
APPENDIX I

Air Emissions Estimates

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This appendix provides detailed information on the calculations of air emissions associated with the Proposed Action and Alternatives. Information from these calculations was incorporated into the analyses in Section 4.3 (Air Quality) of the Environmental Assessment.

1. Emissions Determination

The Proposed Action would result in air emissions from the operation of propulsion and auxiliary motors of harbor craft vessels, land vehicles, and non-road construction equipment for the duration of the project. The type and amount of emissions would depend on each emission source and the time during which the source is operated. Section 1.1 (Emission Sources) lists the assumptions underlying the analysis with regard to source types and duration for each for the duration of the project. Section 1.2 (Methodology) identifies the methodology used to evaluate the emissions for the different types of sources. Table 1.0 show the results of the estimated project emissions. Each project element of the Proposed Action differs in duration, and the project involves multiple phases of work that may be constructed consecutively or concurrently across multiple funding years depending on funding availability. Construction durations are estimated for each project element, below, and do not include weather delays. Future maintenance of dredging areas associated with the Proposed Action will occur.

1.1. Emission Sources – Alternative 1 (Riprap Sill)

Emission sources and operating hours for Alternative 2 assume dredged material placement at the Fort Eustis Dredged Material Management Area (FEDMMA). A mechanical dredge was assumed as emission factors were greater than those for a hydraulic cutterhead dredge. Note that either dredge plant type may be used for any proposed dredging component.

1.1.1. Year 1: Finger Piers Partial Demolition, Construction, and Dredging (approximately 50 days total)

- See Table 1-1 for equipment estimates.
- See Table 1-1 for on-road vehicle estimates

Table 1-1. Equipment emission sources and total operating hours for partial finger pier demolition, construction, and dredging in Year 1.

Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Total Operating Hours
Vibratory Pile Extractor	1	171	127.5147	45	2	90
Pile Driver	1	329	245.3353	45	8	360
26CY Mech Dredge	1	2500 hp Main	1864.25	5	12	60
	1	500 hp aux	372.85	5	12	60
Work Tug	3	750 hp main	559.275	5	12	180
	3	100 hp aux	74.57	5	12	180
Barge	3	171 hp aux	127.5147	45	12	1620
Towing Vessel	3	4000 hp main	2982.8	50	12	1800
	3	400 hp aux	298.28	50	12	1800
Crew Boat	1	400 hp main	298.28	50	12	600
	1	80 hp aux	59.656	50	12	600
Survey Boat	1	400 hp main	298.28	5	6	30
	1	80 hp aux	59.656	5	6	30
Dump Scows	3	250 hp aux	186.425	5	12	180
Crane (Composite)	2	-	-	45	10	900
Forklift (Composite)	1	-	-	45	10	450
Scoop Loader, Rubber Tired (Composite)	1	-	-	45	10	450
Scoop Loader (Composite)	1	-	-	45	10	450
Concrete Mixer (Composite)	1	-	-	45	5	225
Concrete Saw (Composite)	1	-	-	45	2	90

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Table 1-2. On-road vehicle emission sources and operating days for partial finger pier demolition, construction, and dredging in Year 1.

On-road vehicles	Unit	Operating Days	Miles Per Day
Heavy duty diesel truck	2	45	50
Worker Trips (LDGV)	5	45	20
Worker Trips (LDGT)	5	45	20

1.1.2. Year 1: Mooring Field Demolition, Realignment, Access Dredging (approximately 21 days total)

- See Table 1-3 for equipment estimates.
- See Table 1-4 for on-road vehicle estimates.

Table 1-3. Equipment emission sources and total operating hours for mooring field demolition, realignment, and access dredging in Year 1.

Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Total Operating Hours
Vibratory Pile Extractor	1	171	127.5147	14	3	42
Pile Driver	1	329	245.3353	14	4	56
26CY Mech Dredge	1	2500 hp Main	1864.25	7	12	84
	1	500 hp Aux	372.85	7	12	84
Work Tug	3	750 hp main	559.275	11	12	396
	3	100 hp aux	74.57	11	12	396
Barge	3	171 hp aux	171	14	12	504
Towing Vessel	3	4000 hp main	2982.8	21	12	756
	3	400 hp aux	298.28	21	12	756
Crew Boat	1	400 hp main	298.28	21	12	252
	1	80 hp aux	59.656	21	12	252
Survey Boat	1	400 hp main	298.28	7	6	42
	1	80 hp aux	59.656	7	6	42
Dump Scows	3	250 hp aux	186.425	7	12	252
Crane (Composite)	2	-	-	14	6	168
Forklift (Composite)	1	-	-	14	6	84
Scoop Loader, Rubber Tired (Composite)	1	-	-	14	6	84
Scoop Loader (Composite)	1	-	-	14	6	84

Table 1-2. On-road vehicle emission sources and operating days for mooring field demolition, realignment, and access dredging in Year 1.

On-road vehicles	Unit	Operating Days	Miles Per Day
Heavy duty diesel truck	2	14	50
Worker Trips (LDGV)	5	21	20
Worker Trips (LDGT)	5	21	20

1.1.3. Year 1: Mooring Field Riprap Sill Construction (approximately 29 days total)

- See Table 1-5 for equipment estimates.
- See Table 1-6 for on-road vehicle estimates.

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Table 1-5. Equipment emission sources and total operating hours for mooring field riprap sill construction and associated dredging in Year 1.

Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Total Operating Hours
Pile Driver	1	329	245.3353	21	12	252
26CY Mech Dredge	1	2500 hp main	1864.25	8	12	96
	1	500 hp aux	372.85	8	12	96
Work Tug	3	750 hp main	559.275	8	12	288
	3	100 hp aux	74.57	8	12	288
Barge	3	171 hp aux	127.5147	21	12	756
Towing Vessel	3	4000 hp main	2982.8	29	12	1044
	3	400 hp aux	298.28	29	12	1044
Crew Boat	1	400 hp main	298.28	29	12	348
	1	80 hp aux	59.656	29	12	348
Survey Boat	1	400 hp main	298.28	8	6	48
	1	80 hp aux	59.656	8	6	48
Dump Scows	3	250 hp aux	186.425	8	12	288
Crane (Composite)	2	-	-	21	10	420
Excavators (Composite)	3	-	-	21	10	630
Forklift (Composite)	1	-	-	21	10	210
Scoop Loader (Composite)	1	-	-	21	10	210

Table 1-6. On-road vehicle emission sources and operating days for mooring field riprap sill construction and associated dredging in Year 1.

On-road Vehicles	Unit	Operating Days	Miles Per Day
Worker Trips (LDGV)	5	29	20
Worker Trips (LDGT)	5	29	20

1.1.4. Year 2: Finger Piers Partial Demolition, Construction, and Dredging (approximately 35 days total)

- See Table 1-7 for equipment estimates.
- See Table 1-8 for on-road vehicle estimates.

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Table 1-7. Equipment emission sources and total operating hours for finger pier partial demolition, construction, and dredging in Year 2.

Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Total Operating Hours
Vibratory Pile Extractor	1	171	127.5147	30	2	60
Pile Driver	1	329	245.3353	30	8	240
26CY Mech Dredge	1	2500 hp main	1864.25	5	12	60
	1	500 hp aux	372.85	5	12	60
Work Tug	3	750 hp main	559.275	5	12	180
	3	100 hp aux	74.57	5	12	180
Barge	3	171 hp aux	127.5147	30	12	1080
Towing Vessel	3	4000 hp main	2982.8	35	12	1260
	3	400 hp aux	298.28	35	12	1260
Crew Boat	1	400 hp main	298.28	35	12	420
	1	80 hp aux	59.656	35	12	420
Survey Boat	1	400 hp main	298.28	5	6	30
	1	80 hp aux	59.656	5	6	30
Dump Scows	3	250 hp aux	186.425	5	12	180
Crane (Composite)	2	-	-	30	10	600
Forklift (Composite)	1	-	-	30	10	300
Scoop Loader, Rubber Tired (Composite)	1	-	-	30	10	300
Scoop Loader (Composite)	1	-	-	30	10	300
Concrete Mixer (Composite)	1	-	-	30	6	180
Concrete Saw (Composite)	1	-	-	30	6	180

Table 1-8. On-road vehicle emission sources and operating days for finger pier partial demolition, construction, and dredging in Year 2.

On-road Vehicles	Unit	Operating Days	Miles Per Day
Heavy duty diesel truck	2	30	50
Worker Trips (LDGV)	5	35	20
Worker Trips (LDGT)	5	35	20

1.1.5. Year 2: Landship Construction (approximately 14 days total)

- See Table 1-9 for equipment estimates.
- See Table 1-10 for on-road vehicle estimates.

Table 1-9. Equipment emission sources and total operating hours for landship construction in Year 2.

Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Total Operating Hours
Pile Driver	1	329	245.3353	14	4	56
Barge	3	171 hp aux	127.5147	14	12	504
Towing Vessel	3	4000 hp main	2982.8	14	12	504
	3	400 hp aux	298.28	14	12	504
Crew Boat	1	400 hp main	298.28	14	12	168
	1	80 hp aux	59.656	14	12	168
Crane (Composite)	2	500	372.85	14	6	168
Forklift (Composite)	1	94	70.0958	14	6	84
Scoop Loader (Composite)	1	48	35.7936	14	6	84

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Table 1-10. On-road vehicle emission sources and total operating hours for landship construction in Year 2.

On-road vehicles	Unit	Operating Days	Miles Per Day
Worker Trips (LDGV)	5	14	20
Worker Trips (LDGT)	5	14	20

1.1.6. Year 2: General’s Ramp Construction (approximately 20 days total)

- See Table 1-11 for equipment estimates.
- See Table 1-12 for on-road vehicle estimates.

Table 1-11. Equipment emission sources and total operating hours for general’s ramp construction in Year 2.

Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Total Operating Hours
Pile Driver	1	329	245.3353	20	10	200
Barge	3	171 hp aux	127.5147	20	12	720
Towing Vessel	3	4000 hp main	2982.8	20	12	720
	3	400 hp aux	298.28	20	12	720
Crew Boat	1	400 hp main	298.28	20	12	240
	1	80 hp aux	59.656	20	12	240
Crane (Composite)	2	500	372.85	20	10	400
Forklift (Composite)	1	94	70.0958	20	10	200
Scoop Loader (Composite)	1	48	35.7936	20	10	200

Table 1-12. On-road vehicle emission sources and total operating hours for general’s ramp construction in Year 2.

On-road vehicles	Unit	Operating Days	Miles Per Day
Worker Trips (LDGV)	5	20	20
Worker Trips (LDGT)	5	20	20

1.2. Emissions Sources – Alternative 2 (Bulkhead Sill)

Emissions sources and operating hour estimates for Alternative 2 (bulkhead sill) are the same as Alternative 1 except that the riprap sill (Section 1.1.3) would be replaced with a bulkhead sill with emissions sources and operating hours as described below

1.2.1. Year 1: Mooring Field Bulkhead Sill Construction (approximately 90 days total)

- See Table 1-13 for equipment estimates.
- See Table 1-14 for on-road vehicle estimates.

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Table 1-13. Equipment emission sources and total operating hours for bulkhead sill construction in Year 1.

Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Total Operating Hours
Pile Driver	1	329	245.3353	90	12	1080
Barge	3	171 hp aux	127.5147	90	12	3240
Towing Vessel	3	4000 hp main	2982.8	90	12	3240
	3	400 hp aux	298.28	90	12	3240
Crew Boat	1	400 hp main	298.28	90	12	1080
	1	80 hp aux	59.656	90	12	1080
Crane (Composite)	2	-	-	90	10	1800
Forklift (Composite)	1	-	-	90	10	900
Scoop Loader (Composite)	1	-	-	90	10	900

Table 1-14. On-road vehicle emission sources and total operating hours for bulkhead sill construction in Year 1.

On-road Vehicles	Unit	Operating Days	Miles Per Day
Worker Trips (LDGV)	5	90	20
Worker Trips (LDGT)	5	90	20

1.3. Emissions Sources – Alternative 3 (Placement of Dredged Material at NODS)

Emission sources and operating hours for demolition and construction of structures are the same as described in Section 1.1, except that all dredged material would be transported to the Norfolk Ocean Disposal Site (NODS). The total operating hours from each emission source for all dredging proposed in Alternative 1 and Alternative 2 for each construction year are described below.

1.3.1. Alternative 1 (riprap sill)

1.3.1.1. Total Year 1 Dredging (approximately 20 days total)

- See Table 1-15 for equipment estimates.

1.1.1.1. Total Year 2 Dredging (approximately 5 days total)

- See Table 1-16 for equipment estimates.

Table 1-15. Equipment emission sources and total operating hours for dredging and material transport to NODS for Alternative 1 in Year 1.

Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Operating Hours
26CY Mech Dredge	1	2500 hp main	1864.25	20	12	240
	1	500 hp aux	372.85	20	12	240
Work Tug	3	750 hp main	559.275	20	12	720
	3	100 hp aux	74.57	20	12	720
Crew Boat	1	400 hp main	298.28	20	12	240
	1	80 hp aux	59.656	20	12	240
Survey Boat	1	400 hp main	298.28	20	6	120
	1	80 hp aux	59.656	20	6	120
Towing Vessel	3	4000 hp main	2982.8	20	14	840
	3	400 hp aux	298.28	20	14	840
Dump Scows	3	250 hp aux	186.425	20	14	840

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Table 1-16. Equipment emission sources and total operating hours for dredging and material transport to NODS for Alternative 1 in Year 2.

Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Operating Hours
26CY Mech Dredge	1	2500 hp main	1864.25	5	12	60
	1	500 hp aux	372.85	5	12	60
Work Tug	3	750 hp main	559.275	5	12	180
	3	100 hp aux	74.57	5	12	180
Crew Boat	1	400 hp main	298.28	5	12	60
	1	80 hp aux	59.656	5	12	60
Survey Boat	1	400 hp main	298.28	5	6	30
	1	80 hp aux	59.656	5	6	30
Towing Vessel	3	4000 hp main	2982.8	5	14	210
	3	400 hp aux	298.28	5	14	210
Dump Scows	3	250 hp aux	186.425	5	14	210

1.3.2. Alternative 2 (bulkhead sill)

1.3.2.1. Total Year 1 Dredging (approximately 12 days total)

- See Table 1-17 for equipment estimates

1.1.1.1. Total Year 2 Dredging (approximately 5 days total)

- See Table 1-18 for equipment estimates.

Table 1-17. Equipment emission sources and total operating hours for dredging and material transport to NODS for Alternative 2 in Year 1.

Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Operating Hours
26CY Mech Dredge	1	2500 hp main	1864.25	12	12	144
	1	500 hp aux	372.85	12	12	144
Work Tug	3	750 hp main	559.275	12	12	432
	3	100 hp aux	74.57	12	12	432
Crew Boat	1	400 hp main	298.28	12	12	144
	1	80 hp aux	59.656	12	12	144
Survey Boat	1	400 hp main	298.28	12	6	72
	1	80 hp aux	59.656	12	6	72
Towing Vessel	3	4000 hp main	2982.8	12	14	504
	3	400 hp aux	298.28	12	14	504
Dump Scows	3	250 hp aux	186.425	12	14	504

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Table 1-18. Equipment emission sources and total operating hours for dredging and material transport to NODS for Alternative 2 in Year 2.

Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Operating Hours
26CY Mech Dredge	1	2500 hp main	1864.25	5	12	60
	1	500 hp aux	372.85	5	12	60
Work Tug	3	750 hp main	559.275	5	12	180
	3	100 hp aux	74.57	5	12	180
Crew Boat	1	400 hp main	298.28	5	12	60
	1	80 hp aux	59.656	5	12	60
Survey Boat	1	400 hp main	298.28	5	6	30
	1	80 hp aux	59.656	5	6	30
Towing Vessel	3	4000 hp main	2982.8	5	14	210
	3	400 hp aux	298.28	5	14	210
Dump Scows	3	250 hp aux	186.425	5	14	210

1.4. Emissions Sources – Hydraulic Cutterhead Dredge Plant

Emission sources and operating hours for demolition and construction of structures are the same as described in Section 1.1, except that all dredging would be accomplished by a 16-inch hydraulic cutterhead dredge, as is typically used for maintenance dredging of Skiffes Creek channel. The total operating hours from each emission source for all dredging proposed in Alternative 1 and Alternative 2 for each construction year are described below.

1.4.1. Alternative 1

1.4.1.1. Total Year 1 Dredging (approximately 20 days total)

- See Table 1-19 for equipment estimates.

1.4.1.2. Total Year 2 Dredging (approximately 5 days total)

- See Table 1-20 for equipment estimates.

Table 1-19. Equipment emission sources and total operating hours for hydraulic cutterhead dredging for the Alternative 1 in Year 1.

Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Operating Hours
16" Cutterhead Dredge	1	2000	1491.4	20	12	240
Work Tug	3	750 hp main	559.275	20	12	720
	3	100 hp aux	74.57	20	12	720
Crew Boat	1	400 hp main	298.28	20	12	240
	1	80 hp aux	59.656	20	12	240
Survey Boat	1	400 hp main	298.28	20	6	120
	1	80 hp aux	59.656	20	6	120
Towing Vessel	3	4000 hp main	2982.8	20	12	720
	3	400 hp aux	298.28	20	12	720
Barge	3	171 hp aux	127.5147	20	12	720

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Table 1-20. Equipment emission sources and total operating hours for hydraulic cutterhead dredging for Alternative 1 in Year 2.

Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Operating Hours
16" Cutterhead Dredge	1	2000	1491.4	5	12	60
Work Tug	3	750 hp main	559.275	5	12	180
	3	100 hp aux	74.57	5	12	180
Crew Boat	1	400 hp main	298.28	5	12	60
	1	80 hp aux	59.656	5	12	60
Survey Boat	1	400 hp main	298.28	5	6	30
	1	80 hp aux	59.656	5	6	30
Towing Vessel	3	4000 hp main	2982.8	5	12	180
	3	400 hp aux	298.28	5	12	180
Barge	3	171 hp aux	127.5147	5	12	180

1.4.2. Alternative 2 (bulkhead sill)

1.4.2.1. Total Year 1 Dredging (approximately 12 days total)

- See Table 1-21 for equipment estimates.

1.4.2.2. Total Year 2 Dredging (approximately 5 days total)

- See Table 1-22 for equipment estimates.

Table 1-21. Equipment emission sources and total operating hours for hydraulic cutterhead dredging Alternative 2 in Year 1.

Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Operating Hours
16" Cutterhead Dredge	1	2000	1491.4	12	12	144
Work Tug	3	750 hp main	559.275	12	12	432
	3	100 hp aux	74.57	12	12	432
Crew Boat	1	400 hp main	298.28	12	12	144
	1	80 hp aux	59.656	12	12	144
Survey Boat	1	400 hp main	298.28	12	6	72
	1	80 hp aux	59.656	12	6	72
Towing Vessel	3	4000 hp main	2982.8	12	12	432
	3	400 hp aux	298.28	12	12	432
Barge	3	171 hp aux	127.5147	12	12	432

Table 1-22. Equipment emission sources and total operating hours for hydraulic cutterhead dredging for Alternative 2 in Year 2.

Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Operating Hours
16" Cutterhead Dredge	1	2000	1491.4	5	12	60
Work Tug	3	750 hp main	559.275	5	12	180
	3	100 hp aux	74.57	5	12	180
Crew Boat	1	400 hp main	298.28	5	12	60
	1	80 hp aux	59.656	5	12	60
Survey Boat	1	400 hp main	298.28	5	6	30
	1	80 hp aux	59.656	5	6	30
Towing Vessel	3	4000 hp main	2982.8	5	12	180
	3	400 hp aux	298.28	5	12	180
Barge	3	171 hp aux	127.5147	5	12	180

1.5. Methodology

1.5.1. Port Equipment Operations and Emissions

The estimates of equipment emissions were developed based on the engine power, engine load factor, estimated hours of usage, and the emission factor for each pollutant based on the United States Environmental Protection Agency’s (USEPA) *Port Emissions Inventory Guidance* (The Guidance) published in September 2020. The Guidance focuses on port-related diesel emissions from various mobile source sectors. The harbor craft source sector was used for this emissions analysis as it is most relevant to the dredging operations of the Proposed Action. The Guidance defines the harbor craft source sector as “...all commercial marine vessels that are not considered in the ocean-going vessels (OGV) sector, such as tugboats and work boats. Unlike OGV, harbor craft typically spend most of their operating time in or near a single port or region, and they typically have C1 or C2 engines” (USEPA 2020).

The engine tier established for the emissions estimates was established utilizing Table B.1 of The Guidance (Category 1 and 2 Engine Tiers). The power range of the harbor craft proposed to complete the Proposed Action were in the range of Engine Tier 3. Utilizing the Tier 3 power range of the harbor craft, emission factors for the criteria pollutants were obtained from Table H.7 (Average Harbor Craft Emission Factors by Engine Tier 3) of The Guidance (USEPA September 2020).

The USEPA recommends the following formula to calculate harbor craft base year emissions from both propulsion and auxiliary engines for each vessel of the Proposed Action (Equation 4.1):

$$E = P \times LF \times A \times EF$$

Where: E = per vessel emissions (g)
 P = engine power (kW)
 LF = engine load factor (unitless)
 A = engine operating activity (h)
 EF = emission factor (g/kWh)

Except for the emission factor designated for each criteria pollutant based on tier 3 engines, each of the above parameters models a specific emissions source from the Proposed Action and thus changed for each vessel. Tables 1-23 and 1-24 show the parameters associated with each vessel and emission factors used to develop the estimated emission inventory for each Action Alternative.

1.5.2. Marine Vessel Operations and Emissions

USEPA’s methodologies and default marine vessel input parameters and emissions factors available in The Guidance were used to predict emissions from vessels. The Guidance was used to determine the harbor craft source sector as the classification of the marine vessels used during the dredging activities associated with the Proposed Action. Section 4 of the Guidance, “Harbor Craft” was used to determine the emissions inventory of the Proposed Action.

1.5.3. Off-Road Equipment Operations and Emissions

The US Air Force’s (USAF) Air Conformity Applicability Model (ACAM) was used to predict emissions from most off-road construction equipment. The Hampton Roads area was selected as the regulatory area and Newport News was selected as the activity location. Off-road equipment emissions

factors were given in units of pounds per hour; thus, per equipment emissions (g) were calculated by multiplying the emissions factors by the total operating hours of each equipment type.

Estimates and loading factors for pile extractors and drivers were obtained from the “Final Environmental Assessment for Joint Logistics Over-the-Shore Training at Joint Base Expeditionary Base Little Creek-Fort Story, Virginia Beach, Virginia and Marine Corps Base Camp Lejeune, Jacksonville, North Carolina” (2015), which is partially set within the Hampton Roads area (Little Creek-Fort Story). Emissions factors were given in units of grams per horsepower-hour; thus, equipment emissions were calculated as described in Section 1.5.1, where P is engine power in horsepower (hp) instead of kW.

1.5.4. On-Road Vehicle Operations and Emissions

The USAF ACAM was used to predict emissions from heavy duty diesel trucks, light duty gasoline-fueled vehicles, and light duty gasoline-fueled trucks. The Hampton Roads area was selected as the regulatory area and Newport News was selected as the activity location. On-road vehicle emissions factors were reported in grams per mile; thus, on-road vehicle emissions were calculated by multiplying each emissions factor by estimated daily mileage and operating days.

1.5.5. Combined Emissions

The combined emissions for each phase of the Proposed Action under Alternative 1 (riprap sill) are shown in Table 1-23.

The combined emissions under Alternative 2 (bulkhead sill) are shown in Table 1-24.

A comparison of emissions related to dredging and material placement at FEDMMA and NODS (Alternative 3) is presented in Tables 1-25 and 1-26.

The total emissions for the Third Port Improvements project under the No Action Alternative (the baseline) were calculated by combining the inventory from the most recent Hampton Roads area reporting criteria emissions inventory from the Virginia Department of Environmental Quality (VADEQ 2019). This information is presented in Table 1-27.

The increase in emissions associated with each Action Alternative relative to the No Action Alternative (the baseline) is shown in Table 1-28.

A comparison of emissions related to dredge plant type (mechanical and hydraulic cutterhead dredges) is presented in Table 1-29.

DRAFT ENVIRONMENTAL ASSESSMENT

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Appendix I – Air Emissions Estimates**

**Third Port Improvements Project
Joint Base Langley-Eustis, Fort Eustis, Virginia**

General's Ramp Year 2	Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Total Hours	Miles Per Day	Load Factor	Emission Factor (g/hp-hr) (g/kW-hr for marine vessels) (g/hr for off-road equipment) (g/mi for on-road vehicles)							Emission Rate (tons)								
										NO _x	PM ₁₀	PM _{2.5}	VOC	CO	CO ₂	SO ₂	Pb*	NO _x	PM ₁₀	PM _{2.5}	VOC	CO	CO ₂	SO ₂	Pb*
	Pile Driver	1	329	245.34	20	10	200	-	0.59	5.60	0.39	0.37	0.42	2.75	537.08	0.12	0.00	0.24	0.02	0.02	0.02	0.12	22.98	0.01	0.00
	Barge	3	171 hp aux	127.51	20	12	720	-	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.21	0.00	0.00	0.01	0.04	29.57	0.00	0.00
	Towing Vessel	3	4000 hp main	2982.80	20	12	720	-	0.68	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	7.65	0.13	0.13	0.20	1.48	1093.81	0.01	0.00
		3	400 hp aux	298.28	20	12	720	-	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.48	0.01	0.01	0.01	0.09	69.17	0.00	0.00
	Crew Boat	1	400 hp main	298.28	20	12	240	-	0.45	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.17	0.00	0.00	0.00	0.03	24.13	0.00	0.00
		1	80 hp aux	59.66	20	12	240	-	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.03	0.00	0.00	0.00	0.01	4.61	0.00	0.00
	Crane	2	500	372.85	20	10	400	-	-	249.70	9.21	9.21	36.15	173.32	58427.23	0.59	0.00	0.11	0.00	0.00	0.02	0.08	25.76	0.00	0.00
	Forklift	1	94	70.10	20	10	200	-	-	57.38	1.95	1.95	12.43	97.34	24701.28	0.27	0.00	0.01	0.00	0.00	0.00	0.02	5.45	0.00	0.00
	Scoop Loader	1	48	35.79	20	10	200	-	-	104.37	4.31	4.31	17.37	163.20	30338.07	0.32	0.00	0.02	0.00	0.00	0.00	0.04	6.69	0.00	0.00
	Worker Trips (LDGV)	5	-	-	20	-	-	20	-	0.22	0.01	0.01	0.28	3.28	323.28	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.71	0.00	0.00
	Worker Trips (LDGT)	5	-	-	20	-	-	20	-	0.39	0.01	0.01	0.36	4.60	417.30	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.92	0.00	0.00
TOTAL EMISSIONS GENERAL'S RAMP YEAR 2																	8.92	0.17	0.17	0.27	1.92	1283.79	0.02	0.00	
YEAR 2 TOTAL (ALTERNATIVE 1)																	31.40	0.59	0.57	0.93	6.71	4530.54	0.05	0.00	

*Pb (Lead) is considered a Hazardous air pollutant (HAP). Emission factors for HAPs are calculated by multiplying the appropriate basis emission factor by the fraction listed in Table D.1.32 of The Guidance. Therefore, the Pb emission factor was calculated by using the basis emission factor of PM_{2.5} multiplied by the fraction listed in Table D.1.32 (0.000125).

Table 1-24. Total project emissions for Alternative 2 (bulkhead sill). Emissions for all project elements except the mooring field sill are the same as those detailed in Table 1-23 for Alternative 1.

Project Phase	Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Total Hours	Miles Per Day	Load Factor	Emission Factor (g/hp-hr) (g/kW-hr for marine vessels) (g/hr for off-road equipment) (g/mi for on-road vehicles)							Emission Rate (tons)								
										NO _x	PM ₁₀	PM _{2.5}	VOC	CO	CO ₂	SO ₂	Pb*	NO _x	PM ₁₀	PM _{2.5}	VOC	CO	CO ₂	SO ₂	Pb*
TOTAL EMISSIONS FINGER PIERS YEAR 1																	23.07	0.44	0.42	0.69	4.97	3337.32	0.04	0.00	
TOTAL EMISSIONS MOORING FIELD REALIGNMENT AND ACCESS DREDGING YEAR 1																	10.54	0.19	0.18	0.29	2.14	1515.95	0.02	0.00	
Mooring Field Alternative 2 (Bulkhead Sill) Year 1	Pile Driver	1	329	245.34	90	12	1080	-	0.59	5.60	0.39	0.37	0.42	2.75	537.08	0.12	0.00	1.29	0.09	0.09	0.10	0.64	124.11	0.03	0.00
	Barge	3	171 hp aux	127.51	90	12	3240	-	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.93	0.02	0.02	0.02	0.18	133.06	0.00	0.00
	Towing Vessel	3	4000 hp main	2982.80	90	12	3240	-	0.68	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	34.40	0.60	0.58	0.90	6.66	4922.12	0.05	0.00
		3	400 hp aux	298.28	90	12	3240	-	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	2.18	0.04	0.04	0.06	0.42	311.25	0.00	0.00
	Crew Boat	1	400 hp main	298.28	90	12	1080	-	0.45	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.76	0.01	0.01	0.02	0.15	108.58	0.00	0.00
		1	80 hp aux	59.66	90	12	1080	-	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.15	0.00	0.00	0.00	0.03	20.75	0.00	0.00
	Crane	2	-	-	90	10	1800	-	-	249.70	9.21	9.21	36.15	173.32	58427.23	0.59	0.00	0.50	0.02	0.02	0.07	0.34	115.93	0.00	0.00
	Forklift	1	-	-	90	10	900	-	-	57.38	1.95	1.95	12.43	97.34	24701.28	0.27	0.00	0.06	0.00	0.00	0.01	0.10	24.51	0.00	0.00
	Scoop Loader	1	-	-	90	10	900	-	-	104.37	4.31	4.31	17.37	163.20	30338.07	0.32	0.00	0.10	0.00	0.00	0.02	0.16	30.10	0.00	0.00
	Worker Trips (LDGV)	5	-	-	90	-	-	20	-	0.22	0.01	0.01	0.28	3.28	323.28	0.00	0.00	0.00	0.00	0.00	0.00	0.03	3.21	0.00	0.00
Worker Trips (LDGT)	5	-	-	90	-	-	20	-	0.39	0.01	0.01	0.36	4.60	417.30	0.00	0.00	0.00	0.00	0.00	0.05	4.14	0.00	0.00		
TOTAL EMISSIONS MOORING FIELD ALTERNATIVE 2 (BULKHEAD SILL) YEAR 1																	40.37	0.79	0.76	1.21	8.75	5797.76	0.08	0.00	
YEAR 1 TOTAL (ALTERNATIVE 2)																	73.97	1.41	1.37	2.20	15.86	10651.02	0.14	0.00	
TOTAL EMISSIONS FINGER PIERS YEAR 2																	16.37	0.31	0.30	0.49	3.53	2368.36	0.03	0.00	
TOTAL EMISSIONS LANDSHIP YEAR 2																	6.10	0.11	0.11	0.17	1.26	878.39	0.01	0.00	
TOTAL EMISSIONS GENERAL'S RAMP YEAR 2																	8.92	0.17	0.17	0.27	1.92	1283.79	0.02	0.00	
YEAR 2 TOTAL (ALTERNATIVE 2)																	31.40	0.59	0.57	0.93	6.71	4530.54	0.05	0.00	

*Pb (Lead) is considered a Hazardous air pollutant (HAP). Emission factors for HAPs are calculated by multiplying the appropriate basis emission factor by the fraction listed in Table D.1.32 of The Guidance. Therefore, the Pb emission factor was calculated by using the basis emission factor of PM_{2.5} multiplied by the fraction listed in Table D.1.32 (0.000125).

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Table 1-26. Net increase in emissions of Alternative 2 due to placement of dredged material at NODS (Alternative 3).

Project Phase	Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Total Hours	Load Factor	Emission Factor (g/kW-hr for marine vessels)							Emission Rate (tons)								
									NO _x	PM ₁₀	PM _{2.5}	VOC	CO	CO ₂	SO ₂	Pb*	NO _x	PM ₁₀	PM _{2.5}	VOC	CO	CO ₂	SO ₂	Pb*
FEDMMA Placement Year 1	26CY Mech Dredge	1	2500 hp main	1864.25	12	12	144	0.66	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.93	0.02	0.02	0.02	0.18	132.70	0.00	0.00
		1	500 hp aux	372.85	12	12	144	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.12	0.00	0.00	0.00	0.02	17.29	0.00	0.00
	Work Tug	3	750 hp main	559.28	12	12	432	0.52	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.66	0.01	0.01	0.02	0.13	94.10	0.00	0.00
		3	100 hp aux	74.57	12	12	432	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.07	0.00	0.00	0.00	0.01	10.38	0.00	0.00
	Crew Boat	1	400 hp main	298.28	12	12	144	0.45	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.10	0.00	0.00	0.00	0.02	14.48	0.00	0.00
		1	80 hp aux	59.66	12	12	144	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.02	0.00	0.00	0.00	0.00	2.77	0.00	0.00
	Survey Boat	1	400 hp main	298.28	12	6	72	0.45	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.05	0.00	0.00	0.00	0.01	7.24	0.00	0.00
		1	80 hp aux	59.66	12	6	72	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.01	0.00	0.00	0.00	0.00	1.38	0.00	0.00
	Towing Vessel	3	4000 hp main	2982.80	12	12	432	0.68	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	4.59	0.08	0.08	0.12	0.89	656.28	0.01	0.00
		3	400 hp aux	298.28	12	12	432	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.29	0.01	0.00	0.01	0.06	41.50	0.00	0.00
	Dump Scows	3	250 hp aux	186.43	12	12	432	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.18	0.00	0.00	0.00	0.04	25.94	0.00	0.00
	TOTAL FEDMMA PLACEMENT YEAR 1																7.02	0.12	0.12	0.18	1.36	1004.06	0.01	0.00
	NODS Placement Year 1	26CY Mech Dredge	1	2500 hp main	1864.25	12	12	144	0.66	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.93	0.02	0.02	0.02	0.18	132.70	0.00
1			500 hp aux	372.85	12	12	144	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.12	0.00	0.00	0.00	0.02	17.29	0.00	0.00
Work Tug		3	750 hp main	559.28	12	12	432	0.52	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.66	0.01	0.01	0.02	0.13	94.10	0.00	0.00
		3	100 hp aux	74.57	12	12	432	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.07	0.00	0.00	0.00	0.01	10.38	0.00	0.00
Crew Boat		1	400 hp main	298.28	12	12	144	0.45	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.10	0.00	0.00	0.00	0.02	14.48	0.00	0.00
		1	80 hp aux	59.66	12	12	144	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.02	0.00	0.00	0.00	0.00	2.77	0.00	0.00
Survey Boat		1	400 hp main	298.28	12	6	72	0.45	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.05	0.00	0.00	0.00	0.01	7.24	0.00	0.00
		1	80 hp aux	59.66	12	6	72	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.01	0.00	0.00	0.00	0.00	1.38	0.00	0.00
Towing Vessel		3	4000 hp main	2982.80	12	14	504	0.68	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	5.35	0.09	0.09	0.14	1.04	765.66	0.01	0.00
		3	400 hp aux	298.28	12	14	504	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.34	0.01	0.01	0.01	0.07	48.42	0.00	0.00
Dump Scows		3	250 hp aux	186.43	12	14	504	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.21	0.00	0.00	0.01	0.04	30.26	0.00	0.00
TOTAL NODS PLACEMENT YEAR 1																7.86	0.14	0.13	0.21	1.52	1124.68	0.01	0.00	
INCREASE IN EMISSIONS OF ALTERNATIVE 2 DUE TO NODS PLACEMENT YEAR 1																0.84	0.01	0.01	0.02	0.16	120.62	0.00	0.00	
TOTAL ALTERNATIVE 2 EMISSIONS WITH NODS PLACEMENT YEAR 1																74.81	1.43	1.38	2.22	15.98	10767.96	0.14	0.00	
FEDMMA Placement Year 2	26CY Mech Dredge	1	2500 hp main	1864.25	5	12	60	0.66	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.39	0.01	0.01	0.01	0.07	55.29	0.00	0.00
		1	500 hp aux	372.85	5	12	60	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.05	0.00	0.00	0.00	0.01	7.20	0.00	0.00
	Work Tug	3	750 hp main	559.28	5	12	180	0.52	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.27	0.00	0.00	0.01	0.05	39.21	0.00	0.00
		3	100 hp aux	74.57	5	12	180	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.03	0.00	0.00	0.00	0.01	4.32	0.00	0.00
	Crew Boat	1	400 hp main	298.28	5	12	60	0.45	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.04	0.00	0.00	0.00	0.01	6.03	0.00	0.00
		1	80 hp aux	59.66	5	12	60	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.01	0.00	0.00	0.00	0.00	1.15	0.00	0.00
	Survey Boat	1	400 hp main	298.28	5	6	30	0.45	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.02	0.00	0.00	0.00	0.00	3.02	0.00	0.00
		1	80 hp aux	59.66	5	6	30	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.00	0.00
	Towing Vessel	3	4000 hp main	2982.80	5	12	180	0.68	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	1.91	0.03	0.03	0.05	0.37	273.45	0.00	0.00
		3	400 hp aux	298.28	5	12	180	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.12	0.00	0.00	0.00	0.02	17.29	0.00	0.00
	Dump Scows	3	250 hp aux	186.43	5	12	180	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.08	0.00	0.00	0.00	0.01	10.81	0.00	0.00
	TOTAL FEDMMA PLACEMENT YEAR 2																2.92	0.05	0.05	0.08	0.57	418.36	0.00	0.00
	NODS Placement Year 2	26CY Mech Dredge	1	2500 hp main	1864.25	5	12	60	0.66	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.39	0.01	0.01	0.01	0.07	55.29	0.00
1			500 hp aux	372.85	5	12	60	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.05	0.00	0.00	0.00	0.01	7.20	0.00	0.00
Work Tug		3	750 hp main	559.28	5	12	180	0.52	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.27	0.00	0.00	0.01	0.05	39.21	0.00	0.00
		3	100 hp aux	74.57	5	12	180	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.03	0.00	0.00	0.00	0.01	4.32	0.00	0.00
Crew Boat		1	400 hp main	298.28	5	12	60	0.45	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.04	0.00	0.00	0.00	0.01	6.03	0.00	0.00
		1	80 hp aux	59.66	5	12	60	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.01	0.00	0.00	0.00	0.00	1.15	0.00	0.00
Survey Boat		1	400 hp main	298.28	5	6	30	0.45	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.02	0.00	0.00	0.00	0.00	3.02	0.00	0.00
		1	80 hp aux	59.66	5	6	30	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.00	0.00
Towing Vessel		3	4000 hp main	2982.80	5	14	210	0.68	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	2.23	0.04	0.04	0.06	0.43	319.03	0.00	0.00
		3	400 hp aux	298.28	5	14	210	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.14	0.00	0.00	0.00	0.03	20.17	0.00	0.00
Dump Scows		3	250 hp aux	186.43	5	14	210	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.09	0.00	0.00	0.00	0.02	12.61	0.00	0.00
TOTAL NODS PLACEMENT YEAR 2																3.28	0.06	0.06	0.09	0.63	468.62	0.00	0.00	
INCREASE IN EMISSIONS OF ALTERNATIVE 2 DUE TO NODS PLACEMENT YEAR 2																0.35	0.01	0.01	0.01	0.07	50.26	0.00	0.00	
TOTAL ALTERNATIVE 2 EMISSIONS WITH NODS PLACEMENT YEAR 2																31.75	0.60	0.58	0.					

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Table 1-27. Net increase of emissions of the Action Alternatives relative to baseline conditions (No Action).

Criteria Pollutant	NO_x	PM₁₀	PM_{2.5}	VOC	CO	SO₂
2019 Emissions (tons)	3810.16	1322.85	529.26	3718.33	3237.58	1189.98
Alternative 1 Year 1 (tons)	47.80	0.90	0.87	1.41	10.22	0.08
Alternative 1 Year 2 (tons)	31.40	0.59	0.57	0.93	6.71	0.05
Alternative 2 Year 1 (tons)	73.97	1.41	1.37	2.20	15.86	0.14
Alternative 2 Year 2 (tons)	31.40	0.59	0.57	0.93	6.71	0.05
Alternative 3* Year 1 (tons)	49.20	0.92	0.89	1.45	10.46	0.08
Alternative 3* Year 2 (tons)	31.75	0.60	0.58	0.94	6.78	0.06
Alternative 3† Year 1 (tons)	74.81	1.43	1.38	2.22	15.98	0.14
Alternative 3† Year 2 (tons)	31.75	0.60	0.58	0.94	6.78	0.06

*Note that additional emissions from dredged material placement at NODS (Alternative 3) were added to total emissions of Alternative 1.

†Note that additional emissions from dredged material placement at NODS (Alternative 3) were added to total emission of Alternative 2.

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**Environmental Assessment
Appendix I – Air Emissions Estimates**

**Third Port Improvements Project
Joint Base Langley-Eustis, Fort Eustis, Virginia**

Table 1-29. Comparison of Alternative 1 emissions due to dredge plant type. Note that a hydraulic cutterhead dredge would likely be used for FEDMMA placement only; thus, the information provided below represents the maximum change in emissions due to placement of dredged material at FEDMMA. Total emissions from Alternative 2 in year 1 would be less than those for Alternative 1 due to decreased dredging quantity. Total emissions due to the use of hydraulic cutterhead dredges for NODS placement would be less than those presented in Table 1-27.

Project Phase	Equipment	Unit	Engine HP	Engine kW	Operating Days	Hours Per Day	Total Hours	Load Factor	Emission Factor (g/kW-hr for marine vessels)								Emission Rate (tons)									
									NO _x	PM ₁₀	PM _{2.5}	VOC	CO	CO ₂	SO ₂	Pb*	NO _x	PM ₁₀	PM _{2.5}	VOC	CO	CO ₂	SO ₂	Pb*		
TOTAL EMISSIONS MECHANICAL DREDGE PLANT YEAR 1																			11.70	0.20	0.20	0.31	2.26	1673.43	0.02	0.00
Hydraulic Cutterhead Dredge Plant Year 1	16" Cutterhead Dredge	1	2000	1491.4	20	12	240	0.66	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	1.24	0.02	0.02	0.03	0.24	176.94	0.00	0.00		
	Work Tug	3	750 hp main	559.275	20	12	720	0.52	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	1.10	0.02	0.02	0.03	0.21	156.83	0.00	0.00		
		3	100 hp aux	74.57	20	12	720	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.12	0.00	0.00	0.00	0.02	17.29	0.00	0.00		
	Crew Boat	1	400 hp main	298.28	20	12	240	0.45	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.17	0.00	0.00	0.00	0.03	24.13	0.00	0.00		
		1	80 hp aux	59.656	20	12	240	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.03	0.00	0.00	0.00	0.01	4.61	0.00	0.00		
	Survey Boat	1	400 hp main	298.28	20	6	120	0.45	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.08	0.00	0.00	0.00	0.02	12.06	0.00	0.00		
		1	80 hp aux	59.656	20	6	120	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.02	0.00	0.00	0.00	0.00	2.31	0.00	0.00		
	Towing Vessel	3	4000 hp main	2982.8	20	12	720	0.68	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	7.65	0.13	0.13	0.20	1.48	1093.81	0.01	0.00		
		3	400 hp aux	298.28	20	12	720	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.48	0.01	0.01	0.01	0.09	69.17	0.00	0.00		
	Barge	3	171 hp aux	127.5147	20	12	720	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.21	0.00	0.00	0.01	0.04	29.57	0.00	0.00		
TOTAL EMISSIONS HYDRAULIC CUTTERHEAD DREDGE PLANT YEAR 1																			11.09	0.19	0.19	0.29	2.15	1586.71	0.01	0.00
CHANGE IN EMISSIONS DUE TO HYDRAULIC CUTTERHEAD DREDGE PLANT YEAR 1																			-0.61	-0.01	-0.01	-0.02	-0.12	-86.71	0.00	0.00
TOTAL EMISSIONS WITH HYDRAULIC CUTTERHEAD DREDGE PLANT YEAR 1																			47.19	0.89	0.86	1.39	10.07	6823.42	0.08	0.00
TOTAL EMISSIONS MECHANICAL DREDGE PLANT YEAR 2																			2.92	0.05	0.05	0.08	0.57	418.36	0.00	0.00
Hydraulic Cutterhead Dredge Plant Year 2	16" Cutterhead Dredge	1	2000	1491.4	5	12	60	0.66	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.31	0.01	0.01	0.01	0.06	44.23	0.00	0.00		
	Work Tug	3	750 hp main	559.275	5	12	180	0.52	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.27	0.00	0.00	0.01	0.05	39.21	0.00	0.00		
		3	100 hp aux	74.57	5	12	180	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.03	0.00	0.00	0.00	0.01	4.32	0.00	0.00		
	Crew Boat	1	400 hp main	298.28	5	12	60	0.45	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.04	0.00	0.00	0.00	0.01	6.03	0.00	0.00		
		1	80 hp aux	59.656	5	12	60	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.01	0.00	0.00	0.00	0.00	1.15	0.00	0.00		
	Survey Boat	1	400 hp main	298.28	5	6	30	0.45	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.02	0.00	0.00	0.00	0.00	3.02	0.00	0.00		
		1	80 hp aux	59.656	5	6	30	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.00	0.00		
	Towing Vessel	3	4000 hp main	2982.8	5	12	180	0.68	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	1.91	0.03	0.03	0.05	0.37	273.45	0.00	0.00		
		3	400 hp aux	298.28	5	12	180	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.12	0.00	0.00	0.00	0.02	17.29	0.00	0.00		
	Barge	3	171 hp aux	127.5147	5	12	180	0.43	4.75	0.08	0.08	0.12	0.92	679.47	0.01	0.00	0.05	0.00	0.00	0.00	0.01	7.39	0.00	0.00		
TOTAL NODS PLACEMENT YEAR 2																			2.77	0.05	0.05	0.07	0.54	396.68	0.00	0.00
CHANGE IN EMISSIONS DUE TO HYDRAULIC CUTTERHEAD DREDGE PLANT YEAR 2																			-0.15	0.00	0.00	0.00	-0.03	-21.68	0.00	0.00
TOTAL EMISSIONS WITH HYDRAULIC CUTTERHEAD DREDGE PLANT YEAR 2																			31.25	0.59	0.57	0.92	6.68	4508.86	0.05	0.00

*Pb (Lead) is considered a Hazardous air pollutant (HAP). Emission factors for HAPs are calculated by multiplying the appropriate basis emission factor by the fraction listed in Table D.1.32 of The Guidance. Therefore, the Pb emission factor was calculated by using the basis emission factor of PM_{2.5} multiplied by the fraction listed in Table D.1.32 (0.000125).

2. Clean Air Conformity

The 1990 amendments to the Clean Air Act require federal agencies to ensure that their actions conform to the appropriate State Implementation Plan in a nonattainment area. The State Implementation Plan provides for implementation, maintenance, and enforcement of the National Ambient Air Quality Standards (NAAQS); it includes emission limitations and control measures to attain and maintain the NAAQS. Conformity to a State Implementation Plan, as defined in the Clean Air Act, means conformity to the plan's purpose of reducing the severity and number of violations of the NAAQS to achieve the standards. The federal agency responsible for a Proposed Action is required to determine if its Proposed Action conforms to the applicable State Implementation Plan.

The USEPA has developed two sets of conformity regulations; federal actions are differentiated into transportation projects and non-transportation-related projects:

- Transportation projects, which are governed by the “transportation conformity” regulations (40 C.F.R. Parts 51 and 93), effective on December 27, 1993 and revised on August 15, 1997.
- Non-transportation projects which are governed by the “general conformity” regulations (40 C.F.R. Parts 6, 51 and 93) described in the final rule for *Determining Conformity of General Federal Actions to State or Federal Implementation Plans* published in the *Federal Register* on November 30, 1993. The general conformity rule became effective January 31, 1994 and was revised on March 24, 2010.

Since the Proposed Action evaluated in this EA is not a transportation project, the general conformity regulation applies.

2.1. Attainment and Nonattainment Areas

The General Conformity Rule applies to federal actions occurring in air basins designated as nonattainment for the NAAQS or in attainment areas subject to maintenance plans (maintenance areas). Federal actions occurring in air basins that are in attainment with the NAAQS are not subject to the conformity rule. The designation of nonattainment is based on the violations of the NAAQS. Maintenance areas are areas that have been re-designated as attainment from a previous nonattainment status and have established a maintenance plan with measures to control emissions to ensure the air quality standards are maintained.

There are six criteria pollutants for which the USEPA has established NAAQS: carbon monoxide (CO), sulfur dioxide (SO₂), nitrogen dioxide (NO₂), ozone (O₃), inhalable particulate matter (PM₁₀ and PM_{2.5}), and lead (Pb).

Under both Action Alternatives, the project area within Skiffes Creek is located in the Air Quality Control Region (AQCR) known as Hampton Roads Intrastate ACQR in Virginia (40 CFR 81.93) and is a part of the Norfolk-Virginia Beach-Newport News (Hampton Roads), VA Marginal Maintenance Area for the 1997 ozone NAAQS. The Hampton Roads area is in attainment for all other NAAQS. Although the 1997 ozone standard has been revoked, maintenance areas for that standard must still demonstrate compliance with it for 20 years. This requirement is based on the South Coast II Court Decision and subsequent EPA guidance. The Hampton Roads Area was redesignated to attainment for the 1997 ozone NAAQS on June 1, 2007, which would be the point at which the maintenance timeline would start. This includes conducting conformity determinations for projects within those areas, and Hampton Roads is one such area. Therefore, a conformity applicability analysis was completed to estimate the emission totals of the criteria pollutants associated with the Proposed Action.

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2.2. *De Minimis* Emission Levels

To focus general conformity requirements on those federal actions with the potential to have significant air quality impacts, threshold (*de minimis*) rates of emissions were established in the final rule. A formal conformity determination is required when the annual net total of direct and indirect emissions of a criteria pollutant or its precursors from a federal action occurring in a nonattainment or maintenance area would equal or exceed the applicable annual *de minimis* level for that pollutant. Table 2-1 shows the *de minimis* threshold levels for each pollutant.

Table 2-1. Annual *de minimis* criteria pollutant levels for maintenance areas.

Pollutant	Maintenance Area Limits (tons/year) [40 CFR 93.153(b)(2)]
NO _x	100
PM ₁₀	100
PM _{2.5}	100
VOC Inside Transport Region/Outside Transport Region	50/100
CO	100
CO ₂	-
SO ₂	100
Pb	25

2.3. Compliance Analysis

A conformity applicability analysis was conducted for the activity for the Action Alternative according to the guidance provided by 40 CFR Parts 6, 51, and 93, Determining Conformity of General Federal Actions to State or Federal Implementation Plans, (USEPA 1993 and 2010). The analysis was performed to determine whether a formal conformity analysis would be required.

Pursuant to the General Conformity Rule, all reasonably foreseeable emissions (both direct and indirect) associated with a federal action must be quantified and compared to the applicable annual *de minimis* levels. The conformity analysis must take into account the direct and indirect net emissions from mobile and stationary sources. Direct emissions are emissions of a criteria pollutant or its precursors that are caused or initiated by the federal action and occur at the same time and place as the action. Indirect emissions occur later in time or farther from the action; they must be included in the analysis if the following conditions are met:

- That are caused or initiated by the Federal action and originate in the same nonattainment or maintenance area but occur at a different time or place as the action;
- The federal agency can practicably control the emissions and has continuing program responsibility to maintain control;
- The emissions caused by the federal action are reasonably foreseeable;
- For which the agency has continuing program responsibility.

Indirect emissions from this federal action are not reasonably foreseeable, and not controlled by the federal agency. Therefore, indirect emissions were not evaluated for this applicability analysis.

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The General Conformity Rule requires that the federal action’s emissions be compared with baseline emissions on an annual basis. For this Proposed Action, the No Action Alternative, which would amount to not performing the improvements to the Third Port facility. Therefore, the most recent calendar year emissions reporting represents the baseline (USEPA December 2020). Table 1-27 of this appendix showed the estimated net increase of criteria pollutant emissions from each construction year of each Action Alternatives to the Hampton Roads Area will potentially cause.

For ozone maintenance areas, *de minimis* levels have been established for both ozone precursors: NO_x and VOC, on the presumption that NO_x and VOC reductions will contribute to reductions in O₃ formation. The applicable *de minimis* level is 100 tons per year of NO_x and VOC, respectively.

Table 2-2 shows the proposed project’s net emissions of NO_x and VOC associated with Alternative 1 (riprap sill) based on the estimates detailed in Section 1 (Emissions Determination) of this appendix in accordance with 40 CFR 93.153(b)(2).

Table 2-3 shows the proposed project’s net emissions of NO_x and VOC associated with Alternative 2 (bulkhead sill) based on the estimates detailed in Section 1 (Emissions Determination) of this appendix in accordance with 40 CFR 93.153(b)(2).

Table 2-4 shows the proposed project’s net emissions of NO_x and VOC associated with Alternative 3 (placement of material at NODS) for Alternative 1 based on the estimates detailed in Section 1 (Emissions Determination) of this appendix in accordance with 40 CFR 93.153(b)(2).

Table 2-5 shows the proposed project’s net emissions of NO_x and VOC associated with Alternative 3 (placement of material at NODS) for Alternative 2 based on the estimates detailed in Section 1 (Emissions Determination) of this appendix in accordance with 40 CFR 93.153(b)(2).

Table 2-2. Project emissions of NO_x and VOC from Alternative 1 (riprap sill).

Project Year	Construction Element	Emissions (tons)	
		VOC	NO _x
Year 1	Finger Piers	0.69	23.06
	Mooring Field	0.72	24.73
	Year 1 Total	1.41	47.80
Year 2	Finger Piers	0.49	16.37
	Landship	0.17	6.10
	General's Ramp	0.27	8.92
	Year 2 Total	0.93	31.40
De Minimis Level		100	100

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Table 2-3. Project emissions NO_x and VOC from Alternative 2 (bulkhead sill).

Project Year	Construction Element	Emissions (tons)	
		VOC	NO _x
Year 1	Finger Piers	0.69	23.06
	Mooring Field	1.51	50.90
	Year 1 Total	2.20	73.97
Year 2	Finger Piers	0.49	16.37
	Landship	0.17	6.10
	General's Ramp	0.27	8.92
	Year 2 Total	0.93	31.40
De Minimis Level		100	100

Table 2-4. Project emissions NO_x and VOC from Alternative 1 with placement of dredged material at NODS (Alternative 3). Note that additional emissions from alternative placement at NODS were added to total emissions of Alternative 1.

Project Year	Construction Element	Emissions (tons)	
		VOC	NO _x
Year 1	Finger Piers	0.70	23.41
	Mooring Field	0.75	25.79
	Year 1 Total	1.45	49.20
Year 2	Finger Piers	0.50	16.72
	Landship	0.17	6.10
	General's Ramp	0.27	8.92
	Year 2 Total	0.94	31.75
De Minimis Level		100	100

Table 2-4. Project emissions NO_x and VOC from Alternative 2 with placement of dredged material at NODS (Alternative 3). Note that additional emissions from alternative placement at NODS were added to total emissions of Alternative 2.

Project Phase	Construction Element	Emissions (tons)	
		VOC	NO _x
Phase 1 (FY23)	Finger Piers	0.70	23.41
	Mooring Field	1.52	51.40
	Year 1 Total	2.22	74.81
Phase 2 (FY24+)	Finger Piers	0.50	16.72
	Landship	0.17	6.10
	General's Ramp	0.27	8.92
	Year 2 Total	0.94	31.75
De Minimis Level		100	100

Based on this analysis of NO_x and VOC emissions performed in conjunction with the Final Rule of *Determining Conformity of Federal Actions to State or Federal Implementation Plans*, (USEPA 1993

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and 2010), the Proposed Action would not require a formal conformity determination. The total net emissions under all Action Alternative show no exceedance of the applicable *de minimis* criteria of 100 tons per year for VOC and NO_x. Therefore, the Proposed Action would have minimal air quality impacts and would not require a formal conformity determination. A Record of Non-Applicability is included in Appendix D of this Environmental Assessment.

References:

U.S. Environmental Protection Agency. (1993 and 2010). 40 C.F.R. Parts 6, 51, and 93.

Determining conformity of federal actions to state or federal implementation plans.

Federal Register. November 30, 1993. Revisions to Parts 51 and 93 April 5, 2010. Federal Register.

United States Environmental Protection Agency (USEPA) (September 2020). *Ports emissions inventory guidance: methodologies for estimating port-related and goods movement mobile source emissions*. EPA-420-B-20-046.

United States Environmental Protection Agency (USEPA) (December 2020). *General conformity training module 3.2: emissions calculations*. <https://www.epa.gov/general-conformity/general-conformity-training-module-32-emissions-calculations>

Virginia Department of Environmental Quality (VADEQ). (2019). *Annual point source criteria pollutant emissions*. <https://www.deq.virginia.gov/air/air-quality-monitoring-assessments/air-quality-reports>

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: FORT EUSTIS

State: Virginia

County(s): Newport News City

Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- **Action Title:** Third Port Improvements Project

- **Project Number/s (if applicable):**

- **Projected Action Start Date:** 11 / 2022

- **Action Purpose and Need:**

- Action Description:

Improvements to the Third Port, including the finger piers, mooring field, landship, and general's ramp. All work is proposed to be completed from the water, except the removal of demolished moorings and piers. Piles and other debris from demolition of piers and moorings will be removed via truck to an appropriate disposal facility.

- Point of Contact

Name: Megan Wood

Title: Environmental Scientist

Organization: USACE, Norfolk District

Email: megan.a.wood@usace.army.mil

Phone Number: 757-201-7843

- Activity List:

	Activity Type	Activity Title
2.	Construction / Demolition	Finger Pier Demolition and Construction Year 1
3.	Construction / Demolition	Mooring Field Demolition and Realignment Year 1
4.	Construction / Demolition	Riprap Sill Construction (Mooring Field Alternative 1) Year 1
5.	Construction / Demolition	Finger Pier Demolition and Construction Year 2
6.	Construction / Demolition	Landship Construction Year 2
7.	Construction / Demolition	General's Ramp Construction Year 2

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location

County: Newport News City

Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- **Activity Title:** Finger Pier Demolition and Construction Year 1

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Description:

Removing mooring piles at finger piers, constructing Piers 8-10, partial stern ramp, and wave screen.

- Activity Start Date

Start Month: 11
Start Month: 2022

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2022

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.071626
SO _x	0.001216
NO _x	0.439745
CO	0.458319
PM 10	0.017378

Pollutant	Total Emissions (TONs)
PM 2.5	0.017369
Pb	0.000000
NH ₃	0.000206
CO _{2e}	117.3

2.1 Demolition Phase

2.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date

Start Month: 11
Start Quarter: 1
Start Year: 2022

- Phase Duration

Number of Month: 1
Number of Days: 15

2.1.2 Demolition Phase Assumptions

- General Demolition Information

Area of Building to be demolished (ft²): 0
Height of Building to be demolished (ft): 0

- Default Settings Used: No

- Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	5
Concrete/Industrial Saws Composite	1	2
Cranes Composite	2	10
Forklifts Composite	1	10
Rubber Tired Loaders Composite	1	10
Tractors/Loaders/Backhoes Composite	1	10

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20

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Average Hauling Truck Round Trip Commute (mile): 50

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cement and Mortar Mixers Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0085	0.0001	0.0534	0.0414	0.0020	0.0020	0.0007	7.2674
Concrete/Industrial Saws Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0410	0.0006	0.2961	0.3743	0.0148	0.0148	0.0037	58.556
Cranes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0797	0.0013	0.5505	0.3821	0.0203	0.0203	0.0071	128.81
Forklifts Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0274	0.0006	0.1265	0.2146	0.0043	0.0043	0.0024	54.457
Rubber Tired Loaders Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0661	0.0012	0.3848	0.4358	0.0180	0.0180	0.0059	108.76
Tractors/Loaders/Backhoes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	Pb	NH ₃	CO _{2e}
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

2.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (0.00042 * BA * BH) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)

0.00042: Emission Factor (lb/ft³)

BA: Area of Building to be demolished (ft²)

BH: Height of Building to be demolished (ft)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$$

CEE_{POL} : Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

EF_{POL} : Emission Factor for Pollutant (lb/hour)

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$$

VMT_{VE} : Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building being demolish (ft²)

BH: Height of Building being demolish (ft)

(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)

0.25: Volume reduction factor (material reduced by 75% to account for air space)

HC: Average Hauling Truck Capacity (yd³)

(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)

VMT_{VE} : Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL} : Emission Factor for Pollutant (grams/mile)

VM: Vehicle Exhaust On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)

WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)

VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL} : Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Location

County: Newport News City

Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: Mooring Field Demolition and Realignment Year 1

- Activity Description:

Demolition of existing mooring field, realignment of mooring field with new mooring piles.

- Activity Start Date

Start Month: 11

Start Month: 2022

- Activity End Date

Indefinite: False

End Month: 11

End Month: 2022

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.009948
SO _x	0.000168
NO _x	0.061688
CO	0.062303
PM 10	0.002297

Pollutant	Total Emissions (TONs)
PM 2.5	0.002296
Pb	0.000000
NH ₃	0.000036
CO _{2e}	16.5

3.1 Demolition Phase

3.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date

Start Month: 11

Start Quarter: 1

Start Year: 2022

- Phase Duration

Number of Month: 0

Number of Days: 14

3.1.2 Demolition Phase Assumptions

- General Demolition Information

Area of Building to be demolished (ft²): 0

Height of Building to be demolished (ft): 0

- Default Settings Used: No

- Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	2	6
Forklifts Composite	1	6

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Tractors/Loaders/Backhoes Composite	1	6
-------------------------------------	---	---

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20
 Average Hauling Truck Round Trip Commute (mile): 50

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

3.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cranes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0797	0.0013	0.5505	0.3821	0.0203	0.0203	0.0071	128.81
Forklifts Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0274	0.0006	0.1265	0.2146	0.0043	0.0043	0.0024	54.457
Tractors/Loaders/Backhoes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	Pb	NH ₃	CO _{2e}
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

3.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (0.00042 * BA * BH) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
 0.00042: Emission Factor (lb/ft³)
 BA: Area of Building to be demolished (ft²)
 BH: Height of Building to be demolished (ft)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$$

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft²)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd³)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

- Activity Location

County: Newport News City
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- **Activity Title:** Riprap Sill Construction (Mooring Field Alternative 1) Year 1

- **Activity Description:**

Constructing a subaqueous riprap sill at the mooring field.

- **Activity Start Date**

Start Month: 11

Start Month: 2022

- **Activity End Date**

Indefinite: False

End Month: 11

End Month: 2022

- **Activity Emissions:**

Pollutant	Total Emissions (TONs)
VOC	NaN
SO _x	NaN
NO _x	NaN
CO	NaN
PM 10	NaN

Pollutant	Total Emissions (TONs)
PM 2.5	NaN
Pb	0.000000
NH ₃	NaN
CO _{2e}	NaN

4.1 Demolition Phase

4.1.1 Demolition Phase Timeline Assumptions

- **Phase Start Date**

Start Month: 11

Start Quarter: 1

Start Year: 2022

- **Phase Duration**

Number of Month: 0

Number of Days: 21

4.1.2 Demolition Phase Assumptions

- **General Demolition Information**

Area of Building to be demolished (ft²): 0

Height of Building to be demolished (ft): 0

- **Default Settings Used:** No

- **Average Day(s) worked per week:** 7

- **Construction Exhaust**

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	2	10
Excavators Composite	3	10
Forklifts Composite	1	10
Tractors/Loaders/Backhoes Composite	1	10

- **Vehicle Exhaust**

Average Hauling Truck Capacity (yd³): 0

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Average Hauling Truck Round Trip Commute (mile): 0

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

4.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cranes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0797	0.0013	0.5505	0.3821	0.0203	0.0203	0.0071	128.81
Excavators Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0648	0.0013	0.3170	0.5103	0.0136	0.0136	0.0058	119.72
Forklifts Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0274	0.0006	0.1265	0.2146	0.0043	0.0043	0.0024	54.457
Tractors/Loaders/Backhoes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	Pb	NH ₃	CO _{2e}
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

4.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (0.00042 * BA * BH) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)

0.00042: Emission Factor (lb/ft³)

BA: Area of Building to be demolished (ft²)

BH: Height of Building to be demolished (ft)

2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft²)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd³)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

5. Construction / Demolition

5.1 General Information & Timeline Assumptions

- Activity Location

County: Newport News City
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: Finger Pier Demolition and Construction Year 2

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Description:

Removing mooring piles at finger piers, constructing Piers 11-13, and remaining stern ramp.

- Activity Start Date

Start Month: 11
Start Month: 2023

- Activity End Date

Indefinite: False
End Month: 11
End Month: 2023

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.047861
SO _x	0.000852
NO _x	0.285942
CO	0.328427
PM 10	0.010985

Pollutant	Total Emissions (TONs)
PM 2.5	0.010979
Pb	0.000000
NH ₃	0.000138
CO _{2e}	82.1

5.1 Demolition Phase

5.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date

Start Month: 11
Start Quarter: 1
Start Year: 2023

- Phase Duration

Number of Month: 1
Number of Days: 0

5.1.2 Demolition Phase Assumptions

- General Demolition Information

Area of Building to be demolished (ft²): 0
Height of Building to be demolished (ft): 0

- Default Settings Used: No

- Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	6
Concrete/Industrial Saws Composite	1	6
Cranes Composite	2	10
Forklifts Composite	1	10
Rubber Tired Loaders Composite	1	10
Tractors/Loaders/Backhoes Composite	1	10

- Vehicle Exhaust

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Average Hauling Truck Capacity (yd³): 20
 Average Hauling Truck Round Trip Commute (mile): 50

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

5.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cement and Mortar Mixers Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0085	0.0001	0.0534	0.0414	0.0020	0.0020	0.0007	7.2673
Concrete/Industrial Saws Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0382	0.0006	0.2766	0.3728	0.0127	0.0127	0.0034	58.549
Cranes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0754	0.0013	0.5027	0.3786	0.0181	0.0181	0.0068	128.79
Forklifts Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0258	0.0006	0.1108	0.2145	0.0034	0.0034	0.0023	54.454
Rubber Tired Loaders Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0622	0.0012	0.3467	0.4339	0.0157	0.0157	0.0056	108.75
Tractors/Loaders/Backhoes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0364	0.0007	0.2127	0.3593	0.0080	0.0080	0.0032	66.879

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	Pb	NH ₃	CO _{2e}
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

5.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (0.00042 * BA * BH) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)

0.00042: Emission Factor (lb/ft³)

BA: Area of Building to be demolished (ft²)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

BH: Height of Building to be demolished (ft)

2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$$

CEE_{POL} : Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

EF_{POL} : Emission Factor for Pollutant (lb/hour)

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$$

VMT_{VE} : Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building being demolish (ft²)

BH: Height of Building being demolish (ft)

(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)

0.25: Volume reduction factor (material reduced by 75% to account for air space)

HC: Average Hauling Truck Capacity (yd³)

(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)

VMT_{VE} : Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL} : Emission Factor for Pollutant (grams/mile)

VM: Vehicle Exhaust On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)

WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)

VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL} : Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

6. Construction / Demolition

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

6.1 General Information & Timeline Assumptions

- Activity Location

County: Newport News City

Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: Landship Construction Year 2

- Activity Description:

Constructing gangways and fendering at the landship.

- Activity Start Date

Start Month: 11

Start Month: 2023

- Activity End Date

Indefinite: False

End Month: 11

End Month: 2023

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	NaN
SO _x	NaN
NO _x	NaN
CO	NaN
PM 10	NaN

Pollutant	Total Emissions (TONs)
PM 2.5	NaN
Pb	0.000000
NH ₃	NaN
CO _{2e}	NaN

6.1 Demolition Phase

6.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date

Start Month: 11

Start Quarter: 1

Start Year: 2023

- Phase Duration

Number of Month: 0

Number of Days: 14

6.1.2 Demolition Phase Assumptions

- General Demolition Information

Area of Building to be demolished (ft²): 0

Height of Building to be demolished (ft): 0

- Default Settings Used: No

- Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	2	6

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Forklifts Composite	1	6
Tractors/Loaders/Backhoes Composite	1	6

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 0
 Average Hauling Truck Round Trip Commute (mile): 0

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

6.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cranes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0754	0.0013	0.5027	0.3786	0.0181	0.0181	0.0068	128.79
Forklifts Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0258	0.0006	0.1108	0.2145	0.0034	0.0034	0.0023	54.454
Tractors/Loaders/Backhoes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0364	0.0007	0.2127	0.3593	0.0080	0.0080	0.0032	66.879

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	Pb	NH ₃	CO _{2e}
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

6.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (0.00042 * BA * BH) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
 0.00042: Emission Factor (lb/ft³)
 BA: Area of Building to be demolished (ft²)
 BH: Height of Building to be demolished (ft)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$$

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft²)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd³)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7. Construction / Demolition

7.1 General Information & Timeline Assumptions

- Activity Location

County: Newport News City
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- **Activity Title:** General's Ramp Construction Year 2

- **Activity Description:**

Construction of a subaqueous bulkhead and mooring pile with fendering at the general's ramp.

- **Activity Start Date**

Start Month: 11

Start Month: 2023

- **Activity End Date**

Indefinite: False

End Month: 11

End Month: 2023

- **Activity Emissions:**

Pollutant	Total Emissions (TONs)
VOC	NaN
SO _x	NaN
NO _x	NaN
CO	NaN
PM 10	NaN

Pollutant	Total Emissions (TONs)
PM 2.5	NaN
Pb	0.000000
NH ₃	NaN
CO _{2e}	NaN

7.1 Demolition Phase

7.1.1 Demolition Phase Timeline Assumptions

- **Phase Start Date**

Start Month: 11

Start Quarter: 1

Start Year: 2023

- **Phase Duration**

Number of Month: 0

Number of Days: 20

7.1.2 Demolition Phase Assumptions

- **General Demolition Information**

Area of Building to be demolished (ft²): 0

Height of Building to be demolished (ft): 0

- **Default Settings Used:** No

- **Average Day(s) worked per week:** 7

- **Construction Exhaust**

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	2	10
Forklifts Composite	1	10
Tractors/Loaders/Backhoes Composite	1	10

- **Vehicle Exhaust**

Average Hauling Truck Capacity (yd³): 0

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Average Hauling Truck Round Trip Commute (mile): 0

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cranes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0754	0.0013	0.5027	0.3786	0.0181	0.0181	0.0068	128.79
Forklifts Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0258	0.0006	0.1108	0.2145	0.0034	0.0034	0.0023	54.454
Tractors/Loaders/Backhoes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0364	0.0007	0.2127	0.3593	0.0080	0.0080	0.0032	66.879

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	Pb	NH ₃	CO _{2e}
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

7.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (0.00042 * BA * BH) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)

0.00042: Emission Factor (lb/ft³)

BA: Area of Building to be demolished (ft²)

BH: Height of Building to be demolished (ft)

2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

EF_{POL}: Emission Factor for Pollutant (lb/hour)

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building being demolish (ft²)

BH: Height of Building being demolish (ft)

(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)

0.25: Volume reduction factor (material reduced by 75% to account for air space)

HC: Average Hauling Truck Capacity (yd³)

(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Vehicle Exhaust On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location

Base: FORT EUSTIS

State: Virginia

County(s): Newport News City

Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- **Action Title:** Third Port Improvements Project

- **Project Number/s (if applicable):**

- **Projected Action Start Date:** 11 / 2022

- **Action Purpose and Need:**

- Action Description:

Improvements to the Third Port, including the finger piers, mooring field, landship, and general's ramp. All work is proposed to be completed from the water, except the removal of demolished moorings and piers. Piles and other debris from demolition of piers and moorings will be removed via truck to an appropriate disposal facility.

- Point of Contact

Name: Megan Wood

Title: Environmental Scientist

Organization: USACE, Norfolk District

Email: megan.a.wood@usace.army.mil

Phone Number: 757-201-7843

- Activity List:

	Activity Type	Activity Title
2.	Construction / Demolition	Finger Pier Demolition and Construction Year 1
3.	Construction / Demolition	Mooring Field Demolition and Realignment Year 1
4.	Construction / Demolition	Bulkhead Sill Construction (Mooring Field Alternative 2) Year 1
5.	Construction / Demolition	Finger Pier Demolition and Construction Year 2
6.	Construction / Demolition	Landship Construction Year 2
7.	Construction / Demolition	General's Ramp Construction Year 2

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location

County: Newport News City

Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- **Activity Title:** Finger Pier Demolition and Construction Year 1

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Description:

Removing mooring piles at finger piers, constructing Piers 8-10, partial stern ramp, and wave screen.

- Activity Start Date

Start Month: 11
Start Month: 2022

- Activity End Date

Indefinite: False
End Month: 12
End Month: 2022

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.071626
SO _x	0.001216
NO _x	0.439745
CO	0.458319
PM 10	0.017378

Pollutant	Total Emissions (TONs)
PM 2.5	0.017369
Pb	0.000000
NH ₃	0.000206
CO _{2e}	117.3

2.1 Demolition Phase

2.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date

Start Month: 11
Start Quarter: 1
Start Year: 2022

- Phase Duration

Number of Month: 1
Number of Days: 15

2.1.2 Demolition Phase Assumptions

- General Demolition Information

Area of Building to be demolished (ft²): 0
Height of Building to be demolished (ft): 0

- Default Settings Used: No

- Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	5
Concrete/Industrial Saws Composite	1	2
Cranes Composite	2	10
Forklifts Composite	1	10
Rubber Tired Loaders Composite	1	10
Tractors/Loaders/Backhoes Composite	1	10

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Average Hauling Truck Round Trip Commute (mile): 50

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cement and Mortar Mixers Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0085	0.0001	0.0534	0.0414	0.0020	0.0020	0.0007	7.2674
Concrete/Industrial Saws Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0410	0.0006	0.2961	0.3743	0.0148	0.0148	0.0037	58.556
Cranes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0797	0.0013	0.5505	0.3821	0.0203	0.0203	0.0071	128.81
Forklifts Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0274	0.0006	0.1265	0.2146	0.0043	0.0043	0.0024	54.457
Rubber Tired Loaders Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0661	0.0012	0.3848	0.4358	0.0180	0.0180	0.0059	108.76
Tractors/Loaders/Backhoes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	Pb	NH ₃	CO _{2e}
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

2.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (0.00042 * BA * BH) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)

0.00042: Emission Factor (lb/ft³)

BA: Area of Building to be demolished (ft²)

BH: Height of Building to be demolished (ft)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$$

CEE_{POL} : Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

EF_{POL} : Emission Factor for Pollutant (lb/hour)

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$$

VMT_{VE} : Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building being demolish (ft²)

BH: Height of Building being demolish (ft)

(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)

0.25: Volume reduction factor (material reduced by 75% to account for air space)

HC: Average Hauling Truck Capacity (yd³)

(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)

VMT_{VE} : Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL} : Emission Factor for Pollutant (grams/mile)

VM: Vehicle Exhaust On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)

WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)

VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL} : Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Location

County: Newport News City

Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: Mooring Field Demolition and Realignment Year 1

- Activity Description:

Demolition of existing mooring field, realignment of mooring field with new mooring piles.

- Activity Start Date

Start Month: 11

Start Month: 2022

- Activity End Date

Indefinite: False

End Month: 11

End Month: 2022

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.009948
SO _x	0.000168
NO _x	0.061688
CO	0.062303
PM 10	0.002297

Pollutant	Total Emissions (TONs)
PM 2.5	0.002296
Pb	0.000000
NH ₃	0.000036
CO ₂ e	16.5

3.1 Demolition Phase

3.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date

Start Month: 11

Start Quarter: 1

Start Year: 2022

- Phase Duration

Number of Month: 0

Number of Days: 14

3.1.2 Demolition Phase Assumptions

- General Demolition Information

Area of Building to be demolished (ft²): 0

Height of Building to be demolished (ft): 0

- Default Settings Used: No

- Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	2	6
Forklifts Composite	1	6

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Tractors/Loaders/Backhoes Composite	1	6
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- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20
 Average Hauling Truck Round Trip Commute (mile): 50

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

3.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cranes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0797	0.0013	0.5505	0.3821	0.0203	0.0203	0.0071	128.81
Forklifts Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0274	0.0006	0.1265	0.2146	0.0043	0.0043	0.0024	54.457
Tractors/Loaders/Backhoes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	Pb	NH ₃	CO _{2e}
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

3.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (0.00042 * BA * BH) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
 0.00042: Emission Factor (lb/ft³)
 BA: Area of Building to be demolished (ft²)
 BH: Height of Building to be demolished (ft)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$$

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft²)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd³)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

- Activity Location

County: Newport News City
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- **Activity Title:** Bulkhead Sill Construction (Mooring Field Alternative 2) Year 1

- **Activity Description:**

Constructing a subaqueous bulkhead sill at the mooring field.

- **Activity Start Date**

Start Month: 11

Start Month: 2022

- **Activity End Date**

Indefinite: False

End Month: 1

End Month: 2023

- **Activity Emissions:**

Pollutant	Total Emissions (TONs)
VOC	NaN
SO _x	NaN
NO _x	NaN
CO	NaN
PM 10	NaN

Pollutant	Total Emissions (TONs)
PM 2.5	NaN
Pb	0.000000
NH ₃	NaN
CO _{2e}	NaN

4.1 Demolition Phase

4.1.1 Demolition Phase Timeline Assumptions

- **Phase Start Date**

Start Month: 11

Start Quarter: 1

Start Year: 2022

- **Phase Duration**

Number of Month: 3

Number of Days: 0

4.1.2 Demolition Phase Assumptions

- **General Demolition Information**

Area of Building to be demolished (ft²): 0

Height of Building to be demolished (ft): 0

- **Default Settings Used:** No

- **Average Day(s) worked per week:** 7

- **Construction Exhaust**

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	2	12
Forklifts Composite	1	12
Tractors/Loaders/Backhoes Composite	1	12

- **Vehicle Exhaust**

Average Hauling Truck Capacity (yd³): 0

Average Hauling Truck Round Trip Commute (mile): 0

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

4.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cranes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0797	0.0013	0.5505	0.3821	0.0203	0.0203	0.0071	128.81
Forklifts Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0274	0.0006	0.1265	0.2146	0.0043	0.0043	0.0024	54.457
Tractors/Loaders/Backhoes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	Pb	NH ₃	CO _{2e}
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

4.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (0.00042 * BA * BH) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)

0.00042: Emission Factor (lb/ft³)

BA: Area of Building to be demolished (ft²)

BH: Height of Building to be demolished (ft)

2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

EF_{POL}: Emission Factor for Pollutant (lb/hour)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$$

VMT_{VE} : Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building being demolish (ft²)

BH: Height of Building being demolish (ft)

(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)

0.25: Volume reduction factor (material reduced by 75% to account for air space)

HC: Average Hauling Truck Capacity (yd³)

(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)

VMT_{VE} : Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL} : Emission Factor for Pollutant (grams/mile)

VM: Vehicle Exhaust On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)

WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL} : Vehicle Emissions (TONs)

VMT_{WT} : Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL} : Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

5. Construction / Demolition

5.1 General Information & Timeline Assumptions

- Activity Location

County: Newport News City

Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: Finger Pier Demolition and Construction Year 2

- Activity Description:

Removing mooring piles at finger piers, constructing Piers 11-13, and remaining stern ramp.

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Start Date

Start Month: 11
Start Year: 2023

- Activity End Date

Indefinite: False
End Month: 11
End Year: 2023

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.047861
SO _x	0.000852
NO _x	0.285942
CO	0.328427
PM 10	0.010985

Pollutant	Total Emissions (TONs)
PM 2.5	0.010979
Pb	0.000000
NH ₃	0.000138
CO _{2e}	82.1

5.1 Demolition Phase

5.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date

Start Month: 11
Start Quarter: 1
Start Year: 2023

- Phase Duration

Number of Month: 1
Number of Days: 0

5.1.2 Demolition Phase Assumptions

- General Demolition Information

Area of Building to be demolished (ft²): 0
Height of Building to be demolished (ft): 0

- Default Settings Used: No

- Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	6
Concrete/Industrial Saws Composite	1	6
Cranes Composite	2	10
Forklifts Composite	1	10
Rubber Tired Loaders Composite	1	10
Tractors/Loaders/Backhoes Composite	1	10

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20
Average Hauling Truck Round Trip Commute (mile): 50

- Vehicle Exhaust Vehicle Mixture (%)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

	LDGV	LDGT	HDBGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDBGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

5.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cement and Mortar Mixers Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0085	0.0001	0.0534	0.0414	0.0020	0.0020	0.0007	7.2673
Concrete/Industrial Saws Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0382	0.0006	0.2766	0.3728	0.0127	0.0127	0.0034	58.549
Cranes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0754	0.0013	0.5027	0.3786	0.0181	0.0181	0.0068	128.79
Forklifts Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0258	0.0006	0.1108	0.2145	0.0034	0.0034	0.0023	54.454
Rubber Tired Loaders Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0622	0.0012	0.3467	0.4339	0.0157	0.0157	0.0056	108.75
Tractors/Loaders/Backhoes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0364	0.0007	0.2127	0.3593	0.0080	0.0080	0.0032	66.879

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	Pb	NH ₃	CO _{2e}
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDBGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

5.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (0.00042 * BA * BH) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)

0.00042: Emission Factor (lb/ft³)

BA: Area of Building to be demolished (ft²)

BH: Height of Building to be demolished (ft)

2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

$$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft²)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd³)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

6. Construction / Demolition

6.1 General Information & Timeline Assumptions

- Activity Location

County: Newport News City

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- **Activity Title:** Landship Construction Year 2

- **Activity Description:**

Constructing gangways and fendering at the landship.

- **Activity Start Date**

Start Month: 11

Start Month: 2023

- **Activity End Date**

Indefinite: False

End Month: 11

End Month: 2023

- **Activity Emissions:**

Pollutant	Total Emissions (TONs)
VOC	NaN
SO _x	NaN
NO _x	NaN
CO	NaN
PM 10	NaN

Pollutant	Total Emissions (TONs)
PM 2.5	NaN
Pb	0.000000
NH ₃	NaN
CO _{2e}	NaN

6.1 Demolition Phase

6.1.1 Demolition Phase Timeline Assumptions

- **Phase Start Date**

Start Month: 11

Start Quarter: 1

Start Year: 2023

- **Phase Duration**

Number of Month: 0

Number of Days: 14

6.1.2 Demolition Phase Assumptions

- **General Demolition Information**

Area of Building to be demolished (ft²): 0

Height of Building to be demolished (ft): 0

- **Default Settings Used:** No

- **Average Day(s) worked per week:** 7

- **Construction Exhaust**

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	2	6
Forklifts Composite	1	6
Tractors/Loaders/Backhoes Composite	1	6

- **Vehicle Exhaust**

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Average Hauling Truck Capacity (yd³): 0
 Average Hauling Truck Round Trip Commute (mile): 0

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

6.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cranes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0754	0.0013	0.5027	0.3786	0.0181	0.0181	0.0068	128.79
Forklifts Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0258	0.0006	0.1108	0.2145	0.0034	0.0034	0.0023	54.454
Tractors/Loaders/Backhoes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0364	0.0007	0.2127	0.3593	0.0080	0.0080	0.0032	66.879

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	Pb	NH ₃	CO _{2e}
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

6.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (0.00042 * BA * BH) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
 0.00042: Emission Factor (lb/ft³)
 BA: Area of Building to be demolished (ft²)
 BH: Height of Building to be demolished (ft)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft²)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd³)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7. Construction / Demolition

7.1 General Information & Timeline Assumptions

- Activity Location

County: Newport News City
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: General's Ramp Construction Year 2

- Activity Description:

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Construction of a subaqueous bulkhead and mooring pile with fendering at the general's ramp.

- Activity Start Date

Start Month: 11
Start Year: 2023

- Activity End Date

Indefinite: False
End Month: 11
End Year: 2023

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	NaN
SO _x	NaN
NO _x	NaN
CO	NaN
PM 10	NaN

Pollutant	Total Emissions (TONs)
PM 2.5	NaN
Pb	0.000000
NH ₃	NaN
CO _{2e}	NaN

7.1 Demolition Phase

7.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date

Start Month: 11
Start Quarter: 1
Start Year: 2023

- Phase Duration

Number of Month: 0
Number of Days: 20

7.1.2 Demolition Phase Assumptions

- General Demolition Information

Area of Building to be demolished (ft²): 0
Height of Building to be demolished (ft): 0

- Default Settings Used: No

- Average Day(s) worked per week: 7

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	2	10
Forklifts Composite	1	10
Tractors/Loaders/Backhoes Composite	1	10

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 0
Average Hauling Truck Round Trip Commute (mile): 0

- Vehicle Exhaust Vehicle Mixture (%)

LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

POVs	0	0	0	0	0	100.00	0
------	---	---	---	---	---	--------	---

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

Cranes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0754	0.0013	0.5027	0.3786	0.0181	0.0181	0.0068	128.79
Forklifts Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0258	0.0006	0.1108	0.2145	0.0034	0.0034	0.0023	54.454
Tractors/Loaders/Backhoes Composite								
	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	CH ₄	CO _{2e}
Emission Factors	0.0364	0.0007	0.2127	0.3593	0.0080	0.0080	0.0032	66.879

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	Pb	NH ₃	CO _{2e}
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

7.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (0.00042 * BA * BH) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)

0.00042: Emission Factor (lb/ft³)

BA: Area of Building to be demolished (ft²)

BH: Height of Building to be demolished (ft)

2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

EF_{POL}: Emission Factor for Pollutant (lb/hour)

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

$$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft²)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd³)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons