Surry-Skiffes Creek-Whealton 500/230 kV

Correlating the Scope of the Proposed Compensatory Mitigation to the Adverse Impacts and/or Value of Impacted Resources

September 16, 2016

Introduction

As Dominion developed its proposed mitigation, it has considered various ways in which to determine how to correlate the scope of its proposed compensatory mitigation to adverse effects from its Surry-Skiffes Creek-Whealton 500/230 kV project ("Project"). As recognized in numerous places in the record regarding the Project, evaluating the qualities and values of historic resources (for example, related to a visual resources, or setting and feeling), and potential visual impacts thereon from an activity, is inherently subjective. As such, these types of evaluations often do not readily lend themselves to providing a direct, quantitative assessment, as opposed to a direct qualitative assessment, of visual impacts and the value of the resources.

In some cases, as reflected in comments from certain consulting parties, project proponents and action agencies use surrogate or indirect methods to attempt to quantify visual impacts and/or monetize the value of the impacted viewshed or resource. This typically is done to assist in determining an appropriate scope and/or amount of compensatory mitigation. Early in the mitigation development process, Dominion preliminarily evaluated these types of methods to provide it an appropriate starting point regarding the development of compensatory mitigation in this matter. This document provides an evaluation of several quantitative methods that provide assistance in correlating the scope of the compensatory mitigation to the adverse effects from the Project. The evaluation demonstrates that the scope of mitigation proposed in the draft memorandum of agreement ("MOA") to resolve adverse effects on historic properties more than mitigates and resolves the adverse effects in this case, and provides substantial added value to the impacted qualities of the resources at issue and the landscape as a whole.

Evaluation

There are any number of methods that could be used as surrogates to attempt to quantify the effects a project and/or how to monetize the effects or the value of the service (sometimes called an ecoservice) a particular resource provides.[1] In a similar context, to quantify the effects from the Susquehanna to Roseland 500 kV transmission line project, as well as to assist in scoping compensatory mitigation, the National Park Service ("NPS") and a permit applicant used a method that calculated the acreage from which project components (*i.e.*, the towers) could be seen.[2] NPS utilized a slightly modified version of this method to attempt to quantify impacts

[1] *See, e.g.*, Letter from M. Caldwell, National Park Service ("NPS"), to Col. J. Kelly, U.S. Army Corps of Engineers ("Corps") at 8-10 (discussing the quantification and monetization of impacts and ecoservices and citing reports and examples of the same).

[2] NPS, Susquehanna to Roseland 500 kV Transmission Line Right-of-Way and Special Use Permit, Final Environmental Impact Statement, App. N (Aug. 2012) ("NPS FEIS") (this project referred to as "SR Line"). This method resulted in NPS deciding that the applicant would spend at least $56 million in compensatory mitigation,

from the Project.[3] Dominion previously noted just some of the shortcomings of the NPS visual impact analysis ('VIA") for the Project.[4] Nevertheless, below we first present an analysis that provides a monetization of effects based on the quantification thereof in the NPS VIA. Thereafter, we provide three similar monetization/quantification analyses using inputs from the SR Line analysis, which, as noted, was used and approved by NPS. Finally, we provide a different type of analysis that is based on data related to the economic choices individuals make, namely park entrance fees and an evaluation of overall park-related spending, in order to estimate the monetary value of the visual resources.

1. Correlating Mitigation Using the NPS VIA.

The NPS VIA sought to quantify the effects of the Project in two scenarios, one based on the existing vegetation, and one based on no vegetation. Assuming the validity of all of NPS' calculations and assumptions, NPS concluded that the Project would visually impact 20,691.8 acres in a no vegetation scenario, and would visually impact 9,955.97 acres considering vegetation as it currently exists.[5] NPS did not provide any additional information beyond this quantification, except to state that, in its view, these two numbers represented "a high and low end of projected impacts" from the Project, and that "it is logical to assume an impact value somewhere between the high and low ends."[6]

As discussed below, Dominion developed its proposed mitigation for the Project using methodology similar to the SR Line mitigation evaluation. In so doing, in August 2015, Dominion evaluated the average sales price of properties within the past five years in James City, Isle of Wight, and Surry Counties, the counties that are adjacent to and, for portions, are within the area of potential effects ("APE") for the Project.[7] In performing this Project mitigation

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which covered impacts to historic properties in addition to all other identified impacts (*e.g*., wetlands) related to the NPS, Record of Decision, Susquehanna to Roseland 500 kV Transmission Line Right-of-Way and Special Use Permit at 15 (Oct. 1, 2012) ("NPS ROD"). For comparison to this Project, the SR Line is 146 miles long, and cuts directly through three national park units over approximately 4.3 miles, as well as over a Congressionally designated Wild and Scenic river. The SR Line visually effects 16 historical structures (and physically destroys one other) and visually and physically impacts 18 cultural landscapes. Its construction may also directly affects two archeological sites. NPS FEIS at xi. Based on post-decision negotiations, the total compensatory mitigation package was increased to $66 million. *Nat'l Parks Conserv. Ass'n v. Jewell*, 965 F. Supp. 2d 67, 77 (D.D.C. Aug. 30, 2013). According to the National Historic Preservation Act Section 106 Compliance Plan for the SR Line, of the $66 million, $13.67 million is designated for monetized compensatory mitigation related to effects to historic and cultural resources, including effects to the three national park units, although additional non-monetized mitigation activities may be required.

[3] NPS, *Analysis of Visual Impacts to Historic Properties: Proposed Dominion Surry-Skiffes Creek-Whealton Alternatives* at 6 (Sept. 15, 2015) ("NPS VIA").

[4] Dominion, Comments on *Analysis of Visual Impacts to Historic Properties, Proposed Dominion Surry-Skiffes Creek-Whealton Alternative,* prepared by National Park Service-Northeast Region dated September 15, 2015 (Nov. 13, 2015) ("Dom. Response").

[5] NPS VIA at 16.

[6] *Id*. at 16, 17.

[7] Dominion did this because when attempting to quantify/monetize the impacts of the SR Line, after determining the potential number of acres visually impacted by the SR Line, NPS and the permit applicant multiplied the potentially impacted acres by a conservative estimation of the value of an acre of land in the area using an average sales price.

evaluation, Dominion screened the properties to those that are similar to the historic properties in terms of size, use, landscape, vegetation, and development (*i.e.*, generally not developed). This resulted generally in the evaluation and comparison of properties in agricultural or rural residential zoned areas, and properties that were greater than twenty-five acres. The average, geometric mean, standard deviation, and median sales price per acre were provided for all properties, which resulted in $3,935/acre, as well as for waterfront properties, which resulted in $5,101/acre. The additional aesthetic value (*e.g.*, setting, feeling, association) of the waterfront properties is reflected in the price per acre increase from $3,935/acre to $5,101/acre. Using NPS' acreage impact numbers for the two vegetative scenarios, again assuming the validity of all underlying calculations, and using a value of $5,101/acre, would result in the following monetization of impacts:

	Acres Impacted	Price Per Acre	Monetized Value
Existing Vegetation	9,955.97	$5,101	$50,785,402.97
No Vegetation	20,691.8	$5,101	$105,548,871.80

The proposed compensatory mitigation for the Project in the draft Memorandum of Agreement ("MOA") is $85 million. That is consistent with NPS' statement that the impact value, logically, is "somewhere between [its] high and low end[]" estimates (as monetized in the table above). Indeed, the proposed compensatory mitigation is closer to NPS' high end, no vegetation scenario (*i.e.*, it is 13.7 million above the average), than to NPS' existing vegetation scenario. That latter scenario, as NPS and other consulting parties claim, has accurately described the landscape since at least the early 1600s when Captain John Smith and his party arrived in the Jamestown area, and likely earlier. Thus, even using NPS' proposed impact calculations, the proposed mitigation very conservatively accounts for the Project's impacts.

It also is important to note that there are a number of flaws in NPS' calculations that inflate its high and low end impact conclusions.[8] For example, in both scenarios, NPS calculates impacts to *every* acre of Jamestown and the Colonial Parkway together as impacts to the Colonial National Historic Park ("NHP"). This is contrary to the manner in which the historic properties were identified and evaluated, and adverse effects determined, by the Corps, and as concurred to by the Virginia State Historic Preservation Officer ("SHPO"). This matters because it results in NPS adding a substantial amount of potentially impacted acreage that otherwise is not impacted under exiting vegetative conditions.[9] For example, under existing vegetative conditions, the record is clear that the Project's towers would be minimally visible, but only from the island's eastern tip (Black Point). Structures associated with the land based portion of this segment of the transmission line project as the line comes on shore in James City County would be only minimally visible over the tops of the trees. For the river based portion of the Project, visibility would also be minimal and would be limited to the tallest structures within the river crossing,

[8] Some of these flaws were noted in the Dom. Response. *See supra* note 4.

[9] NPS does not explain from which historic property (Jamestown or Colonial Parkway) the acreage assigned to Colonial NHP comes.

structures 582/21 and 582/22 and 582/25 and 582/26.[10] While it is not known exactly how many acres from which the Project could be seen from Black Point, it suffices to say that in light of the vegetation in that area, ninety-two acres would be an overly conservative estimate.[11] Similarly, under existing vegetative conditions, the only part of the Colonial Parkway from which the Project could be seen is the segment of the road in the APE located approximately between College Creek and Back Creek, which is approximately 3.75 to 4 miles long. The parkway generally is a three-lane road (two travel lanes and portions with a center turning lane and portions with turn-off lanes and pull-off-overlook areas).[12] According to the Federal Highway Safety Administration, twelve feet is the recommended size for highway lanes, not including the shoulder, *etc*.[13] Assuming three lanes and additional room for the shoulder, *etc*., the parkway in this area would be approximately 100 feet wide, perhaps 200 feet wide to be conservative. Dominion also located a 1988 report from NPS to Congress regarding the parkway that stated that the average width of the parkway, which would include the roadway as well as the other federally owned buffer /landscaped area, is 500 feet.[14] Using 500 feet for the width of the parkway to account for all of the parkway area from which the Project might be seen, and 4 miles for the length of that area, the number of impacted acres would be 242.42 acres. Adding that number to the potentially impacted acreage from Black Point, the total potentially impacted acreage from these two historic properties should be approximately 334.42 acres. Yet, NPS uses 1,192.71 acres for its calculations, inflating the potential area of impact by over 3.5 times.

NPS' analysis also incorrectly accounts for distance decay. As NPS notes, "[d]istance decay refers to the decline in visibility of an object as the distance between that object and the viewer increases."[15] NPS initially followed the distance decay model it used for the SR Line, which Dominion believes is appropriate. That model "sets out categories or zones of distance from an object (the proposed transmission towers in this case) to the landscape from which the object is viewed. For each of these zones a distance decay function is applied. This function is based on the estimated percentage of visibility diminishment for the distance."[16] In this case, however,

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[10] Cultural Resources Effects Assessment, Surry-Skiffes Creek-Whealton Transmission Line Project, Surry, James City, and York Counties, Cities of Newport News and Hampton, Virginia § 3.33.2.4 (Sept. 15, 2015) ("CREA"). Line of sight ("LOS") analysis shows that portions of other towers may be partially visible. *Id*.

[11] While Dominion believes that the actual number would be substantially lower, 92 acres is used here because it is used below in Dominion's separate, overly conservative calculations based on the SR Line model. Dominion suspects that NPS would agree with that point, as it lists only 78.05 acres of land in the Colonial NHP (*i.e.*, land from both Jamestown and the Colonial Parkway) that falls within 2 to 4 miles from the Project, which is the distance range in which Black Point falls. CREA § 3.33.2. Dominion notes further that while not the subject of additional LOS analysis, as set forth in note 10 above, it is likely that some towers also may be partially visible from other areas on the eastern end of Jamestown Island, although those areas are comprised mostly of tidal marsh and would not be considered places from which visitors would view the landscape, much less key observation points.

[12] *See* NPS, Colonial Parkway, at https://www.nps.gov/colo/parkway.htm (last visited Aug. 17, 2016).

[13] Federal Highway Administration, Safety: Lane Width, at http://safety.fhwa.dot.gov/geometric/pubs/mitigationstrategies/chapter3/3_lanewidth.cfm (last visited Aug. 17, 2016).

[14] NPS, Colonial Parkway, Historical Written Historical and Descriptive Data at 2 (1988) ("NPS 1988").

[15] NPS VIA at 6.

[16] *Id*.

NPS decided to modify the model based on what it called "substantial differences in landscape type and topography." It studied projects of visibility across open water, such as wind turbine projects, and found that in such circumstances the objects at issue could be a "major focus of visual attention at distances of up to 10 miles, and were noticeable to casual observers at distances of almost 18 miles."[17] Based on that, and because a portion of the Project was over a river, NPS decided to adjust the distance decay functions from the SR Line model upward (*i.e.*, to reflect less visual diminishment over distance).

Record evidence demonstrates that adjusting the SR Line model's distance decay upward was in error. Specifically, Truescape photography of the existing transmission line at the James River Bridge and simulations of the Project demonstrate that the Project would not be visible anywhere near distances of 10 miles in this area of the James River. Instead, this information demonstrates that transmission lines located over the James River in the area near the Project are visible at the background/horizon at approximately 3-3.5 miles, but certainly do not constitute a "major focus of visual attention." At 4.25 miles and beyond, the towers fade into the background/horizon. The Corps evaluated these photographs and simulations against their own personal, in-field observations of the transmission line at the James River Bridge, as well as the Project area, and found them to be reliable and accurate.[18] While NPS' analysis regarding distance decay may have proven true in other open water circumstances related to solid wind turbines and their appurtenant blades, record evidence shows that modifying the SR Line model distance decay upwards substantially was not appropriate here, particularly with more moderately-sized lattice tower structures that allow the background to show through. By adjusting the distance decay model upward, NPS' calculations further inflate the potential number of acres impacted.

It also should be noted that NPS' high end/no vegetation scenario is purely hypothetical and speculative; NPS simply provides no reason why, after more than 400 years, the Corps should reasonably anticipate (even in a worst case scenario) a complete loss of vegetation. That scenario also does not appear to account for the local topography (*e.g.*, elevations, bends in the river) that will inhibit views of the project from various areas, as well as any manmade obstructions to such views.[19] These facts further suggest that NPS' impact calculations are artificially inflated.

Finally, NPS' calculations double count numerous acres because it includes the acreage of historic properties within the APE when it addresses them (*e.g.*, the Colonial NHP), and then includes them again when counts the acreage for the Captain John Smith Trail/Historic District which includes all of the historic properties, the boundaries for which are defined as co-existent with the Indirect APE.[20] The double counting further inflates the potential number of acres impacted.

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[17] *Id*.

[18] Email from R. Steffey, Corps, to State Historic Preservation Office("SHPO"), Advisory Council for Historic Preservation, and Consulting Parties (June 20, 2016) ("Corps Email").

[19] *See* Dom. Response at 16-17.

[20] *See id*. at 17.

In conclusion, the proposed compensatory mitigation of $85 million fits comfortably within the monetized range of impacts using the NPS VIA's quantification of impacts, assuming NPS' calculations and assumptions are valid. Indeed, under this model, the proposed mitigation could be considered quite conservative, as it is over $13 million closer to NPS' high-end/no vegetation scenario. When factoring in the errors and faults of the NPS VIA, which, among other things, lead to inflated impact calculations (as discussed above and in the Dom. Response), it becomes even clearer that the proposed mitigation more than accounts for monetized impacts.

2. Correlating Mitigation Using the SR Line Model.

The following provides three different sets of calculations to monetize the effects of the Project using the model NPS and the permit applicant used for the SR Line. A detailed discussion of the methodology for the SR Line evaluation is provided in Appendix N of the NPS FEIS.[21] Generally, like the NPS VIA, the SR Line model first determined the distance decay function based on available and appropriate literature.[22] Next, the SR Line model provides an intensity level factor for each distance range. The SR Line model intended the analysis to address all potential environmental, historic, and cultural impacts (and not just visual impacts), the analysis looked at all potentially affected resource topic areas, of which there were 18, and identified those topics where there were visual or wildlife movement concerns, of which there were 8.[23] The number of identified topics with concerns (8) were divided by the number of evaluated topics (18) to produce a baseline intensity level factor of 0.44. The SR Line distance decay functions and intensity level factors for each distance range are set out in Table 1.

[21] A copy of the NPS FEIS can be found here: NPS, Susquehanna to Roseland 500kV Transmission Line Right-of-Way and Special Use Permit Final Environmental Impact Statement, *at* https://parkplanning.nps.gov/document.cfm?documentID=49285&parkID=220&projectID=25147 (last visited Aug. 25, 2016).

[22] Like the NPS VIA, the SR Line used distance decay function values based on Fisher, P.F. (1994) Probable and fuzzy models of the viewshed operation, among other sources. *See* NPS FEIS, App. N at pdf pg. 106; NPS VIA at 6, n.5. As discussed above, based on the photographs and simulations of the area, the use of the SR Line distance decay function is appropriate.

[23] NPS FEIS, App. N at pdf pg. 108-09. These topic areas were: (1) geologic resources; (2) floodplains; (3) wetlands; (4) vegetation; (5) landscape connectivity and wildlife habitat; (6) special status species; (7) rare and unique communities; (8) archeological resources; (9) historic structures; (10) cultural landscapes; (11) socioeconomics; (12) infrastructure, access, and circulation; (13) visual resources; (14) soundscapes; (15) visitor use and experience; (16) wild and scenic rivers; (17) park operations; and (18) health and human safety. *Id*. While not potentially impacting the same resource topics, based on the record, the Project also could be said to potentially create concern for 8 topic areas: areas 3, 6, 8, 10, 11, 12, 13, 15, and 18.

Table 1

Description	Distance Range	Distance Decay Function	Intensity Level Factor
Immediate Foreground	0-feet to ½ mile	1	0.44
Foreground	½ - 1 mile	0.66	0.293
Middleground	1-2 miles	0.33	0.147
Background	2-3.5 miles	0.10	0.044
Near Horizon	3.5-7 miles	0.05	0.022

Utilizing the SR Line model, including its intensity level factors for each range (see Table 1 and footnote 22), and the $5,101/acre used above for the NPS VIA analysis, Table 2 sets out the monetization of effects from the Project. We note that for purposes of this analysis, Dominion attempted to mirror to the extent possible the NPS VIA analysis for comparison purposes.[24] To be as conservative as possible, the acreage numbers also include all acreages located within the APE that are associated with these properties, regardless of whether or not they are directly or indirectly visually affected by the proposed river crossing. We note, however, that the acreage calculations are made separately for the Colonial Parkway and Jamestown. Also, it is important to note that the acreage calculations for the respective properties triple counts Jamestown Island and double counts Hog Island and Caters Grove, as they are also included in the Colonial National Historic Park and Jamestown/Hog Island Cultural Landscape properties respectively.

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Given that the NPS VIA analysis did not include Ft. Crafford or the Battle of Yorktown, resources not originally determined to be adversely effected, Dominion followed suit and did not include these two resources in its analyses. These two resources were not determined to be adversely effected by the Corps until later in the process after exploration into potential mitigation had begun. In any event, the location of these two properties demonstrates that their acreage generally would be accounted for by NPS' and Dominion's inclusion of the acreage for the Captain John Smith Chesapeake National Historic Trail/Eligible Historic District. Specifically, as set forth in CREA § 3.28 and Figure 123, the acreage associated with the Ft. Crafford property is 7 acres and is located wholly within the Eligible Historic District. At a distance of 3.28 miles from the Project, even if this acreage was included (and thus double counted), it only would result in a negligible change in the NPS and Dominion analyses results. Similarly, as set forth in CREA § 3.34 and Figure 156, while the Battle of Yorktown in total is 63,960 acres, the vast majority of that area is outside of the APE. For those portions within the APE, with one exception discussed below, all of the Battle of Yorktown acreage from which the Project might be seen is, like Fort Crafford, located wholly within the Historic District, and thus, is accounted for in the analyses. The exception to the Battle of Yorktown area not accounted for by the Eligible Historic District is the area of the Battle of Yorktown within the APE for the 230 kV line, as depicted on Figure 156. Nevertheless, as set out in the CREA § 3.34, this area contains an existing 230 kV line, the impacts from which in the Battle of Yorktown predate the Project, and thus, the acreage need not be considered here. This is particularly true because the Project work in this are consists almost of entirely of like-tower replacement and reconductoring. Dominion acknowledges, however, that a minor portion of its work in this area includes the installation of new towers or towers that are larger than the existing towers. See CREA § 3.34.3, Table 6. That work, however, involves minimal acreage, the inclusion of which would result in only negligible changes in the NPS and Dominion analyses.

Table 2

			Distance	Acreage	ILF	Cost per Acre	Total Value
Carters Grove			0 to 0.5	2.5	0.44	$5,101.00	$5,611.10
			0.5 to 1	199.2	0.293	$5,101.00	$297,722.93
			1 to 2	96.3	0.147	$5,101.00	$72,210.27
			2 to 3.5	0	0.044	$5,101.00	$0.00
			3.5 to 7	0	0.022	$5,101.00	$0.00
		Area Sub-total		298			$375,544.29
Colonial National Historical Park/Parkway			0 to 0.5	0	0.44	$5,101.00	$0.00
			0.5 to 1	0	0.293	$5,101.00	$0.00
			1 to 2	0	0.147	$5,101.00	$0.00
			2 to 3.5	180.7	0.044	$5,101.00	$40,557.03
			3.5 to 7	2512.3	0.022	$5,101.00	$281,935.33
		Area Sub-total		2693			$322,492.36
Hog Island Wildlife Management Area			0 to 0.5	280	0.44	$5,101.00	$628,443.20
			0.5 to 1	711.1	0.293	$5,101.00	$1,062,805.08
			1 to 2	678.3	0.147	$5,101.00	$508,621.22
			2 to 3.5	11.3	0.044	$5,101.00	$2,536.22
			3.5 to 7	0	0.022	$5,101.00	$0.00
		Area Sub-total		1680.7			$2,202,405.72
			0 to 0.5	0	0.44	$5,101.00	$0.00
Jamestown NHS			0.5 to 1	0	0.293	$5,101.00	$0.00
			1 to 2	0	0.147	$5,101.00	$0.00
			2 to 3.5	92	0.044	$5,101.00	$20,648.85
			3.5 to 7	1440.1	0.022	$5,101.00	$161,610.90
		Area Sub-total		1532.1			$182,259.75
Jamestown Island/Hog Island/John Smith Water Trail Cultural Landscape/Eligible Historic District			0 to 0.5	4250.9	0.44	$5,101.00	$9,540,890.00
			0.5 to 1	4228.6	0.293	$5,101.00	$6,320,035.96
			1 to 2	9277	0.147	$5,101.00	$6,956,330.62
			2 to 3.5	14008.2	0.044	$5,101.00	$3,144,056.44
			3.5 to 7	32757.8	0.022	$5,101.00	$3,676,145.83
		Area Sub-total		64522.5			$29,637,458.85
						TOTAL	**$32,720,160.97**

As discussed, and consistent with the SR Line model, the analysis reflected above in Table 2 uses intensity level factors based on the number of resource topics for which the Project may cause concern. *See supra* note 22. Unlike in the SR Line case, in which NPS and the permit applicant sought to quantify/monetize all of the impacts of a project running directly through three national park system units, the primary focus of the evaluation related to the Project has been visual impacts to historic properties and resources. Consistent with the implementing regulations of Section 106 of National Historic Preservation Act, the evaluation of visual effects on historic properties is focused on impacts to the characteristics of the property that qualify it for listing on the National Register, in light of the seven aspects of integrity (design, materials, setting, feeling, association, location, workmanship). 36 C.F.R. § 800.5(a)(1). Consistent with the CREA, it conservatively was determined that only three (setting, feeling, and association) aspects of integrity were potentially impacted by the Project. Dividing the number of affected aspects (3) by the total number of aspects (7) resulted in a baseline intensity level factor of 0.42. This baseline intensity level factor was then multiplied by the distance decay function for each distance range to arrive at the corresponding intensity level factor, the results of which are set forth in Table 3.

Table 3

Description	Distance Range	Distance Decay Function	Intensity Level Factor
Immediate Foreground	0-feet to ½ mile	1	0.42
Foreground	½ - 1 mile	0.66	0.27
Middleground	1-2 miles	0.33	0.13
Background	2-3.5 miles	0.10	0.04
Near Horizon	3.5-7 miles	0.05	0.02

Utilizing the SR Line model, the intensity level factors for each range set out in Table 3, and the $5,101/acre used above, Table 4 sets out the monetization of effects from the Project. The calculations in Table 4 are based on the same conservative acreage inputs as discussed above for Table 2.

Table 4

			Distance	Acreage	ILF	Cost per Acre	Total Value
Carters Grove			0 to 0.5	2.5	0.42	$5,101.00	$5,356.05
			0.5 to 1	199.2	0.27	$5,101.00	$274,352.18
			1 to 2	96.3	0.13	$5,101.00	$63,859.42
			2 to 3.5	0	0.04	$5,101.00	$0.00
			3.5 to 7	0	0.02	$5,101.00	$0.00
		Area Sub-total		298			$343,567.65
Colonial National Historical Park/Parkway			0 to 0.5	0	0.42	$5,101.00	$0.00
			0.5 to 1	0	0.27	$5,101.00	$0.00
			1 to 2	0	0.13	$5,101.00	$0.00
			2 to 3.5	180.7	0.04	$5,101.00	$36,870.03
			3.5 to 7	2512.3	0.02	$5,101.00	$256,304.85
		Area Sub-total		2693			$293,174.87
Hog Island Wildlife Management Area			0 to 0.5	280	0.42	$5,101.00	$599,877.60
			0.5 to 1	711.1	0.27	$5,101.00	$979,376.70
			1 to 2	678.3	0.13	$5,101.00	$449,801.08
			2 to 3.5	11.3	0.04	$5,101.00	$2,305.65
			3.5 to 7	0	0.02	$5,101.00	$0.00
		Area Sub-total		1680.7			$2,031,361.03
			0 to 0.5	0	0.42	$5,101.00	$0.00
Jamestown NHS			0.5 to 1	0	0.27	$5,101.00	$0.00
			1 to 2	0	0.13	$5,101.00	$0.00
			2 to 3.5	92	0.04	$5,101.00	$18,771.68
			3.5 to 7	1440.1	0.02	$5,101.00	$146,919.00
		Area Sub-total		1532.1			$165,690.68
Jamestown Island/Hog Island/John Smith Water Trail Cultural Landscape/Eligible Historic District			0 to 0.5	4250.9	0.42	$5,101.00	$9,107,213.18
			0.5 to 1	4228.6	0.27	$5,101.00	$5,823,923.92
			1 to 2	9277	0.13	$5,101.00	$6,151,857.01
			2 to 3.5	14008.2	0.04	$5,101.00	$2,858,233.13
			3.5 to 7	32757.8	0.02	$5,101.00	$3,341,950.76
		Area Sub-total		64522.5			$27,283,177.99
						TOTAL	**$30,116,972.23**

Dominion recognizes that there can be a debate about the proper way in which to calculate the intensity level factor. In using the SR Line model and the Section 106 seven aspects of integrity, Dominion has provided two ways. In the NPS VIA, NPS provides another by using a ratio based on the number of towers potentially visible from the property in question.[25] To provide additional perspective, and to remove the possible debate, the analysis below in Table 5 monetizes the effects of the Project using only the SR Line distance decay function, thereby assuming an equal intensity of effect regardless of the historic properties' acreage's distance from the Project.

Table 5

	Distance	**Acreage**	**Distance Decay Function**	**Cost per Acre**	**Total Value**
Carters Grove	0 to 0.5	2.5	1	$5,101.00	$12,752.50
	0.5 to 1	199.2	0.66	$5,101.00	$670,638.67
	1 to 2	96.3	0.33	$5,101.00	$162,104.68
	2 to 3.5	0	0.33	$5,101.00	$0.00
	3.5 to 7	0	0.05	$5,101.00	$0.00
	Area Sub-total	298			$845,495.85
Colonial National Historical Park/Parkway	0 to 0.5	0	1	$5,101.00	$0.00
	0.5 to 1	0	0.66	$5,101.00	$0.00
	1 to 2	0	0.33	$5,101.00	$0.00
	2 to 3.5	180.7	0.1	$5,101.00	$92,175.07
	3.5 to 7	2512.3	0.05	$5,101.00	$640,762.12
	Area Sub-total	2693			$732,937.19
Hog Island Wildlife Management Area	0 to 0.5	280	1	$5,101.00	$1,428,280.00
	0.5 to 1	711.1	0.66	$5,101.00	$2,394,031.93
	1 to 2	678.3	0.33	$5,101.00	$1,141,802.74
	2 to 3.5	11.3	0.1	$5,101.00	$5,764.13
	3.5 to 7	0	0.05	$5,101.00	$0.00
	Area Sub-total	1680.7			$4,969,878.80
	0 to 0.5	0	1	$5,101.00	$0.00
Jamestown NHS	0.5 to 1	0	0.66	$5,101.00	$0.00
	1 to 2	0	0.33	$5,101.00	$0.00
	2 to 3.5	92	0.1	$5,101.00	$46,929.20
	3.5 to 7	1440.1	0.05	$5,101.00	$367,297.51
	Area Sub-total	1532.1			$414,226.71

[25] NPS VIA at 7-8.

Jamestown Island/Hog Island/John Smith Water Trail Cultural Landscape/Eligible Historic District			0 to 0.5	4250.9	1	$5,101.00	$21,683,840.90
			0.5 to 1	4228.6	0.66	$5,101.00	$14,236,258.48
			1 to 2	9277	0.33	$5,101.00	$15,616,252.41
			2 to 3.5	14008.2	0.1	$5,101.00	$7,145,582.82
			3.5 to 7	32757.8	0.05	$5,101.00	$8,354,876.89
		Area Sub-total		64522.5			$67,036,811.50
						TOTAL	**$73,999,350.03**

In conclusion, based on the analyses and calculations above, the proposed compensatory mitigation of $85 million far exceeds the monetized range of impacts using the SR Line model, which as discussed, was used and approved by NPS and a project applicant when quantifying/monetizing impacts from a 500 kV transmission line project that ran directly through three national park system units. This is true even when the intensity of the impact is removed from consideration.

3. Correlating Mitigation Using Data Related to the Economic Choices Individuals Make

Another way to attempt to correlate proposed mitigation is to estimate the value of the ecoservices provided by the historic properties adversely affected by the Project. Literature cited by NPS provides a number of ways to accomplish this task.[26] Here, consistent with guidance from the Bureau of Land Management ("BLM"),[27] Dominion focuses on estimating the use value of the properties' ecoservices at issue here. Use value is the benefit individuals derive from some direct experience or activity, such as visiting Jamestown Island. Use value is important because it represents behavior, and people tend to do things that reflect the value they place on things. One group of methods to estimate use value look at data or information that reveal preferences. These methods focus on information that demonstrate a willingness to pay for a particular service. Examples of these types of methods are the travel cost method, which evaluates data on visitor travel patterns to a particular recreation site to estimate the value of the site, and the hedonic method, which looks for price differences among otherwise similar goods that differ in a particular environmental attribute (for example houses in the same area, but with different views). How people spend money provides an indirect estimate of how they value an ecoservice, and thus, an idea about the value of the ecoservice. The availability of data and information often will drive what approach or method to use.[28]

Here, we have data available related to the number of visitors to the NPS-managed Colonial NHP (which includes overall visitor data, and visitor data broken down to the park's component

[26] *See supra* note 1. We use the general term "ecoservices" herein because that term is used by NPS and literature it cites. For purposes of this analysis, we intend that term to reflect the benefit provided by historic resources and the views thereof.

[27] BLM, IM No. 2013-131, Guidance on Estimating Nonmarket Environmental Values ("BLM 2013").

[28] BLM 2013.

parts—Jamestown, Colonial Parkway, Williamsburg, and Yorktown).[29] We also have data related to admission fees at Colonial NHP, as well as information regarding the general spending of visitors to all of the Nation's National Parks and the effect of those expenditures,[30] as well as information related to the economic effect of Colonial NHP, based on estimated visitor spending in the area around the Colonial NHP.[31]

NPS tracks and analyzes the number of visitors to its parks, and estimates the amount and economic contributions and impact of its visitors spending on the areas and regions that are adjacent to and nearby national parks (so-called gateway areas/regions). NPS publishes the results of this information collection work and analyses as Visitor Spending Effects reports.[32] According to the 2015 VSE, visitors allot 10.2% of their spending on admission and park fees, with the rest committed to lodging, souvenirs, transportation, fuel, restaurants/bars, groceries/take-out food, transportation, and other fees.[33] The vast majority of the non-admission and park fee-related spending occurs outside of the parks.[34] According to the 2015 VSE, 3,343,909 people visited Colonial NHP in 2015, which accounted for $191,476,400 in gross economic activity associated with park visitor spending in the local/regional area (what NPS calls economic contribution).[35]

Using this macro-level information, it is difficult to determine what amount of the $191.5 million could be assigned as a proxy for the value of the ecoservices (*i.e*., visual resources) of the historic properties at issue here. As noted, NPS estimates that 10.2% is spent on admission and park fees, which would equal $19,530,593.[36] This number, however, accounts for the total number of visits to the Colonial NHP, which, as noted, includes visits along the Colonial

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[29] Dominion, Surry-Skiffes Creek-Whealton 500 kV Project Assessment of Potential Impacts on Heritage Tourism at 2-4 (June 10, 2016) ("Heritage Tourism Assessment").

[30] NPS, 2015 National Park Visitor Spending Effects Report ("NPS 2015"), *available at* *https://www.nps.gov/subjects/socialscience/vse.htm* (last visited August 11, 2016).

[31] NPS, Visitor Spending Effects, *available at* *https://www.nps.gov/subjects/socialscience/vse.htm* (last visited August 11, 2016) (select "Park Economies" and then select "Colonial National Historical Park").

[32] NPS, Visitor Spending Effects, *at* https://www.nps.gov/subjects/socialscience/vse.htm (last visited Aug. 25, 2016). This website contains an interactive Visitor Spending Effects ("VSE") tool that can be used to see VSE data for each national park, including Colonial NHP. It also contains NPS' most recent VSE report titled: 2015 National Park Visitor Spending Effects: *Economic Contributions to Local Communities, States, and the Nation*, National Resource Report NPS/NRSS/EQD/NRR-2016/1200 ("2015 VSE").

[33] 2015 VSE at 9.

[34] *See id*. at 8-9.

[35] *Id*. at 17. According to the NPS VSE interactive tool, this activity accounted for $148.9 million in value added to the local economy in 2015. To place this information in perspective, the National Parks Conservation Association submitted to the Corps the Virginia Tourism Authority's Economic Impact of Domestic Travel On Virginia Counties report, 2014 ("VTA Report"), which stated that tourism revenues in and around the Historic Triangle reach $1.15 billion annually, and are based tourists visiting the full range of historic and non-historic experiences in the area. Heritage Tourism Assessment at 6 & n.20. Using the gross economic activity information, the Colonial NHP visitor related spending accounts for approximately 16% of the total tourism economic activity in the local area/region.

[36] Using admission and park fees is an appropriate subset of spending upon which to focus because it helps separate out spending and visitor activity in the region unrelated or potentially not focused on the historic properties at issue.

Parkway, in Williamsburg, as well as to Yorktown. Annual visitation data indicates that visitation to the various areas in the Colonial NHP, notably between Jamestown and Yorktown, generally is split evenly.[37] With that in mind, approximately half of the admission/park fee related spending could be allocated to Jamestown, an amount of $9,765,297. While there are no data correlating general park admission/fee spending to visitors that took in the views of the river from Colonial Parkway or Jamestown (or anywhere else in the APE), anecdotal information in the record suggests that approximately 8% of visitors to Jamestown were interested in the river as part of their visit, while the majority appeared to be focused on the fort site and the archeological sites.[38] Assuming 10% of visitors to Jamestown took the trip around Island Drive, parked, and walked down the pathway through the trees to Black Point to take in the southeasterly view toward where the Project would be, over 3.25 miles away, the use value of those visual ecoservices would be just shy of $1 million (10% of $9,765,297 = $976,530) annually, also assuming the full value of the park admission/fee of these 10% of people could be applied to the visual services.[39]

While this amount only accounts for specifically for Jamestown and Colonial Parkway, given that NPS' VSE data accounts for spending in the entire local area/region, it likely provides a sufficient proxy for visitors to the other historic properties at issue here, for which there is no specific visitation/economic information.[40] To be conservative, however, we can add an additional 5% to the potential number of visitors that would have spent admission/fees for the sake of the visual resources, which would value the visual ecoservices at just shy of $1.5 million annually (15% of $9,765,297 = $1,464,795).

Based on the forgoing, using macro-economic spending information, it can be discerned that people value the visual ecoservices of the historic properties at issue between $48,826,500 and $73,239,750 over the projected 50-year life of the Project.[41] Based on those numbers, the value of the proposed compensatory mitigation of $85 million more than compensates for any degradation of such services caused by the Project.

These estimates are consistent with conservative estimates derived from total revenues reported by Preservation Virginia. In its 2015 Annual Report, Preservation Virginia reported $2,430,223 in total revenue from venue admission fees, museum sales, and other revenue sources.[42] Assuming all of that revenue came from Historic Jamestowne, which is unrealistically

[37] Heritage Tourism Assessment at 3 & n.13.

[38] *Id*. at 7.

[39] Unlike Jamestown, where the admission fee must be paid to access Island Drive, and thus, Black Point, no park admission/fee is required to drive on Colonial Parkway. Because the numbers discussed in the text, however, are based on visitors to both Jamestown and Colonial Parkway, and many visitors to Jamestown likely get there via the parkway, we use the numbers for Jamestown to include Colonial Parkway.

[40] In addition, Carter's Grove has been closed to the public for years and does not allow visitors.

[41] These numbers were calculated by multiplying the annual value of the ecoservices by the expected 50 year lifespan of the Project using the 10% and 15% estimations for those visitors that paid admission and park fees for the sake of visual resources: ($976,530 x 50 = $48,826,500); ($1,464,795 x 50 = $73,239,750).

[42] The 2015 annual report is available at Preservation Virginia, Annual Reports at https://preservationvirginia.org/about/annual-reports (last visited Sept. 5, 2016).

conservative,[43] and also assuming that the visitors that accounted for 50% of that revenue spent that money based on the southeasterly views of the James River from Jamestown Island, that would create an annual value of the views/landscape (*i.e.*, ecoservices at issue) at $1,215,111.5, or a $60,755,575 value over the life of the Project.

Approaching the issue of use value from a micro-economic level, according to NPS the price to enter Historic Jamestown and Yorktown Battlefield is $14.00. That ticket is good for 7 days. It also appears that one can buy a $7.00 ticket, also good for 7 days, for just Yorktown Battlefield, as well as a $7.00 ticket, also good for 7 days, for just Historic Jamestown.[44] Essentially, one can visit Historic Jamestown, and obtain access to Island Drive (and thus, Black Point), for $1.00 per day. As noted above, NPS calculated that 3,343,909 people visited Colonial NHP in 2015, and about one-half those people (1,671,954) visited Jamestown, or at least drove in Williamsburg and on Colonial Parkway toward Jamestown. While we do not known how many of these people bought the ticket to enter Jamestown, or how many of those traveled to Black Point to take in the southeasterly view toward where the Project will be located, assuming all of them did at least once during their 7-day ticket (a very conservative estimate for the reasons discussed above), the value of the visual resources could be calculated at $1,671,955 per year.[45] Using that amount, the value of the visual ecoservices of the historic properties at issue would be $83,597,750 over the projected 50-year life of the Project. Based on those numbers, the value of the proposed compensatory mitigation of $85 million also more than compensates for any degradation of such services caused by the Project.

Conclusion

The quantification/monetization methods discussed herein yielded a fairly wide range of values for the impacts to the historic properties at issue, or the value of those properties' ecoservices. Those values are: $50,785,402.97; $105,548,871.80; $32,720,160.97; $30,116,972.23; $73,999,350.03; $48,826,500; $60,755,575; $73,239,750; and, $83,597,750. The simple average of these values is $62,176, 703.67. Whether using the range created by the NPS VIA analysis, the SR Line analyses results, use value methods results, or an average of the results of all of those analyses,[46] the discussion herein demonstrates that the proposed compensatory mitigation of $85 million for the Project is well correlated to the monetized value of the impacts and the value of the ecoservices, and more than accounts for the adverse effects of the Project on historic resources in this case, as well as provides substantial added value to the impacted qualities of the resources at issue (regardless of what quantification/monetization method is used, or when the average of all of the methods is used). This conclusion finds substantial support in the fact that

[43] This is unrealistically conservative because Preservation Virginia manages numerous properties that contribute to its revenue stream that are not historic properties at issue here, and which have admission fees and otherwise create avenues for Preservation Virginia to create revenue. *See, e.g.*, Preservation Virginia, Bacon's Castle at https://preservationvirginia.org/visit/historic-properties/bacons-castle (last visited Sept. 5, 2016).

[44] NPS, Fees and Passes – Colonial NHP, at https://www.nps.gov/colo/planyourvisit/fees.htm (last visited Aug. 26, 2016).

[45] Using this assumption also provides an allowance for visitors that did not buy a ticket, but otherwise took in views from the Colonial Parkway or from other historic properties at issue for which an entrance fee is not required.

[46] Using a simple average of the methods provides a normalizing function that curbs a desire to place undue weight on results that are perceived as very high or low under the circumstances.

the majority of the methods used herein either used NPS created data and assumptions (*i.e.*, the NPS VIA), or were based on similar evaluations NPS previously used and approved of (*i.e.*, the SR Line model).