

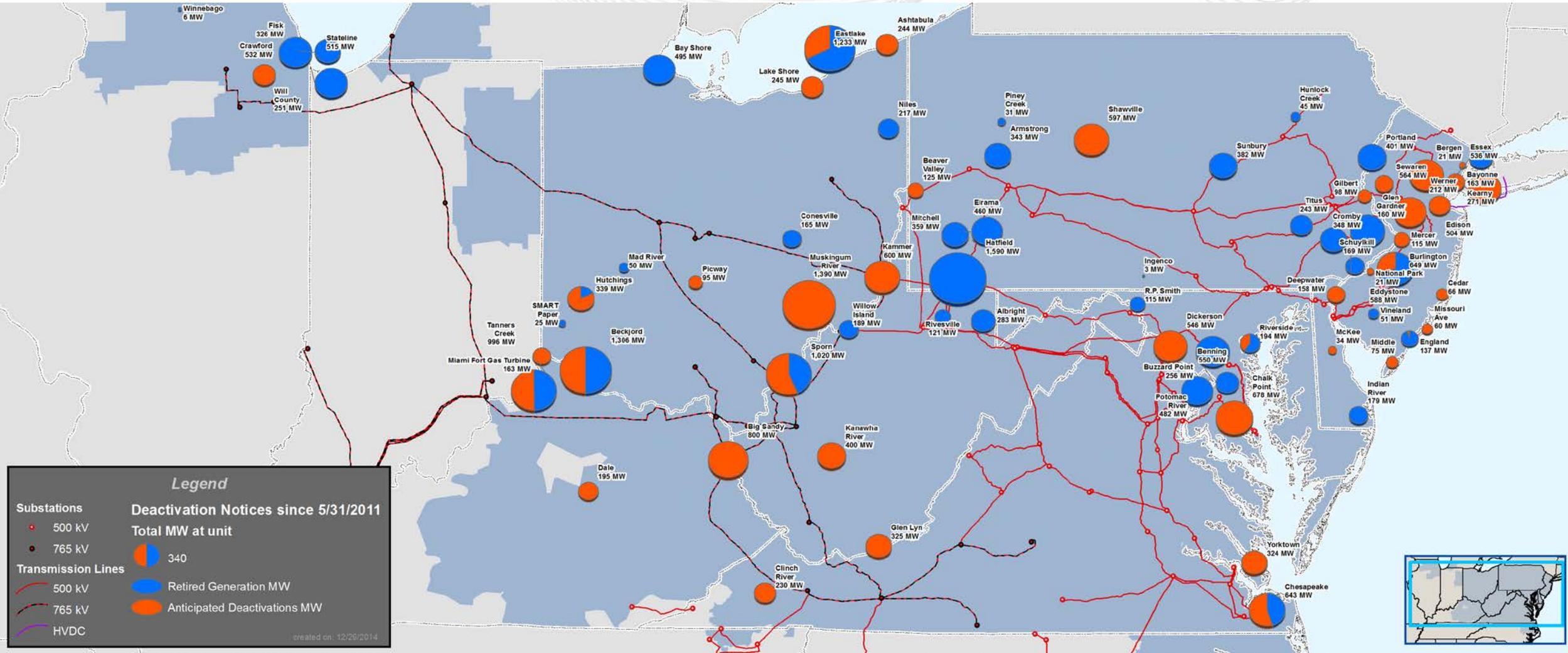


Transmission Expansion Advisory Committee

Reliability Analysis Update

June 11, 2015

Deactivation Update

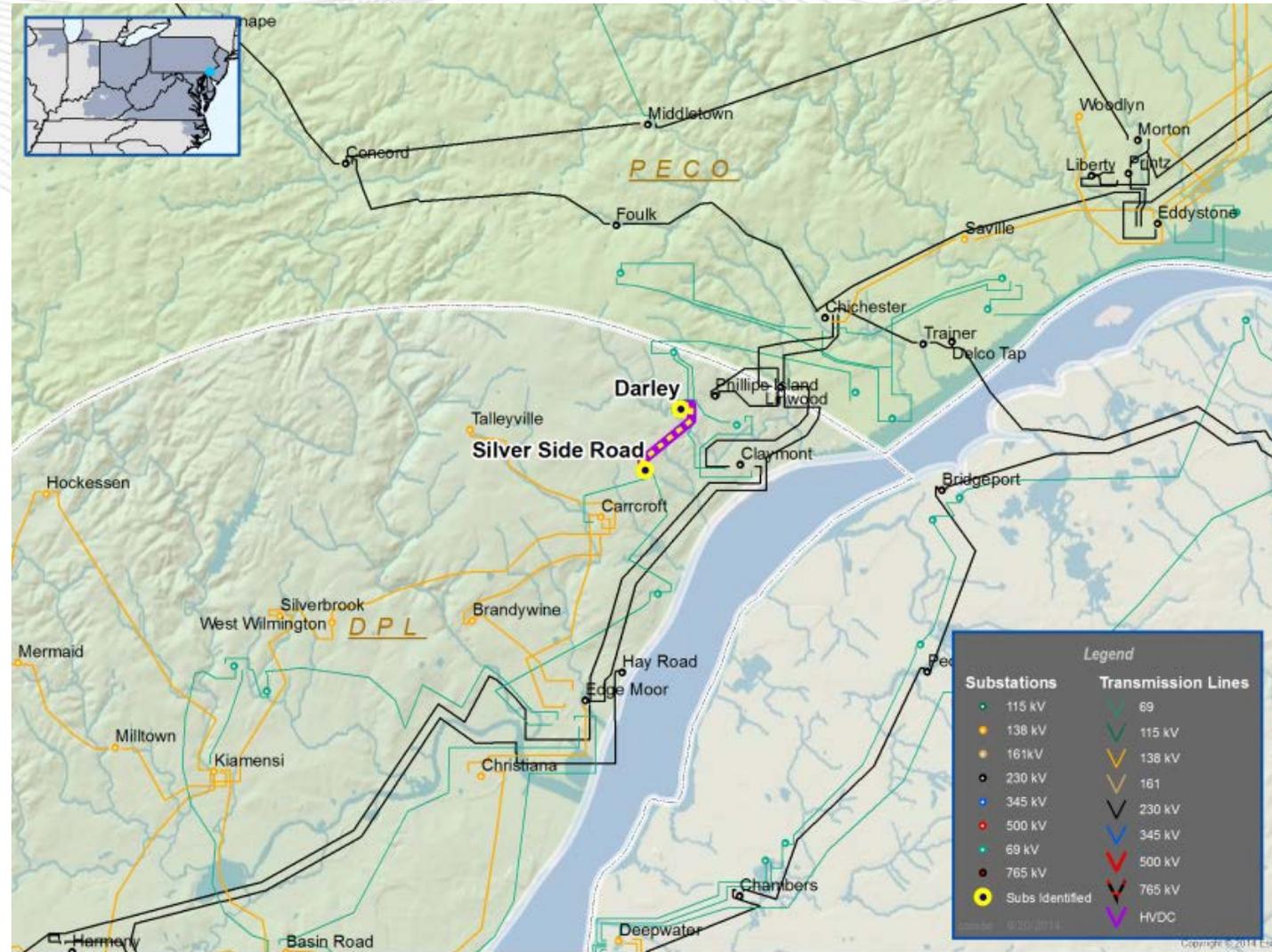




Deactivation Status

Unit(s)	Transmission Zone	Requested Deactivation Date	PJM Reliability Status
FPL MH50 (50.8MWs)	PECO	5/13/2019	Impacts identified (previously identified base line upgrade)
- UPDATED AES Beaver Valley (125MWs)	DUQ	9/1/2015 (Previous 6/1/2017)	Impacts identified for 2017 deactivation. Study underway to determine impacts for 2015 deactivation

- Immediate Need Project
- Common Mode Outage Violation
- The Silver Side Road to Darley 69 kV circuit is overloaded for tower contingency loss of the Edgemore – Clay and Edgemore – Linwood 230 kV circuits .
- Replace Terminal equipment at Silverside 69 kV substation. (B2569) (2014_1-12K) - Previously identified baseline for 2014 RTEP
- Estimated Project Cost: \$0.04M
- Required IS date: 6/1/2019
- DPL (the local TO) will be the designated entity





2015 RTEP Scenario Studies



EPA 111(d) Study

- Three at-risk levels: 6 GW, 16 GW and 32 GW
- 2022 Summer Peak case
- 6 scenarios including a low reserve scenario, and two scenarios that meet state Renewable Portfolio Standards (RPS) targets for renewable energy and energy efficiency
 - State standards include annual energy targets for renewable energy such as wind and also Energy Efficiency (EE)

- FSA generation needed to satisfy load and interchange
- Reliability tests: Generator Deliverability and Load Deliverability of selected areas based on location of at-risk generation
- Monitor all PJM 230 kV+ facilities
- Use transmission conductor ratings

- 111(d) Scenarios
 - Assume replacement by Natural Gas and reserve margin restored
 - **S1** – 6 GW deactivation scenario
 - **S2** – 16 GW deactivation scenario
 - **S3** – 32 GW deactivation scenario
 - Assume replacement by Natural Gas and lower reserve margin
 - **S4** – 32 GW deactivation scenario
 - Assume state Renewable Portfolio Standards (RPS) met
 - **S5** – 16 GW deactivation scenario
 - **S6** – 32 GW deactivation scenario



111(d) At-Risk Scenario Study - Assumptions

Generation Capacity & Load Modeled For Each Scenario

Scenario	S1	S2	S3	S4	S5	S6
At Risk Generation	6 GW	16 GW	32 GW	32 GW	16 GW	32 GW
External Generation (MW)	4,802	4,207	7,709	7,709	3,593	7,709
From 2019 RTEP Case	5,000	5,000	5,000	5,000	5,000	5,000
At Risk Generation	198	1,407	2,219	2,219	1,407	2,219
Additional MTX FTIRs	0	0	3,700	3,700	0	3,700
Additional Gas Generation	0	614	1,228	1,228	0	1,228
Internal Generation (MW)	183,855	184,449	180,948	175,871	184,080	173,614
Existing + ISA Generation	184,112	184,112	184,112	184,112	184,112	184,112
FSA Generation	5,680	12,075	12,075	12,075	12,075	12,075
At Risk Generation	5,937	14,979	29,871	29,871	14,979	29,871
Additional Gas Generation	0	3,241	14,632	9,555	0	4,426
Additional Renewable Generation	0	0	0	0	2,872	2,872
Load (MW)	171,217	171,217	171,217	171,217	171,217	171,217
LM+EE (MW)	13,320	13,320	13,320	13,320	20,654	20,654
From 2014 Forecast	13,320	13,320	13,320	13,320	13,320	13,320
Additional EE	0	0	0	0	7,334	7,334
Reserves	18%	18%	18%	15%	22%	18%

- 17 Locational Deliverability Areas (LDAs) were selected (out of 27 possible) based on the magnitude of at-risk generation in those LDAs

	S1	S2	S3	S4	S5	S6
<u>LDA</u>	6 GW	16 GW	32 GW	32 GW	16 GW	32 GW
BGE	x	x	x	x	x	x
DPL	x	x	x	x	x	x
DPL S	x	x	x	x	x	x
DAY	x	x	x	x	x	x
DVP	x	x	x	x	x	x
AEP	x	x	x	x	x	x
EKPC	x	x	x	x	x	x
FE		x	x	x	x	x
CE		x	x	x	x	x
DEOK		x	x	x	x	x
SWMAAC	x	x	x	x	x	x
PJM W	x	x	x	x	x	x
AE			x	x		x
PL			x	x		x
PENELEC			x	x		x
WMAAC			x	x		x
MAAC			x	x		x

- System-wide Generator Deliverability (for single contingencies) and the Common Mode Outage test (for tower contingencies) and Load Deliverability for a large selection of LDAs completed for all six at-risk scenarios
- Staff has just completed the analysis associated with the scenarios described on the previous slides

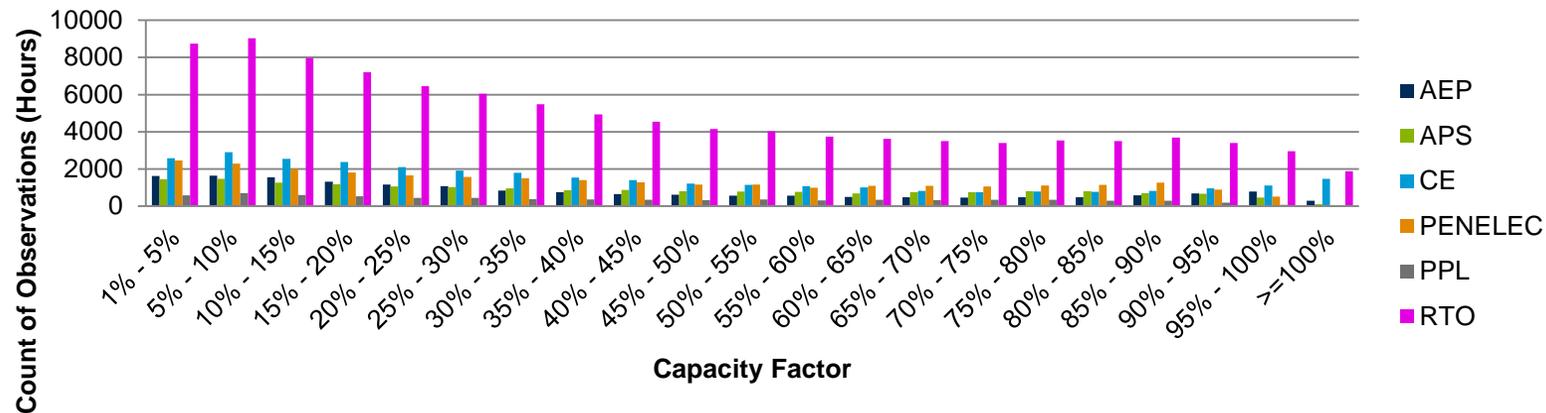
- Next Steps
 - Consolidate results from the scenario analyses that have been completed to date
 - Summarize the results and share with stakeholders (July TEAC)
 - Develop a conceptual transmission overlay as required for each scenario
 - Consider additional scenario studies or sensitivities



Winter Peak Study Update

- Initial year 2020 case was sent to TOs for a winter ratings and load profile update in May.
- Received feedback from TOs
- The winter case will be finalized by the end of June
- Assumption update: Wind will be dispatched to 100% (was 80% in last year's trial test) for single contingency in generator deliverability test

Winter Peak Capacity Factor for Wind from 2012-2015



- The 2014 Winter study
 - N-1-1 thermal and voltage tests were not performed
 - Modeled the gas contingency outages as part of the base case assumptions then ran the load deliverability test only
 - Did not have the exact definitions, used the magnitudes of at-risk gas by TO zone
- The 2015 study will evaluate additional existing RTEP test procedures
 - Each of the 34 gas contingencies will be included in the following test procedures:
 - N-1 thermal, voltage
 - Generator deliverability
 - Load deliverability
 - N-1-1
 - This year, we will just use the gas event as a contingency that we study as part of the tests
 - Now have the specific contingency definitions (at the individual generator level)

- Development of Winter Reliability Criterion
 - 2014
 - Learned about the process of developing an updated Winter model
 - Load profile and internal PJM zonal interchange are critical
 - Initial dispatch and ramping of generation by fuel type
 - Ran initial power flow studies
 - Feedback and lessons learned
 - 2015
 - Evaluate additional test procedures
 - Evaluate detailed gas contingencies (specific units)
 - Establish high level winter peak study criteria
 - Begin to establish a method to mitigate criteria violations
 - Draft Manual 14B Winter Peak Study procedure
 - Approve Winter Peak Study procedure
 - 2016
 - Provide a 5 year out winter peak study case that is consistent with the approved procedure (for use in RTEP and TO Local Planning)
 - Implement Winter Peak Study criteria in 2016 RTEP
 - Identify reliability criteria violations resulting from the new criteria and develop solutions through the RTEP process as needed

- Next Steps
 - Finalize the 2020 winter case
 - Run the test methods
 - Review the results with the TEAC
 - In parallel, review the development and schedule for a Winter Peak Reliability Criterion with the PJM Planning Committee

2015 RTEP Proposal Window Update

- Anticipated window open
 - Week of June 15th, 2015
 - Advance email announcement already made
 - Scope
 - Baseline N-1 (thermal* and voltage)
 - Generation Deliverability* and Common Mode Outage*
 - N-1-1 (thermal and voltage)
 - Load Deliverability (thermal and voltage)
 - Window Duration
 - 30 Days
- * Results already posted to PJM.com for review by window participants

- 2020 PJM Light Load Reliability Criteria
- Request for Transmission Owner specific criteria results
 - Already notified TOs
 - Due date: End of June 2015
 - PJM validation and coordination
 - Window announcement
- PJM 15 Year Analysis



Pratts Discussion

- PJM received formal feedback from several PJM Stakeholders
 - ITC
 - Concerns with overall evaluation method and elimination of ITC proposal due to a relatively small scope TO Upgrade
 - Ameren
 - Concerns that PJM did not consider the additional benefits of the ATXI proposal
 - Northeast Transmission Development (NTD)
 - Suggested new proposal combinations and designated entity combinations to improve the performance or decrease the cost of sponsored proposals

- Key decision factors in the Pratts Recommendation
 - Performance
 - Cost
 - Risk (Siting, Feasibility and cost commitment)



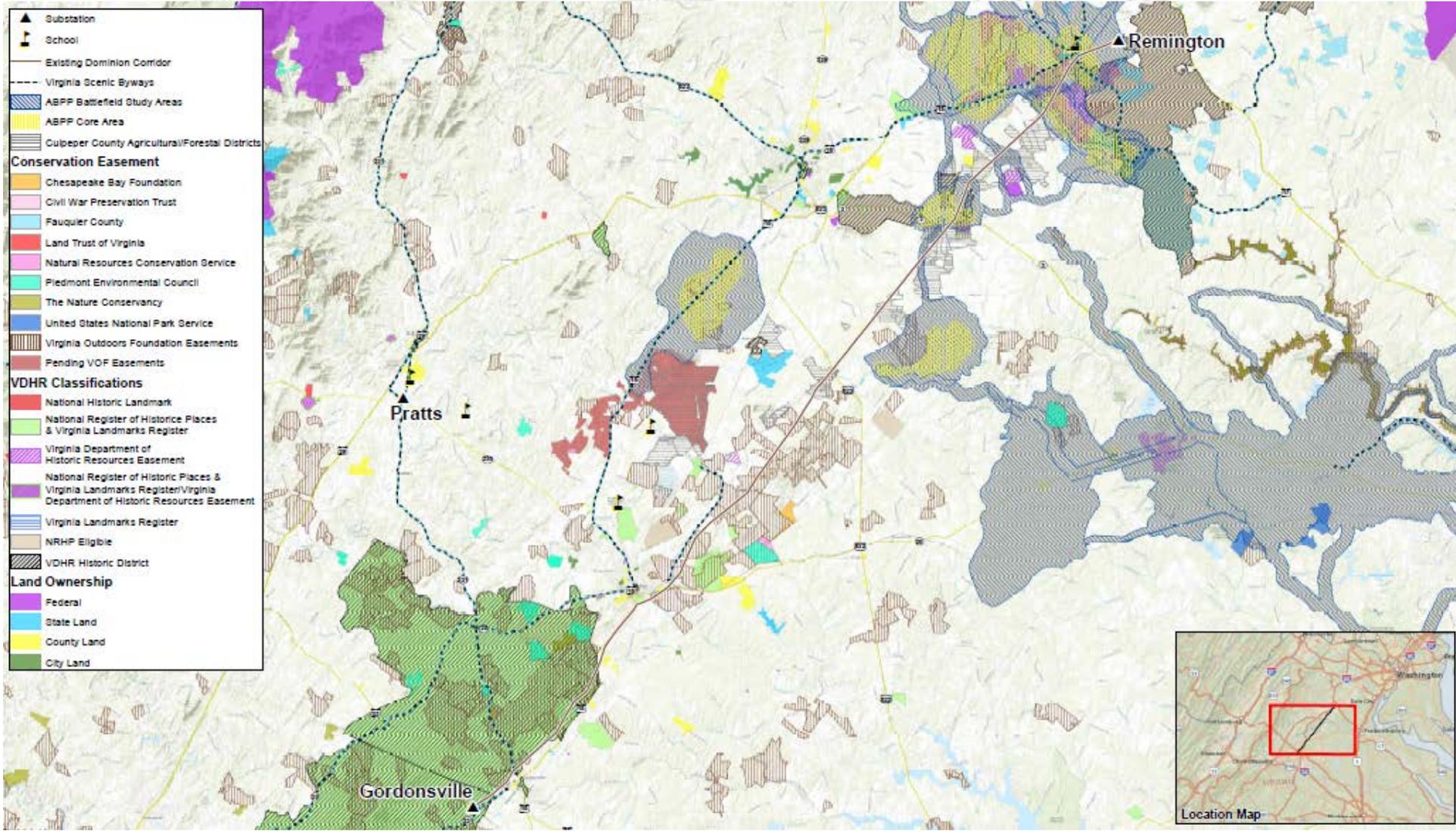
Pratts ROW Summary by Proposal

Project ID	Proposing Entity	Major Route	New ROW mileage	Existing ROW mileage	Total
2014_2-6B	ITC Mid Atlantic	Gordonsville-Pratts-Remington	36	0	36
2014_2-13A	Dominion/First Energy	Gordonsville-Pratts-Remington	7.3	30.2	37.5
2014_2-14A	Ameren	Gordonsville-Pratts-Remington	55	0	55
2014_2-7I	Northeast Transmission Development (NTD)	Gordonsville-Remington	38	0	38

Virginia State Corporation (SCC)

- COMMONWEALTH OF VIRGINIA STATE CORPORATION COMMISSION, DIVISION OF ENERGY REGULATION
- Guidelines of Minimum Requirements for Transmission Line Applications Filed Under Virginia Code Section 56-46.1 and The Utility Facilities Act
 - To the extent permitted by the property interest involved rights-of-way should be selected with the purpose of minimizing, conflict between; the rights-of-way and present and prospective uses of the land on which they are to be located. To this end, existing rights-of-way should be given priority as the locations for additions to existing transmission facilities, and the joint use of existing rights-of-way by different kinds of utility services should be considered.
- <https://www.scc.virginia.gov/pue/docs/trans.pdf>

- Route siting issues are common to all new ROW proposals
- The risk increases with the length of new ROW that is required

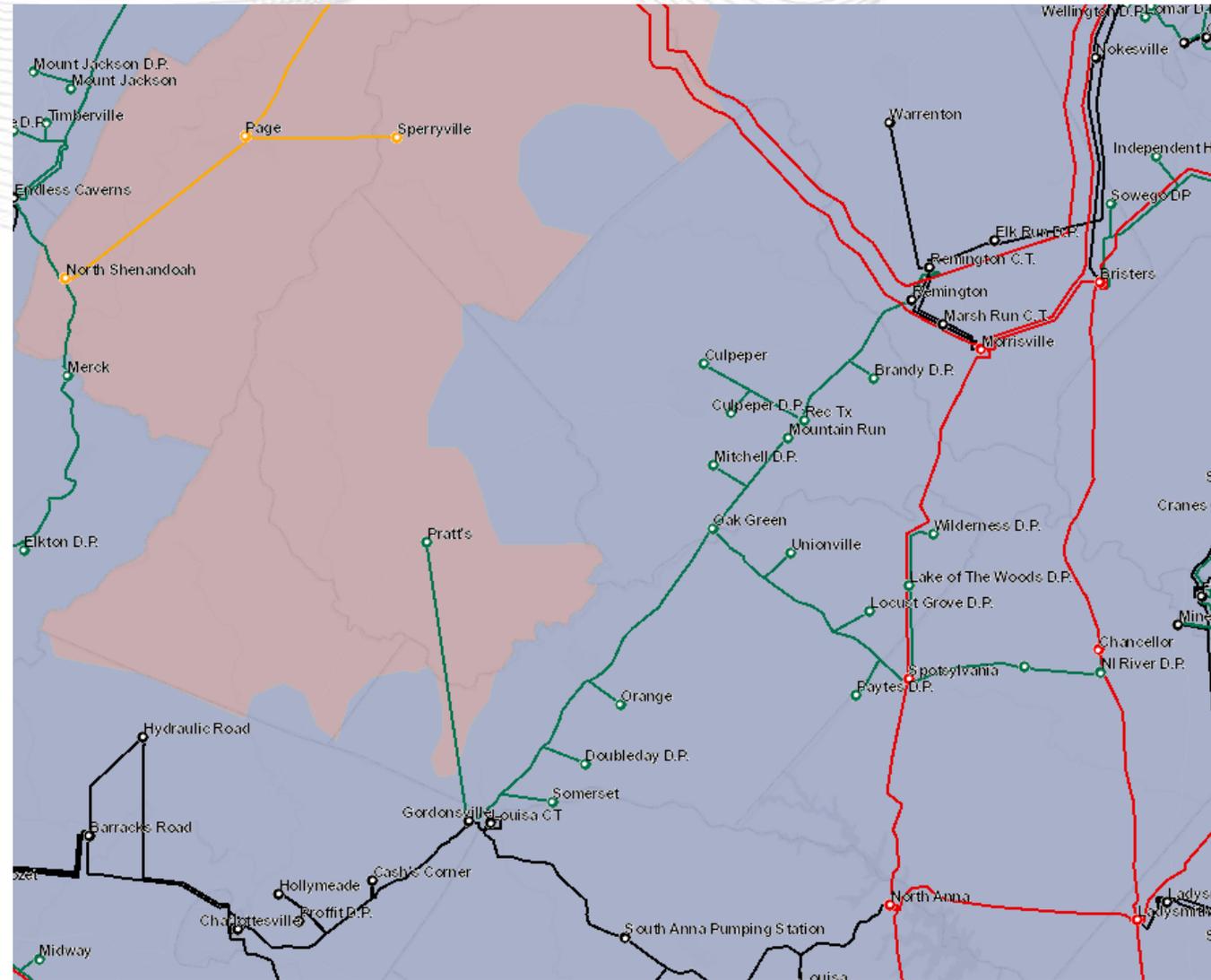


- **Potential Areas to traverse along new ROW:**
 - Virginia Scenic Byways
 - ABPP Battlefield Study Areas
 - ABPP Core Area
 - Culpeper County Agricultural/Forestry Districts
- **Conservation Easement**
 - Chesapeake Bay Foundation
 - Civil War Preservation Trust
 - Fauquier County
 - Land Trust of Virginia
 - Natural Resources Conservation Service
 - Piedmont Environmental Council
 - The Nature Conservancy
 - United States National Park Service
 - Virginia Outdoors Foundation Easements
 - Pending VOF Easements

- **VA Department of Historical Resources Classifications**
 - National Historic Landmark
 - National Register of Historic Places & Virginia Landmarks Register
 - Virginia Department of Historic Resources Easement
 - National Register of Historic Places & Virginia Landmarks Register/ Virginia Department of Historic Resources Easement
 - Virginia Landmarks Register
 - NRHP Eligible
 - VDHR Historic District
- **Land Ownership**
 - Federal
 - State Land
 - County Land
 - City Land

- Stakeholder feedback from Old Dominion Electric Cooperative and Rappahannock Electric Cooperative
 - REC serves the Pratts load
 - Dominion and First Energy, the sponsors of the current 13A solution (Gordonsville – Pratts – Remington) has had several local open house meetings to promote public outreach
 - The 13A solution requires approximately 7 miles of new ROW
 - Significant local public opposition to the required 7 miles of new ROW
 - Alternatives with more new ROW have a very low probability of siting success due to feasibility of lower ROW alternatives

- Situation mentioned in ATXI letter to PJM
- A second 230/115kV transformer or 230kV line could further improve reliability by eliminating this N-1 risk to Pratts area load
- FirstEnergy response that spare transformers are available should the existing one fail
- Similar situations common in PJM and throughout the Eastern Interconnection





Request by NTD to Consider New Proposal Alternatives

Proposal Path	Proposal Id	Proposing Entity	Additional Combination Suggestion by NTD	Total Estimated Cost (\$M)
Gordonsville - Pratts – Remington Route	2014_2-6B	ITC Mid Atlantic	Mitchell - Mt. Run 115kV line	150.2
Gordonsville - Remington Route	2014_2-7I	Northeast Transmission Development (NTD)	DOM Gordonsville 3rd xtr 230/115kV	110.5 (cost capped)
Gordonsville - Pratts – Remington Route	2014_2-13A	Dominion/First Energy	None	129-164 (147 midpoint)
Gordonsville - Remington Route	2014_2-13C	Dominion/First Energy	NTD Brook Run 230/115kV station	111.9 - 123.3 (118 midpoint)
Gordonsville - Pratts – Remington Route	2014_2-14A	Ameren	None	137-174 (151 midpoint)

- Cost cap proposed by NTD
- NTD did not provide substantive details or T&Cs in its cost proposal
- Cost is only one factor that is considered in the evaluation of proposals
- PJM considered the cost cap as well as the other evaluation factors, in particular the significance of the siting issues in its recommendation as discussed on prior slides



TEAC Stakeholder Feedback to Pratts Recommendation

- PJM response to stakeholder feedback:
 - ITC Concerns
 - The ITC proposal is nearly identical to the recommended solution but lacks the advantage of utilizing existing ROW for most of the route and requires additional new ROW. Also, the ITC proposal is estimated to cost more than the recommended solution, which is reasonable due to the additional scope of the ITC proposal.
 - Ameren Concerns
 - PJM did consider the additional benefit to the Pratts load drop issue, but concludes that the additional benefit alone is not justification alone to select the Ameren proposal due to the fact that the Ameren proposal requires additional new ROW and is estimated to cost more than the recommended solution. The load drop scenario at Pratts is prevalent throughout the Eastern Interconnection and FirstEnergy reports that local spares are available.
 - Northeast Transmission Development (NTD) Alternative Proposal
 - Suggested new proposal combinations and designated entity combinations to improve the performance or decrease the cost of original sponsored proposals. The NTD alternative proposal would require additional ROW and the additional risk associated with the new ROW. In addition, the cost containment proposed by NTD is ambiguous due to the lack of detailed terms and conditions and as a result does not provide greater certainty – particularly when you consider the ROW and siting issues associated with their alternative proposal.

- Reaffirm the previous recommendation to implement the 2014_2-13A proposal and assign construction responsibility to First Energy and Dominion.
- As a next step, perform cost allocation and request PJM Board Approval of the project.

Artificial Island Update

- Stakeholder comments are currently under review and were received from the following entities:
 - Atlantic Grid Development
 - ITC
 - Northeast Transmission Development
 - Old Dominion Electric Cooperative
 - PPL Electric Utilities
 - Public Service Electric and Gas Company
 - PSEG Nuclear LLC
 - State of Delaware Division of the Public Advocate
 - State of Delaware Public Service Commission
 - State of Maryland Public Service Commission

<http://www.pjm.com/about-pjm/who-we-are/pjm-board/public-disclosures.aspx>

- **PJM Board Review**
 - Logistics and timing for the PJM Board meetings are still being finalized.
 - Staff will review their recommendation with the Reliability Committee of the Board prior to the full Board meeting.
 - Review of the recommendation of the full Board likely to be during the upcoming meetings in July.

RTEP Next Steps

- Prepare documentation of Winter Reliability Criteria for initial review with PJM Planning Committee
- Prepare for week June 15th 2015 RTEP Proposal Window #1 Open
- Request that the PJM Board approve the recommended Artificial Island solution

Questions?

Email: RTEP@pjm.com

- Revision History
 - V1: Original version distributed to the PJM TEAC - 6/10/2015
 - V2: Slide #30 and #35, change Dominion to Dominion and First Energy – 6/11/2015
 - V3: Updated Slide 34 to reflect Pratts name; Update slide 35 to reflect Dominion/FE – 6/12/2015