

Submission of Supplemental Projects for Inclusion in the Local Plan

Need Number: DEOK-2019-027

Process Stage: Local Plan Submission 02-27-2023

Previously Presented:

Solutions Meeting 10-14-2022

Needs Meeting 11-22-2019

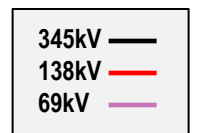
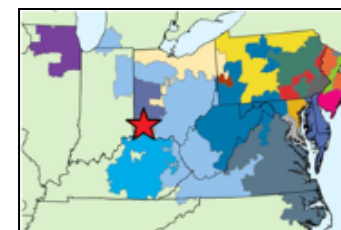
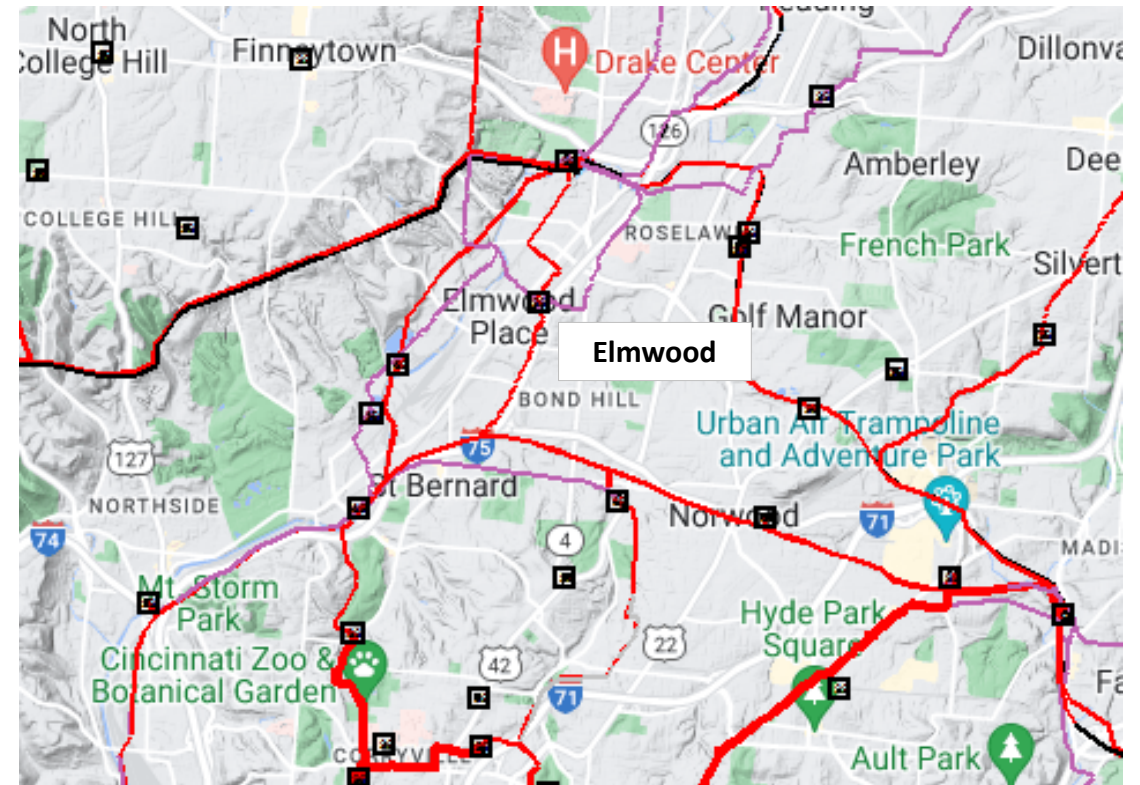
Project Driver: Customer Service

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 9

Problem Statement:

At Elmwood substation Duke Distribution is replacing switchgear on 13 kV Bus 1 and 13 kV Bus 2 with open air breakers. Buses 1 and 2 presently have a single feed, the tertiary winding of 138/69/13 kV, 55 MVA TB6. The transmission system is exposed to faults from five distribution feeders through this tertiary winding.



Need Number: DEOK-2019-027

Process Stage: Local Plan Submission 02-27-2023

Previously Presented:

Solutions Meeting 10-14-2022

Needs Meeting 11-22-2019

Project Driver: Customer Service

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 9

Selected Solution:

Remove the 13 kV switchgear. Demolish the switchgear building. Install new 13 kV bus with breakers for five feeder exits. Install a control building to house control and communications equipment. Demolish the existing 69 kV single bay tower. Install a 4-bay, 69 kV box structure with four 69 kV breakers to create a ring bus. Install two 138 kV breakers into an existing box structure to create a ring bus. Remove the 13 kV tertiary connection on TB6. Install one 138/13 kV and two 69/13 kV, 22 MVA transformers.

Estimated Transmission Cost: \$14.5MM

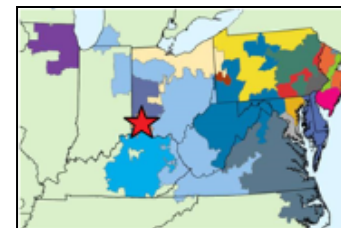
Proposed In-Service Date: 06-10-2026

Supplemental Project ID: s2833

Project Status: Engineering

Model: 2022 RTEP

**Bubble Diagram Not Applicable
Station Modifications Only**



Need Number: DEOK-2021-006

Process Stage: Local Plan Submission 04-10-2023

Previously Presented:

Solutions Meeting 11-18-2022

Needs Meeting 04-16-2021

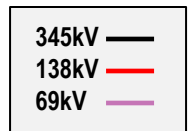
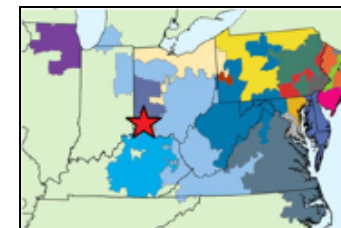
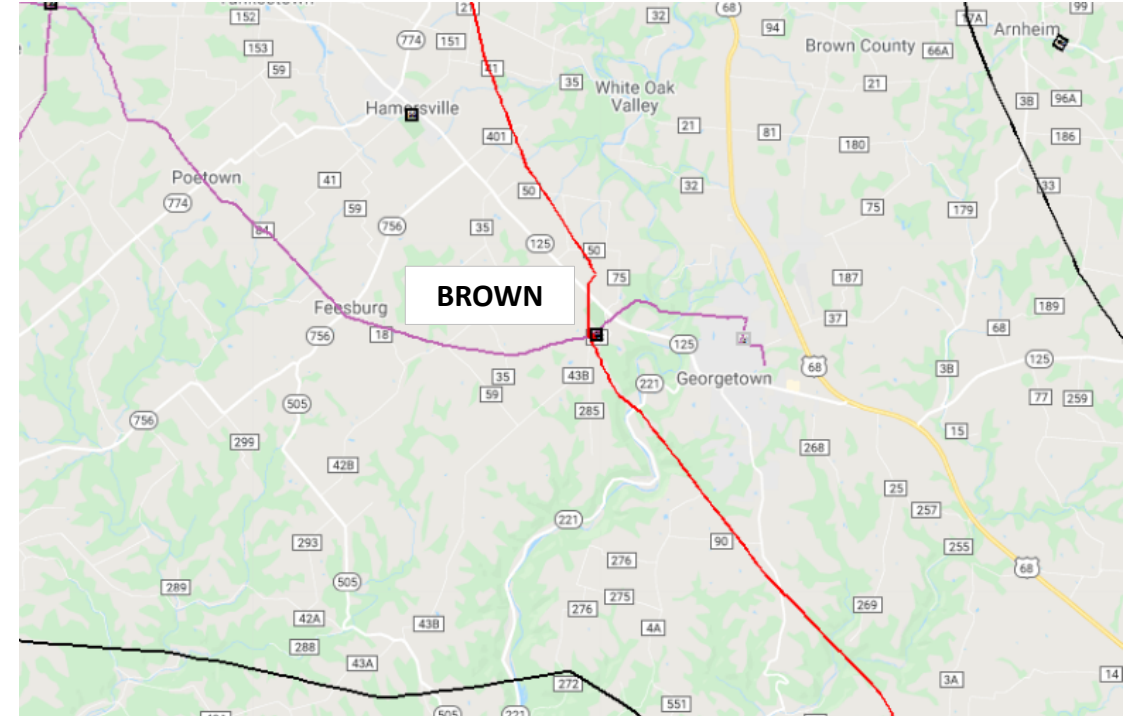
Project Driver: Infrastructure Resilience

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 8

Problem Statement:

Brown TB1 is a 138/69/34 kV 3-winding transformer. The tertiary winding is connected to a 34 kV distribution bus. This old design exposes the transformer to faults on the distribution system.



Need Number: DEOK-2021-006

Process Stage: Local Plan Submission 04-10-2023

Previously Presented:

Solutions Meeting 11-18-2022

Needs Meeting 04-16-2021

Project Driver: Infrastructure Resilience

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 8

Selected Solution:

Disconnect Brown TB1's 34 kV tertiary winding. Install a new 138 kV circuit breaker into the ring bus to create a new position. Connect a new 138/34 kV, 60 MVA transformer in this position. Feed the 34 kV distribution bus from the new transformer. Expand the substation to make room for the new transformer and equipment.

Estimated Transmission Cost: \$1,260,073

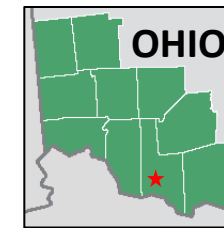
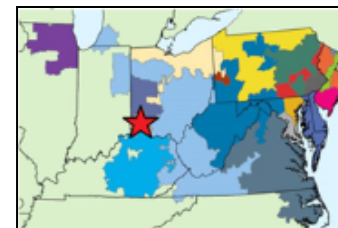
Proposed In-Service Date: 02-02-2026

Supplemental Project ID: s2846

Project Status: Engineering

Model: 2022 RTEP

**Bubble Diagram Not Applicable
Station Modifications Only**



Need Number: DEOK-2022-009

Process Stage: Local Plan Submission 06-08-2023

Previously Presented:

Solutions Meeting 02-17-2023

Needs Meeting 11-18-2022

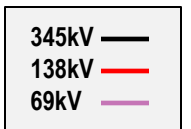
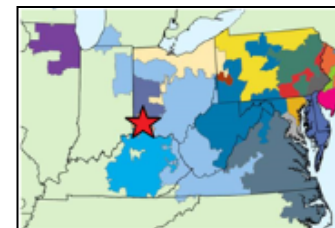
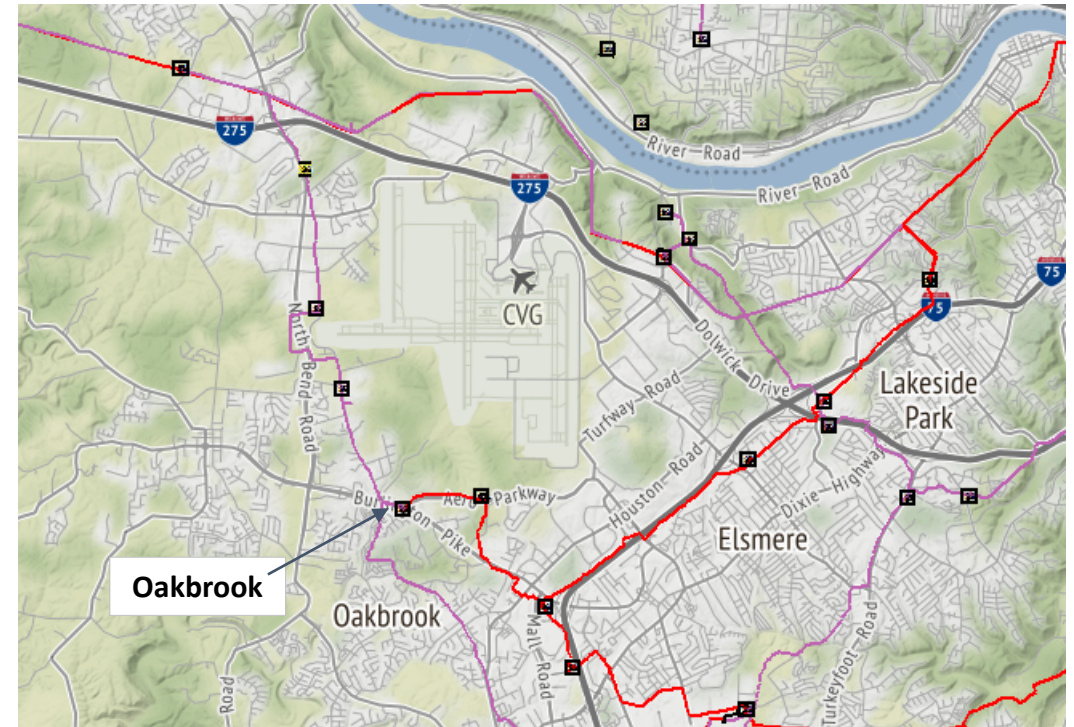
Project Driver: Customer Service

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 9

Problem Statement:

Due to continued commercial and industrial load growth in the area near the Cincinnati/Northern Kentucky International Airport, Duke Energy Distribution has requested the installation of a second 69/13 kV, 22 MVA transformer at Oakbrook substation. An additional 10 MVA of load is expected by Q4 2026.



Need Number: DEOK-2022-009

Process Stage: Local Plan Submission 06-08-2023

Previously Presented:

Solutions Meeting 02-17-2023

Needs Meeting 11-18-2022

Project Driver: Customer Service

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 9

Selected Solution:

Install a new 138/13 kV, 22 MVA transformer and 13 kV bus work for two feeder exits. Roll the incoming 138 kV feeder phases to align with the transformer installation.

Ancillary Benefits: Using 138 kV as the primary relieves the burden on the 69 kV circuit which is at its capacity limit.

Estimated Transmission Cost: \$40,965

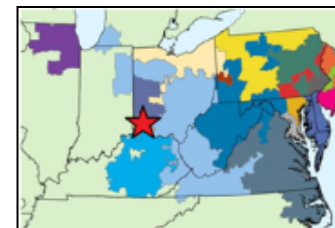
Proposed In-Service Date: 11-06-2025

Supplemental Project ID: s2910

Project Status: Engineering

Model: 2022 RTEP

**Bubble Diagram Not Applicable
Station Modifications Only**



345kV —
138kV —
69kV —

Need Number: DEOK-2019-024

Process Stage: Local Plan Submission 06-08-2023

Previously Presented:

Solutions Meeting 03-17-2023

Needs Meeting 11-22-2019

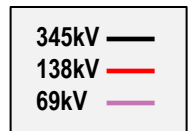
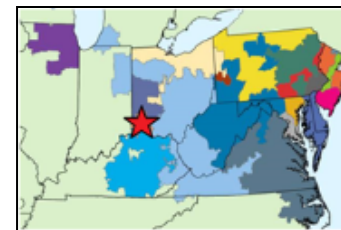
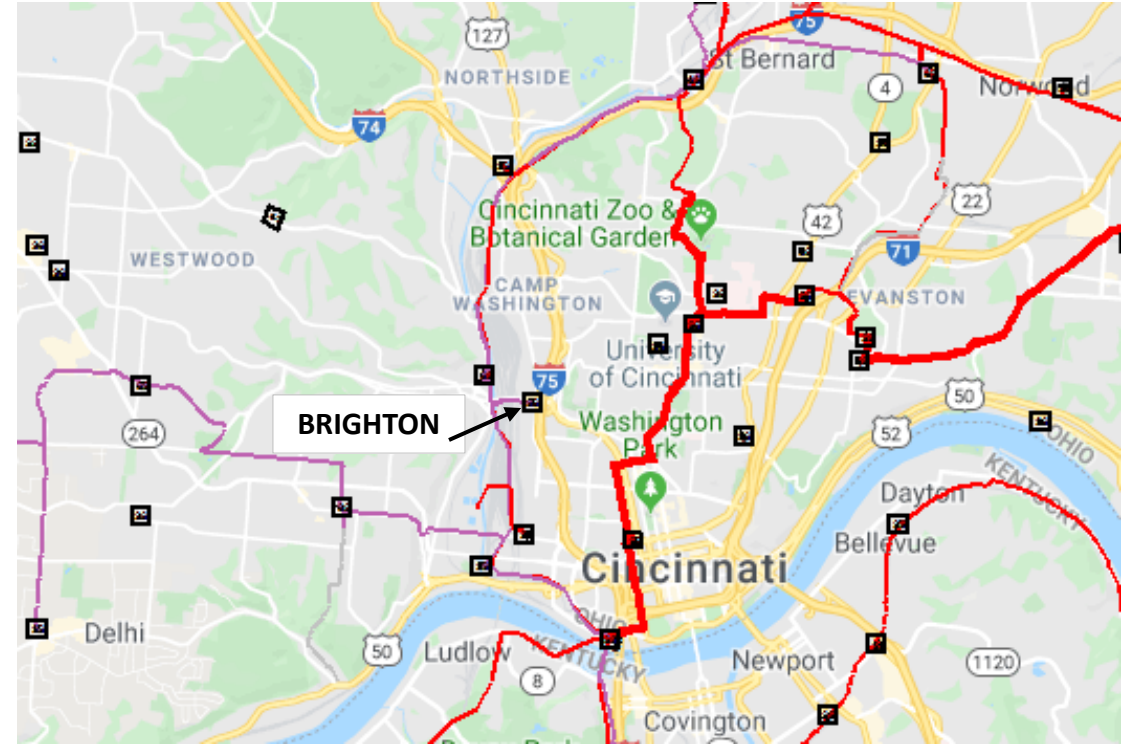
Project Driver: Other

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 11

Problem Statement:

The City of Cincinnati is planning to replace the Western Hills Viaduct. The new roadway will be constructed immediately south of the existing roadway. Brighton substation is in the path of the new roadway. Brighton serves 40MW of residential, commercial and light industrial load with two 69/13kV 35MVA transformers connected to five feeder exits each.





DEOK Transmission Zone M-3 Process

Need Number: DEOK-2019-024

Process Stage: Local Plan Submission 06-08-2023

Previously Presented:

Solutions Meeting 03-17-2023

Needs Meeting 11-22-2019

Project Driver: Other

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 11

Selected Solution:

Disconnect the 69 kV feeder loop connecting Brighton substation. Demolish and remove Brighton. Build Camp Washington, a new 3-breaker ring bus substation to serve area load formally served by Brighton. Install three 138/13 kV, 22 MVA transformers and switchgear for distribution feeders. Due to land constraints two of the ring positions in this small substation will also loop the South Fairmount-Metro Sewer 138 kV feeder through Camp Washington.

Ancillary Benefits: 138 kV is a stronger source for the area load. The 3-breaker ring allows more switching options and increases reliability and resilience.

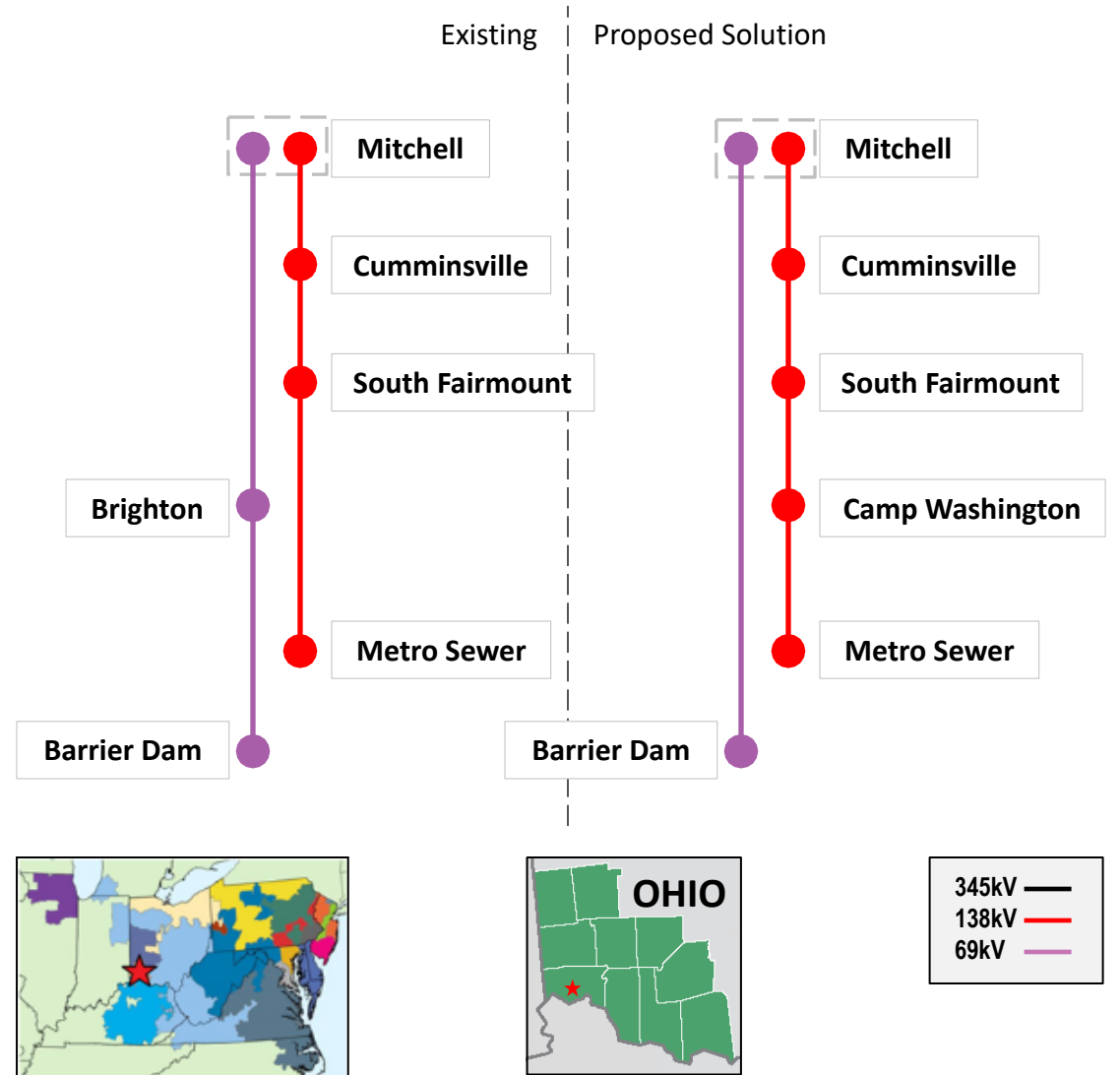
Estimated Transmission Cost: \$19.5MM

Proposed In-Service Date: 12-19-2025

Supplemental Project ID: s2918

Project Status: Engineering

Model: 2022 RTEP



Need Number: DEOK-2023-002

Process Stage: Local Plans Submission 06-08-2023

Previously Presented:

Solutions Meeting 03/17/2023

Needs Meeting 02/17/2023

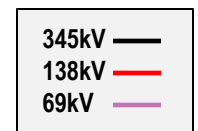
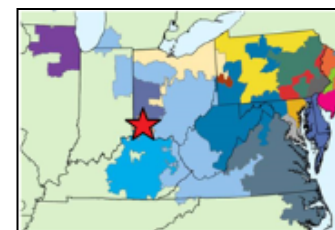
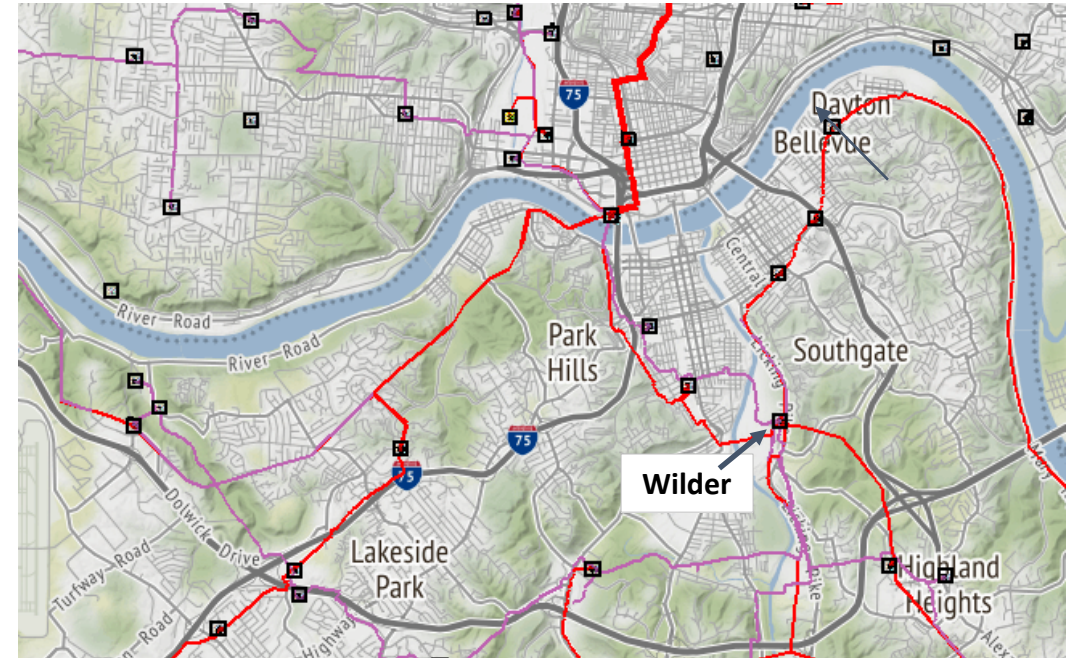
Project Driver: Equipment condition, Performance and Risk

Specific Assumption Reference:

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

Problem Statement:

Wilder 138 kV CB 836 is a vintage 1968 oil filled circuit breaker that is in deteriorating condition. The most recent service indicates the internal wear is exceeding its normal maintenance cycle and is trending towards costly repairs. This breaker also has type U bushings which are known to be prone to failure.



Need Number: DEOK-2023-002

Process Stage: Local Plans Submission 06-08-2023

Previously Presented:

Solutions Meeting 03/17/2023

Needs Meeting 02/17/2023

Project Driver: Equipment Condition, Performance and Risk

Specific Assumption Reference:

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

Potential Solution:

Replace Wilder 138 kV CB 836, its bus and line disconnect switches, and drops from the switches to the breaker.

Ancillary Benefits: Removes the environmental hazard of the oil in the old breaker. The replacement of the drops raises the capacity of the circuit by 8 MVA.

Estimated Transmission Cost: \$655K

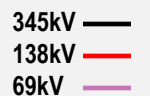
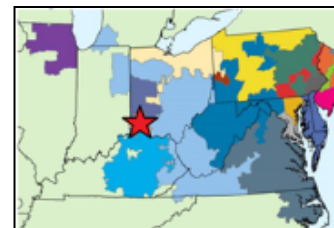
Proposed In-Service Date: 03-25-2024

Supplemental Project ID: s2919

Project Status: Engineering

Model: 2022 RTEP

**Bubble Diagram Not Applicable
Station Modifications Only**



Need Number: DEOK-2021-007

Process Stage: Local Plan Submission 09-07-2023

Previously Presented:

Solutions Meeting 04-21-2023

Needs Meeting 06-15-2021

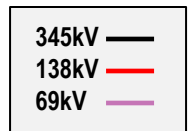
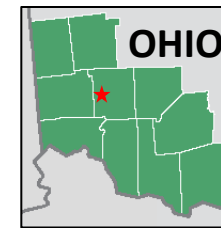
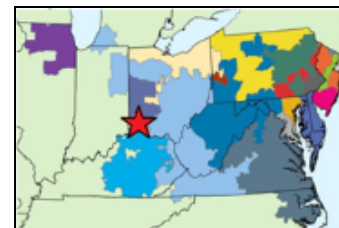
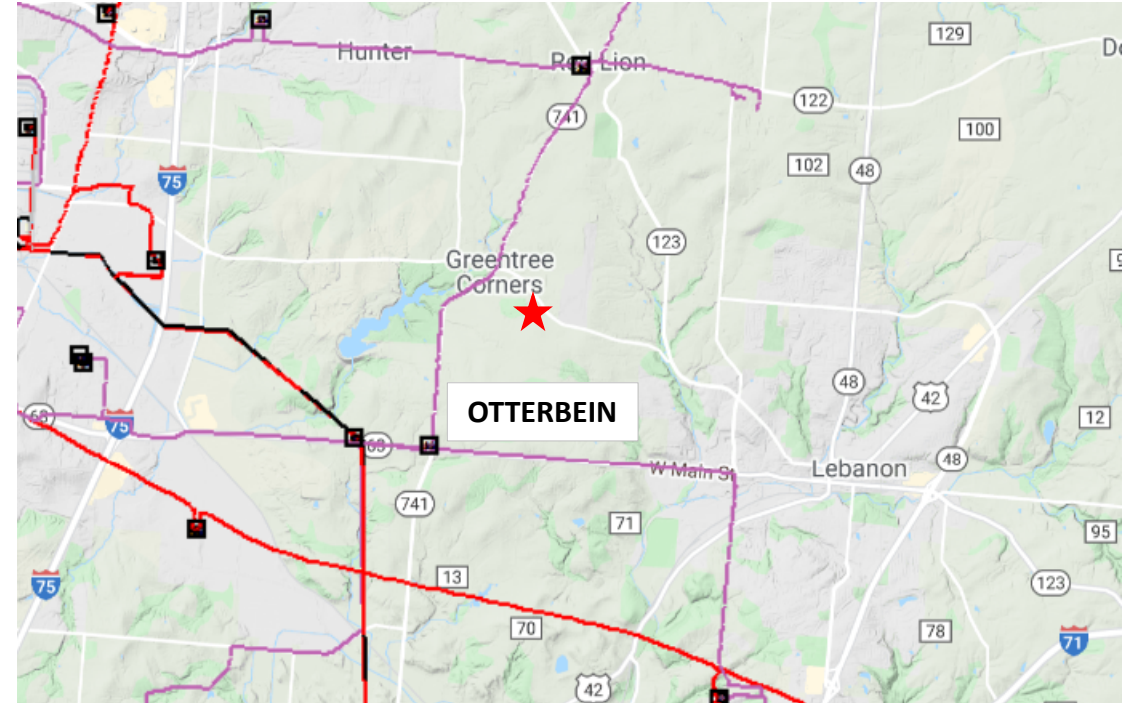
Project Driver: Customer Service

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 9

Problem Statement:

Duke Energy Distribution has asked for a new delivery point near Greentree Road in Warren County, Ohio. Phase 1 of a 4,500 unit residential and light commercial community is currently under construction. Load growth of 2 MW per year is expected. This will exceed the name plate capacity of the local distribution facilities at Otterbein in 2024.





DEOK Transmission Zone M-3 Process Greentree

Need Number: DEOK-2021-007

Process Stage: Local Plan Submission 09-07-2023

Previously Presented:

Solutions Meeting 04-21-2023

Needs Meeting 06-15-2021

Project Driver: Customer Service

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 9

Selected Solution:

Build Greentree, a new 69 kV substation to serve the area load. Loop the Shaker Run – Red Lion feeder into/out of the substation. Greentree will have a straight bus design with line disconnects on each end controlled by an automatic throw-over scheme. A bus disconnect in series with a circuit switcher will connect a 69/13 kV, 22 MVA distribution transformer. Distribution bus work and breakers will be installed for two feeder exits.

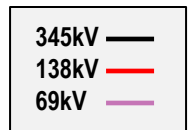
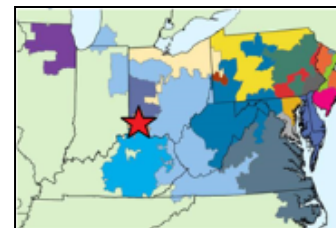
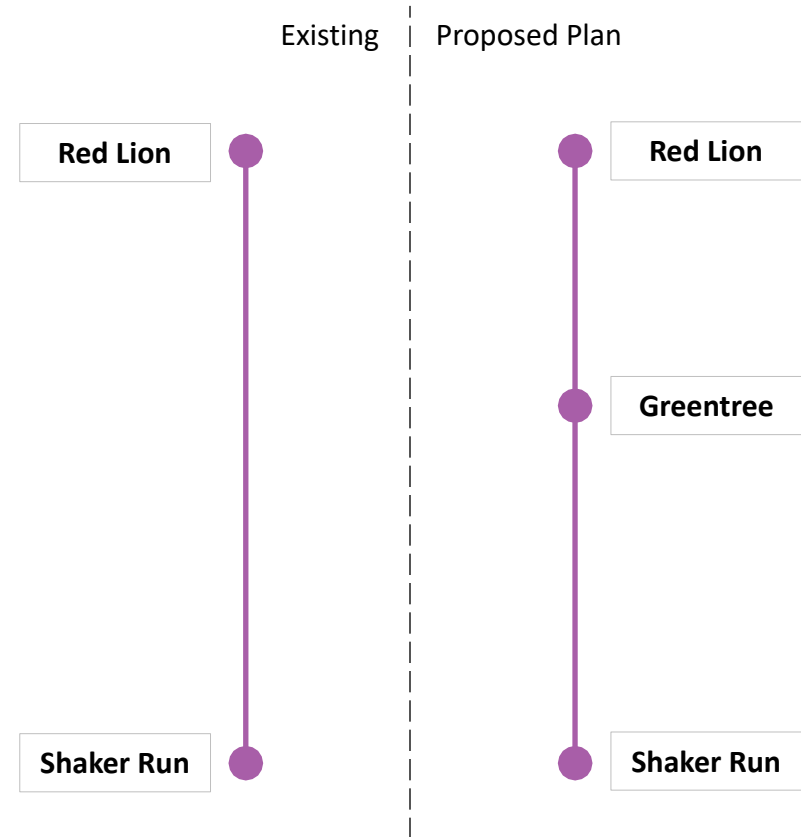
Estimated Transmission Cost: \$3.1MM

Proposed In-Service Date: 12-13-2024

Supplemental Project ID: s2938

Project Status: Engineering

Model: 2022 RTEP



Need Number: DEOK-2019-005

Process Stage: Local Plan Submission 09-18-2023

Previously Presented:

Solutions Meeting 05-19-2023

Needs Meeting 03-25-2019

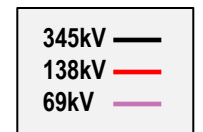
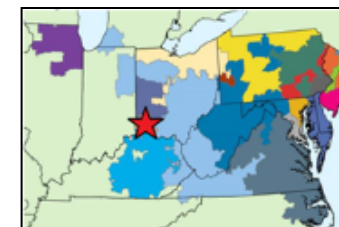
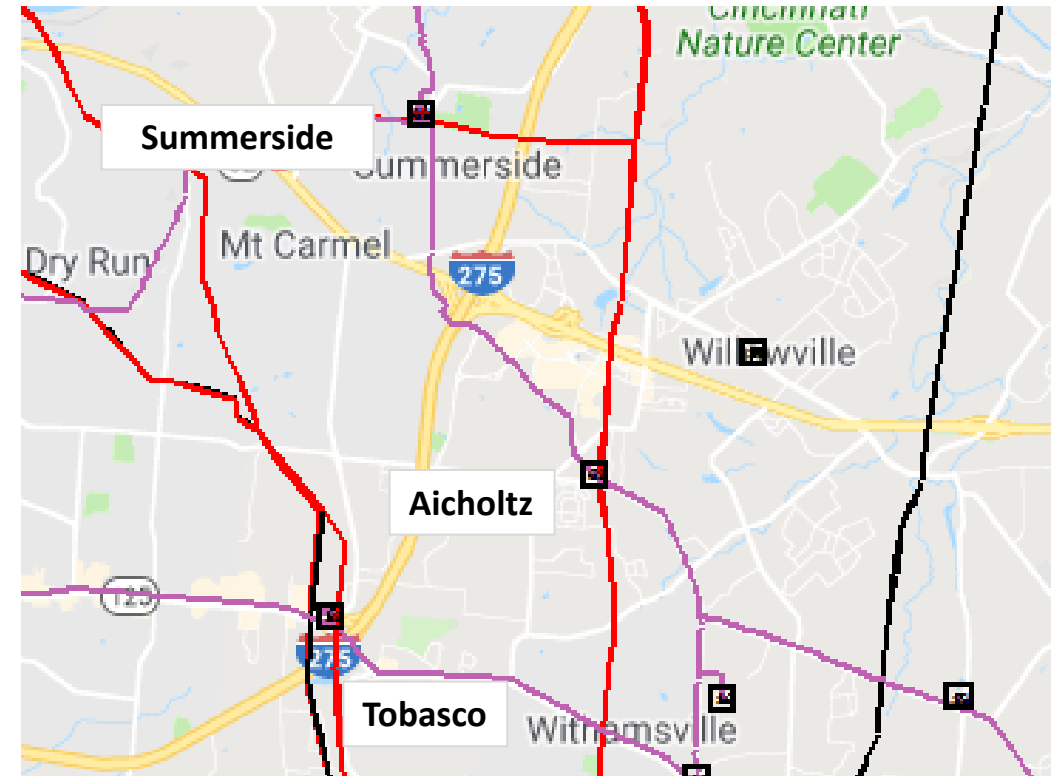
Project Driver: Customer Service

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 5

Problem Statement:

Duke Energy Distribution has requested a new delivery point at Aicholtz substation. The two 69/13kV 10.5MVA transformers at Aicholtz are currently loaded to 86%. There are plans for new subdivisions and a new Medical Center in this area. Distribution Planning predicts the transformers at Aicholtz will be loaded to 95% by 2020. Subsequent commercial development is expected.





DEOK Transmission Zone M-3 Process Aicholtz

Need Number: DEOK-2019-005

Process Stage: Local Plan Submission 09-18-2023

Previously Presented:

Solutions Meeting 05-19-2023

Needs Meeting 03-25-2019

Project Driver: Customer Service

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 5

Selected Solution:

Disconnect the 69 kV feeders from the substation. Remove 69 kV bus, switches and the 69/13 kV transformers. Refeed the substation with the immediately adjacent Beckjord – Summerside 138 kV circuit. Expand the substation and install bus work with two 2000A air-break switches to create positions for three transformers. Install two 2000A motor operated line disconnects with an automatic throw over (ATO) scheme. Install two 138/13 kV, 22 MVA transformers connected with circuit switchers to the 138 kV bus. Install 13 kV switchgear to connect the existing distribution feeders.

Alternatives: Keeping the station fed by 69 kV was considered. However, the current substation is not configured for additional transformers. It's 61 years old, has cap and pin insulators with copper bus, and has had problems with the manual line switches dropping open. Seeing the substation would need to be rebuilt to reconfigure, the amount of land in the area available for development, and the area growth rapidly restarting after COVID, it was decided to refeed the station with 138 kV.

Ancillary Benefits: Connecting to the 138 kV circuit and creating a third transformer position allows for future capacity delivery to this area. The throw over scheme reduces outage recovery time.

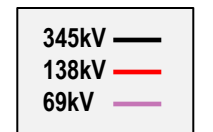
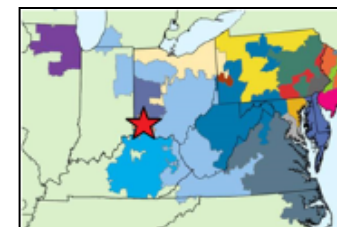
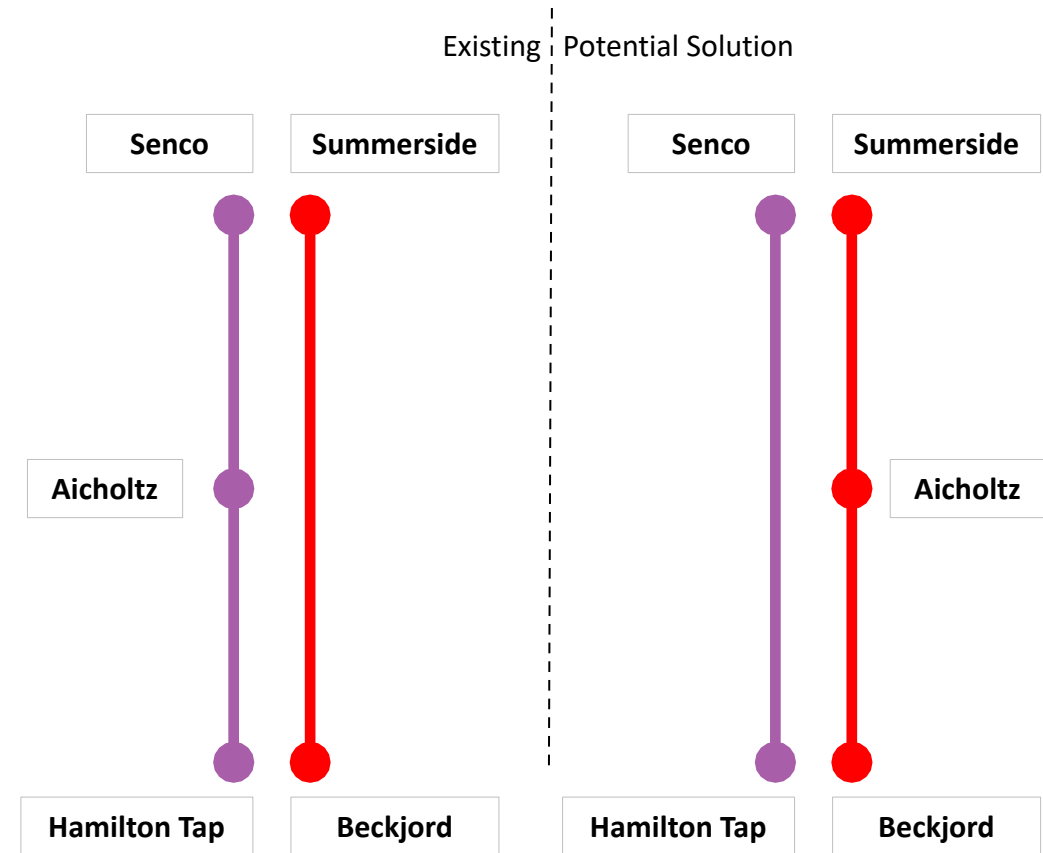
Estimated Transmission Cost: \$6.7MM

Proposed In-Service Date: 03-06-2026

Supplemental Project ID: s2971

Project Status: Engineering

Model: 2022 RTEP



Need Number: DEOK-2021-009

Process Stage: Local Plan Submission 10-13-2023

Previously Presented:

Solutions Meeting 07-21-2023

Needs Meeting 07-16-2021

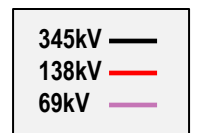
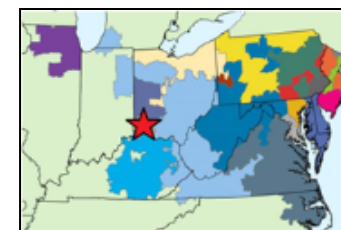
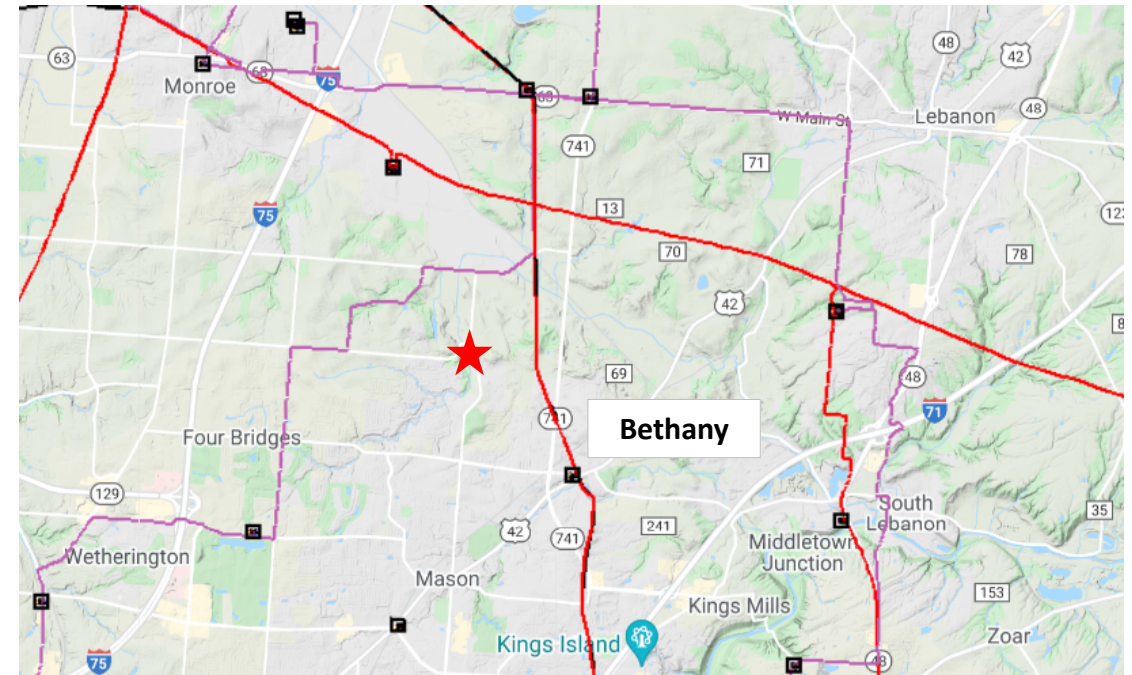
Project Driver: Customer service

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 9

Problem Statement:

Duke Energy Distribution has requested a new delivery point on Brewer Road in Mason, Ohio. The city is developing a 400-acre research and development park. The expected 2 MW per year of load growth will exceed the capacity of local distribution facilities at Bethany by 2025.





DEOK Transmission Zone M-3 Process Brewer

Need Number: DEOK-2021-009

Process Stage: Local Plan Submission 10-13-2023

Selected Solution:

Build Brewer, a new distribution substation. Brewer will have a straight bus configuration with positions for two distribution transformers. Install one 69/13 kV, 22 MVA transformer with a circuit switcher on the high side. The low side will be connected to 13 kV bus work with two feeder exits. Loop the Shaker Run – Liberty feeder into/out of the substation, switch connected with an automation throw over scheme (ATO).

Ancillary Benefits: The new substation is close to the load center. The ATO will increase reliability with the ability to switch between feeders in the event of a loss of either feeder. The Shaker Run – Liberty feeder is lightly loaded so has capacity to accommodate future load growth.

Estimated Transmission Cost: \$2.4MM

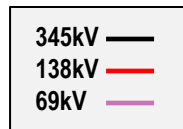
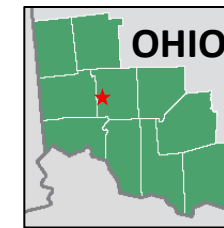
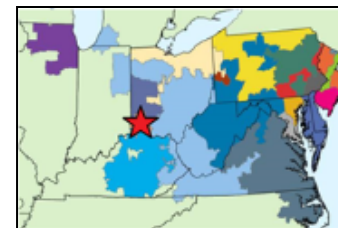
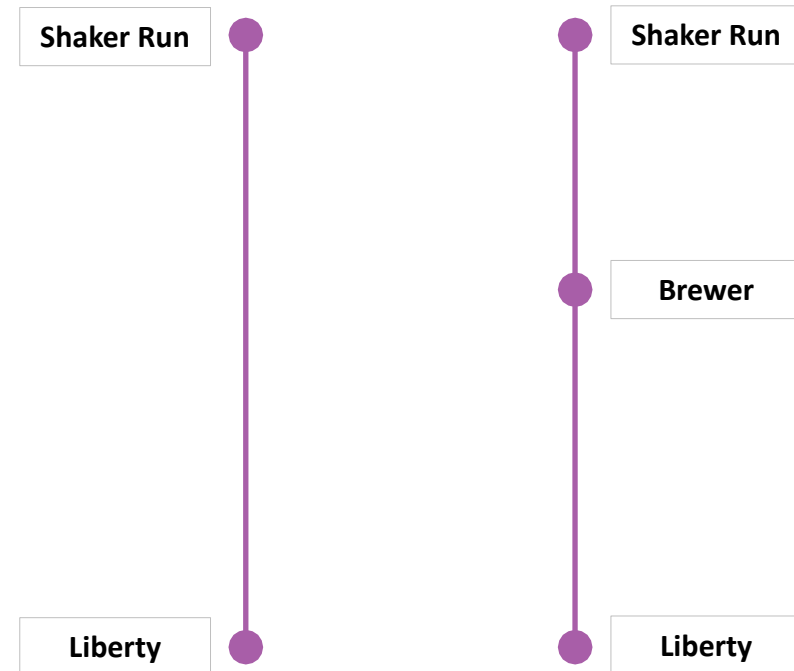
Proposed In-Service Date: 12-18-2025

Supplemental Project ID: s2978

Project Status: Engineering

Model: 2022 RTEP

Existing Proposed Plan





Need Number: DEOK-2022-007

Process Stage: Local Plan Submittal 10-13-2023

Previously Presented:

Solutions Meeting 07-21-2023

Needs Meeting 07-22-2022

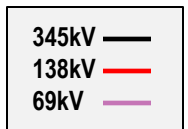
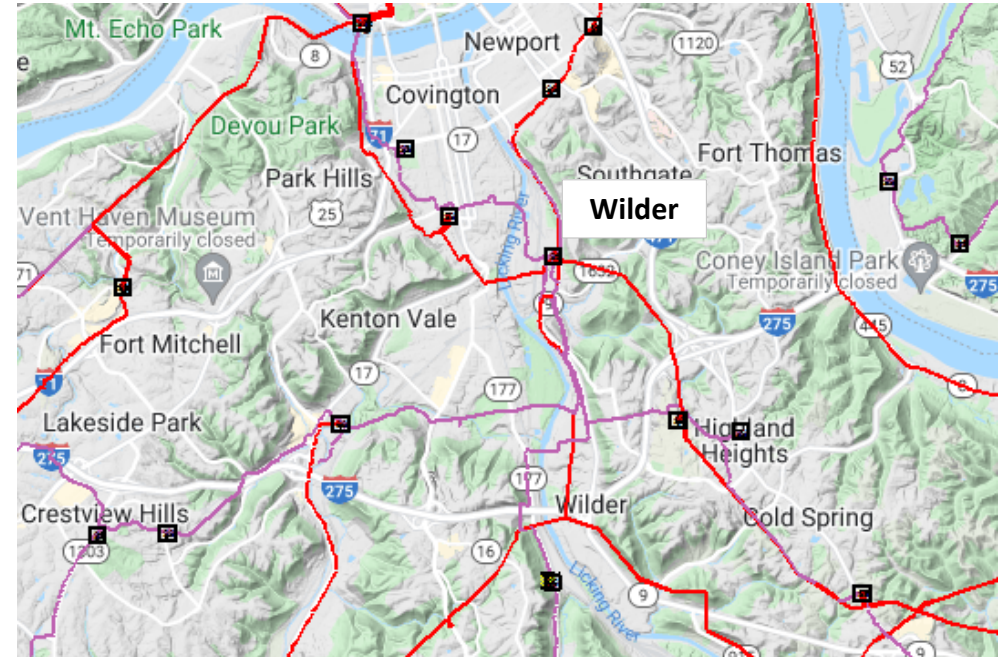
Project Driver: Equipment Condition, Performance and Risk

Specific Assumption Reference:

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

Problem Statement:

138/69/34 kV Transformer 2 at Wilder is in deteriorating condition. It's 66 years old, is overheating during summer months during normal operating conditions, and shows elevated Ethane and Ethylene levels. The coolers have continuing issues and require more frequent maintenance. Spare parts availability for the cooling pump and fans is limited.



Need Number: DEOK-2022-007

Process Stage: Local Plan Submittal 10-13-2023

Previously Presented:

Solutions Meeting 07-21-2023

Needs Meeting 07-22-2022

Project Driver: Equipment Condition, Performance and Risk

Specific Assumption Reference:

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

Selected Solution:

Remove 138/69/34 kV Transformer 2. Install a 138/69 kV, 150 MVA transformer to feed the 69 kV bus and a 138/34 kV, 33 MVA transformer to feed the 34 kV bus. Install a circuit switcher for the new high side connection to the 138/34 kV transformer. Expand the substation and relocate transmission lines and structures to accommodate the new equipment.

Ancillary Benefits: The 138/69 kV transformer can deliver an additional

50 MVA to the 69 kV system. The 138/34 kV transformer isolates the transmission system from faults on the distribution system.

Estimated Transmission Cost: \$10,991,229

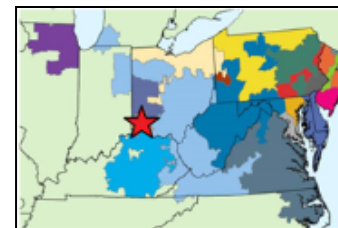
Proposed In-Service Date: 05-08-2026

Supplemental Project ID: s2979

Project Status: Engineering

Model: 2022 RTEP

**Bubble Diagram Not Applicable
Station Modifications Only**





DEOK Transmission Zone M-3 Process Decoursey

Need Number: DEOK-2023-004

Process Stage: Local Plan Submission 10-13-2023

Previously Presented:

Solutions Meeting 07-21-2023

Needs Meeting 04-21-2023

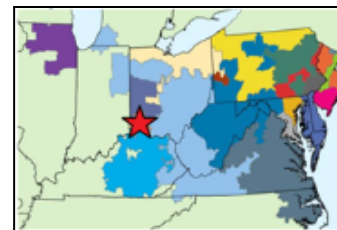
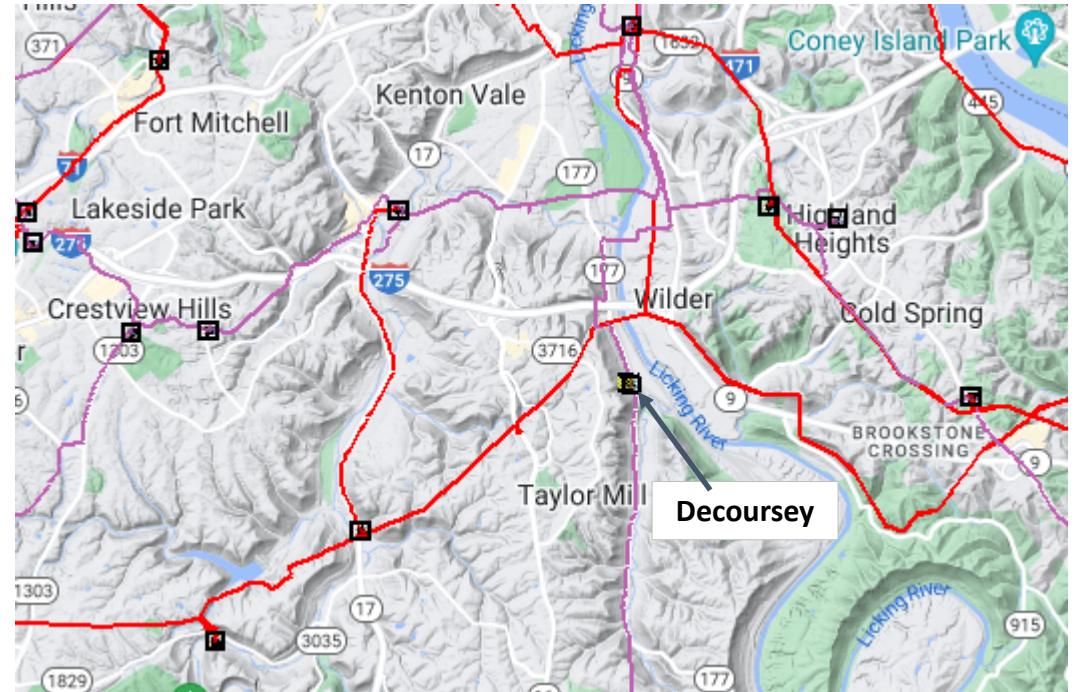
Project Driver: Equipment Condition, Performance and Risk

Specific Assumption Reference:

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

Problem Statement:

Decoursey substation was originally constructed in the 1940's as a 33-4 kV substation. The electrical equipment was converted to 69-13 kV in 1970, but the structural supports were never modified to accommodate the higher voltages. Pole-mounted switches are utilized outside the station fence and a series of hydraulic and electronic reclosers currently provide circuit protection. There is no SCADA; outage notification is only provided by customer call. The single 69/13 kV, 10 MVA transformer that serves 2069 customers is routinely operated at or exceeding its rated capacity. There is no station breaker and not enough space to install one on the existing steel which is rusted. The station layout does not meet minimum approach distance standards. This land-locked station is on a hillside and has no room for expansion.





DEOK Transmission Zone M-3 Process Decoursey

Need Number: DEOK-2023-004

Process Stage: Local Plan Submission 10-13-2023

Previously Presented:

Solutions Meeting 07-21-2023

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

Selected Solution:

Retire Decoursey substation. Build Taylor Mill, a new substation on adjacent land. Install two H-frame take-off structures with motor operated line disconnect switches to loop through the 69 kV feeder, voltage sensors for an automatic throw over scheme (ATO), and 69 kV bus separated with a tie switch in the center. Install a circuit switcher to connect a new 69/13 kV, 22 MVA distribution transformer, and 13 kV bus, circuit breakers and regulators for two feeder exits.

Ancillary Benefits: The ATO will isolate faults for faster service restoration. The circuit switcher will protect the 69 kV feeder from faults on the 13 kV system. The 69 kV tie switch creates a position for a second transformer.

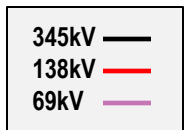
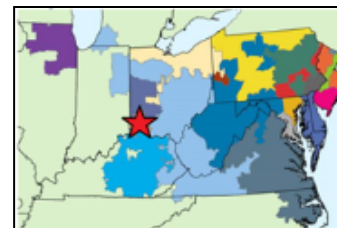
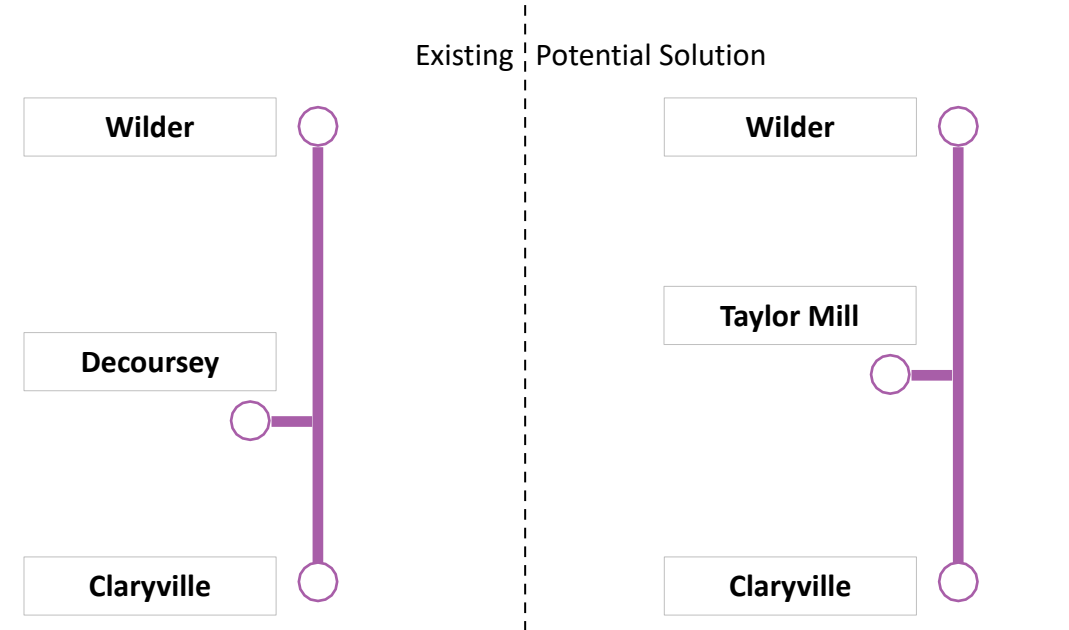
Estimated Transmission Cost: \$2,989,794

Proposed In-Service Date: 11-22-2024

Supplemental Project ID: s2980

Project Status: Engineering

Model: 2022 RTEP



S1782:

Posted to 2019 DEOK Local plan to address Need Number DEOK-2018-001.

Process Stage: Solutions Meeting 12-16-2022

Previously Presented:

Solutions Meeting 01-11-2019

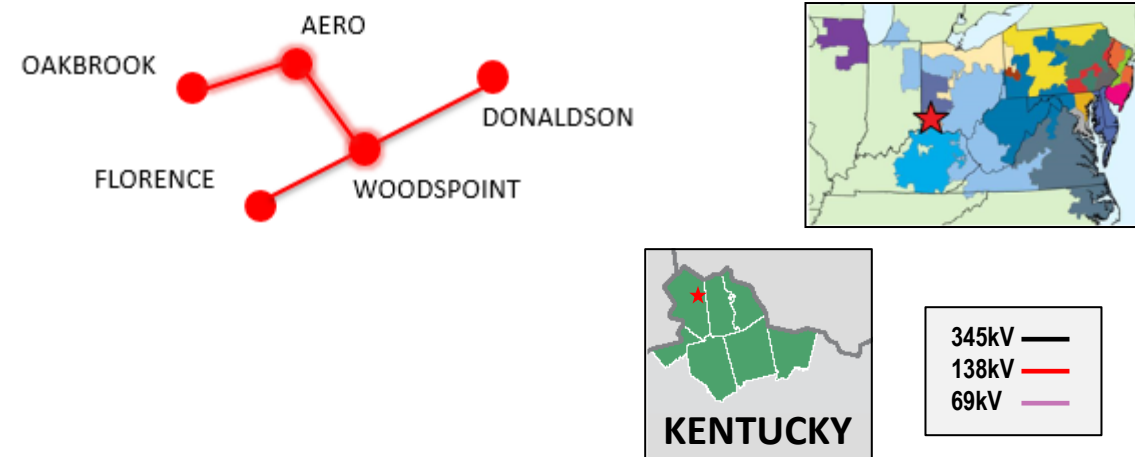
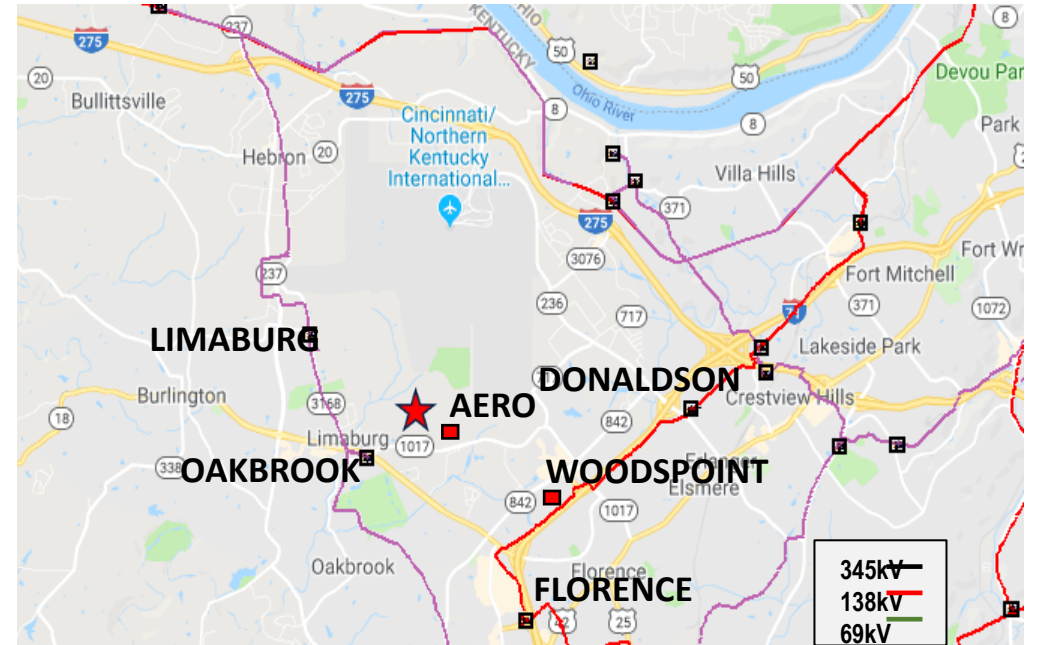
Project Driver: Customer Service

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 9

Original Scope:

Install a new 138kV, 3-breaker ring bus substation, Woodspoint. Install a new 138kV, 6-breaker ring bus, Aero, near Amazon Prime Hub. Install new 138kV lines from Woodspoint to Aero, and from Aero to Oakbrook. The lines will be rated at 301MVA. At Aero install four 138/13kV, 22MVA transformers. At Oakbrook install one 138/69kVA, 150MVA transformer with high side and low side breakers.





DEOK Transmission Zone S1782 Additional Scope

S1782

Process Stage: Solutions Meeting 12-16-2022

Previously Presented: Solutions Meeting 01-11-2019

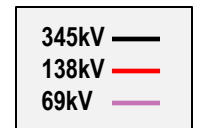
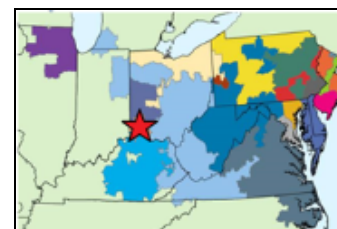
Project Driver: Customer Service

Specific Assumption Reference:

Duke Energy Ohio & Kentucky Local Planning Assumptions slide 9

Problem Statement:

Subsequent to submitting the Aero/Woodspoint project (DEOK-2018-001, s1782) to the 2019 Duke Energy Local Plan, a thermal violation was found on the 69 kV circuit from Buffington to Oakbrook for the loss of the 138 kV circuit from Aero to Woodspoint. Need DEOK-2020-001 addressed this violation in the February 2020 PJM Subregional RTEP-Western meeting. Analysis by PJM found that the violation occurred with incremental loading from the Aero/Woodspoint project and was not tied to the load growth from DEOK-2020-001. PJM advised that need DEOK-2020-001 should be withdrawn and any scope to address the Buffington to Oakbrook violation be amended the solution for the Aero/Woodspoint project. Need DEOK-2020-001 was withdrawn in the April 2020 PJM Subregional RTEP-Western meeting.



Additional Scope:

At Hebron substation expand the box structure and install two new 69 kV, 2000A breakers to create a 4-position ring bus with individual positions for a circuit to Downing and a circuit to Oakbrook. Retire a feeder section from Downing tap to structure HL-752 (0.67mi.). Construct a new section of feeder from Hebron to structure HL-752 with 954 ACSR on steel poles (1.75 mi.). Raise two other circuits on shared structures in the corridor near the former Downing tap to allow the new feeder to pass under. At Levi replace 500 MCM strain bus with 954 ACC conductor, remove bus tie switch SW4250. Replace drops into and out of Limaburg with 954 ACSR conductor. At Limaburg replace 500 MCM strain bus with 954 ACC conductor, remove bus tie switch SW610, close normally open switch SW620 to complete the circuit to Oakbrook. Rebuild the section of feeder from Midvalley to Oakbrook with 954 ACSR on steel poles (1.5 mi.). Retire a feeder section from Oakbrook to Dixie tap (5.70mi.). The ratings on the circuit from Hebron to Oakbrook will increase from 54/54 MVA to 133/133 MVA, S/N/E, and from 69/69 MVA to 166/166 MVA W/N/E. (**S1782.1**)

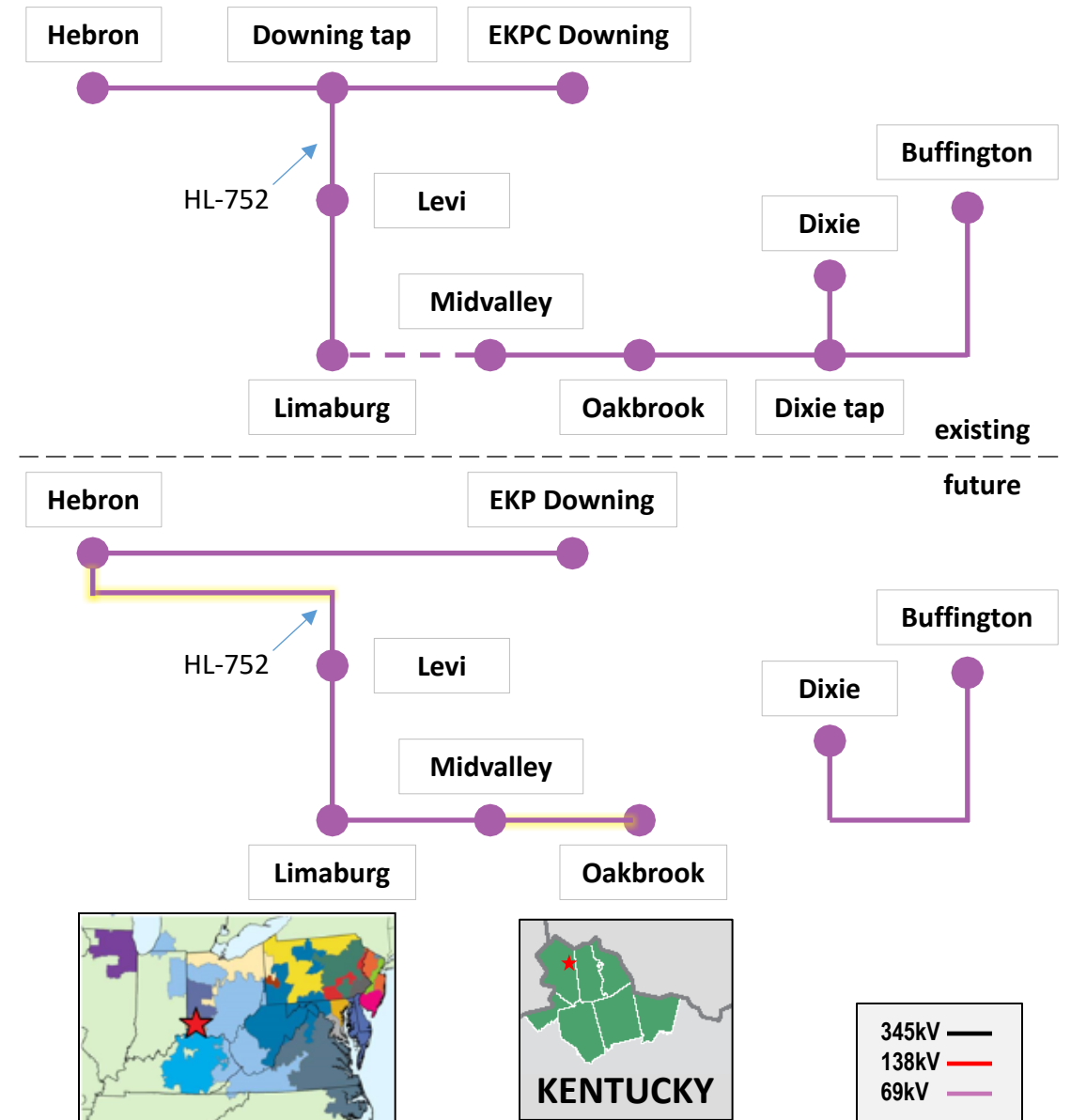
Alternatives: Keeping the Downing tap was considered. However, the Hebron to Oakbrook circuit is the only transmission available in this high growth area. The ring bus separates the circuits increasing the reliability of both the Hebron-Downing circuit and the Hebron-Oakbrook circuit.

Ancillary Benefits: 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: \$32,001,508

Projected In-Service Date: 04-22-2026

Project Status: Engineering



Revision History

2/27/2023 – V1 – Added slides# 2-3, S2833

4/11/2023 – V2 – Added slides# 4-5, S2846

6/8/2023 – V3 – Added slides# 6-11, S2910, S2918 and S2919

9/7/2023 – V4 – Added slides# 12-13, S2938

9/19/2023 – V5 – Added slides# 14-15, S2971

10/17/2023 – V6 – Slides# 10-11, Add local plan submission date

– Added slides# 16-24, S2978 through S2980 and S1782 additional Scope