

**Horse Heaven Wind Farm - Construction Emissions
Emission Summary by Phase and Calendar Year**

Emission Totals by Phase	VOC tons	NO_x tons	CO tons	PM₁₀ tons	PM_{2.5} tons	SO₂ tons	HAP Tons	CO₂ tons	CH₄ tons	N₂O tons	CO₂e tons
Phase 1 Wind	3.03	24.66	17.83	1.34	1.29	0.03	0.40	9,093.78	0.29	0.17	9,150.72
Phase 1 Solar	2.12	14.67	9.94	1.15	1.11	0.02	0.39	4,794.30	0.16	0.10	4,827.91
Phase 1 Battery	0.27	2.29	1.42	0.12	0.11	2.51E-03	0.03	806.49	0.03	1.37E-02	811.34
Phase 1 total	5.43	41.63	29.19	2.61	2.51	0.05	0.82	14,694.57	0.48	0.28	14,789.97
Phase 2a Wind	3.47	29.48	18.44	1.68	1.62	0.04	0.53	11,198.93	0.33	0.22	11,272.03
Phase 2a Solar	1.92	13.23	8.75	1.05	1.01	1.43E-02	0.36	4,547.13	0.15	0.10	4,579.36
Phase 2a Battery	0.25	2.12	1.27	0.11	0.11	2.47E-03	0.03	797.29	0.03	1.37E-02	802.14
Phase 2a total	5.64	44.82	28.46	2.84	2.73	0.05	0.92	16,543.35	0.51	0.33	16,653.53
Phase 2b Wind	4.27	36.73	22.69	2.04	1.96	0.04	0.64	13,857.79	0.41	0.27	13,947.13
Phase 2b total	4.27	36.73	22.69	2.04	1.96	0.04	0.64	13,857.79	0.41	0.27	13,947.13
O&M	0.07	0.28	0.62	9.43E-03	8.65E-03	5.46E-04	0	134.31	1.22E-02	1.00E-03	134.91
O&M total	0.07	0.28	0.62	9.43E-03	8.65E-03	5.46E-04	0	134.31	1.22E-02	1.00E-03	134.91

Emission Totals by Calendar Year	VOC tons	NO_x tons	CO tons	PM₁₀ tons	PM_{2.5} tons	SO₂ tons	HAP Tons	CO₂ tons	CH₄ tons	N₂O tons	CO₂e tons
2023 (Phase 1)	5.43	41.63	29.19	2.61	2.51	0.05	0.82	14,694.57	0.48	0.28	14,789.97
2024 (Maximum of Phase 2a or 2b)	5.64	44.82	28.46	2.84	2.73	0.05	0.92	16,543.35	0.51	0.33	16,653.53
2025 and onward (O&M)	0.07	0.28	0.62	9.43E-03	8.65E-03	5.46E-04	0	134.31	1.22E-02	1.00E-03	134.91

Horse Heaven Wind Farm - Construction Emissions Summary of Construction Schedule by Phase

Proposed Phase 1 Construction Schedule

Task	Start	Finish
Road Construction	1/13/2023	5/3/2023
Wind Turbine Foundations	1/27/2023	4/26/2023
Wind Turbine Assembly	5/4/2023	8/21/2023
Wind Plant Commissioning	7/31/2023	10/30/2023
Solar Array Construction	1/1/2023	10/31/2023
Electrical System Installation	2/15/2023	9/1/2023
Battery Energy Storage System	5/4/2023	9/1/2023
Solar Plant Commissioning	9/1/2023	11/30/2023
Electrical System and Substation	2/15/2023	7/28/2023
O&M Building	3/17/2023	6/28/2023
Phase 1 Final Commercial Operation Date	11/30/2023	-

Proposed Phase 2a Construction Schedule

Task	Start	Finish
Road Construction	1/13/2024	5/3/2024
Wind Turbine Foundations	1/27/2024	4/26/2024
Wind Turbine Assembly	5/4/2024	8/21/2024
Wind Plant Commissioning	7/31/2024	10/30/2024
Solar Array Construction	1/1/2024	10/31/2024
Electrical System Installation	2/15/2024	9/1/2024
Battery Energy Storage System	5/4/2024	9/1/2024
Solar Plant Commissioning	9/1/2024	11/30/2024
Electrical System and Substation	2/15/2024	7/28/2024
O&M Facilities	3/17/2024	6/28/2024
Transmission Line Construction	1/1/2024	8/1/2024
Phase 2a Final Commercial Operation Date	11/30/2024	-

Proposed Phase 2b Construction Schedule

Task	Start	Finish
Road Construction	1/13/2024	5/3/2024
Wind Turbine Foundations	1/27/2024	4/26/2024
Electrical System and Substation	2/15/2024	7/28/2024
Wind Turbine Assembly	5/4/2024	8/21/2024
O&M Facilities	3/17/2024	6/28/2024
Transmission Line Construction	1/1/2024	8/1/2024
Plant Commissioning	7/31/2024	10/30/2024
Phase 2b Final Commercial Operation Date	10/30/2024	-

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC application for site certification.

Horse Heaven Wind Farm - Construction Emissions
Phase 1 Wind (350 MW)

Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	Fuel Use		Emissions															
								gal	VOC tons	NOx tons	CO tons	PM10 tons	PM2.5 tons	SO2 tons	HAP Tons	CO2 tons	CH4 tons	N2O tons	CO2e tons						
Site Prep & Road Const																									
Bulldozer	2270002069	200	diesel	107	12	59%	24	27,989	0.02	0.21	0.07	0.02	1.47E-02	1.14E-03	4.11E-03	422.26	1.17E-03	1.08E-02	425.49						
Excavator / Backhoe	2270002036	150	diesel	108	12	59%	24	20,993	1.05E-02	0.21	0.07	0.02	0.02	8.49E-04	2.53E-03	316.70	8.82E-04	8.06E-03	319.13						
Loader / Skid Steer loader	2270002072	150	diesel	116	12	21%	24	8,679	0.22	1.16	0.71	0.13	0.13	4.81E-04	0.05	130.94	1.11E-02	3.33E-03	132.21						
Motor grader	2270002048	100	diesel	110	12	59%	24	13,994	1.09E-02	0.18	0.07	0.02	0.02	5.76E-04	2.62E-03	211.12	9.21E-04	5.38E-03	212.75						
Vibratory Roller	2270002015	75	diesel	114	12	59%	18	8,741	1.04E-02	0.27	0.10	1.27E-02	1.23E-02	3.61E-04	2.51E-03	131.87	7.68E-04	3.36E-03	132.89						
Dump / Belly Truck	-	-	diesel	302	-	-	72	12,804	0.03	0.48	0.20	1.31E-02	1.21E-02	4.87E-04	-	144.10	3.21E-03	3.13E-04	144.27						
Water Truck	-	-	diesel	304	-	-	48	4,963	0.02	0.11	0.07	2.48E-03	2.28E-03	1.87E-04	-	55.85	8.11E-03	3.24E-04	56.15						
Fuel Truck	-	-	diesel	304	-	-	12	1,241	4.78E-03	0.03	0.02	6.19E-04	5.70E-04	4.68E-05	-	13.96	2.03E-03	8.09E-05	14.04						
Foundation																									
Rough Terrain Cranes	2270002045	200	diesel	106	12	43%	12	10,089	1.18E-02	0.14	0.03	6.58E-03	6.39E-03	4.19E-04	2.84E-03	152.20	8.21E-04	3.88E-03	153.37						
Concrete pump truck	2270002042	200	diesel	105	12	43%	8	6,713	0.07	0.90	0.22	0.04	0.04	3.72E-04	0.02	101.28	3.70E-03	2.58E-03	102.14						
Concrete Truck	2270002042	150	diesel	104	12	43%	64	40,268	0.50	5.77	1.49	0.31	0.30	2.23E-03	0.12	607.50	0.03	0.02	612.76						
Backhoe or Excavator	2270002036	150	diesel	108	12	59%	16	13,995	6.99E-03	0.14	0.05	1.06E-02	1.02E-02	5.66E-04	1.69E-03	211.13	5.88E-04	5.38E-03	212.75						
Forklifts	2270003020	75	diesel	109	12	59%	12	5,828	1.35E-03	0.13	1.19E-02	2.07E-03	2.01E-03	2.32E-04	3.25E-04	87.93	1.10E-03	2.24E-03	88.60						
Skid Steer loader	2270002072	150	diesel	116	12	21%	8	2,893	0.07	0.39	0.24	0.04	0.04	1.60E-04	0.02	43.65	3.69E-03	1.11E-03	44.07						
Dump Truck	-	-	diesel	302	-	-	24	4,268	9.13E-03	0.16	0.07	4.38E-03	4.03E-03	1.62E-04	-	48.03	1.07E-03	1.04E-04	48.09						
Transportation Trucks - materials	-	-	diesel	301	-	-	24	4,080	5.47E-03	0.12	0.06	2.28E-03	2.10E-03	1.54E-04	-	45.92	5.77E-04	5.18E-05	45.95						
Water Truck	-	-	diesel	304	-	-	12	1,241	4.78E-03	0.03	0.02	6.19E-04	5.70E-04	4.68E-05	-	13.96	2.03E-03	8.09E-05	14.04						
Fuel Truck	-	-	diesel	304	-	-	8	827	3.19E-03	0.02	1.13E-02	4.13E-04	3.80E-04	3.12E-05	-	9.31	1.35E-03	5.39E-05	9.36						
Electrical																									
Boom Truck	2270003010	150	diesel	101	12	21%	8	2,902	0.03	0.17	0.09	0.02	0.02	1.35E-04	6.34E-03	43.78	1.45E-03	1.11E-03	44.15						
Fork Truck for Spool Offload	2270003020	75	diesel	109	12	59%	12	5,828	1.35E-03	0.13	1.19E-02	2.07E-03	2.01E-03	2.32E-04	3.25E-04	87.93	1.02E-04	2.24E-03	88.60						
Man Lift Bucket	2270003010	150	diesel	101	12	21%	12	4,353	0.04	0.26	0.13	0.03	0.03	2.02E-04	9.51E-03	65.67	2.17E-03	1.67E-03	66.23						
Trencher	2270002030	200	diesel	119	12	59%	12	13,991	0.03	0.34	0.11	0.02	0.02	6.02E-04	7.03E-03	211.07	1.96E-03	5.37E-03	212.72						
Excavators / Backhoes	2270002036	150	diesel	108	12	59%	12	10,496	5.24E-03	0.11	0.03	7.92E-03	7.68E-03	4.24E-04	1.27E-03	158.35	4.41E-04	4.03E-03	159.56						
Winch Truck	2270002051	250	diesel	111	12	59%	18	26,242	8.04E-03	0.09	0.02	4.14E-03	4.02E-03	1.05E-03	1.94E-03	395.89	3.64E-04	1.01E-02	398.90						
Transportation Trucks - materials	-	-	diesel	301	-	-	32	5,440	7.30E-03	0.16	0.08	3.04E-03	2.79E-03	2.05E-04	-	61.22	7.70E-04	6.91E-05	61.26						
Substation																									
Backhoe or Excavator	2270002036	150	diesel	108	12	59%	8	6,998	3.50E-03	0.07	0.02	5.28E-03	5.12E-03	2.83E-04	8.45E-04	105.57	2.94E-04	2.69E-03	106.38						
Bulldozer	2270002069	200	diesel	107	12	59%	8	9,330	5.69E-03	0.07	0.02	5.06E-03	4.91E-03	3.79E-04	1.37E-03	140.75	3.91E-04	3.58E-03	141.83						
Concrete Trucks	2270002042	150	diesel	104	12	43%	16	10,067	0.13	1.44	0.37	0.08	0.07	5.58E-04	0.03	151.87	6.51E-03	3.87E-03	153.19						
Drill Rig	2270002033	100	diesel	103	12	43%	8	3,356	0.04	0.47	0.12	0.03	0.03	1.86E-04	9.83E-03	50.63	2.28E-03	1.29E-03	51.07						
Man Lift Bucket	2270003010	150	diesel	101	12	21%	8	2,902	0.03	0.17	0.09	0.02	0.02	1.35E-04	6.34E-03	43.78	1.45E-03	1.11E-03	44.15						
Trencher	2270002030	200	diesel	119	12	59%	8	9,327	0.02	0.23	0.07	1.47E-02	1.43E-02	4.01E-04	4.68E-03	140.71	1.30E-03	3.58E-03	141.81						
Winch Truck	2270002051	250	diesel	111	12	59%	4	5,831	1.79E-03	0.02	4.57E-03	9.20E-04	8.93E-04	2.32E-04	4.30E-04	87.98	8.10E-05	2.24E-03	88.65						
Cranes	2270002045	200	diesel	106	12	43%	8	6,726	7.87E-03	0.10	0.02	4.39E-03	4.26E-03	2.80E-04	1.89E-03	101.47	5.47E-04	2.58E-03	102.25						
Forklifts	2270003020	75	diesel	109	12	59%	8	3,886	8.97E-04	0.09	7.96E-03	1.38E-03	1.34E-03	1.55E-04	2.17E-04	58.62	6.80E-05	1.49E-03	59.07						
Skid Steer Loaders	2270002072	150	diesel	116	12	21%	4	1,447	0.04	0.19	0.12	0.02	0.02	8.02E-05	8.91E-03	21.82	1.85E-03	5.56E-04	22.03						
Dump Truck (Side or belly dump)	-	-	diesel	302	-	-	16	2,845	6.09E-03	0.11	0.04	2.92E-03	2.68E-03	1.08E-04	-	32.02	7.13E-04	6.96E-05	32.06						
Wind Turbine Assembly & Erection																									
Man Lift Bucket	2270003010	150	diesel	101	12	21%	40	14,511	0.13	0.86	0.45	0.09	0.09	6.74E-04	0.03	218.91	7.23E-03	5.57E-03	220.76						
Forklift	2270003020	75	diesel	109	12	59%	20	9,714	0.00	0.22	0.02	3.46E-03	3.35E-03	3.87E-04	5.42E-04	146.55	1.70E-04	3.73E-03	147.67						
Rough Terrain Cranes	2270002045	200	diesel	106	12	43%	50	42,036	0.05	0.60	0.14	0.03	0.03	1.75E-03	0.01	634.16	3.42E-03	0.02	639.06						
Track mounted cranes	2270002045	200	diesel	106	12	43%	12	10,089	0.01	0.14	0.03	6.58E-03	6.39E-03	4.19E-04	2.84E-03	152.20	8.21E-04	3.88E-03	153.37						
equip	-	-	diesel	301	-	-	252	42,838	5.75E-02	1.27	0.60	2.39E-02	0.02	1.62E-03	-	482.12	6.06E-03	5.44E-04	482.43						
O&M Building																									
Excavators or Backhoes	2270002036	150	diesel	108	10	59%	12	8,747	4.37E-03	0.09	0.03	6.60E-03	6.40E-03	3.54E-04	1.06E-03	131.96	3.67E-04	3.36E-03	132.97						
Forklifts	2270003020	75	diesel	109	10	59%	8	3,238	7.48E-04	0.07	6.64E-03	1.15E-03	1.12E-03	1.29E-04	1.81E-04	48.85	5.66E-05	1.24E-03	49.22						
Skid Steer Loaders	2270002072	150	diesel	116	10	21%	16	4,822	0.12	0.65	0.40	0.07	0.07	2.67E-04	0.03	72.74	6.15E-03	1.85E-03	73.45						
Air compressor	2270006015	50	diesel	102	10	43%	4	779	2.39E-03																

Horse Heaven Wind Farm - Construction Emissions
Phase 1 Solar (300 MW)

Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	Fuel Use		Emissions																			
								gal	VOC tons	NO _x tons	CO tons	PM ₁₀ tons	PM _{2.5} tons	SO ₂ tons	HAP Tons	CO ₂ tons	CH ₄ tons	N ₂ O tons	CO ₂ e tons										
Site Prep & Road Const																													
Bulldozer	2270002069	200	diesel	107	12	59%	20	23,325	1.42E-02	0.17	0.06	1.27E-02	1.23E-02	9.48E-04	3.43E-03	351.88	9.77E-04	8.96E-03	354.58										
Excavator / Backhoe	2270002036	150	diesel	108	12	59%	20	17,494	8.74E-03	0.18	0.06	1.32E-02	1.28E-02	7.07E-04	2.11E-03	263.92	7.35E-04	6.72E-03	265.94										
Loader / Skid Steer loader	2270002072	150	diesel	116	12	21%	20	7,233	0.19	0.97	0.59	0.11	4.01E-04	0.04	109.11	9.23E-03	2.78E-03	110.17											
Motor grader	2270002048	100	diesel	110	12	59%	20	11,662	9.04E-03	0.15	0.06	1.50E-02	0.01	4.80E-04	2.19E-03	175.94	7.67E-04	4.48E-03	177.29										
Vibratory Roller	2270002015	75	diesel	114	12	59%	15	7,284	8.68E-03	0.23	0.08	1.06E-02	1.03E-02	3.01E-04	2.09E-03	109.89	6.40E-04	2.80E-03	110.74										
Dump / Belly Truck	-	-	diesel	302	-	-	60	10,670	0.02	0.40	0.17	1.09E-02	1.01E-02	4.06E-04	-	120.08	2.67E-03	2.61E-04	120.23										
Water Truck	-	-	diesel	304	-	-	40	4,136	0.02	0.09	0.06	2.06E-03	1.90E-03	1.56E-04	-	46.54	6.76E-03	2.70E-04	46.79										
Fuel Truck	-	-	diesel	304	-	-	10	1,034	3.99E-03	0.02	0.01	5.16E-04	4.75E-04	3.90E-05	-	11.64	1.69E-03	6.47E-05	11.70										
Pile Driving (Solar)																													
Telehandler	2270003010	150	diesel	101	12	21%	15	5,442	0.05	0.32	0.17	0.03	0.03	2.53E-04	1.19E-02	82.09	2.71E-03	2.09E-03	82.78										
PD10 Pile Driver	2270002081	50	diesel	112	12	59%	25	8,090	0.03	0.61	0.19	0.02	0.02	3.46E-04	6.88E-03	122.05	2.64E-03	3.11E-03	123.04										
Tracked Skidsteer	2270002072	150	diesel	116	12	21%	10	3,616	0.09	0.48	0.30	0.06	0.05	2.01E-04	0.02	54.56	4.62E-03	1.39E-03	55.09										
Loader Tractor	2270002066	150	diesel	118	12	21%	5	1,811	0.03	0.18	0.10	0.02	0.02	9.50E-05	7.86E-03	27.32	2.06E-03	6.96E-04	27.58										
Fuel Truck	-	-	diesel	304	12	-	5	517	1.99E-03	1.15E-02	7.09E-03	2.58E-04	2.37E-04	1.95E-05	-	5.82	8.45E-04	3.37E-05	5.85										
Electrical																													
Dozer	2270002069	200	diesel	107	12	59%	4	4,665	2.84E-03	0.03	1.23E-02	2.53E-03	2.46E-03	1.90E-04	6.85E-04	70.38	1.95E-04	1.79E-03	70.92										
Tracked Skidsteer	2270002072	150	diesel	116	12	21%	20	7,233	0.19	0.97	0.59	0.11	4.01E-04	0.04	109.11	9.23E-03	2.78E-03	110.17											
Roller	2270002015	75	diesel	114	12	59%	8	3,885	4.63E-03	0.12	0.04	5.64E-03	5.47E-03	1.61E-04	1.12E-03	58.61	3.41E-04	1.49E-03	59.06										
Towable Air Compressor	2270006015	50	diesel	102	12	43%	4	934	2.86E-03	0.07	1.42E-02	1.88E-03	1.82E-03	4.07E-05	6.89E-04	14.09	3.11E-04	3.59E-04	14.21										
Motor Grader	2270002048	100	diesel	110	12	59%	4	2,332	1.81E-03	0.03	1.21E-02	2.99E-03	2.90E-03	9.60E-05	4.37E-04	35.19	1.53E-04	8.96E-04	35.46										
Trench Padder	2270002072	175	diesel	116	12	21%	4	1,688	0.04	0.23	0.14	0.03	0.03	9.36E-05	1.04E-02	25.46	2.15E-03	6.48E-04	25.71										
Utility Tractor	2270002066	150	diesel	118	12	21%	4	1,449	0.03	0.15	0.08	0.02	0.02	7.60E-05	6.28E-03	21.85	1.65E-03	5.57E-04	22.06										
Telehandler	2270003010	150	diesel	101	12	21%	8	2,902	0.03	0.17	0.09	0.02	0.02	1.35E-04	6.34E-03	43.78	1.45E-03	1.11E-03	44.15										
Boom Truck	2270003010	150	diesel	101	12	21%	12	4,353	0.04	0.26	0.13	0.03	0.03	2.02E-04	9.51E-03	65.67	2.17E-03	1.67E-03	66.23										
Fork Truck for Spool Offload	2270003020	75	diesel	109	12	59%	8	3,886	8.97E-04	0.09	7.96E-03	1.38E-03	1.34E-03	1.55E-04	2.17E-04	58.62	6.80E-05	1.49E-03	59.07										
Man Lift Bucket	2270003010	150	diesel	101	12	21%	8	2,902	0.03	0.17	0.09	0.02	0.02	1.35E-04	6.34E-03	43.78	1.45E-03	1.11E-03	44.15										
Trencher	2270002030	200	diesel	119	12	59%	8	9,327	0.02	0.23	0.07	1.47E-02	0.01	4.01E-04	4.68E-03	140.71	1.30E-03	3.58E-03	141.81										
Excavators / Backhoes	2270002036	150	diesel	108	12	59%	8	6,998	3.50E-03	0.07	0.02	5.28E-03	5.12E-03	2.83E-04	8.45E-04	105.57	2.94E-04	2.69E-03	106.38										
Winch Truck	2270002051	250	diesel	111	12	59%	8	11,663	3.57E-03	0.04	9.14E-03	1.84E-03	1.79E-03	4.65E-04	8.60E-04	175.95	1.62E-04	4.48E-03	177.29										
Water Truck	-	-	diesel	304	-	-	4	414	1.59E-03	9.21E-03	5.67E-03	2.06E-04	1.90E-04	1.56E-05	-	4.65	6.76E-04	2.70E-05	4.68										
Transportation Trucks - materials	-	-	diesel	301	-	-	32	5,440	7.30E-03	0.16	0.08	3.04E-03	2.79E-03	2.05E-04	-	61.22	7.70E-04	6.91E-05	61.26										
Substation																													
Backhoe or Excavator	2270002036	150	diesel	108	12	59%	8	6,998	3.50E-03	0.07	0.02	5.28E-03	5.12E-03	2.83E-04	8.45E-04	105.57	2.94E-04	2.69E-03	106.38										
Bulldozer	2270002069	200	diesel	107	12	59%	8	9,330	5.69E-03	0.07	0.02	5.06E-03	4.91E-03	3.79E-04	1.37E-03	140.75	3.91E-04	3.58E-03	141.83										
Concrete Trucks	2270002042	150	diesel	104	12	43%	16	10,067	0.13	1.44	0.37	0.08	0.07	5.58E-04	0.03	151.87	6.51E-03	3.87E-03	153.19										
Drill Rig	2270002033	100	diesel	103	12	43%	8	3,356	0.04	0.47	0.12	0.03	0.03	1.86E-04	9.83E-03	50.63	2.28E-03	1.29E-03	51.07										
Man Lift Bucket	2270003010	150	diesel	101	12	21%	8	2,902	0.03	0.17	0.09	0.02	0.02	1.35E-04	6.34E-03	43.78	1.45E-03	1.11E-03	44.15										
Trencher	2270002030	200	diesel	119	12	59%	8	9,327	0.02	0.23	0.07	1.47E-02	1.43E-02	4.01E-04	4.68E-03	140.71	1.30E-03	3.58E-03	141.81										
Winch Truck	2270002051	250	diesel	111	12	59%	4	5,831	1.79E-03	0.02	4.57E-03	9.20E-04	8.93E-04	2.32E-04	4.30E-04	87.98	8.10E-05	2.24E-03	88.65										
Cranes	2270002045	200	diesel	106	12	43%	8	6,726	7.87E-03	0.10	0.02	4.39E-03	4.26E-03	2.80E-04	1.89E-03	101.47	5.47E-04	2.58E-03	102.25										
Forklifts	2270003020	75	diesel	109	12	59%	8	3,886	8.97E-04	0.09	7.96E-03	1.38E-03	1.34E-03	1.55E-04	2.17E-04	58.62	6.80E-05	1.49E-03	59.07										
Skid Steer Loaders	2270002072	150	diesel	116	12	21%	4	1,447	0.04	0.19	0.12	0.02	0.02	8.02E-05	8.91E-03	21.82	1.85E-03	5.56E-04	22.03										
Dump Truck (Side or belly dump)	-	-	diesel	302	-	-	16	2,845	6.09E-03	0.11	0.04	2.92E-03	2.68E-03	1.08E-04	-	32.02	7.13E-04	6.96E-05	32.06										
Solar Panel Installation																													
Tracked Skidsteer	2270002072	175	diesel	116	12	21%	25	10,548	0.27	1.41	0.87	0.16	0.16	5.85E-04	0.06	159.12	1.35E-02	4.05E-03	160.67										
Loader	2270002060	150	diesel	115	12	59%	5	4,373	4.86E-03	0.06	0.02	5.21E-03	5.05E-03	1.81E-04	1.17E-03	65.97	3.85E-04	1.68E-03	66.48										
Telehandler	2270003010	150	diesel	101	12	21%	15	5,442	0.05	0.32	0.17	0.03	0.03	2.53E-04	1.19E-02	82.09	2.71E-03	2.09E-03	82.78										
Project Cleanup																													
Telehandler	2270003010	150	diesel	101	12	21%	10	3,628	0.03	0.21	0.11	0.02	0.02	1.69E-04	7.92E-03	54.73	1.81E-03	1.39E-03	55.19										
Tracked Skidsteer	2270002072	150	diesel	116	12	21%	20	7,233	0.19	0.97	0.59	0.11	4.01E-04	0.04	109.11	9.23E-03	2.78E-03	110.17											
Transportation Trucks - material/waste	-	-	diesel	301	-	-	9	1,530	2.05E-03	0.05	0.02	8.54E-04	7.86E-04	5.78E-05	-	17.22	2.16E-04	1.94E-05	17.23										
Daily Construction Traffic																													
Full size pickups, FedEx, UPS, and other delivery trucks, etc. daily	-	-	diesel	305	-	-	900	56,221	0.30	1.88	2.07	0.06	0.06	2.14E-03	-	632.73	0.05	3.14E-03	634.85										
Buggies	-	-	gasoline	306	-	-	384	12,922	0.12	0.08	1.83	3.07E-03	2.72E-03	9.66E-04	-	145.43	1.09E-02	2.29E-03	146.38										
Busses	-	-	diesel	303	-	-	72	6,857	0.01	0.14	0.09	3.08E-03	2.84E-03	2.59E-04	-	77.17	1.75E-03	2.61E-04	77.30										
Total								343,847	2.12	14.67	9.94	1.15	1.11	0.02	0.39	4,794.30	0.16	0.10	4,827.91										

- Notes:
- Equipment assumptions based on information provided by the project.
 - Calculations assume equipment is used 5 days/wk - i.e. 21 days/month.
 - Calculations conservatively assume that onroad vehicles travel approximately 50 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
 - Calculations conservatively assume workers average daily round trip commute is approximately 40 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
 - Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2023.
 - Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October 2013.
 - Onroad vehicle emission factors (lb/VMT) for VOC, NO_x, CO, PM₁₀, SO₂, and CO₂e, were estimated using the MOVES2014b emission model for an assumed construction year of 2023.
 - Onroad vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

**Horse Heaven Wind Farm - Construction Emissions
Phase 1 Battery (150 MW)**

Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	Fuel Use		Emissions									
								gal	VOC tons	NO _x tons	CO tons	PM ₁₀ tons	PM _{2.5} tons	SO ₂ tons	HAP Tons	CO ₂ tons	CH ₄ tons	N ₂ O tons	CO _{2e} tons
Site Prep & Road Const																			
Bulldozer	2270002069	200	diesel	107	12	59%	4	4,665	2.84E-03	0.03	1.23E-02	2.53E-03	2.46E-03	1.90E-04	6.85E-04	70.38	1.95E-04	1.79E-03	70.92
Excavator / Backhoe	2270002036	150	diesel	108	12	59%	4	3,499	1.75E-03	0.04	1.14E-02	2.64E-03	2.56E-03	1.41E-04	4.22E-04	52.78	1.47E-04	1.34E-03	53.19
Loader / Skid Steer loader	2270002072	150	diesel	116	12	21%	2	723	0.02	0.10	0.06	1.12E-02	1.08E-02	4.01E-05	4.46E-03	10.91	9.23E-04	2.78E-04	11.02
Motor grader	2270002048	100	diesel	110	12	59%	2	1,166	9.04E-04	1.49E-02	6.04E-03	1.50E-03	1.45E-03	4.80E-05	2.19E-04	17.59	7.67E-05	4.48E-04	17.73
Vibratory Roller	2270002015	75	diesel	114	12	59%	2	971	1.16E-03	0.03	1.10E-02	1.41E-03	1.37E-03	4.01E-05	2.79E-04	14.65	8.53E-05	3.73E-04	14.77
Dump / Belly Truck	-	-	diesel	302	-	-	4	711	1.52E-03	0.03	1.11E-02	7.29E-04	6.71E-04	2.71E-05	-	8.01	1.78E-04	1.74E-05	8.02
Water Truck	-	-	diesel	304	-	-	2	207	7.97E-04	4.60E-03	2.84E-03	1.03E-04	9.50E-05	7.80E-06	-	2.33	3.38E-04	1.35E-05	2.34
Fuel Truck	-	-	diesel	304	-	-	2	207	7.97E-04	4.60E-03	2.84E-03	1.03E-04	9.50E-05	7.80E-06	-	2.33	3.38E-04	1.35E-05	2.34
Foundation																			
Rough Terrain Cranes	2270002045	200	diesel	106	12	43%	2	1,681	1.97E-03	0.02	5.50E-03	1.10E-03	1.06E-03	6.99E-05	4.73E-04	25.37	1.37E-04	6.46E-04	25.56
Concrete Truck	2270002042	150	diesel	104	12	43%	8	5,034	0.06	0.72	0.19	0.04	2.79E-04	0.02	75.94	3.25E-03	1.93E-03	76.59	
Backhoe or Excavator	2270002036	150	diesel	108	12	59%	4	3,499	1.75E-03	0.04	1.14E-02	2.64E-03	2.56E-03	1.41E-04	4.22E-04	52.78	1.47E-04	1.34E-03	53.19
Forklifts	2270003020	75	diesel	109	12	59%	4	1,943	4.49E-04	0.04	3.98E-03	6.91E-04	6.71E-04	7.74E-05	1.08E-04	29.31	3.40E-05	7.46E-04	29.53
Skid Steer loader	2270002072	150	diesel	116	12	21%	2	723	0.02	0.10	0.06	1.12E-02	1.08E-02	4.01E-05	4.46E-03	10.91	9.23E-04	2.78E-04	11.02
Dump Truck	-	-	diesel	302	-	-	4	711	1.52E-03	0.03	1.11E-02	7.29E-04	6.71E-04	2.71E-05	-	8.01	1.78E-04	1.74E-05	8.02
Transportation Trucks - materials	-	-	diesel	301	-	-	4	680	9.12E-04	0.02	9.58E-03	3.80E-04	3.49E-04	2.57E-05	-	7.65	9.62E-05	8.63E-06	7.66
Water Truck	-	-	diesel	304	-	-	2	207	7.97E-04	4.60E-03	2.84E-03	1.03E-04	9.50E-05	7.80E-06	-	2.33	3.38E-04	1.35E-05	2.34
Fuel Truck	-	-	diesel	304	-	-	2	207	7.97E-04	4.60E-03	2.84E-03	1.03E-04	9.50E-05	7.80E-06	-	2.33	3.38E-04	1.35E-05	2.34
Electrical																			
Boom Truck	2270003010	150	diesel	101	12	21%	2	726	6.59E-03	0.04	0.02	4.45E-03	4.32E-03	3.37E-05	1.58E-03	10.95	3.62E-04	2.79E-04	11.04
Fork Truck for Spool Offload	2270003020	75	diesel	109	12	59%	2	971	2.24E-04	0.02	1.99E-03	3.46E-04	3.35E-04	3.87E-05	5.42E-05	14.65	1.70E-05	3.73E-04	14.77
Man Lift Bucket	2270003010	150	diesel	101	12	21%	2	726	6.59E-03	0.04	0.02	4.45E-03	4.32E-03	3.37E-05	1.58E-03	10.95	3.62E-04	2.79E-04	11.04
Trencher	2270002030	200	diesel	119	12	59%	2	2,332	4.87E-03	0.06	0.02	3.67E-03	3.56E-03	1.00E-04	1.17E-03	35.18	3.26E-04	8.96E-04	35.45
Excavators / Backhoes	2270002036	150	diesel	108	12	59%	2	1,749	8.74E-04	0.02	5.72E-03	1.32E-03	1.28E-03	7.07E-05	2.11E-04	26.39	7.35E-05	6.72E-04	26.59
Transportation Trucks - materials	-	-	diesel	301	-	-	4	680	9.12E-04	0.02	9.58E-03	3.80E-04	3.49E-04	2.57E-05	-	7.65	9.62E-05	8.63E-06	7.66
Project Cleanup																			
Front end loader	2270002060	150	diesel	115	12	59%	1	875	9.72E-04	1.22E-02	4.79E-03	1.04E-03	1.01E-03	3.61E-05	2.34E-04	13.19	7.69E-05	3.36E-04	13.30
Motor grader	2270002048	100	diesel	110	12	59%	1	583	4.52E-04	7.43E-03	3.02E-03	7.49E-04	7.26E-04	2.40E-05	1.09E-04	8.80	3.84E-05	2.24E-04	8.86
Dump Truck	-	-	diesel	302	-	-	1	178	3.80E-04	6.63E-03	2.79E-03	1.82E-04	1.68E-04	6.76E-06	-	2.00	4.46E-05	4.35E-06	2.00
Transportation Trucks - material/waste	-	-	diesel	301	-	-	1	170	2.28E-04	5.05E-03	2.39E-03	9.49E-05	8.73E-05	6.42E-06	-	1.91	2.41E-05	2.16E-06	1.91
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and other delivery trucks, etc. daily	-	-	diesel	305	-	-	400	24,987	0.13	0.83	0.92	0.03	0.03	9.53E-04	-	281.21	0.02	1.39E-03	282.16
Total								60,810	0.27	2.29	1.42	0.12	0.11	2.51E-03	0.03	806.49	0.03	1.37E-02	811.34

- Notes:**
- Equipment assumptions based on information provided by the project.
 - Calculations assume equipment is used 5 days/wk - i.e. 21 days/month.
 - Calculations conservatively assume that onroad vehicles travel approximately 50 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
 - Calculations conservatively assume workers average daily round trip commute is approximately 40 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
 - Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2023.
 - Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume 1 - Methodology, October 7, 2023.
 - Onroad vehicle emission factors (lb/VMT) for VOC, NO_x, CO, PM₁₀, SO₂, and CO_{2e}, were estimated using the MOVES2014b emission model for an assumed construction year of 2023.
 - Onroad vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Horse Heaven Wind Farm - Construction Emissions
Phase 2a Wind (250 MW)

Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	Fuel Use		Emissions										
								gal	CO ₂ tons	VOC tons	NO _x tons	CO tons	PM ₁₀ tons	PM _{2.5} tons	SO ₂ tons	HAP tons	CO ₂ tons	CH ₄ tons	N ₂ O tons	CO ₂ e tons
Site Prep & Road Const																				
Bulldozer	2270002069	200	diesel	207	12	59%	32	37,320	0.02	0.22	0.07	1.43E-02	1.39E-02	1.50E-03	4.34E-03	563.02	1.13E-03	1.43E-02	567.33	
Excavator / Backhoe	2270002036	150	diesel	208	12	59%	32	27,991	1.09E-02	0.23	0.07	1.47E-02	1.12E-03	2.62E-03	8.82E-04	422.28	8.82E-04	1.08E-02	425.50	
Loader / Skid Steer loader	2270002072	150	diesel	216	12	21%	32	11,573	0.29	1.53	0.94	0.18	0.17	6.42E-04	0.07	174.59	0.02	4.45E-03	176.30	
Motor grader	2270002048	100	diesel	210	12	59%	32	18,660	1.02E-02	0.18	0.07	0.02	7.57E-04	2.46E-03	281.51	8.44E-04	7.17E-03	283.67		
Vibratory Roller	2270002015	75	diesel	214	12	59%	24	11,655	1.02E-02	0.33	0.10	1.34E-02	1.30E-02	4.77E-04	2.47E-03	175.94	7.92E-04	4.48E-03	177.19	
Dump / Belly Truck	-	-	diesel	402	-	-	96	16,339	0.03	0.59	0.28	1.44E-02	1.33E-02	6.39E-04	-	189.51	4.20E-03	4.17E-04	189.74	
Water Truck	-	-	diesel	404	-	-	64	6,497	0.02	0.14	0.09	2.81E-03	2.58E-03	2.45E-04	-	73.12	1.08E-02	4.31E-04	73.62	
Fuel Truck	-	-	diesel	404	-	-	16	1,624	6.06E-03	0.03	0.02	7.01E-04	6.45E-04	6.12E-05	-	18.28	2.70E-03	1.08E-04	18.38	
Foundation																				
Rough Terrain Cranes	2270002045	200	diesel	206	12	43%	12	10,089	9.11E-03	0.11	0.03	5.07E-03	4.92E-03	4.14E-04	2.19E-03	152.21	6.27E-04	3.89E-03	153.38	
Concrete pump truck	2270002042	200	diesel	205	12	43%	8	6,713	0.07	0.89	0.22	0.04	0.04	3.72E-04	0.02	101.28	3.78E-03	2.58E-03	102.14	
Concrete Truck	2270002042	150	diesel	204	12	43%	64	40,269	0.50	5.69	1.47	0.30	0.29	2.23E-03	0.12	607.51	0.03	0.02	612.79	
Backhoe or Excavator	2270002036	150	diesel	208	12	59%	16	13,995	5.43E-03	0.12	0.03	7.55E-03	7.33E-03	5.62E-04	1.31E-03	211.14	4.41E-04	5.38E-03	212.75	
Forklifts	2270002020	75	diesel	209	12	59%	12	5,828	1.19E-03	0.13	9.02E-03	1.62E-03	1.57E-03	2.32E-04	2.88E-04	87.93	8.72E-05	2.24E-03	88.60	
Skid Steer loader	2270002072	150	diesel	216	12	21%	8	2,893	0.07	0.38	0.23	0.04	0.04	1.60E-04	0.02	43.65	3.78E-03	1.11E-03	44.07	
Dump Truck	-	-	diesel	402	-	-	24	4,210	8.02E-03	0.15	0.06	3.61E-03	3.32E-03	1.60E-04	-	47.38	1.05E-03	1.04E-04	47.43	
Transportation Trucks - materials	-	-	diesel	401	-	-	24	3,993	5.07E-03	0.11	0.06	1.98E-03	1.83E-03	1.51E-04	-	44.94	5.54E-04	5.18E-05	44.97	
Water Truck	-	-	diesel	404	-	-	12	1,218	4.55E-03	0.03	0.02	5.26E-04	4.84E-04	4.59E-05	-	13.71	2.02E-03	8.08E-05	13.79	
Fuel Truck	-	-	diesel	404	-	-	8	812	3.03E-03	0.02	1.10E-02	3.51E-04	3.23E-04	3.06E-05	-	9.14	1.35E-03	5.39E-05	9.19	
Electrical																				
Boom Truck	2270003010	150	diesel	201	12	21%	8	2,903	0.02	0.16	0.08	0.02	0.02	1.33E-04	5.78E-03	43.79	1.36E-03	1.12E-03	44.16	
Fork Truck for Spool Offload	2270002069	200	diesel	207	12	59%	12	5,828	1.19E-03	0.13	9.02E-03	1.62E-03	1.57E-03	2.32E-04	2.88E-04	87.93	8.72E-05	2.24E-03	88.90	
Man Lift Bucket	2270003010	150	diesel	201	12	21%	12	4,364	0.04	0.24	0.12	0.02	0.02	2.00E-04	6.67E-03	65.68	2.04E-03	1.67E-03	66.23	
Trencher	2270002030	200	diesel	219	12	59%	12	13,992	0.02	0.29	0.09	0.02	0.02	5.93E-04	6.89E-03	211.08	1.64E-03	5.73E-03	212.73	
Excavators / Backhoes	2270002036	150	diesel	208	12	59%	12	10,497	4.07E-03	0.09	0.03	6.68E-03	5.49E-03	4.21E-04	9.84E-04	158.35	3.31E-04	4.03E-03	159.56	
Winch Truck	2270002051	250	diesel	211	12	59%	8	11,663	3.34E-03	0.04	0.01	1.56E-03	1.51E-03	6.44E-04	8.05E-04	175.95	1.41E-04	4.48E-03	177.29	
Transportation Trucks - materials	-	-	diesel	401	-	-	32	5,324	6.78E-03	0.15	0.07	2.65E-03	2.43E-03	2.01E-04	-	59.91	7.39E-04	6.91E-05	59.95	
Substation																				
Backhoe or Excavator	2270002036	150	diesel	208	12	59%	20	17,494	6.79E-03	0.14	0.04	9.44E-03	9.16E-03	7.02E-04	1.64E-03	263.92	5.52E-04	6.72E-03	265.94	
Bulldozer	2270002069	200	diesel	207	12	59%	20	23,325	1.13E-02	0.13	0.04	8.96E-03	8.69E-03	9.40E-04	2.71E-03	351.89	7.09E-04	8.96E-03	354.58	
Concrete Trucks	2270002042	150	diesel	204	12	43%	40	25,168	0.31	3.56	0.92	0.19	0.18	1.40E-03	0.07	379.70	0.02	6.97E-03	382.99	
Drill Rig	2270002033	100	diesel	203	12	43%	20	8,390	0.10	1.14	0.29	0.07	0.06	4.63E-04	0.02	126.58	5.67E-03	3.22E-03	127.68	
Man Lift Bucket	2270003010	150	diesel	201	12	21%	20	7,256	0.06	0.39	0.20	0.04	0.04	3.34E-04	1.44E-02	109.47	3.40E-03	2.79E-03	110.39	
Trencher	2270002030	200	diesel	219	12	59%	20	23,320	0.04	0.48	0.15	0.03	0.03	9.89E-04	9.81E-03	351.81	2.73E-03	8.96E-03	354.55	
Winch Truck	2270002051	250	diesel	211	12	59%	10	14,579	4.18E-03	0.05	9.67E-03	1.95E-03	1.89E-03	5.80E-04	1.01E-03	219.94	1.76E-04	5.60E-03	221.61	
Cranes	2270002045	200	diesel	206	12	43%	20	16,815	0.02	0.18	0.04	8.45E-03	8.19E-03	6.91E-04	3.65E-03	253.68	1.05E-03	4.64E-03	255.63	
Forklifts	2270002020	75	diesel	209	12	59%	20	9,714	1.98E-03	0.21	0.02	2.70E-03	2.62E-03	3.86E-04	4.79E-04	146.55	1.45E-04	3.73E-03	147.67	
Skid Steer Loaders	2270002072	150	diesel	216	12	21%	10	3,617	0.09	0.48	0.29	0.06	0.05	2.01E-04	0.02	54.56	4.73E-03	1.39E-03	55.99	
Dump Truck (Side or belly dump)	-	-	diesel	402	-	-	40	7,016	1.34E-02	0.24	0.11	6.02E-03	5.54E-03	2.66E-04	-	78.96	1.75E-03	1.74E-04	79.06	
Wind Turbine Assembly & Erection																				
Man Lift Bucket	2270003010	150	diesel	201	12	21%	40	14,513	0.12	0.79	0.41	0.08	0.08	6.67E-04	0.03	218.95	6.81E-03	5.58E-03	220.78	
Forklift	2270002020	75	diesel	209	12	59%	20	9,714	1.98E-03	0.21	0.02	2.70E-03	2.62E-03	3.86E-04	4.79E-04	146.55	1.45E-04	3.73E-03	147.67	
Rough Terrain Cranes	2270002045	200	diesel	206	12	43%	50	42,038	0.04	0.46	0.11	0.02	0.02	1.73E-03	9.13E-03	634.19	2.61E-03	0.02	639.07	
Track mounted cranes	2270002045	200	diesel	206	12	43%	12	10,089	9.11E-03	0.11	0.03	5.07E-03	4.92E-03	4.14E-04	2.19E-03	152.21	6.27E-04	3.89E-03	153.38	
Transportation Trucks - materials & equipment	-	-	diesel	401	-	-	252	41,924	5.32E-02	1.19	0.58	0.02	0.02	1.58E-03	-	471.83	5.82E-03	5.44E-04	472.13	
Transmission Line																				
Cranes	2270002045	200	diesel	206	8	43%	8	4,484	4.05E-03	0.05	1.14E-02	2.25E-03	2.18E-03	1.84E-04	9.74E-04	67.65	2.79E-04	1.72E-03	68.17	
Bucket Trucks	2270003010	150	diesel	201	8	21%	20	4,838	0.04	0.26	0.14	0.03	0.03	2.22E-04	6.63E-03	72.98	2.27E-03	1.86E-03	73.59	
Wire Pullers	2270002081	100	diesel	213	6	59%	6	1,749	3.26E-03	0.04	1.35E-02	2.86E-03	2.78E-03	7.38E-05	7.86E-04	26.38	2.38E-04	6.72E-04	26.59	
Wire Tensioners	2270002081	100	diesel	213	6	59%	6	1,749	3.26E-03	0.04	1.35E-02	2.86E-03	2.78E-03	7.38E-05	7.86E-04	26.38	2.38E-04	6.72E-04	26.59	
Excavators or Backhoes	2270002036	150	diesel	208	4	59%	18	5,248	2.04E-03	0.04	1.31E-02	2.83E-03	2.75E-03	2.11E-04	4.92E-04	79.18	1.65E-04	2.02E-03	79.78	
Forklifts	2270002020	75	diesel	209	4	59%	12	1,943	3.97E-04	0.04	3.01E-03	5.41E-04	5.25E-04	7.73E-05	9.59E-05	29.31	2.91E-05	7.46E-04	29.53	
Truck / track diggers	2270002036	150	diesel	208	6	59%	4	1,749	6.79E-04	1.45E-02	4.35E-03	9.44E-04	9.16E-04	7.02E-05	1.64E-04	26.39	5.52E-05	6.72E-04	26.59	
Dozers	2270002069	200	diesel	207	4	59%	5	1,944	9.39E-04	1.12E-02	3.64E-03	7.47E-04	7.24E-04	7.83E-05	2.26E-04	29.32	5.91E-05	7.47E-04	29.55	
UTVs	2270001060	75	diesel	217	2	21%	6	201	2.68E-03	0.02	1.32E-02	1.79E-03	1.74E-03	9.71E-06	6.44E-04	3.04	1.07E-04	7.73E-05	3.06	
Tractor	2270002066	150	diesel	218	6	21%	4	725	1.13E-02	0.06	0.04	7.33E-03	7.11E-03	3.68E-05	2.72E-03	10.93	7.19E-04	2.78E-04	11.03	
Skid Steer Loaders	2270002072	150	diesel	216	6	21%	12	2,170	0.05	0.29	0.18	0.03	0.03	1.20E-04	1.32E-02	32.74	2.84E-03	8.34E-04	33.06	
Underground boring equipment	2270002033	100	diesel	203	8	43%	12	3,356	0.04	0.45	0.12	0.03	0.03	1.85E-04	9.55E-03					

Horse Heaven Wind Farm - Construction Emissions
Phase 2a Solar (250 MW)

Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	Fuel Use		Emissions									
								gal	VOC tons	NO _x tons	CO tons	PM ₁₀ tons	PM _{2.5} tons	SO ₂ tons	HAP Tons	CO ₂ tons	CH ₄ tons	N ₂ O tons	CO ₂ e tons
Site Prep & Road Const																			
Bulldozer	2270002069	200	diesel	207	12	59%	16	18,660	9.01E-03	0.11	0.03	7.17E-03	6.95E-03	7.52E-04	2.17E-03	281.51	5.67E-04	7.17E-03	283.66
Excavator / Backhoe	2270002036	150	diesel	208	12	59%	16	13,995	5.43E-03	0.12	0.03	7.55E-03	7.33E-03	5.62E-04	1.31E-03	211.14	4.41E-04	5.38E-03	212.75
Loader / Skid Steer loader	2270002072	150	diesel	216	12	21%	16	5,787	0.15	0.76	0.47	0.09	0.09	3.21E-04	0.04	87.30	7.57E-03	2.22E-03	88.15
Motor grader	2270002048	100	diesel	210	12	59%	16	9,330	5.10E-03	0.09	0.03	7.91E-03	7.67E-03	3.78E-04	1.23E-03	140.75	4.22E-04	3.58E-03	141.83
Vibratory Roller	2270002015	75	diesel	214	12	59%	12	5,828	5.11E-03	0.17	0.05	6.72E-03	6.52E-03	2.38E-04	1.23E-03	87.92	3.96E-04	2.24E-03	88.60
Dump / Belly Truck	-	-	diesel	402	-	-	48	8,419	0.02	0.29	0.13	7.22E-03	6.64E-03	3.19E-04	-	94.76	2.10E-03	2.09E-04	94.87
Water Truck	-	-	diesel	404	-	-	32	3,249	1.21E-02	0.07	0.04	1.40E-03	1.29E-03	1.22E-04	-	36.56	5.39E-03	2.15E-04	36.76
Fuel Truck	-	-	diesel	404	-	-	8	812	3.03E-03	0.02	1.10E-02	3.51E-04	3.23E-04	3.06E-05	-	9.14	1.35E-03	5.39E-05	9.19
Pile Driving (Solar)																			
Telehandler	2270003010	150	diesel	201	12	21%	15	5,442	0.05	0.29	0.15	0.03	0.03	2.50E-04	1.08E-02	92.11	2.55E-03	2.09E-03	92.79
PD10 Pile Driver	2270002081	50	diesel	212	12	59%	25	8,090	0.03	0.59	0.16	0.02	0.02	3.42E-04	6.04E-03	122.06	2.50E-03	3.11E-03	123.04
Tracked Skidsteer	2270002072	150	diesel	216	12	21%	10	3,617	0.09	0.48	0.29	0.06	0.05	2.01E-04	0.02	54.56	4.73E-03	1.39E-03	55.09
Loader Tractor	2270002066	150	diesel	218	12	21%	5	1,812	0.03	0.16	0.09	0.02	0.02	9.21E-05	6.79E-03	27.33	1.80E-03	6.96E-04	27.58
Fuel Truck	-	-	diesel	404	-	-	5	508	1.89E-03	1.08E-02	6.86E-03	2.19E-04	2.02E-04	1.91E-05	-	5.71	8.43E-04	3.37E-05	5.74
Electrical																			
Dozer	2270002069	200	diesel	207	12	59%	4	4,665	2.25E-03	0.03	8.73E-03	1.79E-03	1.74E-03	1.88E-04	5.43E-04	70.38	1.42E-04	1.79E-03	70.92
Tracked Skidsteer	2270002072	150	diesel	216	12	21%	20	7,233	0.18	0.96	0.58	0.11	0.11	4.01E-04	0.04	109.12	9.46E-03	2.78E-03	110.19
Roller	2270002015	75	diesel	214	12	59%	8	3,885	3.41E-03	0.11	0.03	4.48E-03	4.34E-03	1.59E-04	8.22E-04	58.61	2.64E-04	1.49E-03	59.06
Towable Air Compressor	2270006015	50	diesel	202	12	43%	4	934	2.56E-03	0.07	1.25E-02	1.59E-03	1.54E-03	4.00E-05	6.16E-04	14.10	2.96E-04	3.59E-04	14.21
Motor Grader	2270002048	100	diesel	210	12	59%	4	2,332	1.27E-03	0.02	8.38E-03	1.98E-03	1.92E-03	9.46E-05	3.08E-04	35.19	1.05E-04	8.96E-04	35.46
Trench Padder	2270002072	175	diesel	216	12	21%	4	1,688	0.04	0.22	0.14	0.03	0.02	9.36E-05	1.03E-02	25.46	2.21E-03	6.48E-04	25.71
Utility Tractor	2270002066	150	diesel	218	12	21%	4	1,449	0.02	0.13	0.07	1.47E-02	1.42E-02	7.37E-05	5.43E-03	21.86	1.44E-03	5.57E-04	22.07
Telehandler	2270003010	150	diesel	201	12	21%	8	2,903	0.02	0.16	0.08	0.02	0.02	1.33E-04	5.78E-03	43.79	1.36E-03	1.12E-03	44.16
Boom Truck	2270003010	150	diesel	201	12	21%	12	4,354	0.04	0.24	0.12	0.02	0.02	2.00E-04	8.67E-03	65.68	2.04E-03	1.67E-03	66.23
Fork Truck for Spool Offload	2270003020	75	diesel	209	12	59%	8	3,886	7.93E-04	0.08	6.01E-03	1.08E-03	1.05E-03	1.55E-04	1.92E-04	58.62	5.81E-05	1.49E-03	59.07
Man Lift Bucket	2270003010	150	diesel	201	12	21%	8	2,903	0.02	0.16	0.08	0.02	0.02	1.33E-04	5.78E-03	43.79	1.36E-03	1.12E-03	44.16
Trencher	2270002030	200	diesel	219	12	59%	8	9,328	0.02	0.19	0.06	1.21E-02	1.17E-02	3.96E-04	3.92E-03	140.72	1.09E-03	3.58E-03	141.82
Excavators / Backhoes	2270002036	150	diesel	208	12	59%	8	6,998	2.72E-03	0.06	0.02	3.78E-03	3.66E-03	2.81E-04	6.56E-04	105.57	2.21E-04	2.69E-03	106.38
Winch Truck	2270002051	250	diesel	211	12	59%	12	17,494	5.02E-03	0.06	1.16E-02	2.34E-03	2.27E-03	6.96E-04	1.21E-03	263.93	2.11E-04	6.72E-03	265.94
Water Truck	-	-	diesel	404	-	-	4	406	1.52E-03	8.61E-03	5.49E-03	1.75E-04	1.61E-04	1.53E-05	-	4.57	6.74E-04	6.29E-05	4.60
Transportation Trucks - materials	-	-	diesel	401	-	-	32	5,324	6.76E-03	0.15	0.07	2.65E-03	2.43E-03	2.01E-04	-	59.91	7.39E-04	6.91E-05	59.95
Substation																			
Backhoe or Excavator	2270002036	150	diesel	208	12	59%	8	6,998	2.72E-03	0.06	0.02	3.78E-03	3.66E-03	2.81E-04	6.56E-04	105.57	2.21E-04	2.69E-03	106.38
Bulldozer	2270002069	200	diesel	207	12	59%	8	9,330	4.50E-03	0.05	0.02	3.58E-03	3.48E-03	3.76E-04	1.09E-03	140.76	2.83E-04	3.58E-03	141.83
Concrete Trucks	2270002042	150	diesel	204	12	43%	16	10,067	0.12	1.42	0.37	0.08	0.07	5.58E-04	0.03	151.88	6.67E-03	3.87E-03	153.20
Drill Rig	2270002033	100	diesel	203	12	43%	8	3,356	0.04	0.45	0.12	0.03	0.03	1.85E-04	9.55E-03	50.63	2.27E-03	1.29E-03	51.07
Man Lift Bucket	2270003010	150	diesel	201	12	21%	8	2,903	0.02	0.16	0.08	0.02	0.02	1.33E-04	5.78E-03	43.79	1.36E-03	1.12E-03	44.16
Trencher	2270002030	200	diesel	219	12	59%	8	9,328	0.02	0.19	0.06	1.21E-02	1.17E-02	3.96E-04	3.92E-03	140.72	1.09E-03	3.58E-03	141.82
Winch Truck	2270002051	250	diesel	211	12	59%	4	5,831	1.67E-03	0.02	3.87E-03	7.79E-04	7.56E-04	2.32E-04	4.02E-04	87.98	7.03E-05	2.24E-03	88.65
Cranes	2270002045	200	diesel	206	12	43%	8	6,726	6.08E-03	0.07	0.02	3.38E-03	3.28E-03	2.76E-04	1.46E-03	101.47	4.18E-04	2.58E-03	102.25
Forklifts	2270003020	75	diesel	209	12	59%	8	3,886	7.93E-04	0.08	6.01E-03	1.08E-03	1.05E-03	1.55E-04	1.92E-04	58.62	5.81E-05	1.49E-03	59.07
Skid Steer Loaders	2270002072	150	diesel	216	12	21%	4	1,447	0.04	0.19	0.12	0.02	0.02	8.02E-05	8.79E-03	21.82	1.89E-03	5.56E-04	22.04
Dump Truck (Side or belly dump)	-	-	diesel	402	-	-	16	2,806	5.35E-03	0.10	0.04	2.41E-03	2.21E-03	1.06E-04	-	31.59	7.00E-04	6.95E-05	31.62
Solar Panel Installation																			
Tracked Skidsteer	2270002072	175	diesel	216	12	21%	25	10,548	0.27	1.39	0.85	0.16	0.16	5.85E-04	0.06	159.14	1.38E-02	4.05E-03	160.69
Loader	2270002060	150	diesel	215	12	59%	5	4,373	3.70E-03	0.05	0.02	4.29E-03	4.16E-03	1.79E-04	8.91E-04	65.98	2.92E-04	1.68E-03	66.48
Telehandler	2270003010	150	diesel	201	12	21%	15	5,442	0.05	0.29	0.15	0.03	0.03	2.50E-04	1.08E-02	92.11	2.55E-03	2.09E-03	92.79
Project Cleanup																			
Telehandler	2270003010	150	diesel	201	12	21%	10	3,628	0.03	0.20	0.10	0.02	0.02	1.67E-04	7.22E-03	54.74	1.70E-03	1.39E-03	55.19
Tracked Skidsteer	2270002072	150	diesel	216	12	21%	20	7,233	0.18	0.96	0.58	0.11	0.11	4.01E-04	0.04	109.12	9.46E-03	2.78E-03	110.19
Transportation Trucks - material/waste	-	-	diesel	401	-	-	9	1,497	1.90E-03	0.04	0.02	7.44E-04	6.85E-04	5.65E-05	-	16.85	2.08E-04	1.94E-05	16.86
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and other delivery trucks, etc. daily	-	-	diesel	405	-	-	825	49,991	0.24	1.52	1.65	0.06	0.05	1.90E-03	-	562.62	0.04	2.87E-03	564.56
Buggies	-	-	gasoline	406	-	-	352	11,561	0.11	0.06	1.62	2.79E-03	2.47E-03	8.64E-04	-	130.11	9.33E-03	2.00E-03	130.94
Busses	-	-	diesel	403	-	-	66	6,175	8.76E-03	0.12	0.08	2.85E-03	2.62E-03	2.33E-04	-	69.50	1.54E-03	2.39E-04	69.61
Total								324,457	1.92	13.23	8.75	1.05	1.01	1.43E-02	0.36	4,547.13	0.15	0.10	4,579.36

- Notes:
- Equipment assumptions based on information provided by the project.
 - Calculations assume equipment is used 5 days/wk - i.e. 21 days/month.
 - Calculations conservatively assume that onroad vehicles travel approximately 50 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
 - Calculations conservatively assume workers average daily round trip commute is approximately 40 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
 - Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
 - Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October
 - Onroad vehicle emission factors (lb/VMT) for VOC, NO_x, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
 - Onroad vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

**Horse Heaven Wind Farm - Construction Emissions
Phase 2a Battery (150 MW)**

Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	Fuel Use		Emissions									
								gal	VOC tons	NO _x tons	CO tons	PM ₁₀ tons	PM _{2.5} tons	SO ₂ tons	HAP Tons	CO ₂ tons	CH ₄ tons	N ₂ O tons	CO _{2e} tons
Site Prep & Road Const																			
Bulldozer	2270002069	200	diesel	207	12	59%	4	4,665	2.25E-03	0.03	8.73E-03	1.79E-03	1.74E-03	1.88E-04	5.43E-04	70.38	1.42E-04	1.79E-03	70.92
Excavator / Backhoe	2270002036	150	diesel	208	12	59%	4	3,499	1.36E-03	0.03	8.70E-03	1.89E-03	1.83E-03	1.40E-04	3.28E-04	52.78	1.10E-04	1.34E-03	53.19
Loader / Skid Steer loader	2270002072	150	diesel	216	12	21%	2	723	0.02	0.10	0.06	1.10E-02	1.07E-02	4.01E-05	4.40E-03	10.91	9.46E-04	2.78E-04	11.02
Motor grader	2270002048	100	diesel	210	12	59%	2	1,166	6.37E-04	1.12E-02	4.19E-03	9.88E-04	9.59E-04	4.73E-05	1.54E-04	17.59	5.27E-05	4.48E-04	17.73
Vibratory Roller	2270002015	75	diesel	214	12	59%	2	971	8.52E-04	0.03	8.55E-03	1.12E-03	1.09E-03	3.97E-05	2.05E-04	14.65	6.60E-05	3.73E-04	14.77
Dump / Belly Truck	-	-	diesel	402	-	-	4	702	1.34E-03	0.02	1.07E-02	6.02E-04	5.54E-04	2.66E-05	-	7.90	1.75E-04	1.74E-05	7.91
Water Truck	-	-	diesel	404	-	-	2	203	7.58E-04	4.30E-03	2.74E-03	8.77E-05	8.06E-05	7.66E-06	-	2.29	3.37E-04	1.35E-05	2.30
Fuel Truck	-	-	diesel	404	-	-	2	203	7.58E-04	4.30E-03	2.74E-03	8.77E-05	8.06E-05	7.66E-06	-	2.29	3.37E-04	1.35E-05	2.30
Foundation																			
Rough Terrain Cranes	2270002045	200	diesel	206	12	43%	2	1,682	1.52E-03	0.02	4.29E-03	8.45E-04	8.19E-04	6.91E-05	3.65E-04	25.37	1.05E-04	6.46E-04	25.56
Concrete Truck	2270002042	150	diesel	204	12	43%	8	5,034	0.06	0.71	0.18	0.04	2.79E-04	1.49E-02	75.94	3.33E-03	1.93E-03	76.60	
Backhoe or Excavator	2270002036	150	diesel	208	12	59%	4	3,499	1.36E-03	0.03	8.70E-03	1.89E-03	1.83E-03	1.40E-04	3.28E-04	52.78	1.10E-04	1.34E-03	53.19
Forklifts	2270003020	75	diesel	209	12	59%	4	1,943	3.97E-04	0.04	3.01E-03	5.41E-04	5.25E-04	7.73E-05	9.59E-05	29.31	2.91E-05	7.46E-04	29.53
Skid Steer loader	2270002072	150	diesel	216	12	21%	2	723	0.02	0.10	0.06	1.10E-02	1.07E-02	4.01E-05	4.40E-03	10.91	9.46E-04	2.78E-04	11.02
Dump Truck	-	-	diesel	402	-	-	4	702	1.34E-03	0.02	1.07E-02	6.02E-04	5.54E-04	2.66E-05	-	7.90	1.75E-04	1.74E-05	7.91
Transportation Trucks - materials	-	-	diesel	401	-	-	4	665	8.45E-04	0.02	9.26E-03	3.31E-04	3.04E-04	2.51E-05	-	7.49	9.24E-05	8.63E-06	7.49
Water Truck	-	-	diesel	404	-	-	2	203	7.58E-04	4.30E-03	2.74E-03	8.77E-05	8.06E-05	7.66E-06	-	2.29	3.37E-04	1.35E-05	2.30
Fuel Truck	-	-	diesel	404	-	-	2	203	7.58E-04	4.30E-03	2.74E-03	8.77E-05	8.06E-05	7.66E-06	-	2.29	3.37E-04	1.35E-05	2.30
Electrical																			
Boom Truck	2270003010	150	diesel	201	12	21%	2	726	6.00E-03	0.04	0.02	4.07E-03	3.95E-03	3.34E-05	1.44E-03	10.95	3.40E-04	2.79E-04	11.04
Fork Truck for Spool Offload	2270003020	75	diesel	209	12	59%	2	971	1.98E-04	0.02	1.50E-03	2.70E-04	2.62E-04	3.86E-05	4.79E-05	14.66	1.45E-05	3.73E-04	14.77
Man Lift Bucket	2270003010	150	diesel	201	12	21%	2	726	6.00E-03	0.04	0.02	4.07E-03	3.95E-03	3.34E-05	1.44E-03	10.95	3.40E-04	2.79E-04	11.04
Trencher	2270002030	200	diesel	219	12	59%	2	2,332	4.07E-03	0.05	0.02	3.03E-03	2.94E-03	9.89E-05	9.81E-04	35.18	2.73E-04	8.96E-04	35.45
Excavators / Backhoes	2270002036	150	diesel	208	12	59%	2	1,749	6.79E-04	1.45E-02	4.35E-03	9.44E-04	9.16E-04	7.02E-05	1.64E-04	26.39	5.52E-05	6.72E-04	26.59
Transportation Trucks - materials	-	-	diesel	401	-	-	4	665	8.45E-04	0.02	9.26E-03	3.31E-04	3.04E-04	2.51E-05	-	7.49	9.24E-05	8.63E-06	7.49
Project Cleanup																			
Front end loader	2270002060	150	diesel	215	12	59%	1	875	7.39E-04	9.78E-03	3.89E-03	8.58E-04	8.33E-04	3.58E-05	1.78E-04	13.20	5.85E-05	3.36E-04	13.30
Motor grader	2270002048	100	diesel	210	12	59%	1	583	3.19E-04	5.58E-03	2.09E-03	4.94E-04	4.79E-04	2.36E-05	7.70E-05	8.80	2.64E-05	2.24E-04	8.86
Dump Truck	-	-	diesel	402	-	-	1	175	3.34E-04	6.09E-03	2.67E-03	1.50E-04	1.38E-04	6.66E-06	-	1.97	4.37E-05	4.35E-06	1.98
Transportation Trucks - material/waste	-	-	diesel	401	-	-	1	166	2.11E-04	4.72E-03	2.32E-03	8.27E-05	7.61E-05	6.27E-06	-	1.87	2.31E-05	2.16E-06	1.87
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and other delivery trucks, etc. daily	-	-	diesel	405	-	-	400	24,238	0.12	0.74	0.80	0.03	0.02	9.23E-04	-	272.79	0.02	1.39E-03	273.73
Total								59,993	0.25	2.12	1.27	0.11	0.11	2.47E-03	0.03	797.29	0.03	1.37E-02	802.14

- Notes:**
- Equipment assumptions based on information provided by the project.
 - Calculations assume equipment is used 5 days/wk - i.e. 21 days/month.
 - Calculations conservatively assume that onroad vehicles travel approximately 50 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
 - Calculations conservatively assume workers average daily round trip commute is approximately 40 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
 - Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
 - Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume 1 - Methodology, October 7, 2024.
 - Onroad vehicle emission factors (lb/VMT) for VOC, NO_x, CO, PM₁₀, SO₂, and CO_{2e}, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
 - Onroad vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Horse Heaven Wind Farm - Construction Emissions
Phase 2b Wind (500 MW)

Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	Fuel Use			Emissions									
								gal	VOC tons	NOx tons	CO tons	PM ₁₀ tons	PM _{2.5} tons	SO ₂ tons	HAP Tons	CO ₂ tons	CH ₄ tons	N ₂ O tons	CO ₂ e tons	
Site Prep & Road Const																				
Buildozer	2270002069	200	diesel	207	12	59%	32	37,320	0.02	0.22	0.07	1.43E-02	1.39E-02	1.50E-03	4.34E-03	963.02	1.13E-03	1.43E-02	567.33	
Excavator/ Backhoe	2270002036	150	diesel	208	12	59%	32	27,991	1.05E-02	0.23	0.07	0.02	1.47E-02	1.12E-03	2.62E-03	422.28	8.82E-04	1.08E-02	425.50	
Loader / Skid Steer loader	2270002072	150	diesel	216	12	21%	32	11,573	0.29	1.63	0.94	0.17	6.42E-04	0.07	174.69	0.02	4.45E-03	176.30		
Motor grader	2270002048	100	diesel	210	12	59%	32	18,660	1.02E-02	0.18	0.07	0.02	7.67E-04	2.46E-03	281.51	8.44E-04	7.17E-03	283.67		
Vibratory roller	2270002015	75	diesel	214	12	59%	24	11,655	1.02E-02	0.33	0.10	1.34E-02	1.30E-02	4.77E-04	2.47E-03	175.84	7.92E-04	4.48E-03	177.19	
Dump / Belly Truck	-	-	diesel	402	-	-	96	16,839	0.03	0.59	0.26	1.44E-02	1.33E-02	6.39E-04	-	189.51	4.20E-03	4.17E-04	189.74	
Water Truck	-	-	diesel	404	-	-	64	6,497	0.02	0.14	0.09	2.81E-03	2.58E-03	2.45E-04	-	73.12	1.08E-02	4.31E-04	73.52	
Fuel Truck	-	-	diesel	404	-	-	16	1,624	6.06E-03	0.03	0.02	7.01E-04	6.45E-04	6.12E-05	-	18.28	2.70E-03	1.08E-04	18.38	
Foundation																				
Rough Terrain Cranes	2270002045	200	diesel	206	12	43%	18	15,134	1.37E-02	0.16	0.04	7.60E-03	7.37E-03	6.22E-04	3.29E-03	228.31	9.41E-04	5.81E-03	230.07	
Concrete pump truck	2270002042	200	diesel	205	12	43%	12	10,070	0.11	1.33	0.33	0.06	0.06	5.59E-04	0.03	151.92	5.67E-03	3.87E-03	153.22	
Concrete Truck	2270002042	150	diesel	204	12	43%	96	60,404	0.74	8.53	2.20	0.45	0.44	3.35E-03	0.18	911.27	0.04	0.02	919.19	
Backhoe or Excavator	2270002036	150	diesel	208	12	59%	24	20,993	8.15E-03	0.17	0.05	1.13E-02	1.10E-02	8.43E-04	1.97E-03	316.71	6.62E-04	8.07E-03	319.13	
Forklifts	2270002020	75	diesel	209	12	59%	18	8,743	1.78E-03	0.19	1.35E-02	2.43E-03	2.36E-03	3.48E-04	4.31E-04	131.90	1.31E-04	3.36E-03	132.90	
Skid Steer loader	2270002072	150	diesel	216	12	21%	12	4,340	0.11	0.57	0.35	0.07	0.06	2.41E-04	0.03	65.47	5.68E-03	1.67E-03	66.11	
Dump Truck	-	-	diesel	402	-	-	36	6,315	1.20E-02	0.22	0.06	5.42E-03	4.98E-03	2.40E-04	-	71.07	1.57E-03	1.66E-04	71.15	
Transportation Trucks - materials	-	-	diesel	401	-	-	36	5,989	7.60E-03	0.17	0.08	2.98E-03	2.74E-03	2.26E-04	-	67.40	8.32E-04	7.77E-05	67.45	
Water Truck	-	-	diesel	404	-	-	24	2,436	9.09E-03	0.05	0.03	1.05E-03	9.68E-04	9.19E-05	-	27.42	4.05E-03	1.62E-04	27.57	
Fuel Truck	-	-	diesel	404	-	-	12	1,218	4.55E-03	0.03	0.02	5.26E-04	4.84E-04	4.69E-05	-	13.71	2.02E-03	8.08E-05	13.79	
Electrical																				
Boom Truck	2270003010	150	diesel	201	12	21%	16	5,805	0.05	0.31	0.16	0.03	0.03	2.67E-04	1.16E-02	87.58	2.72E-03	2.23E-03	88.31	
Fork Truck for Spool Offload	2270003020	75	diesel	209	12	59%	16	7,771	1.59E-03	0.17	1.20E-02	2.16E-03	2.10E-03	3.09E-04	3.83E-04	117.24	1.16E-04	2.99E-03	118.13	
Man Lift Bucket	2270003010	150	diesel	201	12	21%	16	5,805	0.05	0.31	0.16	0.03	0.03	2.67E-04	1.16E-02	87.58	2.72E-03	2.23E-03	88.31	
Trencher	2270002030	200	diesel	219	12	59%	16	18,656	0.03	0.38	0.12	0.02	0.02	7.91E-04	7.84E-03	281.45	2.19E-03	7.17E-03	283.64	
Excavators / Backhoes	2270002036	150	diesel	208	12	59%	16	13,995	5.43E-03	0.12	0.03	7.55E-03	7.33E-03	5.62E-04	1.31E-03	211.14	4.41E-04	5.38E-03	212.75	
Winch Truck	2270002051	250	diesel	211	12	59%	24	34,989	1.00E-02	0.12	0.02	4.67E-03	4.53E-03	1.39E-03	2.41E-03	527.85	4.22E-04	1.34E-02	531.87	
Transportation Trucks - materials	-	-	diesel	401	-	-	64	10,647	1.35E-02	0.30	0.15	5.29E-03	4.87E-03	4.02E-04	-	119.83	1.48E-03	1.38E-04	119.91	
Substation																				
Backhoe or Excavator	2270002036	150	diesel	208	12	59%	20	17,494	6.79E-03	0.14	0.04	9.44E-03	9.18E-03	7.02E-04	1.64E-03	263.92	5.52E-04	6.72E-03	265.94	
Buildozer	2270002069	200	diesel	207	12	59%	20	23,325	1.13E-02	0.13	0.04	8.96E-03	8.69E-03	9.40E-04	2.71E-03	351.89	7.09E-04	8.96E-03	354.58	
Concrete Trucks	2270002042	150	diesel	204	12	43%	40	25,168	0.31	3.56	0.92	0.19	0.18	1.40E-03	0.07	379.70	0.02	9.67E-03	382.99	
Drill Rig	2270002033	100	diesel	203	12	43%	20	8,390	0.10	1.14	0.29	0.07	0.06	4.63E-04	0.02	126.58	5.67E-03	3.22E-03	127.68	
Man Lift Bucket	2270003010	150	diesel	201	12	21%	20	7,256	0.06	0.39	0.20	0.04	0.04	3.34E-04	1.44E-02	109.47	3.40E-03	2.79E-03	110.39	
Trencher	2270002030	200	diesel	219	12	59%	20	23,320	0.04	0.48	0.15	0.03	0.03	9.89E-04	9.81E-03	351.81	2.73E-03	8.96E-03	354.55	
Winch Truck	2270002051	250	diesel	211	12	59%	10	14,579	4.18E-03	0.05	9.67E-03	1.95E-03	1.89E-03	5.80E-04	1.01E-03	219.94	1.76E-04	5.60E-03	221.61	
Cranes	2270002045	200	diesel	206	12	43%	20	16,815	0.02	0.18	0.04	8.45E-03	8.19E-03	6.91E-04	3.65E-03	253.68	1.05E-03	6.46E-03	255.63	
Forklifts	2270003020	75	diesel	209	12	59%	20	9,714	1.98E-03	0.21	0.02	2.70E-03	2.62E-03	3.86E-04	4.79E-04	146.55	1.45E-04	3.73E-03	147.67	
Skid Steer Loaders	2270002072	150	diesel	216	12	21%	10	3,617	0.09	0.48	0.29	0.06	0.05	2.01E-04	0.02	54.56	4.73E-03	1.39E-03	55.09	
Dump Truck (Side or belly dump)	-	-	diesel	402	-	-	40	7,016	1.34E-02	0.24	0.11	6.02E-03	5.54E-03	2.66E-04	-	78.96	1.75E-03	1.74E-04	79.06	
Wind Turbine Assembly & Erection																				
Man Lift Bucket	2270003010	150	diesel	201	12	21%	56	20,318	0.17	1.10	0.57	0.11	0.11	9.34E-04	0.04	306.53	9.53E-03	7.81E-03	309.09	
Forklift	2270003020	75	diesel	209	12	59%	28	13,600	2.78E-03	0.30	0.02	3.79E-03	3.67E-03	5.41E-04	6.71E-04	205.17	2.04E-04	5.22E-03	206.73	
Rough Terrain Cranes	2270002045	200	diesel	206	12	43%	70	58,853	0.05	0.64	0.15	0.03	0.03	2.42E-03	1.28E-02	887.87	3.66E-03	0.02	894.70	
Track mounted cranes	2270002045	200	diesel	206	12	43%	18	15,134	1.37E-02	0.16	0.04	7.60E-03	7.37E-03	6.22E-04	3.29E-03	228.31	9.41E-04	5.81E-03	230.07	
Transportation Trucks - materials &	-	-	diesel	401	-	-	336	55,898	7.10E-02	1.59	0.78	0.03	0.03	2.11E-03	-	629.10	7.76E-03	7.25E-04	629.51	
Transmission Line																				
Cranes	2270002045	200	diesel	206	8	43%	8	4,484	4.05E-03	0.05	1.14E-02	2.25E-03	2.18E-03	1.84E-04	9.74E-04	67.65	2.79E-04	1.72E-03	68.17	
Bucket Trucks	2270003010	150	diesel	201	8	21%	20	4,838	0.04	0.26	0.14	0.03	0.03	2.22E-04	9.63E-03	72.98	2.27E-03	1.86E-03	73.59	
Wire Pullers	2270002081	100	diesel	213	6	59%	6	1,749	3.26E-03	0.04	1.35E-02	2.86E-03	2.78E-03	7.38E-05	7.86E-04	26.38	2.38E-04	6.72E-04	26.59	
Wire Tensioners	2270002081	100	diesel	213	6	59%	6	1,749	3.26E-03	0.04	1.35E-02	2.86E-03	2.78E-03	7.38E-05	7.86E-04	26.38	2.38E-04	6.72E-04	26.59	
Excavators or Backhoes	2270002036	150	diesel	208	4	59%	18	5,248	2.04E-03	0.04	1.31E-02	2.83E-03	2.75E-03	2.11E-04	4.92E-04	79.18	1.65E-04	2.02E-03	79.78	
Forklifts	2270003020	75	diesel	209	4	59%	12	1,843	3.97E-04	0.04	3.01E-03	5.41E-04	5.25E-04	7.73E-05	9.59E-05	29.31	2.91E-05	7.46E-04	29.53	
Truck / track diggers	2270002036	150	diesel	208	6	59%	4	1,749	6.79E-04	1.45E-02	2.35E-03	9.44E-04	9.18E-04	7.02E-05	1.64E-04	28.30	5.52E-05	6.72E-04	28.59	
Dozers	2270002069	200	diesel	207	4	59%	5	1,944	9.39E-04	1.12E-02	3.64E-03	7.47E-04	7.24E-04	7.83E-05	2.28E-04	29.32	5.91E-05	7.47E-04	29.55	
UTVs	2270001060	75	diesel	217	2	21%	6	201	2.68E-03	0.02	1.32E-02	1.79E-03	1.74E-03	9.71E-06	6.44E-04	3.04	1.07E-04	7.73E-05	3.06	
Tractor	2270002066	150	diesel	218	6	21%	4	725	1.13E-02	0.06	0.04	7.33E-03	7.11E-03	3.68E-05	2.72E-03	10.93	7.19E-04	2.78E-04	11.03	
Skid Steer Loaders	2270002072	150	diesel	216	6	21%	12	2,170	0.05	0.29	0.18	0.03	0.03	1.20E-04	1.32E-02	32.74	2.84E-03	8.34E-04	33.06	
Underground boring equipment	2270002033	100	diesel	203	8	43%	12	3,356	0.04	0.45	0.12	0.03	0.03	1.85E-04	9.55E-03	50.63	2.27E-03	1.2		

**Horse Heaven Wind Farm - Construction Emissions
Operations and Maintenance**

Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	Fuel Use		Emissions											
								gal	VOC tons	NO _x tons	CO tons	PM ₁₀ tons	PM _{2.5} tons	SO ₂ tons	HAP Tons	CO ₂ tons	CH ₄ tons	N ₂ O tons	CO ₂ e tons		
Solar Panel Cleaning																					
Water Truck	-	-	diesel	404	-	-	24	2,436	9.09E-03	0.05	0.03	1.05E-03	9.68E-04	9.19E-05	-	27.42	4.05E-03	1.62E-04	27.57		
Worker Commute																					
Light Commercial Truck	-	-	diesel	405	-	-	115	6,968	0.03	0.21	0.23	7.76E-03	7.14E-03	2.65E-04	-	78.43	6.07E-03	4.01E-04	78.70		
Passenger Car	-	-	gasoline	406	-	-	77	2,529	0.02	0.01	0.35	6.11E-04	5.40E-04	1.89E-04	-	28.46	2.04E-03	4.38E-04	28.64		
Total								11,934	0.07	0.28	0.62	9.43E-03	8.65E-03	5.46E-04	0.00	134.31	1.22E-02	1.00E-03	134.91		

- Notes:**
- Equipment assumptions based on information provided by the project.
 - Calculations assume equipment is used 5 days/wk - i.e. days/month.
 - Calculations conservatively assume that onroad vehicles travel approximately miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
 - Calculations conservatively assume workers average daily round trip commute is approximately miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
 - Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
 - Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume 1 - Methodology, October 7, 2014.
 - Onroad vehicle emission factors (lb/VMT) for VOC, NO_x, CO, PM₁₀, SO₂, and CO₂e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
 - Onroad vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

**Horse Heaven Wind Farm
Emission Factors**

2023 Factors for Land-based Nonroad Engines and Other Equipment (Benton County, WA)

NONROAD Source Category				NONROAD Emission Factors (g/hp-hr) /a							Climate Leaders (g/kWh) /b	Fuel Consumption gal/kWh /c	NONROAD Default Load Factor	
SCC	Description	Engine Size (hp)	Exhaust+ Crankcase VOC	Exhaust NO _x	Exhaust CO	Exhaust PM ₁₀	Exhaust PM _{2.5}	Exhaust SO ₂	Exhaust CO ₂	Exhaust CH ₄	Exhaust N ₂ O			
101	2270003010	Aerial Lifts	100 < hp <= 175	0.376424	2.443597	1.276235	0.254440	0.246807	0.001927	625.5	0.020662	0.016	0.061	21%
102	2270006015	Air Compressors	50 < hp <= 75	0.119871	2.895070	0.596171	0.078496	0.076141	0.001705	590.0	0.013032	0.015	0.058	43%
103	2270002033	Bore/Drill Rigs	100 < hp <= 175	0.427554	4.897321	1.265764	0.283498	0.274993	0.001948	529.8	0.023823	0.013	0.052	43%
104	2270002042	Cement & Mortar Mixers	100 < hp <= 175	0.436188	5.030485	1.299992	0.266438	0.258445	0.001948	529.8	0.022694	0.013	0.052	43%
105	2270002042	Cement & Mortar Mixers	175 < hp <= 300	0.385082	4.731720	1.157440	0.216126	0.209642	0.001949	529.9	0.019336	0.013	0.052	43%
106	2270002045	Cranes	175 < hp <= 300	0.041190	0.501905	0.115081	0.022971	0.022281	0.001463	530.9	0.002864	0.014	0.052	43%
107	2270002069	Crawler Tractor/Dozers	175 < hp <= 300	0.021693	0.261679	0.093740	0.019313	0.018733	0.001446	536.8	0.001491	0.014	0.053	59%
108	2270002036	Excavators	100 < hp <= 175	0.017780	0.362621	0.116397	0.026855	0.026049	0.001439	536.8	0.001495	0.014	0.053	59%
109	2270003020	Forklifts	75 < hp <= 100	0.009126	0.877277	0.080988	0.014059	0.013638	0.001574	596.1	0.000691	0.015	0.058	59%
110	2270002048	Graders	100 < hp <= 175	0.027585	0.453197	0.184198	0.045672	0.044302	0.001464	536.8	0.002341	0.014	0.053	59%
111	2270002051	Off-highway Trucks	175 < hp <= 300	0.010901	0.128754	0.027887	0.005615	0.005447	0.001417	536.8	0.000494	0.014	0.053	59%
112	2270002081	Other Construction Equipment	50 < hp <= 75	0.139477	2.984215	0.921432	0.109816	0.106521	0.001689	595.8	0.012876	0.015	0.058	59%
113	2270002081	Other Construction Equipment	100 < hp <= 175	0.079433	0.920534	0.324906	0.069897	0.067800	0.001522	536.6	0.005693	0.014	0.053	59%
114	2270002015	Rollers	75 < hp <= 100	0.047096	1.233691	0.449010	0.057364	0.055643	0.001633	596.0	0.003470	0.015	0.058	59%
115	2270002060	Rubber Tire Loaders	100 < hp <= 175	0.039552	0.494267	0.194670	0.042373	0.041102	0.001470	536.7	0.003130	0.014	0.053	59%
116	2270002072	Skid Steer Loaders	100 < hp <= 175	1.058915	5.532446	3.396834	0.638169	0.619024	0.002293	623.5	0.052753	0.016	0.061	21%
117	2270001060	Specialty Vehicle Carts	50 < hp <= 75	0.669291	4.141205	3.279180	0.450044	0.436543	0.002247	694.1	0.025095	0.018	0.068	21%
118	2270002066	Tractors/Loaders/Backhoes	100 < hp <= 175	0.746563	4.152040	2.356593	0.476468	0.462175	0.002172	624.4	0.047102	0.016	0.061	21%
119	2270002030	Trenchers	175 < hp <= 300	0.074220	0.875665	0.280526	0.056045	0.054363	0.001530	536.6	0.004972	0.014	0.053	59%

/a Emission factors for the land-based nonroad engines were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2023.

/b Emission factors for N₂O are based on Table B-8 of the EPA report, "Direct Emissions from Mobile Combustion Sources, U.S. EPA Center for Corporate Leadership – Greenhouse Gas Inventory Guidance," EPA430-K-16-004, January 2016. (0.26 g N₂O/gal fuel)

/c Fuel consumption for each type of equipment was estimated based on CO₂ emission factor (g/hp-hr) generated from the MOVES2014b model and the emission factor for the mass of CO₂ generated per gallon of fuel (10.21 kg CO₂/gal fuel) as presented in Table A-1 of the EPA report, "Direct Emissions from Mobile Combustion Sources, U.S. EPA Center for Corporate Leadership – Greenhouse Gas Inventory Guidance," EPA430-K-16-004, January 2016.

**Horse Heaven Wind Farm
Emission Factors**

2024 Factors for Land-based Nonroad Engines and Other Equipment (Benton County, WA)

NONROAD Source Category				NONROAD Emission Factors (g/hp-hr) / <u>a</u>							Climate Leaders (g/kWh) / <u>b</u>	Fuel Consumption gal/kWh / <u>c</u>	NONROAD Default Load Factor	
				Exhaust+ Crankcase VOC	Exhaust NO _x	Exhaust CO	Exhaust PM ₁₀	Exhaust PM _{2.5}	Exhaust SO ₂	Exhaust CO ₂	Exhaust CH ₄			Exhaust N ₂ O
SCC	Description	Engine Size (hp)												
201	2270003010	Aerial Lifts	100 < hp <= 175	0.343116	2.244312	1.168366	0.232684	0.225704	0.001907	625.6	0.019457	0.016	0.061	21%
202	2270006015	Air Compressors	50 < hp <= 75	0.107269	2.833988	0.524802	0.066519	0.064523	0.001676	590.1	0.012384	0.015	0.058	43%
203	2270002033	Bore/Drill Rigs	100 < hp <= 175	0.415637	4.758356	1.220811	0.276390	0.268098	0.001938	529.9	0.023742	0.013	0.052	43%
204	2270002042	Cement & Mortar Mixers	100 < hp <= 175	0.431877	4.960604	1.278622	0.262782	0.254898	0.001948	529.8	0.023260	0.013	0.052	43%
205	2270002042	Cement & Mortar Mixers	175 < hp <= 300	0.380258	4.656690	1.136865	0.211408	0.205065	0.001949	530.0	0.019791	0.013	0.052	43%
206	2270002045	Cranes	175 < hp <= 300	0.031792	0.383332	0.089851	0.017676	0.017146	0.001446	531.0	0.002188	0.014	0.052	43%
207	2270002069	Crawler Tractor/Dozers	175 < hp <= 300	0.017180	0.205727	0.066568	0.013666	0.013256	0.001434	536.8	0.001081	0.014	0.053	59%
208	2270002036	Excavators	100 < hp <= 175	0.013805	0.294341	0.088521	0.019202	0.018626	0.001428	536.8	0.001122	0.014	0.053	59%
209	2270003020	Forklifts	75 < hp <= 100	0.008068	0.863434	0.061159	0.011000	0.010670	0.001571	596.1	0.000591	0.015	0.058	59%
210	2270002048	Graders	100 < hp <= 175	0.019442	0.340177	0.127815	0.030156	0.029251	0.001443	536.8	0.001608	0.014	0.053	59%
211	2270002051	Off-highway Trucks	175 < hp <= 300	0.010204	0.120191	0.023612	0.004752	0.004610	0.001415	536.8	0.000429	0.014	0.053	59%
212	2270002081	Other Construction Equipment	50 < hp <= 75	0.122516	2.900716	0.785789	0.091306	0.088567	0.001667	595.8	0.012211	0.015	0.058	59%
213	2270002081	Other Construction Equipment	100 < hp <= 175	0.066363	0.777606	0.274295	0.058201	0.056455	0.001502	536.6	0.004835	0.014	0.053	59%
214	2270002015	Rollers	75 < hp <= 100	0.034643	1.131882	0.347647	0.045550	0.044183	0.001616	596.1	0.002685	0.015	0.058	59%
215	2270002060	Rubber Tire Loaders	100 < hp <= 175	0.030069	0.397966	0.158162	0.034918	0.033870	0.001456	536.7	0.002379	0.014	0.053	59%
216	2270002072	Skid Steer Loaders	100 < hp <= 175	1.044565	5.461095	3.340533	0.631123	0.612190	0.002293	623.6	0.054061	0.016	0.061	21%
217	2270001060	Specialty Vehicle Carts	50 < hp <= 75	0.612170	3.999074	3.017768	0.410255	0.397947	0.002220	694.2	0.024358	0.018	0.068	21%
218	2270002066	Tractors/Loaders/Backhoes	100 < hp <= 175	0.645219	3.609054	2.049890	0.418799	0.406235	0.002105	624.7	0.041111	0.016	0.061	21%
219	2270002030	Trenchers	175 < hp <= 300	0.062155	0.730293	0.232913	0.046190	0.044804	0.001509	536.7	0.004169	0.014	0.053	59%

/a Emission factors for the land-based nonroad engines were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.

/b Emission factors for N₂O are based on Table B-8 of the EPA report, "Direct Emissions from Mobile Combustion Sources, U.S. EPA Center for Corporate Leadership – Greenhouse Gas Inventory Guidance," EPA430-K-16-004, January 2016. (0.26 g N₂O/gal fuel)

/c Fuel consumption for each type of equipment was estimated based on CO₂ emission factor (g/hp-hr) generated from the MOVES2014b model and the emission factor for the mass of CO₂ generated per gallon of fuel (10.21 kg CO₂/gal fuel) as presented in Table A-1 of the EPA report, "Direct Emissions from Mobile Combustion Sources, U.S. EPA Center for Corporate Leadership – Greenhouse Gas Inventory Guidance," EPA430-K-16-004, January 2016.

**Horse Heaven Wind Farm
Emission Factors**

2023 Factor for On-road Vehicles (Benton County, WA)

		MOVES2014b Emission factors in grams/VMT /a										
		VOC	NO _x	CO	PM ₁₀	PM2.5	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e	mi/gal
301	Diesel Combination Long-haul Truck	0.19708	4.36280	2.06888	0.08199	0.07543	0.00554	1653.0	0.02078	0.00187	1654.0	6.18
302	Diesel Refuse Truck	0.32863	5.72492	2.40662	0.15755	0.14494	0.00584	1729.2	0.03852	0.00376	1731.2	5.90
303	Diesel Single Unit Long-haul Truck	0.12184	1.62455	1.06090	0.03698	0.03402	0.00310	926.1	0.02096	0.00313	927.6	11.02
304	Diesel Single Unit Short-haul Truck	0.34450	1.98908	1.22486	0.04459	0.04102	0.00337	1005.3	0.14599	0.00583	1010.7	10.16
305	Diesel Light Commercial Truck	0.28924	1.80128	1.98747	0.06054	0.05570	0.00206	607.4	0.04553	0.00301	608.6	16.81
306	Gasoline Passenger Car	0.27542	0.17850	4.10694	0.00691	0.00611	0.00217	327.2	0.02458	0.00515	329.1	31.20

/a Emission factors (lb/VMT) for VOC, NO_x, CO, PM₁₀, SO₂, and CO₂e, were derived using the MOVES2014 model and inputs for calendar year 2023 using the default input files for calendar year 2023 from the State of Washington Department of Ecology.

2024 Factor for On-road Vehicles (Benton County, WA)

		MOVES2014b Emission factors in grams/VMT /a										
		VOC	NO _x	CO	PM ₁₀	PM2.5	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e	mi/gal
401	Diesel Combination Long-haul Truck	0.18245	4.08130	2.00034	0.07144	0.06572	0.00542	1617.7	0.01996	0.00187	1618.7	6.31
402	Diesel Refuse Truck	0.28885	5.26539	2.30820	0.13000	0.11960	0.00575	1705.6	0.03780	0.00376	1707.6	5.99
403	Diesel Single Unit Long-haul Truck	0.11464	1.55932	1.04570	0.03728	0.03430	0.00305	909.8	0.02010	0.00313	911.2	11.22
404	Diesel Single Unit Short-haul Truck	0.32730	1.85878	1.18535	0.03787	0.03484	0.00331	987.2	0.14565	0.00582	992.5	10.34
405	Diesel Light Commercial Truck	0.25216	1.59025	1.72447	0.05833	0.05367	0.00199	589.2	0.04557	0.00301	590.4	17.33
406	Gasoline Passenger Car	0.26095	0.14939	3.96998	0.00685	0.00606	0.00212	319.4	0.02291	0.00492	321.2	31.97

/a Emission factors (lb/VMT) for VOC, NO_x, CO, PM₁₀, SO₂, and CO₂e, were derived using the MOVES2014 model and inputs for calendar year 2024 using the default input files for calendar year 2024 from the State of Washington Department of Ecology.

**Horse Heaven Wind Farm
MOVES Emission Factors**

Benton County, WA												
Input Year	Fuel	Vehicle Type	Emission Factor grams/VMT									
			VOC	NOx	CO	PM10	PM2.5	SO2	CO2	CH4	N2O	CO2e
2023	Diesel	Combination Long-haul Truck	0.19708	4.36280	2.06888	0.08199	0.07543	0.00554	1653.0	0.02078	0.00187	1654.0
		Combination Short-haul Truck	0.20423	4.06897	1.91375	0.07046	0.06483	0.00552	1650.4	0.03287	0.00291	1652.1
		Single Unit Long-haul Truck	0.12184	1.62455	1.06090	0.03698	0.03402	0.00310	926.1	0.02096	0.00313	927.6
		Single Unit Short-haul Truck	0.34450	1.98908	1.22486	0.04459	0.04102	0.00337	1005.3	0.14599	0.00583	1010.7
		Refuse Truck	0.32863	5.72492	2.40662	0.15755	0.14494	0.00584	1729.2	0.03852	0.00376	1731.2
		Light Commercial Truck	0.28924	1.80128	1.98747	0.06054	0.05570	0.00206	607.4	0.04553	0.00301	608.6
	Passenger Car	0.19987	0.10901	4.07464	0.00257	0.00237	0.00114	340.9	0.00394	0.00068	341.2	
	Gasoline	Combination Short-haul Truck	9.23402	7.44913	135.8309	0.07234	0.06400	0.01038	1563.0	0.33299	0.03792	1582.5
		Single Unit Long-haul Truck	0.76947	0.38745	7.97404	0.01577	0.01395	0.00674	1014.4	0.02776	0.00928	1017.8
		Single Unit Short-haul Truck	1.12743	0.66741	11.18899	0.03934	0.03480	0.00717	1079.0	0.06638	0.04681	1093.0
		Refuse Truck	3.28673	4.48433	39.12965	0.18280	0.16171	0.00784	1180.6	0.17743	0.07946	1208.7
		Light Commercial Truck	0.28364	0.31128	5.17191	0.01102	0.00975	0.00298	448.9	0.03101	0.00922	452.2
		Passenger Car	0.27542	0.17850	4.10694	0.00691	0.00611	0.00217	327.2	0.02458	0.00515	329.1

Note: Emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were derived using the MOVES2014 model and inputs for calendar year 2023 using the de input files for Benton County from the State of Washington Department of Ecology.

Benton County, WA												
Input Year	Fuel	Vehicle Type	Emission Factor grams/VMT									
			VOC	NOx	CO	PM10	PM2.5	SO2	CO2	CH4	N2O	CO2e
2024	Diesel	Combination Long-haul Truck	0.18245	4.08130	2.00034	0.07144	0.06572	0.00542	1617.7	0.01996	0.00187	1618.7
		Combination Short-haul Truck	0.19133	3.85586	1.85778	0.06245	0.05746	0.00541	1616.8	0.03167	0.00291	1618.4
		Single Unit Long-haul Truck	0.11464	1.55932	1.04570	0.03728	0.03430	0.00305	909.8	0.02010	0.00313	911.2
		Single Unit Short-haul Truck	0.32730	1.85878	1.18535	0.03787	0.03484	0.00331	987.2	0.14565	0.00582	992.5
		Refuse Truck	0.28885	5.26539	2.30820	0.13000	0.11960	0.00575	1705.6	0.03780	0.00376	1707.6
		Light Commercial Truck	0.25216	1.59025	1.72447	0.05833	0.05367	0.00199	589.2	0.04557	0.00301	590.4
	Passenger Car	0.19368	0.09464	3.90412	0.00255	0.00235	0.00110	329.4	0.00323	0.00068	329.6	
	Gasoline	Combination Short-haul Truck	7.57169	6.25666	112.9196	0.06689	0.05917	0.01057	1590.7	0.28324	0.03486	1608.1
		Single Unit Long-haul Truck	0.70314	0.32138	7.51225	0.01459	0.01291	0.00669	1007.1	0.02535	0.00864	1010.3
		Single Unit Short-haul Truck	1.08079	0.60565	10.67867	0.03860	0.03415	0.00712	1071.7	0.06378	0.04355	1084.8
		Refuse Truck	3.54956	4.40078	38.29389	0.18183	0.16085	0.00789	1187.7	0.17365	0.07850	1215.3
		Light Commercial Truck	0.27141	0.27620	4.88040	0.01095	0.00968	0.00293	440.5	0.02907	0.00876	443.6
		Passenger Car	0.26095	0.14939	3.96998	0.00685	0.00606	0.00212	319.4	0.02291	0.00492	321.2

Note: Emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were derived using the MOVES2014 model and inputs for calendar year 2024 using the de input files for Benton County from the State of Washington Department of Ecology.

HORSE HEAVEN WIND FARM**EPA NEI HAP Emission Factors for Nonroad Diesels**

HAP emission factors for nonroad diesels (below) were obtained from ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October 7, 2003 (available from <http://www.epa.gov/ttn/chief/net/1999inventory.html#final3haps>), Appendix D, Tables D-1 through D-3. This is the reference cited by EPA's National Inventory Model (NMIM), i.e., US EPA, "EPA's National Inventory Model (NMIM), A Consolidated Emissions Modeling System for MOBILE6 and NONROAD", EPA420-R-05-024, December 2005 (available from <http://www.epa.gov/otaq/models/nmim/420r05024.pdf>), pp. 19-21.

Pollutant	Fraction of	Emissions Factor %
1,3-butadiene	VOC - Exhaust	0.0018616
formaldehyde	VOC	0.11815
benzene	VOC	0.020344
acetaldehyde	VOC	0.05308
ethylbenzene	VOC - Exhaust	0.0031001
styrene	VOC - Exhaust	0.00059448
acrolein	VOC	0.00303
toluene	VOC	0.014967
hexane	VOC	0.0015913
propionaldehyde	VOC	0.011815
2,2,4-trimethylpentane	VOC	0.000719235
2,3,7,8-TCDD TEQ **	tons TEQ/gal	1.90705E-14
xylenes	VOC	0.010582
Total HAP (ratioed to VOC)		0.239834715
PAH		
benz[a]anthracene	PM10	0.0000071
benzo[a]pyrene	PM10	0.00000035
benzo[b]fluoranthene	PM10	0.00000049
benzo[k]fluoranthene	PM10	0.00000035
chrysene	PM10	0.0000019
dibenzo[a,h]anthracene	PM10	2.9E-09
indeno[1,2,3-c,d]pyrene	PM10	0.000000079
acenaphthene	PM10	0.0001
acenaphthylene	PM10	0.000084
anthracene	PM10	0.00000043
benzo[g,h,i]perylene	PM10	0.00000019
fluoranthene	PM10	0.000017
fluorene	PM10	0.0001
naphthalene	PM10	0.00046
phenanthrene	PM10	0.00026
pyrene	PM10	0.0000029
Total HAP (ratioed to PM10)		0.001034792
chromium	ug/bhp-hr	0.03
manganese	ug/bhp-hr	1.37
nickel	ug/bhp-hr	2.035
Total HAP (Metals ug/bhp-hr)		3.435

** Note: the emission rate for 2,3,7,8-TCDD TEQ is significantly lower than any other HAP and therefore, was not factored into the total HAP emission factor.