

# 2008 RTEP - Reliability Analysis Update

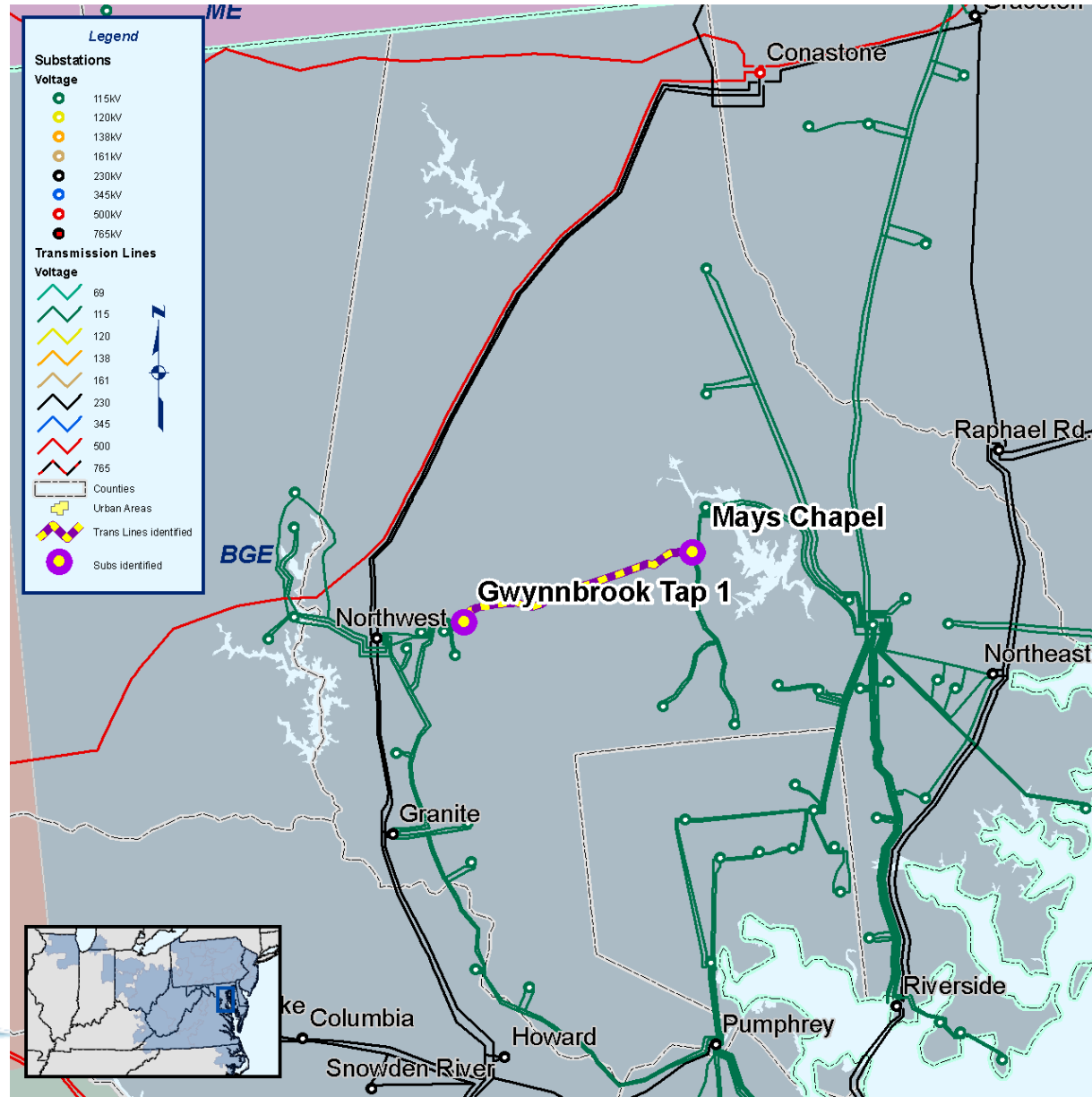
TEAC Meeting  
November 5, 2008



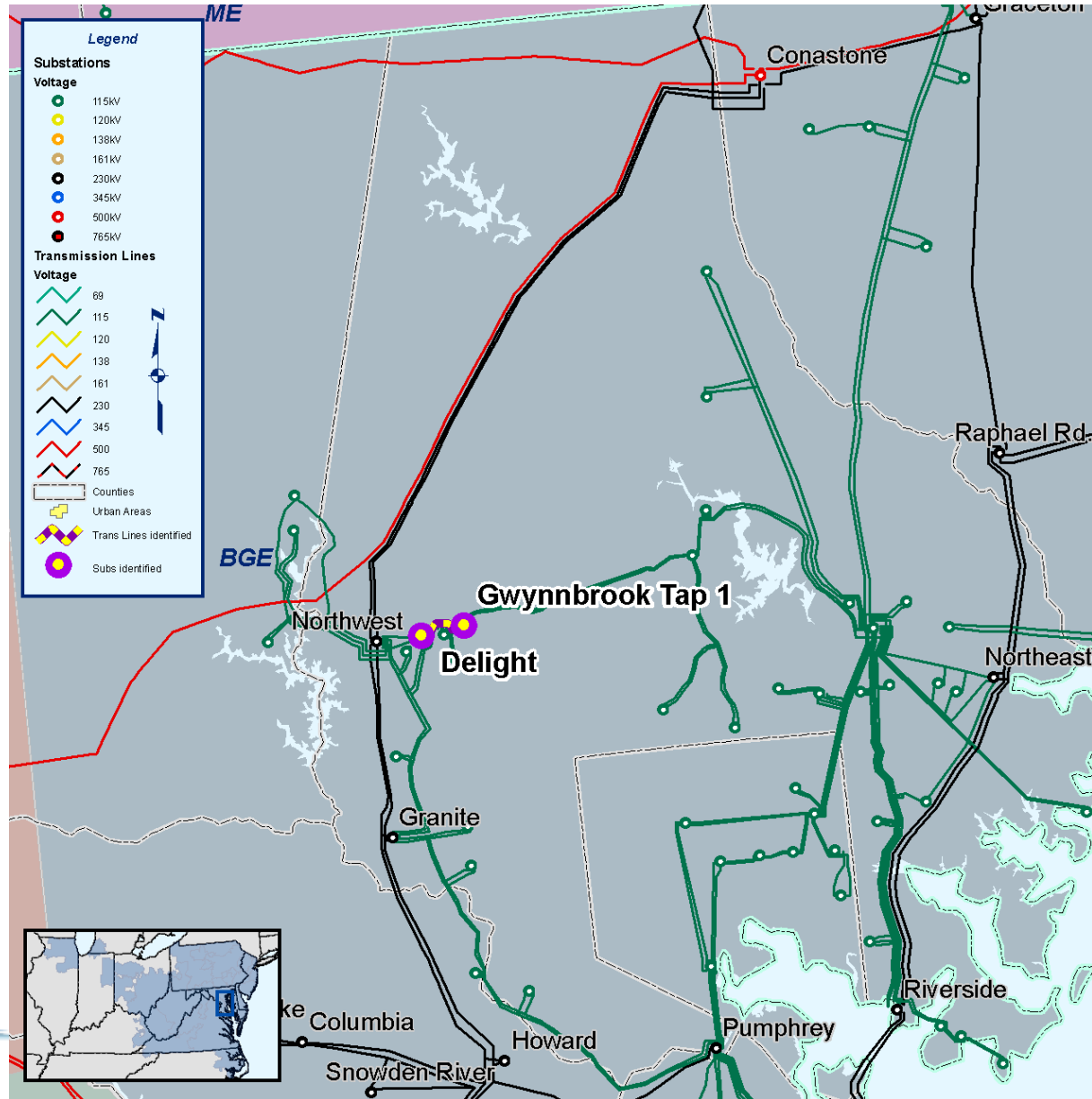
# 2011 Baseline Retool

- At the October 15, 2008 TEAC we reviewed a number of upgrades in New Jersey as a result of our 2011 retool.
- In addition, there are a number of upgrades required in the BG&E zone to relieve thermal overloads for NERC category “C” contingencies.

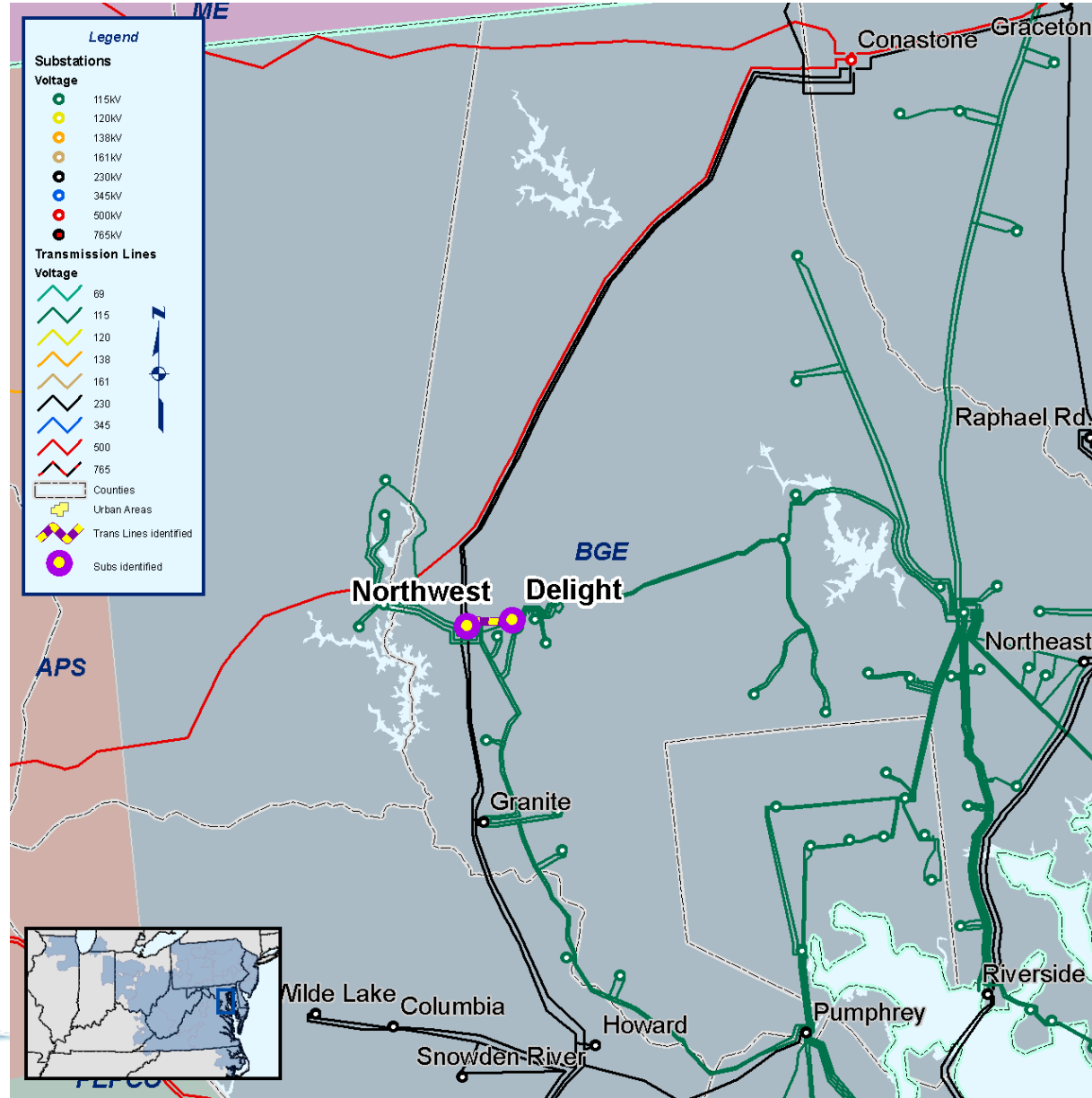
- Gwynnbrook-Mays Chapel 115 kV / line fault with stuck breaker at Windy Edge #1 115 kV
- Remove line drop limitations at the substation terminations
- Cost Estimate: \$100K
- Expected IS Date: 6/01/2011



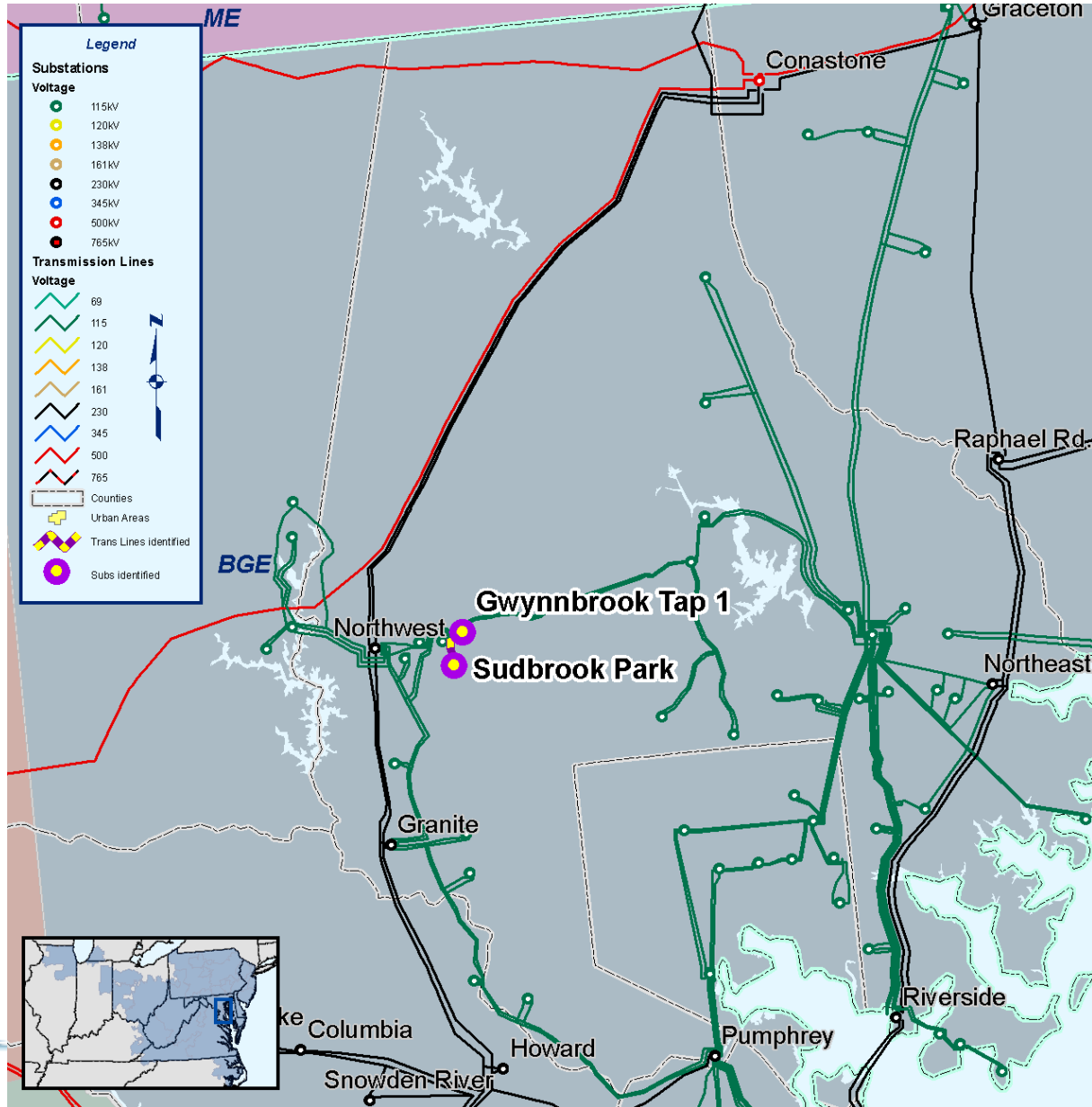
- Delight-Gwynnbrook 115 kV / line fault with stuck breaker at Mays Chapel 115 kV
- Remove line drop limitations at the substation terminations and replace a 115 kV switch
- Cost Estimate: \$400K
- Expected IS Date: 6/01/2011



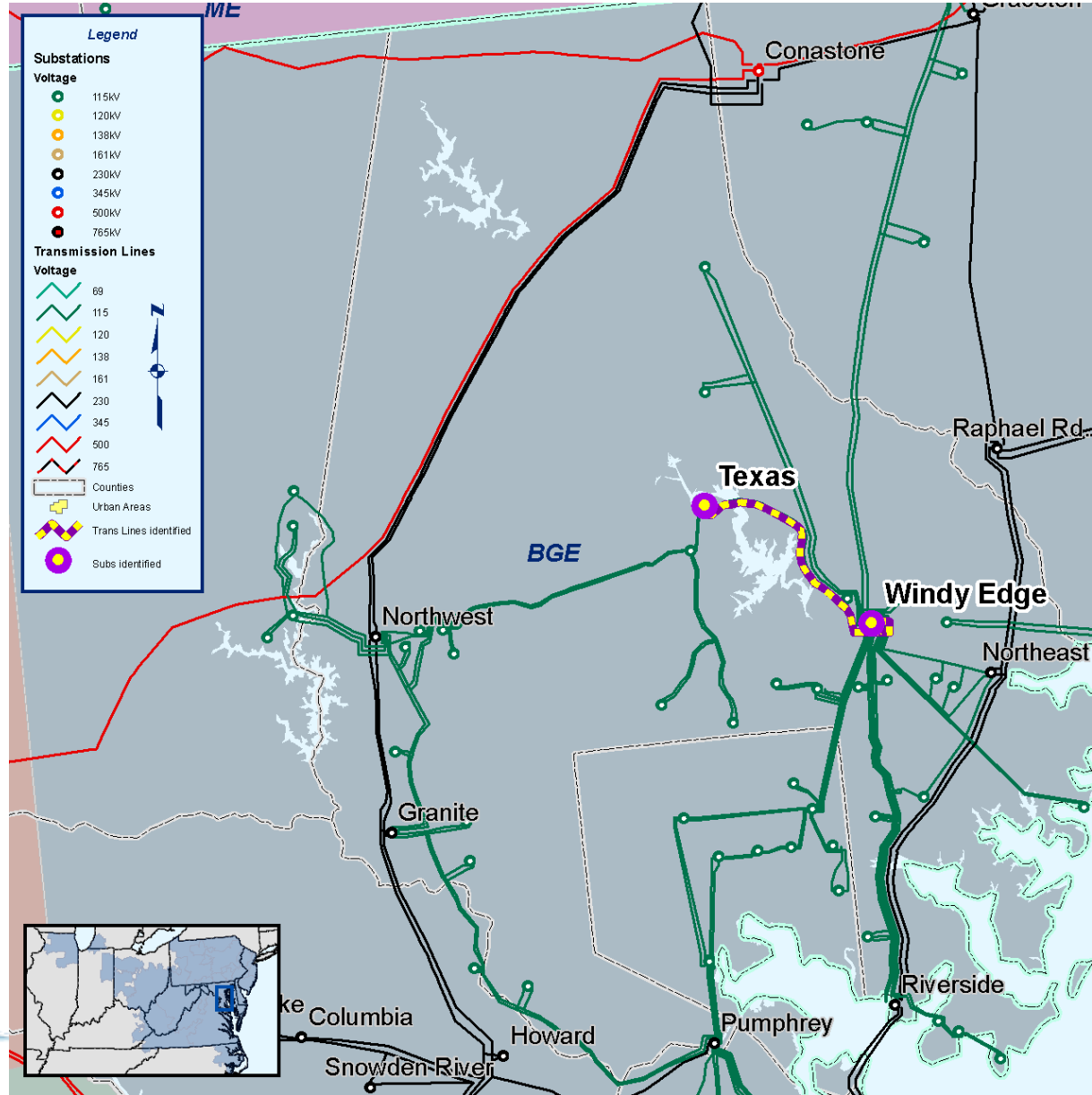
- Northwest-Delight 115 kV / line fault with stuck breaker at Mays Chapel 115 kV
- Remove line drop limitations at the substation terminations
- Cost Estimate: \$100K
- Expected IS Date: 6/01/2011



- Gwynnbrook-Sudbrook 115 kV / line fault with stuck breaker at Northwest 115 kV
- Remove line drop limitations at the substation terminations
- Cost Estimate: \$100K
- Expected IS Date: 6/01/2009

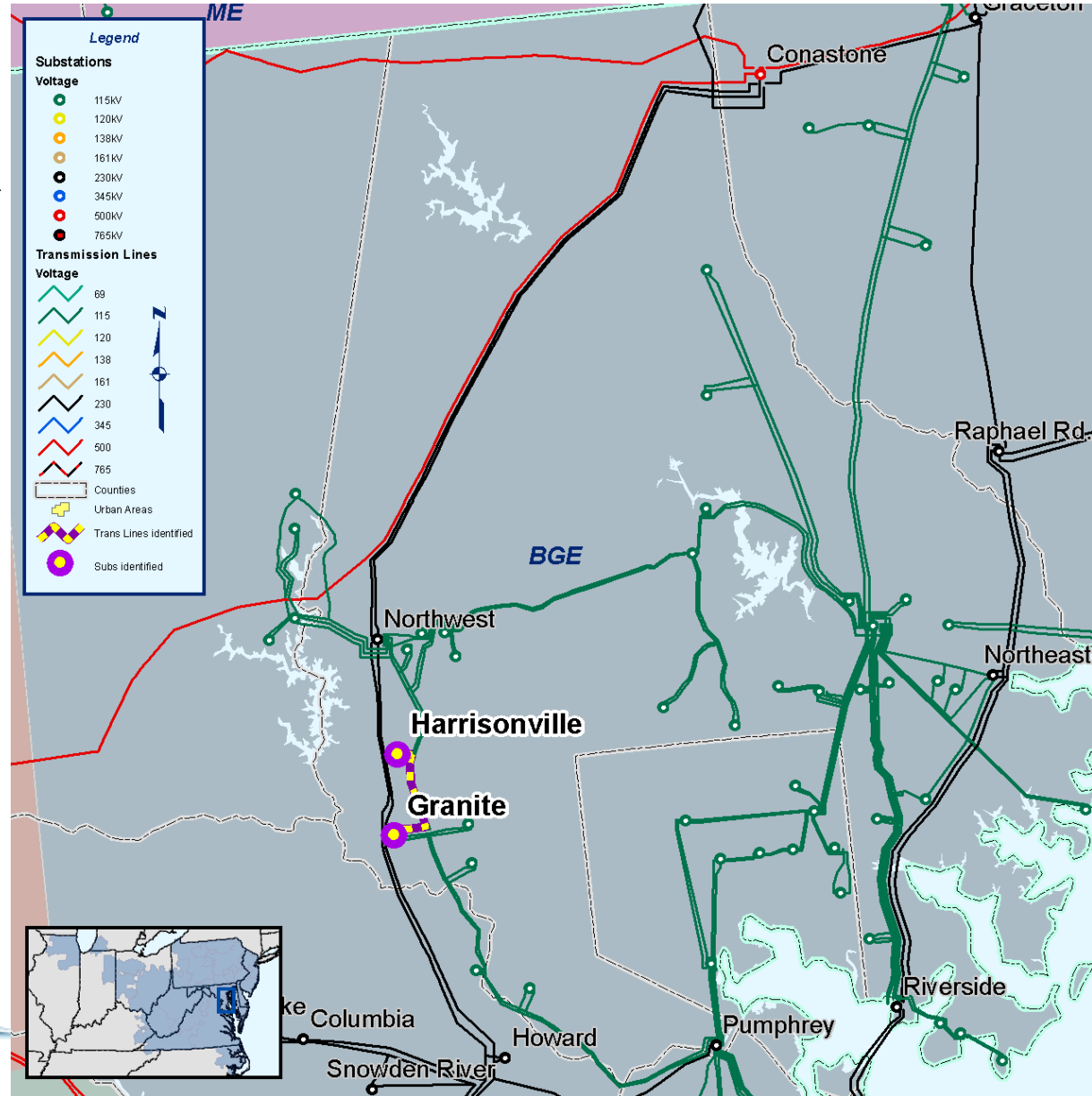


- Windy Edge-Texas 115 kV / line fault with stuck breaker at Northwest 115 kV
- Remove line drop limitations at the substation terminations
- Cost Estimate: \$100K
- Expected IS Date: 6/01/2011

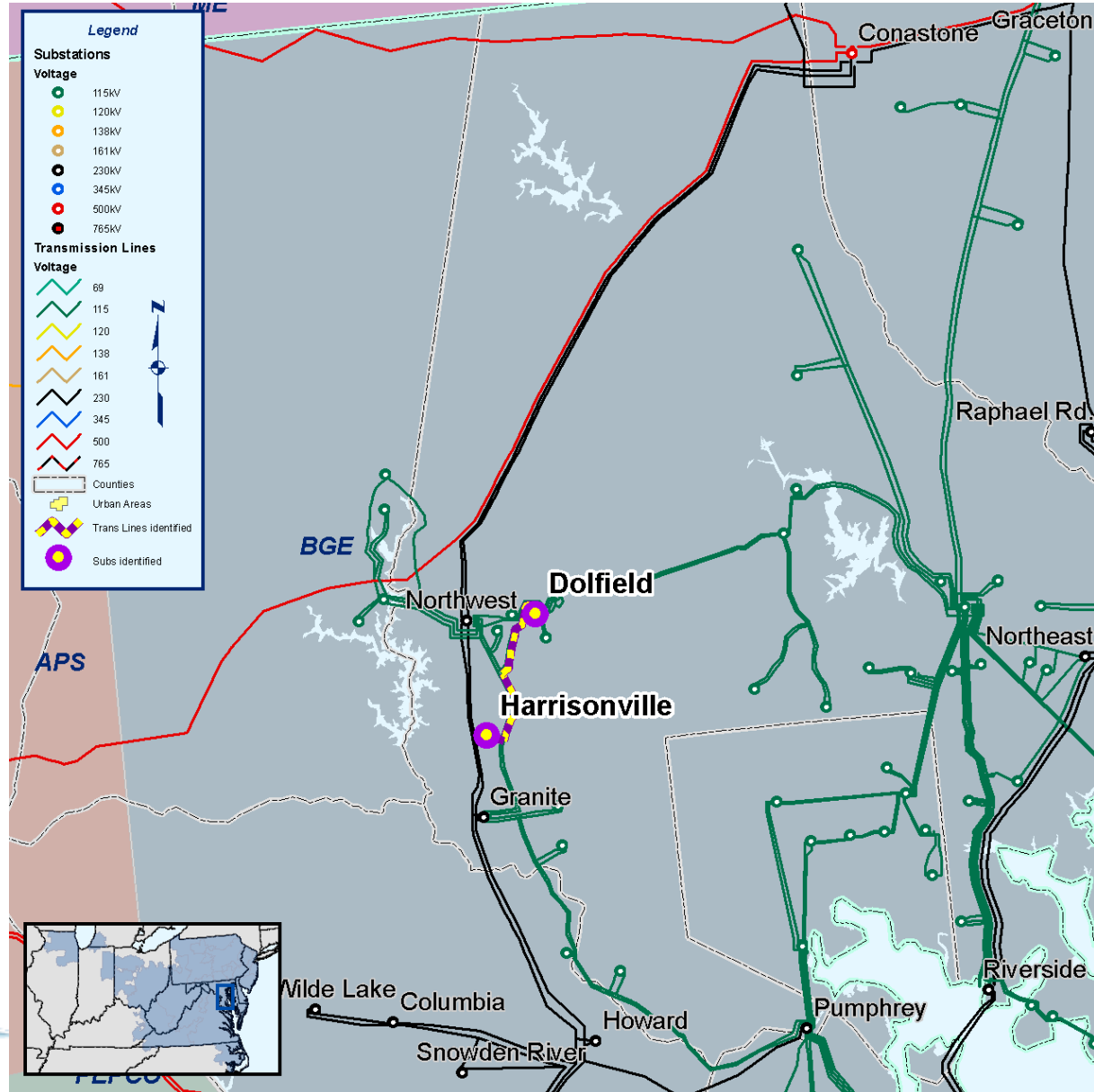




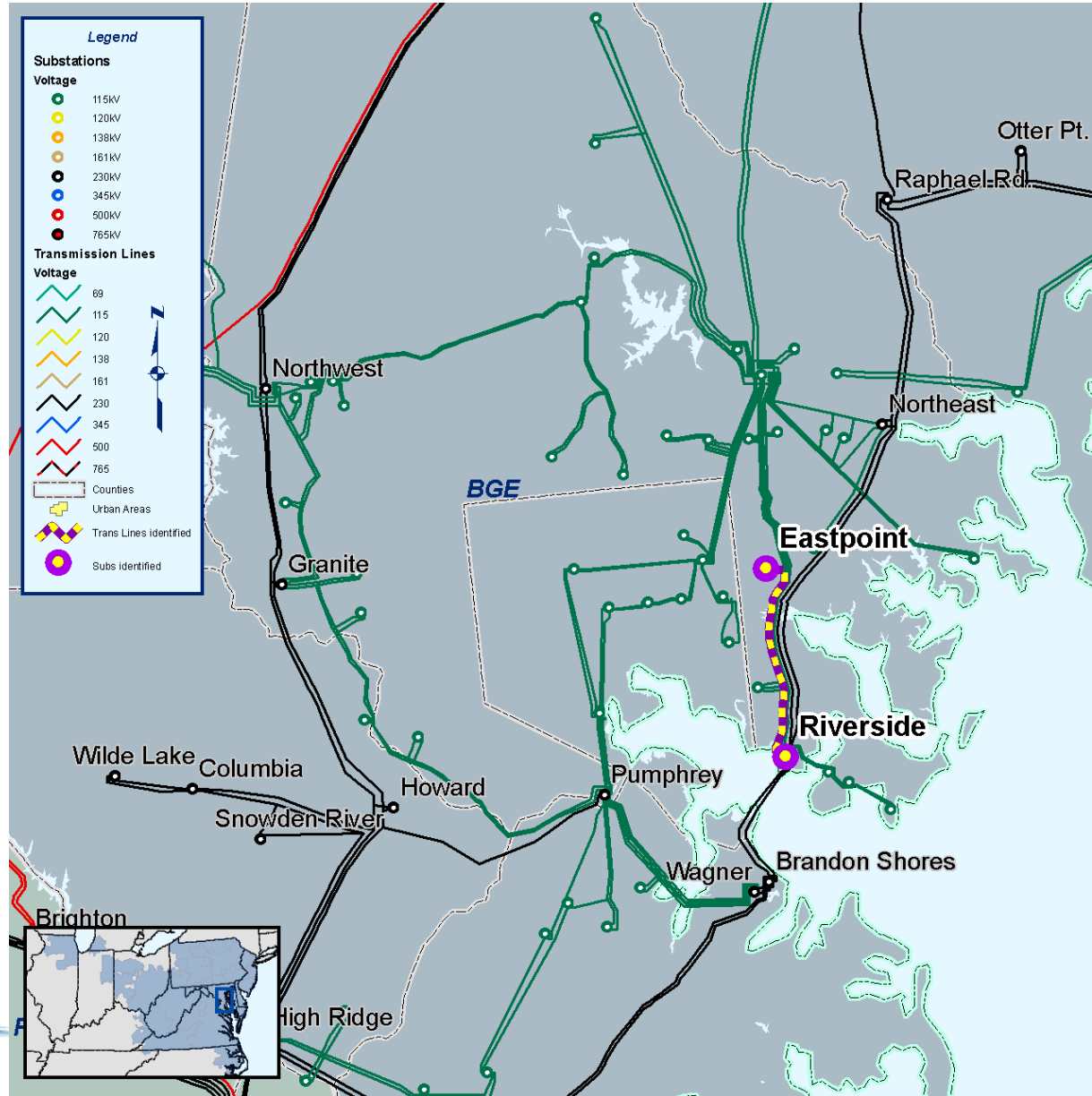
- Granite-Harrisonville 115 kV / line fault with stuck breaker at Northwest 115 kV
- Remove line drop limitations at the substation terminations
- Cost Estimate: \$100K
- Expected IS Date: 6/01/2011



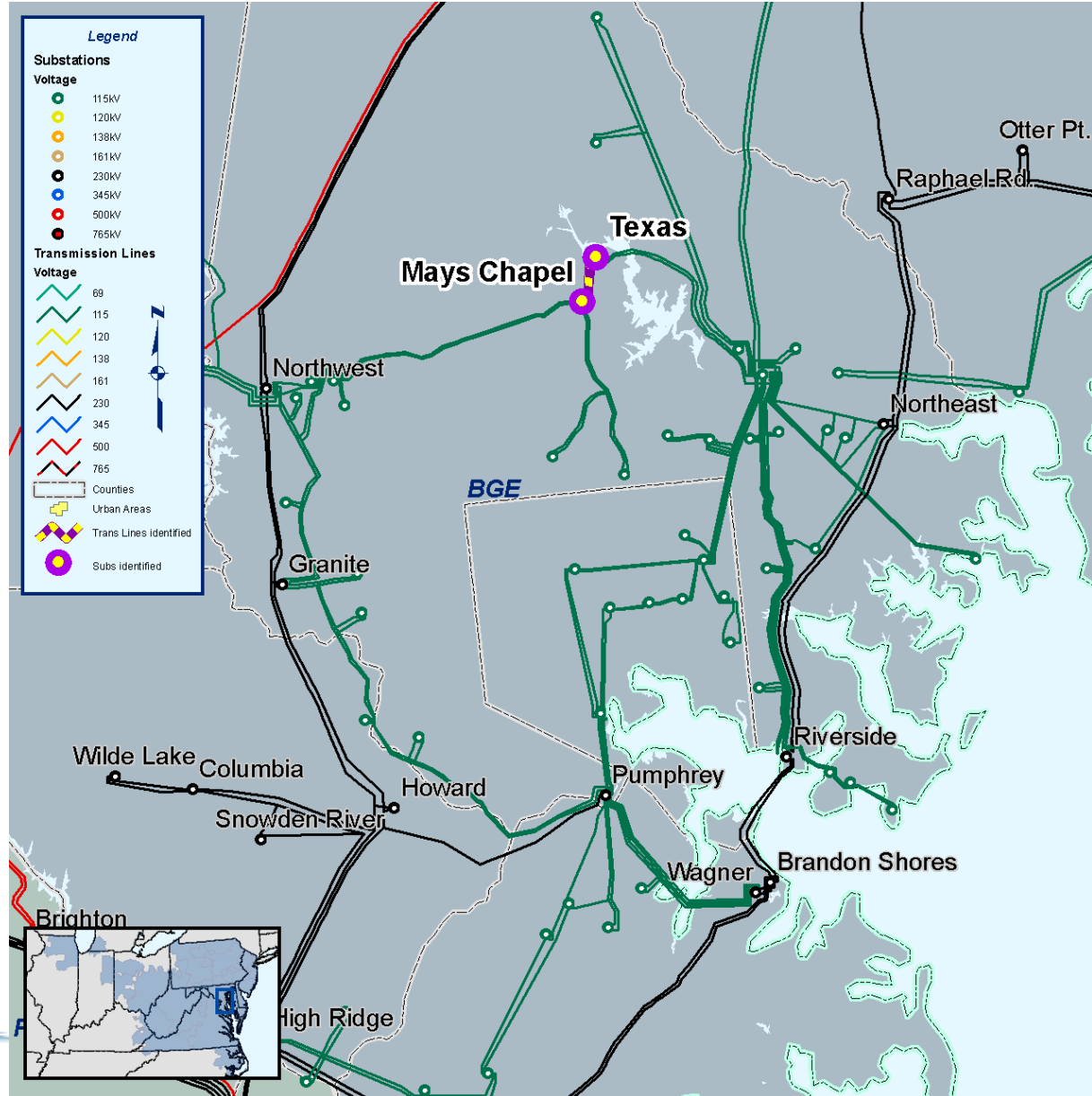
- Harrisonville-Dolefield 115 kV / line fault with stuck breaker at Northwest 115 kV
- Remove line drop limitations at the substation terminations
- Cost Estimate: \$100K
- Expected IS Date: 6/01/2011



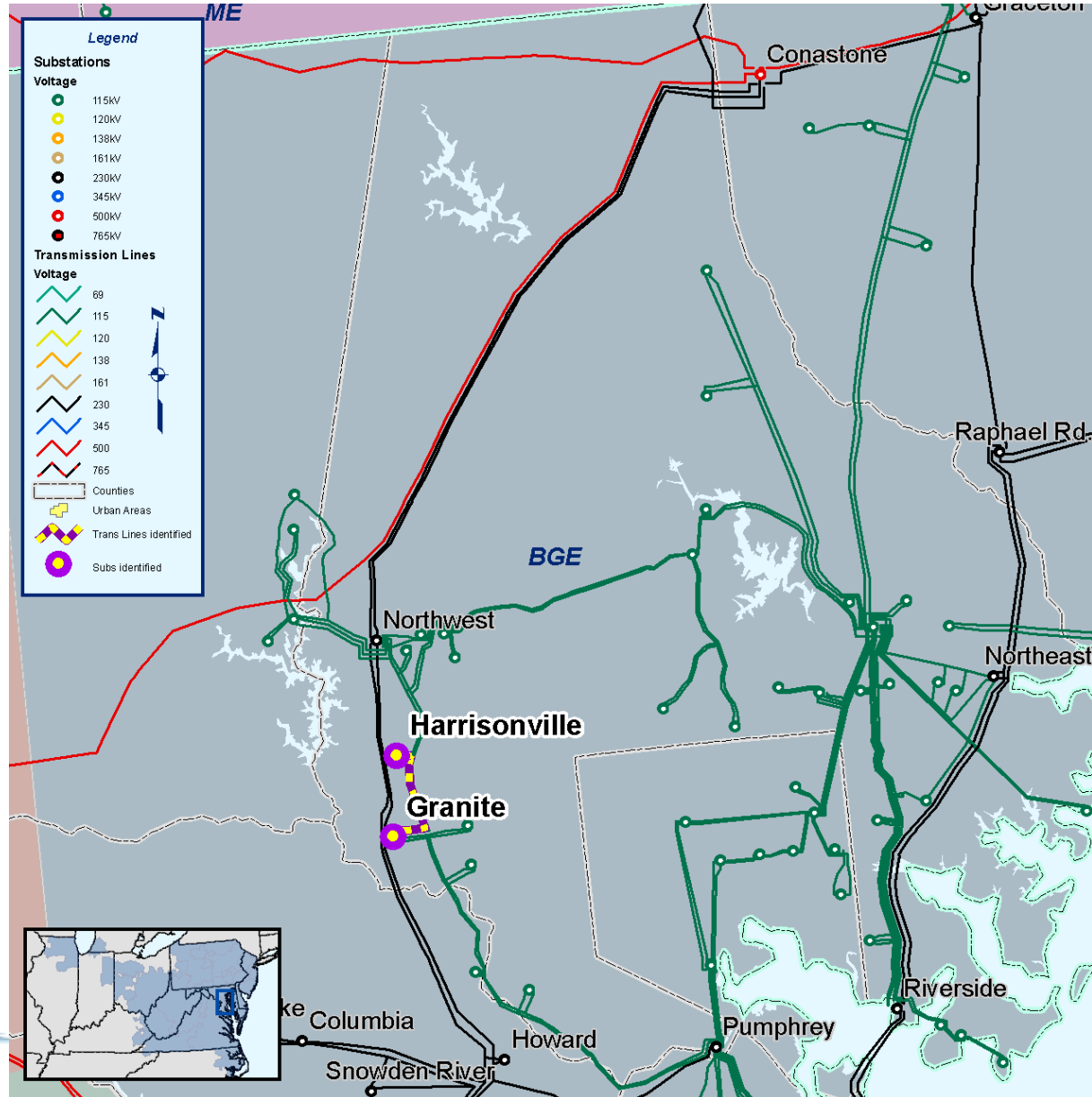
- Riverside-East Point 115 kV / line fault with stuck breaker at Windy Edge 115 kV
- Remove line drop limitations at the substation terminations
- Cost Estimate: \$100K
- Expected IS Date: 6/01/2011



- Texas-Mays Chapel 110509 115 kV / line fault with stuck breaker at Northwest 115 kV
- Install an SPS for one year to trip a Mays Chapel 115 kV breaker on line 110579 for line overloads on 110509. Problem will be resolved in 2012 with network upgrade b0475.
- Cost Estimate: \$20K
- Expected IS Date: 6/01/2011



- Granite-Harrisonville 110560 115 kV / line fault with stuck breaker at Northwest 115 kV
- Disable the HS throwover at Harrisonville for one year. The problem will be resolved in 2012 with upgrade b0475
- Cost Estimate: \$0K
- Expected IS Date: 6/01/2011





# 2012 Baseline Retool

- Purpose: Incorporate changes in assumptions that have occurred since the 2007 RTEP was completed.
- Load
- Generation
- Demand Response
- Network Topology

- The 2007 RTEP analysis was done using the 2007 PJM Load Forecast Report issued in early 2007
- A new load forecast report was issued early this year and updated in September 2008
- Changes for 2012 include:
  - Mid-Atlantic load increased by 111MW
  - EMAAC load increased by 411MW

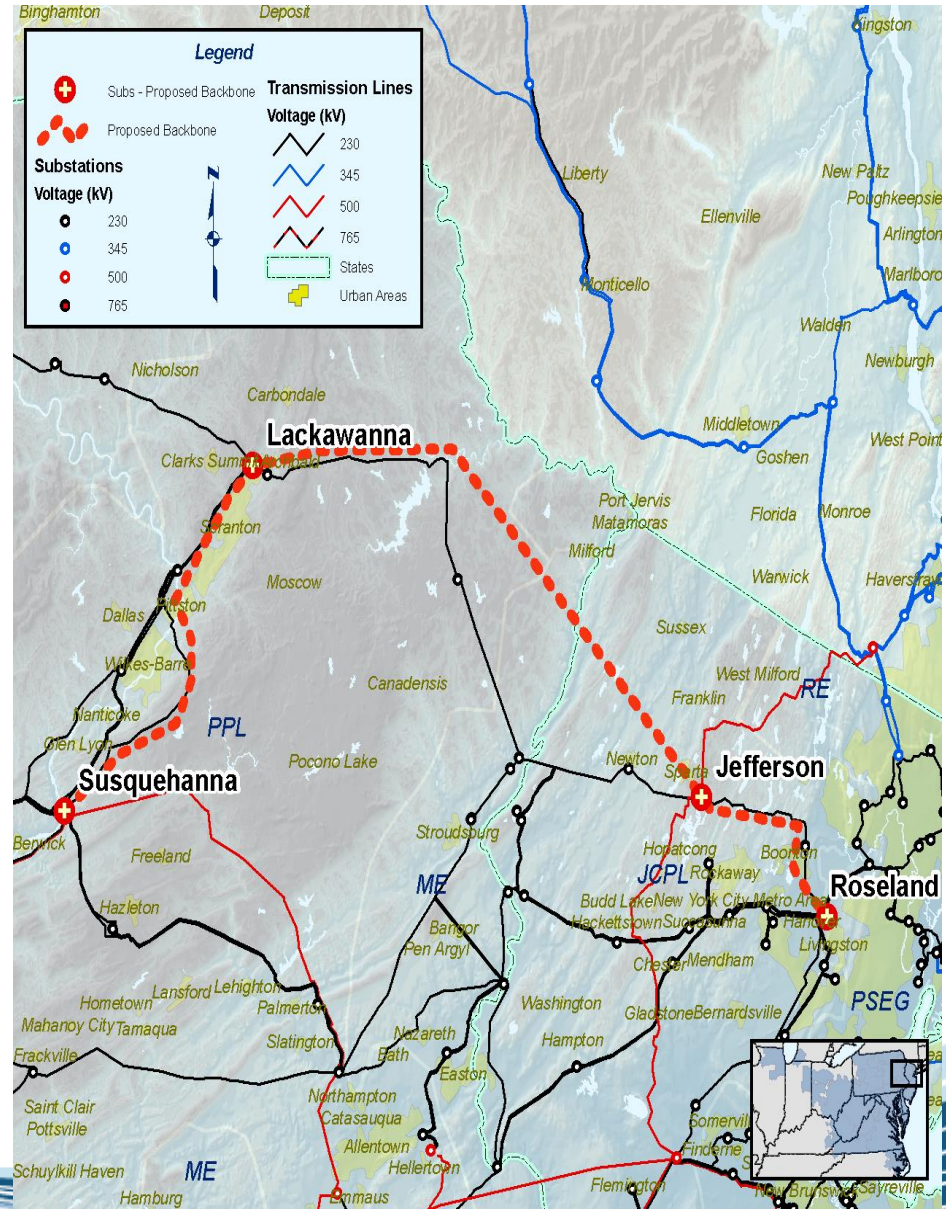


- Since the 2007 RTEP was initiated early in February 2007 there have been a number of changes to generation assumptions
- Several units have announced their intention to retire including:
  - Benning (550 MW total)
  - Buzzard Point (256 MW total)
  - Indian River 1 & 2 (182 MW total)
- Several units that had expected to be retired withdrew their deactivation request
  - Sewaren (453 MW total)
  - B. L. England (447 MW total)
  - Parlin (114 MW)
  - Gould Street (101 MW)
  - Potomac (482MW)

- In addition, a number of new units have progressed through the interconnection process and have signed Interconnection Service Agreements (ISA)
  - Mid-Atlantic Region: 787 MW
  - Western Region: 1425 MW
  - Southern Region: 2343 MW

- Several RPM auctions have been run since the 2007 RTEP was initiated
- Demand Response increased in several areas
  - MAAC Increased by 977MW
  - EMAAC Increased by 185.9
  - PECO Increased by 45MW
  - PSEG Increased by 43MW
  - JCPL Increased by 52MW
  - DPL Increased by 38.5

- The 2007 RTEP identified numerous violations throughout our 15 year planning horizon
- Results of this year's retool show that the Susquehanna to Roseland project is still required in 2012 given numerous Northern New Jersey 230 kV overloads without the line
- The following slides show the loading on these facilities with and without the Susquehanna to Roseland project



## Overload Reduction For Single Contingencies

| Overloaded Facility |           |     | Without     | With        |
|---------------------|-----------|-----|-------------|-------------|
| Fr Name             | To Name   | kV  | Susq-Roseld | Susq-Roseld |
| PORTLAND            | KITATINY  | 230 | 2015        | > 2022      |
| GILBERT             | MO-TOWN   | 230 | 2017        | > 2022      |
| MTN CRK             | MO PARK   | 230 | 2018        | > 2022      |
| BRIDGWTR            | MIDDLESEX | 230 | 2020        | > 2022      |
| BUSHKILL            | KITATINY  | 230 | 2020        | > 2022      |
| READ-GTN            | ROSELAND  | 230 | 2012        | > 2022      |
| BRANCHBG            | READ-GTN  | 230 | 2014        | > 2022      |
| GILBERT             | G GARDNR  | 230 | 2019        | > 2022      |
| MTN CRK             | PORTLAND  | 230 | 2015        | > 2022      |
| WHIPPANY            | ROSELAND  | 230 | 2012        | > 2022      |
| MONTVILE            | ROSELAND  | 230 | 2012        | > 2022      |
| E WINDSR            | SMITHBRG  | 230 | 2017        | > 2022      |
| KITATINY            | POHATCNG  | 230 | 2017        | > 2022      |
| COXSCRNR            | LUMBRTN   | 230 | 2018        | > 2022      |
| GRYSTN Q            | WHIPPANY  | 230 | 2012        | > 2022      |
| HOSENSAK            | ELROY     | 500 | 2019        | > 2022      |
| W WHRTN             | GRYSTN J  | 230 | 2020        | > 2022      |

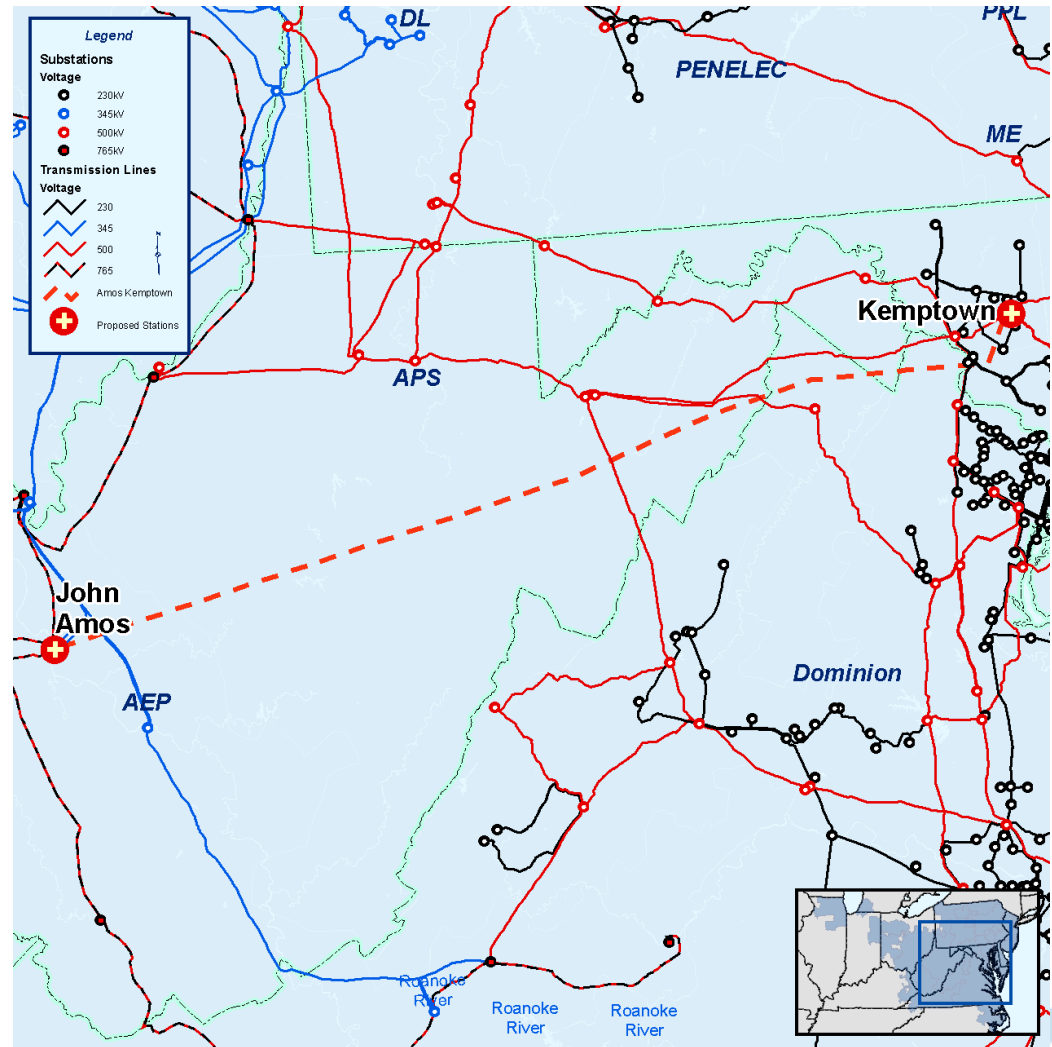
## Overload Reduction For Tower Contingencies

| Overloaded Facility |           |     | Without     | With        |
|---------------------|-----------|-----|-------------|-------------|
| Fr Name             | To Name   | kV  | Susq-Roseld | Susq-Roseld |
| BRIDGWTR            | MIDDLESEX | 230 | 2012        | > 2022      |
| SUSQHNA             | JENK_SQU  | 230 | 2012        | 2019        |
| MTN CRK             | PORTLAND  | 230 | 2012        | > 2022      |
| JENK_SQU            | JENKINS   | 230 | 2012        | > 2022      |
| FLAGTWN2            | SOMRVLLE  | 230 | 2012        | > 2022      |
| MTN CRK             | MO PARK   | 230 | 2012        | 2021        |
| MONTVILE            | ROSELAND  | 230 | 2012        | > 2022      |
| GRYSTN Q            | WHIPPANY  | 230 | 2012        | > 2022      |
| W WHRTN             | GRYSTN J  | 230 | 2012        | > 2022      |
| BRANCHBG            | FLAGTWN2  | 230 | 2012        | > 2022      |
| KITATINY            | POHATCNG  | 230 | 2013        | 2022        |

## Overload Reduction For Tower Contingencies

| Overloaded Facility |          |     | Without     | With        |
|---------------------|----------|-----|-------------|-------------|
| Fr Name             | To Name  | kV  | Susq-Roseld | Susq-Roseld |
| GILBERT             | G GARDNR | 230 | 2013        | > 2022      |
| LK ILIFF            | MONTVILE | 230 | 2014        | > 2022      |
| NEWTON              | LK ILIFF | 230 | 2014        | > 2022      |
| GILBERT             | MO-TOWN  | 230 | 2015        | > 2022      |
| G GARDNR            | CHESTER  | 230 | 2015        | > 2022      |
| PORTLAND            | KITATINY | 230 | 2017        | > 2022      |
| KITATINY            | NEWTON   | 230 | 2017        | > 2022      |
| WARRNGTN            | BUCKNGH2 | 230 | 2019        | > 2022      |
| JUNIA-H1            | CUMBE-H2 | 230 | 2020        | > 2022      |
| PORTLAND            | GRYSTN Q | 230 | 2021        | > 2022      |
| N WALES7            | HARTMAN  | 230 | 2021        | > 2022      |
| FRCKVLE             | SIEGFRED | 230 | 2022        | > 2022      |

- The 2007 RTEP identified several overloads on 500 kV facilities across the central Pennsylvania / Allegheny Mountain corridor
- Results of this year's retool show that without the Amos to Kemptown project there are no thermal overloads in 2012 through the same area
- Beginning in 2013 and throughout the planning horizon there remain numerous 500 kV facility overloads in the region
- The following slide show the loading on these facilities with and without the Amos to Kemptown project





## Overload Reduction For Single Contingencies

| Overloaded Facility |          |     | Without PATH | With PATH   |
|---------------------|----------|-----|--------------|-------------|
| Fr Name             | To Name  | kV  |              |             |
| KEYSTONE            | CONEM-GH | 500 | 2015         | >2023       |
| AIRDAL3             | JUNIATA  | 500 | 2013         | >2023       |
| 8MT STM             | 01DOUBS  | 500 | 2013         | <b>2023</b> |
| CONEM-GH            | AIRDAL2  | 500 | 2021         | >2023       |
| AIRDAL2             | JUNIATA  | 500 | 2013         | >2023       |
| 01DOUBS             | BRIGHTON | 500 | 2023         | >2023       |
| 8LEXNGTN            | 8DOOMS   | 500 | 2014         | >2023       |
| KEYSTONE            | AIRDAL3  | 500 | 2013         | >2023       |

- As noted at the October TEAC due to siting considerations around Bedington substation the configuration of the project has been changed.
- The project will no longer go through Bedington
- The line will start at the Amos 765 kV bus and go to a new midpoint station in the TRAIL line.
- The exact location of the new midpoint station will be determined pending additional siting work.
- There will be two 765 / 500 kV transformers and a 765 kV SVC at the new midpoint station.
- The line will continue from the 765 kV bus at the new midpoint station and go to Kemptown.
- There will be two 765 / 500 kV transformers at Kemptown.
- The analysis results noted on the previous slide used the new configuration.

- Based on this updated analysis the Amos-Kempton project is required by June 2013.
- Note – this analysis was done with the 502 Junction to Loudoun line in-service. Retool analysis for 2011 continues to demonstrate the need for the 502 Junction to Loudoun by June 2011.

- Complete 2012 retool for remaining LDA
- Develop solutions for remaining reactive problems
- Continue to work with our consultant reviewing northern New Jersey alternatives
  - Initial review has identified a potential fatal flaw with the 230 kV alternative related to existing underground duct size and ability to accommodate the larger 230 kV cables
- Continue to evaluate the required in-service date for the Indian River to Salem section of MAPP
- 2009 RTEP Base Case Development
  - MMWG 2008 Series representation of 2014
  - Bus number translation files



# MAPP Supplemental Information

## Chesapeake Bay Crossing

- The revised cost of the total MAPP project for the AC and DC alternatives follows:
  - The AC estimate is \$1.147 Billion
  - The DC estimate is \$ 1.425 Billion
- At the previous meeting stakeholders asked for additional information concerning the length of the bay crossing
- The information on the following slides was provided to PJM by PHI

**The following pages depict some general routes under consideration. Land has not been obtained on either side of the Bay for cable landing locations. Exact landing locations will determine final route and length of cable on land.**

1. Cable landing location on west side of Bay should be at or north of Calvert Cliffs wherever property can be obtained. Several sites north of Calvert Cliffs are being investigated.
2. Cable landing location on east side of Bay should be either on Taylor's Island south of homes or further inland such as Madison Bay or near Route 16, again wherever property can be obtained.
3. Landing points and environmental considerations such as oyster beds (historical and legal), submerged aquatic vegetation and submerged cultural resources will help determine exact final route.
4. The mileages indicated for the various routes are measured distances, the actual cable length will be substantially longer to account for the bottom profile of the Chesapeake Bay.
5. For these reasons, the exact route and length of the submarine cable has not yet been determined.

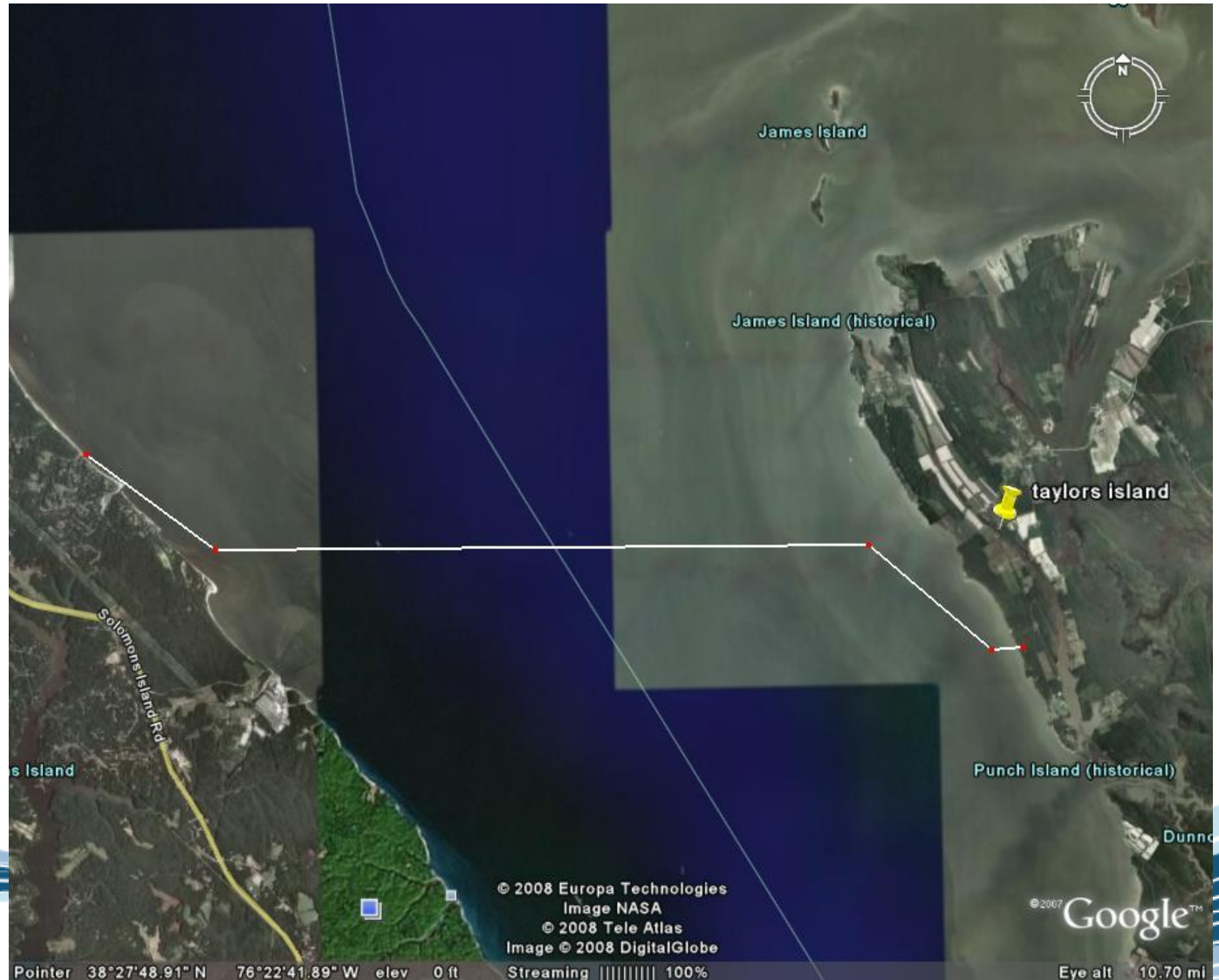
The direct west to east distance across the Bay from Calvert Cliffs to the portion of Taylors Island south of most homes is 7.9 miles.

Since landing sites have not been obtained and there are environmental and cultural resources in the area, this straight line is not considered a viable route

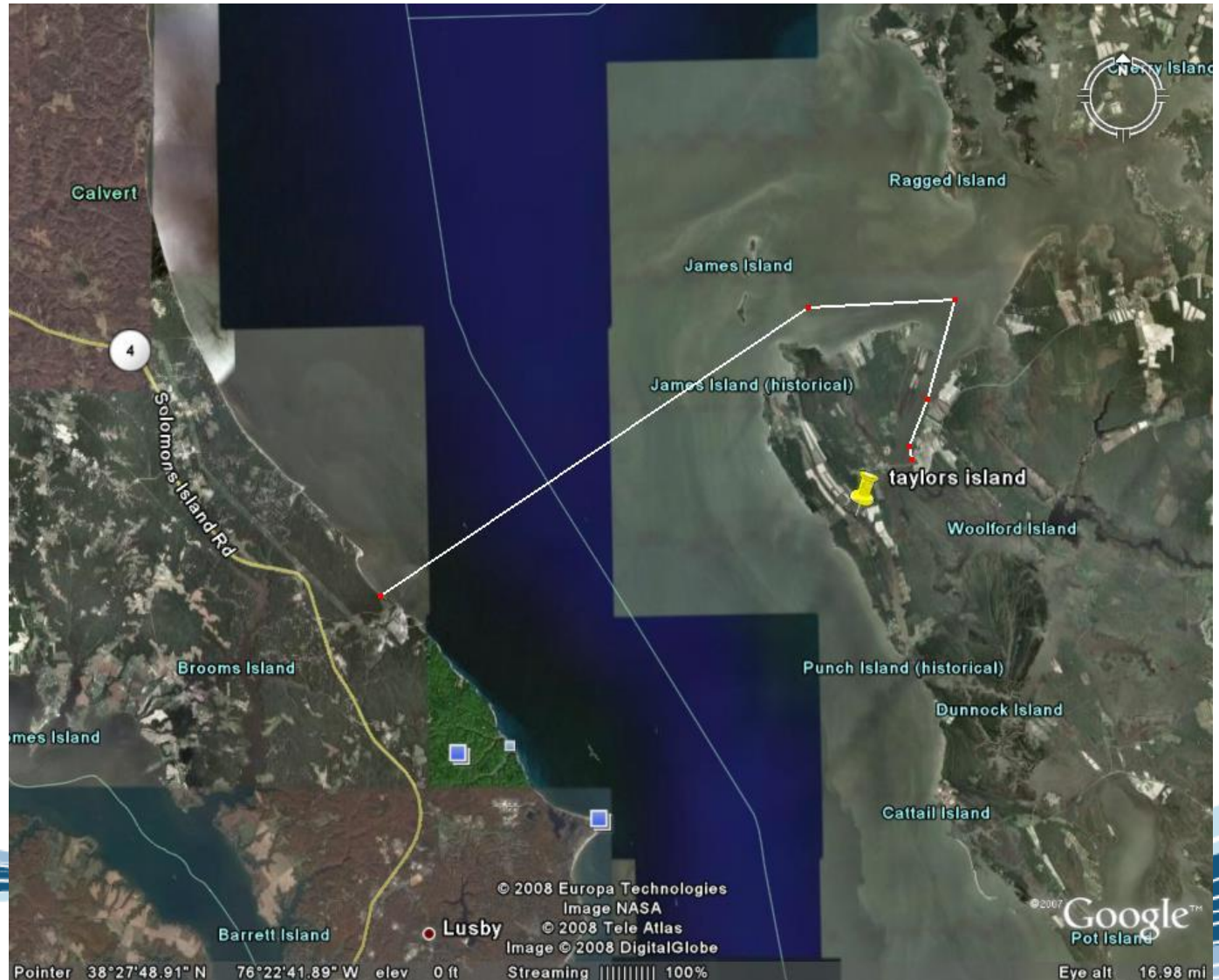




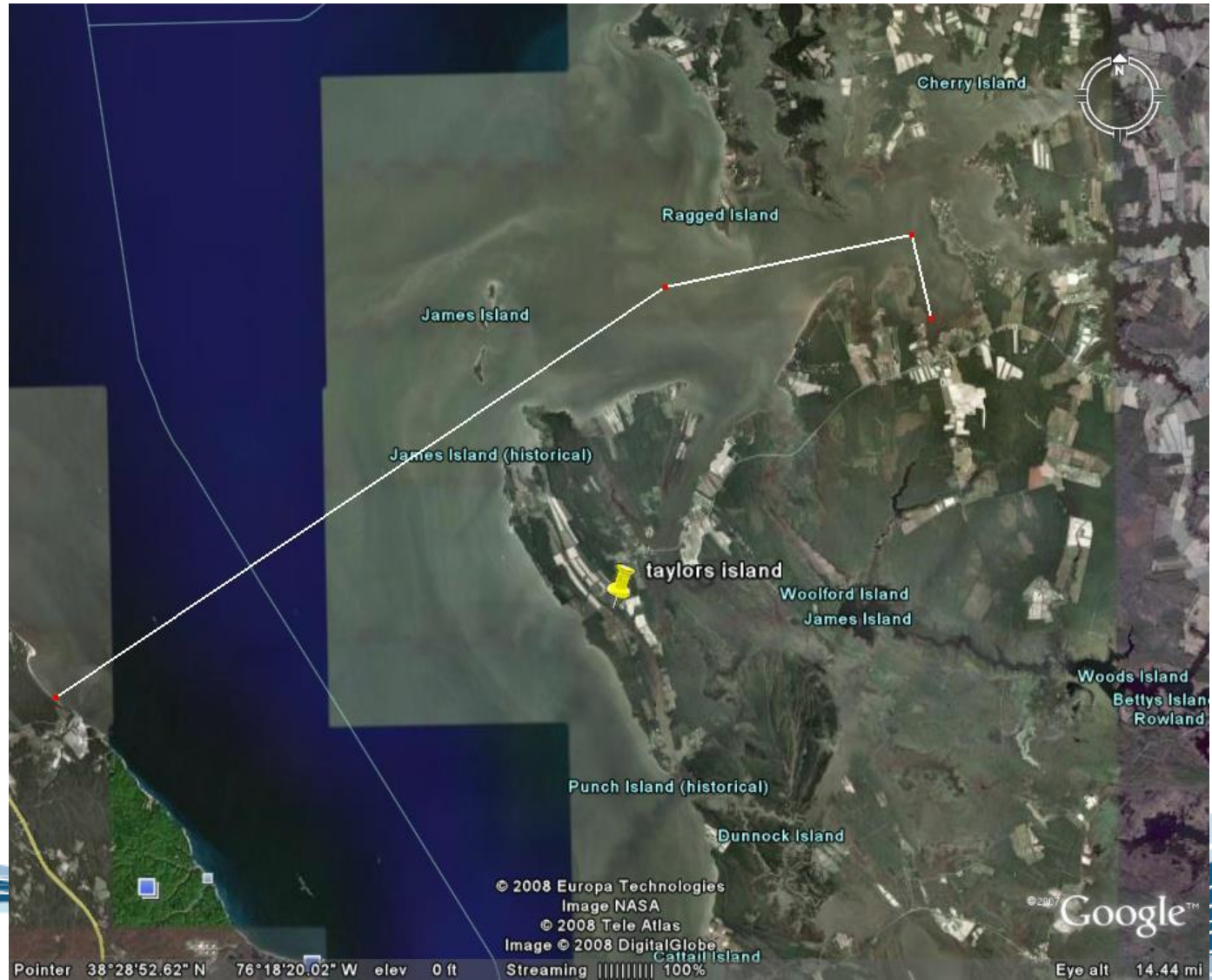
- This route begins north of Calvert Cliffs and indicates what a route may look like in order to avoid oyster beds. The approximate length is 10.25 miles shore to shore.
- Adding 2 miles to allow for taking the cable inland to the converter station and termination station sites brings the potential cable length to 12.25 miles
- The exact location will be determined after the landing sites are determined and environmental and cultural resources are determined



- This possible route would bring the cable onshore near a public road. This route is 13.5 miles long shore to shore.
- Adding 2 miles to allow for taking the cable inland to the converter station and termination station sites brings the potential cable length to 15.5 miles
- This route would miss Taylors Island and could possibly use the public road for some underground if necessary
- Again, the exact landing points and environmental issues have not been determined



- This possible route across the Bay is 14.9 miles measured from shore to shore.
- Adding 2 miles to allow for taking the cable inland to the converter station and termination station sites brings the potential cable length to 16.9 mile
- This route would miss Taylors Island which contains environmentally sensitive areas
- Again, the exact landing points have not been determined and the exact route could change based on environmental and cultural resources



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