

# **Dominion Energy Coastal Virginia Offshore Wind Commercial Project**

## **Request for Rulemaking and Letter of Authorization (LOA) for Taking of Marine Mammals Incidental to Construction Activities on the Outer Continental Shelf (OCS) within Lease OCS-A 0483 and the Associated Offshore Export Cable Route Corridor: Roberts and Halpin (2022) Revision Addendum**

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Virginia Electric and Power Company doing business as Dominion Energy Virginia (Dominion Energy, the Applicant), prepared the following updates to the calculated and requested marine mammal takes for the Coastal Virginia Offshore Wind (CVOW) Commercial Project (the Project) based on the updated Roberts and Halpin (2022) data, including the version 12 (2010-2019) North Atlantic right whale (NARW) data subset and the version 11 (2009-2019) humpback whale data subset. Densities were originally based on the dataset published in 2021, which was updated in June of 2022 to incorporate new survey data and model improvements. Roberts and Halpin (2022) constitutes the currently best available marine mammal data for the Project. Note that table numbers in this addendum align with the corresponding tables in the Adequate and Complete (A&C) Letter of Authorization (LOA) application, and therefore, are not sequential. The Project schedule has been provided for reference (Table 1).

Table 1. Construction Schedule for Activities Permitted Under LOA

Activity	2024				2025				2026				2027				2028				2029a/
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Monopile Installation (piling between May 1 and October 31) b/		X	X	X		X	X	X		X	X	X									
Offshore Substation Installation (piling between May 1 and October 31)			X	X	X	X	X														
Trenchless Installation (cofferdam and goal post piling between May 1 and October 31, 2024)	X	X	X	X																	
HRG Survey Activities (Surveys to begin March 2024 upon LOA issuance and continue through construction) c/	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Note:  
a/ 2029 is included due to LOA extending into 2029, but no activities are planned for 2029.  
b/ Dominion Energy anticipates that all Wind Turbine Generator Monopile and Offshore Substation Jacket Foundations will be installed by October 31, 2025. However, as a contingency to account for the potential for delays due to weather, and/or other unanticipated events, Dominion Energy has proposed installation of up to 15 foundations in 2026. If required to accommodate delays in the installation schedule, the 15 installations would occur between May 1 and September 30, 2026.  
c/ Activities planned prior to March 2024 that could result in harassment of marine mammals include the UXO identification HRG surveys covered in the authorized UXO Survey IHA (Authorized 27 May 2022 to 26 May 2023) and HRG surveys planned for December 2023 - March 2024 that would be covered under a separate IHA, which would terminate with the start of the LOA authorization. HRG Surveys preceding the start date of the LOA in March 2024 are not included. As per the NOAA August 2021 webinar, the developer may need to cover pre-construction surveys under a separate IHA. Such permits have been authorized for Vineyard Wind and Ocean Wind.

# 1 FOUNDATION INSTALLATION ACTIVITIES

## 1.1 Updates to Methodology

- Foundation installation activity resulting in potential marine mammal take is associated with unique animal density estimates defined by the anticipated extent of that activity’s “footprint,” which includes the activity location plus a perimeter that corresponds to maximum extent of the Level B isopleth, derived from marine mammal density data via an updated 5 x 5 km raster dataset from Roberts and Halpin (2022).
- Consistent with guidance received by NOAA Fisheries, the buffer size around the Lease Area was adjusted to 8.9 km to reflect the largest Level B 10 dB attenuated distance and, therefore, account for potential exposures resulting from activities occurring on the perimeter of the Lease Area.
- The 2022 updates to the NARW and humpback whale density models resulted in datasets with three different time spans for each species. We have selected the most recent of these for this analysis: 2009 – 2019 for humpback whales (version 11), and 2010 – 2019 for NARWs (version 12).
- Group size adjustments were included for the following species with references listed parenthetically:
  - **North Atlantic right whale:** Level B take for foundation installation adjusted for group size of 1 individual for months with monthly density < 0.01 per 100 km<sup>2</sup> (Roberts and Halpin 2022) when construction may occur (May – October) and 2 individuals for months with monthly density > 0.01 when construction may occur (May – October)
  - **Fin whale:** Adjusted based on protected species observer (PSO) data (max daily density x days of activity)
  - **Humpback whale:** Adjusted based on PSO data (max daily density x days of activity)
  - **Sperm whale:** Adjusted based on 1 group size / year (3 per Barkaszi et al. 2019)
  - **Atlantic white-sided dolphin:** Adjusted based on 1 group size / year (15 per Reeves et al. 2002)
  - **Pantropical spotted dolphin:** Adjusted based on 1 group size / year (20 per Reeves et al. 2002)
  - **Short-beaked common dolphin:** Adjusted based on 1 group size / day (20 per Dominion Energy 2021)

All other methods outlined within the original LOA, deemed adequate and complete on August 15, 2022, remain unchanged.

## 1.2 Basis for Estimating Number of Marine Mammals That Might be Taken by Harassment from Foundation Installation Activities

### 1.2.1 Marine Mammal Density Estimates

The Roberts and Halpin (2022) marine mammal density estimates for the U.S. Atlantic represent the best available marine mammal data for the Project Area. These density data are delineated by 5 km x 5 km grid cells in U.S. Atlantic waters (see Attachment A) and by species or species groups (if insufficient data were

available to estimate an individual species density) and month, unless sufficient data were only available to estimate an annual density. Note that while grid cells are 25 km<sup>2</sup>, density values are still reported per 100 km<sup>2</sup>. A discrete density is designated for each grid cell within the datasets. The methodology employed to derive these data is described in Roberts et al. (2016).

Density estimates were extracted to represent the density within a buffered area, defined as the Lease Area buffered by the range to the 120 decibel (dB) sound pressure level (SPL) behavioral threshold from vibratory pile driving mitigated by 10 dB. The buffer range of 8.9 kilometers (km) was chosen because it represents the furthest extent where potential impacts to marine mammals could be expected when the sound fields are attenuated by 10 dB. This range of 8.9 km was determined based on the sound fields generated during the acoustic modeling of vibratory pile driving mitigated by 10 dB and the boundaries of the buffered Lease Area to extract densities within. The density estimates extracted within the buffered Lease Area were used to calculate the mitigated takes.

The Roberts and Halpin (2022) grid cells within the buffered Lease Area were averaged for each month to provide a mean monthly density for each marine mammal species/species group. However, seasonal densities were only calculated for three seasonal periods when foundation installation for the Project is expected to occur. May is the only spring month when foundation construction is planned to occur, so the spring density estimates are the mean May densities for each species (Table 24). The summer density estimates are the average of the June, July, and August mean densities for each species/species group, since construction is expected to occur in all three months. Fall densities represent the average of the September and October mean densities for each species/species group. No winter density values are included because no foundation construction is planned to occur in winter months. Foundation installation is only expected to occur from May through October. When monthly density information was not available for a particular species (e.g., pantropical spotted dolphin and pilot whales), the annual density value within the Project modeling area was used.

Two bottlenose dolphin stocks (Southern Migratory Coastal and Offshore) are present within the Project Area, but density estimates are only available in the Roberts and Halpin (2022) density data for the bottlenose species in its entirety. Hayes et al. (2021) defines the boundary between the Western North Atlantic, Southern Migratory Coastal stock and the Western North Atlantic, offshore stock of bottlenose dolphins as the 20-meter (m) isobath north of Cape Hatteras, NC. Thus, the 20-m isobath was used to define and differentiate the stock boundaries within the Roberts and Halpin (2022) data and derive density estimates for each stock of the bottlenose dolphin. All bottlenose dolphin density grid cells less than 20 m in the Project modeling area or buffered Lease Area were used to calculate the density of the Southern Migratory Coastal stock, while all density grid cells greater than 20 m in the modeling and buffered Lease Area were used to calculate the density of the offshore stock of bottlenose dolphins (Table 24).

Table 24. Updated Mean Seasonal Density Estimates for the Potentially Occurring Marine Mammal Species in the Project Buffered (8.9 km) Lease Area (Model Extent Referenced in Attachment A of the main Letter of Authorization document). Endangered Species Act (ESA)-listed Marine Mammal Species Highlighted

Marine Mammal Species or Model Group	Mean Density (animals/km <sup>2</sup> )		
	Spring (May)	Summer (June to August)	Fall (September to October)
Atlantic spotted dolphin	0.00507	0.05873	0.03822
Bottlenose dolphin a/ Western North Atlantic, Southern Coastal Migratory	0.13098	0.13509	0.13852
Bottlenose dolphin a/ Western North Atlantic, Offshore	0.07352	0.07415	0.06439
Common dolphin (short-beaked)	0.05355	0.00559	0.00103
Common minke whale	0.00519	0.00028	0.00011
Fin whale	0.00069	0.00036	0.00019
Harbor porpoise	0.00315	0.00000	0.00000
Humpback whale	0.00136	0.00023	0.00040
North Atlantic right whale	0.00015	0.00004	0.00005
Pantropical spotted dolphin b/	0.00008	0.00008	0.00008
Pilot whale <i>spp.</i> (long- and short-finned pilot whales) c/	0.00098	0.00098	0.00098
Risso's dolphin	0.00084	0.00042	0.00021
Seals d/	0.01828	0.00001	0.00047
Sei whale	0.00021	0.00001	0.00004
Sperm whale	0.00003	0.00000	0.00000

Notes

a/ Bottlenose dolphin density values from Duke University (Roberts and Halpin 2022) reported as “bottlenose” and not identified to stock. Given the foundation installation sound would be confined to beyond the 20 m isobath, where the offshore stock is anticipated to predominate, estimated Level B take for cofferdam installation was accrued to the offshore stock.

b/ Pantropical spotted dolphins are expected to be rare in the Project Area but are included in the analysis since their range extends to 40°N latitude (Jefferson et al. 2015).

c/ Pilot whale density values from Duke University (Roberts and Halpin 2022) reported as "*Globicephala spp.*" and not species-specific. As described in Section 4.1.4 of the main Letter of Authorization document, both the short-finned and long-finned pilot whale occur in the Mid-Atlantic, though the short-finned pilot whale tends to occur in more southern waters.

d/ Pinniped density values attributed 50% to harbor seals and 50% to gray seals.

One of the undifferentiated species groups in the Project Area is the “seal” group, which includes the harbor and gray seals. The summer density for the seal group is 0.00001 animals/square kilometer (km<sup>2</sup>) (see Attachment A), which is not the density derived from Roberts and Halpin (2022). Higher density estimates, 0.0003 animals/km<sup>2</sup> (within buffered Lease Area) and 0.0022 animals/km<sup>2</sup> (within Project modeling area), were derived from Roberts and Halpin (2022) for the summer season for this species group. However, the Roberts and Halpin (2022) derived density estimates were considered unrealistic given that neither seal species are expected to occur in the waters of the modeling or buffered Lease Area during summer (Hayes et al. 2021). For harbor seals, Hayes et al. (2021) estimates the occurrence of harbor seals in mid-Atlantic waters to range only from September through May, not during summer. The summer distribution of both



species is well documented in more northern waters. To reconcile the known distribution of these species with the need for a density estimate, the conservative density estimate of 0.00001 animals/km<sup>2</sup> was used to represent the summer density of both seal species within the Project modeling area and buffered Lease Area. The final calculated Level B estimated takes were accrued 50 percent to harbor seals and 50 percent to gray seals.

### **1.2.2 Exposure Estimates**

Using the revised densities, estimates of potential take by Level A and B Harassment were updated (Table 25a through Table 27b). The exposure histories of each marine mammal species or species group resulting from the animat modeling are subsampled to reflect the duty cycle of each construction activity to create multiple estimates of sound exposure for each source and marine mammal combination (e.g., the monopile is projected to be driven for about 3 hours, so eight different 3-hour exposure histories were extracted). Since AIM records the exposure history for each individual animat, the potential impact is determined on an individual animal basis. The modeled sound exposure level (SEL) received by each individual animat over the duration of the construction activity and the peak sound pressure level were used to calculate the potential for that animat to have experienced permanent threshold shift (PTS) using the NOAA Fisheries (2018) physiological acoustic thresholds for marine mammals. If an animat was not predicted to experience PTS, then the sound energy received by each individual animat over the 24-hour modeled period was used to assess the potential risk of biologically significant behavioral reactions. The modeled root mean square (RMS) sound pressure levels were used to estimate the potential for marine mammal behavioral responses based on the NOAA Fisheries (2005) behavioral criteria. These modeled exposure estimates were then normalized by the ratio of real-world density estimates to the modeled animat density for each modeled marine mammal species to obtain final exposure estimates. This results in the predicted number of exposures or takes for each marine mammal species or species group for each type of noise-producing construction activity, such as pile driving (Table 25a through Table 27b). Note that due to implementation of mitigation as described in Section 11 (shutdown at any distance, etc.), no Level A take of North Atlantic right whales is anticipated.

Table 25a. Updated Estimates of Potential Takes (Roberts and Halpin 2022) by Level A and B Harassment Resulting from Vibratory and Impact Pile Driving (2024) Assuming 10 dB Sound Attenuation

Species	Stock	Estimated Take	
		Level A	Level B
Atlantic spotted dolphin	Western North Atlantic	0	2,108
Bottlenose dolphin a/	Southern Migratory Coastal	0	0
	Western North Atlantic Offshore	0	4,290
Common dolphin (short-beaked)	Western North Atlantic	0	594
Atlantic white-sided dolphin e/	Western North Atlantic	NA	NA
Common minke whale	Canadian East Coast	8	53
Fin whale	Western North Atlantic	4	21
Harbor porpoise	Gulf of Maine/Bay of Fundy	1	23
Humpback whale	Gulf of Maine	4	18
North Atlantic right whale f/	Western Atlantic	1	3
Pantropical spotted dolphin b/	Western North Atlantic	0	4
Pilot whale <i>spp.</i> (long- and short-finned pilot whales) c/	Western North Atlantic	0	61
Risso's dolphin	Western North Atlantic	0	25
Gray seal d/	Western North Atlantic	1	62
Harbor seal d/	Western North Atlantic	1	62
Sei whale	Nova Scotia	1	3
Sperm whale	North Atlantic	0	1

Notes:

a/ Bottlenose dolphin density values from Duke University (Roberts and Halpin 2022) reported as “bottlenose” and not identified to stock. Given the foundation installation sound would be confined to beyond the 20 m isobath, where the offshore stock is anticipated to predominate, estimated Level B take for foundation installation was accrued to the offshore stock.

b/ Pantropical spotted dolphins are expected to be rare in the Project Area but are included in the analysis since their range extends to 40°N latitude (Jefferson et al. 2015).

c/ Pilot whale density values from Duke University (Roberts and Halpin 2022) reported as “*Globicephala spp*” and not species-specific. As described in Section 4.1.4, both the short-finned and long-finned pilot whale occur in the Mid-Atlantic, though the short-finned pilot whale tends to occur in more southern waters.

d/ Pinniped estimated take attributed 50% to harbor seals and 50% to gray seals.

e/ Atlantic white-sided dolphins are not expected in the Project Area, but consideration of take has been included as a precautionary measure based on recommendation from NOAA Fisheries to account for potential future shift in habitat use by the species. This species was incorporated after the animat analysis was completed; therefore, take was not estimated for this species and is reported as NA, “Not Applicable”.

f/ Mitigation measures described in Section 11 of the Request for Rulemaking and Letter of Authorization will be implemented to ensure there is no Level A take of North Atlantic right whales; therefore, no Level A take is requested for this species as presented below in Table 25b.

Table 25b. Requested Takes by Level A and B Harassment Resulting from Vibratory and Impact Pile Driving (2024) Assuming 10 dB Sound Attenuation Incorporating Group Size Adjustments

Species	Stock	Requested Take	
		Level A	Level B
Atlantic spotted dolphin	Western North Atlantic	0	2,108
Bottlenose dolphin a/	Southern Migratory Coastal	0	0
	Western North Atlantic Offshore	0	4,290
Common dolphin (short-beaked) i/	Western North Atlantic	0	1,720
Atlantic white-sided dolphin f/	Western North Atlantic	0	15
Common minke whale	Canadian East Coast	8	53
Fin whale g/	Western North Atlantic	4	112
Harbor Porpoise	Gulf of Maine/Bay of Fundy	1	23
Humpback whale g/	Gulf of Maine	4	129
North Atlantic right whale e/	Western Atlantic	0	6
Pantropical spotted dolphin b/	Western North Atlantic	0	20
Pilot whale <i>spp.</i> (long- and short-finned pilot whales) c/	Western North Atlantic	0	61
Risso's dolphin	Western North Atlantic	0	25
Gray seal d/	Western North Atlantic	1	62
Harbor seal d/	Western North Atlantic	1	62
Sei whale	Nova Scotia	1	3
Sperm whale h/	North Atlantic	0	3

Notes:

a/ Bottlenose dolphin density values from Duke University (Roberts and Halpin 2022) reported as "bottlenose" and not identified to stock. Given the foundation installation sound would be confined to beyond the 20 m isobath, where the offshore stock is anticipated to predominate, estimated Level B take for foundation installation was accrued to the offshore stock.

b/ Pantropical spotted dolphins are expected to be rare in the Project Area but are included in the analysis since their range extends to 40°N latitude (Jefferson et al. 2015). Takes are included to factor for this scenario and are adjusted based on 1 group size / year (20 per Reeves et al. 2002).

c/ Pilot whale density values from Duke University (Roberts and Halpin 2022) reported as "*Globicephala spp*" and not species-specific. As described in Section 4.1.4, both the short-finned and long-finned pilot whale occur in the Mid-Atlantic, though the short-finned pilot whale tends to occur in more southern waters.

d/ Pinniped requested take attributed 50% to harbor seals and 50% to gray seals.

e/ Mitigation measures described in Section 11 of the Request for Rulemaking and Letter of Authorization will be implemented to ensure there is no Level A take of North Atlantic right whales; therefore, no Level A take is requested for this species. Level B take for foundation installation adjusted for group size of 1 individual for months with monthly density < 0.01 when construction may occur (May – October) and 2 individuals for months with monthly density > 0.01 when construction may occur (May – October).

f/ Atlantic white-sided dolphins are not expected in the Project Area, but take has been included as a precautionary measure based on recommendation from NOAA Fisheries to account for potential future shift in habitat use by the species. Adjusted based on 1 group size / year (15 per Reeves et al. 2002).

g/ Adjusted based on PSO data (max daily density x days of activity).

h/ Adjusted based on 1 group size / year (3 per Barkaszi et al. 2019).

i/ Adjusted based on 1 group size / day (20 per Dominion Energy 2021).

Table 26a. Updated Estimates of Potential Takes (Roberts and Halpin 2022) by Level A and B Harassment Resulting from Vibratory and Impact Pile Driving (2025) Assuming 10 dB Sound Attenuation

Species	Stock	Estimated Take	
		Level A	Level B
Atlantic spotted dolphin	Western North Atlantic	0	2,042
Bottlenose dolphin a/	Southern Migratory Coastal	0	0
	Western North Atlantic Offshore	0	3,888
Common dolphin (short-beaked)	Western North Atlantic	0	595
Atlantic white-sided dolphin e/	Western North Atlantic	NA	NA
Common minke whale	Canadian East Coast	8	51
Fin whale	Western North Atlantic	4	20
Harbor Porpoise	Gulf of Maine/Bay of Fundy	1	22
Humpback whale	Gulf of Maine	4	15
North Atlantic right whale f/	Western Atlantic	1	2
Pantropical spotted dolphin b/	Western North Atlantic	0	4
Pilot whale <i>spp.</i> (long- and short-finned pilot whales) c/	Western North Atlantic	0	54
Risso's dolphin	Western North Atlantic	0	25
Gray seal d/	Western North Atlantic	1	56
Harbor seal d/	Western North Atlantic	1	56
Sei whale	Nova Scotia	1	3
Sperm whale	North Atlantic	0	1

## Notes:

a/ Bottlenose dolphin density values from Duke University (Roberts and Halpin 2022) reported as "bottlenose" and not identified to stock. Given the foundation installation sound would be confined to beyond the 20 m isobath, where the offshore stock is anticipated to predominate, estimated Level B take for foundation installation was accrued to the offshore stock.

b/ Pantropical spotted dolphins are expected to be rare in the Project Area but are included in the analysis since their range extends to 40°N latitude (Jefferson et al. 2015).

c/ Pilot whale density values from Duke University (Roberts and Halpin 2022) reported as "*Globicephala spp*" and not species-specific. As described in Section 4.1.4, both the short-finned and long-finned pilot whale occur in the Mid-Atlantic, though the short-finned pilot whale tends to occur in more southern waters.

d/ Pinniped estimated take attributed 50% to harbor seals and 50% to gray seals.

e/ Atlantic white-sided dolphins are not expected in the Project Area, but consideration of take has been included as a precautionary measure based on recommendation from NOAA Fisheries to account for potential future shift in habitat use by the species. This species was incorporated after the animat analysis was completed; therefore, take was not estimated for this species and is reported as NA, "Not Applicable".

f/ Mitigation measures described in Section 11 of the Request for Rulemaking and Letter of Authorization will be implemented to ensure there is no Level A take of North Atlantic right whales; therefore, no Level A take is requested for this species as presented below in Table 26b.

Table 26b. Requested Takes by Level A and B Harassment Resulting from Vibratory and Impact Pile Driving (2025) Assuming 10 dB Sound Attenuation Incorporating Group Size Adjustments

Species	Stock	Requested Take	
		Level A	Level B
Atlantic spotted dolphin	Western North Atlantic	0	2,042
Bottlenose dolphin a/	Southern Migratory Coastal	0	0
	Western North Atlantic Offshore	0	3,888
Common dolphin (short-beaked) i/	Western North Atlantic	0	1,660
Atlantic white-sided dolphin f/	Western North Atlantic	0	15
Common minke whale	Canadian East Coast	8	51
Fin whale g/	Western North Atlantic	4	108
Harbor Porpoise	Gulf of Maine/Bay of Fundy	1	22
Humpback whale g/	Gulf of Maine	4	125
North Atlantic right whale e/	Western Atlantic	0	6
Pantropical spotted dolphin b/	Western North Atlantic	0	20
Pilot whale <i>spp.</i> (long- and short-finned pilot whales) c/	Western North Atlantic	0	54
Risso's dolphin	Western North Atlantic	0	25
Gray seal d/	Western North Atlantic	1	56
Harbor seal d/	Western North Atlantic	1	56
Sei whale	Nova Scotia	1	3
Sperm whale h/	North Atlantic	0	3

Notes:

a/ Bottlenose dolphin density values from Duke University (Roberts and Halpin 2022) reported as "bottlenose" and not identified to stock. Given the foundation installation sound would be confined to beyond the 20 m isobath, where the offshore stock is anticipated to predominate, estimated Level B take for foundation installation was accrued to the offshore stock.

b/ Pantropical spotted dolphins are expected to be rare in the Project Area but are included in the analysis since their range extends to 40°N latitude (Jefferson et al. 2015). Takes are included to factor for this scenario and are adjusted based on 1 group size / year for all activities (20 per Reeves et al. 2002).

c/ Pilot whale density values from Duke University (Roberts and Halpin 2022) reported as "*Globicephala spp*" and not species-specific. As described in Section 4.1.4, both the short-finned and long-finned pilot whale occur in the Mid-Atlantic, though the short-finned pilot whale tends to occur in more southern waters.

d/ Pinniped requested take attributed 50% to harbor seals and 50% to gray seals.

e/ Mitigation measures described in Section 11 of the Request for Rulemaking and Letter of Authorization will be implemented to ensure there is no Level A take of North Atlantic right whales; therefore, no Level A take is requested for this species. Level B take for foundation installation adjusted for group size of 1 individual for months with monthly density < 0.01 when construction may occur (May – October) and 2 individuals for months with monthly density > 0.01 when construction may occur (May – October).

f/ Atlantic white-sided dolphins are not expected in the Project Area, but consideration of take has been included as a precautionary measure based on recommendation from NOAA Fisheries to account for potential future shift in habitat use by the species. Adjusted based on 1 group size / year (15 per Reeves et al. 2002).

g/ Adjusted based on PSO data (max daily density x days of activity).

h/ Adjusted based on 1 group size / year (3 per Barkaszi et al. 2019).

i/ Adjusted based on 1 group size / day (20 per Dominion Energy 2021).

Table 27a. Updated Estimates of Potential Takes (Roberts and Halpin 2022) by Level A and B Harassment Resulting from Vibratory and Impact Pile Driving (2026) Assuming 10 dB Sound Attenuation

Species	Stock	Estimated Take	
		Level A	Level B
Atlantic spotted dolphin	Western North Atlantic	0	323
Bottlenose dolphin a/	Southern Migratory Coastal	0	0
	Western North Atlantic Offshore	0	631
Common dolphin (short-beaked)	Western North Atlantic	0	104
Atlantic white-sided dolphin f/	Western North Atlantic	NA	NA
Common minke whale	Canadian East Coast	2	9
Fin whale	Western North Atlantic	1	4
Harbor porpoise	Gulf of Maine/Bay of Fundy	1	4
Humpback whale	Gulf of Maine	1	3
North Atlantic right whale e/	Western Atlantic	1	1
Pantropical spotted dolphin b/	Western North Atlantic	0	1
Pilot whale <i>spp.</i> (long- and short-finned pilot whales) c/	Western North Atlantic	0	9
Risso's dolphin	Western North Atlantic	0	4
Gray seal d/	Western North Atlantic	1	10
Harbor seal d/	Western North Atlantic	1	10
Sei whale	Nova Scotia	1	1
Sperm whale	North Atlantic	0	1

## Notes:

a/ Bottlenose dolphin density values from Duke University (Roberts and Halpin 2022) reported as "bottlenose" and not identified to stock. Given the foundation installation sound would be confined to beyond the 20 m isobath, where the offshore stock is anticipated to predominate, estimated Level B take for foundation installation was accrued to the offshore stock.

b/ Pantropical spotted dolphins are expected to be rare in the Project Area but are included in the analysis since their range extends to 40°N latitude (Jefferson et al. 2015).

c/ Pilot whale density values from Duke University (Roberts and Halpin 2022) reported as "*Globicephala spp*" and not species-specific. As described in Section 4.1.4, both the short-finned and long-finned pilot whale occur in the Mid-Atlantic, though the short-finned pilot whale tends to occur in more southern waters.

d/ Pinniped estimated take attributed 50% to harbor seals and 50% to gray seals.

e/ Mitigation measures described in Section 11 of the Request for Rulemaking and Letter of Authorization will be implemented to ensure there is no Level A take of North Atlantic right whales; therefore, no Level A take is requested for this species as presented below in Table 27b.

f/ Atlantic white-sided dolphins are not expected in the Project Area, but consideration of take has been included as a precautionary measure based on recommendation from NOAA Fisheries to account for potential future shift in habitat use by the species. This species was incorporated after the animat analysis was completed; therefore, take was not estimated for this species and is reported as NA, "Not Applicable".

Table 27b. Requested Takes by Level A and B Harassment Resulting from Vibratory and Impact Pile Driving (2026) Assuming 10 dB Sound Attenuation Incorporating Group Size Adjustments

Species	Stock	Requested Take	
		Level A	Level B
Atlantic spotted dolphin	Western North Atlantic	0	323
Bottlenose dolphin a/	Southern Migratory Coastal	0	0
	Western North Atlantic Offshore	0	631
Common dolphin (short-beaked) i/	Western North Atlantic	0	300
Atlantic white-sided dolphin f/	Western North Atlantic	0	15
Common minke whale	Canadian East Coast	2	16
Fin whale g/	Western North Atlantic	1	20
Harbor Porpoise	Gulf of Maine/Bay of Fundy	1	4
Humpback whale g/	Gulf of Maine	1	23
North Atlantic right whale e/	Western Atlantic	0	6
Pantropical spotted dolphin b/	Western North Atlantic	0	20
Pilot whale <i>spp.</i> (long- and short-finned pilot whales) c/	Western North Atlantic	0	20
Risso's dolphin j/	Western North Atlantic	0	25
Gray seal d/	Western North Atlantic	1	10
Harbor seal d/	Western North Atlantic	1	10
Sei whale	Nova Scotia	1	1
Sperm whale h/	North Atlantic	0	3

## Notes:

a/ Bottlenose dolphin density values from Duke University (Roberts and Halpin 2022) reported as "bottlenose" and not identified to stock. Given the foundation installation sound would be confined to beyond the 20 m isobath, where the offshore stock is anticipated to predominate, estimated Level B take for foundation installation was accrued to the offshore stock.

b/ Pantropical spotted dolphins are expected to be rare in the Project Area but are included in the analysis since their range extends to 40°N latitude (Jefferson et al. 2015). Takes are included to factor for this scenario and are adjusted based on 1 group size / year for all activities (20 per Reeves et al. 2002).

c/ Pilot whale density values from Duke University (Roberts and Halpin 2022) reported as "*Globicephala spp*" and not species-specific. As described in Section 4.1.4, both the short-finned and long-finned pilot whale occur in the Mid-Atlantic, though the short-finned pilot whale tends to occur in more southern waters. When calculated take was less than a group size (20 / year, Jefferson et al. 2015), take request has been adjusted to account for 1 group size.

d/ Pinniped requested take attributed 50% to harbor seals and 50% to gray seals.

e/ Mitigation measures described in Section 11 of the Request for Rulemaking and Letter of Authorization will be implemented to ensure there is no Level A take of North Atlantic right whales; therefore, no Level A take is requested for this species. Level B take for foundation installation adjusted for group size of 1 individual for months with monthly density < 0.01 when construction may occur (May – October) and 2 individuals for months with monthly density > 0.01 when construction may occur (May – October)

f/ Atlantic white-sided dolphins are not expected in the Project Area, but consideration of take has been included as a precautionary measure based on recommendation from NOAA Fisheries to account for potential future shift in habitat use by the species. Adjusted based on 1 group size / year (15 per Reeves et al. 2002).

g/ Adjusted based on PSO data (max daily density x days of activity).

h/ Adjusted based on 1 group size / year (3 per Barkaszi et al. 2019).

i/ Adjusted based on 1 group size / day (20 per Dominion Energy 2021).

j/ For Risso's dolphin, when estimated take was less than a group size, requested take adjusted based on 1 group size / year (25 per Dominion Energy 2021, Jefferson et al. 2015).

## 2 TRENCHLESS INSTALLATION - COFFERDAM INSTALLATION ACTIVITIES

### 2.1 Updates to Methodology

- Cofferdam installation activity resulting in potential marine mammal take is associated with unique animal density estimates defined by the anticipated extent of that Project Area “footprint,” which includes the cable route corridor and Lease Area. Densities were first derived from marine mammal density data via an updated 5 x 5 km raster dataset from Roberts and Halpin (2022). Through detailed consultation with NOAA Fisheries, certain species were expected to occur in the nearshore during the Project construction activities which required adjustments for group sizes. It should be noted that the take requested for species not expected to occur in the nearshore area was derived from using the density values within each 5 x 5 km cell that intersected the Project Area footprint rather than applying a buffer. Group size adjustments for cetaceans expected to occur in the nearshore were made as discussed through consultation with NOAA Fisheries and detailed below. This approach was deemed to be the most conservative for estimating the extent of acoustic impact and thereby estimating take of cetaceans based on the current best available information as cited below.
- The 2022 updates to the NARW and humpback whale density models resulted in datasets with three different time spans for each species. We have selected the most recent of these for this analysis: version 11 (2009-2019) for humpback whales, and version 12 (2010-2019) for NARWs.
- Group size adjustments were included for the following species with references listed parenthetically:
  - **Atlantic spotted dolphin:** Adjusted based on 1 group size / day (20 per Dominion Energy 2020, Jefferson et al. 2015)
  - **Bottlenose dolphin (Combined Southern Migratory Coastal, Western North Atlantic Offshore):** Adjusted based on 1 group size / day (15 per Jefferson et al. 2015)
  - **Short-beaked common dolphin:** Adjusted based on 1 group size / day (20 per Dominion Energy 2021).

### 2.2 Estimate of Potential Project Vibratory Pile Driving Takes by Harassment

Using Roberts and Halpin (2022), estimates of potential take by Level B Harassment were updated (Table 31a and Table 31b). Estimates of take are computed according to the following formula as provided by NOAA Fisheries (Personal Communication, November 24, 2015):

$$\text{Estimated Take} = D \times ZOI \times (d) \quad (1)$$

Where:

$D$  = average highest species density (number per 100 km<sup>2</sup>)

$ZOI$  = maximum ensonified area to MMPA threshold for impulsive noise (160 dBRMS90% re 1 μPa)

$d$  = number of days



The ensouffied area specific to Level B harassment, as well as the projected duration of installation at each respective vibratory pile driving location, was then used to produce the results of take calculations provided in Table 31a and Table 31b. As described in Section 1.2, it is expected to take 3 days to install and 3 days to remove each of the nine cofferdams. Therefore, 6 days of pile driving is included per cofferdam, for a total of 54 days for nine cofferdams. It should be noted that calculations do not take into account whether a single animal is harassed multiple times or whether each exposure is a different animal. Therefore, the numbers in Table 31a and Table 31b are the maximum number of animals that may be harassed during vibratory pile driving (i.e., the Applicant assumes that each exposure event is a different animal).

Table 31a. Updated Average Marine Mammal Densities (Roberts and Halpin 2022) Used in Exposure Estimates and Estimates of Potential Takes by Level B Harassment due to Vibratory Pile Driving

Species	Stock	Average Seasonal Density a/ (No./100 km <sup>2</sup> )	Estimated Take by Level B Harassment
Atlantic spotted dolphin	Western North Atlantic	2.370	37.169
Bottlenose dolphin b/	Southern migratory coastal stock	17.054	267.462
Common dolphin (short beaked)	Western North Atlantic	1.808	28.355
Atlantic White-sided dolphin f/	Western North Atlantic	0.325	5.097
Common minke whale	Canadian east coast	0.124	1.945
Fin whale	Western North Atlantic	0.041	0.643
Harbor porpoise	Western North Atlantic	0.438	6.869
Humpback whale	Gulf of Maine	0.054	0.847
North Atlantic right whale	Western North Atlantic	0.024	0.376
Pantropical spotted dolphin c/	Western North Atlantic	0.007	0.110
Pilot whale spp. (long- and short-finned pilot whales) d/	Western North Atlantic	0.065	1.019
Risso's dolphin	Western North Atlantic	0.030	0.470
Gray seal e/	Western North Atlantic	1.775	13.919
Harbor seal e/	Western North Atlantic	1.775	13.919
Sei whale	Nova Scotia	0.015	0.235
Sperm whale	North Atlantic	0.001	0.016

Notes:

a/ Density values from Duke University (Roberts and Halpin 2022).

b/ Bottlenose dolphin density values from Duke University (Roberts and Halpin 2022) reported as "bottlenose" and not identified to stock. Given the cofferdam installation sound would be confined to below the 20 m isobath, where the coastal stock is anticipated to predominate, estimated Level B take for cofferdam installation was accrued to the coastal stock.

c/ Pantropical spotted dolphins are expected to be rare in the Project Area but are included in the analysis since their range extends to 40°N latitude (Jefferson et al. 2015).

d/ Pilot whale density values from Duke University (Roberts and Halpin 2022) reported as "*Globicephala spp.*" and not species-specific. As the short-finned pilot whale is the smaller stock, take estimates have been assumed to be of this stock to be conservative. As described in Section 4.1.4, both the short-finned and long-finned pilot whale occur in the Mid-Atlantic, though the short-finned pilot whale tends to occur in more southern waters.

e/ Pinniped density values from Duke University (Roberts and Halpin 2022) reported as "seals" and not species-specific; therefore, for requested takes 50% accrued to harbor seals and 50% accrued to gray seals.

f/ Atlantic white-sided dolphins are not expected in the Project Area, but consideration of take has been included as a precautionary measure based on recommendation from NOAA Fisheries to account for potential future shift in habitat use by the species.

Table 31b. Requested Takes by Level B Harassment due to Vibratory Pile Driving

Species	Stock	Requested Take by Level B Harassment
Atlantic spotted dolphin f/	Western North Atlantic	240
Bottlenose dolphin a/	Southern migratory coastal stock	180
Common dolphin (short beaked) g/	Western North Atlantic	240
Atlantic White-sided dolphin e/	Western North Atlantic	5
Common minke whale	Canadian east coast	2
Fin whale	Western North Atlantic	1
Harbor porpoise	Western North Atlantic	7
Humpback whale	Gulf of Maine	1
North Atlantic right whale	Western North Atlantic	0
Pantropical spotted dolphin b/	Western North Atlantic	0
Pilot whale spp. (long- and short-finned pilot whales) c/	Western North Atlantic	1
Risso's dolphin	Western North Atlantic	0
Gray seal d/	Western North Atlantic	14
Harbor seal d/	Western North Atlantic	14
Sei whale	Nova Scotia	0
Sperm whale	North Atlantic	0

Notes:

a/ Bottlenose dolphin density values from Duke University (Roberts and Halpin 2022) reported as "bottlenose" and not identified to stock. Given the cofferdam installation sound would be confined to below the 20 m isobath, where the coastal stock is anticipated to predominate, estimated Level B take for cofferdam installation was accrued to the coastal stock. Adjusted based on 1 group size / day (15 per Jefferson et al. 2015).

b/ Pantropical spotted dolphins are expected to be rare in the Project Area but are included in the analysis since their range extends to 40°N latitude (Jefferson et al. 2015).

c/ Pilot whale density values from Duke University (Roberts and Halpin 2022) reported as "*Globicephala spp.*" and not species-specific. As the short-finned pilot whale is the smaller stock, take estimates have been assumed to be of this stock to be conservative. As described in Section 4.1.4, both the short-finned and long-finned pilot whale occur in the Mid-Atlantic, though the short-finned pilot whale tends to occur in more southern waters.

d/ Pinniped density values from Duke University (Roberts and Halpin 2022) reported as "seals" and not species-specific; therefore, for requested takes 50% accrued to harbor seals and 50% accrued to gray seals.

e/ Atlantic white-sided dolphins are not expected in the Project Area, but consideration of take has been included as a precautionary measure based on recommendation from NOAA Fisheries to account for potential future shift in habitat use by the species.

f/ Atlantic spotted dolphin adjusted based on 1 group size / day (20 per Dominion Energy 2020, Jefferson et al. 2015).

g/ Short-beaked common dolphin: Adjusted based on 1 group size / day (20 per Dominion Energy 2021).

The data used as the basis for estimating species density for the Project Area are derived from data provided by Duke University's Marine Geospatial Ecology Lab and the Marine-life Data and Analysis Team. This dataset is a compilation of the best available marine mammal data (1994-2022) and was prepared in a collaboration between Duke University, Northeast Regional Planning Body, University of North Carolina, the Virginia Aquarium and Marine Science Center, and NOAA Fisheries (Roberts and Halpin 2022). Recently, these data have been updated with new modeling results and have included density estimates for pinnipeds in addition to revised estimates for right whales (Roberts and Halpin 2022). Pinniped density

data (as presented in Roberts and Halpin 2022) were used to estimate pinniped densities in the planned construction area with 50 percent of take accrued to harbor seals and 50 percent accrued to gray seals.

Maximum monthly densities (i.e., the maximum density of each grid cell), as reported by Roberts and Halpin (2022), were averaged by season over the planned duration of cofferdam installation activities (spring [May], summer [June through August], and fall [September through October]) for the entire Project Area. To be conservative, the maximum average seasonal density for each species was then selected for inclusion in the take calculations. For pinnipeds, because the seasonality of, and habitat use by, gray seals roughly overlaps and the density data, as presented by Roberts and Halpin (2022), does not differentiate between pinniped species, the estimated takes were split evenly between harbor and gray seals.

### 3 TRENCHLESS INSTALLATION – GOAL POSTS

#### 3.1 Updates to Methodology

Goal post installation activity resulting in potential marine mammal take is associated with unique animal density estimates defined by the anticipated extent of that Project Area “footprint,” which includes the cable route corridor and Lease Area. Corresponding densities were derived from marine mammal density data via an updated 5 x 5 km raster dataset from Roberts and Halpin (2022). Through detailed consultation with NOAA Fisheries, certain species were expected to occur in the nearshore during the Project construction activities which required adjustments for group sizes. It should be noted that the take requested for species not expected to occur in the nearshore area was derived from using the density values within each 5 x 5 km cell that intersected the Project Area footprint rather than applying a buffer. Group size adjustments for cetaceans expected to occur in the nearshore were made as discussed through consultation with NOAA Fisheries and detailed below. This approach was deemed to be the most conservative for estimating the extent of acoustic impact and thereby estimating take of cetaceans based on the current best available information as cited below.

- The 2022 updates to the NARW and humpback whale density models resulted in datasets with three different time spans for each species. We have selected the most recent of these for this analysis: version 11 (2009-2019) for humpback whales, and version 12 (2010-2019) for NARWs.
- Group size adjustments were included for the following species with references listed parenthetically:
  - **Atlantic spotted dolphin:** Adjusted based on 1 group size / day (20 per Dominion Energy 2020, Jefferson et al. 2015)
  - **Bottlenose dolphin (Southern Migratory Coastal Stock):** Adjusted based on 1 group size / day (15 per Jefferson et al. 2015)
  - **Short-beaked common dolphin:** Adjusted based on 1 group size / day (20 per Dominion Energy 2021).

### 3.2 Estimate of Potential Project Trenchless Installation – Goal Post Takes by Harassment

Using Roberts and Halpin (2022), estimates of potential take by Level B Harassment were updated (Table 33a and Table 33b). Density data from Roberts and Halpin (2022) were mapped within the boundary of the Project Area for each segment using geographic information systems. The maximum densities (i.e., the maximum density of each grid cell) as reported by Roberts and Halpin (2022), were averaged by season over the activity duration (spring [May], summer [June through August], and fall [September through October]) for the construction area. The average seasonal density for each species was then selected for inclusion in the updated take calculations.

Table 33a. Updated Marine Mammal Density (Roberts and Halpin 2022) and Estimated Level B Harassment Take Numbers from Trenchless Installation – Goal Posts

Species	Stock	Average Seasonal Density a/ (No./100 km <sup>2</sup> )	Estimated Take (No.)
Atlantic spotted dolphin	Western North Atlantic	2.370	6.373
Bottlenose dolphin b/	Southern Migratory Coastal	17.054	45.862
Common dolphin (short beaked)	Western North Atlantic	1.808	4.862
Atlantic White-sided dolphin f/	Western North Atlantic	0.325	0.874
Common minke whale	Canadian east coast	0.124	0.333
Fin whale	Western North Atlantic	0.041	0.110
Harbor porpoise	Western North Atlantic	0.438	1.178
Humpback whale	Gulf of Maine	0.054	0.145
North Atlantic right whale	Western North Atlantic	0.024	0.065
Pantropical spotted dolphin c/	Western North Atlantic	0.007	0.019
Pilot whale spp. (long- and short-Finned pilot whales) d/	Western North Atlantic	0.065	0.175
Risso's dolphin	Western North Atlantic	0.030	0.081
Gray seal e/	Western North Atlantic	1.775	2.387
Harbor seal e/	Western North Atlantic	1.775	2.387
Sei whale	Nova Scotia	0.015	0.040
Sperm whale	North Atlantic	0.001	0.003
<p>Notes:</p> <p>a/ Density values from Duke University (Roberts and Halpin 2022).</p> <p>b/ Bottlenose dolphin density values from Duke University (Roberts and Halpin 2022) reported as "bottlenose" and not identified to stock. Given the goal post pile driving sound would be confined to below the 20 m isobath, where the coastal stock is anticipated to predominate, estimated Level B take for goal post installation was accrued to the coastal stock.</p> <p>c/ Pantropical spotted dolphins are expected to be rare in the Project Area but are included in the analysis since their range extends to 40°N latitude (Jefferson et al. 2015).</p> <p>d/ Pilot whale density values from Duke University (Roberts and Halpin 2022) reported as "<i>Globicephala spp</i>" and not species-specific. As described in Section 4.1.4, both the short-finned and long-finned pilot whale occur in the Mid-Atlantic, though the short-finned pilot whale tends to occur in more southern waters.</p> <p>e/ Pinniped density values from Duke University (Roberts and Halpin 2022) reported as "seals" and not species-specific. The final calculated Level B estimated takes were accrued 50% to harbor seals and 50% to gray seals.</p> <p>f/ Atlantic white-sided dolphins are not expected in the Project Area, but consideration of take has been included as a precautionary measure based on recommendation from NOAA Fisheries to account for potential future shift in habitat use by the species.</p>			

It should be noted that calculations do not take into account whether a single animal is harassed multiple times or whether each exposure is a different animal. Therefore, the numbers in Table 33a and Table 33b are the maximum number of animals that may be harassed during the trenchless installation (i.e., the Applicant assumes that each exposure event is a different animal).

For pinnipeds, because the seasonality of, and habitat use by, gray seals roughly overlap with harbor seals, the same estimated abundance has been applied to both gray and harbor seals. Pinniped density data (as presented in Roberts and Halpin 2022) were used to estimate pinniped numbers presented in Table 33a and Table 33b. These data, as presented by Roberts and Halpin (2022), do not differentiate between pinniped species. The final calculated Level B estimated takes were accrued 50 percent to harbor seals and 50 percent to gray seals.

Table 33b. Requested Takes by Level B Harassment due to Trenchless Installation – Goal Posts

Species	Stock	Requested Take (No.)
Atlantic spotted dolphin f/	Western North Atlantic	360
Bottlenose dolphin a/	Southern Migratory Coastal	270
Common dolphin (short beaked) g/	Western North Atlantic	360
Atlantic White-sided dolphin e/	Western North Atlantic	1
Common minke whale	Canadian east coast	0
Fin whale	Western North Atlantic	0
Harbor porpoise	Western North Atlantic	1
Humpback whale	Gulf of Maine	0
North Atlantic right whale	Western North Atlantic	0
Pantropical spotted dolphin b/	Western North Atlantic	0
Pilot whale spp. (long- and short-finned pilot whales) c/	Western North Atlantic	0
Risso's dolphin	Western North Atlantic	0
Gray seal d/	Western North Atlantic	2
Harbor seal d/	Western North Atlantic	2
Sei whale	Nova Scotia	0
Sperm whale	North Atlantic	0
Notes:		
a/ Bottlenose dolphin density values from Duke University (Roberts and Halpin 2022) reported as "bottlenose" and not identified to stock. Given the cofferdam installation sound would be confined to below the 20 m isobath, where the coastal stock is anticipated to predominate, estimated Level B take for cofferdam installation was accrued to the coastal stock. Adjusted based on 1 group size (15) / day (Jefferson et al. 2015).		
b/ Pantropical spotted dolphins are expected to be rare in the Project Area but are included in the analysis since their range extends to 40°N latitude (Jefferson et al. 2015).		
c/ Pilot whale density values from Duke University (Roberts and Halpin 2022) reported as "Globicephala spp." and not species-specific.		
d/ Pinniped density values from Duke University (Roberts and Halpin 2022) reported as "seals" and not species-specific; therefore, for requested takes 50% accrued to harbor seals and 50% accrued to gray seals.		
e/ Atlantic white-sided dolphins are not expected in the Project Area, but consideration of take has been included as a precautionary measure based on recommendation from NOAA Fisheries to account for potential future shift in habitat use by the species.		
f/ Atlantic spotted dolphin adjusted based on 1 group size / day (20 per Dominion Energy 2020, Jefferson et al. 2015).		
g/ Short-beaked common dolphin: Adjusted based on 1 group size / day (20 per Dominion Energy 2021).		

For bottlenose dolphin densities, Roberts and Halpin (2022) does not differentiate by individual stock. The southern coastal migratory stock tends to be found shallower than 20 m; therefore, bottlenose dolphins likely to be impacted by goal post installation activities are assumed to be of the coastal stock.

In the instance of the large whales (baleen and sperm), the Applicant has proposed a 1,500 m (1,640.4 ft) shutdown zone that exceeds the distance to the Level B harassment isopleth. In addition, given the proximity to land, large whales are not anticipated during Trenchless Installation. Given that the proposed mitigation effectively prevents Level B harassment and large whales would not be expected, take has been adjusted to zero individuals. Note that other mitigation measures may be imposed as part of other agreements that the Applicant must adhere to, such as the lease agreement with the Bureau of Ocean Energy Management (BOEM).

## 4 HRG SURVEY ACTIVITIES

### 4.1 Updates to Methodology

- HRG survey activity resulting in potential marine mammal take is associated with unique animal density estimates defined by the anticipated extent of that Project Area “footprint,” which includes the cable route corridor and Lease Area. Corresponding densities were derived from marine mammal density data from Roberts and Halpin (2022) via an updated 5 x 5 km raster dataset that covers the lease area and the export cable corridor.
- The 2022 updates to the NARW and humpback whale density models resulted in datasets with three different time spans for each species. We have selected the most recent of these for this analysis: 2009-2019 for humpback whales, and 2010-2019 for NARWs.
- Group size adjustments were included for the following species with references listed parenthetically:
  - **Atlantic white-sided dolphin:** Adjusted based on 1 group size / year (15 per Reeves et al. 2002)
  - **Risso’s dolphin:** Adjusted based on 1 group size / year (25 per Dominion Energy 2021, Jefferson et al. 2015)
  - **Bottlenose dolphin (Combined Southern Migratory Coastal, Western North Atlantic Offshore):** Adjusted based on 1 group size / day (15 per Jefferson et al. 2015)
- *Note: As described in Section 4.2 below and in Section 6.4.2 of the A&C LOA, group size adjustments were implemented in the previous iteration of the LOA application for spotted dolphins (20 / day), common dolphins (20 / day), Risso’s dolphins (25 / year), and pilot whales (20 / year).*

### 4.2 Estimate of Potential Project HRG Survey Takes by Harassment

Using Roberts and Halpin (2022), estimates of potential take by Level B Harassment were updated (Table 37a and Table 37b). For this analysis of potential takes, the maximum range to the regulatory thresholds along each radial were combined to create a polygon that forms the impact area or zone of influence (ZOI) surrounding the sound source along the daily trackline distance for High Resolution Geophysical (HRG) survey activities. The parameters in Table 37a and Table 37b were used to estimate Level B harassment for

marine mammals for the entire HRG Project Area utilizing the respective ZOI and duration for each segment of the survey. Density data from Roberts and Halpin (2022) were mapped within the boundary of the Project Area using geographic information systems. The boundary of the HRG Project Area corresponds to the Lease Area and Offshore Export Cable Route Corridor, which was not buffered. For each survey segment, the average densities (i.e., the average density of each grid cell) as reported by Roberts and Halpin (2022), were averaged by season over the survey duration (for spring, summer, fall, and winter) for the entire HRG Project Area. The average seasonal density within the HRG survey area was then selected for inclusion in the take calculations.

All noise-producing survey equipment planned to be used during HRG surveys is assumed to be operated concurrently. The ensonified area specific to Level B harassment, as well as the projected duration of each respective survey segment, was then used to produce the results of take calculations provided in Table 37a and Table 37b. It should be noted that calculations do not take into account whether a single animal is harassed multiple times or whether each exposure is a different animal. Therefore, the numbers in Table 37a and Table 37b are the maximum number of animals that may be harassed during the HRG surveys (i.e., the Applicant assumes that each exposure event is a different animal).

For pinnipeds, because the seasonality of, and habitat use by, gray seals roughly overlap with harbor seals, the same estimated abundance has been applied to both gray and harbor seals. Pinniped density data (as presented in Roberts and Halpin 2022) were used to estimate pinniped numbers presented in Table 37a and Table 37b. These data, as presented by Roberts and Halpin (2022), do not differentiate between pinniped species. The final calculated Level B estimated takes were accrued 50 percent to harbor seals and 50 percent to gray seals.

For bottlenose dolphin densities, Roberts and Halpin (2022) does not differentiate by individual stock. Additionally, bottlenose dolphin takes for HRG survey activities cannot be attributed to stock because surveys will include both nearshore and offshore locations and percent delineation between nearshore and offshore survey effort is not yet known.

Adjustments were made to spotted dolphin, common dolphin, Risso's dolphin, and pilot whale take estimates to account for the potential of large groups of individuals. For common dolphins, two pods averaging 10 individuals each were assumed per day based on PSO data (Dominion Energy 2021); therefore, the total number of operational days was multiplied by the 20 individuals per day. For spotted dolphins, one pod averaging 20 was assumed per day based on PSO data (Dominion Energy 2020) and multiplied by the days of operation. For Risso's dolphin and pilot whales, to account for the potential of interactions with groups of these species, the calculated take of one individual for Risso's dolphin and two individuals for pilot whale were adjusted to account for group size of each species, 25 individuals, based on the pod sizes noted in Reeves et al. (2002), and confirmed by Dominion Energy (2021). These increases were applied to the initial calculated Level B harassment take request, as indicated in Table 37a and Table 37b in this LOA Addendum. Although pantropical spotted dolphins are expected to be rare in the Project Area, their range extends to 40°N latitude (Jefferson et al. 2015); therefore, one group size of 20 animals per year is accounted for in take estimation.

Table 37a. Updated Marine Mammal Density (Roberts and Halpin 2022) and Estimated Level B Harassment Take Numbers from HRG Surveys

Species	Stock	Average Seasonal Density a/ (No./100 km <sup>2</sup> )	Estimated Take (No.)											
			HRG Survey 2024		HRG Survey 2025		HRG Survey 2026		HRG Survey 2027		HRG Survey 2028		HRG Survey 2029	
			Estimated	Requested	Estimated	Requested	Estimated	Requested	Estimated	Requested	Estimated	Requested	Estimated	Requested
North Atlantic right whale	Western North Atlantic	0.095	0.318	0	1.217	1	0.283	0	1.798	2	1.798	2	0	0
Humpback whale	Gulf of Maine	0.103	0.454	0	1.738	2	0.405	0	2.569	3	2.569	3	0	0
Fin whale	Western North Atlantic	0.080	0.378	0	1.448	1	0.337	0	2.140	2	2.140	2	0	0
Sei whale	Nova Scotia	0.038	0.144	0	0.550	1	0.128	0	0.813	1	0.813	1	0	0
Sperm whale	North Atlantic	0.002	0.008	0	0.029	0	0.007	0	0.043	0	0.043	0	0	0
Common minke whale	Canadian east coast	0.344	0.786	1	3.012	3	0.702	1	4.452	4	4.452	4	0	0
Pantropical spotted dolphin b/	Western North Atlantic	0.007	0.053	20	0.203	20	0.047	20	0.300	20	0.300	20	0	0
Pilot whale spp. (long- and short-Finned pilot whales) c/	Western North Atlantic	0.065	0.491	20	1.883	20	0.439	20	2.783	20	2.783	20	0	0
Bottlenose dolphin d/	Southern Migratory Coastal, Western North Atlantic Offshore	24.157	109.021	975	417.634	3,735	97.280	870	617.227	5,520	617.227	5,520	0	0
Atlantic White-sided Dolphin h/	Western North Atlantic	0.678	2.397	15	9.182	15	2.139	15	13.571	15	13.571	15	0	0
Common dolphin (short beaked) e/	Western North Atlantic	6.599	22.730	1,300	87.072	4,980	20.282	1,160	128.685	7,360	128.685	7,360	0	0
Atlantic spotted dolphin e/	Western North Atlantic	4.649	13.618	1,300	52.168	4,980	12.152	1,160	77.100	7,360	77.100	7,360	0	0
Risso's dolphin f/	Western North Atlantic	0.057	0.280	25	1.072	25	0.250	25	1.584	25	1.584	25	0	0
Harbor porpoise	Western North Atlantic	1.477	5.278	5	20.218	20	4.710	5	29.881	30	29.881	30	0	0
Harbor seal g/	Western North Atlantic	5.402	5.070	5	19.422	19	4.524	5	28.704	29	28.704	29	0	0
Gray seal g/	Western North Atlantic	5.402	5.070	5	19.422	19	4.524	5	28.704	29	28.704	29	0	0



Species	Stock	Average Seasonal Density a/ (No./100 km <sup>2</sup> )	Estimated Take (No.)											
			HRG Survey 2024		HRG Survey 2025		HRG Survey 2026		HRG Survey 2027		HRG Survey 2028		HRG Survey 2029	
			Estimated	Requested	Estimated	Requested	Estimated	Requested	Estimated	Requested	Estimated	Requested	Estimated	Requested
Notes:														
a/ Density values from Duke University (Roberts and Halpin 2022).														
b/ Pantropical spotted dolphins are expected to be rare in the Project Area but are included in the analysis since their range extends to 40°N latitude (Jefferson et al. 2015). Takes are adjusted based on 1 group size / year (20 per Reeves et al. 2002).														
c/ Pilot whale density values from Duke University (Roberts and Halpin 2022) reported as " <i>Globicephala spp</i> " and not species-specific. As described in Section 4.1.4, both the short-finned and long-finned pilot whale occur in the Mid-Atlantic, though the short-finned pilot whale tends to occur in more southern waters. A group size of 20 animals per year (Jefferson et al. 2015) was used for requested take as a precautionary measure.														
d/ Bottlenose dolphin density values from Duke University (Roberts and Halpin 2022) reported as "bottlenose" and not identified to stock. Given the lack of spatial resolution at this state of survey planning, estimates could not be split based on bottlenose dolphin stock preferred water depths and so are presented for the combined stock (Reeves et al. 2002; Hayes et al. 2022). Adjusted to one group size per day (15 individuals per Jefferson et al. 2015).														
e/ Since Roberts and Halpin 2022 does not account for group size, the estimated take was adjusted to account for two groups of 10 animals each for a total of 20 animals per day of short-beaked common dolphins and Atlantic spotted dolphins.														
f/ For Risso's dolphins, a group size of 25 animals per year was used for requested take as a precautionary measure (Dominion Energy 2021, Jefferson et al. 2015).														
g/ Pinniped density values from Duke University (Roberts and Halpin 2022) reported as "seals" and not species-specific. The final calculated estimated and requested takes were accrued 50% to harbor and 50% to gray seals.														
h/ Atlantic white-sided dolphins are not expected in the Project Area, but consideration of take has been included as a precautionary measure based on recommendation from NOAA Fisheries to account for potential future shift in habitat use by the species. Adjusted based on 1 group size / year (15 per Reeves et al. 2002).														

Table 37b. Requested Takes by Level B Harassment due to HRG Surveys Incorporating Group Size Adjustments

Species	Stock	HRG 2024	HRG 2025	HRG 2026	HRG 2027	HRG 2028	HRG 2029 h/
North Atlantic right whale	Western Atlantic	0	1	0	2	2	0
Humpback whale	Gulf of Maine	0	2	0	3	3	0
Fin whale	Western North Atlantic	0	1	0	2	2	0
Sei whale	Nova Scotia	0	1	0	1	1	0
Sperm whale	North Atlantic	0	0	0	0	0	0
Common minke whale	Canadian East Coast	1	3	1	4	4	0
Pantropical spotted dolphin a/	Western North Atlantic	20	20	20	20	20	0
Pilot whale spp. (long- and short-finned pilot whales) b/	Western North Atlantic	20	20	20	20	20	0
Bottlenose dolphin c/	Southern Migratory Coastal, Western North Atlantic Offshore	975	3,735	870	5,520	5,520	0
Atlantic white-sided dolphin g/	Western North Atlantic	15	15	15	15	15	0
Common dolphin (short-beaked) d/	Western North Atlantic	1,300	4,980	1,160	7,360	7,360	0
Atlantic spotted dolphin d/	Western North Atlantic	1,300	4,980	1,160	7,360	7,360	0
Risso's dolphin e/	Western North Atlantic	25	25	25	25	25	0

Species	Stock	HRG 2024	HRG 2025	HRG 2026	HRG 2027	HRG 2028	HRG 2029 h/
Harbor porpoise	Gulf of Maine/Bay of Fundy	5	20	5	30	30	0
Gray seal f/	Western North Atlantic	5	19	5	29	29	0
Harbor seal f/	Western North Atlantic	5	19	5	29	29	0

Notes:

a/ Pantropical spotted dolphins are expected to be rare in the Project Area but are included in the analysis since their range extends to 40°N latitude (Jefferson et al. 2015). Takes are adjusted based on 1 group size / year (20 per Reeves et al. 2002).

b/ Pilot whale density values from Duke University (Roberts and Halpin 2022) reported as "*Globicephala spp*" and not species-specific. As described in Section 4.1.4, both the short-finned and long-finned pilot whale occur in the Mid-Atlantic, though the short-finned pilot whale tends to occur in more southern waters. A group size of 20 animals per year (Jefferson et al. 2015) was used for requested take as a precautionary measure.

c/ Bottlenose dolphin density values from Duke University (Roberts and Halpin 2022) reported as "bottlenose" and not identified to stock. Given the lack of spatial resolution at this state of survey planning, estimates could not be split based on bottlenose dolphin stock preferred water depths and so are presented for the combined stock (Reeves et al. 2002; Hayes et al. 2022). Adjusted to one group size per day (15 individuals per Jefferson et al. 2015).

d/ Short-beaked common dolphins and Atlantic spotted dolphins estimated take numbers adjusted based on 1 group size / day of HRG activity (20 per Dominion Energy [2021], Dominion Energy 2020, and Jefferson et al. 2015 ).

e/ For Risso's dolphins, when calculated take was less than 1, a group size of 25 animals per year was used for requested take as a precautionary measure (Dominion Energy 2021, Jefferson et al. 2015).

f/ Pinniped density values from Duke University (Roberts and Halpin 2022) reported as "seals" and not species-specific. The final calculated estimated and requested takes were accrued 50% to harbor and 50% to gray seals.

g/ Atlantic white-sided dolphins are not expected in the Project Area, but consideration of take has been included as a precautionary measure based on recommendation from NOAA Fisheries to account for potential future shift in habitat use by the species. Adjusted based on 1 group size / year (15 per Reeves et al. 2002).

h/ Given that the LOA is not anticipated to be begin until March 2024, the 5-year period that it covers will extend into several months of 2029, however no activities are planned during that time and therefore no take is requested for 2029.

## 5 TOTAL REQUESTED HARASSMENT TAKE

Table 38 and Table 39 summarize the updated total harassment take requested across all Project activities as described in Sections 1.1, 1.2, 1.3, and 1.4, assuming the 10 dB attenuation due to mitigation measures. The mitigation and monitoring measures described in Section 11 will be used to prevent Level A harassment take of North Atlantic right whales; therefore, zero Level A harassment takes are requested for this species for the duration. Note that the Project proposes to utilize a double big bubble curtain as a mitigation measure (see Section 11 for all mitigation measures).

Table 38. Updated (Roberts and Halpin 2022) Summary of Annual Requested Takes by Level A and B Harassment Incorporating Group Size Adjustments

Species	Stock	2024			2025			2026			2027		2028		2029 e/	
		Requested Take (No.) Behavior	Requested Take (No.) Injury	% Stock	Requested Take (No.) Behavior	Requested Take (No.) Injury	% Stock	Requested Take (No.) Behavior	Requested Take (No.) Injury	% Stock	Requested Take (No.) Behavior	% Stock	Requested Take (No.) Behavior	% Stock	Requested Take (No.) Behavior	% Stock
North Atlantic right whale	Western North Atlantic	6	0	1.63	7	0	1.90	6	0	1.63	2	0.54	2	0.54	0	0
Humpback whale	Gulf of Maine	130	4	9.60	127	4	9.38	23	1	1.72	3	0.21	3	0.21	0	0
Fin whale	Western North Atlantic	113	4	1.72	109	4	1.66	20	1	0.31	2	0.03	2	0.03	0	0
Sei whale	Nova Scotia	3	1	0.06	4	1	0.08	1	1	0.03	1	0.02	1	0.02	0	0
Sperm whale	North Atlantic	3	0	0.07	3	0	0.07	3	0	0.07	0	0.00	0	0.00	0	0
Common minke whale	Canadian east coast	56	8	0.29	54	8	0.28	17	2	0.09	4	0.02	4	0.02	0	0
Pantropical spotted dolphin a/	Western North Atlantic	40	0	0.61	40	0	0.61	40	0	0.61	20	0.30	20	0.30	0	0
Pilot whale <i>spp.</i> (long- and short-finned pilot whales) b/	Western North Atlantic	82	0	0.21	74	0	0.19	40	0	0.10	20	0.05	20	0.05	0	0
Bottlenose dolphin	Western North Atlantic Offshore	4,290	0	6.83	3,888	0	6.19	631	0	1.00	0	0.00	0	0.00	0	0
	Southern Migratory Coastal	450	0	12.00	0	0	0.00	0	0	0	0	0.00	0	0.00	0	0
	Southern Migratory Coastal; Western North Atlantic Offshore	975	0	1.46	3,735	0	5.61	870	0	1.31	5,520	8.29	5,520	8.29	0	0
Common dolphin (short beaked)	Western North Atlantic	3,620	0	2.09	6,640	0	3.84	1,460	0	0.84	7,360	4.26	7,360	4.26	0	0
Atlantic spotted dolphin	Western North Atlantic	4,008	0	10.04	7,022	0	17.59	1,483	0	3.72	7,360	18.44	7,360	18.44	0	0
Atlantic white-sided dolphin c/	Western North Atlantic	36	0	0.04	30	0	0.03	30	0	0.03	15	0.02	15	0.02	0	0

Species	Stock	2024			2025			2026			2027		2028		2029 e/	
		Requested Take (No.) Behavior	Requested Take (No.) Injury	% Stock	Requested Take (No.) Behavior	Requested Take (No.) Injury	% Stock	Requested Take (No.) Behavior	Requested Take (No.) Injury	% Stock	Requested Take (No.) Behavior	% Stock	Requested Take (No.) Behavior	% Stock	Requested Take (No.) Behavior	% Stock
Risso's dolphin	Western North Atlantic	50	0	0.14	50	0	0.14	50	0	0.14	25	0.07	25	0.07	0	0
Harbor porpoise	Gulf of Maine/Bay of Fundy	36	1	0.04	42	1	0.05	9	1	0.01	30	0.03	30	0.03	0	0
Harbor seal d/	Western North Atlantic	83	1	0.14	75	1	0.12	15	1	0.03	29	0.05	29	0.05	0	0
Gray seal d/	Western North Atlantic	83	1	0.30	75	1	0.28	15	1	0.06	29	0.11	29	0.11	0	0

Notes:

- a/ Pantropical spotted dolphins are expected to be rare in the Project Area but are included in the analysis since their range extends to 40°N latitude (Jefferson et al. 2015).
- b/ Pilot whale density values from Duke University (Roberts and Halpin 2022) reported as "*Globicephala spp.*" and not species-specific. As the short-finned pilot whale is the smaller stock, take estimates have been assumed to be of this stock to be conservative. As described in Section 4.1.4, both the short-finned and long-finned pilot whale occur in the Mid-Atlantic, though the short-finned pilot whale tends to occur in more southern waters.
- c/ Atlantic white-sided dolphins are not expected in the Project Area, but consideration of take has been included as a precautionary measure based on recommendation from NOAA Fisheries to account for potential future shift in habitat use by the species.
- d/ Pinniped density values from Duke University (Roberts and Halpin 2022) reported as "seals" and not species-specific. The final calculated estimated and requested takes were accrued 50% to harbor seals and 50% to gray seals.
- e/ Given that the LOA is not anticipated to begin until March 2024, the 5-year period that it covers will extend into several months of 2029; however, no activities are planned during that time and therefore no take is requested for 2029.

Table 39. Updated Summary of 5-Year Requested Take Totals by Level A and Level B Harassment Incorporating Group Size Adjustments

Species	Stock	5 Year Take Total (No.) Behavior	5 Year Take Total (No.) Injury
North Atlantic right whale	Western North Atlantic	23	0
Humpback whale	Gulf of Maine	286	9
Fin whale	Western North Atlantic	246	9
Sei whale	Nova Scotia	10	3
Sperm whale	North Atlantic	9	0
Common minke whale	Canadian east coast	135	18
Pantropical spotted dolphin	Western North Atlantic	160	0
Pilot whale <i>spp.</i> (long- and short-finned pilot whales)	Western North Atlantic	236	0
Bottlenose dolphin	Western North Atlantic Offshore	8,809	0
	Southern Migratory Coastal	450	0
	Southern Migratory Coastal; Western North Atlantic Offshore	16,620	0
Common dolphin (short beaked)	Western North Atlantic	26,440	0
Atlantic spotted dolphin	Western North Atlantic	27,233	0
Atlantic white-sided dolphin	Western North Atlantic	126	0
Risso's dolphin	Western North Atlantic	200	0
Harbor porpoise	Gulf of Maine/Bay of Fundy	147	3
Harbor seal	Western North Atlantic	231	3
Gray seal	Western North Atlantic	231	3

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