PJM Western Sub-Regional RTEP Committee
EKPC Supplemental Upgrades

March 25, 2019

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

EKPC Transmission Zone – Lancaster

Need Number: EKPC-2019-001

Process Stage: Solution Meeting

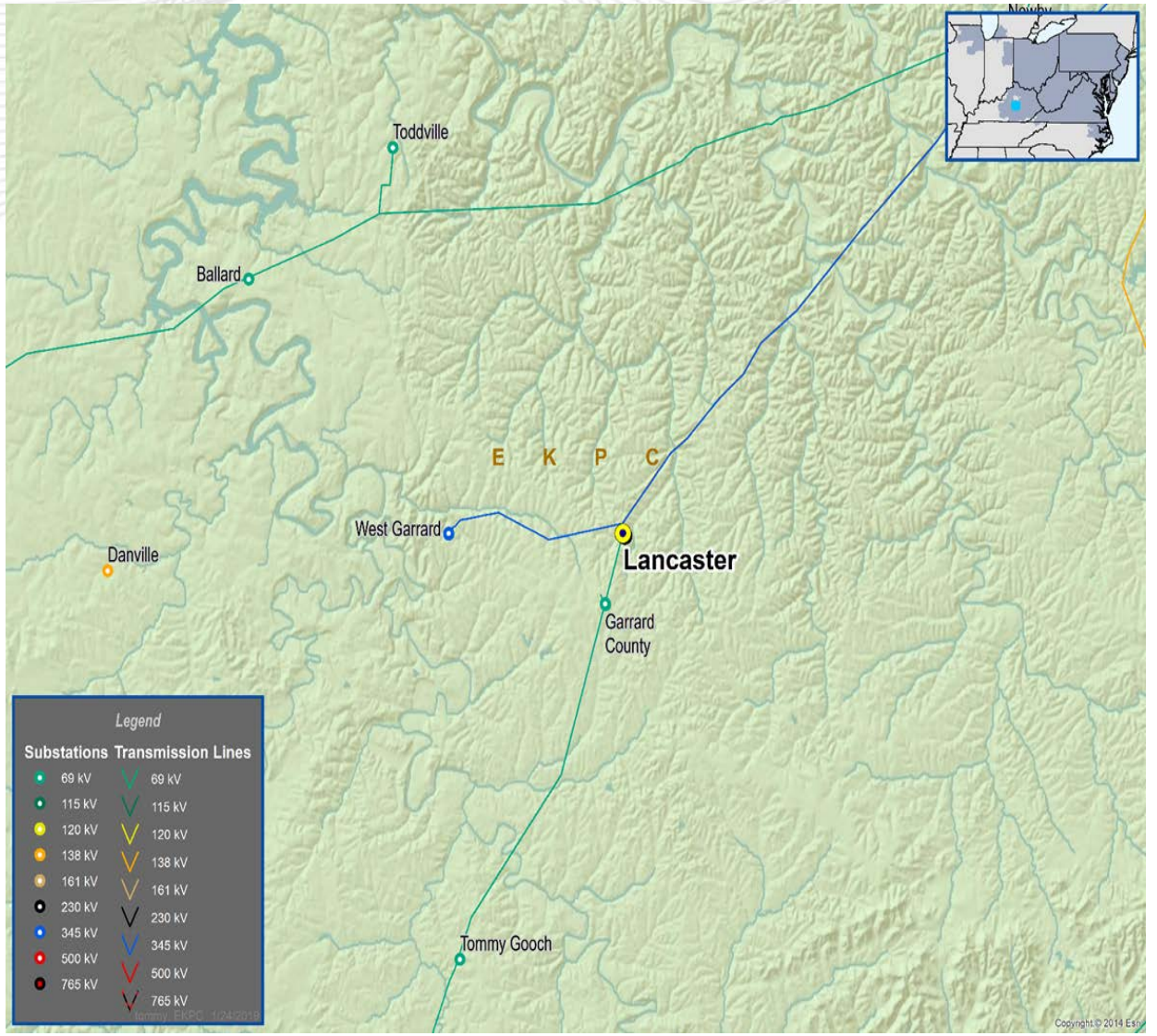
Process Chronology:

Need Meeting: 2/20/2019

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

Specific Assumption Reference(s): EKPC Assumptions Presentation Slide 8

Problem Statement: The Lancaster distribution substation is 64 years old, and does not meet current EKPC standards. The substation has limited space, and due to its current configuration requires a full station outage to replace the regulators. The transformer and regulators are located inside the high side box structure. There is little clearance around the low bay which makes it impossible to use equipment when replacing any of the reclosers. The station does not have a low side transfer bus/scheme or a bypass for metering equipment. Because of the short length of the station drive way, EKPC staff have to park on the roadway to open the station gate. This station drive is located in a slight curve, which make this access a safety concern. The station drive has also had water run-off issues, and has required repairs numerous times over the last several years.



EKPC Transmission Zone – Lancaster

Need Number: EKPC-2019-001

Process Stage: Solution Meeting 3/25/2019

Proposed Solution:

- Rebuild the Lancaster station in a new location, including a new ~1.5 mile 69kV transmission tap line.

Alternatives:

- Rebuild Lancaster Substation on the existing site. This alternative was eliminated from consideration due to the following:

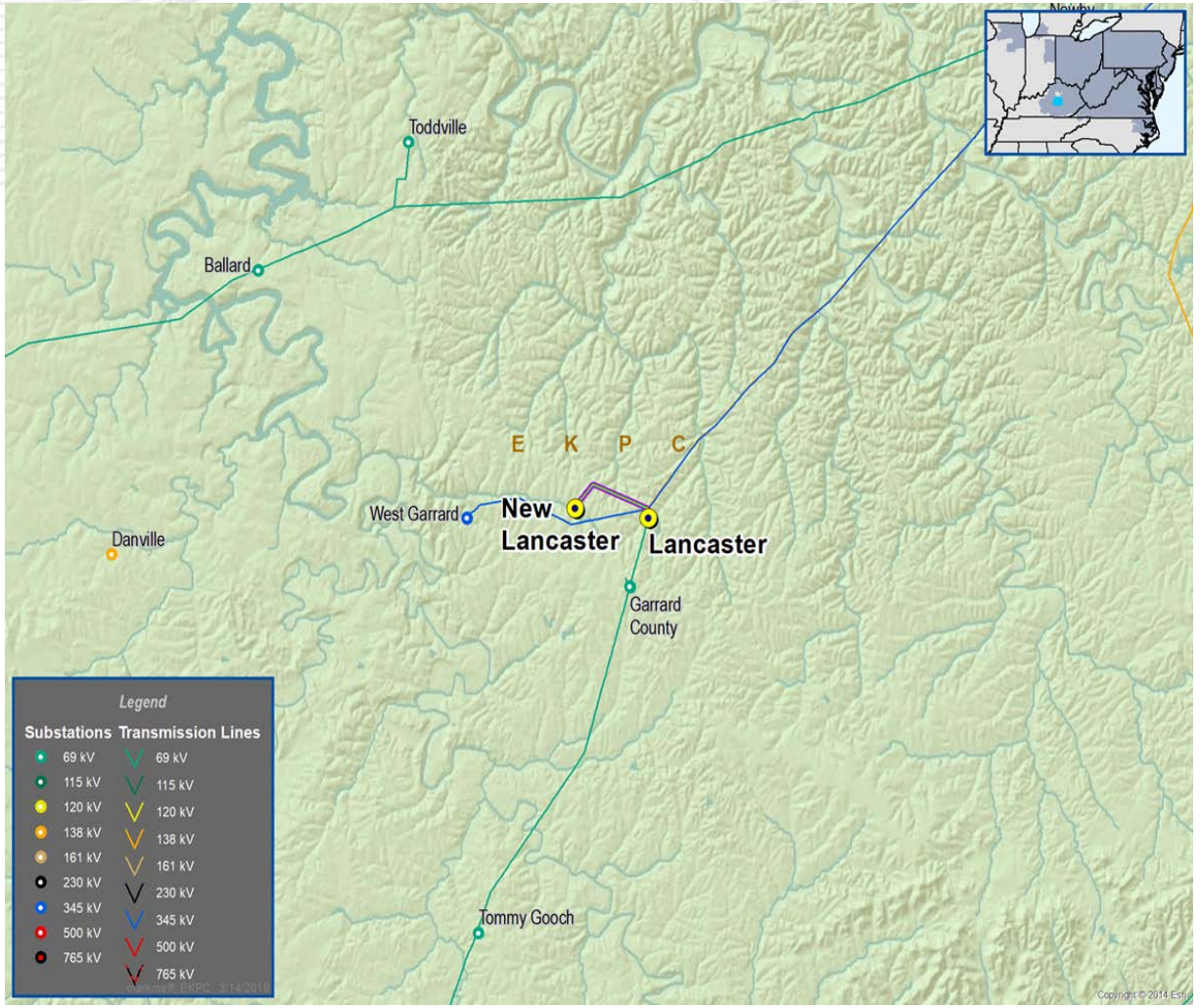
  -All identified issues could not be addressed rebuilding on the existing site.

  -Member System Cooperative load center is better served from the new proposed substation location.

Total Estimated Transmission Cost: $3.4M

Project IS Date: 12/1/2020

Project Status: Scoping



EKPC Transmission Zone - Skaggs

Need Number: EKPC-2019-002

Process Stage: Solution Meeting

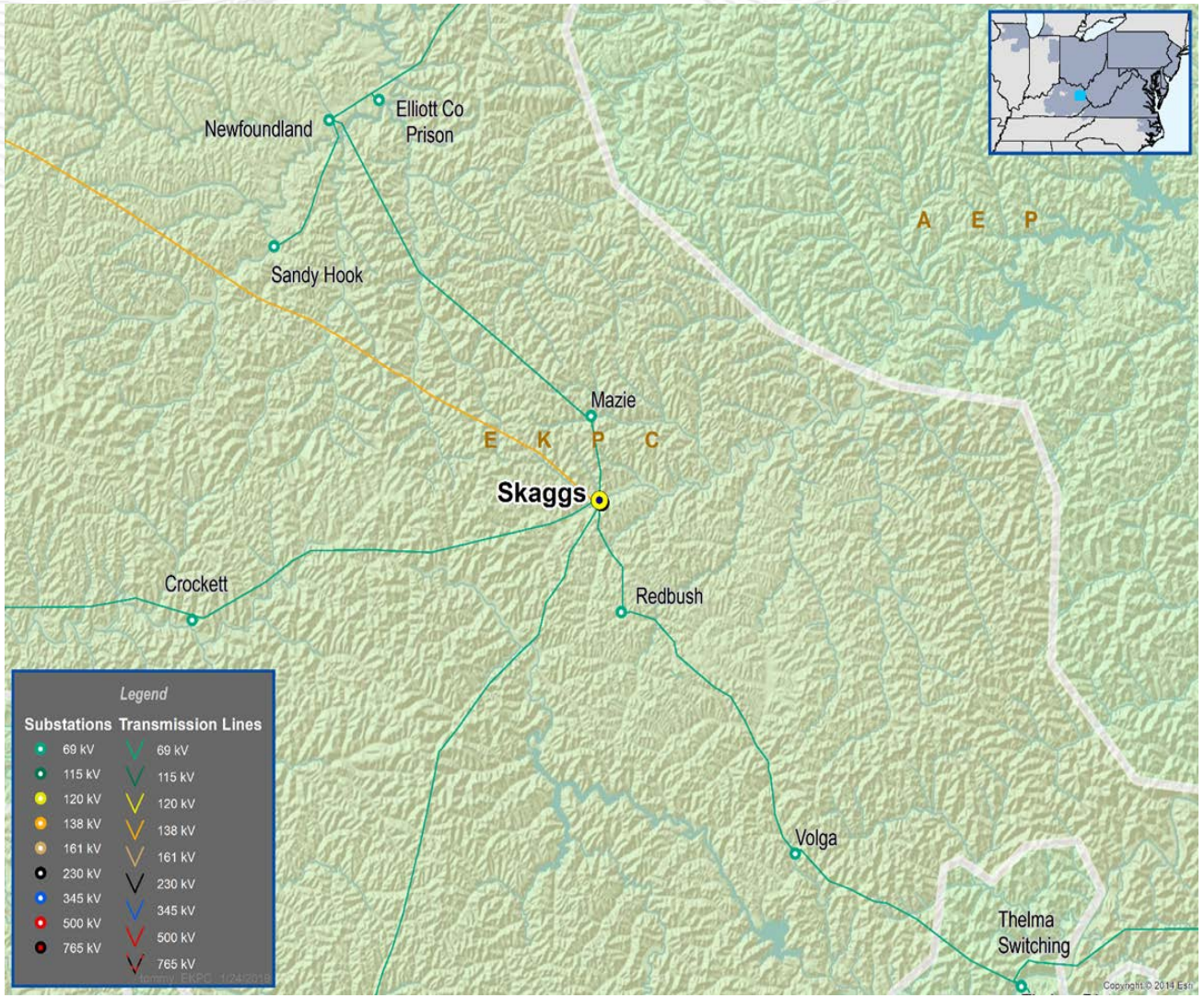
Process Chronology:

Need Meeting: 2/20/2019

Supplemental Project Driver(s): Operational Flexibility and Efficiency

Specific Assumption Reference(s): EKPC Assumptions Presentation Slide 9

Problem Statement: Real time load levels on the Skaggs 138-69 kV autotransformer have exceeded the normal transformer rating on several occasions over the last five years. During extreme weather and other system issues on January 7, 2018, real time loading on the Skaggs transformer reached 136 MVA, over 120% of the normal rating. EKPC experienced operational issues, including loss of load, during this overload event.



EKPC Transmission Zone - Skaggs

Need Number: EKPC-2019-002

Process Stage: Solution Meeting 3/25/2019

Proposed Solution:

- Upgrade the Skaggs Transformer to 150 MVA

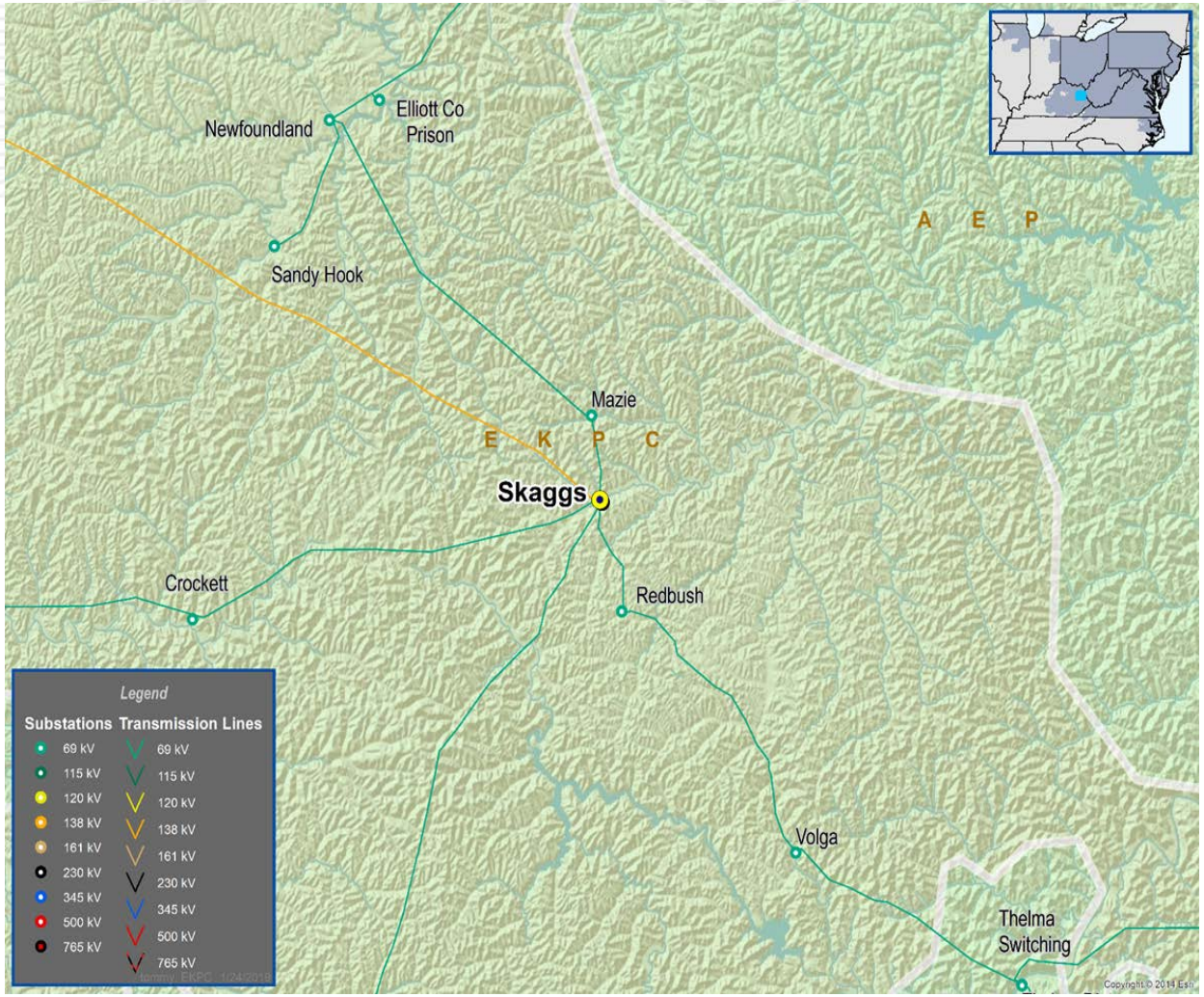
Alternatives:

- None

Total Estimated Transmission Cost: $1.8M

Project IS Date: 12/31/2019

Project Status: Engineering



EKPC Transmission Zone - Rineyville

Need Number: EKPC-2019-003

Process Stage: Solution Meeting

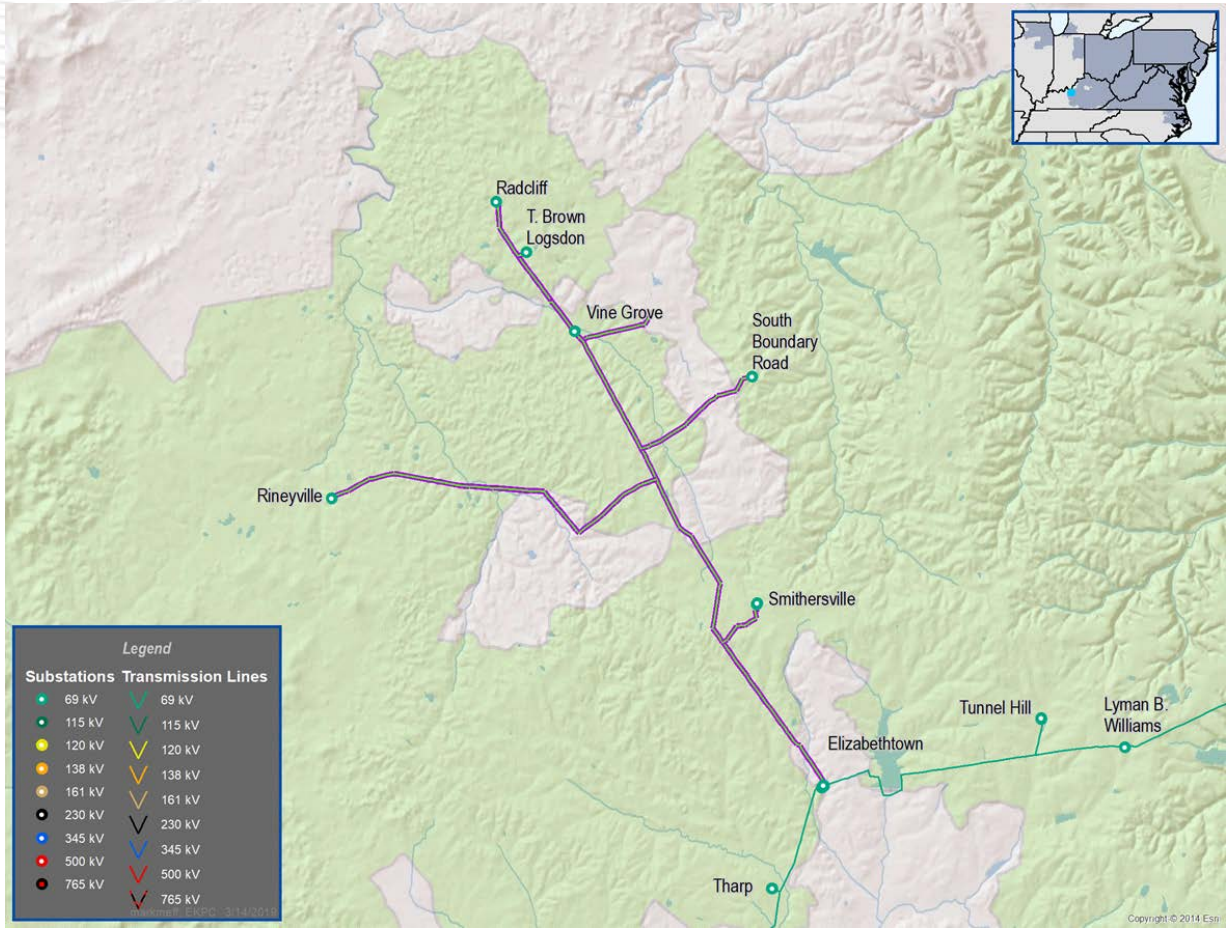
Process Chronology:

Need Meeting: 2/20/2019

Supplemental Project Driver(s): Operational Flexibility and Efficiency; Customer Service

Specific Assumption Reference(s): EKPC Assumptions Presentation Slide 9

Problem Statement: Elizabethtown – KU Rogersville 69 kV line section is one of the worst performing line sections on the EKPC system. There are a total of 7 distribution substations on this one circuit, and this is the largest number of distribution substations on a circuit on the EKPC system. These 7 distribution substations serve over 13,000 customers and almost 40% of the customers on the Nolin RECC system. Nolin has requested that EKPC develop a solution that minimizes the number of customers impacted during an outage.



EKPC Transmission Zone - Rineyville

Need Number: EKPC-2019-003

Process Stage: Solution Meeting 3/25/2019

Proposed Solution:

- Build a 69 kV switching station near Rineyville Junction (Patriot Parkway)

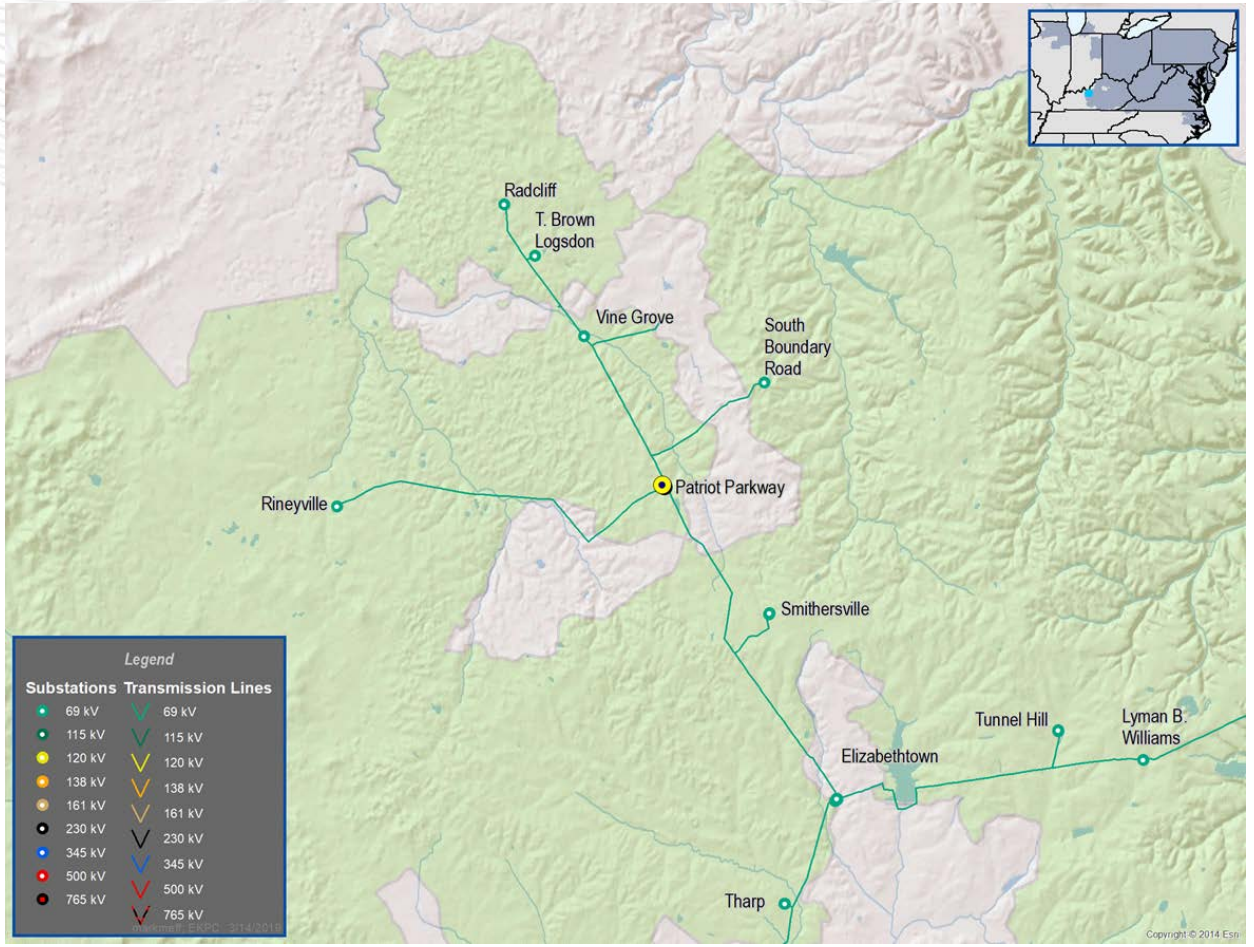
Alternatives:

- New 138–69 kV Transmission Station off the LG&E/KU Hardin County – Rogersville 138 kV Line near South Boundary Rd Tap
- New 69 kV Line from Central Hardin – Vine Grove (~10 miles)

Total Estimated Transmission Cost: $3.8M

Project IS Date: 12/1/2021

Project Status: Scoping



EKPC Transmission Zone - Monticello

Need Number: EKPC-2019-004

Process Stage: Solution Meeting

Process Chronology:

Need Meeting: 2/20/2019

Supplemental Project Driver(s): Equipment Material Condition; Operational Flexibility and Efficiency; Customer Service

Specific Assumption Reference(s): EKPC Assumptions Presentation Slides 8, 9 & 10

Problem Statement:

Denny – Wayne County: The Denny – Wayne County 69 kV line section is one of the worst performing locations on the EKPC system. This line section has five distribution substations tapped off of the main 20.4 mile line section: Slat, Homestead, Monticello, Gap of the Ridge and Gregory Road. The line was originally constructed in 1953 with 4/0 ACSR conductor, and the line section was reconductored to 556 MCM in 1985. EKPC has had numerous recent issues with cross arm failures on this line section.

EKPC Transmission Zone - Monticello

Need Number: EKPC-2019-004 (continued)

Problem Statement (continued):

Homestead: The Homestead substation is the largest substation on the South Kentucky RECC system (# of customers). The Homestead substation serves Wayne County Hospital, some nursing homes, several factories, the Wayne County School system, and over 3,200 customers. The Homestead distribution substation is served from a radial transmission feed. This tap line is approximately 1.2 miles in length, and was originally built by TVA. The line section is at least 50 years old, and has several poles that are in poor condition. South Kentucky RECC ("SKRECC") has very limited back-feed capabilities for the Homestead substation.

Monticello: Issues identified at the Monticello distribution substation include:

-The original Monticello distribution station was constructed in 1954 and does not meet EKPC current standards.

-The current location is adjacent to a saw mill facility, and saw dust debris from this facility has caused contamination issues that have resulted in a paste build-up on equipment in the substation. Outages have been required for equipment cleaning.

EKPC Transmission Zone - Monticello

Need Number: EKPC-2019-004 (continued)

Problem Statement (continued):

Monticello (continued):

-The station has a mix of both 12.5 kV and 25 kV low side voltages, and the station has a non-standard wood structure that was constructed for the 25 kV auto transformer bank. This wood structure is in poor condition.

-The station does not have the EKPC standard low bay transfer scheme, which causes additional outage time and creates a heightened safety risk when taking equipment out of service for maintenance activities.

-The station does not have the EKPC standard metering bypass switching scheme, which causes additional outage time when replacing or working on the metering equipment.

-SKRECC cannot back-feed all of the load on this station during an outage.

EKPC Transmission Zone - Monticello

Need Number: EKPC-2019-004

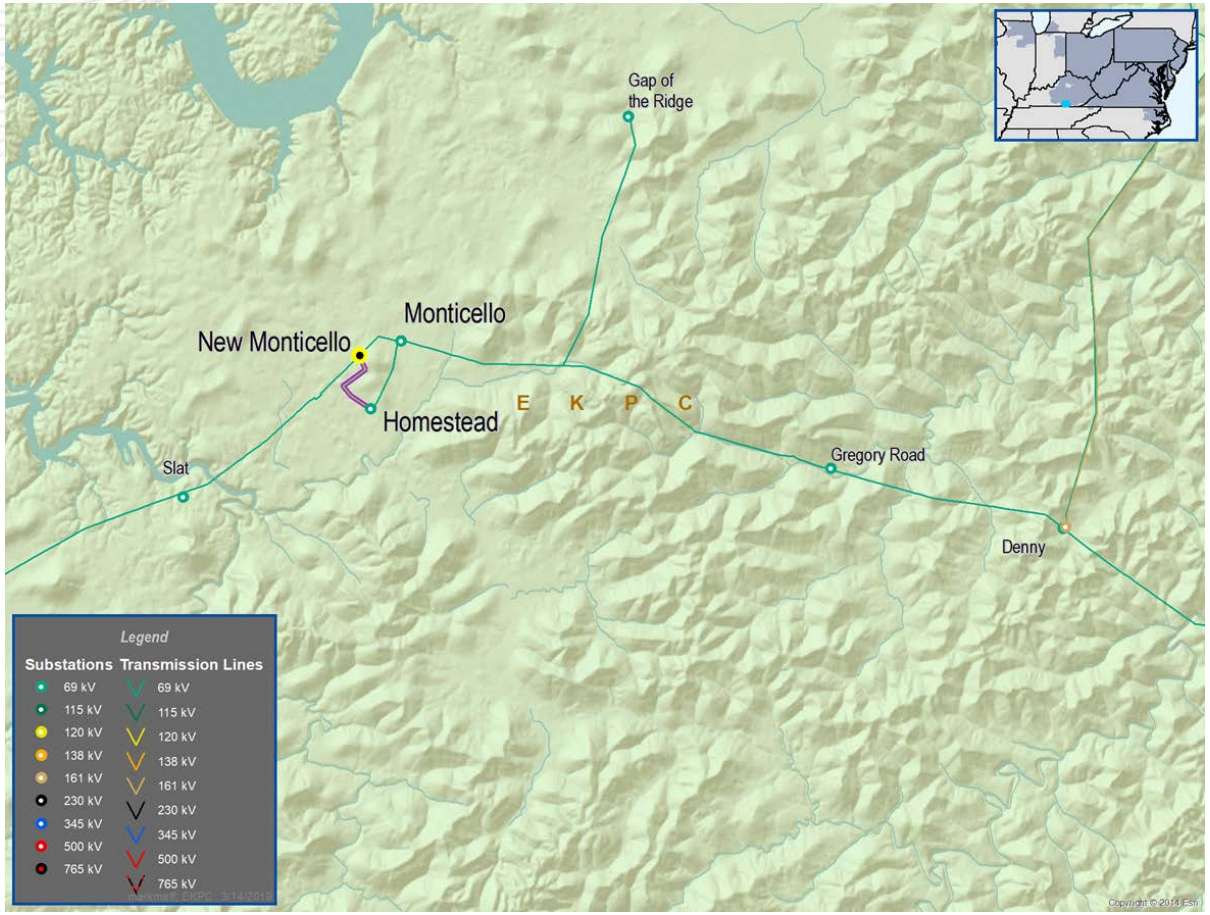
Process Stage: Solution Meeting 3/25/2019

Proposed Solution:

- Rebuild Monticello Substation on new site with a 69 kV breaker station. Rebuild Homestead Tap partially on new R/W (1.3 miles) using 266.8 ACSR.

Alternatives:

- Rebuild Monticello on existing property with a 3 way switch. This was ruled out as an alternative as the property is not large enough to accommodate our new standard distribution substation.
- Rebuild Monticello on existing property with a 69 kV breaker station. This was ruled out as an alternative as the property is not large enough to accommodate our new standard distribution substation.
- Rebuild Monticello on new site with a 3 way MOAB instead of breakers. This alternative does now provide any improvements in terms of reliability on the Denny – Wayne County line section.



EKPC Transmission Zone - Monticello

Need Number: EKPC-2019-004

Process Stage: Solution Meeting 3/25/2019

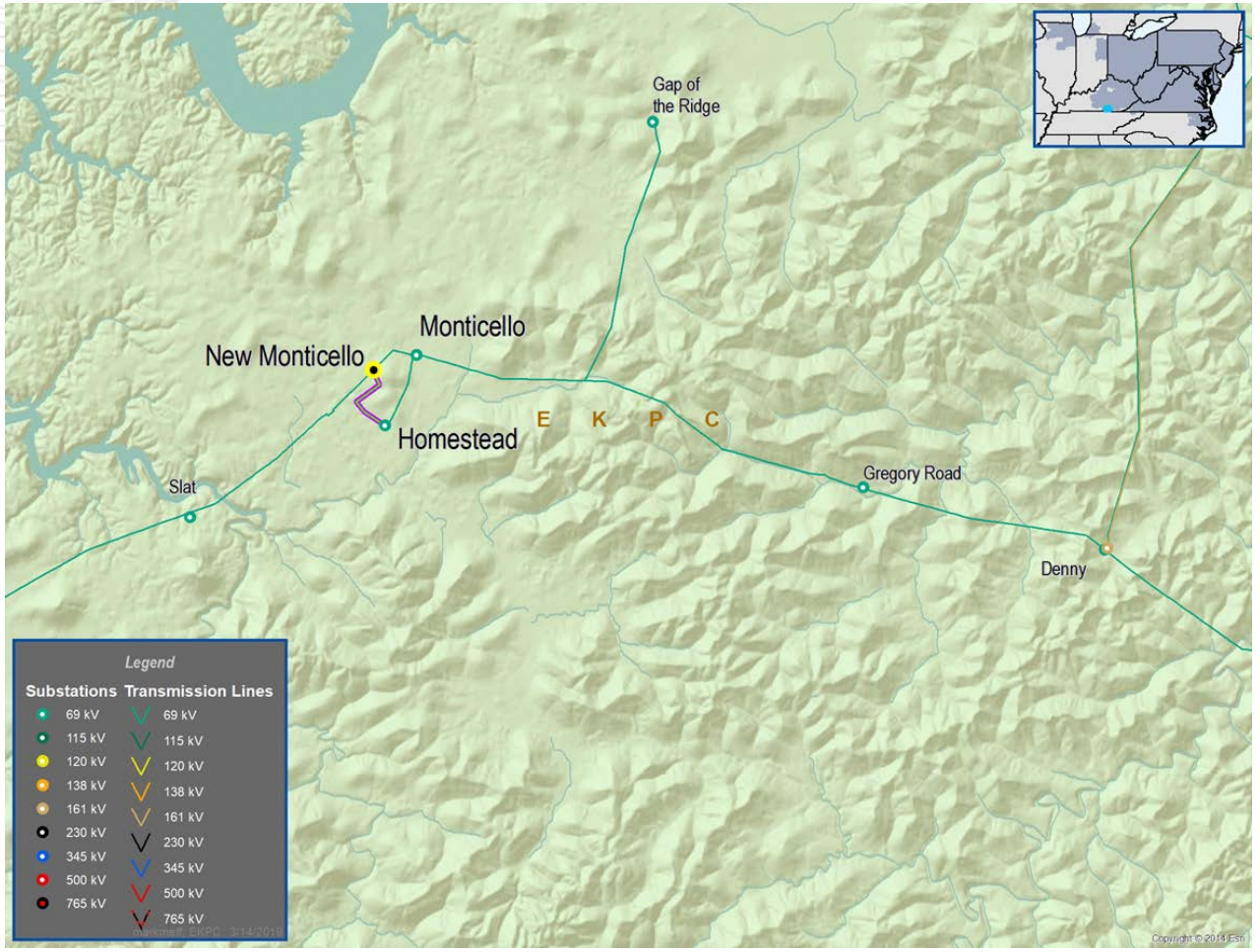
Alternatives (continued):

- Build new 69 kV line to Homestead partially on new R/W. Remove old feed.
- Rebuild existing 69 kV feed to Homestead, including the construction of a temporary 69 kV line to Homestead for construction.

Total Estimated Transmission Cost: $5.5M

Project IS Date: 12/1/2020

Project Status: Scoping



EKPC Transmission Zone – Boone County - Williamstown

Need Number: EKPC-2019-005

Process Stage: Solution Meeting

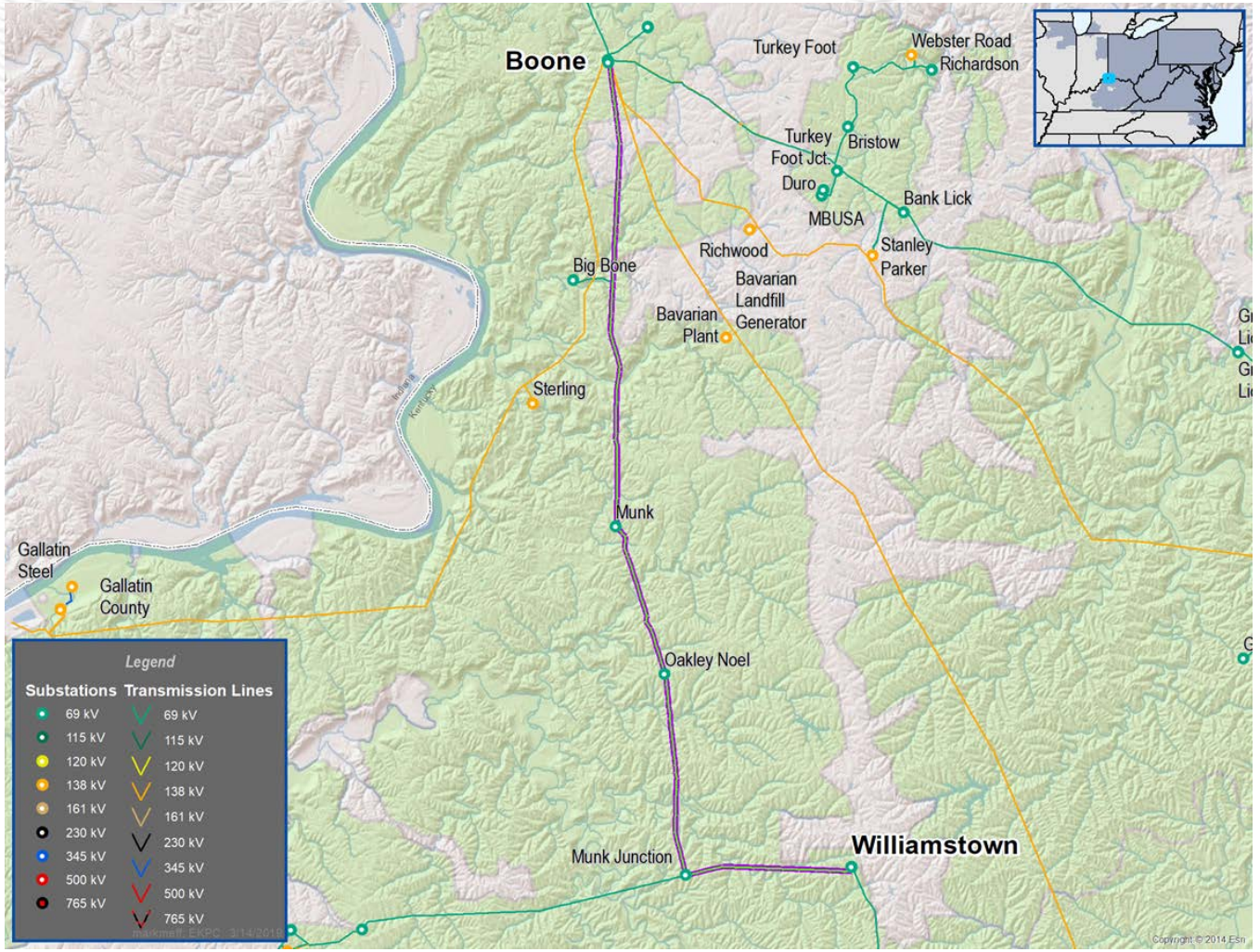
Process Chronology:

Need Meeting: 2/20/2019

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

Specific Assumption Reference(s): EKPC Assumptions Presentation Slide 8

Problem Statement: The Boone County – Williamstown 69 kV line section is 60 years old. The LineVue robot from Kinectrics Corporation revealed the majority of the line section to be in below average or poor condition (static and conductor). The EKPC Reliability team has included this line section in their top 10 of line sections that should be addressed due to the condition assessment.



EKPC Transmission Zone – Boone County - Williamstown

Need Number: EKPC-2019-005

Process Stage: Solution Meeting 3/25/2019

Proposed Solution:

- Rebuild Boone County to Williamstown using 556.5 ACSR/TW (28.5 miles).

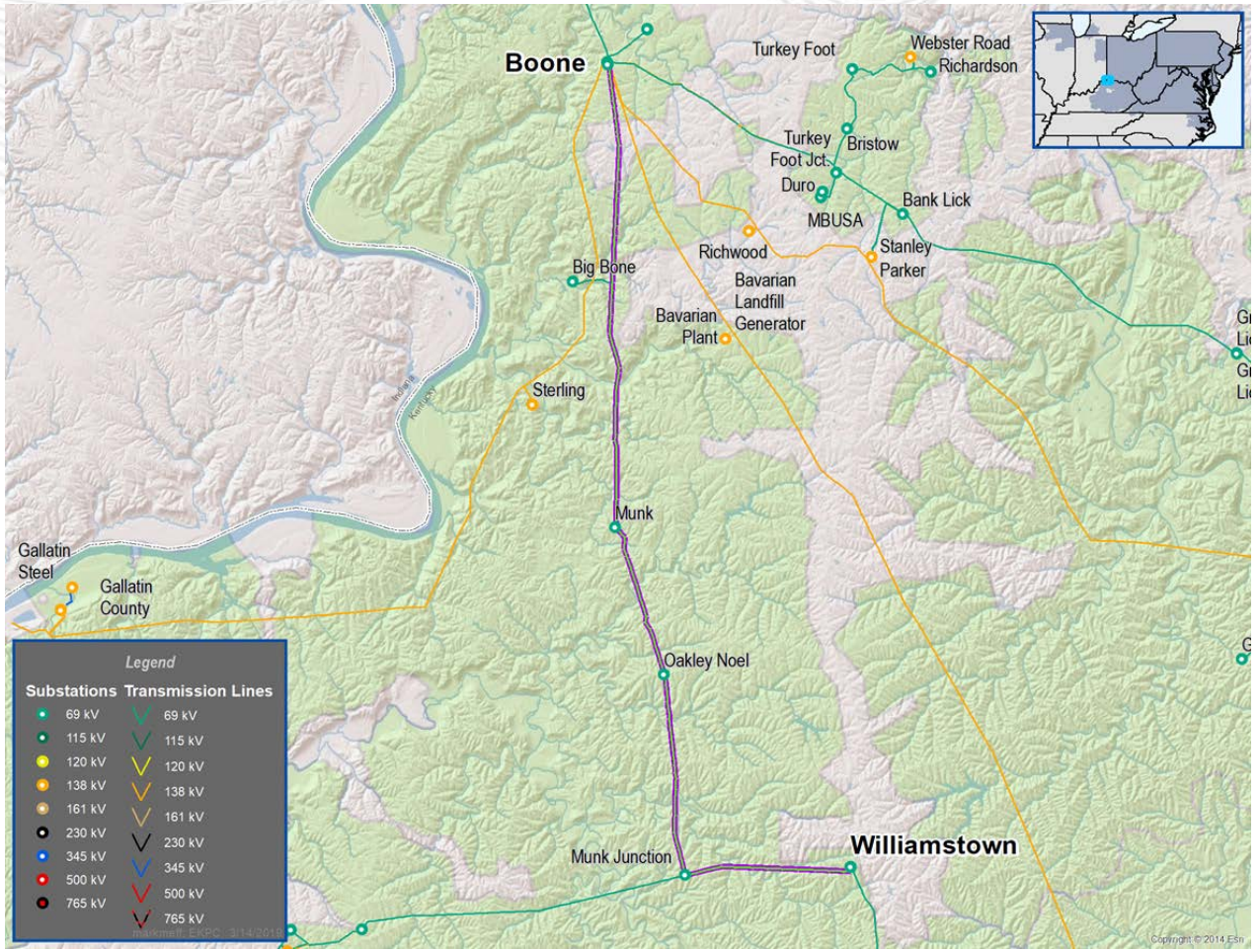
Alternatives:

- 266.8 ACSR Re-Conductor/Re-build
- 556.5 ACSR/TW Re-Conductor/Re-Build

Total Estimated Transmission Cost: $15.8M

Project IS Date: 12/1/2024

Project Status: Scoping



EKPC Transmission Zone – KU Wofford – Whitley City

Need Number: EKPC-2019-006

Process Stage: Solution Meeting

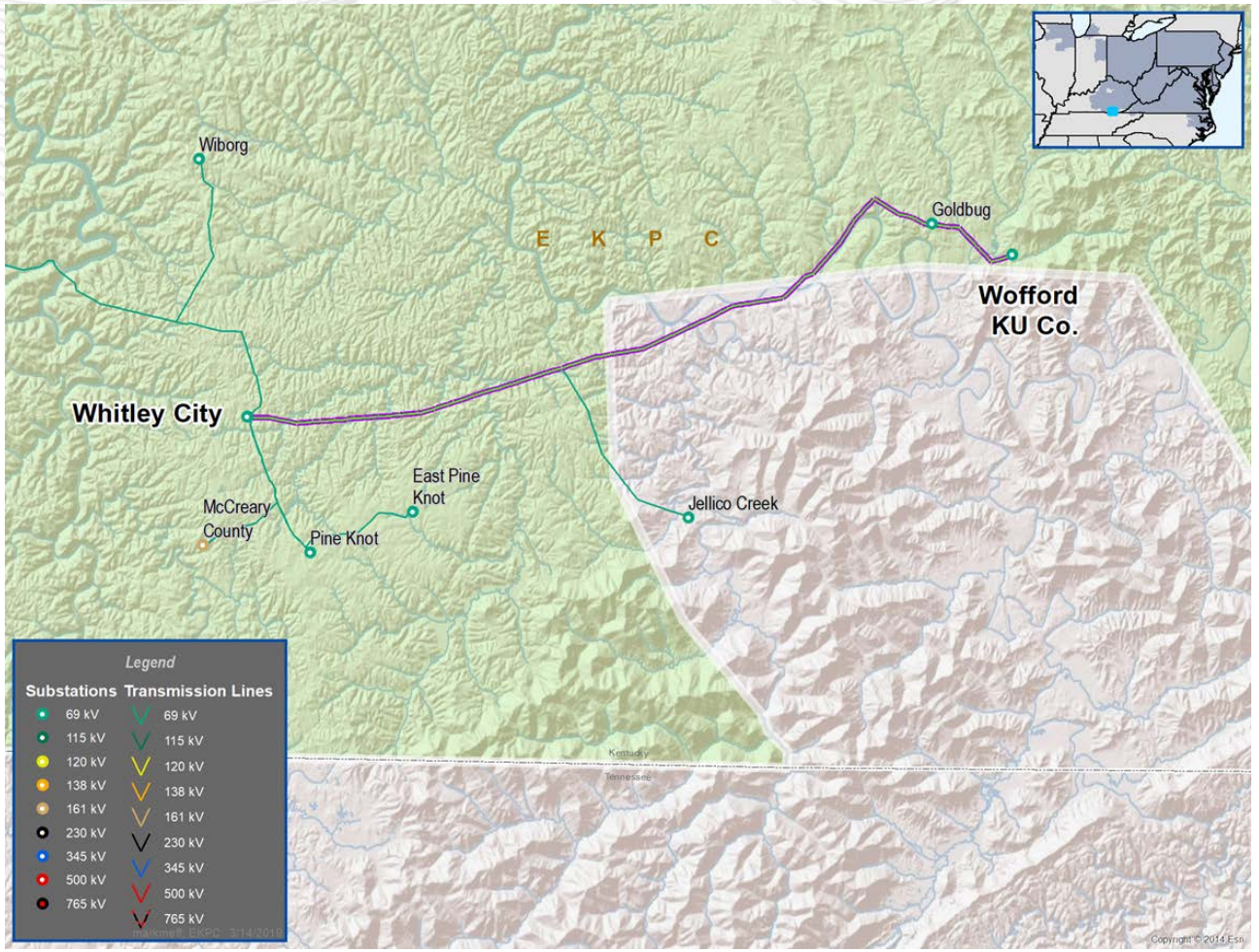
Process Chronology:

Need Meeting: 2/20/2019

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

Specific Assumption Reference(s): EKPC Assumptions Presentation Slide 8

Problem Statement: The KU Wofford – Whitley City 69 kV line section is 67 years old. The LineVue robot from Kinectrics Corporation revealed that the majority of the line section is in poor condition (static and conductor). The EKPC Reliability team has included this line section in their top 10 of line sections that should be addressed due to the condition assessment.



EKPC Transmission Zone – KU Wofford – Whitley City

Need Number: EKPC-2019-006

Process Stage: Solution Meeting 3/25/2019

Proposed Solution:

- Rebuild to 556.5 MCM ACSR/TW conductor (20.7 miles)

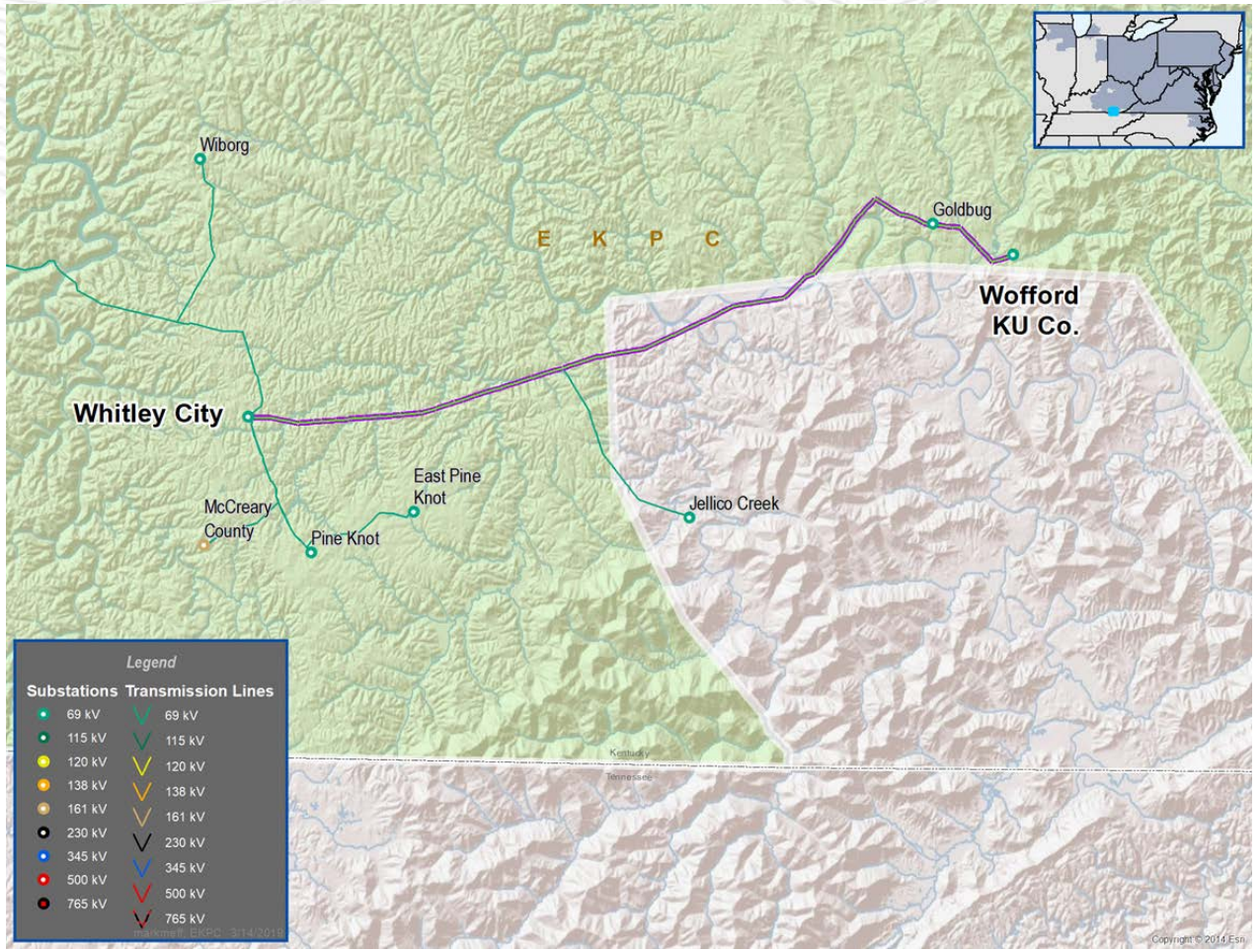
Alternatives:

- Reconductor and partial pole replacement

Total Estimated Transmission Cost: $13M

Project IS Date: 12/31/2022

Project Status: Scoping



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

3/14/2019 – V1 – Original version posted to pjm.com