

Dry Dock 1 (P-381) Modernization – LOA Application Revisions Memo

BLUF: Project modifications and shifting Fleet submarine schedules require resequencing certain activities associated with the construction at Dry Dock 1 to accommodate the modifications and meet the new vessel docking demands. Certain activities authorized under the existing IHA (87 FR 19886; April 6, 2022) for the first year of P-381 construction activities will be shifting to the LOA time period while certain activities requested in the LOA application will be shifting to the IHA period. This memo summarizes those changes and identifies impacts to production days and estimated takes of marine mammals resulting from these schedule shifts to aid NMFS in any necessary revisions to the current LOA request and pending Draft Rule.

Reasoning for Necessary Schedule Changes

Modifications were required for the project to be complete and were not part of the scope upon award of the project, one of which affects the schedule for activities in the LOA application. This modification incorporated updated concrete code requirements that led to longer durations to install drilled shafts and construct the dry docks.

Additionally, the Navy submarine fleet schedule has changed since award resulting in necessary resequencing of work. This sequencing minimizes the schedule increases and supports the future needs of the Navy. The following narrative summarizes the requested changes to the LOA application and the impacts to its respective take estimates. Please note that no new pile sizes or processes are being added to the authorization request.

Summary of Schedule Changes

Two activities covered under the existing IHA (87 FR 19886; April 6, 2022) will not be completed during the first year of P-381 construction, so some of those activities will require coverage under the requested LOA. These activities are the Center Wall, Install Foundation Support Piles (Activity ID # A1 through A4) and DD1 N Entrance, Install Temporary Cofferdam (Activity ID # R).

The location of the future center wall requires reinforcement to allow placement of the large pre-cast monolith structures forming the separation between the two new dry docking positions. Specifically, the floor of the existing basin must be able to provide an adequate foundation for the pre-cast monoliths that will make up the dry dock interiors and center wall. The basin floor will be reinforced by excavating 18, 78-inch diameter shafts throughout the footprint of the center wall that will be filled with concrete to create the structural support piles for the center wall. The shafts will be excavated using a cluster drill consisting of multiple down-the-hole (DTH) mono-hammers (refer to Section 1.4.3 of the LOA application). Before the cluster drill is deployed, a 102-inch diameter casing would be set into bedrock and a 5-foot deep rock socket would be excavated using a 102-inch diameter rotary drill (Figure 1-4 of the LOA application). The rock socket would be filled with concrete and a second 78-inch diameter casing would be installed inside the 102-inch casing and set in the concrete. No drilling is required to install the second casing. The 102-inch diameter outer casing would then be removed with a rotary drill (Activity ID A1 through A4; LOA application section 1.3.1 Dry Dock and Gantry Crane Support).

The conversion of the existing west closure wall to the Dry Dock 1 North entrance requires reinforcement of the section of the west closure wall that will become the new dry dock entrance. The existing west closure wall structure will be surrounded by a temporary cofferdam. The cofferdam will be constructed with 48, 28-inch wide, Z-shaped sheet piles. The sheet piles will be installed using an initial

vibratory set followed by driving with impact hammers to refusal (Activity ID R; LOA Application Section 1.3.1-Temporary Structures).

Three activities included in the request for an LOA will begin earlier than the proposed effective date for the LOA, and are covered under the existing IHA (87 FR 19886; April 6, 2022). Therefore, only a portion of those activities will require coverage in the requested LOA, and the proposed number of construction days for these activities has been decreased. These activities are the Berth 1, Mechanical Rock Removal at Basin Floor (Activity ID #10), Removal of Berth 1 Emergency Repair Sheet Piles (Activity ID # 20), and Removal of Berth 1 Emergency Repair Tremie Concrete (Activity ID # 21). The activities are described in detail in the existing LOA application.

A detailed summary of the changes is included below in Table 1 and a revised accounting of all LOA activities is provided in Table 2.

Table 1: Summary of Schedule Changes

Activity	Method and Size or Amount	Change and New Dates	IHA/LOA Change Result	Revised Production Days	Currently Status of Activity
Center Wall, Install Foundation Support Piles (Activity ID # A1 through A4)	Current: 38, 102-inch drilled casings (rotary) Change: 20	Move operation end date later. Current: Mar 2022 through Mar 2023 Change: Mar 2022 through Aug 2023	No additional production days or change in method, just schedule shift	IHA – Reduce from 38 to 20 days LOA – Add 18 days	Covered in IHA, but would require coverage under LOA also to accommodate schedule shifting later. Currently four of these casings have been partially drilled, with none completely done yet. Production days shown as “LOA” to the left reflect what would need to be added to the LOA request for this activity.
	Current: 38, 102-inch drilled sockets (rotary) Change: 20			IHA – Reduce from 38 to 20 days LOA – Add 18 days	
	Current: 38-102-inch drilled casings (rotary) Change: 20	IHA: 20 casings / sockets / shafts LOA: 18 casings / sockets / shafts		IHA – Reduce from 38 to 20 days LOA – Add 18 days	
	Current: 38, 78-inch drilled shafts (cluster DTH) Change: 20			IHA – Reduce from 247 to 130 days LOA – Add 117 days	
DD1 N Entrance, Install Temporary Cofferdam (Activity ID # R)	Impact / Vibratory Hammer Current: 96, 28-inch sheet piles Change: 48 sheets under existing IHA and 48 sheets under requested LOA	Move operation end date later. Current: Dec 2022 through Mar 2023 Change: Feb 2023 through May 2023	No additional production days or change in method, just schedule shift	IHA – Reduce from 12 to 6 days LOA – Add 6 days	Covered in IHA, but would require coverage under LOA to accommodate schedule shifting later. Production days shown as “LOA” to the left reflect what would need to be added to the LOA request for this activity.
Berth 1, Mechanical Rock Removal at Basin Floor (Activity ID # 10)	Hydraulic Rock Hammering 500 cubic yards (cy)	Move operation start date earlier, for some work to be included in the issued IHA. Current: Apr 2023 through Sept 2023 Proposed: Feb 2023 through Sept 2023	Shift 15 production days to the IHA from the current LOA application	IHA – Add 15 days, 200 cy LOA – Reduce from 40 to 25 days, 300 cy	Hydraulic rock hammering was included in the issued IHA so this would not be a new activity from the LOA into the IHA, just additional production days. Production days shown as IHA reflect the number of days that would need to be shifted earlier into an IHA amendment and days shown as LOA are what would

					remain in the current LOA application.
Removal of Berth 1 Emergency Repair Sheet Piles (Activity ID # 20)	Vibratory Extraction Current: 216, 28-inch sheet piles Change: 108 under IHA and 108 under requested LOA	Move operation start date earlier, for some work to be included in the issued IHA. Current: Aug 2023 through Mar 2024 Change: Jan 2023 through Jul 2023	Shift 18 production days to the IHA from the current LOA application	IHA – Add 18 days LOA – Reduce from 36 to 18 days	The existing IHA covers vibratory installation of 28-inch sheet piles but not removal. However, the same proxy source level was used for both installation and extraction of this pile type/size. Production days shown as IHA reflect the number of days that would need to be shifted earlier into an IHA amendment and days shown as LOA are what would remain in the current LOA application.
Removal of Berth 1 Emergency Repair Tremie Concrete (Activity ID # 21)	Hydraulic Rock Hammering 1,000 cubic yards (cy)	Move operation start date earlier, for some work to be included in the issued IHA. Current: Aug 2023 through Mar 2024 Change: Jan 2023 through Aug 2023	Shift 15 production days to the IHA from the current LOA application	IHA – Add 15 days, 500 cy LOA – Reduce from 30 to 15 days, 500 cy	Hydraulic rock hammering was included in the issued IHA so this would not be a new activity from the LOA into the IHA, just adding production days. Production days shown as IHA reflect the number of days that would need to be shifted left into an IHA amendment and days shown as LOA are what would remain in the current LOA application.

Table 2: Revised In-Water Construction Table for Requested LOA

Activity ID	Activity	Total Amount and Estimated Dates (Construction years)	Activity Component	Method	Daily Production Rate	Total Production Days
A1	Center Wall - Install Foundation Support Piles	18 drilled shafts <i>Apr-23¹ to Aug-23</i>	Install 102-inch diameter outer casing	Rotary Drill	1 shaft/day 1 hour/day	18
A2			Pre-drill 102-inch diameter socket	Rotary Drill	1 shaft/day 9 hours/day	18
A3			Remove 102-inch outer casing	Rotary Drill	1 casing/day 15 minutes/casing	18
A4			Drill 78-inch diameter shaft	Cluster drill DTH	6.5 days/shaft 10 hours/day	117
R	Dry Dock 1 North Entrance - Install Temporary Cofferdam	Install 48 sheet piles <i>Apr-23¹ to May-23</i>	28-inch wide Z-shaped sheets	Impact with initial vibratory set	8 sheets/day 5 minutes and 300 blows/pile	6
1	Berth 11 – Remove Shutter Panels	Remove 112 panels <i>Apr-23¹ to May 23 (Const. year 2)</i>	Concrete shutter panels	Hydraulic rock hammering	5 hours/day	56 ²
2	Berth 1 – Remove Sheet Piles	Remove 168 sheet piles <i>Apr -23¹ to Jun 24 (Const. years 2, 3)</i>	25-inch-wide Z-shaped	Vibratory extraction	4 piles/day	42 ²
3	Berth 1 – Remove Granite Block Quay Wall	2,800 cy <i>Apr -23¹ to Jun 24 (Const. years 2, 3)</i>	Removal of granite blocks	Hydraulic rock hammering	2.5 hours/day	47 ²
4	Berth 1 - Top of Wall Removal for Waler Installation	320 lf <i>Apr -23¹ to Jun 24 (Const. years 2, 3)</i>	Mechanical concrete removal	Hydraulic rock hammering	10 hours/day	74 ²
5	Berth 1 – Install southeast corner Support of Excavation (SOE)	Install 28 sheet piles <i>Apr 23 – Jul 23 (Const. year 2)</i>	28-inch-wide z-shaped	Impact with initial vibratory set	4 piles/day 5 minutes/pile and 300 blows/pile	8 ³
6	Berth 11 - Mechanical Rock Removal at Basin Floor	700 cy <i>Apr -23¹ to Aug 23 (Const. year 2)</i>	Excavate Bedrock	Hydraulic rock hammering	12 hours/day	60 ^{2,3}
7	Berth 11 Face - Mechanical Rock Removal at Basin Floor	Drill 924 relief holes <i>Apr -23¹ to Aug 23 (Const. year 2)</i>	4-6 inch diameter holes	DTH mono-hammer	27 holes/day 22 min/hole	35 ²
8	Install Temporary cofferdam extension	Install 14 sheet piles <i>Apr 23 to Jun 23 (Const. year 2)</i>	28-inch-wide z-shaped	Impact with initial vibratory set	4 piles/day 5 minutes/pile and 300 blows/pile	4
9a	Gantry crane Support Piles at Berth 1 West	Drill 16 shafts <i>Apr 23 to Aug 23 (Const. year 2)</i>	Set 102-inch diameter casing	Rotary drill	1 shaft/day 1 hours/day	16
9b			Pre-drill 102-inch rock socket	Rotary drill	1 shaft/day 9 hours/day	16
9c			Remove 102-inch casing	Rotary drill	1 casing/day 15 minutes/casing	16

Table 2: Revised In-Water Construction Table for Requested LOA

Activity ID	Activity	Total Amount and Estimated Dates (Construction years)	Activity Component	Method	Daily Production Rate	Total Production Days
9d			72-inch diameter shafts	Cluster drill DTH	5 days/shaft 10 hours/day	80
10	Berth 1 - Mechanical Rock Removal at Basin Floor	300 cy Apr 23 ¹ - to Sep 23 (Const. year 2)	Excavate Bedrock	Hydraulic rock hammering	13 cy/day 12 hours/day	25 ³
11	Dry Dock 1 North Entrance - Drill Tremie Tie Downs	Drill 50 rock anchors Apr -23 ¹ to Oct 23 (Const. year 2)	9-inch diameter holes	DTH mono-hammer	2 holes/day 5 hours/hole	25 ²
12	Center Wall – Install Tie-In to Existing West Closure Wall	Install 15 sheet piles Apr -23 to Dec 23 (Const. year 2)	28-inch wide Z-shaped	Impact with initial vibratory set	4 piles/day 5 minutes/pile and 300 blows/pile	4
13a	Dry Dock 1 North – Temporary Work Trestle Piles	Drill 20 shafts May 23 to Nov 24 (Const. years 2, 3)	Set 102-inch diameter casing	Rotary drill	1 shaft/day 1 hours/day	20
13b			Pre-drill 102-inch rock socket	Rotary drill	1 shaft/day 9 hours/day	20
13c			Remove 102-inch casing	Rotary drill	1 casing/day 15 minutes/casing	20
13d			84-inch diameter shafts	Cluster drill DTH	3.5 days/shaft 10 hours/day	70
14	Dry Dock 1 North- Remove Temporary Work Trestle Piles	Remove 20 piles May 23 to Nov 24 (Const. years 2, 3)	84-inch diameter drill piles	Rotary drill	1 day/pile 15 minutes/pile	20
15a	Dry Dock 1 North – Install Leveling Piles (Diving Board Shafts)	Drill 18 shafts May 23 – Nov 24 (Const. years 2, 3)	Set 84-inch casing	Rotary Drill	1 shaft/day 1 hours/day	18
15b			Pre-drill 84-inch rock socket	Rotary drill	1 shaft/day 9 hours/day	18
15c			Remove 84-inch casing	Rotary drill	1 casing/day 15 minutes/casing	18
15d			78-inch diameter shaft	Cluster drill DTH	7.5 days/shaft 10 hours/day	135
16a	Wall Support Shafts for Dry Dock 1 North (Berth 11 face and head wall)	Drill 20 shafts Jun 23 to Nov 24 (Const. years 2, 3)	Set 102-inch diameter casing	Rotary drill	1 shaft/day 1 hours/day	20
16b			Pre-drill 102-inch rock socket	Rotary drill	1 shaft/day 9 hours/day	20
16c			Remove 102-inch casing	Rotary drill	1 casing/day 15 minutes/casing	20
16d			Drill 78-inch diameter shaft	Cluster drill DTH	7.5 days/shaft 10 hours/day	150
17a	Foundation (Floor) Shafts for Dry Dock 1	Drill 23 shafts Jun 23 to Nov 24 (Const. years 2, 3)	Set 126-inch diameter Casing	Rotary drill	1 shaft/day 1 hours/day	23
17b			Pre-drill 126-inch rock socket	Rotary drill	1 shaft/day 9 hours/day	23

Table 2: Revised In-Water Construction Table for Requested LOA

Activity ID	Activity	Total Amount and Estimated Dates (Construction years)	Activity Component	Method	Daily Production Rate	Total Production Days
17c	North (foundation support piles)		Remove 126-inch casing	Rotary drill	1 casing/day 60 minutes/casing	23
17d			Drill 108-inch diameter shafts	Cluster drill DTH	8.5 days/shaft 10 hours/day	196
18	Berth 11 End Wall - Remove Temporary Guide Wall	Remove 60 sheet piles <i>Jul 23 to Aug 23 (Const. year 23)</i>	28-inch wide Z-shaped	Vibratory extraction	8 piles/day 5 minutes/pile	10 ³
19	Remove Berth 1 southeast corner SOE	Remove 28 sheet piles <i>Jul 23 to Sep 23 (Const. year 2)</i>	28-inch-wide z-shaped	Vibratory extraction	8 piles/day 5 minutes/pile	5 ³
20	Removal of Berth 1 Emergency Repair Sheet Piles	Remove 108 sheet piles <i>Apr 23¹ to Jul 23 (Const. year 2)</i>	28-inch-wide z-shaped	Vibratory extraction	6 piles/day 5 minutes/pile	18
21	Removal of Berth 1 Emergency Repair Tremie Concrete	500 cy <i>Apr 23¹ to Aug 23 (Const. year 2)</i>	Mechanical concrete removal	Hydraulic rock hammering	4 hours/day	15
22	Center wall foundation -Drill in monolith Tie Downs	Install 72 rock anchors <i>Aug 23 to May 24 (Const. years 2, 3)</i>	9-inch diameter holes	DTH mono-hammer	2 holes/day 5 hours/hole	36
23	Center Wall – Remove tie-in to existing west closure wall (Dry Dock 1 North) ⁴	Remove 16 sheet piles ⁴ <i>Aug 23 to Aug 24 (Const. years 2, 3)</i>	28-inch-wide z-shaped	Vibratory extraction	8 piles/day 5 minutes/pile	3 ³
24	Center wall East- sheet pile tie-in to Existing Wall	Install 23 sheet piles <i>Aug 23 to Oct 24 (Const. years 2, 3)</i>	28-inch wide z-shaped	Impact with initial vibratory set	2 piles/day 5 minutes/pile and 300 blows/pile	12
25	Remove tie-in to West Closure Wall (Dry Dock 1 West)	Remove 15 sheet pile <i>Dec 23 to Dec 24 (Const. years 2, 3)</i>	28-inch wide z-shaped	Vibratory extraction	8 piles/day 5 minutes/pile	3 ³
26	Remove Center wall East- sheet pile tie-in to Existing Wall (Dry Dock 1 West)	Remove 23 sheet piles <i>Dec 23 to Dec 24 (Const. years 2, 3)</i>	28-inch wide z-shaped	Vibratory extraction	8 piles/day 5 minutes/pile	12 ³
27	Dry Dock 1 north entrance - Remove Temporary Cofferdam	Remove 96 sheet piles <i>Jan 24 to Sep 24 (Const. years 2, 3)</i>	28-inch wide z-shaped	Vibratory extraction	8 piles/day 5 minutes/pile	12
28	Remove temporary cofferdam extension	Remove 14 sheet piles <i>Jan 24 to Sep 24 (Const. years 2, 3)</i>	28-inch wide z-shaped	Vibratory extraction	8 piles/day 5 minutes/pile	2

Table 2: Revised In-Water Construction Table for Requested LOA

Activity ID	Activity	Total Amount and Estimated Dates (Construction years)	Activity Component	Method	Daily Production Rate	Total Production Days
29a	Dry Dock 1 West - Install Temporary Work Trestle Piles	Drill 20 shafts <i>Apr 24 to Feb 26</i> <i>(Const. years 3, 4)</i>	Set 102-inch diameter casing	Rotary drill	1 shaft/day 1 hours/day	20
29b			Pre-drill 102-inch rock socket	Rotary drill	1 shaft/day 9 hours/day	20
29c			Remove 102-inch casing	Rotary drill	1 casing/day 15 minutes/casing	20
29d			84-inch diameter shafts	Cluster drill DTH	3.5 days/shaft 10 hours/day	70
30	Dry Dock 1 West - Remove Temporary Work Trestle Piles	Remove 20 piles <i>Apr 24 to Feb 26</i> <i>(Const. years 3, 4)</i>	84-inch diameter piles	Rotary drill	1 day/pile 15 minutes/pile	20
31a	Wall Support Shafts for Dry Dock 1 West (Berth 1 face)	Drill 22 shafts <i>Jun 24 to Feb 26</i> <i>(Const. years 3, 4)</i>	Set 102-inch diameter casing	Rotary drill	1 shaft/day 1 hours/day	22
31b			Pre-drill 102-inch rock socket	Rotary drill	1 shaft/day 9 hours/day	22
31c			Remove 102-inch casing	Rotary drill	1 casing/day 15 minutes/casing	22
31d			78-inch diameter shaft	Cluster drill DTH	7.5 days/shaft 10 hours/day	165
32a	Foundation (Floor) Shafts for Dry Dock 1 West (foundation support piles)	Drill 23 shafts <i>Jun 24 to Feb 26</i> <i>(Const. years 3, 4)</i>	Set 126-inch casing	Rotary Drill	1 shaft/day 1 hours/day	23
32b			Pre-drill 126-inch rock socket	Rotary drill	1 shaft/day 9 hours/day	23
32c			Remove 126-inch casing	Rotary drill	1 casing/day 15 minutes/casing	23
32d			Drill 108-inch diameter shaft	Cluster drill DTH	8.5 days/shaft 10 hours/day	196
33a	Dry Dock 1 West - Install Leveling Piles (Diving Board Shafts)	Drill 18 shafts <i>Jun 24 to Feb 26</i> <i>(Const. years 3, 4)</i>	Set 84-inch casing	Rotary Drill	1 shaft/day 1 hours/day	18
33b			Pre-drill 84-inch rock socket	Rotary drill	1 shaft/day 9 hours/day	18
33c			Remove 84-inch casing	Rotary drill	1 casing/day 15 minutes/casing	18
33d			Drill 78-inch diameter shaft	Cluster drill DTH	7.5 days/shaft 10 hours/day	135
34	Dry Dock 1 North - Tie Downs	Install 36 rock anchors <i>Jul 24 to Jul 25</i> <i>(Const. years 3, 4)</i>	9-inch diameter holes	DTH mono-hammer	2 holes/day 5 hours/hole	18
35	Dry Dock 1 West – Install Tie Downs	Install 36 rock anchors <i>Dec 25 to Dec 26</i> <i>(Const. years 4, 5)</i>	9-inch diameter hole	DTH mono-hammer	2 holes/day 5 hours/hole	18
Total excavated holes/drilled shafts/sheet piles		1,118/198/580				

Notes: 1 - -These activities began in construction year 1

2 - These activities began in year 1. ONLY the number of production days occurring in construction years 2 through 6 are presented.

3 - Additional production days have been added to account for equipment repositioning

4 - Sheet piles were installed in construction year 1

Source: 381 Constructors, 2022.

Acoustic Modeling and Take Analysis: As a result of the schedule changes described above and shown in Tables 1 and 2, revised take estimates for the LOA have been calculated based on the isopleth distances provided in Tables 3 and 4. Revised takes are presented in Table 5 for the activities that are affected by schedule shifts described above.

Table 3. Calculated Maximum Distances Corresponding to MMPA Thresholds for Underwater Sound from Impulsive Noise (DTH, Impact Pile Driving, Hydraulic Rock Hammering)

Activity ID	Figure Number	Activity	Purpose	Count and Size/Duration	Total Production Days	Level A (PTS Onset) Harassment		Level B (Behavioral) Harassment
						Harbor Porpoise Distance to 155 dB SEL _{cum} Threshold/Area of Harassment Zone	Phocids Distance to 185 dB SEL _{cum} Threshold/Area of Harassment Zone	Harbor Porpoise and Phocids 160 dB RMS (120 dB DTH) Threshold/ Area of Harassment Zone
A4	IHA 6-1	DTH Cluster Drill	Foundation Support Piles for Center Wall	18, 78-inch shafts	117	84,380.4 m/ 0.417417 km ²	37,909.7 m/ 0.417417 km ²	39,811* m/0.417417 km ²
R	IHA 6-5	Impact Pile Driving	Install Sheet Piles for Dry Dock 1 North Entrance and Temporary Cofferdam	48, 28-inch Z-shaped sheets	6	1,568.6 m/ 0.417417 km ²	704.7 m/ 0.364953 km ²	2,512 m/0.417417 km ²

* This distance varies from similar activities in the application due to updated guidance from NMFS on the proxy for Level B harassment. The distances in the application were calculated based on previously issued guidance that was not available at the time of submission.

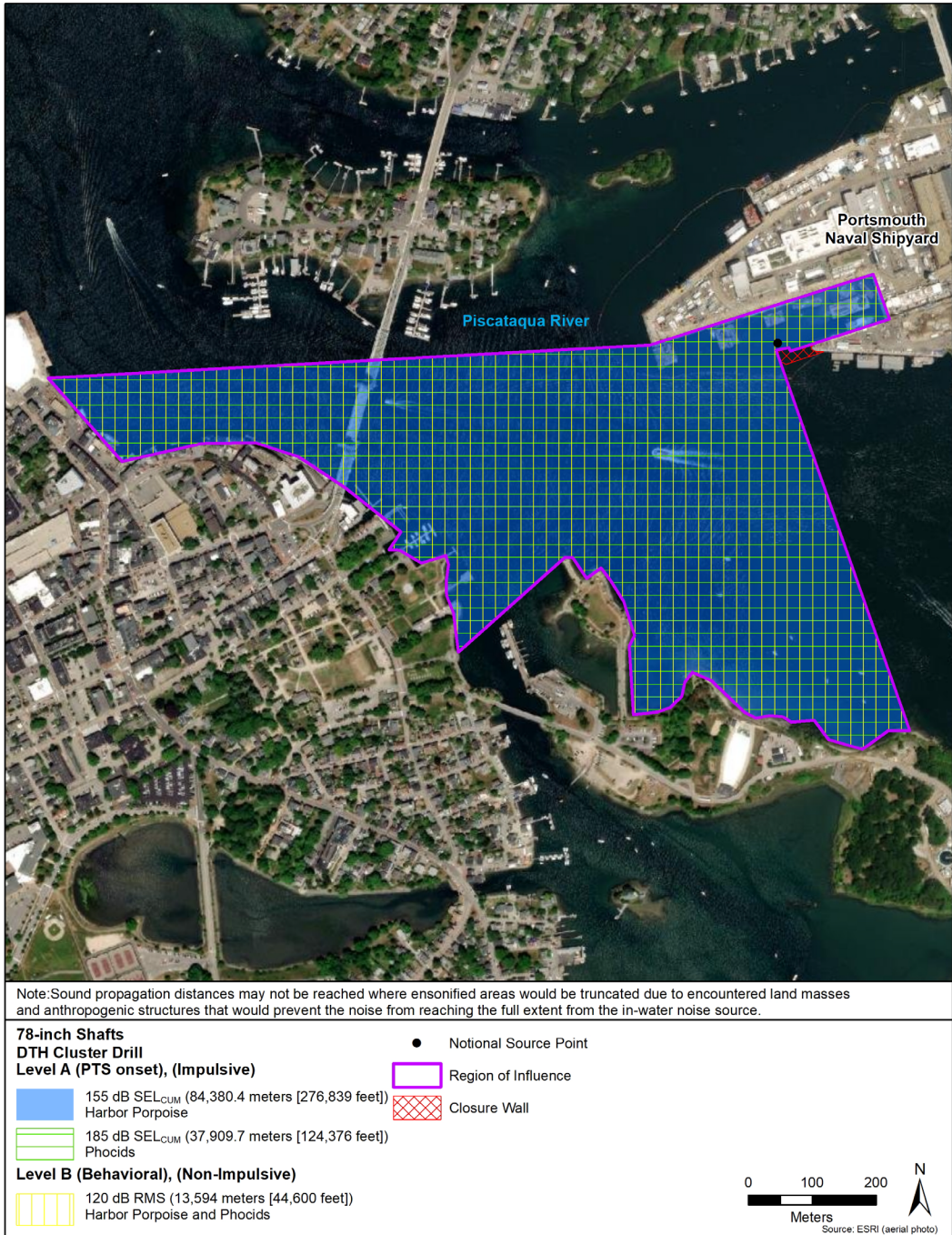


Figure 6-1 from IHA Application. Level A Injury (PTS Onset) and Level B (Behavioral) Harassment Zones from DTH Cluster Drill of 78-inch Shafts (Impulsive)

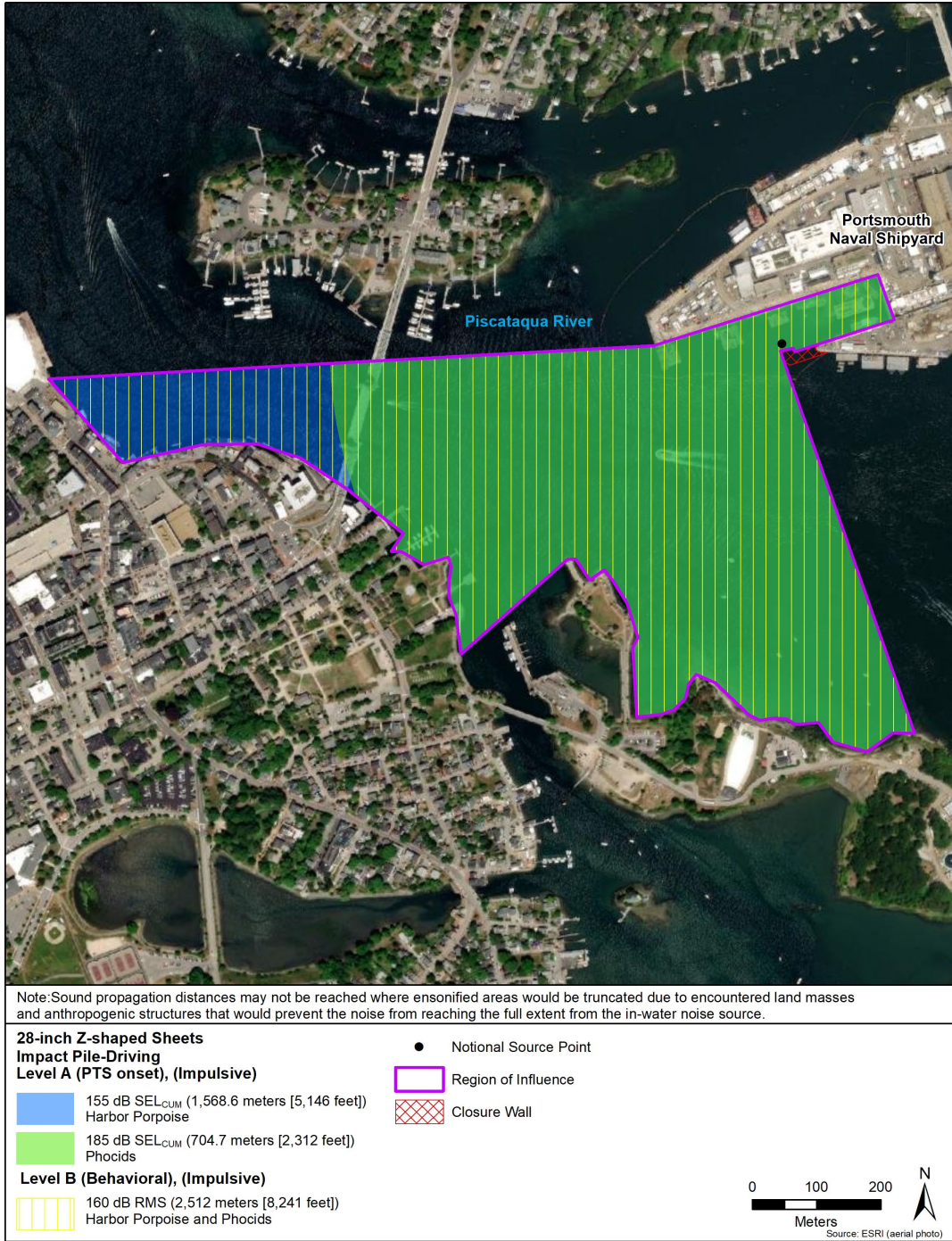


Figure 6-5 from IHA Application. Level A Injury (PTS Onset) and Level B (Behavioral) Harassment Zones from Impact Pile Driving for 28-inch Z-Shaped Sheets (Impulsive)

Table 4. Calculated Maximum Distances Corresponding to MMPA Thresholds for Underwater Sound from Non-Impulsive Noise (Rotary Drilling and Vibratory Pile Driving/Extracting)

Activity ID	Figure Number	Activity	Purpose	Count and Size	Total Production Days	Level A (PTS Onset) Harassment		Level B (Behavioral) Harassment
						Harbor Porpoise Distance to 173 dB SEL _{cum} Threshold/Area of Harassment Zone	Phocids Distance to 201 dB SEL _{cum} Threshold/Area of Harassment Zone	Harbor Porpoise and Phocids Distance to 120 dB RMS Threshold/Area of Harassment Zone
A1	6-9	Rotary Drill	Center Wall Foundation Pile – Install Outer Casing	18, 102-Inch Borings	18	2.1 m/ 0.000014 km ²	1.3 m/ 0.000005km ²	1,848 M/0.417417 Km ²
A2	6-9	Rotary Drill	Center Wall Foundation Pile –Pre-Drill Socket	18, 102-Inch Borings	18	8.9 m/0.000248 km ²	5.4 m/ 0.000091 km ²	1,848 M/0.417417 Km ²
A3	6-9	Rotary Drill	Center Wall Foundation Pile –Remove Outer Casing	18, 102-Inch Borings	18	0.8 m/ 0.000002 km ²	0.5 m/ 0.000001 km ²	1,848 M/0.417417 Km ²
R	6-9	Vibratory Pile Driving	Install Sheet Piles for Dry Dock 1 North Entrance and Temporary Cofferdam	48, 28-Inch Z-Shaped Sheets	6	19.4 m/0.001041 km ²	8.0 m/0.0002 km ²	13,594 M 0.417417 Km ²

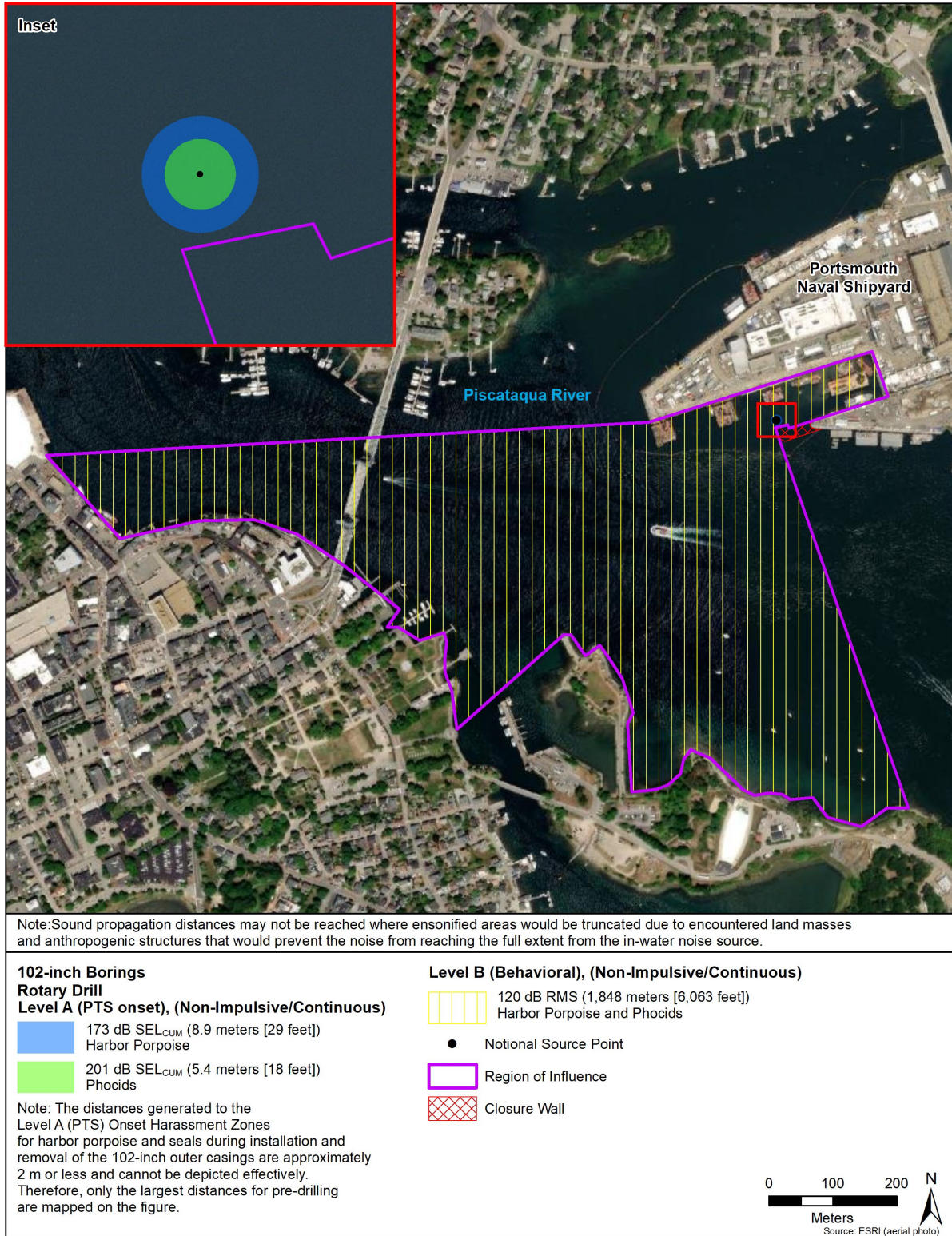
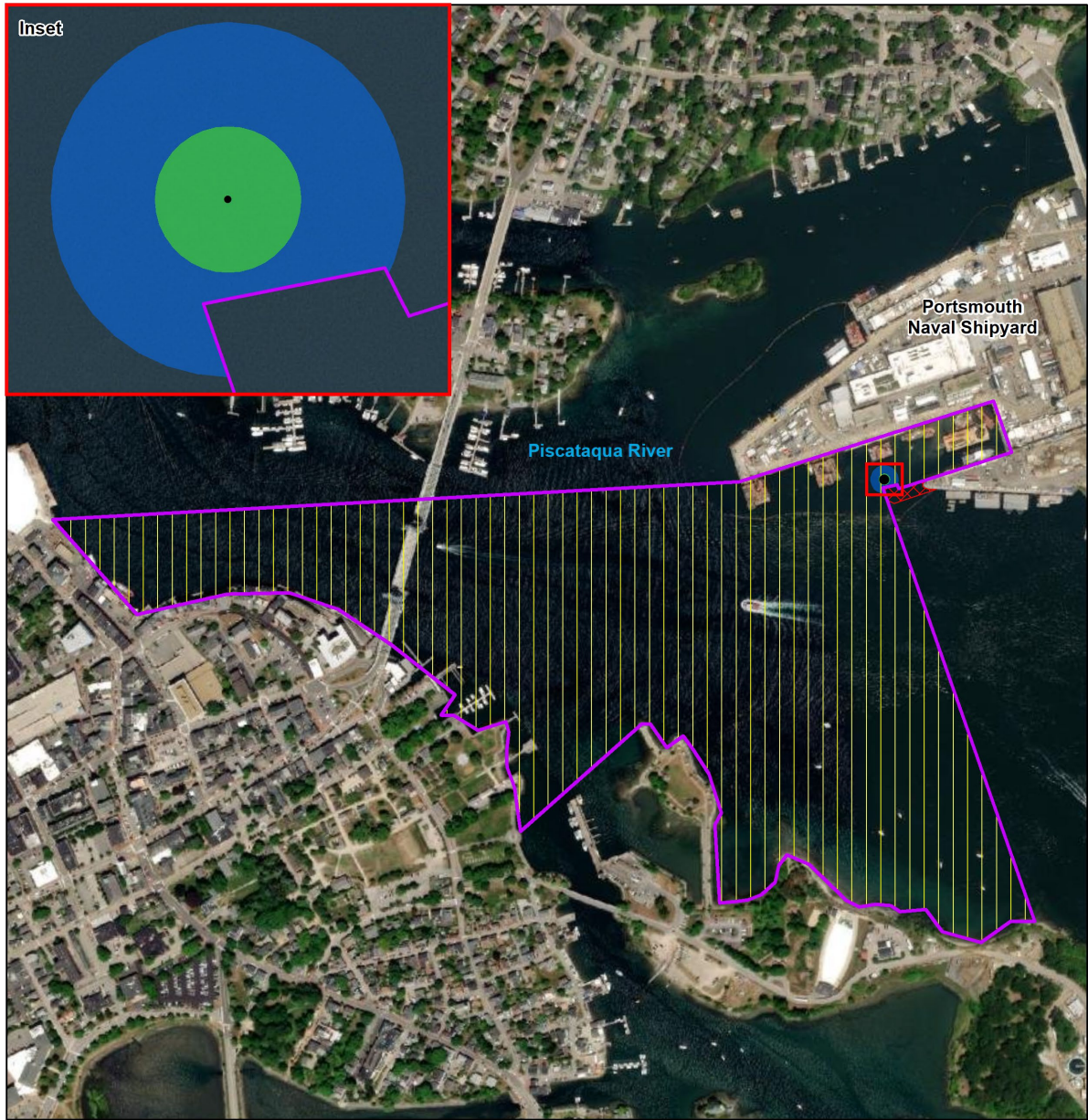


Figure 6-9 from IHA Application. Level A Injury (PTS Onset) and Level B (Behavioral) Harassment Zones from Rotary Drilling for 102-inch Casings and Borings (Non-Impulsive/Continuous)



Note: Sound propagation distances may not be reached where ensounded areas would be truncated due to encountered land masses and anthropogenic structures that would prevent the noise from reaching the full extent from the in-water noise source.

**28-inch Z-shaped Sheets
Vibratory Pile-Driving
Level A (PTS onset), (Non-Impulsive/Continuous)**

- 173 dB SEL_{CUM} (19.4 meters [64 feet])
Harbor Porpoise
- 201 dB SEL_{CUM} (8 meters [26 feet])
Phocids

Level B (Behavioral), (Non-Impulsive/Continuous)

- 120 dB RMS (13,594 meters [44,600 feet])
Harbor Porpoise and Phocids

- Notional Source Point
- Region of Influence
- Closure Wall

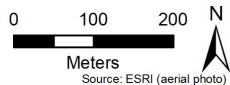


Figure 6-11 from IHA Application. Level A Injury (PTS Onset) and Level B (Behavioral) Harassment Zones from Vibratory Pile Driving 28-inch Z-Shaped Sheets (Non-Impulsive/Continuous)

Table 5: Revised Take Estimate for Requested LOA

Activity ID	Activity	Total Amount and Estimated Dates (Construction years)	Activity Component	Method	Daily Production Rate	Total Production Days	Calculated Takes	Revised Total Production Days	Revised Takes
10	Berth 1 - Mechanical Rock Removal at Basin Floor	500 cy (300cy) Apr 23 ¹ - to Sep 23 (Const. year 2)	Excavate Bedrock	Hydraulic rock hammering	13 cy/day 12 hours/day	40	HP=1(A)/0(B) HS=50(A)/0(B) GS=3(A)/0(B)	25	HP=0(A)/0(B) HS=31(A)/0(B) GS=2(A)/0(B)
20	Removal of Berth 1 Emergency Repair Sheet Piles	Remove 216 (108) sheet piles Aug 23 to Mar 24 (Const. year 2)	28-inch-wide z-shaped	Vibratory extraction	6 piles/day 5 minutes/pile	36	HP=0(A)/1(B) HS=0(A)/45(B) GS=0(A)/3(B)	18	HP=0(A)/0(B) HS=0(A)/23(B) GS=0(A)/2(B)
21	Removal of Berth 1 Emergency Repair Tremie Concrete	1,000 cy (500 cy) Aug 23 to Mar 24 (Const. year 2)	Mechanical concrete removal	Hydraulic rock hammering	4 hours/day	30	HP=1(A)/0(B) HS=38(A)/0(B) GS=3(A)/0(B)	15	HP=0(A)/0(B) HS=19(A)/0(B) GS=1(A)/0(B)
A1	Center Wall - Install Foundation Support Piles	18 drilled shafts Apr-23* to Aug-23 (Const. year 2)	Install 102-inch diameter outer casing	Rotary Drill	1 shaft/day 1 hour/day	N/A	N/A	18	HP=0(A)/0(B) HS=0(A)/23(B) GS=0(A)/2(B)
A2			Pre-drill 102-inch diameter socket	Rotary Drill	1 shaft/day 9 hours/day	N/A	N/A	18	HP=0(A)/0(B) HS=0(A)/23(B) GS=0(A)/2(B)
A3			Remove 102-inch outer casing	Rotary Drill	1 casing/day 15 minutes/casing	N/A	N/A	18	HP=0(A)/0(B) HS=0(A)/23(B) GS=0(A)/2(B)
A4			Drill 78-inch diameter shaft	Cluster drill DTH	6.5 days/shaft 10 hours/day	N/A	N/A	117	HP=2(A)/0(B) HS=147(A)/0(B) GS=10(A)/0(B)
R	Dry Dock 1 North Entrance - Install	Install 48 sheet piles	28-inch wide Z-shaped sheets	Impact	8 sheets/day 300 blows/pile	N/A	N/A	6	HP=0(A)/0(B) HS=7(A)/0(B) GS=0(A)/0(B)

Activity ID	Activity	Total Amount and Estimated Dates (Construction years)	Activity Component	Method	Daily Production Rate	Total Production Days	Calculated Takes	Revised Total Production Days	Revised Takes
	Temporary Cofferdam	<i>Apr 23* to May-23 (Const. year 2)</i>							
R	Dry Dock 1 North Entrance - Install Temporary Cofferdam	Install 48 sheet piles <i>Apr 23* to May-23 (Const. year 2)</i>	28-inch wide Z-shaped sheets	vibratory	8 sheets/day 5 minutes/pile	N/A	N/A	6	HP=0(A)/0(B) HS=0(A)/8(B) GS=0(A)/1(B)
Totals						106	HP=2(A)/1(B) HS=88(A)/45(B) GS=6(A)/3(B)	256	HP=2(A)/0(B) HS=204(A)/100(B) GS=13(A)/9(B)

Schedule shifts in the LOA application will result in an additional 150 production days during the first year of the LOA period from April 1, 2023 – March 31, 2024 (i.e., the second year of P-381 construction activities). No activities would extend beyond the first year of the LOA. The resulting calculated take adjustments for the LOA request result in 0 additional Level A and 1 less Level B take for harbor porpoise; 115 additional Level A and 55 additional Level B takes for harbor seal; and 7 additional Level A and 6 additional Level B takes for gray seal. However, the harbor and gray seal Level B takes were previously adjusted to account for group size and observation data. Since the revised calculations were still less than this adjusted amount, no changes to the adjusted Level B take request have been made and the increases in production activities would only affect the number of Level A takes requested during the first year of the LOA period. Table 6 summarizes the calculated and requested takes for year 1 of the LOA (i.e. the second year of P-381 construction activities). The addition of these takes would not alter the conclusions made in the LOA application with regards to effects to species (See Chapters 7, 9, and 10 of the application).

Table 6 Total Revised Take by Species for Construction Year 2

<i>Species</i>	<i>Initial Requested Calculated Takes (Raw)</i>		<i>Initial Requested Calculated Takes (Adjusted using observation and group size data)</i>		<i>Revised Calculated Takes (Raw)</i>		<i>Revised Requested Calculated Takes (Adjusted using observation and group size data)</i>	
	<i>Level A (PTS Onset)</i>	<i>Level B (Behavioral)</i>	<i>Level A (PTS Onset)</i>	<i>Level B (Behavioral)</i>	<i>Level A (PTS Onset)</i>	<i>Level B (Behavioral)</i>	<i>Level A (PTS Onset)</i>	<i>Level B (Behavioral)</i>
Harbor porpoise	13	3	13	3	13	2	13	3
Harbor seal	880	528	883	1,047 ²	998	583	998	1,047 ²
Gray seal	60	34	60	70 ²	67	40	67	70 ²
Hooded seal	5 ¹	5 ¹	5 ¹	5 ¹	5 ¹	5 ¹	5 ¹	5 ¹
Harp seal	5 ¹	5 ¹	5 ¹	5 ¹	5 ¹	5 ¹	5 ¹	5 ¹

Notes: HP = harbor porpoise; HS = harbor seal; GS = gray seal.

1. To guard against unauthorized take, assume take of 1/month of construction from January through May when these species may occur
2. Level B takes for these species have been increased as described in Chapter 6.14.2 of the LOA application and, therefore, do not correspond with the calculated raw number of takes presented in Table 6-12 of the LOA application.

A: STATIONARY SOURCE: Non-Impulsive, Continuous

VERSION 2.2: 2020

KEY

	Action Proponent Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isopleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Year 1 IHA P-381 multi mission Dry Dock 1 PNSY
PROJECT/SOURCE INFORMATION	Rotary drilling to set 102-in diameter outer casing for center wall foundation support piles (Apr 2023 - Aug 2023)
PROJECT CONTACT	

Activity ID A1

Please include any assumptions

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz)*	2	use 2 for drilling per intro tab
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Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value.

* 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 47), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (L_{rms})	169
Duration of Sound Production (hours) within 24-h period	1
Duration of Sound Production (seconds)	3600
10 Log (duration of sound production)	35.56
Propagation loss coefficient	15

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 Isopleth to threshold (meters)	2.3	0.1	2.1	1.3	0.1

A: STATIONARY SOURCE: Non-Impulsive, Continuous

VERSION 2.2: 2020

KEY

	Action Proponent Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isopleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Year 1 IHA P-381 multi mission Dry Dock 1 PNSY
PROJECT/SOURCE INFORMATION	Rotary drilling 102-in diameter socket for center wall foundation support piles (Apr 2023 - Aug 2023)
Please include any assumptions	
PROJECT CONTACT	

Activity ID A2

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz)*	2	use 2 for drilling per intro tab
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Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value.

* 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 47), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (L_{rms})	169
Duration of Sound Production (hours) within 24-h period	9
Duration of Sound Production (seconds)	32400
10 Log (duration of sound production)	45.11
Propagation loss coefficient	15

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 Isopleth to threshold (meters)	10.1	0.6	8.9	5.4	0.4

A: STATIONARY SOURCE: Non-Impulsive, Continuous

VERSION 2.2: 2020

KEY

	Action Proponent Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isopleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Year 1 IHA P-381 multi mission Dry Dock 1 PNSY
PROJECT/SOURCE INFORMATION	Remove 102-in diameter outer casing for center wall foundation support piles (Apr 2023 - Aug 2023)
Please include any assumptions	
PROJECT CONTACT	

Activity ID A3

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz)*	2	use 2 for drilling per intro tab
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Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value.

* 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 47), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (L_{rms})	169
Duration of Sound Production (hours) within 24-h period	0.25
Duration of Sound Production (seconds)	900
10 Log (duration of sound production)	29.54
Propagation loss coefficient	15

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 Isopleth to threshold (meters)	0.9	0.1	0.8	0.5	0.0

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

VERSION 2.2: 2020

KEY

	Action Proponent Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Year 1 IHA P-381 multi mission Dry Dock 1 PNSY
PROJECT/SOURCE INFORMATION	DTH drilling of 38, 78-inch diameter shafts - foundation support piles for center wall (Apr 2023 - Aug 2023)

Activity ID A4

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	
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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.

STEP 3: SOURCE-SPECIFIC INFORMATION

Sound Pressure Level (L_{rms}), specified at "x" meters (Cell B30)	195.2
Number of piles within 24-h period	1
Duration to drive a single pile (minutes)	600
Duration of Sound Production within 24-h period (seconds)	36000
10 Log (duration of sound production)	45.56
Transmission loss coefficient	15
Distance of sound pressure level (L_{rms}) measurement (meters)	10

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	183	185	155	185	203
PTS Isoleth to threshold (meters)	70,839.1	2,519.5	84,380.4	37,909.7	2,760.2

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
f₁	0.2	8.8	12	1.9	0.94
f₂	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

NOTE: If user decided to override the values, they need to make sure to download the spreadsheet to ensure the built-in calculations function correctly.

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

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

VERSION 2.2: 2020
KEY

Action Proponent Provided Information
NMFS Provided Information (Technical Guidance)
Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Year 1 IHA P-381 multi mission Dry Dock 1 PNSY
PROJECT/SOURCE INFORMATION	vibro install of 48, 28-inch sheets DD1N entrance, Temp cofferdam (Apr 2023- May 2023)

Activity ID R

Please include any assumptions

PROJECT CONTACT

STEP 2: WEIGHTING FACTOR ADJUSTMENT

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

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.

STEP 3: SOURCE-SPECIFIC INFORMATION

Sound Pressure Level (L_{rms}), specified at "x" meters (Cell B30)	167
Number of piles within 24-h period	8
Duration to drive a single pile (minutes)	5
Duration of Sound Production within 24-h period (seconds)	2400
10 Log (duration of sound production)	33.80
Transmission loss coefficient	15
Distance of sound pressure level (L_{rms}) measurement (meters)	10

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)	13.1	1.2	19.4	8.0	0.6

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

VERSION 2.2: 2020

KEY

	Action Proponent Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Year 1 IHA P-381 multi mission Dry Dock 1 PNSY	
PROJECT/SOURCE INFORMATION	impact install of 48, 28-inch sheets DD1N entrance, Temp cofferdam (Apr 2023 - May 2023)	Activity ID R

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	
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* Broadband: 95% frequency contour percentile (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 73), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: METHOD E.1-1 is PREFERRED method when SEL-based source levels are available (because pulse duration is not required). Only use method E.1-2 if SEL-based source levels are not available.

E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT) PREFERRED METHOD (pulse duration not needed)

Unweighted SEL _{cum} (at measured distance) = SEL _{ss} + 10 Log (# strikes)	214.8
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SEL_{cum}

Single Strike SEL _{ss} ($L_{E,p}$, single strike) specified at "x" meters (Cell B32)	181
Number of strikes per pile	300
Number of piles per day	8
Transmission loss coefficient	15
Distance of single strike SEL _{ss} ($L_{E,p}$, single strike) measurement (meters)	10

PK

$L_{p,0-pk}$ specified at "x" meters (Cell G29)	211
Distance of $L_{p,0-pk}$ measurement (meters)	10
$L_{p,0-pk}$ Source level	226.0

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)	1,316.9	46.8	1,568.6	704.7	51.3
PK Threshold	219	230	202	218	232
PTS PK Isoleth to threshold (meters)	2.9	NA	39.8	3.4	NA

"NA": PK source level is \leq to the threshold for that marine mammal hearing group.