



PJM Western Sub-Regional RTEP Committee DEOK Supplemental Upgrades

May 20, 2019

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

Need Number: DEOK 2019-014

Process Stage: Needs Meeting 5/20/2019

Supplemental Project Driver:

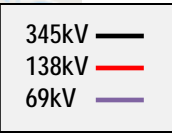
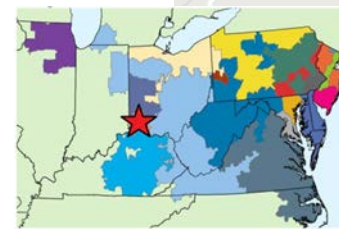
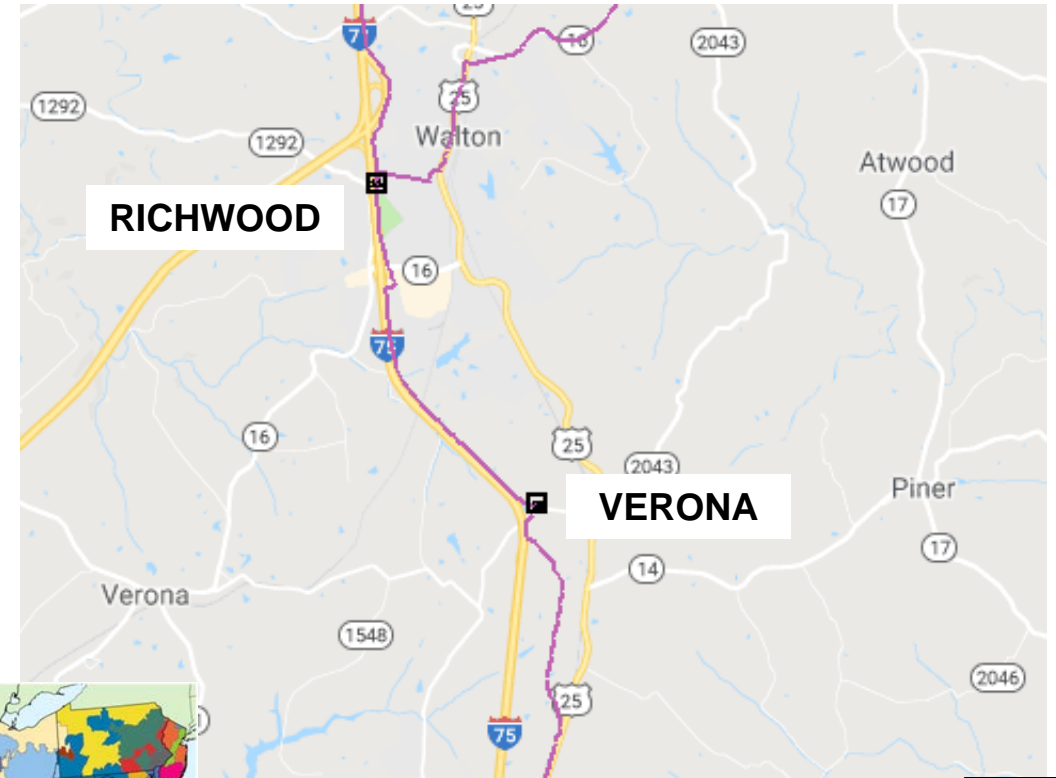
Customer Service

Specific Assumption References:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 10

Problem Statement:

Duke Energy Distribution has requested a new delivery point at Verona substation. Verona's single 69/13kV 10.5MVA transformer is seeing loads at 9 MVA. An additional 5 MW of commercial and industrial load is expected in 2020.



Need Number: DEOK 2019-015

Process Stage: Needs Meeting 5/20/2019

Supplemental Project Driver:

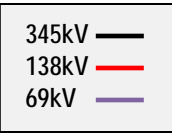
Customer Service

Specific Assumption References:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 10

Problem Statement:

Duke Energy Distribution has requested a new delivery point at Longbranch substation. Loading on the single 138/13kV 22MVA transformer has reached the nameplate rating. Commercial and residential development continues in this area. Load growth has been trending at 7% per year.



Need Number: DEOK 2019-016

Process Stage: Needs Meeting 5/20/2019

Supplemental Project Driver:

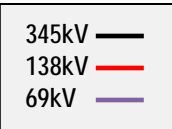
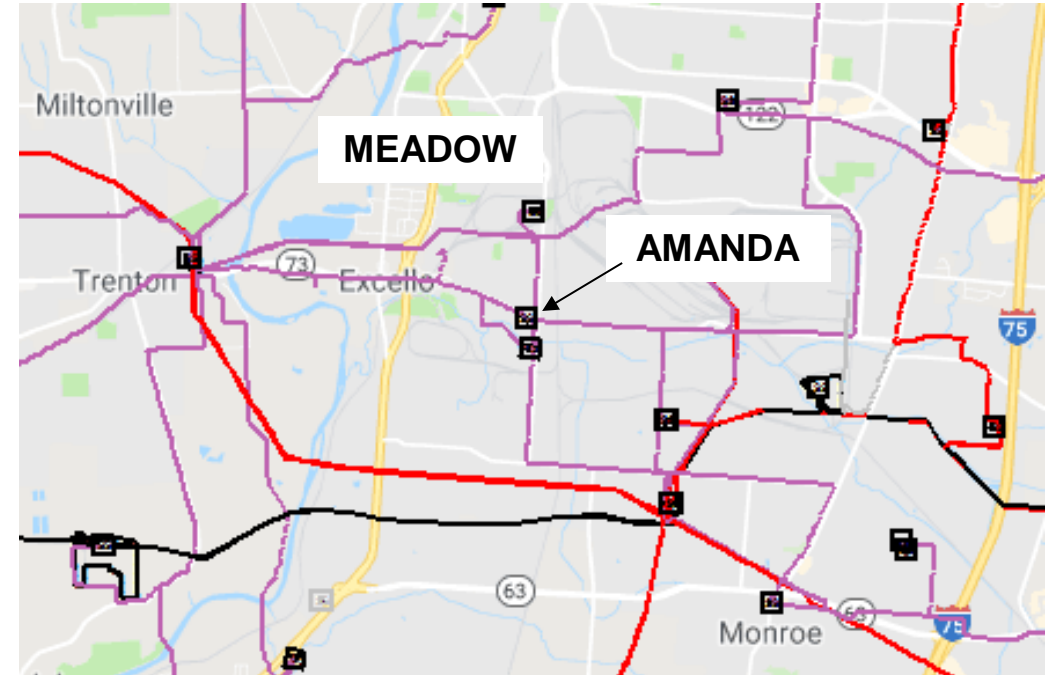
Customer Service

Specific Assumption References:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 10

Problem Statement:

Duke Energy Distribution has requested a new delivery point at Amanda substation. Amanda has a single 69/4kV 2.5MVA transformer. A new commercial customer requires 4MW of service by 12-31-2020.



Need Number: DEOK 2019-017

Process Stage: Needs Meeting 5/20/2019

Supplemental Project Driver:

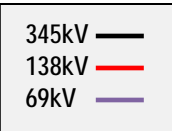
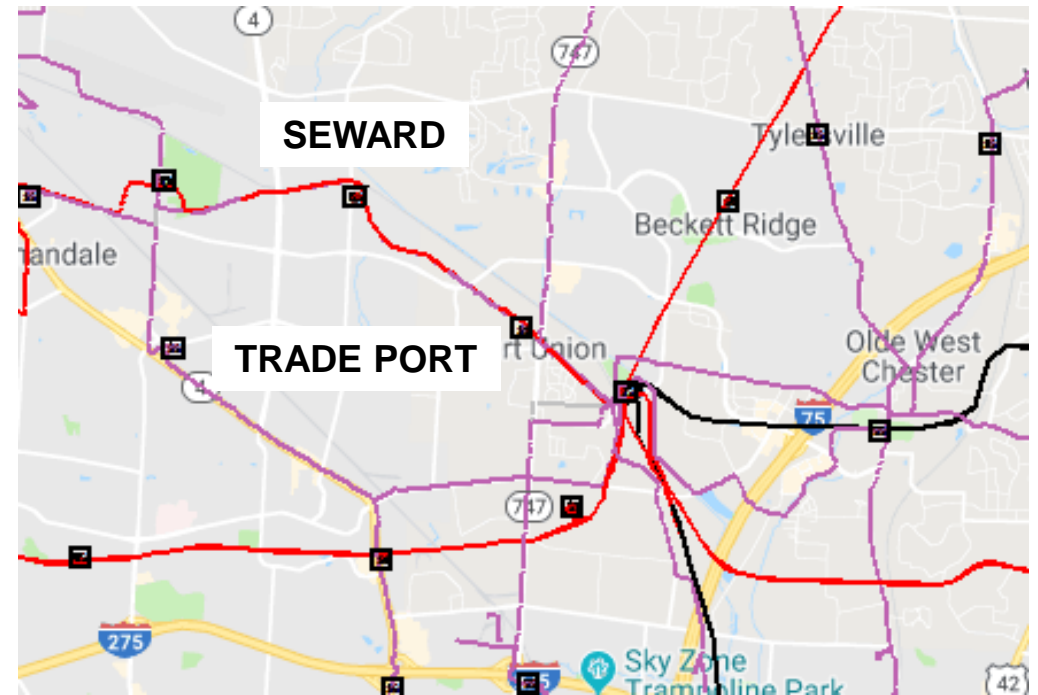
Customer Service

Specific Assumption References:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 10

Problem Statement:

Duke Energy Distribution has requested a new delivery point at Trade Port substation. An existing customer is renovating its operation and requires 5.5MW of additional service by 12-31-2020. Trade Port's single 69/13kV 10.5MVA transformer is seeing loads at 6.5MVA.



Need Number: DEOK 2019-018

Process Stage: Needs Meeting 5/20/2019

Supplemental Project Driver:

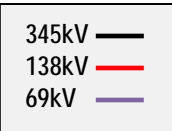
Other

Specific Assumption References:

Duke Energy Ohio & Kentucky Local Planning Assumptions slides 11

Problem Statement:

Line inspection found a clearance between a distribution feeder and a transmission tower. Duke Energy Distribution is moving loads to others feeders in the area, and retiring the feeder. This feeder was the only load on Oakley 69/34kV 27MVA TB5. Oakley TB5 is 69 years old, is one of the last few of it's design on the system.



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: DEOK-2019-006

Process Stage: Solutions Meeting 05/202019

Previously Presented:

Needs Meeting 03/25/2019

Project Driver(s):

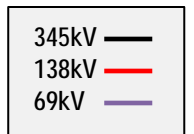
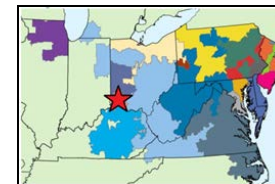
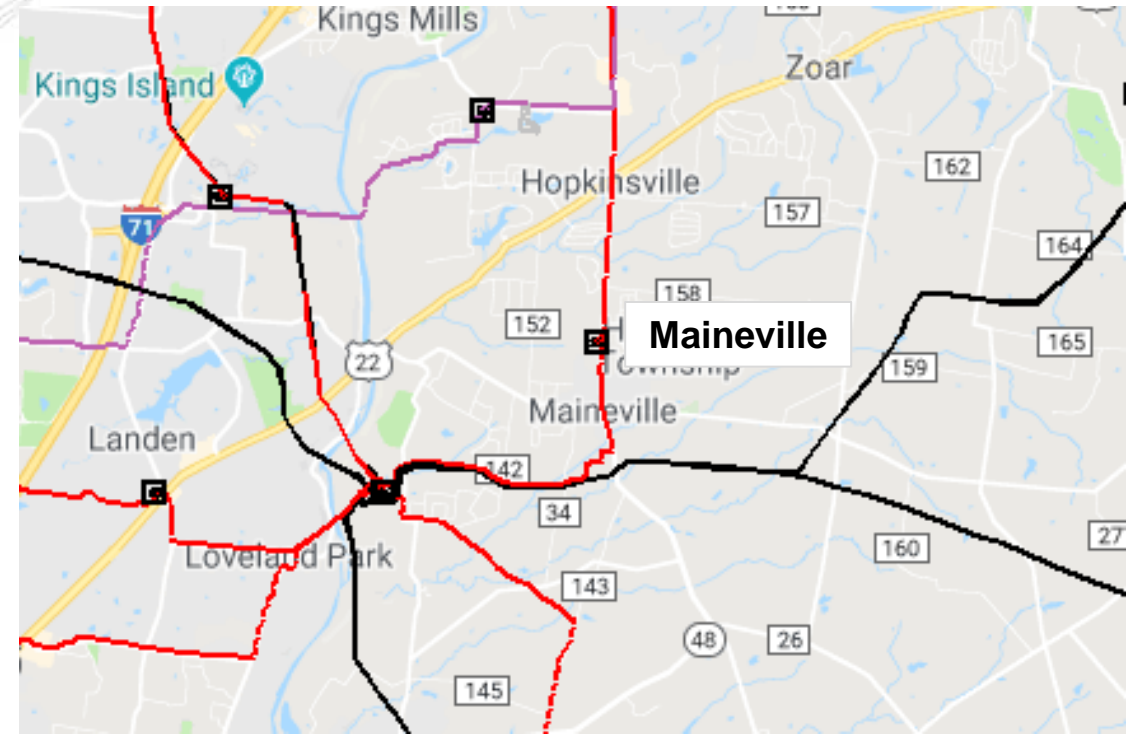
Customer Service

Specific Assumptions Reference(s):

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 10

Problem Statement:

Duke Energy Distribution has requested a new delivery point at Maineville substation. Loading on the single 138/13kV 22MVA transformer at Maineville has reached its nameplate rating.



Need Number: DEOK-2019-006

Process Stage: Solutions Meeting 05/202019

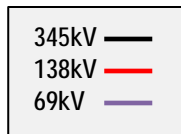
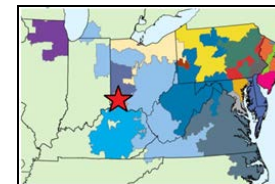
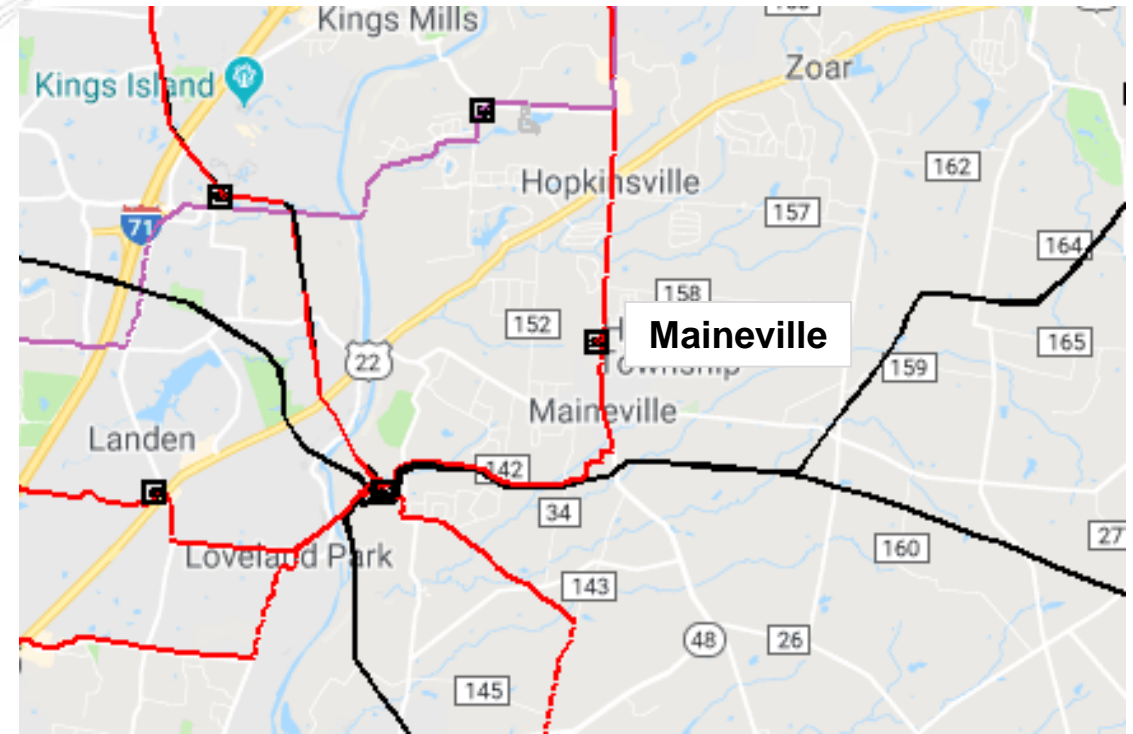
Potential Solution:

Expand Maineville substation. Extend the 138kV bus. Add a second 138/13kV 22MVA transformer, 13kV bus work and breakers for two feeder exits. The new transformer will be switch connected to the 138kV bus similar to TB1.

Transmission Cost Estimate: \$0

Alternatives: none

Projected In-service Date: 06-01-2020



Need Number: DEOK-2019-008

Process Stage: Solutions Meeting 05/20/2019

Previously Presented:

Needs Meeting 03/25/2019

Project Driver(s):

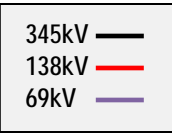
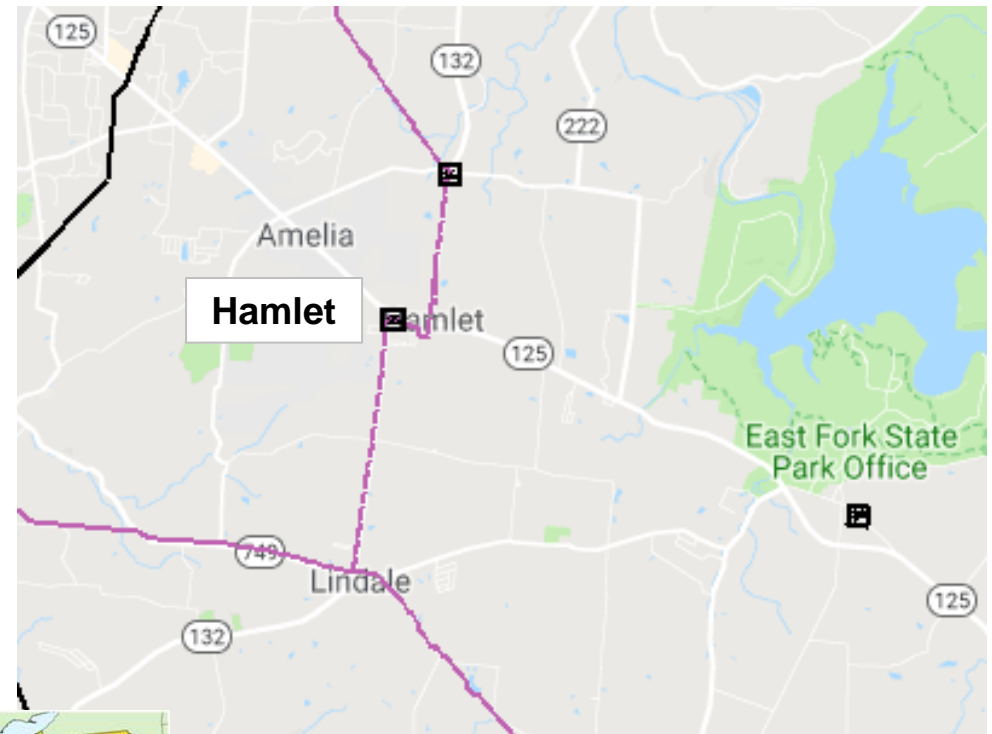
Customer Service

Specific Assumptions Reference(s):

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 10

Problem Statement:

Duke Energy Distribution has requested a new delivery point at Hamlet substation. Winter loading on the single 69/13kV 10.5MVA transformer at Hamlet has reached 96% of its nameplate rating. New residential subdivisions in this area are planned to be completed by 2021. Winter loading is expected to increase 10% since gas service in much of this area is not available.



Need Number: DEOK-2019-008

Process Stage: Solutions Meeting 05/20/2019

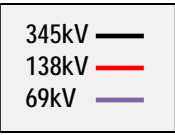
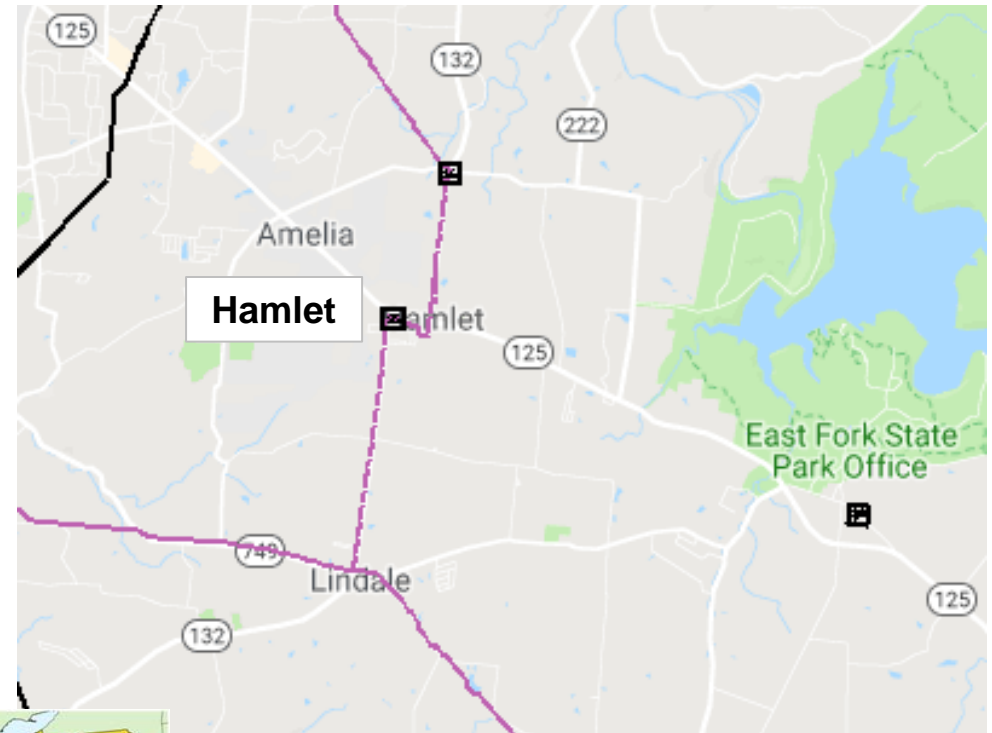
Potential Solution:

Extend the 69kV bus. Add a second 69/13kV 10.5MVA transformer, 13kV bus work and breaker for one feeder exit at Hamlet. The new transformer will be switch connected to the 69kV bus similar to TB1.

Transmission Cost Estimate: \$0

Alternatives: none

Projected In-service Date: 06-01-2020



Need Number: DEOK-2019-009

Process Stage: Solutions Meeting 05/20/2019

Previously Presented:

Needs Meeting 03/25/2019

Project Driver(s):

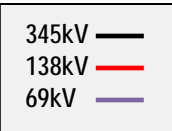
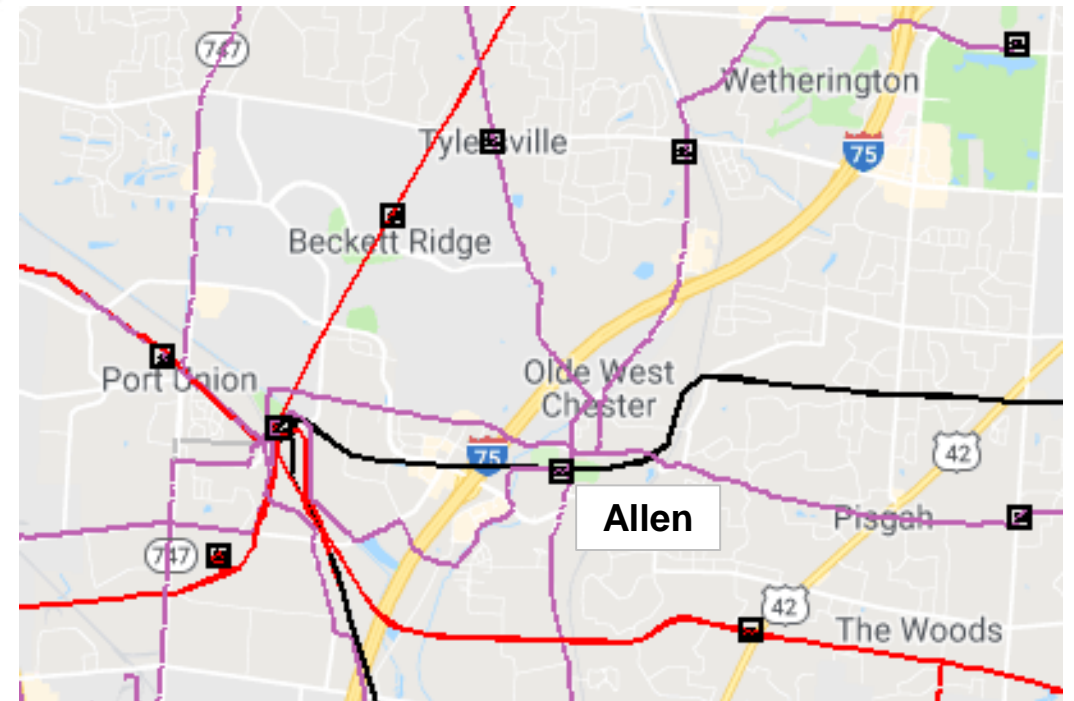
Customer Service

Specific Assumptions Reference(s):

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 10

Problem Statement:

Duke Energy Distribution has requested a new delivery point at Allen substation. Loading on Allen's single 69/13kV 22MVA transformer has reached the nameplate rating.



Need Number: DEOK-2019-009

Process Stage: Solutions Meeting 05/20/2019

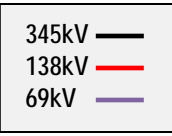
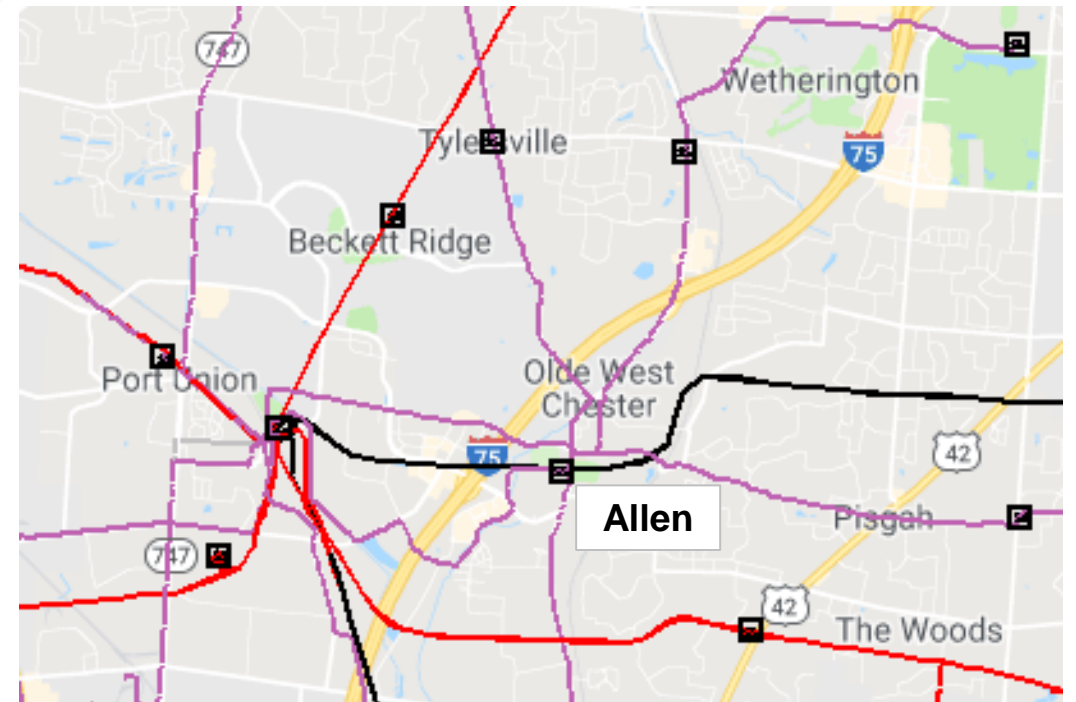
Potential Solution:

Extend the 69kV bus. Add a second 69/13kV 22MVA transformer, 13kV bus work and breakers for two feeder exits at Allen. The new transformer will be switch connected to the 69kV bus similar to TB1.

Transmission Cost Estimate: \$0

Alternatives: none

Projected In-service Date: 06-01-2020



Need Number: DEOK-2019-010

Process Stage: Solutions Meeting 05/20/2019

Previously Presented:

Needs Meeting 03/25/2019

Project Driver(s):

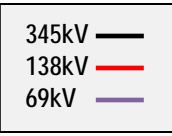
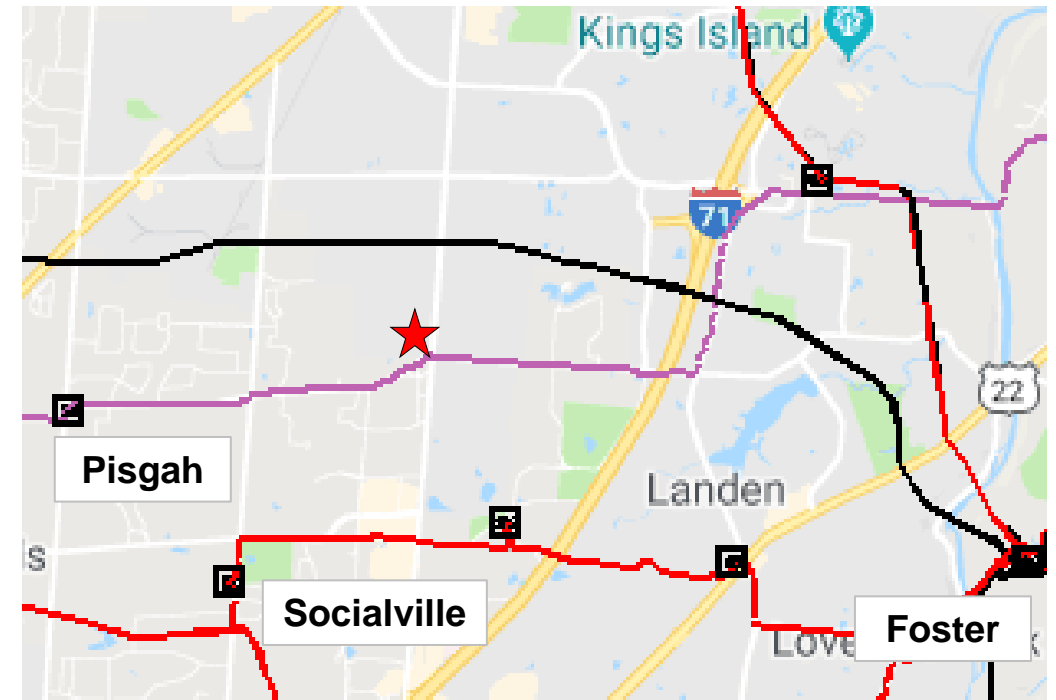
Customer Service

Specific Assumptions Reference(s):

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 10

Problem Statement:

Duke Energy Distribution has requested a new delivery point in the Mason Ohio area. New light industrial load growth requires 7MW of service by 2021 with and additional 15MW expected by 2022.



Need Number: DEOK-2019-010

Process Stage: Solutions Meeting 05/20/2019

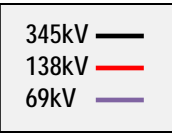
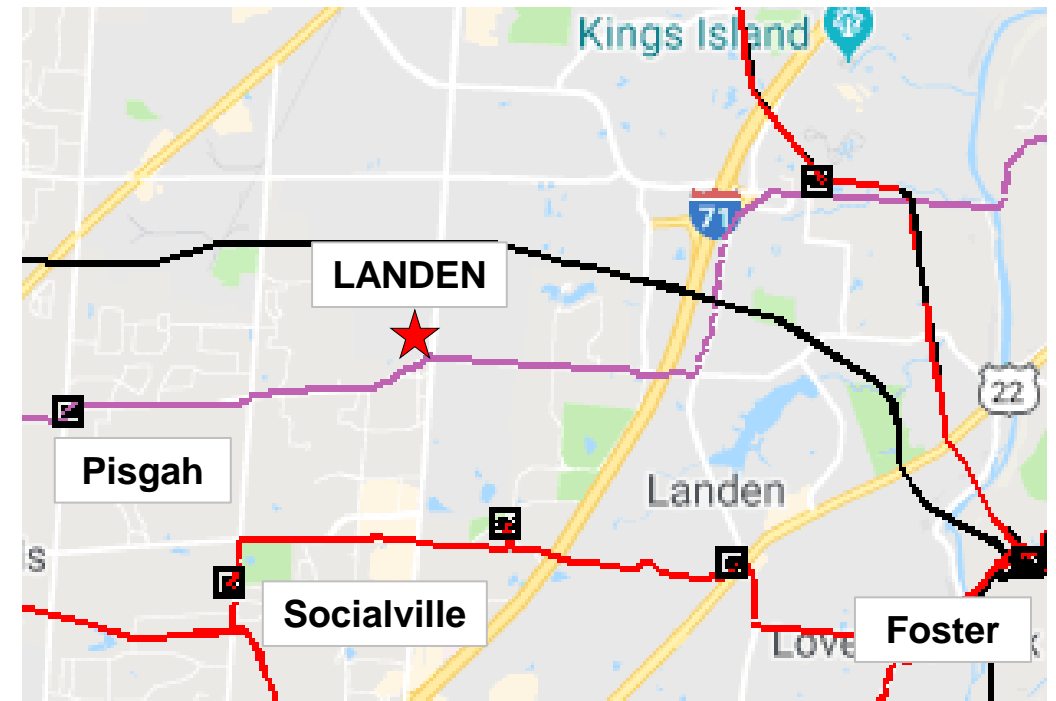
Potential Solution:

Build a new 69kV distribution substation, Landen, with two 13kV feeder exits. Loop the 69kV Pisgah-Kings Mills feeder through the substation. Install one 69/13kV 22.4MVA transformer with a high side circuit switcher.

Transmission Cost Estimate: \$0

Alternatives: none

Projected In-service Date: 12-31-2020



Need Number: DEOK-2019-011

Process Stage: Solutions Meeting 05/20/2019

Previously Presented:

Needs Meeting 03/25/2019

Project Driver(s):

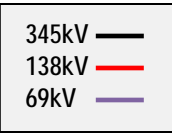
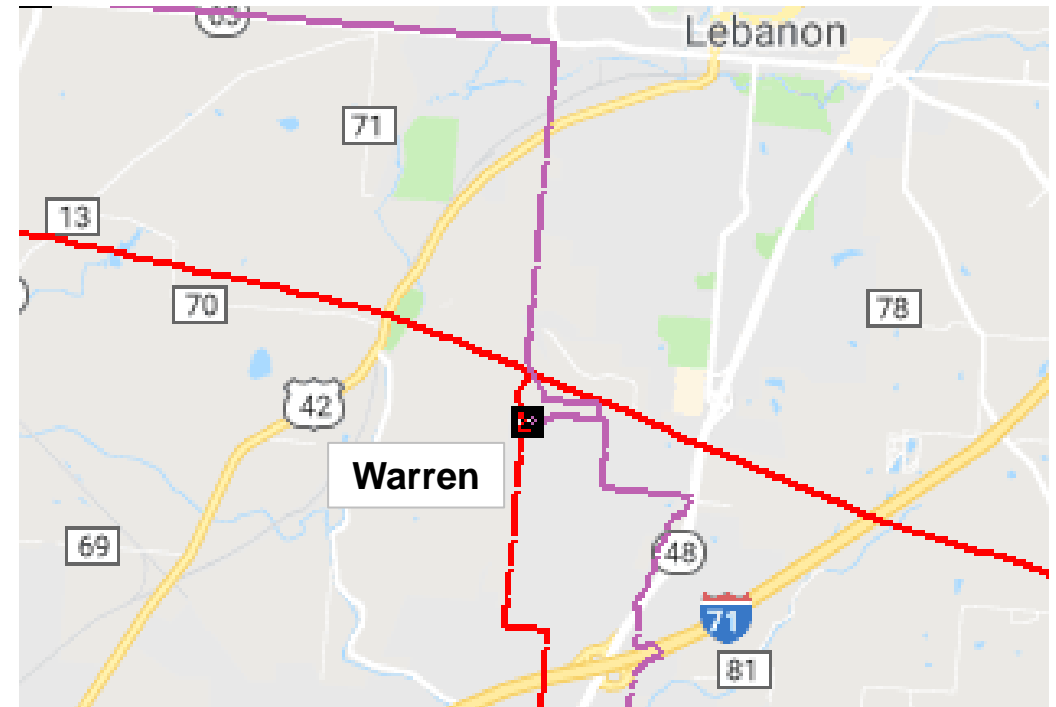
Equipment Condition, Performance, and Risk

Specific Assumptions Reference(s):

Duke Energy Ohio & Kentucky Local Planning Assumptions slides 6-7

Problem Statement:

Warren 138/69kV 100MVA TB1 showed a sharp increase in gassing in 2016. Over the past three years the gas levels continue to increase. The main gasses of concern are ethane and ethylene, indicating a potential deterioration of insulation. Indications are trending towards a possible failure. (continued)

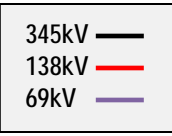
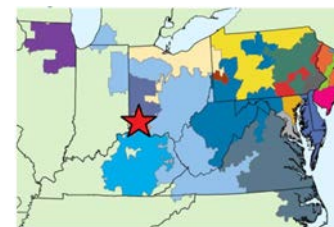
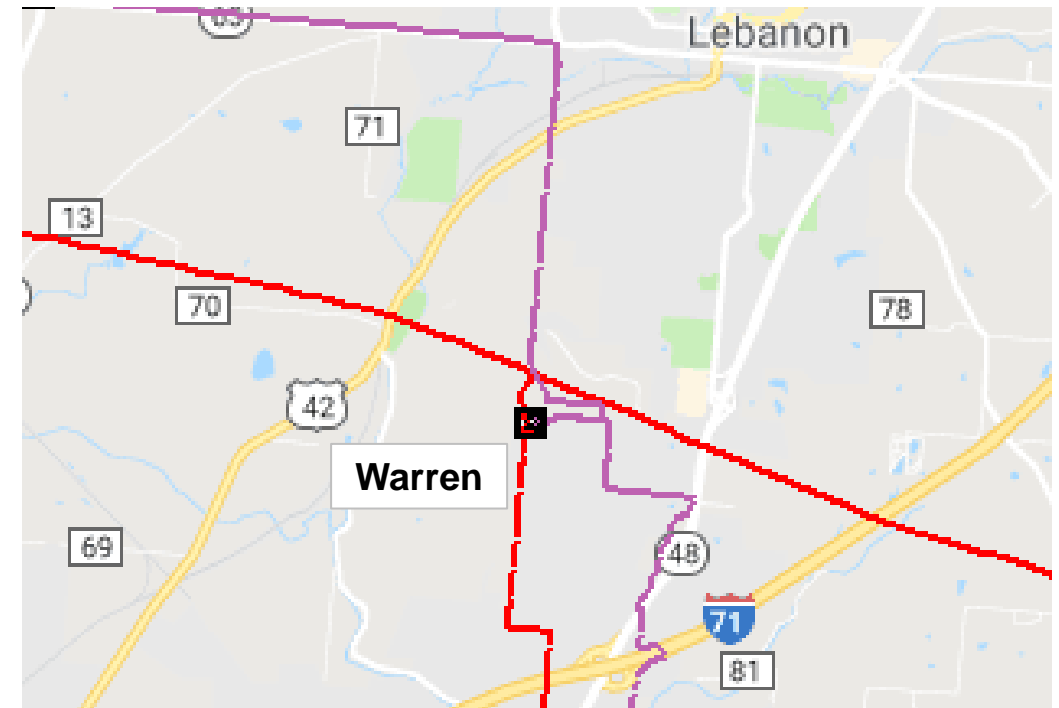


Need Number: DEOK-2019-011

Process Stage: Solutions Meeting 05/20/2019

Problem Statement:

(continued) There has also been an increase in power factor during routine testing indicating the transformer trending towards the end of its useful life. This 62 year old transformer is FOA rated. The capacity of the original cooling equipment has degraded with age. In the event of a failure, it would take an extended amount of time to replace this transformer with a spare (3-4 months). It would require foundation modifications, physical bus modifications, new conduits and control cables. This transformer supplies 69kV service to The City of Lebanon Electric Department.



Need Number: DEOK-2019-011

Process Stage: Solutions Meeting 05/20/2019

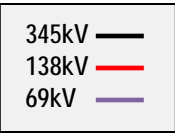
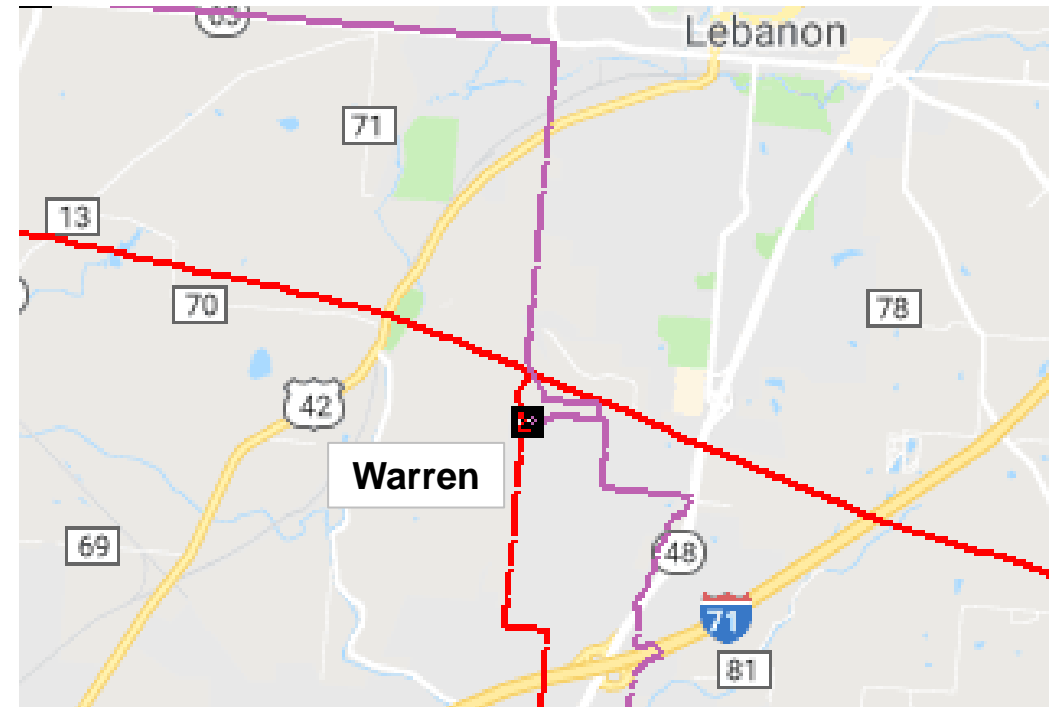
Potential Solution:

Replace TB1 with a 138/69kV 150MVA transformer. Replace jumpers to the high side and low side transformer bushings and lightning arrestors. Install new high voltage and low voltage surge arrestors.

Transmission Cost Estimate: \$3,493,100

Alternatives: none

Projected In-service Date: 12-31-2020



Need Number: DEOK 2019-012

Process Stage: Solutions Meeting 05/20/2019

Previously Presented:

Needs Meeting 04/23/2019

Supplemental Project Driver:

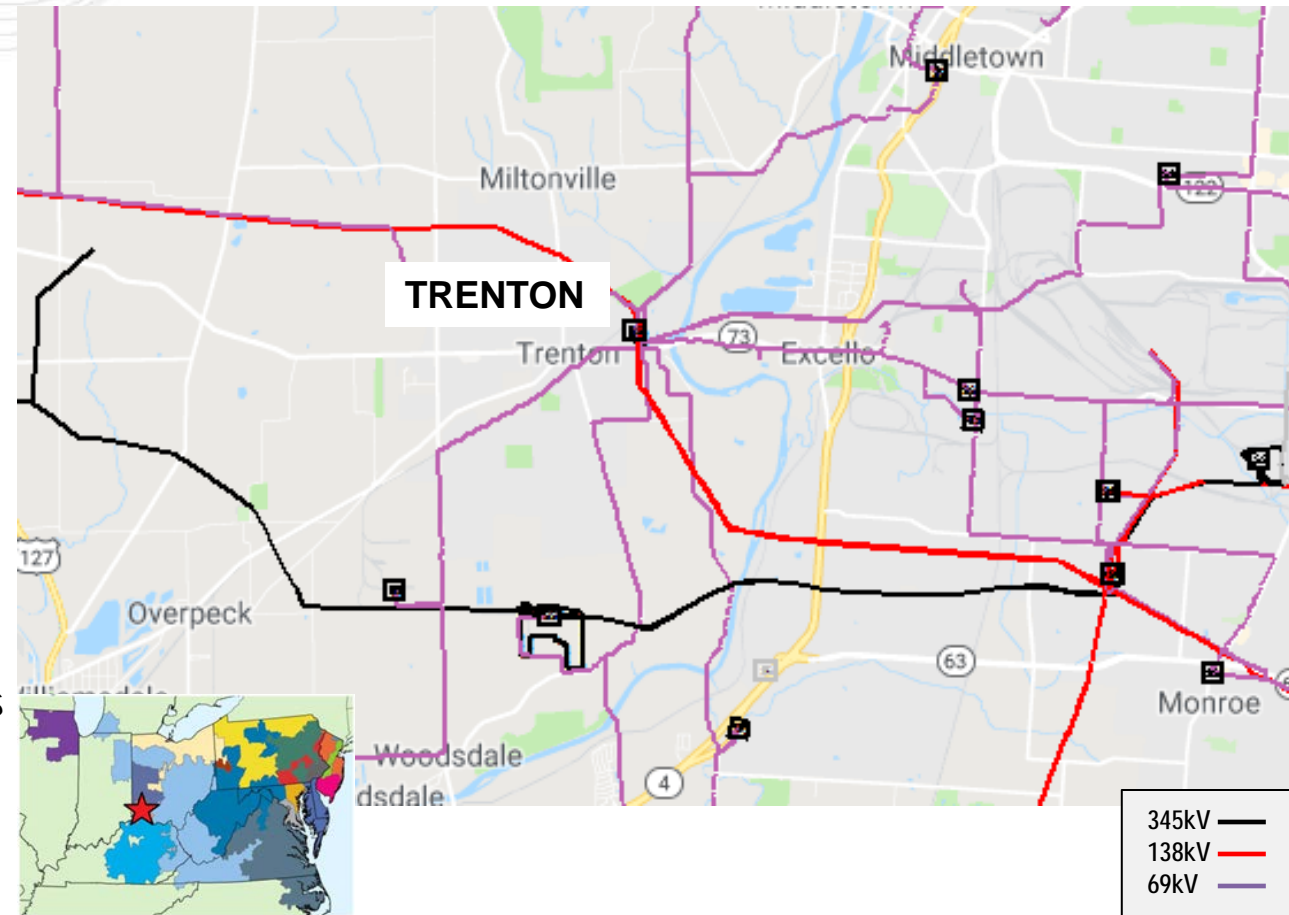
Customer Service

Specific Assumption References:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 10

Problem Statement:

An existing distribution customer is consolidating manufacturing to a facility served from Trenton substation. An additional 5MW of service is required by 01-01-2021. There are two distribution transformers at Trenton, a 22.4MVA experiencing loads near 20MVA and a 33MVA seeing loads at 34MVA.



Need Number: DEOK 2019-012

Process Stage: Solutions Meeting 05/20/2019

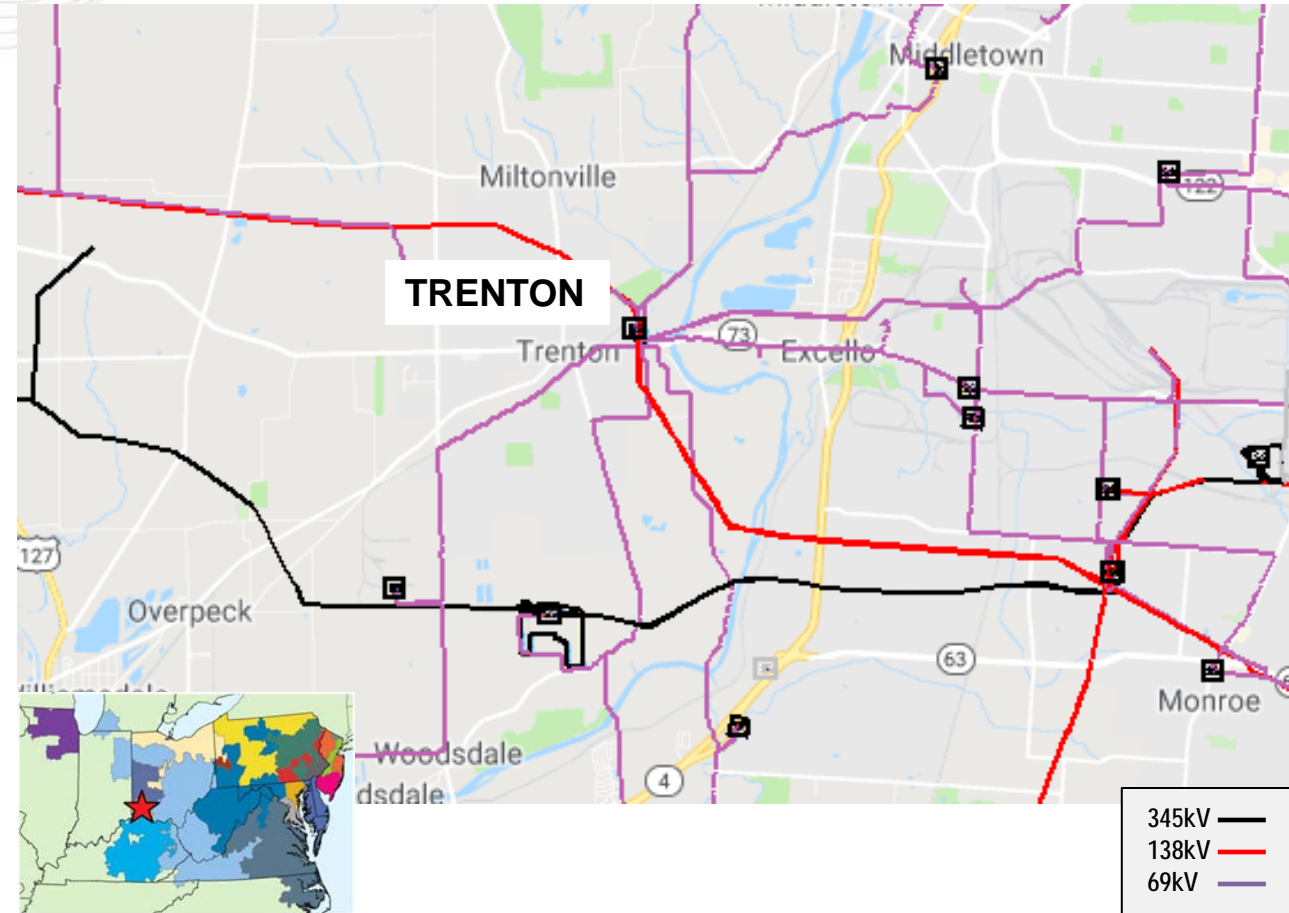
Potential Solution:

Install a 69/13kV 22MVA transformer, 13kV bus work and breakers for two feeder exits at Trenton. Reconfigure distribution feeders to balance load across all transformers. The new transformer will be connected to an existing breaker on the 69kV bus.

Transmission Cost Estimate: \$0

Alternatives: none

Projected In-service Date: 12-31-2020



Need Number: DEOK 2019-013

Process Stage: Solutions Meeting 5/20/2019

Previously Presented:

Needs Meeting 04-23-2019

Supplemental Project Driver:

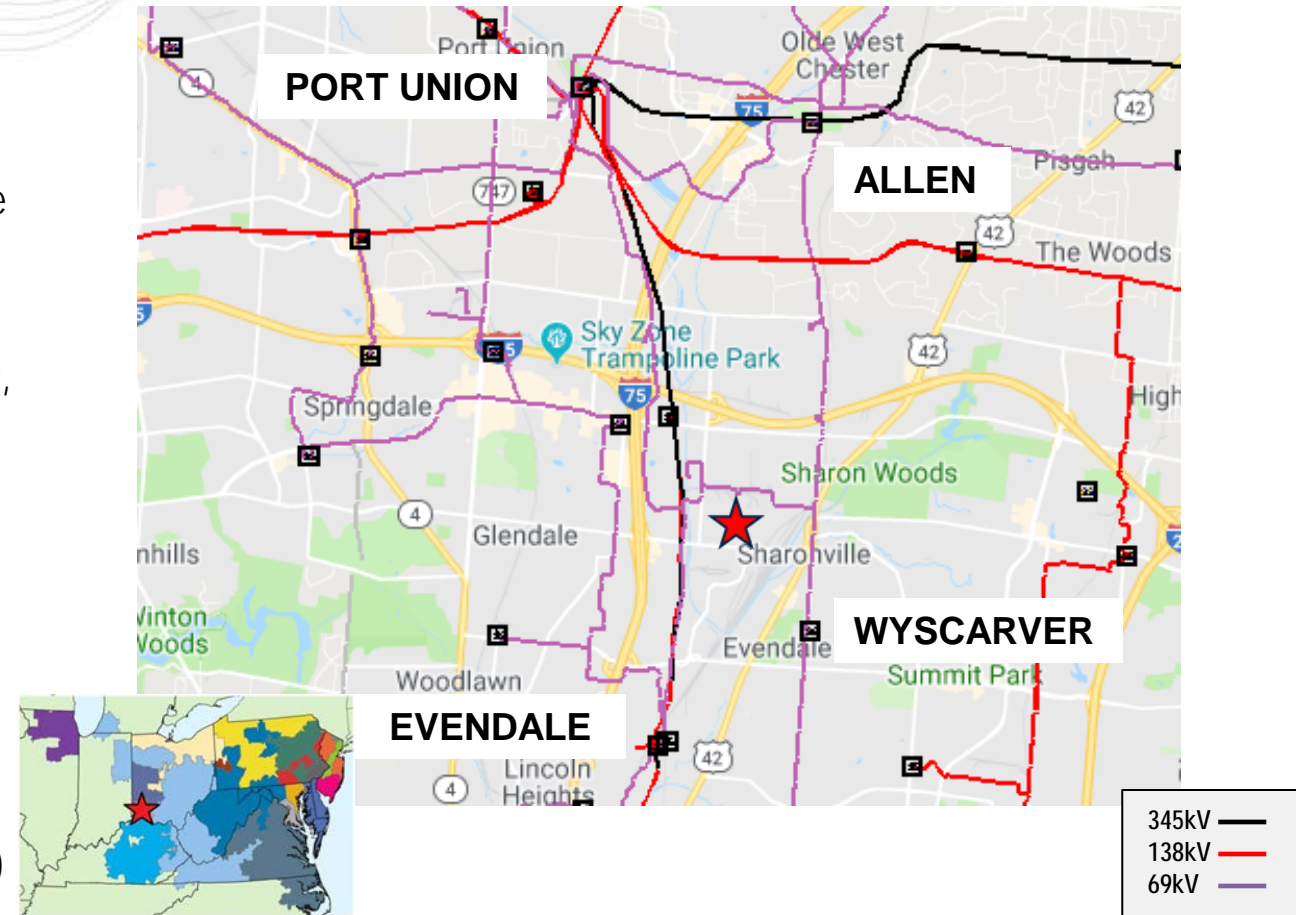
Customer Service, Operational Flexibility and Efficiency, Infrastructure Resilience

Specific Assumption References:

Duke Energy Ohio & Kentucky Local Planning Assumptions slides 8,9, and 10

Problem Statement:

An automotive manufacturer in Sharonville, Ohio is currently supplied via a tap that extends from the 69kV Evendale - Port Union feeder. This tap is also the source for an adjacent Industrial plant. The Evendale - Port Union feeder is also a source for a distribution transformer at Port Union, which supplies commercial and industrial load in the vicinity of Port Union. The circuit has 7.7 miles of line exposure in a heavily commercialized and industrial area. (continued)

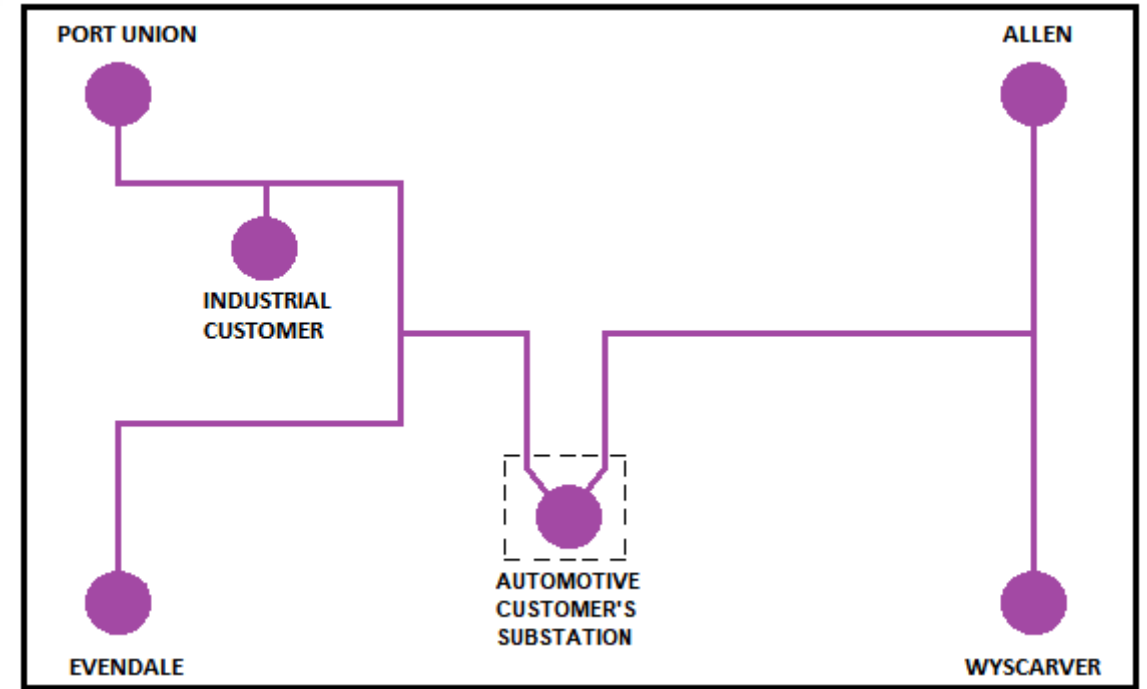


Need Number: DEOK 2019-013

Process Stage: Solutions Meeting 5/20/2019

Problem Statement:

(continued) The primary source for the automotive customer's substation is the Evendale - Port Union feeder. The substation is also connected normally open to an alternate source from the Allen - Wyscarver feeder. There is an auto throw-over (ATO) scheme to transfer to the alternate source via air break switches. Faults on the primary source lead to momentary outages and outages up to 40 seconds if the primary source fault is permanent and restoration is accomplished via the ATO. This causes significant disruption to their operations. During heavy load or abnormal system conditions, the ATO to the alternate source must be disabled. Under such circumstances, an outage of the primary source would result in an extended outage to the automotive plant. The customer has advised that just a momentary outage causes major disruption to the plant's production from which it takes up to 24 hours to recover. The disruptions have a ripple effect throughout their national production chain impacting other plants around the county. (continued)



existing configuration

345kV	—
138kV	—
69kV	—

Need Number: DEOK 2019-013

Process Stage: Solutions Meeting 5/20/2019

Problem Statement:

(continued) The adjacent industrial plant is also interrupted for events on the primary feeder. No ATO is available to restore service.

Restoration must be performed by manual inspection to determine the problem and repair, and the operation of pole mounted switches to sectionalize the circuit.

Any problem in the automotive customer's substation results in the interruption of the Evendale - Port Union path. Disrupting supply to the adjacent industrial customer and to the distribution transformer that serves commercial and industrial load near Port Union.

Any work in the automotive customer's substation must be coordinated, resulting in operational constraints.

Need Number: DEOK 2019-013

Process Stage: Solutions Meeting 5/20/2019

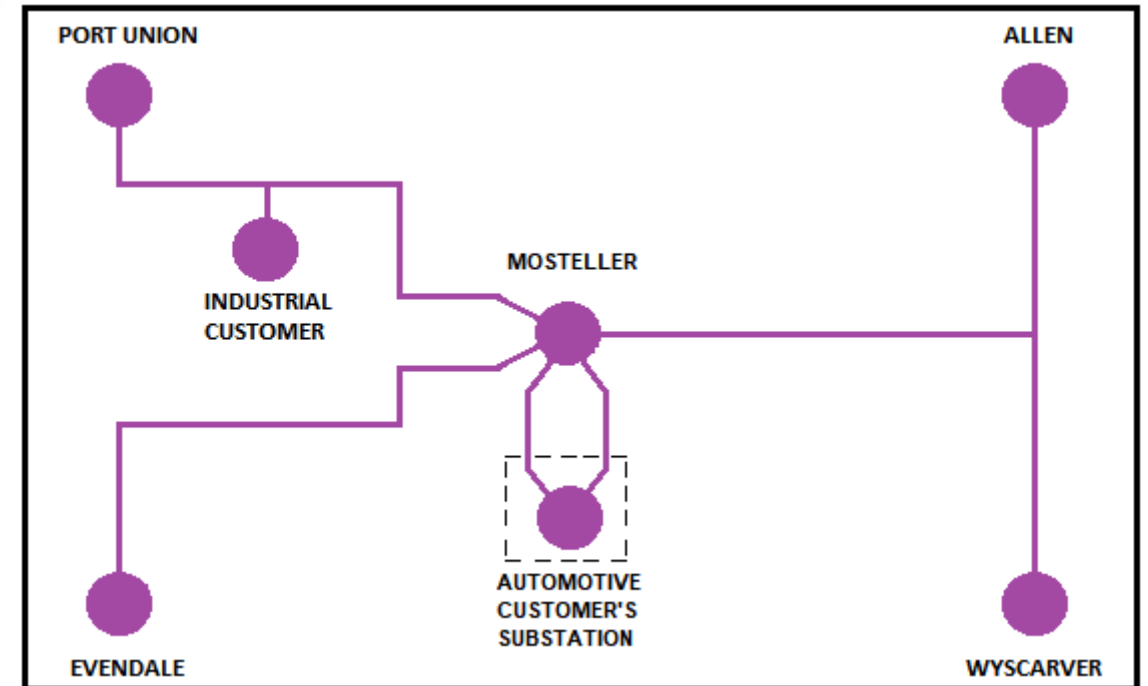
Potential Solution:

Build a new 6-position, 69kV ring bus substation adjacent to the automotive customer's substation. Split the Port Union-Evendale feeder into two segments. Connect to the new substation the feeders into the automotive customer's substation, the Port Union feeder, the Evendale feeder, and the feeder to Wyscarver-Allen. Six breakers are required so that the Evendale and Port Union feeders do not share a common breaker, and the automotive customer feeders do not share a common breaker.

Transmission Cost Estimate: \$4,877,031

Alternatives: none

Proposed In-Service Date: 12-31-2020



proposed configuration

345kV	—
138kV	—
69kV	—



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

5/9/2019 – V1 – Original version posted to pjm.com