SERTP – PJM Biennial Regional Transmission Plan Review

May 8, 2018

Transmission Coordination Between the SERTP and PJM Regions

Interregional Transmission Coordination

Selected points from Tariffs

- Coordinate and share the results of regional transmission plans to identify possible interregional transmission projects that could address transmission needs more efficiently or cost-effectively
- Identify and jointly evaluate (biennially) proposed interregional transmission projects
- Exchange planning data and information at least annually
- Representatives of the SERTP and PJM will meet no less than once per year to facilitate the interregional coordination
- Maintain a website and e-mail list for the communication of information related to the coordinated planning process
  - 1.4 The Office of the Interconnection shall post procedures for coordination and joint evaluation on the Regional Planning website and will coordinate with SERTP
  - 2.1 & 2.2 Post exchanged power flows subject to regional CEII and notify SERTP

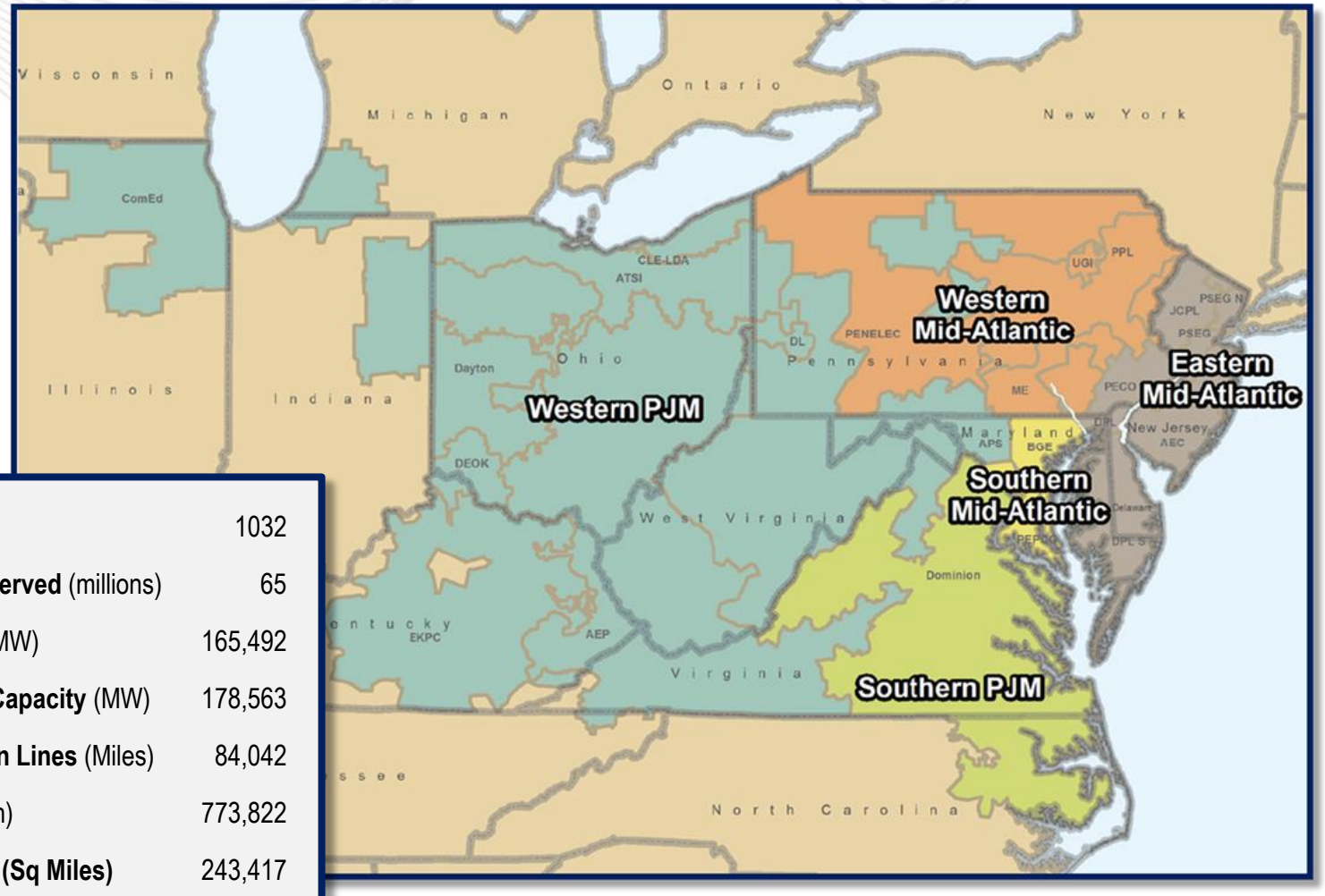
Interregional Transmission Coordination

- 3.2 and 3.4 Stakeholder project proposals submitted to both regions
  - Through Regional processes
- 4. Transparency
  - Post procedures
  - Post data (CEII)
  - SERTP updates and PJM Regional input through the TEAC
  - Links to SERTP process and distribution lists
  - Post a list of projects not eligible for consideration, and explanation

PJM Planning Process

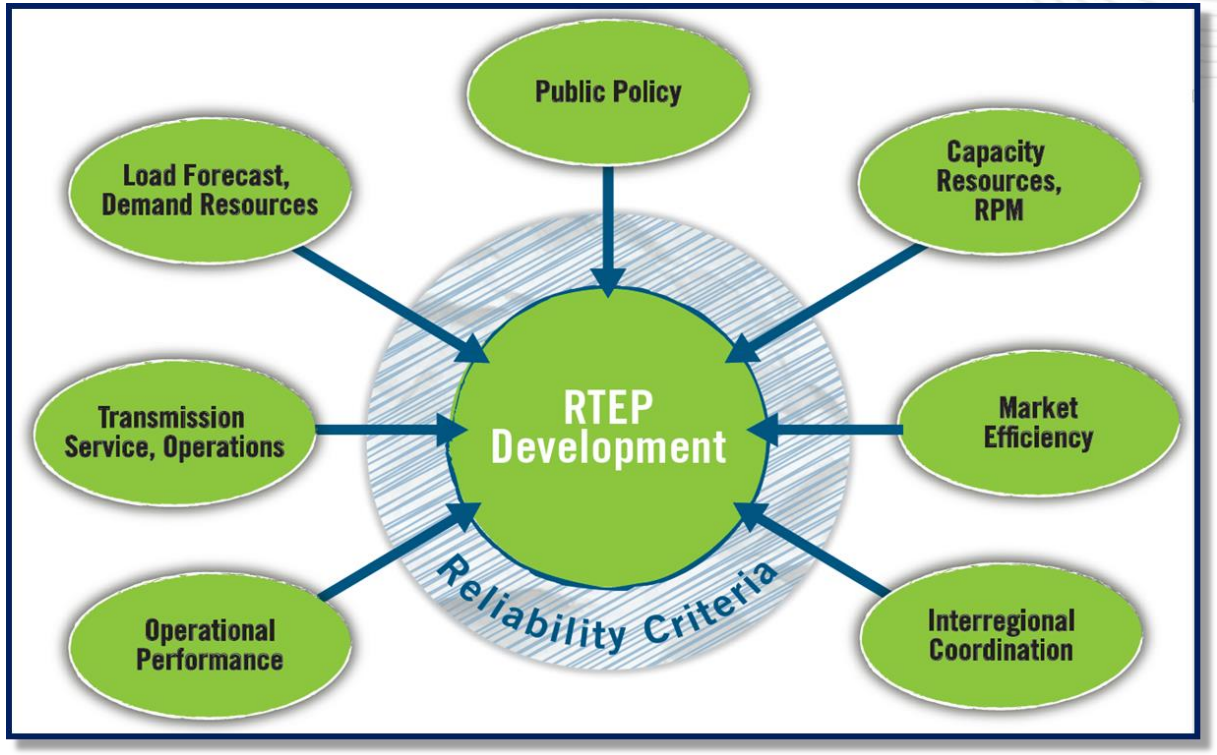
SERTP – PJM Biennial Regional Transmission Plan Review

May 8, 2018

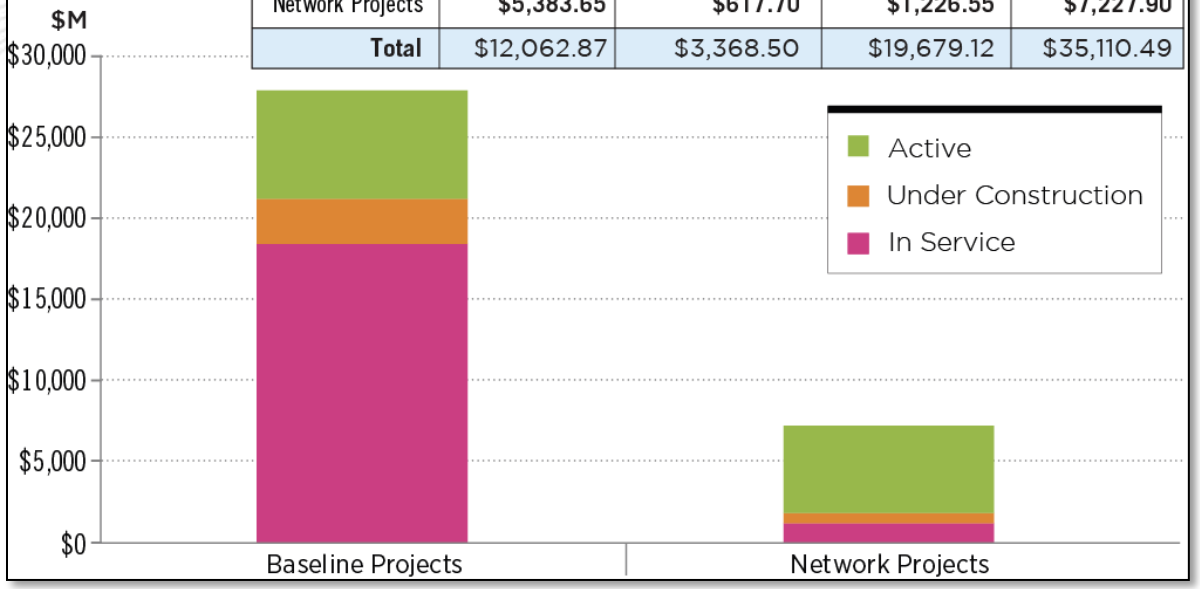


Members	1032
Population served (millions)	65
Peak Load (MW)	165,492
Generating Capacity (MW)	178,563
Transmission Lines (Miles)	84,042
Energy (GWh)	773,822
Area Served (Sq Miles)	243,417
States served	13 + DC

Regional Transmission Expansion Plan (RTEP)



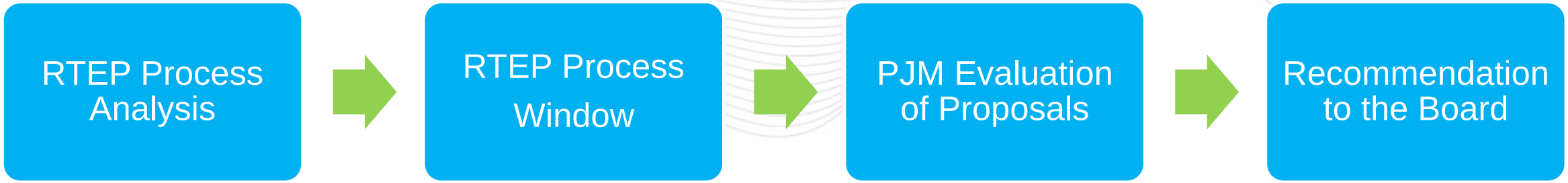
$ Millions	Active	Under Construction	In Service	Total
Baseline Projects	$6,679.22	$2,750.80	$18,452.57	$27,882.59
Network Projects	$5,383.65	$617.70	$1,226.55	$7,227.90
Total	$12,062.87	$3,368.50	$19,679.12	$35,110.49



NOTE:

The PJM Board authorized on February 14, 2018, more than $397 million of additional transmission system enhancements identified by PJM and reviewed with TEAC stakeholders in 2017. This brings PJM's total to more than $35.4 billion since 1999.

RTEP Process Baseline Concept



- ✓ Applicable to all facilities 100 kV+ and operationally controlled facilities below 100 kV
- ✓ FERC-approved
- ✓ 15 year planning horizon
- ✓ Planning cycles
  - ✓ 12-month cycle: market efficiency
  - ✓ 18-month cycle: “annual” baseline
  - ✓ 24-month cycle: longer-term projects including market efficiency & reliability
- ✓ Comprehensive and Holistic
  - Multi-driver: Reliability, Market Efficiency, Public Policy
- ✓ Open, transparent, collaborative stakeholder process
- ✓ Compliant with NERC, Local and Regional planning criteria
- ✓ Order No. 1000 compliant

RTEP Process Study Scope

Baseline

- ✓ Exceeds scope required by NERC
- ✓ Identify violations for multiple deliverability areas, or multiple or severe violations clustered in one specific area
- ✓ Permits PJM to assess larger-scale, longer lead-time solutions
- ✓ RTEP process analyses:
  - Normal system, single and multiple contingency analysis
  - Load deliverability and generator deliverability test conditions

As well as…

- ✓ New service studies (e.g., generator interconnection)
- ✓ Market efficiency studies
- ✓ Scenario studies
  - Operational Performance - winter conditions
  - Regulatory Impact - EPA CPP
- ✓ Interregional analyses

Load Forecast Model

Weather Conditions

- ✓ Weighted average temperature, humidity & wind speed
- ✓ 30+ weather stations across PJM

Economic Conditions

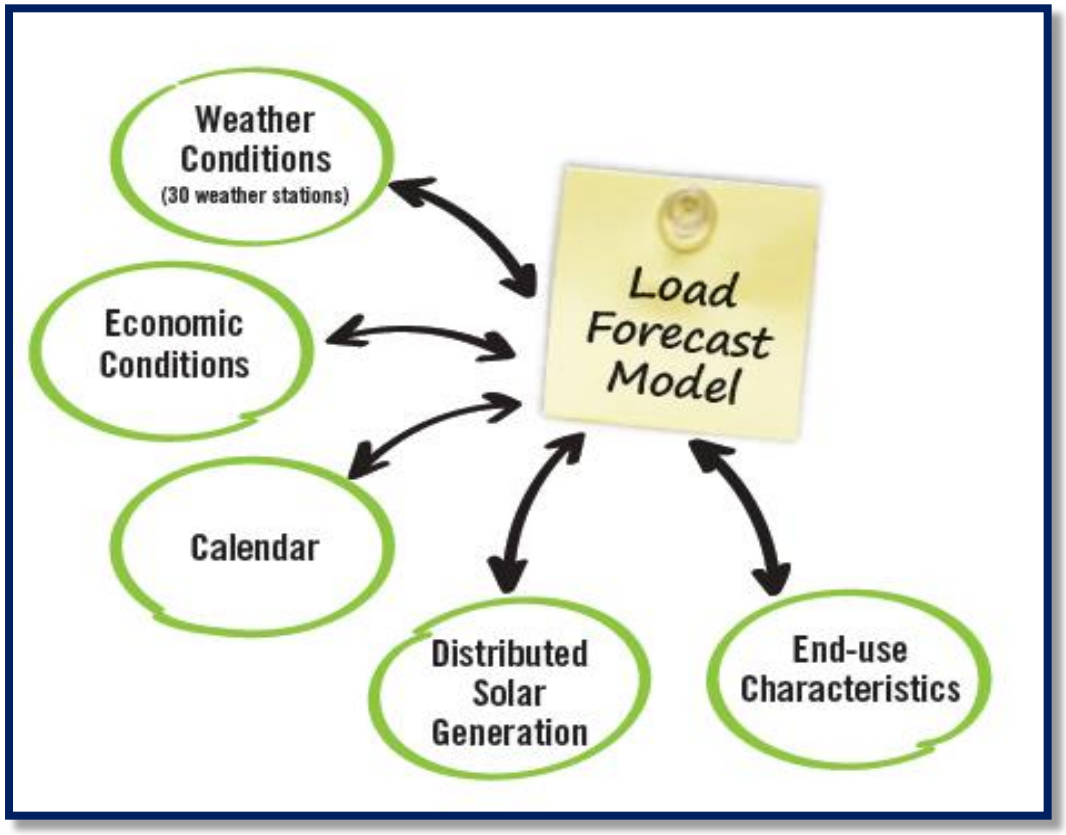
- ✓ Gross Domestic Product
- ✓ Gross Metropolitan Product
- ✓ Real personal income
- ✓ Population
- ✓ Households
- ✓ Non-manufacturing employment

End-Use Characteristics

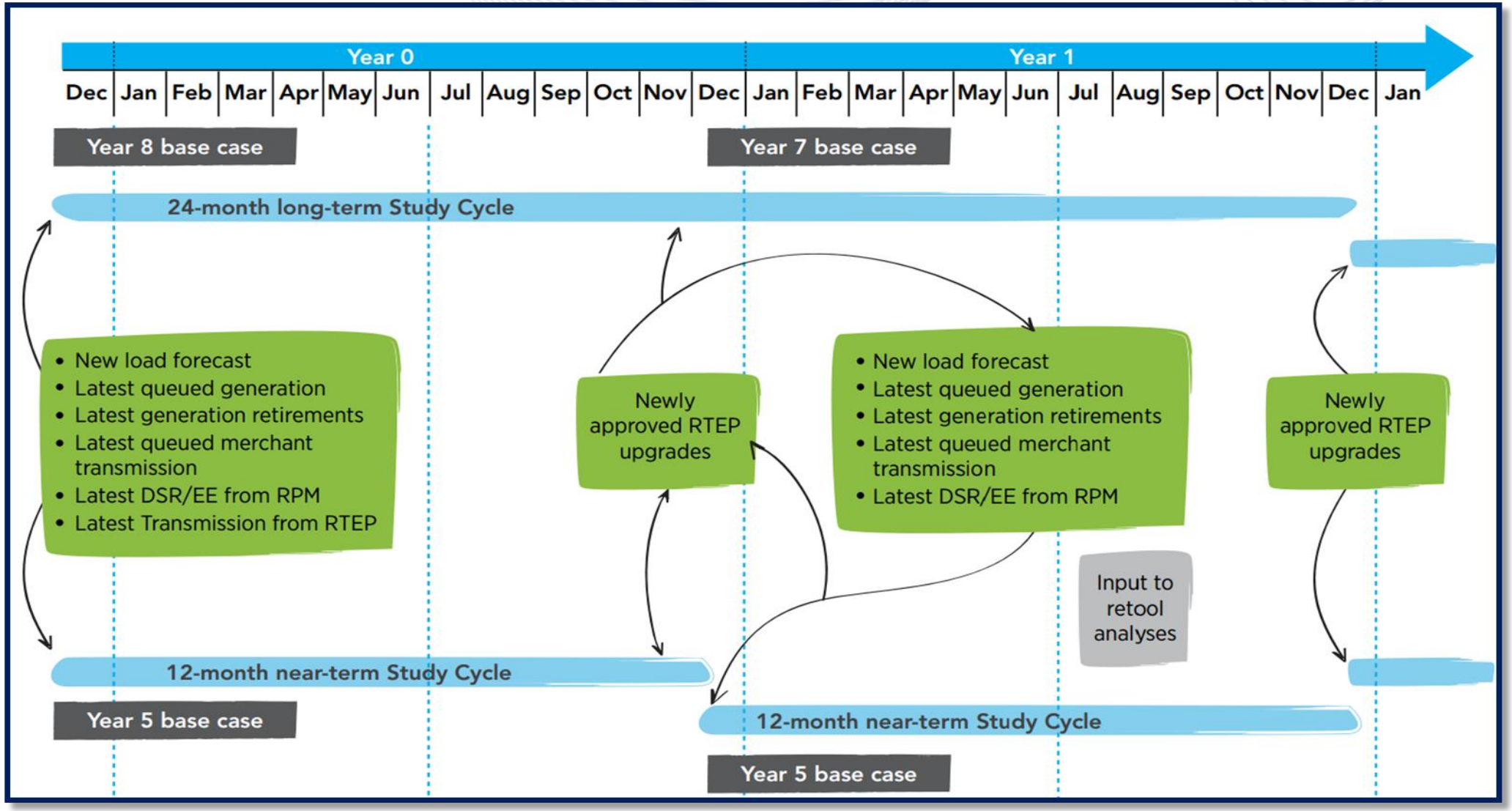
- ✓ Cooling Equipment saturation and efficiency
- ✓ Heating Equipment saturation and efficiency
- ✓ Other Equipment saturation and efficiency

Calendar / Solar Data

- ✓ Day of week
- ✓ Month
- ✓ Weekends / Holidays
- ✓ Distributed solar generation



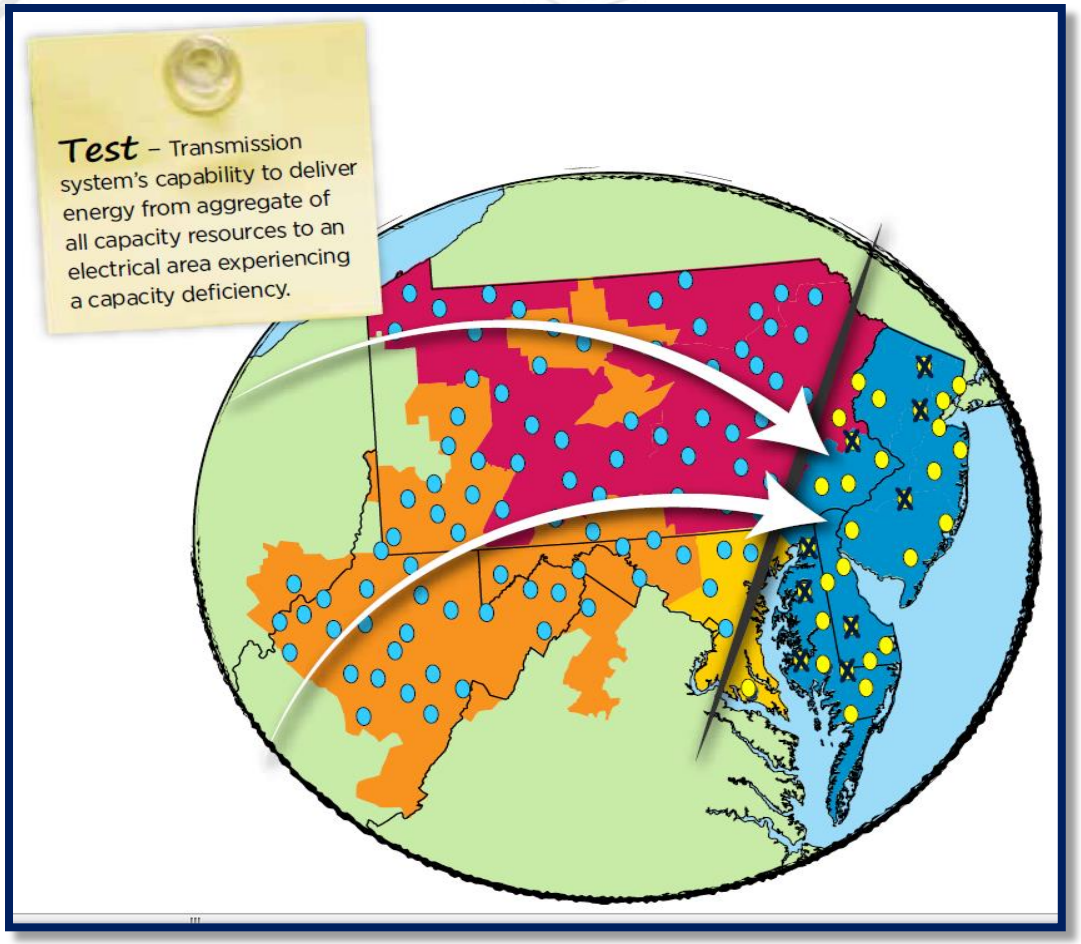
RTEP Power Flow Case Development



Load Deliverability Test

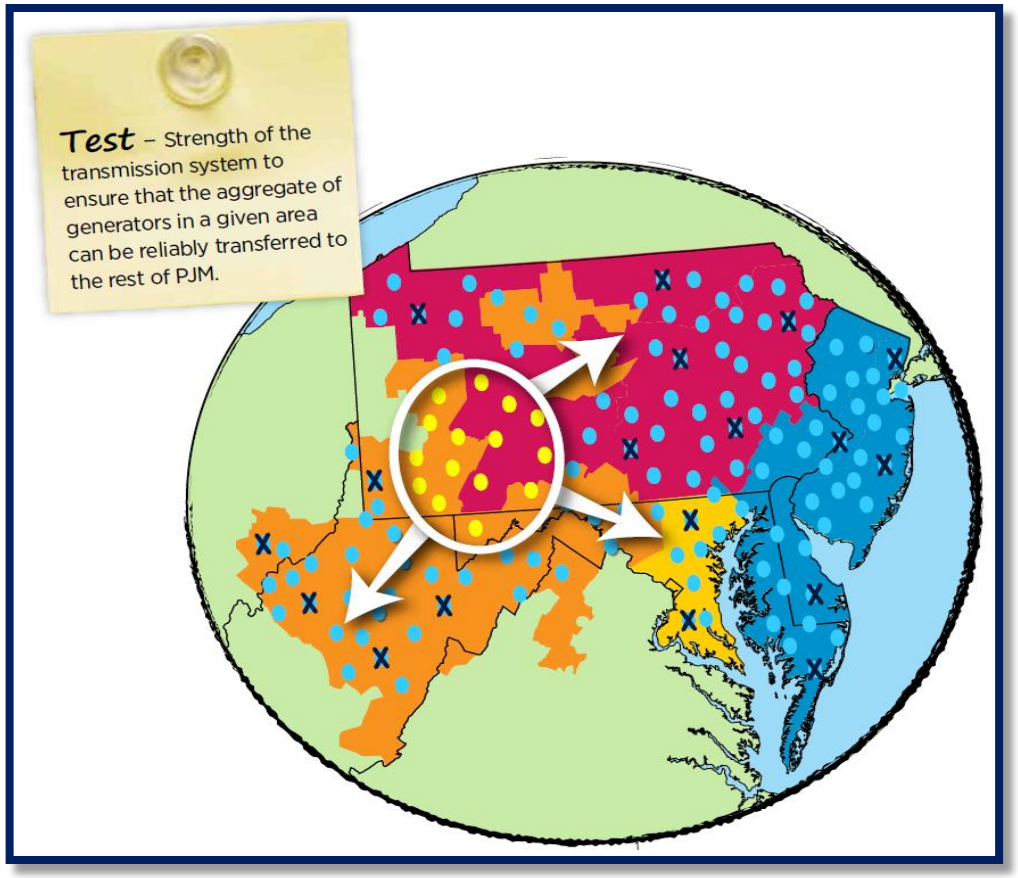
- ✓ Transmission system's capability to deliver energy from aggregate of all capacity resources to an electrical area experiencing a capacity deficiency
- ✓ Test failure: load is "bottled" inside a defined area
- ✓ Maintain CETO in defined area to achieve LOLE of 1-event-in-25 years
- ✓ Area tested for its expected import capability (CETL) up to established transmission facility limits

- ✓ **If CETL < CETO, test fails, additional transmission capability is needed**



Generator Deliverability Test

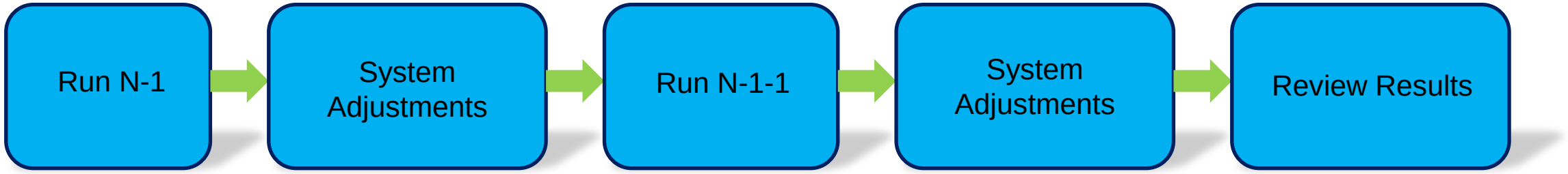
- ✓ Strength of the transmission system to ensure that the aggregate of generators in a given area can be reliably transferred to the rest of PJM.
- ✓ Test determines if transmission limits exist that prevent generation in a defined area to be exported to the rest of PJM … is generation "bottled" or not.
- ✓ Also performed for each queued generator interconnection request at System Impact Study step.



NERC Category P3 and P6 / “N-1-1” Analysis

Study Parameters

- ✓ 50/50 non-diversified case
- ✓ Single contingencies
- ✓ Both thermal and voltage limits



Short Circuit Analysis

- ✓ Fault or short circuit currents cause high thermal and mechanical stresses on power system equipment
- ✓ Circuit breakers clear faults to restore system to a stable operating point and to prevent equipment damage
- ✓ Analysis ensures each circuit breaker is rated sufficiently to interrupt system fault currents
- ✓ PJM studies the circuit breakers for impacts from planned system changes
- ✓ If breaker interrupting capacity < fault current, replacement required
  - Baseline RTEP Analysis
  - System Impact Studies

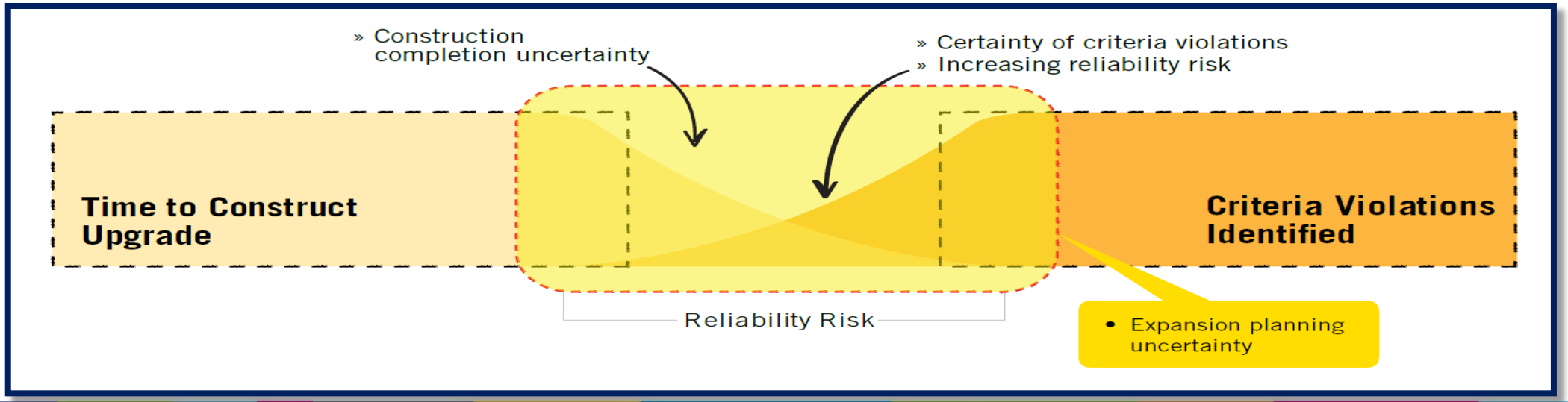
Light Load Analysis

- ✓ Below 50 percent of summer peak in western PJM TO zones (high wind areas)
- ✓ Operational challenges
  - Low demand generation dispatch differs markedly from peak
  - Capacitive effects of lightly loaded transmission lines
  - Intermittent source output
  - Thermal overloads, high voltage events

- ✓ 2010 creation and approval of new regional light load reliability criteria
- ✓ 2011 first implemented and benchmarked in RTEP process
  - Baseline analysis
  - Queued interconnection request studies
- ✓ Overall, ensure transmission capable of delivering generating capacity under light load conditions
- ✓ Generator Deliverability Study
- ✓ Common Mode Voltage Study

Scenario Studies

- ✓ Reliability tests reasonably defined expected date of criteria violations with minimal risk of fluctuation.
- ✓ That has changed. Today...
  - Public policy and regulatory action -- e.g., EPA CPP
  - Operational performance -- e.g., winter peak conditions (polar vortex)
  - Market economics – e.g., fuel-of-choice shifts to natural gas



Market Efficiency Analysis

- ✓ Conduct market simulations to identify congestion in future years
  - Production cost tool
  - TEAC reviewed input parameters and presented to the Board
  - License to commercially available database
  - Hourly security-constrained generation commitment and dispatch
  - Year 1, Year 5, Year 8, Year 11, Year 15

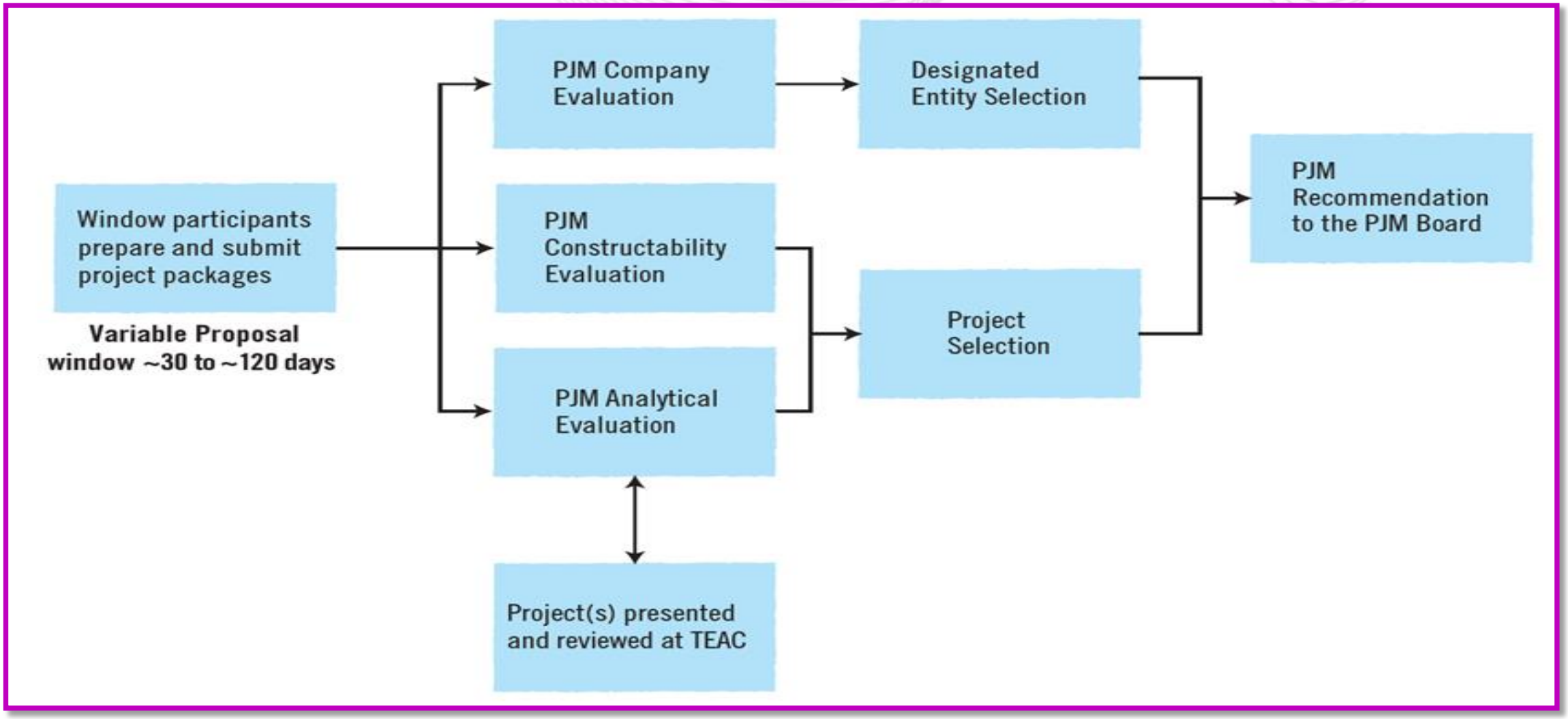
- ✓ Identify transmission enhancement plans that may realize economic benefit by mitigating congestion
  - Accelerate existing reliability-justified enhancement plans
  - Solutions via RTEP Long Term Window process
    - Stand-alone economic project
    - Multi-driver – expand scope of existing reliability enhancement
  - Benefit-to-cost ratio ≥ 1.25

- ✓ PJM evaluation of window-submitted proposals

Competitive Solicitation for Solutions

- ✓ Greater opportunities for transmission development by non-incumbents.
- ✓ One or more needs: reliability, market efficiency, operational performance, public policy
- ✓ If included in RTEP, project could be assigned to proposing party to build.
- ✓ Competitive solicitation window based process project classes:
  - ***Long-lead projects***:
    Reliability or market efficiency driven system enhancements in year 6 or beyond – 120 day window
  - ***Short-term projects***:
    Reliability driven system enhancements needed in year four or five – 30 day window
  - ***Immediate-need projects*:**
    Reliability driven system enhancements needed in three years or less; window if possible, likely less than 30 days nominally

RTEP Process Window Proposal Evaluation



Proposal Window Mechanics

- ✓ Proposal Fee
  - <$20M: No fee
  - $20M - $100M: $5k fee
  - >$100M: $30k fee
- ✓ Proposal Window Exclusions
  - <200kV may be excluded (thermal only); common contingency and geography exemption
  - Upgrades to existing substation equipment (thermal only) may be excluded; common contingency and geography exemption
  - FERC 715 (TO Criteria) excluded
  - Immediate Need

Additional Materials

- **PJM Planning Committee**
  http://www.pjm.com/committees-and-groups/committees/pc.aspx

- **Transmission Expansion Advisory Committee (TEAC)**
  http://www.pjm.com/committees-and-groups/committees/teac.aspx

- **PJM Interregional Planning**
  http://www.pjm.com/planning/interregional-planning.aspx

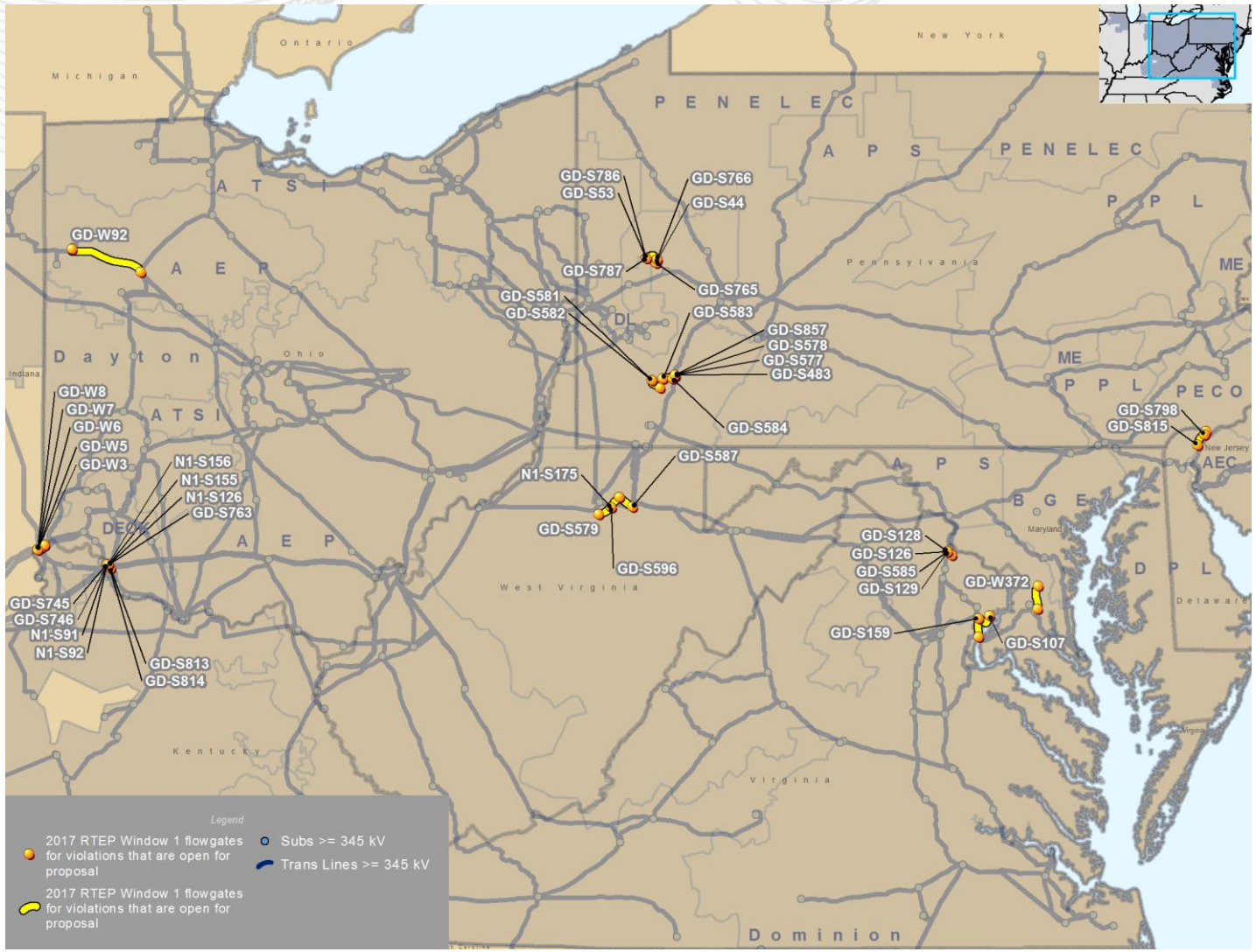
- **M-14B: PJM Region Transmission Planning Process**
  http://www.pjm.com/~/media/documents/manuals/m14b.ashx

PJM Regional Transmission Plans Review

2017 RTEP Proposal Window #1

2017 RTEP Proposal Window #1 Statistics

- PJM requested proposals for 40 reliability violation flowgates
  - 32 in the West region
  - 5 in the South (Dominion) region
  - 3 in the MAAC region
- Window Opened: 7/11/2017
- Window Closed: 8/25/2017
- 51 Proposals received from 10 entities addressing 9 target zones
  - 29 Greenfield
  - 22 Transmission Owner Upgrade



Dominion Transmission Zone – Baseline Reliability (2017 RTEP Proposal Window #1)

Generation Deliverability (Summer) (GD-S126, GD-S585 and GD-S661):

Date Project Presented: 10/12/2017 TEAC & 11/2/2017 TEAC

Problem Statement:

- The Pleasant View – Ashburn 230 kV is overloaded for single contingency loss of the Brambleton – Yardley 230 kV and for a tower line outage loss of the Brambleton – Yardley plus Brambleton – Poland Rd. 230 kV circuits.
- The Ashburn - Beaumeade 230 kV is overloaded for a tower line outage loss of the Brambleton – Yardley plus Brambleton – Poland Rd. 230 kV circuits.

Alternatives considered:

2017_1-1A ($4.52 M)
2017_1-1B ($7.11 M)
2017_1-1C ($3.05 M)
2017_1-7C ($9.74 M)

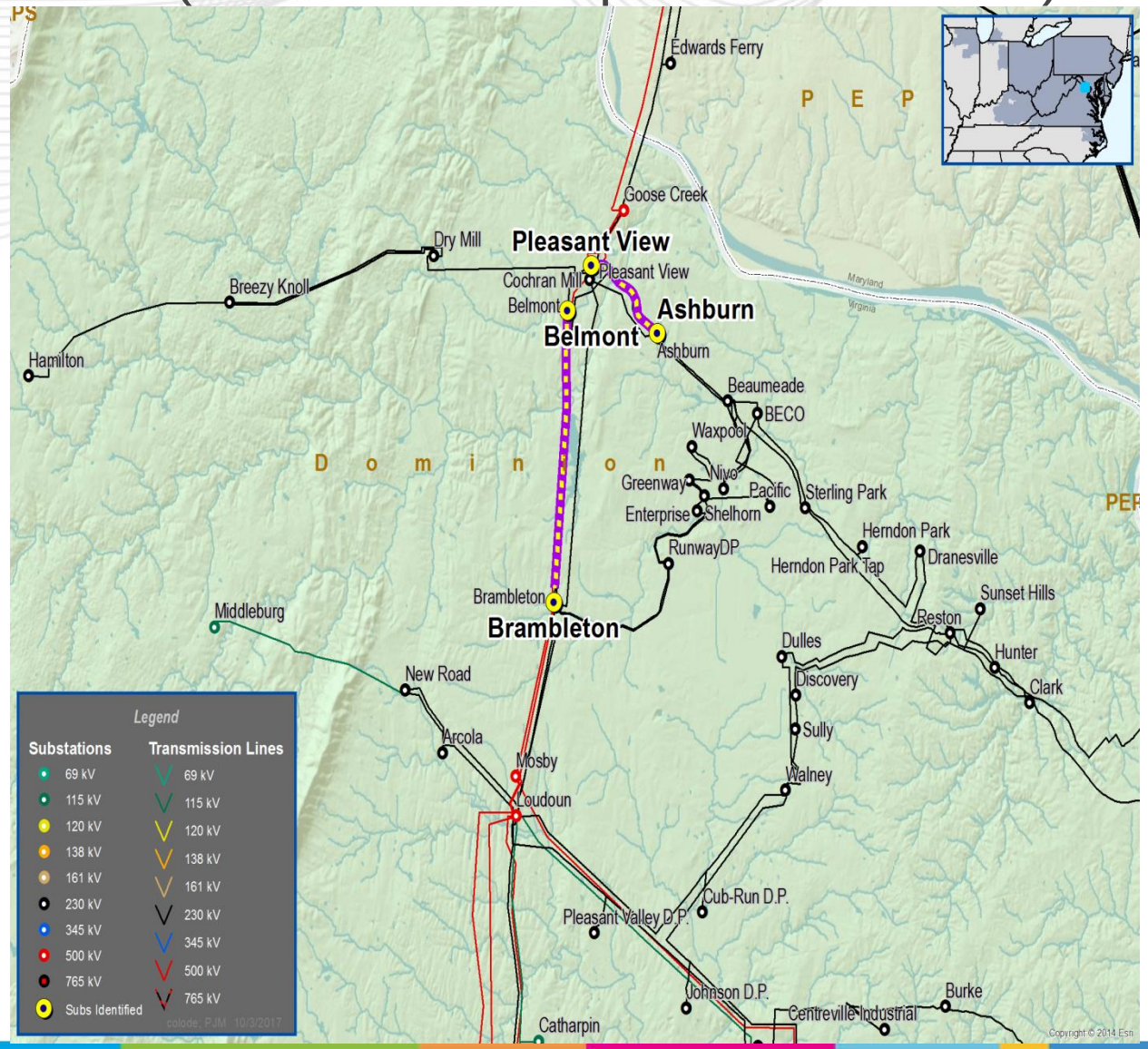
Recommended Solution :

- Split Line #227 Brambleton – Beaumeade 230 kV and terminate into existing Belmont substation. 2017_1-1C (**b2962)**

Estimated Project Cost: $ 3.05 M

Required IS date: 6/1/2022

Project Status: Conceptual



Dominion Transmission Zone – Baseline Reliability (2017 RTEP Proposal Window #1)

Generation Deliverability (Summer) (GD-S107, GD-S159):

Date Project Last Presented: 10/12/2017 TEAC & 11/2/2017 TEAC

Problem Statement:

- The Possum Point – Woodbridge – Occoquan 230 kV circuit is overloaded for single contingency loss of the Possum Point – Possum Creek - Woodbridge – E.P.G. – Hayfield 230 kV circuit.

Alternatives considered:

2017_1-1D ($4.49 M)
2017_1-1E ($4.96 M)
2017_1-1F ($12.68 M)

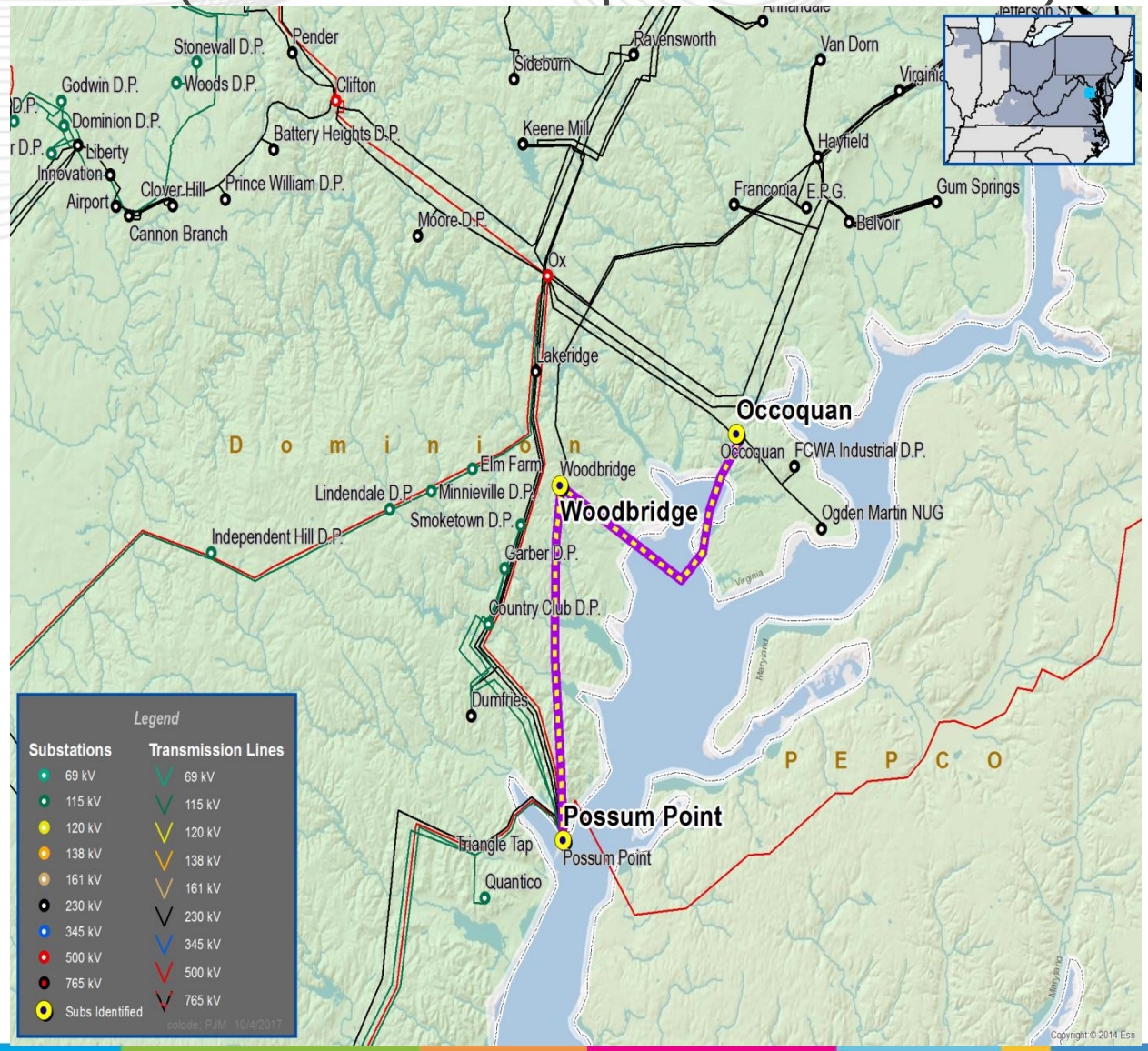
Recommended Solution :

- Reconductor the Woodbridge to Occoquan 230kV line segment of Line 2001 with 1047 MVA conductor and replace line terminal equipment at Possum Point, Woodbridge, and Occoquan. 2017_1-1D **(b2963)**

Estimated Project Cost: $ 4.49 M

Required IS date: 6/1/2022

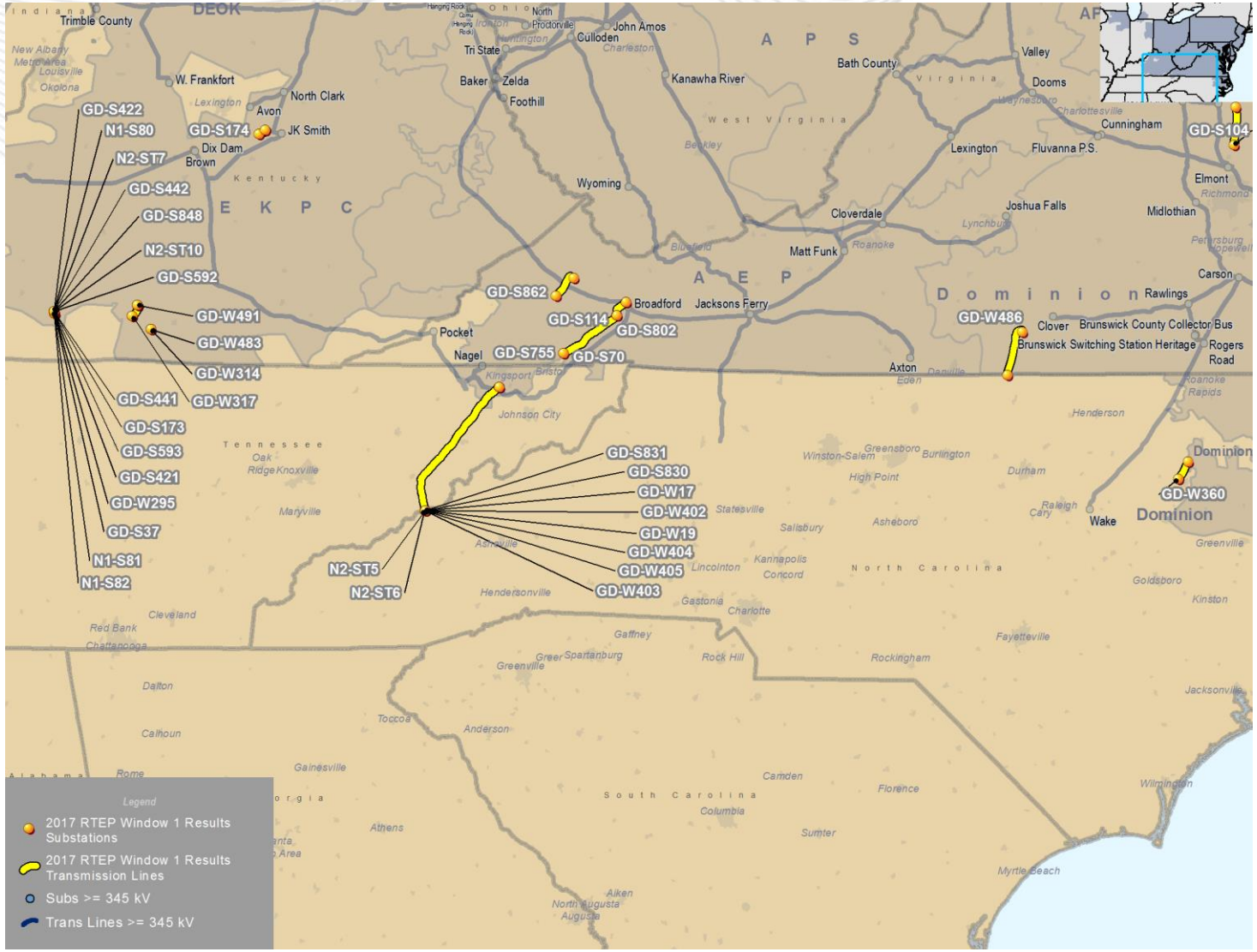
Project Status: Conceptual



2017 RTEP Baseline Reliability
Near PJM-SERTP Interface
(Excluded From 2017 RTEP Proposal Window #1)

2017 RTEP Projects Electrically Near the PJM-SERTP Interface (Excluded From 2017 RTEP Proposal Window #1)

- 190 flowgates were identified as reliability criteria violations
- 150 flowgates excluded for various reasons:
  - Immediate need (PJM OA 1.5.8(m)) (Includes Generator Deactivation related)
  - < 200kV (PJM OA 1.5.8(n))
  - Non-PJM limiting facility



AEP Transmission Zone - Baseline Reliability (Excluded From 2017 RTEP Proposal Window #1)

Baseline Reliability – Common Mode Violation

Previously Presented: 8/30/2017 & 9/11/2017 SRTEAC

Problem Statement:

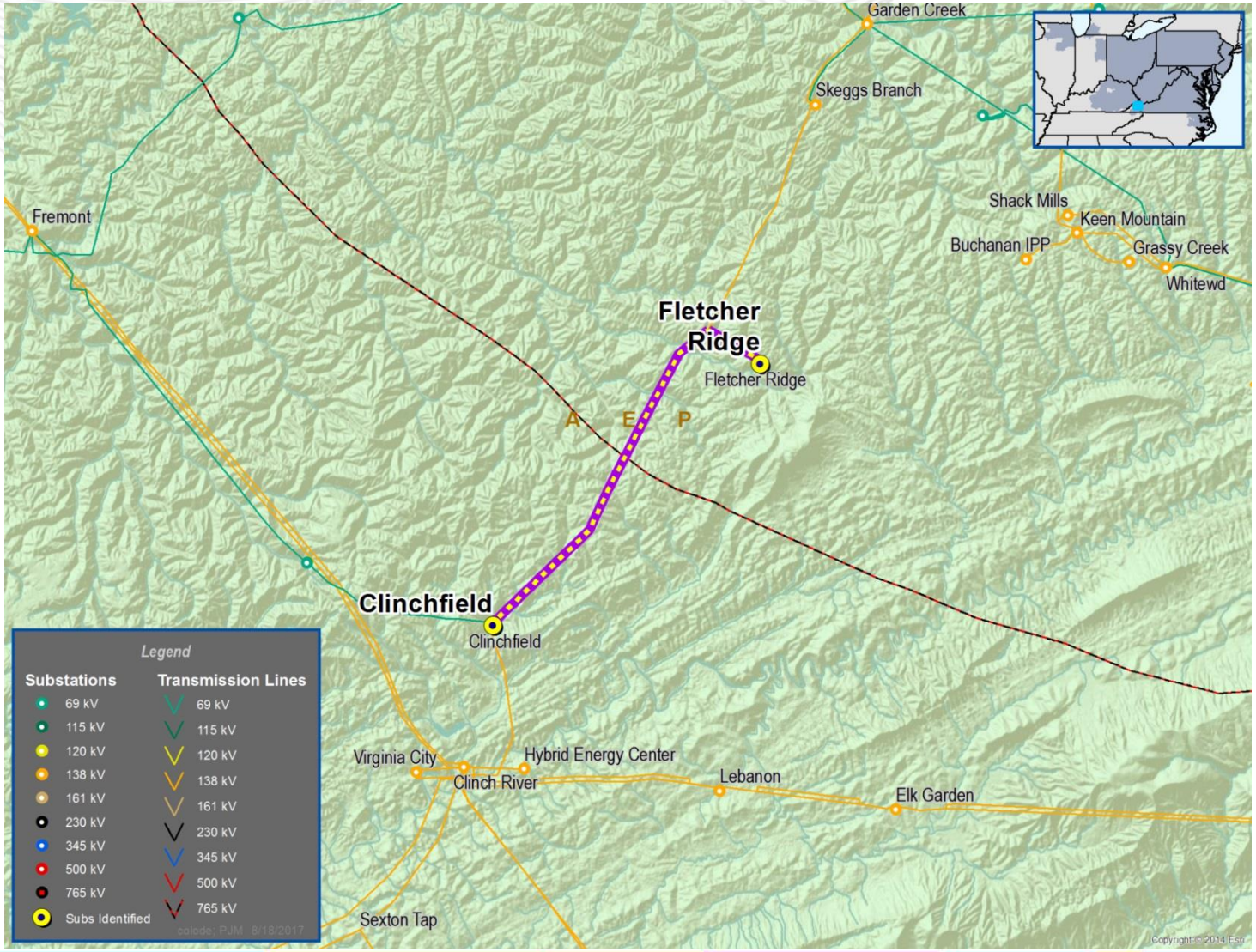
Clinchfield – Fletcher Ridge 138kV line is overloaded for the loss of Broadford – Saltville 138kV line with the stuck breaker at Saltville 138kV (**GD-S862**)

Recommended Solutions:

Replace the existing 636 ACSR 138 kV Bus at Fletchers Ridge with a larger 954 ACSR conductor (**b2937**)

Estimated Project Cost: $0.63M

Required ISD: 6/1/2022



AEP Transmission Zone - Baseline Reliability (Excluded From 2017 RTEP Proposal Window #1)

Baseline Reliability – Generator Deliverability and Common Mode Violation

Previously Presented: 8/30/2017 & 9/11/2017 SRTEAC

Problem Statement:

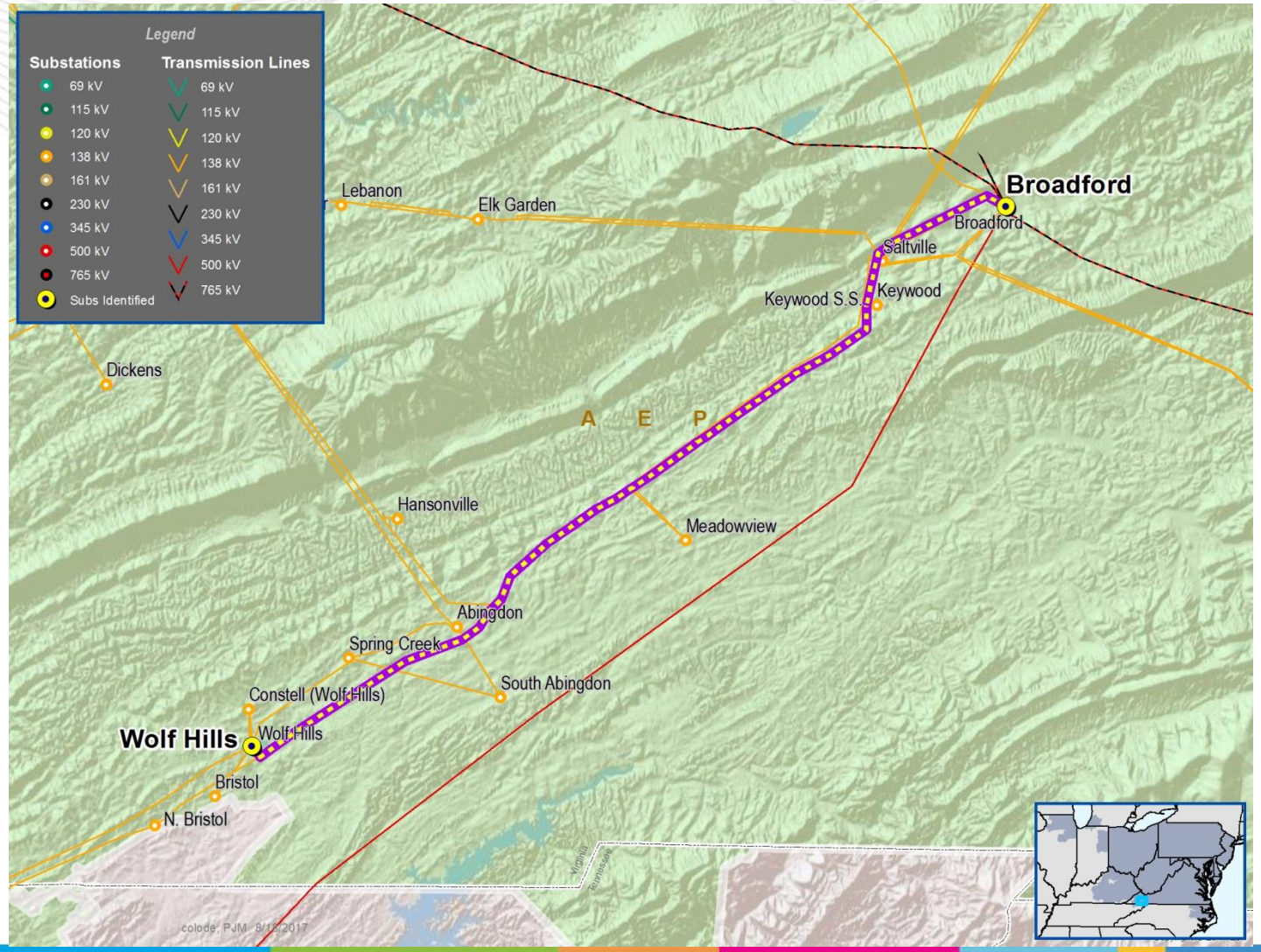
Broadford – Wolf Hills 138kV line is overloaded for the loss of the Broadford – Sullivan 500KV line and the Broadford 765/500kV transformer or the loss of the Broadford – Sullivan 500kV line with the breaker stuck at Broadford 765kV. (**GD-S70, GD-S114, GD-S755, GD-S802**)

Recommended Solutions:

Perform sag mitigation on the Broadford – Wolf Hills 138kV circuit to allow the line to operate to a higher maximum temperature. (**b2938**)

Estimated Project Cost: $2.6M

Required ISD: 6/1/2022



EKPC Transmission Zone - Baseline Reliability (Excluded From 2017 RTEP Proposal Window #1)

Baseline Reliability – Winter Generator Deliverability

Previously Presented: 8/30/2017 & 9/11/2017 SRTEAC

Problem Statement:

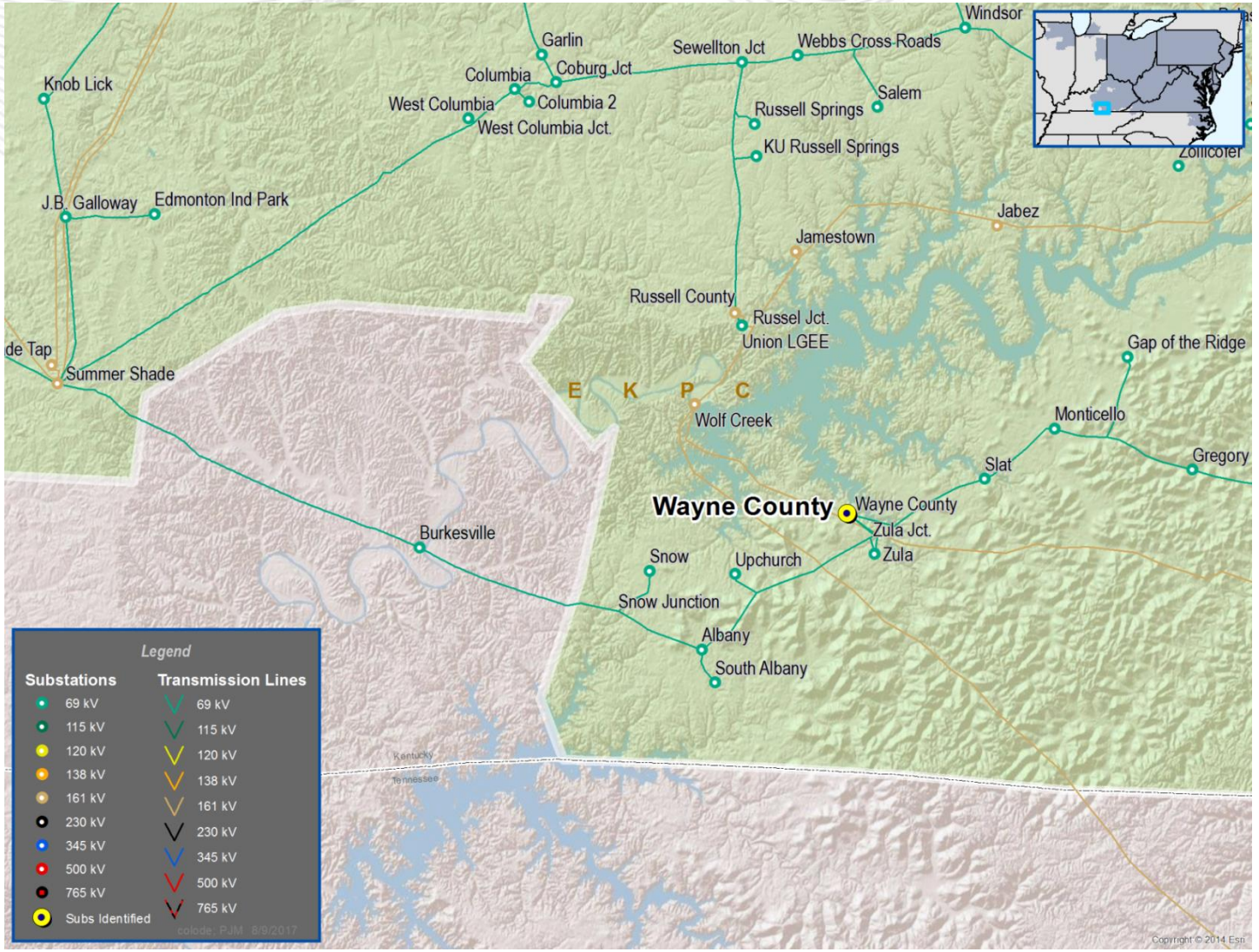
The Wayne Co – Wayne Co KY 161kV line is overloaded for the loss of the Summer Shade 161kV bus section S11-1039. (**GD-W314, GD-W483**)

Recommended Solutions:

Upgrade the distance relay on the Wayne Co – Wayne Co KY 161kV line to increase the line winter rating would be 167/167. (**b2940**)

Estimated Project Cost: $2K

Required ISD: 6/1/2022



EKPC Transmission Zone - Baseline Reliability (Excluded From 2017 RTEP Proposal Window #1)

Baseline Reliability – Summer Generator Deliverability

Previously Presented: 8/30/2017 & 9/11/2017 SRTEAC

Problem Statement:

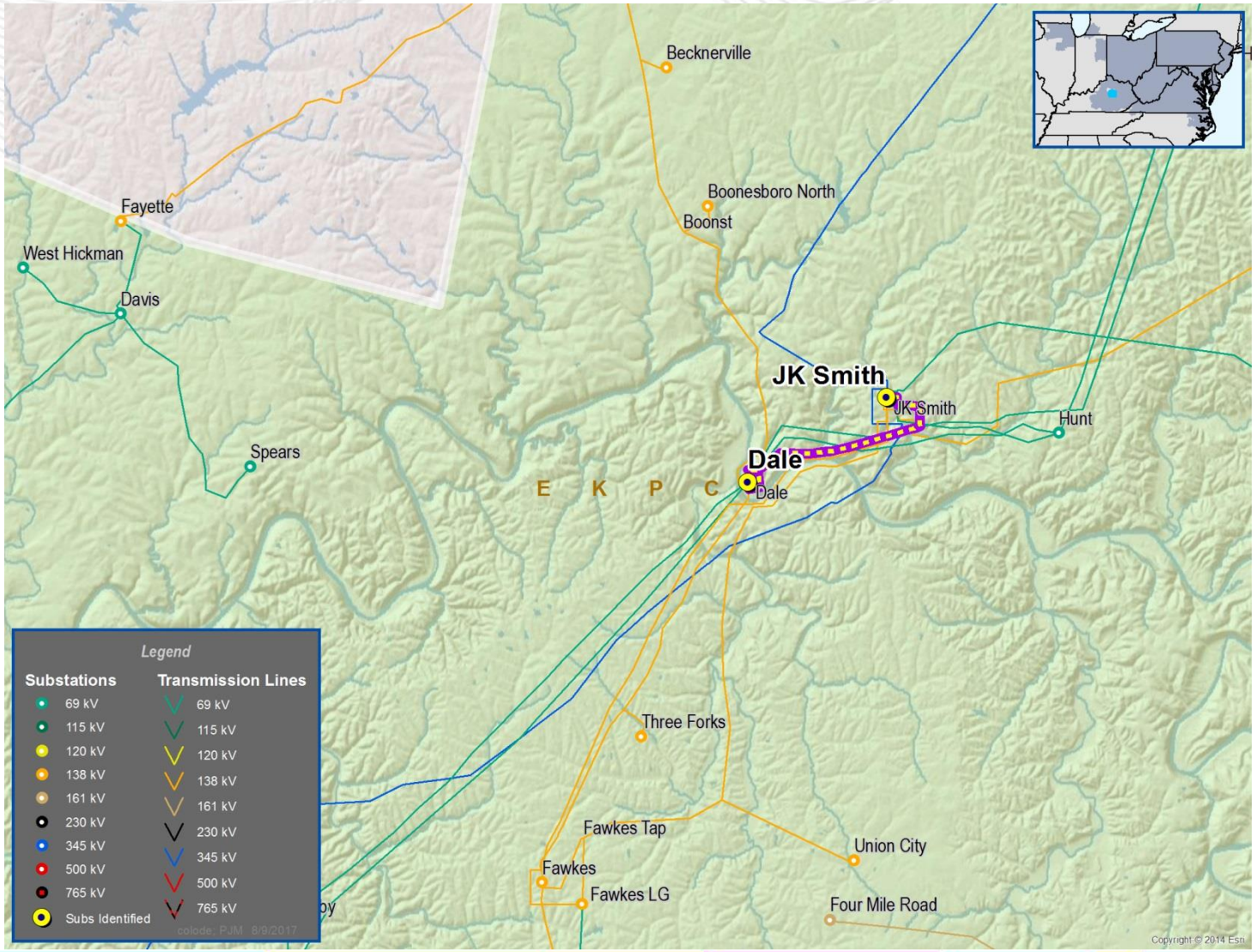
JK Smith – Dale 138kV line is overloaded for the loss of the JK Smith – N Clark 345kV line (**GD-S174**)

Recommended Solutions:

Increase the conductor MOT for the Dale – JK Smith 138kV line to 275˚F. The new summer ratings would be 229/296 (**b2939**)

Estimated Project Cost: $0.4M

Required ISD: 6/1/2022



Non-PJM Limiting Facilities (Excluded From 2017 RTEP Proposal Window #1)

- Non-PJM limiting facilities are those facilities external to the PJM footprint that are potential issues
- Flowgates listed below are monitored element-contingency pairs
  - **N1-S**: N-1 Thermal (Summer)
  - **N2-S**: N-1-1 Thermal (Summer)
  - **GD-S**: Generation Deliverability & Common Mode Outage (Summer)
  - **GD-W**: Generation Deliverability & Common Mode Outage (Winter)

Flowgates	Fr Bus	Fr Name	To Bus	To Name	CKT	KVs	Areas	Rating	Reliability Criteria Violation Test Procedure	Comment
N1-S80, N1-S81, N1-S82, N2-ST7, GD-S37, GD-S421, GD-S422, GD-W295	360334	5SUMMER SHAD	342811	5SUMM SHAD T	1	161/161	347/320	225	N-1 Thermal, N-1-1 Thermal, Gen Deliv Summer, Gen Deliv Winter	Tie line, limited by TVA
N2-ST10, GD-S173, GD-S441, GD-S442, GD-S848, GD-S592, GD-S593	360334	5SUMMER SHAD	342814	5SUMM SHADE	1	161/161	347/320	289	N-1-1 Thermal, Gen Deliv Summer	Tie line, limited by TVA
N2-ST5, N2-ST6, GD-W17, GD-W19, GD-S830, GD-S831, GD-W402, GD-W403, GD-W404, GD-W405	304740	4WALTERS138	242819	05SULVN	1	138/138	341/205	100	N-1-1 Thermal, Gen Deliv Summer, Gen Deliv Winter	Tie line limited by Duke's Walters transformer
GD-W317, GD-W491	360448	5WOLF CRK HP	342796	5RUSSEL CO J	1	161/161	347/320	335	Gen Deliv Winter	Tie line, limited by TVA
GD-W360	304223	3ROCKYMT115T	314554	3BTLEBRO	1	115/115	340/345	133	Gen Deliv Winter	Tie Line, limited by Duke
GD-W486	304070	6PERSON230 T	314697	6SEDGE HILL	1	230/230	340/345	770	Gen Deliv Winter	Tie Line, limited by Duke

2018 RTEP Analysis Update

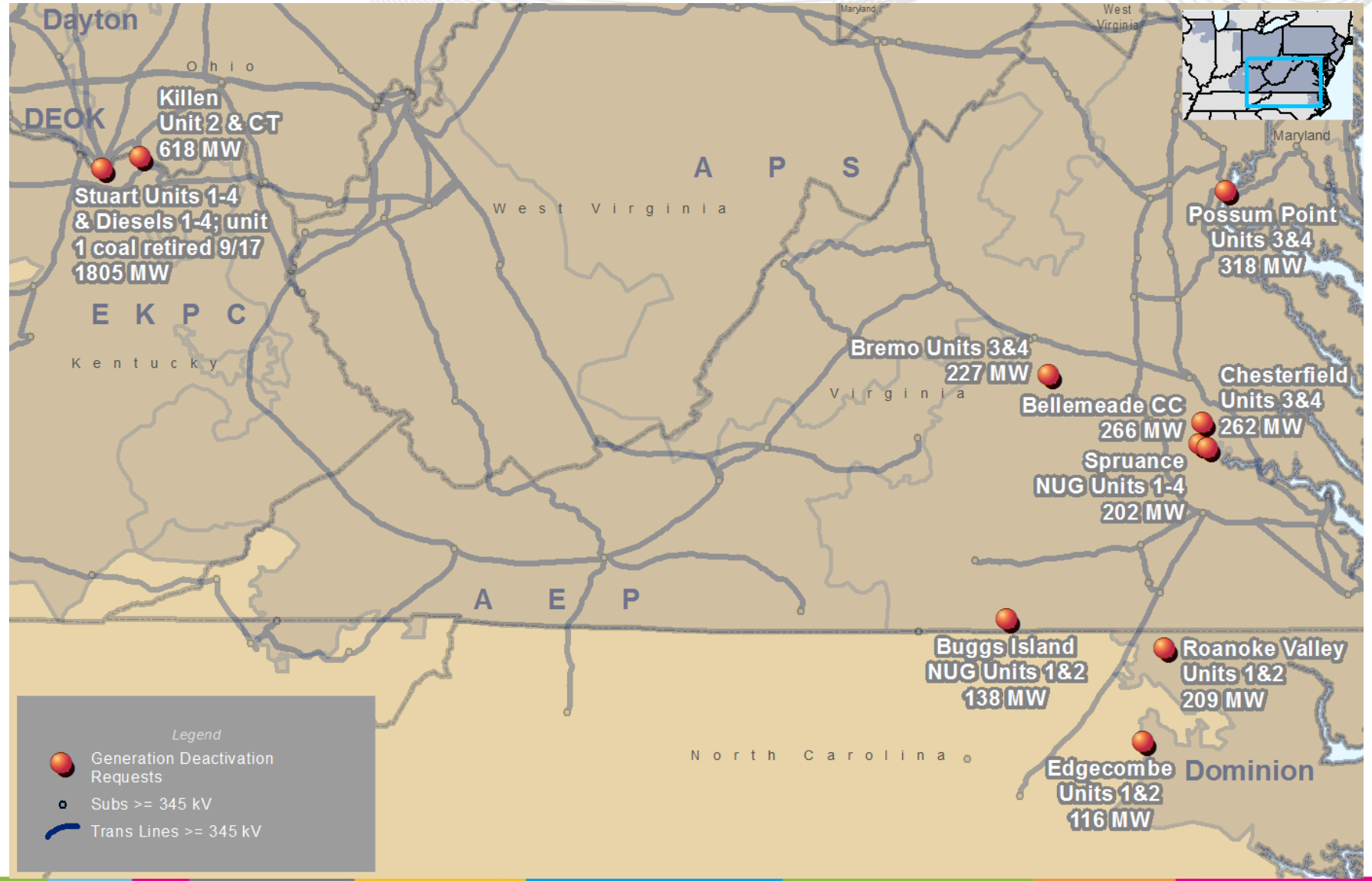
2018 RTEP Analysis Update

- Finalized 2018 Models
- Began 2018 RTEP Analysis

3rd week of April	Preliminary case available
May-June	Post violations
May/June to July/August	Reliability Window (60 day window)

Generation Deactivation Notifications Near the SERTP Interface
(as of May 1, 2018)

Generation Deactivation Requests



Dominion Deactivation Status 2017-2018

Unit(s)	Transmission Zone	Requested Deactivation Date	PJM Reliability Status	Baseline Project
Roanoke Valley Unit 1&2 (209 MW)	Dominion	3/1/2017	Reliability analysis complete; no impacts identified.	
Buggs Island 1&2 (138 MW)	Dominion	4/16/2018	Reliability analysis complete; no impacts identified.	
Bremo 3&4 (227 MW)	Dominion	4/16/2018	Reliability analysis complete. New baseline upgrade was issued to resolve the identified issue.	b2989
Bellemeade CC 1 (265.7 MW)	Dominion	4/16/2018	Reliability analysis complete. New baseline upgrade was issued to resolve the identified issue.	b2990, b2991
Possum Point 3&4 (317.7 MW)	Dominion	12/1/2018	Reliability analysis complete. No impacts identified.	
Chesterfield 3&4 (262.1 MW)	Dominion	12/1/2018	Reliability analysis complete. New baseline upgrade was issued to resolve the identified issue.	b2990, b2991
Spruance 1&2 (202 MW)	Dominion	1/12/2019	Reliability analysis complete; no impacts identified.	
Edgecomb NUG (116 MW)	Dominion	10/31/2020	Reliability analysis complete; no impacts identified.	

Dayton Deactivation Status 2017-2018

Unit(s)	Transmission Zone	Requested Deactivation Date	PJM Reliability Status	Baseline Project
Killen 2 (600 MW)	Dayton	6/1/2018	Reliability analysis complete. Upgrades expected to be completed in future, but interim operating measures identified and unit can deactivate as scheduled.	b2826.1, b2831.2, b2830, b2832, b2826.2, b2879.2, b2879.1, b2878, b2828, b2831.1
Killen CT (18 MW)	Dayton	6/1/2018		
Stuart Diesel 1-4 (9.2 MW)	Dayton	6/1/2018		
Stuart 2-4 (1737.4 MW)	Dayton	6/1/2018		
Stuart 1 (580.6 MW)	Dayton	9/30/2017		

Dominion Transmission Zone Deactivation Upgrades

Problem Statement: N-2 Voltage Outage

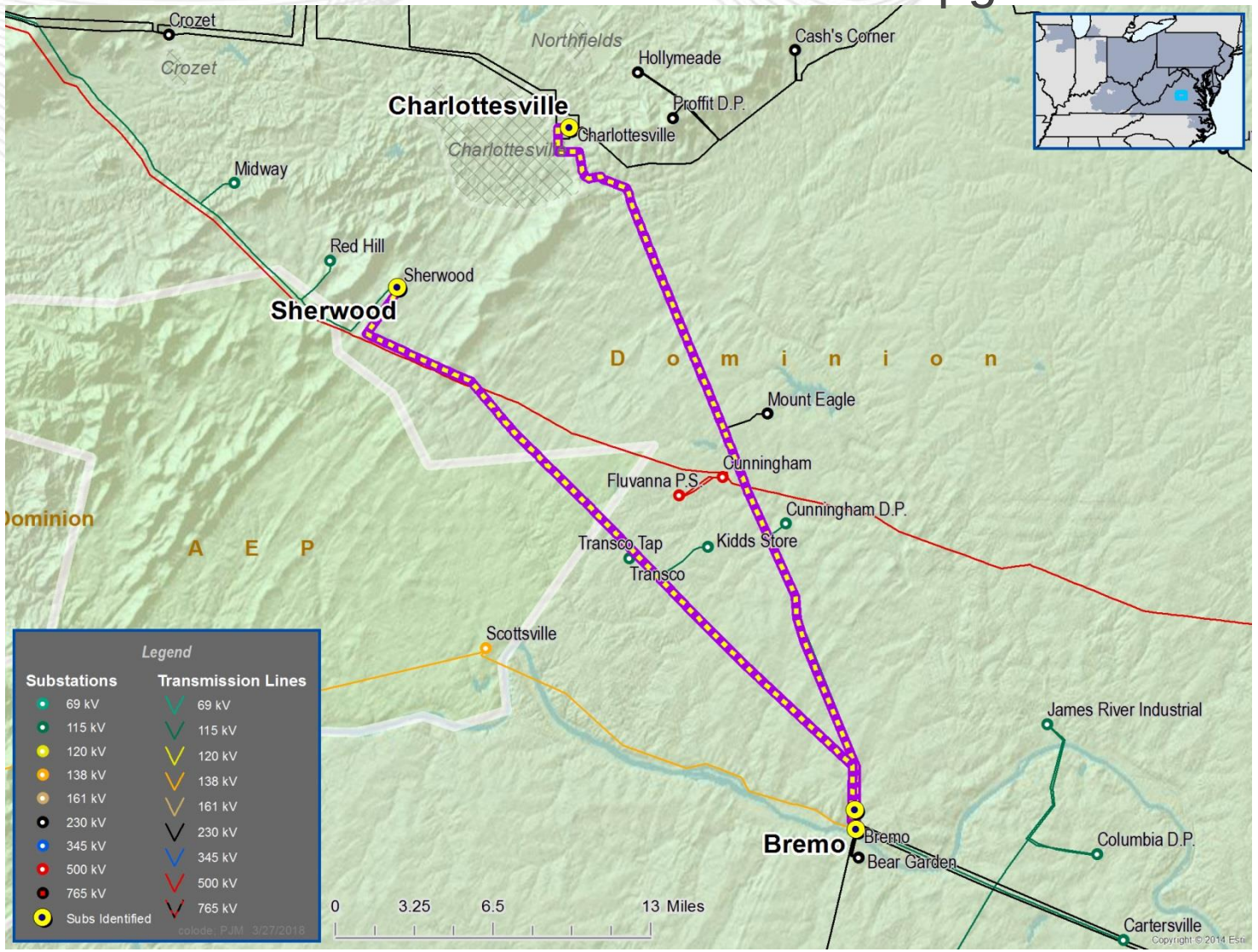
- Voltage magnitude and drop violations were identified in the vicinity of Bremo 138 kV substation for the simultaneous loss of the Bremo #9 230/138 kV transformer and several single contingencies.

Recommended Solution:

- Install a second 230 -115 kV Transformer(224 MVA) approximately 1 mile north of Bremo and tie 230 kV Line #2028(Bremo – Charlottesville) and 115 kV Line #91 (Bremo-Sherwood) together. A three breaker 230 kV ring bus will split Line #2028 into two lines and Line #91 will also be split into two lines with a new three breaker 115 kV ring bus. Install a temporary 230-115 kV transformer at Bremo substation for the interim until the new substation is complete. **(b2989)**

Estimated Project Cost: $27M
Required IS Date: 06/01/2018
Projected IS Date: 06/01/2019
Project Status: Engineering

* Temporary transformer mitigates reliability impacts in the interim



Dominion Transmission Zone Deactivation Upgrades

Problem Statement: Generation Deliverability Outage

- Lakeside to Chesterfield 230 kV line is overloaded for the tower contingency tripping the Chesterfield to Southwest 230 kV line and the Basin to Chesterfield 230 kV line.

Recommended Solution:

- Existing baseline upgrade **(b2745)** previously approved by the PJM Board resolves the issue
  - Rebuild 21.32 miles of existing line between Chesterfield – Lakeside 230 kV

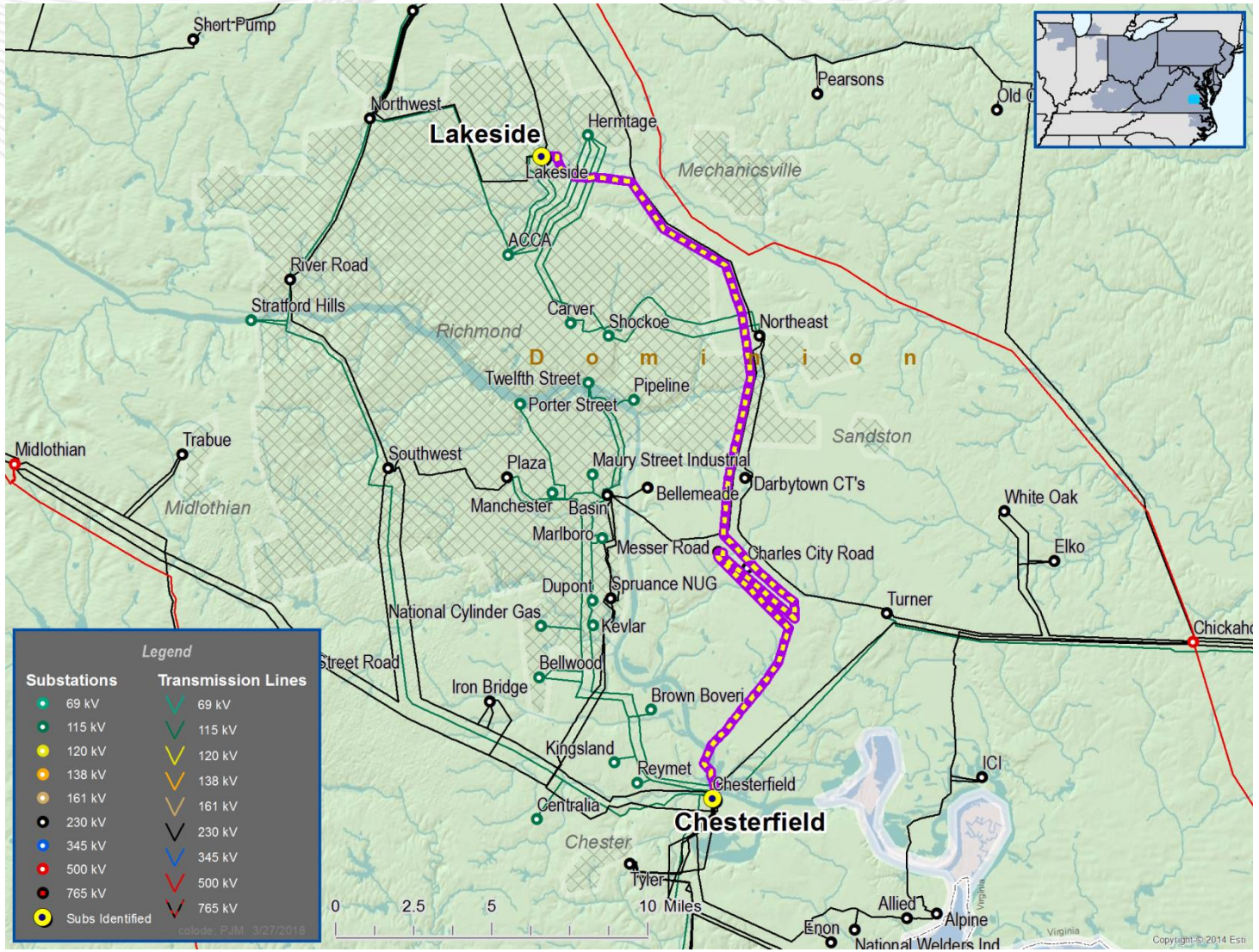
Estimated Project Cost: $31.7M

Required IS Date: 06/01/2018

Projected IS Date: 06/01/2020

Project Status: Engineering

* Operating measures identified to mitigate reliability impacts in interim



Dominion Transmission Zone Deactivation Upgrades

Problem Statement: Generation Deliverability Outage

- Chaparral to Locks 230 kV line is overloaded for the breaker failure contingency tripping the Carson to Septa 500 kV line and the Carson to Midlothian 500 kV line.

Recommended Solution:

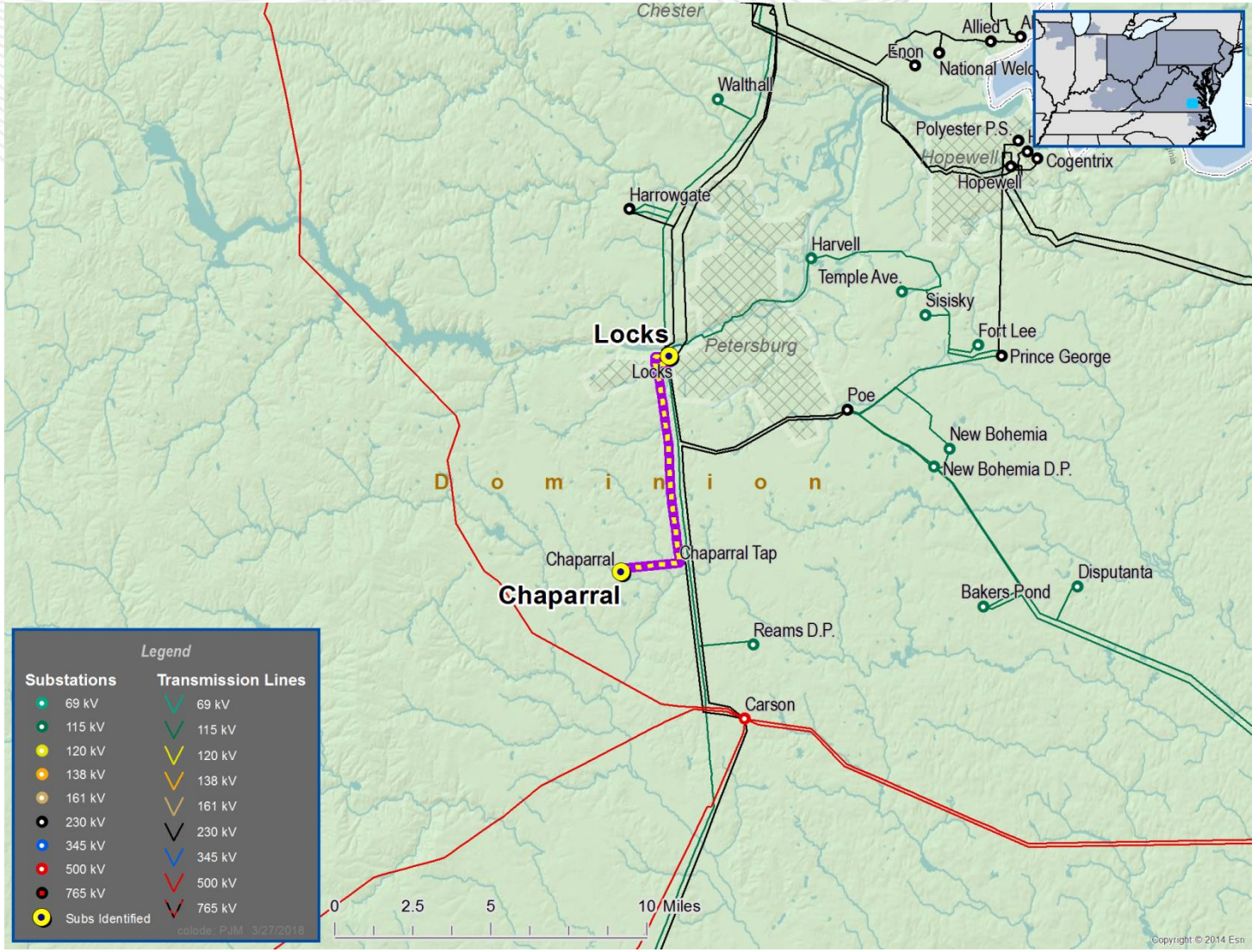
- Replace breaker lead **(b2991)**

Estimated Project Cost: $0.1M

Required IS Date: 06/01/2018

Projected IS Date: 06/01/2018

Project Status: Engineering



Dominion Transmission Zone Deactivation Upgrades

Problem Statement: Generation Deliverability Outage

- Chesterfield to Basin 230 kV line is overloaded for the breaker failure contingency tripping the Carson to Septa 500 kV line and the Carson to Midlothian 500 kV line.

Recommended Solution:

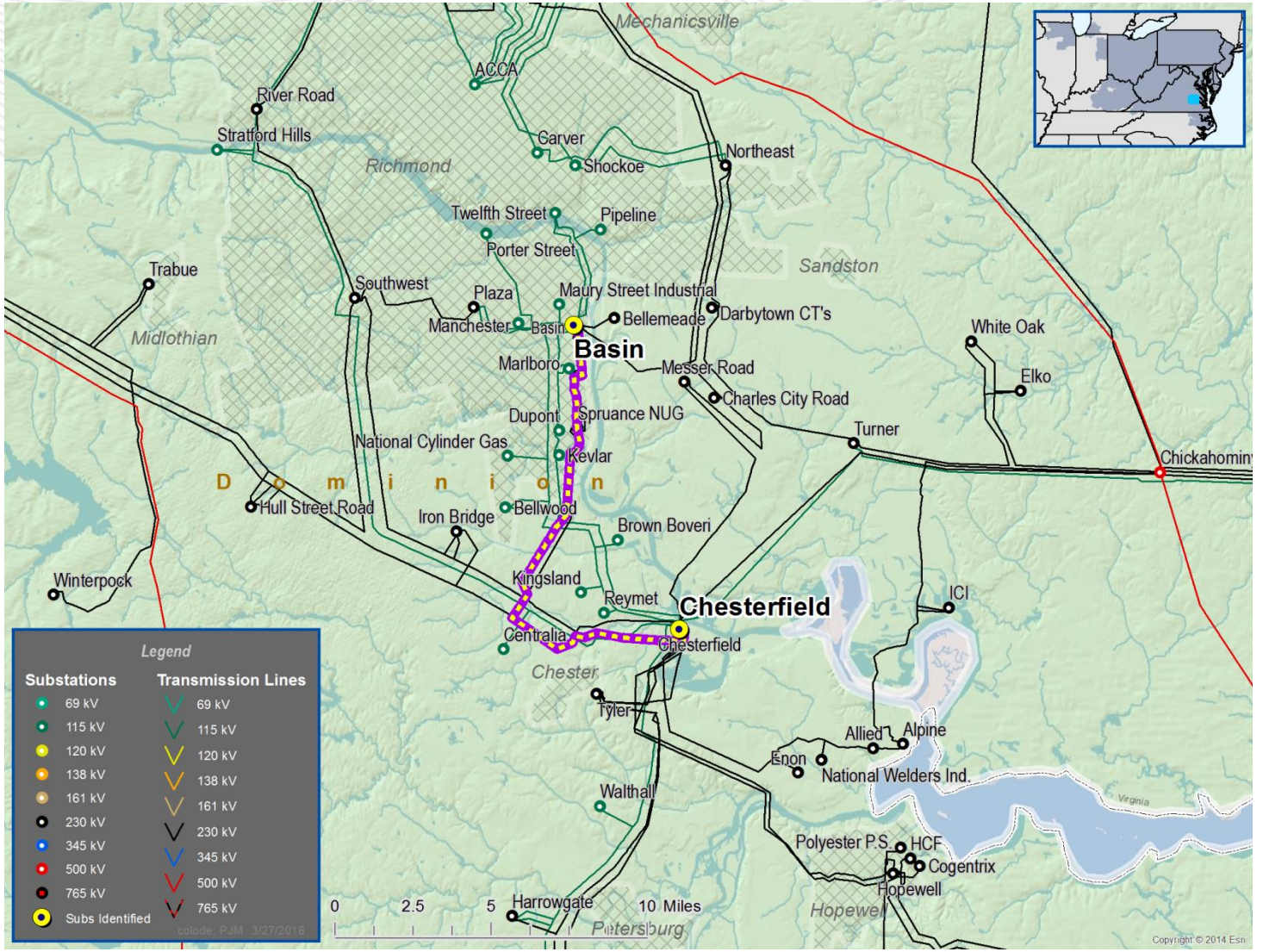
- Replace 0.14 miles of 1109 ACAR with a conductor which will increase the current line rating to approximately 706 MVA. **(b2990)**

Estimated Project Cost: $0.35M

Required IS Date: 06/01/2018

Projected IS Date: 06/01/2018

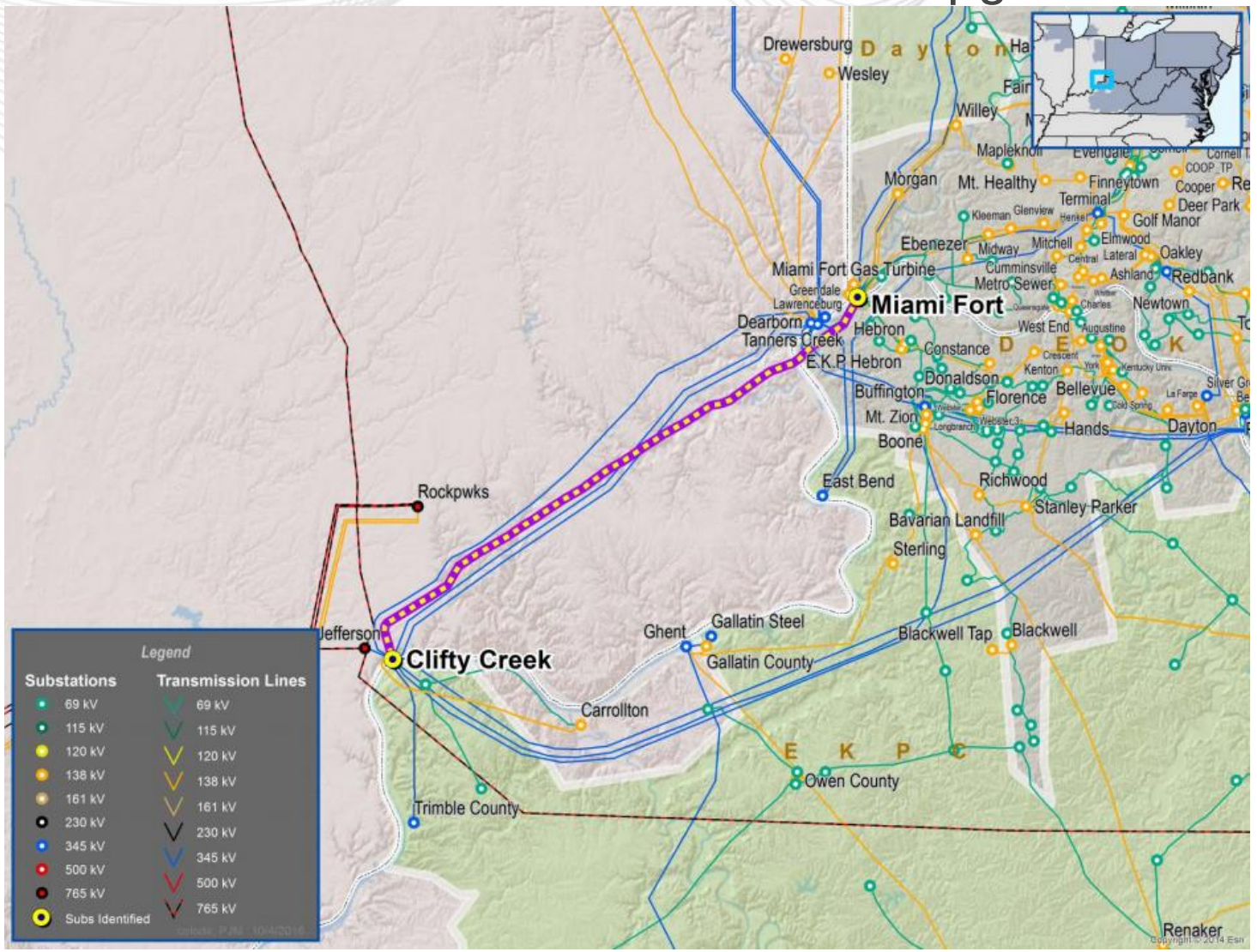
Project Status: Engineering



DEOK Transmission Zone
Stuart and Killen Deactivation Upgrades

Problem Statement: Generation Deliverability Outage

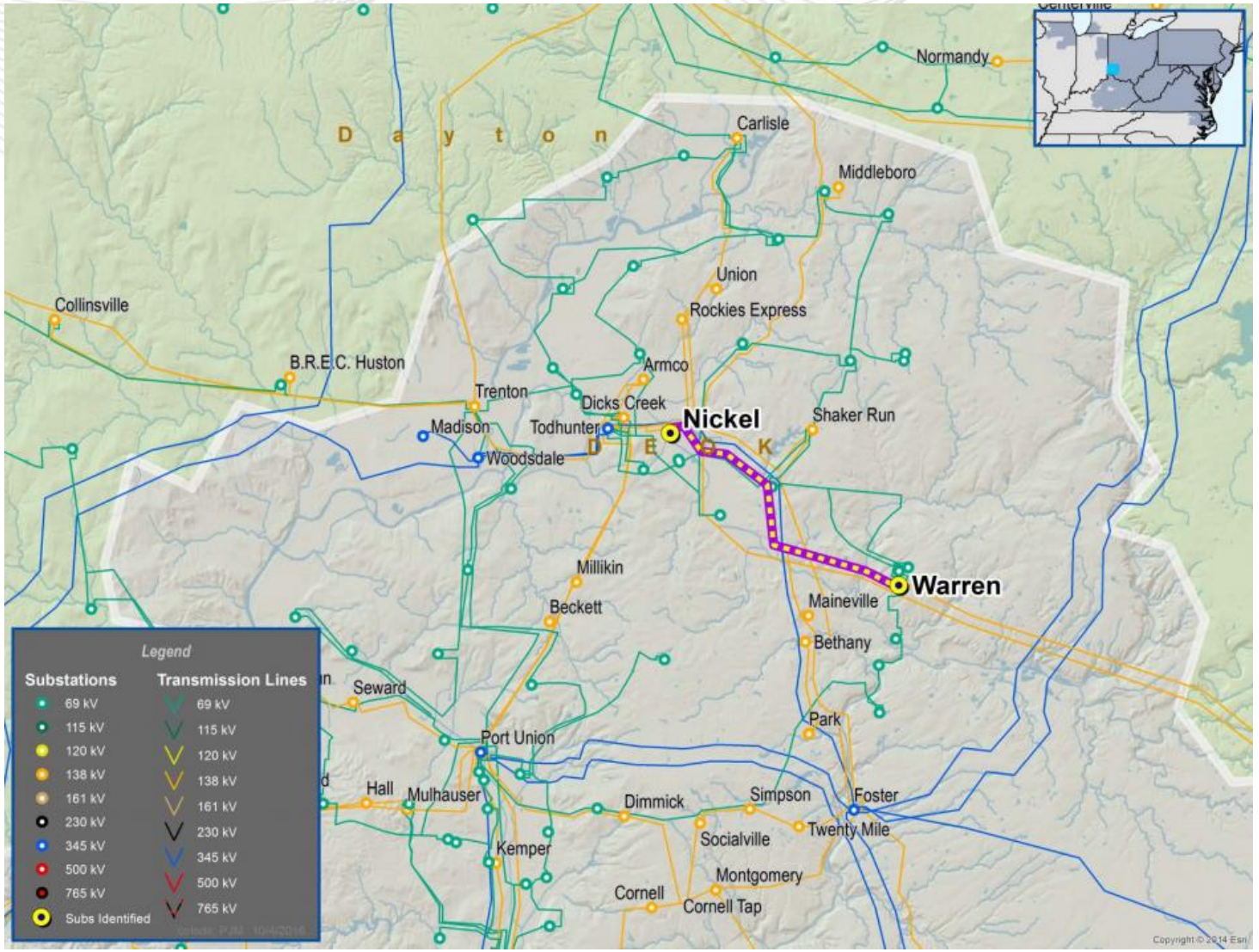
- Clifty Creek – Miami Fort 138 kV line is overloaded for the tower contingency tripping the 2 Clifty Creek – Dearborn 345 kV lines
- Existing Baseline Upgrade (**b2828**) previously approved by the PJM Board resolves the issue
  - Install 5% reactors at Miami Fort 138 kV to limit current
- Cost estimate: $1M
- Required IS Date: 06/01/2018
- Projected IS Date: 06/01/2021 (TO determining if acceleration is possible)



DEOK Transmission Zone
Stuart and Killen Deactivation Upgrades

Problem Statement: Generation Deliverability Outage

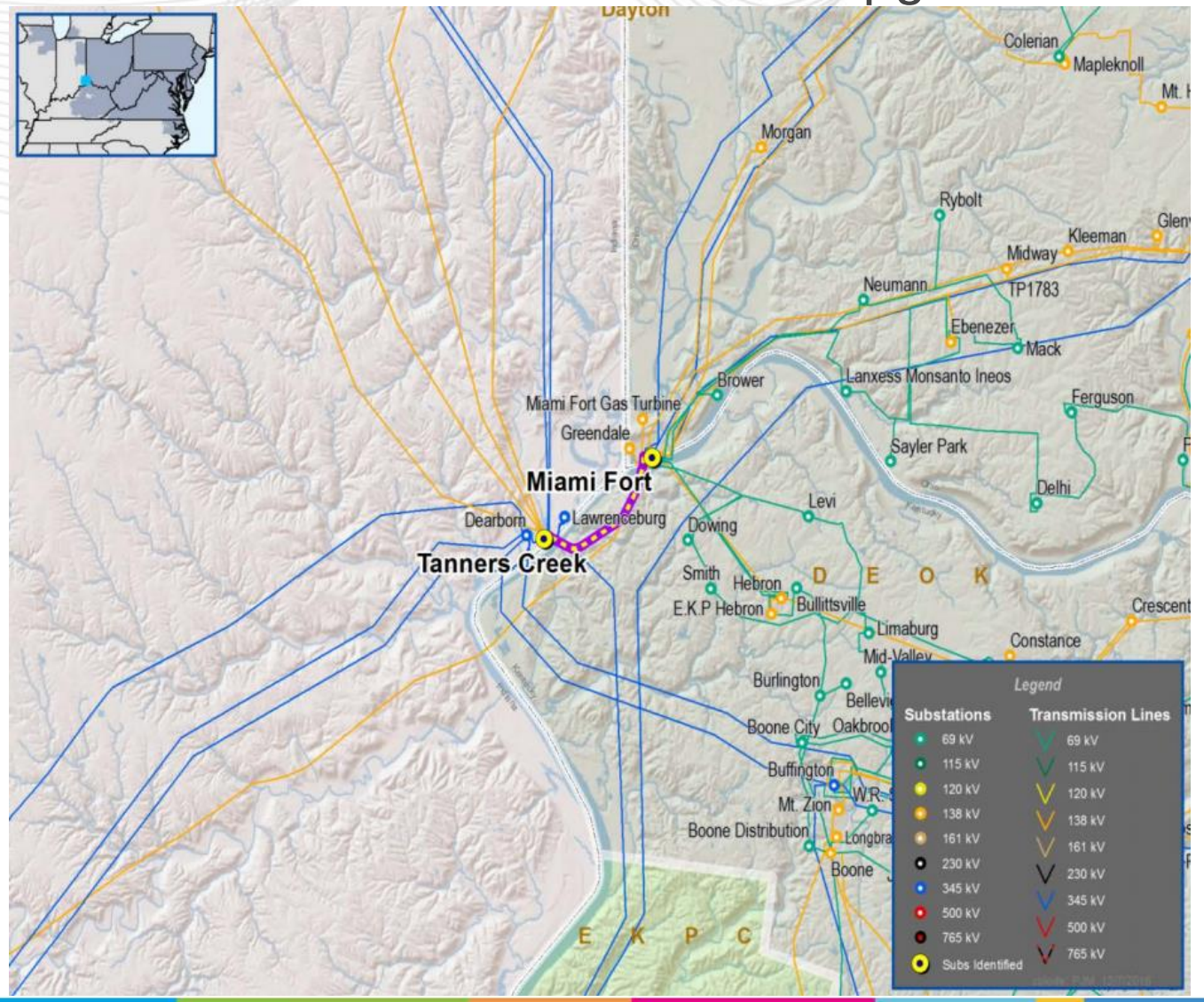
- Nickel – Warren 138 kV line is overloaded for the tower contingency tripping the Todhunter – Rockies Express 138 kV line and the Foster – Garver 345 kV line
- Existing Baseline Upgrade (**b2830**) previously approved by the PJM Board resolves the issue
  - Expand Garver 345 kV sub to include 138 kV
- Cost estimate: $18.7M
- Required IS Date: 06/01/2018
- Projected IS Date: 06/01/2021 (TO determining if acceleration is possible)



AEP and DEOK Transmission Zones
Stuart and Killen Deactivation Upgrades

Problem Statement: Generation Deliverability and Load Deliverability Outage

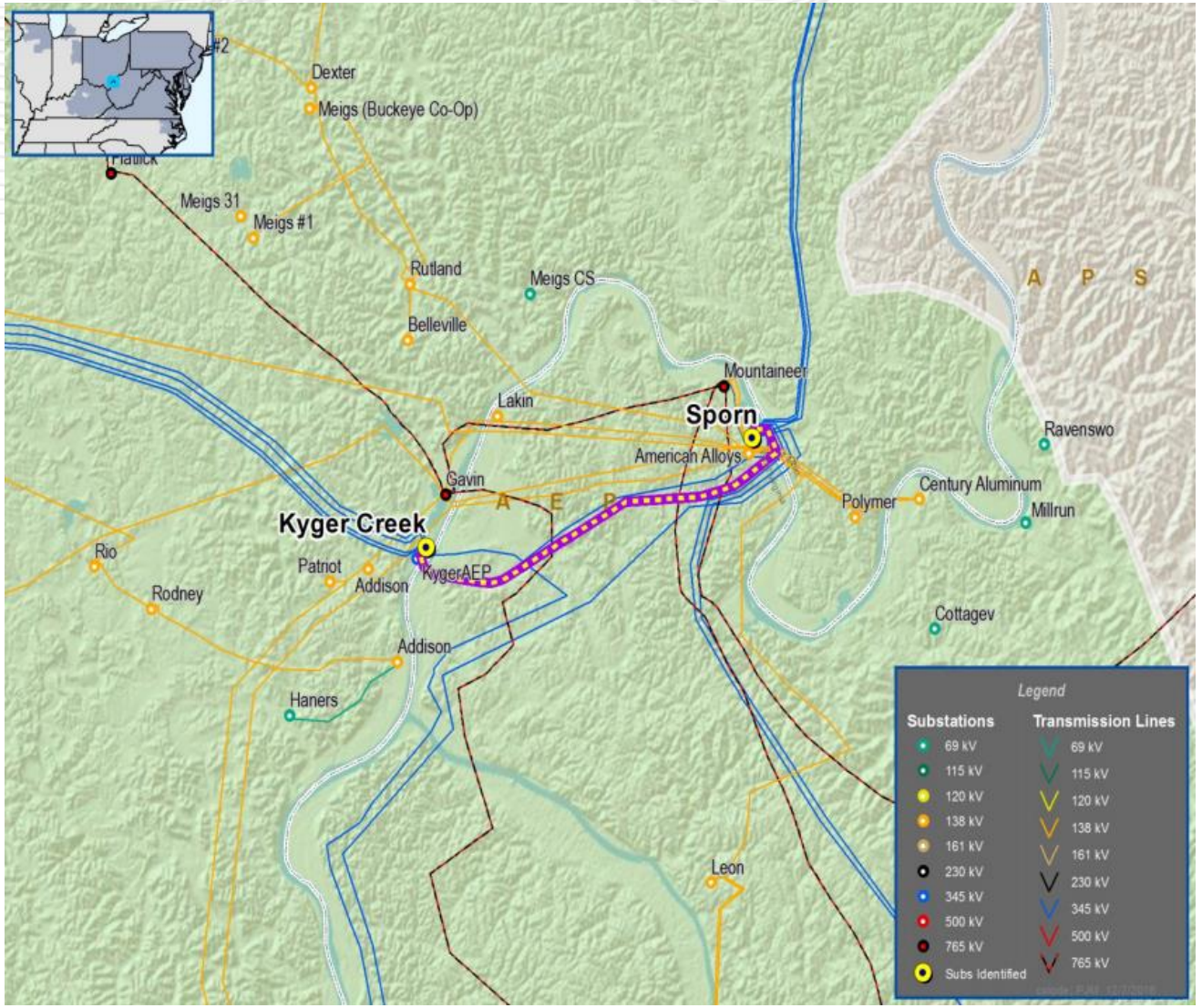
- Tanners Creek – Miami Fort 345 kV line is overloaded for the loss of the Terminal – East Bend 345 kV line
- Existing Baseline Upgrade (**b2831**) previously approved by the PJM Board resolves the issue
  - Upgrade Tanners Creek – Miami Fort 345 kV line
- Cost estimate: $7.8M
- Required IS Date: 06/01/2018
- Projected IS Date: 12/01/2021 (TO determining if acceleration is possible)



AEP Transmission Zone
Stuart and Killen Deactivation Upgrades

Problem Statement: Generation Deliverability Outage

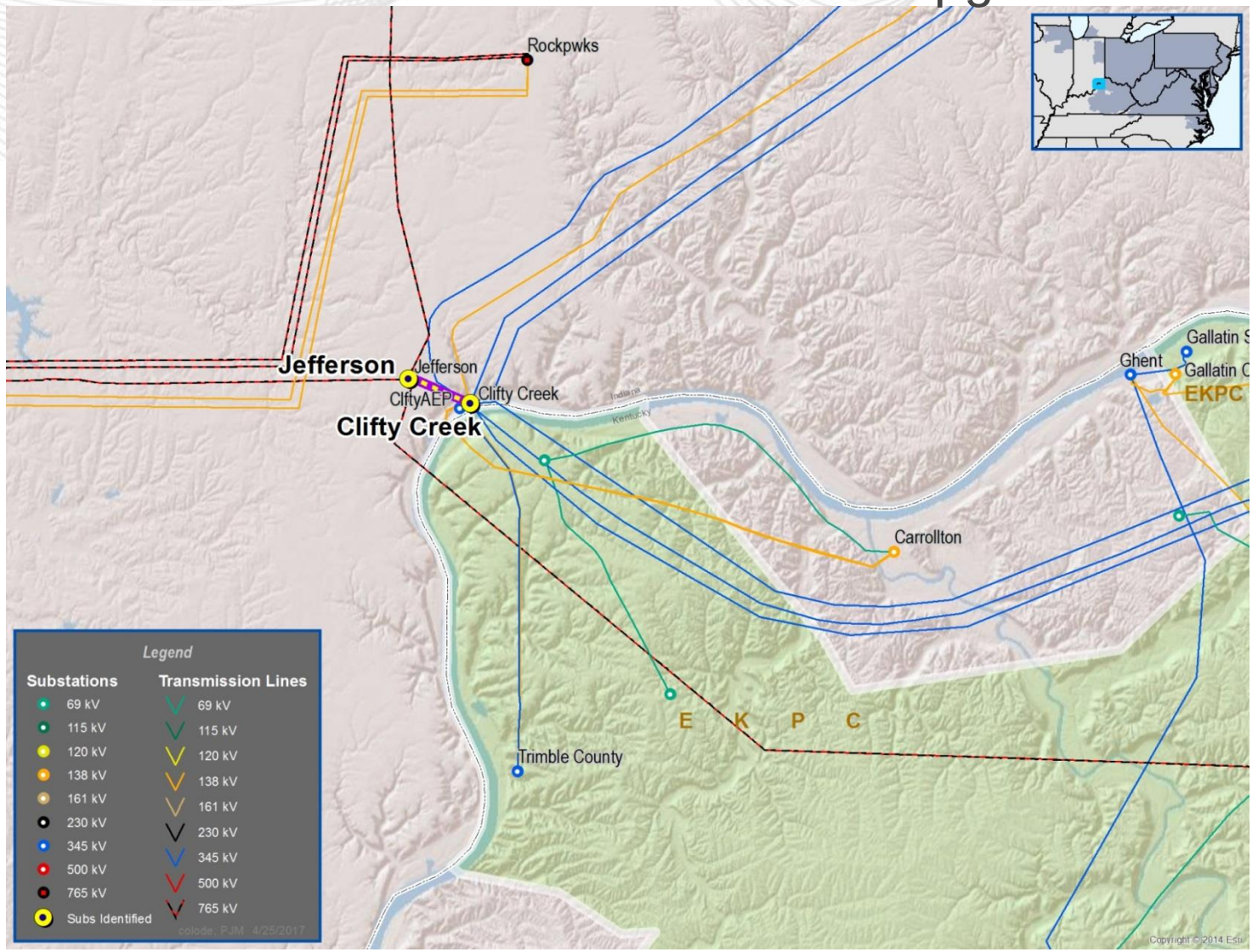
- Kyger Creek – Sporn 345 kV circuit 2 is overloaded for the loss of the Kyger Creek – Sporn 345 kV circuit 1
- Existing Baseline Upgrade (**b2832**) previously approved by the PJM Board resolves the issue
  - Combine 2 existing Kyger Creek – Sporn lines into a single six-wire line
- Cost estimate: $0.3M
- Required IS Date: 06/01/2018
- Projected IS Date 06/01/2019



AEP Transmission Zone
Stuart and Killen Deactivation Upgrades

Problem Statement: Generation Deliverability Outage

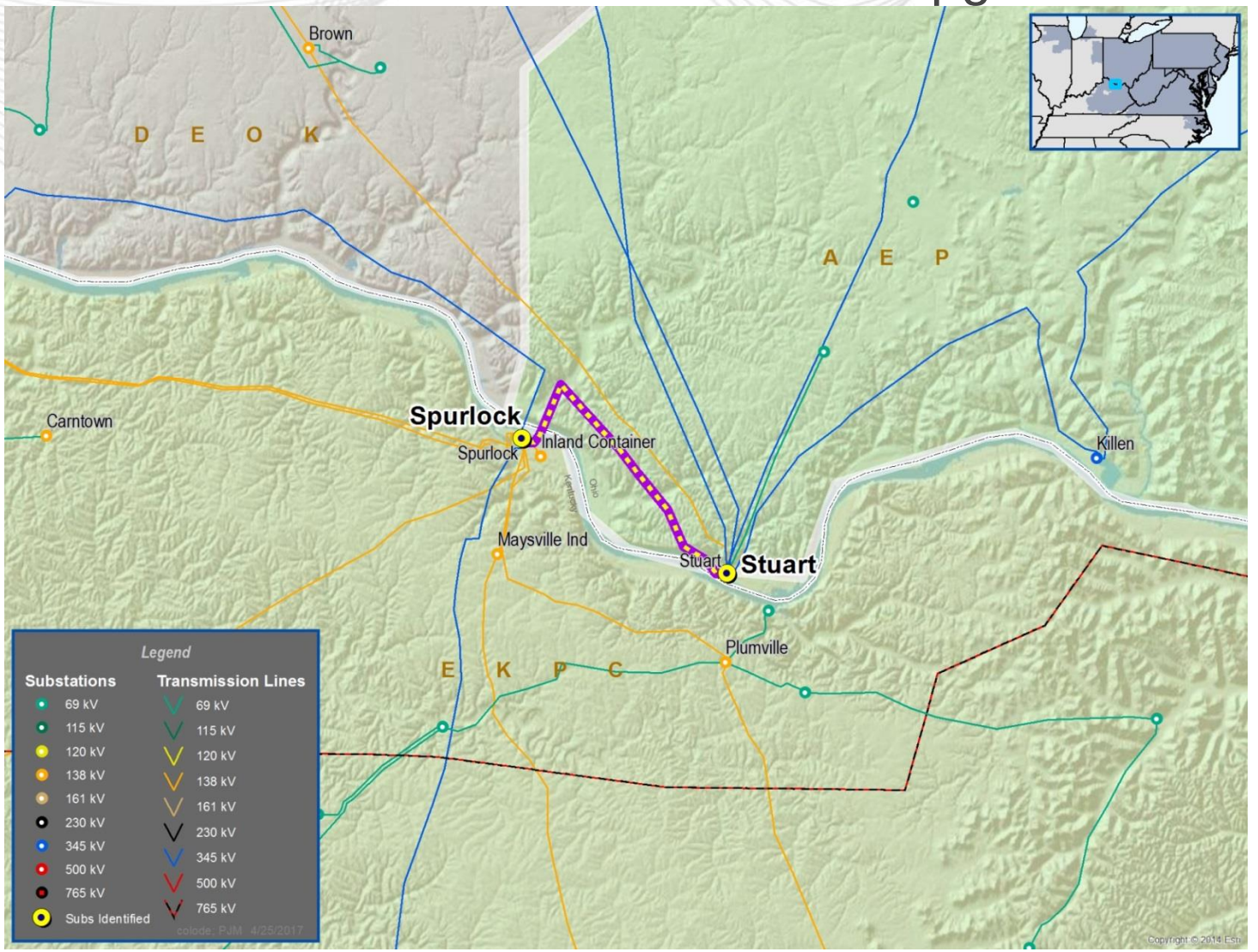
- Jefferson – Clifty Creek 345 kV line is overloaded for the stuck breaker contingency tripping the Greentown – Jefferson 765 kV line and the Hanging Rock – Jefferson 765 kV line
- New Baseline Upgrade (**b2878**) increase rating of the Jefferson – Clifty Creek 345 kV line
- Cost estimate: $0.1M
- Required IS Date: 06/01/2018
- Projected IS Date: 06/01/2019



EKPC and Dayton Transmission Zones
Stuart and Killen Deactivation Upgrades

Problem Statement: Generation Deliverability Outage

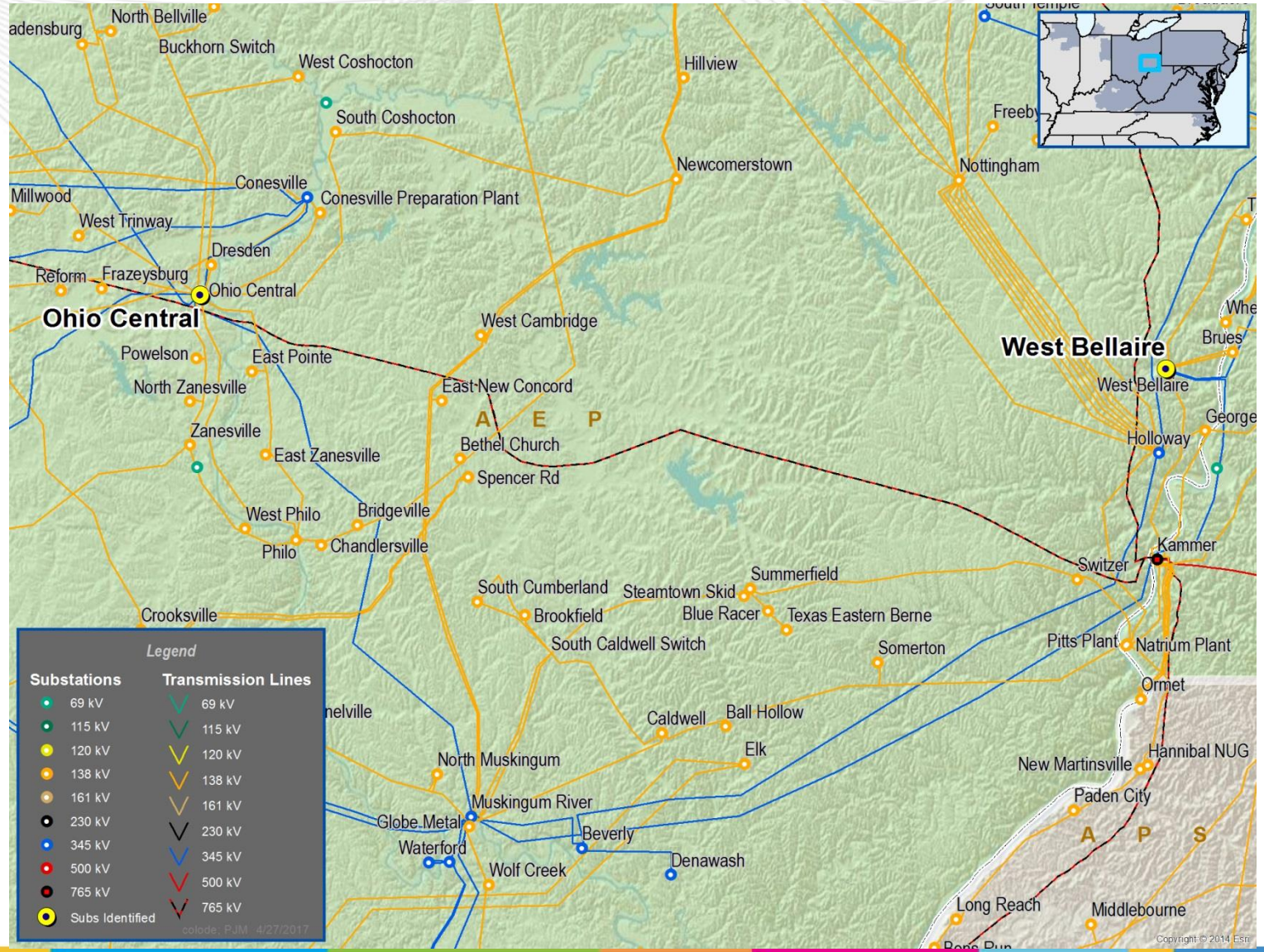
- Spurlock – Stuart 345 kV line is overloaded for the loss of the Silver Grover – Zimmer – Red Bank 345 kV line
- New Baseline Upgrade (**b2879**) – upgrade Stuart – Spurlock 345 kV line
- Cost estimate: $2.5M
- Required IS Date: 06/01/2018
- Projected IS Date: 12/31/2018



High Voltage Concerns – Stuart and Killen Deactivations

Problem Statement: Ongoing high voltages on the EHV system have been occurring in AEP and surrounding areas under light load conditions

- Existing Baseline Upgrades mitigate high voltage issues
  - **b2826.1**: Install 300 MVAR reactor at Ohio Central 345 kV substation ($5M)
  - **b2826.2**: Install 300 MVAR reactor at West Bellaire 345 kV substation ($5M)
- Cost estimate: $10M
- Required IS Date: 06/01/2018
- Projected IS Date: 09/01/2018



Description: baseline upgrade cost and timing
Deactivation – Stuart and Killen

- Immediate Need
- Due to the timing of the need for the reinforcement an RTEP proposal window is infeasible
- Due to the immediate need, the local Transmission Owner will be the Designated Entity

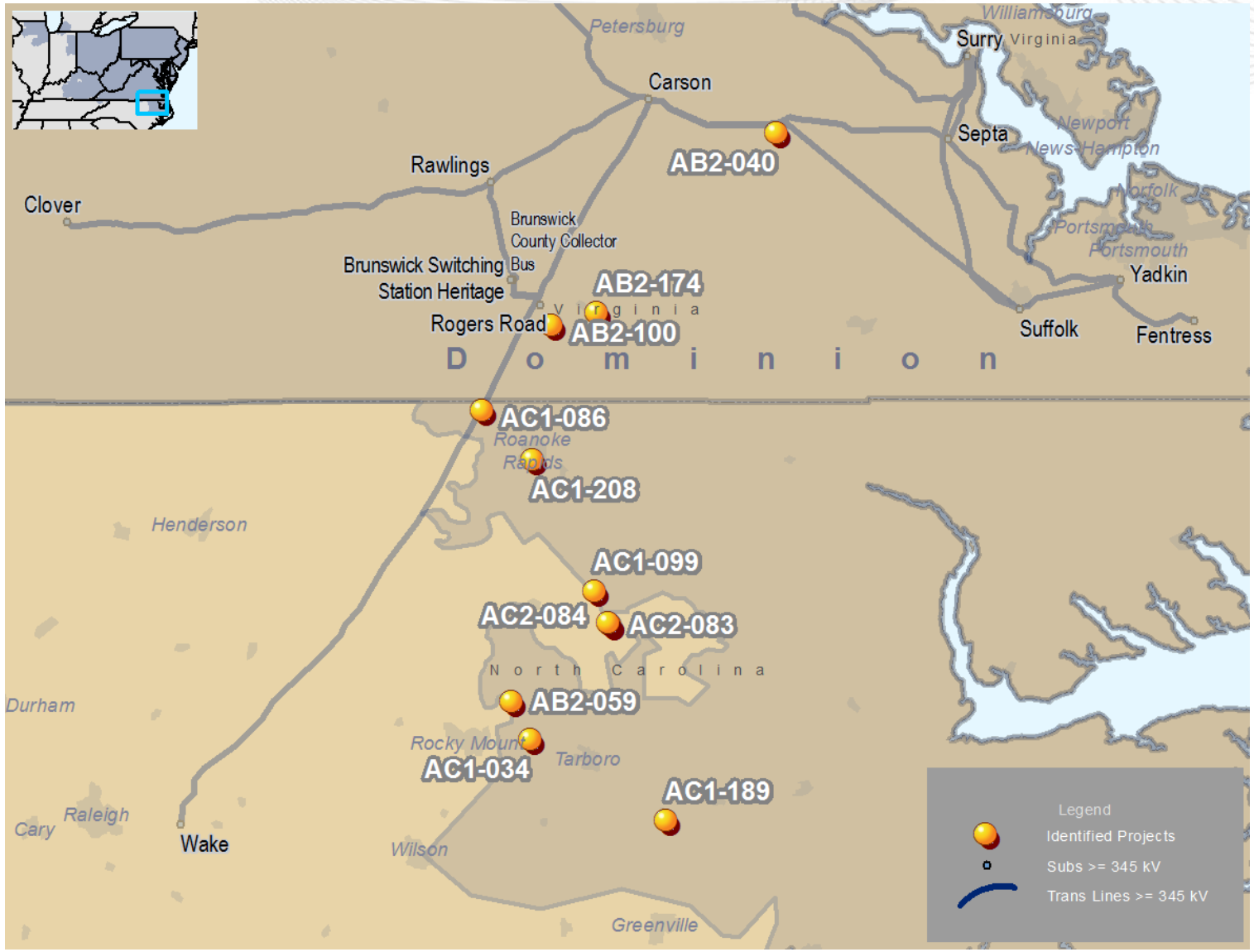
- PJM is working with affected Transmission Owners to determine what interim operational measures can be taken for the period between the Required In-Service Date and the Projected In-Service Date for those projects that cannot be completed by 06/01/2018

- Estimated Project Cost: $39.6M
  - B2828: $1M
  - B2830: $18.7M
  - B2831: $7.8M
  - B2832: $0.3M
  - B2878: $0.1M
  - B2879.1: $0.09M
  - B2879.2: $1.61M
  - B2826: $10M

- Projected In-Service
  - B2828: 06/01/2021
  - B2830: 06/01/2021
  - B2831: 12/01/2021
  - B2832: 06/01/2019
  - B2878: 06/01/2019
  - B2879.1: 06/01/2018
  - B2879.2: 12/31/2018
  - B2826: 09/01/2018

PJM Queue Projects Near the SERTP Interface

PJM Queue Projects Near the PJM-SERTP Interface



PJM Queue Projects Near the PJM-SERTP Interface

Queue Number	Project Name	Company	Transmission Owner	County	State	MFO (MW)	Capacity (MW)	Energy (MW)	Project Status	Requested In-Service Date
AB2-040	Brink 115kV	SunPower Corporation	Dominion	Greensville	VA	80	44	80	Active	9/30/2018
AB2-059	Benson-Dunbar 115kV	Fern Solar LLC	Dominion	Edgecombe	NC	100	66	100	Active	6/1/2018
AB2-100	Clubhouse-Lakeview 230kV	Virginia Electric & Power Company	Dominion	Greensville	VA	100	67	100	Active	12/1/2019
AB2-174	Emporia-Trego 115kV	Greensville County Solar Project, LLC	Dominion	Greensville	VA	80	42	80	Active	12/15/2018
AC1-034	Anaconda–Vaugh 115kV	Invenergy Solar Development North America, LLC	Dominion	Edgecombe	NC	75	42.75	75	Active	12/31/2018
AC1-086	Thelma 230kV	Gaston Green Acres Solar, LLC	Dominion	Northhampton	NC	300	123.7	180	Active	12/31/2017
AC1-099	Dawson-South Justice 115kV	American Beech Solar LLC	Dominion	Alamance	NC	20	12.6	20	Active	6/1/2019
AC1-189	Chinquapin-Everetts 230kV	Bethel NC 11 Solar, LLC	Dominion	Pitt	NC	80	53.4	80	Active	12/31/2017
AC1-208	Cox-Whitakers 115kV	Community Energy Solar Development, LLC	Dominion	Halifax	NC	80	55.4	80	Active	6/30/2018
AC2-083	Dawson-South Justice 115kV	American Beech Solar 2 LLC	Dominion	Halifax	NC	20	13.4	20	Active	6/1/2019
AC2-084	Dawson-South Justice 115kV	American Beech Solar 2 LLC	Dominion	Halifax	NC	60	40.2	60	Active	6/1/2019

Questions?

Email: RTEP@pjm.com