

E.1: IMPACT PILE DRIVING (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.0: 2018

KEY	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NAVSTA Newport Bulkhead Repair
PROJECT/SOURCE INFORMATION	S499/Pier 2 - Install AZ23-800 steel sheets (5.25 ft per pair/31.5-inch each) at 8 piles/day for 23 days
Please include any assumptions	
PROJECT CONTACT	

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz)*	2	
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* Broadband: 95% frequency contour percentile (kHz)
OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 75), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

* **BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: Choose either E1-1 OR E1-2 method to calculate isopleths (not required to fill in sage boxes for both)

E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (USING RMS SPL SOURCE LEVEL)

SEL _{cum}	
Source Level (RMS SPL)	
Number of piles per day	
Strike Duration ^a (seconds)	
Number of strikes per pile	
Duration of Sound Production (seconds)	0
10 Log (duration of sound production)	#NUM!
Propagation (xLogR)	
Distance of source level measurement (meters)	

^a Window that makes up 90% of total cumulative energy (5%-95%) based on Madsen 2005
Unless otherwise specified, source levels are referenced 1 m from the source.

PK	
Source Level (PK SPL)	
Distance of source level measurement (meters)	
Source level at 1 meter	#NUM!

Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	183	185	155	185	203
PTS Isoleth to threshold (meters)	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!
PK Threshold	219	230	202	218	232
PTS PK Isoleth to threshold (meters)	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!

E.1-2: ALTERNATIVE METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT)

Unweighted SEL _{cum} (at measured distance) = SEL _{is} + 10 Log (# strikes)	217.3
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SEL _{cum}	
Source Level (Single Strike SEL)	181
Number of strikes per pile	530
Number of piles per day	8
Propagation (xLogR)	15
Distance of single strike SEL measurement (meters)	10

Unless otherwise specified, source levels are referenced 1 m from the source.

PK	
Source Level (PK SPL)	211
Distance of source level measurement (meters)	10
Source level at 1 meter	226.0

Unless otherwise specified, source levels are referenced 1 m from the source.

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	183	185	155	185	203
PTS Isoleth to threshold (meters)	1,924.5	68.4	2,292.4	1,029.9	75.0
PK Threshold	219	230	202	218	232
PTS PK Isoleth to threshold (meters)	2.9	NA	39.8	3.4	NA

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.5	1.8	1	2
b	2	2	2	2	2
f ₁	0.2	8.8	12	1.9	0.94
f ₂	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB)†	-0.01	-19.74	-26.87	-2.08	-1.15

$$W(f) = C + 10 \log_{10} \left\{ \frac{(f/f_1)^{2a}}{[1 + (f/f_1)^2]^b [1 + (f/f_2)^2]^b} \right\}$$

E.1: IMPACT PILE DRIVING (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.0: 2018

KEY	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NAVSTA Newport Bulkhead Repair
PROJECT/SOURCE INFORMATION	S499/Pier 2 - Install PAZ42 Steel Pipe Pile (42-inch) at 4 piles/day for 18 days
Please include any assumptions	
PROJECT CONTACT	

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz) ^a	2	
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^a Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

[†] If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 75), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: Choose either E1-1 OR E1-2 method to calculate isopleths (not required to fill in sage boxes for both)

E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (USING RMS SPL SOURCE LEVEL)

SEL _{cum}	
Source Level (RMS SPL)	
Number of piles per day	
Strike Duration ^a (seconds)	
Number of strikes per pile	
Duration of Sound Production (seconds)	0
10 Log (duration of sound production)	#NUM!
Propagation (xLogR)	
Distance of source level measurement (meters)	

^a Window that makes up 90% of total cumulative energy (5%-95%) based on Madsen 2005. Unless otherwise specified, source levels are referenced 1 m from the source.

PK	
Source Level (PK SPL)	
Distance of source level measurement (meters)	
Source level at 1 meter	#NUM!

Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS*

^a Impulsive sounds have dual metric thresholds (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	183	185	155	185	203
PTS Isoleth to threshold (meters)	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!
PK Threshold	219	230	202	218	232
PTS PK Isoleth to threshold (meters)	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!

E.1-2: ALTERNATIVE METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT)

Unweighted SEL _{cum} (at measured distance) = SEL _{is} + 10 Log (# strikes)	210.3
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SEL _{cum}	
Source Level (Single Strike SEL)	177
Number of strikes per pile	530
Number of piles per day	4
Propagation (xLogR)	15
Distance of single strike SEL measurement (meters)	10

Unless otherwise specified, source levels are referenced 1 m from the source.

PK	
Source Level (PK SPL)	213
Distance of source level measurement (meters)	10
Source level at 1 meter	228.0

Unless otherwise specified, source levels are referenced 1 m from the source.

RESULTANT ISOPLETHS*

^a Impulsive sounds have dual metric thresholds (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	183	185	155	185	203
PTS Isoleth to threshold (meters)	656.1	23.3	781.5	351.1	25.6
PK Threshold	219	230	202	218	232
PTS PK Isoleth to threshold (meters)	4.0	NA	54.1	4.6	NA

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.5	1.8	1	2
b	2	2	2	2	2
f ₁	0.2	8.8	12	1.9	0.94
f ₂	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB) [†]	-0.01	-19.74	-26.87	-2.08	-1.15

$$W(f) = C + 10 \log_{10} \left\{ \frac{(f/f_1)^{2a}}{[1 + (f/f_1)^2]^a [1 + (f/f_2)^2]^a} \right\}$$

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.0: 2018

KEY

	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NAVSTA Newport Bulkhead Repair
PROJECT/SOURCE INFORMATION	S499/Pier 2 - Install AZ23-800 steel sheets (5.25 ft per pair/31.5-inch each) at 8 piles/day for 23 days

Please include any assumptions

PROJECT CONTACT	
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Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz) [‡]	2.5	
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[‡] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	163
Number of piles within 24-h period	8
Duration to drive a single pile (minutes)	13
Duration of Sound Production within 24-h period (seconds)	6240
10 Log (duration of sound production)	37.95
Propagation (xLogR)	15
Distance from source level measurement (meters)	10

Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring

requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	199	198	173	201	219
PTS Isoleth to threshold (meters)	13.4	1.2	19.8	8.1	0.6

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f ₁	0.2	8.8	12	1.9	0.94
f ₂	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB) [†]	-0.05	-16.83	-23.50	-1.29	-0.60

$$W(f) = C + 10 \log_{10} \left\{ \frac{(f/f_1)^{2a}}{[1 + (f/f_1)^2]^a [1 + (f/f_2)^2]^b} \right\}$$

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.0: 2018

KEY

	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NAVSTA Newport Bulkhead Repair
PROJECT/SOURCE INFORMATION	S499/Pier 2 - Install steel H-pile (14 inch) at 12 piles/day for 14 days

Please include any assumptions

PROJECT CONTACT	
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Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz) [‡]	2.5	
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[‡] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	158
Number of piles within 24-h period	12
Duration to drive a single pile (minutes)	10
Duration of Sound Production within 24-h period (seconds)	7200
10 Log (duration of sound production)	38.57
Propagation (xLogR)	15
Distance from source level measurement (meters)	10

Unless otherwise specified, source levels are referenced 1 m from the source.

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requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	199	198	173	201	219
PTS Isoleth to threshold (meters)	6.8	0.6	10.1	4.2	0.3

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f ₁	0.2	8.8	12	1.9	0.94
f ₂	19	110	140	30	25
C	-0.13	1.2	1.36	0.75	0.64
Adjustment (dB) [†]	-0.05	-16.83	-23.50	-1.29	-0.60

$$W(f) = C + 10 \log_{10} \left\{ \frac{(f/f_1)^{2a}}{[1 + (f/f_1)^2]^a [1 + (f/f_2)^2]^b} \right\}$$

E.1: IMPACT PILE DRIVING (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.0: 2018

KEY	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NAVSTA Newport Bulkhead Repair
PROJECT/SOURCE INFORMATION	S366 - Install PZ35 Steel sheets (3.75 ft per pair/22.5-inch each) at 10 piles/day for 5 days
Please include any assumptions	
PROJECT CONTACT	

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz)*	2
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* Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 75), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

* **BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: Choose either E1-1 OR E1-2 method to calculate isopleths (not required to fill in sage boxes for both)

E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (USING RMS SPL SOURCE LEVEL)

SEL _{cum}	
Source Level (RMS SPL)	
Number of piles per day	
Strike Duration ^a (seconds)	
Number of strikes per pile	
Duration of Sound Production (seconds)	0
10 Log (duration of sound production)	#NUM!
Propagation (xLogR)	
Distance of source level measurement (meters)	

^aWindow that makes up 90% of total cumulative energy (5%-95%) based on Madsen 2005. Unless otherwise specified, source levels are referenced 1 m from the source.

PK	
Source Level (PK SPL)	
Distance of source level measurement (meters)	
Source level at 1 meter	#NUM!

Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	183	185	155	185	203
PTS Isoleth to threshold (meters)	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!
PK Threshold	219	230	202	218	232
PTS PK Isoleth to threshold (meters)	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!

E.1-2: ALTERNATIVE METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT)

Unweighted SEL _{cum} (at measured distance) = SEL _{is} + 10 Log (# strikes)	217.2
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SEL _{cum}	
Source Level (Single Strike SEL)	180
Number of strikes per pile	530
Number of piles per day	10
Propagation (xLogR)	15
Distance of single strike SEL measurement (meters)	10

Unless otherwise specified, source levels are referenced 1 m from the source.

PK	
Source Level (PK SPL)	205
Distance of source level measurement (meters)	10
Source level at 1 meter	220.0

Unless otherwise specified, source levels are referenced 1 m from the source.

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	183	185	155	185	203
PTS Isoleth to threshold (meters)	1,915.4	68.1	2,281.5	1,025.0	74.6
PK Threshold	219	230	202	218	232
PTS PK Isoleth to threshold (meters)	1.2	NA	15.8	1.4	NA

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.5	1.8	1	2
b	2	2	2	2	2
f ₁	0.2	8.8	12	1.9	0.94
f ₂	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB)†	-0.01	-19.74	-26.87	-2.08	-1.15

$$W(f) = C + 10 \log_{10} \left\{ \frac{(f/f_1)^{2a}}{[1 + (f/f_1)^2]^b [1 + (f/f_2)^2]^b} \right\}$$

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.0: 2018

KEY

	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NAVSTA Newport Bulkhead Repair
PROJECT/SOURCE INFORMATION	S366 - Install PZ35 Steel sheets (3.75 ft per pair/22.5-inch each) at 10 piles/day for 5 days

Please include any assumptions

PROJECT CONTACT	
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Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz) [‡]	2.5	
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[‡] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

[†] If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	163
Number of piles within 24-h period	10
Duration to drive a single pile (minutes)	13
Duration of Sound Production within 24-h period (seconds)	7800
10 Log (duration of sound production)	38.92
Propagation (xLogR)	15
Distance from source level measurement (meters)	10

Unless otherwise specified, source levels are referenced 1 m from the source.

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requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	199	198	173	201	219
PTS Isoleth to threshold (meters)	15.5	1.4	23.0	9.4	0.7

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f ₁	0.2	8.8	12	1.9	0.94
f ₂	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB) [†]	-0.05	-16.83	-23.50	-1.29	-0.60

$$W(f) = C + 10 \log_{10} \left\{ \frac{(f/f_1)^{2a}}{[1 + (f/f_1)^2]^a [1 + (f/f_2)^2]^b} \right\}$$

E.1: IMPACT PILE DRIVING (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.0: 2018

KEY	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NAVSTA Newport Bulkhead Repair
PROJECT/SOURCE INFORMATION	S366 - Install steel Soldier piles (30-inch) at 2 piles/day for 15 days
Please include any assumptions	
PROJECT CONTACT	

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz) [*]	2
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^{*} Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

[†] If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 75), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: Choose either E1-1 OR E1-2 method to calculate isopleths (not required to fill in sage boxes for both)

E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (USING RMS SPL SOURCE LEVEL)

SEL _{cum}	
Source Level (RMS SPL)	
Number of piles per day	
Strike Duration ^a (seconds)	
Number of strikes per pile	
Duration of Sound Production (seconds)	0
10 Log (duration of sound production)	#NUM!
Propagation (xLogR)	
Distance of source level measurement (meters)	

^a Window that makes up 90% of total cumulative energy (5%-95%) based on Madsen 2005. Unless otherwise specified, source levels are referenced 1 m from the source.

PK	
Source Level (PK SPL)	
Distance of source level measurement (meters)	
Source level at 1 meter	#NUM!

Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS*

^{*} Impulsive sounds have dual metric thresholds (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	183	185	155	185	203
PTS Isoleth to threshold (meters)	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!
PK Threshold	219	230	202	218	232
PTS PK Isoleth to threshold (meters)	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!

E.1-2: ALTERNATIVE METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT)

Unweighted SEL _{cum} (at measured distance) = SEL _{is} + 10 Log (# strikes)	211.3
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SEL _{cum}	
Source Level (Single Strike SEL)	181
Number of strikes per pile	530
Number of piles per day	2
Propagation (xLogR)	15
Distance of single strike SEL measurement (meters)	10

Unless otherwise specified, source levels are referenced 1 m from the source.

PK	
Source Level (PK SPL)	211
Distance of source level measurement (meters)	10
Source level at 1 meter	226.0

Unless otherwise specified, source levels are referenced 1 m from the source.

RESULTANT ISOPLETHS*

^{*} Impulsive sounds have dual metric thresholds (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	183	185	155	185	203
PTS Isoleth to threshold (meters)	763.7	27.2	909.7	408.7	29.8
PK Threshold	219	230	202	218	232
PTS PK Isoleth to threshold (meters)	2.9	NA	39.8	3.4	NA

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.5	1.8	1	2
b	2	2	2	2	2
f ₁	0.2	8.8	12	1.9	0.94
f ₂	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB) [†]	-0.01	-19.74	-26.87	-2.08	-1.15

$$W(f) = C + 10 \log_{10} \left\{ \frac{(f/f_1)^{2a}}{[1 + (f/f_1)^2]^a [1 + (f/f_2)^2]^a} \right\}$$

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.0: 2018

KEY

	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NAVSTA Newport Bulkhead Repair
PROJECT/SOURCE INFORMATION	S366 - Install 14-inch steel H piles at 12 piles/day for 3 days

Please include any assumptions

PROJECT CONTACT	
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Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz) [‡]	2.5	
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[‡] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	158
Number of piles within 24-h period	12
Duration to drive a single pile (minutes)	10
Duration of Sound Production within 24-h period (seconds)	7200
10 Log (duration of sound production)	38.57
Propagation (xLogR)	15
Distance from source level measurement (meters)	10

Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring

requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	199	198	173	201	219
PTS Isoleth to threshold (meters)	6.8	0.6	10.1	4.2	0.3

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f ₁	0.2	8.8	12	1.9	0.94
f ₂	19	110	140	30	25
C	-0.13	1.2	1.36	0.75	0.64
Adjustment (dB) [†]	-0.05	-16.83	-23.50	-1.29	-0.60

$$W(f) = C + 10 \log_{10} \left\{ \frac{(f/f_1)^{2a}}{[1 + (f/f_1)^2]^a [1 + (f/f_2)^2]^b} \right\}$$

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.0: 2018

KEY

	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NAVSTA Newport Bulkhead Repair
PROJECT/SOURCE INFORMATION	Pier 1 - Install PZ35 Steel Sheets at 10 piles/day for 9 days

Please include any assumptions

PROJECT CONTACT	
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Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz) [‡]	2.5	
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[‡] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	163
Number of piles within 24-h period	10
Duration to drive a single pile (minutes)	13
Duration of Sound Production within 24-h period (seconds)	7800
10 Log (duration of sound production)	38.92
Propagation (xLogR)	15
Distance from source level measurement (meters)	10

Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring

requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	199	198	173	201	219
PTS Isoleth to threshold (meters)	15.5	1.4	23.0	9.4	0.7

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f ₁	0.2	8.8	12	1.9	0.94
f ₂	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB) [†]	-0.05	-16.83	-23.50	-1.29	-0.60

$$W(f) = C + 10 \log_{10} \left\{ \frac{(f/f_1)^{2a}}{[1 + (f/f_1)^2]^a [1 + (f/f_2)^2]^b} \right\}$$

E.1: IMPACT PILE DRIVING (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.0: 2018

KEY	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NAVSTA Newport Bulkhead Repair
PROJECT/SOURCE INFORMATION	Pier 1 - Install PZ35 Steel Sheets at 10 piles/day for 9 days
Please include any assumptions	
PROJECT CONTACT	

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz)*	2	
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* Broadband: 95% frequency contour percentile (kHz)
OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 75), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

* **BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: Choose either E1-1 OR E1-2 method to calculate isopleths (not required to fill in sage boxes for both)

E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (USING RMS SPL SOURCE LEVEL)

SEL _{cum}	
Source Level (RMS SPL)	
Number of piles per day	
Strike Duration ^a (seconds)	
Number of strikes per pile	
Duration of Sound Production (seconds)	0
10 Log (duration of sound production)	#NUM!
Propagation (xLogR)	
Distance of source level measurement (meters)	

^aWindow that makes up 90% of total cumulative energy (5%-95%) based on Madsen 2005
Unless otherwise specified, source levels are referenced 1 m from the source.

PK	
Source Level (PK SPL)	
Distance of source level measurement (meters)	
Source level at 1 meter	#NUM!

Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otarid Pinnipeds
SEL _{cum} Threshold	183	185	155	185	203
PTS Isoleth to threshold (meters)	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!
PK Threshold	219	230	202	218	232
PTS PK Isoleth to threshold (meters)	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!

E.1-2: ALTERNATIVE METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT)

Unweighted SEL _{cum} (at measured distance) = SEL _{is} + 10 Log (# strikes)	217.2
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SEL _{cum}	
Source Level (Single Strike SEL)	180
Number of strikes per pile	530
Number of piles per day	10
Propagation (xLogR)	15
Distance of single strike SEL measurement (meters)	10

Unless otherwise specified, source levels are referenced 1 m from the source.

PK	
Source Level (PK SPL)	205
Distance of source level measurement (meters)	10
Source level at 1 meter	220.0

Unless otherwise specified, source levels are referenced 1 m from the source.

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otarid Pinnipeds
SEL _{cum} Threshold	183	185	155	185	203
PTS Isoleth to threshold (meters)	1,915.4	68.1	2,281.5	1,025.0	74.6
PK Threshold	219	230	202	218	232
PTS PK Isoleth to threshold (meters)	1.2	NA	15.8	1.4	NA

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otarid Pinnipeds
a	1	1.5	1.8	1	2
b	2	2	2	2	2
f ₁	0.2	8.8	12	1.9	0.94
f ₂	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB)†	-0.01	-19.74	-26.87	-2.08	-1.15

$$W(f) = C + 10 \log_{10} \left\{ \frac{(f/f_1)^{2a}}{[1 + (f/f_1)^2]^a [1 + (f/f_2)^2]^a} \right\}$$

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.0: 2018

KEY

	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NAVSTA Newport Bulkhead Repair
PROJECT/SOURCE INFORMATION	Pier 1 - Install 14-inch steel H at 12 piles/day for 5 days

Please include any assumptions

PROJECT CONTACT	
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Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz) [‡]	2.5	
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[‡] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	158
Number of piles within 24-h period	12
Duration to drive a single pile (minutes)	10
Duration of Sound Production within 24-h period (seconds)	7200
10 Log (duration of sound production)	38.57
Propagation (xLogR)	15
Distance from source level measurement (meters)	10

Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring

requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	199	198	173	201	219
PTS Isoleth to threshold (meters)	6.8	0.6	10.1	4.2	0.3

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f ₁	0.2	8.8	12	1.9	0.94
f ₂	19	110	140	30	25
C	-0.13	1.2	1.36	0.75	0.64
Adjustment (dB) [†]	-0.05	-16.83	-23.50	-1.29	-0.60

$$W(f) = C + 10 \log_{10} \left\{ \frac{(f/f_1)^{2a}}{[1 + (f/f_1)^2]^a [1 + (f/f_2)^2]^b} \right\}$$

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.0: 2018

KEY

	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NAVSTA Newport Bulkhead Repair
PROJECT/SOURCE INFORMATION	S45 - Install PZ35 Steel Sheets (3.75 ft per pair/22.5-inch each) at 10 piles/day for 27 days

Please include any assumptions

PROJECT CONTACT	
-----------------	--

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz) [‡]	2.5	
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[‡] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

[†] If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	163
Number of piles within 24-h period	10
Duration to drive a single pile (minutes)	13
Duration of Sound Production within 24-h period (seconds)	7800
10 Log (duration of sound production)	38.92
Propagation (xLogR)	15
Distance from source level measurement (meters)	10

Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring

requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	199	198	173	201	219
PTS Isoleth to threshold (meters)	15.5	1.4	23.0	9.4	0.7

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f ₁	0.2	8.8	12	1.9	0.94
f ₂	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB) [†]	-0.05	-16.83	-23.50	-1.29	-0.60

$$W(f) = C + 10 \log_{10} \left\{ \frac{(f/f_1)^{2a}}{[1 + (f/f_1)^2]^a [1 + (f/f_2)^2]^b} \right\}$$

E.1: IMPACT PILE DRIVING (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.0: 2018

KEY	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NAVSTA Newport Bulkhead Repair
PROJECT/SOURCE INFORMATION	S45 - Install PZ35 Steel Sheets (3.75 ft per pair/22.5-inch each) at 10 piles/day for 27 days
Please include any assumptions	
PROJECT CONTACT	

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz) ^a	2	
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^a Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

[†] If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 75), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: Choose either E1-1 OR E1-2 method to calculate isopleths (not required to fill in sage boxes for both)

E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (USING RMS SPL SOURCE LEVEL)

SEL _{cum}	
Source Level (RMS SPL)	
Number of piles per day	
Strike Duration ^a (seconds)	
Number of strikes per pile	
Duration of Sound Production (seconds)	0
10 Log (duration of sound production)	#NUM!
Propagation (xLogR)	
Distance of source level measurement (meters)	

^a Window that makes up 90% of total cumulative energy (5%-95%) based on Madsen 2005. Unless otherwise specified, source levels are referenced 1 m from the source.

PK	
Source Level (PK SPL)	
Distance of source level measurement (meters)	
Source level at 1 meter	#NUM!

Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS*

^a Impulsive sounds have dual metric thresholds (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	183	185	155	185	203
PTS Isoleth to threshold (meters)	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!
PK Threshold	219	230	202	218	232
PTS PK Isoleth to threshold (meters)	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!

E.1-2: ALTERNATIVE METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT)

Unweighted SEL _{cum} (at measured distance) = SEL _{is} + 10 Log (# strikes)	217.2
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SEL _{cum}	
Source Level (Single Strike SEL)	180
Number of strikes per pile	530
Number of piles per day	10
Propagation (xLogR)	15
Distance of single strike SEL measurement (meters)	10

Unless otherwise specified, source levels are referenced 1 m from the source.

PK	
Source Level (PK SPL)	205
Distance of source level measurement (meters)	10
Source level at 1 meter	220.0

Unless otherwise specified, source levels are referenced 1 m from the source.

RESULTANT ISOPLETHS*

^a Impulsive sounds have dual metric thresholds (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	183	185	155	185	203
PTS Isoleth to threshold (meters)	1,915.4	68.1	2,281.5	1,025.0	74.6
PK Threshold	219	230	202	218	232
PTS PK Isoleth to threshold (meters)	1.2	NA	15.8	1.4	NA

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.5	1.8	1	2
b	2	2	2	2	2
f ₁	0.2	8.8	12	1.9	0.94
f ₂	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB) [†]	-0.01	-19.74	-26.87	-2.08	-1.15

$$W(f) = C + 10 \log_{10} \left\{ \frac{(f/f_1)^{2a}}{[1 + (f/f_1)^2]^a [1 + (f/f_2)^2]^a} \right\}$$

E.1: IMPACT PILE DRIVING (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.0: 2018

KEY	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NAVSTA Newport Bulkhead Repair
PROJECT/SOURCE INFORMATION	S45 - Install steel pipe piles (30-inch) at 2 piles/day for 4 days
Please include any assumptions	
PROJECT CONTACT	

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz) ^a	2	
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^a Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

[†] If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 75), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: Choose either E1-1 OR E1-2 method to calculate isopleths (not required to fill in sage boxes for both)

E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (USING RMS SPL SOURCE LEVEL)

SEL _{cum}	
Source Level (RMS SPL)	
Number of piles per day	
Strike Duration ^a (seconds)	
Number of strikes per pile	
Duration of Sound Production (seconds)	0
10 Log (duration of sound production)	#NUM!
Propagation (xLogR)	
Distance of source level measurement (meters)	

^a Window that makes up 90% of total cumulative energy (5%-95%) based on Madsen 2005. Unless otherwise specified, source levels are referenced 1 m from the source.

PK	
Source Level (PK SPL)	
Distance of source level measurement (meters)	
Source level at 1 meter	#NUM!

Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS*

^a Impulsive sounds have dual metric thresholds (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	183	185	155	185	203
PTS Isoleth to threshold (meters)	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!
PK Threshold	219	230	202	218	232
PTS PK Isoleth to threshold (meters)	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!

E.1-2: ALTERNATIVE METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT)

Unweighted SEL _{cum} (at measured distance) = SEL _{is} + 10 Log (# strikes)	211.3
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SEL _{cum}	
Source Level (Single Strike SEL)	181
Number of strikes per pile	530
Number of piles per day	2
Propagation (xLogR)	15
Distance of single strike SEL measurement (meters)	10

Unless otherwise specified, source levels are referenced 1 m from the source.

PK	
Source Level (PK SPL)	211
Distance of source level measurement (meters)	10
Source level at 1 meter	226.0

Unless otherwise specified, source levels are referenced 1 m from the source.

RESULTANT ISOPLETHS*

^a Impulsive sounds have dual metric thresholds (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	183	185	155	185	203
PTS Isoleth to threshold (meters)	763.7	27.2	909.7	408.7	29.8
PK Threshold	219	230	202	218	232
PTS PK Isoleth to threshold (meters)	2.9	NA	39.8	3.4	NA

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.5	1.8	1	2
b	2	2	2	2	2
f ₁	0.2	8.8	12	1.9	0.94
f ₂	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB) [†]	-0.01	-19.74	-26.87	-2.08	-1.15

$$W(f) = C + 10 \log_{10} \left\{ \frac{(f/f_1)^{2a}}{[1 + (f/f_1)^2]^a [1 + (f/f_2)^2]^a} \right\}$$

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.0: 2018

KEY

	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NAVSTA Newport Bulkhead Repair
PROJECT/SOURCE INFORMATION	S45 - Install 14-inch steel H at 12 piles/day for 13 days

Please include any assumptions

PROJECT CONTACT	
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Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz) [‡]	2.5	
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[‡] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	158
Number of piles within 24-h period	12
Duration to drive a single pile (minutes)	10
Duration of Sound Production within 24-h period (seconds)	7200
10 Log (duration of sound production)	38.57
Propagation (xLogR)	15
Distance from source level measurement (meters)	10

Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring

requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	199	198	173	201	219
PTS Isoleth to threshold (meters)	6.8	0.6	10.1	4.2	0.3

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f ₁	0.2	8.8	12	1.9	0.94
f ₂	19	110	140	30	25
C	-0.13	1.2	1.36	0.75	0.64
Adjustment (dB) [†]	-0.05	-16.83	-23.50	-1.29	-0.60

$$W(f) = C + 10 \log_{10} \left\{ \frac{(f/f_1)^{2a}}{[1 + (f/f_1)^2]^a [1 + (f/f_2)^2]^b} \right\}$$

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.0: 2018

KEY

	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NAVSTA Newport Bulkhead Repair
PROJECT/SOURCE INFORMATION	LNG - Install PZ35 Steel Sheets (3.75 ft per pair/22.5-inch each) at 10 piles/day for 58 days

Please include any assumptions

PROJECT CONTACT	
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Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz) [‡]	2.5	
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[‡] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	163
Number of piles within 24-h period	10
Duration to drive a single pile (minutes)	13
Duration of Sound Production within 24-h period (seconds)	7800
10 Log (duration of sound production)	38.92
Propagation (xLogR)	15
Distance from source level measurement (meters)	10

Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring

requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	199	198	173	201	219
PTS Isoleth to threshold (meters)	15.5	1.4	23.0	9.4	0.7

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f ₁	0.2	8.8	12	1.9	0.94
f ₂	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB) [†]	-0.05	-16.83	-23.50	-1.29	-0.60

$$W(f) = C + 10 \log_{10} \left\{ \frac{(f/f_1)^{2a}}{[1 + (f/f_1)^2]^a [1 + (f/f_2)^2]^b} \right\}$$

E.1: IMPACT PILE DRIVING (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.0: 2018

KEY	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NAVSTA Newport Bulkhead Repair
PROJECT/SOURCE INFORMATION	LNG - Install PZ35 Steel Sheets (3.75 ft per pair/22.5-inch each) at 10 piles/day for 58 days
Please include any assumptions	
PROJECT CONTACT	

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz) ^a	2	
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Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

^a Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

[†] If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 75), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: Choose either E1-1 OR E1-2 method to calculate isopleths (not required to fill in sage boxes for both)

E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (USING RMS SPL SOURCE LEVEL)

SEL _{cum}	
Source Level (RMS SPL)	
Number of piles per day	
Strike Duration ^a (seconds)	
Number of strikes per pile	
Duration of Sound Production (seconds)	0
10 Log (duration of sound production)	#NUM!
Propagation (xLogR)	
Distance of source level measurement (meters)	

^a Window that makes up 90% of total cumulative energy (5%-95%) based on Madsen 2005. Unless otherwise specified, source levels are referenced 1 m from the source.

PK	
Source Level (PK SPL)	
Distance of source level measurement (meters)	
Source level at 1 meter	#NUM!

Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS*

^a Impulsive sounds have dual metric thresholds (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	183	185	155	185	203
PTS Isoleth to threshold (meters)	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!
PK Threshold	219	230	202	218	232
PTS PK Isoleth to threshold (meters)	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!

E.1-2: ALTERNATIVE METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT)

Unweighted SEL _{cum} (at measured distance) = SEL _{is} + 10 Log (# strikes)	217.2
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SEL _{cum}	
Source Level (Single Strike SEL)	180
Number of strikes per pile	530
Number of piles per day	10
Propagation (xLogR)	15
Distance of single strike SEL measurement (meters)	10

Unless otherwise specified, source levels are referenced 1 m from the source.

PK	
Source Level (PK SPL)	205
Distance of source level measurement (meters)	10
Source level at 1 meter	220.0

Unless otherwise specified, source levels are referenced 1 m from the source.

RESULTANT ISOPLETHS*

^a Impulsive sounds have dual metric thresholds (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	183	185	155	185	203
PTS Isoleth to threshold (meters)	1,915.4	68.1	2,281.5	1,025.0	74.6
PK Threshold	219	230	202	218	232
PTS PK Isoleth to threshold (meters)	1.2	NA	15.8	1.4	NA

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.5	1.8	1	2
b	2	2	2	2	2
f ₁	0.2	8.8	12	1.9	0.94
f ₂	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB) [†]	-0.01	-19.74	-26.87	-2.08	-1.15

$$W(f) = C + 10 \log_{10} \left\{ \frac{(f/f_1)^{2a}}{[1 + (f/f_1)^2]^a [1 + (f/f_2)^2]^a} \right\}$$

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.0: 2018

KEY

	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NAVSTA Newport Bulkhead Repair
PROJECT/SOURCE INFORMATION	LNG - Install 14-inch steel H at 12 piles/day for 28 days

Please include any assumptions

PROJECT CONTACT	
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Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz) [‡]	2.5	
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[‡] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	158
Number of piles within 24-h period	12
Duration to drive a single pile (minutes)	10
Duration of Sound Production within 24-h period (seconds)	7200
10 Log (duration of sound production)	38.57
Propagation (xLogR)	15
Distance from source level measurement (meters)	10

Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring

requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	199	198	173	201	219
PTS Isoleth to threshold (meters)	6.8	0.6	10.1	4.2	0.3

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f ₁	0.2	8.8	12	1.9	0.94
f ₂	19	110	140	30	25
C	-0.13	1.2	1.36	0.75	0.64
Adjustment (dB) [†]	-0.05	-16.83	-23.50	-1.29	-0.60

$$W(f) = C + 10 \log_{10} \left\{ \frac{(f/f_1)^{2a}}{[1 + (f/f_1)^2]^a [1 + (f/f_2)^2]^b} \right\}$$