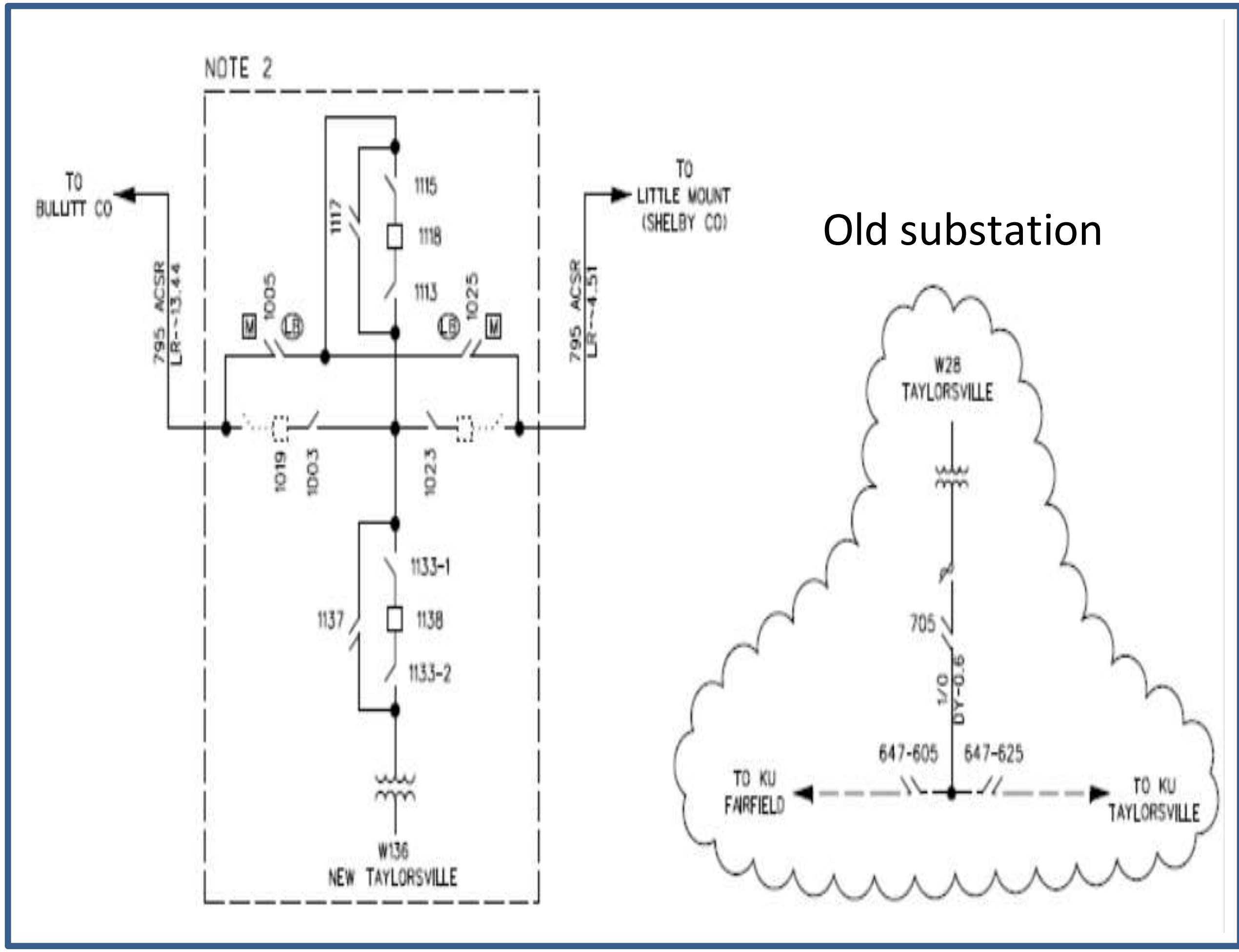
Rebuild at the existing site.

- This was not chosen due to property size and large NITS savings.

Projected In-Service: 12/31/2023

Project Status: Engineering

Model: N/A



Clay Village 69 KV Tie

Need Number: EKPC-2021-012

Process Stage: Solutions Meeting – May 21, 2021

Previously Presented:

Needs Meeting 4/16/2021

Supplemental Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

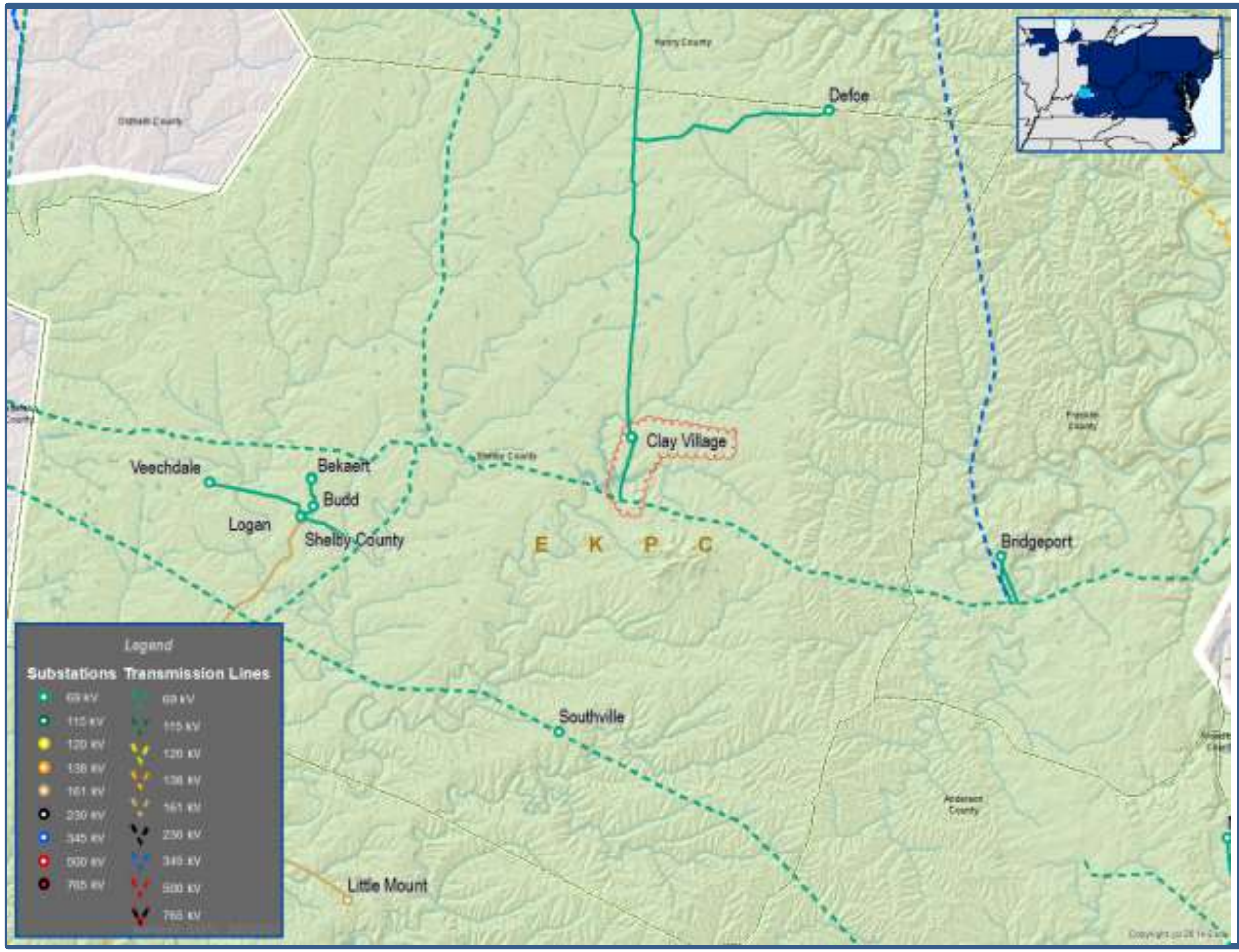
EKPC Assumptions Presentation Slide 12

Problem Statement:

The 1.61 mile, Clay Village 69 KV transmission tie line to LG&E/KU is 70 years old.

This line has condition issues such as conductor steel core and static wire deterioration, rusting, pitting and broken strands.
Based on this information, the EKPC Reliability team has concluded that this line is at or near end of life and should be addressed due to the condition.

Model: N/A



Need Number: EKPC-2021-012

Process Stage: Solutions Meeting – May 21, 2021

Proposed Solution:
Rebuild the 1.6 mile, Clay Village 69 kV tie line using 556.5 ACSR/TW conductor and steel poles & structures.

1.25 miles of single structures will be replaced.
0.35 miles of H-Frame tangent structures will be evaluated on structure by structure basis

Distribution Cost: $0M
Transmission Cost: $1.05M

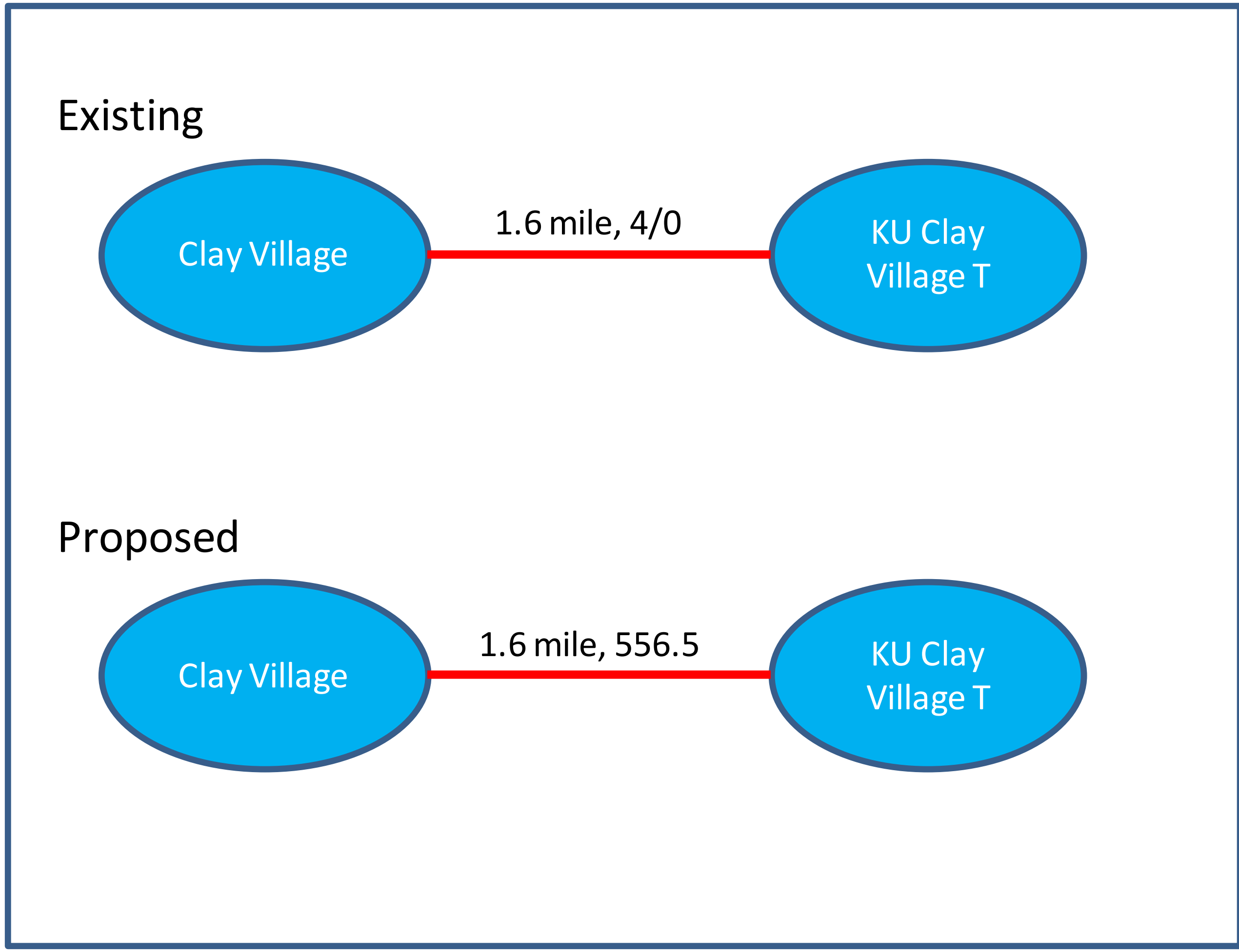
Ancillary Benefits:
None

Alternatives Considered:
No feasible alternatives

Projected In-Service: 6/30/2025

Project Status: Engineering

Model: N/A



EKPC Transmission Zone M-3 Process
KU Carrollton – Bedford 69kV

Need Number: EKPC-2021-016

Process Stage: Solutions Meeting – May 21, 2021

Previously Presented:
Needs Meeting 4/16/2021

Supplemental Project Driver:
Equipment Material Condition, Performance and Risk

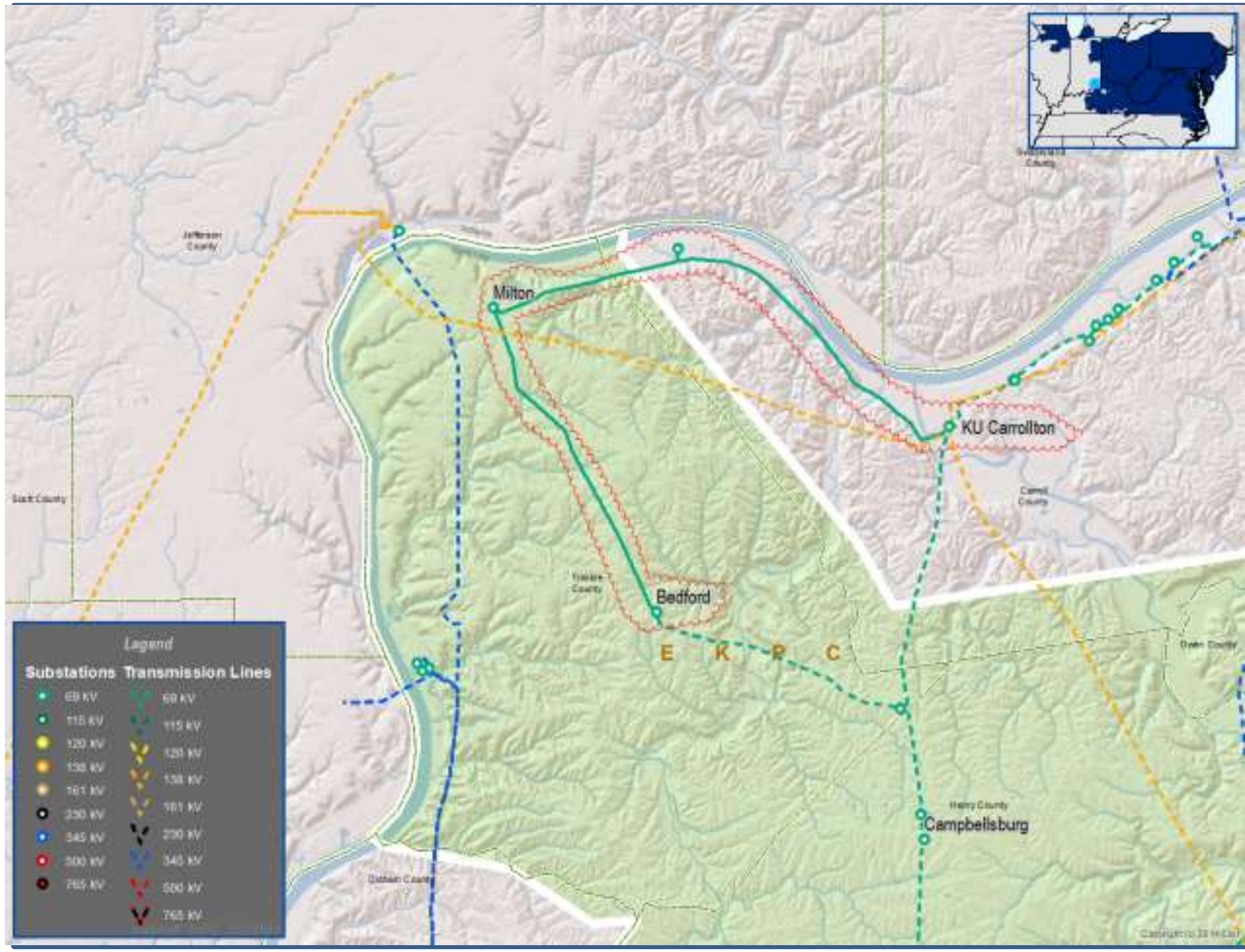
Specific Assumption Reference:
EKPC Assumptions Presentation Slide 12

Problem Statement:

The 22.09 mile, KU Carrollton - Bedford transmission line is 61 to 66 years old.

This line section has continued to show up on EKPC's list of Worst Performing Areas for several years, and it is currently the #5 worst performing line. Testing from the LineVue robot from Kinectrics Corporation deemed the phase and static wire condition as poor to marginal. The testing identified instances of rusting, pitting, and broken strands. Based on this testing information, the EKPC Reliability team has concluded that this line is near end of life and should be addressed due to the condition assessment

Model: N/A



Need Number: EKPC-2021-016

Process Stage: Solutions Meeting – May 21, 2021

Proposed Solution:

Rebuild the 22.1 mile, KU Carrollton-Bedford 69kV line using 556.5 ACSR/TW conductor and steel poles & structures.

All of the single structures will be replaced. The H-Frame tangent structures will be evaluated on structure by structure basis.

Distribution Cost: $0M
Transmission Cost: $12.3M

Ancillary Benefits:

None

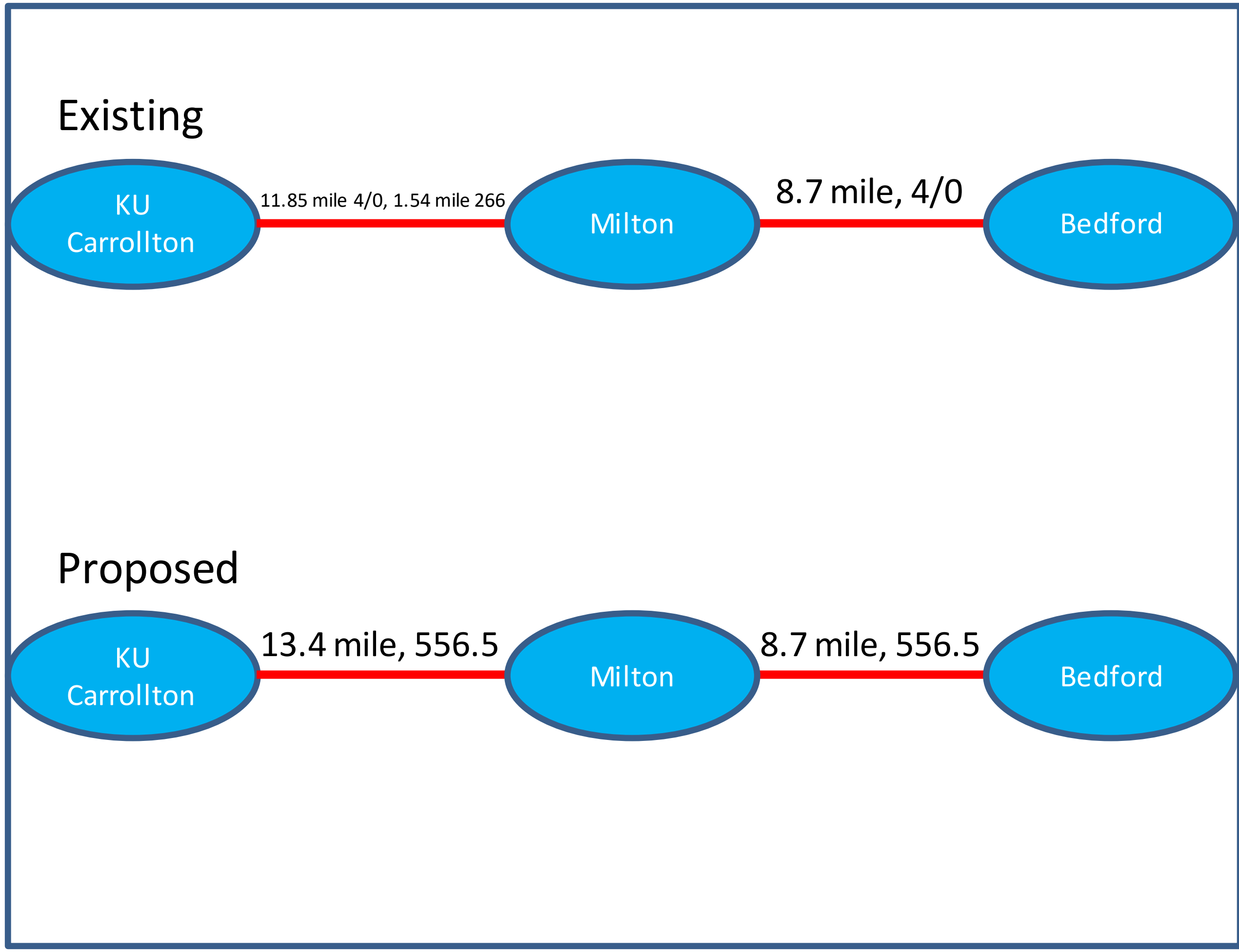
Alternatives Considered:

No feasible alternatives

Projected In-Service: 3/11/2026

Project Status: Engineering

Model: N/A



Need Number: AEP-2019-AP046

Process Stage: Solutions Meeting 6/15/2021

Previously Presented: Needs Meeting 11/22/2019

Supplemental Project Driver: Customer Request

Specific Assumptions Reference: AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 7)

Problem Statement:

- A siting assessment has been requested for establishing a new distribution station in anticipation of a future industrial customer(s) located at the Southern Virginia Mega Site at Berry Hill.
- Part of the VA House Bill 1840 (HB1840) (Electric Utilities: Pilot Programs for Transmission Facilities Serving Business Parks).

Model: 2024 RTEP

Need Number(s): AEP-2019-AP046

Process Stage: Solutions Meeting 6/15/2021

Proposed Solution:

Berry Hill 138 kV Station ($0 M - Distribution)

- Establish a new 138 kV, 3-breaker ring bus (space for a 6-breaker ring)
- Install 138/34.5 kV, 30 MVA Distribution transformer

Berry Hill 138 kV Extension ($14.66 M)

- 0.2 mile relocation of Axton-Danville #2 138 kV and installation of a new 138 kV tap structure
- Construct approximately 5.04 miles of double circuit 138 kV line from tap location to new Berry Hill substation

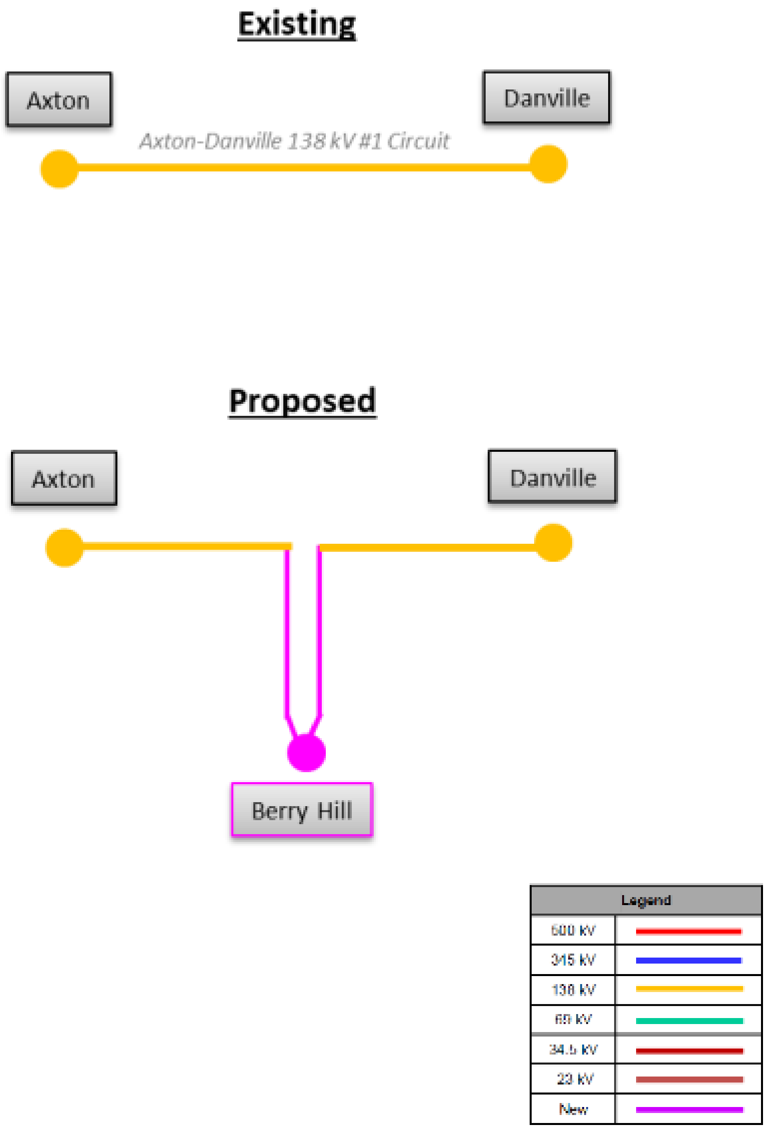
Estimated Total Transmission Cost: $14.66 M

Ancillary Benefits:
Establishing a new 138 kV station near the Berry Hill Mega Park will allow for future interconnection opportunities and economic development in the area. This project is the result of VA House Bill 1840 (HB1840) (Electric Utilities: Pilot Programs for Transmission Facilities Serving Business Parks).

Alternatives Considered:
Tap the nearby Corning Glass-Ridgeway 69 kV Circuit to establish a new 69 kV Berry Hill station, however due to the intended nature to serve large industrial customers in the Berry Hill Mega Site, the 138 kV service is more desirable.

Projected In-Service: 4/15/2022

Project Status: Scoping



AEP Transmission Zone M-3 Process
Eastern Marion Improvements

Need Number: AEP-2018-IM017

Process Stage: Solution Meeting 07/16/2021

Previously Presented: Needs Meeting 1/10/2019

Project Driver: Equipment Material Condition, Performance and Risk

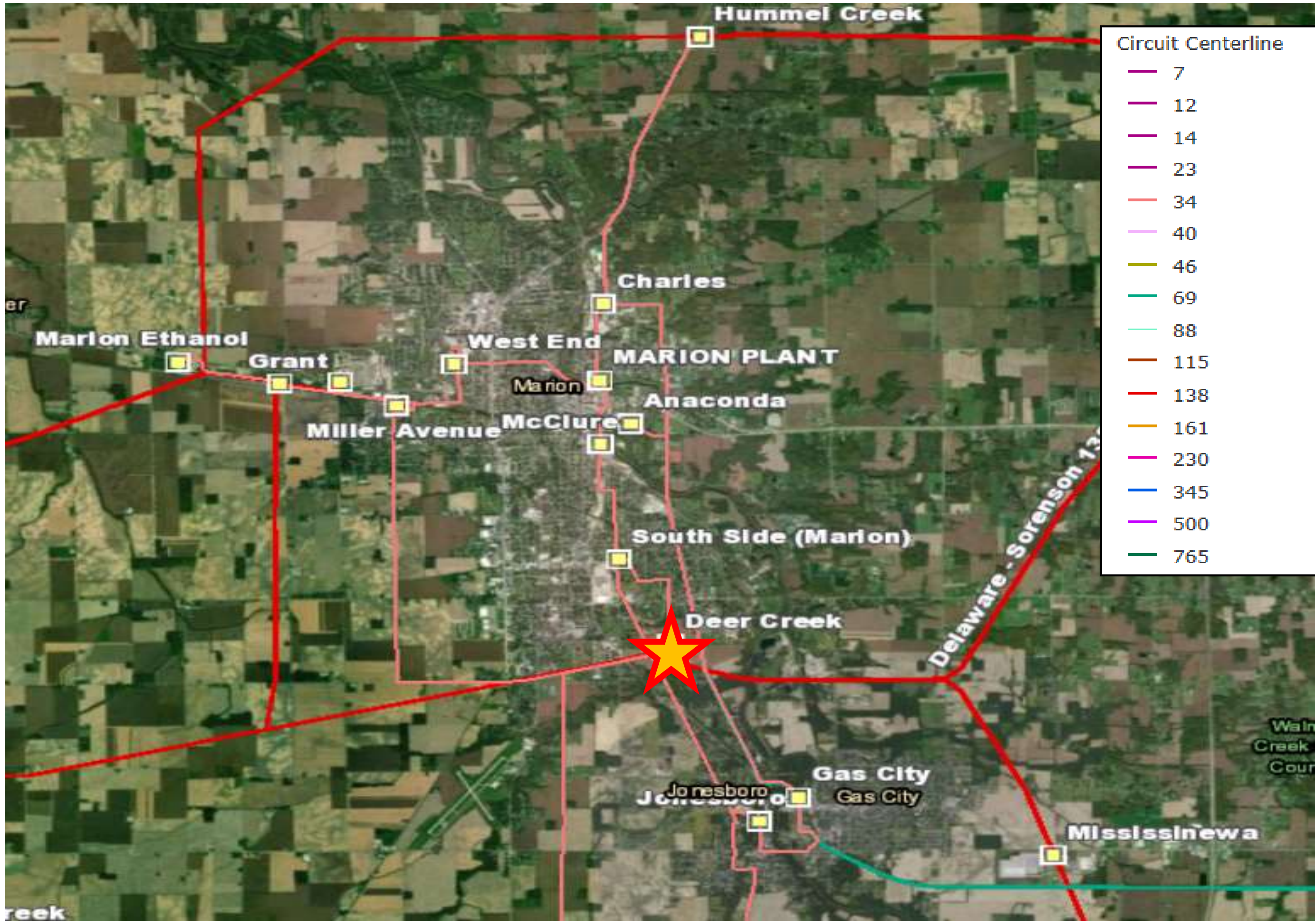
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8);

Problem Statement:

Deer Creek 34.5kV

- Breakers “K”, “F”, “M”, “H”, “V”, “W”
  - 1949-62 vintage FK oil breakers without containment
  - Fault Operations: CB K(9) CB F(1) CB M(17) CB H(16) CB V(5) CB W(1) - Recommended(10)
  - CB W is over the recommended amount of switching operations.



Need Number: AEP-2018-IM022

Process Stage: Solution Meeting 07/16/2021

Previously Presented: Needs Meeting 12/21/2018

Project Driver: Equipment Material Condition, Performance and Risk

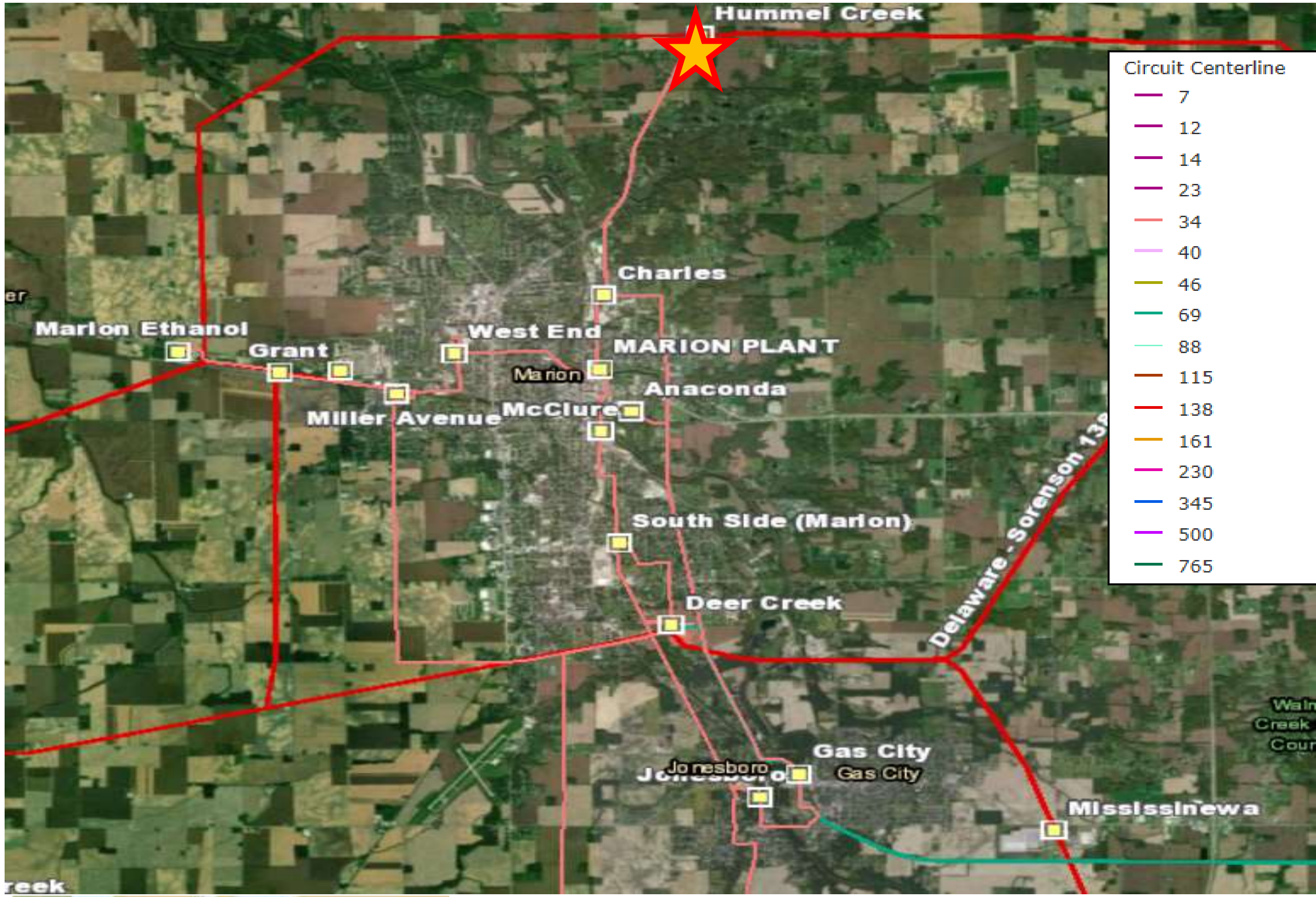
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8);

Problem Statement:

Hummel Creek 34.5kV

- Breakers “L” and “M”
    - 1949-1950 vintage FK oil breaker without containment
    - Fault Operations: CB M(33)– Recommended(10)



Need Number: AEP-2018-IM023

Process Stage: Solution Meeting 07/16/2021

Previously Presented: Needs Meeting 1/11/2019

Project Driver: Equipment Material Condition, Performance and Risk

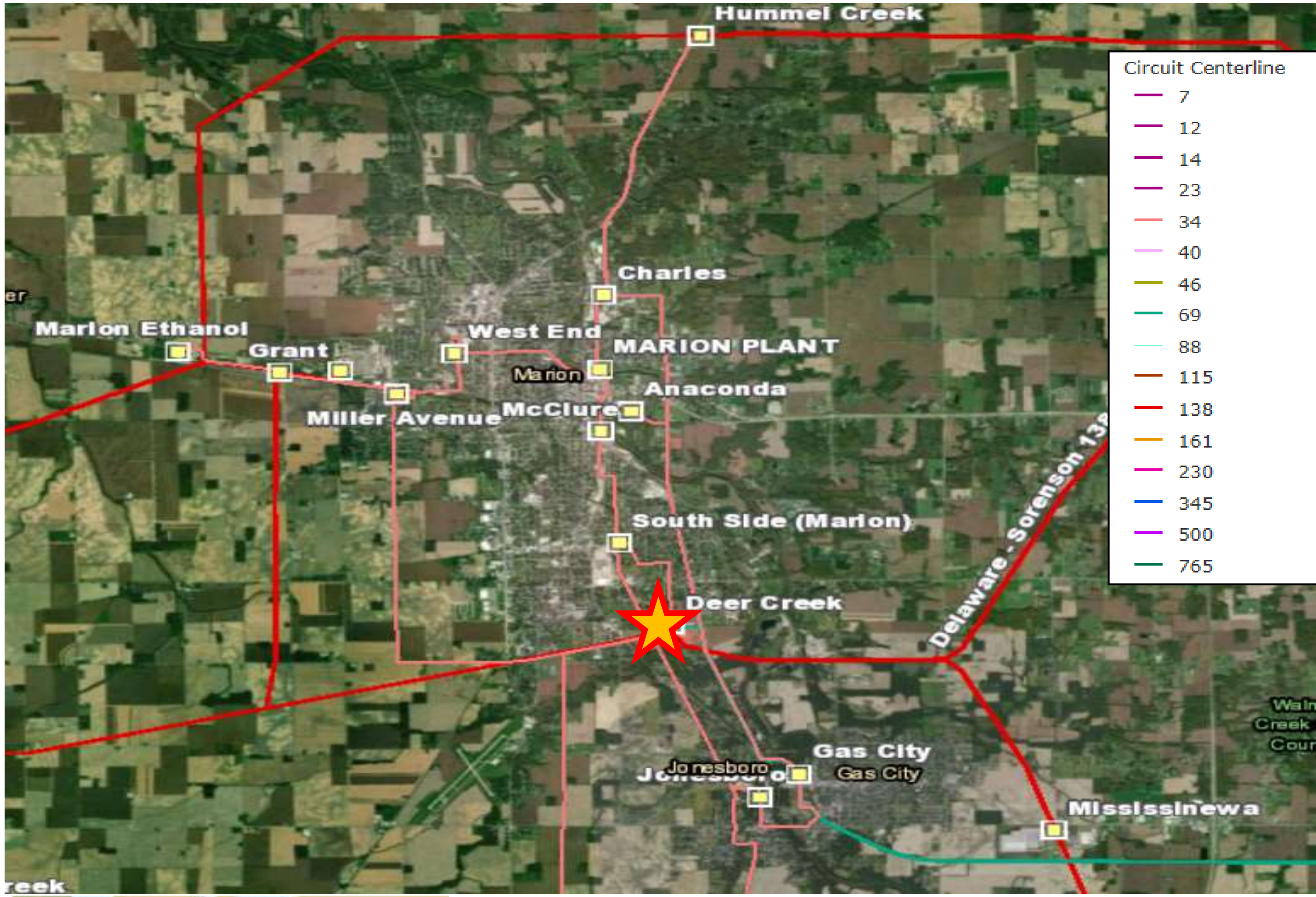
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8);

Problem Statement:

Deer Creek – Hummel Creek 34.5 kV (11 miles)

- 1940 wood crossarm construction (age based on age of station)
- Subject to 16 open A conditions
- Subject to 17 open B conditions
- In the past 10 years, 16 structures have had active maintenance performed. This is expected to increase as line ages.



Need Number: AEP-2021-IM014

Process Stage: Solution Meeting 07/16/2021

Previously Presented: Needs Meeting 04/16/2021

Project Driver: Equipment Material Condition, Performance and Risk

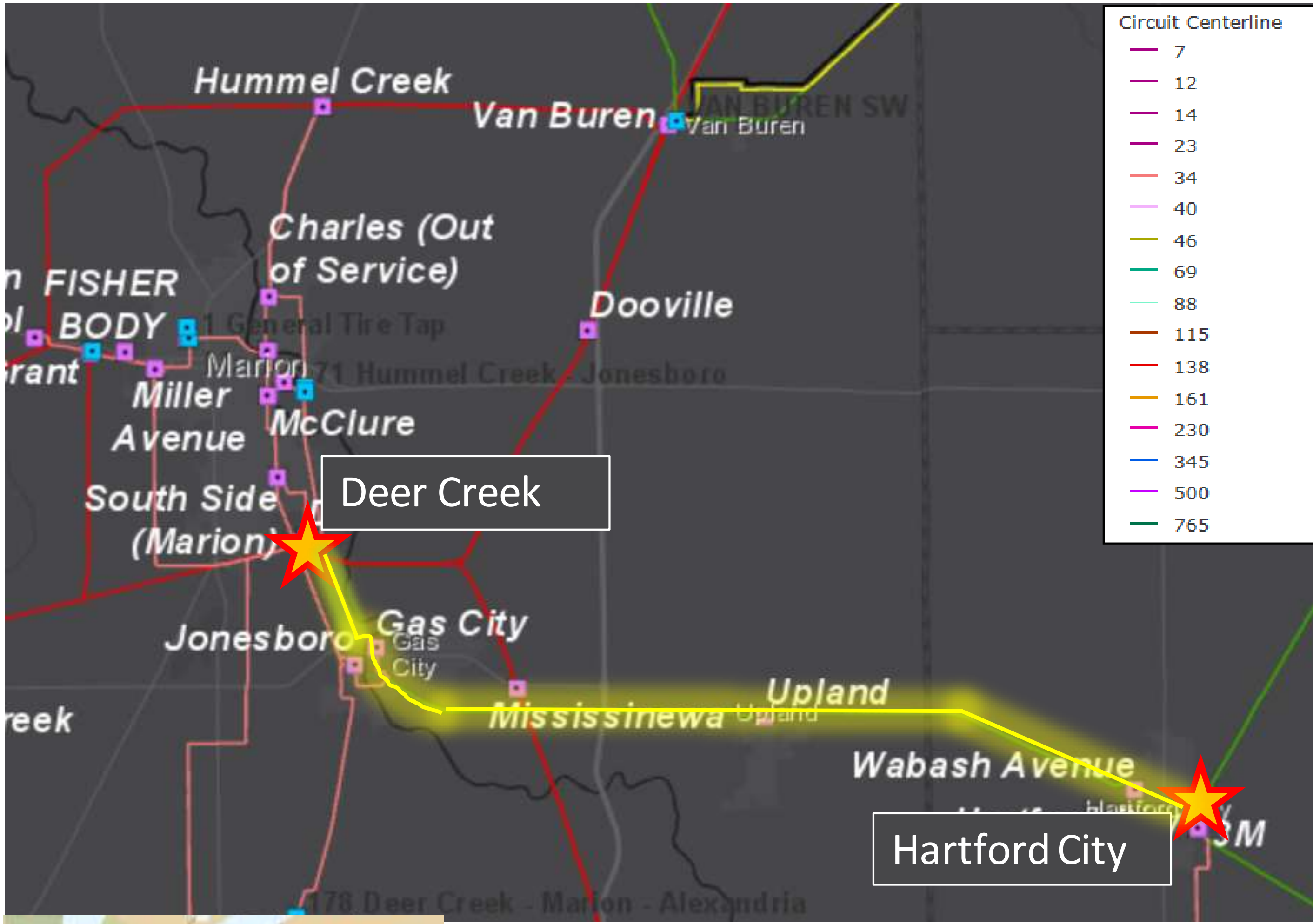
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13);

Problem Statement:

Deer Creek – Hartford City 69 kV (vintage 1967):

- Length: 17.67 Miles
- Original Construction Type: Wood pole structures with cross arm construction and vertical post insulators.
- Original Conductor Type:
  - 336.4 kCM ACSR 18/1 Merlin (18.17 mi, vintage 1967)
  - 3/0 Copper 7 (30COP) (2.24 mi, vintage 1967)
- Momentary/Permanent Outages: 21 total outages: 10 (Momentary), 11 (Permanent).
- 5 Year CMI: 67,818
- Number of open conditions: 4
  - Open conditions include: Cross arm or pole with split and woodpecker conditions and broken or missing ground lead wire.
- Based on the ground crew assessment roughly 28% of the structures had advanced levels of decay on the poles
- Total structure count: 378 with 366 dating back to original installation.



Need Number: AEP-2021-IM014

Process Stage: Solution Meeting 07/16/2021

Previously Presented: Needs Meeting 04/16/2021

Project Driver:

Equipment Material Condition, Performance and Risk

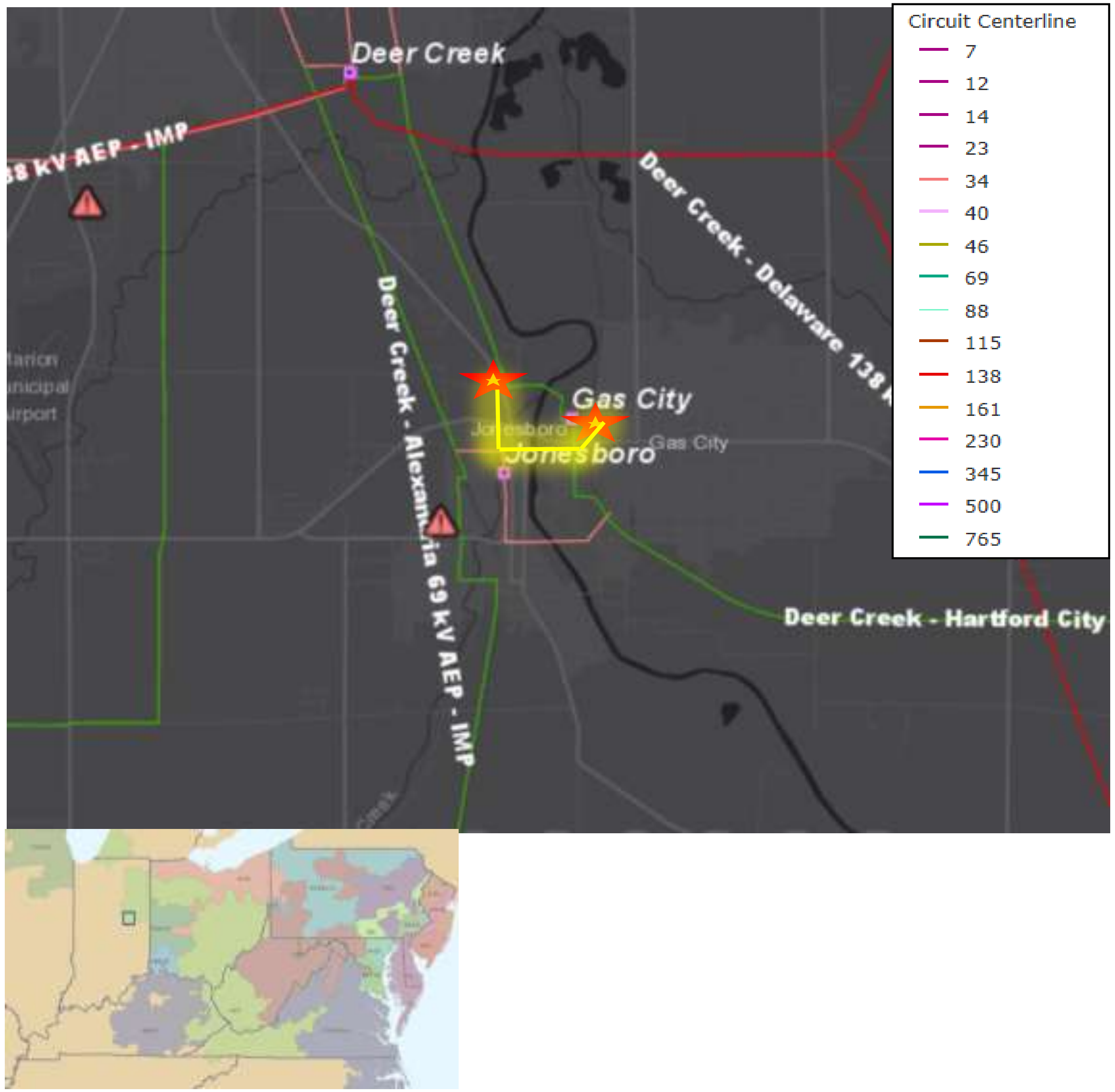
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13);

Problem Statement:

Jonesboro – Gas City 34.5 kV (vintage 1969):

- Length: 1.01 Miles
- Original Construction Type: Wood pole structures
- Original Conductor Type:
  - 336.4 ACSR 18/1 Merlin (0.65 mi, vintage 1969)
  - 3/0 Copper 7 (0.36 mi, vintage 1969)
- Number of open conditions: 12
  - Open conditions include: Cross arm or pole with split rot conditions, knee/vee brace with loose conditions, broken guy strain insulator and right of way encroaching buildings.
- Total structure count: 34 (original vintage)



Need Number: AEP-2021-IM014

Process Stage: Solution Meeting 07/16/2021

Previously Presented: Needs Meeting 04/16/2021

Project Driver:

Equipment Material Condition, Performance and Risk

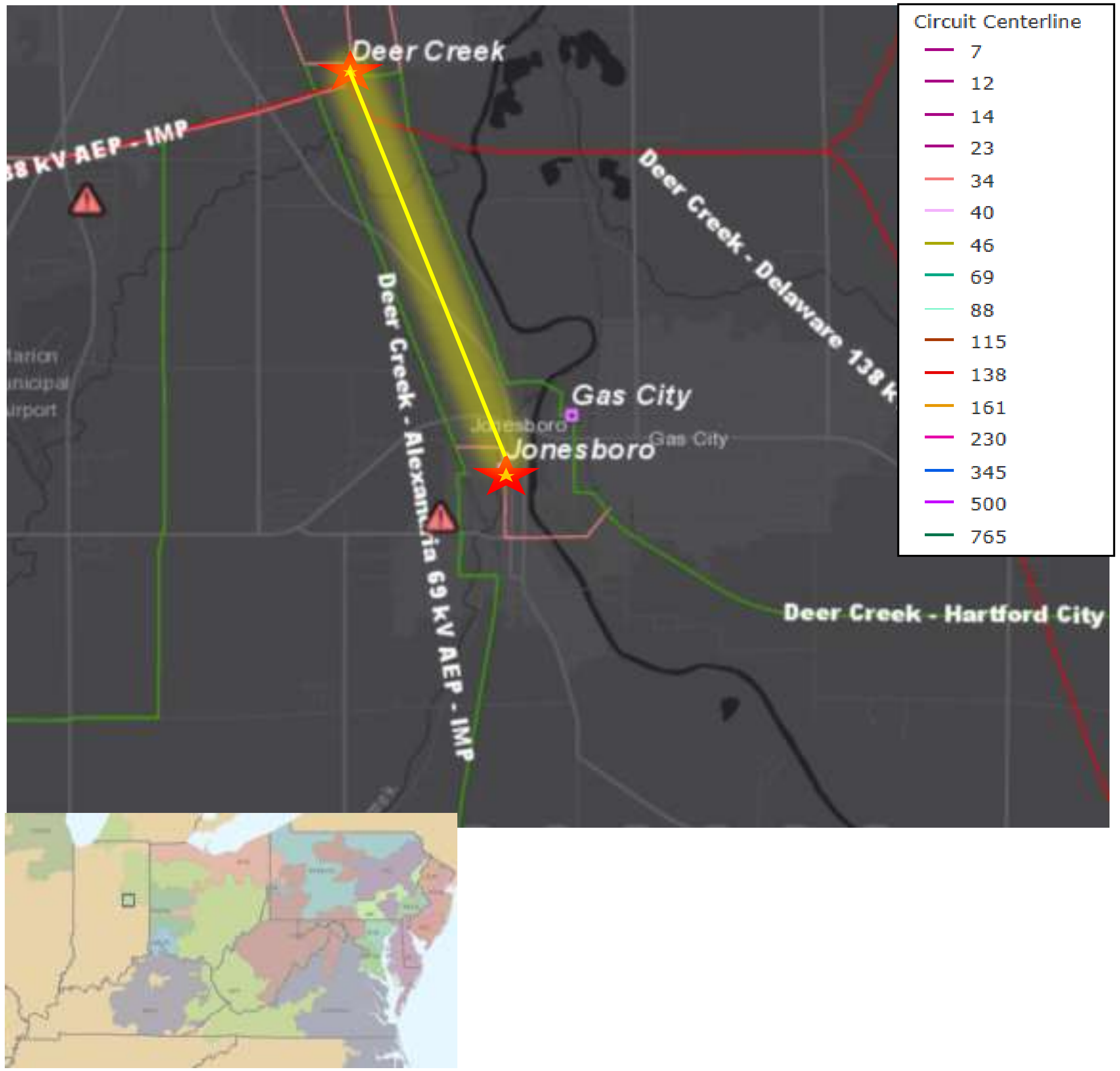
Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13);

Problem Statement:

Deer Creek – Alexandria 34.5 kV (vintage 1968):

- Length: 2.19 Miles
- Original Construction Type: Wood pole structures
- Original Conductor Type:
  - 556.5 kCM ALUM/1250 19 Dahlia
- Number of open conditions: 7
  - Open conditions include: Cross arm or pole with rot top conditions, stolen ground lead wires and improperly installed shield wire.
- Total structure count: 61, with 60 dating back to original installation.



Need Number: AEP-2018-IM017, AEP-2018-IM022, AEP-2018-IM023, AEP-2021-IM014

Process Stage: Solution Meeting 7/16/2021

Proposed Solution:

Deer Creek – Hartford City 69 kV: Rebuild ~17.67 miles of 69 kV line with the conductor size 556.5 ACSR 26/7 Dove. The following cost includes the line rebuild, line removal and right of way.
Cost: $40.69 M

Hummel Creek – Deer Creek 34.5 kV: Retire ~4.6 miles of 34.5 kV 1940s wood line.
Cost: $1.01 M

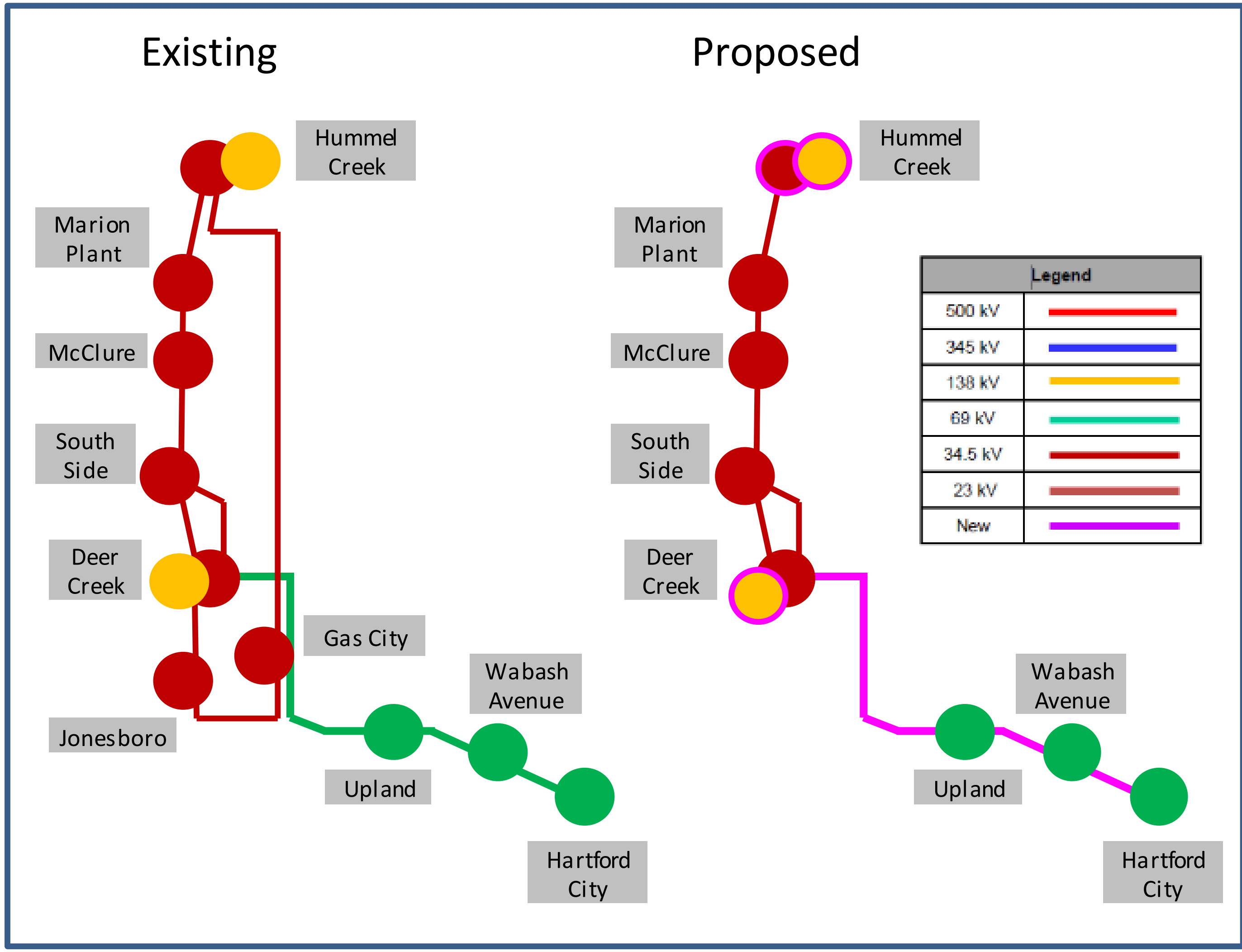
Jonesboro – Gas City 34.5 kV : Retire ~0.99 miles of 34.5 kV 1969 wood line.
Cost: $0.42 M

Deer Creek – Alexandria 34.5 kV : Retire ~2.2 miles of 34.5 kV 1968 wood line.
Cost: $1.23 M

Hummel Creek 34.5 kV Station: Remove the 34.5 kV circuit breaker "M". Replace 34.5 kV circuit breaker "L" with a system spare circuit breaker. Rebuild the 34.5 kV bus to a 69 kV standards. Install a 138 kV high side circuit switcher on the 138/34.5 kV transformer.
Cost: $1.74 M

Deer Creek substation: Remove the 34.5 kV circuit breaker "M". Install a 138/12 kV 20 MVA transformer with a high side 138 kV circuit switcher. Also install a low side 12 kV 2000 A circuit breaker a 12 kV 2000 A bus tie circuit breaker and three 12 kV 2000 A feeder circuit breakers. Install a new high side 138 kV circuit switcher 138/12 kV transformer #4.
Cost: $4.14M

Total Cost: $49.2 M



AEP Transmission Zone M-3 Process
Eastern Marion Improvements

Need Number: AEP-2018-IM017, AEP-2018-IM022, AEP-2018-IM023, AEP-2021-IM014

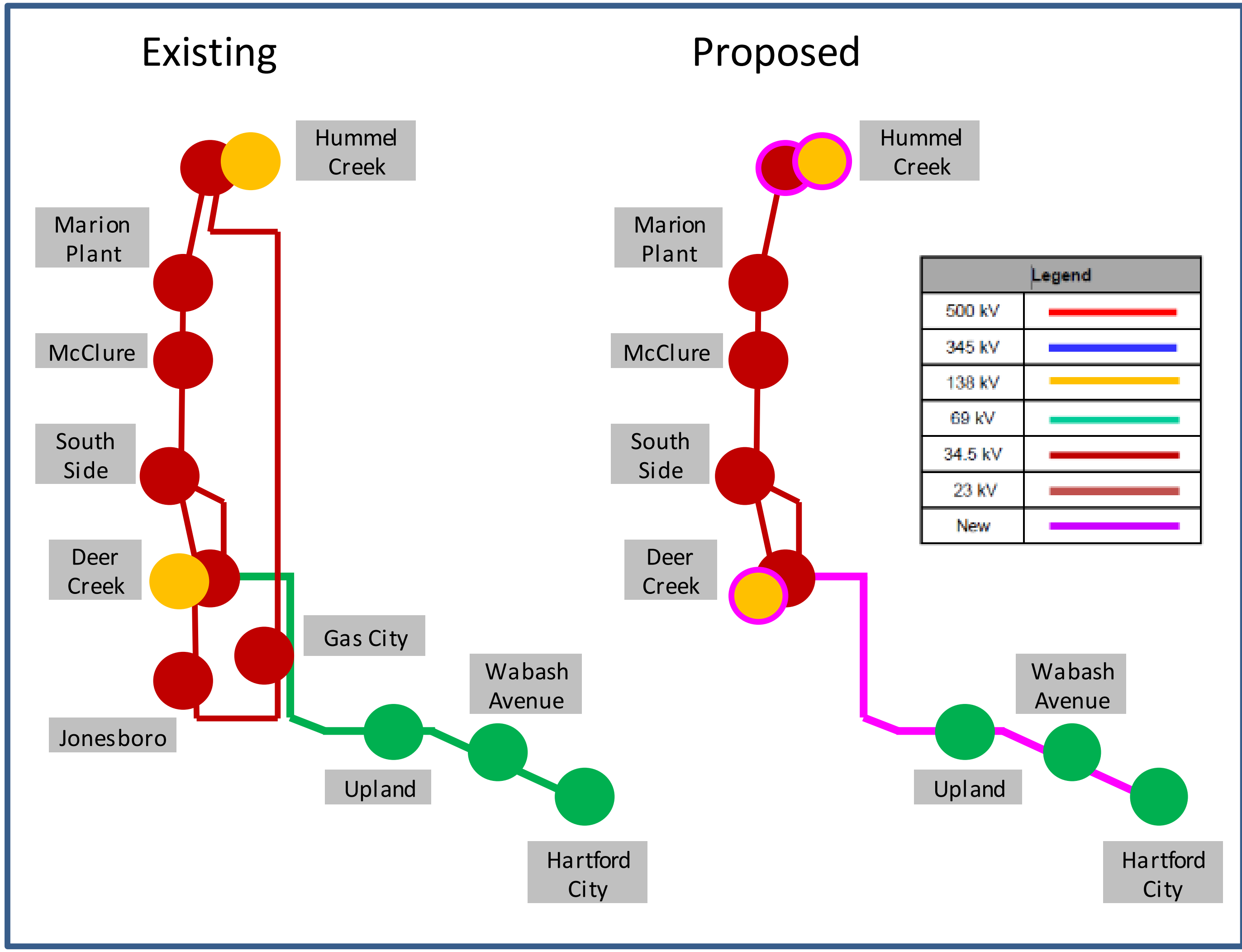
Process Stage: Solution Meeting 7/16/2021

Alternative: Remove the 69 kV line between Deer Creek and Wabash Avenue. Relocate Upland station and connect with a 138 kV loop to the Desoto – Sorenson 138 kV circuit. Loop Wabash Avenue to Hartford City station and install a 69 kV tie circuit breaker at Hartford City. This alternative would also retire the Hummel Creek – Deer Creek 34.5 kV, Deer Creek 34.5 kV extension, Jonesboro – Gas City 34.5 kV and Deer Creek – Alexandria 34.5 kV lines. This alternative was not selected as building an additional line between Wabash Avenue and Hartford City would be difficult and costly due to urban construction.

Cost $53 M

Projected In-Service: 10/25/2024

Project Status: Scoping



Need Number: AEP-2021-IM003
Process Stage: Solution Meeting 7/16/2021
Previously Presented: Needs Meeting 4/16/2021
Supplemental Project Driver: Equipment Condition/Performance/Risk
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)
Model: N/A
Problem Statement:

Riverside – Hartford 138kV line:

- 16.85 miles of mostly 1957 wood H-Frame construction
- Conductor is 397 MCM ACSR
- There are 48 structures with open conditions (36% of line). 40 of these are structure related affecting the crossarm, pole, or X-brace including rot, corrosion, cracked, woodpecker, and disconnected conditions.
- Additional assessment identified the following:
    - 15 structures were subject to some level of decay above normal weathering
    - 10 had crossarm decay
    - 9 had ground line decay
    - 4 had broken/flashed insulators
    - 64% of structures assessed had some level of decay

Need Number: AEP-2021-IM015
Process Stage: Solution Meeting 7/16/2021
Previously Presented: Needs Meeting 4/16/2021
Supplemental Project Driver: Equipment Condition/Performance/Risk
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)
Model: N/A
Problem Statement:

Hartford – South Haven 69kV line:

- 18.68 miles of mostly 1966 wood pole
- Conductor is 336.4 ACSR
- Since 2015 there have been 20 momentary and 4 permanent outages.
- 4,984,780 CMI from 2015-2020
- Structures fail NESC Grade B, AEP Strength requirements and ASCE strength requirements
- There are 90 structures with open conditions (29% of line). 52 of these are structure related including pole rot, split and woodpecker damage

Need Number: AEP-2021-IM003 & AEP-2021-IM015

Process Stage: Solution Meeting 7/16/2021

Proposed Solution:

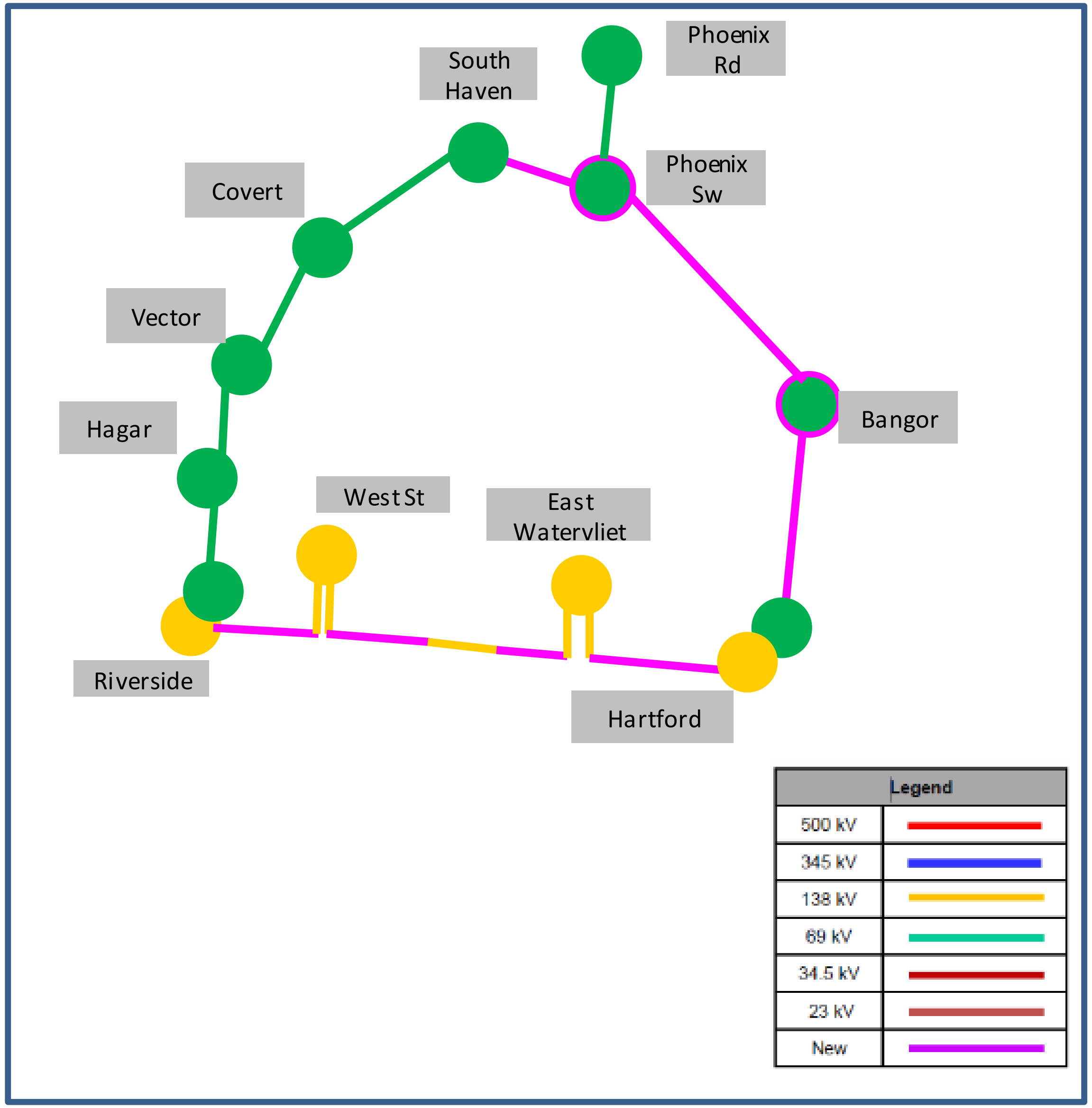
Riverside – Hartford 138kV:
Rebuild the ~14.7 miles of 1950's wood H Frame line with 795 Drake ACSR.
Estimated Cost: $26.9M

South Haven – Hartford 69kV:
Rebuild the ~18.7 miles of 1960's wood pole line with 795 Drake ACSR.
Estimated Cost: $37.1M

Phoenix Switch 69kV:
Replace the switch with a new POP Switch with line MOAB's
Estimated Cost: $0.6M

Bangor 69kV:
Install a bus tie breaker at Bangor 69kV station
Estimated Cost: $0.8M

Total Estimated Cost: $ 65.4 Million



Need Number: AEP-2021-IM003 & AEP-2021-IM015

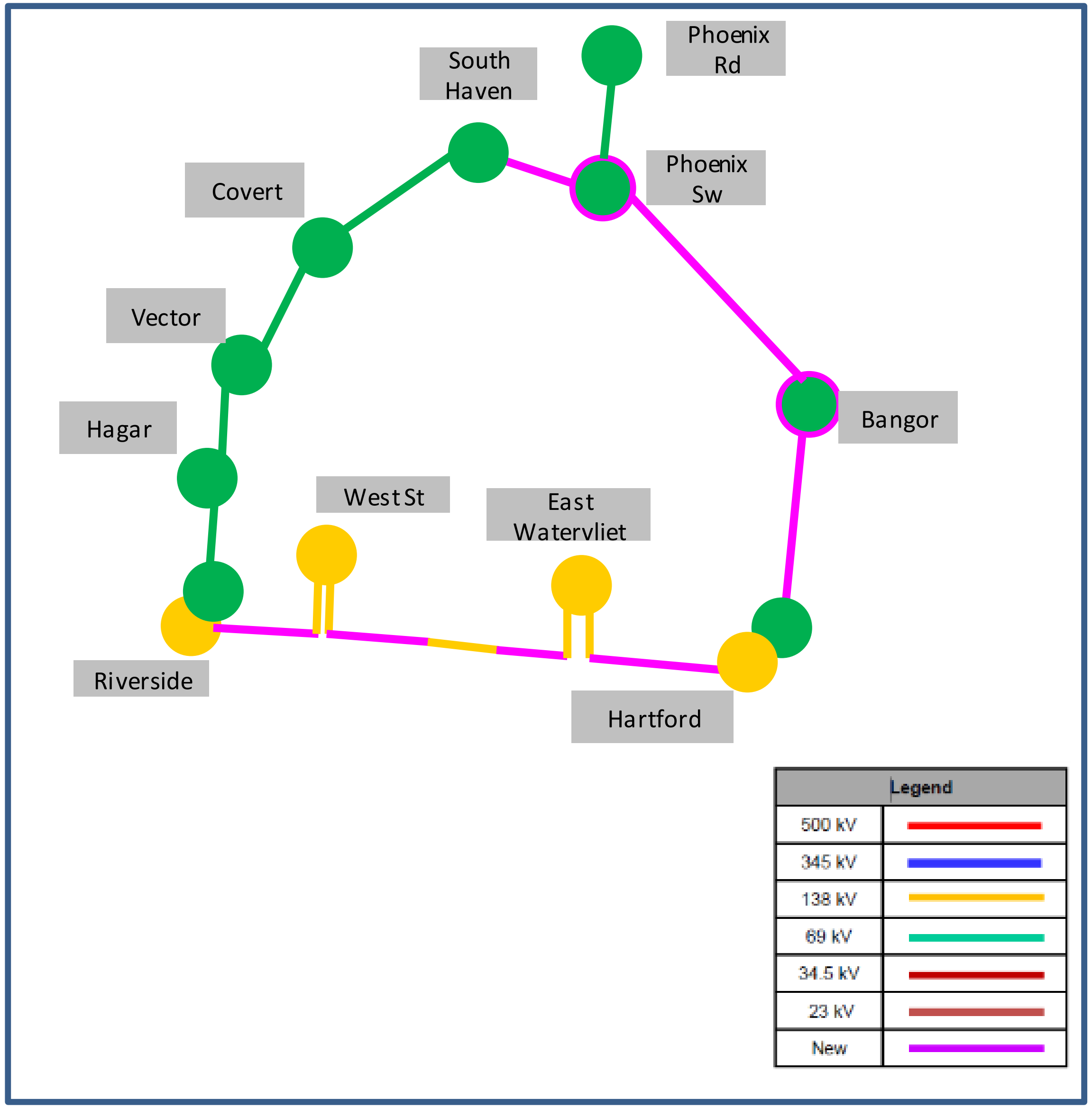
Process Stage: Solution Meeting 7/16/2021

Alternatives:

Considering the location and number of stations served from these lines, no other viable solutions were considered. Consideration was given to looping Phoenix Road station to eliminate the radial feed; however, the area around South Haven and Phoenix Road is urban and well developed, resulting in increased costs. Estimated Cost: $67.4

Projected In-Service: 10/28/2024

Project Status: Scoping



ATSI Transmission Zone M-3 Process
Delta – Wauseon 138 kV New Customer

Need Number: ATSI-2021-013

Process Stage: Solution Meeting – 07/16/2021

Previously Presented: Need Meeting – 06/15/2021

Supplemental Project Driver(s):

Customer Service

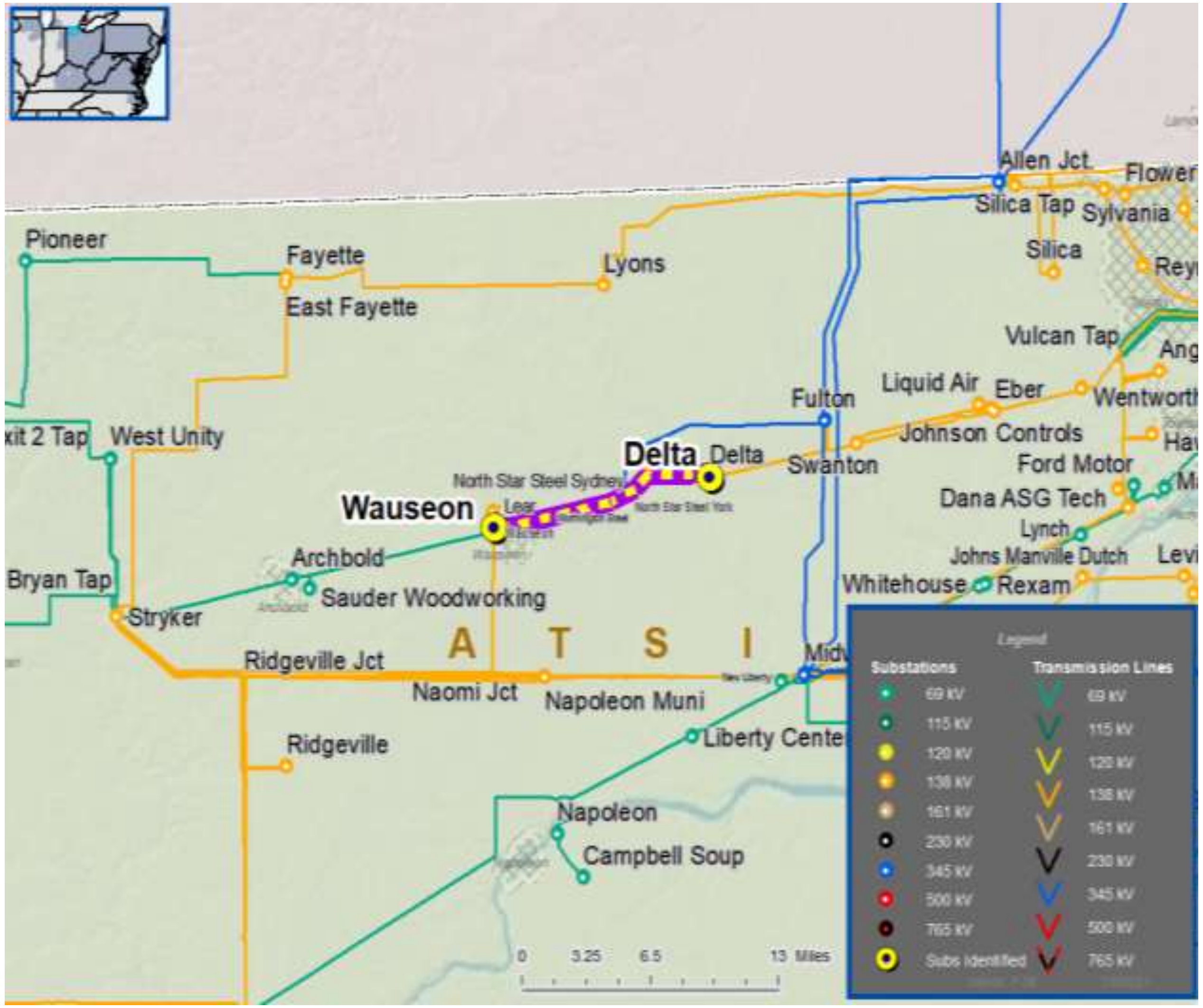
Specific Assumption Reference(s)

Customer connection request evaluated per FirstEnergy's "Requirements for Transmission Connected Facilities" document and "Transmission Planning Criteria" document.

Problem Statement

New Customer Connection – A customer requested 138 kV transmission service for approximately 6.6 MVA of total load near the Delta – Wauseon 138 kV line.

Requested In-Service Date: February 28, 2022



ATSI Transmission Zone M-3 Process
Delta – Wauseon 138 kV New Customer

Need Number: ATSI-2021-013
Process Stage: Solution Meeting – 07/16/2021
Previously Presented: Need Meeting – 06/15/2021

Proposed Solution:

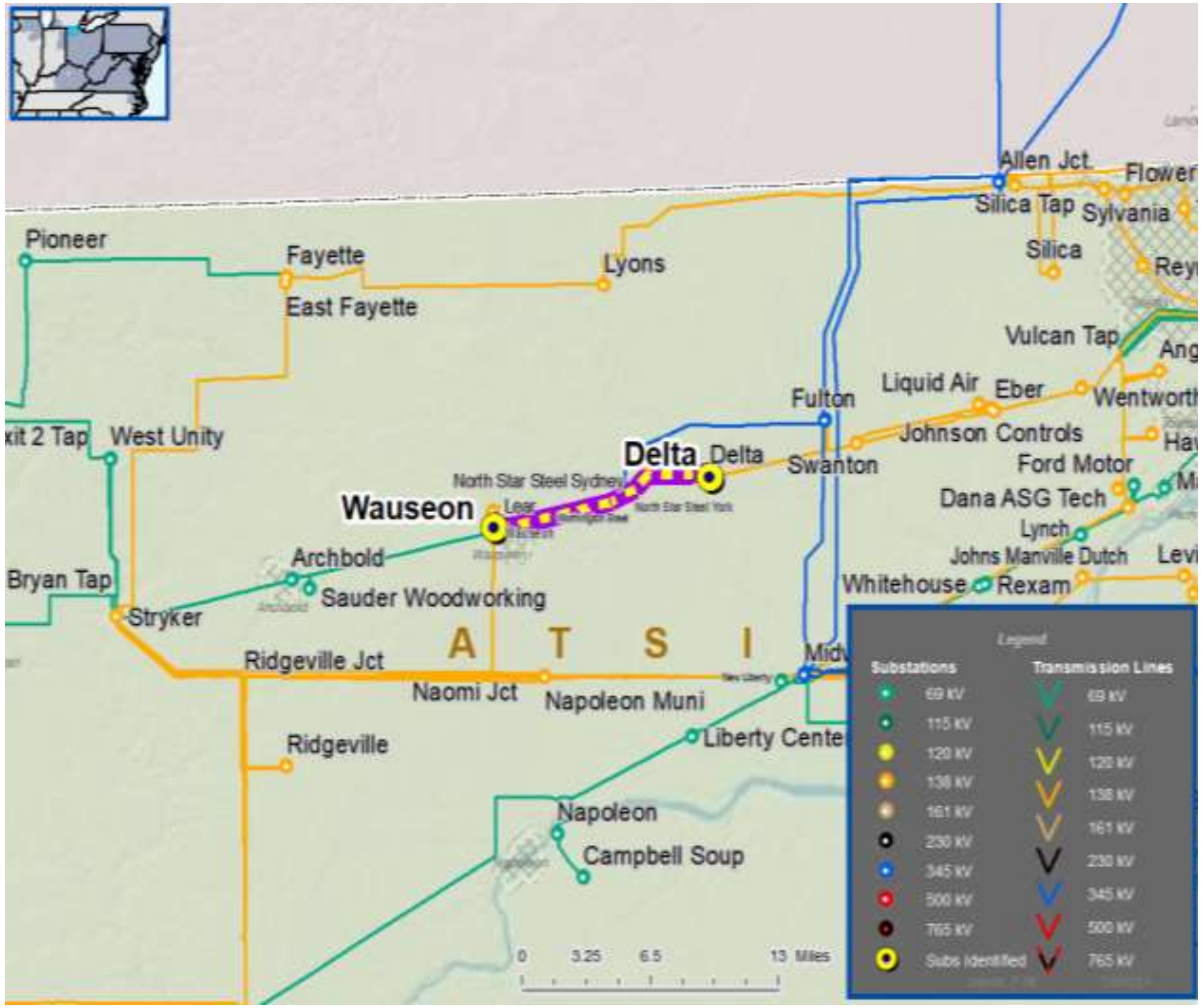
New 138 kV Customer

- Construct a 138 kV tap off the Delta – Wauseon 138 kV line to the customer substation. The customer substation tap location is approximately an 0.8 mile extension from the existing structures to the new customer substation. Provide one 138 kV metering package and add MOAB and SCADA to two existing switches on the Delta – Wauseon 138 kV line.

Alternatives Considered:

- No alternatives considered for this project

Estimated Project Cost: $3.2M
Projected In-Service: 02/15/2022
Status: Engineering
Model: 2020 Series 2025 Summer RTEP 50/50



Need Number: AEP-2018-IM019
Process Stage: Solution Meeting 8/16/2021
Previously Presented: Needs Meeting 1/11/19
Supplemental Project Driver: Equipment Condition/Performance
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)
Problem Statement:

Mottville Hydro Station –
- 1975 vintage 34.5kV grounding transformers carbon dioxide is at IEEE level 3
- PCB's and obsolete bushings

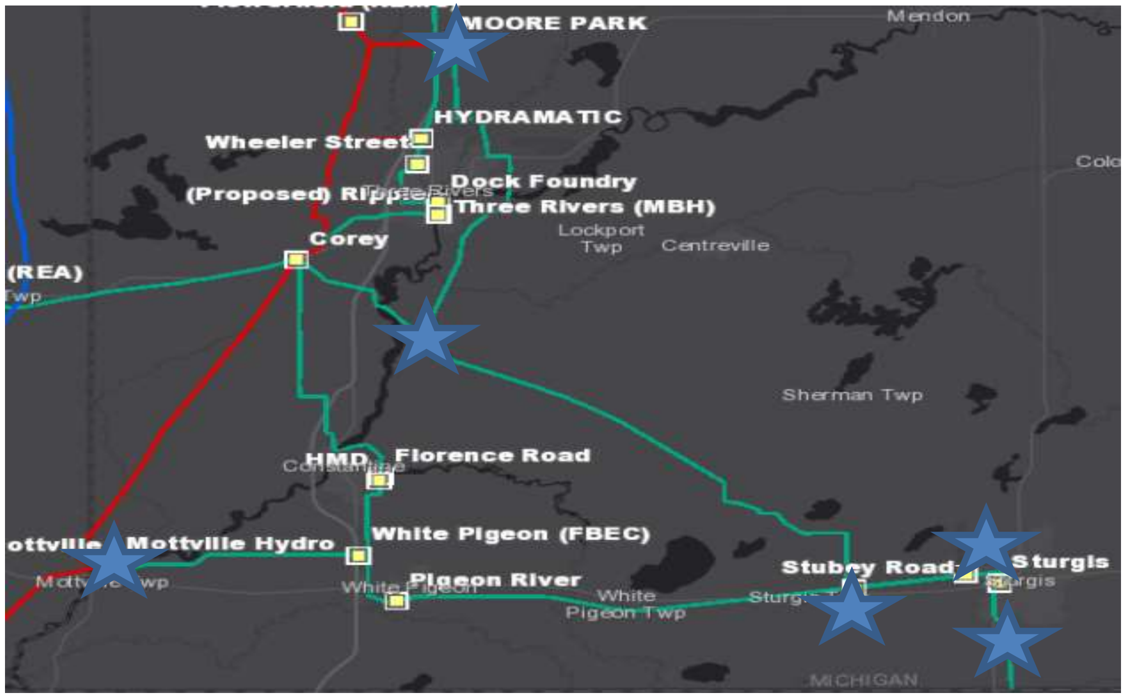
Moore Park Station -
- CB C is a 23 year old 69kV SF6 Breaker (ABB – 72PM31-20)
  - 38 fault operations
  - 38 recorded instances of SF6 additions since 2006

Stubey Road Station –
- Transformer high side ground switch

Sturgis Station –
- CB A and B 63 year old oil CBs with 37 and 28 fault operations, respectively
  - Replacement parts are very difficult to find for these legacy units

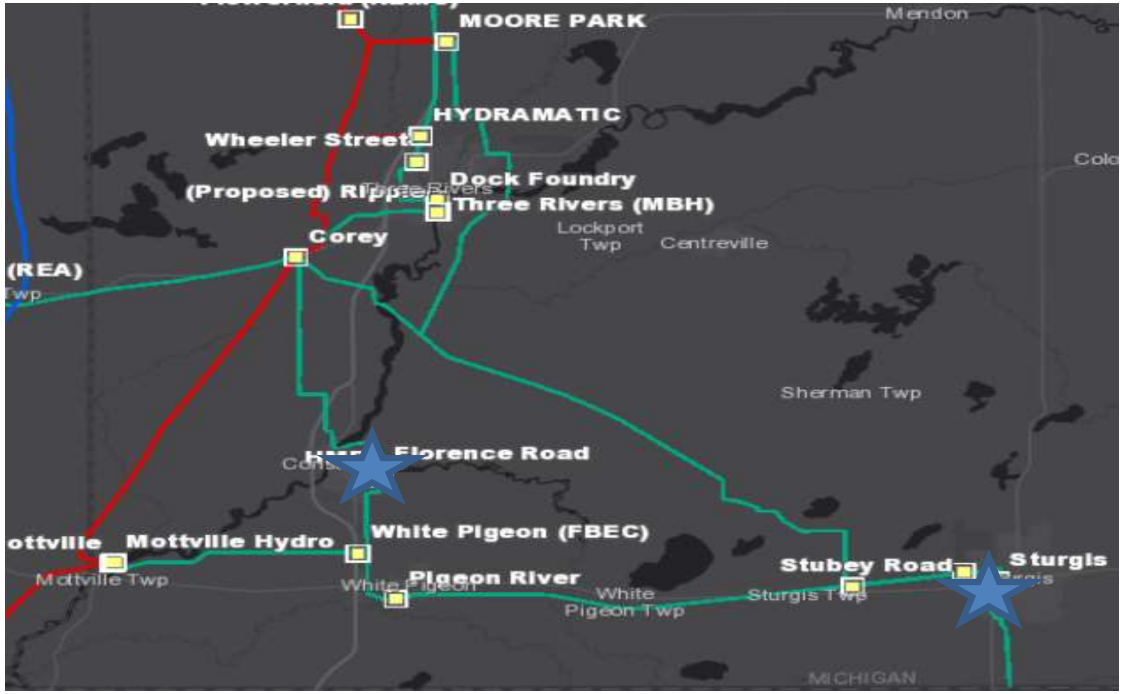
Moore Park Tap 69 kV –
- 1960s vintage wood structures
  - 20 poles identified with structural integrity concerns
  - Part of a three terminal line (~9 miles)

Sturgis – Howe (NIPSCO tie) –
- Vintage 1950s wood cross arm construction with suspended insulators (~3 mi)
- low capability 4/0 ACSR



Need Number: AEP-2018-IM019
Process Stage: Solution Meeting 8/16/2021
Previously Presented: Needs Meeting 1/11/19
Supplemental Project Driver: Operational
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)
Problem Statement:
HMD Station –
- Permanently jumpered disconnects on main bus

Sturgis – Howe (NIPSCO tie)
- Outage constrained – difficult to outage due to local dependence



AEP Transmission Zone: Supplemental
Sturgis Area Improvements

Need Number: AEP-2020-IM007
Process Stage: Solution Meeting 8/16/2021

Previously Presented: Needs Meeting 02/21/2020

Supplemental Project Driver: Equipment Condition/Performance/Risk

Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Model: N/A

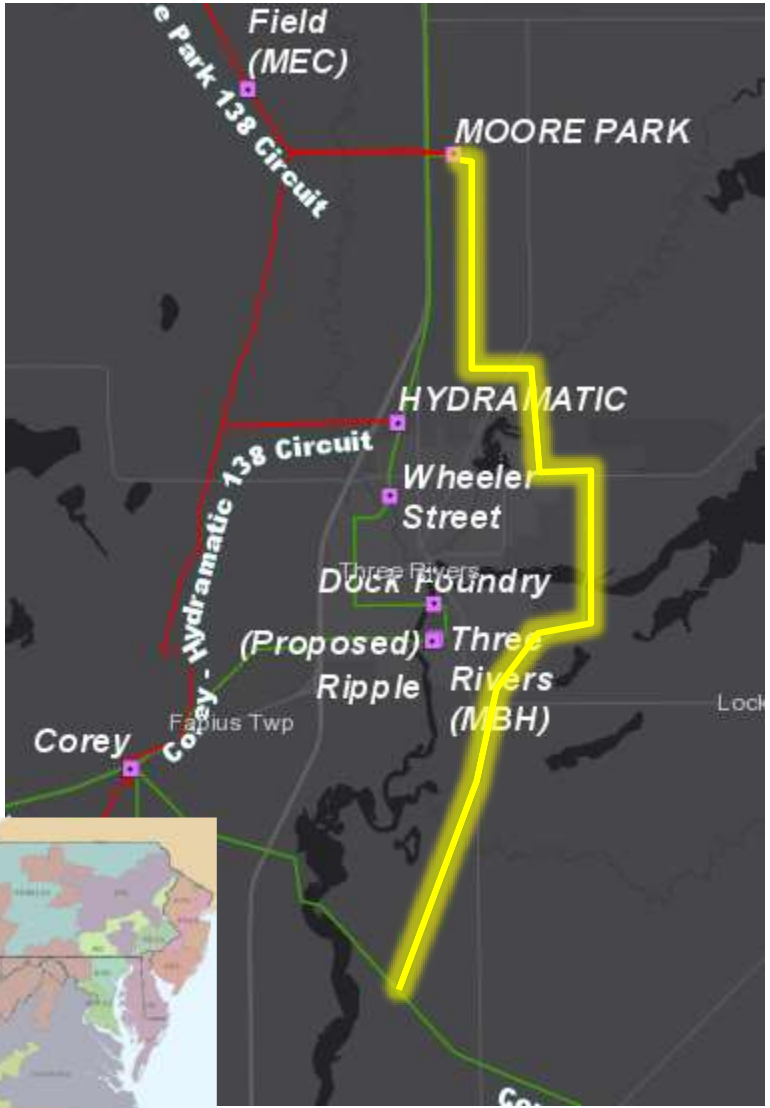
Problem Statement:

Moorepark 69kV Tap line:

- 9.02 miles of 1967 wood pole structure with horizontal insulators
- 94 structures with at least one open condition (52% of the line)
    - Open conditions include pole damage such as cracked, insect damage, rot heart and woodpecker holes, shielding/grounding conditions related to broken, missing or stolen ground wires, and broken or burnt insulators
- Since 2014 8 momentary and 1 permanent outages
    - 7 due to weather (lightning/thunderstorm) demonstrating poor shielding
- This line is a three terminal line which is hard to coordinate from a relaying perspective and is prone to misoperations

Moorepark (138/69kV) Station:

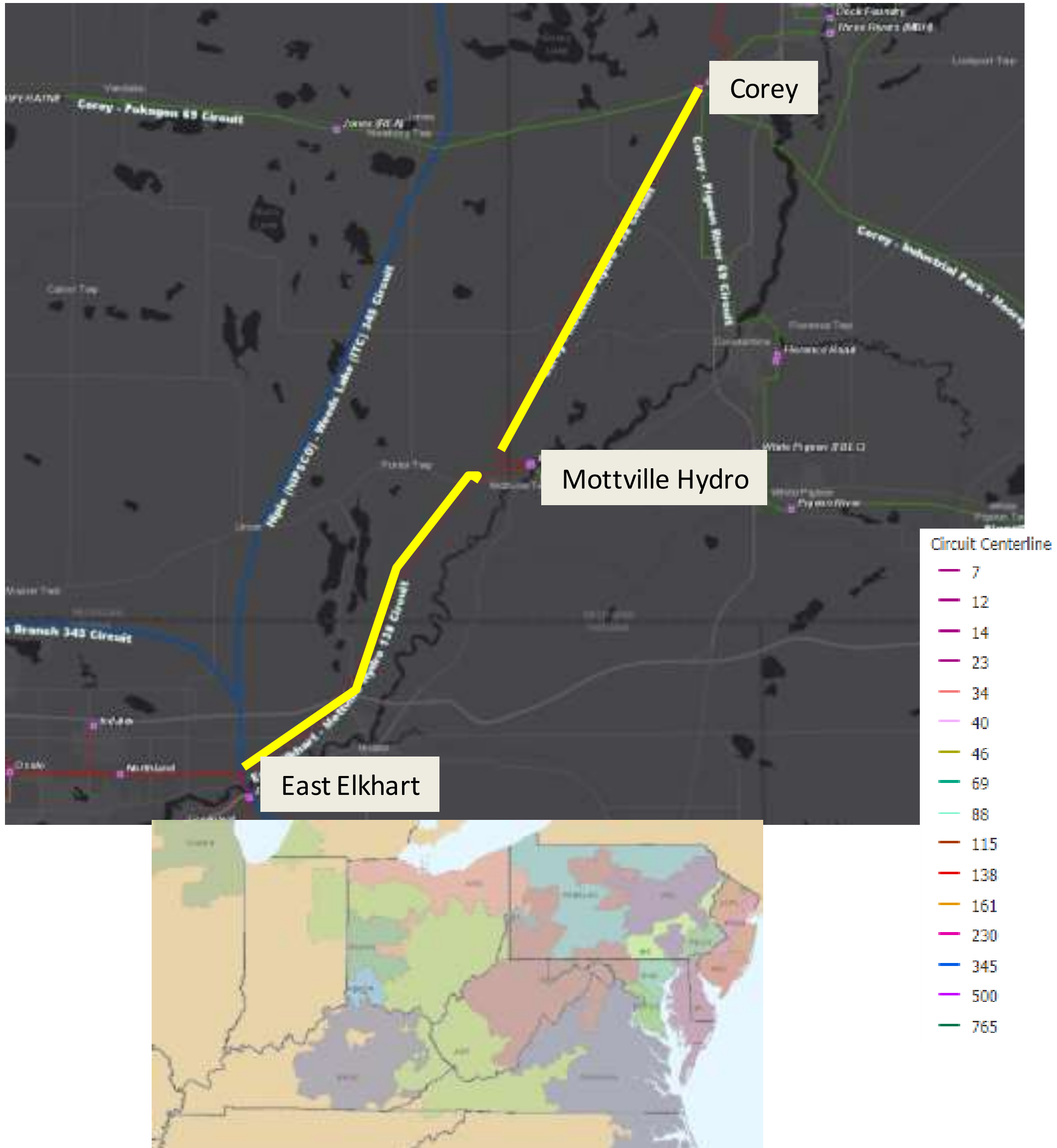
- 69kV circuit breaker (1) installed in 2006 with 41 documented malfunction records due to low SF6. This breaker has exceeded the designed number of fault operations.
- (1) 2030-69 Cap Switcher with no gas monitor. The AEP system has experienced numerous malfunctions of this type of cap switcher due to gas loss, interrupter failures, operating mechanism failures and trip or reclose failures.



Need Number: AEP-2020-IM021
Process Stage: Solution Meeting 8/16/2021
Previously Presented: Needs Meeting 09/11/2020
Supplemental Project Driver: Equipment Condition/Performance/Risk
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)
Problem Statement:

East Elkhart- Mottville Hydro- Corey 138kV

- 16.3 miles consisting of 1960's wood pole H frame structures with vertical insulators
  - 88% of structures are original
  - 100% of conductor is original
- Since 2014 there have been
  - 3 momentary outages on Corey-Mottville Hydro 138kV
  - 2 momentary outages on East Elkhart-Mottville Hydro 138kV
- The line contains 36 open conditions including burnt or broken insulators and broken or missing ground lead wire
  - Leads to poor lightning performance (3 outages caused by lightening)
  - Shielding angle does not meet current AEP shielding requirements
  - The grounding utilizes butt wraps which are not current AEP standards
- Field assessment found 45% of the structures assessed with at least one condition. Conditions included cracked and split cross arms, upper pole and knee brace decay, woodpecker damage and flashed insulators
- Insulators don't meet CIFO and minimum leakage requirements



Need Number: AEP-2018-IM019 & AEP-2020-IM007 & AEP-2020-IM021

Process Stage: Solution Meeting 8/16/2021

Proposed Solution:

East Elkhart – Mottville Hydro 138kV: Rebuild the ~10 miles of 1950's wood on the East Elkhart – Mottville Hydro 138kV line using 795 Drake ACSR. **Estimated Cost: $31M**

Mottville Hydro – Corey 138kV: Retire the ~9 mile 138kV line. **Estimated Cost: $4.25M**

Moore Park 69kV Tap: Retire the ~9 mile 69kV line. **Estimated Cost: $2.8M**

Moore Park 69kV SW: Retire the 69kV POP Sw. **Estimated Cost: $0.2M**

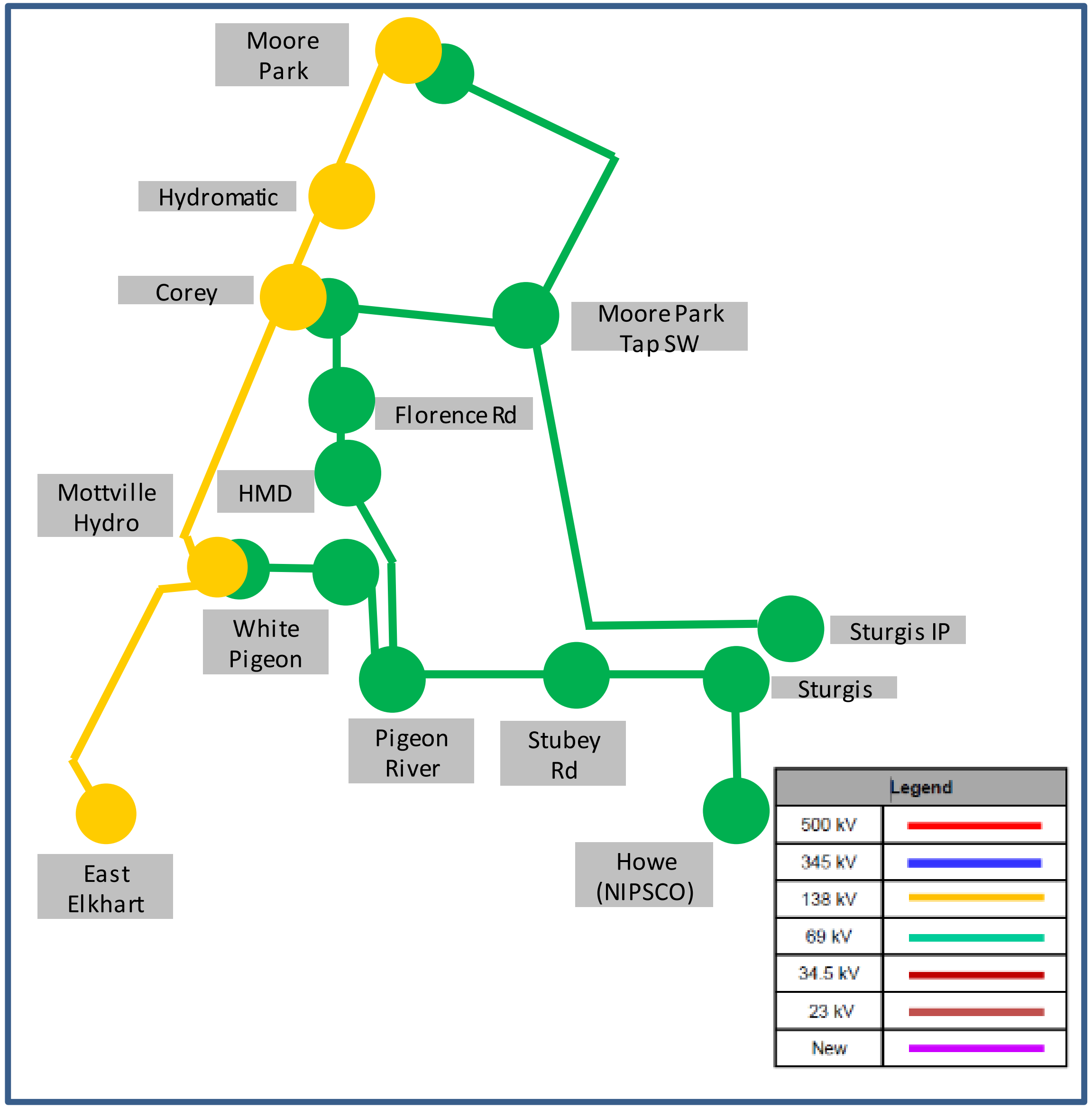
Moore Park 69kV Station: Install a 90MVA 138/69kV XFR with a high side switcher and low side CB. 69kV CB "C" will be replaced with the 69kV CB "B". Replace 69kV cap switcher "BB" **Estimated Cost: $4.6M**

Sturgis 69kV Station: Retire Sturgis 69kV station. **Estimated Cost: $.9M**

Stubey Rd 138/69kV Station: Expand station to include (6) 69kV CB's in a ring , (4) 138kV CB's in a ring, (2) 138/69kV 130MVA XFR's and (2) 17.6Mvar 69kV Cap Banks. Reterminate the Sturgis IP line into Stubey Road. Reterminate the Corey line into Stubey Road to energize the line at 138 kV. **Estimated Cost: $18.9M**

Howe (Nipsco) – Sturgis 69kV: Retire the ~2.9 mile 69kV line. **Estimated Cost: $1.9M**

Mottville Hydro – Stubey Rd 138kV: Re-energize the existing line from Mottville – Pigeon River to 138kV and construct a new ~8.9 mile 138kV line between Pigeon River and Stubey Road to re-establish the 138 kV through path to Corey station. **Estimated Cost: $23.7M**



AEP Transmission Zone: Supplemental Sturgis Area Improvements

Need Number: AEP-2018-IM019 & AEP-2020-IM007 & AEP-2020-IM021

Process Stage: Solution Meeting 8/16/2021

Proposed Solution (Cont):

Pigeon River 69kV Station: Remove 69kV CB “K” from Pigeon River to re-use at Stubey Rd. **Estimated Cost: $0.4M**

Mottville Hydro 138/69kV Station: Remove 69kV CB “D” from Mottville Hydro to re-use at Stubey Rd. **Estimated Cost: $0.4M**

Corey 138/69kV Station: Remove 69kV CB “C” from Corey to re-use at Stubey Rd. **Estimated Cost: $0.4M**

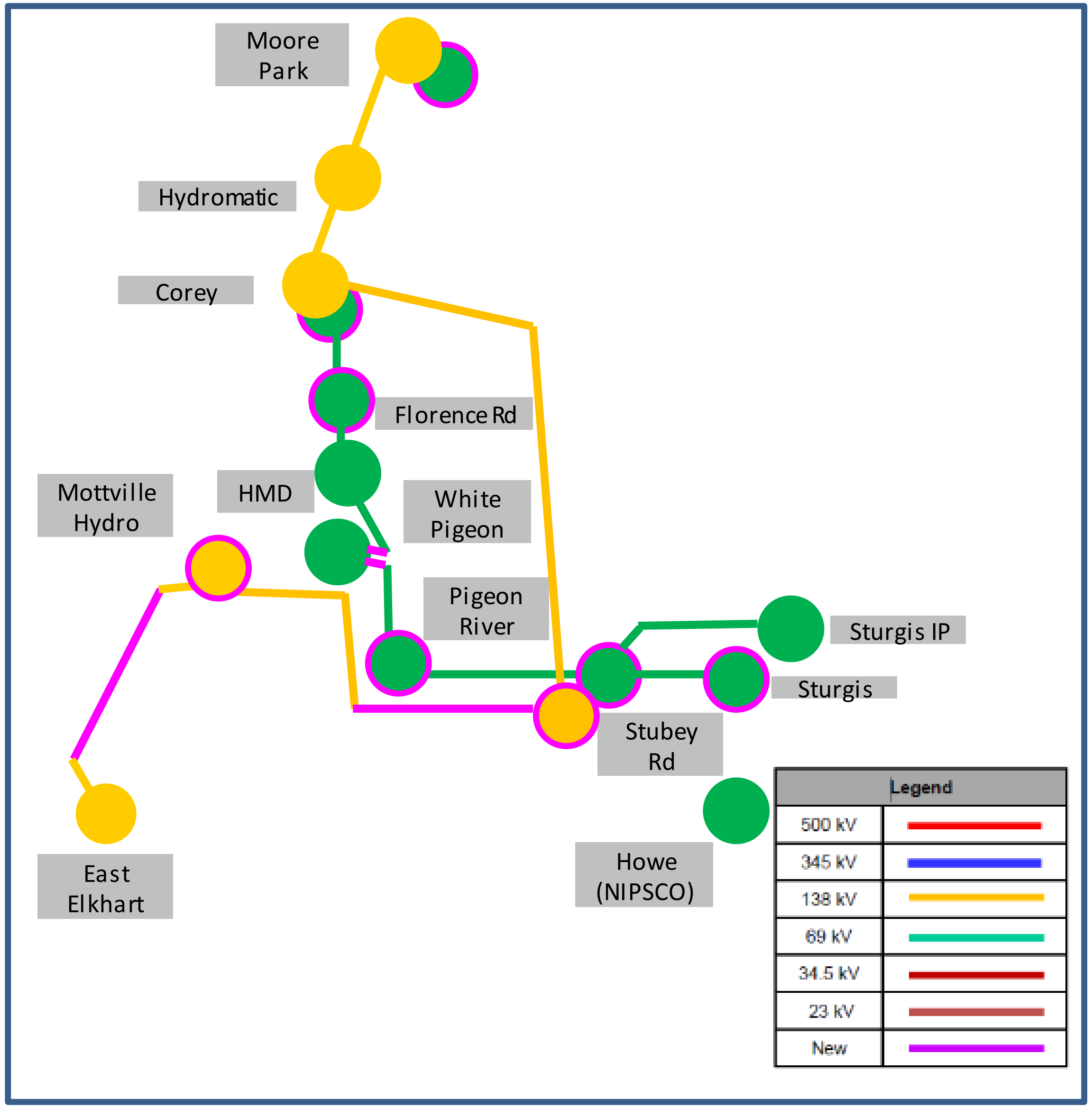
White Pigeon 69kV Ext: Build new 69kV .2 mile extension from Corey – Pigeon River to the existing White Pigeon Station. **Estimated Cost: $1.7M**

Florence Rd 69kV Station: Replace the line switches at Florence Rd. **Estimated Cost: $0M (Distribution Cost)**

Total Estimated Transmission Cost: $91.15M

Ancillary Benefits:

Moves the 138 kV source into the long 69 kV network and utilizes the lines already built to 138 kV to their capability and allows for the retirement of 9 miles of 138 kV line and 9 miles of 69 kV line. Under various outages on the AEP system, the tie to NIPSCO is opened to prevent overloading on the NIPSCO system. From the 7/1/2020-7/1/2021 time period, this line was open on 119 separate days. Because of this NIPSCO operational procedure, under N-1-1 this area drops 71MW of load. By introducing the 138 kV source at Stubey Road, the proposed solution allows for the retirement of 18 total miles of line that would otherwise need to be rebuilt and eliminates the three terminal line out of Moore Park.



Need Number: AEP-2018-IM019 & AEP-2020-IM007 & AEP-2020-IM021

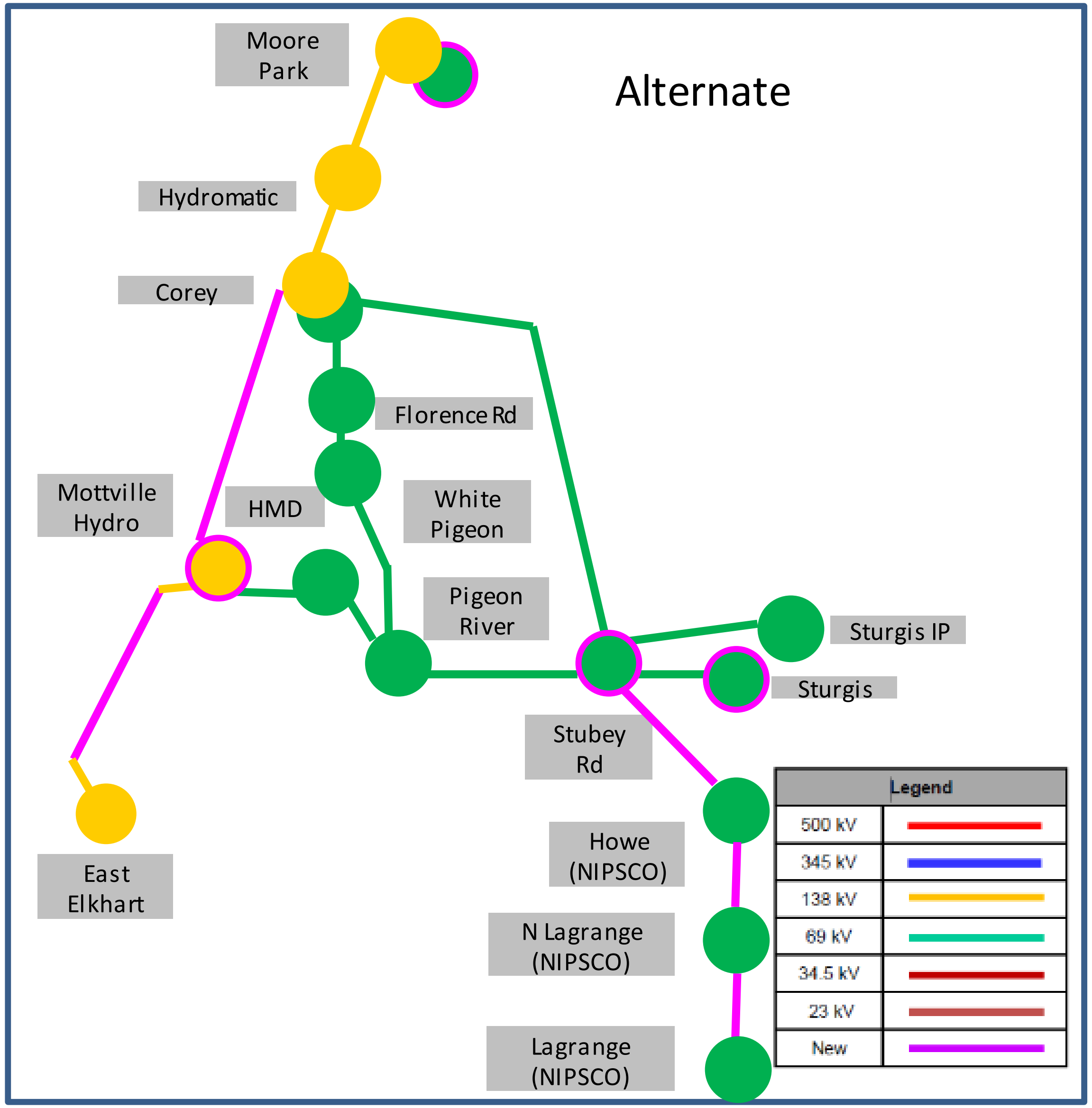
Process Stage: Solution Meeting 8/16/2021

Alternatives Considered:

In addition to the AEP supplemental improvements, improve the NIPSCO system to eliminate issues under various outage scenarios. This would include retirement of the Moore Park tap, station work at Moore Park, the East Elkhart – Corey 138kV rebuild, a smaller expansion of Stubey Rd 69kV and a rebuild/reroute of AEP's portion of the Howe – Sturgis 69kV line. In addition to this, Nipso would have to rebuild their ~3 miles of the Howe – Sturgis line and increase the rating on their ~3.5 mile Howe – North Lagrange line and their ~2 mile North Lagrange – Lagrange 69kV line. Due to the increased cost for the overall solution, this option was not chosen.
Estimated AEP Cost: $90.3M
Estimated NIPSCo Cost: $21.3M
Total Estimated Cost: $111.6M

Projected In-Service: 3/25/2025

Project Status: Scoping



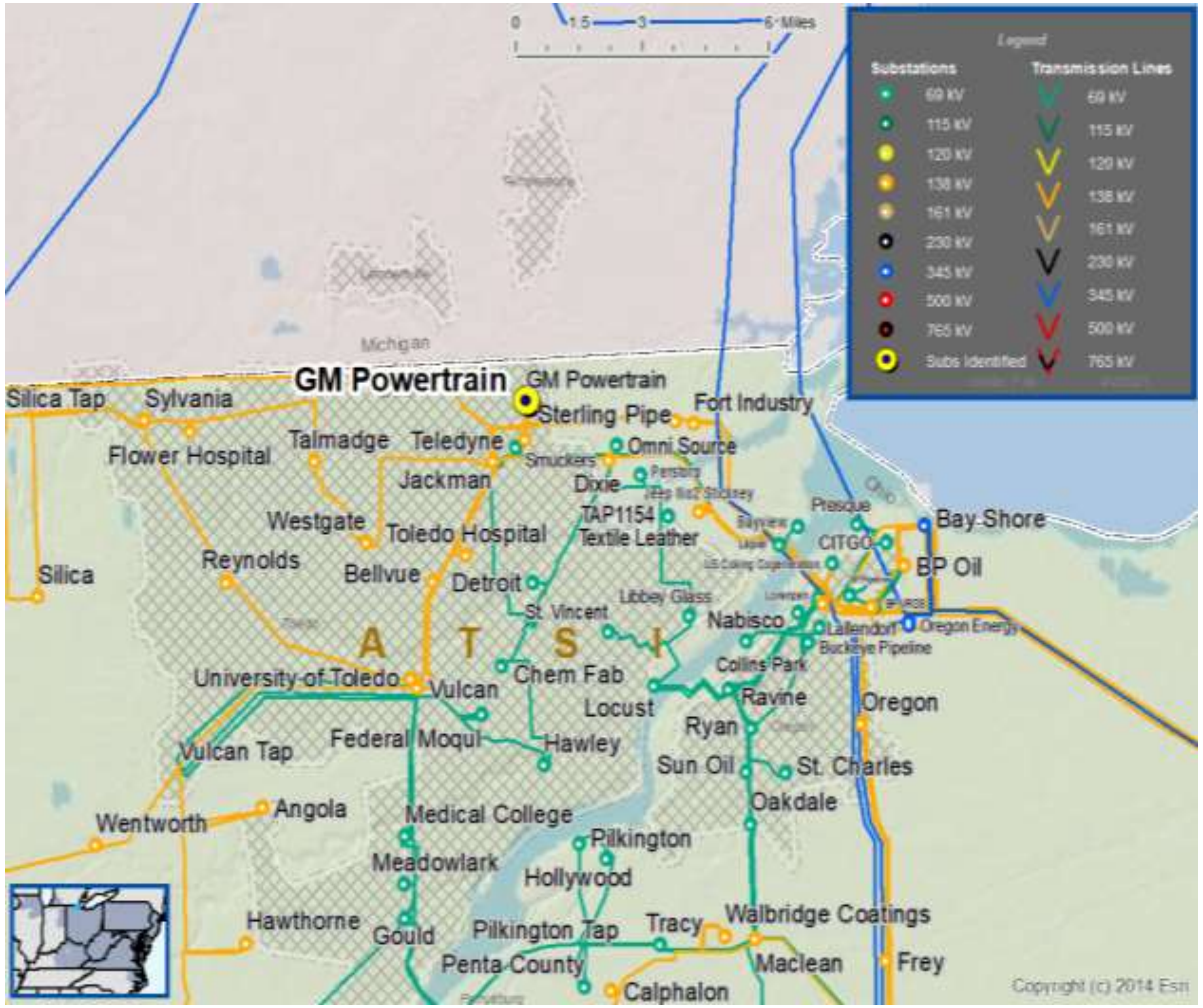
GM Powertrain – Jackman 138 kV Line

Need Number: ATSI-2021-008
Process Stage: Solution Meeting – 08/16/2021
Previously Presented: Need Meeting – 04/16/2021

Supplemental Project Driver(s):
Equipment Material Condition, Performance, and Risk
Infrastructure Resilience

Specific Assumption Reference(s):
Global Factors
- Increasing negative trend in maintenance findings and/or costs
- Failure risk, to the extent caused by asset design characteristics, or historical industry/ company performance data, or application design error
- Expected service life (at or beyond) or obsolescence

Substation Condition Rebuild/Replacement
- Circuit breakers and other fault interrupting devices
- Switches



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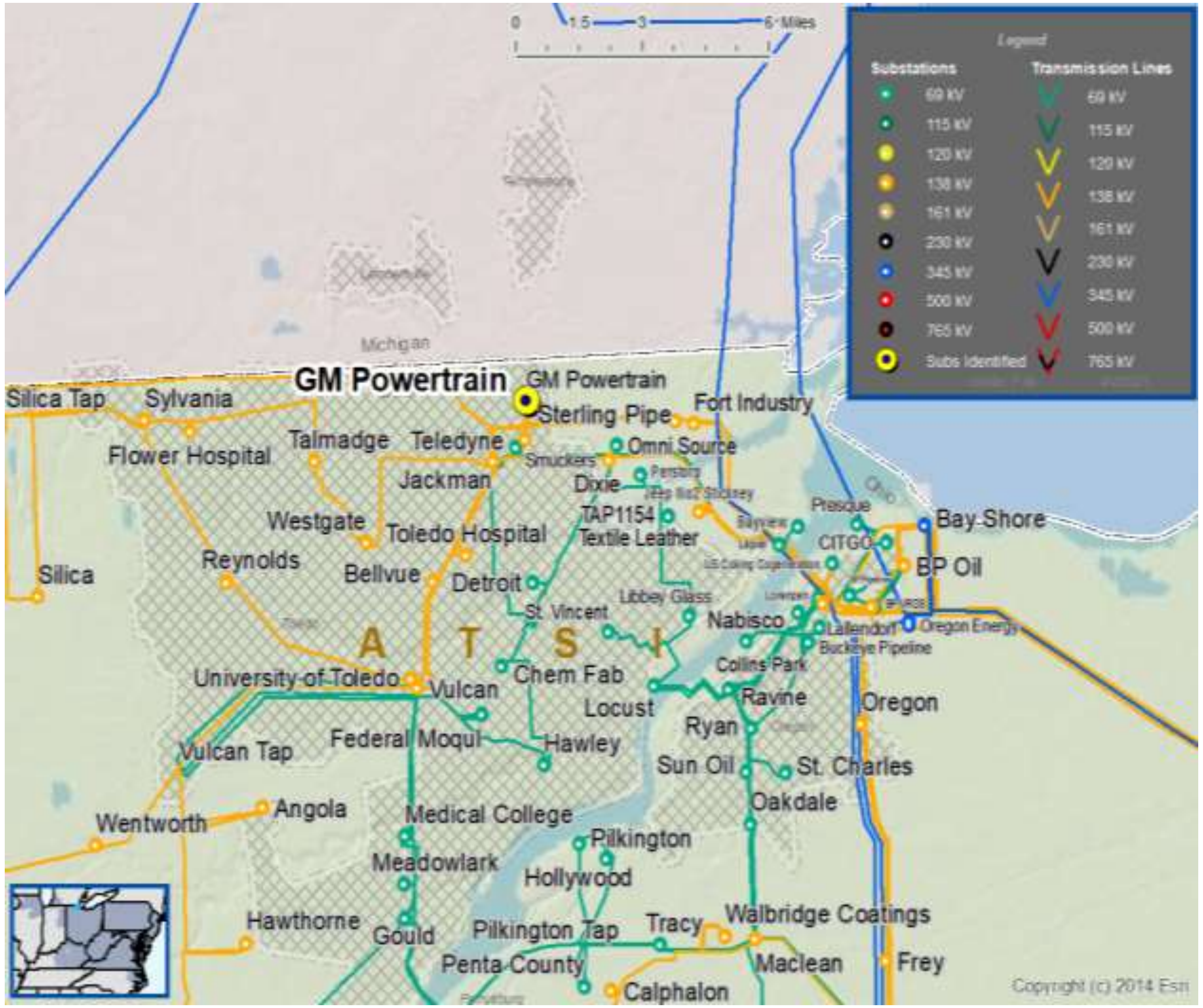
Need Number: ATSI-2021-008

Process Stage: Solution Meeting – 08/16/2021

Previously Presented: Need Meeting – 04/16/2021

Problem Statement

- Breakers B-13295, B-13296, B-13297, and associated disconnect switches at GM Powertrain Substation
  - Increasing maintenance concerns; hydraulic fluid issues, deteriorated operating mechanisms and increasing maintenance trends.
  - Breaker B-13295 is 52 years old, Breaker B-13296 is 52 years old, Breaker B-13297 is 48 years old
  - Associated terminal equipment line arrestors and substation conductor
- Breaker B-13329 and associated disconnect switches at Jackman Substation
  - Increasing maintenance concerns; hydraulic pump issues, valve issues, deteriorated operating mechanisms and increasing maintenance trends
  - Breaker B-13329 is 48 years old



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Need Number: ATSI-2021-008
Process Stage: Solution Meeting – 08/16/2021
Previously Presented: Need Meeting – 04/16/2021

Proposed Solution:

- Replace breakers B-13295, B-13296, B-13297 and associated disconnects at GM Powertrain Substation.
- Replace breaker B-13329 and associated disconnects at Jackman Substation.
- Replace limiting substation conductors to exceed associated line ratings.

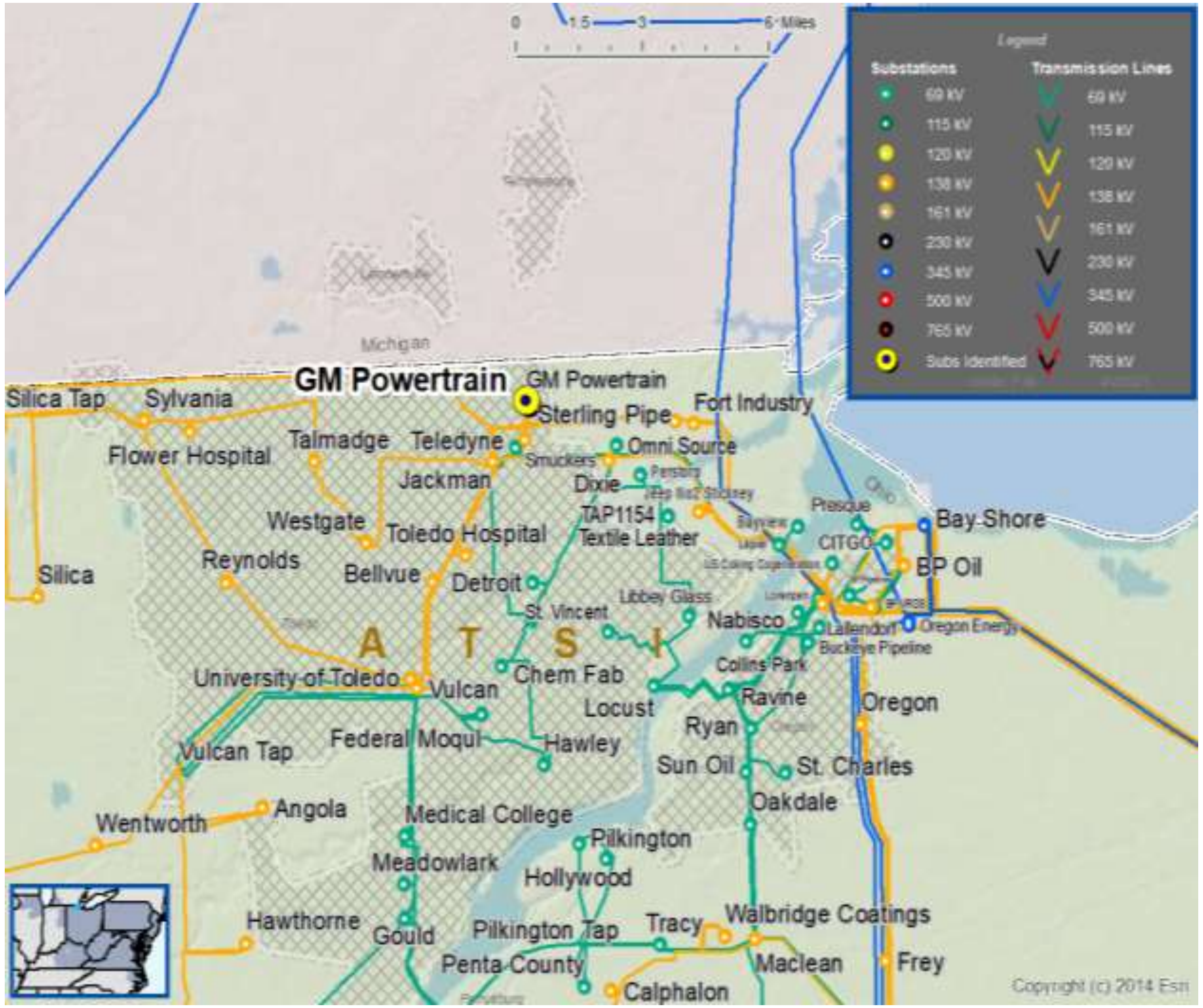
Transmission Line Ratings:

- GM Powertrain – Smuckers 138 kV Line
  - Before Proposed Solution: 327 MVA WN / 396 MVA WE
  - After Proposed Solution: 327 MVA WN / 420 MVA WE
- Bayshore - GM Powertrain 138 kV Line
  - Before Proposed Solution: 327 MVA WN / 396 MVA WE
  - After Proposed Solution: 327 MVA WN / 420 MVA WE

Alternatives Considered:

No alternatives considered for this project

Estimated Project Cost: $1.5M
Projected In-Service: 05/02/2022
Project Status: Engineering
Model: 2020 Series 2025 Summer RTEP 50/50



![FirstEnergy]

Delta – Wauseon 138 kV Line - New Customer

Need Number: ATSI-2021-019

Process Stage: Solution Meeting – 08/16/2021

Previously Presented: Need Meeting – 07/16/2021

Supplemental Project Driver(s):

Customer Service

Specific Assumption Reference(s)

Customer connection request evaluated per FirstEnergy's "Requirements for Transmission Connected Facilities" document and "Transmission Planning Criteria" document.

Problem Statement

New Customer Connection – A customer requested 138 kV transmission service for approximately 20 MVA of total load near the Delta – Wauseon 138 kV Line.

Requested In-Service Dates: 10 MVA by November 1, 2021

10 MVA increase by November 1, 2026

Continued on next page…

FirstEnergy

ATSI Transmission Zone M-3 Process
Delta – Wauseon 138 kV Line - New Customer

Need Number: ATSI-2021-019
Process Stage: Solution Meeting – 08/16/2021
Previously Presented: Need Meeting – 07/16/2021

Proposed Solution:

New 138 kV Customer

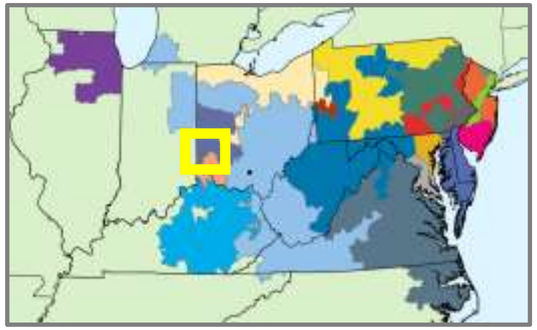
- Construct a 138 kV tap off the Delta – Wauseon 138 kV Line to the customer substation. The customer substation tap location is approximately a 0.9 mile extension from the existing structures to the new customer substation.
- Add MOAB and SCADA to two new switches on the Delta – Wauseon 138 kV Line.

Alternatives Considered:

- No alternatives considered for this project

Estimated Project Cost: $2.0M
Projected In-Service: 06/01/2022
Status: Engineering
Model: 2020 Series 2025 Summer RTEP 50/50

Dayton Transmission Zone M-3 Process
Preble & Montgomery County, Ohio



Need Number: Dayton-2020-011, Dayton-2021-001, Dayton-2021-008
Process Stage: Solutions Meeting 8/16/2021
Previously Presented: Need Meetings 12/18/2020, 2/17/2021, 5/21/2021

Supplemental Project Driver(s):
Requested Customer Upgrade, Operational Performance

Specific Assumption Reference(s):
DP&L 2020 RTEP Assumptions, Slide 5

Dayton-2020-011 Problem Statement:

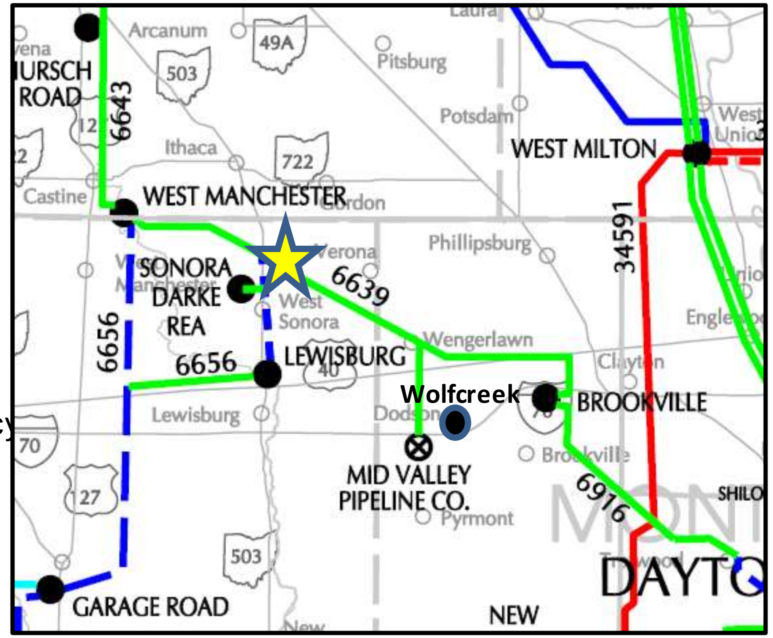
- Buckeye Power, on behalf of Darke Rural Electric Cooperative, has requested reliability upgrades on the West Manchester–Brookville 69kV 6639 and the West Manchester–Garage Road 69kV 6656 lines located in Preble and Montgomery Counties.

Area Transmission Configuration:

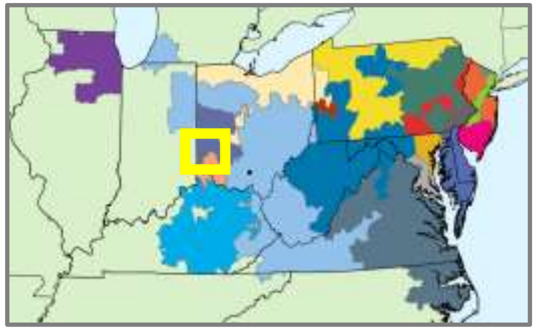
- The 6639 line is a 20-mile 69kV wood pole line serving three Dayton substations (Brookville, Lewisburg, West Manchester), one Darke REA Delivery Point at West Sonora, and one 69kV industrial customer.
    - Lewisburg & West Senora Stations are both served via a 3.2-mile tap from the 6639 line.
    - The 6656 line is a 16-mile 69kV wood pole line built to 138kV standards connecting Dayton substations at Garage Road and West Manchester .
    - Lewisburg & West Senora utilize a 4.61-mile 69kV tap from the 6656 line as a normally open tie for emergency situations. Due to protection limitations, this normally open tie cannot be closed in during normal operations.

Historical Performance

- West Manchester – Brookville 69kV 6639
    - Constructed primarily in 1953
    - Wood pole, crossarm design, 477 ACSR 18/1 conductor
    - 10 permanent outages over last five years
        - The primary causes are equipment failures with broken crossarms being the leading outage cause.
    - 18 momentary outages over last five years
        - The primary causes are lightning, static wire issues, and wind related events.



AES Ohio DP&L



Need Number: Dayton-2020-011, Dayton-2021-001, Dayton-2021-008
Process Stage: Solutions Meeting 8/16/2021
Previously Presented: Need Meetings 12/18/2020, 2/17/2021, 5/21/2021

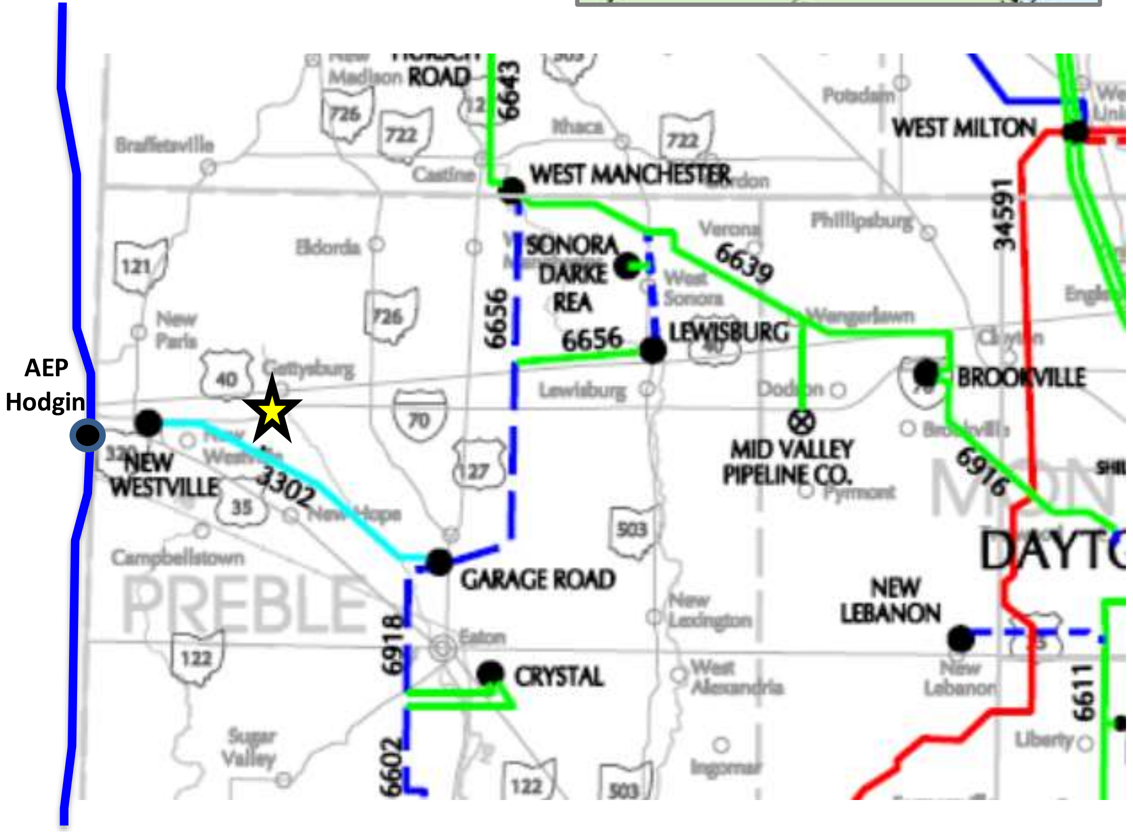
Supplemental Project Driver(s):
Requested Customer Upgrade, System Configuration Improvements, Operational Performance

Specific Assumption Reference(s):
DP&L 2021 RTEP Assumptions, Slide 5

Dayton-2021-001 Problem Statement:

- DP&L Distribution has requested a new 69kV or 138kV delivery point to replace the existing New Westville 33kV Substation due to poor performance and lack of standard equipment which could lead to prolonged system outages.
    - Presently, New Westville Substation is radially fed via a 9.6-mile 33kV line that was constructed in the 1930's.
    - New Westville Substation has three single phase 33/4kV transformers that provide service to 1,428 customers. There are limited transformer spares of this vintage and size so both a near term and long-term solution may be required.
    - In the last five years, the 3302 line has experienced 12 permanent outages and 18 momentary outages.
        - Permanent Outages: six insulator failures, five pole failures, and one crossarm
        - Momentary Outages: one animal, five auto accidents, three insulator flashovers, seven lightning, one high side transformer fuse, one unknown.
        - Due to the remote location of the substation, there are little to no distribution circuit ties to transfer or pick-up loads if there are extended outages.

- In addition, Buckeye Power, on behalf of Darke Electrical Cooperative has indicated they are considering a new transmission delivery located east of New Westville and west of the Garage Rd – West Manchester 6656 circuit.
- Solution development will need to take into consideration recently reviewed need: DPL-2020-011 presented on 12/18/2020.



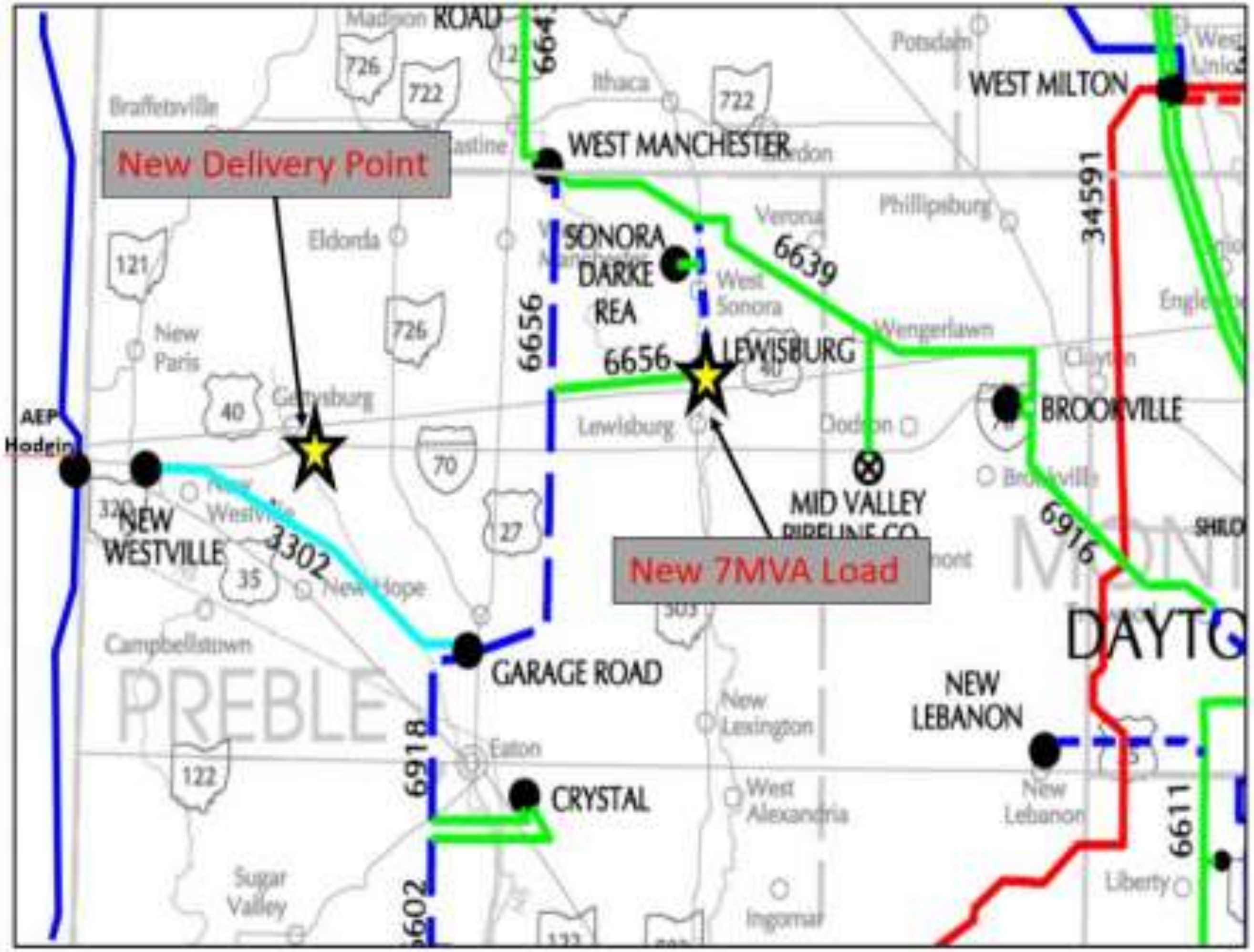
Need Number: Dayton-2020-011, Dayton-2021-001, Dayton-2021-008
Process Stage: Solutions Meeting
Date: 6/17/2020

Supplemental Project Driver(s):
Requested Customer Upgrade

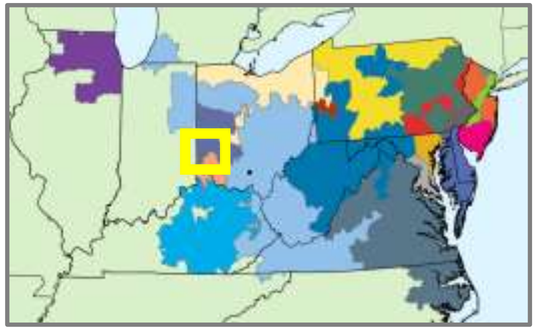
Specific Assumption Reference(s):
DP&L 2021 RTEP Assumptions, Slide 5

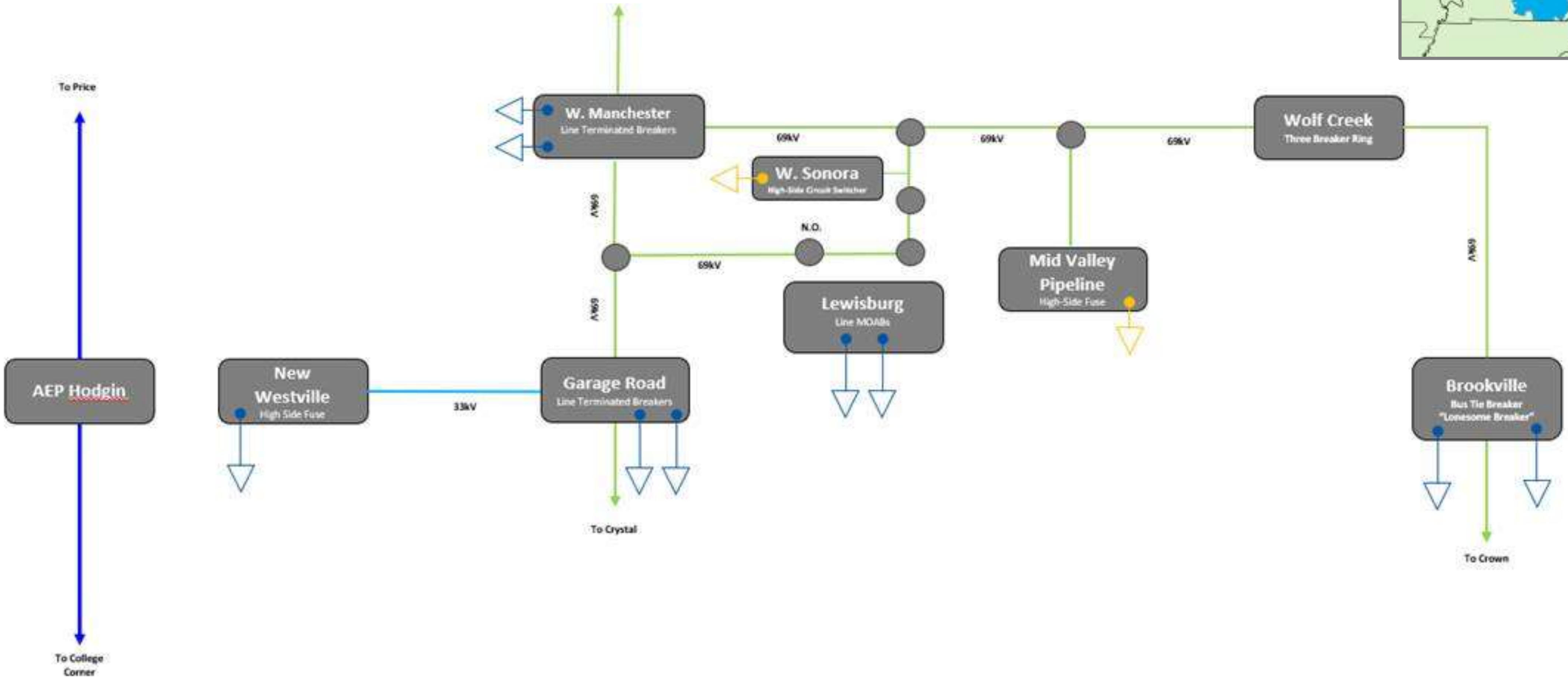
Dayton-2021-008 Problem Statement:

- Ohio Electric Cooperatives on behalf of Darke Rural Electric has requested a new 138kV delivery point located north of the Rockford 69kV substation.
    - New delivery point is expected to serve 1.86 MVA of load with a ten-year projected load exceeding 1.92 MVA.
    - New POI will be referred to as Orphan Rd
- AES Ohio distribution has received a request to serve a new 7MVA load in the vicinity of the AES Ohio Lewisburg substation.
- The following needs previously presented will be taken into consideration during the development of solutions to meeting the submitted request:
    - DP-2020-011: Need presented on 12/18/2020
        - 20201218-dayton-supplemental-projects.ashx (pjm.com)
    - DP-2021-001L Need presented on 2/17/2021
        - 20210217-dayton-supplemental-projects.ashx (pjm.com)



Dayton Transmission Zone M-3 Process
Preble County, Ohio





Need Number: Dayton-2020-011, Dayton-2021-001, Dayton-2021-008
Process Stage: Solutions Meeting 8/16/2021
Previously Presented: Need Meetings 12/18/2020, 2/17/2021, 5/21/2021

Proposed Solution:

Part #1: Project Description:

- **New Westville Substation Replacement:**
  - Establish a new 138kV three breaker ring bus substation that will tie into AEP's Hodgin, connect back to AES Ohio's West Manchester Substation, and serve AES Ohio distribution in the New Westville area. Once the new substation is online, the existing New Westville 33kV Substation will be retired. This will help improve reliability to customers served via New Westville and eliminate vintage 33kV system. The new substation will upgrade the obsolete and non-standard equipment at New Westville
  - **Estimated Cost: $6.0M, In-service Date: 12/31/2025**

- **New Westville – AEP Hodgin 138kV Line:**
  - Construct a 138kV 1.86-mile single circuit transmission line. This transmission line will help loop the radial load served at New Westville as part of the overall effort to improve reliability in this area. Also, it provides a source to feed New Westville load while the 138kV tie built back into the AES Ohio system.
  - **Estimated Cost: $3.7M , In-service Date: 12/31/2025**

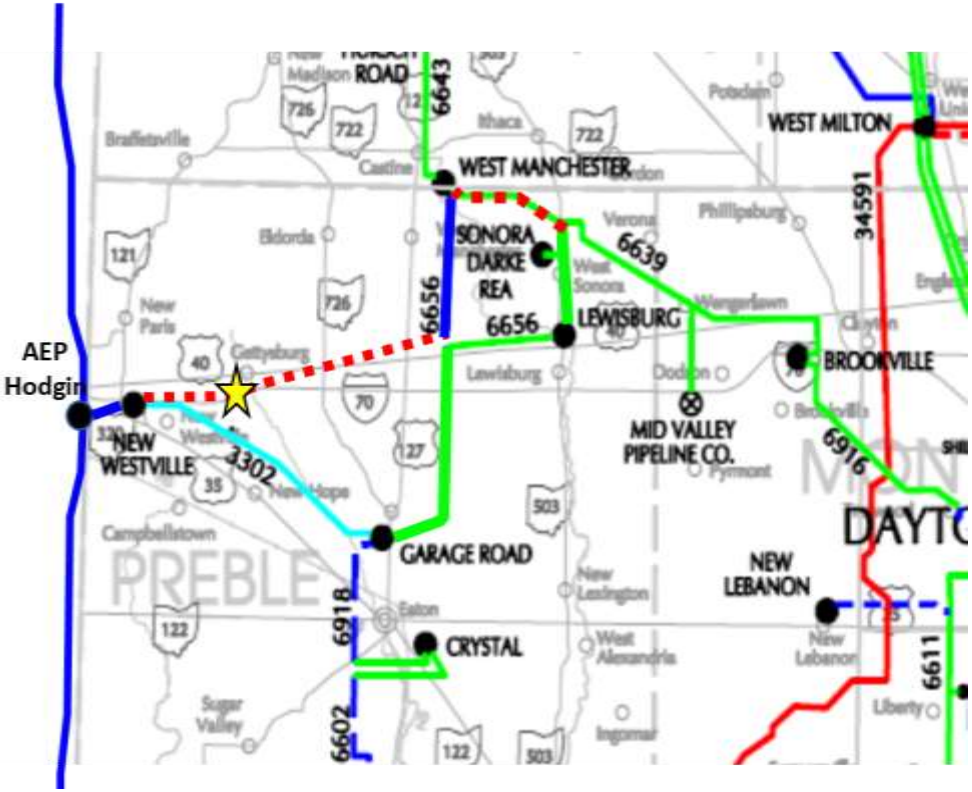
- **New Westville – West Manchester 138kV Line:**
  - Construct a new approximate 11-mile single circuit 138kV line from New Westville to the Lewisburg tap off 6656. Convert a portion of 6656 West Manchester – Garage Rd 69kV line between West Manchester - Lewisburg to 138kV operation (circuit is built to 138kV). This will utilize part of the line already built to 138kV and will take place of the 3302 that currently feeds New Westville. The 3302 line will be retired as part of this project.
  - **Estimated Cost: $16.0M, In-service Date: 12/31/2026**

- **West Manchester Substation:**
  - The West Manchester Substation will be expanded to a double bus double breaker design where AES Ohio will install one 138kV circuit breaker, a 138/69kV transformer, and eight new 69kV circuit breakers. These improvements will improve help improve a non-standard bus arrangement where there is only one bus tie today and will improve the switching arrangement for the West Sonora Delivery Point.
  - **Estimated Cost: $9.9M , In-service Date: 12/31/2026**

- **New Orphan Rd POI (Darke REA):**
  - Install a new three-way phase over phase MOAB to serve a new 138kV delivery point for the Darke REA Electric Co-operative.
  - **Estimated Cost: $0.5M , In-service Date: 12/31/2026**

Total Part 1 Cost: $36.1M

Alternative Part 1: Construct a double circuit from New Westville to Orphans road and install a additional 138kV breaker at New Westville. Cost delta is $3.55M more than proposed MOAB configuration for Ophans Rd. **Total Cost: $39.95M**



Dayton Transmission Zone M-3 Process
Preble & Montgomery County, Ohio

Need Number: Dayton-2020-011, Dayton-2021-001, Dayton-2021-008
Process Stage: Solutions Meeting 8/16/2021
Previously Presented: Need Meetings 12/18/2020, 2/17/2021, 5/21/2021

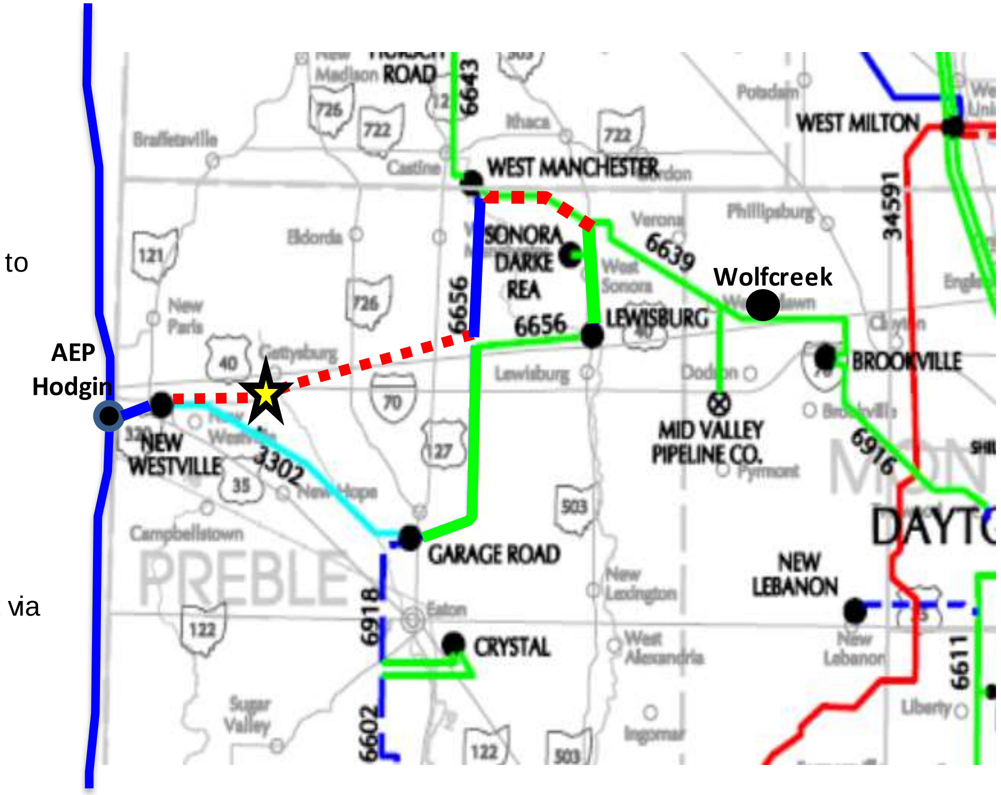
Proposed Solution:

Part #2: Project Description:

- **West Manchester – West Senora Tap Double Circuit Rebuild**
  - Retire the existing single circuit section of the 6639 line tap to Sonora up to West Manchester and rebuild as a 4-mile double circuit 69kV line. One circuit will connect West Manchester to Lewisburg and the other circuit will connect back to West Manchester to Wolfcreek.
  - **Estimated Cost: $8.0M, In-service Date: 12/1/2026**
- **Lewisburg Substation**
  - The Lewisburg 69kV Substation will be converted to a new four breaker 69kV ring station and will serve the 7MVA additional customer load that is being added in Lewisburg. Also, this conversion will allow AES Ohio to close in the normally open feed at Lewisburg when complete.
  - **Estimated Cost: $4.5M, In-service Date: 12/1/2025**
- **West Sonora (Darke REA)**
  - Install a new three-way phase over phase MOAB to serve the Sonora Darke REA delivery point that is currently served via a one-way switch. Retire the existing switch.
  - **Estimated Cost: $0.5M, In-service Date: 12/1/2025**
- **Mid-Valley Pipeline Tap**
  - Replace the existing two-way switch with a new three-way phase over phase MOAB switch. This will provide greater flexibility to switch during outages on the portion of the tap down to the customer.
  - **Estimated Cost: $0.5M, In-service Date: 12/1/2026**
- **Brookville Substation:**
  - Modify the bus arrangement at Brookville Substation to install two new 69kV line circuit breakers. This will improve reliability at Brookville Substation by removing tapped transformers from the transmission lines.
  - **Estimated Cost: $2.9M, In-service Date: 12/1/2026**

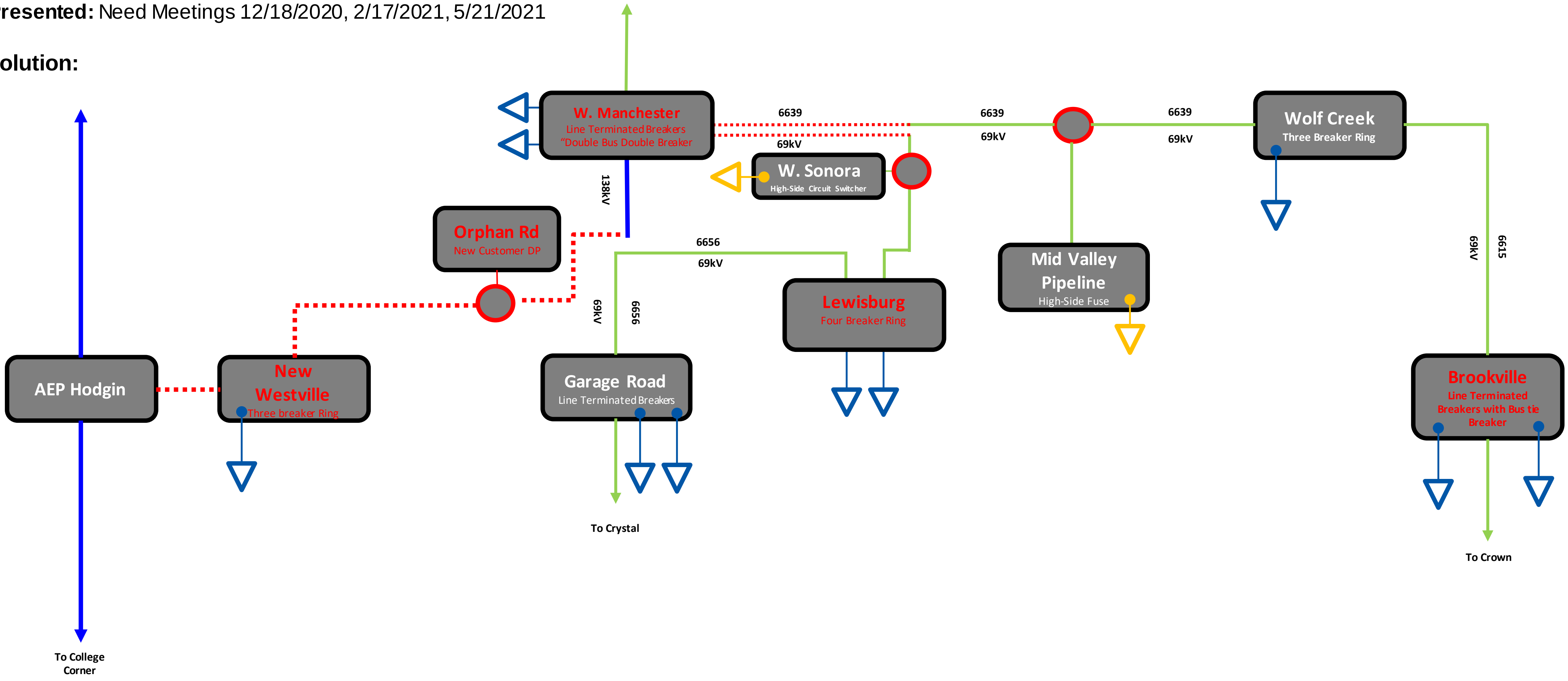
Total Part 2 Cost: $16.4M

Alternative Part 2: Rebuild from West Manchester - West Sonora Tap using single circuit configuration and install a new four position 69kV ring switching station expandable to a total of six positions in place of West Sonora Tap. **Total Cost: $12.7M.** It does not address the operational performance and condition identified in the needs statement.



Need Number: Dayton-2020-011, Dayton-2021-001, Dayton-2021-008
Process Stage: Solutions Meeting 8/16/2021
Previously Presented: Need Meetings 12/18/2020, 2/17/2021, 5/21/2021

Proposed Solution:



Need Number: AEP-2021-IM001

Process Stage: Solution Meeting 10/15/2021

Previously Presented: Needs Meeting 02/17/2021

Project Driver: Equipment Material Condition, Performance and Risk

Specific Assumption Reference:
AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13), AEP presentation on pre-1930s lines (link)

Problem Statement:
South Bend – New Carlisle 138kV line:

- 0.88 miles of double circuit 1930 steel lattice line
- Original 397 MCM ACSR and steel structures are still on the line
- There is one structure with open conditions (20% of line) relating to worn shield wire hardware
- Circuit 1 has had 3 momentary outages and 3 permanent outages since 2015.
- Circuit 2 had 1 permanent outage since 2015
- Circuit is a tie with NIPSCO

Need Number: AEP-2021-IM002

Process Stage: Solution Meeting 10/15/2021

Previously Presented: Needs Meeting 02/17/2021

Project Driver: Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

New Carlisle - Maple 138kV line:

- 0.86 miles of 1952 wood pole H frame line
- Utilizes original structures and 397 ACSR from 1952
- 5 structures have open conditions (63% of line) relating to pole rot, split or rot crossarms, broken ground lead wire, rusty guy wires, and cracked static bracket
- 2 momentary outages over the past 5 years
- Circuit is an interconnection with NIPSCO and MISO

AEP Transmission Zone M-3 Process
New Carlisle 138 kV line rebuilds

Need Number: AEP-2021-IM001 and AEP-2021-IM002

Process Stage: Solution Meeting 10/15/2021

Proposed Solution:

New Carlisle - Maple 138 kV: Rebuild ~0.95 miles of 138 kV single circuit line with 1590 ACSR 45/7 Lapwing to match the NIPSCO owned conductor size. **Estimated Cost: $1.5M**

New Carlisle - Bosserman 138 kV: Rebuild ~0.95 miles of 138 kV double circuit line with 1590 ACSR 45/7 Lapwing to match the NIPSCO owned conductor size and transition fiber installation for NIPSCO connectivity. **Estimated Cost: $ 1.89M**

New Carlisle – South Bend 138 kV: Remove ~0.86 mile of the existing 138 kV line. **Estimated Cost: $0.17M**

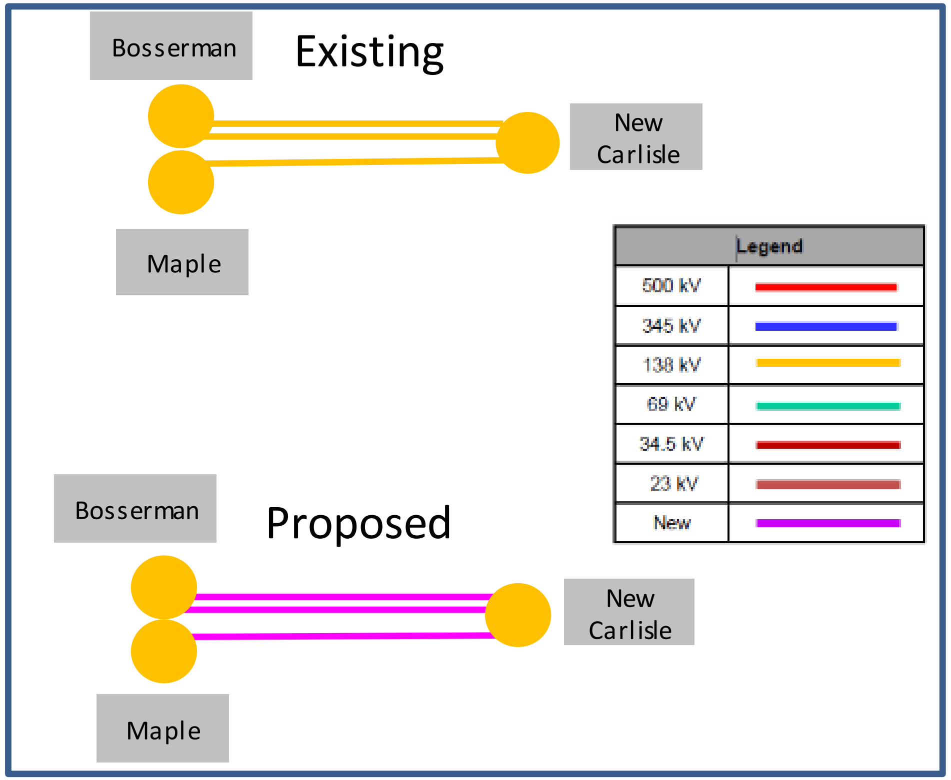
Bosserman 138 kV Station: Relay settings changes. **Estimated Cost: $0.08M**

New Carlisle 138 kV station: Remote end relaying upgrades and settings changes. **Estimated Cost: $0.82M**

Total Estimated Transmission Cost: $4.69 M

Alternative: No viable transmission alternatives. No option to retire the line as it serves as an important tie to the NIPSCO system and no other options to rebuild in a new route that would be cost effective.

Projected IS Date: 10/28/2024



AEP Transmission Zone: Supplemental
Lincoln Extension Retirement

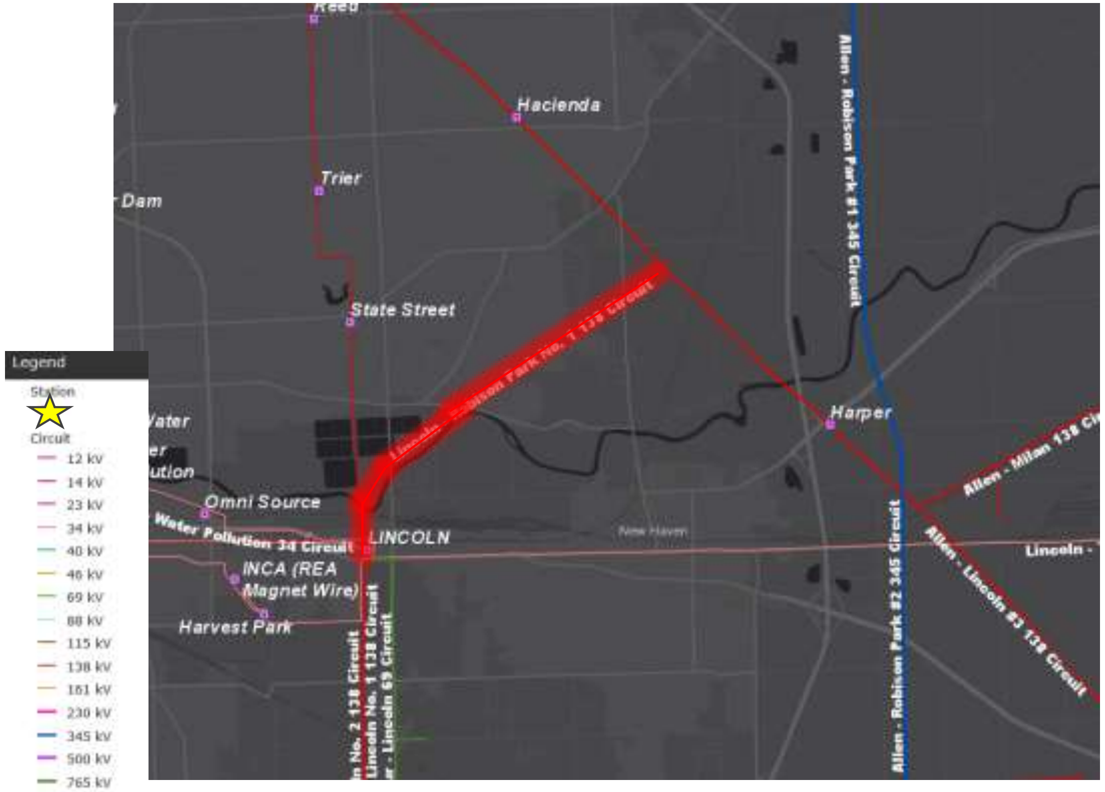
Need Number: AEP-2021-IM010
Process Stage: Solution Meeting 10/15/2021
Previously Presented: Needs Meeting 04/16/2021

Supplemental Project Driver: Equipment Material/Condition/Performance/Risk
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 8)

Problem Statement:

- **Lincoln Tap 138kV ~3.65 Miles**
  - Steel lattice double circuit 397 ACSR construction with all 20 structures original from 1947
  - 9 open hardware conditions on 7/20 structures
    - Insulator equipment and hooks with moderate wear
    - 50% of the towers had flashed insulator strings
    - Corrosion on insulator caps & pins

Model: N/A



Need Number: AEP-2021-IM011
Process Stage: Solution Meeting 10/15/2021
Previously Presented: Needs Meeting 02/17/2021

Supplemental Project Driver: Equipment Material/Condition/Performance/Risk
Specific Assumptions Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)

Problem Statement:

- **Lincoln 138/69/34.5kV**
- CB “B”, “C” and “I” are 1995, 1988 and 1987 vintage 145-PA type breakers
  - The 145-PA Type Breakers are experiencing marked increases in malfunctions. There have been 437 recorded malfunctions on 132 total units of this model type on the AEP System. The most common issues are related to loss of SF6 gas and mis-operations. The expected life of the bushing gaskets and door inspection port seals is 25 years; all three of these units have reached this age. Seals that are no longer adequate can cause SF6 leaks to become more frequent. Low SF6 pressure in the breaker reduces the ability of the breaker to correctly interrupt a fault. Additionally, low pressure alarms and SF6 leaks lead to increased maintenance costs. The manufacturer provides no support or parts for this model of circuit breakers. Finally, SF6 leaks impact the environment.
  - CB “B” has experienced 37 fault operations

Model: N/A

Need Number: AEP-2021-IM010, AEP-2021-IM011

Process Stage: Solution Meeting 10/15/2021

Proposed Solution:

Retire the ~3.65 mile 138kV Lincoln extension and reconnect the existing line between Robison Park and Allen. The extension can be retired due to previous upgrades strengthening the underlying sub-transmission system through connections to other sources and a rebuild of the existing Robison Park-Allen and Lincoln-Robison Park lines which increased the 138 kV capacity. This extension does not impact the larger 138 kV network as Lincoln station will keep three 138 kV sources to serve the Fort Wayne area.

Cost: $2.8M

At Lincoln station, retire 138kV CB "B" and "C", Replace 138kV CB "I" and relocate 138kV CB "A" to the old CB "C" position.

Cost: $2M

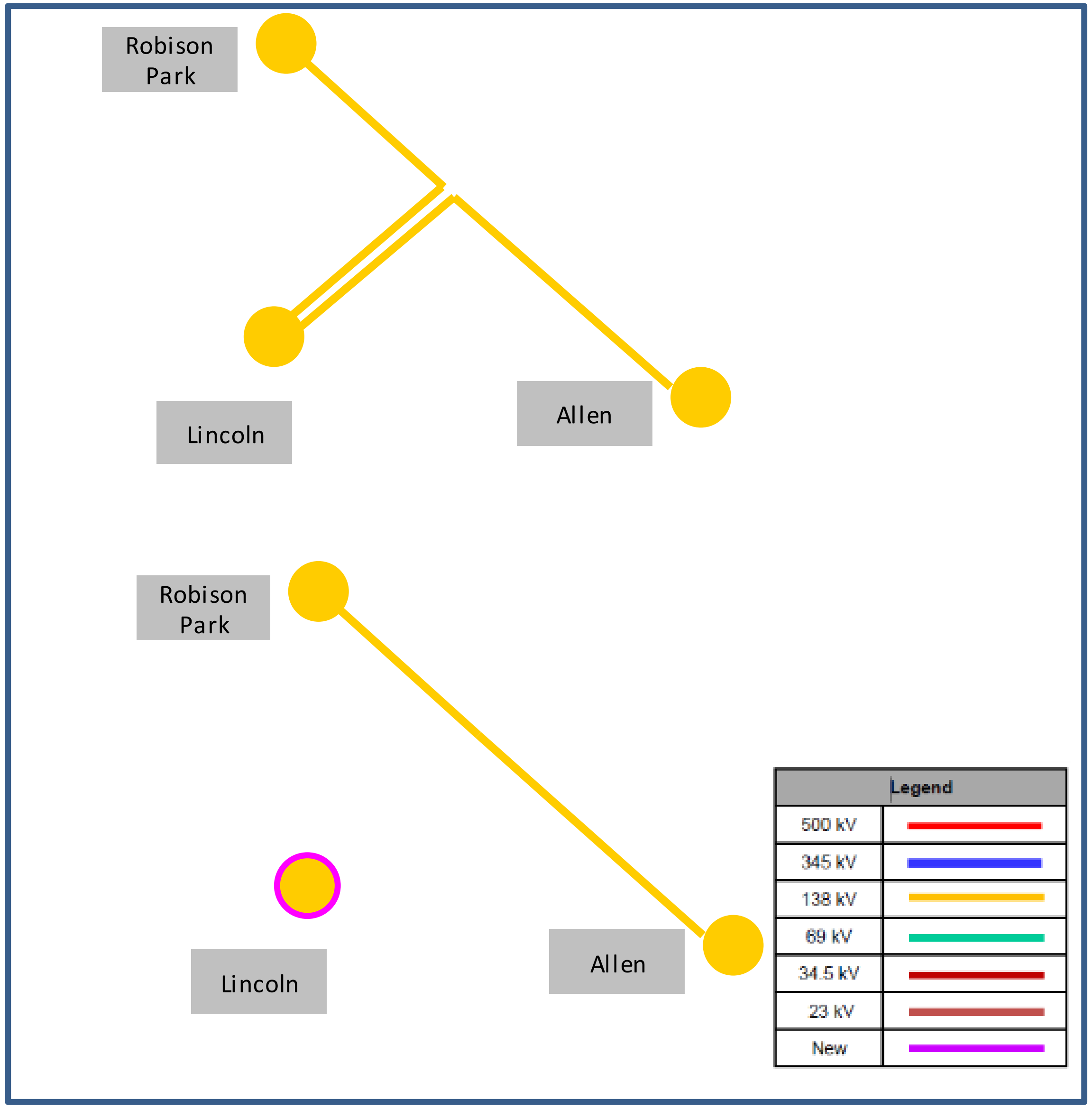
Total Estimated Transmission Cost: $4.8M

Alternatives Considered:

Rebuild the line as is and replace the Lincoln CB's.
Estimated Cost: $12.3M

Projected In-Service: 3/25/2025

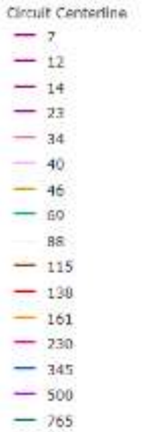
Project Status: Scoping



AEP Transmission Zone M-3 Process
New Buffalo – Bridgman 69kV Rebuild

Need Number: AEP-2021-IM016
Process Stage: Solution Meeting 10/15/2021
Previously Presented: Needs Meeting 5/21/2021
Supplemental Project Driver: Equipment Condition/Performance/Risk
Specific Assumption Reference: AEP Guidelines for Transmission Owner Identified Needs (AEP Assumptions Slide 13)
Model: N/A
Problem Statement:

New Buffalo – Bridgman 69kV line:
- 22.1 miles of mostly 1964-68 wood pole
- Conductor is 336.4 ACSR and 4/0 ACSR
- Since 2015 there have been 4 momentary and 6 permanent outages on the Three Oaks – Bridgman circuit.
- Since 2015 there have been 8 momentary and 2 permanent outages on the Three Oaks – Bosserman circuit.
- 4,488,189 CMI from 2015-2020 on the Bosserman – Three Oaks circuit
- Structures fail NESC Grade B, and AEP Strength requirements with portions failing ASCE structural strength standards
- 23 of 53 structures assessed had wood decay such as rot, heavy checking or woodpecker damage.
- All inspected poles show moderate to heavy shell decay



New Buffalo – Bridgman 69kV Rebuild

Need Number: AEP-2021-IM016

Process Stage: Solution Meeting 10/15/2021

Proposed Solution:

New Buffalo – Bridgman 69kV line:
Rebuild the 22.1 mile New Buffalo – Bridgman 69kV line with 556.5 ACSR Dove.
Estimated Cost: $55.5M

Alternates:

Considering the location and stations served from the line, retirement was not an option as building 138 kV to serve the distribution stations through this area would be cost prohibitive and results in similar amount of new line construction as the proposed rebuild. Further, this would leave New Buffalo (~15 MVA peak load) served from an 8 mile long 69 kV radial.

Rebuild line as greenfield to minimize outages. This wasn't chosen due to increased cost and community impact.

Projected In-Service: 10/01/2025

Project Status: Scoping