

Transmission Expansion Advisory Committee – AEP Supplemental Projects

March 10, 2020

Needs

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

AEP Transmission Zone: Supplemental Axton, VA

Need Number: AEP-2020-AP010

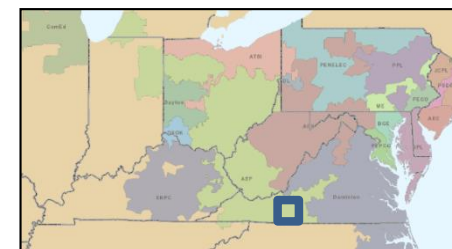
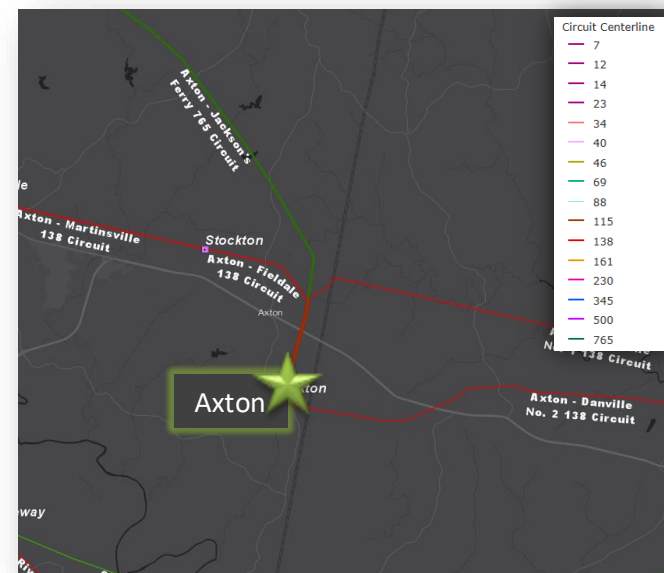
Process Stage: Needs Meeting 003/10/2020

Supplemental Project Driver: Equipment Material/Condition/Performance/Risk

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

Problem Statement:

- The 765/138 kV phase 1 transformer at Axton failed. The on-site spare unit was switched in. There is currently no spare at site to deal with any future failures.
- **Model:** N/A



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: AEP-2018-OH003

Process Stage: Solutions Meeting 03/10/2020

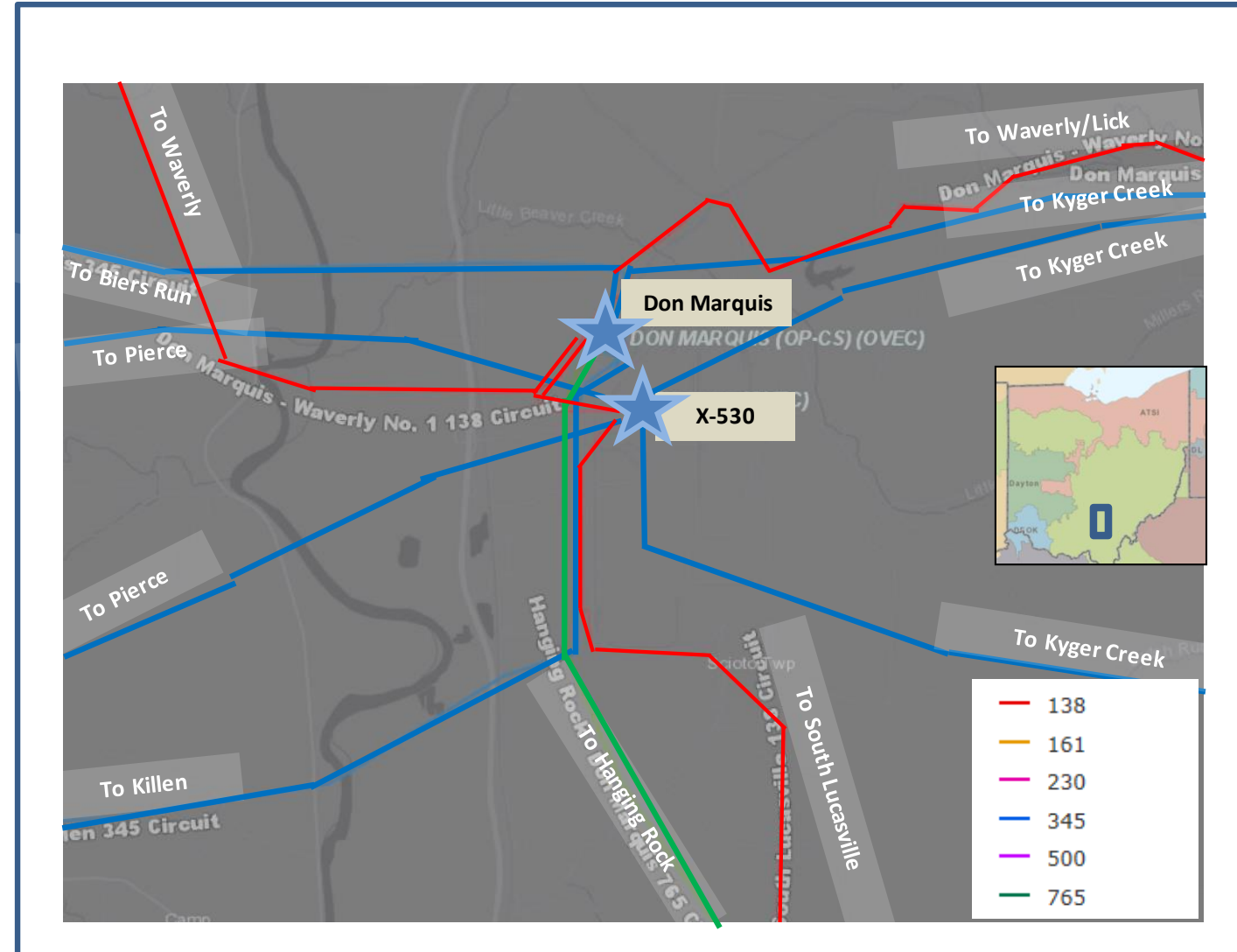
Previously Presented: Needs Meeting 10/26/18

Supplemental Project Driver: Customer Service

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

Problem Statement:

The Ohio Valley Electric Corporation (OVEC) and the US Department of Energy (DOE) are in the process of terminating their connection at Don Marquis. The DOE has informed AEP of its intention to retire its X-530 Substation, adjacent to AEP's Don Marquis Substation and has requested a new delivery point from AEP at the same location. The new load is anticipated to peak near 38MW.



Need Number: AEP-2018-OH003

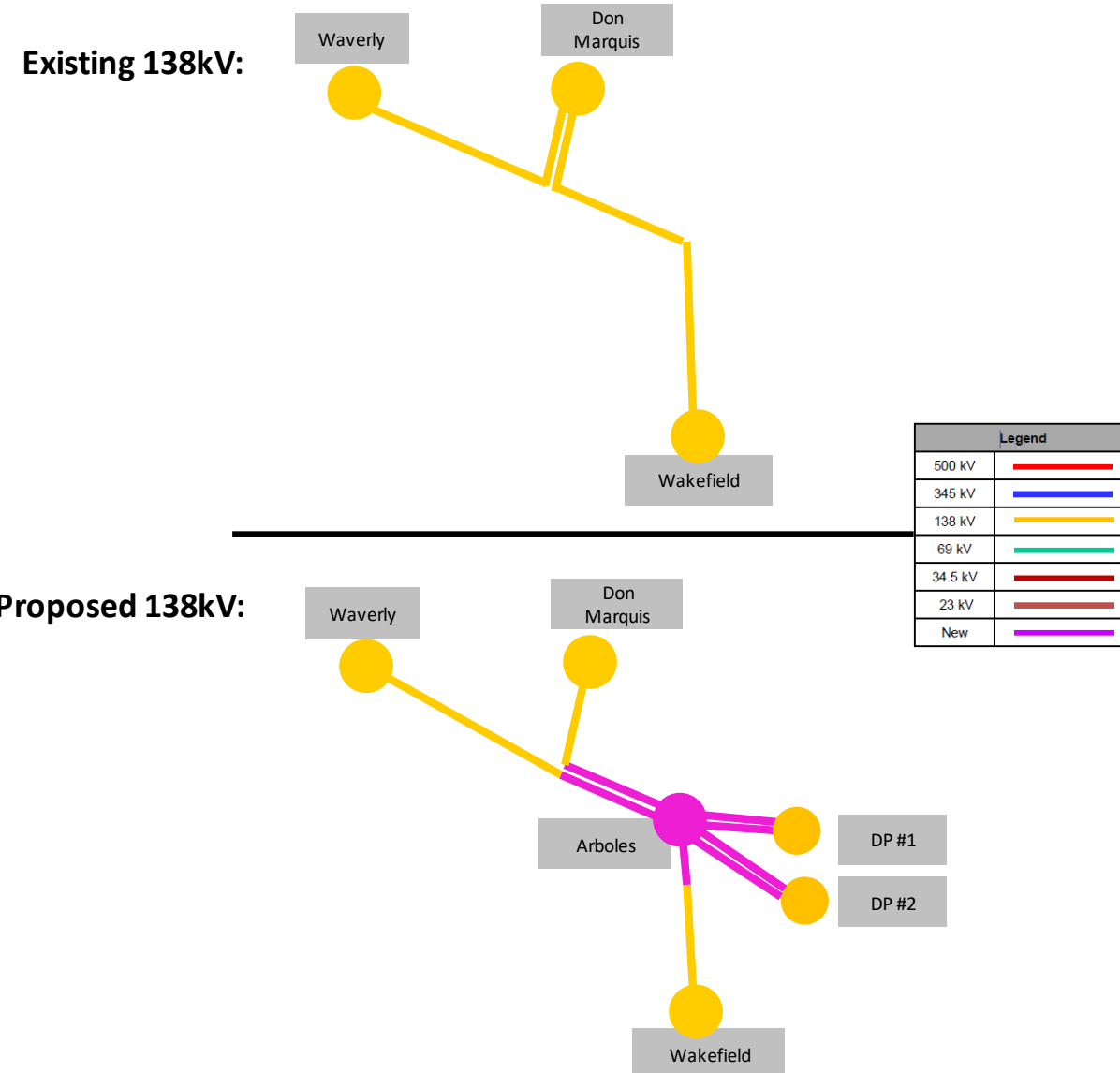
Process Stage: Solutions Meeting 03/10/2020

Proposed Solution:

- Install a new transmission switching station (Arboles) to connect 138 kV lines to Don Marquis, Waverly, and Wakefield as well as four radial lines to serve the two new loads. The station will have 11 CBs (3000A, 40kA) in a breaker-and-a-half configuration. DOE requires 3 feeds and has requested 138 kV service.

Estimated Cost: \$13.4M (AEP)

- 6-wire the existing Don Marquis extension for 0.4-miles and rebuild 0.7 miles of the existing Marquis-Wakefield line as double circuit for two feeds from Waverly and Don Marquis. **Estimated Cost: \$1.7M (AEP)**
- Construct ~0.3 miles of new line to terminate the South Lucasville circuit into Arboles. **Estimated Cost: \$1.3M (AEP)**
- Construct two independent lines to serve the X-555 substation (DP #1). The lines will be ~0.4 miles long each. **Estimated Cost: \$1.7M (AEP)**
- Construct two independent lines to serve the X-5001 substation (DP #2). The lines will be ~0.8 miles long each. **Estimated Cost: \$3.5M (AEP)**



AEP Transmission Zone M-3 Process DOE X-530

- At Don Marquis 345 kV, install 3-345kV 4000A 63kA circuit breakers to terminate the OVEC lines from Pierce and Kyger Creek. ~~Install intertie metering — AEP side.~~
Estimated Cost: \$8.8M (AEP), \$0.8M (OVEC)
- At Kyger Creek station, remove X-530 No.1 Exit and associated equipment. Update remote end relaying towards Don Marquis. **Estimated Cost: \$1.1M (OVEC)**
- At Pierce station, remove X-530 No.1 Exit and associated equipment. Update the remote end relaying towards Don Marquis. **Estimated Cost: \$0.8M (OVEC)**
- Six-wire 71.5 miles of the Pierce-Don Marquis line. Construct 0.13 miles of line to tie into Don Marquis station. **Estimated Cost: \$0.8M (OVEC)**
- Six-wire 50.4 miles of the Kyger Creek-Don Marquis line. Construct 0.5 miles of line to tie into Don Marquis station. **Estimated Cost: \$0.9M (OVEC)**
- **Install intertie metering at Don Marquis 345 kV station - OVEC side. Estimated Cost: \$0.8M (OVEC)**

Total Cost AEP: \$30.4M

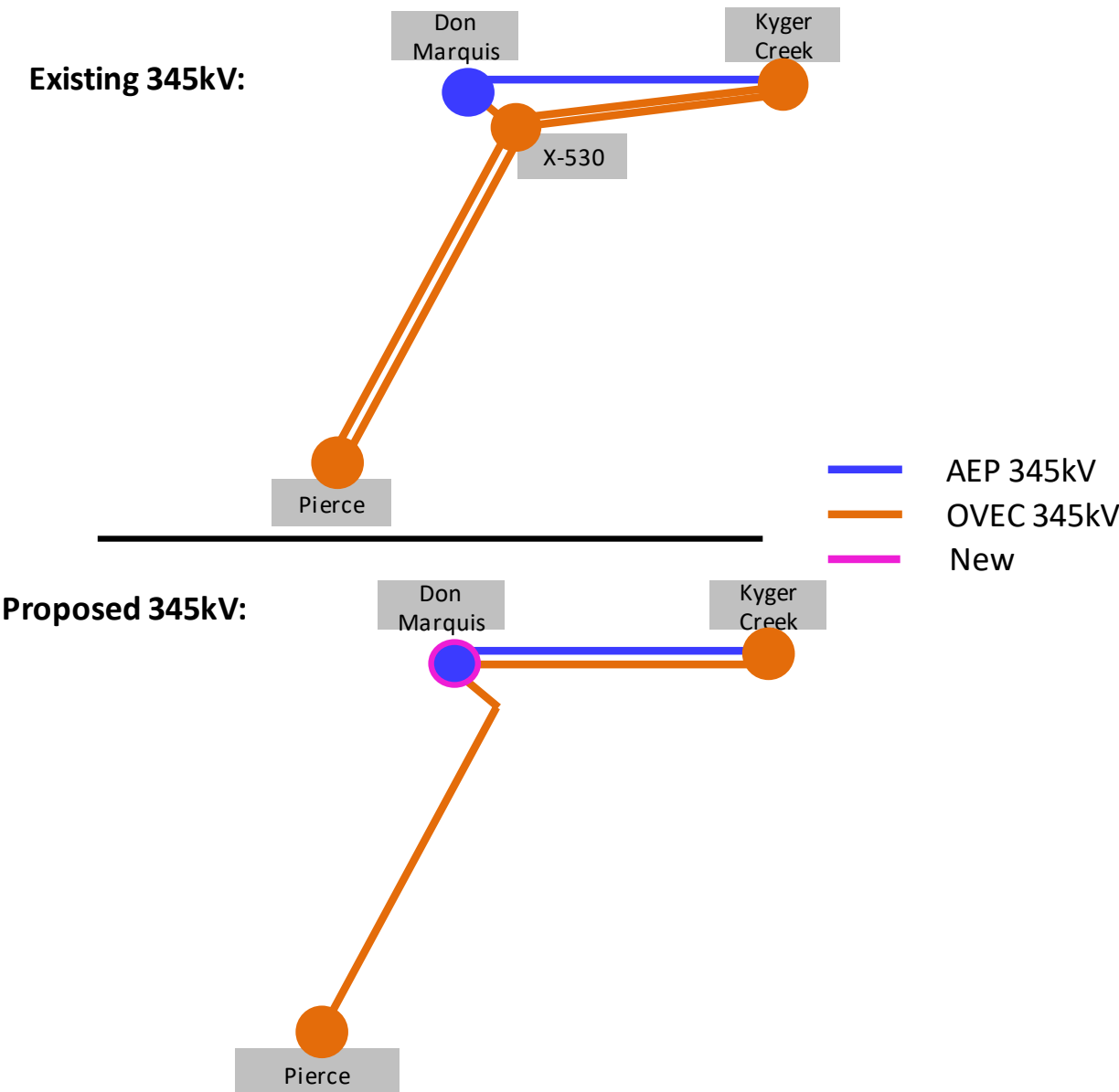
Total Cost OVEC: \$4.4M

Alternatives Considered:

Expand Don Marquis Substation and bring all four customer lines out of Don Marquis to the two new DPs: two 2.1-mile lines extending to DP#2 and two 1.5-mile lines to DP#1. This option has a higher cost due to the increased length of the four independent lines and because the terrain at Don Marquis is such that, any station expansion will require extensive civil work and environmental concerns. The 345kV scope would be the same.
Estimated Cost: \$50.4M

Projected In-Service: 11/01/2021

Project Status: Scoping



Need Number: AEP-2019-IM041

Process Stage: Solution Meeting 03/10/2020

Previously Reviewed: Needs Meeting 11/14/2019

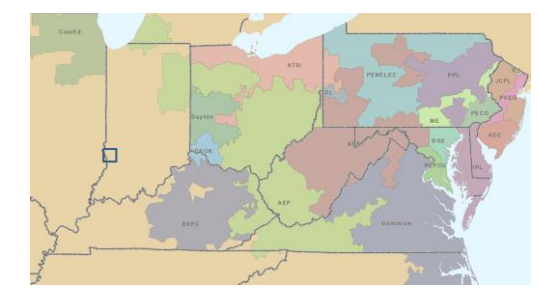
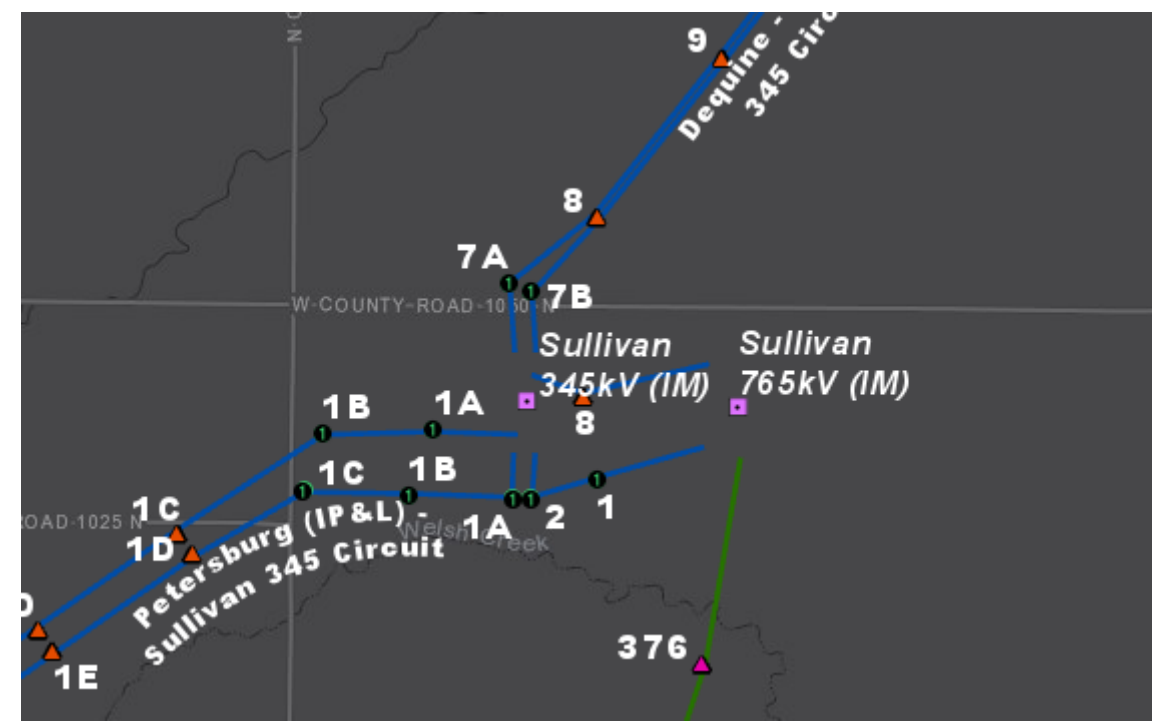
Supplemental Project Driver: Equipment Condition/Performance/Risk

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

Problem Statement:

Sullivan 765/345kV Station
765kV CB A2

- The Sullivan CB A2 is an ELF-SL8-4 Type SF6 breaker.
- As of September 2019 there are 9 of these breakers remaining in AEP's system including CB A at this station which just recently failed under AEP-2019-IM036.
- Since 2002, there have been 16 documented issues with the 9 remaining breakers dealing primarily with compressor failures and failure to open/reclose.



AEP Transmission Zone: Supplemental Sullivan Station Improvements

Need Number: AEP-2019-IM041

Process Stage: Solutions Meeting 03/10/2020

Proposed Solution:

Sullivan 765/345kV Station:

Replace Sullivan CB A2 765kV CB and associated equipment.

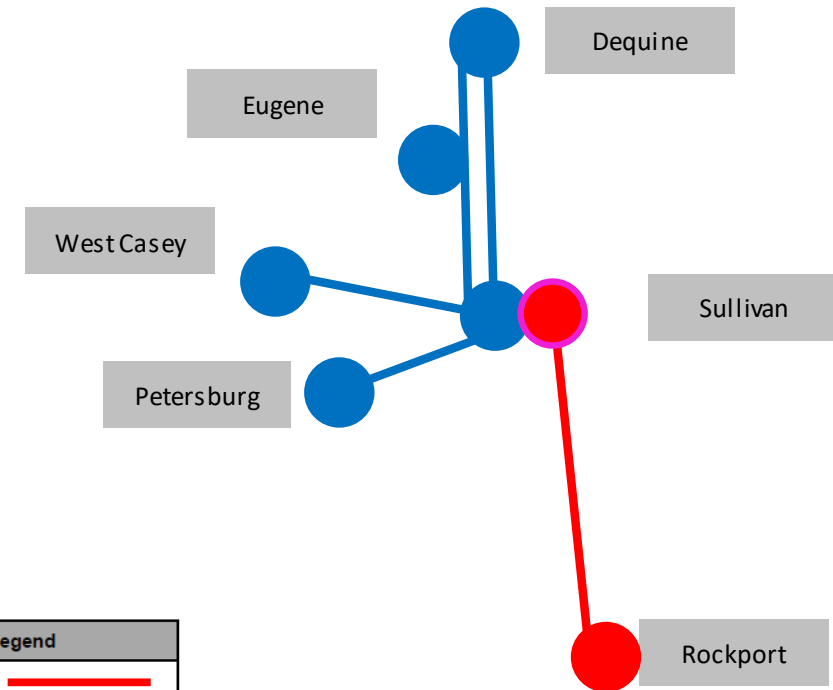
Total Estimated Transmission Cost: \$7.1M

Alternatives Considered:

There is no viable alternative solution.

Projected ISD: 2/1/2023

Project Status: Scoping



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

AEP Transmission Zone M-3 Process Cameron Customer Service

Need Number: AEP-2018-OH032

Process Stage: Solutions Meeting 3/10/2020

Previously Presented:

Needs Meeting 1/11/2019

Solutions Meeting 02/21/2020

Supplemental Project Driver:

Customer Service

Specific Assumption Reference:

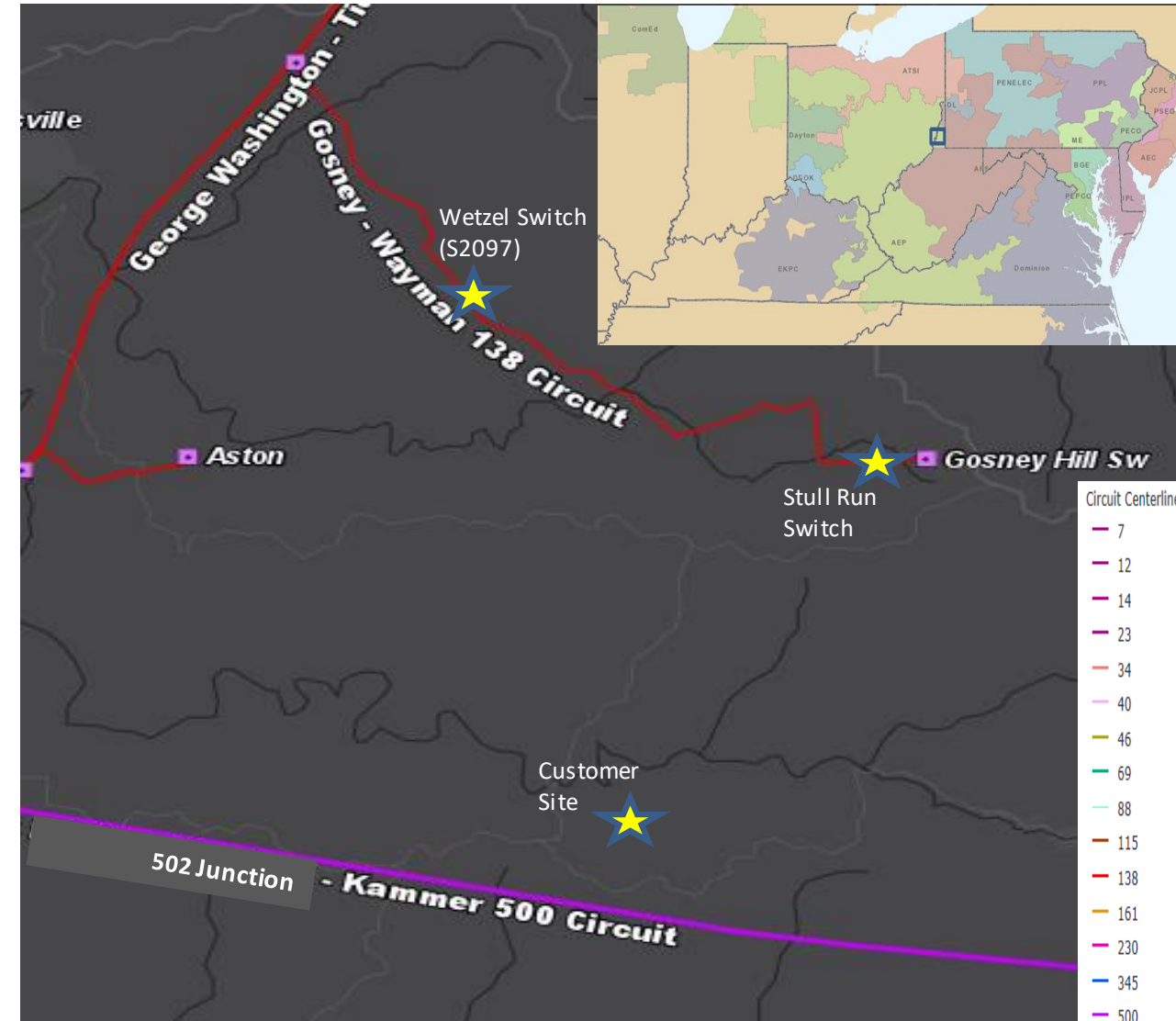
AEP Connection Requirements for the AEP Transmission System (AEP Assumptions Slide 7)

Problem Statement:

A customer has requested new service west of Cameron, West Virginia. The forecasted peak demand is 30 MW initially, with long-term prospects of 90 MW.

With the addition of this customer load, ~~plus the new customer load on S2097 (AEP-2019-OH006)~~, the Wayman-Gosney-Nauvoo Ridge 138kV radial line has an MVA-mile demand of ~~1142 896~~, far exceeding AEP's guideline of 75 MVA-miles. ~~The MVA-mi demand that exists today on the Wayman – Gosney Hill 138 kV circuit is 313 without any new load additions.~~

Model: Summer RTEP 2024



AEP Transmission Zone M-3 Process Cameron Customer Service

Need Number: AEP-2018-OH032

Process Stage: Solutions Meeting 3/10/2020

Proposed Solution:

Construct a new 500-138kV station (Panhandle), connecting to the Kammer-502 Junction 500kV circuit (~10.3 miles from Kammer, 31.7 miles from 502 Junction). Install a 3-breaker 500kV ring bus; 450 MVA 500-138kV transformer; 3-breaker 138kV ring bus. **Estimated Cost: \$25.0 M**

Construct a new 138kV switching station (Nauvo0 Ridge) with 8- 138kV breakers in a breaker-and-a-half design. The station will have 1 circuit to Gosney Hill, 2 circuits to the customer's facility, 2 circuits to Panhandle, and a 23 MVAR 138kV cap bank. **Estimated Cost: \$16.4 M**

At Gosney Hill, install a new 138kV breaker toward Nauvo0 Ridge. Update station protection. **Estimated Cost: \$1.0 M**

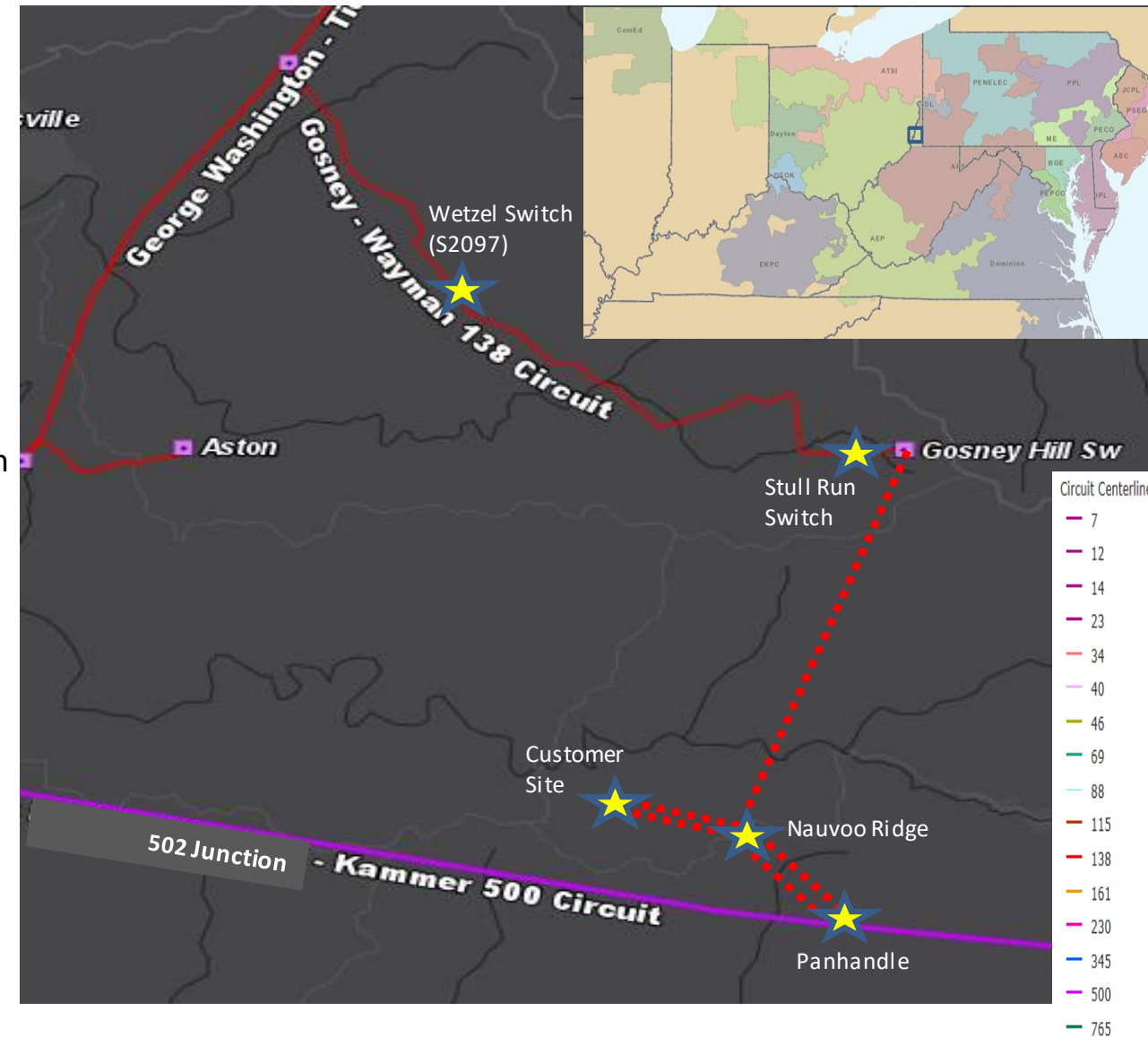
Construct a new 4.7-mile 138kV line south of Gosney Hill station to Nauvo0 Ridge. Utilize 1033 ACSR conductor. Acquire new right-of-way. **Estimated Cost: \$14.7 M**

Construct a new 1.3 mile double-circuit 138kV line from Nauvo0 Ridge to the customer's substation. Acquire new right-of-way. **Estimated Cost: \$4.8 M**

Construct a new 1.5 mile double-circuit 138kV line from Panhandle to Nauvo0 Ridge. Utilize 1033 ACSR conductor for each circuit. Acquire new right-of-way. **Estimated Cost: \$5.0 M**

Extend the Kammer-502 Junction 500kV transmission line 0.1-mile into Panhandle station (0.2 mile total). **Estimated Cost: \$1.5 M**

Total Estimated Transmission Cost: \$68.4 M



AEP Transmission Zone M-3 Process Cameron Customer Service

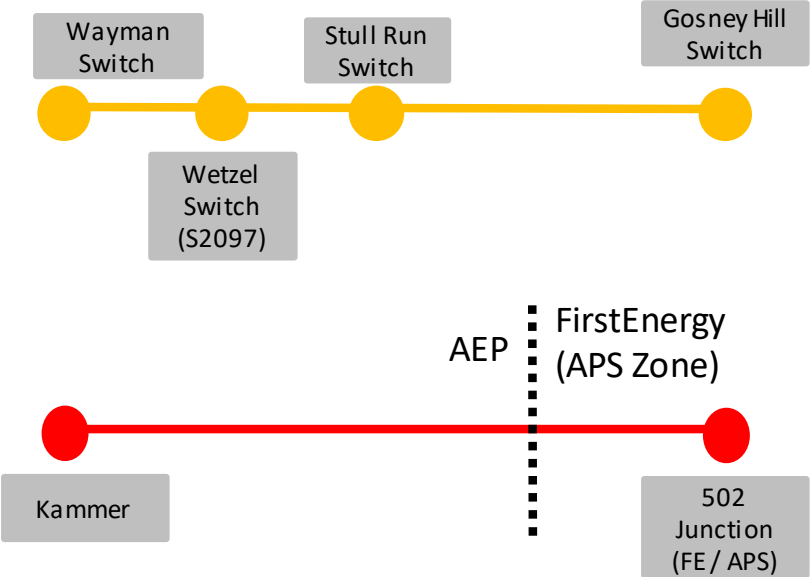
Need Number: AEP-2018-OH032

Process Stage: Solutions Meeting 3/10/2020

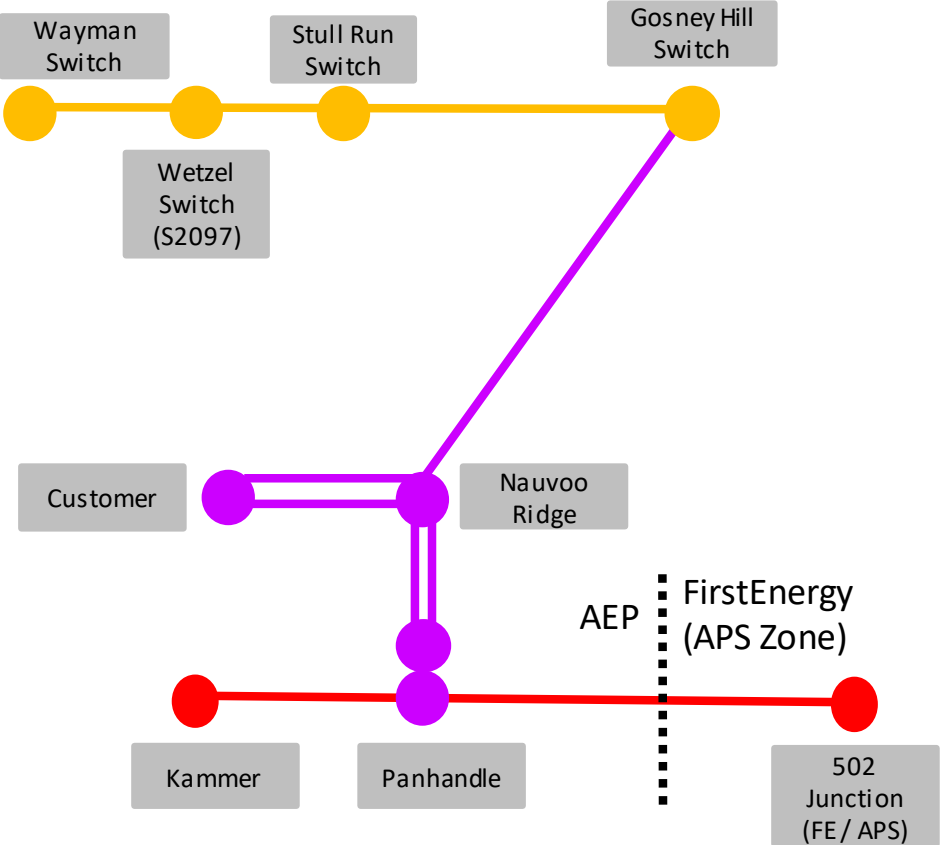
Proposed Solution:

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

Existing:



Proposed:



AEP Transmission Zone M-3 Process Cameron Customer Service

Need Number: AEP-2018-OH032

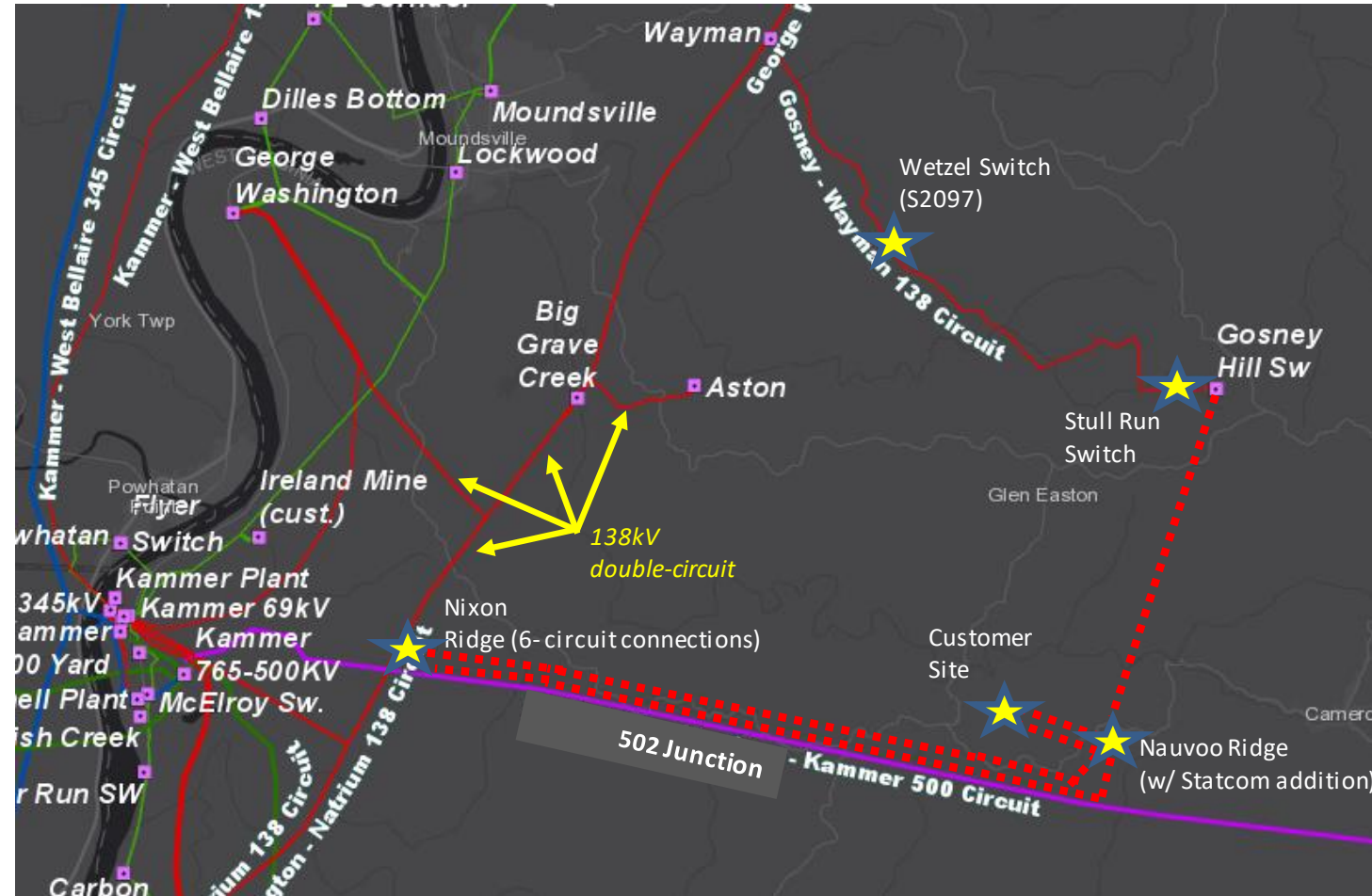
Process Stage: Solutions Meeting 03/10/2020

Alternatives Considered:

Construct a new 9-breaker switching station (Nixon Ridge, breaker-and-a-half) at the crossing of the Kammer-502 Junction 500kV line & 138kV double-circuit corridor (3 miles east of Kammer), looping in the Aston-Kammer 138kV & George Washington-Natrium 138kV circuits, plus 2 new circuits to Nauvoo Ridge. Remote-end 138kV protection & RTU updates at Aston, Kammer, George Washington & Natrium stations. Build a 9-mile 138kV double-circuit line from Nixon Ridge east to Nauvoo Ridge. *Keep the remaining scope between Gosney-Nauvoo-New Customer 138kV.* This solution resulted in several violations, as it strains the local 138kV system, as the only EHV sources in the region are at Kammer & West Bellaire. Overloads on Kammer-Nixon Ridge 138kV, near-overload on Kammer-Natrium 138kV (would overload with a pending customer project). In addition, N-1-1 voltage violations of 0.90-0.92 pu in the area; to rectify this, more cap banks could be placed, but due to 6 in the region already, switching conflicts (hunting) would likely arise. To mitigate these violations, this alternate would require a reconductor or rebuild 18 miles of 138kV lines and install a 138kV +/- 75 MVAR Statcom system in the area, for dynamic voltage support. **Total Cost of \$120 Million**

Projected In-Service: 7/21/2020 (for initial 138kV service to the customer). 3/1/2022 (for the 2nd phase to construct Panhandle station and complete the 138kV loop).

Project Status: Engineering (for initial customer service project); Scoping (for 2nd phase)



Appendix

High Level M-3 Meeting Schedule

Assumptions	Activity	Timing
	Posting of TO Assumptions Meeting information	20 days before Assumptions Meeting
	Stakeholder comments	10 days after Assumptions Meeting
Needs	Activity	Timing
	TOs and Stakeholders Post Needs Meeting slides	10 days before Needs Meeting
	Stakeholder comments	10 days after Needs Meeting
Solutions	Activity	Timing
	TOs and Stakeholders Post Solutions Meeting slides	10 days before Solutions Meeting
	Stakeholder comments	10 days after Solutions Meeting
Submission of Supplemental Projects & Local Plan	Activity	Timing
	Do No Harm (DNH) analysis for selected solution	Prior to posting selected solution
	Post selected solution(s)	Following completion of DNH analysis
	Stakeholder comments	10 days prior to Local Plan Submission for integration into RTEP
	Local Plan submitted to PJM for integration into RTEP	Following review and consideration of comments received after posting of selected solutions

Revision History

2/27/2020 – V1 – Original version posted to pjm.com

3/10/2020 – V2 – Slide #13, add alternatives considered

– Slide #9, update Alternative Considered statement

3/12/2020 – V3 – Slide #10, Changes reflected in the slide

3/31/2020 – V4 – Slide #8, Corrected Needs meeting date