

## Staff's Direct Testimony

On February 7, 2017, Staff filed the direct testimony of Michael A. Cizenski, utilities engineer in the Commission's Division of Public Utility Regulation; and Neil Joshipura, utilities engineer in the Commission's Division of Public Utility Regulation. Each testimony is summarized below.

**Michael A. Cizenski** sponsored the following sections of the Staff Report: introduction, existing facilities, project description, need, construction period, cost of the project, proposed route, and right-of-way cross sections and line materials.<sup>493</sup>

In the introduction to the Staff Report, Mr. Cizenski noted that the Company's Application in this proceeding was filed after the Commission issued its *Injunction Order* in which it found that Dominion Energy must obtain a Certificate before undertaking the Rebuild Project.<sup>494</sup>

In reviewing need, Mr. Cizenski highlighted that since 1999, planned outages of the Harmony Village – White Stone section of Line # 65 average over 109 days per year.<sup>495</sup> During these planned outages, the Garner DP and the Lancaster, Ocran and White Stone Substations are fed radially.<sup>496</sup> Mr. Cizenski maintained that because radial transmission lines consist of a single line that originates in a substation, serves load, and does not tie to any other transmission line or substation, “[u]nplanned outages that occur while these lines are operating in a radial configuration result in [a] longer outage duration and less reliable service for the customers in the area.”<sup>497</sup> Mr. Cizenski confirmed that currently VDOT has a bridge painting project underway that is estimated to take approximately 811 days, with its completion scheduled for late 2018.<sup>498</sup> Mr. Cizenski agreed with Dominion Energy “that the existing Line # 65 transmission facilities crossing the Rappahannock River have either reached or are approaching the end of their useful life.”<sup>499</sup> However, Mr. Cizenski advised that a need for increased capacity has not been identified, “and as such, a rebuild of Line # 65 matching, at a minimum, the existing capacity of 147 MVA, would satisfy the need driving the proposed [Rebuild Project].”<sup>500</sup>

Mr. Cizenski reported that the design capacity for the Proposed 115 kV Overhead Route is 437 MVA, and “the overall capacity of Line # 65 is limited to 147 MVA due to limitations on the remainder of the line.”<sup>501</sup>

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<sup>493</sup> Exhibit No. 83, at 1-2.

<sup>494</sup> Exhibit No. 84, at 1.

<sup>495</sup> *Id.* at 6.

<sup>496</sup> *Id.*

<sup>497</sup> *Id.* (footnote omitted).

<sup>498</sup> *Id.* at 8.

<sup>499</sup> *Id.* at 10.

<sup>500</sup> *Id.*

<sup>501</sup> *Id.* at 13-14.

**Neil Joshipura** sponsored the following sections of the Staff Report: transmission alternatives, additional variations via reduced capacity, Staff alternative analysis, economic development benefits, DEQ coordinated environmental review, wetlands impacts consultations, conclusions and recommendations.<sup>502</sup>

Mr. Joshipura listed six transmission alternatives to the Proposed 115 kV Overhead Route: (i) 230 kV Overhead Alternative, (ii) 115 kV Bridge Attachment Option, (iii) the Company's Underground Option, (iv) Lanexa-Northern Neck-White Stone Option, (v) Barnhardt Option 1, and (vi) Barnhardt Option 2.<sup>503</sup>

For the 230 kV Overhead Alternative, Mr. Joshipura noted that this option would be similar to the Proposed 115 kV Overhead Route, but: (i) its towers would be taller, ranging from 55 feet to 180 feet tall; (ii) have a carrying capacity of 874 MVA; (iii) require approximately three feet of additional right-of-way in Middlesex County; and (iv) is estimated to cost \$26.3 million, or about \$0.1 million more than the Proposed 115 kV Overhead Route.<sup>504</sup> Mr. Joshipura found this alternative to be a viable and comparable option.<sup>505</sup>

Mr. Joshipura testified that one alternative would be to replace the current Rappahannock River crossing with new 115 kV structures and bridge attachments built to today's standards within the existing route of the 2.2-mile segment of Line # 65 ("115 kV Bridge Attachment Option").<sup>506</sup> Because this option would require deactivating the line for personnel safety considerations during a majority of VDOT bridge work, Mr. Joshipura recommended that this alternative be rejected.<sup>507</sup>

For the Company's Underground Option, Mr. Joshipura noted that two splice locations would be required under the river.<sup>508</sup> Mr. Joshipura advised that two temporary splice platforms would be built in the river, with one splice platform approximately 1,815 feet from the southern shore and the other approximately 1,130 from the northern shore.<sup>509</sup> Mr. Joshipura stated that this option consists of two sets of cables, each in its own 8-inch steel pipe to assure redundancy, with a combined capacity of 340 MVA operated at 115 kV.<sup>510</sup> The cables of the Company's Underground Option will be capable of operating at 230 kV, with a combined capacity of 679 MVA.<sup>511</sup> In addition, Mr. Joshipura confirmed that the Underground Option would require two transition stations, one on each side of the river, with the northern transition station estimated to cost approximately \$7.5 million and the southern transition station estimated to cost

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<sup>502</sup> Exhibit No. 86, at 1-2.

<sup>503</sup> Exhibit No. 84, at 14.

<sup>504</sup> *Id.* at 15-16.

<sup>505</sup> *Id.* at 16.

<sup>506</sup> *Id.*

<sup>507</sup> *Id.* at 17.

<sup>508</sup> *Id.*; Exhibit No. 10, Attached Supplemental Alternatives Analysis at 7.

<sup>509</sup> Exhibit No. 84, at 18.

<sup>510</sup> *Id.*

<sup>511</sup> *Id.* at 18-19.

approximately \$1.9 million.<sup>512</sup> Mr. Joshipura reported that the estimated total time to complete this alternative is approximately 26 months (including an estimated construction period of approximately 18 months).<sup>513</sup> Mr. Joshipura showed the total estimated cost for this alternative to be \$83.6 million.<sup>514</sup>

Mr. Joshipura presented information on an alternative that would (i) rebuild approximately 41.3 miles of the single circuit 230 kV Line # 224 between the Lanexa and Northern Neck Substations with a double circuit 230 kV line and (ii) rebuild approximately 29.4 miles of the single circuit 115 kV Line # 65 between the Northern Neck and White Stone Substations with a double circuit 115 kV line (“Lanexa-Northern Neck-White Stone Rebuild Option”). Mr. Joshipura advised that while no new right-of-way would be required for this alternative, upgrades would be required for the Lanexa, Northern Neck, and White Stone Substations, and that the tower heights would increase for this rebuild.<sup>515</sup> Mr. Joshipura agreed with Dominion Energy that this alternative should be rejected due to its higher cost of approximately \$234.9 million, and due to the increased environmental impacts of a 70.7 mile project.<sup>516</sup>

In regard to Barnhardt Option 1, Mr. Joshipura noted that during the construction of this alternative, it is estimated that the Norris Bridge would be closed to all traffic for up to 35 days, and an additional 48 days of single lane closures.<sup>517</sup> Mr. Joshipura reported the cost of this alternative to be approximately \$70 to \$75 million, consisting of \$35 million for installation of cable on the bridge, \$9.8 million for the transition stations and substation work, and \$25 to \$30 million to strengthen and reconfigure the bridge.<sup>518</sup> Mr. Joshipura advised that because the fiberglass conduit cannot be relied upon to provide protection to personnel working in the vicinity of the cable system, a majority of VDOT bridge work would require deenergizing the transmission line.<sup>519</sup> Mr. Joshipura agreed with Dominion Energy that this alternative fails to acceptably resolve the operational and reliability issues that support the need for the Rebuild Project.<sup>520</sup> Therefore, Mr. Joshipura recommended “that this alternative be rejected due to the higher combined cost, traffic impacts, and because it does not acceptably resolve the operational and reliability issues.”<sup>521</sup>

As for Barnhardt Option 2, Mr. Joshipura confirmed that the seven XLPE cables are designed to have a capacity of 455 MVA operated at 115 kV, and are capable of operating at 230 kV, with a capacity of 909 MVA.<sup>522</sup> Mr. Joshipura reported the estimated construction

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<sup>512</sup> *Id.* at 19-20.

<sup>513</sup> *Id.* at 22.

<sup>514</sup> *Id.*

<sup>515</sup> *Id.* at 22-23.

<sup>516</sup> *Id.* at 23.

<sup>517</sup> *Id.* at 28.

<sup>518</sup> *Id.* at 30.

<sup>519</sup> *Id.*

<sup>520</sup> *Id.*

<sup>521</sup> *Id.*

<sup>522</sup> *Id.* at 32.

period to be approximately 14 months, and the total time to complete to be approximately 30 months.<sup>523</sup> Mr. Joshipura stated that the estimated cost for this alternative is \$102.1 million, including \$92.3 million for the underground transmission line and \$9.8 million for the transition stations and substation work.<sup>524</sup>

Mr. Joshipura contended that the Rebuild Project is not capacity driven, and that if the existing water-crossing segment of Line # 65, which has a capacity rating of 147 MVA, was not attached to the bridge the Rebuild Project would not be required at this time.<sup>525</sup> Mr. Joshipura noted that the Company has stated that it presently has no plans, other than the Rebuild Project, to upgrade any other sections of Line # 65.<sup>526</sup> Mr. Joshipura maintained that regardless of the capacity of the Rebuild Project, “the overall capacity of Line # 65, including this segment, will likely remain restricted to 147 MVA due to limitations on the remainder of the line for the foreseeable future.”<sup>527</sup> Thus, Mr. Joshipura took the position that for the Rebuild Project, “a power transfer capacity equal to or greater than 147 MVA is sufficient to resolve the need . . . .”<sup>528</sup> Mr. Joshipura maintained that it would be reasonable for Dominion Energy to provide information to the Commission on alternatives with a lower power transfer capacity that will still satisfy the need for the Rebuild Project, but reduce the number of conductors required, which can lower cost and environmental impact.<sup>529</sup> Mr. Joshipura agreed with the testimony of Barnhardt witness Soleski that a 292 MVA rating would be equal to or greater than 99 percent of the existing Line # 65.<sup>530</sup> Accordingly, Mr. Joshipura requested that the Company provide an assessment of the reliability and cost of the following variations to Barnhardt Option 2 proposed by Mr. Soleski:

- One three-core XLPE submarine cable installed in one trench (“Soleski Variation 1”);
- Three single-core XLPE submarine cables installed in one trench (“Soleski Variation 2”);
- Two three-core XLPE submarine cables installed in two trenches, with one in each trench (“Soleski Variation 3”); and
- Six single-core XLPE submarine cables installed in two trenches, with three in each trench (“Soleski Variation 4”).<sup>531</sup>

In addition, Mr. Joshipura requested that the Company provide an assessment of the reliability and cost of four single-core XLPE submarine cables installed in four trenches (“Staff Variation 1”).<sup>532</sup>

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<sup>523</sup> *Id.* at 36.

<sup>524</sup> *Id.*

<sup>525</sup> *Id.* at 37.

<sup>526</sup> *Id.*

<sup>527</sup> *Id.*

<sup>528</sup> *Id.*

<sup>529</sup> *Id.*

<sup>530</sup> *Id.* at 38.

<sup>531</sup> *Id.* at 38-39.

Mr. Joshipura provided further comparisons of the Proposed 115 kV Overhead Route, 230 kV Overhead Alternative, the Underground Option, and Barnhardt Option 2 concerning: (i) Baylor Grounds and permitting considerations; (ii) use of existing right-of-way; (iii) visual impact; (iv) boating impact; (v) environmental impacts; (vi) the use of HPFF vs XLPE; and (vii) cost.<sup>533</sup>

Mr. Joshipura described the Baylor Grounds as “state-owned subaqueous bottom areas that are managed for the propagation of oysters.”<sup>534</sup> Legislative approval was required and obtained by the Company that authorized VMRC to grant and convey to Dominion Energy a right-of-way for an overhead transmission line through the Baylor Grounds.<sup>535</sup> Mr. Joshipura stated that approximately 8.27 acres of the Baylor Grounds were vacated and no additional area of the Baylor Grounds would be required to be vacated for the Overhead Alternatives.<sup>536</sup> Mr. Joshipura advised that the Company’s Underground Option would require vacating an additional 5.19 acres of the Baylor Grounds through legislation, and the Barnhardt Option 2 would require vacating an additional 72.79 acres of the Baylor Grounds through legislation.<sup>537</sup>

As for use of existing right-of-way, Mr. Joshipura noted that in addition to the right-of-way through the Baylor Grounds described above, the 230 kV Overhead Alternative would require an additional three feet of right-of-way width in Middlesex County.<sup>538</sup>

Mr. Joshipura testified that construction of the overhead alternatives would alter the existing viewshed and have a visual impact.<sup>539</sup> However, Mr. Joshipura stated that the Norris Bridge and the existing Line # 65 “are man-made engineered structures crossing the river that have existed in the project area for over 50 years.”<sup>540</sup> Mr. Joshipura asserted that the Underground Option and Barnhardt Option 2 would alter the viewshed by removing existing river structures, and by adding transition stations on each side of the river.<sup>541</sup>

In regard to boating, Mr. Joshipura acknowledged the safety concerns about the proposed fender system associated with the Overhead Alternatives raised by Lancaster County and members of the public.<sup>542</sup> Mr. Joshipura advised that there would be disruptions to boating activities during construction of each of the alternatives.<sup>543</sup>

<sup>532</sup> *Id.* at 39.

<sup>533</sup> *Id.* at 39-40.

<sup>534</sup> *Id.* at 40.

<sup>535</sup> *Id.*

<sup>536</sup> *Id.* at 41.

<sup>537</sup> *Id.*

<sup>538</sup> *Id.* at 42, n.198.

<sup>539</sup> *Id.* at 43.

<sup>540</sup> *Id.*

<sup>541</sup> *Id.*

<sup>542</sup> *Id.*

<sup>543</sup> *Id.* at 43-44.

Mr. Joshipura testified that construction of the structures' foundations and fender system for the Overhead Alternatives would result in approximately 0.02 acres of disturbance to the river bottom.<sup>544</sup> Construction of the Company's Underground Option would disturb approximately 5.97 acres of river bottom and the dispersion and suspension of approximately 2,677 cubic yards of sediments.<sup>545</sup> Mr. Joshipura reported that construction of Barnhardt Option 2 would disturb approximately 3.30 acres of river bottom and the dispersion of approximately 15,595 cubic yards of sediments.<sup>546</sup>

As for HPFF vs XLPE cable, Mr. Joshipura stated that Dominion Energy has three river crossings with HPFF cable, one of which has been in operation for approximately 45 years, and no river crossings with XLPE cable.<sup>547</sup> However, Mr. Joshipura pointed out that XLPE cable has been installed by the Company for various land-crossing underground projects.<sup>548</sup> Mr. Joshipura advised that HPFF would require two splicing locations in the river and HPFF requires periodic monitoring and maintenance to keep the steel pipes from corrosion that can lead to fluid leaks.<sup>549</sup> Moreover, for Barnhardt Option 2, XLPE splicing would be conducted on land, and no pumping plant or cathodic protection is required for an XLPE cable system.<sup>550</sup>

Mr. Joshipura reported the estimated total cost of each alternative as follows:

- Proposed 115 kV Overhead Route - \$26.2 million;
- 230 kV Overhead Alternative - \$26.3 million;
- Underground Option (including transition stations and substation work) - \$83.6 million; and
- Barnhardt Option 2 (including transition stations and substation work) - \$102.1 million.<sup>551</sup>

In conclusion Mr. Joshipura agreed with Dominion Energy that the existing Line # 65 crossing the Rappahannock River has either reached or is approaching the end of its useful life and that the Rebuild Project is required in order to improve operational performance.<sup>552</sup> Mr. Joshipura found that the Proposed 115 kV Overhead Route resolves the demonstrated need, has legislative authorization necessary to be constructed, and is the least costly alternative.<sup>553</sup> Nonetheless, Mr. Joshipura advised that the 230 kV Alternative is a viable and comparable

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<sup>544</sup> *Id.* at 44.

<sup>545</sup> *Id.*

<sup>546</sup> *Id.* at 45.

<sup>547</sup> *Id.*

<sup>548</sup> *Id.*

<sup>549</sup> *Id.* at 46.

<sup>550</sup> *Id.*

<sup>551</sup> *Id.*

<sup>552</sup> *Id.* at 50.

<sup>553</sup> *Id.*

overhead option.<sup>554</sup> Finally, Mr. Joshipura took the position that “[i]f any of the Variations of Barnhardt Option 2 can be constructed in a reliable manner and the costs of such construction are comparable to the Company’s [Proposed 115 kV Overhead Route] then Staff believes such options are reasonable alternatives.”<sup>555</sup>

### **Dominion Energy’s Rebuttal Testimony**

On March 2, 2017, Dominion Energy filed the rebuttal testimony of Wesley D. Keck; Dennis D. Kaminsky; Jacob G. Heisey; Gregory E. Mathe, electric transmission communications consultant for the Company; Carlo Stark, project director for Truescape Limited (“Truescape”); Robert B. Smith, consulting engineer in the Electric Transmission Department of the Company; Robert M. Cumming, Jr., supervisor in the Electric Transmission Group at the Company; Susan A. Kessler, Esquire; Thomas W. Reitz, Jr., consulting engineer in the Electric Transmission Group with Dominion Technical Solutions, Inc.; Donald E. Koonce; Peter L. Tirinzoni, P.E., senior engineer with PDC; Amanda M. Mayhew; Benjamin W. Sussman; Jon M. Berkin; and Paul B. Haynes. A summary of the rebuttal testimony of each witness is provided below.

**Wesley D. Keck** provided: (i) an introduction of Dominion Energy’s rebuttal witnesses; (ii) a follow up to the VDOT Letter; (iii) a summary of an alternative fender system; and (iv) the Company’s position on the Rebuild Project.<sup>556</sup>

In regard to the VDOT Letter, Mr. Keck disagreed with Lancaster County witness Matthews and maintained that VDOT’s concerns with the transmission line remaining on the bridge cannot be resolved.<sup>557</sup> Mr. Keck stated that VDOT’s concerns relate to: (i) its ability to inspect the bridge; (ii) the impact of a transmission line on the structural integrity of the bridge; and (iii) the amount of time either the bridge or a lane would be closed during construction, and the amount of time the line would need to be de-energized during bridge inspection, maintenance, and construction.<sup>558</sup>

Mr. Keck responded to public criticism of the proposed fender system.<sup>559</sup> Mr. Keck asserted that the proposed fender will not be overly intrusive visually, and will not present any credible challenge to navigation.<sup>560</sup> Nonetheless, Mr. Keck advised that Dominion Energy is offering an alternative, a scaled down fender system that it calls the “SK5” fender system.<sup>561</sup>

Mr. Keck testified that Dominion Energy continues to support the Proposed 115 kV Overhead Route for the Rebuild Project.<sup>562</sup> Mr. Keck stated that the studies of the additional

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<sup>554</sup> *Id.*

<sup>555</sup> *Id.* at 51.

<sup>556</sup> Exhibit No. 89, at 2.

<sup>557</sup> *Id.* at 4.

<sup>558</sup> *Id.* at 5.

<sup>559</sup> *Id.* at 6.

<sup>560</sup> *Id.*

<sup>561</sup> *Id.* at 7.

<sup>562</sup> *Id.*

options “confirm that the Company’s Proposed 115 kV Overhead Route is the least expensive and most robust and reliable long-term solution, which has the shortest construction time, solves the need, and reasonably minimizes adverse impacts on the scenic assets, historic districts and environment of the area concerned.”<sup>563</sup>

**Dennis D. Kaminsky** addressed issues related to: (i) the reliability of overhead and underground lines from a planning perspective; (ii) whether the Company’s Underground Option should be constructed and operated at 230 kV; (iii) the continued need for the Rebuild Project; (iv) the appropriate capacity rating for the Rebuild Project; and (v) economic impacts of the Rebuild Project.<sup>564</sup>

Mr. Kaminsky compared the reliability of overhead transmission lines to underground transmission lines and noted that when an overhead line faults, circuit breakers automatically “reclose,” limiting outages where the line is not damaged to a fraction of a second to less than two minutes.<sup>565</sup> Mr. Kaminsky stated that automatic “reclosing” is not allowed by Dominion Energy on underground transmission lines “because the fault will likely result in damage to the cable and its insulation and automatic reclosing would cause more extensive damage.”<sup>566</sup> In this case, Mr. Kaminsky advised that the Company’s Underground Option, and all of the variations of Barnhardt Option 1 and Barnhardt Option 2 include a 115 kV breaker in the transition station on the north side of the Rappahannock River “to enable any underground component to be isolated in the event of a failure and to enable reclosing on the overhead line section for faults.”<sup>567</sup> Mr. Kaminsky maintained that the 115 kV breakers would subject the underground cable to fault currents and add more equipment and complexity to the existing overhead 115 kV line.<sup>568</sup>

Mr. Kaminsky reported that the unplanned sustained outage rate for overhead transmission lines of all ratings is 0.00803 outages per mile per year as compared to 0.013 outages per mile per year for underground transmission lines of all ratings.<sup>569</sup> Mr. Kaminsky also reported the sustained outages per mile per year for overhead and underground transmission lines for 115 kV and 230 kV to be:<sup>570</sup>

	Overhead	Underground
115 kV	0.01140	None
230 kV	0.00647	0.0278

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<sup>563</sup> *Id.* at 8.

<sup>564</sup> Exhibit No. 93, at 2.

<sup>565</sup> *Id.* at 3.

<sup>566</sup> *Id.* at 3-4.

<sup>567</sup> *Id.* at 4.

<sup>568</sup> *Id.*

<sup>569</sup> *Id.* at 5.

<sup>570</sup> *Id.*; Attached Rebuttal Schedule 2.



In addition, Mr. Kaminsky pointed to the longer repair times for underground transmission lines as not supporting the reliability improvement the Rebuild Project is intended to address.<sup>571</sup>

	Overhead	Underground
115 kV	724 min.	None
230 kV	1,569.6 min.	35 days
All Trans.	1,113 min.	35 days

Mr. Kaminsky stressed that there is an immediate need for the Rebuild Project and that the overhead alternatives can be completed in six months, while the Underground Option, Barnhardt Option 1, and Barnhardt Option 2 will take 26, 54, and 22 months, respectively.<sup>572</sup>

Mr. Kaminsky addressed a recommendation by Lancaster County witness Lanzalotta to construct and operate the Company’s Underground Option at 230 kV instead of at 115 kV as proposed by Dominion Energy.<sup>573</sup> Mr. Kaminsky stated that such an option would require: (i) the remaining 34.5 miles of Line # 65 to be converted to 230 kV, increasing the cost of the Rebuild Project to approximately \$124 million; or (ii) the installation of a 230-115 kV switching station on the north side of the Rappahannock River and the conversion of Line # 65 to 230 kV between the existing Harmony Village Substation and the new 230-115 switching station, which would increase the cost of the Rebuild Project to between \$82.65 million and \$93.65 million.<sup>574</sup>

Mr. Kaminsky responded to Lancaster County witness Lanzalotta’s testimony regarding the lower 2017 PJM Load Forecast and the Company’s projected 2018 NERC violation.<sup>575</sup> Mr. Kaminsky emphasized that the need for the Rebuild Project is based on safety, operational performance, and a potential NERC Reliability Violation.<sup>576</sup> Mr. Kaminsky advised that Dominion Energy is in the process of updating the contingency analysis, but asserted that “even if the line does not reach the 300 MW load loss threshold until after 2018, the Rebuild Project is still required in order to improve operational performance.”<sup>577</sup>

In regard to Staff’s position that the Norris Bridge segment of Line # 65 requires only a capacity of 147 MVA, Mr. Kaminsky pointed out that approximately 70% of Line # 65 has been upgraded to a summer rating of 217 MVA.<sup>578</sup> Mr. Kaminsky defended the Company’s design at 437 MVA as “prudent planning and engineering to design and build new overhead facilities with a 60-year life expectancy to the maximum level of capacity and flexibility that can be obtained at

<sup>571</sup> *Id.* at 5-6; Attached Rebuttal Schedule 2.

<sup>572</sup> *Id.* at 6.

<sup>573</sup> *Id.* at 7.

<sup>574</sup> *Id.* at 7-8. \$82.65 million = \$23 million + \$59.65 million and \$93.65 million = \$34 million + \$59.65 million.

<sup>575</sup> Exhibit No. 93, at 9.

<sup>576</sup> *Id.*

<sup>577</sup> *Id.*

<sup>578</sup> *Id.* at 10.

reasonable cost for long-term growth.”<sup>579</sup> Mr. Kaminsky maintained that when Dominion Energy rebuilds a transmission line it typically increases the carrying capacity by two to three times the original capacity.<sup>580</sup> For similar reasons, Mr. Kaminsky agreed with Staff’s conclusion that while there is no foreseeable need for 230 kV operation of Line # 65, the 230 Overhead Alternative is a viable option.<sup>581</sup> Mr. Kaminsky contended that the Company’s design of the Underground Option and Barnhardt Option 2 were targeted to match the Company’s proposed overhead line to provide a basis of cost comparison among the alternatives being considered and to permit future conversion to 230 kV operation.<sup>582</sup>

Finally, Mr. Kaminsky responded to testimony by Lancaster County witness Bellows and Coalition witness Szyperski concerning the detrimental effect of the Rebuild Project on the local economy.<sup>583</sup> Mr. Kaminsky testified that the “Company is committed to providing reliable power at the lowest reasonable cost and making sound long-term investment in the development of a robust transmission system.”<sup>584</sup> Mr. Kaminsky pointed to the Staff’s statement that by ensuring continued reliable bulk electric power, the Rebuild Project would support economic development in and around the Northern Neck.<sup>585</sup>

**Jacob G. Heisey** addressed: (i) the existing configuration of Line # 65; (ii) the “as-is” Rebuild; and (iii) the Company’s Proposed 115 kV Overhead Route.<sup>586</sup>

Mr. Heisey disagreed with Lancaster County witness Matthews concerning the vertical load and applied moment that the existing davit arms and overhead line exert upon the bridge.<sup>587</sup> Mr. Heisey contended that Mr. Matthews overstated the existing conductor weight by over 26.5 times, and incorrectly assumed that all cables are suspended from the eastern most point on the arms, which dramatically over estimates the calculated moment of the existing line.<sup>588</sup> Mr. Heisey calculated the total vertical load from an arm to equate to approximately 3,590 pounds and the average resulting moment per existing structure to be approximately 59,933 foot pounds.<sup>589</sup> Mr. Heisey advised that Mr. Matthews calculated “existing” to be 86,400 foot pounds.<sup>590</sup> Mr. Heisey rejected Mr. Matthews contention that the removal of the existing line should be considered in the analysis of the proposed new attachment and testified that “the existing 50,260 pounds vertical load (3,590 pounds-per-structure x 14 structures) of the overhead

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<sup>579</sup> *Id.*

<sup>580</sup> *Id.* at 10-11.

<sup>581</sup> *Id.* at 12.

<sup>582</sup> *Id.* at 12-13.

<sup>583</sup> *Id.* at 15.

<sup>584</sup> *Id.*

<sup>585</sup> *Id.*

<sup>586</sup> Exhibit No. 95, at 2.

<sup>587</sup> *Id.*

<sup>588</sup> *Id.* at 3.

<sup>589</sup> *Id.* at 4.

<sup>590</sup> *Id.*

line is dwarfed by the more than one million pounds the underground cable contemplated as part of Barnhardt Option 1 would add to the bridge . . . .”<sup>591</sup>

Mr. Heisey disagreed with Mr. Matthews’ claim that VDOT proposed an option of new davit arms attached the bridge.<sup>592</sup> Mr. Heisey contended that VDOT’s discussion of new davit arms attached to the bridge was in response to questions raised by Dominion Energy.<sup>593</sup> Mr. Heisey advised that VDOT stated that the rebuild davit arms would reduce the live load carrying capacity of the truss system, take 60 days for construction, and continue the need to de-energize the line during bridge inspections and rehabilitation work.<sup>594</sup> Mr. Heisey also noted that VDOT estimated that work to strengthen and rehabilitate the bridge as a result of the new davit arms would cost approximately \$5 million.<sup>595</sup> Mr. Heisey calculated that the cost of replacing the davit arms would be approximately \$15,465,067, exclusive of any VDOT costs. Mr. Heisey emphasized that such an option does not solve the reliability or safety concerns driving the Rebuild Project and is not supported by either Dominion Energy or Staff.<sup>596</sup>

Mr. Heisey supported the Company’s design of the Proposed 115 kV Overhead Route for 437 MVA.<sup>597</sup> Mr. Heisey noted that approximately 70% of Line # 65 is rated for 217 MVA.<sup>598</sup> Mr. Heisey stated that “engineering chose the 900 ACSS/TW/HS-285/MM 20/7 conductor (437 MVA; 2194 Amps) for its beneficial mechanical properties including decreased-sag, increased self-damping properties, improved resistance, and suitability for operation at 230 kV if ever needed and the proper upgrades to the remainder of Line # 65 are performed.”<sup>599</sup> Mr. Heisey pointed out that only approximately 1.77 miles of Line # 65 is rated for 147 MVA.<sup>600</sup> Mr. Heisey maintained that the Company is not “overbuilding” or “over-engineering” its system, but is making prudent design decisions based on the line’s expected life.<sup>601</sup>

**Gregory E. Mathe** addressed issues raised concerning the Company’s public outreach.<sup>602</sup> In response to testimony by Lancaster County witness Bellows, Mr. Mathe stated that Dominion Energy first briefed Lancaster County officials on the initial planning for the Rebuild Project in September of 2014.<sup>603</sup> In addition, Mr. Mathe confirmed that on April 10, 2015, the Lancaster County Board of Supervisors received written notification of the Rebuild Project, and on April 16, 2015, approximately 70 landowners received the same written notification of the Rebuild Project, which consisted of: (i) a Rebuild Project announcement letter, (ii) a Rebuild

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<sup>591</sup> *Id.* at 5.

<sup>592</sup> *Id.* at 6.

<sup>593</sup> *Id.*

<sup>594</sup> *Id.* at 7.

<sup>595</sup> *Id.*

<sup>596</sup> *Id.* at 8.

<sup>597</sup> *Id.* at 9.

<sup>598</sup> *Id.*

<sup>599</sup> *Id.* at 9-10.

<sup>600</sup> *Id.* at 10.

<sup>601</sup> *Id.* at 11.

<sup>602</sup> Exhibit No. 96, at 2.

<sup>603</sup> *Id.*

Project factsheet, (iii) reference to the Company’s website where further information on the Rebuild Project could be found, and (iv) contact information.<sup>604</sup> Mr. Mathe testified the Company became aware of the public’s concern about the Rebuild Project when the Lancaster County Board of Supervisors passed a resolution in June 2015 supporting an underground installation and when opponents to the Rebuild Project participated in the VMRC public hearing on July 28, 2015.<sup>605</sup> Mr. Mathe asserted that between June 2015 and February 29, 2016, when Dominion Energy filed this Application with the Commission, the Company “engaged in correspondence with the public on at least 15 different instances.”<sup>606</sup> Mr. Mathe also confirmed that on August 21, 2015, the Company sent a letter to a “then-Lancaster County Board of Supervisors Chairman Bellows explaining its position and rationale (attached as my Rebuttal Schedule 1) for rebuilding Line # 65 in an overhead configuration off of the bridge.”<sup>607</sup>

Mr. Mathe acknowledged concerns about the initial photo simulation used for the VMRC hearing on July 28, 2015, and solicited another vendor in May 2016 to compile new simulations.<sup>608</sup> Mr. Mathe maintained “The Company’s willingness to hire a second vendor in response to the community’s questions and concerns regarding the [Rebuild Project] photo simulations shows its commitment to providing the most accurate and complete information available at the time.”<sup>609</sup> Mr. Mathe noted that the Company has received no complaints regarding the new simulations.<sup>610</sup>

Mr. Mathe disagreed with Mr. Bellows’ testimony that the Company’s postcard mailing regarding the visual simulations is an example of Dominion Energy’s obfuscation of facts, and stated that the mailing was an attempt to correct the Company’s unintended error of displaying a simulation of an earlier version of the Rebuild Project.<sup>611</sup> Mr. Mathe responded to criticism by Mr. Bellows regarding the 2 inch x 2 inch newspaper public notice for the Rebuild Project by pointing out that the referenced notice related to the proceeding before VMRC and was produced and placed by VMRC.<sup>612</sup> Mr. Mathe argued that “[t]he Company’s public engagement and notification process for this [Rebuild Project] has been expansive and thorough.”<sup>613</sup>

In regard to the testimony of Coalition witness Szyperski concerning the large portion of the population of the Northern Neck living below the poverty line, Mr. Mathe testified that experience with the Company’s EnergyShare Program (“EnergyShare”) is consistent with Mr. Szyperski’s testimony.<sup>614</sup> Mr. Mathe emphasized that the underground solutions have a rate

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<sup>604</sup> *Id.* at 3.  
<sup>605</sup> *Id.*  
<sup>606</sup> *Id.* at 4.  
<sup>607</sup> *Id.*  
<sup>608</sup> *Id.* at 5.  
<sup>609</sup> *Id.* at 6.  
<sup>610</sup> *Id.*  
<sup>611</sup> *Id.* at 7.  
<sup>612</sup> *Id.* at 8.  
<sup>613</sup> *Id.*  
<sup>614</sup> *Id.* at 10.

increase more than three times greater than the Company's Proposed 115 kV Overhead Route for a residential customer using 1,000 kWh per month.<sup>615</sup>

**Carlo Stark** responded to testimony presented by Lancaster County witness Bellows regarding visual simulations.<sup>616</sup> Mr. Stark clarified that his testimony was limited to the visual simulations produced by Truescape in May of 2016 and filed as part of Dominion Energy's Supplemental Alternatives Analysis.<sup>617</sup> Mr. Stark testified that his simulations are TrueView™ photo simulations designed to represent the "Primary Human Field of View" that would be seen if standing 19.7 inches back from actual photo point position.<sup>618</sup> Mr. Stark affirmed that the full size simulations are approximately 21 inches by 59 inches and are designed to "completely fill your field of view with the same view you would see at the actual photo point position."<sup>619</sup>

Mr. Stark noted Mr. Bellows criticism of earlier photo simulations that failed to depict the proposed fender system and affirmed that Truescape's TrueView™ simulations all include the original fender system.<sup>620</sup> Mr. Stark advised that there was not sufficient time to update photo simulations to show the Company's alternative SK5 fender system.<sup>621</sup> Based on the SK5 fender system being similar in height and shorter in length, Mr. Stark argued that it "would very likely be of less visual presence than the original fender system shown . . . ."<sup>622</sup>

Mr. Stark referred to Mr. Bellows' testimony that "Truescapes" presented by the Company had numerous errors and omissions brought to Dominion Energy but remain to this date.<sup>623</sup> Mr. Stark maintained that Mr. Bellows incorrectly uses the term "Truescape" to refer to earlier photo simulations, and not the Truescape's TrueView™ photo simulations.<sup>624</sup>

**Robert B. Smith** presented testimony on the design of the original and SK5 fender systems.<sup>625</sup> Mr. Smith reported that there are approximately 30 barges per year that traverse the Rappahannock River channel with about a 0.04% probability of striking one of the two transmission towers crossing the channel per year, or about a 2% chance of a collision occurring over a 50-year period.<sup>626</sup> Mr. Smith maintained that if a transmission tower foundation system is struck by a barge, "there is a high probability that the line would be out-of-service resulting in a very long unplanned outage period needed to make necessary repairs or replacements to damaged components of the line and its support system."<sup>627</sup>

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<sup>615</sup> *Id.* at 11.  
<sup>616</sup> Exhibit No. 94, at 2.  
<sup>617</sup> *Id.* at 3.  
<sup>618</sup> *Id.* at 4.  
<sup>619</sup> *Id.*  
<sup>620</sup> *Id.* at 7.  
<sup>621</sup> *Id.*  
<sup>622</sup> *Id.*  
<sup>623</sup> *Id.*; Exhibit No. 40, at 6-7.  
<sup>624</sup> Exhibit No. 94, at 7.  
<sup>625</sup> Exhibit No. 97, at 2.  
<sup>626</sup> *Id.* at 2-3.  
<sup>627</sup> *Id.* at 4.

Mr. Smith described the fenders as originally proposed as follows:<sup>628</sup>

The [two] fenders are approximately 169 feet long (measured by curved length) and rise approximately 9 feet above the water. Each fender is comprised of one 48-inch and seventeen 32-inch diameter fiberpiles, with five fiberwales bolted to the piles.

Mr. Smith testified that based on public witness testimony concerning the overall size of the proposed fender system, Dominion Energy offered an alternative SK5 fender system.<sup>629</sup> Mr. Smith stated that the SK5 fender system is moved closer to the transmission structures, which permits a reduction in the curved length to approximately 92 feet and 120 feet long.<sup>630</sup> Mr. Smith confirmed that the SK5 fender system would still rise approximately 9 feet above the water, but would cost approximately \$2.2 million less than the original fender system.<sup>631</sup> In addition, Mr. Smith noted that the minimum horizontal clearance between the fenders increases to approximately 720 feet as compared to the original fender system's minimum horizontal clearance of approximately 680 feet.<sup>632</sup>

Mr. Smith advised that both fender system provide equivalent protection, but the original fender system provides space for Dominion Energy vessels to operate between the fender and the transmission structure to perform maintenance, and more coverage on the upstream side.<sup>633</sup>

Finally, Mr. Smith noted that Dominion Energy does not always propose installing a fender system at channel crossing transmission line structures as such decisions are made on a case-by-case basis.<sup>634</sup>

**Robert M. Cumming, Jr.** provided estimated sailing angles relative to the geometry of the original and SK5 fender systems.<sup>635</sup> Mr. Cumming provided diagrams representing the worst case scenario for a sailing boat traveling upriver with the wind coming from the northwest, blowing perpendicular to the bridge.<sup>636</sup> Mr. Cumming testified that the drawings illustrate "a sailboat approaching the fender system from the left and right sides of the channel, tacking and approaching the bridge at angles between 30 and 60 degrees."<sup>637</sup> Mr. Cumming stated that "[t]hese angles represent tacking angles most representative of sailing vessels . . . ."<sup>638</sup>

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<sup>628</sup> *Id.* at 6; Exhibit No. 8 at Appendix Attachment II.A.3.m.

<sup>629</sup> *Id.*; Attached Rebuttal Schedule 1.

<sup>630</sup> *Id.*

<sup>631</sup> *Id.* at 6-7.

<sup>632</sup> *Id.* at 7.

<sup>633</sup> *Id.*

<sup>634</sup> *Id.* at 8.

<sup>635</sup> Exhibit No. 98, at 1.

<sup>636</sup> *Id.* at 2.

<sup>637</sup> *Id.*

<sup>638</sup> *Id.*

Susan A. Kessler responded to the alleged sailing difficulties caused by the Rebuild Project and the original fender system.<sup>639</sup> Ms. Kessler stated that she has sailed on the Rappahannock River under the Norris Bridge many times.<sup>640</sup> Ms. Kessler advised that “[i]f you are sailing a boat larger than 30 feet, it is likely that your mast is higher than 50 feet and you will need to pass under the center span [of the bridge].”<sup>641</sup> Ms. Kessler described sailing under the Norris Bridge as follows:<sup>642</sup>

As the boat sails toward the bridge, you adjust your course and trim your sails to maintain your preferred sailing angle. Once you enter the channel, it is a matter of tacking your boat through the center span. Sailing anywhere from 30 degrees to 60 degrees to windward, this can be done in one tack. And, although we prefer to sail, sailboats also have engines; so if a skipper is concerned about sailing underneath the Norris Bridge, he can always turn on the “Iron Genny” and motor or motor sail until he feels confident resuming sail power.

Ms. Kessler agreed that the illustrations presented by Mr. Cummings show that a sailboat can clear the tower fenders and bridge with a single tack.<sup>643</sup> As for a novice sailor, Ms. Kessler acknowledged that he may have to tack twice or turn on his motor.<sup>644</sup>

Ms. Kessler disagreed with Coalition witness Sanders that the Rebuild Project’s towers and fenders would create a chute under the center span of the bridge leading to congestion and a higher probability of accidents.<sup>645</sup> Ms. Kessler pointed out that the bridge center span already is marked by lights and sailboats with masts less than 50 feet tall and power boats can pass under any span.<sup>646</sup>

As for Mr. Sanders’ warning that the Rebuild Project’s towers and fenders will alter the wind and tidal currents, creating additional hazards for boaters, Ms. Kessler acknowledged that a sailor might have to adjust the sails to stay on course, but maintained that “alter” is an overstatement.<sup>647</sup> In addition, Ms. Kessler generally disagreed with Mr. Sanders that the 9 foot tall fenders would obscure sight lines.<sup>648</sup> Ms. Kessler contended “that in most situations there would only be a very small blind spot for a relatively short period of time.”<sup>649</sup>

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<sup>639</sup> Exhibit No. 99, at 1.

<sup>640</sup> *Id.* at 2.

<sup>641</sup> *Id.* at 3.

<sup>642</sup> *Id.*

<sup>643</sup> *Id.* at 3-4.

<sup>644</sup> *Id.* at 4.

<sup>645</sup> *Id.*

<sup>646</sup> *Id.*

<sup>647</sup> *Id.* at 5.

<sup>648</sup> *Id.*

<sup>649</sup> *Id.*

While she took the position that the original fender design would not pose a hazard to navigation safety, Ms. Kessler testified that the alternative SK5 fender system, which increases the passageway between the fenders from 680 feet to 720 feet, gives sailors more room to navigate boats through the center span.<sup>650</sup> Ms. Kessler stated that the SK5 fender system would reduce, if not eliminate, the sight line concerns raised by Mr. Sanders.<sup>651</sup>

Finally, Ms. Kessler testified that to her knowledge there are no sailboat races that go under the Norris Bridge.<sup>652</sup> Ms. Kessler asserted.<sup>653</sup>

I do not see how 10 structures in the water (when there are 7 already) and a fender system around 2 of those structures with ample navigational distance between them will affect anyone's desire to come to the area or their enjoyment of a day on the Rappahannock River.

**Thomas W. Reitz** responded to the testimony of Lancaster County witness Lanzalotta concerning Dominion Energy's cost estimates for its Underground Option.<sup>654</sup> Mr. Reitz stated that the Company's Underground Option, among other things, involved HDD "to install pipes to contain underground electric cables, temporary construction of two in river platforms for drilling, pipe installation, cable pulling and cable splicing, and dredging large pits in the river bed to allow for burial of the completed splices from the temporary platforms."<sup>655</sup> Mr. Reitz also advised that the Company would install a 3500 kcmil copper HPFF cable insulated for 230 kV, but operated initially at 115 kV.<sup>656</sup> Mr. Reitz stated that the Underground Option would require a transition station on each side of the river crossing, and is estimated to cost approximately \$83.6 million.<sup>657</sup>

Mr. Reitz testified that the estimated underground construction costs for the Underground Option of \$22.2 million reasonably compared to the approximate cost-per-mile of \$9.1 million of the 2010 successful bid for the installation of a Hayes-Yorktown, adjusted for a 1% per year increase in labor costs.<sup>658</sup> As for material costs, Mr. Reitz stated that based on a February 2016 quote, the cable would cost approximately \$126 per foot, and require 88,600 feet of cable, for a total cost of approximately \$11.2 million.<sup>659</sup> Mr. Reitz estimated other costs as follows: (i) northern transition station approximately \$7.5 million; (ii) southern transition station \$1.9 million; (iii) Harmony Village Substation approximately \$360,000; (iv) sound barrier for

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<sup>650</sup> *Id.* at 5-6.

<sup>651</sup> *Id.* at 6.

<sup>652</sup> *Id.*

<sup>653</sup> *Id.*

<sup>654</sup> Exhibit No. 101, at 2.

<sup>655</sup> *Id.* at 2-3.

<sup>656</sup> *Id.* at 3.

<sup>657</sup> *Id.*

<sup>658</sup> *Id.*

<sup>659</sup> *Id.* at 4.



HDD approximately \$1 million; and (v) retirement of the overhead line approximately \$3.2 million.<sup>660</sup> Finally, Mr. Reitz applied the following markups:<sup>661</sup>

- Sales Tax (Material Virginia): 5.3%
- Billing Surcharge (DTECH Labor Costs): 12.08%
- Stock Material Surcharge: 6.5%
- Project Management Surcharge (Va Power, Contractor, and Construction Labor): 8.511%
- Project Management Surcharge (DTECH Labor): 23.853%
- AFUDC: 7%
- Contingency: 40%

In regard to Mr. Lanzalotta's estimated \$59.65 million to construct the Company's Underground Option if it were to be built and operated at 230 kV, Mr. Reitz pointed out that Mr. Lanzalotta relied upon the all-in per mile cost for Hayes-Yorktown of \$17.4 million, but that the main driver of differences between the actual cost for Hayes-Yorktown and the Company's estimate for the Underground Option is the line material costs that were \$19,232,526 for Hayes-Yorktown and are \$28,764,120 for the Underground Option.<sup>662</sup> More specifically, Mr. Reitz reported that the actual cost of the HPFF cables for Hayes-Yorktown was \$96 per foot, while the Company received cost estimates for such cable of \$166 per foot in August 2015, and \$126 per foot in February 2016.<sup>663</sup>

Mr. Reitz supported the use of a 40% contingency allowance based on the Company's experience with the Hayes-Yorktown project where actual costs were 36.4% over total conceptual estimate, and the Garrisonville underground project undertaken in 2009, which had actual costs 62% over the conceptual estimate.<sup>664</sup> Mr. Reitz agreed with the Commission's December 2014 report on underground transmission lines<sup>665</sup> that "underground construction is inherently subject to unpredictable circumstances and, therefore both underground transmission line construction costs and project schedules are highly variable, project dependent and more likely to exceed estimates."<sup>666</sup>

**Donald E. Koonce** testified concerning: (i) overhead versus underground, (ii) the Company's Underground Option, (iii) response to VDOT on Barnhardt Option 1, and (iv) response to Respondent testimony regarding Barnhardt Option 1.<sup>667</sup>

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<sup>660</sup> *Id.*

<sup>661</sup> *Id.*

<sup>662</sup> *Id.* at 5-6.

<sup>663</sup> *Id.* at 6.

<sup>664</sup> *Id.* at 7.

<sup>665</sup> *See Id.* Attached Rebuttal Schedule 4, Final Report on the Pilot Program to Place Certain Transmission Lines Underground.

<sup>666</sup> *Id.* at 15 of 20.

<sup>667</sup> Exhibit No. 104, at 2.

Mr. Koonce stated that of the 6,490 miles of transmission lines (69 kV and above) in the Dominion Energy transmission system, 98.72% is overhead construction.<sup>668</sup> Mr. Koonce asserted that “the Company has more experience with overhead construction and it is more reliable.”<sup>669</sup> In addition, Mr. Koonce maintained that overhead construction “involves far fewer ‘unknowns,’ is faster, less subject to cost overruns, and is less disruptive during the construction process.”<sup>670</sup>

Mr. Koonce advised that when the Company does construct underground transmission lines, it prefers HPFF.<sup>671</sup> Mr. Koonce noted that since 2009, Dominion Energy has used some XLPE with 230 kV installations, but “there has not yet been sufficient experience with XLPE to determine if these cables will withstand the test of time.”<sup>672</sup>

Mr. Koonce disagreed with Barnhardt witness Soleski and contended that HPFF cable installed with HDD within 3/8-inch walled pipe more than 40 feet below the river bottom is less likely to be damaged than XLPE cables buried three feet into the river bottom.<sup>673</sup> Mr. Koonce also disagreed with Mr. Soleski and maintained that XLPE cable was not significantly less expensive than pipe-type cable system and the Company’s experience with XLPE cables in its distribution system “has been less than what would be acceptable on the transmission system.”<sup>674</sup>

Mr. Koonce reviewed the “4C Database” of XLPE cable projects referred to by Coalition witness Ormesher and pointed out: (i) all but one of the projects were installed after Dominion Energy’s first 230 kV XLPE project in 2009; (ii) the Horns 2 project completed in 2010 experienced a cable failure on October 19, 2015, and was out of service until December 17, 2015; (iii) the Horns 3 project calls for cables to be buried 9.8-16.4 feet deep near the shoreline; (iv) there are about 10 incidents of submarine cables being damaged each year and repair time averages 100 days; and (v) in the last seven years, 90 underwater cable losses have resulted in costs in excess of € 350 million.<sup>675</sup>

Mr. Koonce disagreed with Lancaster County witness Lanzalotta and asserted that overhead transmission lines are more reliable than underground transmission lines from an outage duration perspective.<sup>676</sup> Mr. Koonce pointed to the Company’s overhead transmission lines serving the Outer Banks of North Carolina, which “were designed to withstand hurricane force winds and have survived multiple events without damage leading to extended outages.”<sup>677</sup>

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<sup>668</sup> *Id.* at 2-3.

<sup>669</sup> *Id.* at 3.

<sup>670</sup> *Id.*

<sup>671</sup> *Id.*

<sup>672</sup> *Id.* at 4.

<sup>673</sup> *Id.* at 6.

<sup>674</sup> *Id.*

<sup>675</sup> *Id.* at 7-8.

<sup>676</sup> *Id.* at 8.

<sup>677</sup> *Id.* at 8-9.

Indeed, for a failure of a HPFF cable system in a HDD river crossing, Mr. Koonce stated that such a cable system could not be repaired and would require a new installation.”<sup>678</sup>

Mr. Koonce noted that for both the Company’s Underground Option and Barnhardt Option 2, there will be significant noise disturbance associated with the HDD equipment, including the large “shakers” that are used to separate spoils from the drilling mud.<sup>679</sup> In addition, Mr. Koonce confirmed that there would be noise and dust from on-land duct bank excavation and construction.<sup>680</sup>

Mr. Koonce commented on the underwater 230 kV transmission cable project examples provided by Coalition witness Clarke.<sup>681</sup> In regard to the Cape Fear project, Mr. Koonce noted that the 230 kV HPFF cable system was installed as a backup circuit parallel to an existing overhead transmission line.<sup>682</sup> For the SMECO project, Mr. Koonce asserted that the project was initiated to replace an existing 69 kV submarine cable that was installed in 1993.<sup>683</sup> Mr. Koonce stated that the project included a temporary non-armored cable, followed by a new permanent armored submarine cable, with the temporary cable de-energized but left in place as a backup or spare.<sup>684</sup>

Mr. Koonce disagreed with Mr. Lanzalotta’s recommendation to install only one underground circuit or two smaller circuits, with the option of installing additional circuits in the future if additional capacity is needed.<sup>685</sup> Mr. Koonce maintained that such a recommendation is not consistent with long-term planning for long-lived assets and fails to consider the disruption associated with such an approach.<sup>686</sup> Furthermore, Mr. Koonce argued that comparing a less robust underground solution to a more robust overhead solution “is not an apples to apples comparison and unfairly penalizes the overhead option.”<sup>687</sup>

Mr. Koonce also disagreed with questions raised by Mr. Lanzalotta concerning the need for a seventh, or spare cable.<sup>688</sup> Mr. Koonce stated that Mr. Lanzalotta was wrong in describing the Company’s Underground Option as “two circuits” when it is one circuit with two cables per phase.<sup>689</sup> Mr. Koonce advised that “[i]f there is a failure in one of the two pipes containing all three phases, all components of the line between Harmony Village and the transition station on the Lancaster side of the river would trip.”<sup>690</sup> As for Mr. Lanzalotta’s comparison with the

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<sup>678</sup> *Id.* at 10.

<sup>679</sup> *Id.*

<sup>680</sup> *Id.* at 10-11.

<sup>681</sup> *Id.* at 11.

<sup>682</sup> *Id.*

<sup>683</sup> *Id.* at 11-12.

<sup>684</sup> *Id.* at 12.

<sup>685</sup> *Id.* at 15.

<sup>686</sup> *Id.*

<sup>687</sup> *Id.*

<sup>688</sup> *Id.* at 16.

<sup>689</sup> *Id.*

<sup>690</sup> *Id.*

Garrisonville line, a 230 kV underground installation without the seventh or spare cable, Mr. Koonce confirmed that the Garrisonville line is part of a “loop in, loop out” arrangement that is not available in this case.<sup>691</sup>

In regard to VDOT’s letter dated November 29, 2016, concerning Barnhardt Option 1, Mr. Koonce testified that for the “beam spans,” because of the weight of the transmission cables and the management of expansion and contraction due to thermal loading cycling of the cables because of changes in system loading, and due to the limited vertical space, a flat “1 x 8” arrangement was recommended.<sup>692</sup> Mr. Koonce emphasized that the cost of structural modifications to the bridge would have to be added to the overall project cost.<sup>693</sup> In addition, Mr. Koonce agreed with VDOT that the number of requests for de-energizing will only increase as the bridge ages and requires additional maintenance.<sup>694</sup>

Mr. Koonce testified that the reel and pulling machinery weigh approximately 48.5 tons, which exceeds the current bridge restriction of 45 tons.<sup>695</sup> Mr. Koonce stated that lighter weight equipment and pulling a single cable would further increase cost and increase the time for construction.<sup>696</sup> As for VDOT’s requirement for full access to the bridge for inspection, Mr. Koonce maintained that any inspection above the eight-inch conduits will be “difficult if not impossible.”<sup>697</sup>

Mr. Koonce responded to Lancaster County witness Matthews’ testimony regarding Barnhardt Option 1.<sup>698</sup> Mr. Koonce disagreed with Mr. Matthews’ testimony that appropriately insulated conduits could be used that would avoid the need to de-energize during VDOT bridge work.<sup>699</sup> Mr. Koonce pointed out that Mr. Matthews is not an electrical engineer and failed to provide specific information in discovery the kind of cable or conduit he is referring to.<sup>700</sup> Mr. Koonce acknowledged that Mr. Matthews’ proposal for using additional longitudinal beams to solve the bridge loading reductions “may possibly work, but it comes at a price.”<sup>701</sup> However, Mr. Koonce advised that such an approach would not be possible in the beam and girder sections of the bridge and the underground cable cannot be suspended from overhead line structures in the river.<sup>702</sup> Mr. Koonce stated that the insulated cable is significantly heavier and larger in diameter than an overhead conductor and would cause the proposed H-frame structures to fail.<sup>703</sup>

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<sup>691</sup> *Id.* at 16-17.  
<sup>692</sup> *Id.* at 18.  
<sup>693</sup> *Id.* at 19.  
<sup>694</sup> *Id.*  
<sup>695</sup> *Id.* at 21.  
<sup>696</sup> *Id.*  
<sup>697</sup> *Id.* at 22.  
<sup>698</sup> *Id.*  
<sup>699</sup> *Id.*  
<sup>700</sup> *Id.* at 22-23.  
<sup>701</sup> *Id.* at 24.  
<sup>702</sup> *Id.* at 24-25.  
<sup>703</sup> *Id.* at 26.

In addition, Mr. Koonce contended that Mr. Matthews' recommendation for three separate cables pulled into a common conduit, may be found in distribution application, but is not found in transmission voltage XLPE cable installations because: (i) this configuration increases mutual heating effects, which reduces cables' ability to transfer power; (ii) a fault on one phase may damage additional cables; (iii) replacement of a damaged cable becomes more difficult and costly; and (iv) the failure of one cable in either common conduit would result in a complete outage.<sup>704</sup>

Mr. Koonce disagreed with Mr. Matthews' estimated cost of \$29 million for his Matthews Bridge Option.<sup>705</sup> Mr. Koonce testified that Mr. Matthews used PDC estimates to arrive at "per foot" and "per H-tower" costs, and applied his own overheads and adders.<sup>706</sup> Mr. Koonce pointed out that Mr. Matthews failed to include costs for the removal of the existing overhead line and substation work.<sup>707</sup> Mr. Koonce contended that some of the components of Mr. Matthews' estimates were extremely understated, such as his estimate of \$5,113.33 for traffic control on the bridge for one month, as compared to actual costs of \$2,600 for traffic control for a single lane for a partial day in August 2016.<sup>708</sup> Mr. Koonce affirmed that PDC developed a reliable cable configuration and then sought input from domestic cable manufactures and underground transmission line contractors.<sup>709</sup>

Mr. Koonce revised his estimated cost to construct Barnhardt Option 1 to \$43.2 million, exclusive of any additional costs from VDOT, to reflect the use of a smaller conductor, which reduces cost by \$1.56 million.<sup>710</sup> Mr. Koonce advised that this change also reduces the overall system weight loading by 41.3 pounds per foot, or a revised total loading of the cable system of 141.4 pounds per foot.<sup>711</sup>

**Peter L. Tirinzoni, P.E.**, testified in support of PDC's conceptual design and analysis of Barnhardt Option 2.<sup>712</sup> Mr. Tirinzoni addressed: (i) XLPE cable experience; (ii) trenching considerations for transmission cables; and (iii) Soleski and Staff variations for Barnhardt Option 2.<sup>713</sup>

In regard to Barnhardt witness Soleski's testimony that he is not aware of any failure or any time his company's underground cables have required replacement under warranty, Mr. Tirinzoni pointed out that Mr. Soleski's company, Kerite, produces cables insulated with ethylene propylene rubber ("EPR") and not XLPE cables.<sup>714</sup> Mr. Tirinzoni testified about his

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<sup>704</sup> *Id.* at 26-27.

<sup>705</sup> *Id.* at 27.

<sup>706</sup> *Id.*

<sup>707</sup> *Id.*

<sup>708</sup> *Id.*

<sup>709</sup> *Id.* at 28.

<sup>710</sup> *Id.* at 29.

<sup>711</sup> *Id.*

<sup>712</sup> Exhibit No. 115, at 1.

<sup>713</sup> *Id.* at 2.

<sup>714</sup> *Id.* at 2-3.

own experience with two XLPE cable failures and agreed “that there are manufacturing concerns and a lack of operating history that make the cables riskier than more time-proven options.”<sup>715</sup>

Mr. Tirinzoni maintained that a three-foot trench burial depth in the soft mud of the Rappahannock River offers very little protection to the submarine cables.<sup>716</sup> Mr. Tirinzoni noted that Dominion Energy buried distribution cables across the Rappahannock River near Tappahannock at a depth of six feet.<sup>717</sup> In response to Mr. Soleski’s testimony that there is little difference between the trenching for a transmission line and other types of lines, Mr. Tirinzoni acknowledged that the process was similar, but argued that there is significant difference in the equipment and risks.<sup>718</sup> Mr. Tirinzoni advised that the XLPE cable must be installed in a lead sheath, which increases the weight and diameter of an XLPE transmission cable over a distribution cable, and requires the use of larger and more expensive equipment.<sup>719</sup> In addition, Mr. Tirinzoni stated that “because of the risks involved, transmission voltage submarine cable manufacturers typically self-install their product rather than have a customer hire their own marine contractor, which also adds to the cost.”<sup>720</sup> Mr. Tirinzoni pointed out that the laying of transmission voltage cables require: (i) large capacity cranes to lift heavy drums or baskets of cables from the delivery ship to the cable laying vessel; (ii) a large radius laying chute and special tension control equipment; (iii) the laying vessels to be outfitted with dynamic positioning thrusters and controls; (iv) remotely operated vehicle touchdown monitoring; and (v) deeper trenches.<sup>721</sup>

In assessing the variations of Barnhardt Option 2 proposed by Mr. Soleski and Staff, Mr. Tirinzoni maintained that the minimum burial depth should be six feet based on the bottom conditions of the Rappahannock River near the Norris Bridge, and that there needs to be 75 feet between trenches to allow for the loop of excess cable that would result from a potential repair and to protect adjacent cables during the laying process.<sup>722</sup> Mr. Tirinzoni addressed Soleski Variation 1, Soleski Variation 2, Soleski Variation 3, Soleski Variation 4, and Staff Variation 1.<sup>723</sup>

Mr. Tirinzoni contended that placing three individual XLPE submarine cables in the same trench offered no benefit over a single three-core XLPE submarine cable, and required each individual cable to be armored.<sup>724</sup> Thus, Mr. Tirinzoni found no engineering or practical justifications for installing three single-core cables in a common trench and therefore did not attempt a conceptual cost estimate for Soleski Variation 2 and Soleski Variation 4.<sup>725</sup>

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<sup>715</sup> *Id.* at 3.

<sup>716</sup> *Id.* at 4.

<sup>717</sup> *Id.* at 5.

<sup>718</sup> *Id.*

<sup>719</sup> *Id.* at 6.

<sup>720</sup> *Id.*

<sup>721</sup> *Id.* at 8.

<sup>722</sup> *Id.* at 9-10.

<sup>723</sup> *Id.* at 10-12.

<sup>724</sup> *Id.* at 10-11.

<sup>725</sup> *Id.* at 11-12.

Mr. Tirinzoni estimated capacity and total cost of Soleski Variation 1, Soleski Variation 3, and Staff Variation 1 as follows:

Variation	Capacity		Total Costs
	At 115 kV	At 230 kV	
Soleski Variation 1 <sup>726</sup>	149 MVA	299 MVA	\$71.38 million
Soleski Variation 3 <sup>727</sup>	299 MVA	598 MVA	\$95.89 million
Staff Variation 1 <sup>728</sup>	149 MVA	299 MVA	\$83.10 million

Mr. Tirinzoni disagreed with Mr. Soleski’s rating values for Soleski Variation 2 and noted that the specifications used by Mr. Soleski do not reflect his proposed installation and operating conditions.<sup>729</sup>

Mr. Tirinzoni emphasized that all of the variations of Barnhardt 2 offered by Mr. Soleski and Staff offer less capacity than parts of the existing Line # 65 and “will need to be supplemented sometime in the future.”<sup>730</sup> Mr. Tirinzoni also pointed out that, among other things, all of his cost estimates are based on conceptual cost quotations from LS Cable & Systems, which manufactures submarine XLPE cable.<sup>731</sup>

Mr. Tirinzoni disagreed with Mr. Soleski’s cost estimates because they appeared to be based on the costs of distribution projects and because Mr. Soleski failed to provide supporting details.<sup>732</sup> Mr. Tirinzoni supported the Company’s cost estimates by providing information on project undertaken by Vermont Electric Power Company to install 1.8 miles of XLPE submarine cable rated at 230 kV and operated at 115 kV in Lake Champlain by the end of 2017 (“PV20 Project”).<sup>733</sup> Mr. Tirinzoni reported that the PV20 Project is estimated to cost \$91.6 million, including the cost of cable installation estimated to be \$68.3 million.<sup>734</sup>

As for construction duration, Mr. Tirinzoni agreed with Mr. Soleski that it is possible to lay and bury 10,000 feet of three-core cable in a week, but stated that it was not possible to lay and bury seven single-core cables in one week, which is the Company’s design for Barnhardt Option 2.<sup>735</sup> In addition, Mr. Tirinzoni estimated that the drilling of the HDD bore holes would take approximately one week per bore hole, or approximately four months to complete all fourteen boreholes for the Company’s design for Barnhardt Option 2, including contractor set-up and breakdown.<sup>736</sup>

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<sup>726</sup> *Id.* at 10.  
<sup>727</sup> *Id.* at 11-12.  
<sup>728</sup> *Id.* at 12-13.  
<sup>729</sup> *Id.* at 13.  
<sup>730</sup> *Id.*  
<sup>731</sup> *Id.* at 15.  
<sup>732</sup> *Id.* at 16.  
<sup>733</sup> *Id.* at 17-18.  
<sup>734</sup> *Id.* at 19.  
<sup>735</sup> *Id.* at 20.  
<sup>736</sup> *Id.*

Mr. Tirinzoni responded to Staff's conclusion that any of the Barnhardt Option 2 Variations would be reasonable alternatives if they could be constructed in a reliable manner and at a cost comparable to the Company's Overhead Alternatives.<sup>737</sup> Mr. Tirinzoni testified that none of the Barnhardt Option 2 Variations can be constructed at a cost comparable to the Company's Overhead Alternatives.<sup>738</sup> Mr. Tirinzoni also noted that the Company's design for Barnhardt Option 2 is the most reliable variation for Barnhardt Option 2, but the Overhead Alternatives are more reliable than the underground options.<sup>739</sup>

**Amanda M. Mayhew** addressed: (i) navigation impacts, (ii) mischaracterization of the Rebuild Project, (iii) rejection of Barnhardt Option 1, (iv) additional permitting requirements, and (v) recommendations in the DEQ Reports.<sup>740</sup>

Ms. Mayhew disagreed with Coalition witness Sanders' statement that Dominion Energy undertook the Rebuild Project without consulting any agency responsible for boating safety, and pointed to a JPA filed with the Corps and VMRC.<sup>741</sup> Ms. Mayhew affirmed that "neither agency raised specific concerns at that time regarding navigation impacts."<sup>742</sup> Ms. Mayhew noted that if an overhead alternative is approved for the Rebuild Project, the Company will be required to file a Private Aids to Navigation application with the Coast Guard concerning the lighting and marking of the structures and fender system for boating safety.<sup>743</sup>

In response to criticism by Lancaster County witness Bellows regarding notice and visual renderings of the Rebuild Project, Ms. Mayhew stressed that for the VMRC permitting process, VMRC provides the public notice.<sup>744</sup> Ms. Mayhew emphasized that VMRC did not receive any protests from property owners adjacent to the Proposed 115 kV Overhead Route.<sup>745</sup> In addition, Ms. Mayhew disagreed with Coalition witness Clarke that Dominion Energy mischaracterized the Rebuild Project and provided misleading information to agencies, and quoted from the executive summary of the JPA to demonstrate the clarity of the information provided by the Company.<sup>746</sup> Ms. Mayhew acknowledged that DCR changed its recommendation to favor Barnhardt Option 1, but contended that this option should be rejected because: (i) this option will not resolve issues related to safety operational performance and NERC Reliability Standards; (ii) as reported by DEQ, this option is undesirable due to its direct impacts to wetlands; and (iii) this option would require significantly more land disturbance than the Overhead Alternatives.<sup>747</sup>

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<sup>737</sup> *Id.* at 21.

<sup>738</sup> *Id.*

<sup>739</sup> *Id.* at 21-22.

<sup>740</sup> Exhibit No. 128, at 2.

<sup>741</sup> *Id.* at 3.

<sup>742</sup> *Id.*

<sup>743</sup> *Id.* at 4.

<sup>744</sup> *Id.*

<sup>745</sup> *Id.*

<sup>746</sup> *Id.* at 5.

<sup>747</sup> *Id.* at 6.



Ms. Mayhew affirmed that the types of permitting and agency review associated with the Barnhardt Option 2 Variations would be similar to the required permitting and agency review of the Company's Barnhardt Option 2, with the possible exception that Soleski Variation 1 and Soleski Variation 2 concerning the vacation of the Baylor Grounds.<sup>748</sup> Ms. Mayhew advised that Soleski Variation 1 and Soleski Variation 2 can be installed within the 80-foot easement already permitted by VMRC, reducing permitting time and eliminating the need for further legislative action.<sup>749</sup> Ms. Mayhew agreed with Staff that an additional 5.19 acres of Baylor Grounds would need to be vacated for the Underground Option and up to an additional 72.79 acres of Baylor Grounds would need to be vacated for Barnhardt Option 2, Soleski Variation 3, Soleski Variation 4, and Staff Variation 1.<sup>750</sup>

Ms. Mayhew also agreed with Staff that the Proposed 115 kV Overhead Route would be built within either existing right-of-way or authorized and approved right-of-way, while the 230 kV Overhead Alternative, the Underground Option, and Barnhardt Option 2 would require right-of-way not authorized and approved.<sup>751</sup> Ms. Mayhew advised that the Baylor Grounds would not need to be "re-vacated," and would not require further action through the General Assembly.<sup>752</sup> Ms. Mayhew partially agreed with Staff that Dominion Energy will need to obtain new Corps approval if the Rebuild Project does not commence by March 18, 2017, but maintained that "if the Company is able to obtain a Commission Final Order by no later than June 30, 2017, to construct the Rebuild Project, the Company believes it would be able to complete construction of the Rebuild Project by the PJM energization date of December 30, 2017, under the current [Nationwide Permit 12 ("NWP 12")]."<sup>753</sup>

In response to the DEQ Reports, Ms. Mayhew noted that the Second DEQ Report has the recommendation from the DEQ Office of Wetlands and Stream Protection to avoid and minimize impact to wetlands and waters if either Barnhardt Option 1 or Barnhardt Option 2 is chosen.<sup>754</sup> Ms. Mayhew stated that while the Company does not support these options, they are designed to impact the minimum amount of wetlands.<sup>755</sup> Ms. Mayhew disagreed with DCR's recommendation for the selection of Barnhardt Option 1 because the Company does not support Barnhardt Option 1.<sup>756</sup> Finally, Ms. Mayhew disagreed with VOF's recommendation that if either of the Overhead Alternatives is chosen that the Company further coordinate with VOF to minimize visual impacts.<sup>757</sup> Ms. Mayhew argued that the only VOF property in view of the Norris Bridge is approximately 7,000 feet south of the bridge, the towers are already at their

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<sup>748</sup> *Id.* at 7.

<sup>749</sup> *Id.*

<sup>750</sup> *Id.* at 8.

<sup>751</sup> *Id.*

<sup>752</sup> *Id.*

<sup>753</sup> *Id.* at 10.

<sup>754</sup> *Id.*

<sup>755</sup> *Id.* at 10-11.

<sup>756</sup> *Id.* at 11.

<sup>757</sup> *Id.*

minimum allowable clearance, and would be “barely visible from that single VOF property.”<sup>758</sup> Therefore, Ms. Mayhew stated that “the Company would not agree to [VOF’s] recommendation.”<sup>759</sup>

**Benjamin W. Sussman** addressed concerns raised by Respondents regarding the visual impacts of the Rebuild Project. In response to comments that an overhead alternative would have negative impacts on the natural beauty of the Rappahannock River, Mr. Sussman maintained: (i) neither the Norris Bridge, Route 3, nor the Rappahannock River in this location has any state or federal scenic designation;<sup>760</sup> (ii) the overall appearance of the proposed towers “would not be meaningfully different from the existing towers;”<sup>761</sup> (iii) “the proposed transmission lines and towers would be minimally visible from most observation points other than those on or close to the bridge;”<sup>762</sup> (iv) marine businesses, such as vessel maintenance facilities and fuel docks could be considered “industrial” and are inconsistent with a “pristine” aesthetic environment;<sup>763</sup> (v) several other bridges that carry state or national scenic byways or cross federally designated scenic rivers, trails or parks, have collocated transmission lines;<sup>764</sup> and (vi) the Company’s Underground Option, Barnhardt Option 1, and Barnhardt Option 2 would “change the viewshed by removing existing structures and constructing a transition station on each side of the river.”<sup>765</sup> Mr. Sussman acknowledged that there will be incremental visual impacts resulting from the Overhead Alternatives, but pointed out that there is an existing transmission line in this area and that the other alternative all have visual impacts.<sup>766</sup>

**Jon M. Berkin** addressed: (i) impacts of underground/trenching versus overhead; (ii) environmental assessments of Barnhardt Option 2 Variations; (iii) routing considerations; and (iv) Harmony Village Substation work.<sup>767</sup>

Mr. Berkin disagreed with Barnhardt witness Soleski’s statement that there are no significant advantages that would make an all HDD crossing of the Rappahannock River preferable to a primarily trenching crossing.<sup>768</sup> Mr. Berkin maintained that the primarily trenching crossing will result in greater environmental impacts than the all HDD crossing.<sup>769</sup> Mr. Berkin testified that on the Middlesex County side, the Company’s Underground Option, using all HDD, would have no impact on wetlands, while the Company’s Barnhardt Option 2 would result in the temporary impact (during construction) of up to 0.46 acre of wetland, and

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<sup>758</sup> *Id.*

<sup>759</sup> *Id.*

<sup>760</sup> Exhibit No. 129, at 3.

<sup>761</sup> *Id.*

<sup>762</sup> *Id.* at 4.

<sup>763</sup> *Id.*

<sup>764</sup> *Id.* at 4-5.

<sup>765</sup> *Id.* at 5.

<sup>766</sup> *Id.* at 6.

<sup>767</sup> Exhibit No. 132, at 2.

<sup>768</sup> *Id.*

<sup>769</sup> *Id.* at 3.

approximately 0.1 acre of beach.<sup>770</sup> Mr. Berkin advised that the amount of sedimentation re-suspended within the Rappahannock River during construction would be “far greater” for Barnhardt Option 2 than for the Underground Option.<sup>771</sup> Mr. Berkin also noted that Barnhardt Option 1 and Barnhardt Option 2 would require a permit due to impacts to State Waters.<sup>772</sup>

Mr. Berkin testified that the Overhead Alternatives will require between 0.0 and 0.07 acres of new permanent right-of-way, while the Underground Option will require 4.29 acres, Barnhardt Option 1 will require 4.04 acres and Barnhardt Option 2 will require 3.5 acres of new permanent right-of-way.<sup>773</sup> Mr. Berkin stated that the duct bank associated with Barnhardt Option 1 and Barnhardt Option 2 will require trenching through wetlands.<sup>774</sup> As for river bottom disturbance, Mr. Berkin reported acres of disturbance, resuspension of sediment, and right-of-way across the river as follows:<sup>775</sup>

Option	Disturbance	Resuspension	Right-of-Way
Overhead Alternatives	0.1 Acres	10.7 cubic yards	80' wide, 200' at the fenders
Underground Option	6.0 Acres	2,677 cubic yards	100' wide and two 3.0 acre split locations
Barnhardt Option 1	0.0 Acres	0.0 cubic yards	None
Barnhardt Option 2	3.0 Acres	17,686 cubic yards	780' wide

Mr. Berkin contended that construction of the Overhead Alternatives would have no negative impact on the local oyster or artisan industries.<sup>776</sup> In addition, Mr. Berkin noted the added noise and construction traffic associated with HDD construction and with trenching operations.<sup>777</sup>

**Paul B. Haynes** provided the estimated customer rate impacts of the Rebuild Project for the Proposed 115 kV Overhead Route, Underground Option, Barnhardt Option 1, and Barnhardt Option 2.<sup>778</sup> For a residential customer using 1,000 kilowatt hours (“kWh”) per month, Mr. Haynes provided the following estimates based on rates in effect as of January 1, 2017:<sup>779</sup>

<sup>770</sup> *Id.*

<sup>771</sup> *Id.* at 4.

<sup>772</sup> *Id.*

<sup>773</sup> *Id.* at 4-5.

<sup>774</sup> *Id.* at 5.

<sup>775</sup> *Id.* at 6.

<sup>776</sup> *Id.* at 7.

<sup>777</sup> *Id.* at 8-9.

<sup>778</sup> Exhibit No. 100, at 2.

<sup>779</sup> *Id.* at 4; Attached Revised Rebuttal Schedule 2.

Rebuild Project	1/1/2017	Increase	Total	Percentage
Proposed 115 kV Overhead Route	\$111.76	\$0.06	\$111.82	0.05%
Underground Option	\$111.76	\$0.19	\$111.95	0.17%
Barnhardt Option 1 <sup>780</sup>	\$111.76	\$0.10	\$111.86	0.09%
Barnhardt Option 2	\$111.76	\$0.23	\$111.99	0.21%

### Public Hearing – March 15, 2017

On March 15, 2017, a public hearing solely for the purpose of receiving testimony from public witnesses was convened in the Commission's courtroom in Richmond, Virginia. Three public witnesses presented testimony. The testimony of each witness is summarized below.

**Andy Hall** of Reedville, Virginia, spoke on behalf of Omega Protein, a leading producer of omega-3 fish oil, in favor of the 115 (kV) rebuild across the Rappahannock at Norris Bridge.<sup>781</sup> Mr. Hall stated Omega Protein depends on reliable electrical power from the Company. If there is an interruption of power, which currently does not happen often, it can negatively affect the business. Upon cross-examination Mr. Hall stated the plant is run by computers that are sensitive to voltage drops. These computers will shut down if they sense a voltage drop, which affects the whole system.<sup>782</sup> Mr. Hall stated Omega Protein operates seven vessels ranging in size from 188 feet to 220 feet.<sup>783</sup> These vessels operate in Portsmouth, the Chesapeake Bay, the ocean and up to the Norris Bridge. He stated their vessels never drop anchor around the bridge, nor has he seen any other vessels anchor within 100 feet of the bridge.<sup>784</sup>

**Roy Carter** of White Stone, Virginia, spoke against placing the towers over the Rappahannock River.<sup>785</sup> Mr. Carter stated before moving to the Northern Neck, he was a retail merchant in Richmond. He spoke nationally about how to bring customers to retail businesses. When giving these presentations, Mr. Carter stated the merchant had to use all five senses, and of the five, vision is 80 percent of a customer's perception. Mr. Carter maintains that the same holds true for the tourist visiting the Northern Neck. He believes if the towers are built, the visual impact will have a very real and negative effect on tourism, which is the largest revenue generator in the area.<sup>786</sup>

**Joy Gwaltney**, who is a professional photographer from White Stone, Virginia, spoke about the photo simulations provided by TrueView of the existing and proposed power lines.<sup>787</sup>

<sup>780</sup> Does not include any costs associated with strengthening the Norris Bridge, which VDOT estimated to cost \$25 to \$35 million.

<sup>781</sup> Hall, Tr. at 330-31.

<sup>782</sup> *Id.* at 333.

<sup>783</sup> *Id.* at 334.

<sup>784</sup> *Id.* at 334-35.

<sup>785</sup> R. Carter, Tr. at 336-37.

<sup>786</sup> *Id.* at 336-41.

<sup>787</sup> Gwaltney, Tr. at 345

As a professional, Ms. Gwaltney stated TrueView did an excellent job.<sup>788</sup> However, she raised concerns about TrueView’s claim that the simulations “represent[ ] the primary human field of view.”<sup>789</sup> She claims that “anyone behind the camera knows that the camera just can’t do it. It cannot take what the eye can see.”<sup>790</sup> Ms. Gwaltney stated there is a pattern of taking the pictures on a cloudy day which starts on page four of the photo simulations. Cloudy days create a color issue. On cloudy days everything takes on a gray, blue hue. Because of this, the power lines and the towers recede in the simulation. Ms. Gwaltney indicated that if the simulations were done on a sunny day, the power lines and towers would not recede. “In daylight they will gleam, they will glisten.”<sup>791</sup>

### Public Hearing – April 18, 2017

On April 18, 2017, a public hearing on this matter was held in the Commission’s courtroom in Richmond, Virginia. In addition to opening statements, and the presentation of the Company’s direct and supplemental testimony, three public witnesses presented testimony. The testimony of each witness is summarized below.

**Martha H. Little** of VOF stated that VOF was established to promote the preservation of open-space lands.<sup>792</sup> Ms. Little disagreed with Company witness Mayhew’s testimony that there is only one VOF property in view of the Norris Bridge from which the towers of the Proposed 115 kV Overhead Route would be barely visible. Ms. Little maintained that there are at least two VOF easements within view of the Norris Bridge and that the protected view is by the traveling public from the bridge.<sup>793</sup> Ms. Little asserted that the proposed towers would impede the “currently unimpeded view of Parrot’s Island, which is an easement of VOF.”<sup>794</sup> Ms. Little also pointed out that the Rappahannock River was listed as number five in America’s Most Endangered Rivers 2017.<sup>795</sup>

**Ralph Higgins** of Richmond, Virginia, testified that he is a landscape architect and is concerned about stewardship.<sup>796</sup> Mr. Higgins referred to the Rappahannock crossing as the gateway to the Northern Neck and Middle Peninsula, and argued that the impact of this matter is regional. Mr. Higgins contended that “the high-voltage transmission lines located on the elevated towers beside the [Norris Bridge] represent a substantial failure of the Commonwealth of Virginia’s obligation to its citizens for cultural sustainability and, to a larger extent, all of our responsibility for good stewardship.”<sup>797</sup>

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<sup>788</sup> *Id.* at 345-46.

<sup>789</sup> *Id.* at 346.

<sup>790</sup> *Id.*

<sup>791</sup> *Id.* at 347-48.

<sup>792</sup> Little, Tr. at 424.

<sup>793</sup> *Id.* at 425.

<sup>794</sup> *Id.*

<sup>795</sup> *Id.* at 429-30; Exhibit No. 1.

<sup>796</sup> Higgins, Tr. at 446.

<sup>797</sup> *Id.* at 449.

**Pete Mansfield**, a supervisor with Middlesex County, emphasized that Middlesex County is “arm in arm” with Lancaster County.<sup>798</sup> Mr. Mansfield testified that this case is important economically.

It’s important for us just when we go out and really are to enjoy ourselves, being able to see the beautiful vista without these ugly towers.<sup>799</sup>

### Public Hearing – April 24, 2017

On April 24, 2017, the final public hearing on this matter was held in the Commission’s courtroom in Richmond, Virginia. Marcie Parker, district administrator of the Fredericksburg District for VDOT; and Annette Adams, district bridge engineer for the Fredericksburg District for VDOT, appeared as public witnesses. The testimony of each witness is summarized below.

**Marcie Parker** testified that although the Norris Bridge has a low traffic count of less than 9,000 vehicles a day, VDOT is conducting a construction feasibility study for a superstructure replacement, which would replace everything except the vertical piers.<sup>800</sup> Ms. Parker stated that currently there is no funding to do a superstructure replacement.<sup>801</sup> Ms. Parker envisioned the superstructure replacement for the Norris Bridge to be similar to the replacement of the Coleman Bridge with replacement sections of the bridge brought in on barges and moved into place by cranes, also on barges.<sup>802</sup> Ms. Parker maintained that any transmission towers built beside the Norris Bridge “would be just an existing condition that we would design around or that the contractor would have to move around.”<sup>803</sup> Ms. Parker noted that if the superstructure of the Norris Bridge is replaced, the bridge will be widened to permit traffic to get around a broken-down vehicle.<sup>804</sup> Ms. Parker agreed that the added shoulder would permit or include a scenic pull-off.<sup>805</sup> Ms. Parker estimated that a superstructure replacement for the Norris Bridge could take “a couple of years.”<sup>806</sup>

Ms. Parker affirmed that “whether the lines get de-energized or not, VDOT has no say in that; that’s hundred percent [Dominion Energy].”<sup>807</sup>

Ms. Parker advised that because Lancaster County witness Matthews did not have the authority to construct or make the Company construct the Matthews Bridge Option, VDOT did

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<sup>798</sup> Mansfield, Tr. at 456.

<sup>799</sup> *Id.*

<sup>800</sup> Parker, Tr. at 1479-80.

<sup>801</sup> *Id.* at 1491.

<sup>802</sup> *Id.* at 1492-93.

<sup>803</sup> *Id.* at 1493.

<sup>804</sup> *Id.* at 1481, 1498.

<sup>805</sup> *Id.* at 1498.

<sup>806</sup> *Id.* at 1513.

<sup>807</sup> *Id.* at 1481.

not perform any analysis of the Matthews Bridge Option.<sup>808</sup> Consequently, Ms. Parker could not agree with any amount presented as the cost of repairs to the Norris Bridge if the Matthews Bridge Option is undertaken.<sup>809</sup>

**Annette Adams** agreed with the testimony of Ms. Parker and confirmed that because Mr. Matthews was not the permittee, VDOT could not analyze his Matthews Bridge Option.<sup>810</sup> Ms. Adams explained that for a permittee proposed plan, VDOT offers review and comments of what is and is not acceptable, so that the permittee can prepare its permit package for VDOT processing.<sup>811</sup> Ms. Adams contended that “[i]t is logical to assume that structural strengthening will be required for any additional dead load.”<sup>812</sup>

Ms. Adams clarified that by signing the minutes to meetings with Mr. Matthews, she was confirming that the statements were made during the meeting, but she was not confirming that the statements were correct.<sup>813</sup> For example, Ms. Adams pointed to a statement concerning two conduits not requiring de-energization, and maintained that she agreed that the statements were made by Mr. Matthews, but did not confirm that the statement was true.<sup>814</sup>

## DISCUSSION

During the course of this proceeding 15 alternatives have been considered for meeting the needs identified by the Company:

- Proposed 115 kV Overhead Route,<sup>815</sup>
- 230 kV Overhead Alternative,<sup>816</sup>
- Underground Option,<sup>817</sup>
- Barnhardt Option 1,<sup>818</sup>
- Barnhardt Option 2,<sup>819</sup>
- Barnhardt Option 3,<sup>820</sup>
- 115 kV Bridge Attachment Option,<sup>821</sup>
- Matthews Bridge Option,<sup>822</sup>

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<sup>808</sup> *Id.* at 1504.

<sup>809</sup> *Id.* at 1505.

<sup>810</sup> Adams, Tr. at 1514.

<sup>811</sup> *Id.* at 1518-19.

<sup>812</sup> *Id.* at 1580.

<sup>813</sup> *Id.* at 1581.

<sup>814</sup> *Id.* at 1581-82.

<sup>815</sup> Exhibit No. 8, Alternatives Analysis at 2-3.

<sup>816</sup> *Id.* at 3.

<sup>817</sup> *Id.*

<sup>818</sup> Exhibit No. 11, at 3-4.

<sup>819</sup> *Id.* at 4-5.

<sup>820</sup> *See*, June 22, 2016, Barnhardt Motion to Require Applicant to Supplement Application with Additional Alternatives at 1-2.

<sup>821</sup> Exhibit No. 84, at 16.

- Lanexa-Northern Neck-White Stone Rebuild Option,<sup>823</sup>
- Soleski Variation 1,<sup>824</sup>
- Soleski Variation 2,<sup>825</sup>
- Soleski Variation 3,<sup>826</sup>
- Soleski Variation 4,<sup>827</sup>
- Staff Variation 1,<sup>828</sup> and
- 69 kV Option.<sup>829</sup>

The Company and ODEC supported approval of the 115 kV Overhead Project or the 230 kV Overhead Alternative.<sup>830</sup> Barnhardt focused on Soleski Variation 3 and supported selection of one of the Respondents' alternatives.<sup>831</sup> The Coalition and Lancaster County supported any alternative other than the 115 kV Overhead Project or the 230 kV Overhead Alternative.<sup>832</sup> Staff supported the proposed 115 kV Overhead Project and the 230 kV Overhead Alternative, "unless the Commission gives substantial weight to the visual impact or other environmental impacts associated with overhead construction in this area of the Rappahannock River that may be greater than for the more expensive underground alternatives."<sup>833</sup>

The Discussion will outline the statutory requirements to be applied in this proceeding, and will be followed by analysis of: need, cost, viewshed, economic development, public safety, Baylor Grounds Legislation, reliability, County Comprehensive Plan, and other environmental considerations. The Discussion will conclude with a weighing of the factors.

### Statutory Requirements

Pursuant to the Utility Facilities Act,<sup>834</sup> it is unlawful for any public utility to construct facilities, except ordinary extensions or improvements in the usual course of business, without first obtaining a certificate of public convenience and necessity from the Commission.<sup>835</sup> For overhead transmission lines of 138 kV or more, § 56-265.2 A 2 of the Code requires compliance with the provisions of § 56-46.1 of the Code. In this case, all of the alternatives will be operated

<sup>822</sup> Exhibit No. 51, at 18-19.

<sup>823</sup> Exhibit No. 84, at 22-23.

<sup>824</sup> Exhibit No. 69, at 6.

<sup>825</sup> *Id.*

<sup>826</sup> *Id.*

<sup>827</sup> *Id.*

<sup>828</sup> Exhibit No. 84, at 39-40.

<sup>829</sup> Soleski, Tr. at 855-61.

<sup>830</sup> Company Brief at 70; ODEC Brief at 12.

<sup>831</sup> Barnhardt Brief at 3, 23.

<sup>832</sup> Coalition Brief at 74; Lancaster County Brief at 47-48.

<sup>833</sup> Staff Brief at 27.

<sup>834</sup> Chapter 10.1 of Title 56, §§ 56-265.1 to 56-265.9 of the Code.

<sup>835</sup> Section 56-265.2 A of the Code.



at 115 kV, even if they are capable of operating at 230 kV. Nonetheless, Staff and all of the parties utilized the analysis outlined in § 56-46.1 B for this case.<sup>836</sup>

Section 56-46.1 of the Code directs the Commission to consider several factors in regard to proposed new facilities. For example, § 56-46.1 A of the Code directs the Commission to consider the effect of the facility on the environment and establish “such conditions as may be desirable or necessary to minimize adverse environmental impact.” Section 56-46.1 A of the Code directs the Commission to consider all reports that relate to the proposed facility by state agencies concerned with environmental protection and, if requested, to local comprehensive plans. In addition, § 56-46.1 A of the Code states that “the Commission (a) shall consider the effect of the proposed facility on economic development within the Commonwealth . . . and (b) shall consider any improvements in service reliability that may result from the construction of such facility.”

Section 56-46.1 B of the Code states as follows:

[N]o electrical transmission line of 138 kilovolts or more shall be constructed unless . . . [a]s a condition to approval the Commission shall determine that the line is needed and that the corridor or route the line is to follow will reasonably minimize adverse impact on the scenic assets, historic districts and environment of the area concerned. To assist the Commission in this determination, as part of the application for Commission approval of the line, the applicant shall summarize its efforts to reasonably minimize adverse impact on the scenic assets, historic districts, and environment of the area concerned. In making the determinations about need, corridor or route, and method of installation, the Commission shall verify the applicant’s load flow modeling, contingency analyses, and reliability needs presented to justify the new line and its proposed method of installation. . . . Additionally, the Commission shall consider, upon the request of the governing body of any county or municipality in which the line is proposed to be constructed, (a) the costs and economic benefits likely to result from requiring the underground placement of the line and (b) any potential impediments to timely construction of the line.

Section 56-46.1 C of the Code provides for hearings and includes a requirement that “[i]n any hearing the public service company shall provide adequate evidence that existing rights-of-way cannot adequately serve the needs of the company.” This requirement is further supported by § 56-259 C of the Code which states that “[p]rior to acquiring any easement of right-of-way, public service corporations will consider the feasibility of locating such facilities on, over, or under existing easements of rights-of-way.”

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<sup>836</sup> Staff Brief at 7-8, 21; Company Brief at 13, 17, 40; ODEC Brief at 1; Barnhardt Brief at 4-7; Coalition Brief at 12-18; Lancaster County Brief at 11-16.

Section 56-46.1 D of the Code provides that “‘environment’ or ‘environmental’ shall be deemed to include in meaning ‘historic,’ as well as a consideration of the probable effects of the line on the health and safety of the persons in the area concerned.”

Section 56-46.1 E of the Code permits the Commission to cause the publishing of additional notice to consider a route or routes significantly different from the route described in the notice required by § 56-46.1 B.

In reviewing the Commission’s application of the above statutes, the Virginia Supreme Court stated that the “Commission, pursuant to Code § 56-46.1(B), determines whether a need for the proposed infrastructure exists.”<sup>837</sup> The Court provided that in determining need, “the Commission must assess the magnitude and timing of any such need.”<sup>838</sup> The Court also noted the statutory requirement to “verify the applicant’s load flow modeling, contingency analyses, and reliability needs presented to justify the new line and its proposed methods of installation;” and acknowledged consideration of additional factors, along with minimizing adverse impacts, such as cost of construction, economic and environmental factors, reliability of electric service and engineering feasibility.<sup>839</sup>

Furthermore, the Court addressed the Commission’s consideration of the adverse impacts of a project, which “are not to be considered in a vacuum.”<sup>840</sup> The Court found that “the Commission must ‘balance’ adverse impacts along with other ‘factors’ and ‘traditional considerations.’”<sup>841</sup> The Court concluded “that the use of the word ‘reasonably’ demonstrates the General Assembly’s recognition of the multifactorial balancing that goes into such an investigation . . . .”<sup>842</sup>

**Need**

Staff and the parties to this proceeding agree there is a need to replace the aging and deteriorating transmission Line # 65 as it crosses the Rappahannock River at and on the Norris Bridge.<sup>843</sup> However, there is disagreement regarding: (i) whether the new transmission line should remain on the Norris Bridge;<sup>844</sup> and (ii) the required capacity for the new transmission line.<sup>845</sup>

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<sup>837</sup> *BASF Corp. v. SCC*, 289 Va. 375, 394 (2015) (“*BASF*”).

<sup>838</sup> *Id.*

<sup>839</sup> *Id.* (citing *Board of Supervisors v. Appalachian Power Co.*, 216 Va. 93, 104 (1975)).

<sup>840</sup> *BASF* at 394.

<sup>841</sup> *Id.* at 395, citing *Board of Supervisors* at 100.

<sup>842</sup> *BASF* at 395.

<sup>843</sup> Coalition Brief at 22; Lancaster County Brief at 14; ODEC Brief at 3-4; Company Brief at 6-13; and Staff Brief at 8-14.

<sup>844</sup> Lancaster County Brief at 41-47; Barnhardt Brief at 18-19; Company Brief at 10-16, 41-49; and Staff Brief at 12.

<sup>845</sup> Coalition Brief at 40-45; Lancaster County Brief at 25-27; Barnhardt Brief at 8, 13-14; Company Brief at 63-65; and Staff Brief at 11, 14.

Dominion Energy supported the need to rebuild the Rappahannock River crossing segment of Line # 65 based on the following issues: (i) the current configuration of Line # 65 in relation to the Norris Bridge deck poses a major safety concern for the public and for VDOT and Company personnel; (ii) it is necessary to improve operational performance and reliability on this aging segment of the line; and (iii) the rebuild is required for compliance with mandatory NERC Reliability Standards and the Company’s planning requirements.<sup>846</sup>

The Rappahannock River crossing segment of Line # 65 was built in 1962, is suspended by wooden structures in the river, and attached to the Norris Bridge, which was completed in 1957.<sup>847</sup> This segment of Line # 65 is part of a transmission network serving approximately 19,000 customers in the Northern Neck.<sup>848</sup> When the Rappahannock River crossing segment of Line # 65 is out of service, these customers are served by a 29.4-mile radial line.<sup>849</sup> If an outage also occurs on the radial line, customers would experience outages for a longer duration.<sup>850</sup> Moreover, radial operation makes it more difficult to schedule maintenance to maintain reliability on line.<sup>851</sup>

Dominion Energy advised that since 2010 the Rappahannock River crossing segment of Line # 65 has been de-energized over 50% of the time due to VDOT maintenance.<sup>852</sup> In response to a Staff interrogatory, Dominion Energy stated that for the period 1999 through 2018, “there have been and are 21 planned outages for VDOT bridge maintenance on [the Rappahannock River crossing segment of Line # 65] for a total of 2,175 days, which averages to over 109 days per year or 30% of the time that this line has been or will be in a radial configuration.”<sup>853</sup> These planned outages include a current ongoing outage projected to be 811 days through December 9, 2018, for VDOT’s bridge painting.<sup>854</sup> Looking to the future, the aging of the Norris Bridge is likely to require more VDOT maintenance.<sup>855</sup> VDOT also has funded studies concerning superstructure replacement, which would replace everything except the vertical piers.<sup>856</sup> VDOT witness Parker testified that a superstructure replacement would likely be completed in sections and would take “a couple years.”<sup>857</sup> Thus, the level of planned outages related to VDOT maintenance appears likely to remain high for the foreseeable future, or at least until after the superstructure of the bridge is replaced.

In addition to the planned outages related to VDOT bridge maintenance, Company witness Kaminsky stated that “[s]ince 2010 there have been seven unplanned outage events that

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<sup>846</sup> Company Brief at 6.

<sup>847</sup> *Id.* at 7; Staff Brief at 8; Exhibit No. 8, Attached Appendix at 4; Parker, Tr. at 1488.

<sup>848</sup> *Id.*; Exhibit No. 16, at 4.

<sup>849</sup> *Id.*; Exhibit No. 84, Attached Appendix A, Staff Interrogatory 5-44.

<sup>850</sup> *Id.*; *Id.*

<sup>851</sup> Staff Brief at 9-10; Exhibit 84, at 7; Exhibit No. 16, at 5.

<sup>852</sup> Company Brief at 9; Exhibit No. 16, at 5.

<sup>853</sup> Exhibit No. 9.

<sup>854</sup> *Id.*; Staff Brief at 10.

<sup>855</sup> Exhibit No. 11, Attached Supplemental Direct Schedule 2, at 4; Parker, Tr. at 1483.

<sup>856</sup> *Id.*; *Id.* at 1479-80.

<sup>857</sup> Parker, Tr. at 1492-93, 1513.

occurred on the Norris Bridge water crossing.<sup>858</sup> Company witness Heisey provided inspection reports and photographs illustrating the deterioration of this segment.<sup>859</sup> As outlined in the Staff Report and Staff Brief, the existing wood pile foundations exhibit hour glassing, checking and splitting; and the insulators on the bridge davit arms have reached the end of their service lives, with some of insulators damaged probably from debris from bridge traffic.<sup>860</sup>

As for compliance with mandatory NERC Reliability Standards, since January 1, 2015, Dominion Energy has been required to model the Rappahannock River crossing segment of Line # 65 as out of service for any known outages exceeding six months.<sup>861</sup> With this modeling criteria, Company witness Kaminsky testified that the Company would be required to take remedial action to address a NERC planning violation (*i.e.*, a projected load loss of more than 300 MW) during N-1-1 contingency modeling, beginning in 2019.<sup>862</sup> Mr. Kaminsky also advised that “[a]ny option that would remove the line from the bridge would solve the NERC reliability problem . . . .”<sup>863</sup>

Based on the evidence presented in this proceeding as outlined above, I agree with Staff and the parties that there is a need to replace the aging and deteriorating transmission Line # 65 as it crosses the Rappahannock River at and on the Norris Bridge.

**On the bridge** – Whether the Rappahannock River crossing segment of Line # 65 should remain on the Norris Bridge was explored during the hearings mainly through consideration of Barnhardt Option 1 and variations on the Matthews Bridge Option. The Matthews Bridge Option called for the installation of XLPE cables below the middle or truss section of the bridge.<sup>864</sup> Lancaster County offered several means of transitioning the transmission cables from the truss section of the bridge to shore, including: (i) via overhead H-frames; (ii) running the cables down bridge piers and continuing underground to shore; and (iii) constructing an island for a transition station in the river.<sup>865</sup> In addition, Staff investigated the possibility of re-attaching the transmission line to the bridge on new davit arms.<sup>866</sup>

Both the Company and Staff argued that none of the on-bridge variations met the identified needs for the project.<sup>867</sup> On brief, both Barnhardt and Lancaster County criticized Dominion Energy for presenting an unworkable design for Barnhardt Option 1.<sup>868</sup> Lancaster

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<sup>858</sup> Exhibit No. 16, at 5. Note, on brief the Company stated that “ten unplanned outages have affected Line # 65 at the Norris Bridge water crossing since 2010.” Company Brief at 9 (no citation provided).

<sup>859</sup> Exhibit No. 23, Attached Supplemental Direct Schedule 1.

<sup>860</sup> Exhibit No. 84, at 8; Staff Brief at 9.

<sup>861</sup> Exhibit No. 8, Attached Appendix at 4; Exhibit No. 17, at 3-4.

<sup>862</sup> Exhibit No. 18; Kaminsky, Tr. at 499-503; Staff Brief at 10-11; Company Brief at 11-13.

<sup>863</sup> Kaminsky, Tr. at 516.

<sup>864</sup> Exhibit No. 84, at 16-17.

<sup>865</sup> Exhibit No. 51, at 22.

<sup>866</sup> Lanzalotta, Tr. at 688-91; Matthews, Tr. at 717-21, 725-26.

<sup>867</sup> Company Brief at 41-49; Staff Brief at 12-14.

<sup>868</sup> Barnhardt Brief at 18-19; Lancaster County Brief at 46.

County also defended the Matthews Bridge Option as a preliminary design and recommended that “[s]hould the Commission conclude that none of the underwater options detailed in this proceeding meet the requirements of the controlling statutory framework, then further study should be undertaken to address VDOT’s concerns and determine precisely how the lines could transition from the bridge to shore.”<sup>869</sup>

I agree with the Company and Staff that any configuration of maintaining the line on the bridge would likely remain subject to extended outages.<sup>870</sup> These outages include: (i) annual inspections, which are scheduled for three weeks but can take longer; (ii) increased VDOT maintenance, such as the current on-going 811-day painting project, on an aging bridge; and (iii) the superstructure replacement currently under study. At a minimum, such outages result in the radial operation of a large segment of Line # 65, and may result in violation of mandatory NERC Reliability Standards. Consequently, I agree with the Company and Staff that based on the record in this proceeding, none of the on-bridge variations met the identified needs for the project.

**Required Capacity** – The current Rappahannock River crossing segment of Line # 65 has a summer rating of 147 MVA and a winter rating of 185 MVA.<sup>871</sup> Staff contended that currently, this line segment can carry approximately double the power of recent historic peak loads and three times the capacity needed to handle recent summer peaks.<sup>872</sup>

The chart below provides the current capacity for the entire Line # 65:<sup>873</sup>

Line Conductor	Mileage and Percent of Total Line Length	Summer Emergency Rating
1033 ACSR (45/7) @ 150C	0.04 miles (0.1%)	353 MVA
1534 ACAR (42/19) @ 90C	3.34 miles (9.1%)	292 MVA
477 ACSR (24/7) @ 90C <sup>874</sup>	2.20 miles (6.0%)	147 MVA
477 ACSR (24/7) @ 90C	1.77 miles (4.8%)	147 MVA
1534 ACAR (42/19) @ 75C	4.30 miles (11.7%)	274 MVA
477 ACSR (24/7) @ 150C	25.05 miles (68.3%)	217 MVA

Company witness Heisey affirmed that the Company’s “Transmission Planning specified a rating for the Rebuild Project of 217 MVA, or in this case what approximately 70% of Line # 65 is rated for.”<sup>875</sup> Nonetheless, Dominion Energy designed its Overhead Alternatives at 437 MVA for the following reasons: (i) to meet or exceed the design rating using a conductor with a similar rating to one of the Company’s standard conductor sizes; and (ii) for the conductor’s beneficial mechanical properties including decreased-sag, increased self-damping

<sup>869</sup> Lancaster County Brief at 46-47.

<sup>870</sup> Company Brief at 41; Staff Brief at 12-13.

<sup>871</sup> Exhibit No. 60.

<sup>872</sup> Staff Brief at 12, 16.

<sup>873</sup> Exhibit No. 84, Attached Appendix A, Staff Interrogatory 10-71.

<sup>874</sup> Current Rappahannock River crossing segment of Line # 65.

<sup>875</sup> Exhibit No. 95, at 9 (footnote omitted).

properties, improved corrosion resistance, and suitability for operation at 230 kV if ever needed.<sup>876</sup>

After designing its Overhead Alternatives to have a capacity of 437 MVA, Dominion Energy designed all other alternatives to provide similar capacity to create an apples-to-apples comparison.<sup>877</sup> Consequently, Dominion Energy designed its Underground Option for a capacity of 340 MVA, Barnhardt Option 1 for a capacity of 428 MVA, and Barnhardt Option 2 for a capacity of 454 MVA.<sup>878</sup> The Company stated that “it is typical for the capacity of a 115 kV rebuild to increase by two to three times the original capacity.”<sup>879</sup> Company witness Kaminsky acknowledged that this project is not capacity driven, but contended that the Company is “making a sound investment in a robust transmission system to improve reliability for the Northern Neck area well into the future.”<sup>880</sup>

In reviewing this record, I can find no indication or forecast of appreciable growth on Line # 65. Indeed, there is nothing in the record to indicate that the current capacity of the Rappahannock River crossing segment of Line # 65 is, or ever will be inadequate to meet any projected load. For example, Coalition witness Ormesher adjusted the highest peak demand for an annual growth of 1.5% (from Dominion Energy’s Integrated Resource Plan) for 40 years and found that peak demand remained well under a capacity of 147 MVA.<sup>881</sup>

Although Staff offers the possibilities of using 292 MVA and 147 MVA as design starting points for a replacement line, Staff contended that a design starting point of 217 MVA for each of the alternatives would be consistent with what Dominion Energy’s transmission planning department determined to be sufficient for the project, consistent with the design starting point for the Overhead Alternatives, and would remove a limitation on the capacity of the line as approximately 80% of Line # 65 would have a capacity at or below 217 MVA.<sup>882</sup> Finally, Staff advised:

Based on the objective to satisfy the reliability needs demonstrated in the instant proceeding, Staff easily concluded that “a project with a lower capacity that more closely matches the existing sections of Line # 65 can also resolve the reliability needs identified by the Company.”<sup>883</sup>

I agree with Staff, and similar positions taken by the Respondents, that the design starting point of 217 MVA should be used for each of the alternatives evaluated in this proceeding.

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<sup>876</sup> *Id.* at 9-10.

<sup>877</sup> Company Brief at 63-65.

<sup>878</sup> *Id.* at 63-64; Exhibit No. 89, Rebuttal Schedule 1.

<sup>879</sup> Company Brief at 64; Exhibit No. 93, at 11, Rebuttal Schedule 4.

<sup>880</sup> Exhibit No. 93, at 11.

<sup>881</sup> Coalition Brief at 43; Exhibit No. 61; Ormesher, Tr. at 789-90.

<sup>882</sup> Staff Brief at 15-16.

<sup>883</sup> *Id.* at 17 (quoting Exhibit No. 84, at 51).

Trenching alternatives with a lower capacity developed in this proceeding include Soleski Variation 1, Soleski Variation 3, and Staff Variation 1. The chart below provides the capacity and configuration of each of these alternatives.

Alternative	Capacity at 115 kV	Configuration
Soleski Variation 1 <sup>884</sup>	149 MVA	One three-core XLPE submarine cable installed in one trench
Soleski Variation 3 <sup>885</sup>	299 MVA	Two three-core XLPE submarine cables installed in two trenches
Staff Variation 1 <sup>886</sup>	149 MVA	Four single-core XLPE submarine cables installed in four trenches

Based solely on a design starting point of 217 MVA, Soleski Variation 1 and Staff Variation 1 would require more capacity, and Soleski Variation 3 would require less capacity.

### Cost

The chart below provides an outline of the cost estimates offered by Dominion Energy and the parties.

Alternative	Party	Cost (Millions)
Proposed 115 kV Overhead Route With Smaller Fender	Dominion Energy	\$26.2 <sup>887</sup>
	Dominion Energy	\$24.0 <sup>888</sup>
230 kV Overhead Alternative With Smaller Fender	Dominion Energy	\$26.3 <sup>889</sup>
	Dominion Energy	\$24.1 <sup>890</sup>
Underground Option Lanzalotta operated at 115 kV Lanzalotta operated at 230 kV Lanzalotta operated at 230 kV	Dominion Energy	\$83.6 <sup>891</sup>
	Lancaster County	\$49.65 <sup>892</sup>
	Lancaster County	\$59.65 <sup>893</sup>
	Dominion Energy	\$82.65-\$183.65 <sup>894</sup>
Barnhardt Option 1 Matthews Alternative	Dominion Energy	\$68.2-\$78.2 <sup>895</sup>
	Lancaster County	\$29.4 <sup>896</sup>

<sup>884</sup> Exhibit No. 115, at 10.

<sup>885</sup> *Id.* at 11-12.

<sup>886</sup> *Id.* at 12-13.

<sup>887</sup> Exhibit No. 89, Rebuttal Schedule 1.

<sup>888</sup> Exhibit No. 97, at 7.

<sup>889</sup> Exhibit No. 89, Rebuttal Schedule 1.

<sup>890</sup> Exhibit No. 97, at 7.

<sup>891</sup> Exhibit No. 89, Rebuttal Schedule 1.

<sup>892</sup> Lanzalotta Tr. at 667.

<sup>893</sup> Exhibit No. 43, at 11-12.

<sup>894</sup> Exhibit No. 89, Rebuttal Schedule 1.

<sup>895</sup> *Id.*

<sup>896</sup> Exhibit No. 52.

Alternative	Party	Cost (Millions)
Barnhardt Option 2	Dominion Energy	\$102.1 <sup>897</sup>
Soleski Variation 1	Barnhardt	\$12.68 <sup>898</sup>
	Dominion Energy	\$71.4 <sup>899</sup>
Soleski Variation 3	Barnhardt	\$23.59 <sup>900</sup>
	Dominion Energy	\$95.9 <sup>901</sup>
Staff Variation 1	Dominion Energy	\$83.1 <sup>902</sup>

Analysis of the various cost estimates presented in the proceeding will be organized as follows: (1) Overhead Alternatives, which include the Proposed 115 kV Overhead Route and the 230 kV Overhead Alternative; (2) Underground Option, which includes the Company's Underground Option and the Lanzalotta alternatives; (3) On Bridge Options, which include Barnhardt Option 1 and the Matthews Alternative; and (4) Trenching Options, which include Barnhardt Option 2, Soleski Variation 1, Soleski Variation 3, and Staff Variation 1.

### (1) Overhead Alternatives

Dominion Energy's estimated costs for the Overhead Alternatives were unchallenged by the Respondents, accepted by Staff, and supported by ODEC.<sup>903</sup> These estimated costs included \$4.4 million to remove the existing structures and line.<sup>904</sup> Because this is a water crossing, the Company included a 20% contingency in its cost estimates for the Overhead Alternatives instead of the 10% contingency allowance included in the estimated costs of other overhead transmission line projects.<sup>905</sup> Therefore, I find that Dominion Energy's estimated costs for the Overhead Alternatives should be accepted in this case.

### (2) Underground Option

Dominion Energy's estimated cost for its Underground Option of \$83.6 million was also accepted by Staff and supported by ODEC.<sup>906</sup> Nonetheless, Staff noted that: (i) the Company's estimated cost included a 40% contingency, instead of the Company's usual 30% contingency for underground installations; and (ii) this option would have a lower cost if it is designed for a capacity of 217 MVA, instead of a capacity of 340 MVA.<sup>907</sup>

<sup>897</sup> Exhibit No. 89, Rebuttal Schedule 1.

<sup>898</sup> Exhibit No. 69, Attached Soleski Exhibit 3.

<sup>899</sup> Exhibit No. 89, Rebuttal Schedule 1.

<sup>900</sup> Exhibit No. 69, Attached Soleski Exhibit 3.

<sup>901</sup> Exhibit No. 89, Rebuttal Schedule 1.

<sup>902</sup> *Id.*

<sup>903</sup> Staff Brief at 17-18; ODEC Brief at 8.

<sup>904</sup> Exhibit No. 26.

<sup>905</sup> Exhibit No. 88; Koonce Tr. at 1116.

<sup>906</sup> Staff Brief at 19-20; ODEC Brief at 8-9.

<sup>907</sup> Staff Brief at 19-20.



Staff reported that the overall estimated cost of the Company's Underground Option of \$83.6 million consisted of \$73.8 million for the construction of the underground river crossing and \$9.8 million for transition stations and substation work.<sup>908</sup> The \$73.8 million estimate for the construction of the underground river crossing can be broken down as follows:<sup>909</sup>

Category	Cost (Millions)	Markups (Millions)	Total Estimate (Millions)
Labor	\$27.32	\$17.67	\$44.98
Material	\$17.03	\$11.79	\$28.82
Equipment	\$0.03	\$0.02	\$0.05
<b>Total</b>	<b>\$44.38</b>	<b>\$29.47</b>	<b>\$73.85</b>

The markups include: sales tax, surcharges, contingencies, and allowance for funds used during construction ("AFUDC"), with markups to allow for contingencies totaling approximately \$18.73 million.<sup>910</sup> Thus, if Dominion Energy would have used their "usual" 30% for contingency, the Underground Option would have cost approximately \$4.68 million less.<sup>911</sup>

In support of the use of a 40% contingency factor, Company witness Keck sponsored an exhibit that compared actual to estimated cost for six underground projects that were approximately 35% over-budget (with the budget including a 30% contingency).<sup>912</sup> On brief, Lancaster County contended that Dominion Energy double counted contingency costs by basing its estimates on the actual cost of projects such as Hayes-Yorktown, which included a 36.4% cost overrun, and then applying a 40% contingency markup to the actual costs.<sup>913</sup>

I find that in this case a 40% contingency factor may be appropriate for cost estimates produced by estimating specific line items. However, such a contingency could be a concern in the future. A significant amount of the underground projects used by the Company to justify its contingency factor were either pilot or experimental projects designed to gain experience with underground transmission lines. As lessons are learned and the costs of these lessons are added to the estimated cost of proposed new underground transmission lines, I agree with Lancaster County that the cost of such lessons may be double counted. However, because of the Company's relative lack of experience with underground submarine transmission, significant contingency factors are likely appropriate at this time. Moreover, in order to make a double counting determination, a significantly more granular cost analysis would need to be presented and developed than is in the record of this proceeding.

<sup>908</sup> Exhibit No. 84, at 46.

<sup>909</sup> Exhibit No. 114, at 5. The Labor Category is the sum of VP Labor – Internal, VP Labor – Contractor, and DTECH Labor. Totals may be off due to rounding.

<sup>910</sup> Exhibit No. 103. \$18.73 million = Cost Contingencies of \$8,737,212.89 plus Labor Contingencies of \$9,988,361.02, with the sum of \$18,725,573.91 rounded.

<sup>911</sup> \$4.68 million = \$18.73 divided by 40% times 10%.

<sup>912</sup> Keck, Tr. at 1118; Exhibit No. 91.

<sup>913</sup> Lancaster Brief at 36.

Like the Company, Lancaster County witness Lanzalotta proposed installing an underground transmission cable capable of operating at 230 kV. Mr. Lanzalotta attempted to reduce costs by proposing that the underground transmission line operate at 230 kV rather than at 115 kV as proposed by the Company, which would enable more energy to flow over a smaller, less expensive conductor.<sup>914</sup> Mr. Lanzalotta based his cost recommendations on the actual installed cost per mile of \$17.4 million for Dominion Energy's Hayes-Yorktown line completed in 2012.<sup>915</sup> Mr. Lanzalotta multiplied the Hayes-Yorktown cost per mile of \$17.4 million by the length of the Rappahannock River crossing of 2.3 mile; added to that amount the Company's estimated cost for the transition stations and substation work; and added another \$10 million for the cost of a transformer for the north side of the river for a total estimated cost of \$59.65 million if the line is operated at 230 kV.<sup>916</sup> During the Hearing Mr. Lanzalotta testified that if a line with the capacity of the Hayes-Yorktown line is installed and operated at 115 kV, the cost of the transformer can be eliminated to produce a cost estimate of \$49.65 million.<sup>917</sup> Mr. Lanzalotta advised that such a line would have a capacity of 300 MVA, and if one cable is out of service the line could operate at 200 MVA.<sup>918</sup>

Dominion Energy witness Kaminsky estimated that the cost of a 230-115 kV switching station on the north side of the Rappahannock would more likely range from \$23-\$34 million, rather than the \$10 million for a transformer included by Mr. Lanzalotta.<sup>919</sup> Mr. Kaminsky further estimated that the cost to upgrade the entire Line # 65 to 230 kV operation would be approximately \$124 million.<sup>920</sup>

Dominion Energy witness Reitz used the actual costs of Hayes-Yorktown as a proxy or check for the construction of duct and manhole installation, but also addressed differences between the actual costs of Hayes-Yorktown and its estimated cost for the Rappahannock crossing the Underground Option.<sup>921</sup> These costs are summarized in the table below.<sup>922</sup>

Category	Hayes-Yorktown Actual Cost	Rappahannock River Underground Option
Engineering	\$259,617	\$306,091
Support	\$149,165	\$290,584
Line Material	\$19,232,526	\$28,764,120
Construction	\$42,860,335	\$44,490,362
Total	\$62,501,643	\$73,851,157

<sup>914</sup> Exhibit No. 43, at 11-12.

<sup>915</sup> *Id.* at 12; \$17.4 million = \$62.5 million actual Hayes-Yorktown cost divided by the length of the water crossing, or 3.6 miles, Exhibit No. 101, at Rebuttal Schedule 2.

<sup>916</sup> *Id.*; Exhibit No. 101, at 5.

<sup>917</sup> Lanzalotta, Tr. at 665; Lancaster County Brief at 39.

<sup>918</sup> *Id.* at 665-66; *Id.*

<sup>919</sup> Exhibit No. 93, at 8; Company Brief at 52.

<sup>920</sup> *Id.*; *Id.*

<sup>921</sup> Exhibit No. 101, at 3, 5-6.

<sup>922</sup> *Id.* at Rebuttal Schedule 3.

Mr. Reitz focused on line material as the main driver of differences in cost.<sup>923</sup> Because the Underground Option will be operated at 115 kV, the Company maintained that voltage differences require a larger cable and accessories to fit the cable in this case.<sup>924</sup> Mr. Reitz also pointed to fluctuating copper prices, which were \$96 per foot for Hayes-Yorktown as compared to the \$126 per foot at the time of the Company's filing in February 2016.<sup>925</sup> In addition, in this case Dominion Energy included the cost of spare splices and a termination to fit the larger cable in the event of failure.<sup>926</sup> Because of the availability of suitable spares from another project, no spares were included in the actual Hayes-Yorktown cost.<sup>927</sup>

Based on the findings discussed above in the Needs section, I agree with Staff that the Underground Option would have a lower cost if the size of the cable is reduced to better match need. This would place the Company's estimate of \$83.6 million above the top of any range of likely costs for the Underground Option. On the other hand, because of cost increases since the construction of Hayes-Yorktown, I find that Mr. Lanzalotta's estimate of \$49.65 million is below the bottom of the range of likely costs for the Underground Option.

### (3) On Bridge Options

Company witness Koonce presented the cost of Barnhardt Option 1 to be \$43.2 million before the cost of bridge enhancements required by VDOT.<sup>928</sup> The estimated cost of the required bridge enhancements as provided by VDOT was \$25 - \$35 million, producing a total cost estimate of \$68.2 - \$78.2 million.<sup>929</sup>

Lancaster County witness Matthews presented an alternative to Barnhardt Option 1, which he estimated would cost approximately \$29.4 million.<sup>930</sup> On brief, Lancaster County stated: "Importantly, however, Mr. Matthew's [sic] proposed design remains a preliminary one."<sup>931</sup> VDOT did not prepare a cost estimate for any required bridge enhancements for Mr. Matthews' proposed design.<sup>932</sup> In addition, unlike Barnhardt Option 1, which has the transmission line installed on the bridge from end to end, the Matthews Bridge Option proposed transitioning the transmission line off the bridge at the end of the truss sections of the bridge, approximately 2,240 feet from the north shoreline and approximately 777 feet from the south shoreline.<sup>933</sup> The cost estimate provided by Mr. Matthews included a line item for H-frames, which did not appear to provide a complete estimate of the cost of getting the transmission lines

<sup>923</sup> *Id.* at 5-6.

<sup>924</sup> *Id.* at Rebuttal Schedule 3.

<sup>925</sup> *Id.* at 6.

<sup>926</sup> *Id.* at Rebuttal Schedule 3.

<sup>927</sup> *Id.*

<sup>928</sup> Exhibit No. 104, at 29.

<sup>929</sup> Exhibit No. 11, Supplemental Direct Schedule 2, at 6; Exhibit No. 89, Rebuttal Schedule 1.

<sup>930</sup> Exhibit No. 52.

<sup>931</sup> Lancaster County Brief at 46.

<sup>932</sup> Parker, Tr. at 1504-05.

<sup>933</sup> Koonce, Tr. at 1211; Exhibit No. 106; Exhibit No. 51, Attached Exhibit MAM-3.

from the bridge to shore. In its brief, Dominion Energy maintained that “[p]ut simply, there are too many holes in both the design and cost estimates for the [Matthews Bridge Option] to be seriously considered, and it should be rejected by the Commission.”<sup>934</sup> Therefore, I agree with Lancaster County that the cost estimates for the Matthews Bridge Option were of a preliminary nature. However, I also agree with Dominion Energy that the cost estimates for the Matthews Bridge Option were too incomplete to be used as a viable cost estimate in this proceeding.

#### (4) Trenching Options

The trenching options addressed by Staff and the parties in their post-hearing briefs include Barnhardt Option 2, Soleski Variation 1, Soleski Variation 3, and Staff Variation 1 (“Trenching Options”). Dominion Energy provided cost estimates for each of the Trenching Options. Chronologically as developed in this proceeding, Dominion Energy was directed to develop Barnhardt Option 2 in a Hearing Examiner’s Ruling dated July 22, 2016. Company witness Koonce presented Barnhardt Option 2 and estimated its cost at \$102.1 million.<sup>935</sup> Barnhardt witness Soleski provided design and cost estimates for four trenching variations including Soleski Variation 1, which he estimated to cost \$12.68 million, and Soleski Variation 3, which he estimated to cost \$23.59 million.<sup>936</sup> At the request of Staff witness Joshipura, Dominion Energy developed cost estimates for Soleski Variation 1 of \$71.4 million, Soleski Variation 3 of \$95.9 million, and Staff Variation 1 of \$83.1 million.<sup>937</sup> The cost estimates for these options are analyzed below.

**Barnhardt Option 2** – Dominion Energy designed Barnhardt Option 2 to provide the equivalent level of capacity as the Overhead Alternatives and proposed trenching seven XLPE cables in seven separate trenches.<sup>938</sup> When initially prefiled, Barnhardt Option 2 was estimated to cost \$92.3 million, which was eventually corrected to reflect \$102.1 million.<sup>939</sup> The backup documentation for the original \$92.3 million, based on cost estimates from submarine cable manufacturers, was attached to the rebuttal testimony of Company witness Tirinzoni.<sup>940</sup> The confidential summary documents show that the markups included in the overall price are similar to the markups included in the Company’s estimate for the Underground Option, which, among other things, included a 40% contingency factor.<sup>941</sup> However, Mr. Tirinzoni testified that XLPE submarine transmission cable manufacturers typically manufacture, deliver, lay and terminate the transmission cable on a turnkey or fixed price basis.<sup>942</sup> I find that the inclusion of a large contingency markup on a project that has the transmission cable provided on a fixed cost basis, would significantly overstate costs.

<sup>934</sup> Company Brief at 49.

<sup>935</sup> Exhibit No. 27, at 3 (as corrected on 1/10/17).

<sup>936</sup> Exhibit No. 69, Attached Soleski Exhibit 3.

<sup>937</sup> Exhibit No. 84, at 38-39; Exhibit No. 89, Attached Rebuttal Schedule 1.

<sup>938</sup> Exhibit No. 11, at 4-5.

<sup>939</sup> Koonce, Tr. at 544.

<sup>940</sup> Exhibit No. 115, at 21.

<sup>941</sup> See, Exhibit No 116C, Attached Rebuttal Schedule 7, at 53-55.

<sup>942</sup> Tirinzoni, Tr. at 1373-76.

**Soleski's Cost Estimates** – The estimated costs for Soleski Variation 1 and Soleski Variation 3 developed by Barnhardt witness Soleski, were based primarily on his 29 years of industry experience.<sup>943</sup> During the hearing, Mr. Soleski advised that he had no direct experience in trenching XLPE submarine transmission cable.<sup>944</sup> Moreover, as pointed out in the Company's brief, Mr. Soleski failed to include any costs associated with removing the existing line, taxes, AFUDC, transition stations, or transportation costs associated with purchasing the cable from an overseas manufacturer.<sup>945</sup>

The usefulness of Mr. Soleski's cost estimates were seriously undermined by his failure to provide any workpapers or backup documentation as requested in discovery.<sup>946</sup> During the hearing, Mr. Soleski explained that he developed the cost of the XLPE submarine transmission cable by estimating the cost of each component included in the manufacturing of an XLPE submarine cable, including the conductor, conductor shield, insulation, insulation shield, metallic shield, fillers, bedding layer, armor wires, and an overall layer.<sup>947</sup> These calculations and the support for these calculations were not disclosed during discovery and no one has had an opportunity to further test or evaluate their validity. Without any such detail, it is impossible to test or determine the reasonableness of which costs were considered, how they were derived, or whether such cost estimates can be corroborated. Therefore, I can give no weight to the estimates provided by Mr. Soleski in this case.

**Company's Cost Estimates** – Company witness Tirinzoni testified that like the cost estimate for Barnhardt Option 2, he developed cost estimates based on input from XLPE submarine transmission cable manufacturers.<sup>948</sup> Also like Barnhardt Option 2, Mr. Tirinzoni's cost estimates appear to suffer from applying a large contingency to a turnkey or fixed price contract. In addition, during the hearing Mr. Tirinzoni admitted that his cost estimates for Soleski Variation 1, Soleski Variation 3, and Staff Variation 1 were less developed and subject to a wide range of possibilities.

Q. In this instance, Mr. Tirinzoni, if you only got one vendor responding, how can you know whether that's the high bid or the low bid?

A. You can't.

...

Again, were talking order of magnitude type estimates. This is not a plus or minus 25 percent estimate. This is, I'd say, higher than that. We've done no studies of any kind for this.<sup>949</sup>

<sup>943</sup> Soleski, Tr. at 953-56.

<sup>944</sup> *Id.* at 969-70, 992-93.

<sup>945</sup> Company Brief at 59; Soleski, Tr. at 975-77.

<sup>946</sup> Exhibit No. 75; Soleski, Tr. at 964.

<sup>947</sup> Soleski, Tr. at 965.

<sup>948</sup> Exhibit No. 115, at 21; Tirinzoni, Tr. at 1281-83.

<sup>949</sup> Tirinzoni, Tr. at 1350.

Subtracting or adding 25% to Mr. Tirinzoni's cost estimates would translate to cost ranges of: \$53.55 million to \$89.25 million for Soleski Variation 1; \$71.925 million to \$119.875 million for Soleski Variation 3; and \$62.325 million to \$103.875 million for Staff Variation 1. Consequently, I find that the Company's cost estimates for Soleski Variation 1, Soleski Variation 3, and Staff Variation 1 are of limited reliability.

In summary, the conclusions to be drawn concerning cost are that the Overhead Alternatives are the least cost alternatives. The Company's Underground Option should cost less than the amount presented by Dominion Energy if the transmission line is sized to reflect actual need. As for the Trenching Options, I find that none of the cost estimates provided in this case are particularly reliable or convincing. Nonetheless, a Trenching Option that is sized to meet need (as discussed in the Need section above), and bid on a turnkey basis for manufacturing, delivering, installing, and terminating the trenched cable (thus, limiting the need for a large contingency), could very well provide a lower cost underground alternative. Therefore, if the Commission ultimately chooses an underground option, I recommend that the Company be directed to seek bids from XLPE submarine transmission cable companies for the installation of an appropriately sized option on a turnkey basis, with such bids to be compared to the Company's estimated cost of installing appropriately sized HPFF transmission cable via HDD. In addition, as discussed below in the Reliability Section, the XLPE submarine transmission cable bids should be based on the Soleski Variation 3 configuration of two three-core XLPE submarine cables installed in two trenches with one in each trench.

### Viewshed

Dominion Energy maintained that the Proposed 115 kV Overhead Route will present only incremental change to the current viewshed, which has the Norris Bridge and the current transmission line with its seven 83-foot-tall wooden H-frame towers that have been in place since 1957 and 1962, respectively.<sup>950</sup> The Company supported its "only incremental change" contention with visual simulations prepared by Truescape and presented by Company witness Sussman.<sup>951</sup> Mr. Sussman testified that the Truescape simulations demonstrate that "the proposed transmission lines and towers would be minimally visible from most observation points other than those on or close to the bridge."<sup>952</sup> In addition, Mr. Sussman presented photographs of marine businesses on the lower Rappahannock River that he asserted "observers could reasonably consider to be inconsistent with a 'pristine' aesthetic environment."<sup>953</sup>

Dominion Energy emphasized that the Proposed 115 kV Overhead Route will not cross or impact any formally designated scenic rivers or visually sensitive areas such as, but not limited to, "scenic byways or scenic viewpoints, recreational sites or facilities (such as biking or hiking trails); and historic resources either listed or eligible for listing in the National Register of Historic Places ('NRHP')."<sup>954</sup>

<sup>950</sup> Company Brief at 18-21; Exhibit No. 8, Appendix Attachment II.A.3.b.

<sup>951</sup> *Id.* at 18; Exhibit No. 129; Exhibit No. 142.

<sup>952</sup> Exhibit No. 129, at 4.

<sup>953</sup> *Id.*

<sup>954</sup> Company Brief, at 22; Exhibit No. 10, Attached Alternatives Analysis at 33.

Furthermore, on brief, the Company pointed to the opening statement of counsel for Barnhardt for raising concerns regarding the impact of the Proposed 115 kV Overhead Route on views from the bridge for the first time.<sup>955</sup> Dominion Energy contended that such concerns were overstated and should be rejected.<sup>956</sup> Mr. Sussman acknowledged that the Commonwealth does not have specific criteria for evaluating visual impacts, and applied federal criteria to distinguish between temporary views and stationary views.<sup>957</sup> Because the Norris Bridge lacks a pull-off for drivers to have a stationary view, Mr. Sussman testified that the value of the view from the bridge is “mitigate[d] . . . a bit.”<sup>958</sup>

Respondents Barnhardt, and the Coalition criticized the Company and the Truescape simulations for failing to consider the view from the Norris Bridge.<sup>959</sup> As stated by the Coalition:

[The Rebuild Project] will remove a transmission line suspended from the middle of the Norris Bridge and place it on 173 foot towers in the middle of the Rappahannock River with the centerline just 100 feet away from the bridge. Aesthetically, inserting such huge industrial transmission towers on the Rappahannock would deface a scenic treasure and inflict a loss suffered by *all* Virginians.<sup>960</sup>

The Coalition pointed to written comments and the testimony of public witnesses as support for its contention that the proposed line and towers will “present visual clutter when viewing the mouth of the Rappahannock River and the Chesapeake Bay from the bridge.”<sup>961</sup>

Based on viewing the full sized Truescape simulations from the prescribed distance,<sup>962</sup> I find that whether the viewshed impacts of the Proposed 115 kV Overhead Route are merely incremental or create visual clutter depends on which Truescape viewpoint is observed. Specifically, I find that Truescape simulations from viewpoints 02, 03, and 05 through 08 show incremental visual impacts, while Truescape simulations from viewpoints 01, 04, and 09 show the creation of visual clutter.

More importantly, however, I find that none of the Truescape simulations address the viewshed impact of the Proposed 115 kV Overhead Route on the views from the Norris Bridge. I strongly disagree with Dominion Energy’s assertion that during opening statements, counsel for Barnhardt raised concerns regarding the impact of the Proposed 115 kV Overhead Route on

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<sup>955</sup> *Id.* at 23.

<sup>956</sup> *Id.*

<sup>957</sup> *Id.*; Sussman, Tr. at 1434.

<sup>958</sup> *Id.*; *Id.*

<sup>959</sup> Barnhardt Brief at 19-20; Coalition Brief at 24-26.

<sup>960</sup> Coalition Brief at 25 (emphasis in the original).

<sup>961</sup> *Id.*; Herndon, Tr. at 276; McKelway, Tr. at 122-23.

<sup>962</sup> *See*, Exhibit No. 142.

views from the bridge for the first time. As illustrated in the Coalition Brief, and a review of the transcripts of the public witness testimony, which were summarized earlier in this report, the impact of the proposed new overhead transmission line on views from the bridge was a recurring theme raised by many of the public witnesses.<sup>963</sup> Based on my attending the public hearing in Kilmarnock (and driving across the Norris Bridge) I agree with many of the public witnesses that the view of the Rappahannock River and Chesapeake Bay is a unique and memorable view that creates a positive first impression of the Northern Neck; and that construction of the Proposed 115 kV Overhead Route will have a significant and negative impact on that view. I disagree with Mr. Sussman's testimony concerning federal standards that distinguish between temporary views and stationary views. As with many of the public witnesses, I found that the length of time required to cross Norris Bridge was adequate enough to create a positive impression of the view and area.

In regards to Mr. Sussman's testimony and photographs of marine businesses on the lower Rappahannock River that he found to be inconsistent with a "pristine" aesthetic environment, as noted in the Coalition Brief, Mr. Sussman's photographs were taken miles from the Norris Bridge; the marine businesses were not visible from the Norris Bridge; and Mr. Sussman had no knowledge of the frequency, temporary nature, or even the true character of what was depicted in the photographs.<sup>964</sup> While I agree with Mr. Sussman that the Rappahannock River, as viewed from the Norris Bridge, is not a pristine or untouched landscape, I find that his testimony provides little, if any, help in gauging the impact of the proposed overhead transmission line on the aesthetics of the area. I find that the testimony of public witnesses, such as artist John Barber, provides a more meaningful assessment of the impact of the proposed overhead transmission line on the aesthetics of the area.

Chief Seattle . . . admonished, we do not inherit the earth from our ancestors, we borrow it from our children. And it is in this vein of stewardship that I say, our Rappahannock River and the Norris crossing must not be used merely as a convenience and expediency for the commercial benefit of [Dominion Energy]. The power lines must be run beneath the riverbed to preserve the natural beauty that draws so many people to this beautiful place. The unwise and destructive use of these treasures cannot easily be reversed. I humbly ask the [Commission] not allow this magnificent river scape to be blighted by the proposed gargantuan towers.<sup>965</sup>

Based on the evidence presented in this case, I find that the Proposed 115 kV Overhead Route will create a more cluttered view of the Norris Bridge and the area around the bridge. Moreover, I find that the Proposed 115 kV Overhead Route will significantly and negatively

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<sup>963</sup> Coalition Brief at 25-28; *See e.g.*, R. Carter, Tr. at 63; Hooper, Tr. at 70-71; Dunton, Tr. at 87-88; Clingan, Tr. at 199-200; Fay, Tr. at 207-08; Sullivan, Tr. at 210-11; Blackstone, Tr. at 240.

<sup>964</sup> Coalition Brief at 31-32; Sussman, Tr. at 1422-30.

<sup>965</sup> Barber, Tr. at 127.



impact the currently uninterrupted views of the Rappahannock River and Chesapeake Bay from the Norris Bridge.

Dominion Energy maintained that the Company's Underground Option and the Trenching Options "[will] also change the viewshed by removing existing structures and constructing a transition station on each side of the river."<sup>966</sup> I count the removal of the existing structures in the river and on the Norris Bridge as a positive change to the viewshed, especially the viewshed from the Norris Bridge. On the other hand, the new transition stations, each with an 80-foot tall H-frame structure and ancillary building, will likely negatively impact viewsheds at or near these sites. No Truescape simulations were prepared concerning the transition stations. Nonetheless, having a clear river crossing would seem to more than offset the negative viewshed impacts of the transition stations.

### **Economic Development**

In its brief, the Coalition pointed to the testimony of local citizens and elected leaders "who believe the wisest course for developing the economy starts with preserving the area's natural beauty--particularly the Rappahannock River."<sup>967</sup> Specifically, the Coalition highlighted the testimony of Coalition witness Szyperski that "[the local] economy depends, almost entirely, on our ability to preserve and promote our natural resources."<sup>968</sup>

Dominion Energy contended that the Proposed 115 kV Overhead Route "provides the most reliable, long-term, and least cost electrical solution."<sup>969</sup> The Company maintained that its proposal minimizes economic impact across the Commonwealth by having the least impact on customer bills, and that the additional new capacity will benefit the local economy, as "new projects, upgrades, or rebuilds will not be required to reliably accommodate . . . new load."<sup>970</sup> Dominion Energy does not contest that much of the local economy is dependent on tourism and retirees.<sup>971</sup> However, the Company maintained that "the Respondents have not produced any objective evidence or analysis supporting the claim that an overhead line will harm the local economy."<sup>972</sup>

Lancaster County witness Bellows testified that Lancaster and Middlesex Counties generate more revenue for the Commonwealth than they receive, but their economies are quite fragile, as they are based on tourism and retirees moving to the area.<sup>973</sup> Mr. Bellows stressed the importance of first impressions and asserted that beauty of the Rappahannock River is their "greatest asset in attracting these folks and revenues."<sup>974</sup> The importance of first impressions

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<sup>966</sup> Company Brief at 20.

<sup>967</sup> Coalition Brief at 38.

<sup>968</sup> *Id.*; Exhibit No. 56, at 8.

<sup>969</sup> Company Brief at 69.

<sup>970</sup> *Id.*

<sup>971</sup> *Id.* at 70.

<sup>972</sup> *Id.*

<sup>973</sup> Exhibit No. 40, at 5-6.

<sup>974</sup> *Id.* at 6.

created by the crossing of the Rappahannock River on the Norris Bridge was at the heart of testimony of many of the public witnesses in this proceeding, including local business and civic leaders.<sup>975</sup> Moreover, the importance and reliance of this area on tourism, and the willingness of local leaders to proactively enhance or protect the area’s appeal was demonstrated in the testimony public witness Bott. Mr. Bott testified that Lancaster County has recently eliminated its tax on boats in order to spur the use and development of marinas and an associated tourism contribution to the County of approximately \$40 million.<sup>976</sup>

Among other things, § 56-46.1 A of the Code requires that “the Commission (a) shall consider the effect of the proposed facility on economic development within the Commonwealth . . . .” In the area of the Commonwealth that is the subject of this case, I find that that economy is dependent on tourism and retirees moving to the area. Respondents have provided convincing evidence that the impressions made during the crossing of the Rappahannock River on the Norris Bridge likely have an impact attracting tourist and retirees. Furthermore, as discussed above, the identified need or improvements to service reliability, is to replace aging and deteriorating transmission facilities, and remove those facilities from the Norris Bridge to avoid outages associated with VDOT bridge maintenance. The additional capacity built into the Proposed 115 kV Overhead Route, for which there is no showing of any associated need, would have little or no effect on economic development. Thus, I find that the Proposed 115 kV Overhead Route may have negative impact on local economic development.

**Public Safety**

Respondents raised public safety issues concerning: (i) the impact of an overhead transmission line on rescue efforts of vehicles and drivers falling into the river from the bridge; and (ii) the impact of the transmission towers and proposed new fenders on navigational safety. These issues are discussed separately below.

**Bridge rescues** – Barnhardt witnesses McCranie and George Sanders testified of the possible need for a helicopter rescue of accident victims who have fallen into the river from the bridge.<sup>977</sup> Both witnesses pointed to the operational challenges created by a transmission line with its centerline 100 feet from the bridge.<sup>978</sup>

While I accept the testimony of the Barnhardt witnesses that helicopter rescues at the Norris Bridge would be made more difficult with the construction of the Proposed 115 kV Overhead Route, their testimonies were silent regarding the probability or likelihood of such rescues. On its face, I would expect the probability or likelihood of such rescues to be extremely low. Therefore, I have given this factor very little weight.

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<sup>975</sup> Coalition Brief at 26-27; R. Carter, Tr. at 64-65; Hooper, Tr. at 71-74; Slatford, Tr. at 76-77; J. Carter, Tr. at 83-84; Dunton, Tr. at 87; Clingan, Tr. at 199-200; Fay, Tr. at 208-09; Monroe, Tr. at 198; Prescott, Tr. at 230; Butler, Tr. at 239.

<sup>976</sup> Bott, Tr. at 184-85.

<sup>977</sup> Barnhardt Brief at 21; Exhibit No. 67; Exhibit No. 68.

<sup>978</sup> *Id.*; *Id.*; *Id.*

**Boating impacts** – Dominion Energy stressed that the Corps and VMRC are the agencies responsible for determining whether the Overhead Alternatives, including the proposed fender system at the channel, pose a threat to navigation.<sup>979</sup> The Company advised that neither agency raised specific concerns regarding navigation impacts.<sup>980</sup> The Company also acknowledged that if one of the Overhead Alternatives is approved by the Commission, Dominion Energy will be required to submit a Private Aids to Navigation application to the U.S. Coast Guard (“Coast Guard”), “which will include how the structures and fender system will be lighted and/or marked for boating safety.”<sup>981</sup>

Dominion Energy contended that the Respondents overstate the navigational impacts of the fenders and towers.<sup>982</sup> The Company argued that Respondents failed to support their claims that the proposed fenders and towers will dramatically increase the probability of boating accidents.<sup>983</sup> Dominion Energy pointed out that because the center span of the bridge is already marked by navigation lights, the new fenders should not create a chute or corridor under the center span.<sup>984</sup> The Company also maintained that its alternative, scaled down SK5 fender system, further minimizes adverse impacts.

Coalition witness W. Bruce Sanders testified that boating is “a cornerstone of the local economy.”<sup>985</sup> Mr. Sanders averred that if the fenders and towers are constructed, “it’s going to fundamentally alter the sailing experience and how sailors can enjoy this part of the river and dramatically increase the probability of boating accidents.”<sup>986</sup> The Coalition asserted that the probability of boating accidents will be increased by the introduction of fixed objects (*i.e.*, the additional towers and fenders) and by creating a *de facto* channel through the center span of the bridge and the fenders around the two towers on either side of the bridge’s center span.<sup>987</sup>

In addition, the Coalition and Mr. Sanders distinguished between agencies responsible for navigation and agencies responsible for boating safety; and contended that the Company has failed to discuss boating safety with the Coast Guard, the Virginia Marine Police, and the Lancaster and Middlesex Sheriff’s Departments.<sup>988</sup>

I agree with the Coalition that from a boating safety standpoint, the introduction of the towers and fenders near the center span of the Norris Bridge will introduce new fixed objects, where currently none exist; and tend to create a *de facto* channel that may draw more boat traffic to the center span of the Norris Bridge. Both of these factors will have a negative impact on boating safety by increasing the likelihood of boating accidents. While it is difficult to determine

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<sup>979</sup> Company Brief at 32-33.

<sup>980</sup> *Id.* at 33.

<sup>981</sup> *Id.* at 34; Exhibit No. 128, at 3-4.

<sup>982</sup> *Id.* at 34-36.

<sup>983</sup> *Id.* at 34 (footnote omitted).

<sup>984</sup> *Id.* at 35.

<sup>985</sup> Exhibit No. 57, at 5.

<sup>986</sup> W. Sanders, Tr. at 761-62.

<sup>987</sup> Coalition Brief at 37.

<sup>988</sup> *Id.* at 37; W. Sanders, Tr. at 745-48.

the significance or extent of the increased risk for boating accidents associated with the proposed construction of towers and fenders, the demonstrated importance of boating to the local economy requires that some weight be given to the negative impact of the Proposed 115 kV Overhead Route on boating safety.

### **Baylor Grounds Legislation**

In anticipation of constructing one of the Overhead Alternatives, during the 2015 Session of the Virginia General Assembly, legislation was enacted to vacate public oyster grounds known as the Baylor Grounds.<sup>989</sup> VMRC then approved an 80-foot-wide right-of-way, with 200-foot-wide sections at the river channel to accommodate the fender system.<sup>990</sup> Staff confirmed that the Company's Underground option would require legislation to vacate approximately 5.2 acres of additional Baylor Grounds.<sup>991</sup> Furthermore, Barnhardt Option 2, Soleski Variation 3, and Staff Variation 1 would require vacating approximately 72.79 acres, 5.4 acres, and 35.8 acres of additional Baylor Grounds, respectively.<sup>992</sup> The Overhead Alternatives and Soleski Variation 1 would not require any additional vacating of the Baylor Grounds.<sup>993</sup>

In addition, Dominion Energy stated that Underground Option and the Trenching Options will require authorization from the VMRC and the Corps under new JPAs.<sup>994</sup> On the other hand, if the Commission does not issue a Final Order by July 2017, and the Company is unable to complete construction by July 2018, the Company will likely submit another JPA with the Corps regardless of the alternative.<sup>995</sup>

The necessity for obtaining legislation to vacate additional public oyster grounds and further regulatory approvals weigh against the Underground Option and the Trenching Options. However, because there is nothing in the record to suggest that such actions and approvals may represent a barrier, or are otherwise unlikely to be obtained, I find the little weight should be given to this factor. As discussed above, this is a transmission line that has been de-energized for over 50% of the time since 2010, and the need in this case does not include required added capacity by a specific date. Thus, obtaining the additional approvals should not be a major factor in choosing between alternatives. Indeed, all alternatives at this point are likely to require some additional approvals.

### **Reliability**

Dominion Energy contended that (i) overhead transmission lines are more reliable than underground transmission lines, and (ii) HPFF cable is more reliable than XLPE for underground

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<sup>989</sup> Company Brief at 28; Exhibit No. 8, Appendix Attachment II.A.4.a.

<sup>990</sup> *Id.*; *Id.* Appendix at 126.

<sup>991</sup> Staff Brief at 23; Exhibit No. 132 at Rebuttal Schedule 1, page 5, notes g, l.

<sup>992</sup> *Id.*; *Id.*; Company Brief at 29.

<sup>993</sup> Exhibit No. 89, Rebuttal Schedule 1.

<sup>994</sup> Company Brief at 38.

<sup>995</sup> *Id.*



project. In this case, Mr. Kaminsky testified that since 2010 there have been seven unplanned outage events that occurred on the Norris Bridge water crossing of Line # 65, which is 30 times the annual rate/mile goal set by Dominion Energy, even with the line de-energized for over 50% of the time since 2010.<sup>1003</sup> As discussed above, the identified need or improvements to service reliability, is to replace aging and deteriorating transmission facilities, and remove those facilities from the Norris Bridge to avoid outages associated with VDOT bridge maintenance. Therefore, I find that the Overhead Alternatives, the Underground Option (appropriately sized), or the Trenching Options (appropriately sized and as further limited below) would provide the required improvements in service reliability in this case.

In regard to reliability from a HPFF or XLPE cable perspective, the Company's support for HPFF appeared to be based on its history and familiarity with such cable installations.<sup>1004</sup> Company witness Tirinzoni testified that "[w]hile I am not against XLPE cables as a general matter and believe they are the appropriate technology choice for certain situations, I do agree that there are manufacturing concerns and a lack of operating history that make the cables riskier than more time-proven options."<sup>1005</sup> However, Mr. Tirinzoni also testified that the trenching of submarine XLPE cable is specialized to a few manufacturers that typically contract to furnish, manufacture, deliver and install such cable on a fixed or turnkey basis, with the manufacturer responsible for any failures.<sup>1006</sup>

Because this case is not driven by a need to increase capacity, much of the manufacturing, installation, and operating risks associated with either underwater HPFF or XLPE cables can be managed through configuration of the cable installation. For example, Dominion Energy asserted that its Underground Option provided a robust alternative "since there will be two sets of cables installed in two separate steel pipes protecting the cables."<sup>1007</sup> Company witness Reitz testified that if one cable fails, the other cable can be operated at 57% of full capacity.<sup>1008</sup> Similarly, Soleski Variation 3 is a two-trench configuration that can be sized to provide a design capacity of 217 MVA, with operation of the line in only one trench sized to provide capacity to meet current and reasonably foreseeable demand.<sup>1009</sup> Therefore, if the Commission ultimately chooses an underground option, and the Company is directed to seek bids from XLPE submarine transmission cable companies for the installation of an appropriately sized option on a turnkey basis, with such bids to be compared to the Company's estimated cost of installing appropriately sized HPFF transmission cable via HDD, I recommend that the XLPE installation be based on the Soleski Variation 3 configuration of two three-core XLPE submarine cables installed in two trenches with one in each trench.

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<sup>1003</sup> Exhibit No. 16, at 5.

<sup>1004</sup> Company Brief at 66.

<sup>1005</sup> Exhibit No. 115, at 3.

<sup>1006</sup> Tirinzoni, Tr. at 1373-76.

<sup>1007</sup> Company Brief at 67.

<sup>1008</sup> *Id.*; Reitz, Tr. at 1195.

<sup>1009</sup> *See, e.g.*, Exhibit No. 61.

## County Comprehensive Plan

Lancaster County pointed to the testimony of Lancaster County witness Bellows and argued that the Overhead Alternatives are inconsistent with the County's Comprehensive Plan.<sup>1010</sup> Mr. Bellows maintained that the Comprehensive Plan emphasizes the importance of the Rappahannock River and protection of natural assets:

Lancaster County is a coastal community that has . . . approximately 330 miles of tidal shoreline. The environment created by this interaction between the land and water along the County's coasts has helped to form our community's identity. Residents who want to live in a scenic setting, citizens who come to the water for recreation, and watermen who earn a living off the rich resources found here value this area of land and water. The importance of shoreline areas to Lancaster County's citizens . . . is reflected in their desire and actions to protect these areas.<sup>1011</sup>

Lancaster County contended that the Overhead Alternatives will have a significant negative impact on: (i) scenic assets, especially from the center of the River; (ii) the ability of citizens to safely use the water for recreation; and (iii) the County's base industry – tourism.<sup>1012</sup>

Dominion Energy argued that the “objectives discussed in Lancaster County's Comprehensive Plan are not required considerations under Virginia Law.”<sup>1013</sup> The Company pointed to § 56-46.1 B and stated that “the Commission shall determine that a line is needed and that the corridor or route the line is to follow will reasonably minimize adverse impact on the scenic assets, historic districts, and environment of the area concerned.”<sup>1014</sup> Dominion Energy asserted that the Proposed 115 kV Overhead Route meets these requirements and is “the least expensive and most robust and reliable long-term solution, which has the shortest construction time, and solves the need.”<sup>1015</sup>

As outlined in the beginning of the Discussion Section, the Commission must undertake a multifactorial balancing, which includes the requirement in § 56-46.1 A that “the Commission shall receive and give consideration . . . if requested by any county or municipality in which the facility is proposed to be built, to local comprehensive plans that have been adopted . . .” In this case, I find that Lancaster County's Comprehensive Plan further strengthens the findings discussed above in the Viewshed, Economic Development, and Public Safety Sections.

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<sup>1010</sup> Lancaster County Brief at 17-20; Exhibit No. 40, at 2-3.

<sup>1011</sup> *Id.* at 18; *Id.* at 3, Attached Exhibit JDB-1, at 6.

<sup>1012</sup> *Id.* at 18-19.

<sup>1013</sup> Company Brief at 40.

<sup>1014</sup> *Id.*

<sup>1015</sup> *Id.*

## Other Environmental Considerations

Staff found that many of the environmental impacts of the Overhead Alternatives, the Underground Option, and Trenching Options (other than Barnhardt Option 2) are comparable.<sup>1016</sup> For example, Staff found that all of these alternatives avoided wetlands and subaquatic vegetation by either spanning across or drilling underneath these resources.<sup>1017</sup> For other impacts, such as potential impacts to historic resources, Staff was unable to identify any significant difference among these alternatives.<sup>1018</sup> Nonetheless, Staff pointed out that the drilling and/or trenching alternatives would disturb more river bottom and require additional right-of-way than the Overhead Alternatives, including acreage necessary for transition stations on each side of the river.<sup>1019</sup> Staff also advised that “in Middlesex County, the expanded right-of-way necessary for underground construction could implicate at least one dwelling within 60 feet of the route . . . .”<sup>1020</sup>

Therefore, I find that environmental considerations, other than viewshed, tend to favor the Overhead Alternatives. However, because such other environmental considerations are temporary and of relatively minor impact, I find that such other environmental considerations should not be given substantial weight in this proceeding.

## Weighing of Factors

One of the keys to this case is that the identified need for the Rebuild Project is not capacity driven. Indeed, the Rappahannock River crossing segment of Line # 65 has been out of service for approximately half of the time since 2010, and there is nothing in the record to suggest that the current 147 MVA capacity of this segment is or is likely to become insufficient. Consequently, little weight was given to Dominion Energy’s contention that the Proposed 115 kV Overhead Route was the most robust and reliable long-term solution, which has the shortest construction time.<sup>1021</sup>

Instead, this case boils down to a determination of whether the added cost of an underground option is reasonable in light of the impact the Proposed 115 kV Overhead Route would have on the viewshed, economic development, and public safety. While the record in this case does not permit a precise estimate of the added cost of an underground option, as discussed more fully above, the likely added cost of an underground option is substantial. However, in this case I find that the Proposed 115 kV Overhead Route will significantly and negatively impact the viewshed, especially the currently uninterrupted views of the Rappahannock River and Chesapeake Bay from the Norris Bridge. Moreover, this viewshed is vital to a local economy dependent on tourism and retirees moving to the area. Closely tied to an economy dependent on tourism and retirees moving to the area is the negative impact of the added towers and fenders

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<sup>1016</sup> Staff Brief at 24.

<sup>1017</sup> *Id.*

<sup>1018</sup> *Id.*

<sup>1019</sup> *Id.*

<sup>1020</sup> *Id.* at 25-26.

<sup>1021</sup> *See*, Company Brief at 13.



may have on boating. In this case, I find that the negative impacts of the Proposed 115 kV Overhead Route outweigh the added cost of an underground option.

**FINDINGS AND RECOMMENDATIONS**

In conclusion, based on the evidence and for the reasons set forth above, I find that:

1. There is a need to replace the aging and deteriorating transmission Line # 65 as it crosses the Rappahannock River at and on the Norris Bridge;
2. None of the on-bridge variations met the identified needs for the project;
3. The Underground Option and Trenching Options should be sized base on a design starting point of 217 MVA to satisfy the identified need;
4. The Underground Option or Soleski Variation 3 best satisfies the statutory requirement that the line is needed and that the corridor or route the line is to follow will reasonably minimize adverse impact on the scenic assets, historic districts and environment of the area concerned; and
5. Recommendations contained in the Second DEQ Report should be adopted by the Commission as conditions of approval.

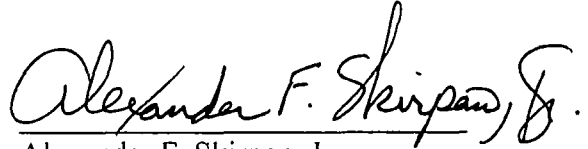
In accordance with the above findings, ***I RECOMMEND*** that the Commission enter an order that:

1. ***ADOPTS*** the findings in this Report;
2. ***GRANTS*** the Company’s Application to construct the proposed transmission facilities as specified above;
3. ***APPROVES*** the Company’s request for a certificates of public convenience and necessity to authorize construction of the proposed transmission facilities as specified; and
4. ***DISMISSES*** this case from the Commission’s docket of active cases.

**COMMENTS**

The parties are advised that pursuant to Rule 5 VAC 5-20-120 C of the Commission’s Rules of Practice and Procedure, any comments to this Report must be filed with the Clerk of the Commission in writing, in an original and fifteen copies, within twenty-eight days from the date hereof. The mailing address to which any such filing must be sent is Document Control Center, P.O. Box 2118, Richmond, Virginia 23218. Any party filing such comments shall attach a certificate to the foot of such document certifying that copies have been mailed or delivered to all other counsel of record and to any party not represented by counsel.

Respectfully submitted,



Alexander F. Skirpan, Jr.  
Senior Hearing Examiner

A copy hereof shall be sent by the Clerk of the Commission to all persons on the official Service List in this matter. The Service List is available from the Clerk of the State Corporation Commission, c/o Document Control Center, 1300 East Main Street, First Floor, Tyler Building, Richmond, VA 23219.

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