



Market Efficiency Update

Transmission Expansion Advisory Committee

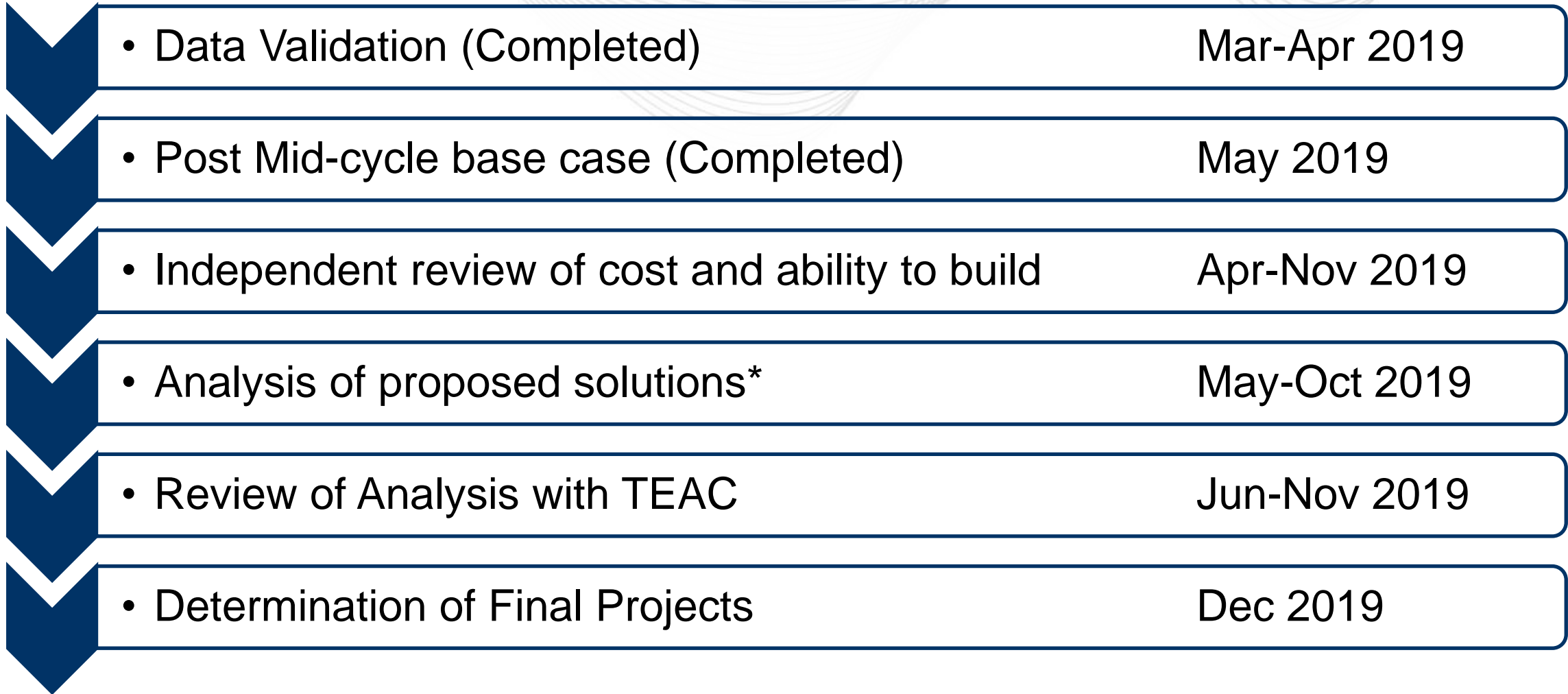
May 16, 2019

Nick Dumitriu, Market Simulation

2018/19 Market Efficiency Window

- 22 proposals addressing Hunterstown - Lincoln 115 kV
 - 19 Greenfields
 - \$5M - \$291M
 - 3 Upgrades
 - \$7M - \$137M
- 10 proposals on interregional congestion drivers
 - 5 Greenfields
 - \$19M - \$266M
 - 5 Upgrades
 - \$0.1M - \$36M
- 2 proposals not addressing PJM-identified congestion drivers
- 11 Proposing entities (including 1 joint proposal)
- 6 battery proposals and 1 Smart Wire proposal

* Updated on 5/10/2019 to reflect new proposals summary

A vertical timeline graphic on the left side of the slide, consisting of six downward-pointing chevrons in a dark blue color, each corresponding to a row in the table.

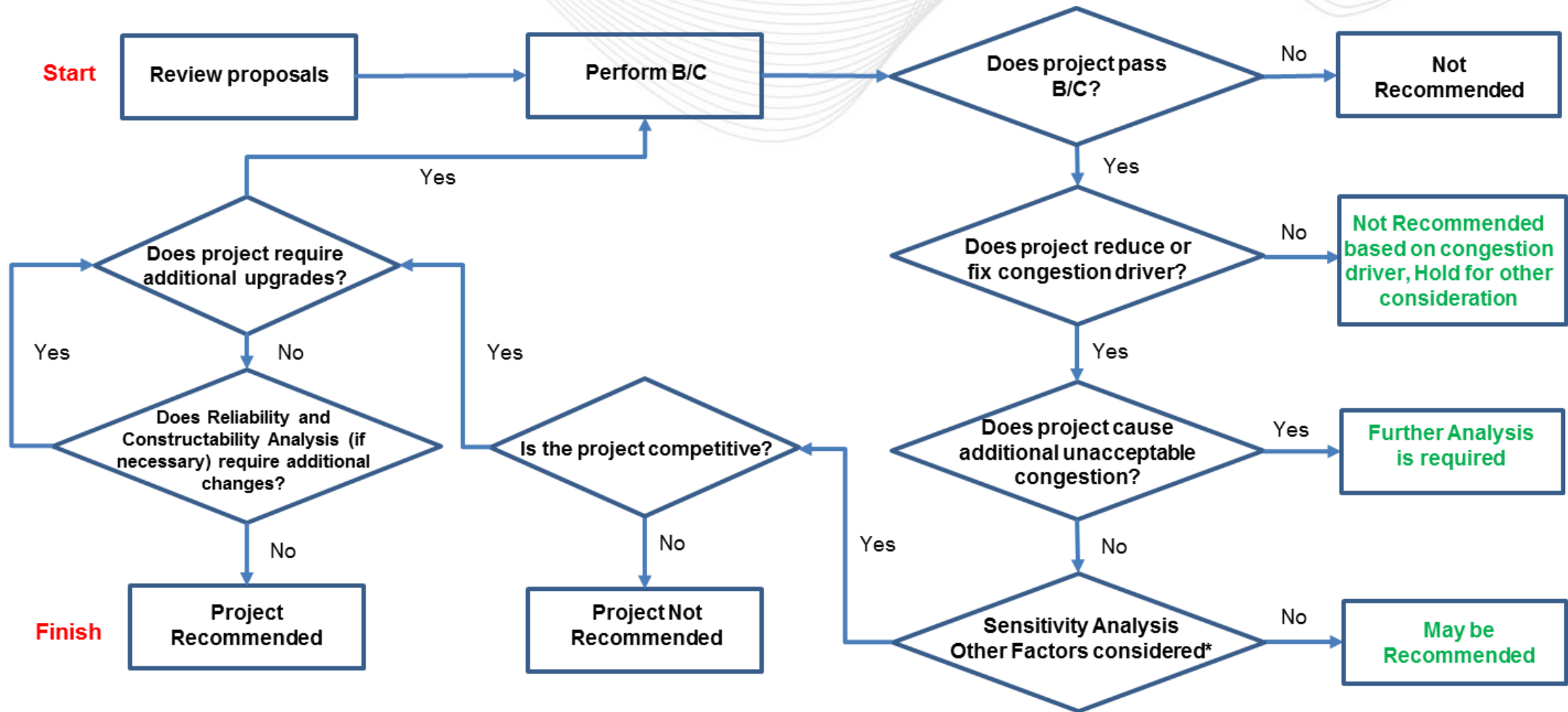
• Data Validation (Completed)	Mar-Apr 2019
• Post Mid-cycle base case (Completed)	May 2019
• Independent review of cost and ability to build	Apr-Nov 2019
• Analysis of proposed solutions*	May-Oct 2019
• Review of Analysis with TEAC	Jun-Nov 2019
• Determination of Final Projects	Dec 2019

* Due to the need to coordinate with MISO, interregional proposals will be analyzed first.

- Completed Mid-cycle update of major assumptions
 - Demand Forecast
 - Generation Expansion
 - Fuel/Emission Prices
 - Topology Updates
 - Con/Mon Updates
- Posted updated Input Assumptions White Paper
 - <https://www.pjm.com/committees-and-groups/committees/teac.aspx>
- Posted Base Case mid-cycle update and Base Case congestion results
 - <https://www.pjm.com/planning/rtep-development/market-efficiency/economic-planning-process.aspx>
 - Note: No-FSA sensitivity case and congestion results will be posted in the following weeks

- PJM completed data validation for all proposals.
 - Individual description of proposals can be found in Appendix B
- For all proposals, PJM staff is currently performing preliminary N-1 contingency analysis to determine flowgates to monitor
- Currently finalizing the PROMOD models for interregional proposals
 - By June TEAC, expected to complete first round of simulations for interregional proposals
- Analysis of Hunterstown-Lincoln proposals to be performed after completing the interregional proposals analysis

Market Efficiency Project Selection Process



Appendix A

2018/19 Long Term Window Proposals Received



Proposal Statistics by Target Congestion Driver*

Congestion Driver	Transmission Zone	Greenfield Proposals Count	Upgrade Proposals Count	Total Proposals Count	Cost Range
Hunterstown - Lincoln 115 kV	METED	19	3	22	\$5M - \$291M
Bosserman - Trail Creek 138 kV	AEP-MISOE	4	1	5	\$14M - \$266M
Marblehead XFMR	MISOC	1	1	2	\$36M
Monroe 1&2 - Wayne 345 kV	MISOE	-	3	3	\$0.1M - \$0.5M
No PJM Driver	-	1	1	2	\$2M - \$14M
Total	-	25	9	34	-

* Updated on 5/10/2019 to reflect new proposals summary

ID	Proposal Description	Greenfield /Upgrade	Project Cost (In-Service \$M)	In-Service Year	Appendix B Slide #
398	New Meadow Lake-Pike Creek 345kV line.	Greenfield	\$266.44	2023	20
249	A 50 MW 4-hour battery at Trail Creek 138 kV station.	Greenfield	\$45.40	2022	19
129	New Kuchar station cutting into Bosserman–Liquid Carbonics 138 kV line. New Kutchar-Luchtman 138kV line.	Greenfield	\$27.62	2023	18
436	New Toto 345kV station interconnecting Olive-Reynolds #1, Olive-Reynolds #2, and Schahfer-Burr Oak 345kV lines.	Greenfield	\$19.31	2023	21
481	Reconductor Michigan City-Trail Creek-Bosserman 138 kV and Maple-LNG 138 kV circuits.	Upgrade	\$14.10	2023	22

* Updated on 5/10/2019 to reflect new proposals summary

ID	Proposal Description	Greenfield /Upgrade	Project Cost (In-Service \$M)	In-Service Date	Appendix B Slide #
506	Rebuild Palmyra-Marblehead 161 kV and Marblehead-Herleman 138 kV lines. New Maywood-Palmyra 345 kV line.	Greenfield	\$36.02	2023	24
322	Rebuild Palmyra-Marblehead 161 kV and Marblehead-Herleman 138 kV lines. New 345 kV ring bus at the Palmyra substation.	Upgrade	\$35.95	2023	23

ID	Proposal Description	Greenfield /Upgrade	Project Cost (In-Service \$M)	In-Service Date	Appendix B Slide #
782	Upgrade Monroe-Wayne 345 kV line rating by replacing switches at the 345kV Wayne station.	Upgrade	\$0.46	2023	27
078	Modify the Monroe-Wayne 345 kV line impedance to significantly reduce line flows.	Upgrade	\$0.10	2023	25
775	Reconfigure the Monroe-Coventry 345 kV line that runs adjacent to the Monroe-Wayne line on common structures.	Upgrade	\$0.10	2023	26

* Updated on 5/10/2019 to reflect new proposals summary



Hunterstown - Lincoln 115 kV

ID	Proposal Description	Greenfield /Upgrade	Project Cost (In-Service \$M)	In-Service Date	Appendix B Slide #
616	Build a new Wentz-Carroll 230 kV line and a new Peach Bottom-Graceton 230 kV line. Increase ratings of Carroll-Mt. Airy 230 kV line.	Greenfield	\$290.95	2024	42
593	Build a new Littlestown-Germantown 115 kV line and a new Peach Bottom-Graceton 230 kV line.	Greenfield	\$183.69	2024	41
387	Build a new Wentz-Carroll 230 kV line. Increase ratings of Carroll-Mt. Airy 230 kV line.	Greenfield	\$152.18	2024	34
389	Rebuild Hunterstown-Lincoln 115 kV line. Build a new Peach Bottom-Graceton 230 kV line.	Greenfield	\$147.64	2024	35
034	Rebuild the Hunterstown-Lincoln-Germantown 115 kV and Germantown-Carrol 138 kV corridors as a new Hunterstown-Carroll 230 kV circuit.	Upgrade	\$136.64	2023	30
868	Build a new Delta Tap-Conastone 500 kV line. Build a new 115 kV ring bus at the Lincoln tap connecting Orrtanna, Hunterstown and Lincoln 115 kV buses. Replace Face Rock 115/69 kV transformers.	Greenfield	\$122.08	2023	47

ID	Proposal Description	Greenfield /Upgrade	Project Cost (In-Service \$M)	In-Service Date	Appendix B Slide #
511	Build a new 115 kV ring bus at the Lincoln tap connecting Orrtanna, Hunterstown and Lincoln 115 kV buses. Build a new Otter Creek 500/230 kV substation connecting to the existing Otter Creek 230 kV switchyard. Upgrade the existing Otter Creek-Conastone 230 kV line. Replace Face Rock 115/69 kV transformers. Reconductor Manor-Graceton 230 kV.	Greenfield	\$95.47	2023	40
357	Build a new Robinson Run-Graceton 230 kV line. Rebuild Cooper-Graceton 230 kV line. Build a new Hunterstown-Green Valley 230 kV line.	Greenfield	\$91.35	2023	33
847	Build a new Robinson Run-Graceton 230 kV line. Rebuild of Cooper-Graceton 230 kV line. Reconductor Hunterstown-Lincoln 115 kV line.	Greenfield	\$56.00	2023	46



Hunterstown - Lincoln 115 kV

ID	Proposal Description	Greenfield /Upgrade	Project Cost (In-Service \$M)	In-Service Date	Appendix B Slide #
647	Build a new 115 kV ring bus at the Lincoln tap connecting Orrtanna, Hunterstown and Lincoln 115 kV buses. Build a new Otter Creek 500/230 kV substation connecting to the existing Otter Creek 230 kV switchyard. Replace Face Rock 115/69 kV transformers. Reconductor Manor-Graceton 230 kV line.	Greenfield	\$55.12	2023	44
021	Rebuild Hunterstown-Lincoln 115 kV. Build a new Peach Bottom-Graceton 230 kV circuit. Upgrade Face Rock 115/69 kV transformers.	Upgrade	\$54.74	2023	29
830	Build a new Littlestown-Germantown 115 kV line.	Greenfield	\$44.92	2024	45
892	Install a 50 MW 2-hour battery at Lincoln 115 kV substation.	Greenfield	\$28.98	2021	48
453	Install a 25 MW 4-hour battery at Lincoln 115 kV substation.	Greenfield	\$26.69	2021	38
402	Build a new Hunterstown-Lincoln 115 kV line. Install a 25 MW 2-hour battery at Lincoln 115 kV substation.	Greenfield	\$25.81	2021	36

ID	Proposal Description	Greenfield /Upgrade	Project Cost (In-Service \$M)	In-Service Date	Appendix B Slide #
413	Build a new Hunterstown-Lincoln 115 kV line. Install a 10 MW 2-hour battery at Lincoln 115 kV substation.	Greenfield	\$19.22	2021	37
201	Install a 25 MW 2-hour battery at Lincoln 115 kV station.	Greenfield	\$17.36	2021	31
960	Build a new Hunterstown-Lincoln 115 kV line.	Greenfield	\$10.13	2021	49
293	Build a new Meade 115 kV substation with outgoing lines to Orrtanna, Hunterstown, and Lincoln substations.	Greenfield	\$8.95	2023	32
007	Build a new 115 kV ring bus at the Lincoln tap connecting Orrtanna, Hunterstown and Lincoln 115 kV buses.	Greenfield	\$7.58	2023	28
622	Rebuild the Hunterstown-Lincoln 115 kV line.	Upgrade	\$7.21	2023	43
469	Install a Smart Wire with 5% of series reactance along the Lincoln Tap-Hunterstown 115 kV line.	Greenfield	\$4.65	2022	39

Appendix B

2018/19 Long Term Window

Individual Proposal Descriptions

Project ID: 201819_BT_129

Proposed Solution:

Establish a new 138 kV Kuchar station cutting into the Bosserman-Liquid Carbonics 138 kV line. Build a new Kuchar - Luchtman 138kV line. Establish The Bosserman-Liquid Carbonics 138 kV cut in (Kuchar 138 kV Extension Line). Upgrade Luchtman 138 kV station.

kV Level: 138 kV

In-Service Cost (\$M): \$27.62

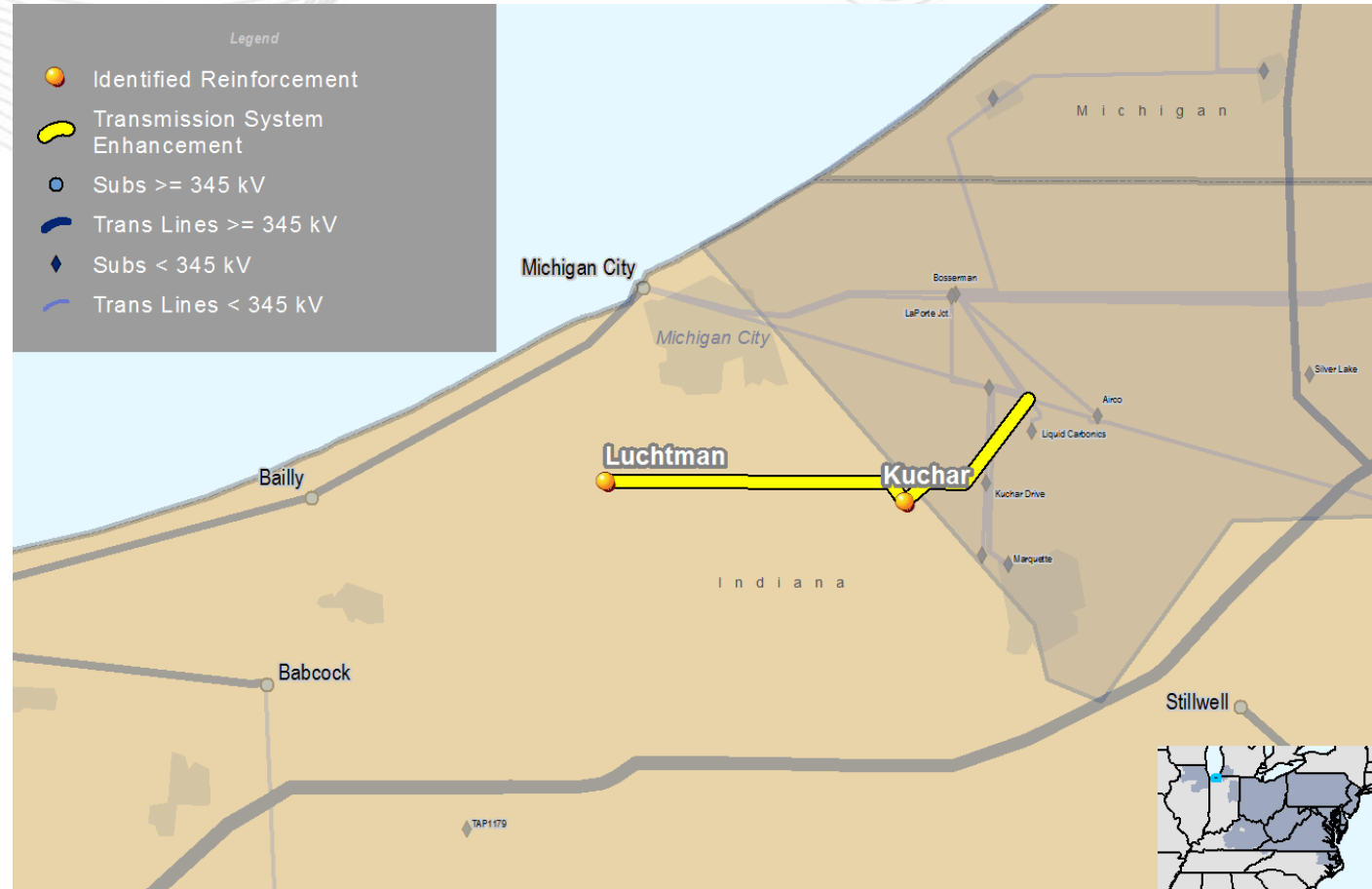
In-Service Year: 2023

Target Zone: AEP/MISOE

ME Constraints:

Bosserman - Trail Creek 138kV

Notes:



Project ID: 201819_BT_249

Proposed Solution:

Build a 50 MW 4-hour Warnke Battery Energy Storage System (BESS) to be connected to Trail Creek 138 kV station. Upgrade Trail Creek 138 kV station.

kV Level: 138 kV

In-Service Cost (\$M): \$45.40

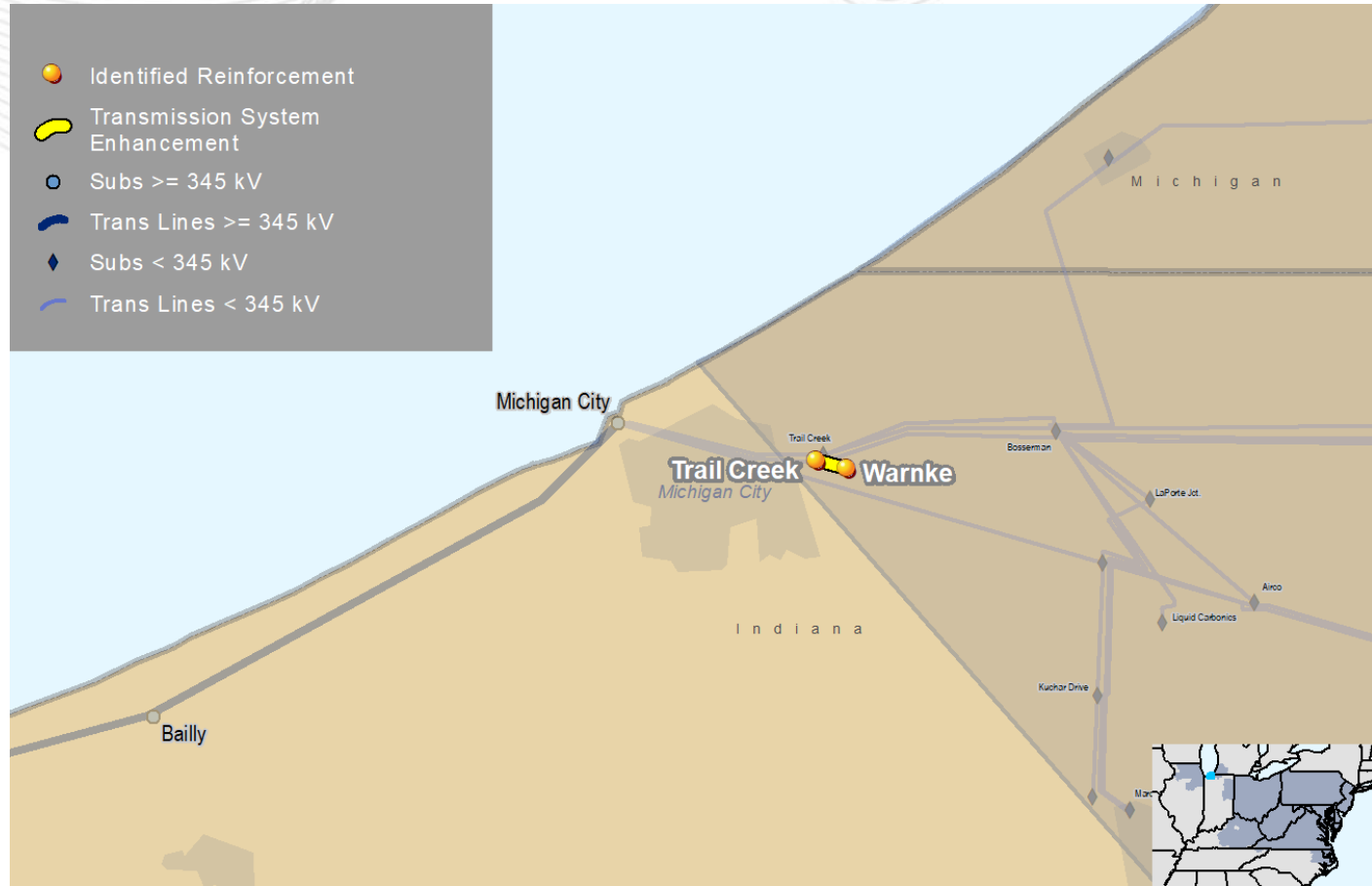
In-Service Year: 2022

Target Zone: AEP/MISOE

ME Constraints:

Bosserman - Trail Creek 138kV

Notes:



Project ID: 201819_BT_398

Proposed Solution:

Establish a new 345 kV Pike Creek station near the intersection of the 345 kV Bloom-Davis Creek and the 345 kV Burnham-Davis Creek lines. Build a new Meadow Lake-Pike Creek 345kV line. Upgrade Meadow Lake 345 kV station.

kV Level: 345 kV

In-Service Cost (\$M): \$266.44

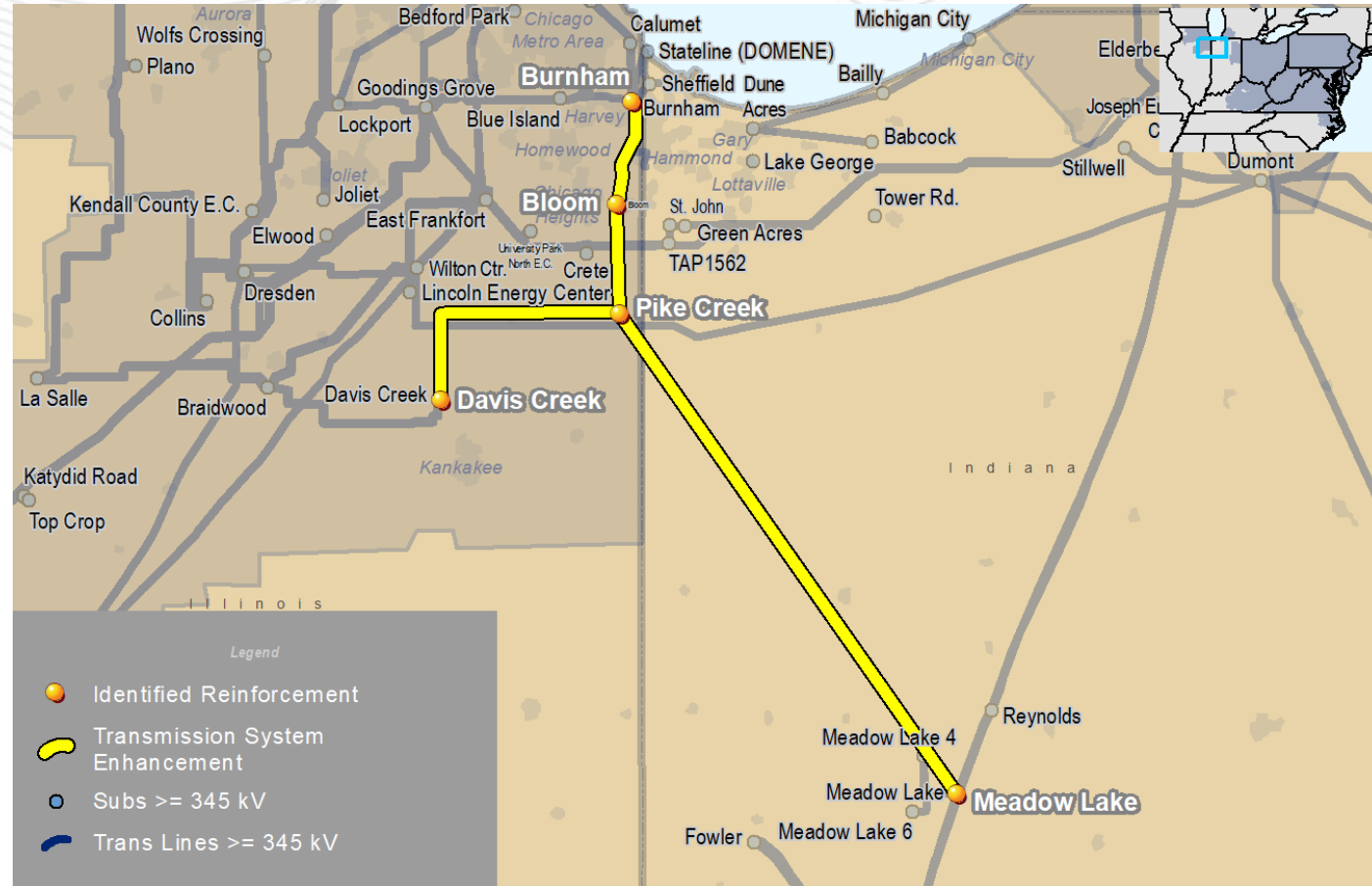
In-Service Year: 2023

Target Zone: AEP/MISOE

ME Constraints:

Bosserman - Trail Creek 138kV

Notes:



Project ID: 201819_BT_436

Proposed Solution:

Build a new Toto 345kV station, interconnecting the existing Olive-Reynolds #1, Olive-Reynolds #2, and Schahfer-Burr Oak 345kV transmission lines with a new 345kV switching station.

kV Level: 345 kV

In-Service Cost (\$M): \$19.31

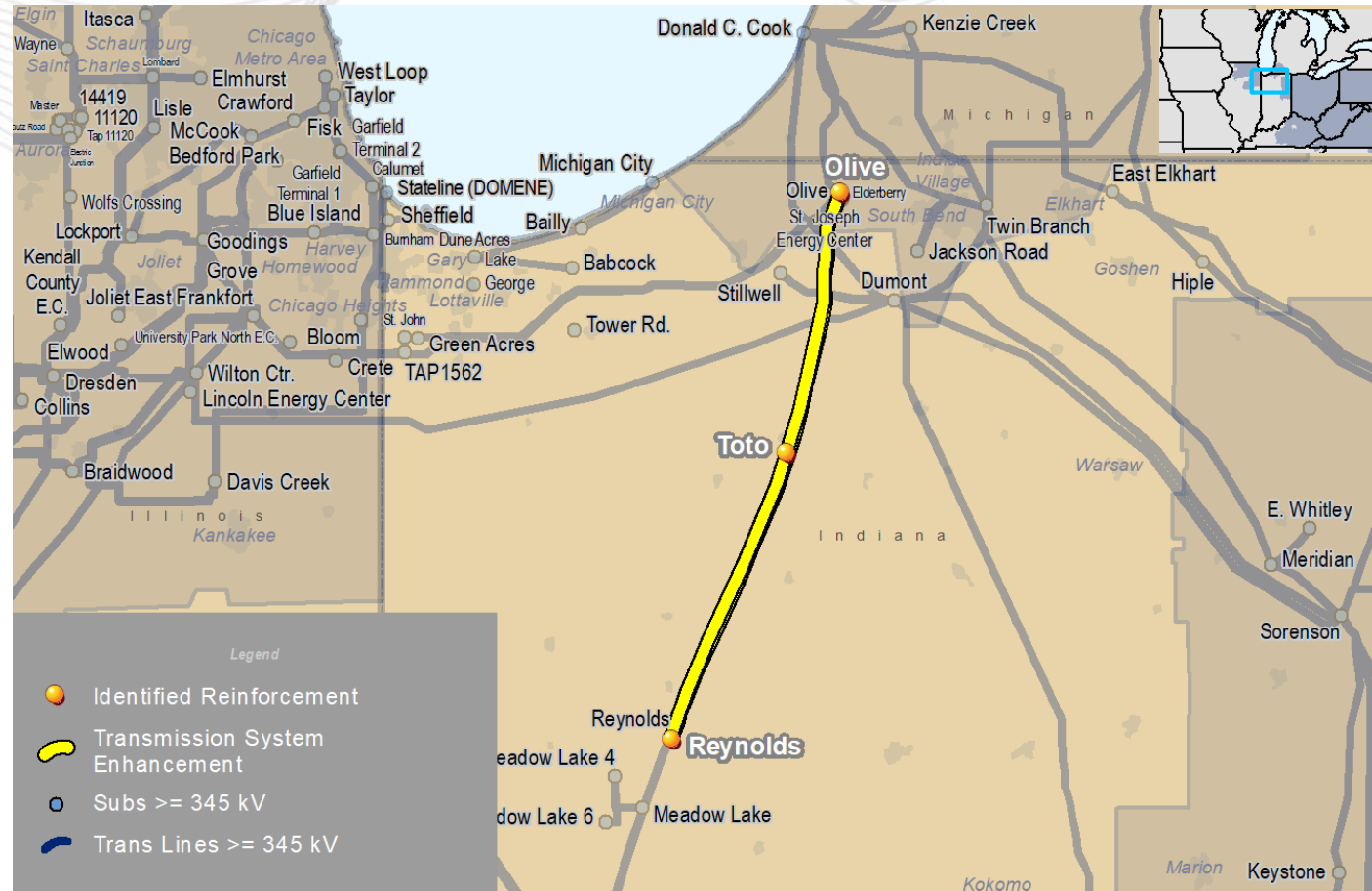
In-Service Year: 2023

Target Zone: AEP/MISOE

ME Constraints:

Bosserman - Trail Creek 138kV

Notes:



Project ID: 201819_BT_481

Proposed Solution:
 Reconductor Michigan City-Trail Creek-Bosserman 138 kV circuits. Reconductor Maple-LNG 138 kV circuit. Upgrade Michigan City, Trail Creek, Maple and LNG terminals.

kV Level: 138 kV

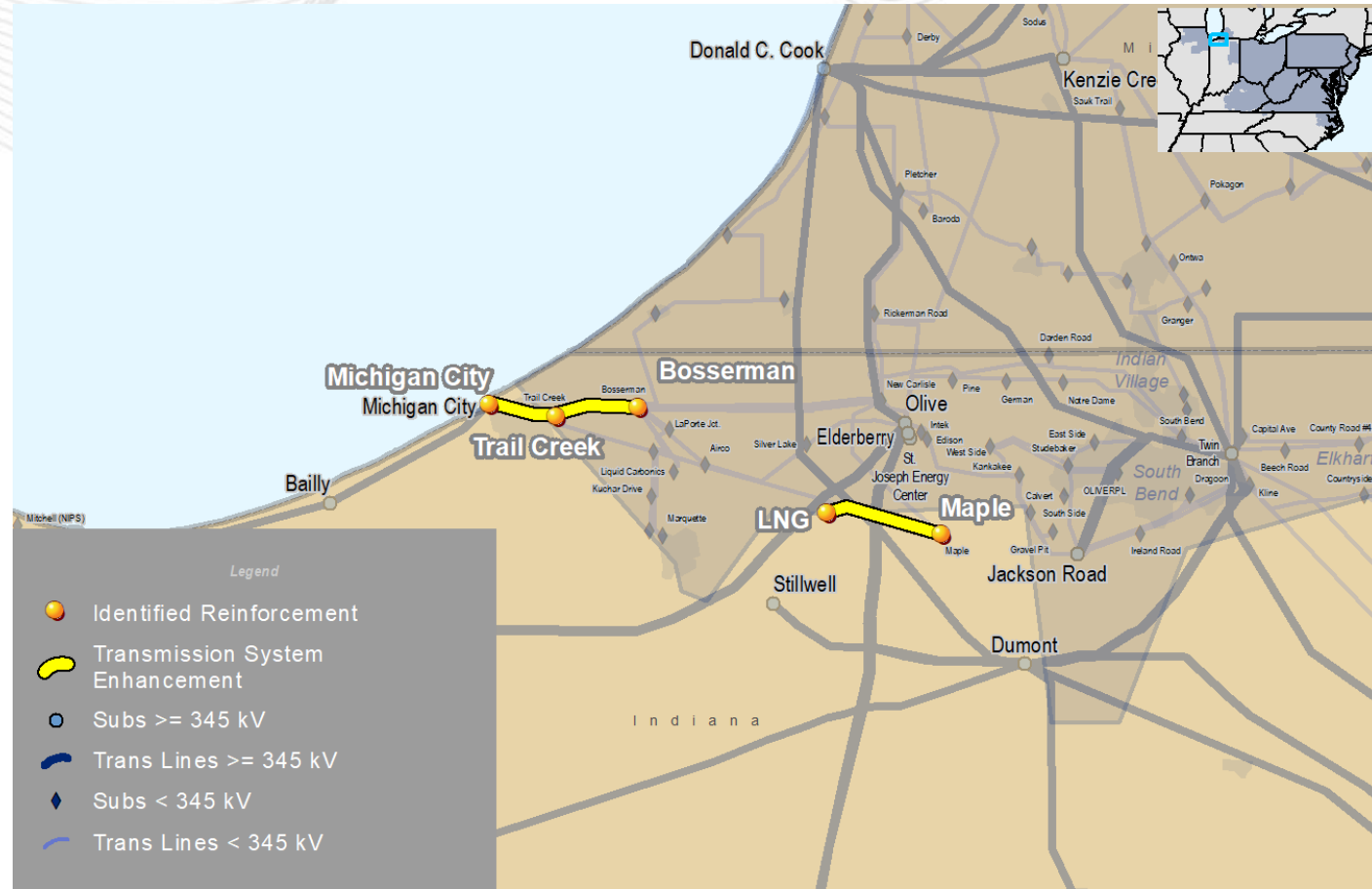
In-Service Cost (\$M): \$14.10

In-Service Year: 2023

Target Zone: AEP/MISOE

ME Constraints:
 Bosserman - Trail Creek 138kV

Notes:



Project ID: 201819_MH_322

Proposed Solution:

Rebuild Palmyra-Marblehead 161 kV as a 345 kV/161 kV double circuit line, and Marblehead-Herleman 138 kV as a 345 kV/138 kV double circuit line. Upgrade Herleman substation. Construct a 345 kV ring bus at the Palmyra substation.

kV Level: 345 kV

In-Service Cost (\$M): \$35.95

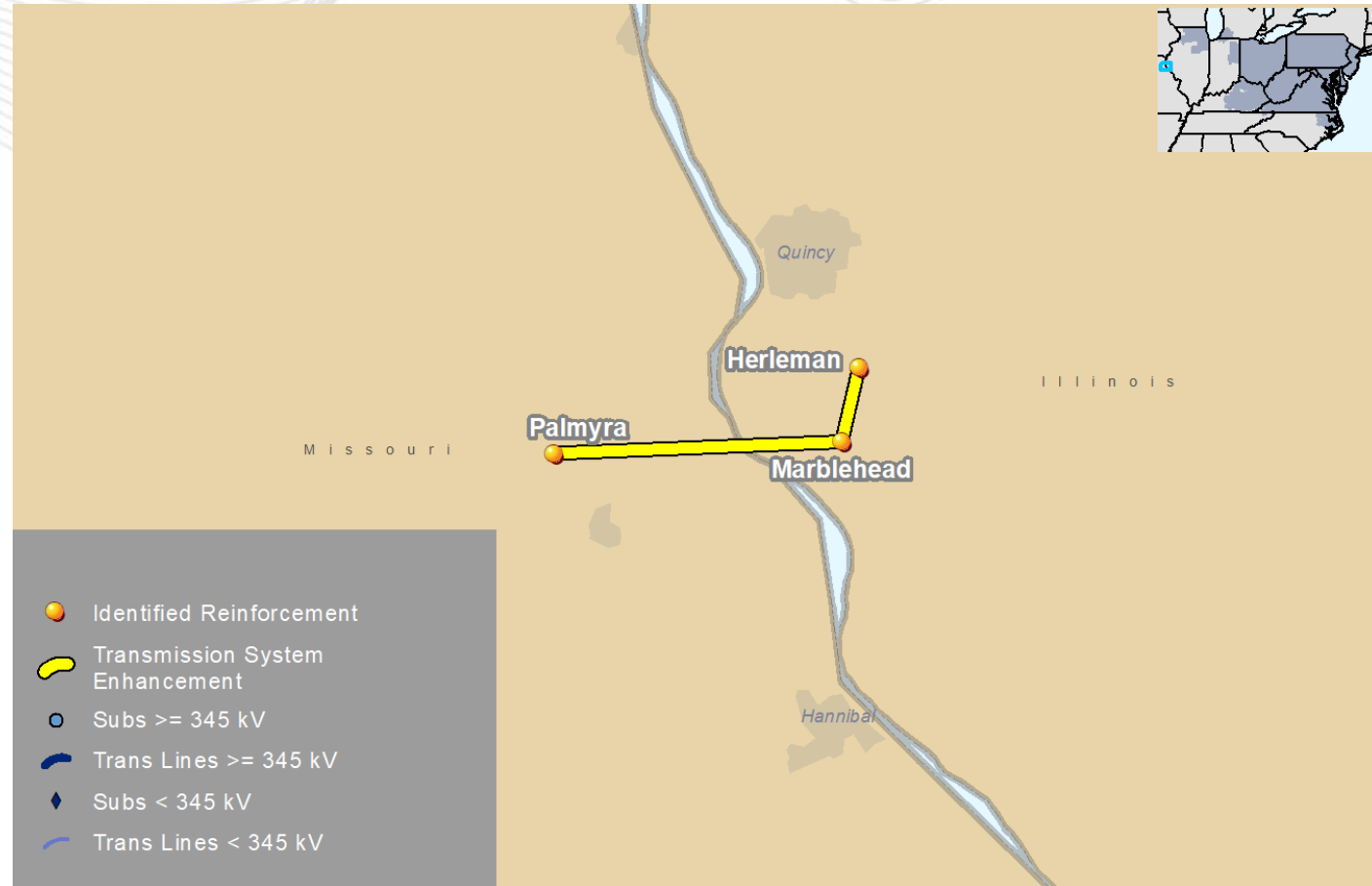
In-Service Year: 2023

Target Zone: MISOC

ME Constraints:

Marblehead Transformer

Notes:



Project ID: 201819_MH_506

Proposed Solution:

Rebuild Palmyra-Marblehead 161 kV as a 345 kV/161 kV double circuit line, and Marblehead-Herleman 138 kV as a 345 kV/138 kV double circuit line. Construct Maywood-Palmyra 345 kV line. Upgrade Herleman and Maywood substations.

kV Level: 345 kV

In-Service Cost (\$M): \$36.02

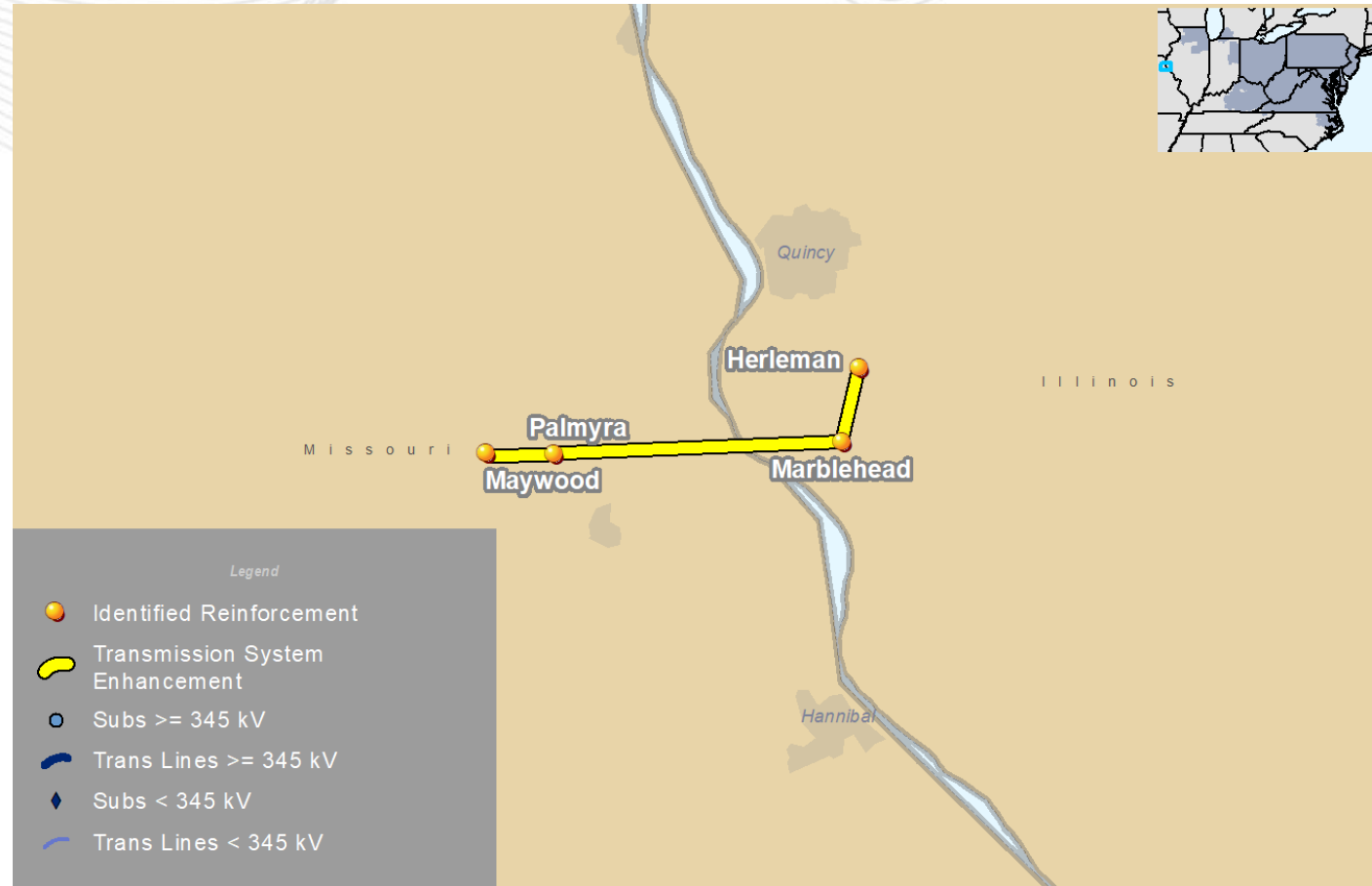
In-Service Year: 2023

Target Zone: MISOC

ME Constraints:

Marblehead Transformer

Notes:



Project ID: 201819_MW_078

Proposed Solution:
 Modify the Monroe-Wayne 345 kV line impedance to significantly reduce line flows.

kV Level: 345 kV

In-Service Cost (\$M): \$0.10

In-Service Year: 2023

Target Zone: MISOE

ME Constraints:
 Monroe 1&2 - Wayne 345 kV

Notes:



Project ID: 201819_MW_775

Proposed Solution:
 Reconfigure the Monroe-Coventry 345 kV line that runs adjacent to the Monroe-Wayne line on common structures.

kV Level: 345 kV

In-Service Cost (\$M): \$0.10

In-Service Year: 2023

Target Zone: MISOE

ME Constraints:
 Monroe 1&2 - Wayne 345 kV

Notes:



Project ID: 201819_MW_782

Proposed Solution:
 Upgrade Monroe-Wayne 345 kV line rating by replacing switches at the 345kV Wayne station.

kV Level: 345 kV

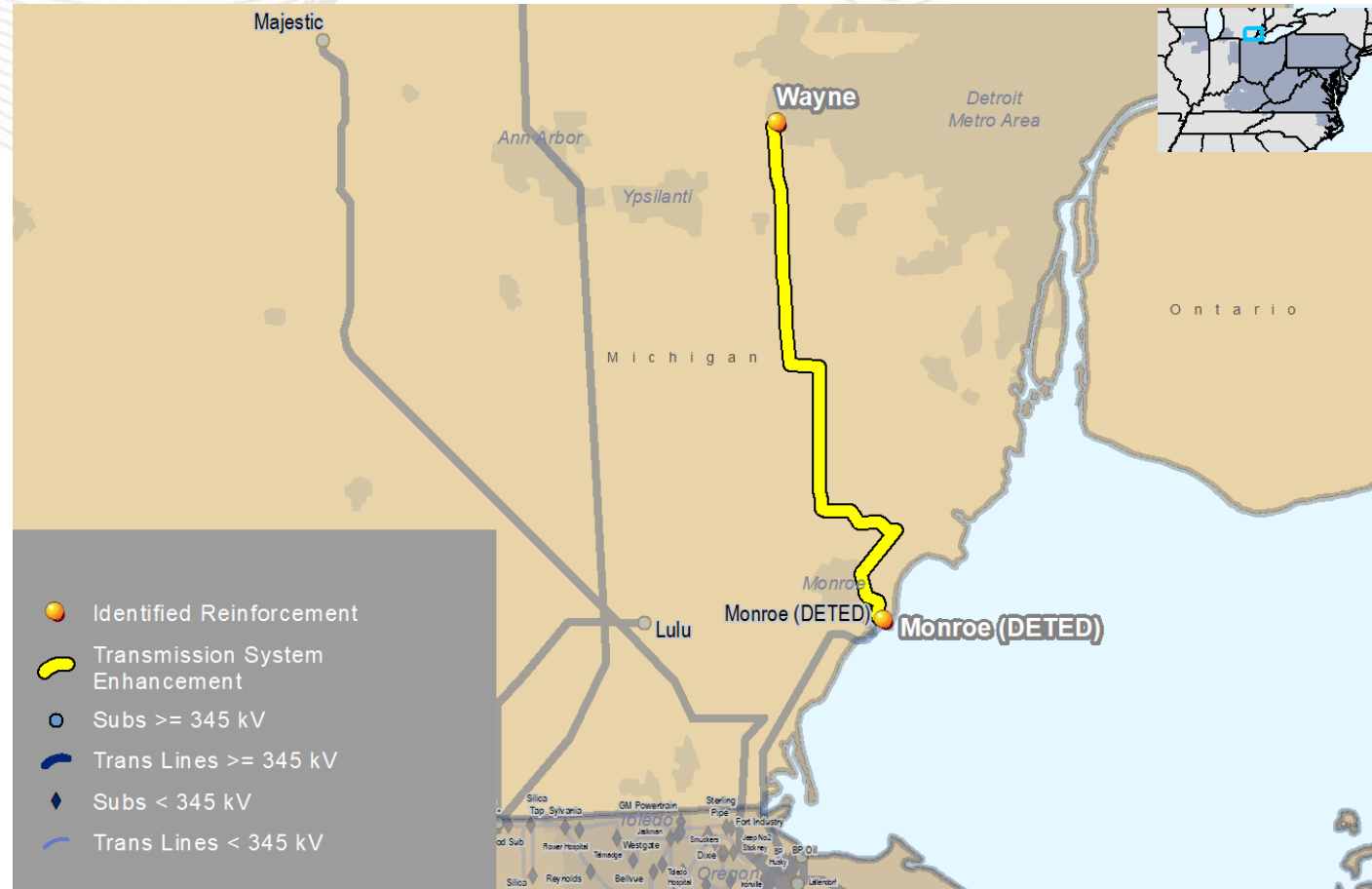
In-Service Cost (\$M): \$0.46

In-Service Year: 2023

Target Zone: MISOE

ME Constraints:
 Monroe 1&2 - Wayne 345 kV

Notes:



Project ID: 201819_HL_007

Proposed Solution:

Install a new 115 kV ring bus at the Orrtanna tap point of the METED Hunterstown-Orrtanna-Lincoln 115 kV 963 line.

kV Level: 115 kV

In-Service Cost (\$M): \$7.58

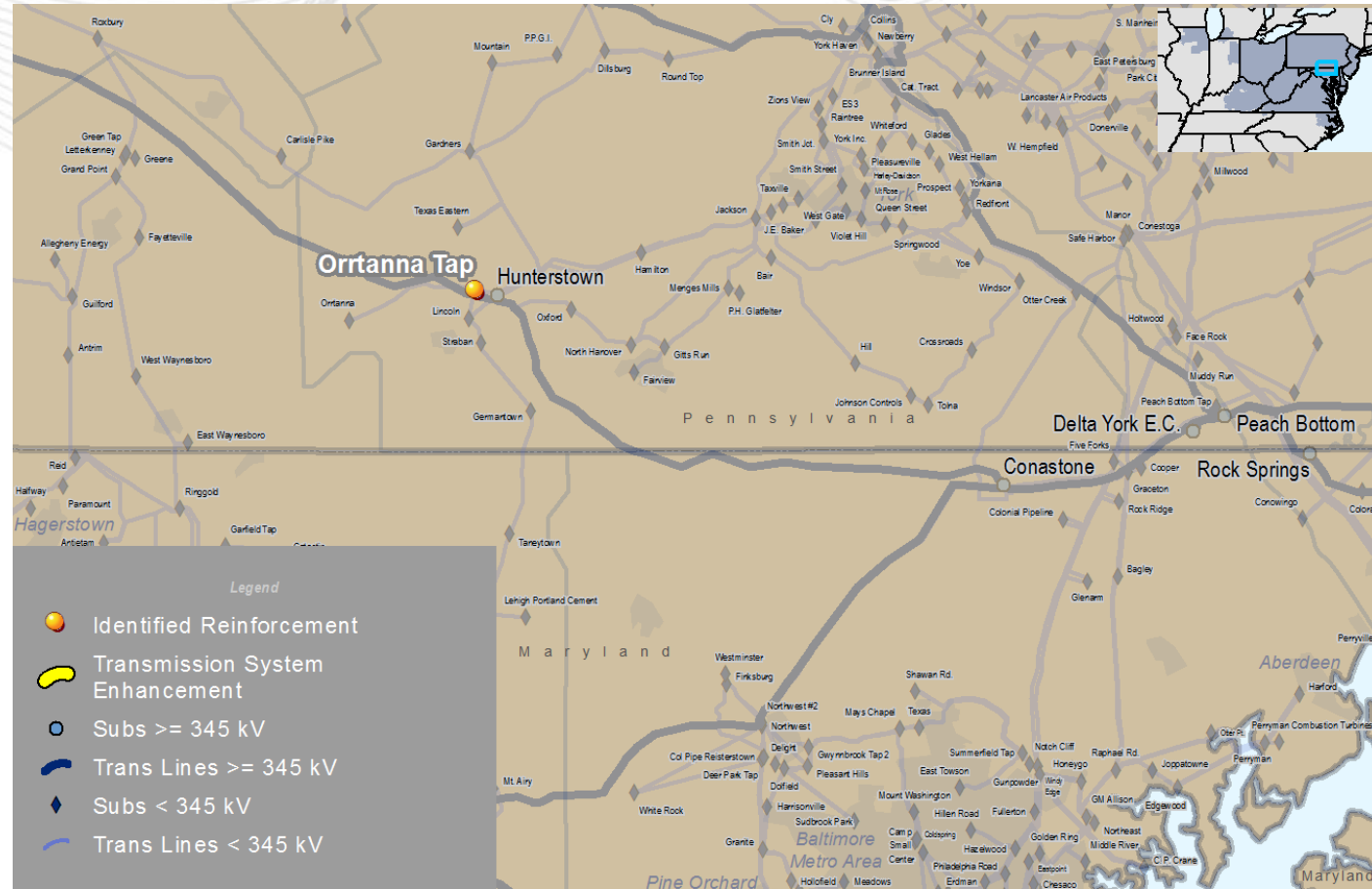
In-Service Year: 2023

Target Zone: METED

ME Constraints:

Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_021

Proposed Solution:

Rebuild the Hunterstown-Lincoln 115 kV line. Create a new Peach Bottom-Graceton 230 kV circuit, with a series reactor at Graceton. Upgrade/Replace the existing Face Rock 115/69 kV transformers. Upgrade Rice and Ringgold 230 kV stations.

kV Level: 230 kV

In-Service Cost (\$M): \$54.74

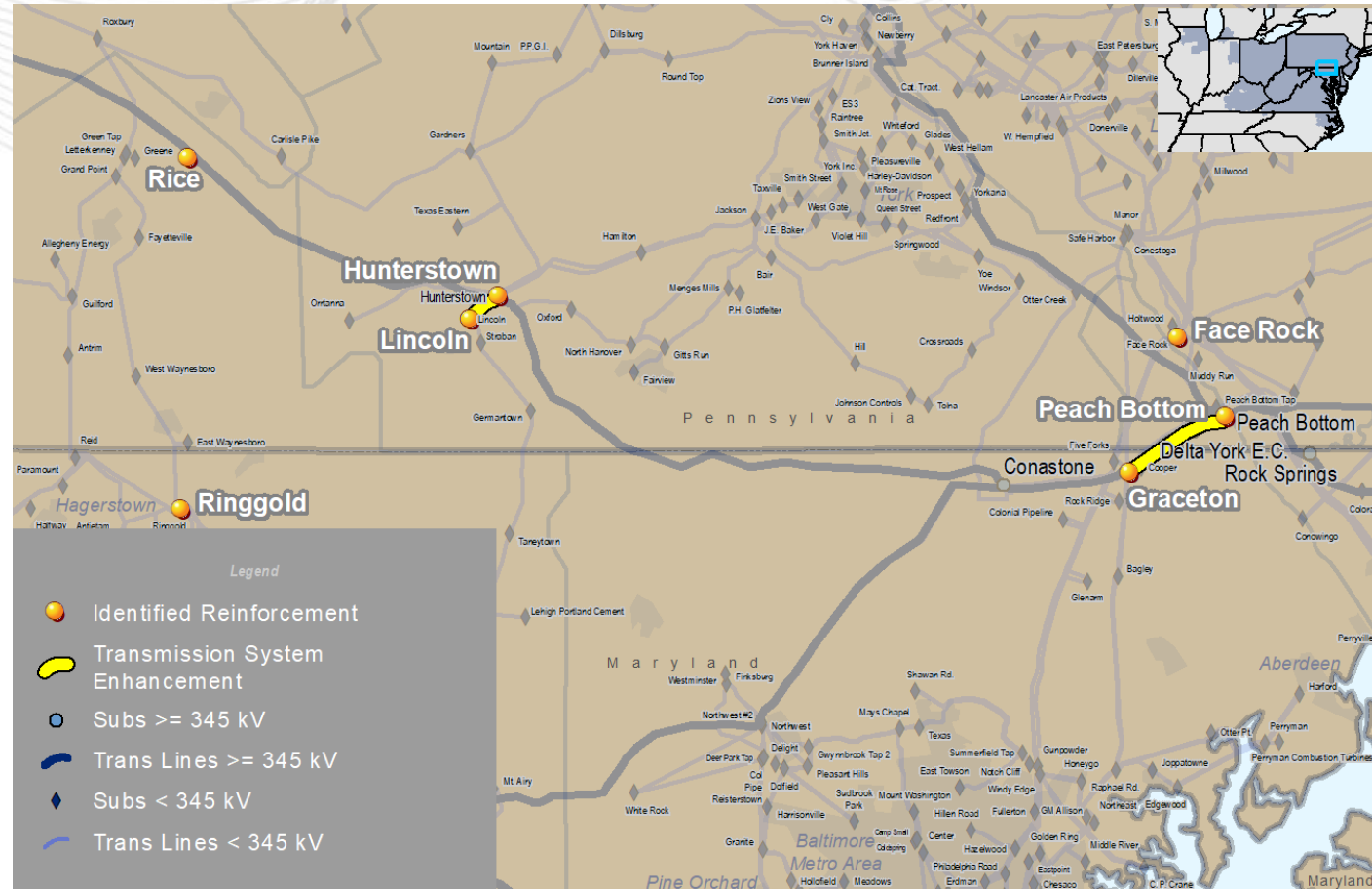
In-Service Year: 2023

Target Zone: METED

ME Constraints:

Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_034

Proposed Solution:

Rebuild the Hunterstown-Lincoln-Germantown 115 kV and Germantown-Carroll 138 kV corridor using double circuit 230 kV construction. Construct a new 230 kV ring bus at Carroll substation and add a new 230 kV breaker at Hunterstown substation.

kV Level: 230 kV

In-Service Cost (\$M): \$136.64

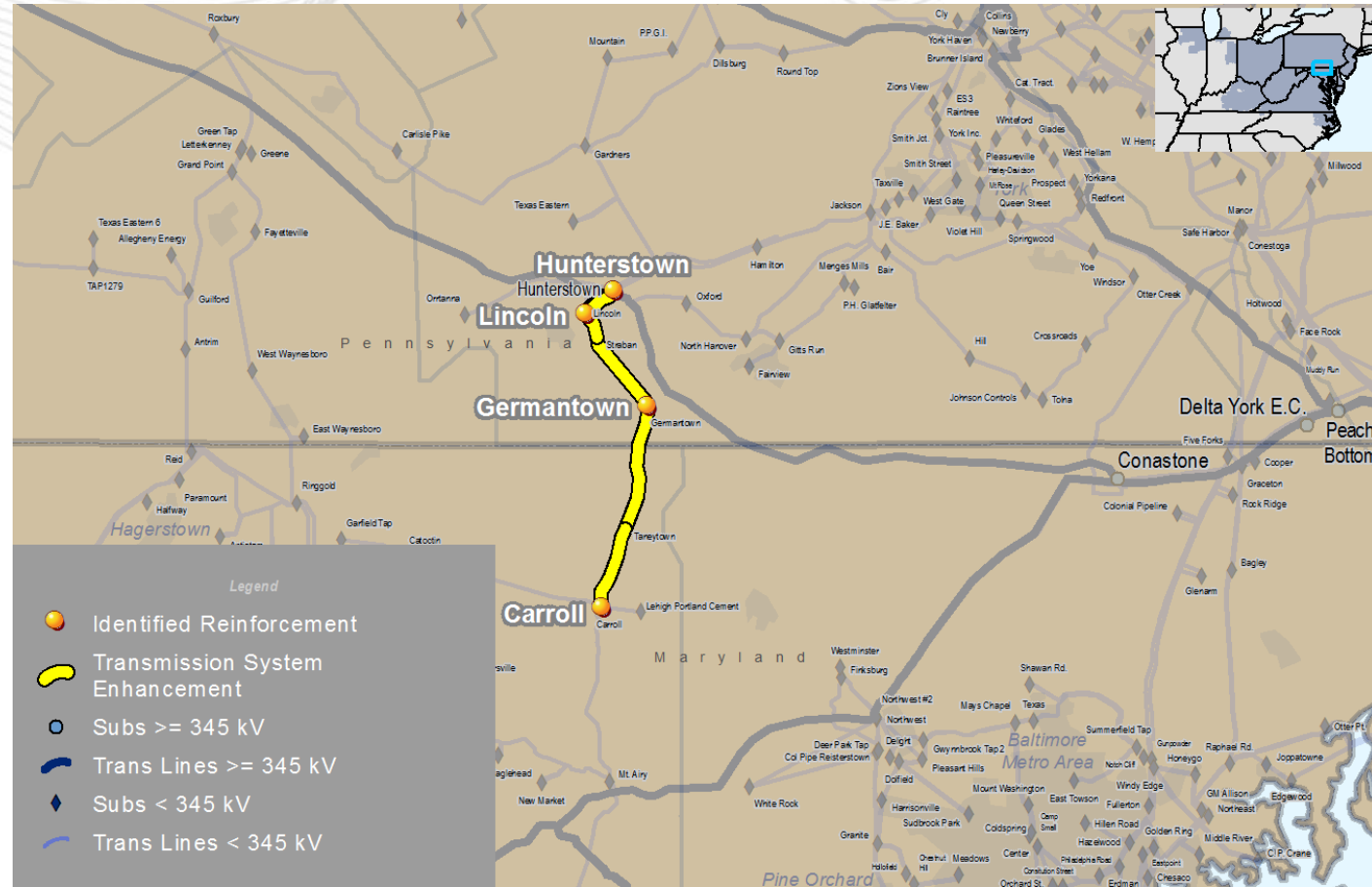
In-Service Year: 2023

Target Zone: METED

ME Constraints:

Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_201

Proposed Solution:
 Build a 25 MW 2-hour battery to be connected to Lincoln 115 kV station. Upgrade Lincoln 115 kV station.

kV Level: 115 kV

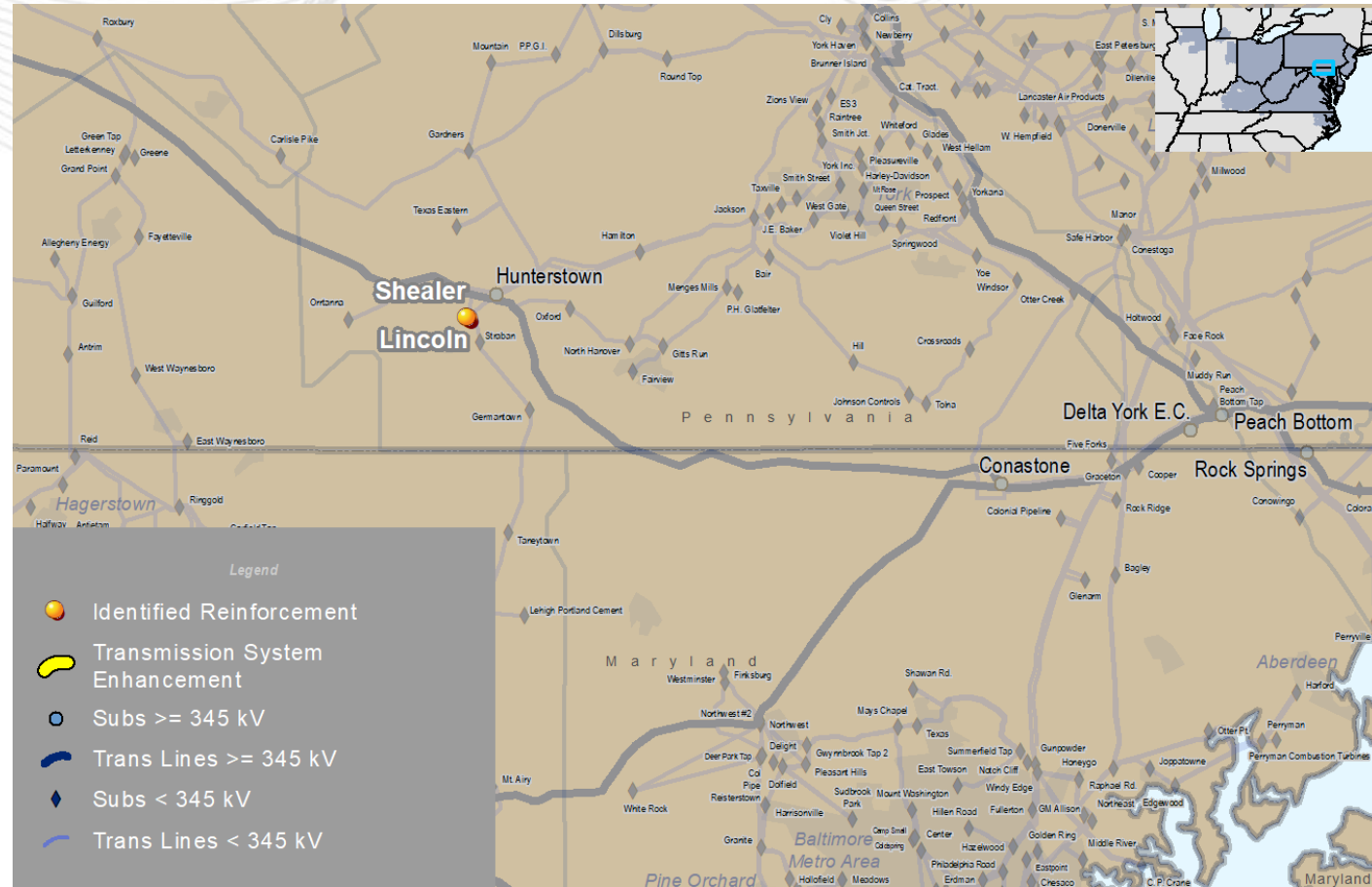
In-Service Cost (\$M): \$17.36

In-Service Year: 2021

Target Zone: METED

ME Constraints:
 Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_293

Proposed Solution:

Construct a new 115 kV Meade ring bus at Lincoln Tap substation, including outgoing lines to Orrtanna, Hunterstown, and Lincoln substations.

kV Level: 115 kV

In-Service Cost (\$M): \$8.95

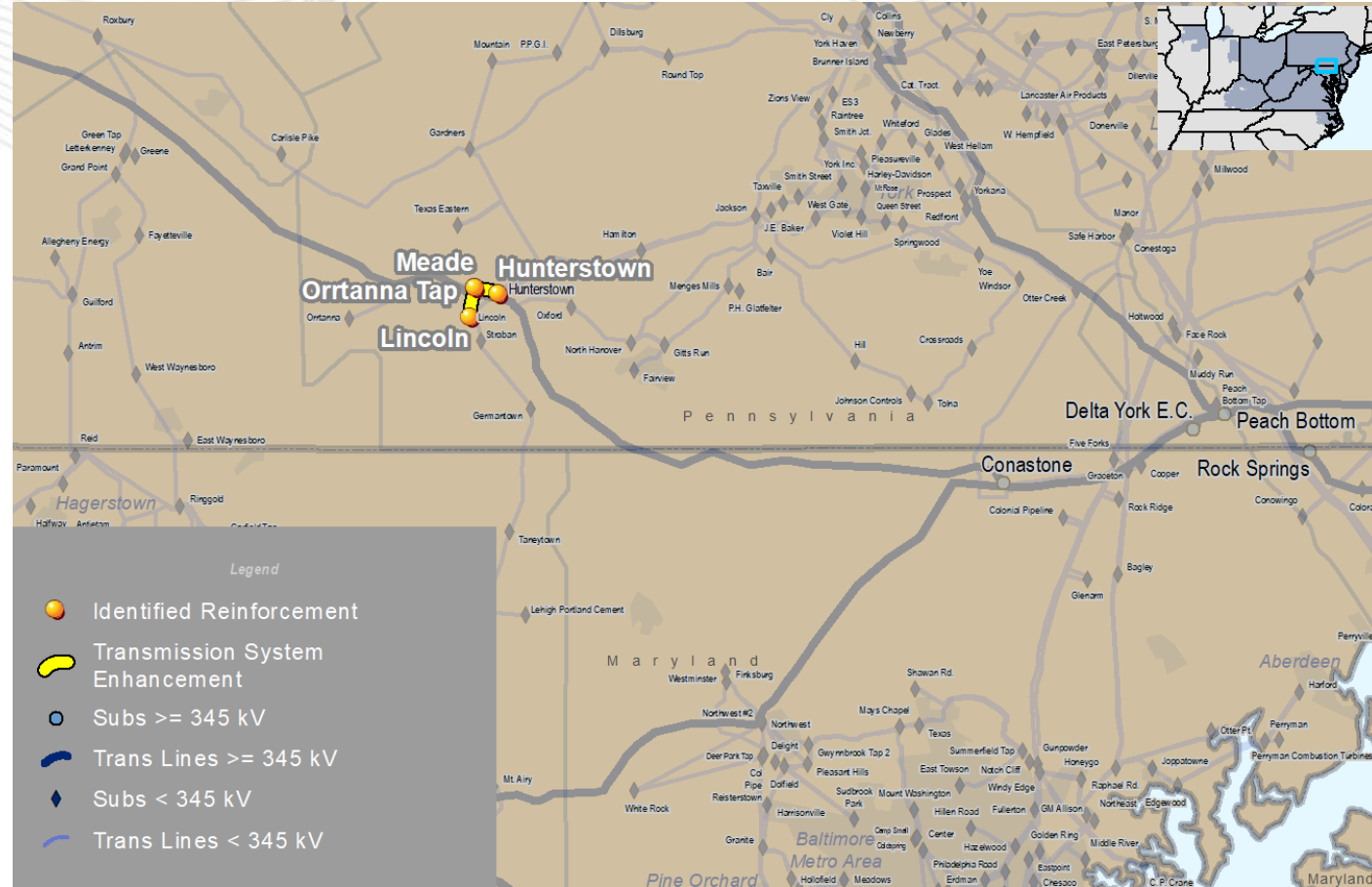
In-Service Year: 2023

Target Zone: METED

ME Constraints:

Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_357

Proposed Solution:

Build a new Robinson Run 500/230 kV substation interconnecting Delta-Peach Bottom 500 kV line. Build Robinson Run-Graceton 230 kV line. Rebuild Cooper-Graceton 230 kV line. Build a new Green Valley 230 kV switching station interconnecting Carroll-Mt. Airy 230 kV line. Construct Hunterstown-Green Valley 230 kV line.

kV Level: 230 kV

In-Service Cost (\$M): \$91.35

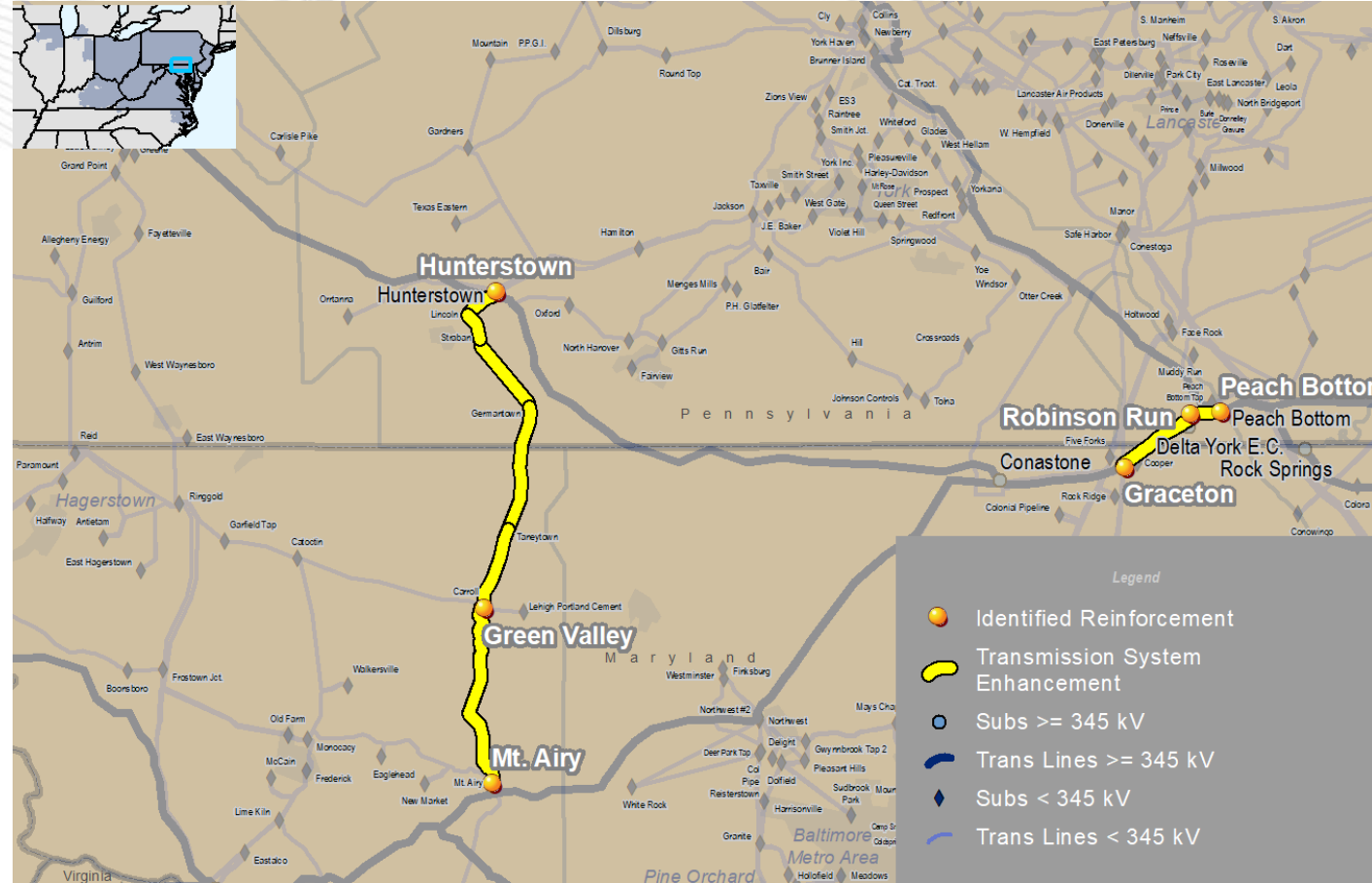
In-Service Year: 2023

Target Zone: METED

ME Constraints:

Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_387

Proposed Solution:

Add a new Wentz 500 kV substation on Hunterstown-Conastone 500 kV line and a 500/230 kV transformer at Wentz substation. Add a new Wentz-Carroll 230 kV line. Increase ratings of Carroll-Mt. Airy 230 kV line.

kV Level: 500 kV

In-Service Cost (\$M): \$152.18

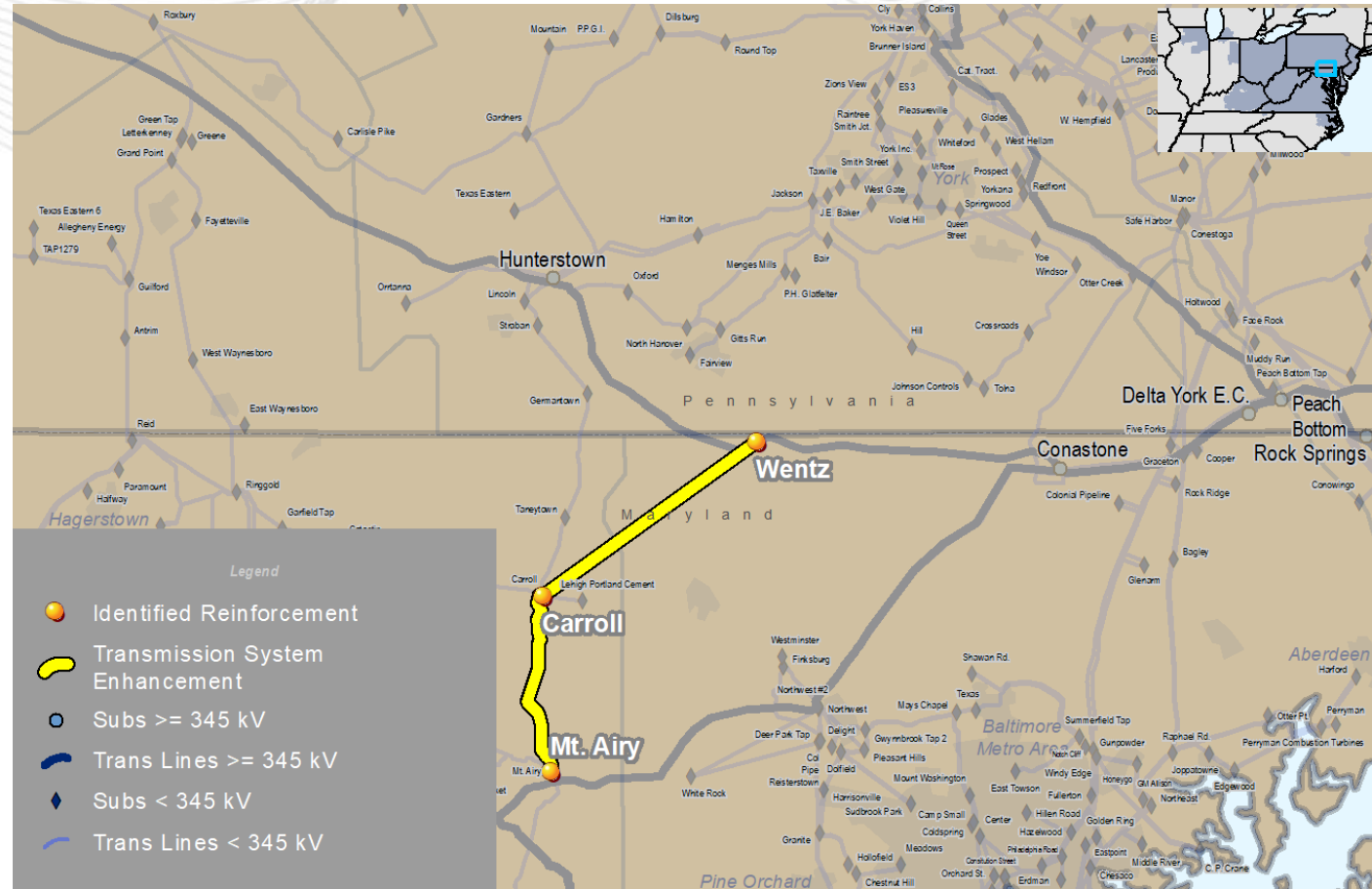
In-Service Year: 2024

Target Zone: METED

ME Constraints:

Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_389

Proposed Solution:

Rebuild Hunterstown-Lincoln 115 kV line. Add a Peach Bottom 500/230 kV transformer. Add a Peach Bottom-Graceton 230 kV line and reconfigure the 230 kV connections at Peach Bottom into a new switching station.

kV Level: 500 kV

In-Service Cost (\$M): \$147.64

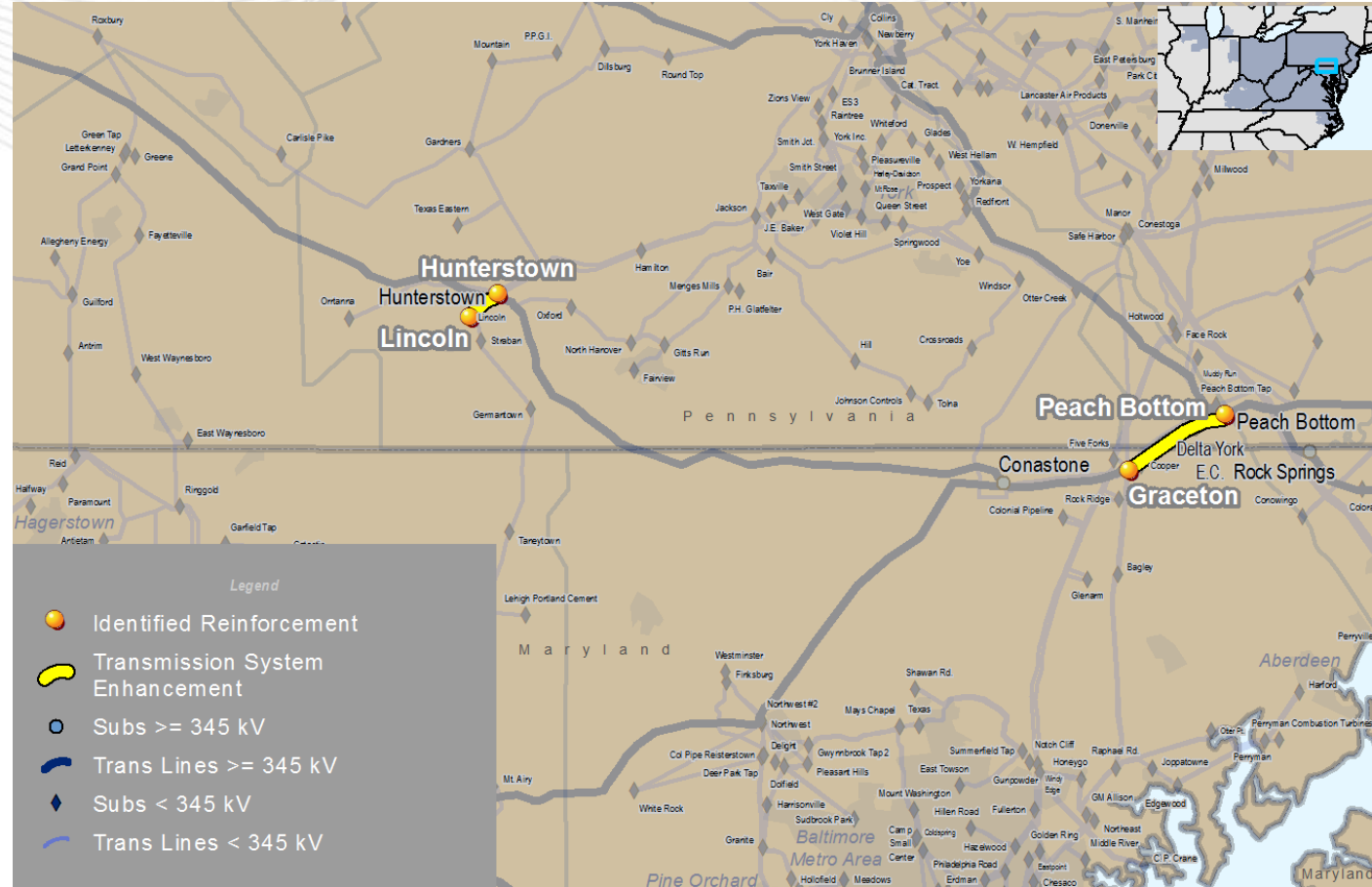
In-Service Year: 2024

Target Zone: METED

ME Constraints:

Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_402

Proposed Solution:

Build a new Hunterstown-Lincoln 115 kV line. Construct a 25 MW 2-hour battery storage facility to be connected to Lincoln 115 kV station. Upgrade Lincoln 115 kV and Hunterstown 115 kV substations.

kV Level: 115 kV

In-Service Cost (\$M): \$25.81

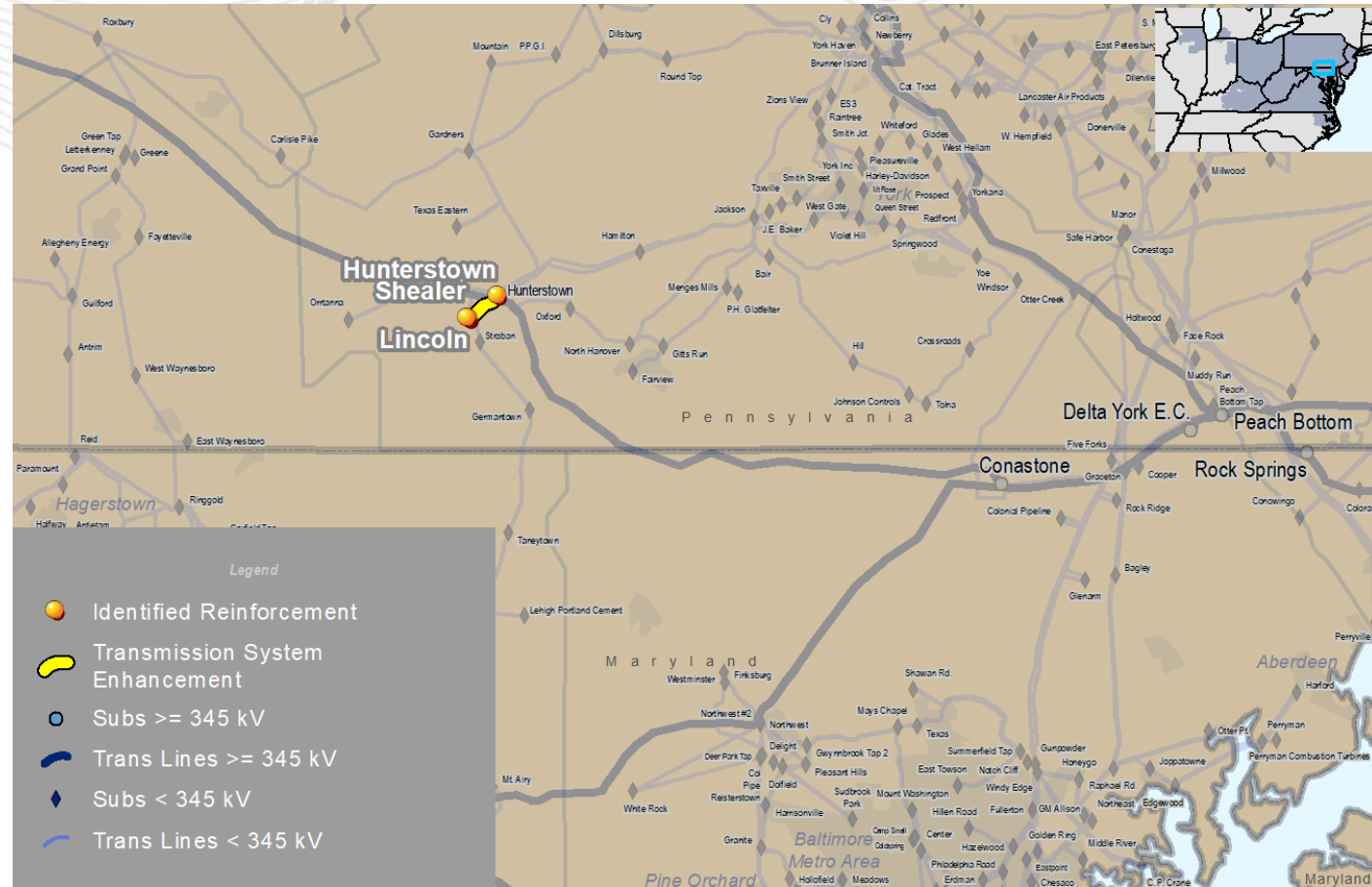
In-Service Year: 2021

Target Zone: METED

ME Constraints:

Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_413

Proposed Solution:

Build a new Hunterstown-Lincoln 115 kV line. Construct a 10 MW 2-hour battery storage facility to be connected to Lincoln 115 kV station. Upgrade Lincoln 115 kV and Hunterstown 115 kV substations.

kV Level: 115 kV

In-Service Cost (\$M): \$19.22

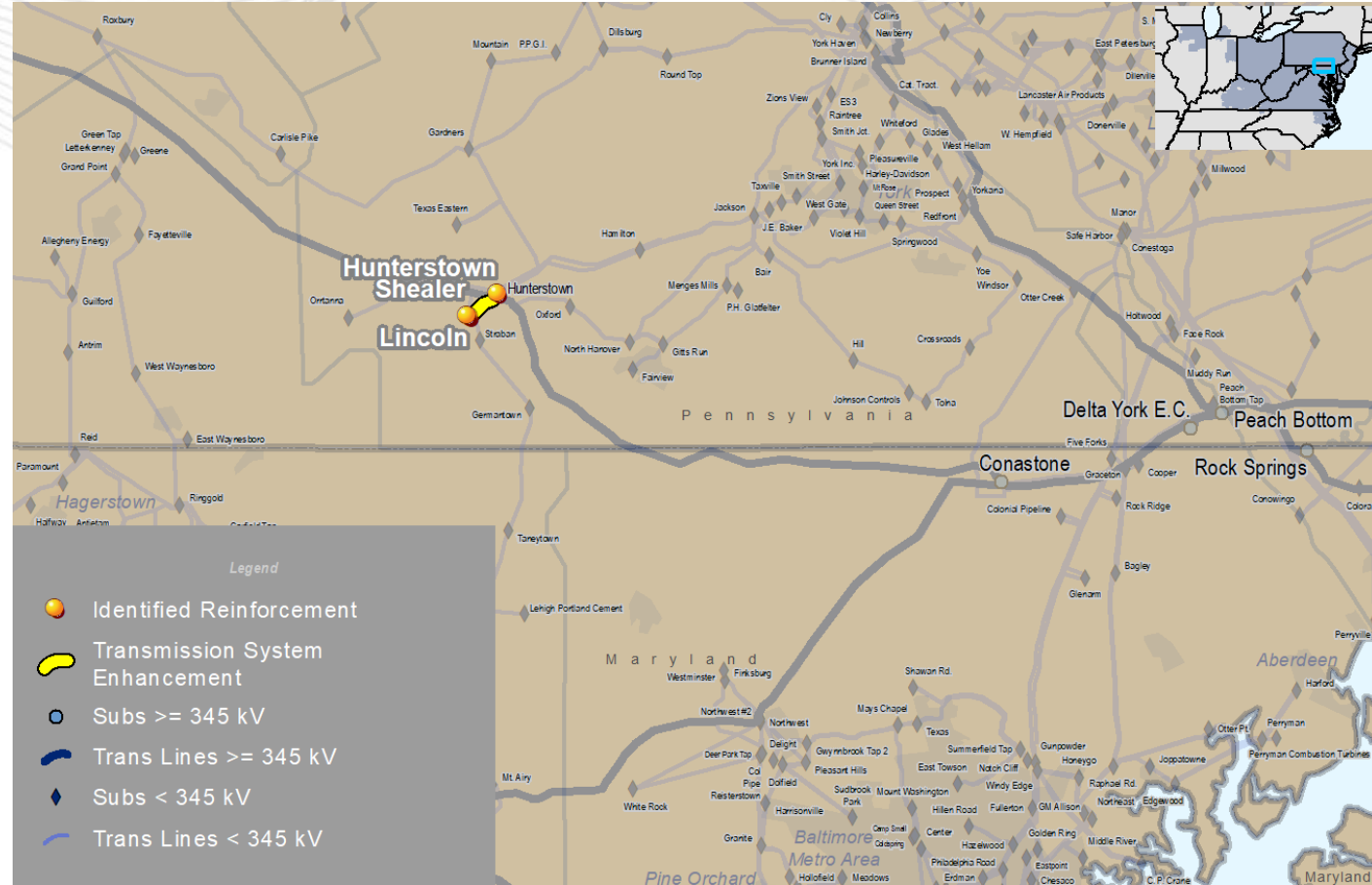
In-Service Year: 2021

Target Zone: METED

ME Constraints:

Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_453

Proposed Solution:
 Build a 25 MW 4-hour battery to be connected to Lincoln 115 kV station. Upgrade Lincoln 115 kV station.

kV Level: 115 kV

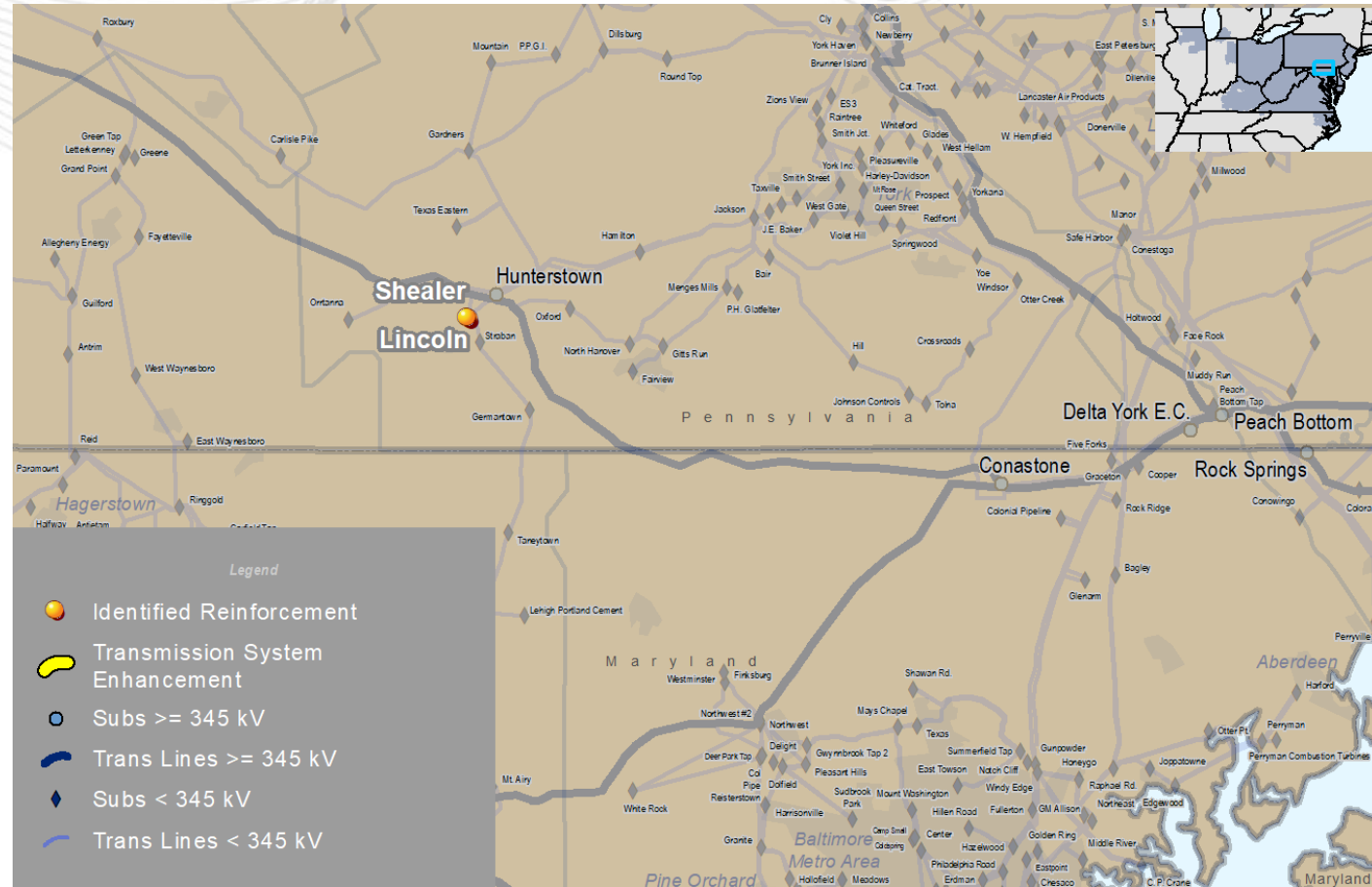
In-Service Cost (\$M): \$26.69

In-Service Year: 2021

Target Zone: METED

ME Constraints:
 Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_469

Proposed Solution:
 Smart Wire with 5% of series reactance along the Lincoln Tap-Hunterstown 115 kV line.

kV Level: 115 kV

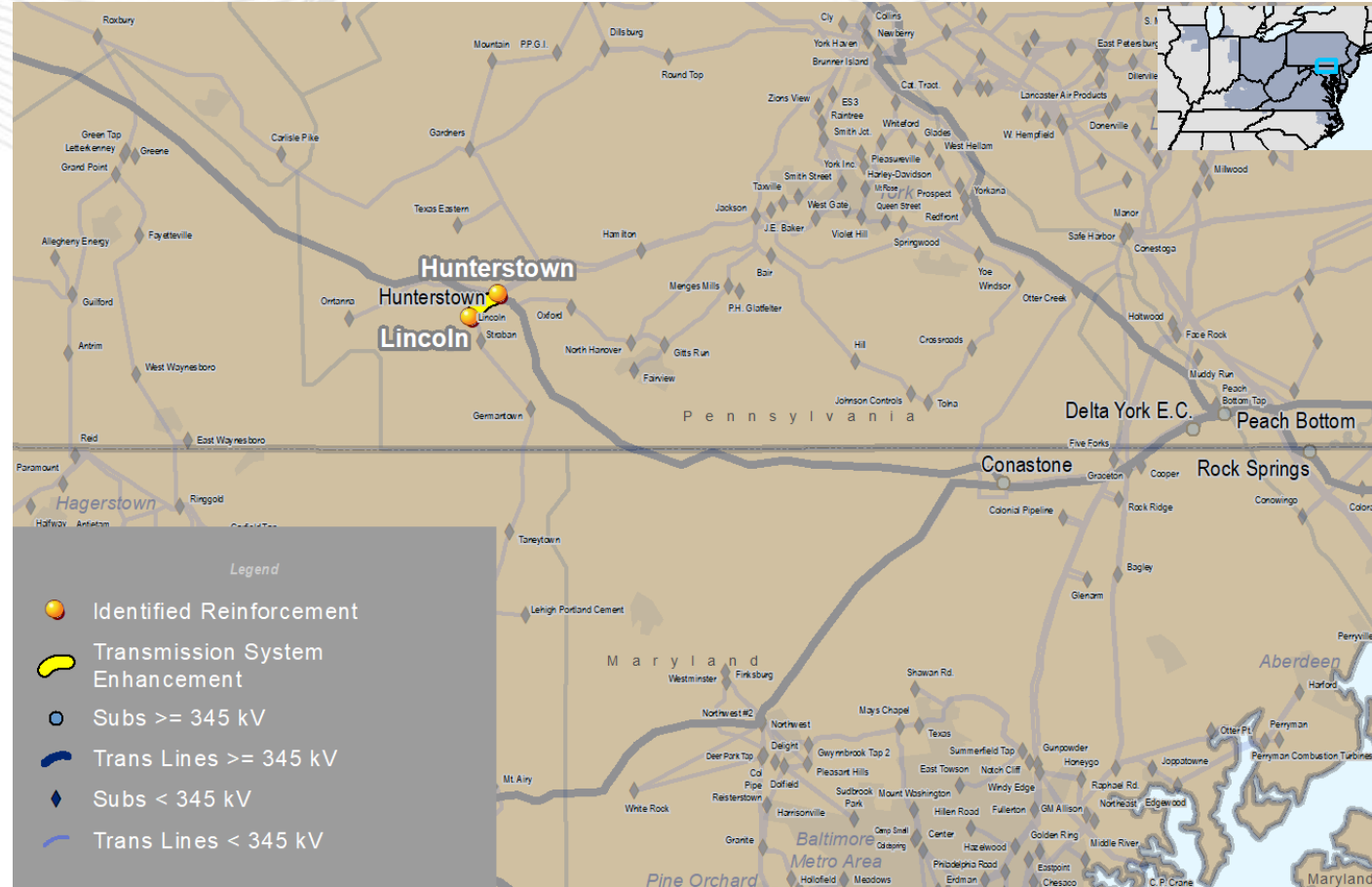
In-Service Cost (\$M): \$4.65

In-Service Year: 2022

Target Zone: METED

ME Constraints:
 Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_511

Proposed Solution:

Install a new 115 kV ring bus at the Orrtanna tap point of Hunterstown-Orrtanna-Lincoln 115 kV 963 line and tap into Hunterstown-Lincoln 115 kV 963 line. Construct a new Otter Creek 500/230 kV substation and tap into TMIS-Furnace Run 500 kV line. Connect the new Otter Creek 500/230 kV substation to the existing Otter Creek 230 kV station. Upgrade the existing Otter Creek 230 kV switchyard and Otter Creek - Conastone 230 kV line. Replace Face Rock 115/69 kV T1 and T2 transformers. Reconduct/rebuild 1.3 miles of Manor-Graceton 230 kV line. Upgrade Peach Bottom North station.

kV Level: 500 kV

In-Service Cost (\$M): \$95.47

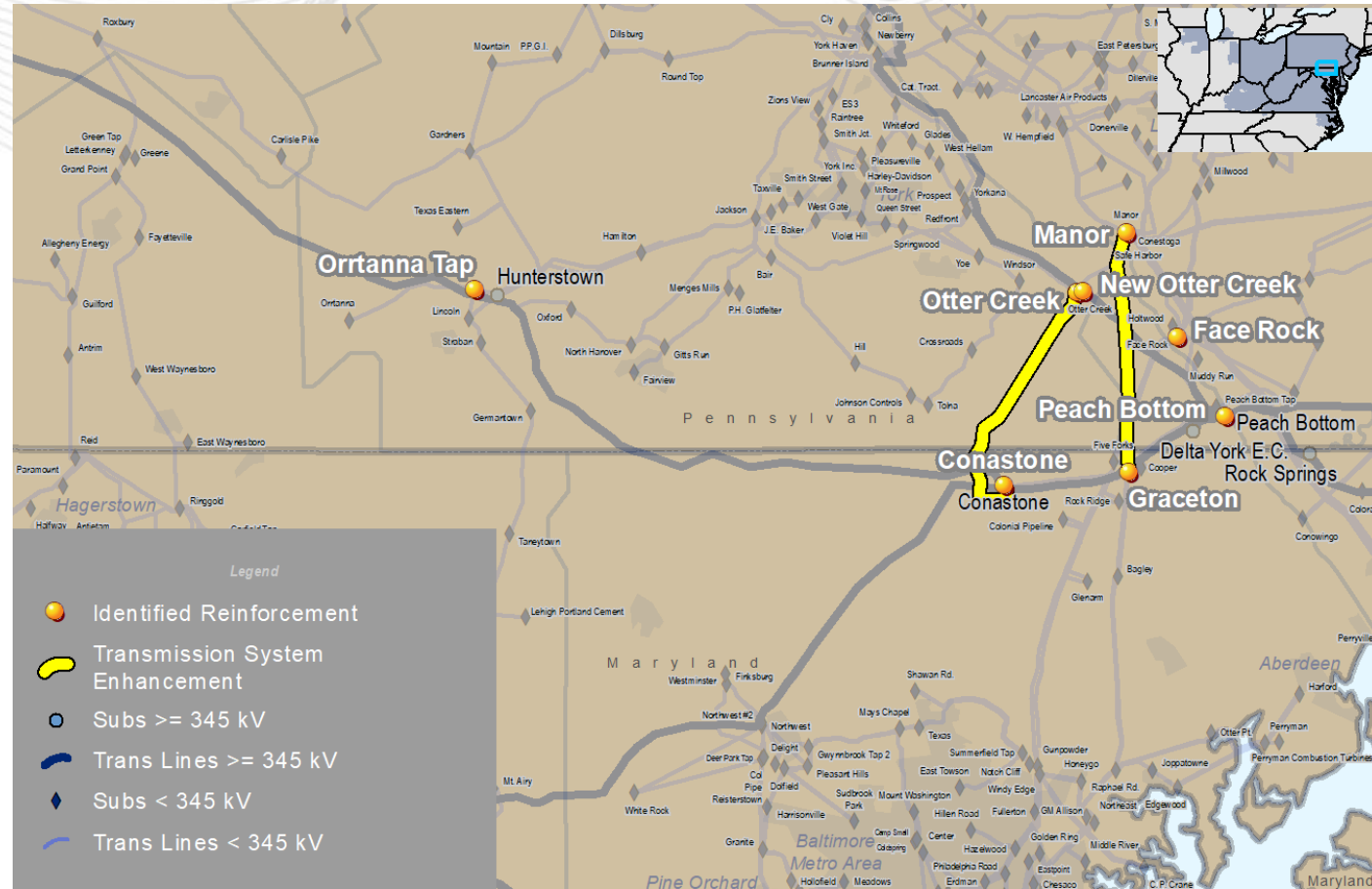
In-Service Year: 2023

Target Zone: METED

ME Constraints:

Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_593

Proposed Solution:

Add a new Littlestown 500 kV substation on Hunterstown-Conastone 500 kV line and a 500/115 kV transformer at Littlestown substation. Add a new Littlestown-Germantown 115 kV line. Add a Peach Bottom 500/230 kV transformer, add a Peach Bottom-Graceton 230 kV line and reconfigure the 230 kV connections at Peach Bottom into a new switching station.

kV Level: 500 kV

In-Service Cost (\$M): \$183.69

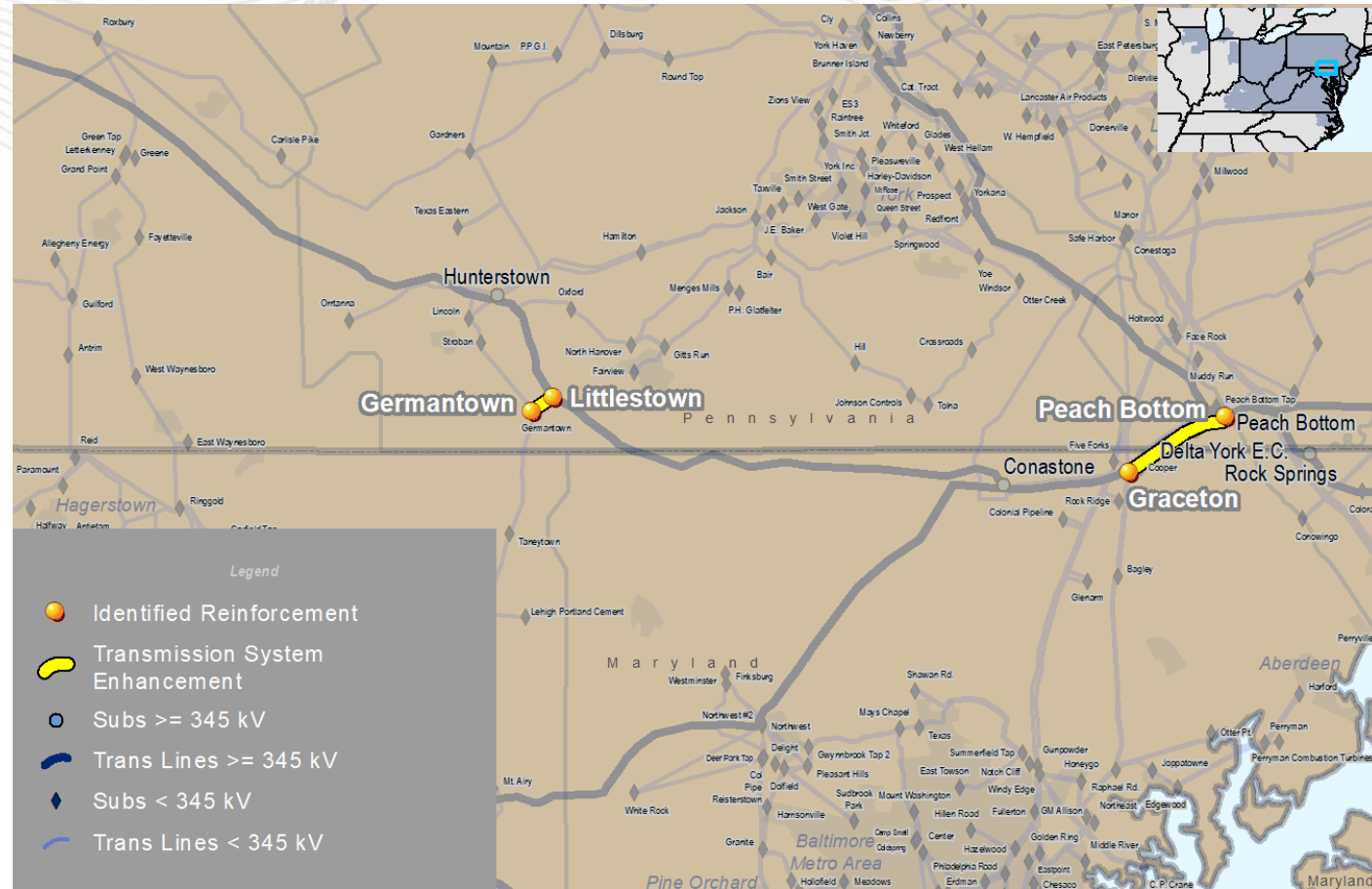
In-Service Year: 2024

Target Zone: METED

ME Constraints:

Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_616

Proposed Solution:

Add a new Wentz 500 kV substation on Hunterstown-Conastone 500 kV line and a 500/230 kV transformer at Wentz substation. Add a new Wentz-Carroll 230 kV line. Add a Peach Bottom 500/230 kV transformer, add a Peach Bottom-Graceton 230 kV line and add 230 kV switching station at Peach Bottom. Increase ratings of Carroll-Mt. Airy 230 kV line.

kV Level: 500 kV

In-Service Cost (\$M): \$290.95

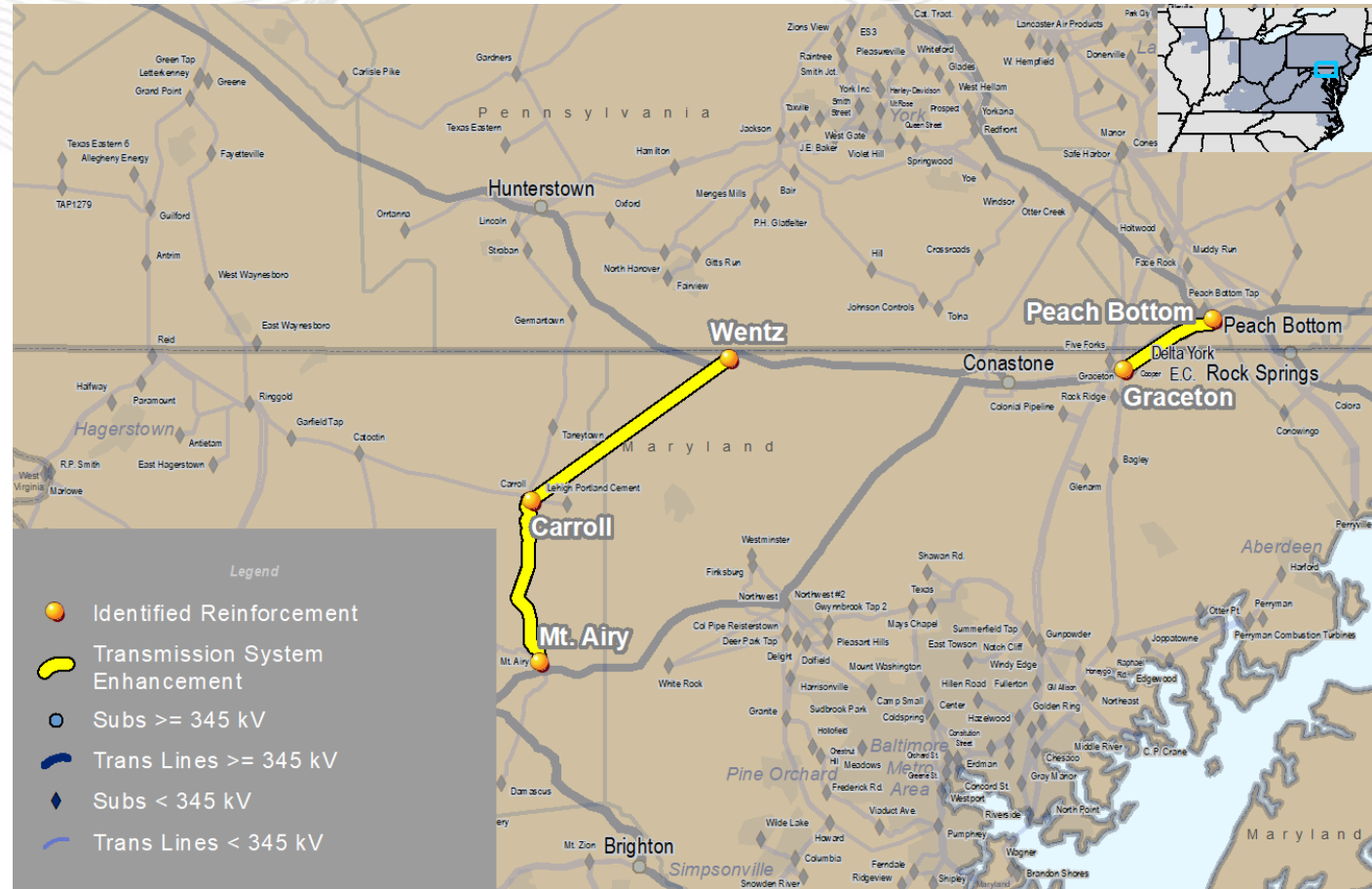
In-Service Year: 2024

Target Zone: METED

ME Constraints:

Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_622

Proposed Solution:
 Rebuild the Hunterstown-Lincoln 115 kV 962 line. Upgrade limiting terminal equipment at Hunterstown 115 kV and Lincoln 115 kV substations.

kV Level: 115 kV

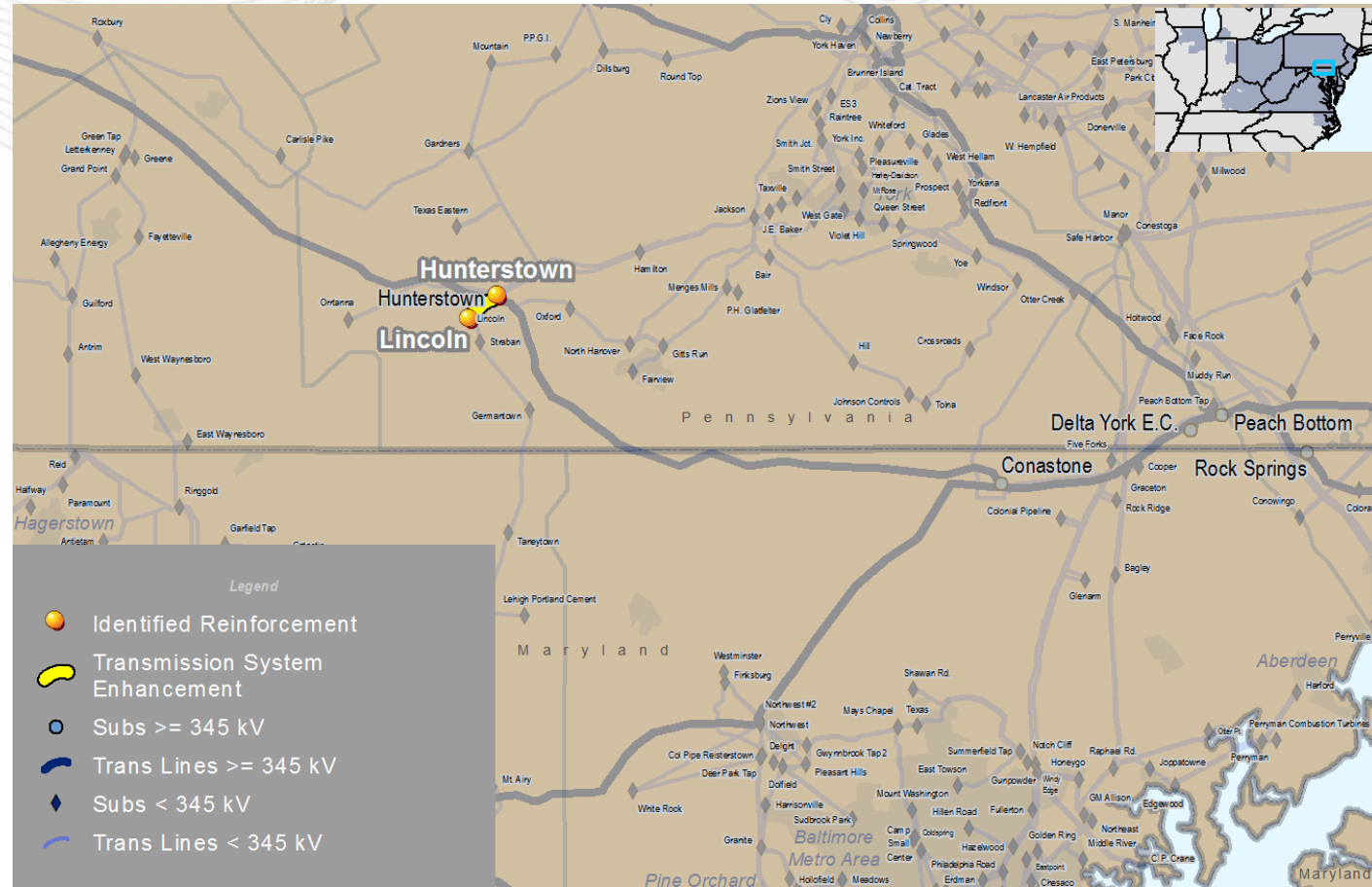
In-Service Cost (\$M): \$7.21

In-Service Year: 2023

Target Zone: METED

ME Constraints:
 Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_647

Proposed Solution:

Install a new 115 kV ring bus at the Orrtanna tap point of Hunterstown-Orrtanna-Lincoln 115 kV 963 line and tap into Hunterstown-Lincoln 115 kV 963 line. Construct a new Otter Creek 500/230 kV substation and tap into TMIS-Furnace Run 500 kV line. Connect the new Otter Creek 500/230 kV substation to the existing Otter Creek 230 kV station. Upgrade the existing Otter Creek 230 kV switchyard. Replace Face Rock 115/69 kV T1 and T2 transformers. Reconduct/rebuild 1.3 miles of Manor-Graceton 230 kV line. Upgrade Peach Bottom North station.

kV Level: 500 kV

In-Service Cost (\$M): \$55.12

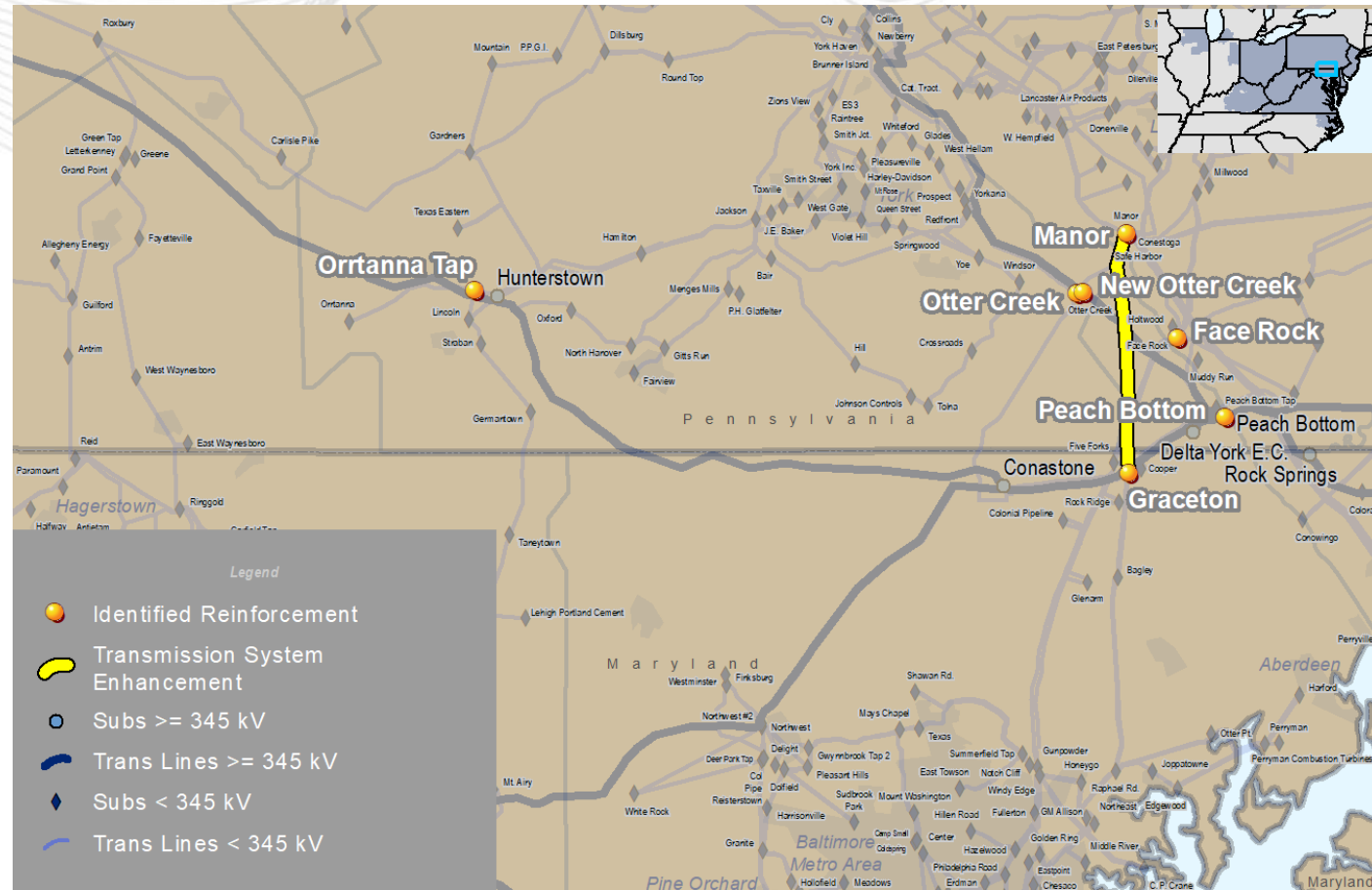
In-Service Year: 2023

Target Zone: METED

ME Constraints:

Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_830

Proposed Solution:

Add a new Littlestown 500 kV substation on Hunterstown-Conastone 500 kV line and a 500/115 kV transformer at Littlestown substation. Add a new Littlestown-Germantown 115 kV line.

kV Level: 500 kV

In-Service Cost (\$M): \$44.92

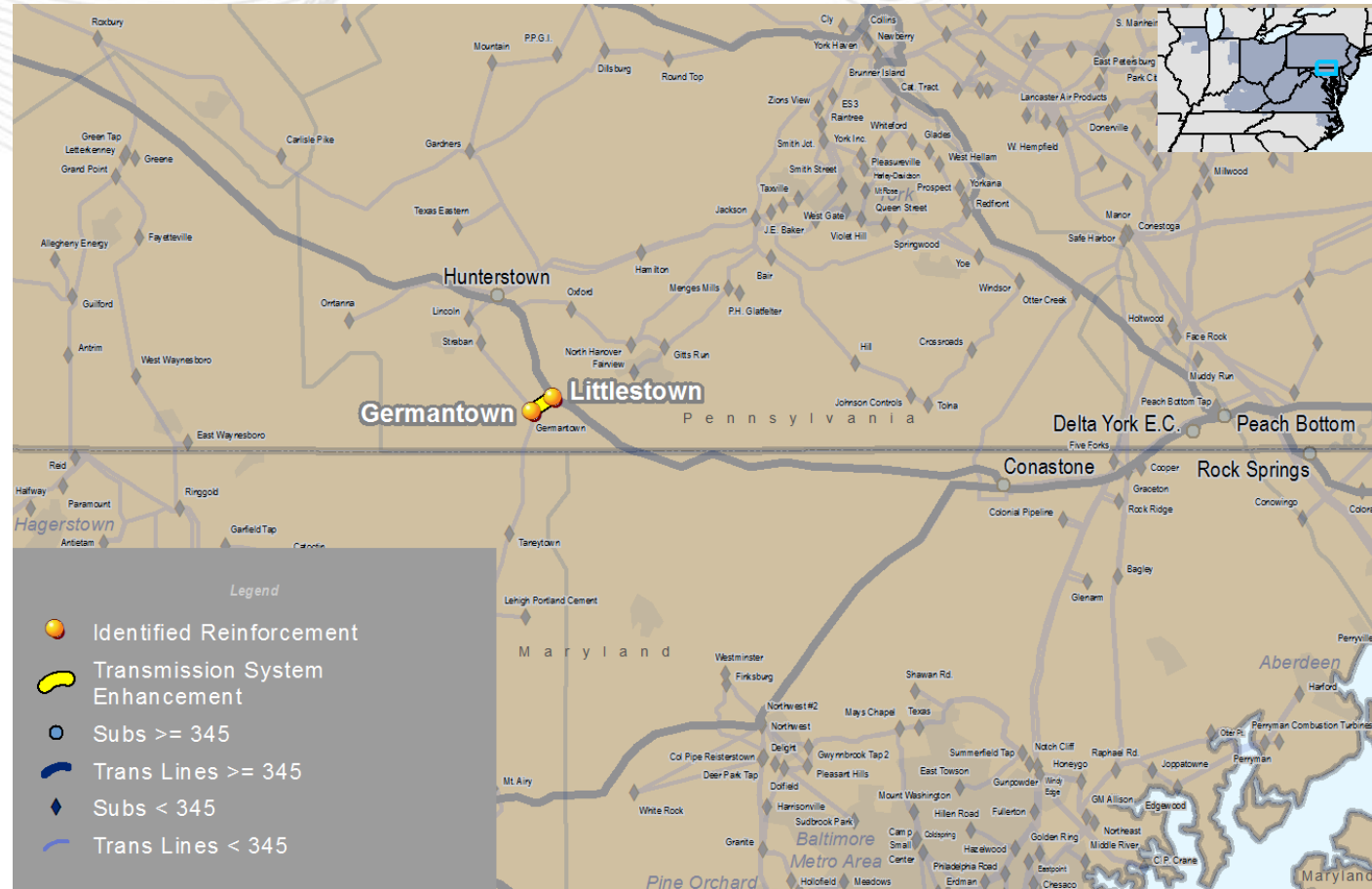
In-Service Year: 2024

Target Zone: METED

ME Constraints:

Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_847

Proposed Solution:

Build a new Robinson Run 500/230 kV substation interconnecting Delta-Peach Bottom 500 kV line. Build Robinson Run-Graceton 230 kV line. Rebuild Cooper-Graceton 230 kV line. Reconnector Hunterstown-Lincoln 115kV line.

kV Level: 230 kV

In-Service Cost (\$M): \$56.00

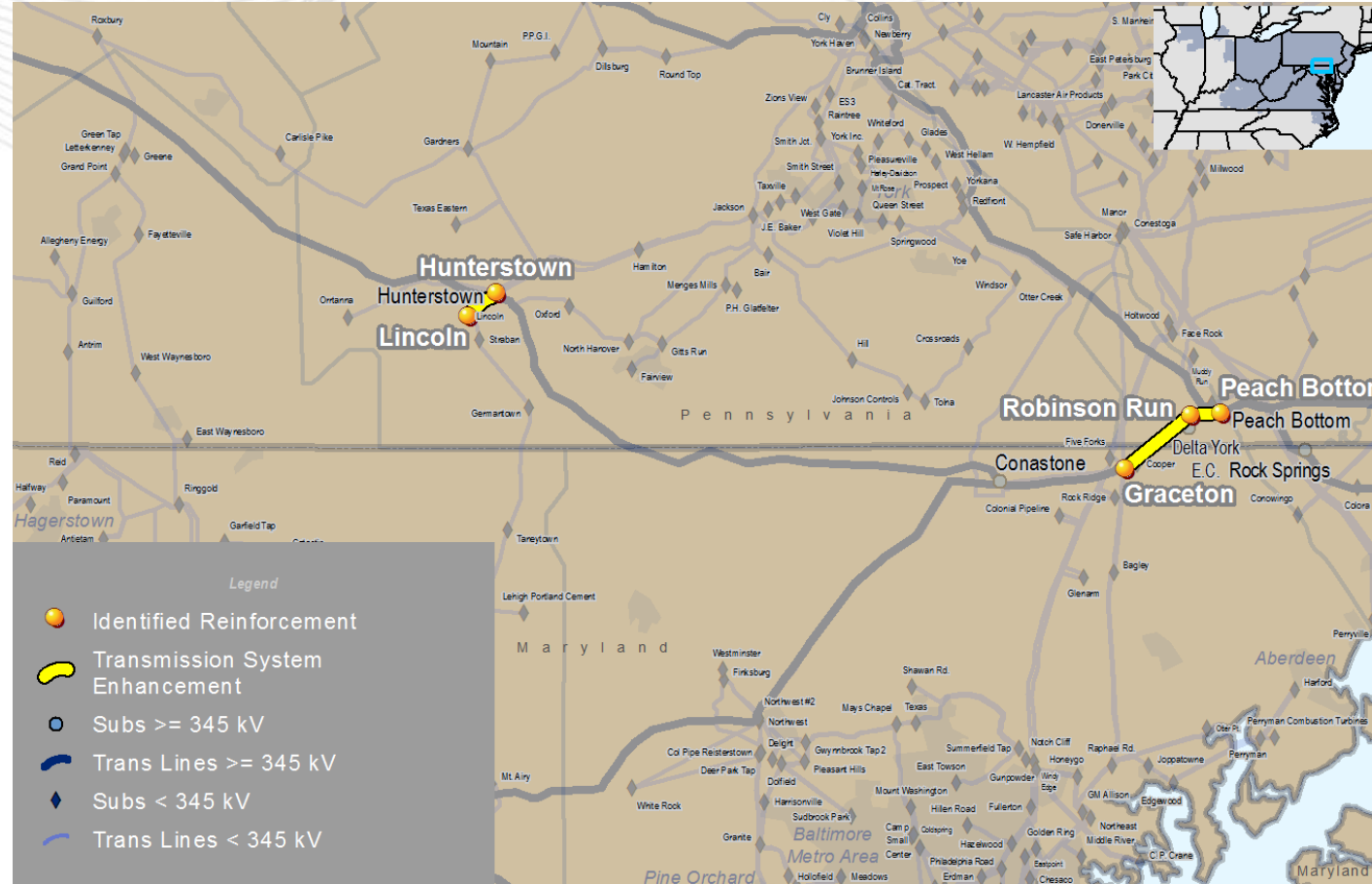
In-Service Year: 2023

Target Zone: METED

ME Constraints:

Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_868

Proposed Solution:

Build a new Delta 500 kV switchyard and tap into Peach Bottom-Delta 500 kV (5034) line. Construct a new Delta Tap Switchyard-Conastone 500 kV line. Install a new 115 kV ring bus at the Orrtanna tap point of Hunterstown-Orrtanna-Lincoln 115 kV 963 line. Replace Face Rock 115/69 kV T1 and T2 transformers.

kV Level: 500 kV

In-Service Cost (\$M): \$122.08

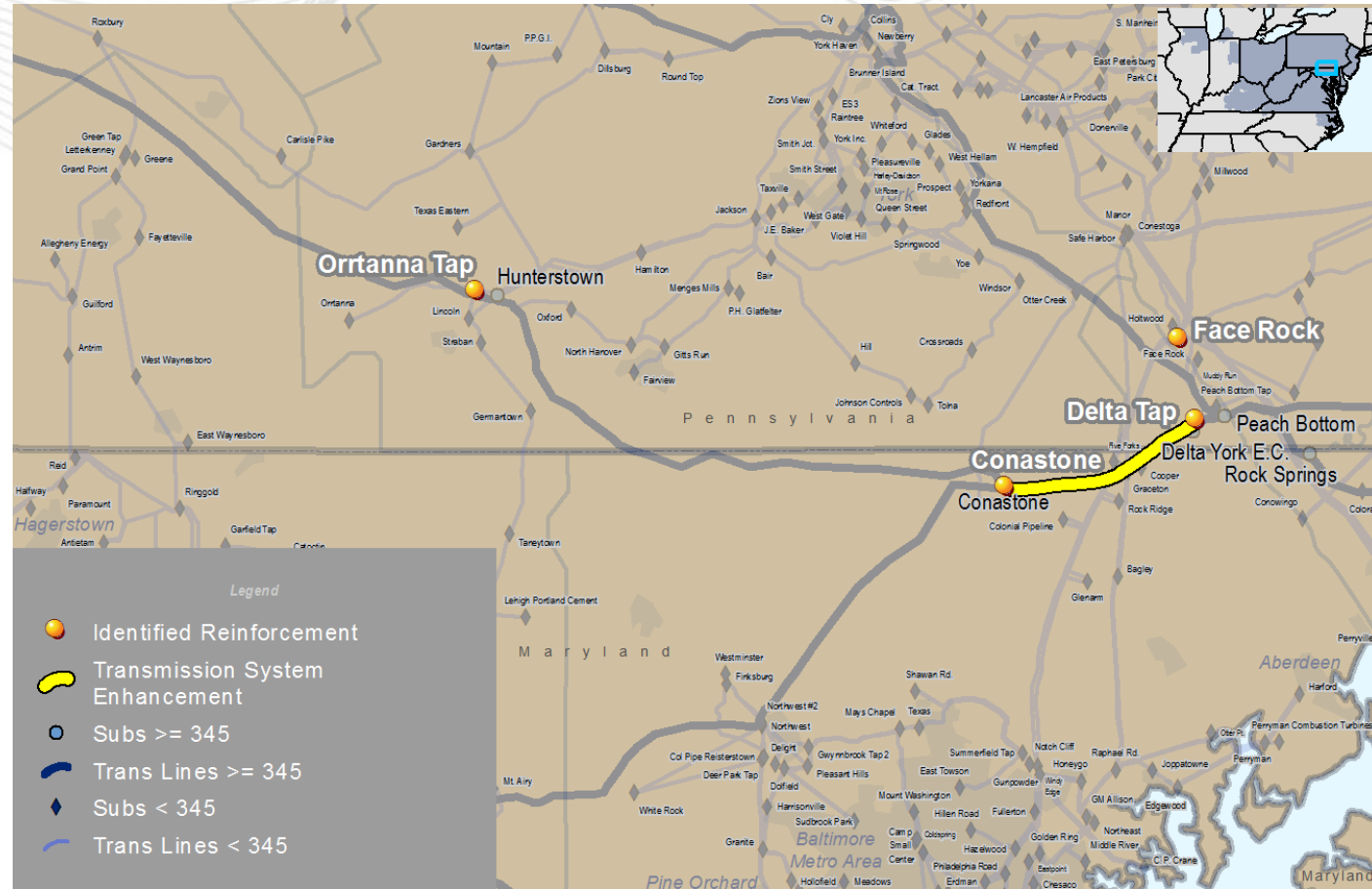
In-Service Year: 2023

Target Zone: METED

ME Constraints:

Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_892

Proposed Solution:
 Build a 50 MW 2-hour battery to be connected to Lincoln 115 kV station. Upgrade Lincoln 115 kV substation.

kV Level: 115 kV

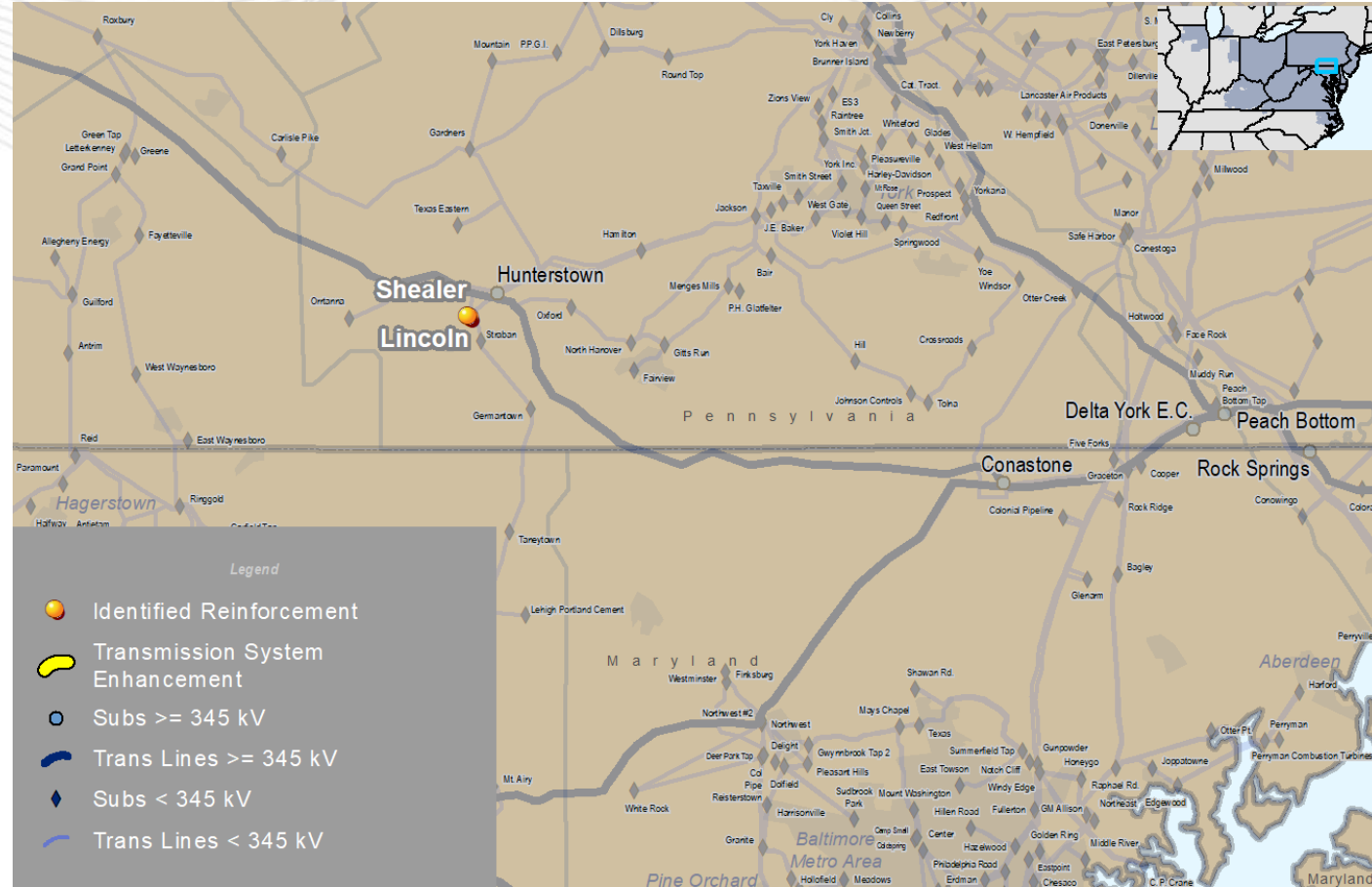
In-Service Cost (\$M): \$28.98

In-Service Year: 2021

Target Zone: METED

ME Constraints:
 Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_HL_960

Proposed Solution:

Construct a new Hunterstown-Lincoln 115 kV line. Upgrade Hunterstown 115 kV and Lincoln 115 kV substations.

kV Level: 115 kV

In-Service Cost (\$M): \$10.13

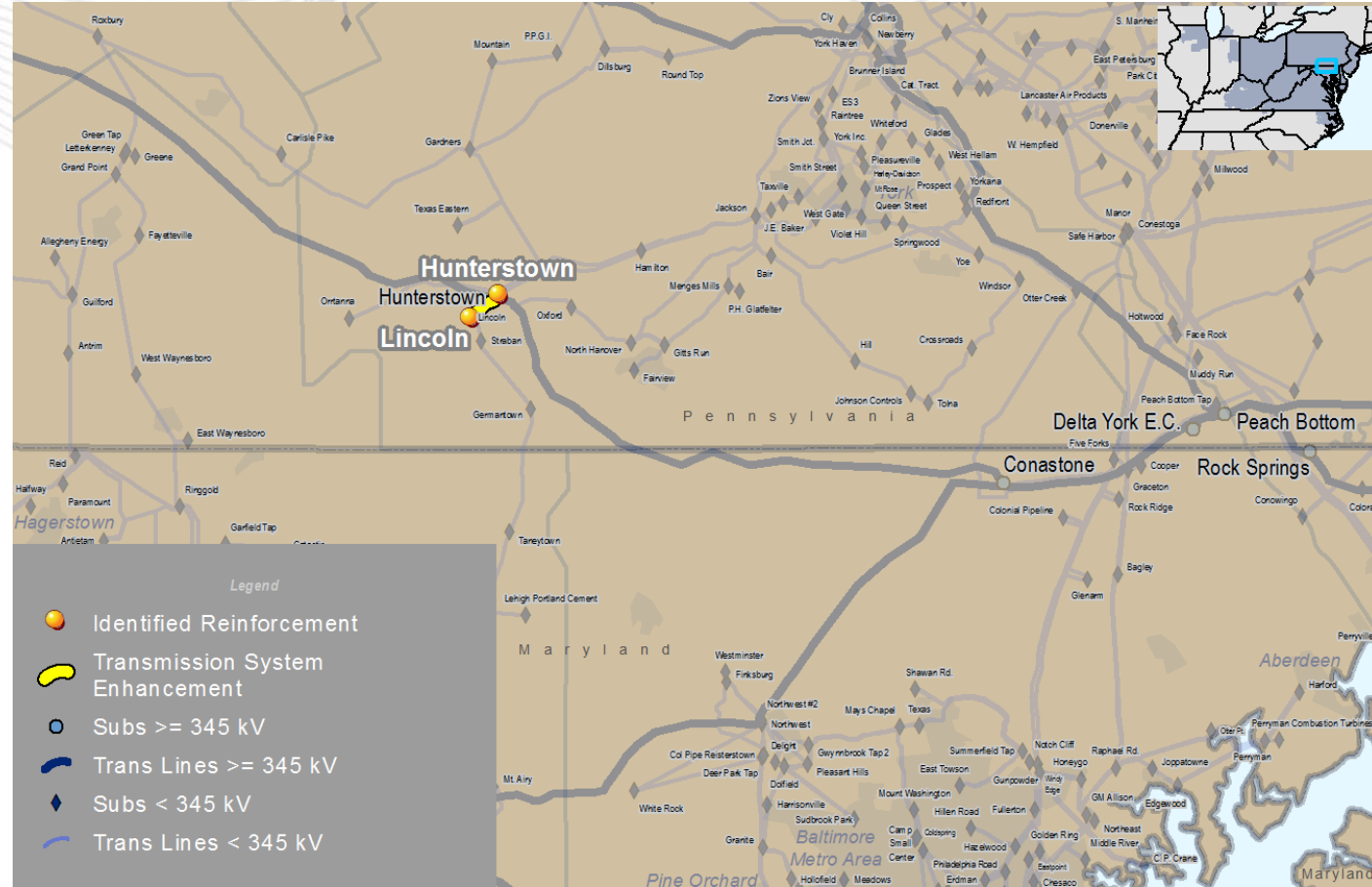
In-Service Year: 2021

Target Zone: METED

ME Constraints:

Huntertown - Lincoln 115 kV

Notes:



Project ID: 201819_931

Proposed Solution:
 Build a new Second Creek 345kV switching station
 interconnecting Tanners Creek-East Bend and Miami Fort-
 Terminal 345kV lines.

kV Level: 345 kV

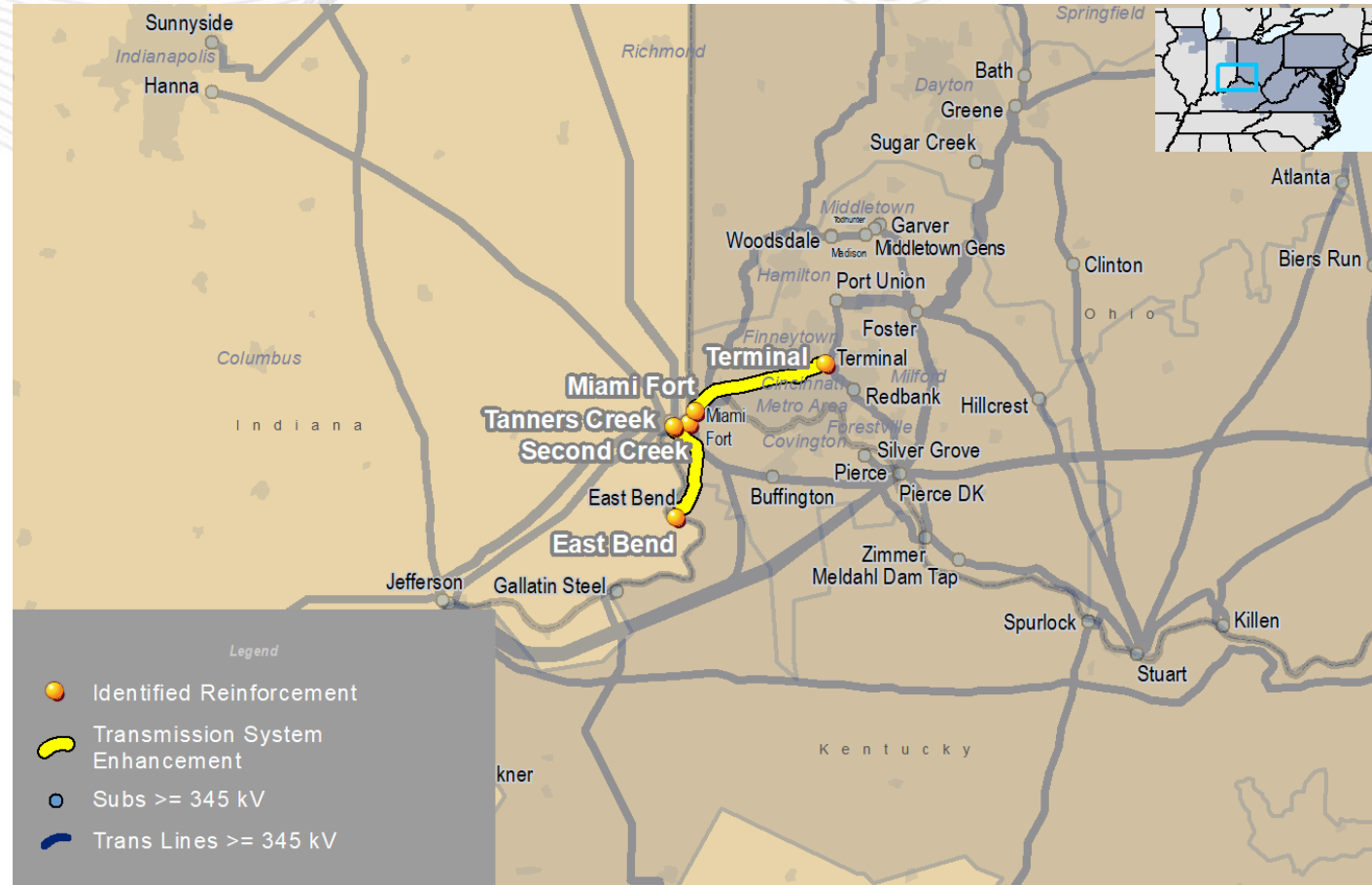
In-Service Cost (\$M): \$13.76

In-Service Year: 2023

Target Zone: MISOC

ME Constraints:
 Hubble-Batesville 138 kV

Notes: Not a PJM congestion driver



Project ID: 201819_067

Proposed Solution:
 Fix identified Locations of Concern from sag studies performed on AEP section of Dumont-Stillwell 345 kV line.

kV Level: 345 kV

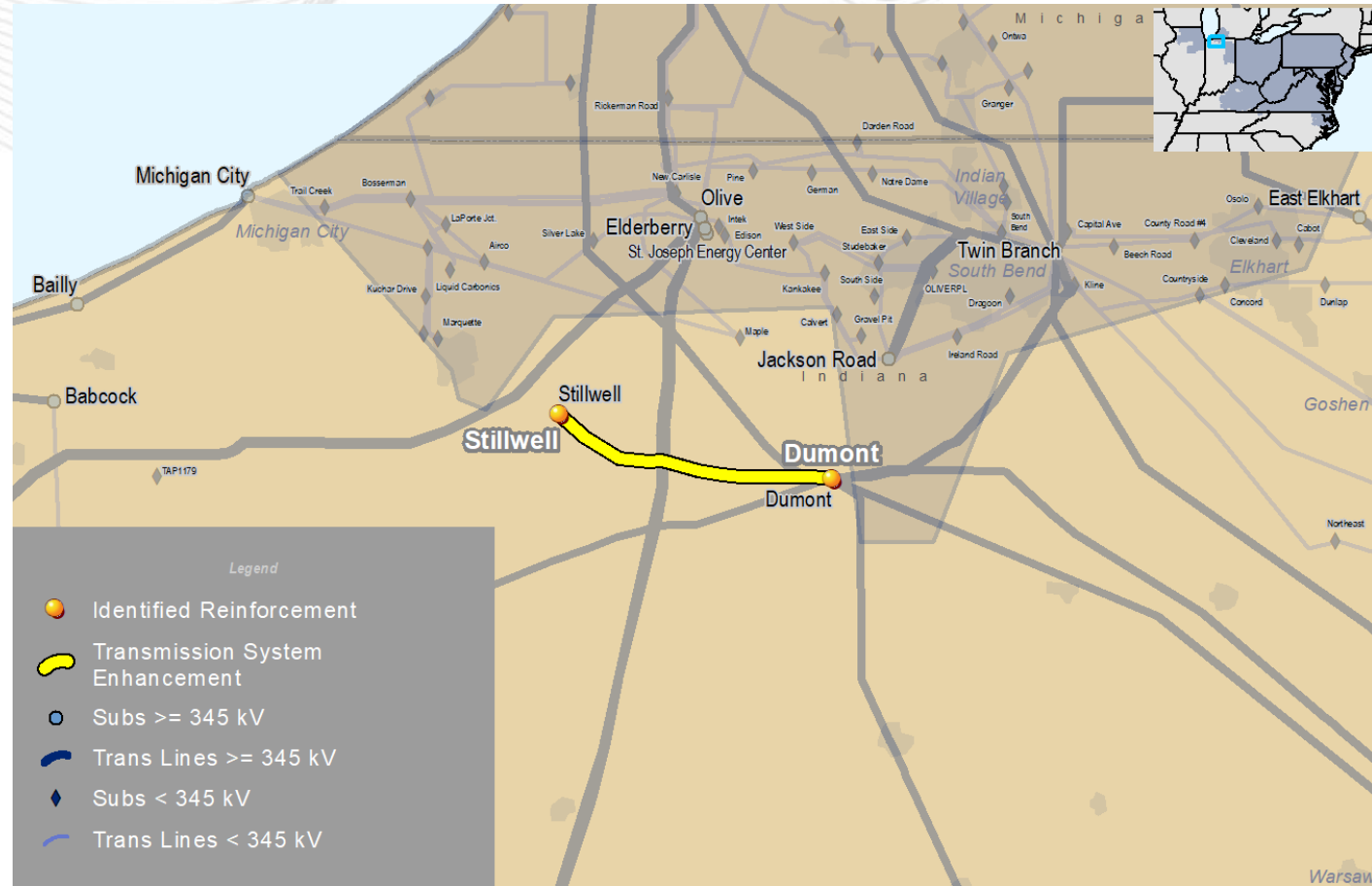
In-Service Cost (\$M): \$1.89

In-Service Year: 2021

Target Zone: AEP

ME Constraints:
 Dumont-Stillwell 345 kV

Notes: **Unspecified congestion driver**





Revision History

5/13/2019 – V1 – Original version posted to pjm.com