

**ATLANTIC COAST PIPELINE, LLC
ATLANTIC COAST PIPELINE**

and

**DOMINION TRANSMISSION, INC.
SUPPLY HEADER PROJECT**

**Supplemental Filing
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APPENDIX D

Noise Studies for Meter and Regulating Stations

ENVIRONMENTAL NOISE CONTROL

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8 March 2017

Atlantic Coast Pipeline, LLC
925 White Oaks Boulevard
Bridgeport, West Virginia 26330

Attention: Mr. Paul A. Bastin

Subject: ENC Report No. 563:
Ambient Sound Surveys and Noise Analyses for Measurement and Regulation
Stations at Seven Sites for the Atlantic Coast Pipeline Project
ENC Project No. 17-01

Dear Mr. Bastin:

Environmental Noise Control (ENC) has conducted ambient sound surveys and noise analyses of the sound levels due to the installation of Measurement and Regulation (M&R) stations at seven sites for the Atlantic Coast Pipeline Project.

1.0 PURPOSE

The purpose of the noise sensitive area (NSA) sound surveys was to document the existing ambient sound levels in response to FERC Condition 86 on the Draft EIS for the Atlantic Coast Pipeline Project at the seven M&R station sites. The purposes of the noise analyses were to predict the sound levels due to the M&R stations at the NSAs and determine if the planned noise mitigation measures are sufficient to reduce the M&R station sound levels to meet the FERC limit of a maximum L_{dn} sound level of 55 dBA at the NSAs. Presented below are descriptions of the M&R station sites, the sound survey measurement locations, the measured ambient sound levels, the predicted M&R station L_{dn} sound levels at the NSAs, and the total predicted L_{dn} sound levels.

2.0 AMBIENT AND PREDICTED M&R STATION SOUND LEVELS AT THE NSAs

The ambient sound levels were measured during January and February 2017 at the seven M&R station sites. The ambient sound levels and predicted M&R station L_{dn} sound levels at the NSAs within 0.5 miles are presented for each M&R station site in the following Sections 2.1 through 2.7.

2.1 LONG RUN M&R STATION

The site of the Long Run M&R Station is located west of Country Road 42/1 in the Town of Mill Creek, Randolph County, West Virginia. The Chesapeake compressor station is located approximately 200 feet east. It is planned that this M&R station will include two ultrasonic meters

located in an acoustically insulated meter building, two regulation runs located in an acoustically insulated regulation building, and four gas heaters.

The land use surrounding this site is forested areas. There are no NSAs within one-half mile of this site. The closest NSA to the site is approximately 7200 feet north-northeast. The site and the one-half mile radius circle around site are shown in Figure 1.

2.2 BRUNSWICK M&R STATION

The site of the Brunswick M&R Station is located south of Route 58 in the Town of Freeman, Brunswick County, Virginia. It is planned that this M&R station will include two ultrasonic meter runs located in an acoustically insulated meter building, three regulation runs located in an acoustically insulated regulation building, and three gas heaters.

The land uses surrounding this site are forested, industrial, and agricultural areas. This M&R station site is on the Dominion Transmission, Inc. Brunswick County Power Plant property. There are no NSAs within one-half mile of this site. The closest NSA to the site is approximately 3300 feet southeast. The site and the one-half mile radius circle around site are shown in Figure 2.

2.3 GREENSVILLE M&R STATION

The site of the Greensville M&R Station is located north of Route 605 in the Town of Emporia, Greensville County, Virginia. It is planned that this M&R station will include two ultrasonic meter runs located in an acoustically insulated meter building, three regulation runs located in an acoustically insulated regulation building, and three gas heaters.

The land uses surrounding this site are forested and agricultural areas. The M&R station site is on the Dominion Transmission, Inc. Greensville Power Plant property. There are no NSAs within one-half mile of this site. The closest NSA to the site is approximately 3650 feet west-northwest. The site and the one-half mile radius circle around site are shown in Figure 3.

2.4 ELIZABETH RIVER M&R STATION

The site for the Elizabeth River M&R Station is located south of Route 13 in Chesapeake, Virginia. It is planned that this M&R station will include two ultrasonic meter runs located in an acoustically insulated meter building and two regulation runs located in an acoustically insulated regulation building.

The land uses surrounding this site are residential, industrial, and forested areas. The nearest NSAs are approximately 1450 and 1750 feet northeast, 1650 feet east-southeast, 1650 and 1750 feet southeast, 1800 feet south-southeast, 2450 feet south, 2500 feet south-southwest, and 2150 feet southwest. The site, the one-half mile radius circle around the site, and the nearest NSAs are shown in Figure 4.

2.4.1 SOUND SURVEY MEASUREMENTS

Sound survey measurements were conducted at the NSAs on 25 January 2017. Daytime measurements were conducted between 11:30 AM and 2 PM and nighttime measurements were conducted between 10:30 PM and 12 PM. The weather conditions during the daytime measurements were a temperature of 55 degrees F increasing to 64 degrees F, a relative humidity of 55% decreasing to 30%, clear skies, and light west winds (2 to 4 mph) becoming calm. During the nighttime measurements, the weather conditions were a temperature of 57 degrees F, a relative humidity of 60%, clear skies, and light west winds (1 to 3 mph).

Audible sources of daytime ambient sound were local traffic, traffic on Route 58, dogs barking, birds, airplanes, an ambulance at S1 and S5, a chain saw at S2, wind chimes at S4, a helicopter at S6, and backup alarms at S7, S8, and S9. During the nighttime, audible ambient sound sources were local traffic, traffic on Route 58, a dog barking at S2, wind chimes at S4, geese at S6, and backup alarms at S5 and S7 through S9.

At the NSAs, the measured daytime ambient L_{eq} sound levels ranged from 44.7 to 58.0 dBA, the measured nighttime ambient L_{eq} sound levels ranged from 48.2 to 53.1 dBA, and the calculated ambient L_{dn} sound levels ranged from 54.4 to 60.7 dBA.

2.4.2 NOISE CONTROL MEASURES/SPECIFICATIONS FOR THE ELIZABETH RIVER M&R STATION

Implementation of the following noise control measures/specifications is necessary to ensure that the continuous sound from this M&R station will not exceed a day-night sound level (L_{dn}) of 55 dBA at the NSAs.

1. The maximum noise from each ultrasonic meter with flow conditioner must not exceed an A-weighted sound level of 80 dBA at 3 feet with maximum octave band sound pressure levels (SPL) as follows:

	Ultrasonic Meter Maximum SPL at 3 feet in dB									
	Octave Band Center Frequency in Hz									
	31.5	63	125	250	500	1000	2000	4000	8000	
dB	70	72	74	75	75	74	73	72	70	

2. The wall and roof panels of the Meter Building must have a minimum Sound Transmission Class (STC) of 29 and a minimum Noise Reduction Coefficient (NRC) of 0.90, with a minimum of 3 inch thick acoustic insulation. In addition, these panels must have minimum Sound Transmission Loss (TL) values as follows:

	Meter Building Wall and Roof Panel Minimum TL in dB									
	Octave Band Center Frequency in Hz									
	31.5	63	125	250	500	1000	2000	4000	8000	
dB	2	8	13	18	23	31	38	40	40	

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3. The doors for the Meter Building must be insulated, metal doors with full weather-stripping. Any windows in these doors must be double glazed using minimum 1/4 inch thick glass or acrylic panels separated by a minimum 1/2 inch airspace.
4. A maximum of four ventilation air inlet louvers must be located in the walls of the Meter Building to reduce the sound from the two ultrasonic meters.
5. The Meter Building can have a maximum 4 inch wide roof ridge vent.
6. The maximum noise from the 8 inch operating regulator valve must not exceed an A-weighted sound level of 81 dBA at 3 feet with maximum octave band sound pressure levels (SPL) as follows:

	Regulator Valve Maximum SPL at 3 feet in dB								
	Octave Band Center Frequency in Hz								
	31.5	63	125	250	500	1000	2000	4000	8000
dB	92	91	88	83	77	72	70	69	68

7. The maximum noise from the 10 inch operating regulator valve must not exceed an A-weighted sound level of 80 dBA at 3 feet with maximum octave band sound pressure levels (SPL) as follows:

	Regulator Valve Maximum SPL at 3 feet in dB								
	Octave Band Center Frequency in Hz								
	31.5	63	125	250	500	1000	2000	4000	8000
dB	91	90	87	82	76	71	69	68	67

8. The wall and roof panels of the Regulation Building must have a minimum Sound Transmission Class (STC) of 29 and a minimum Noise Reduction Coefficient (NRC) of 0.90, with a minimum of 3 inch thick acoustic insulation. In addition, these panels must have minimum Sound Transmission Loss (TL) values as follows:

	Regulation Building Wall and Roof Panel Minimum TL in dB								
	Octave Band Center Frequency in Hz								
	31.5	63	125	250	500	1000	2000	4000	8000
dB	2	8	13	18	23	31	38	40	40

9. The doors for the Regulation Building must be insulated, metal doors with full weather-stripping. Any windows in these doors must be double glazed using minimum 1/4 inch thick glass or acrylic panels separated by a minimum 1/2 inch airspace.

10. A maximum of four ventilation air inlet louvers must be located in the walls of the Regulation Building to reduce the sound from the two operating regulator valves that escapes through these openings.
11. The Regulation Building can have a maximum 4 inch wide roof ridge vent.

2.4.3 PREDICTED ELIZABETH RIVER M&R STATION SOUND LEVELS

The octave band sound pressure levels and A-weighted sound levels predicted at the nearest NSA (S1) approximately 1450 feet northeast of this M&R station are shown in Table 2.4.1. Sheet 1 of this table present the calculations that predict the sound levels from this M&R station at this NSA. Detailed line item descriptions are presented on Sheets 2 and 3 of this table. The attached noise control analysis indicates a predicted continuous L_{eq} sound level of 21 dBA at the nearest NSA with a corresponding L_{dn} sound level of 27.4 dBA. At the NSAs approximately 1650 to 2500 feet from this M&R station, the L_{eq} sound levels are predicted to range from 15 to 19 dBA, with corresponding L_{dn} sound levels ranging from 21.4 to 25.4 dBA. The predicted L_{dn} sound levels from the Elizabeth River M&R Station are below 55 dBA at all NSAs around the site.

Table 2.4.2 presents the sound levels at the NSAs around the Elizabeth River M&R Station. Shown are:

- the ambient L_d , L_n and L_{dn} sound levels,
- the predicted L_{dn} sound levels from the M&R station equipment,
- the predicted total L_{dn} sound levels resulting from summing the L_{dn} sound levels from the M&R station equipment with the ambient L_{dn} sound levels, and
- the predicted increases in the ambient L_{dn} sound levels due to the M&R station equipment.

At the nearest NSAs, the predicted total L_{dn} sound levels range from 54.4 to 60.7 dBA. These total L_{dn} sound levels are below 55 dBA at NSAs S5 and S7. At NSA S1 though S4, S6, S8, and S9, where the total L_{dn} sound levels are over 55 dBA, the predicted L_{dn} sound levels from the M&R Station equipment are lower than the ambient L_{dn} sound levels and there are no increases to the ambient L_{dn} sound levels.

2.5 SMITHFIELD M&R STATION

The site of the Smithfield M&R Station is located east of Yelverton Grove Road in the Town of Smithfield, Johnston County, North Carolina. It is planned that this M&R station will include four ultrasonic meter runs located in an acoustically insulated meter building and two regulation runs located in an acoustically insulated regulation building.

The land uses surrounding this site are residential, agricultural, and forested areas. A Narenco Power Plant is located directly to the north of the M&R station site. The nearest NSAs are approximately 1250 and 2450 feet north-northwest, 1900 feet south, 1700 feet southwest, and 2600

feet northwest. The site, the one-half mile radius circle around the site, and the nearest NSAs are shown in Figure 5.

2.5.1 SOUND SURVEY MEASUREMENTS

Sound survey measurements were conducted at the NSAs on 26 January 2017. Daytime measurements were conducted between 4 PM and 5:30 PM and nighttime measurements were conducted between 10 PM and 11 PM. The weather conditions during the daytime measurements were a temperature of 67 degrees F decreasing to 62 degrees F, a relative humidity of 30%, clear skies, and northwest winds (5 to 8 mph). During the nighttime measurements, the weather conditions were a temperature of 50 degrees F, a relative humidity of 40%, clear skies, and light west winds (1 to 3 mph).

Audible sources of daytime ambient sound were traffic on Route 70, wind in the trees, birds, frogs at S2 through S4, and dogs barking at S3 and S4. During the nighttime, audible ambient sound sources were traffic on Route 70, frogs, an airplane at S1, and a cell tower buzzing at S4.

At the NSAs, the measured daytime ambient L_{eq} sound levels ranged from 49.4 to 61.7 dBA, the measured nighttime ambient L_{eq} sound levels ranged from 43.7 to 56.5 dBA, and the calculated ambient L_{dn} sound levels ranged from 51.5 to 64.1 dBA.

2.5.2 NOISE CONTROL MEASURES/SPECIFICATIONS FOR THE SMITHFIELD M&R STATION

Implementation of the following noise control measures/specifications is necessary to ensure that the continuous sound from this M&R station will not exceed a day-night sound level (L_{dn}) of 55 dBA at the NSAs.

1. The maximum noise from each 16 inch ultrasonic meter with flow conditioner must not exceed an A-weighted sound level of 80 dBA at 3 feet with maximum octave band sound pressure levels (SPL) as follows:

	Ultrasonic Meter Maximum SPL at 3 feet in dB								
	Octave Band Center Frequency in Hz								
	31.5	63	125	250	500	1000	2000	4000	8000
dB	70	72	74	75	75	74	73	72	70

2. The maximum noise from each 12 inch ultrasonic meter with flow conditioner must not exceed an A-weighted sound level of 80 dBA at 3 feet with maximum octave band sound pressure levels (SPL) as follows:

	Ultrasonic Meter Maximum SPL at 3 feet in dB								
	Octave Band Center Frequency in Hz								
	31.5	63	125	250	500	1000	2000	4000	8000
dB	70	72	74	75	75	74	73	72	70

3. The maximum noise from each 6 inch ultrasonic meter with flow conditioner must not exceed an A-weighted sound level of 80 dBA at 3 feet with maximum octave band sound pressure levels (SPL) as follows:

Ultrasonic Meter Maximum SPL at 3 feet in dB									
Octave Band Center Frequency in Hz									
	31.5	63	125	250	500	1000	2000	4000	8000
dB	70	72	74	75	75	74	73	72	70

4. The wall and roof panels of the Meter Building must have a minimum Sound Transmission Class (STC) of 29 and a minimum Noise Reduction Coefficient (NRC) of 0.90. In addition, these panels must have minimum Sound Transmission Loss (TL) values as follows:

Meter Building Wall and Roof Panel Minimum TL in dB									
Octave Band Center Frequency in Hz									
	31.5	63	125	250	500	1000	2000	4000	8000
dB	2	8	13	18	23	31	38	40	40

5. The doors for the Meter Building must be insulated, metal doors with full weather-stripping. Any windows in these doors must be double glazed using minimum 1/4 inch thick glass or acrylic panels separated by a minimum 1/2 inch airspace.
6. Ventilation air inlet acoustic louvers must be located in the walls of the Meter Building to reduce the sound from the two ultrasonic meters. Each acoustic louver must have minimum Sound Transmission Loss (TL) values as follows:

Ventilation Air Inlet Acoustic Louver Minimum TL in dB									
Octave Band Center Frequency in Hz									
	31.5	63	125	250	500	1000	2000	4000	8000
dB	2	4	5	3	7	13	14	13	12

7. The Meter building can have a maximum 50 foot long 12 inch wide roof ridge vent.
8. The maximum noise from the 16 inch operating regulator valve must not exceed an A-weighted sound level of 66 dBA at 3 feet with maximum octave band sound pressure levels (SPL) as follows:

Regulator Valve Maximum SPL at 3 feet in dB									
Octave Band Center Frequency in Hz									
	31.5	63	125	250	500	1000	2000	4000	8000
dB	77	76	73	68	62	57	55	54	53

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9. The maximum noise from the 8 inch operating regulator valve must not exceed an A-weighted sound level of 71 dBA at 3 feet with maximum octave band sound pressure levels (SPL) as follows:

Regulator Valve Maximum SPL at 3 feet in dB									
Octave Band Center Frequency in Hz									
	31.5	63	125	250	500	1000	2000	4000	8000
dB	82	81	78	73	67	62	60	59	58

10. The wall and roof panels of the Regulation Building must have a minimum Sound Transmission Class (STC) of 29 and a minimum Noise Reduction Coefficient (NRC) of 0.90. In addition, these panels must have minimum Sound Transmission Loss (TL) values as follows:

Regulation Building Wall and Roof Panel Minimum TL in dB									
Octave Band Center Frequency in Hz									
	31.5	63	125	250	500	1000	2000	4000	8000
dB	2	8	13	18	23	31	38	40	40

11. The doors for the Regulation Building must be insulated, metal doors with full weather-stripping. Any windows in these doors must be double glazed using minimum 1/4 inch thick glass or acrylic panels separated by a minimum 1/2 inch airspace.
12. Ventilation air inlet acoustic louvers must be located in the walls of the Regulation Building to reduce the sound from the two operating regulator valves that escapes through these openings. Each acoustic louver must have minimum Sound Transmission Loss (TL) values as follows:

Ventilation Air Inlet Acoustic Louver Minimum TL in dB									
Octave Band Center Frequency in Hz									
	31.5	63	125	250	500	1000	2000	4000	8000
dB	2	4	5	3	7	13	14	13	12

13. The Regulation Building can have a maximum of three 10 foot long 9 inch wide roof ridge vent.

2.5.3 PREDICTED SMITHFIELD M&R STATION SOUND LEVELS

The octave band sound pressure levels and A-weighted sound levels predicted at the nearest NSA (S2) approximately 1250 feet north-northwest of this M&R station are shown in Table 2.5.1. Sheet 1 of this table present the calculations that predict the sound levels from this M&R station at this NSA. Detailed line item descriptions are presented on Sheets 2 and 3 of this table. The attached noise control analysis indicates a predicted continuous L_{eq} sound level of 20 dBA at the nearest

NSA with a corresponding L_{dn} sound level of 26.4 dBA. At the NSAs approximately 1700 to 2650 feet from this M&R station, the L_{eq} sound levels are predicted to range from 12 to 17 dBA, with corresponding L_{dn} sound levels ranging from 18.4 to 23.4 dBA. The predicted L_{dn} sound levels from Smithfield M&R Station are below 55 dBA at all NSAs around the site.

Table 2.5.2 presents the sound levels at the NSAs around the Smithfield M&R Station. Shown are:

- the ambient L_d , L_n and L_{dn} sound levels,
- the predicted L_{dn} sound levels from the M&R station equipment,
- the predicted total L_{dn} sound levels resulting from summing the L_{dn} sound levels from the M&R station equipment with the ambient L_{dn} sound levels, and
- the predicted increases in the ambient L_{dn} sound levels due to the M&R station equipment.

At the nearest NSAs, the predicted total L_{dn} sound levels range from 51.5 to 64.1 dBA. These total L_{dn} sound levels are below 55 dBA at NSAs S3 and S4. At NSA S1, S2, and S5, where the total L_{dn} sound levels are over 55 dBA, the predicted L_{dn} sound levels from the M&R station equipment are lower than the ambient L_{dn} sound levels and there are no increases to the ambient L_{dn} sound levels.

2.6 FAYETTEVILLE M&R STATION

The site of the Fayetteville M&R Station is located south of Swamp Road in the Town of Wade, North Carolina. It is planned that this M&R station will include two ultrasonic meter runs located in an acoustically insulated meter building and one regulation run located in an acoustically insulated regulation building.

The land uses surrounding this site are forested and agricultural areas. There are no NSAs within one-half mile of the site. The closest NSA to the site is approximately 3600 feet east-northeast. The site and the one-half mile radius circle around site are shown in Figure 6.

2.7 PEMBROKE M&R STATION

The site of the Pembroke M&R Station is located west of Route 710 in the Town of Pembroke, Robeson County, North Carolina. It is planned that this M&R station will include four ultrasonic meter runs located in an acoustically insulated meter building, two regulation runs located in an acoustically insulated regulation building, and two catalytic gas heaters.

The land uses surrounding this site are residential, agricultural, and forested areas. The Piedmont Compressor Station is located adjacent to the south property line. The nearest NSAs are approximately 1200 feet northeast, 800 feet east, 1600 feet southeast, 1200 feet south-southeast, 1250 feet south-southwest, 2200 feet west, and 2150 feet northwest. The New Prospect Methodist Church is located 1600 feet north-northeast. The site, the one-half mile radius circle around the site, and the nearest NSAs are shown in Figure 7.

2.7.1 SOUND SURVEY MEASUREMENTS

Sound survey measurements were conducted at the NSAs on 2 February 2017. Daytime measurements were conducted between 11:30 AM and 1:30 PM and nighttime measurements were conducted between 10 PM and 11:30 PM. The weather conditions during the daytime measurements were a temperature of 62 degrees F increasing to 67 degrees F, a relative humidity of 55%, partly cloudy skies, and north winds (2 to 6 mph). During the nighttime measurements, the weather conditions were a temperature of 56 degrees F, a relative humidity of 55%, cloudy skies, and light northwest winds (1 to 2 mph).

Audible sources of daytime ambient sound were local traffic, birds, airplanes, a rooster at S1, the Piedmont Compressor Station at S2 through S5, and the Piedmont M&R piping at S4. During the nighttime, audible ambient sound sources were local traffic, the Piedmont Compressor Station, airplanes, dogs barking at S3 through S5, S7, and S8, a train at S6, and crickets at S6 and S7.

At the NSAs, the measured daytime ambient L_{eq} sound levels ranged from 41.3 to 61.3 dBA, the measured nighttime ambient L_{eq} sound levels ranged from 35.1 to 53.7 dBA, and the calculated ambient L_{dn} sound levels ranged from 44.6 to 61.5 dBA.

2.7.2 NOISE CONTROL MEASURES/SPECIFICATIONS FOR THE PEMBROKE M&R STATION

Implementation of the following noise control measures/specifications is necessary to ensure that the continuous sound from this M&R station will not exceed a day-night sound level (L_{dn}) of 55 dBA at the NSAs.

1. The maximum noise from each 16 inch ultrasonic meter with flow conditioner must not exceed an A-weighted sound level of 80 dBA at 3 feet with maximum octave band sound pressure levels (SPL) as follows:

	Ultrasonic Meter Maximum SPL at 3 feet in dB								
	Octave Band Center Frequency in Hz								
	31.5	63	125	250	500	1000	2000	4000	8000
dB	70	72	74	75	75	74	73	72	70

2. The maximum noise from each 12 inch ultrasonic meter with flow conditioner must not exceed an A-weighted sound level of 80 dBA at 3 feet with maximum octave band sound pressure levels (SPL) as follows:

	Ultrasonic Meter Maximum SPL at 3 feet in dB								
	Octave Band Center Frequency in Hz								
	31.5	63	125	250	500	1000	2000	4000	8000
dB	70	72	74	75	75	74	73	72	70

- The maximum noise from each 6 inch ultrasonic meter with flow conditioner must not exceed an A-weighted sound level of 80 dBA at 3 feet with maximum octave band sound pressure levels (SPL) as follows:

Ultrasonic Meter Maximum SPL at 3 feet in dB									
Octave Band Center Frequency in Hz									
	31.5	63	125	250	500	1000	2000	4000	8000
dB	70	72	74	75	75	74	73	72	70

- The wall and roof panels of the Meter Building must have a minimum Sound Transmission Class (STC) of 29 and a minimum Noise Reduction Coefficient (NRC) of 0.90. In addition, these panels must have minimum Sound Transmission Loss (TL) values as follows:

Meter Building Wall and Roof Panel Minimum TL in dB									
Octave Band Center Frequency in Hz									
	31.5	63	125	250	500	1000	2000	4000	8000
dB	2	8	13	18	23	31	38	40	40

- The doors for the Meter Building must be insulated, metal doors with full weatherstripping. Any windows in these doors must be double glazed using minimum 1/4 inch thick glass or acrylic panels separated by a minimum 1/2 inch airspace.
- Ventilation air inlet acoustic louvers must be located in the walls of the Meter Building to reduce the sound from the two ultrasonic meters. Each acoustic louver must have minimum Sound Transmission Loss (TL) values as follows:

Ventilation Air Inlet Acoustic Louver Minimum TL in dB									
Octave Band Center Frequency in Hz									
	31.5	63	125	250	500	1000	2000	4000	8000
dB	2	4	5	3	7	13	14	13	12

- The Meter building can have a maximum 50 foot long 12 inch wide roof ridge vent.
- The maximum noise from the 16 inch operating regulator valve must not exceed an A-weighted sound level of 71 dBA at 3 feet with maximum octave band sound pressure levels (SPL) as follows:

Regulator Valve Maximum SPL at 3 feet in dB									
Octave Band Center Frequency in Hz									
	31.5	63	125	250	500	1000	2000	4000	8000
dB	82	81	78	73	67	62	60	59	58

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9. The maximum noise from the 8 inch operating regulator valve must not exceed an A-weighted sound level of 77 dBA at 3 feet with maximum octave band sound pressure levels (SPL) as follows:

Regulator Valve Maximum SPL at 3 feet in dB									
Octave Band Center Frequency in Hz									
	31.5	63	125	250	500	1000	2000	4000	8000
dB	88	87	84	79	73	68	66	65	64

10. The wall and roof panels of the Regulation Building must have a minimum Sound Transmission Class (STC) of 29 and a minimum Noise Reduction Coefficient (NRC) of 0.90. In addition, these panels must have minimum Sound Transmission Loss (TL) values as follows:

Regulation Building Wall and Roof Panel Minimum TL in dB									
Octave Band Center Frequency in Hz									
	31.5	63	125	250	500	1000	2000	4000	8000
dB	2	8	13	18	23	31	38	40	40

11. The doors for the Regulation Building must be insulated, metal doors with full weather-stripping. Any windows in these doors must be double glazed using minimum 1/4 inch thick glass or acrylic panels separated by a minimum 1/2 inch airspace.
12. Ventilation air inlet acoustic louvers must be located in the walls of the Regulation Building to reduce the sound from the two operating regulator valves that escapes through these openings. Each acoustic louver must have minimum Sound Transmission Loss (TL) values as follows:

Ventilation Air Inlet Acoustic Louver Minimum TL in dB									
Octave Band Center Frequency in Hz									
	31.5	63	125	250	500	1000	2000	4000	8000
dB	2	4	5	3	7	13	14	13	12

13. The Regulation building can have a maximum of three 10 foot long 9 inch wide roof ridge vent.

2.7.3 PREDICTED PEMBROKE M&R STATION SOUND LEVELS

The octave band sound pressure levels and A-weighted sound levels predicted at the nearest NSA (S2) approximately 800 feet east of this M&R station are shown in Table 2.7.1. Sheet 1 of this table present the calculations that predict the sound levels from this M&R station at this NSA. Detailed line item descriptions are presented on Sheets 2 and 3 of this table. The attached noise control analysis indicates a predicted continuous L_{eq} sound level of 30 dBA at the nearest NSA with a

corresponding L_{dn} sound level of 36.4 dBA. At the NSAs approximately 1200 to 2200 feet from the M&R site, the L_{eq} sound levels are predicted to range from 20 to 26 dBA, with corresponding L_{dn} sound levels ranging from 26.4 to 32.4 dBA. The predicted L_{dn} sound levels from Smithfield M&R Station are below 55 dBA at all NSAs around the site.

Table 2.7.2 presents the sound levels at the NSAs around the Pembroke M&R Station. Shown are:

- the ambient L_d , L_n and L_{dn} sound levels,
- the predicted L_{dn} sound levels from the M&R station equipment,
- the predicted total L_{dn} sound levels resulting from summing the L_{dn} sound levels from the M&R station equipment with the ambient L_{dn} sound levels, and
- the predicted increases in the ambient L_{dn} sound levels due to the M&R station equipment.

At the nearest NSAs, the predicted total L_{dn} sound levels range from 44.7 to 61.5 dBA. These total L_{dn} sound levels are below 55 dBA at NSAs S1 through S3, and S7. At NSA S4 through S6 and S8, where the total L_{dn} sound levels are over 55 dBA, the predicted L_{dn} sound levels from the M&R station equipment are lower than the ambient L_{dn} sound levels.

3.0 SUMMARY

The predicted M&R Station L_{dn} sound levels at the NSAs are below the FERC limit of 55 dBA at Elizabeth River, Smithfield, and Pembroke M&R station sites with the planned noise mitigation measures. At Long Run, Brunswick, Greenville, and Fayetteville M&R station sites, there are no NSAs within one-half mile of the M&R station sites.

Sincerely yours,
ENVIRONMENTAL NOISE CONTROL



William E. Biker
Principal Engineer
Noise and Vibration Control

TABLE 2.4.1
ELIZABETH RIVER M&R STATION
COMPONENT NOISE ANALYSIS

Sheet 1 of 3

Sound Pressure Levels (SPL) in dB re 20 microPa
Sound Power Levels (PWL) in dB re 10⁻¹² watts

Description*	OCTAVE BAND CENTER FREQUENCIES IN Hz								
	31.5	63	125	250	500	1000	2000	4000	8000
1. SPL	70	72	74	75	75	74	73	72	70
2. + DT	8	8	8	8	8	8	8	8	8
3. = PWL	78	80	82	83	83	82	81	80	78
4. + NF	3	3	3	3	3	3	3	3	3
5. = PWL	81	83	85	86	86	85	84	83	81
6. - TL	2	8	12	14	18	23	24	24	23
7. = PWL	79	75	73	72	68	62	60	59	58
8. SPL	92	91	88	83	77	72	70	69	68
9. + AT	16	16	16	16	16	16	16	16	16
10. = PWL	108	107	104	99	93	88	86	85	84
11. SPL	91	90	87	82	76	71	69	68	67
12. + AT	16	16	16	16	16	16	16	16	16
13. = PWL	107	106	103	98	92	87	85	84	83
14. = PWL	111	110	107	102	96	91	89	88	87
15. - TL	2	8	12	15	19	24	25	24	24
16. = PWL	108	102	94	87	77	67	64	63	63
17. = PWL	108	102	94	87	77	68	65	65	64
18. - DT	62	62	62	63	63	66	69	77	87
19. SPL 21 dBA	47	40	32	24	14	3	-3	-12	-22
20. Ldn 27.4 dBA									

* Detailed Line Item Descriptions are listed on Sheets 2 and 3.

TABLE 2.4.1. (cont.)

Sheet 2 of 3

Detailed Line Item Descriptions
To Support Noise Analysis on Sheet 1

1. Specified maximum SPL at 3 feet from one (1) ultrasonic meter (Noise Control Measure/ Specification No. 1).
2. Distance Term (DT) to convert maximum ultrasonic meter SPL at 3 feet to PWL.
3. PWL of one (1) ultrasonic meter.
4. Number Factor for two (2) ultrasonic meters.
5. PWL of two (2) ultrasonic meters.
6. Composite sound transmission loss (TL) of the Meter Building using the specified STC 29 wall and roof panels, the specified doors, the specified ventilation air inlet acoustic louvers and the specified roof ridge vent (Noise Control Measures/Specifications Nos. 2, 3, 4, and 5).
7. PWL of the two (2) ultrasonic meters in the Meter Building; result of lines 1 through 6.
8. Specified maximum SPL at 3 feet from one (1) 8 inch operating regulator valve (Noise Control Measure/Specification No. 6).
9. Conversion of SPL in line 8 to represent the PWL of one (1) 8 inch operating regulator valve.
10. PWL of one (1) 8 inch operating regulator valve.
11. Specified maximum SPL at 3 feet from one (1) 10 inch operating regulator valve (Noise Control Measure/Specification No. 7).
12. Conversion of SPL in line 11 to represent the PWL of one (1) 10 inch operating regulator valve.
13. PWL of one (1) 10 inch operating regulator valve.
14. PWL of two (2) operating regulator valves; logarithmic sum of lines 10 and 13.

TABLE 2.4.1 (cont.)

Sheet 3 of 3

Detailed Line Item Descriptions
To Support Noise Analysis on Sheet 1

15. Composite sound transmission loss (TL) of the Regulation Building using the specified STC 29 wall and roof panels, the specified doors, the specified ventilation air inlet acoustic louvers and the specified roof vent (Noise Control Measures/Specifications Nos. 8, 9, 10, and 11).
16. PWL of the two (2) operating regulator valves in the Regulation Building; result of lines 8 through 15.
17. Total PWL of two (2) ultrasonic meters in the Meter Building and two (2) operating regulator valves in the Regulation Building; logarithmic sum of lines 7 and 16.
18. Distance Term (DT) to convert total PWL of the two (2) ultrasonic meters in the Meter Building and two (2) operating regulator valves in the Regulation Building to SPL at the nearest NSA (S1) 1450 feet northeast of this M&R station.
19. Energy equivalent sound level (L_{eq}) at the nearest NSA (S1) 14500 feet northeast of two (2) ultrasonic meters and two (2) operating regulator valves at the Elizabeth River M&R Station; result of lines 17 and 18.
20. Day-night sound level (L_{dn}) at the nearest NSA (S1) of two (2) ultrasonic meters and two (2) operating regulator valves at the Elizabeth River M&R Station.

TABLE 2.4.2
NOISE ANALYSIS FOR THE ELIZABETH RIVER M&R STATION

Sheet 1 of 1

Ambient Sound Levels, Predicted Sound Levels from the M&R Station Equipment,
Predicted Total Sound Levels, and Noise Increases

A-Weighted Sound Levels in dBA re 20 microPa

Location/ Description	Distance/ Direction	Existing ⁽¹⁾			Predicted M&R L _{dn} ⁽²⁾	Total L _{dn} ⁽³⁾	Noise Increase ⁽⁴⁾
		L _{eq} (d)	L _{eq} (n)	L _{dn}			
S1. Residence	1450 ft. NE	54.9	50.3	57.7	27.4	57.7	0.0
S2. Residence	1750 ft. NE	54.6	51.9	58.8	25.4	58.8	0.0
S3. Residence	1650 ft. ESE	58.1	53.1	60.7	25.4	60.7	0.0
S4. Residence	1650 ft. SE	47.9	52.0	58.0	25.4	58.0	0.0
S5. Residence	1750 ft. SE	44.7	48.9	54.9	25.4	54.9	0.0
S6. Residence	1800 ft. SSE	48.0	49.7	55.9	24.4	55.9	0.0
S7. Residence	2450 ft. S	46.4	48.2	54.4	21.1	54.4	0.0
S8. Residence	2500 ft. SSW	51.2	49.5	56.2	21.4	56.2	0.0
S9. Residence	2150 ft. SW	58.0	51.9	59.9	23.4	59.9	0.0

(1) Audible sources of daytime ambient sound were local traffic, traffic on Route 58, dogs barking, birds, airplanes, an ambulance at S1 and S5, a chain saw at S2, wind chimes at S4, a helicopter at S6, and backup alarms at S7, S8, and S9. During the nighttime, audible ambient sound sources were local traffic, traffic on Route 58, a dog barking at S2, wind chimes at S4, geese at S6, and backup alarms at S5 and S7 through S9.

(2) Predicted L_{dn} sound levels for M&R station equipment with the planned noise mitigation measures.

(3) Predicted total L_{dn} = 10 log (10^(Ambient L_{dn}/10) + 10^(Predicted L_{dn}/10)).

(4) Predicted increase of the ambient L_{dn} sound levels due to the M&R station equipment.

ENVIRONMENTAL NOISE CONTROL

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**TABLE 2.5.1
SMITHFIELD M&R STATION
COMPONENT NOISE ANALYSIS**

Sheet 1 of 3

Sound Pressure Levels (SPL) in dB re 20 microPa
Sound Power Levels (PWL) in dB re 10⁻¹² watts

Description*	OCTAVE BAND CENTER FREQUENCIES IN Hz								
	31.5	63	125	250	500	1000	2000	4000	8000
1. SPL	70	72	74	75	75	74	73	72	70
2. + DT	8	8	8	8	8	8	8	8	8
3. = PWL	78	80	82	83	83	82	81	80	78
4. + NF	3	3	3	3	3	3	3	3	3
5. = PWL	81	83	85	86	86	85	84	83	81
6. SPL	70	72	74	75	75	74	73	72	70
7. + DT	8	8	8	8	8	8	8	8	8
8. = PWL	78	80	82	83	83	82	81	80	78
9. SPL	70	72	74	75	75	74	73	72	70
10. + DT	8	8	8	8	8	8	8	8	8
11. = PWL	78	80	82	83	83	82	81	80	78
12. = PWL	84	86	88	89	89	88	87	86	84
13. - TL	2	8	12	14	18	23	24	24	23
14. = PWL	82	78	76	75	71	65	63	62	61
15. SPL	77	76	73	68	62	57	55	54	53
16. + AT	24	24	24	24	24	24	24	24	24
17. = PWL	101	100	97	92	86	81	79	78	77
18. SPL	82	81	78	73	67	62	60	59	58
19. + AT	25	25	25	25	25	25	25	25	25
20. = PWL	107	106	103	98	92	87	85	84	83
21. = PWL	108	107	104	99	93	88	86	85	84
22. - TL	2	8	12	15	19	24	25	24	24
23. = PWL	106	99	92	84	74	64	61	61	60
24. = PWL	106	99	92	85	76	68	65	64	63
25. - DT	60	61	61	61	61	64	66	73	82
26. = SPL 20 dBA	46	39	31	23	14	4	-1	-9	-19
27. Ldn 26.4 dBA									

* Detailed Line Item Descriptions are listed on Sheets 2 and 3.

TABLE 2.5.1. (cont.)

Sheet 2 of 3

Detailed Line Item Descriptions
To Support Noise Analysis on Sheet 1

1. Specified maximum SPL at 3 feet from one (1) 16 inch ultrasonic meter (Noise Control Measure/Specification No. 1).
2. Distance Term (DT) to convert maximum ultrasonic meter SPL at 3 feet to PWL.
3. PWL of one (1) 16 inch ultrasonic meter.
4. Number Factor for two (2) 16 inch ultrasonic meters.
5. PWL of two (2) 16 inch ultrasonic meters.
6. Specified Maximum SPL at 3 feet from one (1) 12 inch ultrasonic meter (Noise Control Measure/Specification No. 2).
7. Distance Term (DT) to convert maximum ultrasonic meter SPL at 3 feet to PWL.
8. PWL of one (1) 12 inch ultrasonic meter.
9. Specified maximum SPL at 3 feet from one (1) 6 inch ultrasonic meter (Noise Control Measure/Specification No. 3).
10. Distance Term (DT) to convert maximum ultrasonic meter SPL at 3 feet to PWL.
11. PWL of one (1) 6 inch ultrasonic meter.
12. PWL of four (4) ultrasonic meters; logarithmic sum of lines 5, 8, and 11.
13. Composite sound transmission loss (TL) of the Meter Building using the specified STC 29 wall and roof panels, the specified doors, the specified ventilation air inlet acoustic louvers and the specified roof vent (Noise Control Measures/Specifications Nos. 4, 5, 6, and 7).
14. PWL of the four (4) ultrasonic meters in the Meter Building; result of lines 1 through 13.
15. Specified maximum SPL at 3 feet from one (1) 16 inch operating regulator valve (Noise Control Measure/Specification No. 8).
16. Conversion of SPL in line 15 to represent the PWL of one (1) 16 inch operating regulator valve.

TABLE 2.5.1 (cont.)

Detailed Line Item Descriptions
To Support Noise Analysis on Sheet 1

17. PWL of one (1) 16 inch operating regulator valve.
18. Specified maximum SPL at 3 feet from one (1) 8 inch operating regulator valve (Noise Control Measure/Specification No. 9).
19. Conversion of SPL in line 18 to represent the PWL of one (1) 8 inch operating regulator valve.
20. PWL of one (1) 8 inch operating regulator valve.
21. PWL of two (2) operating regulator valves; logarithmic sum of lines 17 and 20.
22. Composite sound transmission loss (TL) of the Regulation Building using the specified STC 29 wall and roof panels, the specified doors, the specified ventilation air inlet acoustic louvers and the specified roof vent (Noise Control Measures/Specifications Nos. 10, 11, 12, and 13).
23. PWL of the two (2) operating regulator valves in the Regulation Building; result of lines 15 through 22.
24. Total PWL of four (4) ultrasonic meters in the Meter Building and two (2) operating regulator valves in the Regulation Building; logarithmic sum of lines 14 and 23.
25. Distance Term (DT) to convert total PWL of the four (4) ultrasonic meters in the Meter Building and two (2) operating regulator valves in the Regulation Building to SPL at the nearest NSA (S2) 1250 feet north-northwest of the M&R station.
26. Energy equivalent sound level (L_{eq}) at the nearest NSA (S2) 1250 feet north-northwest of the Smithfield M&R Station; result of lines 24 and 25.
27. Day-night sound level (L_{dn}) at the nearest NSA (S2) of four (4) ultrasonic meters and two (2) operating regulator valves at the Smithfield M&R Station.

TABLE 2.5.2
NOISE ANALYSIS FOR THE SMITHFIELD M&R STATION

Ambient Sound Levels, Predicted Sound Levels from the M&R Station Equipment,
Predicted Total Sound Levels, and Noise Increases

A-Weighted Sound Levels in dBA re 20 microPa

Location/ Description	Distance/ Direction	Existing ⁽¹⁾			Predicted M&R L _{dn} ⁽²⁾	Total L _{dn} ⁽³⁾	Noise Increase ⁽⁴⁾
		L _{eq} (d)	L _{eq} (n)	L _{dn}			
S1. Residence	2450 ft. NNW	59.0	54.9	62.2	19.4	62.2	0.0
S2. Residence	1250 ft. NNW	55.7	48.0	56.7	26.4	56.7	0.0
S3. Residence	1900 ft. S	50.5	44.8	52.6	22.4	52.6	0.0
S4. Residence	1700 ft. SW	49.4	43.7	51.5	23.4	51.5	0.0
S5. Residence	2600 ft. NW	61.7	56.5	64.1	18.4	64.1	0.0

(1) Audible sources of daytime ambient sound were traffic on Route 70, wind in the trees, birds, frogs at S2 through S4, and dogs barking at S3 and S4. During the nighttime, audible ambient sound sources were traffic on Route 70, frogs, an airplane at S1, and a cell tower buzzing at S4.

(2) Predicted L_{dn} sound levels for M&R station equipment with the planned noise mitigation measures.

(3) Predicted total L_{dn} = 10 log (10^(Ambient L_{dn}/10) + 10^(Predicted L_{dn}/10)).

(4) Predicted increase of the ambient L_{dn} sound levels due to the M&R station equipment.

ENVIRONMENTAL NOISE CONTROL

Report No. 563

**TABLE 2.7.1
PEMBROKE M&R STATION
COMPONENT NOISE ANALYSIS**

Sheet 1 of 3

Sound Pressure Levels (SPL) in dB re 20 microPa
Sound Power Levels (PWL) in dB re 10⁻¹² watts

Description*	OCTAVE BAND CENTER FREQUENCIES IN Hz								
	31.5	63	125	250	500	1000	2000	4000	8000
1. SPL	70	72	74	75	75	74	73	72	70
2. + DT	8	8	8	8	8	8	8	8	8
3. = PWL	78	80	82	83	83	82	81	80	78
4. + NF	3	3	3	3	3	3	3	3	3
5. = PWL	81	83	85	86	86	85	84	83	81
6. SPL	70	72	74	75	75	74	73	72	70
7. + DT	8	8	8	8	8	8	8	8	8
8. = PWL	78	80	82	83	83	82	81	80	78
9. SPL	70	72	74	75	75	74	73	72	70
10. + DT	8	8	8	8	8	8	8	8	8
11. = PWL	78	80	82	83	83	82	81	80	78
12. = PWL	84	86	88	89	89	88	87	86	84
13. - TL	2	8	12	14	18	23	24	24	23
14. = PWL	82	78	76	75	71	65	63	62	61
15. SPL	82	81	78	73	67	62	60	59	58
16. + AT	24	24	24	24	24	24	24	24	24
17. = PWL	106	105	102	97	91	86	84	83	82
18. SPL	88	87	84	79	73	68	66	65	64
19. + AT	25	25	25	25	25	25	25	25	25
20. = PWL	113	112	109	104	98	93	91	90	89
21. = PWL	114	113	110	105	99	94	92	91	90
22. - TL	2	8	12	15	19	24	25	24	24
23. = PWL	112	105	98	90	80	71	68	67	66
24. = PWL	112	105	98	90	81	72	69	68	67
25. - DT	56	56	57	57	57	58	60	65	70
26. = SPL 30 dBA	55	49	41	33	24	13	9	4	-3
27. Ldn 36.4 dBA									

* Detailed Line Item Descriptions are listed on Sheets 2 and 3.

TABLE 2.7.1. (cont.)

Sheet 2 of 3

Detailed Line Item Descriptions
To Support Noise Analysis on Sheet 1

1. Specified maximum SPL at 3 feet from one (1) 16 inch ultrasonic meter (Noise Control Measure/Specification No. 1).
2. Distance Term (DT) to convert maximum ultrasonic meter SPL at 3 feet to PWL.
3. PWL of one (1) 16 inch ultrasonic meter.
4. Number Factor for two (2) 16 inch ultrasonic meters.
5. PWL of two (2) 16 inch ultrasonic meters.
6. Specified Maximum SPL at 3 feet from one (1) 12 inch ultrasonic meter (Noise Control Measure/Specification No. 2).
7. Distance Term (DT) to convert maximum ultrasonic meter SPL at 3 feet to PWL.
8. PWL of one (1) 12 inch ultrasonic meter.
9. Specified maximum SPL at 3 feet from one (1) 6 inch ultrasonic meter (Noise Control Measure/Specification No. 3).
10. Distance Term (DT) to convert maximum ultrasonic meter SPL at 3 feet to PWL.
11. PWL of one (1) 6 inch ultrasonic meter.
12. PWL of four (4) ultrasonic meters; logarithmic sum of lines 5, 8, and 11.
13. Composite sound transmission loss (TL) of the Meter Building using the specified STC 29 wall and roof panels, the specified doors, the specified ventilation air inlet acoustic louvers and the specified roof vent (Noise Control Measures/Specifications Nos. 4, 5, 6, and 7).
14. PWL of the four (4) ultrasonic meters in the Meter Building; result of lines 1 through 13.
15. Specified maximum SPL at 3 feet from one (1) 16 inch operating regulator valve (Noise Control Measure/Specification No. 8).
16. Conversion of SPL in line 15 to represent the PWL of one (1) 16 inch operating regulator valve.

TABLE 2.7.1 (cont.)

Sheet 3 of 3

Detailed Line Item Descriptions
To Support Noise Analysis on Sheet 1

17. PWL of one (1) 16 inch operating regulator valve.
18. Specified maximum SPL at 3 feet from one (1) 8 inch operating regulator valve (Noise Control Measure/Specification No. 9).
19. Conversion of SPL in line 18 to represent the PWL of one (1) 8 inch operating regulator valve.
20. PWL of one (1) 8 inch operating regulator valve.
21. PWL of two (2) operating regulator valves; logarithmic sum of lines 17 and 20.
22. Composite sound transmission loss (TL) of the Regulation Building using the specified STC 29 wall and roof panels, the specified doors, the specified ventilation air inlet acoustic louvers and the specified roof vent (Noise Control Measures/Specifications Nos. 10, 11, 12, and 13).
23. PWL of the two (2) operating regulator valves in the Regulation Building; result of lines 15 through 22.
24. Total PWL of four (4) ultrasonic meters in the Meter Building and two (2) operating regulator valves in the Regulation Building; logarithmic sum of lines 14 and 23.
25. Distance Term (DT) to convert total PWL of the four (4) ultrasonic meters in the Meter Building and two (2) operating regulator valves in the Regulation Building to SPL at the nearest NSA (S2) 800 feet east of the M&R station.
26. Energy equivalent sound level (L_{eq}) at the nearest NSA (S2) 800 feet east of the Pembroke M&R Station; result of lines 24 and 25.
27. Day-night sound level (L_{dn}) at the nearest NSA (S2) of four (4) ultrasonic meters and two (2) operating regulator valves at the Pembroke M&R Station.

**TABLE 2.7.2
NOISE ANALYSIS FOR THE PEMBROKE M&R STATION**

Sheet 1 of 1

Ambient Sound Levels, Predicted Sound Levels from the M&R Station Equipment,
Predicted Total Sound Levels, and Noise Increases

A-Weighted Sound Levels in dBA re 20 microPa

Location/ Description	Distance/ Direction	Existing ⁽¹⁾			Predicted M&R L _{dn} ⁽²⁾	Total L _{dn} ⁽³⁾	Noise Increase ⁽⁴⁾
		L _{eq} (d)	L _{eq} (n)	L _{dn}			
S1. Residence	1200 ft. NE	44.1	46.9	53.0	32.4	53.0	0.0
S2. Residence	800 ft. E	44.0	43.1	49.7	36.4	49.9	0.2
S3. Residence	1600 ft. SE	41.3	43.4	49.6	29.4	49.6	0.0
S4. Residence	1200 ft. SSE	61.3	43.6	59.7	32.4	59.7	0.0
S5. Residence	1250 ft. SSW	59.3	53.7	61.5	32.4	61.5	0.0
S6. Residence	2200 ft. W	55.0	50.0	57.6	26.4	57.6	0.0
S7. Residence	2150 ft. NW	44.3	35.1	44.6	26.4	44.7	0.1
S8. Church	1600 ft. NNE	58.3	53.2	60.8	29.4	60.8	0.0

⁽¹⁾ Audible sources of daytime ambient sound were local traffic, birds, airplanes, a rooster at S1, the Piedmont Compressor Station at S2 through S5, and the Piedmont M&R piping at S4. During the nighttime, audible ambient sound sources were local traffic, the Piedmont Compressor Station, airplanes, dogs barking at S3 through S5, S7, and S8, a train at S6, and crickets at S6 and S7.

⁽²⁾ Predicted L_{dn} sound levels for M&R equipment with the planned noise mitigation measures.

⁽³⁾ Predicted total L_{dn} = 10 log (10^(Ambient L_{dn}/10) + 10^(Predicted L_{dn}/10)).

⁽⁴⁾ Predicted increase of the ambient L_{dn} sound levels due to the M&R station equipment.

Long Run M&R
Figure 1: Noise Sensitive Area Identification
Atlantic Coast Pipeline Project

Legend

- Long Run
- Half Mile Radius



Brunswick M&R
Figure 2: Noise Sensitive Area Identification
Atlantic Coast Pipeline Project

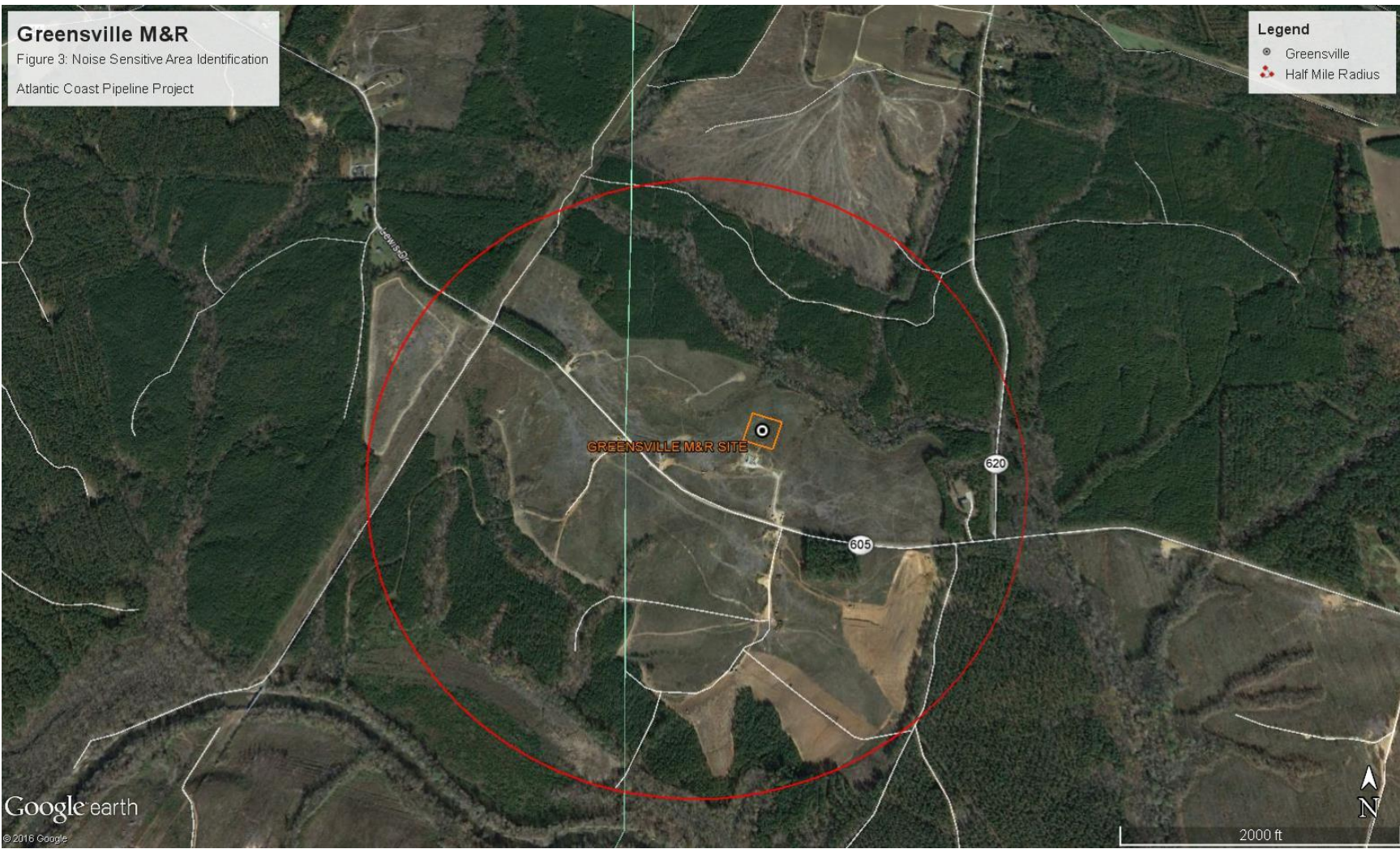
Legend

- Brunswick
- ⊕ Half Mile Radius



Greenville M&R
Figure 3: Noise Sensitive Area Identification
Atlantic Coast Pipeline Project

Legend
○ Greenville
⊕ Half Mile Radius



Google earth
© 2016 Google

2000 ft

Elizabeth River M&R
Figure 4: Noise Sensitive Area Identification
Atlantic Coast Pipeline Project

Legend

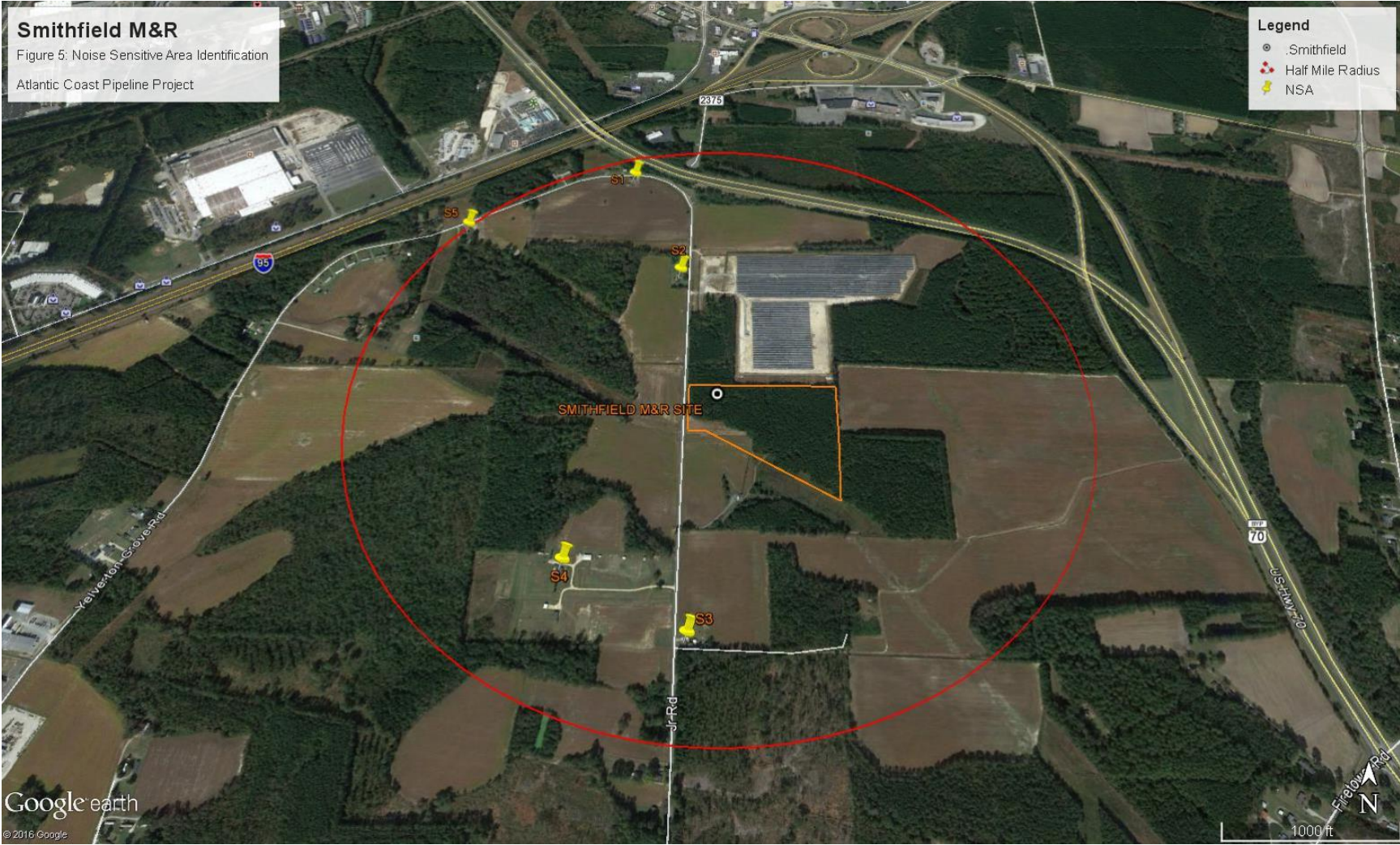
- Elizabeth River
- ⊕ Half Mile Radius
- 📍 NSA



Smithfield M&R
Figure 5: Noise Sensitive Area Identification
Atlantic Coast Pipeline Project

Legend

- Smithfield
- ⊕ Half Mile Radius
- 📍 NSA



Fayetteville M&R
Figure 6: Noise Sensitive Area Identification
Atlantic Coast Pipeline Project

Legend

- Fayetteville
- Half Mile Radius



