

Submission of Supplemental Projects for Inclusion in the Local Plan

DEOK Local Plan - 2024

Need Number: DEOK-2021-002

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 06/04/2024

Needs Meeting 03/19/2021

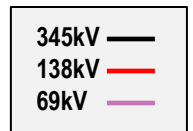
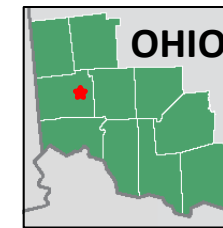
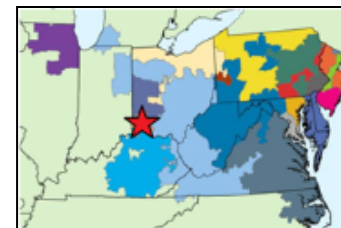
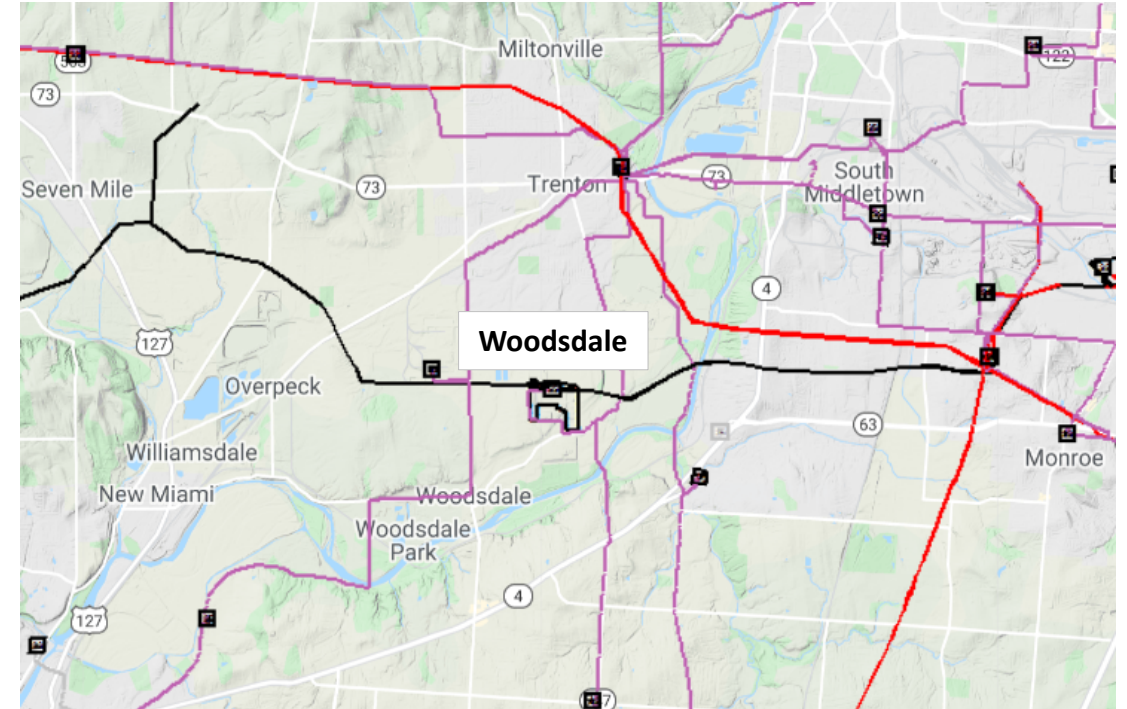
Project Driver: Equipment Condition, Performance and Risk

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slides 5-6

Problem Statement:

Woodsdale substation has nine 345 kV Cogener breakers that went into service in 1992. These breakers require intensive maintenance due to issues with hydraulic systems and oil filled CTs. Spare parts availability is challenging due to these being unique, older model breakers. The number of operations on these breakers ranges from 221 to 457.



Need Number: DEOK-2021-002

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 06/04/2024

Needs Meeting 03/19/2021

Project Driver: Equipment Condition, Performance and Risk

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slides 5-6

Solution:

Replace the circuit breakers with 3000A, gas filled circuit breakers. Replace 17 disconnect switches with 3000A switches. Replace all bus conductor with dual 1590 kcmil conductor.

Ancillary Benefit: The higher rated breakers, switches and bus conductor eliminate single element derate contingencies, making the transmission line conductors the limiting elements.

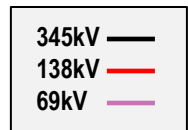
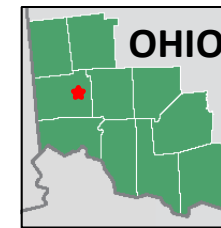
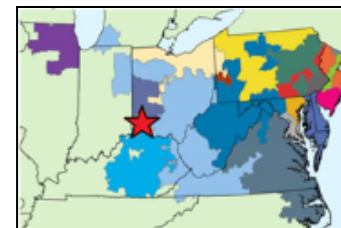
Estimated Transmission Cost: \$7,769,972

Proposed In-Service Date: 11/12/2027

Supplemental Project ID: s3447.1

Project Status: Engineering

**Bubble Diagram Not Applicable
 Station Modifications Only**



Need Number: DEOK-2022-006

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 03/15/2024

Needs Meeting 06/15/2022

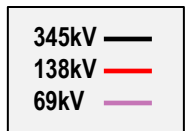
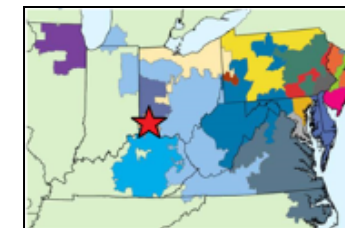
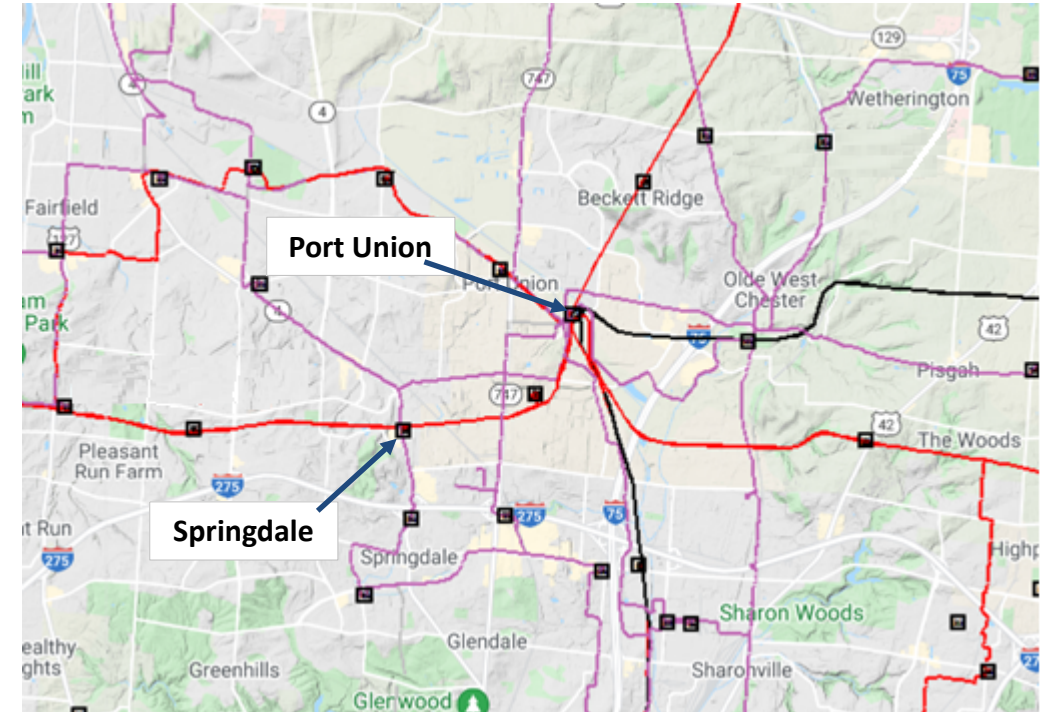
Project Driver: Equipment Condition, Performance and Risk, Operational Flexibility and Efficiency

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slides 7, 8 and 9

Problem Statement:

The 69 kV section of Port Union is 52 years old. It is built with cap and pin insulators which are known to fail. Structures are showing signs of deterioration. The older design fails to meet current minimum approach distance standards. Each of the two buses has eight breakers in a straight bus configuration. This limits operational switching affecting planned and unplanned outages.



Need Number: DEOK-2022-006

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 03/15/2024

Needs Meeting 06/15/2022

Project Driver: Equipment Condition, Performance and Risk, Operational Flexibility and Efficiency

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slides 7, 8 and 9

Solution:

Rebuild the 69 kV section of Port Union, expanding the substation to allow adequate room for minimum approach distances. Add tie breakers to split each of the buses into two sections. Redistribute the feeders among all four bus sections to increase operational flexibility.

Ancillary Benefits: Adding the tie breakers and redistributing the feeders increases reliability due to more elements remaining in service for planned and unplanned outages.

Estimated Transmission Cost: \$37,218,235

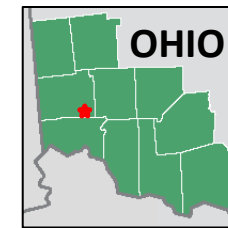
Proposed In-Service Date: 06/13/2033

Supplemental Project ID: s3380.1

Project Status: Engineering

Model: 2023 RTEP

Bubble Diagram Not Applicable
Station Modifications Only



Need Number: DEOK-2022-008

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 10/20/2023

Needs Meeting 11/18/2022

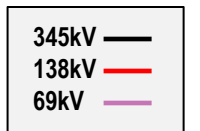
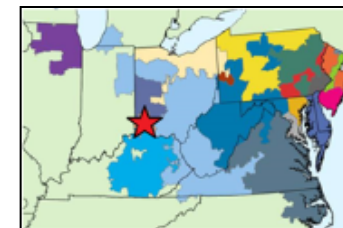
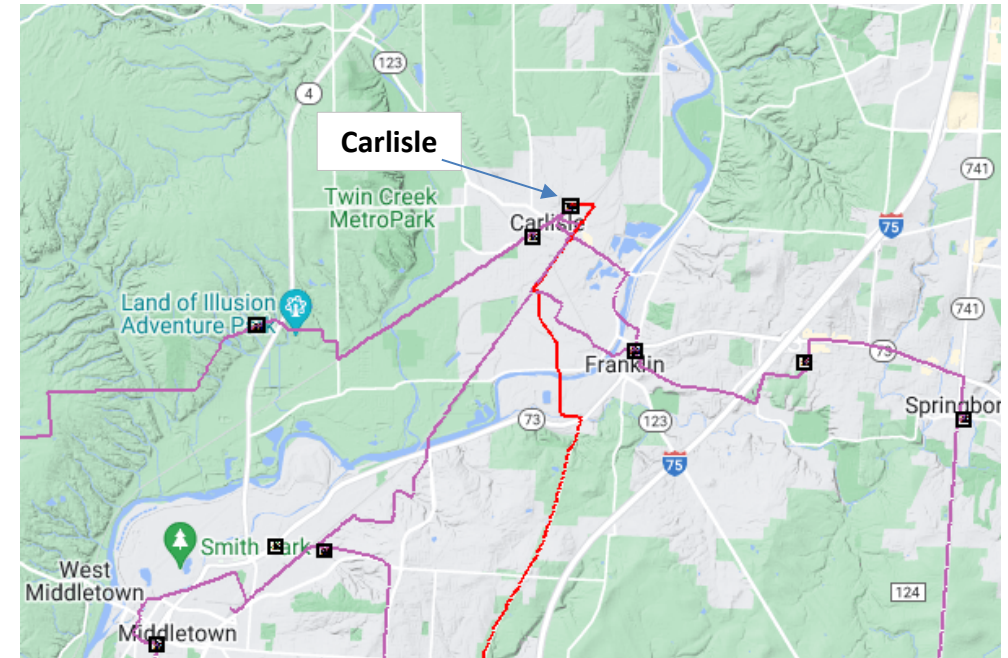
Project Driver: Equipment Condition, Performance and Risk, and Infrastructure Resilience

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slides 5, 6, & 8

Problem Statement:

138/69/13 kV Transformer TB2 at Carlisle feeds two distribution buses through a tertiary winding. This exposes the transformer to faults on the distribution system. 2000A, 69 kV breakers 619, 621, 622 and 623 are 39 years old and oil filled, requiring more maintenance due to oil handling. The mechanisms, linkages, & interrupters of these breakers are worn to the point where proper measurements are difficult to obtain & maintain. This often leads to mis-operations which could jeopardize system reliability. Spare parts for these older oil breakers are becoming difficult to find and are no longer available from the vendor. 39.6 MVAR, 69 kV Capacitor 2 is 31 years old and has reached the end of its useful life. Replacement of this fused-barrel type capacitor is recommended after 25 years.



Need Number: DEOK-2022-008

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 10/20/2023

Needs Meeting 11/18/2022

Project Driver: Equipment Condition, Performance and Risk, and Infrastructure Resilience

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slides 5, 6, & 8

Solution:

Disconnect the 13 kV tertiary winding on TB2. Install a new 138/13 kV, 22.4 MVA transformer to feed the distribution buses. Replace 69 kV breakers 619, 621, 622 and 623 with 2000A breakers. Replace Capacitor 2 with a non-fused, rack style 39.6 MVAR capacitor. Install two new 138 kV breakers to form a ring bus with the one existing breaker.

Ancillary Benefits: The 138 kV ring bus configuration provides operational options for switching, provides more options to deal with non-standard operating conditions, improves the system's ability to absorb and recover from an interruption, and reconfigures infrastructure to limit load loss.

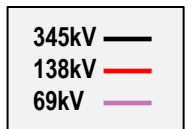
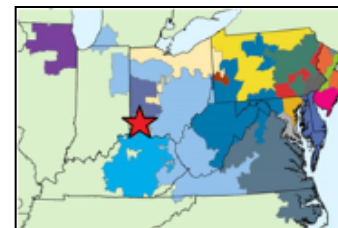
Estimated Transmission Cost: \$10,239,263

Proposed In-Service Date: 04/06/2027

Supplemental Project ID: s3381.1

Project Status: Engineering

**Bubble Diagram Not Applicable
Station Modifications Only**





DEOK Transmission Zone M-3 Process Mitchell

Need Number: DEOK-2023-003

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 05/17/2024

Needs Meeting 04/21/2023

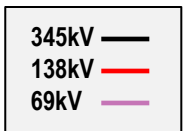
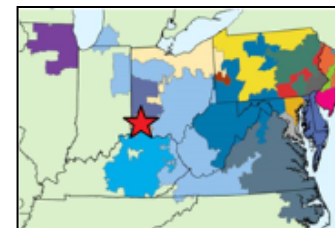
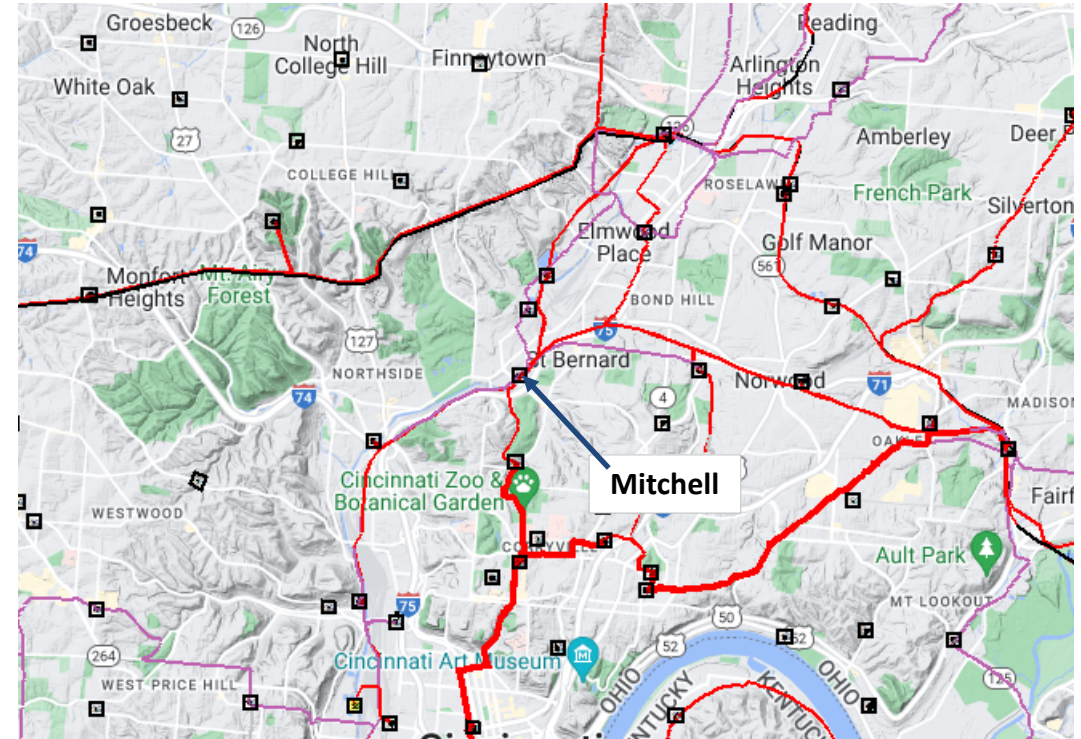
Project Driver: Customer Service

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 5

Problem Statement:

Duke Energy Distribution has requested additional capacity delivery through Mitchell substation. There is only one 138/13 kV, 22MVA transformer which connects to all three distribution feeders. The transformer is expected to start exceeding nameplate in 2025.



Need Number: DEOK-2023-003

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 05/17/2024

Needs Meeting 04/21/2023

Project Driver: Customer Service

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 5

Solution:

Relocate 138/69 kV TB 4 to make room for a 2nd 22 MVA distribution transformer, TB 6. Install a circuit breaker on the high side of TB 4 to reconnect it to 138 kV Bus 4. Install a circuit switcher on the high side of TB 6 to connect it to 138 kV Bus 4. Rework distribution feeders transferring some load from the existing distribution transformer to TB 6.

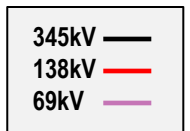
Estimated Transmission Cost: \$1,870,984

Proposed In-Service Date: 12/4/2025

Supplemental Project ID: s3377.1

Project Status: Engineering

**Bubble Diagram Not Applicable
Station Modifications Only**





DEOK Transmission Zone M-3 Process Foster

Need Number: DEOK-2023-005

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 04/19/2024

Needs Meeting 04/21/2023

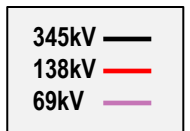
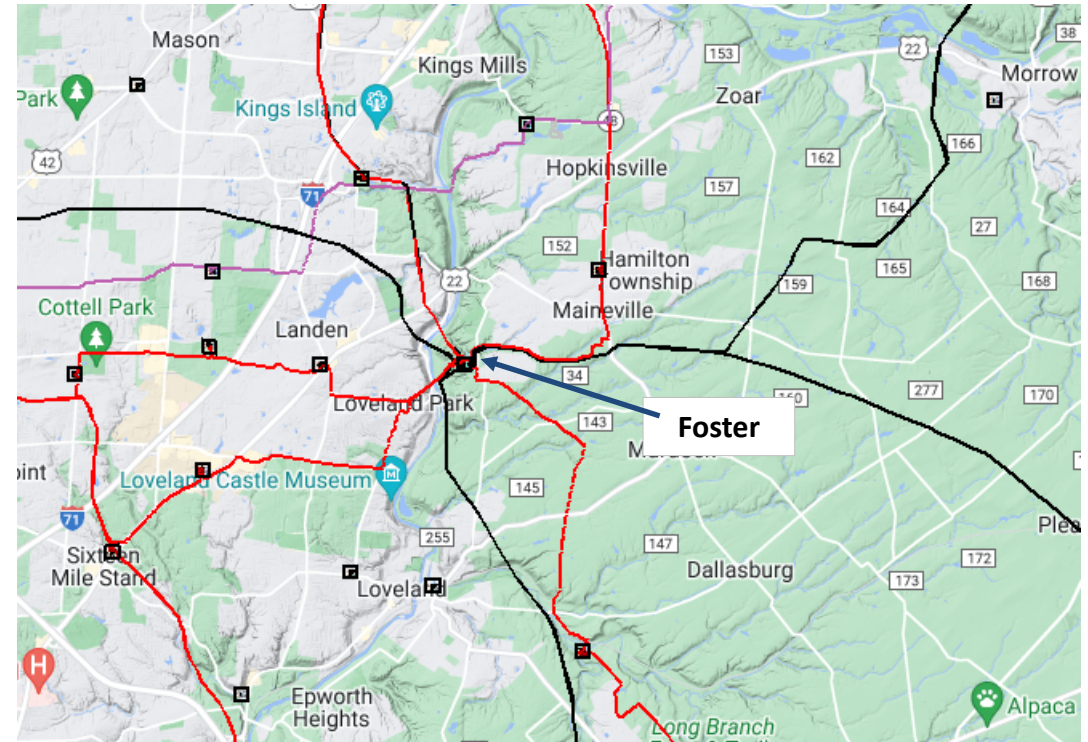
Project Driver: Equipment Condition, Performance and Risk

Specific Assumption Reference:

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

Problem Statement:

Foster 138 kV circuit breakers 961 and 962 are vintage 1969, oil filled breakers. These breakers are worn to the point where proper measurements are difficult to obtain & maintain. Spare parts for these older oil breakers are becoming hard to find and are often no longer available from the OEM's. Failure of these breakers could result in an oil spill which is an environmental concern.



Need Number: DEOK-2023-005

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 04/19/2024

Needs Meeting 04/21/2023

Project Driver: Equipment Condition, Performance and Risk

Specific Assumption Reference:

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

Solution:

Replace CB 961 with a new gas filled circuit breaker, the CB 961 disconnects and bus conductor. Replace CB 962 with a new gas filled circuit breaker, the CB 962 disconnects and bus conductor. Replace the disconnects and bus conductor for CBs 964 and 967. While scoping the project these were found to be the same vintage and condition as those for CBs 961 and 962.

Ancillary Benefits: The 138 kV bus connects to a 345/138 kV transformer through CB 962. The new breaker increases the summer B and C ratings for the transformer path from 498/498 MVA to 509/509 MVA.

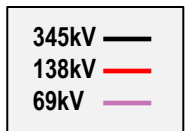
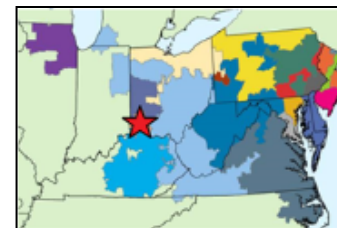
Estimated Transmission Cost: \$4,980,000

Proposed In-Service Date: 04/28/2025

Supplemental Project ID: s3379.1

Project Status: Engineering

**Bubble Diagram Not Applicable
Station Modifications Only**



Need Number: DEOK-2023-006

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 05/17/2024

Needs Meeting 04/21/2023

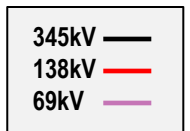
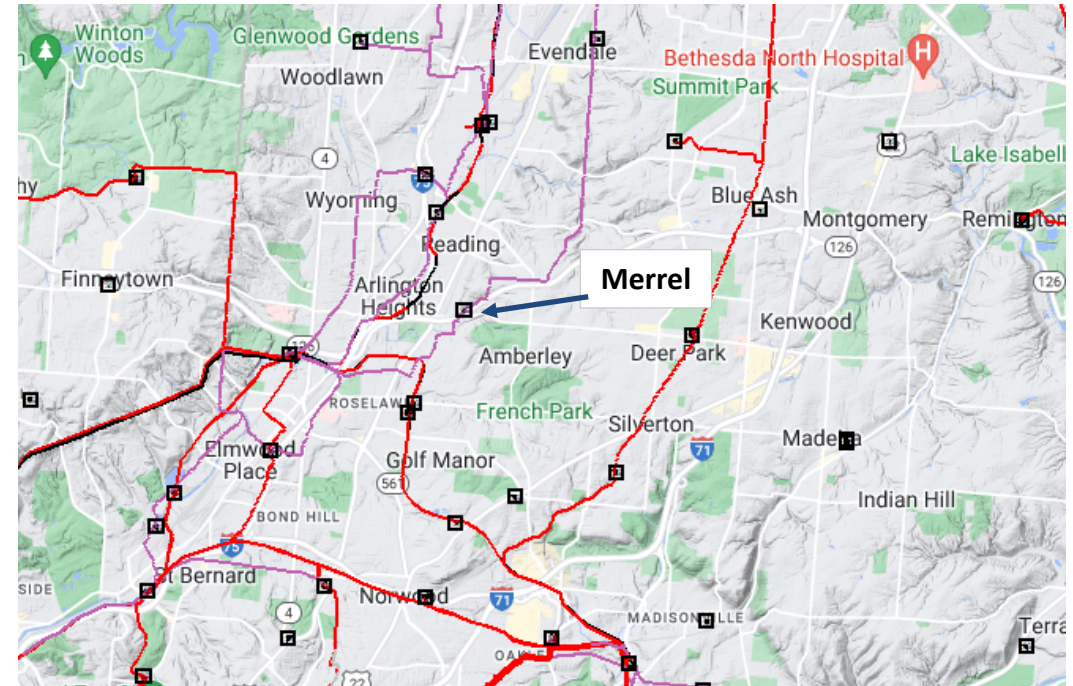
Project Driver: Customer Service

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 5

Problem Statement:

Merrel substation has two 69/13 kV, 10 MVA transformers that feed mostly industrial load. TB1 is loaded to 85% and TB2 has exceeded nameplate capacity several times in the last few summers. An industrial customer is expanding and has asked for an additional 5 MVA of service by the first quarter of 2027, with an expectation that 14 MVA may eventually be needed. The substation is land locked and lacks adequate safety clearances such that a complete substation outage is needed for maintenance. There are no options in the area to tie out customer load, or isolate substation equipment without the customer opening their switches.



Need Number: DEOK-2023-006

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 05/17/2024

Needs Meeting 04/21/2023

Project Driver: Customer Service

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 5

Solution:

Retire the existing substation. Expand the substation area to allow for new equipment installation meeting adequate safety clearances. Install new 69 kV bus, switch separated into two sections. Reconnect the 69 kV feeders to the bus with motorized switches and transmission line sectionalizing. Install two 69/13 kV, 22 MVA transformers, each connected to the 69 kV bus with circuit switchers. Install two new open air breaker sections of 13 kV bus to reconnect distribution feeders.

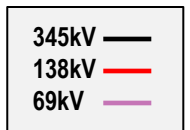
Estimated Transmission Cost: \$2,553,102

Proposed In-Service Date: 04/23/2027

Supplemental Project ID: s3378.1

Project Status: Engineering

**Bubble Diagram Not Applicable
Station Modifications Only**





DEOK Transmission Zone M-3 Process Dayton Technologies, Worthington Steel

Need Number: DEOK-2023-007

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 10/20/2023

Needs Meeting 08/18/2023

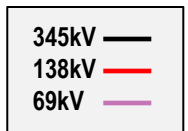
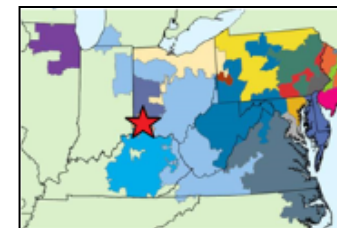
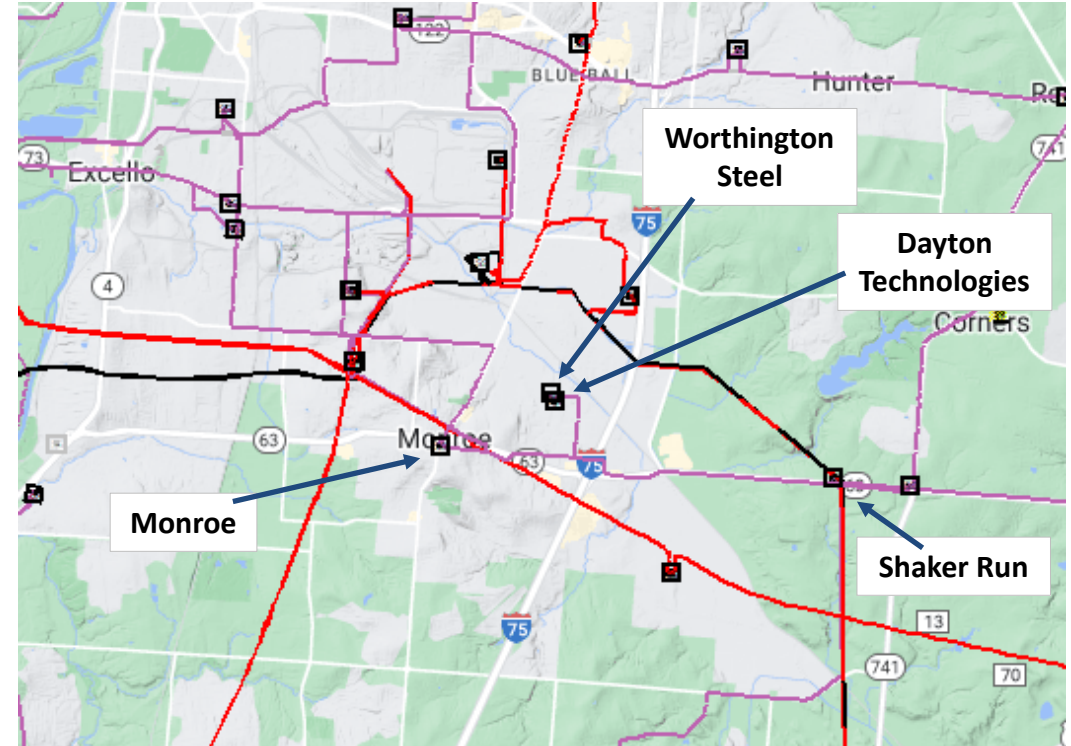
Project Driver: Operational Flexibility and Efficiency

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 8

Problem Statement:

Dayton Technologies and Worthington Steel substations supply industrial customers. They are fed from a 69 kV line tapped into the Monroe – Shaker Run feeder. Damage to the tap line or the feeder results in the inability to supply the customers for the time required to repair the damage. Scheduled work requires coordination of outage windows with both customers. In the past it's been necessary to perform maintenance work with the line energized due the inability of the customers to take an outage.





DEOK Transmission Zone M-3 Process Dayton Technologies, Worthington Steel

Need Number: DEOK-2023-007

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 10/20/2023

Needs Meeting 08/18/2023

Project Driver: Operational Flexibility and Efficiency

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 8

Solution:

Tap into the 69 kV Todhunter-Monroe feeder. Replace a 600A switch between Todhunter and the new tap with a 2000A switch to increase the capacity of the feeder. Install 0.9 miles of feeder from the new tap to Dayton Technologies using 17 steel poles with 954 ACSR conductor. Install a tap with a switch and drop to connect Worthington Steel. This configuration allows Worthington Steel and Dayton Technologies to be fed from either direction and the isolation of both individually.

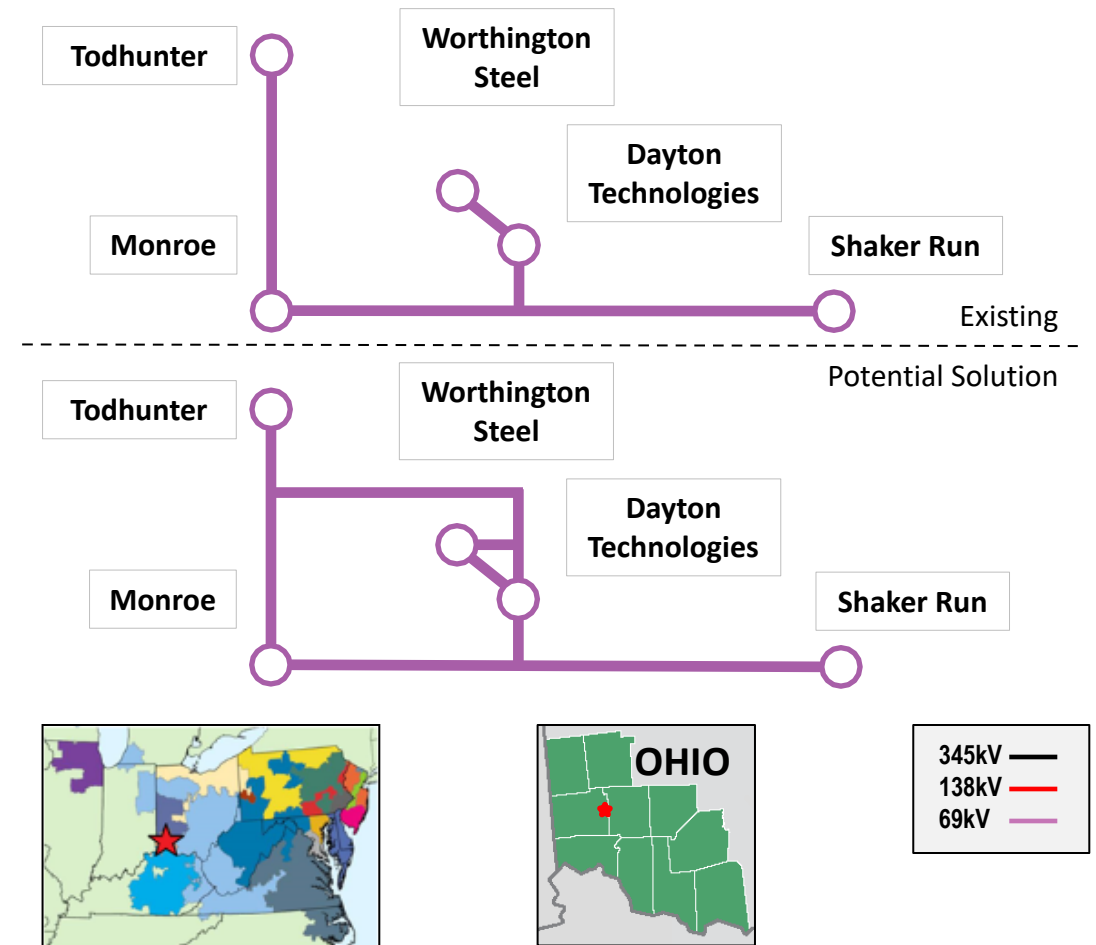
Ancillary Benefits: Loop flow between Todhunter and Shaker Run is maintained when maintenance is required at Monroe.

Estimated Transmission Cost: \$5,733,438

Proposed In-Service Date: 08/28/2026

Supplemental Project ID: s3382.1

Project Status: Engineering



Need Number: DEOK-2023-008

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 07/19/2024

Needs Meeting 11/17/2023

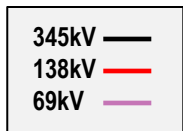
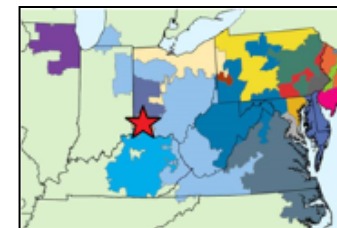
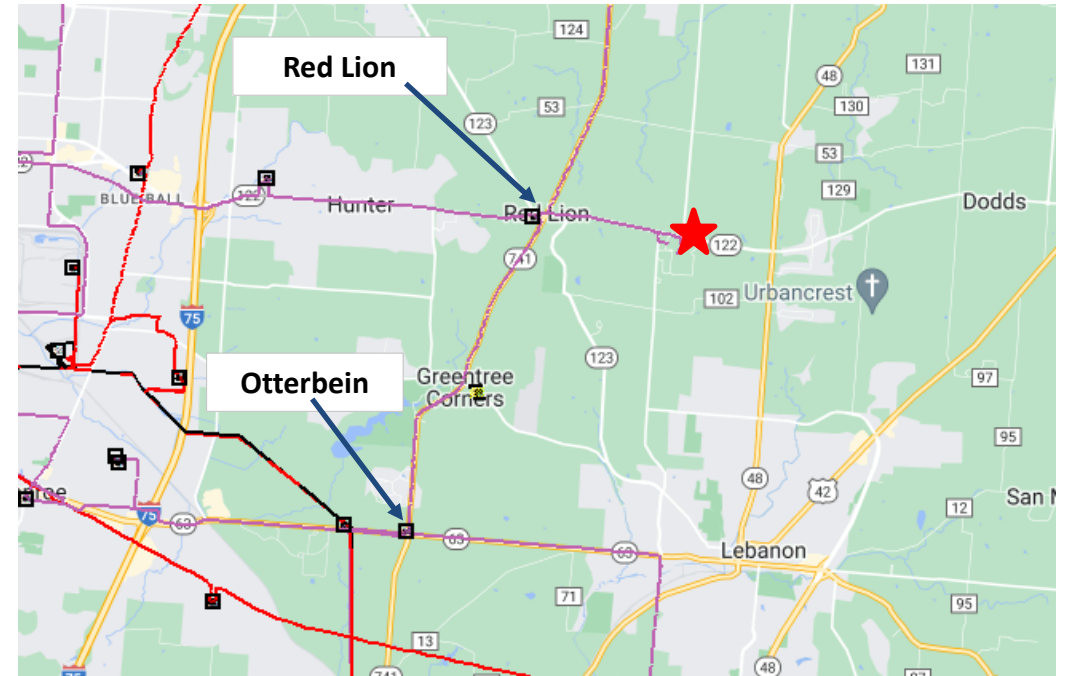
Project Driver: Customer Service

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 5

Problem Statement:

An existing customer with two 69 kV connected substations is building a third substation to serve their expanding facility. They have requested a third 69 kV connection for the new substation. 15 MW of new load is expected by Q1 2026.





DEOK Transmission Zone M-3 Process Existing Customer New Substation

Need Number: DEOK-2023-008

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 07/19/2024

Needs Meeting 11/17/2023

Project Driver: Customer Service

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 8

Solution:

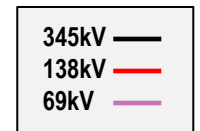
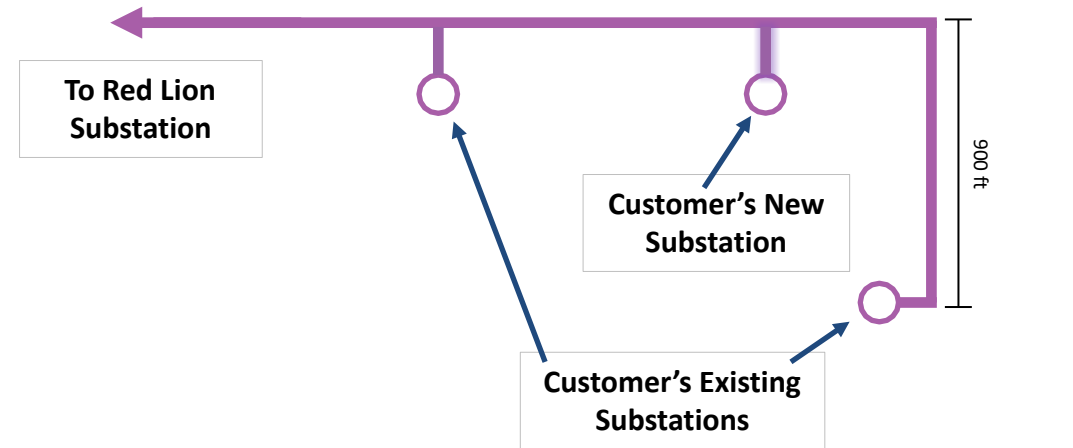
Tap the existing feeder adjacent to customer's new substation. Install three steel poles: one at the tap, one to support a line switch, and one to support two spans to the customer's substation. Install a motorized line switch with SCADA control. Connect all with 954 ACSR conductor. Install revenue metering in the customer's new substation.

Estimated Transmission Cost: \$499,100

Proposed In-Service Date: 02/23/2026

Supplemental Project ID: s3443.1

Project Status: Engineering





DEOK Transmission Zone M-3 Process Millville - Layhigh

Need Number: DEOK-2024-001

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 05/17/2024

Needs Meeting 01/19/2024

Project Driver: Equipment Condition, Performance and Risk

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slides 7-8

Problem Statement:

A 69 kV feeder section that runs from Millville (Duke) to Layhigh (Butler Rural Electric Cooperative) is in deteriorating condition. Inspections have recorded 38 structure rejects due to ground line rot, pole top rot and bird holes. There are ten open ground lines. Since 2018 there have been 36 interruptions on the line, 14 sustained and 22 momentary, with an average of 274 minutes/outage and 96,000 CMI/outage. The outage causes vary, consisting of broken or damaged insulators, conductors, or crossarms, vegetation encroachment, lightning, and vehicle impacts. The entire feeder, end to end, serves 25,561 customers and connects Butler Rural Electric Cooperative substations: Colerain, Ross, Layhigh, Stillwell-Beckett, Oxford, and Reily.

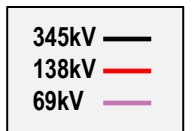
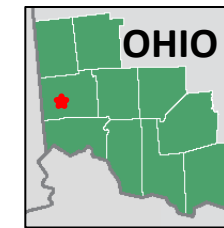
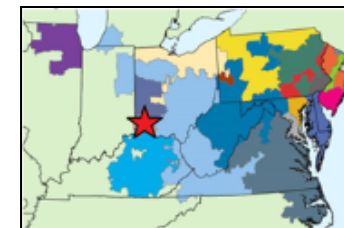
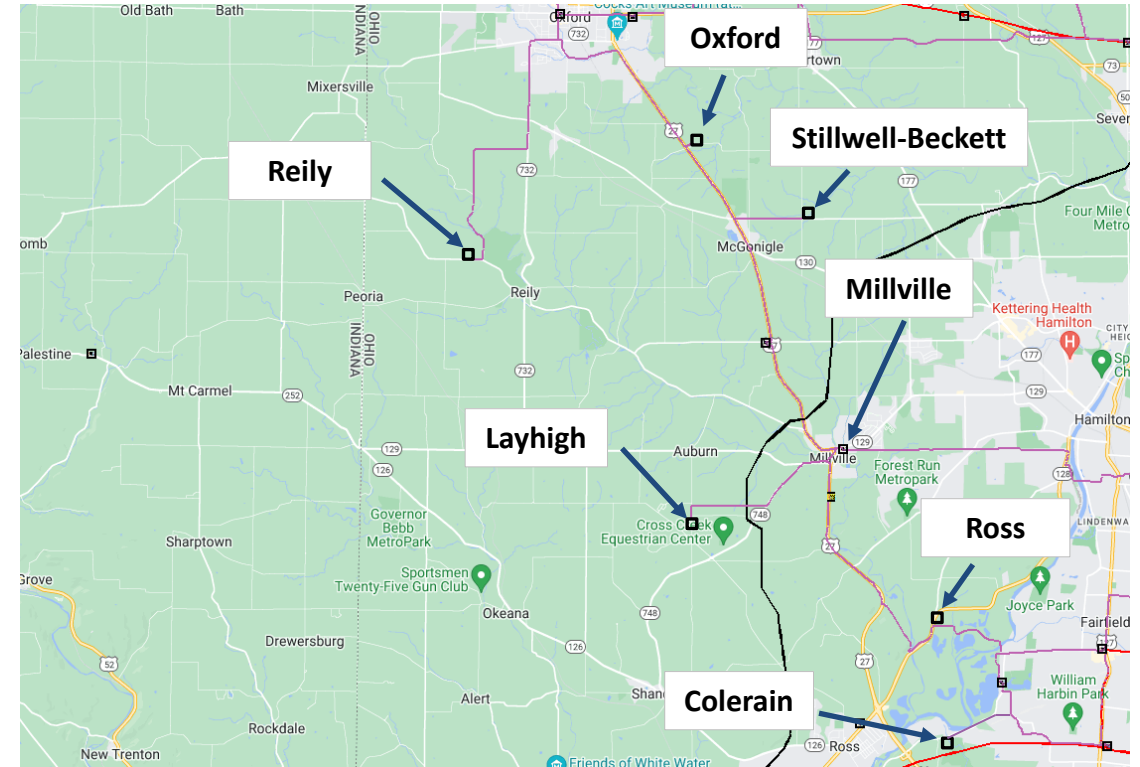
Line Characteristics:

Original Install Date: 1955

Length: 3.23 miles / 83 poles

Construction Type: Single wood pole with suspension insulators

Conductor Type: 4/0-6/1 ACSR





DEOK Transmission Zone M-3 Process Millville - Layhigh

Need Number: DEOK-2024-001

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 05/17/2024

Needs Meeting 01/19/2024

Project Driver: Equipment Condition, Performance and Risk

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slides 7-8

Solution:

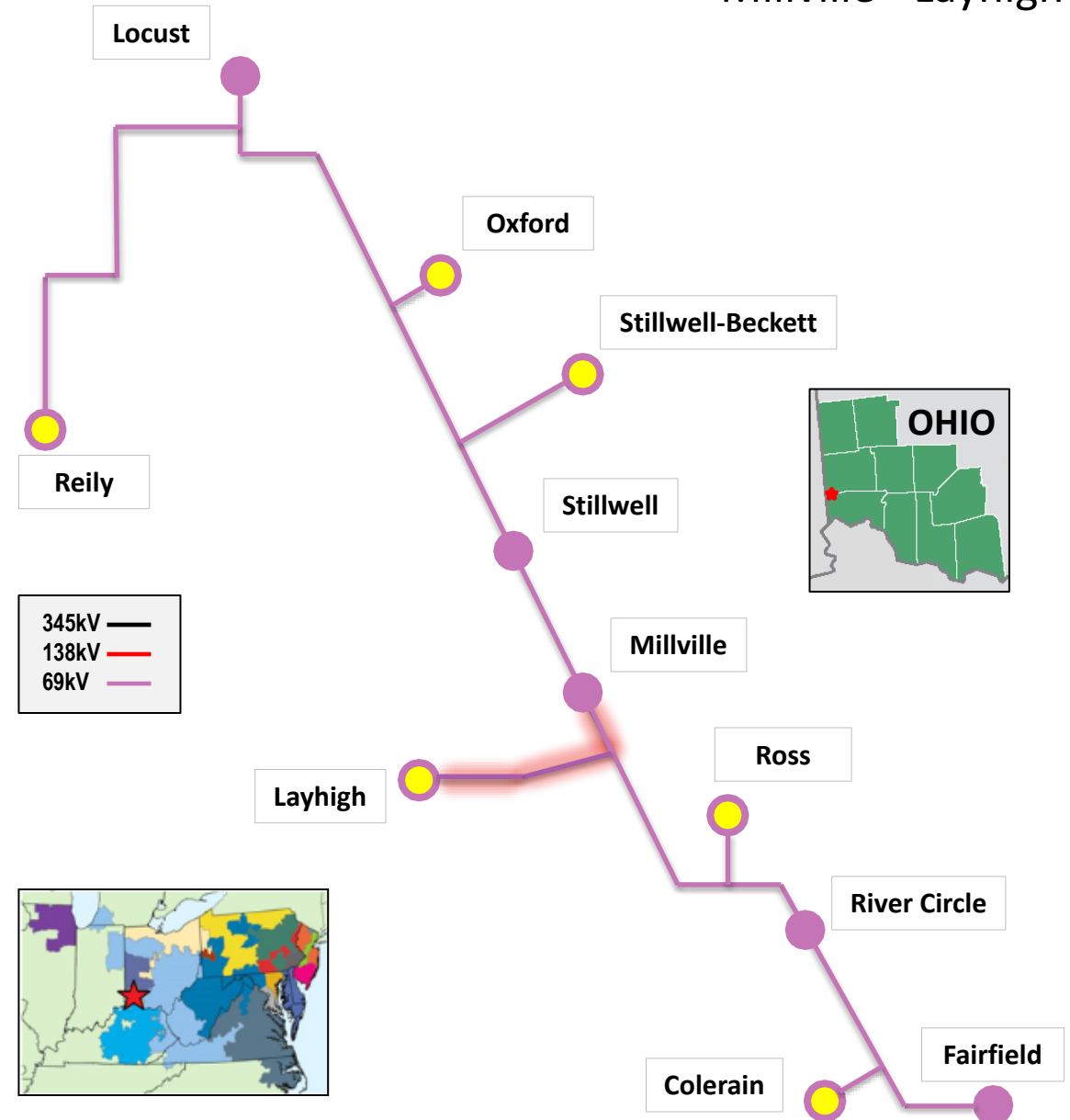
From Layhigh to the tap to Millville; replace wooden structures with steel pole structures, reconductor the line with 954ACSR, retire a switch between Layhigh and the tap. The new ratings increase to 150/150/174 MVA summer, 189/189/206 MVA winter.

Estimated Transmission Cost: \$8,496,341

Proposed In-Service Date: 05/06/2026

Supplemental Project ID: s3386.1

Project Status: Engineering





DEOK Transmission Zone M-3 Process Evendale

Need Number: DEOK-2024-002

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 07/19/2024

Needs Meeting 02/16/2024

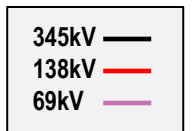
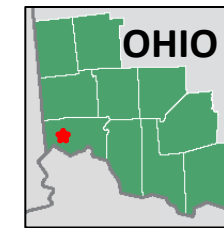
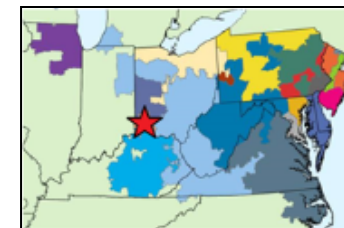
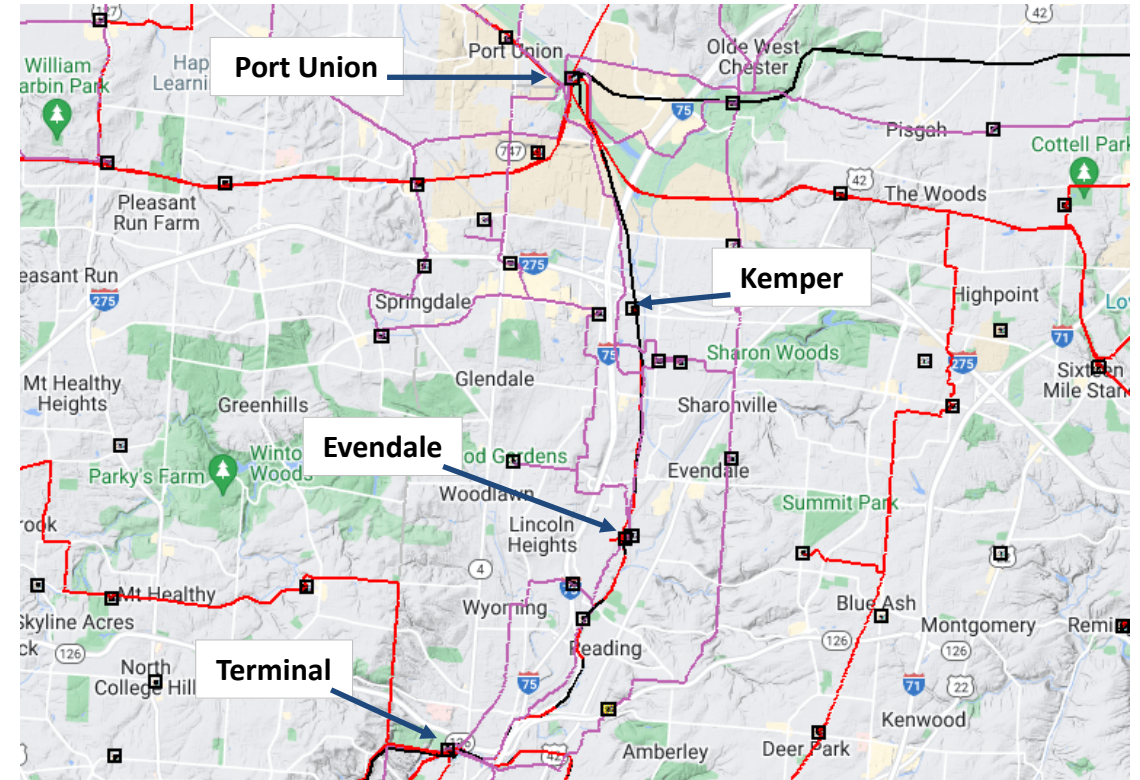
Project Drivers: Infrastructure Resilience, Equipment condition, performance and risk

Specific Assumption References:

Duke Energy Ohio & Kentucky Local Planning Assumptions slides 7-8, 10

Problem Statement:

Evendale substation supplies a large industrial customer. 138 kV Buses 1 and 2 are tied together with breaker CB930. A CB930 failure will trip both Bus 1 and Bus 2 resulting in a complete interruption of service to the customer, and the tripping of two 138/69 kV transformers that supply the 69 kV network in this industrial area. Port Union CB835 connects the feeder from Port Union through Kemper to Evendale. It's a 53-year-old, oil filled breaker. Oil spills are frequent with breaker failures presenting an environmental hazard. Spare parts for this older style breaker are more difficult to find.



Need Number: DEOK-2024-002

Process Stage: Local Plan Submission 09/20/2024

Previously Presented:

Solutions Meeting 07/19/2024

Needs Meeting 02/16/2024

Project Drivers: Infrastructure Resilience, Equipment condition, performance and risk

Specific Assumption References:

Duke Energy Ohio & Kentucky Local Planning Assumptions slides 7-8, 10

Solution:

At Evendale, disconnect CB930 and save it for re-use. In an open, adjacent bay install a new 3000A gas circuit breaker in series with CB929 creating a double bus, double breaker connection for the feeder that connects Evendale through Kemper to Port Union. Install new line and bus disconnects and connecting bus conductors. This double breaker configuration removes the total interruption of service contingency and acts as a but tie.

At Port Union, replace CB835 with a new 3000A gas circuit breaker, its line and bus disconnects, and connecting bus conductors. Circuit limiting CTs are being replaced with CB835. The new ratings for the circuit from Port Union to Kemper are 394/394 MVA summer and 487/487 MVA winter.

Alternatives: Move CB930 to the new position. However, the new circuit breaker will need to be in service before CB930 is disconnected.

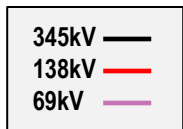
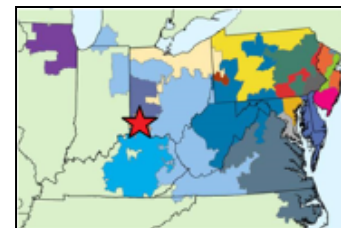
Estimated Transmission Cost: \$3,064,034

Proposed In-Service Date: 11/19/2026

Supplemental Project ID: s3444.1

Project Status: Engineering

**Bubble Diagram Not Applicable
Station Modifications Only**



Revision History

9/25/2024 – V1 – Added s3447.1, s3380.1, s3381.1, s3377.1, s3379.1, s3378.1, s3382.1, s3443.1, s3386.1, s3444.1