



Reliability Analysis Update

Sami Abdulsalam

Transmission Expansion Advisory Committee

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2023 Reliability Proposal Window 1

- Window opened on 7/24/2023
- Window closed on 9/22/2023
- For this Window, PJM seeks technical solutions, also called proposals, to resolve potential reliability criteria violations on facilities identified in accordance with all applicable planning criteria (PJM, NERC, SERC, RFC, and Local Transmission Owner criteria).
- 20 total proposals submitted from 9 different entities (7 Incumbents & 2 Non Incumbents)
 - 7 Greenfields
 - 13 Upgrades
- Cost Estimates: Approximate range from \$1.08 M – \$1,300 M
- 5 proposals with Cost Containment



2022 RTEP Window 3 Transmission Planning Update

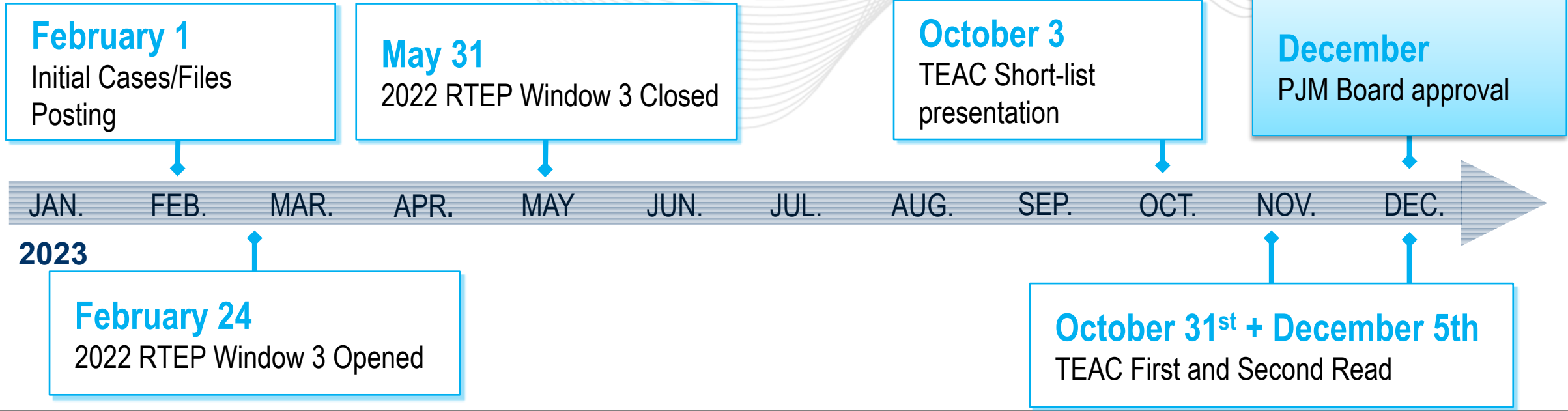
- Background
- 2022 RTEP Window 3 purpose and timeline
- Need statement summary
- Load forecast and generation assumptions
- Summary of proposals
- Summary of scenarios studied
- Proposals detailed review and short list scenarios
- Summary of short circuit results
- Summary of load deliverability results

- **Purpose:**

- Address reliability needs in the Dominion and APS zones primarily associated with Data Center Load forecasts (up to 7,500 MWs by 2027-28)
- Seeking robust and flexible solutions to address the reliability needs in those specific areas

- **Window Opened; February 24th 2023 / Closed May 31st 2023**

- PJM posted preliminary planning basecases on January 31st 2023
- 90 Day Window – Extended from April 25th to May 31st 2023



- Currently, system models with the data center loads (starting 2027) do not solve without reinforcements.
- Supplemental (M3 Process) can not evaluate project impacts until the reliability constraints are resolved.
- In 2024, PJM needs clean base cases for interconnections, NJOSW 2.0, Offshore Wind studies and LTRTP.
- Reinforcements need to be finalized by end of 2023.

72 Proposals Were Received From 10 Entities

6 incumbent,
4 non-incumbent

22 projects are upgrades,
while 50 are greenfield

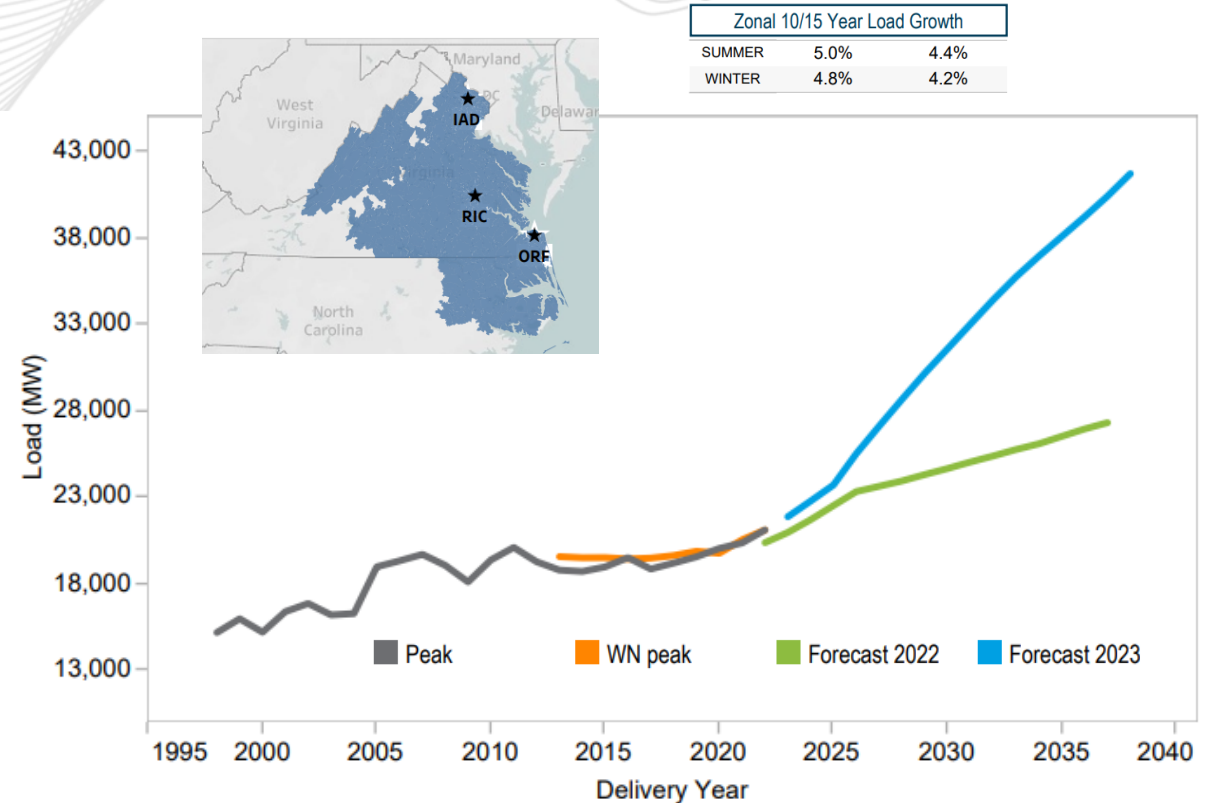
Total ~\$50.7B *
(sum of all proposal costs – not all are
required)

Proposals include:

- 230 kV, 500 kV and 765 kV developments
- 500 kV GIS substations
- UG 500 kV AC cable developments
- Double circuit 500 kV proposals
- HVDC development

***One proposal cost was revised by submitting entity from \$1.6B to \$5.4B**

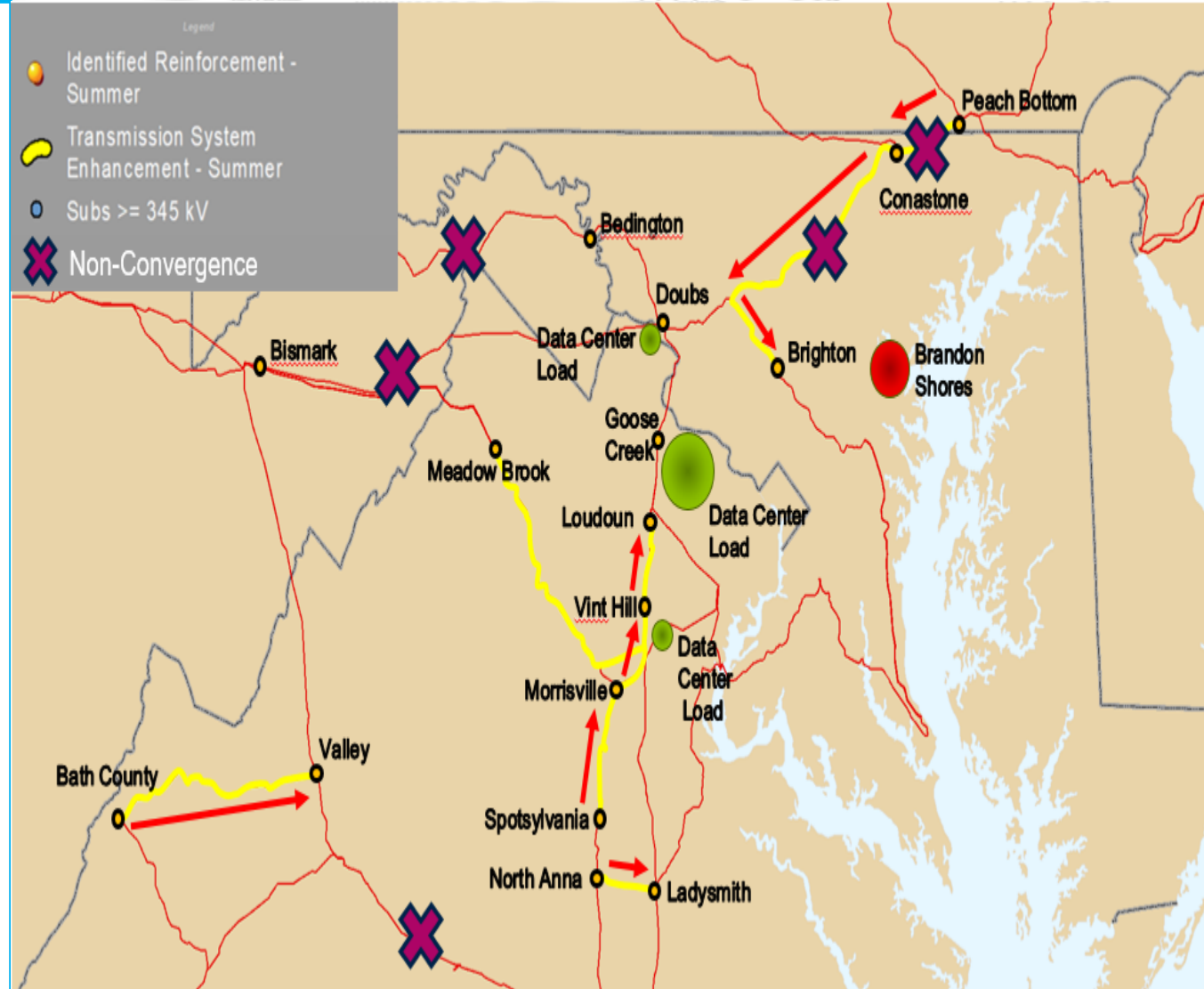
- PJM began receiving near and long term forecast input from Dominion, First Energy and NOVEC for Data Center load growth projections up to and including 2038 (15 year planning horizon).
- The PJM 2023 Forecast calls for approximately between 4.2% to 5.0% annual load growth in the Dominion area over the next 10-15 year timeframe.
- The Load Forecast information was refined and developed down to a bus/substation level for the 2028 and 2030 study years.
- PJM reassessed the transmission development needs in the area based on the refined forecast information and localized allocation of load.



<https://pjm.com/-/media/library/reports-notice/load-forecast/2022-load-report.ashx>

- Develop robust, holistic and expandable solutions that address the 2027-28 baseline violations associated with:
 - 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
- Adhere to all applicable planning criteria, including PJM, NERC, SERC, RFC and Local Transmission Owner Criteria.

- PJM has had unprecedented data center load growth (up to ~7,500 MW) currently forecasted by 2027- 28 in Dominion (Northern Virginia) and APS (Doubs)
- 11,100 MW of announced deactivations to the west and south of Conastone
 - Approximately 5,300 MW occurring after the 2022 RTEP 2027 case was created
- The vast majority of the new generation with signed ISAs has been solar
 - Solar has low availability during the winter period
- The replacement generation is coming from the region to the east of Peach Bottom as well as west of Doubs to meet projected load growth.
- PJM has implemented a new block dispatch procedure
 - The old dispatch procedure maintained historical intraregional transfers, dispatching most of the generators in the Dominion zone at 100%.



- 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.

- **2027-28 Summer / Winter**
 - Baseline Thermal and Voltage N-1 Contingency Analysis
 - Generator Deliverability and Common Mode Reliability Analysis
 - N-1-1 Thermal and Voltage Analysis
 - Load Deliverability Thermal and Voltage Analysis
 - Dynamic Stability Assessment
 - Short Circuit Assessment
- **2027-28 Light Load**
 - Baseline Thermal and Voltage N-1 Contingency Analysis
 - Generator Deliverability and Common Mode Reliability Analysis
- **2027-28 CSPA Study**

- 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) as data center load increases in the Dominion and APS zones.
 - 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).

- **Preliminary Reactive Support:**

- 2027-28 basecases included a set of reactive VAR support at existing/proposed substations to partially meet the system reactive demand under system normal, N-0 conditions.
- Included at specific locations as indicated in PJM's 2022 RTEP Window 3 Problem Statement.
- Initial VARs not imply final VAR level, type or location.
 - Only adequate for need analysis purposes.
 - Should be removed and replaced consistent with an entity's proposal to provide the necessary VAR support.
- PJM expects that proposals will provide for the needed reactive VAR support through either transmission development or static/dynamic VAR support devices or a combination of both.
- A number of non-convergent contingencies due to deficient VAR support and excessive reactive power loss in the 2027-28 modeling basecases.
- Based on the preliminary VAR resource assumptions in the cases, the provided voltage performance results are for guiding purposes only.
 - Proposal developers are to re-evaluate the voltage performance part of their proposal development to ensure compliance with voltage performance requirements.

- **Basecase N-0 thermal Violations:**

- 2027-28 baseline case(s) show thermal violations along the Peach Bottom-Conastone and Conastone-Brighton 500kV paths.
- These 500 kV segments are also showing marginal overloads approaching 98% to 100% under N-1 conditions for the baseline summer conditions.

- **Non-Converged N-1 Contingencies:**

- Key contingencies lead to voltage collapse on the 500kV system due to insufficient transmission system transfer capability and VAR support inadequacy.
- Following development of VAR support enhancements, thermal loading on all system elements needs to be monitored and overloads, if any, need to be addressed part of the proposed solutions.

- **N-1-1 Analysis;**

- Due to the significant load growth presented in the baseline 2027-28 basecases, a large number of N-1-1 contingencies lead to unsolvable security constraint redispatch conditions.
- Hence, the provided N-1-1 results are to be reevaluated as part of the proposal solution development process.
- PJM posted the interim 2027-28 basecase N-1-1 results early March on the PJM website in the competitive planning section.

- **Load Deliverability analysis:**

- PJM requires that proposed solutions are evaluated for their effectiveness towards load deliverability into the APS and Dominion zones.

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

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

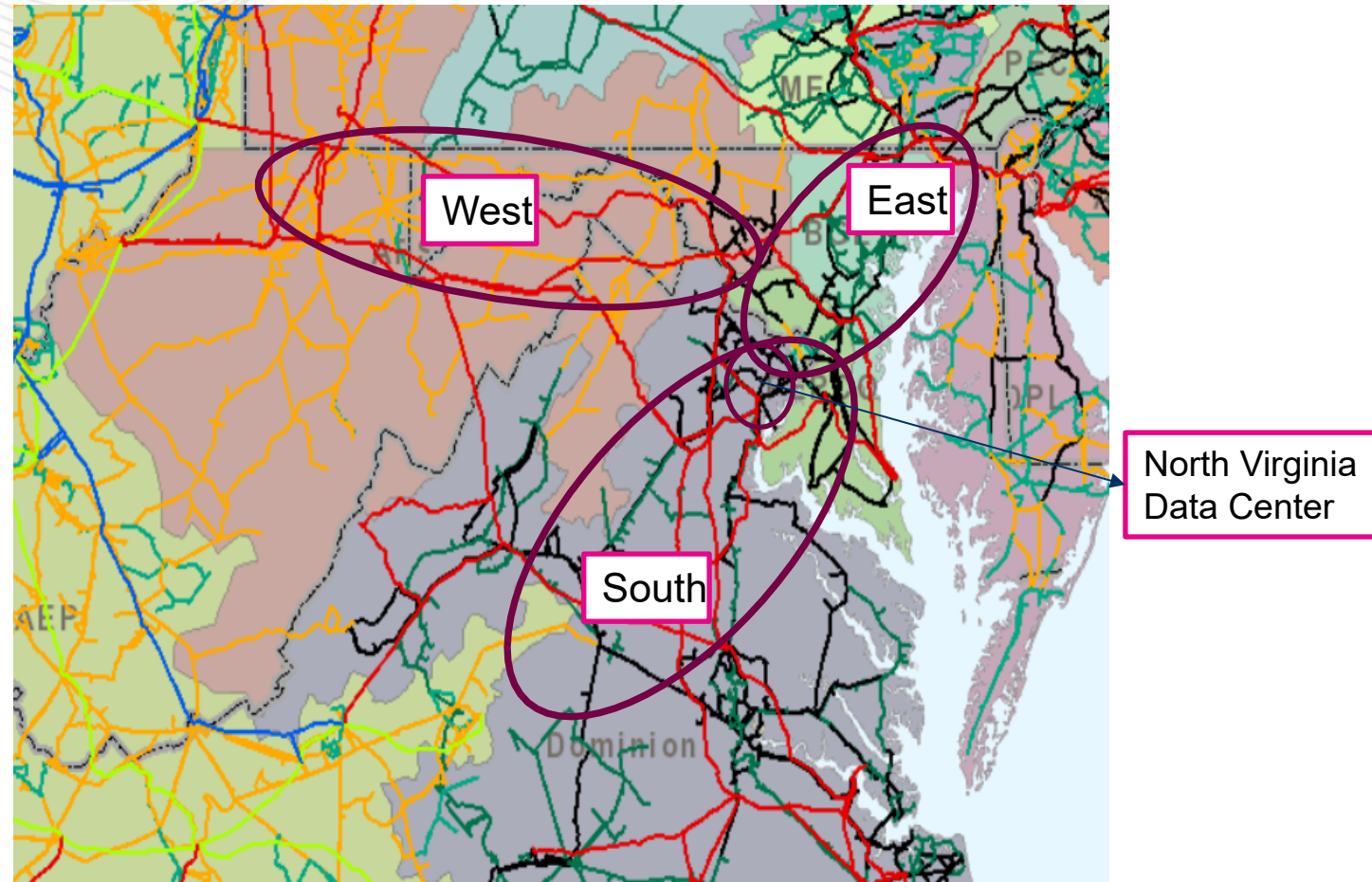
<p><u>Performance</u></p> <p>Meeting the system needs of 2027 and being flexible to address 2028 needs</p>	<p><u>Scalability</u></p> <p>Scenario/development longevity – system robustness and utilization</p>	<p><u>Impact</u></p> <p>Utilization of existing ROWs where possible and efficient.</p>	<p><u>Validated Cost</u></p> <p>Cost evaluation using third-party benchmarking metrics</p>
<p><u>Risks</u></p> <ul style="list-style-type: none"> • Triggering additional costs: <ul style="list-style-type: none"> – 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 		<p><u>Efficiencies</u></p> <ul style="list-style-type: none"> • Avoidance of redundant capital investment including recognizing synergies with EOL facilities and overlaps of previously approved (or imminent) supplemental/baseline upgrades. 	



2022 RTEP Window 3

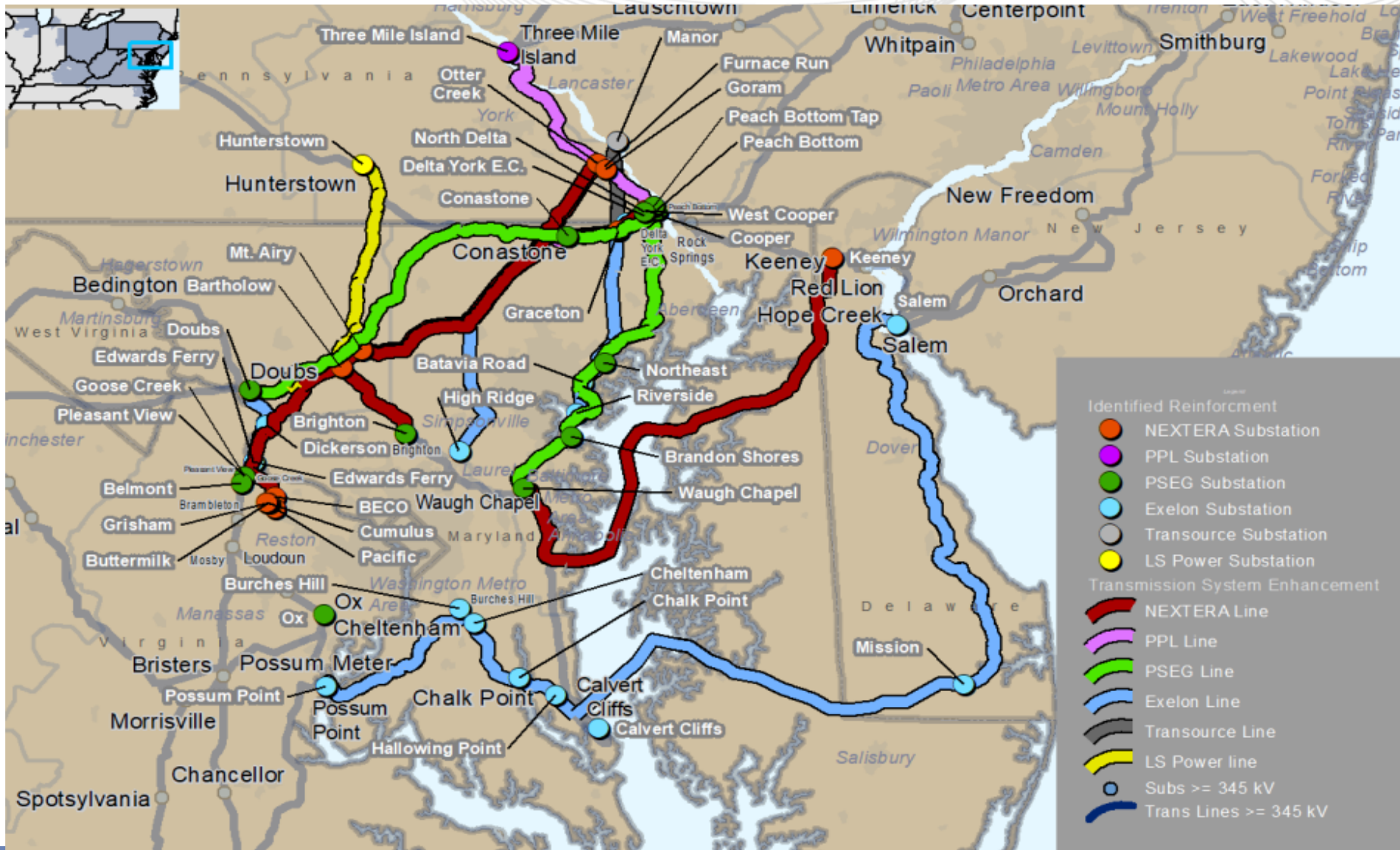
Overview of Submitted Proposals

- 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



- Initial screening was conducted for all proposals on 2027 RTEP cases
- Scenario studies followed by developing and assessing:
 - Combination Proposals from various proposing entities
 - Combination of components from different proposals
- 2027 Results indicate all combination proposals can address the 2027 needs to a varying degree
 - All 2027 combination proposals offered 500 kV or 765kV solutions in the West
 - Three out of four proposed combinations offered 500 kV reinforcements in the East
 - Several other proposing entities offered 500kV and HVDC solutions
 - Some 230 kV reinforcements were also offered as options to address eastern cluster needs

- 2028 Robustness test was utilized to further assess the merit of all proposals
 - 2028 evaluations indicated need for further regional transfer reinforcements (beyond those offered for 2027)
 - Account for major deactivations in the study area (Brandon Shores among others)
 - Account for higher regional transfers as a result of block dispatch and new gen deliverability test
- LS Power, Transource and NextEra (598) combination proposals show more significant violations in 2028 initial testing
 - PJM further tested components from LS Power and Transource proposal in developing additional scenarios
 - Nextera proposed a standalone add-on component to upgrade its 2027 combination proposal (598) to address 2028 needs (175)
- NextEra 175 and the Incumbent (Exelon, FE and Dominion) proposal scenarios showed promising performance – These were used as starting point for further assessments



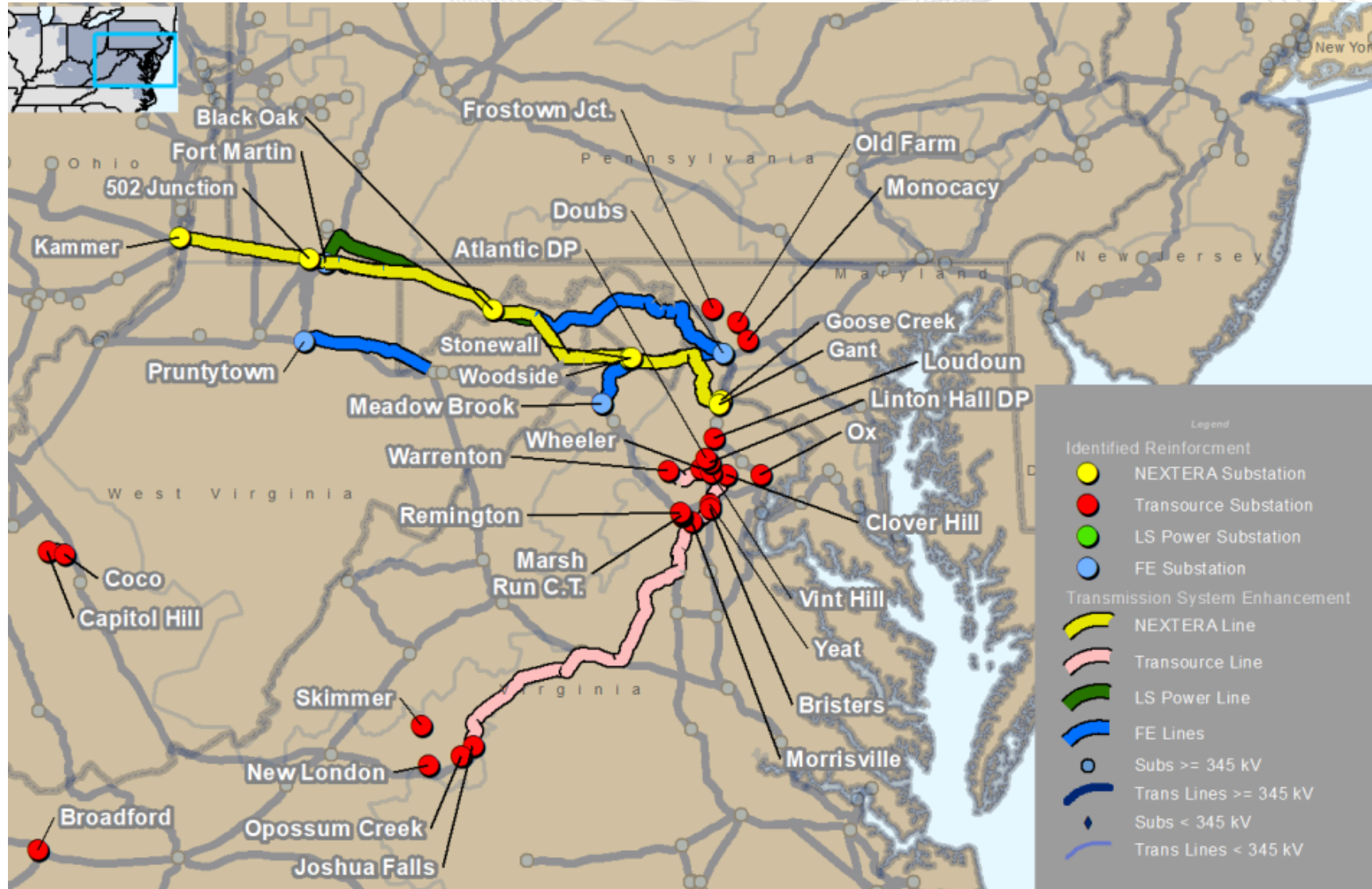
NOTE: This map is only intended to illustrate the general electrical connectivity of the projects, and should not be relied upon for exact geographical substation locations or line routes.

- Six proposing entities submitted proposals to address the East cluster violations
- PJM confirmed the need for the following
 - Regional reinforcements between Peach Bottom area and Northern Virginia
 - Regional and local reinforcements into BGE
- PJM evaluated various combinations of the proposals/components to identify the most effective solution
- PJM is finalizing its evaluations of the Ring Gold – Rice proposal against a number of alternatives.

- BGE local/regional solution
 - West Cooper – High Ridge 500 kV (Exelon)
 - Peach Bottom/N. Delta – Raphael - Waugh Chapel 500 kV (PSEG)
 - Peach Bottom – Brandon Shore 500 kV (PSEG)
 - Keeney – Waugh Chapel double 230 kV (Nextera)
- BGE local area solution (Focused on Brandon Shores Deactivation)
 - Graceton – Batavia double circuit 230 kV (Exelon-Deactivation Scope)
 - Peach Bottom/N. Delta – Raphael - Waugh Chapel 500 kV (PSEG)
 - Peach Bottom – Brandon Shore 500 kV (PSEG)
 - Keeney – Waugh Chapel 230 kV double circuit (Nextera)

* Red boxes refer to solutions proposed by incumbent to address BGE area needs.

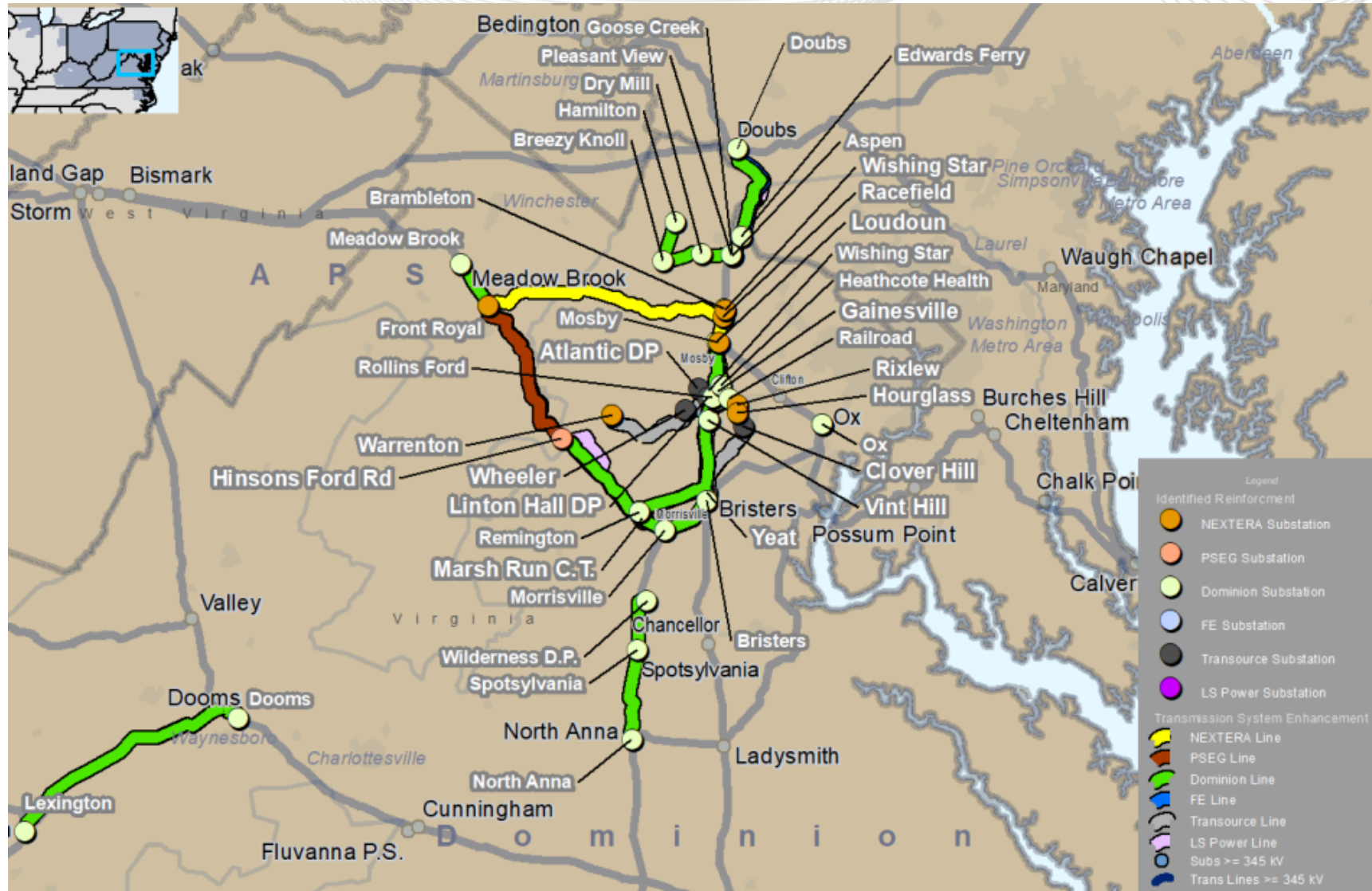
- Regional solution (Regional Transfers)
 - Peach Bottom – Graceton - Conastone/N. Delta 500kV upgrade (Exelon/Transource)
 - Peach Bottom – Doubs 500 kV (PSEG)
 - Conastone – Doubs 500 kV (PSEG)
 - Hunterstown – Green Valley 500 kV (PSEG)
 - Hunterstown – Doubs – Goose Creek 500 kV (NextEra and LS Power)
 - Otter Creek – T-Point 500 kV (NextEra)
 - Conastone – T-Point 500 kV (NextEra)
 - Otter Creek – Conastone 500kV (PPL)
 - North Delta – Conastone 500kV (NextEra and LS Power)
 - T-Point – Data Center Alley 230 kV (NextEra)
 - Transource 230kV development between Peach Bottom and Conastone (Transource)



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.

- West regional solutions
 - 502 J – Black Oak – Stonewall – New Belmont (Gant) 500 kV (NextEra)
 - Fort Martin – Doubs 500 kV double/single circuits (FE)
 - Pruntytown – Mt. Storm and Meadow Brook – Doubs 500 kV (FE)
 - 502J – Black Oak – Doubs 500 kV (LS Power)
 - Joshua Falls – Yeat 765 kV (Transource)
- All of the 500 kV proposals listed above overlap or use similar ROWs adjacent to existing transmission developments in the area.
- Less effective/efficient solutions were also tested, for example:
 - Front Royal – New Wishing Star 500 kV (NextEra)
 - Black Oak - Goose Creek 500 kV (NextEra)

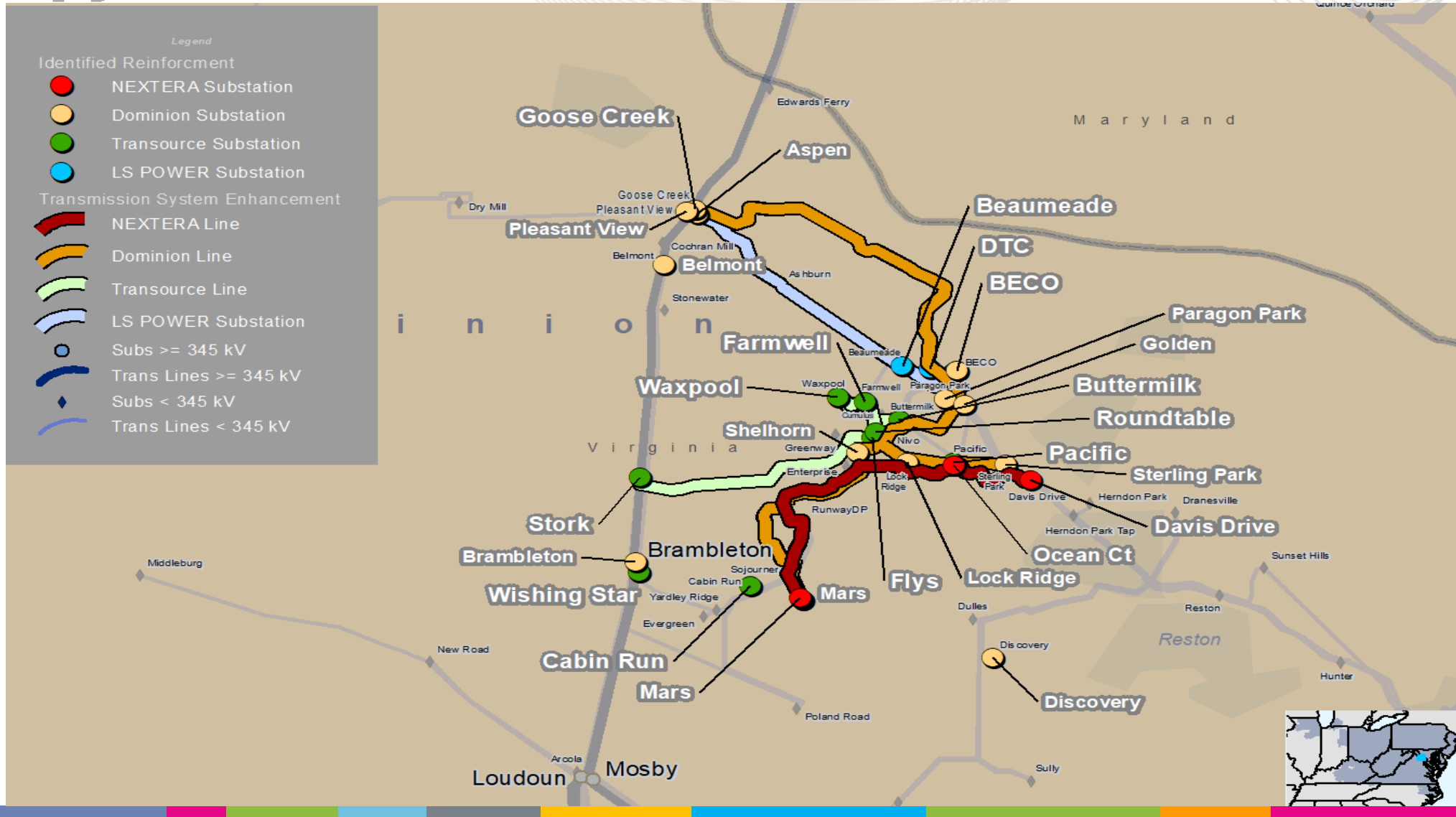
- Four proposing entities submitted proposals to address the West cluster violations
 - All proposals are approaching the western needs by 500 kV or 765 kV new lines
 - PJM evaluated every proposal individually
- PJM evaluated various combinations of proposals or their components to identify the most effective solution
- PJM confirmed the need for the following
 - Regional reinforcements from West (a minimum of 1x500 kV or 1x765 kV development – both require dedicated dynamic VAR support)
 - For the 500 kV reinforcement options terminating at Doubs, additional transfer capability is required into Goose Creek area (Northern Virginia)



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.

- Four proposing entities submitted proposals to address the South cluster violations
 - All proposals are addressing the South needs by proposing new 500kV lines primarily
 - PJM evaluated every proposal individually and in combination
- South Regional Solutions
 - Front Royal – Vint Hill 500 kV (LS Power)
 - Hinsons Ford Rd – Brambleton 500 kV (PSEG)
 - Front Royal – New Wishing Star (Racefield) 500kV (NextEra)
 - North Anna – Wishing Star 500kV (Dominion)
- PJM is evaluating the need for a portion of the North Anna – Wishing Star 500 kV

Summary of Proposal Clusters - Dominion



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.

- Three proposing entities submitted proposals to address the Data Center Alley violations
 - Two underground 500kV cables Vs. One overhead 500/230KV
 - PJM evaluated every proposal individually
- Dominion Data Center Alley Solutions
 - Goose Creek – Beaumeade 500KV underground (LS Power) – 2308/3596 MVA for SN/SE
 - Stork – Flys 500 kV underground (Transource) – 3302/3302 MVA for SN/SE
 - Aspen – Golden – Mars 500/230kV overhead (Dominion) – 4357/4357 MVA for SN/SE
 - This solution attempts to establish a second 500kV path along the existing 500kV path between Brambleton and Goose Creek
 - Existing substations in the area are congested/space limited and hence the two new substations (Aspen and Golden) will establish two new main substations
 - Both the 500kV and 230kV systems will be accessible to serve additional load and Delivery Points
- PJM is evaluating the need for Golden – Mars 500kV extension
 - Closing the Aspen-Golden-Mars 500kV loop could take place in stages.



Proposals Detailed Constructability Review and Scenario Short List

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 quantitative 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.



Risk Assessment Matrix - East

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 Components)	6/1/2030	\$ 495.83	\$ 609.44	Medium	Medium	Low	Low	Medium	Medium-High
637	PSEG	Proposal D-Conastone-Doubs 500kV	6/1/2027	\$ 684.22	\$ 676.36	Low	Low	Low	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



Risk Assessment Matrix - West

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	6/1/2030	\$ 2,394.96	\$ 2,095.63	Low	High	Medium	Medium-High	Medium-High	Low
548	LS Power	RTEP Window 3 Solution (West Components)	6/1/2030	\$ 972.71	\$ 876.03	Low	Medium	Medium	Medium-High	Medium-High	Low
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	Medium-High	Low
904	AEP - Transource	Joshua Falls - Yeat 765kV Greenfield Line and Substation	12/1/2029	\$ 1,048.10	\$ 1,136.50	Low	Medium	High	Medium	High	Low



Risk Assessment Matrix - South

South Cluster Projects – Selected for Detailed Evaluation

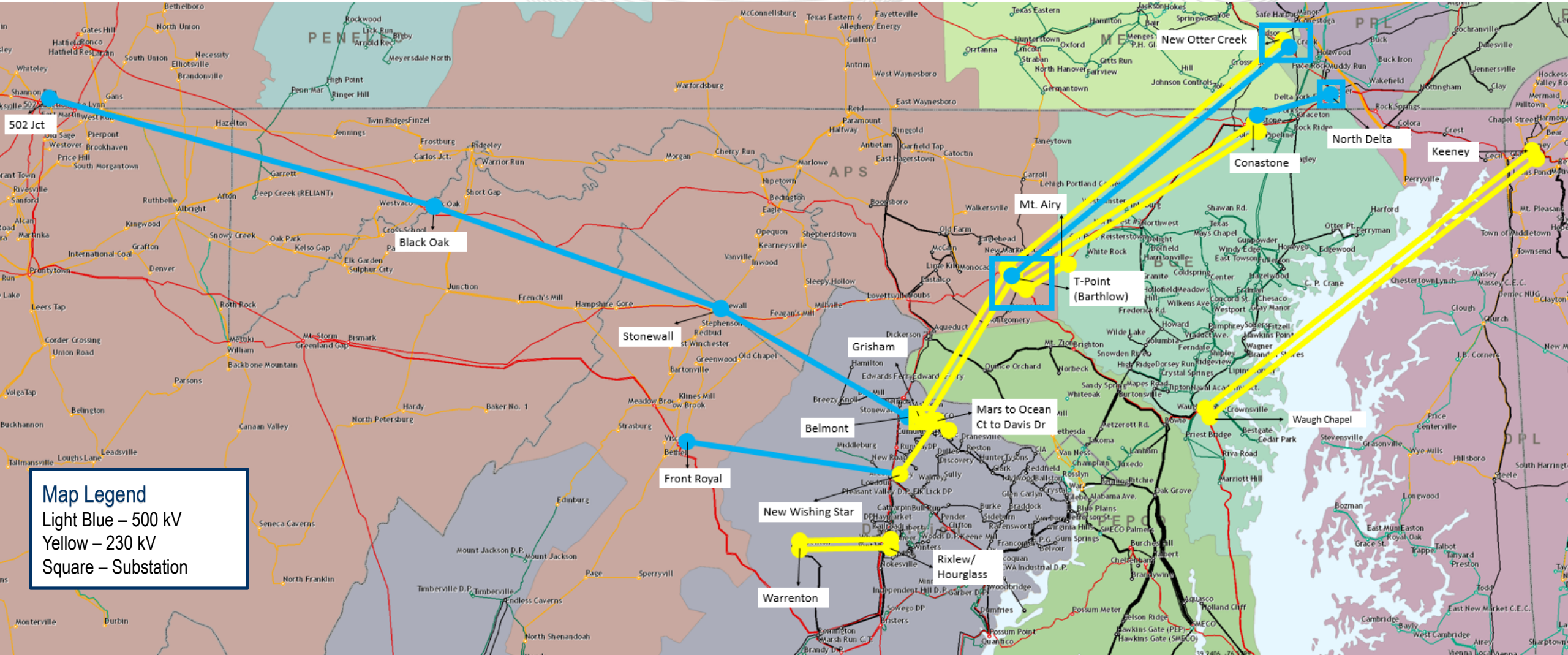
PJM Proposal ID	Proposing Entity	Project Title	Proposed In-Service Date	Proposal Costs (\$M)	Independent Costs (\$M)	Cost Estimate Risks	Cost Containment Risks	Schedule Risks	Constructability Risks	Use of Existing ROW & Brownfield	Outage Coordination Risks
516	Dominion	Interregional solution- Aspen-Doubs Second 500 kV Line	12/1/2027	\$ 61.72	\$ 77.95	Medium-High	High	Low	Medium	Medium	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	LSPower	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 Components)	6/1/2030	\$ 203.38	\$ 209.16	Low	High	Low	Medium	Medium	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

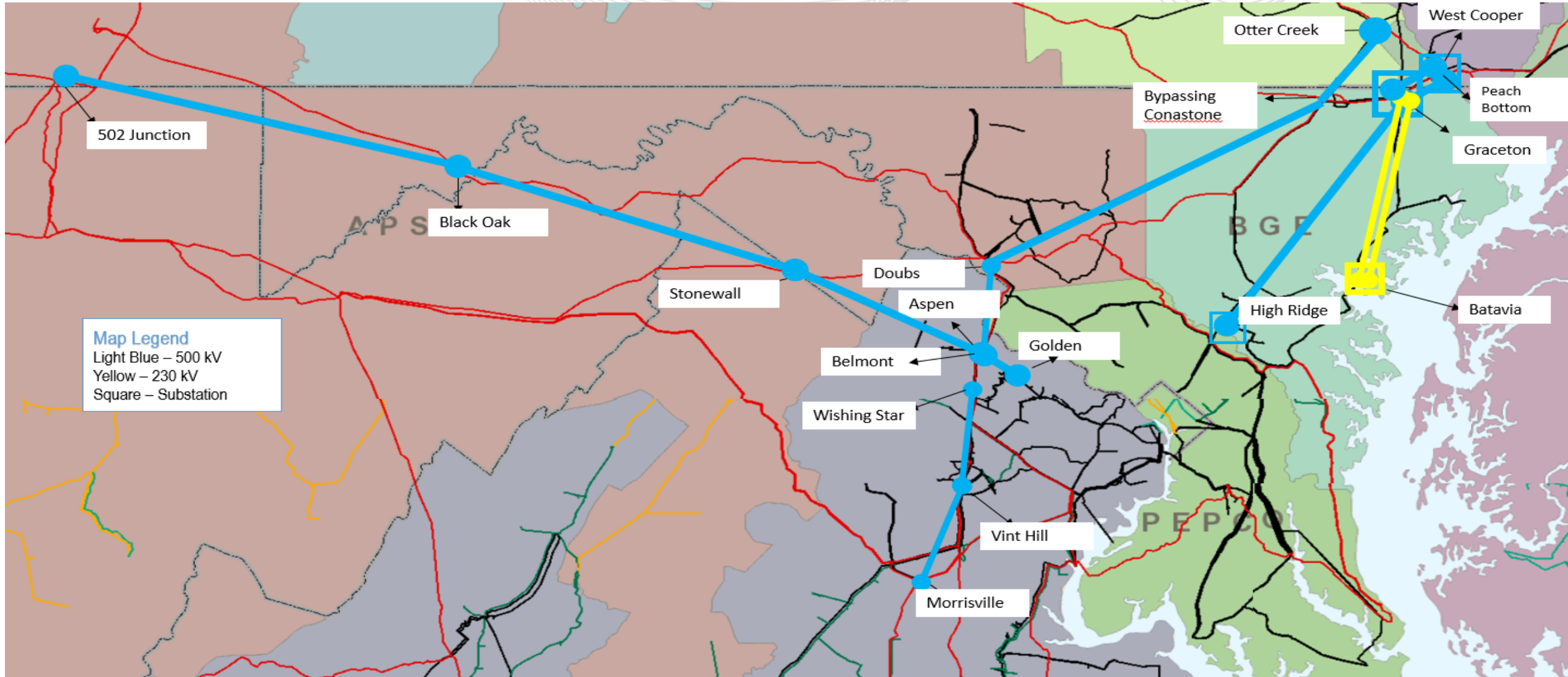


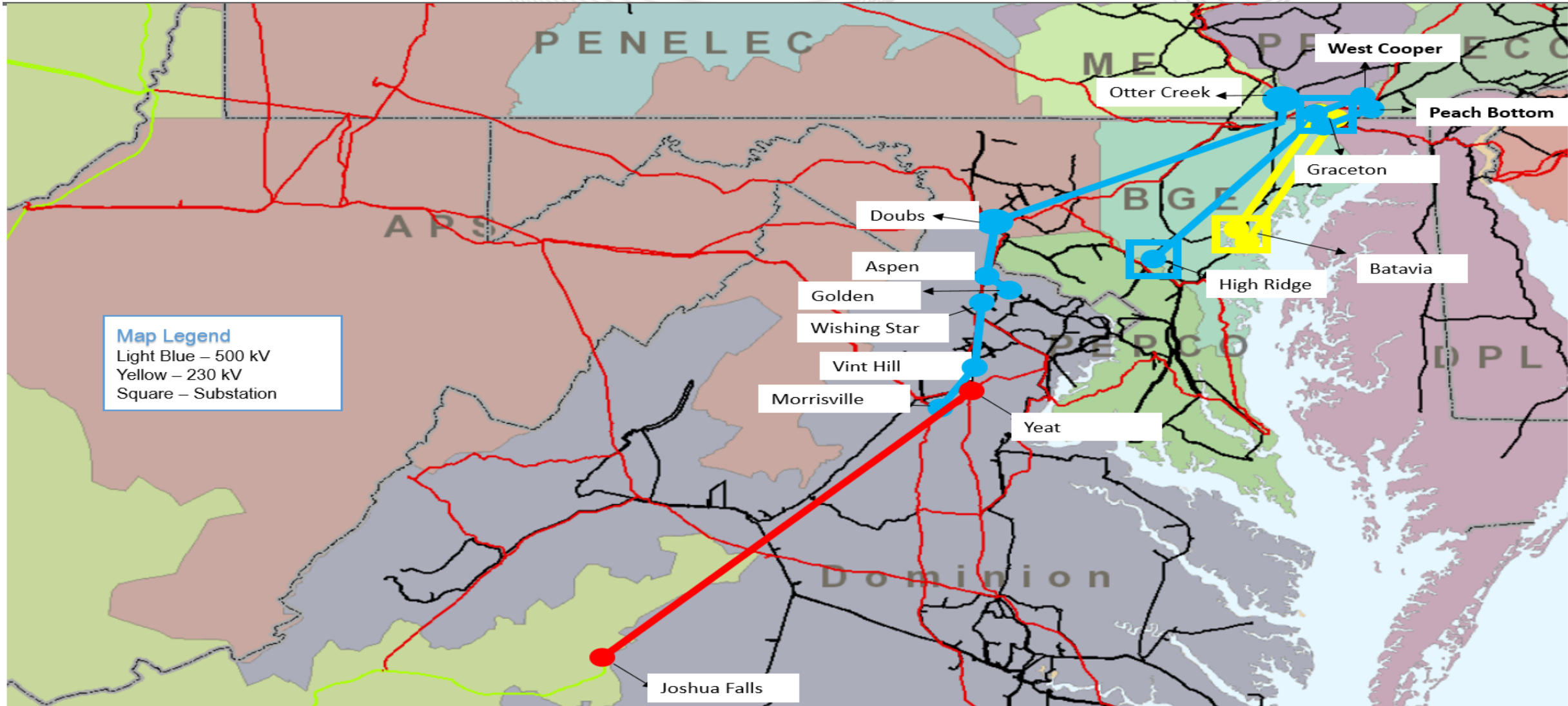
Risk Assessment Matrix – Dominion

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	Low	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	LSPower	RTEP Window 3 Solution (Dominion Components)	6/1/2030	\$ 283.78	\$ 307.52	Low	Medium	Medium-High	High	Medium-High	Low









2022 RTEP W3

Initial Short Circuit Evaluation

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

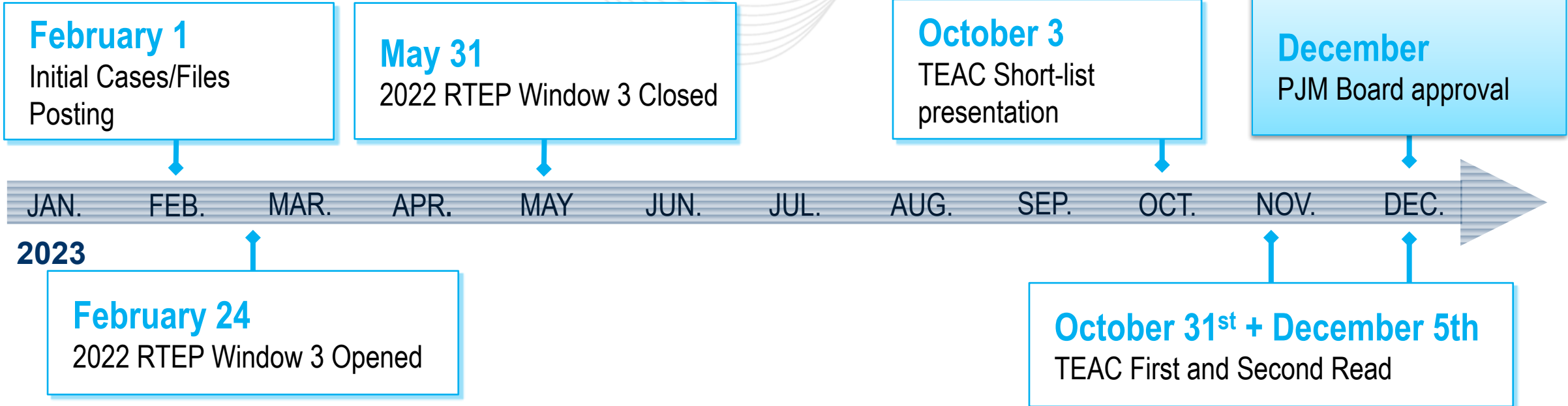
Scenario Description	Over Duty Bus (Qty)						Over Duty CBs Total	Maximum Fault Duty (kA)					Comments	
	115 kV	138 kV	230 kV	345 kV	500 kV	765 kV		765 kV	500 kV	345 kV	230 kV	138 kV		115 kV
Nextera Proposal 175	0	1	26	0	1	0	97	38.3	62.9	59.7	75.4	74.4	58.8	Conastone 500kV bus operating well above capability will require rebuild. Peach Bottom 500kV bus operating just below 63kA capability
PJM combination 500 kV - Scenario	1	1	13	0	4	0	63	38.3	61.7	59.7	75.4	74.4	59.1	Conastone 500kV bus operating below the 52kA rated capability Peach Bottom 500kV bus operating below the 63kA rated capability



2022 RTEP W3

Initial Load Deliverability Evaluation

- PJM conducted Load Deliverability assessment covering the 3 shortlisted scenarios evaluating BGE, SWMAC and Dominion zones.
- NextEra's 175 Proposal combo did not meet the 115% (barely meeting 100% CETO for BGE) CETL/CETO ratio requirement for the 2028 year
- PJM combination proposals, both at 500kV and 765 kV well-exceeded the 115% requirement for BGE, SWMAC and Dominion zones.
- Results are being finalized and will be shared at the Oct 31st TEAC.



Appendix



2022 RTEP W3

List of Proposal



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	Combo	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	Combo	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



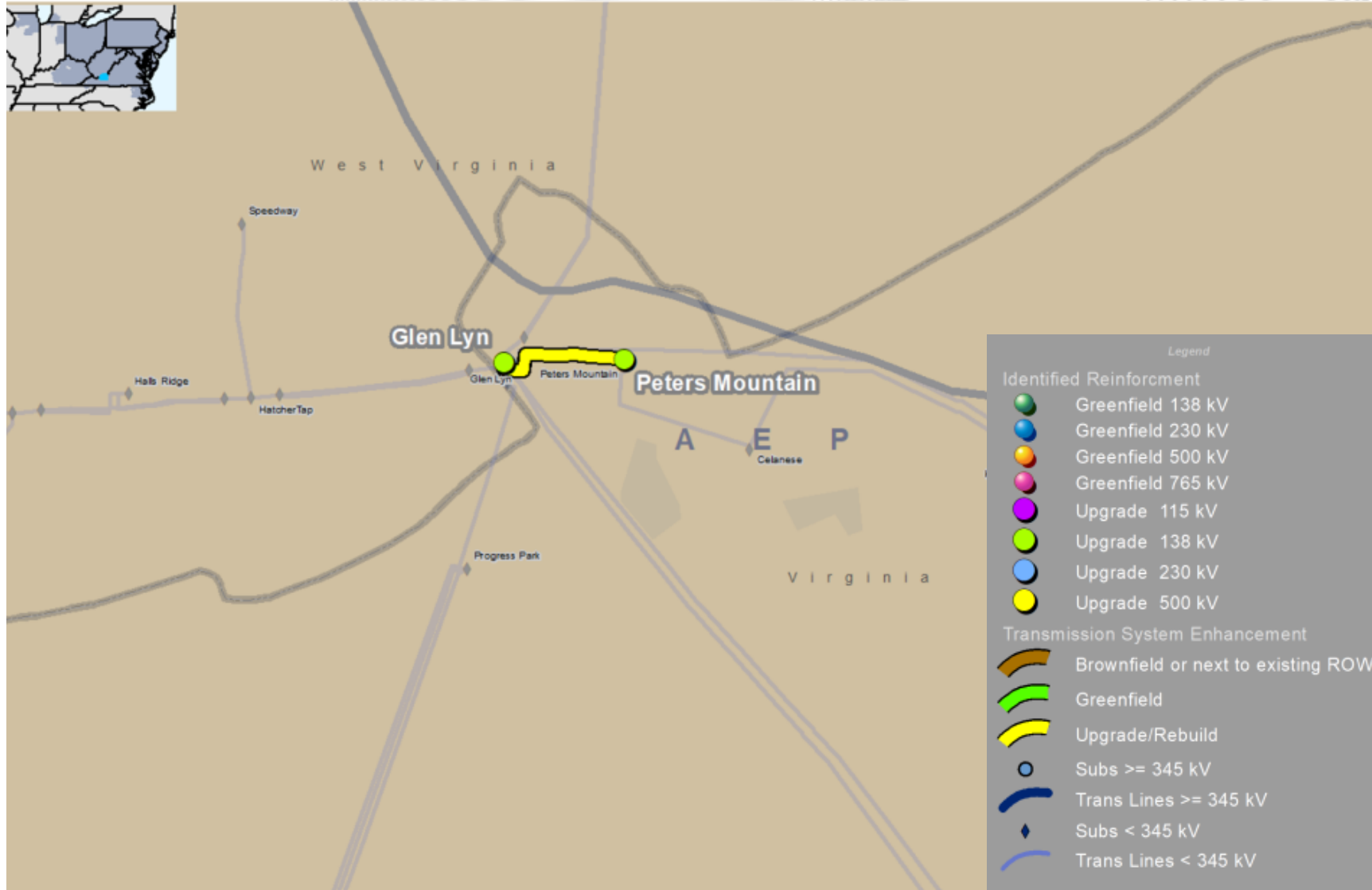
2022 RTEP W3 Submitted Proposals

#	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

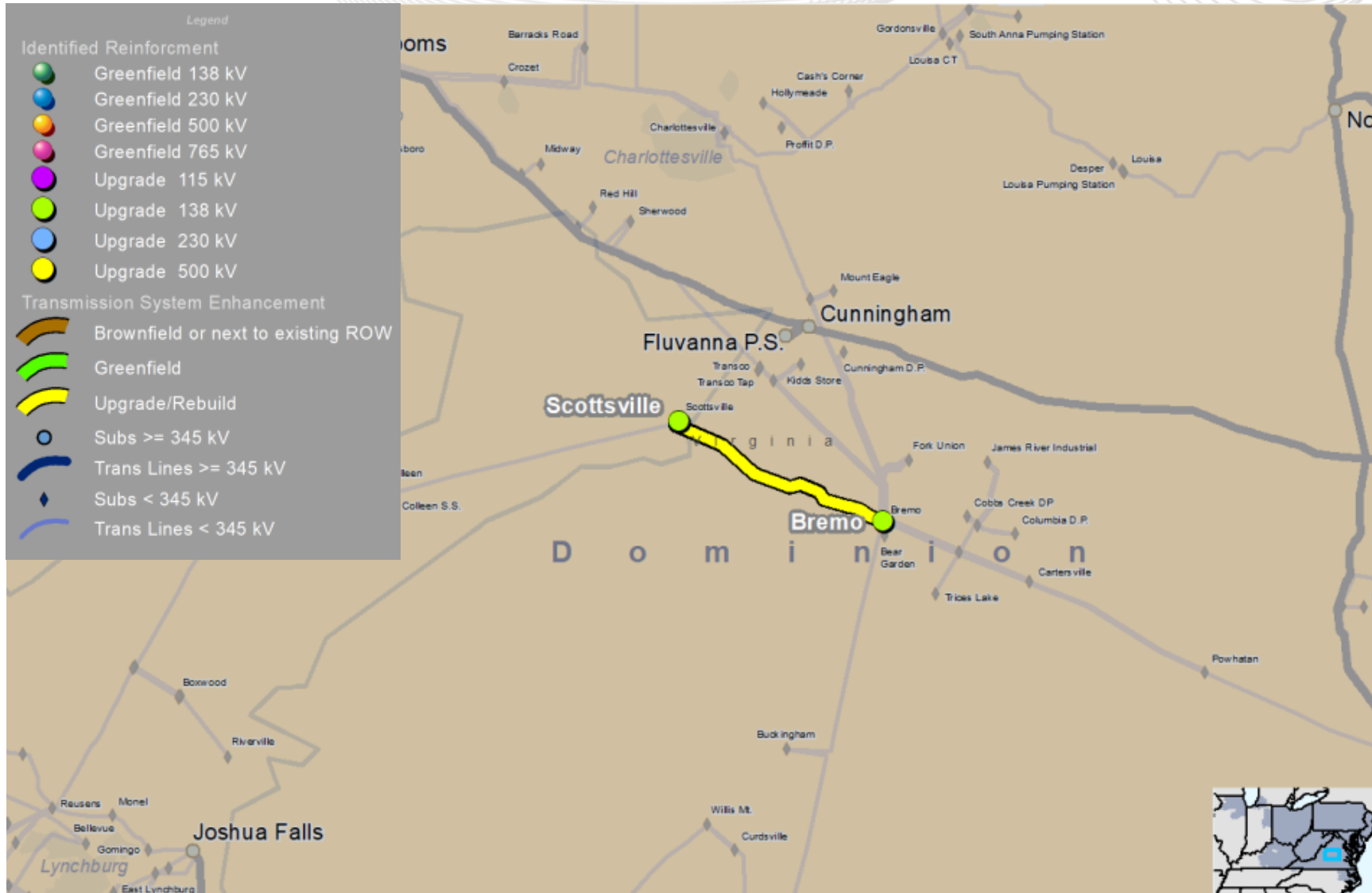


2022 RTEP W3 Submitted Proposals

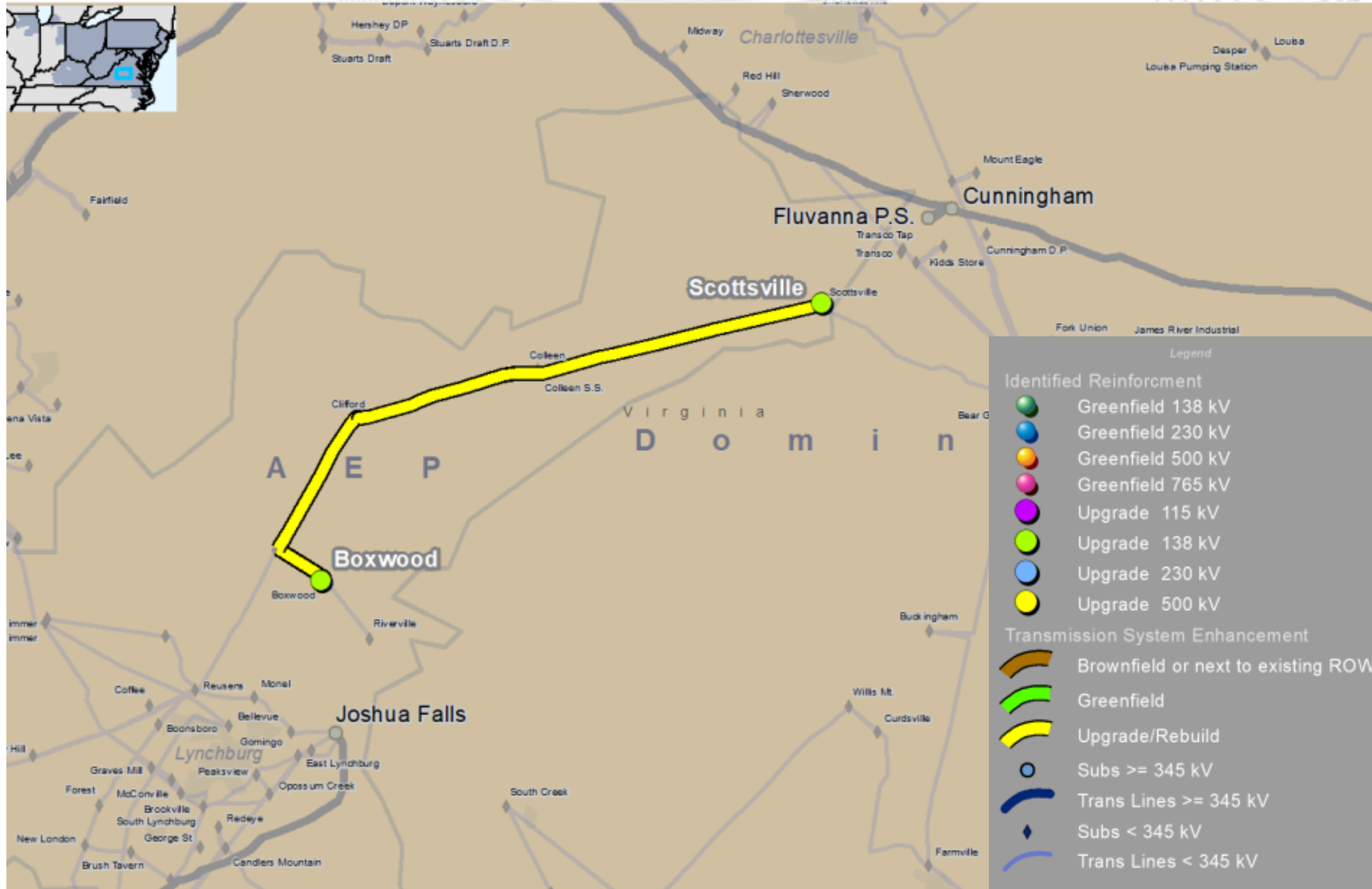
#	Proposal ID	Proposing Entity	Focus Area	Project Title	Submitted Cost (\$M)
56	951	NextEra	West	Black Oak - Gore - Goose Creek, Pike SVC + Cap Bank Solution	\$419.86
57	344	PECO	East	PECO Expansion Plan for DOM Window 2023	\$302.86
58	600	PECO	Local Other	Exelon Replacement Upgrades	\$423.79
59	660	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	Combo	Data Center Reinforcement Proposal #2	\$3,503.86
62	837	POTOED - FirstEnergy	Combo	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	Combo	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



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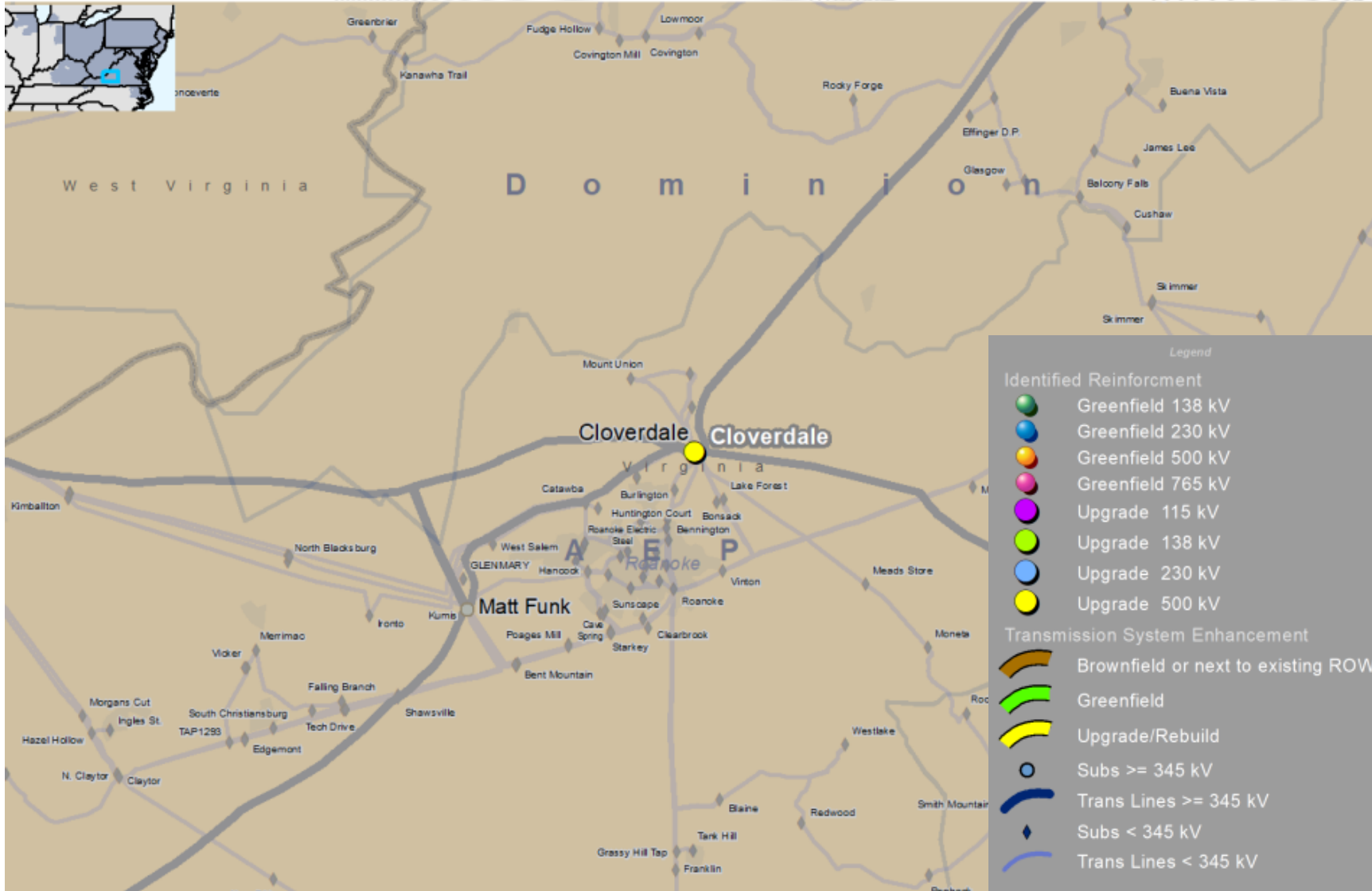


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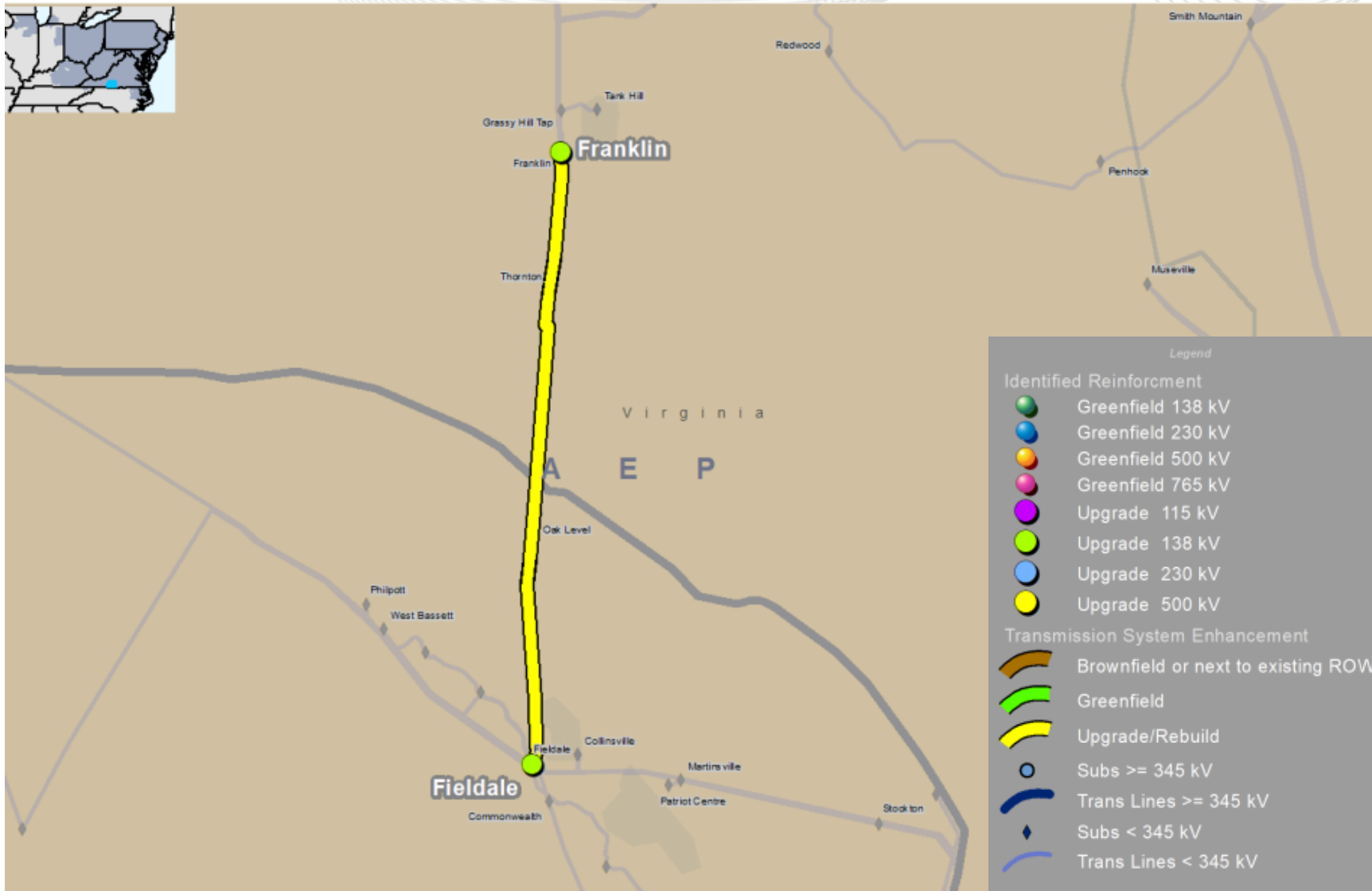


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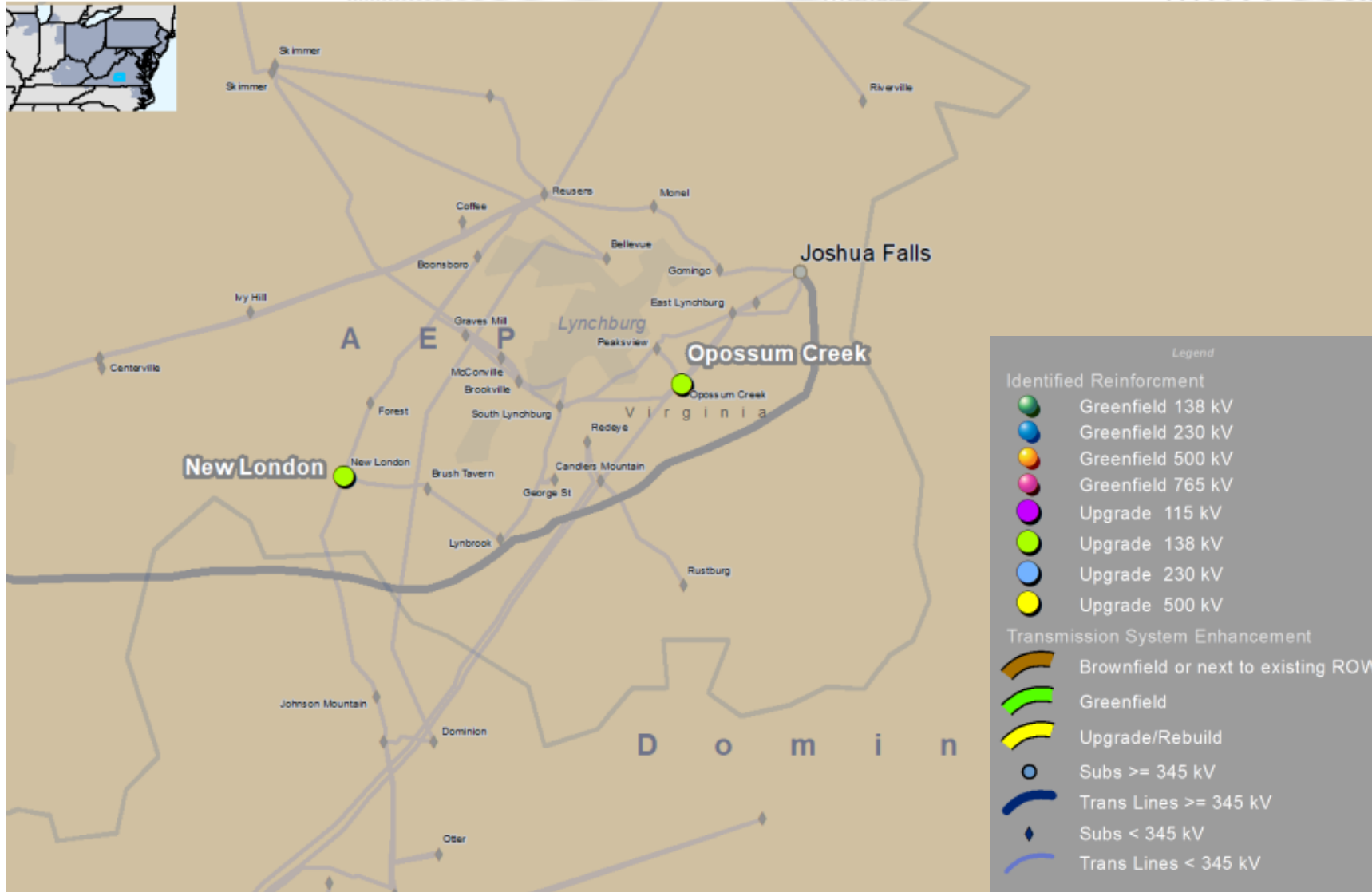
2022 Window 3 proposals – AEP - 202 & 410



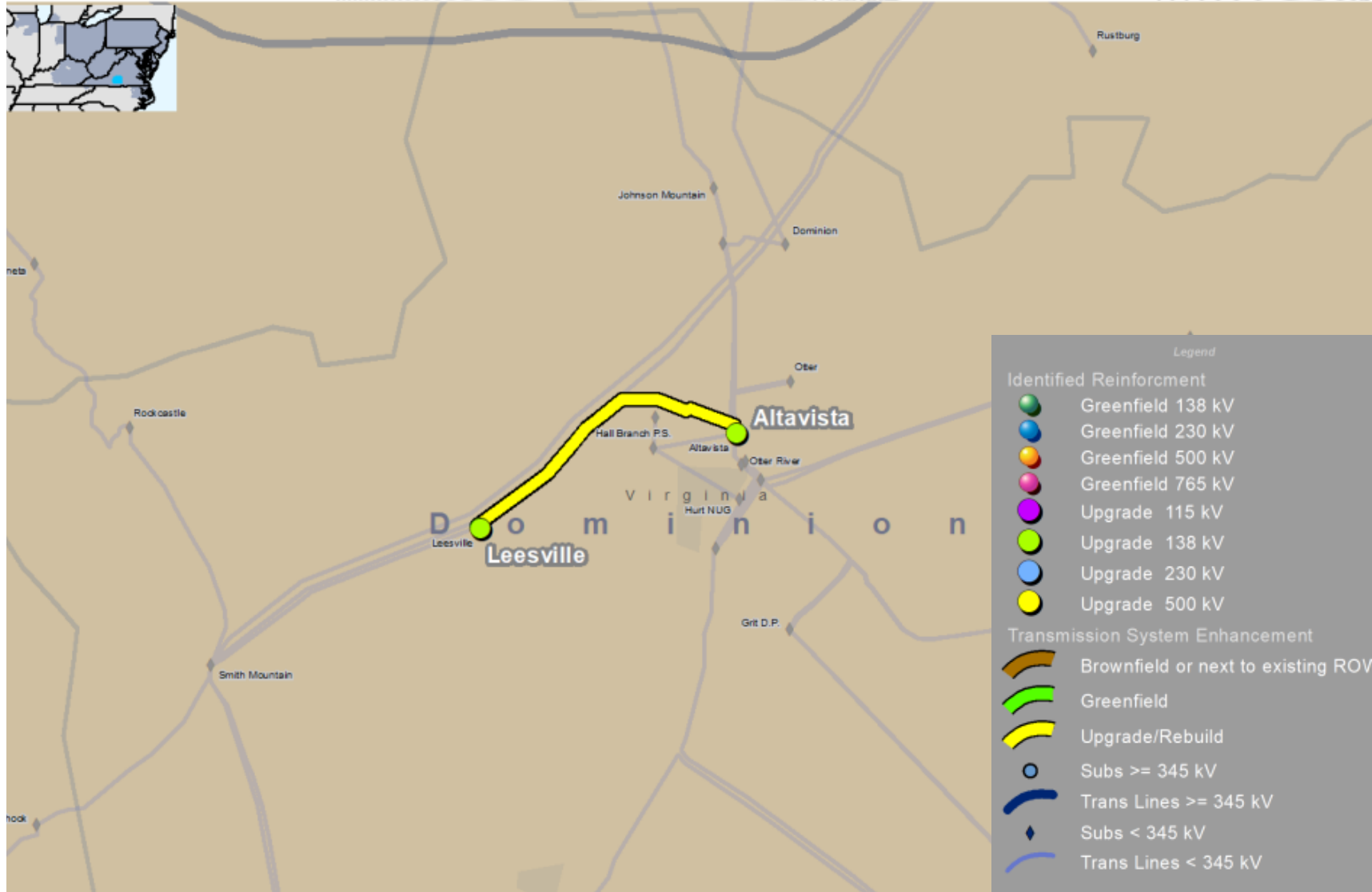
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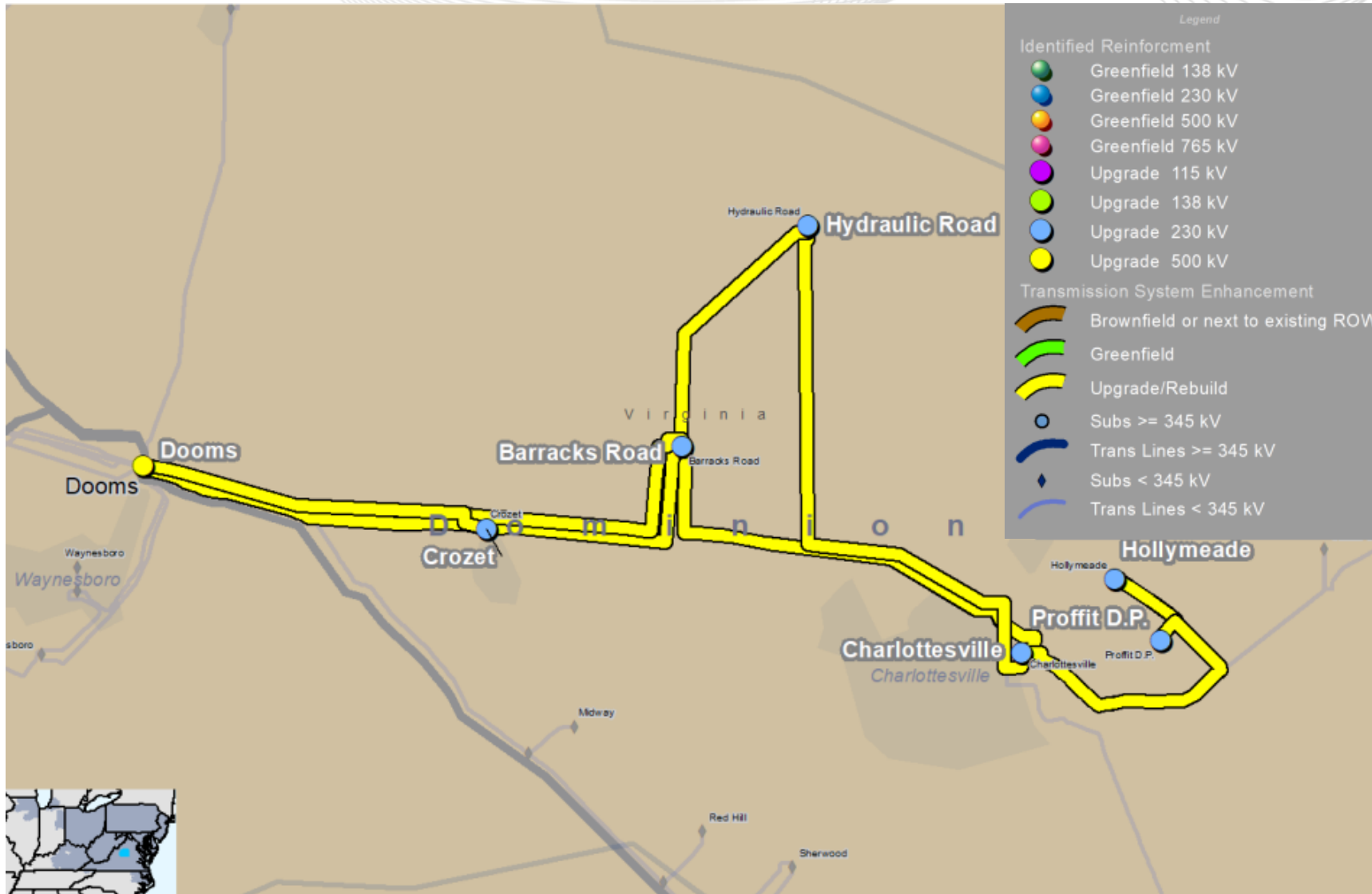
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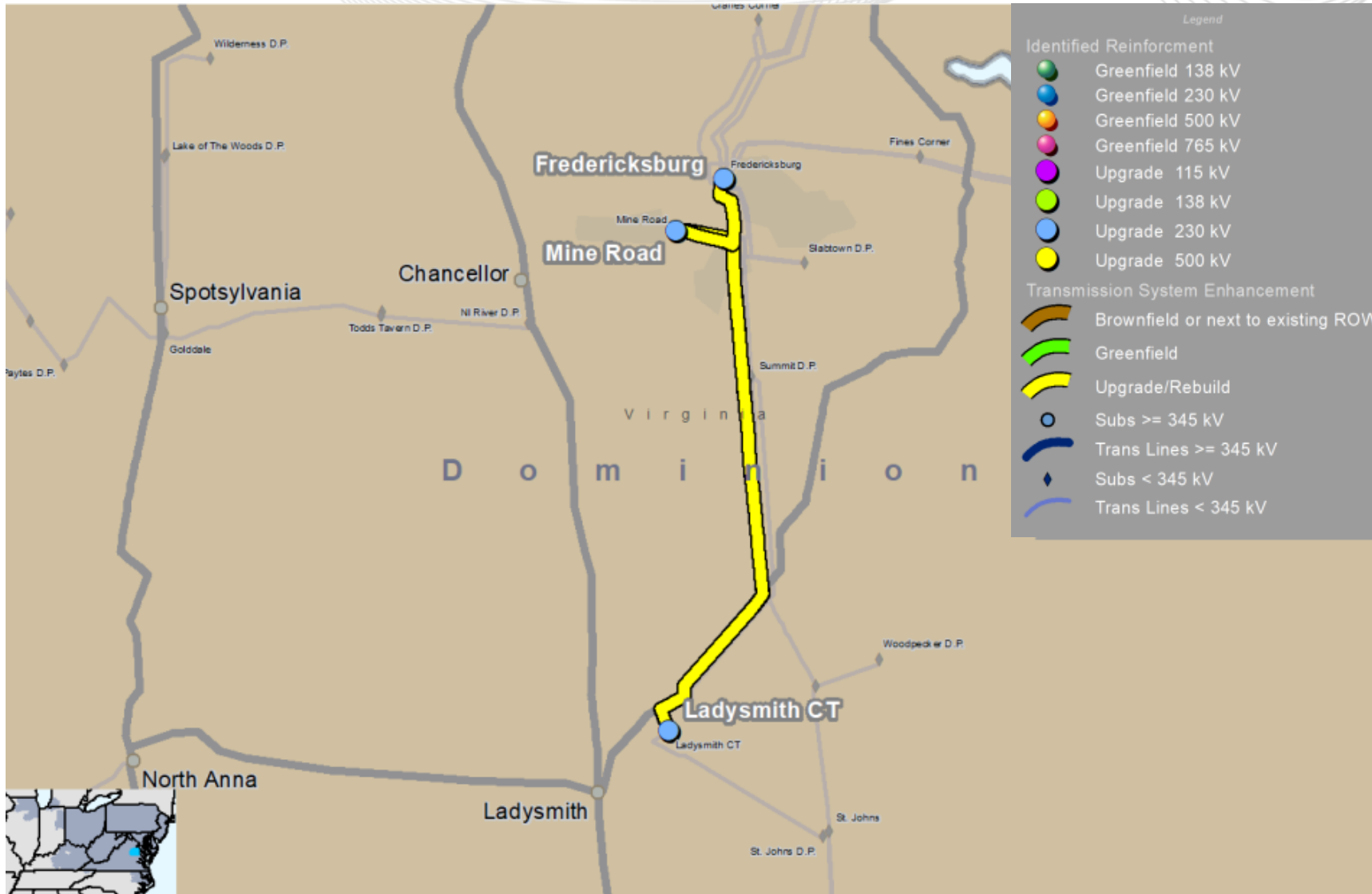
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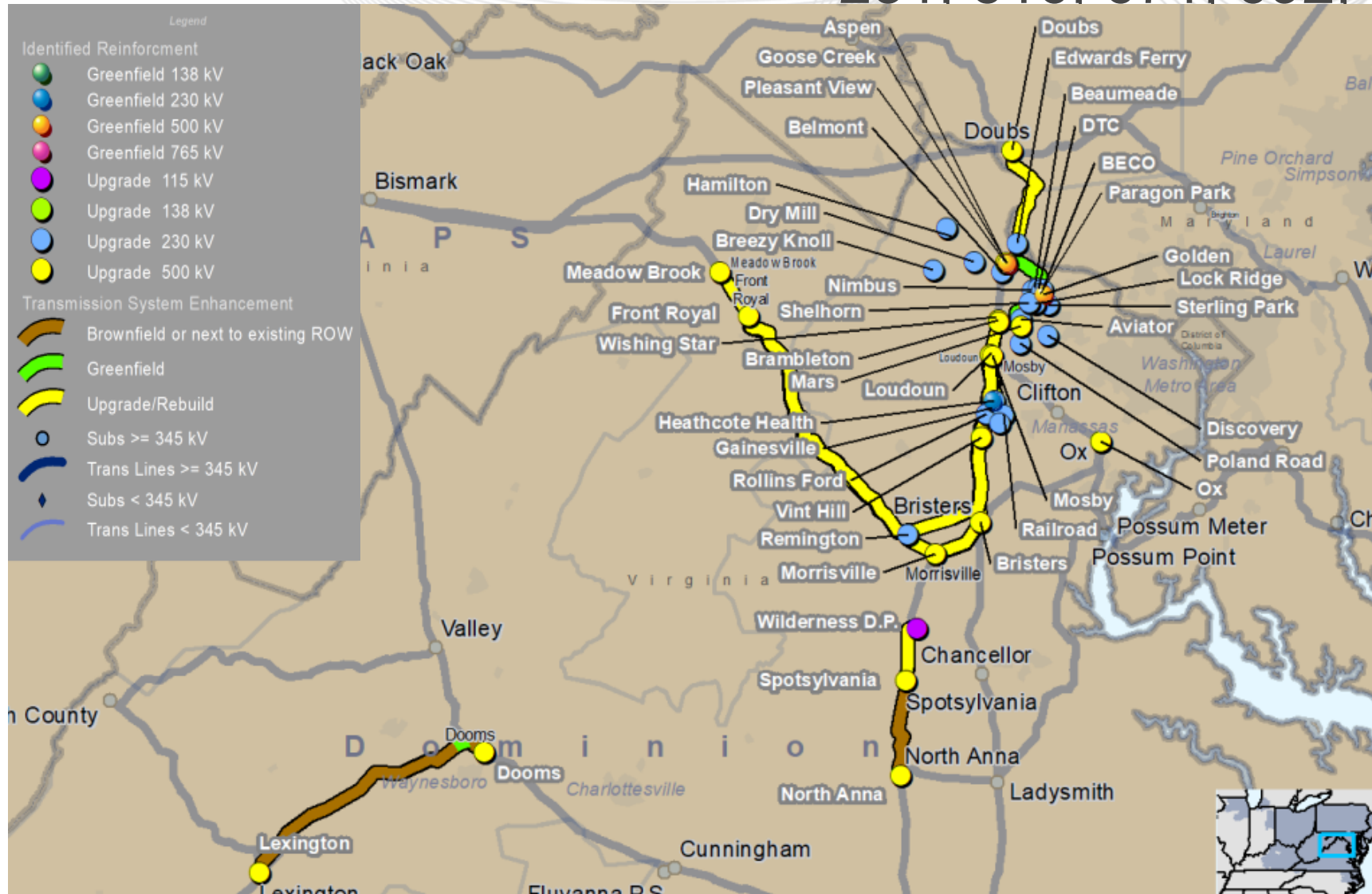
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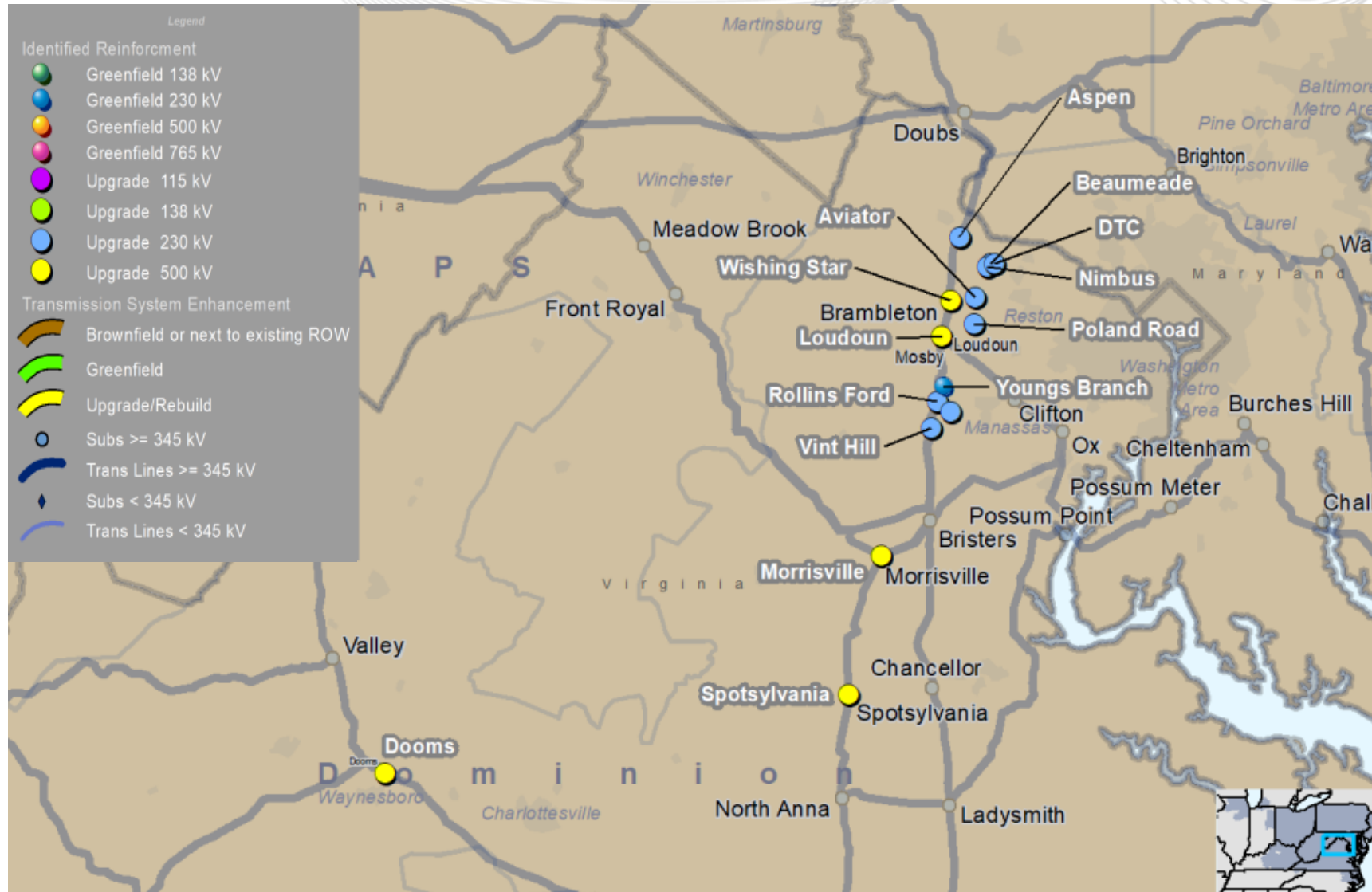
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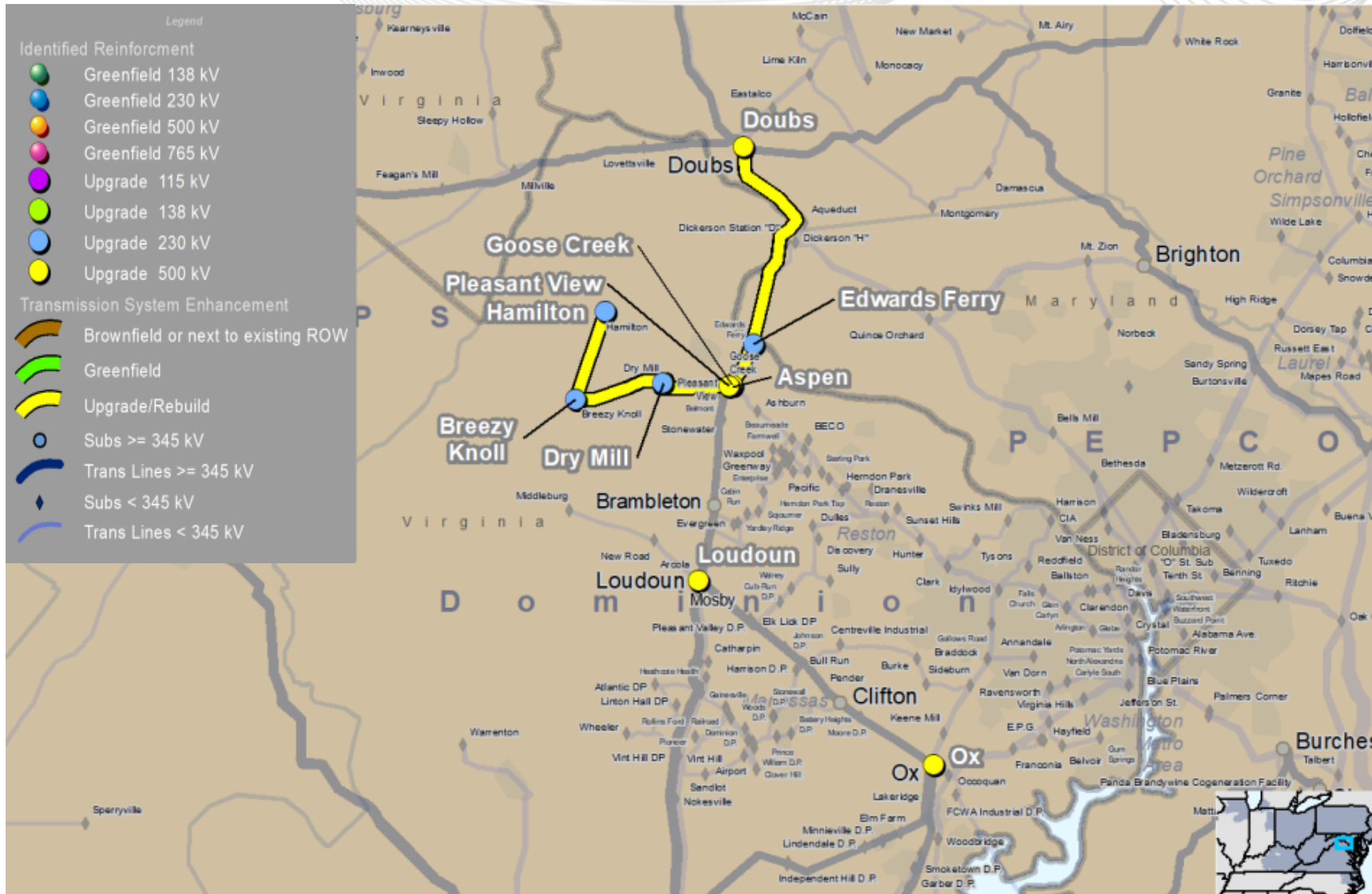
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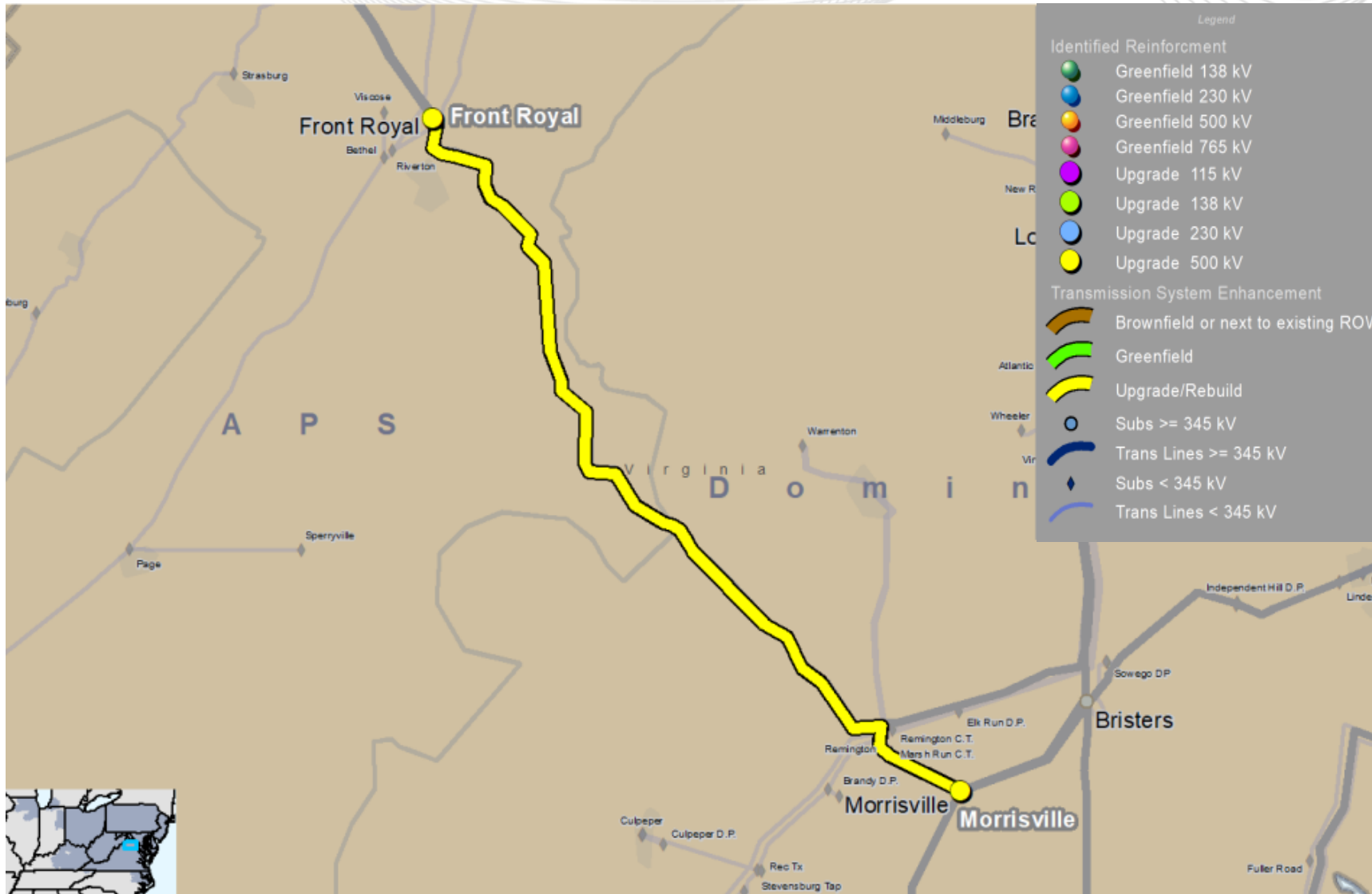
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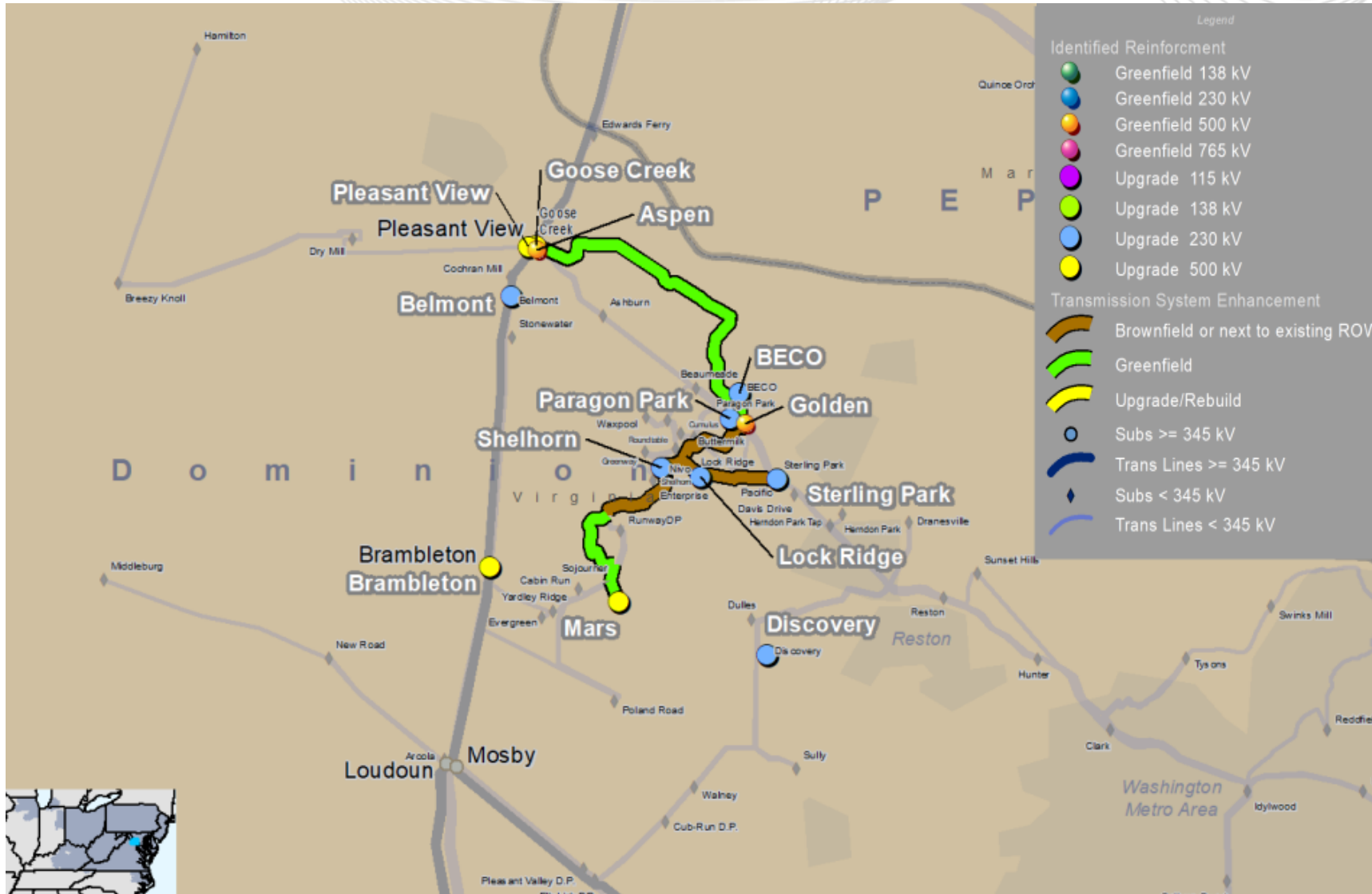
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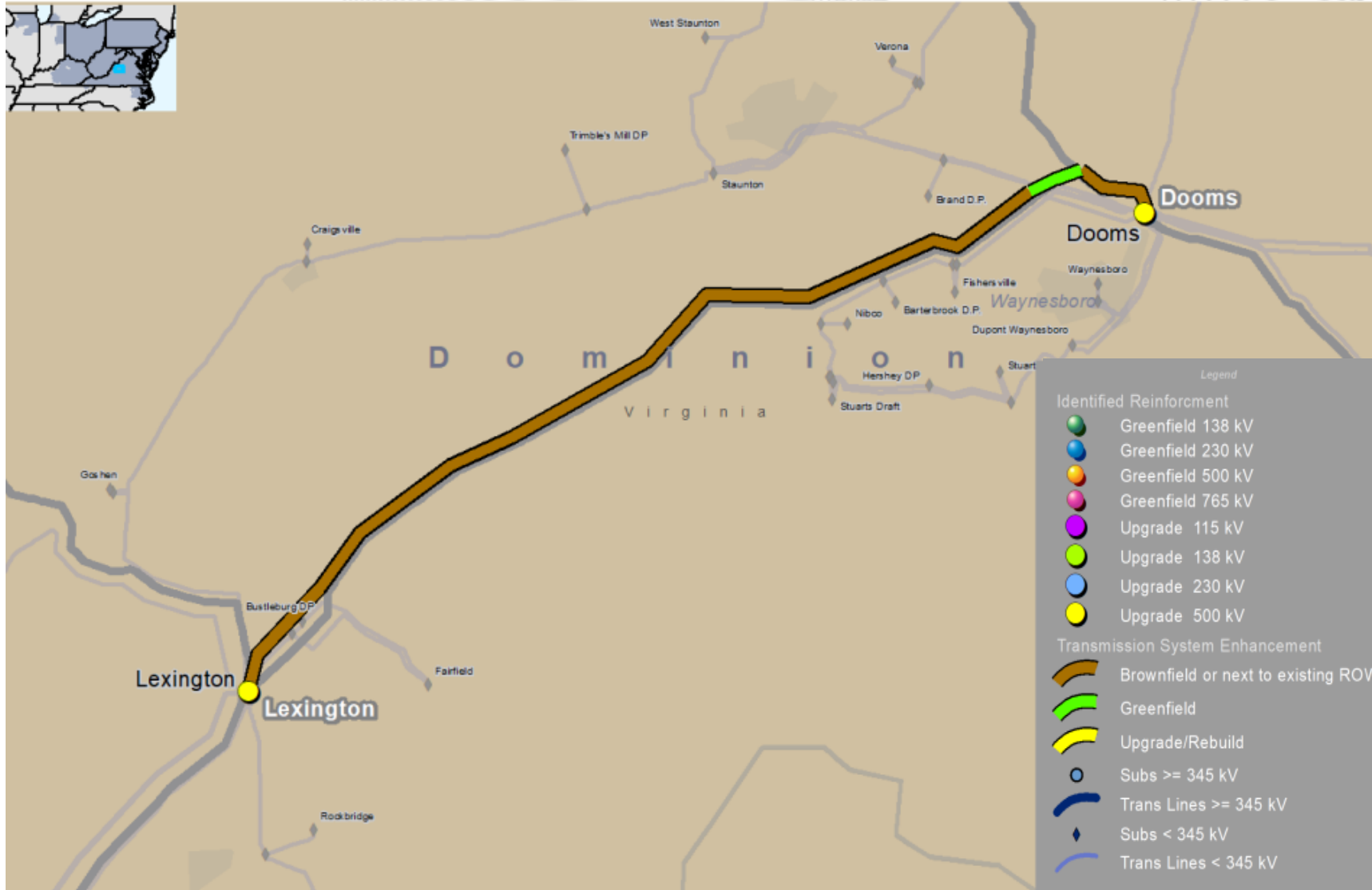
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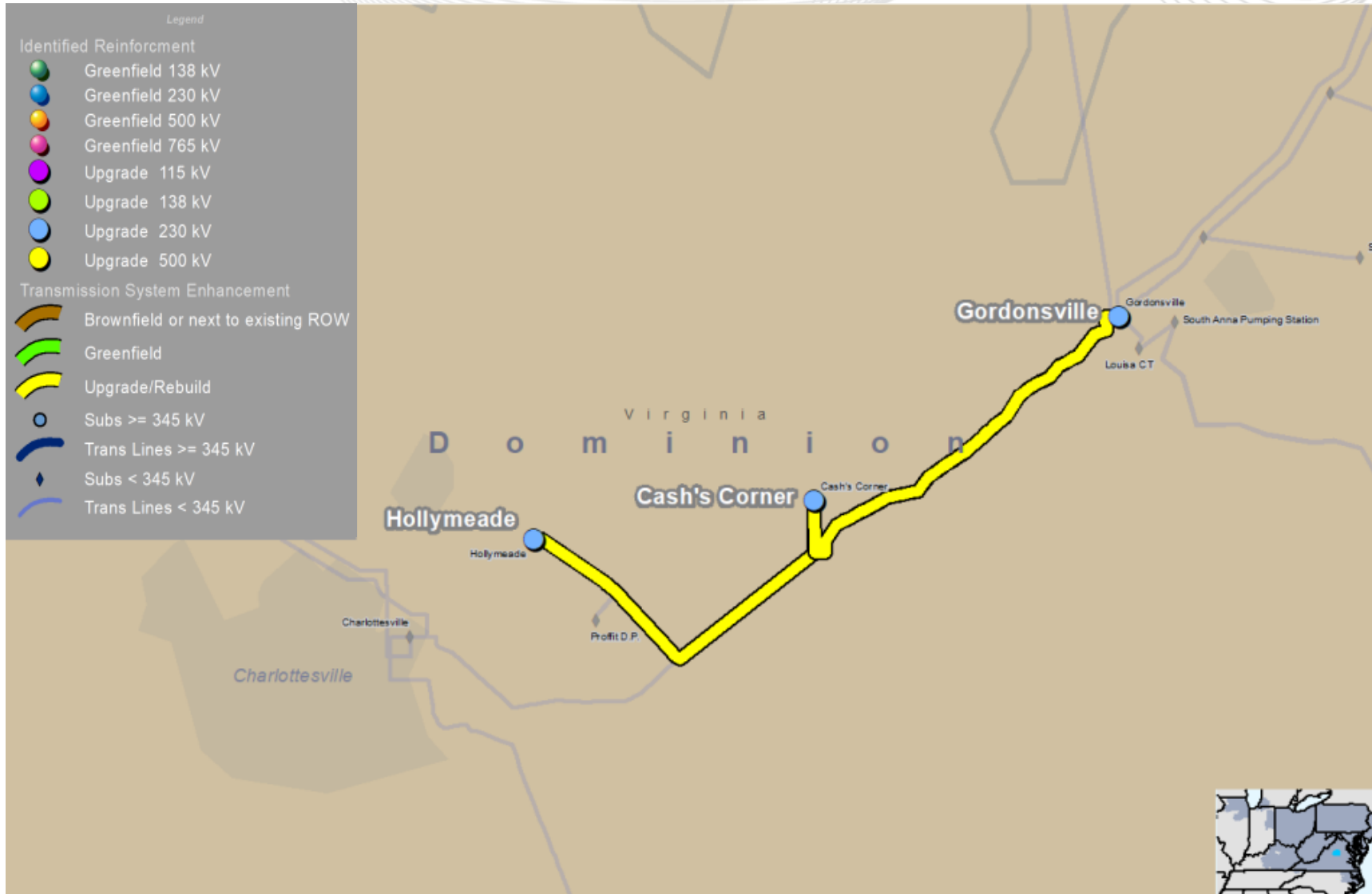
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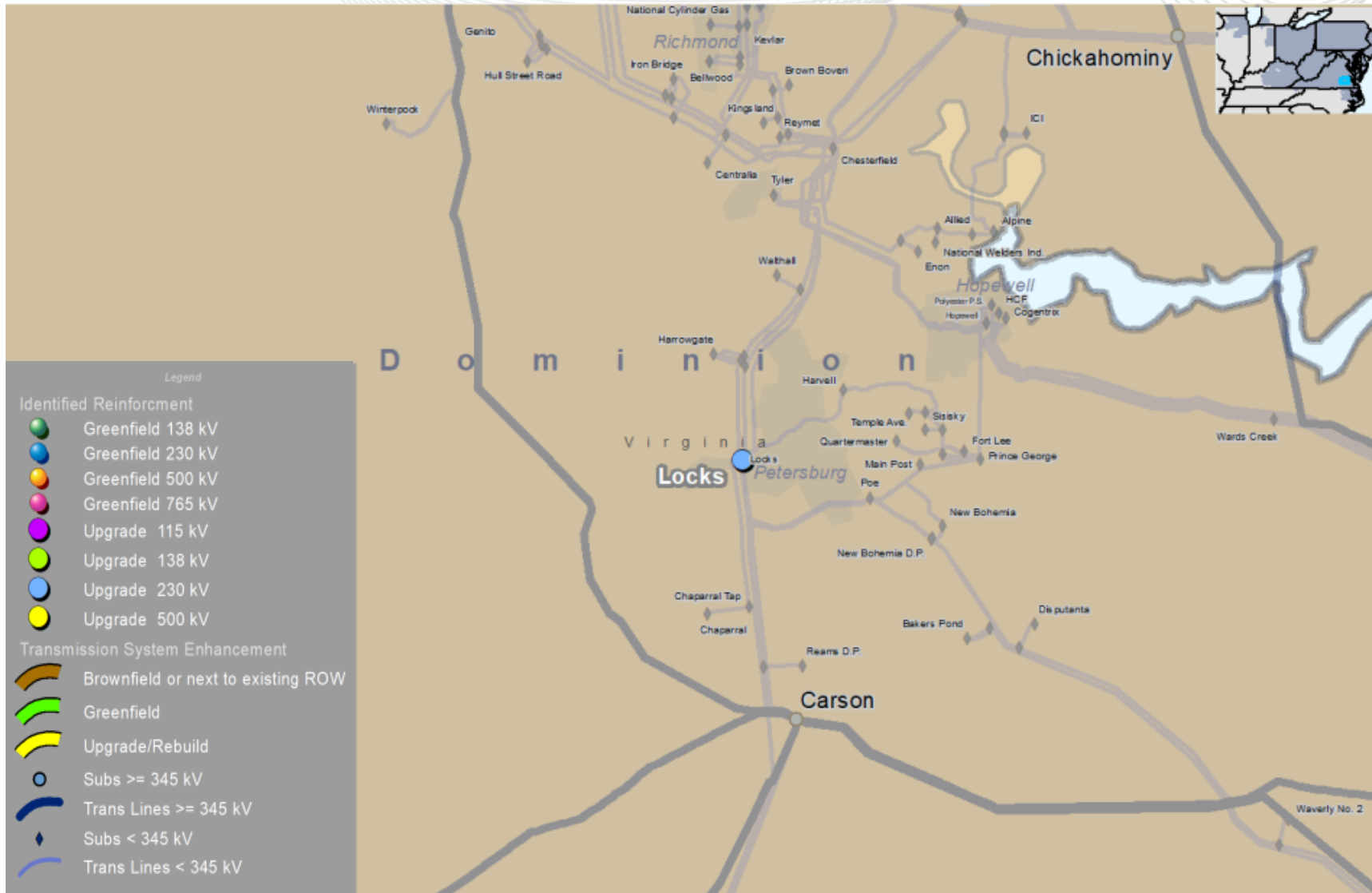
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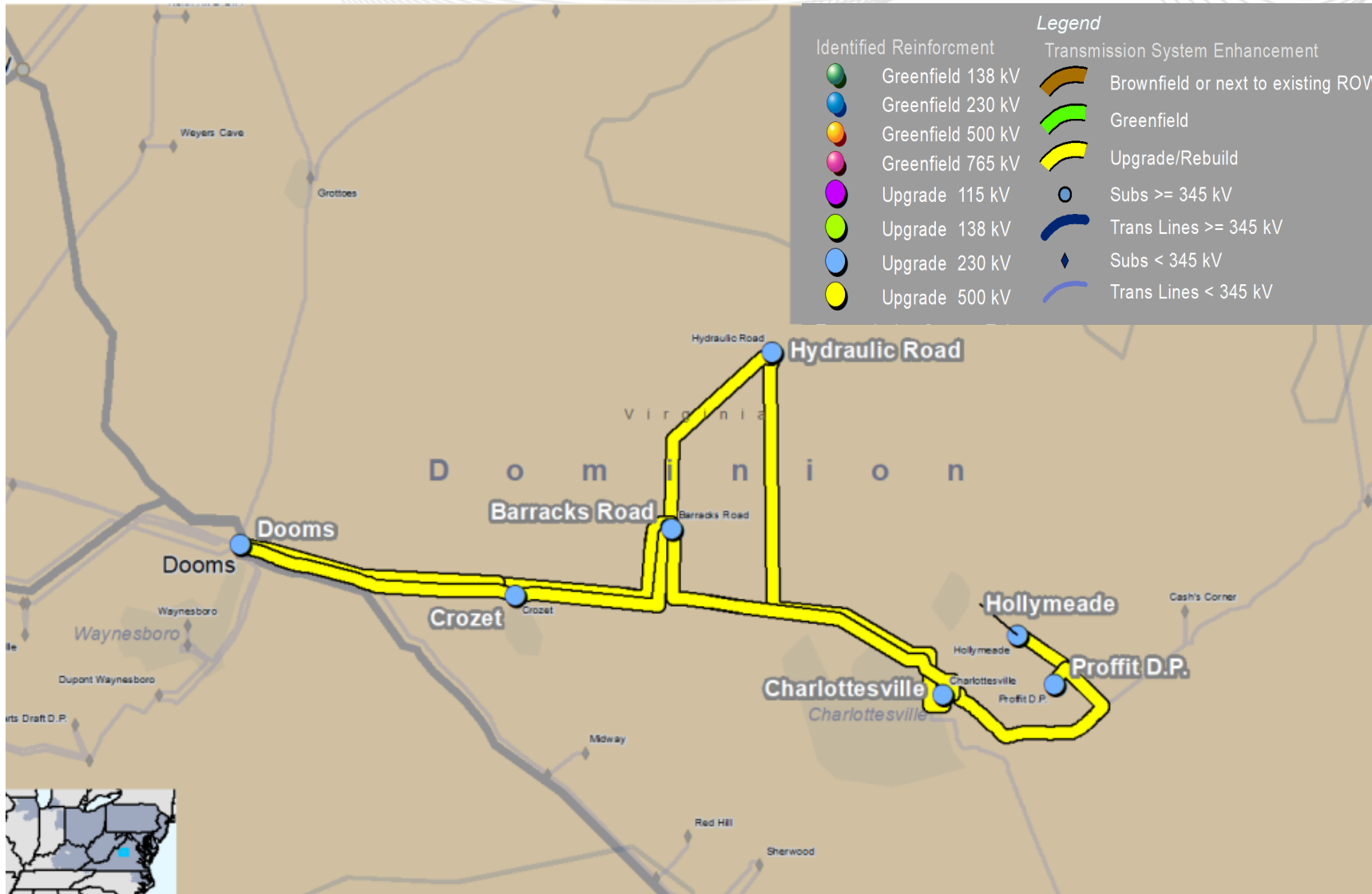
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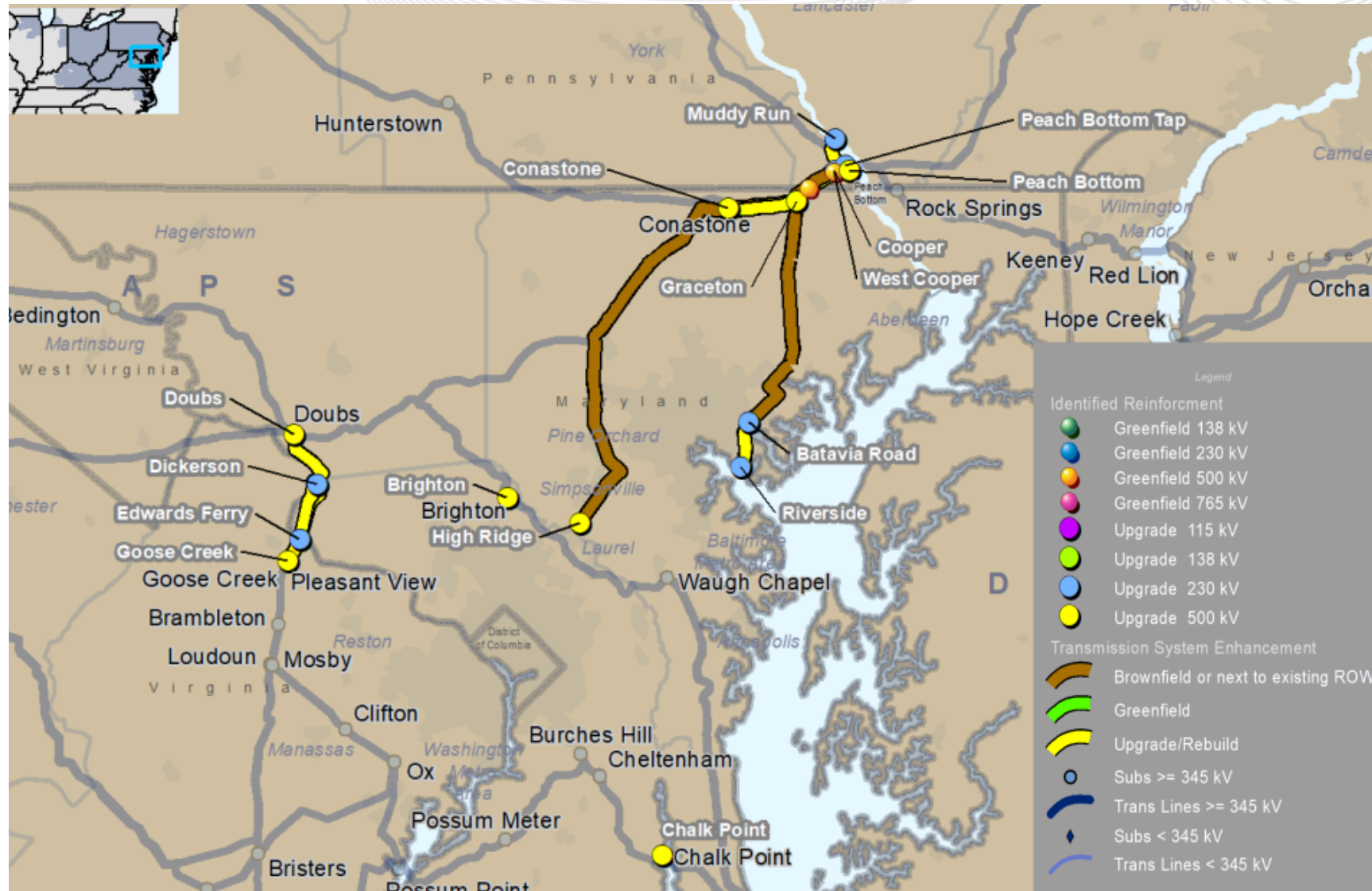
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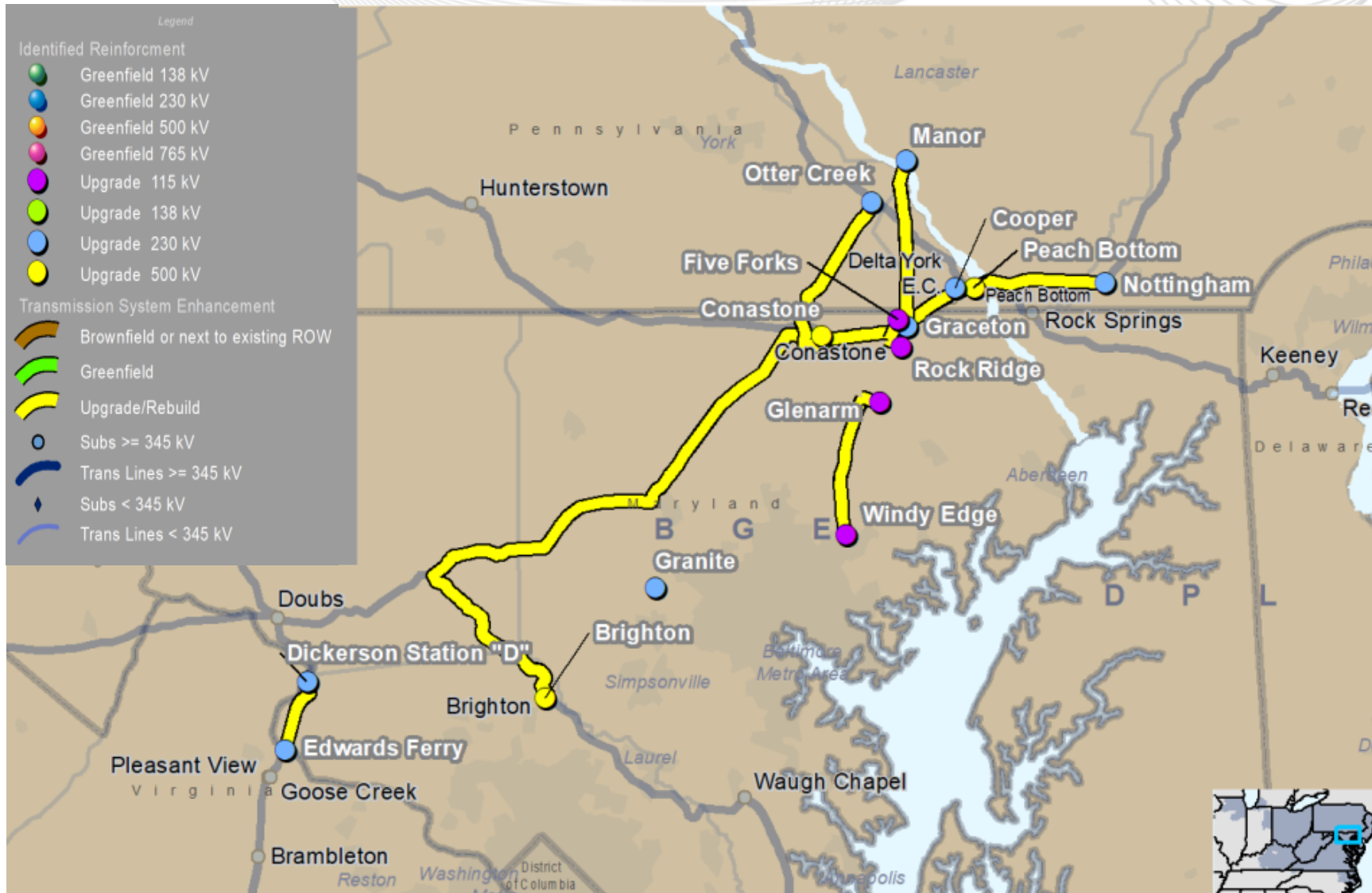
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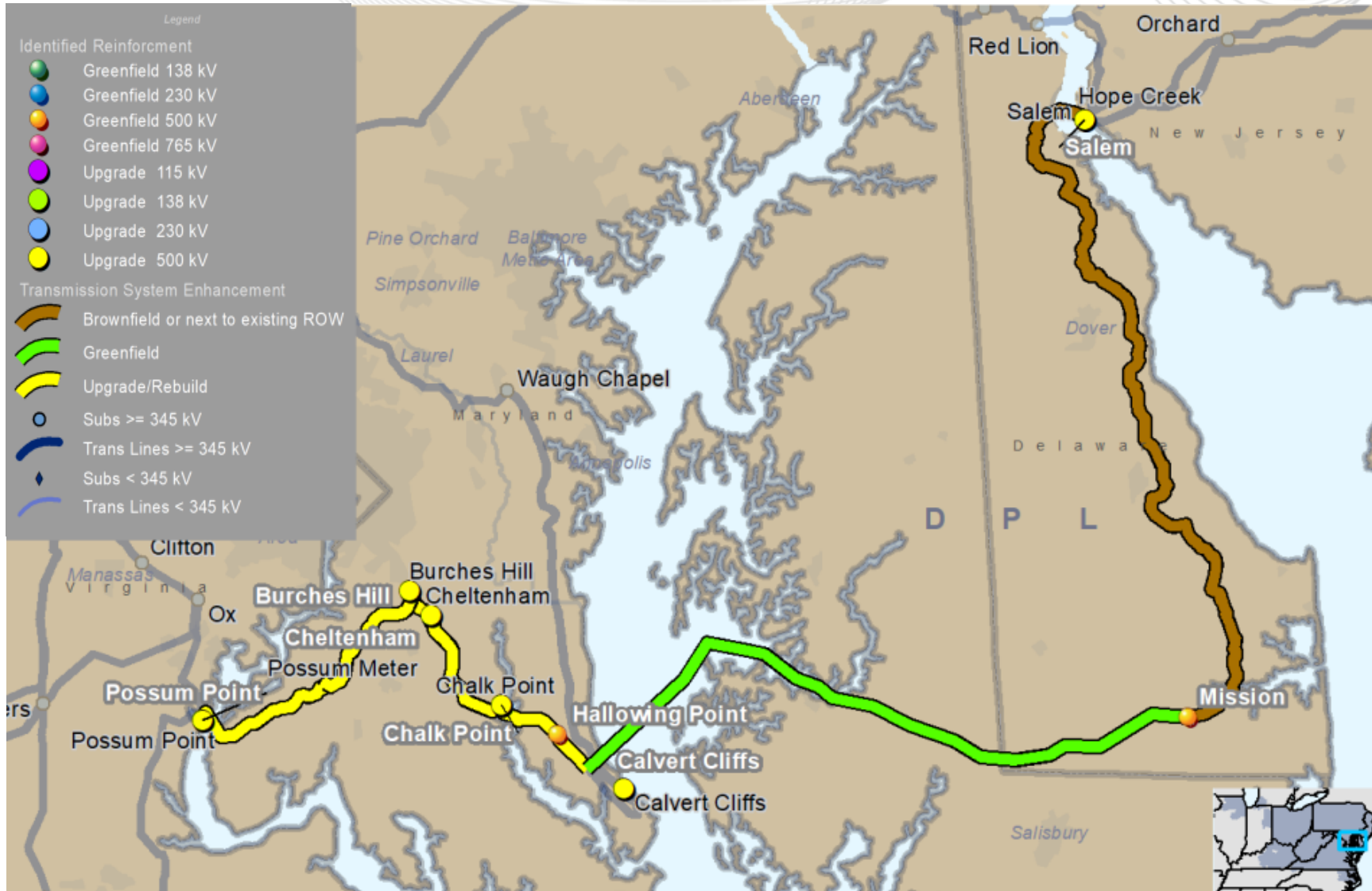
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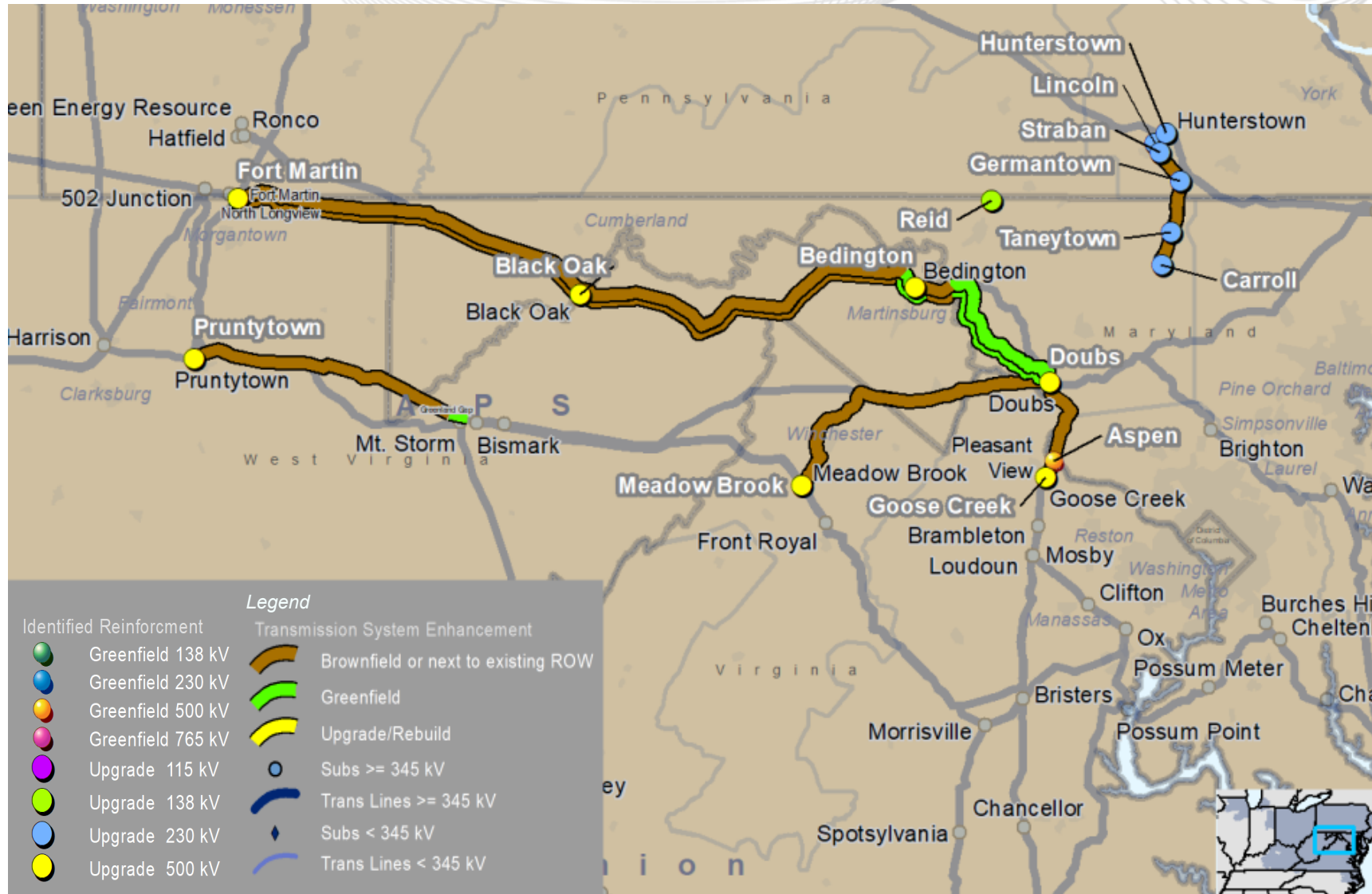
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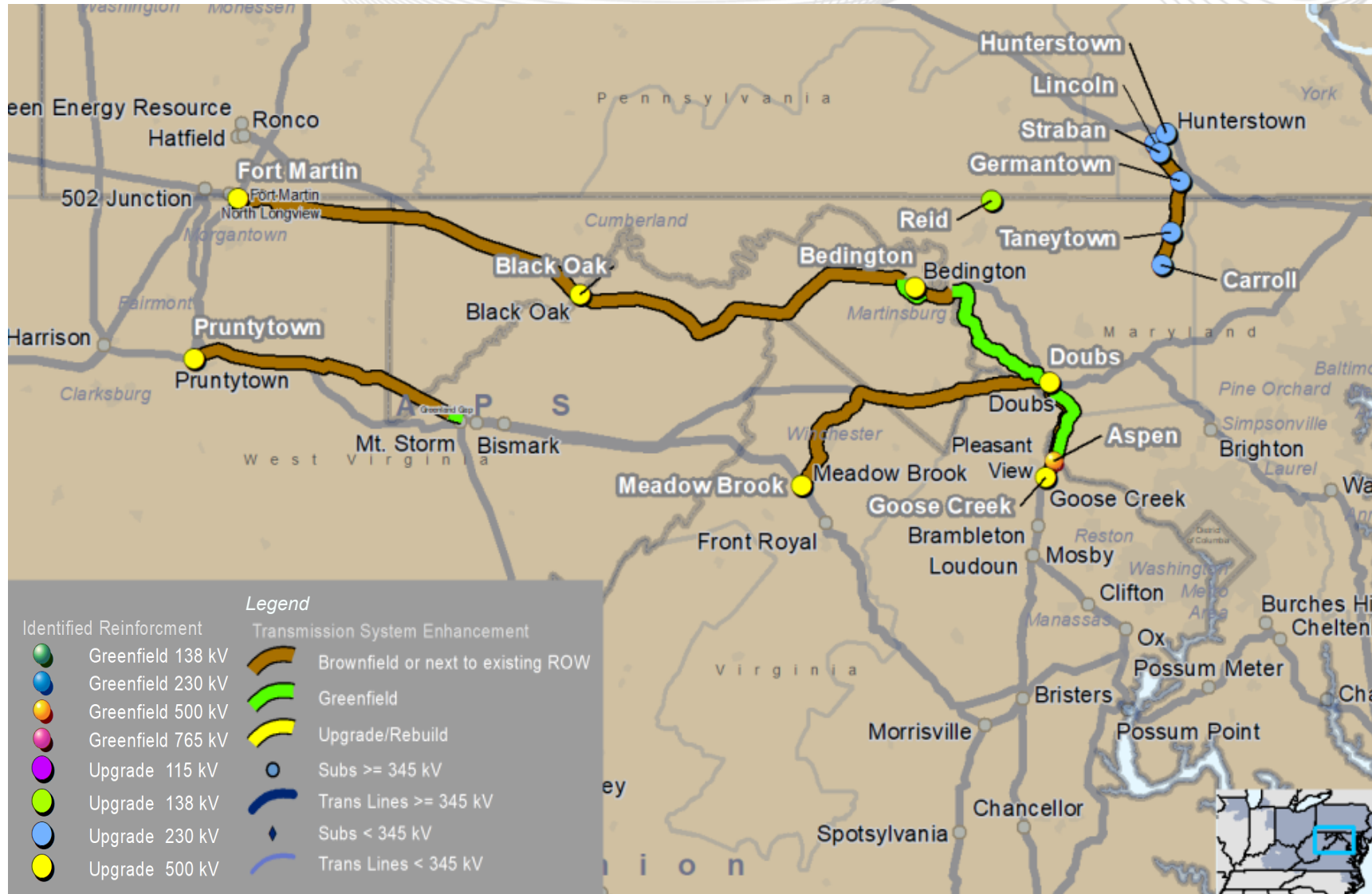
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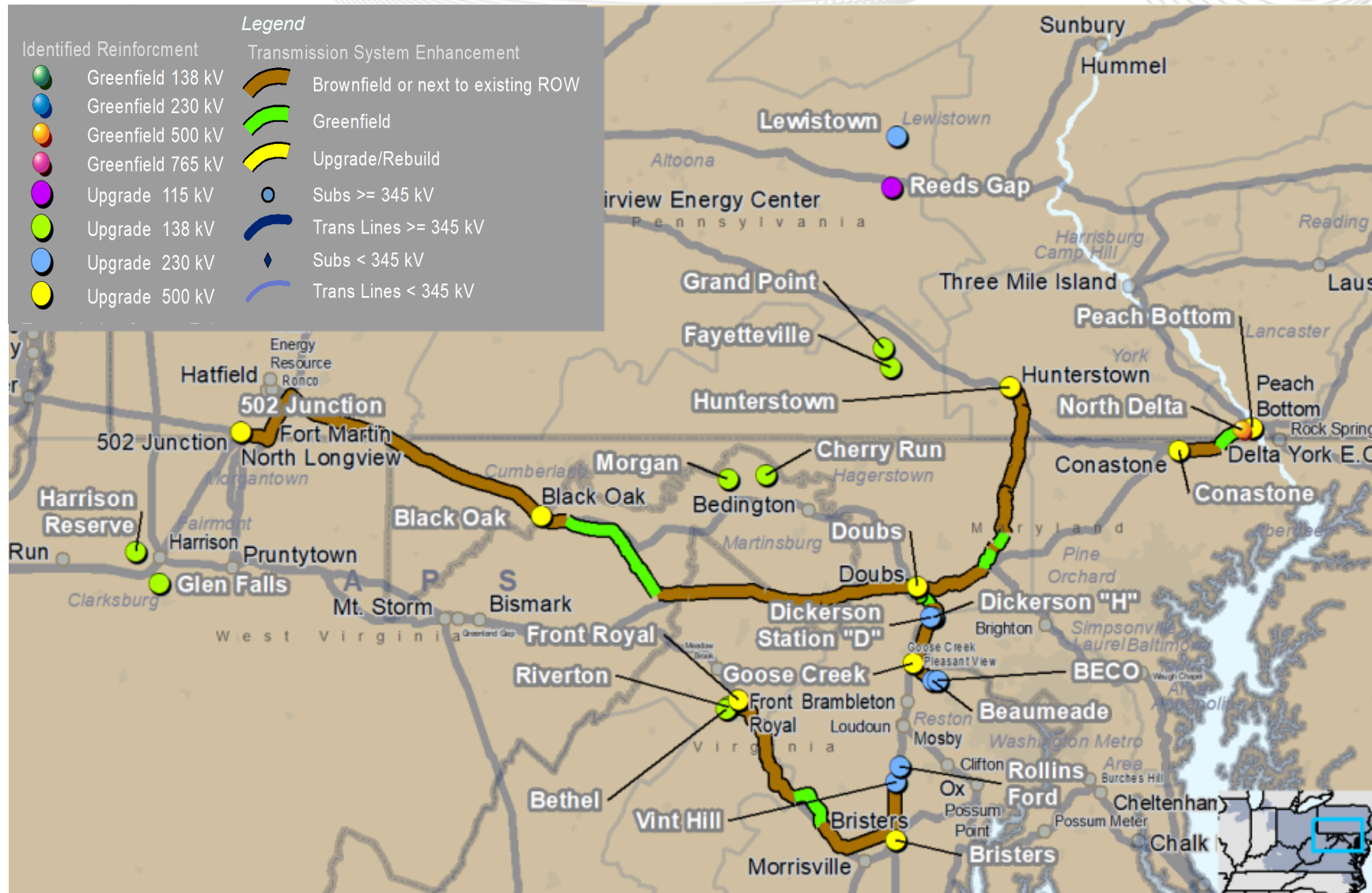
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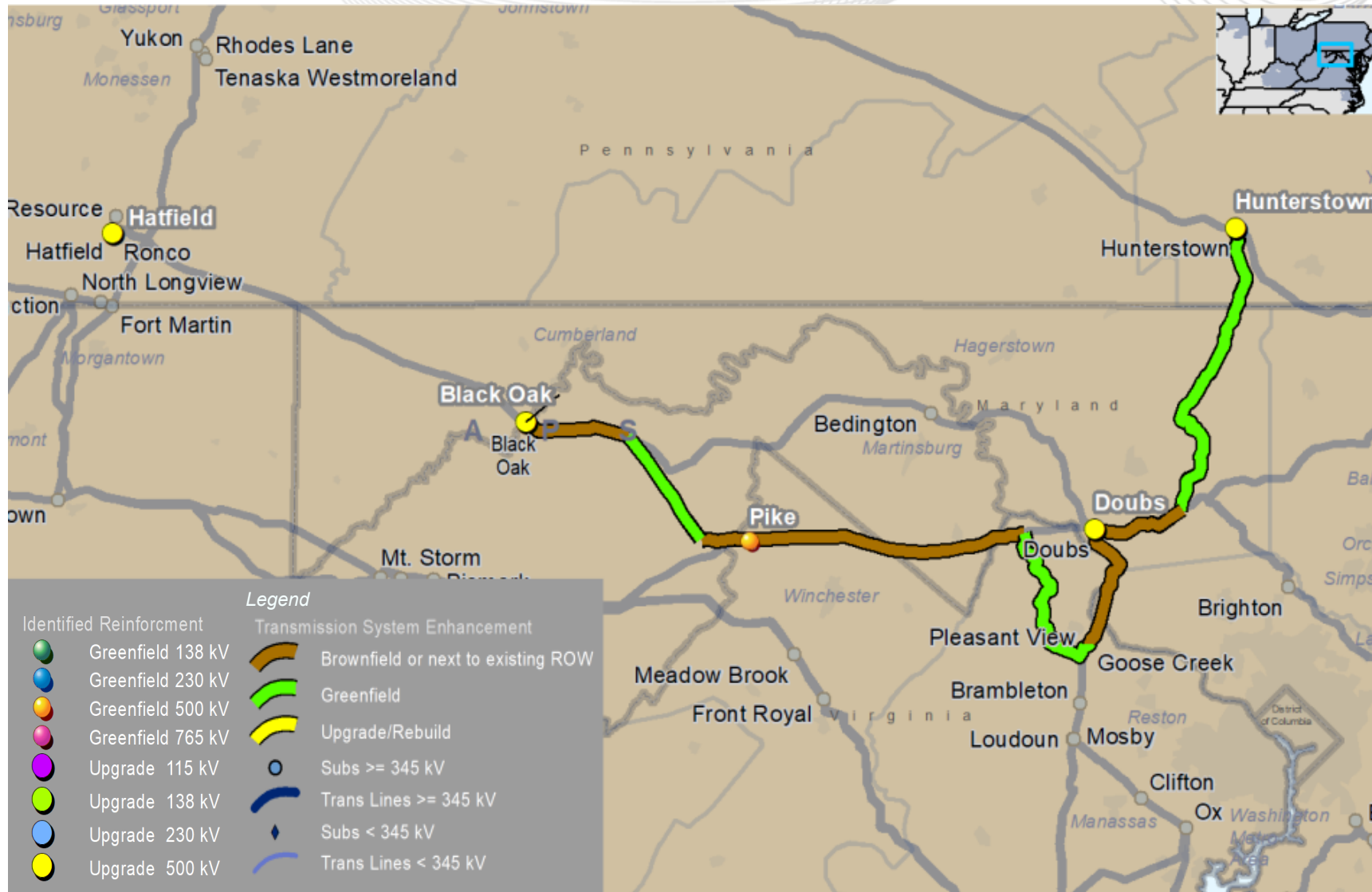
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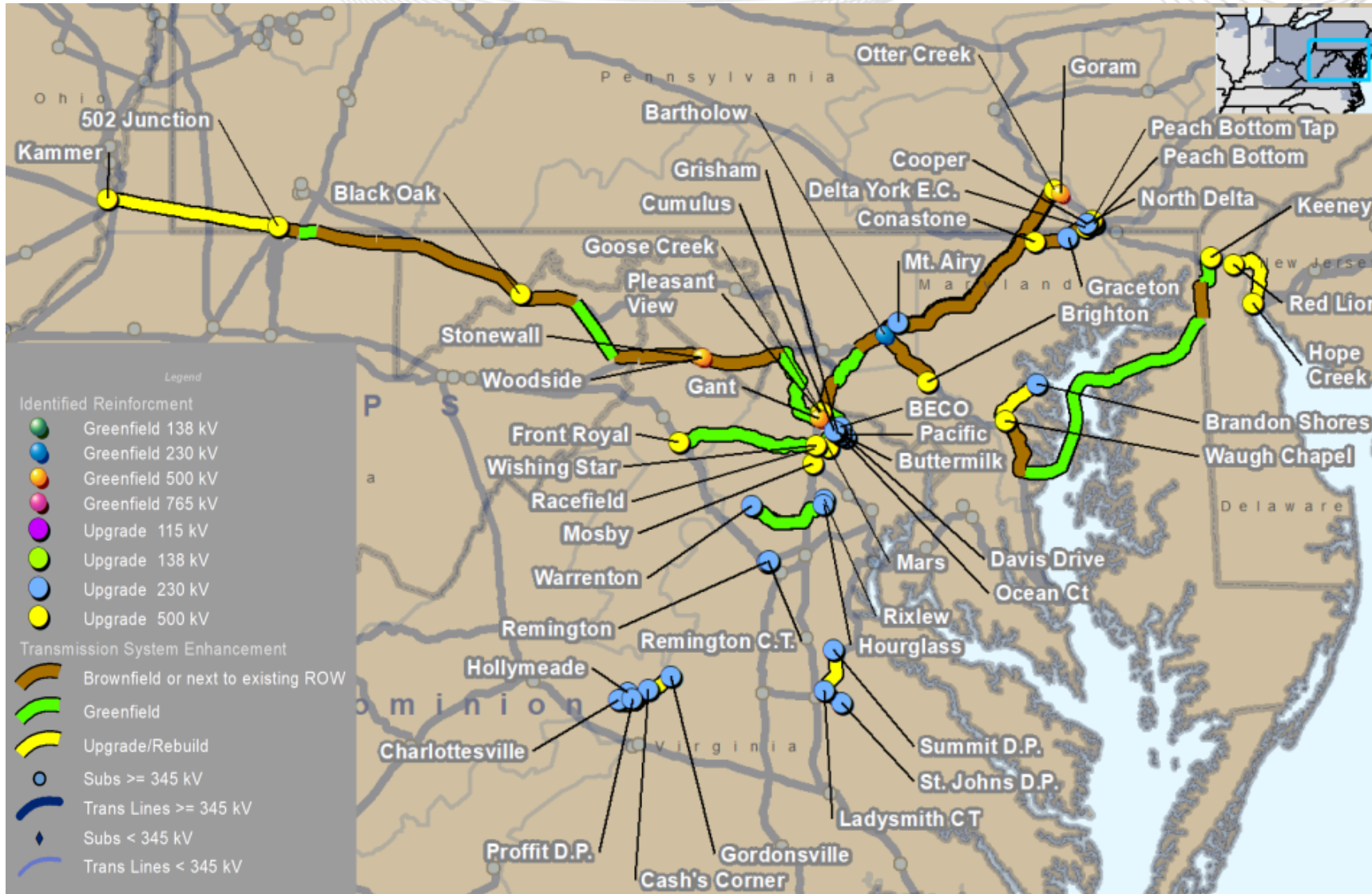
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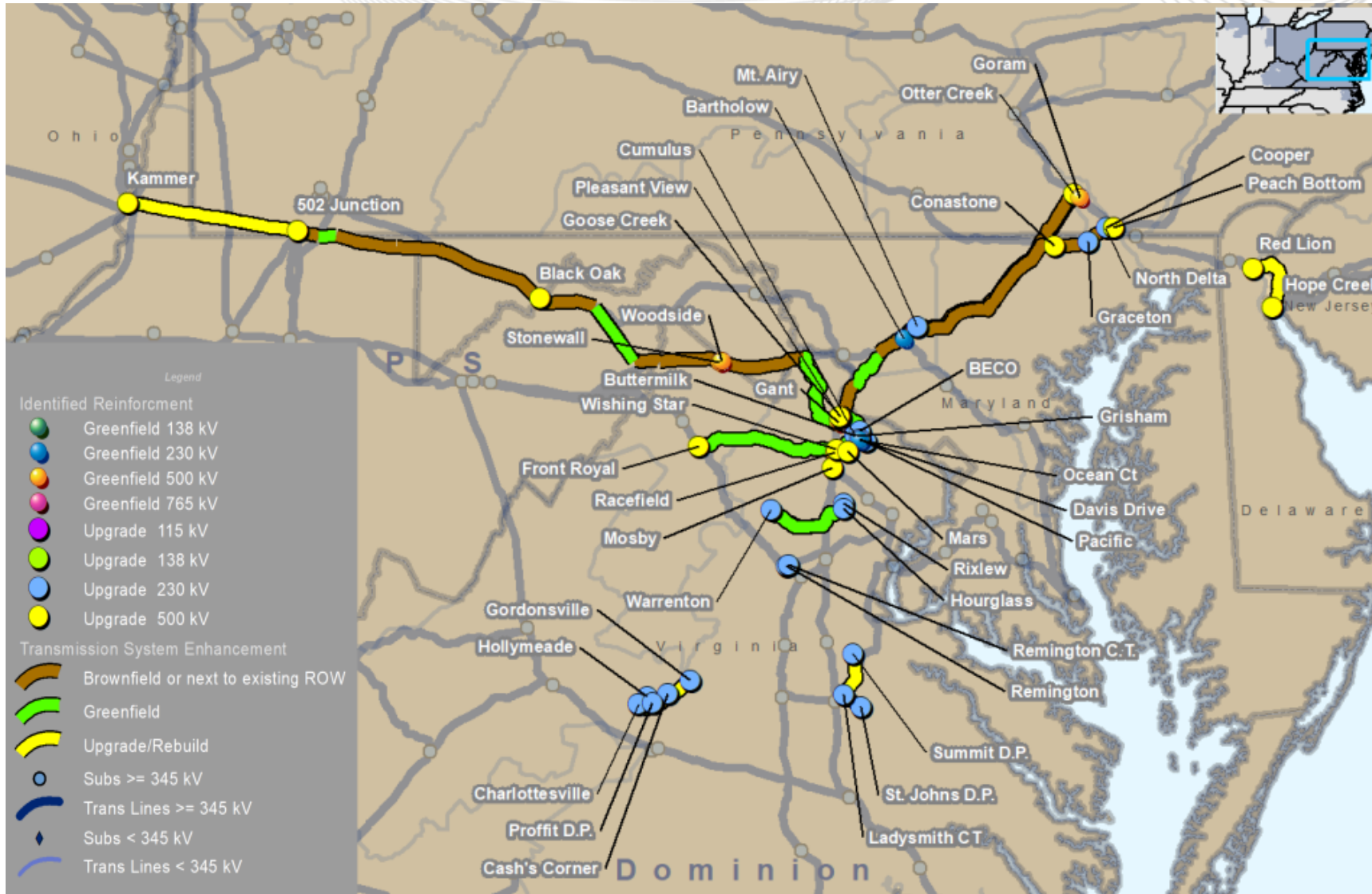
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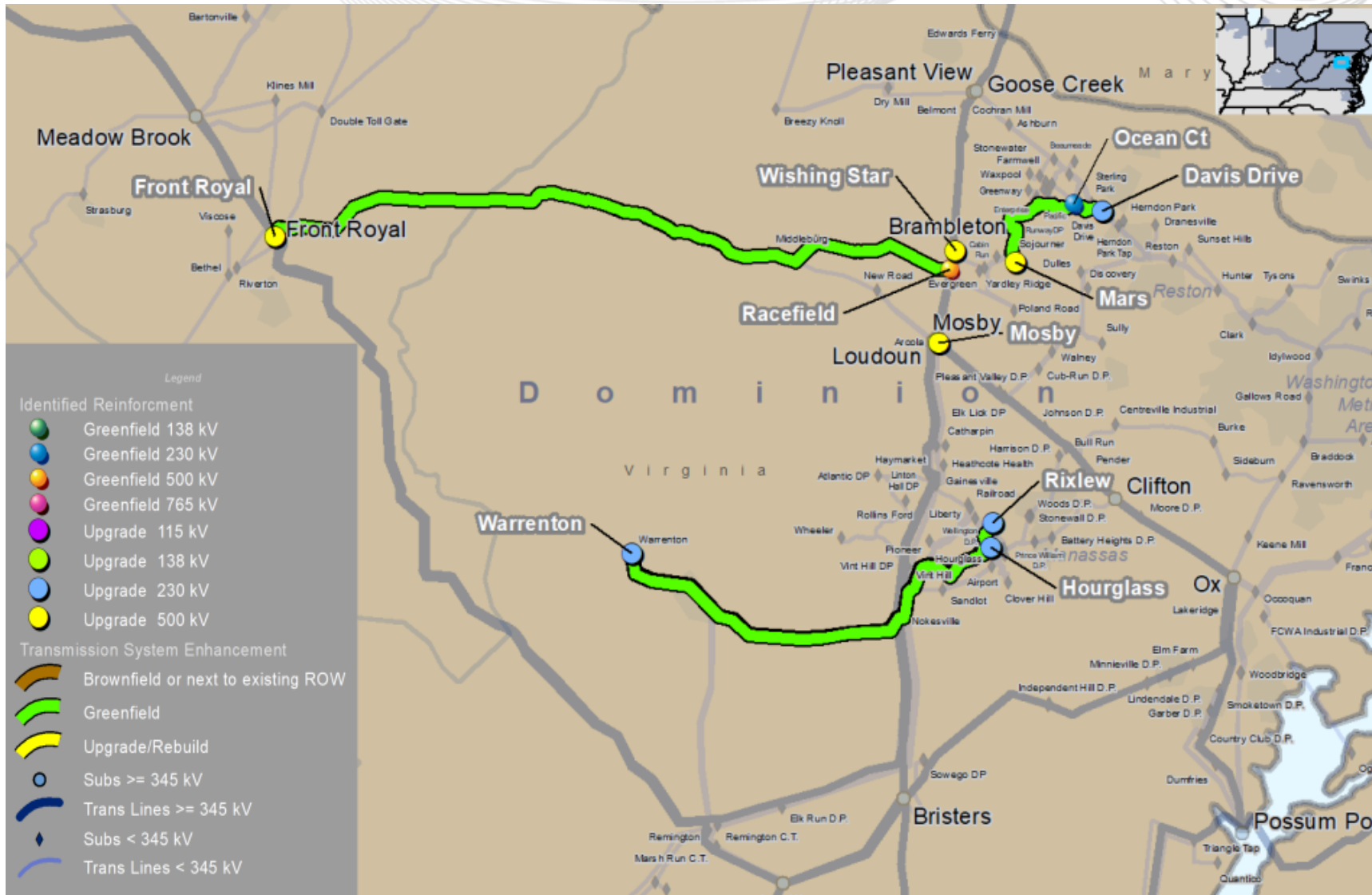
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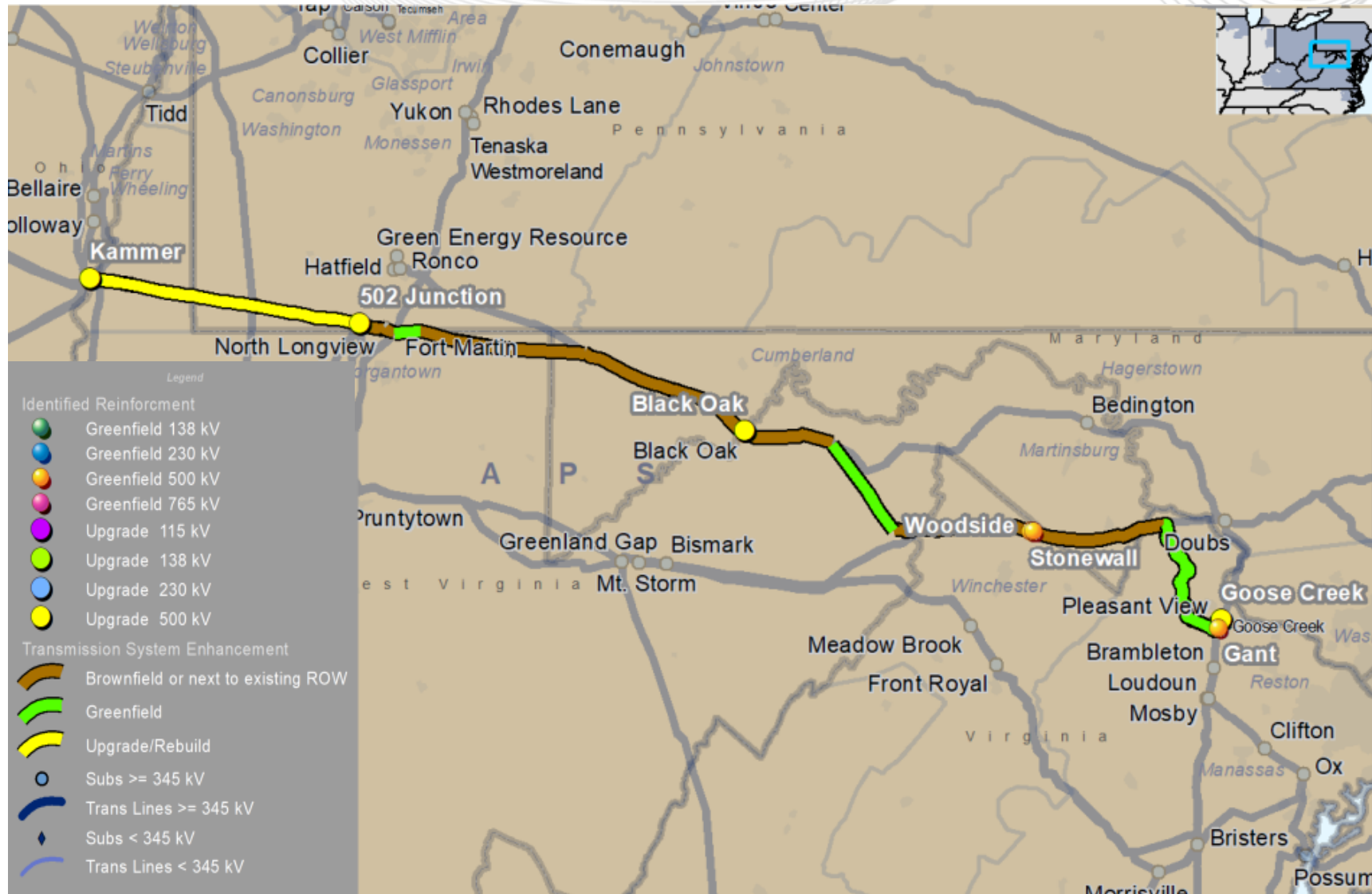
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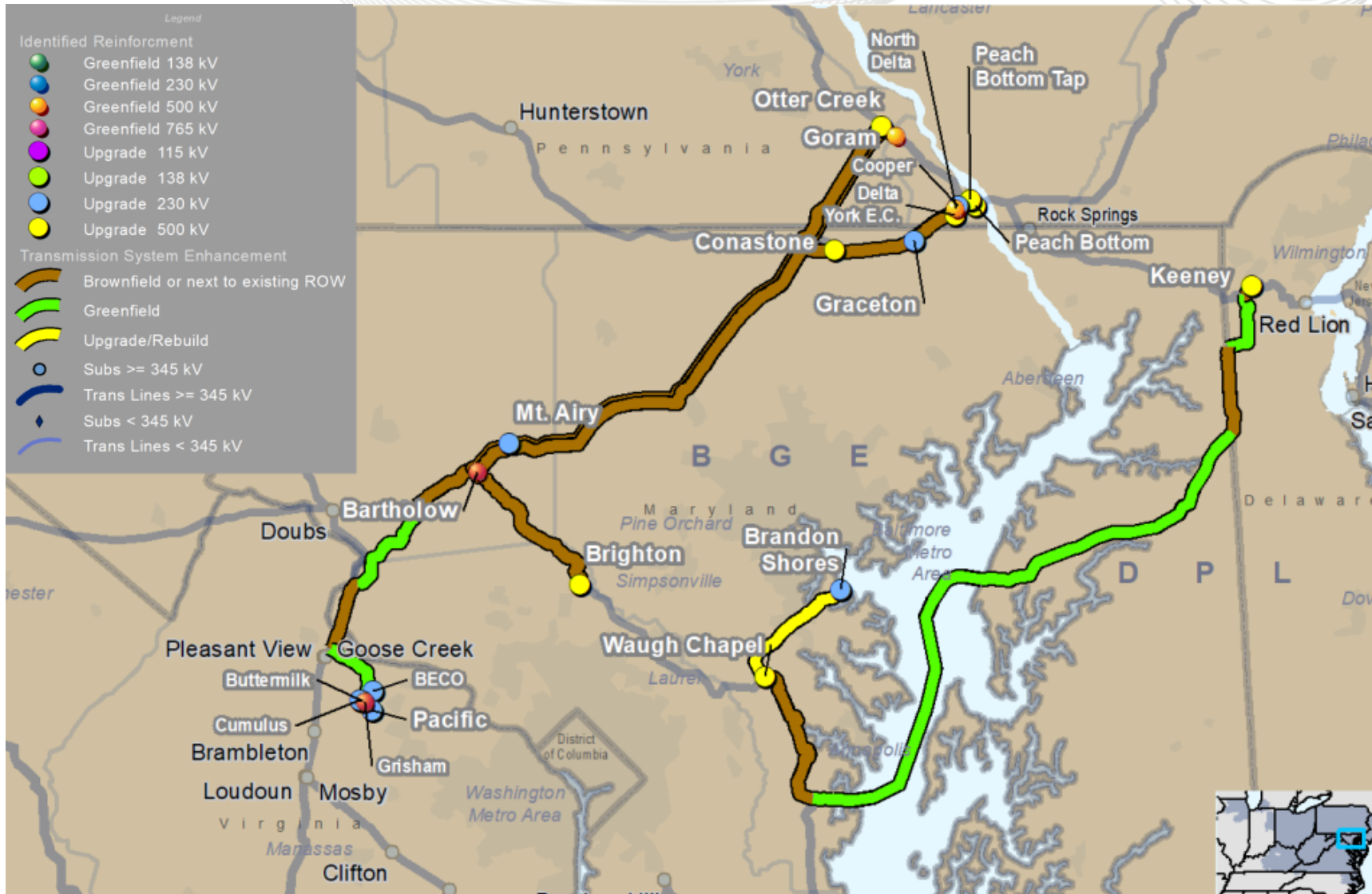
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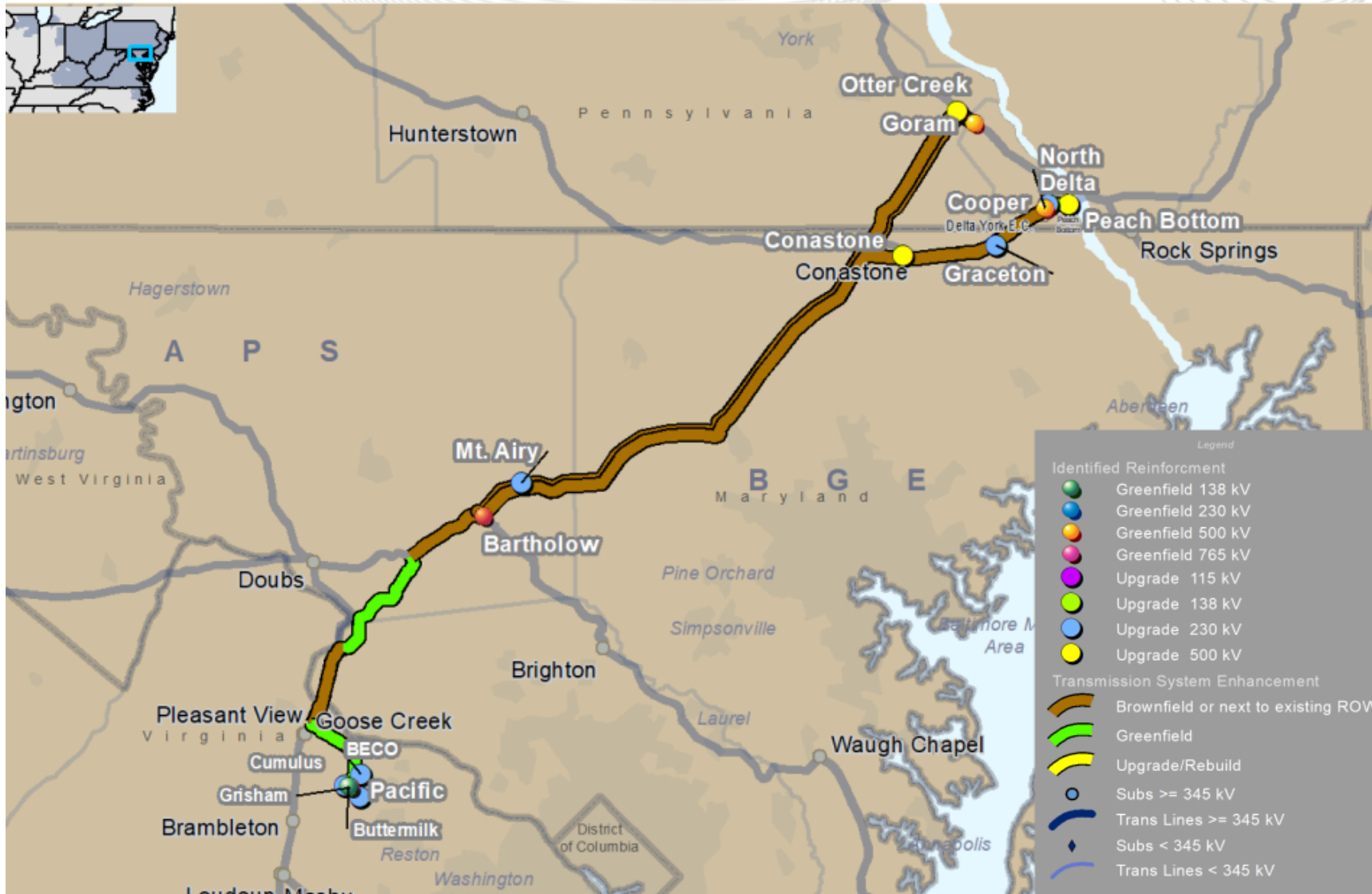
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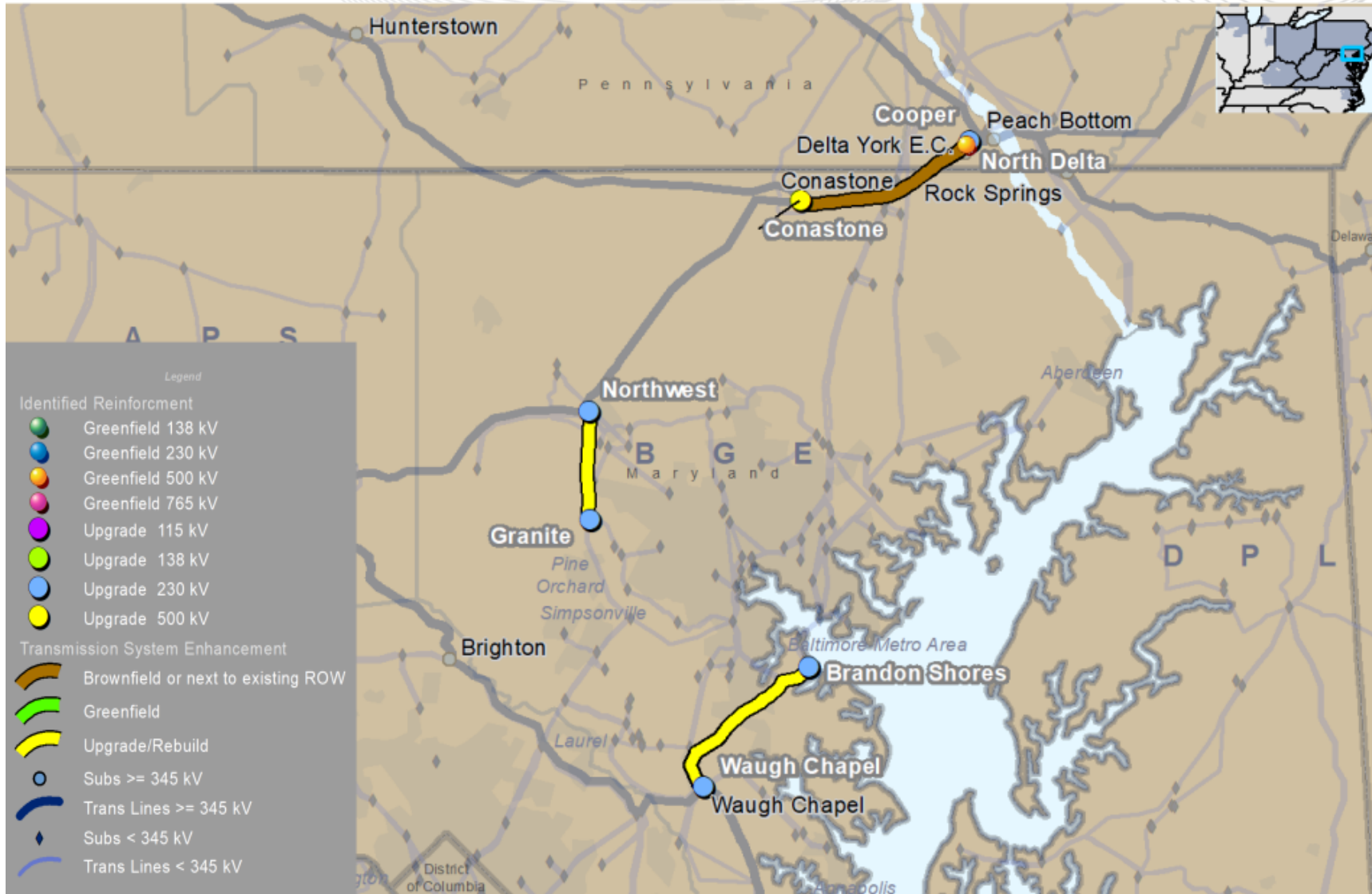
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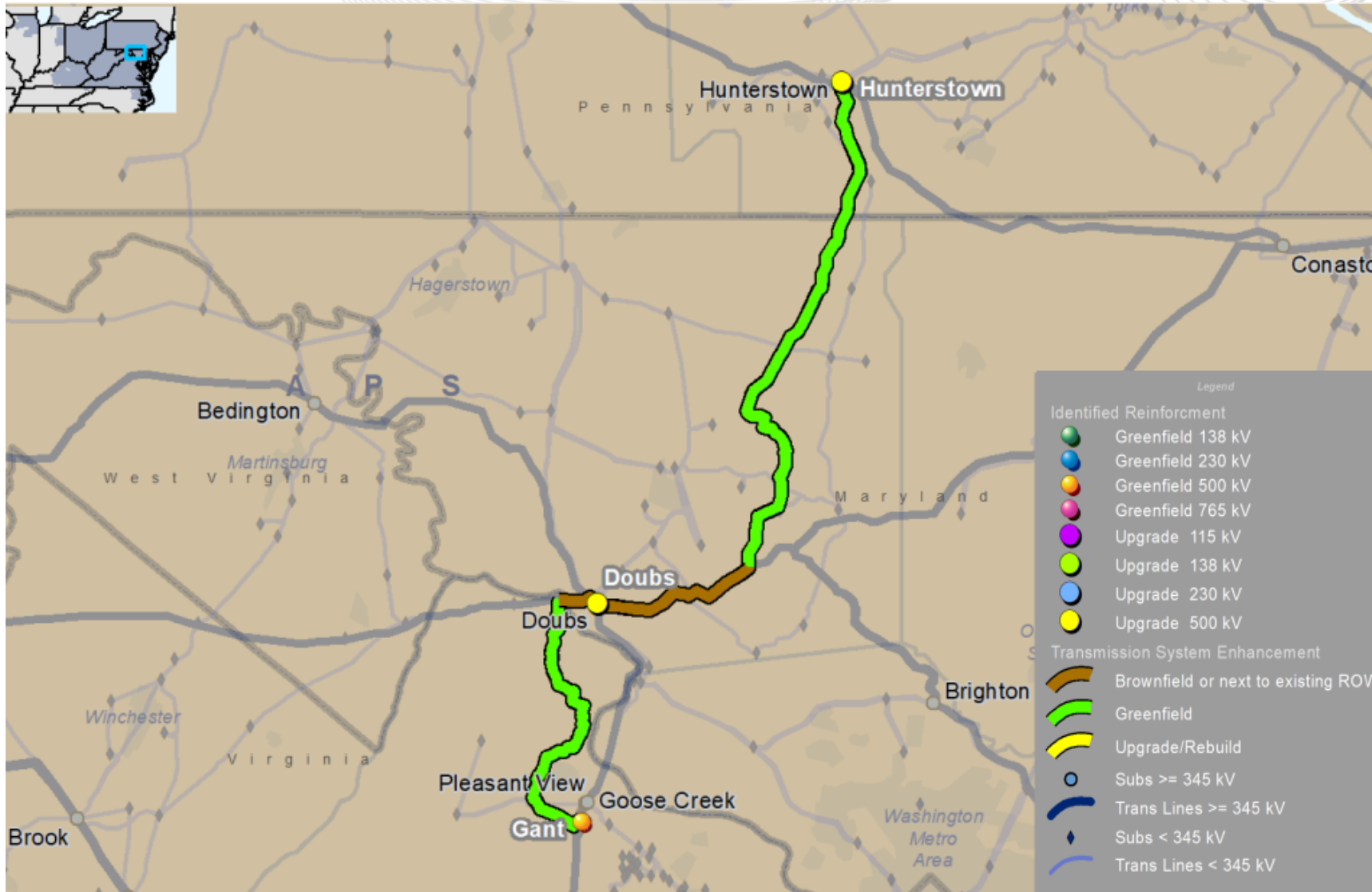
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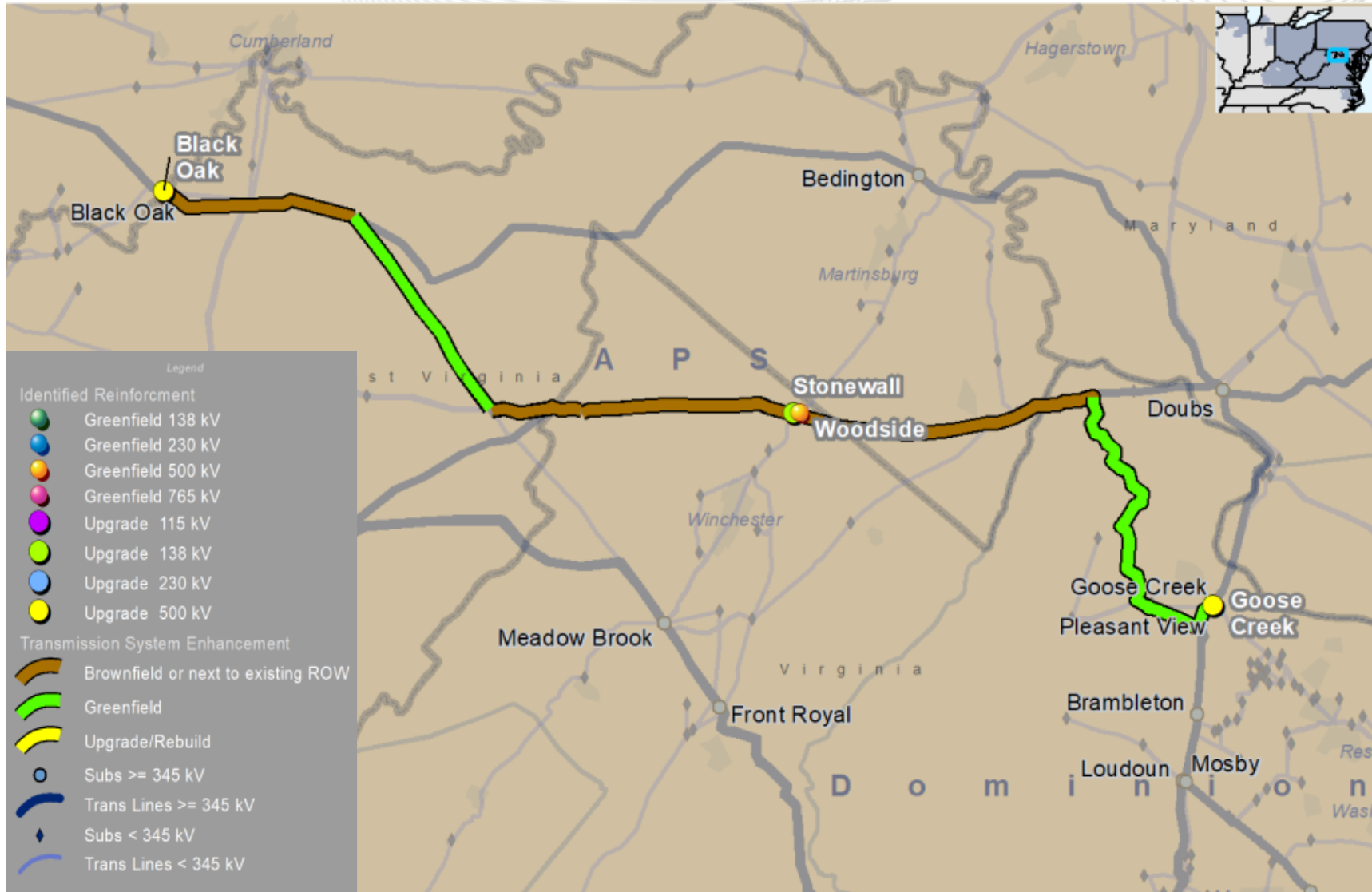
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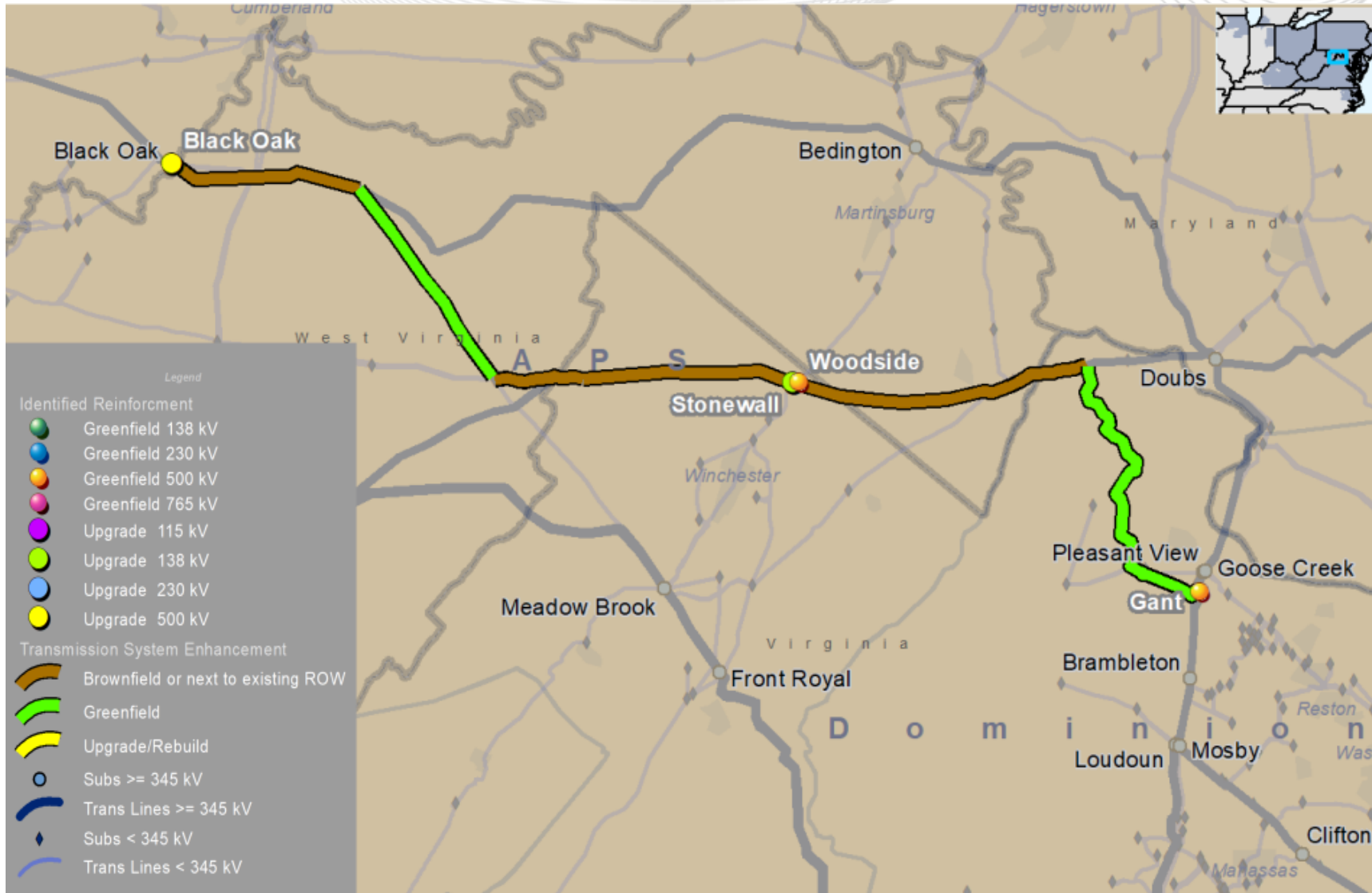
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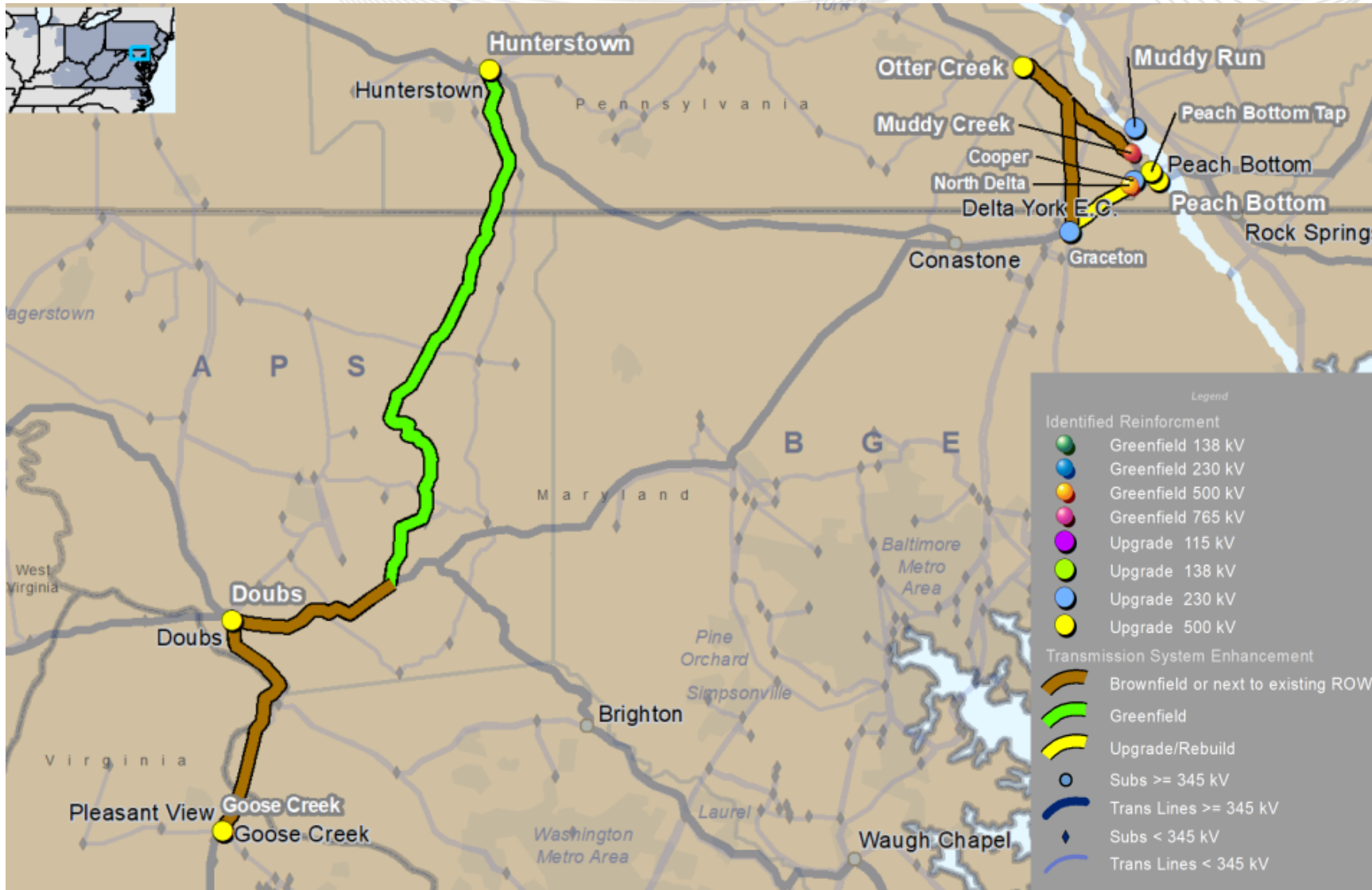


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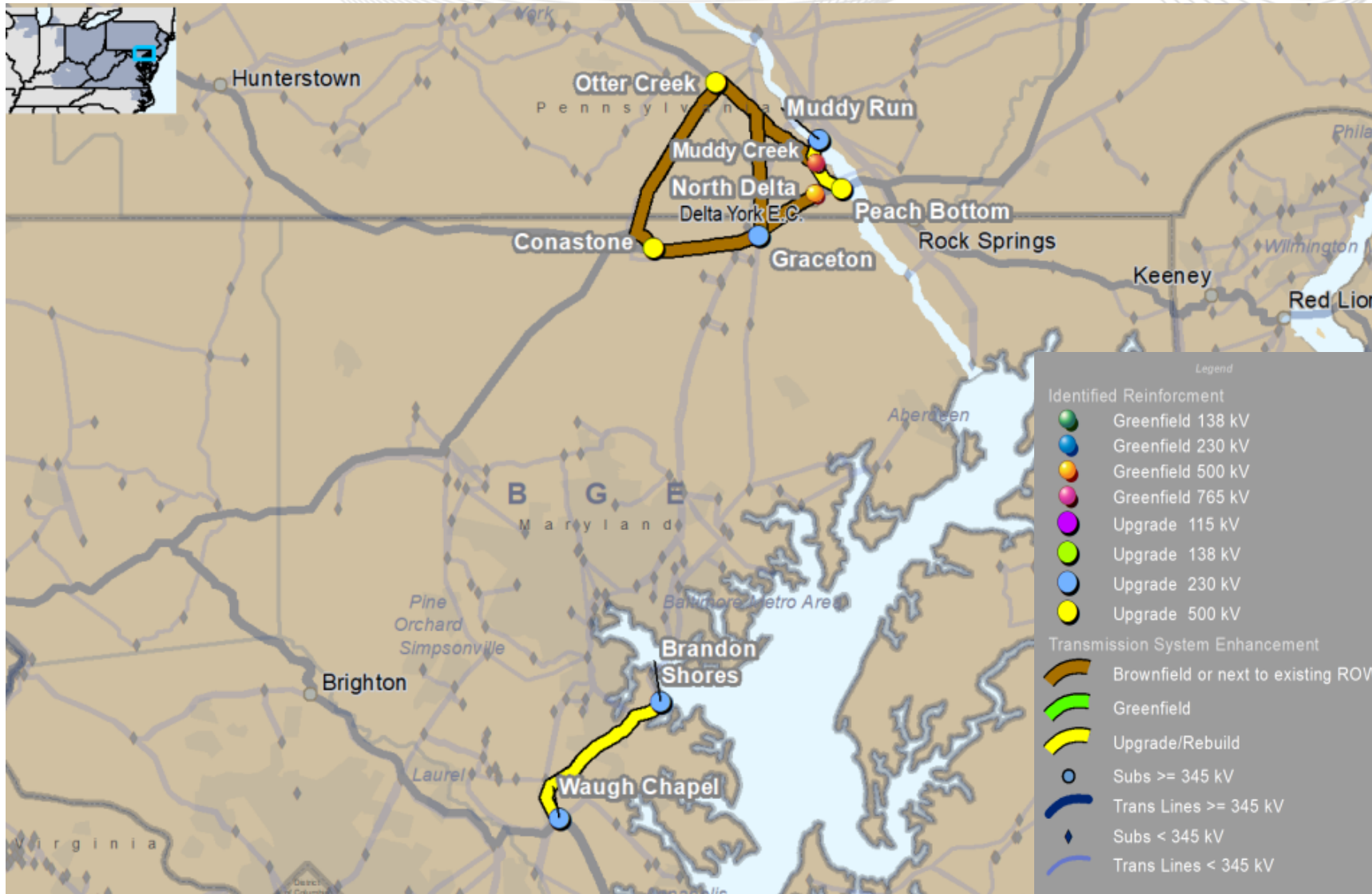




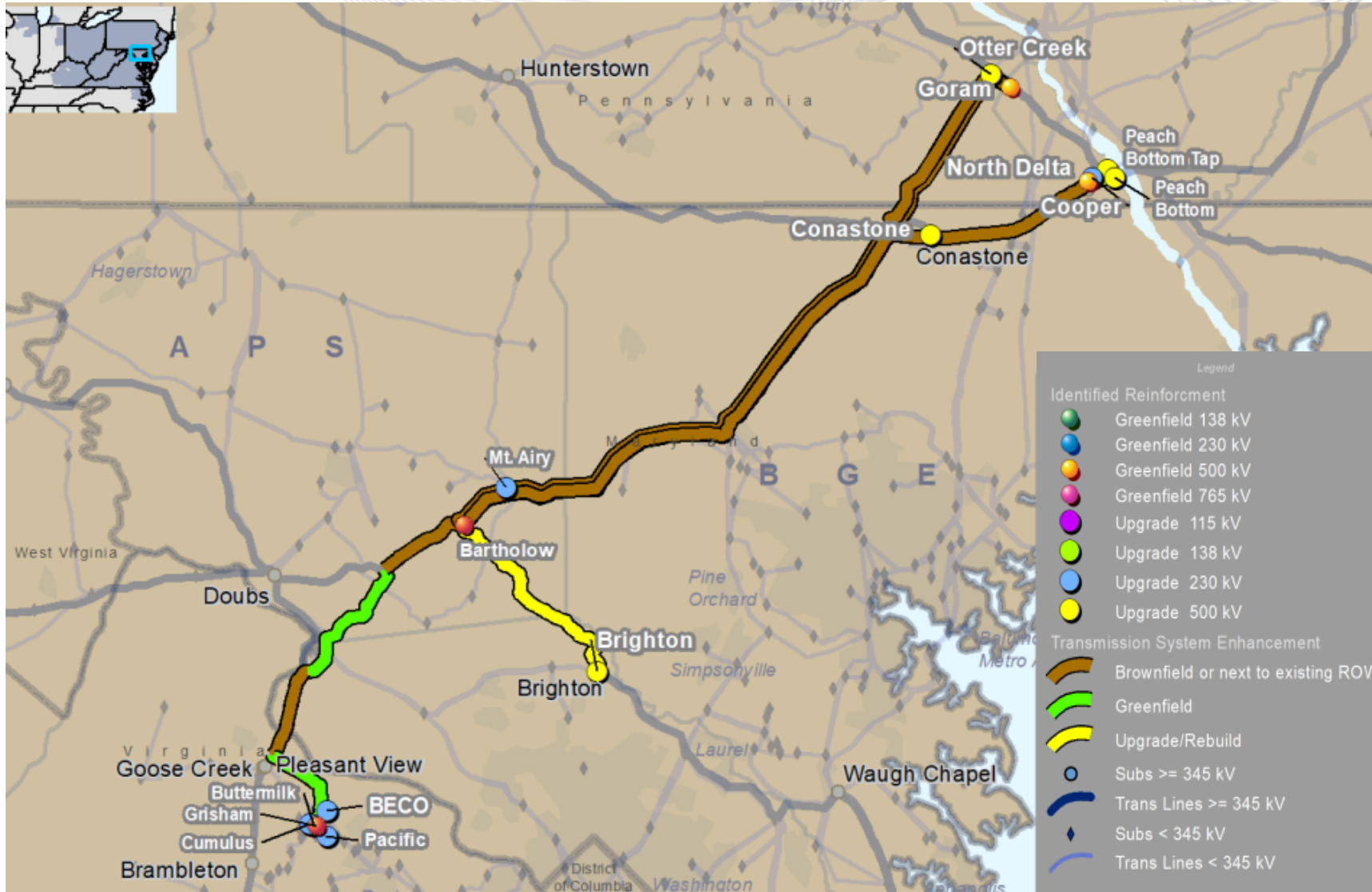
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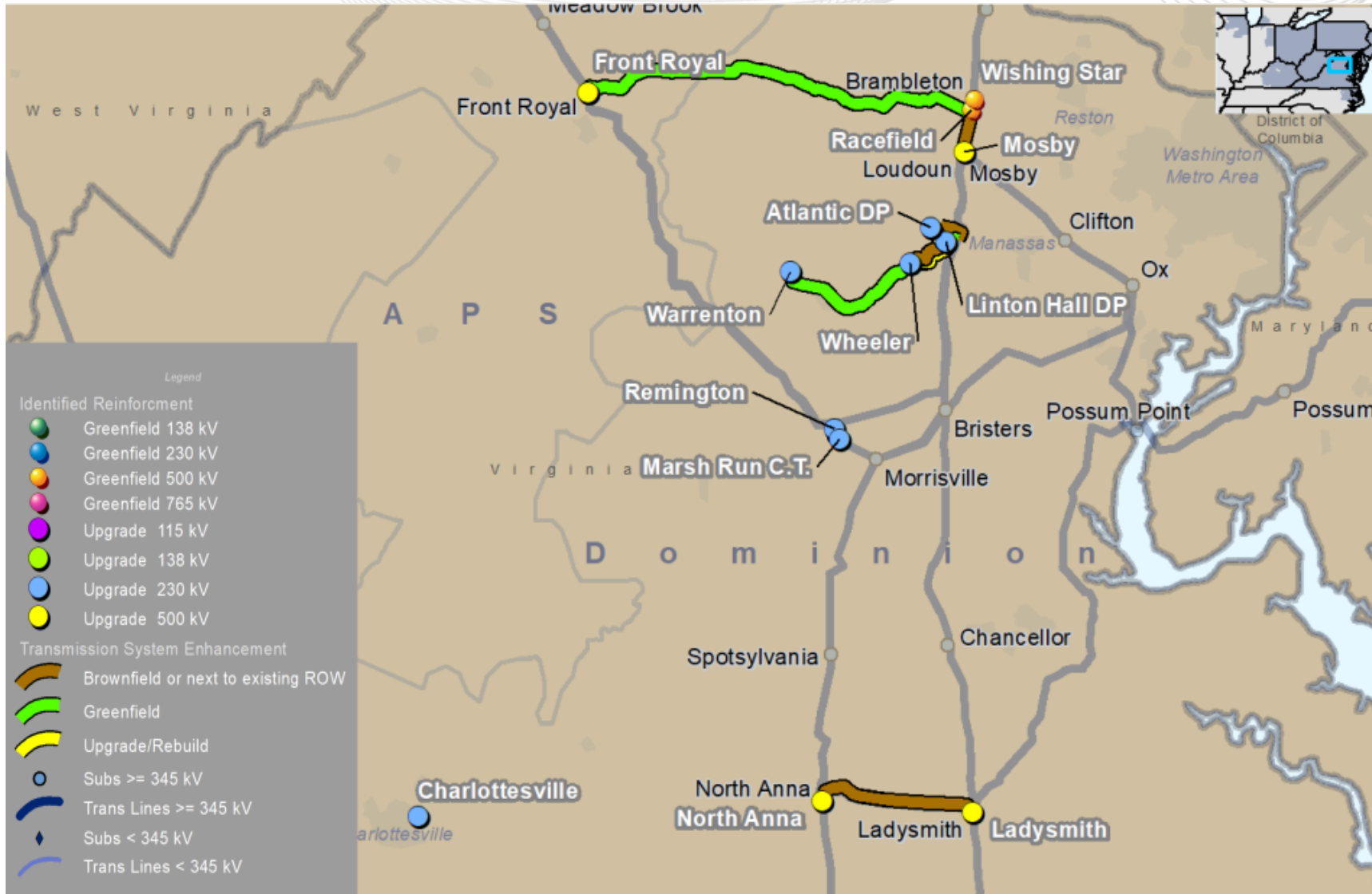
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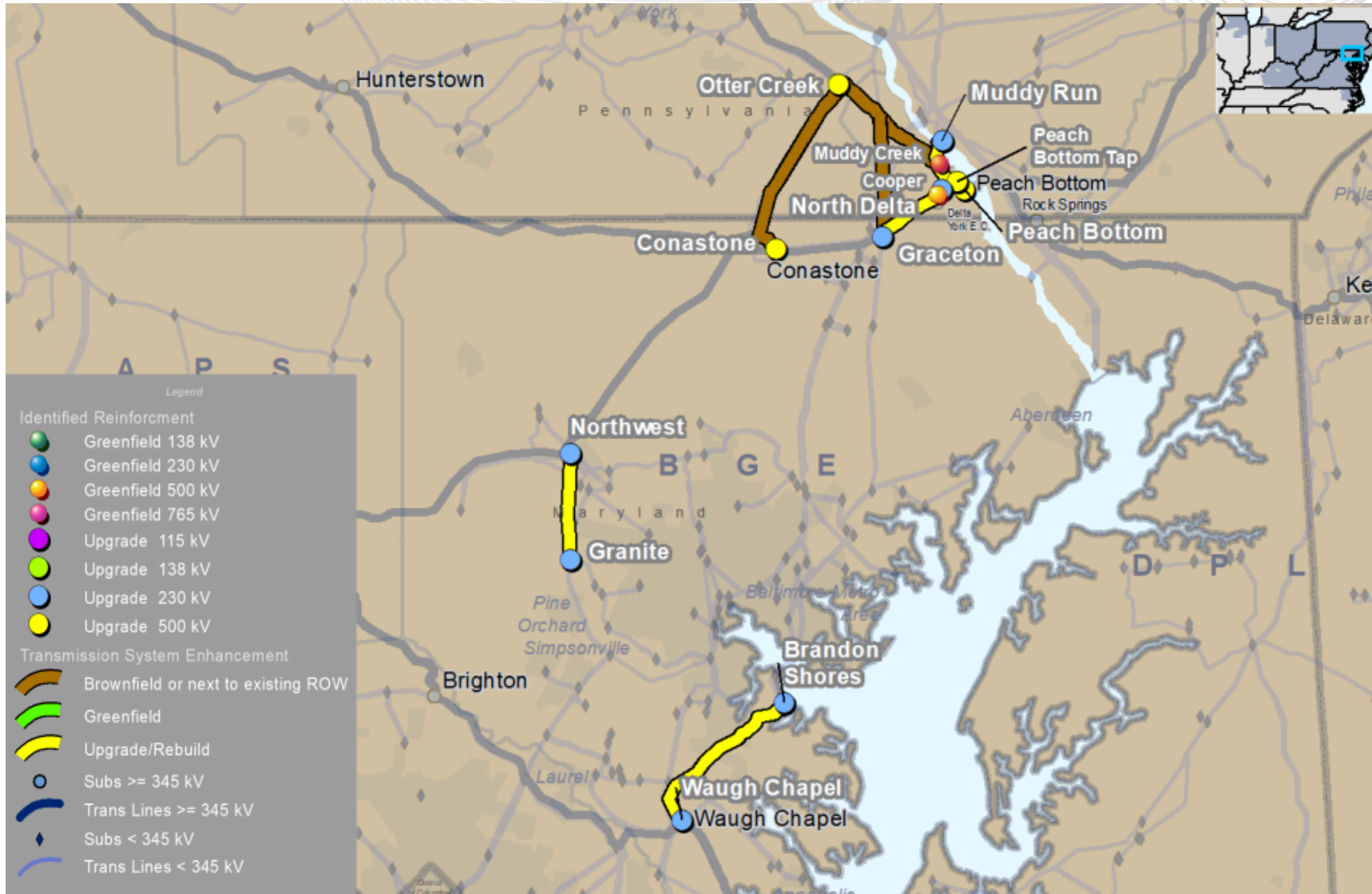
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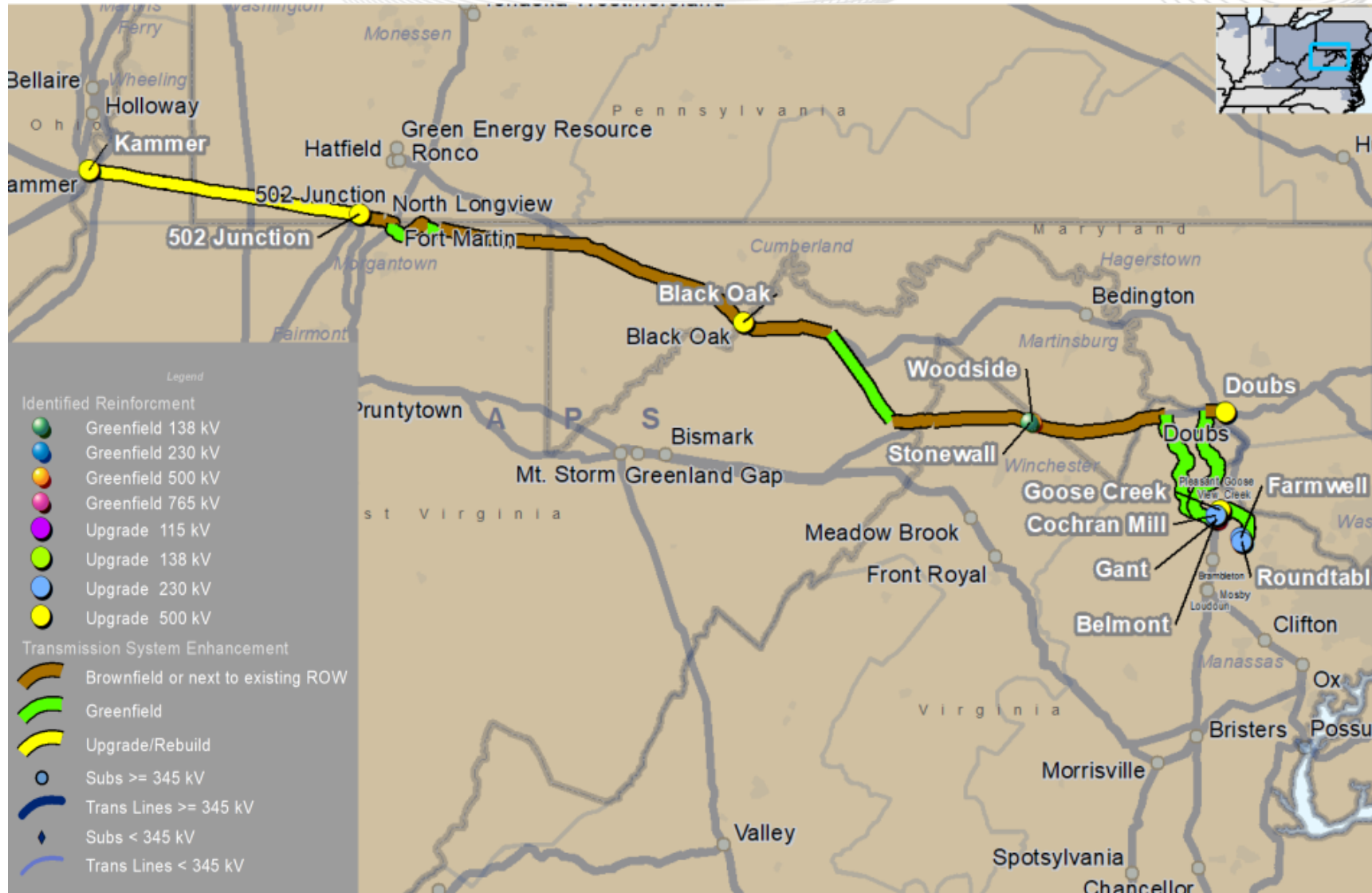
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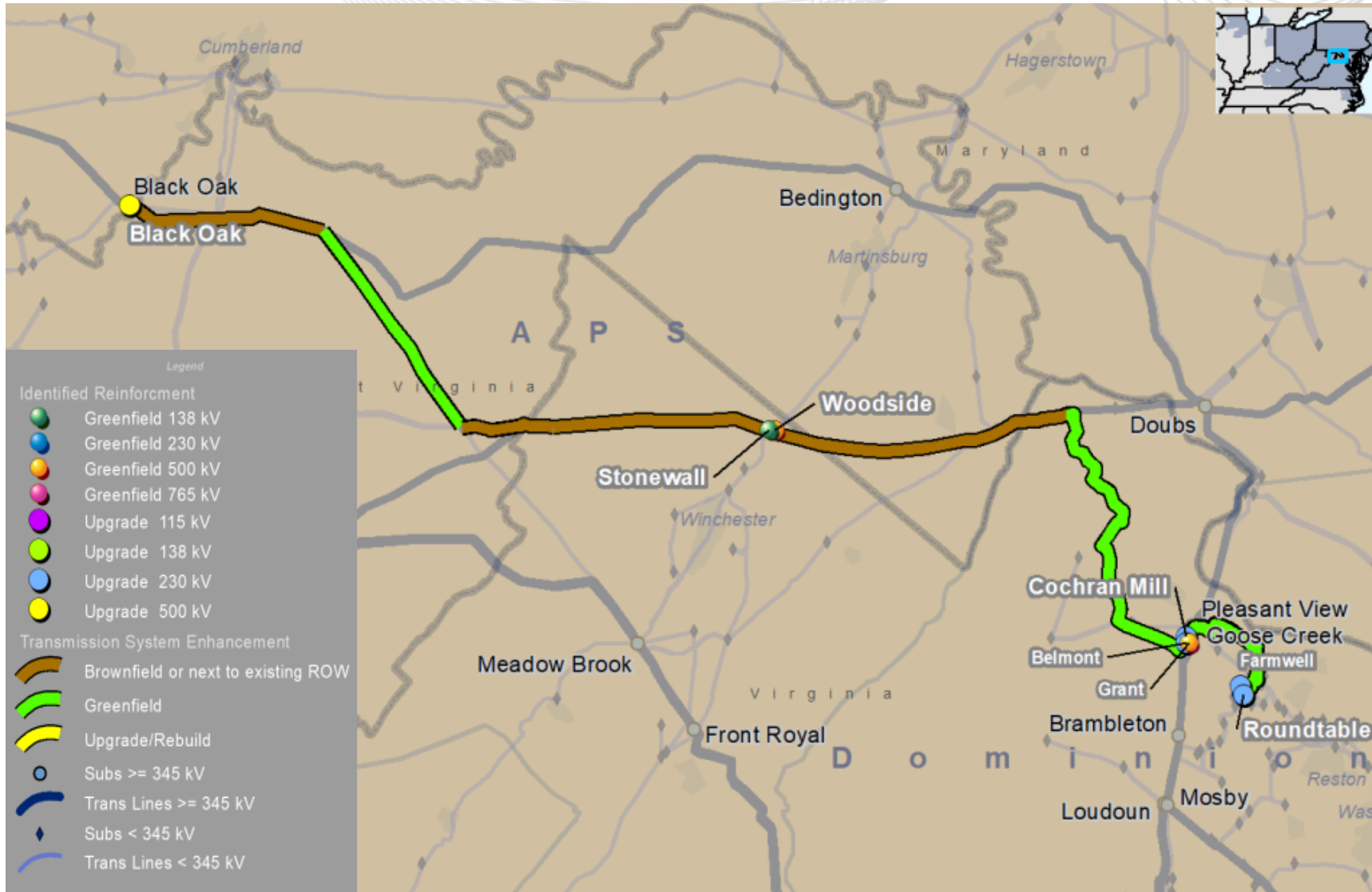
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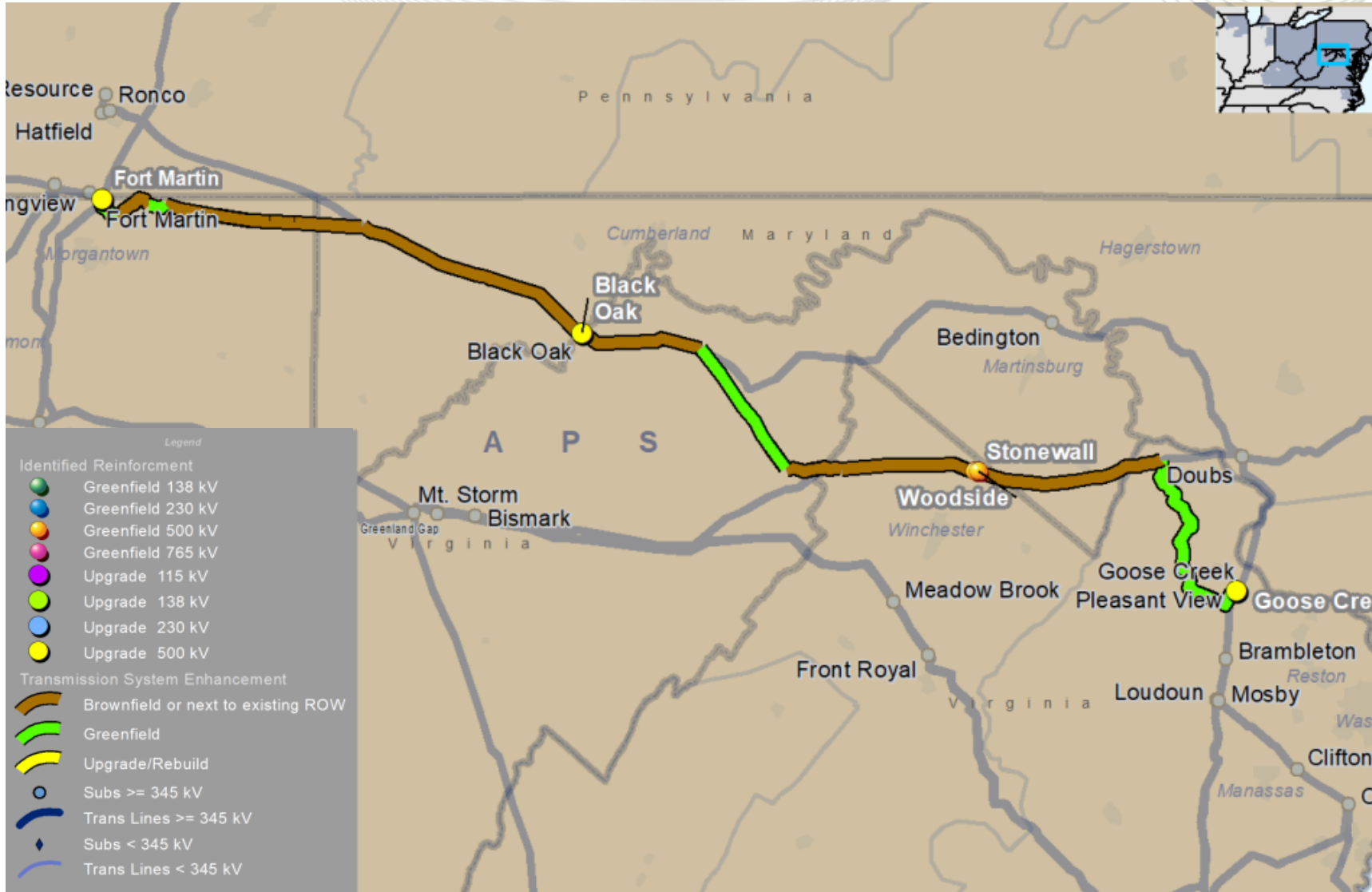
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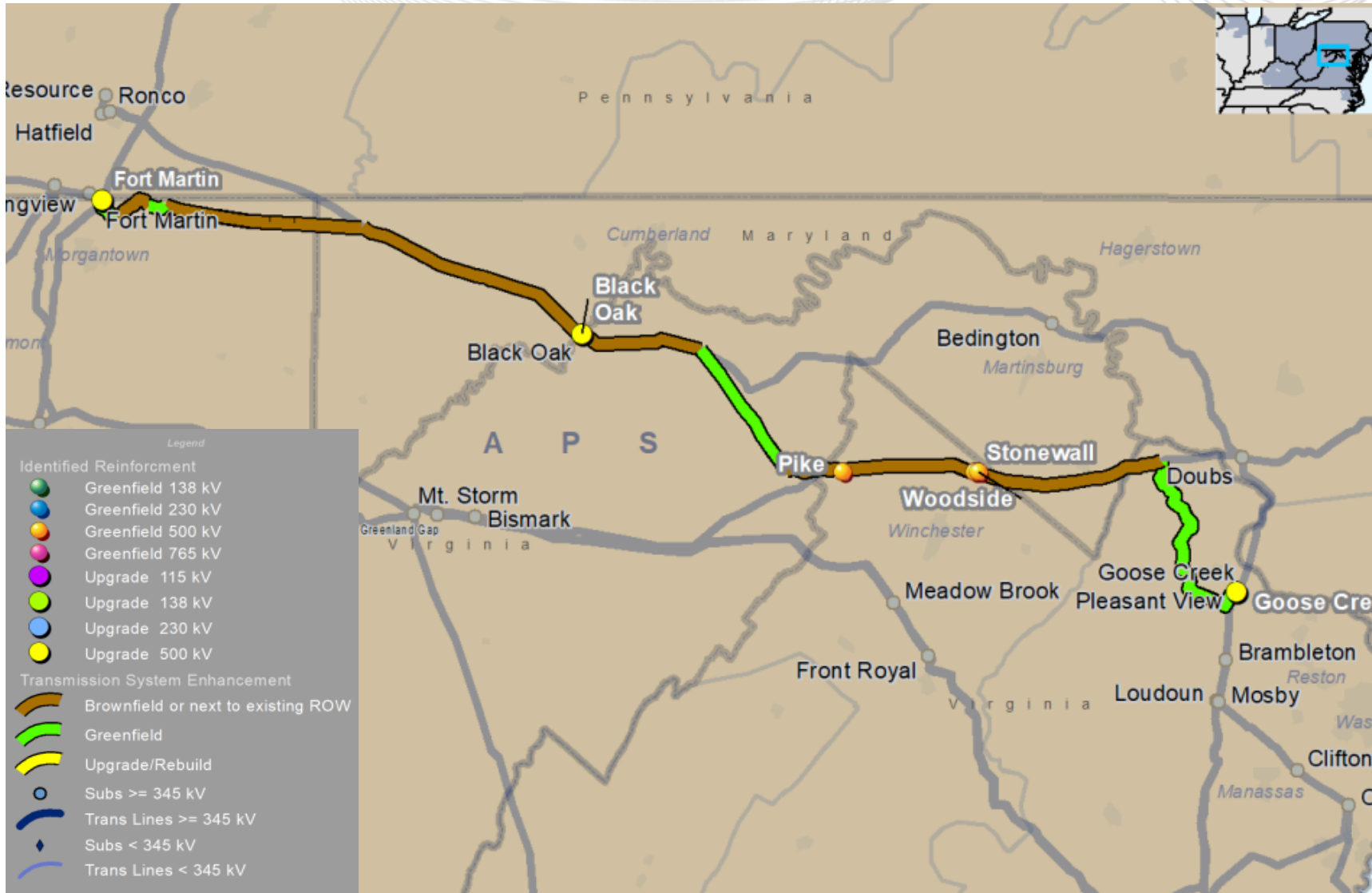
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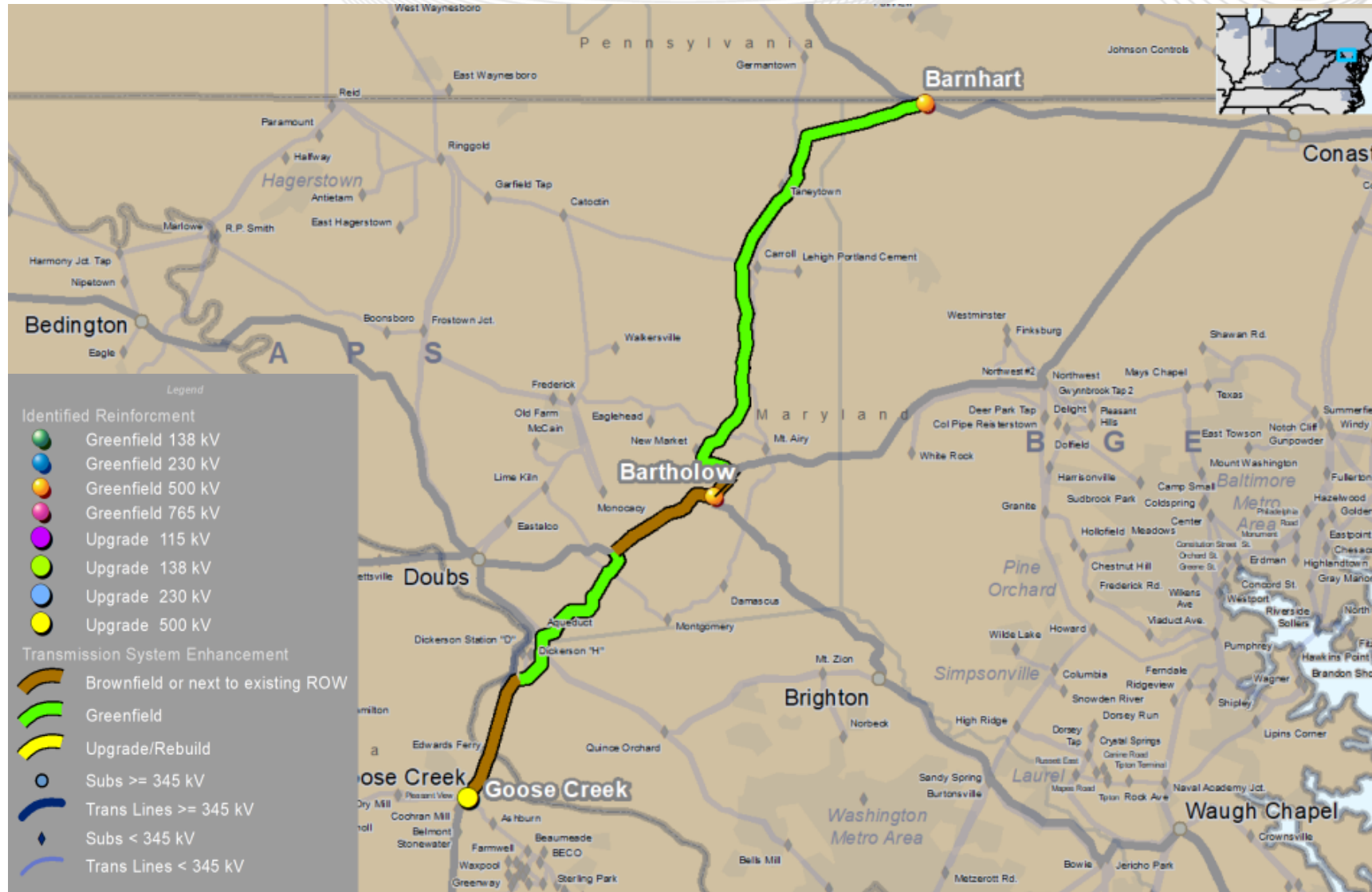
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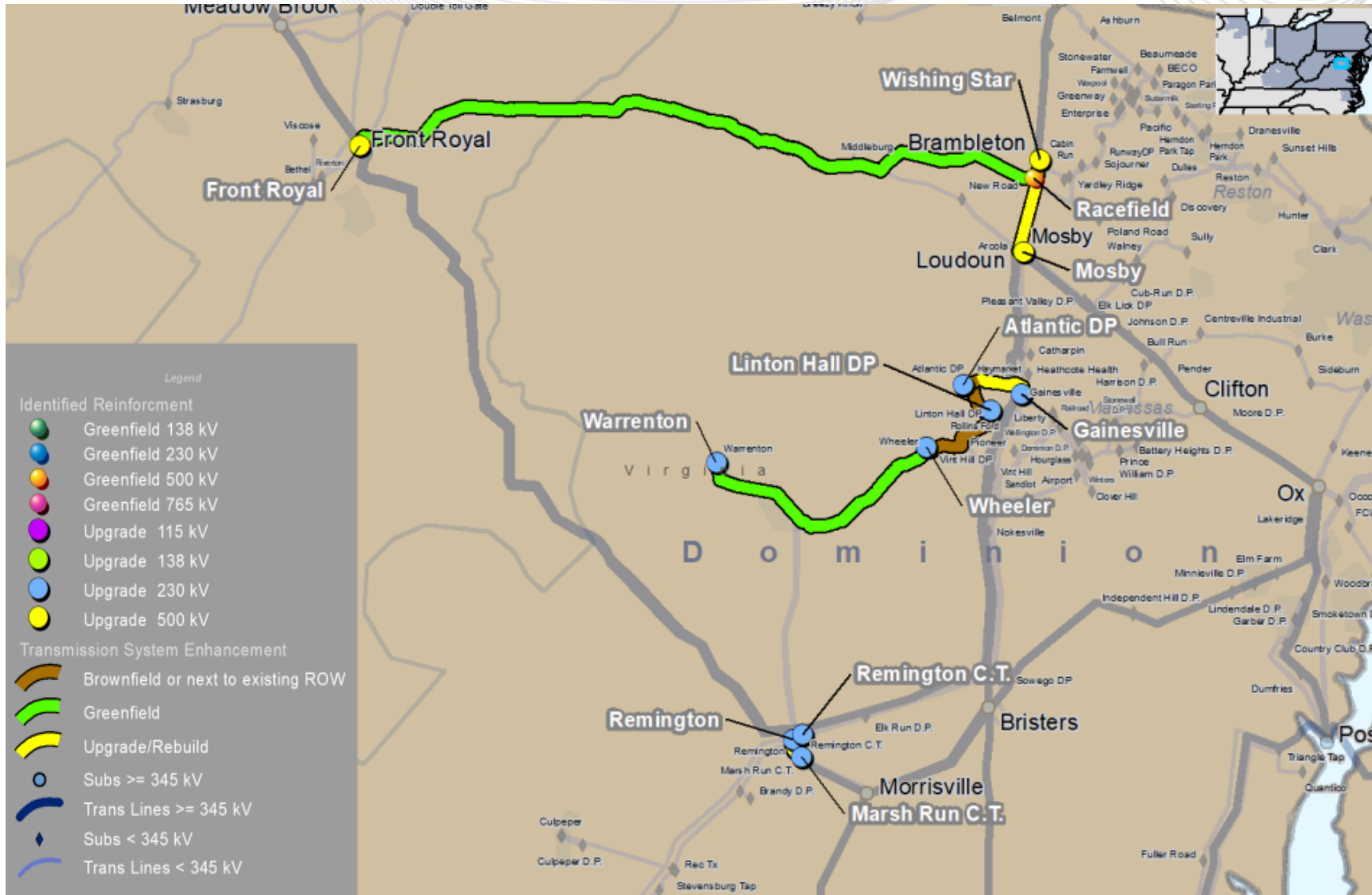
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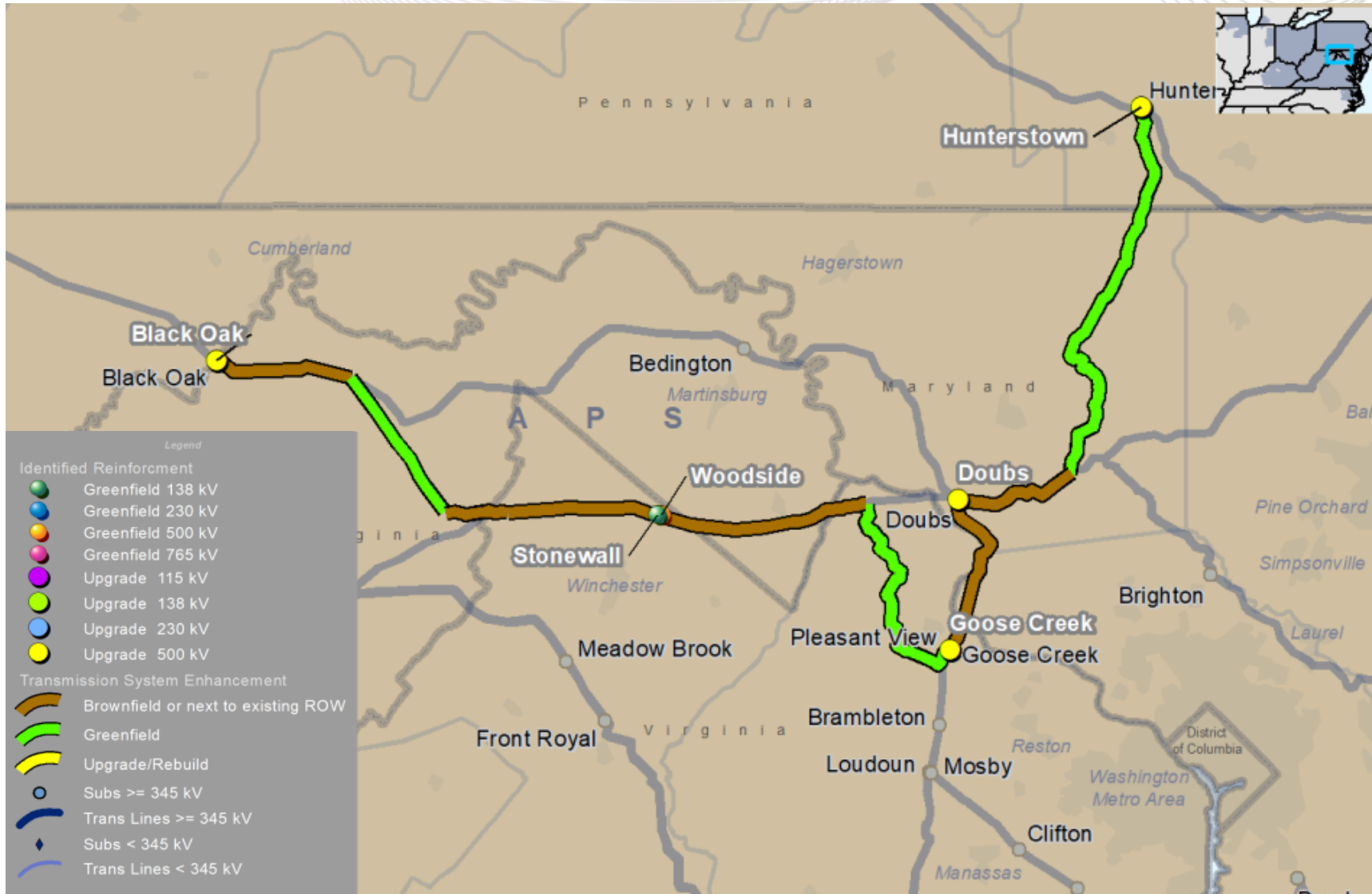


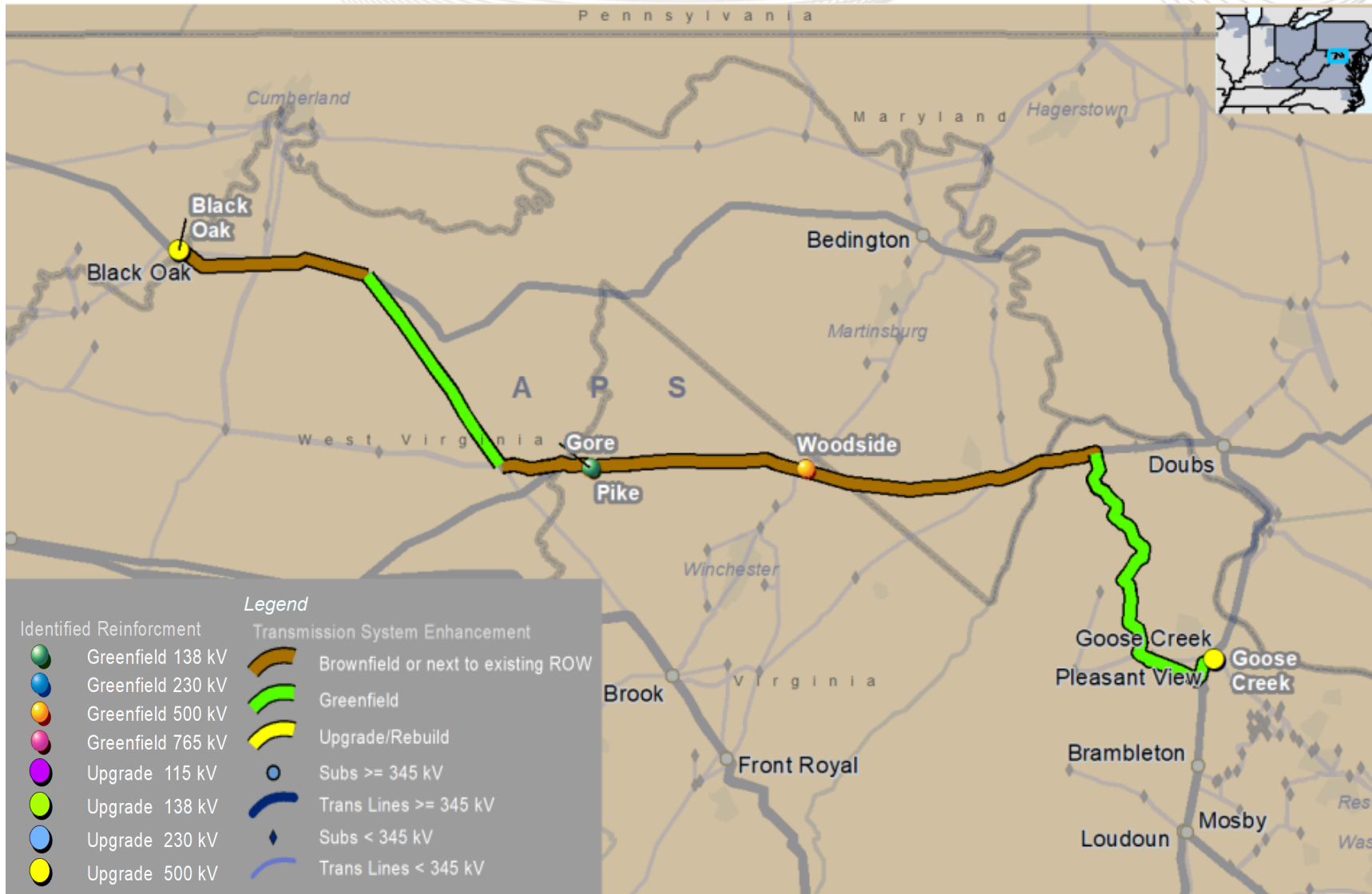
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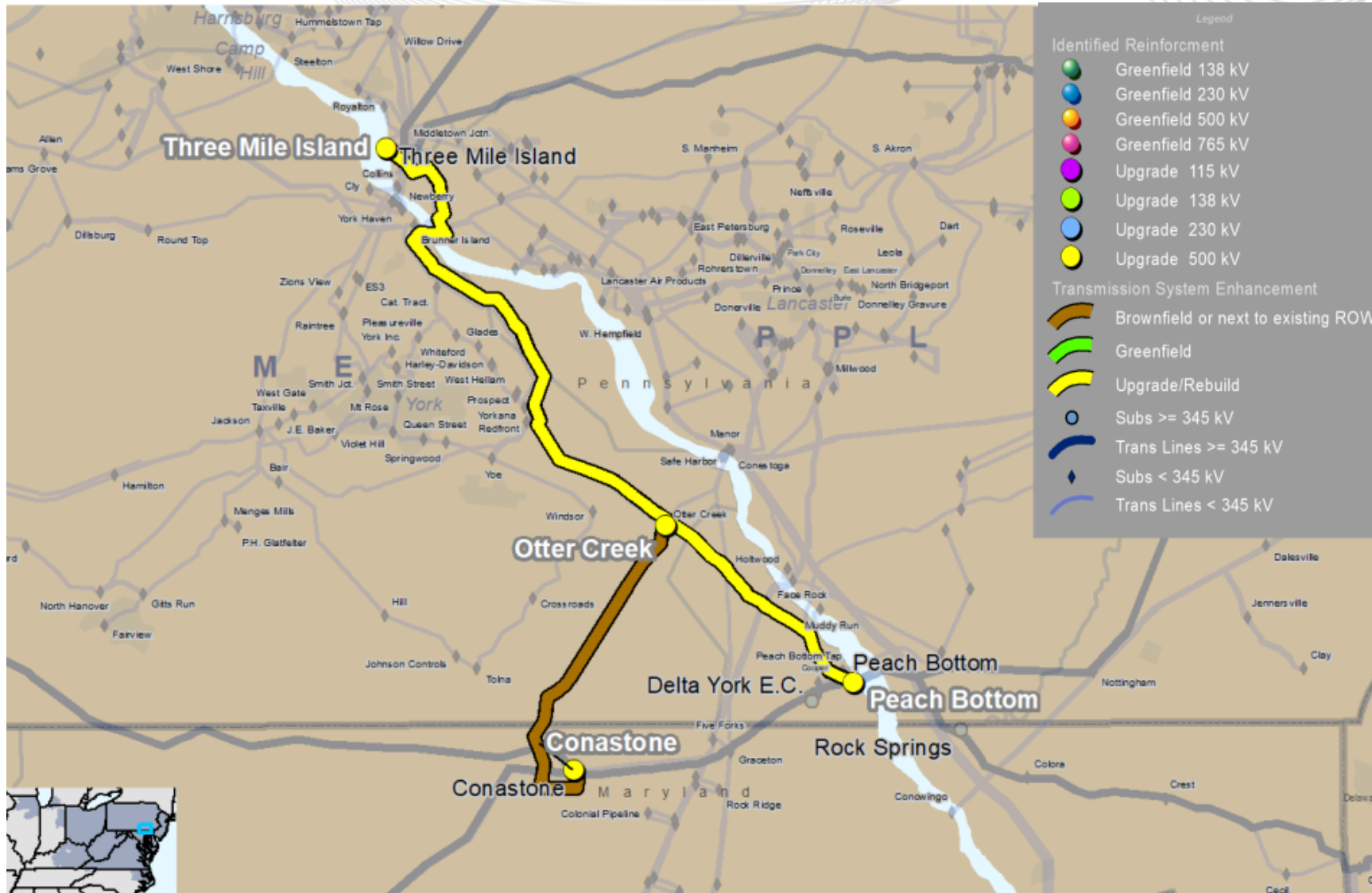


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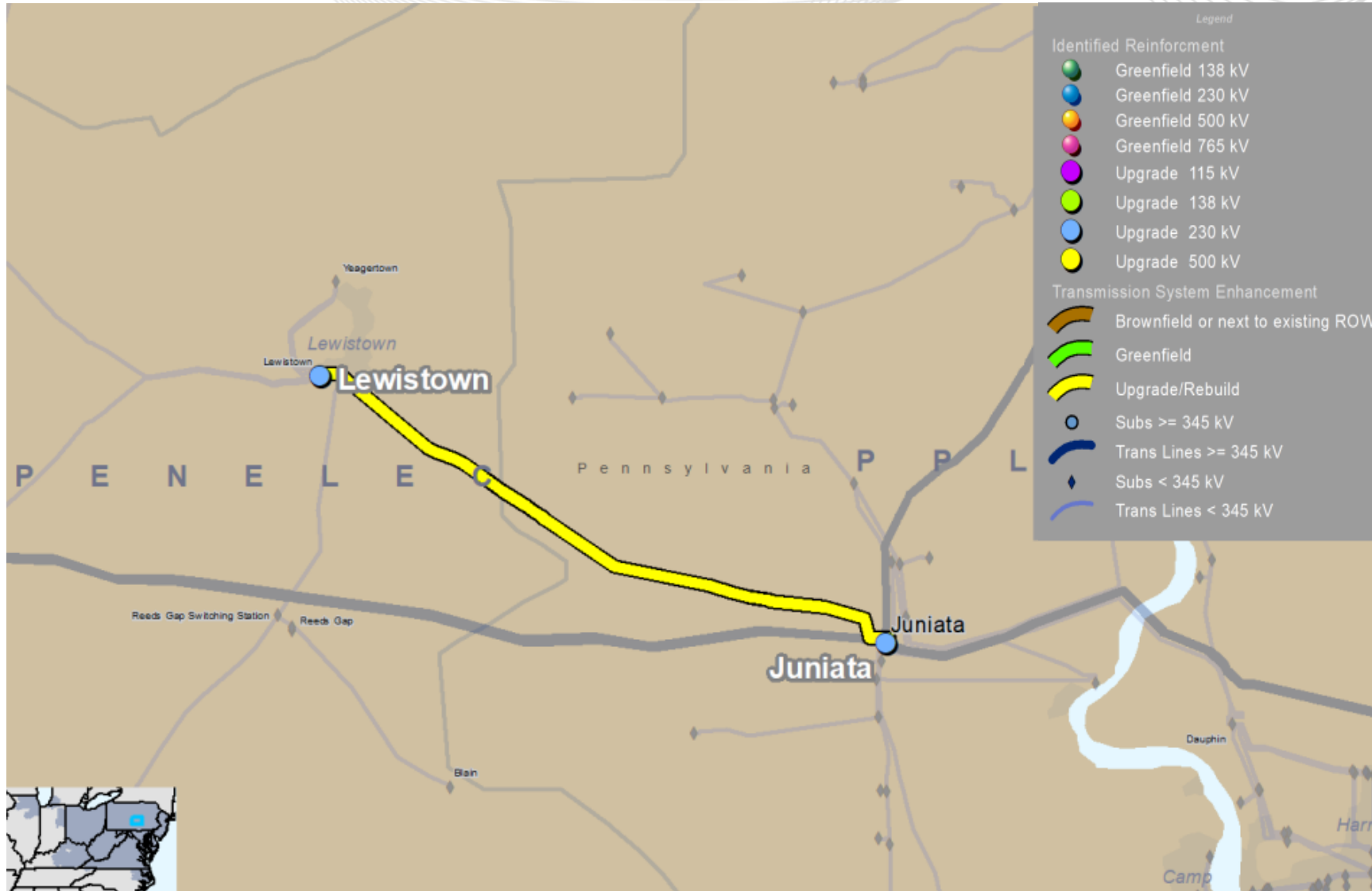




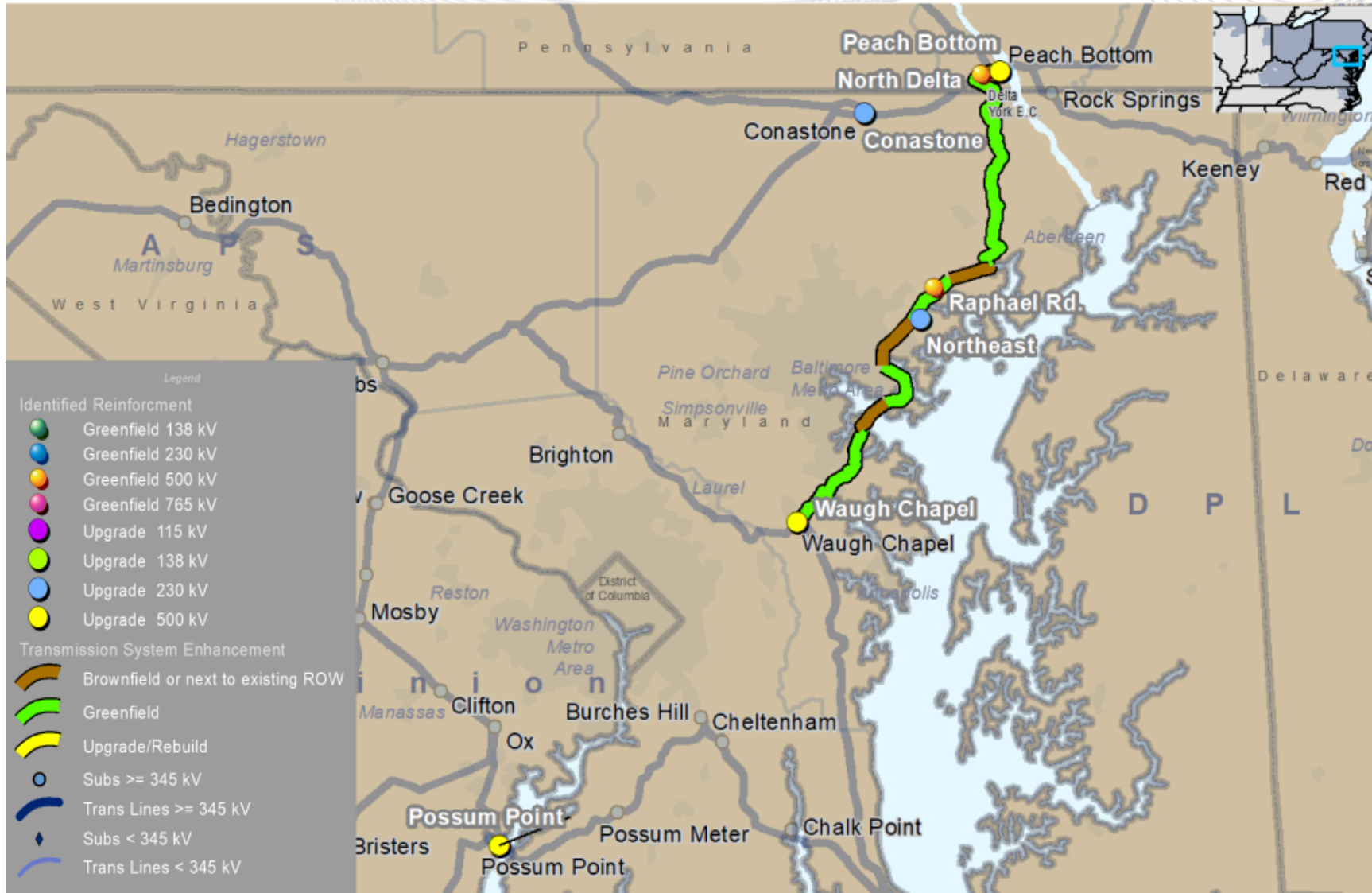




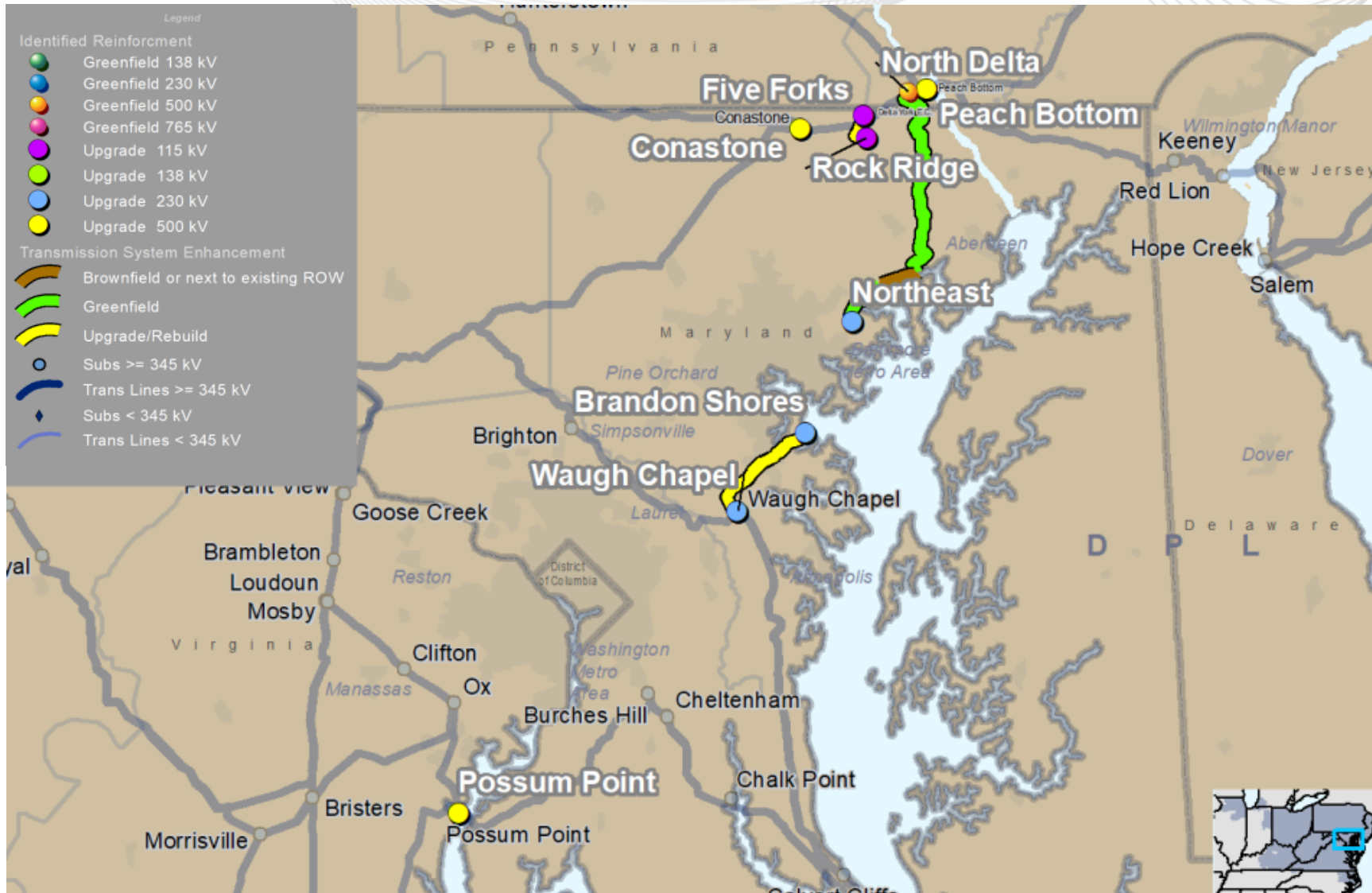
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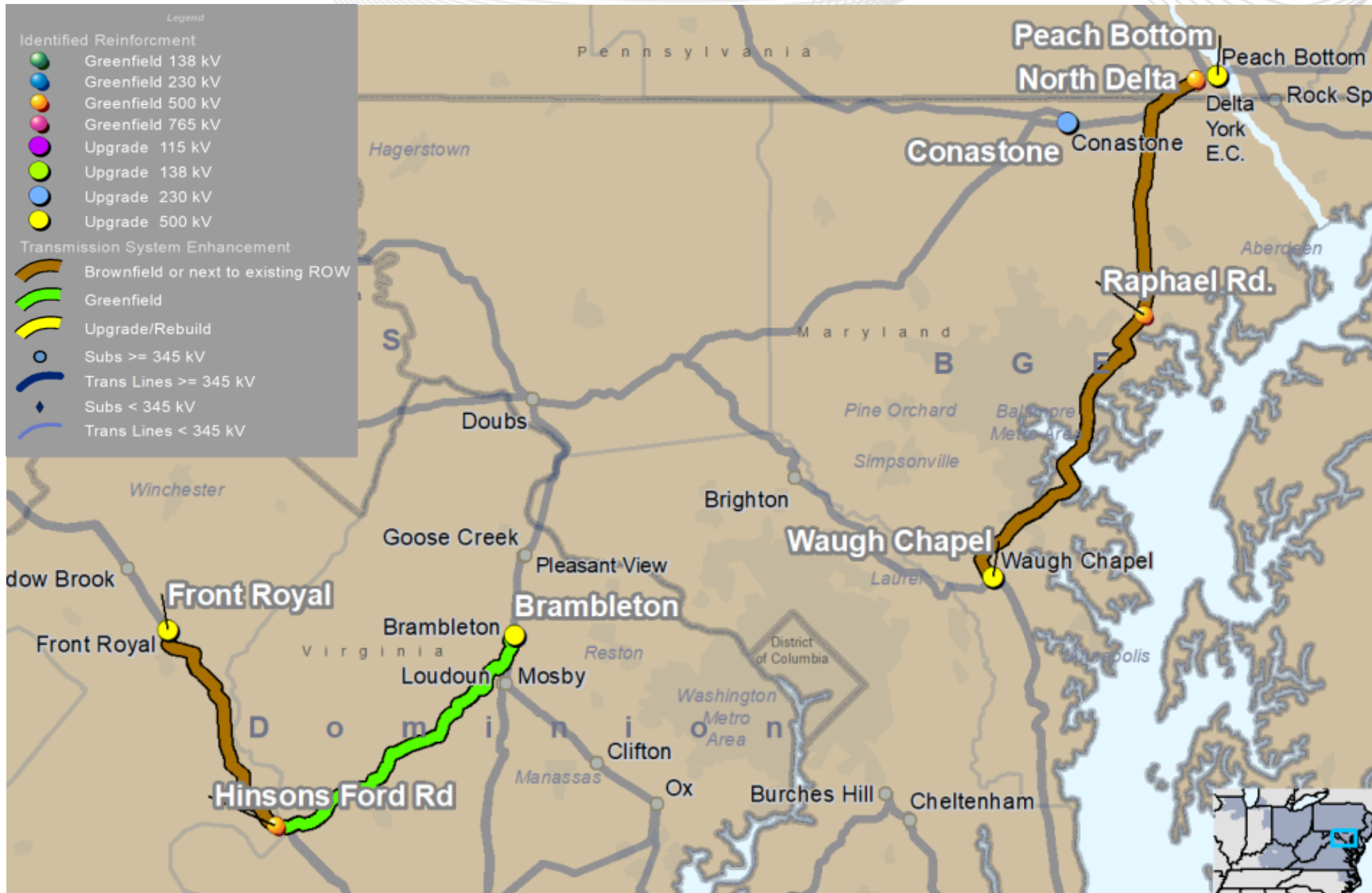
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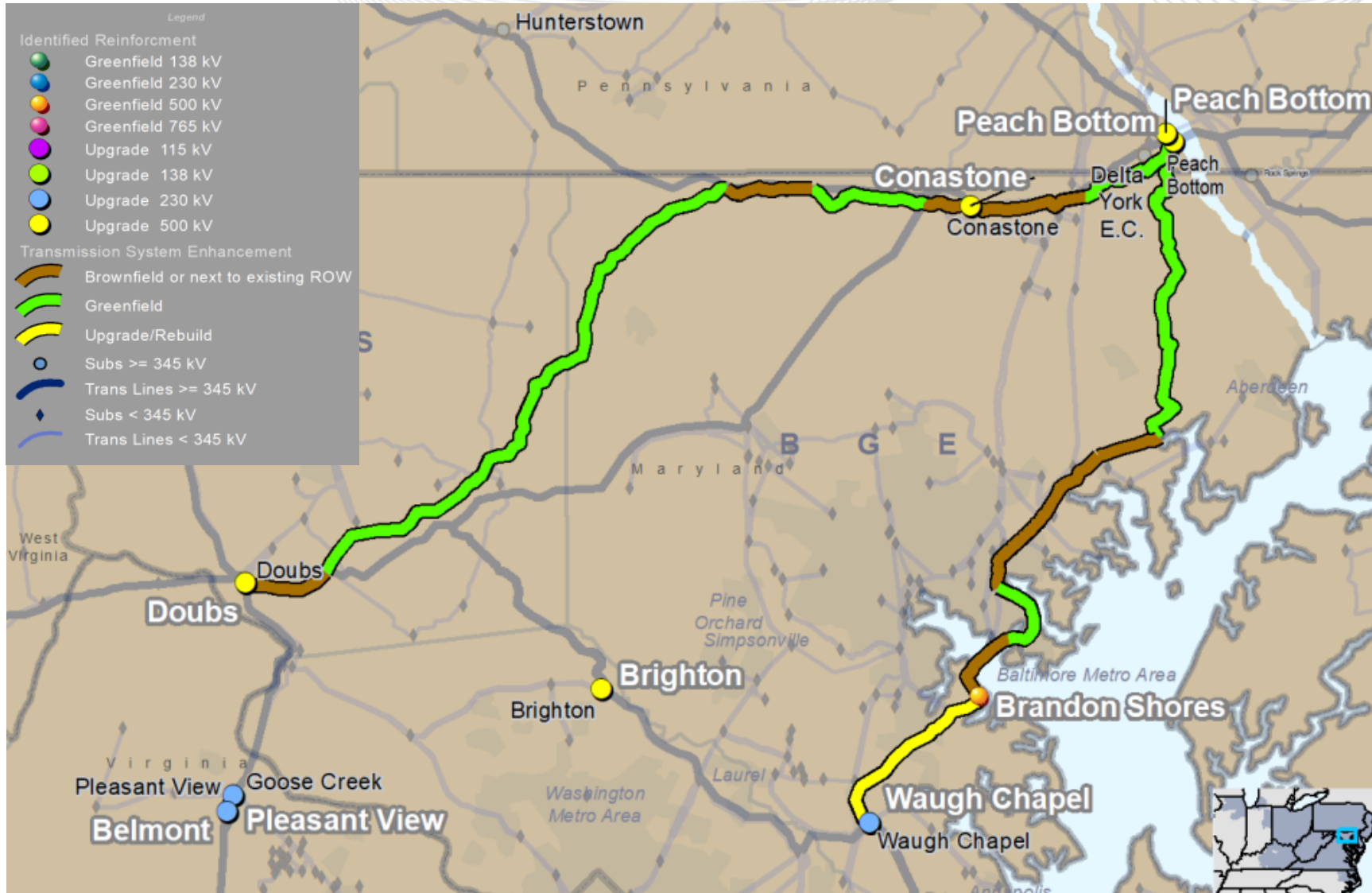
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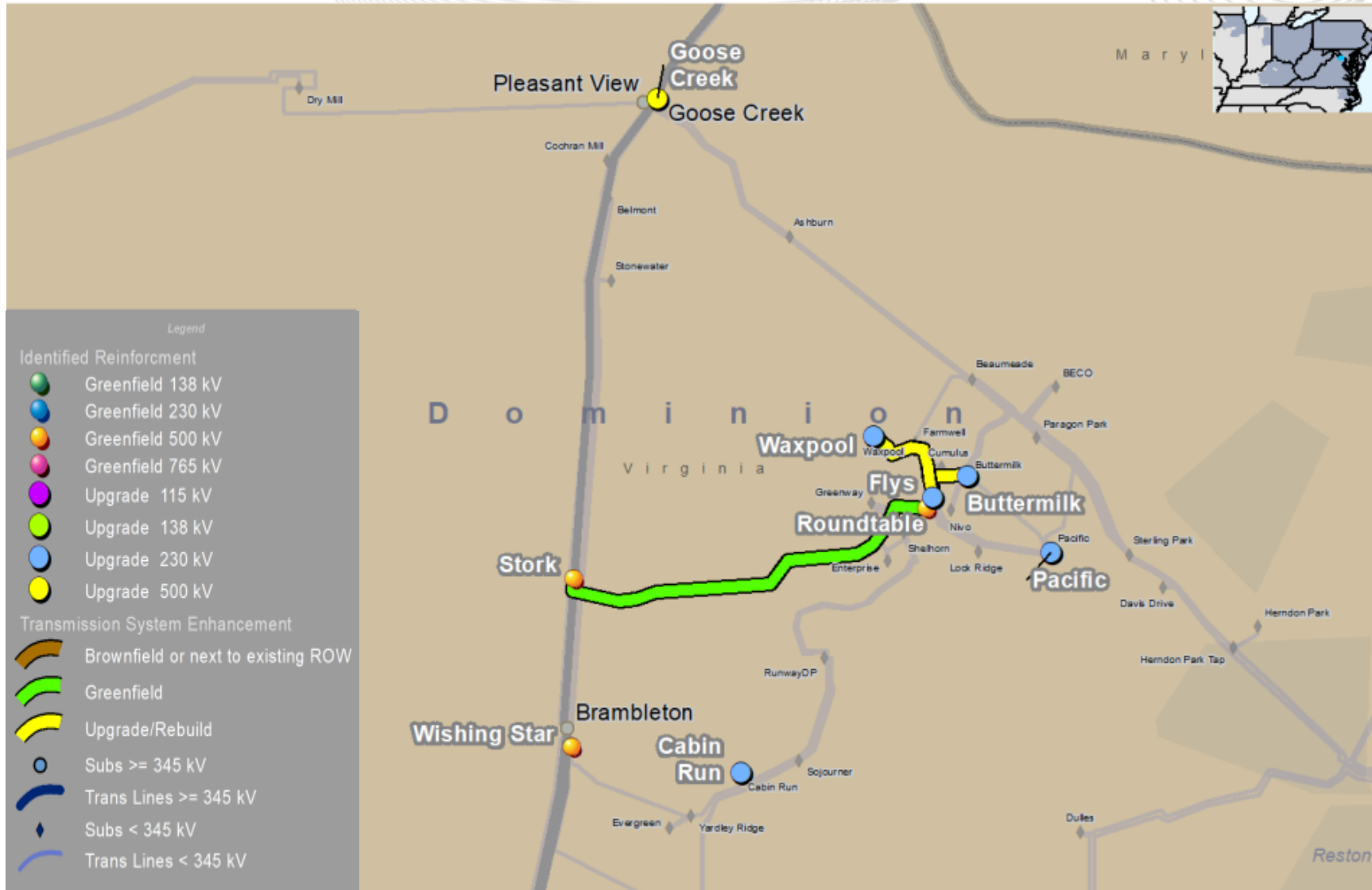
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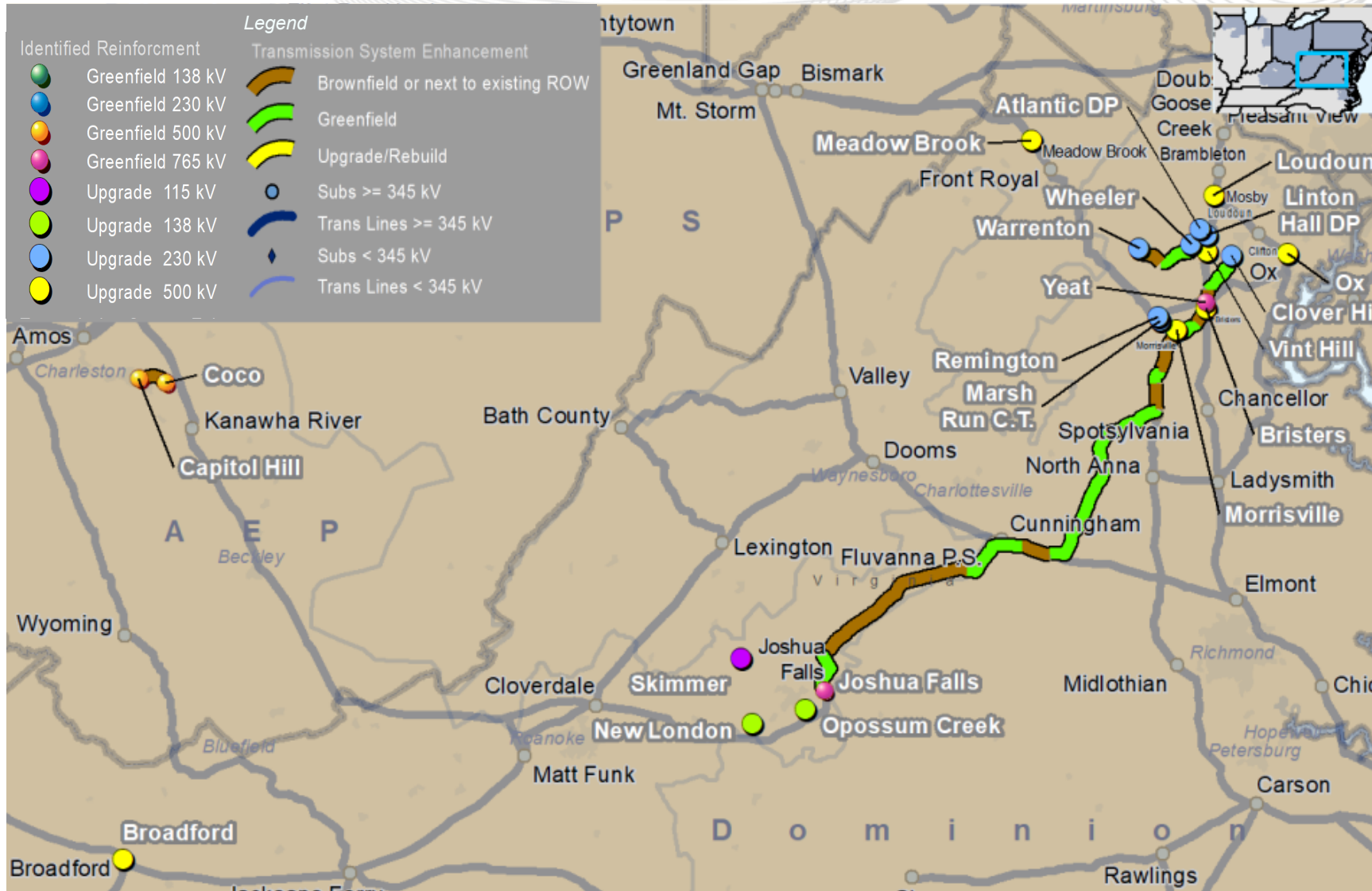
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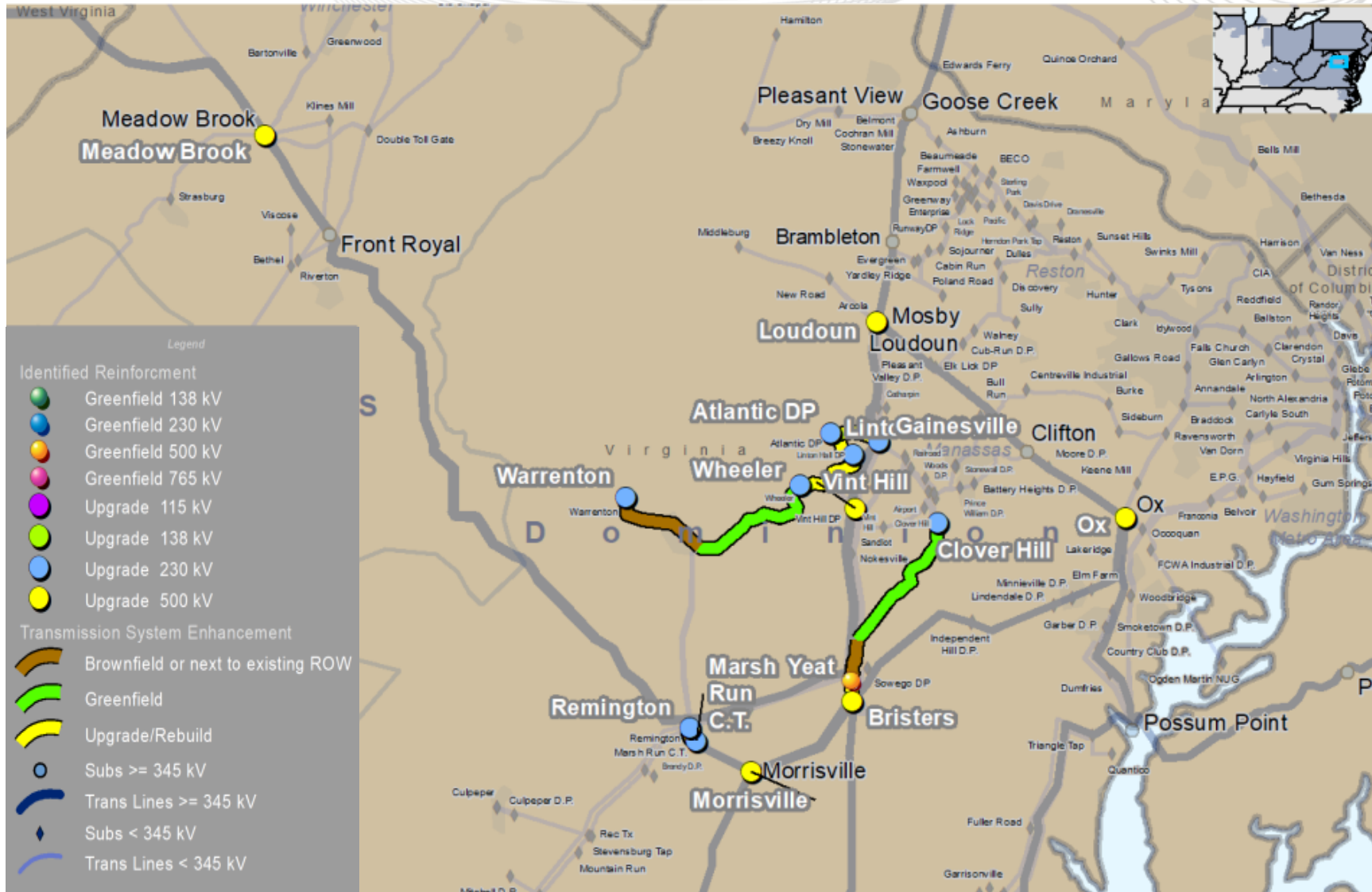


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Facilitator:
Dave Souder,
David.Souder@pjm.com

Secretary:
Tarik Bensala,
Tarik.Bensala@pjm.com

SME/Presenter:
Sami Abdulsalam,
Sami.Abdulsalam@pjm.com

Reliability Analysis Update



Member Hotline

(610) 666 – 8980

(866) 400 – 8980

custsvc@pjm.com

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