

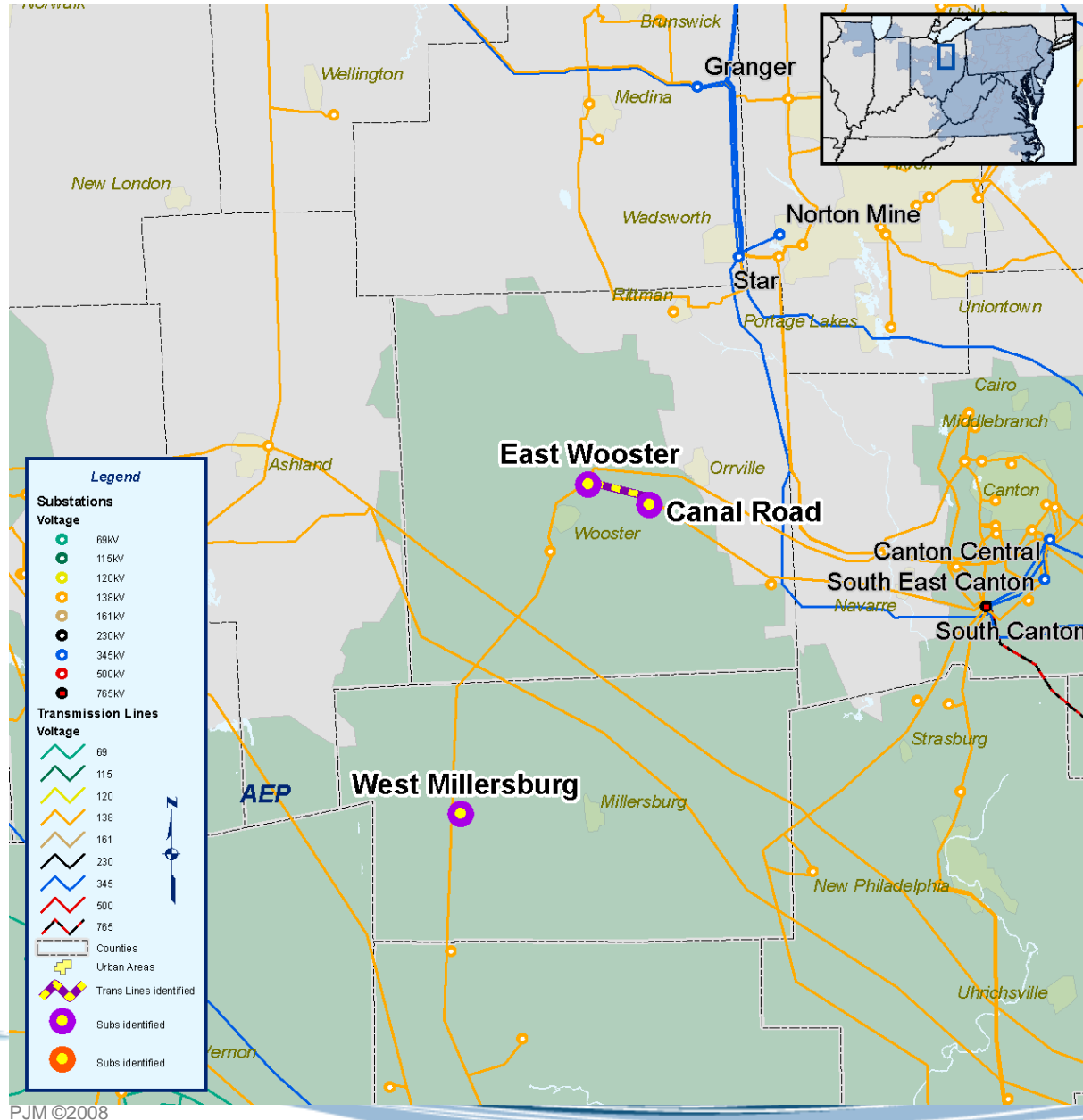
Subregional RTEP Committee Western Area

September 10, 2008

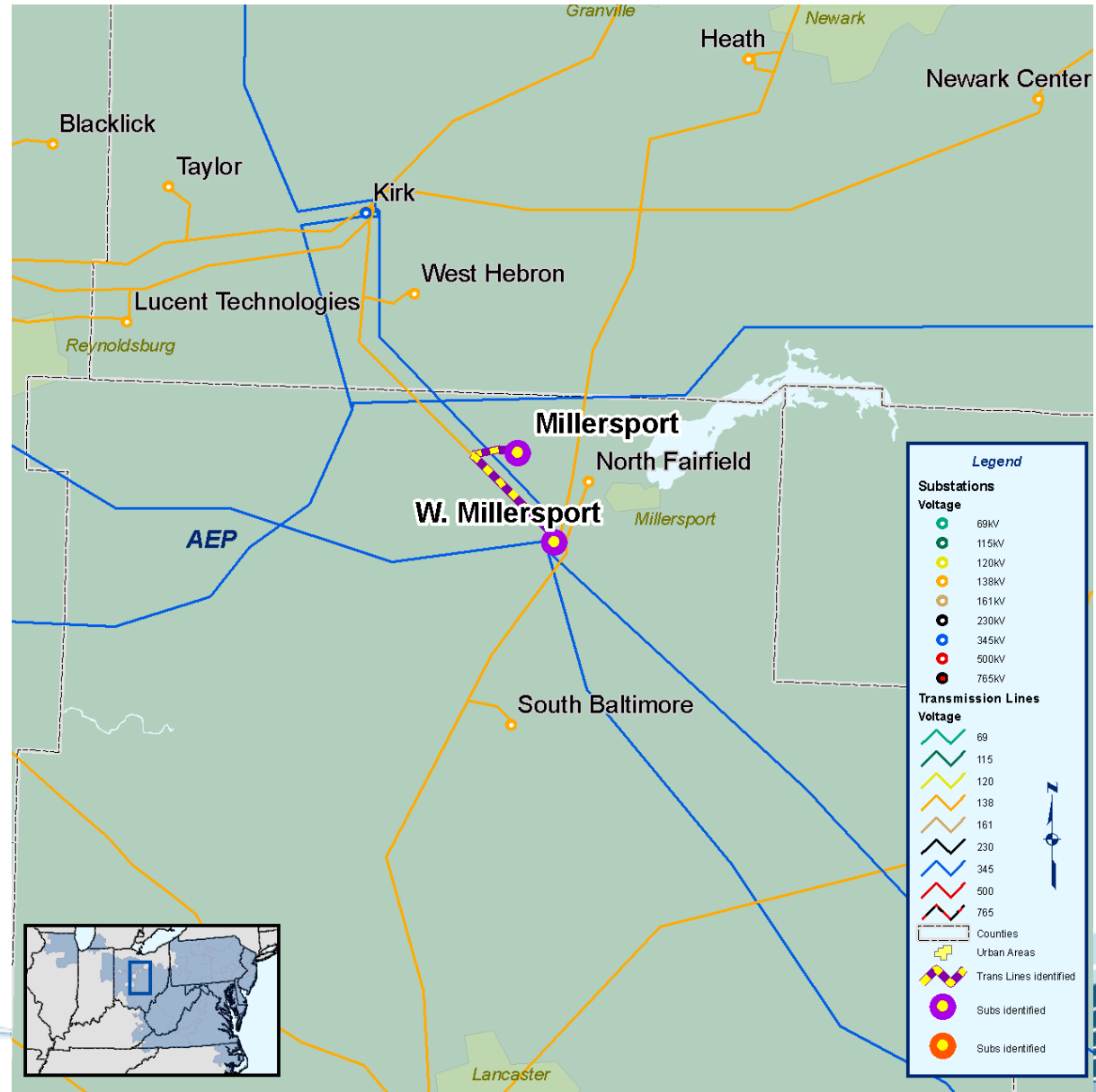


American Electric Power Baseline Upgrades

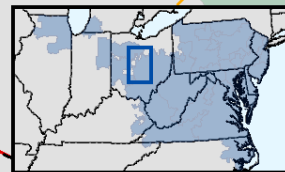
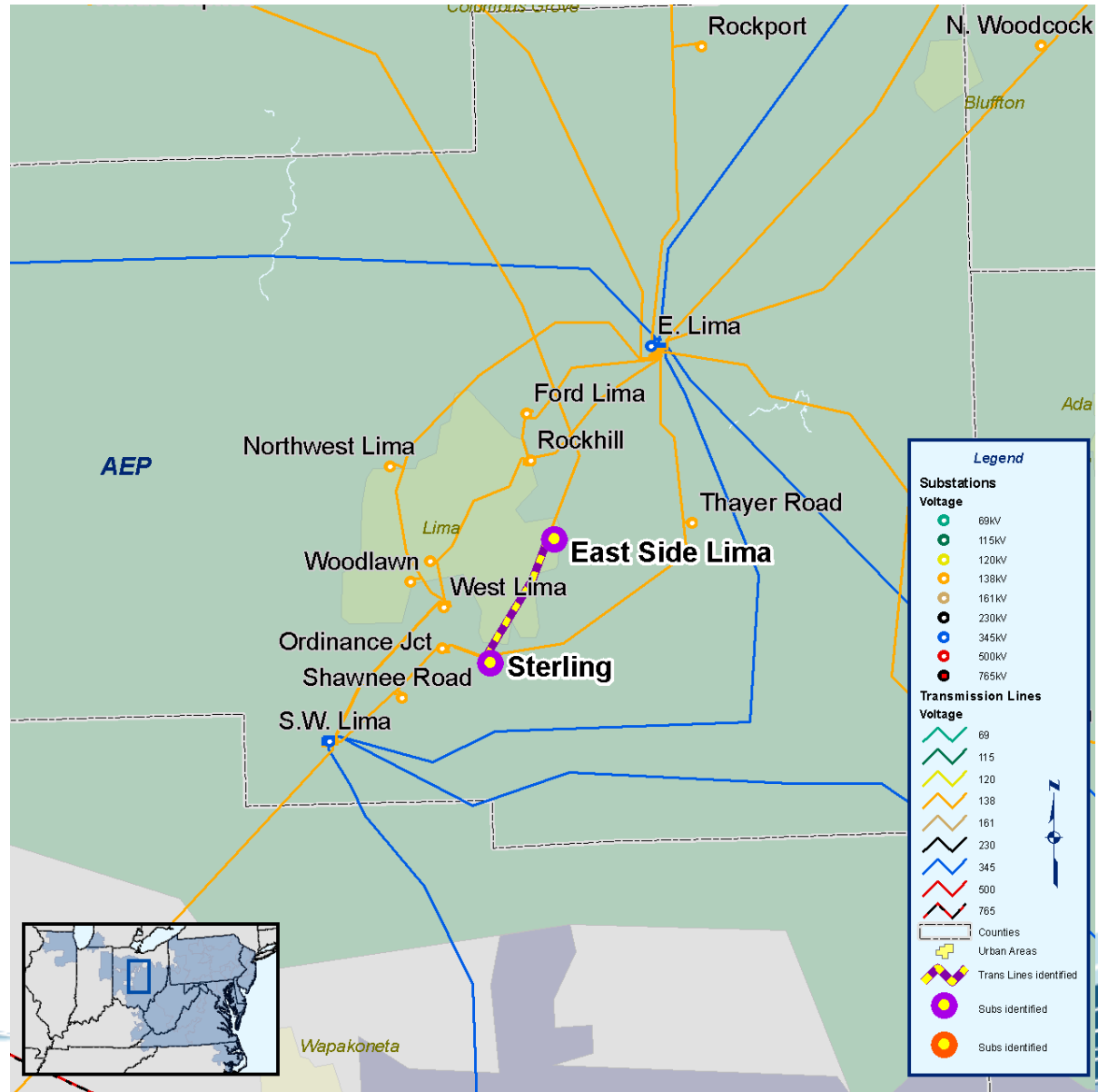
- 69 kV system in the Wooster-Moreland area of AEP (Northern Ohio) is no longer single contingency reliable
- Recommended Solution (major components):
 - Establish a new 69 kV circuit between the Canal Road and East Wooster stations
 - Establish a new 69 kV circuit between the West Millersburg and Moreland Switch stations (via Shreve)
 - Add reactive support VIA cap banks
- AEP Criteria
- Estimated cost: \$27M
- Expected in-service date: 12/1/2010



- Generator Deliverability Problem: The tower outage of West Millersport – Kirk 345 kV and West Millersport – Hyatt 345 kV overloads West Millersport – Millersport 138 kV
- Generator Deliverability
- Solution: Reconductor West Millersport - Millersport 138 kV
- Estimated Project Cost: \$6.5M
- IS Date: 6/1/2012



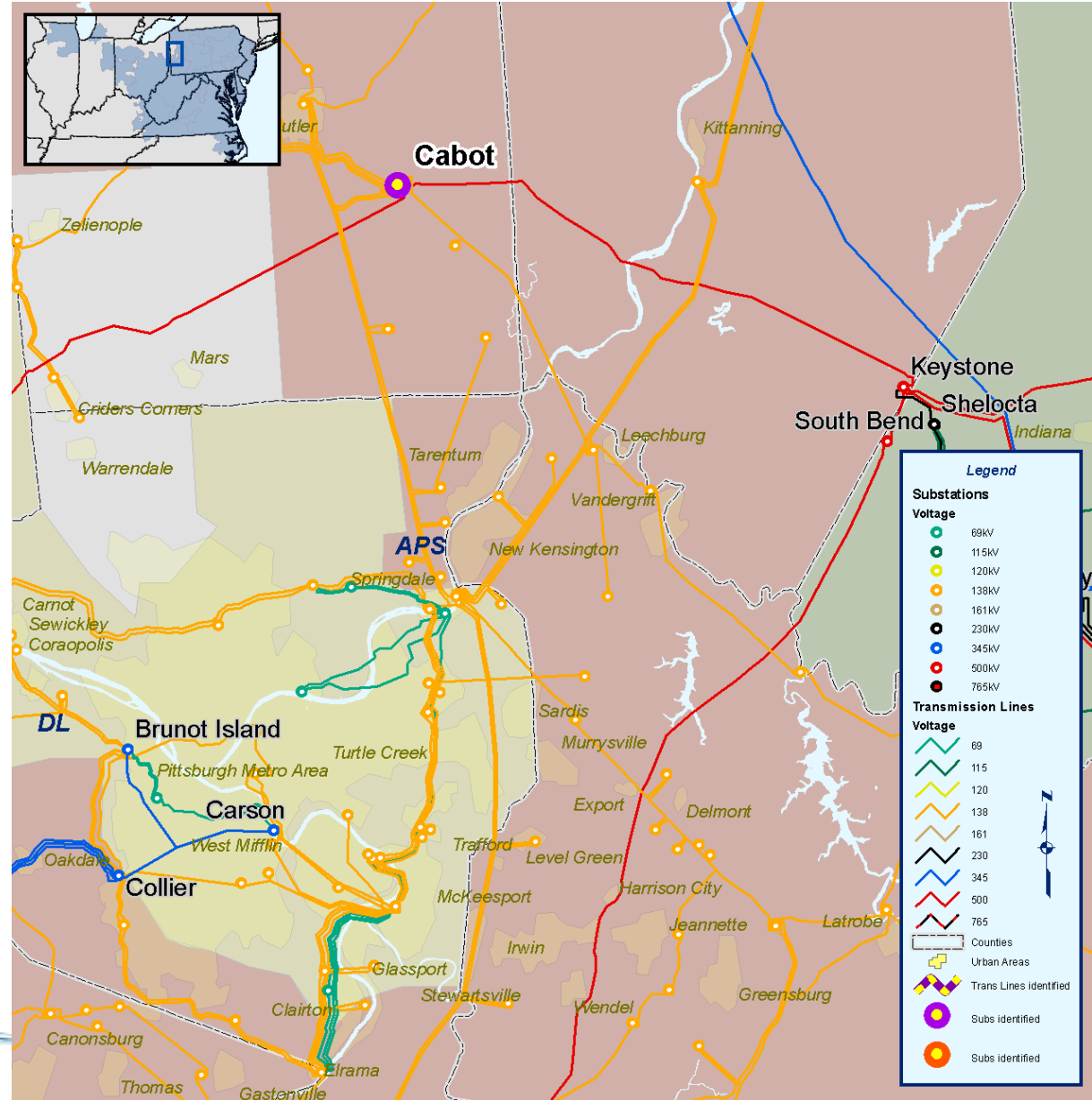
- Problem: The tower outage of Allen – Sorensen 345 kV and Convoy – Robinson Park 345 kV overloads East Side Lima – Sterling 138 kV
- Generator Deliverability
- Solution: Reconductor East Side Lima - Sterling 138 kV
- Estimated Project Cost: \$5M
- IS Date: 6/1/2012



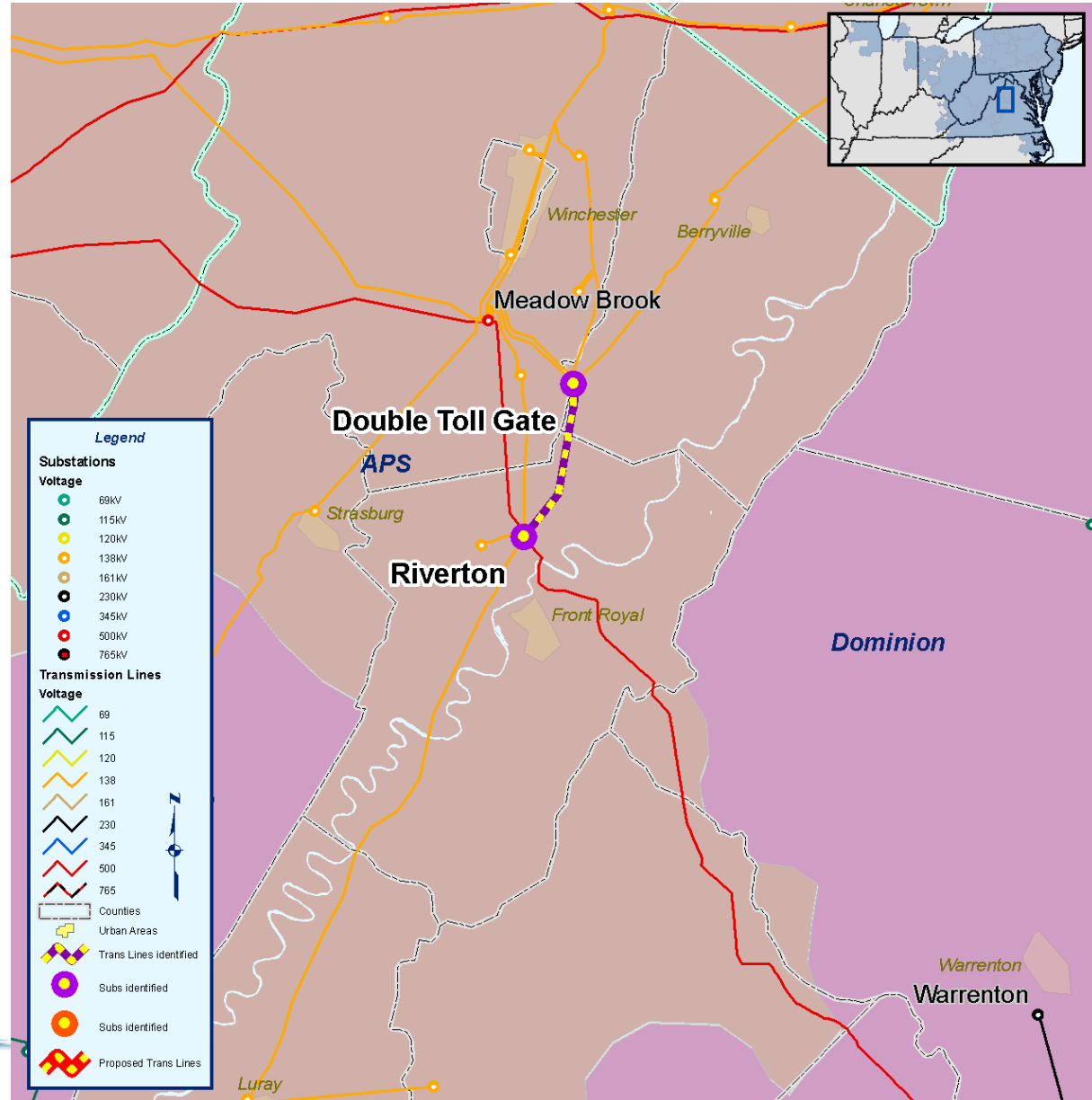


Allegheny Power Baseline Upgrades

- Thermal Overload of Cabot #1 500/138 kV transformer
- Bus fault contingency of the #2 Main 500 kV bus resulting in loss of the #2 and #4 banks
- APS Criteria
- Solution: Install a third Cabot 500/138kV autotransformer
- Estimated Cost: \$8.07M
- IS Date: 6/1/2011



- Double Toll Gate - Riverton 138 kV is overloaded for the loss of the North Shenandoah 138 - 115 kV transformer & Meadowbrook - Klines Mill 138 kV line
- Solution: Reconductor Double Toll Gate – Riverton with 954 ACSR
- Estimated Cost: \$2.7M
- IS Date: 6/1/2013

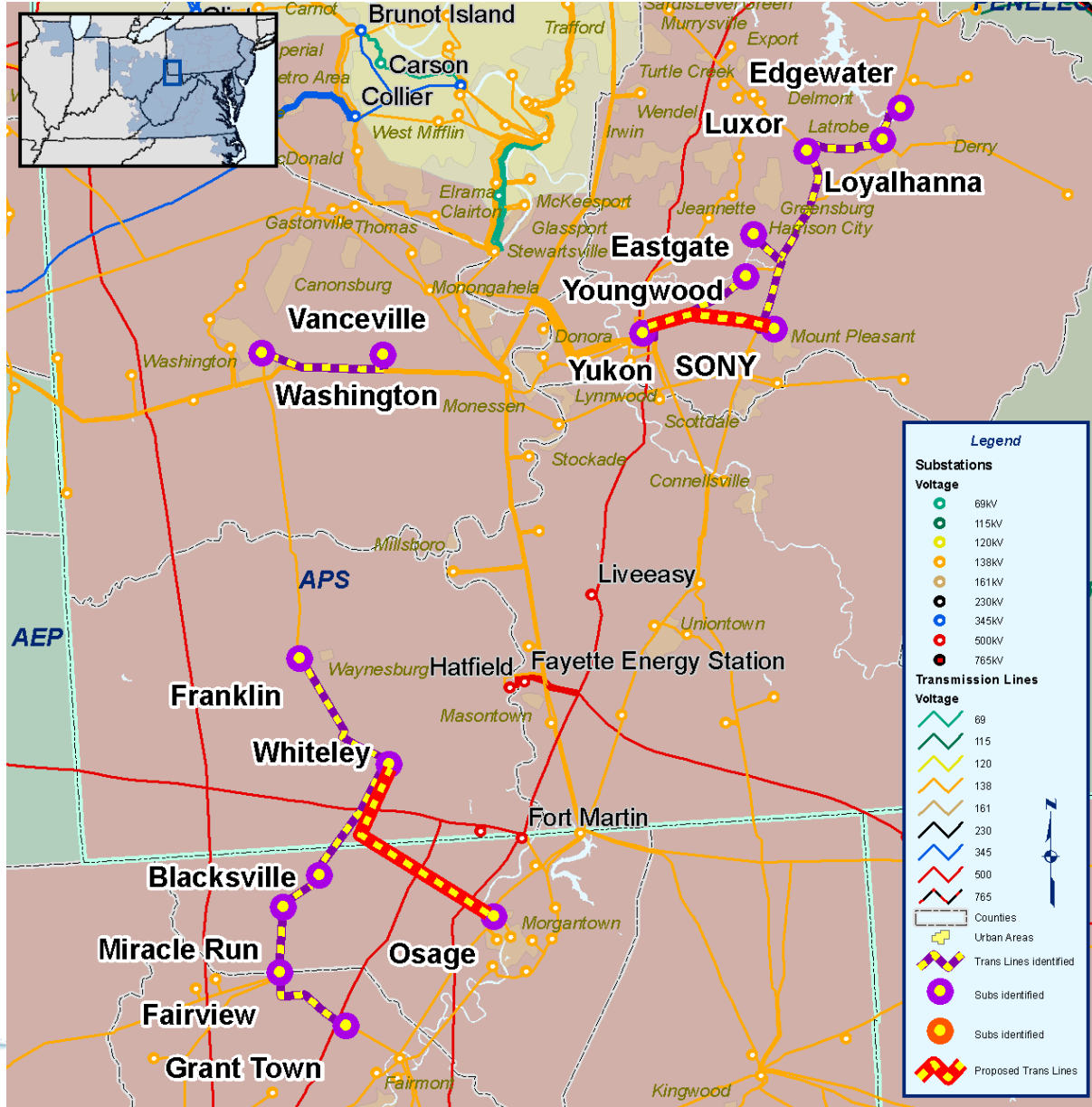


- Thermal overload of:

- Blacks - Miracle Run 138 kV
- Bracken - Luxor 138 kV
- Eastgate - Luxor 138 kV
- Eastgate - Sony 138 kV
- Edgewater - Loyalhanna 138 kV
- Edgewater - Vanceville Jct 138 kV
- Fairview - Grant Town 138 kV
- Fairview - Miracle Run 138 kV
- King Farm - Sony 138 kV
- Luxor - Loyalhanna 138 kV
- Luxor - Stony Springs Jct 138 kV
- Social Hall - Vanceville Jct 138 kV
- Whiteley - Blacksville 138 kV
- Youngwood - Yukon 138 kV
- Yukon - Waltz Mills Tap 138 kV
- Vanceville Jct - Washington 138 kV

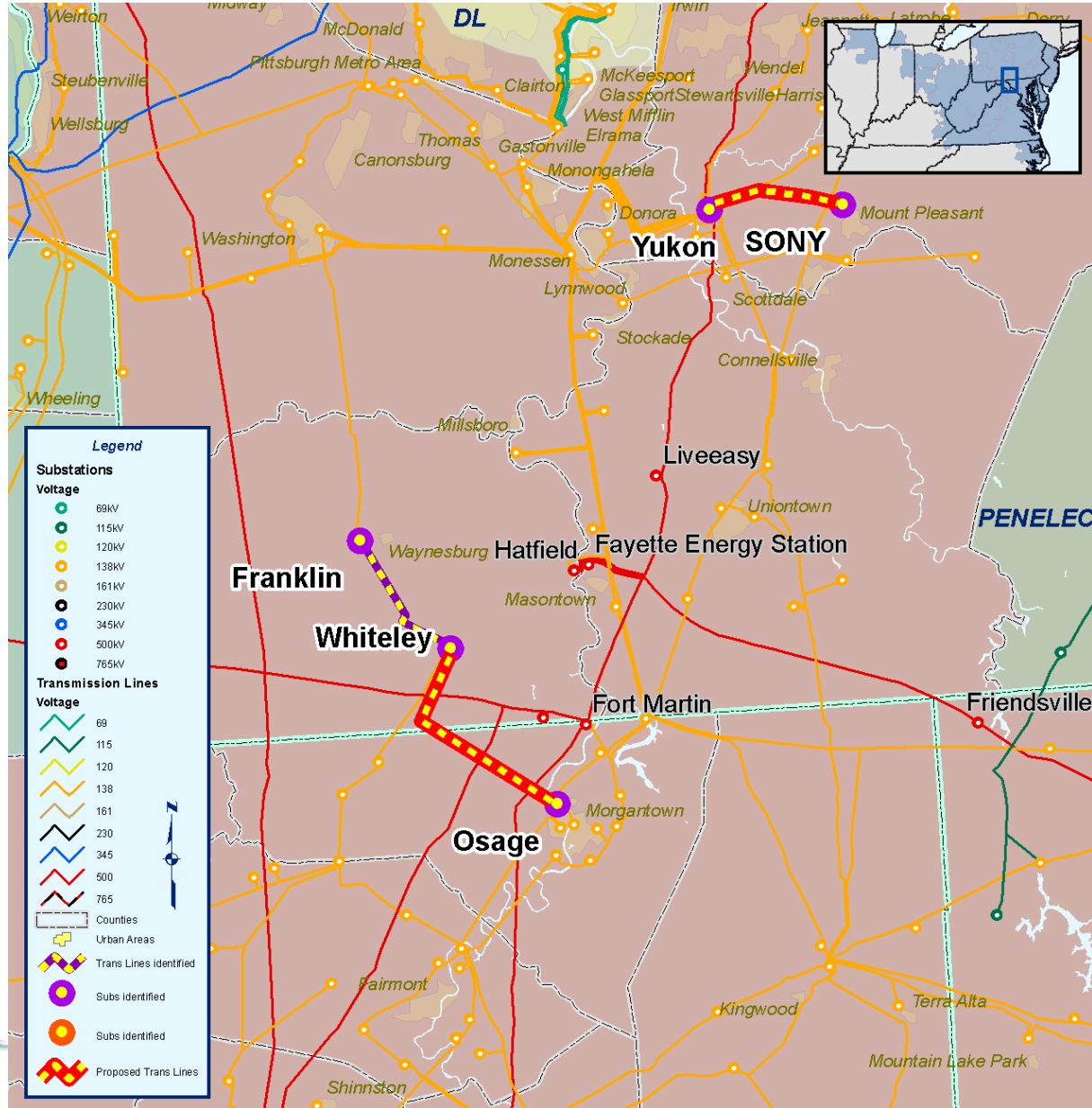
- Solution: Construct new 138 kV line from Osage - Whiteley
- Estimated Cost: \$13.3M
- IS Date: 6/1/2013

- Solution: Tap Yukon - Bethel Boro 138 kV line and construct new 138 kV Line to Sony
- Estimated Cost: \$10.3M
- IS Date: 6/1/2013



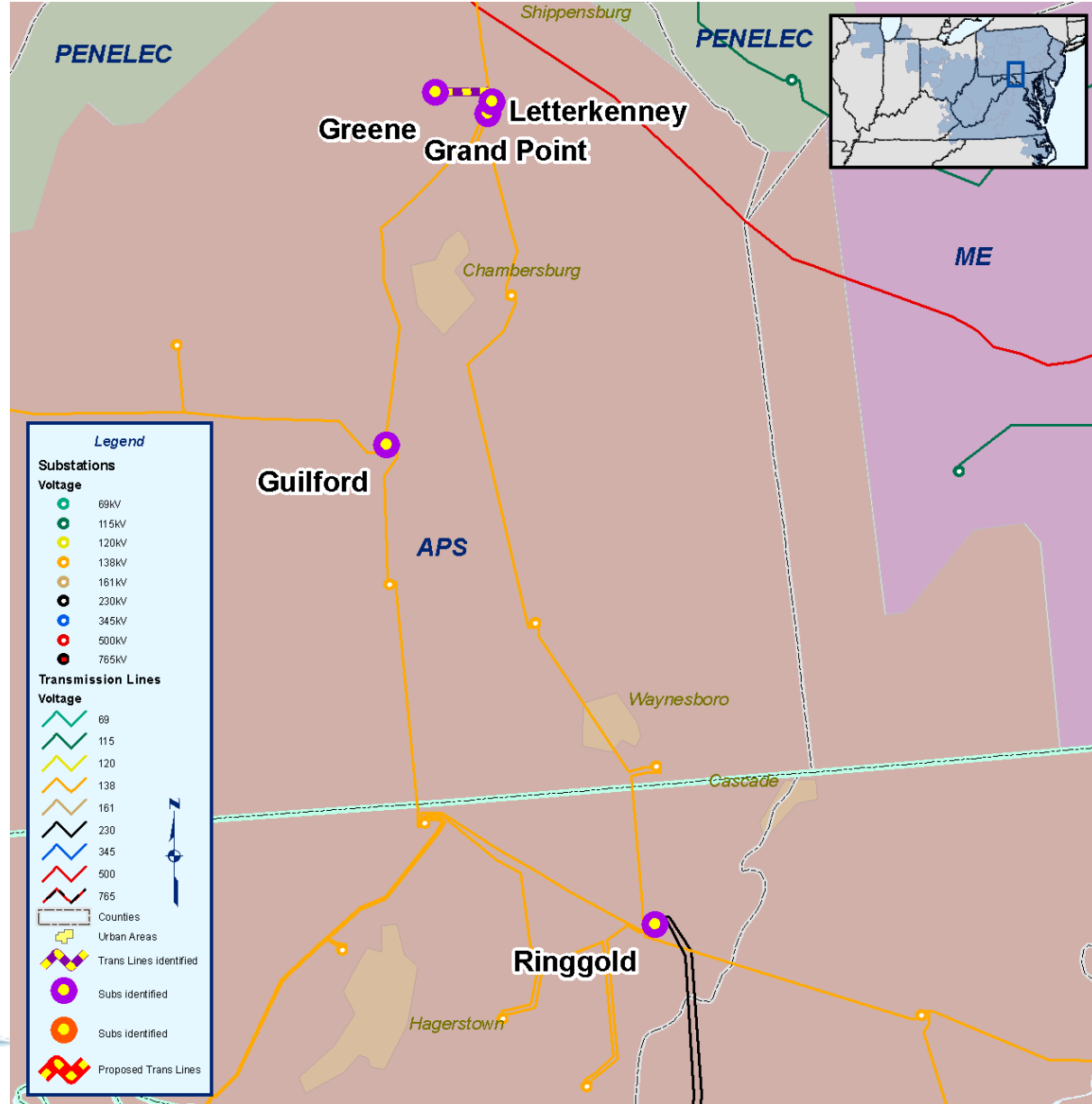
- Thermal Overload of Franklin – Pursley 138 kV I/o Vanceville Jct –Washington 138 kV line & Dutch Fork - Windsor 138 kV line
- Solution: Replace 600/5 CT's at Franklin
- Estimated Cost: \$0.01M
- IS Date: 6/1/2013

- Thermal Overload of Whiteley – Pursley 138 kV I/o Vanceville Jct –Washington 138 kV line & Dutch Fork - Windsor 138 kV line
- Solution: Replace 600/5 CT's at Whiteley
- Estimated Cost: \$0.01M
- IS Date: 6/1/2013



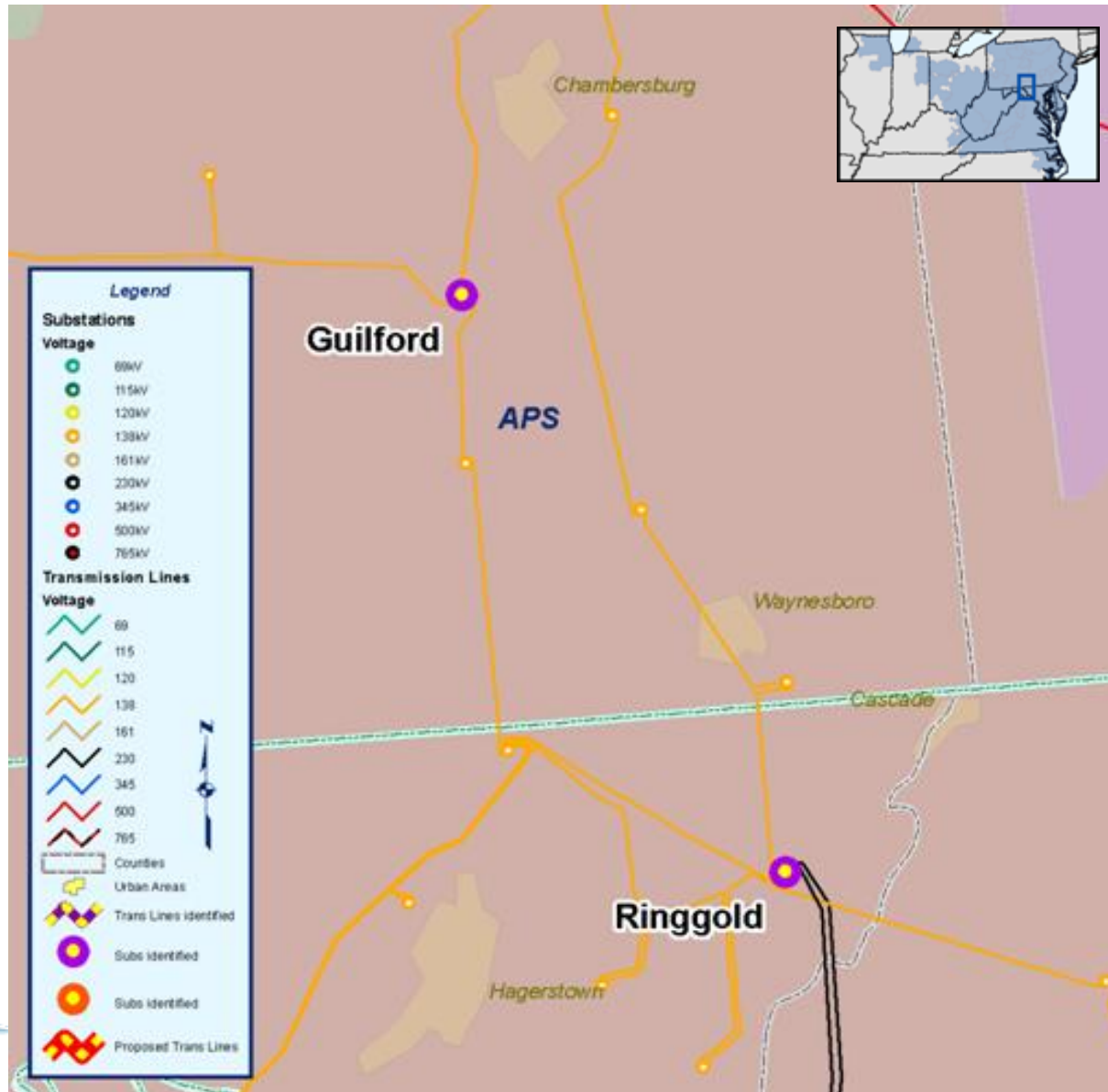
- Thermal overload of Grand Point – Letterkenney 138 kV I/o East Waynesboro – Ringgold 138 kV line & Grand Point – Guilford 138 kV line
- Reconductor Grand Point - Letterkenney with 954 ACSR
- Estimated Cost: \$2.1M
- IS Date: 6/1/2013

- Thermal overload of Greene – Letterkenney 138 kV I/o East Waynesboro – Ringgold 138 kV line & Grand Point – Guilford 138 kV line
- Reconductor Greene - Letterkenney with 954 ACSR
- Estimated Cost: \$0.56M
- IS Date: 6/1/2013

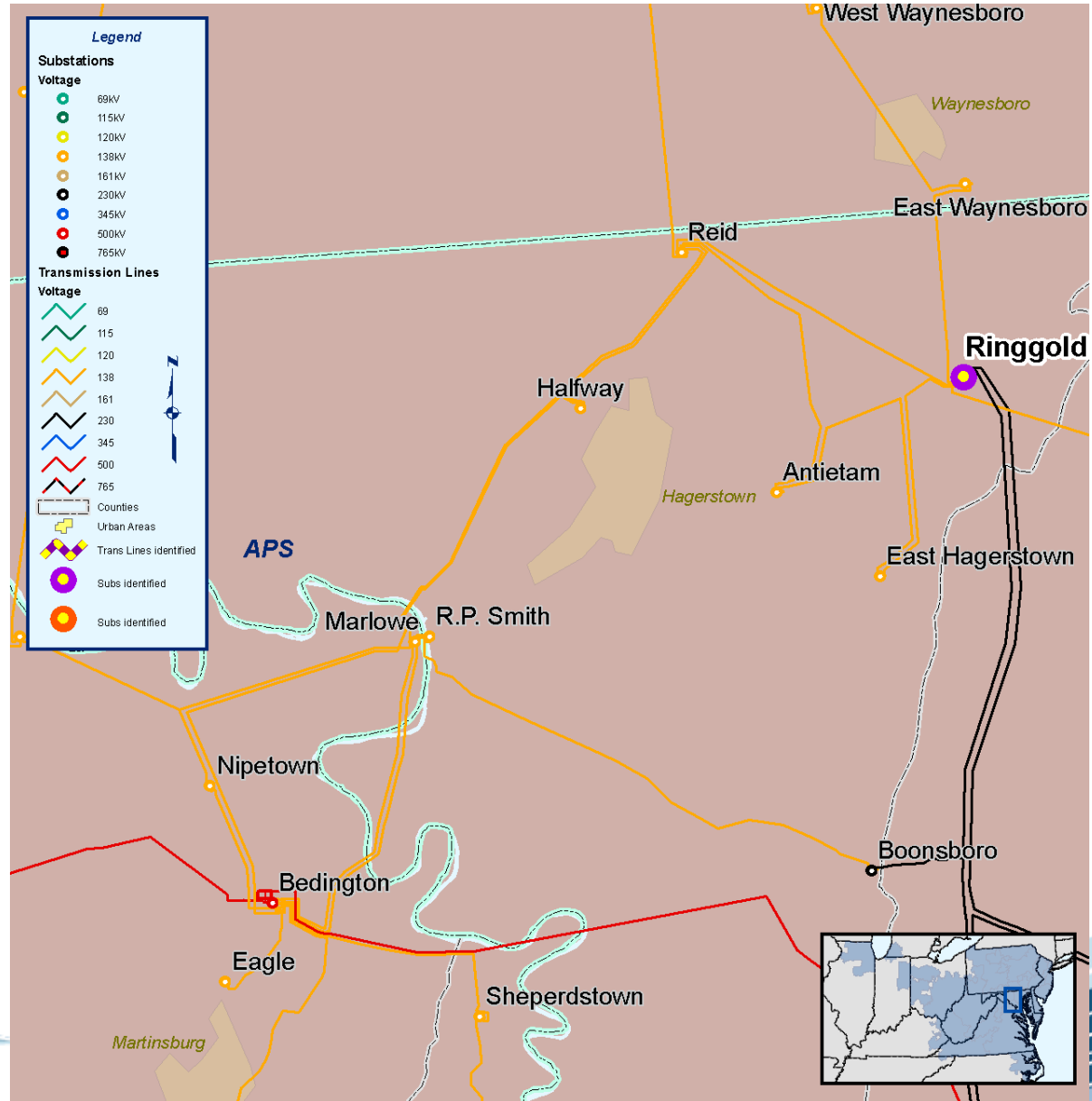


- Thermal overload of Guilford – South Chambersburg 138 kV for the loss of Ringgold – East Waynesboro 138 kV
- Generator Deliverability
- Reconductor Guilford - South Chambersburg with 954 ACSR
- Estimated Cost: \$3.2M
- IS Date: 6/1/2013

- Thermal overload of the Ringgold #3 230/138 kV transformer for the tower outage of Marlow – Halfway 138 kV and Reid – Nipetown 138 kV
- Solution: Replace the Ringgold #3 230/138 kV transformer with a larger transformer
- Generator Deliverability
- Estimated Cost: \$5.8M
- IS Date: 6/1/2013



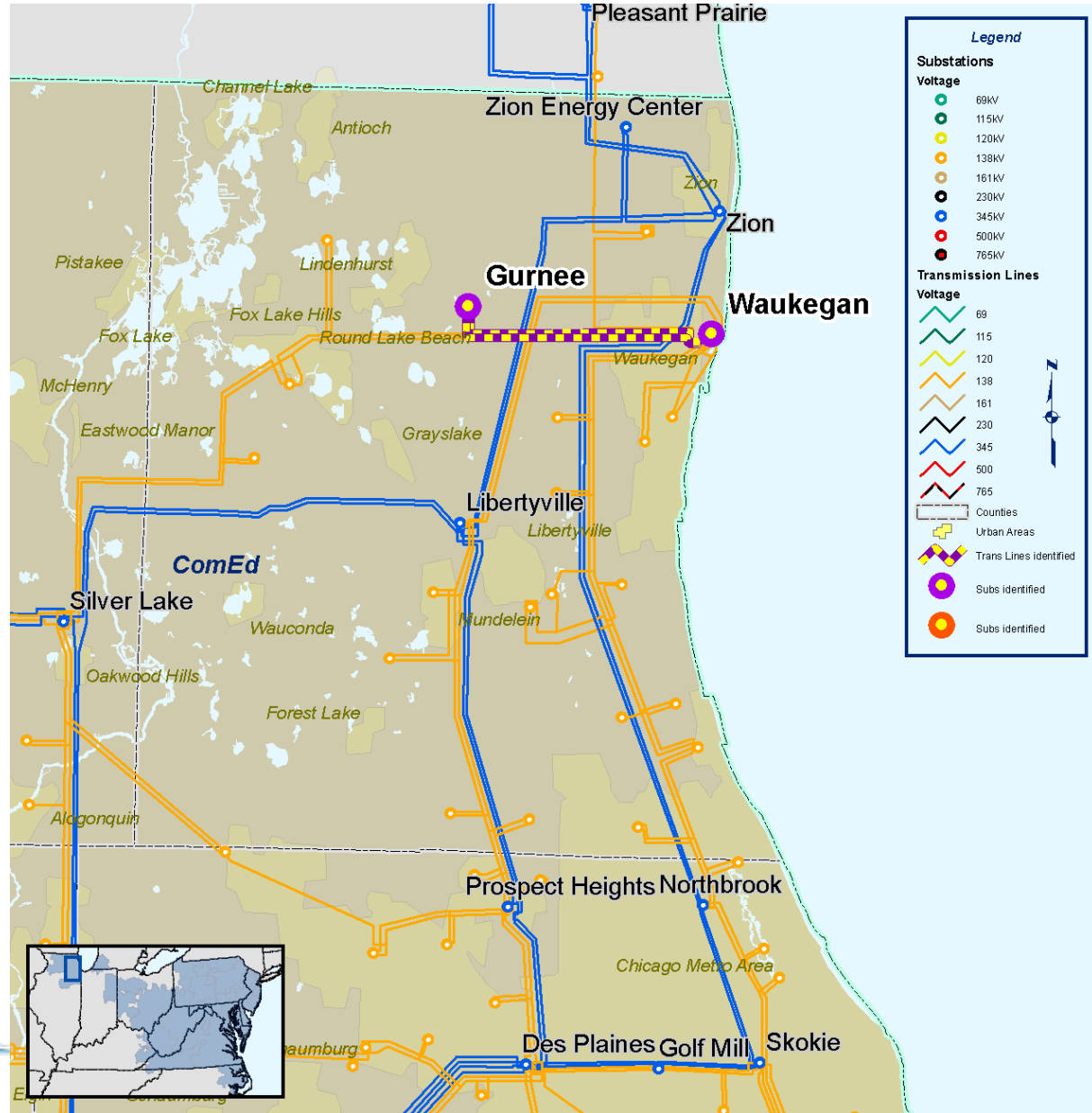
- In 2013, the Ringgold #3 230/138 kV transformer is overloaded for the tower outage of Reid - Nipetown 138 kV and Marlowe - Halfway 138 kV
- Solution: Replace the Ringgold #3 230/138 kV transformer with a larger transformer
- Generator deliverability
- Estimated Project Cost: \$5.8
- IS Date: June 2013





ComED Baseline Upgrades

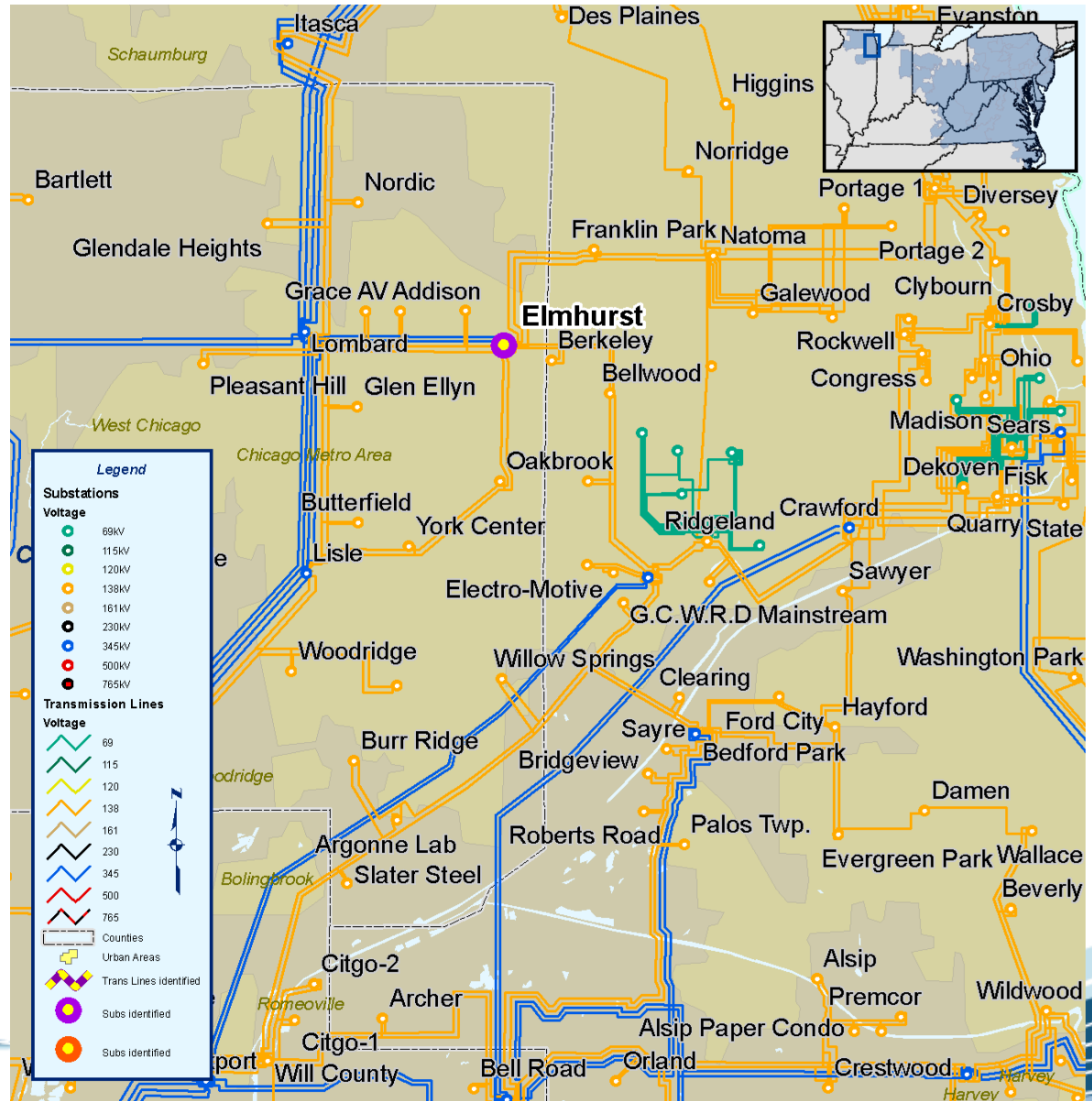
- Thermal overload of Waukegan – Gurnee 138 kV “Red”
 - Bus fault at Silver Lake 138 kV “Red”
- Thermal overload of Waukegan – Gurnee 138 kV “Blue”
 - Tower Outage of Round Lake – Wilson 138 kV “Blue” and “Red” circuits
- Generator Deliverability
- Reconductor 138 kV lines 1603 and 1607 from Waukegan to Gurnee
- Estimated Cost: \$11.6M
- IS Date: 6/1/2013



Dynamic Voltage Criteria & Voltage Stability Criteria

- Solution: Add a 300 MVAR SVC at Elmhurst 138 kV “Red”
- IS Date: 6/1/2013
- Cost: \$32.5M

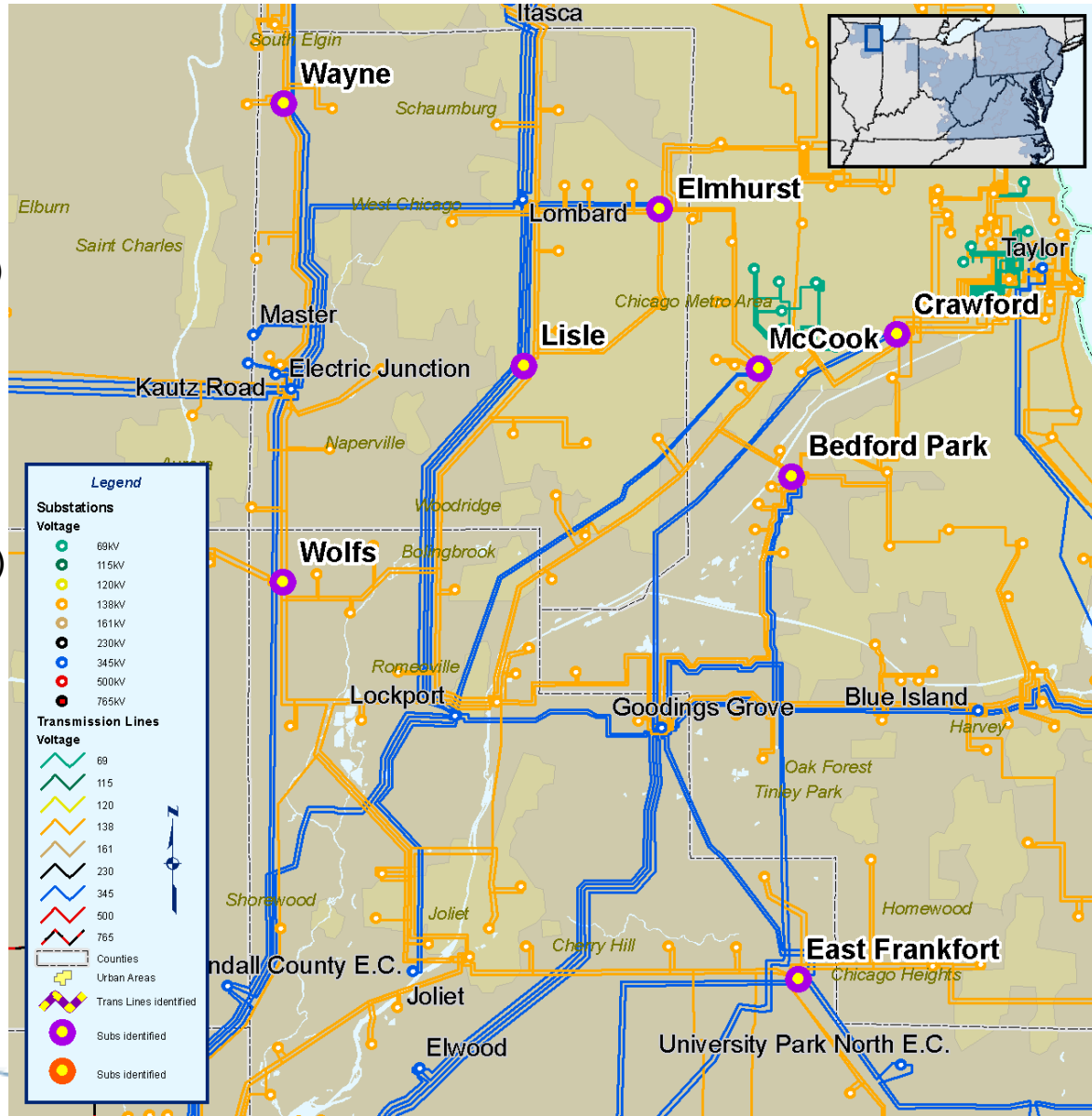
- Solution: Add a 300 MVAR SVC at Elmhurst 138 kV “Blue”
- IS Date: 6/1/2013
- Cost: \$32.5M



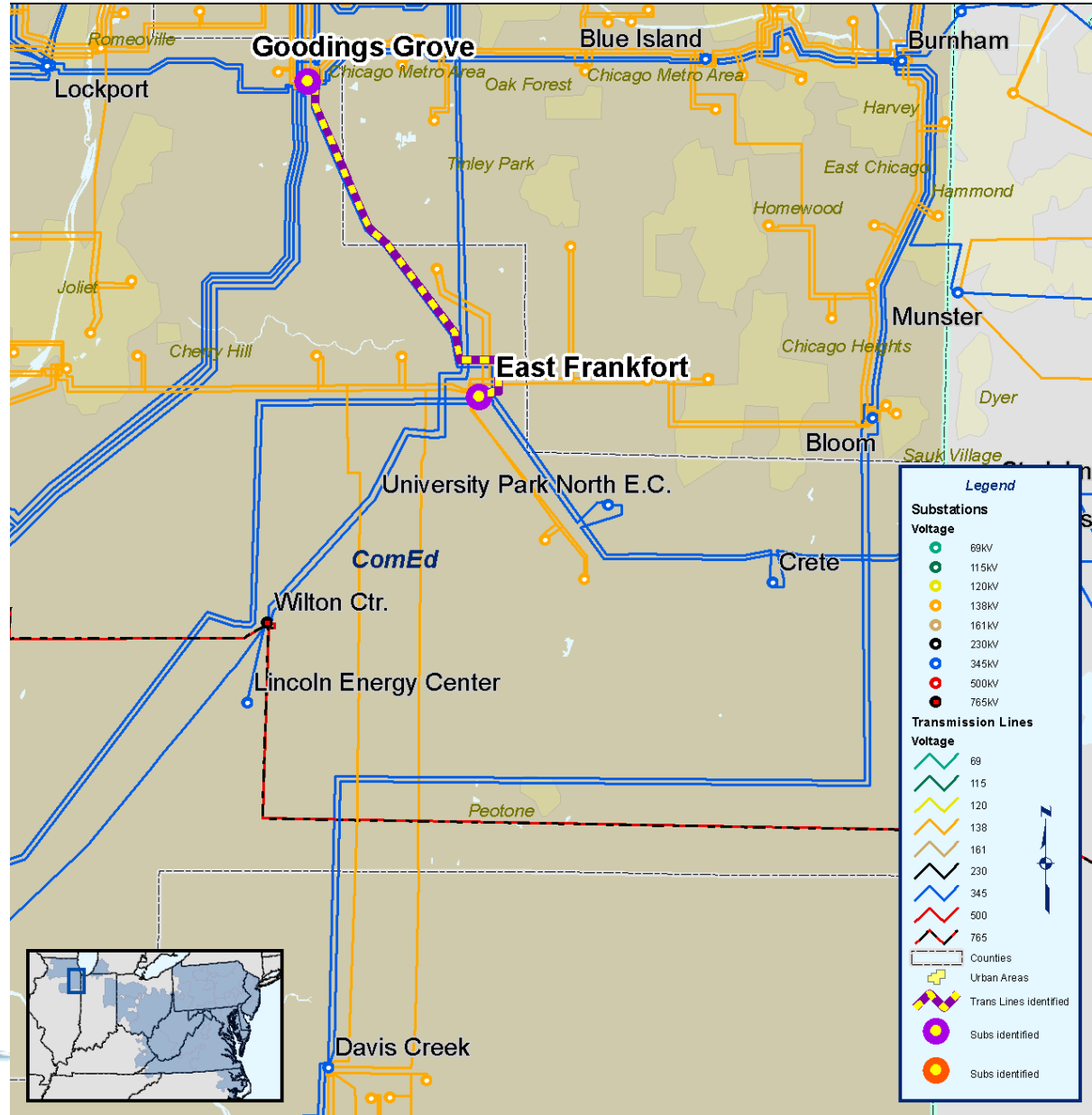
Voltage Stability

• Solution: Install 115.2 MVAR switched capacitors at the following locations by 6/1/2013:

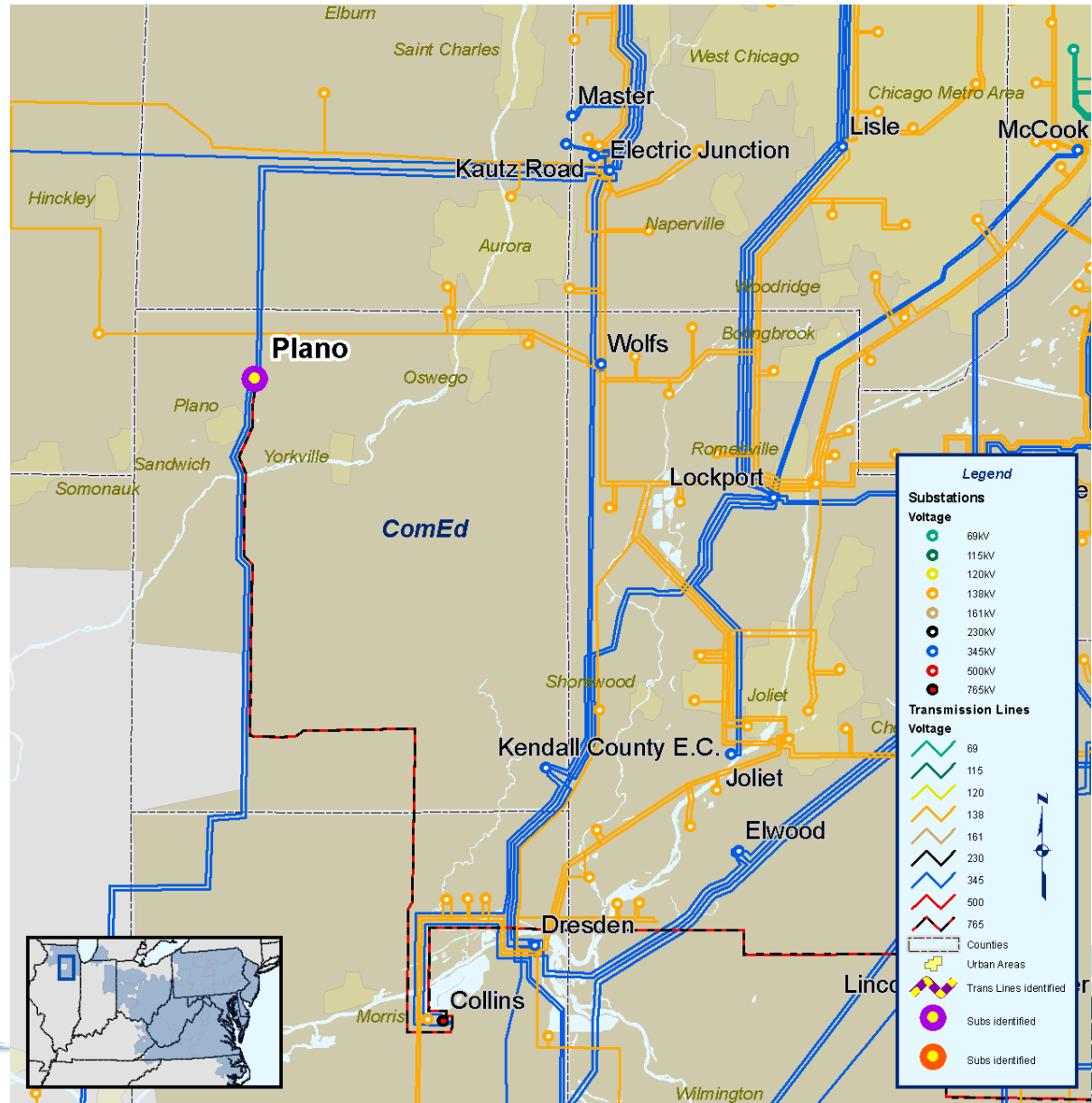
- East Frankfort 138 kV (\$2.9M)
- Plano 138 kV Red (\$2.3M)
- Plano 138 kV Blue (\$2.3M)
- McCook 138 kV Red (\$2.3M)
- McCook 138 kV Blue (\$2.3M)
- Wayne 138 kV Blue (\$2.9M)
- Wayne 138 kV Red (\$2.9M)
- Crawford 138 kV Blue (\$2.3M)
- Crawford 138 kV Red (\$2.3M)
- Bedford Park 138 kV Blue (\$2.9M)
- Bedford Park 138 kV Red (\$2.9M)
- Wolfs 138 kV (57.6 MVAR) (\$1.5M)



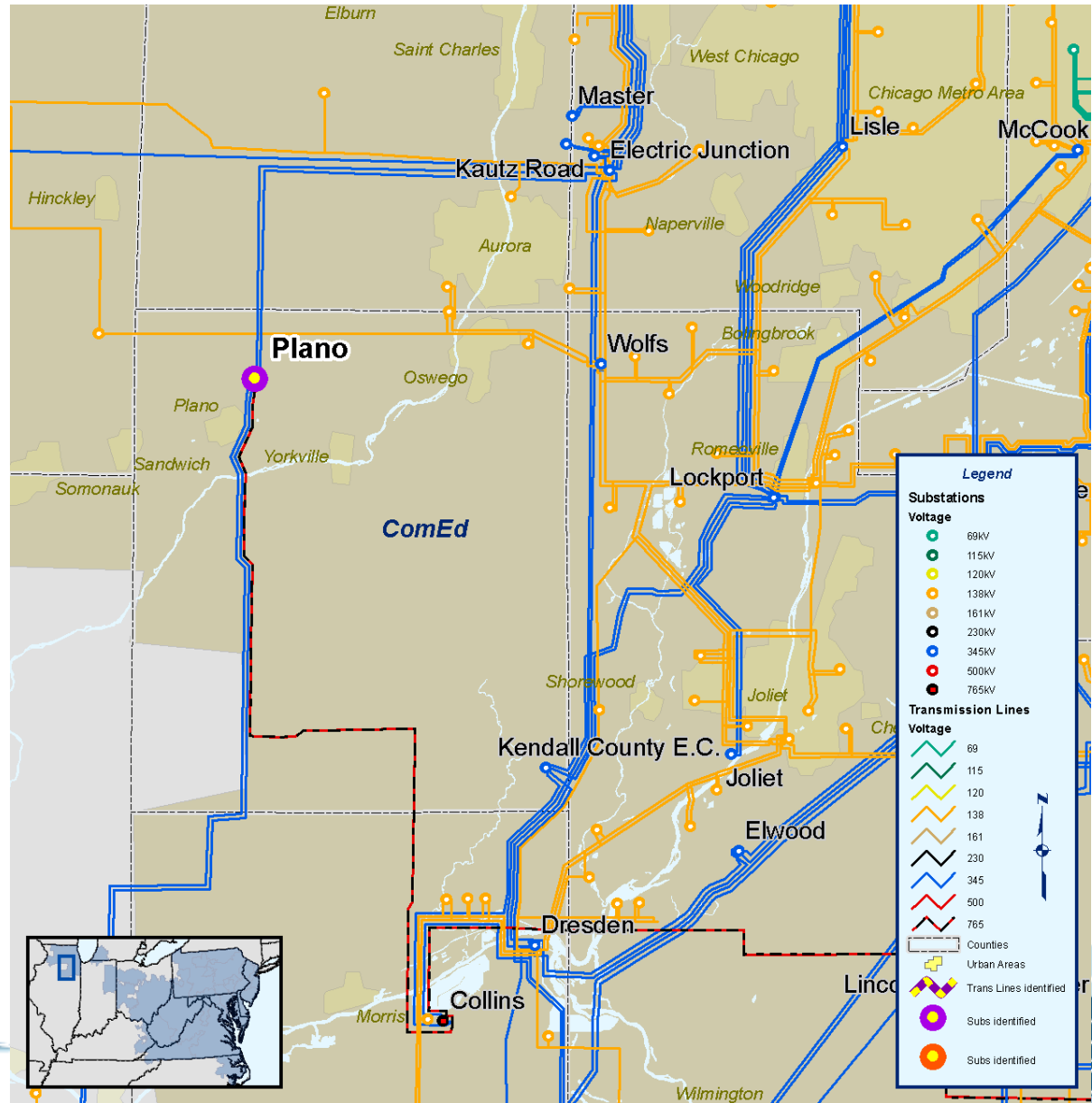
- Thermal Overload of East Frankfort – Goodings Grove 345 kV “Red”
- No contingency – all facilities in Service
- Solution: Reconductor East Frankfort - Goodings Grove 345 kV "Red" line 11602
- Generator and Load Deliverability
- IS Date: 6/1/2013
- Cost Estimate: \$15M



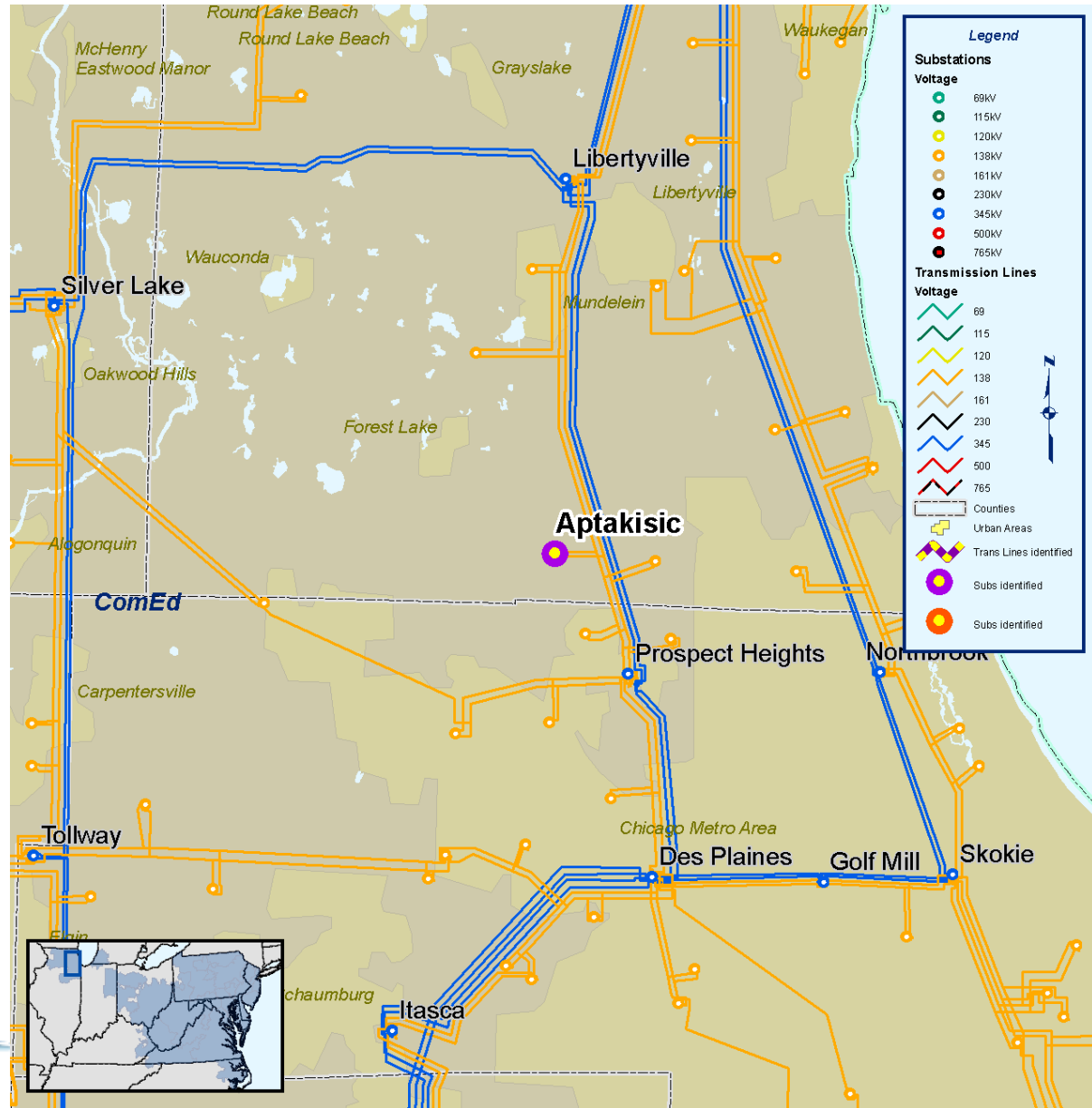
- Thermal overload of Wolfs 345/138 kV “Blue” transformer for the loss of the Wolfs 345/138 kV “Red” transformer
- Thermal overload of Wolfs – Oswego 138 KV “Blue” for the outage of Wolfs – Oswego 138 kV “Red”
- Solution for both violations: Replace the existing baseline upgrade to install a 2nd Wolfs 345/138 kV transformer. The replacement project is a 345/138 kV transformer at Plano “Red”
- Generator Deliverability
- Cost Estimate: \$20M
- IS Date: 6/1/2013



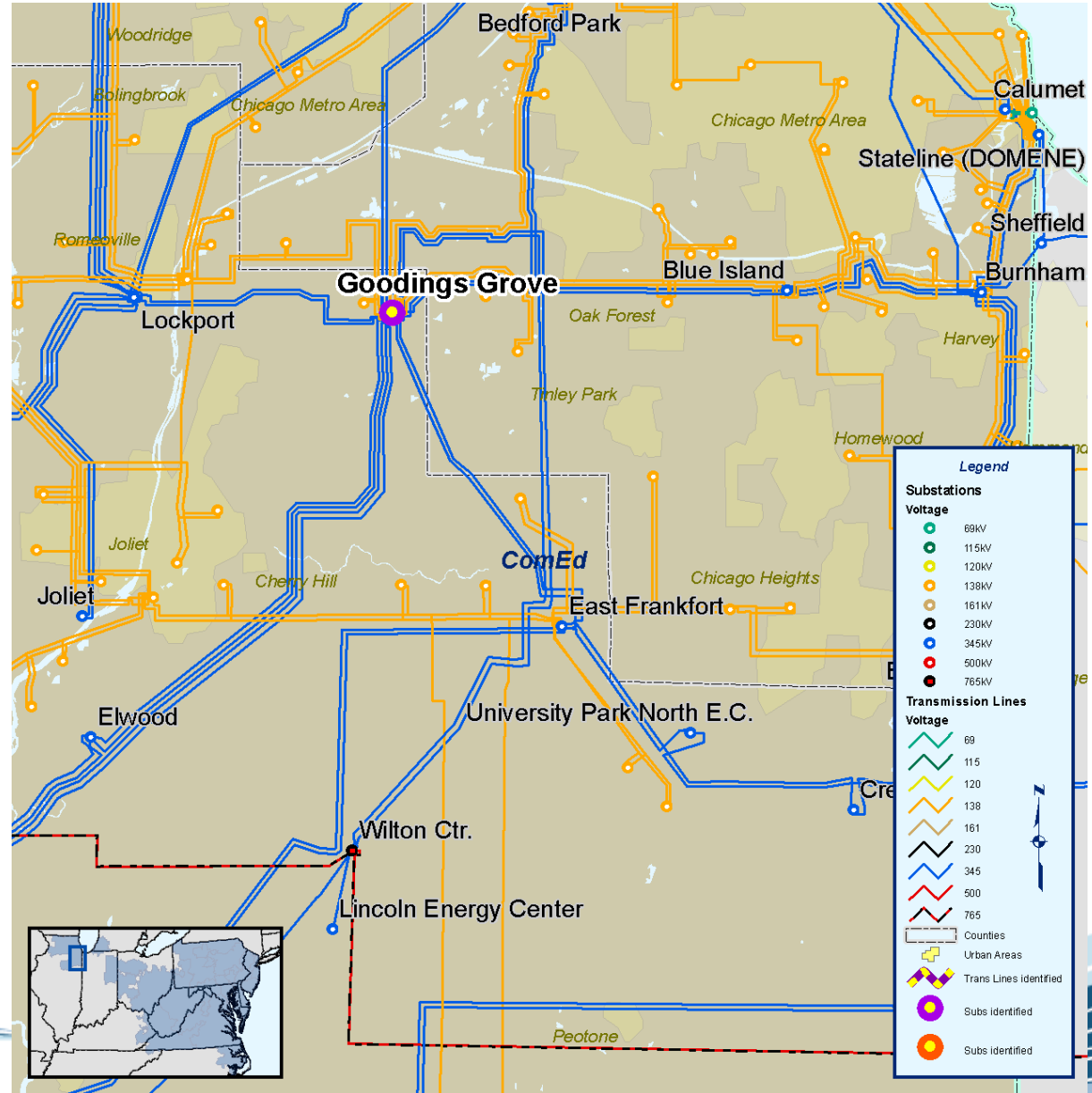
- Thermal overload of Electric Jct 345/138 kV TR84 for the loss of the parallel TR83 and vice versa
- Solution: Install a second 345/138 kV transformer at Plano “Red”
- Generator Deliverability and Load Deliverability
- Estimated Cost: \$10M
- IS Date: June 2013



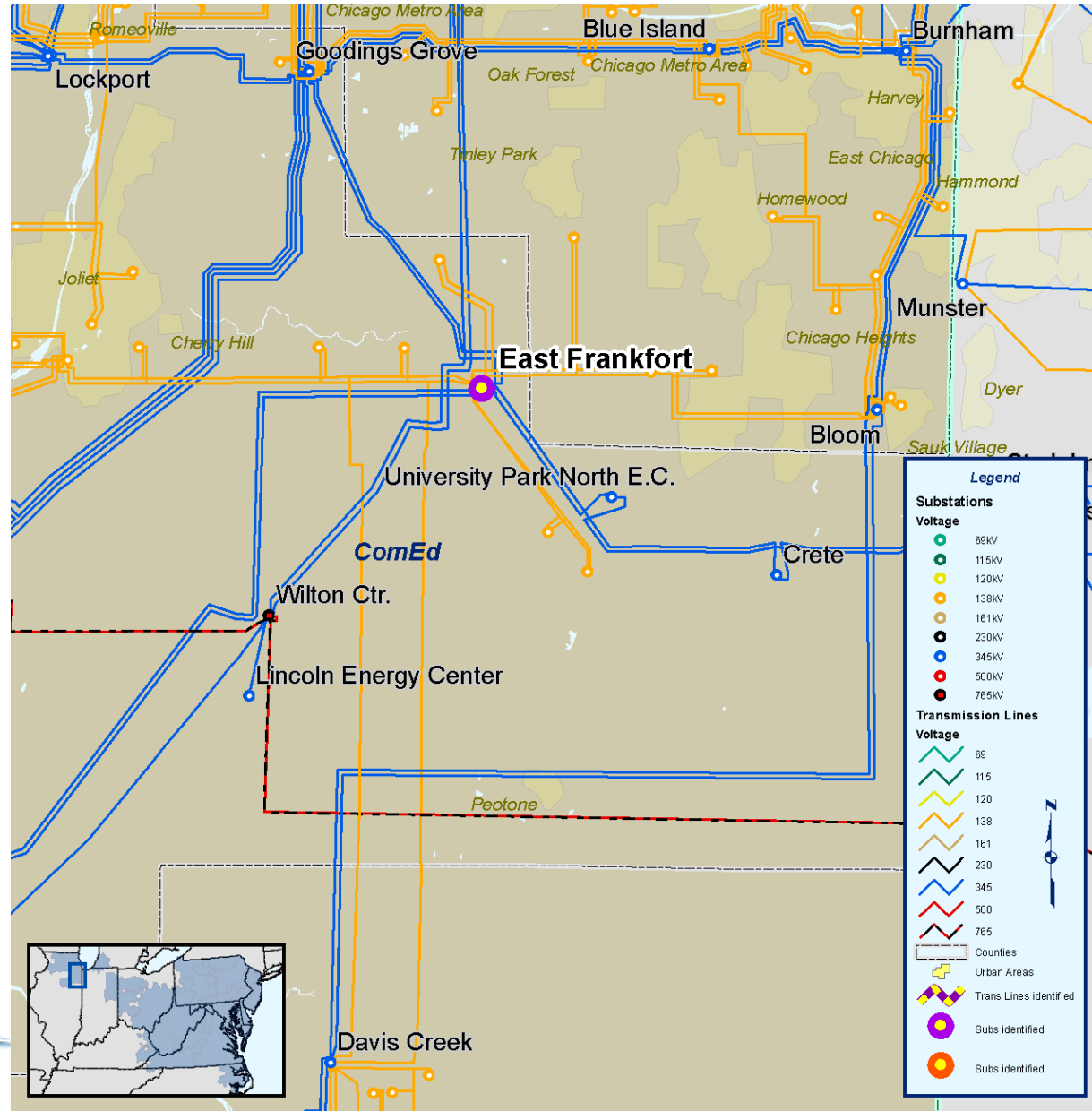
- Thermal overload of Prospect Heights 345/138 kV “Red” transformer for the loss of Prospect Heights – Leithton 138 kV line 11708
- Solution: Add a breaker at Aptakisic 138 kV to split the line in two for the 11708 contingency
- ComEd criteria & PJM Load Deliverability
- Expected IS Date: 6/1/2013
- Cost estimate: \$4M



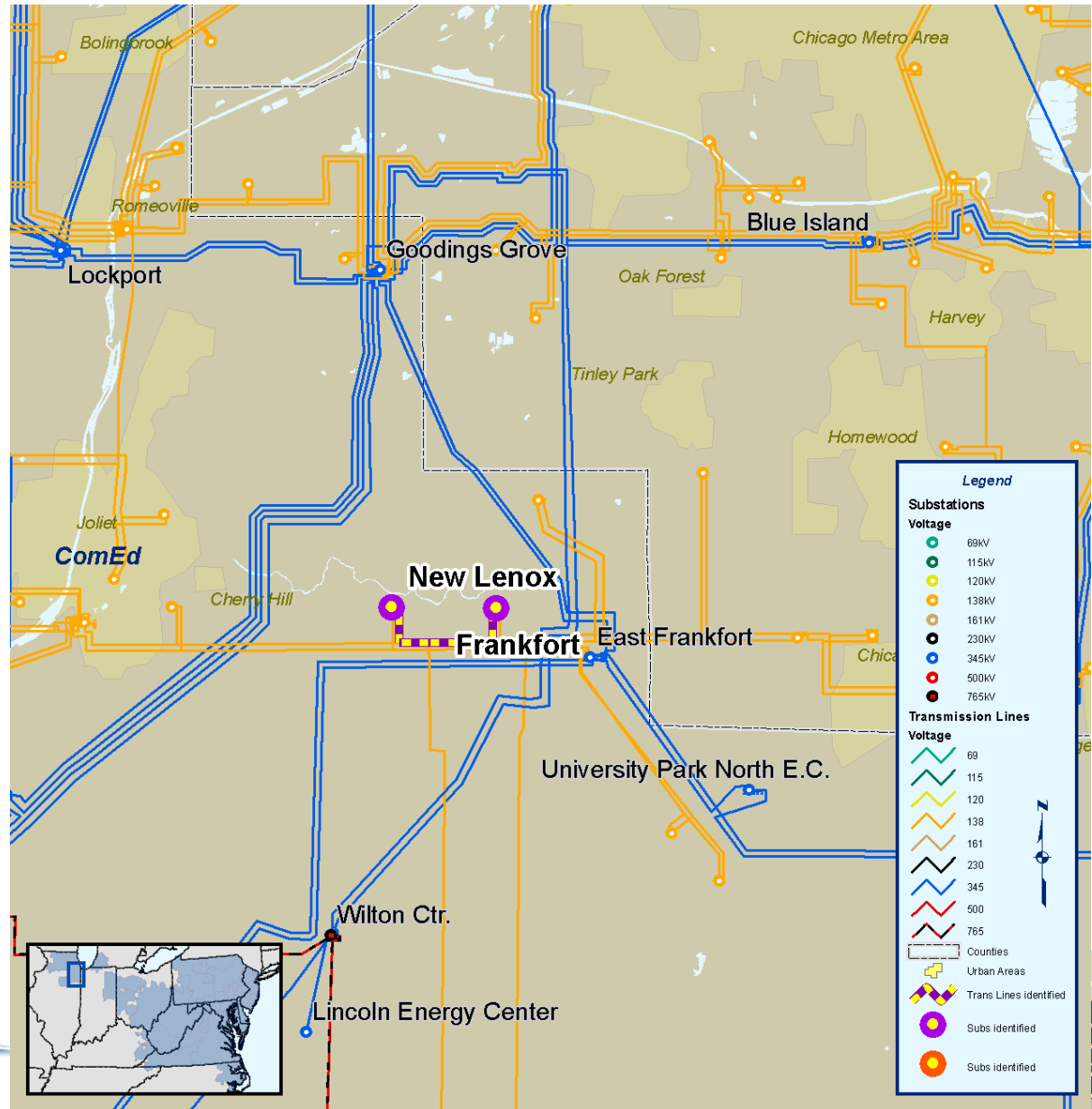
- Thermal overload of Goodings Grove 345/138 kV “Red” transformer for the loss of Blue Island – Alsip 138 kV
- Solution: Install a third 345/138 kV transformer at Goodings Grove “Red”
- Generator Deliverability & Load Deliverability
- IS Date: 6/1/2013
- Cost Estimate: \$15M



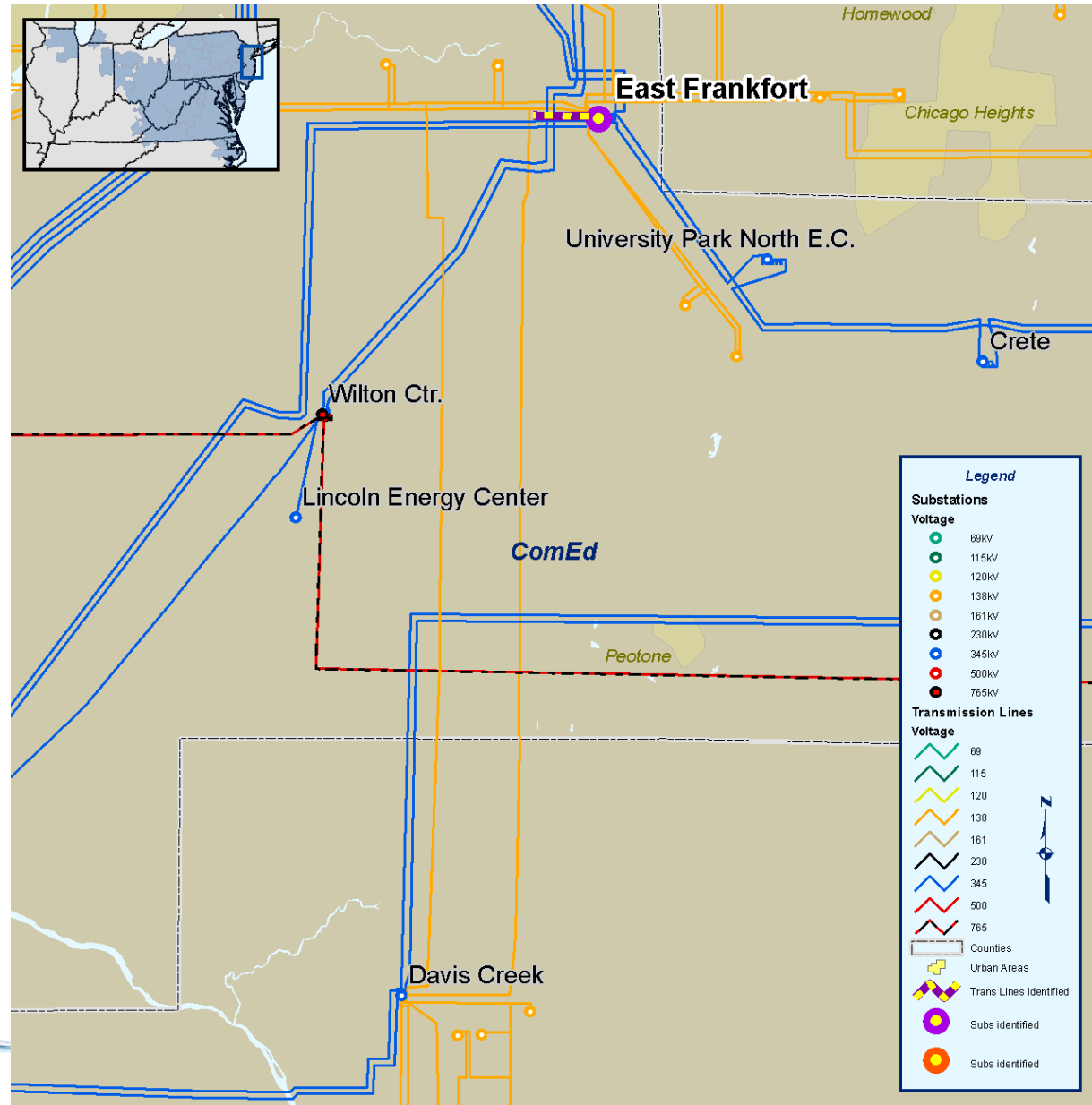
- Thermal overload of East Frankfort – Goodings Grove 345 kV “Blue”
- No contingency – all Facilities in Service
- Solution: Install a 2nd East Frankfort 345/138 kV Autotransformer and reconductor Country Club Hills – Matteson 138 kV
- Generator Deliverability & Load Deliverability
- IS Date: 6/1/2013
- Cost Estimate: \$11.25M



- Thermal overload of 0902 Frankfort – New Lenox 138 kV for the loss of Dresden – Shorewood 138 kV
- Solution: Reconductor line 0902 Frankfort - New Lenox 138 kV
- Generator Deliverability
- Expected IS Date: 6/1/2013
- Cost Estimate: \$2M



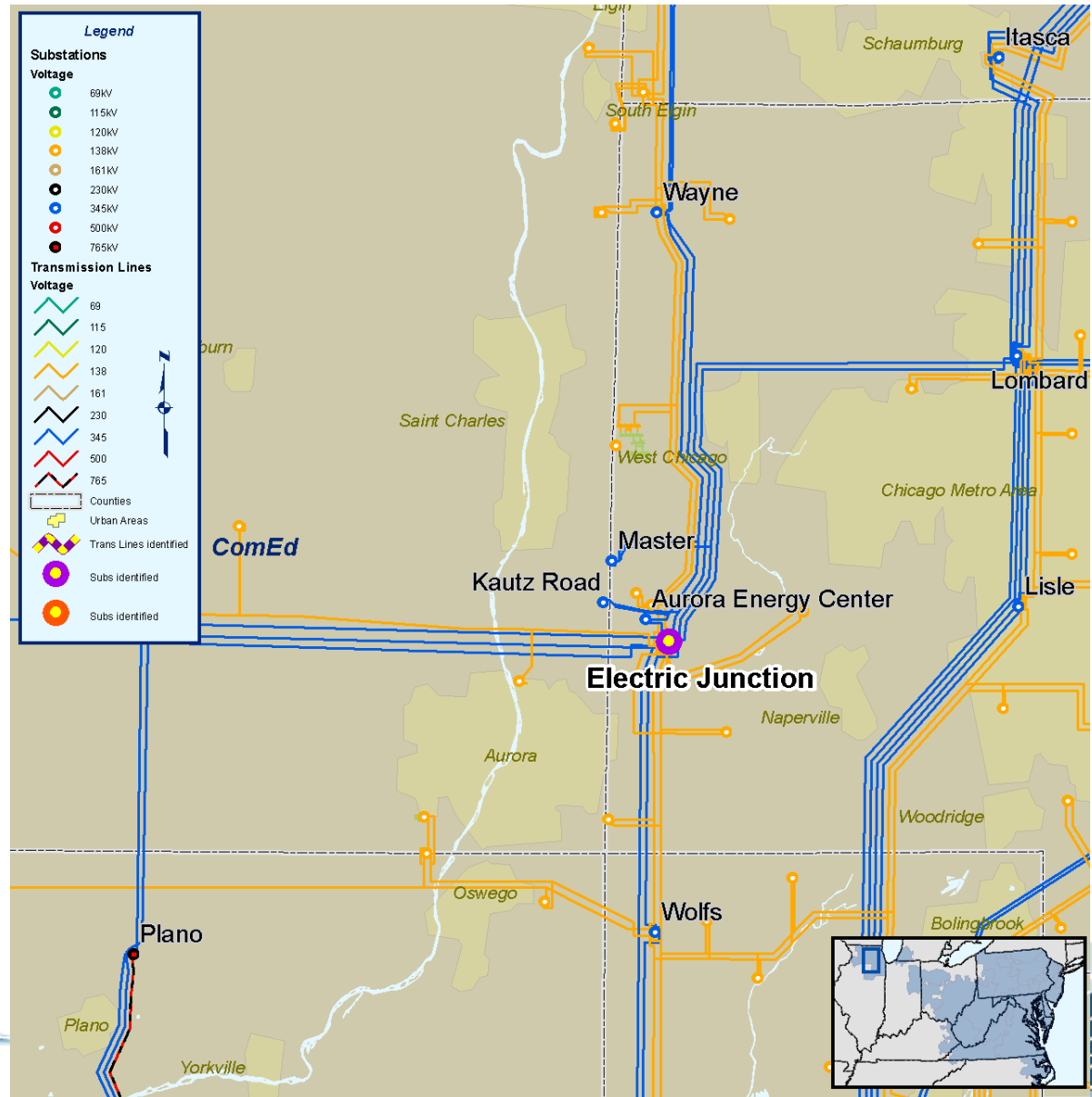
- Thermal overload of 138 kV line 0902 between E. Frankfort TSS 66 and Davis Creek TSS 86 tap for the loss of East Frankfort – Matteson 138 kV
- Solution: Increase the capacity of the overloaded section
- Generator Deliverability
- Expected IS Date: 6/1/2013
- Cost Estimate: \$1.5M





ComED Supplemental Upgrades

- Provide new service to a customer west of Electric Jct on 138 kV lines 11104 & 11106
- Supplemental Project
- Cost Estimate: \$2.3M
- Expected IS Date: 5/15/2009



- Add 345/138 kV Transformer 81 at Pontiac to serve a new customer interconnection
- Supplemental Project
- Cost estimate: \$18M
- Expected IS Date: 10/1/2008

