

# Haymarket 230 kV Transmission Line and Substation

Report and Finding of the Town of Haymarket Planning Commission

December 8, 2014



Haymarket Planning Commission

Robert Weir – Chairman

Ralph Ring – Vice Chairman

Matt Caudle - Council Liaison

Josh Mattox

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## **Introduction**

Dominion Virginia Power (Dominion) proposes to construct a new overhead 230 kilovolt (kV) double circuit transmission line, using existing transportation corridors, where possible, and new right of way (ROW) that will tap into either the existing Gainesville to Loudoun transmission line near the Route 234 Bypass, the New Road substation in Loudoun County or the proposed Wheeler substation in Prince William County and extend to a new substation west of the Haymarket town limits.

Dominion has proposed a two-phase approach to the project. The first phase will require the addition of distribution reinforcements to the existing distribution lines (double-build) along Washington Street in the Town of Haymarket to provide “bridging power” until the new transmission lines have been completed and energized; this phase will provide dedicated 34.5 kV service to a single Dominion client, allowing them to begin operations. Phase two entails the actual construction of the overhead 230 kV double circuit transmission line. Dominion’s preliminary route for the overhead 230kV line included a corridor that spans the southern boundary of the Town of Haymarket. As a result of input from the Town of Haymarket and numerous local citizens, Dominion has identified and mapped several alternate routes consisting of both overhead and underground transmission lines.

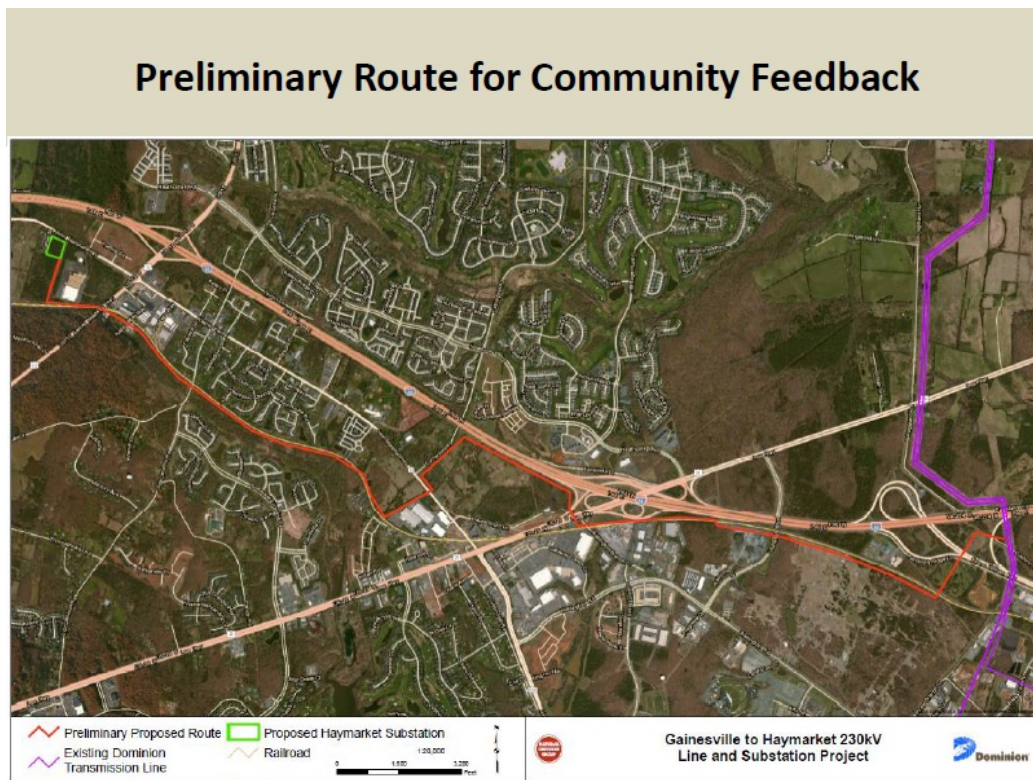
Dominion asserts the need for the Haymarket 230kV Line and Substation project is due to increased energy demand and future growth projections within the Haymarket area and western Prince William County. Dominion claims the need comes as a result of the rapid growth of the high-tech and commercial sectors in the region. Similarly, Dominion states that current demand from growth has already outgrown the steady and reliable infrastructure that is in place today, and will strain the existing system, thus causing issues for the community and its economic development efforts. Dominion holds that the proposed transmission infrastructure will address forecast increases in energy demand that will exceed the capabilities of the current distribution system beginning in 2017. Despite those assertions, Dominion has provided no indication that the local load is projected to result in violations of either federally mandated reliability criteria on existing facilities or the North American Electric Reliability Corporation (NERC) Transmission Reliability Criteria. Rather, Dominion does note that the primary driver for the

new substation is an expected block load addition from an existing local customer that has rapid and substantial plans for expansion.<sup>1</sup>

### Meetings

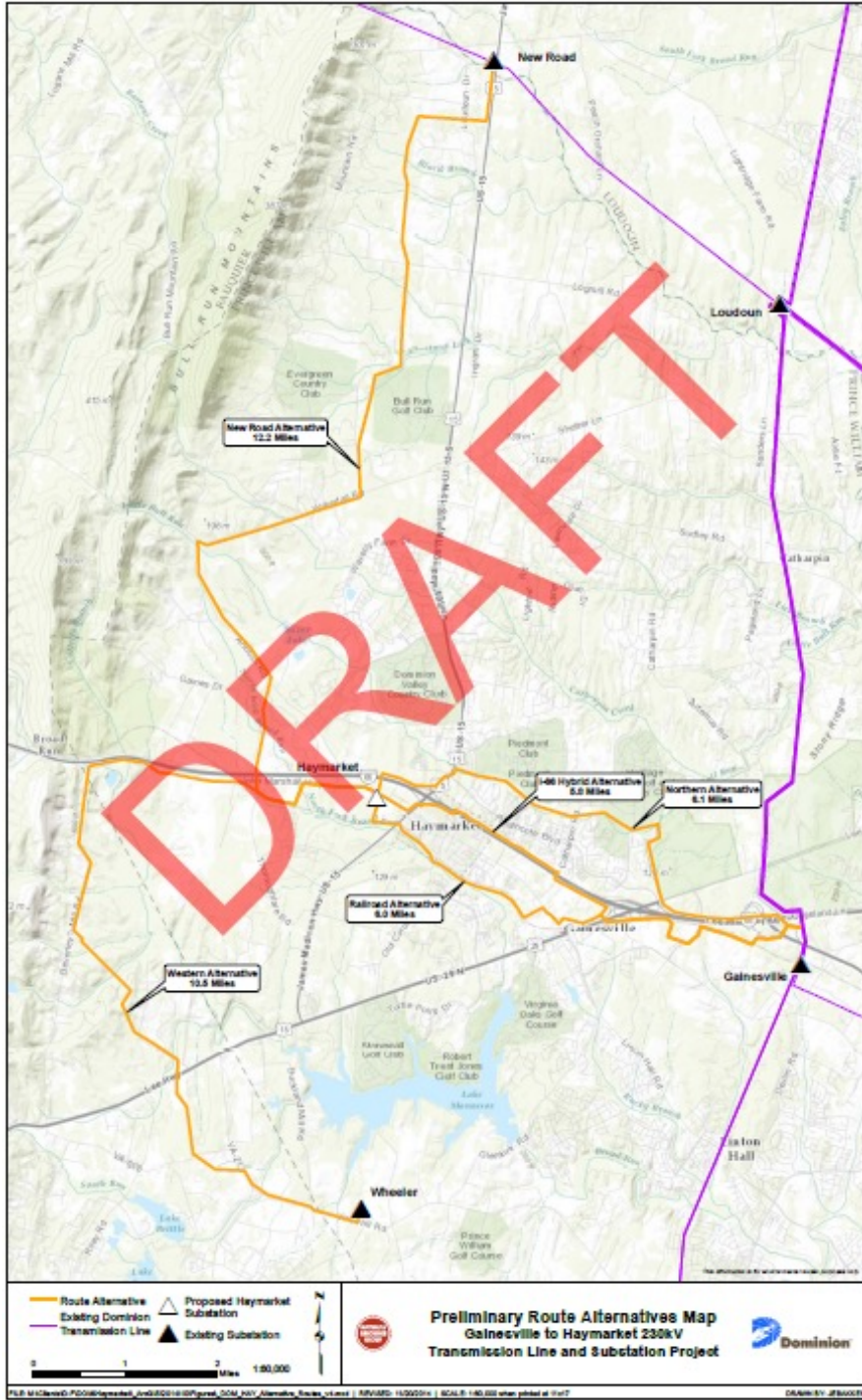
In order to present the merits of their proposal and solicit public input, Dominion held a public meeting with the Haymarket Town Council on August 25, 2014, the Haymarket Planning Commission on September 8, 2014 and an open house community outreach event at Battlefield High School on September 10, 2014.

At the August 25, 2014 meeting with the Haymarket Town Council, Dominion presented, among other materials, a singular preferred route (denoted in red) with no alternate routes (Fig. 1). Dominion also provided a rendering of the “double-build” distribution reinforcements to be added to the existing distribution lines (Fig. 2).



(Fig. 1)

<sup>1</sup> Haymarket 230 kV Line and Substation Project, <https://www.dom.com/about/electric-transmission/haymarket/index.jsp>



(Fig. 1A)



## Phase 1: Distribution Reinforcements - *AFTER*



Viewpoint 10 - Intersection of Washington Street and Coach Way - Proposed View

(Fig. 2)

At the September 8, 2014 meeting with the Haymarket Planning Commission, Dominion presented, among other materials, both a map of preliminary route options that were considered (Fig. 3) as well as a map denoting modified route options based on community feedback (Fig. 4). Dominion also provided maps of the Study Area and Route Constraints (Fig. 5 and Fig. 6) as well as a map of existing transmission lines and substations in the region (Fig. 7).

## Preliminary Route Options Considered



(Fig. 3)

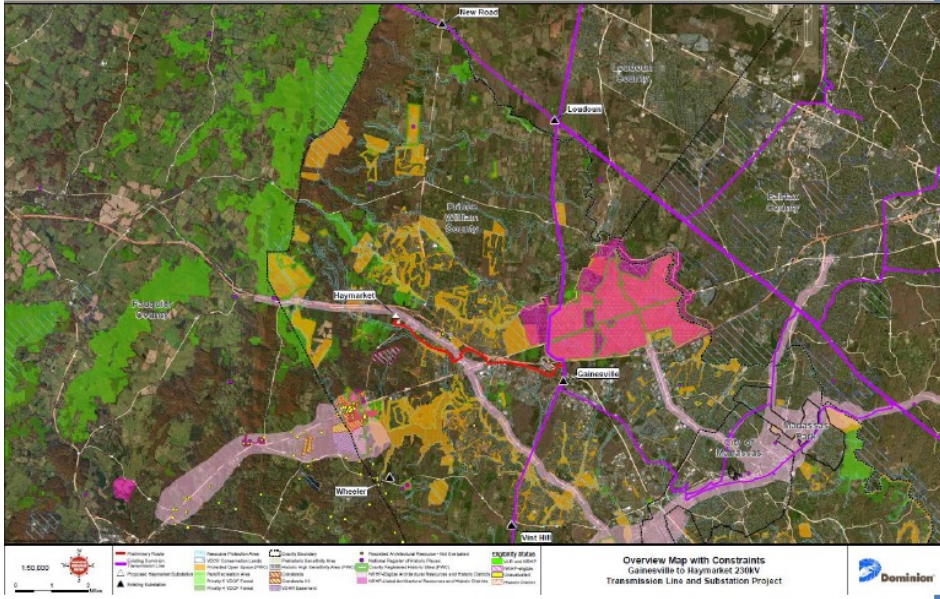
## Modified Route Options Based on Community Feedback



(Fig. 4)

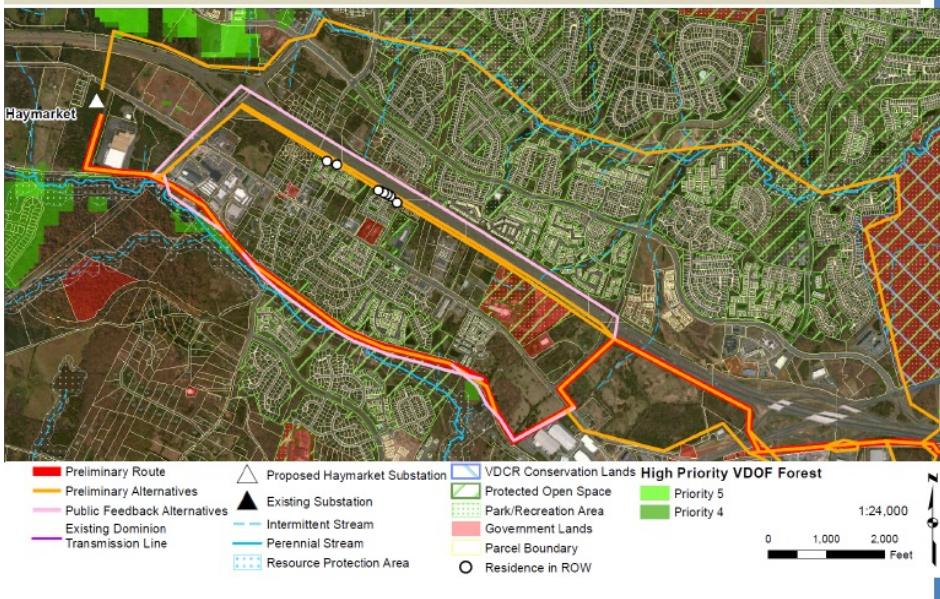


# Study Area: Constraints



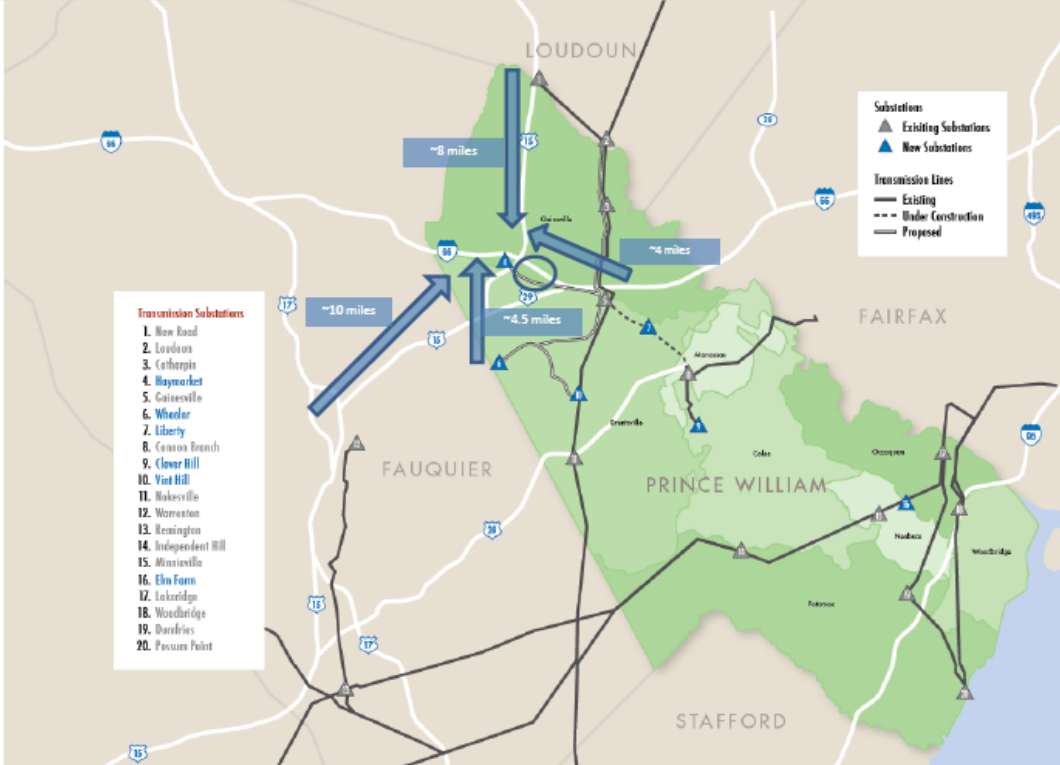
(Fig. 5)

# Constraints



(Fig. 6)

## Prince William County and Surrounding Counties Transmission Lines and Substations (Existing and Proposed)



(Fig. 7)

At the September 10, 2014 Open House held at Battlefield High School, Dominion presented all materials, updated as required, previously presented to the Haymarket Town Council and the Haymarket Planning Commission as well as additional renderings of project details and route photo simulations denoting the visual impact of the transmission lines and double-build distribution reinforcements to be added to the existing distribution lines along Washington Street.

On November 24, 2014, Dominion posted a new route alternatives map<sup>2</sup> (Figure 1A) that delineated the previous alternatives as well as a Western Alternative extending from the proposed Wheeler substation and a New Road Alternative extending from the New Road substation in Loudoun County. The Western Alternative would extend west from the proposed

<sup>2</sup> <https://www.dom.com/library/domcom/pdfs/electric-transmission/haymarket/alternative-routes.pdf>



Wheeler substation across Route 29 south of Buckland Mills to a point along Beverly Mill Road. The route would follow Beverly Mill Road north to its intersection with Route 55 and then turn east to its terminus at the proposed Amazon substation. The New Road Alternative would extend south from the New Road substation in Loudoun County along a path west of and parallel to Route 15, between Evergreen Country Club and Bull Run Country Club to a point on Waterfall Road, west along Waterfall Road to the intersection with Antioch Road, south along Antioch Road to the intersection with Route 55 and then east to its terminus at the proposed Amazon substation.

### **Duty of the Planning Commission**

The Haymarket Planning Commission was created in order to promote the orderly development of the locality and its environs. As such, the primary responsibility of the Planning Commission is to ensure the public health, safety, convenience, and welfare of the citizens and to plan for the future development of the Town. To that end, the Planning Commission must ensure that transportation systems are carefully planned; new community centers are developed with adequate highway, utility, health, educational, and recreational facilities; the need for mineral resources and the needs of agriculture, industry, and business be recognized for future growth; residential areas shall be provided with healthy surroundings for family life; agricultural and forestal land be preserved; and that the growth of the community remains consonant with the efficient and economical use of public funds.<sup>3</sup>

The Haymarket Planning Commission is also charged with the responsibility of ensuring the compatibility of land use, protecting residential areas from the adverse aspects of commercial and industrial land use and identifying land best suited for residential, commercial, and industrial activities with regard to available public infrastructure, environmental constraints, as well as economic and aesthetic considerations. In so doing, the Haymarket Planning Commission is tasked with determining the optimum density of development by considering: 1) environmental capacity of land; 2) capacity of public utilities; and 3) transportation networks and reappraising their identification periodically, and amending the zoning districts if appropriate.<sup>4</sup>

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<sup>3</sup> Code of Virginia Title § 15.2-2200

<sup>4</sup> Comprehensive Plan, Town of Haymarket, Commonwealth of Virginia 2008-2013, Chapter 2.7 Land Use

### **Dominion's Process Going Forward**

1. Finalize proposed route or routes and impact analysis
2. Submit application to the State Corporation Commission (SCC)
3. Department of Environmental Quality (DEQ) reviews the application and issues a report. As part of the review, DEQ will coordinate additional reviews by multiple agencies, i.e.: Virginia Marine Resources Commission, Department of Conservation and Recreation, Department of Games and Inland Fisheries, Department of Historic Resources, Army Corps of Engineers and others.
4. SCC issues an order and the review schedule is set
5. Review process begins, environmental review, SCC staff review, etc. are initiated
6. Commission shall receive and give consideration to all reports that relate to the proposed facility if requested by any municipality in which the facility is proposed to be built, to local comprehensive plans that have been adopted pursuant to Article 3 (§ 15.2-2223 et seq.) of Chapter 22 of Title 15.<sup>5</sup>
7. Public comments are accepted by the SCC
8. Interested respondents may participate in the case after filing a notice of participation with the SCC
9. Participants may submit testimony in response to Dominion's application
10. Dominion may rebut public testimony and agency analysis
11. SCC may conduct public hearings in the affected areas, if written requests therefor are received from 20 or more interested parties, the Commission shall hold at least one hearing in the area which would be affected by construction of the line, for the purpose of receiving public comment on the proposal<sup>6</sup>
12. The SCC may conduct a formal evidentiary hearing in Richmond
13. Hearing Examiner's report and recommendation are forwarded to the SCC
14. Dominion, participants and SCC staff may respond to the Hearing Examiner's report
15. SCC issues final order

### **Factors Considered by the Planning Commission**

1. Capacity required to serve growth
2. Location of future growth in demand
3. Location of past and future population growth
4. Reliability of the current electrical grid
5. Impact of the transmission line on the community and economic development opportunities
6. Cost burdens and physical impacts
7. Location of proposed lines within Town boundaries
8. Compatibility of routes with the Comprehensive Plan
9. Chesapeake Bay Act compliance
10. Possibility of mini-substations and antennae arrays within the Dominion ROW
11. Estimated cost of underground options

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<sup>5</sup> Code of Virginia Title § 56-46.1

<sup>6</sup> Code of Virginia Title § 56-46.1

12. Use of VDOT ROW
13. Use of Norfolk Southern ROW
14. Impact of construction on residential and commercial property values
15. Construction with densely populated suburban areas
16. Construction within areas with limited ROW
17. Construction with the flood plain
18. Construction across wetlands
19. Environmental impact of the proposed route
20. Potential impact on endangered species
21. Visual impact of overhead power lines
22. Impact of construction within the context of the Town of Haymarket Historic District
23. Impact on the Journey Through Hallowed Ground National Heritage Area
24. Concordance with Prince William County Zoning and Overlay Districts
25. Health considerations
26. Alternative routes
27. Alternative substation locations

### **Route Analysis**

The Haymarket Planning Commission has considered all preferred and alternate routes currently proposed by Dominion. For purposes of this report, the analysis will focus primarily on those routes and portions of routes that lie within or directly adjacent to the Town of Haymarket.

A primary factor for the terminus of the route is a single Dominion customer with a 100 mW power demand. Dominion states that they have a customer that will be the primary consumer of electricity provided by the 230 kV lines. This customer is the sole consumer for the power supplied by the 34.5 kV lines. Due to a confidentiality agreement, Dominion will not release the name of the customer at this time. Although not delineated in any of Dominion's presentations, Amazon is in the process of receiving approval to build a 491,625 square foot data center at 15505 John Marshall Highway<sup>7</sup>. Dominion's proposed substation is located on the same parcel, adjoining Amazon's proposed facility.

### **Distribution Reinforcements to existing distribution lines (Double-build)**

Presuming the location of the proposed datacenter does not change, each route for the new transmission lines will require the addition of distribution reinforcements to the existing distribution lines along Washington Street in order to provide enough "bridging power" for the datacenter's startup operations.

#### Strengths

- The distribution reinforcements may provide some measure of increased reliability, redundancy and the potential for backup service for existing customers.

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<sup>7</sup> Prince William County Land Plan Review Status, Final Site Plan No. 15-00046R00S01, [http://eservice.pwcgov.org/apps/landstatus/review.asp?CaseNo=15-00046R00S01&ParcelNo=7298-42-4221&Status=Quality\\_Control](http://eservice.pwcgov.org/apps/landstatus/review.asp?CaseNo=15-00046R00S01&ParcelNo=7298-42-4221&Status=Quality_Control) (as of October 9, 2014)



- Dominion will be able to use existing infrastructure and there will be no need to acquire additional ROW.
- There is no additional environmental impact

#### Weaknesses

- Given the power demands of the new datacenter (100mw), the distribution reinforcements will not provide capacity for its full operations or for additional future growth.
- The aesthetics of the design creates a visual image that is not in concordance with the Town's Historic District ordinances.
- The addition of the distribution reinforcements may be in violation of Chapter 58 Sec. 58-62, 58-104, 58-145, 58-185, 58-225, 58-266 and 58-305 of the Code of the Town of Haymarket.
- Dominion's engineers have stated that the distribution reinforcements will require the replacement of the existing distribution lines with new distribution line poles.
- The distribution reinforcements will minimize, but not guarantee protection from potential blackouts as a result of the new datacenter's aggressive implementation schedule.
- No alternate routes have been provided.

#### Conclusion

Although the distribution reinforcements will likely provide some degree of service benefits to the Town, those benefits must be weighed against the service requirements of future growth and their visual impact.

Dominion's professional staff has asserted that the planned datacenter will have an immediate 100mw power requirement, effectively negating any immediate or long-term benefits of the transmission lines to existing and/or future residents or businesses.

The Town's zoning ordinance provides that "except for transmission power lines of 34.5 kV or greater" all "utility facilities serving new uses or installed after the effective date of the ordinance except for good cause shown because of unusual soil or topographical conditions, shall be installed underground including, among others, electrical, water, sewer, power, gas, telephone and cable utilities". At this point, it is clear that the distribution reinforcements will carry at least 34.5 kV. Thus, the upgrade to the current infrastructure along Washington Street does not fall within the Town's Zoning Ordinance requirement for underground installation.

The aesthetics of the design create a visual impact that is not in concordance with the vision of the Town of Haymarket as detailed in the Historic District Ordinance and the Comprehensive Plan. Further, the requirement to replace the existing distribution poles will likely have an adverse impact on the existing Streetscape improvements.

The Planning Commission thus can not support the current distribution reinforcements plan and suggests that the Haymarket Town Council contact Dominion to secure additional information regarding the capacity of those lines and the possibility of using an alternate route to access the datacenter site.

**Preferred Preliminary Route, Alternate Preferred Preliminary Route and Public Input Preferred Alternate Preliminary Route**

Dominion's preferred preliminary route (now referred to as the Railroad Alternative see Figure 1a), an overhead transmission line, designated by the red line in Figure 1, traverses the length of the Town of Haymarket's southern boundary and is virtually identical to both the alternate preferred preliminary route and the public input preferred alternate route designated by the orange and pink lines respectively at the same general locations as the preferred preliminary route in Figure 4. This report contemplates both overhead and underground construction of the lines.

Strengths

- The routes make use of existing ROW.

Weaknesses

- The routes bisect two heavily populated residential subdivisions.
- The routes bisect several commercial parcels within the Town.
- The routes traverse most of the Town's Conservation District.
- The routes traverse two of the Gateways into the Town's Historic District.
- The routes traverse that area of the Town that constitutes a portion of the Journey Through Hallowed Ground.
- Given the power demands of the new datacenter (100mw), the new transmission lines will not provide capacity for additional future growth.
- The aesthetics of the design creates a visual image that is not in concordance with the Town's Historic District ordinances.
- The routes are not in accordance with the Town's Comprehensive Plan.
- The routes are not in accordance with Prince William County's Comprehensive Plan.
- The routes, terminus point and proposed substation are not located in the principal area of future residential, commercial and industrial growth.
- The overhead routes will adversely impact the value of many existing residential units.<sup>8 9</sup>
- Diminished property values do not appear to be explicitly considered as a factor by the SCC.<sup>10</sup>

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<sup>8</sup> Report of the Joint Legislative Audit and Review Commission to the Governor and the General Assembly of Virginia, Evaluation of Underground Electric Transmission Lines in Virginia, page 106.

<sup>9</sup> The Price Effects of HVTLs on Abutting Homes, (Appraisal Journal, Oct. 2, 2013)

<sup>10</sup> Report of the Joint Legislative Audit and Review Commission to the Governor and the General Assembly of Virginia, Evaluation of Underground Electric Transmission Lines in Virginia, page 106.

- The routes will adversely impact several existent commercial properties in the Town's southwestern corner.
- The routes will be constructed largely within the 100-year flood plain.
- The routes will traverse several designated wetlands.
- The routes may jeopardize the Town's ability to comply with the provisions of the Chesapeake Bay Act.
- Upon information and belief, the routes will traverse areas containing several endangered species.
- In addition to the fiscal impact that will be absorbed by residential ratepayers, many of those residential ratepayers within the Town limits will also have to absorb the visual impact of the overhead lines on their view shed.
- The overhead lines would allow for the construction of substations and communication arrays on the towers and within Dominion's ROW without public hearings or public facilities reviews.
- Upon information and belief, Dominion has not negotiated with the Norfolk Southern Railroad (NS) regarding use of NS's existing ROW.
- The overhead routes have a ROW that is severely limited by existing utility and railroad ROWs and numerous conservation easements.
- Due to environmental and topographical constraints, placing the transmission lines underground would be prohibitively expensive.
- Due to environmental and topographical constraints, placing the transmission lines underground would present significant engineering challenges.
- The overhead routes present a potential health hazard.

## Conclusion

As a preliminary matter, the Planning Commission notes that on October 21, 2014 the Prince William County Board of Supervisors adopted a resolution urging Dominion and the SCC to "consider alternatives to the preliminary route".<sup>11</sup>

Although the Preferred Preliminary Route, Alternate Preferred Preliminary Route and Public Input Preferred Alternate Route all allow Dominion to make use of existing ROW and by default are purported to be the most cost-effective routes offered by Dominion, the cost benefits must be weighed against the fiscal and physical impacts on existing residents and business, the service requirements of future growth and the visual impact of the overhead lines.

Dominion's professional staff has asserted that the planned datacenter will have an immediate 100mw power requirement, effectively negating any immediate or long-term benefits of the transmission lines to existing and/or future residents or businesses. Similarly, the proposed routes are not located in the principal area of future residential, commercial and industrial growth as designated by both the Town of Haymarket and Prince William County Comprehensive Plans.

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<sup>11</sup> <http://eservice.pwcgov.org/documents/bocs/agendas/2014/1021/10-B.pdf>



Further, the routes do not fall within the “Designated Corridors or Routes for Electric Transmission Lines of 150 Kilovolts or More” as delineated in the Long Range Land Use Chapter of the Prince William County Comprehensive Plan<sup>12</sup> (Fig. 8) and thus do not comport with Land Use Policy 3.14, “Designated Corridors or Routes for Electric Transmission Lines of 150 Kilovolts or More,” that designates the corridors that all future electric utility lines of 150 kilovolts or more should follow.

Additionally, the aesthetics of the overhead lines create a visual impact that is not in concordance with the vision of the Town of Haymarket as detailed in the Historic District Ordinance and the Comprehensive Plan. Similarly, the aesthetics of the overhead lines create a similar circumstance with regard to that area of the proposed route designated as a portion of the Journey Through Hallowed Ground.

Further, as the routes traverse that portion of the Town that lies within the 100-year flood plain, contain several areas designated as wetlands and potentially contain several endangered species, the routes present significant environmental issues. Given those circumstances, the proposed routes may make the Town’s concordance with the provisions of the Chesapeake Bay Act difficult and expensive.

Upon review, the proposed routes of the overhead lines will have a significant, detrimental impact on the assessed value of a considerable percentage of the Town’s residential properties and several commercial parcels. Although the SCC tends to disregard that as a factor in their review, the Planning Commission cannot ignore the potential for a negative financial impact on the Town’s residents and businesses.

Upon further review, it appears that the proposed routes may be restricted by existing railroad and utility ROW and potentially constrained by existing conservation easements. It must be noted that as regards said existing ROW, Dominion has informed the Town that it has not as of yet contacted the Norfolk Southern Railroad to negotiate use of their ROW.

Additionally, the Planning Commission finds the potential for unrestricted construction of additional Dominion electrical infrastructure and third-party communication arrays on the proposed transmission towers and within the Dominion ROW an unacceptable condition, particularly as such construction within Prince William County requires neither a public facilities review nor public hearing.

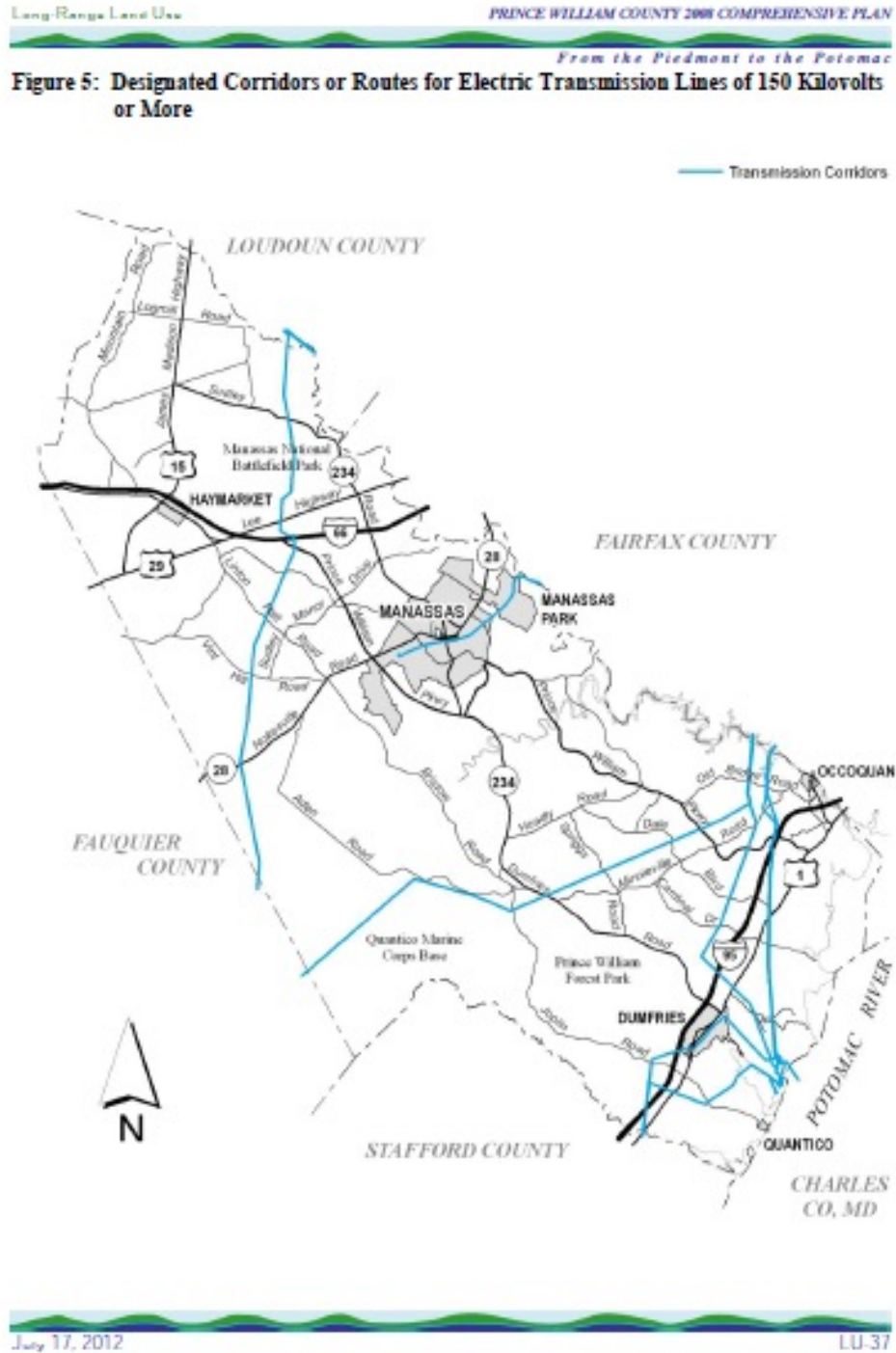
Lastly, although the subject of heated debate, the Planning Commission cannot ignore the potential hazard to the public health that may be attributed to the electromagnetic field surrounding high voltage transmission lines.

Thus, the Planning Commission cannot support these proposed routes and suggests the Haymarket Town Council adopt a resolution in opposition to those routes, enumerating the weaknesses of the proposed routes in the text of the resolution and appending this report as an exhibit to the resolution. The Planning Commission recommends forwarding

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<sup>12</sup> Prince William County Long-Range Land Use Plan, pages LU-7, LU-37

any such resolution and a copy of this report to Dominion prior to their submission of their proposed route or routes to the SCC.



(Fig. 8)

## **Alternate Preliminary Route and Public Input Alternate Preliminary Route, South of I-66**

Dominion has presented an alternate preliminary route, an overhead transmission line, designated by the orange line just to the south of I-66 in Figure 4 that traverses the length of the Town of Haymarket's northern boundary and is virtually identical to the underground public input alternate route designated by the pink line at the same general location as the alternate preliminary route in Figure 4.

### Strengths

- The routes make use of existing ROW.
- The routes do not fall within the 100-year flood plain.
- The routes do not traverse any known designated wetlands.

### Weaknesses

- The routes pass through at least eighteen (18) residential lots.
- The routes cross four heavily populated residential subdivisions.
- The routes cross several commercial parcels within the Town.
- The routes traverse most of the Town's Planned Interchange Park.
- The routes traverse two of the Gateways into the Town's Historic District.
- The routes traverse that area of the Town that constitutes a portion of the Journey Through Hallowed Ground.
- Given the power demands of the new datacenter (100mw), the new transmission lines will not provide the capacity for additional future growth.
- The aesthetics of the design creates a visual image that is not in concordance with the Town's Historic District ordinances.
- The routes are not in accordance with the Town's Comprehensive Plan.
- The routes, terminus point and proposed substation are not located in the principal area of future residential, commercial and industrial growth.
- The overhead routes will adversely impact the value of many existing residential units.<sup>13</sup>
- Diminished property values do not appear to be explicitly considered as a factor by the SCC.<sup>14</sup>
- The routes will adversely impact several commercial properties in the Town's northwestern corner.
- In addition to the fiscal impact that will be absorbed by residential ratepayers, many of those residential ratepayers within the Town limits will also have to absorb the visual impact of the overhead lines on their view shed.
- The overhead lines would allow for the construction of substations and communication arrays on the towers and within Dominion's ROW without public hearings or public facilities reviews.

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<sup>13</sup> Report of the Joint Legislative Audit and Review Commission to the Governor and the General Assembly of Virginia, Evaluation of Underground Electric Transmission Lines in Virginia, page 106.

<sup>14</sup> Report of the Joint Legislative Audit and Review Commission to the Governor and the General Assembly of Virginia, Evaluation of Underground Electric Transmission Lines in Virginia, page 106.



- The overhead routes present a potential health hazard.

## Conclusion

Although the Alternate Preliminary Route and Public Input Alternate Preliminary Route, South of I-66 both allow Dominion to make use of existing ROW and are cost-effective routes offered by Dominion, the cost benefits must be weighed against the fiscal and physical impacts on existing residents and business, the service requirements of future growth and the visual impact of the overhead lines.

The most immediate impact of these proposed routes would be the likely demolition of approximately eighteen existing residential units within the Town limits, many of them built within the last five years. Additionally, the routes would require the construction of the transmission lines in the backyards of several dozen additional residential properties. Given that the Dominion would have to acquire those properties through condemnation proceedings, the acquisition costs would likely be greater than the savings realized from the existing ROW.

Dominion's professional staff has asserted that the planned datacenter will have an immediate 100mw power requirement, effectively negating any immediate or long term benefits of the transmission lines to existing and/or future residents or businesses. Similarly, the proposed routes are not located in the principal area of future residential, commercial and industrial growth as designated by both the Town of Haymarket and Prince William County Comprehensive Plans.

The routes do not fall within the "Designated Corridors or Routes for Electric Transmission Lines of 150 Kilovolts or More" as delineated in the Long Range Land Use Chapter of the Prince William County Comprehensive Plan<sup>15</sup> (Fig. 8) and thus do not comport with Land Use Policy 3.14, "Designated Corridors or Routes for Electric Transmission Lines of 150 Kilovolts or More," that designates the corridors that all future electric utility lines of 150 kilovolts or more should follow.

Additionally, the aesthetics of the overhead lines create a visual impact that is not in concordance with the vision of the Town of Haymarket as detailed in the Historic District Ordinance and the Comprehensive Plan. Similarly, the aesthetics of the overhead lines create a similar circumstance with regard to that area of the proposed route designated as a portion of the Journey Through Hallowed Ground.

Upon review, the proposed routes of the overhead lines will have a significant, detrimental impact on the assessed value of a considerable percentage of the Town's residential properties and several commercial parcels. Although the SCC tends to disregard that as a factor in their review, the Planning Commission cannot ignore the potential for a negative financial impact on the Town's residents and businesses.

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<sup>15</sup> Prince William County Long-Range Land Use Plan, pages LU-7, LU-37

Additionally, the Planning Commission finds the potential for unrestricted construction of additional Dominion electrical infrastructure and third-party communication arrays on the proposed transmission towers and within the Dominion ROW an unacceptable condition, particularly as such construction within Prince William County requires neither a public facilities review nor public hearing.

Lastly, although the subject of heated debate, the Planning Commission cannot ignore the potential hazard to the public health that may be attributed to the electromagnetic field surrounding high voltage transmission lines.

Thus, the Planning Commission cannot support these proposed routes and suggests the Haymarket Town Council adopt a resolution in opposition to those routes, enumerating the weaknesses of the proposed routes in the text of the resolution and appending this report as an exhibit to the resolution. The Planning Commission recommends forwarding any such resolution and a copy of this report to Dominion prior to their submission of their proposed route or routes to the SCC.

### **Alternate Public Input Alternate Preliminary Route, North of I-66**

Dominion's has presented a public input alternate route designated by the pink line just to the north of I-66 in Figure 4 that traverses the length of the Town of Haymarket's northern boundary. Dominion has presented no information with regard to whether the proposed route is to be overhead or underground but has agreed to provide cost estimates for both options.

#### Strengths

- The route makes use of existing ROW.
- The route does not fall within the 100-year flood plain.
- The route does not traverse any known designated wetlands.
- The route does not require the demolition of any existing residential units.

#### Weaknesses

- The route traverses the Town's Planned Interchange Park.
- The route traverses one of the Gateways into the Town's Historic District.
- The route traverses that area of the Town that constitutes a portion of the Journey Through Hallowed Ground.
- Given the power demands of the new datacenter (100mw), the new transmission lines will not provide the capacity for additional future growth.
- The aesthetics of the design creates a visual image that is not in concordance with the Town's Historic District ordinances.
- The route is not in accordance with the Town's Comprehensive Plan.
- The route, terminus point and proposed substation are not located in the principal area of future residential, commercial and industrial growth.

- The overhead route will adversely impact the value of many existing residential units.<sup>16</sup>
- Diminished property values do not appear to be explicitly considered as a factor by the SCC.<sup>17</sup>
- The route will adversely impact a large commercial parcel in the Town's northwestern corner.
- In addition to the fiscal impact that will be absorbed by residential ratepayers, many of those residential ratepayers within the Town limits will also have to absorb the visual impact of the overhead lines on their view shed.
- The overhead routes present a potential health hazard.

## Conclusion

Although the Public Input Alternate Route, north of I-66 allows Dominion to make use of existing ROW and is a cost-effective route offered by Dominion, the cost benefits must be weighed against the fiscal and physical impacts on existing residents and business, the service requirements of future growth and the visual impact of the overhead lines.

Dominion's professional staff has asserted that the planned datacenter will have an immediate 100mw power requirement, effectively negating any immediate or long term benefits of the transmission lines to existing and/or future residents or businesses. Similarly, the proposed routes are not located in the principal area of future residential, commercial and industrial growth as designated by both the Town of Haymarket and Prince William County Comprehensive Plans.

The routes do not fall within the "Designated Corridors or Routes for Electric Transmission Lines of 150 Kilovolts or More" as delineated in the Long Range Land Use Chapter of the Prince William County Comprehensive Plan<sup>18</sup> (Fig. 8) and thus do not comport with Land Use Policy 3.14, "Designated Corridors or Routes for Electric Transmission Lines of 150 Kilovolts or More," that designates the corridors that all future electric utility lines of 150 kilovolts or more should follow.

Additionally, the aesthetics of the overhead lines create a visual impact that is not in concordance with the vision of the Town of Haymarket as detailed in the Historic District Ordinance and the Comprehensive Plan. Similarly, the aesthetics of the overhead lines create a similar circumstance with regard to that area of the proposed route designated as a portion of the Journey Through Hallowed Ground.

Upon review, the proposed routes of the overhead lines will have a significant, detrimental impact on the assessed value of a considerable percentage of the Town's residential properties and several commercial parcels. Although the SCC tends to

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<sup>16</sup> Report of the Joint Legislative Audit and Review Commission to the Governor and the General Assembly of Virginia, Evaluation of Underground Electric Transmission Lines in Virginia, page 106.

<sup>17</sup> Report of the Joint Legislative Audit and Review Commission to the Governor and the General Assembly of Virginia, Evaluation of Underground Electric Transmission Lines in Virginia, page 106.

<sup>18</sup> Prince William County Long-Range Land Use Plan, pages LU-7, LU-37

disregard that as a factor in their review, the Planning Commission cannot ignore the potential for a negative financial impact on the Town's residents and businesses.

Additionally, the Planning Commission finds the potential for unrestricted construction of additional Dominion electrical infrastructure and third-party communication arrays on the proposed transmission towers and within the Dominion ROW an unacceptable condition, particularly as such construction within Prince William County requires neither a public facilities review nor public hearing.

Moreover, although the subject of heated debate, the Planning Commission cannot ignore the potential hazard to the public health that may be attributed to the electromagnetic field surrounding high voltage transmission lines.

If however, the transmission lines were placed underground in the northern I-66 ROW from Catharpin Road to a point west of the I-66/Route 15 interchange and then to the terminus at the planned substation, many of the Planning Commission's concerns would be alleviated.

Underground transmission lines would not create an adverse visual impact and thus would have a far less detrimental impact on the assessed value of the Town's residential properties, commercial properties, Gateways to the Town's Historic District or the Journey Through Hallowed Ground.

Similarly, underground transmission lines would dramatically decrease the potential hazard to the public health that may be attributed to the electromagnetic field surrounding high voltage transmission lines.

Further, underground service from Catharpin Road to the terminus at the substation location would provide greater security for both the transmission line and the end-user's facility, effectively diminishing the potential for intentional or accidental damage or disruption.

Dominion has asserted that the cost of constructing underground transmission lines is prohibitively expensive in that it is several orders of magnitude more costly than the construction of overhead lines. While Dominion's professional staff has stated that historically such underground construction costs upwards of ten times that of overhead construction, data from similar projects indicates that the true cost is less than twice that of overhead construction. That being said, the Planning Commission has been advised that dedicated fiber optic lines servicing the Amazon site have already been buried in the southern I-66 ROW and that on or about October 8, 2014, Dominion filed a request with VDOT to bury the transmission lines on the north side of I-66.

Moreover, the Planning Commission notes that Dominion has undertaken or completed the construction of several underground transmission lines in Arlington County, Loudoun County and the City of Alexandria. The Planning Commission notes that said underground transmission lines ranged in length from one half to nearly four miles and

traversed variously, densely populated urban and suburban areas, areas with limited ROW, and areas where overhead transmission lines were deemed unacceptable for visual amenity reasons.

**Arlington County, Radnor Heights 230 kV Underground Transmission Lines and Substation<sup>19</sup>**

Dominion is constructing 3.7 miles of new 230kV underground electric transmission lines and a new electrical substation to support future growth and continue to provide reliable electricity to customers in Arlington County. (Fig. 9)

**Arlington County, City of Alexandria, Glebe – Potomac River Substation New 230kV Line and Substation Modifications<sup>20</sup>**

Dominion is proposing a new underground transmission line between Dominion’s Glebe Substation located at the intersection of S. Glebe Road and S. Eads Street, and Pepco’s Station C Substation at the intersection of Slaters Lane and E. Abingdon Drive. (Fig. 10)

**Loudoun County, Beaumeade - NIVO 230kV Double-Circuit Line<sup>21</sup>**

In the Ashburn area of Loudoun County Dominion installed a 230 kV double circuit underground transmission line, approximately 2700 feet (0.5 mile±) long, from the existing Beaumeade substation to a new substation (NIVO) located near the intersection of Smith Switch Road and Chilum Place. (Fig. 11)

Although, the Planning Commission can not support the proposed overhead route, it can support the proposed route if the transmission lines are constructed underground and suggests in the interest of the public health, safety, convenience, and welfare, the Haymarket Town Council adopt a resolution in support of said underground route, enumerating the strengths of the proposed route in the text of the resolution and appending this report as an exhibit to the resolution. The Planning Commission recommends forwarding any such resolution and a copy of this report to 1. Dominion, prior to their submission of their proposed route or routes to the SCC, 2. The Commonwealth of Virginia State Corporation Commission, 3. The Gainesville Magisterial District Supervisor, The Honorable Peter Candland, and 4. The Chairman of the Prince William County Board of County Supervisors, The Honorable Corey Stewart.

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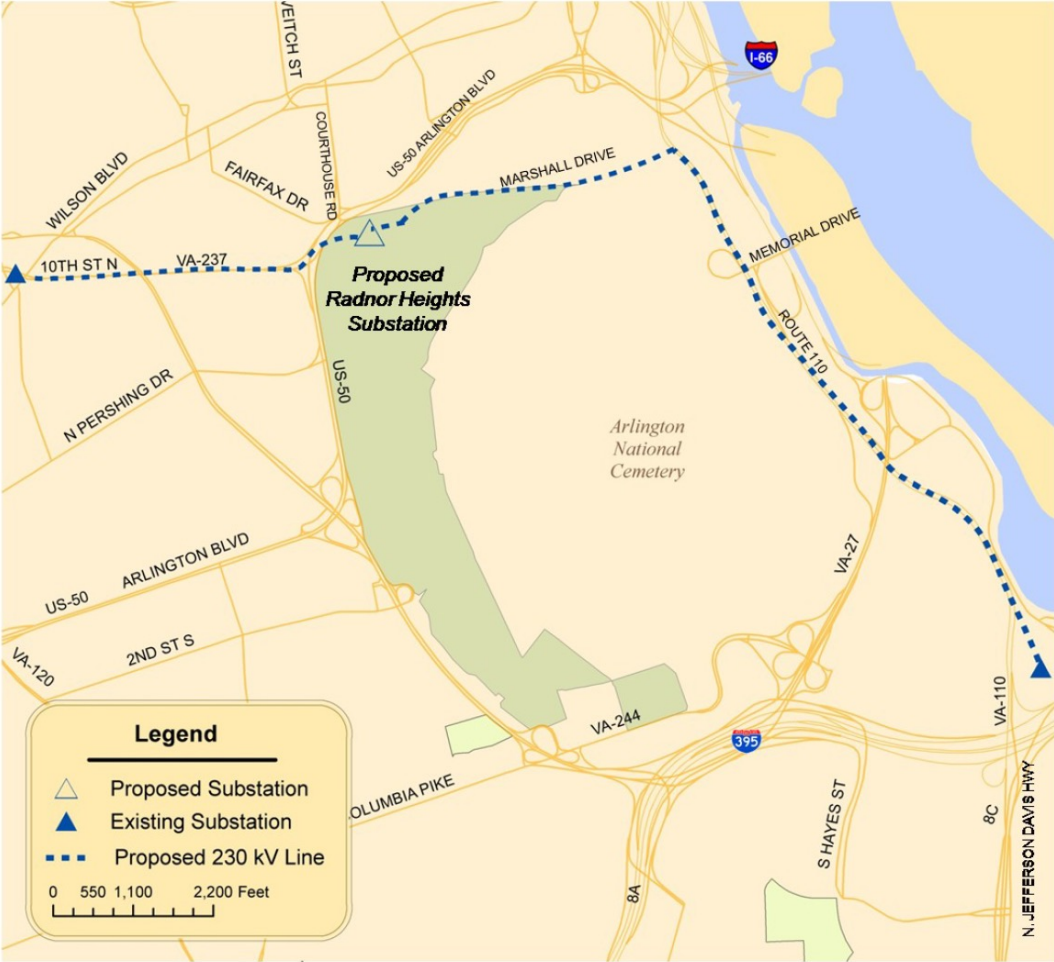
<sup>19</sup> <https://www.dom.com/about/electric-transmission/radnor/index.jsp>

<sup>20</sup> <https://www.dom.com/about/electric-transmission/glebe/index.jsp>

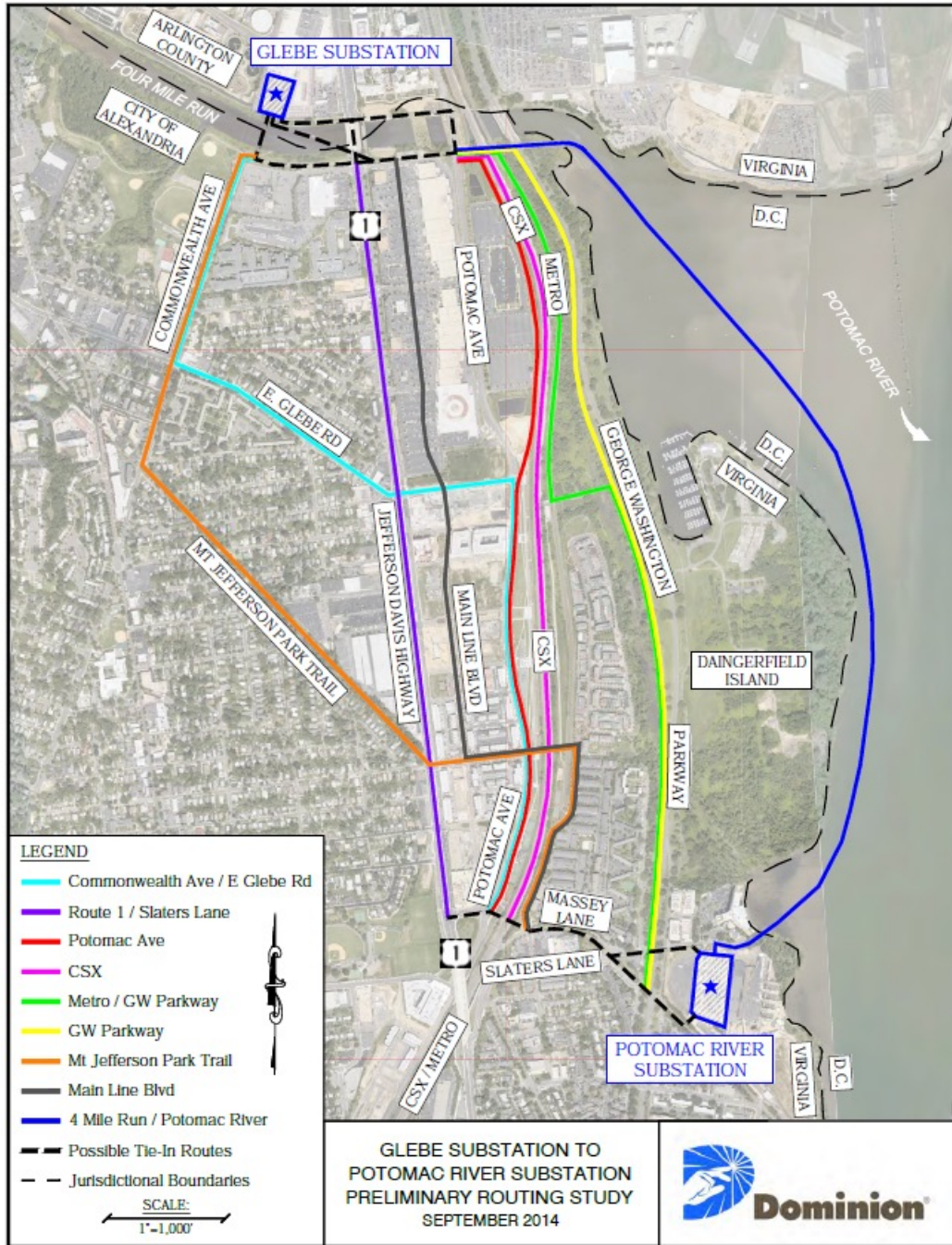
<sup>21</sup> <https://www.dom.com/about/electric-transmission/ashburn/index.jsp>



# Radnor Heights Proposed 230 kV Line & Substation

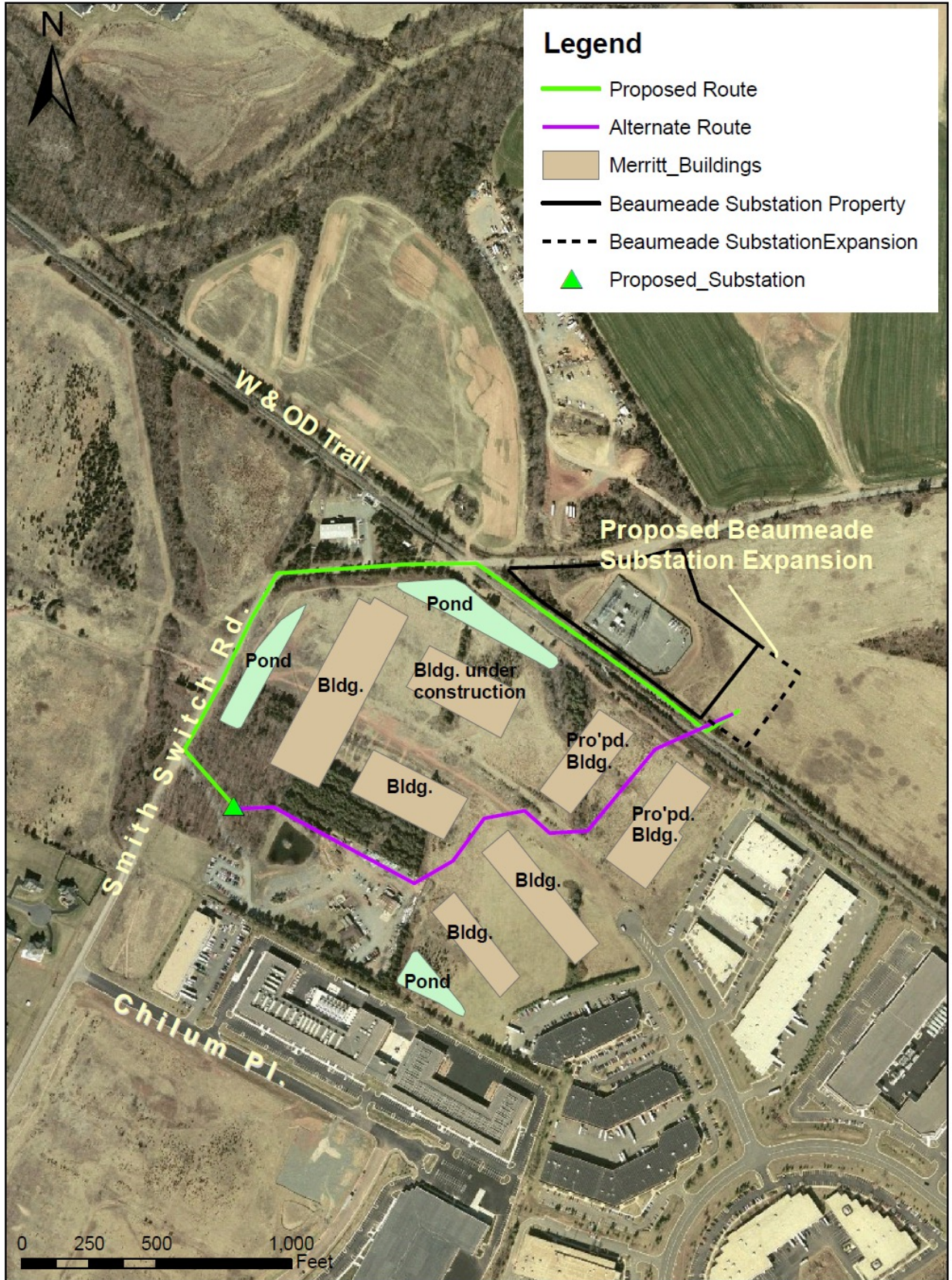


(Fig. 9)



(Fig. 10)





(Fig. 11)

## **Preliminary and Public Input Alternate Preliminary Piedmont Route**

Among the options initially presented by Dominion was a route that extended along the northern boundary of I-66 from the 234 Bypass to its intersection with Route 29 in Gainesville. From that point the route proceeded north along the boundary between Conway Robinson State Park and the Heritage Hunt subdivision, swung west through the Heritage Hunt Golf Course and wetlands separating the Piedmont communities to a point north of the intersection of Route 15 and Heathcote Boulevard, skirted the Haymarket Hospital site, crossed I-66 and terminated at the Amazon substation site. As of November 3, 2014, Dominion has “effectively ruled out” that route due to the State Park lands crossed.<sup>22</sup>

## **Western and New Road Alternatives**

Although both the Western and New Road Alternatives fall entirely without the Town’s boundaries, the Planning Commission notes that many of the concerns regarding overhead power lines within the Town boundaries, would seemingly also apply to the Western and New Road Alternatives. As with the other routes, these two alternatives do not fall within the “Designated Corridors or Routes for Electric Transmission Lines of 150 Kilovolts or More” as delineated in the Long Range Land Use Chapter of the Prince William County Comprehensive Plan (Fig. 8) and thus do not comport with Land Use Policy 3.14, “Designated Corridors or Routes for Electric Transmission Lines of 150 Kilovolts or More,” that designates the corridors that all future electric utility lines of 150 kilovolts or more should follow.

Similarly, the aesthetics of the overhead lines create a visual impact that is likely not in concordance with the vision of Prince William County as detailed in the Long Range Land Use, Environmental, Transportation and Historic Chapters of the Prince William County Comprehensive Plan and/or restrictions regarding construction in the Rural Crescent and near historic areas. Similarly, the aesthetics of the overhead lines create an identical circumstance with regard to those areas of the proposed routes that are designated as a portion of the Journey Through Hallowed Ground.

Upon cursory review, these proposed routes will not have a significant, detrimental impact on the Town but will likely have a significant, detrimental impact on the assessed value of many properties both residential and commercial, in western Prince William County. Although said impacts do not fall within the purview of the Town of Haymarket Planning Commission, it cannot disregard them as a factor in its review of all proposed routes. Nevertheless, the Planning Commission would defer to the findings of Prince William County and urges the Town Council to make our local Prince William County officials aware of the newly proposed routes so that Prince William County may weigh in on the matter.

## **Evolution of Underground Power Transmission Lines**

The use of underground routes for high voltage transmission lines has increased dramatically in recent years. Although once limited to large urban areas, New York City has not permitted

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<sup>22</sup> November 1, 2014 e-mail from Travis K Cutler ([travis.k.cutler@dom.com](mailto:travis.k.cutler@dom.com)) to Mayor Leake ([dleake@townofhaymarket.org](mailto:dleake@townofhaymarket.org))



construction of overhead lines since the 1890's<sup>23</sup>, underground transmission lines are increasingly being constructed in suburban and rural environments and indeed in the entirety of some jurisdictions. The State of Connecticut enacted legislation (Public Act No. 04-246, 2004) mandating the burial of high-voltage power lines and the Commonwealth of Virginia is currently underwriting the replacement of many overhead distribution lines with underground lines. Similarly, as a result of blackouts caused by the ice storm of 1998<sup>24</sup> (Fig. 12) and more recently Superstorm Sandy (Fig. 13), several northeastern states are currently giving priority to underground transmission options and/or initiating legislation to mandate that all new power transmission lines be constructed underground.

Nearly a decade ago, Connecticut Light & Power in conjunction with The United Illuminating Co., understood the need for an expansion of the transmission system in southwest Connecticut. As a result, the first of several 345-kV transmission projects with significant underground components took place as early as 2006. The growing list of projects at that time included<sup>25</sup>:

- CL&P's Bethel — Norwalk project. This project included 2.1 miles (3.4 km) of 345-kV XLPE cable, from Plumtree Substation to Hoyt's Hill Road in Connecticut.
- CL&P and United Illuminating's Middletown — Norwalk project. This project included 24 miles (39 km) of 345-kV XLPE cable from East Devon to Singer and Singer to Norwalk in Connecticut.
- ComEd's Transmission Reliability Reinforcement project. This project included 10 miles (16 km) of 345-kV XLPE cable connecting the Crawford, Taylor and West Loop substations in Chicago, Illinois, U.S.
- ITCTransmission's Bismarck — Troy project. This project included 10 miles of 345 kV in Detroit, Michigan, U.S.
- Neptune Regional Transmission System (RTS) and Long Island Power Authority's (LIPA's) Duffy Avenue Converter Substation to Newbridge Road Substation project. The project included 2.5 miles (4 km) of 345-kV XLPE cable. (This was a small part of the overall Neptune RTS project, which consists of 67 miles (108 km) of a 500-kV high-voltage dc submarine cable system.)
- LIPA and New York State Department of Transportation's Newbridge Road connector project. A total of 13 miles (20 km) — 4 miles (6.4 km) of the Western Connector and 9 miles (14.5 km) of the Eastern Connector — of 345-kV XLPE cable was proposed.

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<sup>23</sup> Testimony of Harry E. Orton, "Overhead or Underground: A Comparison", to the Commonwealth of Virginia Joint Commission On Technology And Science, Emerging Technology Issues Advisory Committee, Wednesday, May 18, 2005, <http://dls.virginia.gov/commission/pdf/overheadorunderground.pdf>

<sup>24</sup> Idem

<sup>25</sup> HV Transmission Goes Underground, Vito Longo, Technology Editor, T&D World Magazine, April 1, 2006.



Such initiatives are not limited to the United States, Belgium has banned overhead lines since 1992 and as result of the outages experienced after the winter storms of 1999, France has mandated that at least 25% of its high voltage lines be placed underground<sup>26</sup>.

Dominion, in a fashion consistent with utilities in other states, has asserted that the cost of constructing underground transmission lines is prohibitively expensive, several orders of magnitude more costly than the construction of overhead lines. Nevertheless, the Planning Commission has found several examples of such underground construction in other NOVA jurisdictions.

Further examples have been located in states such as Vermont, New York and New Hampshire in which underground transmission lines extend for lengths as long as 333 miles<sup>27</sup>. Other large scale examples, both existing and planned, can be found throughout New England with underground runs ranging from 150 to 230 miles.

It should be noted that the utility companies, which preferred the construction of overhead transmission lines in those jurisdictions, made similar claims regarding their expense, noting that they “would spend on average \$3million per mile on overhead and \$15-20 million per mile of underground cable”<sup>28</sup>. A 2013 analysis by the Conservative Law Foundation of three such projects in New England, determined that the actual cost averaged \$5.47 million per mile<sup>29</sup>, a finding supported in 2014 by the CEO of Transmission Developers Inc., the contractor for one of the projects, who noted that the actual cost for the underground portion of the project was roughly \$5 million per mile<sup>30</sup>.

Further, upon review, the terrain to be traversed for the Haymarket 230 kV Transmission Line is significantly less challenging than that contemplated in the New England examples, presumably resulting in a lower cost per mile. Additionally, as underground transmission lines require a significantly smaller ROW and in the instant case could be constructed largely within existing easements, the acquisition costs should be greatly diminished.

A review of Dominion’s existing projects suggests that their opposition to placing the lines underground may be based more on a desire to monetize Dominion’s existing ROW than in determining the best option for transmission. Should the lines be placed underground and within the VDOT ROW, Dominion would not be afforded that opportunity and the state would benefit from the ownership of the ROW.

Upon consideration of similar projects in NOVA and the consistent average construction cost per mile across several projects and jurisdictions, the Planning Commission is skeptical of Dominion’s assertions regarding the actual expense of burying the instant high voltage transmission line.

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<sup>26</sup> Idem

<sup>27</sup> Conservative Law Foundation, Champlain Hudson Power Express (Transmission Developers Inc.), <http://www.clf.org/wp-content/uploads/2013/11/Transmission-Line-Cost-Fact-Sheet-11-6-13.pdf>

<sup>28</sup> Burying Electrical Transmission Lines Not So Simple, Concord Monitor, Allie Morris, May 18, 2014.

<sup>29</sup> Conservative Law Foundation, Champlain Hudson Power Express (Transmission Developers Inc.), <http://www.clf.org/wp-content/uploads/2013/11/Transmission-Line-Cost-Fact-Sheet-11-6-13.pdf>

<sup>30</sup> Burying Electrical Transmission Lines Not So Simple, Concord Monitor, Allie Morris, May 18, 2014.

## Strengths

- Minimal visual impact
- Low EMF
- Not affected by weather
- No corona discharge
- No potential for brush fires
- Low maintenance costs
- Lower ROW acquisition costs
- Minimal impact on the value of land and buildings
- Underground structures are more secure than overhead lines
- Potentially lower life cycle costs
- Reduced potential for accidents
- Greater physical security

## Weaknesses

- Higher construction costs
- Potentially higher life cycle costs
- Higher costs will be passed on to rate payers
- Continuous trench required

Placing the high voltage transmission lines underground would address the property values, aesthetic and health concerns of the residents. It would also provide for a transmission system largely immune to the effects of inclement weather or natural phenomena such as lightning. Likewise, it would reduce the potential for accidental damage caused by individuals, vehicles, wildlife, etc. Similarly, it would create a utility infrastructure more secure from the threat of sabotage or terrorism. Additionally, placing the lines underground would result in lower maintenance costs as well as lower ROW acquisition costs<sup>31</sup>.

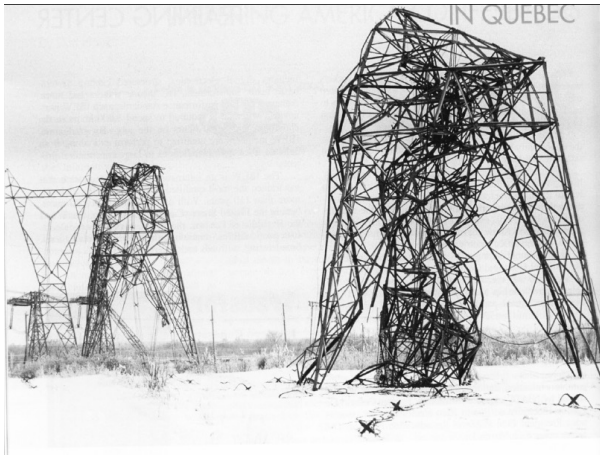
Historically, both overhead and underground high voltage transmission lines have been presumed to have a life cycle of thirty-five years. Thus when calculating the life cycle cost for each, the initial construction cost weighs heavily in the average life cycle cost for each system. The higher construction and ultimately life cycle cost of underground lines have typically been cited by power providers as the greatest weakness of underground initiatives given that the costs are typically passed on to the ratepayers. Dominion has asserted such and further claims that fault location and repair of underground transmission lines could take days or weeks in the case of outages whereas overhead line fault location and repair could generally be accomplished in one day. While that scenario may have been true as recently as a decade ago, advances in technology render such thinking obsolete. The oil filled conduits historically used to carry underground transmission lines have been replaced with more cost-effective and lower maintenance technology and current smart grid technology provides machine learning methods that assure almost instantaneous fault location through advances in technology and monitoring

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<sup>31</sup> Testimony of Harry E. Orton, "Overhead or Underground: A Comparison", to the Commonwealth of Virginia Joint Commission On Technology And Science, Emerging Technology Issues Advisory Committee, Wednesday, May 18, 2005, <http://dls.virginia.gov/commission/pdf/overheadorunderground.pdf>

equipment. As a result, power companies have largely switched from reactive maintenance plans to proactive maintenance plans<sup>32</sup>.

Thus given the significantly lower average actual construction costs experienced in New England, 25%-33% of the construction costs originally estimated by the power companies, in conjunction with technological advances that allow for nearly instantaneous fault location, the life cycle cost model of past decades is likely obsolete. Further, given that underground power transmission facilities are largely secure from the effects of weather, natural phenomena, accidents and sabotage, the number of outages and subsequent repairs are fewer than those experienced by overhead transmission facilities drawing the delta of costs for the systems closer and diminishing the power companies claims of higher life cycle expenses.



(Fig. 12)



(Fig. 13)

### Summary

Upon consideration of the of the potential fiscal, physical and aesthetic impacts, the Planning Commission can not support the proposed distribution enforcements, Preferred Preliminary Route, Alternate Preferred Preliminary Route, Public Input Preferred Alternate Preliminary Route, Alternate Preliminary Route (South of I-66), Public Input Alternate Preliminary Route (South of I-66) and the Overhead Public Input Alternate Preliminary Route (North of I-66).

**The Planning Commission does however support the Public Input Alternate Preliminary Route North of I-66 provided that the transmission lines are constructed underground and suggests in the interest of the public health, safety, convenience, and welfare, the Haymarket Town Council adopt a resolution in support of said underground route, enumerating the strengths of the proposed route in the text of the resolution and appending this report as an exhibit to the resolution.** The Planning Commission recommends forwarding any such resolution and a copy of this report to 1. Dominion, prior to their submission of their proposed route or routes to the SCC, 2. The Commonwealth of Virginia State Corporation Commission, 3. The Gainesville Magisterial District Supervisor, The Honorable Peter Candland,

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<sup>32</sup> Machine Learning for the New York City Power Grid, Rudin, etal, IEEE Transactions on Pattern Analysis and Machine Intelligence archive, Volume 34 Issue 2, February 2012

and 4. The Chairman of the Prince William County Board of County Supervisors, The Honorable Corey Stewart.