Reliability Analysis Update

Sub Regional RTEP Committee - PJM West

June 15, 2021

Changes for Existing Projects

Baseline Reliability Projects

EKPC Transmission Zone Baseline Reliability

B2334 Cancellation

Criteria: EKPC FERC 715 Criteria

Previously Presented: 8/21/2013 SRRTEP-W

Problem Statement:

Low voltage at the Keith and Clay Village 69 kV buses during an N-1 outage.

Recommended Solution:

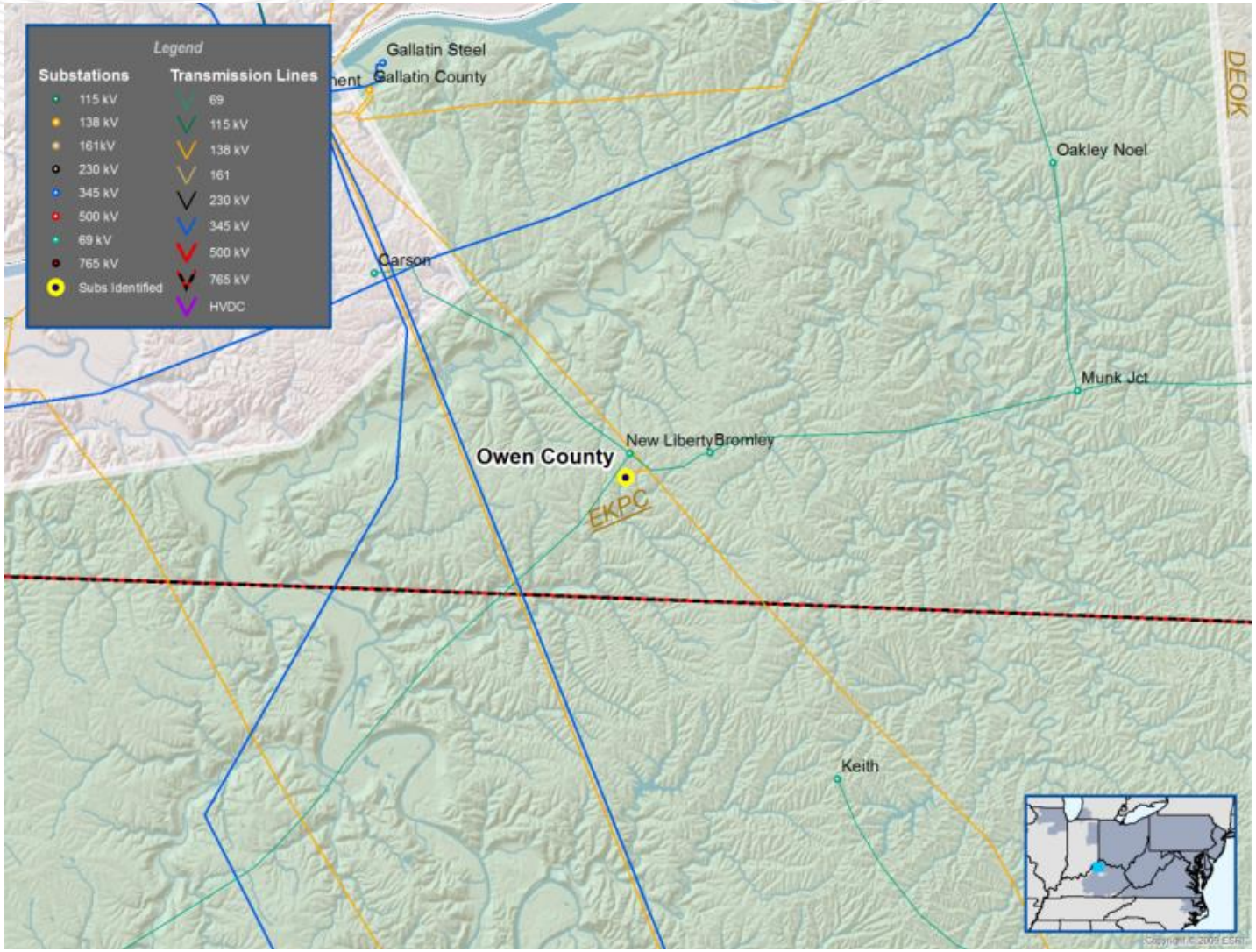
Install a 69 kV, 28.06 MVAR capacitor bank at the Owen County substation. **(B2334)**

Estimated Cost: $0.36M

Required In-Service: 12/1/2017

Reason for cancellation:

EKPC's 2020 screening results show that the need for this project has been pushed beyond 7 years. There has been multiple case changes that contributed to the need being pushed back, including load forecast updates in the area and nearby transmission system upgrades outside of PJM.



EKPC Transmission Zone Baseline Reliability

B2783 Cancellation

Criteria: EKPC FERC 715 Criteria

Previously Presented: 5/31/2017 SRRTEP-W

Problem Statement:

The Davis-Fayette 69 kV line is overloaded for an N-1 outage.

Recommended Solution:

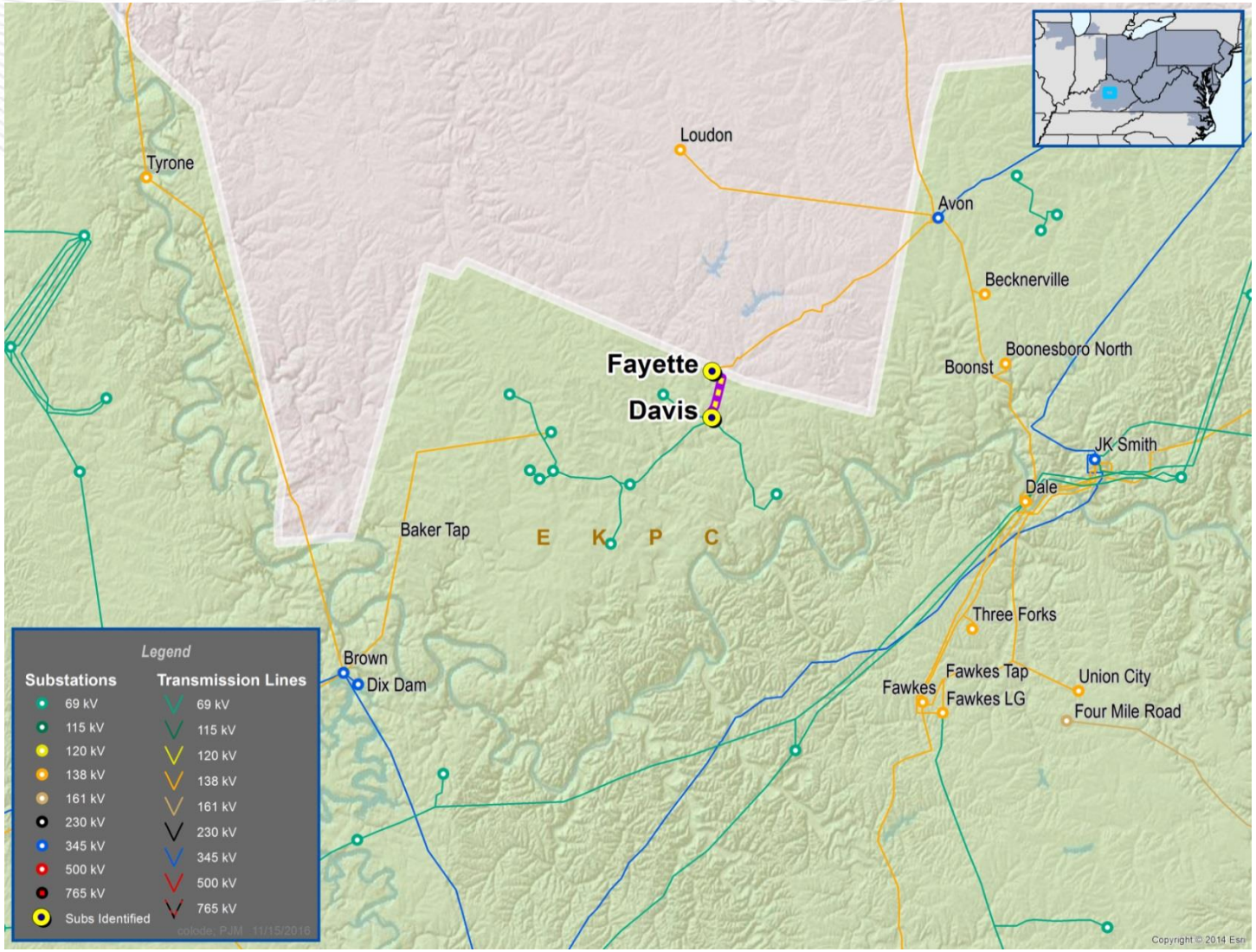
Rebuild the Davis - Fayette 69kv line section to 556.5 MCM (3.15 miles) **(B2783)**

Estimated Cost: $1.3M

Required In-Service: 12/1/2021

Reason for cancellation:

EKPC's 2020 screening results show that the need for this project has been pushed beyond 7 years due to load forecast updates in the area.



EKPC Transmission Zone Baseline Reliability

B2915 Cancellation

Criteria: EKPC FERC 715 Criteria

Previously Presented: 6/30/2017 SRRTEP-W

Problem Statement:

Low voltage at the Mt. Sterling substation for an N-1 outage.

Recommended Solution:

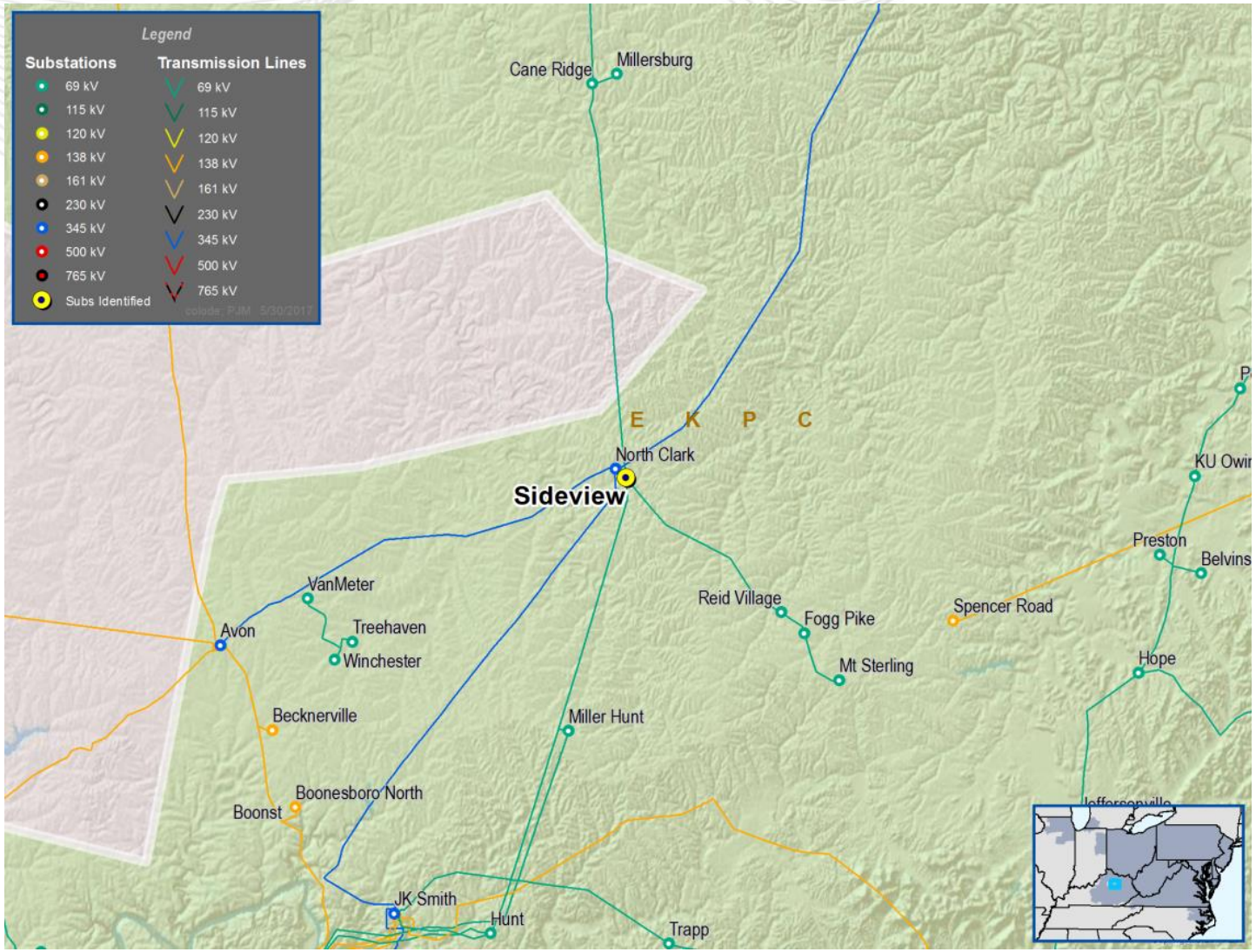
Resize the Sideview 69 kV capacitor bank from 6.12 MVAR to 9.18 MVAR. **(B2915)**

Estimated Cost: $0.07M

Required In-Service: 12/1/2023

Reason for cancellation:

EKPC's 2020 screening results show that the need for this project has been pushed beyond 7 years due to load forecast updates in the area.



EKPC Transmission Zone Baseline Reliability

B3045 Cancellation

Criteria: EKPC FER 715 Criteria

Previously Presented: 9/28/2018

Problem Statement:

The Liberty Church Tap-Bacon Creek Tap 69 kV circuit is overloaded for an N-1 outage.

Recommended Solution:

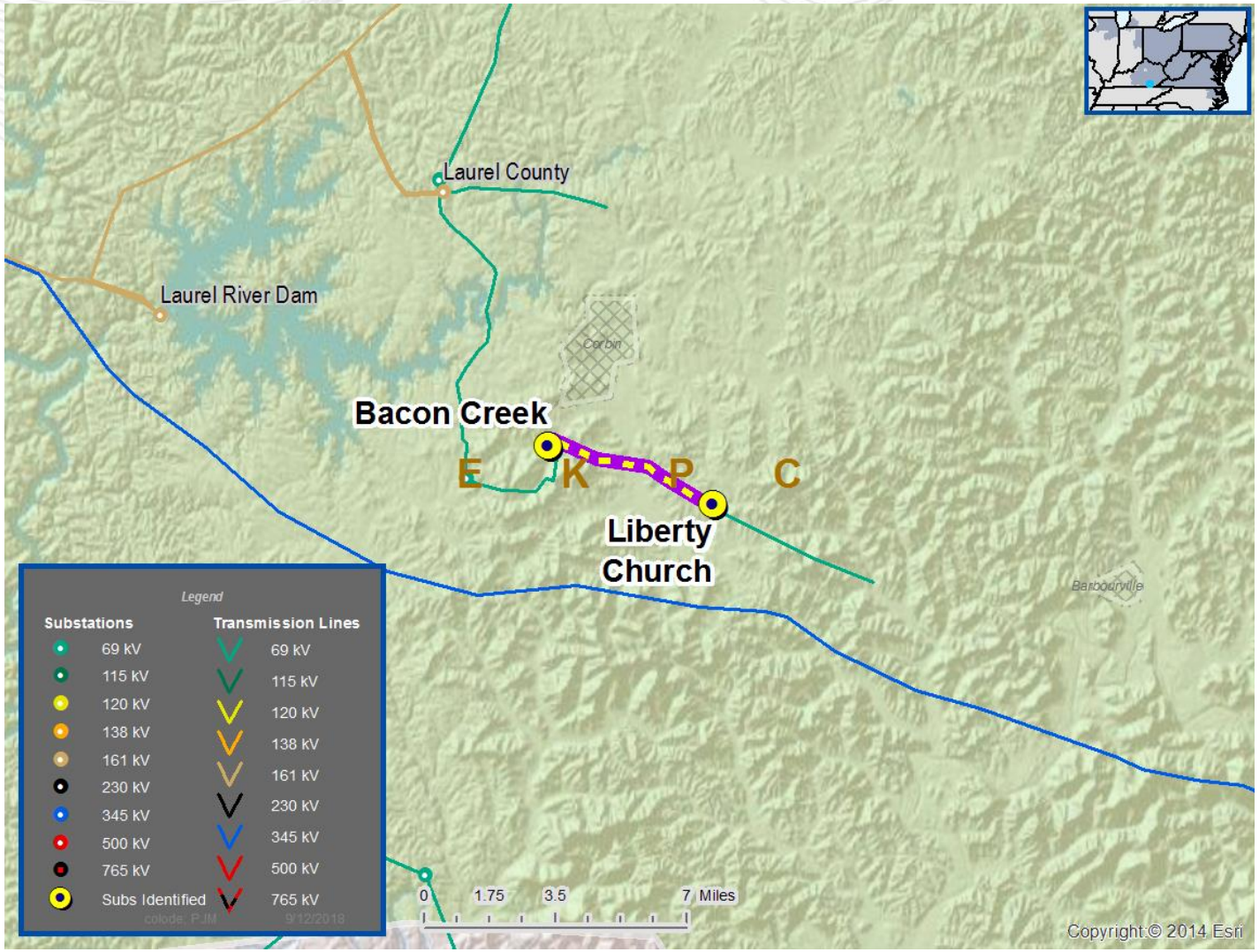
Increase the MOT of Liberty Church Tap-Bacon Creek Tap 69 kV line 266.8 MCM conductor from 212° F to 266° F. **(B3045)**

Estimated Cost: $0.25 M

Required In-Service: 6/1/2020

Reason for cancellation:

EKPC's 2020 screening results show that the need for this project has been pushed beyond 7 years.



EKPC Transmission Zone Baseline Reliability

B3046 Cancellation

Criteria: EKPC FER 715 Criteria

Previously Presented: 9/28/2018

Problem Statement:

The Summer Shade-JB Galloway Jct. 69 kV line is overloaded for an N-1 outage.

Recommended Solution:

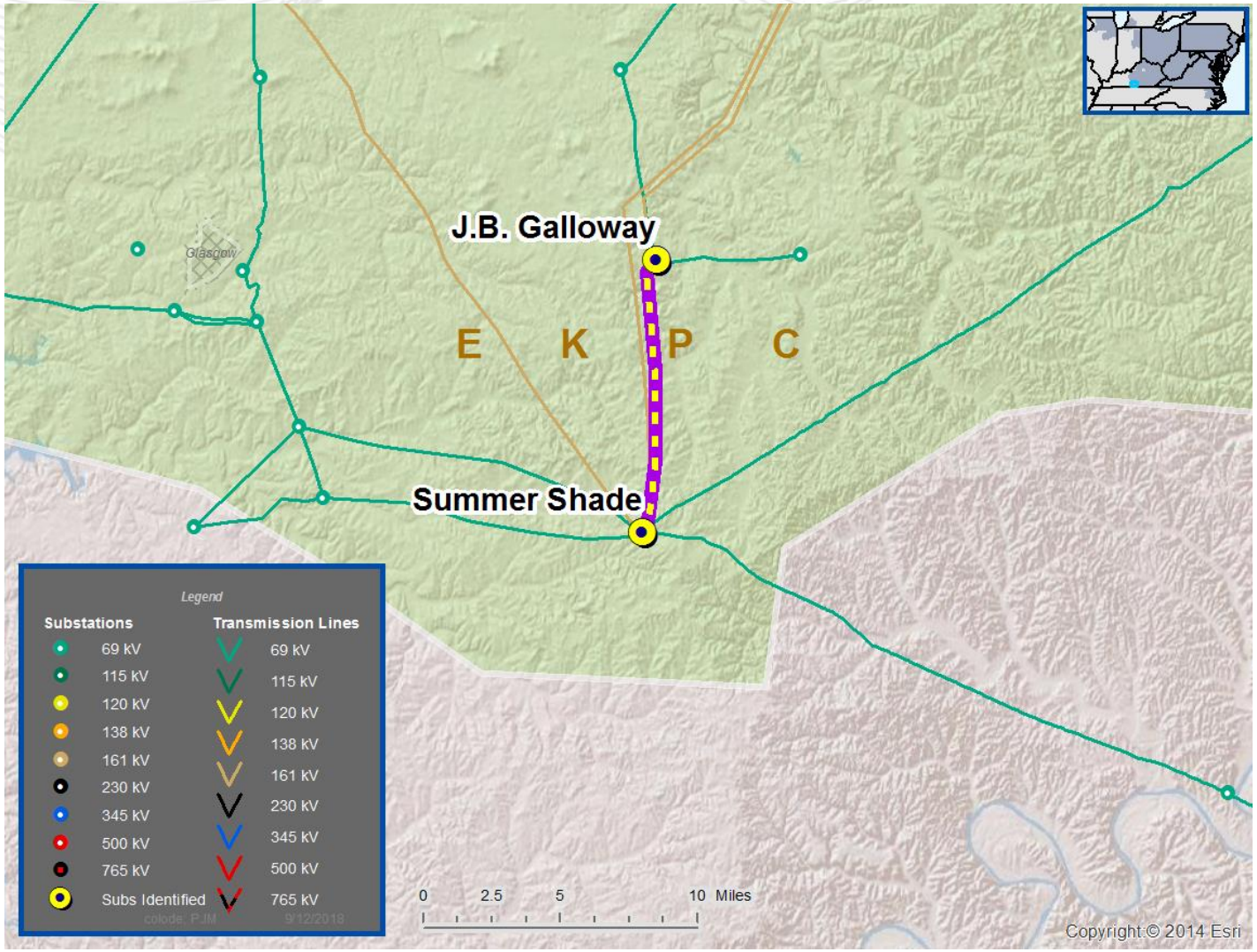
Increase the MOT of Summer Shade-JB Galloway Jct. 69 kV line 266.8 MCM conductor from 167° F to 212° F. **(B3046)**

Estimated Project Cost: $0.75 M

Required In-Service: 6/1/2019

Reason for cancellation:

EKPC's 2020 screening results show that the need for this project has been pushed beyond 7 years.



AEP Transmission Zone Baseline Reliability

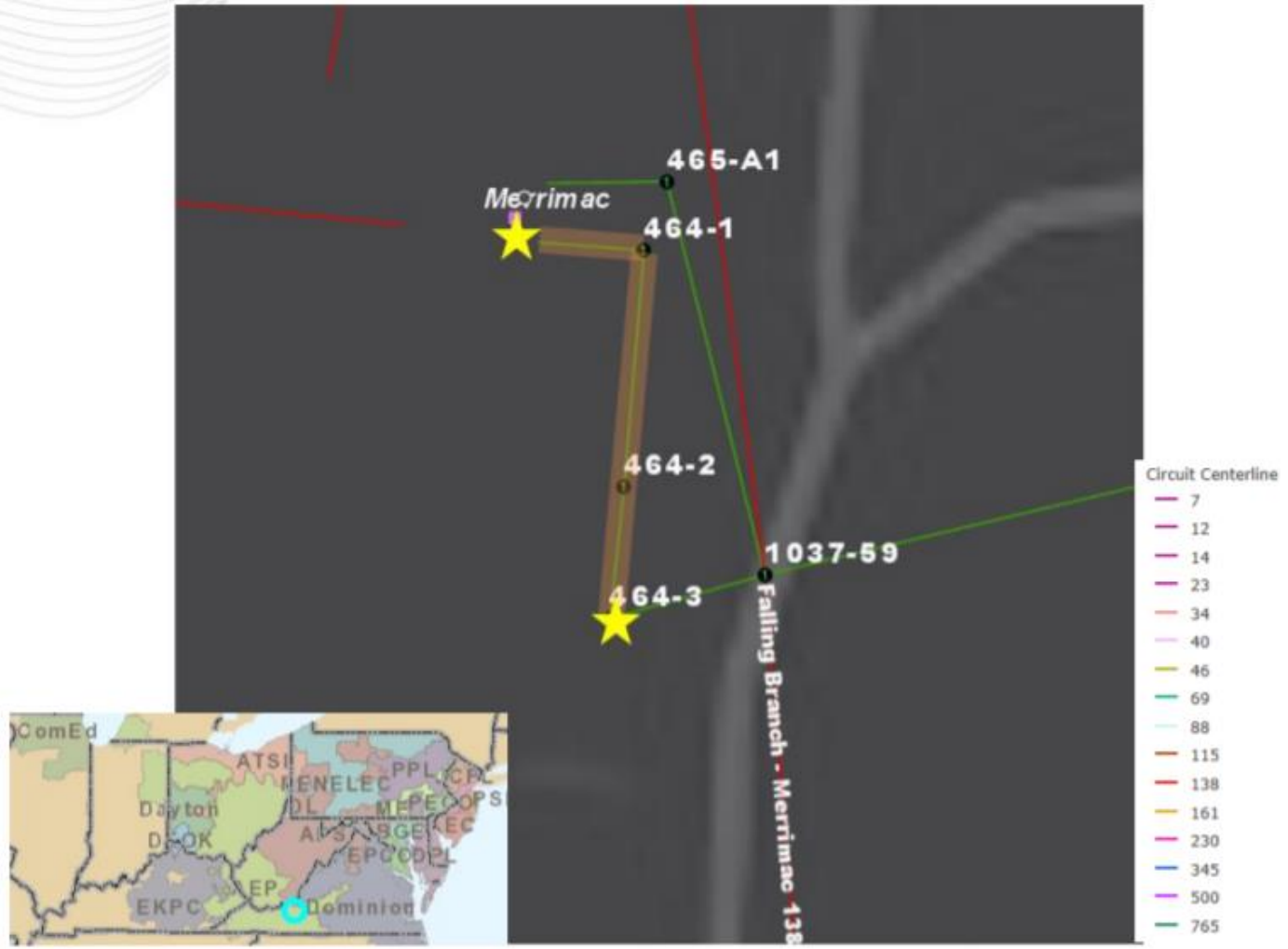
Project cancellation for B3286 (Presented in 12/18/2020 and 1/15/2021 W-SRRTEP)

B3286: Reconductor the first 3 spans from Merrimac station to Str. 464-3 of 3/0 ACSR conductor utilizing 336 ACSR on the existing Merrimac –Midway 69 kV circuit.

Estimated Project Cost: $0.45M

Required IS Date: 6/1/2025

Reason for the cancellation: During completing detailed scoping, AEP discovered that the wire size documented as 3/0, is actually 556 AAC. With 556 AAC, the original driver, the overload on the Merrimac - Midway 69kV line, doesn't exist anymore.



AEP Transmission Zone Baseline Reliability

Project cost change for B2611.1- .2 (Presented in 1/7/2015 TEAC)

B2611.1- .2 was in 2014 RTEP window #2. It was proposal P2014_2-2U, which was the only proposal received to address the AEP 715 violations on the Becco – Latrobe 46kV line overloads and low voltage issues at the Toney Fork, Cyclone, Latrobe, Craneco S. S. 1, Craneco S. S. 2, Pardee S.S., Three Forks, 46kV buses and Chap 69kV bus.

Project Description:

- Install a new 138/46 kV station near Skin Fork (B2611.1)
- Construct 3.2 miles of 1033 ACSR double circuit from New Station to cut into Sundial-Baileysville 138 kV line; Build 0.5 795 ACSR 69kV standards (operated at 46kV) line to Skin Fork station from the New Station; At Skin Fork, install a Breaker on new line exit towards New Station and circuit switcher on 46/12 kV transformer; At Becco, Install a circuit switcher on 46/12 kV transformer; Rebuild 3.57 mile section of Becco - Latrobe 46kV line with 795 ACSR built to 69kV standards (operated 46kV) (B2611.2)

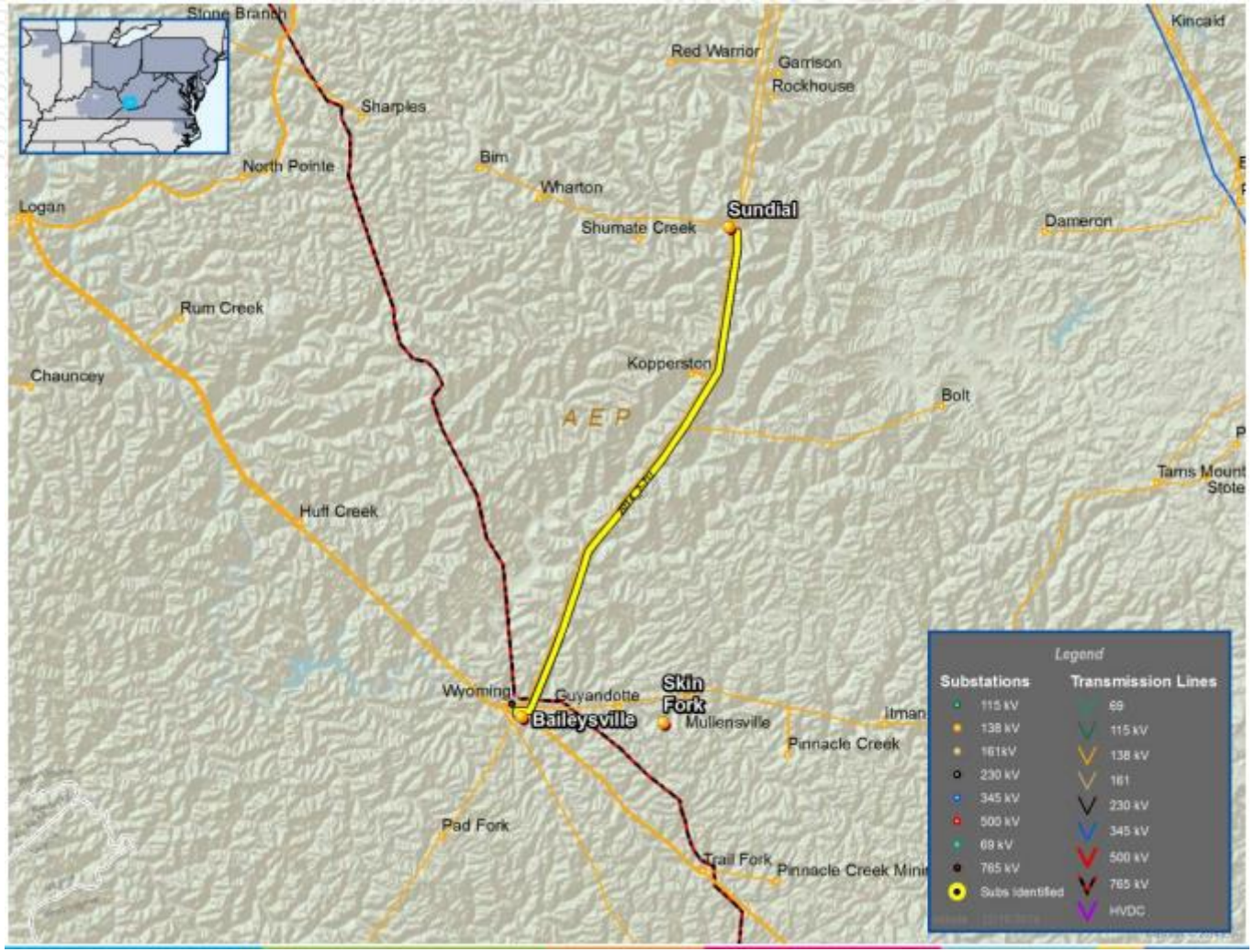
Estimated Project Cost: ~~$25.98 M~~

Functional Estimated Transmission Cost: $33.5M

New Estimated Project Cost: $60.1M

Required IS Date: 6/1/2019

Project IS Date: 11/30/2021



AEP Transmission Zone Baseline Reliability

Major Reasons for Cost increase (B2611.1-.2):

Project complexity and terrain ($7.1M)
- Due to the complexity of the project and difficult terrain, construction bids came in higher than original estimates.

Skin Fork ROW Delay ($8.1M)
- Delay due to inability to secure required easements through the condemnation process in time for work to continue without demobilization. Costs encompass remobilization and some temporary work to keep line in service during delay. An additional complication was added with the closure of WV courts in response to the COVID pandemic.

Unaccounted for rock at drilling and grillage sites ($4.1M)
- Encountering excessive access road rock & excessive rock drilling costs above anticipated amounts based on available soil borings.

Additional SWPPP Maintenance ($2.1 M)
- WVDEP requirement on enhanced SWPPP including increased inspection intervals and enhanced environmental barriers. Recent change to state regulations.

Changes to Station Scopes ($2.1 M)
- Non-topology changes identified in detailed design to Station scopes for the remote end stations resulted in additional costs at Baileysville and Chauncey. These changes include relay panel changes, the addition of SST/CTs/CCVTs, rock adders and scope for testing and commissioning.

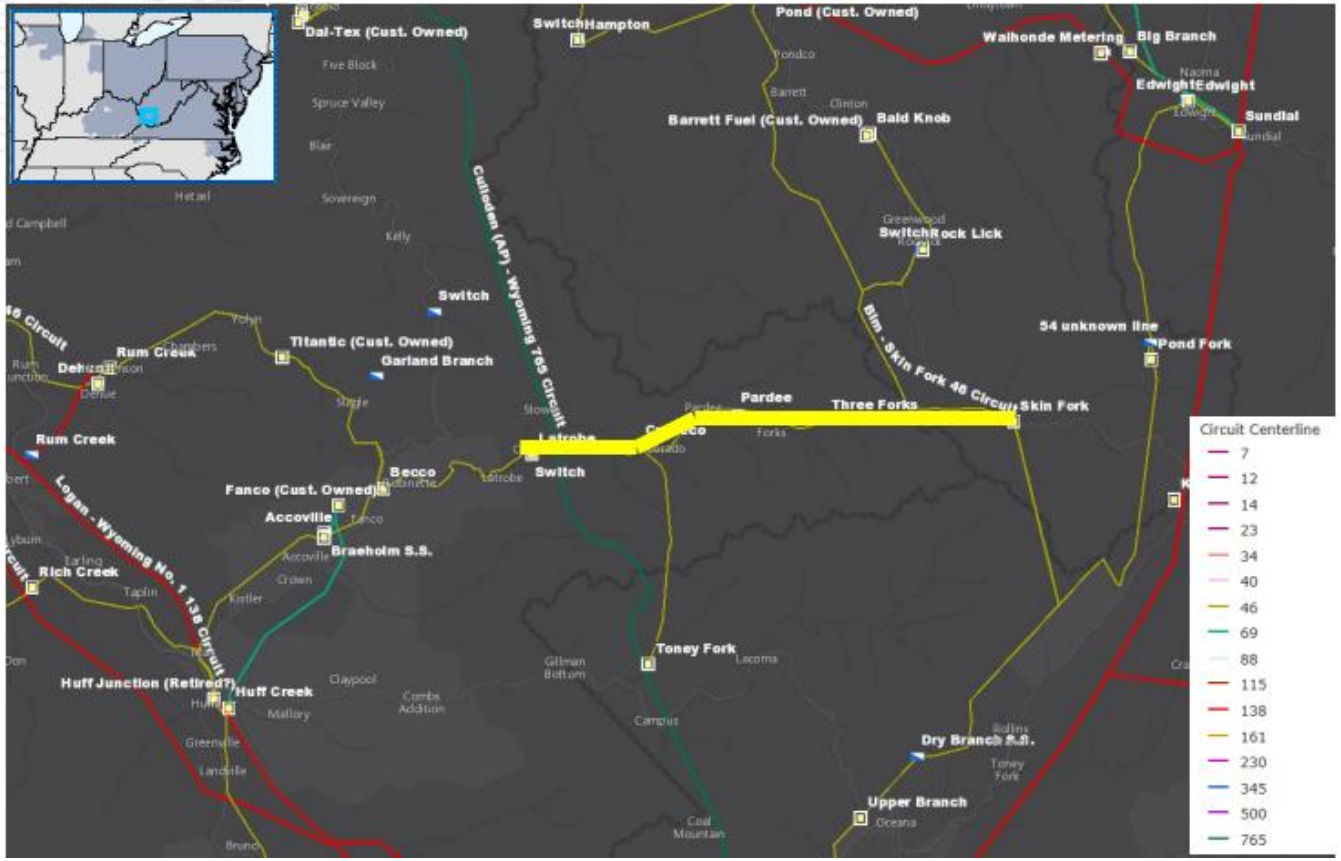
Changes to Line Scopes ($3.1M)
- Non-topology changes identified in detailed design to Line scopes resulted in additional costs that include alignment shifts, changes in foundation designs, distribution relocations, steel tariffs, and bat studies.

AEP Transmission Zone
Baseline Reliability

Project B2883 Revision (Presented in 4/17/2017 and 5/31/2017 SRRTEP)

B2883: Rebuild the Craneco – Pardee – Three Forks – Skin Fork 46kV line section (approximately 7.2 miles) utilizing 795 26/7 ACSR conductor (108 MVA rating, 43%).
Estimated Transmission Cost: ~~$12.2M~~
Functional Estimated Transmission Cost: $13.7M
New Estimated Transmission Cost: $42.2M

Required IS date: 6/1/2021
Projected IS date: ~~4/1/2018~~ 11/30/2021



AEP Transmission Zone Baseline Reliability

Major Reasons for Cost increase:

Project complexity and terrain ($6.7M)

- Due to the complexity of the project and difficult terrain, construction bids came in higher than original estimates.

Skin Fork ROW Delay ($9.0M)

- Delay due to inability to secure required easements through the condemnation process in time for work to continue without demobilization. Costs encompass remobilization and some temporary work to keep line in service during delay. An additional complication was added with the closure of WV courts in response to the COVID pandemic.

Unaccounted for rock at drilling and grillage sites ($3.9M)

- Encountering excessive access road rock & excessive rock drilling costs above anticipated amounts based on available soil borings.

Additional SWPPP Maintenance ($3.3M)

- WVDEP requirement on enhanced SWPPP including increased inspection intervals and enhanced environmental barriers. Recent change to state regulations.

Changes to Station Scopes ($1.8M)

- Non-topology changes identified in detailed design to Station Scopes resulted in additional costs associated with station work at Lacey's Branch, Skin Fork and Becco stations. These changes include relay panel changes, the addition of SST/CTs/CCVTs, rock adders and scope for testing and commissioning.

Changes to Line Scopes ($3.8M)

- Non-topology changes identified in detailed design to Line scopes resulted in additional costs which include changes in foundation designs, distribution relocations, steel tariffs, and bat studies.

Project B2603 .1 - .3 Revision (Presented in 1/7/2015 TEAC)

- B2603 .1- .3 was in 2014 RTEP window #2. It was proposal P2014_2-2K, which was the only proposal received to address the AEP 715 violations on the Slaughter Creek –Winifrede 46kV line overloads and low voltage issues at the Emmons, Round Bottom, Peytona, Penn VA Coal, Mikes Run, Shabdue, Hopkins Fork, Boone, Maxine S. S., Camp Creek 46kV buses.

Original Scope:

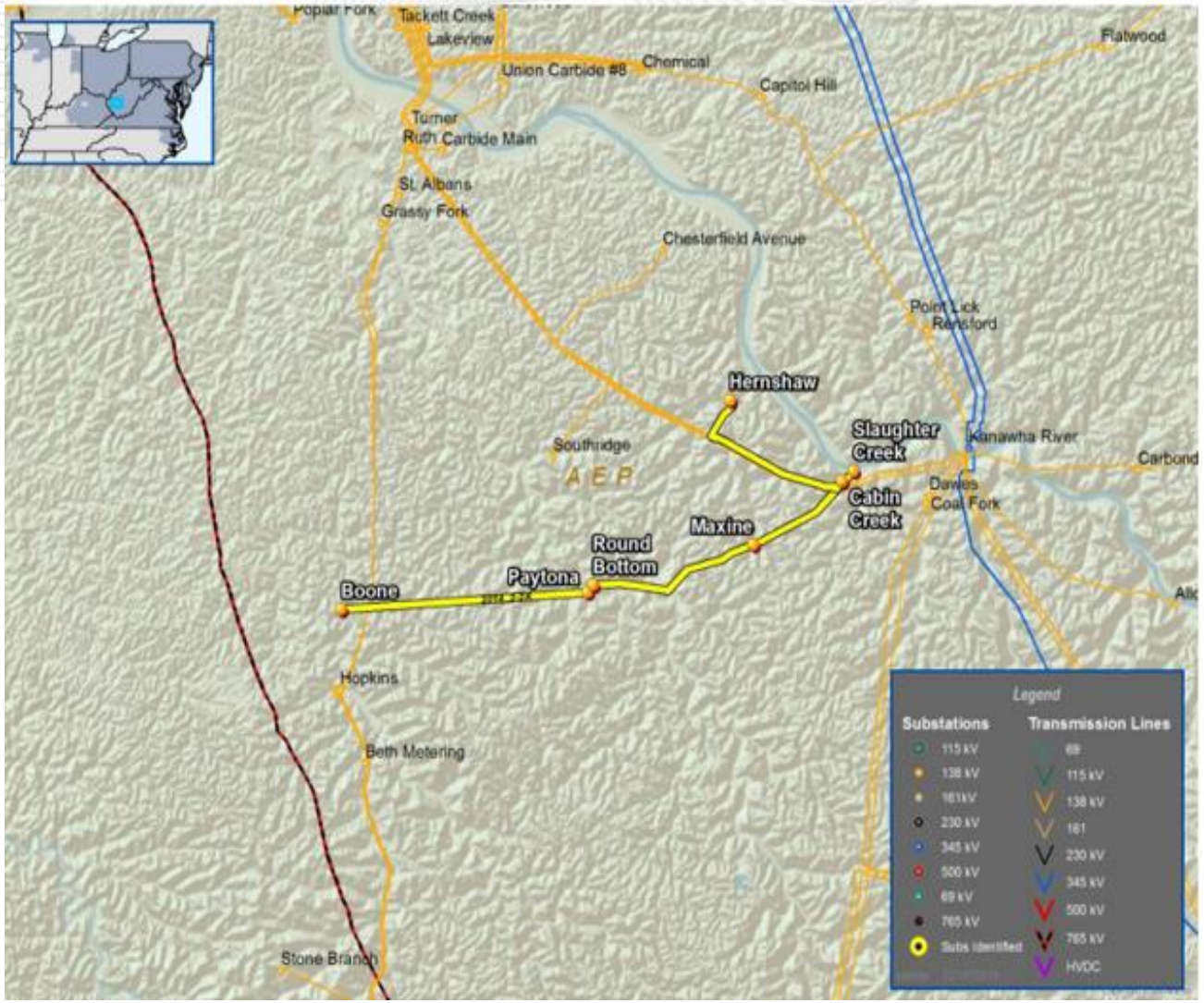
- **B2603.1:** Purchase approximately a 200X300 station site near Slaughter Creek 46 kV station (to establish a greenfield 138kV Wilbur Station).Install 3 138 kV circuit breakers,
- **B2603.2:** Loop the Cabin Creek to Hernshaw 138 kV circuit into the new station by constructing ~1mile double circuit 138kV line extending north from the station
- **B2603.3:** Construct 15.86 miles of 138 kV double circuit line using 1033 ACSR 54/7 conductor and 1-2#8 alumoweld and one 86 Sq.MM. 0.646" OPGW Static wires with one conductor side insulated at 138 kV and one side insulated at 69 kV. Connect 46 kV line insulated to 69 kV to Slaughter Creek, Maxine, Peytona, Round Bottom and Boone Stations. Add 138-69/46 kV 130 MVA Transformer and circuit switcher to Boone Station. Add 69 kV 40 kA 3000 amp circuit breaker operated at 46 kV.

Original Presented Estimated Cost: ~~$43.18M~~

Original Corrected Estimated Cost: $62M (Discrepancy between PDF and Excel in the submittal)

Functional Estimated Transmission Cost: $86.45M

Required IS Date: 6/1/2019



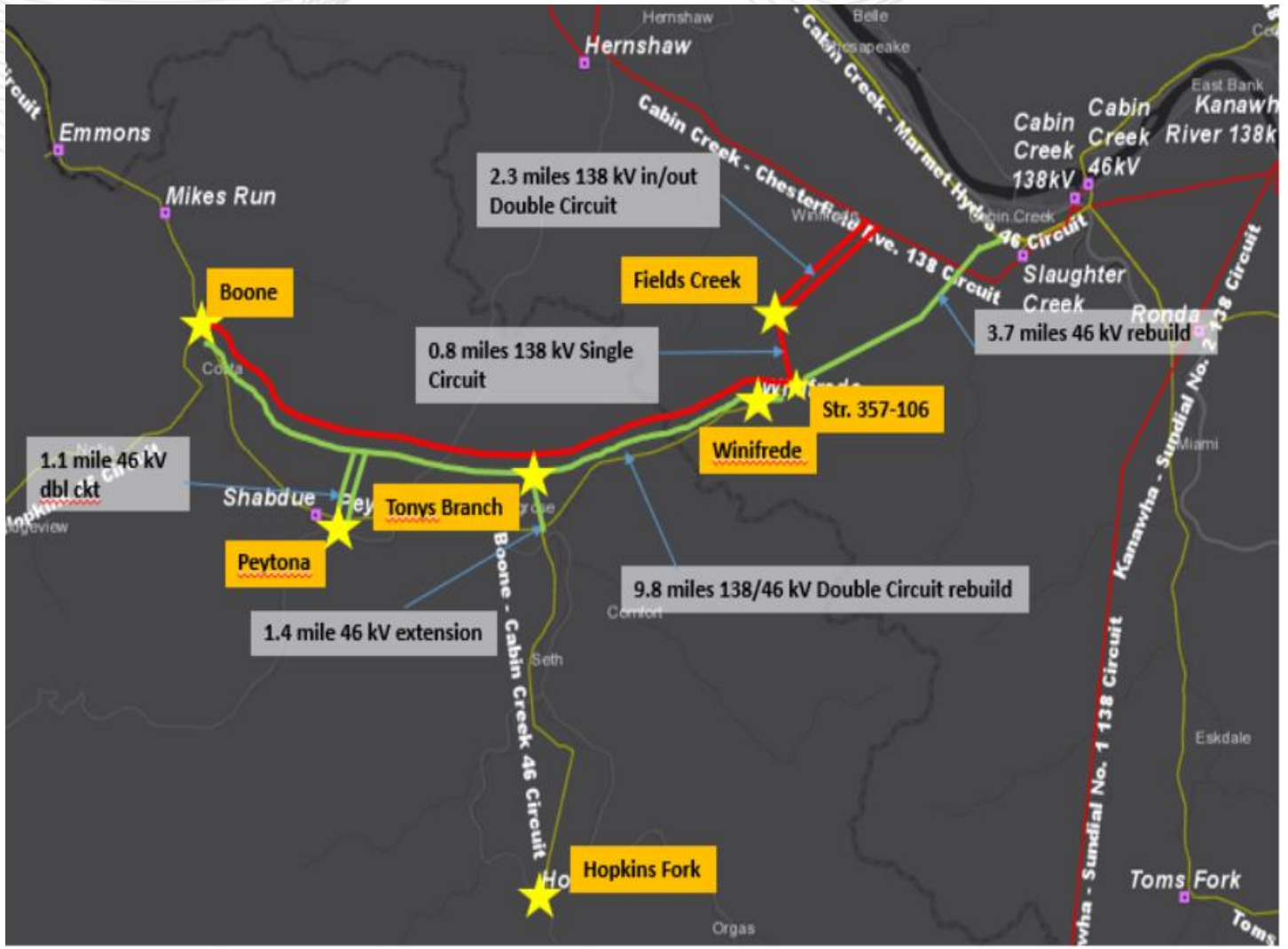
AEP Transmission Zone Baseline Reliability

New Scope:

- **B2603.1:** Establish a new greenfield 138kV station at Fields Creek which is located 2.3 miles from the existing line Station location (changed from the original proposed site at Wilbur, Near Slaughter Creek Wilbur) .Install 3 138 kV circuit breakers
- **B2603.2:** Loop the Cabin Creek to Hernshaw 138 kV circuit into the new Fields Creek station by constructing ~2.3 mile double circuit 138kV line extending north from the station
- **B2603.3:** Construct ~~15.86~~ ~9.8 miles of 138 kV double circuit line using 1033 ACSR 54/7 conductor and 1-2#8 alumoweld and one 86 Sq.MM. 0.646" OPGW Static wires with one conductor side insulated at 138 kV and one side insulated at 69 kV from Boone substation to Structure 351-11 on the Belle – Cabin Creek No.1 46kV line. Connect 46 kV line insulated to 69 kV to ~~Slaughter Creek~~, Winifrede, Maxine (Tonys Branch), Peytona, Round Bottom and Boone Stations. Add 138-69/46 kV 130 MVA Transformer and circuit switcher to Boone Station. Add 69 kV 40 kA 3000 amp circuit breaker operated at 46 kV. Rebuild the 3.7 miles 46kV circuit from the Structure 357-106 to Slaughter Creek. (The original plan proposed rebuilding Boone – Wilbur on the existing centerline. The current plan is rebuilding off centerline, which drove additional scope:) Build back a double circuit extension (1.1 miles) back to existing switches at Peytona as well as the addition of a new extension to a new switch at Tonys Branch (replaced existing Maxine switch). Rebuild the 1.4 miles 46kV single circuit to connect the existing line to Hopkins Fork to the new Tonys Branch Switch. Replace two 46kV switches at Winifrede 46kV Station:

New Estimated Project Cost: $114.5M

Projected IS Date: 12/31/2021



Major Reasons for Cost increase:

- **Transmission Line Tension changes to Increase life Span ($342K):** Tension requirements were decreased by using a different standard causing some engineering and material changes. These changes increase conductor life span when they transverse the longer spans necessitated in the West Virginia mountains.
- **Varying quantities of steel and conductor and type foundations needed due to differing conditions encountered. ($2.13M):** The Boone Area Reinforcements Transmission Line design was adjusted based on landowner required changes and obtaining detailed geotechnical data.
- **Reroutes of approximately 3 miles ($7.183M):** Reroutes of an approximate total amount of 3 miles to accommodate landowner requests, avoidance of encroachments, and slide prone areas that caused the center line route to be adjusted.
- **Bat Survey (Loaded $302K):** A bat survey was necessary to avoid additional mitigation costs during construction.
- **Reroute of approximately 1.5 miles ($ 2.72M):** This approximate 1.5 mile reroute made outage accommodations possible so the line could be rebuilt within outage window constraints.
- **T-Line Alignment change at Entrance to Fields Creek ($751K):** Land owner would not allow a structure on their property so the T-line entrance had to be moved from original engineered position. This move required additional dead ends to allow for proper clearances.
- **New Access Requirements ($3.04M):** New access routes were required due to DOH (WV Division of Highways) bridge being built in the area and mining efforts in the area. Access roads had to be moved because a DOH permit was denied and ongoing mining activities encroached on the proposed access making those routes no longer possible.
- **Danger tree removal costs ($1.30M):** Costs for clearing danger trees in the area of the T-line. A danger tree is a tree outside our defined ROW that poses the risk of falling into the T-line.
- **T-Line Grounding Extra costs $2.39M):**Two ground rods were driven but acceptable ground reading was not achieved. A ground-well configuration was engineered and implemented in order to allow for proper grounding on the line.
- **Boone East ROW Delay ($510K):** Delay due to inability to secure required easements through the condemnation process in time for work to continue without demobilization. Costs encompass remobilization and some temporary work to keep line in service during delay.
- **Unaccounted for rock at drilling and grillage sites ($3.66M):** Encountering excessive access road rock & excessive rock drilling costs above anticipated amounts based on available soil borings.
- **Slide Remediation Work ($3.5M):** Terrain and excessive rain caused landslides, and in some cases construction of access roads and clearing of trees for Transmission line clearances.
- **Additional Drill Shaft Foundation efforts due to unknown subsurface issues ($222K):**The impact associated with mitigating subsurface latent conditions that could not be detected by soil boring analysis or other methods.

AEP Transmission Zone
Baseline Reliability

Questions?

Revision History

- V1 – 6/10/2021 – Original slides posted
- V2 – 6/15/2021 – Slide #9, Added details for the scope of B2611.2 and exact date for Project IS date
  – Slide #10, Added typo $8M.1 to $8.1M
  – Slide #11, Added exact date for Project IS date
  – Slide #14, Updated the new scope description