Appendix E

DOMINION VIRGINIA POWER
Line #65 115 kV Rebuild at Norris Bridge

Supplemental Alternatives Analysis

APPENDIX E
Visual Simulations

Norris Bridge: Overhead 115kV

Dominion

Truescape®

TrueView Photosimulations - Existing & Proposed
May 2016

www.truescape.com

Viewpoint 01 - Norris Bridge

Viewpoint 02 - Grey's Point Docks

Viewpoint 03 - Rappahannock River, East of Norris Bridge

Viewpoint 04 - Norris Bridge, North End

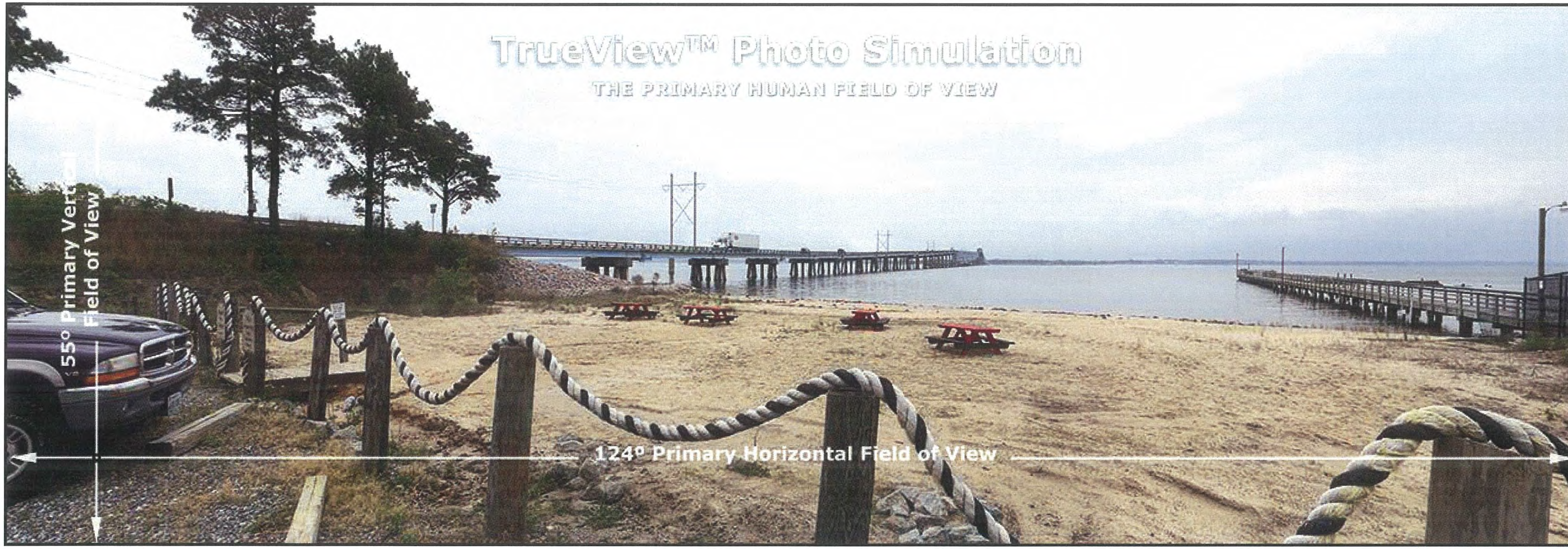
Viewpoint 05 - Rappahannock River, Near Locklies Marina

Viewpoint 06 - Rappahannock River, South-East of Norris Bridge

Viewpoint 07 - Rappahannock River, North-West of Norris Bridge

Viewpoint 08 - Norris Bridge, South End

Viewpoint 09 - Near West High Bank Road



A TrueView™ is a high-resolution photo simulation that has been developed with survey grade accuracy, and represents the 'Primary Human Field of View'. The TrueView™ depicts how the proposed project will look when viewed from the exact photo point position under the same light and atmospheric conditions as those experienced at time of photography.

How to view a TrueView™

The TrueView™ has been developed to be viewed on a specifically sized printed sheet (66.8 inches by 23.9 inches paper size) standing at a distance of 19.7 inches from the image. Accurate visual assessments should always be made from the full-sized printed version of the TrueView™ rather than reduced size booklets or digital devices.

Viewing on digital devices

When viewing a TrueView™ on digital devices please confirm that the scale bar located in the bottom-right corner of the TrueView™ is scaled to four inches wide and then the image viewed from a distance of 19.7 inches. This ensures that the portion of the TrueView™ visible on the screen is a true to scale representation.

Important

If the scale bar is not adjusted to four inches on your screen, and if the image is not viewed at a distance of 19.7 inches then the TrueView™ image displayed will either overstate or understate how the project will look from the photo point position.

Viewpoint 01 - Norris Bridge, Looking East-Northeast - **Existing View**

Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 10 inches (25 cm)

Dominion

Viewpoint 01

Norris Bridge

Viewpoint Location   Proposed 115kV

Easting Position (State Plane Virginia South):	12082136.9
Northing Position (State Plane Virginia South):	3754496.9
Elevation of Photopoint Position (NAD88):	52.8
Height of Camera Above Ground (ft):	4.6
Date of Photography:	10 May 2016 at 09:42 AM
Orientation of View:	ENE
Horizontal Field of View:	66°
Vertical Field of View:	46°
Distance to Bridge (ft):	0.0

NOTES:

Camera alignment based on handheld GPS.

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo-Simulation Provided by

Truescape®

www.truescape.com

DATE	SHEET
27 May 2016	4

Viewpoint 01 - Norris Bridge, Looking East-Northeast - **Proposed View**

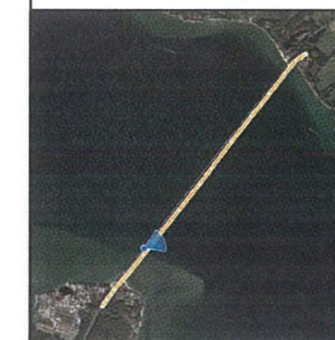
Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 10 inches (25 cm)

Dominion

Viewpoint 01

Norris Bridge

Viewpoint Location   Proposed 115kV



Easting Position (State Plane Virginia South):	12082136.9
Northing Position (State Plane Virginia South):	3754496.9
Elevation of Photopoint Position (NAD88):	52.8
Height of Camera Above Ground (ft):	4.6
Date of Photography:	10 May 2016 at 09:42 AM
Orientation of View:	ENE
Horizontal Field of View:	66°
Vertical Field of View:	46°
Distance to Bridge (ft):	0.0

NOTES:

Camera alignment based on handheld GPS.

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo-Simulation Provided by

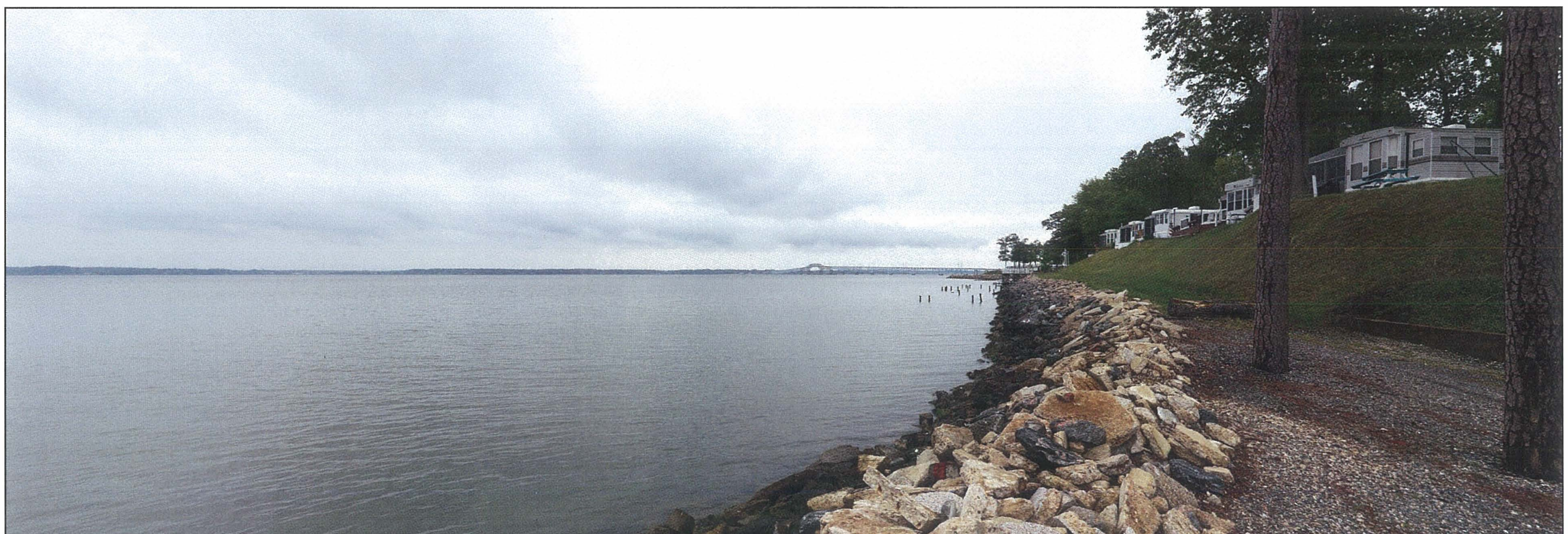
Truescape®

www.truescape.com

DATE 27 May 2016

SHEET 5

Viewpoint 02 - Grey's Point Docks, Looking Northeast - **Existing View**



Viewpoint 02 - Grey's Point Docks, Looking Northeast - **Proposed View**

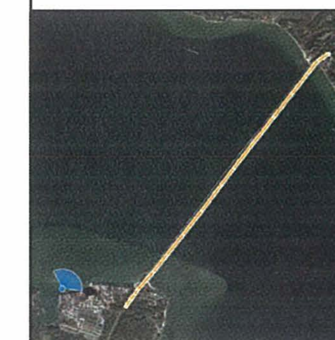
Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 20 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

Viewpoint 02

Grey's Point Docks



Easting Position (State Plane Virginia South):	12078240.6
Northing Position (State Plane Virginia South):	3752805.9
Elevation of Photopoint Position (NAD88):	3.9
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 10:06 AM
Orientation of View:	NE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	3342.8

NOTES:

Viewpoint locations have been precision surveyed by:

Pennoni
Virginia Beach, VA

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo Simulation Created Using TrueView™ Technology (Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

DATE	SHEET
27 May 2016	6

Viewpoint 02 - Grey's Point Docks, Looking Northeast - Existing View

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

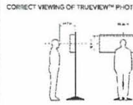
Norris Bridge: Overhead 115kV

Viewpoint 02
Grey's Point Docks
Looking Northeast

● Viewpoint Location ● Proposed 115kV

Easting Position State Plane Virginia South:	12078240.6
Northing Position State Plane Virginia South:	3752805.9
Elevation of Viewpoint Position NAD88:	3.9
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 10:06 AM
Orientation of View:	NE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	3342.8

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using TrueView™ Technology (Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 02 - Grey's Point Docks, Looking Northeast - Proposed View

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

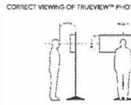
Viewpoint 02
Grey's Point Docks

Looking Northeast

● Viewpoint Location ○ Proposed 115kV

Easting Position State Plane Virginia South:	12078240.6
Northing Position State Plane Virginia South:	3752805.9
Elevation of Viewpoint Position NAD88:	3.9
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 10:06 AM
Orientation of View:	NE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	3342.8

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 03 - Rappahannock River, East of Norris Bridge, Looking West-Northwest - **Existing View**

Viewpoint 03 - Rappahannock River, East of Norris Bridge, Looking West-Northwest - **Proposed View**

Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 20 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

Viewpoint 03

Rappahannock River,
East of Norris Bridge

Viewpoint Location · Proposed 115kV

Easting Position (State Plane Virginia South):	**12094766.9**
Northing Position (State Plane Virginia South):	**3755724.1**
Elevation of Photopoint Position (NAD88):	**1.8**
Height of Camera Above Ground (ft):	**5.4**
Date of Photography:	**10 May 2016 at 10:58 AM**
Orientation of View:	**WNW**
Horizontal Field of View:	**124°**
Vertical Field of View:	**55°**
Distance to Bridge (ft):	**9560.3**

NOTES:

Viewpoint locations have been precision surveyed by:

Pennoni
Virginia Beach, VA

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo Simulation Created Using TrueView™ Technology (Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

DATE	SHEET
27 May 2016	9

Viewpoint 03 - Rappahannock River, East of Norris Bridge, Looking West-Northwest - Existing View

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

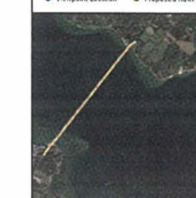
Dominion

Norris Bridge: Overhead 115kV

Viewpoint 03
Rappahannock River,
East of Norris Bridge

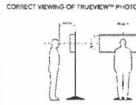
Looking West-Northwest

● Viewpoint Location   ○ Proposed 115kV



Easting Position State Plane Virginia South:	12094766.9
Northing Position State Plane Virginia South:	3755724.1
Elevation of Viewpoint Position NAD88:	1.8
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 10:58 AM
Orientation of View:	WNW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	9560.3

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 03 - Rappahannock River, East of Norris Bridge, Looking West-Northwest - **Proposed View**

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

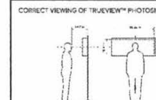
Viewpoint 03
Rappahannock River,
East of Norris Bridge

Looking West-Northwest

● Viewpoint Location ○ Proposed 115kV

Easting Position State Plane Virginia South:	12094766.9
Northing Position State Plane Virginia South:	3758724.1
Elevation of Viewpoint Position NAD88:	1.8
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 10:58 AM
Orientation of View:	WNW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	9560.3

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches).

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape

www.truescape.com

Viewpoint 04 - Norris Bridge, North End, Looking Southwest - **Existing View**

Viewpoint 04 - Norris Bridge, North End, Looking Southwest - **Proposed View**

Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 20 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

Viewpoint 04

Norris Bridge,
North End

● Viewpoint Location ● Proposed 115kV

Easting Position (State Plane Virginia South):	12087411.8
Northing Position (State Plane Virginia South):	3761824.5
Elevation of Photopoint Position (NAD88):	5.9
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 13:45 PM
Orientation of View:	SW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	201.7

NOTES:

Viewpoint locations have been precision surveyed by:

Pennoni
Virginia Beach, VA

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo Simulation Created Using TrueView™ Technology (Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

DATE	SHEET
27 May 2016	12

Viewpoint 04 - Norris Bridge, North End, Looking Southwest - Existing View

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

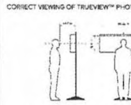
Viewpoint 04
Norris Bridge,
North End

Looking Southwest

Viewpoint Location · Proposed 115kV

Easting Position State Plane Virginia South:	12087411.8
Northing Position State Plane Virginia South:	3761824.5
Elevation of Viewpoint Position NAD88:	5.9
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 12:45 PM
Orientation of View:	SW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	201.7

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 04 - Norris Bridge, North End, Looking Southwest - **Proposed View**

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

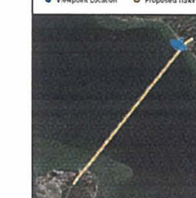
Dominion

Norris Bridge: Overhead 115kV

Viewpoint 04
Norris Bridge,
North End

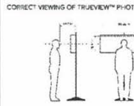
Looking Southwest

● Viewpoint Location ● Proposed 115kV



Easting Position State Plane Virginia South:	12087411.8
Northing Position State Plane Virginia South:	3761824.5
Elevation of Viewpoint Position NAD88:	5.9
Height of Camera Above Ground m:	5.4
Date of Photography:	10 May 2016 at 13:45 PM
Orientation of View:	SW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge m:	201.7

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 05 - Rappahannock River, Near Locklies Marina, Looking North-Northeast - **Existing View**

Viewpoint 05 - Rappahannock River, Near Locklies Marina, Looking North-Northeast - **Proposed View**

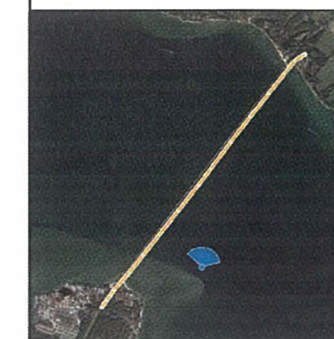
Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 20 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

Viewpoint 05

Rappahannock River,
Near Locklies Marina



Easting Position (State Plane Virginia South):	12084159.5
Northing Position (State Plane Virginia South):	3753881.3
Elevation of Photopoint Position (NAD88):	1.8
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 11:35 AM
Orientation of View:	NNE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	1979.1

NOTES:

Viewpoint locations have been precision surveyed by:

Pennoni
Virginia Beach, VA

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo Simulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

DATE	SHEET
27 May 2016	15

Viewpoint 05 - Rappahannock River, Near Locklies Marina, Looking North-Northeast - Existing View

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

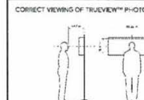
Viewpoint 05
Rappahannock River,
Near Locklies Marina

Looking North-Northeast

● Viewpoint Location ○ Proposed 115kV

Easting Position State Plane Virginia South:	12084159.5
Northing Position State Plane Virginia South:	3753881.3
Elevation of Viewpoint Position NAD88:	1.8
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 11:35 AM
Orientation of View:	NNE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	1979.1

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 05 - Rappahannock River, Near Locklies Marina, Looking North-Northeast - **Proposed View**

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

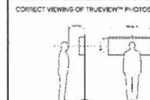
Viewpoint 05
Rappahannock River,
Near Locklies Marina

Looking North-Northeast

● Viewpoint Location ○ Proposed 115kV

Easting Position State Plane Virginia South:	12084159.5
Northing Position State Plane Virginia South:	3753881.3
Elevation of Viewpoint Position NAD88:	1.8
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 11:35 AM
Orientation of View:	NNE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	1979.1

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches).

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 06 - Rappahannock River, South-East of Norris Bridge, Looking Northwest - **Existing View**

Viewpoint 06 - Rappahannock River, South-East of Norris Bridge, Looking Northwest - **Proposed View**

Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 20 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

Viewpoint 06

Rappahannock River,
South-East of Norris Bridge

Easting Position (State Plane Virginia South):	12085945.4
Northing Position (State Plane Virginia South):	3755830.2
Elevation of Photopoint Position (NAD88):	0.3
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 11:46 AM
Orientation of View:	NW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	2297.4

NOTES:

Viewpoint locations have been precision surveyed by:

Pennoni
Virginia Beach, VA

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo Simulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

DATE	SHEET
27 May 2016	18

Viewpoint 06 - Rappahannock River, South-East of Norris Bridge, Looking Northwest - Existing View

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

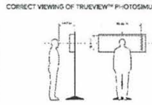
Viewpoint 06
Rappahannock River,
South-East of Norris Bridge

Looking Northwest

● Viewpoint Location ● Proposed 115kV

Easting Position State Plane Virginia South:	12085945.4
Northing Position State Plane Virginia South:	3755830.2
Elevation of Viewpoint Position NAD88:	0.3
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 11:46 AM
Orientation of View:	NW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	2297.4

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 06 - Rappahannock River, South-East of Norris Bridge, Looking Northwest - Proposed View

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

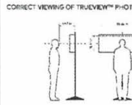
Viewpoint 06
Rappahannock River,
South-East of Norris Bridge

Looking Northwest

● Viewpoint Location ○ Proposed 115kV

Easting Position State Plane Virginia South:	12085945.4
Northing Position State Plane Virginia South:	3755830.2
Elevation of Viewpoint Position NAD88:	0.3
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 11:46 AM
Orientation of View:	NW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	2297.4

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 07 - Rappahannock River, North-West of Norris Bridge, Looking Southeast - **Existing View**

Viewpoint 07 - Rappahannock River, North-West of Norris Bridge, Looking Southeast - **Proposed View**

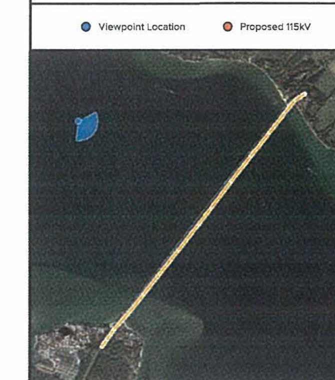
Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 20 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

Viewpoint 07

Rappahannock River,
North-West of Norris Bridge



Easting Position (State Plane Virginia South):	12079535.7
Northing Position (State Plane Virginia South):	3760406.7
Elevation of Photopoint Position (NAD88):	-0.2
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 11:56 AM
Orientation of View:	SE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	5658.2

NOTES:

Viewpoint locations have been precision surveyed by:

Pennoni
Virginia Beach, VA

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo Simulation Created Using TrueView™ Technology (Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

DATE	SHEET
27 May 2016	21

Viewpoint 07 - Rappahannock River, North-West of Norris Bridge, Looking Southeast - **Existing View**

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

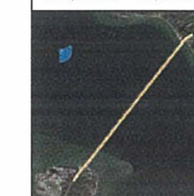
Dominion

Norris Bridge: Overhead 115kV

Viewpoint 07
Rappahannock River,
North-West of Norris Bridge

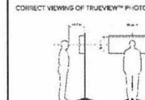
Looking Southeast

Viewpoint Location · Proposed 115kV



Easting Position State Plane Virginia South:	12079535.7
Northing Position State Plane Virginia South:	3760406.7
Elevation of Viewpoint Position NAD88:	-0.2
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 11:56 AM
Orientation of View:	SE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	5658.2

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches).

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 07 - Rappahannock River, North-West of Norris Bridge, Looking Southeast - **Proposed View**

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

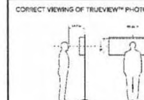
Viewpoint 07
Rappahannock River,
North-West of Norris Bridge

Looking Southeast

● Viewpoint Location ○ Proposed 115kV

Easting Position State Plane Virginia South:	12079535.7
Northing Position State Plane Virginia South:	3760406.7
Elevation of Viewpoint Position NAD88:	-0.2
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 11:56 AM
Orientation of View:	SE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	5658.2

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 08 - Norris Bridge, South End, Looking Northeast - **Existing View**

Viewpoint 08 - Norris Bridge, South End, Looking Northeast - **Proposed View**

Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 20 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

Viewpoint 08

Norris Bridge,
South End

● Viewpoint Location ● Proposed 115kV

Easting Position (State Plane Virginia South):	12081487.8
Northing Position (State Plane Virginia South):	3753613.9
Elevation of Photopoint Position (NAD88):	25.6
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 12:43 PM
Orientation of View:	NE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	8.5

NOTES:

Viewpoint locations have been precision surveyed by:

Pennoni
Virginia Beach, VA

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo Simulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

DATE	SHEET
27 May 2016	24

Viewpoint 08 - Norris Bridge, South End, Looking Northeast **- Existing View**

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

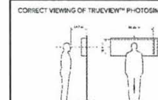
Viewpoint 08
Norris Bridge,
South End

Looking Northeast

● Viewpoint Location ○ Proposed 115kV

Easting Position State Plane Virginia South:	12081487.8
Northing Position State Plane Virginia South:	3753613.9
Elevation of Viewpoint Position NAD88:	25.6
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 12:43 PM
Orientation of View:	NE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	8.5

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 08 - Norris Bridge, South End, Looking Northeast - Proposed View

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

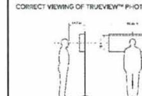
Viewpoint 08
Norris Bridge,
South End

Looking Northeast

Viewpoint Location · Proposed 115kV

Easting Position State Plane Virginia South:	12081487.8
Northing Position State Plane Virginia South:	3753613.9
Elevation of Viewpoint Position NAD88:	25.6
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 12:43 PM
Orientation of View:	NE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	8.5

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 09 - Near West High Bank Road, Looking West-Southwest - **Existing View**

Viewpoint 09 - Near West High Bank Road, Looking West-Southwest - **Proposed View**

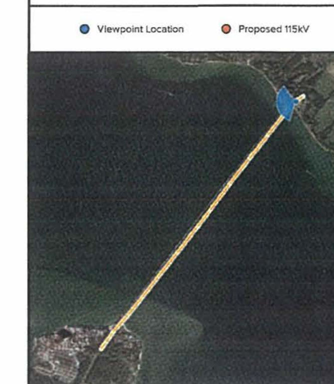
Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 20 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

Viewpoint 09

Near West High Bank Road



Easting Position (State Plane Virginia South):	12087828.6
Northing Position (State Plane Virginia South):	3761662.1
Elevation of Photopoint Position (NAD88):	33.2
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 13:20 PM
Orientation of View:	WSW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	350.0

NOTES:

Viewpoint locations have been precision surveyed by:

Pennoni
Virginia Beach, VA

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo Simulation Created Using TrueView™ Technology (Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

DATE	SHEET
27 May 2016	27

Viewpoint 09 - Near West High Bank Road, Looking West-Southwest - **Existing View**

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

Viewpoint 09
Near West High Bank Road
Looking West-Southwest

● Viewpoint Location ○ Proposed 115kV

Easting Position State Plane Virginia South:	12087828.6
Northing Position State Plane Virginia South:	3761662.1
Elevation of Viewpoint Position NAD88:	33.2
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 13:20 PM
Orientation of View:	WSW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	350.0

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS

This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches).

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 09 - Near West High Bank Road, Looking West-Southwest - **Proposed View**

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

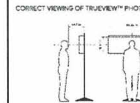
Viewpoint 09
Near West High Bank Road

Looking West-Southwest

● Viewpoint Location ○ Proposed 115kV

Easting Position State Plane Virginia South:	12087828.6
Northing Position State Plane Virginia South:	3761662.1
Elevation of Viewpoint Position NAD88:	33.2
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 13:20 PM
Orientation of View:	WSW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	350.0

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches).

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Appendix F

DOMINION VIRGINIA POWER
Line #65 115 kV Rebuild at Norris Bridge

Supplemental Alternatives Analysis

APPENDIX F

Assessment of Sediment Related Impacts Associated with Proposed and Alternative Construction Activities Under Consideration for the 2016 Lie #65 115kV Rebuild Project at the Norris Bridge, Virginia

RPS asa

Assessment of Sediment Related Impacts Associated with Construction Activities Under Consideration for the Dominion Virginia Power Line #65 115kV Rebuild at Norris Bridge

RPS-ASA Project: 16-246

Prepared For: Virginia Electric and Power Company

Prepared By: Nathan Vinhateiro, Deborah Crowley and Chris Galagan | RPS ASA

Date Filed: October 31, 2016

Contents

List of Figures

List of Tables

1. Introduction

This assessment describes the evaluation of sediment related impacts conducted on behalf of Virginia Electric and Power Company (Dominion Virginia Power or Dominion) by RPS ASA from construction activities associated with the construction of Line #65 115 kV Rebuild at Norris Bridge (Rebuild Project). In order to maintain the structural integrity and reliability of its transmission system and perform needed maintenance on its existing facilities, Dominion proposes to rebuild the approximately two miles of overhead transmission line that currently crosses the Rappahannock River in eastern Virginia.

The assessment evaluated three potential construction options: an overhead option referred to as the *Overhead Alternative* and two subsurface alternatives, one utilizing a horizontal directional drilling (HDD) referred to as the *Underground Option* and the other predominately jet plow trenching referred to as *Barnhardt Option 2*. The details of the Overhead Alternative and Barnhardt Option 2 were provided through a combination of an engineering report from Power Delivery Consultants (PDC 2016) and communications with Natural Resource Group (NRG). The details of the Underground Option were provided through information documented in a previous report relative to the project (NRG, 2016) as well as communications with NRG.

This report provides a description of the study area and a relative comparative assessment of the construction options with respect to potential sediment impacts based on estimates of project size, footprint, construction methods and sediment characteristics.

2. Description of Study Area

Dominion Virginia Power currently operates Line #65, an overhead, single circuit 115 kilovolt (kV) transmission line that runs for approximately 38 miles between the Northern Neck Substation in Richmond County and the Harmony Village Substation in Middlesex County, Virginia. A 2.2-mile-long section of Line #65 parallels State Route 3 across the Rappahannock River. A portion of this line is attached to Robert O. Norris Bridge (Norris Bridge) and a portion is suspended between wooden H-frame structures located within the water. The existing 115 kV transmission line crosses the Rappahannock River approximately 7.8 miles upstream of the river mouth entrance into the Chesapeake Bay as shown in Figure 2-1. A photo showing the existing in-water structures near the northern shore is shown in Figure 2-2.

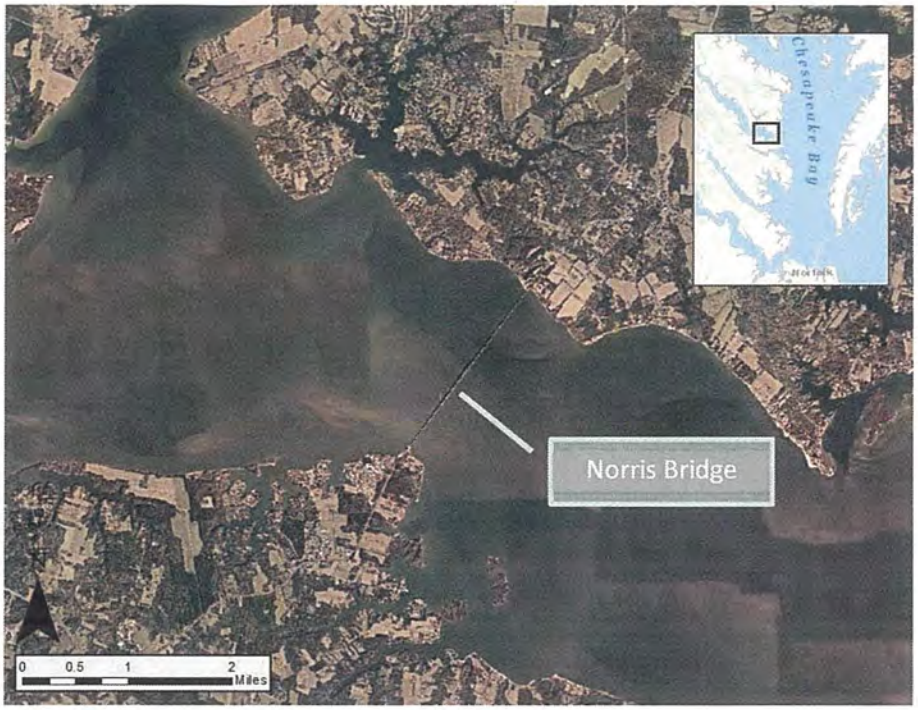


Figure 2-1. Map of Study Area.

Figure 2-2. Photo of existing in-water structures from a southwest viewpoint. Source: Dominion (www.dom.com)

An illustration of depth soundings and a vertical cross section of water depth near the bridge are shown in Figure 2-3 and Figure 2-4 respectively. The river width at the Norris Bridge is approximately 1.9 miles with shallows (depths < 10 ft.) extending approximately 0.3 mile from both shorelines. The majority of the cross section, over one mile, is 30 ft. or deeper.

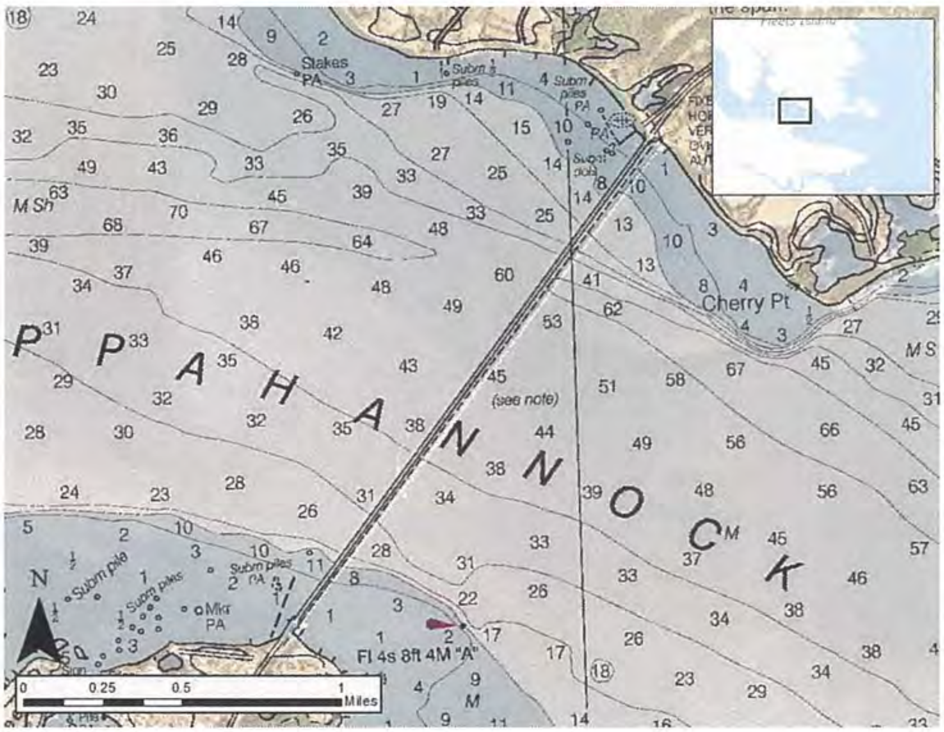


Figure 2-3. Closer view of study area showing river depths in feet relative to mean lower low water from NOAA Chart 12235.

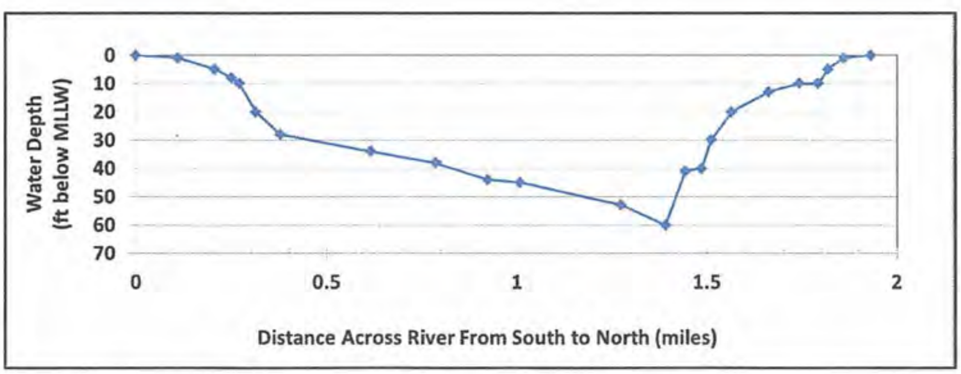


Figure 2-4. Approximate cross section of river depths immediately east of the bridge.

The currents in the river at the project site are predominately influenced by freshwater flow down the Rappahannock River and by tides. Currents at the bridge reverse direction in response to ebb and flood tides and vary in magnitude throughout the tidal cycle. Snapshots of flood and ebb currents from the NOAA Chesapeake Bay Operational Forecast Model are shown in Figure 2-5 to illustrate this reversing nature of the current at the project site. In tidally-influenced tributaries, the relative magnitude of the current is seasonally influenced by the freshwater inputs, where higher freshwater input reduces the flood current and increases the ebb current. Current speeds in this area are not well documented; however, one study (Haight, Finnegan and Anderson 1930) found that current velocities ranged from 0.5 to 1.2 knots (~0.25 to 0.77 m/s), which is relatively consistent with the forecast model output shown below.

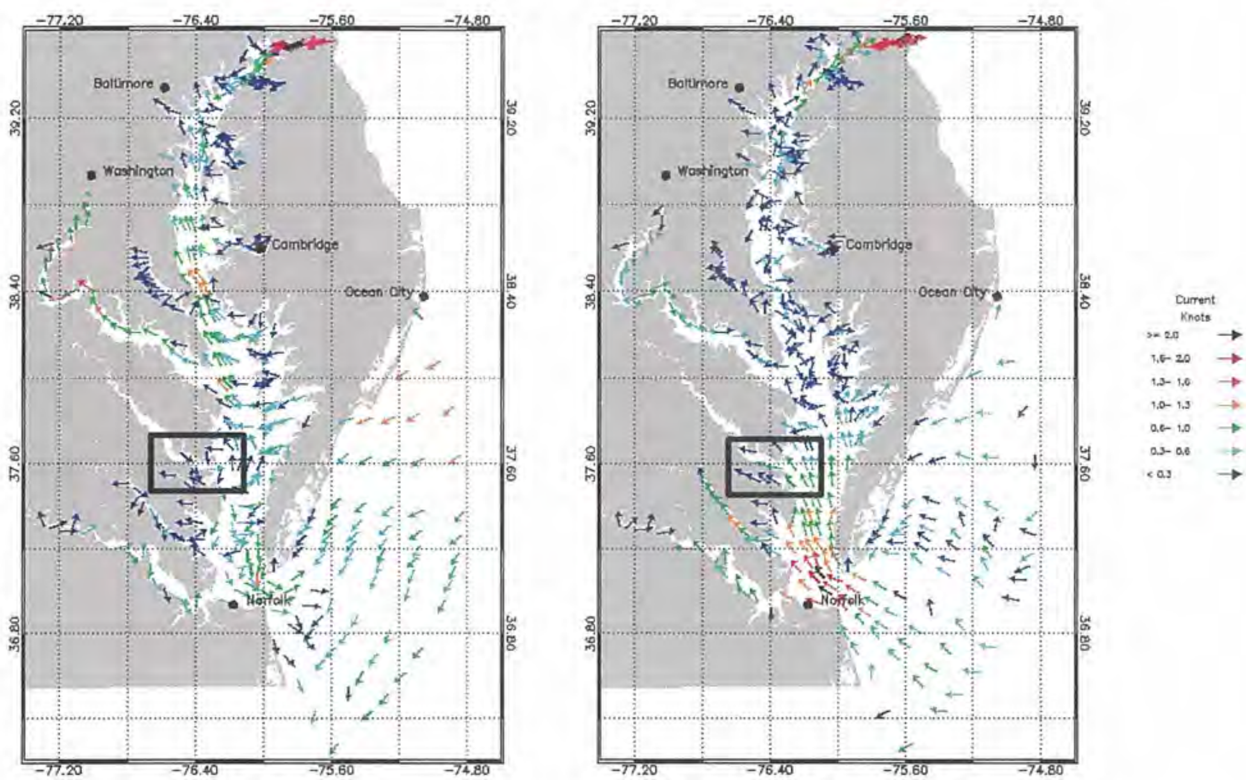


Figure 2-5. Illustration of ebb (left) and flood (right) currents in the Chesapeake Bay system, overlaid black outline illustrating the lower Rappahannock River. Source: NOAA Chesapeake Bay Operational Forecast System.

Private oyster lease grounds regulated by the Virginia Marine Resources Commission (VMRC) extend approximately 1,300 ft. from the southern shoreline and approximately 700 ft. from the northern shoreline in the prospective project areas east of the bridge. In this area, the common Baylor Grounds extend from the VMRC lease areas out to approximately 3,600 ft. from the southern shore and 2,800 ft. from the northern shore. Submerged aquatic vegetation (SAV) is present adjacent to both shores, however, in both cases, does not extend as far as the VMRC lease areas. The VMRC lease areas, Baylor Grounds and SAV areas are illustrated in Figure 2-6.

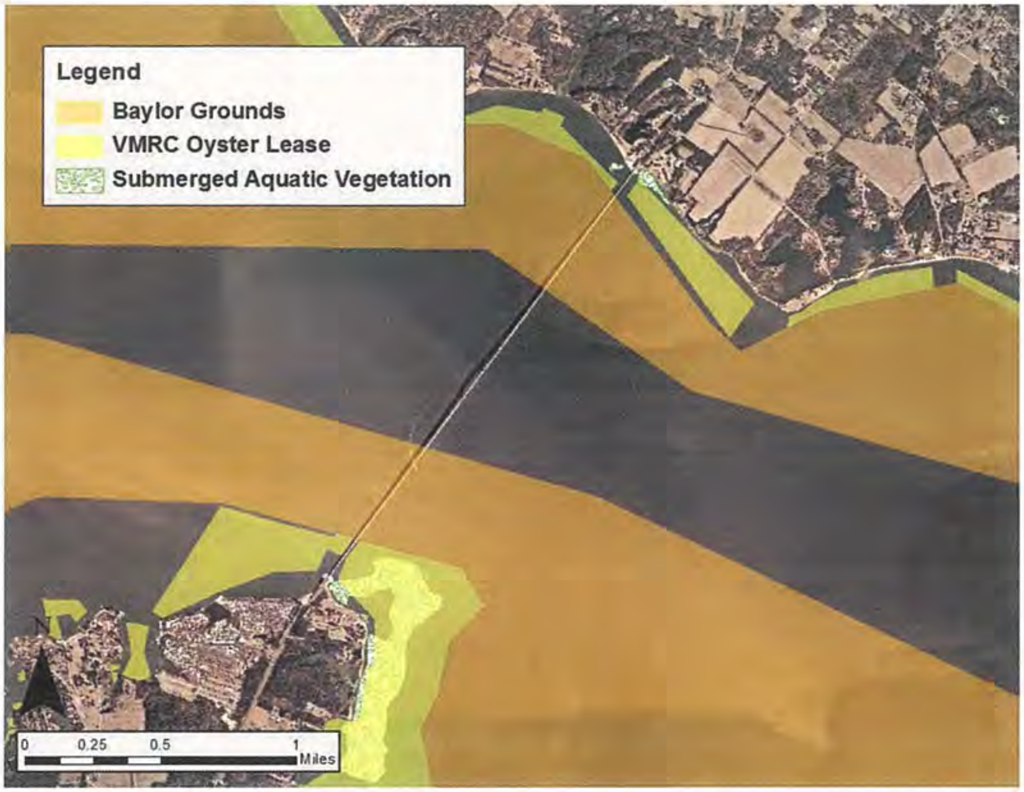


Figure 2-6. Illustration of Baylor Grounds, VMRC oyster lease areas and submerged aquatic vegetation (SAV).

Sediment grain size data was available from the geotechnical report associated with the project (Ciloglue and Roth 2016). This report presents sample data collected from a number of borings, including grain size data obtained from sieve analysis at multiple depths, generally available starting at depths below 5-10 ft. deep in each boring. The report also included profile data that provides a descriptive characterization of the sediments (e.g. "silty sand") throughout the entire sample, including surficial sediments, at the sample sites. The sieve analysis is a laboratory analysis that yields the percentage of the sample that pass through sieves of various mesh opening size in order to quantify the percentage of various classes of sediments based on grain size. For this study, this output was used through evaluating the distribution within three classes: gravel (diameters >2 mm), sand (diameters > 0.075 mm and < 2 mm), and fines (diameters <0.075 mm), where fines are the combination of silt and clay. For the purposes of understanding the grain size distributions of sediments that may be impacted by project activities, both the descriptive assessment of the upper surficial sediments and sieve analysis output available within the upper sediments was used to determine the grain size distribution of the upper 15 ft. of the sediments at each sample site based on depth/volume weighting the two characterizations where available. The descriptive assessment was converted to an equivalent sieve analysis quantification of percent gravel, sands and fines based on identifying the surficial characterization (e.g. "silty sand") elsewhere in the boring sample that also had sieve analysis output and assigning the associated quantitative output to the surficial sediments. Note for some sites (B-4, B-5, B-6 and B-7) this was not performed because the sieve analysis captured the entire upper sediment layers. Figure 2-7 shows the location of the samples and the sediment grain size distribution at each site and Table 1 summarizes the grain size data based on the analysis of available data.

These shallow sediments consist of very fine silt and clay material that would likely produce sustained suspended sediment plumes. These intervals are described as "river mud" and are thinner near the banks (~10-15 ft.) and thickest in the middle of the river. The sediments are primarily silt, clay, and organic matter, the exception noted at B-3 where the upper 10 ft. is mostly sand with fines beneath.

Table 1. Summary of sediment samples.

Boring	Depth Interval	Weight	Proxy Sample	Sample Depth (ft.)	USCS Classification	Sample Distributions			Depth-Averaged Distributions		
						Gravel (%)	Sand (%)	Fines (%)	Gravel (%)	Sand (%)	Fines (%)
B-2	0.0-10.0	0.67	ST-1	54.4 - 54.9	Silty Sand (Non-Plastic Fines)	0.39	68.05	31.56	0.26	51.85	47.89
	10.0-20.0	0.33	S-3,4	10.0, 15.0	Lean Clay with Sand	0	19.46	80.54			
B-3	0.0-10.5	0.70	S-2	5.0 - 6.5	Poorly Graded Sand with Silt (Non- Plastic Fines)	0.46	89.96	9.58	0.32	67.39	32.29
	10.5-25.0	0.30	S-14	65.0-66.0	Lean Clay	0	14.73	85.27			
B-4	0.0-30.0	1.00	ST-1	21.5 - 23.5	Lean Clay	0	3.34	96.66	0.00	3.34	96.66
B-5	0.0-30.0	1.00	ST-1	18.0 - 20.0	Lean Clay	0	8.57	91.43	0.00	8.57	91.43
B-6	0.0-30.0	1.00	S-6,7	25.0, 30.0	Lean Clay with Sand	0	24.68	75.32	0.00	24.68	75.32
B-7	0.0-15.0	1.00	S-2,3	5.0, 10.0	Clayey Sand	6.69	61.09	32.22	6.69	61.09	32.22

Figure 2-7. Sediment grain size distributions from available samples. Sample percentages within three classes (gravel, sand, and fines) represented by variable sized pie slices in a pie chart.

Sediment chemistry data in the region was available from multiple sources identified in a previous analysis performed for this project (Colwell and Mason, 2016). That assessment summarized data from samples available from a study by Hartwell and Hameedi (2007) and a combination of Virginia Department of Environmental Quality (VDEQ) and Environmental Monitoring and Assessment Program (EMAP). Figure 2-8 shows the discrete locations with available data. The data available is at a low spatial resolution and a single sample location (VDEQ and EMAP station 2) is the closest sample to the majority of possible project activities. In that respect, the sampling does not provide any differentiator between options.

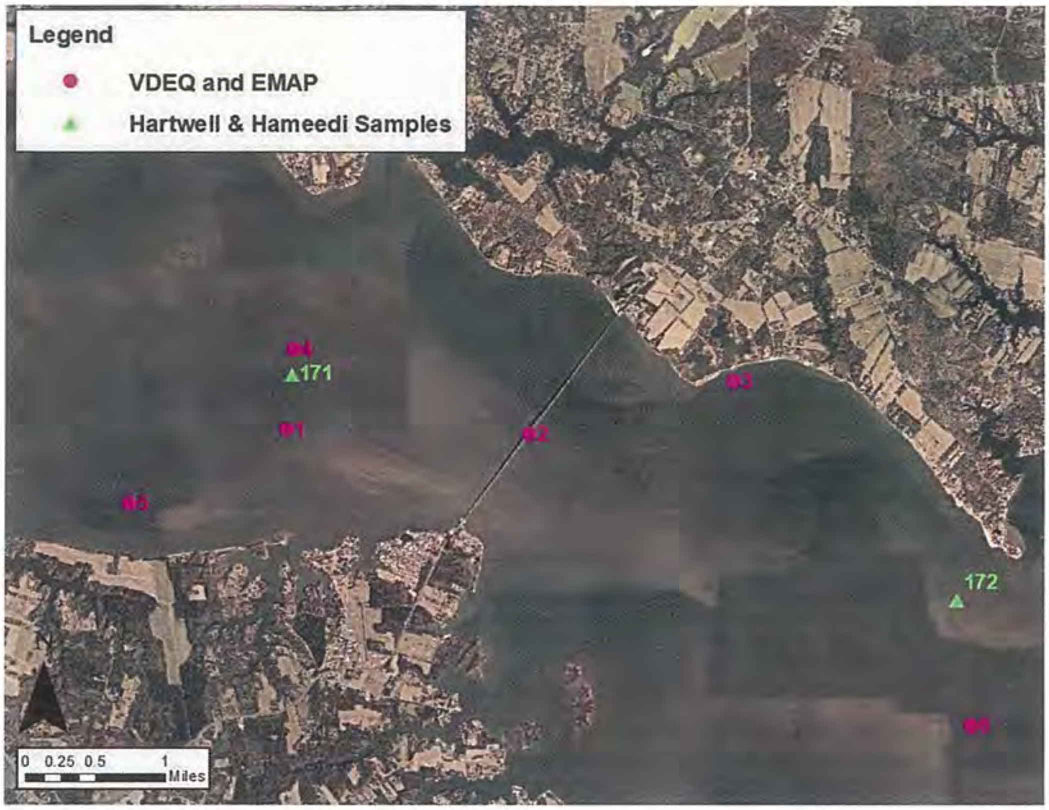


Figure 2-8. Sediment chemistry samples available in the study area.

3. Construction Sediment Impacts Summary

Three potential construction options were investigated for this study: an overhead option referred to as the _Overhead Alternative_ and two subsurface alternatives, one primarily utilizing HDD referred to as the _Underground Option_ and the other predominately utilizing jet plow trenching referred to as _Barnhardt Option 2_. A brief description of each option with respect to potential sediment impacts is presented in Section 3.1 and a relative assessment is presented in Section 3.2.

3.1. Construction Alternatives

Overhead Alternative: The 115 kV Overhead Route includes the rebuild, entirely within the existing/currently maintained right-of-way, of a total of approximately 0.3 mile of existing single circuit 115 kV Line #65 on land on both sides of the Rappahannock River in Lancaster County (less than 0.1 mile) and Middlesex County (approximately 0.3 mile), and the rebuild of the approximately 1.9 mile over water section of single circuit 115 kV Line #65 in the Rappahannock River in an 80-foot-wide right-of-way permitted by the VMRC, which expands to 200 feet at two sections in the center span of the Norris Bridge to accommodate a fender system on either side of and parallel to the navigational channel in the river. The Overhead Alternative could be rebuilt at either 115 kV or 230 kV. The centerline of the proposed H-Frame structures will be located approximately 100 feet east of the Norris Bridge. Additionally, a fender system will be installed in front of the two structures on both side of and parallel to the navigational channel for protection against boating traffic. Figure 3.1-1 illustrates the locations of the H-Frame structures with an inset shown the layout of the fender piles. Note that due to the zoom level, the indicators for the structures are not to scale and while they may appear to fall within the VMRC oyster lease areas they do not; Figure 3.1-2 shows zoomed in views of the structures near the shorelines demonstrating that the structures do not fall within the VMRC oyster lease areas. The H-Frame structures closest to the shoreline are in relatively close proximity to the VMRC oyster lease areas however these individual sites have a relatively small volume of sediment associated with them that will be disturbed during construction.

The Overhead Alternative will require installation of 10 steel H-Frame structures in the river which will include two to three 66-inch piles each as well as a 6.5 ft. by 34 ft. concrete encasement/foundation above the water line and two fender systems that include 34 32-inch piles and two 48-inch piles. Additional temporary piles including 46 24-inch piles and 28 14-inch piles will be required to support installation construction. Sediment disturbance will occur during pile driving, and sediments will be introduced to the water column close to the mudline. Table 2 summarizes the permanent H-Frame piles for each H-Frame location, Table 3 summarizes the permanent fender piles and Table 4 summarizes the temporary piles to be used during construction of this option. Details of the pile geometry and embedment estimates were provided by Dominion. The H-Frame structures have IDs that reference the main line (#65) and the structure number, which are structure 686-695 where 686 is located on the northern bank and the numbers increase from north to south.

Table 2. Summary of H-Frame permanent piles.

H-Frame Structure IDs	# Piles	Pile OD (inches)	Embedment Depth (ft.)
Str 65/686	2	66	46
Str 65/687	2	66	45
Str 65/688	2	66	59
Str 65/689	3	66	87
Str 65/690	3	66	89
Str 65/691	3	66	98
Str 65/692	3	66	104
Str 65/693	2	66	92
Str 65/694	2	66	93
Str 65/695	2	66	69

Table 3. Summary of Fender permanent piles.

Fender Piles	# Piles	Pile OD (inches)	Embedment Depth (ft.)
Fender Small Piles	34	32	82
Fender Large Piles	2	48	82

Table 4. Summary of temporary piles. Note (1) refers to temporary piles for H-Frame and note (2) refers to temporary piles for fender system.

Temporary Piles Closest Structure ID	# Piles	Pile OD (inches)	Embedment Depth (ft.)
Str 65/686	4	24	25
Str 65/687	4	24	25
Str 65/688	4	24	25
Str 65/689	4	24	65
Str 65/690 (1)	4	24	65
Str 65/690 (2)	14	14	65
Str 65/691 (1)	4	24	70
Str 65/691 (2)	14	14	70
Str 65/692	4	24	70
Str 65/693	4	24	65
Str 65/694	4	24	30
Str 65/695	10	24	30

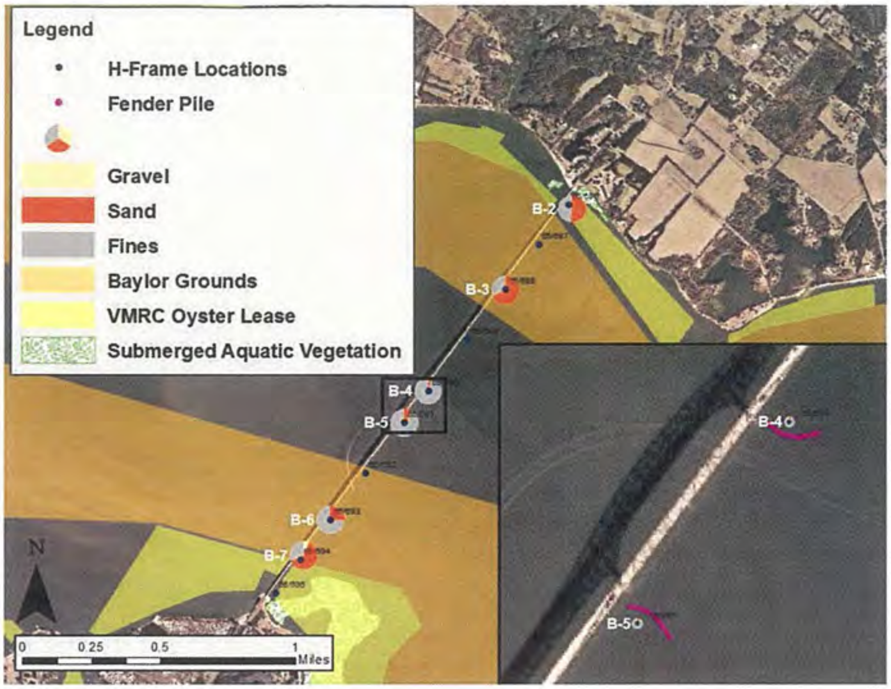


Figure 3.1-1. Illustration of Overhead Alternative construction components which will incur sediment impact overlaid on environmental resources and the spatial variability of sediment grain size characteristics. Note the black framed extent window shows a zoomed view of the two H-Frames near the channel as well as a schematic of the fender pile system. Note also that the indicators for location of the H-Frame and Piles are not to scale as they would not be viewable at scale.

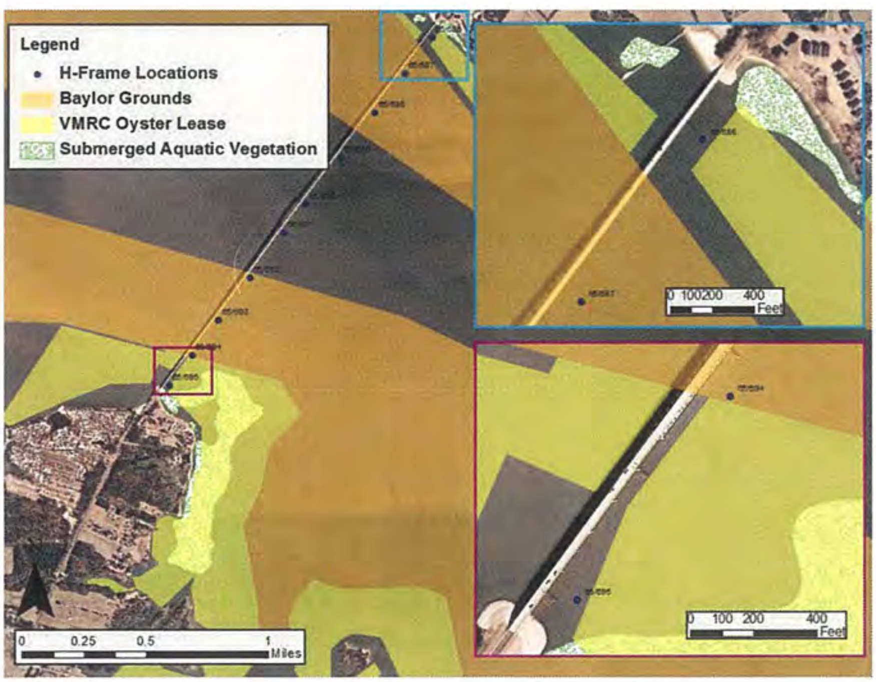


Figure 3.1-2. Illustration of Overhead Alternative construction components which will incur sediment impact overlaid on environmental resources. Note that the indicators for location of the H-Frame and Piles are not to scale as they would not be viewable at scale. The insets shown illustrate zoomed views near the north and south shoreline demonstrating that the structure locations do not fall within the VMRC Oyster Lease areas.

Underground Option: The Underground Option utilizes HDD across the river such that the cables are installed below the riverbed. The drilling itself will displace sediment; however, the sediments associated with the drilling will not be introduced into the water column. Due to construction limitations, the HDD will require two 200 ft. wide by 650 ft. by 15 ft. deep long splice pits at locations part way across the river. The locations of the splice pits are shown in Figure 3.1-3 along with available environmental resources and grain size distributions; this figure has two insets showing the separate pits in a closer view. The splice pit is an allocated area within which two separate parallel trenches will be excavated where the cables will be connected. The trenches will vary in width from 30 ft. wide on the top (sediment surface) and 4 ft. at their deepest point which will be 15 ft. below the mudline. The excavated sediments will be stored on a barge and used to backfill the trenches after the connection is completed. Excavation may introduce sediments throughout the water column, though typically sediments will be localized near the bottom where the excavation occurs and near the surface where the bucket breaks the surface of the water. Additionally, dewatering and overflow from the barge may introduce some sediment to the upper water column. Backfilling will also introduce sediments to the water column, with a small fraction lost as the bucket enters the water column and then localized near the bottom where it is deposited. It should be noted that HDD operations can potentially have unintended releases of sediments and drilling muds through frac out, particularly at locations where the drilling is approaching the mudline. Such releases are not intended and would be unconfined.

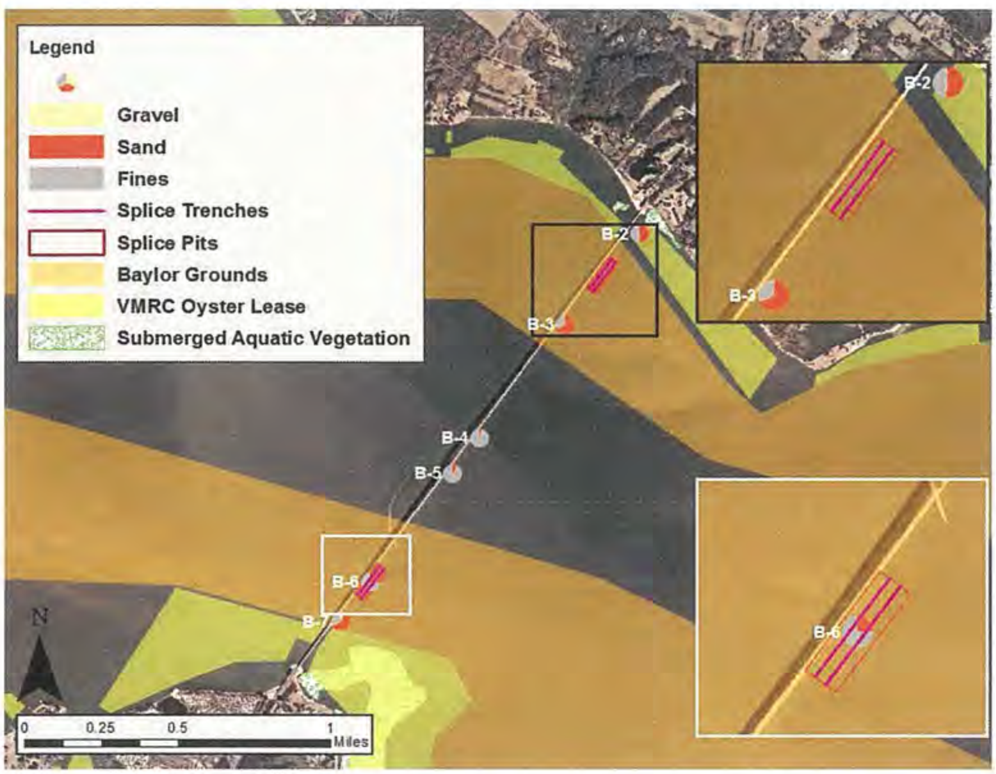


Figure 3.1-3. Illustration of Underground Option construction components which will incur sediment impact overlaid on environmental resources and the spatial variability of sediment grain size characteristics. Note the black framed extent shows a closer view of the northern splice pit trenches and the white framed extent window shows a closer view of the southern splice pit trenches. Note also that the trench widths are not to scale as they would not be viewable at scale.

Barnhardt Option 2: Seven underground individual routes for seven cables will be created through a combination of HDD and jet plow cable burial. The HDD and jet plow paths will connect at seven 25 ft. wide by 100 ft. long by 15 ft. deep receiving pits on each side of the river (14 receiving pits total) just outside several private oyster lease areas. The location of the receiving pits and the jet plow routes are shown in Figure 3.1-4 along with available environmental resources and sediment grain size distributions. Note the HDD paths are not shown as those are not anticipated to have sediment impacts to the water column. The HDD will be used for installation of cables from land to the nearshore region and jet plow burial will be used across the river. The receiving pits will be excavated and the sediments will be placed on a barge and used for backfill after threading of the cables is completed. Sediments may be introduced to the water column as a result of these activities and are anticipated to be localized to the bottom waters where the activity occurs. The jet plow uses hydraulic jets to fluidize the sediment bed, creating a narrow trench (each path is 2 ft. wide by 15 ft. deep with a variable length per Table 5). The cable is fed through the plow and is laid into the trench as it moves forward and the fluidized sediment then settles into the trench to bury the cable. This activity introduces sediments to the water column near the bottom where the fluidization process takes place. Depending on the final HDD approach used for construction, one option has the potential for use of the receiving pits as regions where drilling muds will be re-circulated throughout the drilling process. If this option is employed, silt curtains will be used to contain the drilling muds and when operations are completed the drilling mud will be removed to the extent practical. This construction activity will likely have releases of drilling muds outside the intended containment area through movement or gaps in the silt curtains and possible material that may fit through the silt curtain mesh. Also, HDD operations can potentially have unintended releases of sediments and drilling muds through frac out, particularly at locations where the drilling is approaching the mudline. Such releases are not intended and would be unconfined.

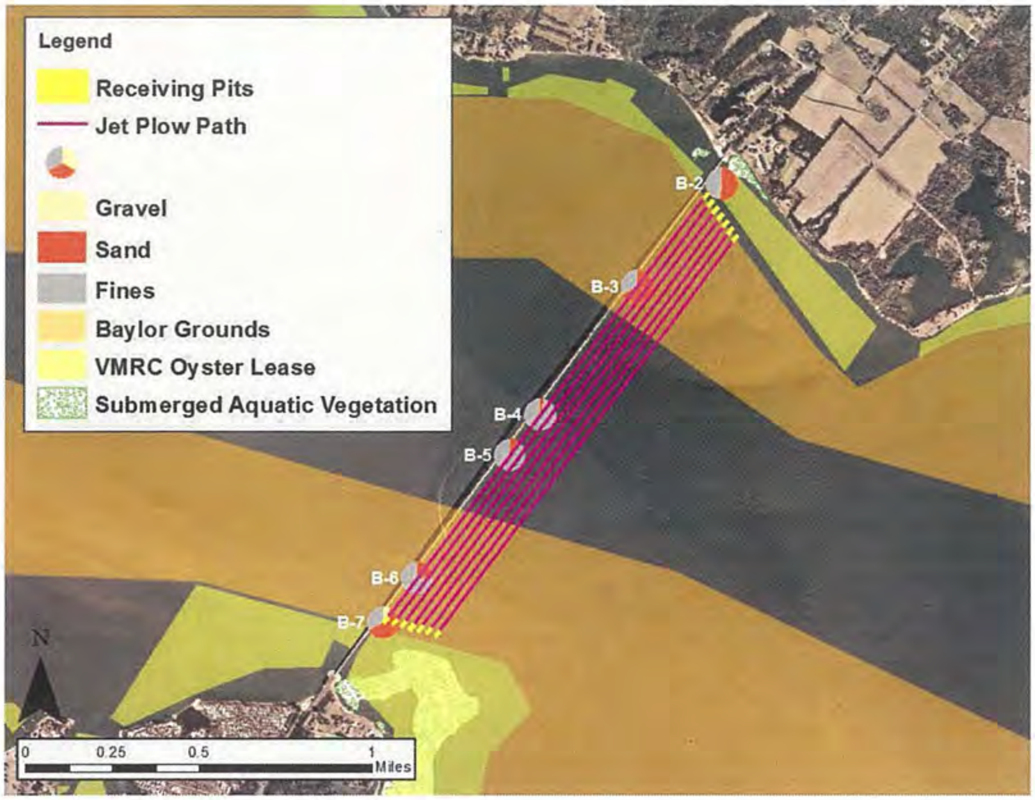


Figure 3.1-4. Illustration of Barnhardt Option 2 construction components which will incur sediment impact overlaid on environmental resources and the spatial variability of sediment grain size characteristics. Note that the trench widths are not to scale as they would not be easily viewable at scale.

Table 5. Summary of jet plow trenches.

Trench	Width (ft.)	Depth (ft.)	Length (mi.)	Length (ft.)
1	2	15	1.55	8,185
2	2	15	1.57	8,295
3	2	15	1.48	7,820
4	2	15	1.52	8,002
5	2	15	1.53	8,092
6	2	15	1.46	7,732
7	2	15	1.50	7,915

3.2. Relative Assessment of Construction Options

A relative assessment of each of the construction options included a comparison of the footprint and volume of sediments that are involved with each activity and a mapping of the different construction options along with available delineation of sensitive resources. The sediment volumes that are involved with the construction activity were calculated, however only a percentage of the involved sediments would be introduced to the water column (often referred to as sediment resuspension) depending on the construction activity. The relative assessment also included an assessment of the duration of "active" construction based on the rate or duration for the different individual activities. The following text provides a summary of the approach and results of calculating the footprint of project impacts, calculation of the volume involved, assumptions of sediment "loss" or "resuspension" percentages and assumptions on the active construction time for each alternative, where active construction refers to the actual duration of activities that have direct impacts on the river bottom.

3.2.1. Footprint and Volume Calculation Approach

The footprint of each construction activity was calculated as follows below:

- H-Frame footprint area was calculated by summing the area of all (24) piles necessary for the 10 H-Frame foundations where the individual pile footprint was calculated using **$A=pi*(D/2)^2$** where A is area, pi is the constant pi (~3.14159), and D is the diameter of the pile (66 in.).
- H-Frame temporary pile footprint area was calculated by summing the area of all (46) piles where individual pile area was calculated using **$A=pi*(D/2)^2$** where A is Area, pi is the constant pi (~3.14159) and D is the diameter of the pile (24 in.).
- Permanent fender pile footprint area was calculated by summing the area of all (36) piles where individual pile area was calculated using **$A=pi*(D/2)^2$** where A is Area, pi is the constant pi (~3.14159) and D is the diameter of the pile (either 32 in. or 38 in.).
- Fender temporary pile footprint area was calculated by summing the area of all (28) piles where individual pile area was calculated using **$A=pi*(D/2)^2$** where A is Area, pi is the constant pi (~3.14159) and D is the diameter of the pile (14 in.).
- Splice pit footprint was calculated as the sum of all (4) trench footprints using **A=L*W** where A is area, L is the trench length through the pit (650 ft.) and W is the trench width at the surface (30 ft.)
- Receiving pit footprint was calculated as the sum of all (14) receiving pit areas using **A=L*W** where A is area, L is the trench length through the pit (100 ft.) and W is the trench width at the surface (25 ft.)
- Jet plow footprint was calculated as the sum of all (7) plow trench route areas using **A=L*W** where A is area, L is the trench length (~ 1.5 miles each) and W is the trench width at the surface (2 ft.)

In order to calculate the area that intersects with Baylor Grounds for each activity, the number of individual construction elements that would be located in Baylor Grounds was determined and the appropriate area was calculated and summed.

The volume of total sediments involved for each activity was calculated as follows:

- H-Frame foundation volume, temporary pile volume and permanent fender pile volume was calculated by summing the total pile volume for all piles needed. Volume was calculated using

V=A*L where V is volume, A is area and L is the embedment length. The number of piles, pile diameters and pile embedment lengths are summarized in Table 2 through Table 4.

- Splice pit trench volume was calculated by summing the volume of all (4) trenches using **V = A*D** for each trench, where V is volume, A is area and D is depth. The area of the splice trenches for this calculation was taken as the average of the top (30 ft.) and bottom (4 ft.) width of the trench.
    - Backfill volumes are assumed the same as the excavated volume minus the volume assumed lost during excavation. Details on loss rates to follow.
- Receiving pit trench volume was calculated by summing the volume for all (14) thread pits where individual pit volume was calculated using **V=A*D**, where V is volume, A is area and D is depth (15 ft.).
    - Backfill volumes are assumed the same as the excavated volume minus the volume assumed lost during excavation. Details on loss rates to follow.
- Jet plow trench volume was calculated by summing the volume for all (7) trench routes where trench volume was calculated using **V=A*D**, where V is volume, A is area and D is depth (15 ft.).

3.2.2. Construction Sediment Loss Rate Assumptions

Construction activities such as pile driving, excavation, and jet plowing all disturb or resuspend sediments in to the water column. This resuspension results in a plume and eventual sediment deposition nearby depending on the volume and characteristics of sediments, the location they are introduced in the water column and advection and dispersion processes. Each construction activity is different and has a different volume "loss" to the water column. The assumed volume losses as represented by volume percentage of the total sediment volume involved in the process are summarized for each construction activity in Table 6. Where available these values were based on referenced material as noted whereas others are based on assumptions used in similar studies by both RPS ASA and other consultants including Federal Highway Administration, 2012, Hayes and Wu, 2001, Anchor Environmental, 2003 and Foreman, 2002.

Table 6. Summary of assumed sediment loss (resuspension) rates.

Method	Applicable Construction Option	Loss %	Reference	Location of Sediments Resuspended in Water Column
Pile driving	Overhead Alternative	0.4	FHA, 2012	Near bottom
Jet plow burial	Barnhardt Option 2	25	Foreman, 2002	Near bottom
Excavation: bucket to barge	Underground Option, Barnhardt Option 2	1	FHA, 2012 Anchor Environmental, 2003 Hayes and Wu, 2001	Throughout water column, mainly near surface and near bottom
Backfill: barge/bucket to bottom	Underground Option, Barnhardt Option 2	10	RPS ASA Assumption	Throughout water column, mainly near surface and near bottom

3.2.3. Construction Duration Assumptions

Each construction activity differs also in terms of the rate and duration it takes to move/disturb sediments. The metric by which the volume moved is referred to as the production rate. This is the rate of active construction and neglects any operational downtime. Based on other similar projects the following production rates have been assumed:

- Pile driving of the H-Frame permanent concrete piles by impact hammer will take approximately 60 minutes per pile. Similar projects have shown that up to 50% of the embedment will take place under the weight of the pile and hammer alone and not need to be hammered, however to be conservative 60 minutes per pile was assumed. This estimate was provided by Dominion. Total duration of the activity is the product of this rate by the number of piles.
- Pile driving of the fender permanent fiber piles by vibratory hammer will take approximately 40 minutes per pile. This estimate was provided by Dominion. Total duration of the activity is the product of this rate by the number of piles.
- Pile driving of the temporary steel piles will take approximately 15 minutes per pile. This estimate was provided by Dominion. Total duration of the activity is the product of this rate by the number of piles.
- Excavation and backfill is assumed to take place at a rate of 392.4 cy/hr. For each activity the duration is calculated by dividing the total volume involved by this rate. This estimate was assumed by RPS ASA based on the production rate specified in studies of similar activity.
- Jet plow advance rate is assumed to be 100 meters/hr. Duration of jet plowing is calculated by dividing total plow route length by this rate. This estimate was provided by PDC.

3.2.4. Summary of Relative Assessment Calculations

A summary of the sediment impacts as characterized by footprint of sediments impacted, volume of sediments disturbed, footprint of sediments intersecting with Baylor Grounds and the duration estimated for each activity can be found in Table 7, Table 8, Table 9, respectively. Note for areas that are excavated and then backfilled, the activity takes place within the same area so while their individual areas are calculated they are not cumulatively added for totaling the areas. Further note that for backfilling where the fill is the previously excavated sediment, the total volume is slightly smaller since the excavation will lose a percentage to the water column during excavation.

From these tables it can be seen that the Overhead Alternative has the smallest overall footprint, smallest footprint intersecting Baylor Grounds and smallest volume of involved sediments and volume of sediments introduced to the water column. The total disturbed footprint for the Overhead Alternative increases by a factor of 30 and 35 when compared to the Underground Option and Barnhardt Option 2, respectively. The volume of sediments introduced to the water column for the Overhead Alternative option increases by a factor of 250 and 1,479 when compared to the Underground

Option and Barnhardt Option 2, respectively. The Underground Option has the shortest active construction duration neglecting downtime; however, it is the same order of magnitude approximately as the Overhead Alternative, which are both approximately 50 % shorter than Barnhardt Option 2.

Table 7. Summary of areas, volumes and durations of construction activities associated with the Overhead Alternative.

Overhead Alternative	Footprint	Footprint Intersecting with Baylor Grounds	Volume of Sediments Involved	Volume of Sediments Resuspended	Duration of Active Construction Based on Volume and Production Rate
	ac	ac	cy	cy	hrs.
Ten H-Frame Structures • Twenty four 66 in. piles	0.013	0.006	1708.8	6.8	24
Two Fender Systems • Thirty four 32 in. piles • Two 48 in. piles	0.005	0	653.0	2.6	24
Temporary Piles for H-Frame • Forty six 24 in. piles	0.003	0.001	239.7	1.0	11.5
Temporary Piles for Fenders • Twenty eight 14 in. piles	0.001	0	74.8	0.3	7
Total	**0.022**	**0.007**	**2,676**	**10.7**	**66.5**

Table 8. Summary of areas, volumes and durations of construction activities associated with the Underground Option (HDD).

Underground Option (HDD)	Footprint	Footprint Intersecting with Baylor Grounds	Volume of Sediments Involved	Volume of Sediments Resuspended	Duration of Active Construction Based on Volume and Production Rate
	ac	ac	cy	cy	hrs.
Splice Pit Trenches Excavation • Four trenches	1.791	1.791	24,556	246	62.6
Splice Pit Trenches Backfill • Four trenches	1.791	1.791	24,310	2,431	61.3
Total	**1.791**	**1.791**	**48,866**	**2,677**	**123.9**

Table 9. Summary of areas, volumes and durations of construction activities associated with Alternative 2: Barnhardt Option 2 (jet plow).

Barnhardt Option 2 (jet plow)	Footprint	Footprint Intersecting with Baylor Grounds	Volume of Sediments Involved	Volume of Sediments Resuspended	Duration of Active Construction Based on Volume and Production Rate
	ac	ac	cy	cy	hrs.
14 Thread Pits - Excavation	0.803	0.565	1,389	13.9	3.5
14 Thread Pits - Backfill	0.803	0.565	1,375	13.8	3.5
7 Trenches	1.287	0.684	62,268	15,567	90.8
Total	**2.090**	**1.249**	**65,032**	**15,595**	**97.8**

The activities were also assessed with respect to the likely sediment grain size characteristics of the disturbed sediments. Table 10 through Table 12 summarize the boring samples that would be representative of the sediments of each activity (Refer to Figure 2-7 for location and characteristics of each boring sample). Based on assumed equal weight of samples relative to each activity and volume weighting of each activity, the estimated overall sediment grain size distribution for each activity was calculated. These volume weighted sediment size characteristics are shown as pie charts in Figure 3.2.4-1 through Figure 3.2.4-3 . In general, the sediment characteristics associated with each activity are similar and are predominately fines and sand with a small gravel fraction.

Table 10. Summary of grain size samples that represent each activity associated with the Overhead Alternative.

Overhead Alternative	**Grain Size Samples Representing Activities**
Install of ten H-Frame Structures with 2-3 piles each	B-2,B-3,B-4,B-5,B-6,B-7
Install of two Fender Systems	B-4, B-5
Temporary Piles to Support H Frame Installation	B-2,B-3,B-4,B-5,B-6,B-7
Temporary Piles to Support Fender Installation	B-4, B-5

Table 11. Summary of grain size samples that represent each activity associated with Underground Option (HDD).

Underground Option (HDD)	**Grain Size Samples Representing Activities**
Splice Pit Trenches North	B-2, B-3
Splice Pit Trenches South	B-6

Table 12. Summary of grain size samples that represent each activity associated with Barnhardt Option 2 (jet plow).

Barnhardt Option 2 (jet plow)	**Grain Size Samples Representing Activities**
14 Thread Pits	B-2, B-7
7 Trenches	B-2,B-3,B-4,B-5,B-6,B-7

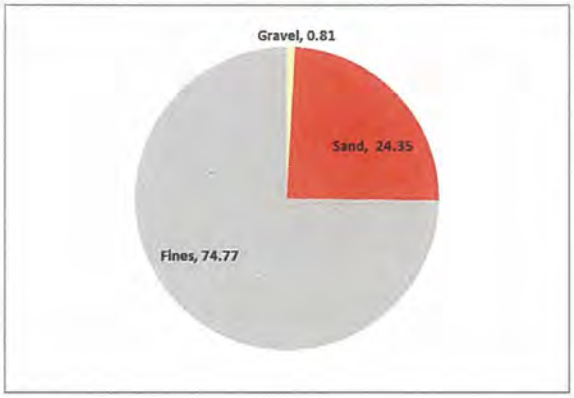


Figure 3.2.4-1. Estimated volume weighted sediment size characteristics associated with the Overhead Alternative. Total volume resuspended in water column ~ 10.7 cy.

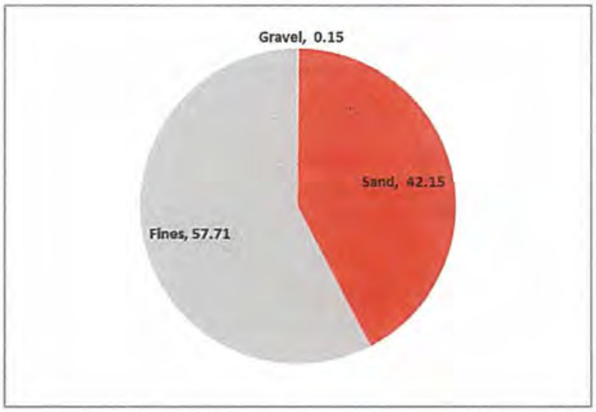


Figure 3.2.4-2. Estimated volume weighted sediment size characteristics associated with Underground Option (HDD). Total volume resuspended in water column ~ 2,677.

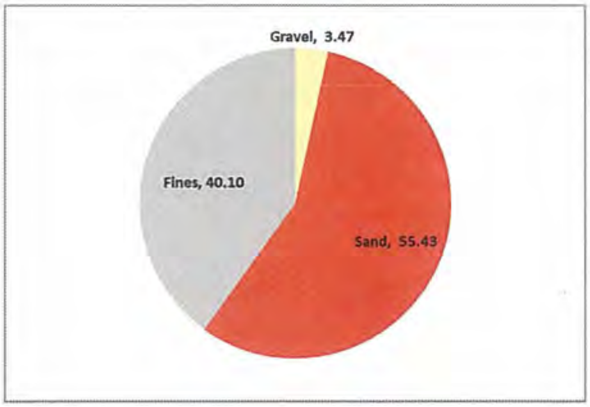


Figure 3.2.4-3. Estimated volume weighted sediment size characteristics associated with Barnhardt Option 2 (jet plow). Total volume resuspended in water column ~ 15,595 cy.

4. Concluding Remarks

An assessment was performed to evaluate potential sediment impacts associated with different construction options under consideration for the Dominion Virginia Power Rebuild Project.

The assessment evaluated the three potential construction options, the overhead option referred to as the *Overhead Alternative* and two subsurface alternatives, one primarily horizontal directional drilling (HDD) referred to as the *Underground Option* and the other predominately jet plow trenching referred to as *Barnhardt Option 2*.

The assessment compared the overall footprint, volume, footprint of intersection with sensitive environmental resources, sediment characteristics and construction duration with each construction option. Based on this assessment the following findings have been made:

- All options will have some sediment disturbance that will result in a suspended sediment plume and riverbed deposition.
- All options are located in the river and are subject to tidally reversing currents, and as such the sediment plumes may be transported in any direction from the activity.
- The total footprint of disturbed river bottom sediments is 0.022 acre for the Overhead Alternative, 1.791 acres for the Underground Option and 2.090 acres for Barnhardt Option 2.
    - The Overhead Alternative has the smallest footprint of disturbed sediments.
    - The Overhead Alternative footprint is approximately 81 times smaller than the Underground Option and 94 times smaller than Barnhardt Option 2.
- None of the options have construction elements that intersect directly with VMRC oyster lease areas or submerged aquatic vegetation areas.
    - The Overhead Alternative will have three H-Frame structures located in close proximity (~20-50 ft.) to the VMRC oyster lease areas near the north (1 structure) and south (2 structures) shorelines respectively. The construction activities associated with these structures disturbs a relatively small volume of sediments (< 1 cy each).
    - The Barnhardt Option 2 has receiving pits located in close proximity (~100-200 ft.) to the VMRC oyster lease areas near each shoreline. The volume introduced to the water column associated with construction at these pits is approximately 28 cy considering both excavation and backfill.
- The total footprint of disturbed river bottom sediments that intersect with Baylor Grounds is 0.007 acre for the Overhead Alternative, 1.791 acres for the Underground Option and 1.249 acres for Barnhardt Option 2.
    - The Overhead Alternative has the smallest footprint of disturbed sediments that intersects with the Baylor Grounds.
    - The Overhead Alternative area intersecting with Baylor Grounds is approximately 241 times smaller than the Underground Option and 168 times smaller than Barnhardt Option 2.

- The total volume of sediments that may be resuspended in the water column is 10.7 cy for the Overhead Alternative, 2,677 cy for the Underground Option and 15,595 cy for Barnhardt Option 2.
    - The Overhead Alternative has the smallest volume of disturbed sediments.
    - The Overhead Alternative volume of disturbed sediments is approximately 250 times less than the Underground Option and 1,456 times less than Barnhardt Option 2.
- The volume weighted sediment characteristics for each activity are relatively similar and are primarily fines and sand with a small gravel fraction.
    - The Overhead Alternative has the greatest relative percent of fines (74.77%), as compared to the Underground Option which has 57.71% fines, and Barnhardt Option 2 which has 40.10 % fines. While the relative fractions are similar orders of magnitude, the volume anticipated to be resuspended associated with each activity is highly variable; the estimated volume of fines that may be resuspended are 8 cy, 1,545 cy and 6,253 cy for the Overhead Alternative, the Underground Option and Barnhardt Option 2, respectively.
- Based on the construction methods, the location of the sediment plume in the water column varies between the three options. The Overhead Alternative consists of pile driving, which will induce a plume near the bottom. The Underground Option consists of excavation, storage on a barge and then backfilling, and as such may induce a sediment plume throughout the water column with likely higher concentrations of suspended sediments near the bottom and near the surface. Barnhardt Option 2 consists of excavation to a barge and eventual backfill at the receiving pits and jet plow across the majority of the river, and as such is anticipated to induce sediment plumes primarily near the bottom of the water column, though movement to and from the barge may introduce a small portion to the upper water column.
- The suspended sediments associated with each activity will eventually settle out of the water column. Since the sediment characteristics are predominately fines, they are likely to stay suspended for relatively longer periods and produce an extended thin deposit on the riverbed. The sand and gravel will deposit closer to the activity.
- The resolution of sediment chemistry data in the area is coarse and as such no conclusions can be drawn using chemistry/quality as a differentiator between construction options with the exception of comparison of potential chemical loading. The chemical loading is directly proportional to the volume of sediments, and as such the Overhead Alternative has the smallest volume of potential pollutant mass loading and it is approximately 250 times less than the Underground Option and 1,456 times less than Barnhardt Option 2.
- The duration of active construction, where active construction refers to periods of time with direct impacts to the river bottom, is 66.5 hours for the Overhead Alternative, 123.9 hours for the Underground Option and 97.8 hours for Barnhardt Option 2. The Overhead Option has the shortest active construction and is approximately 1.8 times shorter than the Underground Alternative and approximately 1.47 times shorter than Barnhardt Option 2.
- Based on the durations and the total volume of sediment estimated to be suspended, the average rate of resuspension is 0.16 cy/hr. for the Overhead Alternative, 21.6 cy/hr. for the

Underground Option and 159.5 cy/hr. for Barnhardt Option 2 as summarized in Table 13. The Overhead Alternative average flux is approximately 134 times less than the Underground Option flux and approximately 990 times less than Barnhardt Option 2 flux.

- Assuming all else equal, a greater flux will result in greater instantaneous physical impacts of suspended sediment concentration. However the overall impact depends on the sensitivity of receptors to specific concentration thresholds of suspended sediment concentration and the duration in which the concentration is present in the water column in any particularly area.

Table 13. Summary volume of resuspended sediments, duration of construction and average resuspension rate for the three options.

	Volume of Sediments Introduced to the Water Column (cy)	Duration of Active Construction Based on Volume and Production Rate (hrs)	Average Rate of Resuspended Sediments (cy/hr.)
Overhead Alternative	10.7	66.5	0.16
Underground Option (HDD)	2,677	123.9	21.6
Barnhardt Option 2 (jet plow)	15,595	97.8	159.5

- Barnhardt Option 2 may include discharges of drilling muds to the receiving pits depending on the final approach to construction. The receiving pits will be contained with silt curtains and subsequent to operations the drilling mud will be removed to the extent practical; however, there would be potential releases of the drilling mud (mixed with river water) outside the receiving pit areas depending on the silt screen mesh size and any gaps in the containment.
- Both the Underground Option and Barnhardt Option 2 have the potential for unintended releases of sediments and drilling muds through frac out, particularly at locations where the drilling is approaching the mudline. Such releases are not intended and would be unconfined. Further, should frac out occur, it is likely to take place close to the splice pits, within the Baylor Grounds for the Underground Option and near the receiving pits closer to shore and the VMRC Oyster Lease Beds, Baylor Grounds and Submerged Aquatic Vegetation.

5. References

Anchor Environmental (2003). Literature Review of effects of resuspended sediments due to dredging operations. Prepared for Los Angeles Contaminated Sediments Task Force. Los Angeles California, June 2003.

Ciloglue, F. and B. Roth, 2016. Geotechnical Exploration Report. T/L 65 Rappahannock River Crossing North Neck (STR 686) to Harmony Village (STR 695). GAI Consultants, Inc. Technical Report prepared for Dominion Technical Solutions, Inc., August, 2016.

Colwell, L and M. Mason, 2016. ERM Memorandum on Line #65 115 kV Rebuild at Norris Bridge. Contaminated Sediment Review: Rappahannock River Crossing. ERM Memorandum prepared for Dominion Virginia Power, April, 2016.

Dominion 2016. Norris Bridge -115kV Transmission Line Rebuild and Relocation Project. https://www.dom.com/corporate/what-we-do/electricity/transmission-lines-and-projects/norris-bridge-115kv-transmission-line-rebuild-and-relocation-project. September 2016.

NRG, 2016. Dominion Virginia Power Line #65 115kV Rebuild at Norris Bridge. Alternatives Analysis. Final Report. NRG Technical Report , February, 2016.

Federal Highway Administration, 2012. Final Environmental Impact Statement and Final Section 4(f) Evaluation for Tappan Zee Hudson River Crossing Project. Interstate 87/287, Rockland and Westchester Counties, New York. Appendix E: Water Quality.

Foreman, J., 2002. Resuspension of sediment by the jet plow during submarine cable installation. Submitted to GenPower, LLC, Needham, MA. Submitted by Engineering Technology Applications, Ltd, Romsey, Great Britain, May, 2002.

Haight, F. J., H. E. Finnegan and G. L. Anderson. 1930. Tides and currents in Chesapeake Bay and tributaries.*Special Publication No. 162,U.S. Coast and Geodetic Survey,Washington, D.C.*, pp. 1, 48.

Hayes, Donald and Wu, Pei-Yao, 2001. Simple Approach to TSS Source Strength Estimates, Proceedings of the WEDA XXI Conference, Houston, TX, June 25-27, 2001.

Hartwell, S.I. and J Hameedi. 2007 Magnitude and Extent of Contaminated Sediment and Toxicity in Chesapeake Bay. NOAA Technical Memorandum NOS NCCOS 47. 234 pp.

NOAA 2016. Chesapeake Bay OFS. https://tidesandcurrents.noaa.gov/ofs/ofs_animation.shtml?ofsregion=cb&subdomain=0&model_type=currents_nowcast, September, 2016.

PDC, 2016. Dominion Virginia Power Evaluation of Cable Options For Rappahannock River Crossing. XLPE Cables Attached to the Norris Bridge. XLPE Submarine Cables Buried in the River Bottom. PDC Transmission and Distribution Systems. Draft 092816, September, 2016.

Appendix G

DOMINION VIRGINIA POWER
Line #65 115 kV Rebuild at Norris Bridge

Supplemental Alternatives Analysis

APPENDIX G
Cultural Resources Assessment

Stantec

1049 Technology Park Drive
Glen Allen, Virginia 23059
(804) 355-7200

October 25, 2016
File: 203400254

Attention: Ms. Amanda Mayhew
Virginia Electric and Power Company
(Dominion Virginia Power)
701 East Cary Street, 12th Floor
Richmond VA 23219

Dear Ms. Mayhew,

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: ***Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia***

Stantec was retained by Dominion to conduct a Stage I Pre-Application Analysis for the Line #65 115 kV Rebuild at Norris Bridge in Lancaster and Middlesex Counties, Virginia (Rebuild Project). This analysis was completed in December of 2015 and February of 2016. Stantec conducted preliminary background research and a field study pursuant to the *Guidelines for Assessing Impacts of Proposed Electric Transmission Lines and Associated Facilities on Historic Resources in the Commonwealth of Virginia* (Virginia Department of Historic Resources [VDHR] 2008) for transmission line improvements. At the time that the project commenced, two overhead alternatives and one underground option were under consideration – a 115 kV Overhead Route, a 230 kV Overhead Alternative (collectively the Overhead Alternatives), and an Underground Option. Since the time of the Stage I Pre-Application Analysis, the Commission has directed the Company to evaluate two additional alternatives for this project.

The following is presented as an addendum to the *Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia* dated February 2016 (Brady and Stewart 2016) and accepted by the VDHR by letter dated April 11, 2016. Included in the Addendum are assessments of potential effects for two new options – Barnhardt Option 1 and Barnhardt Option 2, as well as a review of revised photo simulations prepared for the overhead routes previously assessed.

PROJECT DESCRIPTION

Dominion considered two overhead alternatives that involve rebuilding a total of approximately 0.3 mile of transmission Line #65 on land on both sides of the Rappahannock River in Lancaster and Middlesex Counties, and a rebuild and relocation of the approximately 1.9-mile section of Line #65 in the Rappahannock River. These two overhead alternatives are referred to as the 115 kV Overhead Route and the 230 kV Overhead Alternative (collectively, the Overhead Alternatives). An approximately 2.3-mile underground option along a similar route as the Overhead Alternatives was also considered (Underground Option). Two additional options the Company has been directed to evaluate, Barnhardt Option 1 and Barnhardt Option 2, are described below.

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia

BARNHARDT OPTION 1

Barnhardt Option 1 involves replacement and relocation of a section of Line #65 that parallels Route 3 and crosses the Rappahannock River with new cables, entirely attached to the bridge. This option would involve the placement of seven cables (two cables per phase with one spare) within approximately 1,100 feet of concrete-encased duct-bank on the south shore and 1,200 feet of concrete-encased duct-bank on the north shore. The duct-bank would be constructed within a 4.5-foot-wide by 5.5-foot-deep trench on the land portions of the project on both sides of the river. The cables will be installed in the trench and ready-mix concrete will be poured into the trench encasing the cables and creating the duct bank. This duct bank would be located 3 feet below final grade, covered by 2 feet of thermal backfill and 1-foot of native backfill (soil). At the bridge, the land cables would transition into eight fiberglass conduits. The remaining approximately 10,000 feet of cable will be installed within eight separate 8-inch-diameter fiberglass conduits attached to the underside of the bridge. Where the conduits reach the ends of the bridge, they would curve to the east of the bridge and turn downward to enter the ground. At this point, the cables would transition from the conduit and into concrete-encased duct-bank described above. This option would require the same transition stations previously identified for the Underground Option. Figures prepared by Natural Resource Group (NRG) in Attachment A depict the route of Barnhardt Option 1.

BARNHARDT OPTION 2

Barnhardt Option 2 involves replacement and relocation of a section of Line #65 that parallels Route 3 and crosses the Rappahannock River with new cables trenched into the bottom of the Rappahannock River. This option would involve the placement of seven cables within 800 feet of concrete duct-bank on the south shore and 800 feet of concrete duct-bank on the north shore. The duct-bank would be constructed within a 4.5-foot-wide by 5.5-foot-deep trench on the land portions of the project on both sides of the river. The cables will be installed in the trench and ready-mix concrete will be poured into the trench encasing the cables and creating the duct bank. This duct bank would be located 3 feet below final grade, covered by 2 feet of thermal backfill and 1-foot of native backfill (soil). At the end of the duct-bank, the land cables would enter manholes where they would be spliced to submarine cables. At the on-land splice locations, the seven submarine cables would enter into seven conduits. The conduits, installed via HDD, would extend below the riverbed and would surface on the river bottom between 1,308 and 1,781 feet from shore on the south side and between 910 and 1,400 feet from the top of bank on the north side. The use of conduit in these locations would avoid direct disturbance to existing oyster leases. In the river, between the south and north side conduits, the submarine cables would be installed in seven trenches excavated into the river bottom using water jet plow technology. In addition, an approximately 25-feet-wide by 100-feet-long transition area would be excavated on either end of the jet plow areas. These seven trenches for the submarine cables would vary in

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia

length between 7,500 and 8,100 feet long. This option would require the same transition stations previously identified for the Underground Option. Figures prepared by NRG in Attachment B depict the route of Barnhardt Option 2.

ADDENDUM TO STAGE I PRE-APPLICATION ANALYSIS: VDHR FILE 2015-0969

The *Guidelines for Assessing Impacts of Proposed Electric Transmission Lines and Associated Facilities on Historic Resources in the Commonwealth of Virginia* (VDHR 2008) were developed by VDHR to assist the State Corporation Commission (SCC) and their applicants to address and minimize potential impacts to historic resources associated with the construction of large-scale transmission lines and associated facilities. In consideration to the general project design, as described above, and other elements associated with the undertaking, including current ROW conditions within the project area, Stantec designed the present study to identify all previously recorded architectural and archaeological resources requiring inclusion in a formal Stage I Pre-Application Analysis, as defined by the *Guidelines for Assessing Impacts of Electric Transmission Lines and Associated Facilities on Historic Resources in the Commonwealth of Virginia* (VDHR 2008). The following presents a Stage I level assessment of Barnhardt Option 1 and Barnhardt Option 2.

SUMMARY OF BACKGROUND RESEARCH

As part of the Stage I Pre-Application Analysis effort, VDHR guidance recommends a four-tier study area strategy to be considered for each alternative alignment for the undertaking. Per this guidance consideration was given to: NHL properties located within a 1.5-mile radius of the project centerline; NRHP-listed properties, battlefields, and historic landscapes located within a 1.0-mile radius of the project centerline; NRHP-eligible sites located within a 0.5-mile radius of the project centerline; and archaeological sites located within the project ROW corridor. The background research conducted applies to not only the alternatives addressed in the February 2016 analysis but also the Barnhardt Option 1 and Barnhadt Option 2, the focus of this addendum, as they are located within the same general location and thus APE. The Barnhardt Option 2 does require a much larger APE for the riverine crossing; however, the installation of cables for this option is below surface. Therefore, it is recommended that the above-ground APE utilized for the previous assessment is appropriate.

The VDHR files of archaeological sites and historic structures were examined and information was retrieved on all archaeological sites located up to a 0.5-mile radius of the project area and all previously recorded architectural resources up to a 1.5-mile radius of the project corridor. A summary of the background research follows.

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia

Architectural Resources

There are 56 previously-identified architectural resources located within a 1.5-mile radius of the project centerline for this Rebuild Project. No NHL-listed architectural resources are located within the 1.5-mile buffer. Two NRHP-listed resources were identified within the 1.0-mile buffer and include Pop Castle (VDHR #051-0075) and Prospect (Grey's Point Plantation) (VDHR #059-0025). No eligible resources are located within the 0.5-mile buffer. Pop Castle is located approximately 0.78 mile from the existing bridge and 0.79 mile from the transmission line center line, while Prospect (Grey's Point Plantation) is located approximately 0.76 mile from the transmission line corridor (Table 1; Attachment C).

In addition to the resources identified within the VDHR's V-CRIS, research indicated that a portion of the Captain John Smith Chesapeake National Historic Trail is located within the APE for this project. The Trail route extends throughout the Chesapeake Bay and includes tributaries explored by Smith (Attachment D). The Trail was further extended into four additional rivers considered as historic components of the Trail by the Secretary of the Interior in May 2012. While the Captain John Smith Chesapeake National Historic Trail is not a traditionally documented historic resource, a segment of the Trail within the James River has been recently identified as a potential historic resource. In their correspondence dated April 11, 2016, the VDHR noted that it was their opinion that this section of the Captain John Smith Chesapeake National Historic Trail was not likely eligible for listing on the NRHP. An assessment of potential effects associated with the two new options is included here in order to be consistent with the previous pre-application analysis.

Table 1. Previously Recorded Architectural Resources Considered within the Stage I Pre-Application

VDHR ID	Resource Name	VDHR/NRHP Status	Distance to Line (feet)
051-0075	Pop Castle	Listed on the NRHP in 1989	4159
059-0025	Prospect (Grey's Point Plantation)	Listed on the NRHP in 2004	4036
N/A	Captain John Smith Chesapeake National Historic Trail	N/A	0

Archaeological Resources

No previously identified archaeological resources are located within the project ROW corridor (Table 2; Attachment C). Four previously recorded archaeological sites are located within the 0.5-mile buffer of the center line for the rebuild but would not be impacted by the Rebuild Project.

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia

Table 2. Previously Recorded Archaeological Resources Located within 1.5-Miles of the Rebuild Project			
VDHR ID	**Resource Type**	**VDHR/NRHP Status**	**Distance to Line (feet)**
44MX0002	Unknown	Not Evaluated	3406
44MX0018	Shipwreck, canoe	Not Evaluated	8016
44MX0045	Cemetery, Dwelling, single	Not Evaluated	5755
44MX0046	Dwelling, single	Not Evaluated	4984

RESULTS OF THE STAGE I PRE-APPLICATION ANALYSIS – BARNHARDT OPTIONS 1 AND 2

No new fieldwork was conducted as part of the preparation of this addendum. Fieldwork was conducted under the direction of Senior Architectural Historian, Sandra DeChard on December 15, 2015 and on February 17, 2016. The fieldwork for the assessment entailed photographing the resources requiring visual assessment according to the Stage I Pre-Application review process and examining the potential views from the resources towards the transmission line improvements. Photographs and previously field collected data were considered sufficient for the analysis of potential impacts to historic resources for the two new alternatives. Three resources – Pop Castle (VDHR #051-0075), Prospect (Grey's Point Plantation) (VDHR #059-0025), and the Captain John Smith Chesapeake National Historic Trail – were considered for this analysis.

Pop Castle (VDHR #051-0075)

Pop Castle (VDHR #051-0075) is located northwest of Norris Bridge (VA Route 3) in Lancaster County, Virginia. The property consists of a house dating to 1855 situated on an approximately 12-acre parcel northwest of the Norris Bridge. The parcel is defined on the east and west by fence lines. To the south, the house has an unobstructed view of the Rappahannock River and is surrounded by a mowed lawn with mature trees. The parcel has a private dock on the Rappahannock River. To the north of the house is a horseshoe-shaped gravel driveway leading to Pop Castle Road. A series of small associated outbuildings is situated on the north side of Pop Castle Road. Facing south, the main house is set on a fairly level grade that slopes gradually to the south toward the Rappahannock River. Outbuildings on the property include one granary, one smokehouse, one dairy, four structures dating to the 1940s, one decorative well cover, one pump house, one workshop, and one garage/stable (VDHR Site Files; Wells 1998). Pop Castle was listed on the NRHP in 1989 (Figures 6 and 7) under Criteria A and C with a period of significance of 1785-1865. The resource is considered significant at a local level for its architectural merit (Criterion C) as well as its local significance as the location of a ferry landing and association with activities of the War of 1812 and the Civil War.

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia

Visual Effect Assessment

Currently, the existing transmission line corridor, including riverine and bridge attachment components, is within the view shed of Pop Castle (VDHR #051-0075). The closest point from the boundary of Pop Castle to the existing transmission line corridor is 0.79 mile. This point is located at the southeastern resource boundary along the shoreline of the Rappahannock River. Distances from the main dwelling on the property to the proposed river crossing towers range from 0.84 mile to the closest point as the line approaches Middlesex County at the northern terminus of the Norris Bridge and 1.10 mile from the center of the bridge and the location of the tallest structures. Norris Bridge is visible from the front of the house as well as the shore line down by the private dock; however, the existing transmission line towers cannot be discerned.

Figure 1. View Looking Northeast toward Pop Castle (VDHR #051-0075).

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia

Figure 2. View from Pop Castle (VDHR #051-0075) Looking Southeast toward Norris Bridge.

Barnhardt Option 1

Barnhardt Option 1 would present no visual effect to this resource for the riverine portion of the crossing. At the bridge approaches, tower replacements would not be required; however, two transition stations, one on each side of the river, would be sited on approximately 2.0 acres at inland locations along the existing ROW. These stations would be similar to a small pump station with a low profile building measuring approximately 13 feet in height and two associated towers which would be approximately 80 feet in height. The Line-of-Sight (LOS) analysis previously conducted for the Stage I Pre-Application Analysis indicated that these stations with an approximate height of 80 feet would not be visible from Pop Castle (Attachment E). The attachment of cables to the Norris Bridge structure would also not pose a visual effect to Pop Castle. The cables will be installed in conduit on the underside of the bridge structure. ***As previously illustrated, the two transition stations and associated approximately 80-foot structures would not be visible from Pop Castle. The cables associated with this option would be affixed to the under structure of the Norris Bridge. While the cables would be suspended from the bridge structure utilizing traverse beams and hanger beams and possibly visible, it is not likely that they would be noticeable from this resource. Therefore, it is recommended that there would be No Visual Effect to Pop Castle (VDHR #051-0075) resulting from Barnhardt Option 1.***

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia

Barnhardt Option 2

Barnhardt Option 2 would present no visual effect to this resource. This option includes the placement of seven cables within 800 feet of concrete duct-bank on the south shore and 800 feet of concrete duct-bank on the north shore. At the end of the duct-bank, land cables would enter into seven conduits installed by HDD via on-land splice locations and would extend below the riverbed. In the river channel, between the south and north side conduits, the submarine cables would be installed in seven trenches excavated into the river bottom using water jet plow technology. Like Barnhardt Option 1, two transition stations, one on each side of the river, would be sited on approximately two acres at inland locations along the existing ROW. These stations would be similar to a small pump station with a low profile building measuring approximately 13 feet in height and two associated towers which would be approximately 80 feet in height. The LOS analysis previously conducted for the Stage I Pre-Application Analysis indicated that these stations with associated structures of approximately 80 feet would not be visible from Pop Castle (see Attachment E). ***Therefore, it is recommended that there would be No Visual Effect to Pop Castle (VDHR #051-0075) resulting from Barnhardt Option 2.***

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia

Prospect (Grey's Point Plantation) (VDHR #059-0025)

Prospect, also known as Grey's Point Plantation (VDHR #059-0025), is located south of Norris Bridge (VA Route 3). The property consists of a circa 1849 house situated on an approximately 9-acre parcel southwest of the Norris Bridge. The parcel, once the center of a 700+-acre plantation, is surrounded on three sides by native tree species and planted boxwood as well as other plantings. The southwest corner of the parcel is comprised of open meadow and provides a view of the main house from Grey's Point Road (VA Route 3). The overall parcel is bounded on the west by a County-owned airstrip and on the east by Grey's Point Road (VA Route 3). An approximately 450-foot gravel two-track, tree-lined drive extends from the main house to Grey's Point Road (VA Route 3) from which the Norris Bridge can be accessed. Prospect (Grey's Point Plantation) includes both contributing and non-contributing outbuildings such as one carriage house, one farm shed, one brick-lined well, and one pole-shed (VDHR Site Files; Perkinson and Taylor 2004). Prospect (Grey's Point Plantation) was listed on the NRHP in 2004 under Criterion C for its architectural merit.

Figure 3. View Looking Southwest toward Prospect (Grey's Point Plantation) (VDHR #059-0025)

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia

Visual Effect Assessment

Currently, the existing transmission line corridor, including riverine and bridge attachment components, is within the view shed of Prospect (Grey's Point Plantation) (VDHR #059-0025). The closest point from the boundary of Prospect (Grey's Point Plantation) to the existing terrestrial structures in the Rebuild Project area and nearest to the resource is 0.76 mile. This point is located at the northeastern resource boundary and along VA Route 3. Distance from the main dwelling on the property to the first tower in the project requiring replacement for the Overhead Alternatives (65/696) is 0.83-mile. Prospect (Grey's Point Plantation) is located along VA Route 3 and located at the end of a drive and surrounded by mature trees. The view toward the project is across open field; however, beginning at a tree line approximately 0.12-mile northeast of the main dwelling, a dense stand of mature trees is present and extends all the way to the commencement of the project. This distance as well as the presence of the mature vegetation protects Prospect (Grey's Point Plantation) from any view of the project. There are no views of the Rappahannock River or Norris Bridge from this resource.

Figure 4. View from Prospect (Grey's Point Plantation) (VDHR #059-0025), Looking Northeast toward Norris Bridge.

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia

Barnhardt Option 1

Barnhardt Option 1 would present no visual effect to this resource for the riverine portion of the crossing. At the bridge approaches, tower replacements would not be required; however, two transition stations, one on each side of the river, would be sited on approximately two acres at inland locations along the existing ROW. The LOS analysis previously conducted for the transition station and associated structures located approximately 0.7 mile from Prospect (Grey's Point Plantation) indicated that there would be no visibility of the station or its associated structures from the main yard or house, but that there would be limited visibility of the top 11 feet of the approximately 80-foot tall structure at the transition station from the property entrance at VA Route 3 (Attachment E). ***Improvements associated with Barnhardt Option 1 would pose a Minimal Visual Effect to Prospect (Grey's Point Plantation). Approximately 11 feet of the proposed structure required at the nearest transition station would be potentially visible from the entry to the resource. Additionally, previous analysis indicated that there is no visibility of the Norris Bridge or existing structures from Grey's Point Plantation. Therefore, it is recommended that there would be a Minimal Visual Effect to Prospect (Grey's Point Plantation) (VDHR #059-0025) resulting from Barnhardt Option 1.***

Barnhardt Option 2

Barnhardt Option 2 would present no visual effect to this resource. This option includes the placement of 7 cables within 800 feet of concrete duct-bank on the south shore and 800 feet of concrete duct-bank on the north shore. At the end of the duct-bank, land cables would enter seven conduits installed by HDD via on-land splice locations and would extend below the riverbed. In the river channel, between the south and north side conduits, the submarine cables would be installed in seven trenches excavated into the river bottom using water jet plow technology. Like Barnhardt Option 1, two transition stations, one on each side of the river, would be sited on approximately two acres at inland locations along the existing ROW. The LOS analysis previously conducted for the transition station and associated structures located approximately 0.7 mile from Prospect (Grey's Point Plantation) indicated that there would be no visibility of the station or its associated structures from the main yard or house, but that there would be limited visibility of the top 11 feet of the approximately 80-foot tall structure at the transition station from the property entrance at VA Route 3 (see Attachment E). ***Improvements associated with Barnhardt Option 2 would pose a Minimal Visual Effect to Prospect (Grey's Point Plantation). Approximately 11 feet of the proposed structure required at the nearest transition station would be potentially visible from the entry to the resource. Therefore, it is recommended that there would be a Minimal Visual Effect to Prospect (Grey's Point Plantation) (VDHR #059-0025) resulting from Barnhardt Option 2.***

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia

Captain John Smith Chesapeake National Historic Trail

The Captain John Smith Chesapeake National Historic Trail encompasses over 3,000 miles of waterway associated with the voyages of John Smith as well as early explorations of the Chesapeake Bay region. With regards to the current project, this portion of the Rappahannock River is identified as related to "Smith Voyage 2" (see Attachment D). However, the portion of the trail associated with this section of the Rappahannock River is not identified as a high potential route; is not identified as having associated sites (voyage stops, seventeenth century Native American sites, cross sites) within the project ROW and APE; and contains only small areas noted as having a landscape generally evocative of the seventeenth century. Residential development is present but generally sparse near the project area.

Figure 5. View of the Norris Bridge and Rappahannock River from the Northern Shoreline with Existing H-Frame Structures, Looking Southwest. View also illustrates the Captain John Smith Chesapeake National Historical Trail within the River.

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia

Visual and Direct Effect Assessment

Barnhardt Option 1

Barnhardt Option 1 would present minimal visual effect to this resource for the riverine portion of the crossing. The cables would be affixed in conduit to the underside of the Norris Bridge structure. A visitor to the Captain John Smith Trail may view the conduit from a location on the water, however, this view would not detract from the visitor experience or greatly alter the current view within the project vicinity from the Trail.

At the bridge approaches, tower replacements would not be required; however, two transition stations, one on each side of the river, would be sited on approximately 2.0 acres at inland locations along the existing ROW. A LOS model was prepared during the prior Stage I Analysis for the Underground Option and is also applicable to an assessment of visual effect for Barnhardt Option 1. The model was developed from three points within the river and within the project ROW for the Underground Option simulating the potential view from a boater or Trail visitor on the water (see Attachment E). The LOS indicated that the transition station structures in Lancaster County would not be visible from any of the three LOS points because of its location inland and slightly offset from the already existing open, terrestrial ROW. In Middlesex County, approximately 40 feet of the H-frame structure would be visible above the existing trees and structures within and adjacent to the ROW primarily because it would be a direct view through the currently cleared easement to the transition station located approximately 900 feet inland from the shoreline. The structures would be visible from the central view point at 1.3 miles and the northern view point at 2.07 miles but not from the closest viewpoint at 0.26 mile. The angle at which a viewer would look up the ROW toward the station from the south view point precludes any visibility. Because the H-frame structure would be visible from the center and north view points and would be slightly taller than the existing structures and trees in the immediate vicinity and a visitor to the trail may have a view of the conduits affixed to the underside of the bridge structure, ***it is recommended that the Barnhardt Option 1 would have a Minimal Visual Effect to the Captain John Smith Chesapeake National Historic Trail. The view of this additional structure at the transition station and the potential view of the cable conduits do not significantly alter the current conditions associated with the view of the ROW from the Captain John Smith Chesapeake National Historic Trail.***

Barnhardt Option 2

Barnhardt Option 2 would present little visual effect to this resource. This option includes the placement of seven cables within 800 feet of concrete duct-bank on the south shore and 800 feet of concrete duct-bank on the north shore. At the end of the duct-bank, land cables would enter seven conduits installed by HDD via on-land splice locations and would extend below the riverbed. In the river channel, between the south and north side conduits, the submarine cables

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia

would be installed in seven trenches excavated into the river bottom using water jet plow technology.

At the bridge approaches, tower replacements would not be required; however, two transition stations, one on each side of the river, would be sited on approximately 2.0 acres at inland locations along the existing ROW. A LOS model was prepared during the prior Stage I Analysis for the Underground Option and is also applicable to an assessment of visual effect for Barnhardt Option 2. The model was developed from three points within the river and within the project ROW for the Underground Option simulating the potential view from a boater or Trail visitor on the water (see Attachment E). The LOS indicated that the transition station structures in Lancaster County would not be visible from any of the three LOS points because of its location inland and slightly offset from the already existing open, terrestrial ROW. In Middlesex County, approximately 40 feet of the H-frame structure would be visible above the existing trees and structures within and adjacent to the ROW primarily because it would be a direct view through the currently cleared easement to the transition station located approximately 900 feet inland from the shoreline. The structures would be visible from the central view point at 1.3 miles and the northern view point at 2.07 miles but not from the closest viewpoint at 0.26 mile. The angle at which a viewer would look up the ROW toward the station from the south view point precludes any visibility. Because the H-frame structure would be visible from the center and north view points and would be slightly taller than the existing structures and trees in the immediate vicinity, ***it is recommended that the Barnhardt Option 2 would have a Minimal Visual Effect to the Captain John Smith Chesapeake National Historic Trail. The view of this additional structure at the transition station does not significantly alter the current conditions associated with the view of the ROW from the Captain John Smith Chesapeake National Historic Trail.***

In addition to visual effects, because the transmission line construction would be conducted within the river and within the identified historic water trail, a preliminary assessment of direct effects has been conducted. The underground conduit as it leaves the shore on both sides would be constructed within a 75-foot ROW that would widen to an approximately 780-foot ROW as the seven trenches containing the submarine cables. The underground cabling associated with Barnhardt Option 2 would not detract from the visitor experience on the trail. However, because of the disturbance associated with the jet-plow technology additional assessment of direct effects to potential submerged resources associated with the Trail may be required. While it is not anticipated that river bottom features associated with historic activity in the area would be identified, additional investigation may be warranted. ***It is recommended that the project would have a Minimal Direct Effect to the Captain John Smith Chesapeake National Historic Trail.***

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia

REVISED PHOTOSIMULATIONS – OVERHEAD ALTERNATIVES

Photo simulations were prepared by NB&C on behalf of Dominion in February 2016 and were utilized during the Stage I Pre-Application Analysis to supplement the field reconnaissance and LOS analysis (Brady and Stewart 2016). Since that time, revised photo simulations have been prepared by TrueScape (May 2016) on behalf of Dominion to better represent the existing and proposed views for the 115 kV and 230 kV Overhead Alternatives.

Resulting from a review of the revised simulations, Stantec has concluded that the recommendations stated in the February 26, 2016 Stage I Pre-Application Analysis and reviewed and accepted by the VDHR in their correspondence dated April 11, 2016, remain accurate and no updates to those recommendations are necessary. The photo simulations prepared by TrueScape are included in this submittal as Attachment F. The following table correlates the revised simulations with those submitted with the February 2016 Stage I Analysis.

Table 3. Previously Recorded Archaeological Resources Located within 1.5-Miles of the Project

TrueScape View Point	Location	Previous Simulation (Appendix C – Brady and Stewart 2016)
Viewpoint 2	Grey's Point Docks	C-1, C-2
Viewpoint 3	Rappahannock River, East of Norris Bridge	C-3, C-4
Viewpoint 5	Rappahannock River, Near Locklies Marina	C-5, C-6
Viewpoint 7	Rappahannock River, Northwest of Norris Bridge	C-7, C-8
Viewpoint 8	Norris Bridge, South End	C-9, C-10
Viewpoint 9	Near West High Bank Road	C-11, C-12

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia

SUMMARY AND CLOSING

As detailed in the above paragraphs, Stantec makes the following recommendations with regards to the potential effects to historic properties associated with Barnhardt Option 1 and Barnhardt Option 2.

Barnhardt Option 1

Barnhardt Option 1 involves replacement and relocation of a section of Line #65 that parallels Route 3 and crosses the Rappahannock River with new cables, entirely attached to the bridge. This option would involve the placement of seven cables within approximately 1,100 feet of concrete-encased duct-bank on the south shore and 1,200 feet of concrete-encased duct-bank on the north shore. The remaining approximately 10,000 feet of cable will be installed within eight separate 8-inch-diameter fiberglass conduits attached to the underside of the bridge. Where the conduits reach the ends of the bridge, they would curve to the east of the bridge and turn downward to enter the ground. At this point, the cables would transition from the conduit and into concrete-encased duct-bank described above. This option would require two transition stations at the same locations as the previously assessed Underground Option (Brady and Stewart 2016).

There are 56 previously identified architectural resources located within a 1.5-mile radius of the project centerline for this project. No NHL-listed architectural resources are located within the 1.5-mile buffer. Two NRHP-listed resources were identified within the 1.0-mile buffer and include Pop Castle (VDHR #051-0075) and Prospect (Greys Point Plantation) (VDHR #059-0025). No eligible resources are located within the 0.5-mile buffer. Pop Castle is located approximately 0.79 mile from the corridor while Prospect (Grey's Point Plantation) is located approximately 0.76 mile from the corridor. ***As previously illustrated the two transition stations and associated approximately 80-foot structures would not be visible from Pop Castle and only one would be minimally visible from Prospect (Grey's Point Plantation). The cables associated with this option that would be affixed to the structure of the Norris Bridge would possibly be visible but likely not distinguishable due to their location on the underside of the bridge structure. Therefore, it is recommended that there would be No Visual Effect to Pop Castle (VDHR #051-0075) and a Minimal Visual Effect to Prospect (Grey's Point Plantation) (VDHR #059-0025) resulting from Barnhardt Option 1.***

In addition to the resources identified within the VDHR's V-CRIS, research indicated that a portion of the Captain John Smith Chesapeake National Historic Trail is located within the APE for this project. While not a traditionally documented historic resource, the trail has been identified recently as a potential historic resource and is therefore noted here and considered as part of this assessment. ***It is recommended that the Barnhardt Option 1 would have a Minimal Visual Effect to the Captain John Smith Chesapeake National Historic Trail. The view of this additional structure and the potential view of the cable conduits do not significantly alter the current conditions***

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia

associated with the view of the ROW from the Captain John Smith Chesapeake National Historic Trail. It is anticipated that the project would have a Minimal Direct Effect to the Captain John Smith Chesapeake National Historic Trail.

Table 4. Previously Recorded Architectural Resources Considered within the Stage I Pre-Application – Barnhardt Option 1

VDHR ID	Resource Name	VDHR/NRHP Status	Distance to Line (feet)	Potential Impact - Visual	Potential Impact - Direct
051-0075	Pop Castle	Listed on the NRHP in 1989	4159.09	None	None
059-0025	Prospect (Grey's Point Plantation)	Listed on the NRHP in 2004	4035.93	Minimal	None
N/A	Captain John Smith Chesapeake National Historic Trail	N/A	0.0	Minimal	Minimal

Barnhardt Option 2

Barnhardt Option 2 involves replacement and relocation of a section of Line #65 that parallels Route 3 and crosses the Rappahannock River with new cables trenched into the bottom of the Rappahannock River. This option would involve the placement of seven cables within 800 feet of concrete duct-bank on the south shore and 800 feet of concrete duct-bank on the north shore. At the end of the duct-bank, the land cables would enter manholes where it would be spliced to submarine cables. At the on-land splice locations, the seven submarine cables would enter into seven conduits. The conduits, installed via HDD, would extend below the riverbed and would surface on the river bottom between 1,308 and 1,781 feet from shore on the south side and between 910 and 1,400 feet from the top of bank on the north side. The use of conduit in these locations is to avoid direct disturbance to existing oyster leases. In the river, between the south and north side conduits, the submarine cables would be installed in seven trenches excavated into the river bottom using water jet plow technology. These seven trenches for the submarine cables would vary in length between 7,500 and 8,100 feet long. This option would require the same transition stations previously identified for the Underground Option.

There are 56 previously identified architectural resources located within a 1.5-mile radius of the project centerline for this project. No NHL-listed architectural resources are located within the 1.5-mile buffer. Two NRHP-listed resources were identified within the 1.0-mile buffer and include Pop Castle (VDHR #051-0075) and Prospect (Greys Point Plantation) (VDHR #059-0025). No eligible resources are located within the 0.5-mile buffer. Pop Castle is located approximately 0.79 mile from the corridor while Prospect (Grey's Point Plantation) is located approximately 0.76 mile from

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia

the corridor. ***As previously illustrated the two transition stations and associated approximately 80-foot structures would not be visible from Pop Castle and only one associated structure would be minimally visible from Prospect (Grey's Point Plantation). The remainder of the option's elements would be below ground surface. Therefore, it is recommended that there would be No Visual Effect to Pop Castle (VDHR #051-0075) and a Minimal Visual Effect to Prospect (Grey's Point Plantation) (VDHR $059-0025) resulting from Barnhardt Option 2.***

In addition to the resources identified within the VDHR's V-CRIS, research indicated that a portion of the Captain John Smith Chesapeake National Historic Trail is located within the APE for this project. While not a traditionally documented historic resource, the trail has been identified recently as a potential historic resource and is therefore noted here and considered as part of this assessment. ***It is recommended that Barnhardt Option 2 would have a Minimal Visual Effect to the Captain John Smith Chesapeake National Historic Trail. The view of the additional structure at the transition station does not significantly alter the current conditions associated with the view of the ROW from the Captain John Smith Chesapeake National Historic Trail. It is anticipated that the project would have a Minimal Direct Effect to the Captain John Smith Chesapeake National Historic Trail.***

Table 5. Previously Recorded Architectural Resources Considered within the Stage I Pre-Application – Barnhardt Option 2

VDHR ID	Resource Name	VDHR/NRHP Status	Distance to Line (feet)	Potential Impact - Visual	Potential Impact - Direct
051-0075	Pop Castle	Listed on the NRHP in 1989	4159.09	None	None
059-0025	Prospect (Grey's Point Plantation)	Listed on the NRHP in 2004	4035.93	Minimal	None
N/A	Captain John Smith Chesapeake National Historic Trail	N/A	0.0	Minimal	Minimal

Reference: SCC Case No. PUE 2016-00021: VDHR File 2015-0969: Addendum to Stage I Pre-Application Analysis for The Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia

The above paragraphs have been presented as an Addendum to the Stage I Pre-Application Analysis for the Line #65 Rebuild at Norris Bridge in Lancaster and Middlesex Counties (Brady and Stewart 2016). This additional assessment has been prepared for the Barnhardt Options 1 and 2 and also addressed revisions to photo simulations prepared for the 115 kV and 230 kV Overhead Alternatives. If additional information is required, please do not hesitate to contact me at 757-831-3979 or ellen.brady@stantec.com.

Regards,

Stantec Consulting Services Inc.

Ellen M Brady

Ellen M. Brady
Senior Principal Investigator
Phone: (757) 831-3979
Fax: (804) 355-1520
ellen.brady@stantec.com

Attachment: Attachments A-F, Supporting Information

c. Corey Gray, Stantec

REFERENCES

Advisory Council for Historic Preservation (ACHP)

2000 *36 CFR 800:Part 800- Protection of Historic and Cultural Properties.* Federal Register, September 2, Washington, D.C.

Brady, Ellen M., and Brynn Stewart

2016 *Stage I Pre-Application Analysis for the Line #65 115 kV Rebuild at Norris Bridge, Lancaster and Middlesex Counties, Virginia.* Report on filed, VDHR, Richmond.

Perkinson, Patricia and Mary Taylor

2004 *Prospect.* National Register Nomination. On file, VDHR, Richmond.

United States Department of the Interior (Interagency Resources Division)

1981 *Department of the Interior's Regulations, 36 CFR Part 60: National Register of Historic Places.* Interagency Resources Division, National Park Service, U.S. Department of the Interior, Washington, D.C.

1983 *Department of the Interior, Archaeology and Historic Preservation: Secretary of the Interior's Standard's and Guidelines.* Interagency Resources Division, National Park Service, U.S. Department of the Interior, Washington, D.C.

1991 How to Apply the National Register Criteria of Evaluation. *National Register Bulletin 15.* Interagency Resources Division, National Park Service, U.S. Department of the Interior, Washington, D.C.

Virginia Department of Historic Resources (VDHR)

1997 *Historic Context Guidelines for Preparing Cultural Resource Survey Reports.* VDHR, Richmond.

2008 *Guidelines for Assessing Impacts of Electric Transmission Lines and Associated Facilities on Historic Resources in the Commonwealth of Virginia.* VDHR, Richmond.

2011 *Guidelines for Historic Resource Survey in Virginia.* VDHR, Richmond.

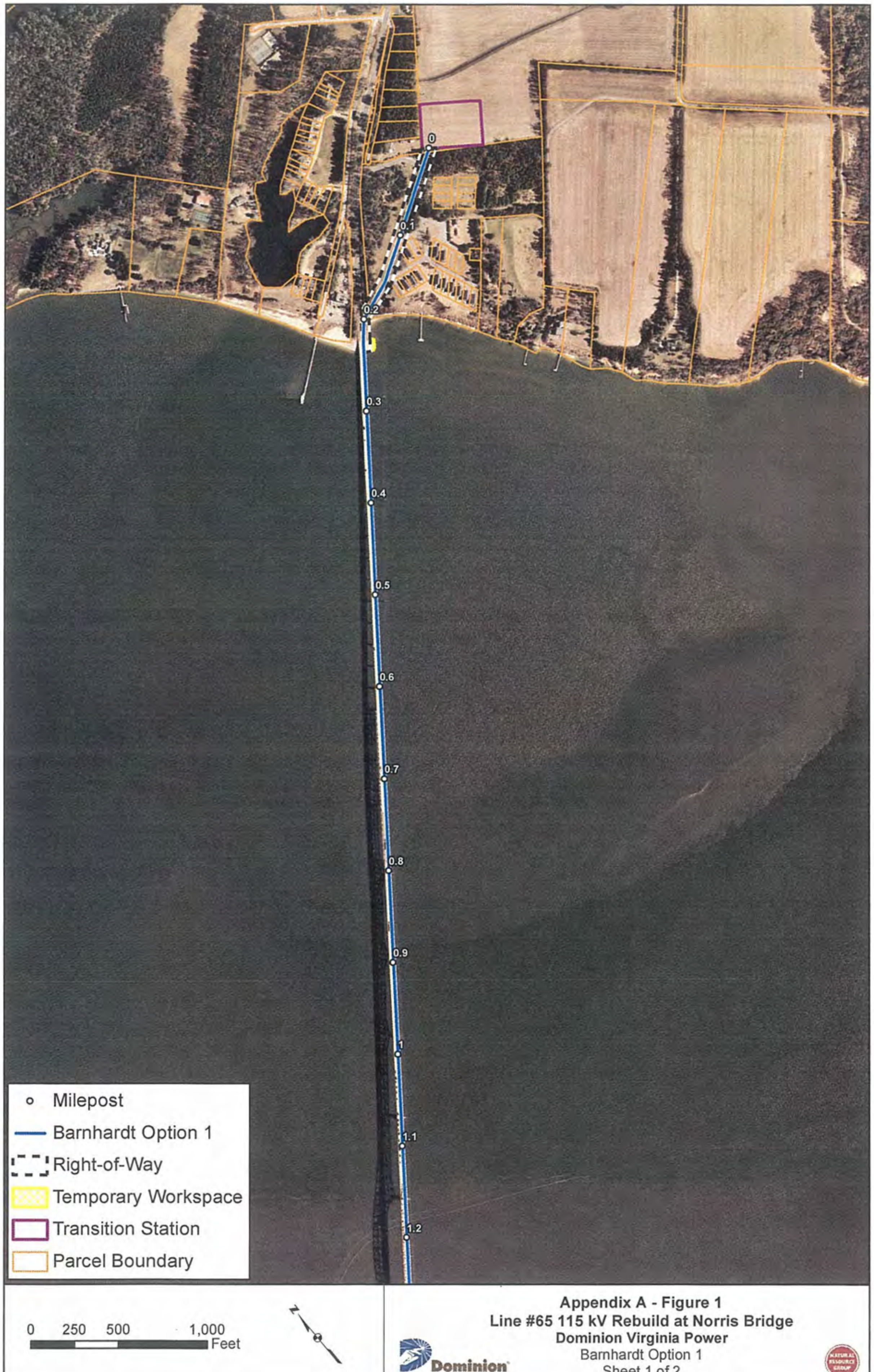
2015 Archive Files.

Wells, Camille

1988 *Pop Castle. National Register Nomination.* On File, VDHR, Richmond.

Appendix A

A.1 ROUTE MAP – BARNHARDT OPTION 1



Appendix A - Figure 1
Line #65 115 kV Rebuild at Norris Bridge
Dominion Virginia Power
Barnhardt Option 1
Sheet 1 of 2

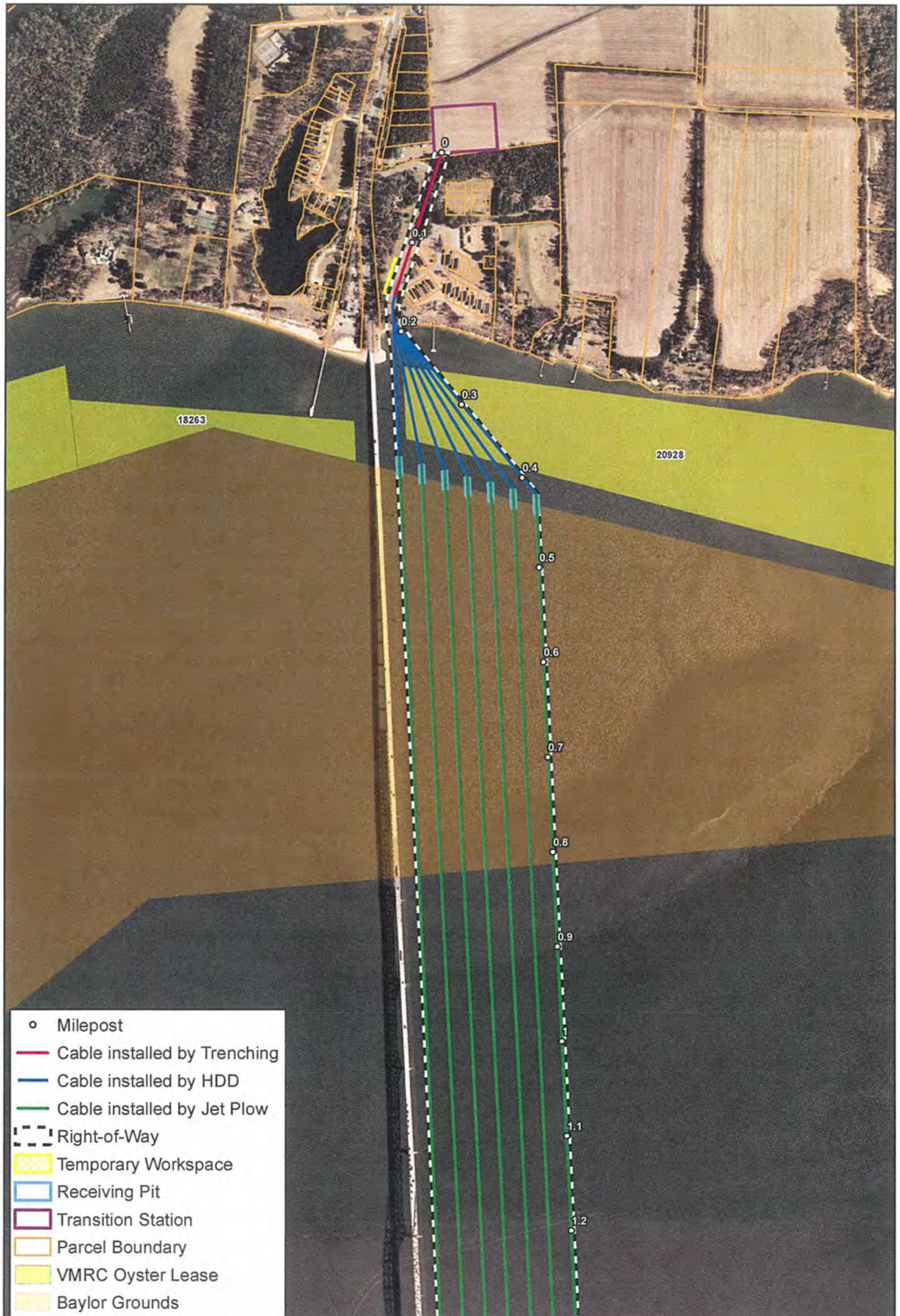
FILE: M:\Clients\D-F\DOM\Norris_Bridge_ArcGIS\2016\10\Report_Figures\Bridge_Option_DOM_Norris_Bridge_Aerials_Detailed_ApdxA.mxd | REVISED: 10/28/2016 | SCALE: 1:6,000 when printed at 11x17 | DRAWN BY: JPB

Appendix A - Figure 2
Line #65 115 kV Rebuild at Norris Bridge
Dominion Virginia Power
Barnhardt Option 1
Sheet 2 of 2

FILE: M:\Clients\D-F\DOM\Norris_Bridge_ArcGIS\2016\10\Report_Figures\Bridge_Option_DOM_Norris_Bridge_Aerials_Detailed_ApdxA.mxd | REVISED: 10/28/2016 | SCALE: 1:6,000 when printed at 11x17 | DRAWN BY: JPB

Appendix B

B.1 ROUTE MAP – BARNHARDT OPTION 2



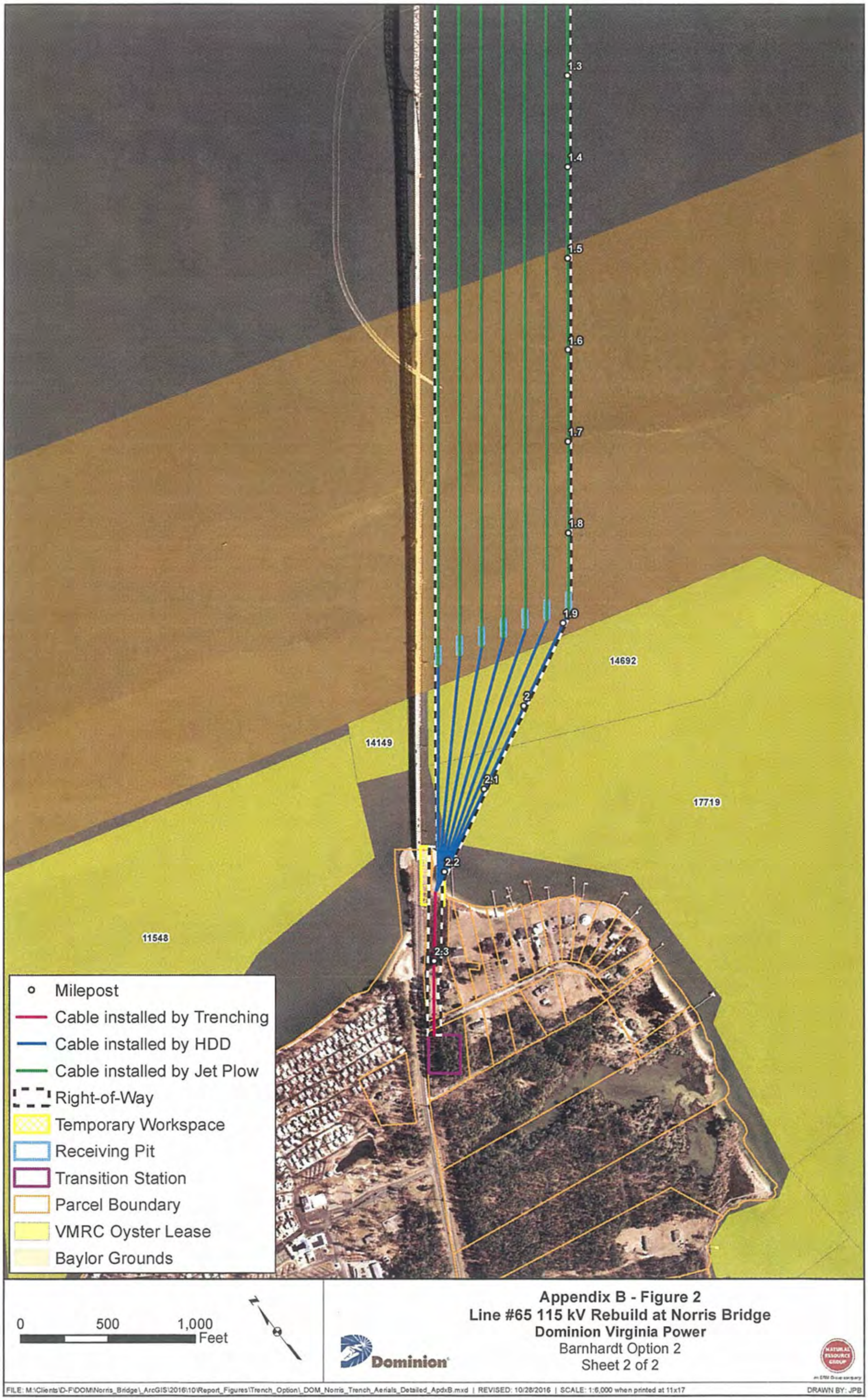
0 500 1,000 Feet

N

Appendix B - Figure 1
Line #65 115 kV Rebuild at Norris Bridge
Dominion Virginia Power
Barnhardt Option 2
Sheet 1 of 2

Dominion

FILE: M:\Clients\D-F\DOM\Norris_Bridge_ArcGIS\2016\10\Report_Figures\Trench_Option_DOM_Norris_Trench_Aerials_Detailed_ApdxB.mxd | REVISED: 10/28/2016 | SCALE: 1:6,000 when printed at 11x17 DRAWN BY: JPB



Appendix B - Figure 2
Line #65 115 kV Rebuild at Norris Bridge
Dominion Virginia Power
Barnhardt Option 2
Sheet 2 of 2

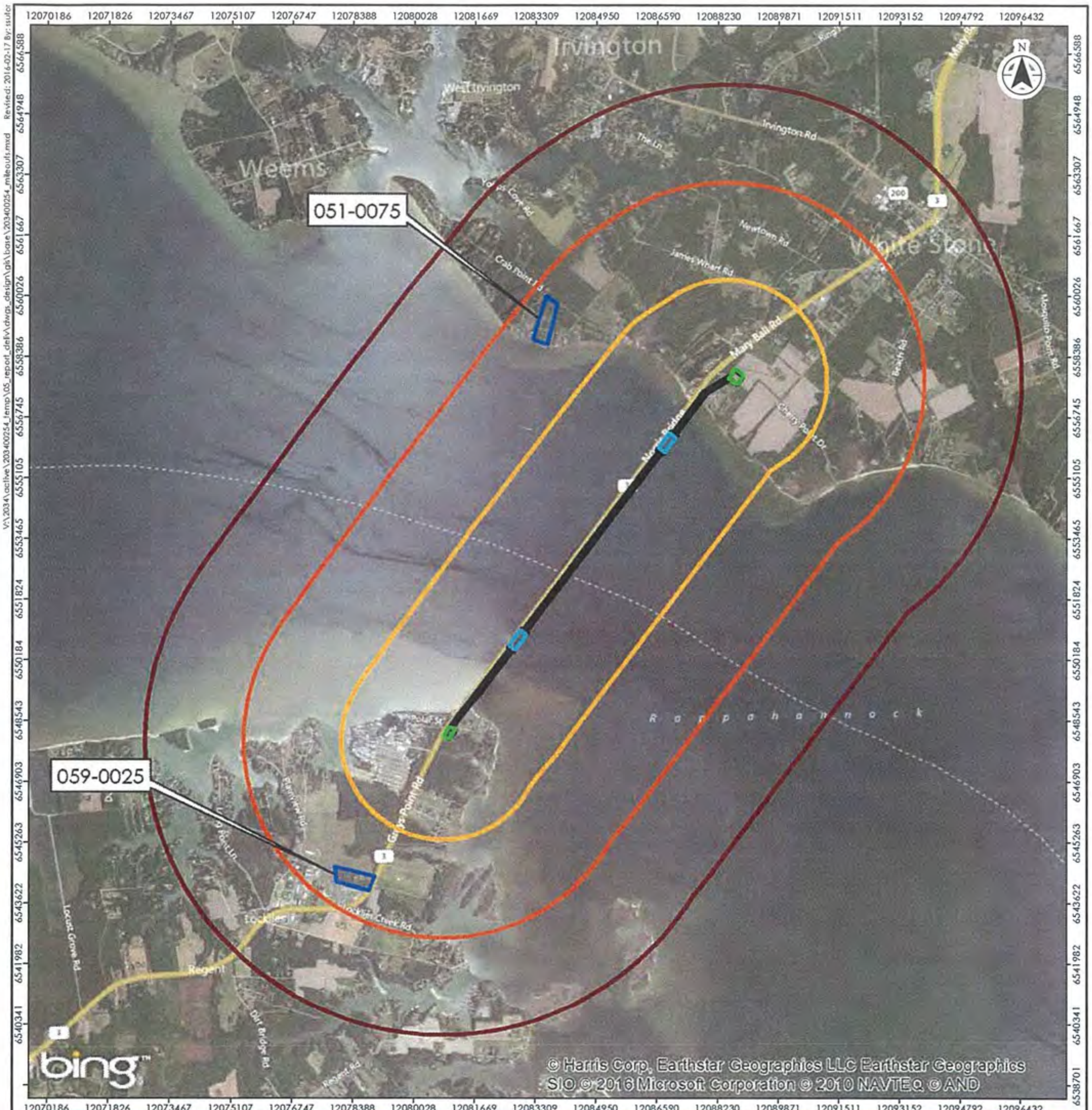
FILE: M:\Clients\D-F\DOM\Norris_Bridge_ArcGIS\2016\10\Report_Figures\Trench_Option_DOM_Norris_Trench_Aerials_Detailed_ApdxB.mxd | REVISED: 10/28/2016 | SCALE: 1:6,000 when printed at 11x17

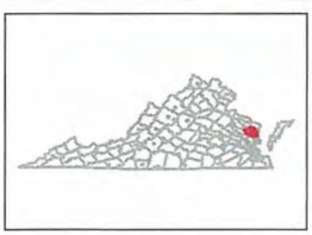
DRAWN BY: JPB

Appendix C

C.1 PREVIOUSLY RECORDED ARCHITECTURAL RESOURCES

C.2 PREVIOUSLY RECORDED ARCHAEOLOGICAL RESOURCES





Legend

- Architectural Resources
- Splice Locations
- Transition Stations
- Project Limits
- 0.5 mi. buffer
- 1 mi. buffer
- 1.5 mi. buffer

0 2,000 4,000 Feet

1:48,000 (at original document size of 8.5x11)

Stantec

Project Location
County: Lancaster, Middlesex
USGS Quad: Wilton, Irvington

Prepared by SWS on 2016-02-16
Technical Review by AJL on 2016-02-16
Independent Review by EMB on 2016-02-16

Client/Project

Dominion Virginia Power

Appendix C - 1

Title

Architectural Resources Under Consideration within a 1.5-Mile Radius of the Project Limits

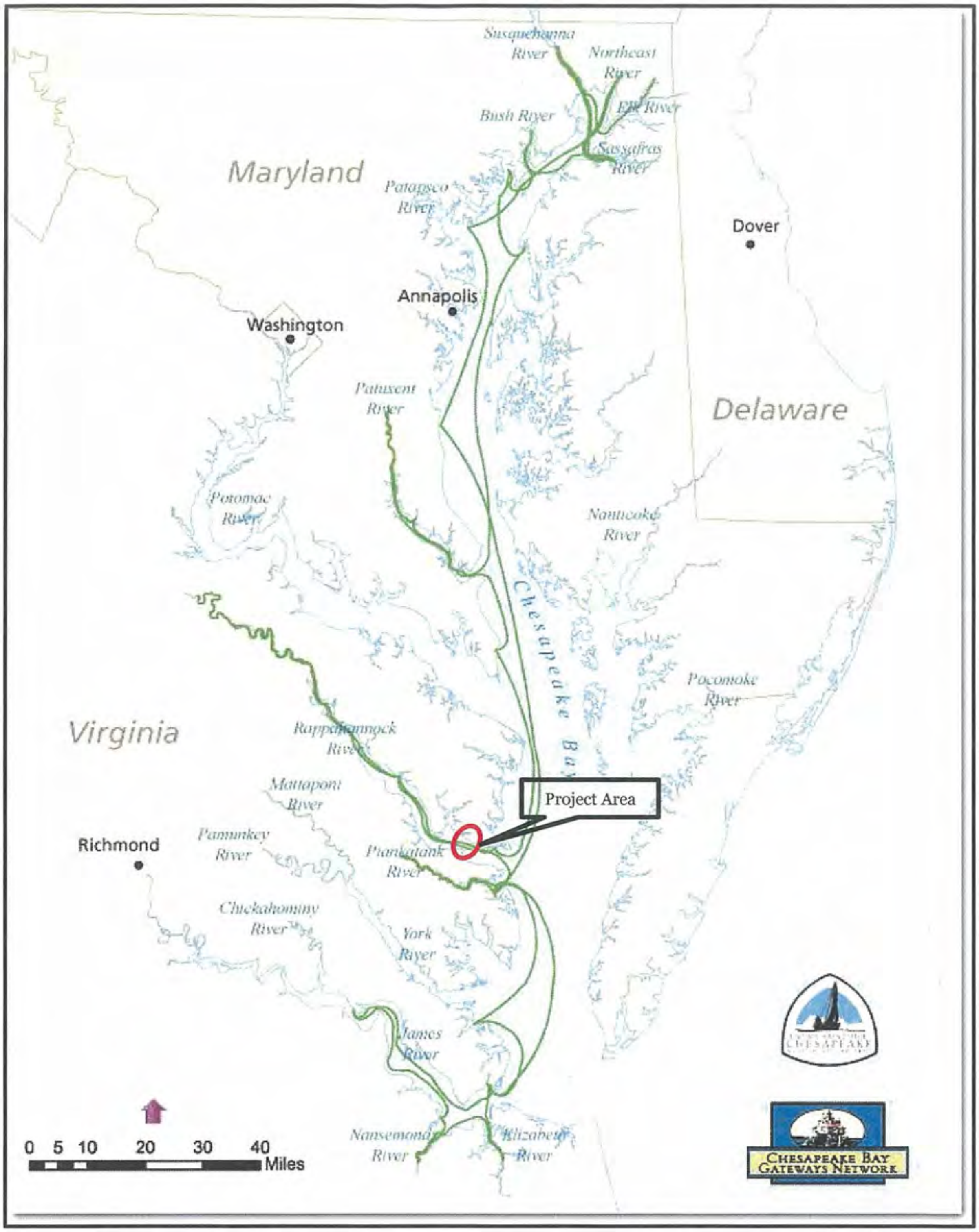
Notes
1. Coordinate System: NAD 1983 StatePlane Virginia North FIPS 4501 Feet
2. Orthoimagery © Bing Maps

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

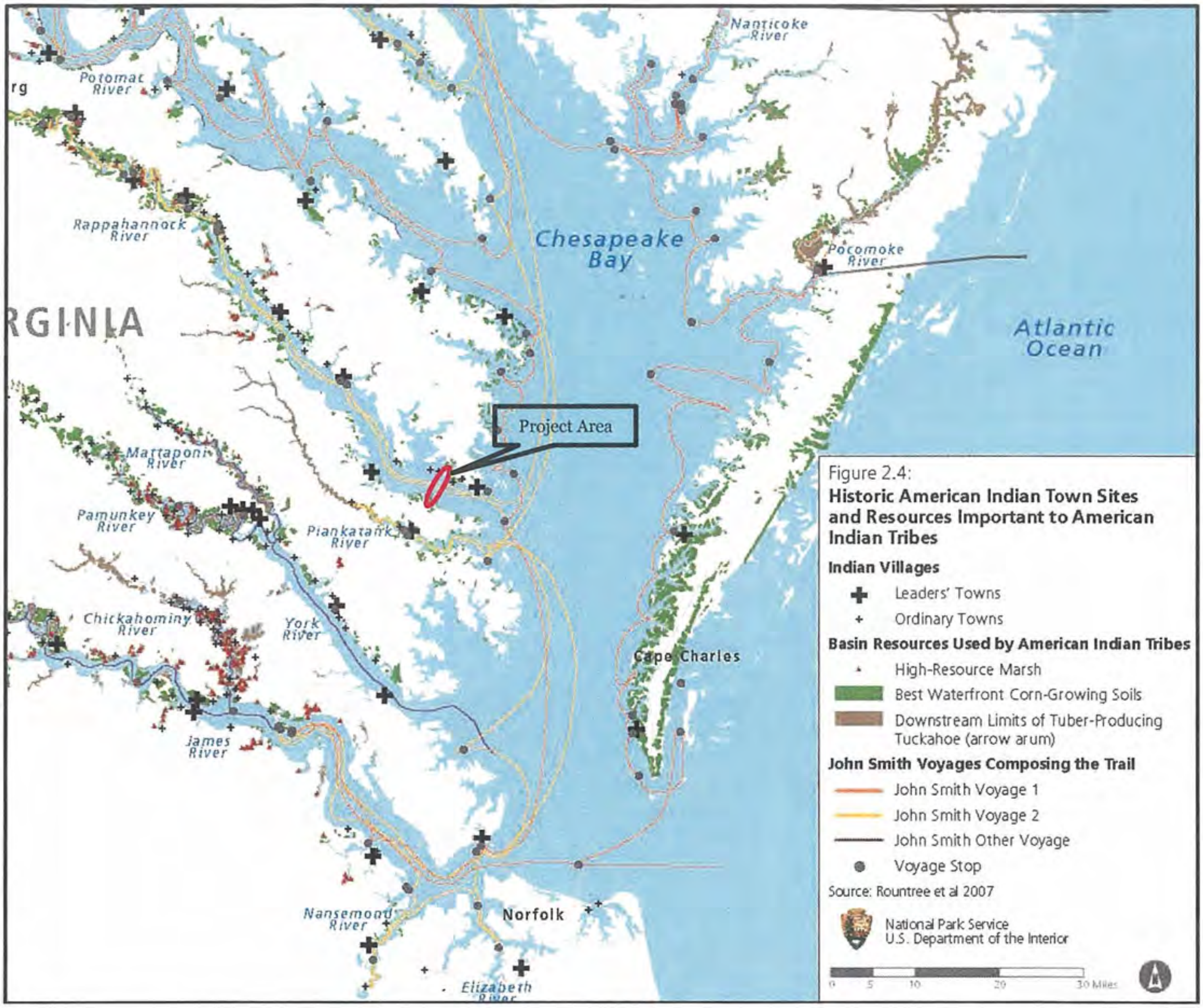
C.2 - Previously Recorded Archaeological Resources - Archaeological Site Locations are Protected and this page has been intentionally removed.

Appendix D

D.1 MAP OF THE CAPTAIN JOHN SMITH CHESAPEAKE HISTORIC TRAIL WITHIN THE PROJECT RIGHT OF WAY



Appendix D-1: Map of the Captain John Smith Chesapeake National Historic Trail (http://smithtrail.net/captain-john-smith/the-voyages/second-voyage).

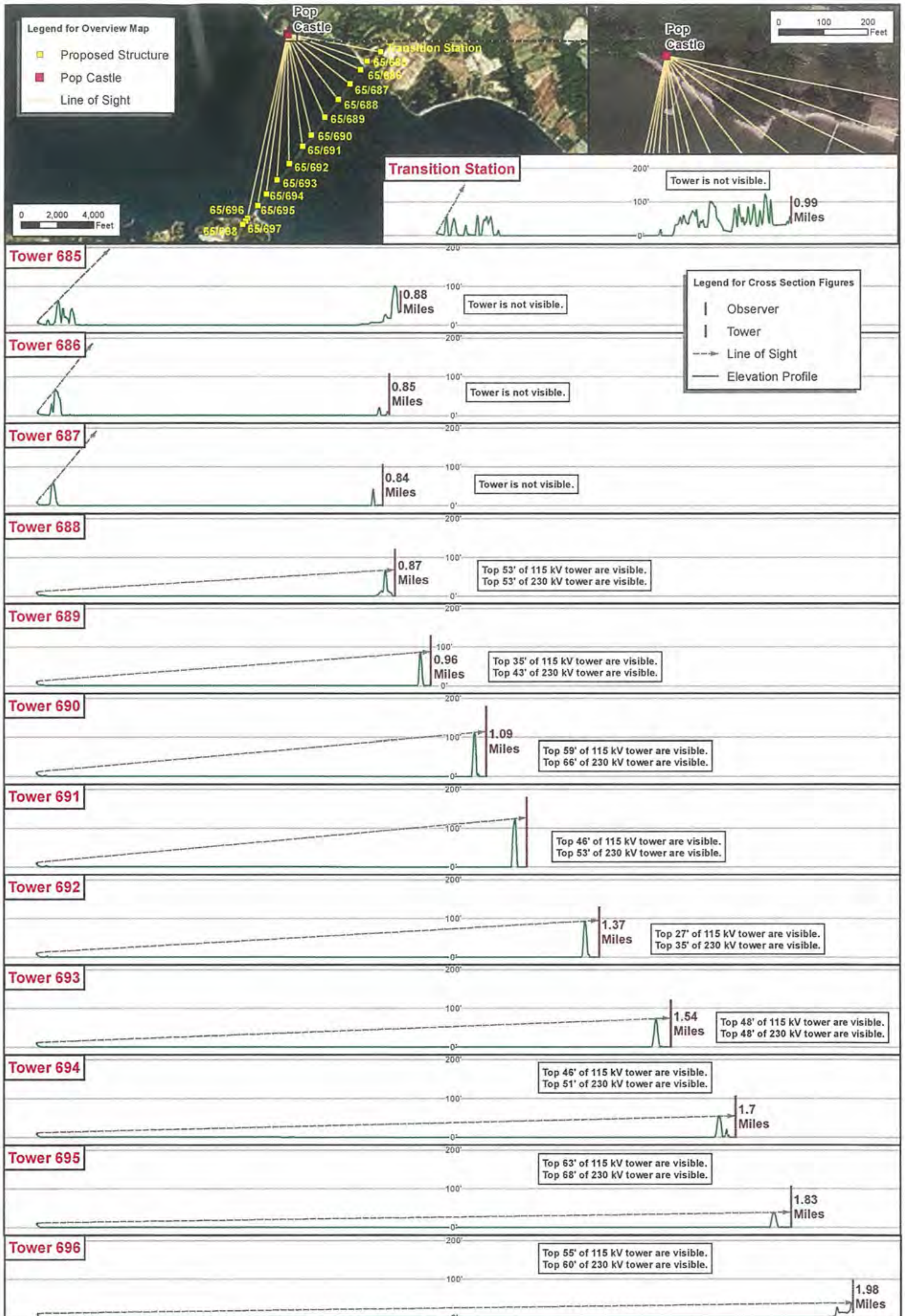


Appendix D:2 Detail Map of the Captain John Smith Chesapeake National Historic Trail Showing the Project Location and Features Such as Native American Towns, Voyage Stops, and Shorelines. Note there are no identified resources within the immediate area of the Project (http://parkplanning.nps.gov/showFile.cfm?projectID=18545&docType=public&MIMEType=application%252Fpdf&filename=3%20CAJO%20DRAFT%20CMP%20Chapter%202%20Part%202%2Epdf&clientFilename=3%20CAJO%20DRAFT%20CMP%20Chapter%202%20Part%202%2Epdf

Appendix E

E.1 LINE OF SIGHT ANALYSIS – POP CASTLE (VDHR #051-0075)

E.2 LINE OF SIGHT ANALYSIS – PROSPECT (GREY'S POINT PLANTATION) (VDHR #059-0075)

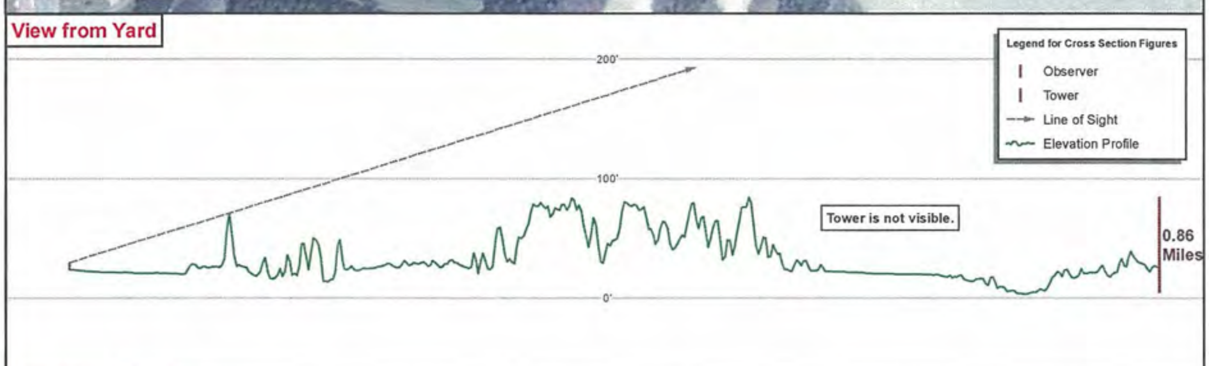


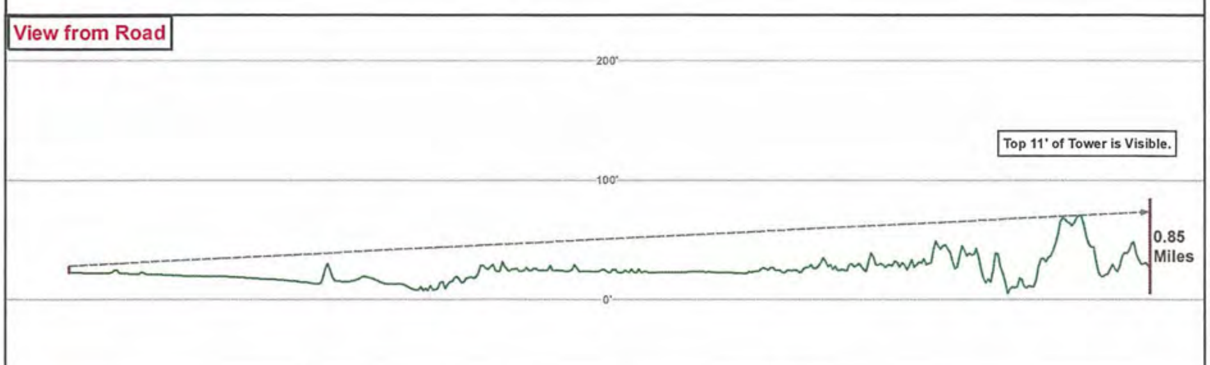
Dominion

Appendix E-1
Norris Bridge Transmission Line
Rebuild and Relocation Project
Rappahannock River Crossing
Line of Sight and Tower Visibility Analysis from Pop Castle
Vertical Exaggeration X 5

M:\Clients\D-F\DOM\Norris_Bridge_ArcGIS\2016\01\Line_of_Sight_DOM_Norris_Bridge_LOS_Pop_Castle.mxd REVISED: 02/11/2016

DRAWN BY: JPB





Dominion

Appendix E - 2

Norris Bridge Transmission Line

Rebuild and Relocation Project

Rappahannock River Crossing

Line of Sight and Tower Visibility Analysis from Grey's Point Plantation

Vertical Exaggeration X 5

M:\Clients\D-F\DOM\Norris_Bridge_ArcGIS\2016\01\Line_of_Sight_DOM_Norris_Bridge_LOS_Greys_Point.mxd REVISED: 02/04/2016

DRAWN BY: JPB

Appendix F

F.1 PHOTOSIMULATIONS – REVISED MAY 2016

TrueView Photosimulations - Existing & Proposed
May 2016

www.truescape.com

Viewpoint 01 - Norris Bridge

Viewpoint 02 - Grey's Point Docks

Viewpoint 03 - Rappahannock River, East of Norris Bridge

Viewpoint 04 - Norris Bridge, North End

Viewpoint 05 - Rappahannock River, Near Locklies Marina

Viewpoint 06 - Rappahannock River, South-East of Norris Bridge

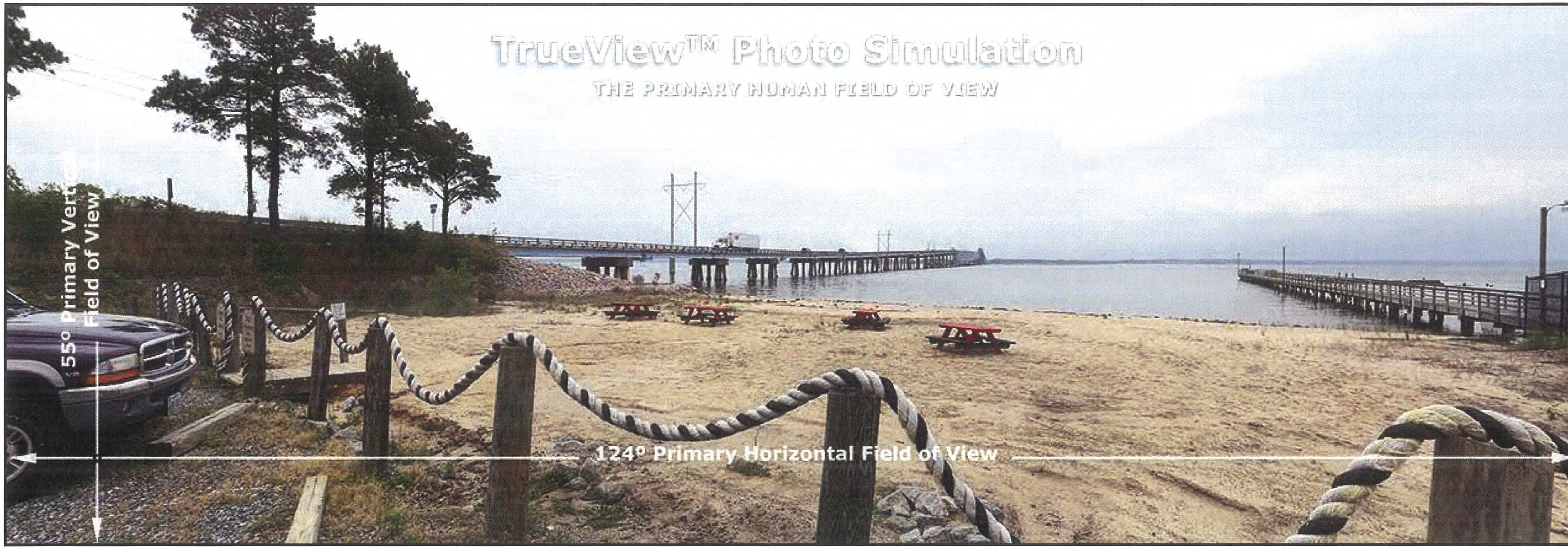
Viewpoint 07 - Rappahannock River, North-West of Norris Bridge

Viewpoint 08 - Norris Bridge, South End

Viewpoint 09 - Near West High Bank Road

TrueView™ Printing and Viewing Guidelines

Truescape®



A TrueView™ is a high-resolution photo simulation that has been developed with survey grade accuracy, and represents the 'Primary Human Field of View'. The TrueView™ depicts how the proposed project will look when viewed from the exact photo point position under the same light and atmospheric conditions as those experienced at time of photography.

How to view a TrueView™

The TrueView™ has been developed to be viewed on a specifically sized printed sheet (66.8 inches by 23.9 inches paper size) standing at a distance of 19.7 inches from the image. Accurate visual assessments should always be made from the full-sized printed version of the TrueView™ rather than reduced size booklets or digital devices.

Viewing on digital devices

When viewing a TrueView™ on digital devices please confirm that the scale bar located in the bottom-right corner of the TrueView™ is scaled to four inches wide and then the image viewed from a distance of 19.7 inches. This ensures that the portion of the TrueView™ visible on the screen is a true to scale representation.

Important

If the scale bar is not adjusted to four inches on your screen, and if the image is not viewed at a distance of 19.7 inches then the TrueView™ image displayed will either overstate or understate how the project will look from the photo point position.

Viewpoint 01 - Norris Bridge, Looking East-Northeast - **Existing View**

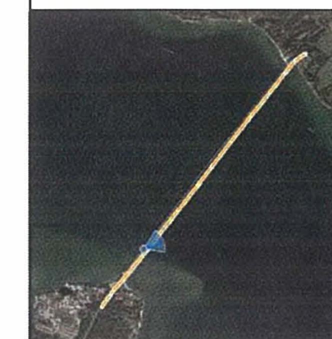
Viewing Instructions:	Scale bar width to be approximately 4 inches (10 cm) Viewing distance to be approximately 10 inches (25 cm)

Dominion

Viewpoint 01

Norris Bridge

Viewpoint Location · Proposed 115kV



Easting Position (State Plane Virginia South):	12082136.9
Northing Position (State Plane Virginia South):	3754496.9
Elevation of Photopoint Position (NAD88):	52.8
Height of Camera Above Ground (ft):	4.6
Date of Photography:	10 May 2016 at 09:42 AM
Orientation of View:	ENE
Horizontal Field of View:	66°
Vertical Field of View:	46°
Distance to Bridge (ft):	0.0

NOTES:

Camera alignment based on handheld GPS.

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo-Simulation Provided by

Truescape®

www.truescape.com

DATE	SHEET
27 May 2016	4

Viewpoint 01 - Norris Bridge, Looking East-Northeast - **Proposed View**

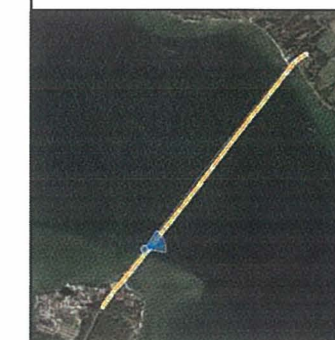
Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 10 inches (25 cm)

Dominion

Viewpoint 01

Norris Bridge

Viewpoint Location · Proposed 115kV



Easting Position (State Plane Virginia South):	12082136.9
Northing Position (State Plane Virginia South):	3754496.9
Elevation of Photopoint Position (NAD88):	52.8
Height of Camera Above Ground (ft):	4.6
Date of Photography:	10 May 2016 at 09:42 AM
Orientation of View:	ENE
Horizontal Field of View:	66°
Vertical Field of View:	46°
Distance to Bridge (ft):	0.0

NOTES:

Camera alignment based on handheld GPS.

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

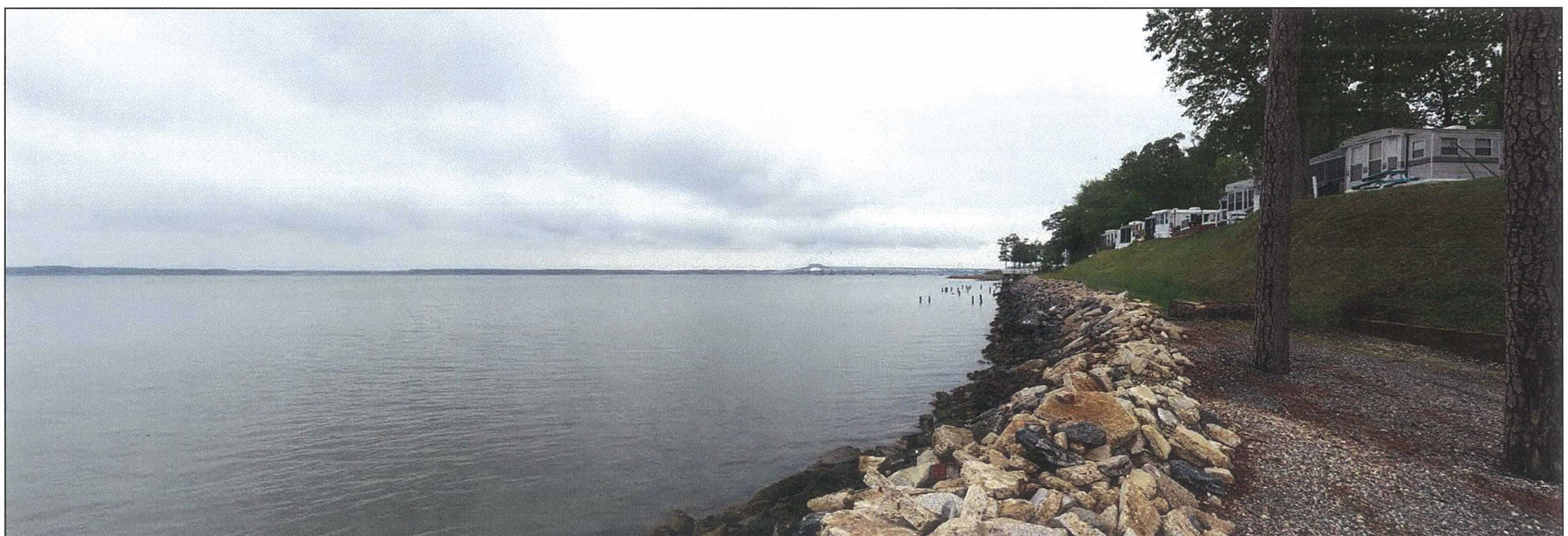
Photo-Simulation Provided by

Truescape®

www.truescape.com

DATE	SHEET
27 May 2016	5

Viewpoint 02 - Grey's Point Docks, Looking Northeast - **Existing View**



Viewpoint 02 - Grey's Point Docks, Looking Northeast - **Proposed View**

Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 20 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

Viewpoint 02

Grey's Point Docks

● Viewpoint Location ● Proposed 115kV

Easting Position (State Plane Virginia South):	12078240.6
Northing Position (State Plane Virginia South):	3752805.9
Elevation of Photopoint Position (NAD88):	3.9
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 10:06 AM
Orientation of View:	NE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	3342.8

NOTES:

Viewpoint locations have been precision surveyed by:

Pennoni
Virginia Beach, VA

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo Simulation Created Using TrueView™ Technology (Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

DATE	SHEET
27 May 2016	6

Viewpoint 02 - Grey's Point Docks, Looking Northeast - **Existing View**

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

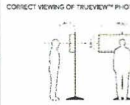
Norris Bridge: Overhead 115kV

Viewpoint 02
Grey's Point Docks
Looking Northeast

Viewpoint Location   Proposed 115kV

Easting Position State Plane Virginia South:	12078240.6
Northing Position State Plane Virginia South:	3752805.9
Elevation of Viewpoint Position NAD88:	3.9
Height of Camera Above Ground ft:	5.4
Date of Photography:	10 May 2016 at 10:06 AM
Orientation of View:	NE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge ft:	3342.8

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches).

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 02 - Grey's Point Docks, Looking Northeast - **Proposed View**

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

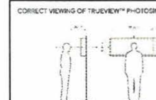
Viewpoint 02
Grey's Point Docks

Looking Northeast

● Viewpoint Location ● Proposed 115kV

Easting Position State Plane Virginia South:	**12078240.6**
Northing Position State Plane Virginia South:	**3752805.9**
Elevation of Viewpoint Position NAD88:	**3.9**
Height of Camera Above Ground (ft):	**5.4**
Date of Photography:	**10 May 2016 at 10:06 AM**
Orientation of View:	**NE**
Horizontal Field of View:	**124°**
Vertical Field of View:	**55°**
Distance to Bridge (ft):	**3342.8**

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 03 - Rappahannock River, East of Norris Bridge, Looking West-Northwest - **Existing View**

Viewpoint 03 - Rappahannock River, East of Norris Bridge, Looking West-Northwest - **Proposed View**

Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 20 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

Viewpoint 03

Rappahannock River,
East of Norris Bridge

Viewpoint Location Proposed 115kV

Easting Position (State Plane Virginia South):	12094766.9
Northing Position (State Plane Virginia South):	3755724.1
Elevation of Photopoint Position (NAD88):	1.8
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 10:58 AM
Orientation of View:	WNW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	9560.3

NOTES:

Viewpoint locations have been precision surveyed by:

Pennoni
Virginia Beach, VA

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo Simulation Created Using TrueView™ Technology (Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

DATE	SHEET
27 May 2016	9

Viewpoint 03 - Rappahannock River, East of Norris Bridge, Looking West-Northwest - **Existing View**

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

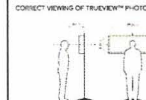
Viewpoint 03
Rappahannock River,
East of Norris Bridge

Looking West-Northwest

● Viewpoint Location ● Proposed 115kV

Easting Position State Plane Virginia South:	12094766.9
Northing Position State Plane Virginia South:	3755724.1
Elevation of Viewpoint Position NAD88:	1.8
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 10:58 AM
Orientation of View:	WNW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	9560.3

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 03 - Rappahannock River, East of Norris Bridge, Looking West-Northwest - Proposed View

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

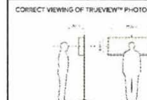
Viewpoint 03
Rappahannock River,
East of Norris Bridge

Looking West-Northwest

● Viewpoint Location ○ Proposed 115kV

Easting Position State Plane Virginia South:	12094766.9
Northing Position State Plane Virginia South:	3755724.1
Elevation of Viewpoint Position NAD88:	1.8
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 10:58 AM
Orientation of View:	WNW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	9560.3

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 04 - Norris Bridge, North End, Looking Southwest - **Existing View**

Viewpoint 04 - Norris Bridge, North End, Looking Southwest - **Proposed View**

Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 20 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

Viewpoint 04

Norris Bridge,
North End

Viewpoint Location · Proposed 115kV

Easting Position (State Plane Virginia South):	12087411.8
Northing Position (State Plane Virginia South):	3761824.5
Elevation of Photopoint Position (NAD88):	5.9
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 13:45 PM
Orientation of View:	SW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	201.7

NOTES:

Viewpoint locations have been precision surveyed by:

Pennoni
Virginia Beach, VA

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo Simulation Created Using TrueView™ Technology (Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

DATE	SHEET
27 May 2016	12

Viewpoint 04 - Norris Bridge, North End, Looking Southwest - **Existing View**

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

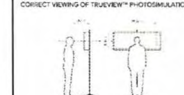
Viewpoint 04
Norris Bridge,
North End

Looking Southwest

● Viewpoint Location ● Proposed 115kV

Easting Position State Plane Virginia South:	12087411.8
Northing Position State Plane Virginia South:	3761824.5
Elevation of Viewpoint Position NAD88:	5.9
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 13:45 PM
Orientation of View:	SW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	201.7

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using TrueView™ Technology (Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 04 - Norris Bridge, North End, Looking Southwest - **Proposed View**

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

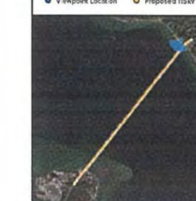
Dominion

Norris Bridge: Overhead 115kV

Viewpoint 04
Norris Bridge,
North End

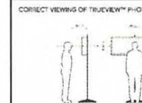
Looking Southwest

● Viewpoint Location ● Proposed 115kV



Easting Position State Plane Virginia South:	12087411.8
Northing Position State Plane Virginia South:	3761824.5
Elevation of Viewpoint Position NAD88:	5.9
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 13:45 PM
Orientation of View:	SW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	201.7

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches).

NOTES:

Viewpoint locations have been precision surveyed by:

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 05 - Rappahannock River, Near Locklies Marina, Looking North-Northeast - **Existing View**

Viewpoint 05 - Rappahannock River, Near Locklies Marina, Looking North-Northeast - **Proposed View**

Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 20 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

Viewpoint 05

Rappahannock River,
Near Locklies Marina

Viewpoint Location ● Proposed 115kV

Easting Position (State Plane Virginia South):	12084159.5
Northing Position (State Plane Virginia South):	3753881.3
Elevation of Photopoint Position (NAD88):	1.8
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 11:35 AM
Orientation of View:	NNE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	1979.1

NOTES:

Viewpoint locations have been precision surveyed by:

Pennoni
Virginia Beach, VA

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo Simulation Created Using TrueView™ Technology (Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

DATE 27 May 2016

SHEET 15

Viewpoint 05 - Rappahannock River, Near Locklies Marina, Looking North-Northeast - Existing View

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

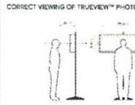
Viewpoint 05
Rappahannock River,
Near Locklies Marina

Looking North-Northeast

● Viewpoint Location ○ Proposed 115kV

Easting Position State Plane Virginia South:	12084159.5
Northing Position State Plane Virginia South:	3753881.3
Elevation of Viewpoint Position NAD88:	1.8
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 11:35 AM
Orientation of View:	NNE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	1979.1

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 05 - Rappahannock River, Near Locklies Marina, Looking North-Northeast - Proposed View

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

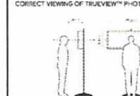
Norris Bridge: Overhead 115kV

Viewpoint 05
Rappahannock River,
Near Locklies Marina

Looking North-Northeast

Easting Position State Plane Virginia South:	12084159.5
Northing Position State Plane Virginia South:	3753881.3
Elevation of Viewpoint Position NAD88:	1.8
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 11:35 AM
Orientation of View:	NNE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	1979.1

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 06 - Rappahannock River, South-East of Norris Bridge, Looking Northwest - **Existing View**

Viewpoint 06 - Rappahannock River, South-East of Norris Bridge, Looking Northwest - **Proposed View**

Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 20 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

Viewpoint 06

Rappahannock River,
South-East of Norris Bridge

● Viewpoint Location ● Proposed 115kV

Easting Position (State Plane Virginia South):	12085945.4
Northing Position (State Plane Virginia South):	3755830.2
Elevation of Photopoint Position (NAD88):	0.3
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 11:46 AM
Orientation of View:	NW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	2297.4

NOTES:

Viewpoint locations have been precision surveyed by:

Pennoni
Virginia Beach, VA

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo Simulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

DATE	SHEET
27 May 2016	18

Viewpoint 06 - Rappahannock River, South-East of Norris Bridge, Looking Northwest - **Existing View**

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

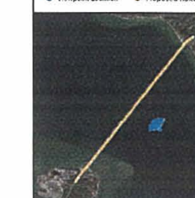
Dominion

Norris Bridge: Overhead 115kV

Viewpoint 06
Rappahannock River,
South-East of Norris Bridge

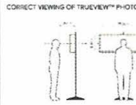
Looking Northwest

● Viewpoint Location ○ Proposed 115kV



Easting Position State Plane Virginia South:	12085945.4
Northing Position State Plane Virginia South:	3755830.2
Elevation of Viewpoint Position NAD88:	0.3
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 11:46 AM
Orientation of View:	NW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	2297.4

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches).

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Dominion

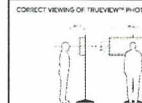
Norris Bridge: Overhead 115kV

Viewpoint 06
Rappahannock River,
South-East of Norris Bridge

Looking Northwest

Easting Position State Plane Virginia South:	12085945.4
Northing Position State Plane Virginia South:	3755830.2
Elevation of Viewpoint Position NAD88:	0.3
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 11:46 AM
Orientation of View:	NW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	2297.4

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 06 - Rappahannock River, South-East of Norris Bridge, Looking Northwest - **Proposed View**

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Viewpoint 07 - Rappahannock River, North-West of Norris Bridge, Looking Southeast - **Existing View**

Viewpoint 07 - Rappahannock River, North-West of Norris Bridge, Looking Southeast - **Proposed View**

Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 20 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

Viewpoint 07

Rappahannock River,
North-West of Norris Bridge

Viewpoint Location   Proposed 115kV

Easting Position (State Plane Virginia South):	12079535.7
Northing Position (State Plane Virginia South):	3760406.7
Elevation of Photopoint Position (NAD88):	-0.2
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 11:56 AM
Orientation of View:	SE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	5658.2

NOTES:

Viewpoint locations have been precision surveyed by:

Pennoni
Virginia Beach, VA

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo Simulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

DATE	SHEET
27 May 2016	21

Viewpoint 07 - Rappahannock River, North-West of Norris Bridge, Looking Southeast - **Existing View**

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

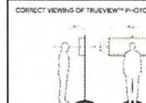
Viewpoint 07
Rappahannock River,
North-West of Norris Bridge

Looking Southeast

Viewpoint Location   Proposed 115kV

Easting Position State Plane Virginia South:	12079535.7
Northing Position State Plane Virginia South:	3760406.7
Elevation of Viewpoint Position NAD88:	-0.2
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 11:56 AM
Orientation of View:	SE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	5658.2

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 07 - Rappahannock River, North-West of Norris Bridge, Looking Southeast - Proposed View

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

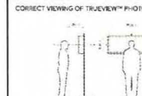
Viewpoint 07
Rappahannock River,
North-West of Norris Bridge

Looking Southeast

● Viewpoint Location ○ Proposed 115kV

Easting Position State Plane Virginia South:	12079535.7
Northing Position State Plane Virginia South:	3760406.7
Elevation of Viewpoint Position NAD88:	-0.2
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 11:56 AM
Orientation of View:	SE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	5658.2

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 08 - Norris Bridge, South End, Looking Northeast - **Existing View**

Viewpoint 08 - Norris Bridge, South End, Looking Northeast - **Proposed View**

Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 20 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

Viewpoint 08

Norris Bridge,
South End

● Viewpoint Location ● Proposed 115kV

Easting Position (State Plane Virginia South):	12081487.8
Northing Position (State Plane Virginia South):	3753613.9
Elevation of Photopoint Position (NAD88):	25.6
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 12:43 PM
Orientation of View:	NE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	8.5

NOTES:

Viewpoint locations have been precision surveyed by:

Pennoni
Virginia Beach, VA

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo Simulation Created Using TrueView™ Technology (Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

DATE	SHEET
27 May 2016	24

Viewpoint 08 - Norris Bridge, South End, Looking Northeast - Existing View

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

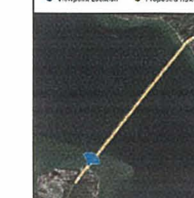
Dominion

Norris Bridge: Overhead 115kV

Viewpoint 08
Norris Bridge,
South End

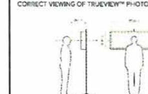
Looking Northeast

● Viewpoint Location ○ Proposed 115kV



Easting Position State Plane Virginia South:	12081487.8
Northing Position State Plane Virginia South:	3753613.9
Elevation of Viewpoint Position NAD88:	25.6
Height of Camera Above Ground (m):	5.4
Date of Photography:	10 May 2016 at 12:43 PM
Orientation of View:	NE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (m):	8.5

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches).

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using TrueView™ Technology (Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Dominion

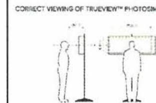
Norris Bridge: Overhead 115kV

Viewpoint 08
Norris Bridge,
South End

Looking Northeast

Easting Position State Plane Virginia South:	12081487.8
Northing Position State Plane Virginia South:	3753613.9
Elevation of Viewpoint Position NAD88:	25.6
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 12:43 PM
Orientation of View:	NE
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	8.5

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

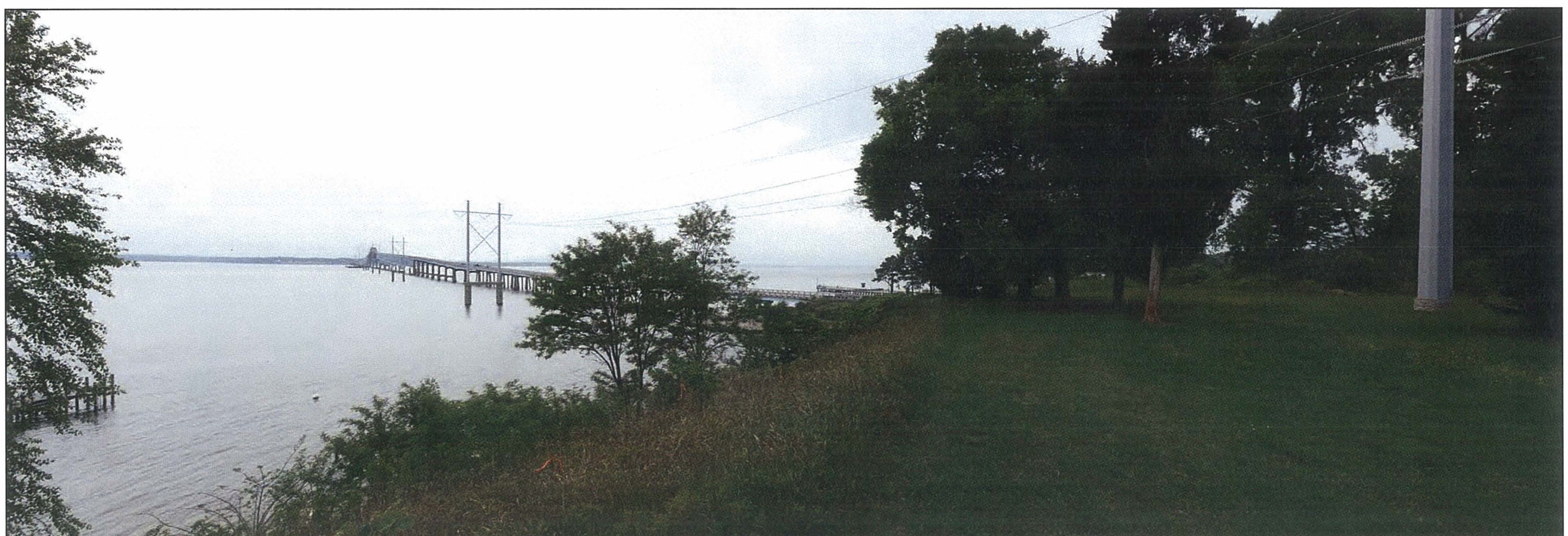
Truescape®

www.truescape.com

Viewpoint 08 - Norris Bridge, South End, Looking Northeast **- Proposed View**

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Viewpoint 09 - Near West High Bank Road, Looking West-Southwest - **Existing View**



Viewpoint 09 - Near West High Bank Road, Looking West-Southwest - **Proposed View**

Viewing Instructions: Scale bar width to be approximately 4 inches (10 cm)
Viewing distance to be approximately 20 inches (50 cm)

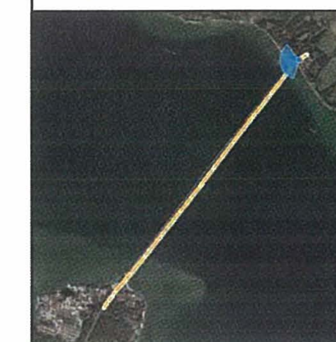
Dominion

Norris Bridge: Overhead 115kV

Viewpoint 09

Near West High Bank Road

Viewpoint Location | Proposed 115kV



Easting Position (State Plane Virginia South):	12087828.6
Northing Position (State Plane Virginia South):	3761662.1
Elevation of Photopoint Position (NAD88):	33.2
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 13:20 PM
Orientation of View:	WSW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	350.0

NOTES:

Viewpoint locations have been precision surveyed by:

Pennoni
Virginia Beach, VA

No part of this photo simulation shall be altered in any way.

Visual assessments should be made from the full size TrueView™ only.

Photo Simulation Created Using TrueView™ Technology (Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

DATE	SHEET
27 May 2016	27

Viewpoint 09 - Near West High Bank Road, Looking West-Southwest - **Existing View**

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

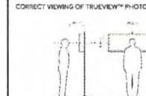
Viewpoint 09
Near West High Bank Road

Looking West-Southwest

● Viewpoint Location ○ Proposed 115kV

Easting Position State Plane Virginia South:	12087828.6
Northing Position State Plane Virginia South:	3761662.1
Elevation of Viewpoint Position NAD88:	33.2
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 13:20 PM
Orientation of View:	WSW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	350.0

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS



This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches).

NOTES

Viewpoint locations have been precision surveyed by

Penneni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using TrueView™ Technology (Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com

Viewpoint 09 - Near West High Bank Road, Looking West-Southwest - Proposed View

For on-screen display:
Scale bar to be 4 inches (101.6 mm) wide
Viewing distance 19.7 inches (50 cm)

Dominion

Norris Bridge: Overhead 115kV

Viewpoint 09
Near West High Bank Road

Looking West-Southwest

Viewpoint Location · Proposed 115kV

Easting Position State Plane Virginia South:	12087828.6
Northing Position State Plane Virginia South:	3761662.1
Elevation of Viewpoint Position NAD88:	33.2
Height of Camera Above Ground (ft):	5.4
Date of Photography:	10 May 2016 at 13:20 PM
Orientation of View:	WSW
Horizontal Field of View:	124°
Vertical Field of View:	55°
Distance to Bridge (ft):	350.0

CORRECT VIEWING OF TRUEVIEW™ PHOTOSIMULATIONS

This full-size TrueView™ is to be printed without scaling on approximately 1697 x 608 mm paper (66.8 x 23.9 inches)

NOTES:

Viewpoint locations have been precision surveyed by

Pennoni
Virginia Beach, VA

Heights are above mean sea level.

No part of this photosimulation shall be altered in any way.

Photosimulation Created Using
TrueView™ Technology
(Patent No.: US 8,184,906 B2)

Provided by

Truescape®

www.truescape.com