Reliability Analysis Update

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PJM Transmission Planning

Transmission Expansion Advisory Committee
October 31, 2023

2023 Transmission Owners Local Plans

- The 2023 Local Plans for the Transmission Owners listed below, are posted as information only under this TEAC meeting material.
- Board review planned for December 2023.

JCPL
MetEd
PECO
Penelec
PEPCO
PPL
PSEG
Dayton
DEOK
AEP

ACE
AMPT
APS
ATSI
BGE
ComEd
DLCO
DPL
EKPC
Dominion

First Read – 2023 Window 1

Baseline Reliability Projects

AEP Transmission Zone: Baseline
Olive 345kV Breaker "D" Replacement

Process Stage: First Read

Criteria: Short Circuit

Assumption Reference: 2023 RTEP assumptions

Model Used for Analysis: 2028 RTEP Short Circuit base case

Proposal Window Exclusion: None

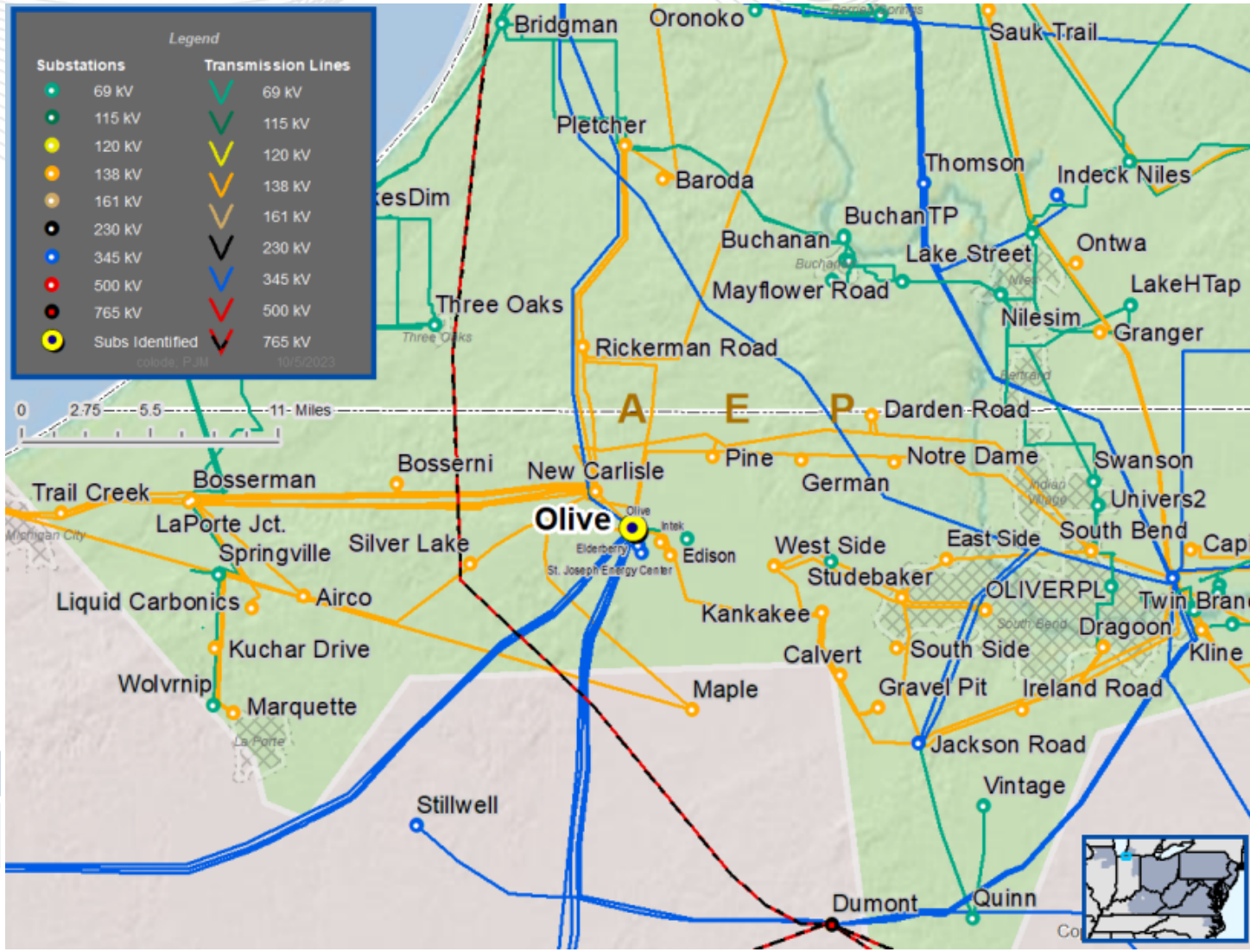
Problem Statement:

2023W1-SC-4

In the 2028 RTEP Short Circuit base case, the Olive 345 kV breaker "D" is identified as over duty.

Existing Facility Rating:

Circuit Breaker	Interrupting Rating (kA)
Olive 345kV breaker "D"	50



AEP Transmission Zone: Baseline Olive 345kV Breaker “D” Replacement

As part of the 2023 RTEP Window #1, the project listed in the table below is proposed to address the following violations: 2023W1-SC-4

Proposal ID	Proposing Entity	Upgrade Description	Upgrade Cost ($M)
384	AEP	Replace the overdutied Olive 345kV circuit breaker "D" with a 5000A 63 kA circuit breaker.	1.083

AEP Transmission Zone: Baseline
Olive 345kV Breaker "D" Replacement

Proposed Solution: Proposal #2023_W1-384

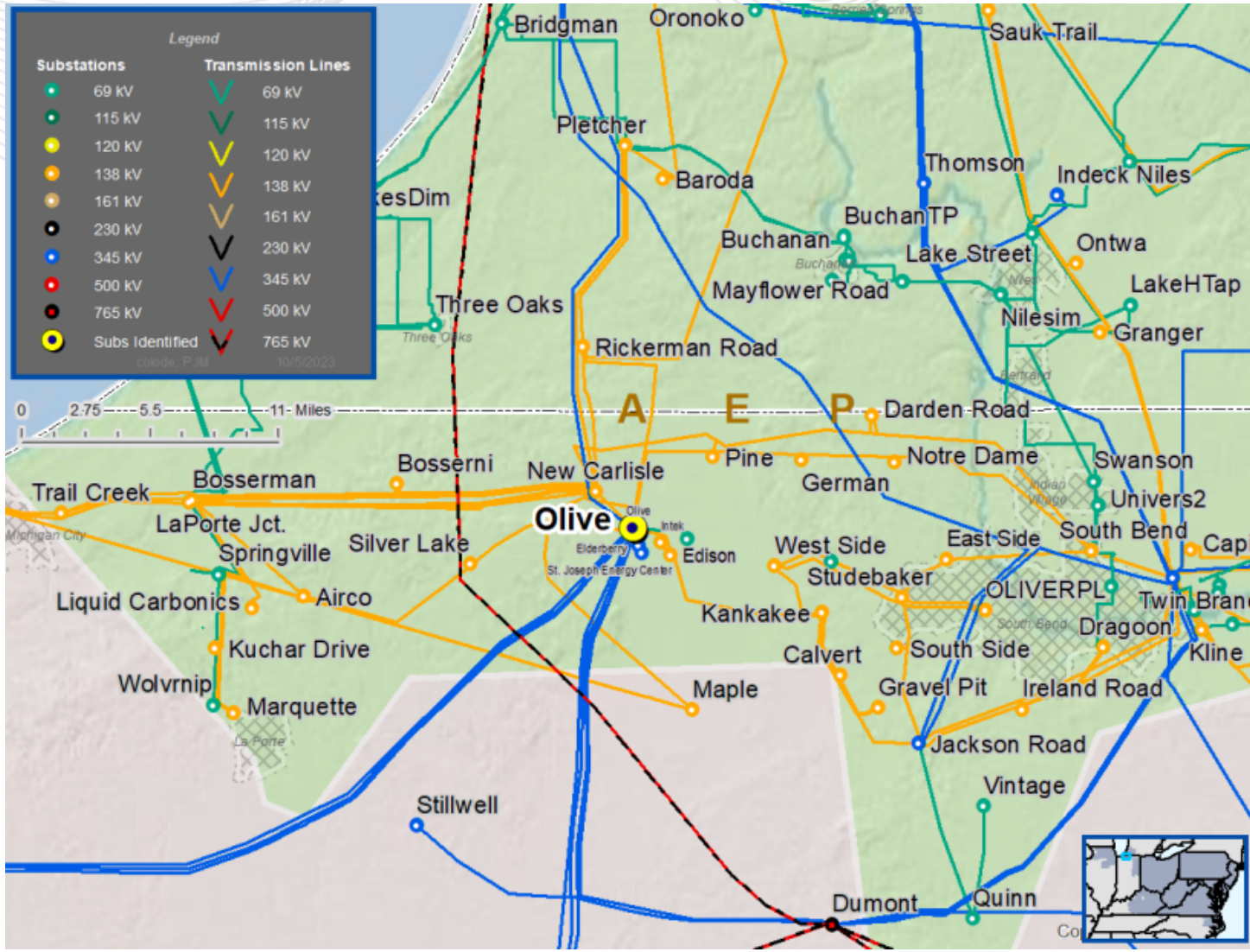
1) Replace the overdutied Olive 345kV circuit breaker "D" with a 5000A 63 kA circuit breaker.
2) Re-use existing cables and a splice box to support the CB install.

Estimated Cost: $1.083M

Preliminary Facility Rating:

Circuit Breaker	Interrupting Rating (kA)
Olive 345kV breaker "D"	63

Required IS Date: 6/1/2028
Projected IS Date: 9/1/2027



AEP Transmission Zone: Baseline Mountaineer 765 kV Wavetrap Replacement

Process Stage: First Read

Criteria: Summer Gen Deliv

Assumption Reference: 2023 RTEP assumption

Model Used for Analysis: 2028 RTEP cases

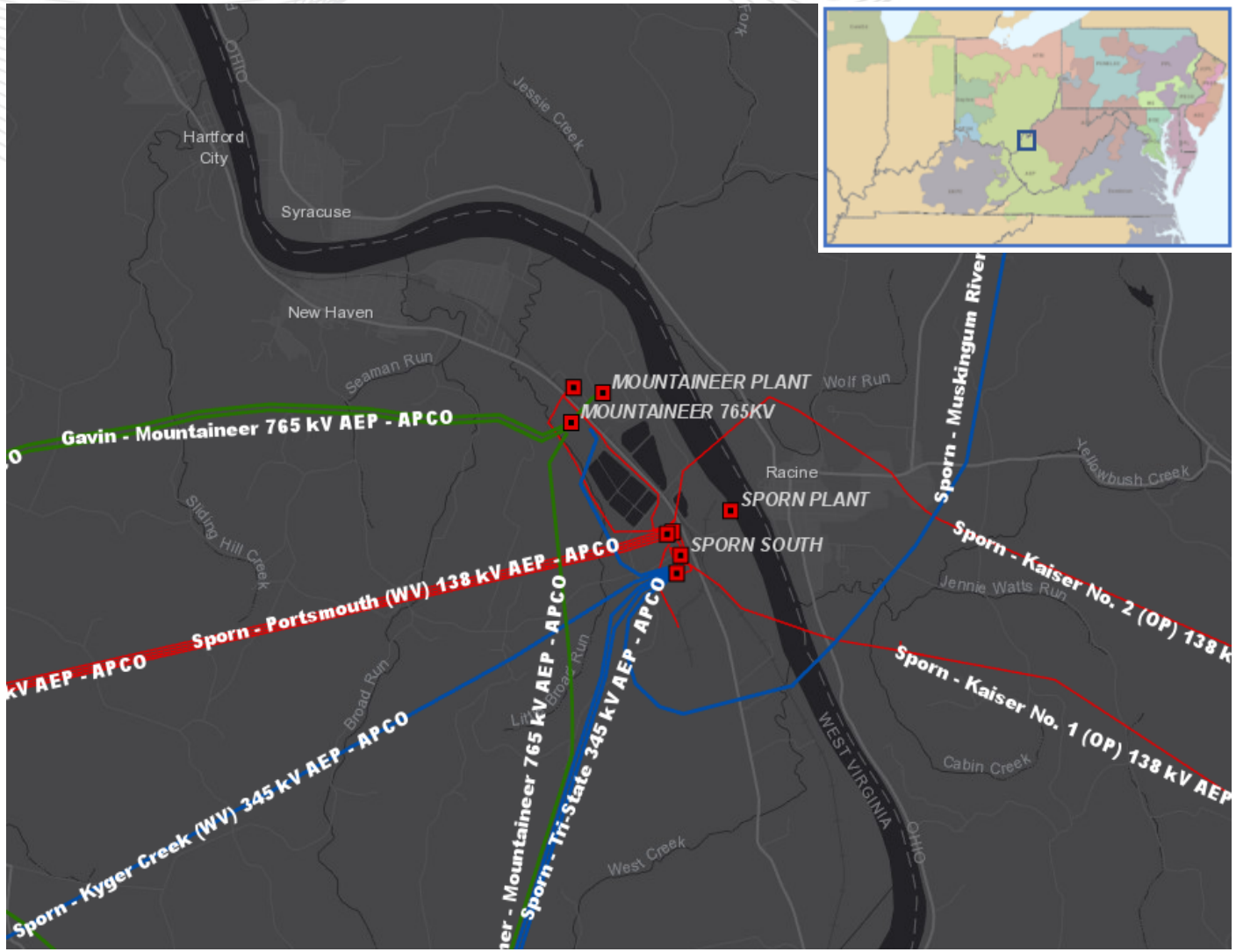
Proposal Window Exclusion: Substation Equipment Exclusion

Problem Statement: FG: 2023-W1-GD-S1286, 2023-W1-GD-S595, 2023-W1-GD-S671, 2023-W1-GD-S726, 2023-W1-GD-S820, 2023-W1-GD-S834

In 2028 RTEP Summer case, the Belmont - Mountaineer-765 kV is overloaded in generator deliverability test for multiple common mode contingencies.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Mountaineer - Belmont 765kV line	4047/4571/4484/4961



AEP Transmission Zone: Baseline Mountaineer 765 kV Wavetrap Replacement

Proposed Solution: Replace existing 3000 A wavetrap at Mountaineer 765 kV, on the Belmont - Mountaineer 765 kV line, with a new 5000 A wavetrap.

Estimated Cost: $0.46M

Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Mountaineer - Belmont 765kV line (Existing)	4047/4571/4484/4961
Mountaineer - Belmont (765) (Post Upgrade)	4558/5523/5992/6845

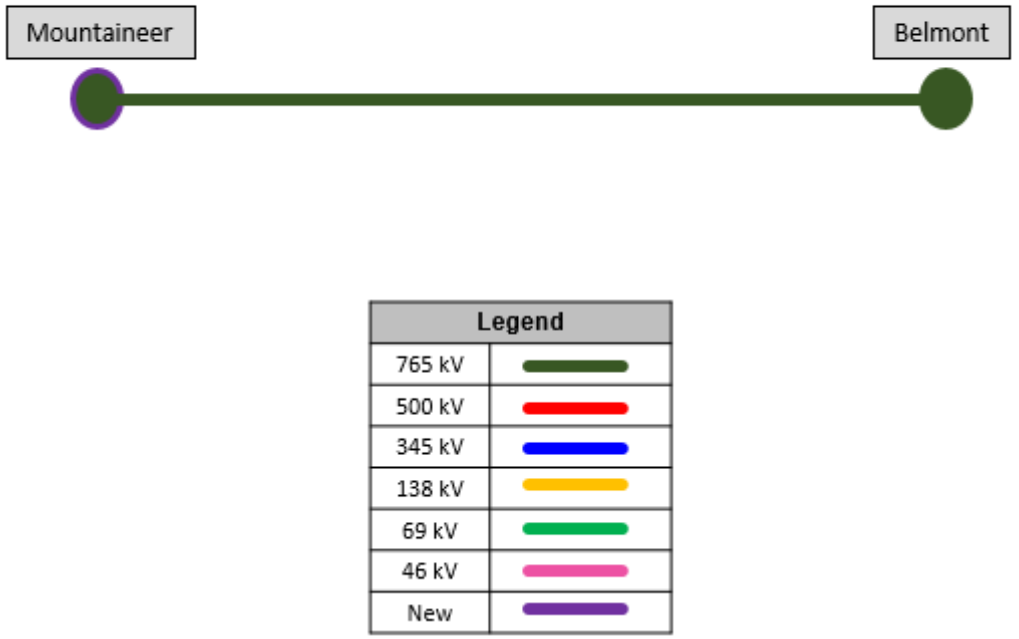
Alternatives: A fiber path for relaying between Mountaineer and Kammer may be possible to allow for retirement of the wavetrap instead of replacing. However, roughly 120 miles of fiber path would need to be installed based on a preliminary engineering look for a much higher cost. Therefore, this option was not pursued. Cost: $120M

Ancillary Benefits: N/A

Required IS Date: 6/1/2028

Projected IS Date: 6/1/2028

Proposed:



AEP & OVEC Transmission Zone: Baseline Kyger Creek Station Equipment Replacement

Process Stage: First Read

Criteria: Summer Gen Deliv

Assumption Reference: 2023 RTEP assumption

Model Used for Analysis: 2028 RTEP cases

Proposal Window Exclusion: Substation Equipment Exclusion

Problem Statement: FG: 2023-W1-GD-S582, 2023-W1-GD-S584, 2023-W1-GD-S590, 2023-W1-GD-S646, 2023-W1-GD-S650

In 2028 RTEP Summer case, the Kyger Creek-Sporn 345 kV line is overloaded under gen deliv analysis for multiple common mode contingencies.

Existing Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Kyger Creek - Sporn (345)	1025/1204/1298/1512

AEP & OVEC Transmission Zone: Baseline
Kyger Creek Station Equipment Replacement

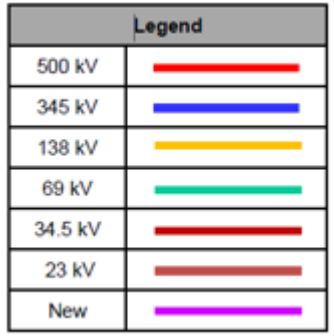
Proposed Solution:
Replace AEP owned station takeoff riser and breaker BB risers at OVEC owned Kyger Creek station. **Estimated Cost: 0.41M**
Replace OVEC owned breaker AA risers, bus work, and breaker AA disconnect switches at OVEC owned Kyger Creek station.
Estimated Cost: 0.75M
Total Estimated Cost: $1.16 M

Preliminary Facility Rating:

Branch	SN/SE/WN/WE (MVA)
Kyger Creek - Sporn 345kV line	1189/1540/1507/1778

Alternatives: N/A
Ancillary Benefits: N/A
Required IS Date: 6/1/2028
Projected IS Date: 6/1/2028

Existing:



Proposed:

DPL Transmission Zone: Baseline

Process Stage: First Review

Criteria: Summer Generation Deliverability

Assumption Reference: 2028 RTEP assumption

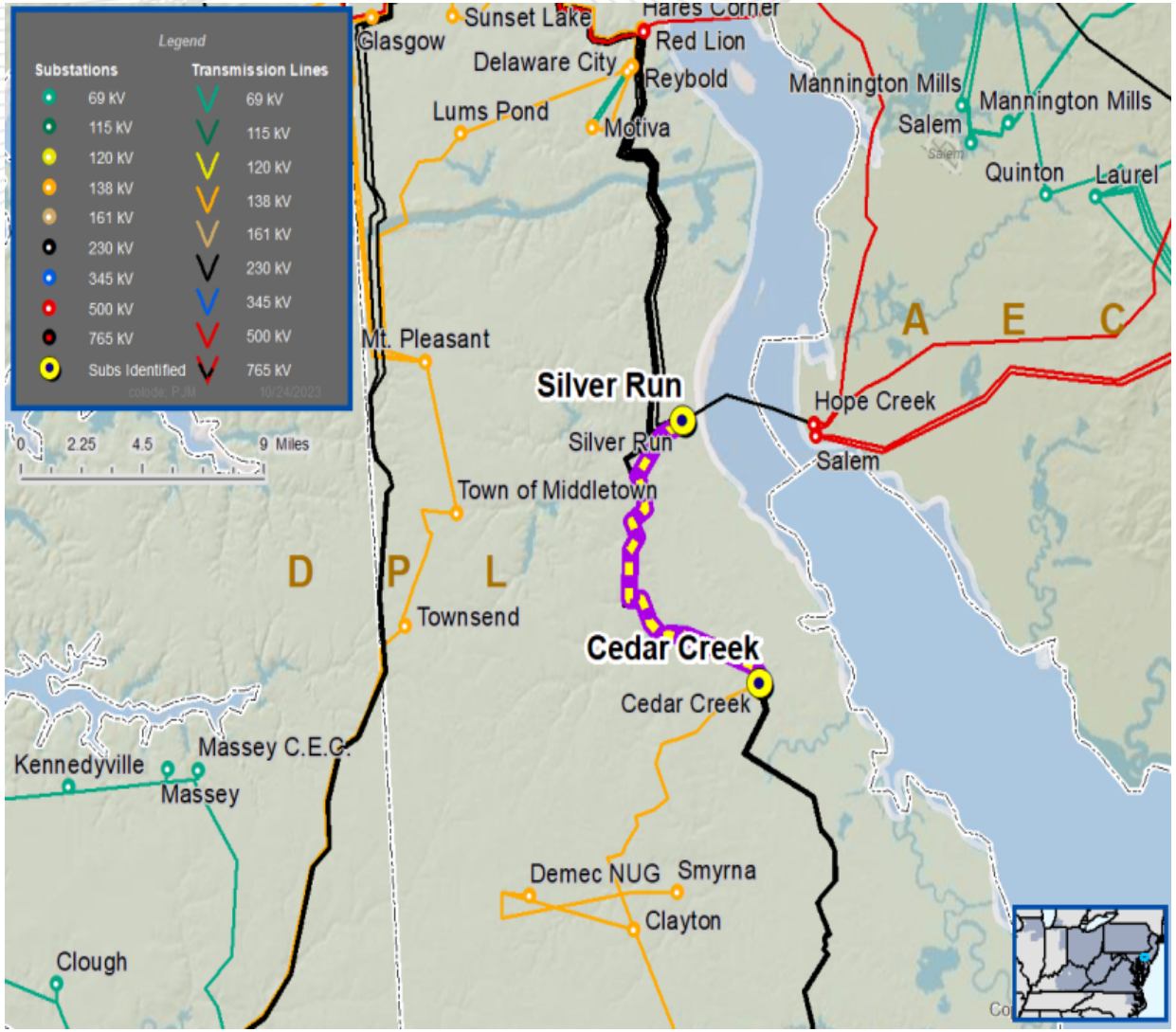
Model Used for Analysis: 2028 RTEP Summer case

Proposal Window Exclusion: No

Problem Statement: The Silver Run – Cedar Creek 230 kV circuit overloaded for several contingencies

Violations were posted as part of the 2023 Window 1: FG#s

2023W1-IPD-S1	2023W1-IPD-S5	2023W1-IPD-S9	2023W1-IPD-S13	2023W1-IPD-S17	2023W1-IPD-S27
2023W1-IPD-S2	2023W1-IPD-S6	2023W1-IPD-S10	2023W1-IPD-S14	2023W1-IPD-S18	2023W1-IPD-S28
2023W1-IPD-S3	2023W1-IPD-S7	2023W1-IPD-S11	2023W1-IPD-S15	2023W1-IPD-S19	2023W1-IPD-S29
2023W1-IPD-S4	2023W1-IPD-S8	2023W1-IPD-S12	2023W1-IPD-S16	2023W1-IPD-S26	



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DPL Transmission Zone: Baseline

Proposed Solution: Proposal #2023-W1-573

- Reconductor Silver Run - Cedar Creek 230kV line. Upgrade bushing, disconnect, stranded bus, and rigid bus at Cedar Creek substation. Upgrade 1590 ACSR "Lapwing" jumper and disconnect at Silver Run substation
- **Silver Run** – Replace three (3) standalone CTs, disconnect switch, stranded bus, and rigid bus to achieve higher rating.
- **Silver Run -** Replace three(3) 1-1590 ACSR Jumpers and one(1) air disconnect switch.

Existing Facility Rating: 653SN/808SE, 753WN/911WE MVA

Proposed Facility Rating: 996SN/1146SE , 1060WN/1209WE MVA

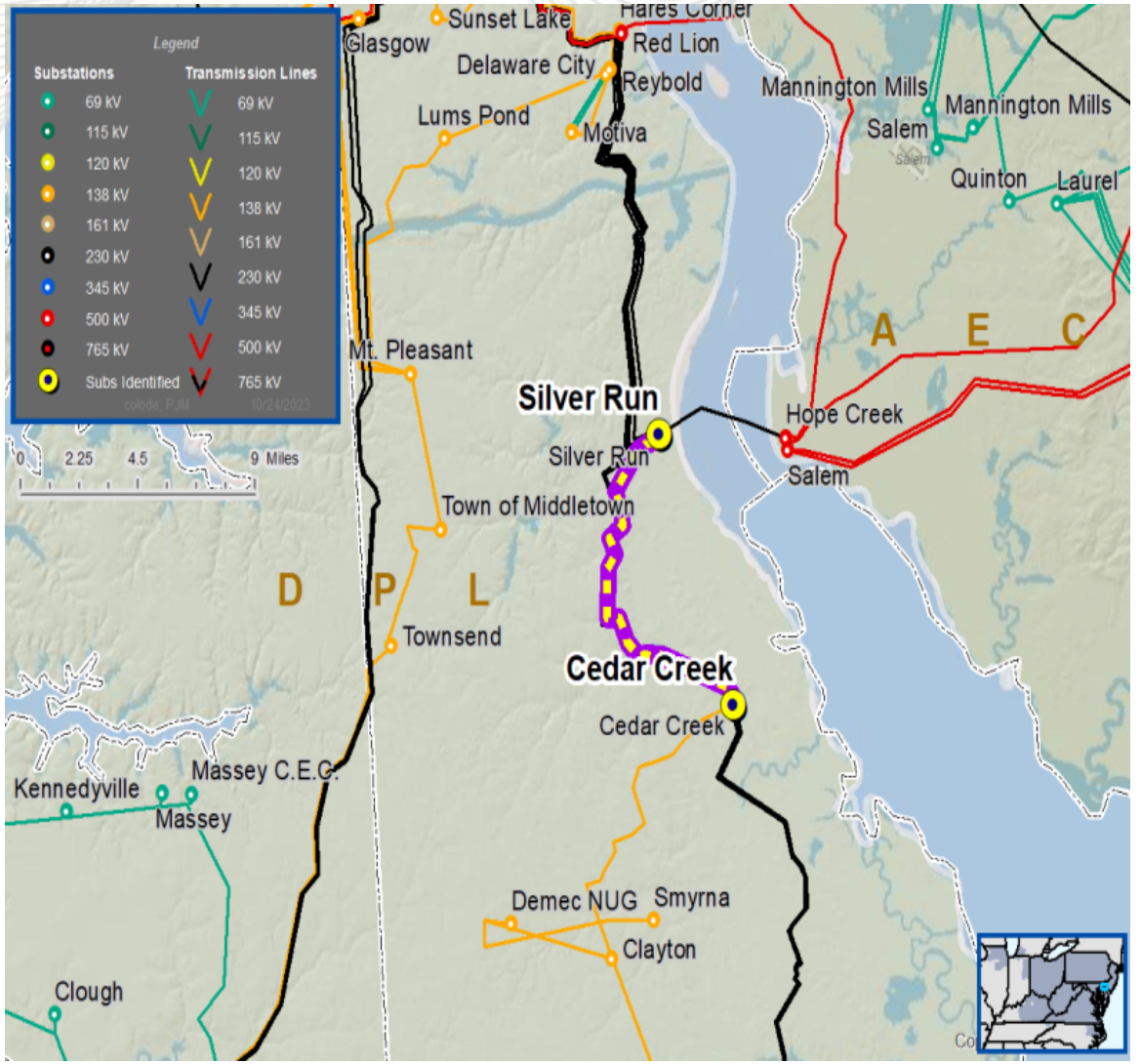
Estimated Cost: $8.7 M

Alternatives

- None

Required In-Service: 6/1/2028

Projected In-Service: 6/1/2028



PECO Transmission Zone: Baseline

Process Stage: First Review

Criteria: Summer Generation Deliverability

Assumption Reference: 2028 RTEP assumption

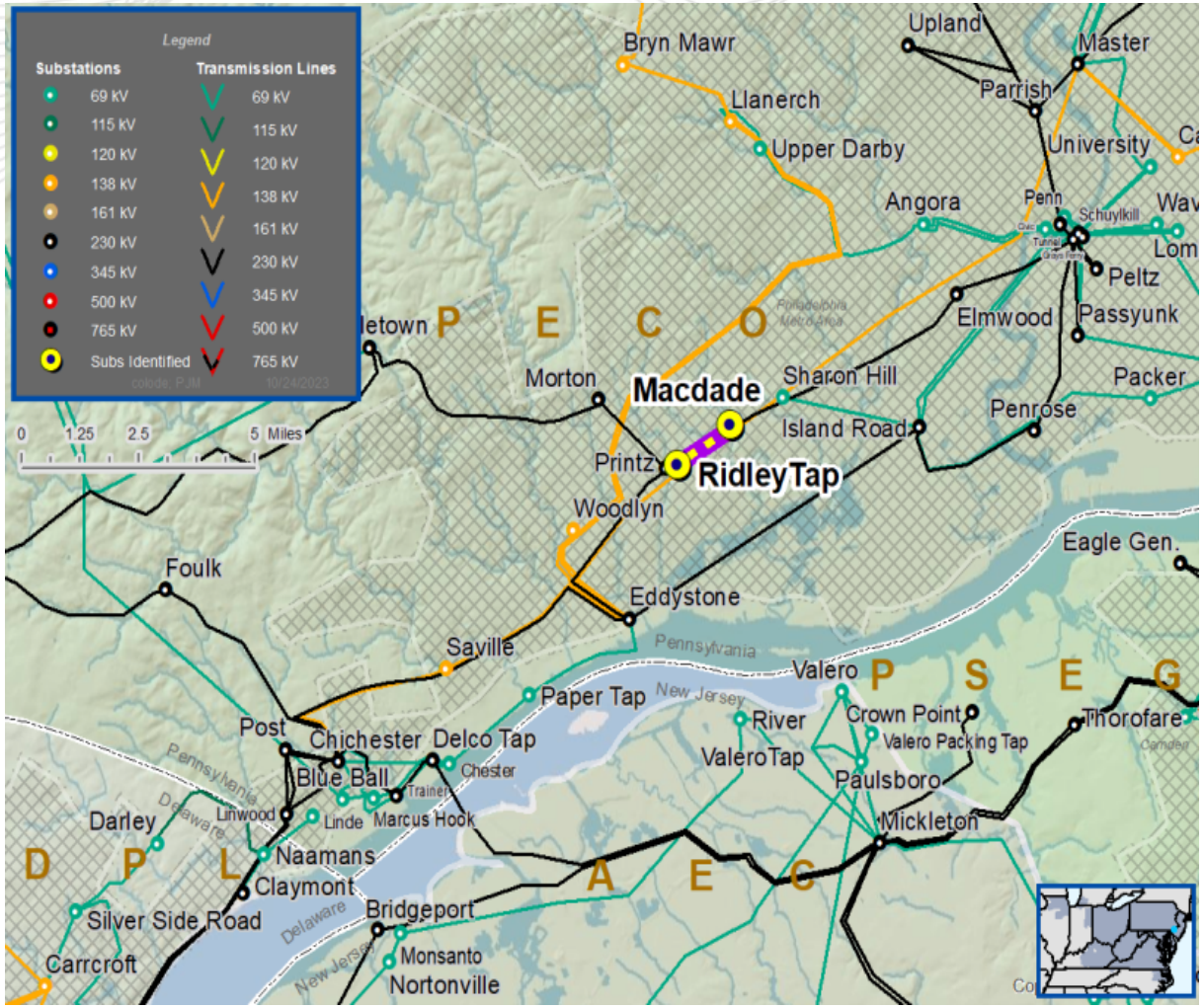
Model Used for Analysis: 2028 RTEP Summer case

Proposal Window Exclusion: Substation equipment Exclusion

Problem Statement: The Ridley – Macdade 230 kV circuit overloaded for several contingencies

Violations were posted as part of the 2023 Window 1: FG#s

2023W1-GD-S108	2023W1-GD-S1267	2023W1-GD-S1276
2023W1-GD-S693	2023W1-GD-S1397	2023W1-GD-S833
2023W1-GD-S704	2023W1-GD-S134	2023W1-GD-S845
2023W1-GD-S705		



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PECO Transmission Zone: Baseline

Proposed Solution:

- Replace relays at Macdade, Printz, and Morton 230 kV station to increase rating limits of transmission. Line protection relays will be upgraded with latest standard relays used across the PECO system

Existing Facility Rating: 927SN/927SE, 927WN/927WE MVA

Proposed Facility Rating: 1079SN/1260SE, 1301WN/1455WE MVA

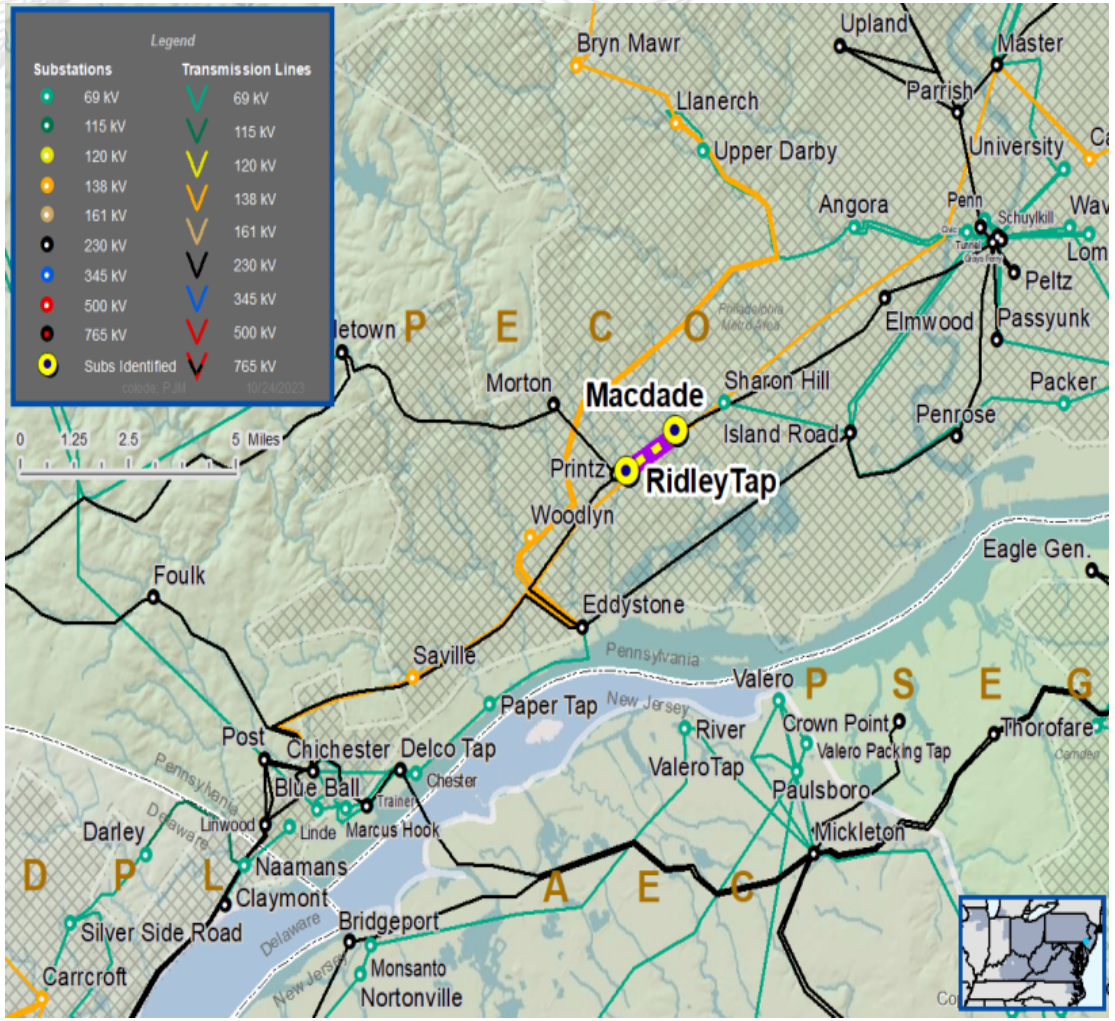
Estimated Cost: $1.4 M

Alternatives

- None

Required In-Service: 6/1/2028

Projected In-Service: 6/1/2028



PSEG Transmission Zone: Baseline

Process Stage: First Review

Criteria: Light Load Baseline Voltage

Assumption Reference: 2028 RTEP assumption

Model Used for Analysis: 2028 RTEP Summer case

Proposal Window Exclusion: No

Problem Statement: High voltage issue on multiple stations around Waldwick vicinity for several contingencies.

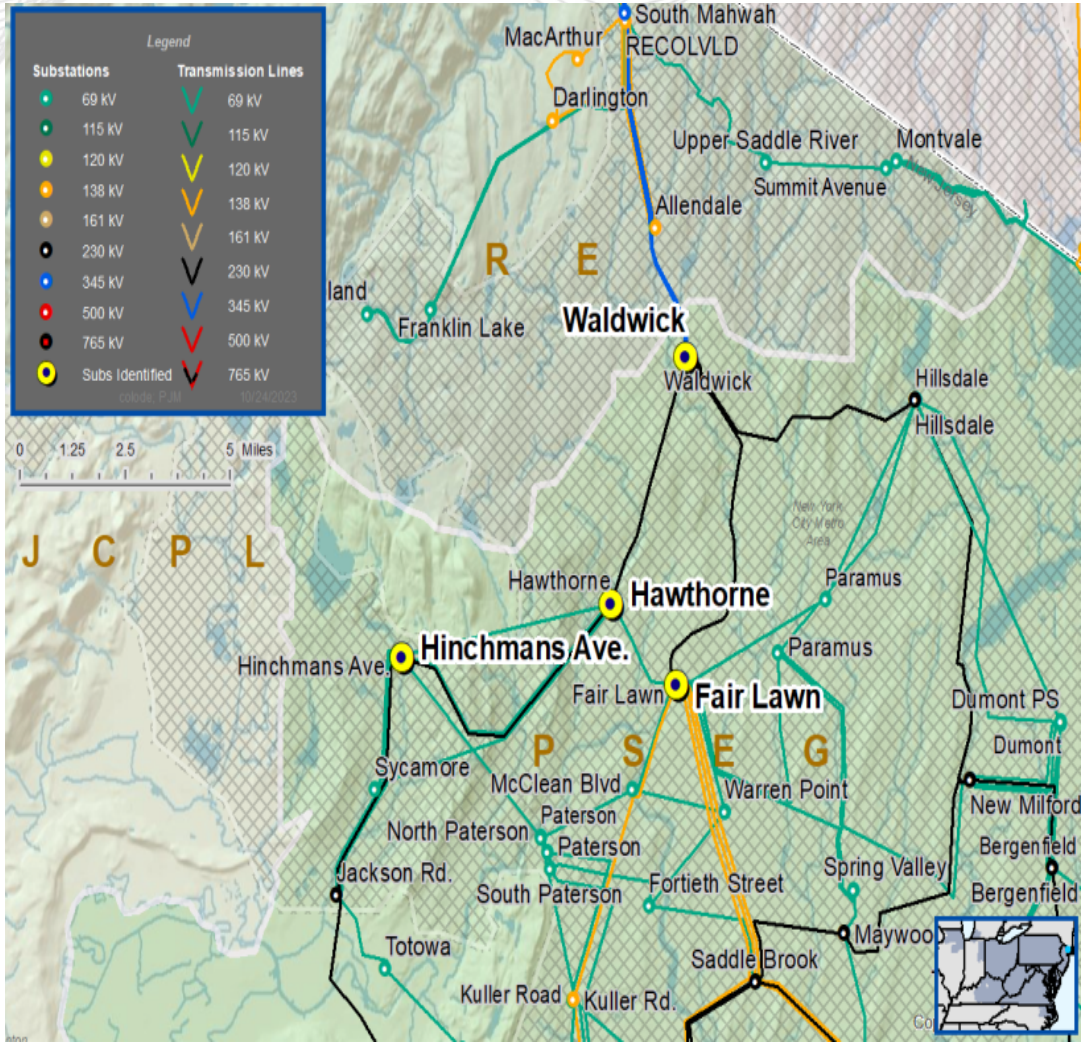
Violations were posted as part of the 2023 Window 1: FG#s

2023W1-N1-LLVM13	2023W1-N1-LLVM17	2023W1-N1-LLVM21	2023W1-N1-LLVM25	2023W1-N1-LLVM29	2023W1-N1-LLVM33
2023W1-N1-LLVM14	2023W1-N1-LLVM18	2023W1-N1-LLVM22	2023W1-N1-LLVM26	2023W1-N1-LLVM30	2023W1-N1-LLVM34
2023W1-N1-LLVM15	2023W1-N1-LLVM19	2023W1-N1-LLVM23	2023W1-N1-LLVM27	2023W1-N1-LLVM31	2023W1-N1-LLVM35
2023W1-N1-LLVM16	2023W1-N1-LLVM20	2023W1-N1-LLVM24	2023W1-N1-LLVM28	2023W1-N1-LLVM32	2023W1-N1-LLVM36
2023W1-N1-LLVM37	2023W1-N1-LLVM38				

Proposed Solution:
Replace existing 230kV 50MVAR fixed shunt reactor with a 230kV 150MVAR variable shunt reactor.
Replace existing 345kV 100MVAR fixed shunt reactor with a 345kV 150MVAR variable shunt reactor.
Estimated Cost: $29.6 M

Alternatives
- None

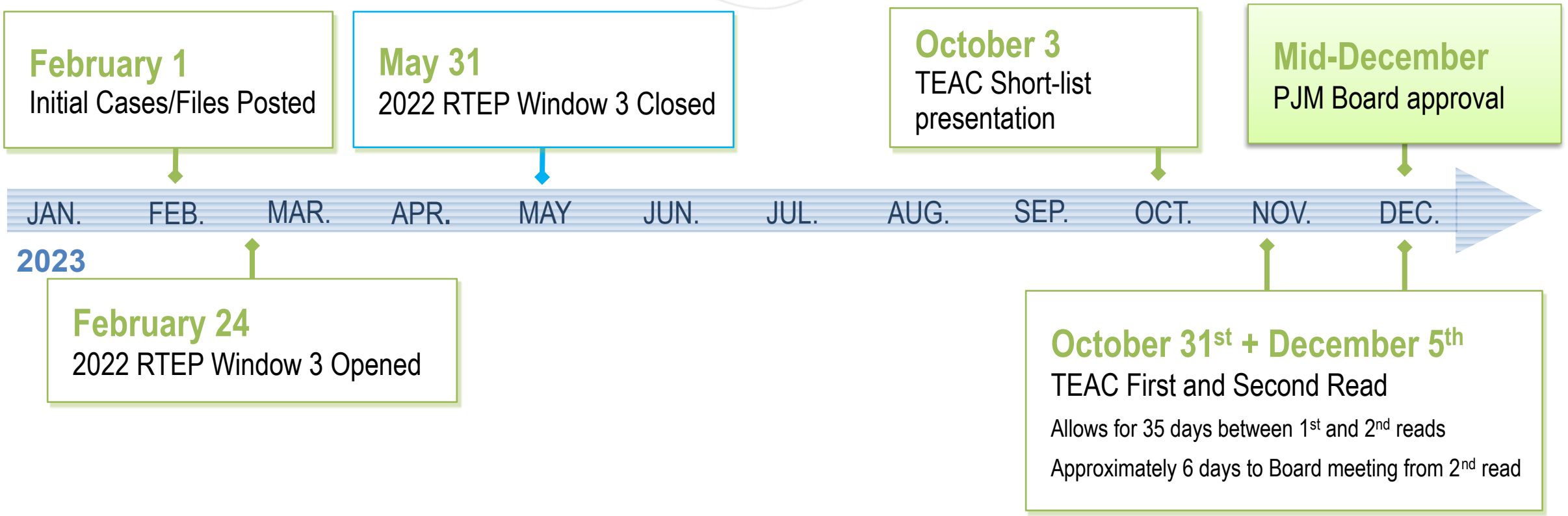
Required In-Service: 6/1/2028
Projected In-service: 6/1/2028



First Read – 2022 Window 3

Baseline Reliability Projects

2022 RTEP Window 3 - Timeline



2022 RTEP Window 3 – Objective & Evaluation

- Develop robust, holistic and expandable solutions that address the 2027-28 baseline violations associated with:
  - Local constraints: resulting from directly serving data center loads in APS / Dominion
  - Regional constraints resulting from imports into load center areas (500 kV primarily):
  - Needed reactive power VAR reinforcements, both static and dynamic as necessary.
  - Address reliability impacts due to the deactivation of 11GWs of generation.
- Adhere to all applicable planning criteria, including PJM, NERC, SERC, RFC and Local Transmission Owner Criteria.
- Evaluation on both 2027 and 2028 RTEP cases
  - Generation deliverability analysis
  - Load deliverability analysis
  - N-1-1 analysis
  - Baseline contingency analysis
  - Short circuit analysis
  - Dynamic analysis
  - Critical Substation Planning Analysis-CSPA

2022 RTEP Window 3 - Requirements

- Holistic solutions are to be designed such that they are robust and expandable as the load grows within the area.

- A scalable solution ensures, at a minimum, near-term reliability needs are addressed while also enabling future expansion (beyond the 2027-28 baseline levels).

  - Consider flexibility, robustness and scalability of 2027-28-baseline solutions against the Interim 2027-28 Summer, Winter and Light Load basecases.
  - Evaluate proposals for their effectiveness towards existing reactive interfaces in the area, particularly those supporting the Dominion and APS zones.
  - Evaluate the effectiveness of the proposed solutions towards the transmission system load deliverability into the Dominion and APS zones (CETL).

Two Rounds of PJM Meetings With Proposing Entities:

- Discussions to clarify details of proposed developments, assumptions, rationale of proposed alternatives/variations
- First round was conducted in June/July 2023.
- Second round was initiated in late July and concluded mid-August:
  - Focus on outage scheduling, routing, risk and cost assumptions/considerations

Scenario Development and Analysis

To date, PJM developed and analyzed:

- >30 scenarios for the 2027 model (Combination of proposals and components from different proposals)
- >80 scenarios for the 2028 model

Scenarios Were Built Based On:

- Full combination scenarios by proposing entities (Incumbents, Nextera, LS Power and Transource)
- Optimized scenarios using components from incumbent and non-incumbent proposing entities

2022W3 – Window Evaluation Criteria

Scenarios With Their Associated Proposed Developments Will Be Evaluated Based On the Following Principles:

Performance	Scalability	Impact	Validated Cost
Meeting the system needs of 2027 and being flexible to address 2028 needs	Scenario/development longevity – system robustness and utilization	Utilization of existing ROWs where possible and efficient.	Cost evaluation using third-party benchmarking metrics

Risks

- Triggering additional costs:
  - Substation rebuilds due to extreme short-circuit levels
  - Avoid extended critical outages (Peach Bottom / Conastone rebuilds)
- Imposing high permitting
- Inability to meeting in-service date

Efficiencies

- Avoidance of redundant capital investment including recognizing synergies with EOL facilities and overlaps of previously approved (or imminent) supplemental/baseline upgrades.

Brandon Shores Deactivation Assumptions

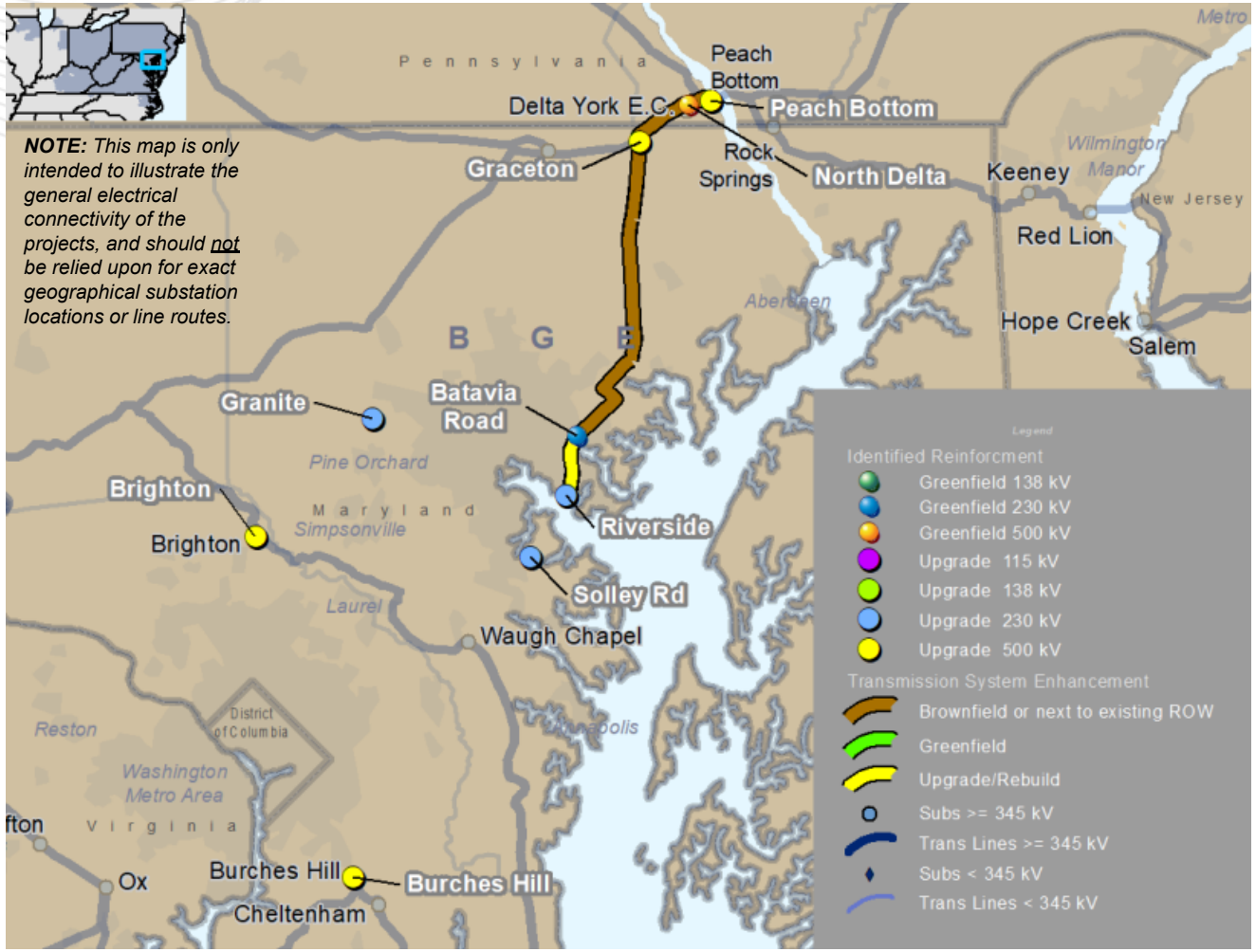
- Initial 2022 Window 3 (2027 basecase) has Brandon Shores generators modeled and dispatched
- The 2022 Window 3 (2028 basecase) has Brandon Shores generators removed as per the deactivation notice
- As will be shown, PJM received proposals from PSEG, NextEra, and Exelon addressing the Brandon Shores deactivation covering 2028 robustness test
- All proposals submitted to address only 2027 base case needs do not consider Brandon Shores deactivation
- PJM evaluated effectiveness of all submitted proposals to address Brandon Shores deactivation against the PJM Board approved project.

Board Approved Brandon Shores Deactivation Projects

Exelon:2022-W3-344/660

B3780 - Substation Projects: (Approved components under Brandon Shores Deactivation Immediate Need)

- **B3780 – (assigned to Transource) Substation Projects**
  - Modify the planned North Delta 500/230 kV substation (cut into Peach Bottom – Delta/Calpine 500 kV line)
    - Three breaker ring bus configuration
    - Install one 500/230 kV transformer
    - This scope will amend the approved B3737.47
- **B3780 – Exelon Scope -Substation Projects**
  - Expand Peach Bottom North yard to accommodate additional 500kV circuits to BGE (Graceton).
  - Build Graceton 500 kV substation – adjacent to the existing Graceton 230kV yard
    - Three bay breaker and half configuration
    - Two 500/230 kV transformers
  - Build new Batavia Rd. 230 kV switching station (cut in to the existing Northeast – Riverside 230 kV circuits
    - Four bay 8-position GIS BAAH switching station
- **Cancel B3780.3** (Build 500/230 kV West Cooper substation) (Cost Estimate: $60M)



B3780 Continue on next slide …

Board Approved Brandon Shores Deactivation Projects

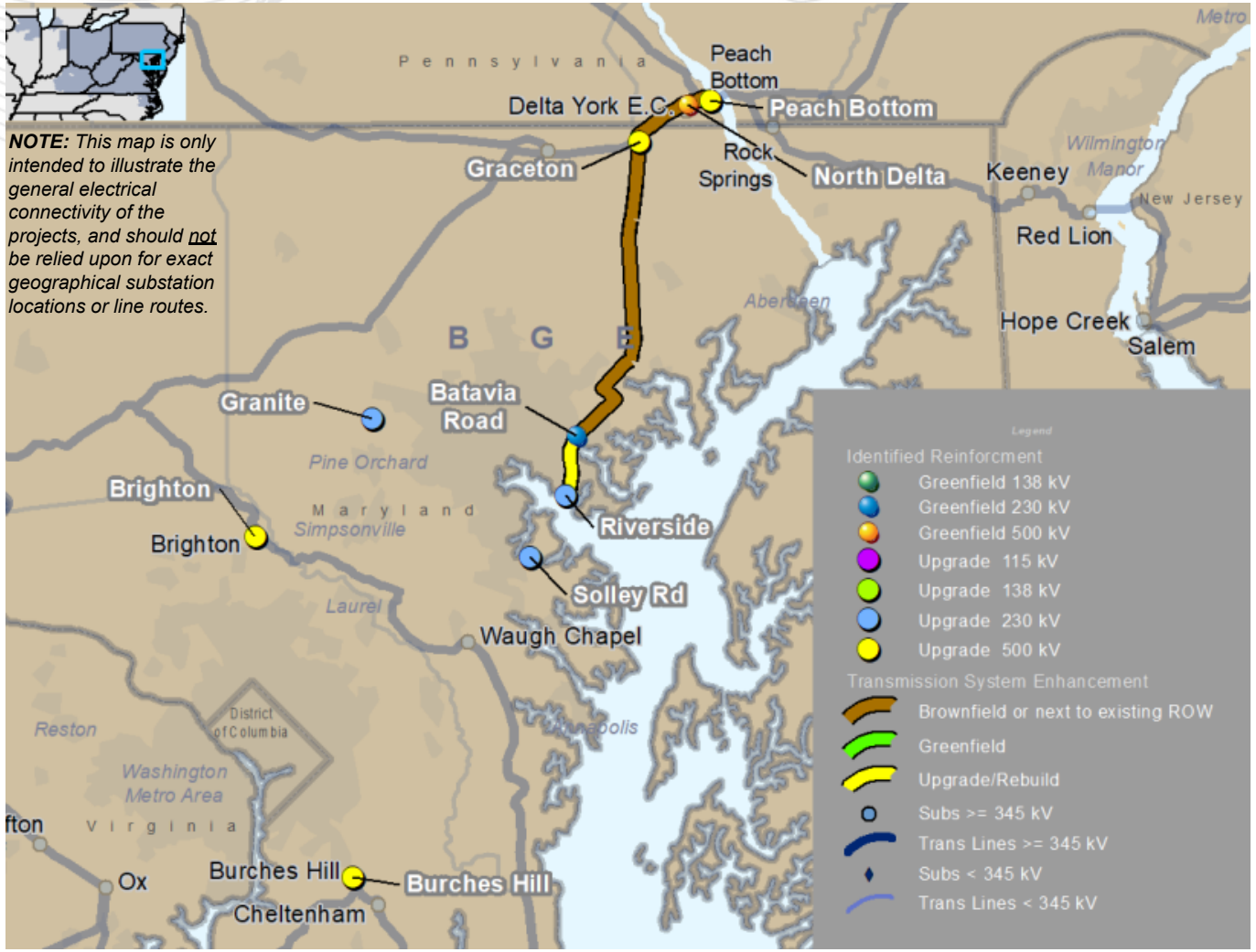
Exelon:2022-W3-344/660

B3780 - Transmission Projects: (Approved components under Brandon Shores Deactivation Immediate Need)

- Build new Peach Bottom North - Graceton 500kV Line - (~10 miles)
  - New Rating - 4503SN/5022SE/5206WN/5802WE MVA
- Build new 230 kV double circuit from Graceton to Batavia Road with 2 x 1590kcm 54/19 ACSR (~29 miles)
  - New Rating – 1331SN/1594SE/1534WN/1795WE MVA
- Reconductor 230 kV double circuit from Batavia Road to Riverside with bundled 1622kcm 38/19 ACCR/TW (~6 miles)
  - New Rating – 1941SN/2181SE/WN2065/WE2302 MVA
- Install Statcom at Granite 230 kV (+/- 350MVAR) and Solley 230kV (+/- 350 MVAR), and 250 MVAR capacitor at Graceton 230 kV
- Install Statcom at Brighton 500 kV (+/- 350MVAR), Capacitors - 350 MVAR at Brighton 500 kV, 250 MVAR at Burchess Hill 500 kV and 350 MVAR at Conastone 500 kV

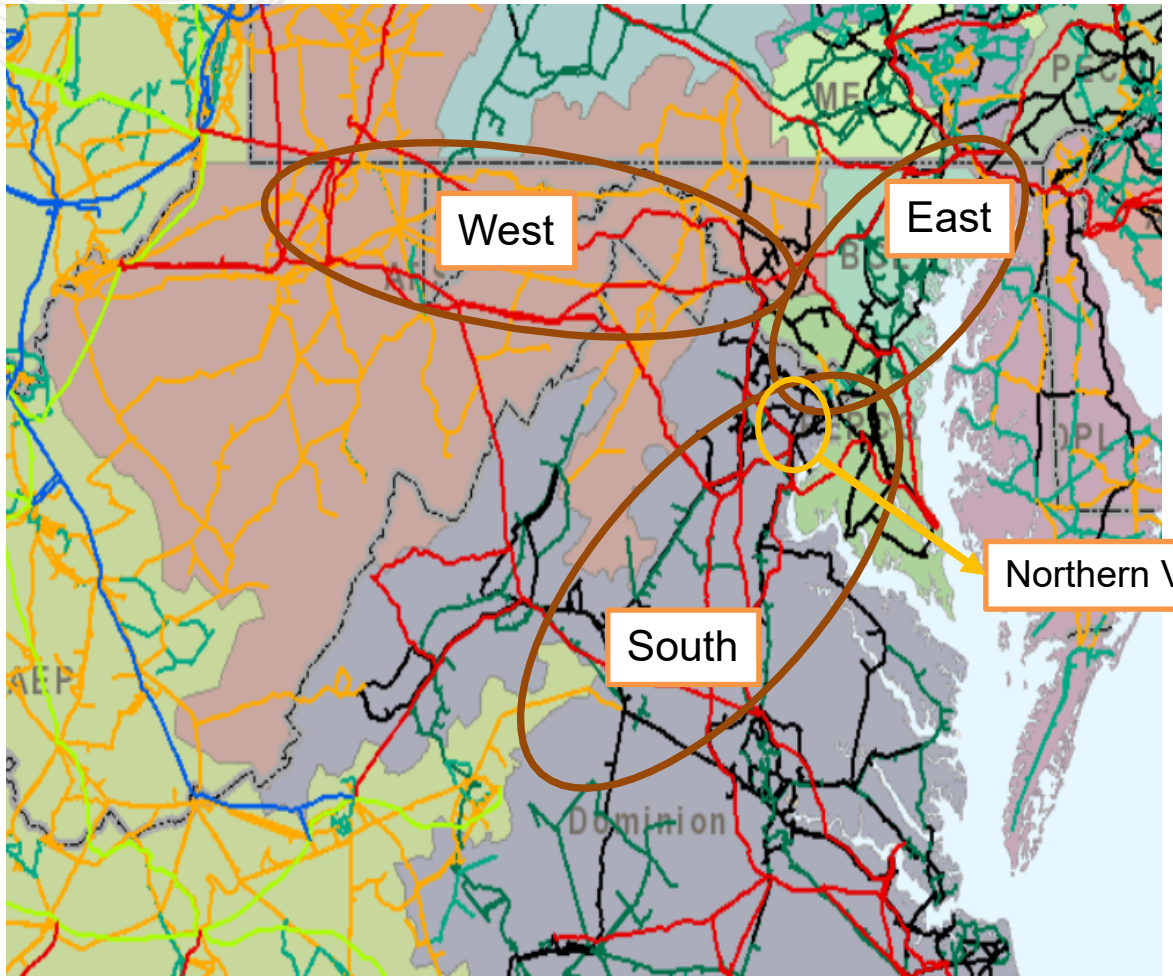
Required In-Service Date : June 2025

Projected In-Service Date: 2026-2028



Study Clusters

- Proposals were grouped in 4 main clusters (East, West, South and Dominion)
- Each cluster included proposals by different entities in the same need area and/or addressing the same local/regional needs
- Scenarios were developed and tested:
  - First; address regional needs
  - Next; scenarios were refined (building new scenarios) to cover local needs
  - Scenarios were further refined using more effective proposal components as demonstrated through performance



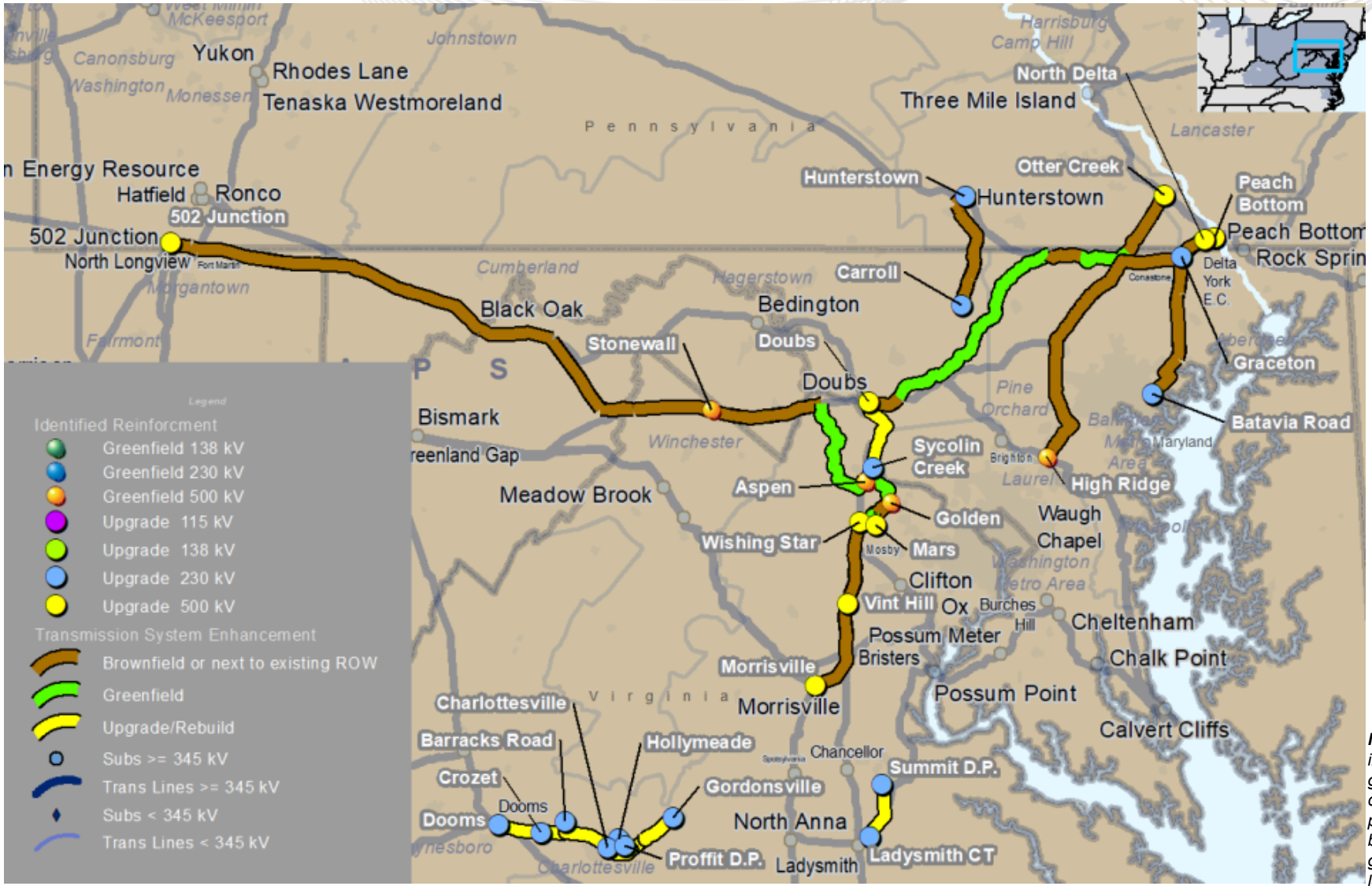
2022 RTEP W3 – Selected Proposals

- Proposals selected are for the most part those presented at the Oct 3rd TEAC under the PJM – 500kV Short List Scenario
- The selected proposals are robust and expandable while also being the more effective or cost efficient solutions to address the bulk transfer, regional and local transmission needs in the study area.
- Main Changes from Oct 3rd TEAC:
  - Hunterstown to Carrol 230kV development is selected instead of the Transource 487 Rice – Ringgold development due to cost and constructability advantages given comparable performance. .
  - PJM selected the full closure of the Aspen-Golden-Mars 500kV loop to mitigate 230kV network overloads
  - PJM proposes to proceed with the expansion of the Transource North Delta 500/230 kV Substation providing access to the Calpine-PB 500kV lead line and allowing utilization of existing Exelon ROW. The proposed West Cooper 500kV substation, part of the Brandon Shores deactivation proposal, will be canceled.
  - PJM is postponing its decision on the Joshua Falls-Yeat 765kV line proposal until further load and/or generation developments materialize in the study area (LTRTP analysis).

2022 RTEP W3 – Selected Proposals

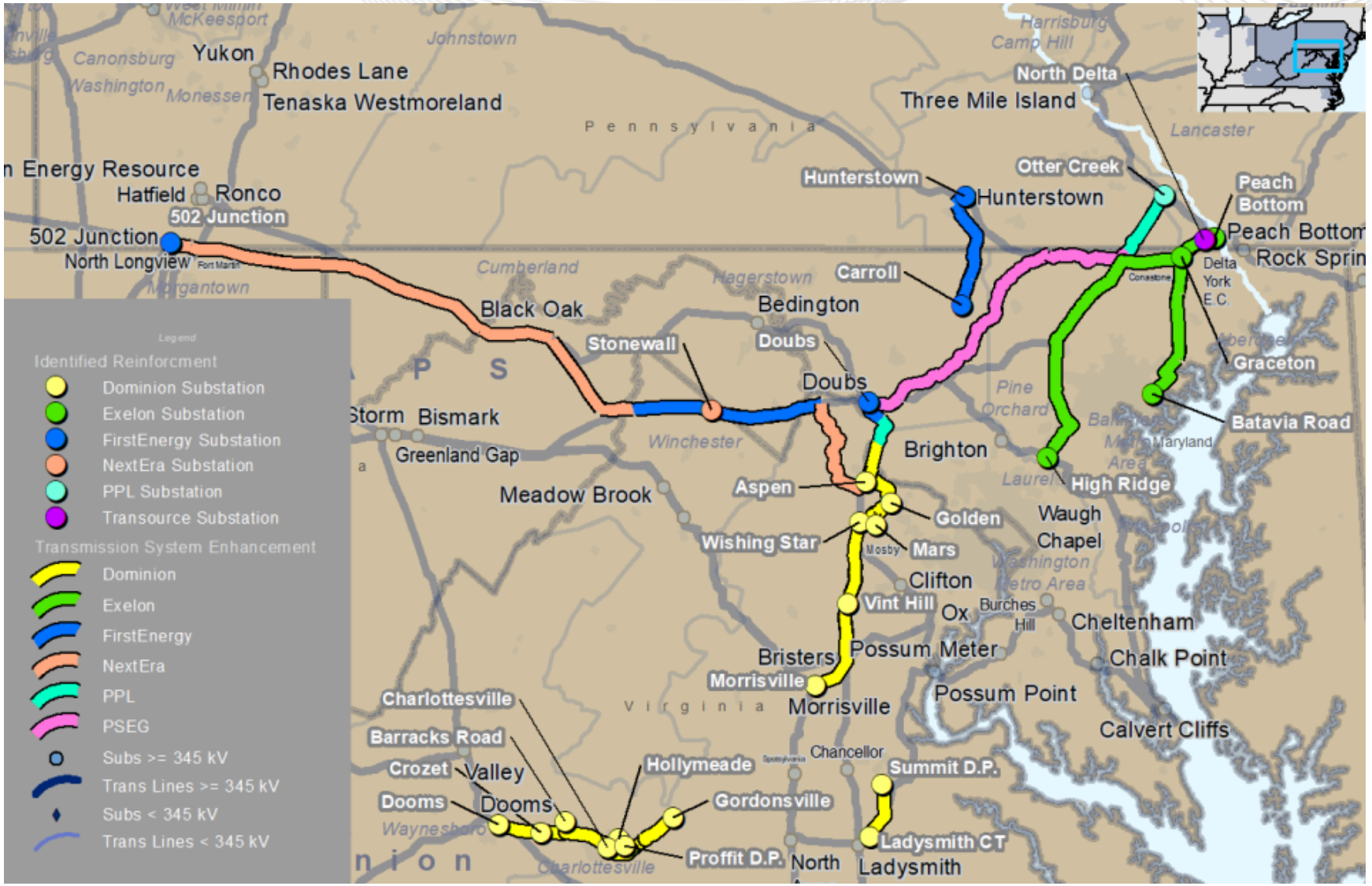
- In the slides to follow, PJM will walk through the selected proposals in each cluster (South, Northern Virginia/Doubs, East, and West)
- Changes to earlier approved projects (either expansions, adjustments or cancellations)
- Proposals selected proposals of the 2022 RTEP W3
- PJM identified additional upgrades for each cluster

Major Proposals Selected in 2022 Window 3



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

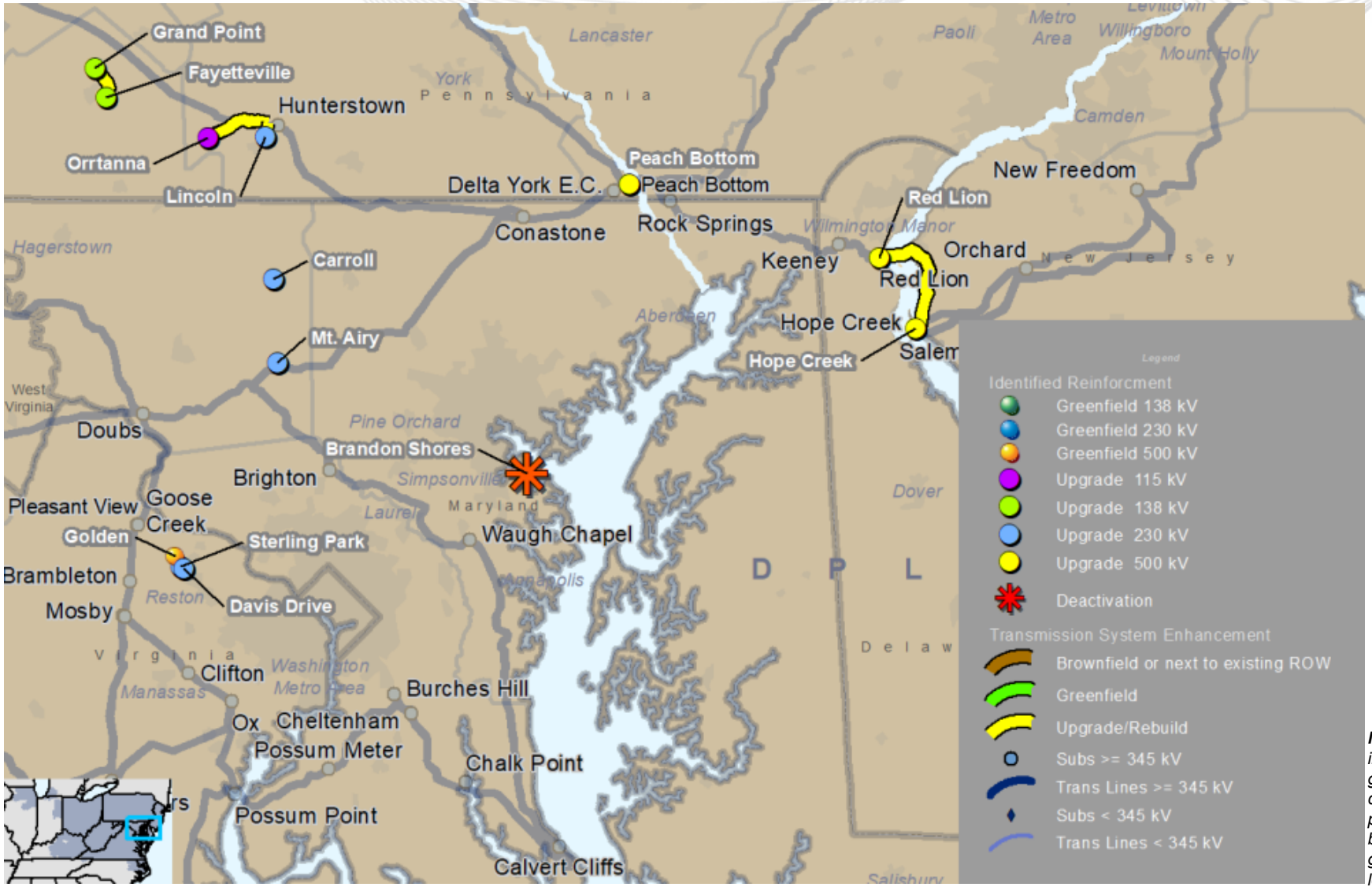
Major Proposals Selected in 2022 Window 3 - by Designated Entity



R3:corrected designated entity for 500kV west and East of Stonewall

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.*

Additional upgrades needed in 2022 Window 3



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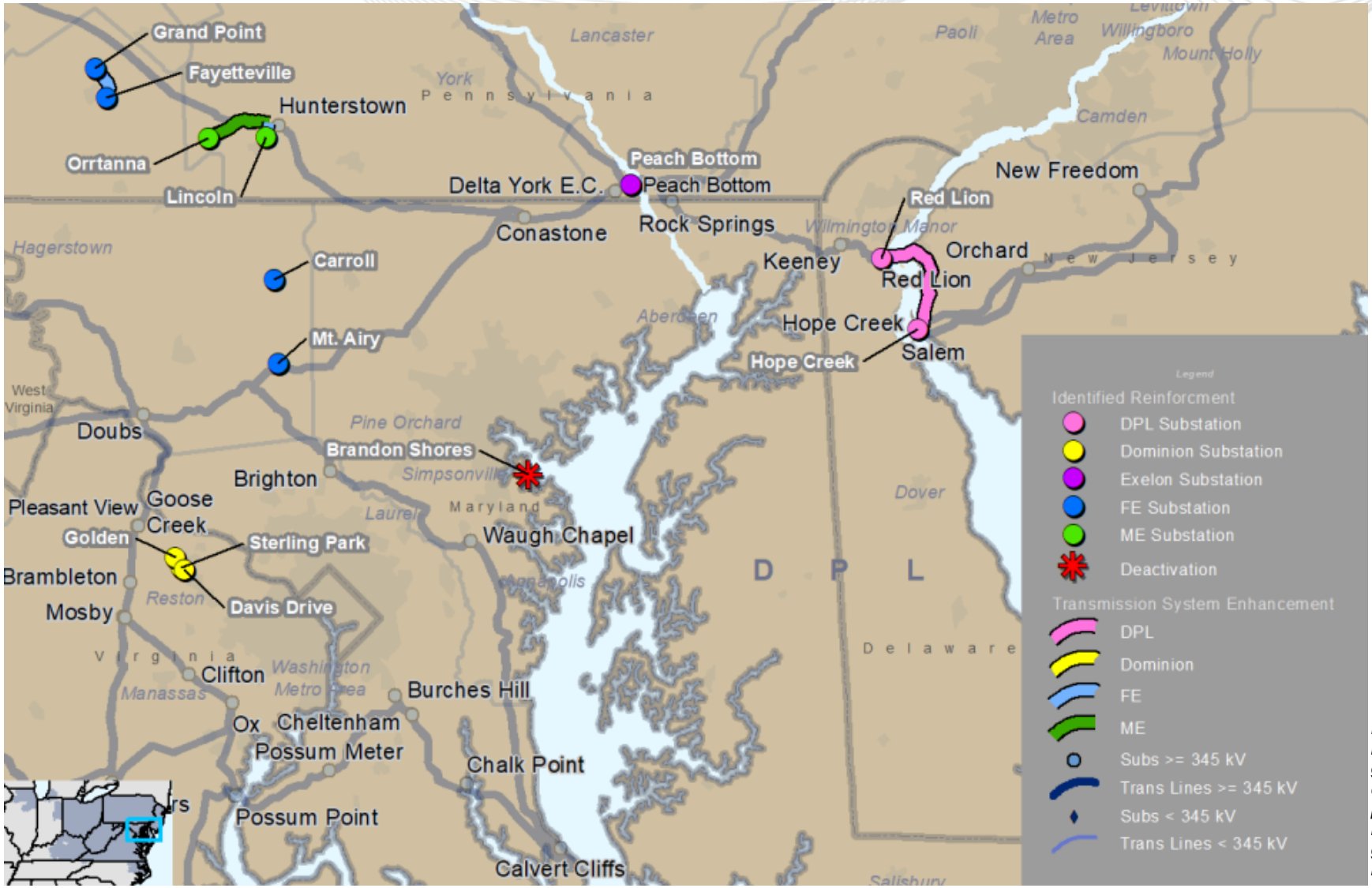
Additional upgrades needed in 2022 Window 3 – by TO



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2022W3 – Preferred Solutions: AEP Local

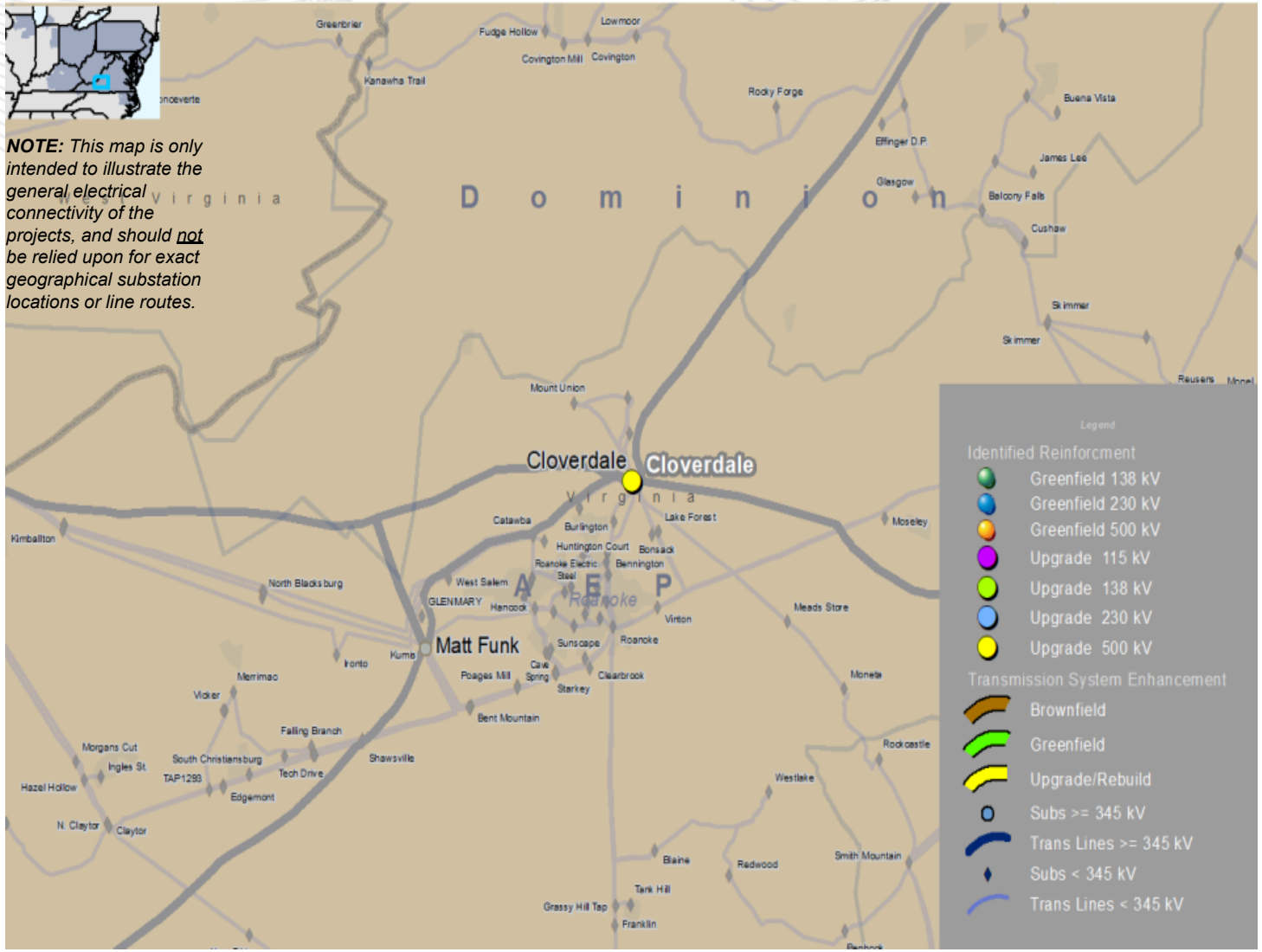
AEP: 2022-W3-410

- Establish a new 500 kV breaker position for the low-side of the existing 765/500 kV transformer at Cloverdale Station. The new position will be between two new 500 kV circuit breakers located in a new breaker string, electrically converting the 500 kV yard to "double-bus double-breaker" configuration.

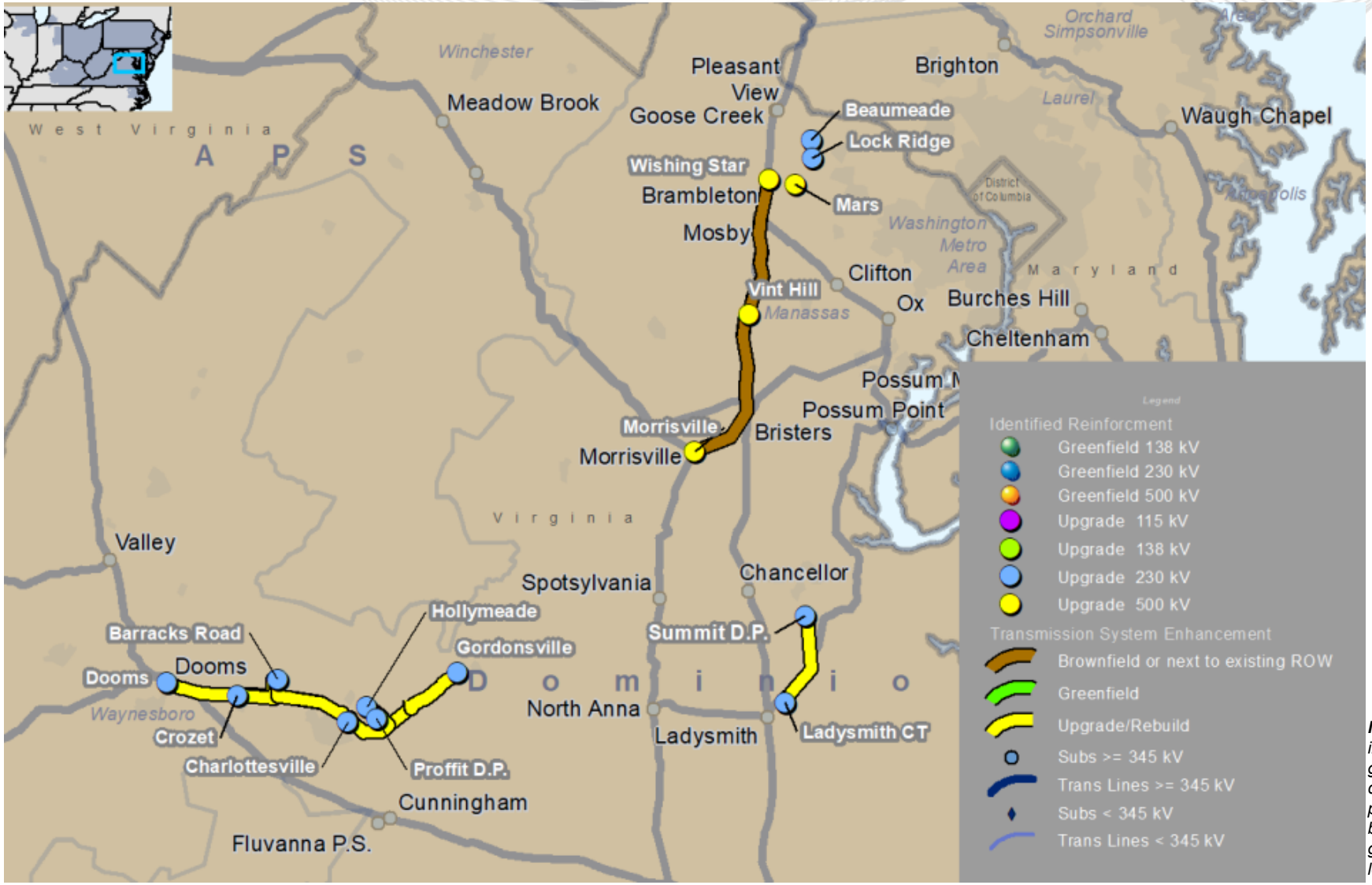
Estimated Cost: $11.59 M

Required IS Date: 6/1/2027

Projected IS Date: 10/31/2026

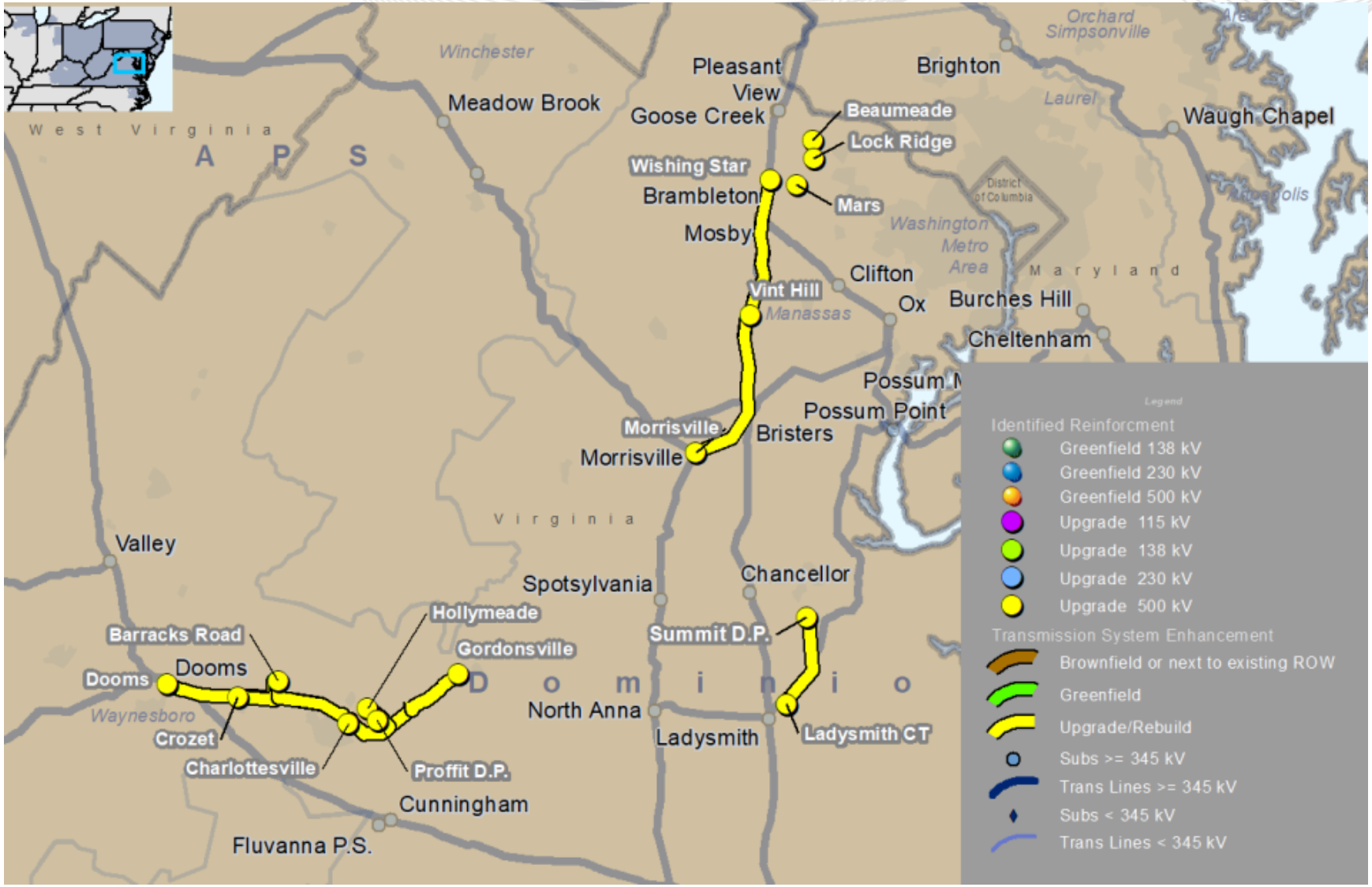


2022W3 – Preferred Solutions: South Cluster



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.*

2022W3 – Preferred Solutions: South Cluster by Designated Entity



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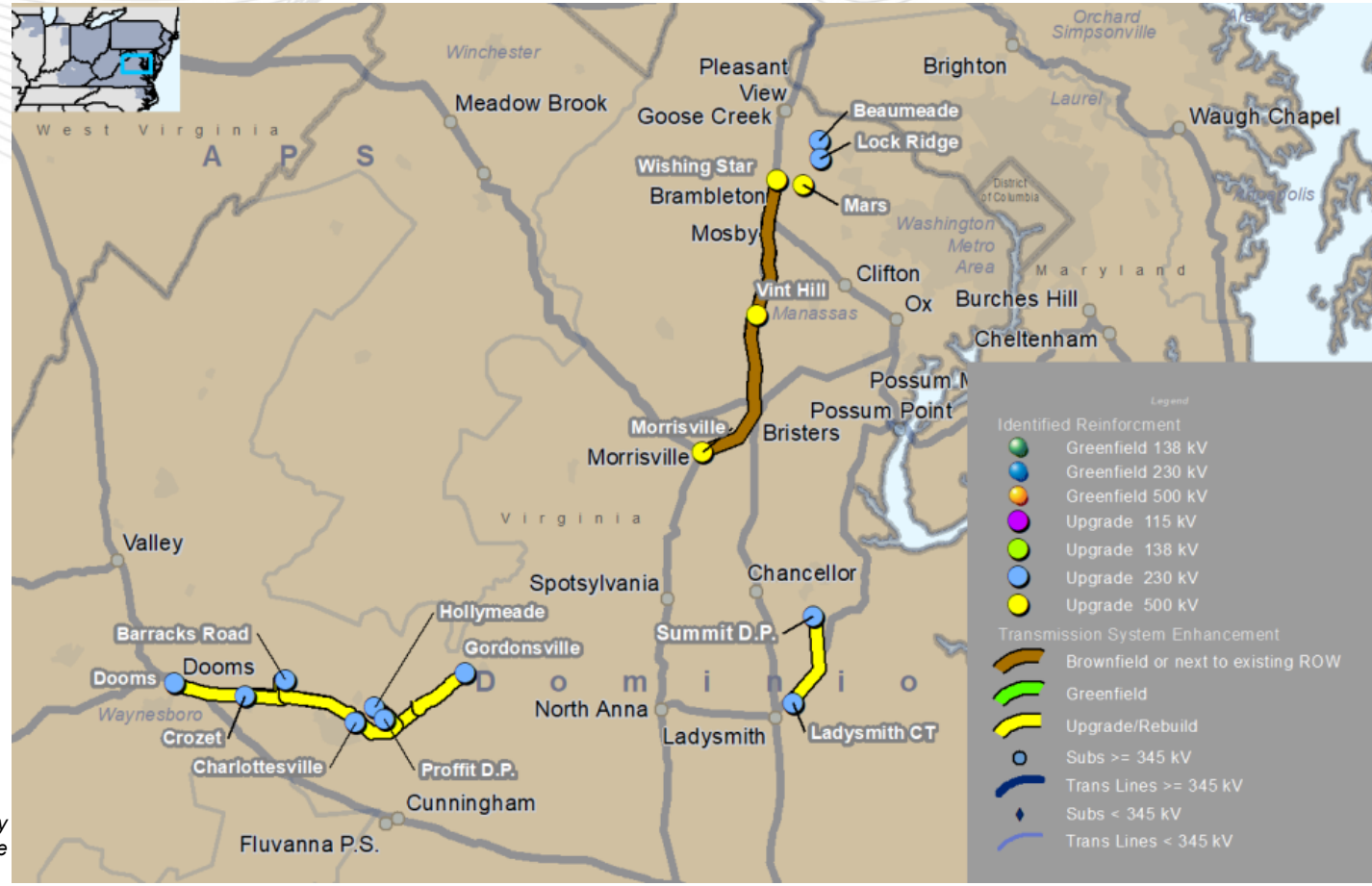
2022W3 – Preferred Solutions: South Cluster

Proposed Solution: 2022-W3-711 Revised

- Build a new 500kV line from Morrisville – Vint Hill – Wishing Star (approximately 36.3 miles) while maximizing the use of existing ROW within this corridor.
- Wrecking and rebuilding both the 5-2 towers in the Morrisville-Loudoun-Brambleton corridor to free up space for the new single-500kV monopole within the same corridor.
  - Line #545 (Bristers - Morrisville) Rebuild
  - Line #569 (Loudoun to Morrisville) Rebuild
  - Line #535 (Vint Hill- Loudoun) Resag/Rebuild
  - Line #546 (Mosby - Wishing Star) Rebuild
  - Line #590 (Mosby - Wishing Star) Rebuild
  - Line #2030 (Gainesville - Loudoun) Rebuild
  - Line #2045 (Loudoun - Brambleton) Rebuild
  - Line #2094 & 2227 (Brambleton - Racefield - Loudoun) Rebuild
  - Line #2101 (Bristers - Vint Hill) Rebuild
  - Line #2114 (Remington CT - Rollin Ford) Rebuild



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2022W3 – Preferred Solutions: South Cluster

Proposed Solution: 2022-W3-711 Revised

- Line #2140 (Loudoun - Heathcote) Rebuild
- Line #2151 (Railroad DP - Gainesville) Rebuild
- Line #2163 (Vint Hill - Liberty) Rebuild
- Line #2176 (Heathcote - Gainesville) Rebuild
- Line #2222 (Rollins Ford - Gainesville) Rebuild
- Line #183 (Bristers - Ox) Rebuild
- Line #37 (Spotsylvania - Wilderness D.P.) Rebuild

- Substation upgrades at:
  - Bristers, Brambleton, Dawkins Branch, Gainesville, Heathcote, Loudoun, Mint Springs, Morrisville, Mosby, North Star, Racefield, Railroad, Spotsylvania, Vint Hill, Wishing Star, Youngs Branch
- Breaker upgrades at the following substations:
  - Loudoun 230kV, Ox 500kV, North Anna 500kV

Estimated Cost: $953.71 M

Required IS Date: 6/1/2027
Projected IS Date: 6/1/2028

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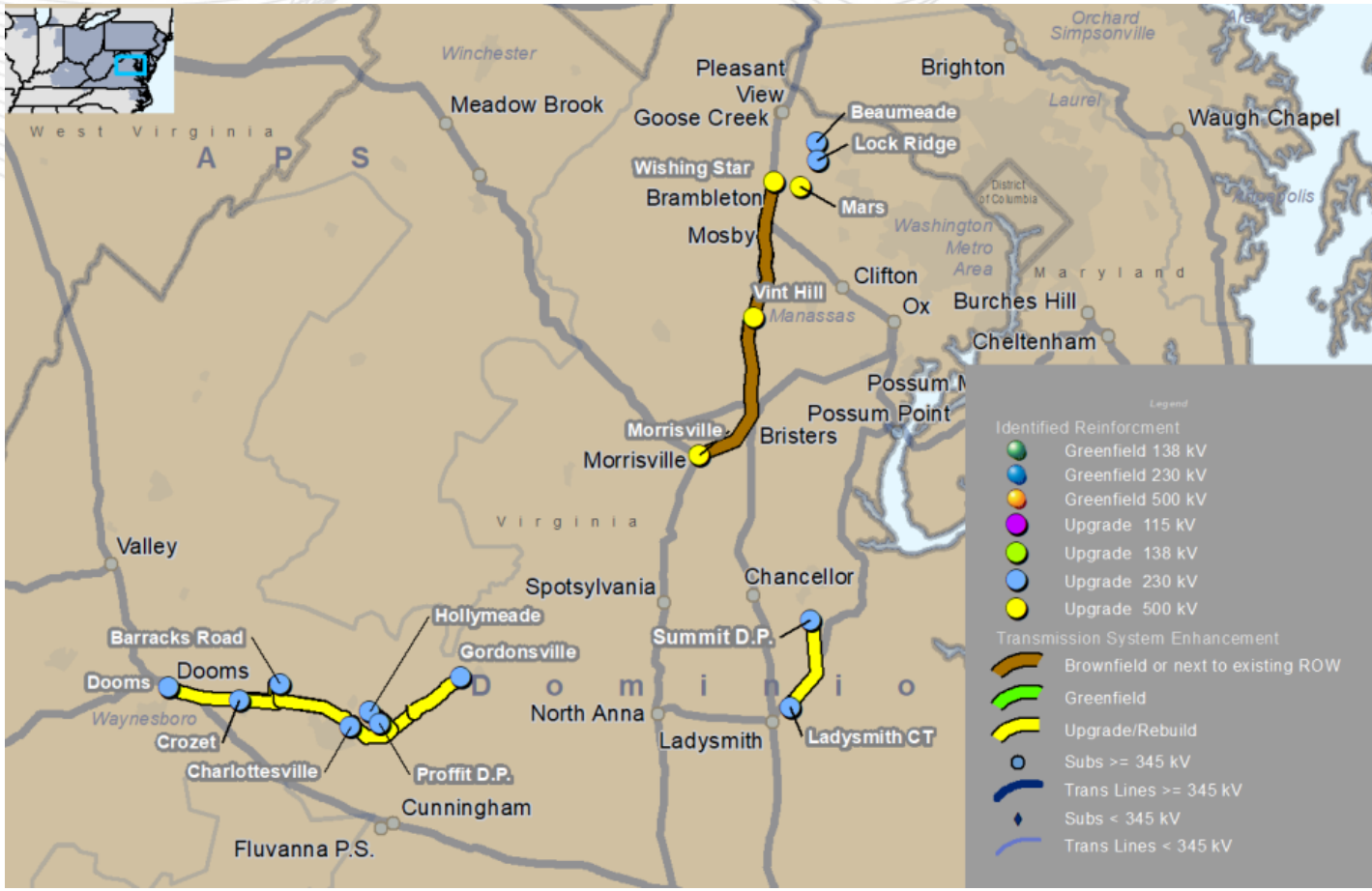

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2022W3 – Preferred Solutions: South Cluster

Dominion: 2022-W3-967 Partial

- Rebuild 230kV Line #2054 Charlottesville – Proffit DP using double-circuit capable 500/230 kV poles (the 500kV circuit will not be wired as part of this project).
- Rebuild 230kV Line #233 segment from Barracks Road – Crozet
- Rebuild 230kV Line #291 Charlottesville – Barracks Road – Crozet – Dooms
- Relay resets/revisions at the following substations:
  - Hollymeade, Proffit, Barracks Road, Crozet
- Terminal equipment upgrades at the following substations:
  - Charlottesville for Line #2054 rebuild & Dooms for Line #291 rebuild

Estimated Cost: $183.48 M

Required IS Date: 6/1/2027
Projected IS Date: 6/1/2028

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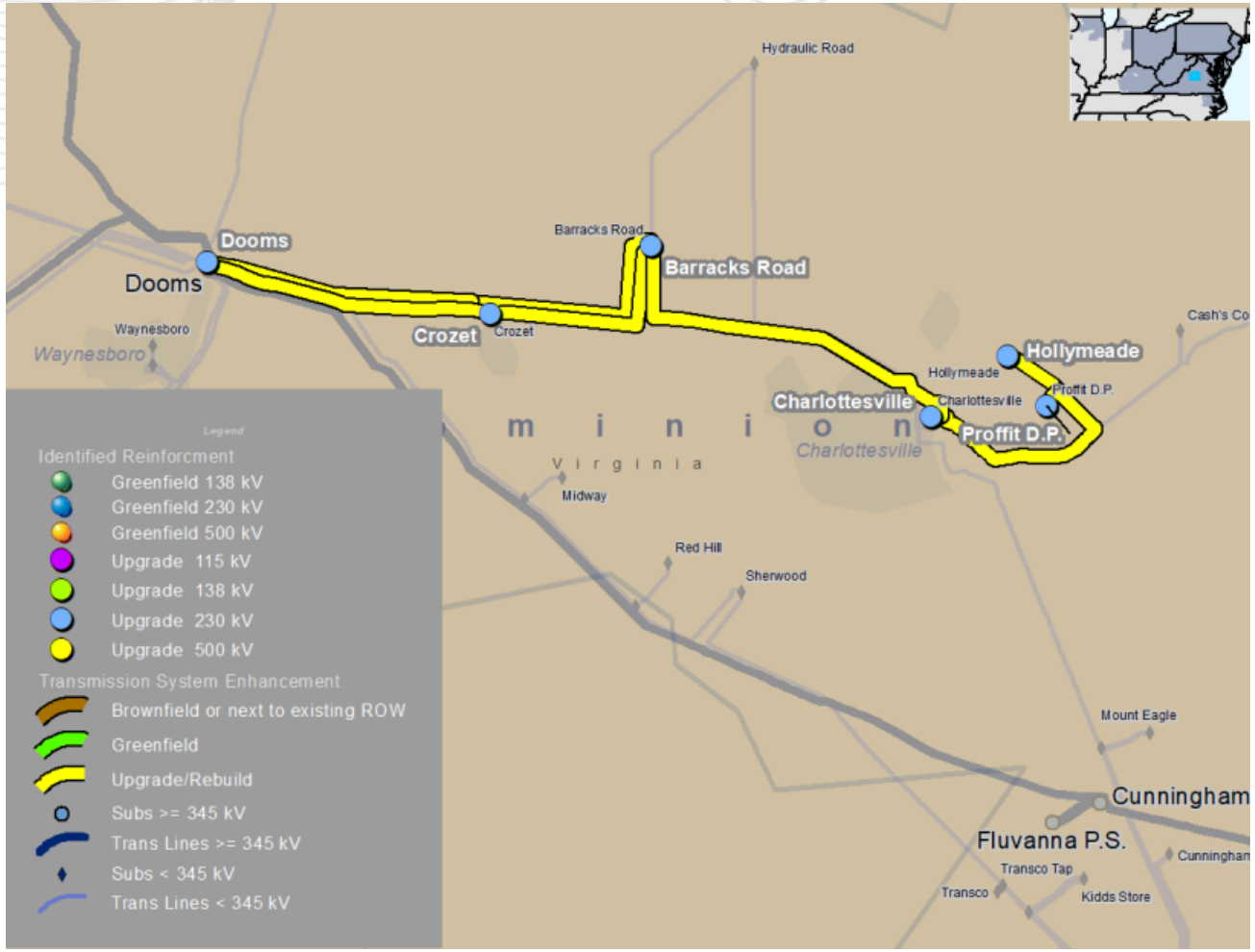

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2022W3 – Preferred Solutions: South Cluster

Proposed Solution: 2022-W3-211

- Rebuild 230kV Line #2135 Hollymeade – Gordonsville using double-circuit capable 500/230 kV poles (the 500kV circuit will not be wired as part of this project).
- Terminal equipment upgrades at the following substations:
  - Hollymeade, Gordonsville, Cash's Corner

Existing Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
230kV Line #2135 Cash's Corner - Gordonsville	586/586/741/741
230kV Line #2135 Cash's Corner - Hollymeade	586/586/741/741

Preliminary Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
230kV Line #2135 Cash's Corner - Gordonsville	1573/1573/1648/1648
230kV Line #2135 Cash's Corner - Hollymeade	1047/1047/1160/1160

Estimated Cost: $54.85 M

Required IS Date: 6/1/2027
Projected IS Date: 6/1/2028

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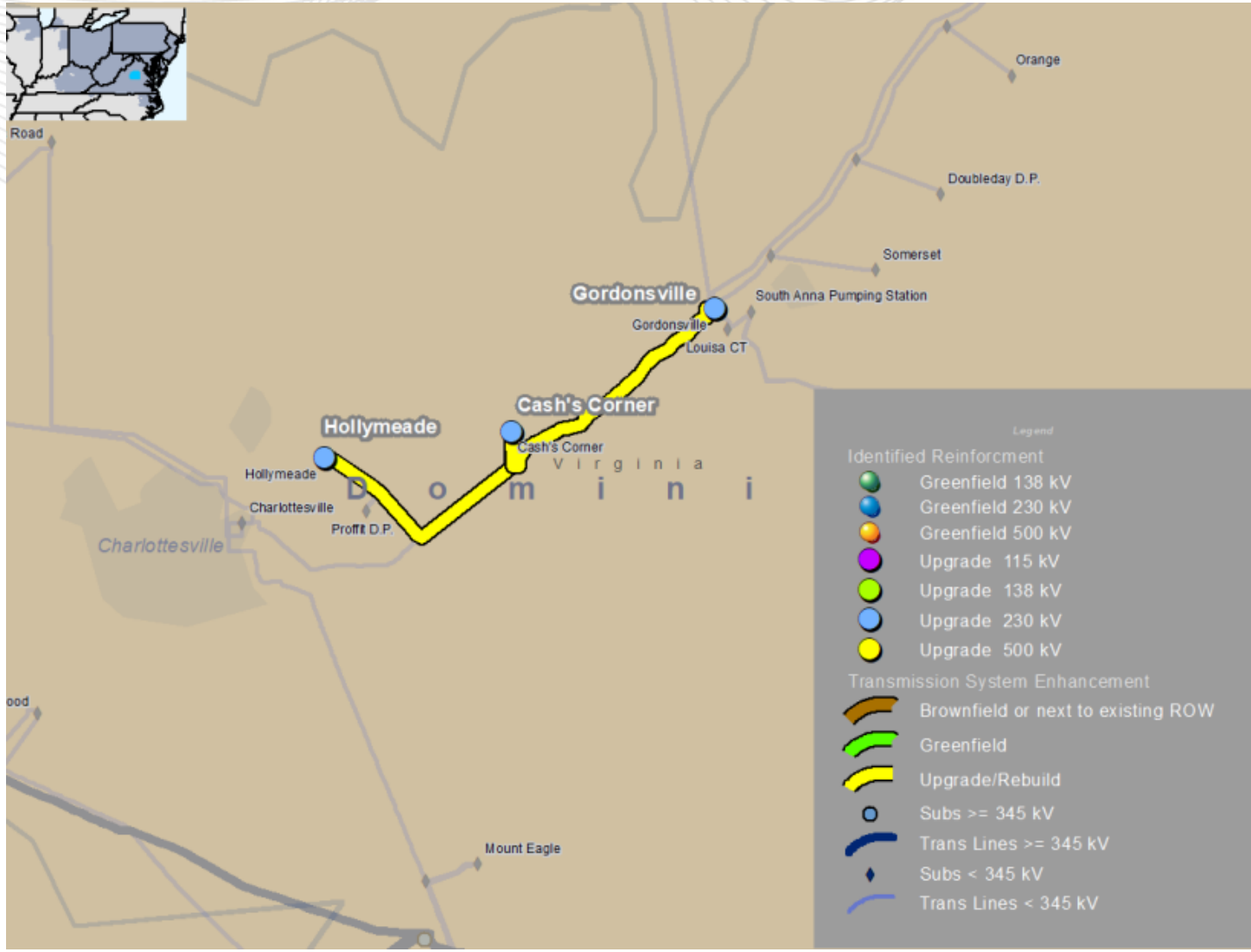
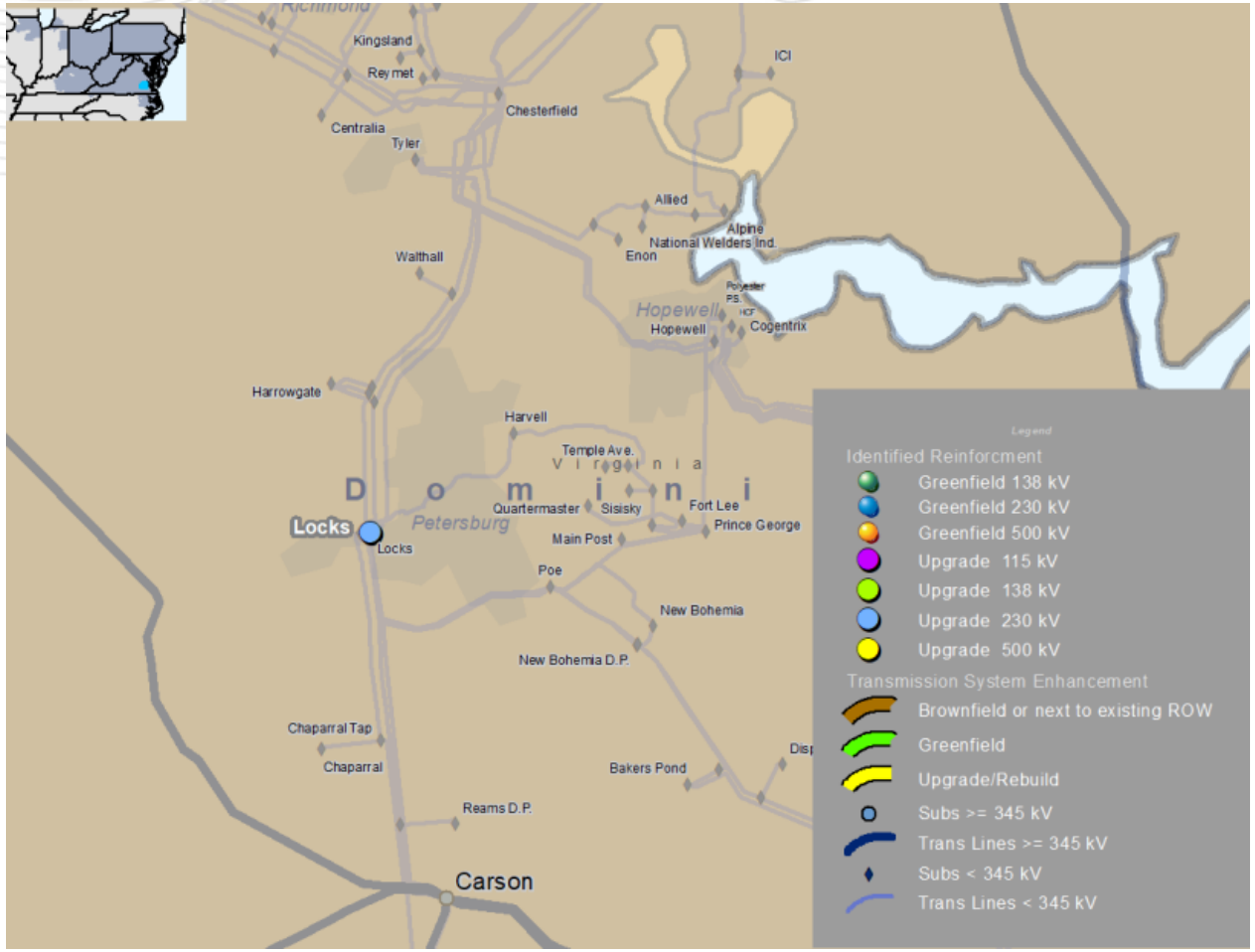


2022W3 – Preferred Solutions: South Cluster

Proposed Solution: 2022-W3-731

- Replace single unit Locks 230/115 kV 168MVA transformer TX #7 with new single unit transformer with a rating of 224 MVA.
- Lead lines at the 115 kV level will be upgraded to 2000 A.



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.*

Estimated Cost: $7.14 M

Required IS Date: 6/1/2027
Projected IS Date: 6/1/2028

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2022W3 – Preferred Solutions: South Cluster

Proposed Solution: 2022-W3-74 Partial

- Wreck and rebuild Line #2090 Ladysmith CT – Summit D.P. segment as a double circuit 230kV line. Only one circuit will be wired at this stage.
- Upgrade circuit breaker leads, switches and line leads at Ladysmith CT.

Existing Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
230kV Line #2090 Ladysmith CT – Summit D.P	1225/1225/1358/1358

Preliminary Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
230kV Line #2090 Ladysmith CT – Summit D.P	1573/1573/1648/1648

Estimated Cost: $57.34 M

Required IS Date: 6/1/2027
Projected IS Date: 12/1/2027

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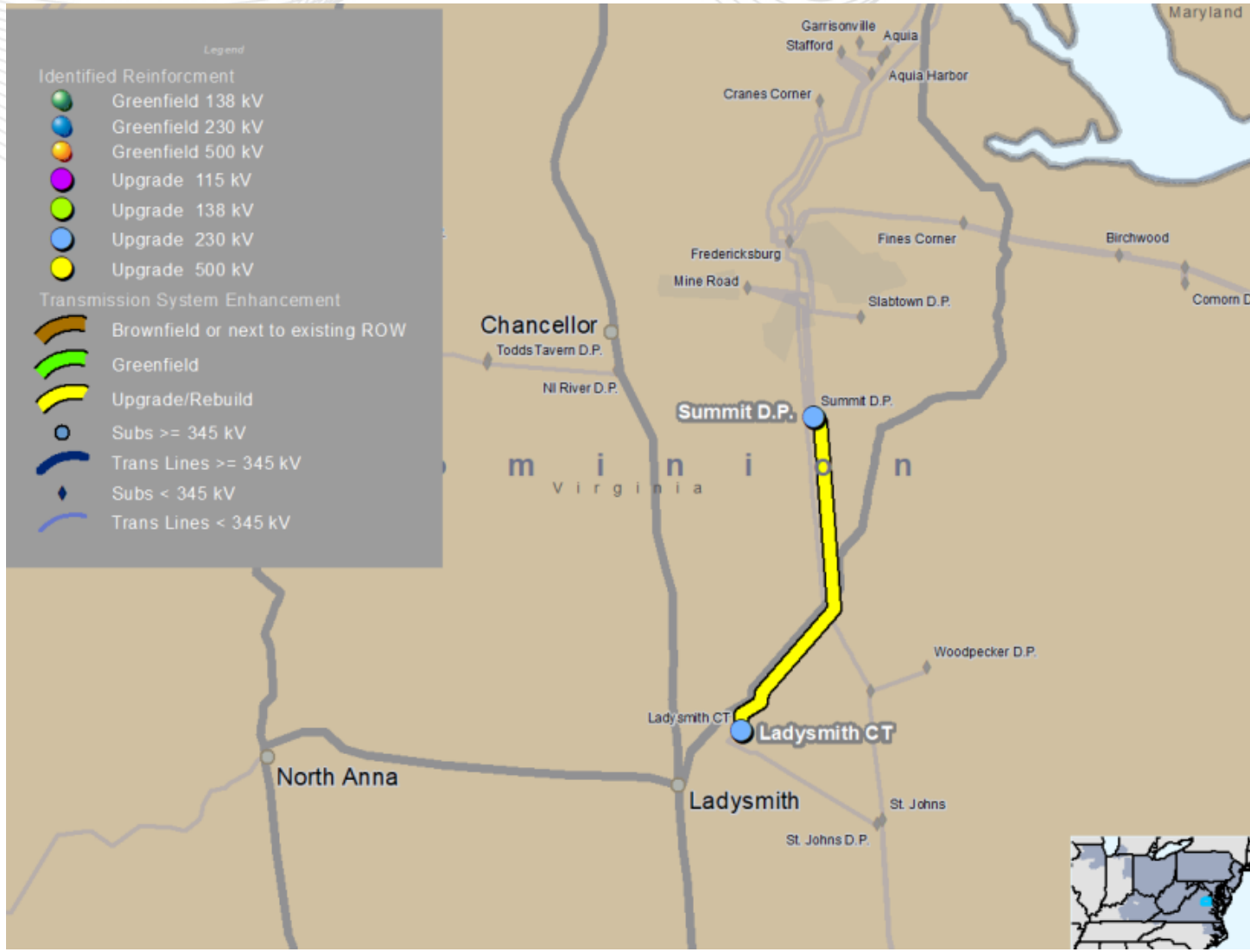
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*



2022W3 – Preferred Solutions: South Cluster

Proposed Solution: 2022-W3-231

- Install 230kV, 500kV shunt cap banks (static devices) as well as STATCOMs (dynamic devices) and associated equipment to address the reactive power needs of the system
  - (1) 500kV, 150 MVAr Shunt Capacitor Bank & associated equipment at Morrisville substation
  - (1) 230kV, 150 MVAr Shunt Capacitor Bank and (1) 500kV, 293.8MVAr Shunt Capacitor Bank & associated equipment at Wishing Star substation
  - (1) 500kV, 300 MVAr Static synchronous Compensator (STATCOM) and (1) 230KV, 150MVAr Shunt Capacitor Bank & associated equipment at Mars substation
  - (1) 230kV, 300 MVAr Static synchronous Compensator (STATCOM) & associated equipment at Beaumeade substation

Estimated Cost: $103.80 M

Required IS Date: 6/1/2027
Projected IS Date: 12/1/2027

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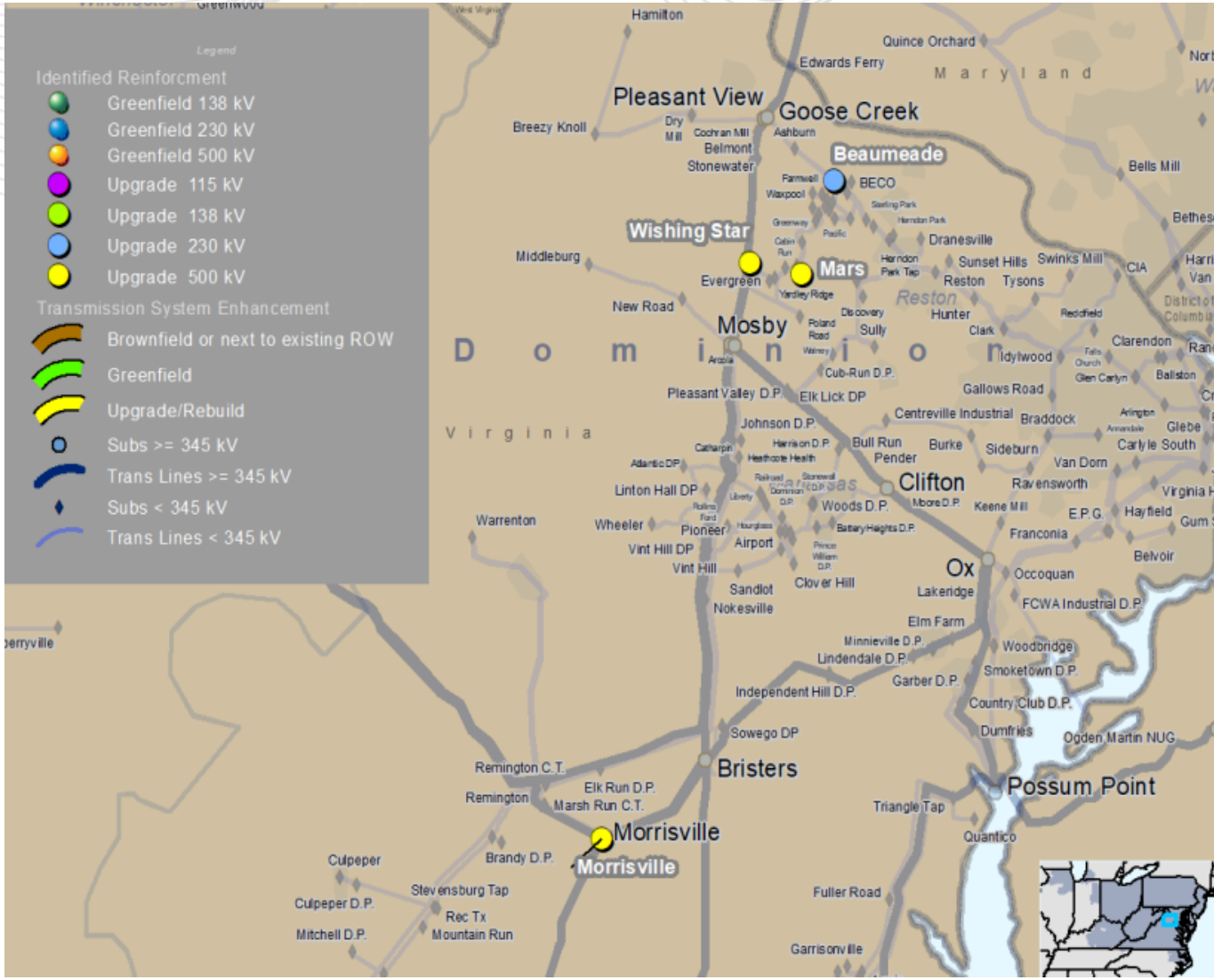


NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

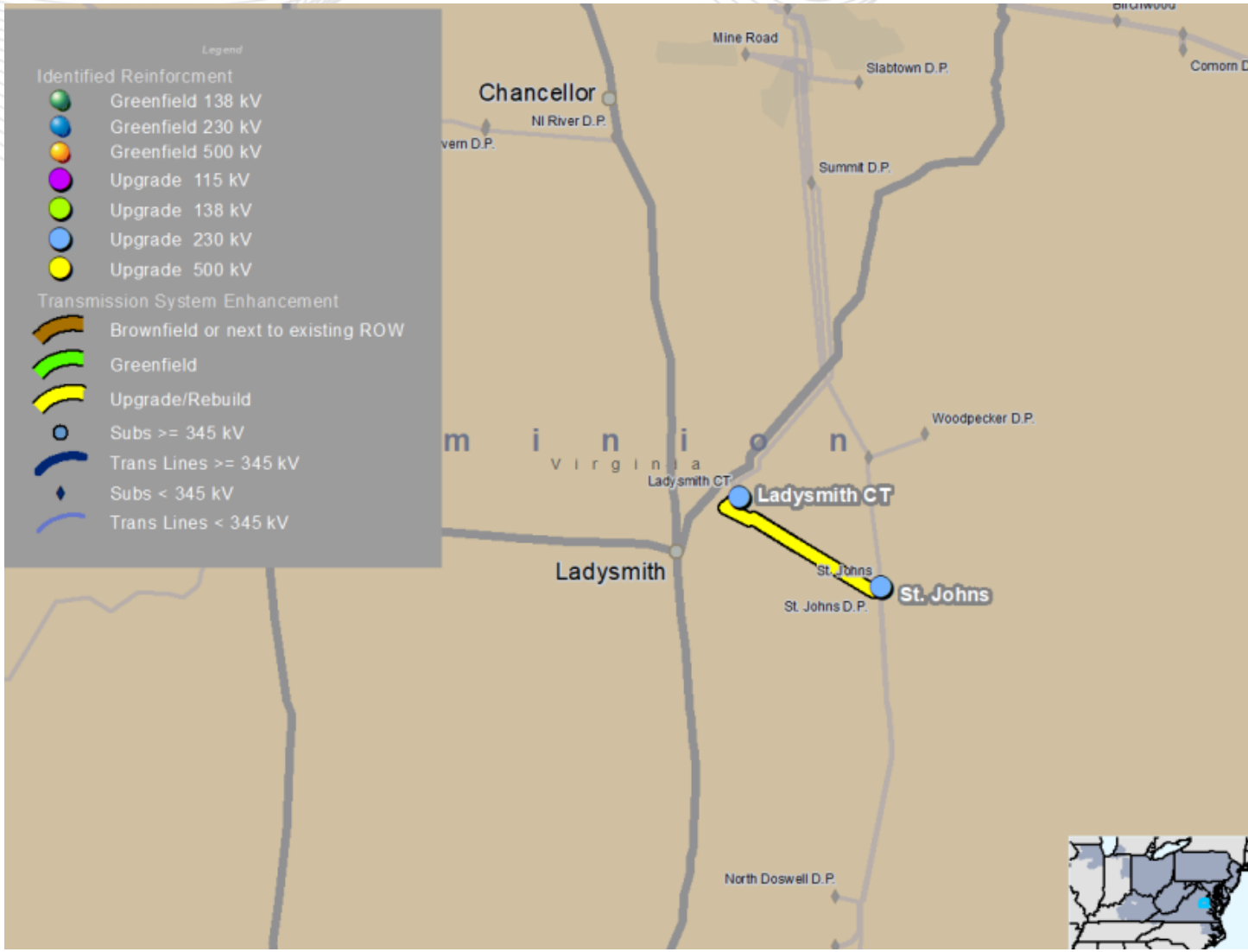
2022W3 – Preferred Solutions: South Cluster

Proposed Solution: Additional upgrades

- Uprate 12.44 miles of 230kV circuit 256 from St. Johns to Ladysmith CT
- Approximately 7.14 miles of the line from St Johns Substation to 256/108 is supported by a mix of single circuit wood and steel H-frames installed in 1991. This portion of the line will be rebuilt with a mix of light duty steel DOM pole tangent H-frames and engineered steel 3-pole deadend angle structures. The proposed conductor for the rebuilt line will be 2-768 ACSS "Maumee" with dual 48 fiber DNO-11410 for shielding.
- The remaining 5.30 miles of the line from structure 256/107 to Ladysmith CT is supported on double circuit lattice towers installed in 2010-2011. This portion of the line will be reconductored with proposed 2-768 ACSS "Maumee" conductor and the existing structures and shield wire will remain.
- Transmission line switch 25666 will be upgraded to 4000A at St. Johns Substation. Terminal equipment at remote end substations will be upgraded to 4000A continuous current rating to support new conductor ratings.

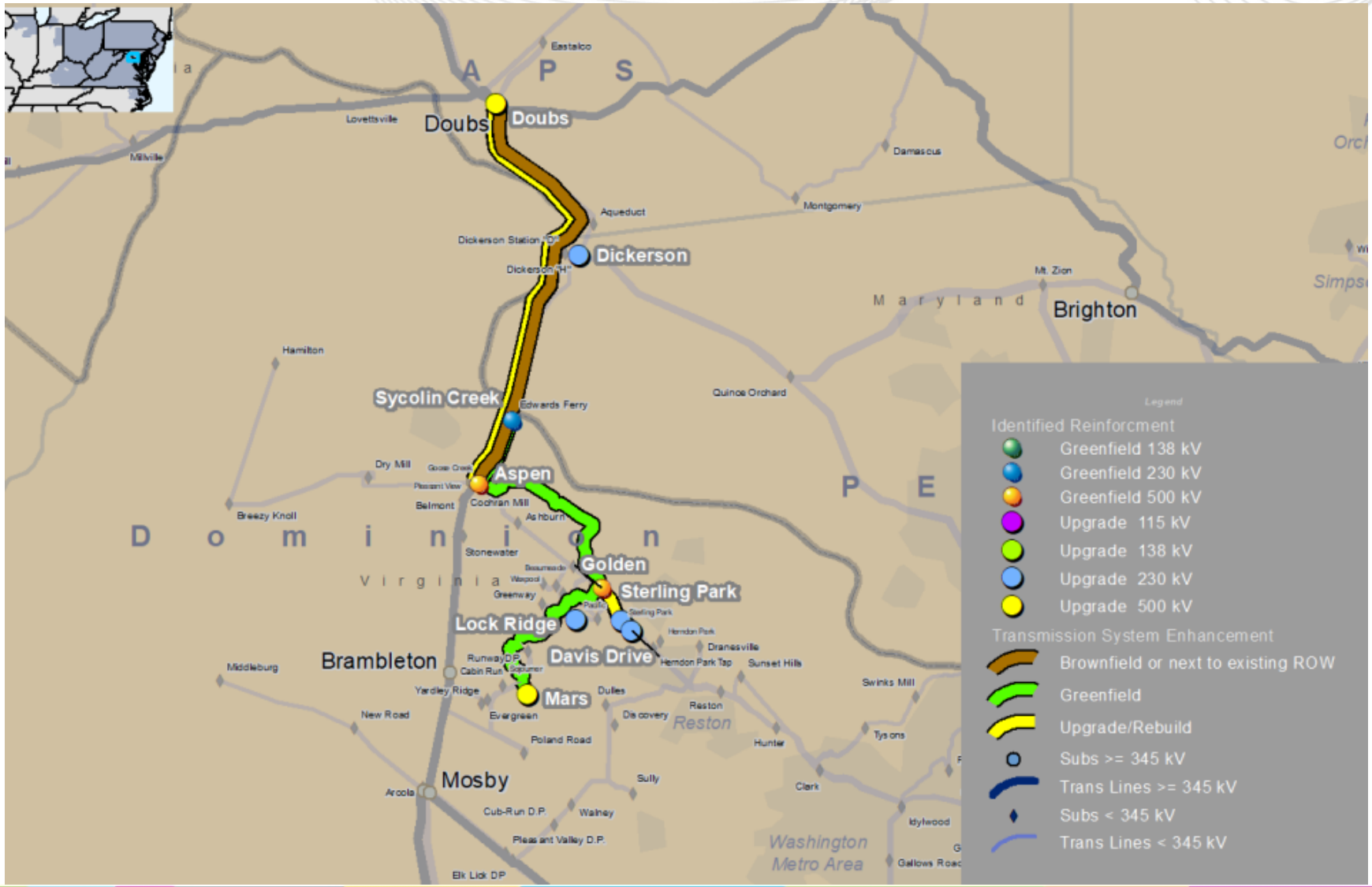
Estimated Cost: $37.89 M
Total Estimated South Cluster Cost: $1398.21 M

Required IS Date: 6/1/2028
Projected IS Date: 6/1/2028



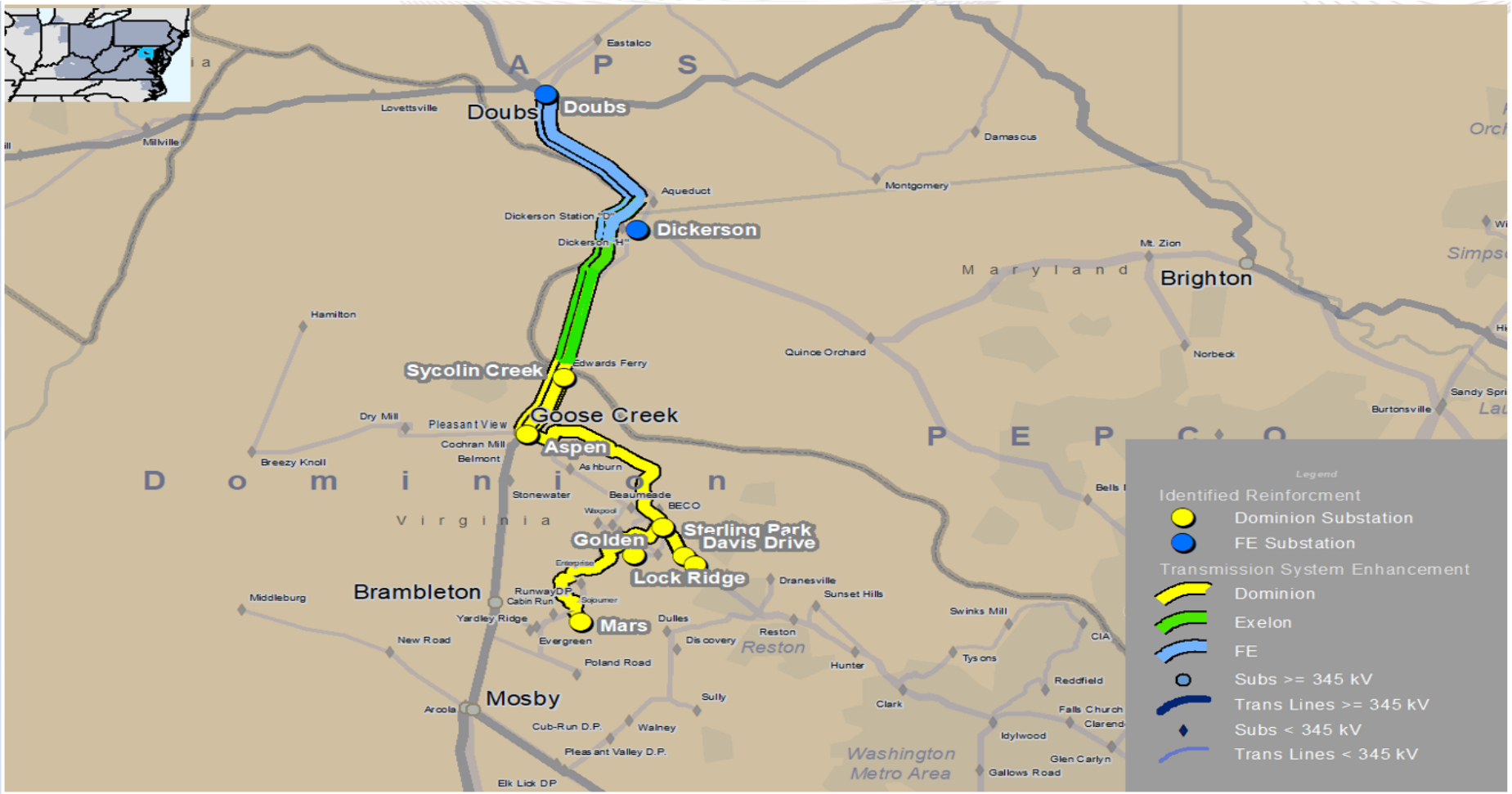
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022W3 – Preferred Solutions: North Virginia/Doubs Cluster



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

2022W3 – Preferred Solutions: North Virginia/Doubs Cluster by Designated Entity



R3: Correction to the designated entity portions of the lines between Doubs and Goose Creek

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.*

2022W3 – Preferred Solutions: Northern Virginia/Doubs Cluster

Proposed Solution: 2022-W3-692

- Construct new double-circuit 500/230 kV lines from Aspen substation to Golden substation
  - 230kV Line will connect Aspen – Sycolin Creek – Golden
- Construct new double-circuit 500/230 kV lines from Golden substation to Mars substation
  - 230kV Line will connect Golden – Lockridge – Mars
- Construct a new 500kV Line from Aspen to Goose Creek
- Install the 2nd 500-230 kV 1440 MVA transformer at Mars Substation
- Construct a new Aspen 500/230kV substation by tapping 500kV Line #558
- Construct a new Golden 500/230kV substation
- Upgrade existing double-circuit 230 kV lines from Golden substation to Paragon Park substation (Lines # 2150 & 2081)
- Upgrade existing single circuit 230 kV line from Paragon Park substation to BECO Substation (Line # 2207) to a minimum normal summer rating of 1573 MVA. Equipment at each substation will be upgraded to support the new conductor rating of 4000A
- Equipment upgrades at the following substations:
  - Paragon Park, BECO
- Golden relay setting reset
- Replace overdutied breakers at Belmont, BECO, Beaumeade, Pleasant View, Shellhorn, and Discovery.

Estimated Cost: $1058.45 M
Required IS Date: 6/1/2027
Projected IS Date: 6/1/2028

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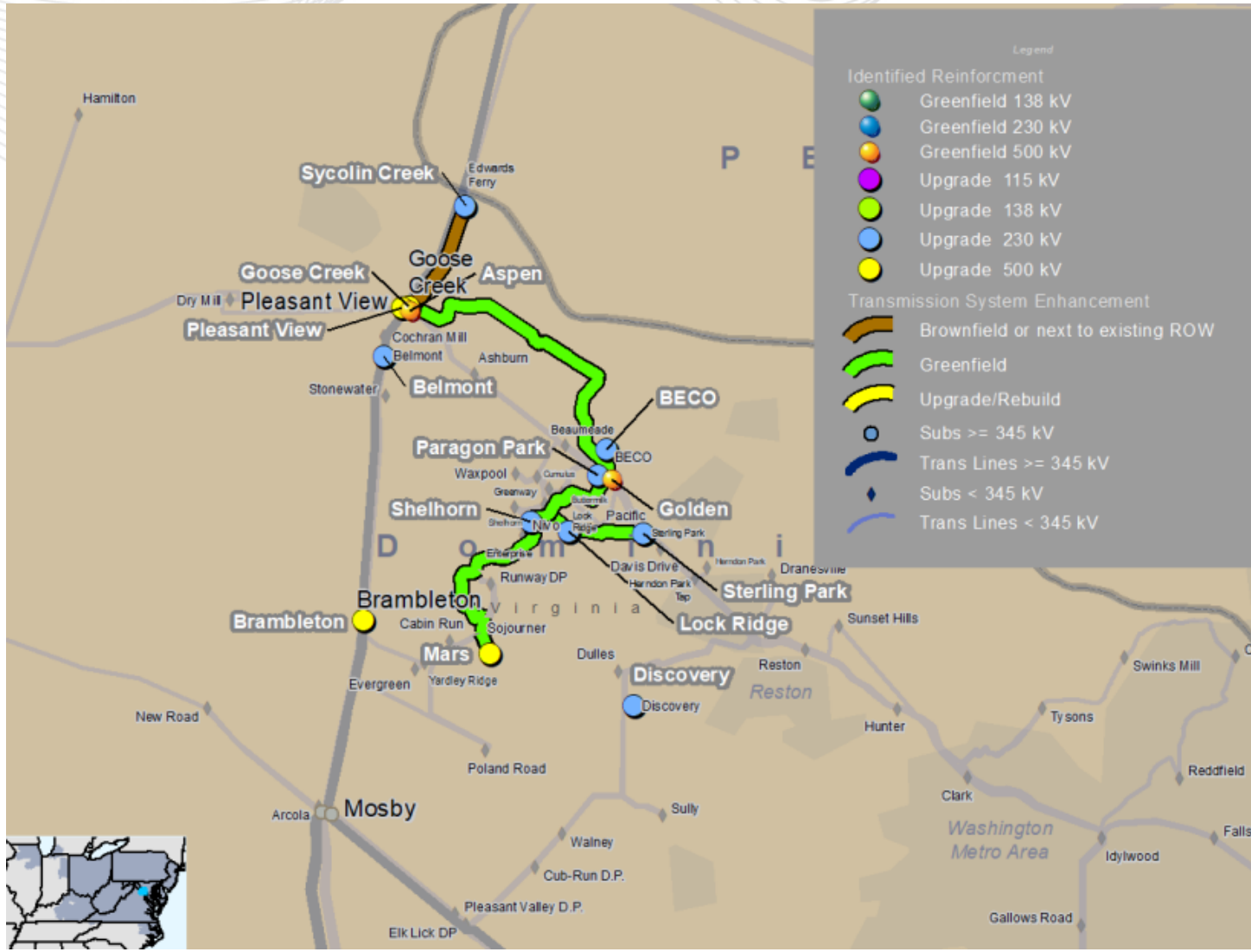

NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022W3 – Preferred Solutions: Northern Virginia/Doubs Cluster

Proposed Solution: Additional upgrades

- Reconductor 1.47 miles of 230kV circuits 2081 and 2150 from Sterling Park to Golden substation
- Reconductor 0.67 miles of 230kV circuits 2194 and 9231 from Davis Drive to Sterling Park substation

Estimated Cost: $13.50 M
Total Estimated Northern Virginia/Doubs Cluster Cost: $1435.07 M

Required IS Date: 6/1/2027
Projected IS Date: 6/1/2028

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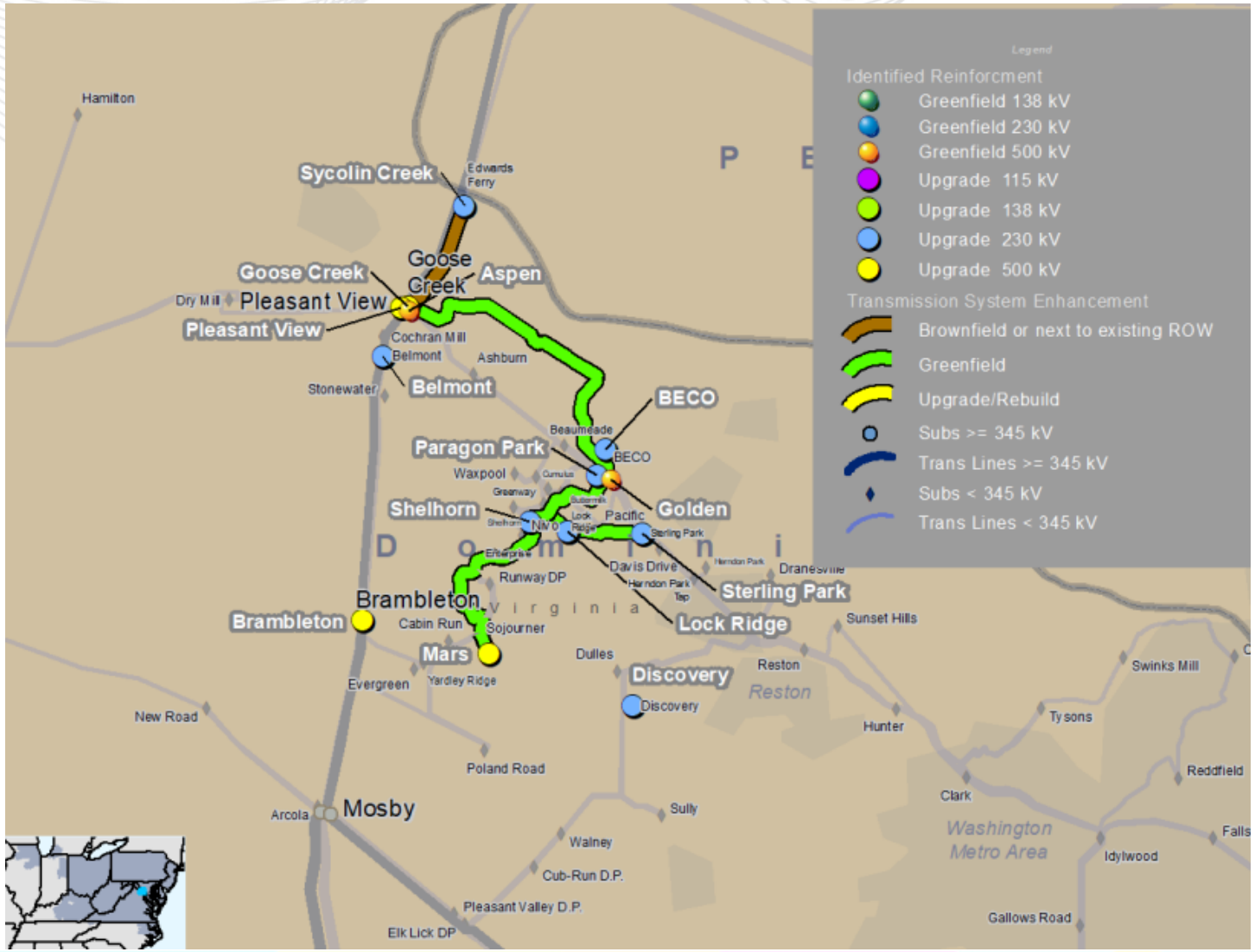

2022W3 – Preferred Solutions: Northern Virginia/Doubs Cluster

Proposed Solution: 2022-W3-516 **(Dominion)**

- Rebuild 500kV Line #514 Doubs – Goose Creek using double circuit 500kV/230kV towers on foundations. Scope covers line construction between Goose Creek and the Doubs Interconnection point, which is south of the Potomac River.
- Construct a new 500kV Line between Doubs and a new substation called Aspen. Scope covers line construction between Aspen and the Doubs Interconnection point, which is south of the Potomac River.
- Rebuild 230kV Line #203 Pleasant View – Dickerson (from Pleasant View substation and structure 203/15 within the existing ROW using double circuit 500kV/230kV towers on foundations.
- Wreck and rebuild approximately 1 mile of 230kV Line #2098 between Pleasant View and Structure 2098/9, where Line 2098 turn towards Hamilton Substation. The 1 mile portion will share the new double circuit 500/230kV towers with Line 514, which is being rebuilt as part of this project.
- Relay resets/revisions at the following substations:
  - Breezy Knoll, Dry Mill, Hamilton
- Terminal equipment upgrades at the following substations:
  - Goose Creek, Pleasant View, Edwards Ferry
- Replace overdutied breakers at Loudoun, Ox, Pleasant View.

Estimated Cost: $61.72 M

Required IS Date: 6/1/2027
Projected IS Date: 12/1/2027

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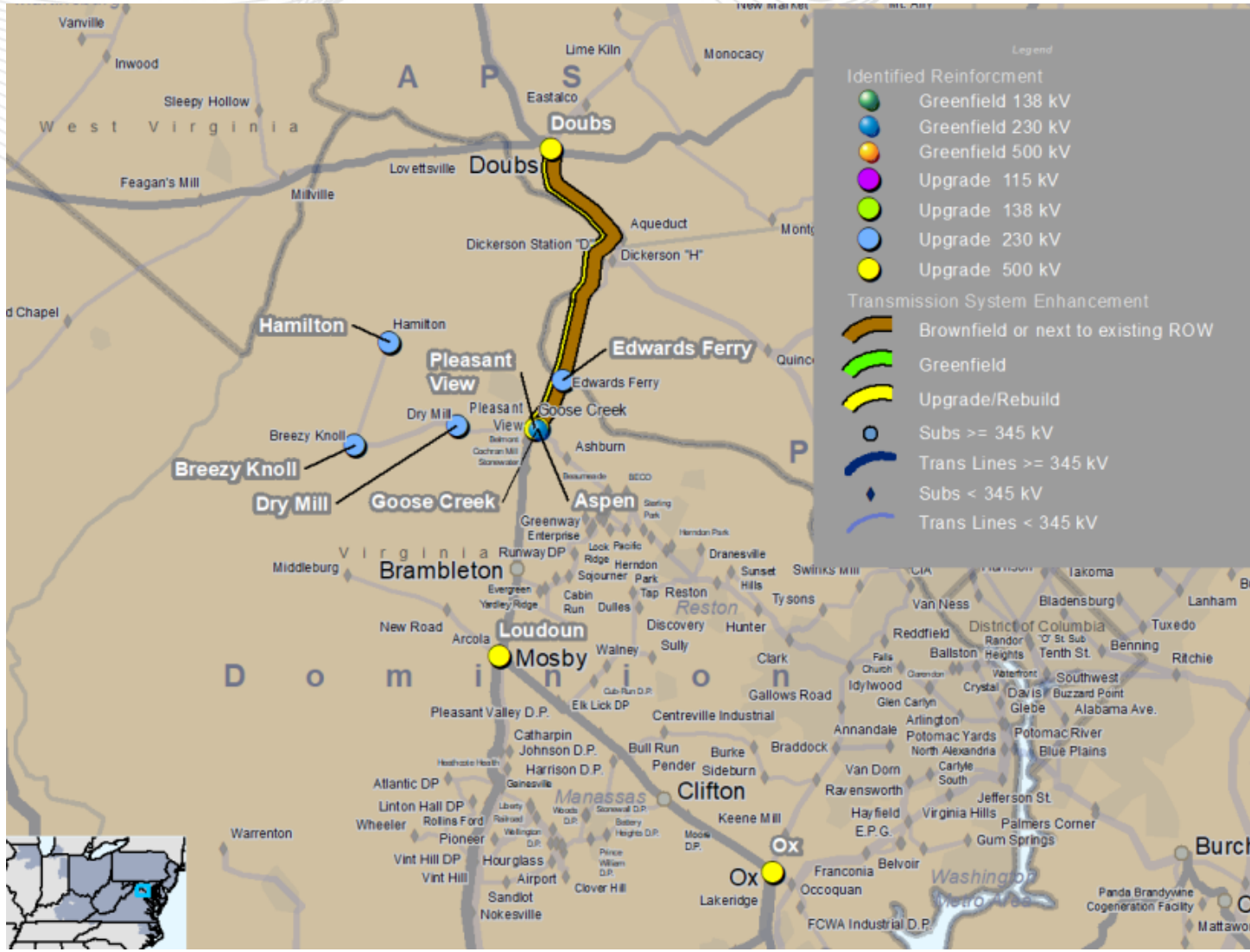

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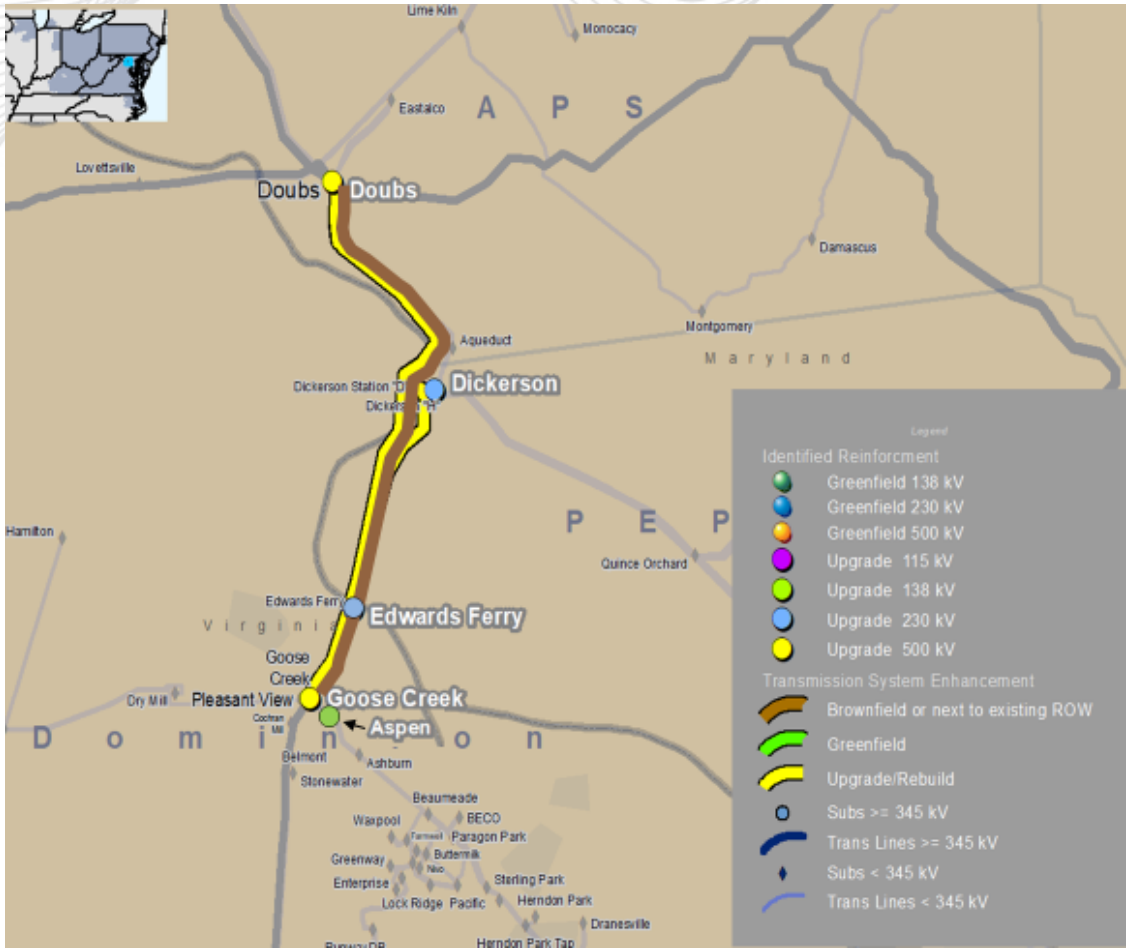
2022W3 – Preferred Solutions: Northern Virginia/Doubs Cluster

Exelon:2022-W3-344/660

- Exelon portion of the New 500 kV Doubs to Goose Creek utilizing Existing Exelon ROW
  - Rebuild 7.26 miles of existing 230 kV circuit from Dickerson Station H to Ed's Ferry area to accommodate the new 500 kV circuit between Doubs and Goose Creek. The new structure will carry both 500 kV and the 230 kV from Dickerson Station H to Ed's Ferry circuits. (**Exelon**)
    - 500 kV New Rating 4357SN/4357SE/WN5155/2155WE MVA
    - 230 kV New Rating 1618SN/1867SE/WN1702/1951WE MVA
  - Reconfigure Dickerson H 230 kV Substation and upgrade terminal equipment. (**Exelon**)



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Proposed Cost Estimate: $66.4 M

Required In-Service Date : 6/1/2027

Projected In-Service Date : 2028-2030

2022W3 – Preferred Solutions: Northern Virginia/Doubs Cluster

- **FirstEnergy:2022-W3-837 (Existing Doubs to Goose Creek 500 kV rebuild and New Doubs to Aspen 500 kV line)**
  - **Rebuild 500kV Line #514 from Doubs – Goose Creek 500 kV line**. The Doubs – Goose Creek 500 kV Line will be rebuilt and the Doubs - Dickerson 230 kV will be relocated and underbuilt on the same structure - **(FE Cost Estimate: $87.7M)**
  - **New Doubs to Aspen 500 kV line -** Aspen Substation is not yet constructed but is a component in Dominion's proposal 2022-W3-692. The Doubs - Aqueduct and Aqueduct - Dickerson 230 kV lines will be rebuilt and attached on the same structures. - **(FE Cost Estimate: $115.6M)**
  - **Doubs Substation work** - Re-terminate the rebuilt Doubs – Goose Creek 500 kV line in its existing bay, Terminate the new Doubs – Aspen 500 kV line in the open bay at Doubs, Replace three 500 kV breakers, Replace 500 kV terminal equipment including disconnect switches, CTs and substation conductor & Replace relaying - **(FE Cost Estimate: $31.7M)**

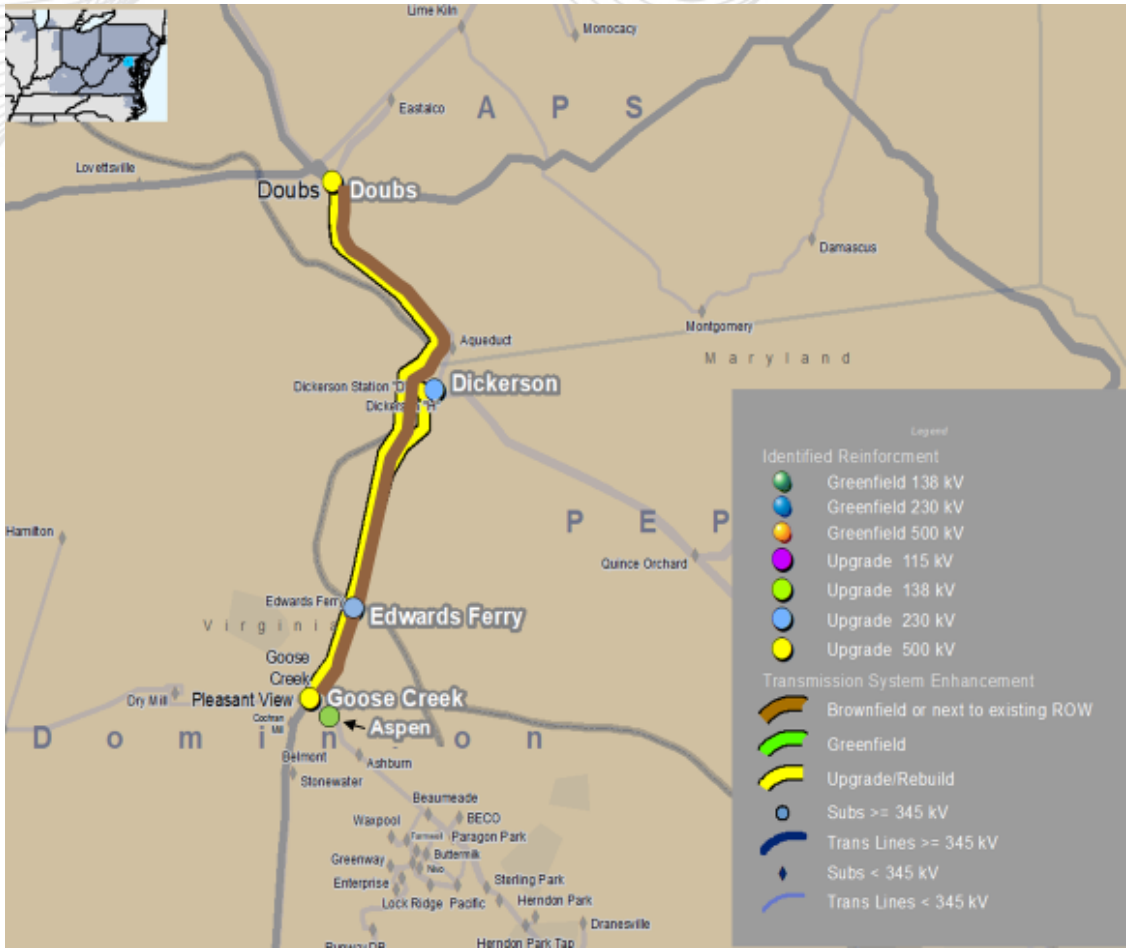
Preliminary Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
Doubs – Goose Creek 500 kV Rebuild Doubs – ASPEN 500 kV	4357/4357/5155/5155

Estimated Cost: $235M

Required IS Date: 6/1/2027

Projected IS Date: 6/1/2030



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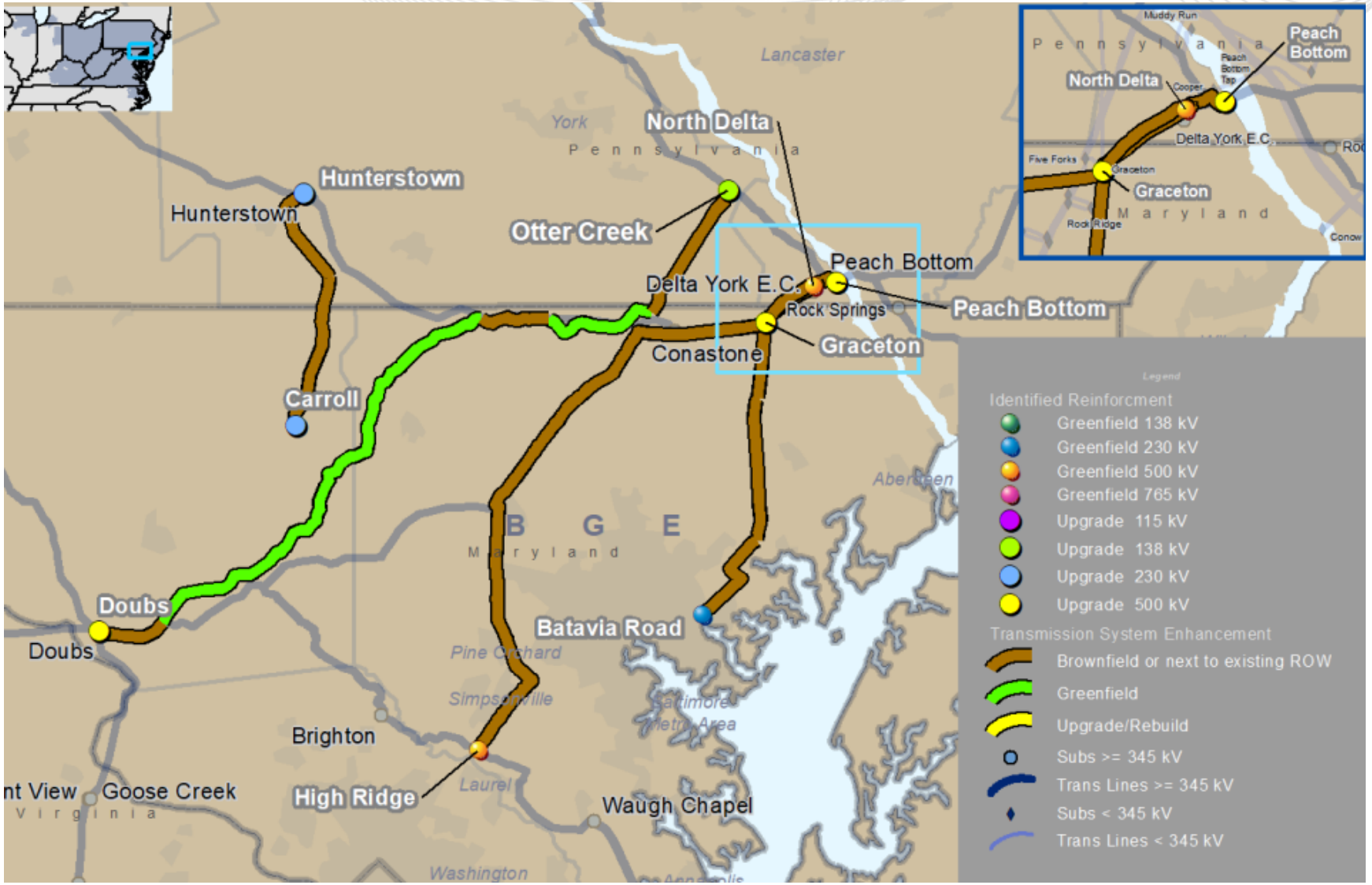
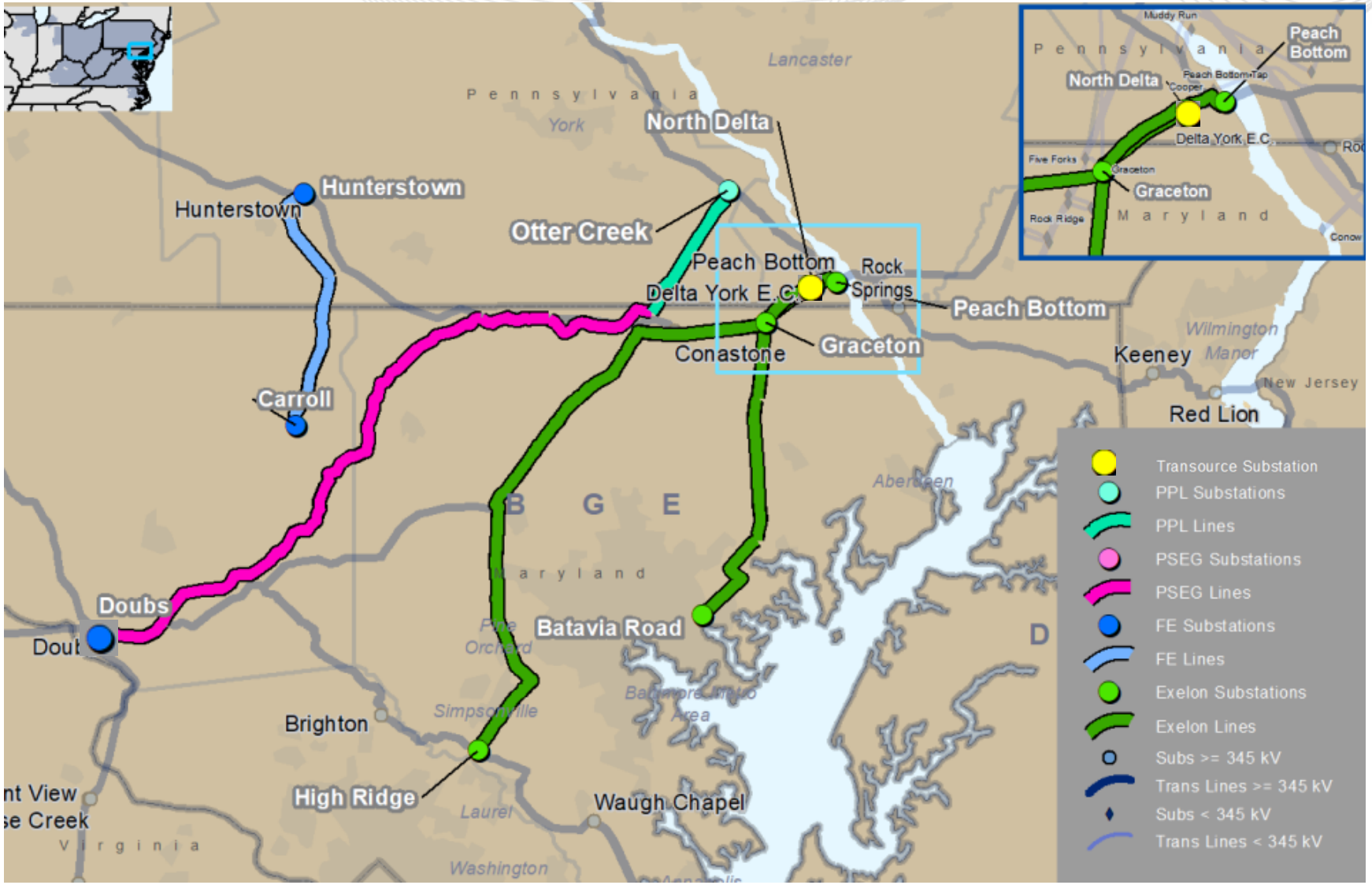
2022W3 – Preferred Solutions: East Cluster



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.*

2022W3 – Preferred Solutions: East Cluster by Designated Entity



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

Summary of Proposal Clusters - East

- Seven entities submitted several proposals to address the East cluster violations including the Hunterstown area
- PJM evaluated various combinations of the proposals/components.
- PJM finalized the study and identified the most effective solution
- The solution consists of Regional and local projects including:
  - Three new 500 kV substations and one new 230 kV switching station
  - Three new 500 kV transmission lines
  - Rebuilding of one 500 kV transmission line
  - Three new 230 kV transmission lines

Preferred Proposals to Address Clusters - East

Exelon:2022-W3-344/660

Regional Substation Projects

- Expand North Delta 500 kV substation (scope beyond that proposed under BS De-Activation)
  - The 2022 W3 RTEP requires an expansion of the North Delta 500 kV substation to accommodate the termination of the new 500 kV lines as well as reconfiguration of the Peach Bottom substation
  - Expand the North Delta 500 substation to include four bay breaker and half configuration
- Build High Ridge 500 kV substation (cut into Brighton – Waugh Chapel 500 kV line)
  - Three bay breaker and half configuration
  - Two 500/230 kV transformers
  - Replace terminal equipment at both Brighton and Waugh Chapel

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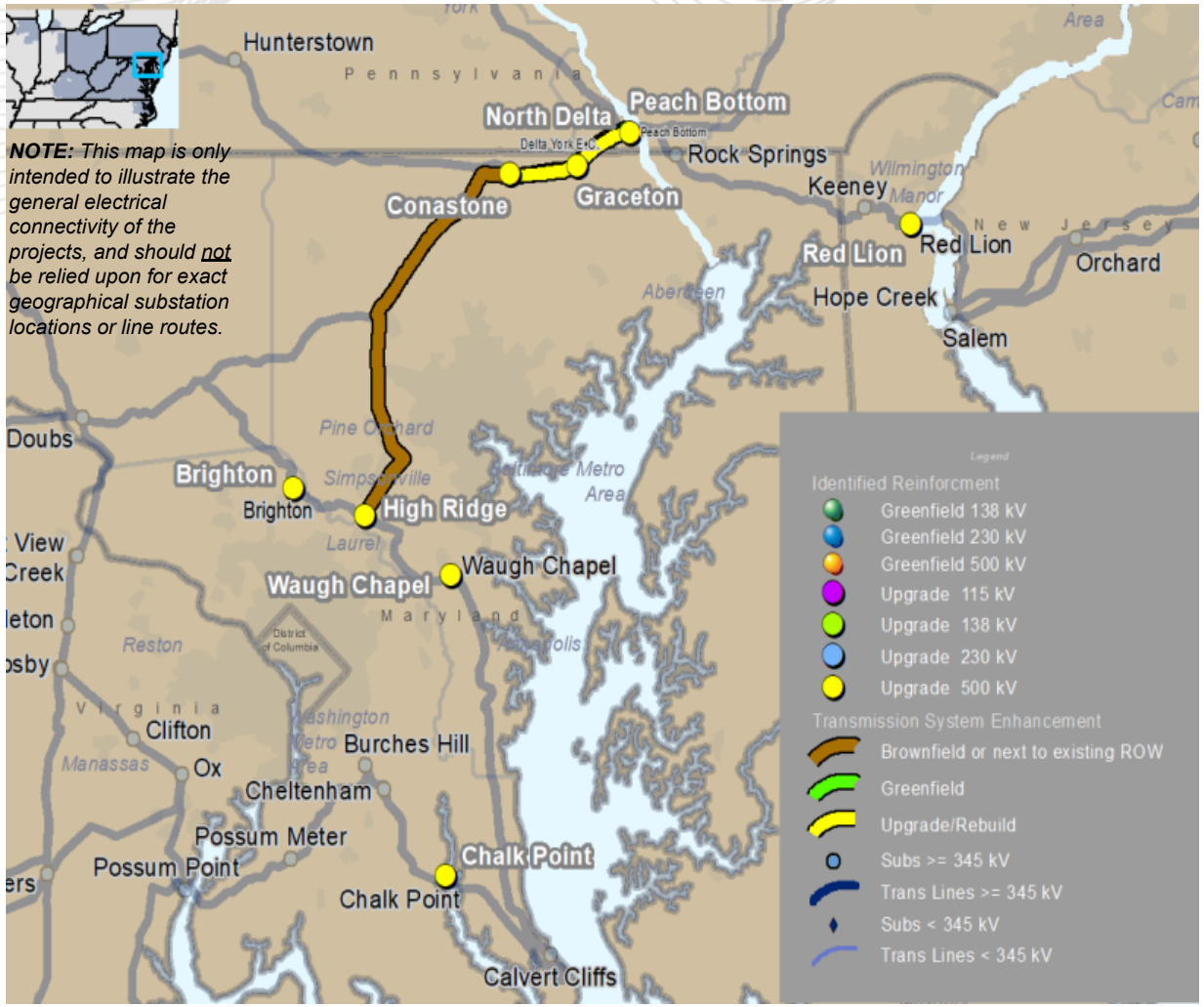

Preferred Proposals to Address Clusters - East

Exelon:2022-W3-344/660

Regional Transmission Projects

- Build new 500 kV lines from Peach Bottom area to BGE utilizing existing ROW
  - Build new Peach Bottom South - North Delta 500kV line – cut in to Peach Bottom tie #1 and extending line to North Delta (~1.25 miles new ROW)
    - New Rating - 4503SN/5022SE/5206WN/5802WE MVA
  - Rebuild 5012L (existing Peach Bottom – Conastone) 500 kV line on single circuit structures within existing ROW and cut into North Delta 500 kV and Gracetone 500 kV stations.
    - New Rating - 4503SN/5022SE/5206WN/5802WE MVA
  - Build new North Delta – High Ridge 500 kV line. (~65 miles)
    - New Rating - 4503SN/5022SE/5206WN/5802WE MVA

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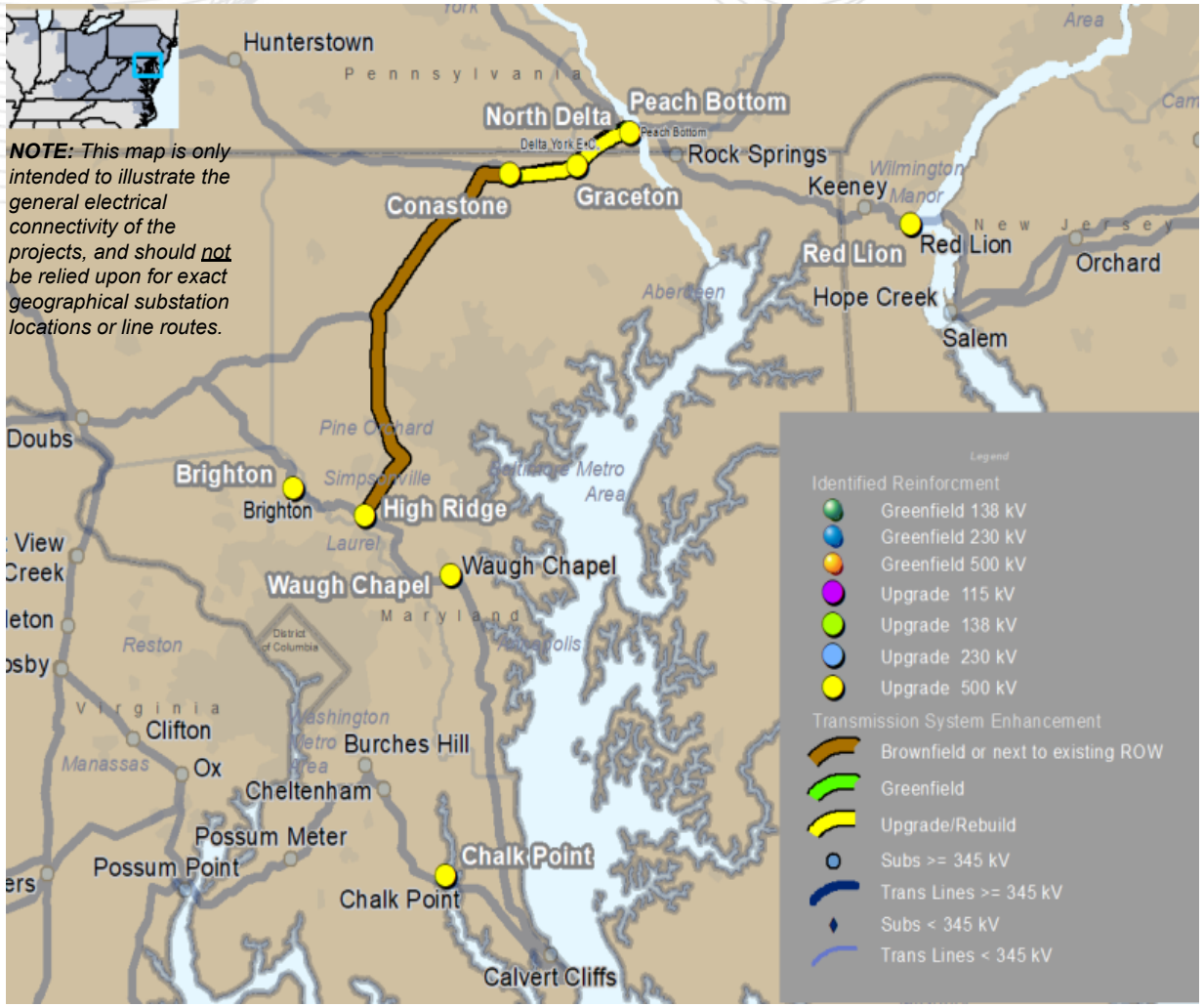


Preferred Proposals to Address Clusters - East

Exelon:2022-W3-344/660

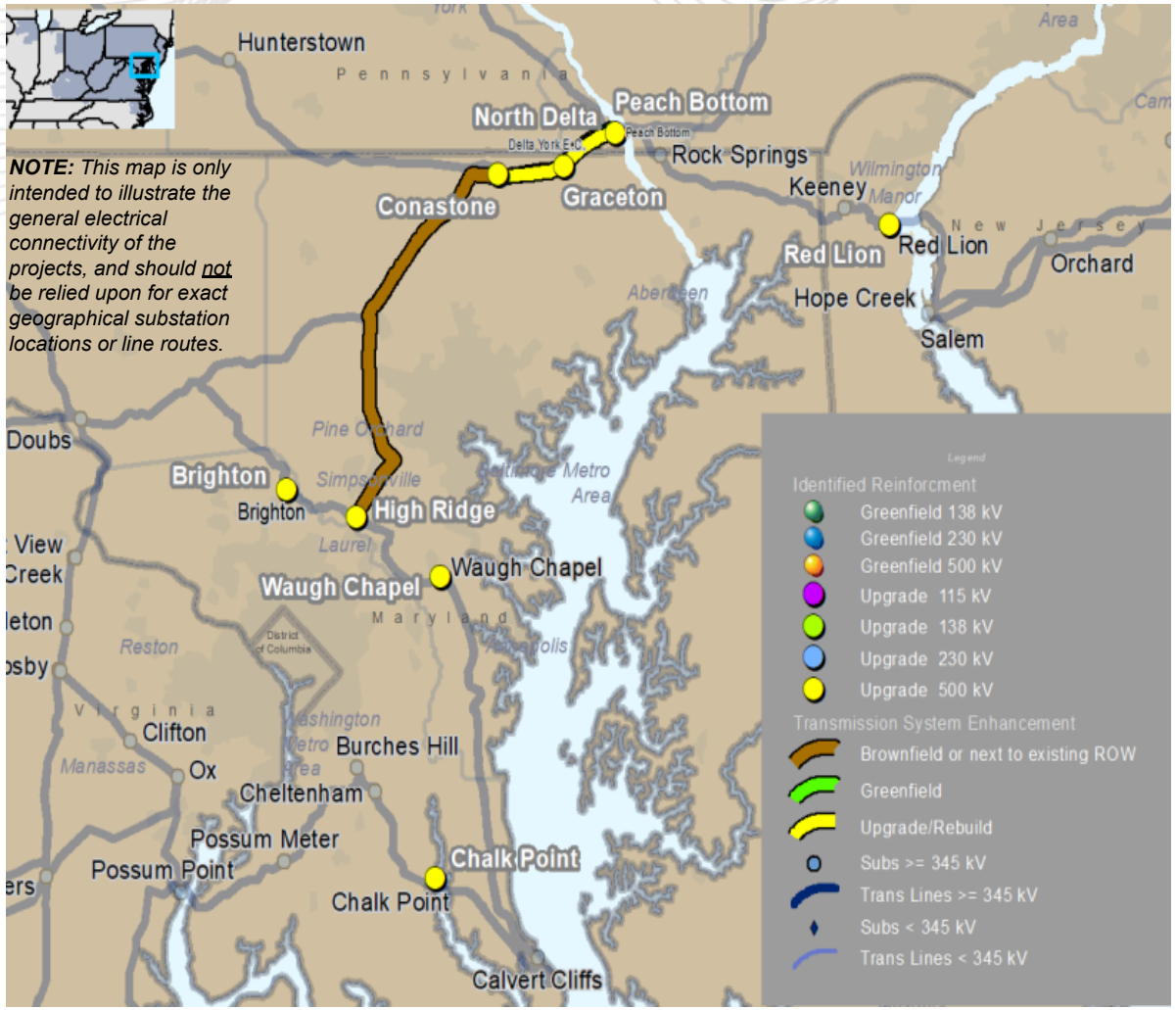
Additional Exelon Upgrades to address the East Cluster

- Conastone - Brighton 500 kV (5011 circuit) - Replace terminal equipment limitations at both Conastone and Brighton 500 kV –(New Rating 2920SN/3598SE/3594WN/4264WE)
- Brighton - Waugh Chapel 500kV (5053) - Replace terminal equipment limitations at Brighton 500kV –(New Rating 3498SN/4070SE/4014WN/4010WE MVA)
- Chalk Point - Cheltanham 500 kV (5073) - Replace relay at Chalk Point 500 kV –(New Rating – 2670SN/3099SE/3064WN/3567WE MVA)
- Conastone - Peach Bottom 500 kV (5012 circuit)- Upgrade (2) existing 500 kV breakers at Conastone from 4000A to 5000A. (New Rating - 4503SN/5022SE/5206WN/5802WE MVA)
- Peach Bottom 500 kV – Reconfigure and upgrade several terminal/substation equipment at both North and South Peach Bottom 500 kV substations
- Red Lion - Hope Creek 500 kV - Replace terminal equipment at Red Lion (New Rating – 2598SWN/SWE MVA)
- Install 250 MVAR at Graceton 230 kV

Proposed Cost Estimate: $781 M

Required In-Service Date : 6/1/2027

Projected In-Service Date : 2028-2030



Preferred Proposals to Address Clusters - East

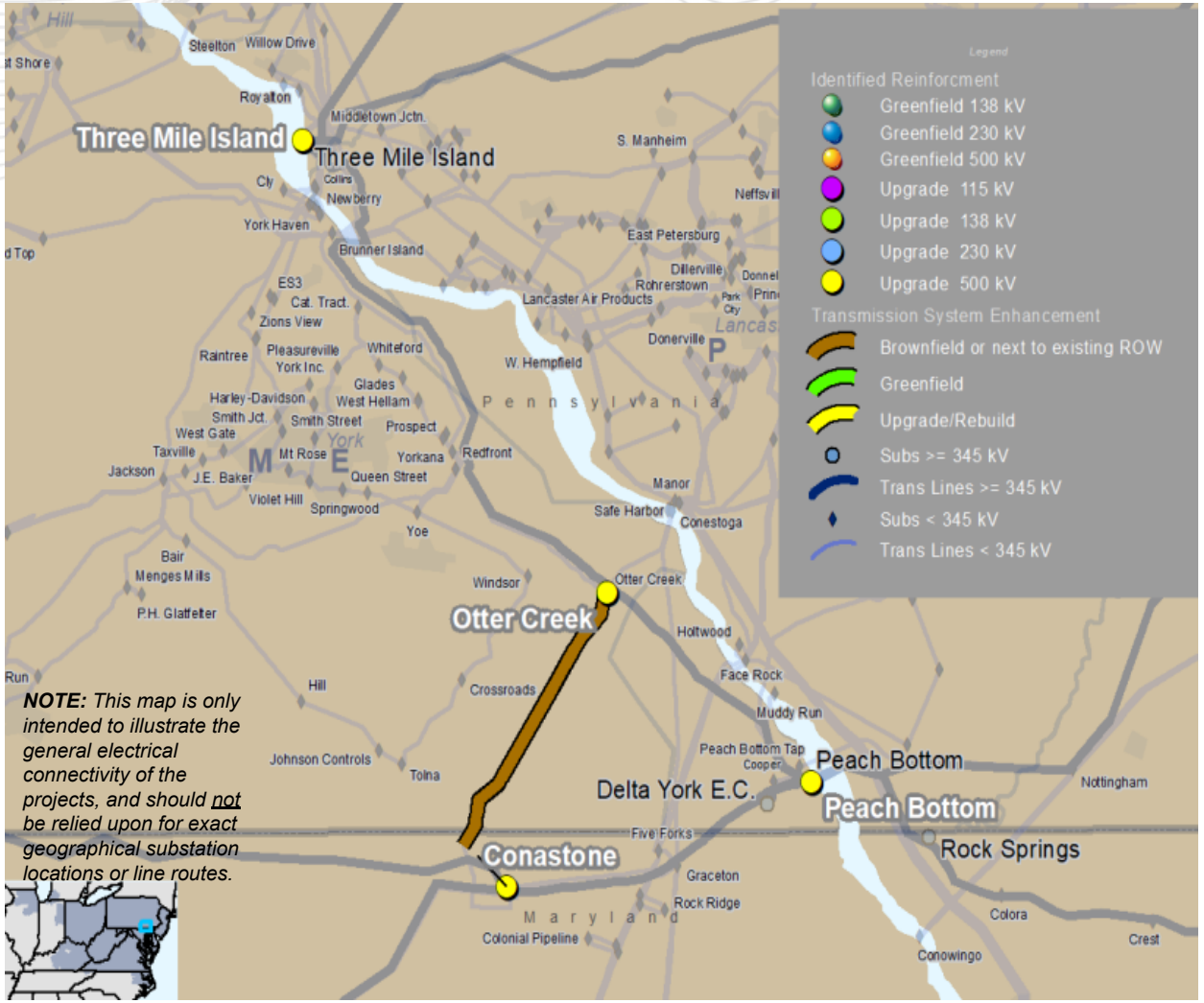
PPL:2022-W3-374

- Build New Otter Creek 500 kV switching station – cut into Peach Bottom – TMI 500 kV line
  - Two bay three breaker configuration
- Build New 500kV AC line from the new Otter Creek substation – towards Conastone station fence – Conastone demarcation point (~17 miles)
  - Rebuild the existing Otter Creek - Conastone 230 kV line to become a double-circuit 500 and 230 kV line. The existing line is owned by PPL and BGE will share responsibility.
    - New Rating - 4398SN/5237SE/4762WN/5609WE MVA
- Upgrade terminal equipment at Peach Bottom and TMI substations
  - 2644SN/3016SE/2917WN/3250WE MVA

Proposed Cost Estimate: $145M

Required In-Service Date : 6/1/2027

Projected In-Service Date : 6/1/2027



Preferred Proposals to Address Clusters - East

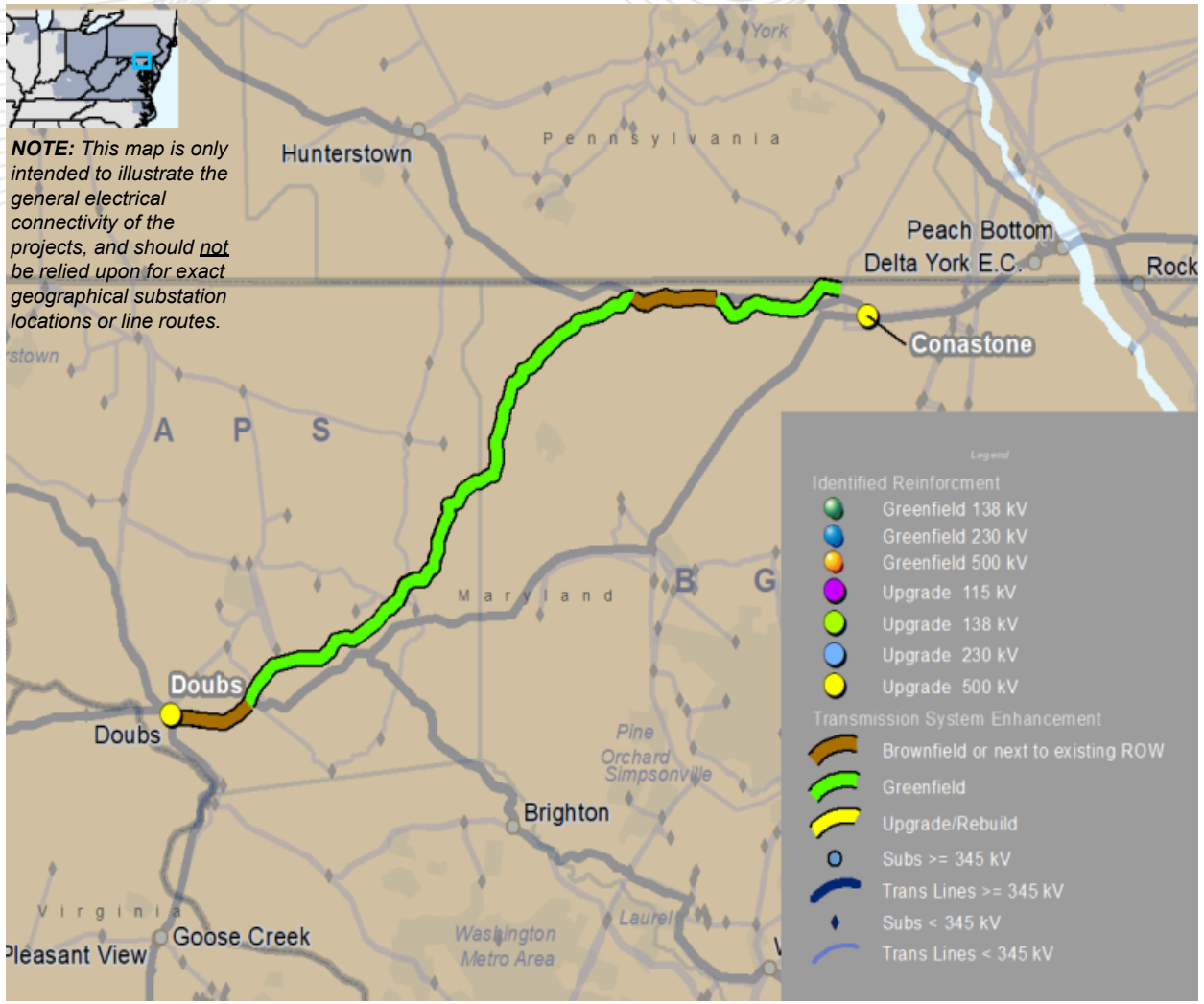
PSEG: 2022-W3-637

- Build new 500kV AC line from the Conastone demarcation point with PPL Otter Creek line to – Doubs station (~40 miles)
  - Construct a 500kV overhead AC line between the Conastone demarcation point and the Doubs Substations
    - New Rating - 3341SN/4156SE/3759WN/4595WE MVA
  - The 500 kV line will tie into the PPL proposed Otter Creek – Conastone, bypassing the Conastone station
  - Reconfigure Doubs 500 kV station and upgrade terminal equipment to terminate new line

Proposed Cost Estimate: $447 M

Required In-Service Date : 6/1/2027

Projected In-Service Date : 6/1/2027



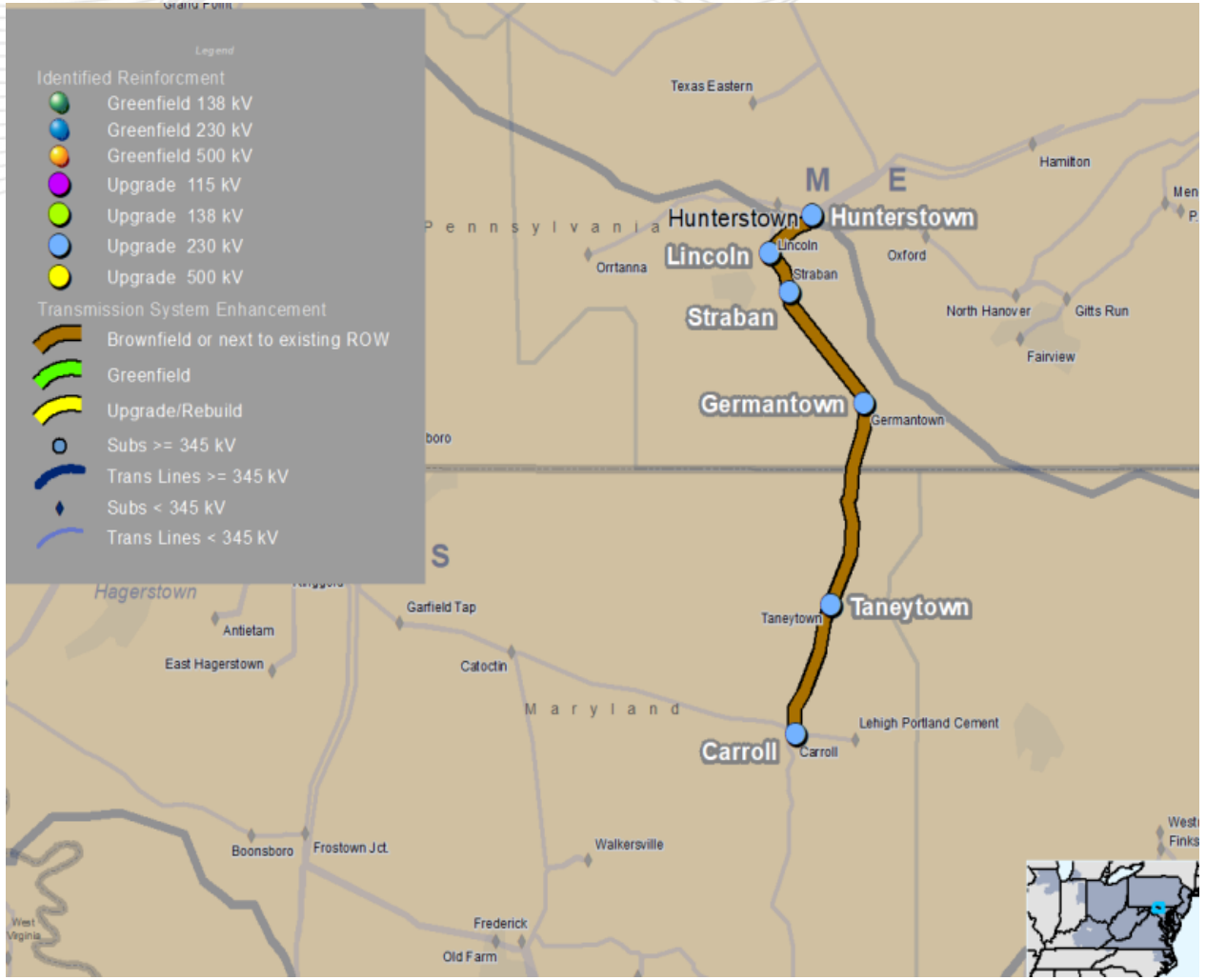
Preferred Proposals to Address Clusters - East

FE: 2022-W3-837

Build new 230 kV AC circuit from Hunterstown - Carroll

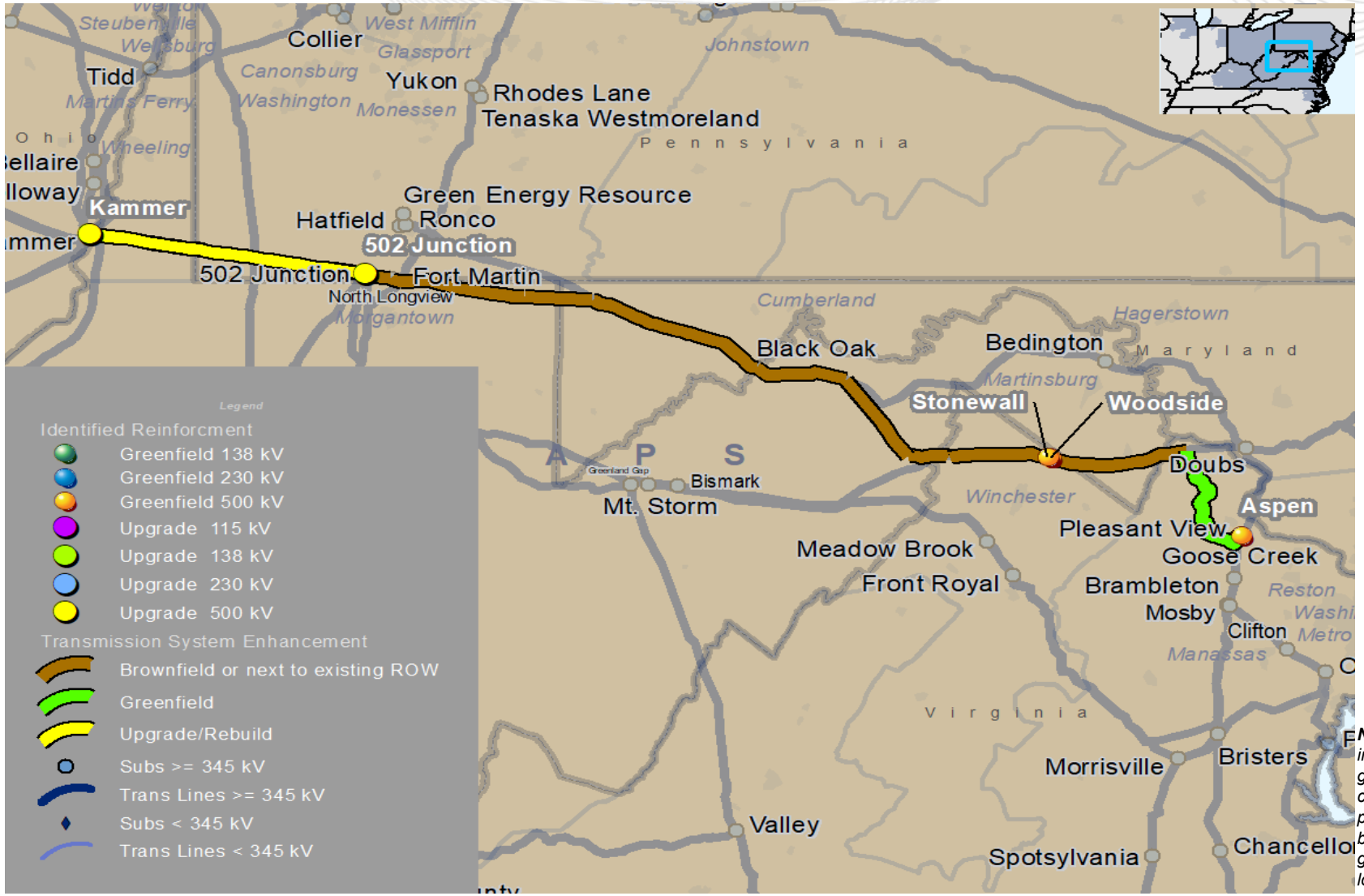
- Rebuild the existing Hunterstown – Carroll 115/138 kV Corridor as Double Circuit using 230kV construction standards
  - 230kV New Rating – 726SN/890SE/824WN/1056WE MVA
  - 115kV New Rating – 363SN/445SE/412WN/528WE MVA
- Reconductor Lincoln – Orrtanna 115 kV Line
  - New Rating- 232SN/282SE/263WN/334WE MVA
- Fayetteville – Grand Point 138 kV - Replace line trap at Grand Point 138 kV
  - New Rating – 195SN/258SE/280WN/368WE MVA
- Reid - Ringgold 138 kV - Replace line trap, substation conductor, breaker at Ringgold, relaying and CTs
  - New Rating – 308SN/376SE/349WN/445WE MVA
- Cancel b3768 (Rebuild/Reconductor the Germantown - Lincoln 115 kV Line.) (Cost: $17.36M)

Proposed Cost Estimate: $**137M**
Required In-Service Date : **6/1/2027**
Projected In-Service Date : 2028-2030



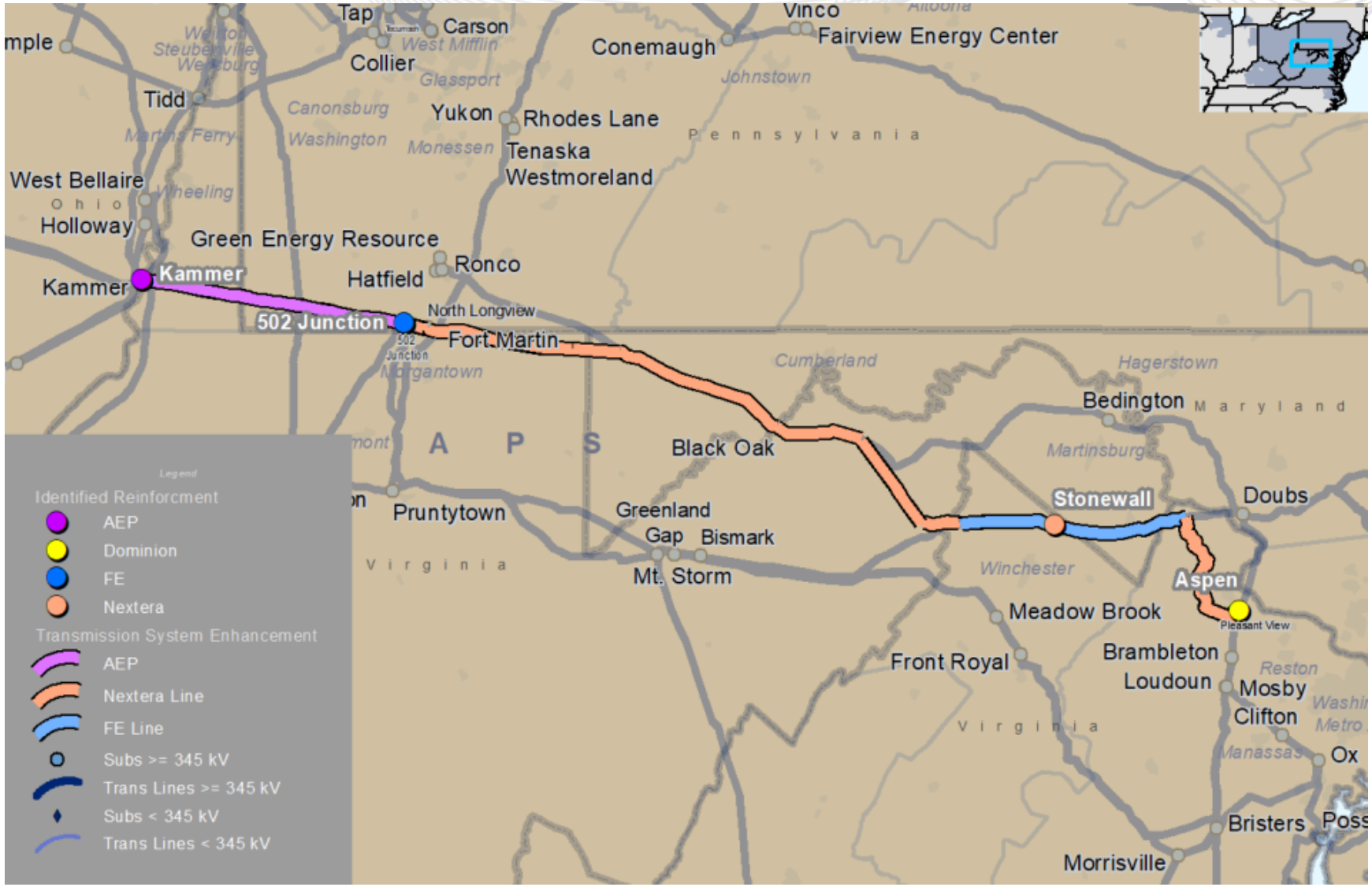
NOTE: *This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.*

2022W3 – Preferred Solutions: West Cluster



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.*

2022W3 – Preferred Solutions: West Cluster By Designated Entity



R3: Map updated to highlight scope of FE west and east of Stonewall

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.*

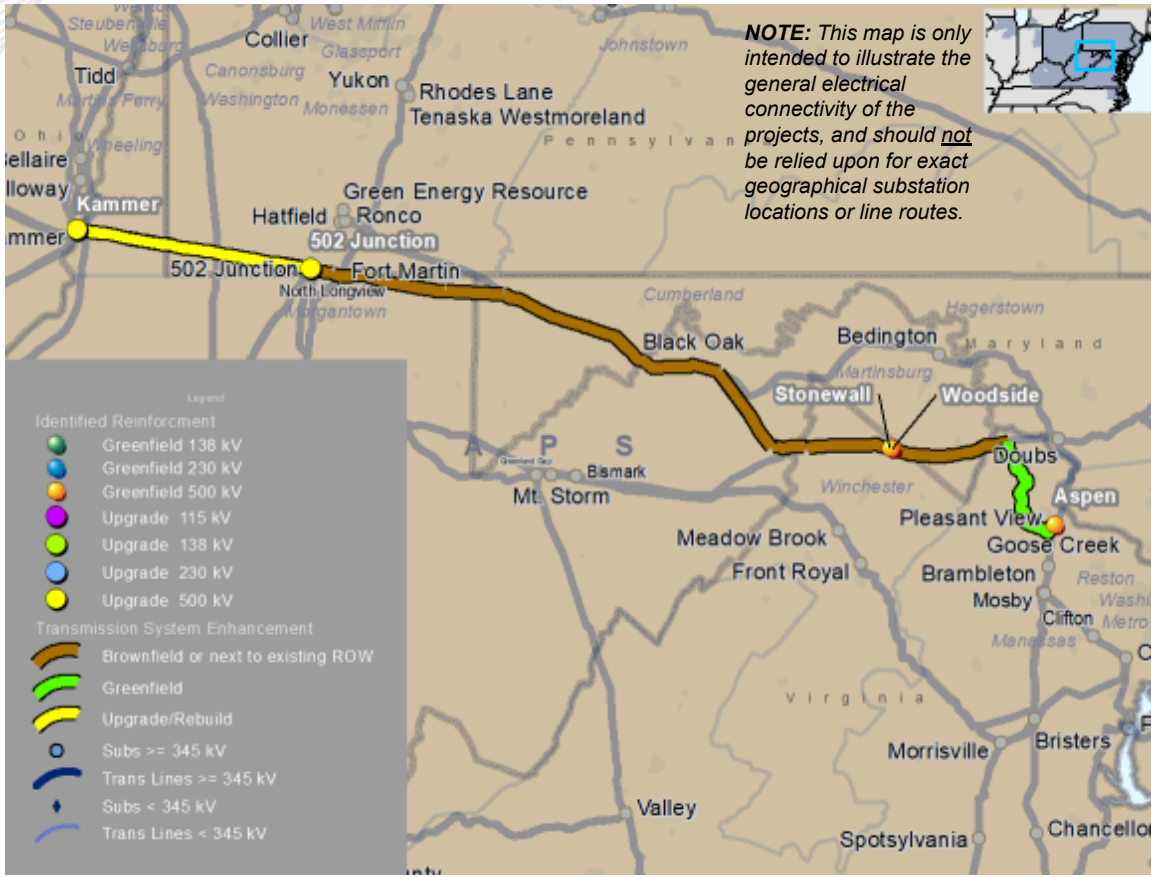
Preferred Proposals to Address Clusters - West

- **NextEra:2022-W3-853** (bypass Black Oak, terminate at Aspen instead of Gant)
  - New 500kV line from existing 502 Junction substation to New Stonewall/Woodside substation **(bypass Black Oak) (NextEra & FE) - (Cost Estimate: $345.40M)**
  - New Stonewall/Woodside substation adjacent to existing Stonewall 138 kV substation. **(NextEra)** (**Cost Estimate: $125.30M**)
    - Loop in Bismark to Doubs 500 kV line.
    - Two 500/138 kV transformers
    - Two 150 MVAR Cap banks and one +500/-300 MVAR STATCOM
  - New 500kV transmission line from new Woodside substation to Aspen substation – (**NextEra & FE**)**(Cost Estimate: $123.17M)**
  - Aspen substation work to terminate new NextEra 500 kV line **(Dominion**) (**Cost Estimate : $13.82M)**
  - Combined FE transmission line cost is approximately $341M

Preliminary Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
502 Jct – New Stonewall –ASPEN 500 kV	4295/4357/5066/5196

R3: highlighted scope for FE part of the NEET 853 proposal



Preferred Projects to Address Clusters – West

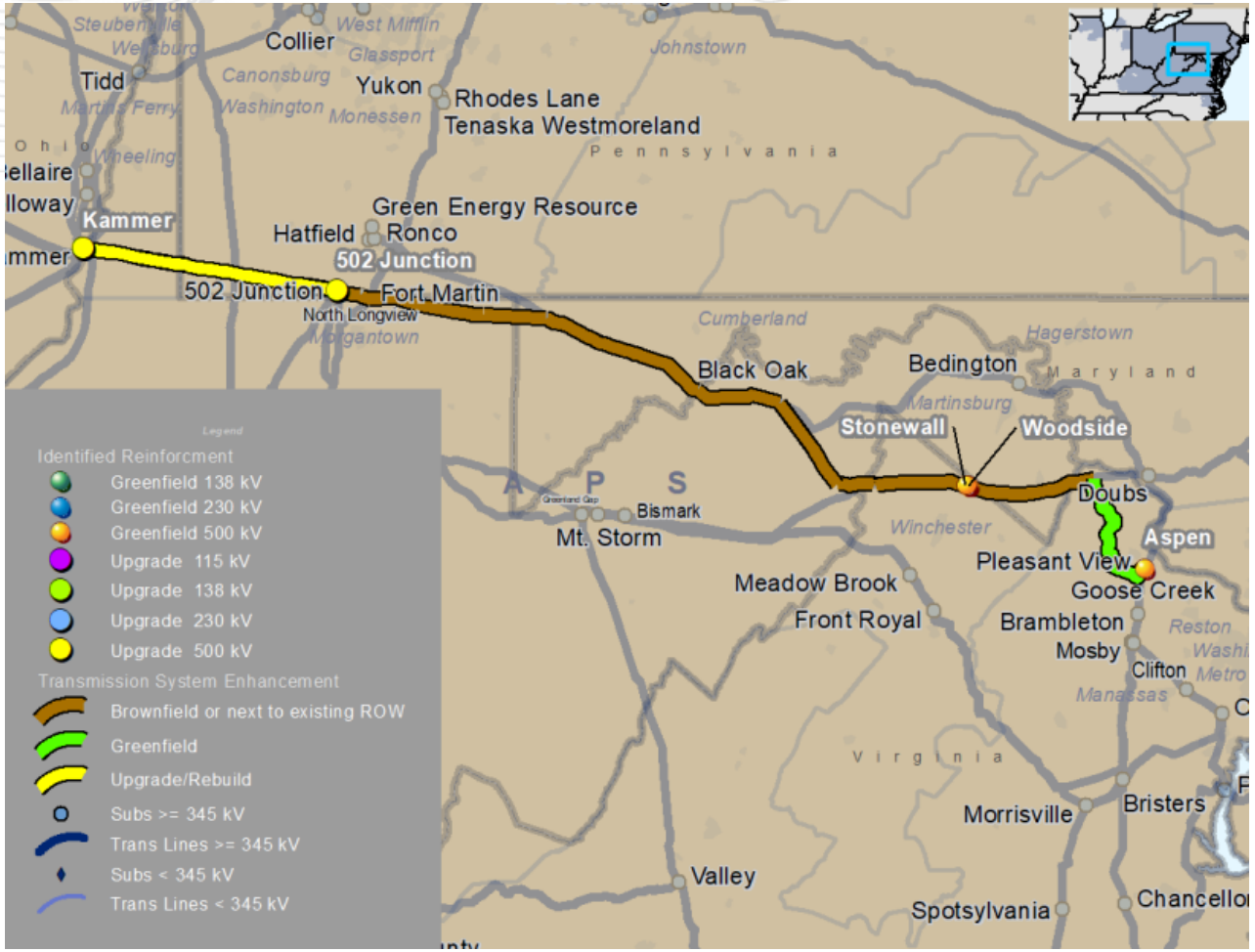
- Kammer to 502 Junction 500kV line: Conduct LIDAR Sag Study to assess SE rating and needed upgrades (**AEP) (Cost Estimate: $0.1M)**

Existing Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
502 Jct – Kammer	3173/3173/3928/4030

Preliminary Facility Ratings:

Branch	SN/SE/WN/WE (MVA)
502 Jct – Kammer	3204/3729/3928/4140



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.*

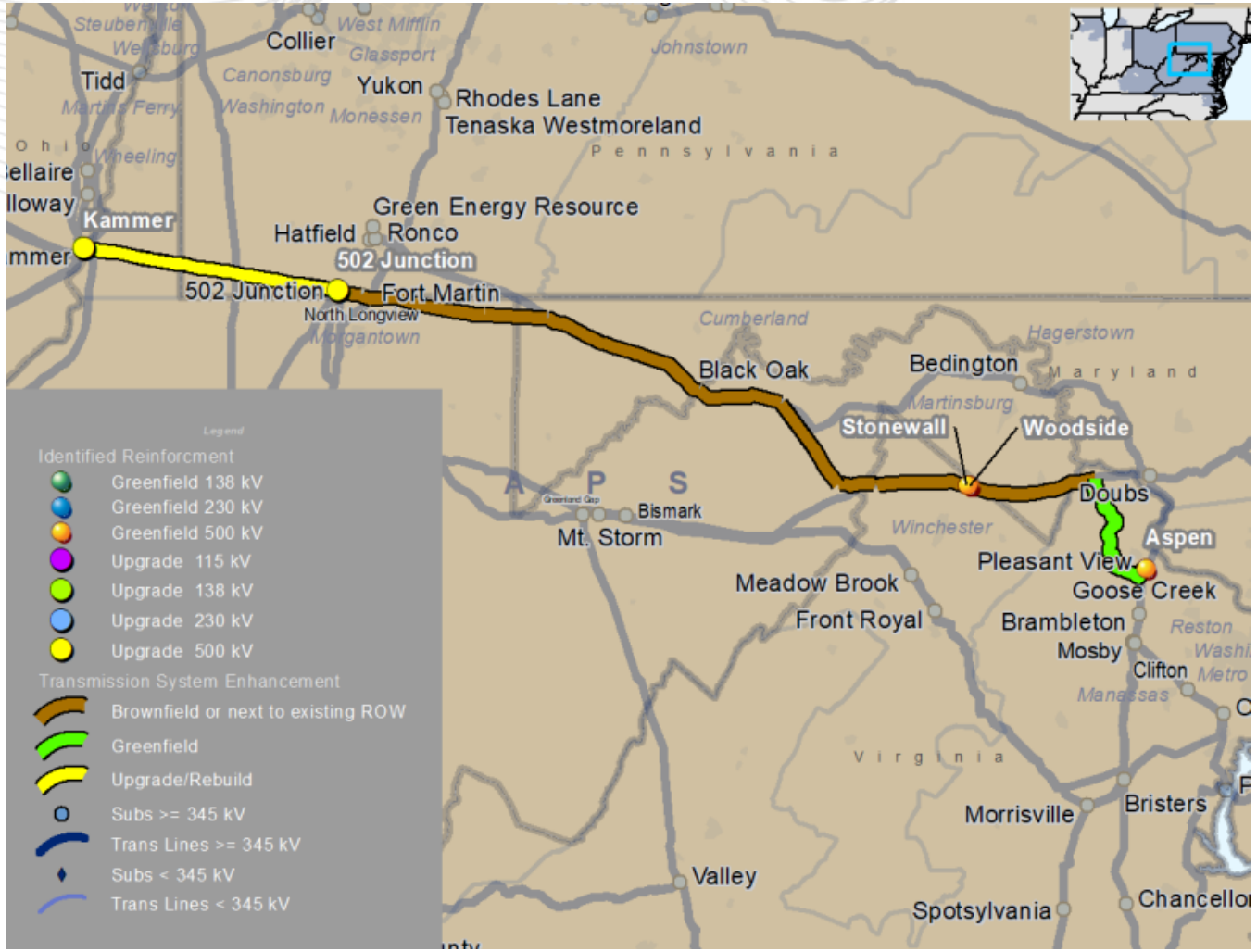
Preferred Projects to Address Clusters - West

- **NextEra:2022-W3-853 (PJM Modified)**
  - Stonewall 138 kV substation two 138kV breaker expansion - **(FE Cost Estimate: $8.3M) (Incumbent)**
  - 502 Junction substation two 500 kV circuit breaker expansion - **(FE Cost Estimate: $30.6M) (Incumbent)**

Estimated Cost: $**646.69** M

Required IS Date: 6/1/2027

Projected IS Date: 6/1/2027



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

- Posted window case based on 2027 topology
- Considered impacts to existing breakers in 11 TO areas

	Over Duty Bus (Qty)						Over Duty CBs	Maximum Fault Duty (kA)						
Scenario Description	115 kV	138 kV	230 kV	345 kV	500 kV	765 kV	Total	765 kV	500 kV	345 kV	230 kV	138 kV	115 kV	Comment
PJM Final Selection	1	1	14	0	5	0	80	38.3	61.9	59.7	76.1	74.4	59.1	Conastone 500kV bus operating below the 52kA rated capability Peachbottom 500kV bus operating below the 63kA rated capability

APS Area - Short Circuit Upgrades

Item	BUS	BREAKER	Existing Rating (kA)	Proposed Rating (kA)	**Cost**
1	DOUBL TG 138.kV	MDT 138 OCB	19.7	40	$3.0M
2	DOUBS 500.kV	DL-55 522LIN	40	63	$10.01M
3	STONEWAL 138.kV	OPS	40	63	$3.0M
					$16.01M

Dominion Area - Short Circuit Upgrades

Item	BUS	BREAKER	Existing Rating (kA)	Proposed Rating (kA)	Cost
1	ASHBURN 2 230.kV	SC432	50	80	$0.5M
2	BEAUMEADE 230.kV	227T2152	63	80	$0.5M
3	BECO 230.kV	215012	50	80	$0.5M
4	BECO 230.kV	H12T2150	50	80	$0.5M
5	BELMONT 230.kV	227T2180	63	80	$0.5M
6	BRAMBLETON 230.kV	20102	63	80	$0.5M
7	BRAMBLETON 230.kV	20602	63	80	$0.5M
8	BRAMBLETON 230.kV	204502	63	80	$0.5M
9	BRAMBLETON 230.kV	209402	63	80	$0.5M
10	BRAMBLETON 230.kV	201T2045	63	80	$0.5M
11	BRAMBLETON 230.kV	206T2094	63	80	$0.5M
12	BRAMBLETON 230.kV	2172T2183	63	80	$0.5M
13	GAINESVILLE 230.kV	216192	40	80	$0.5M
14	IDYLWOOD 230.kV	20212	40	80	$0.5M
15	IDYLWOOD 230.kV	20712	40	80	$0.5M
16	LOUDOUN 230.kV	204552	63	80	$0.5M
17	LOUDOUN 230.kV	217352	63	80	$0.5M
18	OX 230.kV	22042	63	80	$0.5M
19	OX 230.kV	24342	63	80	$0.5M
20	OX 230.kV	24842	63	80	$0.5M

Continued on next slide

Dominion Area - Short Circuit Upgrades

Item	BUS	BREAKER	Existing Rating (kA)	Proposed Rating (kA)	Cost
21	OX 230.kV	220T2063	63	80	$0.5M
22	OX 230.kV	243T2097	63	80	$0.5M
23	OX 230.kV	248T2013	63	80	$0.5M
24	OX 230.kV	H342	63	80	$0.5M
25	PARAGON PARK 230.kV	208132	63	80	$0.5M
26	PARAGON PARK 230.kV	215032	63	80	$0.5M
27	PARAGON PARK 230.kV	2081T2206	63	80	$0.5M
28	PARAGON PARK 230.kV	2150T2207	63	80	$0.5M
29	RESTON 230.kV	264T2015	40	80	$0.5M
30	STONEWATER 230.kV	20662-1	63	80	$0.5M
31	STONEWATER 230.kV	20662-2	63	80	$0.5M
32	STONEWATER 230.kV	217862-1	63	80	$0.5M
33	STONEWATER 230.kV	217862-2	63	80	$0.5M
34	WAXPOOL 230.kV	214922-5	50	80	$0.5M
35	WAXPOOL 230.kV	214922-6	50	80	$0.5M
36	WAXPOOL 230.kV	216622-5	50	80	$0.5M
37	WAXPOOL 230.kV	216622-6	50	80	$0.5M
					$18.5M

Summary of Selected Projects and Rationale

Project Area	Proposal ID	Entity	Key Facilities Included	Reason for Selection
East	344	PECO	New Peach Bottom - Graceton 500 kV (PECO) New Peach Bottom - North Delta - Highridge 500 kV (PECO) Rebuild 5012: Peach Bottom - North Delta - Graceton -Conastone (PECO) New North Delta - Cooper 230 kV	Addresses both 2027 and 2027/28 needs and offers robust transmission solution by debottlenecking the Peach Bottom-Conastone 500kV path Efficiently utilizes existing (incumbent owned ROW) North Delta expansion allows for utilization of Calpine-PB 500kV line and use of existing 230kV ROW for 500kV development and offers equipment and cost efficiencies Limitts the number of additional transmission line ROWs Provides needed transmission capability to both the Northern Virginia and BGE Systems Cost effective
	660	PEPCO	Graceton 500 kV Expansion New Peach Bottom - Graceton 500 kV (BGE) Rebuild 5012: Peach Bottom - North Delta - Gracetone -Conastone (BGE)	
	b3780.6	BGE	Build Granite substation + Statcom. New STATCOM rating: 350 MVAR Add 4x 230 kV breaker bays	
	374	PPL	New Otter Creek 500 kV (tie-in to TMI - Peach Bottom 500 kV) New Otter Creek - Conastone 500/230 kV DCT	Addresses both 2027 and 2027/28 needs and offers robust transmission solution by debottlenecking the Peach Bottom-Conastone 500kV path Efficiently utilizes existing (incumbent owned ROW) Provides needed transmission capability to Northern Virginia and helps clear capacity across the PB - Conastone - BGE corridor Offers a strong supply source towards Doubs Does not require intermediate new Susbstations along route to Doubs and limits the number of lines to be constructed along the corridor Cost effective
	637	PSEG	New Conastone - Doubs 500 kV line	Addresses both 2027 and 2027/28 needs and offers robust transmission solution by debottlenecking the Peach Bottom-Conastone 500kV path Strong Cost-Cap provisions Provides needed transmission capability to Northern Virginia, helps clear capacity across the Peach Bottom - Conastone - BGE corridor and prevents voltage collapse conditions in BGE under outage conditions Offers a strong supply source towards Doubs Does not require intermediate new Susbstations along route to Doubs and limits the number of lines to be constructed along the corridor Cost effective

Summary of Selected Projects and Rationale

Project Area	Proposal ID	Entity	Key Facilities Included	Reason for Selection
West	853	Nextera	New Woodside 500 kV substation with 500 MVAR STATCOM & Capbanks New Gant 500 KV substation Black Oak 500 kV Expansion New 502 Junction - Black Oak - Woodside - Gant 500 kV line	Superior solution addressing West to Northern Virginia transfer capability needs and provide one additional 500kV supply line directly into the Northern Virginia load center Avoids terminating additional lines at the existing Doubs Susbtation Cost effective
Dominion Data Center Alley	692	Dominion	New Aspen and Golden 500/230 kV Substation New Mars 500/230 Transformer New Aspen - Golden 500 kV and 230 kV lines New Golden - Mars 500 kV and 230 kV lines	Offers robust transmission solution in the area that adds one new 500kV circuit along the existing 500kV corridor and encompasses the load center Introduces one additional 500kV source substation at the heart of the load center Does not bottleneck the existing 500kV infrastructure in the area due to higher overhead line ratings Offers direct accessibility to the transmission infrastructure Offers a prallel 500kV path to the current 500kV circuit between Brambleton/Loudon and Goose Creek area.

Summary of Selected Projects and Rationale

Project Area	Proposal ID	Entity	Key Facilities Included	Reason for Selection
South	837	FirstEnergy	Doubs - Goose Creek 500 kV Rebuild (FE) New Doubs - Aspen 500 kV Line (FE)	Debottlenecks the existing transmission corridor between the APS and Dominion systems and allows for 2X500 kV high capacity lines Utilizes existing ROW
	516	Dominion	Doubs - Goose Creek 500 kV Rebuild (DOM) New Doubs - Aspen 500 kV Line (DOM) New Aspen Substation upgrade	This development enables the First Energy scope above (south of the Potomac River) Allows for a new substation in the area as the existing Goose Creek and Pleasant View substations are congested
	711	Dominion	Morrisville - Vint Hill - Wishing Star 500 kV Bristers - Morrisville 500 kV Rebuild Loudoun - Morrisville 500 kV Rebuild Mosby - Wishing Star 500 kV Rebuild	Needed development to provide supply to the Dominion Data Center loads under both the 2027 and 2027/28 needs Efficiently utilizes existing (incumbent owned ROW)
	231	Dominon	Morrisville Substation (230 kV 150 MVAR Cap) Wishing Star Substation (230 kV 150 MVAR Cap, 500 kV 293.8 MVAR Cap) Mars Substation (230 kV 150 MVAR Cap, 500 kV 300 MVAR STATCOM) Beaumeade Substation (230 kV 300 MVAR STATCOM)	Provides needed local VAR support to reliably serve the forecasted load in the study area (Load Center)
	74, 211, 731, 967	Dominion	Charlottesville to Hollymead 230 kV Reconductor Ladysmith CT - Fredericksburg 230 kV Rebuild Hollymead - Gordonsville 230 kV Rebuild Locks 230 kV Substation Transformer upgrade	Needed local 230kV upgrades to provide transmission system capability to serve local load on existing infrastructure (upgrades) Cost Effective Minimal new disturbances
	PJM Identified Upgrades	Dominion	Line #256 Rebuild St. Johns - Ladysmith CT 230 kV Sterling Park – Golden 230 kV Reconductor Davis Drive – Sterling Park 230 kV Reconductor	Maximizes utliziation of existing transmission system capability Cost effective

2022 Window 3 Recommended Solution

Project Area	Proposal ID	Key Facilities Included	Entity	Proposal Cost ($M)	Independent Cost ($M)	Proposed In-Service Date	Greenfield/ Brownfield
East	344	New Peach Bottom - North Delta - Highridge 500 kV (PECO) Rebuild 5012: Peach Bottom - North Delta - Graceton -Conastone (PECO)	PECO	60.90	67.55	12/1/2029	Brownfield routes
	b3780.3	Cancel West Cooper Substation scope from Brandon Shores Immediate Need Approved Projects	PECO	(60.00)	(60.00)	N/A	N/A
	b3737.47*	Enhanced North Delta 500/230 kV Substation (NJ SAA Project)	Transource	104.11	93.88	12/1/2027	Greenfield substation
	660	High Ridge 500 kV Expansion New Peach Bottom - North Delta - Highridge 500 kV (BGE) Rebuild 5012: Peach Bottom - North Delta - Gracetone -Conastone (BGE)	PEPCO	653.42	479.99	12/1/2030	Brownfield routes, substation expansion
	374	New Otter Creek 500 kV (tie-in to TMI - Peach Bottom 500 kV) New Otter Creek - Conastone 500/230 kV DCT (Conastone Bypass for 500 kV)	PPL	144.12	152.70	5/1/2027	Brownfield route, Greenfield substation
	637	New Conastone - Doubs 500 kV line	PSEG	447.28	492.50	6/1/2027	Greenfield route
	837	New Carroll - Hunterstown 230 kV line	FirstEnergy	137.45	202.30	6/1/2030	Brownfield routes
	b3768	Cancel Rebuild/Reconductor Germatown - Lincoln 115 kV project from 2022 RTEP Window Approved Projects	FirstEnergy	(17.36)	(17.36)	N/A	N/A
West	853	New Woodside 500 kV substation with 500 MVAR STATCOM & Capbanks (NextEra) New 502 Junction - Woodside - Aspen 500 kV line (NextEra/FE) Aspen 500 kV line Termination (Dominion)	Nextera FirstEnergy Dominion	646.69	1,038.75	6/1/2027	Mostly Greenfield parallel to existing ROW, Part Brownfield, Part Greenfield
South	837 516 660	Doubs - Goose Creek 500 kV Rebuild New Doubs - Aspen 500 kV Line	FirstEnergy Dominion PEPCO	336.20	378.51	12/1/2027	Brownfield routes
	711	New Morrisville - Vint Hill - Wishing Star 500 kV	Dominion	953.71	1,010.48	12/1/2027	Brownfield routes
	231	Morrisville, Wishing Star, Mars and Beaumeade Substation Reactive Upgrades	Dominion	103.80	103.80	12/1/2027	Substation upgrades
	74, 211, 731, 967	Proposed Dominion 230 kV Upgrades	Dominion	302.82	302.82	12/1/2027	Brownfield upgrades
	PJM Identified Upgrades	Line #256 Rebuild St. Johns - Ladysmith CT 230 kV Sterling Park – Golden 230 kV Reconductor Davis Drive – Sterling Park 230 kV Reconductor	Dominion	51.39	51.39	12/1/2027	Brownfield upgrades
Dominion Data Center Alley	692	New Aspen and Golden 500/230 kV Substation & Mars Station Upgrade New Aspen - Golden - Mars 500 kV and 230 kV lines	Dominion	1,058.45	1,098.96	12/1/2027	Greenfield routes & greenfield substation
Local	410	Cloverdale Breaker Reconfiguration	AEP	11.59	11.59	10/1/2026	Substation upgrades
* NJ SAA Project b3737.47 accelerated from 6/1/2029 ISD to 12/1/2027 ISD and scope updated to address 2022W3 needs			**TOTAL**	**4,934.56**	**5,407.86**		

Appendix

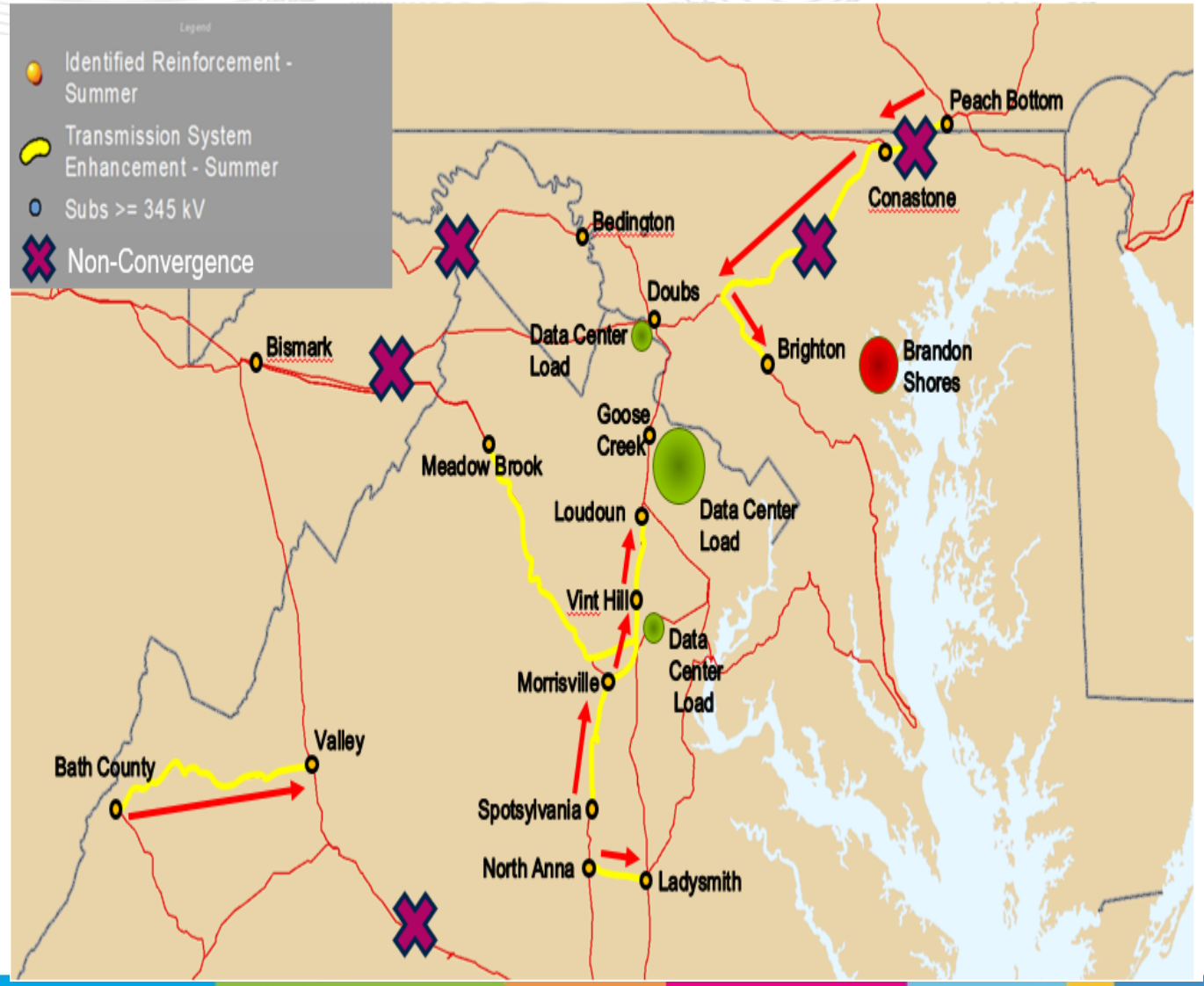
2022 RTEP W3

List of Proposal

2022W3 RTEP- High Level Summary of Drivers/Needs

- Local constraints resulting from directly serving the data center loads in APS and Dominion zones through the respective 230 kV networks and into the points of delivery:
  - Goose Creek- Ashburn – Mars - Wishing Star and Brambleton
- Regional constraints resulting from imports into load center areas (500 kV primarily):
  - Front Royal - Morrisville – Vint Hill – Loudoun/Mosby
  - Meadow Brook - Vint Hill
  - Morrisville – Bristers - Ox
  - Peach Bottom – Conastone – Brighton – Doubs
- Needed reactive power VAR reinforcements, both static and dynamic as deemed necessary, to address the reactive power needs of the system for the 2027-28 baseline scenario
- Other Local constraints result form the transfers
  - Local AEP violations
  - Local PPL violations

** The detailed flowgates are posted in [PJM - Competitive Planning Process](#) webpage



2022 RTEP W3 Submitted Proposals

#	Proposal ID	Proposing Entity	Focus Area	Project Title	Submitted Cost ($M)
1	9	AEP	Local AEP	Scottsville-Bremo Sag Study	$1.27
2	55	AEP	Local AEP	Boxwood-Scottsville 138 kV Rebuild	$104.88
3	181	AEP	Local AEP	Boxwood-Scottsville 138 kV Sag Study	$4.26
4	196	AEP	Local AEP	Glen Lyn-Peters Mountain Rebuild	$21.89
5	202	AEP	Local AEP	Cloverdale Transformer Addition	$57.29
6	234	AEP	Local AEP	Glen Lyn-Peters Mountain Sag Study	$0.80
7	410	AEP	Local AEP	Cloverdale Breaker Reconfiguration	$11.59
8	477	AEP	Local AEP	Fieldale-Franklin Rebuild	$74.89
9	524	AEP	Local AEP	Opossum Creek and New London Reactors	$8.86
10	537	AEP	Local AEP	Fieldale-Franklin Sag Study	$30.19
11	629	AEP	Local AEP	Scottsville-Bremo Rebuild	$31.31
12	856	AEP	Local AEP	Leesville-Altavista Rebuild	$28.85
13	487	AEP - Transource	East/West	Maryland & Pennsylvania Baseline Reliability Solution	$492.75
14	858	AEP - Transource	South	Stork - Flys 500kV Greenfield Line and Substations	$510.44
15	904	AEP - Transource	West/South/Northern Virginia/Doubs	Joshua Falls - Yeat 765kV Greenfield Line and Substation	$1,048.10
16	977	AEP - Transource	South	Yeat 500/230kV Greenfield Station	$232.14
17	30	Dominion	Local DOM	Charlottesville - Hollymead Line # 2054 Rebuild	$159.87
18	74	Dominion	Local DOM	Line #2090 (Ladysmith CT - Fredericksburg) Rebuild	$57.34
19	129	Dominion	South	Dominion Aggregate 500kV Proposal	$3,035.05
20	211	Dominion	Local DOM	Hollymead - Gordonsville Line # 2135 Rebuild	$54.85

2022 RTEP W3 Submitted Proposals

#	Proposal ID	Proposing Entity	Focus Area	Project Title	Submitted Cost ($M)
21	231	Dominion	Local DOM	Reactive Power VAR Reinforcements	$155.82
22	516	Dominion	East	Interregional solution- Aspen-Doubs Second 500 kV Line	$61.72
23	671	Dominion	Local DOM	Lines #541 (Front Royal to Morrisville) Rebuild	$299.03
24	692	Dominion	South	Data Center Alley Local solution - New 500 kV/230 kV Aspen-Golden & Golden-Mars lines	$1,058.45
25	704	Dominion	Local DOM	Hollymead - Gordonsville Line # 2135 Rebuild	$36.89
26	711	Dominion	South	Regional Solution - 500 kV North Anna-Wishing Star Upgrades	$1,227.84
27	731	Dominion	Local DOM	Locks Substation 230/115 kV Transformer Upgrade	$7.14
28	923	Dominion	South	Second 500 kV line from Lexington to Dooms	$232.18
29	967	Dominion	Local DOM	Charlottesville - Hollymead Line # 2054 Rebuild	$183.48
30	548	LSPower	Scenario	RTEP Window 3 Solution	$2,404.48
31	28	NextEra	East/West	Hunterstown - Doubs - Goose Creek, Black Oak - Pike - Goose Creek, Pike SVC + Cap Banks	$884.05
32	116	NextEra	West	Hunterstown - Doubs - Gant Solution	$478.87
33	175	NextEra	Scenario	Combination of PEBO 215A + WOP 1F + SOP 8E	$6,265.95
34	217	NextEra	East	North Delta - Conastone Solution	$155.99
35	255	NextEra	East/West	Hunterstown - Doubs - Gant Solution	$411.61
36	279	NextEra	West	Black Oak - Woodside - Goose Creek, Woodside SVC + Cap Banks Solution	$429.18
37	347	NextEra	West	Black Oak - Woodside - Gant, Woodside SVC + Cap Banks	$483.83
38	385	NextEra	East	New 500/230kV Bartholow substation, new 500/230kV North Delta substation, new 230kV Grisham switchyard, new 500/230kV Goram substation	$1,140.73
39	419	NextEra	East/West	Hunterstown - Doubs - Audobon - Goose Creek	$548.75
40	445	NextEra	East	Muddy Creek / Delta - Conastone / Hunterstown - Doubs - Goose Creek Solution	$637.80

2022 RTEP W3 Submitted Proposals

#	Proposal ID	Proposing Entity	Focus Area	Project Title	Submitted Cost ($M)
41	530	NextEra	East	Muddy Creek / North Delta - Conastone Solution	$166.74
42	564	NextEra	East	New 500/230kV Bartholow substation, new 500/230kV North Delta substation, new 230kV Grisham switchyard, new 500/230kV Goram substation	$876.88
43	577	NextEra	South	Front Royal - Racefield, Warrenton - Wheeler, North Anna - Lady Smith	$258.38
44	598	NextEra	Scenario	Combination of PEBO 220 + WOP 1F + SOP 8E	$2,036.47
45	631	NextEra	East	Muddy Creek / North Delta - Conastone Solution	$184.47
46	642	NextEra	West	502 Junction - Black Oak - Woodside - Gant, Woodside SVC + Cap Banks, Gant - Farmwell, Cochran Tap - Round Table	$747.31
47	663	NextEra	South	Front Royal - Racefield, Warrenton - Rixlew, Warrenton - Hourglass, Mars - Ocean Court - Davis Drive	$284.17
48	676	NextEra	West	Black Oak - Stonewall - Gant, Stonewall SVC + Cap Banks, Gant - Farmwell, Cochran Tap - Round Table Solution	$552.49
49	685	NextEra	West	Ft. Martin - Black Oak - Woodside, Woodside SVC + Cap Banks Solution	$609.78
50	719	NextEra	West	Ft. Martin - Black Oak - Pike, Pike SVC + Cap Banks Solution	$600.90
51	728	NextEra	West	Barnhart Substation, Bartholow Substation, Barnhart - Bartholow - Goose Creek solution	$385.36
52	766	NextEra	South	Front Royal - Racefield, Warrenton - Wheeler	$239.59
53	846	NextEra	East/West	Hunterstown - Doubs - Goose Creek, Black Oak - Woodside - Goose Creek, Stonewall SVC + Cap Banks	$892.94
54	853	NextEra	West	502 Junction - Black Oak - Woodside - Gant, Woodside SVC + Cap Banks	$683.55
55	948	NextEra	East	New 500/230kV Bartholow substation, new 500/230kV North Delta substation, new 230kV Grisham switchyard, new 500/230kV Goram substation, and Keeney to Waugh Chapel tie-in.	$5,381.25
56	951	NextEra	West	Black Oak - Gore - Goose Creek, Pike SVC + Cap Bank Solution	$419.86

2022 RTEP W3 Submitted Proposals

#	Proposal ID	Proposing Entity	Focus Area	Project Title	Submitted Cost ($M)
56	951	NextEra	West	Black Oak - Gore - Goose Creek, Pike SVC + Cap Bank Solution	$419.86
57	344	PECO	East	PECO Expansion Plan for DOM Window 2023	$302.86
58	600	PECO	Local Other	Exelon Replacement Upgrades	$423.79
59	660	PEPCO	East	West Cooper BGE-PEPCO	$1,105.62
60	691	PEPCO	East	Mid-Atlantic Power Pathway (MAPP)	$1,990.28
61	23	POTOED - FirstEnergy	East/West	Data Center Reinforcement Proposal #2	$3,503.86
62	837	POTOED - FirstEnergy	East/West	Data Center Reinforcement Proposal #1	$2,991.77
63	374	PPL	East	Otter Creek - Conastone 500 and 230 kV DCT Line	$154.21
64	606	PPL	Local Other	Juniata - Lewistown 230 kV # 2 line	$141.16
65	24	PSEG	East	Proposal A - North Delta - New Raphael - Waugh Chapel 500kV	$739.40
66	125	PSEG	Local Other	Proposal B - North Delta-Northeast 230kV	$313.34
67	229	PSEG	East	Proposal C - Hunterstown-New Green Valley 500kV	$529.11
68	325	PSEG	West/South/Northern Virginia/Doubs	Proposal E - Brambleton-Hinsons Ford Rd 500kV	$944.05
69	637	PSEG	East	Proposal D-Conastone-Doubs 500kV	$684.22
70	741	PSEG	East	Proposal G - Peach Bottom-New Brandon Shores 500kV; Peach Bottom-Doubs 500kV	$1,065.32
71	808	PSEG	East	Proposal F - Peach Bottom-New Raphael-Waugh Chapel 500kV; Peach Bottom-Doubs 500kV	$1,150.80
72	962	PSEG	East	Proposal H - Peach Bottom-Doubs 500kV (Circuits #1 and #2)	$977.71

Risk Assessment Criteria

PJM Risk Assessment Criteria

Risk Assessment	Cost Estimate Risks	Cost Containment Risk	Schedule Risks	Constructability Risks	Use of Existing ROW/Brownfield	Outage Coordination Risks
Low	Greater than or within 0-10% of Independent Estimate	Hard cost cap	Ratings assessed based on independent assessment of proposed in-service dates, and assessment of significant schedule risks such as such as permitting and constraint mitigation, long-lead material procurement, land/ROW acquisition, construction complexity.	Ratings assessed based on independent assessment of the number and severity of constructability risks assessed for the proposed project scope, such as permitting and constraint mitigation, land/ROW acquisition, construction complexity.	Rebuild/Reconductor Upgrades or Pure Brownfield	Minimal existing facility outages required, beyond short outages to cut-in to existing facilities
Medium	Within 10-20% of Independent Estimate	Soft cost containment (e.g ROE caps)			Mostly Brownfield (i.e. Uses/Overlaps existing ROW but requires expansion)	Significant existing facility outages required, with reasonable outage coordination plan proposed
Medium-High	Within 20-30% of Independent Estimate	Minimal cost containment/Excessive Exclusions			Greenfield paralleling existing ROW	Significant existing facility outages required, with no coordination plan proposed
High	Less than 30% of Independent Estimate	No cost containment			Pure Greenfield	Significant existing facility outages required, with known operational concerns and no coordination plan proposed.

NOTE:

- PJM conducted its constructability evaluation of the project data submitted by proposers, and engaged expert consultants to evaluate the constructability, cost estimation, and cost containment risks of the projects.
- PJM also reached out to key regulatory agencies for their insight on certain projects to help clarify permitting risks.
- This risk assessment is not intended as a pass/fail or quantitive test, but rather as qualitative information on potential risks PJM has considered along with the reliability performance in selection of the finalist scenarios, and ultimately the recommended solution.

East Cluster Constructability Matrix

East Cluster Projects – Selected for Detailed Evaluation

PJM Proposal ID	Proposing Entity	Project Title	Proposed In-Service Date	Proposal Costs ($M)	Independent Costs ($M)	Cost Estimate Risks	Cost Containment Risks	Schedule Risks	Constructability Risks	Use of Existing ROW & Brownfield	Outage Coordination Risks
344	Exelon	PECO Expansion Plan for DOM Window 2023	12/1/2029	$ 168.63	$ 186.06	Low	Medium-High	Low	Low	Low	Medium
660	Exelon	West Cooper BGE-PEPCO	12/1/2030	$ 1,105.62	$ 1,060.63	Low	Medium-High	Low	Low	Low	Medium
548	LS Power	RTEP Window 3 Solution (East)	6/1/2030	$ 495.83	$ 609.44	Medium	Medium	Low	Medium	Medium-High	Medium-High
637	PSEG	Proposal D-Conastone-Doubs 500kV	6/1/2027	$ 684.22	$ 676.36	Low	Low	Medium	Medium	High	Low
741	PSEG	Proposal G - Peach Bottom-New Brandon Shores 500kV; Peach Bottom-Doubs 500kV	6/1/2028	$ 1,065.32	$ 1,178.75	Medium	Low	Medium-High	High	High	Low
487	Transource	Maryland & Pennsylvania Baseline Reliability Solution	3/1/2027	$ 492.75	$ 503.43	Low	Medium	Low	Low	Medium	Medium
374	PPL	Otter Creek - Conastone 500 and 230 kV DCT Line	5/1/2027	$ 154.21	$ 162.69	Low	Medium-High	Low	Low	Medium	Medium
948	NextEra	New 500/230kV Bartholow substation, new 500/230kV North Delta substation, new 230kV Grisham switchyard, new 500/230kV Goram substation, and Keeney to Waugh Chapel tie-in	6/1/2028	$ 5,381.25	$ 6,265.88	Medium	Medium	High	High	High	Low

West Cluster Constructability Matrix

West Cluster Projects – Selected for Detailed Evaluation

PJM Proposal ID	Proposing Entity	Project Title	Proposed In-Service Date	Proposal Costs ($M)	Independent Costs ($M)	Cost Estimate Risks	Cost Containment Risks	Schedule Risks	Constructability Risks	Use of Existing ROW & Brownfield	Outage Coordination Risks
837	POTOED - FirstEnergy	Data Center Reinforcement Proposal #1 (West)	6/1/2030	$ 2,788.40	$ 2,642.05	Low	High	Medium	Medium-High	High	Low
548	LS Power	RTEP Window 3 Solution (West)	6/1/2030	$ 972.71	$ 876.03	Low	Medium	Medium	Medium-High	Medium-High	Medium
853	NextEra	502 Junction - Black Oak - Woodside - Gant, Woodside SVC + Cap Banks	6/1/2027	$ 683.55	$ 1,195.24	High	Medium	Medium-High	Medium-High	High	Medium
904	AEP - Transource	Joshua Falls - Yeat 765kV Greenfield Line and Substation	12/1/2029	$ 1,048.10	$ 1,122.40	Low	Medium	Medium-High	Medium	High	Low

South Cluster Constructability Matrix

South Cluster Projects – Selected for Detailed Evaluation

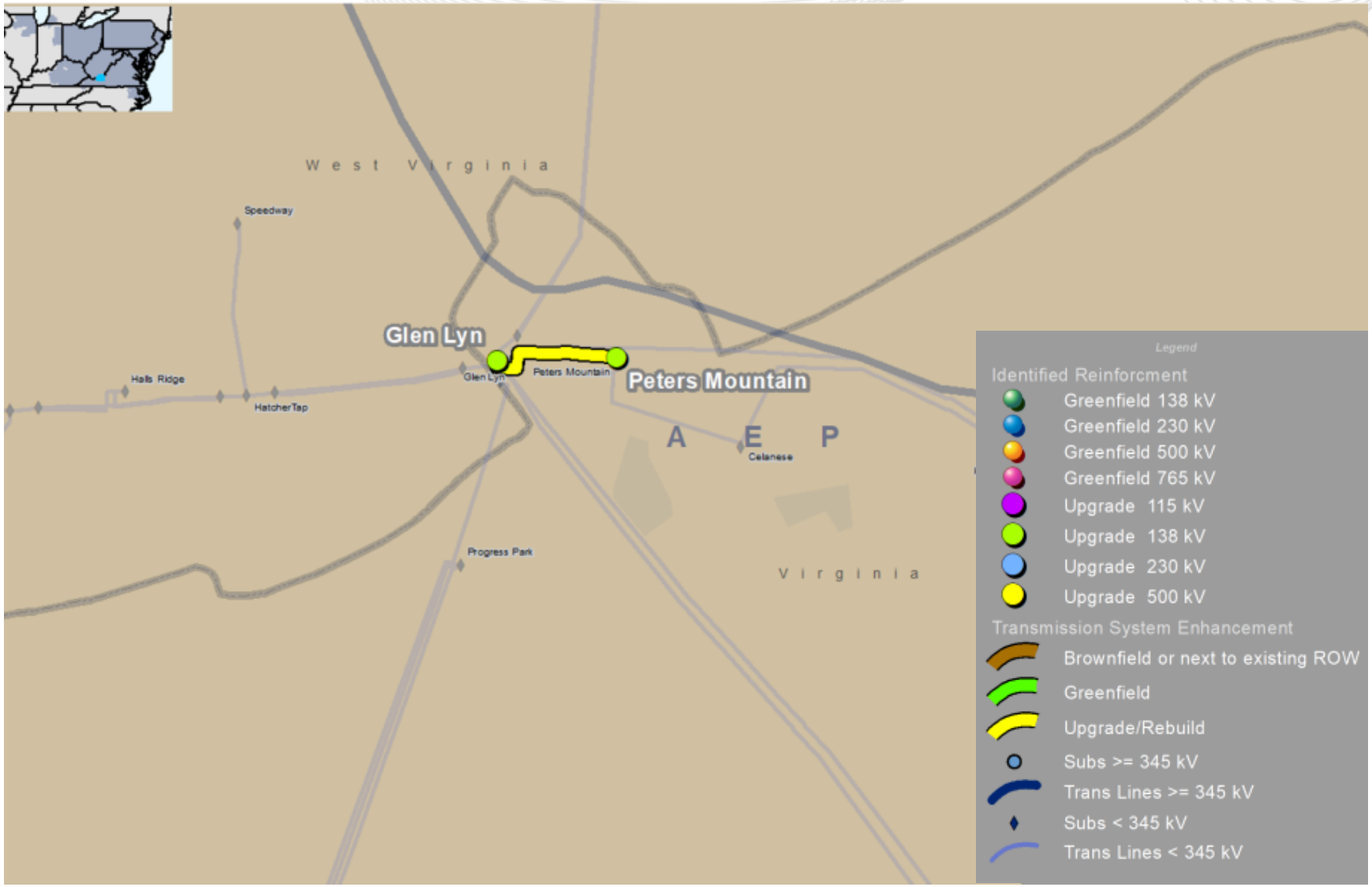
PJM Proposal ID	Proposing Entity	Project Title	Proposed In-Service Date	Proposal Costs ($M)	Independent Costs ($M)	Cost Estimate Risks	Cost Containment Risks	Schedule Risks	Constructability Risks	Use of Existing ROW & Brownfield	Outage Coordination Risks
516	Dominion	Interregional solution- Aspen-Doubs Second 500 kV Line	12/1/2027	$ 61.72	$ 77.95	Medium-High	High	Low	Low	Low	Medium
711	Dominion	Regional Solution - 500 kV North Anna-Wishing Star Upgrades	12/1/2027	$ 1,227.84	$ 1,284.62	Low	High	Medium	Low	Low	Medium
548	LS Power	RTEP Window 3 Solution (South Components)	6/1/2030	$ 628.56	$ 617.00	Low	Medium	Medium-High	Medium-High	Medium-High	Medium
325	PSEG	Proposal E - Brambleton-Hinsons Ford Rd 500kV	6/1/2027	$ 267.38	$ 275.56	Low	Low	High	High	High	Low
837	POTOED - FirstEnergy	Data Center Reinforcement Proposal #1 (South)	6/1/2030	$ 203.38	$ 209.16	Low	High	Low	Low	Low	Medium
663	NextEra	Front Royal - Racefield, Warrenton - Rixlew, Warrenton - Hourglass, Mars - Ocean Court - Davis Drive	6/1/2027	$ 284.17	$ 514.17	High	Medium	High	High	High	Low

Dominion Cluster Constructability Matrix

Dominion Cluster Projects – Selected for Detailed Evaluation

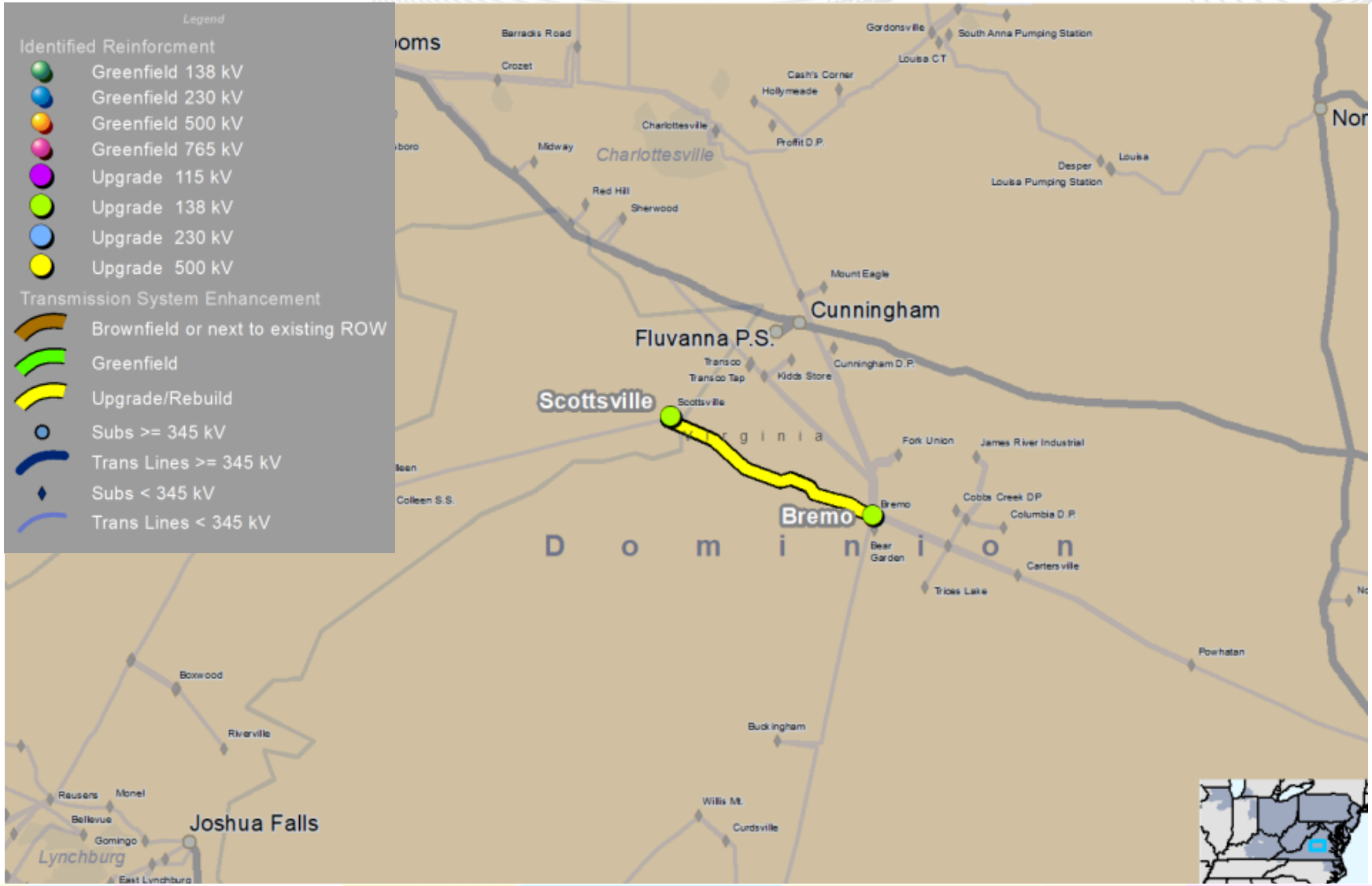
PJM Proposal ID	Proposing Entity	Project Title	Proposed In-Service Date	Proposal Costs ($M)	Independent Costs ($M)	Cost Estimate Risks	Cost Containment Risks	Schedule Risks	Constructability Risks	Use of Existing ROW & Brownfield	Outage Coordination Risks
692	Dominion	Data Center Alley Local solution - New 500 kV/230 kV Aspen-Golden & Golden-Mars lines	12/1/2027	$ 1,058.45	$ 1,098.96	Low	High	Medium	Medium	High	Low
858	AEP - Transource	Stork - Flys 500kV Greenfield Line and Substations	12/1/2027	$ 510.44	$ 516.60	Low	Medium	Medium-High	High	High	Low
548	LS Power	RTEP Window 3 Solution (Dominion Components)	6/1/2030	$ 283.78	$ 307.52	Low	Medium	Medium-High	High	Medium-High	Low

2022 Window 3 proposals – AEP – 196 & 234



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.*

2022 Window 3 proposals – AEP - 9 & 629



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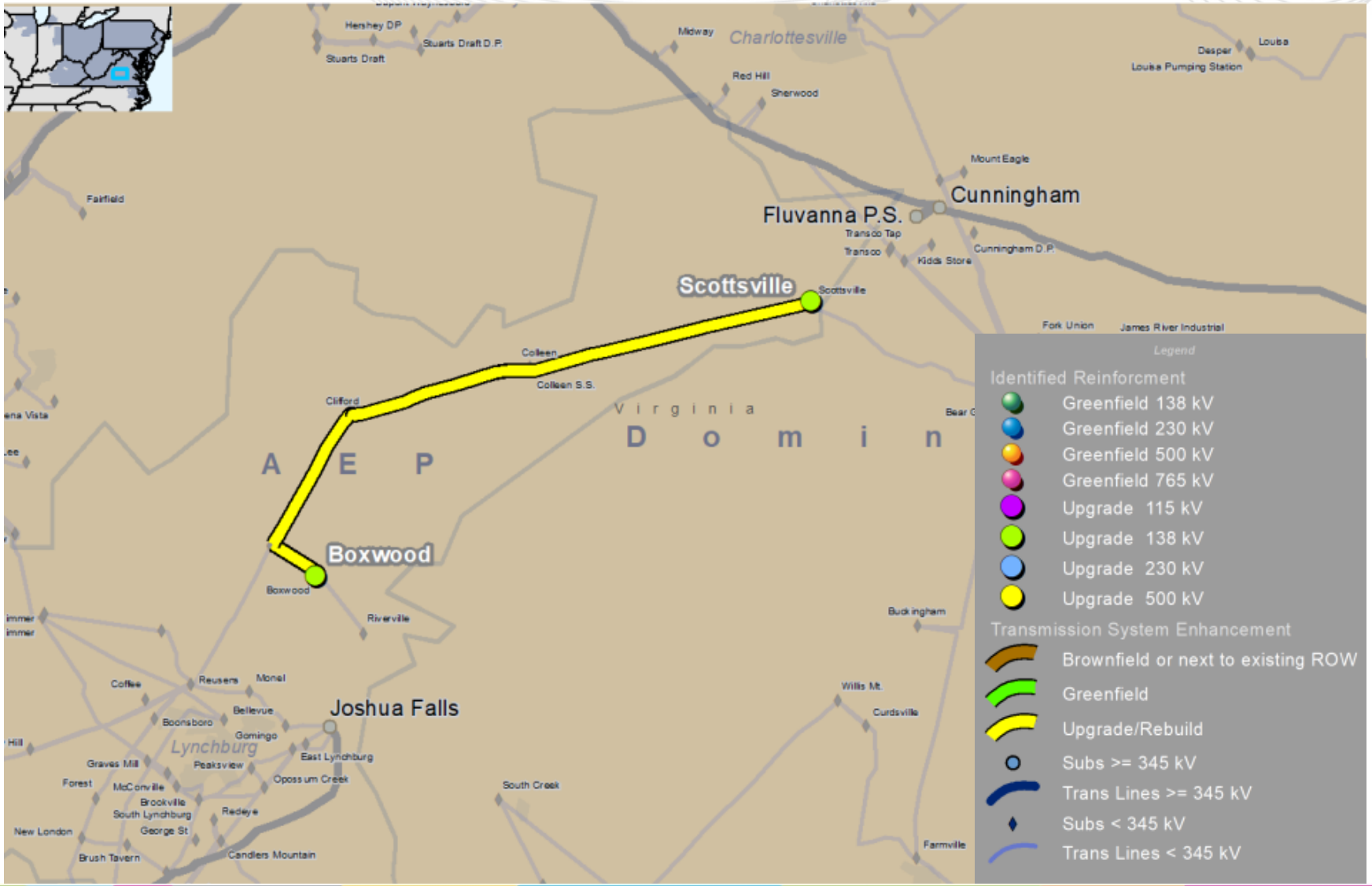
2022 Window 3 proposals – AEP – 55 & 181



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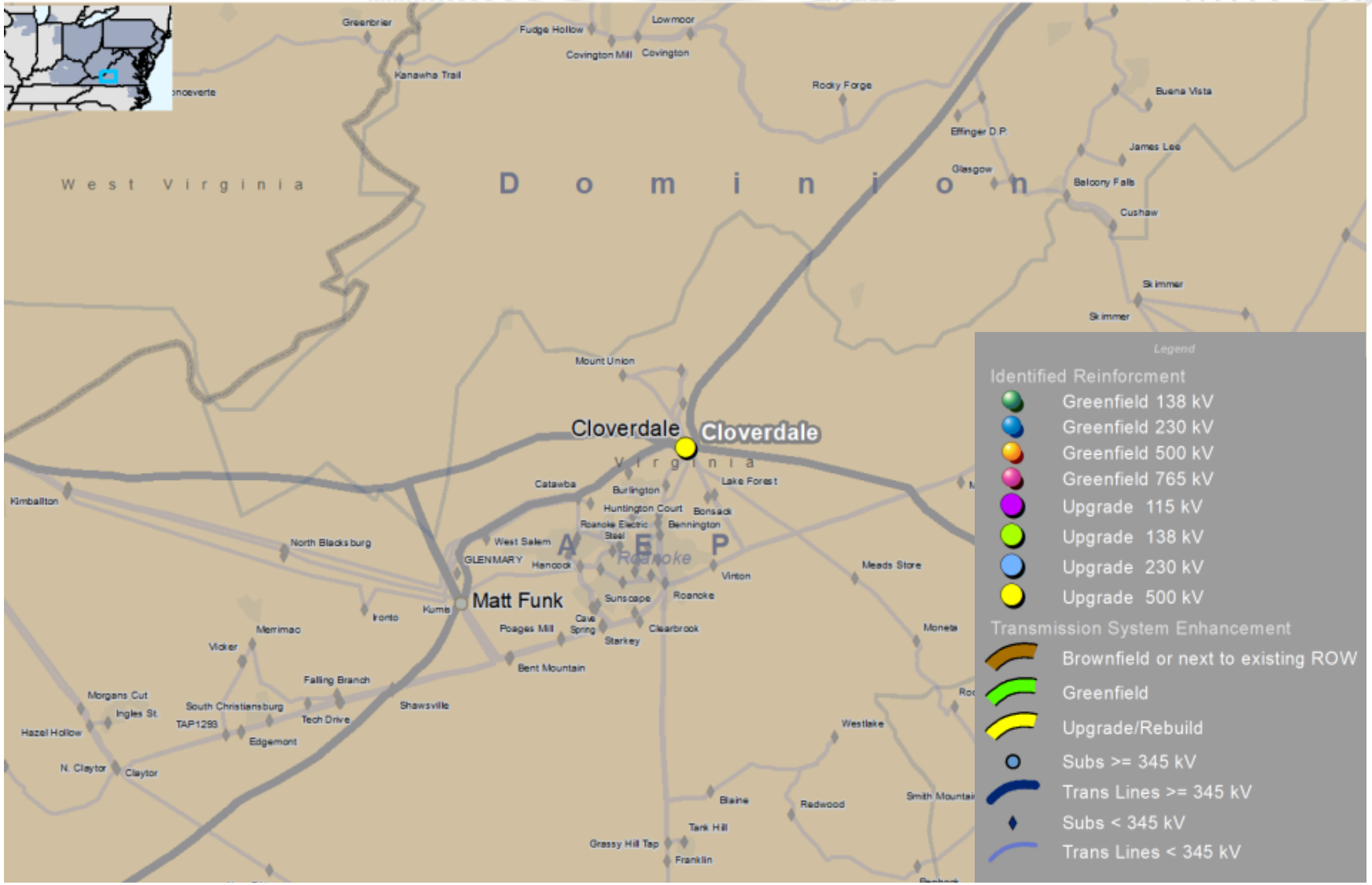
2022 Window 3 proposals – AEP - 202 & 410



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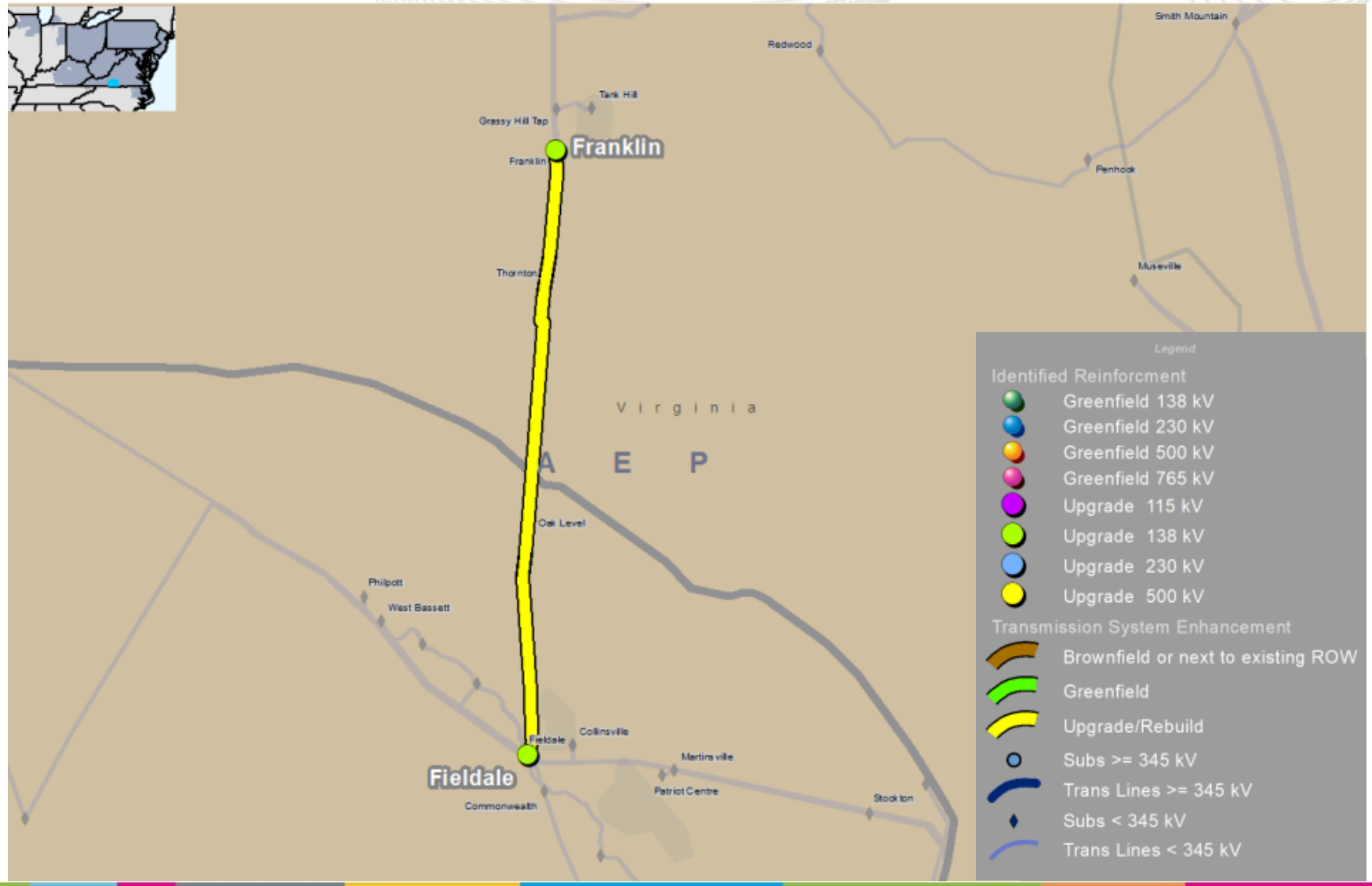
2022 Window 3 proposals – AEP - 477 & 537



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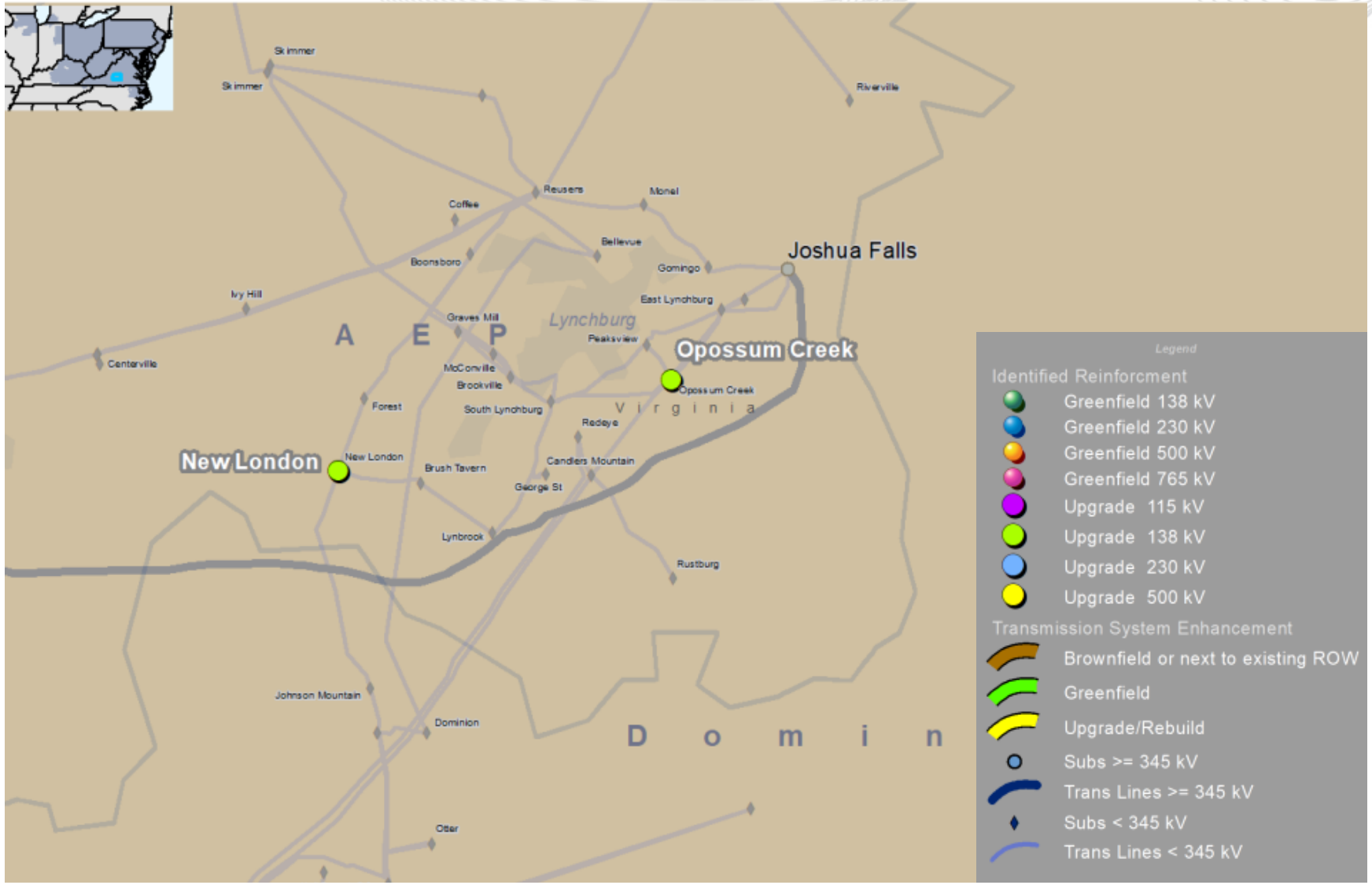
2022 Window 3 proposals – AEP - 524



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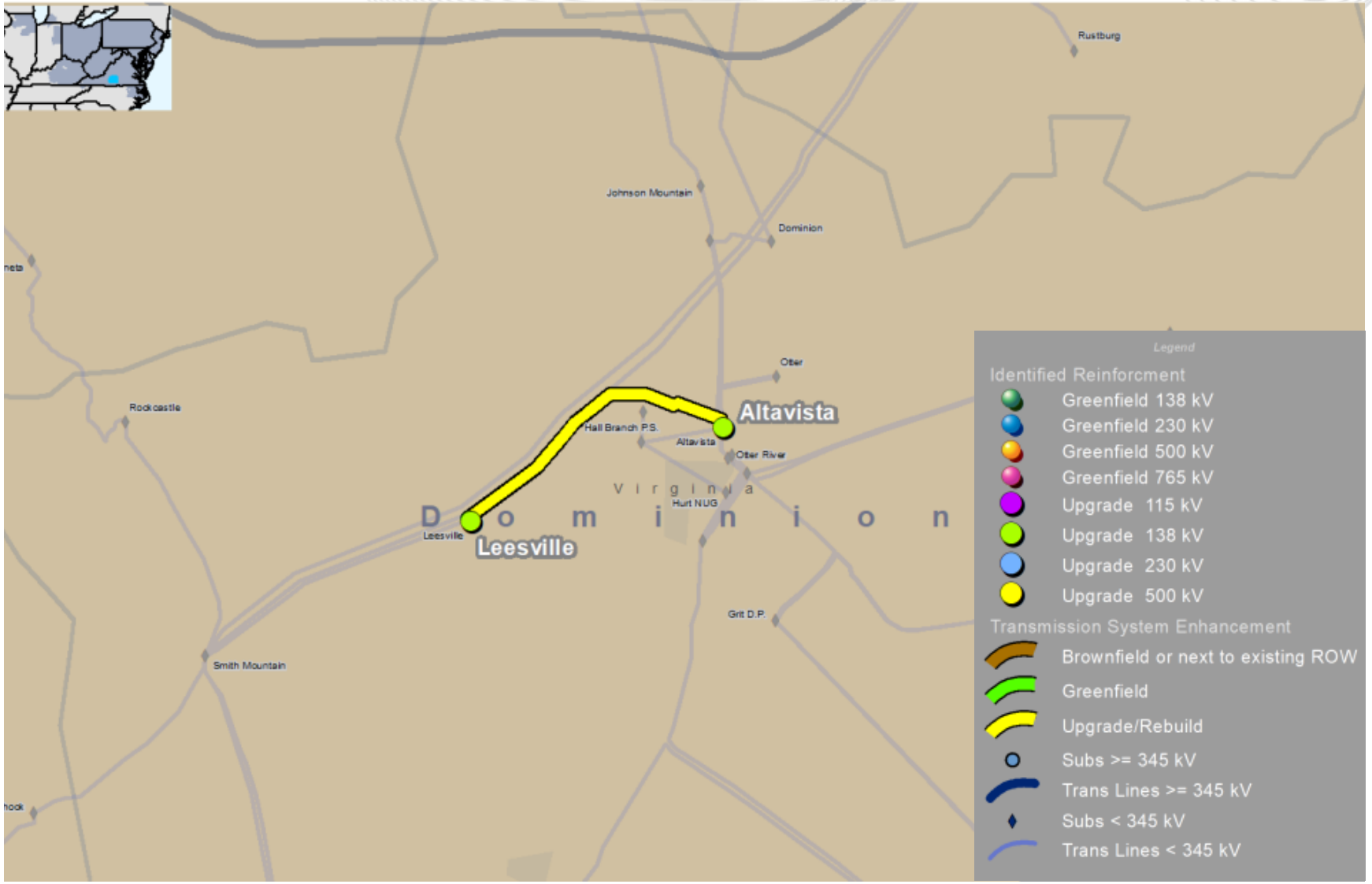
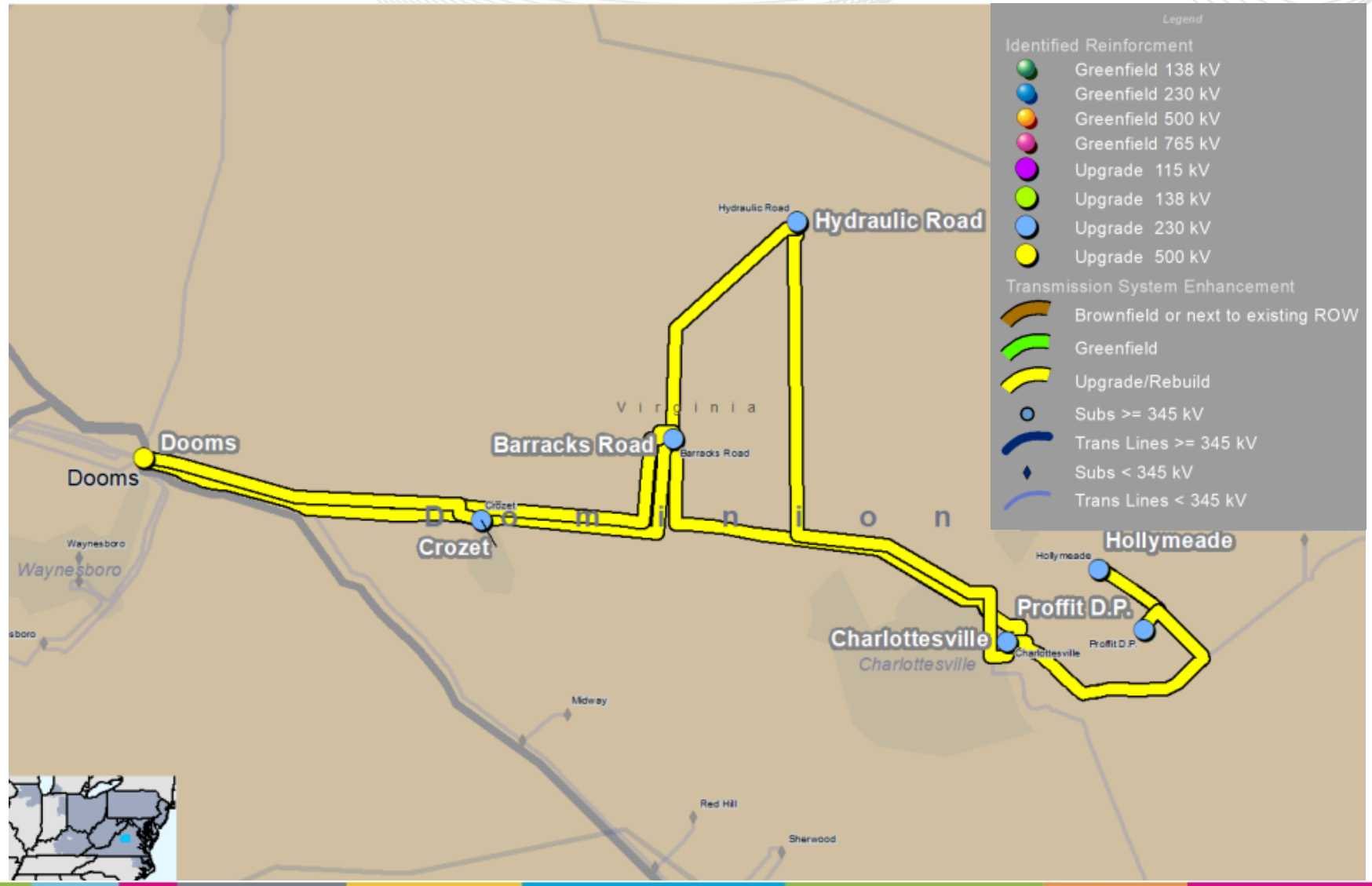
2022 Window 3 proposals – AEP - 856



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

2022 Window 3 proposals – Dominion - 30



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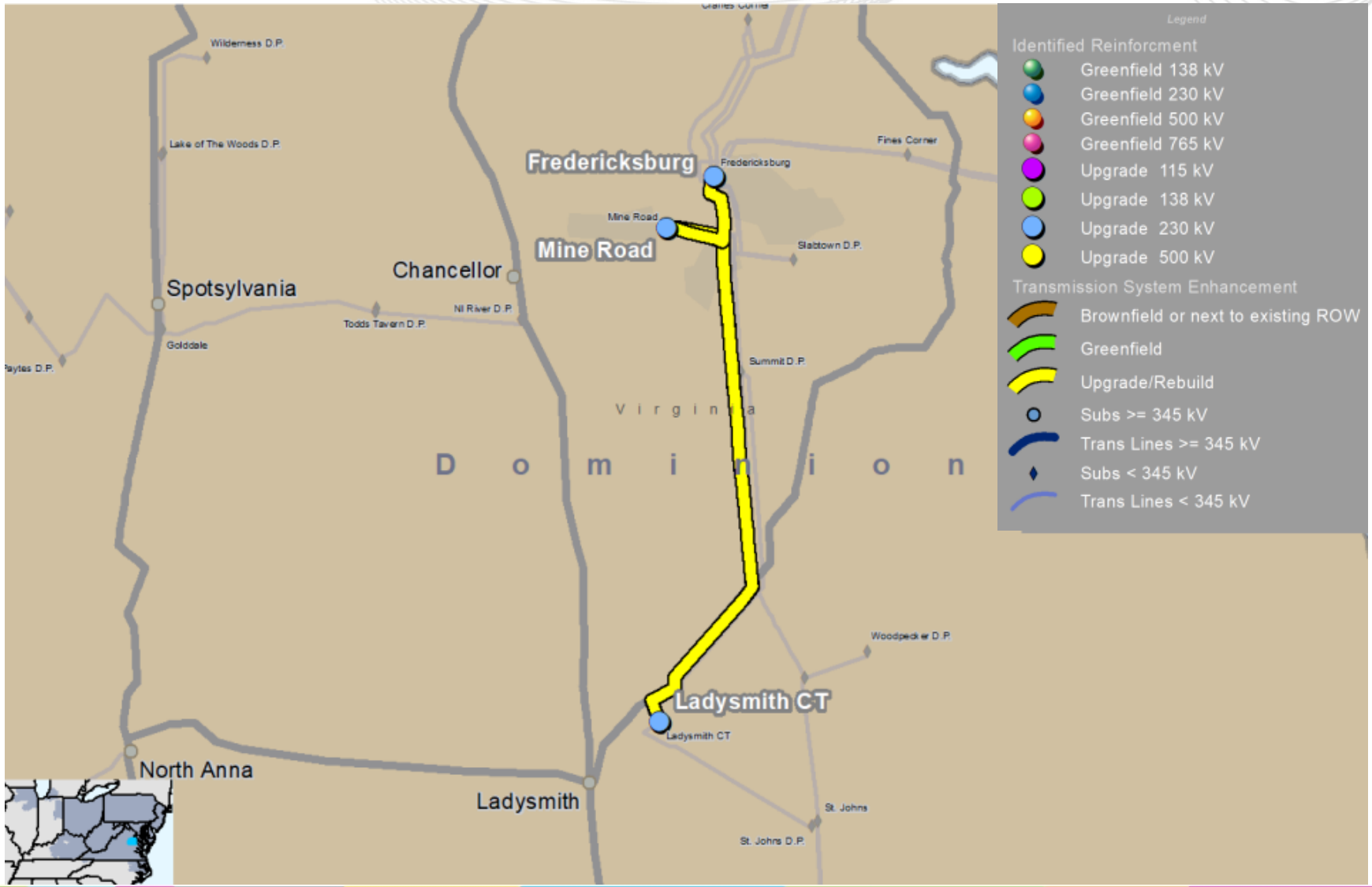
2022 Window 3 proposals – Dominion - 74



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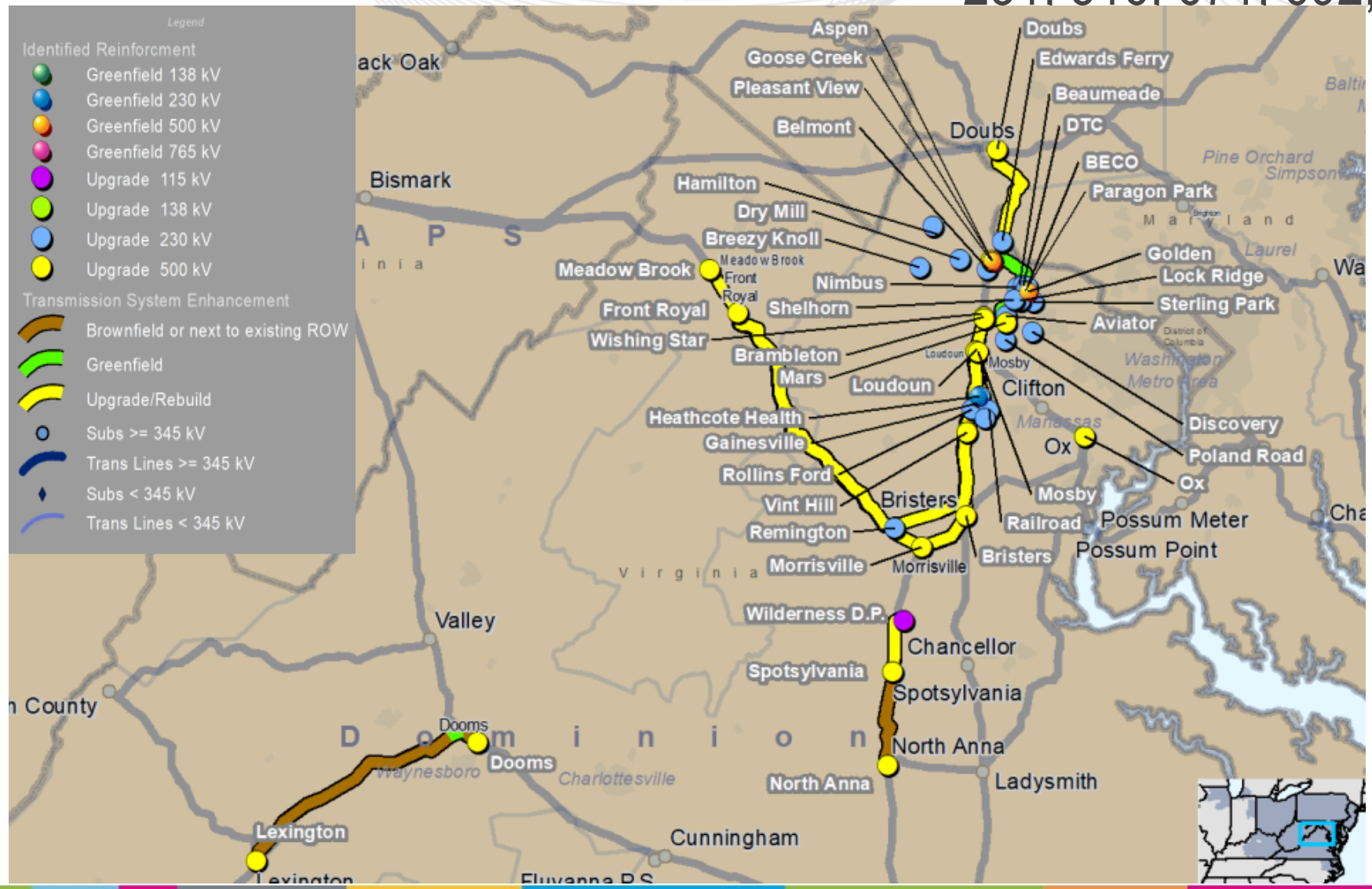
2022 Window 3 proposals – Dominion – 129
231, 516, 671, 692, 711, 923



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2022 Window 3 proposals – Dominion - 231

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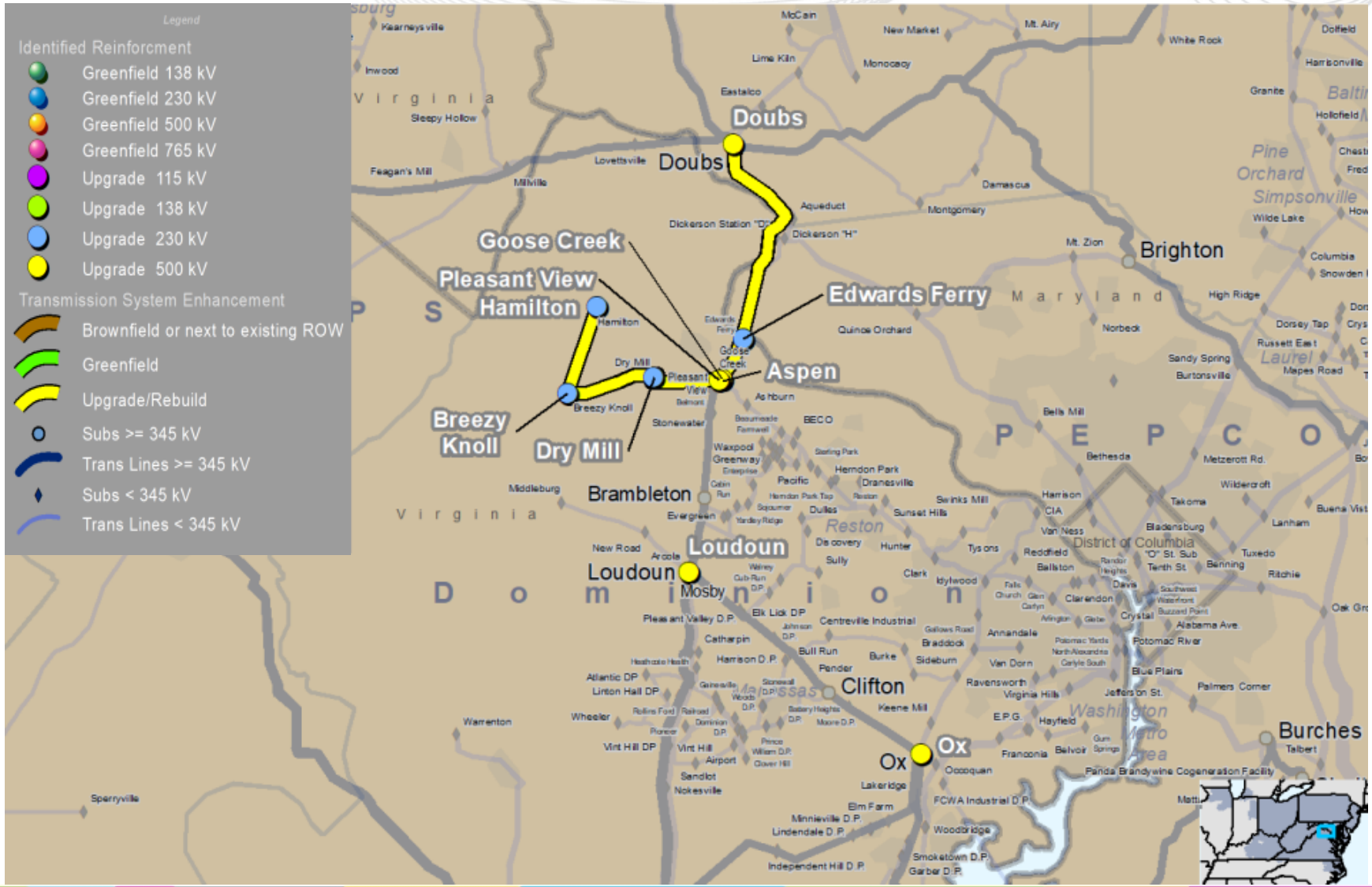
2022 Window 3 proposals – Dominion - 516



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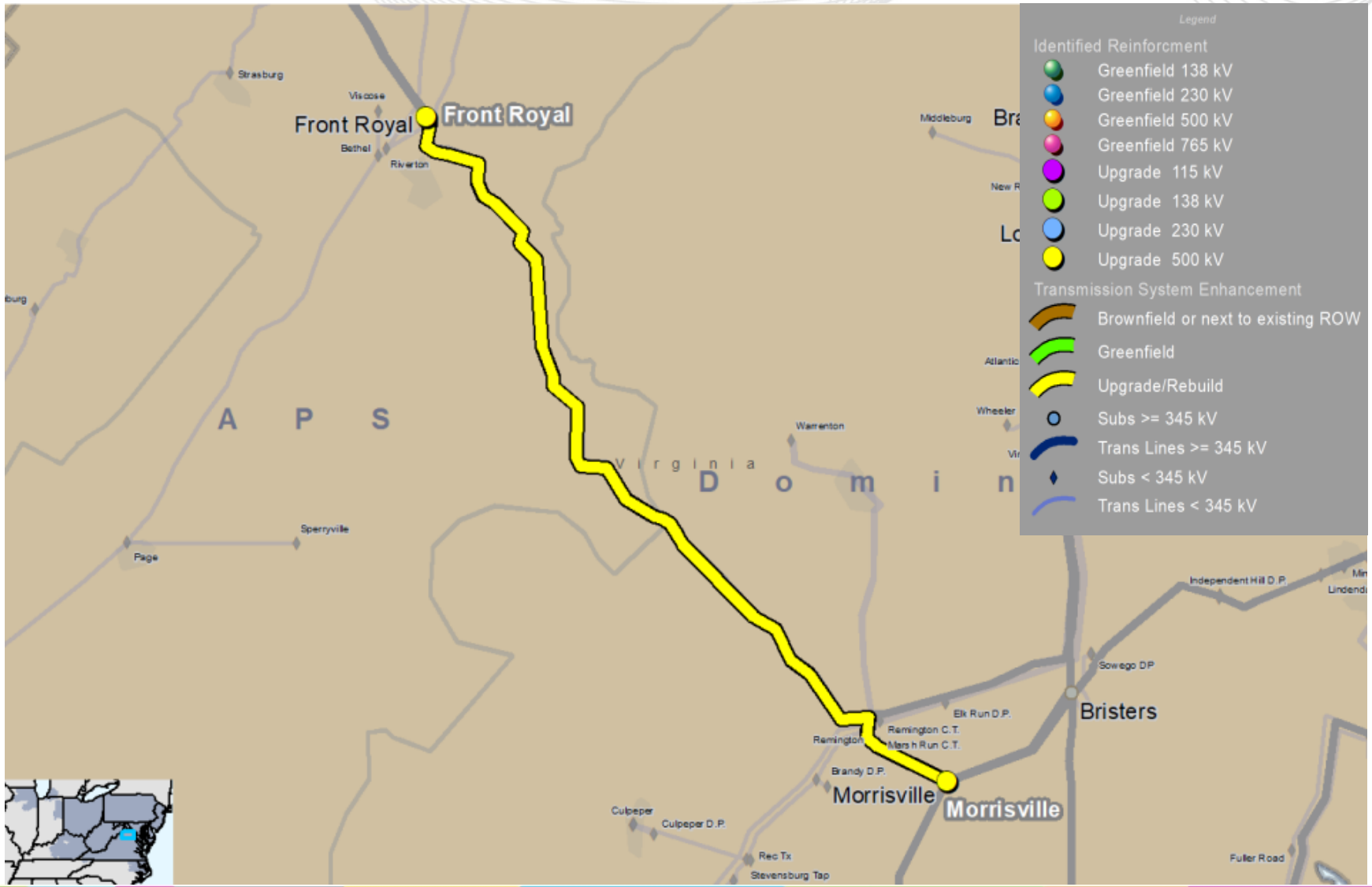
2022 Window 3 proposals – Dominion - 671



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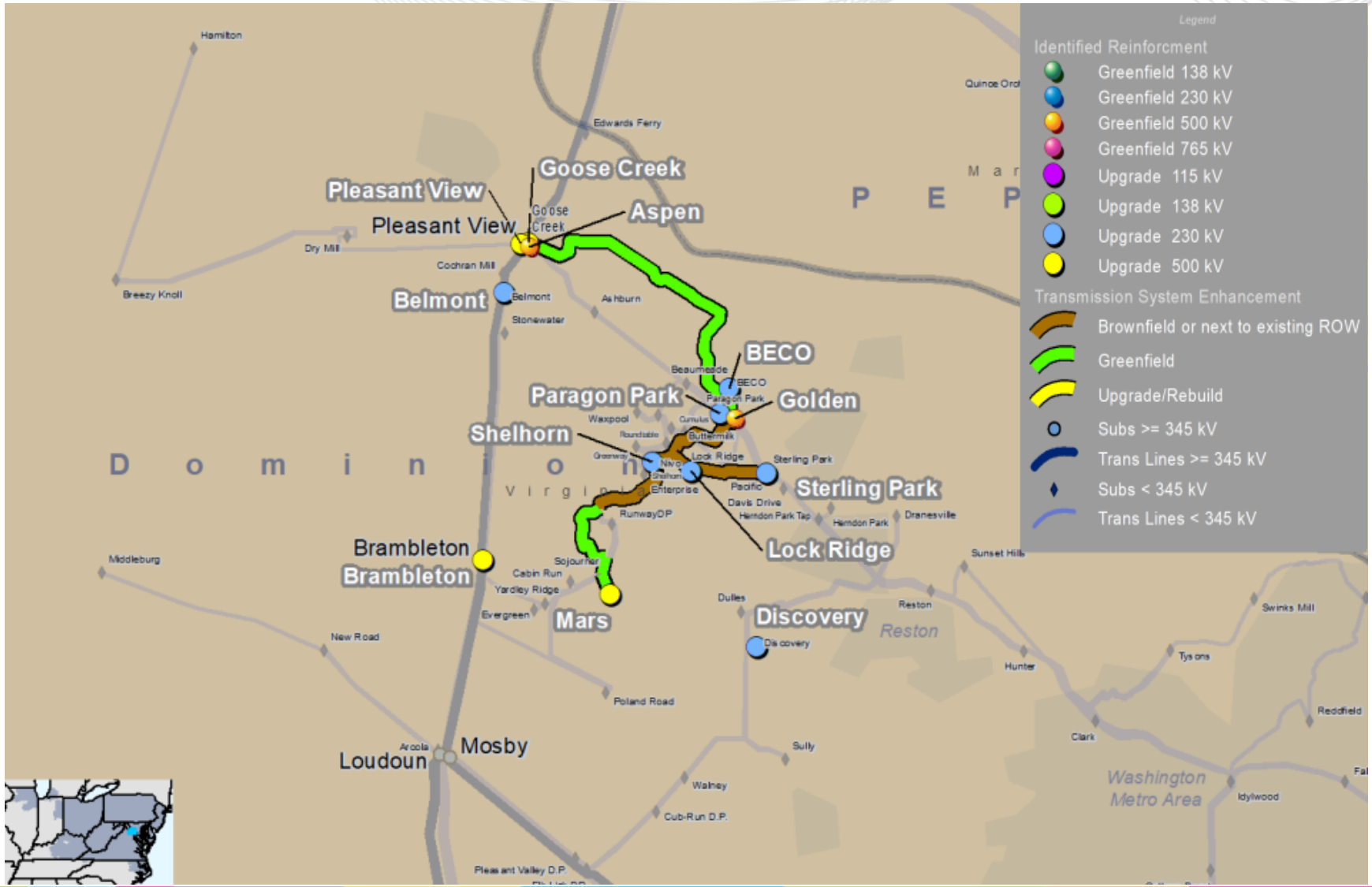
2022 Window 3 proposals – Dominion - 692



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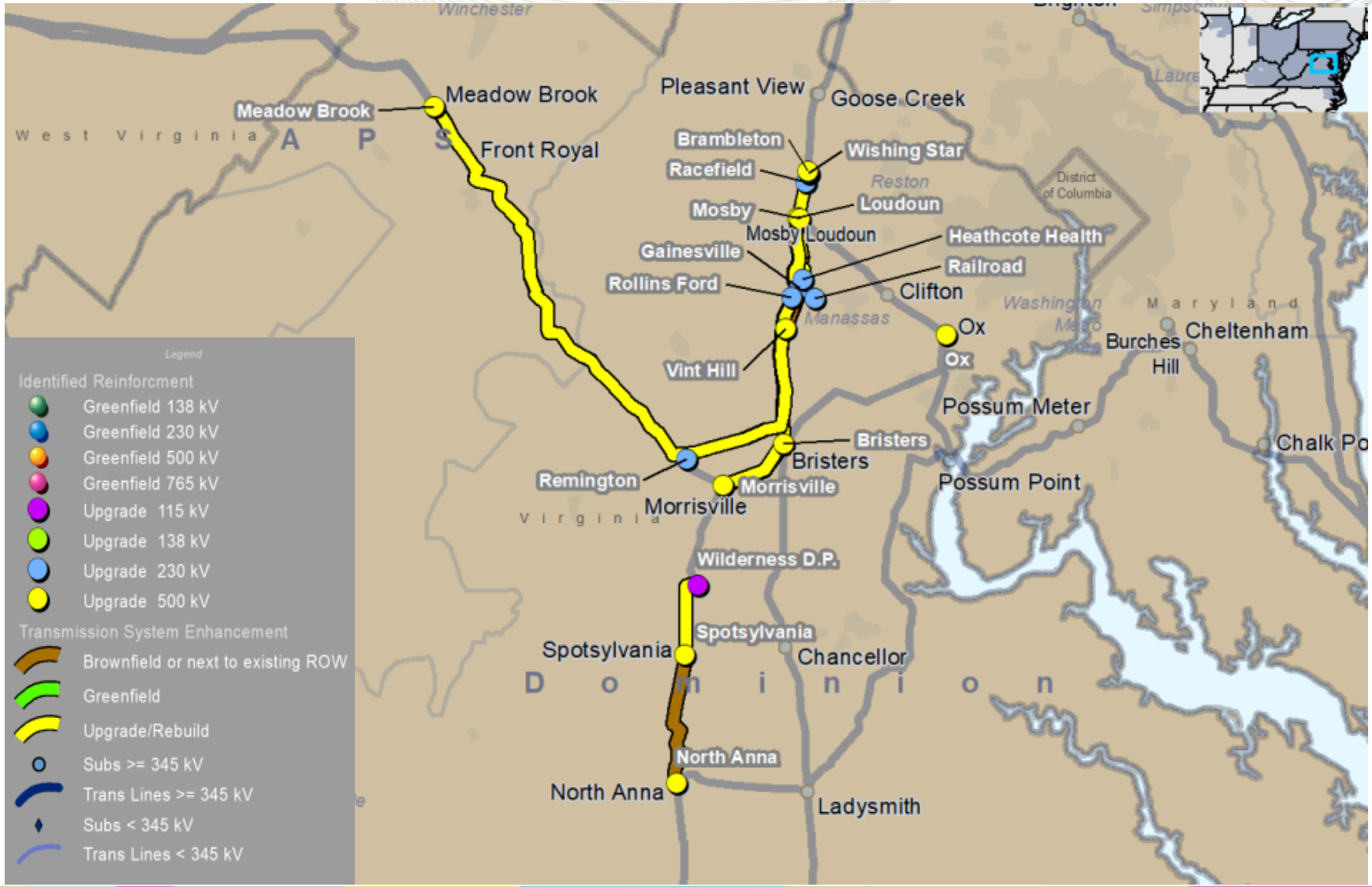
2022 Window 3 proposals – Dominion - 711



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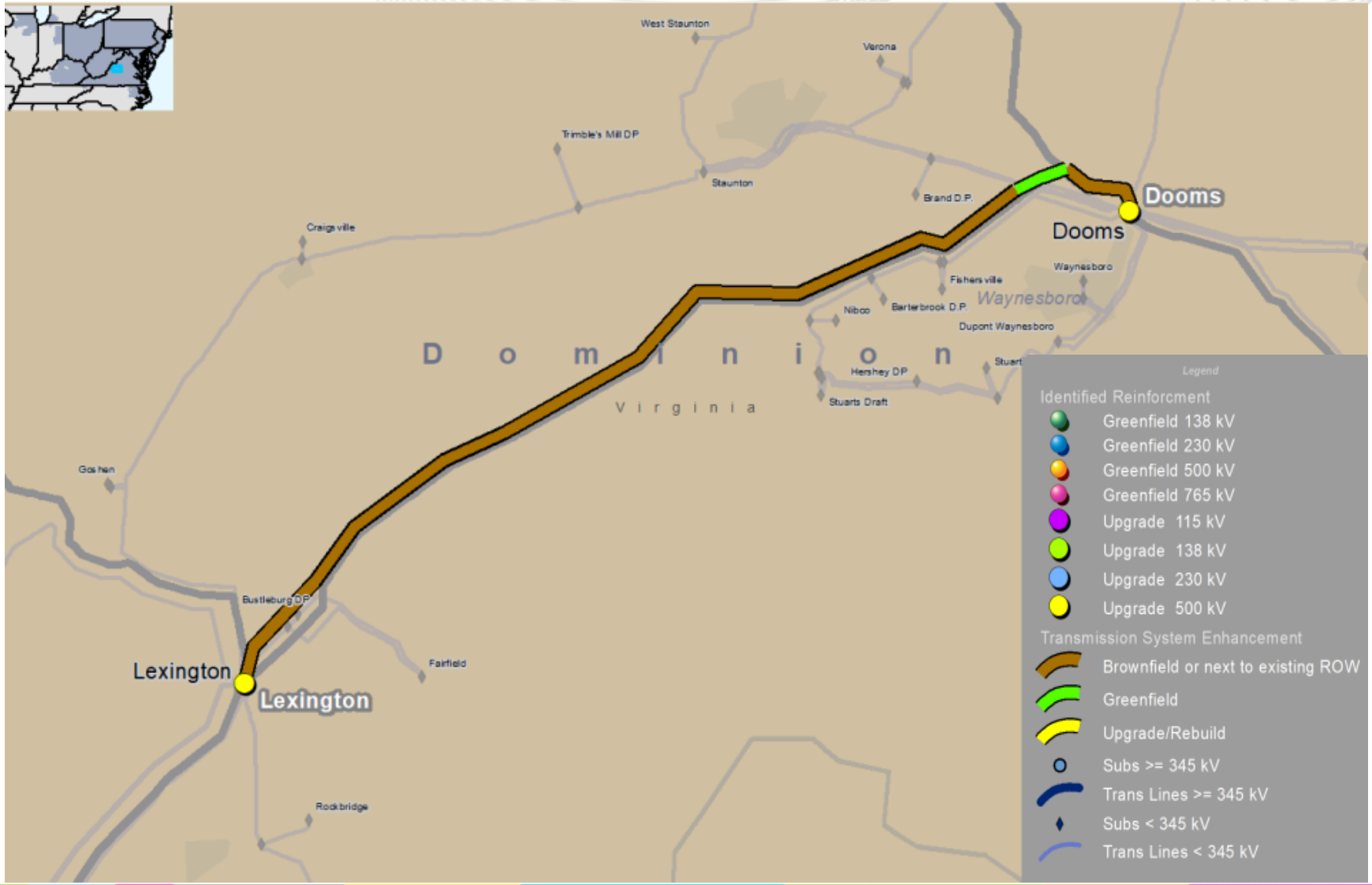
2022 Window 3 proposals – Dominion - 923



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2022 Window 3 proposals – Dominion - 211

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2022 Window 3 proposals – Dominion - 704

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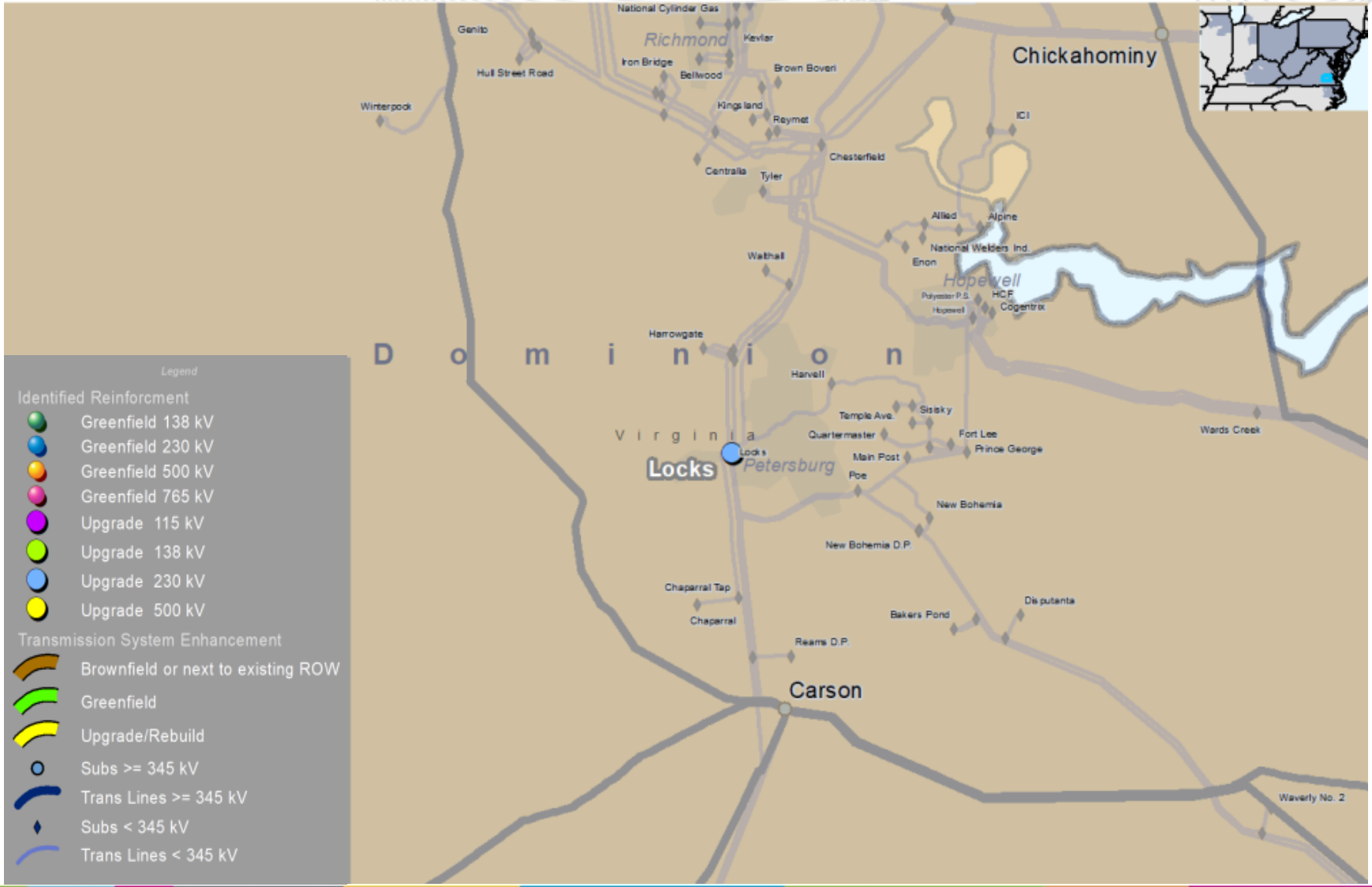
2022 Window 3 proposals – Dominion – 731



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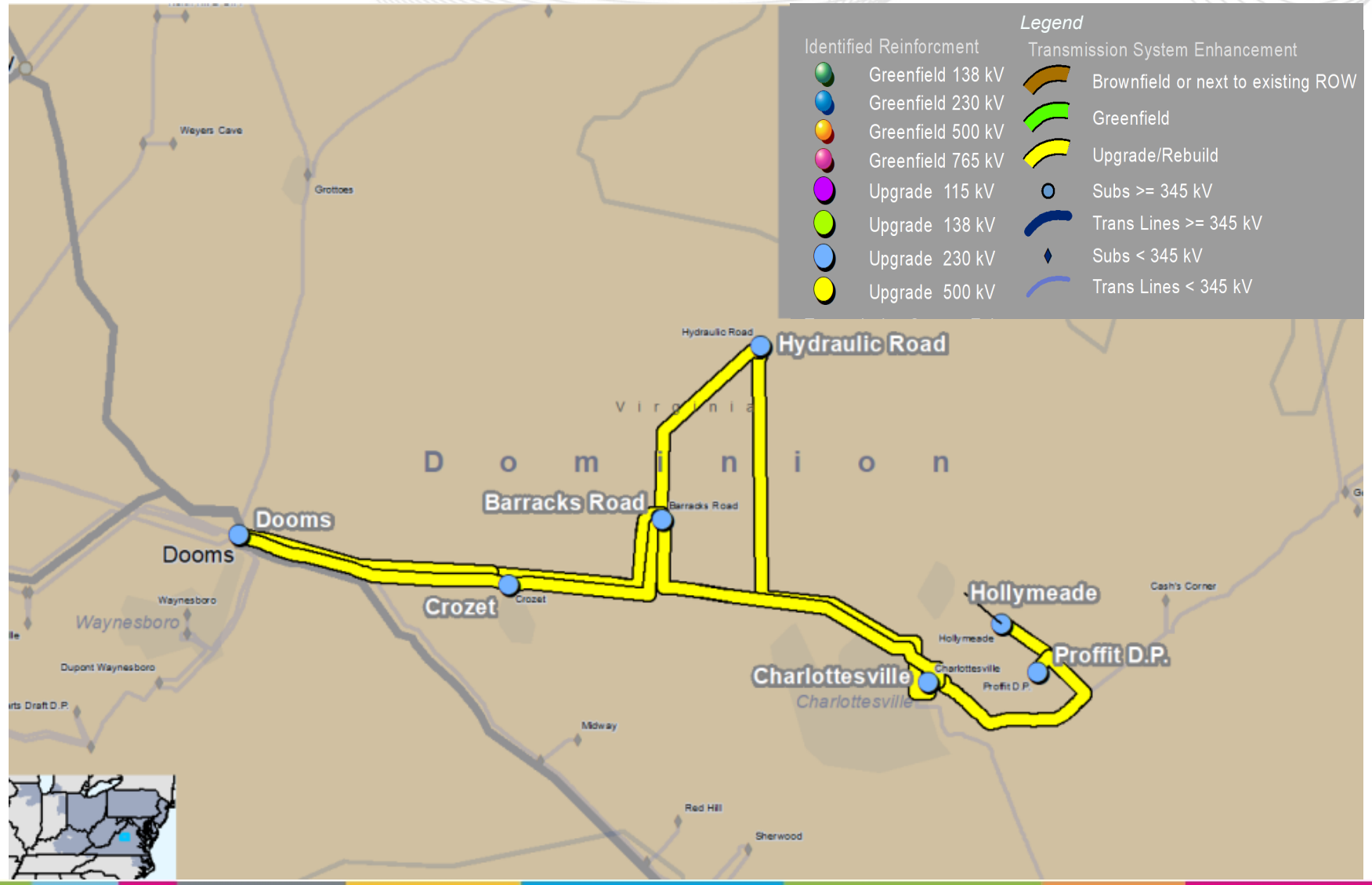
2022 Window 3 proposals – Dominion - 967



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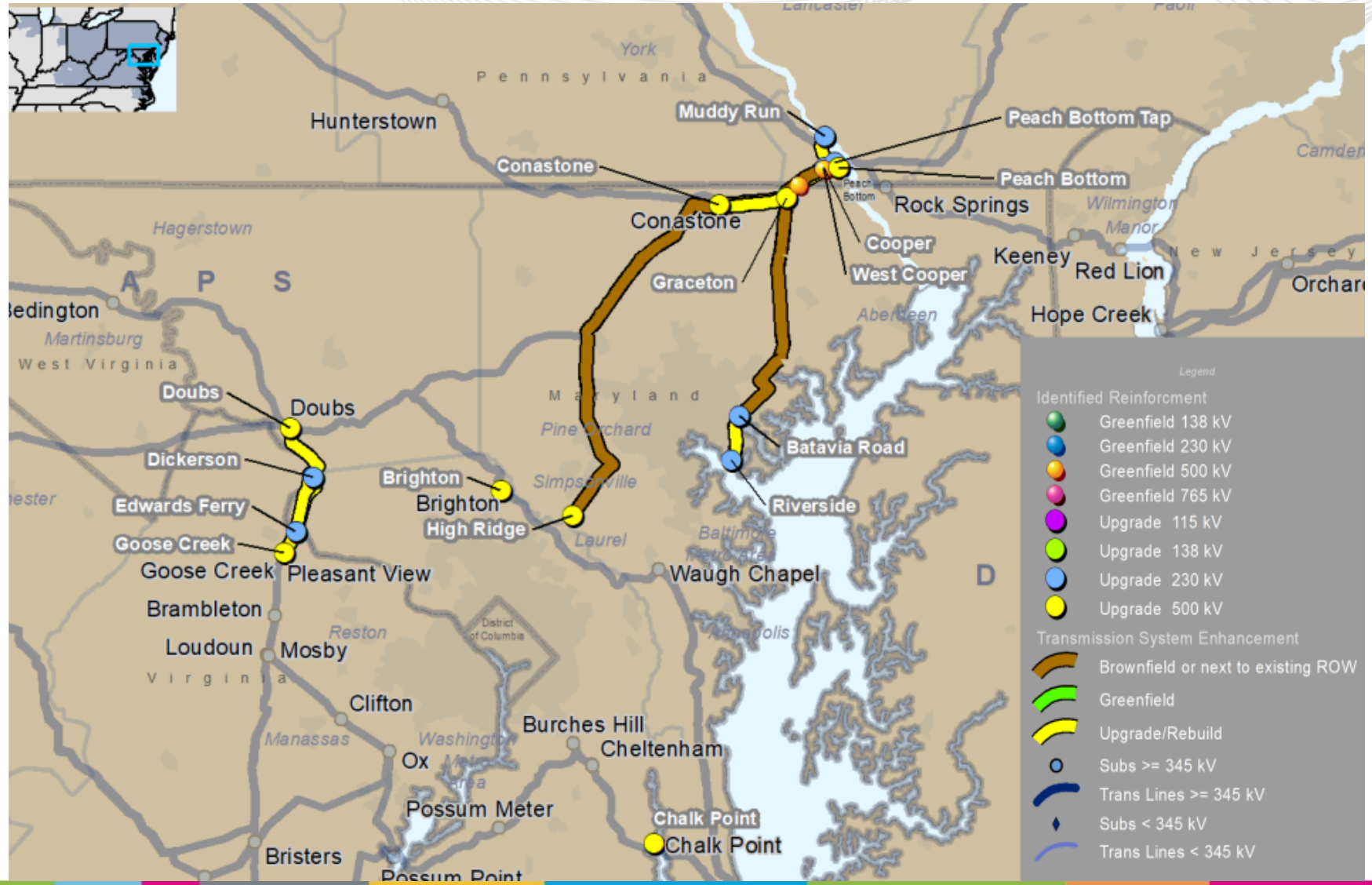
2022 Window 3 proposals – Exelon – 344 & 660



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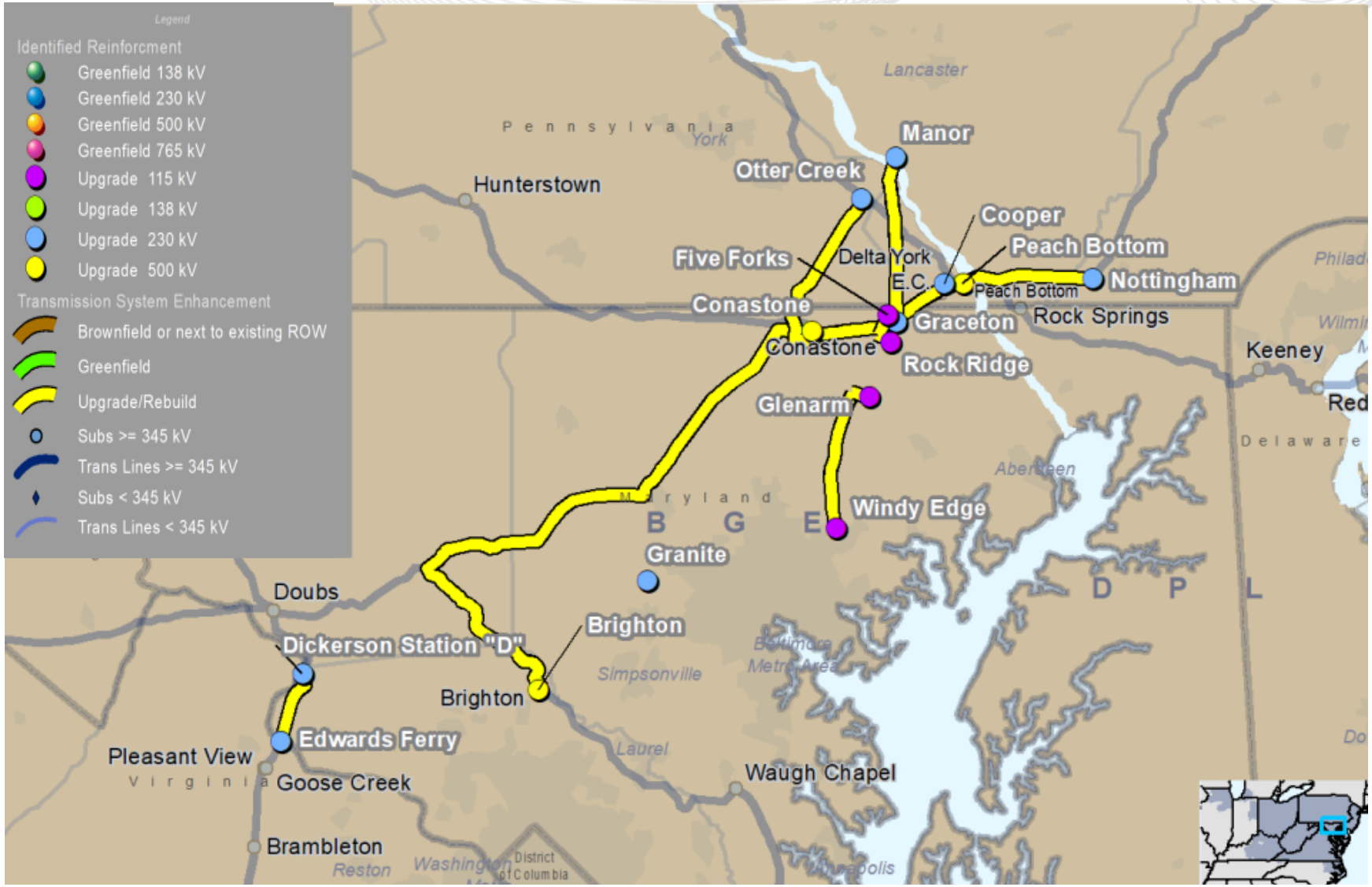
2022 Window 3 proposals – Exelon - 600



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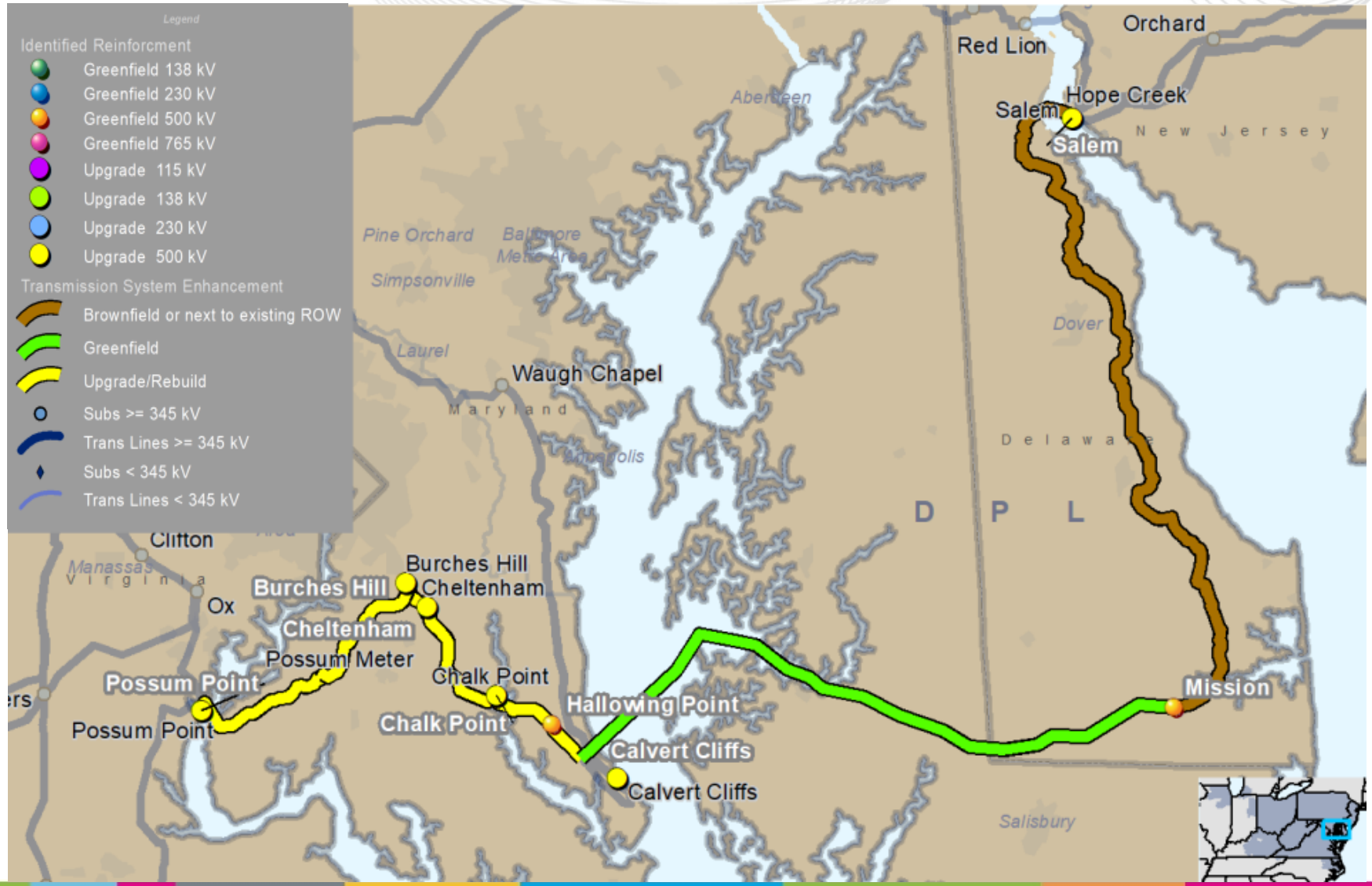
2022 Window 3 proposals – Exelon - 691



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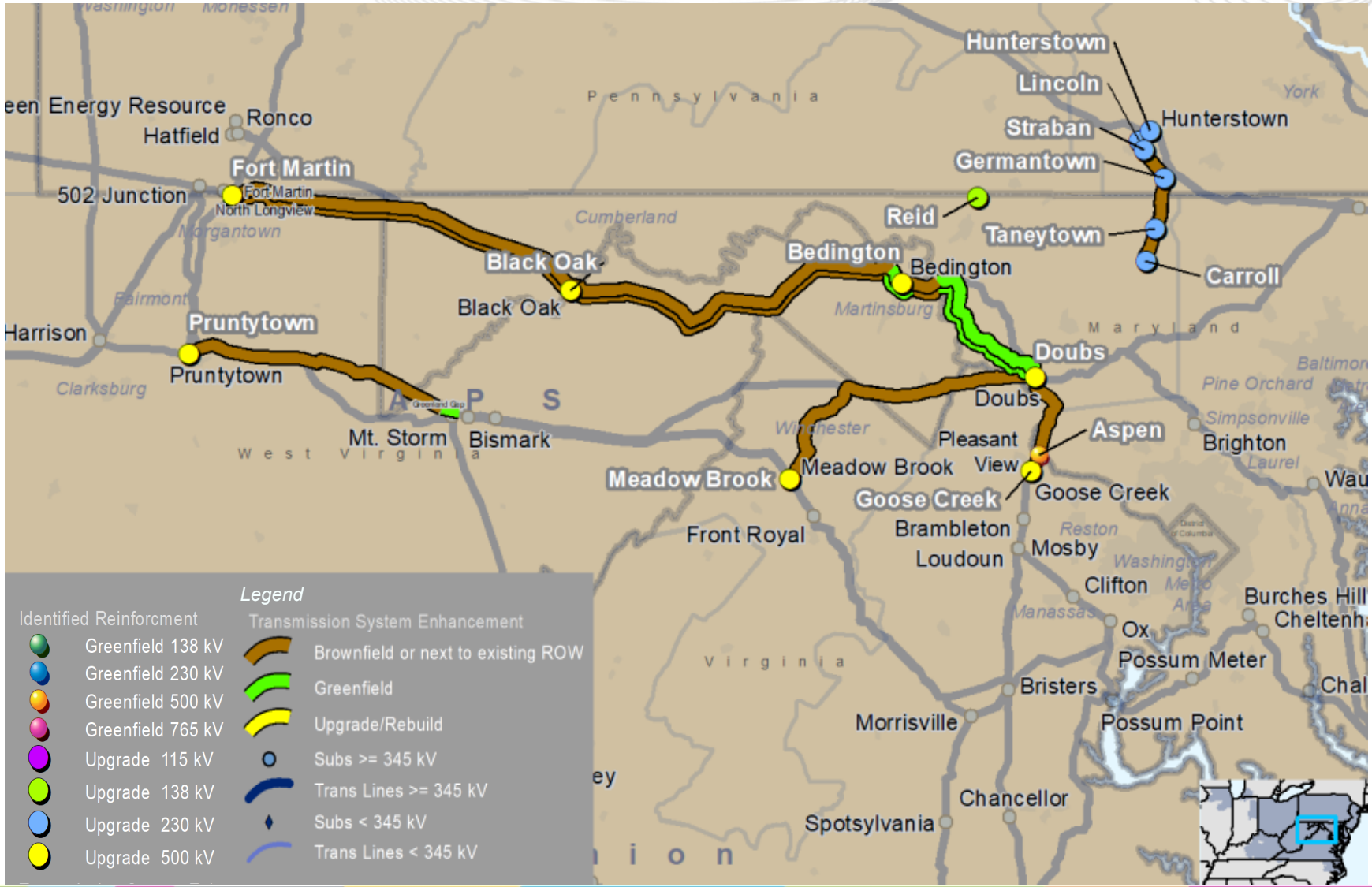
2022 Window 3 proposals – FE – 23



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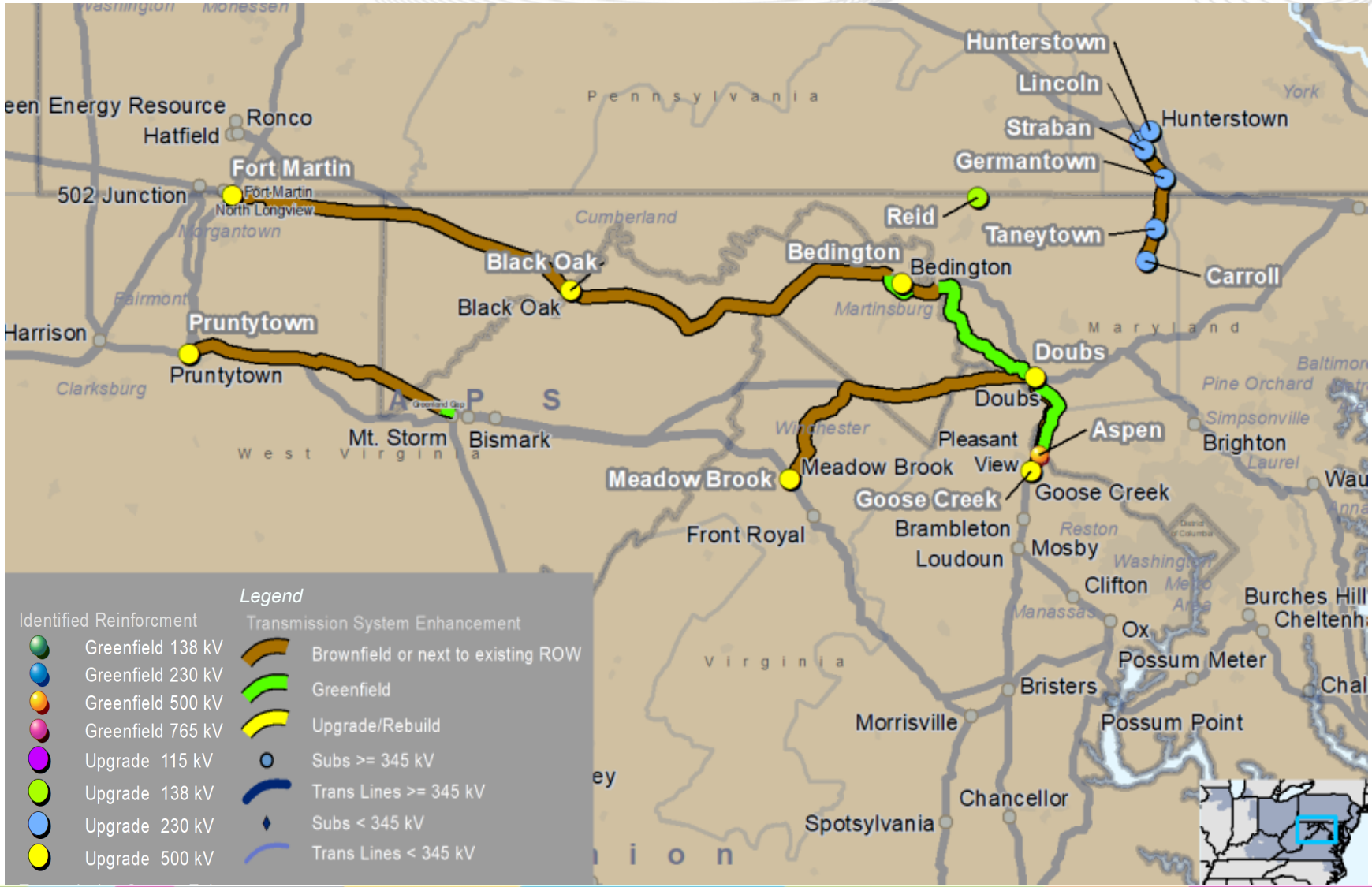
2022 Window 3 proposals – FE – 837



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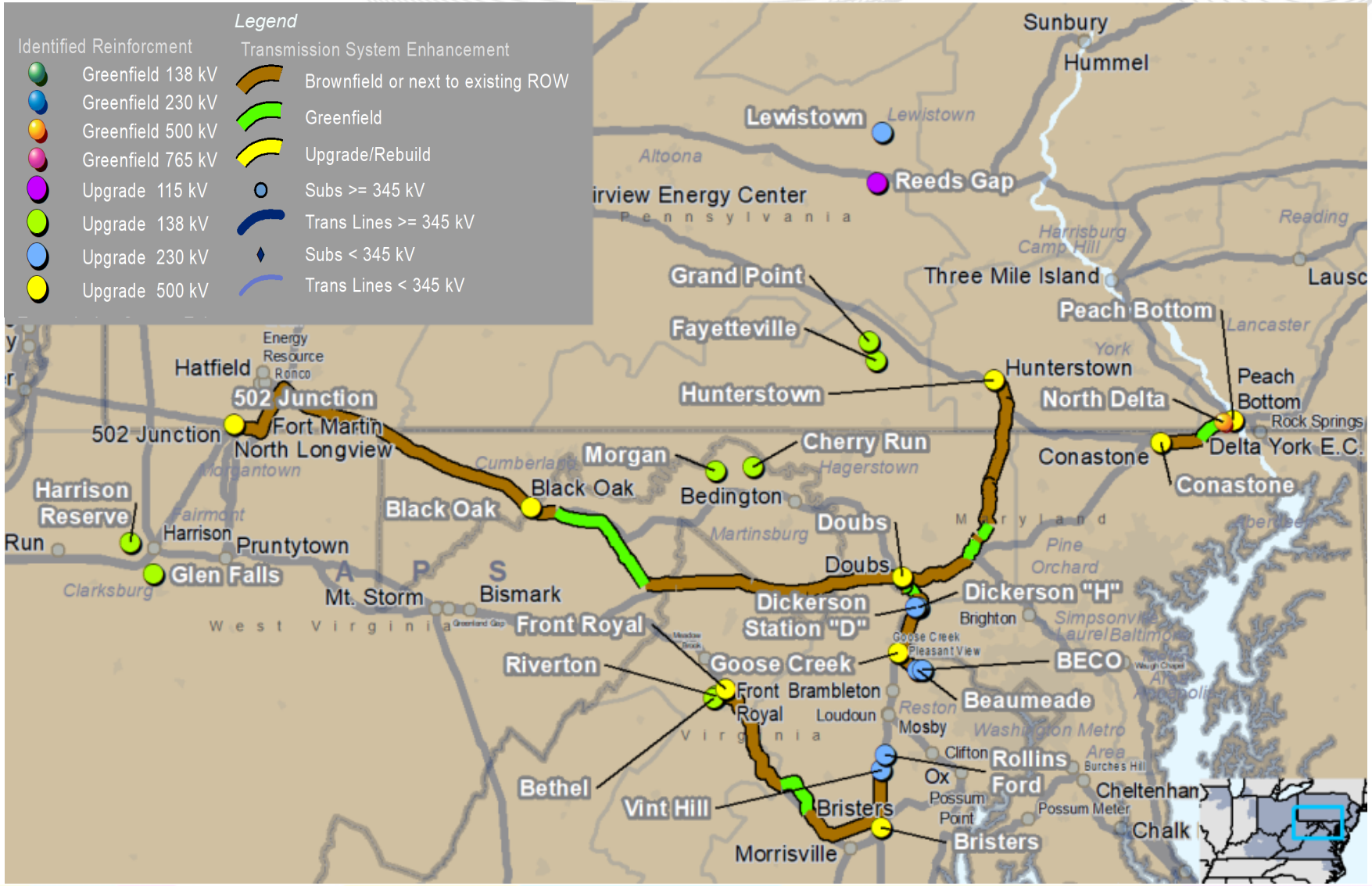
2022 Window 3 proposals – LS Power - 548



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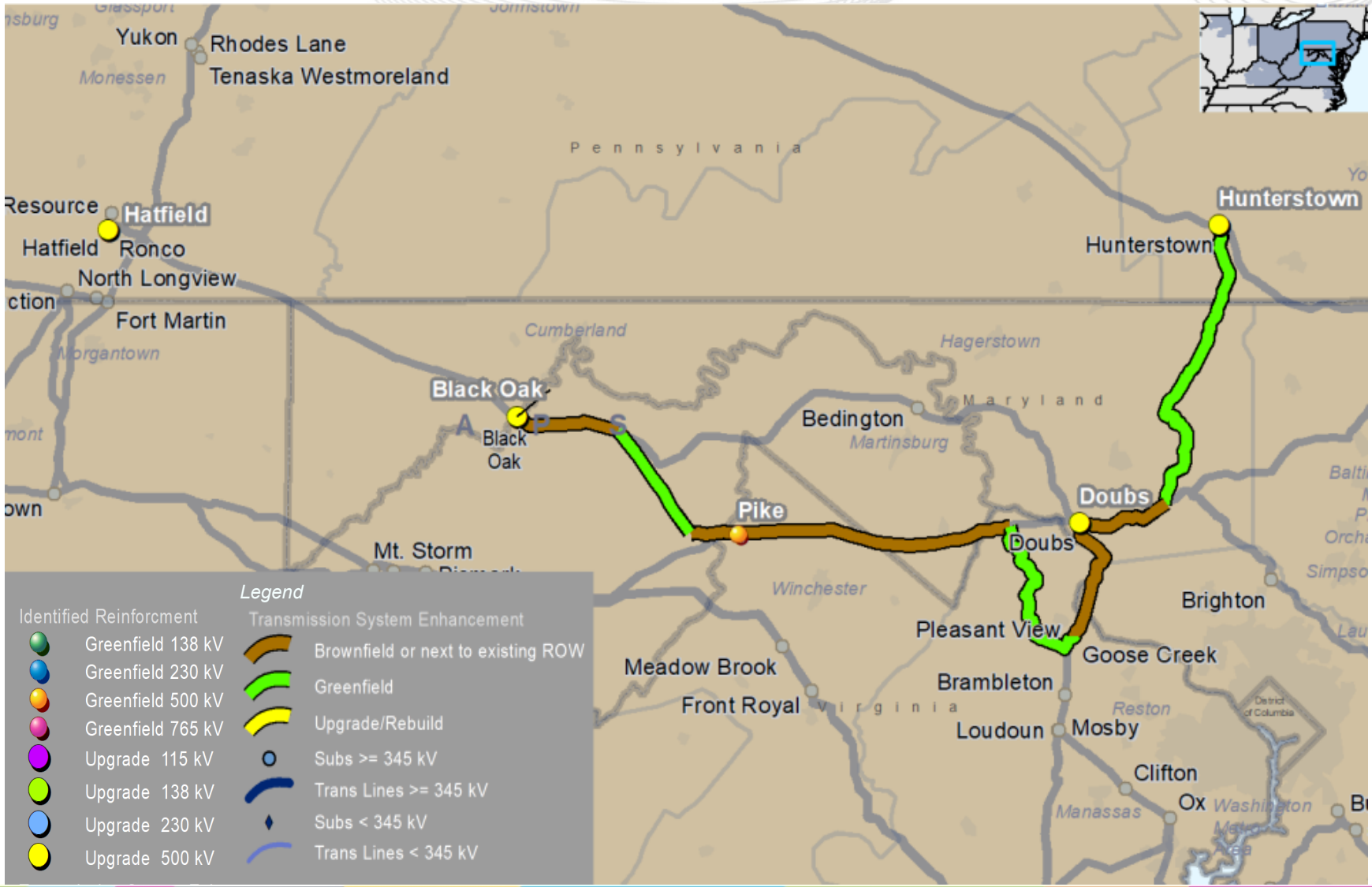
2022 Window 3 proposals – Nextera- 28



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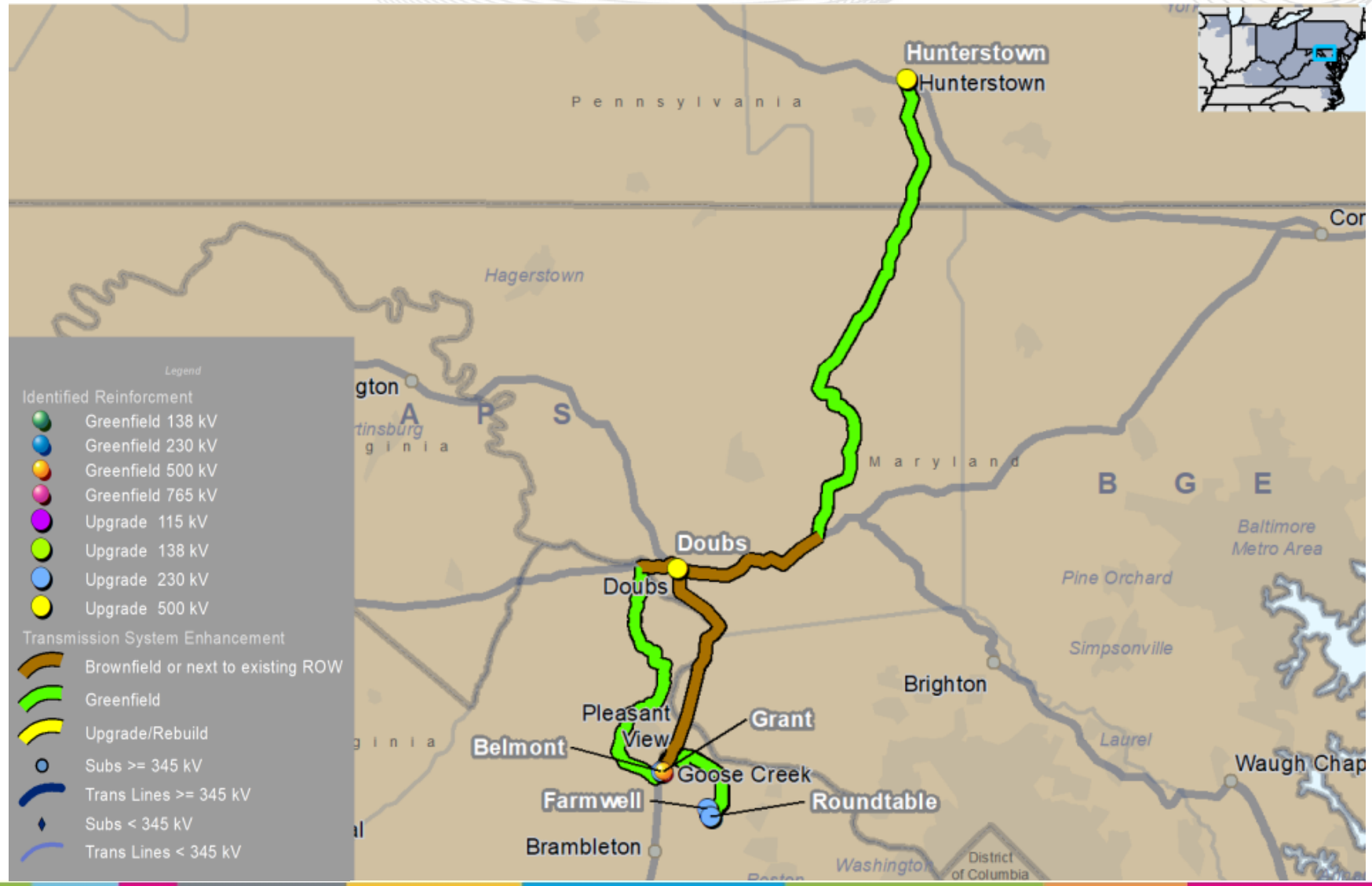
2022 Window 3 proposals – Nextera - 116



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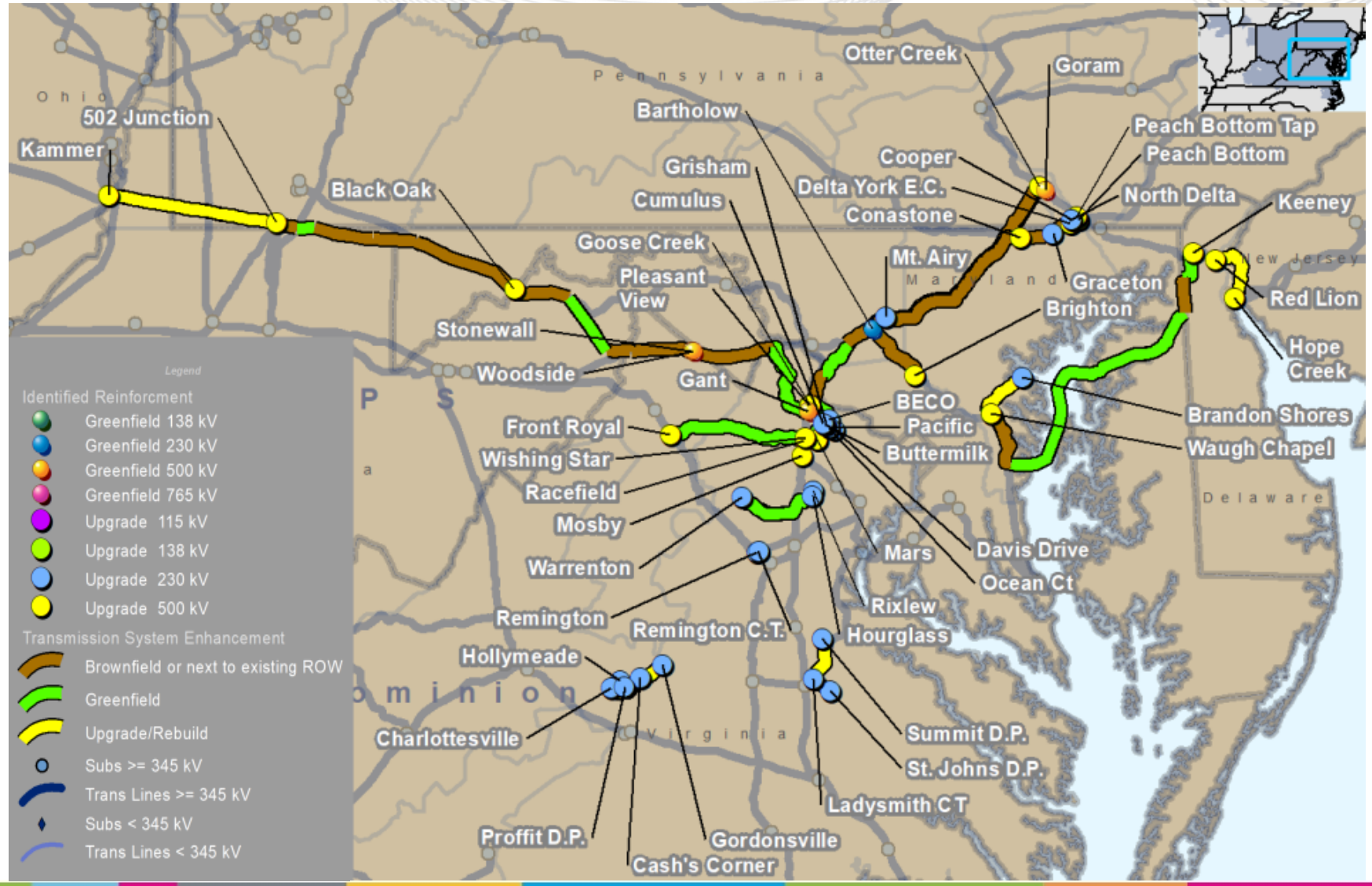
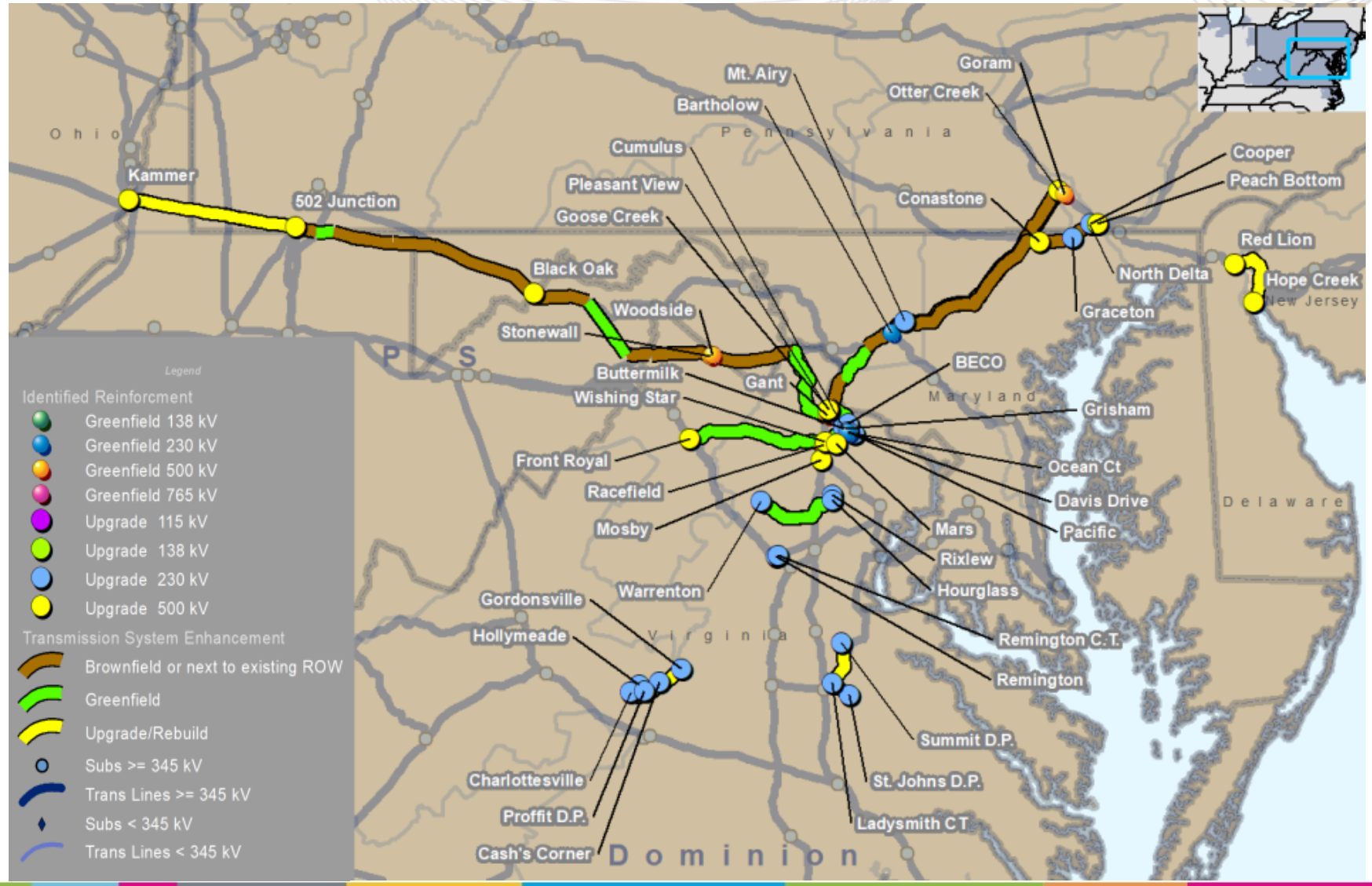
2022 Window 3 proposals – Nextera - 175 with 663, 853, 948



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.*

2022 Window 3 proposals – Nextera - 598 with 663, 853, 385



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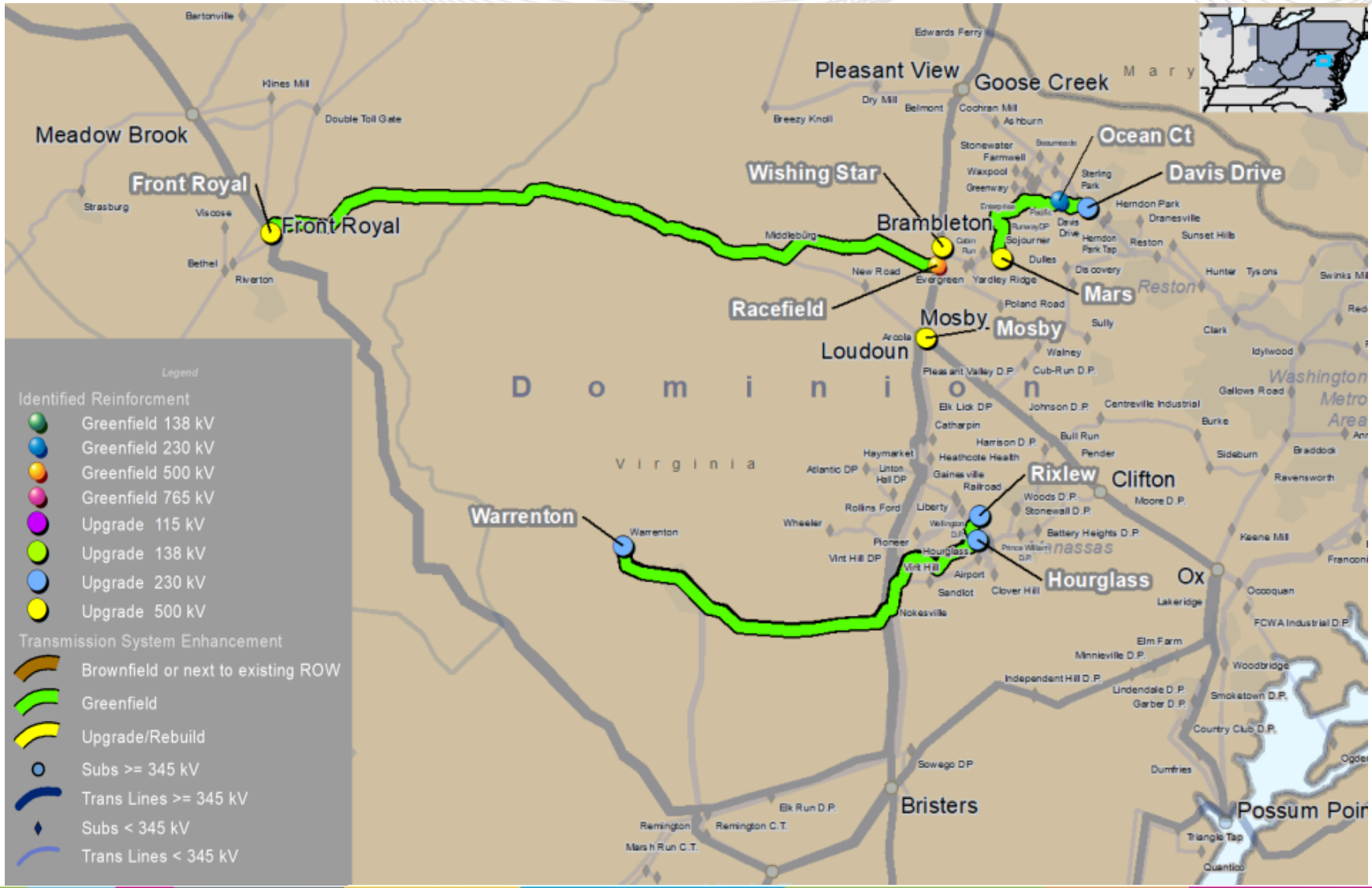
2022 Window 3 proposals – Nextera - 663



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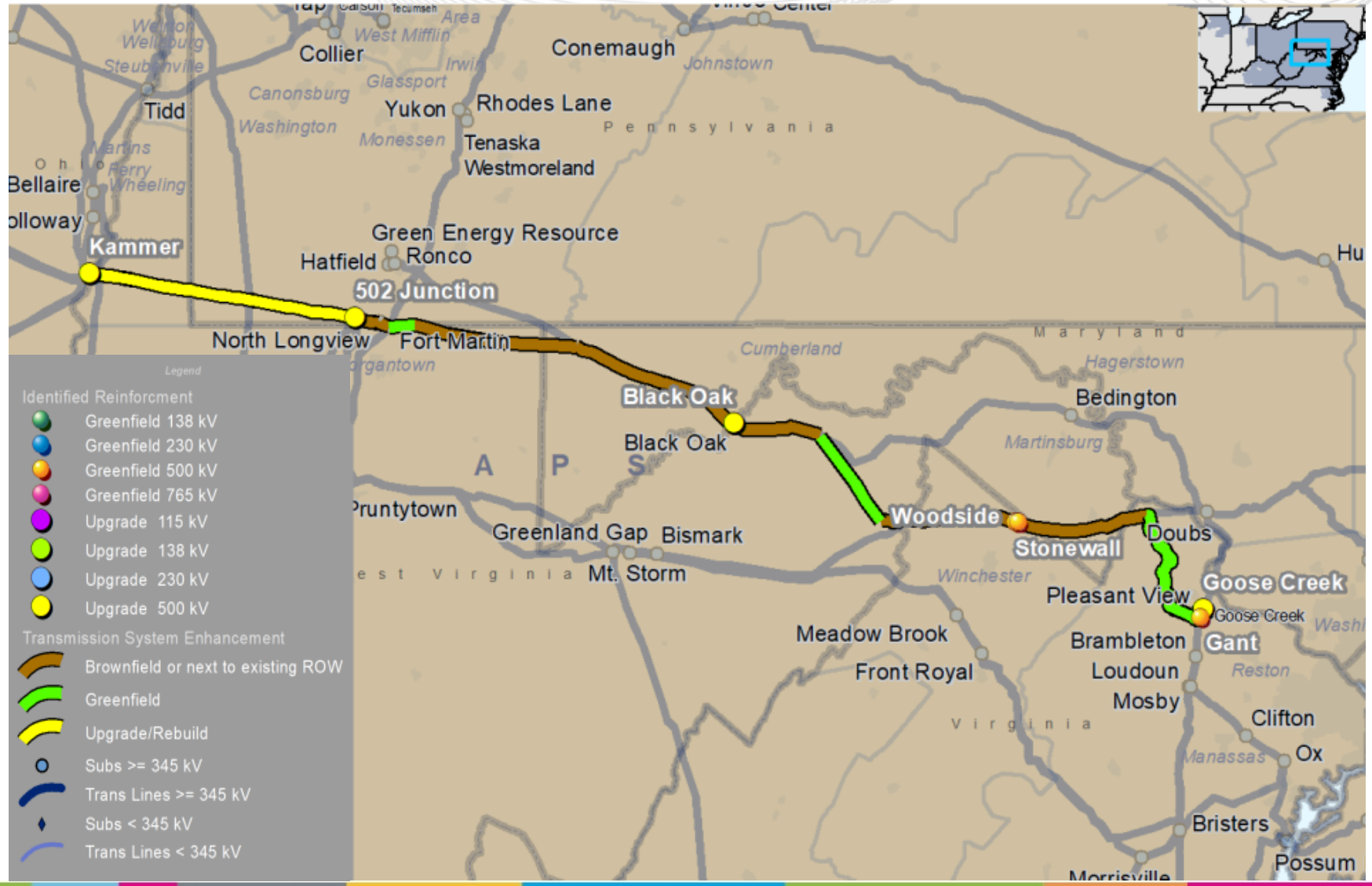
2022 Window 3 proposals – Nextera - 853



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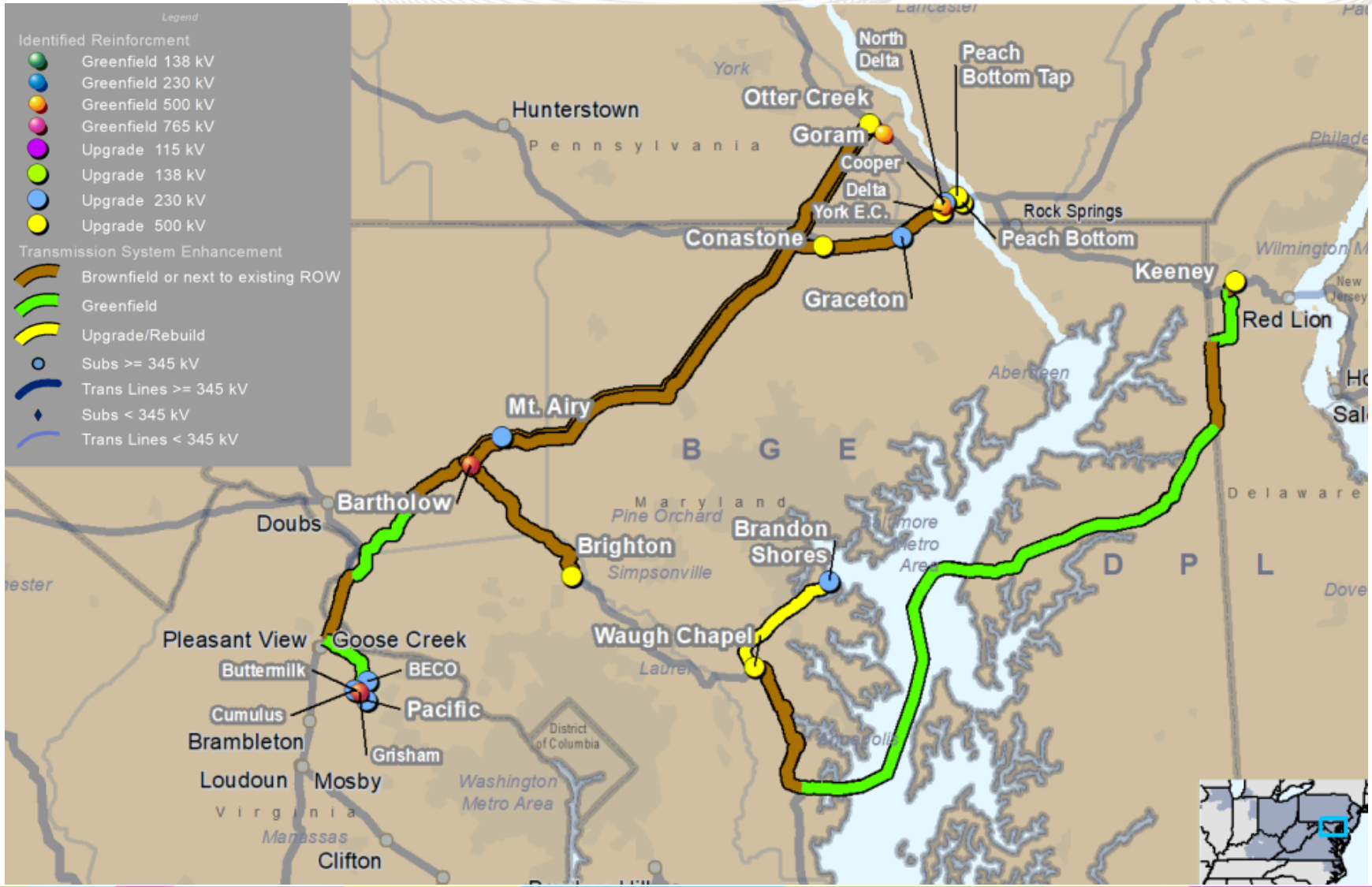
2022 Window 3 proposals – Nextera - 948



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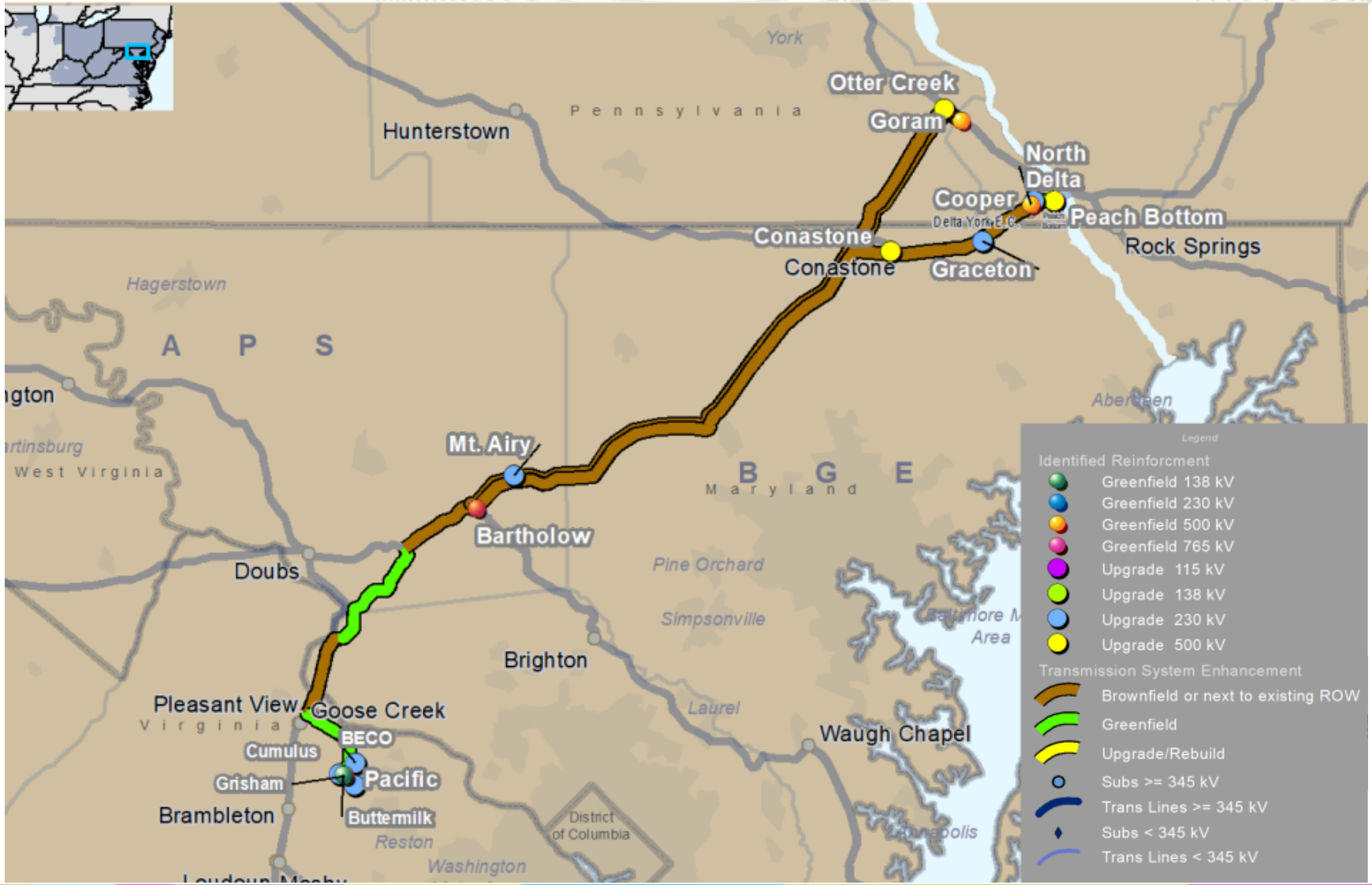
2022 Window 3 proposals – Nextera 385



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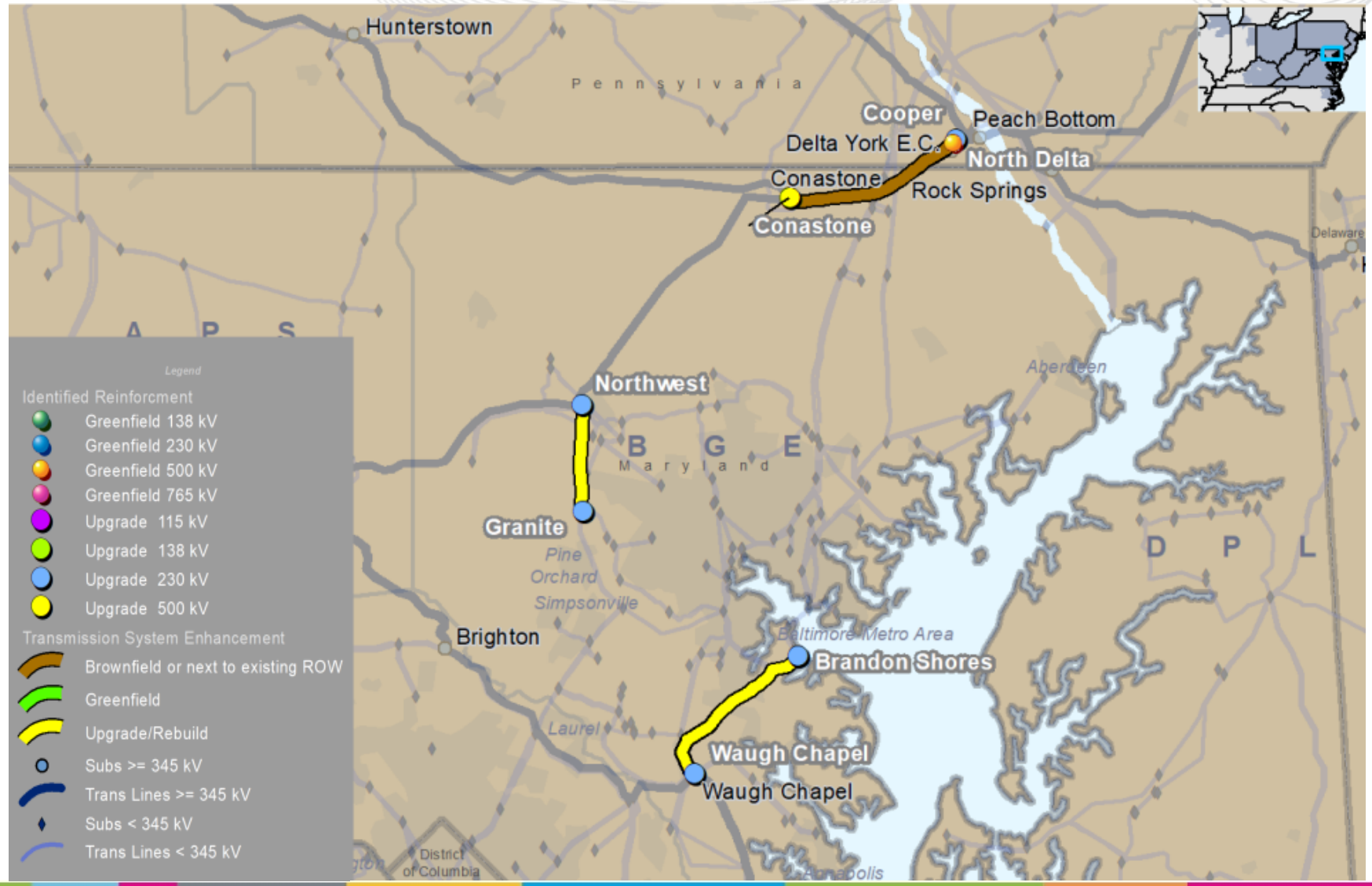
2022 Window 3 proposals – Nextera - 217



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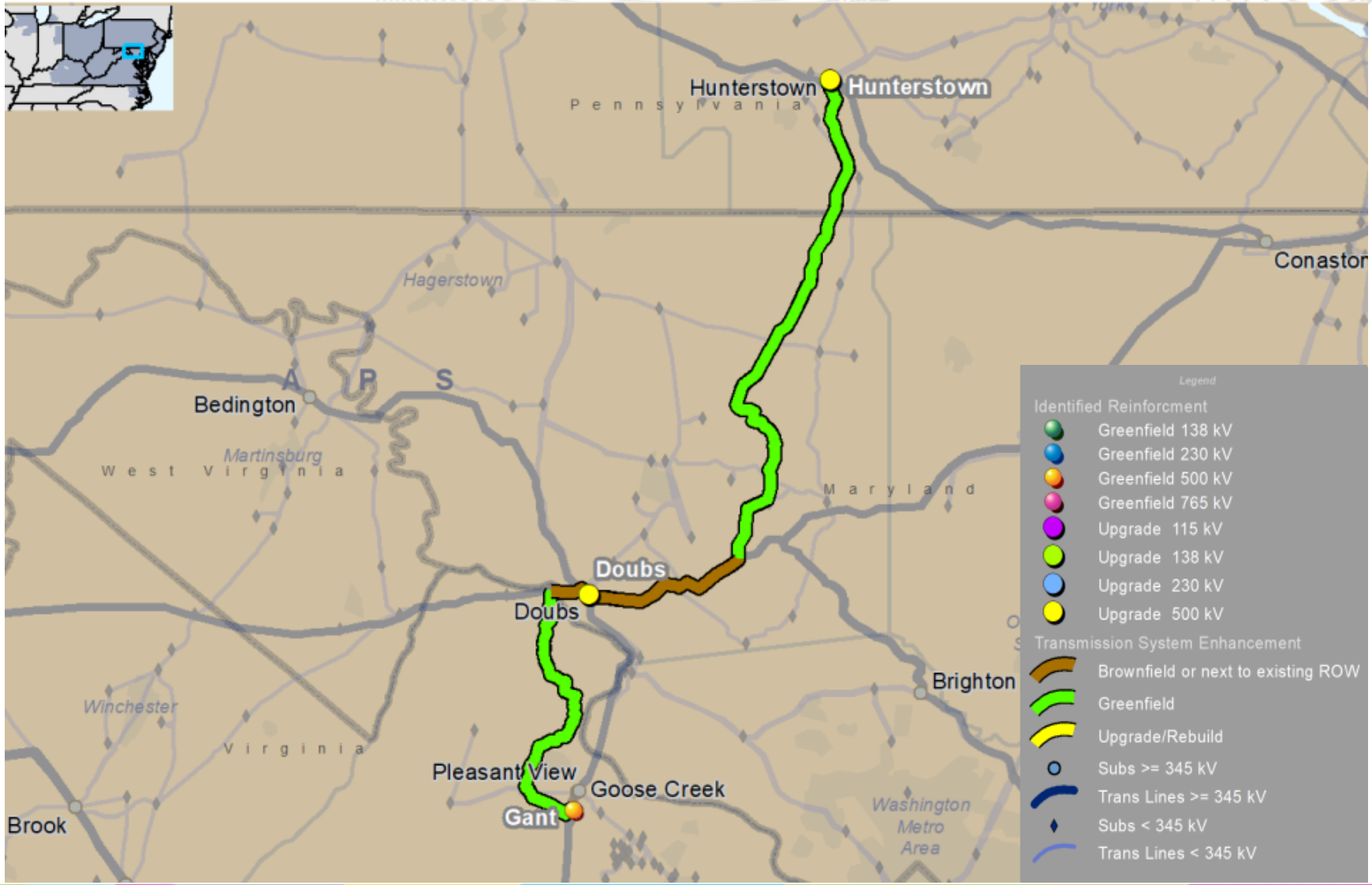
2022 Window 3 proposals – Nextera - 255



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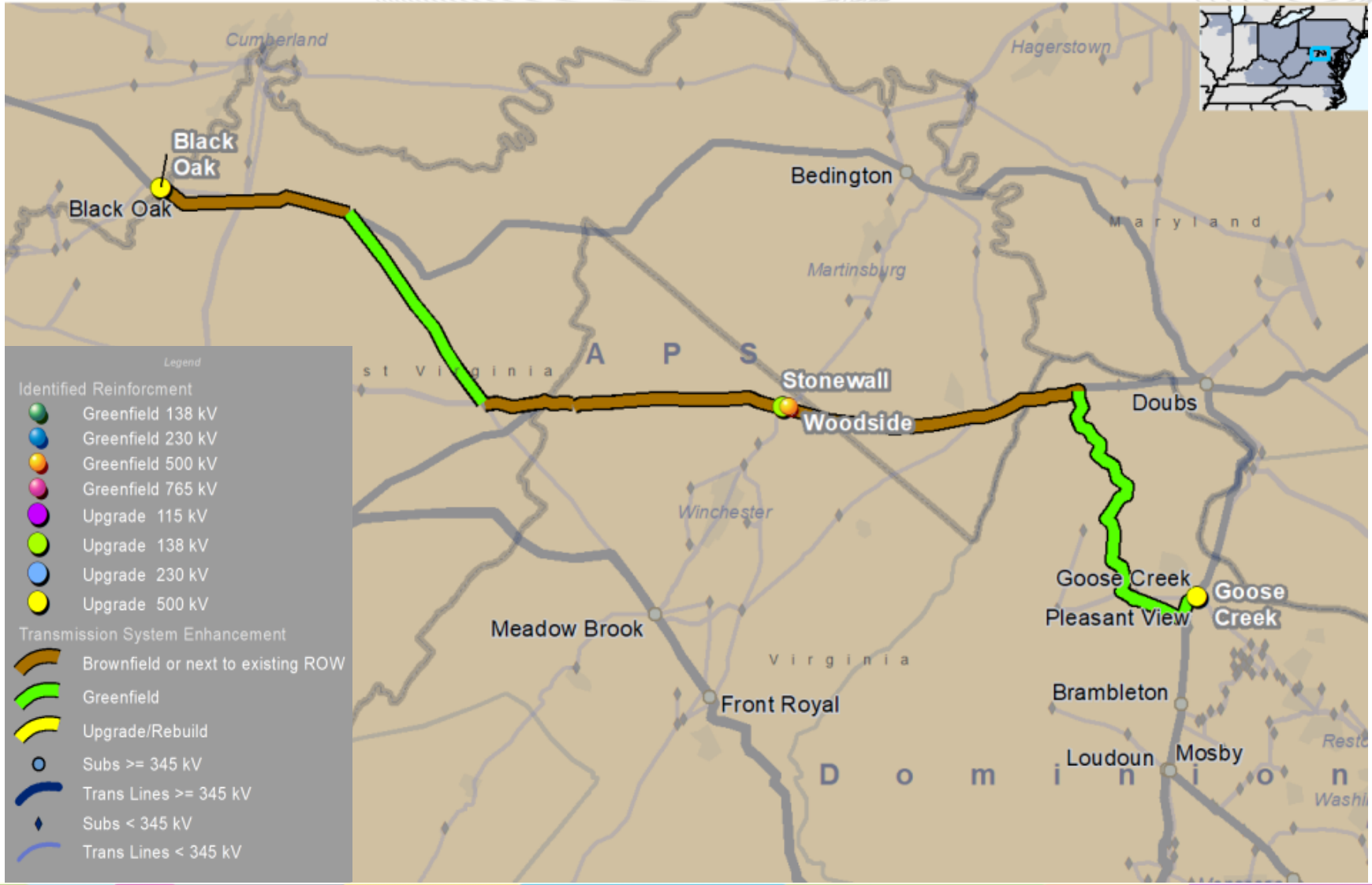
2022 Window 3 proposals – Nextera - 279



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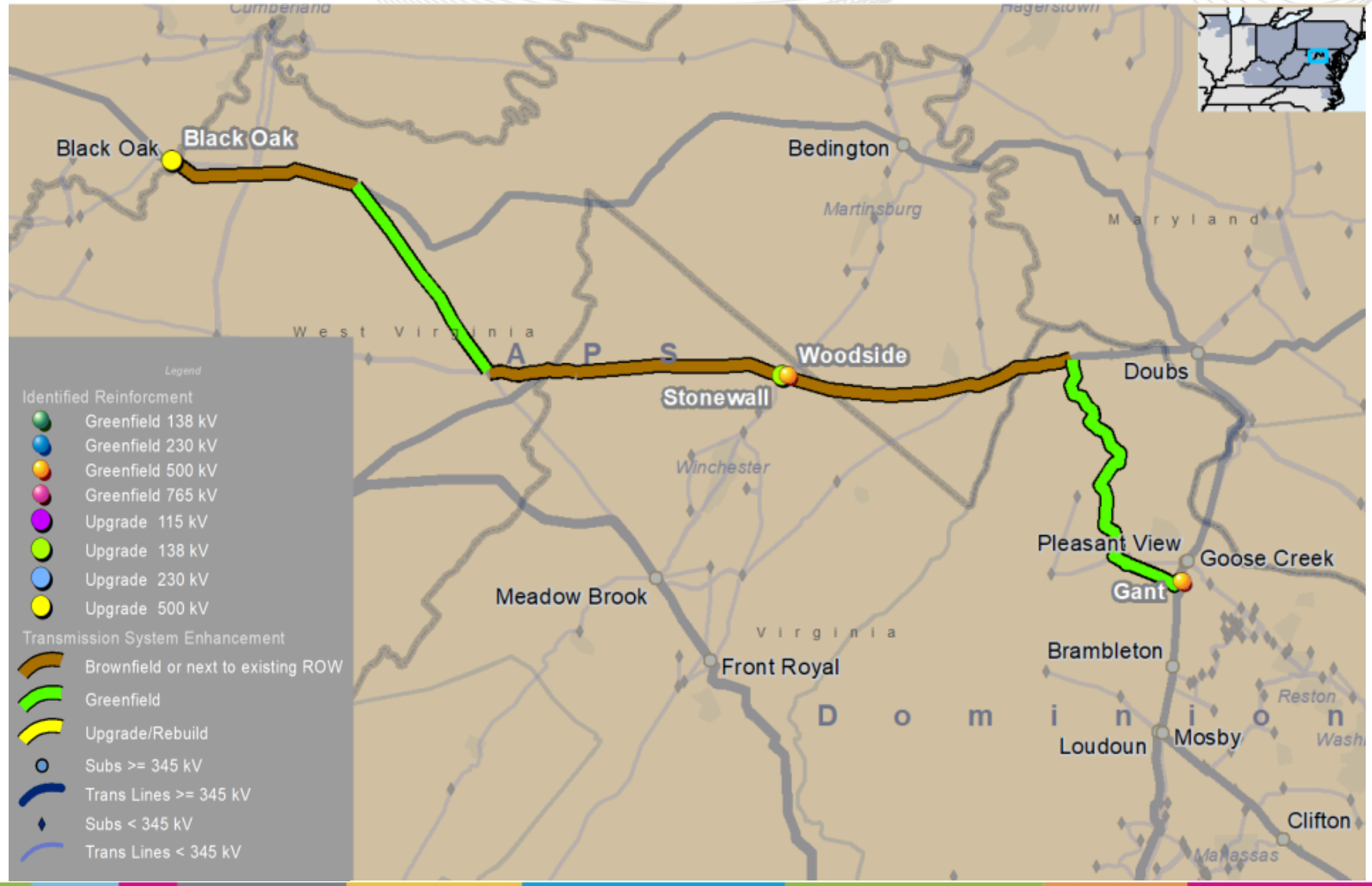
2022 Window 3 proposals – Nextera - 347



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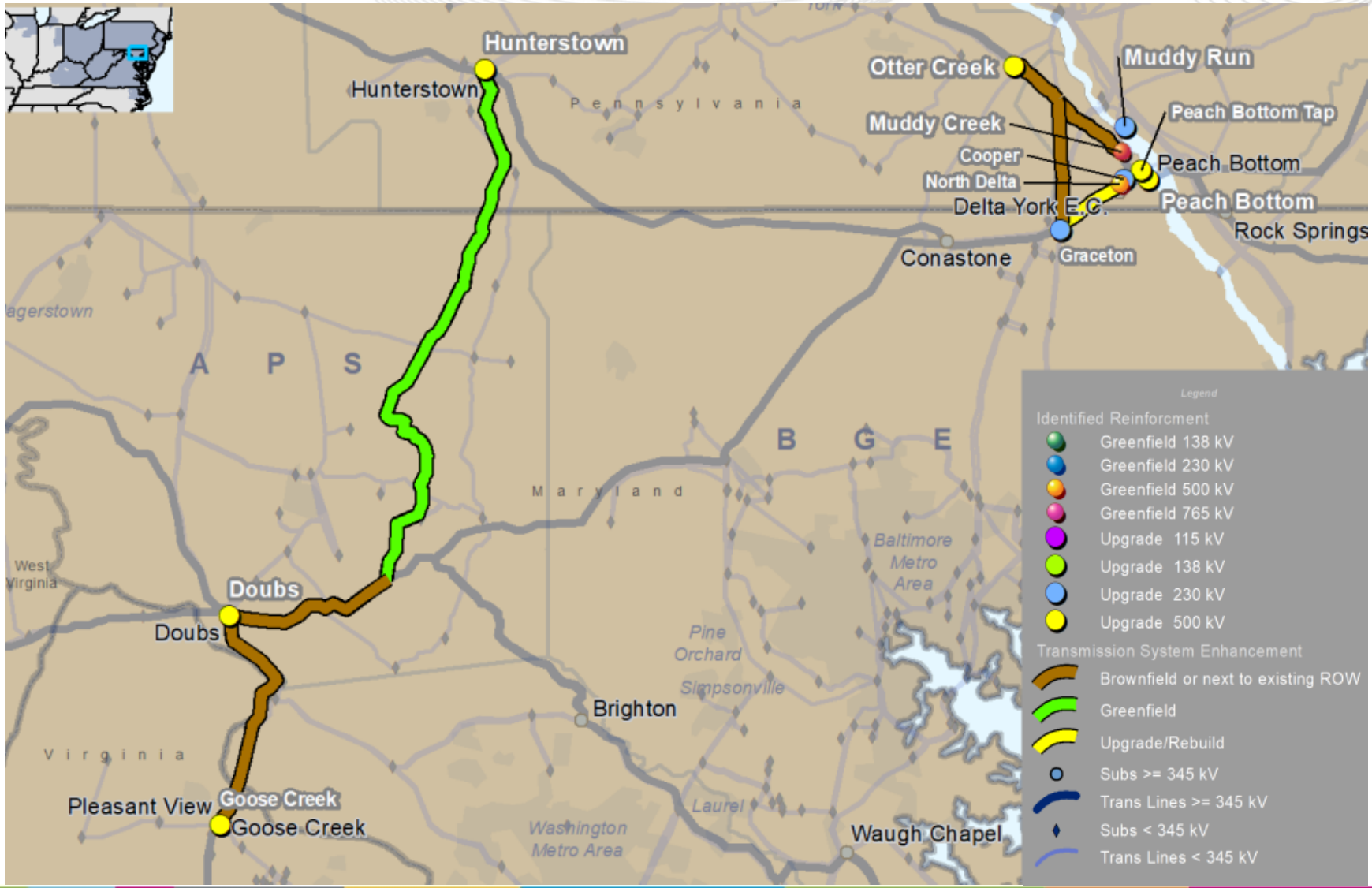
2022 Window 3 proposals – Nextera – 419

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

2022 Window 3 proposals – Nextera - 445



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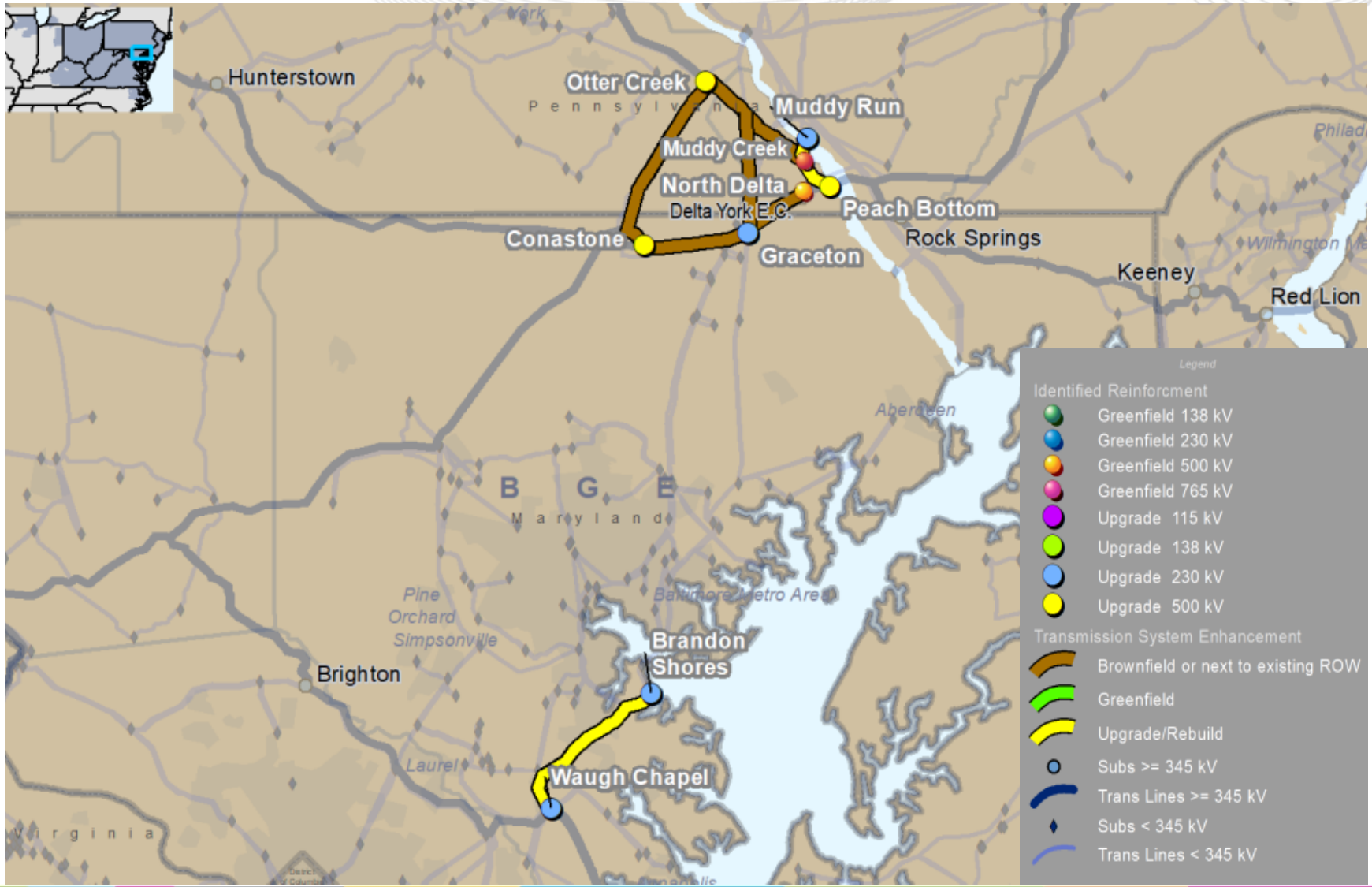
2022 Window 3 proposals – Nextera - 530



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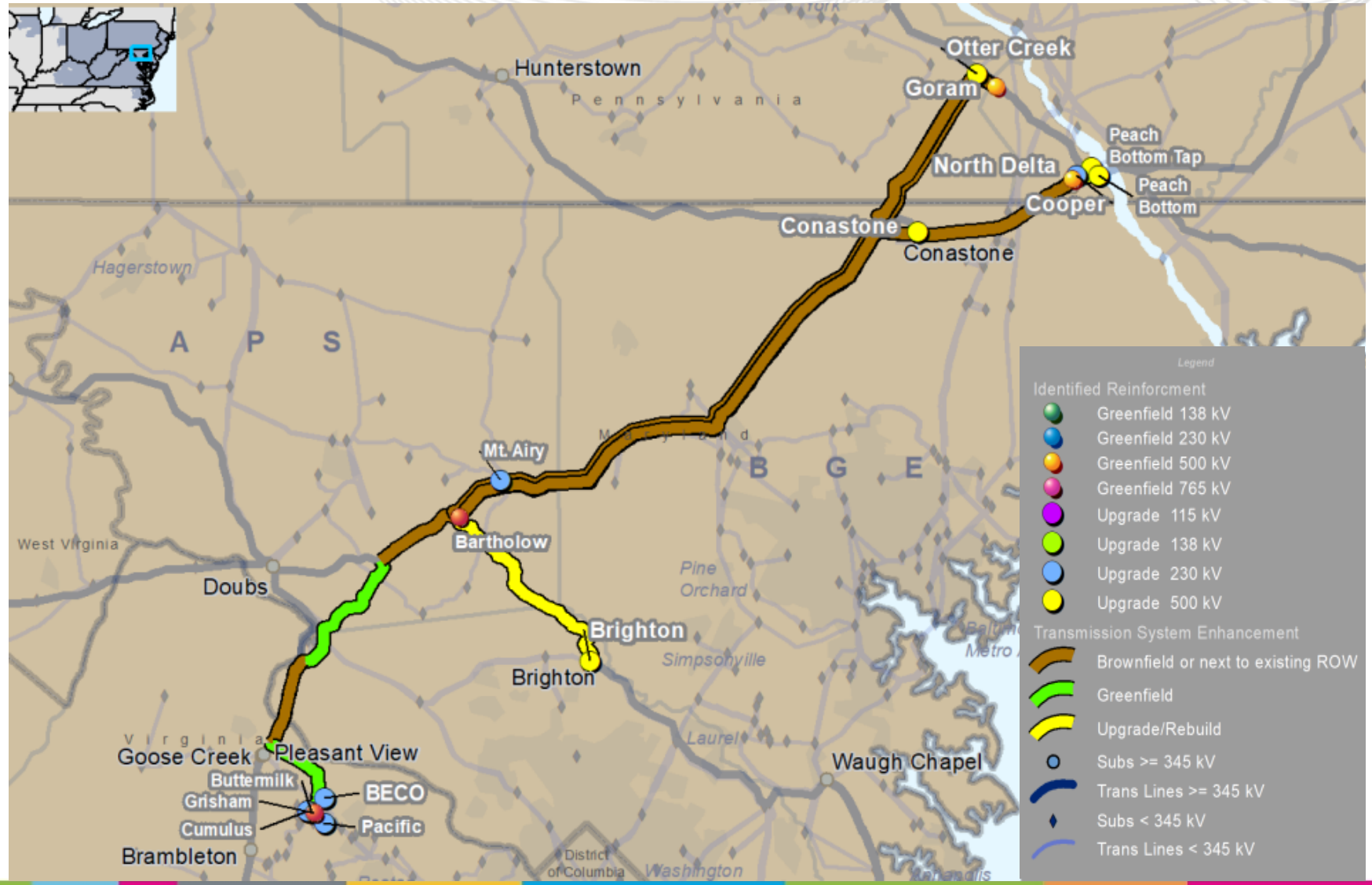
2022 Window 3 proposals – Nextera - 564



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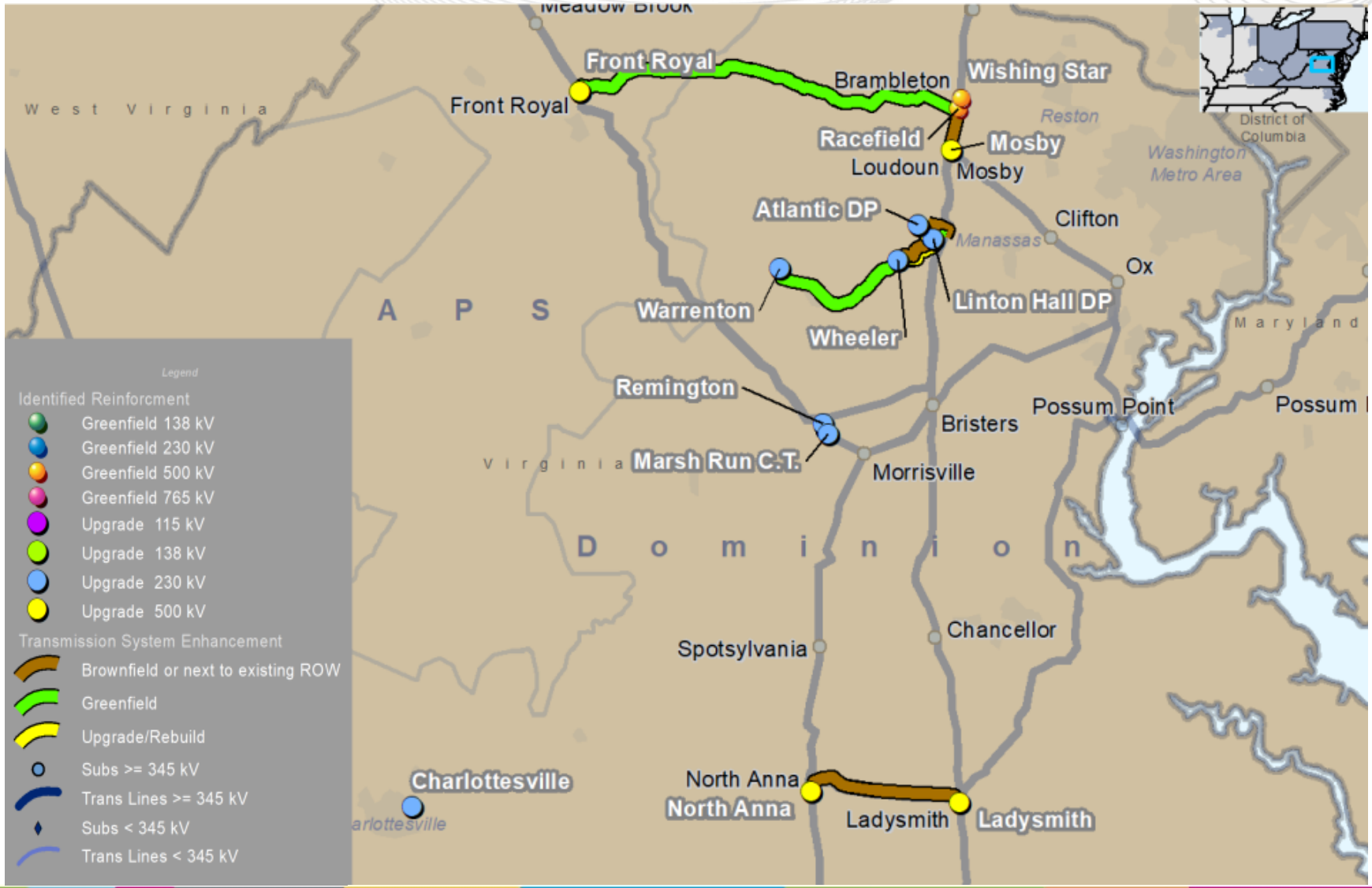
2022 Window 3 proposals – Nextera - 577



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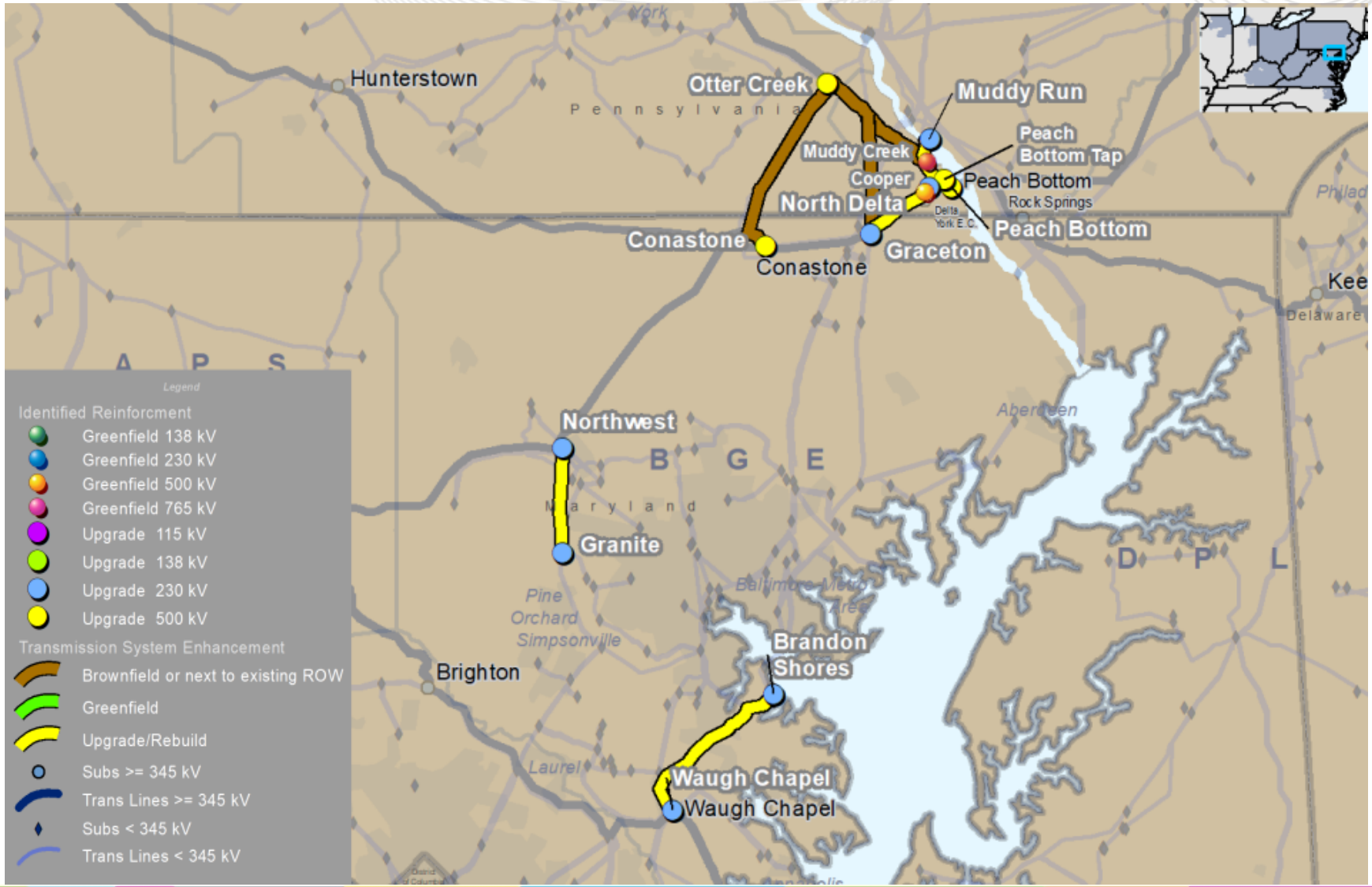
2022 Window 3 proposals – Nextera - 631



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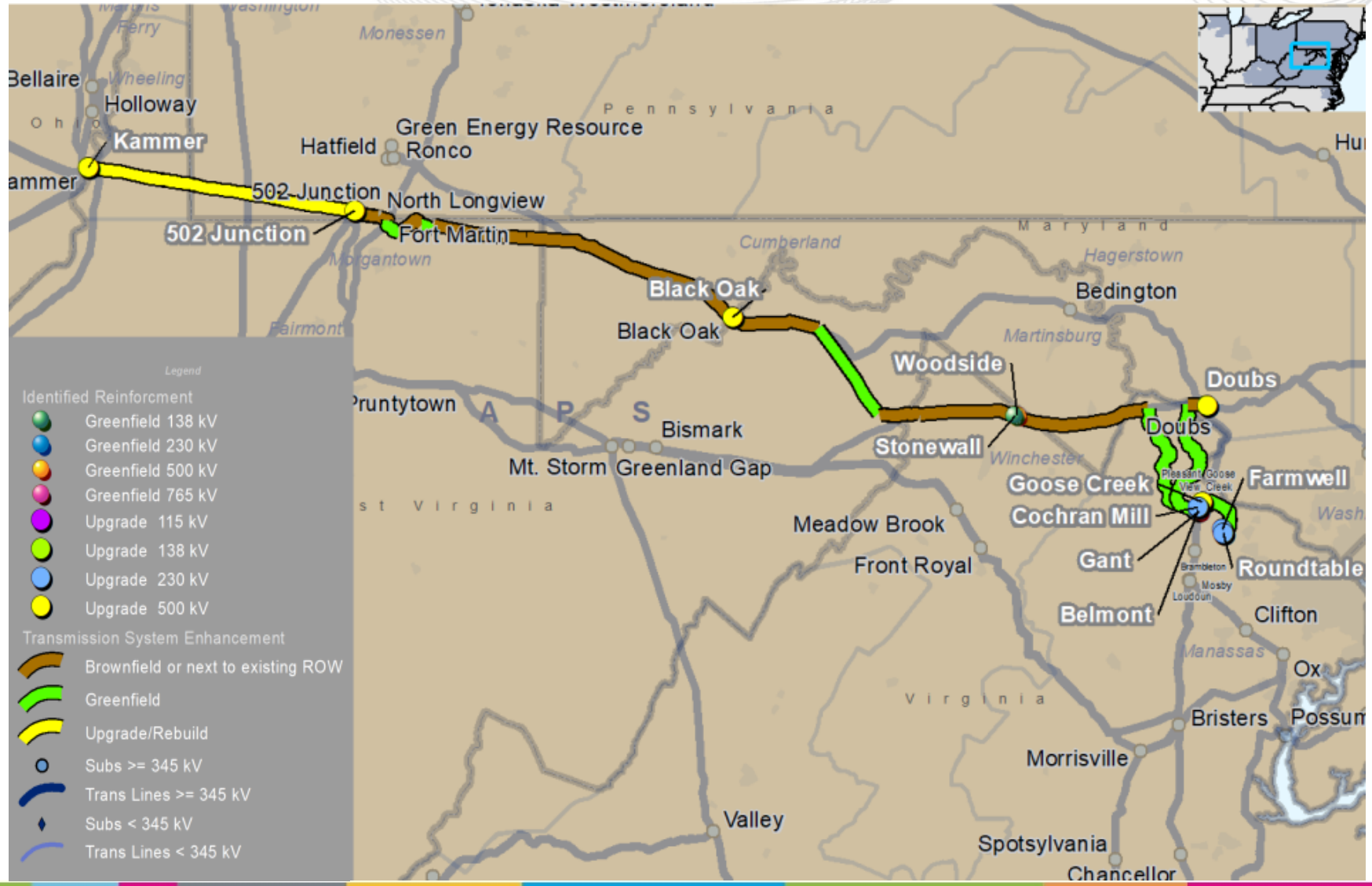
2022 Window 3 proposals – Nextera - 642



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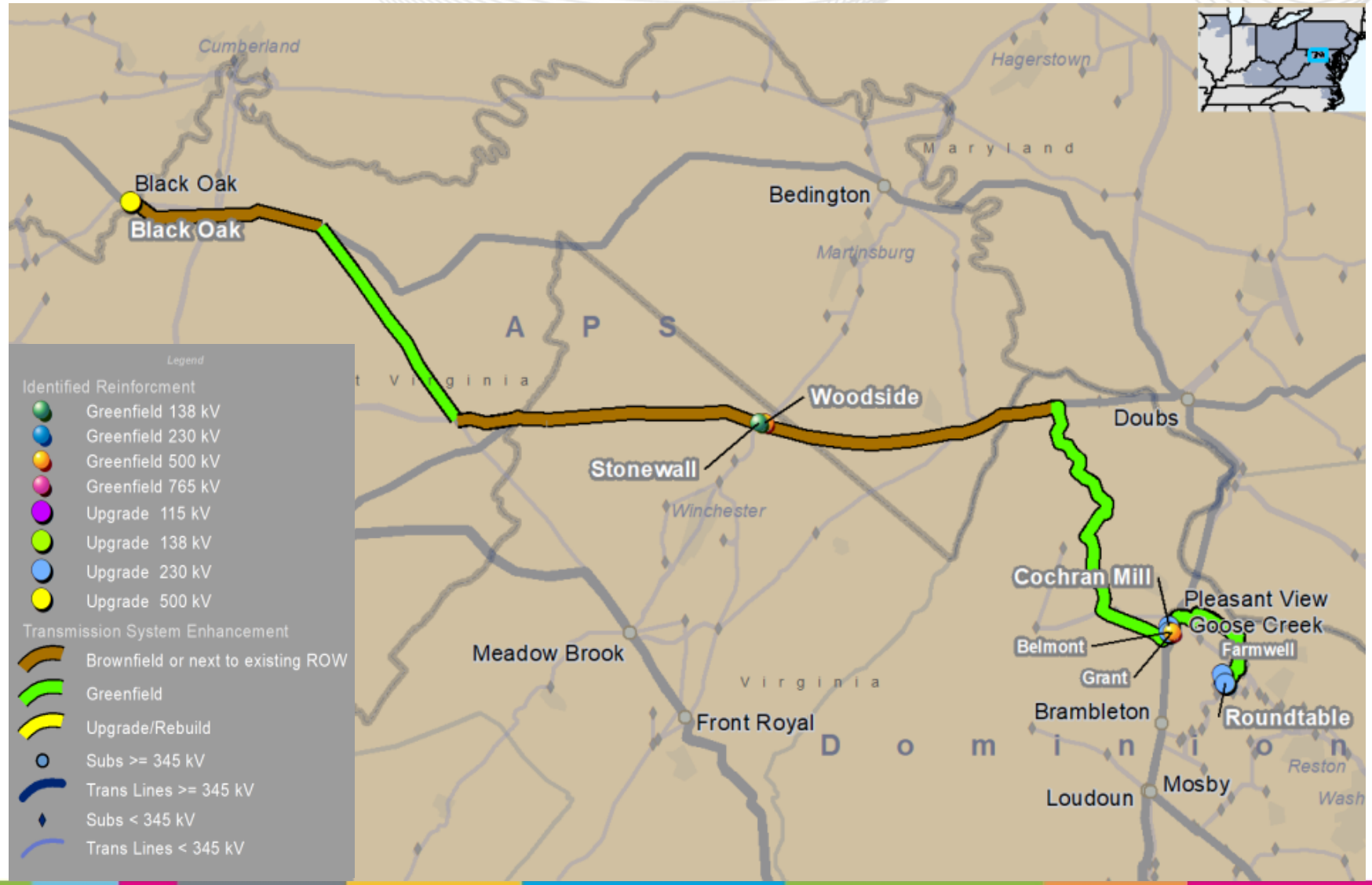
2022 Window 3 proposals – Nextera - 676



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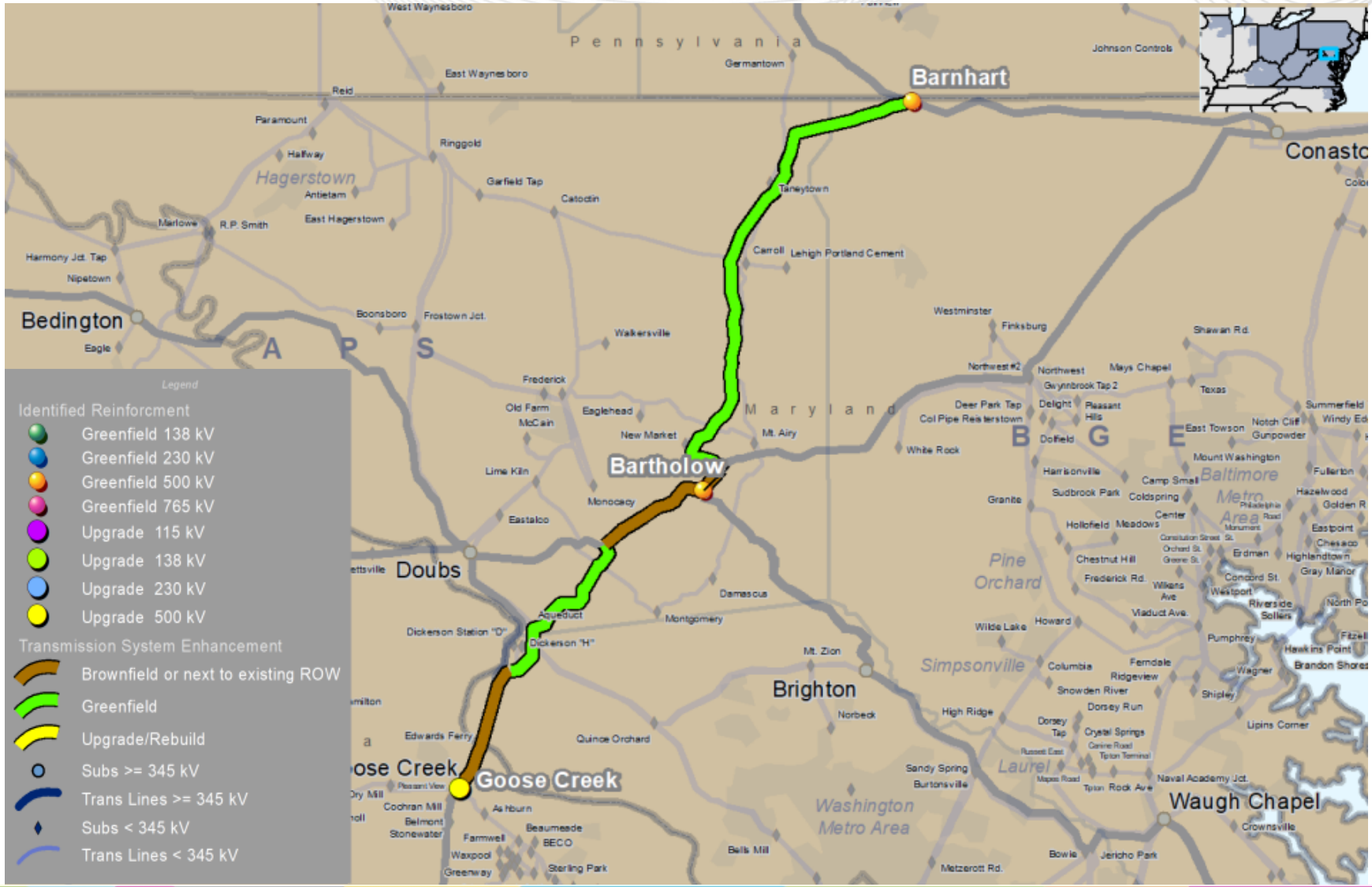
2022 Window 3 proposals – Nextera - 685

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.*

2022 Window 3 proposals – Nextera - 719

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

2022 Window 3 proposals – Nextera - 728



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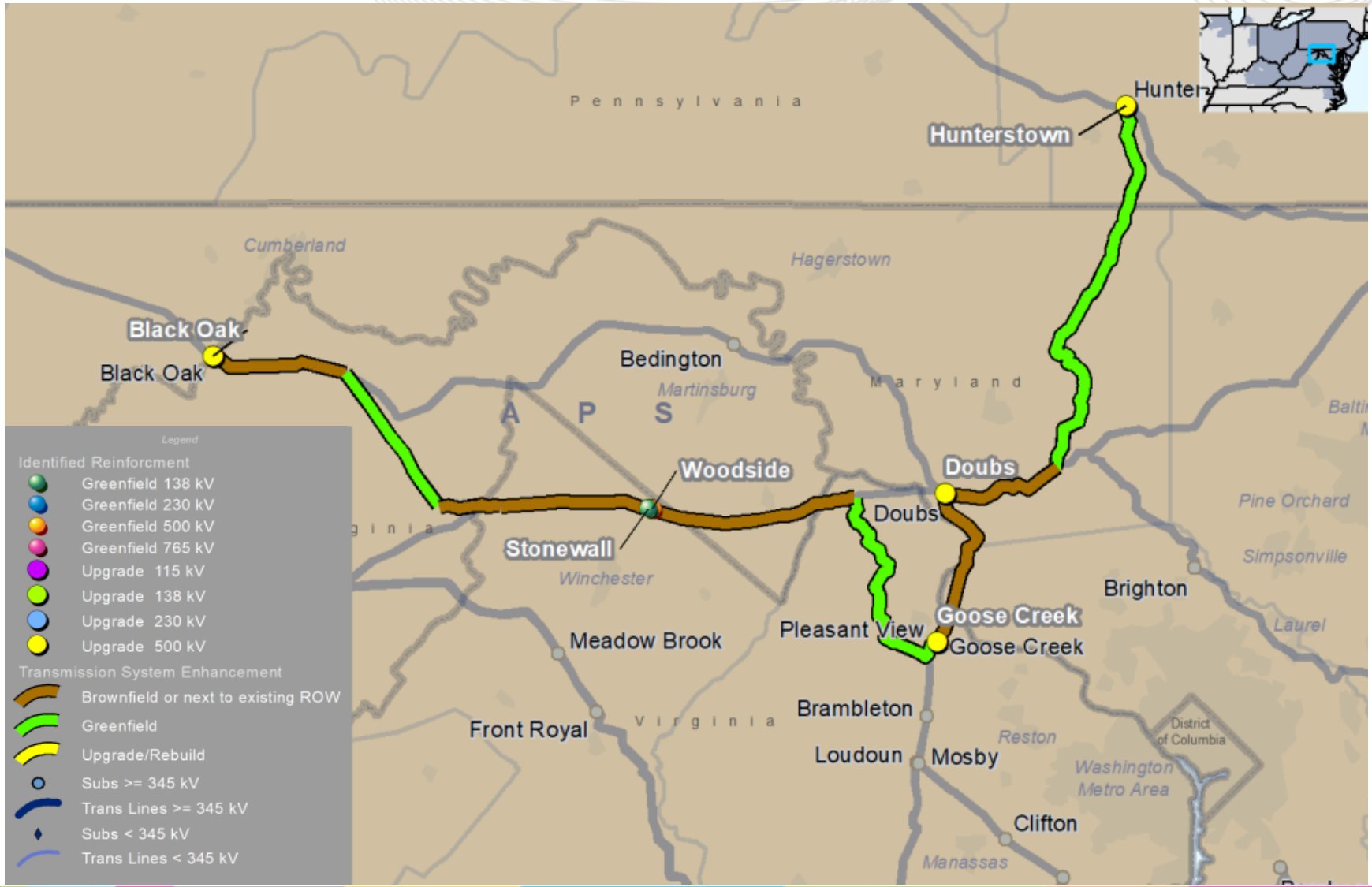
2022 Window 3 proposals – Nextera - 766

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.*

2022 Window 3 proposals – Nextera - 846



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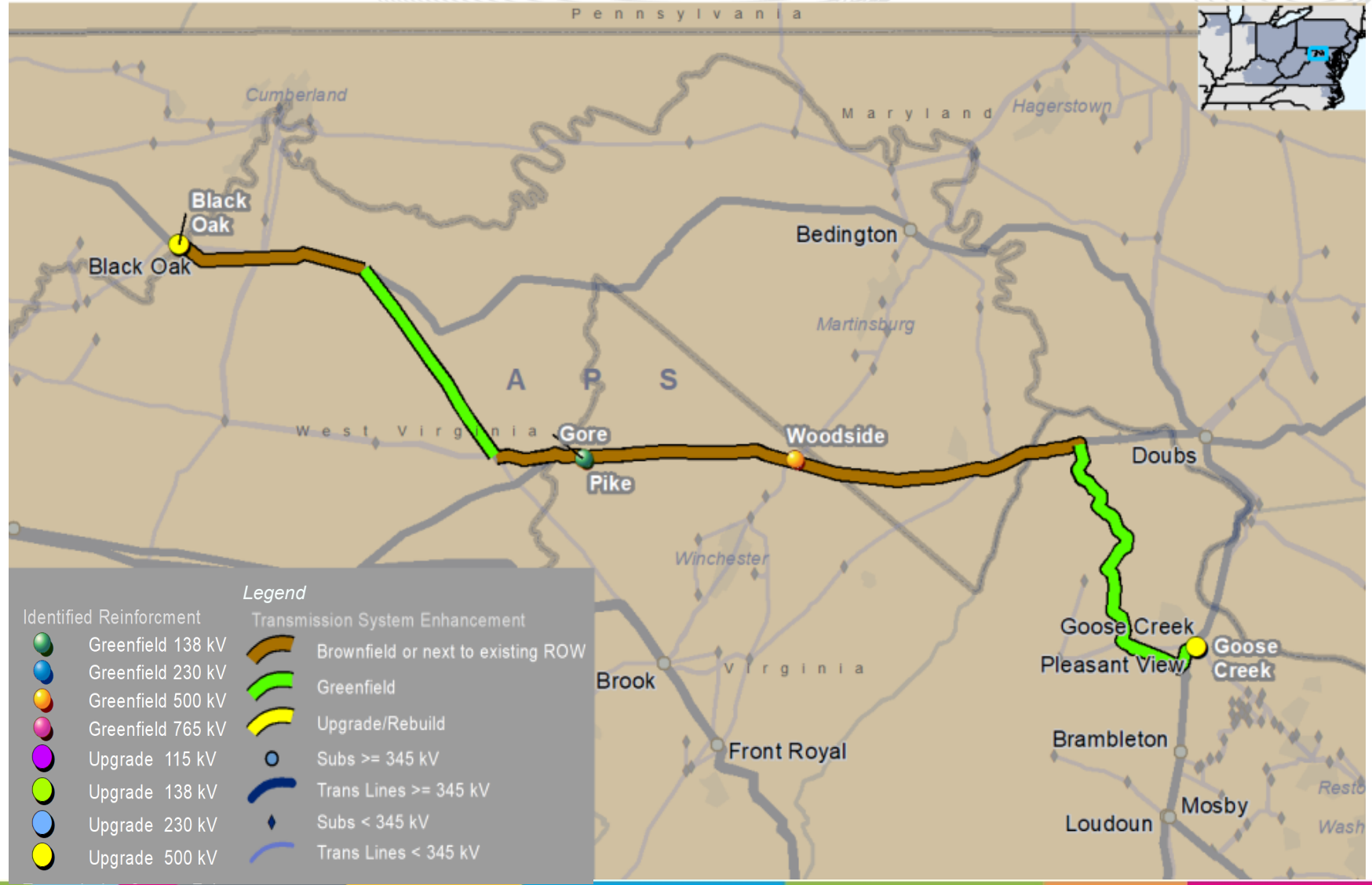
2022 Window 3 proposals – Nextera - 951



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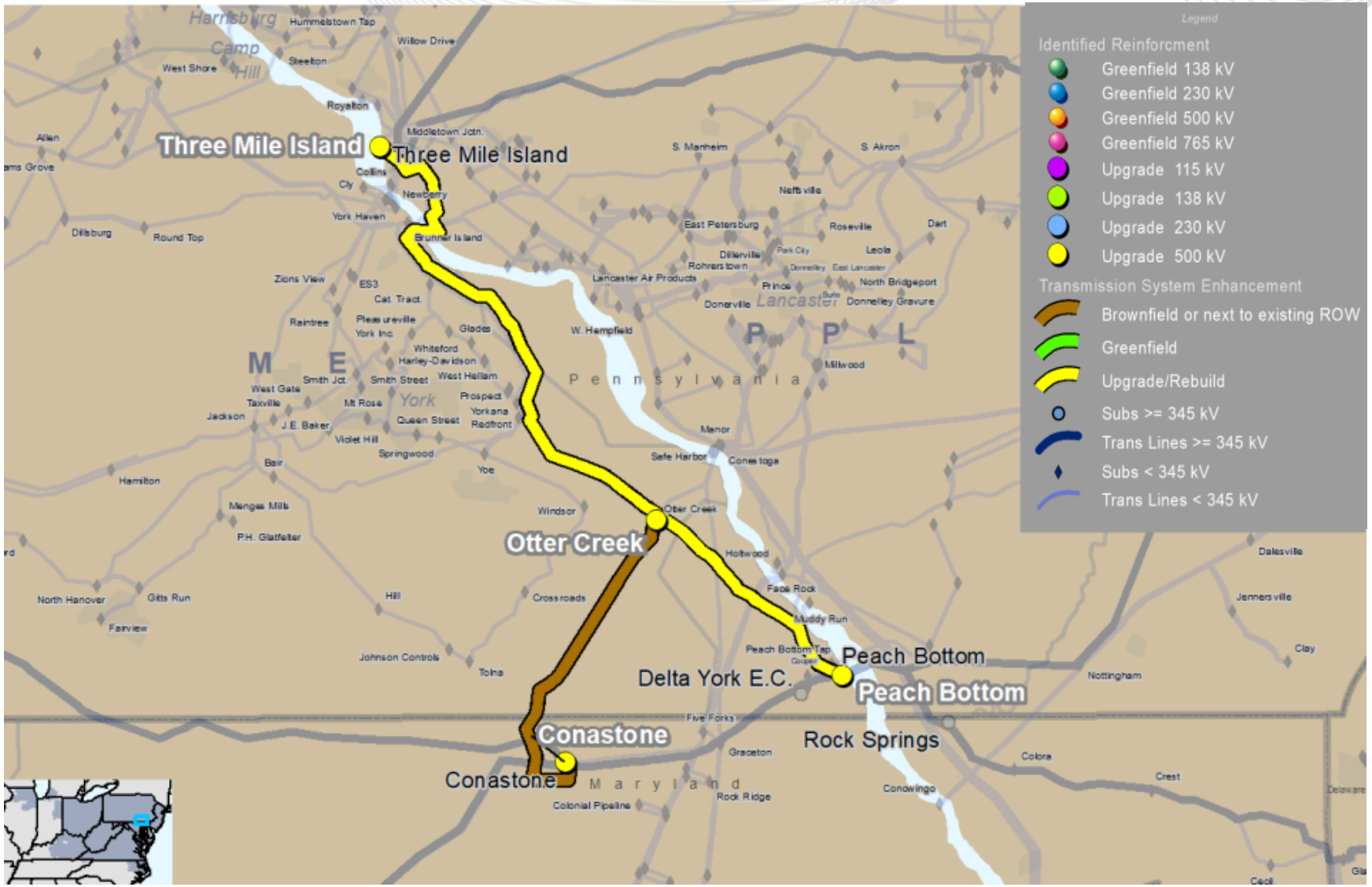
2022 Window 3 proposals – PPL - 374



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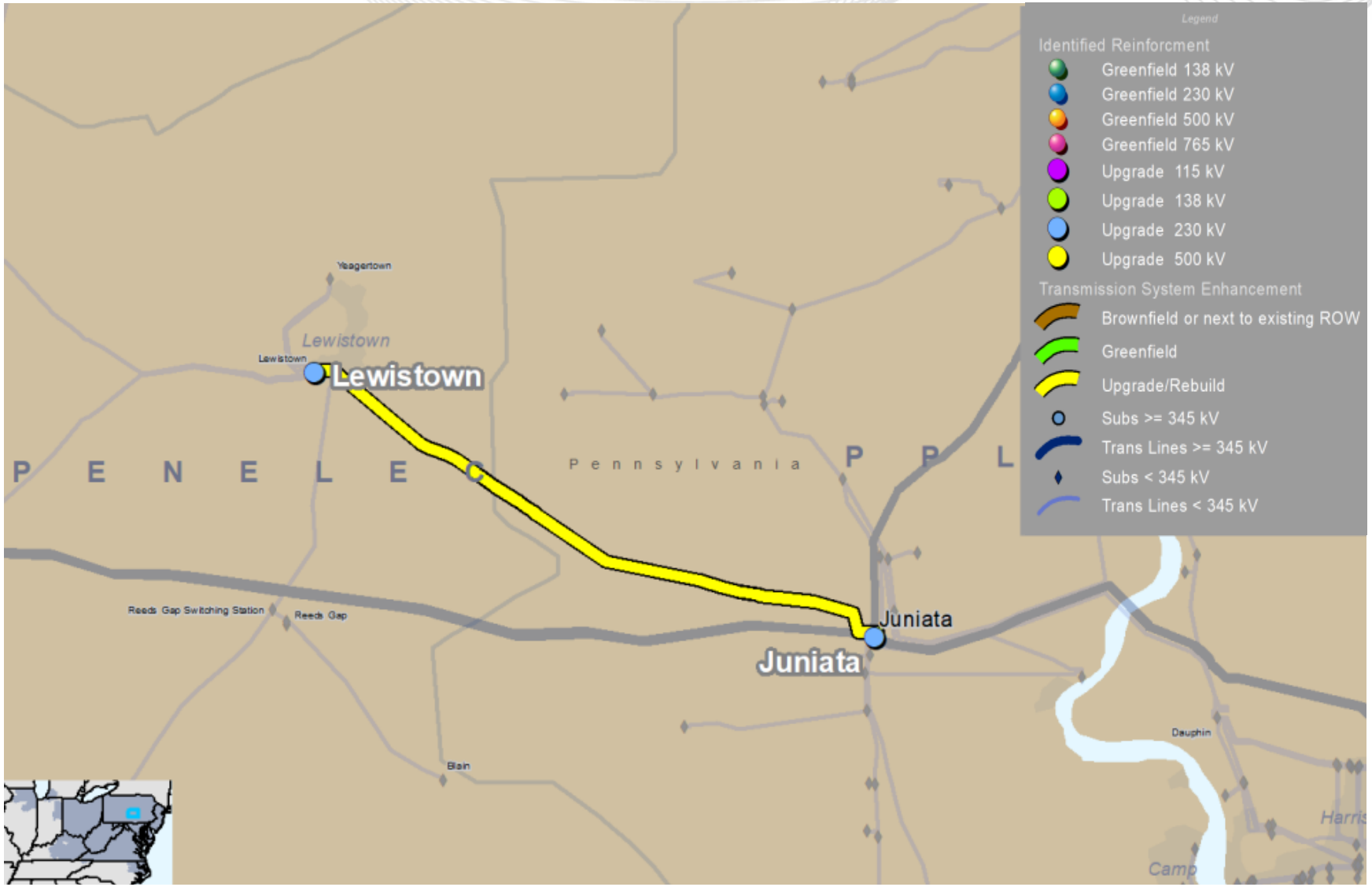
2022 Window 3 proposals – PPL - 606



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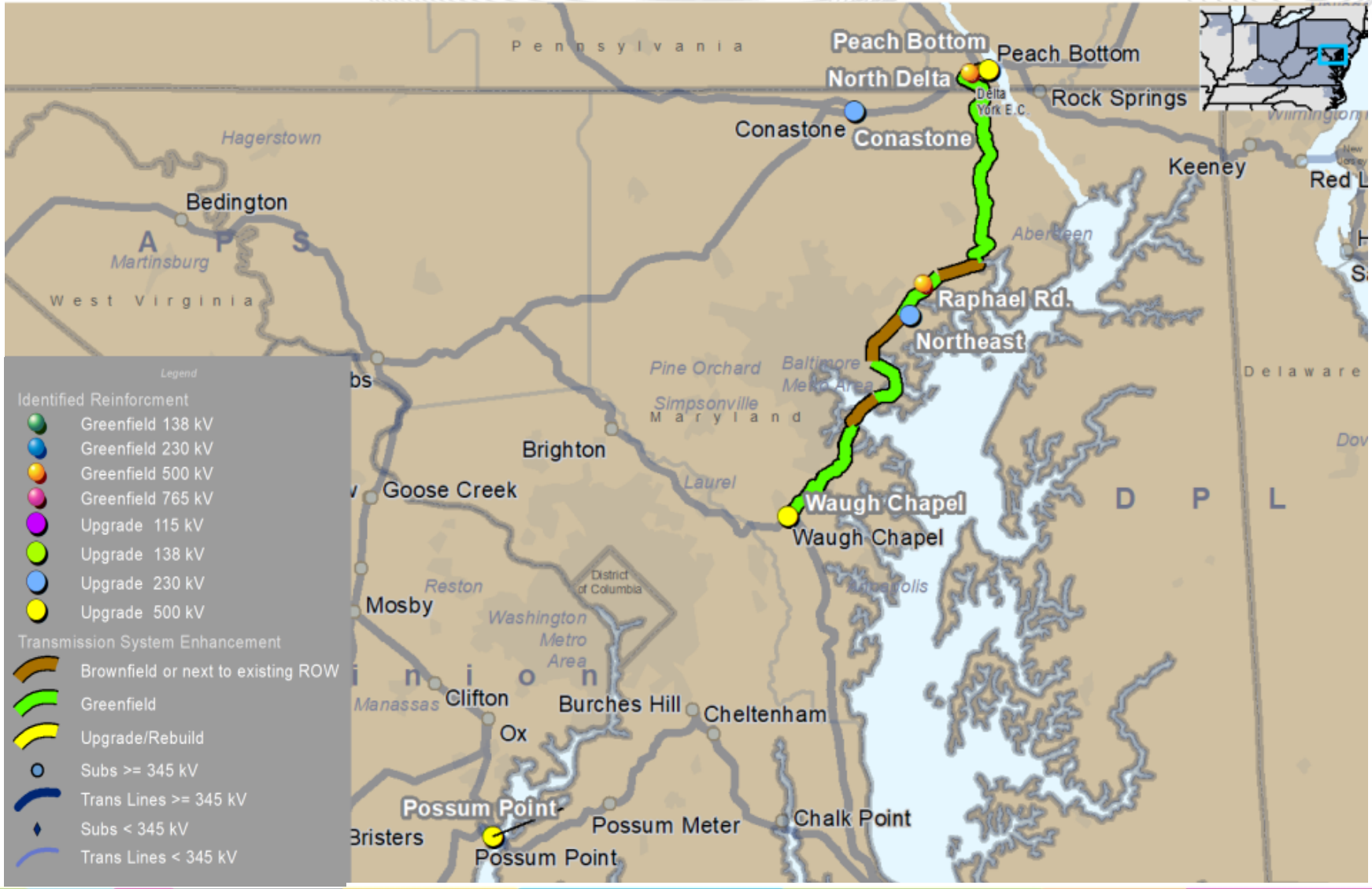
2022 Window 3 proposals – PSEG - 24



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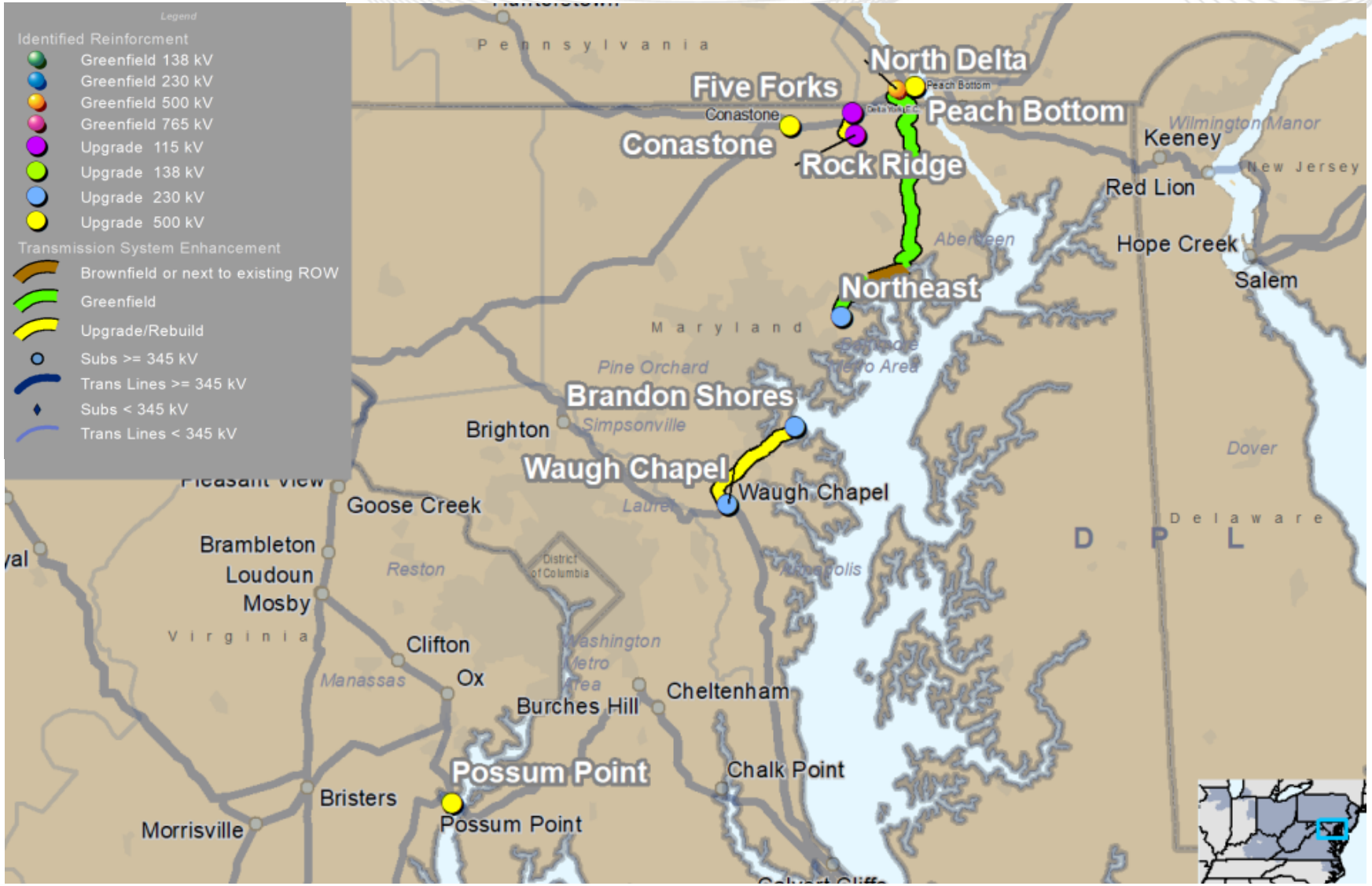
2022 Window 3 proposals – PSEG - 125



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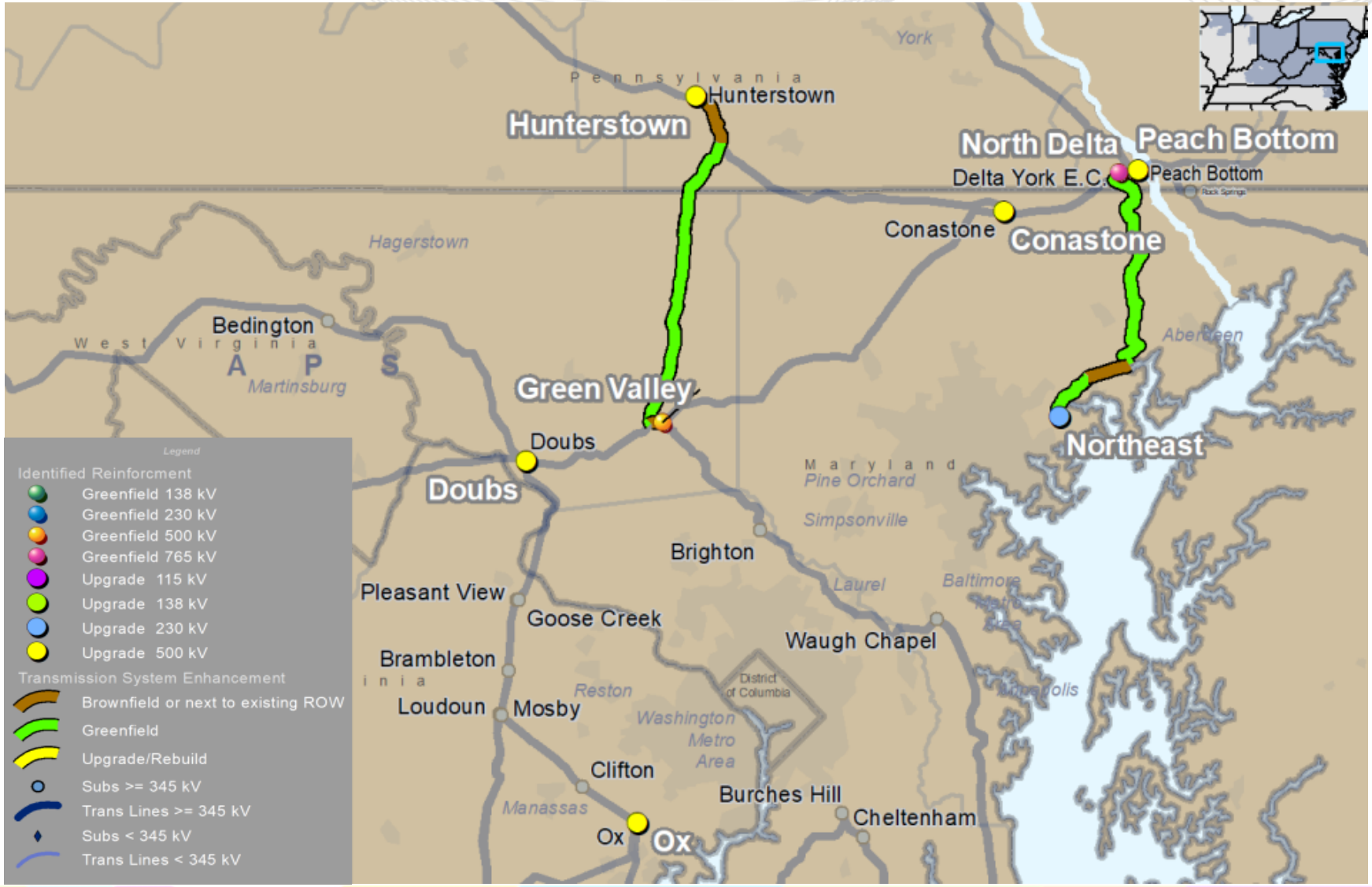
2022 Window 3 proposals – PSEG - 229



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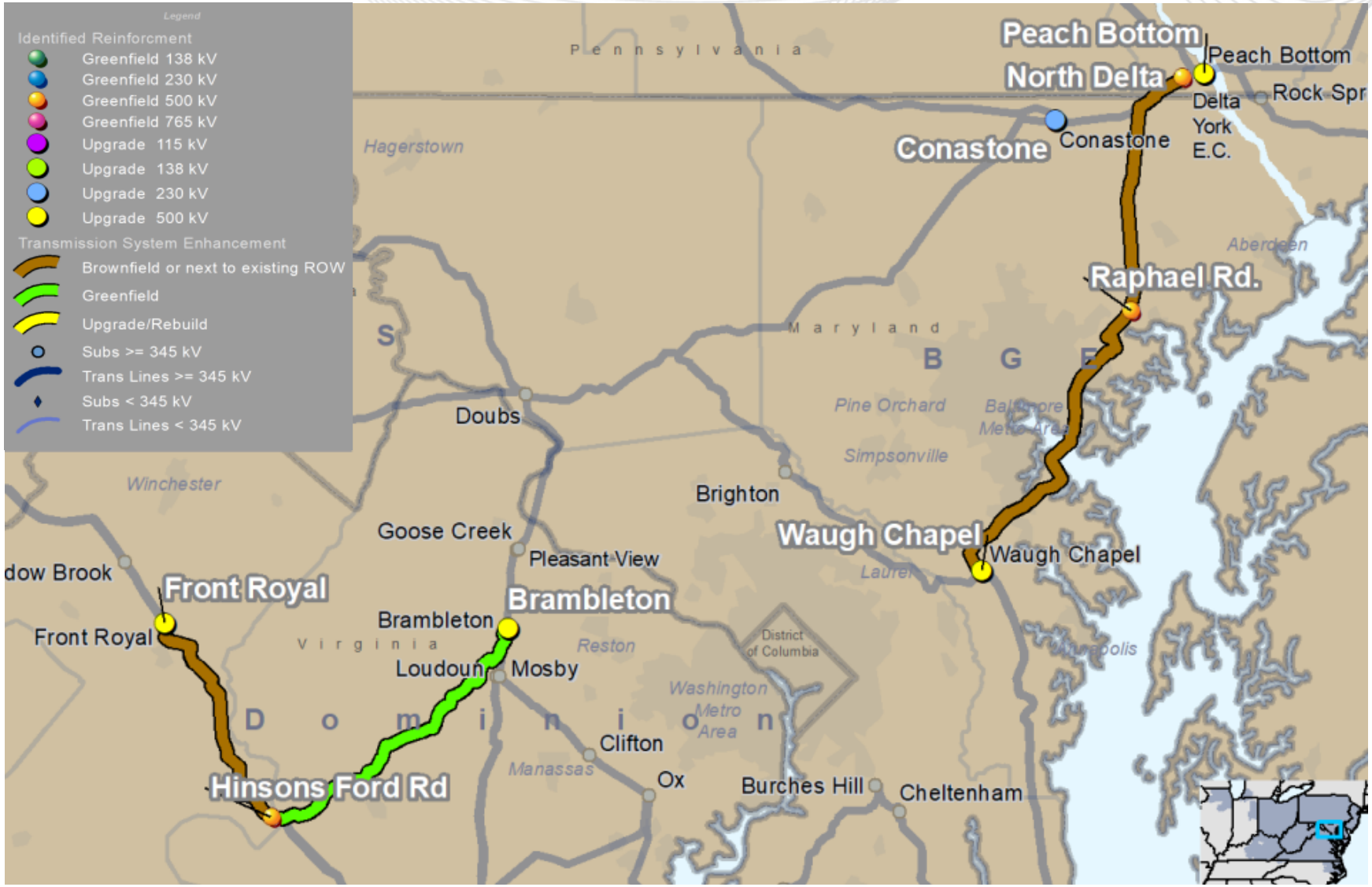
2022 Window 3 proposals – PSEG - 325



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2022 Window 3 proposals – PSEG - 637

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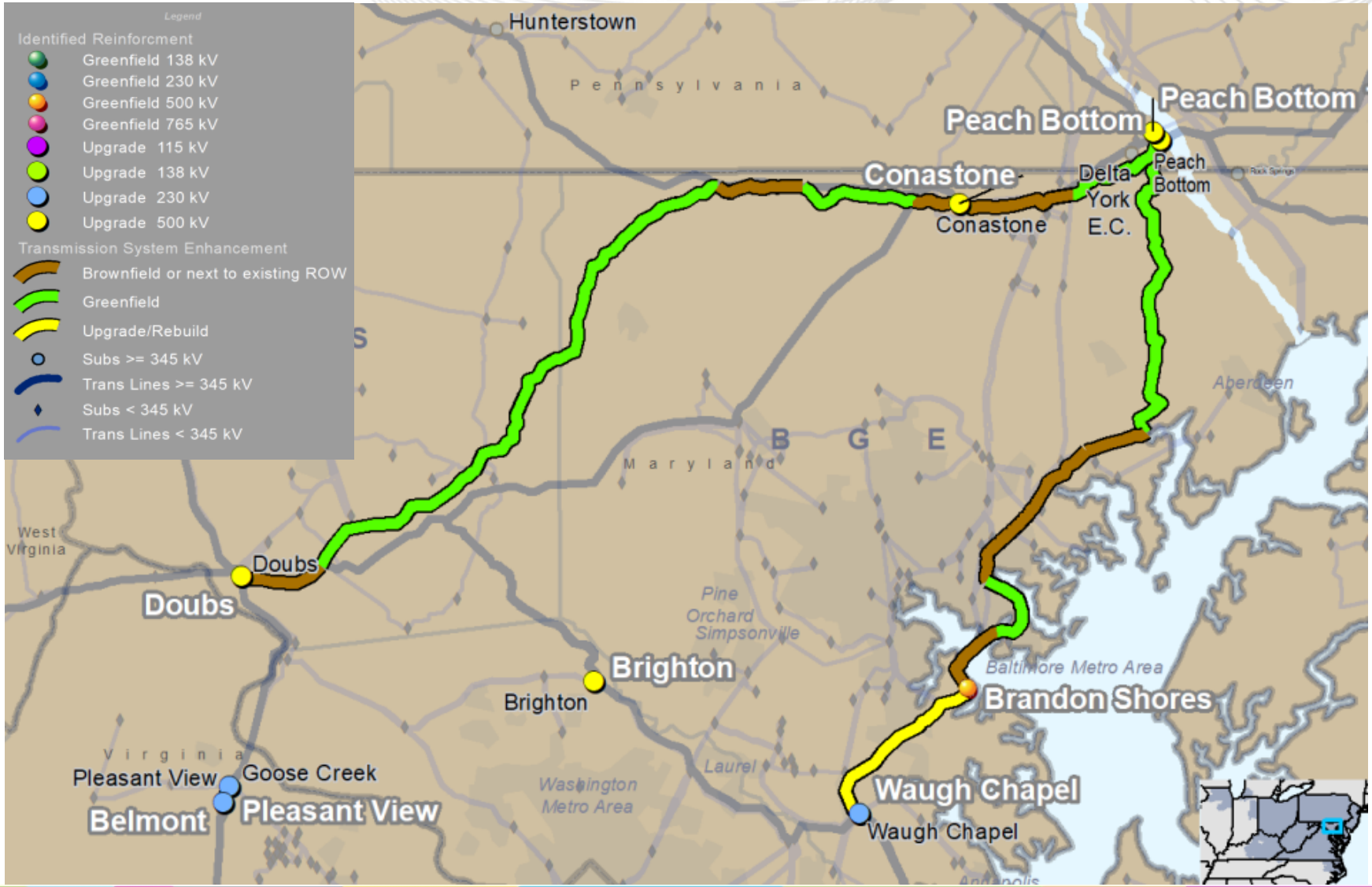
2022 Window 3 proposals – PSEG - 741



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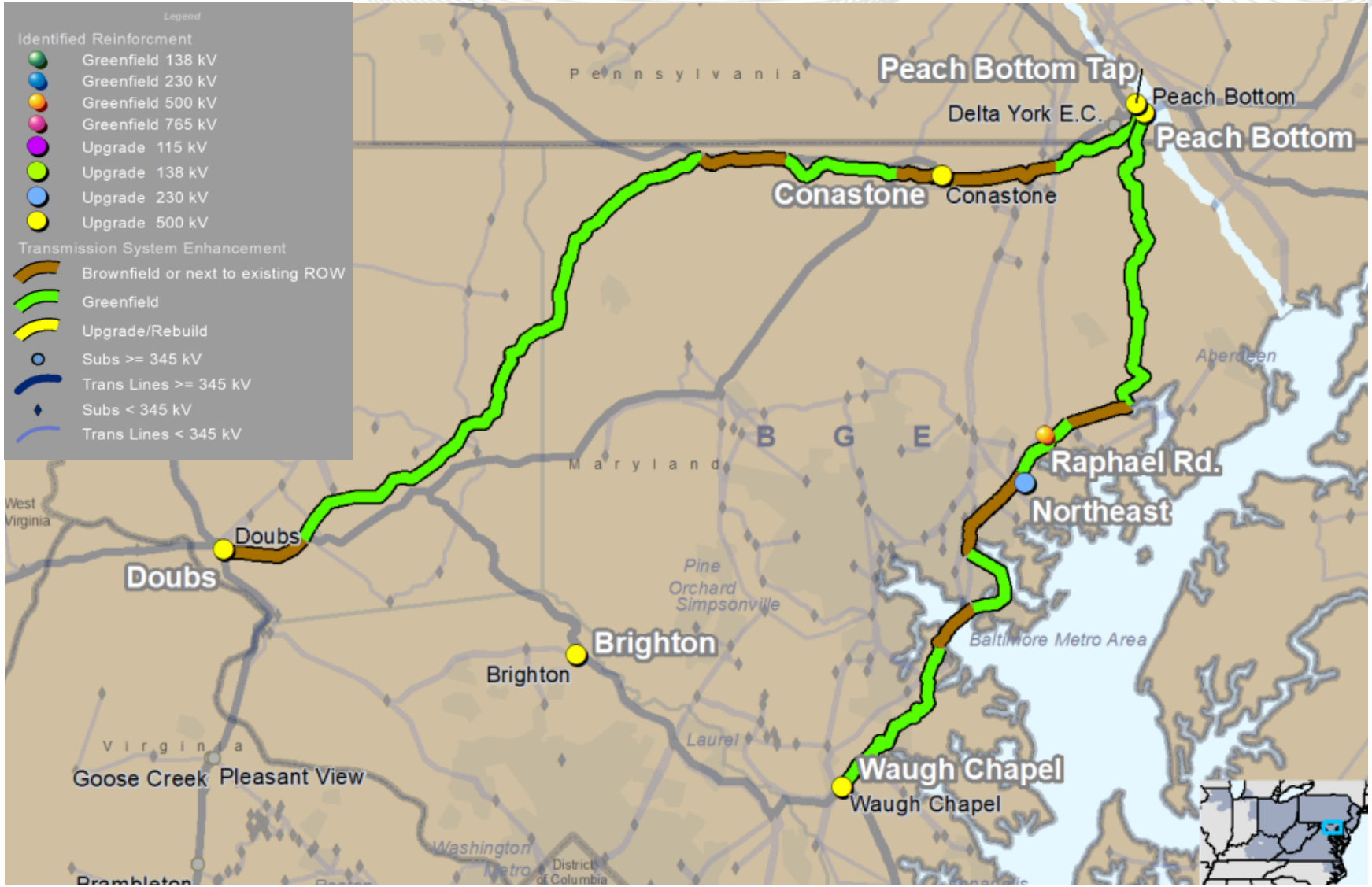
2022 Window 3 proposals – PSEG - 808



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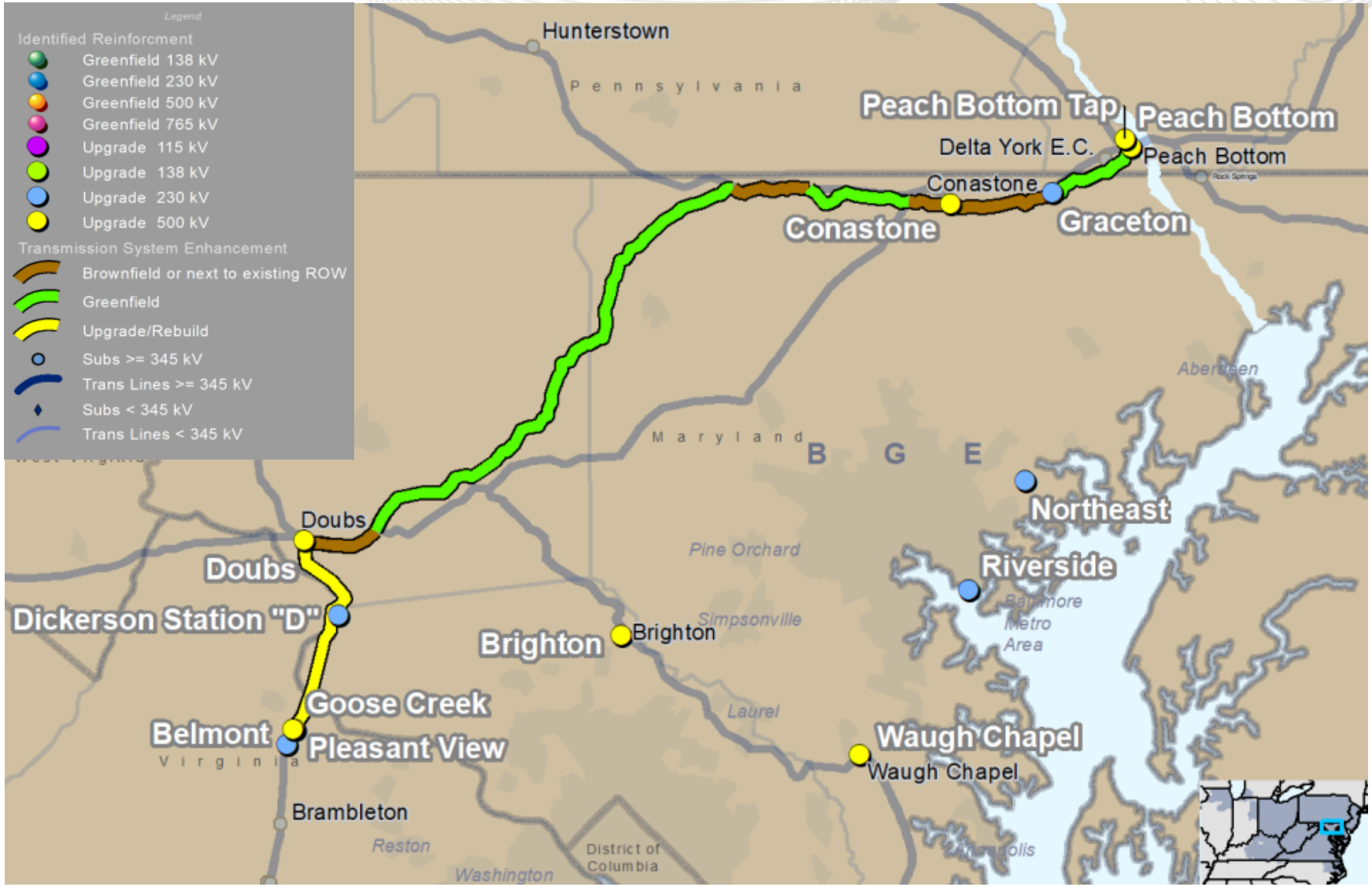
2022 Window 3 proposals – PSEG – 962



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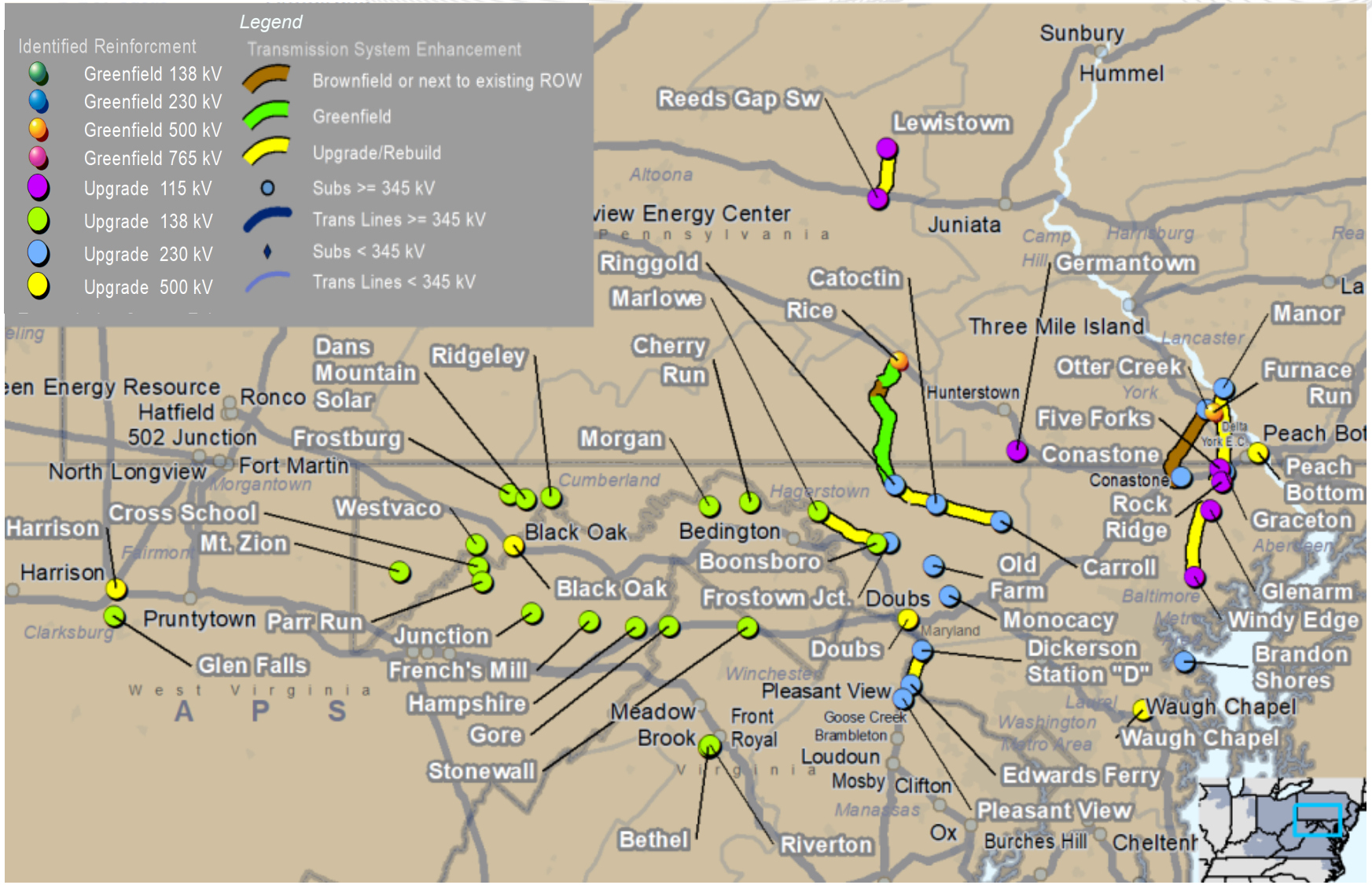
2022 Window 3 proposals – Transource - 487



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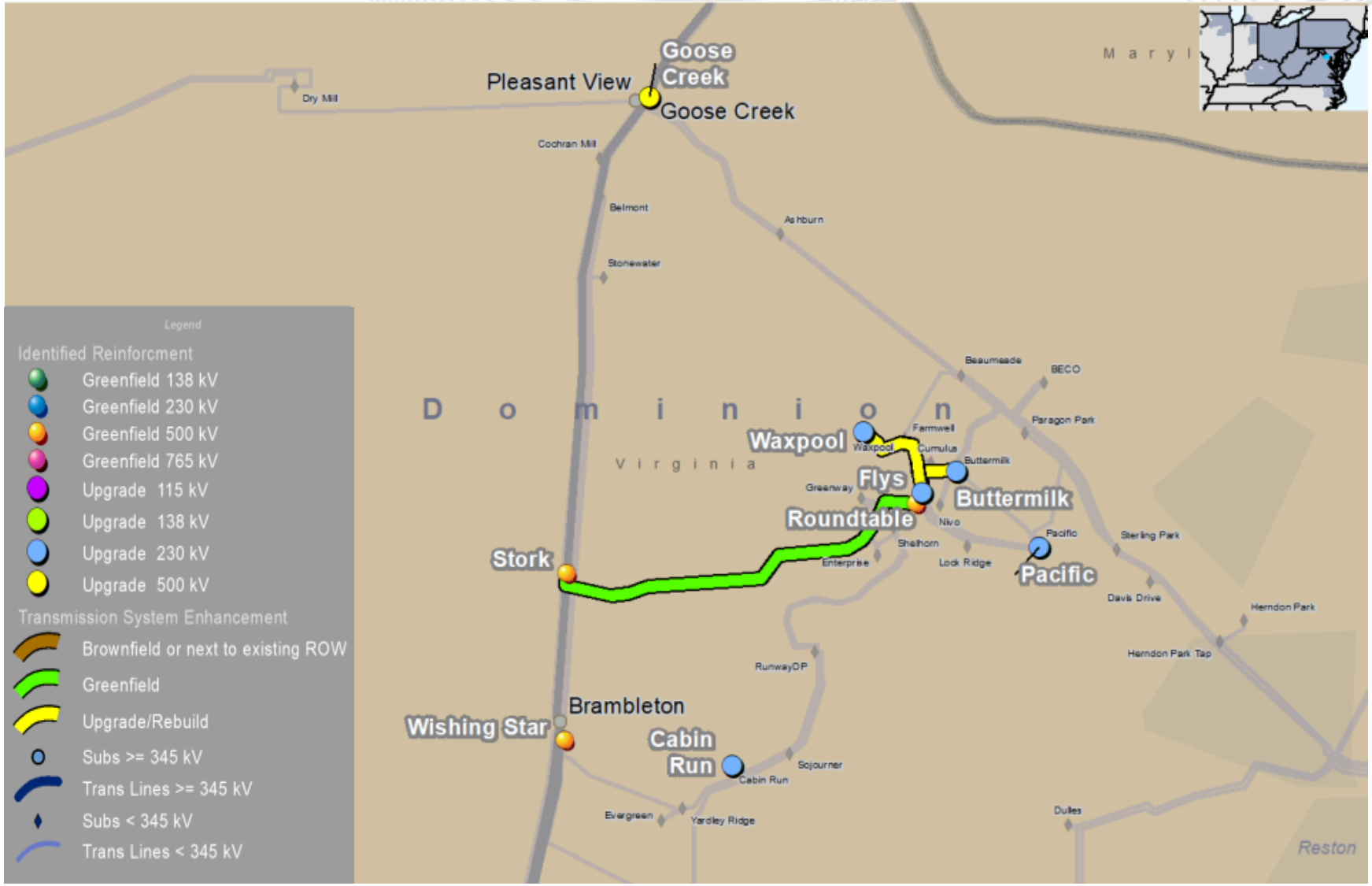
2022 Window 3 proposals – Transource - 858



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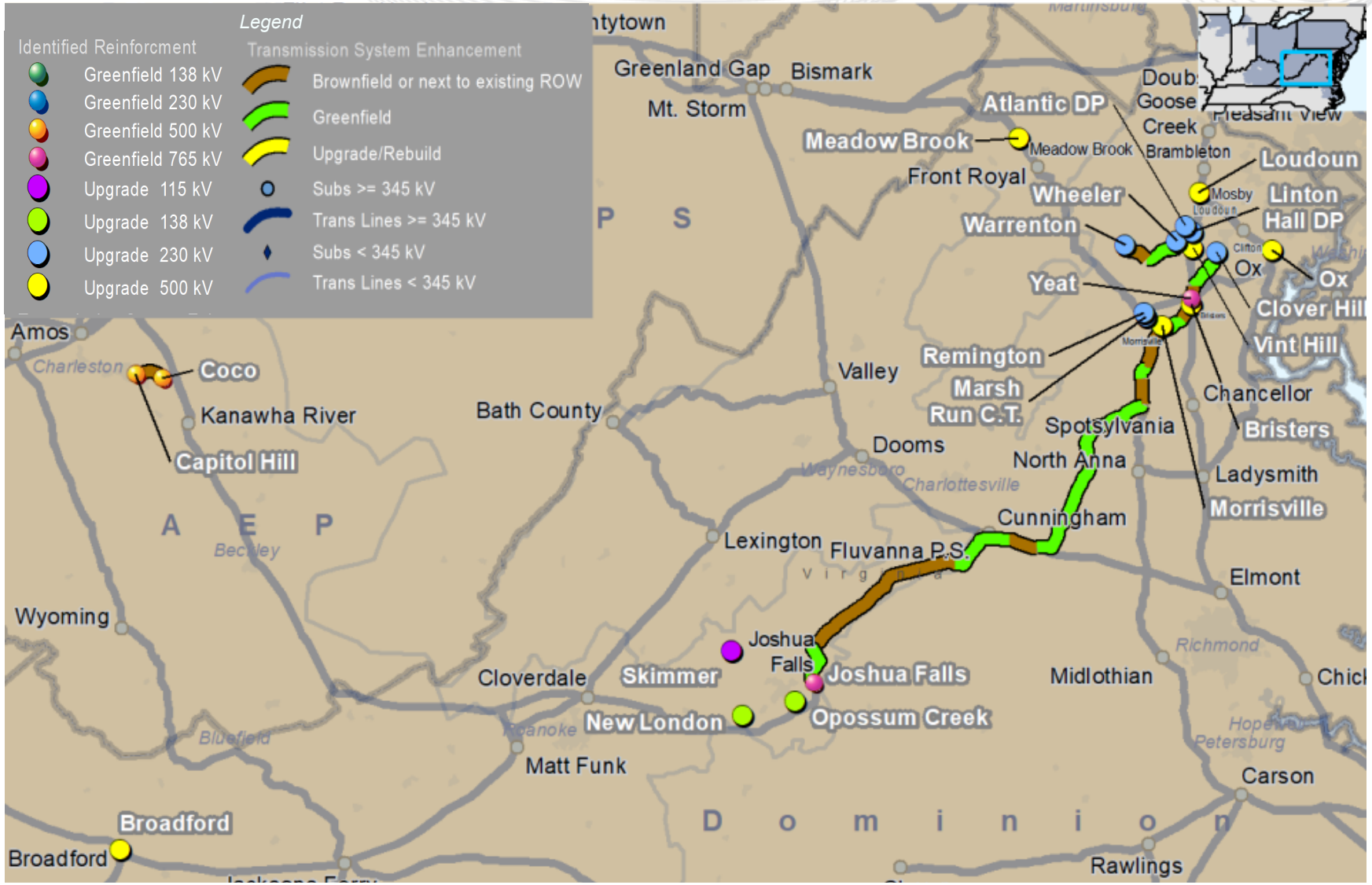
2022 Window 3 proposals – Transource - 904



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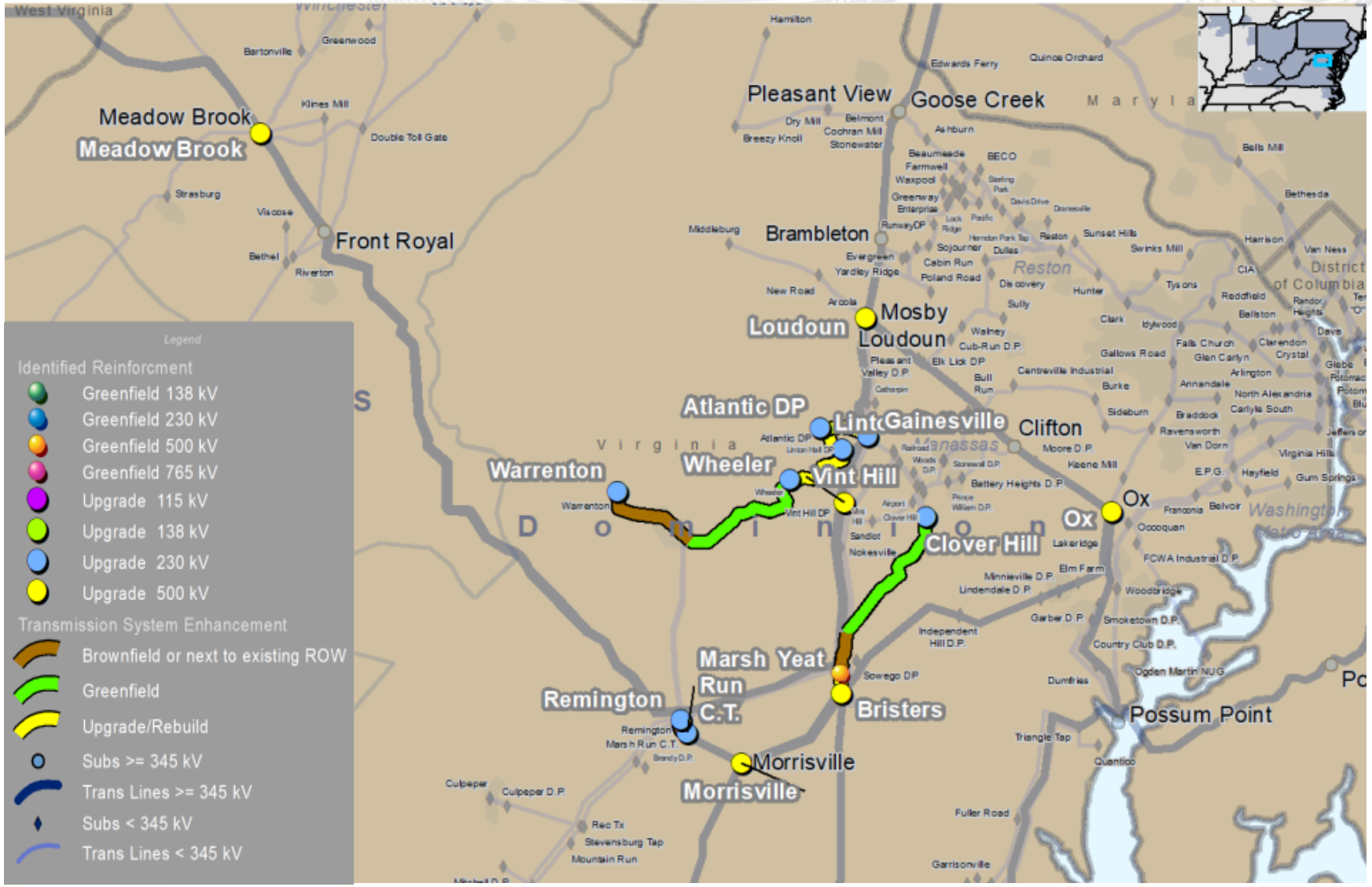
2022 Window 3 proposals – Transource - 977



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Revision History

Version No.	Date	Description
1	Oct 26th 2023	• Original slides posted
2	Oct 27th 2023	• Minor addition to slide #18
3	Oct 30th 2023	• Minor adjustments and corrections as marked with the R3 red text
4	Oct 31st 2023	• Minor update on slides #13, 14 and 55

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