Reliability Analysis Update

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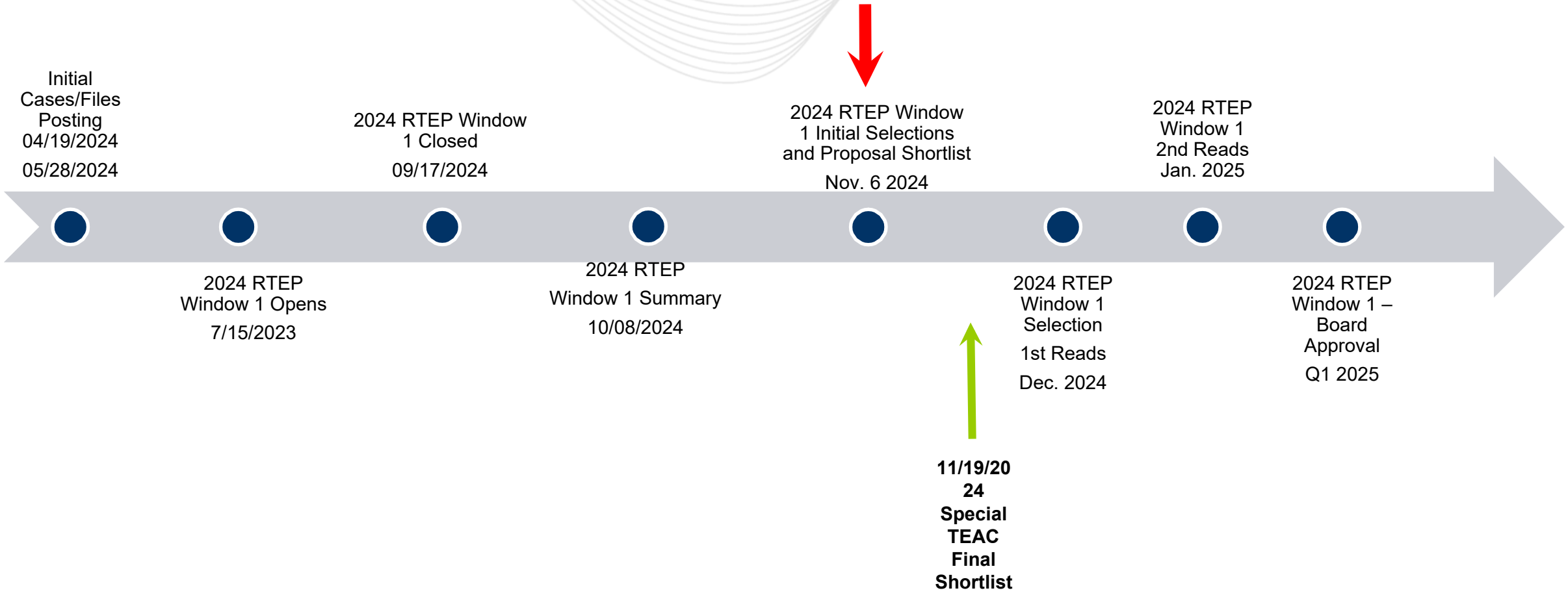
Transmission Expansion Advisory Committee
November 6, 2024

Outline

- Timeline Updates
- Overview of Needs and Evaluation Criteria
- Submitted Proposals and General Merits
- Evaluation Progress
- Transfer Capability Assessment – Major Proposals
- 2024 RTEP W1 - Project Selections (First Reads) / Shortlists:
  - AEP (& shortlist)
  - ComEd
  - ACE / DPL / PECO / BGE
  - ATSI (shortlist)

2024 RTEP Window 1 Updates

2024 RTEP Window 1 – Timeline



Major Need Drivers Behind 2024 RTEP

Heavy transmission interface flows west to east driven by load increase in Dominion/East. PJM earlier identified need for additional west-east reinforcement is materializing earlier – higher forecasted load in MAAC/Dominion/APS.

- 10 GW and 15 GW of load increase for 2029 and 2032 respectively between the 2022 LF and 2024 LF
- The load growth is attributed primarily to data centers and some electrification/EV loads.

Proposed reinforcements through 2022 RTEP Window 3 and 2023 RTEP Windows 1 and 2 are performing well.

No major transmission upgrades identified east of DOM/APS.

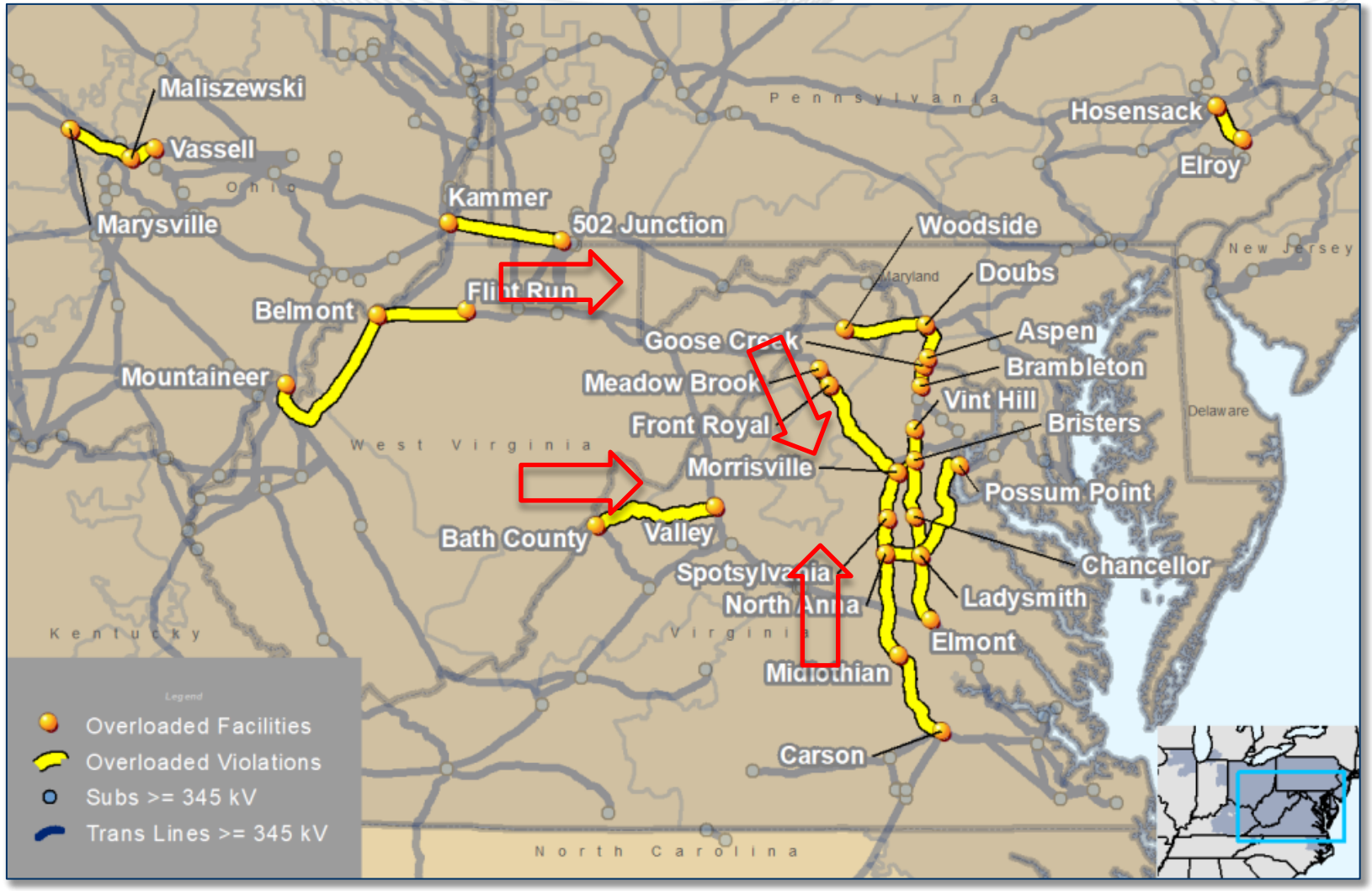
In addition to regional transfer requirements, there are load pockets that need to be addressed in AEP, ATSI, Dominion, PECO, BGE and PPL transmission zones.

Primarily due to shift in generation flow as a result of overall system load increase and +2 GW of generation deactivations.

The eight-year RTEP (2032) scenarios mainly focus on right-sizing solutions.

- Long-lead transmission needs (capture long-lead items).
- Check/confirm impact of “forecast” generation on transmission needs identified in the five-year model.
- PJM will also be considering robustness of the solutions in view of the anticipated 2025 PJM Load Forecast.

2024 RTEP Window 1 Needs: 500 kV & 765 kV



2024 RTEP Window 1
Proposals Overview

Window **opened**
July 15, 2024

60-Day Window

Window **closed**
Sept. 17, 2024

94 total proposals submitted from 16 different entities
(10 incumbent and 6 non-incumbent).

40 Greenfield Projects and **48** Upgrades	**6** Joint Proposals (Parent Projects – representing combinations of select projects from above group)	**~$50 B** Total Proposals Value – Only a fraction of it will be selected.

- Several proposals have cost containment commitments – mostly minor (e.g., engineering).
- Proposals range from simple upgrades to facilities, to new extra-high-voltage transmission lines and facilities.
- Targeting Q1 2025 Board approval – December and January for TEAC first and second reads

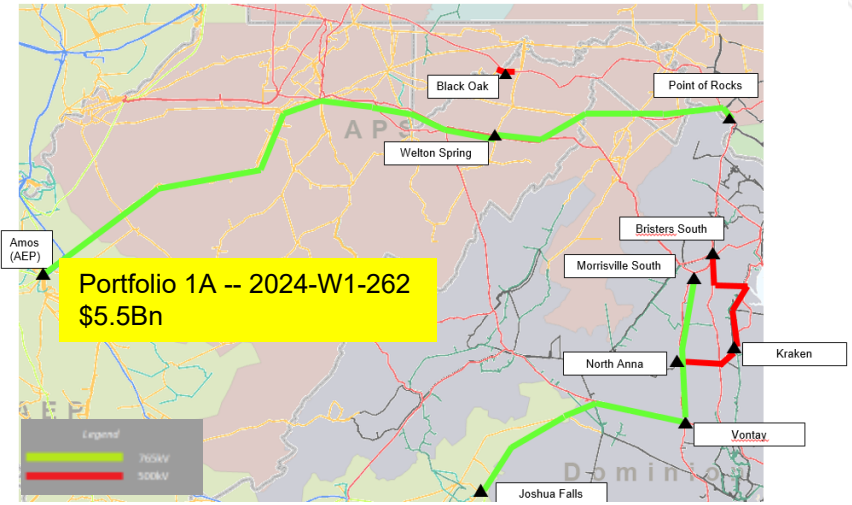
All proposals submitted to address west-east regional flows recommended 765 kV solutions:

A number of proposals attempt to address in-zone N-1-1 conditions that were found to be alleviated with the selected regional solutions. These needs will then be eliminated accordingly (Primarily in PPL zone).

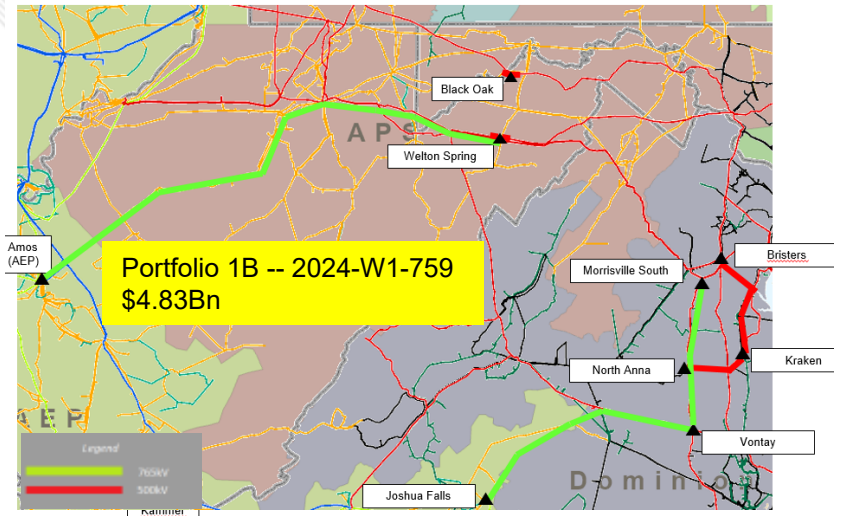
- Multiple proposals recommend variants of Joshua Falls/Axton-Morrisville area 765 kV development.
  - Transource (Dominion, FirstEnergy, and Transource)
  - LS Power
  - NextEra
- The Joint Planning Proposals (by DOM/FE/Transource) recommend a northern, John Amos-Northern Virginia 765 kV development.
- West-east regional solutions will include at least one variant of these proposals for a 765 kV development, plus accompanying 500 kV and 765 kV upgrades.

2024 RTEP Window 1

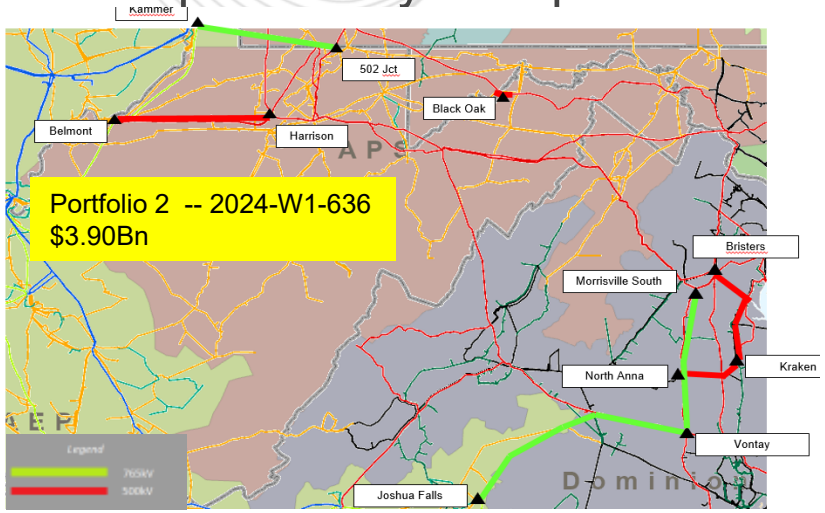
Dominion/First Energy/Transource – Simplified Key Components



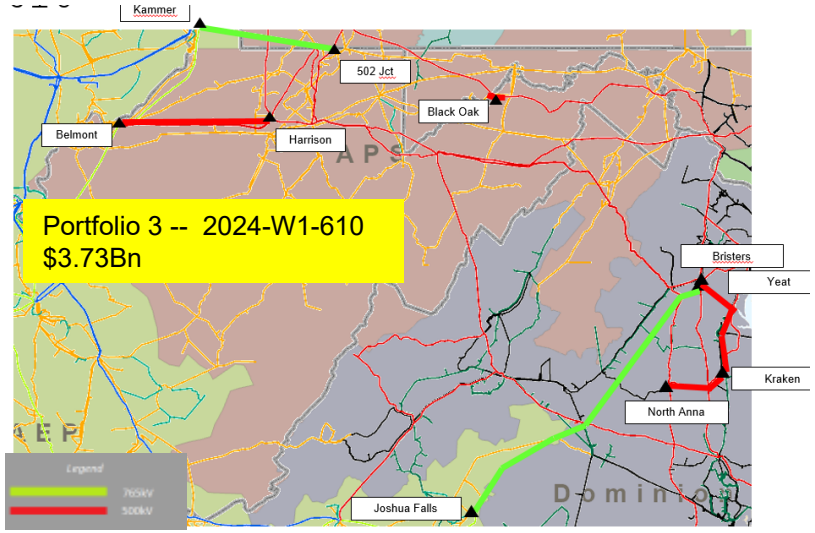
Portfolio 1A -- 2024-W1-262
$5.5Bn



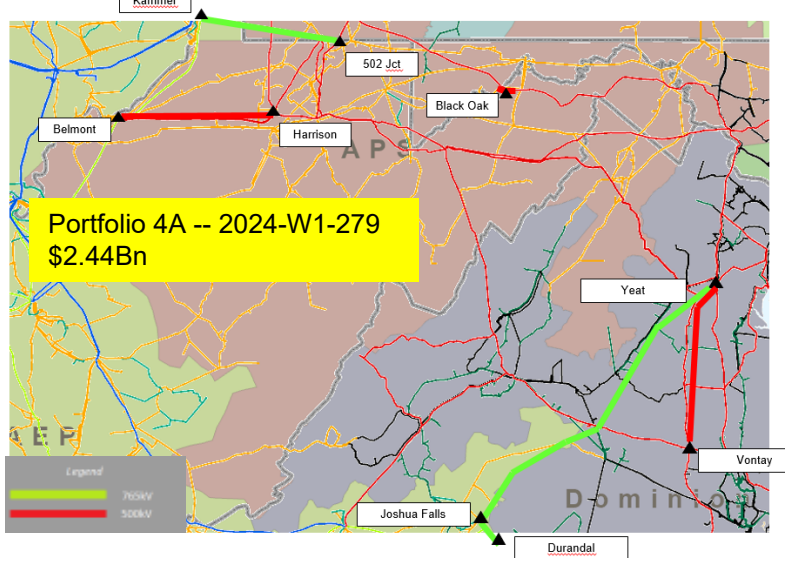
Portfolio 1B -- 2024-W1-759
$4.83Bn



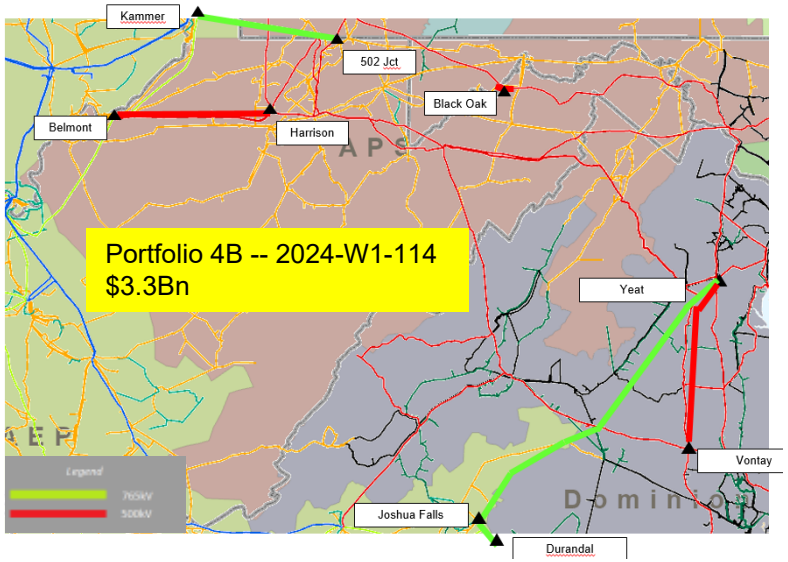
Portfolio 2 -- 2024-W1-636
$3.90Bn



Portfolio 3 -- 2024-W1-610
$3.73Bn



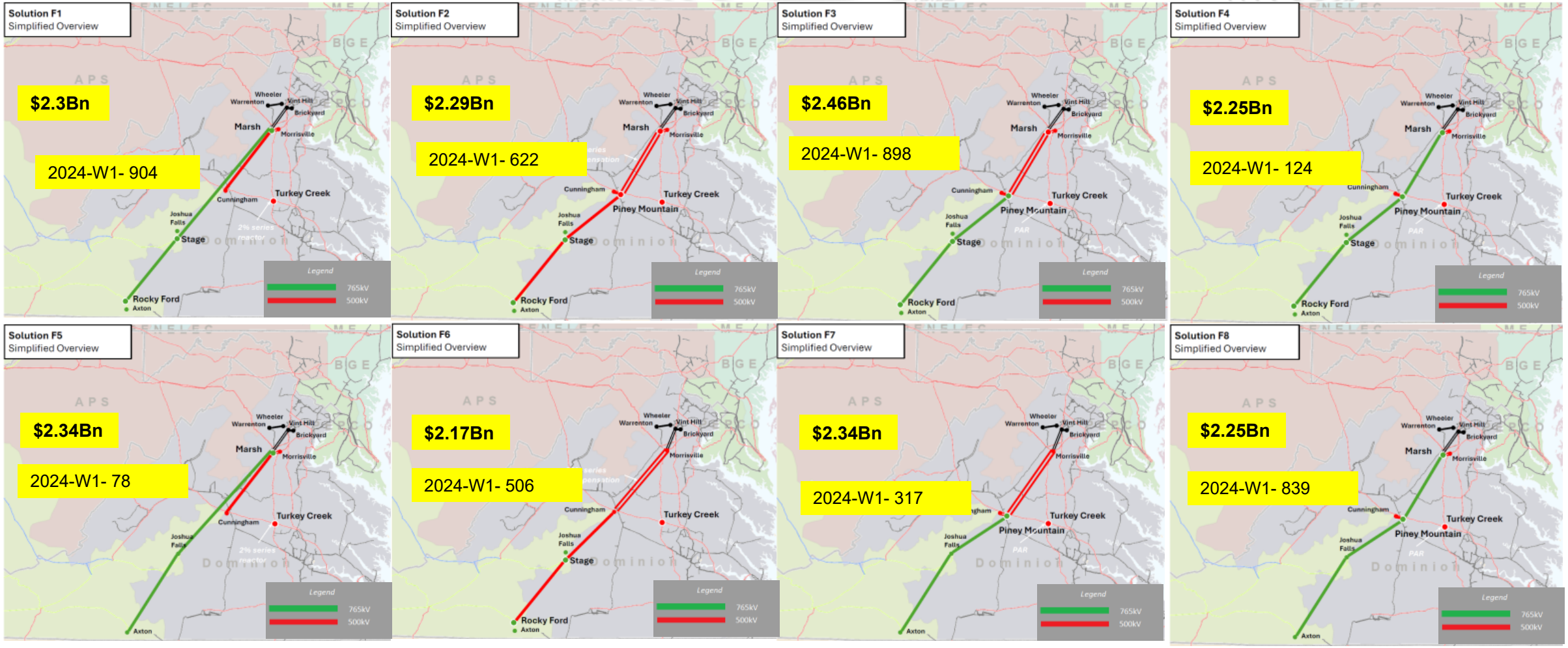
Portfolio 4A -- 2024-W1-279
$2.44Bn



Portfolio 4B -- 2024-W1-114
$3.3Bn

2024 RTEP Window 1

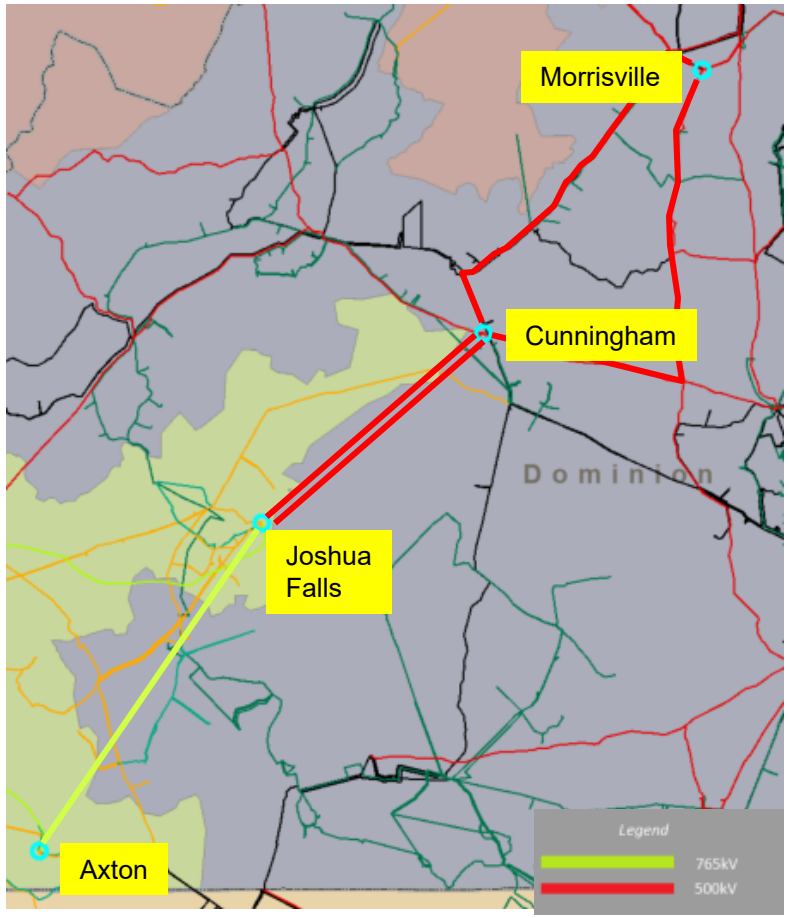
LS Power Proposal Summaries – Simplified Key Components



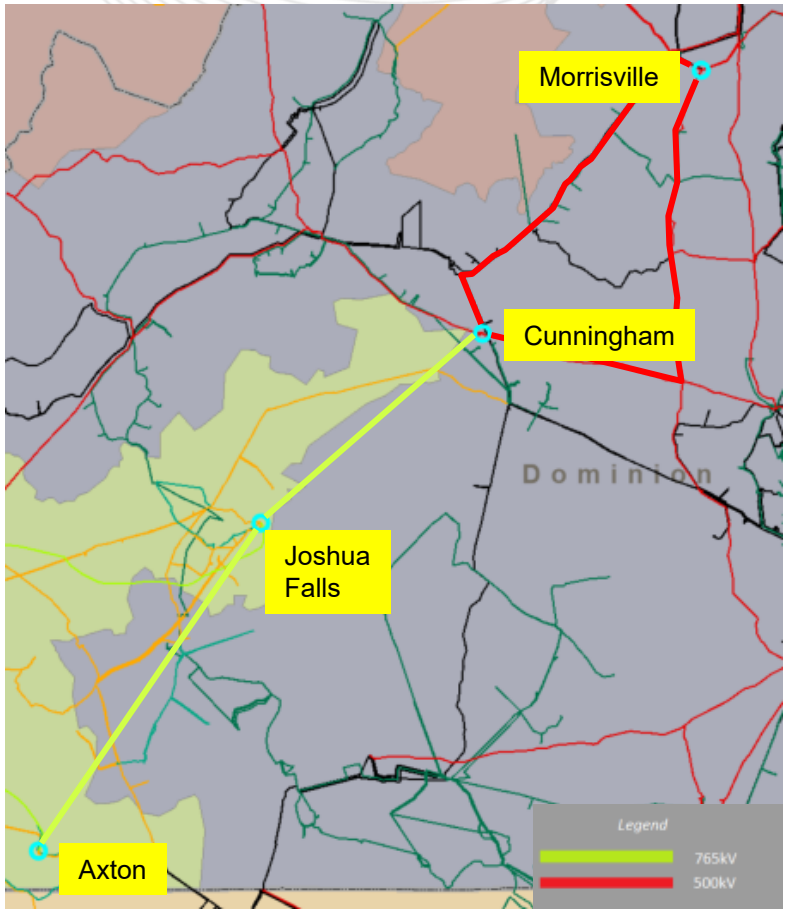
2024 RTEP Window 1

NextEra Proposal Summaries - Simplified Key components

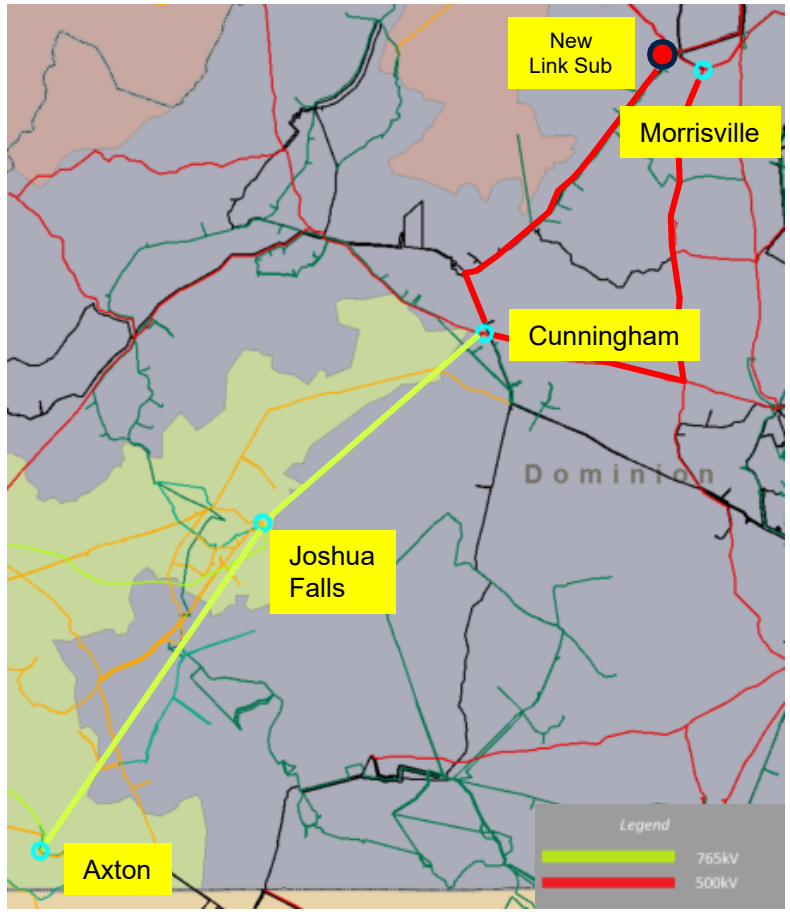
2024W1-146 -- $2.26Bn



2024W1-768 -- $2.2Bn



2024W1-992 -- $2.26Bn



Individual Proposal Screening	Complete	
Baseline Scenarios Were Developed and Analyzed	• Preliminary analysis shows good performance of a number of holistic proposals (joint proposals and those submitted to cover both regional transfer and local needs combined).	• PJM developed scenarios incorporating (or eliminating) components to identify an optimal combination yielding better performance.
Transfer Capability Analysis	PJM conducted Transfer Capability analysis for key proposals – regional west-east needs.	
Scenario Analysis	• PJM scenario analysis considered variants to where both future generation (west-north and west-south) may materialize and ratio of future load growth split (DOM, PPL and PSEG "Eastern MAAC").	• Full scenario details and evaluation results will be shared at the November 19th TEAC.

Scenarios with their associated proposed developments will be ranked based on:

Meeting the system needs of 2029 (all kV levels) and 2032 (long-lead reinforcements)

Being scalable/flexible to address forecasted needs going forward (for right-sizing and limiting disruption)

Anticipated load growth to be included in the PJM 2025 Load Forecast (Eastern PJM/MAAC), which will further increase west-east flow requirements from modeled 2024W1 base models.

Utilization of existing ROWs and brownfield development/expansion (where possible and efficient)

- Greenfield developments will be required, particularly along all proposed 765 kV solutions – Varying degrees.
- Expansion to existing 500 kV ROWs instead of wreck and rebuild due to outage and scheduling considerations.

Cost evaluation using third-party cost benchmarking metrics – weak cost containment provisions

Proposing entity experience in developing and operating 765 kV facilities

Incremental Bulk Transfer Studies
West-East Transfers

- In order to assist with further evaluation and ranking of submitted proposals, PJM conducted a large number of transfer analysis assessing the West-East Transfer Capability offered by each major proposal

- Proposals were evaluated as-submitted and with modifications to specific components (in order to lower overall impact, maximize transfer capability, efficiency and cost effectiveness)

- All proposals with 765kV regional transfer components performed significantly better than 500kV transfer path reinforcements.

  – Considering that 500kV reinforcements will require additional ROW that is similar to 765kV developments, 765kV upgrades will be preferred given the high transfer requirements/need.

  – 765kV developments in southern PJM offer highest “initial” incremental transfer capability.

  – Northern 765kV reinforcements will consequently offer considerable transfer capability addition once the southern 765kV reinforcements are in place.

  – A number of proposals offer similar transfer capability while covering a wider geographic footrpint (allowing for more flexibility to future utilization by load and further reinforcements)

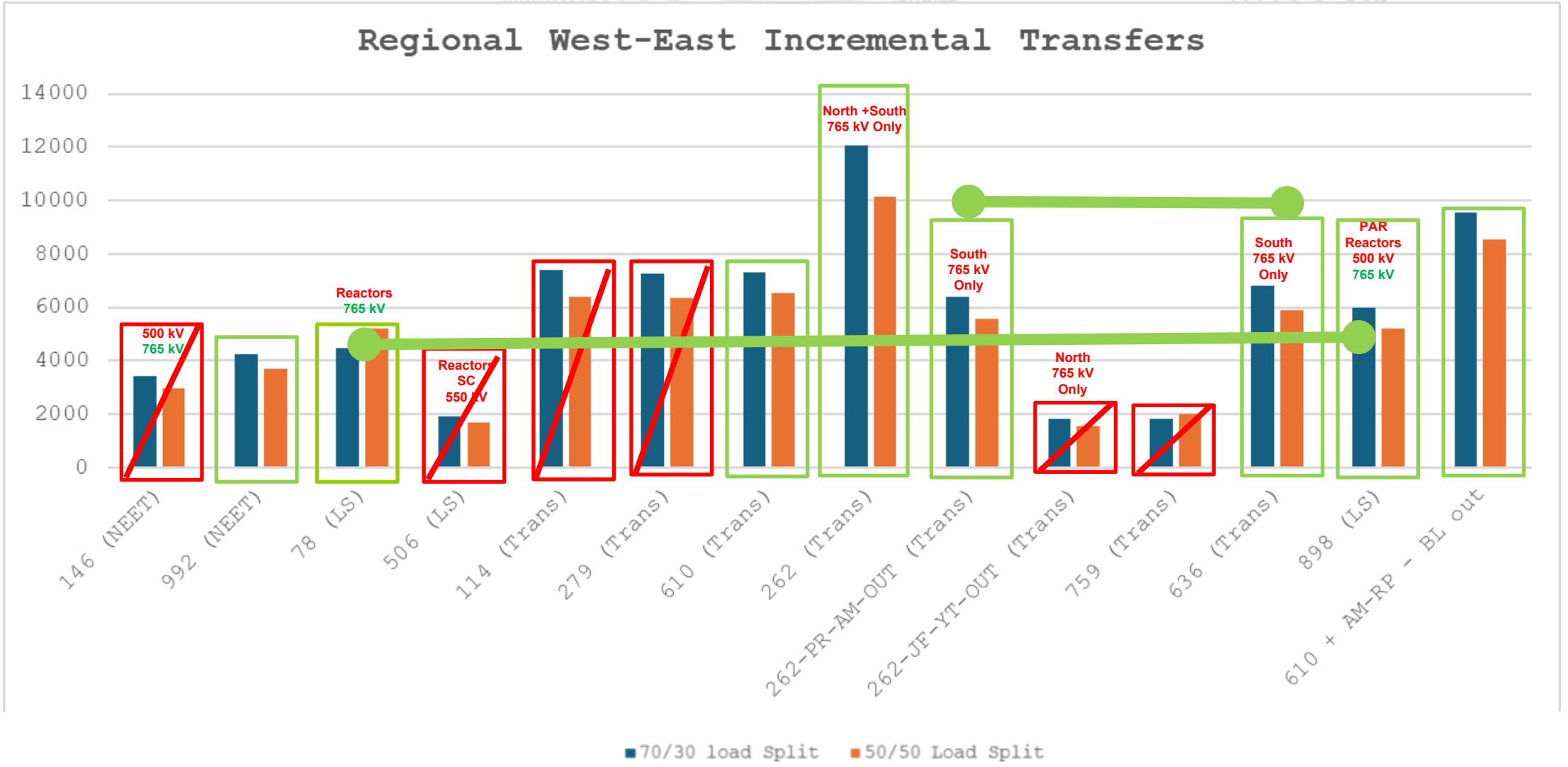
- A number of proposals offer similar capability with longer circuit-miles

Incremental Bulk Transfer Studies
West-East Transfers - Procedure

- DC Bulk transfer study using various Source “Western PJM” – Sink “Eastern PJM” pairs
  - Actual AC incremental transfer levels will be lower but generally enabled through more localized reactive power compensation and smaller upgrades.
- As per earlier TEAC updates, and based on the future generation outlook as informed by the PJM Interconnection Queue, PJM anticipates that the majority of the future surplus generation will be sourced from Western PJM.
- The source was set at two major 765kV nodes in western PJM (Northern AEP and Southern AEP).
  - Two surplus generation split ratios were also selected; (70% North -30% South) and (50% North – 50% South)
  - The sink was set to multiple locations in Eastern PJM including Dominion, APS and Eastern MAAC
- PJM further analyzed and filtered constraints and eliminated those that are terminal limited, short upgrades and similar.
- A select set of AC analysis was conducted on both 2029 and 2032 scenarios
- More details will be provided at the November 19th Special TEAC

Regional Transfer Performance – Key Proposals

Bulk Transfer Capability (DC) and Preliminary Shortlist



Recommended Solutions

BGE Transmission Zone: Baseline Conastone 230 kV 2322 B5 CB Replacement

Process Stage: Recommended Solution

Criteria: Short Circuit

Assumption Reference: 2024 RTEP assumptions

Model Used for Analysis: 2029 RTEP Short Circuit base case

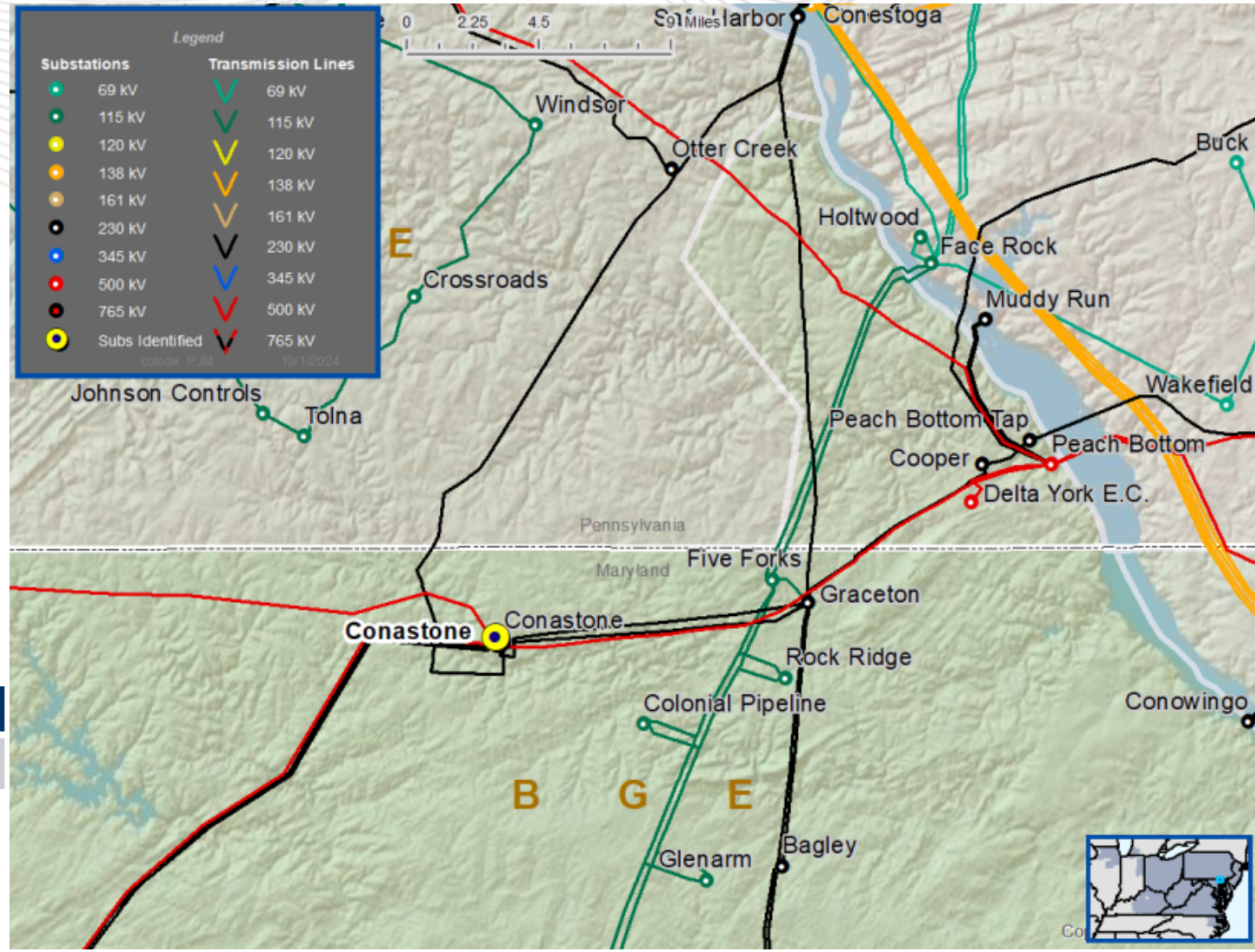
Proposal Window Exclusion: None

Flowgate: 2024W1-SC-26

Problem Statement:

In the 5-year 2028 RTEP Short Circuit base case, the Conastone 230 kV breaker 2322 B5 is identified as being over duty.

Circuit Breaker	Interrupting Rating (kA)
230kV breaker 2322 B5	50



BGE Transmission Zone: Baseline Conastone 230 kV 2322 B5 CB Replacement

Recommended Solution: b3857

1) Replace over duty Conastone 230 kV circuit breaker 2322 B5 with an interrupting rating of 63 kA.

Estimated Cost: $1.921M

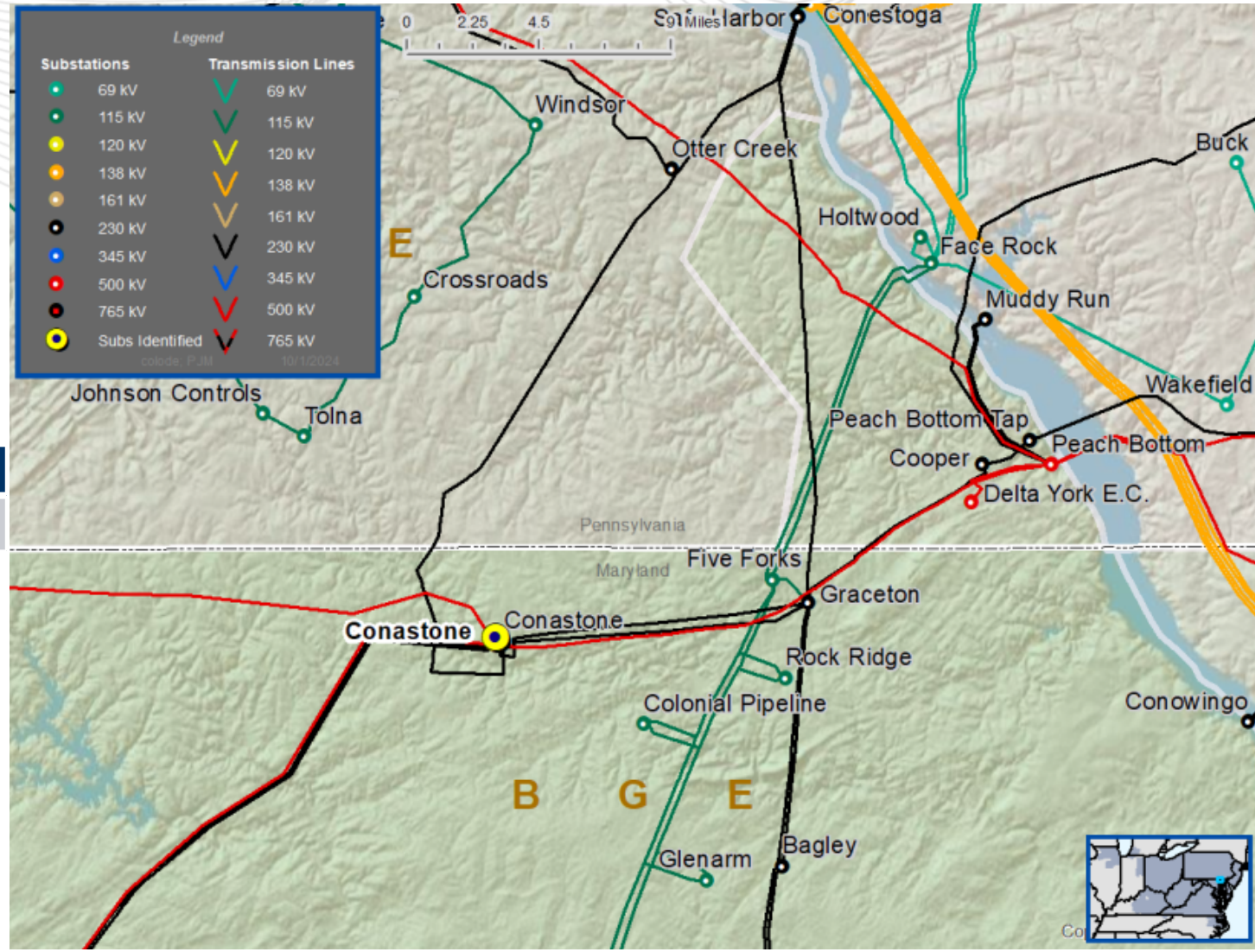
Preliminary Facility Rating:

Circuit Breaker	Interrupting Rating (kA)
230kV breaker 2322 B5	63

Required IS Date: 6/1/2029

Projected IS Date: 6/1/2029

Previously Presented: 10/8/2024



2024 RTEP
First Read
Baseline Reliability Projects

AEP Transmission Zone: Baseline Beatty – Adkins 345kV Station Upgrades

Process Stage: First Read

Criteria: Summer Gen Deliv

Assumption Reference: 2024 RTEP assumptions

Model Used for Analysis: 2029 RTEP Summer base case

Proposal Window Exclusion: Substation Equipment Exclusion

Problem Statement:

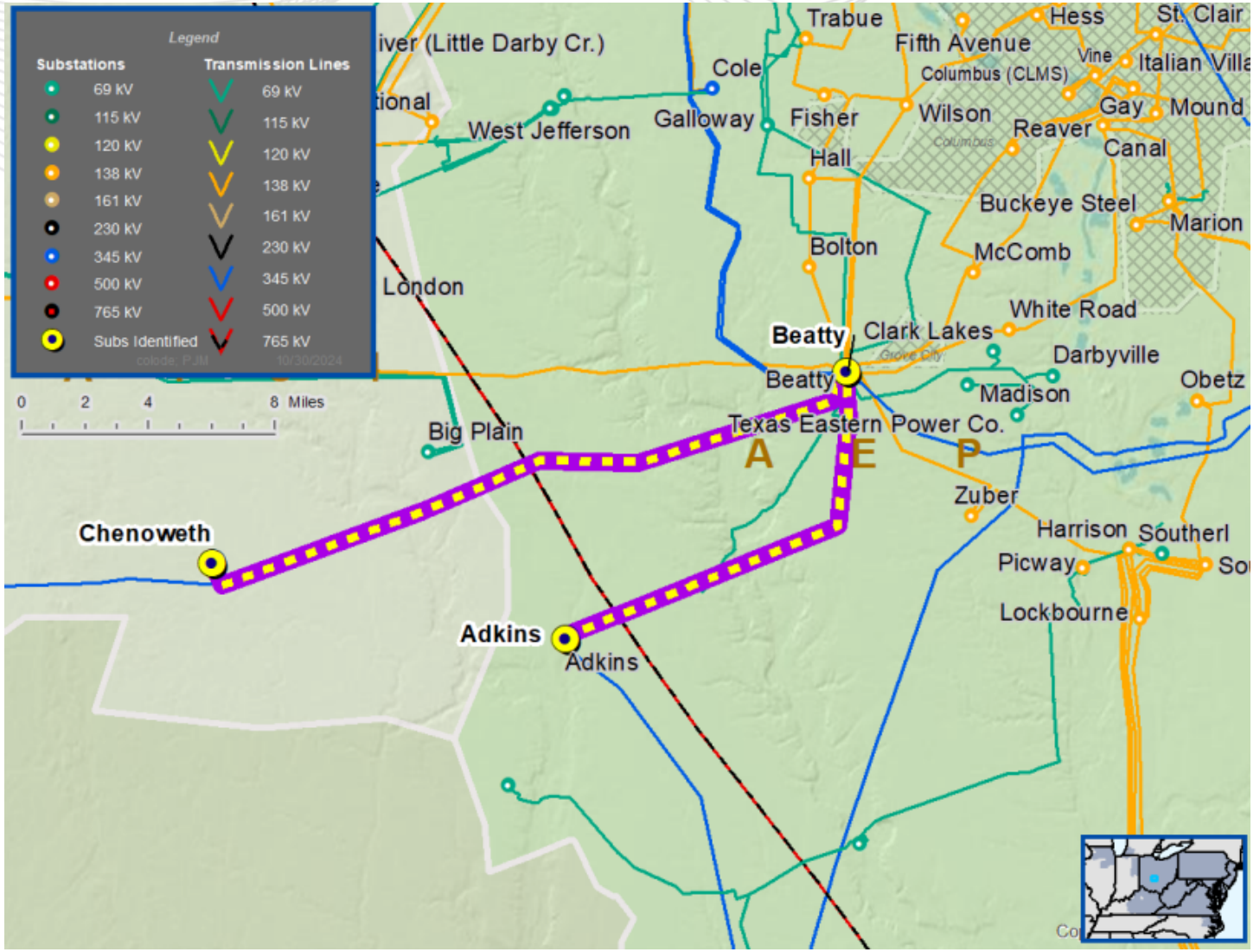
Flowgates: 2024-W1-GD-S378, 2024-W1-GD-S381, 2024-W1-GD-S426, 2024-W1-GD-S435, 2024-W1-GD-S436, 2024-W1-GD-S471, 2024-W1-GD-S472, 2024-W1-GD-S894

In the 5-year 2029 RTEP summer case, the Beatty – Adkins and Beatty – Chenoweth 345kV lines are overloaded in gen deliv test for multiple contingencies.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Beatty - Adkins (345)	1096/1203/1423/1511
Beatty - Chenoweth (345)	1096/1203/1255/1374

Breakers	Capacity (KA)
Adkins 345kV A	50
Adkins 345kV A1	50



AEP Transmission Zone: Baseline Beatty – Adkins 345kV Station Upgrades

Proposed Solution:

Replace station conductor and switches in the 345 kV yard at Beatty that are currently limiting the 345 kV lines to Adkins and Chenoweth **Estimated Cost: 0.50M**

Upgrade 345 kV circuit breakers 'A' and 'A1' to 4000A 63 kA breakers at Adkins station along with some station conductor that is currently limiting the 345 kV line to Beatty. **Estimated Cost: 4.50M**

Total Estimated Cost: $5M

Preliminary Facility Rating:

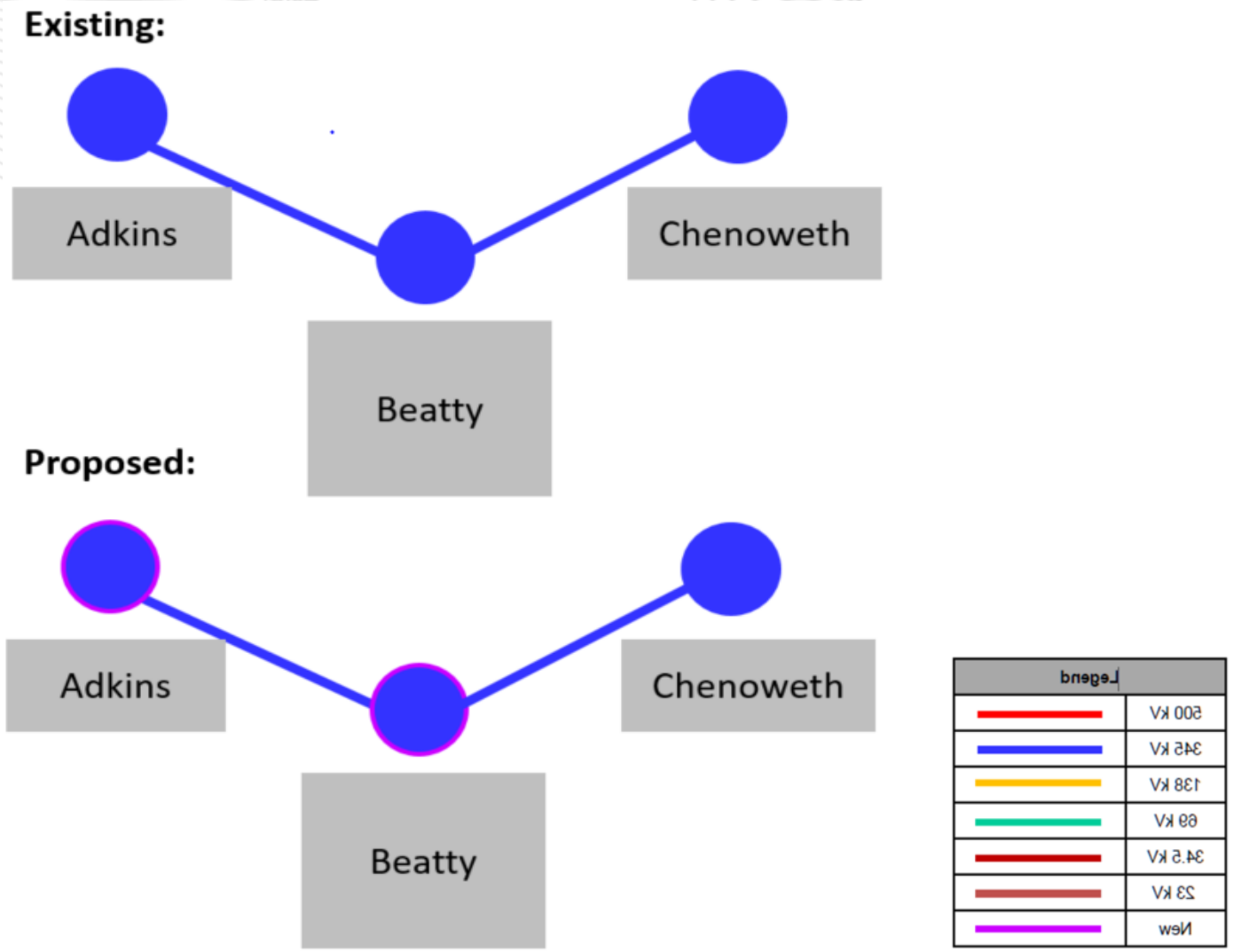
Branch	SN/SE/WN/WE (MVA)
Beatty - Adkins (345)	1269/1385/1604/1737
Beatty - Chenoweth (345)	1442/1635/1822/1943

Breakers	Capacity (KA)
Adkins 345kV A	63
Adkins 345kV A1	63

Alternatives: Considering the limited station scope and cost of the upgrade, no viable transmission alternates were identified.

Required IS Date: 6/1/2029

Projected IS Date: 4/1/2029



AEP Transmission Zone: Baseline Canal – Gay St. 138kV Rebuild

Process Stage: First Read

Criteria: Summer N-1-1

Assumption Reference: 2024 RTEP assumptions

Model Used for Analysis: 2029 RTEP Summer base case

Proposal Window Exclusion: None

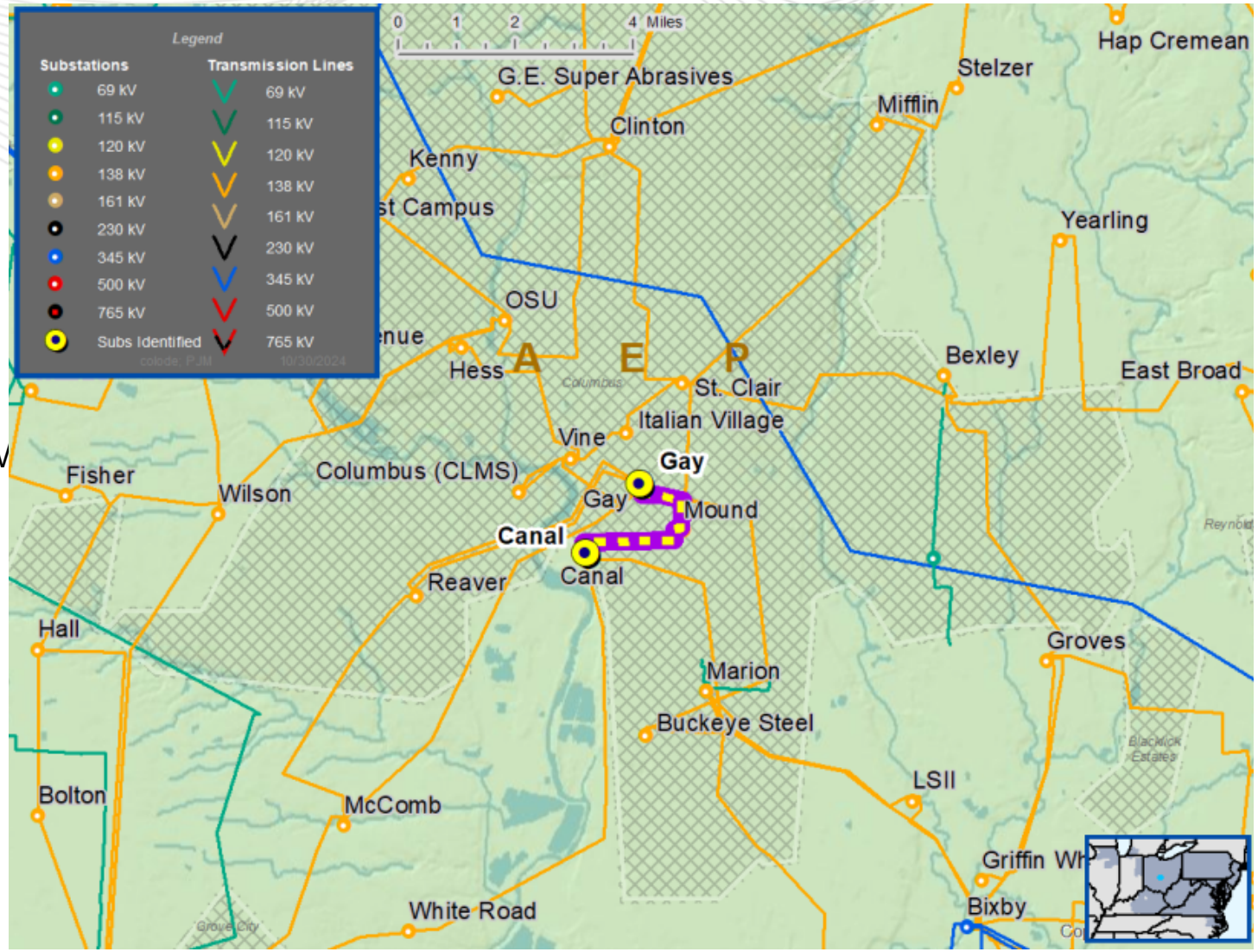
Problem Statement:

Flowgate: 2024-W1-N22-ST14

In the 5-year 2029 RTEP summer case, the Canal – Gay 138kV line is overloaded in N-1-1 test.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Canal – Gay St. 138kV line	170/233/179/242



AEP Transmission Zone: Baseline Canal – Gay St. 138kV Rebuild

Proposed Solution: Proposal No. 2024-W1-940

Rebuild the existing 1.1 mile Canal - Gay 138 kV oil filled pipe-type underground line to address overloads on the existing cable utilizing 5000 MCM XLPE cable.

Estimated Cost: $15.595 M

Preliminary Facility Rating:

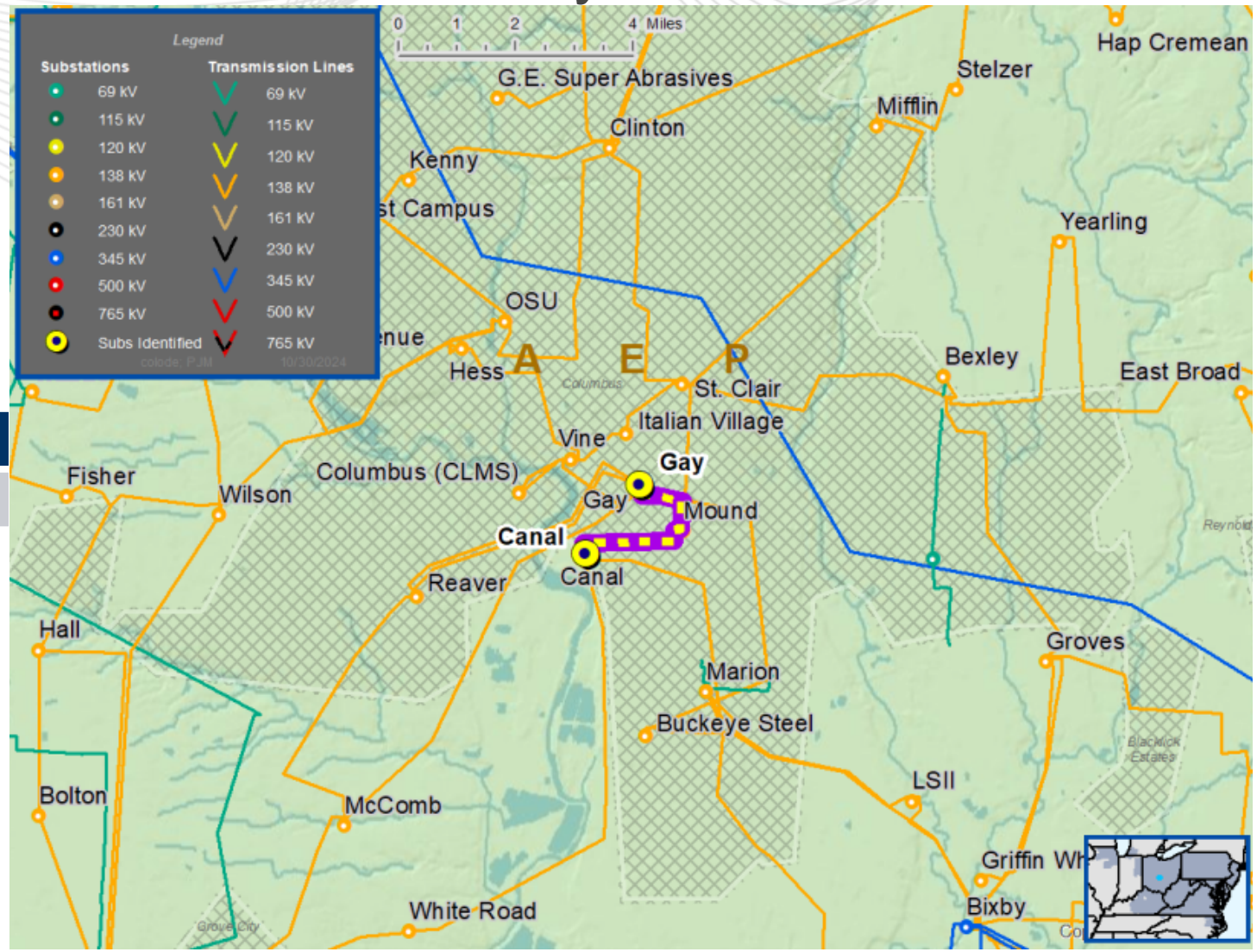
Branch	SN/SE/WN/WE (MVA)
Canal – Gay St. 138kV line	296/369/369/369

Alternatives: None.

Ancillary Benefits: The Canal - Gay line is a 1970's vintage oil-filled pipe type cable design and the concerns on this line was described in AEP-2023-OH024, presented in 3/17/2023 SRRTEP.

Required IS Date: 6/1/2029

Projected IS Date: 12/31/2027



AEP Transmission Zone: Baseline Cluster AEP-2

Process Stage: First Read

Criteria: Summer Gen Deliv, Basecase Analysis, N-1-1

Assumption Reference: 2024 RTEP assumptions

Model Used for Analysis: 2029 RTEP Summer base case

Proposal Window Exclusion: None

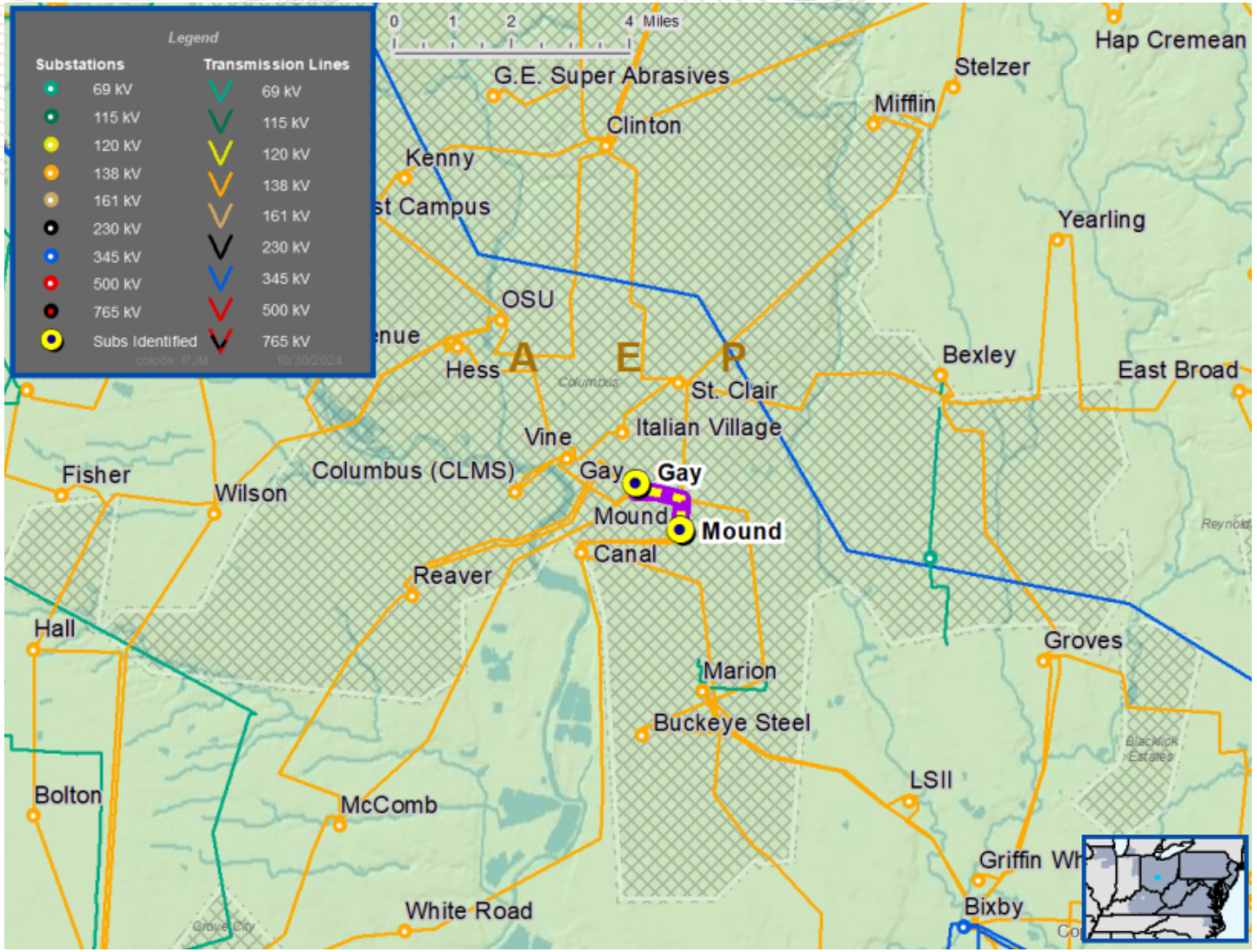
Problem Statement:

Flowgates: 2024W1-GD-S870, 2024W1-N1-ST43, 2024W1-N11-ST10, 2024W1-N11-ST11, 2024W1-N11-ST7, 2024W1-N11-ST8

In the 5-year 2029 RTEP summer case, the Canal – Mound Street 138kV line is overloaded in Gen Deliv test, Basecase Analysis, N-1-1 test.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Canal – Mound St. 138kV line	122/145/134/175



AEP Transmission Zone: Baseline Cluster AEP-2

- As part of the 2024 RTEP Window 1, the projects listed in the table below were proposed to address Cluster AEP-2

Proposal ID #	Project Type	Entity	Project Title	Project Description	kV Level	Estimated Cost ($M)
856	UPGRADE	AEP	Canal - Mound Street 138 kV Rebuild	rebuild the existing 2.2-mile Canal-Mound St 138 kV oil filled pipe-type underground line to address overloads on the existing cable utilizing 5000 MCM XLPE cable.	138	31.090
276	UPGRADE	AEP	Bixby – Buckeye Steel 138kV Reconfiguration	Reconfigure the Bixby - Buckeye Steel 138 kV line to tie in to the nearby Marion Road Station.	138	4.080

- The Canal – Mound Steet 138kV line is a 1926 vintage oil-filled pipe type cable design and the Equipment Material/Conditional/Performance/Risk concerns on this line were earlier presented part of AEP-2023-OH024 at the 3/17/2023 SRRTEP.

AEP Transmission Zone: Baseline Cluster AEP-2

Proposed Solution: Proposal No. 2024-W1-856

Rebuild the existing 2.2-mile Canal-Mound St 138 kV oil filled pipe-type underground line to address overloads on the existing cable utilizing 5000 MCM XLPE cable.

Estimated Cost: $31.090 M

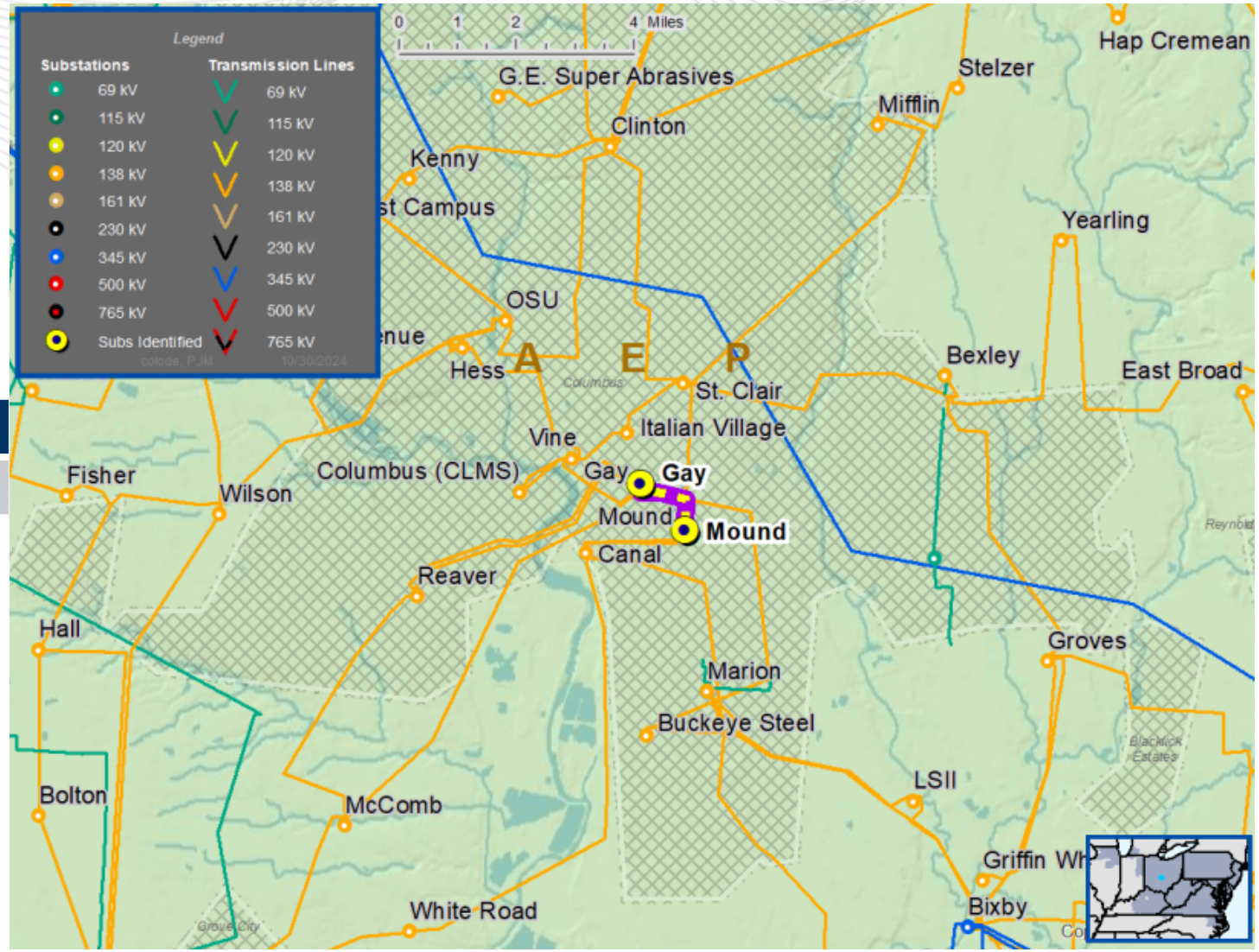
Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Canal – Gay St. 138kV line	219/255/277/303

Ancillary Benefits: The Canal – Mound St. 138KV line is a 1970's vintage oil-filled pipe type cable design and the concerns on this line was described in AEP-2023-OH024, presented in 3/17/2023 SRRTEP. This proposed solution addresses the part of supplemental need on this line.

Required IS Date: 6/1/2029

Projected IS Date: 12/31/2028



AEP Transmission Zone: Baseline Cluster AEP-6

Process Stage: First Read

Criteria: Summer Gen Deliv/IPD, Basecase Analysis, N-1-1

Assumption Reference: 2024 RTEP assumptions

Model Used for Analysis: 2029 RTEP Summer base case

Proposal Window Exclusion: None

Problem Statement:

Flowgates: 2024W1-GD-S854, 2024W1-GD-S873, 2024W1-IPD-S15, 2024W1-IPD-S42, 2024W1-N1-ST19, 2024W1-N1-ST57, 2024W1-N11-ST1, 2024W1-N11-ST2, 2024W1-N11-ST31, 2024W1-N11-ST32, 2024W1-N11-ST5, 2024W1-N11-ST6

In the 2029 RTEP summer cases, the Beatty – White Road - Cyprus 138kV line is overloaded in Gen Deliv test, IPD test, Basecase Analysis, and N-1-1 test.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Beatty – White Road 138kV line	216/243/272/289
White Road – Cyprus 138kV line	216/243/272/289
Beatty – McComb 138kV line	216/243/272/277

AEP Transmission Zone: Baseline Cluster AEP-6

- As part of the 2024 RTEP Window 1, the projects listed in the table below were proposed to address Cluster AEP-6

Proposal ID #	Project Type	Entity	Project Title	Project Description	kV Level	Estimated Cost ($M)
769	UPGRADE	AEP	Beatty – Cyprus 138 kV Rebuild	Rebuild approximately 7.9 miles of the Beatty-White Road-Cyprus 138 kV line.	138	33.113
756	UPGRADE	AEP	Cyprus Station Reconfiguration	Reconfigure the 138 kV lines into Cyprus station to separate the station from the 138 kV network in the area.	138	1.745

- Beatty – Cyprus line is in the AEP EOL list. The existing overhead sections between Beatty Road and Cyprus stations are mostly comprised of wood poles. More than half of the structures date back to the 1960's. The vast majority of the conductor on the line was originally installed in 1967. Proposal 769 addresses the EOL issue of this line while also solving the posted violations.

AEP Transmission Zone: Baseline Cluster AEP-6

Proposed Solution: Proposal No. 2024-W1-769

Rebuild two overhead sections of the 138 kV line between Beatty Road and Cyprus stations (approximately 7.84 miles). Update remote end relay settings as needed.

Estimated Cost: $33.113 M

Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Beatty – White Road 138kV line	329/361/424/453
White Road – Cyprus 138kV line	492/492/519/519
Beatty – McComb 138kV line	216/251/272/295

Alternatives: None.

Ancillary Benefits: Addresses the EOL issues on the Beatty – White Road - Cyprus line.

Required IS Date: 6/1/2029

Projected IS Date: 4/30/2028

ComEd Transmission Zone: Baseline
Wilton Center BT 4-5 CB

Process Stage: First Review

Criteria: Generator Deliverability

TEAC/SRRTEP assumptions: 2024 RTEP assumptions

Model Used for Analysis: 2029 RTEP Winter base case

Proposal Window Exclusion: Substation Equipment Exclusion

Problem Statement:

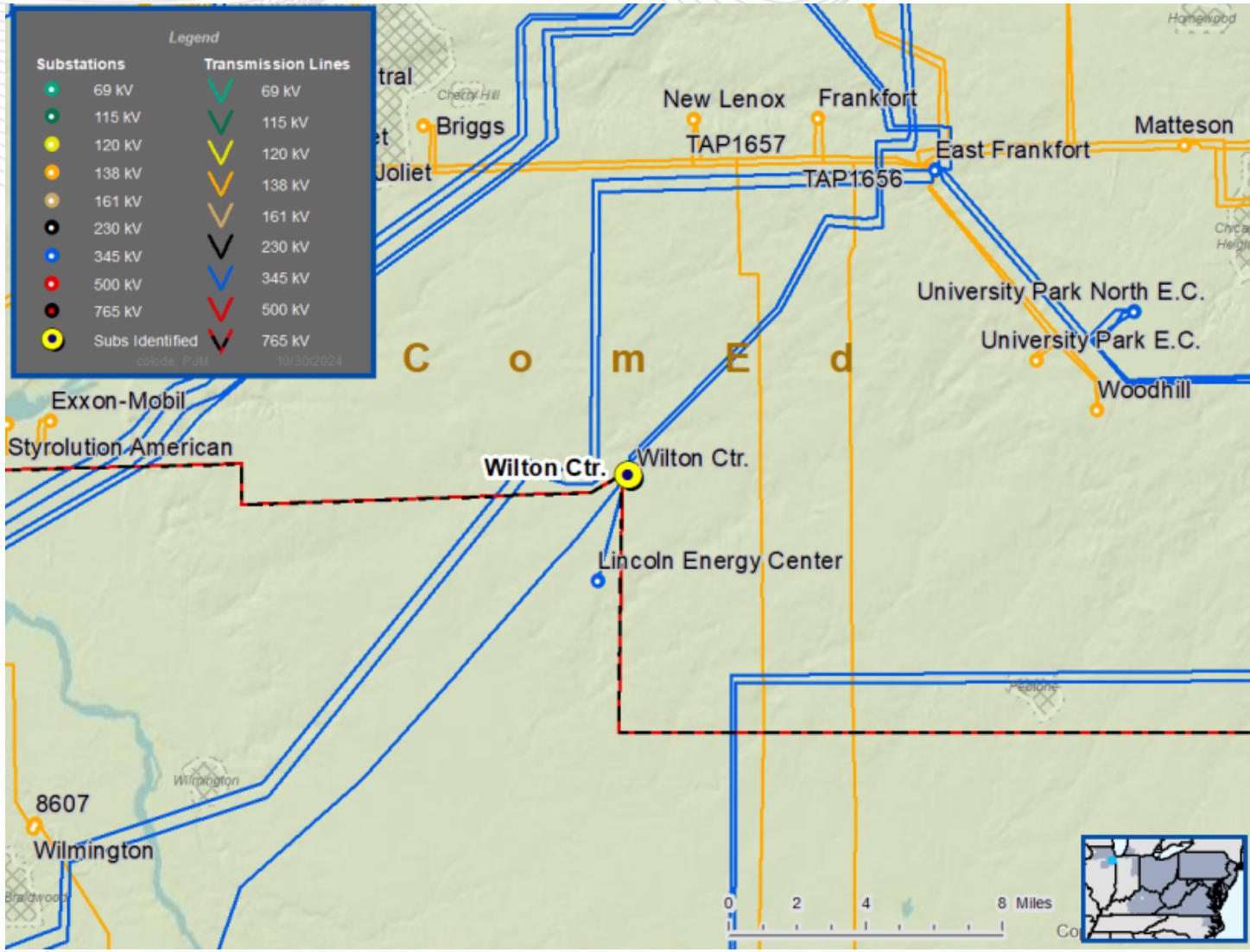
FG: 2024-W1-GD-W107, 2024-W1-GD-W108, 2024-W1-GD-W109, 2024-W1-GD-W5

In the 2029 RTEP Winter case, the Wilton Center-AD1-100 tap 345 kV line is overloaded for a N-1 and N-2 outages.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Wilton - AD1-100 (345)	1364/1528/1590/1781

Breaker	Capacity (kA)
Wilton BT 4-5	50



ComEd Transmission Zone: Baseline Wilton Center BT 4-5 CB

Proposed Solution: Replace the Wilton Center 345 kV BT 4-5 circuit breaker.

Estimated Cost: $2.7 M

Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Wilton - AD1-100 (345)	1679/2058/2091/2340

Breaker	Capacity (kA)
Wilton BT 4-5	63

Alternatives:

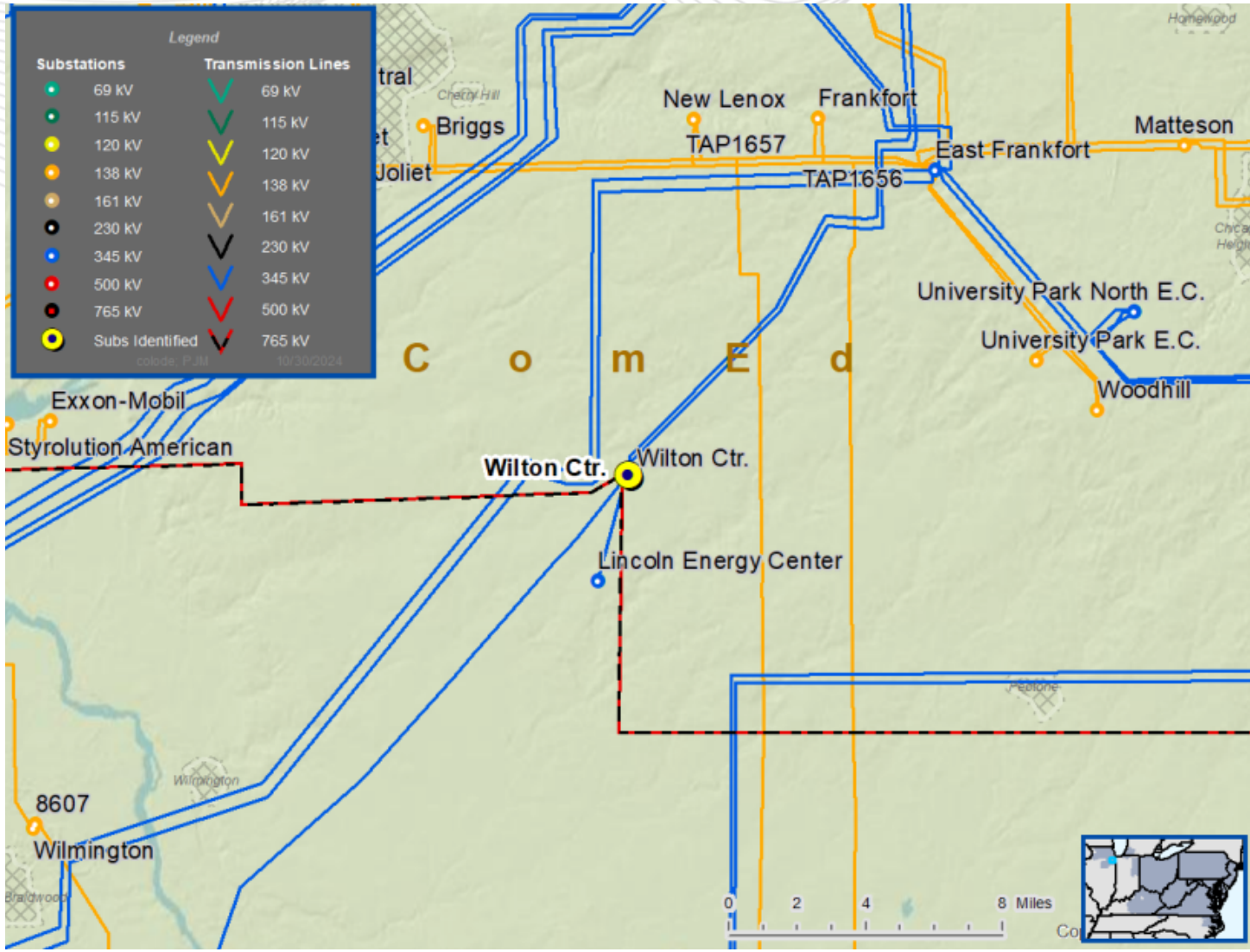
N/A

Ancillary Benefits:

N/A

Required In-Service: 12/1/2029

Projected IS Date: 12/1/2029



ComEd Transmission Zone: Baseline Cluster 1

Process Stage: First Review

Criteria: Baseline & Generator Deliverability

TEAC/SRRTEP assumptions: 2024 RTEP assumptions

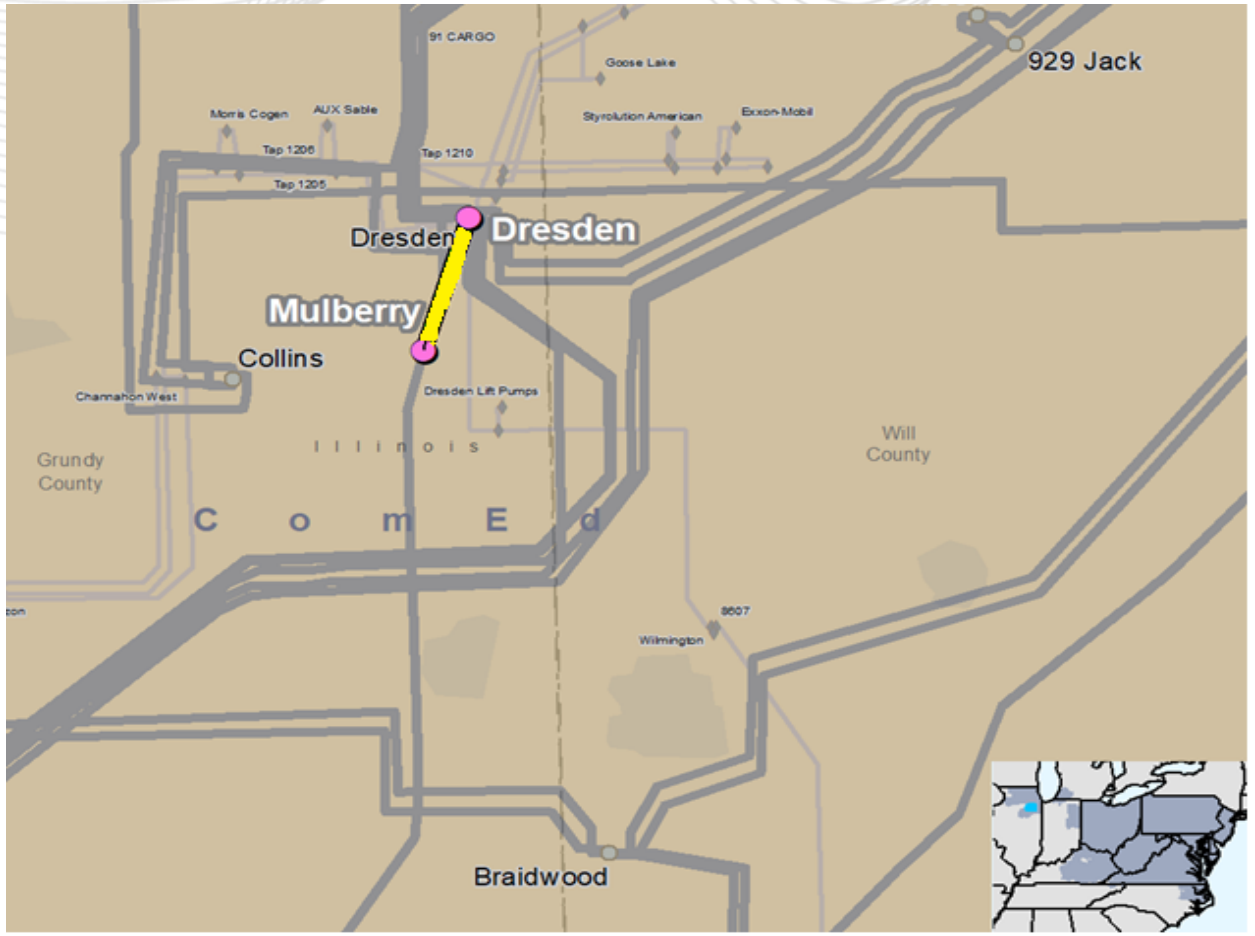
Model Used for Analysis: 2029 RTEP Summer and Winter base cases

Proposal Window Exclusion: None

Problem Statement:

FG: 2024W1-N1-ST51, 2024W1-N1-ST54, 2024W1-GD-S307, 2024W1-GD-S19, 2024W1-GD-S376, 2024W1-IPD-S109, 2024W1-IPD-S110, 2024W1-IPD-S111, 2024W1-IPD-S112, 2024W1-IPD-S113, 2024W1-IPD-S114, 2024W1-IPD-S115, 2024W1-IPD-S116, 2024W1-IPD-S117, 2024W1-IPD-S118, 2024W1-IPD-S119, 2024W1-IPD-S120, 2024W1-IPD-S121, 2024W1-IPD-S122, 2024W1-IPD-S123, 2024W1-IPD-S124, 2024W1-IPD-S125, 2024W1-IPD-S126, 2024W1-IPD-S127, 2024W1-IPD-S128, 2024W1-IPD-S129, 2024W1-IPD-S130, 2024W1-IPD-S131, 2024W1-IPD-S132, 2024W1-IPD-S133, 2024W1-IPD-S134, 2024W1-IPD-S135, 2024W1-IPD-S136, 2024W1-IPD-S137, 2024W1-IPD-S138, 2024W1-IPD-S139, 2024W1-IPD-S140, 2024W1-IPD-S141, 2024W1-IPD-S142, 2024W1-IPD-S143, 2024W1-N1-WT2, 2024W1-GD-W101, 2024W1-GD-W2, 2024W1-GD-W4, 2024W1-GD-W105, 2024W1-IPD-W3,2024W1-IPD-W4,2024W1-IPD-W5,2024W1-IPD-W6,2024W1-IPD-W7,2024W1-IPD-W8,2024W1-IPD-W9,2024W1-IPD-W10,2024W1-IPD-W11,2024W1-IPD-W12,2024W1-IPD-W13,2024W1-IPD-W14,2024W1-IPD-W15,2024W1-IPD-W16,2024W1-IPD-W17,2024W1-IPD-W18,2024W1-IPD-W19,2024W1-IPD-W20,2024W1-IPD-W21,2024W1-IPD-W22,2024W1-IPD-W23

In the 2029 RTEP Summer and Winter base cases, the Dresden-Mulberry 345 kV double circuit is overloaded for N-1 and N-2 outages.



Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Dresden-Mulberry (345)	1201/1479/1497/1710

ComEd Transmission Zone: Baseline Cluster 1

- As part of the 2024 RTEP Window 1, the projects listed in the table below were proposed to address ComEd Cluster 1
- Proposal 135 is an upgrade, with least cost, and addresses the posted violation well

Proposal ID #	Project Type	Entity	Project Title	Project Description	kV Level	Estimated Cost ($M)
135	UPGRADE	COMED	Reconductor 345 kV lines 1202 & 1227 Dresden to Mulberry	Reconductor 1.5 miles of 345 kV lines 1202 & 1227 from Dresden to Mulberry with two conductor bundled 1033.5 ACSS conductor. Modify and replace towers as necessary to accommodate the higher mechanical loads of the bundled conductor.	345	16.27
447	GREENFIELD	COMED	Cut 345 kV L8014 Pontiac to Dresden into Mulberry	Cut 345 kV L8014 Pontiac to Dresden into Mulberry	345	23.60
532	UPGRADE	COMED	345kV Shunt Inductor at Mulberry	Install new 345 kV shunt inductor at Mulberry	345	28.23

ComEd Transmission Zone: Baseline Cluster 1

Proposed Solution: 2024-W1-135

- Reconductor 1.5 miles of 345 kV lines 1202 & 1227 from Dresden to Mulberry with two conductor bundled 1033.5 ACSS conductor. Modify and replace towers as necessary to accommodate the higher mechanical loads of the bundled conductor. ($12.33 M)
- Install 345 kV circuit breaker on line 1202 (Dresden-Mulberry 345 kV) and upgrade sisconnects and associated equipment at Dresden 345 kV. ($3.77 M)
- Upgrade disconnects and associated equipment at Mulberry 345 kV. ($0.17 M)

Total Estimated Cost: $16.27 M

Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Dresden-Mulberry (345)	1961/2112/2324/2457

Ancillary Benefits: Includes replacement of several existing structures that are 52 year old.

Required In-Service: 6/1/2029

Projected IS Date: 6/1/2029

ComEd Transmission Zone: Baseline Cluster 2

Process Stage: First Review

Criteria: Baseline N-1-1

TEAC/SRRTEP assumptions: 2024 RTEP assumptions

Model Used for Analysis: 2029 RTEP Summer base case

Proposal Window Exclusion: None

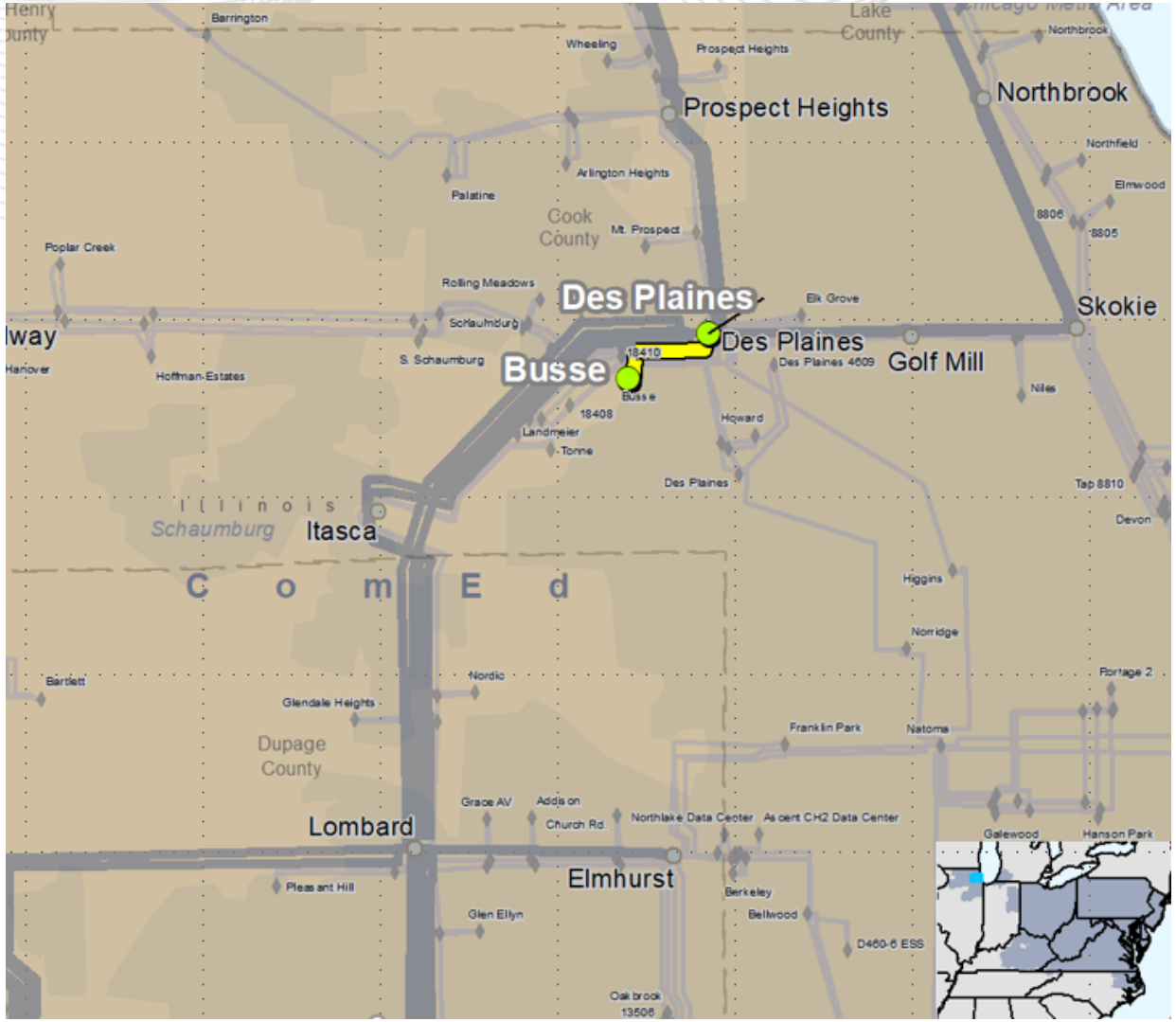
Problem Statement:

FG: 2024W1-N11-ST37, 2024W1-N11-ST34

In the 2029 RTEP Summer base case, the Busse-Des Plaines 138 kV line is overloaded for N-1 contingency pairs.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Busse-Des Plaines (138)	351/449/421/500



ComEd Transmission Zone: Baseline Cluster 2

- As part of the 2024 RTEP Window 1, the projects listed in the table below were proposed to address Cluster 2
- Proposal 816 addresses the posted violations, is an upgrade and represents a portion of an M-3 solution presented at August TEAC (Need ID ComEd-2024-004)

Proposal ID #	Project Type	Entity	Project Title	Project Description	kV Level	Estimated Cost ($M)
816	UPGRADE	COMED	Autotransformer at Itasca	Autotransformer at Itasca	345/138	14.31
888	UPGRADE	COMED	Reconductor Des Plaines to Busse	Reconductor Des Plaines to Busse L4605	138	7.21

ComEd Transmission Zone: Baseline Cluster 2

Proposed Solution: 2024-W1-816

Install a new 420 MVA 345/138 kV autotransformer and associated 345 kV and 138 kV circuit breakers at Itasca substation.

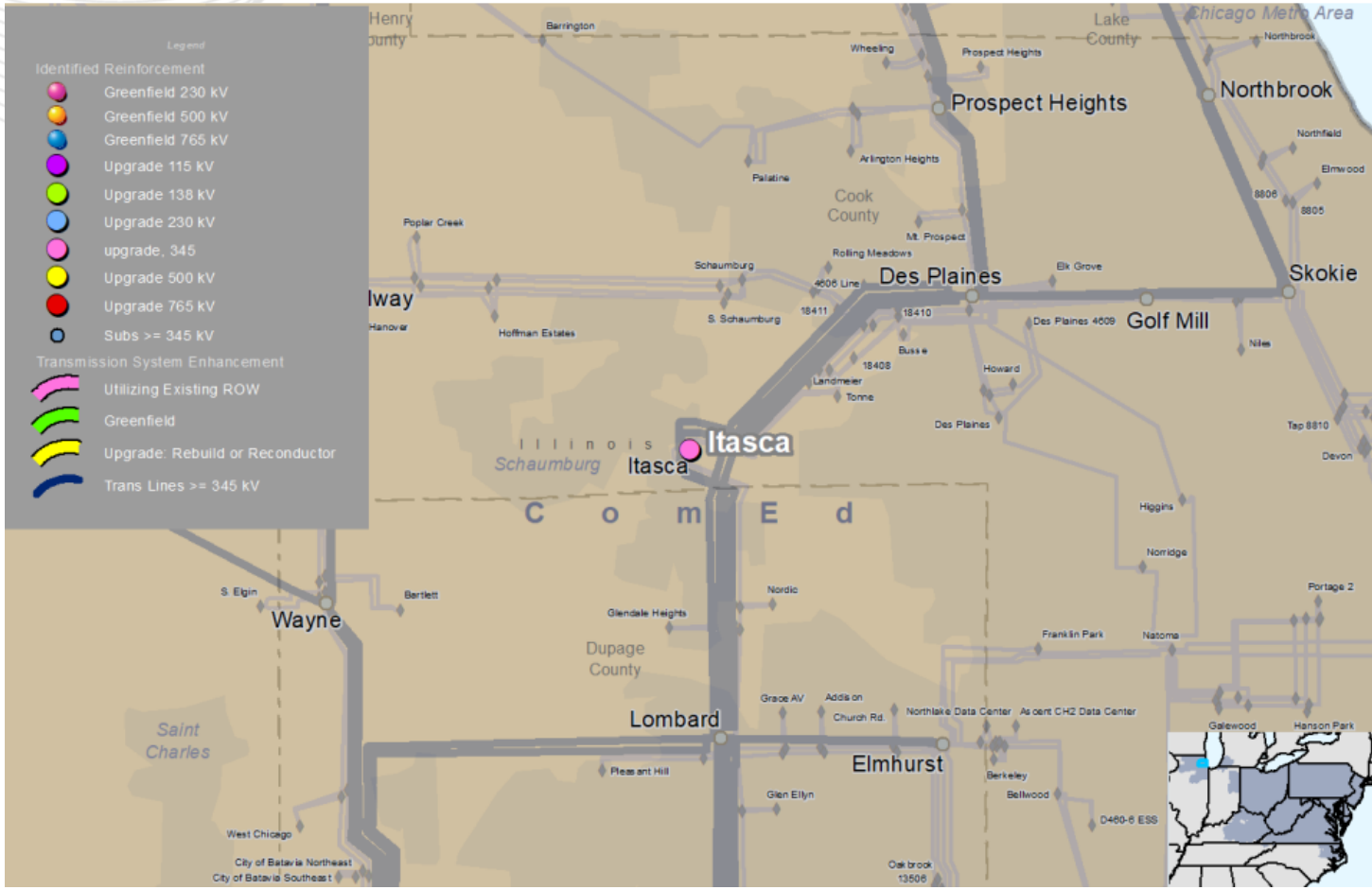
Estimated Cost: $14.31 M

Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Itasca 84 Transformer (345/138)	420/480/420/480

Required In-Service: 6/1/2029

Projected IS Date: 6/1/2029



ACE Transmission Zone: Baseline
Delco Tap – Mickleton Facility Upgrades

Process Stage: First Review

Criteria: Summer Generation Deliverability

Assumption Reference: 2029 RTEP assumption

Model Used for Analysis: 2029 RTEP Summer

Proposal Window Exclusion: Substation Equipment

Problem Statement: The Delco Tap – Mickleton facility is overloaded for multiple contingencies.

Violations were posted as part of the 2024 Window 1: FG# - 2024-W1-GD-S769, FG# -2024-W1-GD-S84N, FG# -2024-W1-GD-S85N, FG# -2024-W1-GD-S86N

Existing Facility Rating: 637SN/733SE, 637WN/733WE

Proposed Solution:

1. Upgrade a circuit switcher at the Mickleton Substation

Proposed Facility Rating: 800SN/900SE, 715WN/835WE

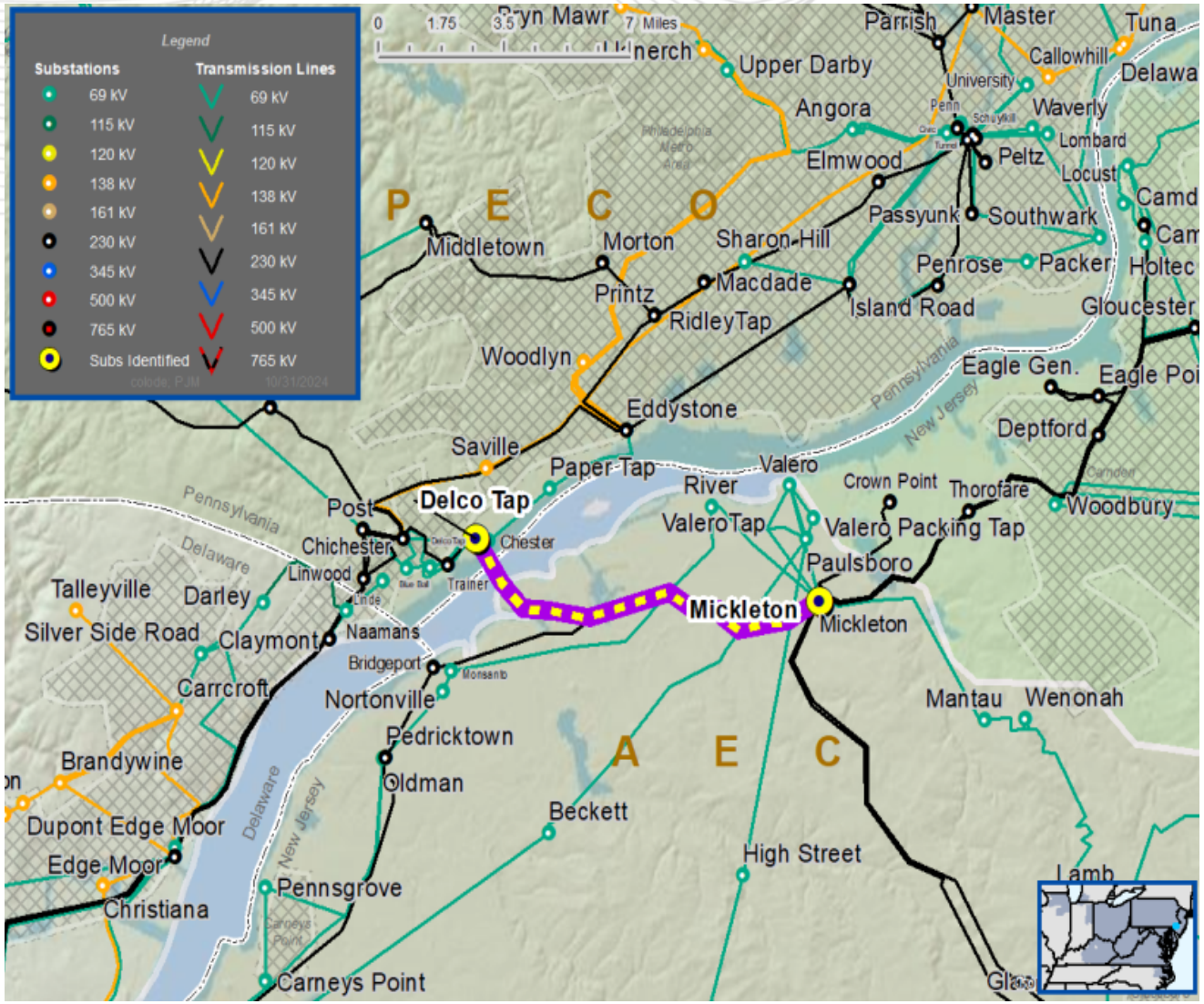
Estimated Cost: $1.03M

Alternatives

- N/A

Required In-Service: 06/01/2029

Projected In-Service: 06/01/2029



DPL Transmission Zone: Baseline
Milford and Cedar Creek Facility Upgrades

Process Stage: First Review

Criteria: Winter Generation Deliverability / Winter Thermal

Assumption Reference: 2029 RTEP assumption

Model Used for Analysis: 2029 RTEP Winter

Proposal Window Exclusion: Substation Equipment

Problem Statement: The Cedar Creek – Milford facility is overloaded for a stuck breaker contingency.

Violations were posted as part of the 2024 Window 1: FG# - 2024-W1-GD-W121, FG# -2024-W1-N1-WT6

Existing Facility Rating: 654SN/738SE, 738WN/775WE

Proposed Solution:

1. Adjust relay setting at Cedar Creek Substation
2. Adjust relay setting at Milford Substation

Proposed Facility Rating: 800SN/900SE, 752WN/910WE

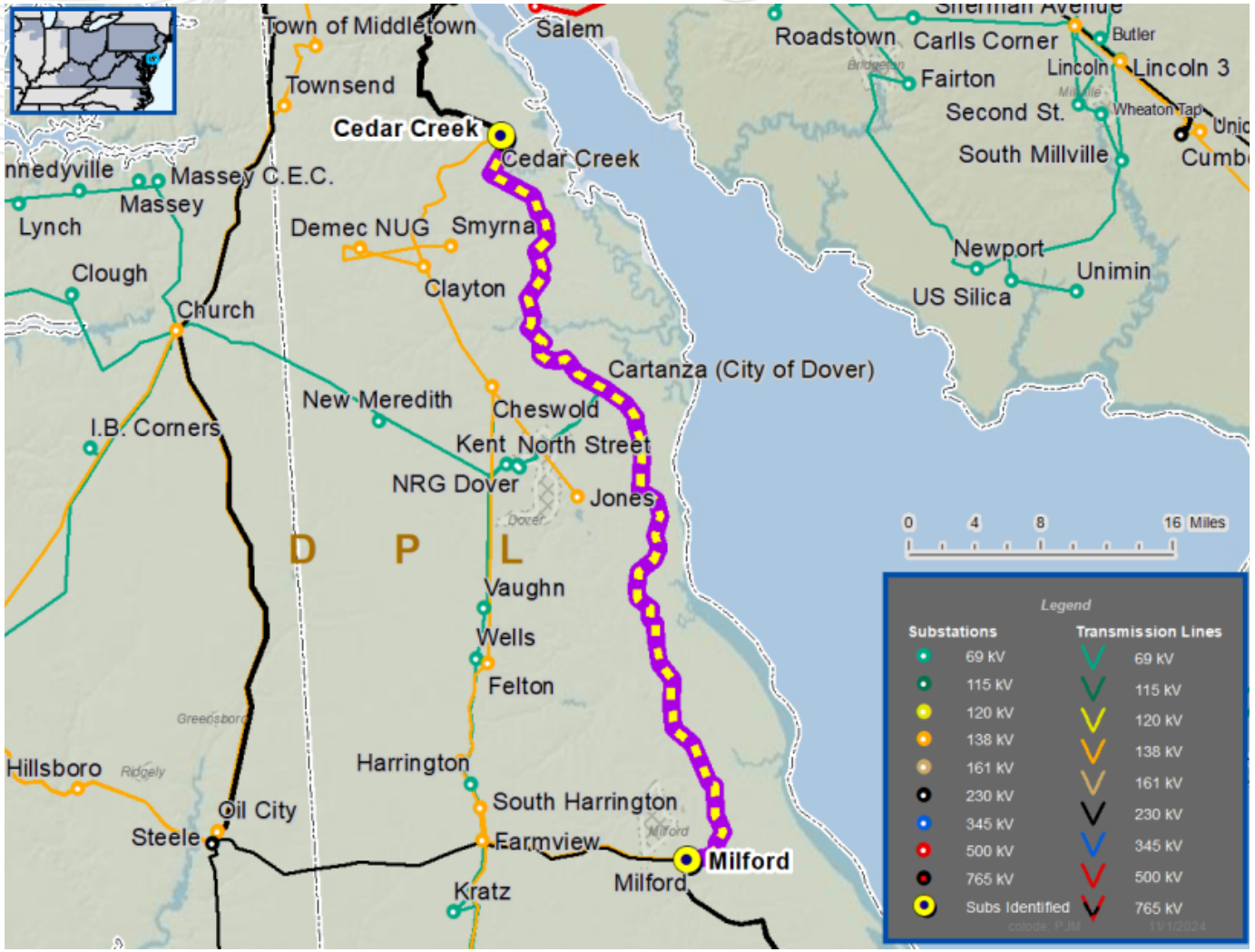
Estimated Cost: $0.200M

Alternatives

- N/A

Required In-Service: 12/31/2029

Projected In-Service: 12/31/2029



PECO Transmission Zone: Baseline Elroy – Hosensack Facility Upgrades

Process Stage: First Review

Criteria: Summer Generation Deliverability

Assumption Reference: 2029 RTEP assumption

Model Used for Analysis: 2029 RTEP Summer

Proposal Window Exclusion: Substation Equipment

Problem Statement: The Elroy – Hosensack facility is overloaded for multiple stuck breaker contingencies

Violations were posted as part of the 2024 Window 1: FG# - 2024-W1-IPD-S105, FG# - 2024-W1-IPD-S106, FG# - 2024-W1-IPD-S107, FG# - 2024-W1-IPD-S108, FG# - 2024-W1-GD-S85, FG# - 2024-W1-GD-S427, FG# - 2024-W1-GD-S429, FG# -2024-W1-GD-S431

Existing Facility Rating: 2477SN/2860SE, 2948WN/3277WE

Proposed Solution:

1. Upgrade two (2) 500kV free standing CTs, one (1) disconnect switch, and four (4) sections of tube bus at Elroy 500kV Substation.

Proposed Facility Rating: 2920SN/3707SE, 3593WN/4403WE

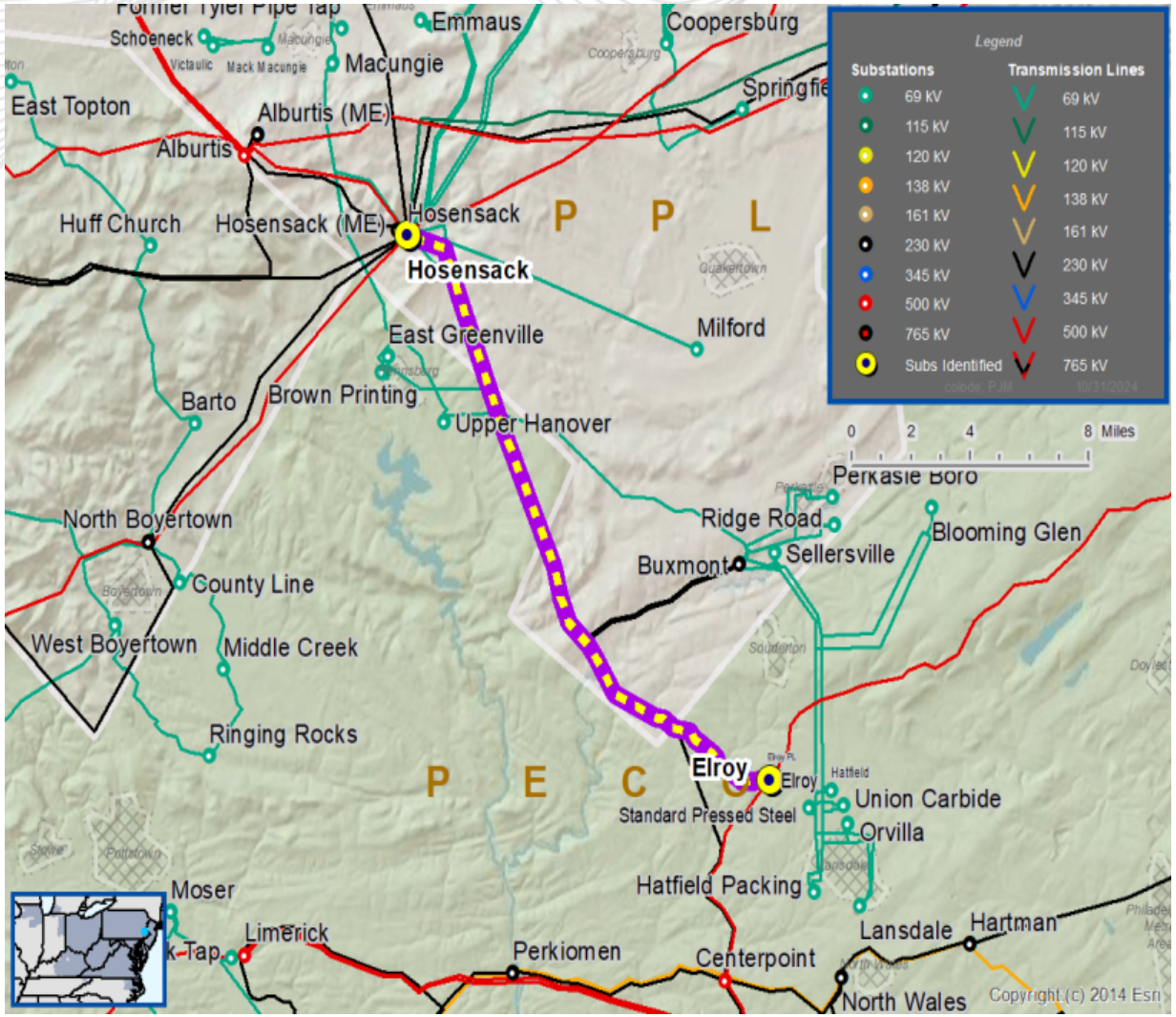
Estimated Cost: $1.5M

Alternatives

- N/A

Required In-Service: 06/01/2029

Projected In-Service: 06/01/2029:



BGE Transmission Zone: Baseline
BGE Local N-1-1

Process Stage: First Review

Criteria: Summer N-1-1 Thermal

Assumption Reference: 2029 RTEP assumption

Model Used for Analysis: 2029 RTEP Summer

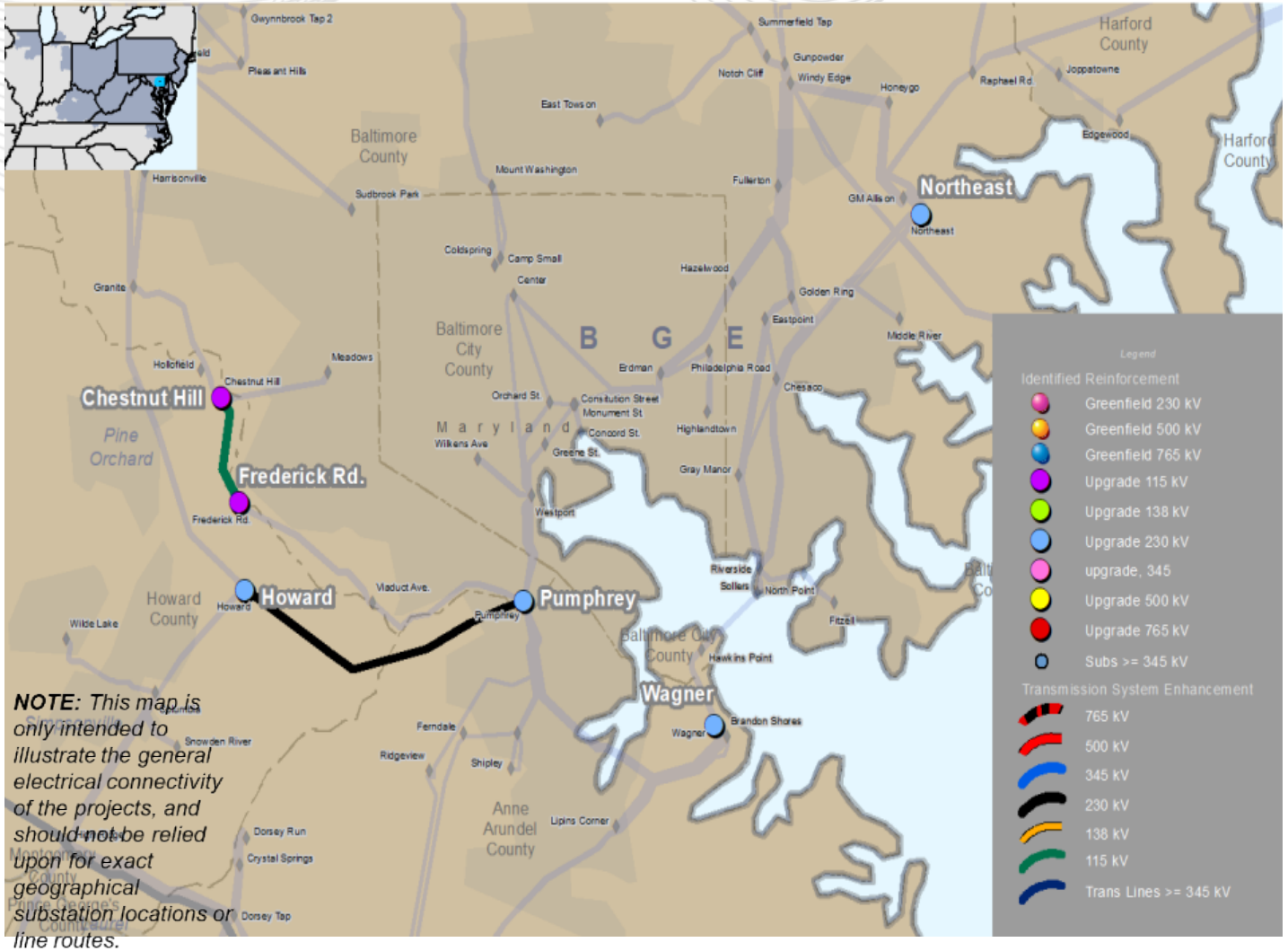
Proposal Window Exclusion: No

Problem Statement: The following facilities are overloaded for summer N-1-1 in the BGE area

- Chestnut Hill – Frederick Rd. 115 kV ckt #527
- Chestnut Hill – Frederick Rd. 115 kV ckt #528
- North East 230/115 kV transformer #1
- North East 230/115 kV transformer #2
- Wagner 230/115 kV transformer #1
- Wagner 230/115 kV transformer #2
- Howard – Pumphrey 230 kV

Violations were posted as part of the 2024 Window 1:

2024W1-N11-ST9	2024W1-N11-ST22	2024W1-N11-ST26
2024W1-N11-ST12	2024W1-N11-ST23	2024W1-N11-ST27
2024W1-N11-ST17	2024W1-N11-ST24	2024W1-N11-ST28
2024W1-N11-ST18	2024W1-N11-ST25	2024W1-N11-ST29



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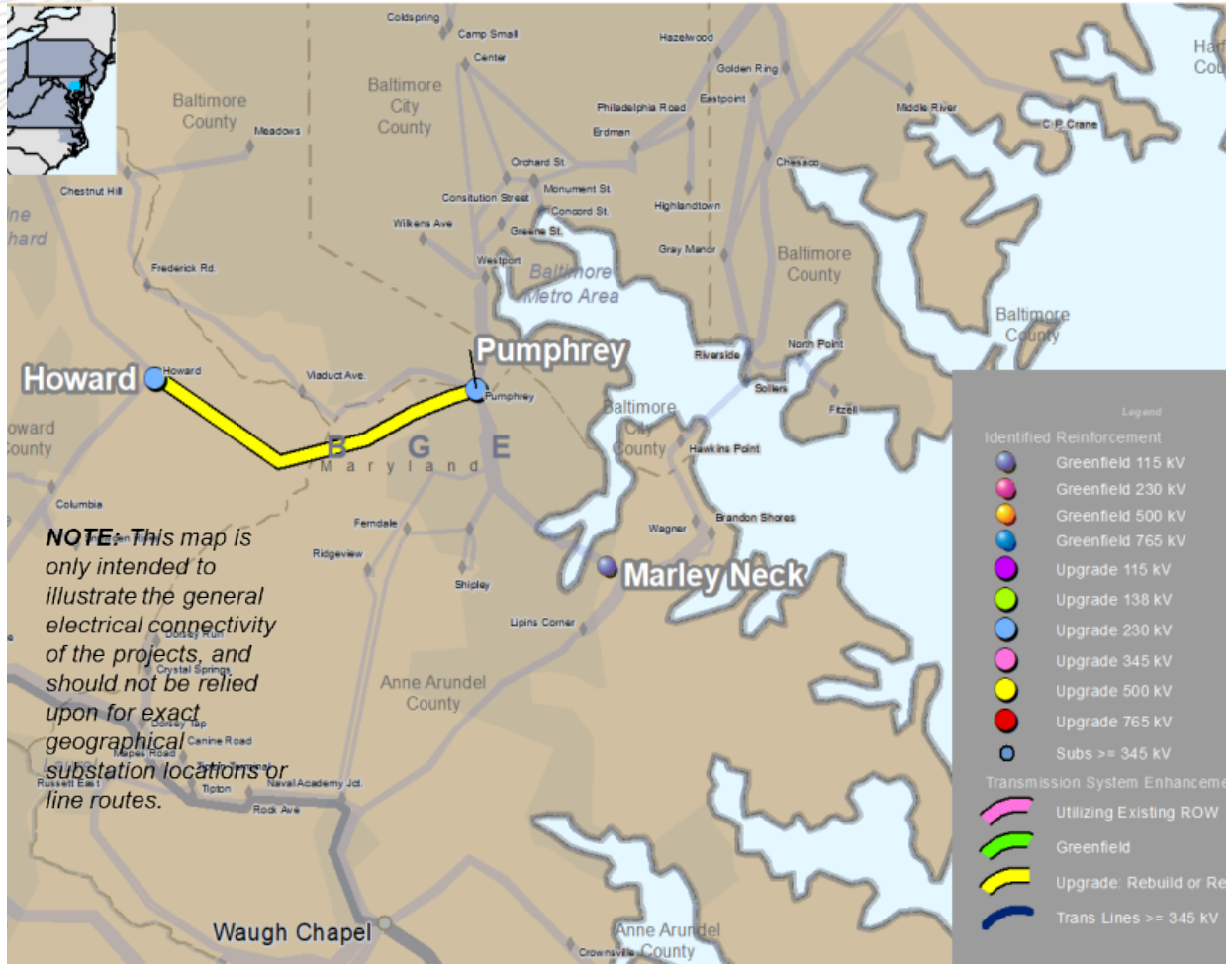
BGE Transmission Zone: Baseline
BGE Local N-1-1

Process Stage: First Review

Proposed Solution:

Propsal ID	Proposing Entity	Zone	Upgrade Description	Cost ($M)	Projected In-service Date
295	BGE	BGE	• Construct new Marley Neck 115 kV substation. Marley Neck 115kV portion will accommodate 10 breaker-and-a-half bays, with only 6 bays planned for initial service while accommodating 4 future bays. Two Standard 230/115kV transformers will be connected between the 230 and 115 kV equipment with appropriate isolation methods.	$107.62	6/1/2029
470	BGE	BGE	• Replace existing Graceton 230-1 high-impedance transformer with standard 230/115 kV transformer. • Howard to Pumphrey 230 kV Transmission Line Rebuild approximate distance 8.7Miles.	$71.96	6/1/2031
Non Competitive	BGE	BGE	• Replace the existing 556.5 kcm ACSR conductor drops from the 110527-A & 110528-A transmission lines to the line switches at Frederick Rd with 2-bundle 556.5 kcm ACSR per phase	$0.74	6/1/2029



Required In-Service: 06/01/2029

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Process Stage: First Review

Evaluation Results:

- Both proposals 295 and 470 address the intended flowgates
- Proposal 470 causes a new violation (overload on the Rock Ridge – Five Forks 115 kV line)
- As a result of outage challenges in the BGE area to rebuild the Howard – Pumphrey 230 kV circuit, the in-service date of proposal 470 will be delayed until 2031 (to coordinate with other planned outages in the area)
- Proposal 295 addresses the identified need and it does not require lengthy outages, majority of the construction can be done without interrupting the system
- Ancillary Benefits: Proposal 295 provides operational flexibility. The project increases the resiliency of the currently tapped 115 kV circuits as well as increasing reactive support to downtown 115kV system.

Preferred Solution: Proposal ID 295 (New Marley 115 kV station)

PECO Transmission Zone: Baseline

Process Stage: First Review

Criteria: Summer and Winter Generation Deliverability

Assumption Reference: 2029 RTEP assumption

Model Used for Analysis: 2029/2032 RTEP Summer and Winter

Proposal Window Exclusion: No

Problem Statement: The following facilities in PECO are overloaded for Summer and Winter Generation Deliverability

- Richmond – Waneeta 230 kV
- Waneeta – North Philadelphia 230 kV
- North Philadelphia – Master 230 kV

Violations were posted as part of the 2024 Window 1:

2024W1-GD-S89N	2024W1-GD-W21N	2024W1-32GD-S143	2024W1-32GD-W14
2024W1-GD-S770	2024W1-GD-W22N	2024W1-32GD-S144	2024W1-32GD-W15
2024W1-GD-S90N	2024W1-32GD-S135	2024W1-32GD-S145	2024W1-32GD-W16
2024W1-GD-S91N	2024W1-32GD-S136	2024W1-32GD-S146	2024W1-32GD-W17
2024W1-GD-S201N	2024W1-32GD-S137	2024W1-32GD-W2	2024W1-32GD-W18
2024W1-GD-S791	2024W1-32GD-S138	2024W1-32GD-W3	2024W1-32GD-W19
2024W1-GD-S202N	2024W1-32GD-S139	2024W1-32GD-W4	2024W1-32GD-W20
2024W1-GD-S203N	2024W1-32GD-S140	2024W1-32GD-W5	2024W1-32GD-W21
2024W1-GD-W238	2024W1-32GD-S141	2024W1-32GD-W6	
2024W1-GD-W20N	2024W1-32GD-S142	2024W1-32GD-W8	

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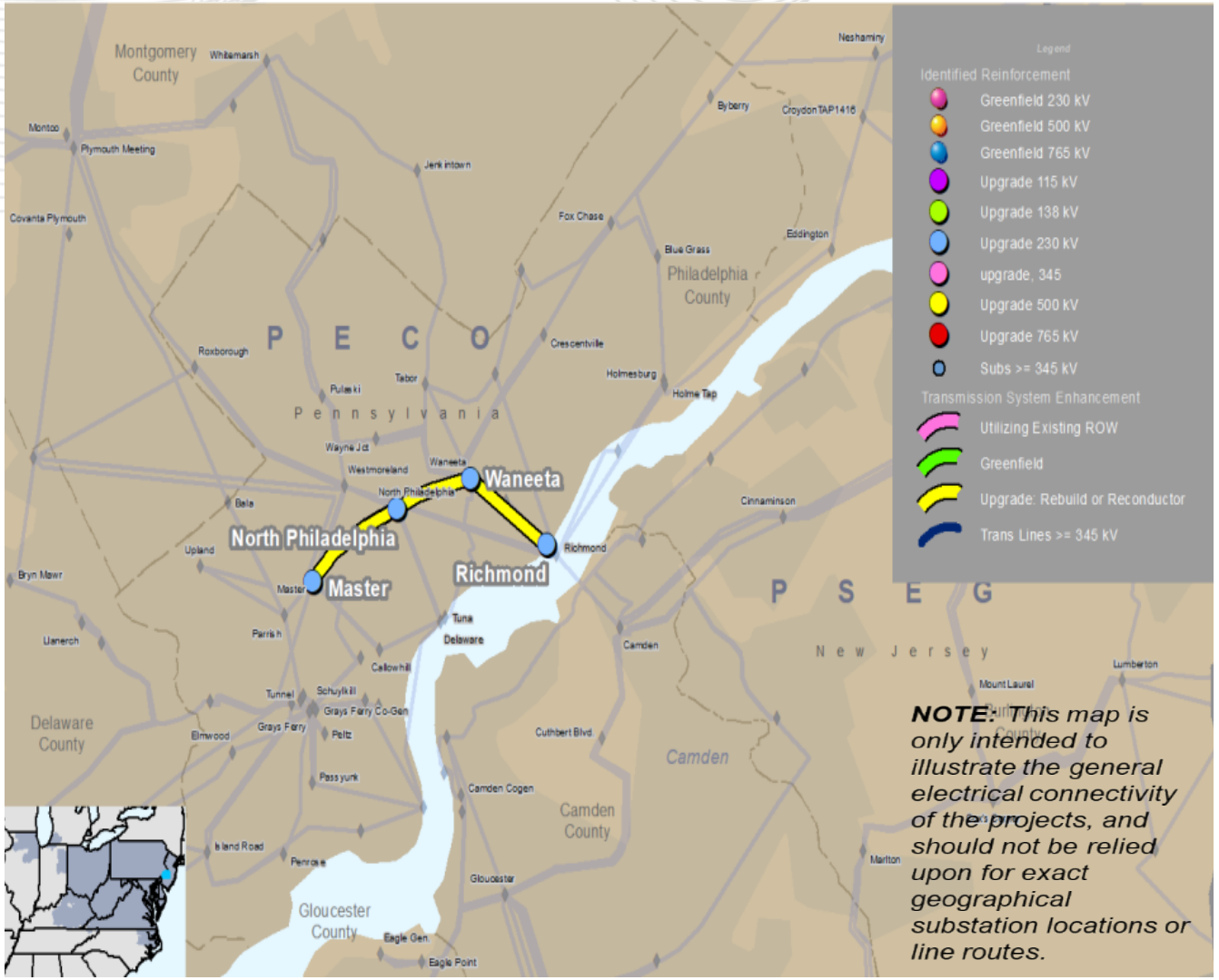

PECO Transmission Zone: Baseline

Process Stage: First Review

Proposed Solution: #2024-W1-12

- Reconductor entire 2.5 miles of North Philadelphia to Master 230 kV line
- Richmond to Waneeta Line: Rebuild entire 0.95 miles of existing UGT, and rebuild entire 2.23 miles of existing OHT
- Reconductor 2.12 miles of North Philadelphia to Waneeta 230 kV line

	Existing Rating SN/SE/WN/WE (MVA)	Proposed Rating SN/SE/WN/WE (MVA)
North Philadelphia to Master	456/572/513/632	647/756/781/873
North Philadelphia to Waneeta	505/621/556/674	731/885/822/978
Richmond to Waneeta Line	760/1180/803/1201	1245/1543/1535/1754

Estimated Cost: $43.22 M

Projected In-Service: 6/1/2029
Required In-Service: 6/1/2029

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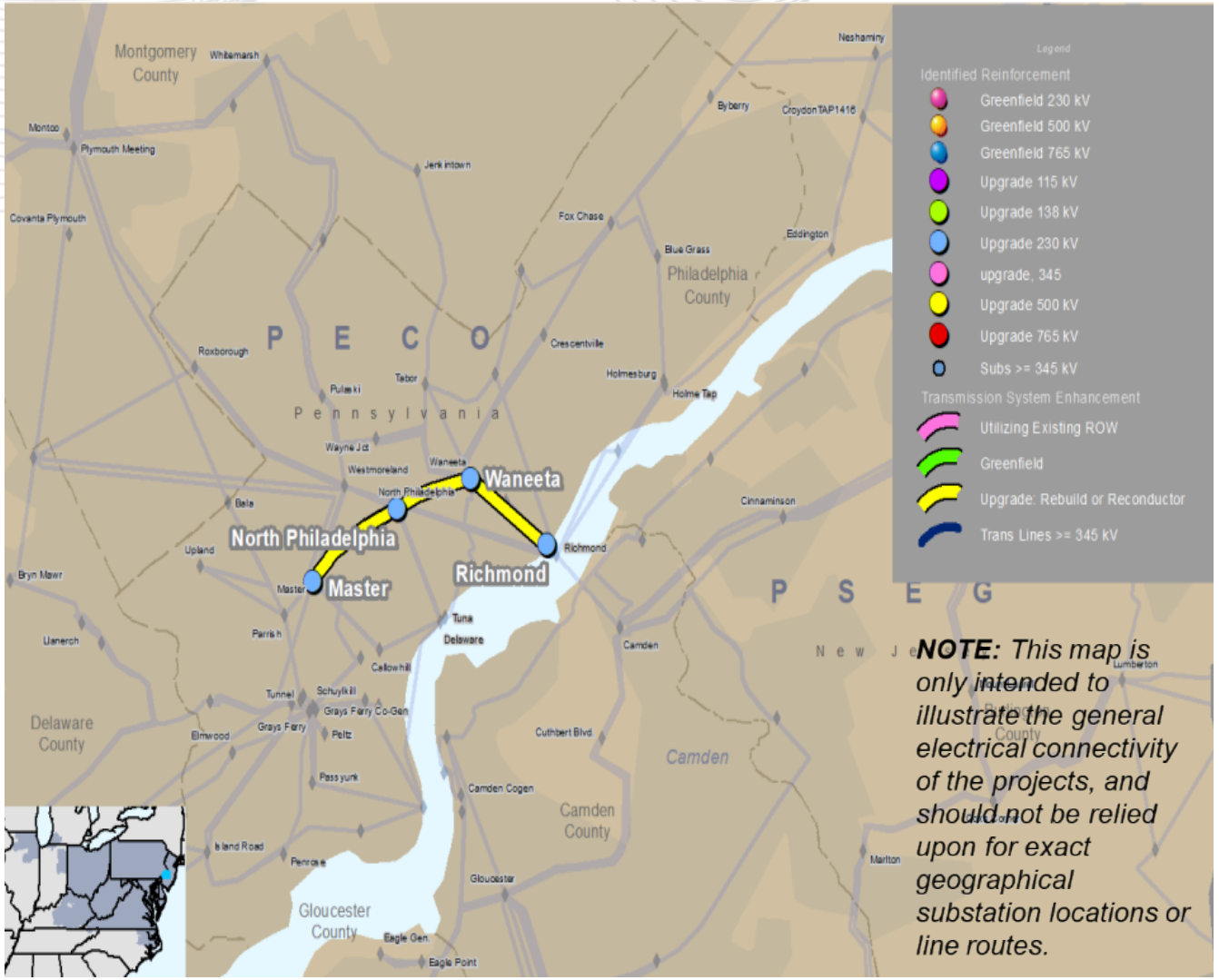


PECO Transmission Zone: Baseline

Process Stage: First Review

Alternatives: #2024-W1-955

- Build new 230kV circuit from Eagle Point - Penrose line and several substations upgrade. This new transmission line consists of approximately 1.5 miles of 230kV overhead transmission and approximately 3.6 miles underground 230kV XLPE transmission

	Proposed Rating SN/SE/WN/WE (MVA)
Eagle Point - Penrose line	798/1297/798/1297

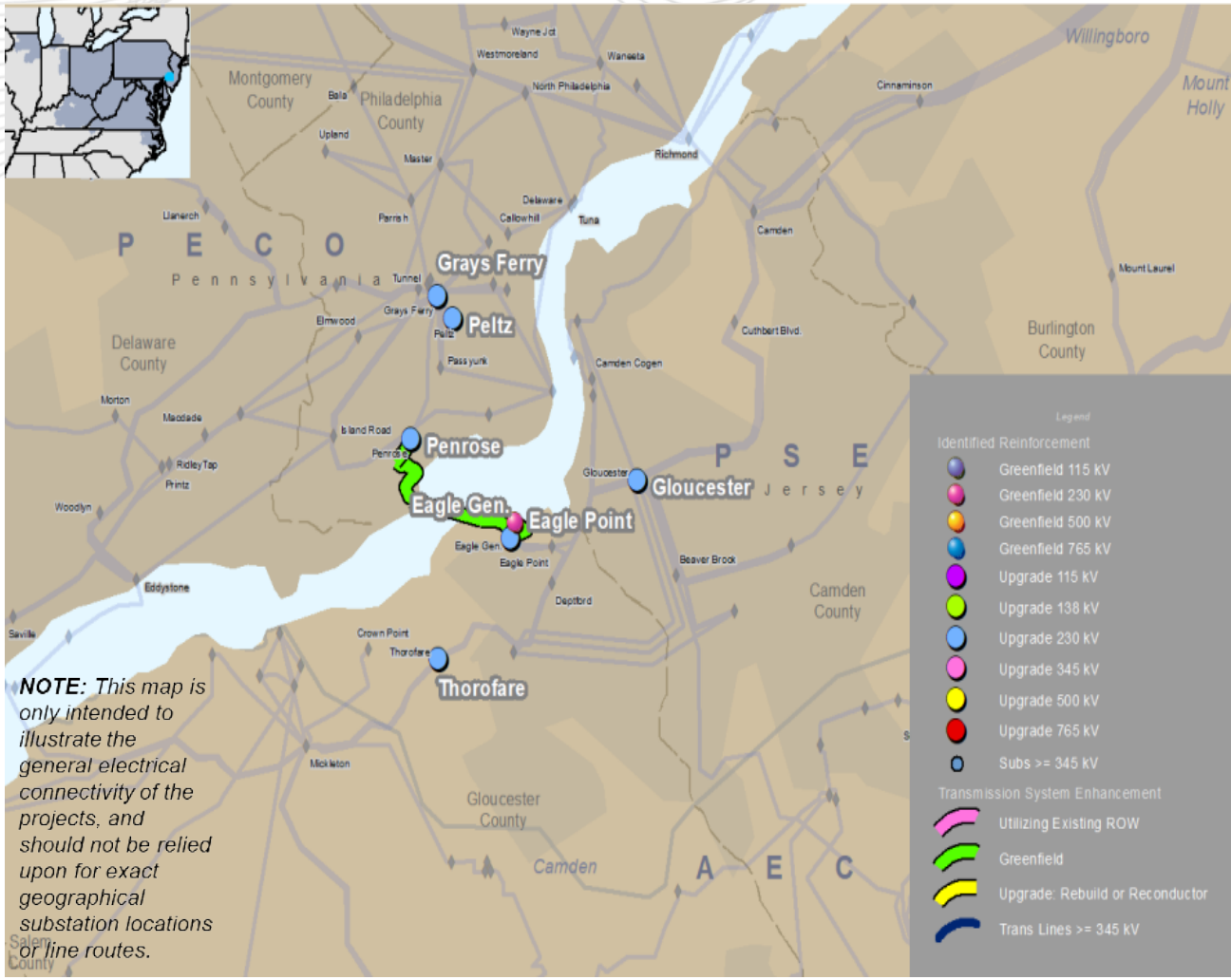
Estimated Cost: $390.99 M
Required In-Service: 6/1/2029

Projected In-Service: 6/1/2029

Evaluation Results

- Both proposal 12 and 955 address the intended flowgates
- Proposal 12 is upgrade to an existing facility
- Proposal 955 is greenfield
- Proposal 955 while providing additional source in the area, the project significantly more cost than proposal 12

Preferred Solution: Proposal ID 12 (Rebuild/Reconductor PECO facilities)



PPL Transmission Zone: Baseline Pocono area Evaluation Progress

Process Stage: First Review

Criteria: Winter N-1-1 Voltage

Assumption Reference: 2029 RTEP assumption

Model Used for Analysis: 2029 RTEP Winter

Proposal Window Exclusion: No

Problem Statement: Voltage magnitude and drop violation on the PPL 230 kV system in the Pocono vicinity for the loss of multiple contingencies

Violations were posted as part of the 2024 Window 1:

2024W1-N11-WVM1	2024W1-N11-WVM10	2024W1-N11-WVM19	2024W1-N11-WVD9
2024W1-N11-WVM2	2024W1-N11-WVM11	2024W1-N11-WVD1	2024W1-N11-WVD10
2024W1-N11-WVM3	2024W1-N11-WVM12	2024W1-N11-WVD2	2024W1-N11-WVD11
2024W1-N11-WVM4	2024W1-N11-WVM13	2024W1-N11-WVD3	2024W1-N11-WVD12
2024W1-N11-WVM5	2024W1-N11-WVM14	2024W1-N11-WVD4	2024W1-N11-WVD13
2024W1-N11-WVM6	2024W1-N11-WVM15	2024W1-N11-WVD5	2024W1-N11-WVD14
2024W1-N11-WVM7	2024W1-N11-WVM16	2024W1-N11-WVD6	2024W1-N11-WVD15
2024W1-N11-WVM8	2024W1-N11-WVM17	2024W1-N11-WVD7	2024W1-N11-WVD16
2024W1-N11-WVM9	2024W1-N11-WVM18	2024W1-N11-WVD8	2024W1-N11-WVD17

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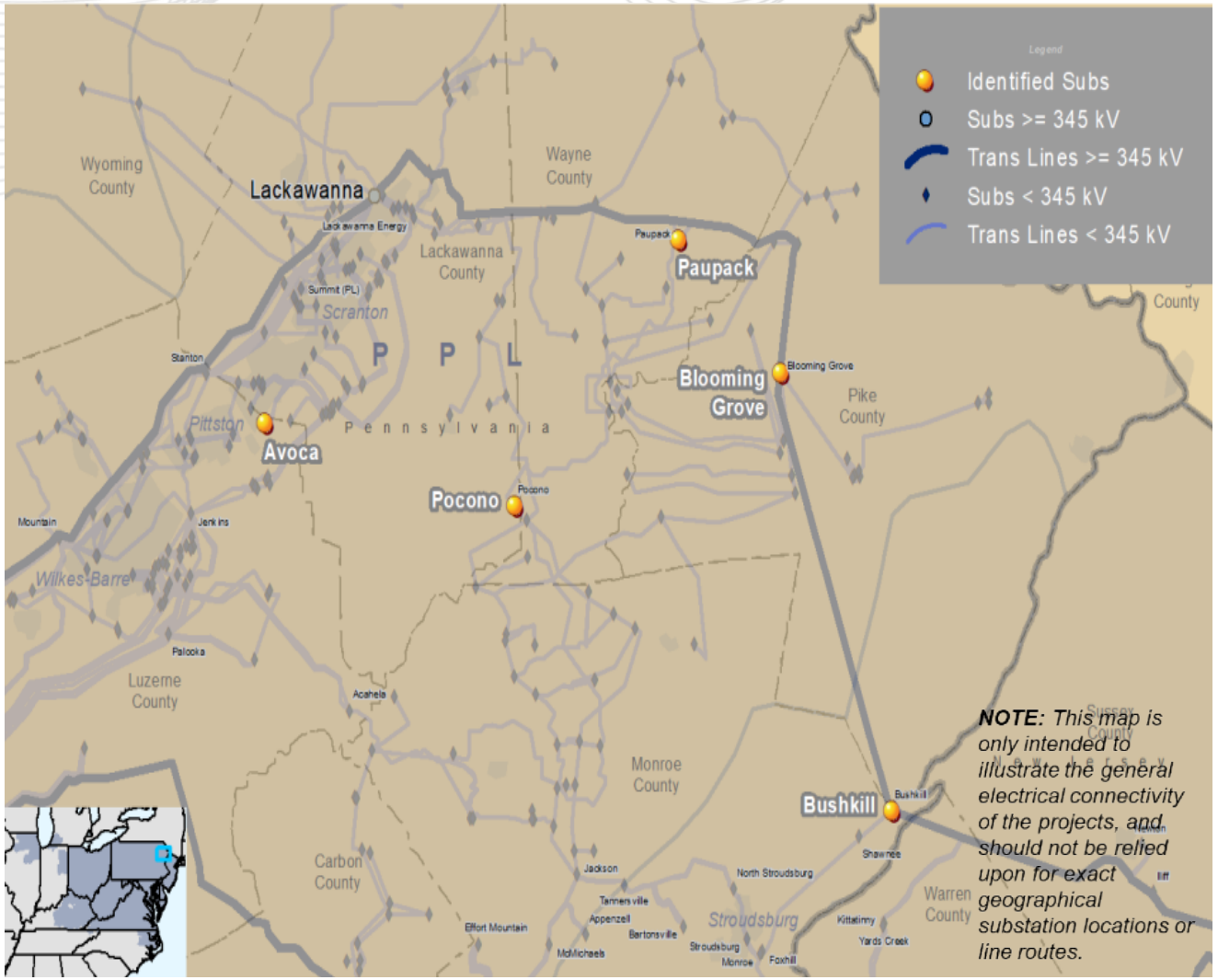
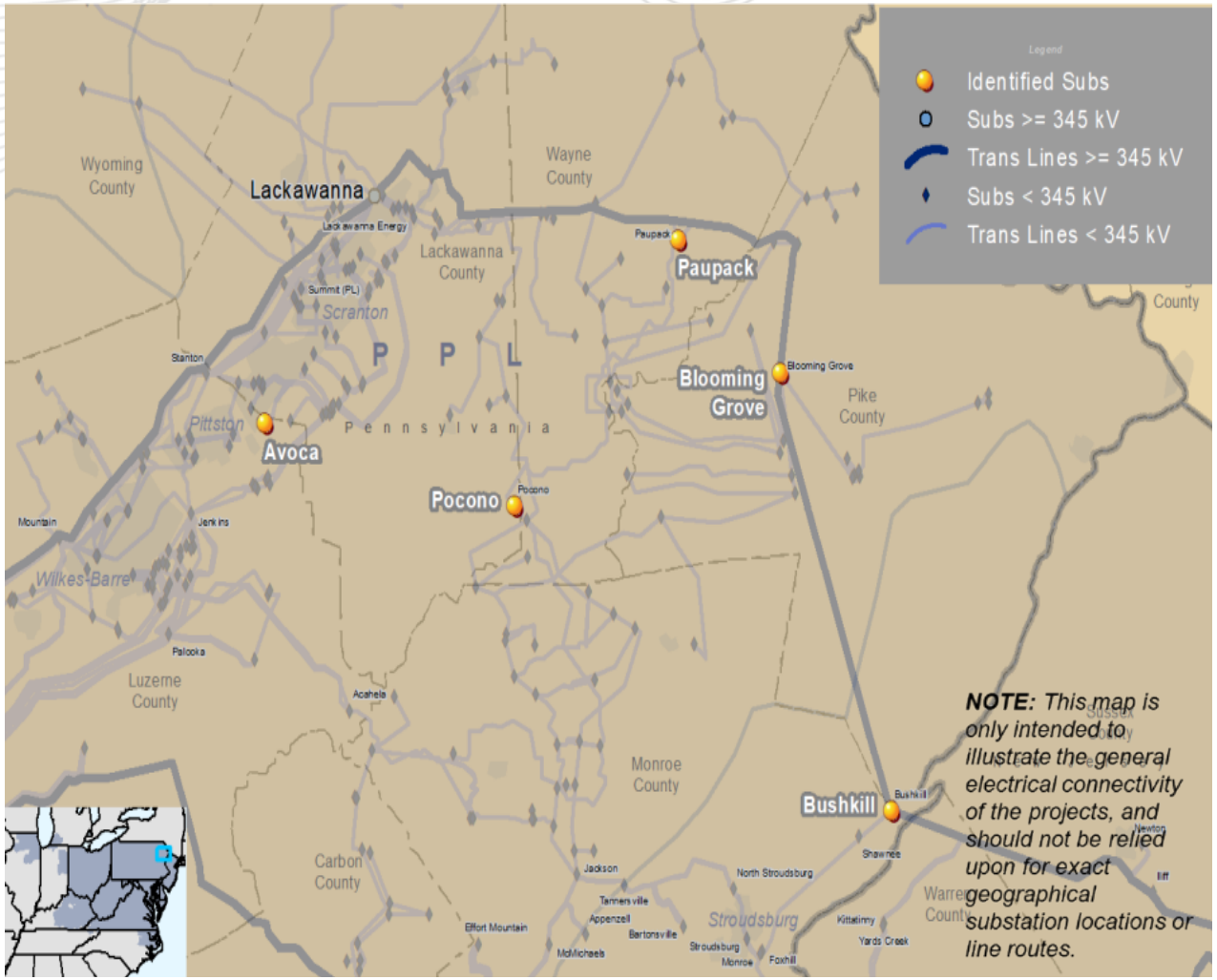


PPL Transmission Zone: Baseline Pocono area Evaluation Progress

Process Stage: First Review

Proposed Solution:

Propsal ID	Proposing Entity	Zone	Upgrade Description	Cost (M)	Projected ISD
850	PPL	PPL	Install one 80 MVAr 230 kV capacitor bank at Pocono 230kV Substation	$4.93	10/30/2027
526	PPL	PPL	Biuld new 230 kV circuit from Jenkins - Pocono	$60.03	10/30/2029
312	PPL	PPL	• Acahela 500/230/69 kV Substation Expansion • Lackawanna - Siegfried 500 kV line taps in and out of Acahela	$116.33	12/31/2032



Evaluation Result Solution:

- All three proposals address the violations identified in the Pocono vicinity
- Proposal 526 provides flexibility, however the project requires a new line
- Proposal 312 is greenfield and rely on another greenfield proposal
- The violation in this cluster are local and proposal 850 is sufficient to address violations based on the current load forecast in the area

Preferred Solution: Proposal ID 850 (Install capacitor at Pocono 230 kV station)

PPL Transmission Zone: Baseline

Process Stage: First Review

Criteria: Summer and Winter Generation Deliverability

Assumption Reference: 2029 RTEP assumption

Model Used for Analysis: 2029 RTEP Summer and Winter

Proposal Window Exclusion: No

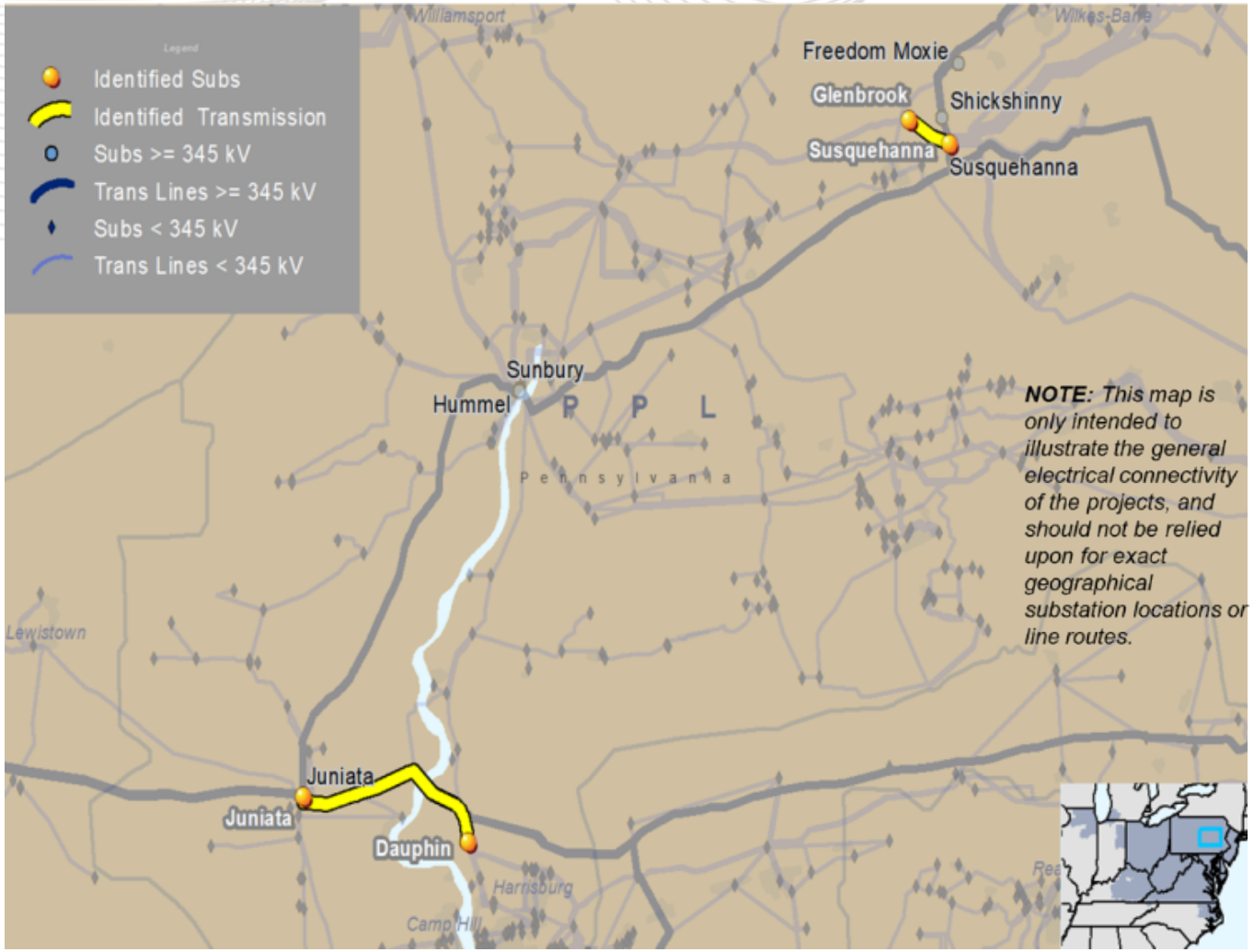
Problem Statement:

- The Juniata 500/230 kV transformer is overloaded for multiple line fault stuck breaker contingencies.
- Susquehanna – Glenbrook 230 kV is overloaded for tower line contingency.

Violations were posted as part of the 2024 Window 1: FG#

2024W1-GD-S390	2024W1-GD-W106	2024W1-GD-S896
2024W1-IPD-S104	2024W1-IPD-W2	

Required In-Service: 6/1/2029



PPL Transmission Zone: Baseline

Process Stage: First Review

Proposed Solution:

Proposal ID 2024-W1-935

- Juniata 500 kV yard expansion/reconfiguration to include one new bay and eliminate the line fault stuck breaker

Estimated Cost: $22.2 M

Projected In-Service: 3/30/2029

Proposal ID 2024-W1-549

- Susquehanna T10 230 kV Station Reconfiguration. Break the existing Susquehanna - Glen Brook 230 kV line and loop it 0.2 miles in and out of the Susquehanna T10 230 kV Station.

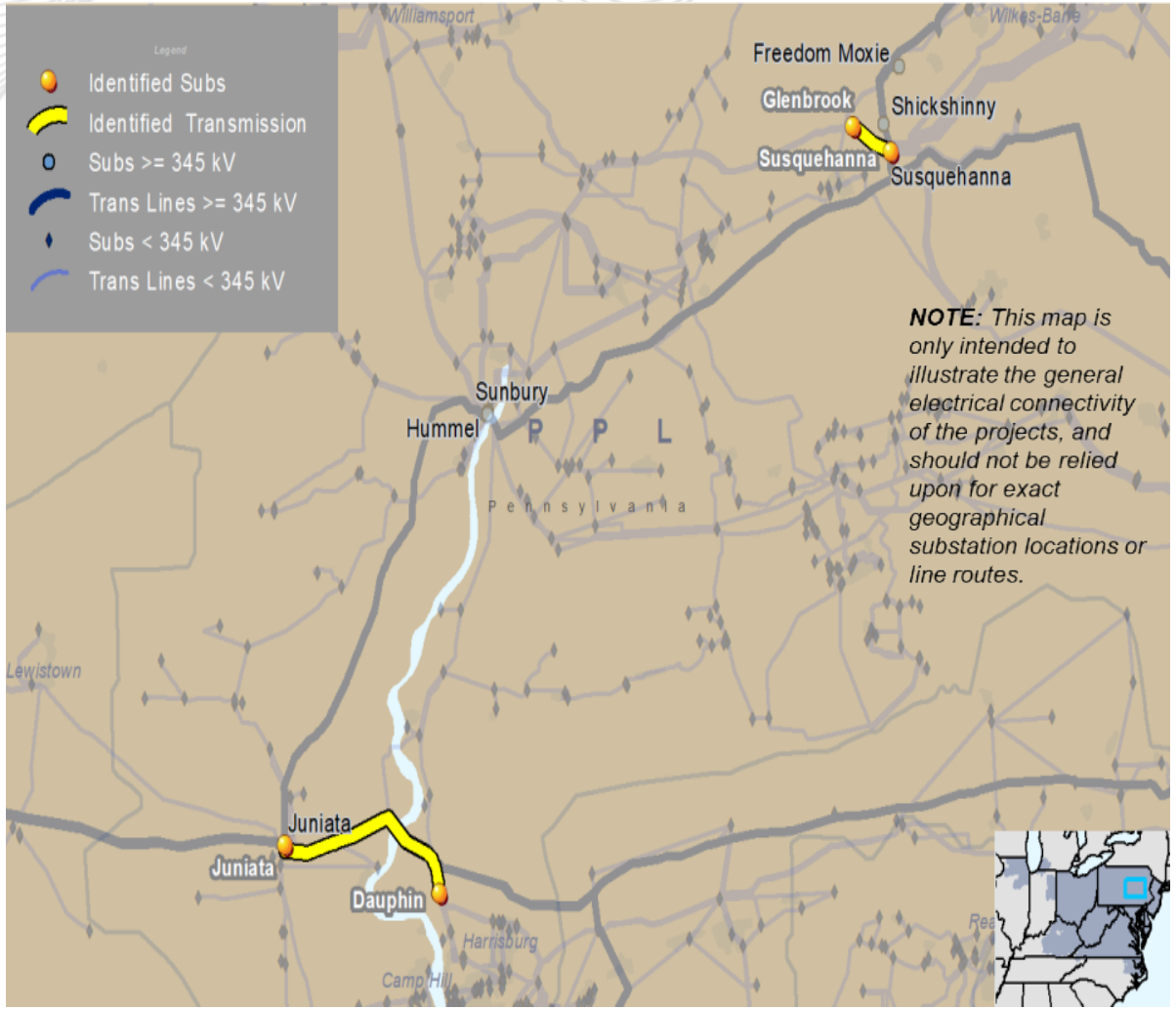
Estimated Cost: $9.5 M

Projected In-Service: 12/31/2028

Alternatives:

Propsal ID	Proposing Entity	Upgrade Description	Cost ($M)
72	PPL	Cumberland - Williams Grove 230 kV line reconductor Juniata - Cumberland 230 kV DCT line	$78.59
330	PPL	Build new Juniata - Hunterstown 500 kV line	$329.03
386	PPL	Buildd new Juniata - Three Mile Island 500 kV	$334.61

Preferred Solution: Proposal ID 935 and 549



Remaining MAAC Materials:

The following facilities are overloaded and Violations were posted as part of the 2024 Window 1. The violations are expected to be mitigated with the regional solutions

- The Hunterstown 500/230 kV transformer
- The Juniata – Dauphin 230 kV

First Energy/MAIT proposed project

Propsal ID	Proposing Entity	Upgrade Description	Cost ($M)
502	MAIT	Hunterstown #2 500/230 kV Transformer	$43.09

PPL N-1-1 violation related to Regional

Several PPL facilities overloaded for N-1-1 as a result of the regional issues

PPL/TRNSLK proposed several proposals, see table below. to address the N-1-1 violations, however, the regional solutions are expected to be mitigate the violations

PPL/TRANSLK Proposed Projects

Propsal ID	Proposing Entity	Upgrade Description	Cost ($M)
994	PPL	Juniata - Dauphin 230 kV line reconductor (PPL side)	$2.26
926	PPL	Addition of a Wescosville 500/138 T2 transformer (2nd 500/138 kV transformer)	$36.83
479	PPL	Lackawanna - Paupack 230 kV line reconductor	$47.70
876	PPL	Siegfried 500/230 kV Substation ExpansionSusquehanna - Wescosville 500 kV line taps into new Siegfried 500 kV yard	$106.93
922	PPL	Siegfried 500 kV Switchyard: Susquehanna - Wescosville 500 kV line taps into new Siegfried 500 kV yard Siegfried - Drakestown 500 kV line (PA segment) Lackawanna - Siegfried 500 kV line	$613.87
546	TRNSLK	Hopatcong - Branchburg 500 kV line taps into new Drakestown 500 kV yardPennsylvania Border - Drakestown 500 kV line (greenfield alternative)Drakestown 500 kV Switchyard	$2,460.47
900	TRNSLK	Pennsylvania border - Drakestown 500 kV line (brownfield alternative)Hopatcong - Branchburg 500 kV line taps into new Drakestown 500 kV yard Drakestown 500 kV Switchyard	$277.00

2024 RTEP
short list
Baseline Reliability Projects

AEP Transmission Zone: Baseline Clusters AEP- 3, 4, 5 (Shortlist)

Process Stage: Short List

Criteria: Summer Gen Deliv, N-1-1

Assumption Reference: 2024 RTEP assumptions

Model Used for Analysis: 2029 RTEP Summer base case

Proposal Window Exclusion: None

Problem Statement:

Cluster 3: Flowgates 2024W1-N11-ST33, 2024W1-N11-ST39

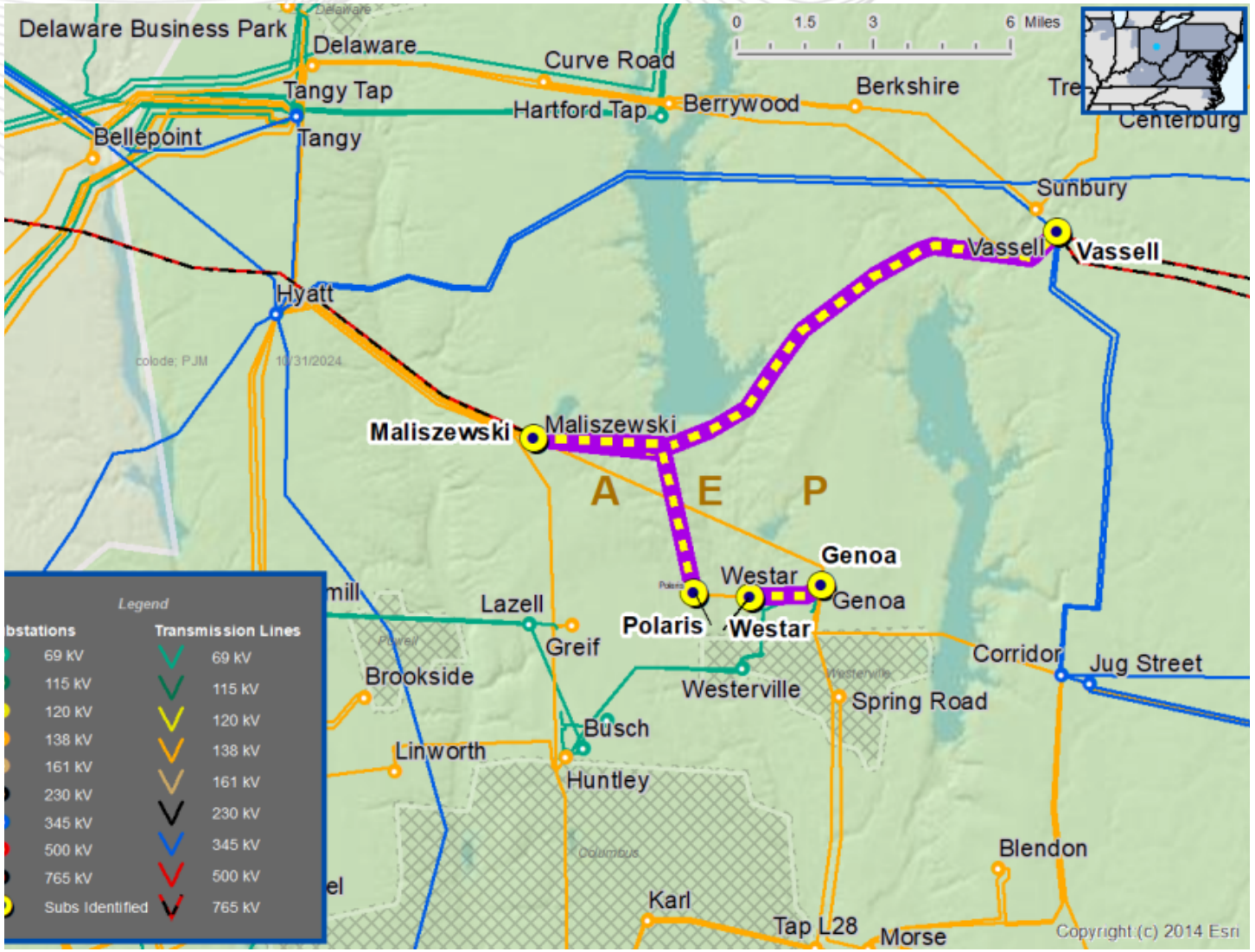
In 2029 RTEP summer case, the Genoa – Westar 138kV line is overloaded for multiple N-1-1 contingency pairs.

Cluster 4: Flowgates 2024W1-N11-ST13, 2024W1-N11-ST15, 2024W1-N11-ST20, 2024W1-N11-ST21

In 2029 RTEP summer case, the Maliszewski – Polaris 138kV line is overloaded for multiple N-1-1 contingency pairs.

Cluster 5: Flowgates 2024W1-GD-S395, 2024W1-GD-S437, 2024W1-GD-S438, 2024W1-GD-S439, 2024W1-32GD-S28, 2024W1-32GD-S29, 2024W1-32GD-S30, 2024W1-32GD-S31

In the 2029 and 2032 RTEP summer cases, the Maliszewski – Vassell 765V line is overloaded in Gen Deliv test.



AEP Transmission Zone: Baseline Cluster AEP-3,4,5

- As part of the 2024 RTEP Window 1, the projects listed in the table below were proposed to address Cluster AEP-3, 4, 5

Proposal ID #	Project Type	Entity	Cluster	Project Title	Project Description	kV Level	Estimated Cost ($M)
408	UPGRADE	AEPSCT	AEP - 3/4/5	Maliszewski 765/345 kV Upgrades	Establish a 345 kV yard at the existing Maliszewski station and upgrade the 765 kV portion of the station to accommodate and install a 765/345 kV transformer. Cut in the existing Hyatt - West Millersport 345 kV.	765/345	145.494
350	GREENFIELD	TRNSRC	AEP - 3/4	Jester - Hayden	- Jester greenfield 765/345kV station - Approx. 12 miles of greenfield 345kV double circuit transmission line between Jester greenfield 765/345kV Station and Hayden 345kV stations.	765/345	229.411
863	UPGRADE	AEPSCT	AEP - 3/4	Maliszewski Series Reactor Upgrades	Replace the existing 138 kV series reactor at Maliszewski station with a 4% reactor with a higher continuous current rating. In addition, the proposal will upgrade limiting station equipment on the reactor bypass.	138	2.328
744	UPGRADE	AEPSCT	AEP - 4	Maliszewski-Polaris Rebuild	Rebuild the 2.8 mile 138 kV line between Maliszewski and Polaris stations.	138	8.884
338	UPGRADE	AEPSCT	AEP - 3	Genoa-Westar Rebuild	Rebuild the approximately 2 mile long 138 kV line between Westar and Genoa stations.	138	8.789
464	UPGRADE	AEPSCT	AEP - 3	Genoa-Westar Sag Remediation	Perform a sag study and mitigate clearance issues on Westar - Genoa 138 kV line to allow line to operate to conductor's designed rating	138	2.815

- Additionally, in the non-competitive solution, AEP submitted a solution to upgrade 765 kV circuit breaker 'B' to a 5000A 50 kA breaker at Maliszewski station . In addition, the project will replace disconnect switches on breakers 'B' and 'D", upgrade the existing wavetrap towards Marysville, and upgrades relays on the 765 kV lines towards Marysville and Vassell. **Estimated cost: $6.9M**

AEP Transmission Zone: Baseline Cluster AEP-3,4,5 (Shortlist)

Short List:

	Proposal	Estimate Cost ($M)
Option 1	408	145.494
Option 2	863 + Non comp	9.228

PJM is currently evaluating both options taking into consideration local load increase in the upcoming 2025 load forecast and will make the initial selection in Dec. TEAC.

ATSI Transmission Zone: Baseline Cluster 2 (ATSI)

Process Stage: Short List

Criteria: Summer & LL Gen Deliv and N-1

Assumption Reference: 2024 RTEP assumptions

Model Used for Analysis: 2029 RTEP Summer and Light load base case

Proposal Window Exclusion: None

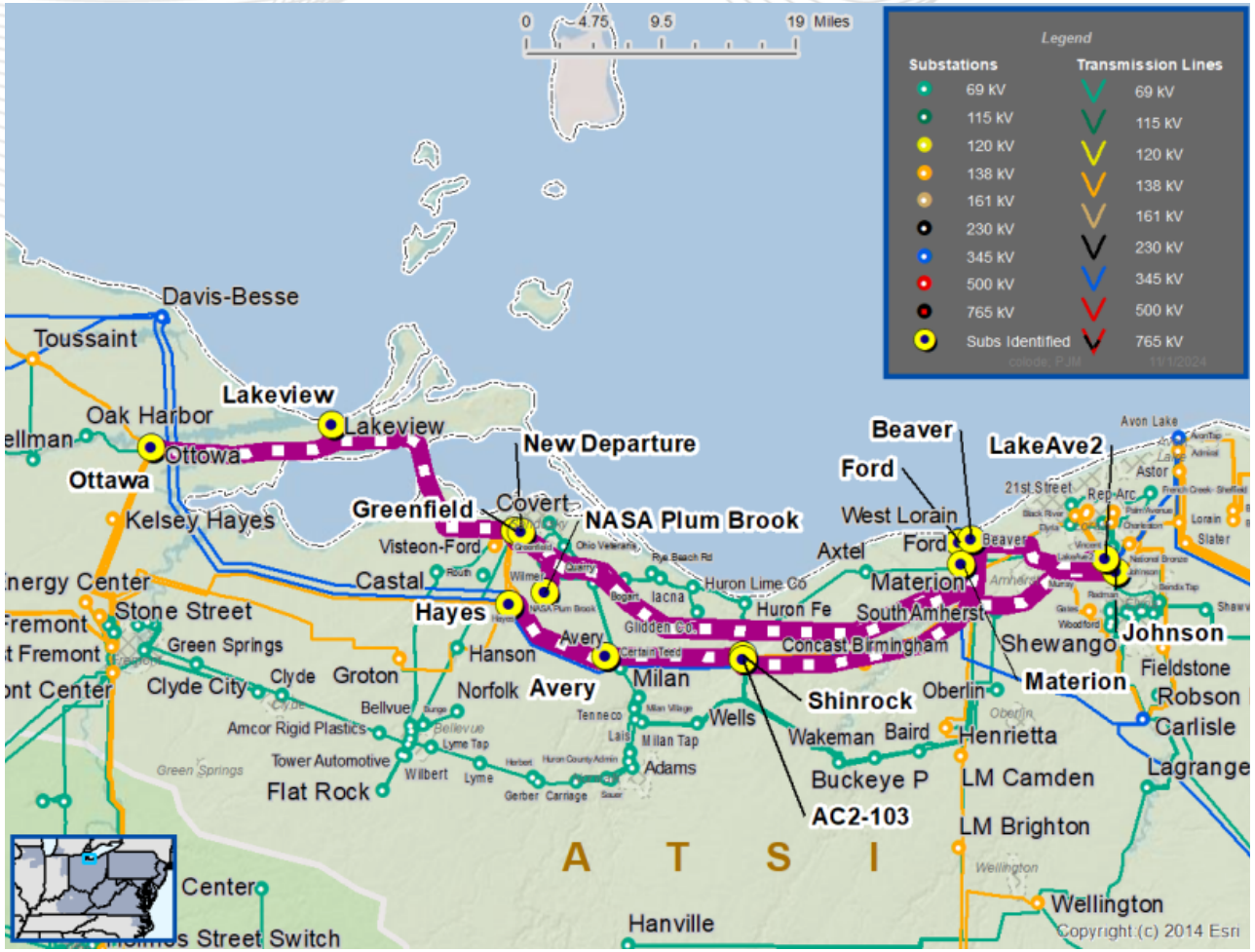
Problem Statement:

2024W1-GD-S865, 2024W1-GD-S866, 2024W1-GD-S885, 2024W1-GD-S353, 2024W1-GD-S855, 2024W1-GD-S858, 2024W1-GD-S861, 2024W1-GD-S864, 2024W1-GD-S848, 2024W1-GD-S849, 2024W1-GD-S868, 2024W1-GD-S872, 2024W1-GD-S850, 2024W1-GD-S853, 2024W1-GD-S856, 2024W1-GD-S851, 2024W1-GD-S85, 2024W1-GD-S897, 2024W1-GD-S400, 2024W1-N1-ST100, 2024W1-N1-ST101, 2024W1-N1-ST103, 2024W1-N1-ST104, 2024W1-N1-ST33, 2024W1-N1-ST34, 2024W1-N1-ST37, 2024W1-N1-ST38, 2024W1-N1-ST39, 2024W1-N1-ST48,2024W1-N1-ST49, 2024W1-N1-ST55, 2024W1-N1-ST56, 2024W1-N1-ST73, 2024W1-N1-ST76

In 2029 RTEP summer case, multiple 138 kV lines are overloaded for N-2 contingency pairs. In addition, two 345 kV lines are overloaded for N-2 contingency pairs.

2024W1-GD-LL93, 2024W1-GD-LL94, 2024W1-GD-LL96, 2024W1-GD-LL97, 2024W1-GD-LL98, 2024W1-GD-LL99, 2024W1-GD-LL103, 2024W1-GD-LL104, 2024W1-GD-LL105, 2024W1-GD-LL106, 2024W1-GD-LL107, 2024W1-GD-LL108

In 2029 RTEP Light Load case, multiple 138 kV lines are overloaded for N-2 contingency pairs.



ATSI Transmission Zone: Baseline Cluster 2 (ATSI)

- As part of the 2024 RTEP Window 1, the projects listed in the table below were proposed to address Cluster 2 in ATSI zone

Proposal ID #	Project Type	Entity	Cluster	Project Title	Project Description	kV Level	Estimated Cost ($M)
605	UPGRADE	ATSI	ATSI - 2	Rebuild/Reconductor existing 138 kV lines/Terminal upgrades at 345 kV substations	Rebuild Beaver to Johnson, Greenfield to Lakeview, Avery to Shinkrock, Avery to Hayes and Greenfield to Beaver Corridor. Reconductor 1 span from Ottawa substation. Upgrade terminal equipment at Beaver, Davis Besse & Bayshore 345 kV substation. Swap 345 kV line terminals at Beaver 345 kV substation	138/345	265.1
843	GREENFIELD	ATSI	ATSI – 2	New 345 kV line between Lemoyne to Lake Ave	Build a new approximately 88 miles Lemoyne - Lake Avenue 345 kV line by leveraging existing 138 kV corridors. Associated yard work at Lemoyne and Lake Ave 345 kV substations	345	455.0
694	GREENFIELD	TRNSRC	ATSI – 2	New double circuit 345 kV line between Fostoria Central and Lake Ave	Build a new 79 mile 345kV double circuit line from Fostoria Central to Lake Avenue 345kV station. - Lake Ave 345kV station. Associated Substation work at Fostoria Central and Lake Ave 345 kV substations	345	328.3
533	GREENFIELD	NEXTERA	ATSI – 2	New 345 kV line between Lemoyne - Lake Ave	Construct a single circuit 345kV line from ATSI's Lemoyne substation to ATSI's Lake Ave substation. Associated yard work at Lemoyne and Lake Ave 345 kV substations	345	202.0
294	GREENFIELD	NEXTERA	ATSI – 2	New 345 kV line between Bayshore to Davis Besse to Lake Ave	Install second circuit on open tower position along the existing Bayshore - Davis-Besse 345 kV line. Utilize spare tower position on the Davis-Besse to Lemoyne line to string a new 345kV circuit from Davis-Besse to Lake Ave. Associated yardwork at existing Bay Shore, Davis Besse and Lake Ave 345 kV substations	345	257.3
357	GREENFIELD	NEXTERA	ATSI - 2	New 345 kV line between Bayshore to Davis Besse to Lake Ave New 345 kV line between Lemoyne to Lake Ave	Install second circuit on open tower position along the existing Bayshore - Davis-Besse line. Utilize spare tower position on the Davis-Besse to Lemoyne line to string a new 345kV circuit from Davis-Besse to Lake Ave. Install new circuit on empty tower position on portion of Lemoyne - Davis Besse corridor. Associated yardwork at existing Bay Shore, Davis Besse, Lemoyne and Lake Ave 345 kV substations	345	344.1

ATSI Transmission Zone: Baseline Cluster 2 (ATSI)

Short List:

	Project	Estimate Cost ($M)	Pros
Option 1	605	265.1	Addresses the intended violations Rebuilds/reconductor existing 138 kV lines provides sufficient margin
Option 2	843	455.0	Addresses the intended violations Leveraging existing 138 kV ROW (Greenfield)
Option 3	533	202.0	Addresses the intended violations Low cost (Greenfield)

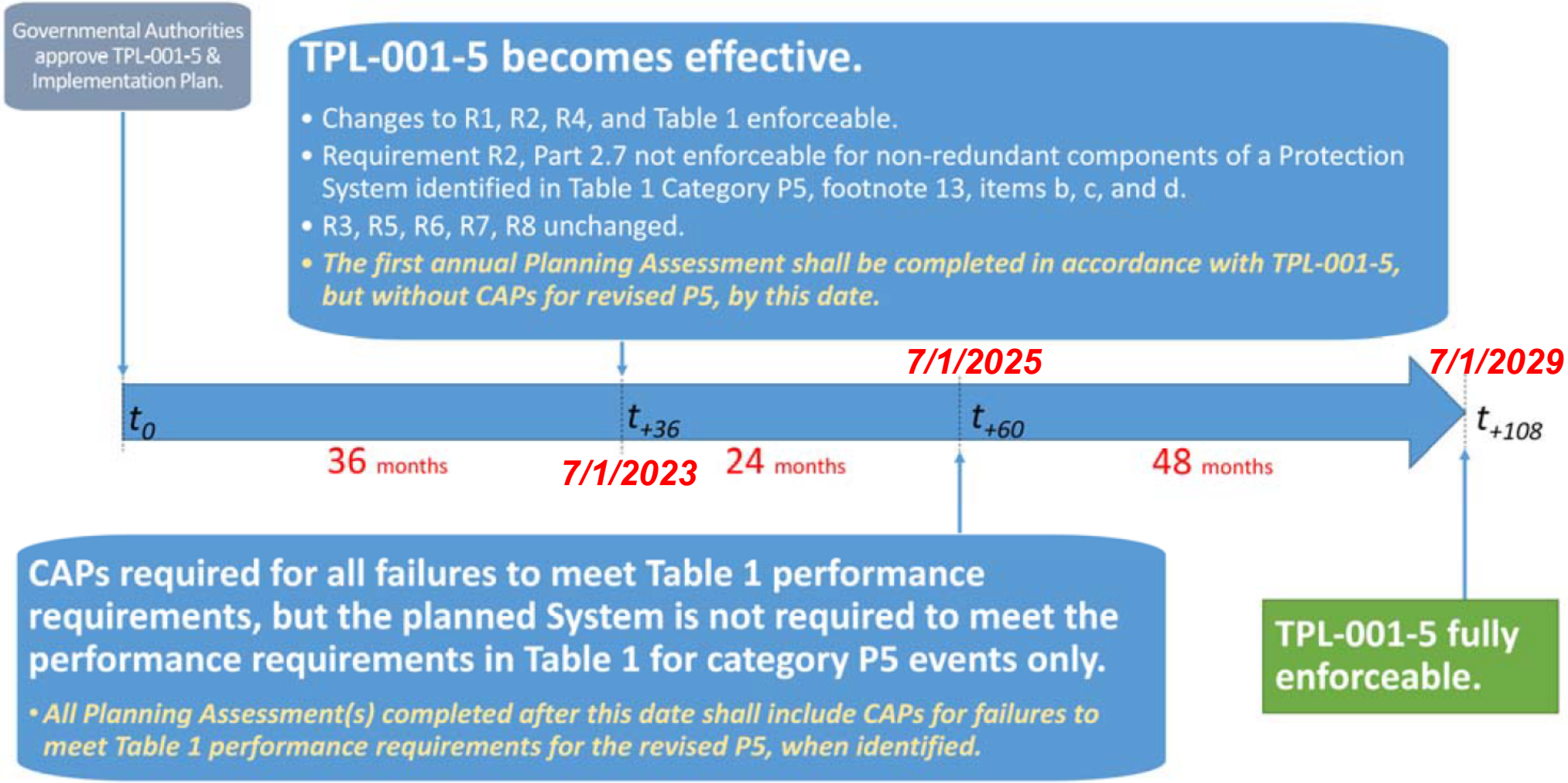
PJM is currently evaluating all three options based and conducting additional analysis and will make the initial selection in Dec. TEAC.

TPL-001-5 P5 Contingency Violations Updates

TPL-001-5.1 P5 Contingencies

- As previously presented during the August TEAC, PJM has determined that the P5 CAPs will be exempted as reliability violations on transmission substation equipment (OA, Schedule 6, section 1.5.8(p)). The construction responsibility for and ownership of each project shall be designated to the respective incumbent Transmission Owner. Preliminary findings were presented at the September TEAC.
- The solution to the violations resulting from lack of redundancy, lack of alarming, or DC supply issues including monitoring and alarming, is to incorporate local redundancy or implement needed alarms/protection/DC supply enhancements within existing substation equipment.
- PJM is presenting here a summary of the P5 violations from the 2024 Series RTEP (2029 SUM/WIN/LL cases).
    - PJM does not intend to post detailed information regarding the violations due to CEII/CIP-014 considerations.
- PJM is currently working with Transmission Owners to finalize the CAPs by July of 2025.
    - The NERC Implementation Plan involving the development of CAPs for Category P5 planning events is provided on the following slide.

TPL-001-5.1 Implementation Plan Timeline



TPL-001.5 P5 Violations

PJM TO's	Summer/Winter/LL Valid P5 Contingency Count	PJM TO's	Summer/Winter/LL Valid P5 Contingency Count
AEC	8	JCPL	7
AEP	12	METED	10
APS	25	PECO	18
ATSI	18	PENELEC	6
BGE	15	PEPCO	1
COMED	31	PPL	0
DPL	10	PSEG	3
DVP	41	Remaining PJM TO's	0

This table summarizes the number of unique P5 contingencies (by TO) which result in valid violations

2024 RTEP W1 – Next Steps

- PJM will provide a more detailed update on the evaluation results at the Nov 19th TEAC
- PJM will provide and publish the Reliability and Constructability/Cost Assessment Reports in December 2024.
- Special TEAC on Nov 19th will focus on 2024 RTEP Window Evaluation and the Final Shortlist (for all areas)
- December 2024 TEAC will cover all 1st Reads and 2nd Reads for projects selected and presented at the current meeting.

Appendix 1
2024 RTEP Window 1 Proposals

2024 RTEP Window 1 Proposals

Proposal ID #	Entity	Cluster	Project Title	Total Component Cost ($M)
12	PE	PECO	PECO Competitive Window Upgrades	$43.2
17	PPLTO	PPL - 2	Bushkill - Kittatinny 230 kV line reconductor	$35.5
24	VEPCO	DOM - 1	230kV and 115kV Solutions for Portfolios	$861.7
72	PPLTO	PPL - 2	Juniata - Cumberland - Williams Grove 230 kV upgrade project	$78.5
78	CNTLTM	0 & DOM - 1	F5 Solution	$1,897.0
81	TRNSRC	0	AEP incumbent upgrades for Portfolio #1, 2 & 3	$137.0
114	TRNSRC	0 & DOM - 1	Joint	See Proposal
408	AEPSCT	AEP - 3/4/5	Maliszewski 765/345 kV Upgrades	$145.5
124	CNTLTM	0 & DOM - 1	F4 Solution	$1,810.8
132	PEPCO	No Cluster	Dickerson H 230kV Caps	$12.4
135	COMED	COMED - 1	Reconductor 345 kV lines 1202 & 1227 Dresden to Mulberry	$16.3
146	NEETMH	0 & DOM - 1	Axton - Joshua Falls 765kV + Joshua Falls - Mt Ida 500kV	$2,263.7
459	AEPSCT	No Cluster	Mountaineer and Belmont Station Upgrades	$10.5
200	CNTLTM	0 & DOM - 1	Common Components	$439.7
232	POTOED	No Cluster	FirstEnergy Upgrades to Support Portfolio Proposals	$97.5
261	VEPCO	DOM - 1	Overdutied Breaker Replacement	$70.7
262	TRNSRC	0 & DOM - 1	Joint	See Proposal
738	AEPSCT	AEP - 1	Boxwood-Bremo 138 kV Rebuild	$140.4
279	TRNSRC	0 & DOM - 1	Joint	See Proposal

2024 RTEP Window 1 Proposals

Proposal ID #	Entity	Cluster	Project Title	Total Component Cost ($M)
286	TRNSRC	0	Joshua Falls - Durandal	$350.3
294	NEETMH	ATSI	Bay Shore - Davis-Besse - Lake Ave	$257.3
295	PEPCO	BGE	Marley Neck 115 kV Substation	$107.6
300	TRNSRC	0	Yeat - Vontay	$381.7
312	PPLTO	PPL - 2	Acahela 500/230 kV Substation expansion project	$116.3
317	CNTLTM	0 & DOM - 1	F7 Solution	$1,896.7
330	PPLTO	PPL - 2	Juniata - Hunterstown 500 kV line	$356.7
949	AEPSCT	AEP - 1	Boxwood-Bremo 138 kV Sag Study and Partial Rebuild	$10.5
350	TRNSRC	AEP - 3/4	Jester - Hayden	$229.4
357	NEETMH	ATSI	Bay Shore - Davis-Besse - Lake Ave + Lemoyne - Lake Ave 345kV	$344.1
386	PPLTO	PPL - 2	Juniata - TMIS 500 kV DCT line	$353.7
390	VEPCO	DOM - 1	230kV Safety Solutions	$1,008.5
117	AEPSCT	No Cluster	Tidd-Mahans Lane 138 kV Rebuild	$15.1
447	COMED	COMED - 1	Cut 345 kV L8014 Pontiac to Dresden into Mulberry	$23.5
574	AEPSCT	No Cluster	Tiltonsville-West Bellaire 138 kV Rebuild	$28.5
863	AEPSCT	AEP - 3/4	Maliszewski Series Reactor Upgrades	$2.3
470	PEPCO	BGE	BGE local Mitigation Alternative	$71.9
479	PPLTO	PPL - 2	Lackawanna - Paupack 230 kV line reconductor	$47.6
502	MATLIT	METED	Hunterstown #2 500/230 kV Transformer	$43.1
506	CNTLTM	0 & DOM - 1	F6 Solution	$1,732.1

2024 RTEP Window 1 Proposals

Proposal ID #	Entity	Cluster	Project Title	Total Component Cost ($M)
526	PPLTO	PPL - 2	Jenkins - Pocono 230 kV line	$60.0
527	VEPCO	DOM - 1	Cap Bank and STATCOM Installation	$322.0
532	COMED	COMED - 1	345kV Shunt Inductor at Mulberry	$28.2
533	NEETMH	ATSI	Lemoyne - Lake Ave 345kV	$202.1
546	TRNSLK	PPL - 1	Pennsylvania Border - Drakestown 500 kV line (greenfield route)	$246.1
549	PPLTO	PPL - 2	Susquehanna T10 Station Line Reconfiguration	$9.5
551	POTOED	0	Chanceford - Goose Creek 500 kV Line	$13.9
167	AEPSCT	No Cluster	Leesville Station Conductor Replacement	$.120
605	ATSI	ATSI	ATSI 138kV Rebuild + Substation Terminal Upgrades	$265.2
610	TRNSRC	0 & DOM - 1	Joint	See Proposal
617	TRNSRC	0	AEP incumbent upgrades for Portfolio #4	$167.3
622	CNTLTM	0 & DOM - 1	F2 Solution	$1,848.1
636	TRNSRC	0 & DOM - 1	Joint	See Proposal
665	TRNSRC	0	Joshua Falls - Vontay - Morrisville South	$1,188.5
694	TRNSRC	ATSI	Fostoria Central - Lake Ave. 345 kV DC	$328.3
708	TRAIL	0	Amos - Welton Springs - Point of Rocks 765 kV Line	$1,944.9
727	KEYATC	0	Kammer - 502 Junction 765 kV Line	$292.4
756	AEPSCT	AEP - 6	Cyprus Station Reconfiguration	$1,745.0
769	AEPSCT	AEP - 6	Rebuild Beatty-Cyprus 138 kV Line	$33.1
276	AEPSCT	AEP - 2	Bixby - Buckeye Steel 138 kV Reconfiguration	$4.1

2024 RTEP Window 1 Proposals

Proposal ID #	Entity	Cluster	Project Title	Total Component Cost ($M)
759	TRNSRC	0 & DOM - 1	Joint	See Proposal
761	VEPCO	DOM - 1	138/115 kV Safety Solutions	$104.1
768	NEETMH	0 & DOM - 1	Axton - Joshua Falls - Mt Ida	$2,191.0
856	AEPSCT	AEP - 2	Canal - Mound Street 138 kV Rebuild	$31.1
781	VEPCO	DOM - 1	500kV Solutions for Portfolios	$161.7
816	COMED	COMED - 2	Autotransformer at Itasca	$14.3
820	TRNSRC	0	Joshua Falls - Yeat	$1,016.8
839	CNTLTM	0 & DOM - 1	F8 Solution	$1,808.1
843	ATSI	ATSI	Lemoyne - Lake Ave 345 kV Line	$455.0
850	PPLTO	PPL - 2	Pocono 80 MVAr 230 kV capacitor bank	$4.9
744	AEPSCT	AEP - 4	Maliszewski-Polaris Rebuild	$8.8
860	PPLTO	PPL - 2	Face Rock T1 and T2 transformer replacement	$9.5
940	AEPSCT	No Cluster	Canal - Gay 138 kV Rebuild	$15.6
873	VEPCO	AEP - 1	Line 8 Rebuild - Bremo to Scottsville Interconnection (APCO)	$42.1
876	PPLTO	PPL - 2	Siegfried 500/230 kV Substation expansion project	$106.9
883	TRAIL	0	Amos - Welton Spring 765 kV Line	$1,274.4
885	TRAIL	0	FirstEnergy Components for Proposals 2024-W1-636, 610, 279 and 114	$52.6
888	COMED	COMED - 2	Reconductor Des Plaines to Busse	$7.2
898	CNTLTM	0 & DOM - 1	F3 Solution	$2,015.6
900	TRNSLK	PPL - 1	Pennsylvania Border - Drakestown 500 kV line (brownfield route)	$276.9

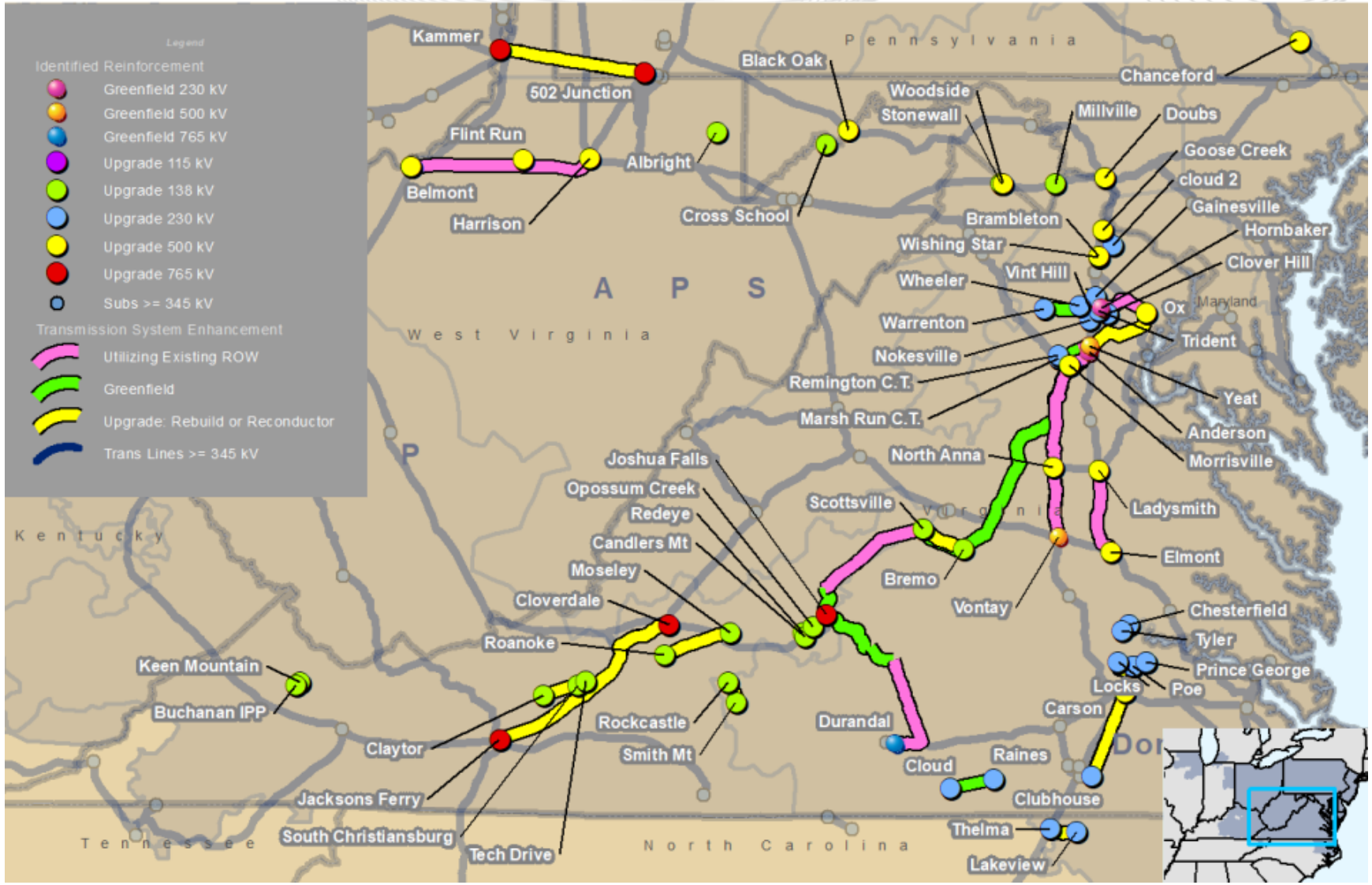
2024 RTEP Window 1 Proposals

Proposal ID #	Entity	Cluster	Project Title	Total Component Cost ($M)
904	CNTLTM	0 & DOM - 1	F1 Solution	$1,864.6
907	TRAIL	0	500 kV Expansion Plan	$2,838.9
922	PPLTO	PPL - 2	Lackawanna - Siegfried - Drakestown 500 kV line project	$618.3
926	PPLTO	PPL - 2	Wescosville 2nd 500/138 kV transformer	$36.8
935	PPLTO	PPL - 2	Juniata 500 kV Substation yard reconfiguration	$22.2
338	AEPSCT	AEP - 3	Genoa-Westar Rebuild	$8.7
944	NEETMH	No Cluster	Upgrades to AEP 138kV and Dominion 230kV transmission lines	$69.1
464	AEPSCT	AEP - 3	Genoa-Westar Sag Remediation	$2.8
955	PSEGRT	PECO	230kv Eagle Point - Penrose	$390.9
967	VEPCO	DOM - 1	DVP Central Area Improvement for Portfolios	$1,189.7
977	TRAIL	0	Belmont - Harrison 500 kV Line	$277.4
980	VEPCO	DOM - 1	Line #579 EOL Rebuild_Septa to Yadkin (99-2993)	$216.7
983	VEPCO	DOM - 1	500kV Safety Solutions	$2,839.3
992	NEETMH	0 & DOM - 1	Axton - Joshua Falls - Mt Ida 765kV transmission lines + Link 500/230kV substation	$2,256.2
994	PPLTO	PPL - 2	Juniata - Dauphin 230 kV line reconductor	$2.2

Appendix 2
2024 RTEP W1– Proposal Maps

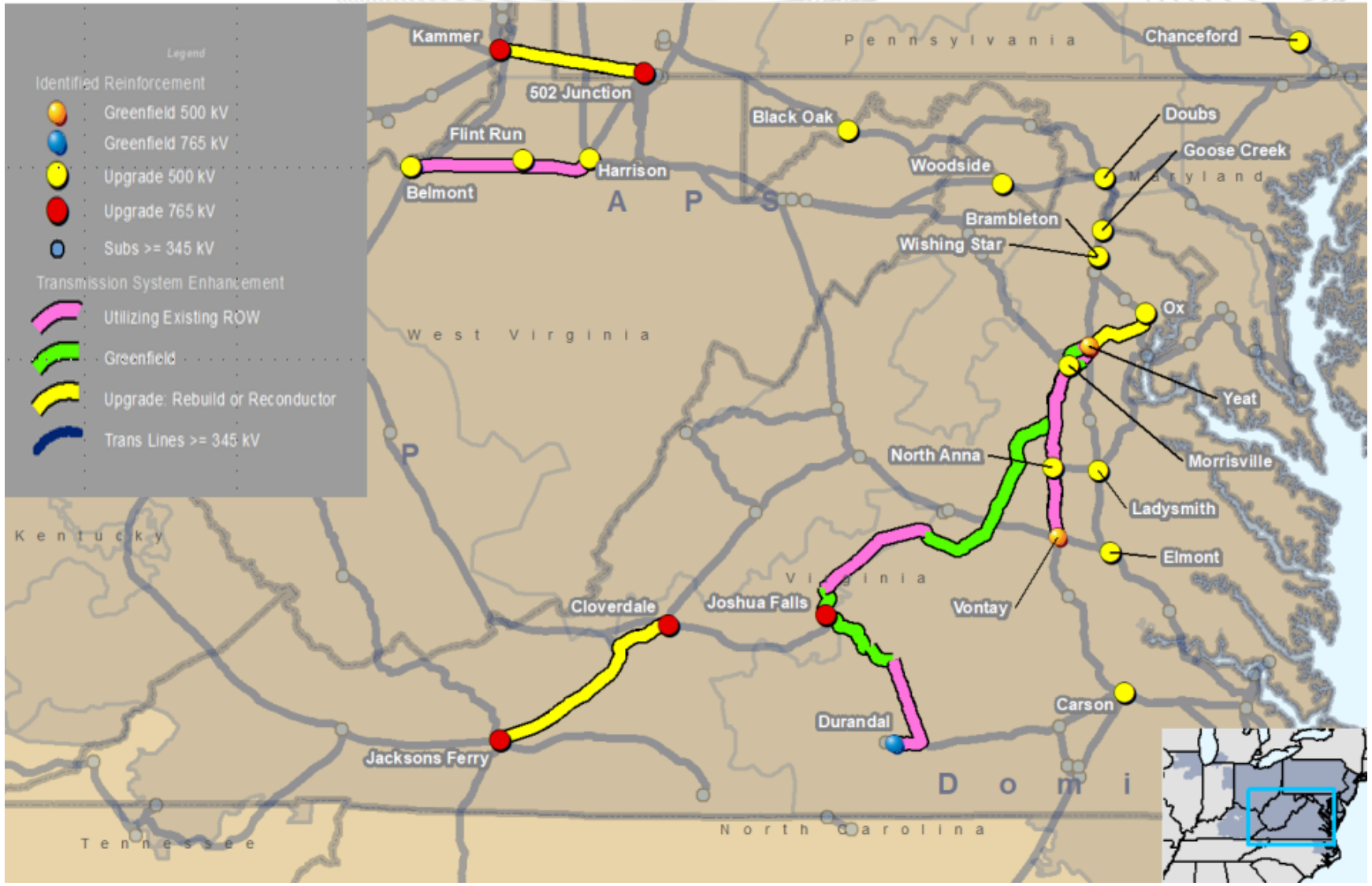
Transource Proposals

TRNSRC Joint Proposal – 114
(ROW designation only, All kVs)



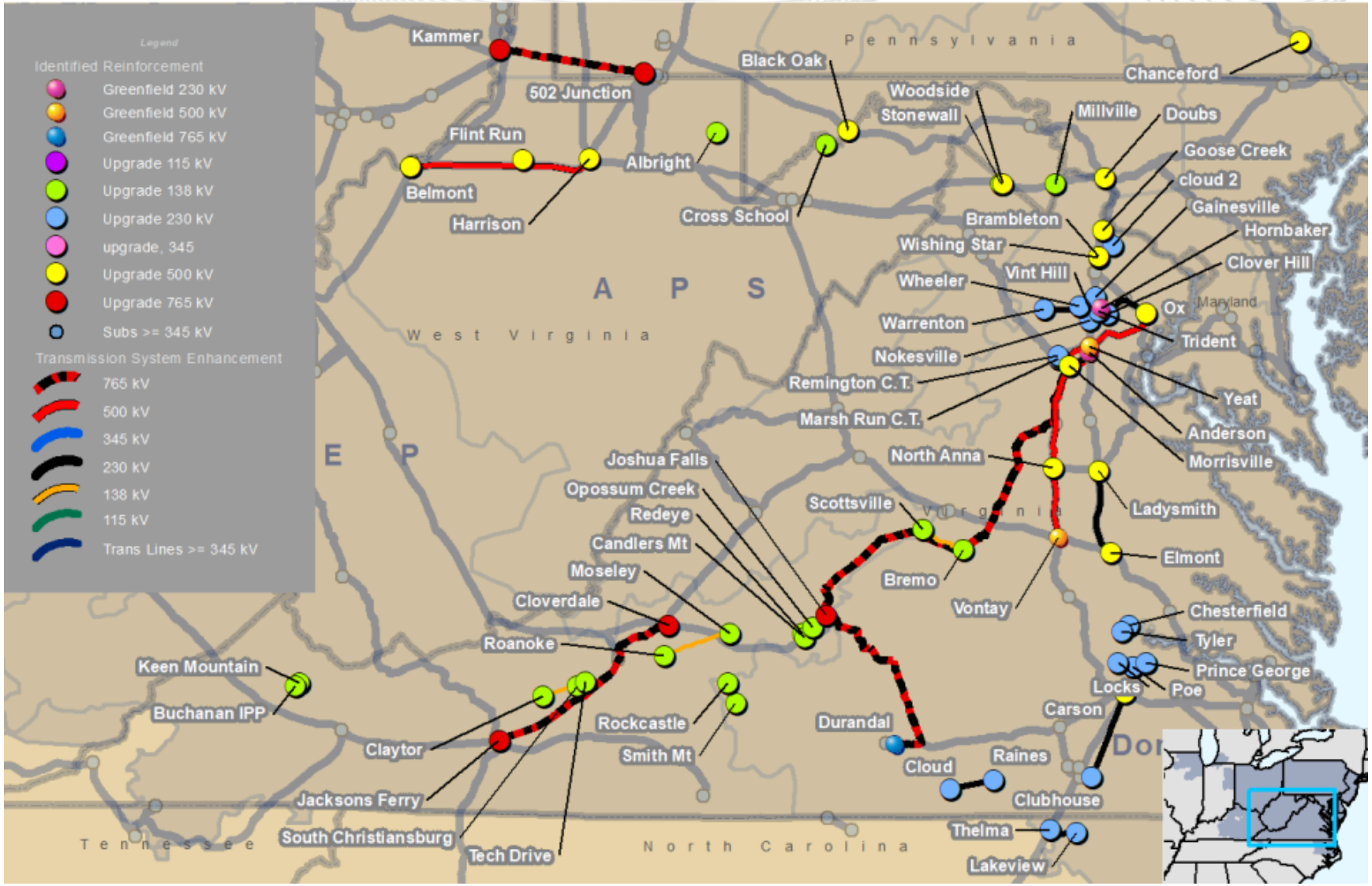
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

TRNSRC Joint Proposal – 114
(ROW Designation, 345 KV and above)



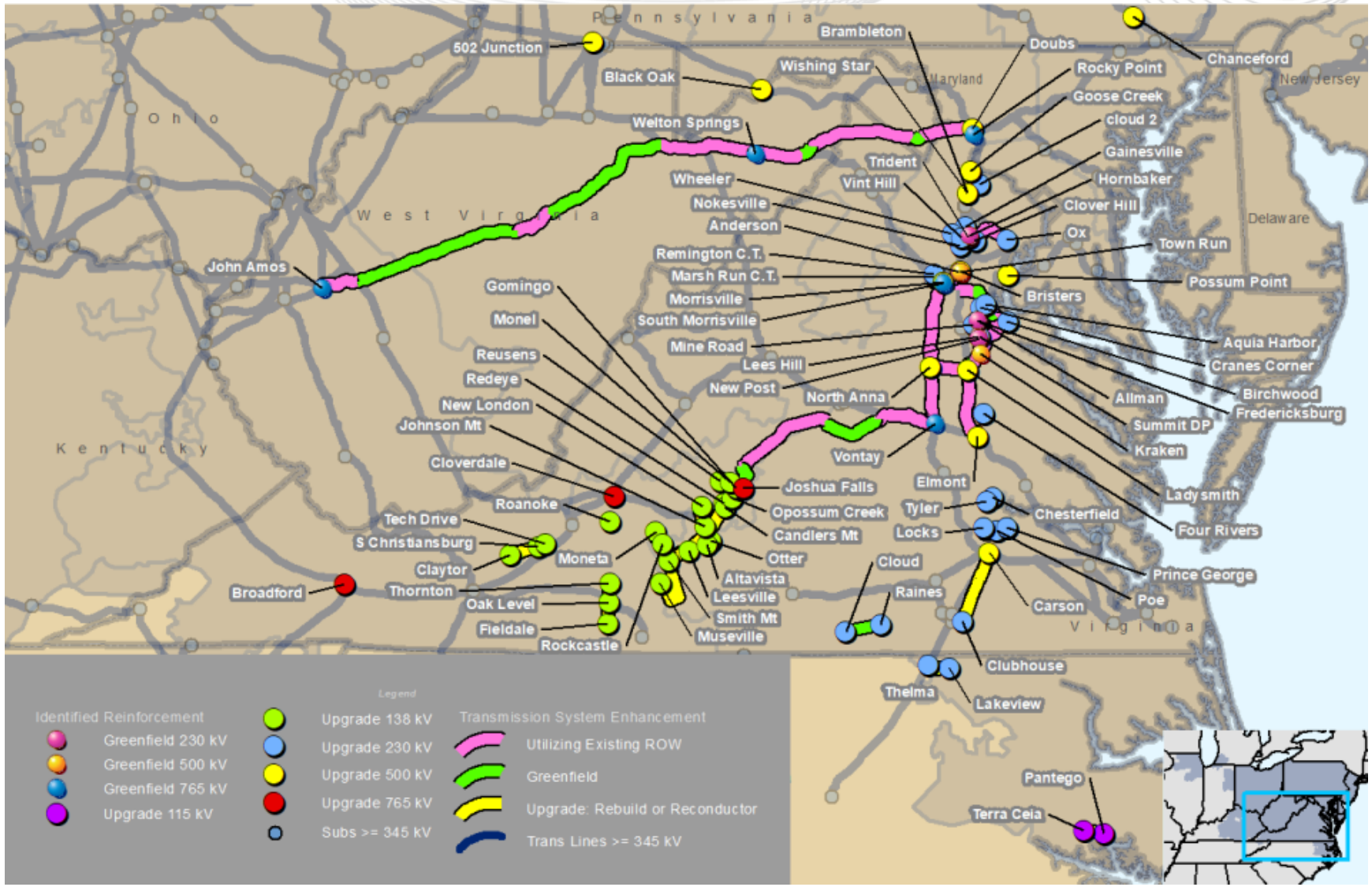
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

TRNSRC Joint Proposal – 114
(kV designation only, All kVs)



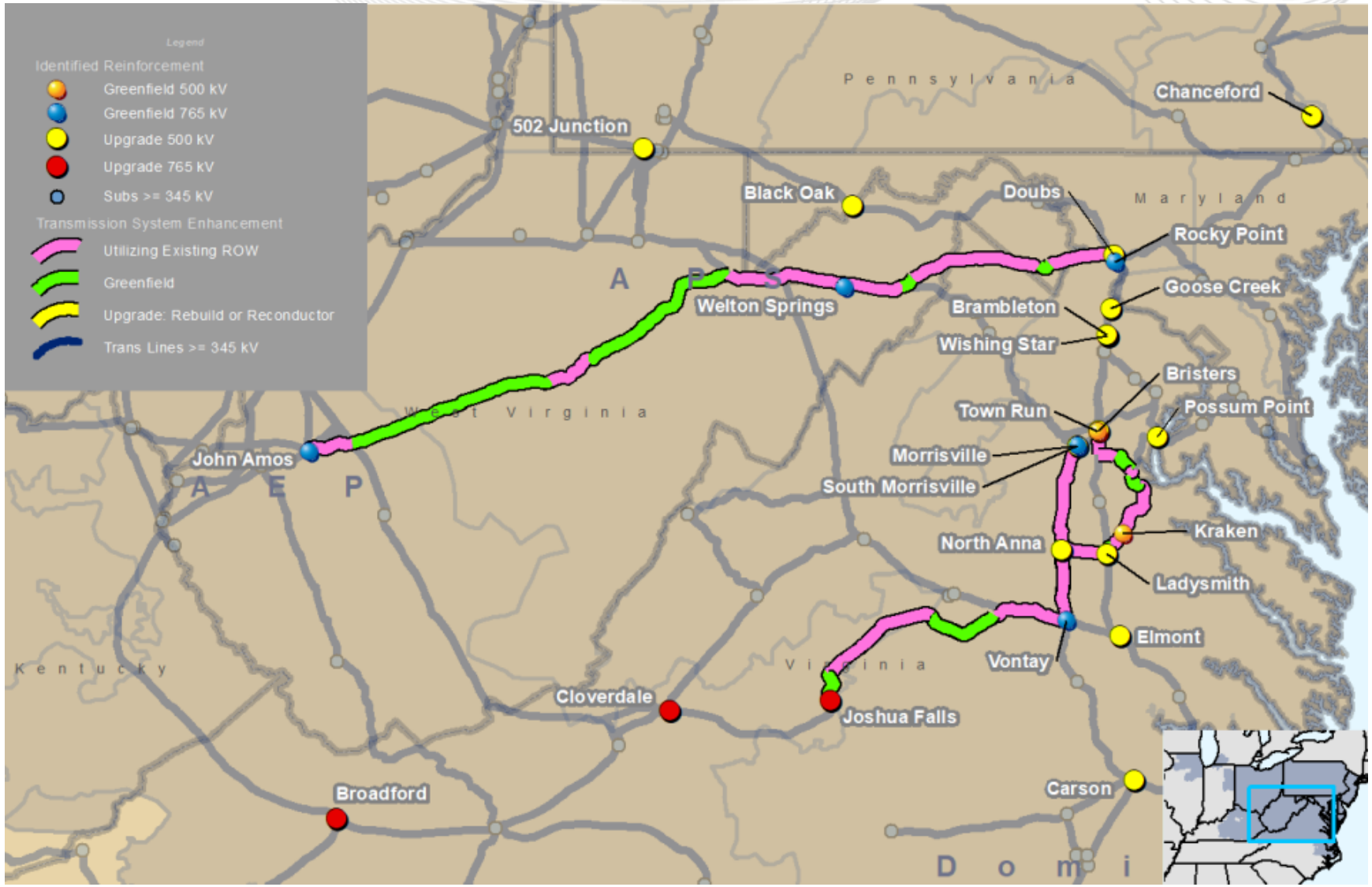
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

TRNSRC Joint Proposal – 262
(ROW designation only, All kVs)



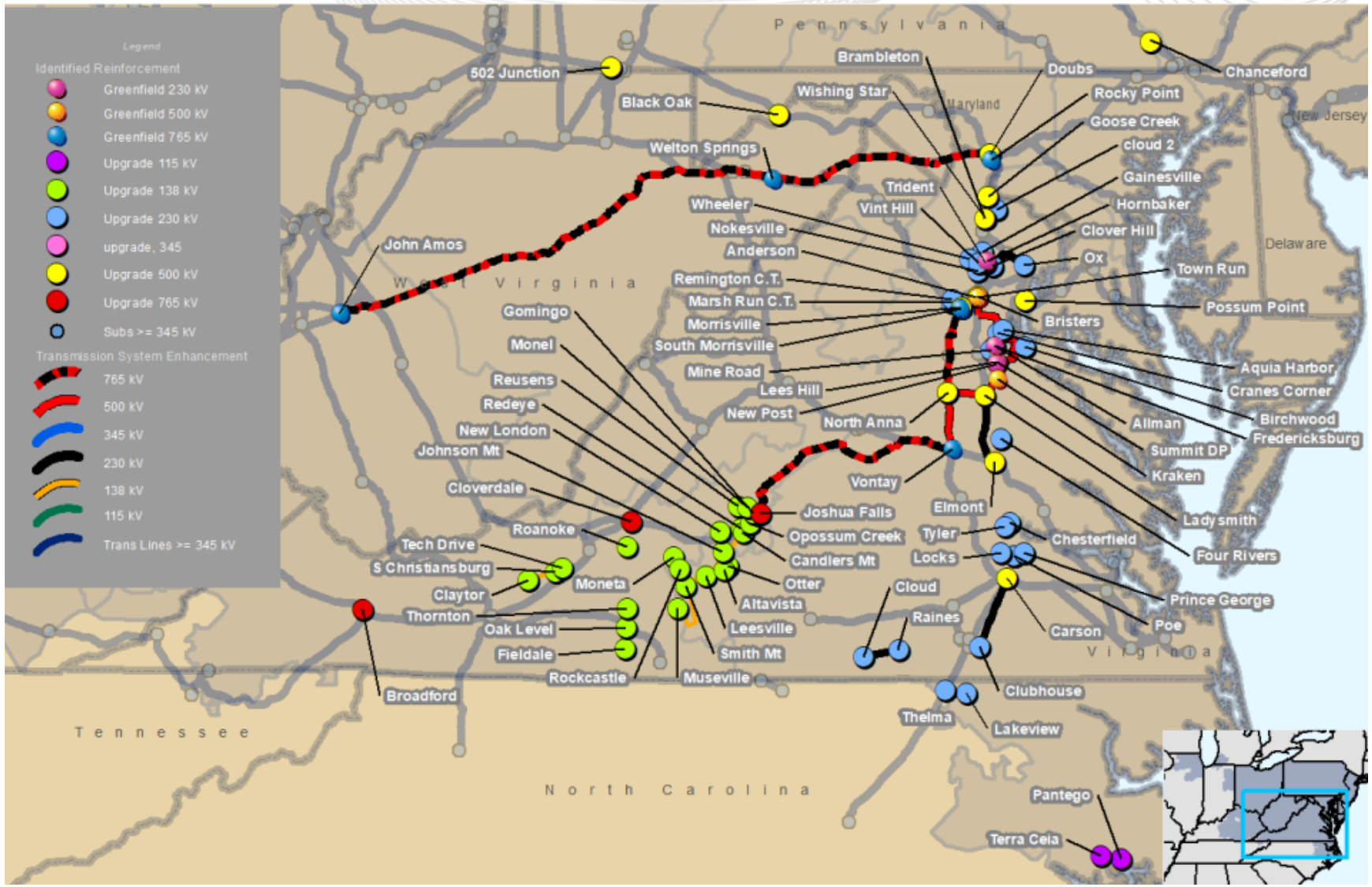
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

TRNSRC Joint Proposal – 262
(ROW Designation, 345 KV and above)



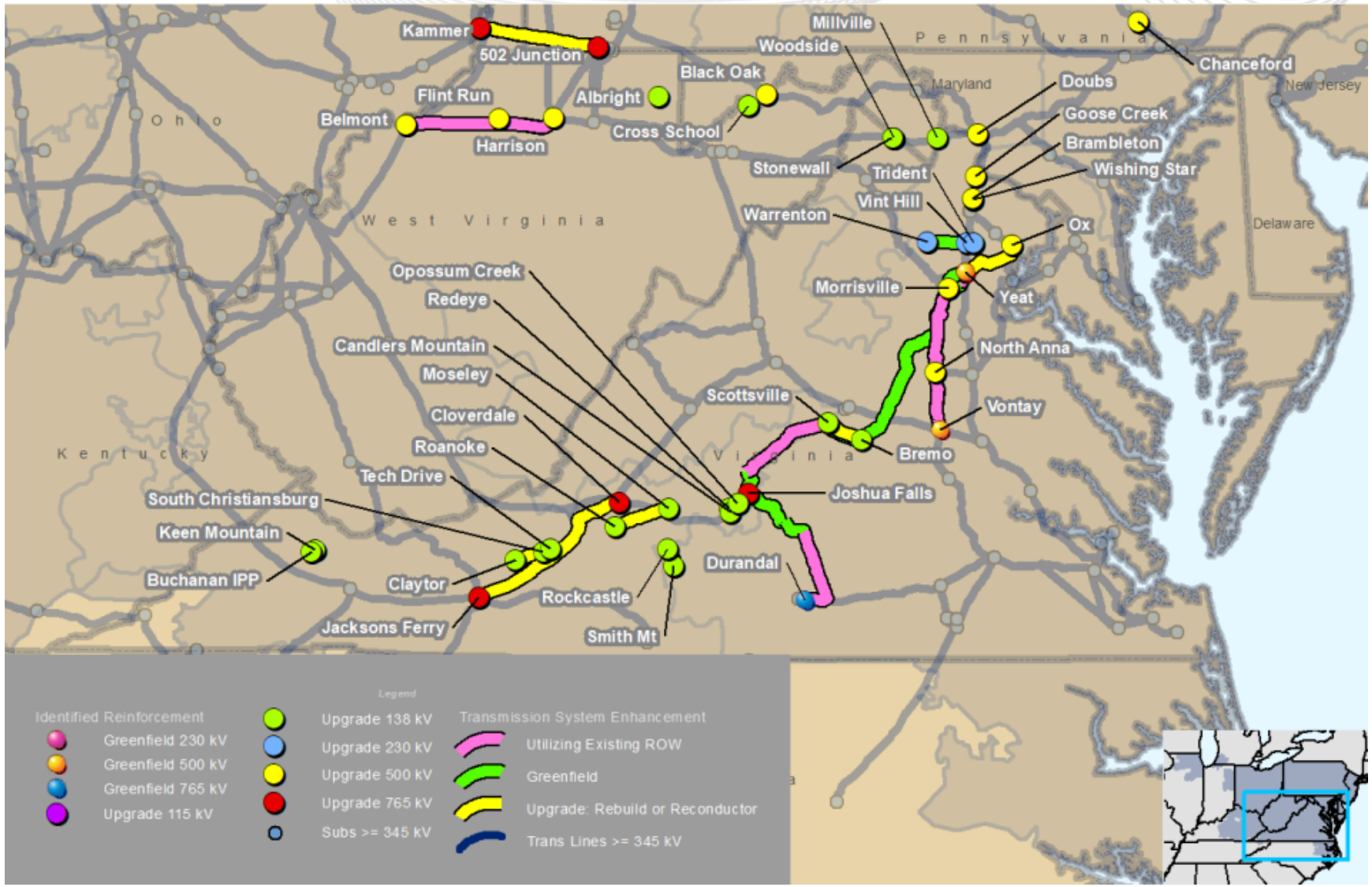
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

TRNSRC Joint Proposal – 262
(kV designation only, All kVs)



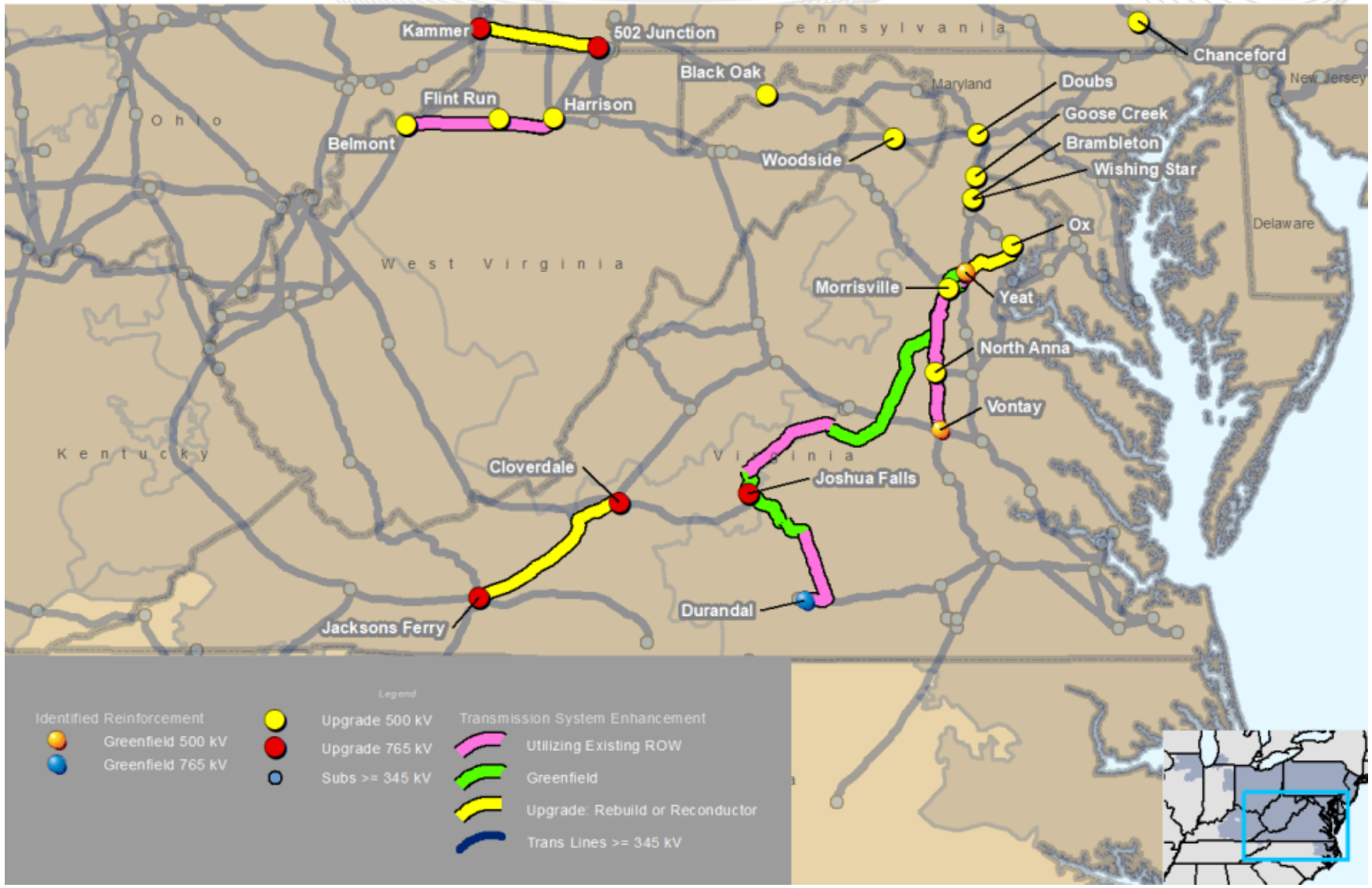
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

TRNSRC Joint Proposal – 279
(ROW designation only, All kVs)



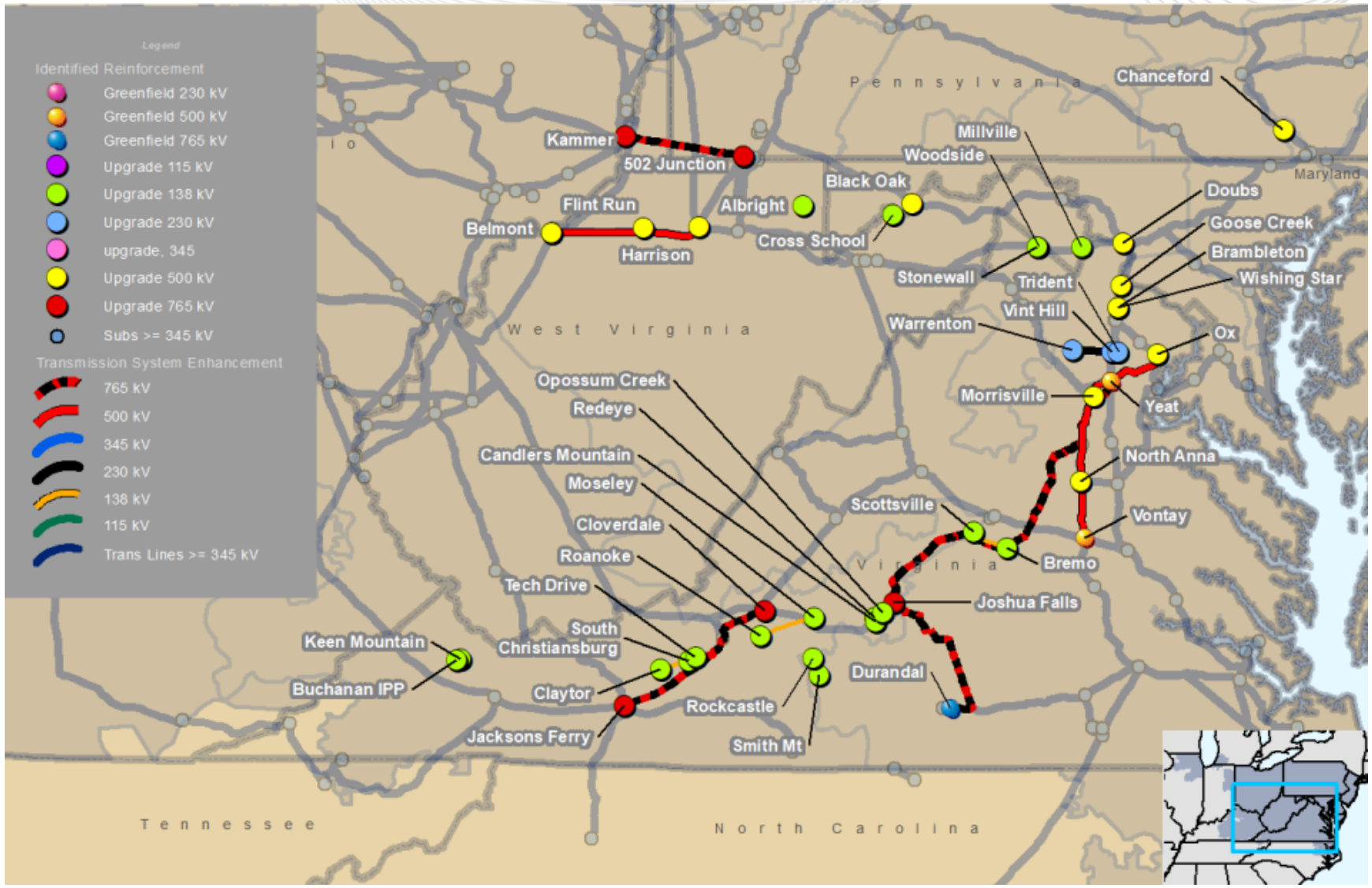
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

TRNSRC Joint Proposal – 279
(ROW Designation, 345 KV and above)



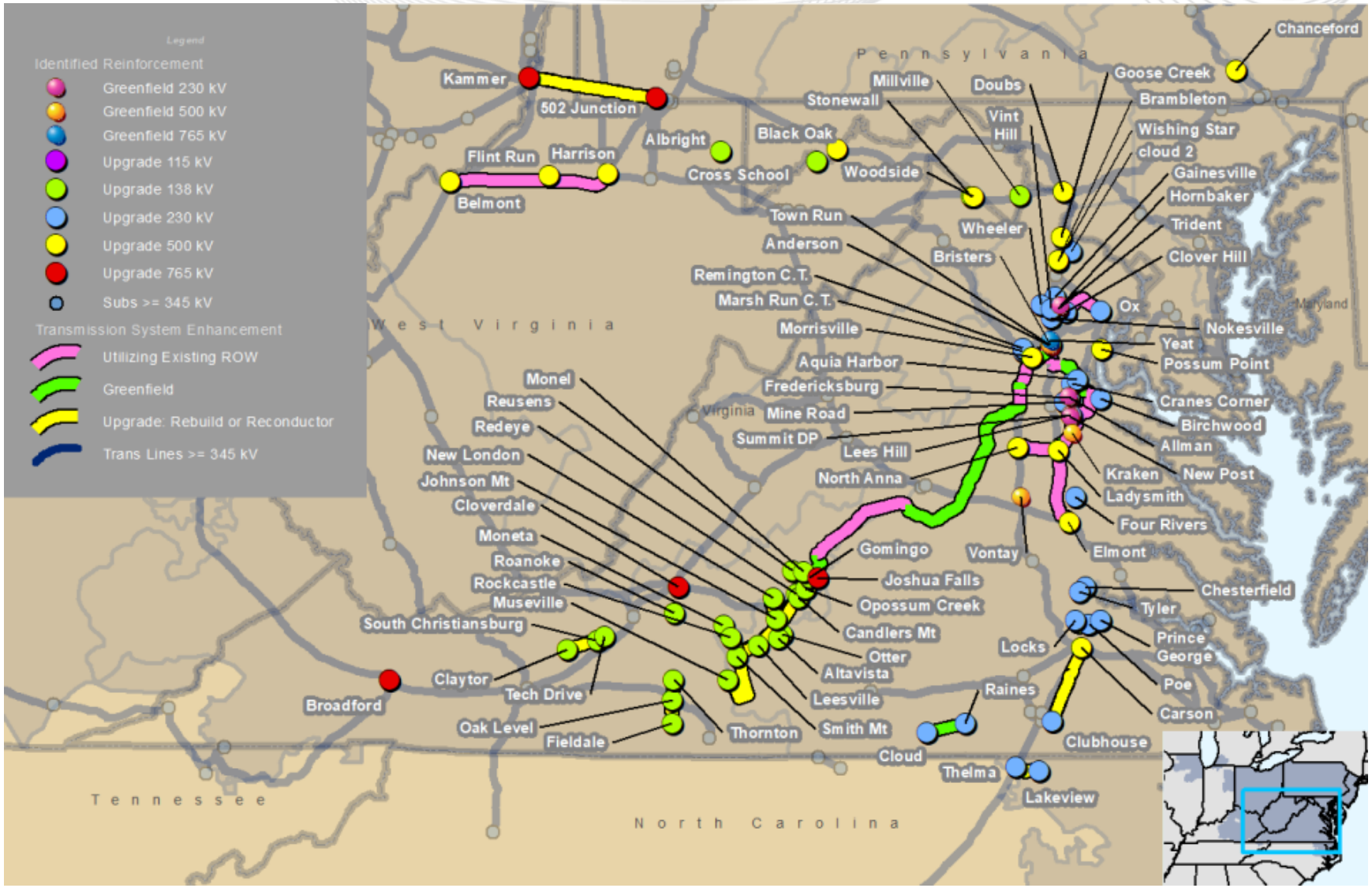
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

TRNSRC Joint Proposal – 279
(kV designation only, All kVs)



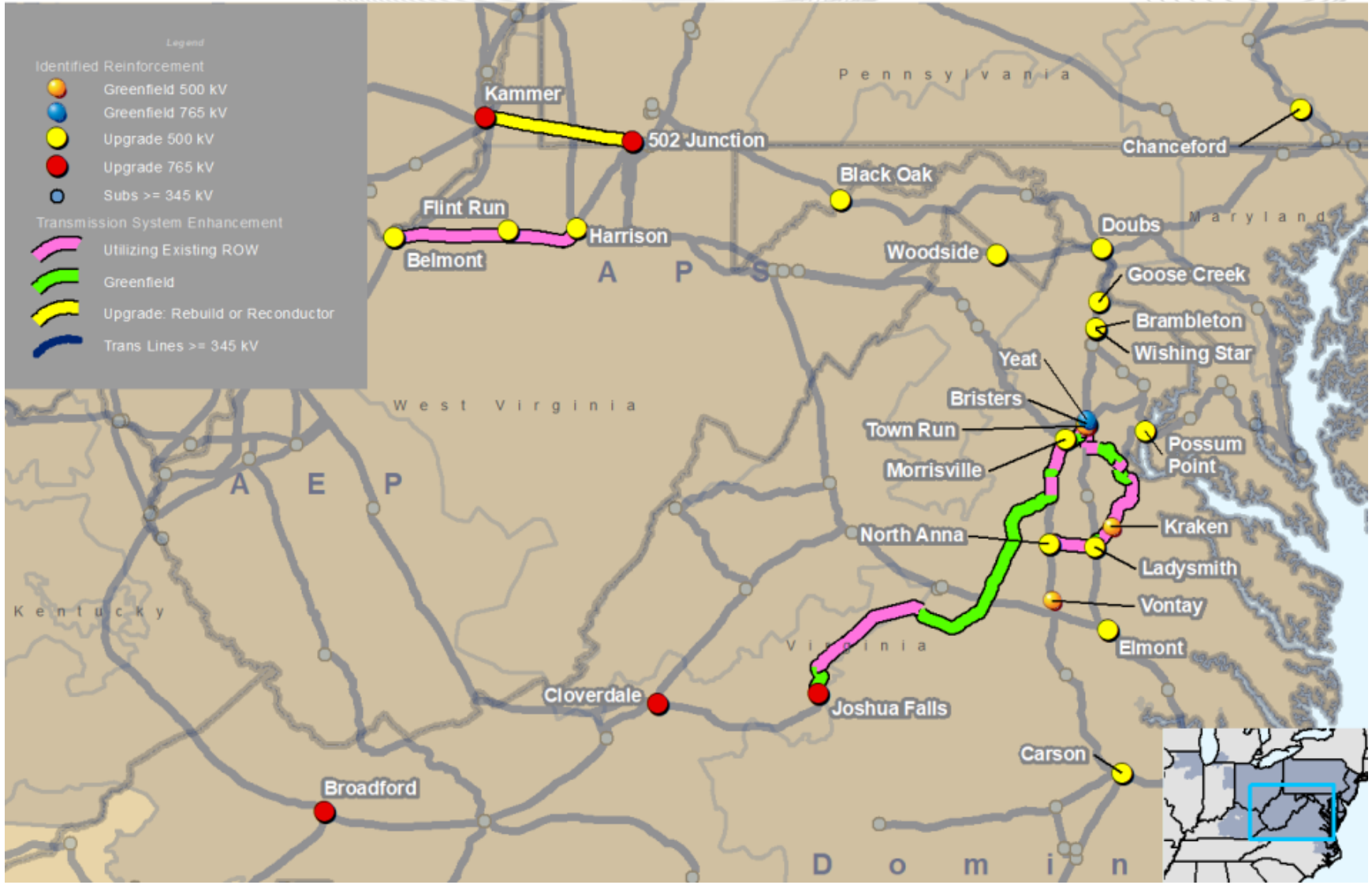
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

TRNSRC Joint Proposal – 610
(ROW designation only, All kVs)



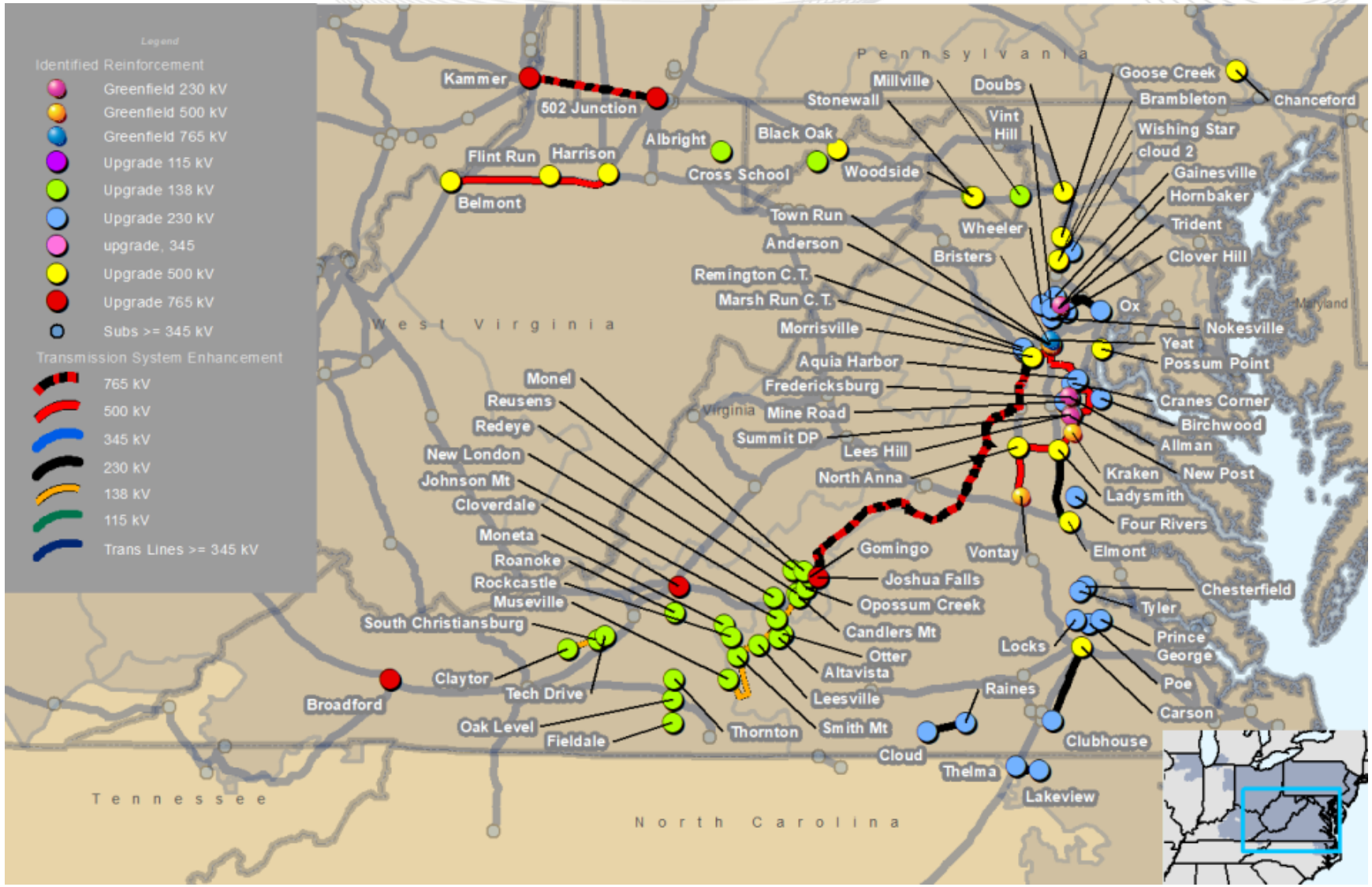
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

TRNSRC Joint Proposal - 610
(ROW Designation, 345 KV and above)



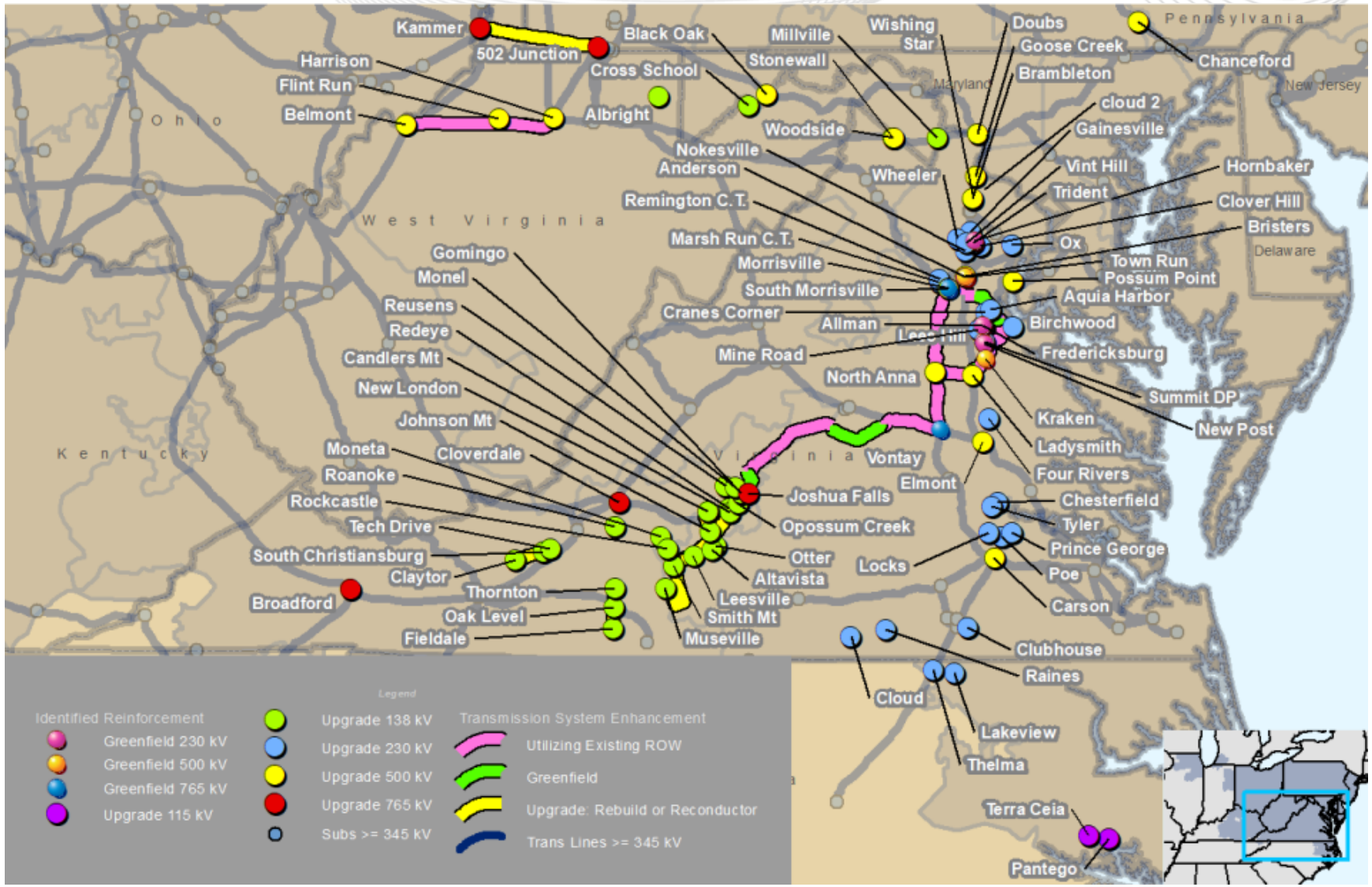
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

TRNSRC Joint Proposal – 610
(kV designation only, All kVs)



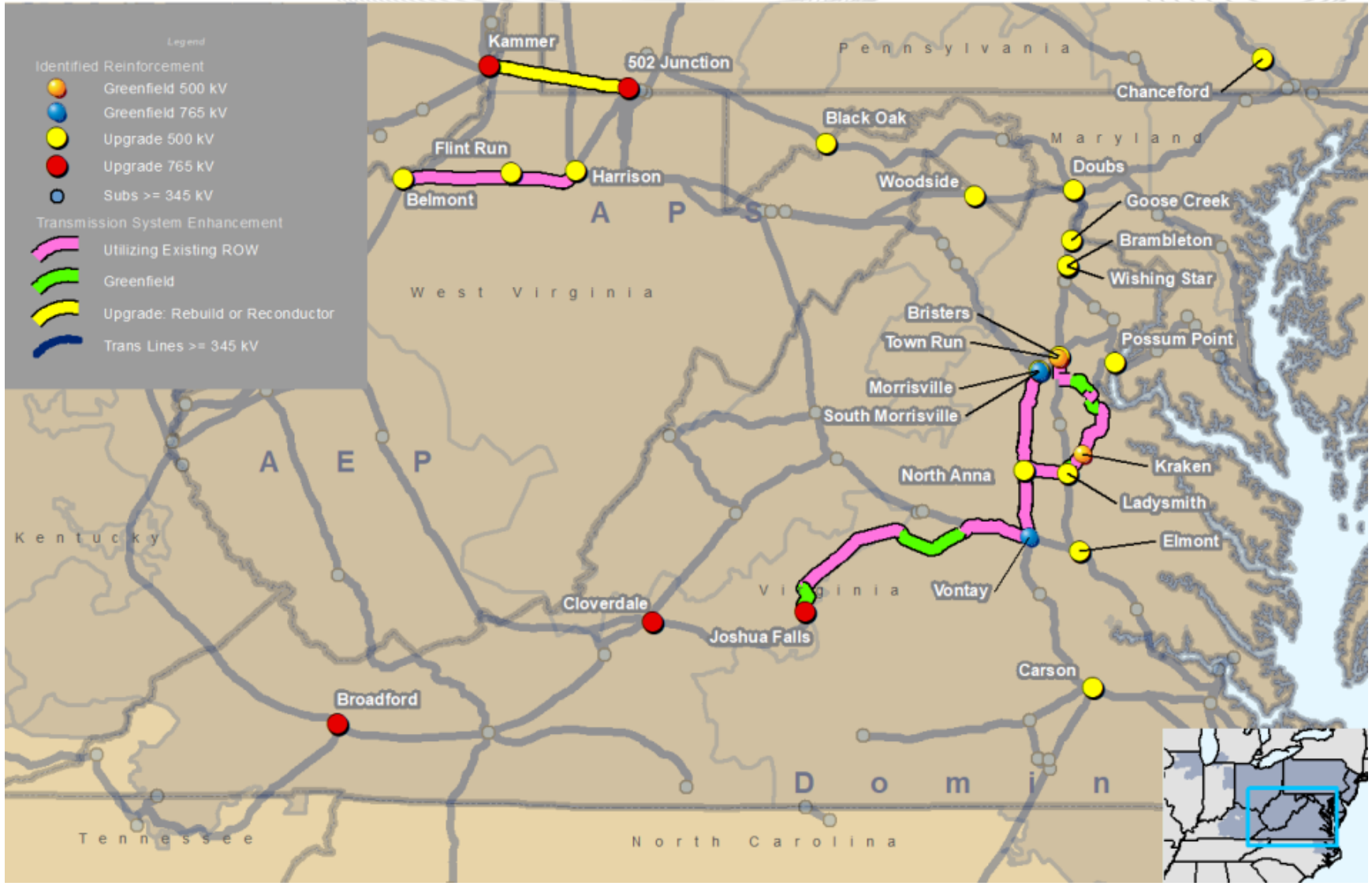
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

TRNSRC Joint Proposal – 636
(ROW designation only, All kVs)



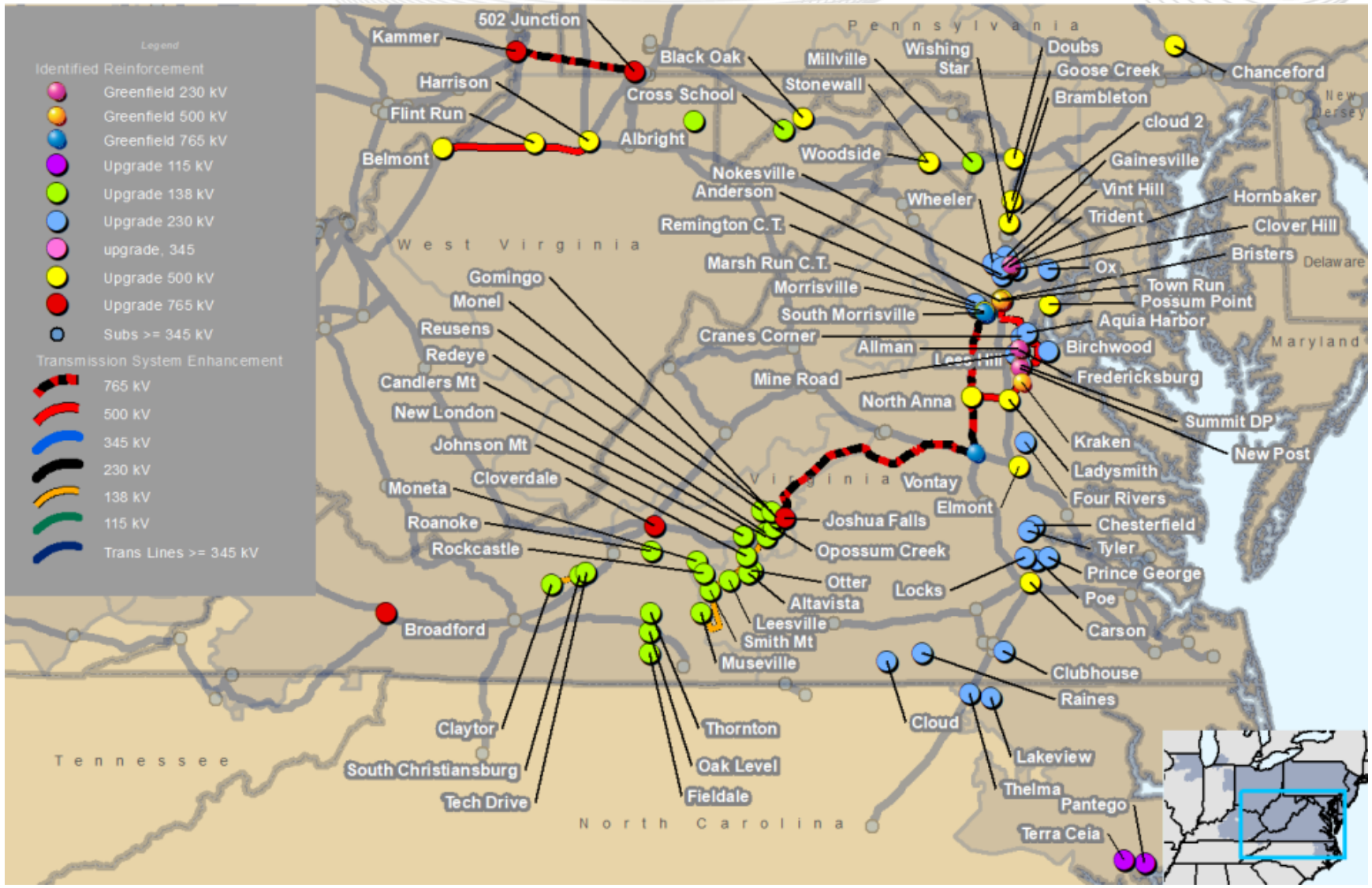
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

TRNSRC Joint Proposal – 636
(ROW Designation, 345 KV and above)



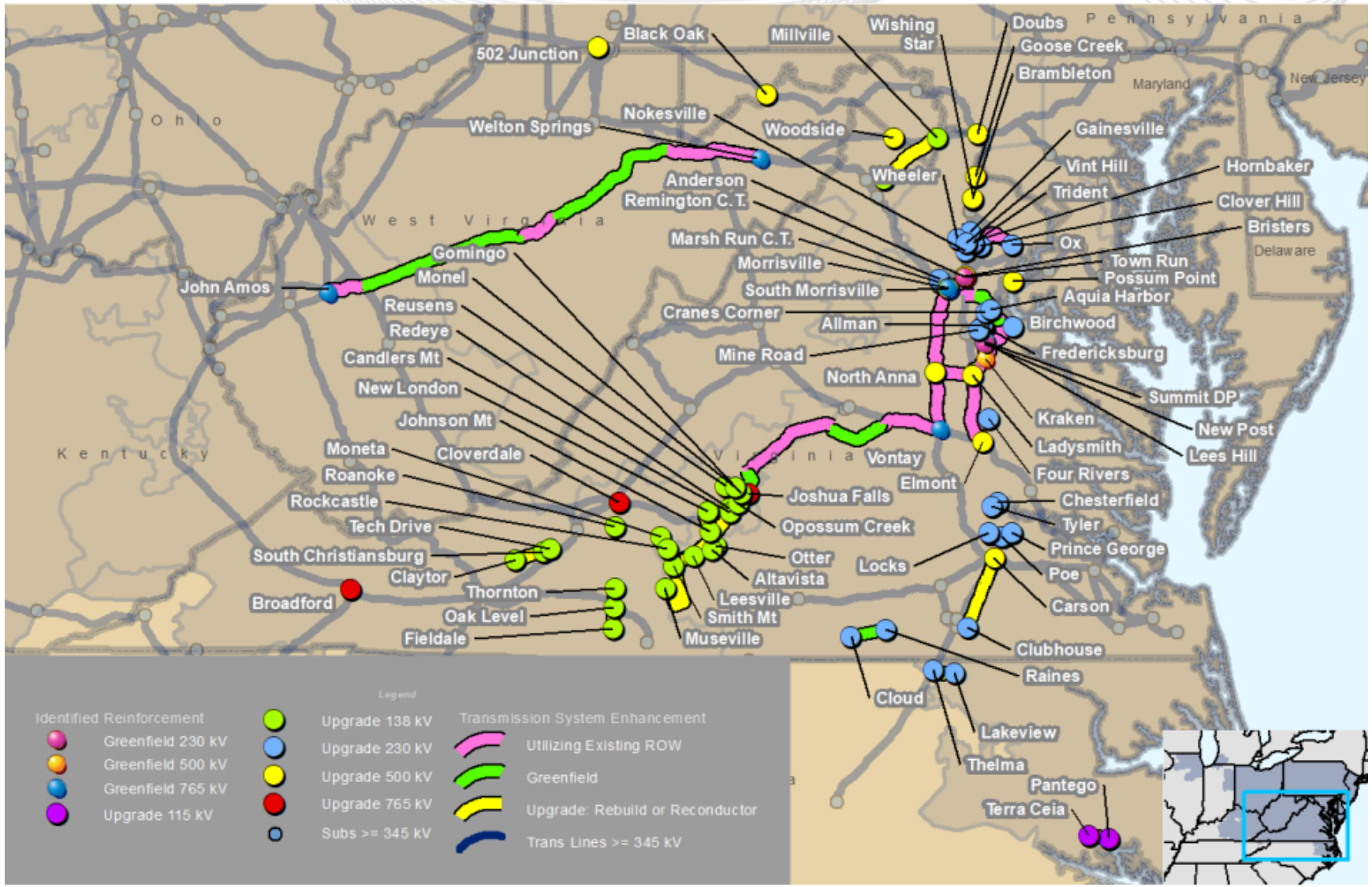
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

TRNSRC Joint Proposal – 636
(kV designation only, All kVs)



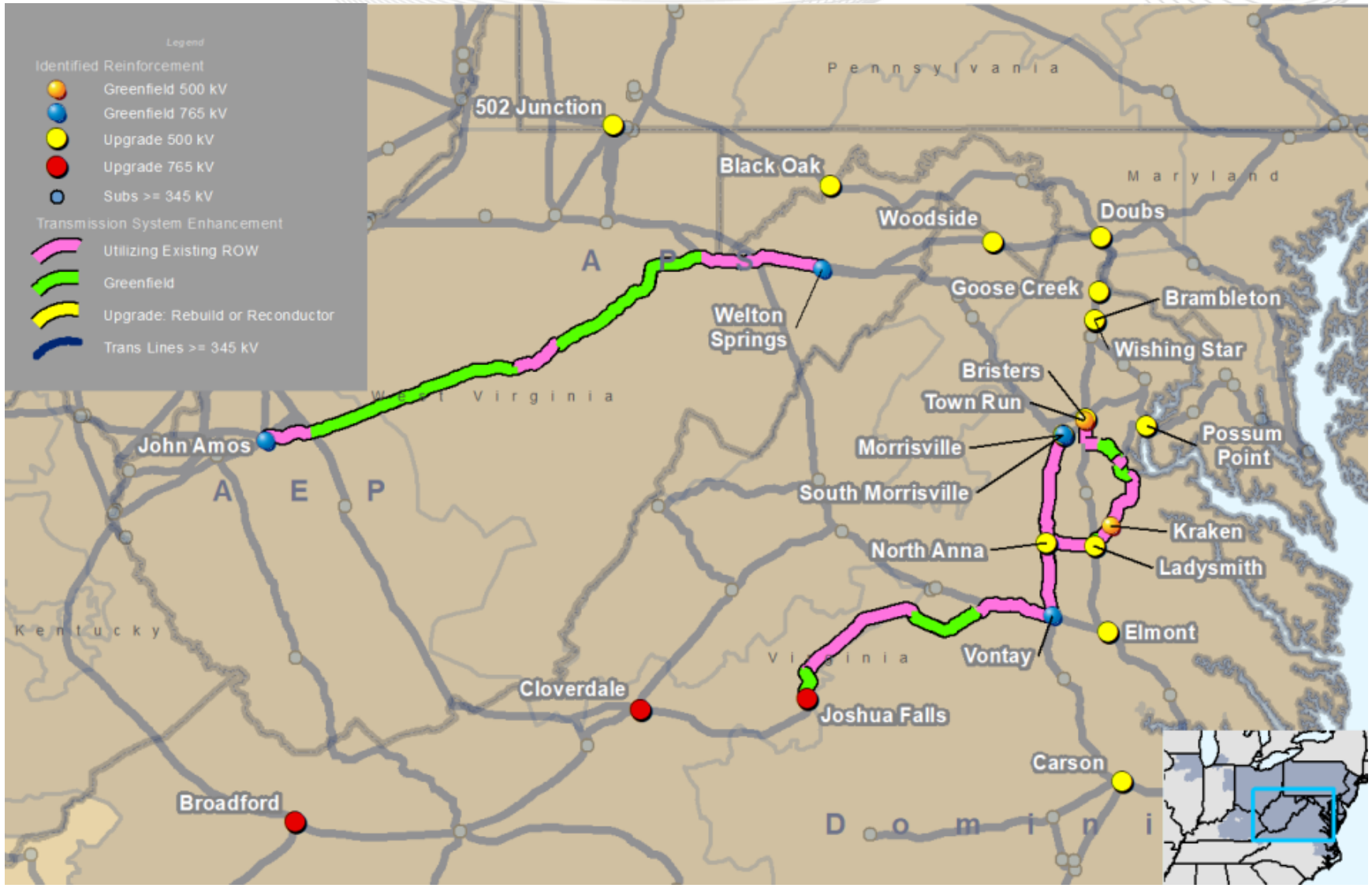
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

TRNSRC Joint Proposal – 759
(ROW designation only, All kVs)



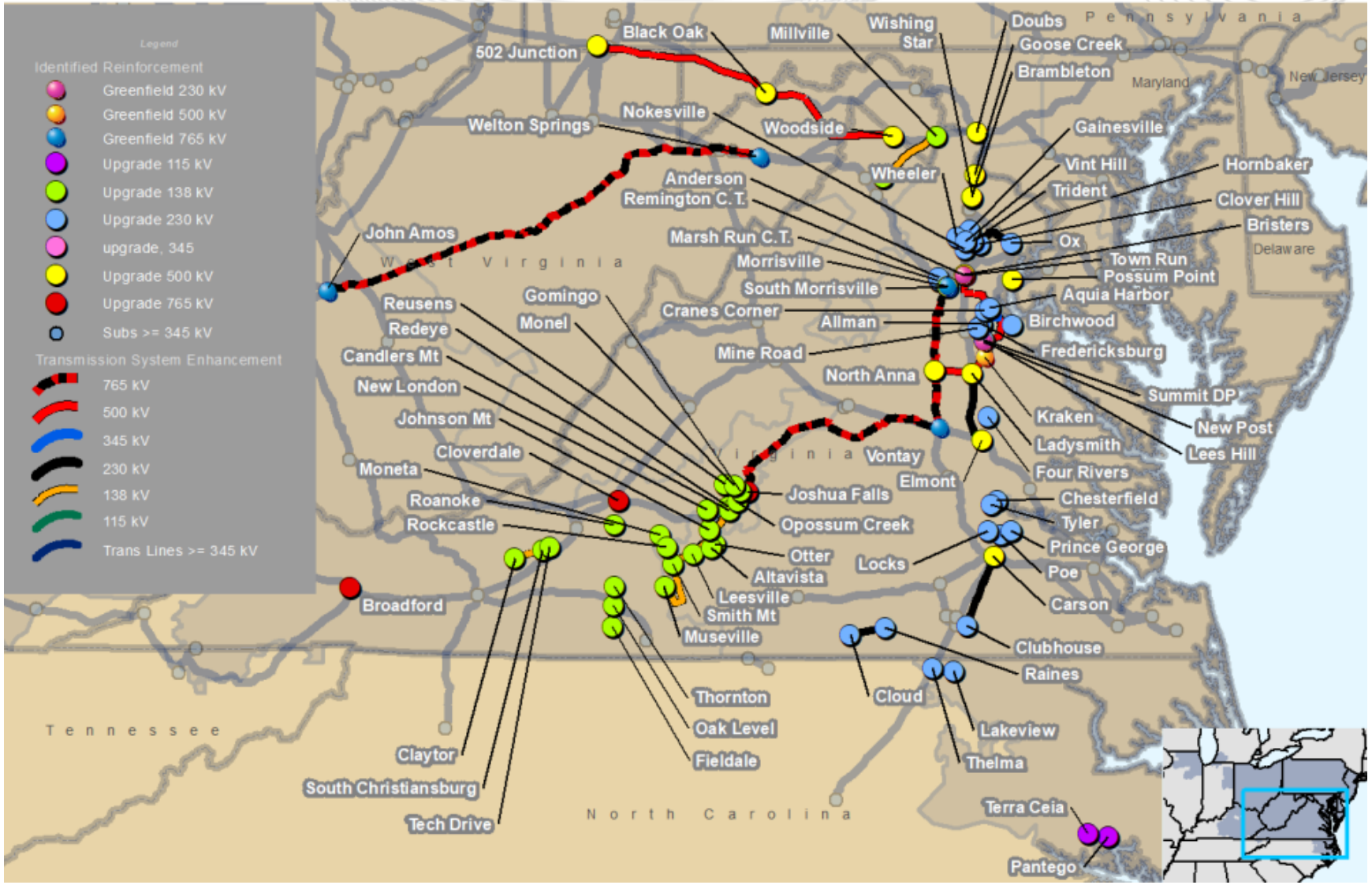
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

TRNSRC Joint Proposal – 759
(ROW Designation, 345 KV and above)



NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

TRNSRC Joint Proposal – 759
(kV designation only, All kVs)



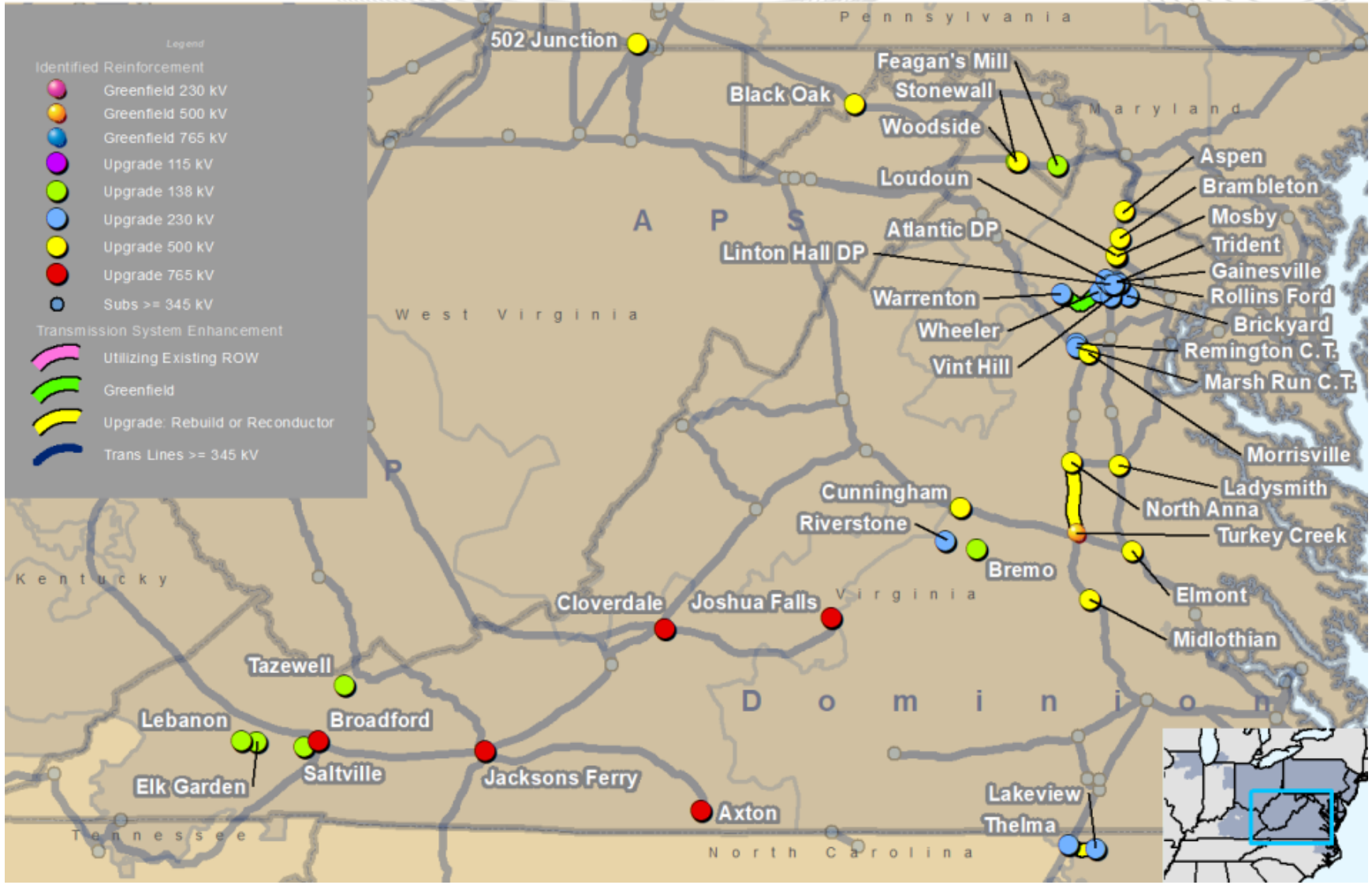
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

Please note that the following proposals are part of Transource Portfolio projects, 262, 759, 636, 610, 279 and 114 and as a result, are not included in this slide deck:

24, 81, 286, 300, 551, 617, 665, 708, 727, 781, 820, 883, 885, 967 & 977

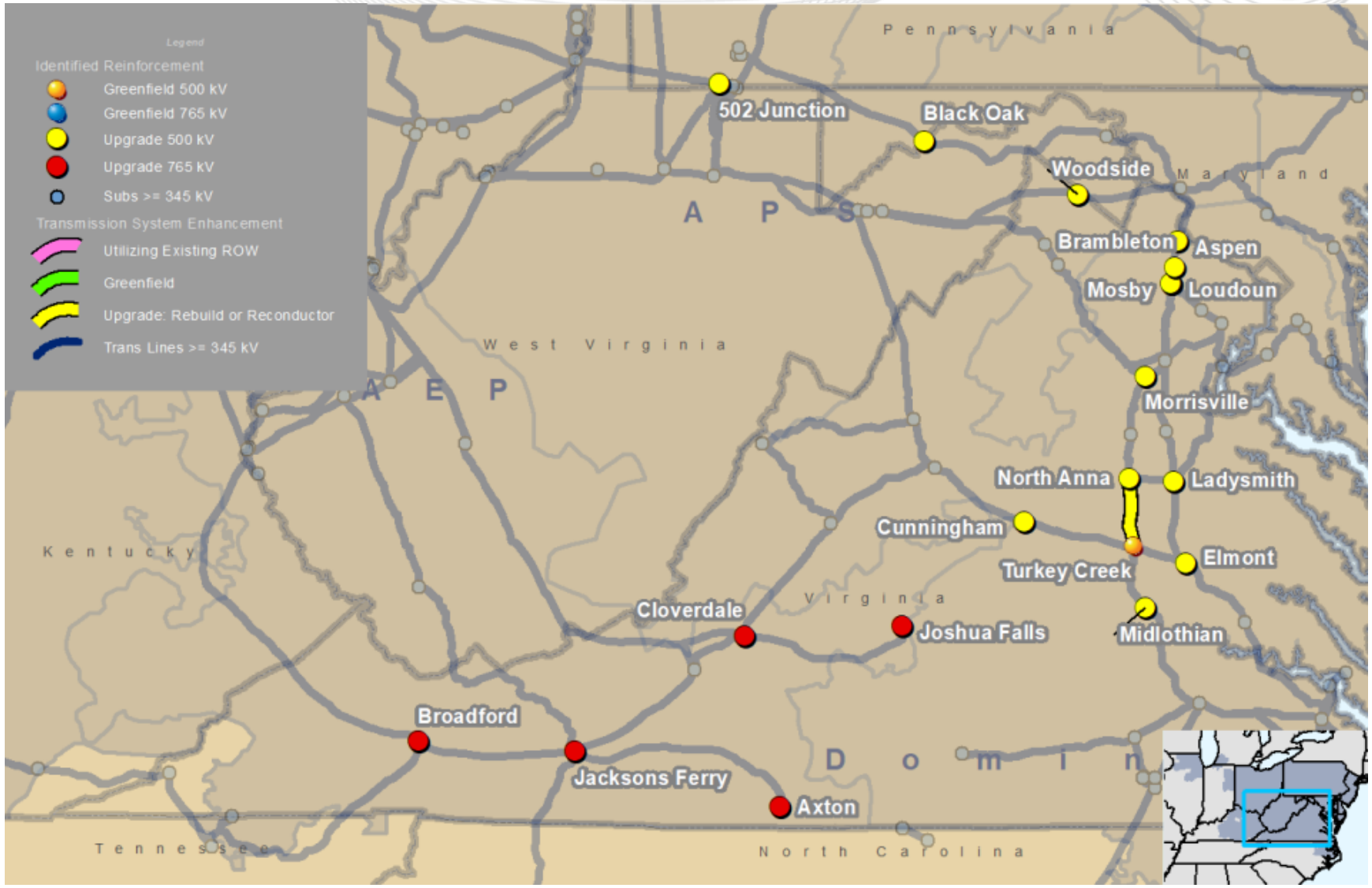
CNTLTM (LS Power) Proposals

CNTLTM – 200
(ROW Designation, all KVs)



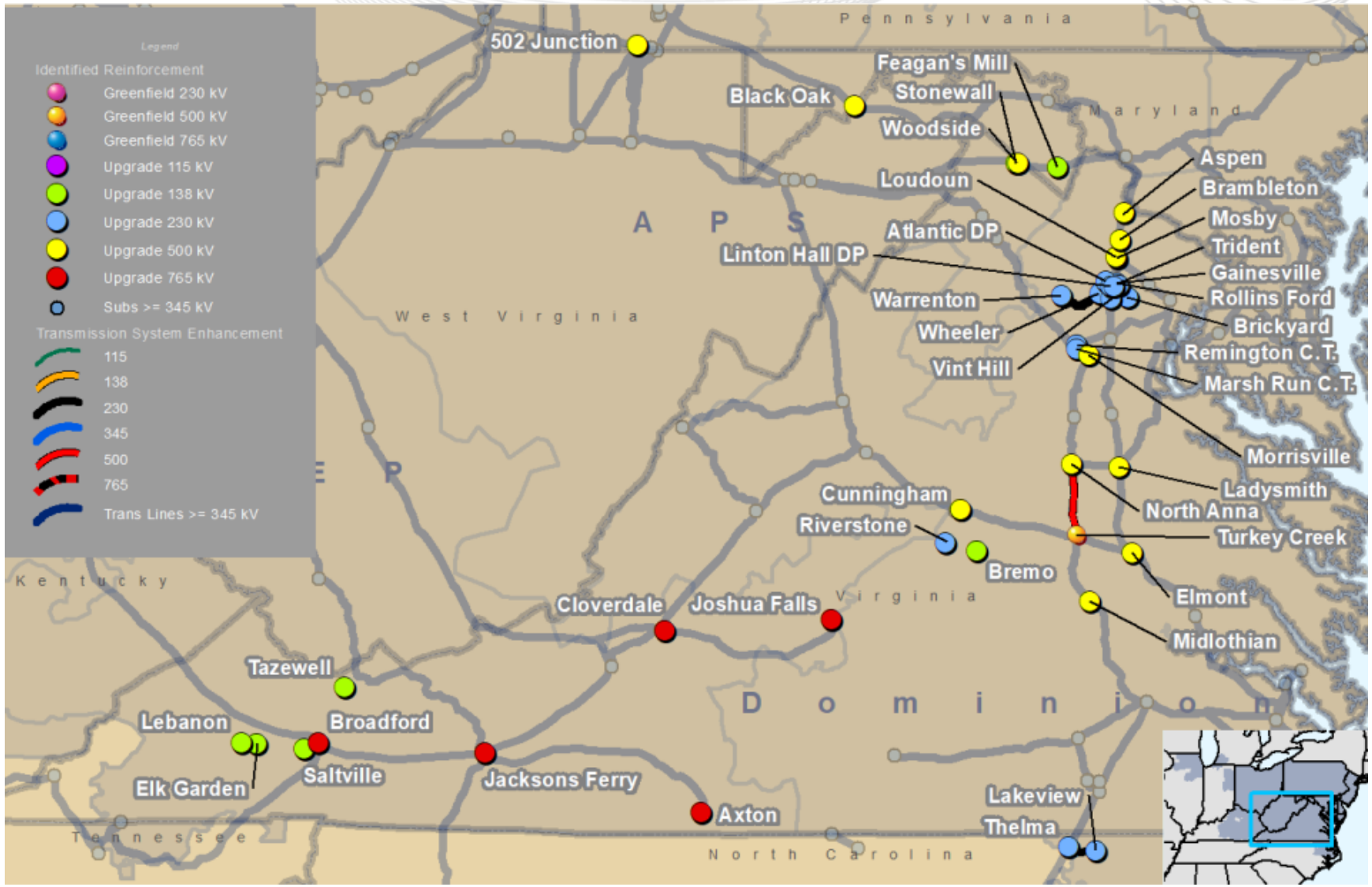
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM – 200
(ROW Designation, 345 KV and above)



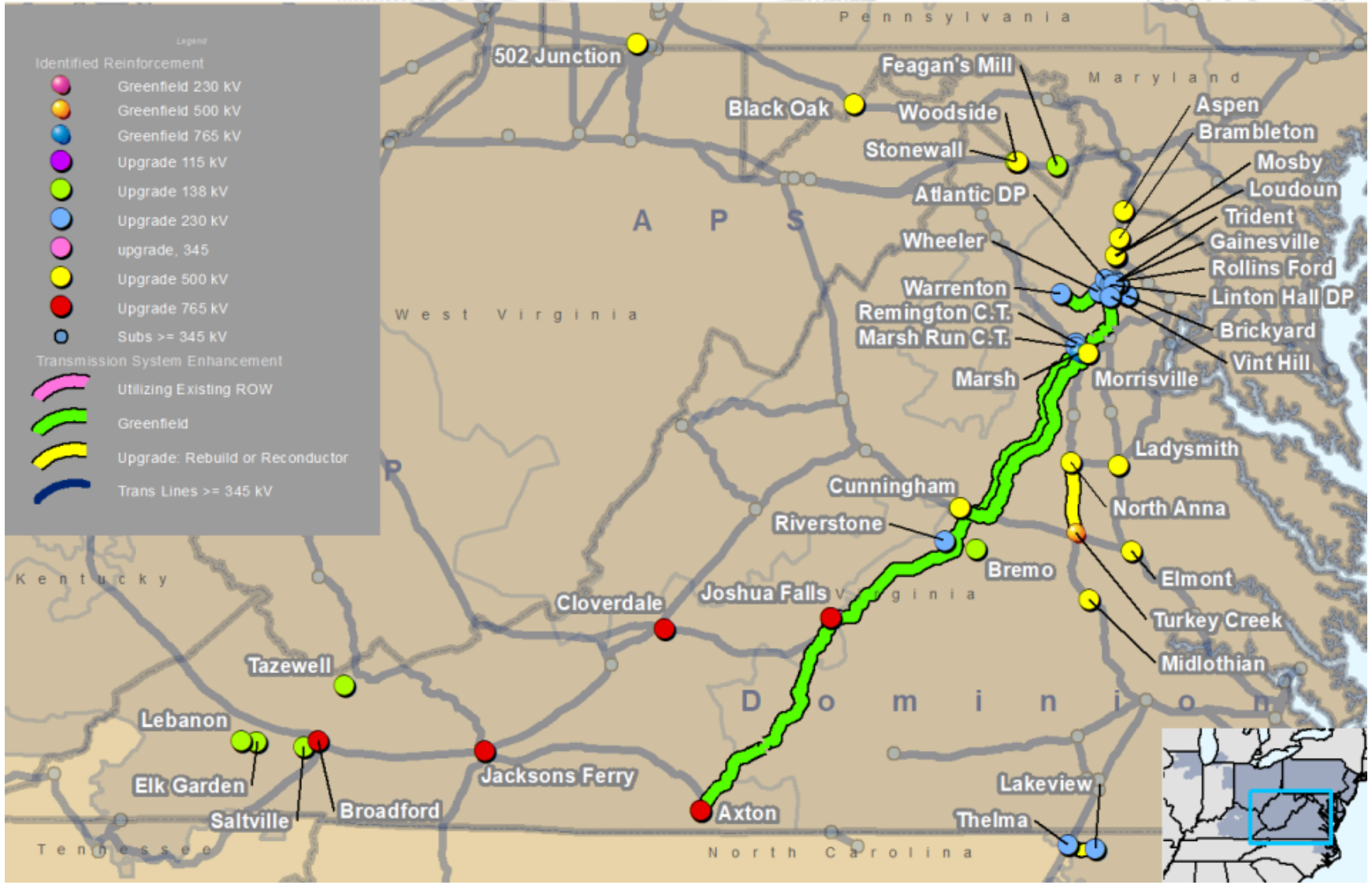
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM – 200
(kV designation only, All kVs)



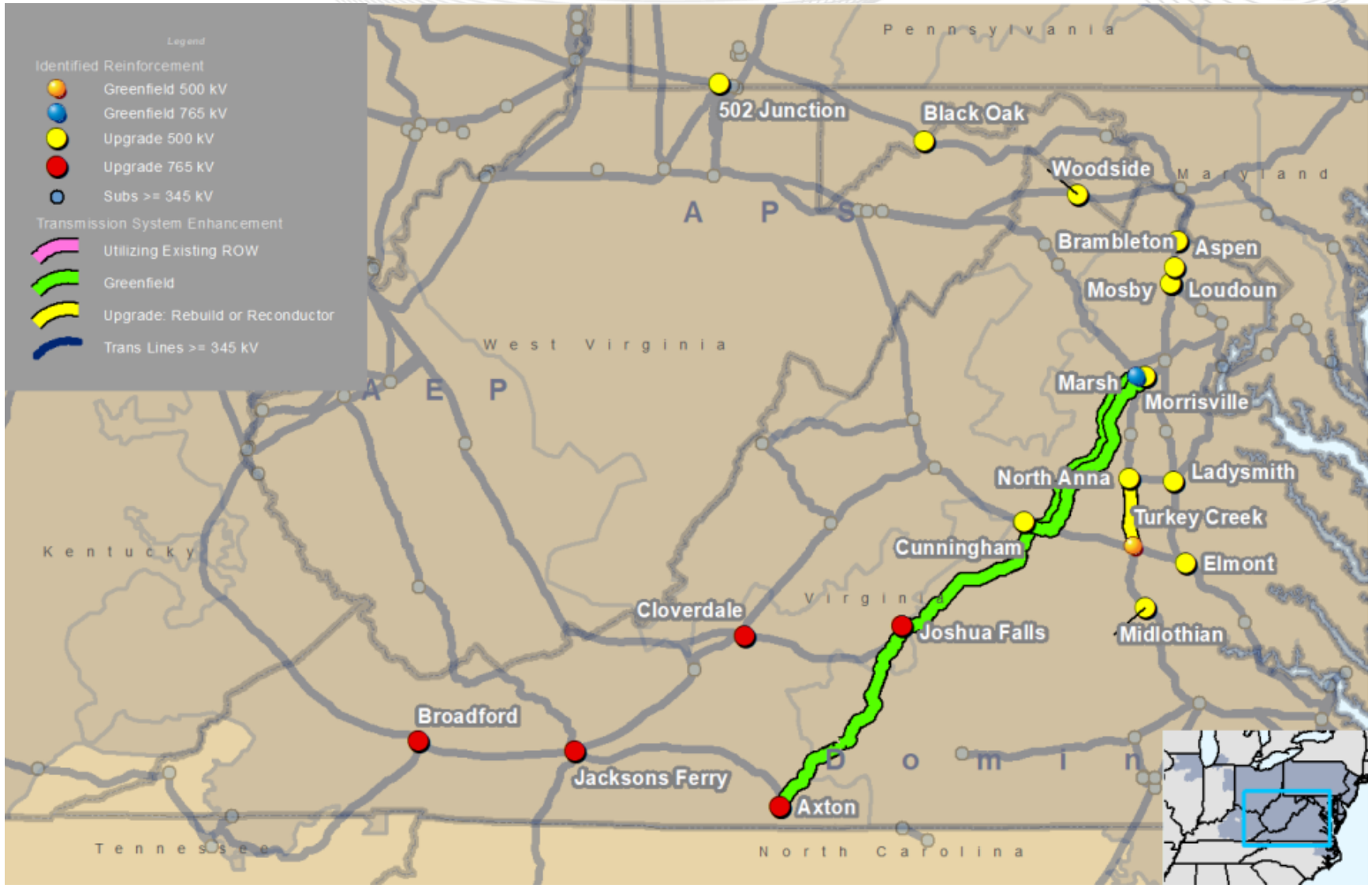
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM – 78
(ROW Designation, all KVs)



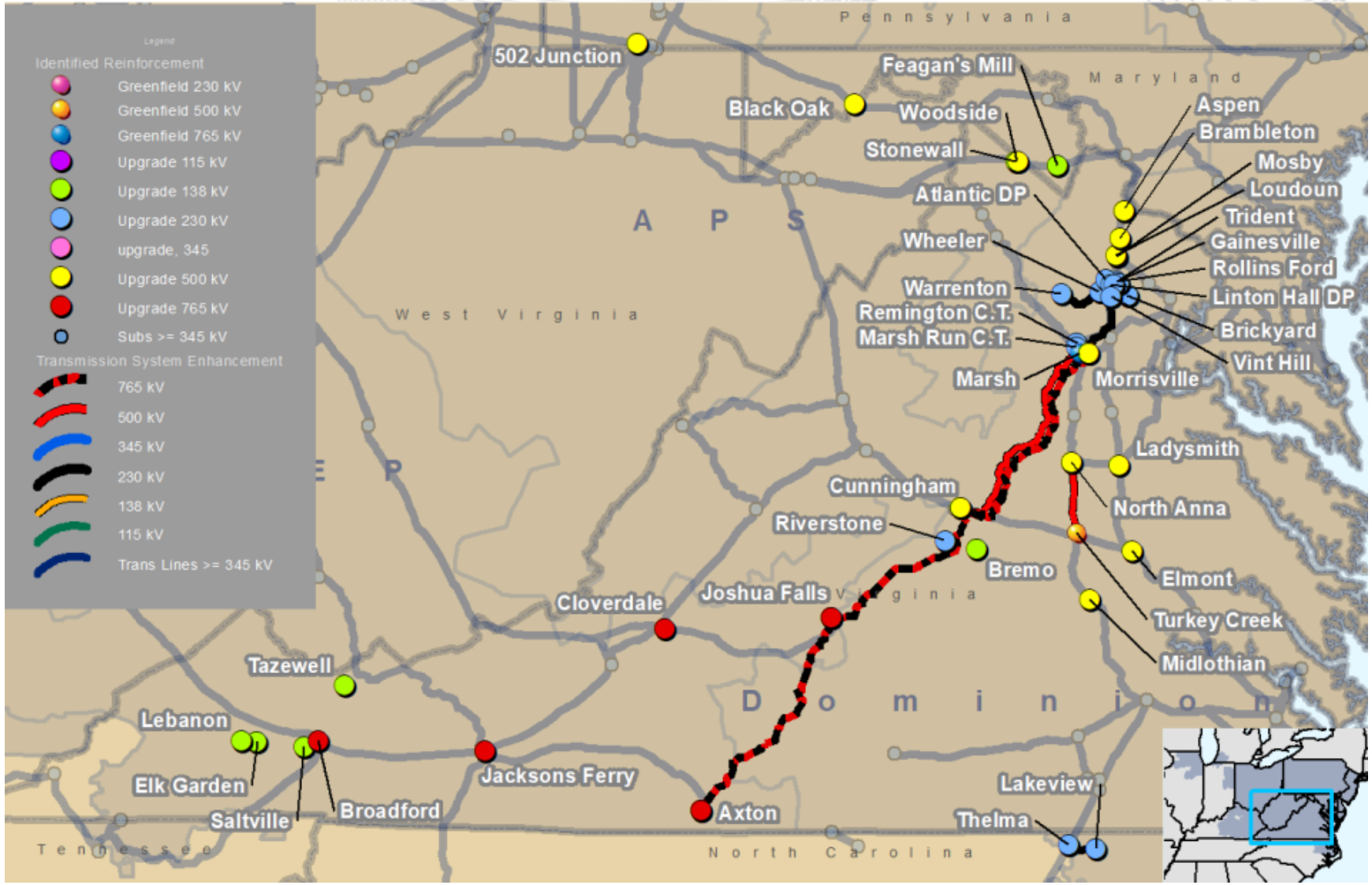
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM – 78
(ROW Designation, 345 KV and above)



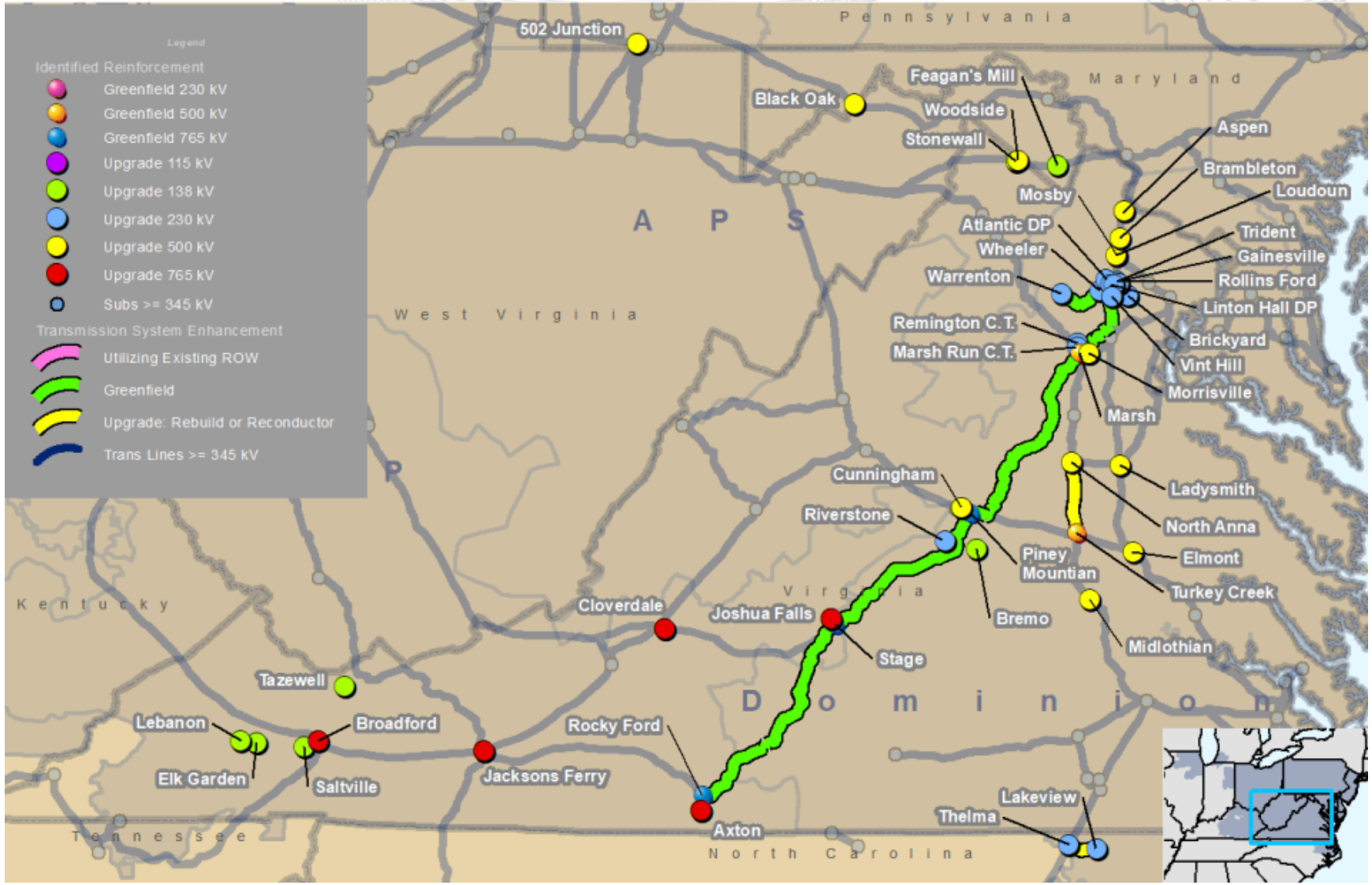
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM – 78
(kV designation only, All kVs)



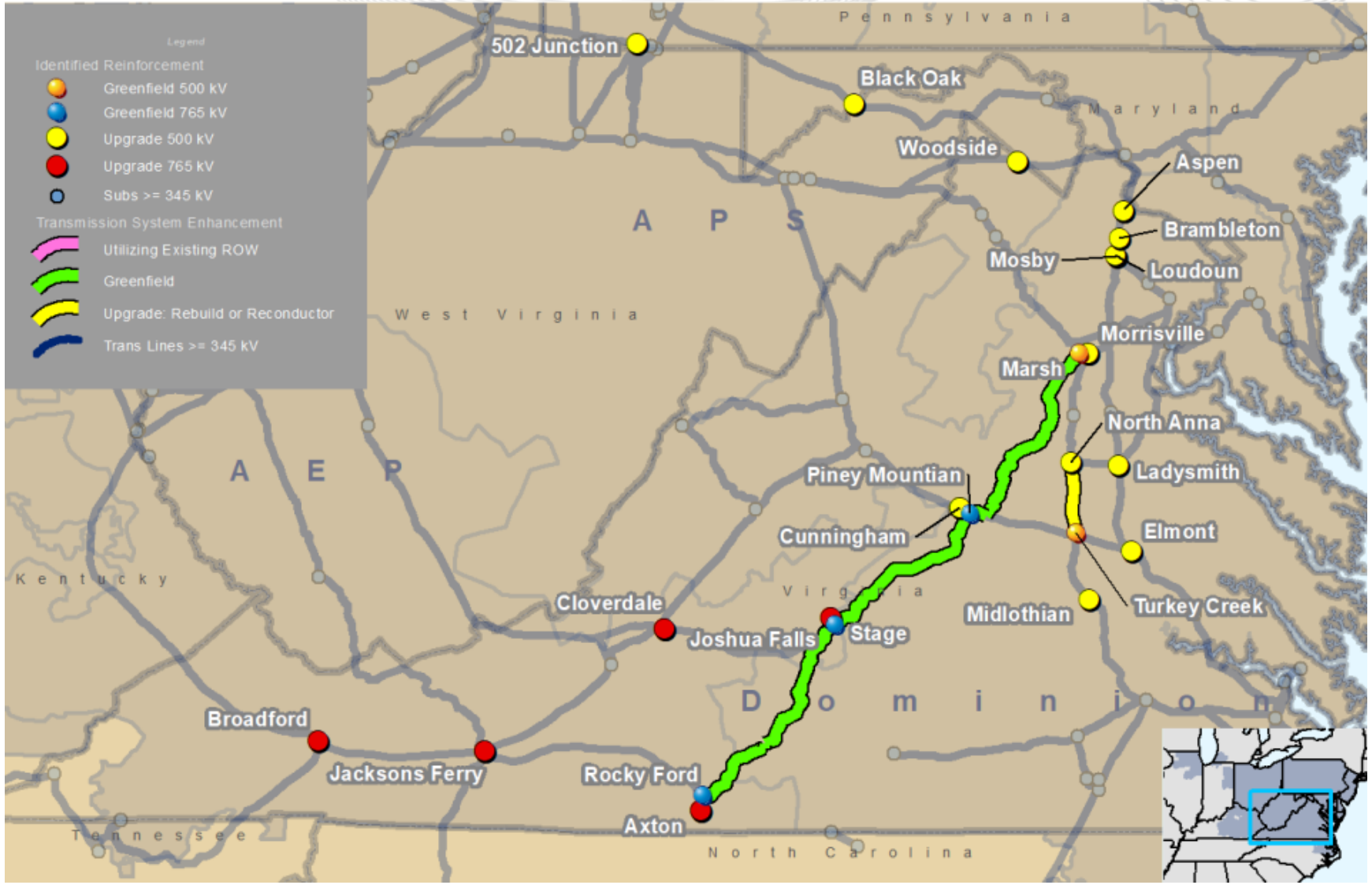
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM - 124
(ROW Designation, all KVs)



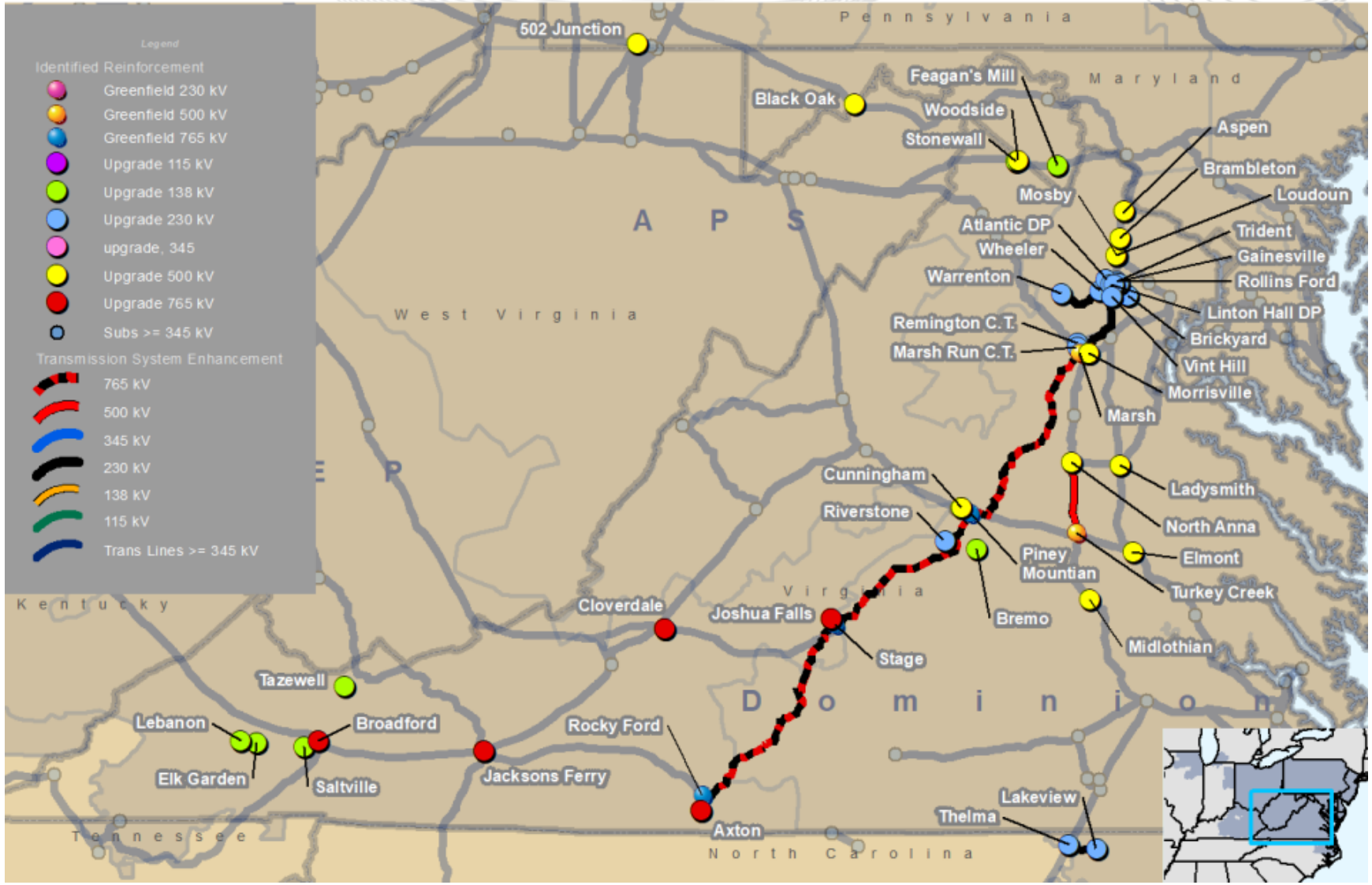
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM – 124
(ROW Designation, 345 KV and above)



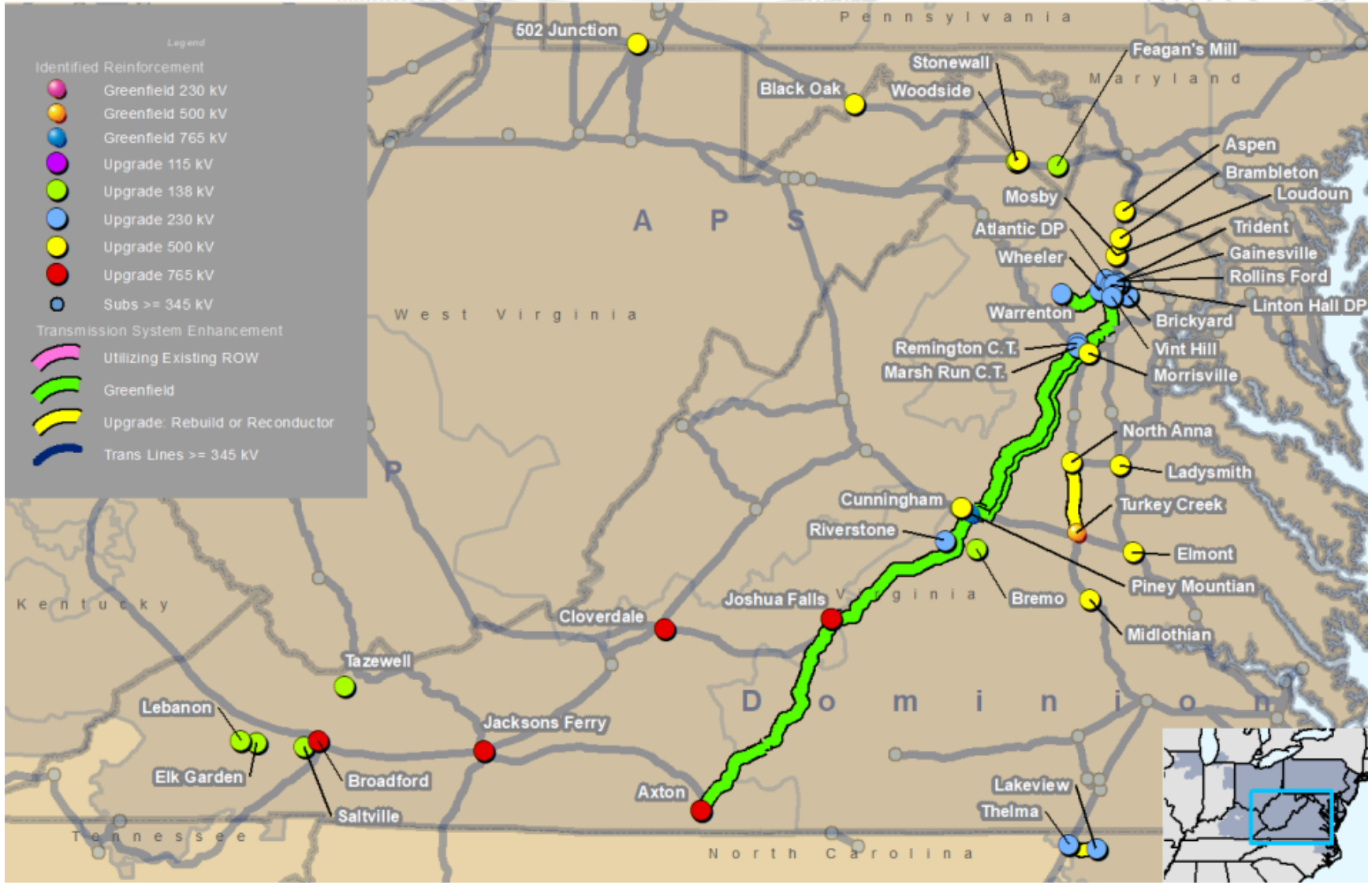
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM – 124
(kV designation only, All kVs)



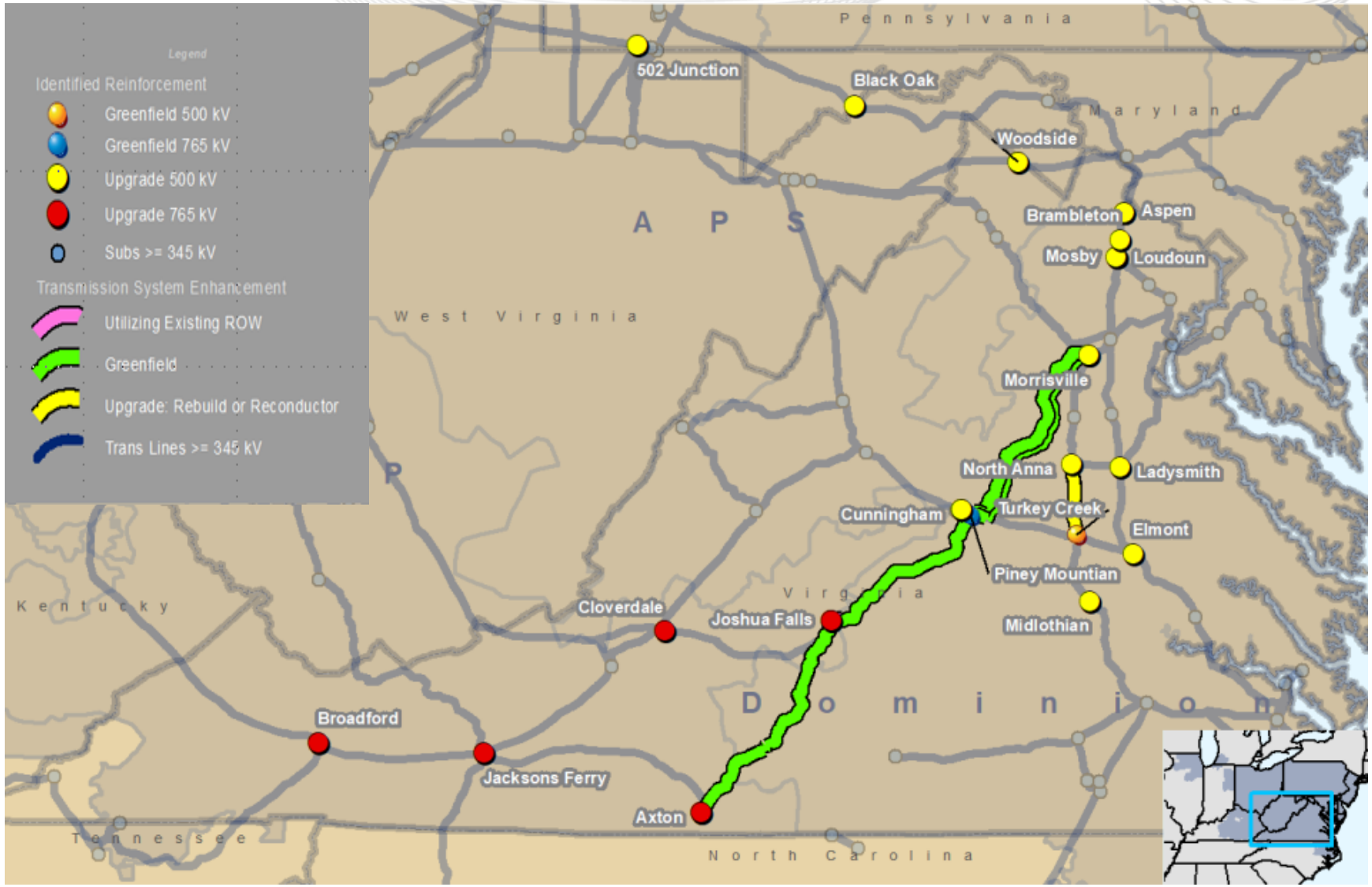
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM - 317
(ROW Designation, all KVs)



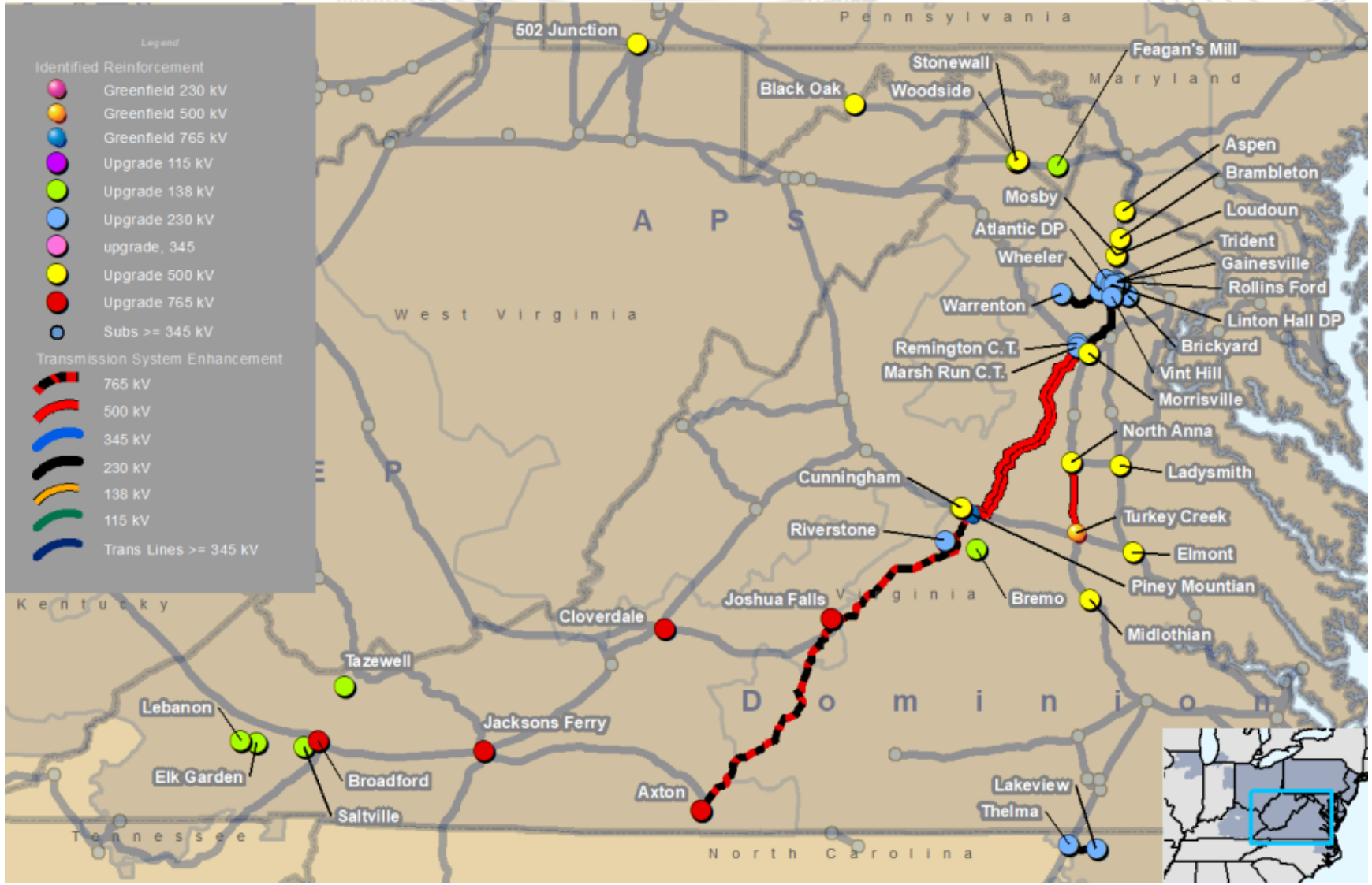
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM - 317
(ROW Designation, 345 KV and above)



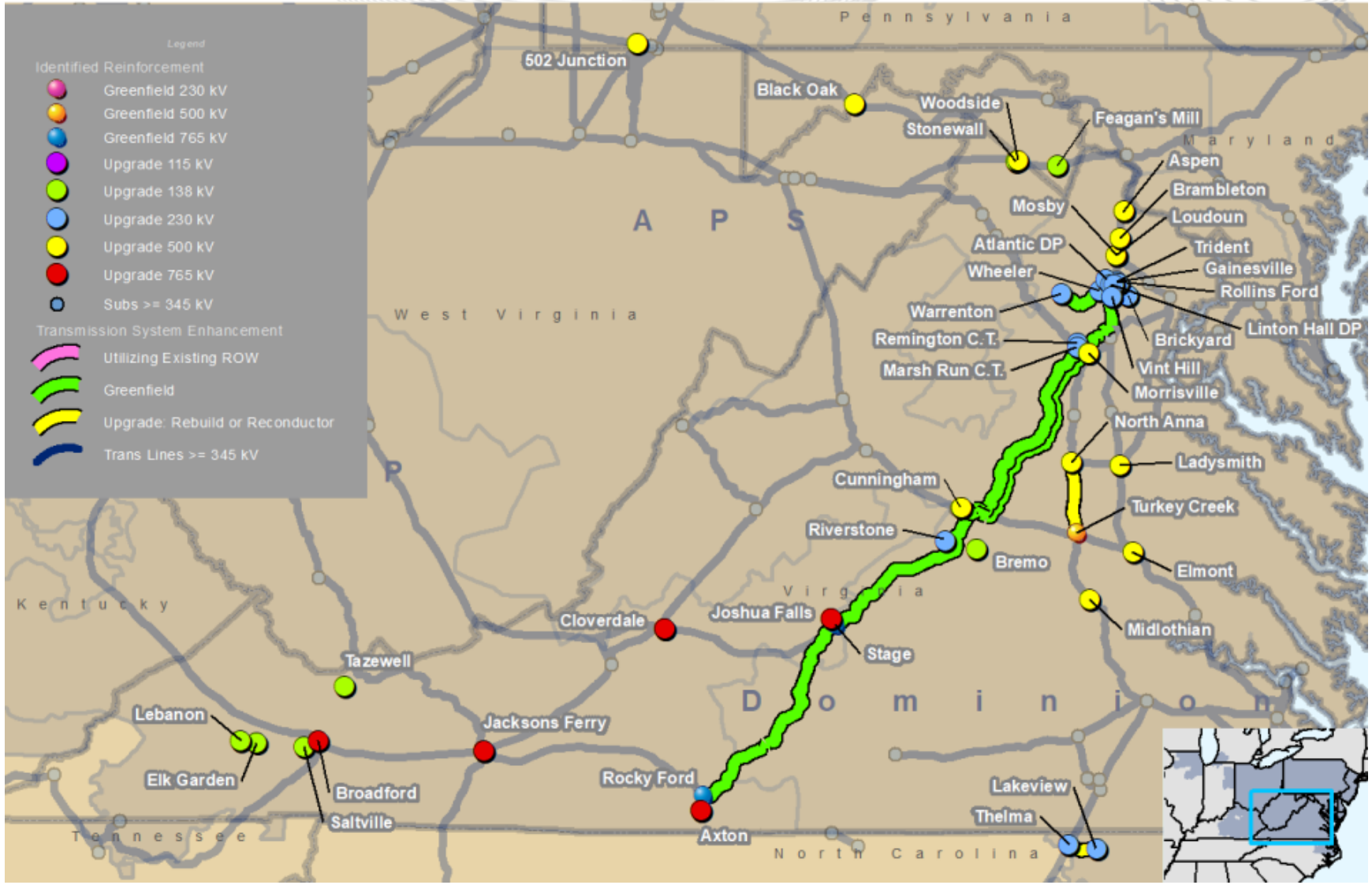
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM - 317
(kV designation only, All kVs)



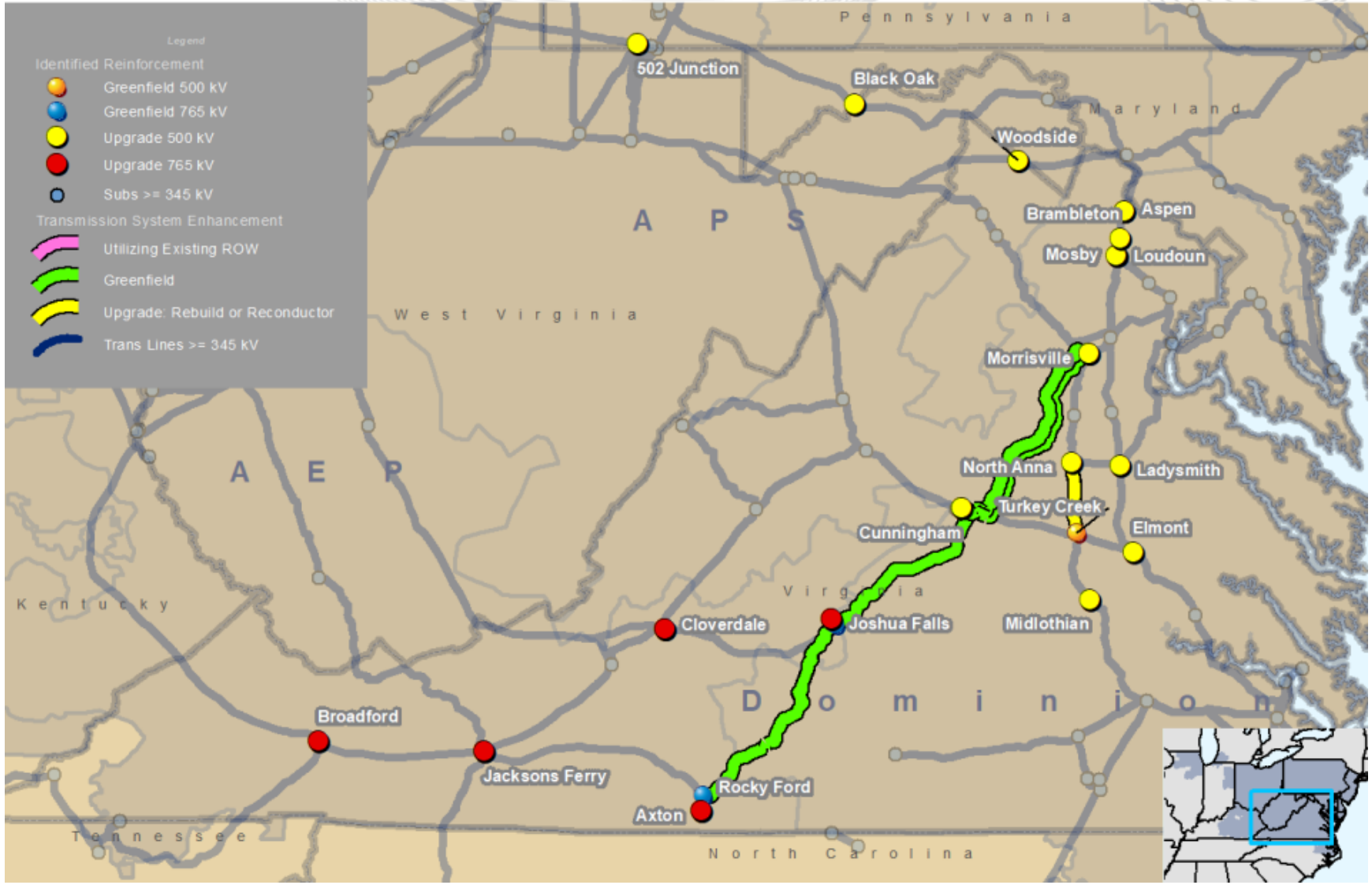
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM - 506
(ROW Designation, all KVs)



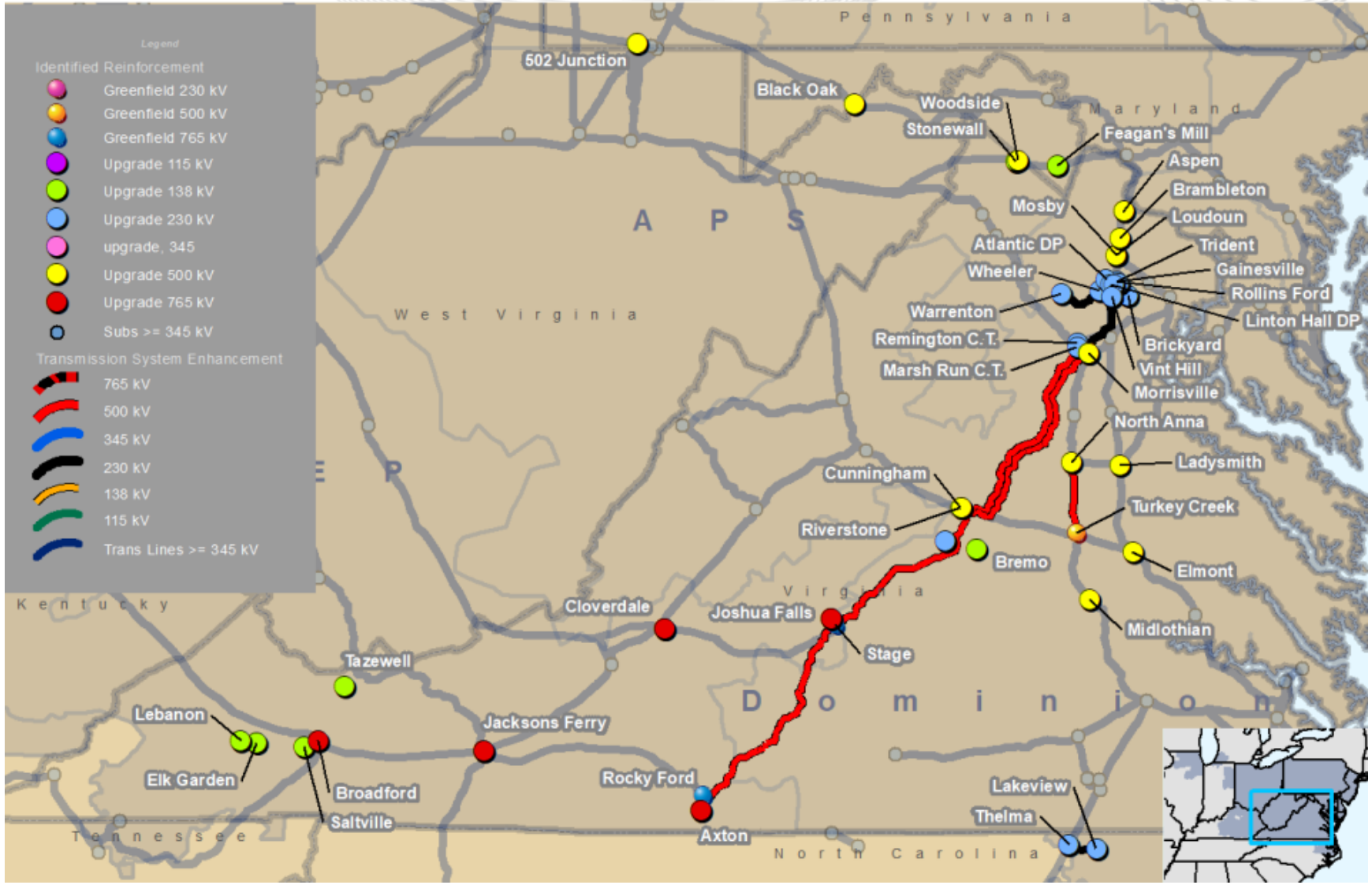
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM - 506
(ROW Designation, 345 KV and above)



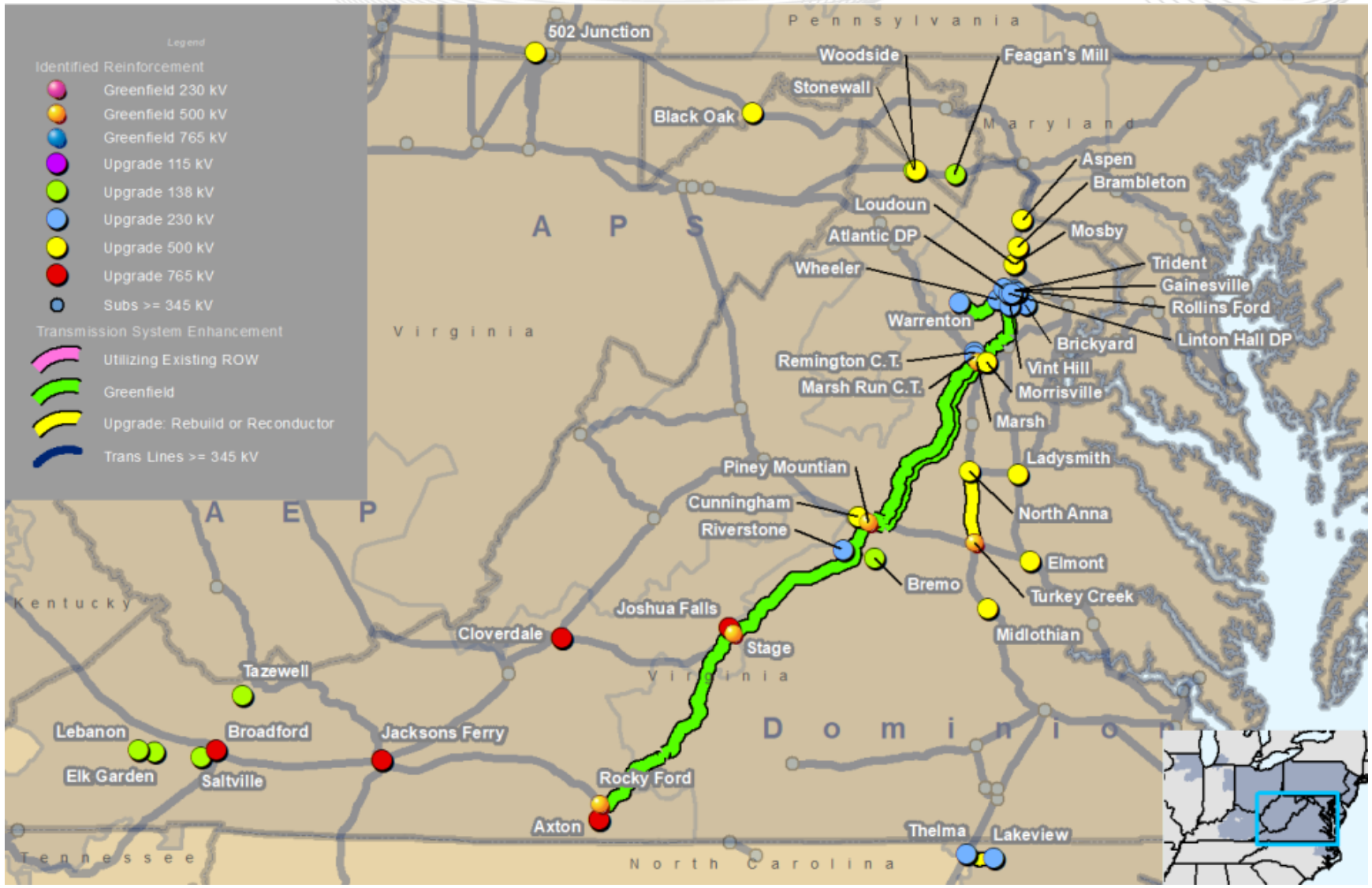
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM - 506
(kV designation only, All kVs)



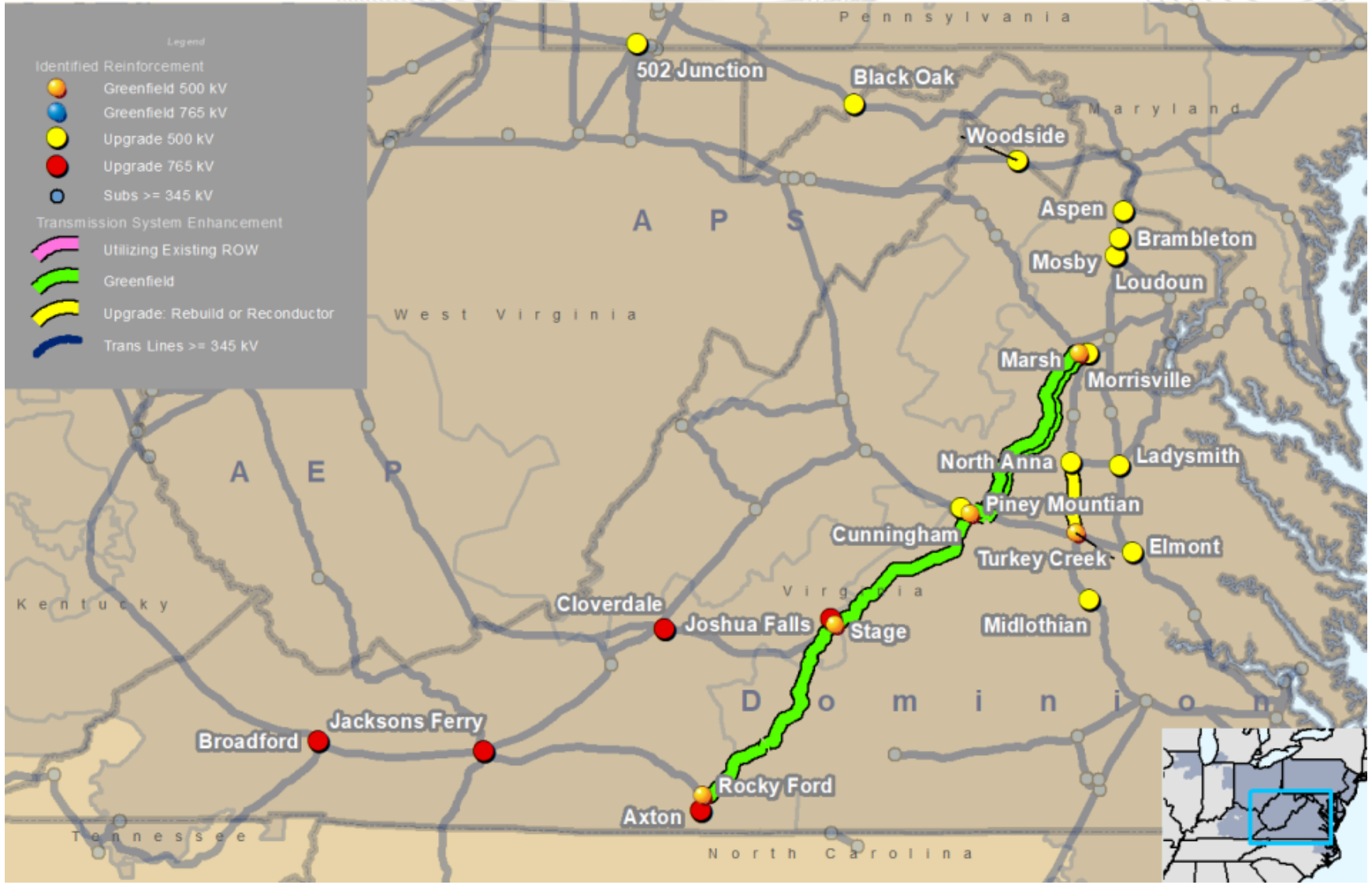
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM - 622
(ROW Designation, all KVs)



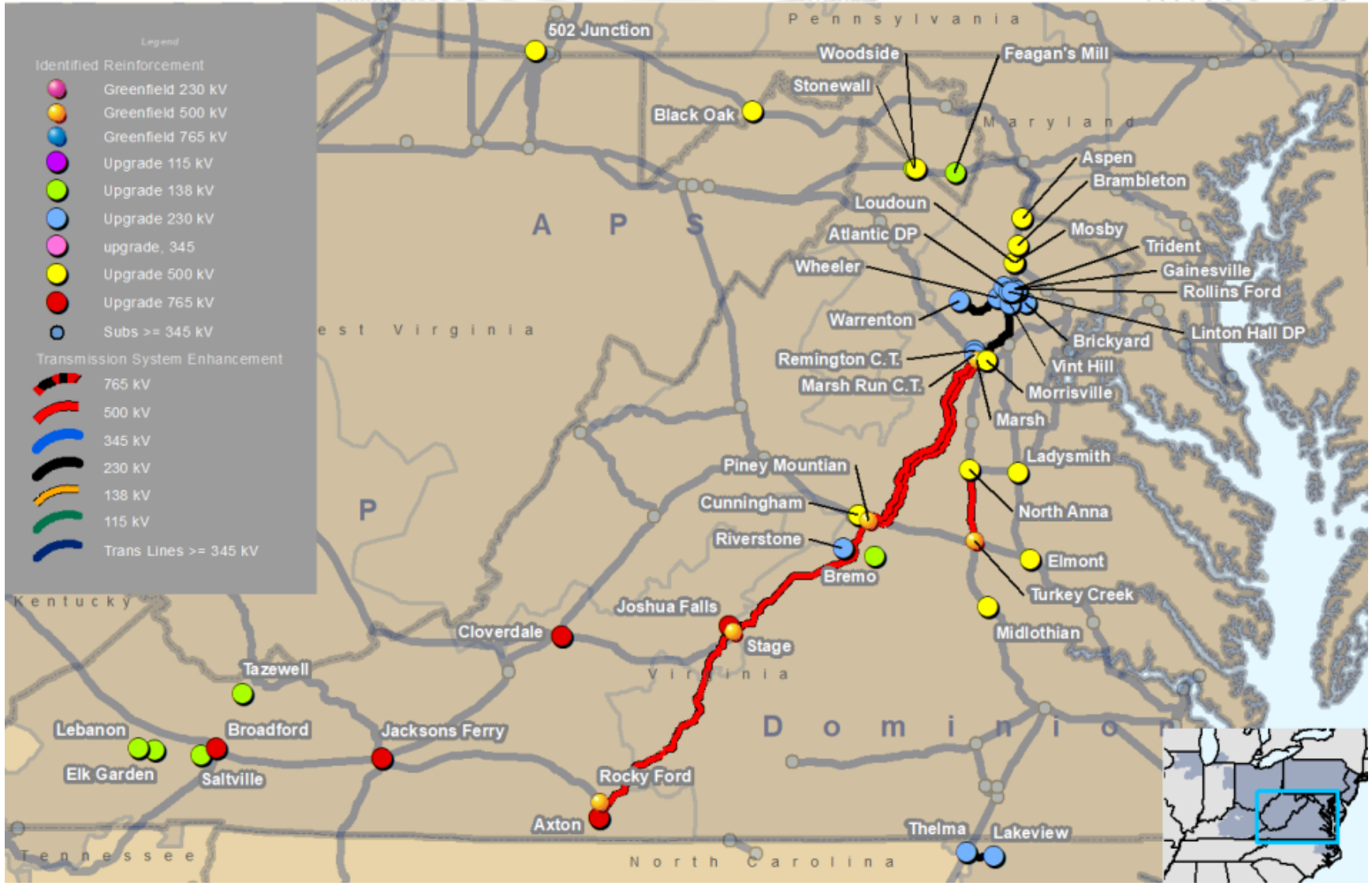
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM – 622
(ROW Designation, 345 KV and above)



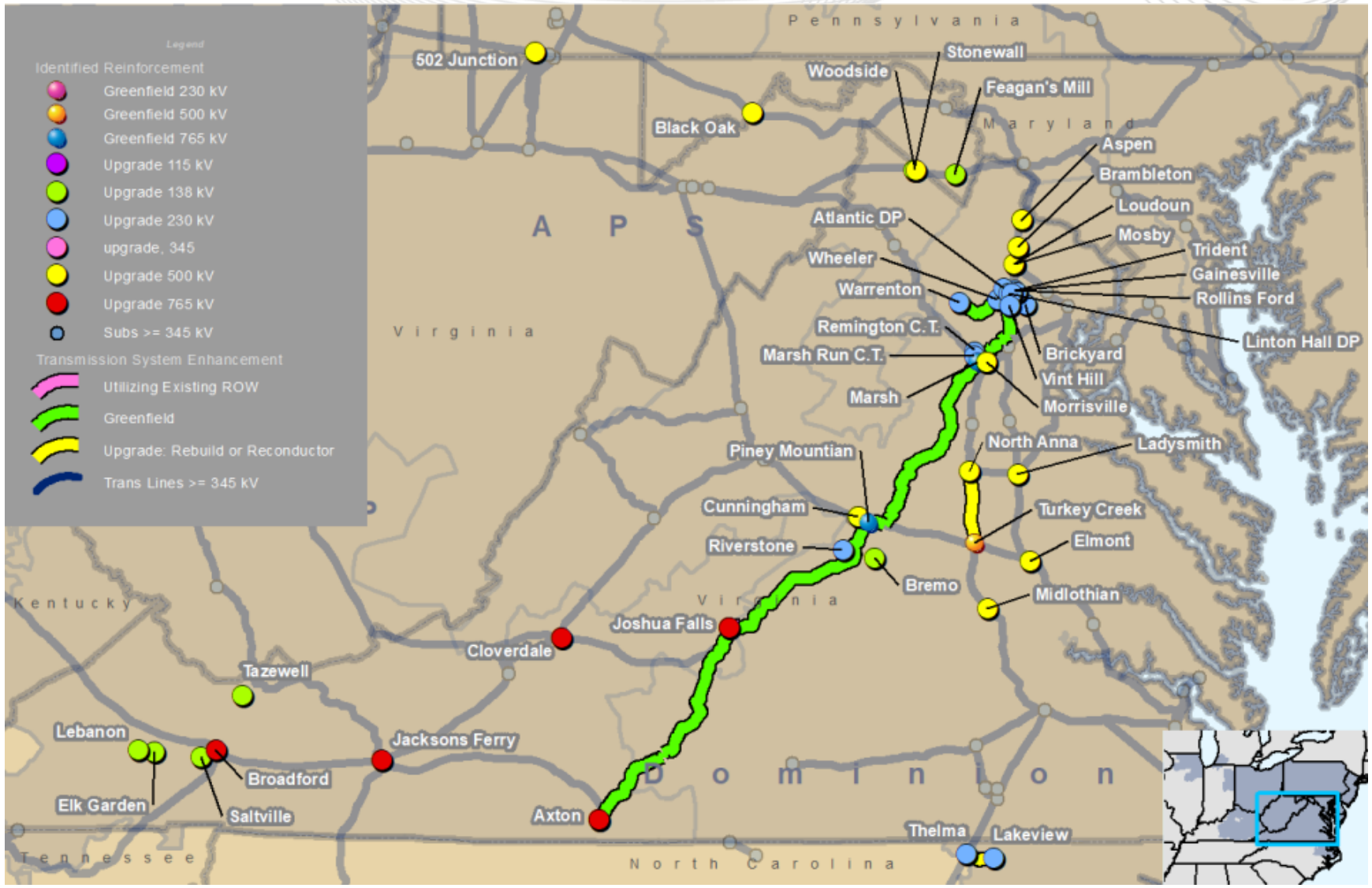
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM - 622
(kV designation only, All kVs)



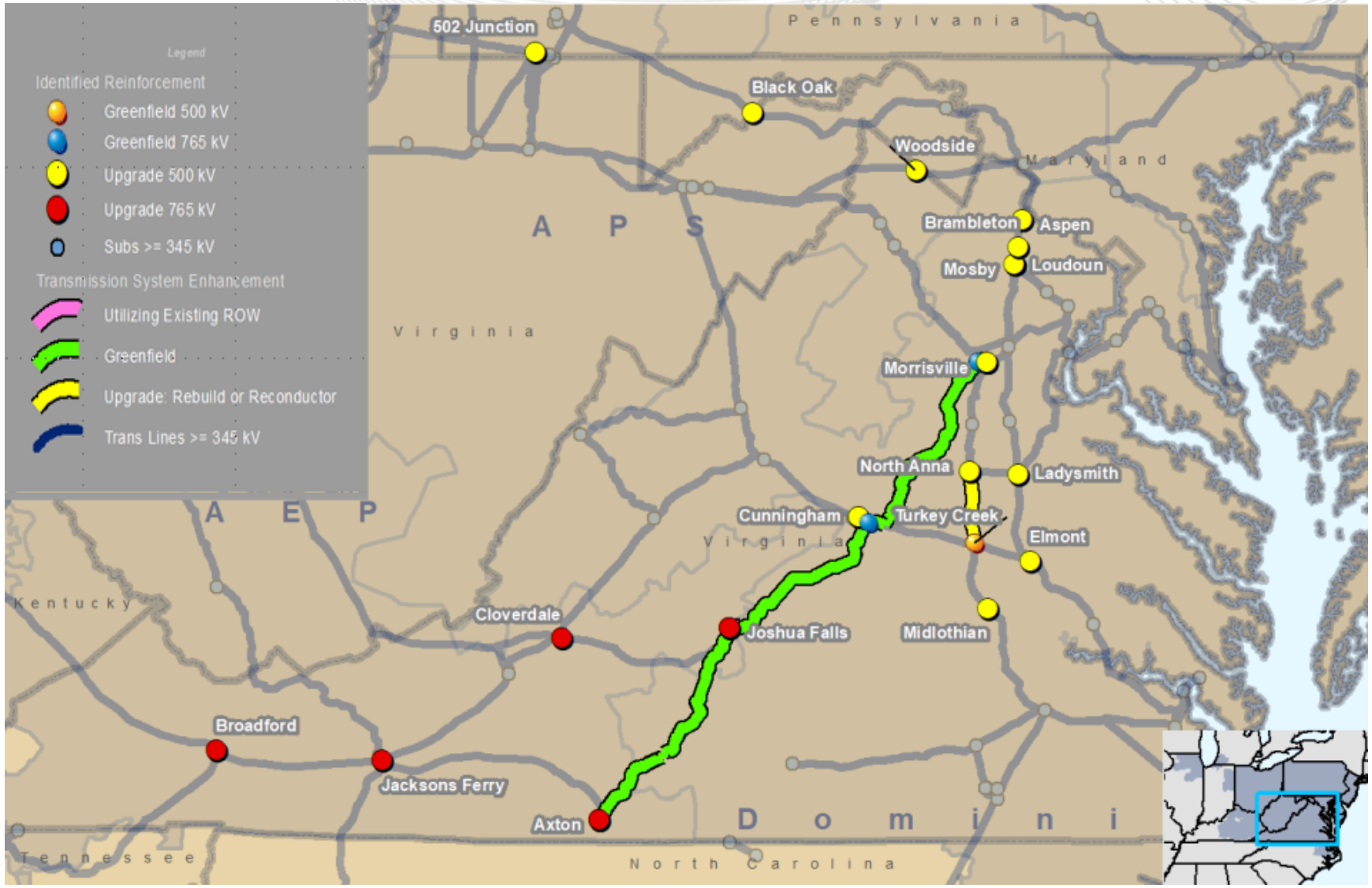
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM – 839
(ROW Designation, all KVs)



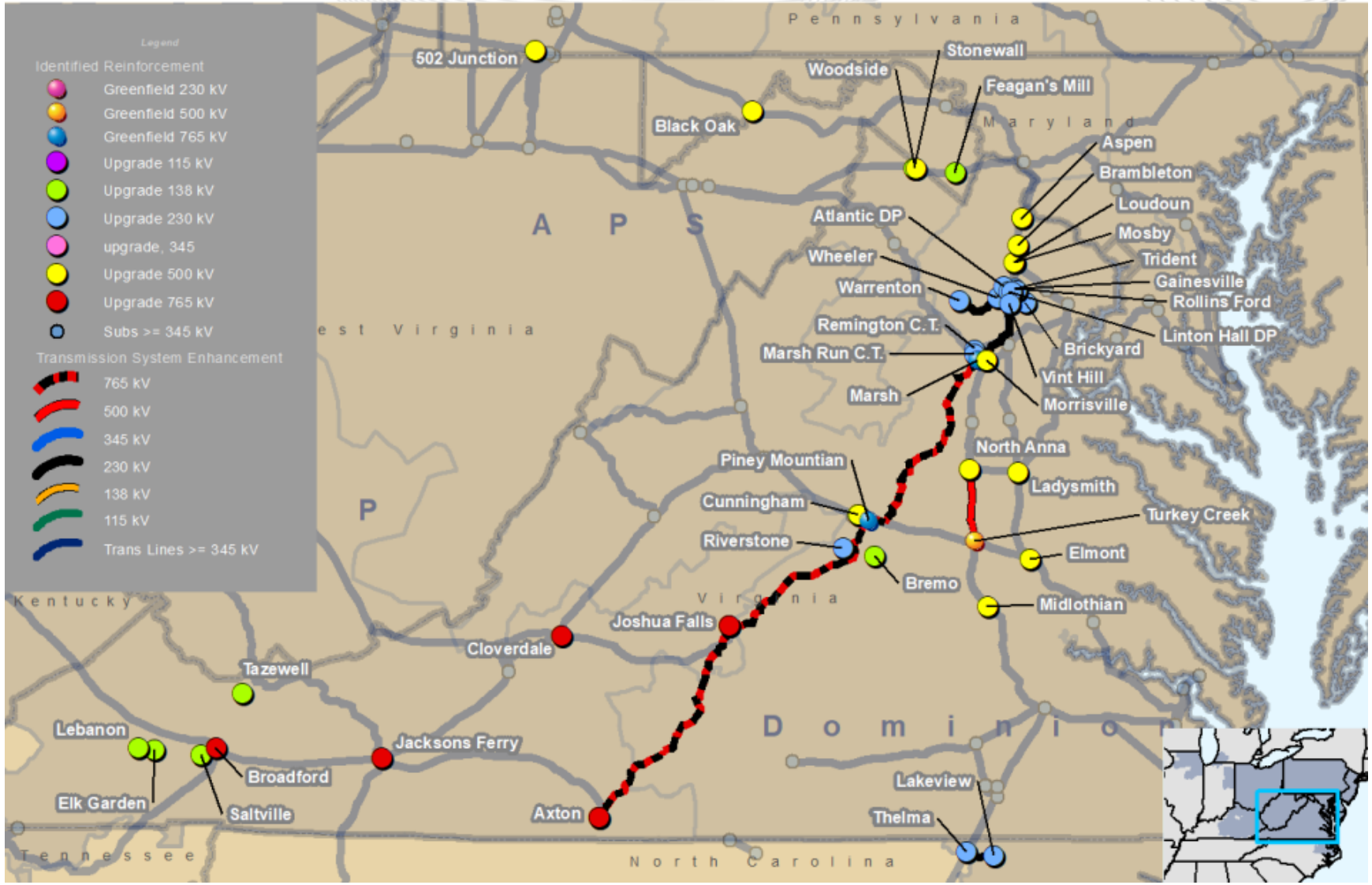
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM – 839
(ROW Designation, 345 KV and above)



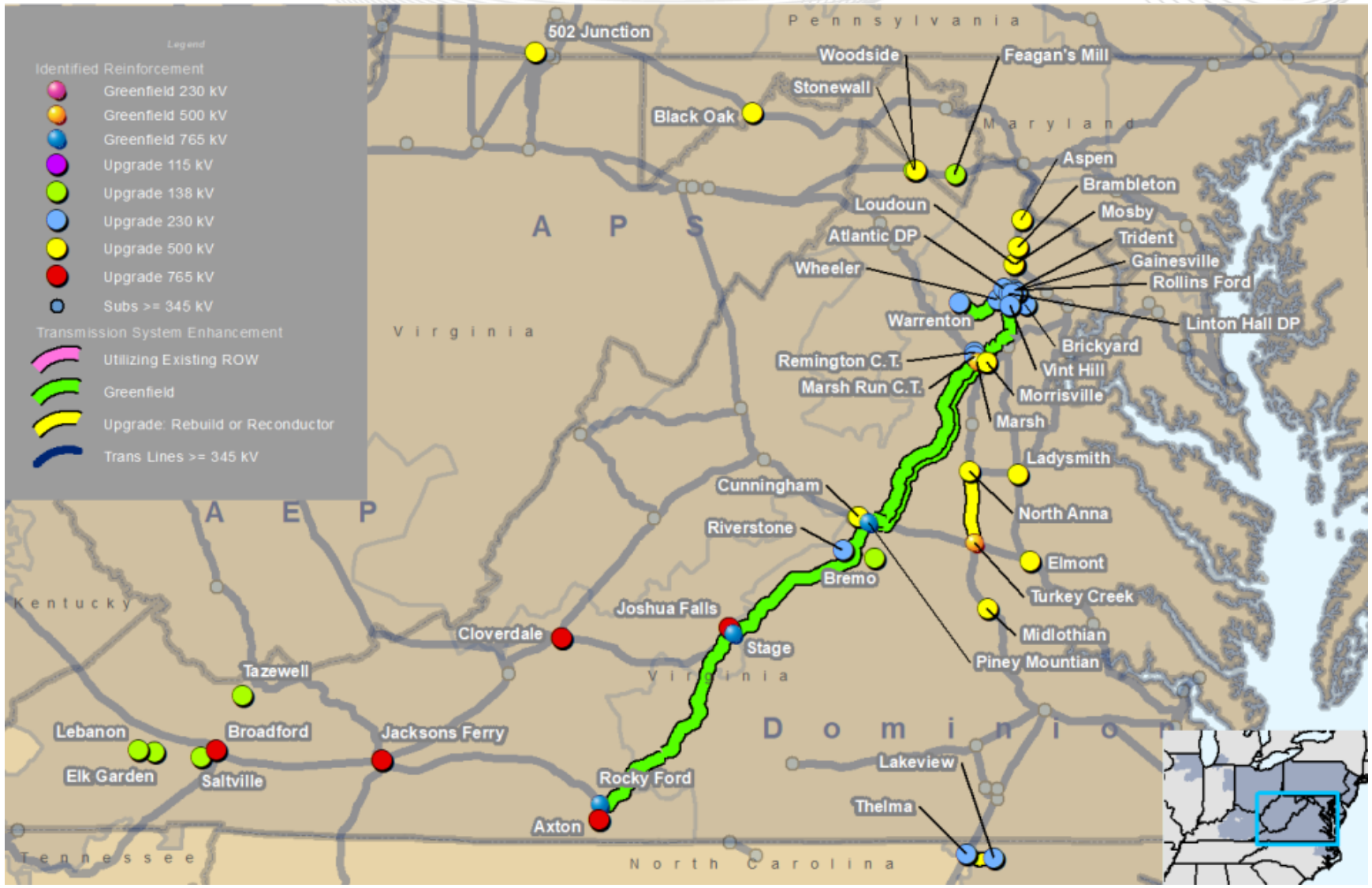
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM - 839
(kV designation only, All kVs)



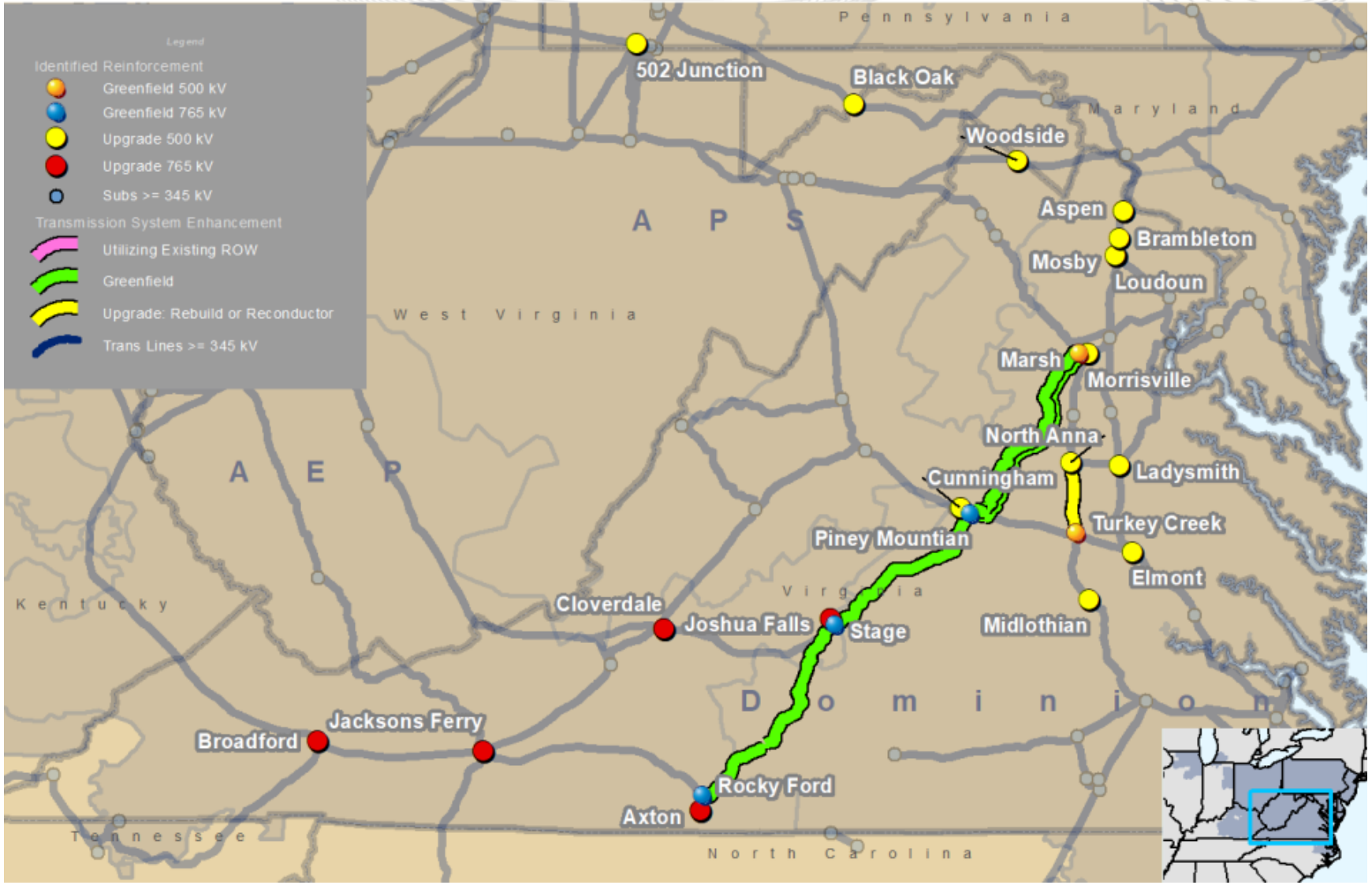
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM - 898
(ROW Designation, all KVs)



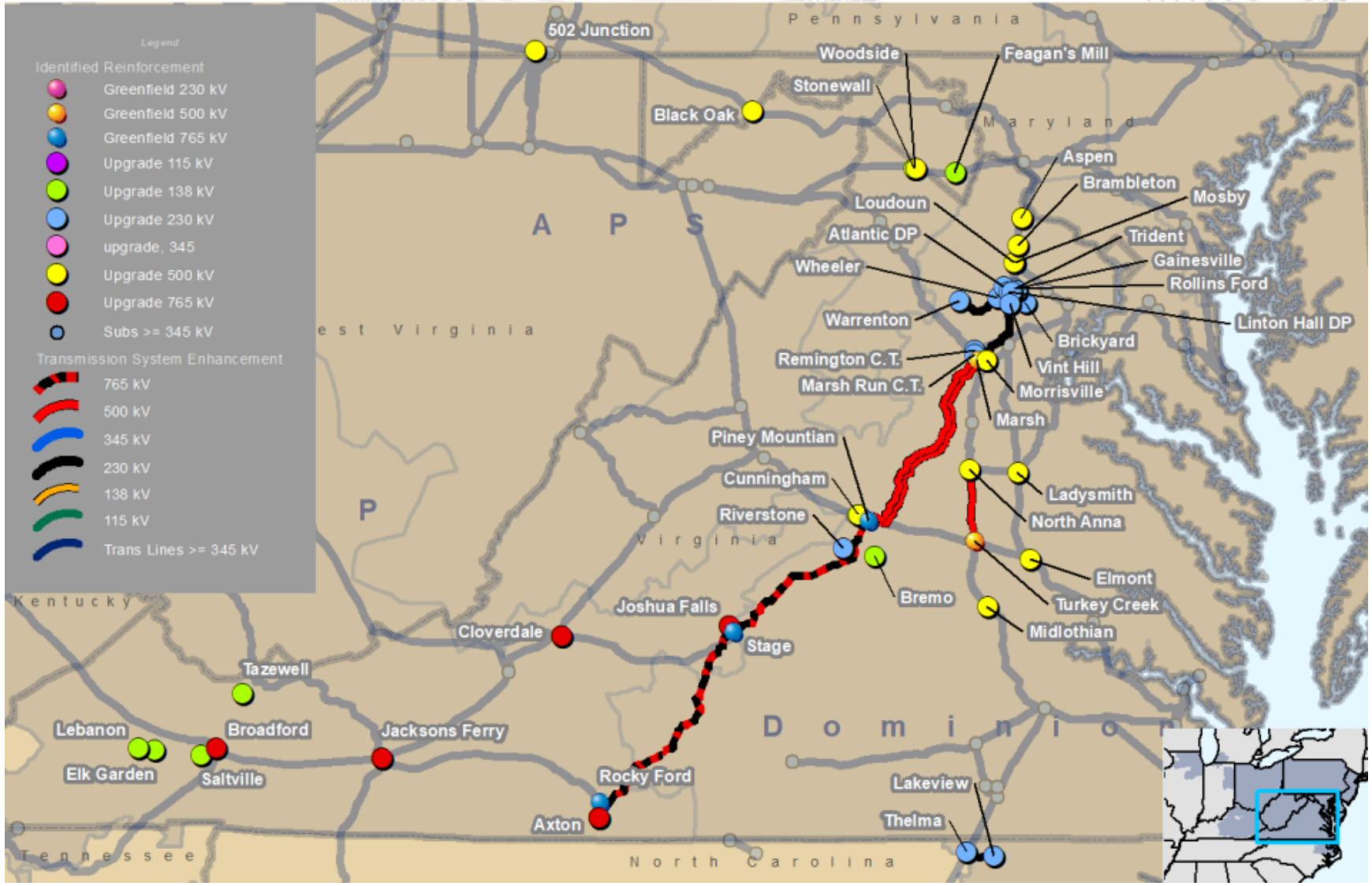
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM - 898
(ROW Designation, 345 KV and above)



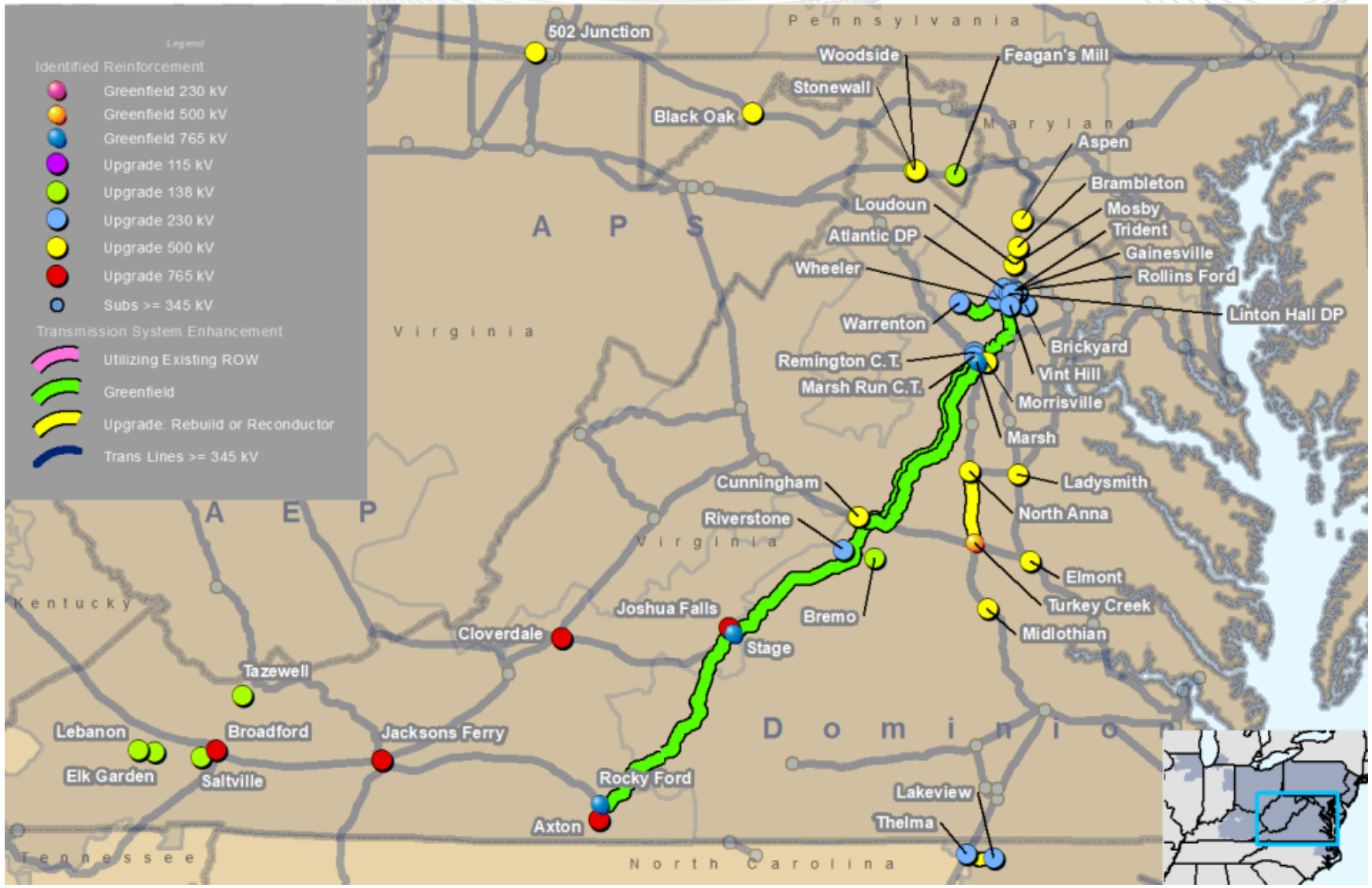
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM – 898
(kV designation only, All kVs)



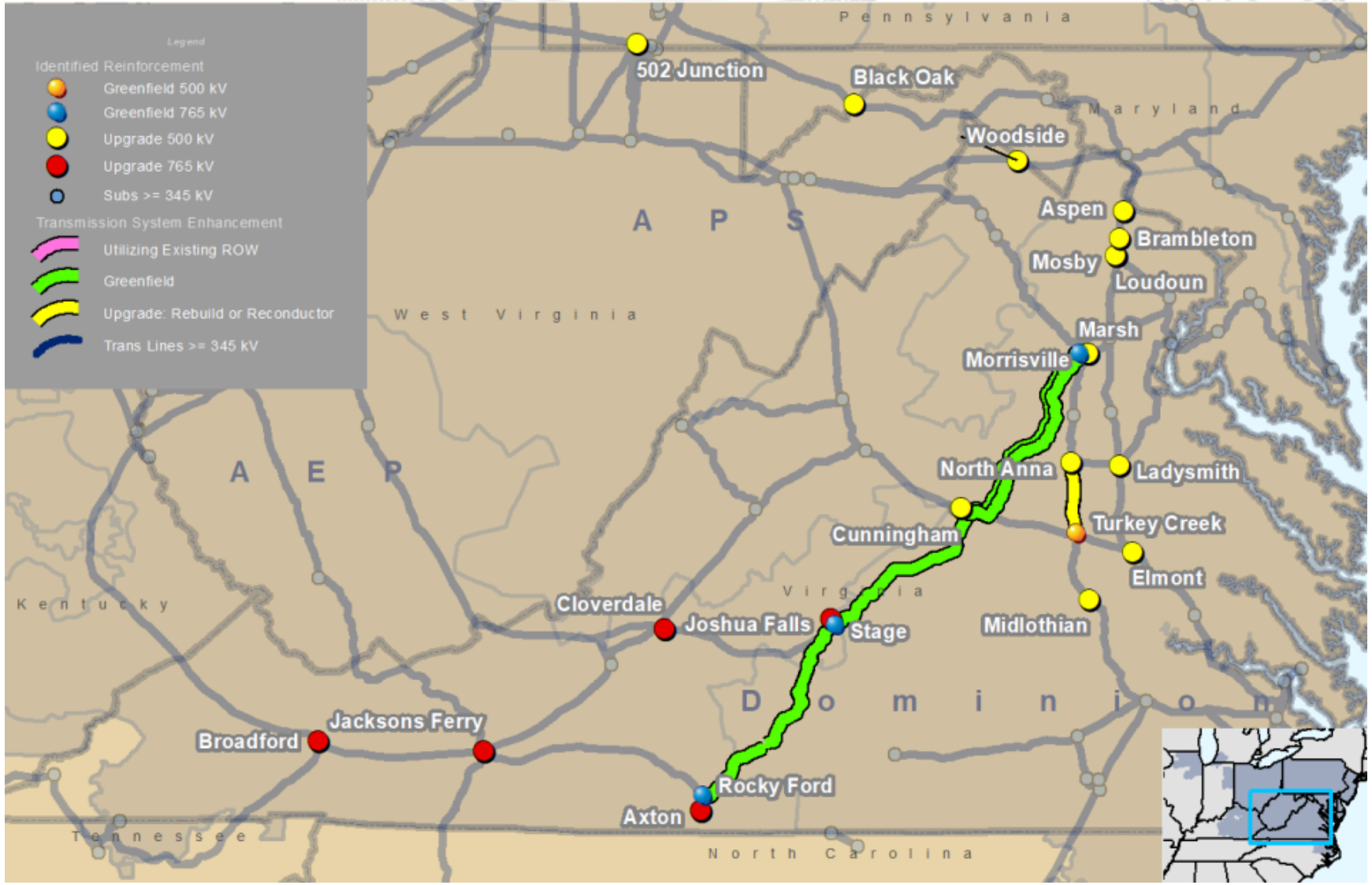
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM - 904
(ROW designation only, All kVs)



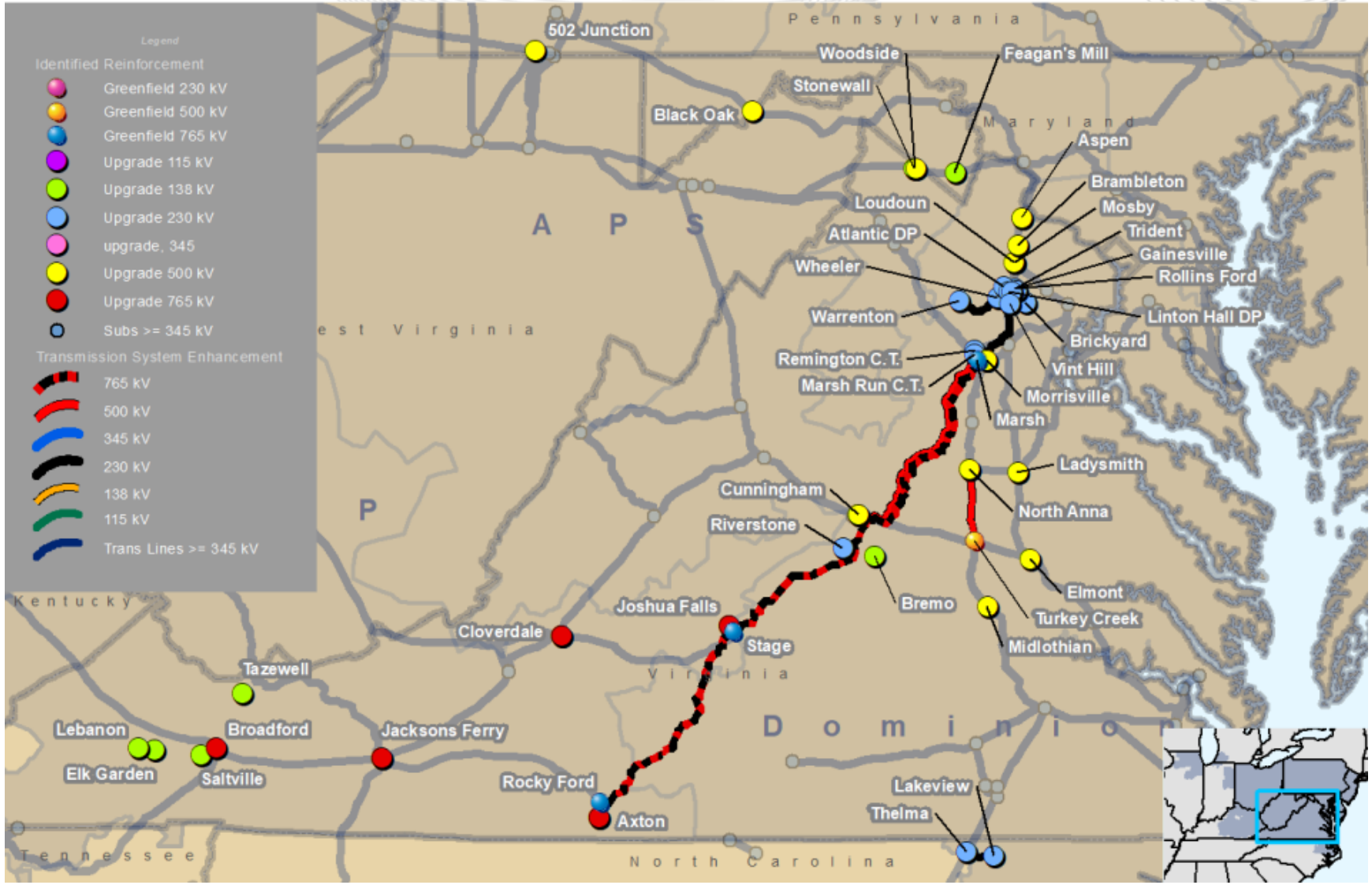
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM – 904
(ROW Designation, 345 KV and above)



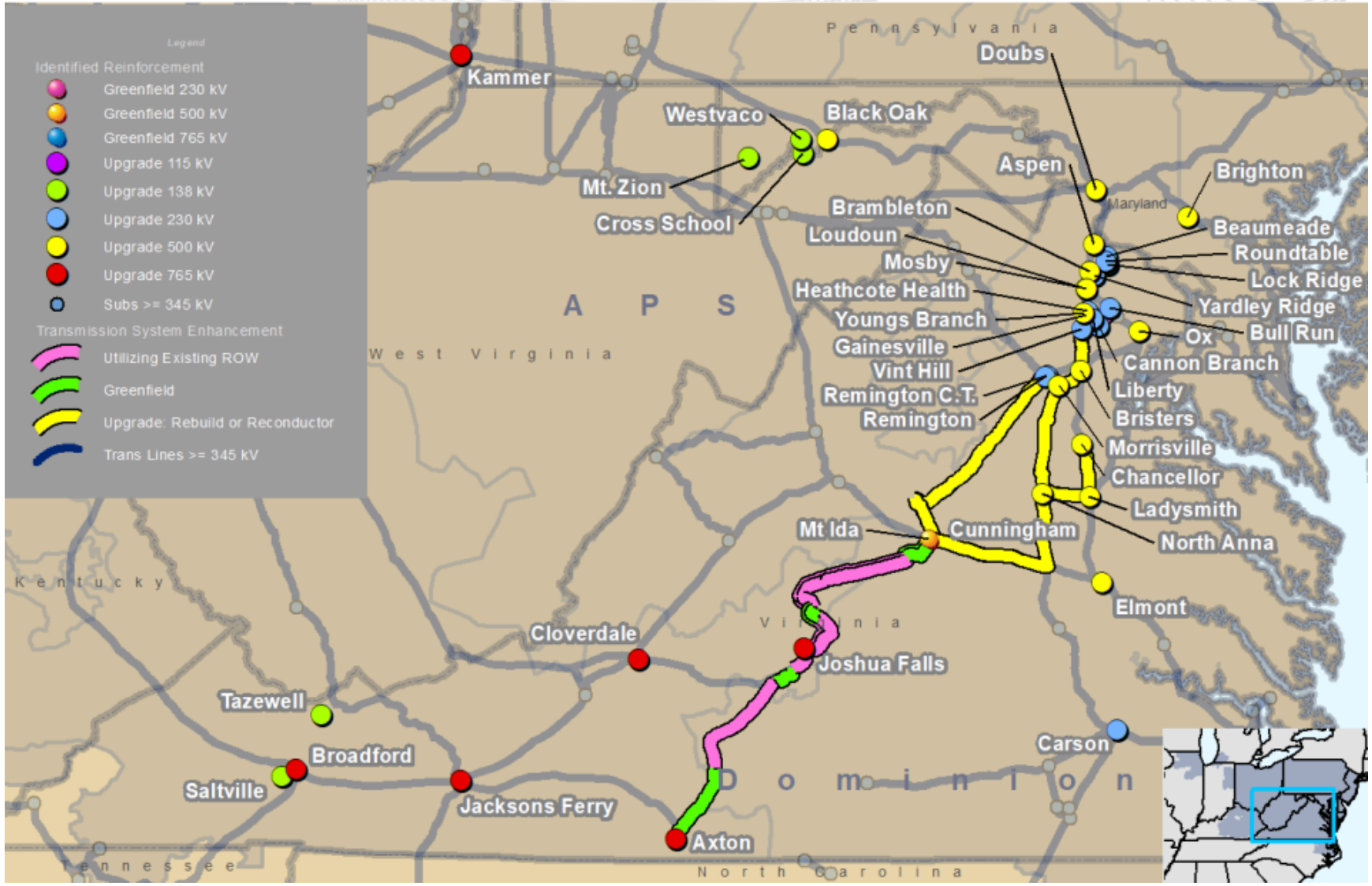
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

CNTLTM - 904
(kV designation only, All kVs)



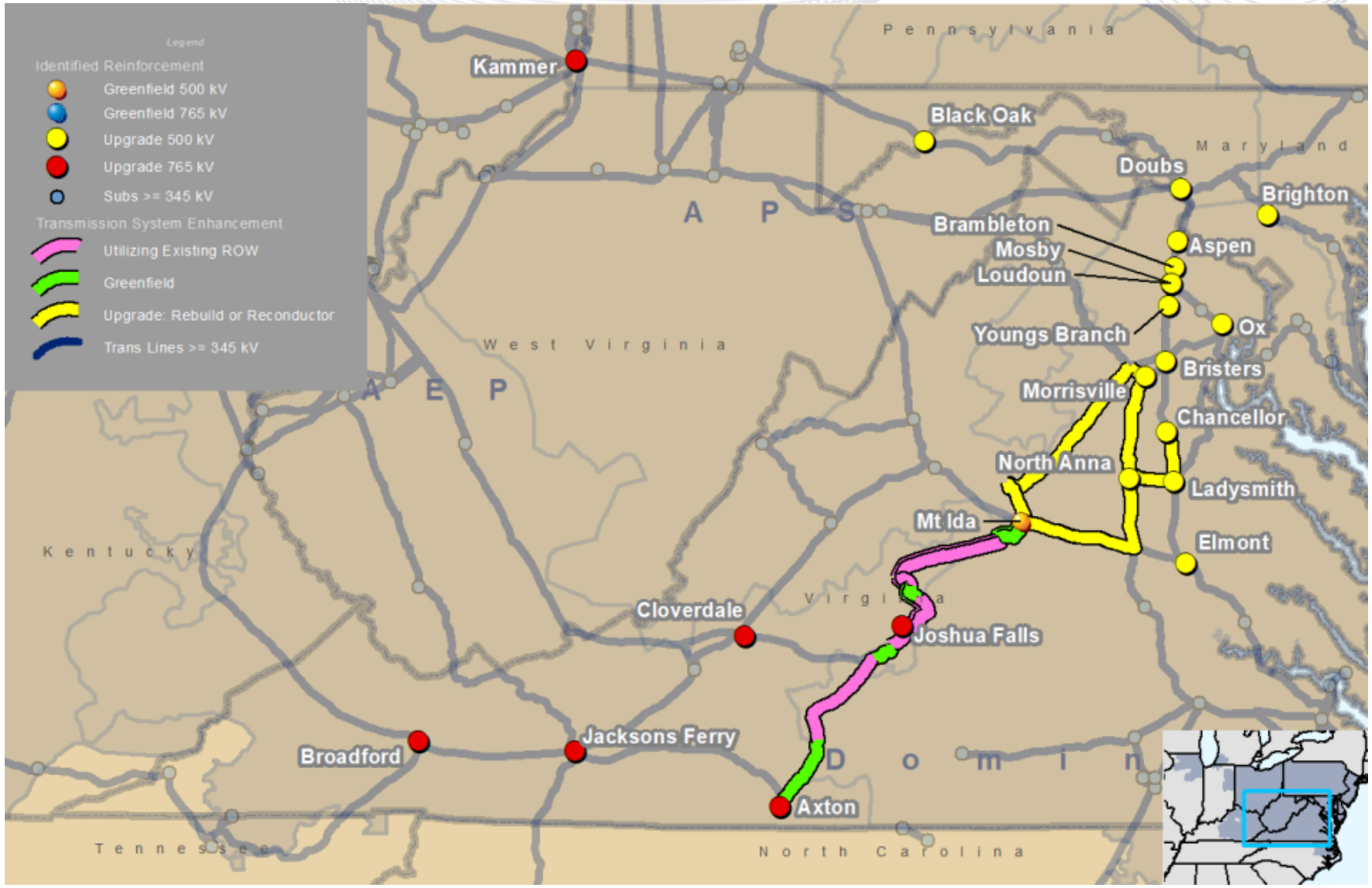
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

NEETMH (NextEra) Proposals

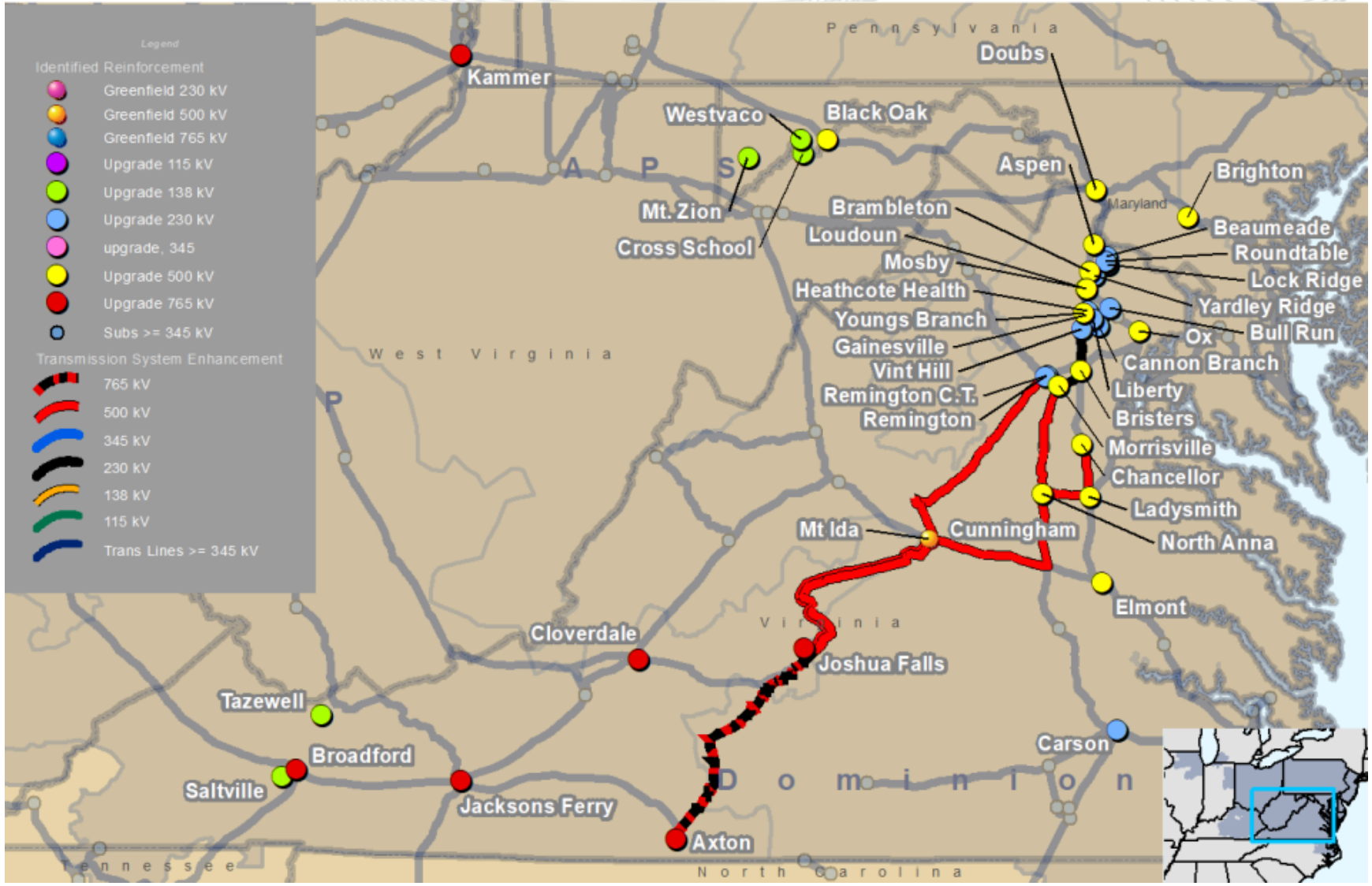


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

NEETMH- 146
(ROW Designation, 345 KV and above)

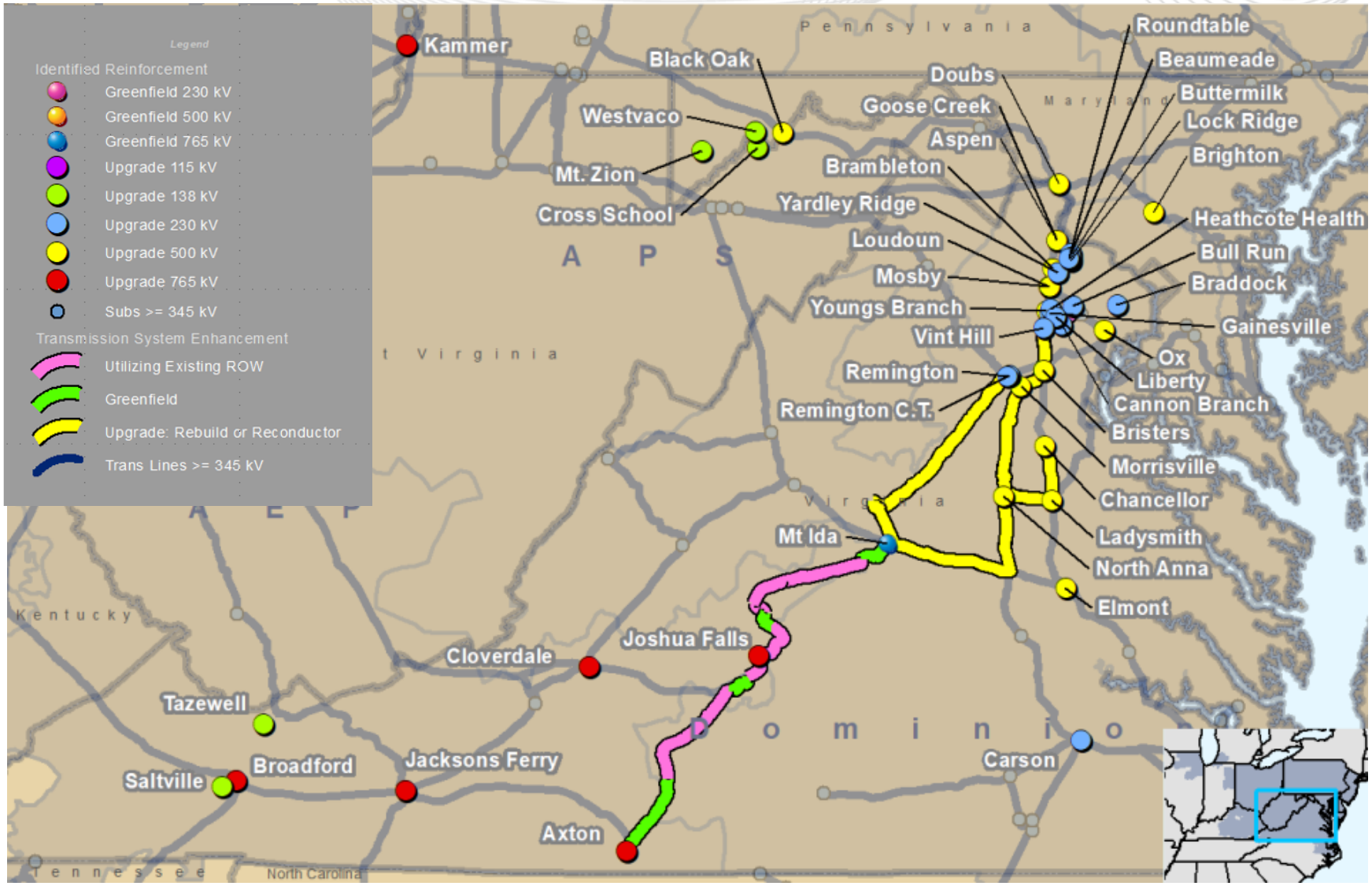


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



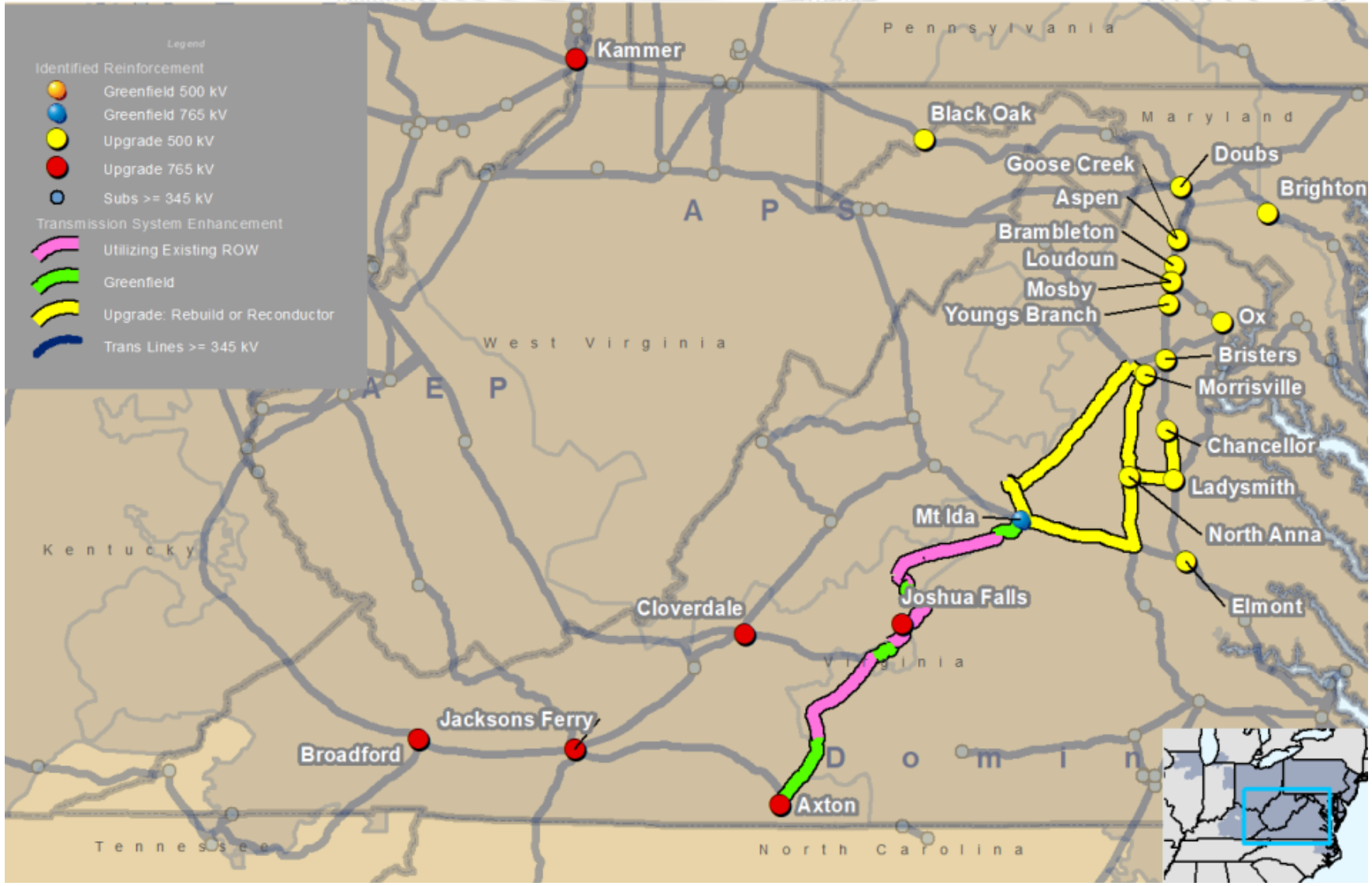
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

NEETMH- 768
(ROW Designation, all KVs)



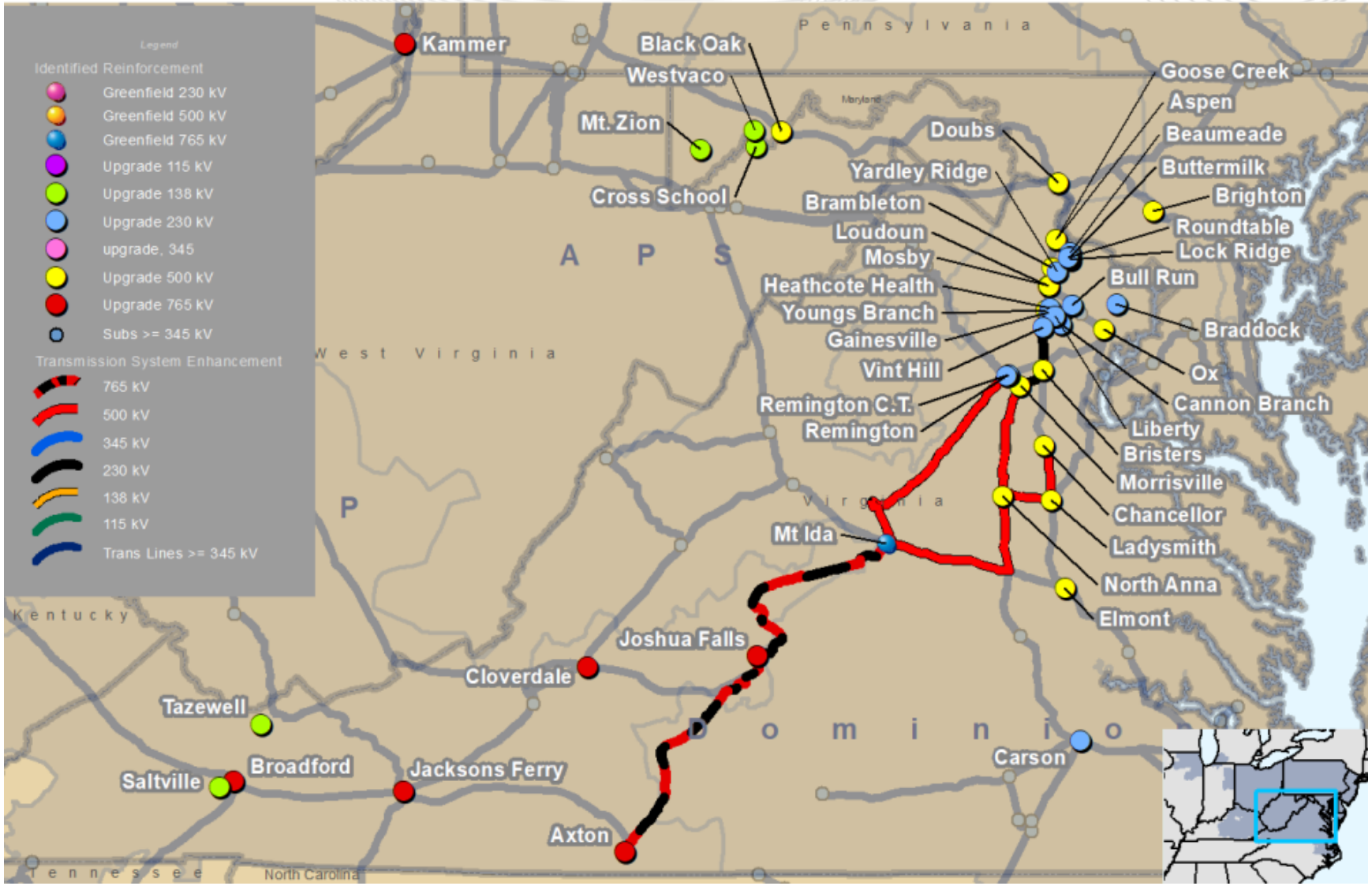
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

NEETMH- 768
(ROW Designation, 345 KV and above)



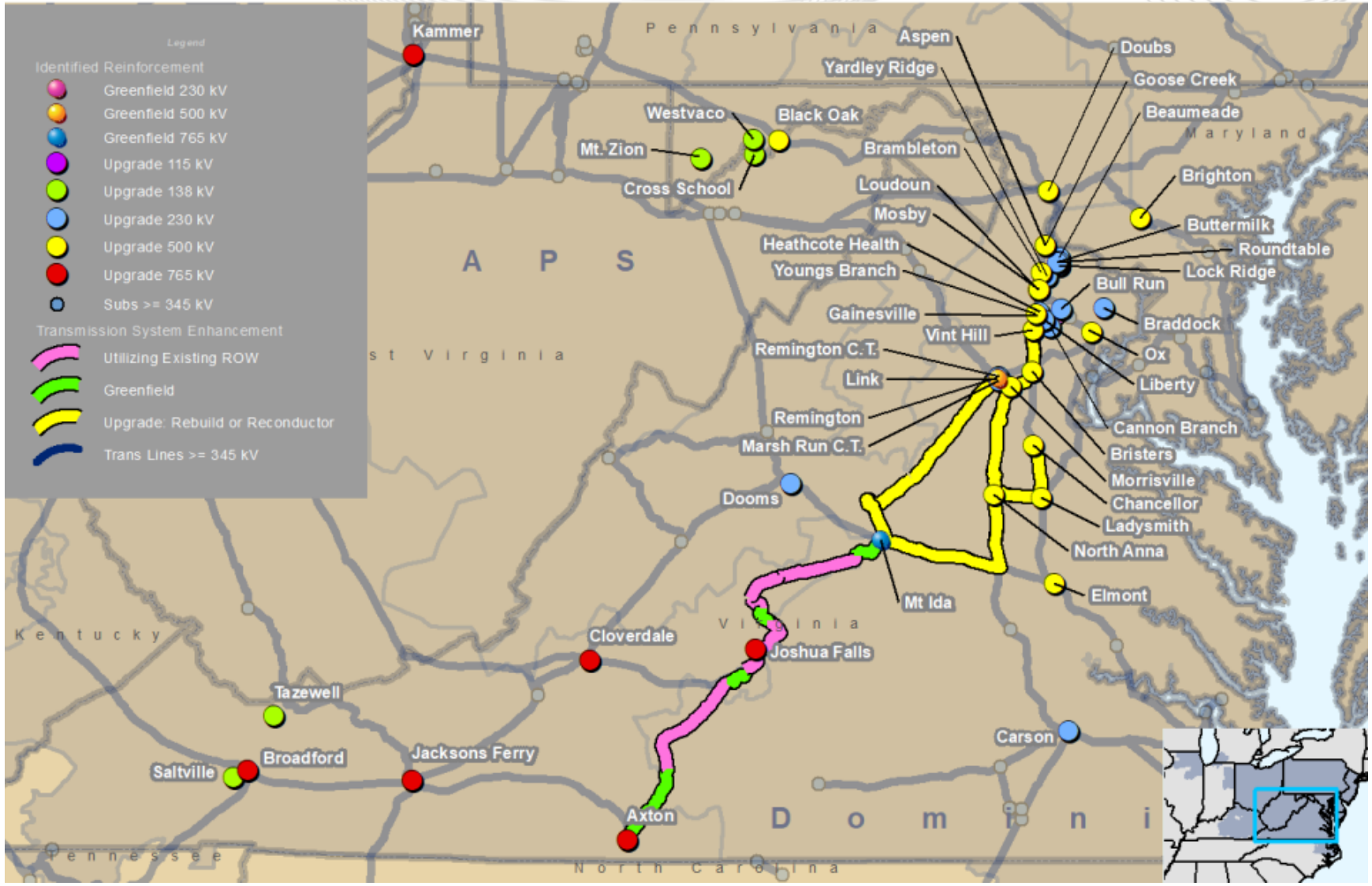
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

NEETMH- 768
(kV designation only, All kVs)



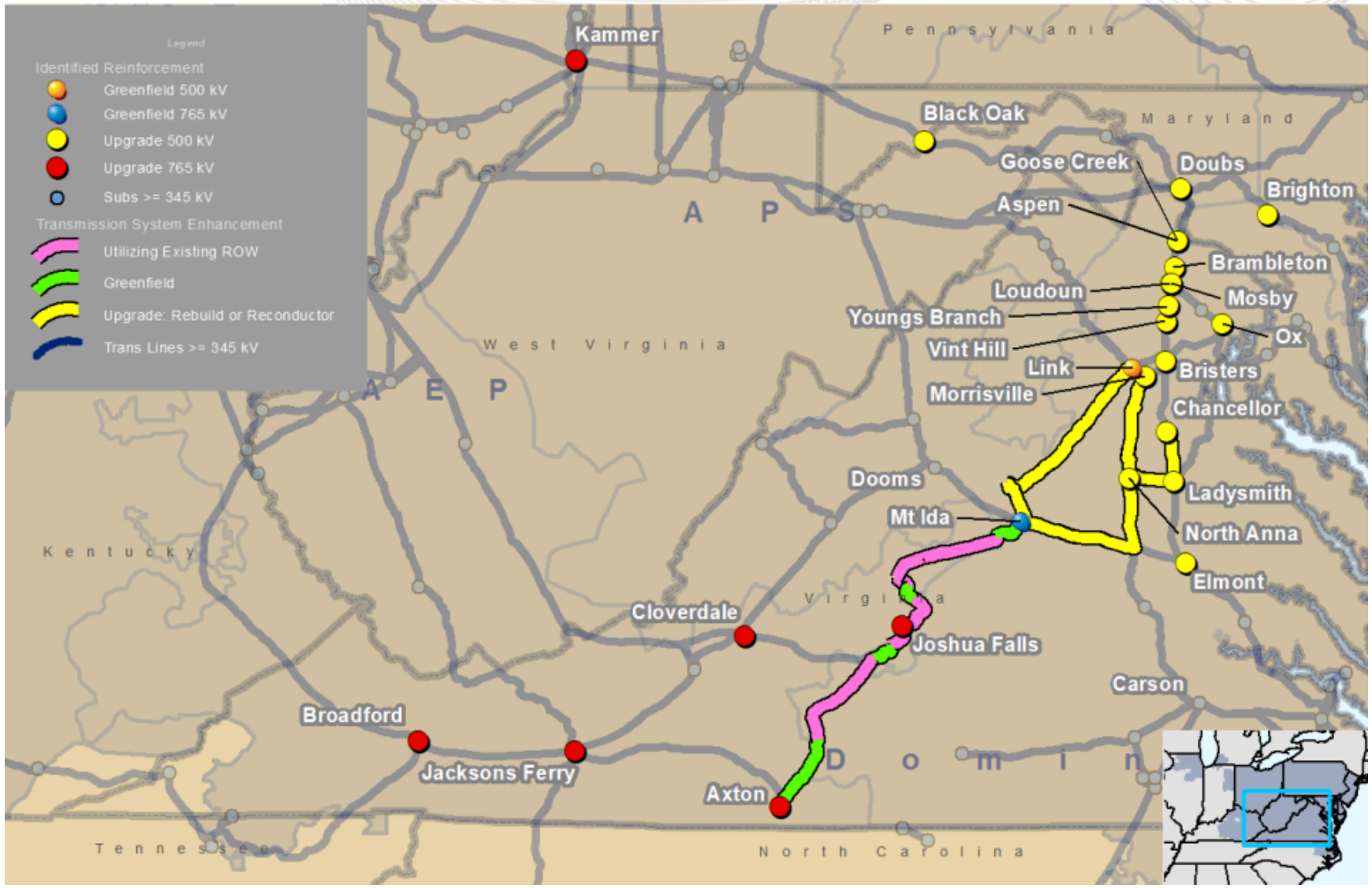
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

NEETMH- 992
(ROW Designation, all KVs)



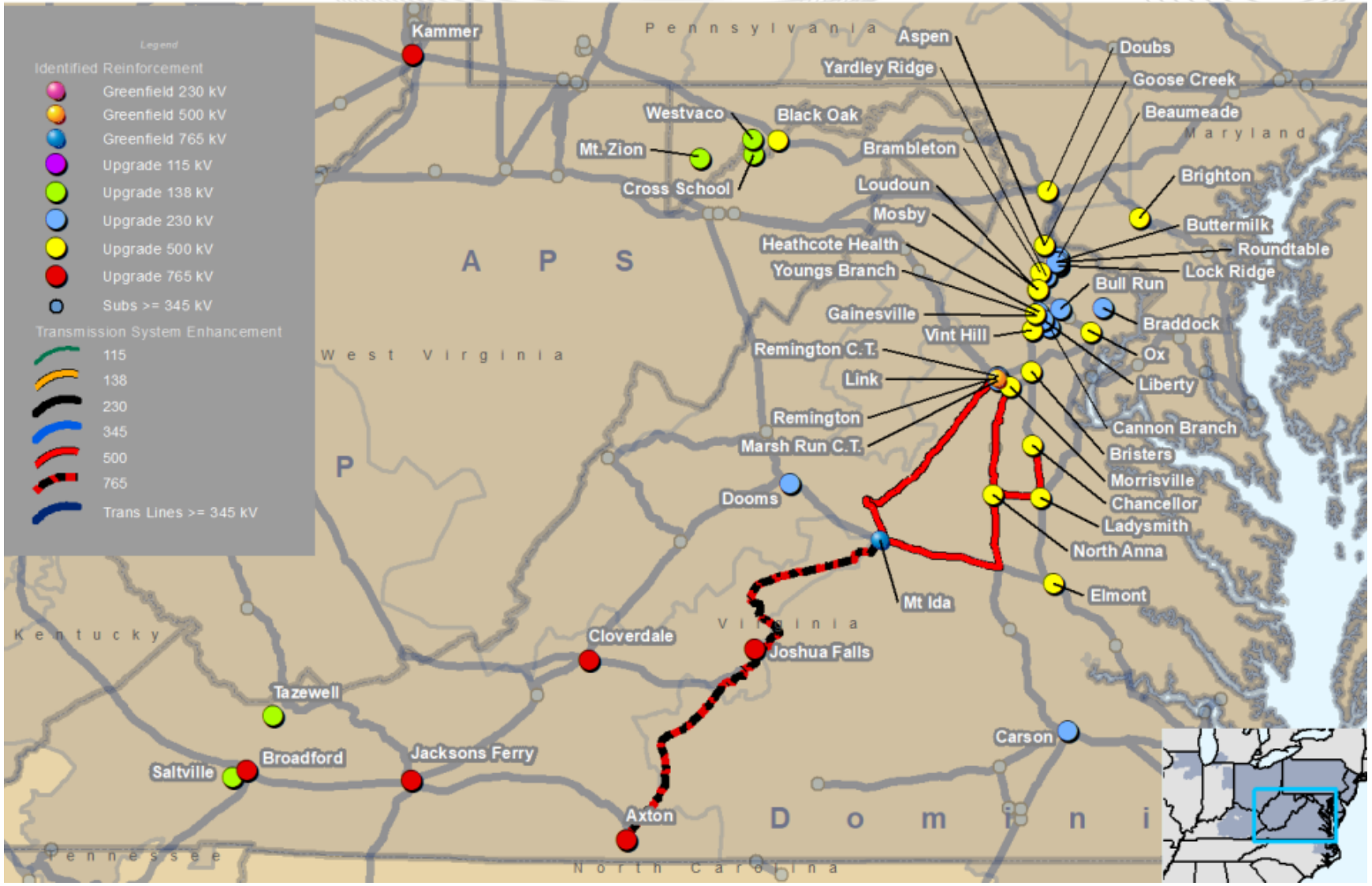
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

NEETMH- 992
(ROW Designation, 345 KV and above)



NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

NEETMH- 992
(kV designation only, All kVs)



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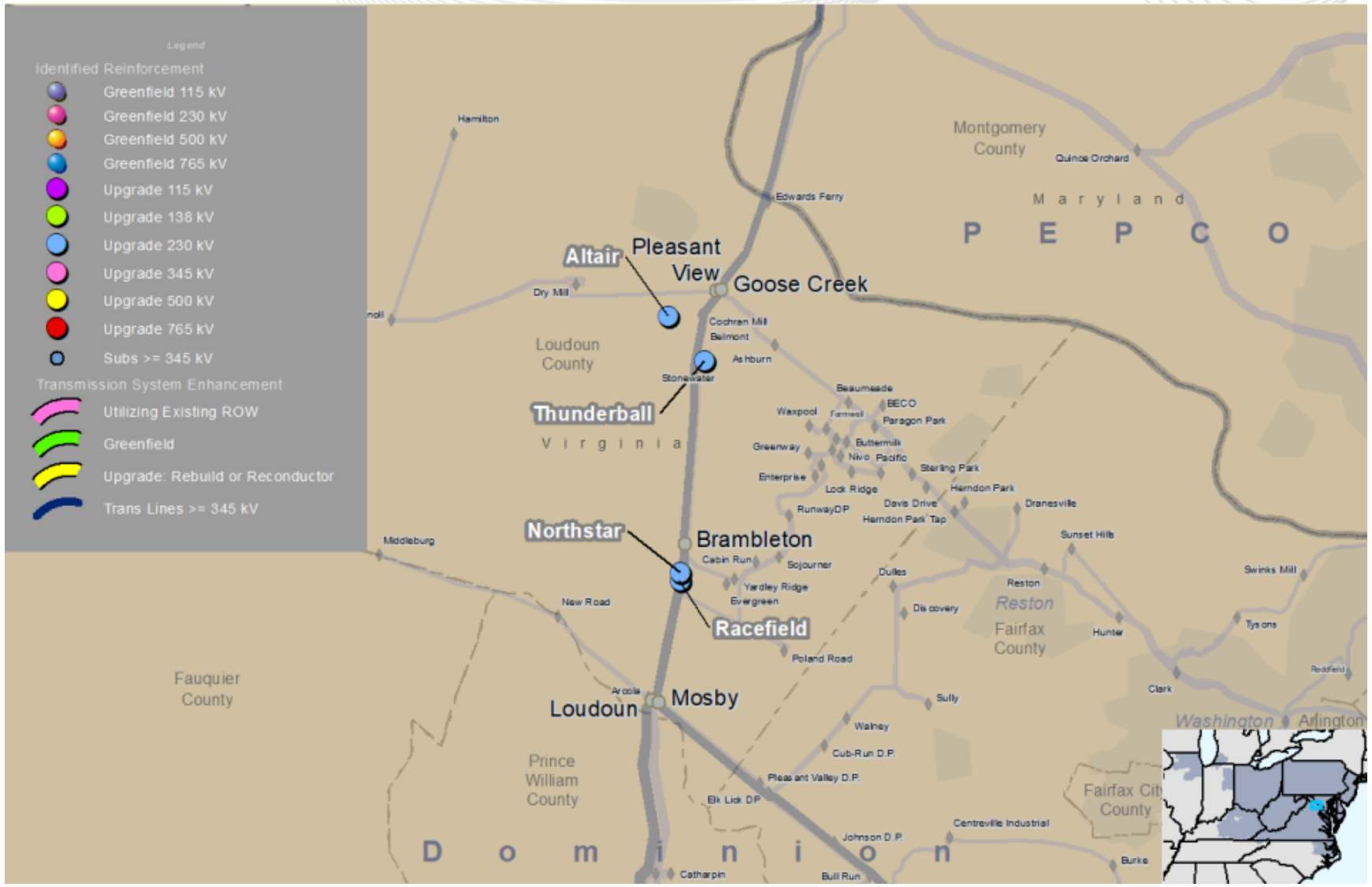
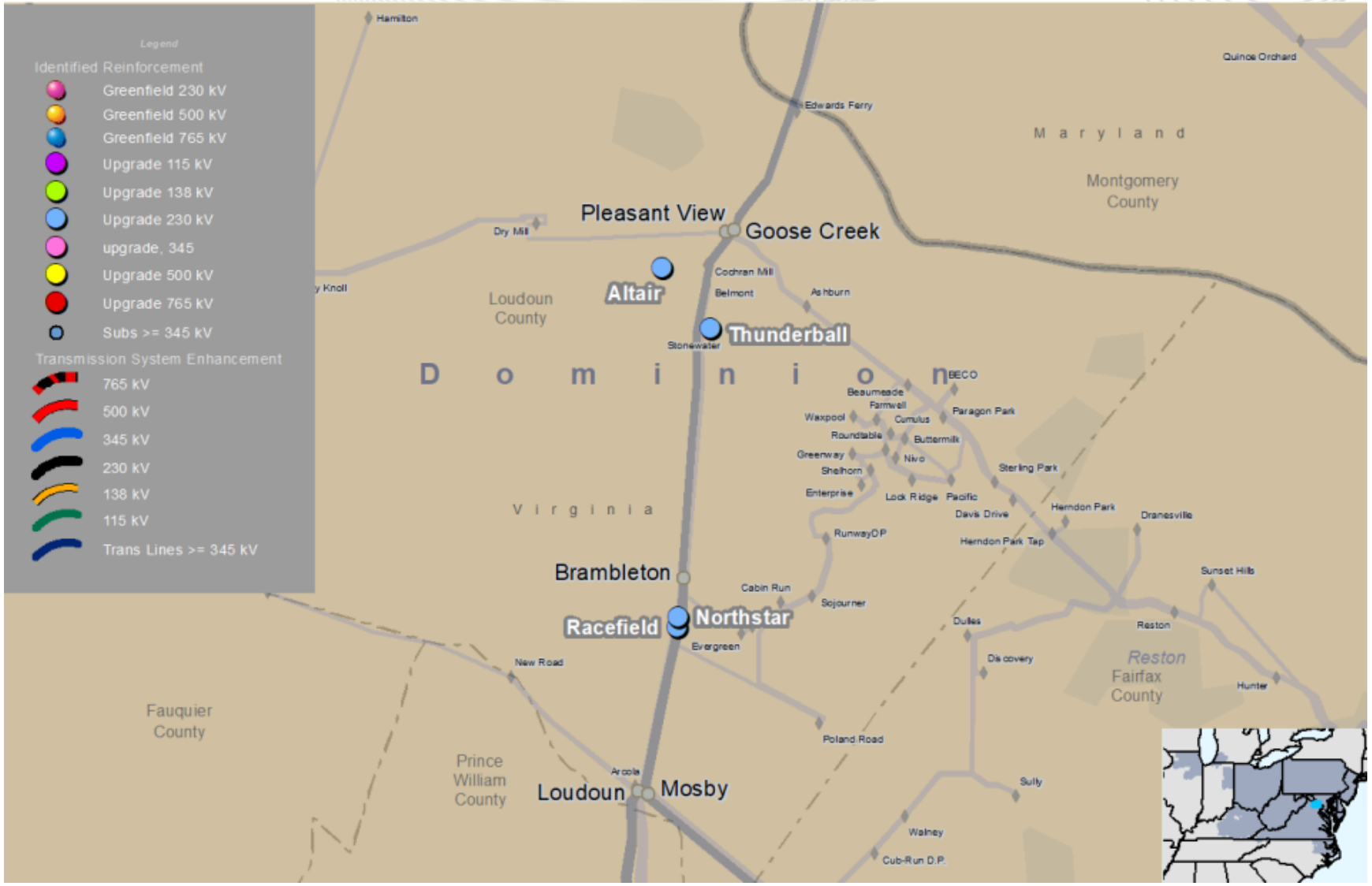
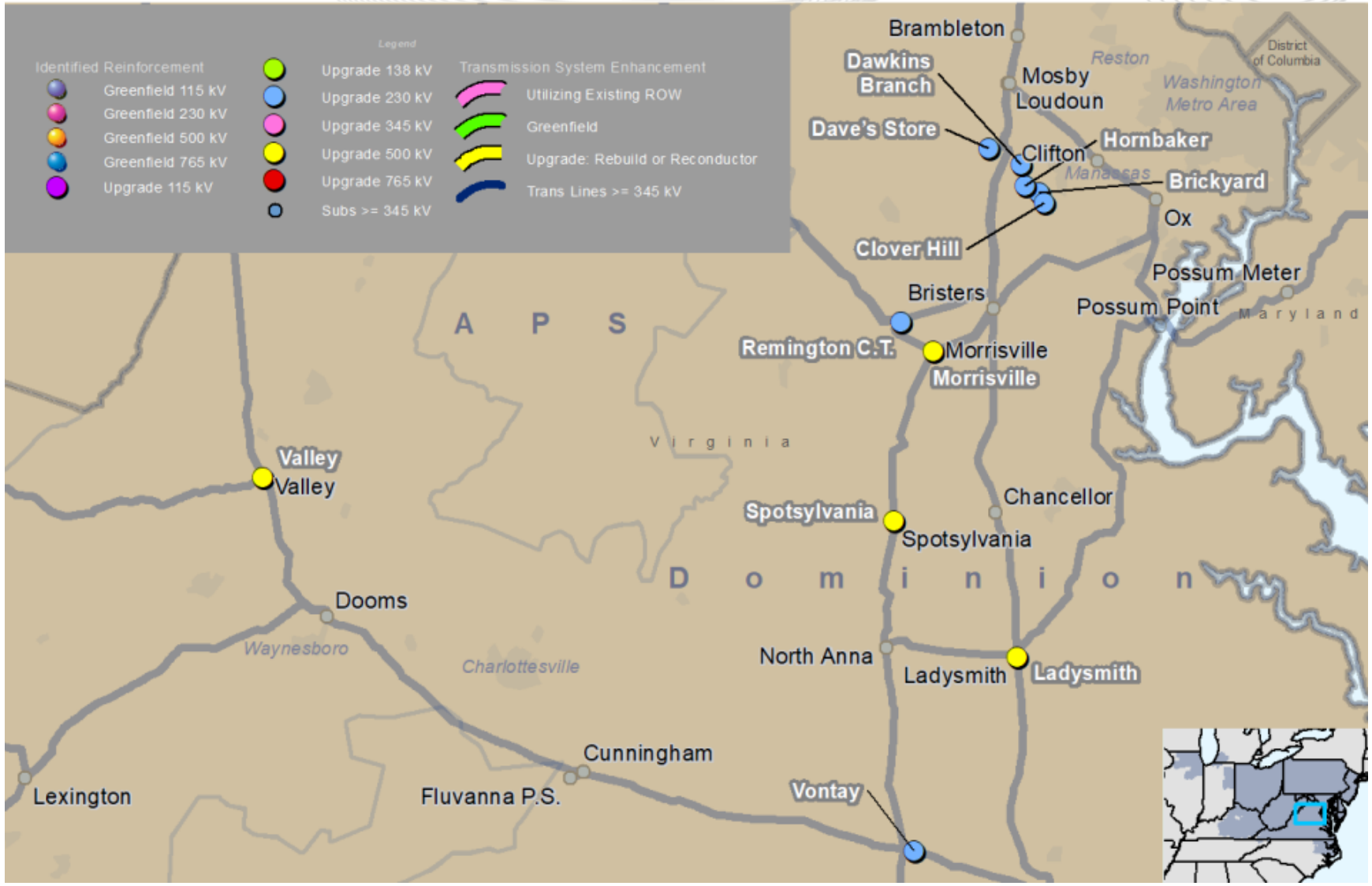
VEPCO


Legend
Identified Reinforcement
Greenfield 115 kV
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
Upgrade 345 kV
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
Utilizing Existing ROW
Greenfield
Upgrade: Rebuild or Reconductor
Trans Lines >= 345 kV
Hamilton
Montgomery County
Quince Orchard
Edwards Ferry
Maryland
PEPCO
Altair
Pleasant View
Goose Creek
Dry Mill
Cochran Mill
Belmont
Loudoun County
Ashburn
Stonewater
Thunderball
Virginia
Beaumeade
BECO
Waxpool
Paragon Park
Greenway
Buttermilk
Nivo
Pacific
Enterprise
Sterling Park
Lock Ridge
Herndon Park
RunwayDP
Davis Drive
Dranesville
Herndon Park Tap
Northstar
Brambleton
Middleburg
Cabin Run
Sojourner
Sunset Hills
Yardley Ridge
Dulles
Swinks Mill
Evergreen
Reston
New Road
Discovery
Racefield
Reston
Fairfax County
Hunter
Tysons
Poland Road
Fauquier County
Arcola
Mosby
Loudoun
Sully
Clark
Washington
Arlington
Walney
Cub Run D.P.
Prince William County
Pleasant Valley D.P.
Elk Lick DP
Fairfax City County
Centreville Industrial
Johnson D.P.
Dominion
Burke
Catharpin
Bull Run

2024-W1-261
(kV designation only, All kVs)




Legend
Identified Reinforcement
Greenfield 115 kV
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
Upgrade 345 kV
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
Utilizing Existing ROW
Greenfield
Upgrade: Rebuild or Reconductor
Trans Lines >= 345 kV
Brambleton
Dawkins Branch
Mosby
Loudoun
Reston
District of Columbia
Washington Metro Area
Dave's Store
Clifton
Hornbaker
Manassas
Brickyard
Ox
Clover Hill
Possum Meter
Possum Point
Maryland
Bristers
A P S
Remington C.T.
Morrisville
Morrisville
Virginia
Valley
Valley
Chancellor
Spotsylvania
Spotsylvania
D o m i n i o n
Dooms
Waynesboro
Charlottesville
North Anna
Ladysmith
Ladysmith
Cunningham
Lexington
Fluvanna P.S.
Vontay


Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
upgrade, 345
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
765 kV
500 kV
345 kV
230 kV
138 kV
115 kV
Trans Lines >= 345 kV
Meadow Brook
Front Royal
Dawkins Branch
Brambleton
Reston
Loudoun
Dave's Store
Mosby
Brickyard
Clifton
Burches Hill
Hornbaker
Ox
Clover Hill
Possum Meter
Remington C.T.
Bristers
Morrisville
Morrisville
Possum Point
Maryland
Valley
Valley
Spotsylvania
Chancellor
Spotsylvania
Virginia
Dooms
Waynesboro
Charlottesville
North Anna
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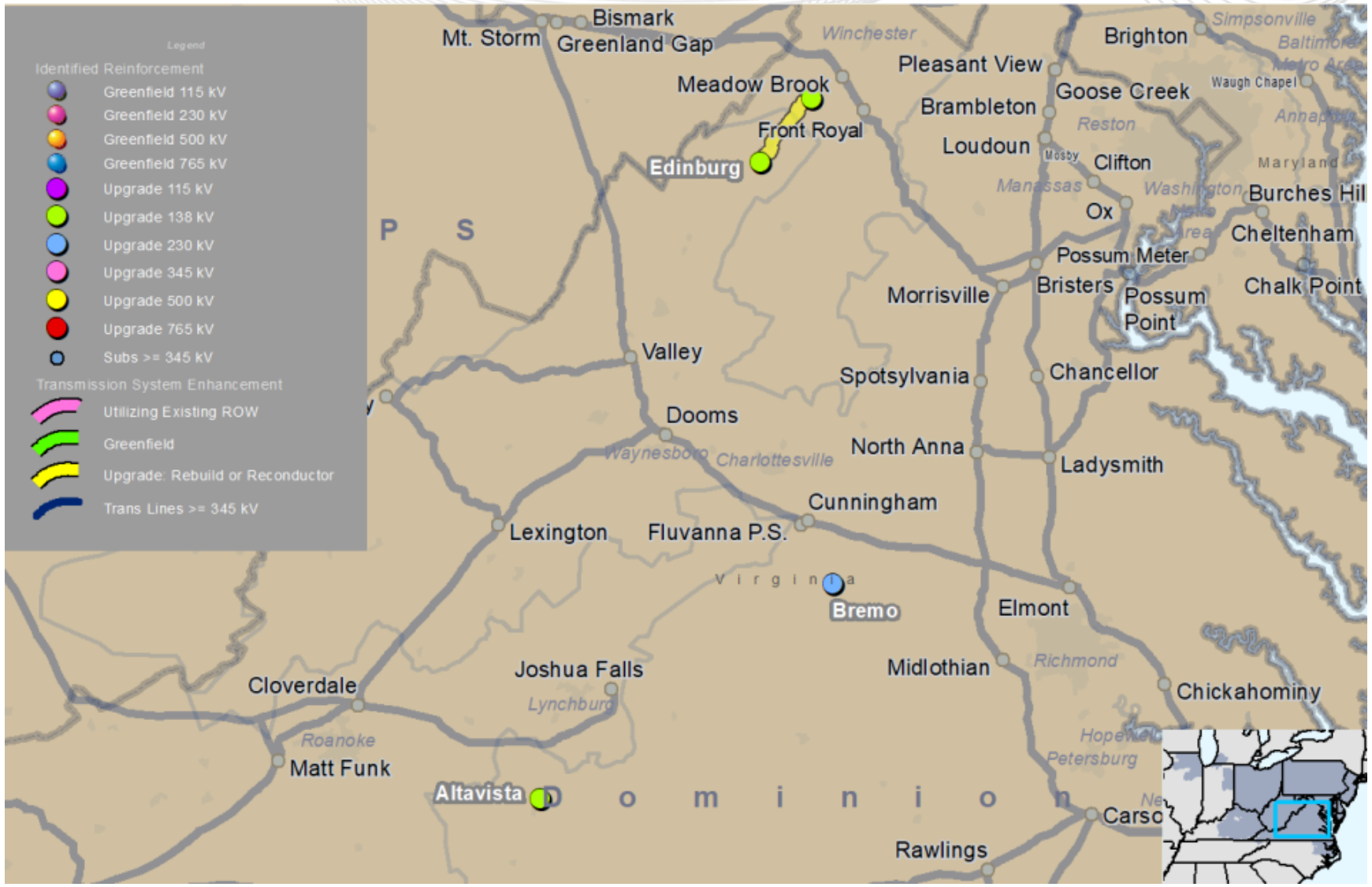
Dominion
Cunningham
Lexington
Fluvanna P.S.
Vontay
Elmont
Richmond
Midlothian


Legend
Identified Reinforcement
Greenfield 115 kV
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
Upgrade 345 kV
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
Utilizing Existing ROW
Greenfield
Upgrade: Rebuild or Reconductor
Trans Lines >= 345 kV
Bismark
Mt. Storm
Greenland Gap
Winchester
Meadow Brook
Front Royal
Edinburg
Pleasant View
Brighton
Simpsonville
Goose Creek
Waugh Chapel
Brambleton
Reston
Loudoun
Mosby
Clifton
Maryland
Manassas
Burches Hil
Ox
Cheltenham
Possum Meter
Bristers
Chalk Point
Morrisville
Possum Point
Valley
Spotsylvania
Chancellor
Dooms
North Anna
Waynesboro
Charlottesville
Ladysmith
Cunningham
Lexington
Fluvanna P.S.
Virginia
Bremo
Elmont
Joshua Falls
Midlothian
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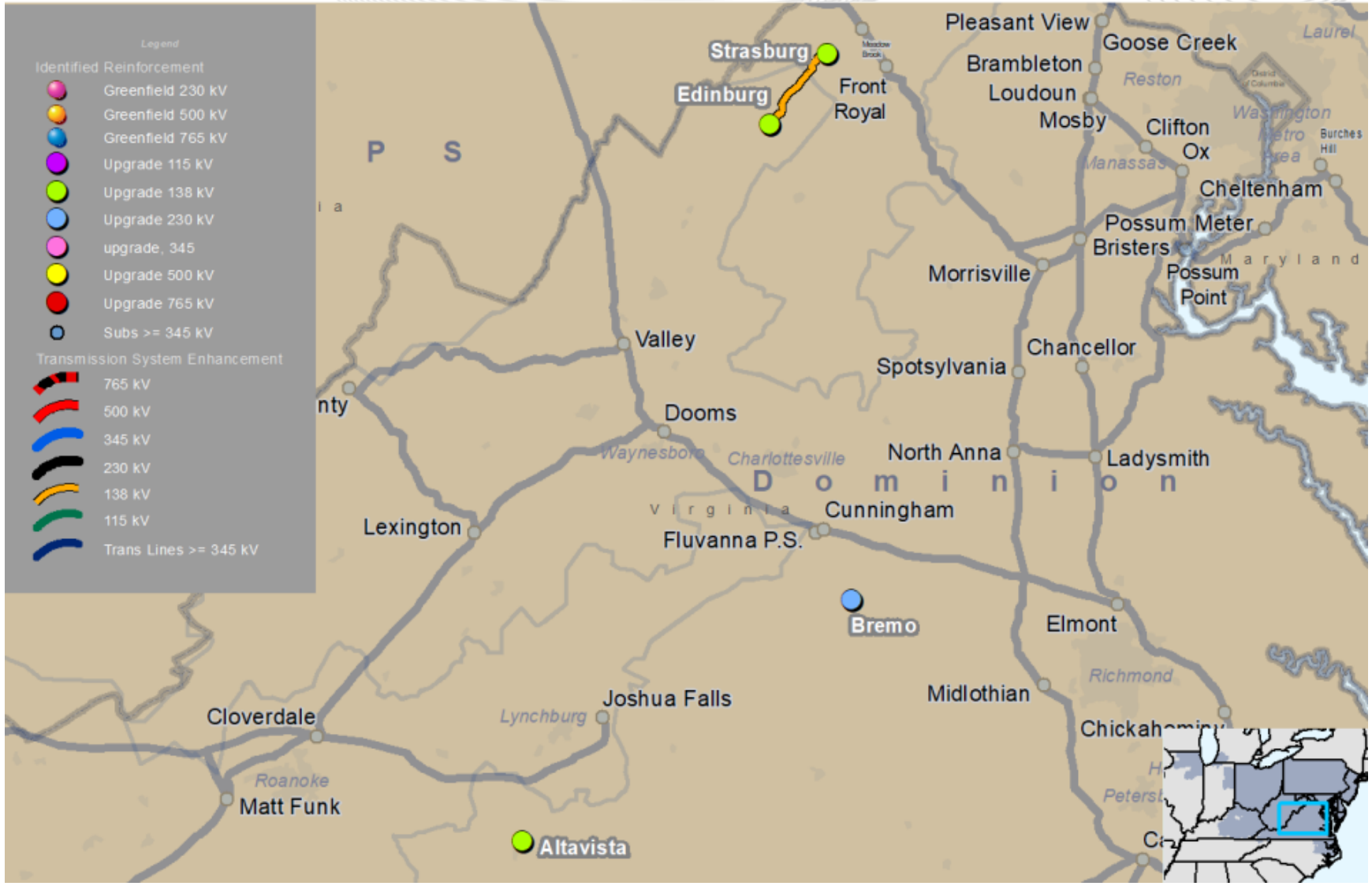
Cloverdale
Lynchburg
Chickahominy
Roanoke
Matt Funk
Petersburg
Altavista
Dominion
Carso
Rawlings


Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
upgrade, 345
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
765 kV
500 kV
345 kV
230 kV
138 kV
115 kV
Trans Lines >= 345 kV
Strasburg
Edinburg
Front Royal
Pleasant View
Goose Creek
Brambleton
Loudoun
Mosby
Reston
Clifton
Ox
Manassas
Cheltenham
Possum Meter
Bristers
Morrisville
Possum Point
Maryland
Valley
Spotsylvania
Chancellor
Dooms
Waynesboro
Charlottesville
North Anna
Ladysmith
D o m i n i o n
Virginia
Cunningham
Lexington
Fluvanna P.S.
Bremo
Elmont
Richmond
Midlothian
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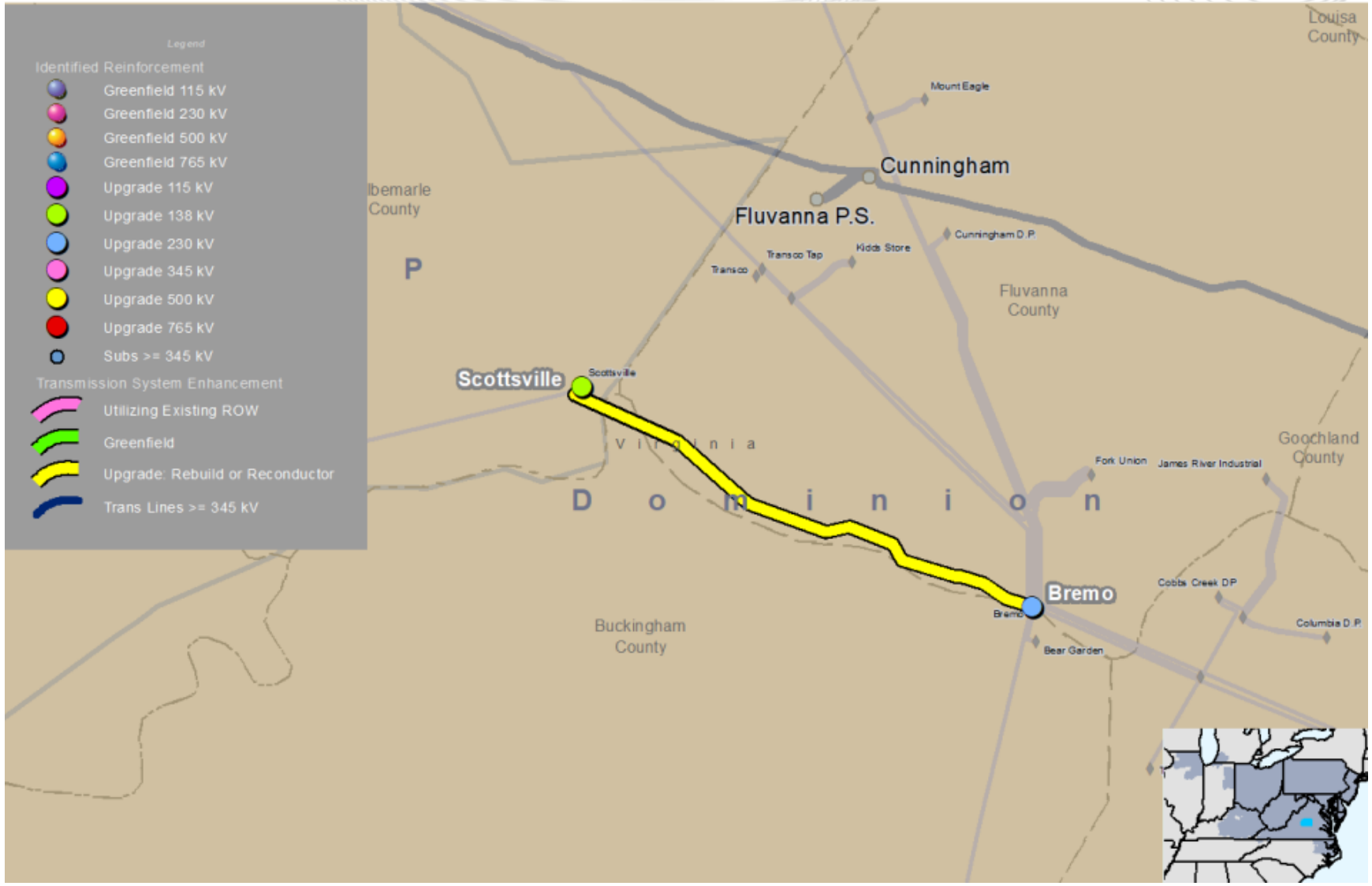
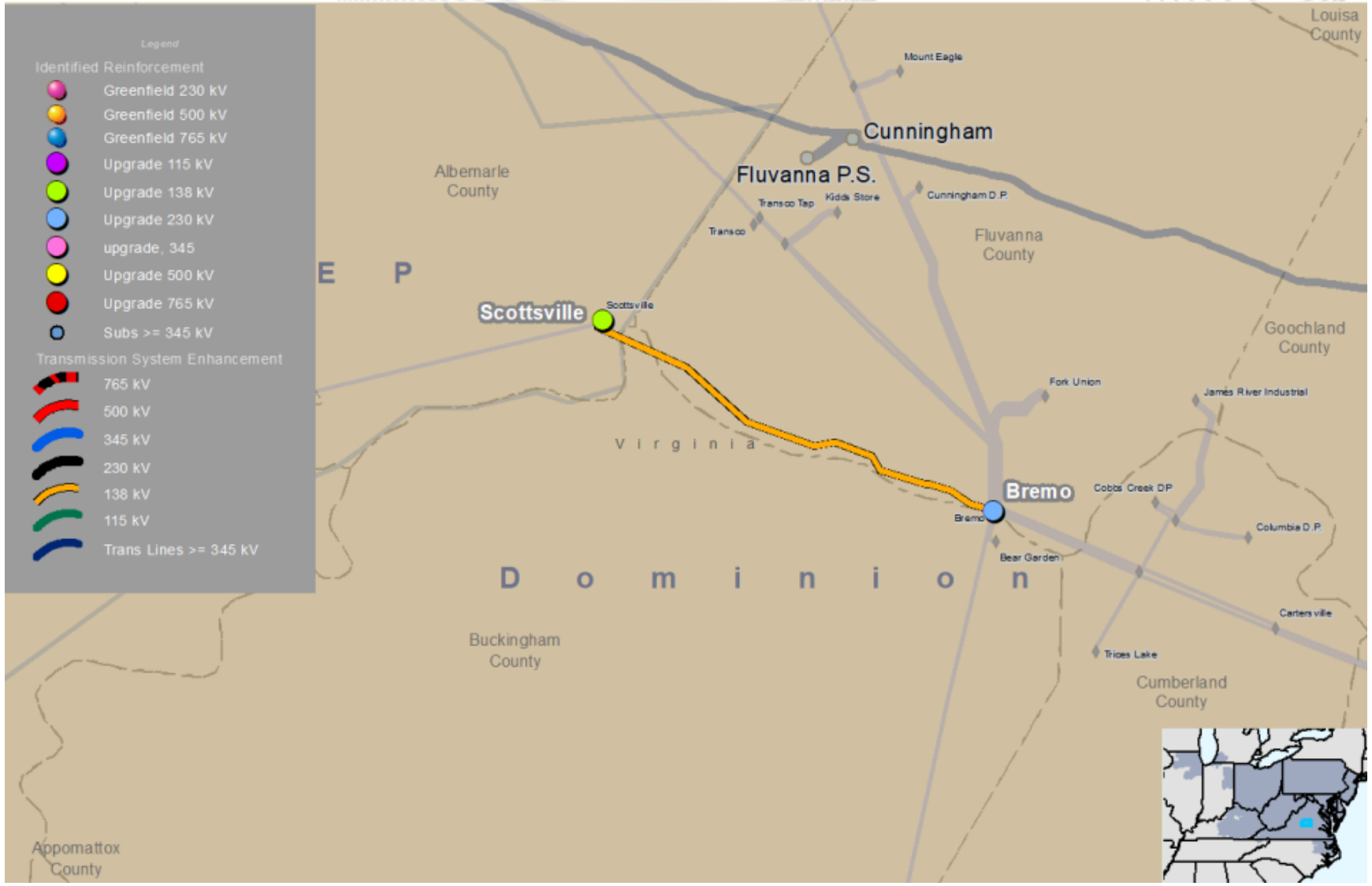
Lynchburg
Cloverdale
Roanoke
Matt Funk
Altavista


Legend
Identified Reinforcement
Greenfield 115 kV
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
Upgrade 345 kV
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
Utilizing Existing ROW
Greenfield
Upgrade: Rebuild or Reconductor
Trans Lines >= 345 kV
Louisa County
Mount Eagle
Cunningham
Fluvanna P.S.
Cunningham D.P.
Transco Tap
Kidds Store
Transco
Albemarle County
Fluvanna County
Scottsville
Virginia
Dominion
Fork Union
James River Industrial
Goochland County
Bremo
Cobbs Creek D.P.
Columbia D.P.
Bear Garden
Buckingham County


Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
upgrade, 345
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
765 kV
500 kV
345 kV
230 kV
138 kV
115 kV
Trans Lines >= 345 kV
Louisa County
Mount Eagle
Cunningham
Fluvanna P.S.
Albemarle County
Transco Tap
Kidds Store
Cunningham D.P.
Transco
Fluvanna County
E P
Scottsville
Scottsville
Goochland County
Fork Union
James River Industrial
V i r g i n i a
Bremo
Cobbs Creek DP
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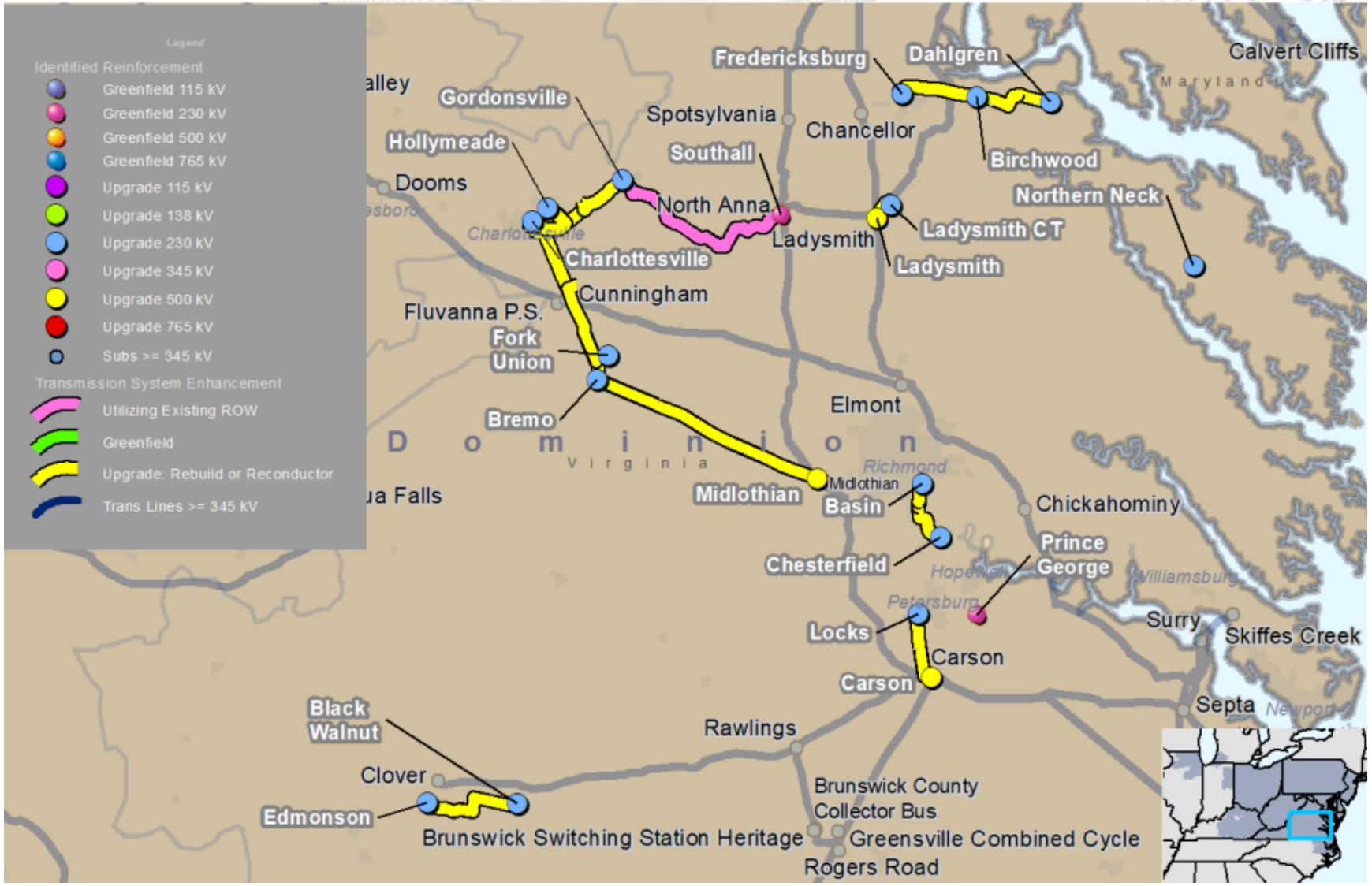
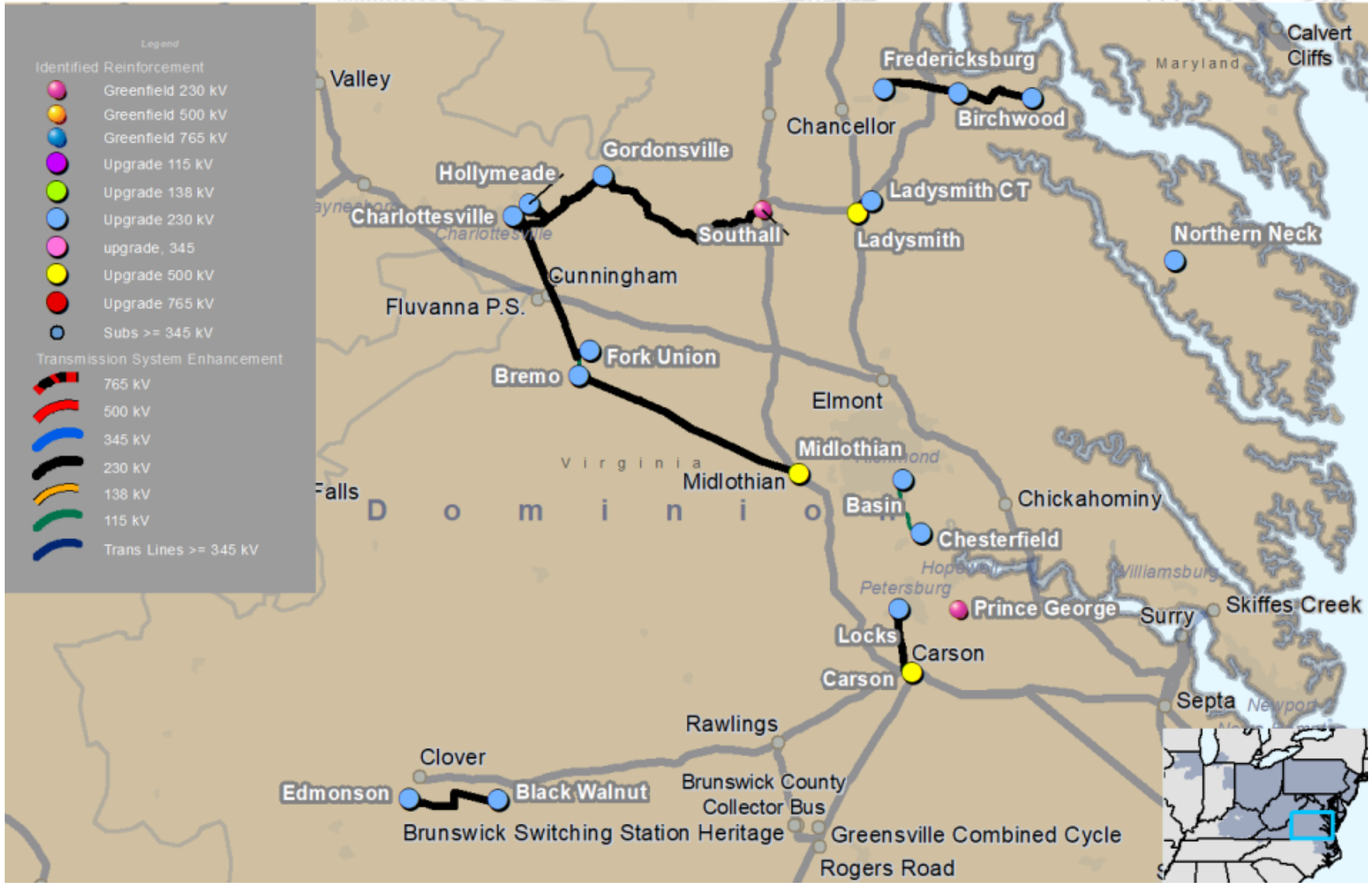
Columbia D.P.
Bear Garden
D o m i n i o n
Carters ville
Trices Lake
Buckingham County
Cumberland County
Appomattox County


Legend
Identified Reinforcement
Greenfield 115 kV
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
Upgrade 345 kV
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
Utilizing Existing ROW
Greenfield
Upgrade: Rebuild or Reconductor
Trans Lines >= 345 kV
Fredericksburg
Dahlgren
Calvert Cliffs
Maryland
Gordonsville
Spotsylvania
Chancellor
Hollymeade
Southall
Birchwood
Dooms
North Anna
Northern Neck
Ladysmith CT
Ladysmith
Charlottesville
Cunningham
Fluvanna P.S.
Fork Union
Bremo
Elmont
Dominion
Virginia
Richmond
Midlothian
Basin
Chickahominy
Prince George
Chesterfield
Hopewell
Williamsburg
Petersburg
Surry
Skiffes Creek
Locks
Carson
Septa
Newport
Black Walnut
Rawlings
Clover
Edmonson
Brunswick Switching Station Heritage
Brunswick County Collector Bus
Greensville Combined Cycle
Rogers Road


Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
upgrade, 345
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
765 kV
500 kV
345 kV
230 kV
138 kV
115 kV
Trans Lines >= 345 kV
Valley
Fredericksburg
Calvert Cliffs
Maryland
Chancellor
Birchwood
Gordonsville
Hollymeade
Ladysmith CT
Charlottesville
Southall
Ladysmith
Northern Neck
Cunningham
Fluvanna P.S.
Fork Union
Bremo
Elmont
Midlothian
Virginia
Midlothian
Basin
Chickahominy
Falls
Chesterfield
Petersburg
Prince George
Surry
Skiffes Creek
Locks
Carson
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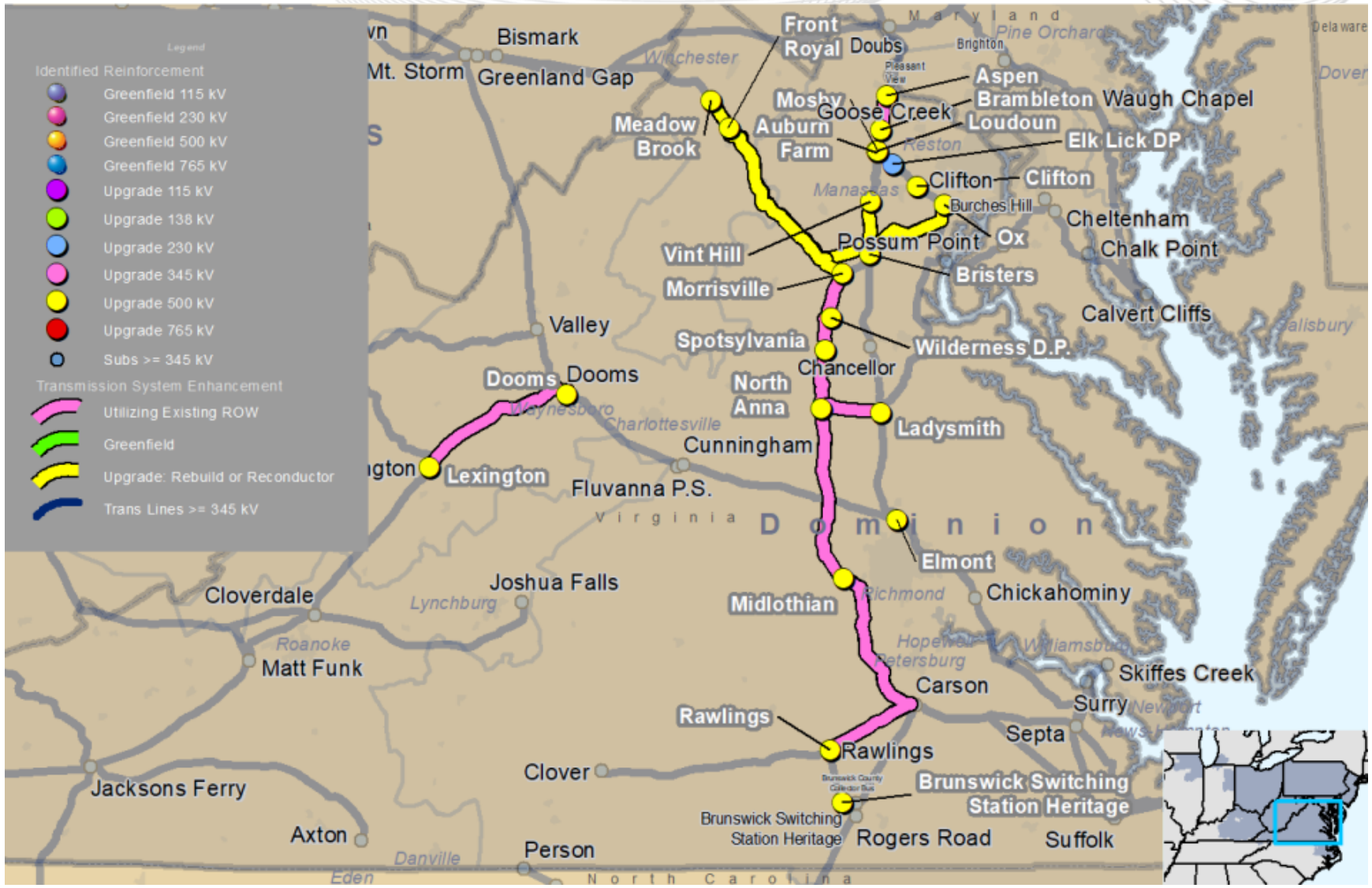
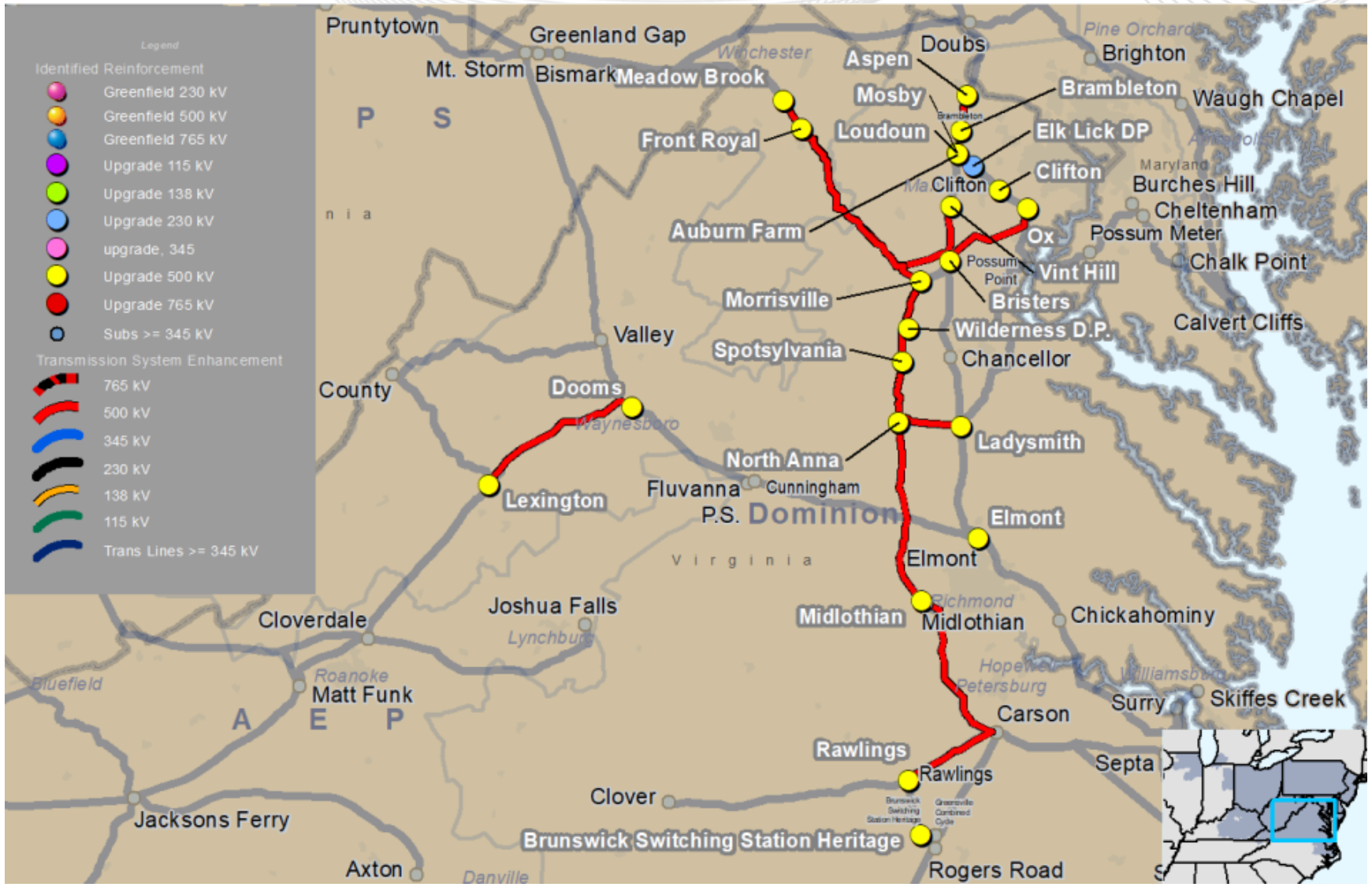
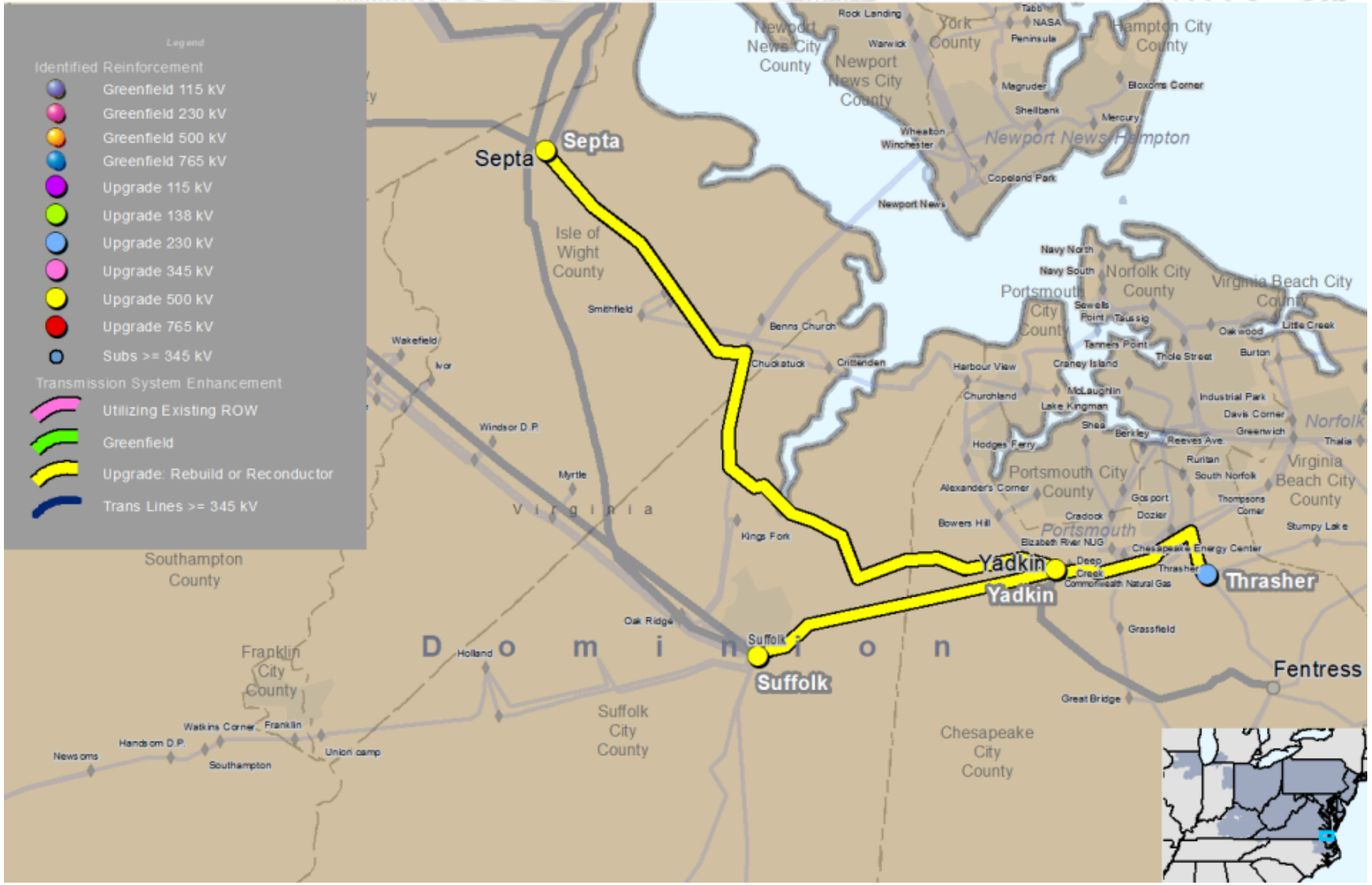
Septa
Rawlings
Clover
Edmonson
Black Walnut
Brunswick County
Collector Bus
Brunswick Switching Station
Heritage
Greensville Combined Cycle
Rogers Road

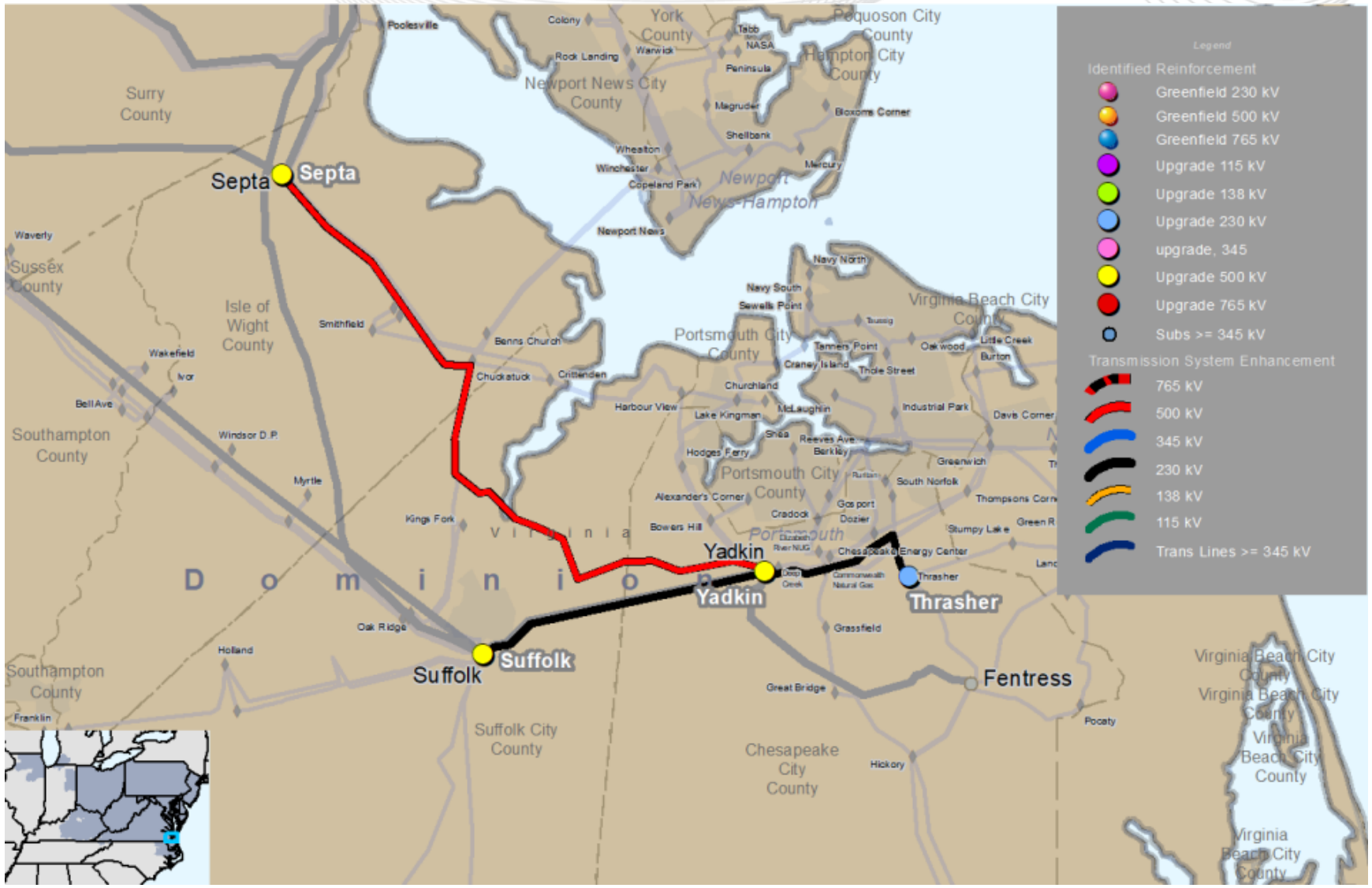

Legend
Identified Reinforcement
Greenfield 115 kV
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
Upgrade 345 kV
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
Utilizing Existing ROW
Greenfield
Upgrade: Rebuild or Reconductor
Trans Lines >= 345 kV
Bismark
Mt. Storm
Greenland Gap
Front Royal
Doubs
Aspen
Brambleton
Waugh Chapel
Meadow Brook
Moshy
Goose Creek
Auburn
Farm
Loudoun
Elk Lick DP
Clifton
Clifton
Burches Hill
Cheltenham
Possum Point
Ox
Chalk Point
Vint Hill
Morrisville
Bristers
Calvert Cliffs
Valley
Spotsylvania
Wilderness D.P.
Chancellor
Dooms
Dooms
North Anna
Ladysmith
Cunningham
Lexington
Fluvanna P.S.
Virginia
Dominion
Elmont
Joshua Falls
Cloverdale
Midlothian
Chickahominy
Roanoke
Matt Funk
Carson
Skiffes Creek
Surry
Rawlings
Rawlings
Septa
Clover
Brunswick Switching Station Heritage
Jacksons Ferry
Brunswick Switching Station Heritage
Rogers Road
Suffolk
Axton
Person
Danville
Eden
North Carolina
Maryland
Delaware
Winchester
Pine Orchard
Brighton
Reston
Manassas
Dover
Salisbury
Lynchburg
Richmond
Hopewell
Petersburg
Williamsburg
Newport News


Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
upgrade, 345
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
765 kV
500 kV
345 kV
230 kV
138 kV
115 kV
Trans Lines >= 345 kV
Pruntytown
Greenland Gap
Mt. Storm
Bismark
Meadow Brook
Winchester
Aspen
Doubs
Pine Orchard
Brighton
Mosby
Brambleton
Waugh Chapel
Front Royal
Loudoun
Elk Lick DP
Clifton
Maryland
Burches Hill
Cheltenham
Auburn Farm
Ox
Possum Meter
Possum Point
Vint Hill
Chalk Point
Morrisville
Bristers
Valley
Spotsylvania
Wilderness D.P.
Calvert Cliffs
Chancellor
County
Dooms
Waynesboro
Ladysmith
North Anna
Lexington
Fluvanna
Cunningham
P.S. Dominion
Elmont
Virginia
Joshua Falls
Midlothian
Richmond
Chickahominy
Cloverdale
Lynchburg
Roanoke
Bluefield
Matt Funk
Hopewell
Petersburg
Williamsburg
Surry
Skiffes Creek
Carson
Rawlings
Septa
Clover
Jacksons Ferry
Brunswick Switching Station Heritage
Axton
Danville
Rogers Road

2024-W1-980
(ROW Designation, all KVs)

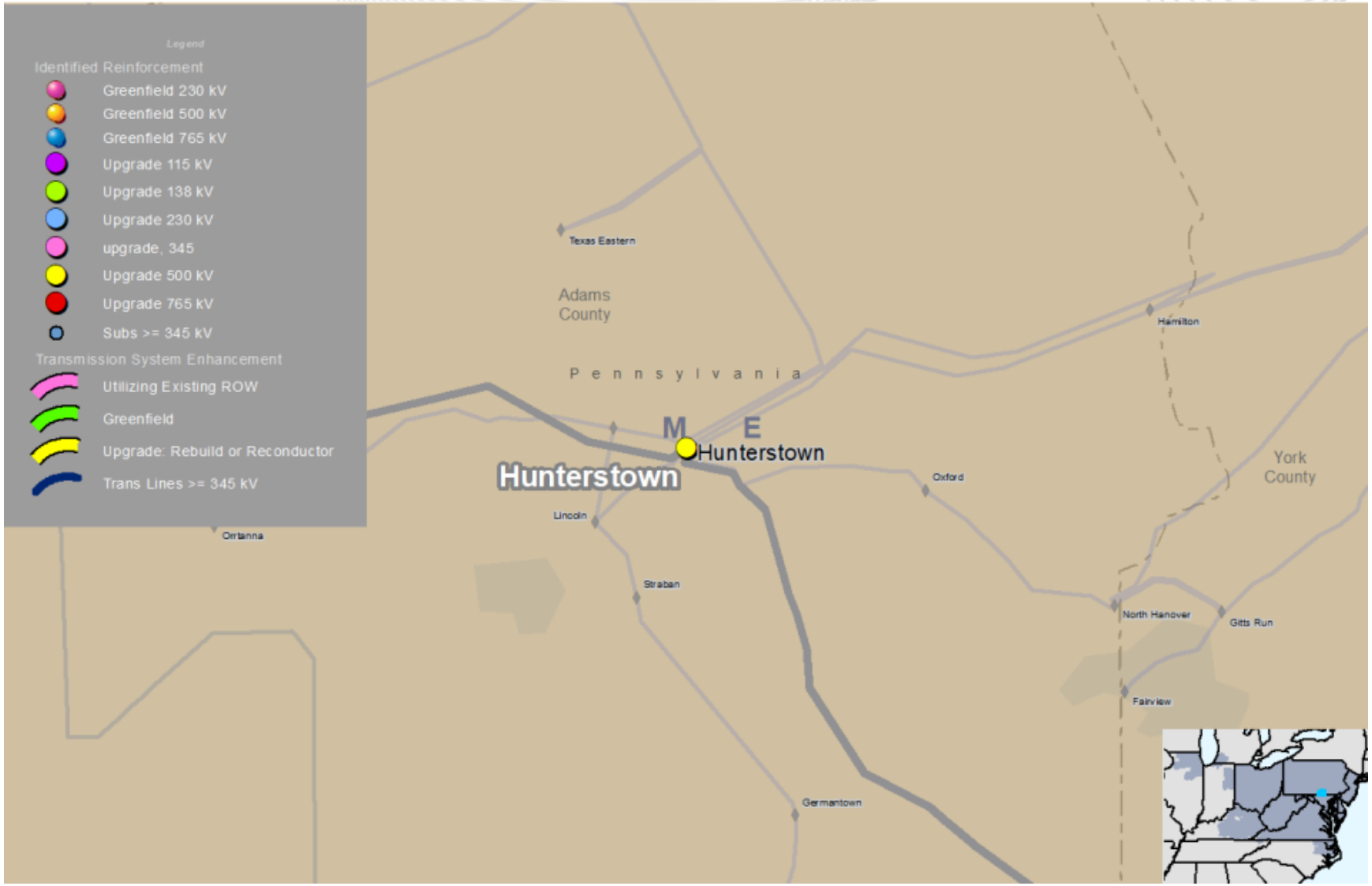


2024-W1-980
(kV designation only, All kVs)

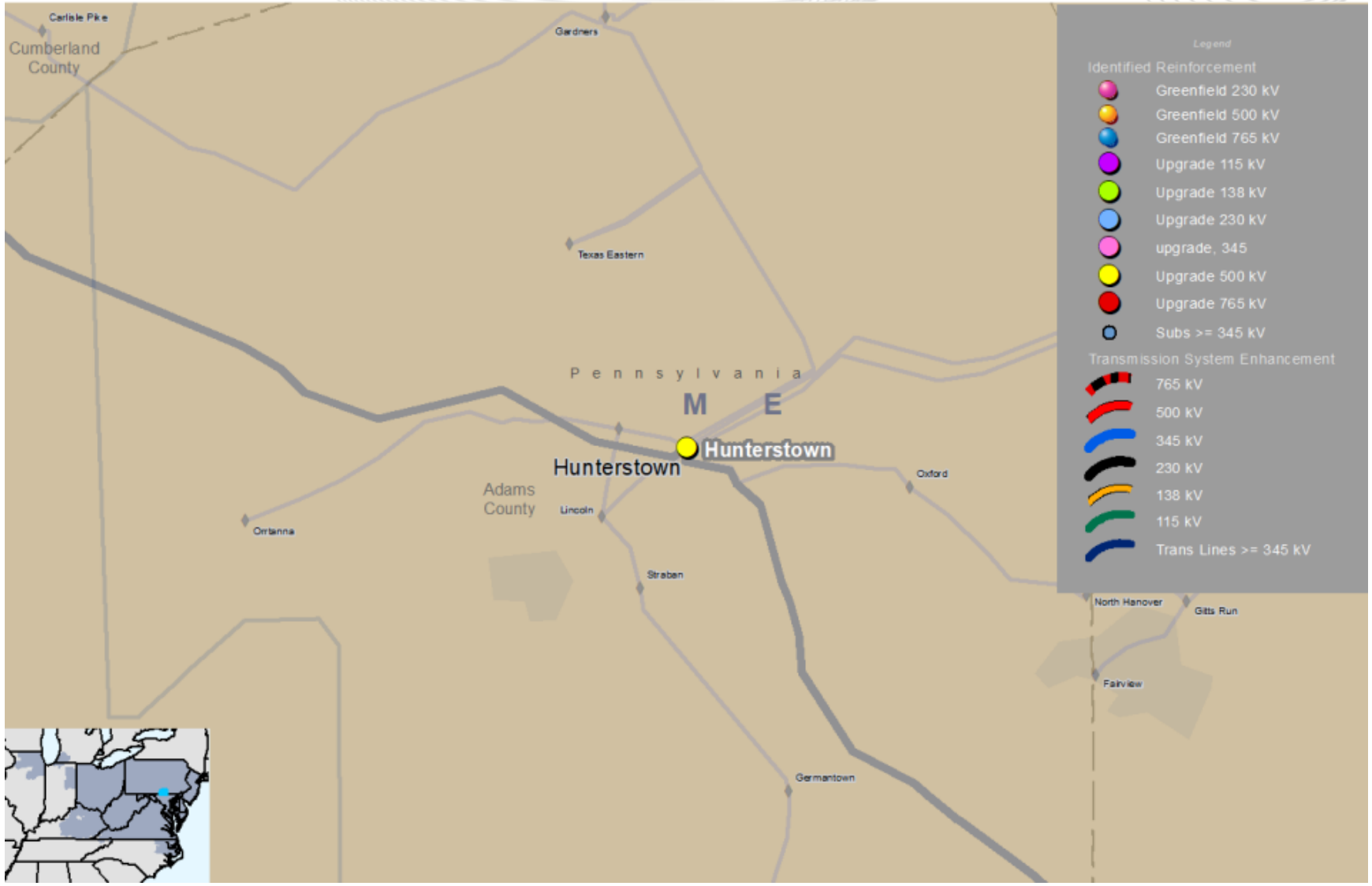


MATLIT

2024-W1-502
(ROW Designation, all KVs)

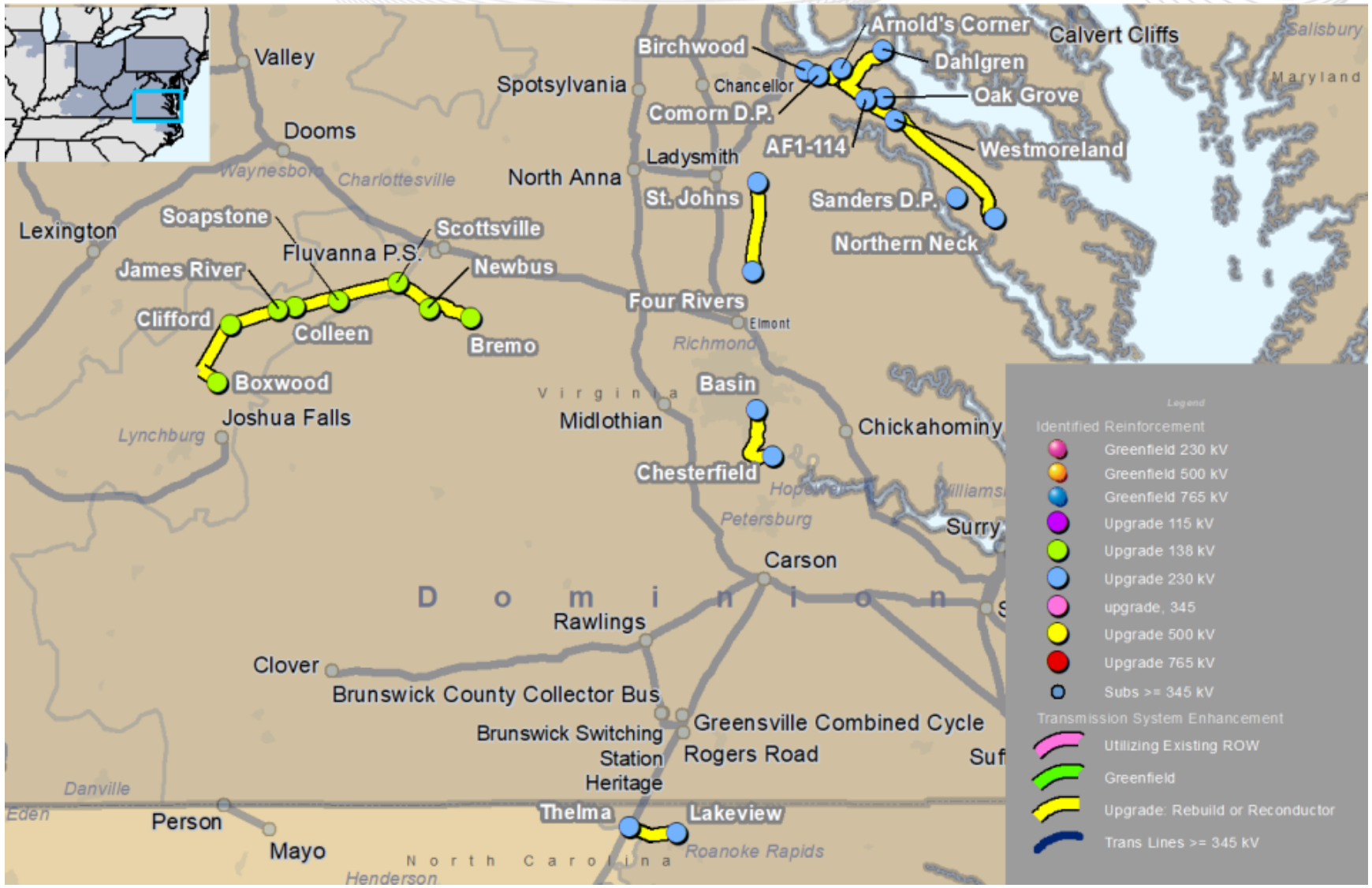


2024-W1-502
(kV designation only, All kVs)



NEETMH- Proposals

NEETMH – 944
(ROW designation only, All kVs)



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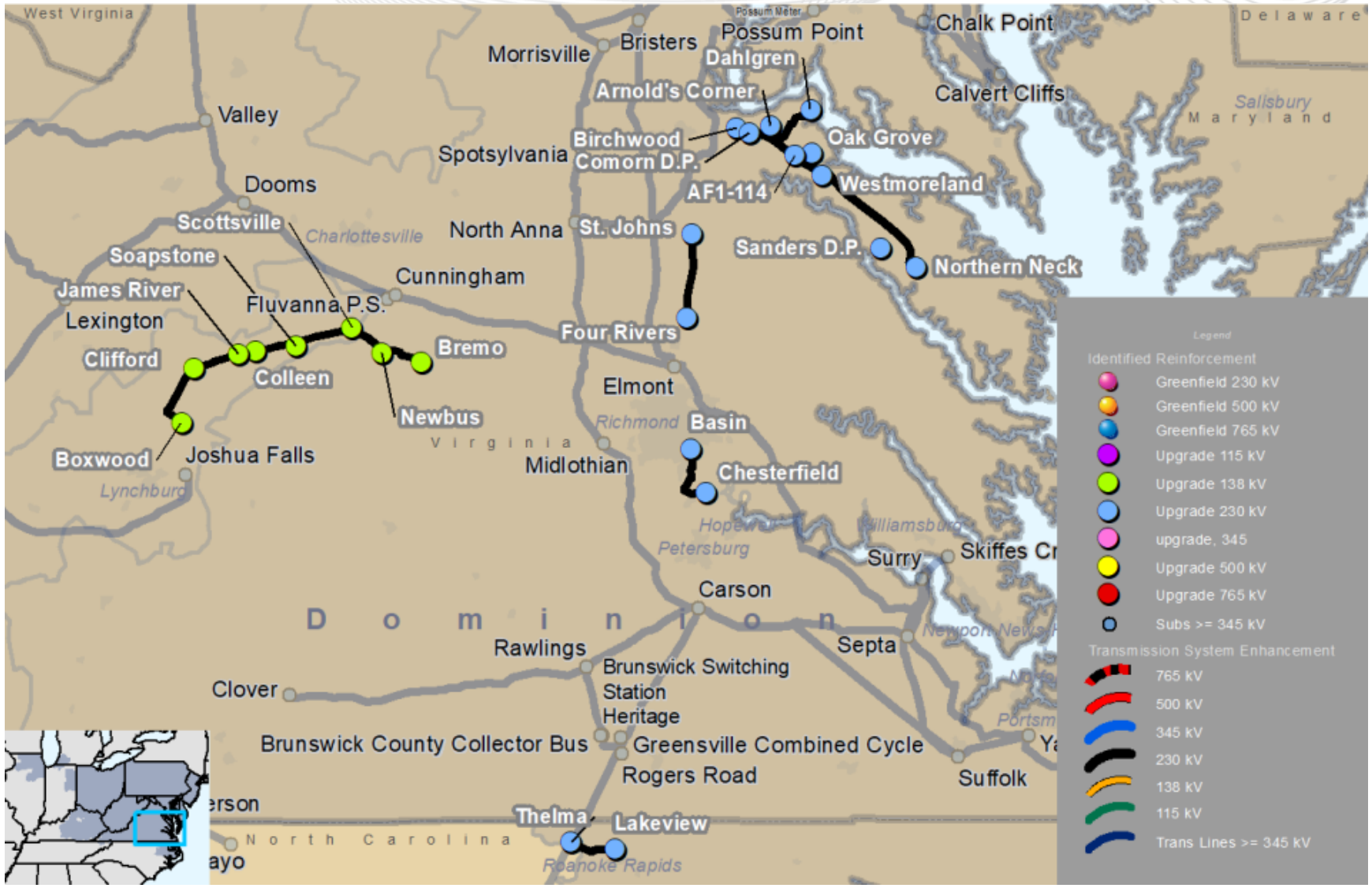
NEETMH – 944
(kV designation only, All kVs)



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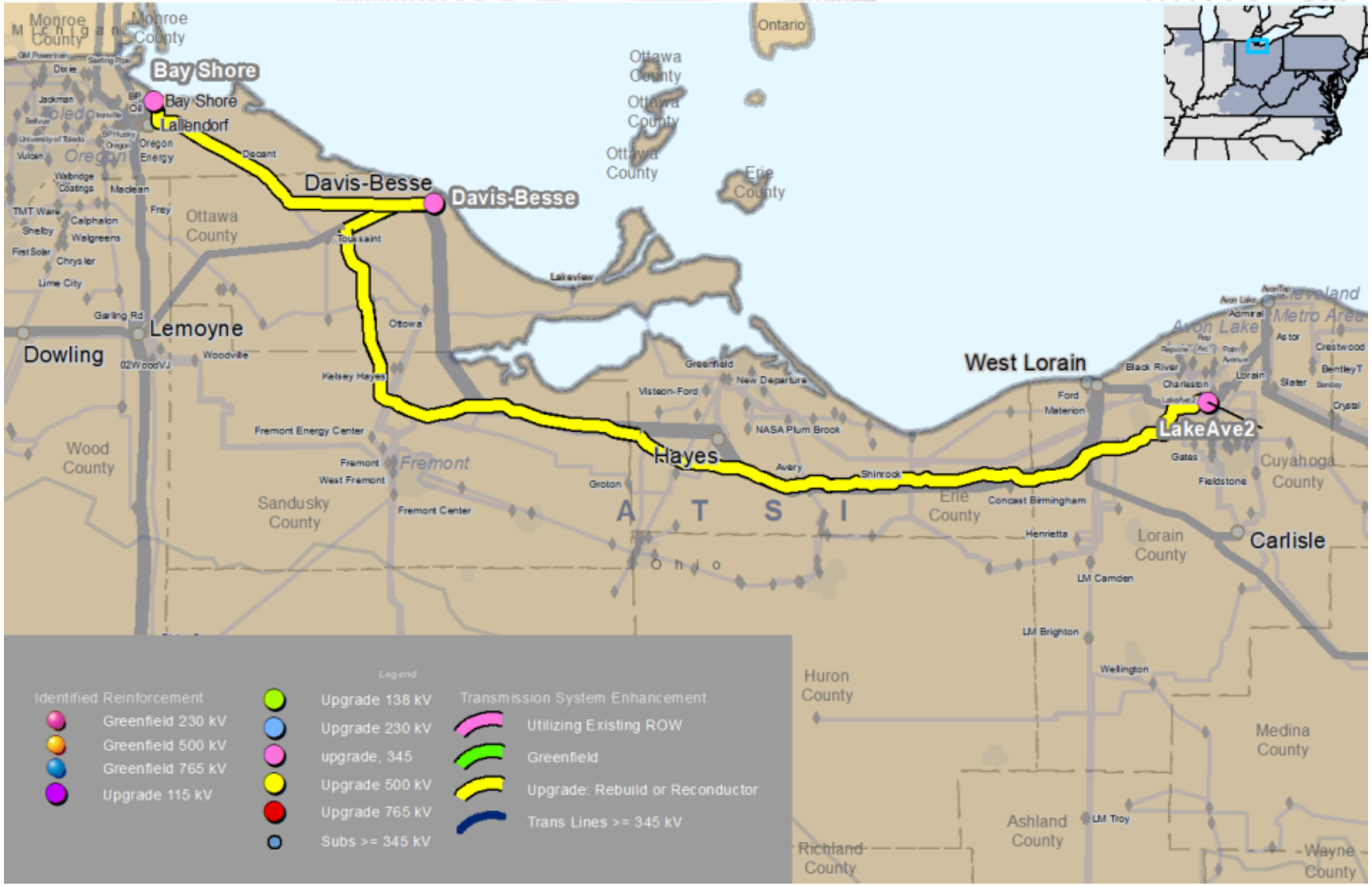

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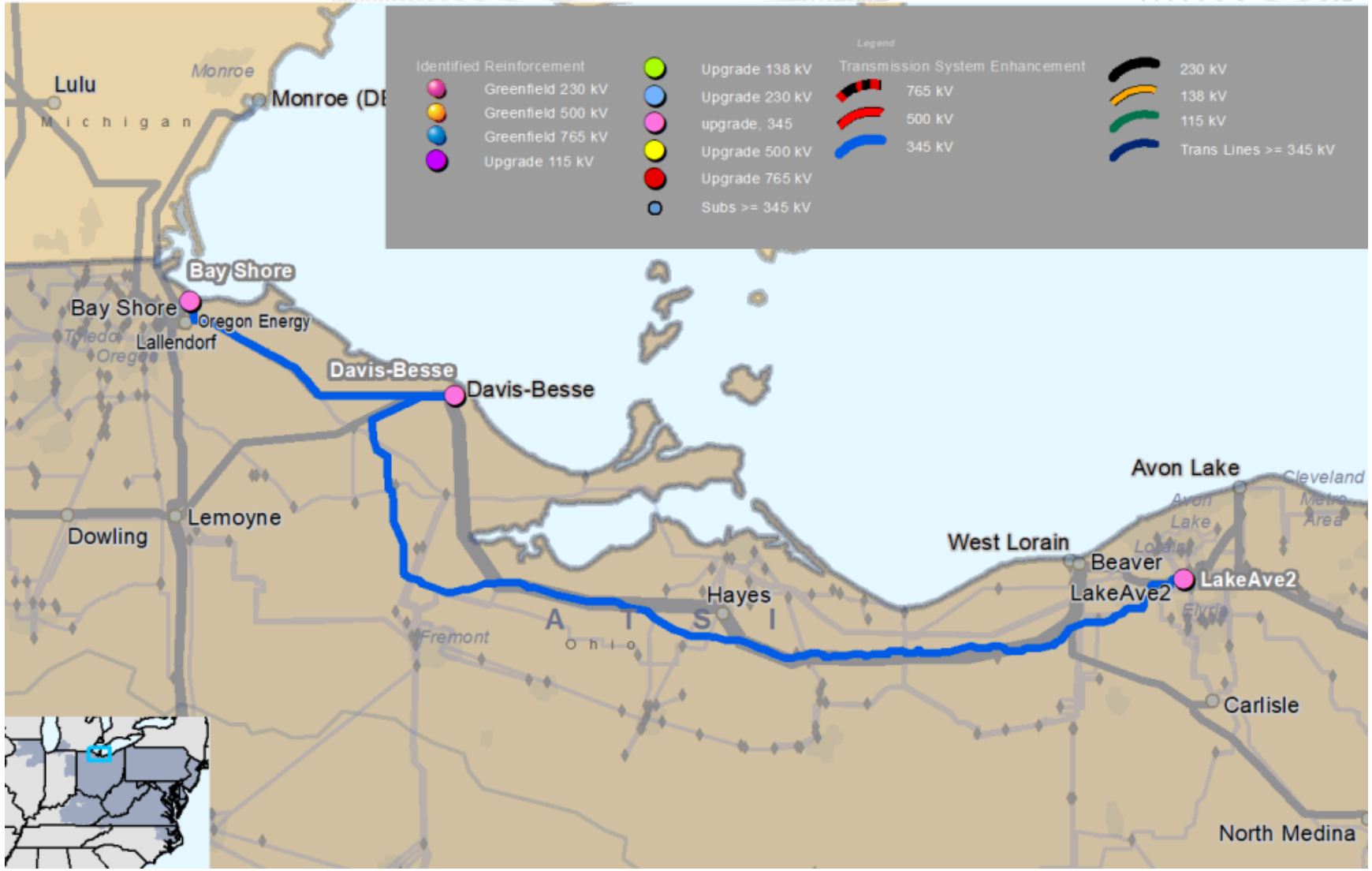

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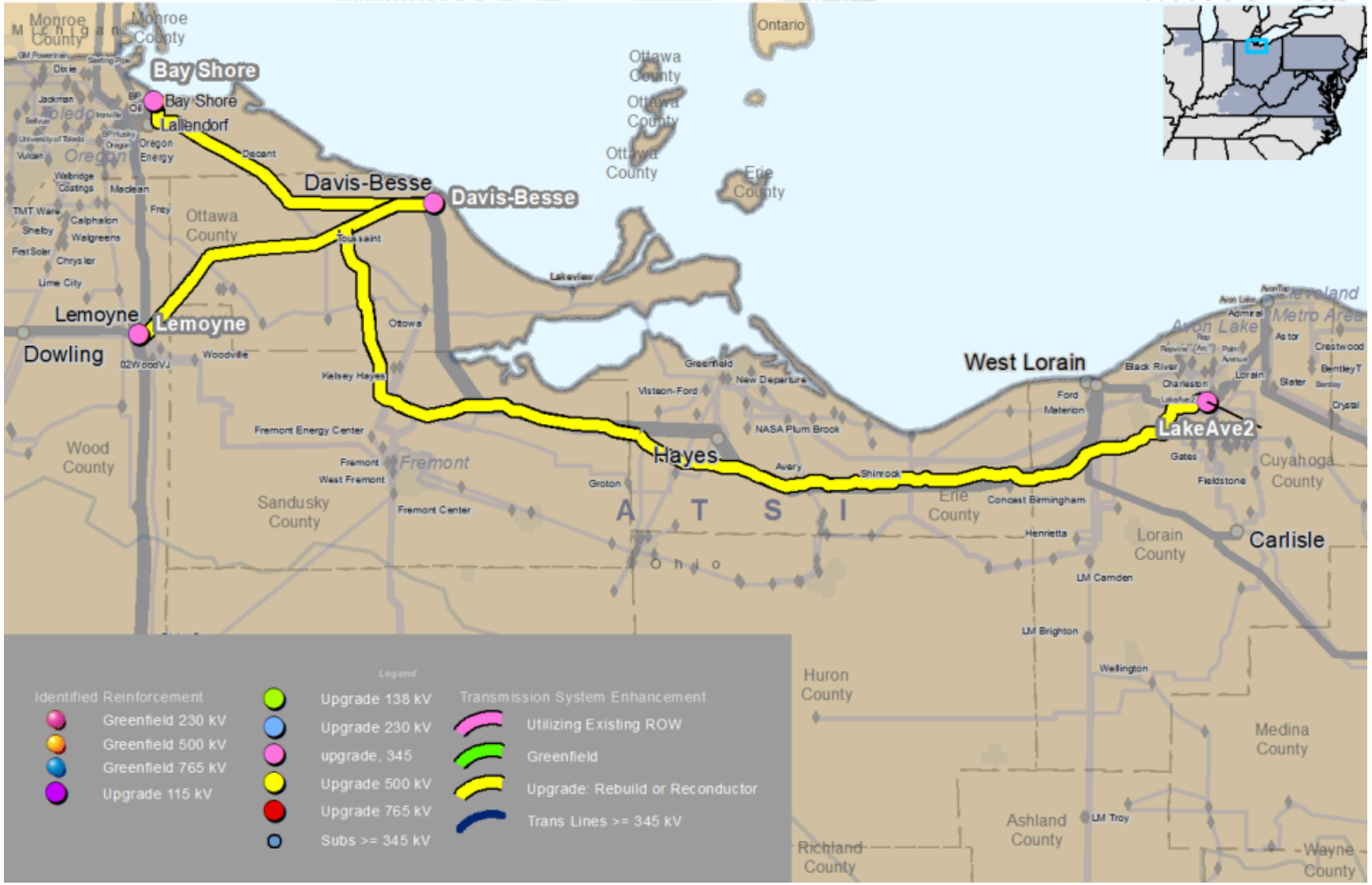

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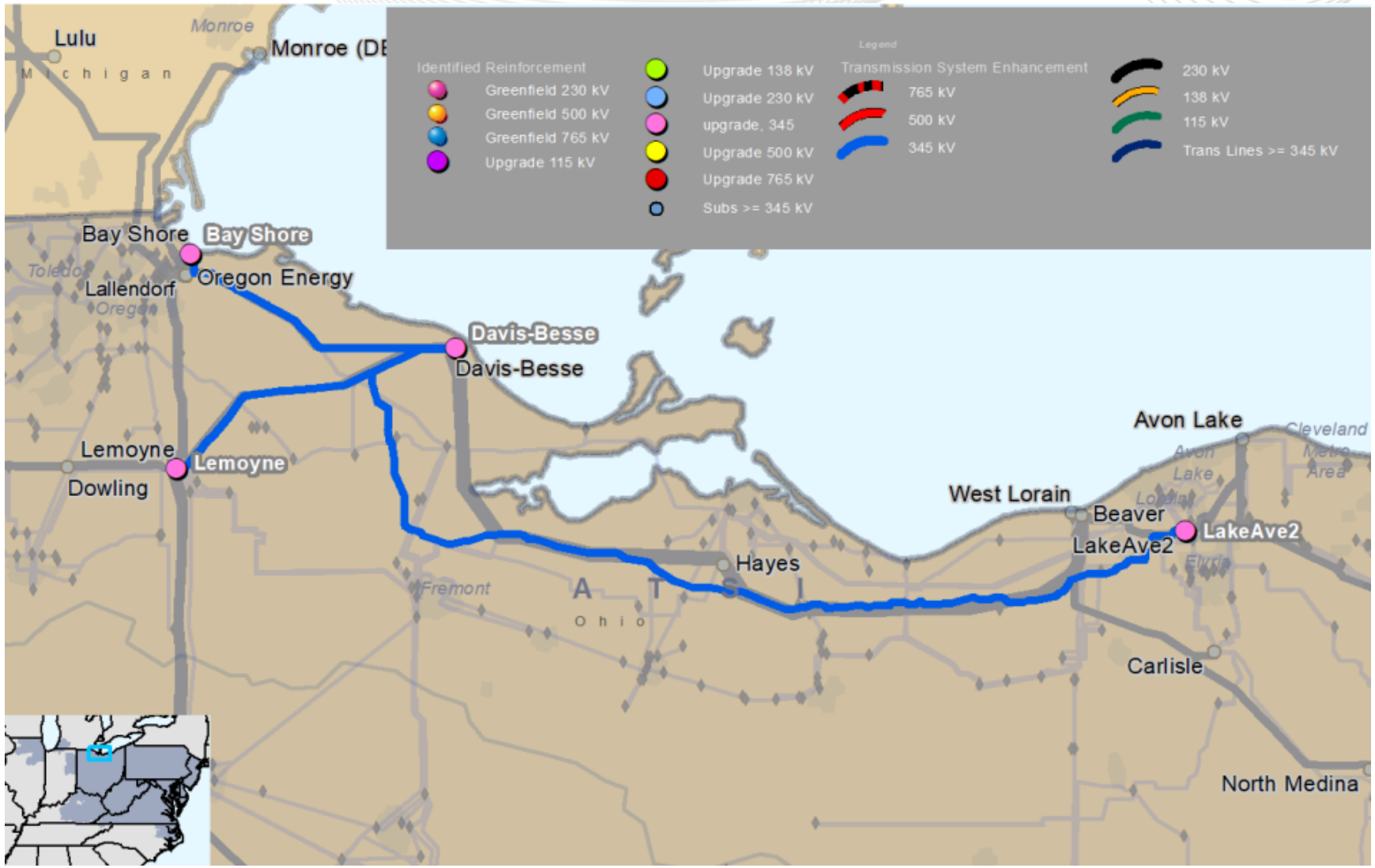
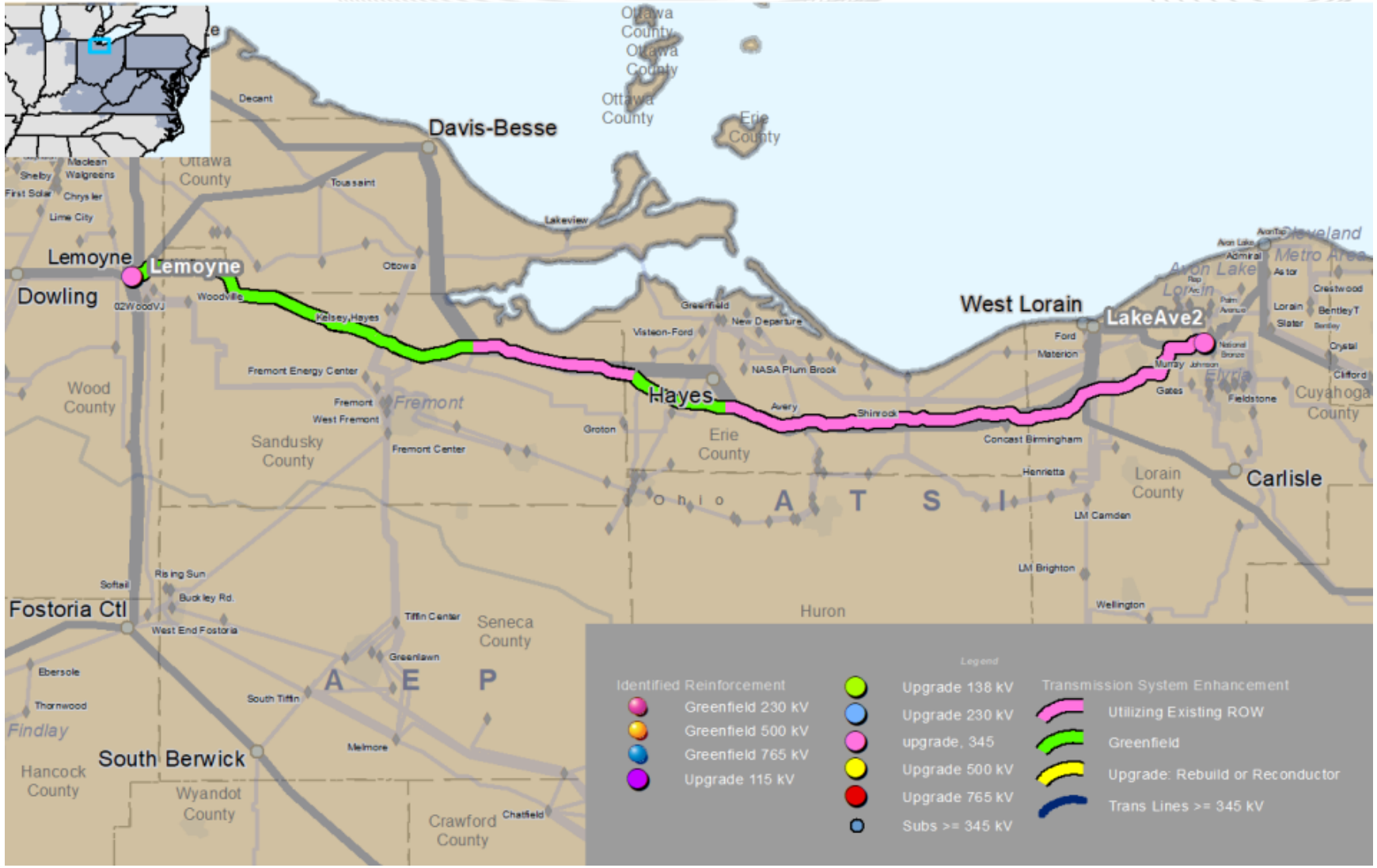
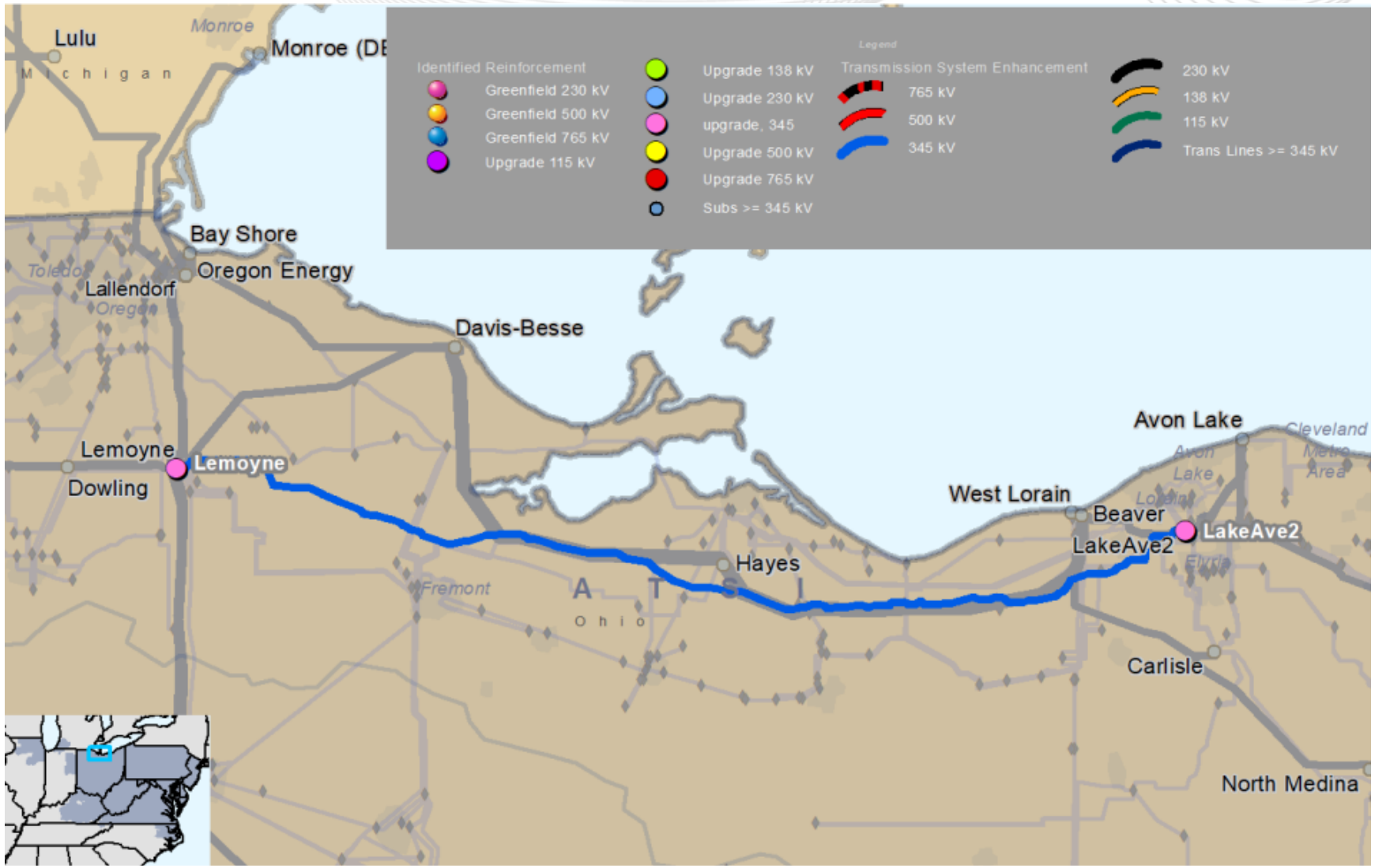


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



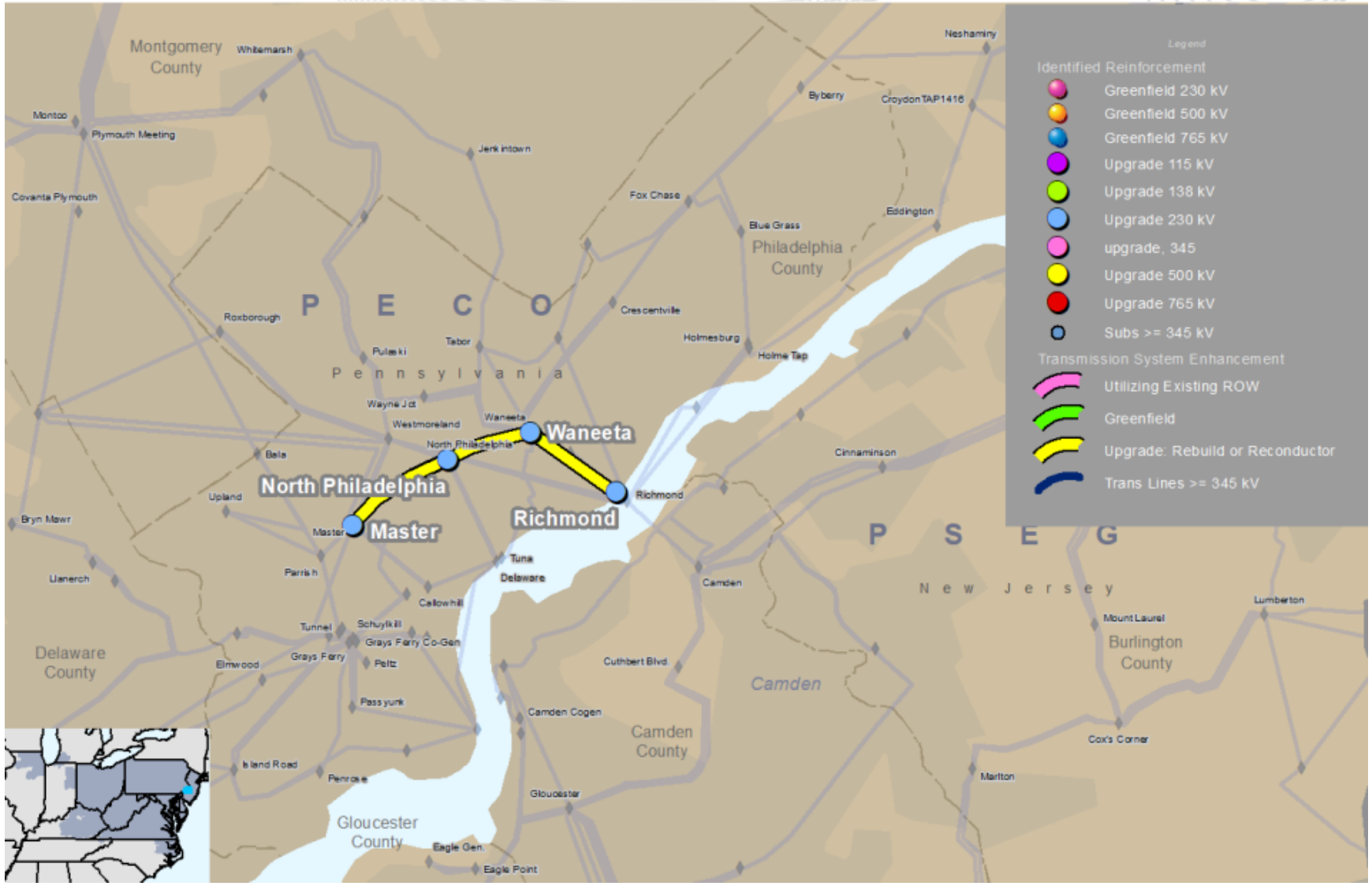
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2024-W1-533
(kV designation only, All kVs)

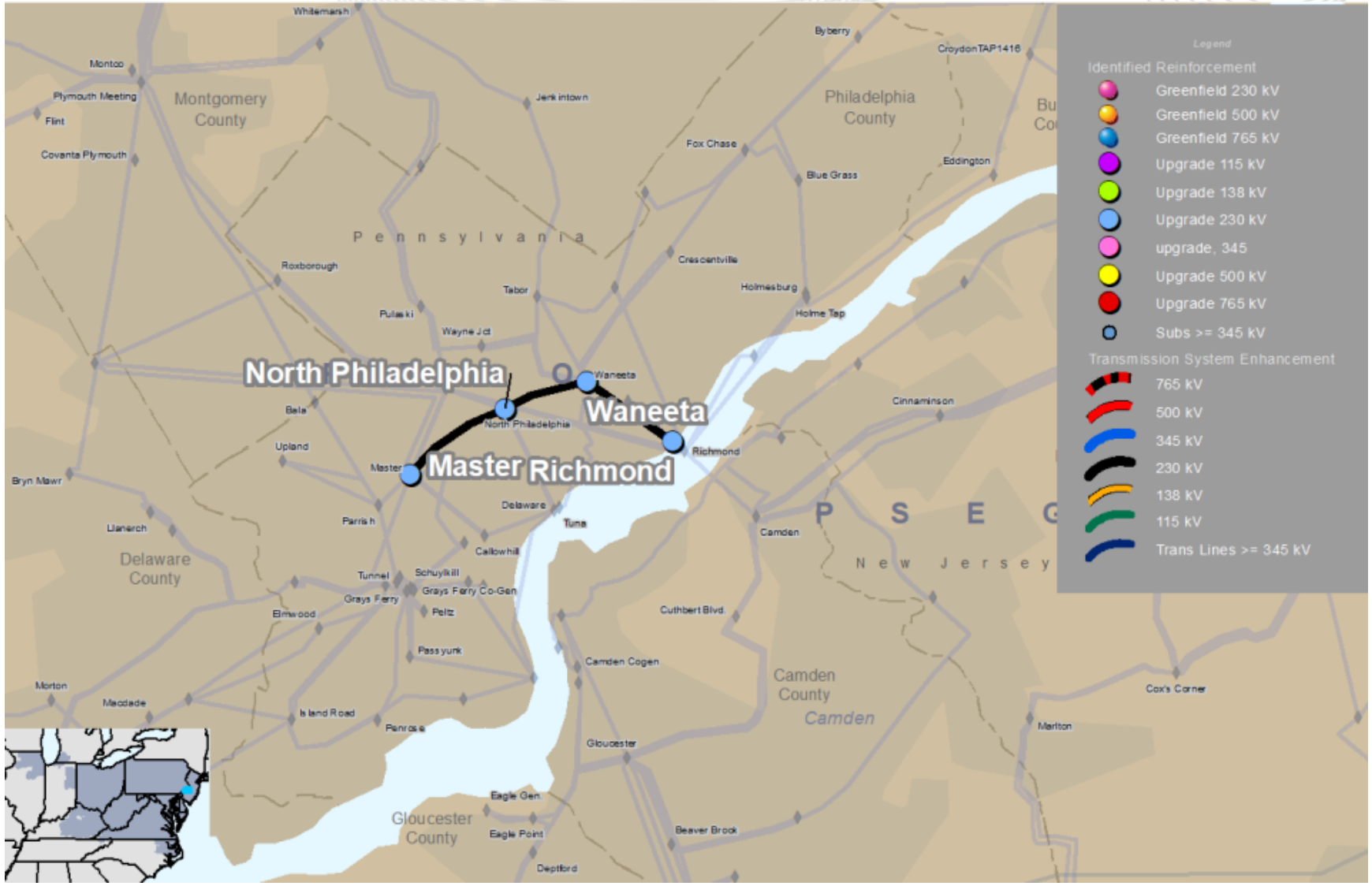


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

PECO



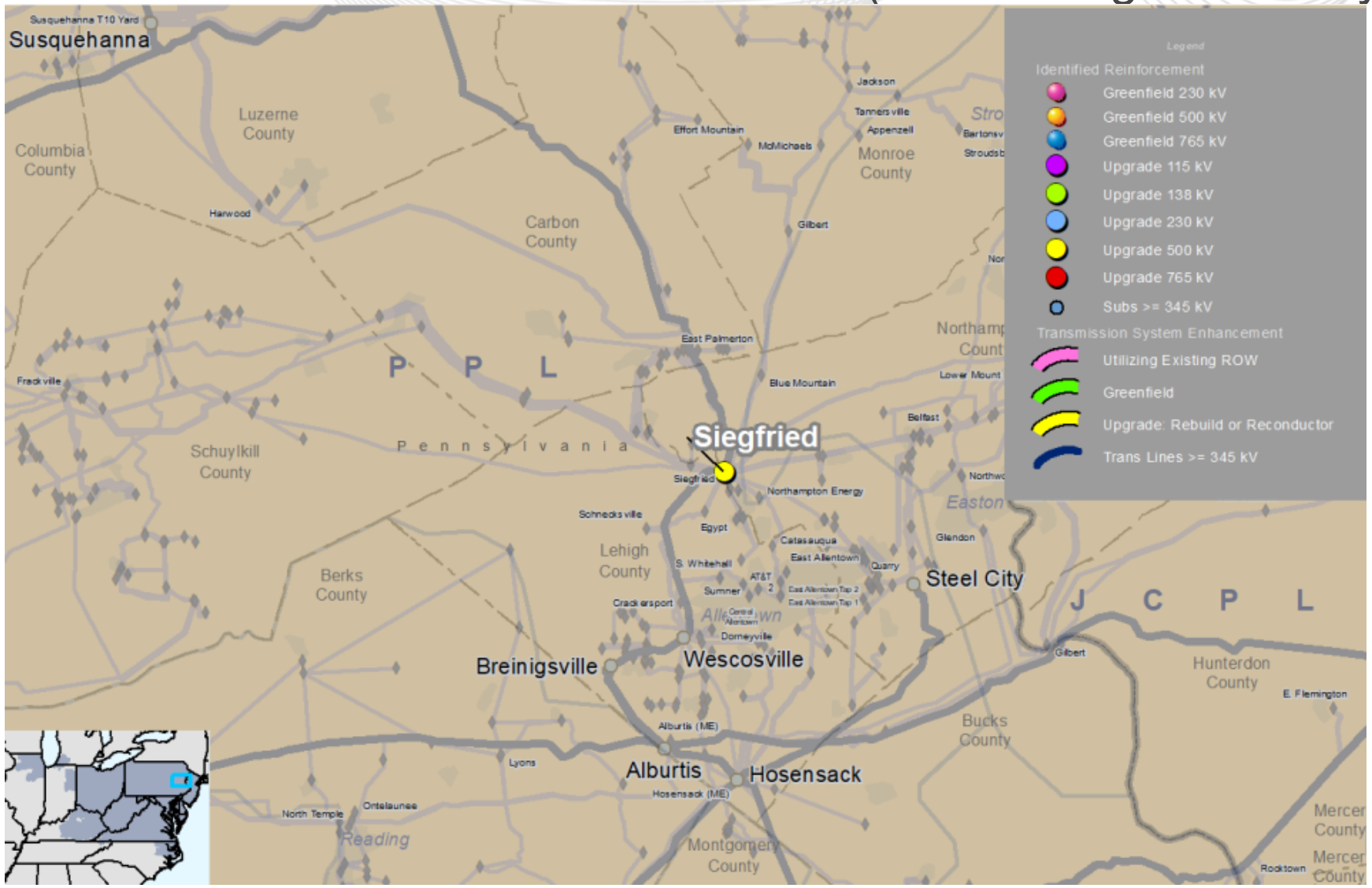
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

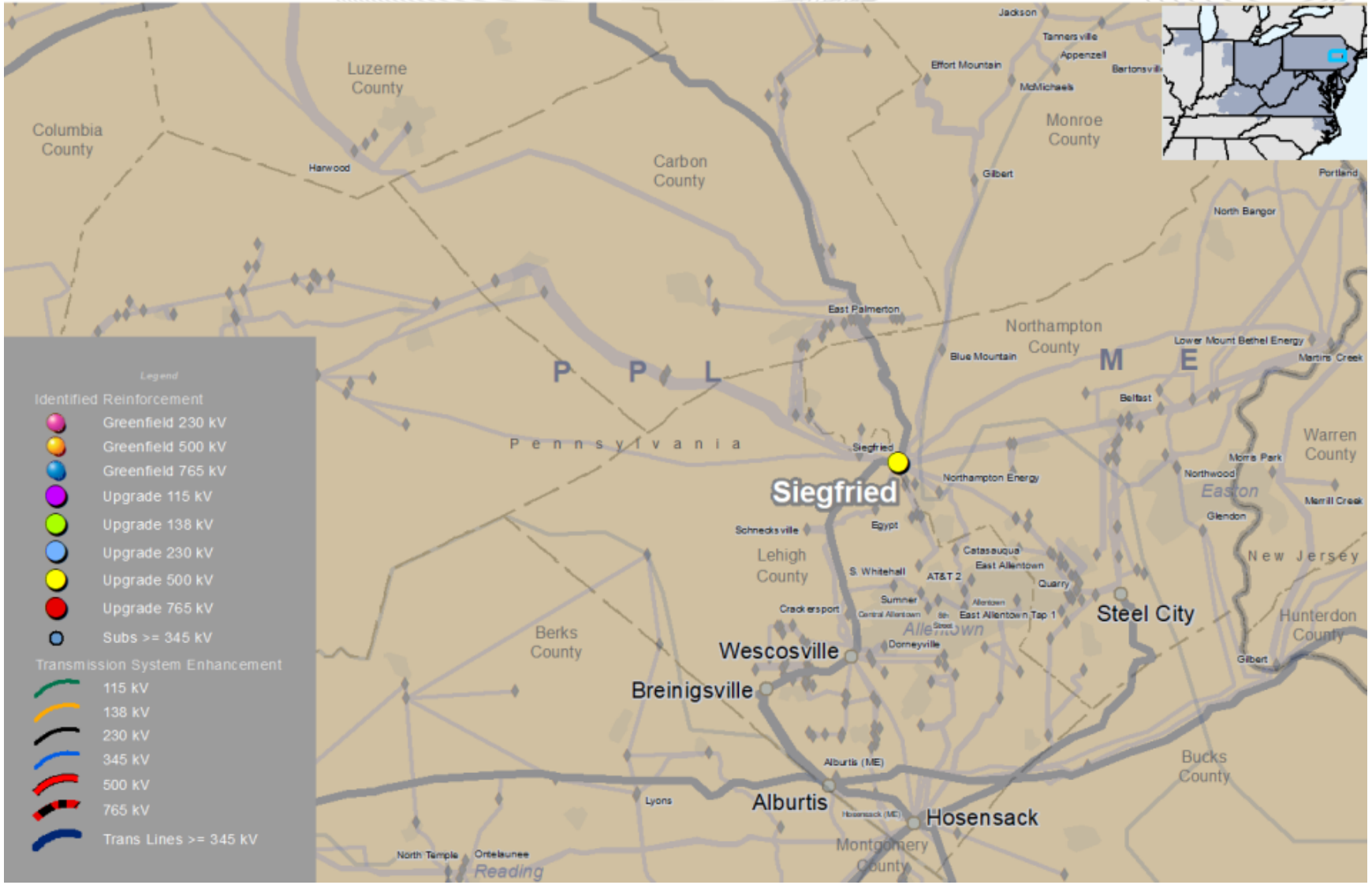
PPL/TRANSLK

2024-W1-876
(ROW designation only, All kVs)



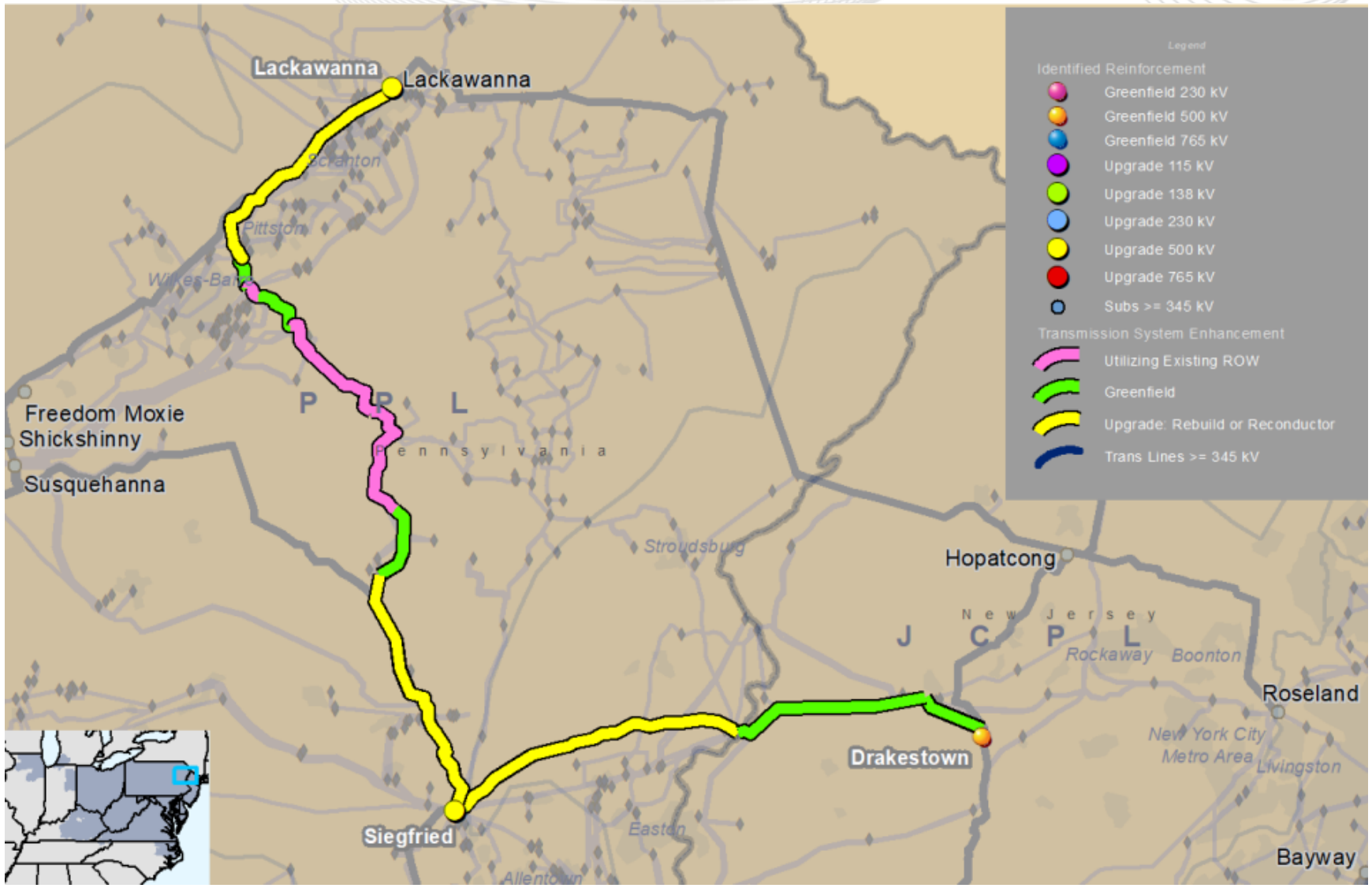
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2024-W1-876
(kV designation only, All kVs)



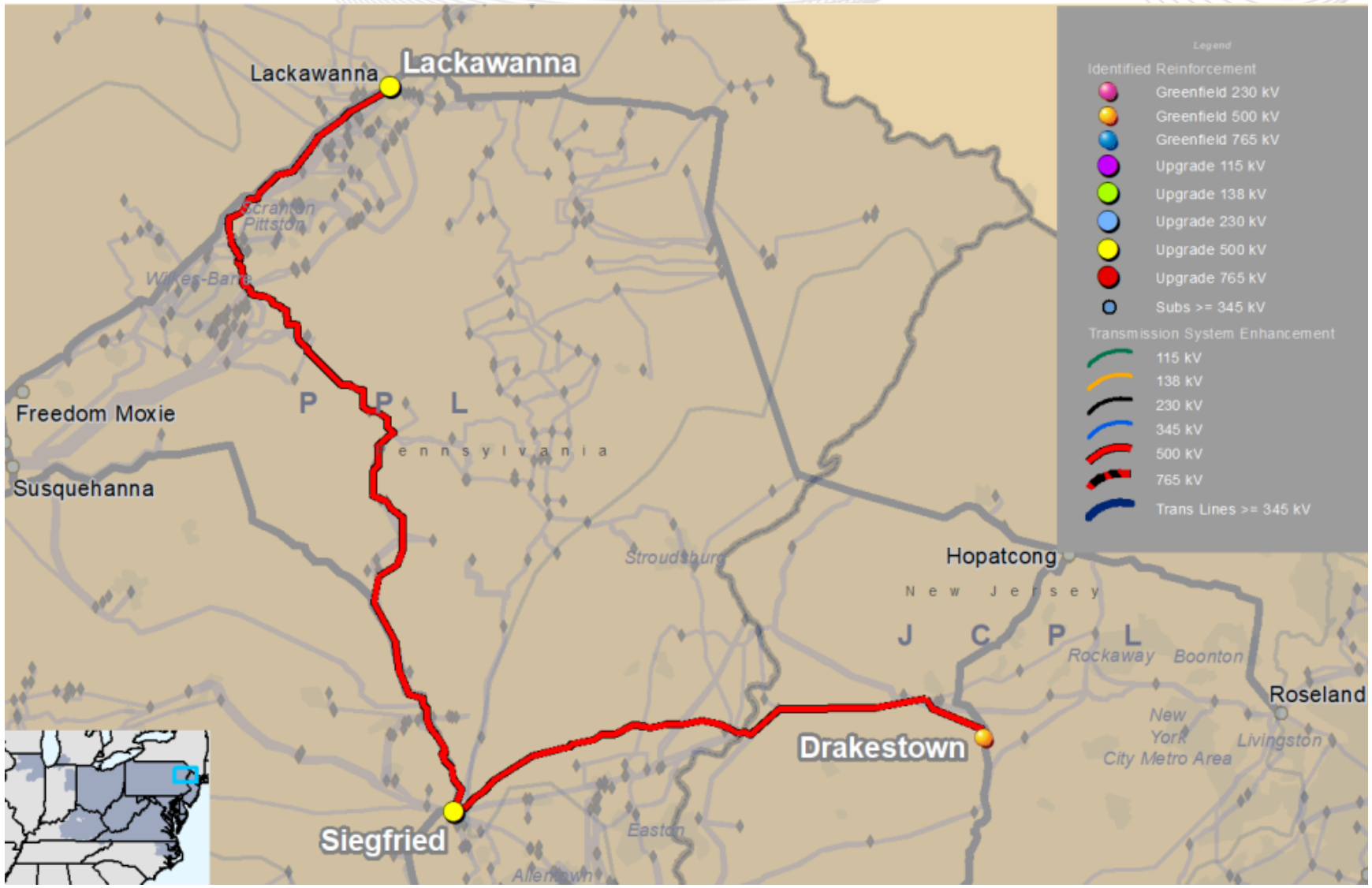
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2024-W1-922/ 2024-W1-546
(ROW designation only, All kVs)



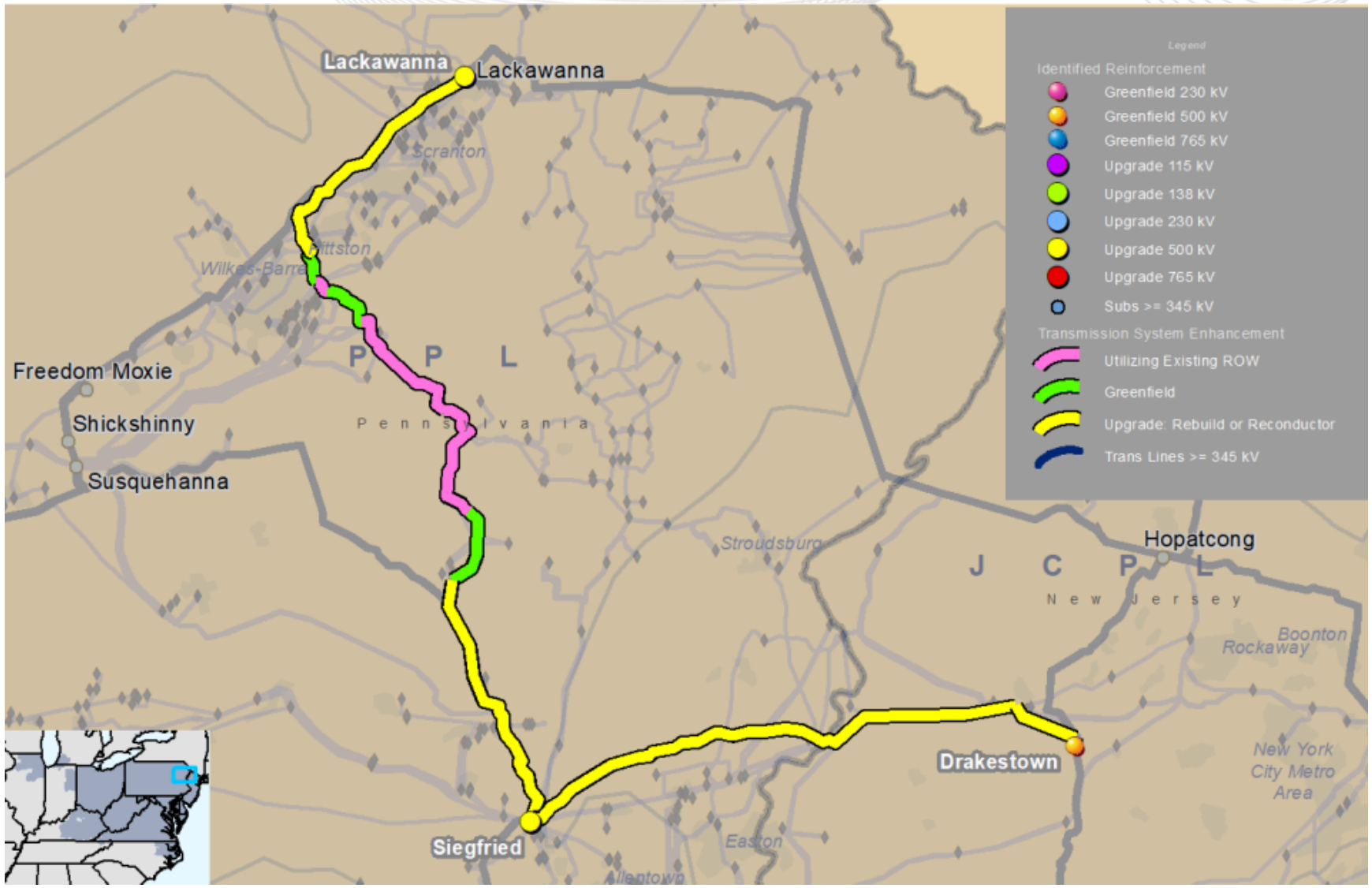
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2024-W1-922/ 2024-W1-546
(kV designation only, All kVs)



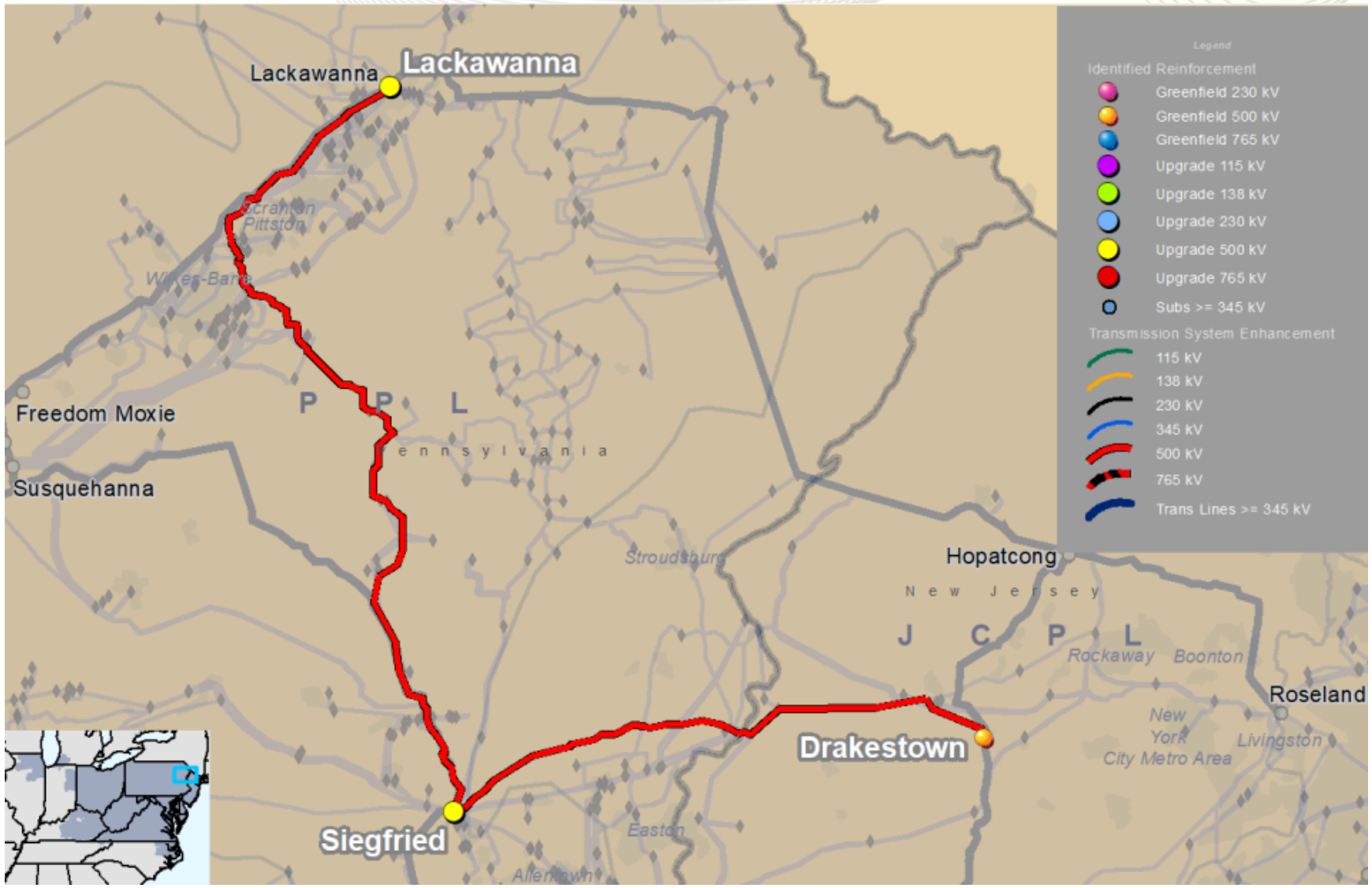
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2024-W1-922/ 2024-W1-900
(ROW designation only, All kVs)

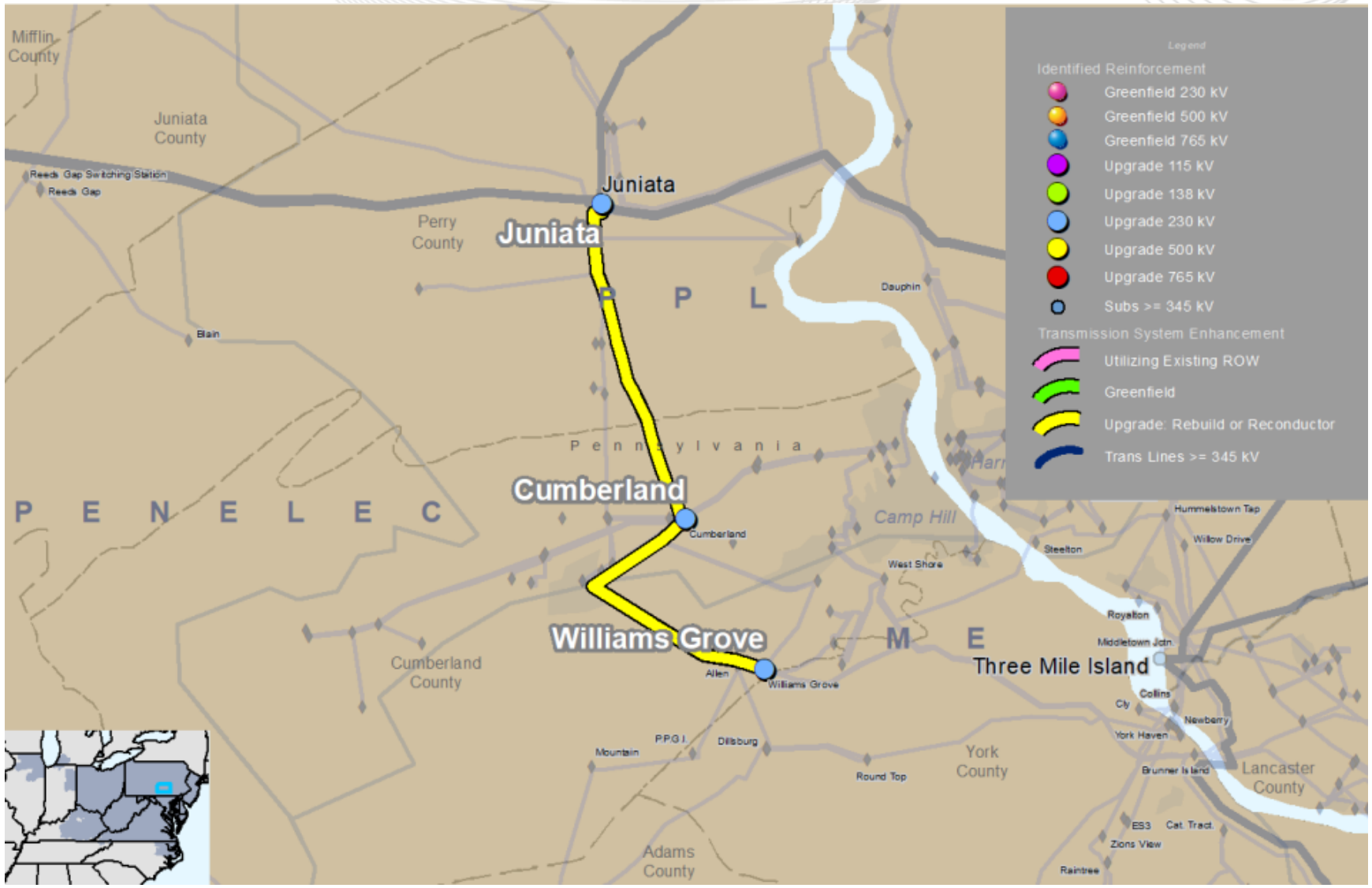


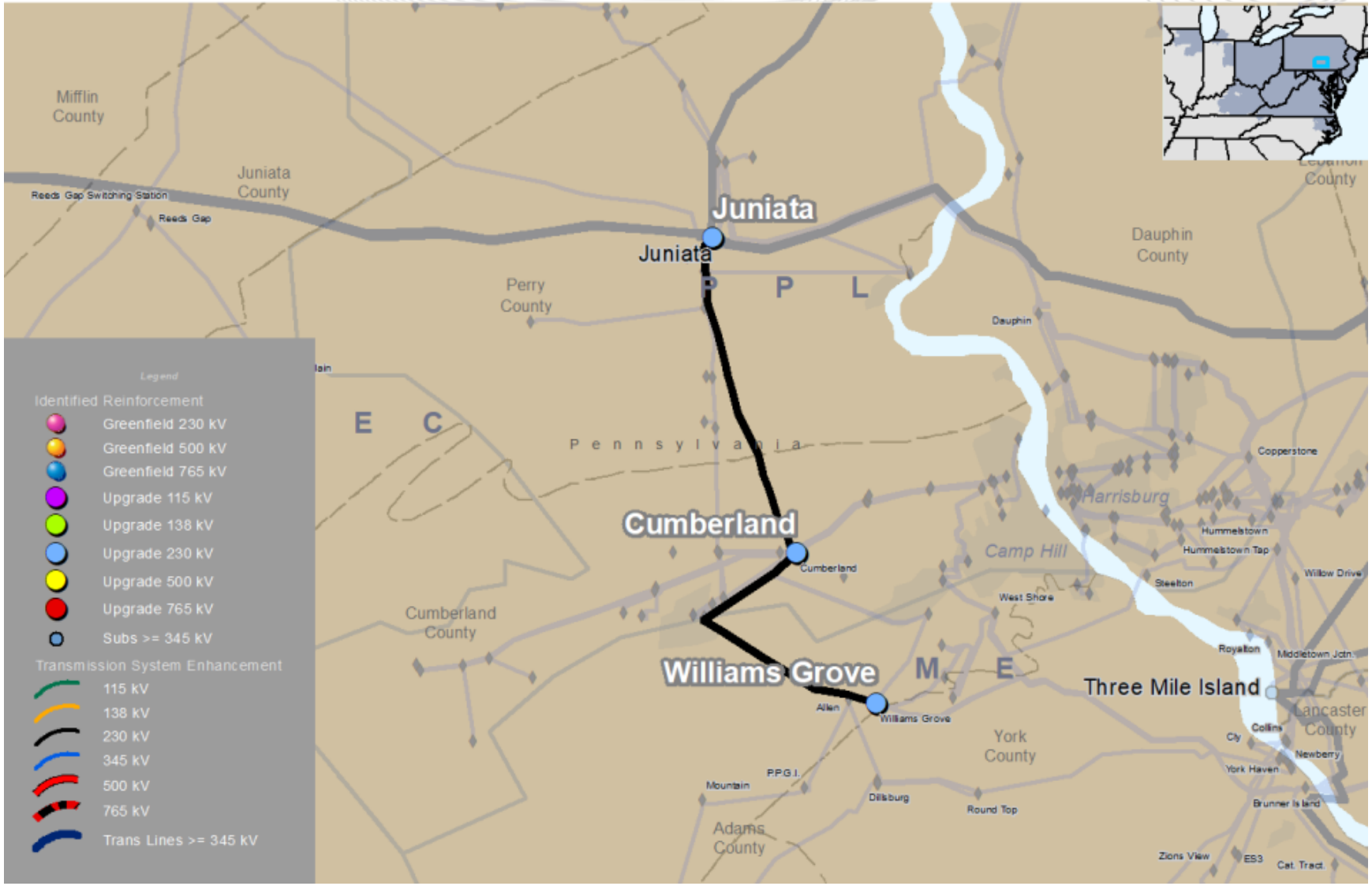
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

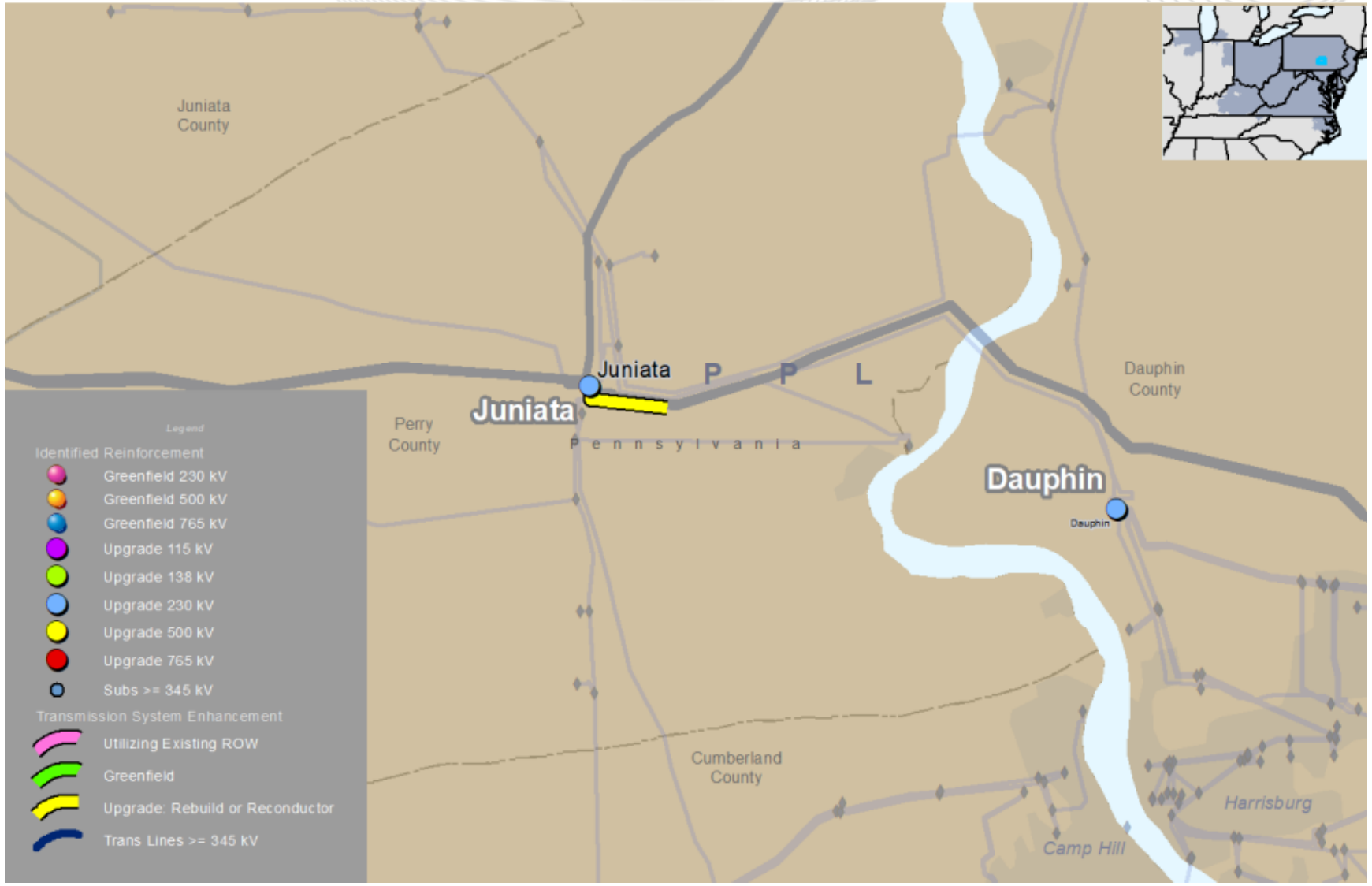
2024-W1-922/ 2024-W1-900
(kV designation only, All kVs)



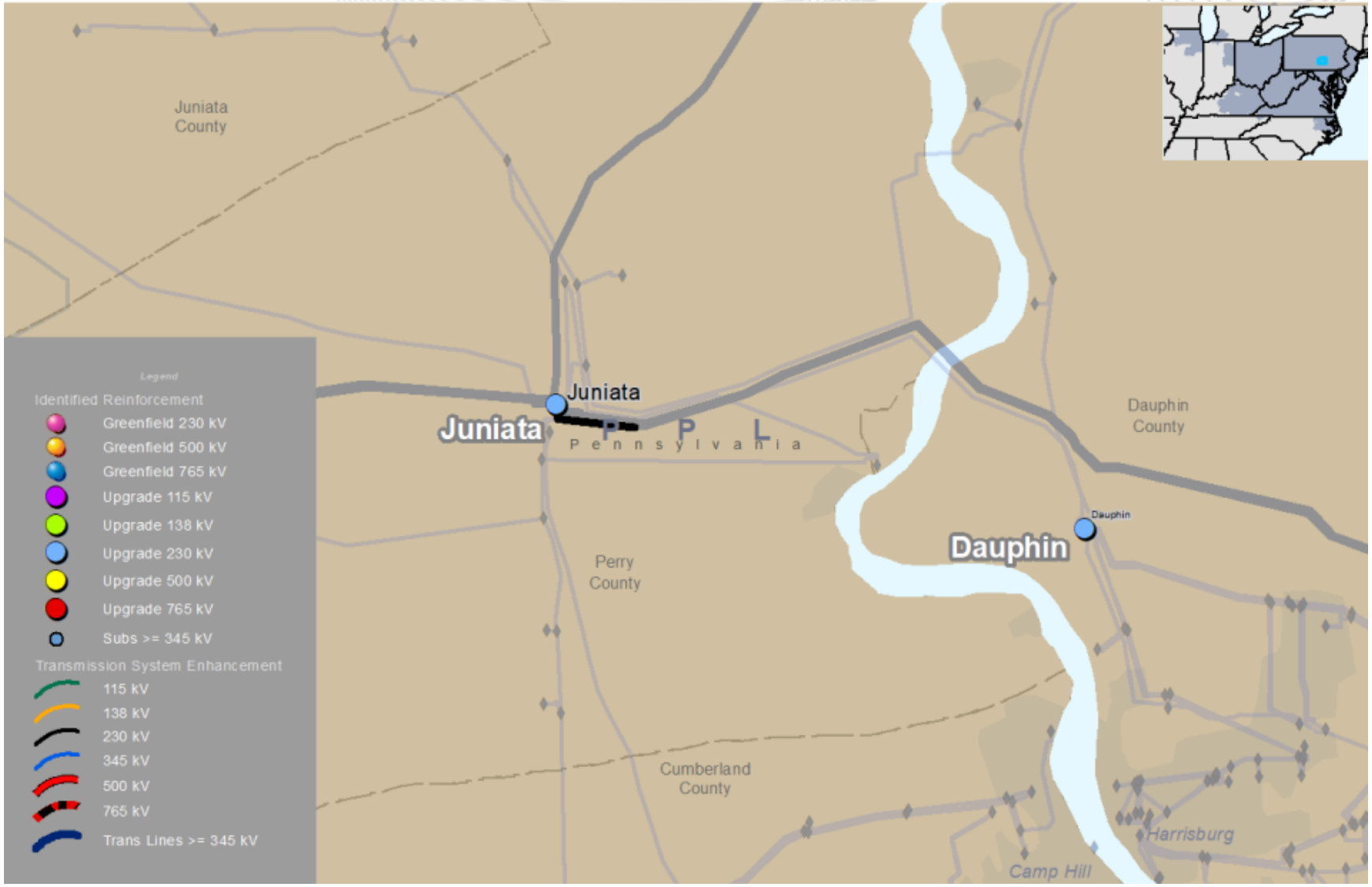
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*


Mifflin County
Juniata County
Reeds Gap Switching Station
Reeds Gap
Juniata
Juniata
Perry County
P L
Dauphin
Blain
Pennsylvania
P E N E L E C
Cumberland
Cumberland
Camp Hill
Hummelstown Tap
Willow Drive
Steelton
West Shore
Royalton
Middletown Jctn.
M E
Three Mile Island
Williams Grove
Allen
Williams Grove
Cumberland County
Collins
Cly
Newberry
York Haven
PPGI
Dillsburg
Mountain
Round Top
York County
Brunner Island
Lancaster County
ES3
Cat. Tract.
Zions View
Raintree
Adams County
Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
Utilizing Existing ROW
Greenfield
Upgrade: Rebuild or Reconductor
Trans Lines >= 345 kV


Mifflin County
Juniata County
Reeds Gap Switching Station
Reeds Gap
Juniata
Juniata
P P L
Perry County
Dauphin County
Dauphin
Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
115 kV
138 kV
230 kV
345 kV
500 kV
765 kV
Trans Lines >= 345 kV
E C
Pennsylvania
Cumberland
Cumberland
Cumberland County
Harrisburg
Camp Hill
Copperstone
Hummelstown
Hummelstown Tap
Steelton
Willow Drive
West Shore
Royalton
Middletown Jctn
Williams Grove
M E
Three Mile Island
Allen
Williams Grove
York County
Lancaster County
Collins
City
Newberry
York Haven
Brunner Island
PPG I.
Mountain
Dillsburg
Round Top
Adams County
Zions View
ES3
Cat. Tract

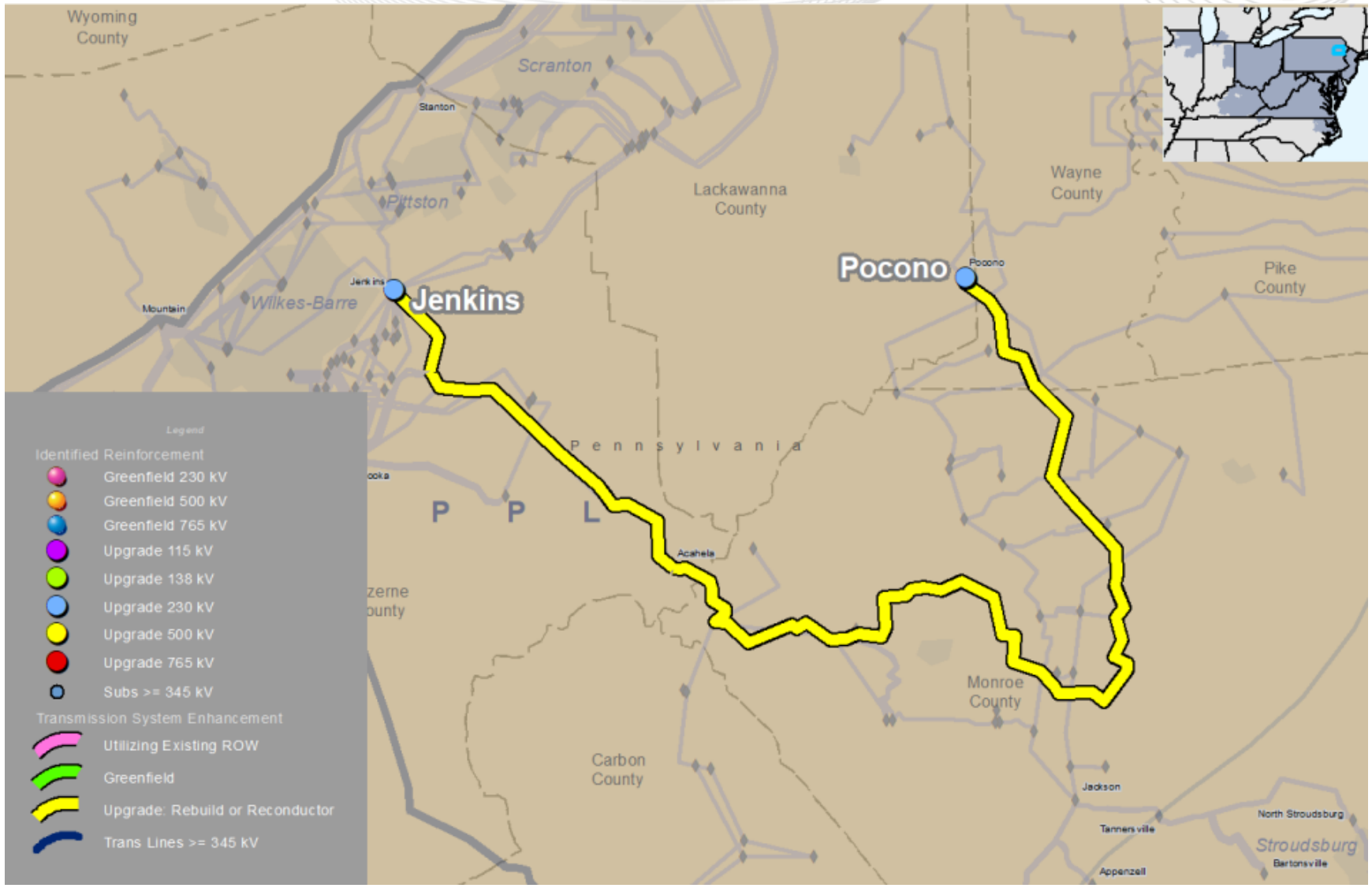


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

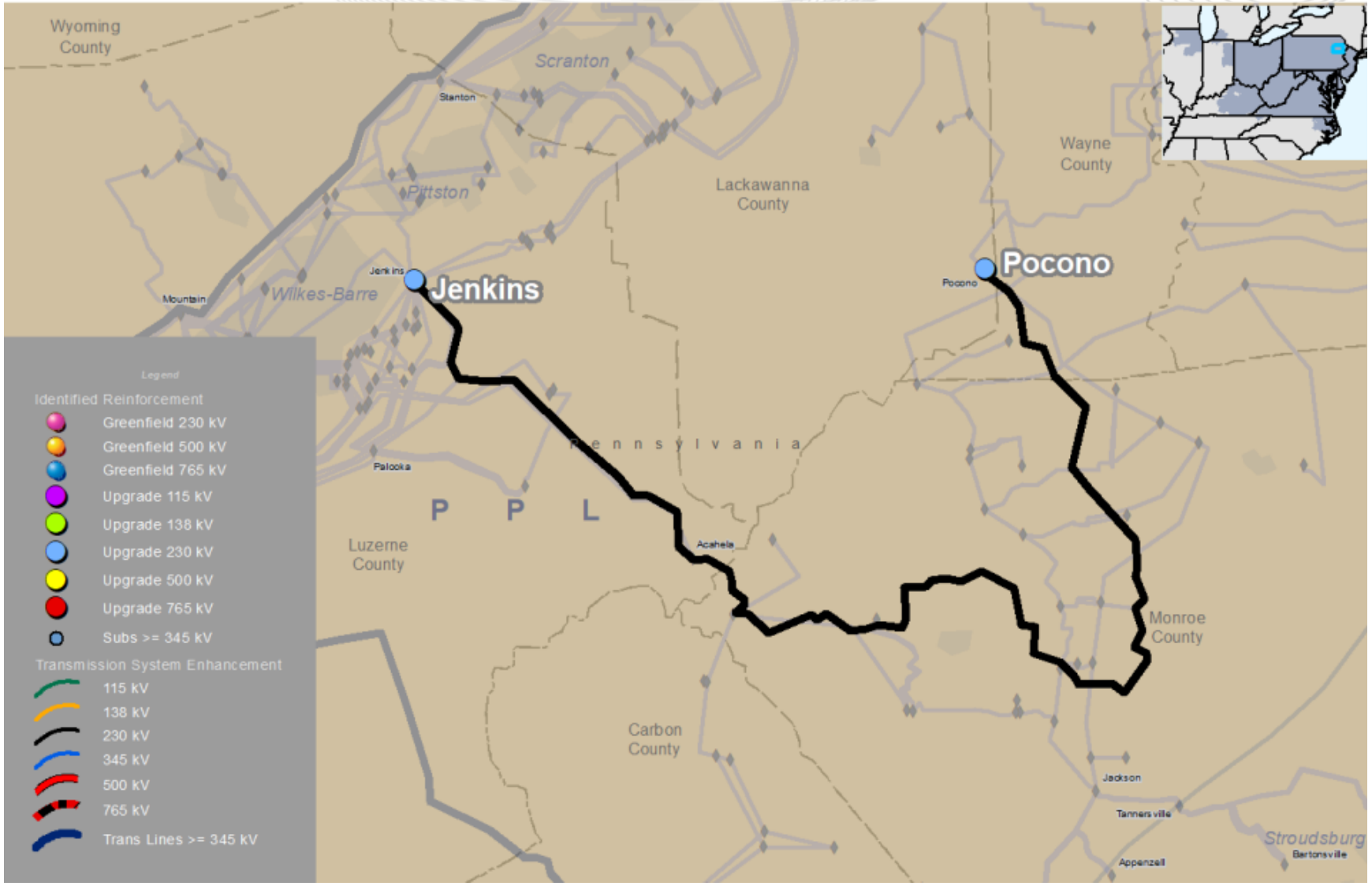


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

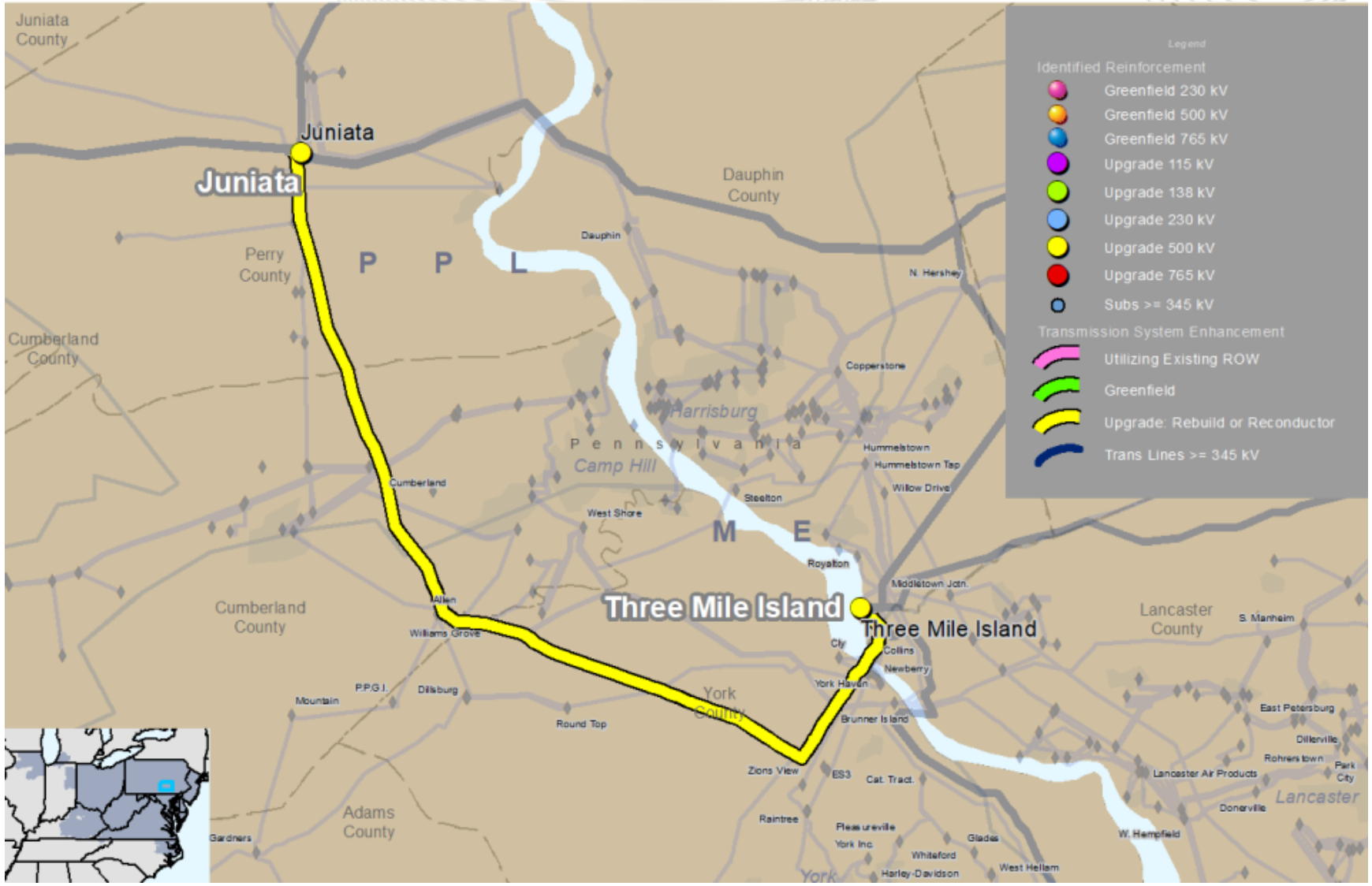
2024-W1-526
(ROW designation only, All kVs)



NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



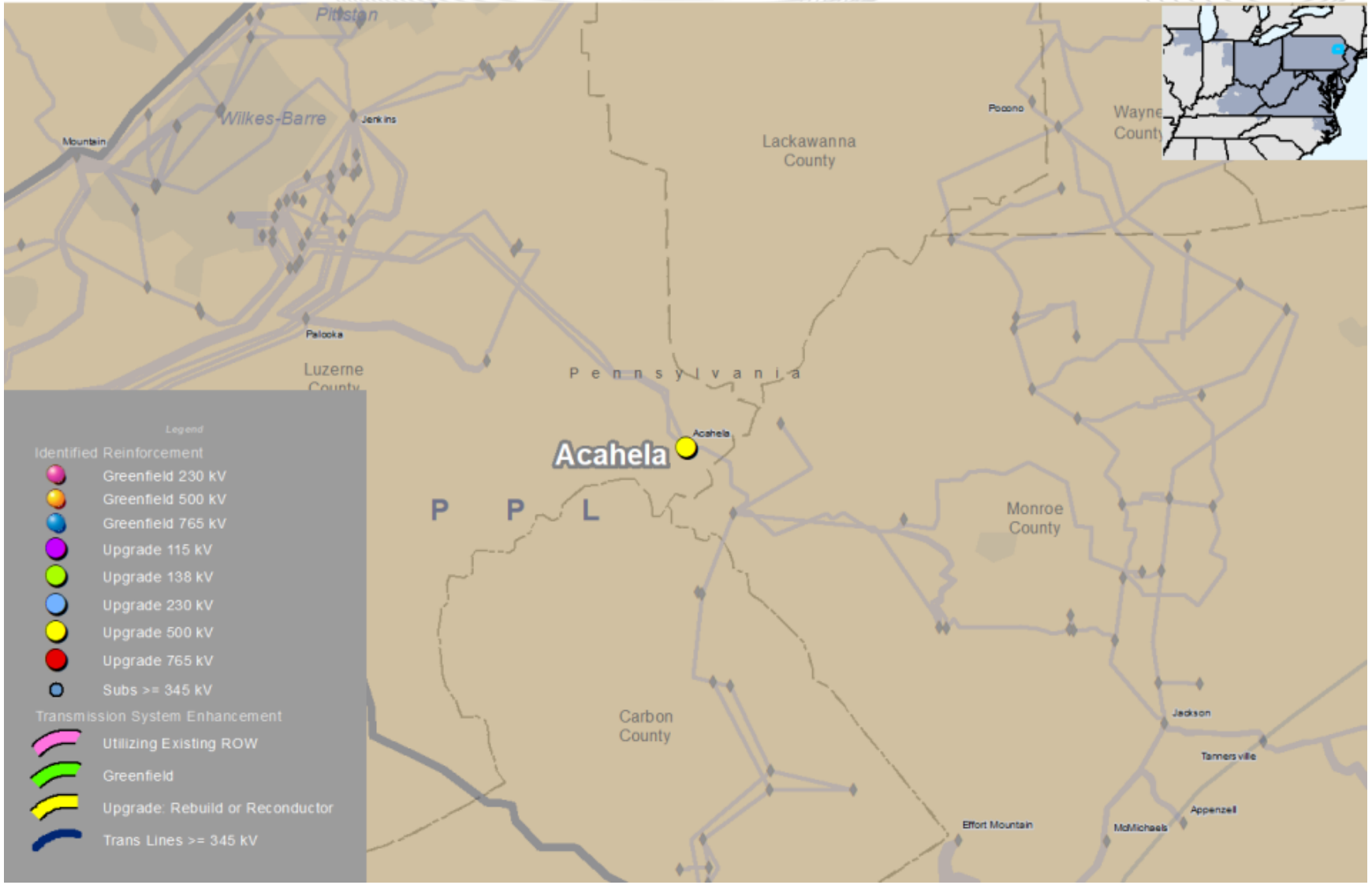
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



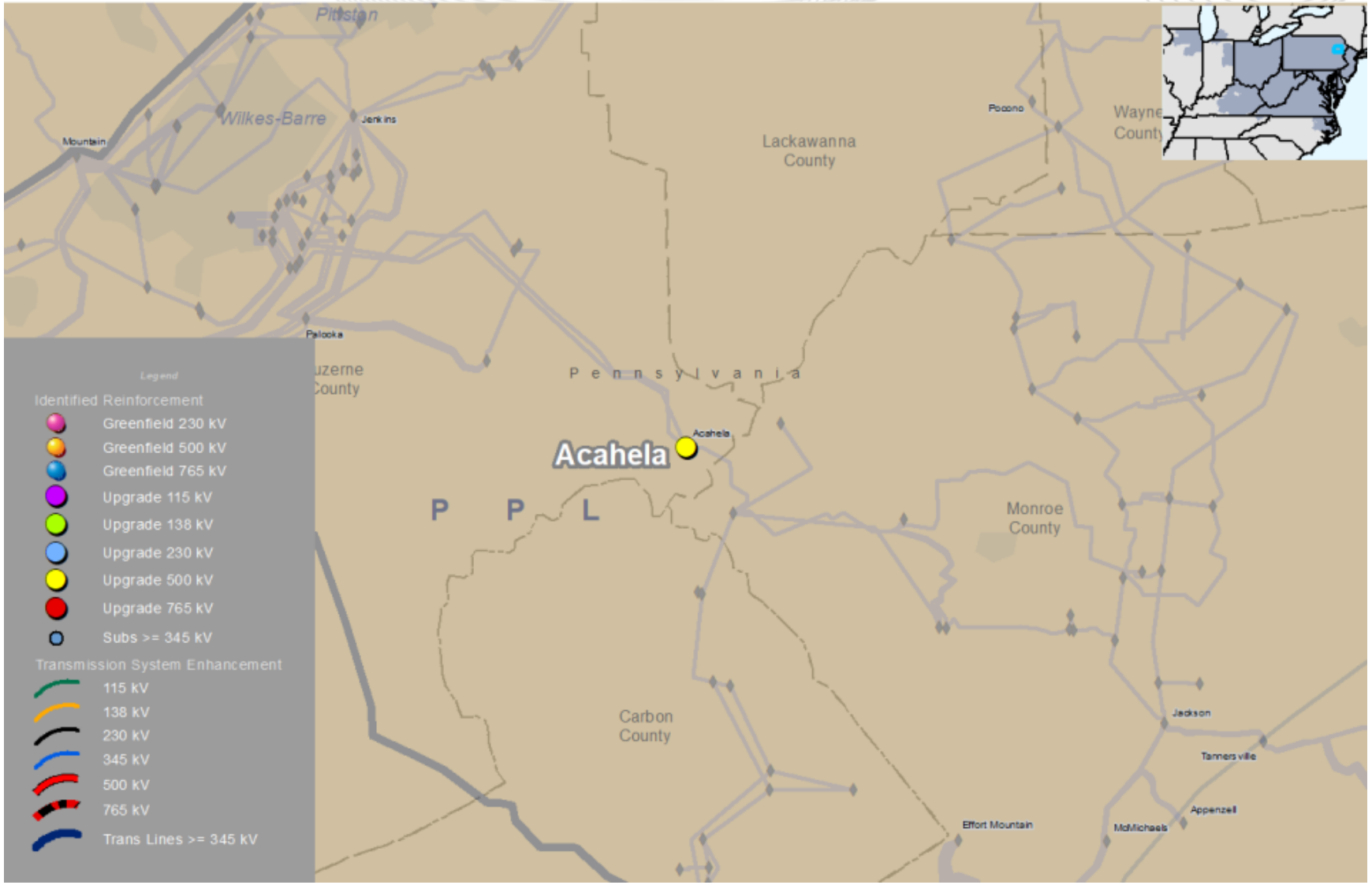
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

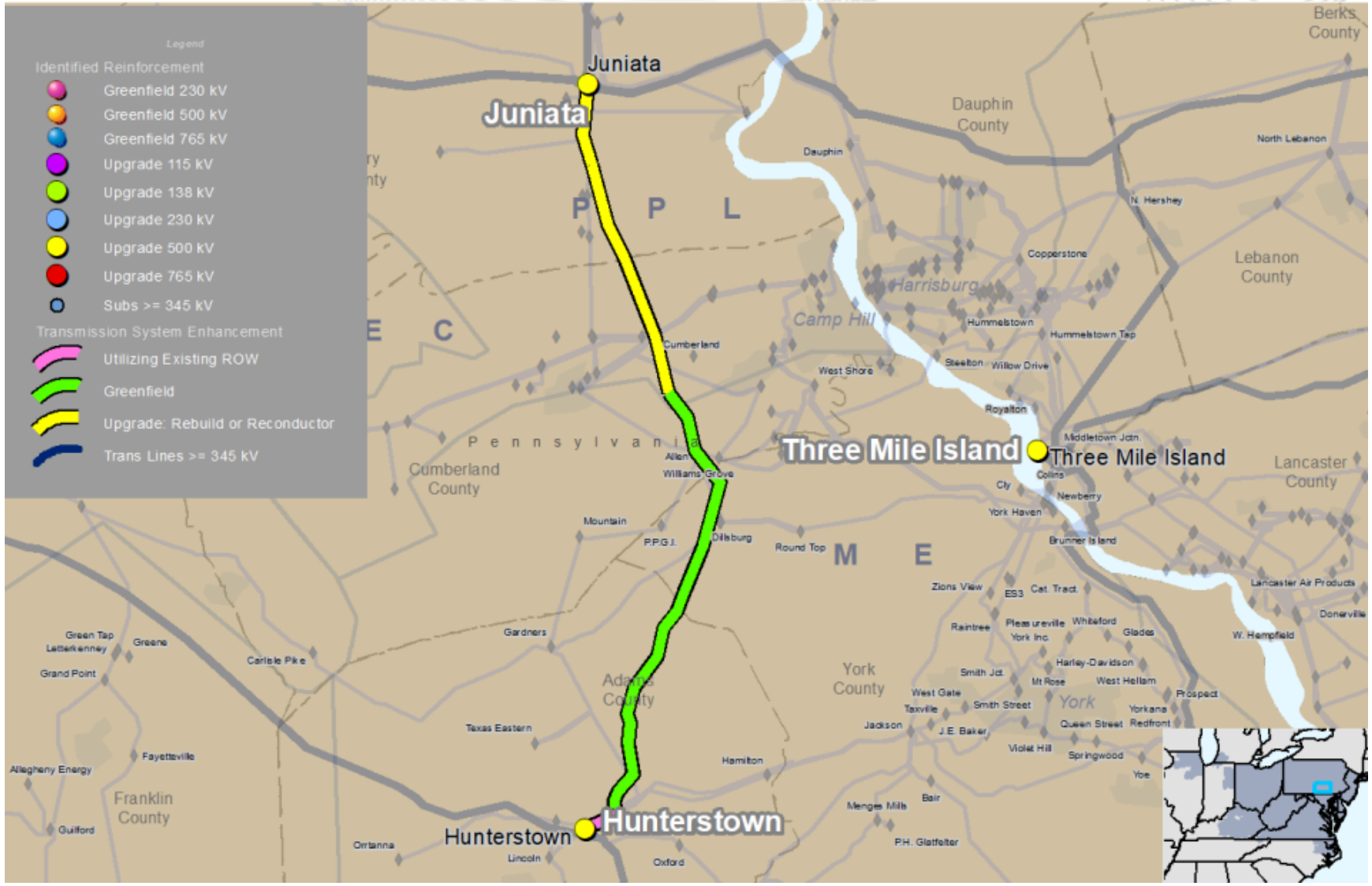
2024-W1-312
(ROW designation only, All kVs)



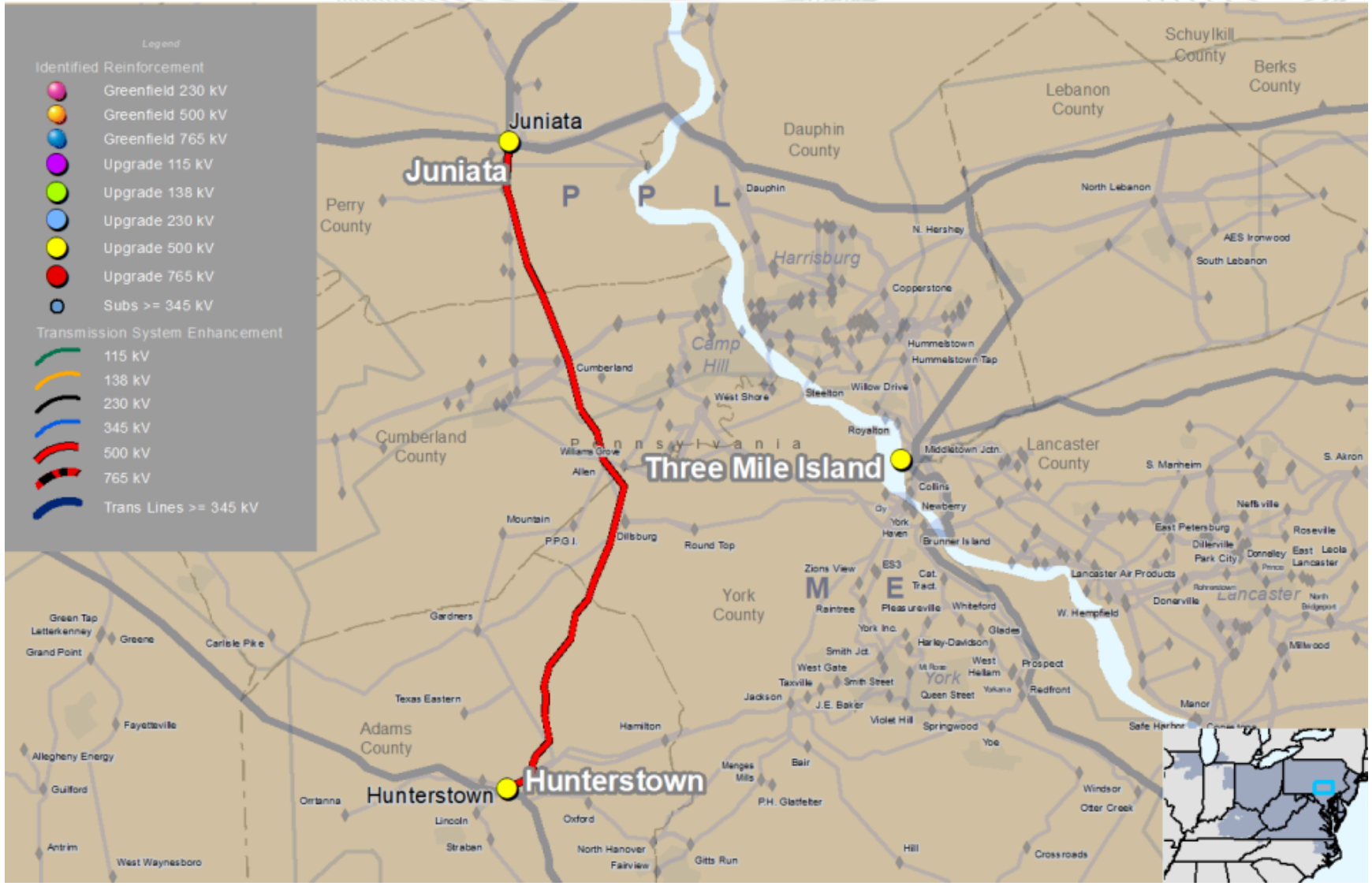
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



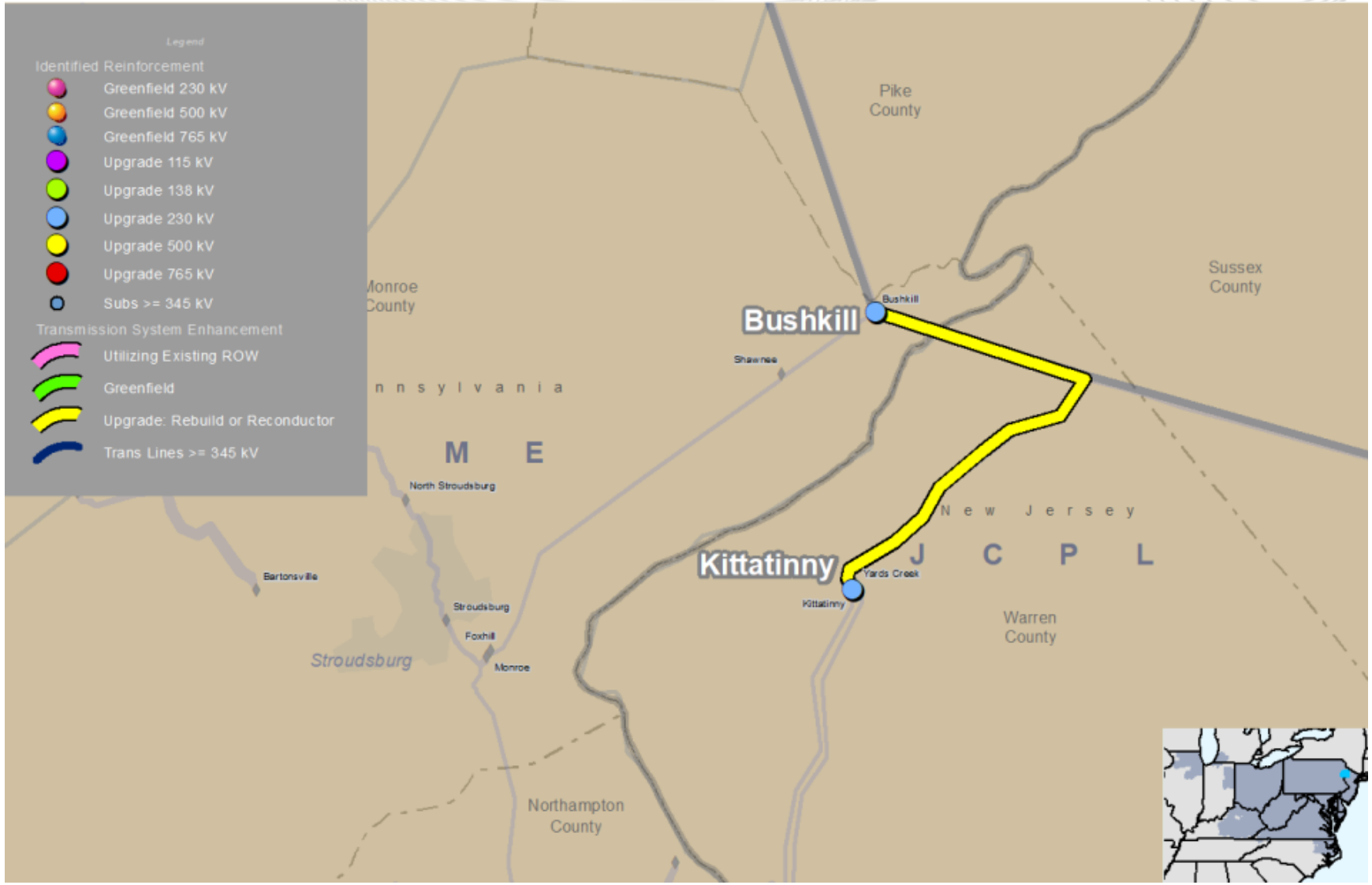
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

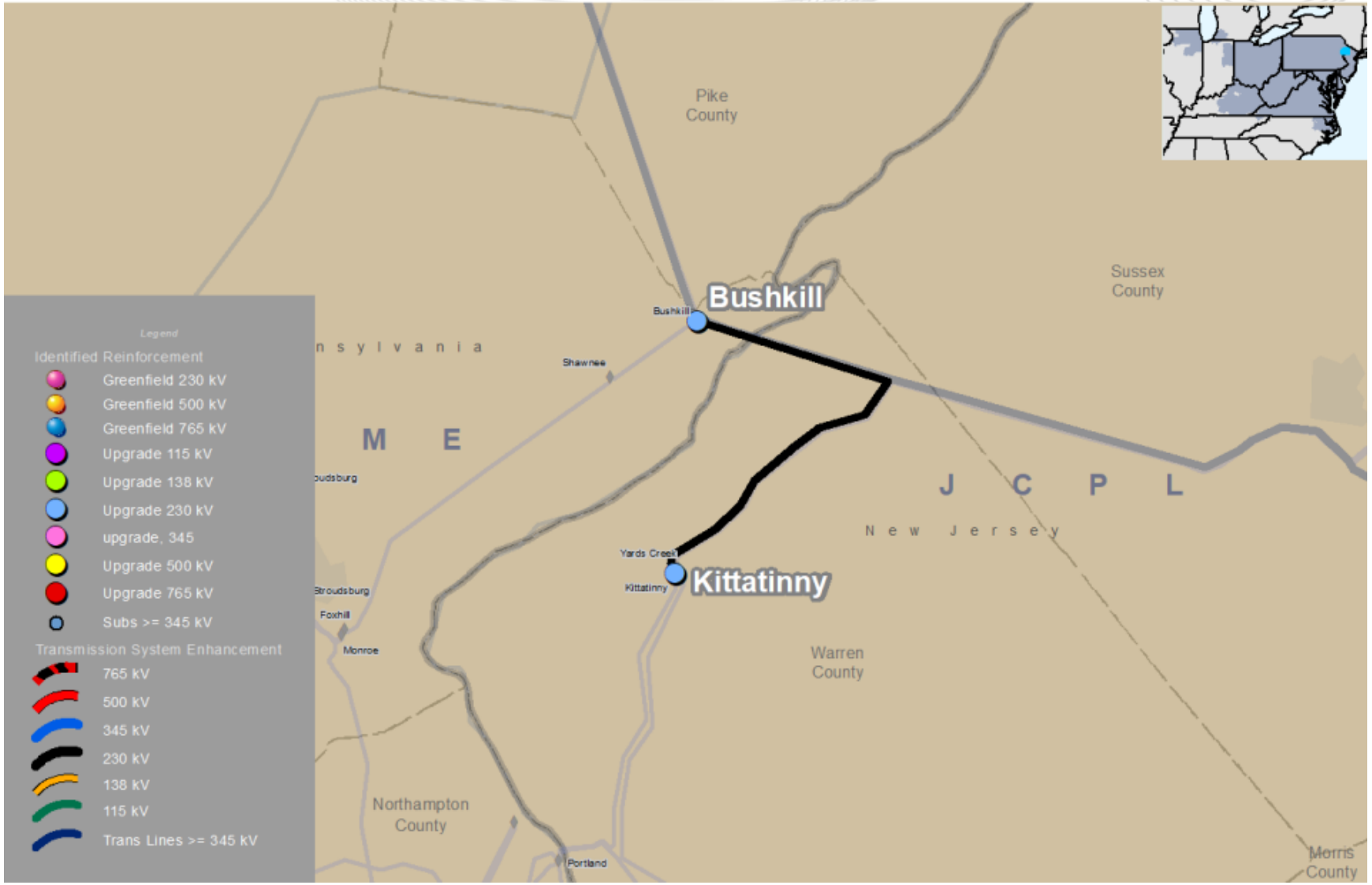


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

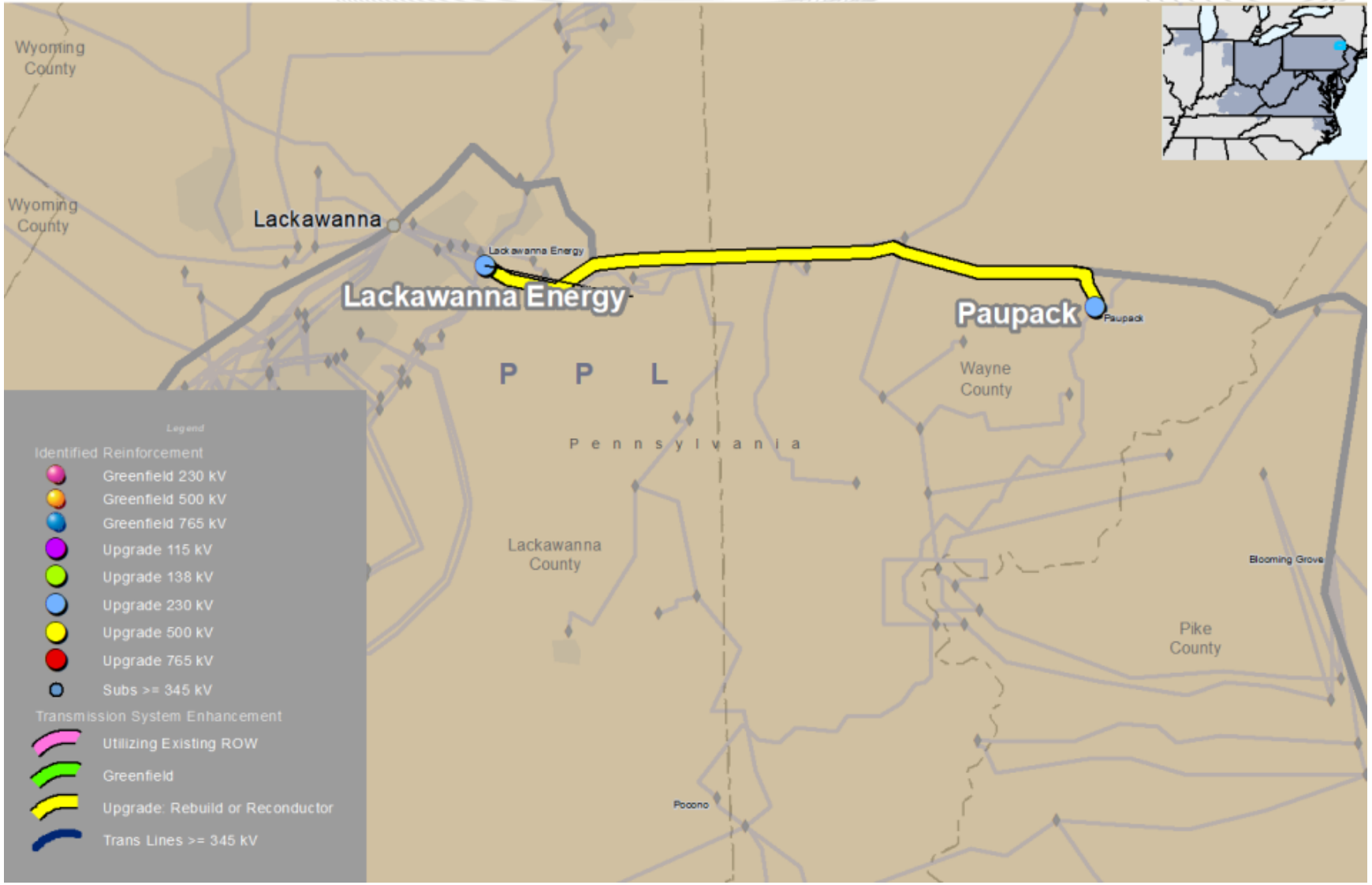


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

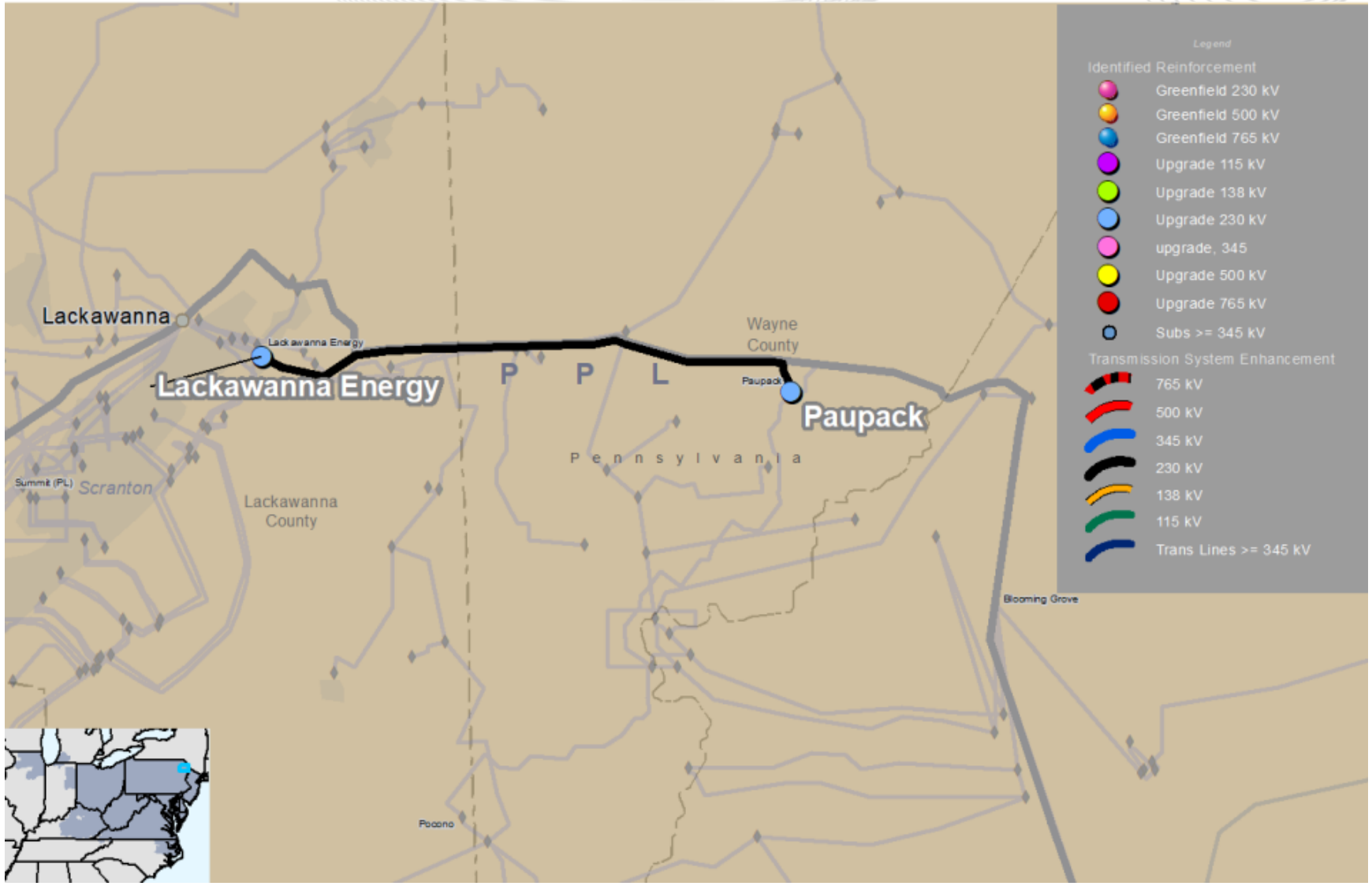

Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
Utilizing Existing ROW
Greenfield
Upgrade: Rebuild or Reconductor
Trans Lines >= 345 kV
Pike County
Monroe County
Sussex County
Bushkill
Bushkill
Shawnee
n n s y l v a n i a
M E
North Stroudsburg
New Jersey
J C P L
Kittatinny
Yards Creek
Kittatinny
Bartonsville
Stroudsburg
Foxhill
Monroe
Stroudsburg
Warren County
Northampton County


Pike County
Bushkill
Bushkill
Shawnee
Sussex County
M E
J C P L
New Jersey
Yards Creek
Kittatinny
Kittatinny
Stroudsburg
Foxhill
Monroe
Warren County
Northampton County
Portland
Morris County
Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
upgrade, 345
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
765 kV
500 kV
345 kV
230 kV
138 kV
115 kV
Trans Lines >= 345 kV

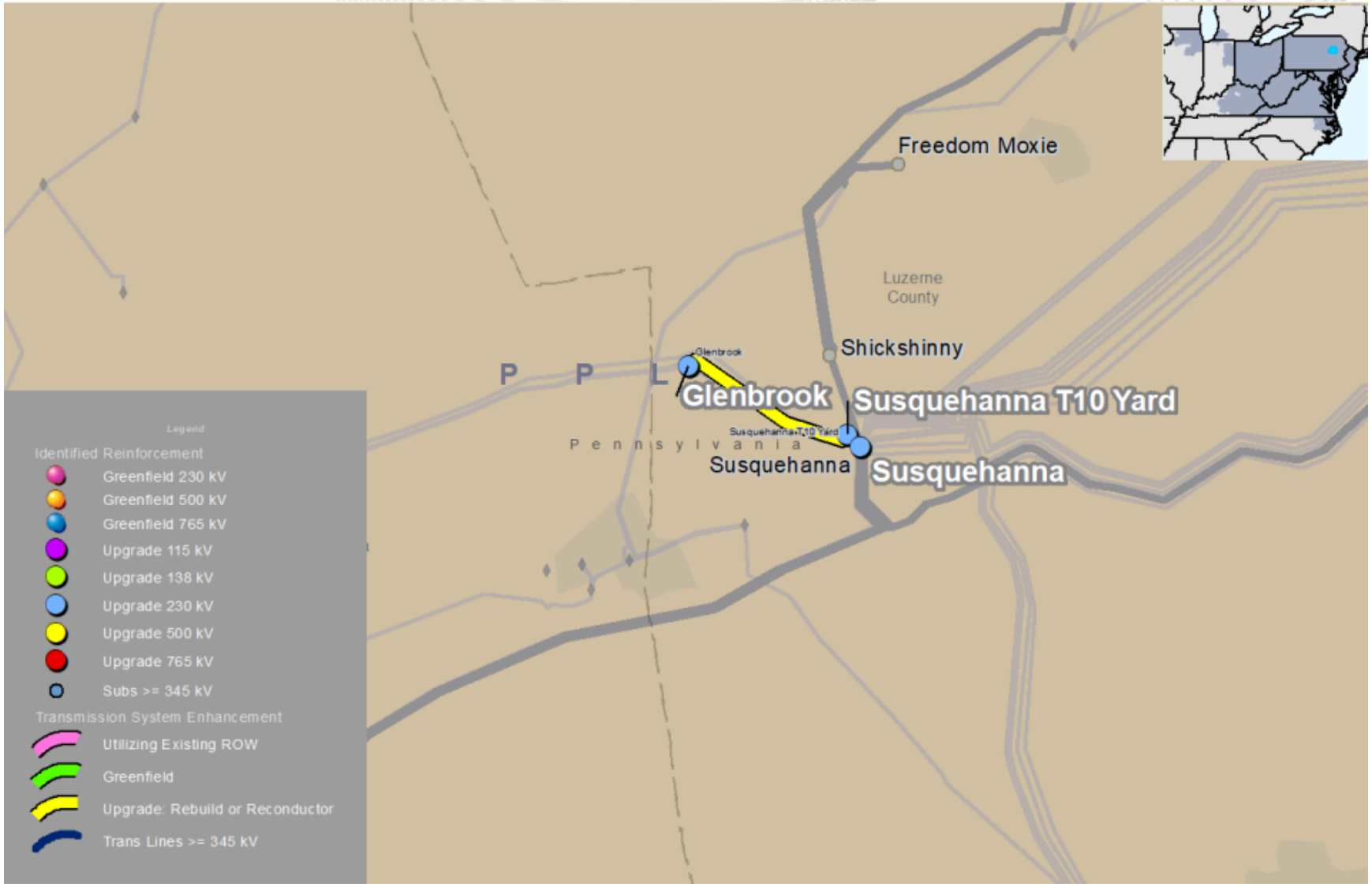
2024-W1-479
(ROW designation only, All kVs)



2024-W1-479
(kV designation only, All kVs)

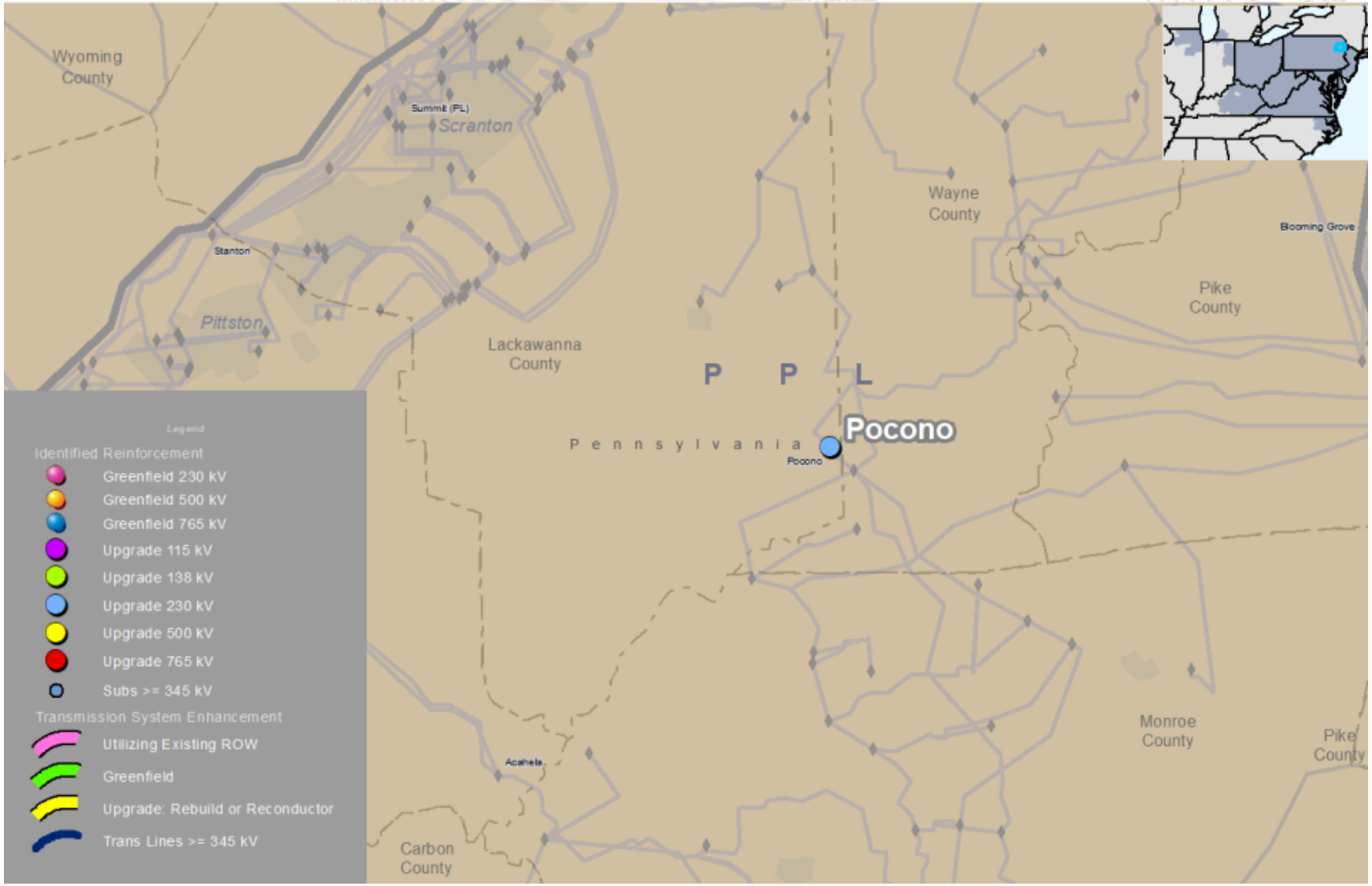


2024-W1-549
(ROW designation only, All kVs)

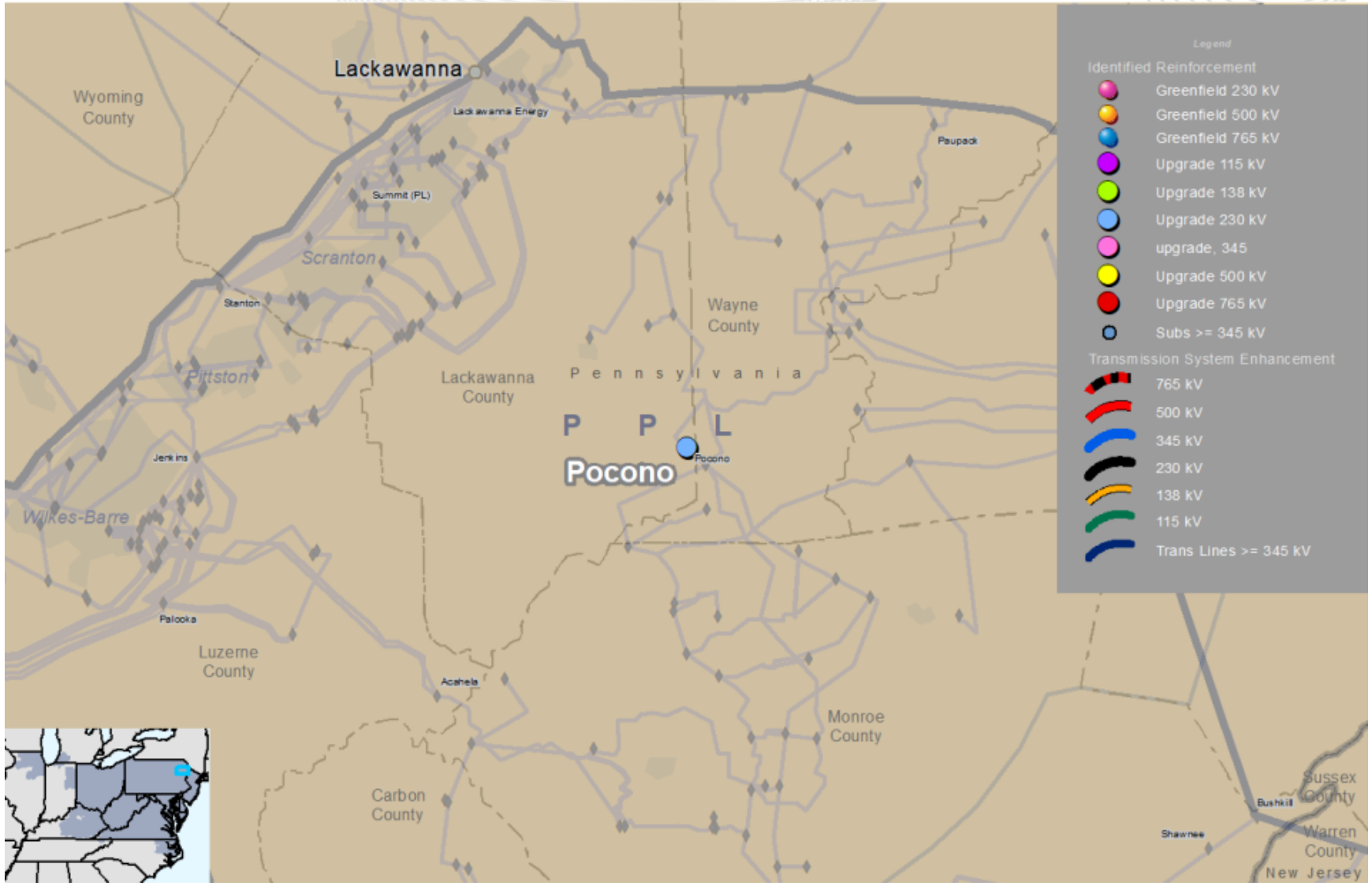


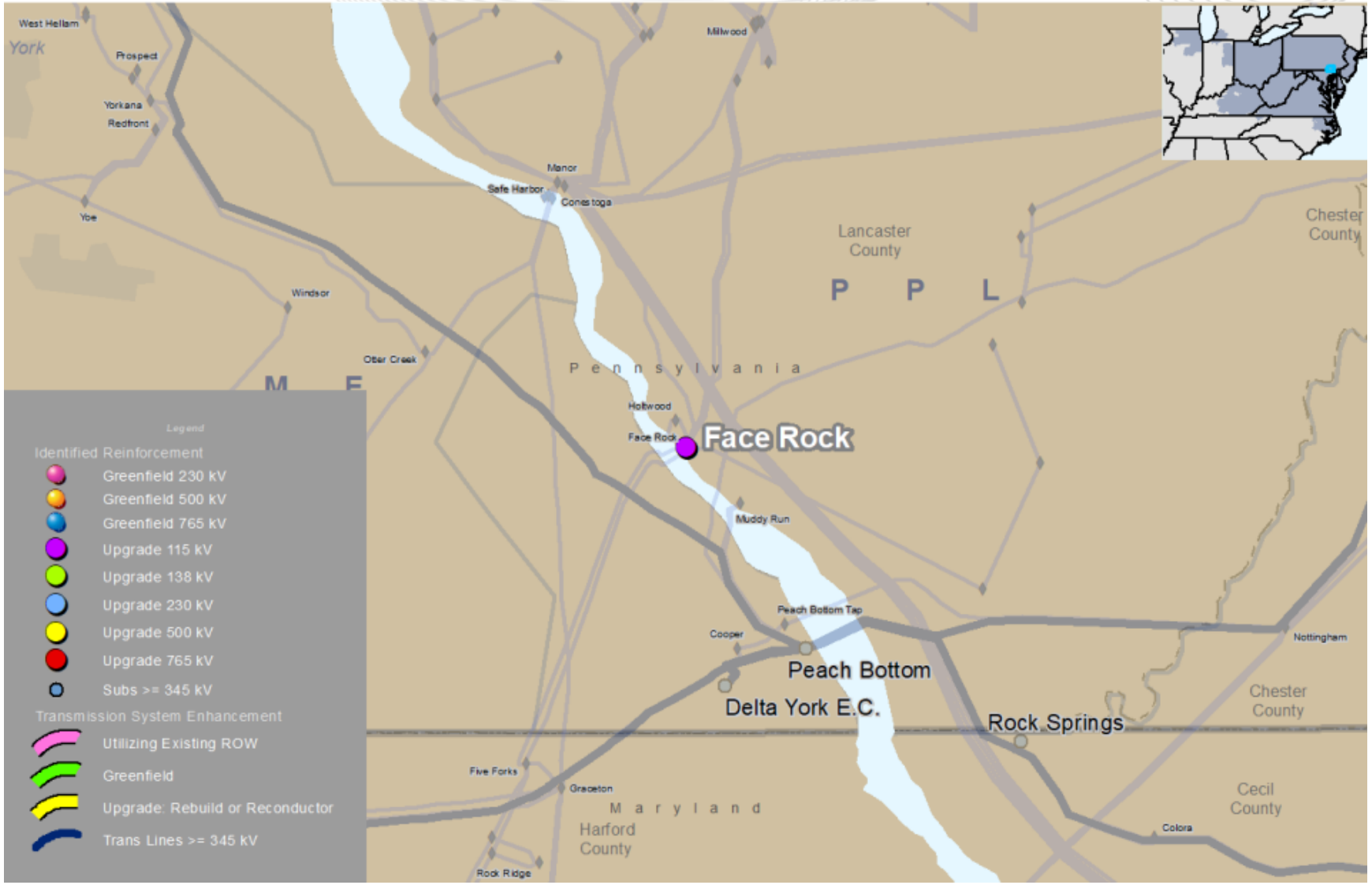

Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
upgrade, 345
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
765 kV
500 kV
345 kV
230 kV
138 kV
115 kV
Trans Lines >= 345 kV
Wilkes-Barre
Freedom Moxie
Luzerne
County
P P L
Shickshinny
Glenbrook
Glenbrook
Susquehanna
Susquehanna T10 Yard
Susquehanna

2024-W1-850
(ROW designation only, All kVs)

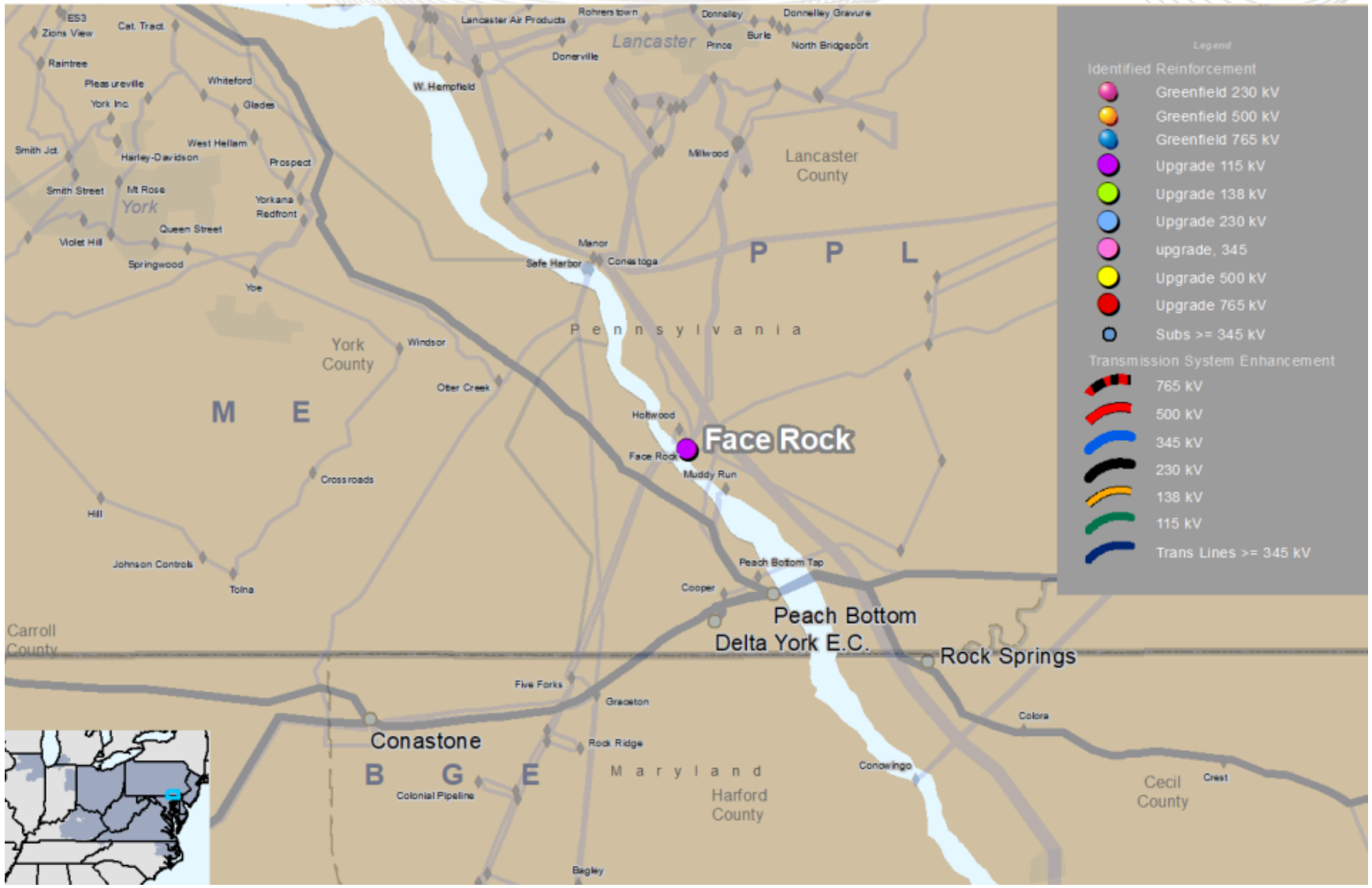


2024-W1-850
(kV designation only, All kVs)

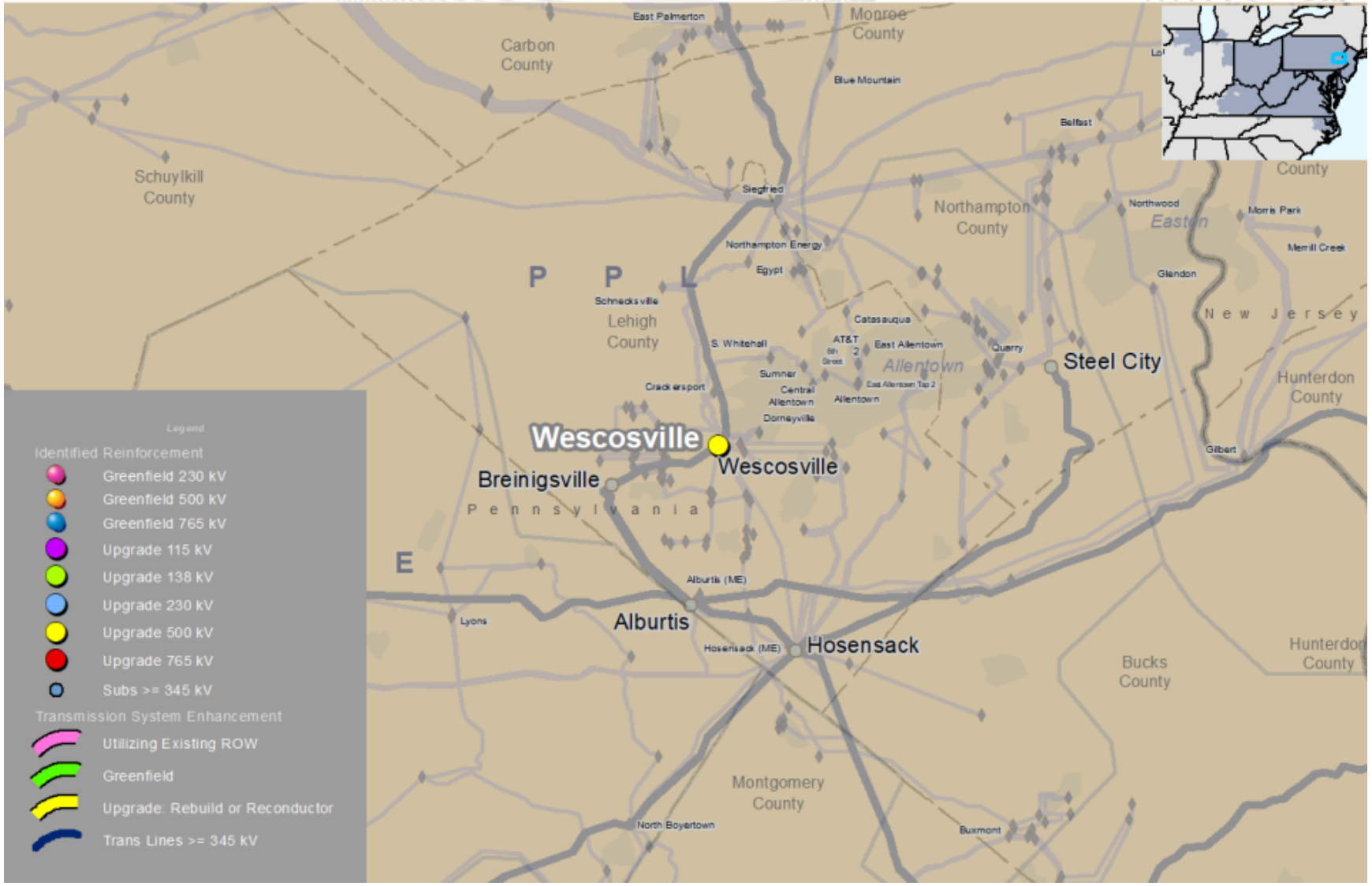


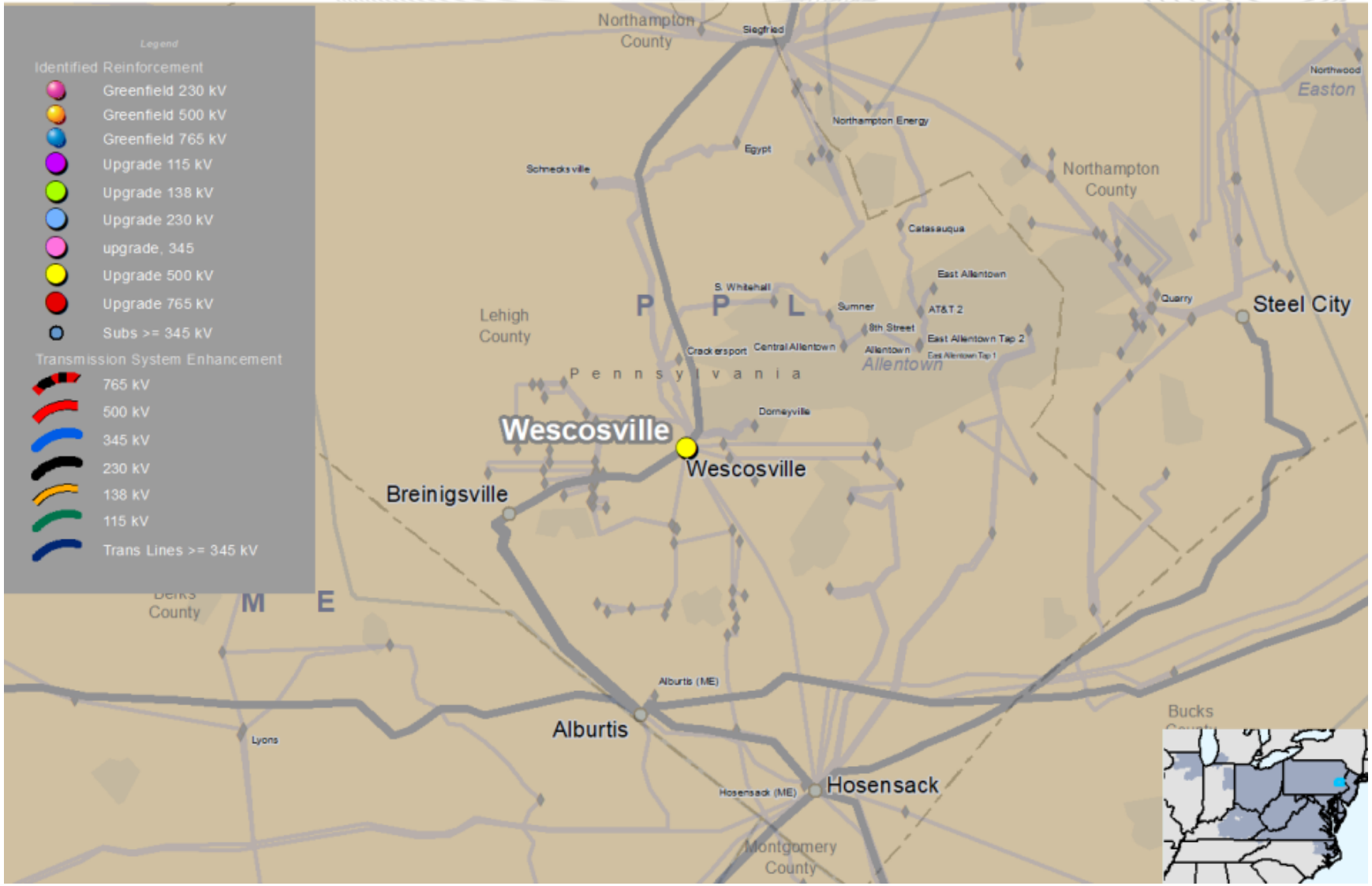

West Hellam
York
Prospect
Yorkana
Redfront
Yoe
Windsor
Ober Creek
Millwood
Manor
Safe Harbor
Conestoga
Lancaster County
Chester County
P P L
Pennsylvania
Holtwood
Face Rock
Face Rock
Muddy Run
Peach Bottom Tap
Cooper
Peach Bottom
Delta York E.C.
Rock Springs
Nottingham
Chester County
Five Forks
Graceton
Maryland
Harford County
Cecil County
Colora
Rock Ridge
Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
Utilizing Existing ROW
Greenfield
Upgrade: Rebuild or Reconductor
Trans Lines >= 345 kV

2024-W1-860
(kV designation only, All kVs)

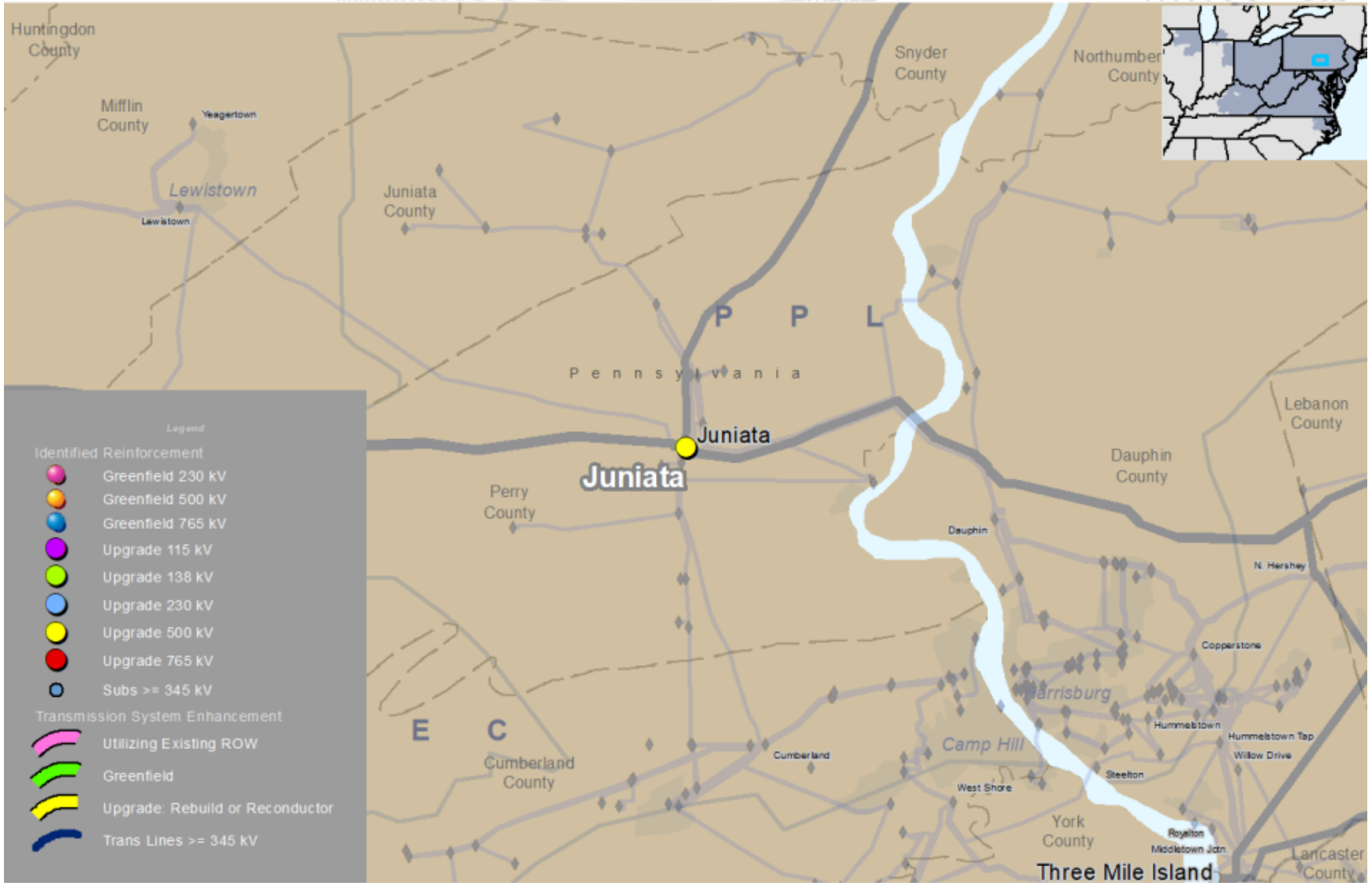


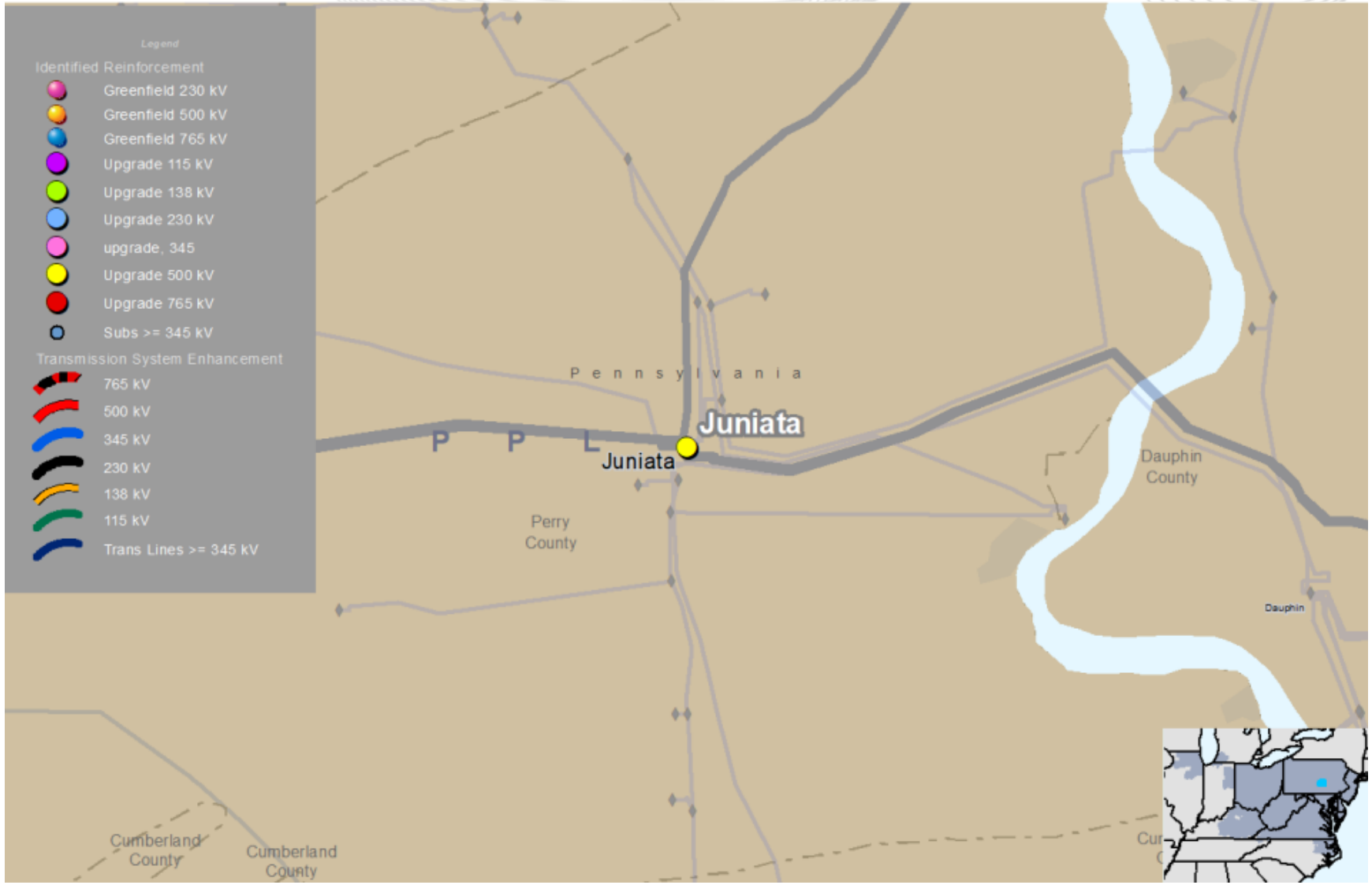
2024-W1-926
(ROW designation only, All kVs)




Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
upgrade, 345
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
765 kV
500 kV
345 kV
230 kV
138 kV
115 kV
Trans Lines >= 345 kV
Northampton County
Siegfried
Northwood
Easton
Northampton Energy
Egypt
Schnecksville
Northampton County
Catasauqua
East Allentown
S. Whitehall
P P L
Sumner
AT&T 2
Quarry
Steel City
Lehigh County
8th Street
Crackersport
Central Allentown
Allentown
East Allentown Tap 2
Pennsylvania
Allentown
Domeyville
Wescosville
Wescosville
Breinigsville
M E
Alburtis (ME)
Alburtis
Lyons
Bucks
Hosensack (ME)
Hosensack
Montgomery County

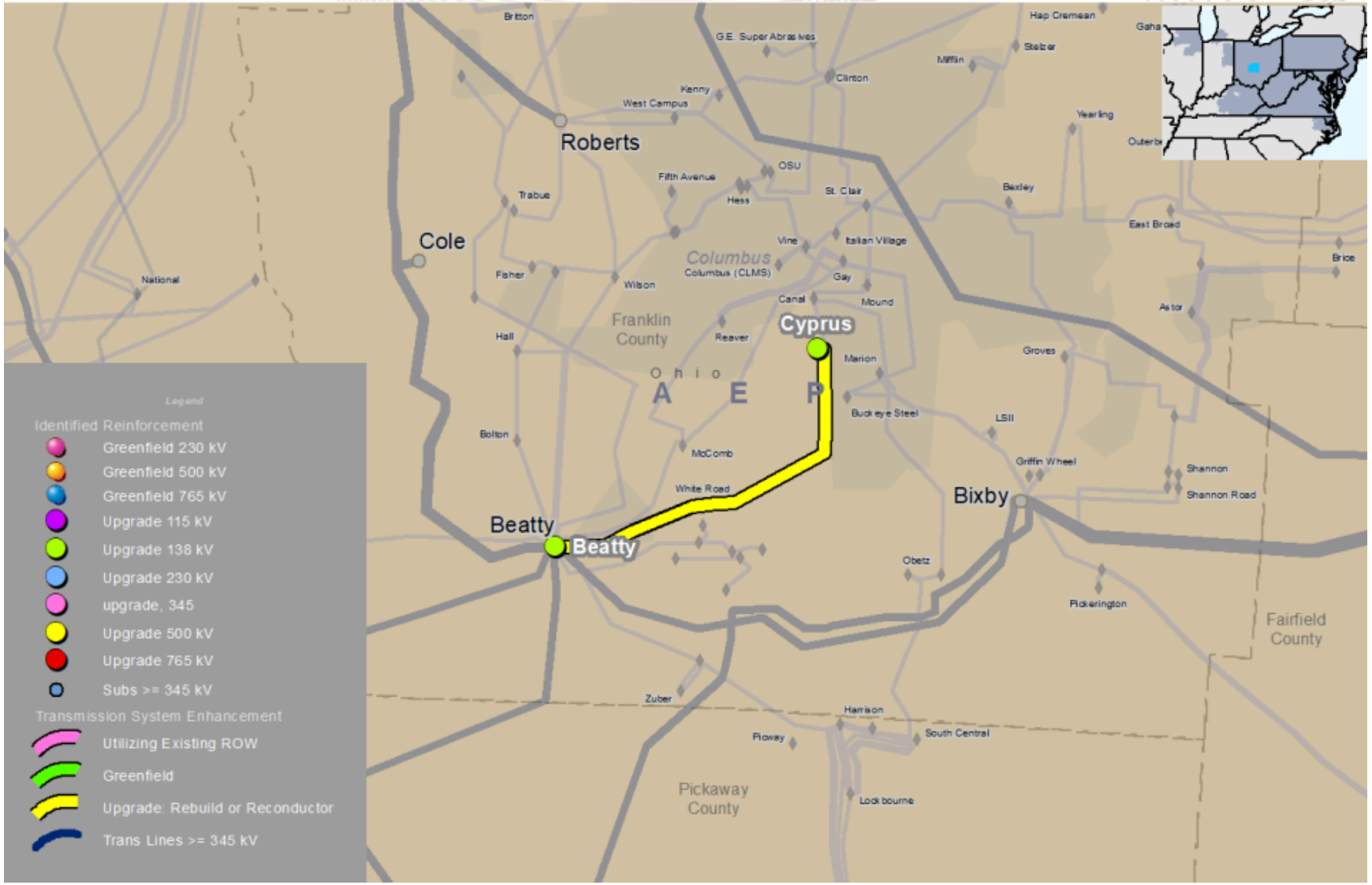
2024-W1-935
(ROW designation only, All kVs)



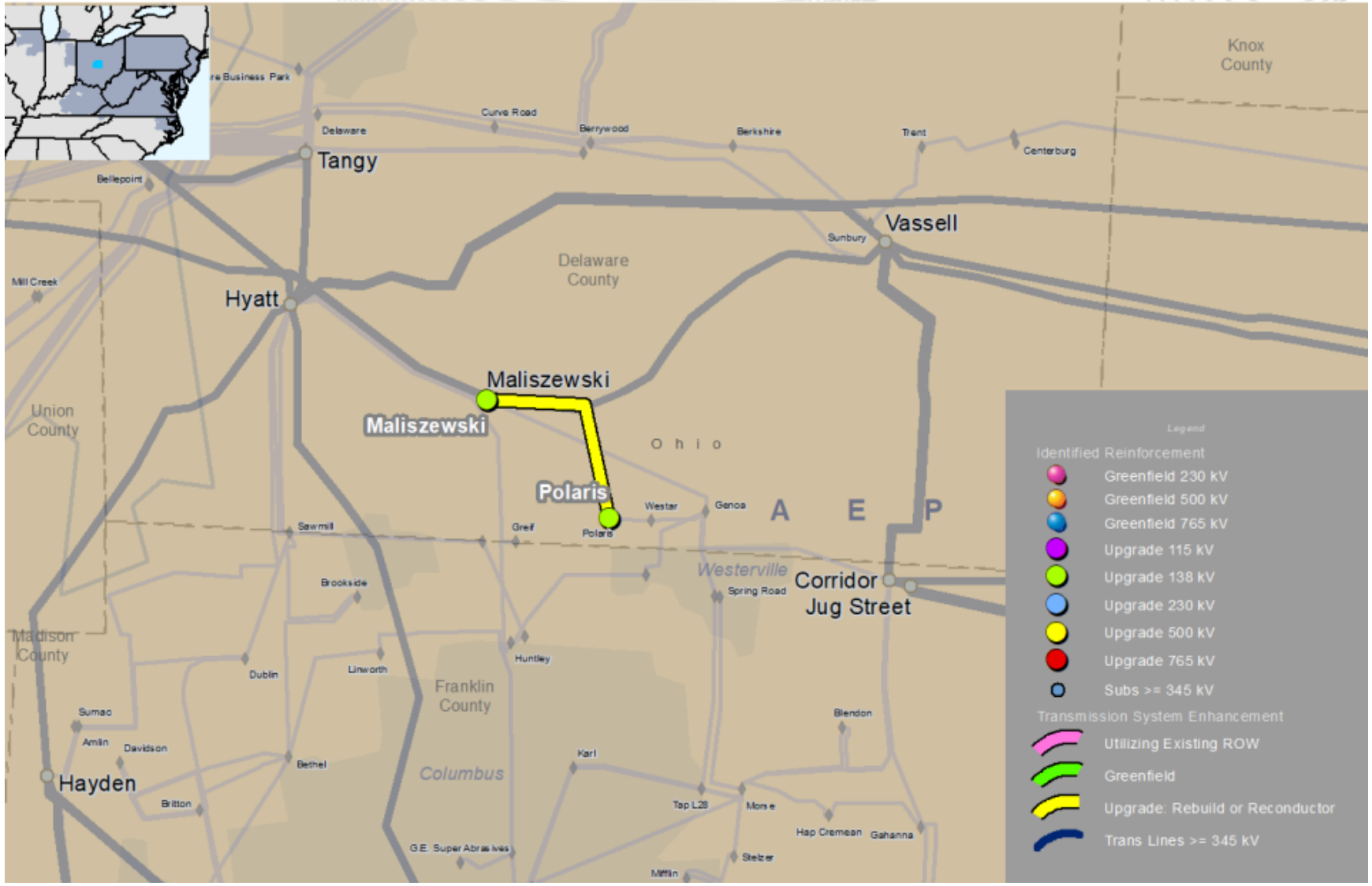

Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
upgrade, 345
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
765 kV
500 kV
345 kV
230 kV
138 kV
115 kV
Trans Lines >= 345 kV
Pennsylvania
P P L
Juniata
Juniata
Perry County
Dauphin County
Dauphin
Cumberland County
Cumberland County

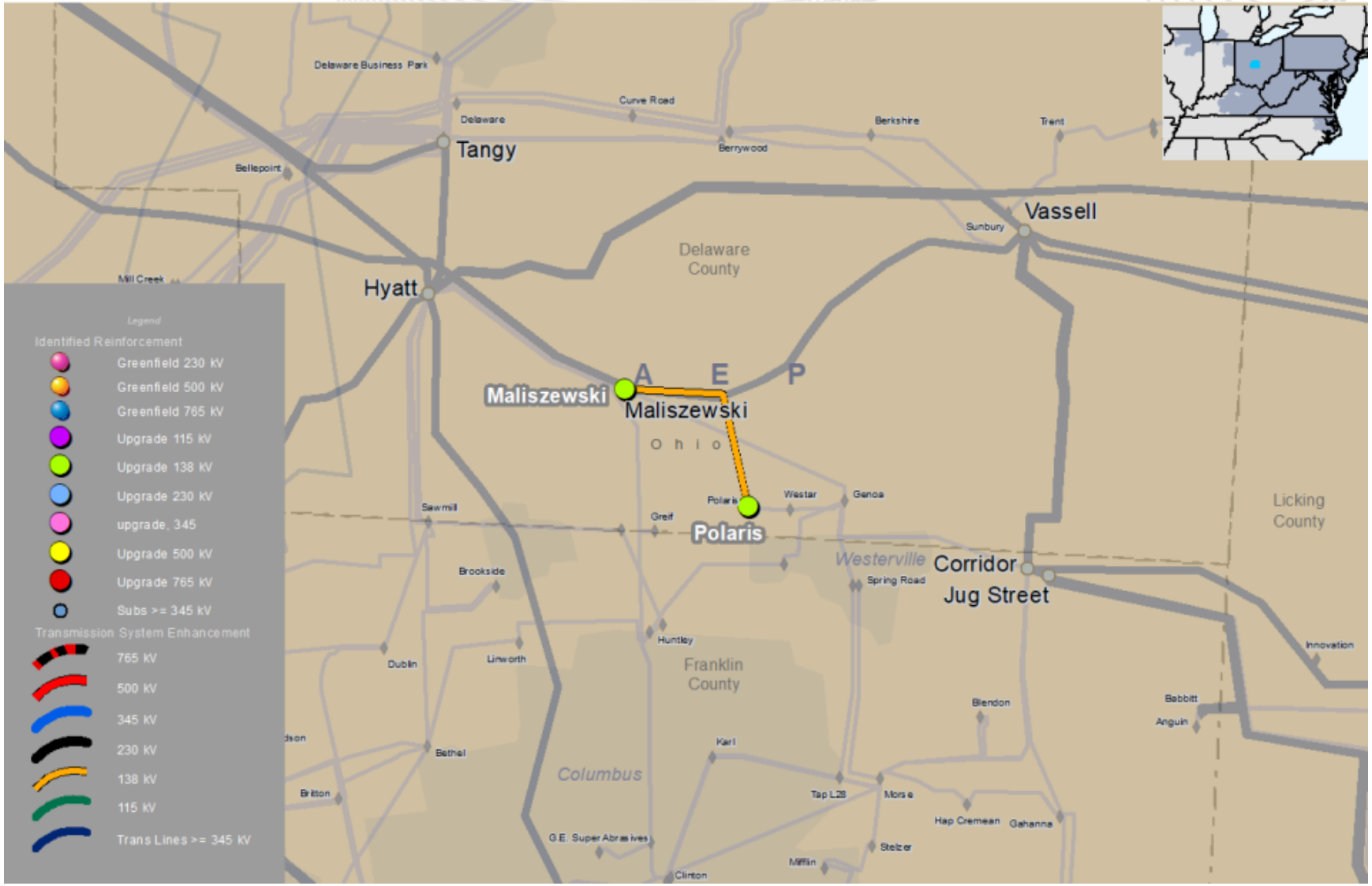
AEP

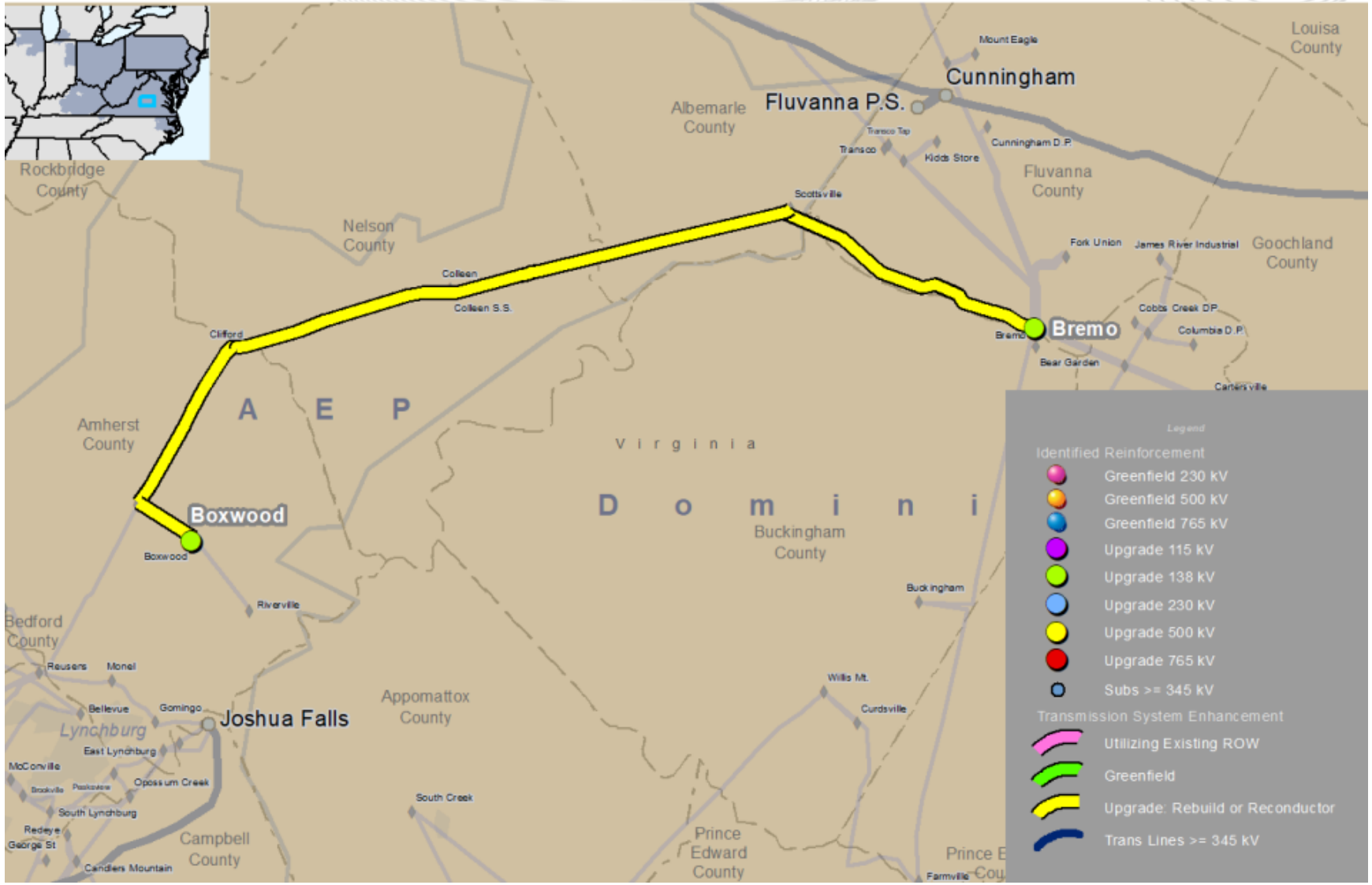
2024-W1-769
(ROW designation only, All kVs)



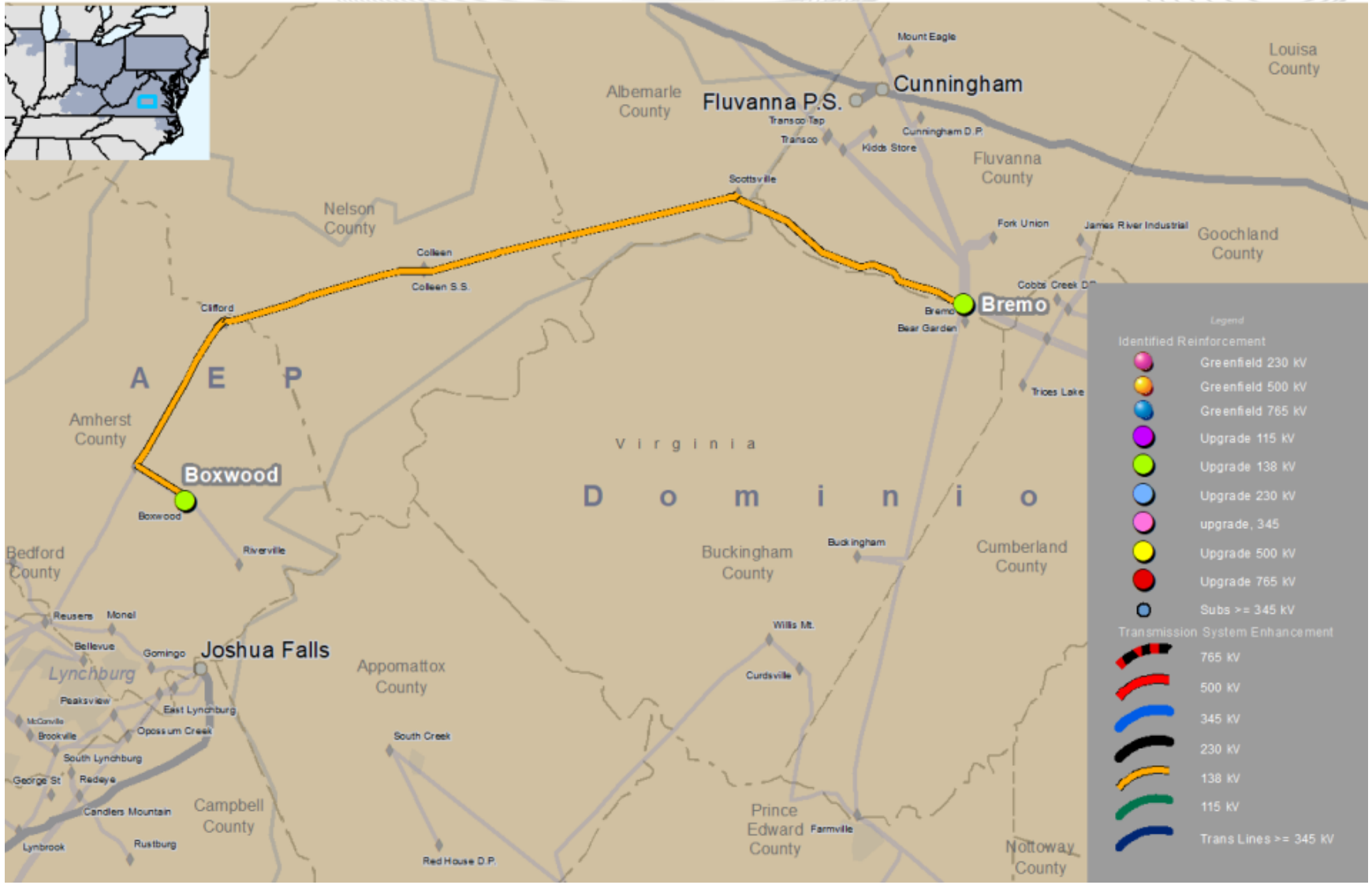
2024-W1-769
(kV designation only, All kVs)


Knox County
Tangy
Vassell
Hyatt
Delaware County
Maliszewski
Maliszewski
Union County
Ohio
Polaris
A E P
Corridor
Jug Street
Westerville
Madison County
Franklin County
Columbus
Hayden
Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
Utilizing Existing ROW
Greenfield
Upgrade: Rebuild or Reconductor
Trans Lines >= 345 kV

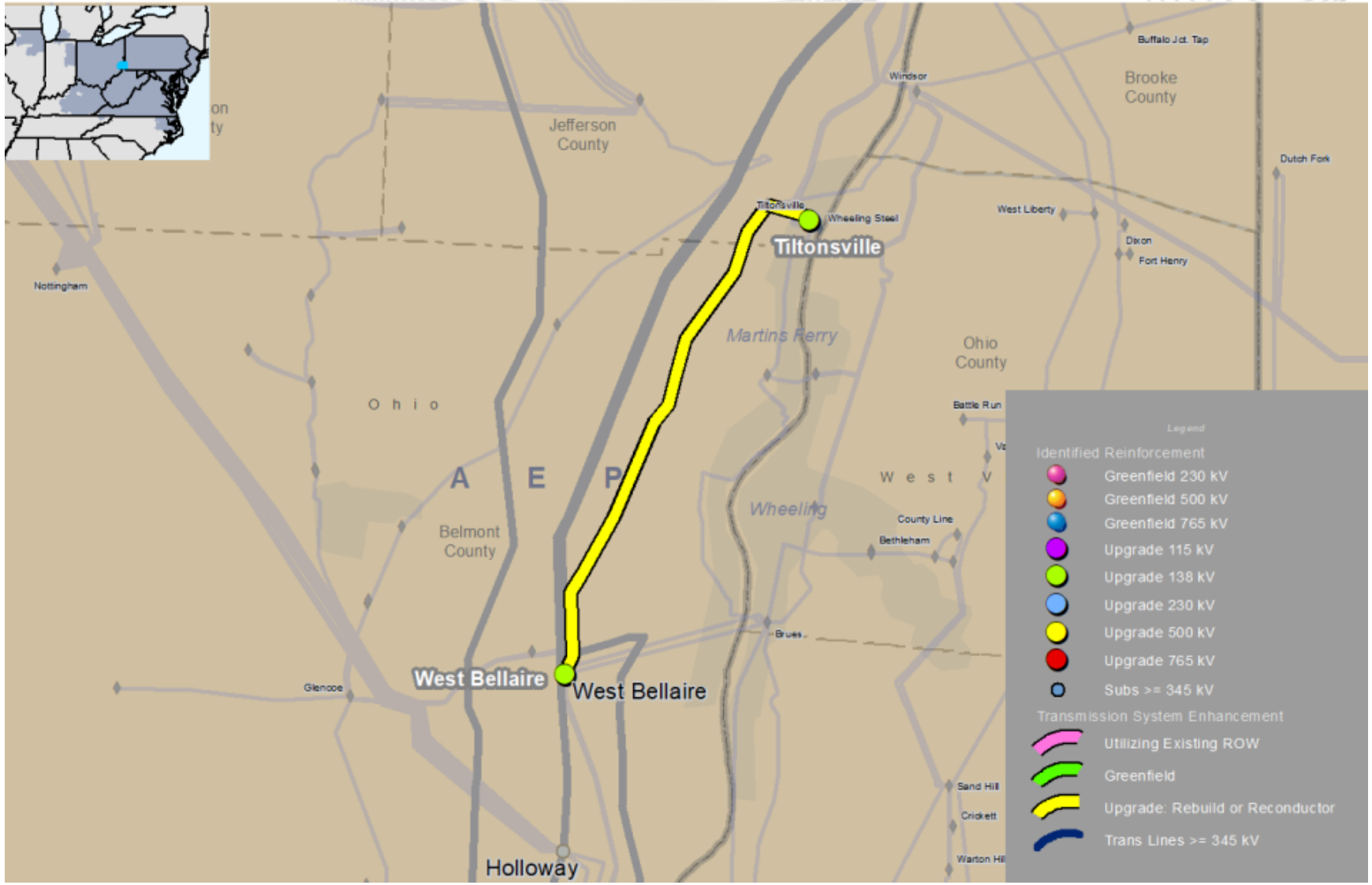

Delaware Business Park
Curve Road
Delaware
Berkshire
Trent
Tangy
Berrywood
Bellepoint
Vassell
Sunbury
Delaware County
Mill Creek
Hyatt
Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
upgrade, 345
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
765 kV
500 kV
345 kV
230 kV
138 kV
115 kV
Trans Lines >= 345 kV
A E P
Maliszewski
Maliszewski
O h i o
Polaris
Westar
Genoa
Sawmill
Greif
Polaris
Licking County
Brookside
Westerville
Corridor
Spring Road
Jug Street
Huntley
Dublin
Linworth
Franklin County
Innovation
Blendon
Babbitt
Anguin
Karl
Bethel
Columbus
Britton
Tap L28
Morse
Hap Cremean
Gahanna
G.E. Super Abrasives
Stelzer
Mifflin
Clinton


Mount Eagle
Louisa County
Cunningham
Albemarle County
Fluvanna P.S.
Transco Tap
Transco
Cunningham D.P.
Kidds Store
Fluvanna County
Rockbridge County
Scottsville
Nelson County
Fork Union
James River Industrial
Goochland County
Colleen
Colleen S.S.
Clifford
Bremo
Cobbs Creek DP
Columbia D.P.
Bear Garden
Amherst County
A E P
Virginia
D o m i n i
Boxwood
Buckingham County
Buckingham
Riverville
Bedford County
Reusens
Monel
Willis Mt.
Bellevue
Gomingo
Joshua Falls
Appomattox County
Curdsville
Lynchburg
East Lynchburg
McConville
Opossum Creek
South Lynchburg
Redeye
George St
Campbell County
South Creek
Prince Edward County
Candlers Mountain
Farmville
Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
Utilizing Existing ROW
Greenfield
Upgrade: Rebuild or Reconductor
Trans Lines >= 345 kV

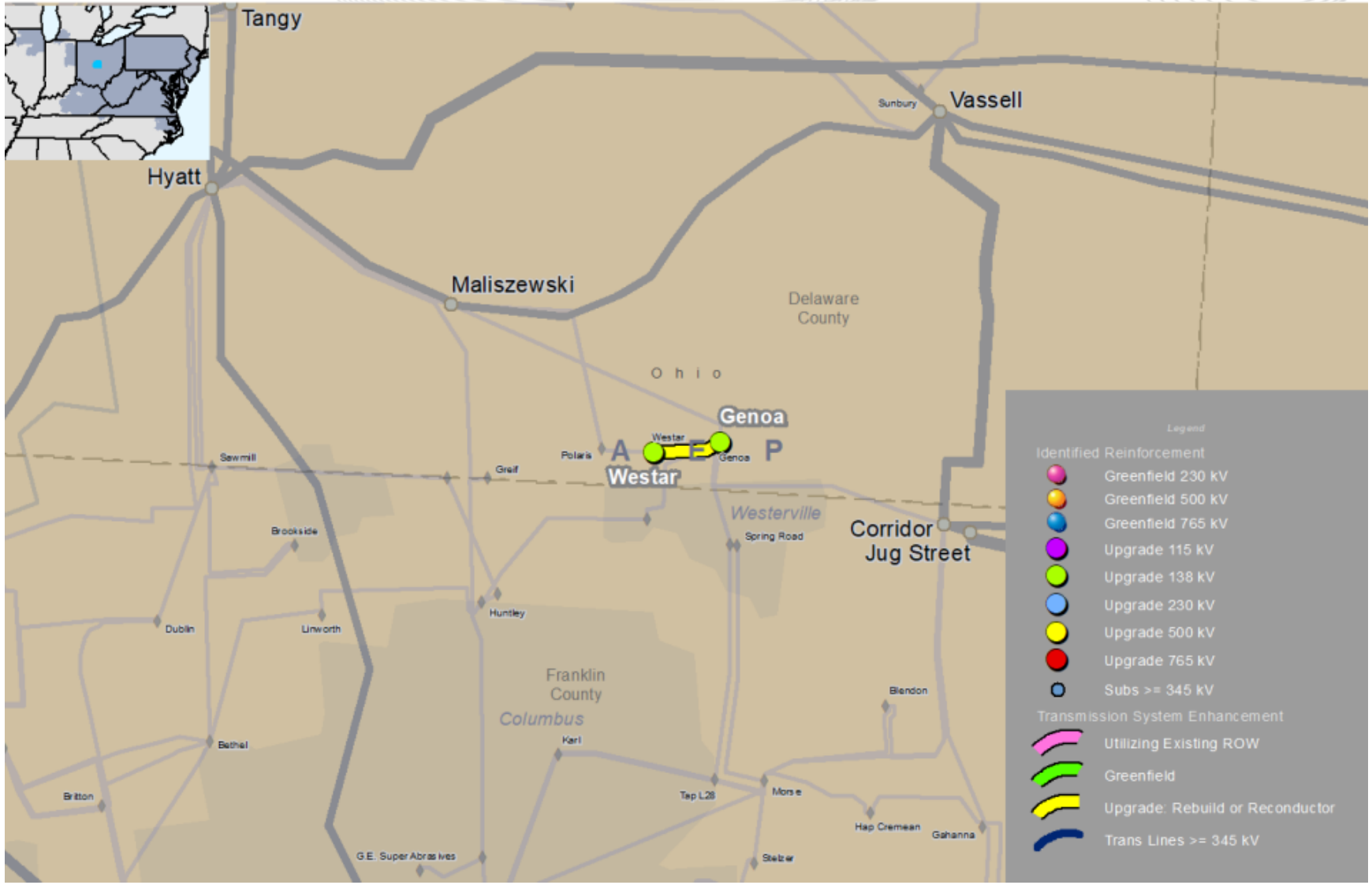
2024-W1-738
(kV designation only, All kVs)



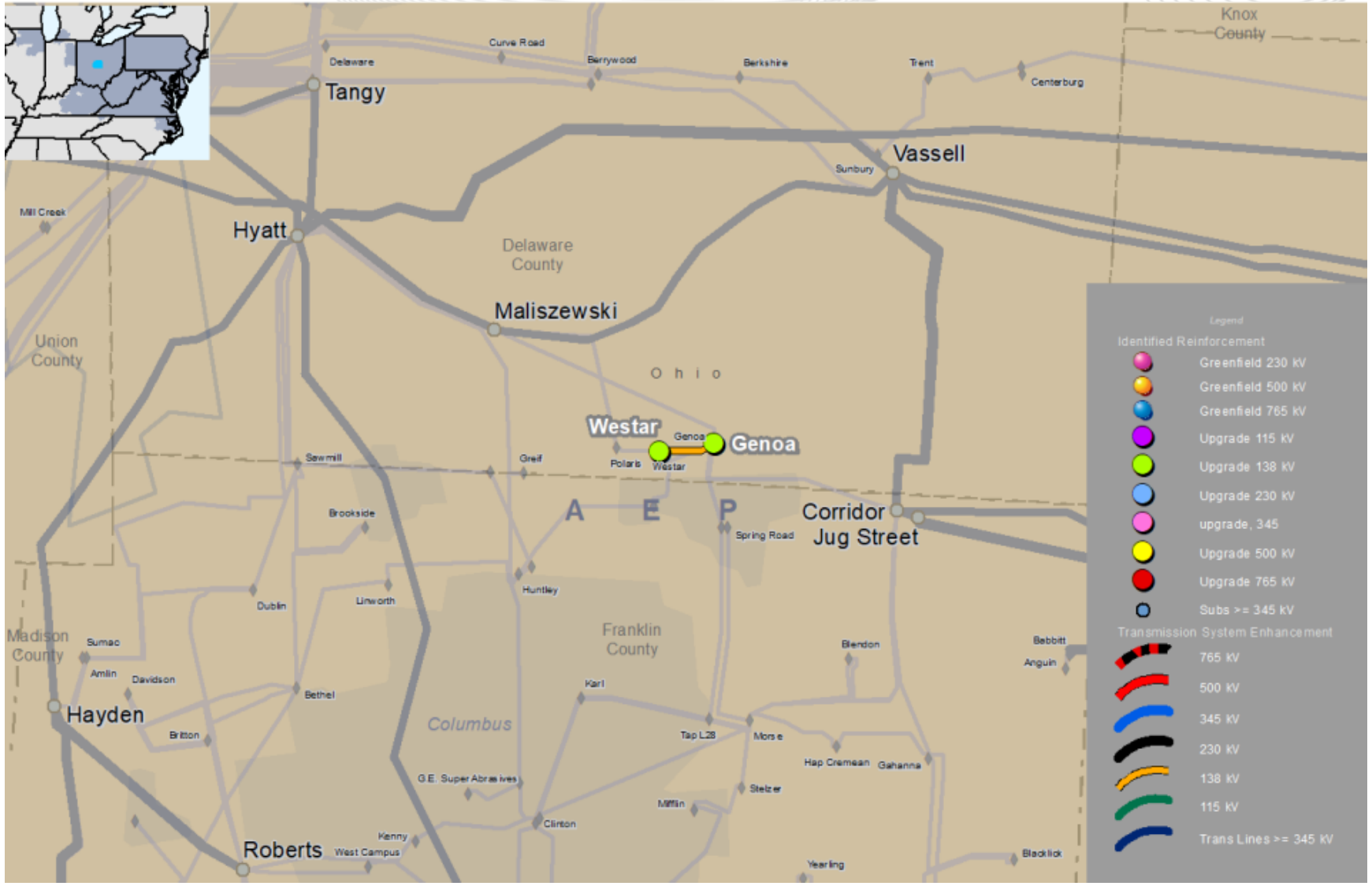
2024-W1-574
(ROW designation only, All kVs)



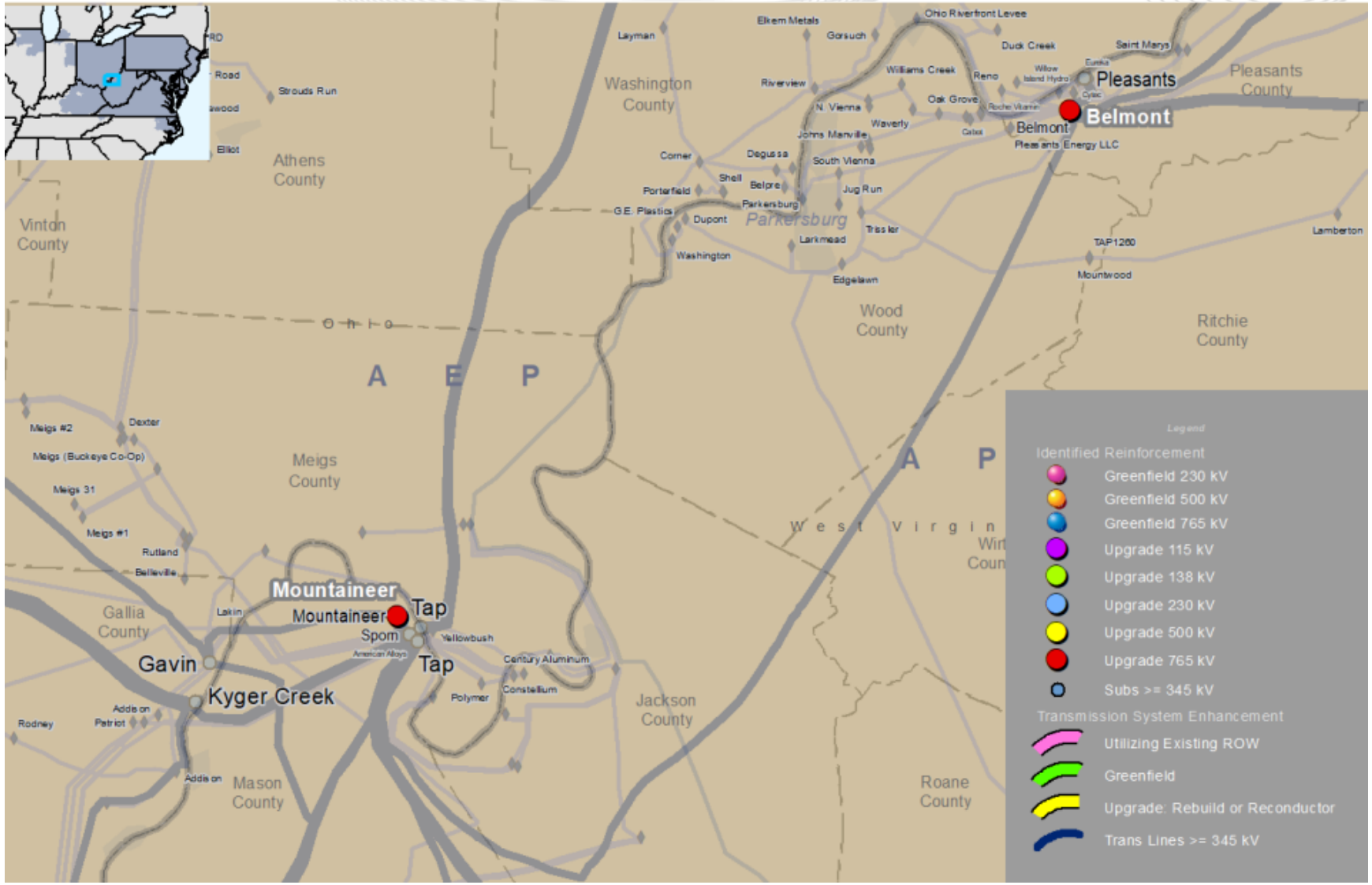

Buffalo Jct. Tap
Windsor
Brooke County
Jefferson County
Dutch Fork
Tiltonsville
Wheeling Steel
Tiltonsville
West Liberty
Dixon
Fort Henry
Martins Ferry
Ohio County
Ohio
A E P
Battle Run
Valley Grove
West Virginia
Wheeling
County Line
Bethlehem
Belmont County
Brues
Glencoe
West Bellaire
West Bellaire
Marshall County
Sand Hill
Crickett
Warton Hill Switch
Holloway
Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
upgrade, 345
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
765 kV
500 kV
345 kV
230 kV
138 kV
115 kV
Trans Lines >= 345 kV

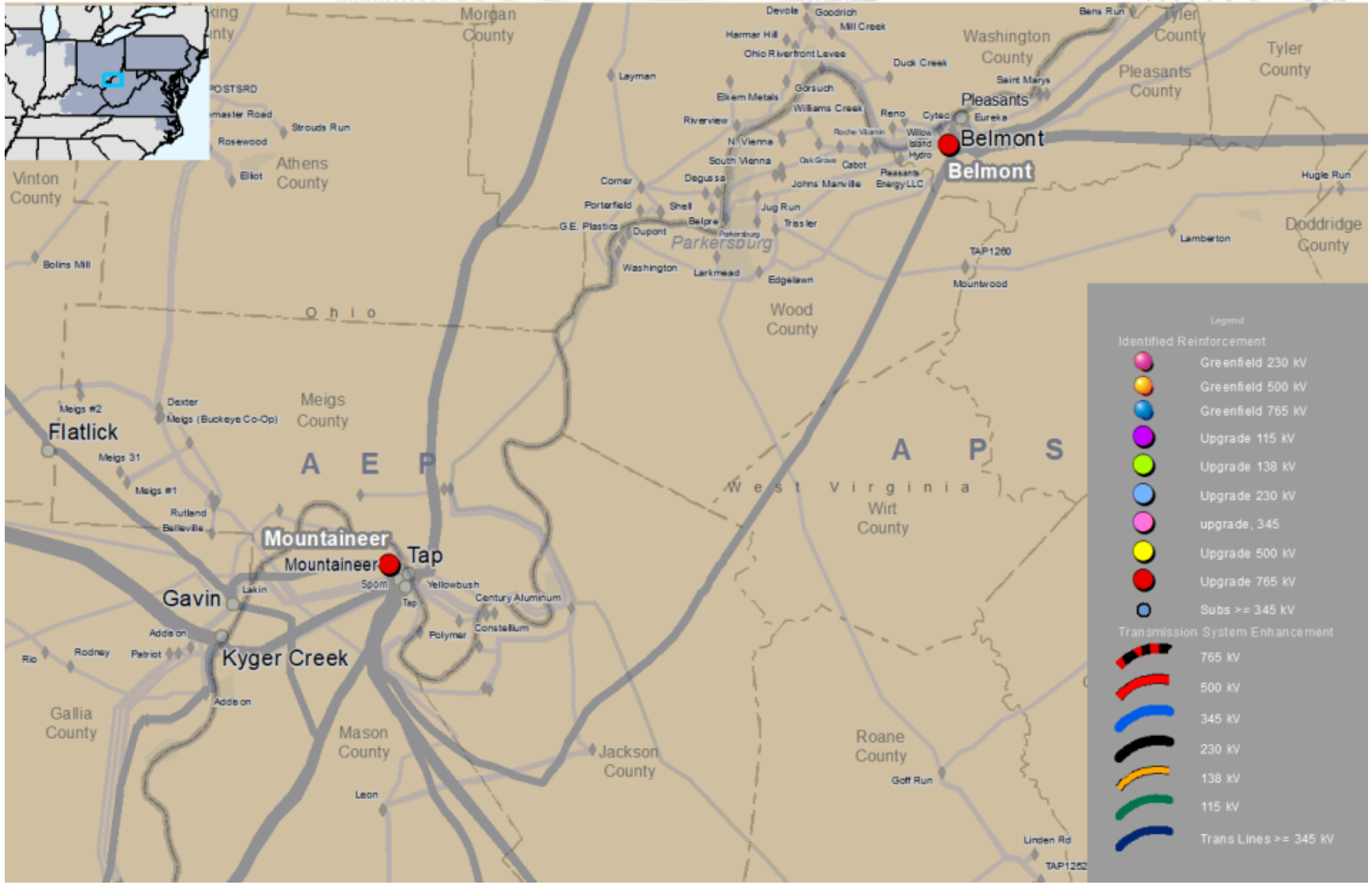

Tangy
Hyatt
Maliszewski
Sunbury
Vassell
Delaware County
Ohio
Genoa
Westar
Polaris
Sawmill
Greif
Westerville
Spring Road
Corridor
Jug Street
Brookside
Dublin
Linworth
Huntley
Franklin County
Columbus
Karl
Bethel
Britton
Tap L28
Morse
Blendon
Hap Cremean
Gahanna
G.E. Super Abrasives
Stelzer
Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
Utilizing Existing ROW
Greenfield
Upgrade: Rebuild or Reconductor
Trans Lines >= 345 kV

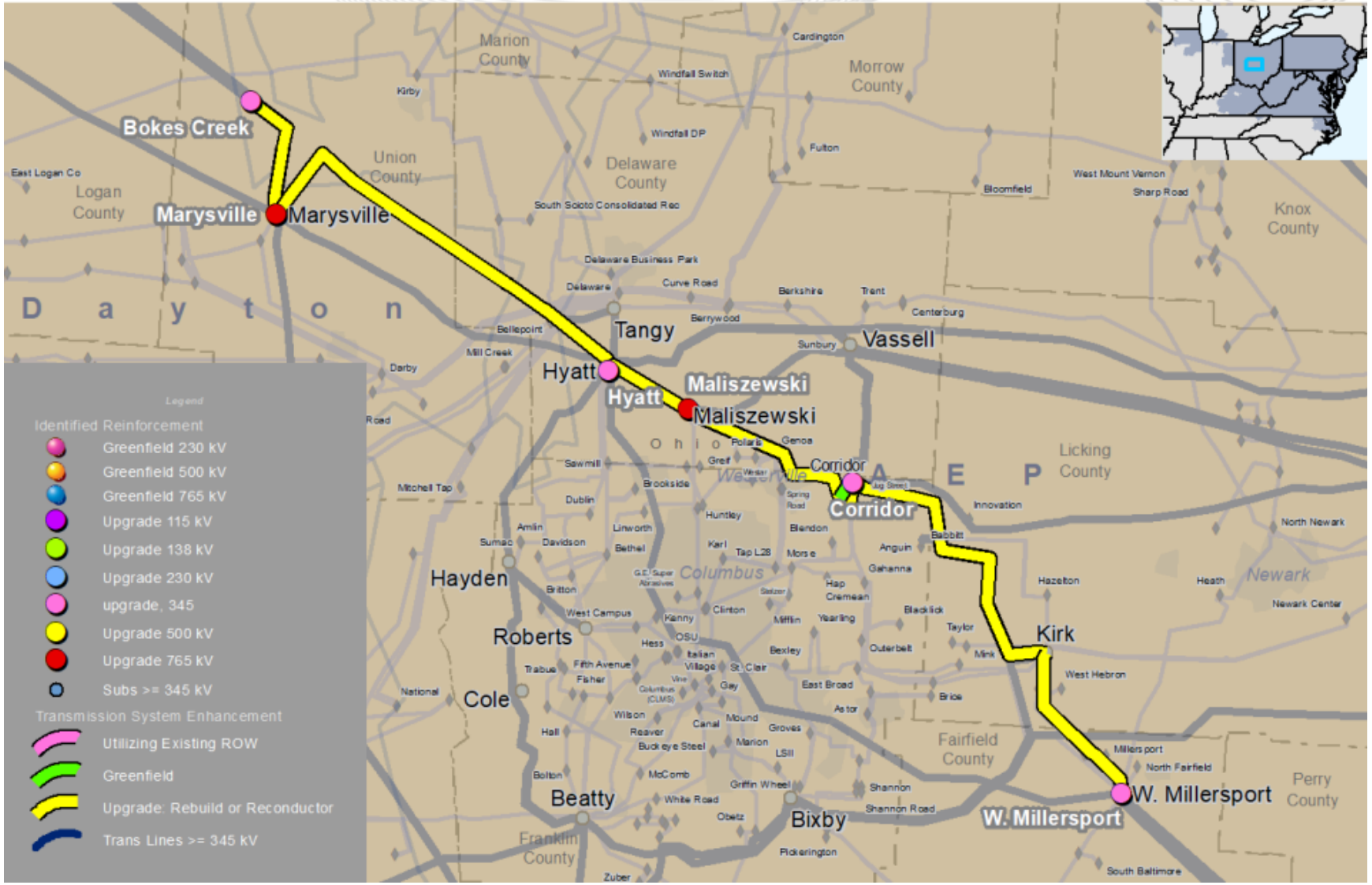
2024-W1-464
(kV designation only, All kVs)

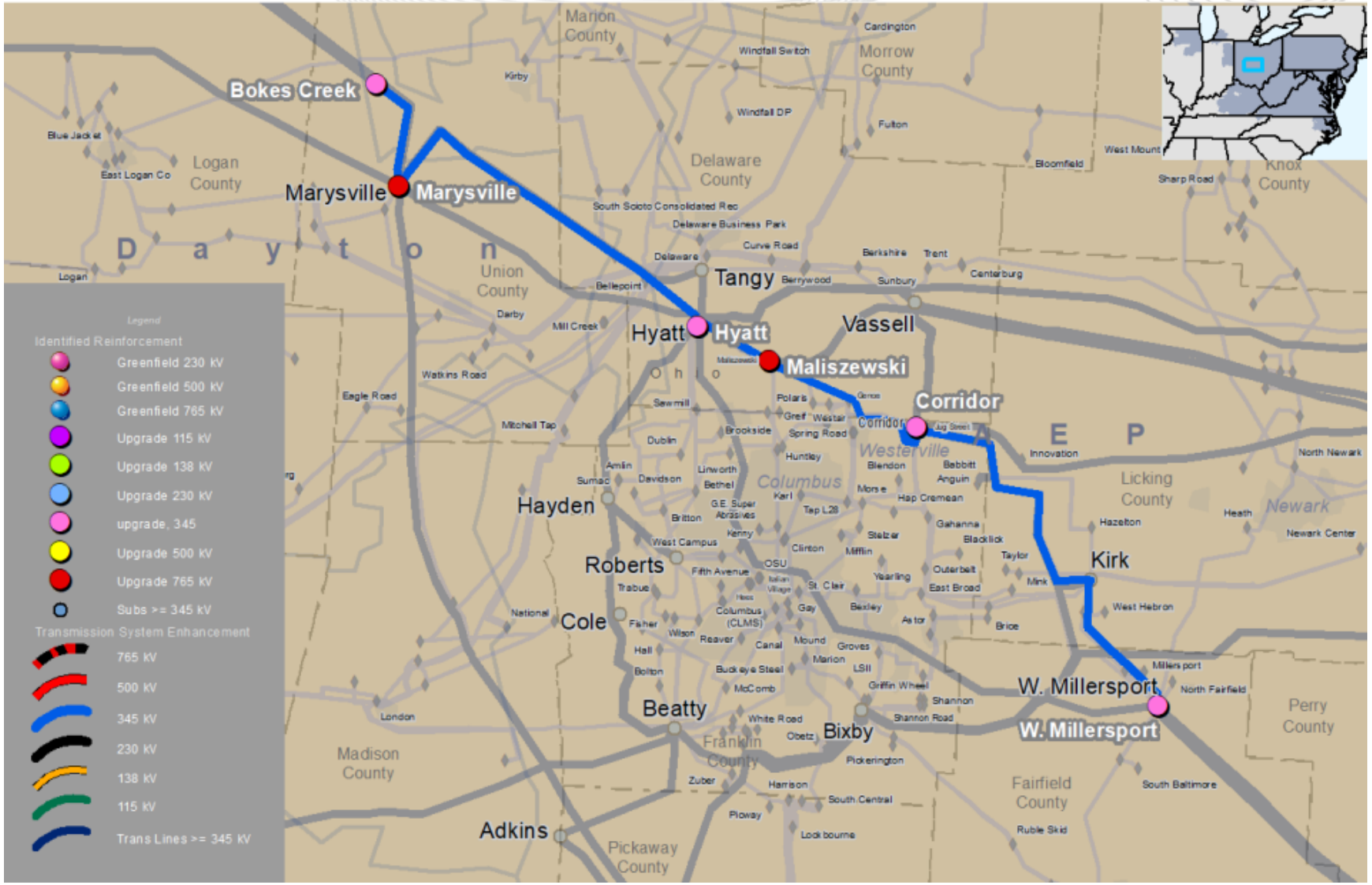


2024-W1-459
(ROW designation only, All kVs)

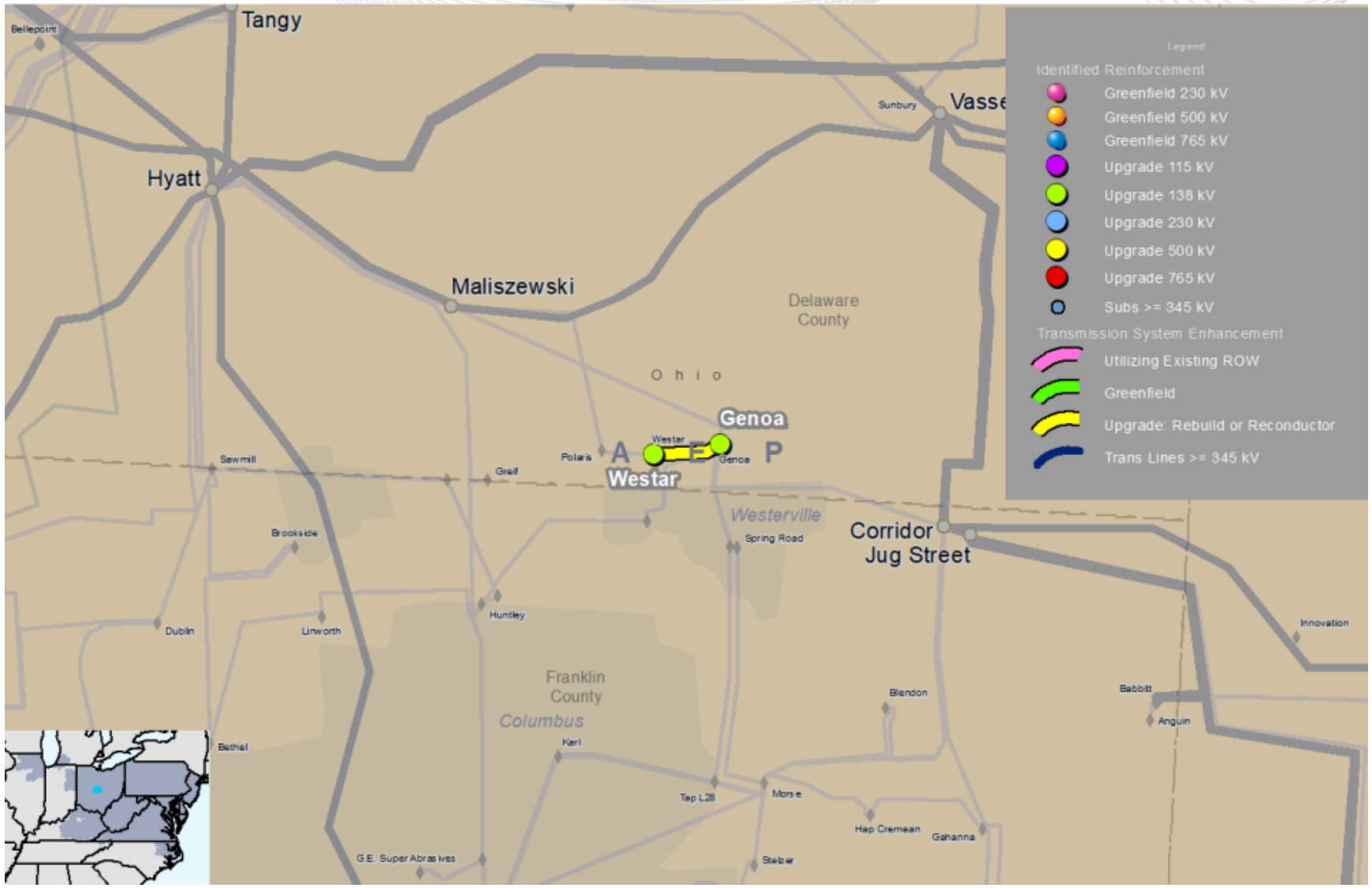



Morgan County
Washington County
Tyler County
Pleasants County
Pleasants
Belmont
Belmont
Vinton County
Athens County
Hugle Run
Doddridge County
Parkersburg
Wood County
Meigs County
Flatlick
Meigs #2
Meigs 31
Meigs #1
Dexter
Meigs (Buckeye Co-Op)
A E P
A P S
West Virginia
Wirt County
Mountaineer
Mountaineer Tap
Gavin
Kyger Creek
Century Aluminum
Polymer
Constellium
Gallia County
Mason County
Jackson County
Roane County
Ohio
Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
upgrade, 345
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
765 kV
500 kV
345 kV
230 kV
138 kV
115 kV
Trans Lines >= 345 kV

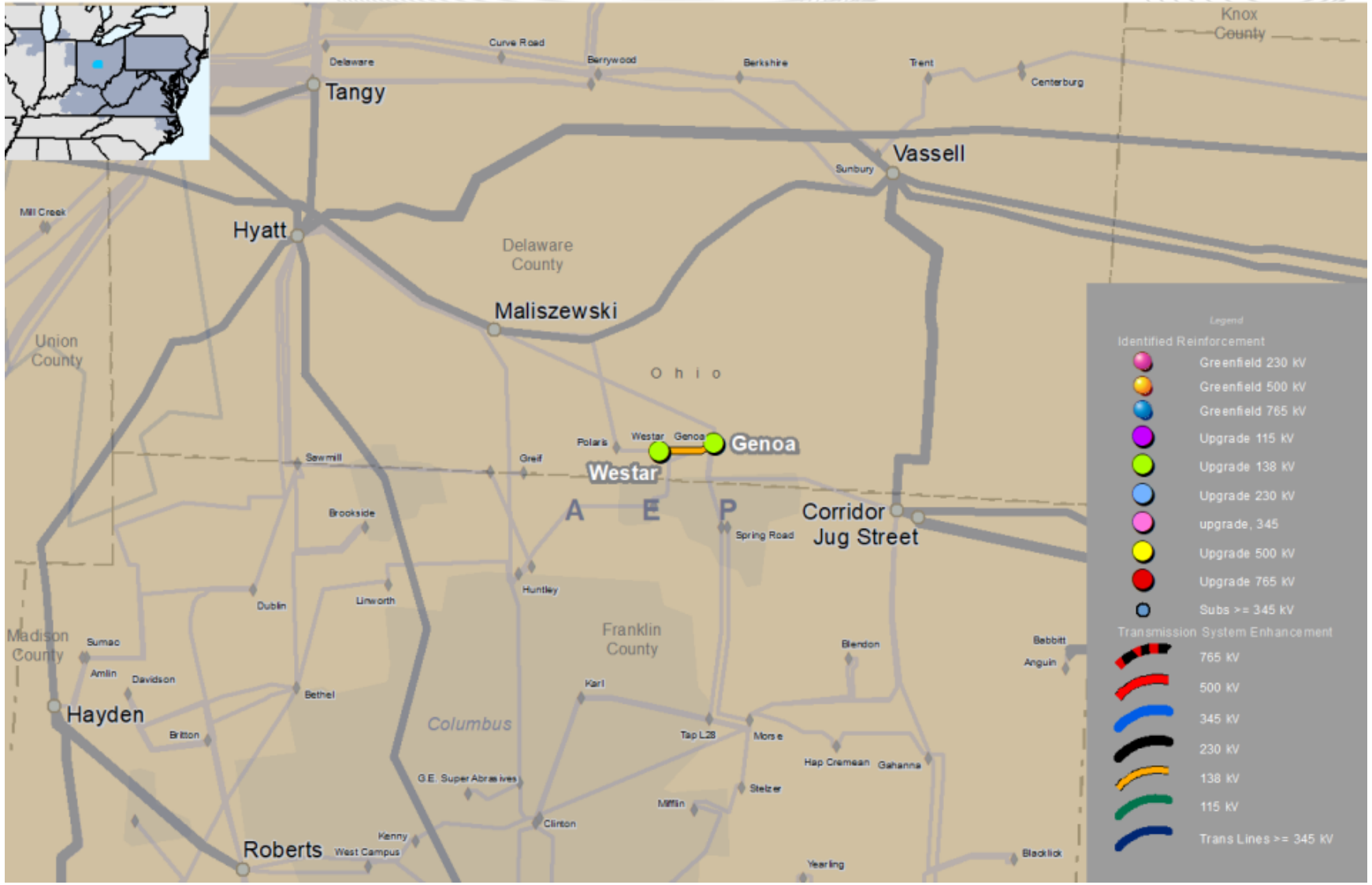

Bokes Creek
Marysville
Marysville
Tangy
Hyatt
Hyatt
Maliszewski
Maliszewski
Corridor
Corridor
Kirk
W. Millersport
W. Millersport
Beatty
Bixby
Roberts
Hayden
Cole
Vassell
Marion County
Union County
Delaware County
Morrow County
Logan County
Knox County
Licking County
Perry County
Fairfield County
Franklin County
Dayton
Columbus
Newark
Ohio
Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
upgrade, 345
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
Utilizing Existing ROW
Greenfield
Upgrade: Rebuild or Reconductor
Trans Lines >= 345 kV


Bokes Creek
Marysville
Marysville
Tangy
Hyatt
Hyatt
Vassell
Maliszewski
Corridor
Hayden
Roberts
Cole
Beatty
Adkins
Bixby
Kirk
W. Millersport
W. Millersport
Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
upgrade, 345
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
765 kV
500 kV
345 kV
230 kV
138 kV
115 kV
Trans Lines >= 345 kV
Logan County
Union County
Delaware County
Marion County
Morrow County
Knox County
Licking County
Perry County
Fairfield County
Madison County
Franklin County
Pickaway County
Columbus
Westerville
Newark
Dayton

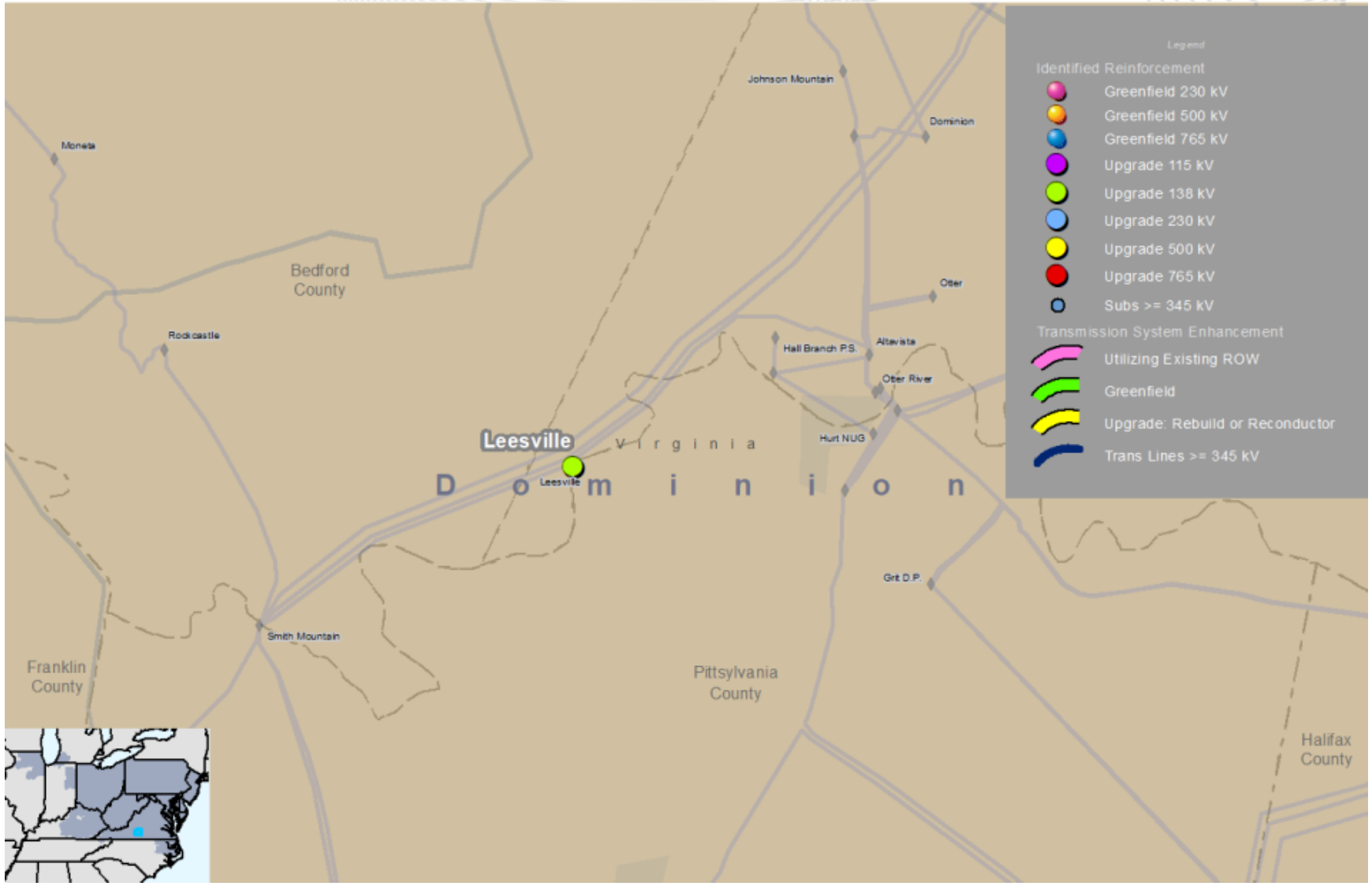
2024-W1-338
(ROW designation only, All kVs)



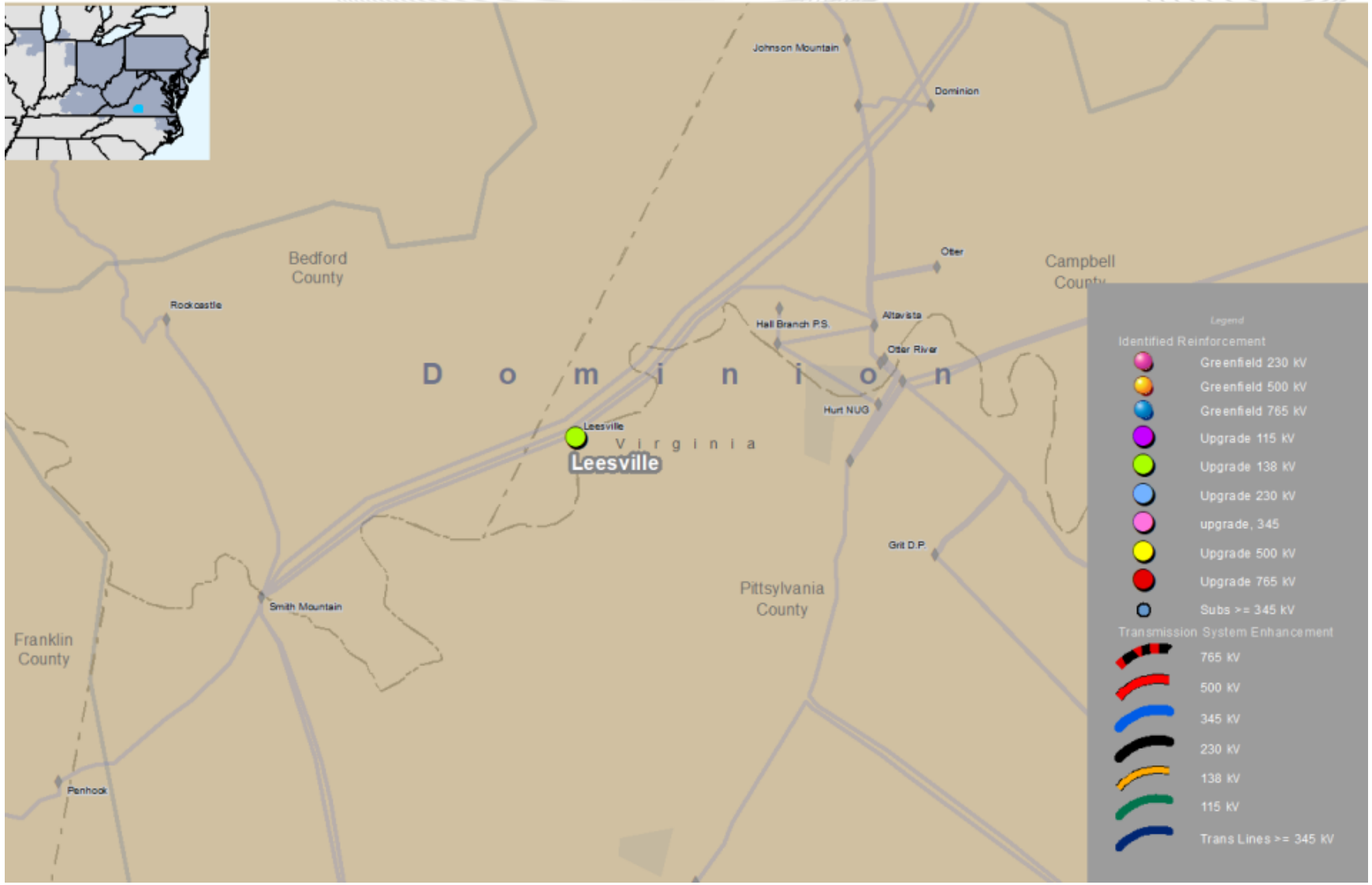
2024-W1-338
(kV designation only, All kVs)

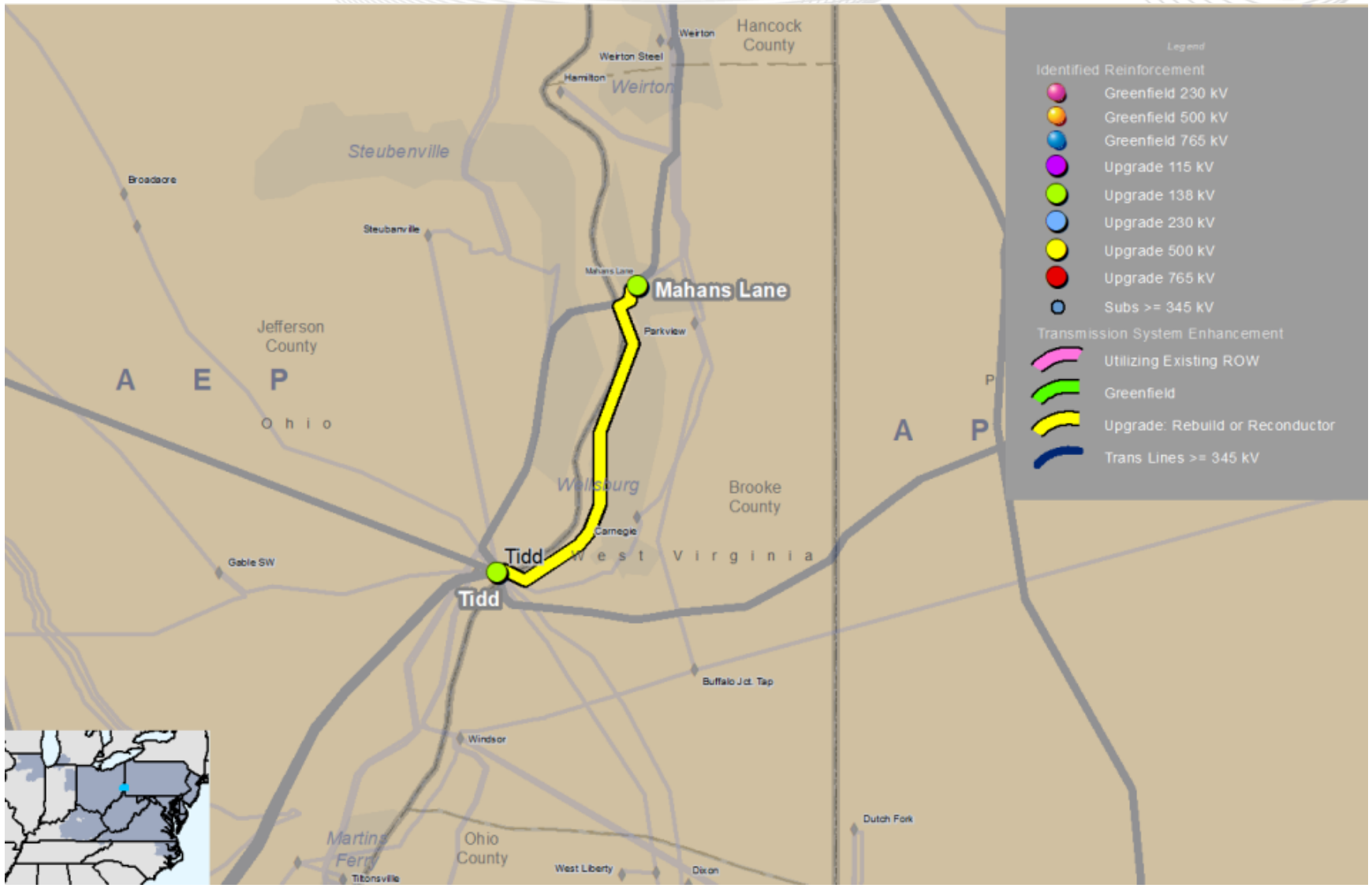


2024-W1-167
(ROW designation only, All kVs)



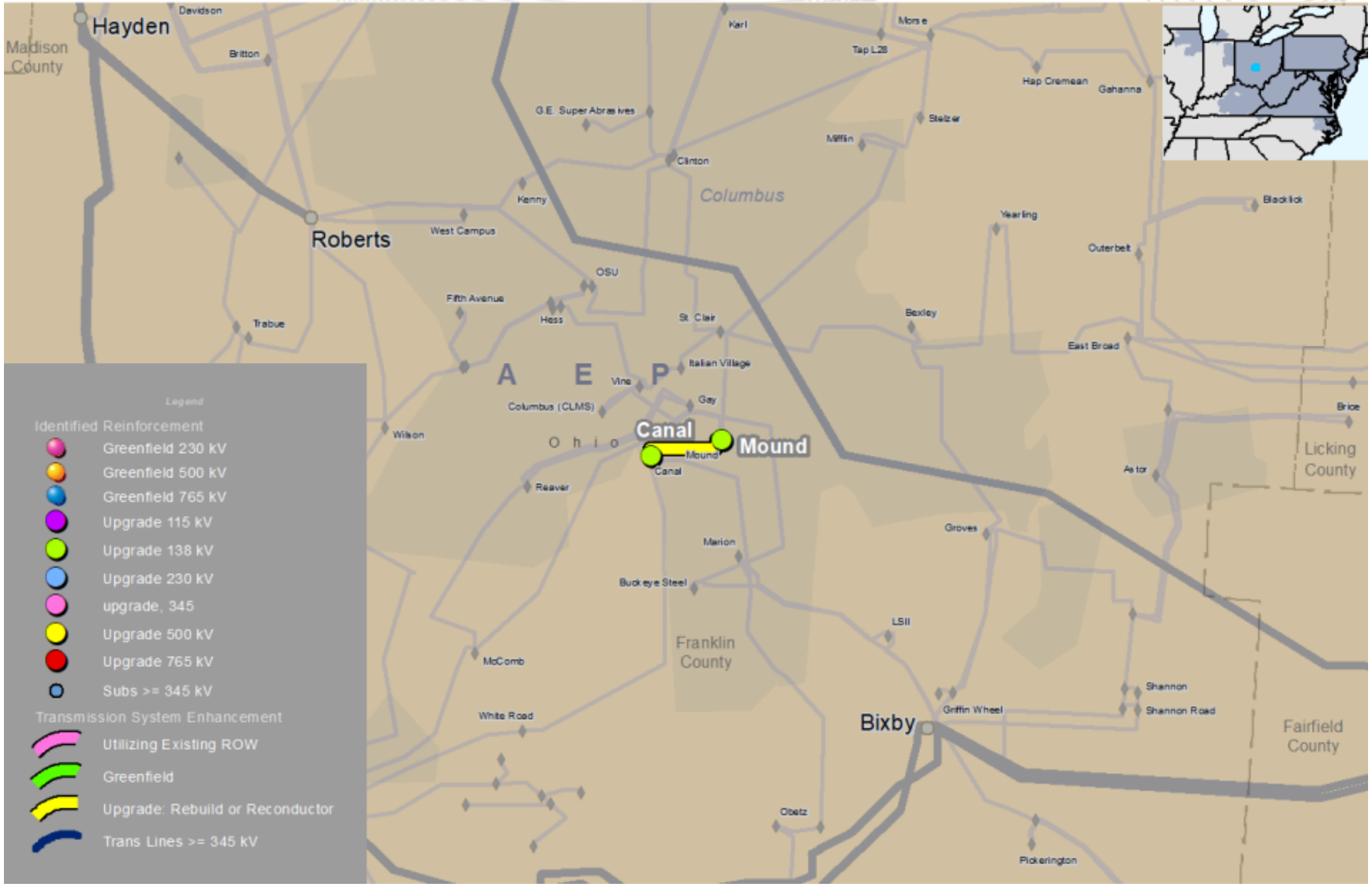
2024-W1-167
(kV designation only, All kVs)

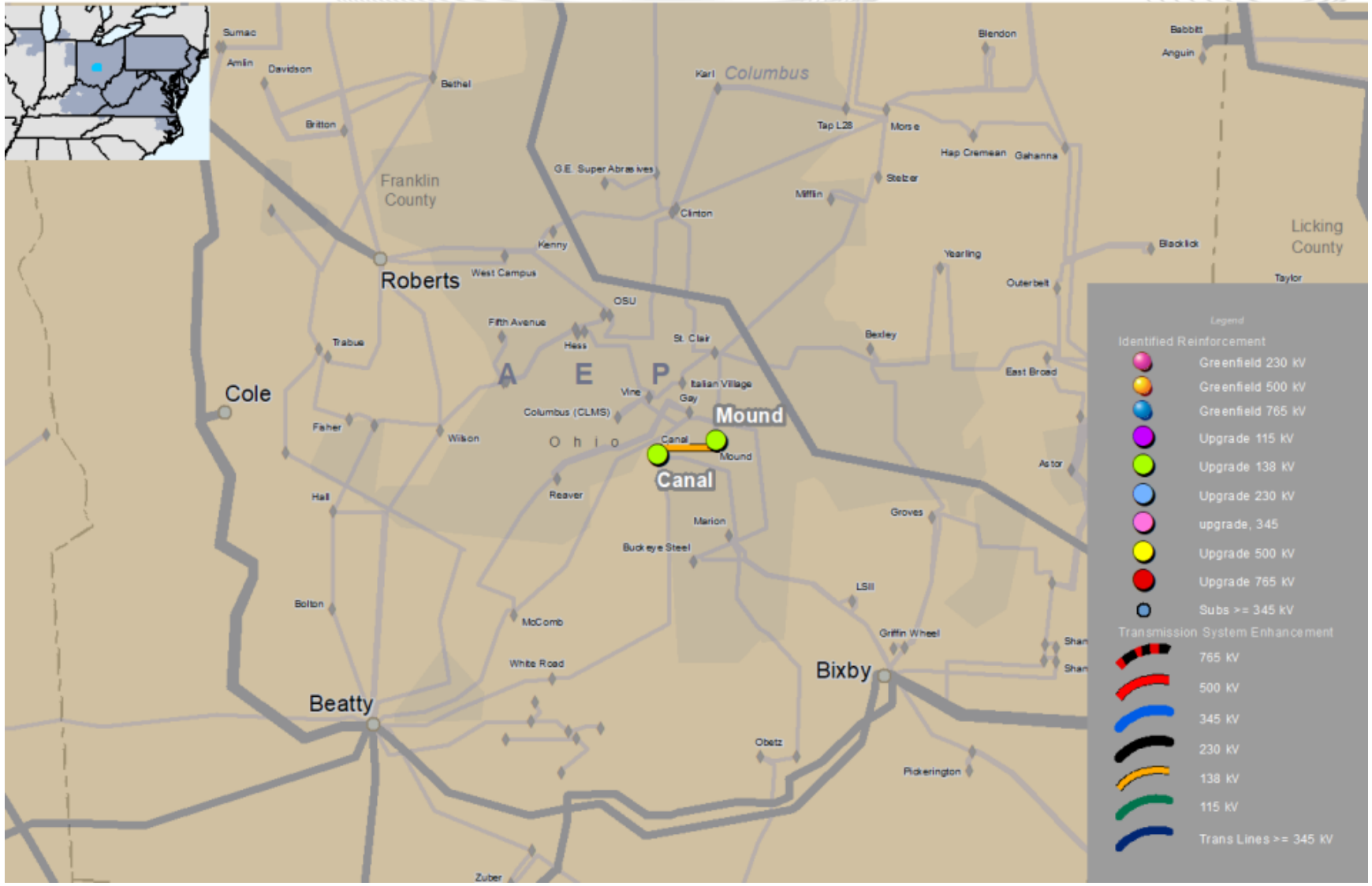



Hancock County
Weirton
Weirton Steel
Hamilton
Steubenville
Broadacre
Steubenville
Mahans Lane
Mahans Lane
Parkview
Jefferson County
A E P
Ohio
Wellsburg
Brooke County
Carnegie
Tidd
Tidd
West Virginia
Gable SW
A P
Buffalo Jct. Tap
Windsor
Martins Ferry
Ohio County
West Liberty
Dixon
Tiltonsville
Dutch Fork
Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
Utilizing Existing ROW
Greenfield
Upgrade: Rebuild or Reconductor
Trans Lines >= 345 kV

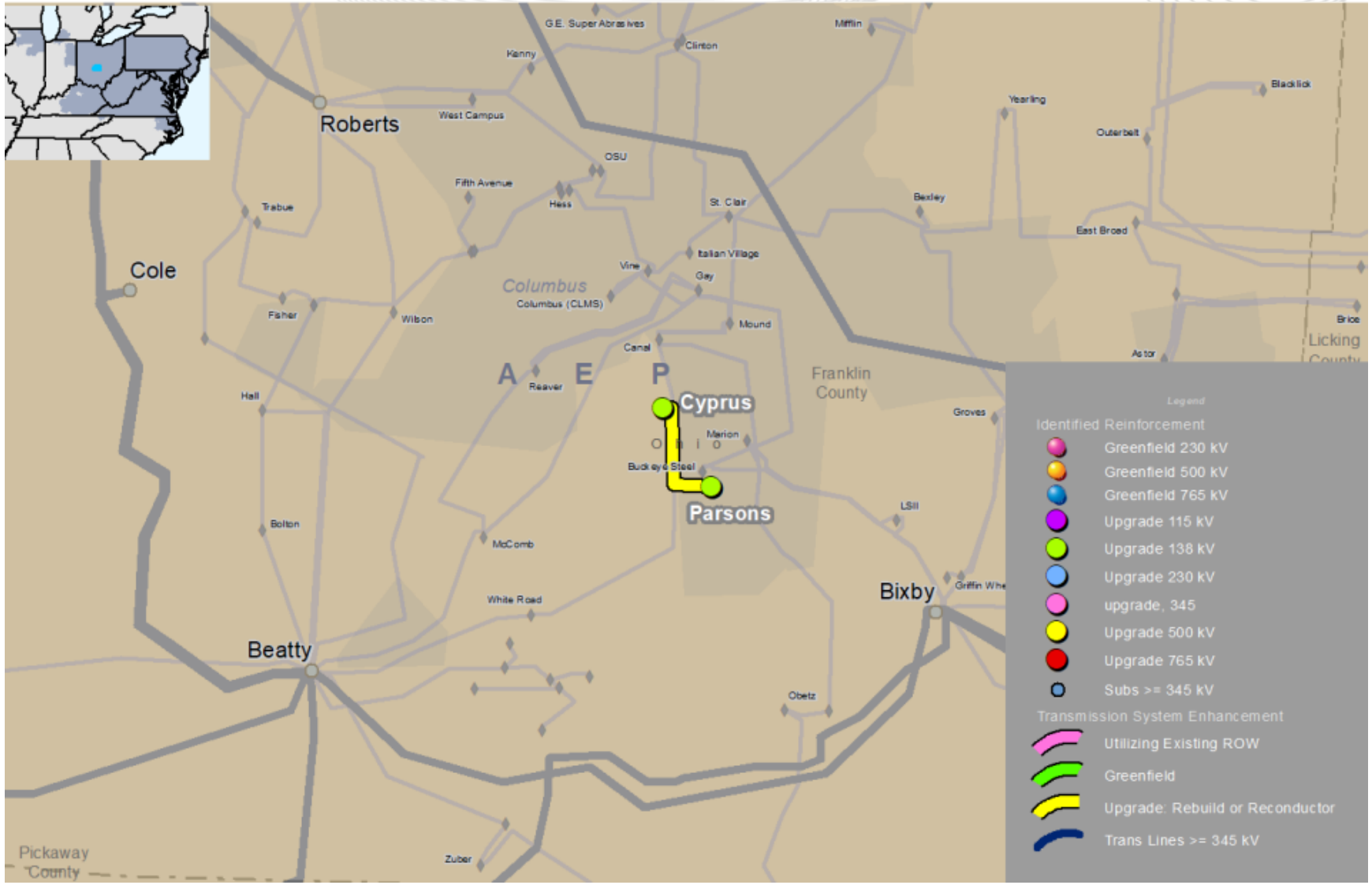

Hancock County
Weirton
Weirton Steel
Hamilton
Weirton
Steubenville
Broadacre
Steubenville
Jefferson County
A E P
Ohio
Mahans Lane
Mahans Lane
Parkview
Wellsburg
Carnegie
Tidd
Tidd
West Virginia
Brooke County
Gable SW
Buffalo Jct. Tap
Windsor
Martins Ferry
Belmont County
Titonsville
Wheeling Steel
Ohio County
West Liberty
Dixon
Dutch Fork
Allegheny County
Smith
Joffre
North Fayette
A P
Penns
Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
upgrade, 345
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
765 kV
500 kV
345 kV
230 kV
138 kV
115 kV
Trans Lines >= 345 kV

2024-W1-856
(ROW designation only, All kVs)

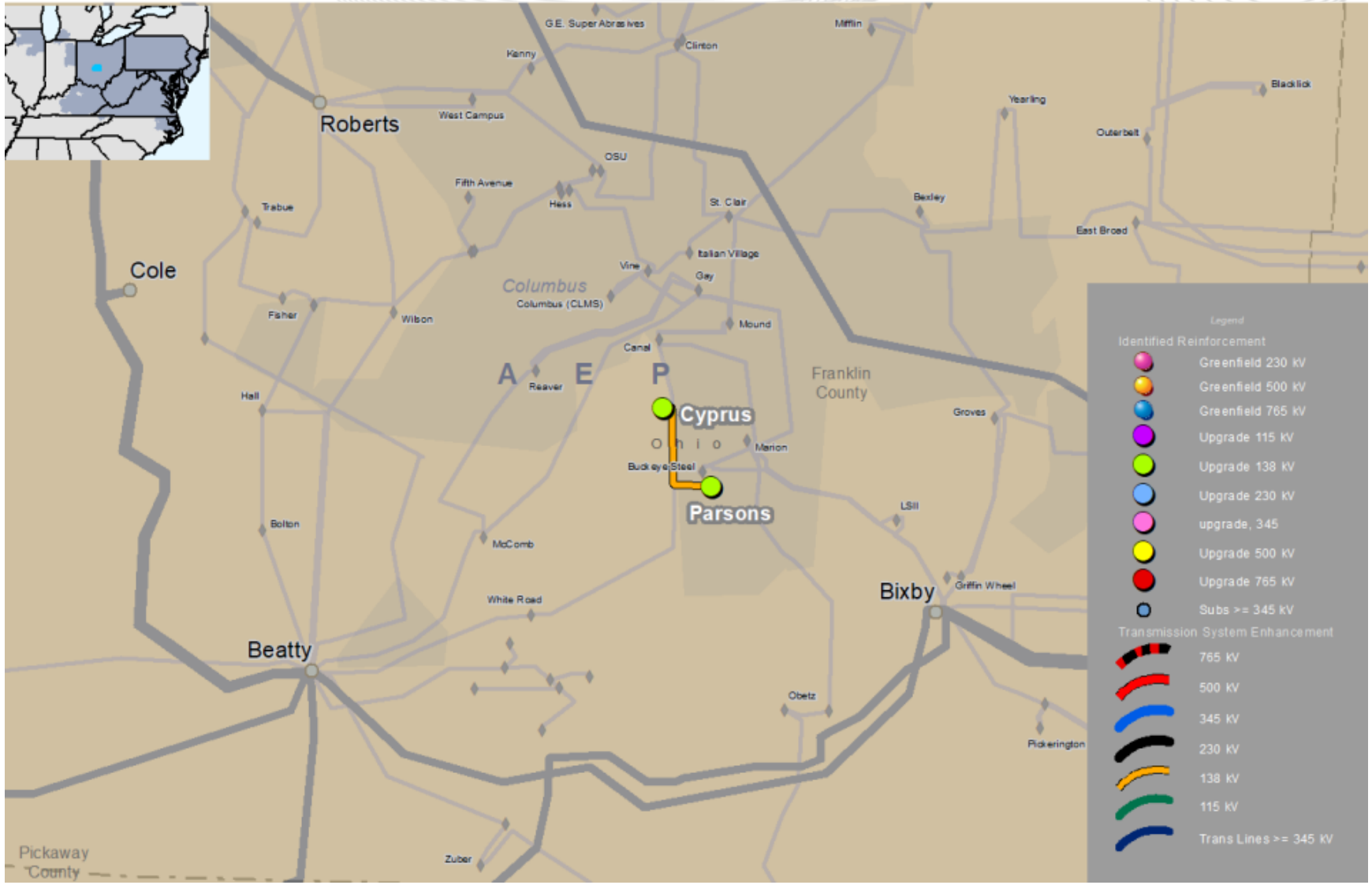



Sumac
Amlin
Davidson
Bethel
Britton
Franklin County
Karl
Columbus
Blendon
Babbitt
Anguin
Tap L28
Morse
Hap Cremean
Gahanna
G.E. Super Abrasives
Stelzer
Mifflin
Clinton
Licking County
Blacklick
Yearling
Outerbelt
Taylor
Kenny
West Campus
Roberts
OSU
Fifth Avenue
Hess
Trabue
St. Clair
Bexley
East Broad
A E P
Italian Village
Vine
Gay
Cole
Columbus (CLMS)
Mound
Faher
Wilson
O h i o
Canal
Mound
Canal
Astor
Reaver
Hall
Marion
Groves
Buckeye Steel
LSII
Bolton
McComb
Griffin Wheel
White Road
Bixby
Beatty
Obetz
Pickerington
Zuber
Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
upgrade, 345
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
765 kV
500 kV
345 kV
230 kV
138 kV
115 kV
Trans Lines >= 345 kV

2024-W1-756
(ROW designation only, All kVs)

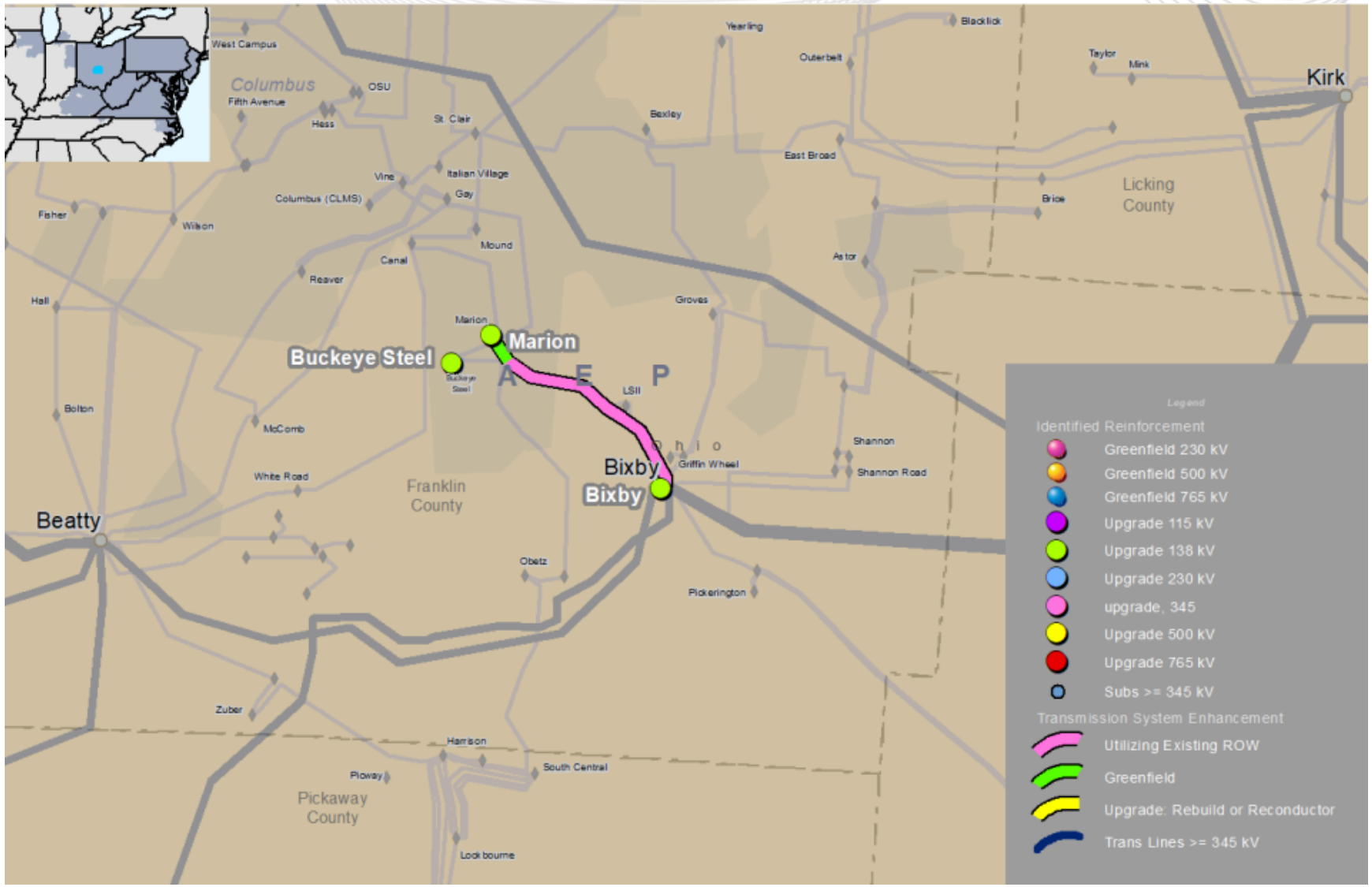


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

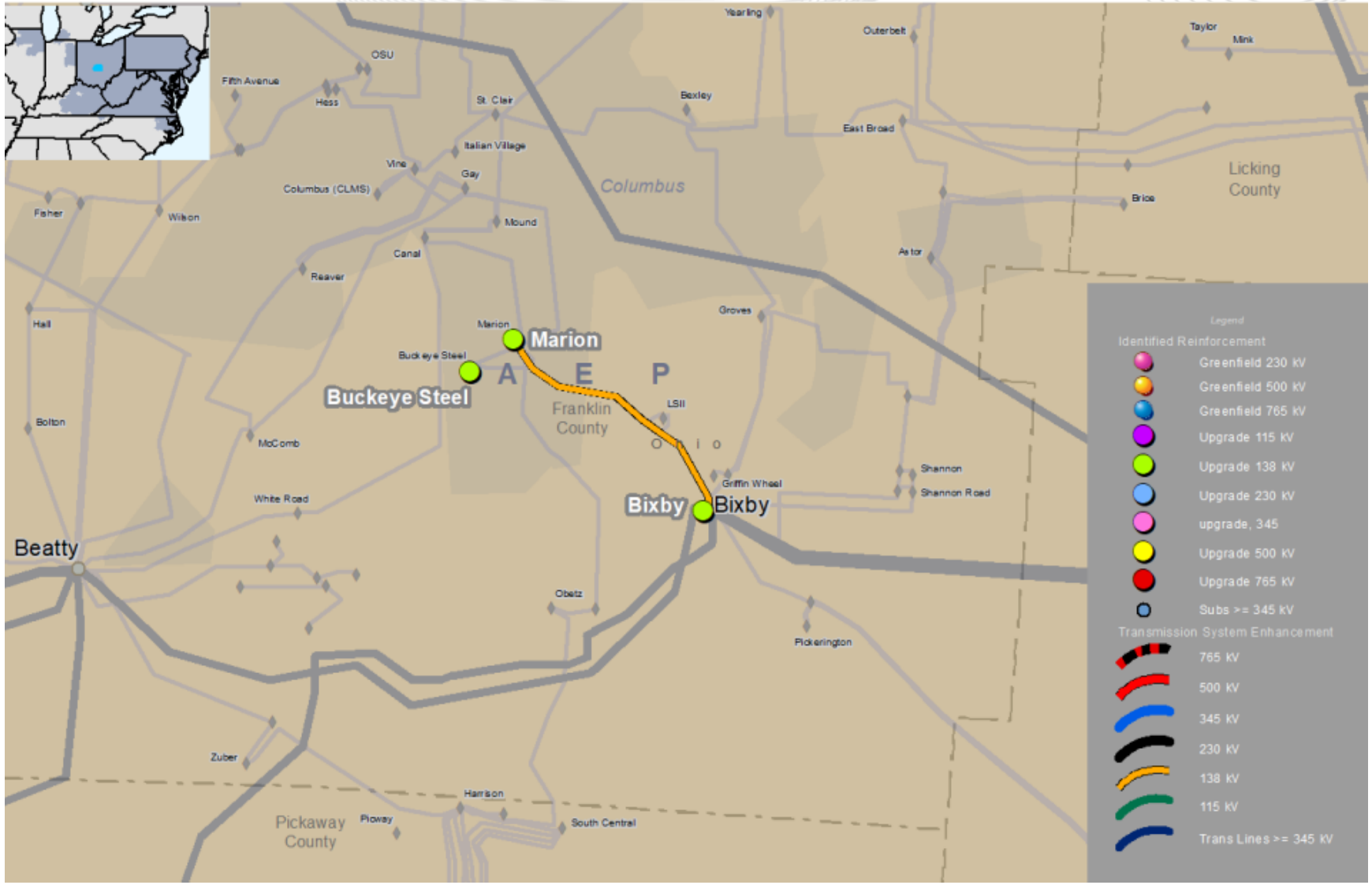


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2024-W1-276
(ROW designation only, All kVs)

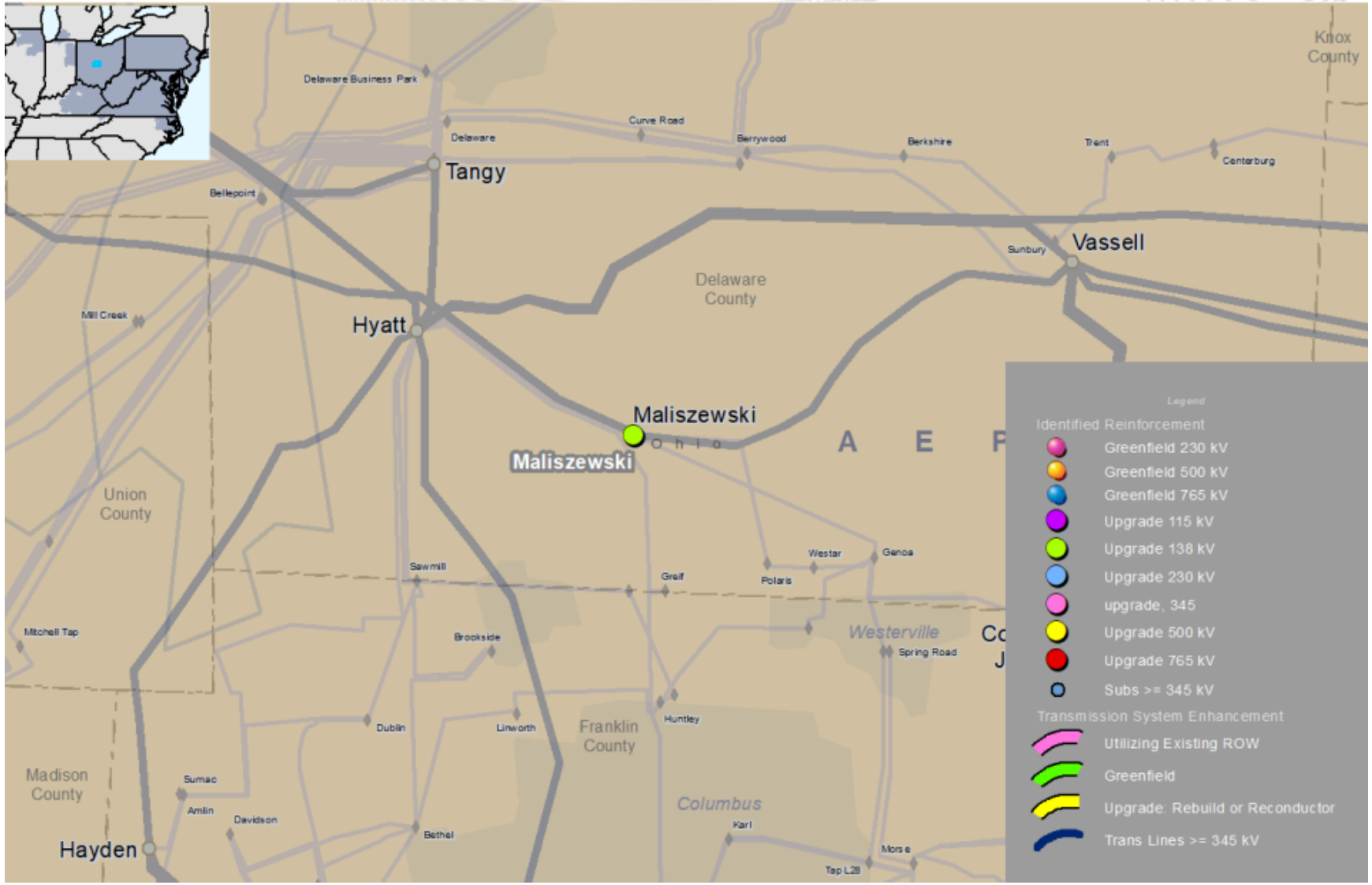


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

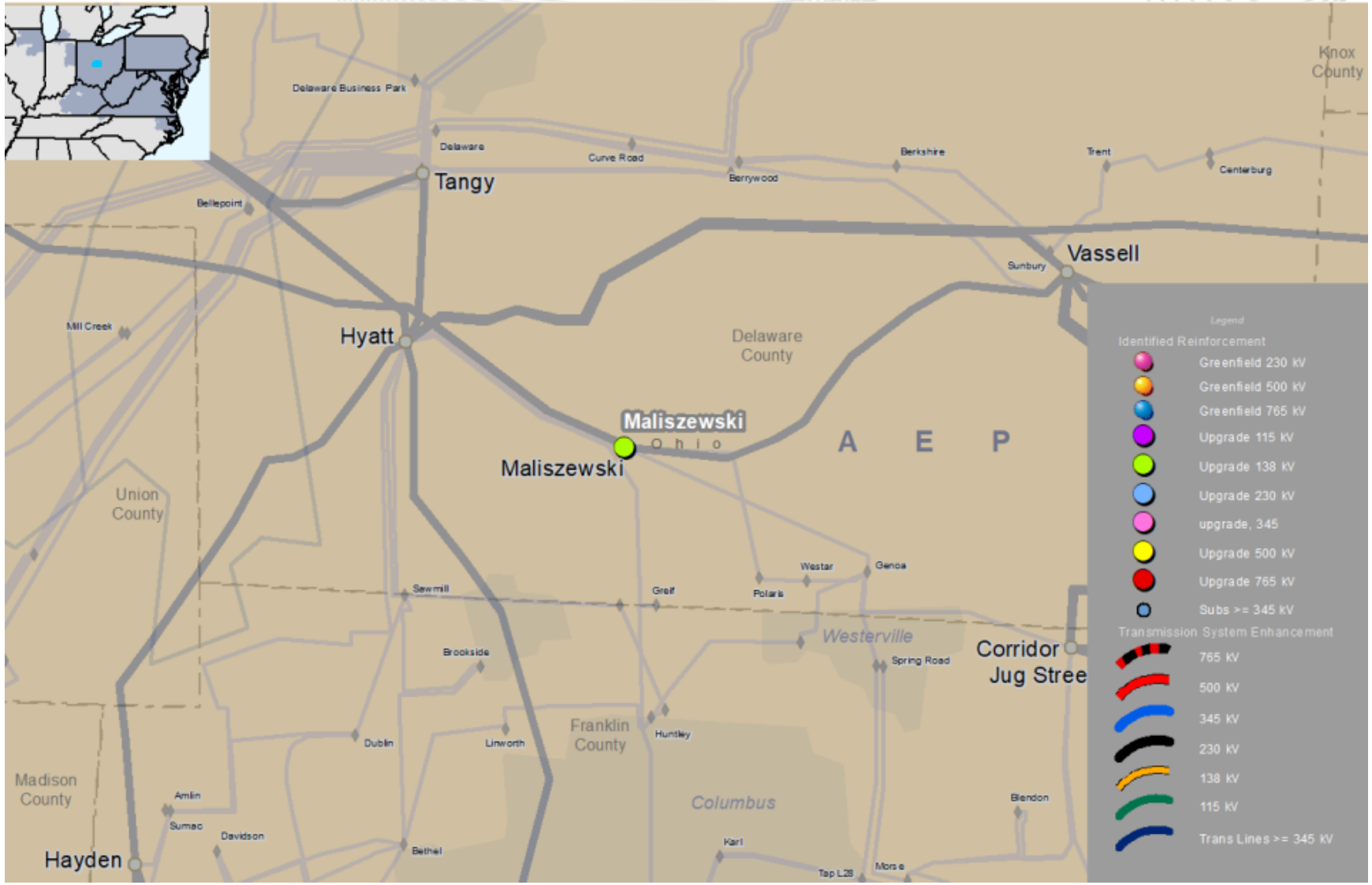


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

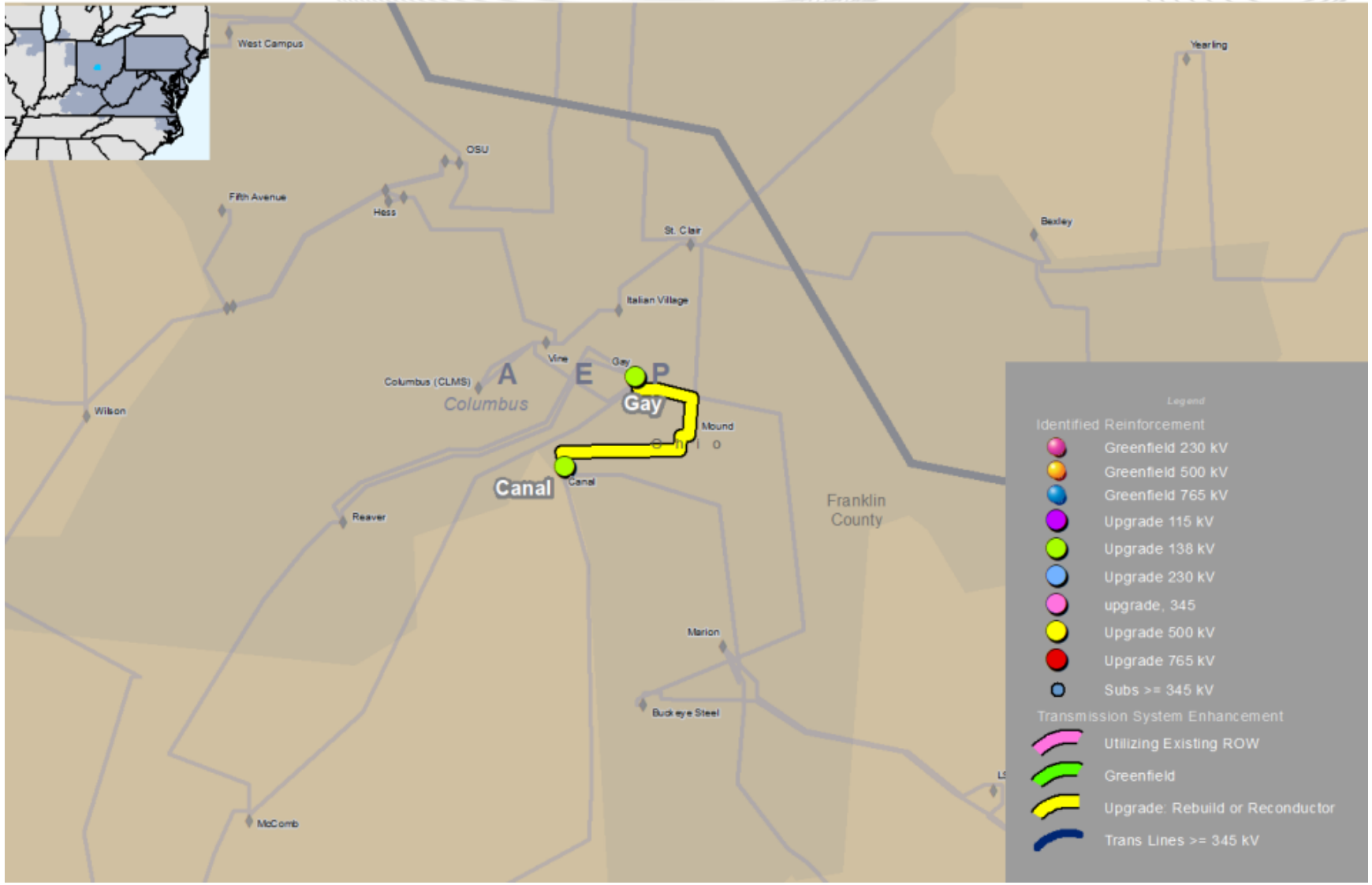
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



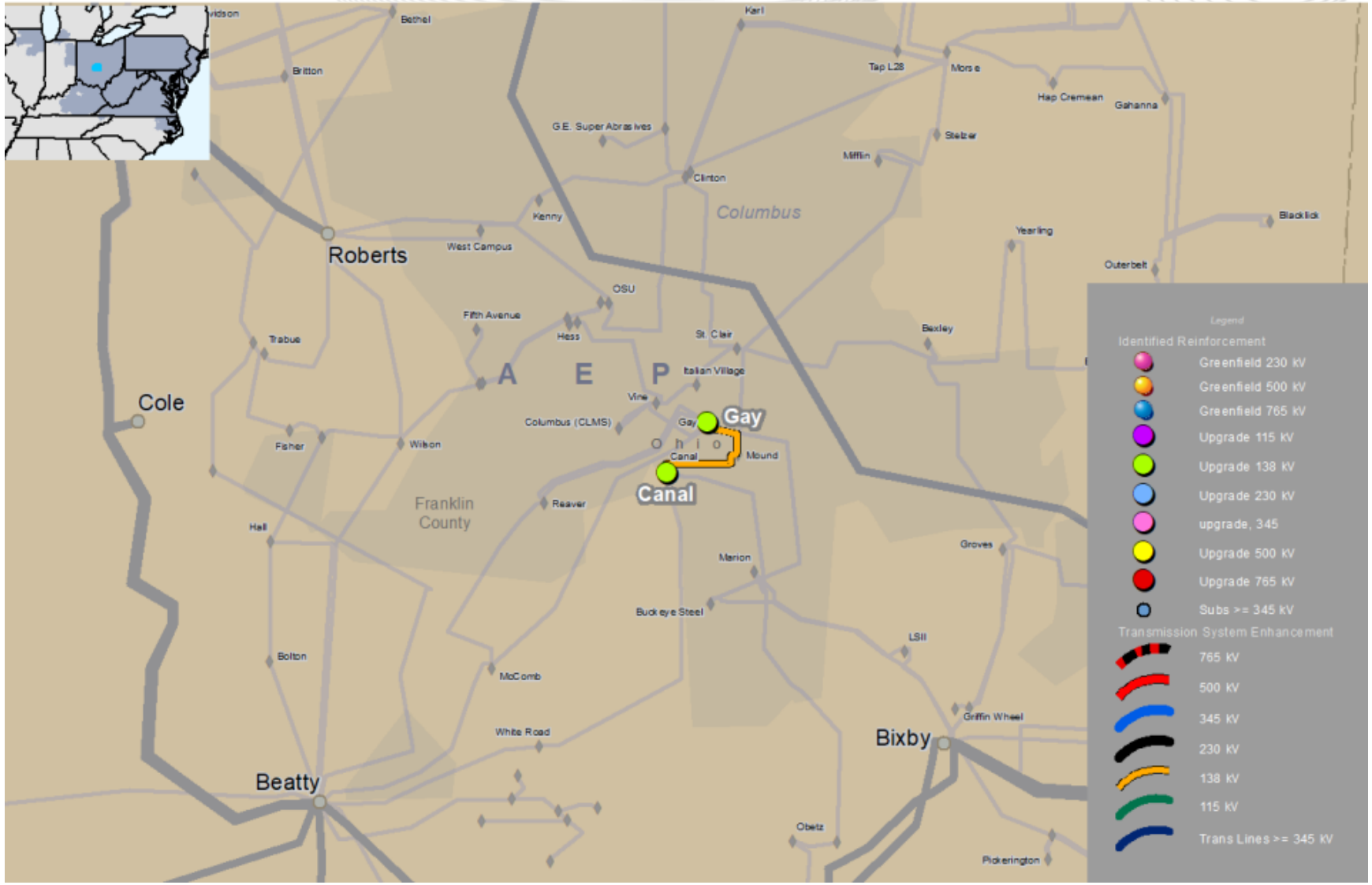
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



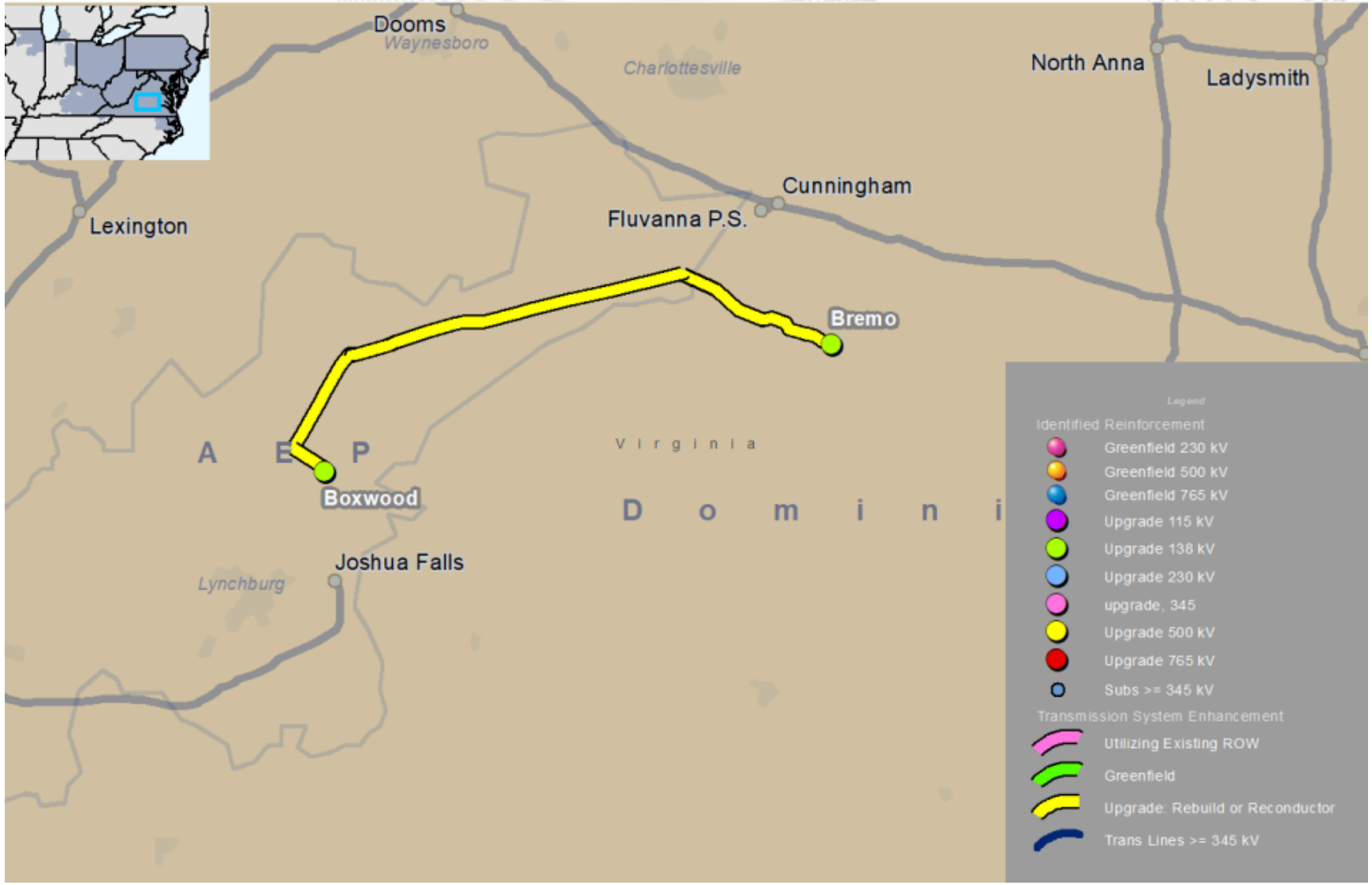
2024-W1-940
(ROW designation only, All kVs)



NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



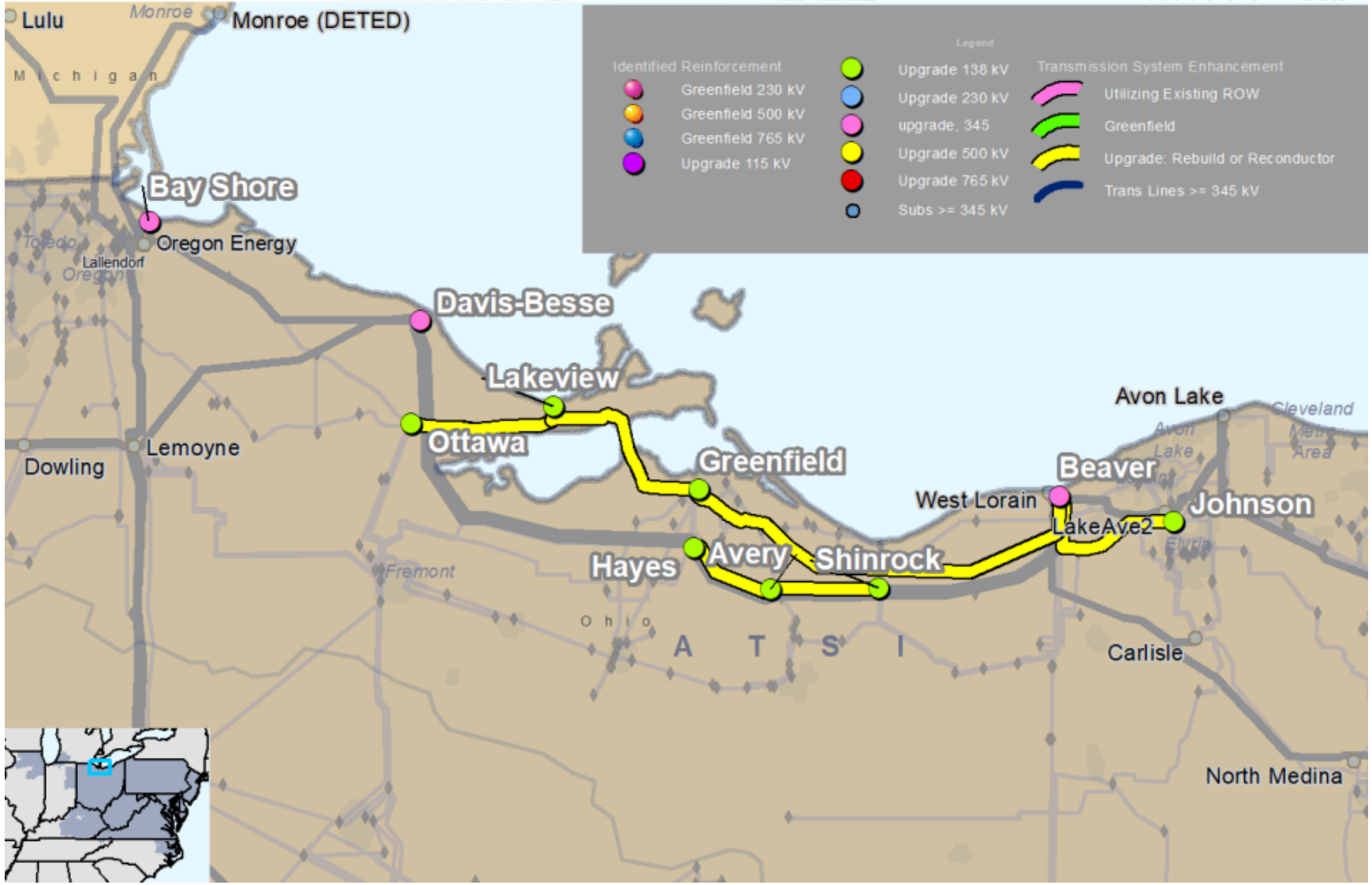
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



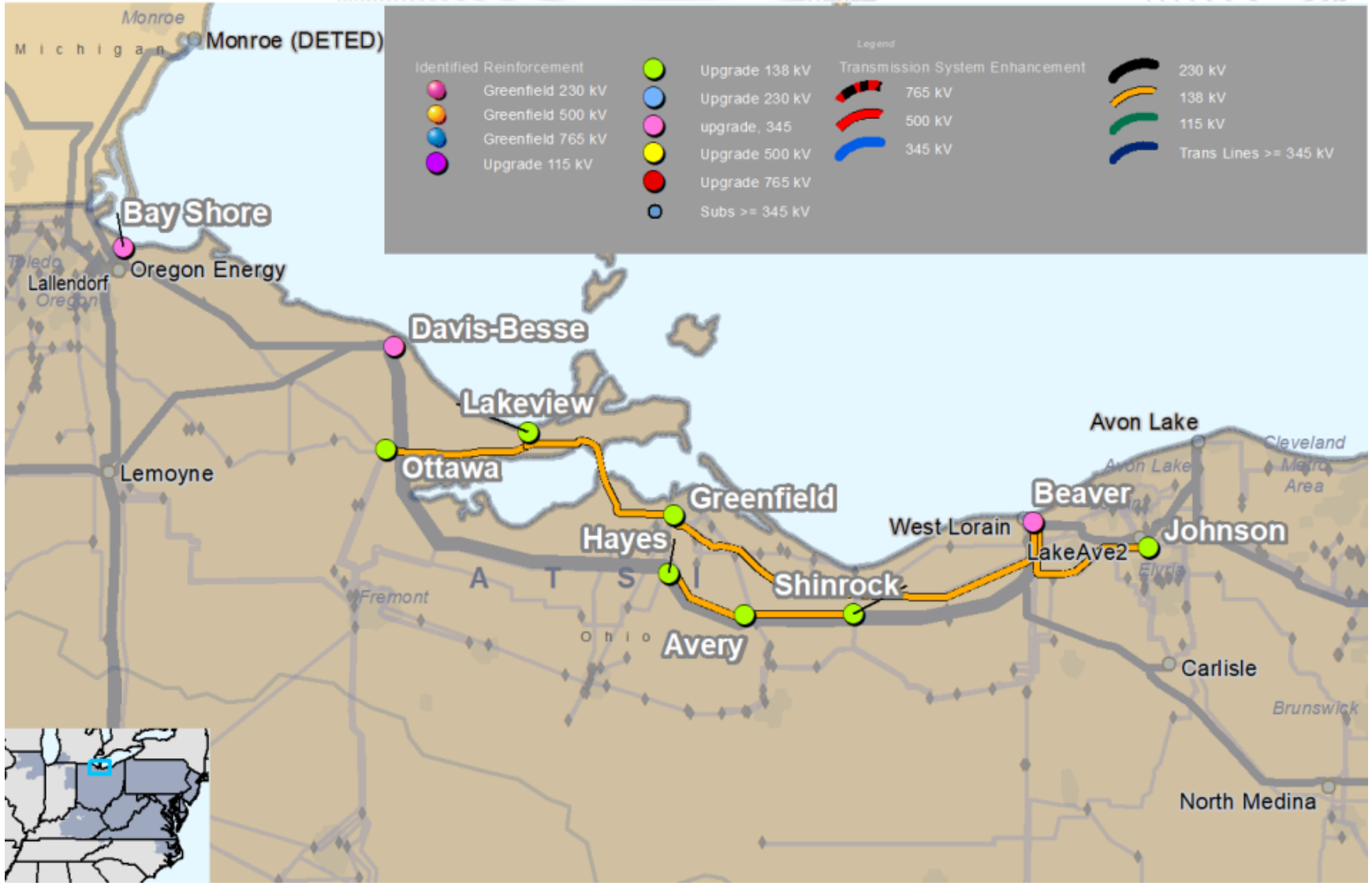
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

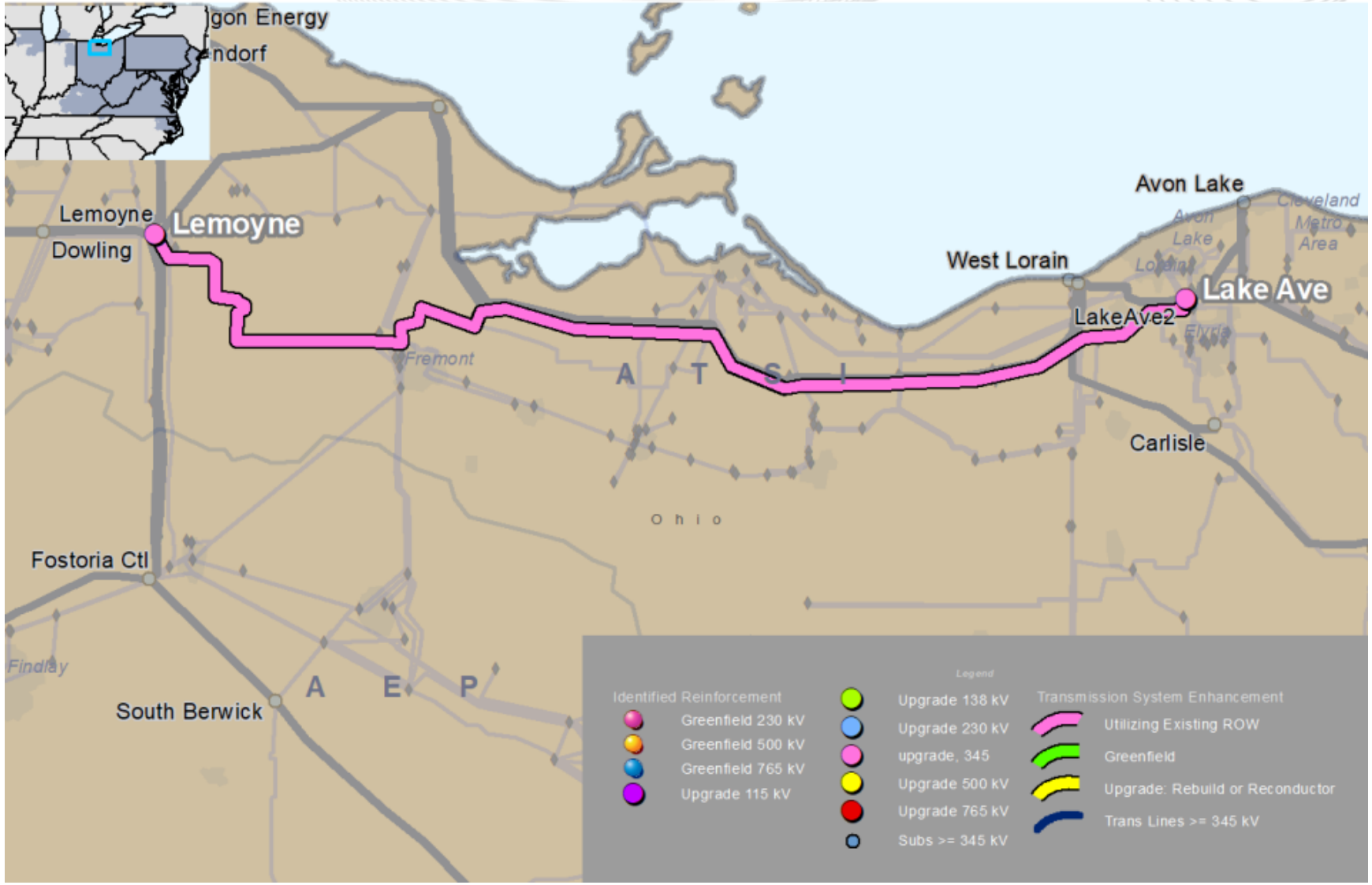
ATSI



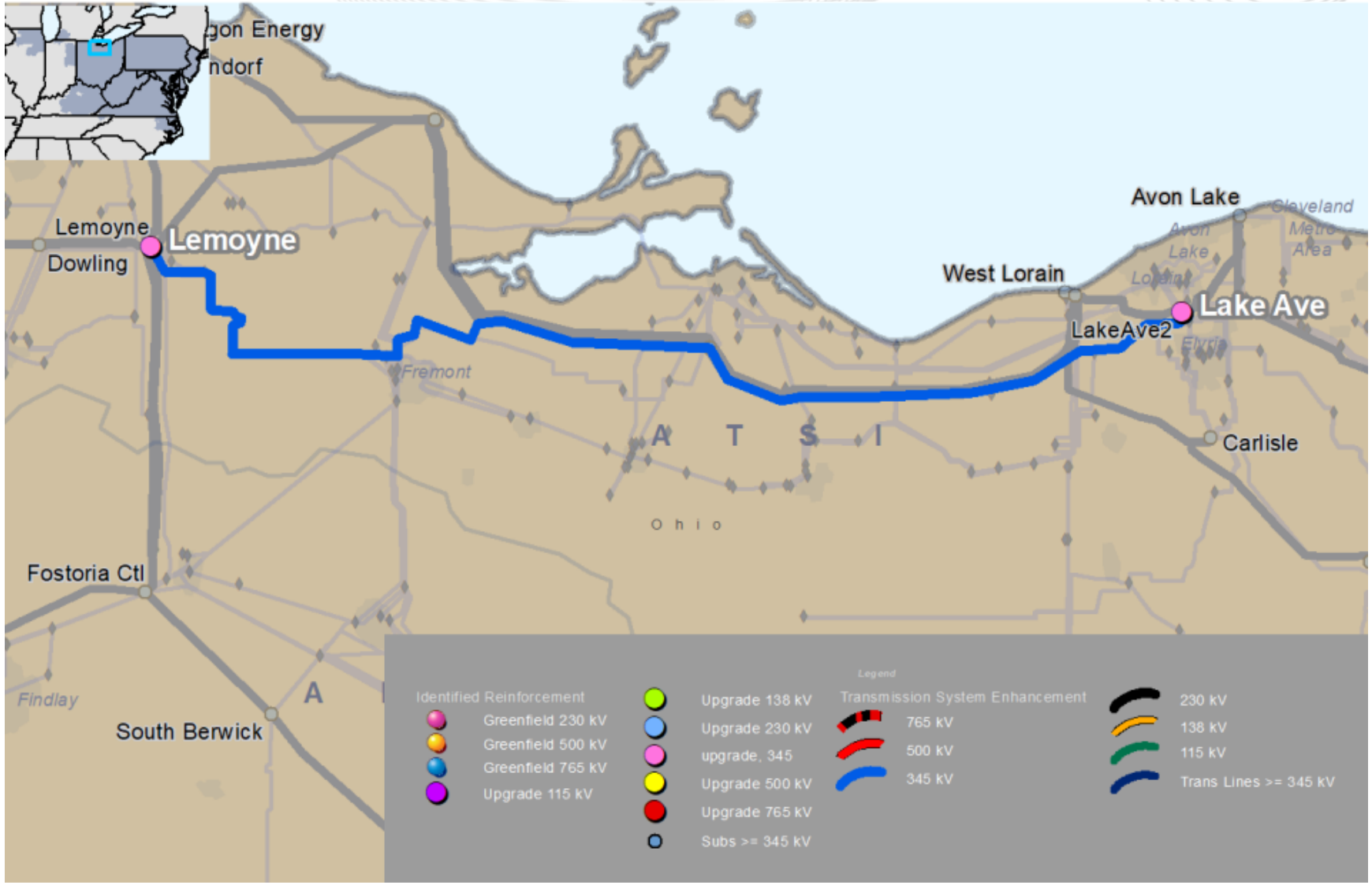
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

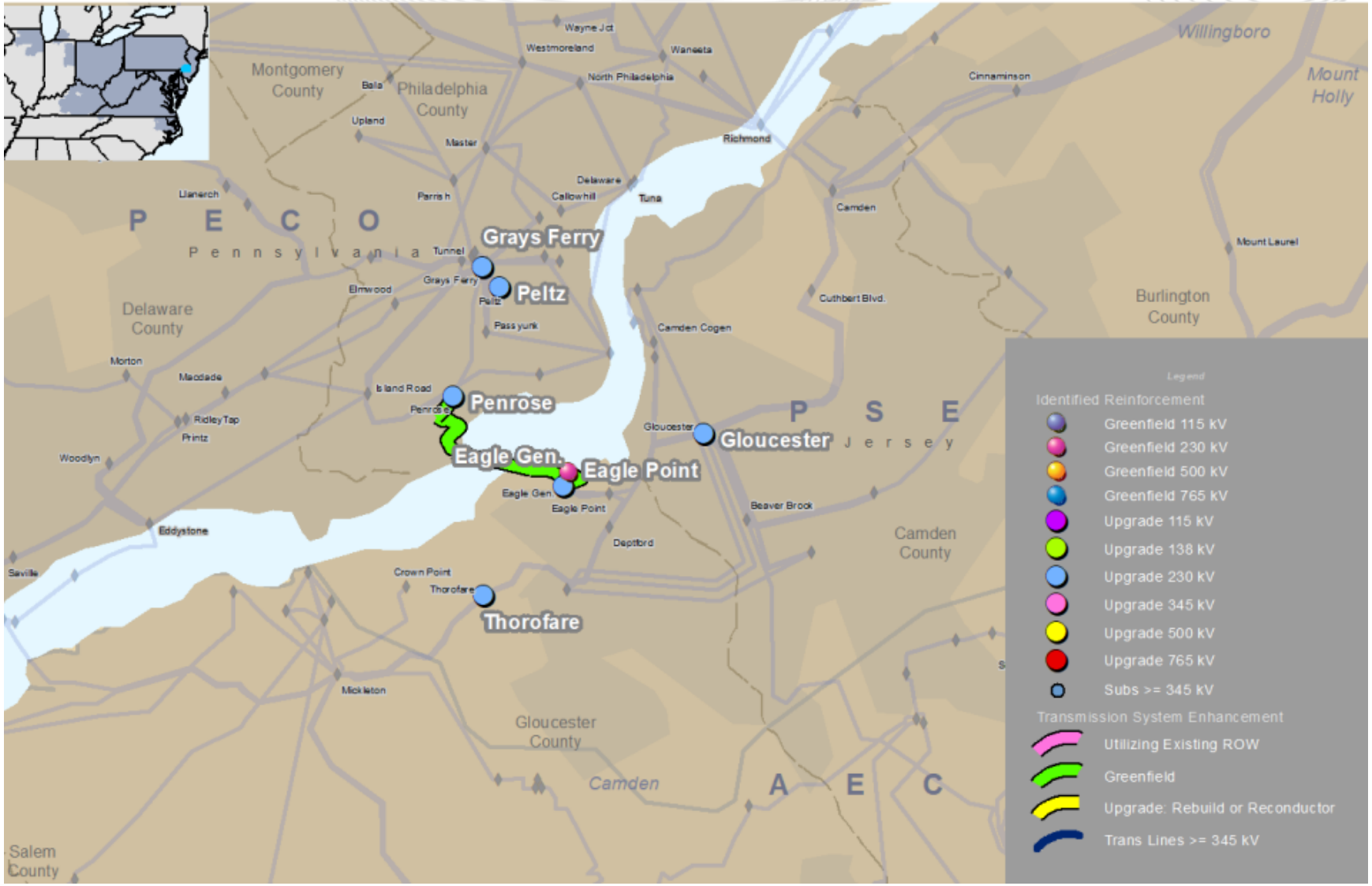


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



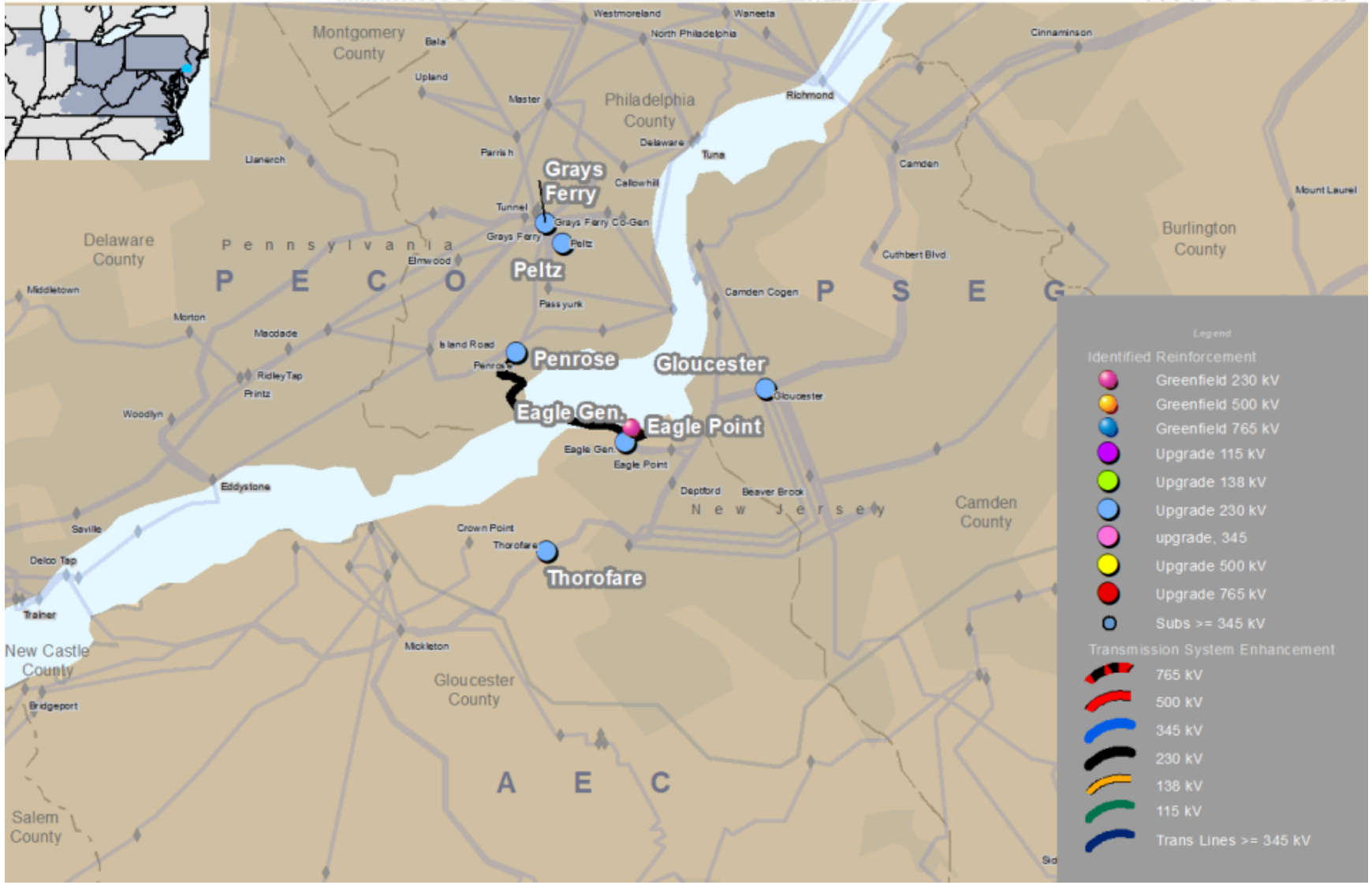
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

PSEG



NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2024-W1-955
(kV designation only, All kVs)



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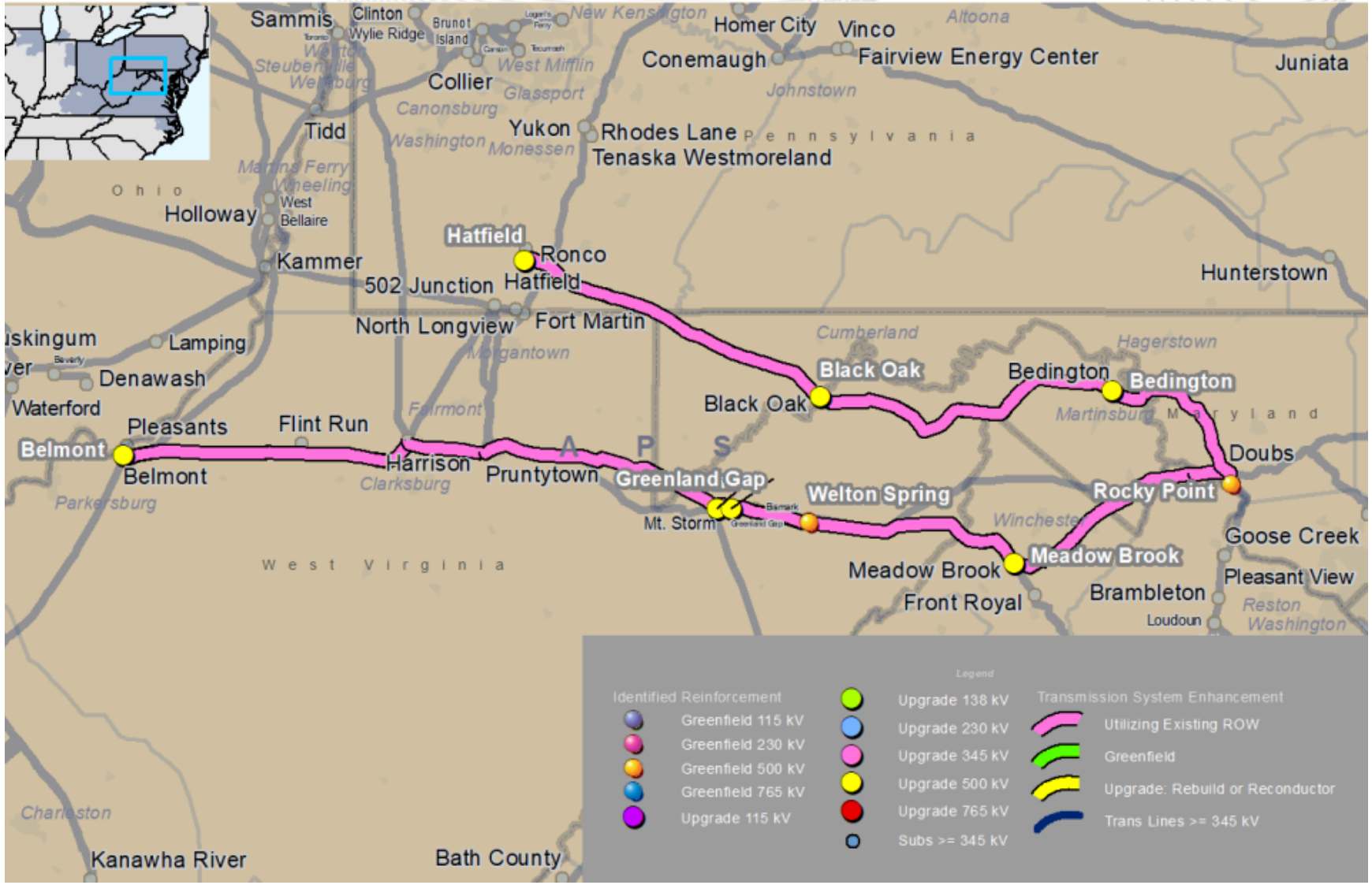
TRAIL



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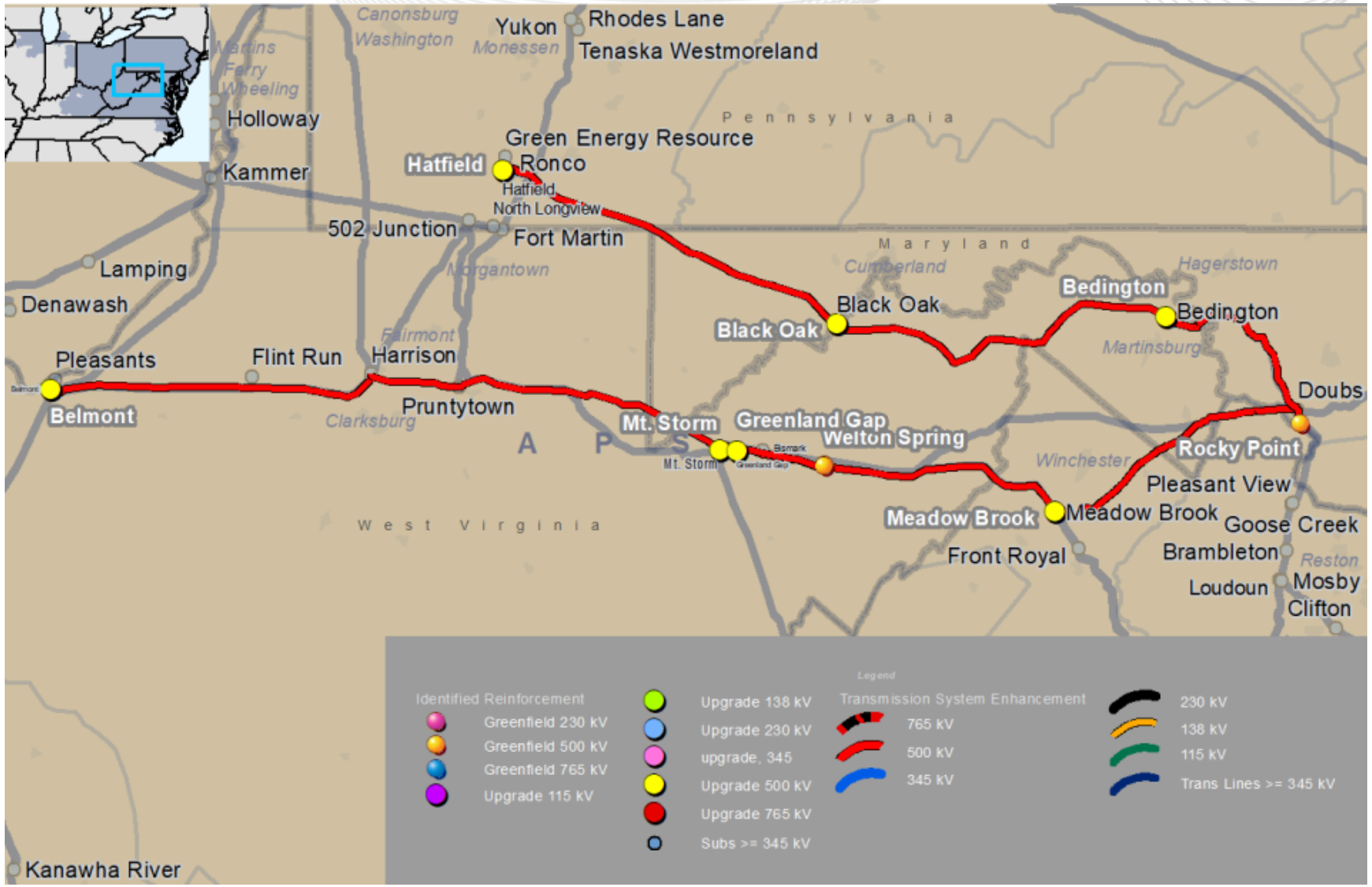

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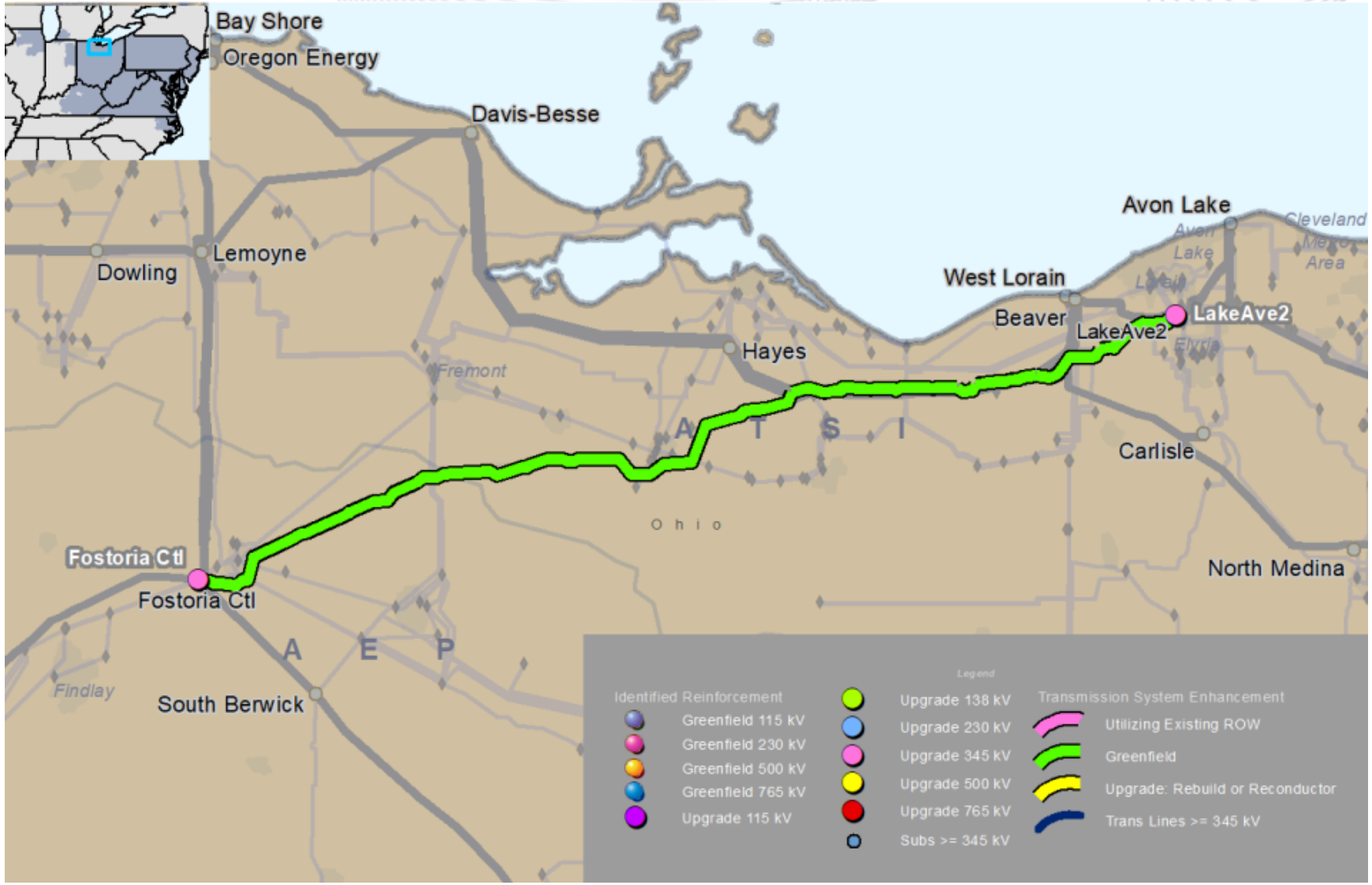
TRANSOURCE



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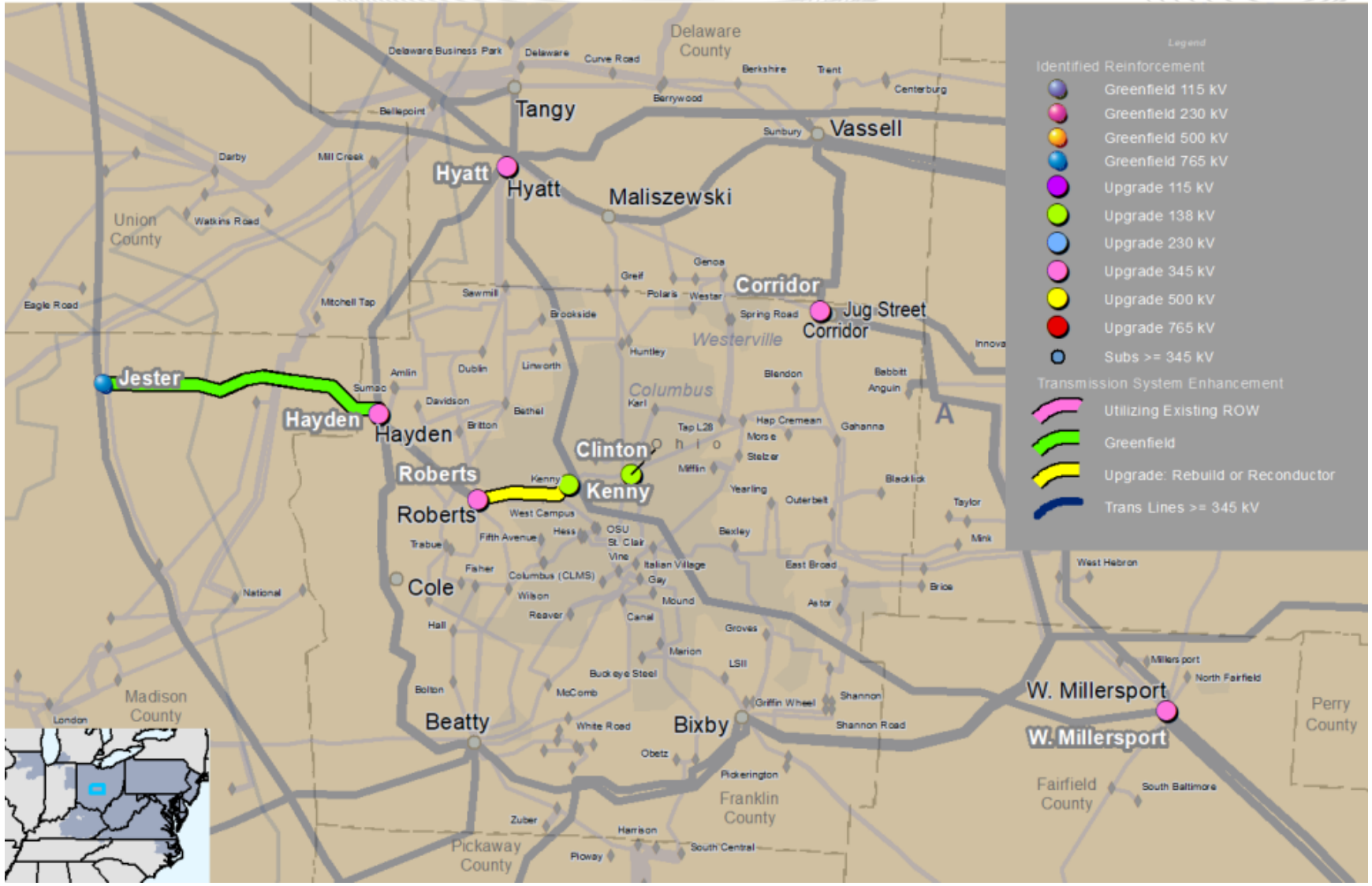

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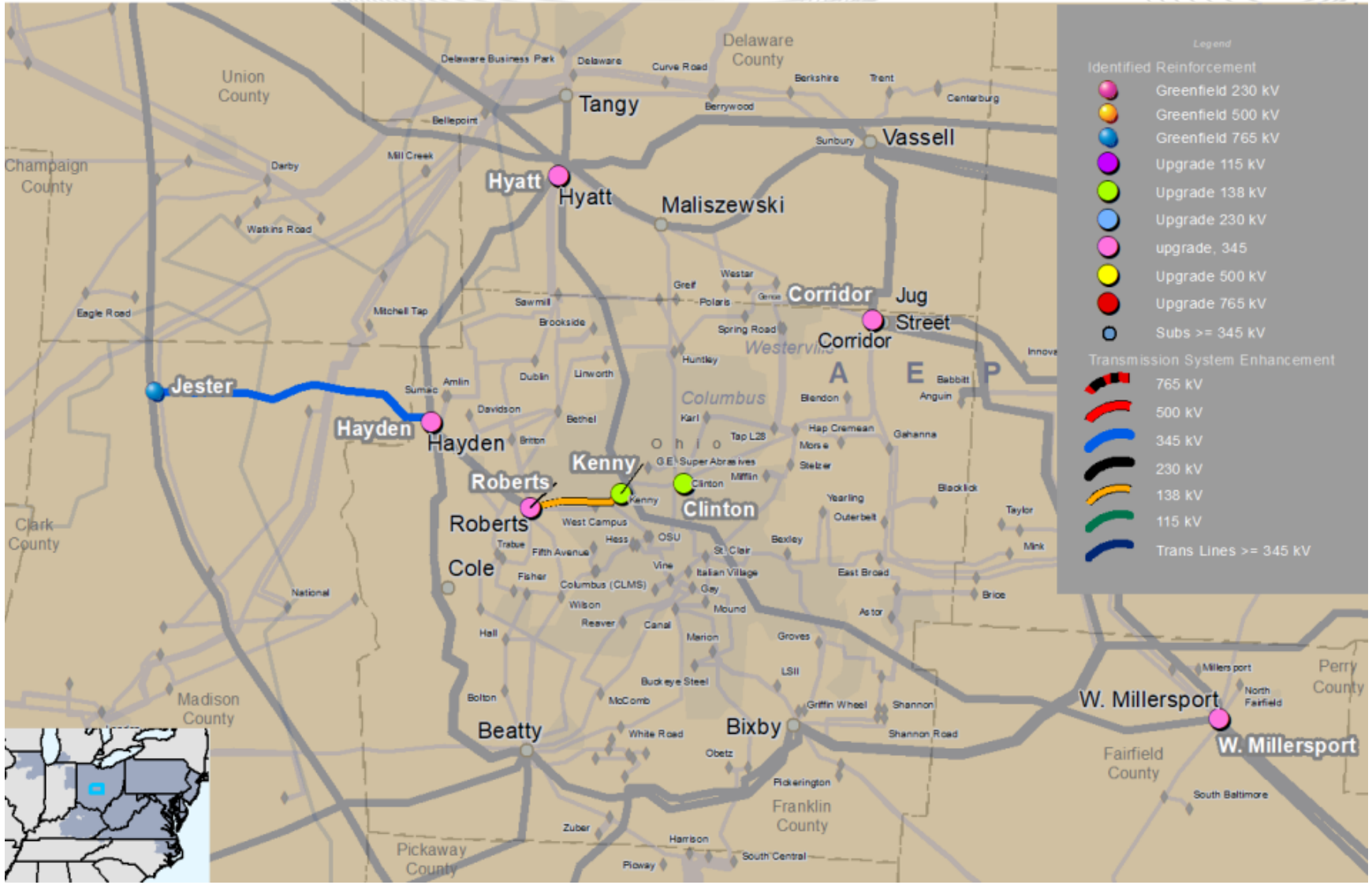

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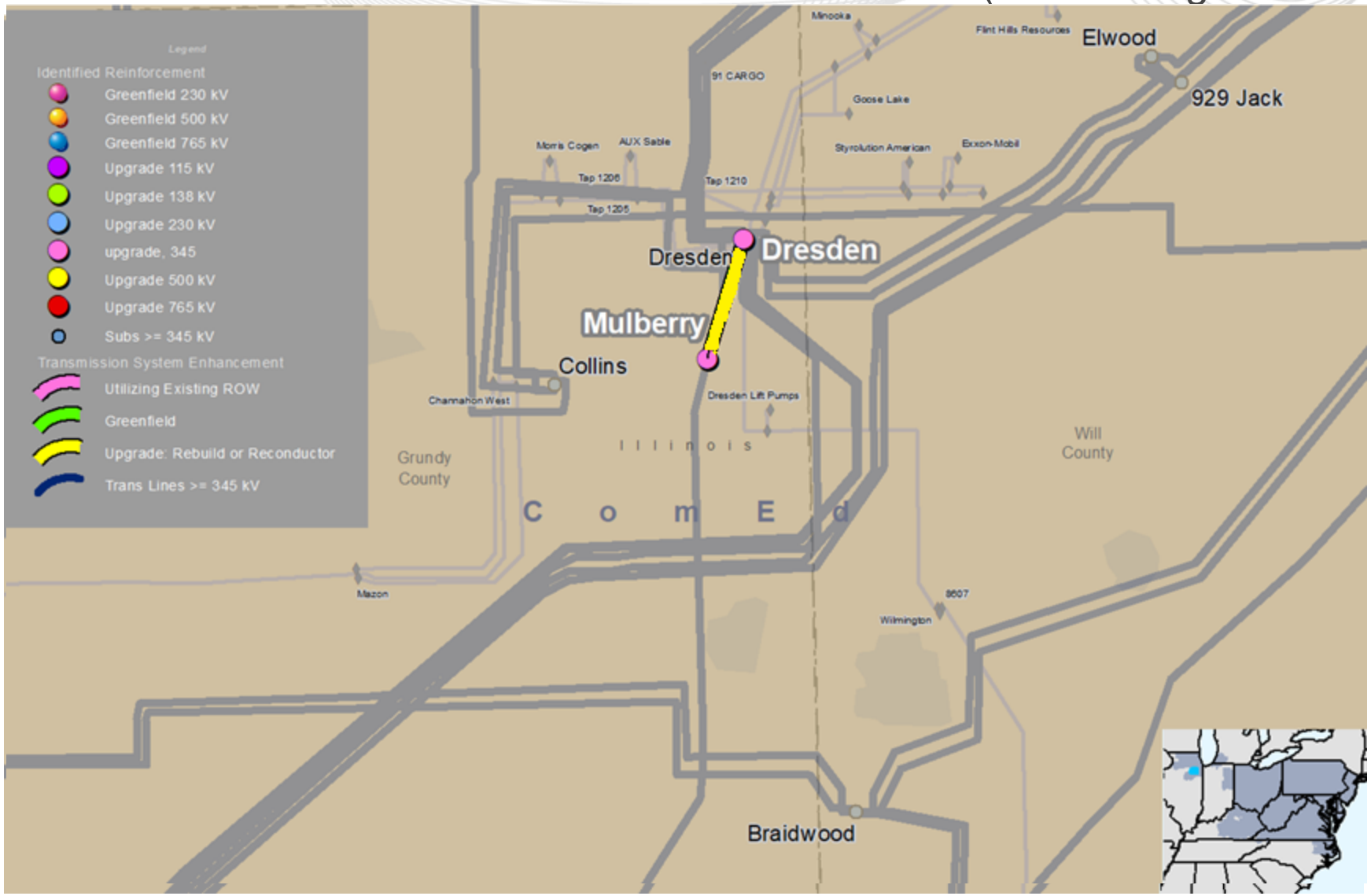
COMED



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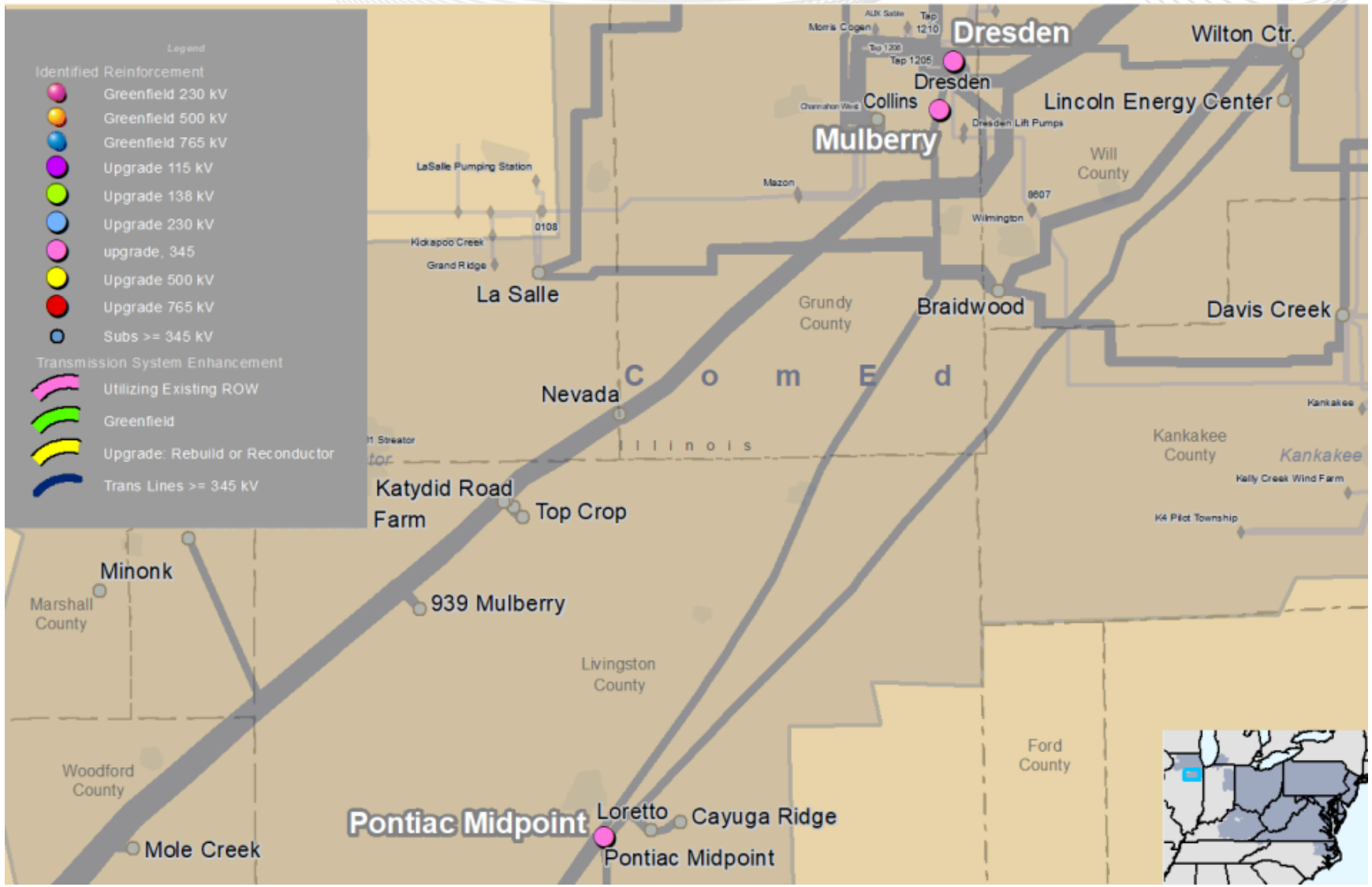

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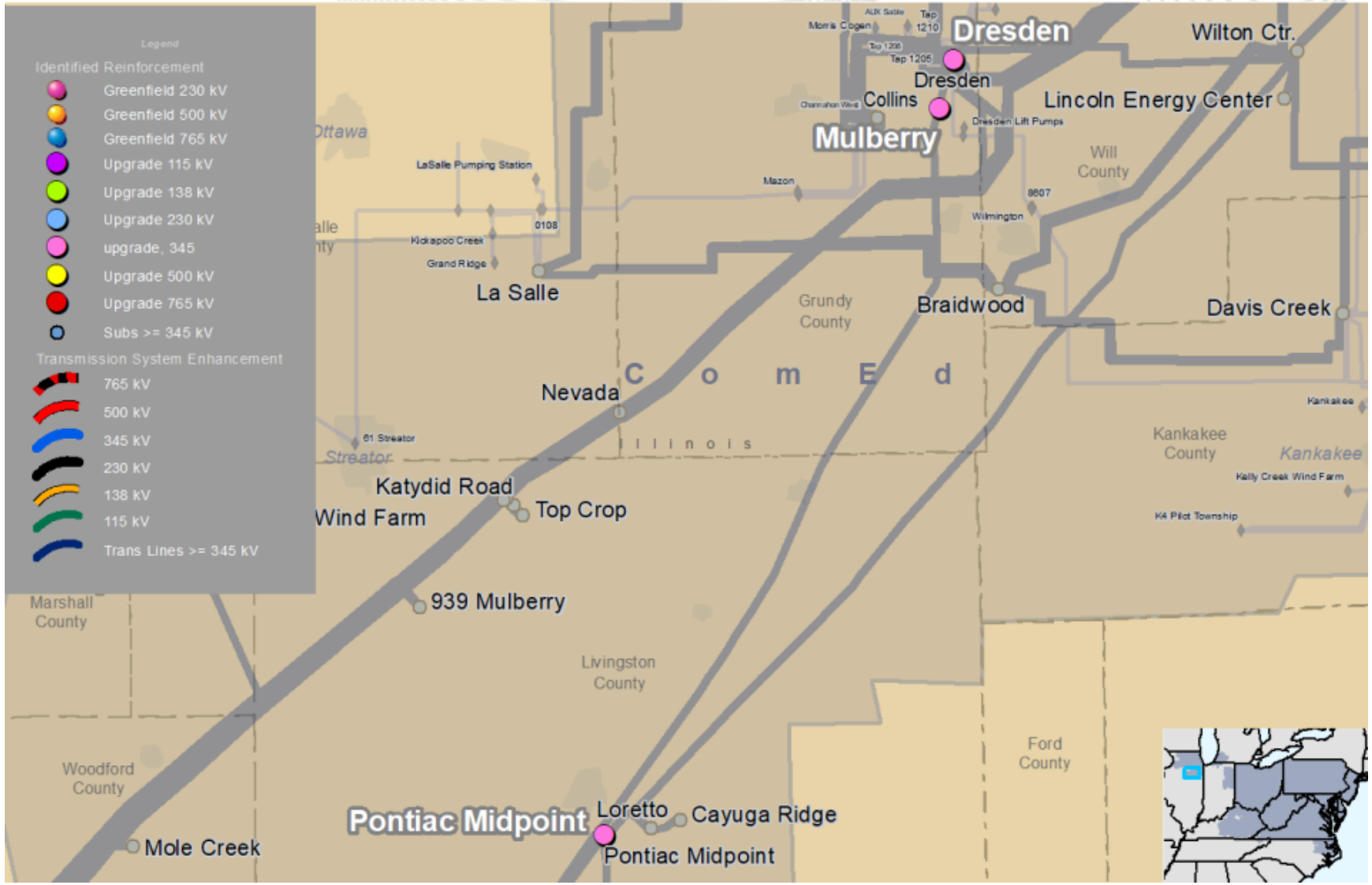

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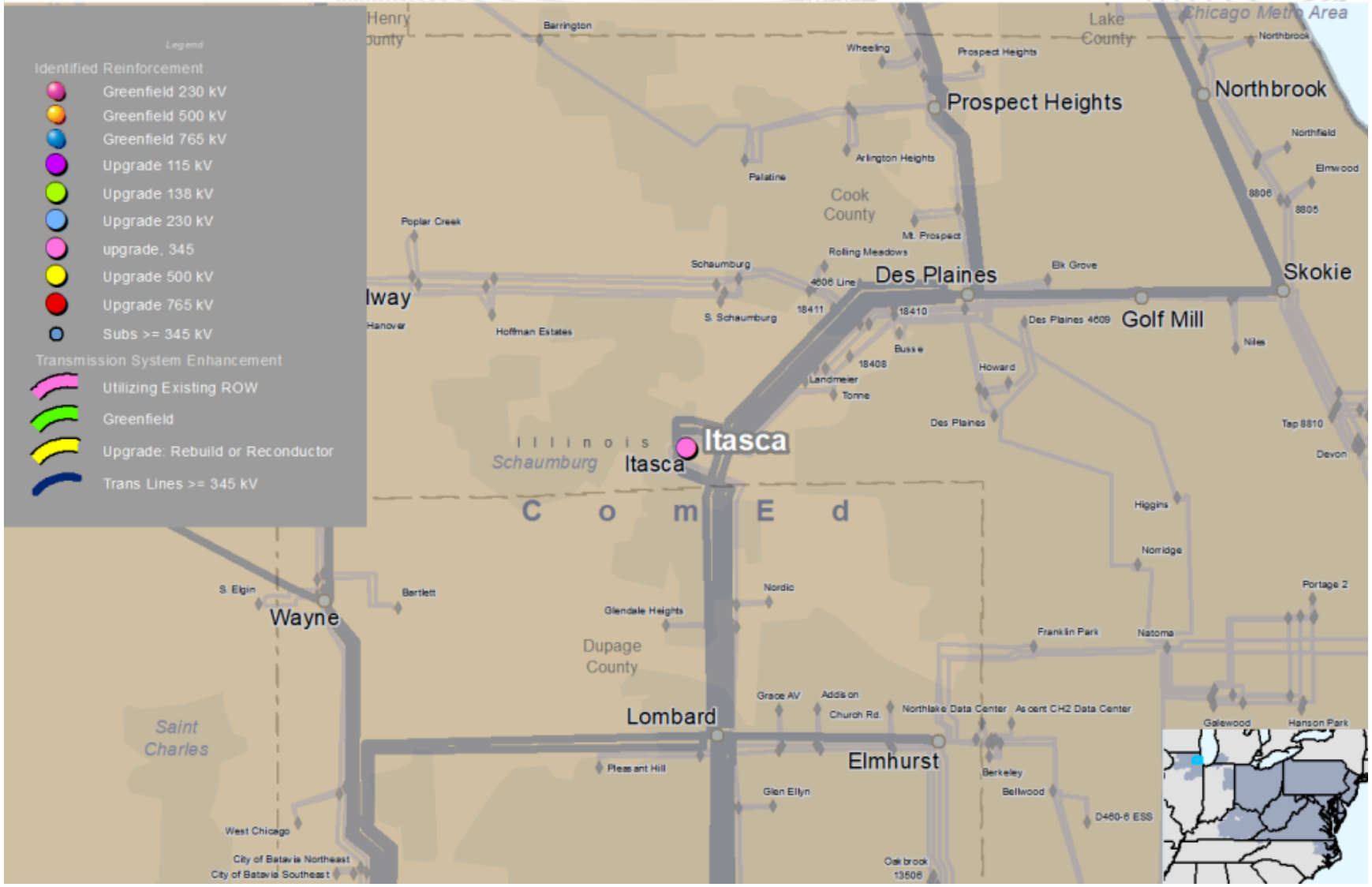
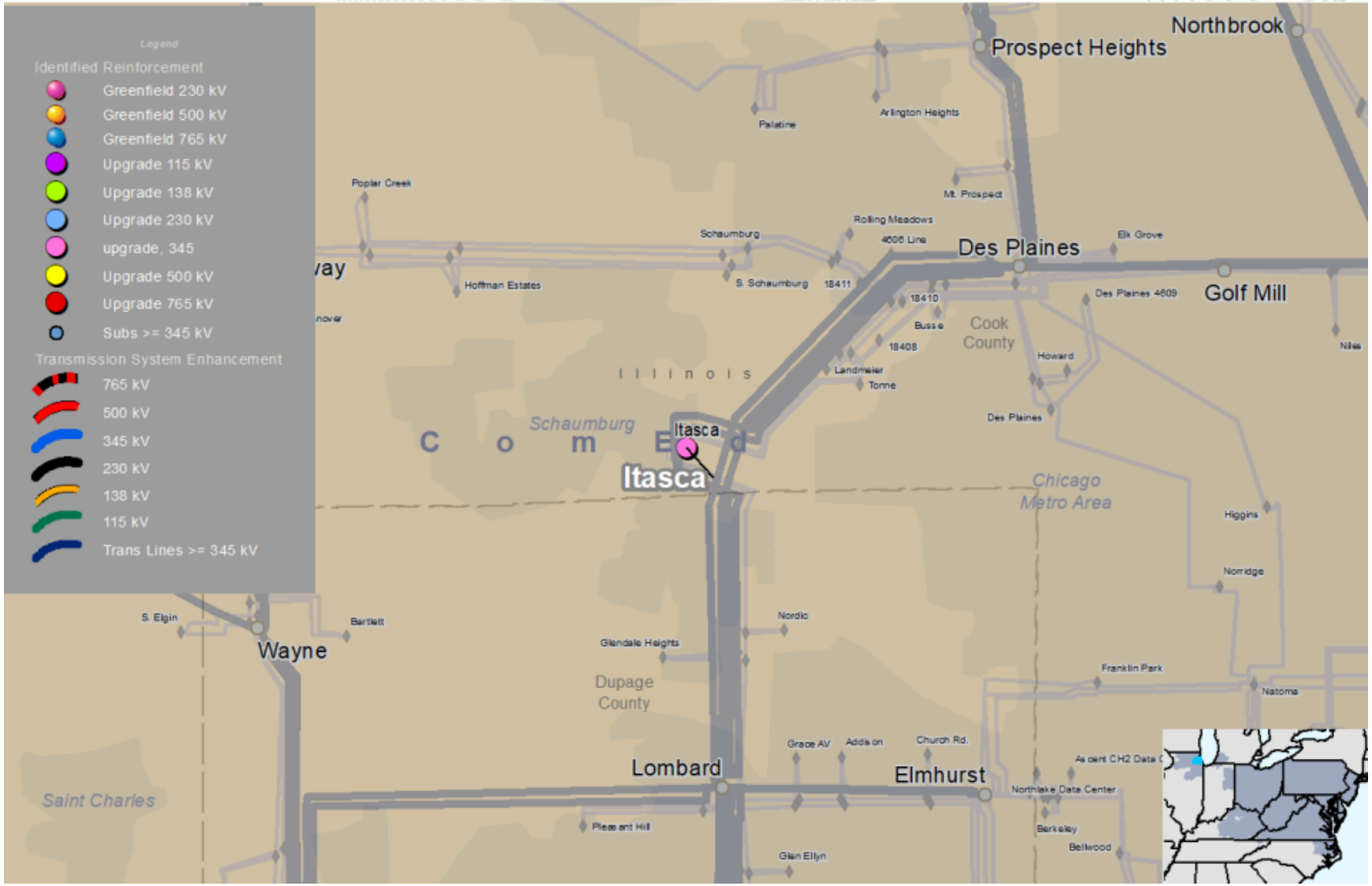

Legend
Identified Reinforcement
Greenfield 230 kV
Greenfield 500 kV
Greenfield 765 kV
Upgrade 115 kV
Upgrade 138 kV
Upgrade 230 kV
upgrade, 345
Upgrade 500 kV
Upgrade 765 kV
Subs >= 345 kV
Transmission System Enhancement
Utilizing Existing ROW
Greenfield
Upgrade: Rebuild or Reconductor
Trans Lines >= 345 kV
Itasca
Schaumburg
Itasca
Illinois
ComEd
Des Plaines
Golf Mill
Skokie
Prospect Heights
Northbrook
Lombard
Elmhurst
Wayne
Cook County
Dupage County
Lake County
Chicago Metro Area
Saint Charles
Barrington
Wheeling
Palatine
Arlington Heights
Rolling Meadows
Mt. Prospect
Elk Grove
Schaumburg
Hoffman Estates
Hanover
Poplar Creek
Bartlett
S. Elgin
West Chicago
City of Batavia Northeast
City of Batavia Southeast
Glendale Heights
Nordic
Grace AV
Addison
Church Rd.
Pleasant Hill
Glen Ellyn
Oakbrook
13506
Northlake Data Center
Ascent CH2 Data Center
Berkeley
Bellwood
D460-6 ESS
Franklin Park
Natoma
Norridge
Higgins
Howard
Busse
Landmeier
Tonne
Des Plaines
Des Plaines 4609
Niles
Tap 8810
Devon
Galewood
Hanson Park
Portage 2
Northfield
Elmwood
8806
8805
4606 Line
18411
18410
18408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765 kV
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Trans Lines >= 345 kV
Northbrook
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Palatine
Arlington Heights
Poplar Creek
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4606 Line
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Bartlett
Wayne
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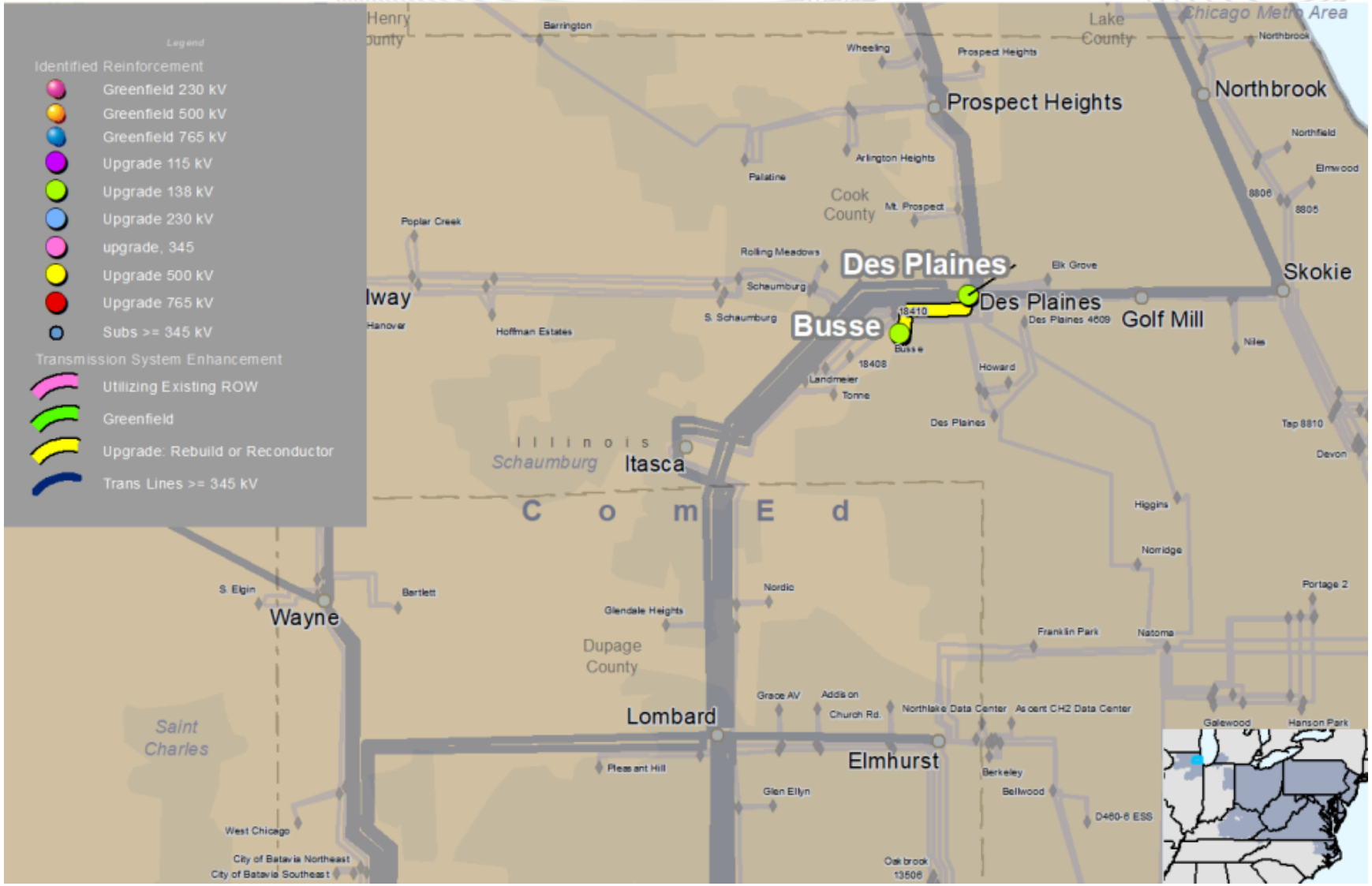
Glendale Heights
Franklin Park
Dupage County
Natoma
Grace AV
Addison
Church Rd.
Lombard
Elmhurst
Northlake Data Center
Berkeley
Bellwood
Saint Charles
Pleasant Hill
Glen Ellyn

2024-W1-888
(ROW designation only, All kVs)



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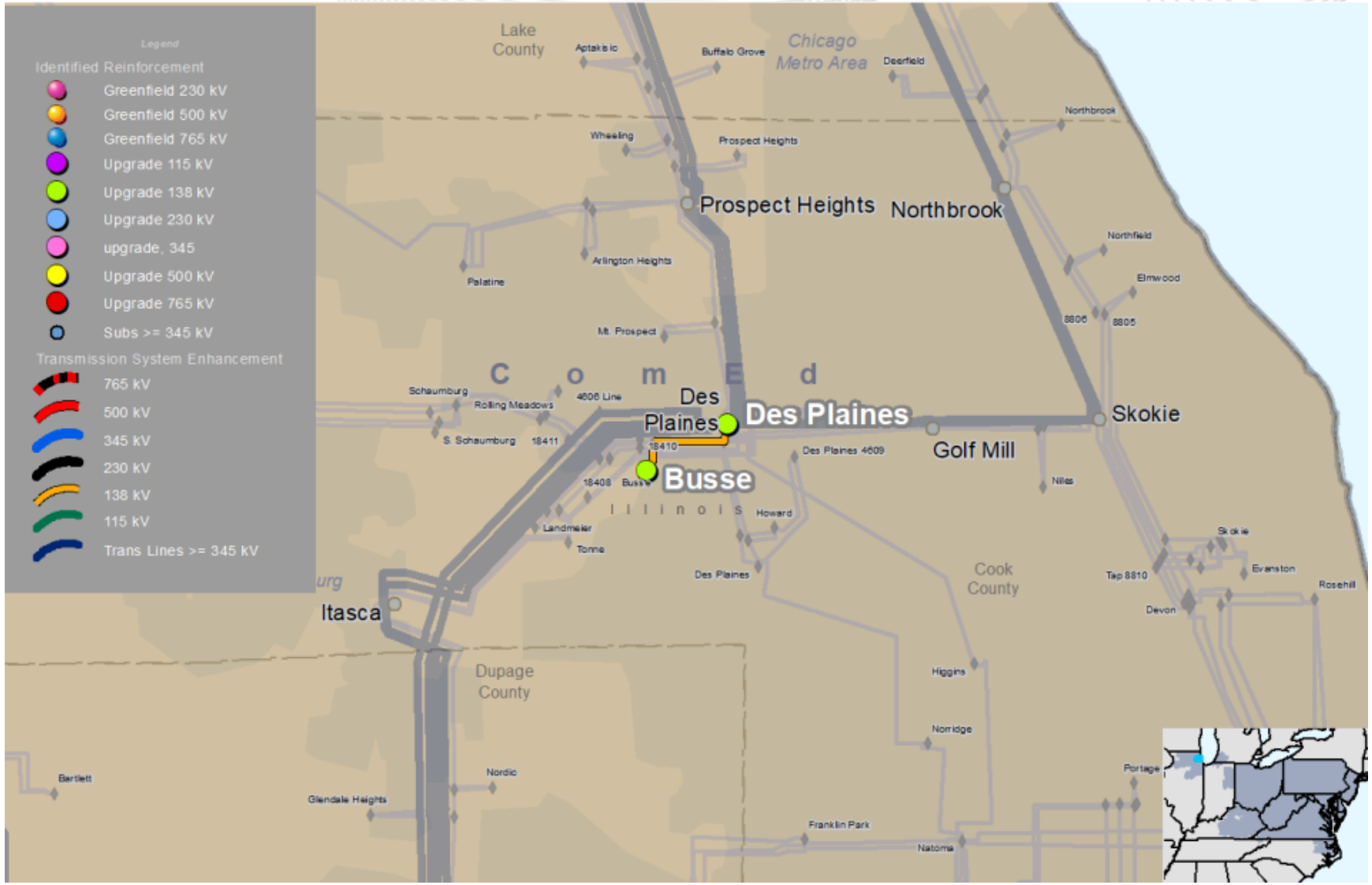

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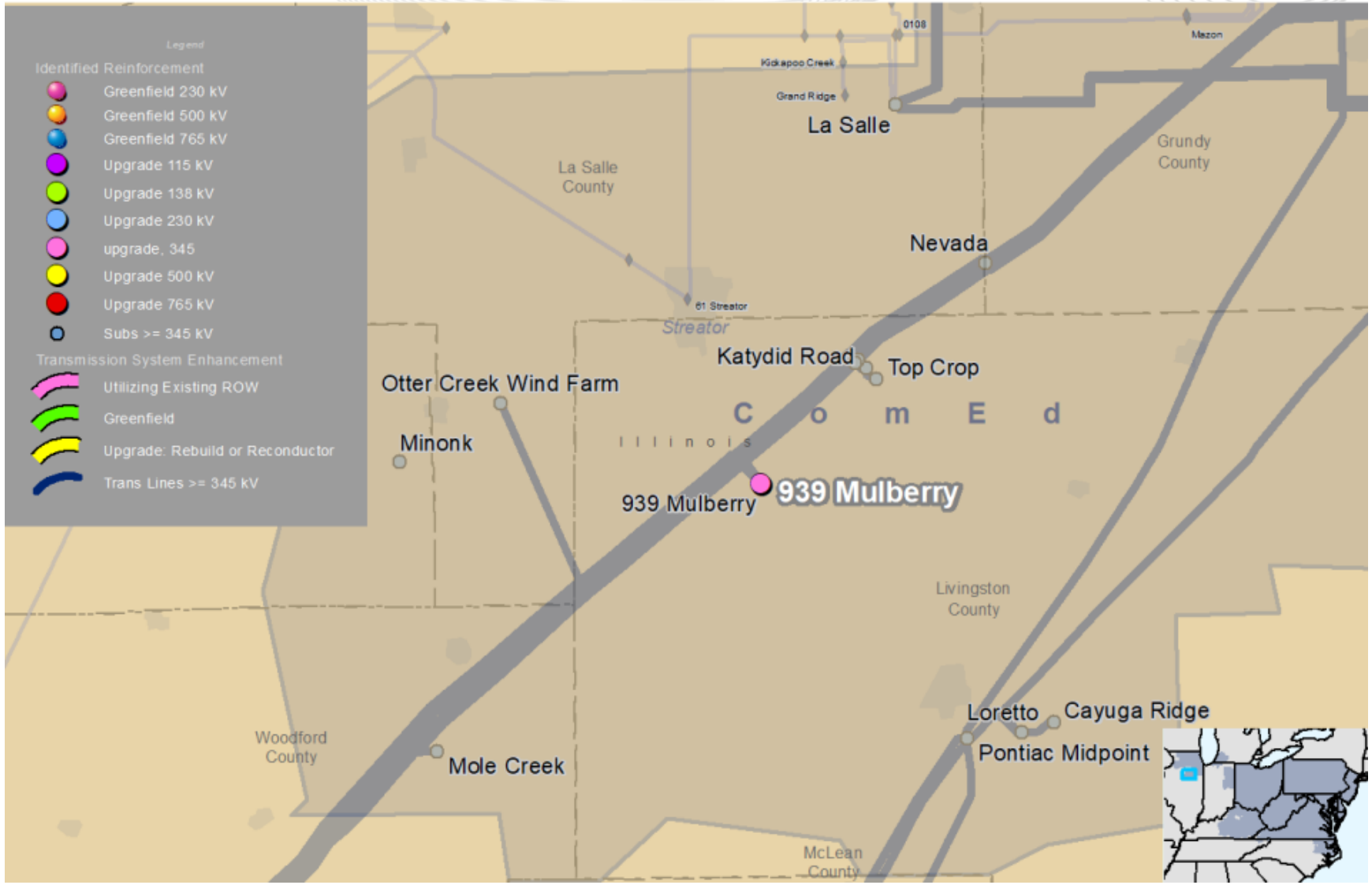
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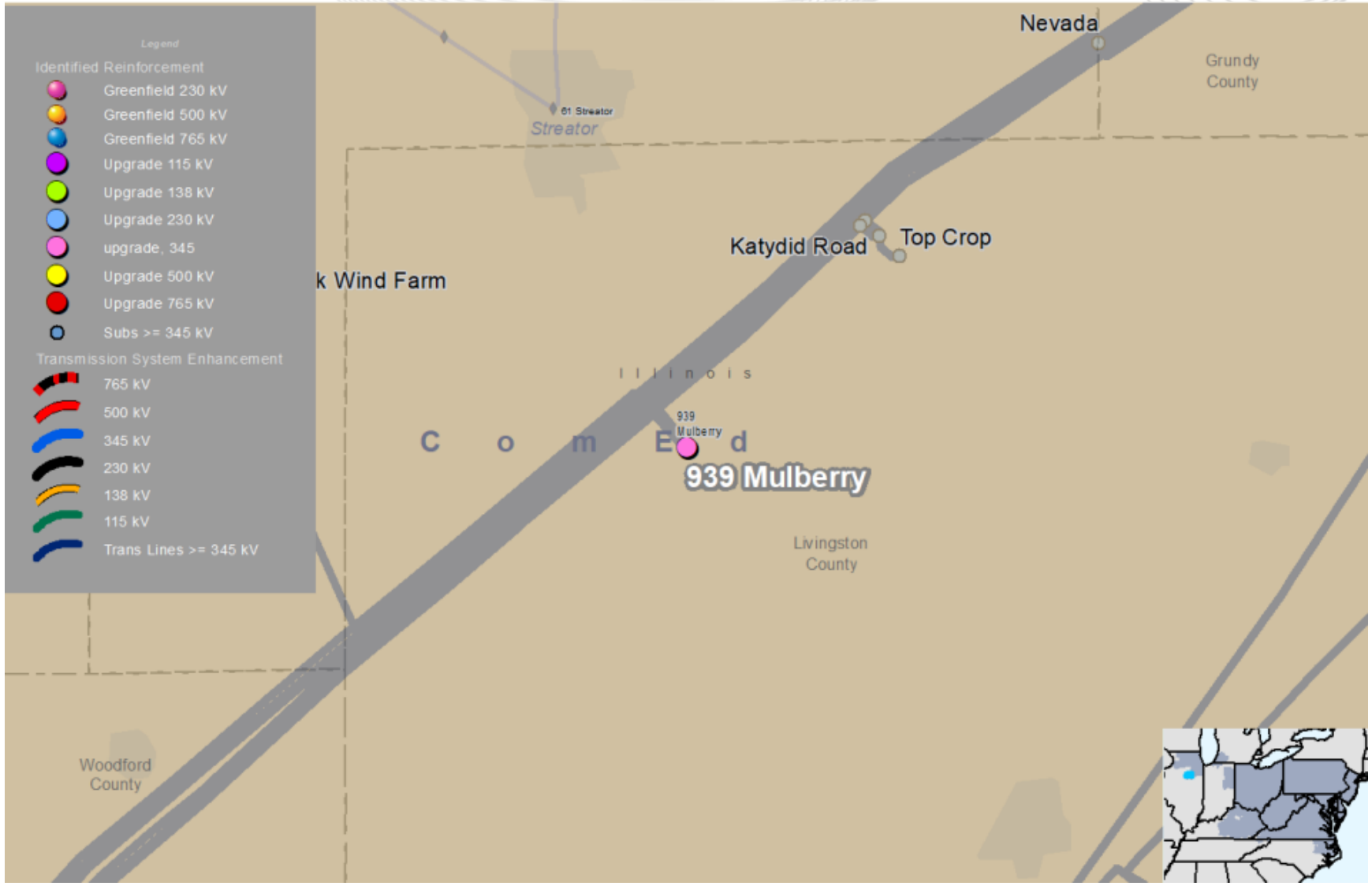
Subs >= 345 kV
Transmission System Enhancement
Utilizing Existing ROW
Greenfield
Upgrade: Rebuild or Reconductor
Trans Lines >= 345 kV
0108
Kickapoo Creek
Grand Ridge
La Salle
Mazon
La Salle County
Grundy County
Nevada
61 Streator
Streator
Katydid Road
Top Crop
Otter Creek Wind Farm
C o m E d
Minonk
I l l i n o i s
939 Mulberry
939 Mulberry
Livingston County
Loretto
Cayuga Ridge
Pontiac Midpoint
Woodford County
Mole Creek
McLean County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115 kV
Trans Lines >= 345 kV
Nevada
Grundy County
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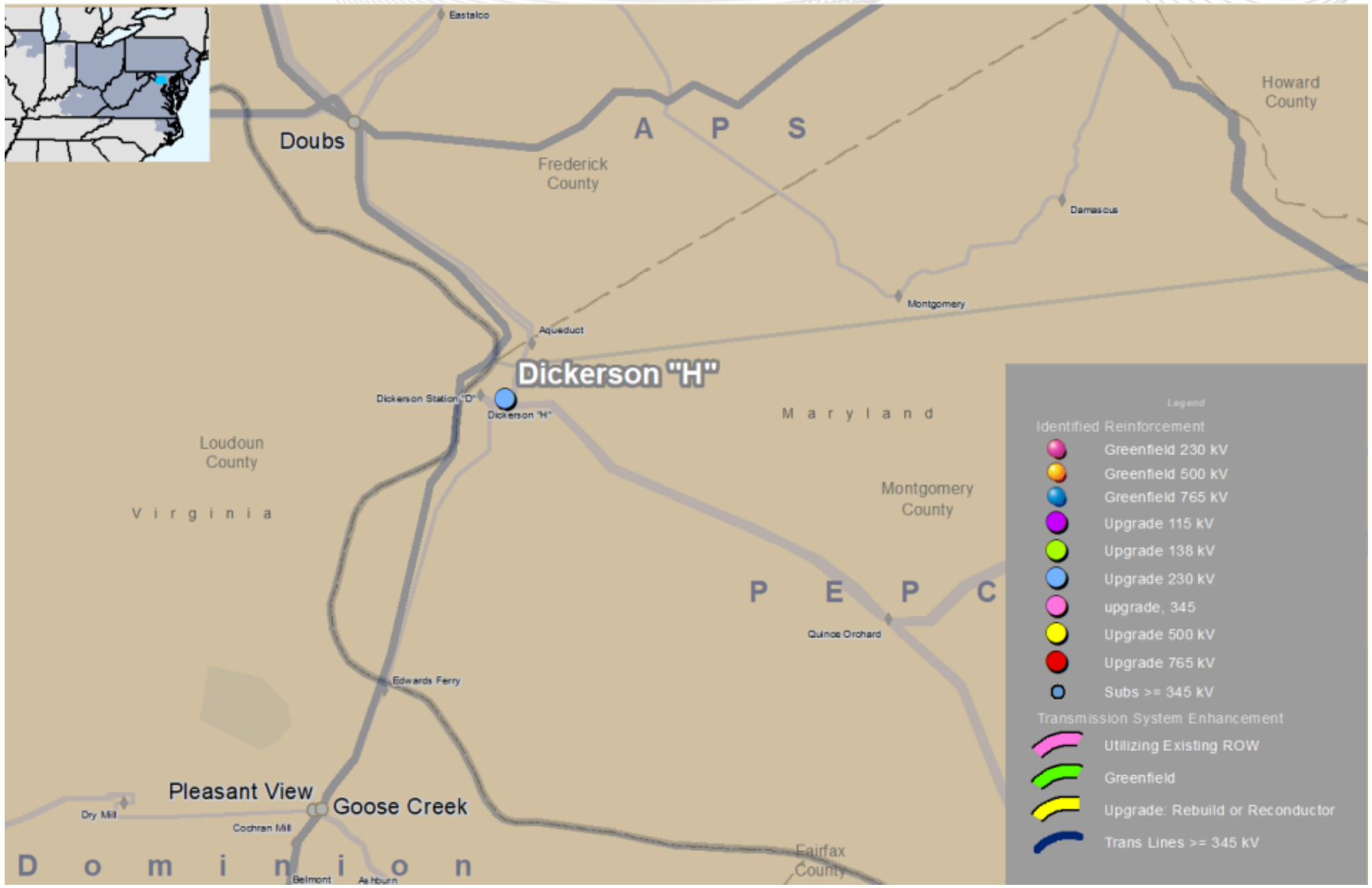
Streator
Katydid Road
Top Crop
k Wind Farm
I l l i n o i s
939 Mulberry
939 Mulberry
Livingston County
Woodford County

PEPCO


Eastalco
Doubs
Frederick County
A P S
Howard County
Damascus
Montgomery
Aqueduct
Dickerson "H"
Dickerson Station "D"
Dickerson "H"
M a r y l a n d
Loudoun County
V i r g i n i a
Montgomery County
P E P C
Quince Orchard
Edwards Ferry
Pleasant View
Goose Creek
Dry Mill
Cochran Mill
D o m i n i o n
Belmont
Ashburn
Fairfax County
Legend
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345 kV
230 kV
138 kV
115 kV
Trans Lines >= 345 kV
Eastalco
Frederick County
Lovettsville
Doubs
A P S
M a r y l a n d
Montgomery
Aqueduct
Dickerson Station "D"
Dickerson "H"
Dickerson "H"
n i o n
Montgomery County
r g i n i a
Loudoun County
P E P C O
Hamilton
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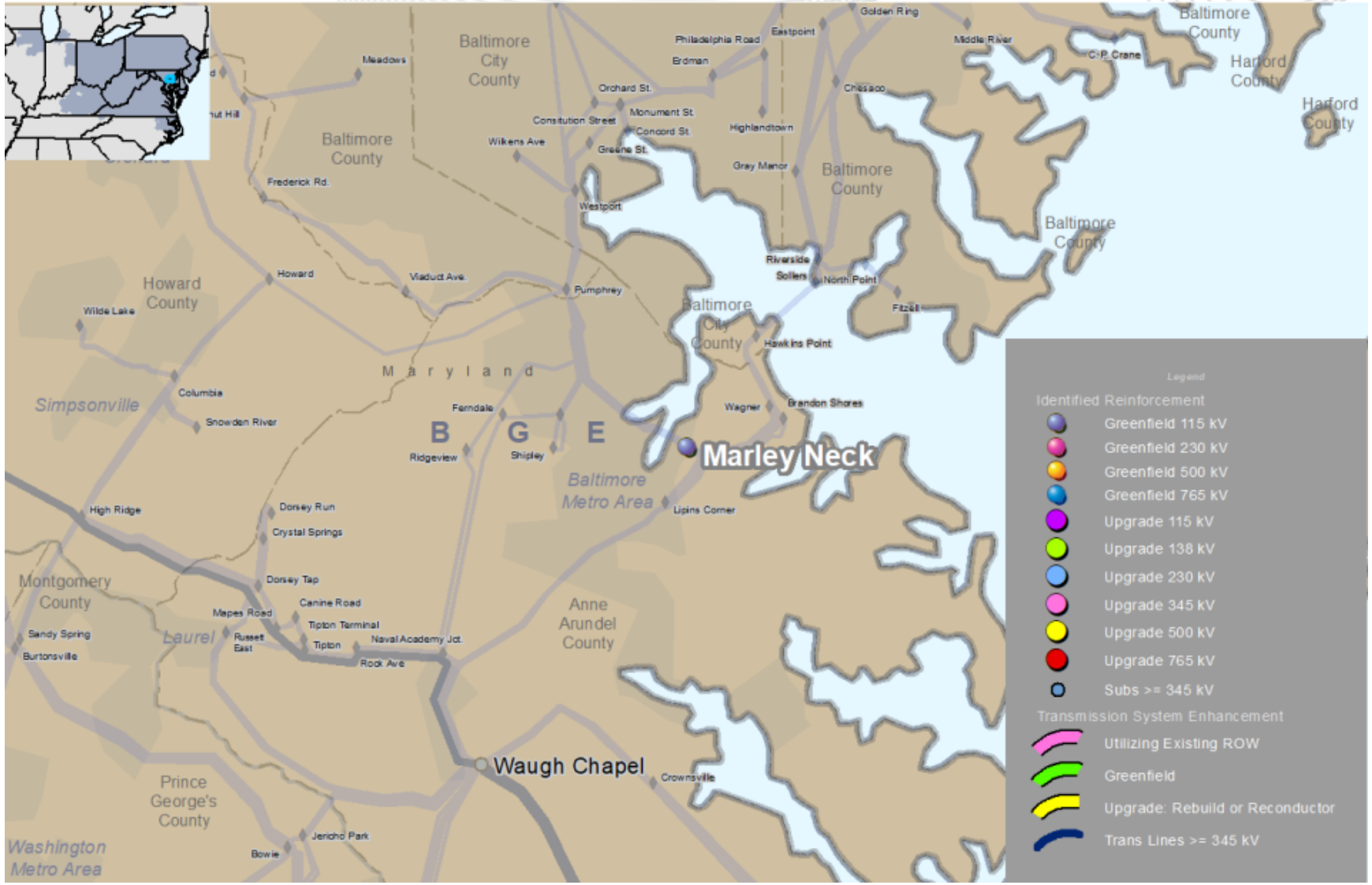
Edwards Ferry
Dry Mill
Pleasant View
Goose Creek



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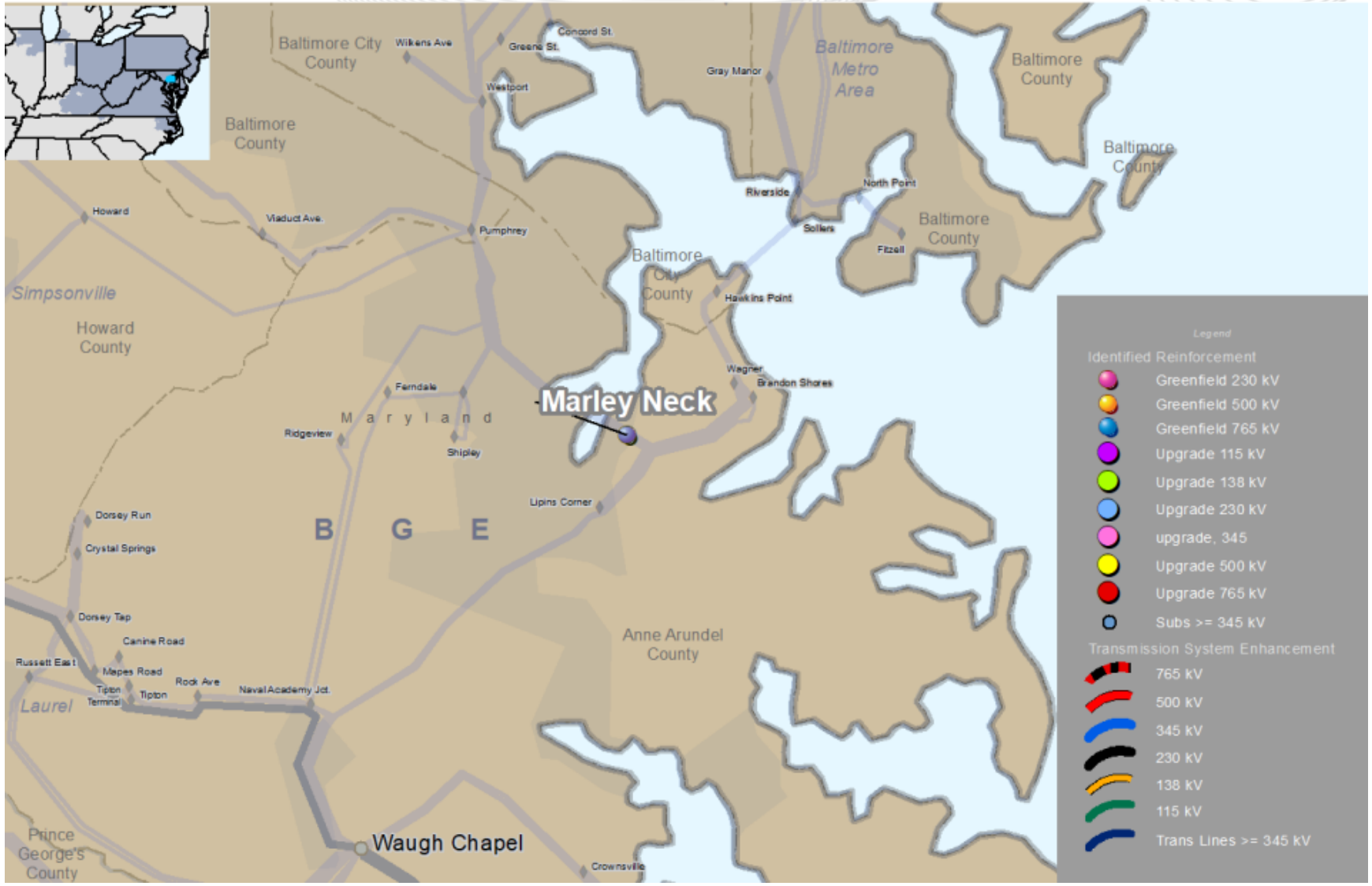

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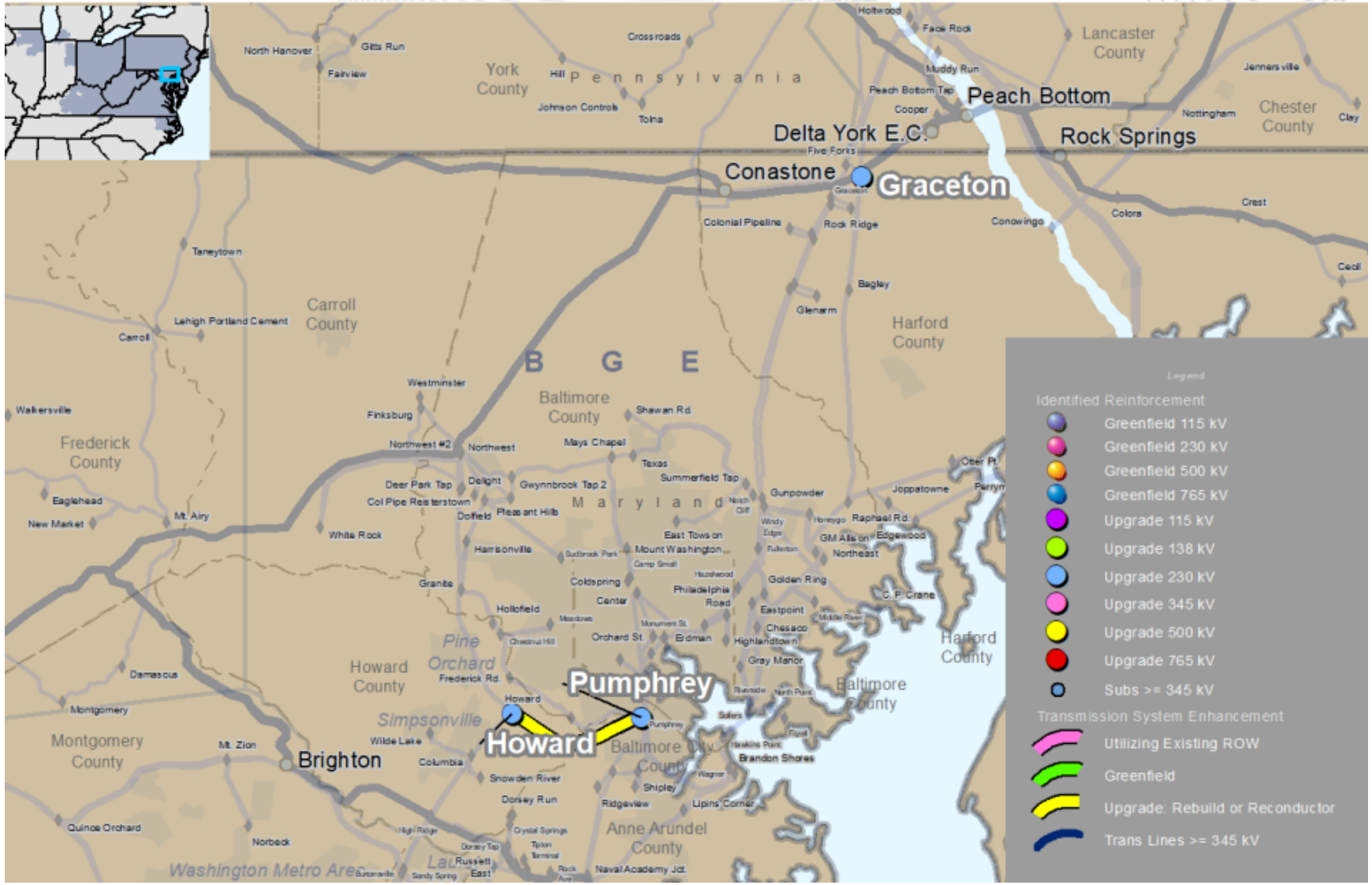

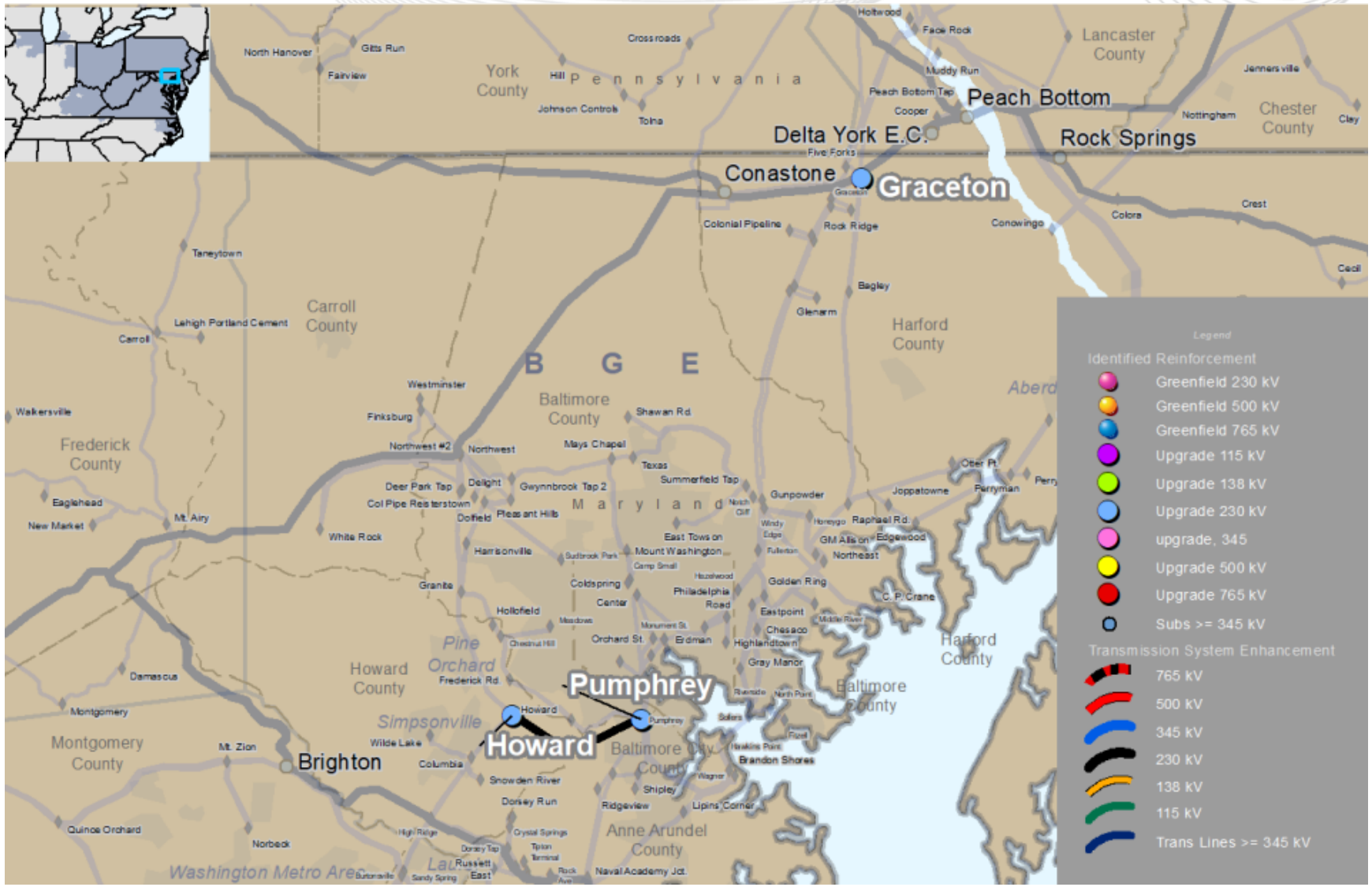

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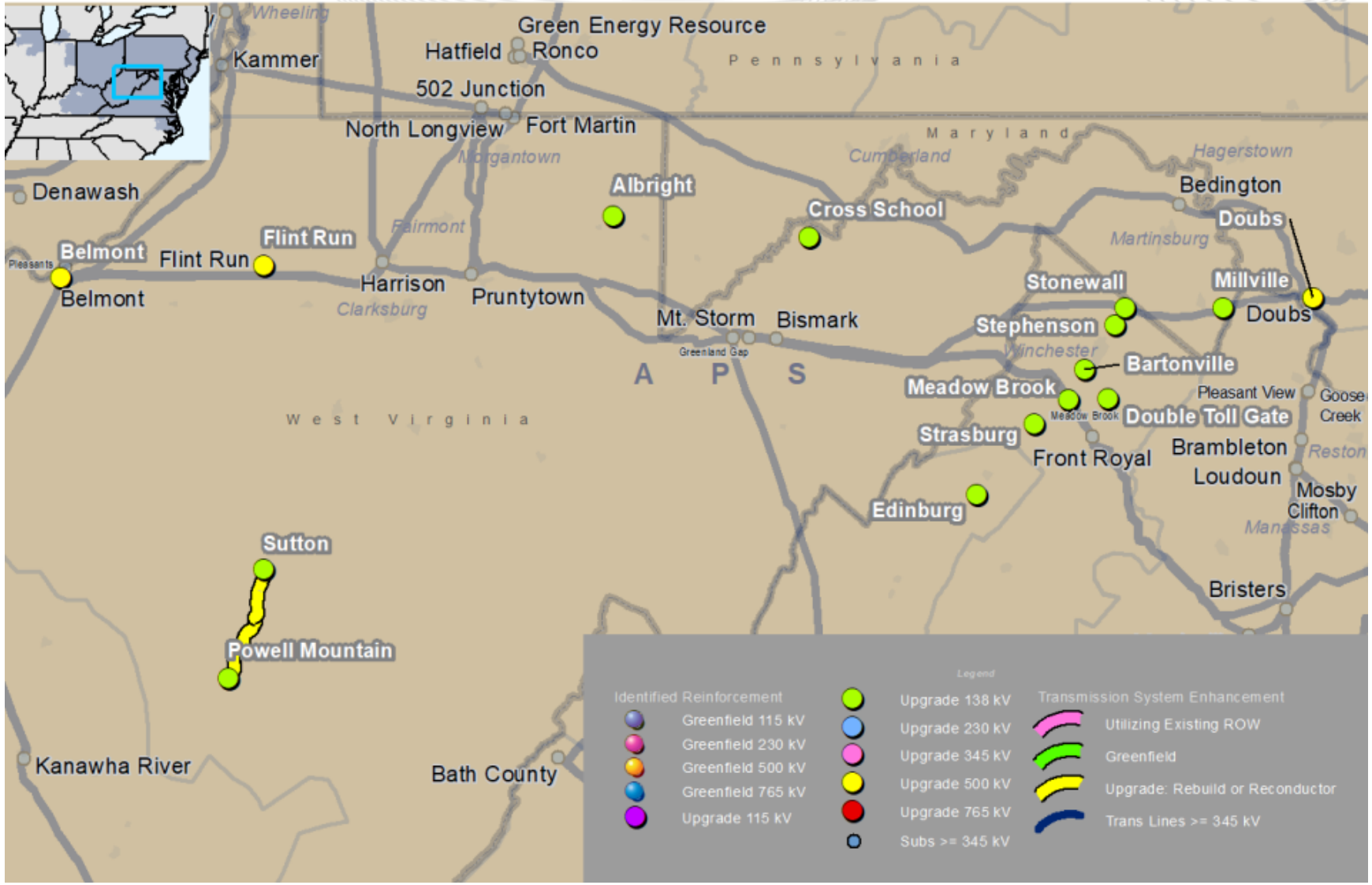

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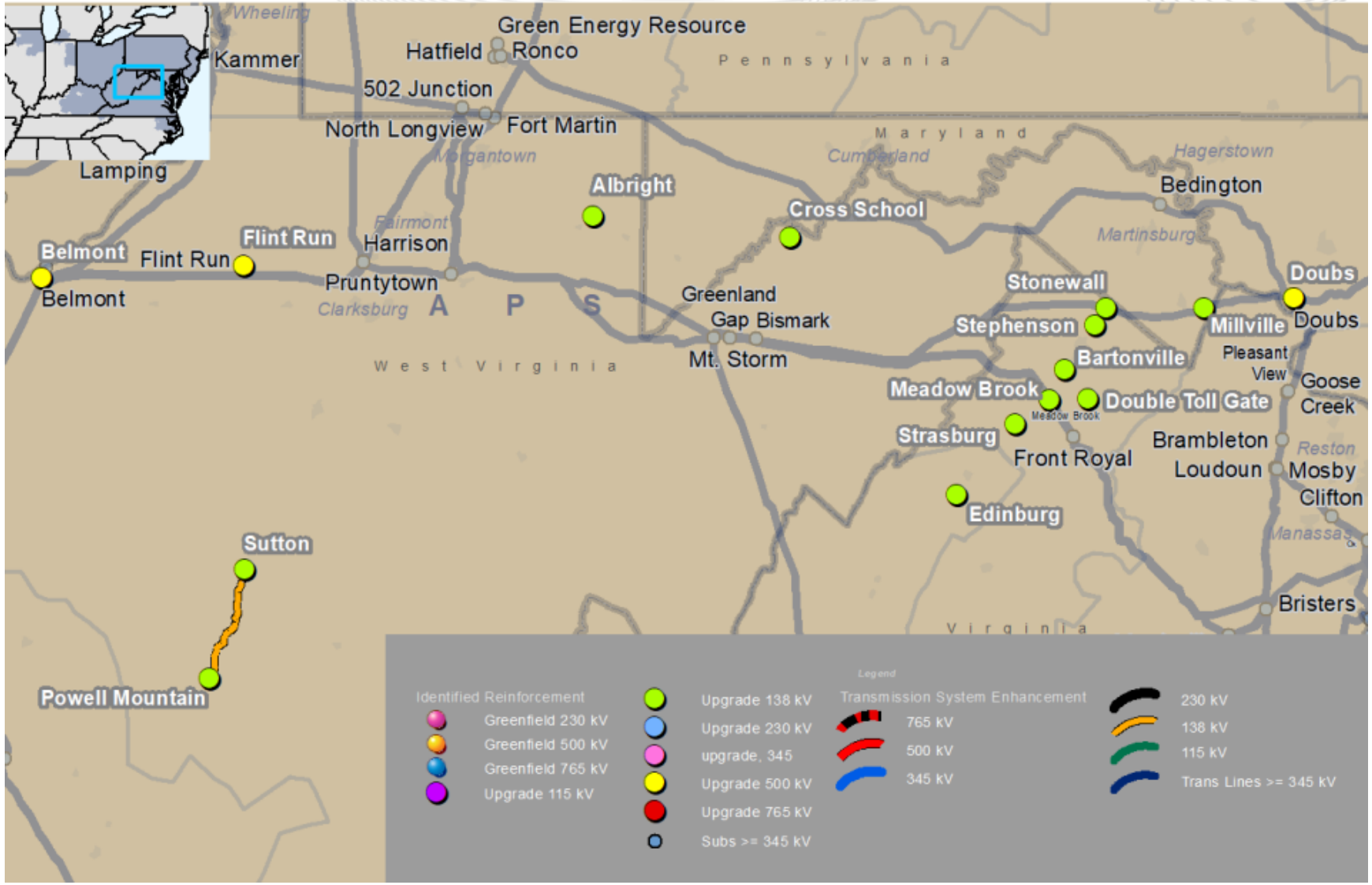

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Questions?

Contact

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Jason.Connell@pjm.com

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Reliability Analysis Update

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(610) 666-8980

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custsvc@pjm.com

Revision History

Version No.	Date	Description
1	11/1/2024	• Original slides posted
2	11/4/2024	• Move slides # 32 and 33 to the short list session, remove slide #21, add slide #55 • Slide #9, Cost correction for proposal 636, from $3.89B to $3.90B • Slide #16, Add legend
3	11/5/2024	• Slide #10, Corrected the proposal numbers • Slide #11, 33, 243, Updated the maps • Slide #16, Updated the bar chart • Slide #49, Minor update on the statement • Slide #33, 35 and 36, Updated the map • Slide # 37, updated cluster number

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