



Transmission Expansion Advisory Committee

May 27, 2010



Issues Tracking

Open Issues:

Owner	Requestor	Issue ID	Issue Title	Issue Description	Issue Status	Stakeholder	Body	Date Created
PJM	NRG / Patty Esposito	Raised at May TEAC	MAAC and EMAAC Reactive Analysis Details	Request for more detail regarding the relative severity of reactive issues in EMAAC.	Open	TEAC		5/12/2010

New Issues:



2010 RTEP Sensitivity Analysis Update

**RPS
Magnitude**

Determined
by State
mandates

**DR/EE
Magnitude**

Determined
by State
Mandates

**Participation
Factor**

Locational
Distribution
of individual
RPS
generation

**Capacity
Factor**

Locational
Value of
RPS
generation

**At-Risk
Generation**

Sink for
RPS
generation

Thermal Overload Year

RPS

- Generally increases loading on EHV facilities

DR/EE

- Reduces load and therefore loadings in the future



Preliminary Sensitivity Results – Thermal Result

Table 1: Sensitivity Reliability Criteria Violation Year

From	To	CKT	KVs	Base	RPS to Existing	RPS to At-Risk*	RPS+DR+EE to At-Risk*
Lexington	Dooms	1	500/500	2017	2016	2016	2016
T157 Tap	Doubs	1	500/500	2017	2016	2016	2016
Pruntytown	Mt. Storm	1	500/500	2019	2016	2017	2016
Jacks Mt. 1	Juniata	1	500/500	2019	2016	2016	2022
Mt. Storm	T157 Tap	1	500/500	2017	2016	2016	2016
Jacks Mt. 2	Juniata	1	500/500	2020	2016	2016	2023
Keystone	Jacks Mt. 1	1	500/500	2023	2017	2018	2024
Bath County	Valley	1	500/500	2022	2018	2019	2020
Mt. Storm	Greenland Gap	1	500/500	2022	2019	2019	2020
Greenland Gap	Meadowbrk	1	500/500	2021	2019	2019	2020
Keystone	Conemaugh	1	500/500	>2024	2020	2022	>2024
Mt. Storm	Meadowbrk	2	500/500	2024	2021	2021	2022
Harrison	Pruntytown	1	500/500	2024	2021	2021	2022
Doubs	Brighton	1	500/500	>2024	2021	>2024	>2024
Black Oak	Bedington	1	500/500	>2024	2023	2023	2024
Conemaugh	Jacks Mt. 2	1	500/500	>2024	2024	>2024	>2024

* Note that the at-risk generation considered included only coal generation



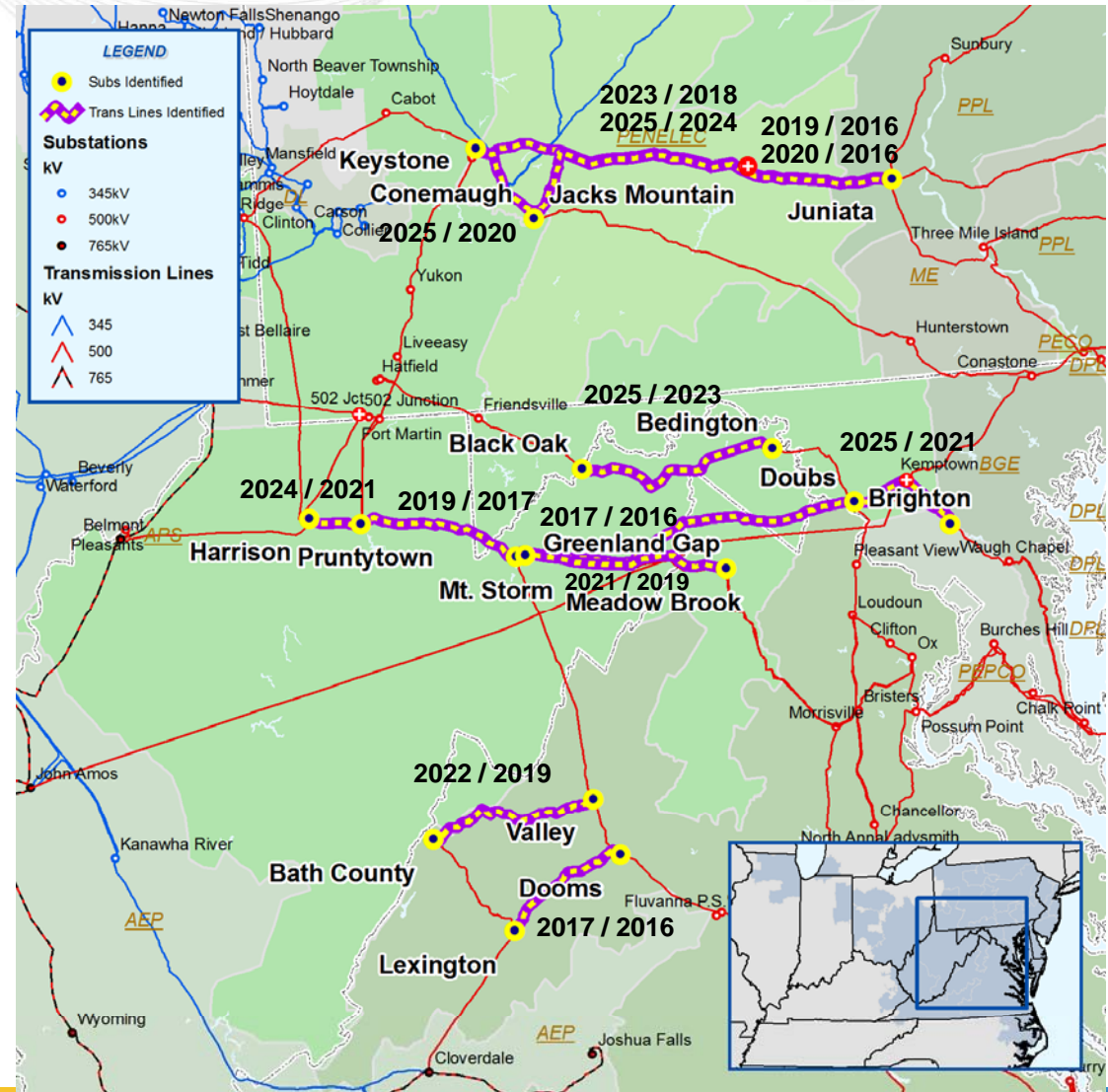
Preliminary Sensitivity Results

Table 2: Reliability Criteria Violation Year Advancement due to Sensitivity (Years)

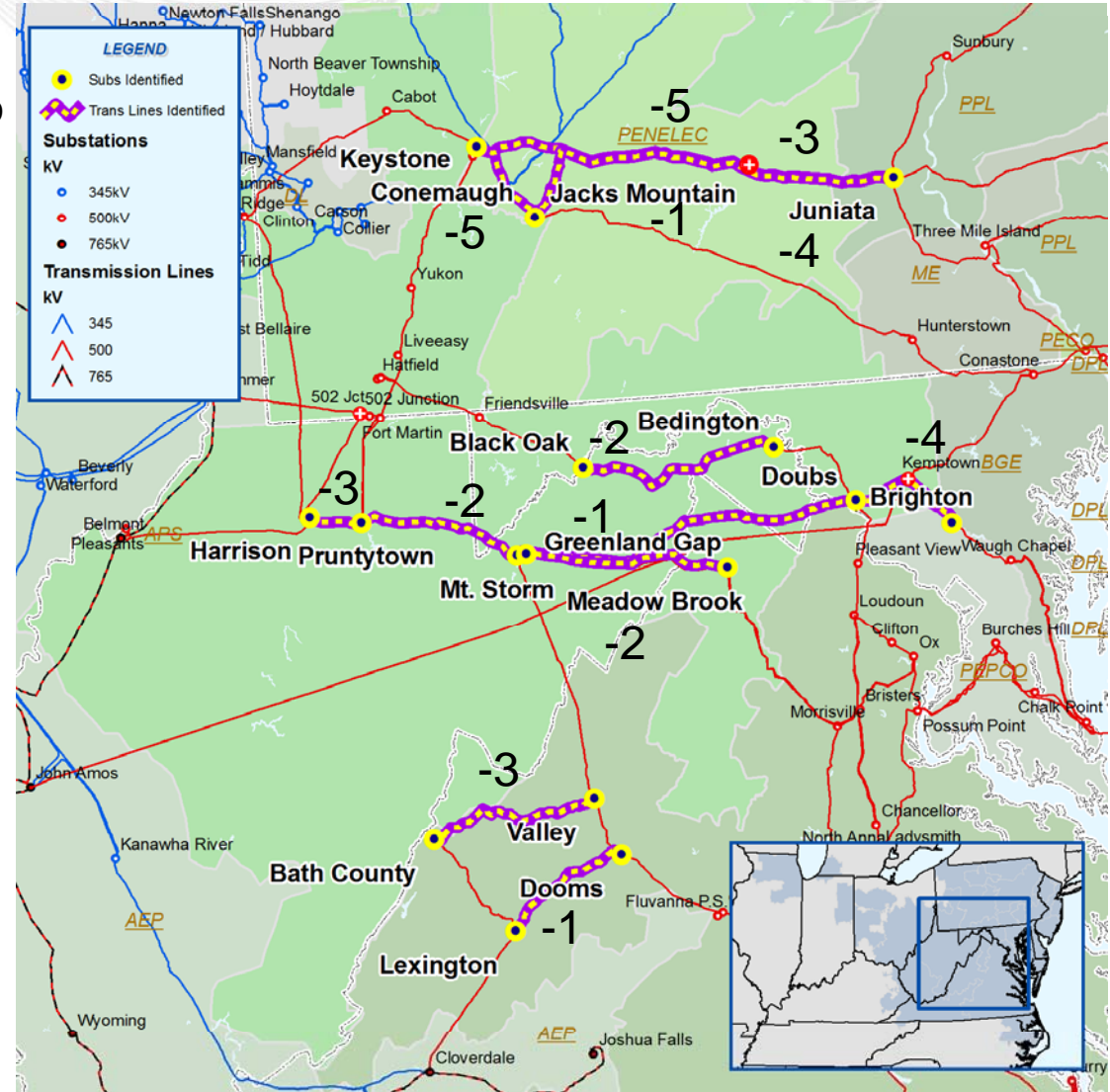
From	To	CKT	KVs	Base	RPS to Existing	RPS to At-Risk*	RPS+DR+EE to At-Risk*
Keystone	Jacks Mt. 1	1	500/500	2023	-6	-5	1
Keystone	Conemaugh	1	500/500	>2024	-5	-3	0
Doubs	Brighton	1	500/500	>2024	-4	0	0
Bath County	Valley	1	500/500	2022	-4	-3	-2
Jacks Mt. 2	Juniata	1	500/500	2020	-4	-4	3
Mt. Storm	Meadowbrk	2	500/500	2024	-3	-3	-2
Pruntytown	Mt. Storm	1	500/500	2019	-3	-2	-3
Jacks Mt. 1	Juniata	1	500/500	2019	-3	-3	3
Mt. Storm	Greenland Gap	1	500/500	2022	-3	-3	-2
Harrison	Pruntytown	1	500/500	2024	-3	-3	-2
Greenland Gap	Meadowbrk	1	500/500	2021	-2	-2	-1
Black Oak	Bedington	1	500/500	>2024	-2	-2	-1
Lexington	Dooms	1	500/500	2017	-1	-1	-1
T157 Tap	Doubs	1	500/500	2017	-1	-1	-1
Conemaugh	Jacks Mt. 2	1	500/500	>2024	-1	0	0
Mt. Storm	T157 Tap	1	500/500	2017	-1	-1	-1

* Note that the at-risk generation considered included only coal generation

- Comparison of traditional 15 year criteria violation year vs. sensitivity violation year
- Data shown for RPS to at-risk generation scenario
- Example:
 - 15 year criteria overload year = 2023
 - Sensitivity overload year = 2018
 - 2023 / 2018



- Advancement of traditional 15 year criteria violation year due to sensitivity
- Data shown for RPS to at-risk generation scenario
- Example:
 - 15 year criteria overload year = 2023
 - Sensitivity overload year = 2017
 - 2018 – 2023 = -5 years (advancement)

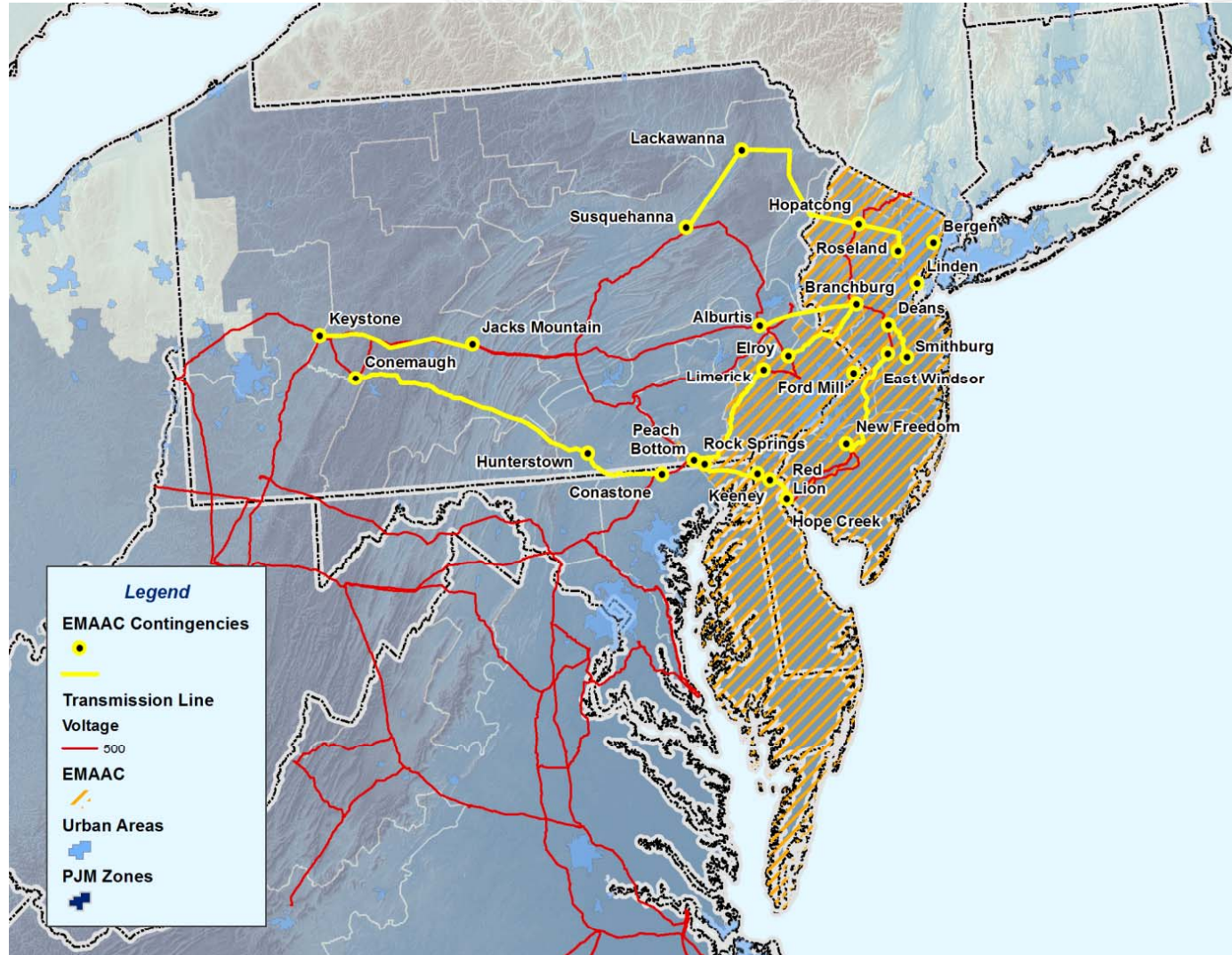




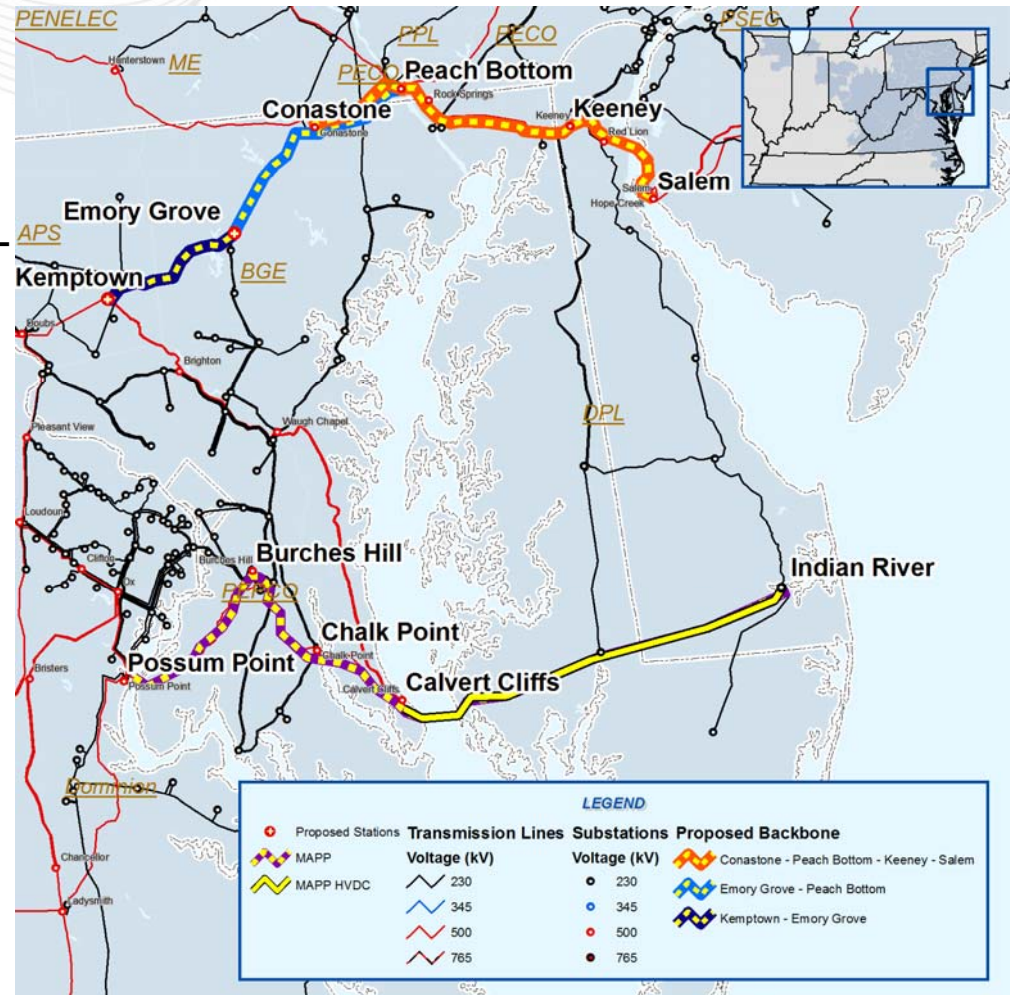
2010 RTEP Analysis Update

- Several critical contingencies are non-convergent
 - Red Lion to Hope Creek 500 kV
 - New Freedom to East Windsor 500 kV
 - Conemaugh to Hunterstown 500 kV
 - Hunterstown to Conastone 500 kV
 - Susquehanna to Lackawanna 500 kV
 - Lackawanna to Hopatcong 500 kV
 - Hopatcong to Roseland 500 kV
 - Keeney to Rock Springs 500 kV
 - Rock Springs to Peach Bottom 500 kV
 - Peach Bottom to Limerick 500 kV
 - Alburtis to Branchburg 500 kV
 - Smithburg to Deans 500 kV
 - Keystone to Jacks Mt. 500 kV
 - Branchburg to Elroy 500 kV
 - Ford Mill 600 MW generator
 - Ford Mill 600 MW generator
 - Bergen 550 MW generator
 - Linden 750 MW generator

EMAAC Non-converged Contingencies



- BG&E proposal for a new 500 kV line from Kemptown to Peach Bottom with 500/230 kV substation at Emory Grove (near Northwest)
- Maryland OPC and DNR suggested that (C-PB-K) be reevaluated
- PSE&G suggested that (C-PB-K) be extended to Salem
- Additional alternatives under evaluation, including reactive upgrades



2015 – 2020 EMAAC Maximum Import for Base Conditions

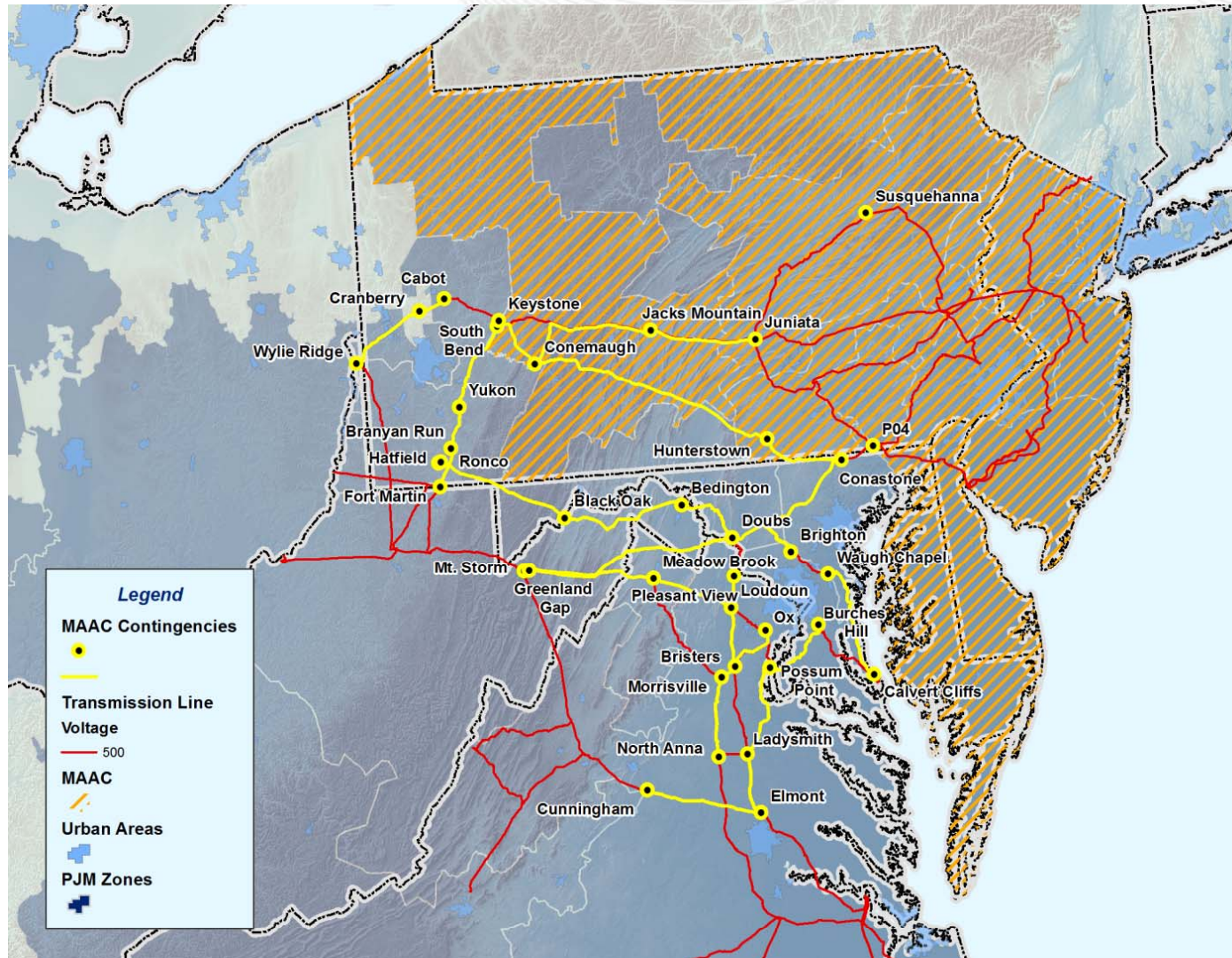
Year	Estimated EMAAC CETO (MW)	Current EMAAC Import Limit (MW)	Reactive Support Only	
			Maximum EMAAC Import Limit (MW)	Reactive Compensation To Maximize EMAAC Import Limit (MVar)
2015	8270	8408	9436	626
2016	8643	7387	9407	949
2017	9006	5588	9362	1357
2018	9192	4934	9345	1619
2019	9579	--	9330	2114

2015 – 2020 EMAAC Maximum Import for Keeney – Rock Springs 500 kV Outage

Year	Estimated EMAAC CETO (MW)	Current EMAAC Import Limit (MW)	Reactive Support Only	
			Maximum EMAAC Import Limit (MW)	Reactive Compensation To Maximize EMAAC Import Limit (MVar)
2015	8270	7152	8277 ⁴	794 ⁴
2015	8270	7152	8709	1355
2016	8643	6456	8609	1732
2017	9006	5299	8478	2236
2018	9192	4345	8410	2431
2019	9579	--	8222	2974

- Alternative Analysis for EMAAC will follow
 - Coordinating thermal and reactive solutions in EMAAC
- Coordinating solutions with 2015 local reactive issues in JCPL

- **Several critical contingencies are non-covergent**
 - Keystone - South Bend 500 kV
 - Conemaugh - Keystone 500 kV
 - Conemaugh - Jacks Mountain 500 kV
 - Keystone - Jacks Mountain 500 kV
 - Jacks Mountain - Juniata 1&2 500 kV
 - Conemaugh - Hunterstown 500 kV
 - Hunterstown - Conastone 500 kV
 - Conastone - Brighton 500 kV
 - Brighton - Doubs 500 kV
 - Calvert Cliffs - Waugh Chapel 500 kV
 - Burches Hill - Possum Point 500 kV
 - Brister - Ox 500 kV
 - Elmont - Cunningham 500 kV
 - Elmont - Ladysmith 500 kV
 - Ladysmith - Possum Point 500 kV
 - Loudoun - Morrisville 500 kV
 - Morrisville - North Anna 500 kV
 - Loudoun - Pleasant View 500 kV
 - Meadow Brook - Loudoun 500 kV
 - Mount storm - Meadow Brook 500 kV
 - Mount Storm - Greenland Gap 500 kV
 - Mount Storm - T157 Tap 500 kV
 - T157 Tap - Doubs 500 kV
 - Hatfield - Black Oak 500 kV
 - Hatfield - Ronco 500 kV
 - Hatfield - Banyan Run 500 kV
 - Bedington - Black Oak 500 kV
 - Bedington - Doubs 500 kV
 - Fort Martin - Ronco 500 kV
 - Yukon - South Bend 500 kV
 - Yukon - Banyan Run 500 kV
 - Cabot - Cranberry 500 kV
 - Cranberry - Wylie Ridge 500 kV
 - Calvert Cliffs 1&2 500 kV
 - P04 500 kV
 - Susquehanna #2



Alternative 1

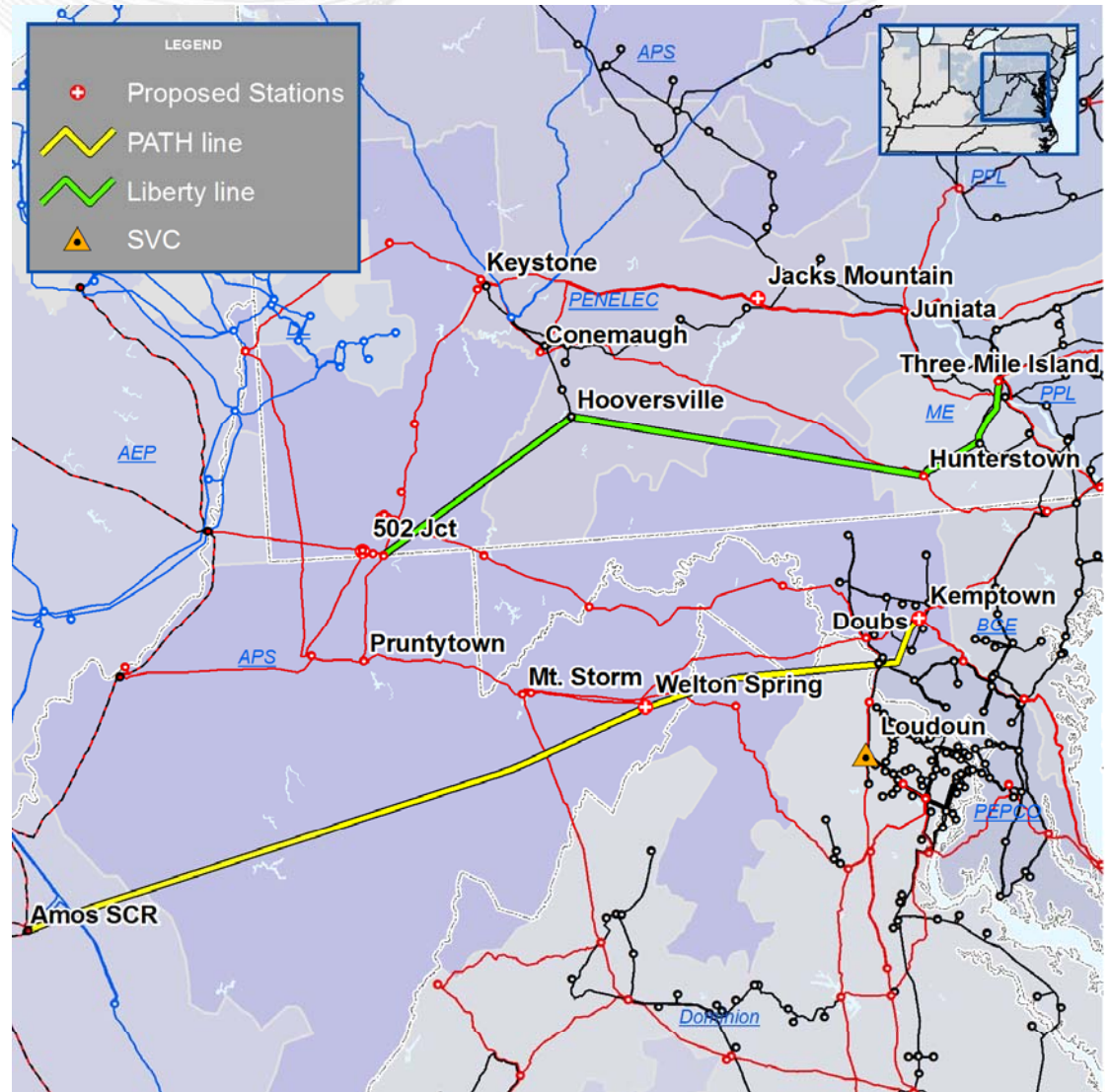
- 900 MVAR SVC at Loudoun 230 kV

Alternative 2

- Liberty / LS Power Proposal
- 502J – Hooversville – Hunterstown – TMI
- Meadow Brook - Doubs

Alternative 3

- PATH
- Description: Amos – Welton Spring – Kemptown



Alternative 4

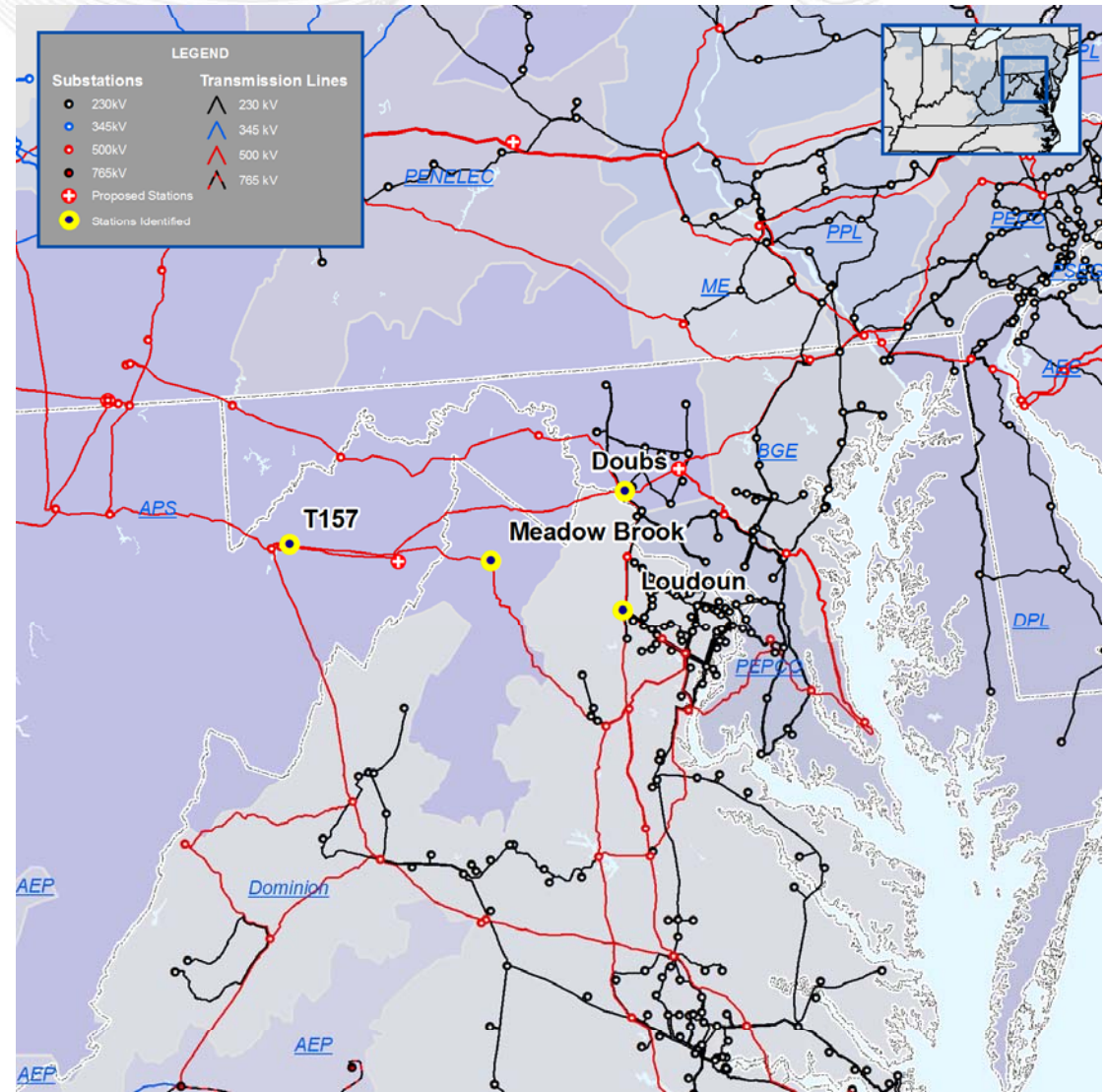
- 900 MVAR SVC at Loudoun 230 kV
- 900 MVAR static caps
- 300 @ Meadow Brook 500 kV
- 300 @ Loudoun 500 kV
- 300 @ Doubs 500 kV

Alternative 5

- 900 MVAR SVC at Loudoun 230 kV
- 900 MVAR SVC at T157 Tap 500 kV

Alternative 6

- 900 MVAR SVC at Loudoun 230 kV
- 900 MVAR SVC at T157 Tap 500 kV
- 900 MVAR static caps
- 300 @ Meadow Brook 500 kV
- 300 @ Loudoun 500 kV
- 300 @ Doubs 500 kV





PATH Alternative Analysis

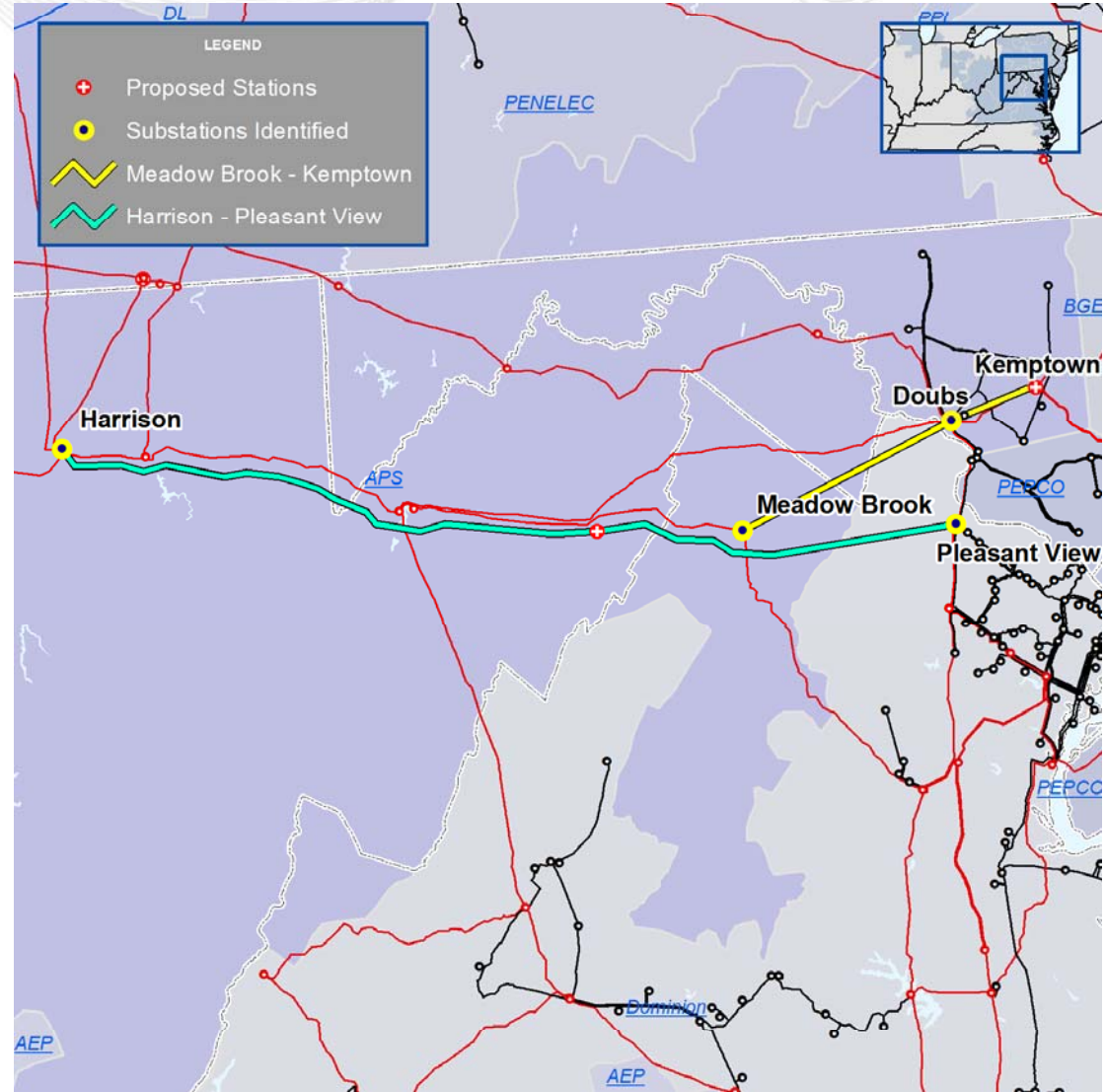
Alternative 7

Harrison – Pleasant View 2000 MW
HVDC

Meadowbrook – Kemptown 500 kV
500 MVAR SVC at Meadow Brook
500 kV

500 MVAR switched shunts

- 250 MVAR @ Kemptown 500 kV
- 250 MVAR @ Pleasant View 500 kV





Path Alternative Analysis

From Bus	To Bus	Base	Reconductor Mt. Storm - Doubs	PATH	Liberty	Harrison - P. View & Meadow Bk. - Kemptown
Lexington	Dooms	2017	2017	>2025	2018	2022
Mt. Storm	T157 Tap	2017	> 2025	>2025	> 2025	> 2025
T157 Tap	Doubs	2017	> 2025	>2025	> 2025	> 2025
Pruntytown	Mt. Storm	2019	2019	2025	2020	2024
Jacks Mountain	Juniata #1	2019	2019	>2025	> 2025	> 2025
Jacks Mountain	Juniata #2	2020	2020	>2025	> 2025	> 2025
Greenland Gap	MeadowBrook	2021	2021	>2025	2022	2025
Mt. Storm	Greenland Gap	2022	2022	>2025	2023	2025
Bath County	Valley	2022	2022	>2025	2023	> 2025
Keystone	Jacks Mountain	2023	2023	>2025	> 2025	> 2025
Harrison	Pruntytown	2024	2024	>2025	2024	> 2025
Mt. Storm	MeadowBrook	2024	2024	>2025	2025	> 2025

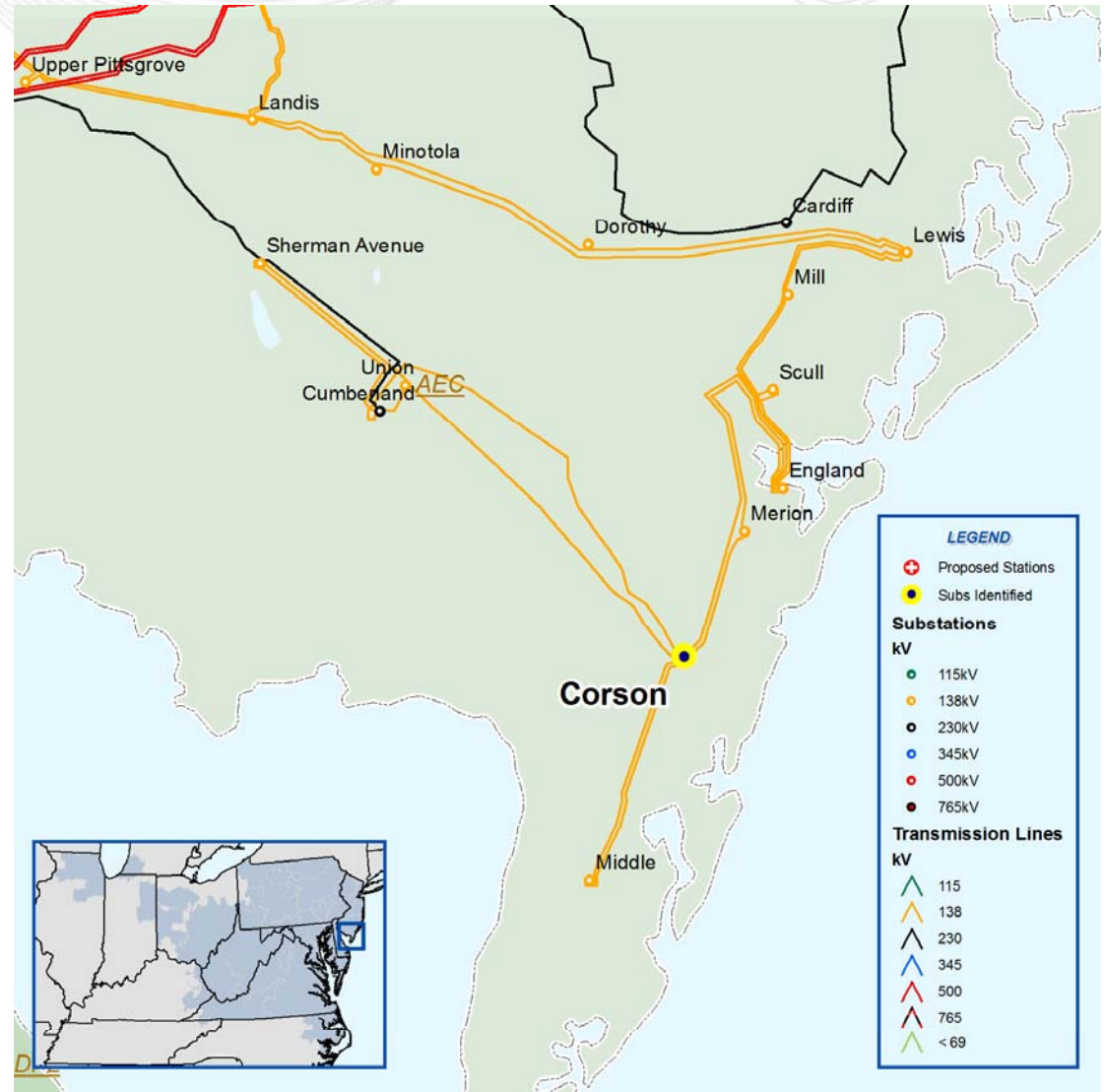
- Reactive upgrades alone are not adequate to solve all violations through the 15 year horizon

- Continue MAAC voltage analysis
- Coordinate MAAC and EMAAC solutions

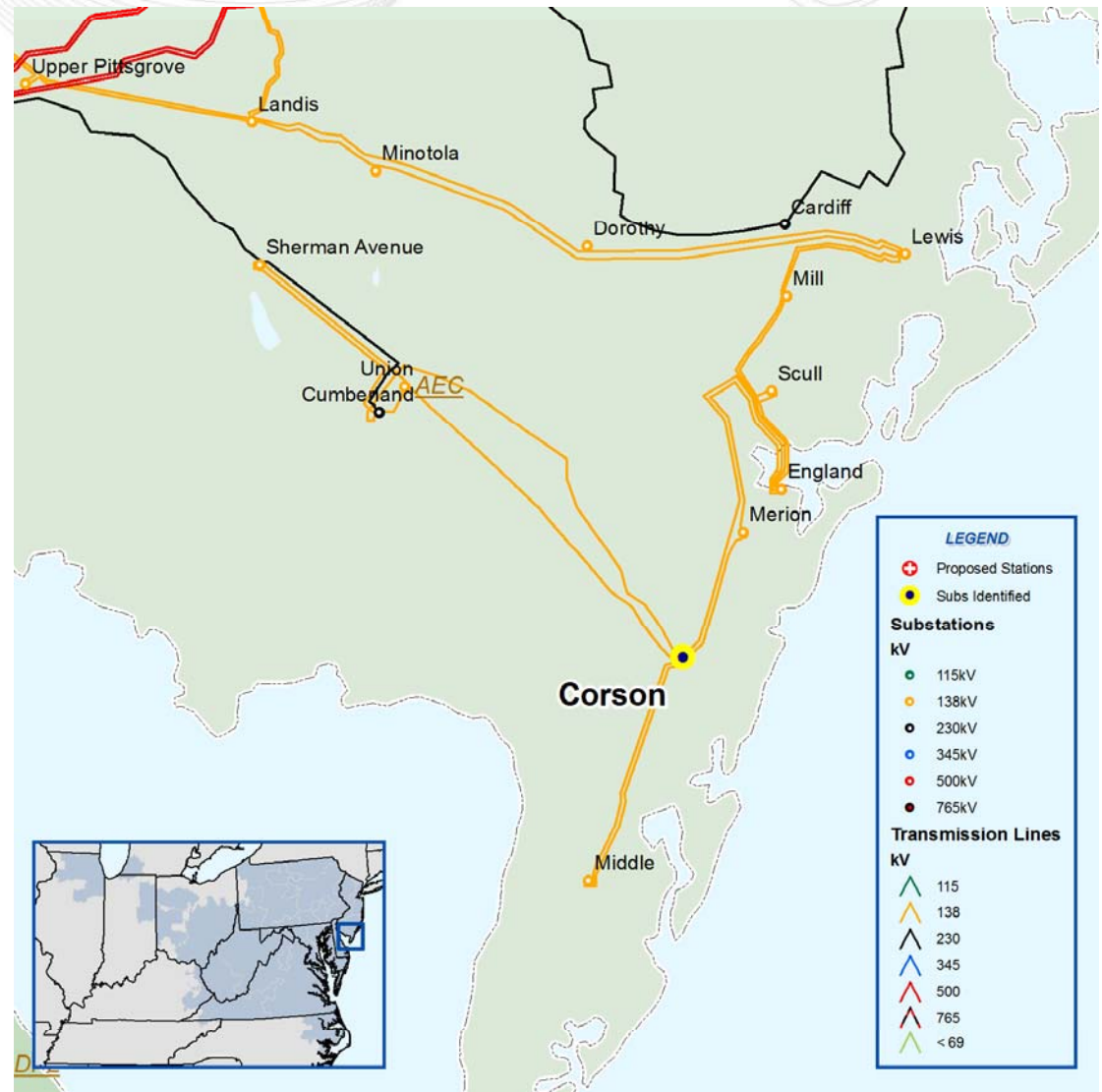


Baseline Reliability Update

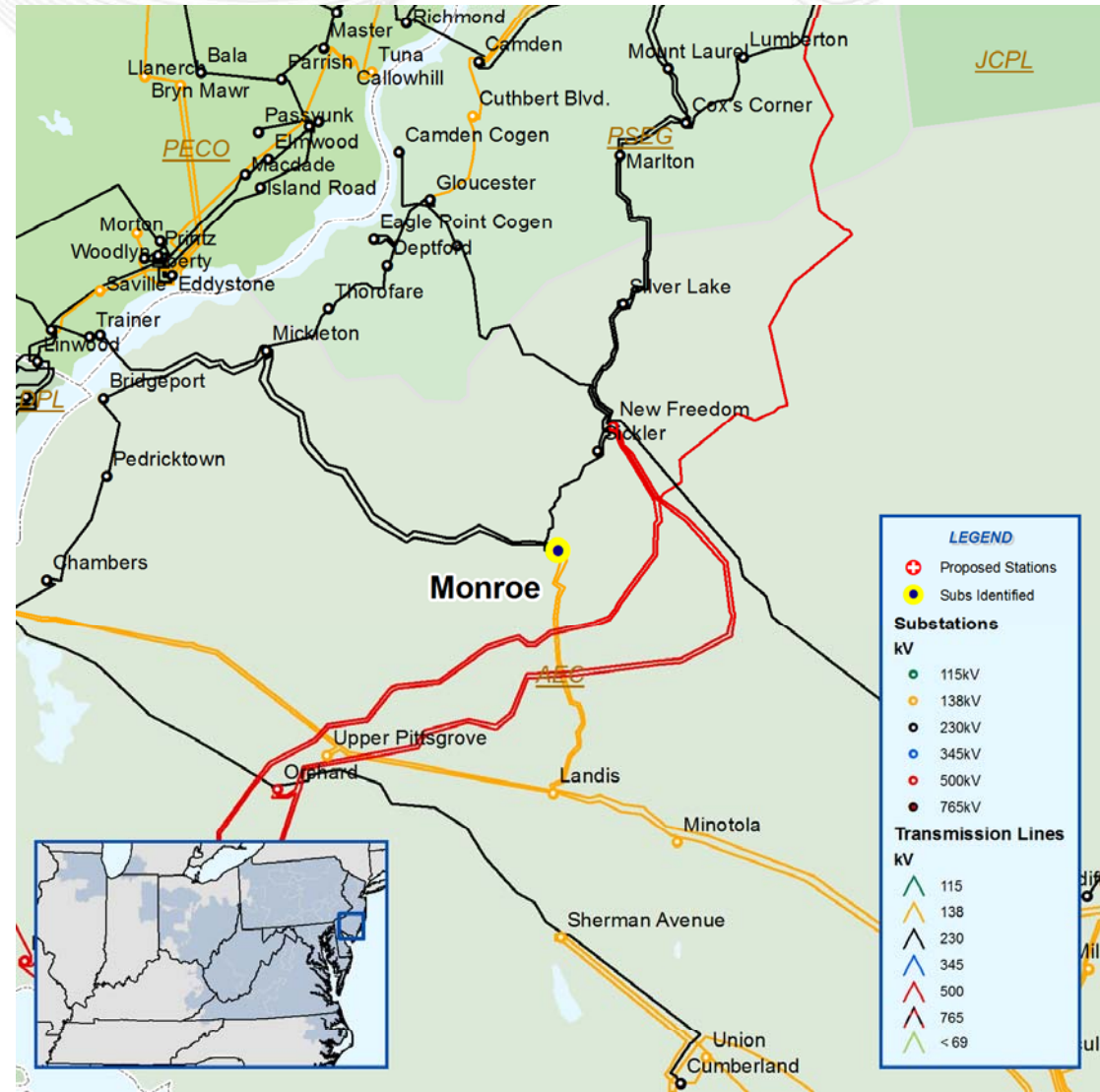
- Generation Deliverability
- The Corson 138/69 kV transformer # 2 is overloaded for the loss of the parallel transformer
- Proposed Solution: Upgrade the Corson Sub T2 terminal (B1195.1)
- Estimated Project Cost: \$0.1M
- Expected IS Date: 5/31/2011



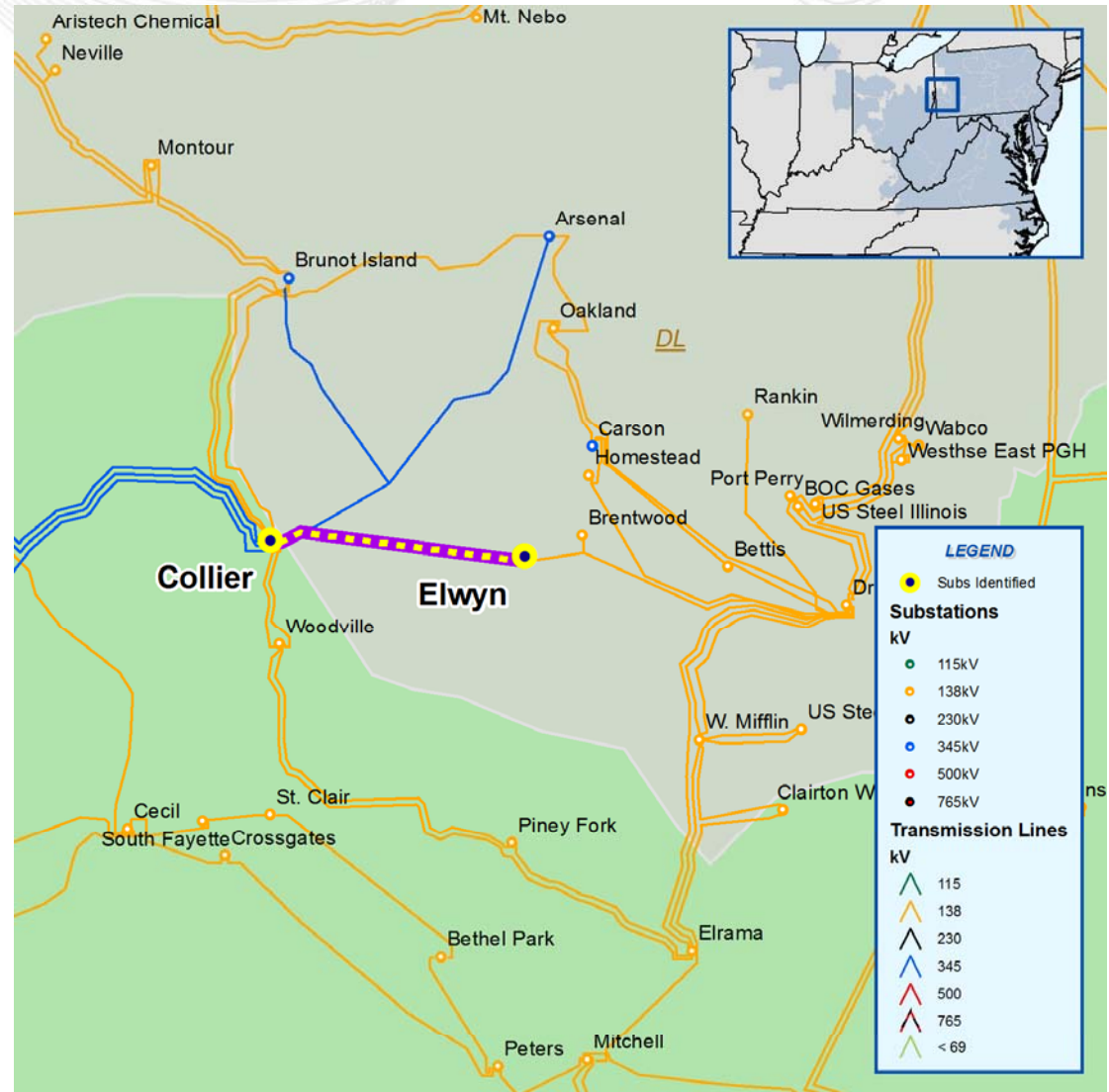
- Generation Deliverability
- The Corson 138/69 kV transformer # 1 is overloaded for the loss of the parallel transformer
- Proposed Solution: Upgrade the Corson Sub T1 terminal (B1195.2)
- Estimated Project Cost: \$0.3M
- Expected IS Date: 5/31/2012



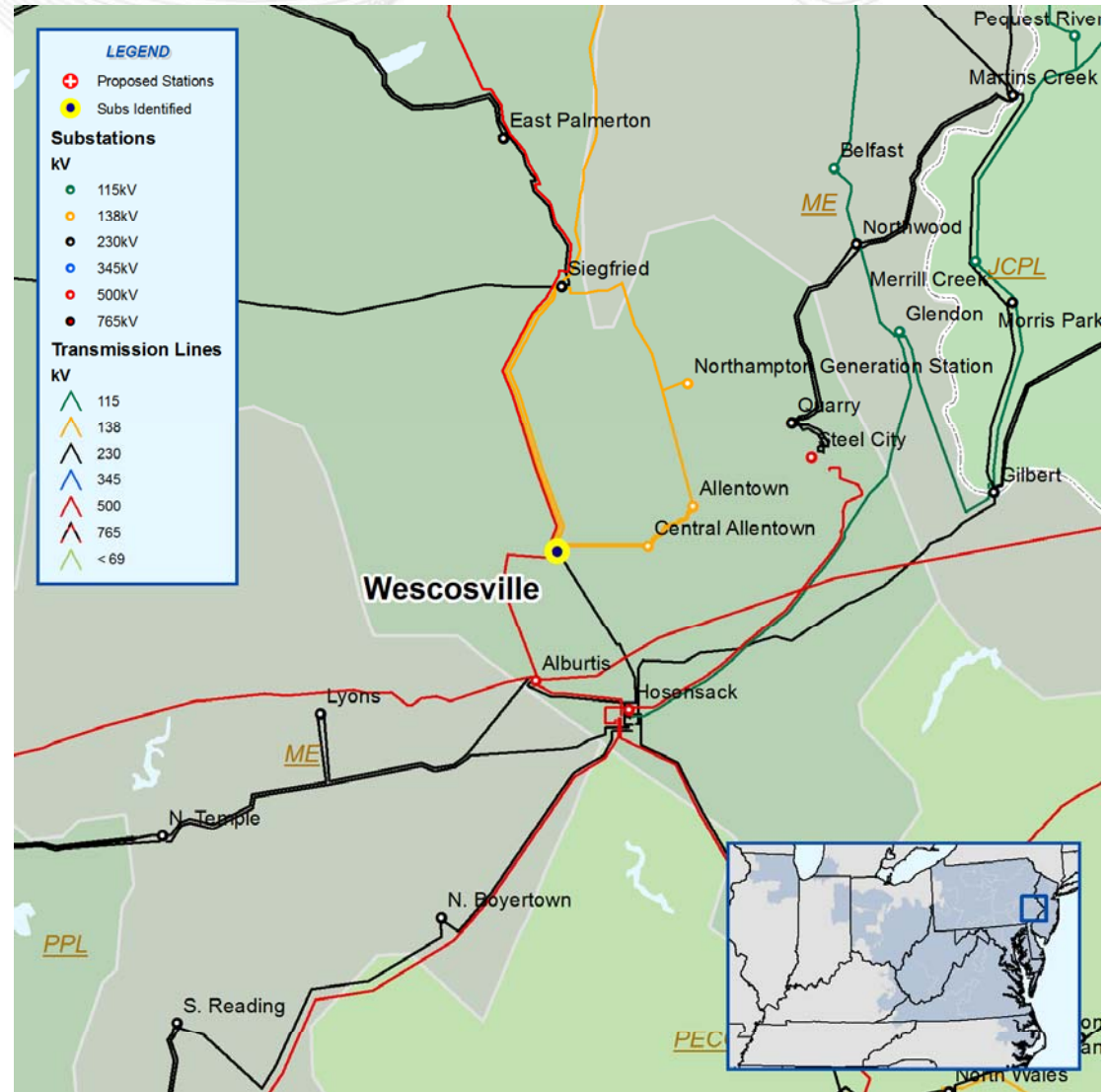
- Load Deliverability
- The Monroe 230/69 kV transformers # 2 and # 3 were overloaded and replaced in 2009 (B0267), as part of the project, a bus conductor will be upgraded to increase the rating of transformer # 2 (B0267.1)
- Estimated Project Cost: \$0.25M
- Expected IS Date: 5/31/2011



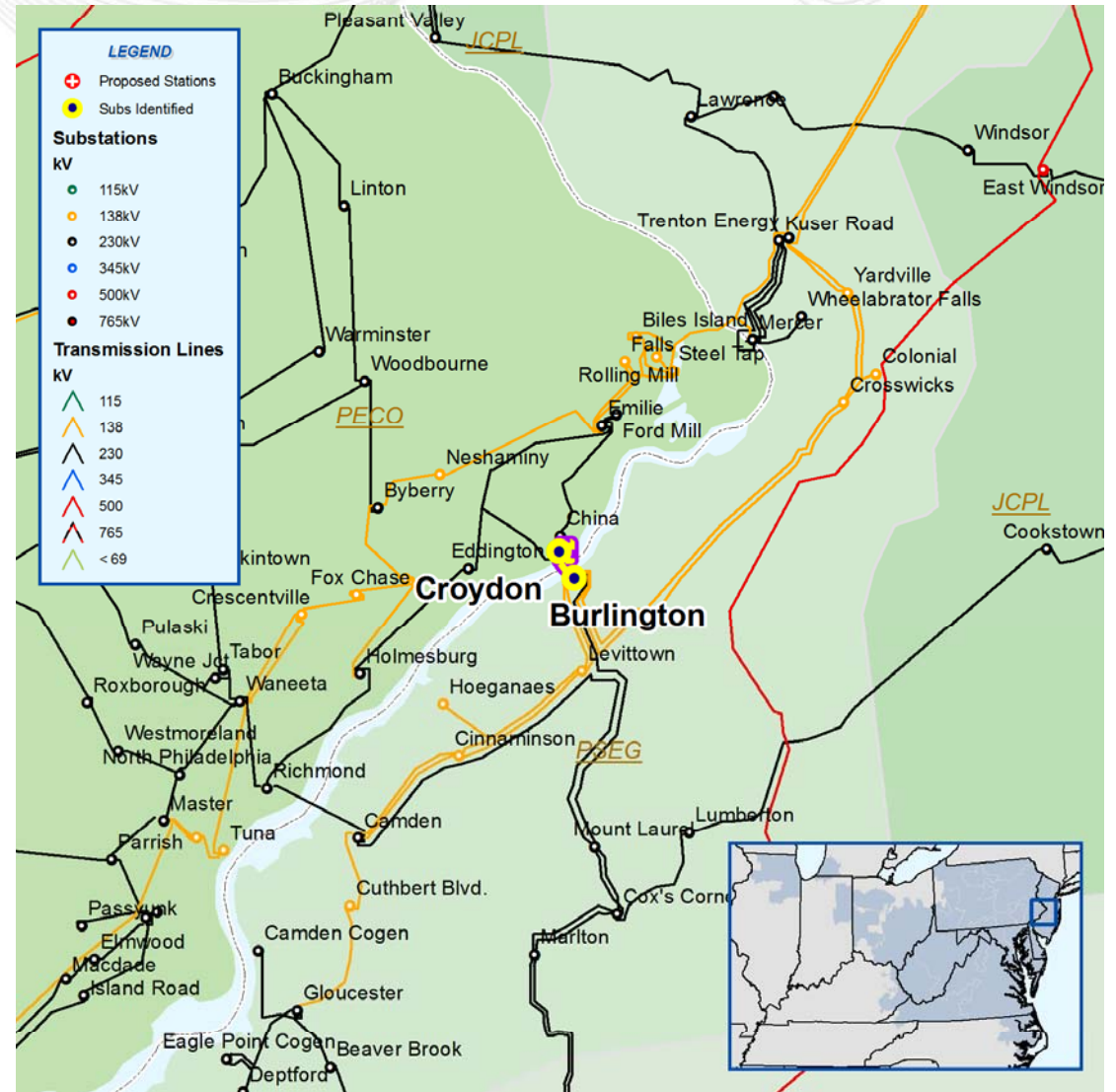
- DLCO planning criteria requires that *Transmission Supply to Bulk Stations* have three transmission sources
- Proposed Solution: Create a second Collier-Elwyn 138kV circuit (Z-162) by utilizing both sets of bifurcated conductors on the existing Collier-Elwyn (Z-62) 138kV circuit (B1174)
- Estimated Project Cost : \$3.88M
- Expected IS Date: 5/31/2011



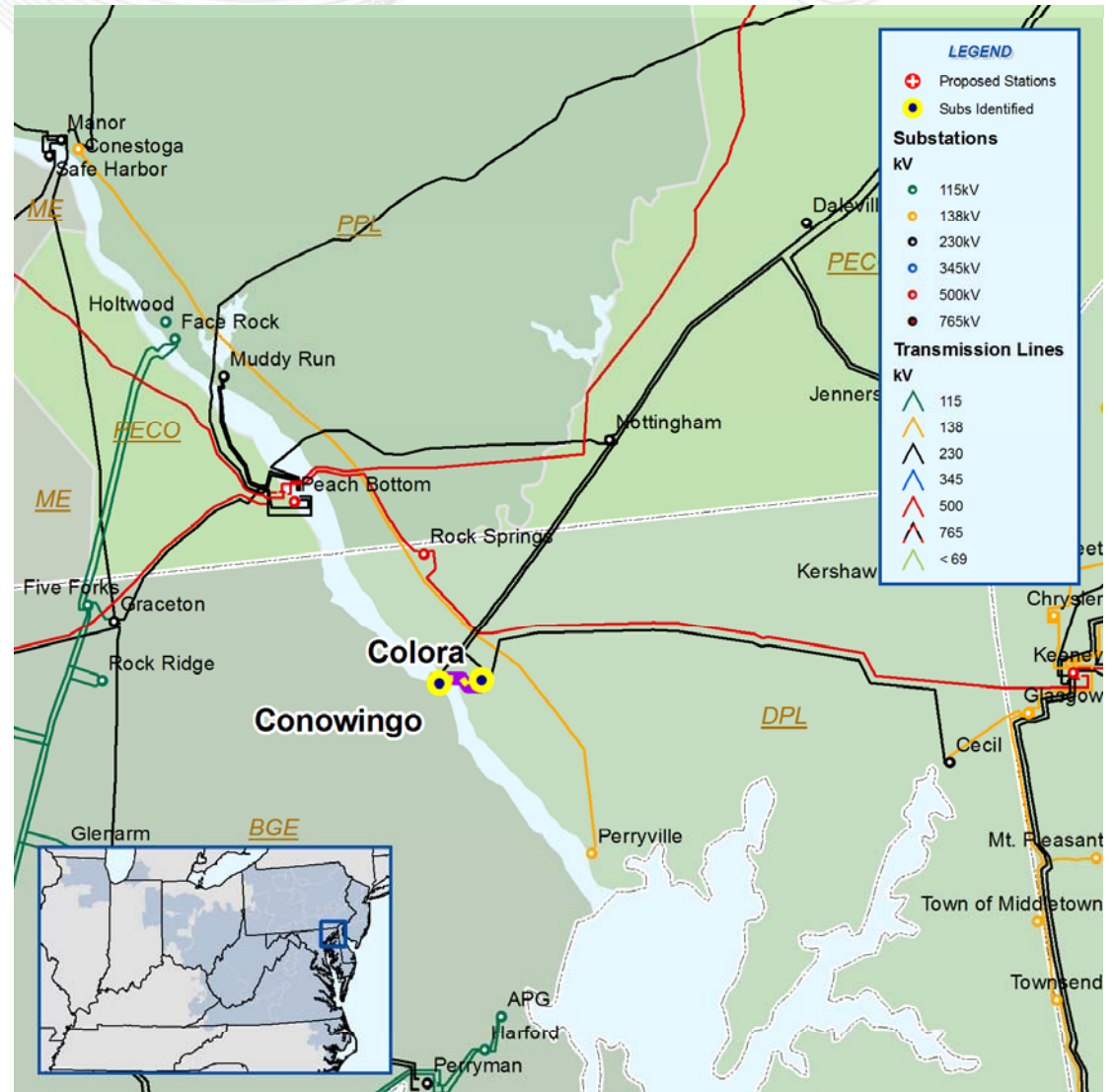
- Common Mode Outage Procedure
- The Wescosville 500/138 kV transformer is overloaded for a fault on either Siegfried transformer #4 or #5 with the stuck breaker at Siegfried 230 kV East-West bus tie breaker
- Proposed Solution: Remove the Siegfried bus tie breaker and install a new breaker on the Martins Creek 230 kV line west bay to maintain two ties between the 230 kV buses (B1196)
- Estimated Project Cost: \$1.0M
- Expected IS Date: 6/1/2013



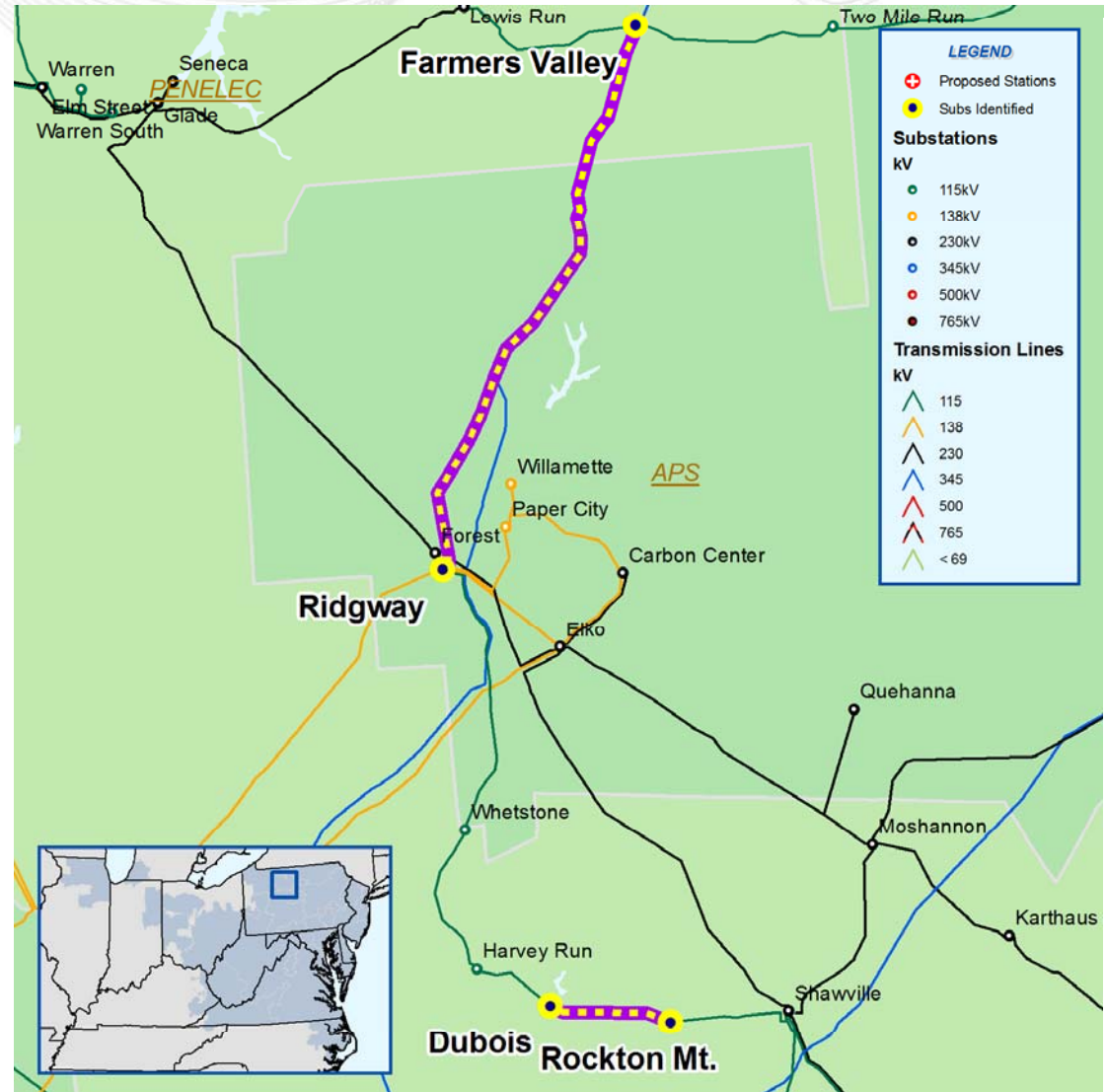
- Generation Deliverability and Common Mode Outage procedure
- The Burlington – Croydon 230 kV is overloaded for several contingencies
- Proposed Solution: Reconductor the PECO portion of the Burlington – Croydon circuit (B1197)
- Estimated Project Cost: \$1.0M
- Expected IS Date: 6/1/2015



- Generation Deliverability:
- Conowingo – Colora 230 kV is overloaded for the single contingency loss of either Conowingo – Nottingham 230 kV circuit
- Proposed Solution: Replace terminal equipment including station cable, disconnects, and relays at the Conowingo 230 kV station (B1198)
- Estimated Project Cost: \$0.5 M
- Expected IS Date: 6/1/2015



- N-1-1 Voltage Violation
- In 2014, voltage drop violations in the vicinity of Ridgway and Farmers Valley 115 kV for the loss of the Dubois – Rockton Mt. and Ridgway – Farmers Valley 115 kV circuits.
- Proposed Solution: Increase the size of the capacitor at Ridgway (B0564) to 25 MVAR.
- Estimated Project Cost: \$1.029 M
- Expected IS Date: 6/1/2013





Review Issues Tracking

- Continue MAAC voltage analysis, including alternatives
- Continue EMAAC voltage analysis, including alternatives
- Continue to develop proposed solutions for baseline reliability violations
- Coordinate MAAC and EMAAC solutions
- Sub-regional RTEP meetings scheduled
- Sensitivity analysis