APPENDIX 4.3-1

Emission Calculations

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Horse Heaven Wind Farm LLC's Emission Calculations

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

Emission Totals by Phase	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_2O tons	CO_2e 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	PM_{10} tons	$PM_{2.5}$ tons	SO_2 tons	HAP Tons	CO_2 tons	CH_4 tons	N_2O tons	CO_2e 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)

								Fuel Use	Emissions										
Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	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_2O tons	CO_2e 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	1.02E-04	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	0.06	1.19E-02	1.56E-03	1.52E-03	3.40E-05	5.74E-04	11.75	2.59E-04	2.99E-04	11.84
Project Cleanup																			
Front end loader	2270002060	150	diesel	115	12	59%	8	6,997	7.78E-03	0.10	0.04	8.33E-03	8.08E-03	2.89E-04	1.87E-03	105.55	6.16E-04	2.69E-03	106.37
Motor grader	2270002048	100	diesel	110	12	59%	8	4,665	3.62E-03	0.06	0.02	5.99E-03	5.81E-03	1.92E-04	8.74E-04	70.37	3.07E-04	1.79E-03	70.92
Dump Truck	-	-	diesel	302	-	-	8	1,423	3.04E-03	0.05	0.02	1.46E-03	1.34E-03	5.41E-05	-	16.01	3.57E-04	3.48E-05	16.03
Transportation Trucks - material/waste	-	-	diesel	301	-	-	12	2,040	2.74E-03	0.06	0.03	1.14E-03	1.05E-03	7.70E-05	-	22.96	2.89E-04	2.59E-05	22.97
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and other delivery trucks, etc. daily	-	-	diesel	305	-	-	1,080	67,465	0.36	2.25	2.48	0.08	0.07	2.57E-03	-	759.27	0.06	3.76E-03	761.82
Worker Commute																			
Light Commercial Truck	-	-	diesel	305	-	-	1,584	98,948	0.53	3.30	3.64	0.11	0.10	3.77E-03	-	1113.60	0.08	5.52E-03	1117.33
Passenger Car	-	-	gasoline	306	-	-	1,056	35,535	0.34	0.22	5.02	8.44E-03	7.47E-03	2.66E-03	-	399.92	0.03	6.30E-03	402.55
							Total	**675,415**	**3.03**	**24.66**	**17.83**	**1.34**	**1.29**	**0.03**	**0.40**	**9,093.78**	**0.29**	**0.17**	**9,150.72**

Notes:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., 21 days/month.
3. 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.
4. 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.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2023.
6. 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 7, 2
7. Onroad vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2023.
8. 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 Solar (300 MW)

								Fuel Use	Emissions										
Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	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_2O tons	CO_2e 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	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	6.74E-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	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	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:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e. 21 days/month.
3. 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.
4. 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.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2023.
6. 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
7. Onroad vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2023.
8. 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)

								Fuel Use	Emissions										
Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	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_2O 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	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:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., 21 days/month.
3. 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.
4. 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.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2023.
6. 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 7, 2
7. Onroad vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2023.
8. 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)

								Fuel Use	Emissions										
Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	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_2O tons	CO_2e 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	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	1.53	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	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	175.84	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%	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	3.88E-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	2270003020	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	2270003020	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
Man Lift Bucket	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
Trencher	2270002030	200	diesel	219	12	59%	12	13,992	0.02	0.29	0.09	0.02	0.02	5.93E-04	5.88E-03	211.08	1.64E-03	5.38E-03	212.73
Excavators / Backhoes	2270002036	150	diesel	208	12	59%	12	10,497	4.07E-03	0.09	0.03	5.66E-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	4.64E-04	8.05E-04	175.95	1.41E-04	4.48E-03	177.29
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%	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	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%	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	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
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	3.88E-03	153.38
Transportation Trucks - materials & equi	-	-	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	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	1,943	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	50.63	2.27E-03	1.29E-03	51.07
Tractor Trailers	-	-	diesel	401	-	-	6	998	1.27E-03	0.03	1.39E-02	4.96E-04	4.56E-04	3.76E-05	-	11.23	1.39E-04	1.30E-05	11.24
Fuel Trucks / Trailers	-	-	diesel	404	-	-	6	609	2.27E-03	1.29E-02	8.23E-03	2.63E-04	2.42E-04	2.30E-05	-	6.86	1.01E-03	4.04E-05	6.89
O&M Building																			
Excavators or Backhoes	2270002036	150	diesel	208	10	59%	12	8,747	3.39E-03	0.07	0.02	4.72E-03	4.58E-03	3.51E-04	8.20E-04	131.96	2.76E-04	3.36E-03	132.97
Forklifts	2270003020	75	diesel	209	10	59%	8	3,238	6.61E-04	0.07	5.01E-03	9.01E-04	8.74E-04	1.29E-04	1.60E-04	48.85	4.85E-05	1.24E-03	49.22
Skid Steer Loaders	2270002072	150	diesel	216	10	21%	16	4,822	0.12	0.64	0.39	0.07	0.07	2.67E-04	0.03	72.75	6.31E-03	1.85E-03	73.46
Air compressor	2270006015	50	diesel	202	10	43%	4	779	2.14E-03	0.06	1.04E-02	1.32E-03	1.28E-03	3.34E-05	5.14E-04	11.75	2.47E-04	2.99E-04	11.84
Project Cleanup																			
Front end loader	2270002060	150	diesel	215	12	59%	8	6,997	5.91E-03	0.08	0.03	6.87E-03	6.66E-03	2.86E-04	1.43E-03	105.56	4.68E-04	2.69E-03	106.37
Motor grader	2270002048	100	diesel	210	12	59%	8	4,665	2.55E-03	0.04	0.02	3.95E-03	3.84E-03	1.89E-04	6.16E-04	70.38	2.11E-04	1.79E-03	70.92
Dump Truck	-	-	diesel	402	-	-	8	1,403	2.67E-03	0.05	0.02	1.20E-03	1.11E-03	5.32E-05	-	15.79	3.50E-04	3.48E-05	15.81
Transportation Trucks - material/waste	-	-	diesel	401	-	-	12	1,996	2.53E-03	0.06	0.03	9.92E-04	9.13E-04	7.53E-05	-	22.47	2.77E-04	2.59E-05	22.48
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and other delivery trucks, etc. daily	-	-	diesel	405	-	-	1,400	84,833	0.41	2.58	2.79	0.09	0.09	3.23E-03	-	954.75	0.07	4.88E-03	958.05
Worker Commute																			
Light Commercial Truck	-	-	diesel	405	-	-	1,412	85,560	0.41	2.60	2.82	0.10	0.09	3.26E-03	-	962.93	0.07	4.92E-03	966.26
Passenger Car	-	-	gasoline	406	-	-	942	30,938	0.28	0.16	4.33	7.47E-03	6.61E-03	2.31E-03	-	348.19	0.02	5.36E-03	350.41
							Total	**817,455**	**3.47**	**29.48**	**18.44**	**1.68**	**1.62**	**0.04**	**0.53**	**11,198.93**	**0.33**	**0.22**	**11,272.03**

Notes:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., 21 days/month.
3. 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.
4. 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.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. 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 7, 2
7. Onroad vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. 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 Solar (250 MW)

								Fuel Use	Emissions										
Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	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_2O tons	CO_2e 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	82.11	2.55E-03	2.09E-03	82.79
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	2.69E-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	82.11	2.55E-03	2.09E-03	82.79
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:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e. 21 days/month.
3. 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.
4. 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.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. 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
7. Onroad vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. 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)

								Fuel Use	Emissions										
Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	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_2O 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	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:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., 21 days/month.
3. 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.
4. 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.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. 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 7, 2
7. Onroad vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. 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)

								Fuel Use	Emissions										
Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	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_2O tons	CO_2e 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	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	1.53	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	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	175.84	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	2270003020	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	0.10	5.42E-03	4.98E-03	2.40E-04	-	71.07	1.57E-03	1.56E-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	4.59E-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	9.16E-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	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	1,943	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	50.63	2.27E-03	1.29E-03	51.07
Tractor Trailers	-	-	diesel	401	-	-	6	998	1.27E-03	0.03	1.39E-02	4.96E-04	4.56E-04	3.76E-05	-	11.23	1.39E-04	1.30E-05	11.24
Fuel Trucks / Trailers	-	-	diesel	404	-	-	6	609	2.27E-03	1.29E-02	8.23E-03	2.63E-04	2.42E-04	2.30E-05	-	6.86	1.01E-03	4.04E-05	6.89
O&M Building																			
Excavators or Backhoes	2270002036	150	diesel	208	10	59%	12	8,747	3.39E-03	0.07	0.02	4.72E-03	4.58E-03	3.51E-04	8.20E-04	131.96	2.76E-04	3.36E-03	132.97
Forklifts	2270003020	75	diesel	209	10	59%	8	3,238	6.61E-04	0.07	5.01E-03	9.01E-04	8.74E-04	1.29E-04	1.60E-04	48.85	4.85E-05	1.24E-03	49.22
Skid Steer Loaders	2270002072	150	diesel	216	10	21%	16	4,822	0.12	0.64	0.39	0.07	0.07	2.67E-04	0.03	72.75	6.31E-03	1.85E-03	73.46
Air compressor	2270006015	50	diesel	202	10	43%	4	779	2.14E-03	0.06	1.04E-02	1.32E-03	1.28E-03	3.34E-05	5.14E-04	11.75	2.47E-04	2.99E-04	11.84
Project Cleanup																			
Front end loader	2270002060	150	diesel	215	12	59%	10	8,746	7.39E-03	0.10	0.04	8.58E-03	8.33E-03	3.58E-04	1.78E-03	131.95	5.85E-04	3.36E-03	132.97
Motor grader	2270002048	100	diesel	210	12	59%	10	5,831	3.19E-03	0.06	0.02	4.94E-03	4.79E-03	2.36E-04	7.70E-04	87.97	2.64E-04	2.24E-03	88.65
Dump Truck	-	-	diesel	402	-	-	10	1,754	3.34E-03	0.06	0.03	1.50E-03	1.38E-03	6.66E-05	-	19.74	4.37E-04	4.35E-05	19.76
Transportation Trucks - material/waste	-	-	diesel	401	-	-	15	2,495	3.17E-03	0.07	0.03	1.24E-03	1.14E-03	9.41E-05	-	28.08	3.47E-04	3.24E-05	28.10
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and other delivery trucks, etc. daily	-	-	diesel	405	-	-	2,100	127,250	0.61	3.87	4.19	0.14	0.13	4.84E-03	-	1432.12	0.11	7.32E-03	1437.07
Worker Commute																			
Light Commercial Truck	-	-	diesel	405	-	-	1,626	98,528	0.47	2.99	3.25	0.11	0.10	3.75E-03	-	1108.87	0.09	5.66E-03	1112.71
Passenger Car	-	-	gasoline	406	-	-	1,084	35,602	0.33	0.19	4.98	8.60E-03	7.61E-03	2.66E-03	-	400.68	0.03	6.17E-03	403.24
							Total	**1,015,521**	**4.27**	**36.73**	**22.69**	**2.04**	**1.96**	**0.04**	**0.64**	**13,857.79**	**0.41**	**0.27**	**13,947.13**

Notes:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e. 21 days/month.
3. 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.
4. 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.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. 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 7, 2003.
7. Onroad vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. 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
Operations and Maintenance

								Fuel Use	Emissions										
Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	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_2O tons	CO_2e 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:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., 21 days/month.
3. 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.
4. 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.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. 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 7, 2
7. Onroad vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. 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.

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		NONROAD
	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_2O	Fuel Consumption gal/kWh /c	Default Load Factor
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 N_2O 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 CO_2/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.

2024 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		NONROAD
	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_2O	Fuel Consumption gal/kWh /c	Default Load Factor
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 N_2O 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 CO_2/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_2O	CO_2e	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, NOx, 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_2O	CO_2e	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, NOx, 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.

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EFSEC Supplementary Emission Calculations

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

Emission Totals by Phase	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_2O tons	CO_2e 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	PM_{10} tons	$^{PM}2.5$ tons	SO_2 tons	HAP Tons	CO_2 tons	CH_4 tons	N_2O tons	CO_2e 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

Construction Distrurbance Area

Project-Related Impacts

Project Component	Units	Dimensions per Unit	Number of Units	Temporary Disturbance Acres[1/]	Units[2/]	Dimensions per Unit[3/]	Number of Units[4/]	Permanent Disturbance Acres	# Construction Scheduled Days			Factor to multiply (frequency)		
									Phase 1	Phase 2a	Phase 2b	Phase 1	Phase 2a	Phase 2b
Wind Turbine Generators	Acres per tower	4.51	244	1,070	Square feet per tower	5,278.0	244	30	198	199	199	0.54	0.55	0.55
Overhead Collector Lines[2/]	Feet of width per linear foot	35	1.8 (mi)	0.5	Square feet per structure	7.1	58	0.01	163	164	164	0.45	0.45	0.45
Underground Collector Lines[2/]	Feet of width per linear foot	30	285.4 (mi)	787	Square feet per structure	25.0	103	0.06	163	164	164	0.45	0.45	0.45
230-kV Transmission Lines	Feet of width per linear foot	100	19.4 (mi)	235	Square feet per structure	4.3	213	0.02	NA	NA	213	NA	NA	0.58
500-kV Transmission Lines	Feet of width per linear foot	200	0.5 (mi)	12	Square feet per structure	4.3	4	<0.01	NA	213	NA	NA	0.58	NA
Meteorological Towers	Acres	1.62	13	21	Square feet per tower	1,764	13	0.5	163	164	164	0.45	0.45	0.45
Meteorological Towers Roads	Feet of width per linear foot	50	2.8 (mi)	17	Feet of width per linear foot	16.0	2.8 (mi)	5	NA	NA	NA	NA	NA	NA
New Access Roads[4/]	Feet of width per linear foot	50	104.5	634	Feet of width per linear foot	16	104.5 (mi)	203	NA	NA	NA	NA	NA	NA
Road Modification (Turning Radius Widening)	Each	--	19	3	Acres	--	--	0	NA	NA	NA	NA	NA	NA
Crane Paths	Feet of width per linear foot	36	33.6 (mi)	147	Feet of width per linear foot	--	--	0	NA	NA	NA	NA	NA	NA
Substations[5/]	Acres	--	5	3	Acres	--	5	38	163	164	164	0.45	0.45	
Battery Storage Facilities	Acres	--	3	1	Acres	--	3	18	120	120	NA	0.33	0.33	NA
Laydown Yards	Acres	--	2	48	Acres	--	--	0	NA	NA	NA	NA	NA	NA
O&M Building	Acres	--	2	0.9	Acres	--	2	10	103	103	103	0.28	0.28	
Solar Array County Well	Acres	--	--	18	Acres	--	--	2,641[6/]	NA	304	NA	NA	0.83	NA
Solar Array Sellards	Acres	--	--	22	Acres	--	--	1,935[6/]	303	304	NA	0.83	0.83	NA
Solar Array East	Acres	--	--	37	Acres	--	--	1,994[5/]	303	NA	NA	0.83	NA	NA
Total Impacts[7/]:	Temporary			2,957	Permanent			6,869						Total

1/ Overlapping permanent disturbance area is subtracted from temporary impact corridors/areas (e.g., temporary impact area around a Turbine does not include the Turbine foundation and graveled area; those are shown only in the permanent impact column).
2/ The collector lines within the solar siting area are not included in this row. Collector lines associated with the Project's solar component are within the fenceline and included in the total permanent disturbance reported for the solar arrays. As the entire area is considered permanently disturbed, no temporary impact is estimated for collector lines within the solar siting area.
3/ See Table 2.3-3 for alternates under consideration for transmission lines. The longest potential transmission line alternative would be construction of the intertie between the alternate HH-West substation and the HH-East substation (19.4 miles). Table 2.3-3 describes other potential combinations of transmission line but none would have greater disturbance area than shown here.
4/ As for collector lines, disturbance from construction of new access roads associated with the Project's solar component is included in the total permanent disturbance reported for the solar siting area. As the entire area within the fenceline is considered permanently disturbed, no temporary impact is estimated for new access roads within the solar siting area.
5/ A total of five Project substation locations are under consideration but no more than four substations would be constructed (see Table 2.3-2). The disturbance area associated with all five locations is shown here as a conservative depiction of potential project impacts.
6/ Permanent Disturbance for Solar Arrays is shown here as disturbance of all areas inside the fence line. However, vegetation would remain within the majority of the solar array except for graveled interior access roads, inverter pad placement, and tracker system support posts,
7/ Totals were calculated using consolidated data, with areas of overlap eliminated. Therefore, totals are not a sum of the Project component rows.

Construction Distrurbance Area

Temporary			Permanent			Total Area (acres)			Total Area (acres) adjusted		
Phase 1	**Phase 2a**	**Phase 2b**	**Phase 1**	**Phase 2a**	**Phase 2b**	**Phase 1**	**Phase 2a**	**Phase 2b**	**Phase 1**	**Phase 2a**	**Phase 2b**
340	244	486	10	7	14	350	251	499	189.7	136.9	272.2
0.167	0.167	0.167	0.003	0.003	0.003	0	0	0	0.1	0.1	0.1
262.33	262.33	262.33	0.02	0.02	0.02	262	262	262	117.2	117.9	117.9
NA	NA	235	NA	NA	0.02	NA	NA	235	NA	NA	137.1
NA	12	NA	NA	0.01	NA	NA	12	NA	NA	7.0	NA
10.5	10.5	10.5	0.25	0.25	0.25	11	11	11	4.8	4.8	4.8
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0.6	1.8	0.6	7.6	22.8	7.6	8	25	8	3.7	11.1	0.0
0.3333333	0.666666667	no battery storage facilities	6	12	no battery storage facilities	6	13	NA	2.1	4.2	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0.45	0.45	0.45	5	5	5	5	5	5	1.5	1.5	0.0
NA	18	NA	NA	NA	NA	NA	18	NA	NA	NA	NA
11	11	NA	NA	NA	NA	11	11	NA	9.1	NA	NA
37	NA	NA	NA	NA	NA	37	NA	NA	30.7	NA	NA
663	561	995	28	47	27	691	608	1021	359	283	532

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 ASC

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

								Fuel Use	Emissions										
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**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_2O tons**	**CO_2e 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	1.02E-04	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	0.06	1.19E-02	1.56E-03	1.52E-03	3.40E-05	5.74E-04	11.75	2.59E-04	2.99E-04	11.84
Project Cleanup																			
Front end loader	2270002060	150	diesel	115	12	59%	8	6,997	7.78E-03	0.10	0.04	8.33E-03	8.08E-03	2.89E-04	1.87E-03	105.55	6.16E-04	2.69E-03	106.37
Motor grader	2270002048	100	diesel	110	12	59%	8	4,665	3.62E-03	0.06	0.02	5.99E-03	5.81E-03	1.92E-04	8.74E-04	70.37	3.07E-04	1.79E-03	70.92
Dump Truck	-	-	diesel	302	-	-	8	1,423	3.04E-03	0.05	0.02	1.46E-03	1.34E-03	5.41E-05	-	16.01	3.57E-04	3.48E-05	16.03
Transportation Trucks - material/waste	-	-	diesel	301	-	-	12	2,040	2.74E-03	0.06	0.03	1.14E-03	1.05E-03	7.70E-05	-	22.96	2.89E-04	2.59E-05	22.97
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and otherdelivery trucks, etc. daily	-	-	diesel	305	-	-	1,080	67,465	0.36	2.25	2.48	0.08	0.07	2.57E-03	-	759.27	0.06	3.76E-03	761.82
Worker Commute																			
Light Commercial Truck	-	-	diesel	305	-	-	1,584	98,948	0.53	3.30	3.64	0.11	0.10	3.77E-03	-	1113.60	0.08	5.52E-03	1117.33
Passenger Car	-	-	gasoline	306	-	-	1,056	35,535	0.34	0.22	5.02	8.44E-03	7.47E-03	2.66E-03	-	399.92	0.03	6.30E-03	402.55
							Total	**675,415**	**3.03**	**24.66**	**17.83**	**1.34**	**1.29**	**0.03**	**0.40**	**9,093.78**	**0.29**	**0.17**	**9,150.72**

Notes:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., days/month.
3. Calculations conservatively assume that on-road vehicles travel approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2023.
6. 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 7, 2
7. On-road vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2023.
8. On-road vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

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

								Fuel Use	Emissions										
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**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_2O tons**	**CO_2e 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	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	6.74E-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	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	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, andother 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:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e. days/month.
3. Calculations conservatively assume that on-road vehicles travel approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2023.
6. 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
7. On-road vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2023.
8. On-road vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

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

								Fuel Use	Emissions										
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**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_2O 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	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 otherdelivery 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:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., days/month.
3. Calculations conservatively assume that on-road vehicles travel approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2023.
6. 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 7,
7. On-road vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2023.
8. On-road vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

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Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

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

								Fuel Use	Emissions										
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**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_2O tons**	**CO_2e 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	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	1.53	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	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	175.84	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%	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	3.88E-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	2270003020	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	2270003020	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
Man Lift Bucket	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
Trencher	2270002030	200	diesel	219	12	59%	12	13,992	0.02	0.29	0.09	0.02	0.02	5.93E-04	5.88E-03	211.08	1.64E-03	5.38E-03	212.73
Excavators / Backhoes	2270002036	150	diesel	208	12	59%	12	10,497	4.07E-03	0.09	0.03	5.66E-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	4.64E-04	8.05E-04	175.95	1.41E-04	4.48E-03	177.29
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%	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	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%	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	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
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	3.88E-03	153.38
rials & equip	-	-	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	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	1,943	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	50.63	2.27E-03	1.29E-03	51.07
Tractor Trailers	-	-	diesel	401	-	-	6	998	1.27E-03	0.03	1.39E-02	4.96E-04	4.56E-04	3.76E-05	-	11.23	1.39E-04	1.30E-05	11.24
Fuel Trucks / Trailers	-	-	diesel	404	-	-	6	609	2.27E-03	1.29E-02	8.23E-03	2.63E-04	2.42E-04	2.30E-05	-	6.86	1.01E-03	4.04E-05	6.89

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

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

								Fuel Use	Emissions										
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**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_2O tons**	**CO_2e tons**
O&M Building																			
Excavators or Backhoes	2270002036	150	diesel	208	10	59%	12	8,747	3.39E-03	0.07	0.02	4.72E-03	4.58E-03	3.51E-04	8.20E-04	131.96	2.76E-04	3.36E-03	132.97
Forklifts	2270003020	75	diesel	209	10	59%	8	3,238	6.61E-04	0.07	5.01E-03	9.01E-04	8.74E-04	1.29E-04	1.60E-04	48.85	4.85E-05	1.24E-03	49.22
Skid Steer Loaders	2270002072	150	diesel	216	10	21%	16	4,822	0.12	0.64	0.39	0.07	0.07	2.67E-04	0.03	72.75	6.31E-03	1.85E-03	73.46
Air compressor	2270006015	50	diesel	202	10	43%	4	779	2.14E-03	0.06	1.04E-02	1.32E-03	1.28E-03	3.34E-05	5.14E-04	11.75	2.47E-04	2.99E-04	11.84
Project Cleanup																			
Front end loader	2270002060	150	diesel	215	12	59%	8	6,997	5.91E-03	0.08	0.03	6.87E-03	6.66E-03	2.86E-04	1.43E-03	105.56	4.68E-04	2.69E-03	106.37
Motor grader	2270002048	100	diesel	210	12	59%	8	4,665	2.55E-03	0.04	0.02	3.95E-03	3.84E-03	1.89E-04	6.16E-04	70.38	2.11E-04	1.79E-03	70.92
Dump Truck	-	-	diesel	402	-	-	8	1,403	2.67E-03	0.05	0.02	1.20E-03	1.11E-03	5.32E-05	-	15.79	3.50E-04	3.48E-05	15.81
aterial/waste	-	-	diesel	401	-	-	12	1,996	2.53E-03	0.06	0.03	9.92E-04	9.13E-04	7.53E-05	-	22.47	2.77E-04	2.59E-05	22.48
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and other delivery trucks, etc. daily	-	-	diesel	405	-	-	1,400	84,833	0.41	2.58	2.79	0.09	0.09	3.23E-03	-	954.75	0.07	4.88E-03	958.05
Worker Commute																			
Light Commercial Truck	-	-	diesel	405	-	-	1,412	85,560	0.41	2.60	2.82	0.10	0.09	3.26E-03	-	962.93	0.07	4.92E-03	966.26
Passenger Car	-	-	gasoline	406	-	-	942	30,938	0.28	0.16	4.33	7.47E-03	6.61E-03	2.31E-03	-	348.19	0.02	5.36E-03	350.41
							Total	**817,455**	**3.47**	**29.48**	**18.44**	**1.68**	**1.62**	**0.04**	**0.53**	**11,198.93**	**0.33**	**0.22**	**11,272.03**

Notes:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., days/month.
3. Calculations conservatively assume that on-road vehicles travel approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. 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 7, 2
7. On-road vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. On-road vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

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

								Fuel Use	Emissions										
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**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_2O tons**	**CO_2e 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	82.11	2.55E-03	2.09E-03	82.79
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	2.69E-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	82.11	2.55E-03	2.09E-03	82.79
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, andother 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:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e. days/month.
3. Calculations conservatively assume that on-road vehicles travel approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. 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
7. On-road vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. On-road vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

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

								Fuel Use	Emissions										
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**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_2O 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	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 otherdelivery 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:
1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., days/month.
3. Calculations conservatively assume that on-road vehicles travel approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. 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 7,
7. On-road vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. On-road vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

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Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

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 gal	Emissions 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_2O tons	CO_2e 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	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	1.53	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	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	175.84	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	2270003020	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	0.10	5.42E-03	4.98E-03	2.40E-04	-	71.07	1.57E-03	1.56E-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	4.59E-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	9.16E-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	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	1,943	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

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

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

								Fuel Use	Emissions										
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**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_2O tons**	**CO_2e tons**
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	50.63	2.27E-03	1.29E-03	51.07
Tractor Trailers	-	-	diesel	401	-	-	6	998	1.27E-03	0.03	1.39E-02	4.96E-04	4.56E-04	3.76E-05	-	11.23	1.39E-04	1.30E-05	11.24
Fuel Trucks / Trailers	-	-	diesel	404	-	-	6	609	2.27E-03	1.29E-02	8.23E-03	2.63E-04	2.42E-04	2.30E-05	-	6.86	1.01E-03	4.04E-05	6.89
O&M Building																			
Excavators or Backhoes	2270002036	150	diesel	208	10	59%	12	8,747	3.39E-03	0.07	0.02	4.72E-03	4.58E-03	3.51E-04	8.20E-04	131.96	2.76E-04	3.36E-03	132.97
Forklifts	2270003020	75	diesel	209	10	59%	8	3,238	6.61E-04	0.07	5.01E-03	9.01E-04	8.74E-04	1.29E-04	1.60E-04	48.85	4.85E-05	1.24E-03	49.22
Skid Steer Loaders	2270002072	150	diesel	216	10	21%	16	4,822	0.12	0.64	0.39	0.07	0.07	2.67E-04	0.03	72.75	6.31E-03	1.85E-03	73.46
Air compressor	2270006015	50	diesel	202	10	43%	4	779	2.14E-03	0.06	1.04E-02	1.32E-03	1.28E-03	3.34E-05	5.14E-04	11.75	2.47E-04	2.99E-04	11.84
Project Cleanup																			
Front end loader	2270002060	150	diesel	215	12	59%	10	8,746	7.39E-03	0.10	0.04	8.58E-03	8.33E-03	3.58E-04	1.78E-03	131.95	5.85E-04	3.36E-03	132.97
Motor grader	2270002048	100	diesel	210	12	59%	10	5,831	3.19E-03	0.06	0.02	4.94E-03	4.79E-03	2.36E-04	7.70E-04	87.97	2.64E-04	2.24E-03	88.65
Dump Truck	-	-	diesel	402	-	-	10	1,754	3.34E-03	0.06	0.03	1.50E-03	1.38E-03	6.66E-05	-	19.74	4.37E-04	4.35E-05	19.76
Transportation Trucks - material/waste	-	-	diesel	401	-	-	15	2,495	3.17E-03	0.07	0.03	1.24E-03	1.14E-03	9.41E-05	-	28.08	3.47E-04	3.24E-05	28.10
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and other delivery trucks, etc. da	-	-	diesel	405	-	-	2,100	127,250	0.61	3.87	4.19	0.14	0.13	4.84E-03	-	1432.12	0.11	7.32E-03	1437.07
Worker Commute																			
Light Commercial Truck	-	-	diesel	405	-	-	1,626	98,528	0.47	2.99	3.25	0.11	0.10	3.75E-03	-	1108.87	0.09	5.66E-03	1112.71
Passenger Car	-	-	gasoline	406	-	-	1,084	35,602	0.33	0.19	4.98	8.60E-03	7.61E-03	2.66E-03	-	400.68	0.03	6.17E-03	403.24
							Total	**1,015,521**	**4.27**	**36.73**	**22.69**	**2.04**	**1.96**	**0.04**	**0.64**	**13,857.79**	**0.41**	**0.27**	**13,947.13**

Notes:
1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e. days/month.
3. Calculations conservatively assume that on-road vehicles travel approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. 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 7, 2003.
7. On-road vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. On-road vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

Horse Heaven Wind Farm - Construction Emissions Operations and Maintenance

								Fuel Use	Emissions											
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**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_2O tons**	**CO_2e 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:
1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., days/month.
3. Calculations conservatively assume that on-road vehicles travel approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. 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 7,
7. On-road vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. On-road 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	NONROAD
	SCC	**Description**	**Engine Size (hp)**	**Exhaust+ Crankcase VOC**	**Exhaust NOx**	**Exhaust CO**	**Exhaust PM_{10}**	**Exhaust $^{PM}2.5$**	**Exhaust SO_2**	**Exhaust CO_2**	**Exhaust CH_4**	**Exhaust N_2O**	**gal/kWh/c**	**Default Load Factor**
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 N_2O 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 CO_2/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.

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

Horse Heaven Wind Farm

2024 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	NONROAD
	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_2O	gal/kWh /c	Default Load Factor
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 N_2O 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 CO_2/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)

301	Diesel Combination Long-haul	0.19708	4.36280	2.06888	0.08199	0.07543	0.00554	1653.0	0.02078	0.00187	1654.0	6.18
302	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 Refuse 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 Long-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 Single Unit Short-haul Truck	0.28924	1.80128	1.98747	0.06054	0.05570	0.00206	607.4	0.04553	0.00301	608.6	16.81
306	Diesel Light Commercial Truck	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, NOx, 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)

401	Diesel Combination Long-haul	0.18245	4.08130	2.00034	0.07144	0.06572	0.00542	1617.7	0.01996	0.00187	1618.7	6.31
402	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 Refuse 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 Long-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 Single Unit Short-haul Truck	0.25216	1.59025	1.72447	0.05833	0.05367	0.00199	589.2	0.04557	0.00301	590.4	17.33
406	Diesel Light Commercial Truck	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, NOx, 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.

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

Horse Heaven Wind Farm MOVES Emission Factors

Benton												
Input Year	**Fuel**	**Vehicle Type**	**Emission**									
			VOC	**NOx**	**CO**	**PM10**	**PM2.5**	**SO2**	**CO2**	**CH4**	**N2O**	**CO2e**
2023	Diesel	Combination	0.19708	4.36280	2.06888	0.08199	0.07543	0.00554	1653.0	0.02078	0.00187	1654.0
		Combination	0.20423	4.06897	1.91375	0.07046	0.06483	0.00552	1650.4	0.03287	0.00291	1652.1
		Single Unit Long-haul	0.12184	1.62455	1.06090	0.03698	0.03402	0.00310	926.1	0.02096	0.00313	927.6
		Single Unit Short-haul	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	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	9.23402	7.44913	135.8309	0.07234	0.06400	0.01038	1563.0	0.33299	0.03792	1582.5
		Single Unit Long-haul	0.76947	0.38745	7.97404	0.01577	0.01395	0.00674	1014.4	0.02776	0.00928	1017.8
		Single Unit Short-haul	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	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**									
			VOC	**NOx**	**CO**	**PM10**	**PM2.5**	**SO2**	**CO2**	**CH4**	**N2O**	**CO2e**
2024	Diesel	Combination	0.18245	4.08130	2.00034	0.07144	0.06572	0.00542	1617.7	0.01996	0.00187	1618.7
		Combination	0.19133	3.85586	1.85778	0.06245	0.05746	0.00541	1616.8	0.03167	0.00291	1618.4
		Single Unit Long-haul	0.11464	1.55932	1.04570	0.03728	0.03430	0.00305	909.8	0.02010	0.00313	911.2
		Single Unit Short-haul	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	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	7.57169	6.25666	112.9196	0.06689	0.05917	0.01057	1590.7	0.28324	0.03486	1608.1
		Single Unit Long-haul	0.70314	0.32138	7.51225	0.01459	0.01291	0.00669	1007.1	0.02535	0.00864	1010.3
		Single Unit Short-haul	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	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.

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

HORSE HEAVEN WIND FARMEPA 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.

Horse Heaven Fugitive Dust Emissions Summary
Construction Scenario

Emission Totals by Phase		PM10	PM2.5
		tons	tons
Phase 1			
Exposed surface windblown dust		20.46	10.23
Access road traffic fugitive dust		1,140.97	114.10
Fugitive PM Emissions from Bulldozing activities		1.79	0.88
Fugitive PM Emissions from Grading Activities		0.16	0.01
	Total	1,163.38	125.22
Phase 2a			
Exposed surface windblown dust		16.15	8.08
Access road traffic fugitive dust		939.44	93.94
Fugitive PM Emissions from Bulldozing activities		2.06	1.01
Fugitive PM Emissions from Grading Activities		0.14	0.01
	Total	957.79	103.05
Phase 2b			
Exposed surface windblown dust		30.33	15.17
Access road traffic fugitive dust		931.87	93.19
Fugitive PM Emissions from Bulldozing activities		1.70	0.84
Fugitive PM Emissions from Grading Activities		0.07	0.01
	Total	963.97	109.19

Material Throughput and Vehicle Traffic Count on Unpaved Roads
Construction Phase 1, 2a and 2b
Horse Heaven Wind Farm

Parameters	Phase 1		Phase 2A		Phase 2B	
	Construction Traffic	Workforce	Construction Traffic	Workforce	Construction Traffic	Workforce
Operating Time						
Days per month	24	24	24	24	24	24
Number of Months	11	11	11	11	10	10
Total Operating Days (days) [a]	264	264	264	264	240	240
Daily Operating Hours (hrs/day)	12	12	2	2	2	10
Vehicle and Travel Data						
Vehicle Model [b]	Trucks	Pick up truck	Trucks	Pick up truck	Trucks	Pick up truck
Empty Vehicle Weight (tons) [c]	25.5	2.3	25.5	2.3	25.5	2.3
Vehicle Capacity (tons)	19.0	0.8	19.0	0.8	19.0	0.8
Loaded Vehicle Weight (tons)	44.5	3.0	44.5	3.0	44.5	3.0
W = Average Vehicle Weight (tons)	35.0	2.7	35.0	2.7	35.0	2.7
Number of Vehicles (duration)	52,584	63,360	42,212	56,496	39,618	65,040
Number of Vehicles (daily)	200	240	160	214	165	271
D = Distance traveled on unpaved roads (2-way miles) [d]	50.0	40.0	50.0	40.0	50.0	40.0
Daily Vehicle Miles Travelled (VMT)	10000.0	9600.0	8000.0	8560.0	8250.0	10840.0
Activity Duration Vehicle Miles Travelled (VMT)	2,629,200	2,534,400	2,110,600	2,259,840	1,980,900	2,601,600

Notes:

[a] Operating days and months are based on construction schedule information obtained from the Table Summary of Construction Schedule by Phase.

[b] Typical vehicle model to transport construction material. It assumed pick up trucks for workers.

[c] Empty vehicle weights were obtained from technical specifications of each vehicle.

[d] Hauling distance is conservatively assume that on road vehicles travel 50 miles per day and workers average daily round trip commute is approximately 40 miles per day.

Fugitive Particulate Matter (PM) Emissions from Vehicle Traffic on Unpaved Roads
Construction Phase 1, 2a and 2b
Horse Heaven Wind Farm

Parameters	Phase 1				Phase 2A				Phase 2B			
	Construction Traffic		Workforce		Construction Traffic		Workforce		Construction Traffic		Workforce	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Vehicle and Travel Data [b]												
W = Average Vehicle Weight (tons)	35.0	35.0	2.7	2.7	35.0	35.0	2.7	2.7	35.0	35.0	2.7	2.7
D = Distance traveled on unpaved roads (2-way miles)	50.0	50.0	40.0	40.0	50.0	50.0	40.0	40.0	50.0	50.0	40.0	40.0
Daily Operation Hours (hrs/day)	12	12	12	12	2	2	2	2	2	2	10	10
Total No. of Operating Days for activity (days)	264	264	264	264	264	264	264	264	240	240	240	240
No. of truck trips per day (trucks/day)	200	200	240	240	160	160	214	214	165	165	271	271
Total No. of trucks for activity (trucks)	52,584	52,584	63,360	63,360	42,212	42,212	56,496	56,496	39,618	39,618	65,040	65,040
Daily Vehicle Miles Travelled (VMT)	10,000	10,000	9,600	9,600	8,000	8,000	8,560	8,560	8,250	8,250	10,840	10,840
Activity Duration Vehicle Miles Travelled (VMT)	2,629,200	2,629,200	2,534,400	2,534,400	2,110,600	2,110,600	2,259,840	2,259,840	1,980,900	1,980,900	2,601,600	2,601,600
Site Characteristics												
k = Particle size multiplier (lb/VMT) [e]	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15
s = Silt content of site specific unpaved roads (%) [d]	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
P = Mean annual number of days with precipitation greater than or equal to 0.01 inch (0.25 mm) [c]	72	72	72	72	72	72	72	72	72	72	72	72
a (constant, AP-42, Table 13.2.2-2)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
b (constant, AP-42, Table 13.2.2-2)	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Control Efficiency												
Dust Control Efficiency (%) [f]	75	75	75	75	75	75	75	75	75	75	75	75
Emission Factors [a]												
Emission Factor (lb/VMT) - Daily	3.32	0.332	1.0	0.1	3.3	0.3	1.0	0.1	3.3	0.3	1.0	0.1
Emission Factor (lb/VMT) - Annual	2.67	0.27	0.83	0.08	2.67	0.27	0.83	0.08	2.67	0.27	0.83	0.08
Emission Rates [a]												
Uncontrolled Emission Factor (UEF) Equation - Daily (lb/day)	33,222.4	3,322.2	9,984.6	998.5	26,577.9	2,657.8	8,903.0	890.3	27,408.5	2,740.8	11,274.3	1,127.4
Uncontrolled Emission Factor (UEF) Equation - Duration (tons)	3,505.9	350.6	1,058.0	105.8	2,814.4	281.4	943.4	94.3	2,641.4	264.1	1,086.0	108.6
Controlled Daily Emissions (lb/day)	8,305.6	830.6	2,496.2	249.6	6,644.5	664.4	2,225.7	222.6	6,852.1	685.2	2,818.6	281.9
Controlled Annual Emissions (TPY)	876.5	87.6	264.5	26.4	703.6	70.4	235.8	23.6	660.4	66.0	271.5	27.2
Controlled Hourly Emissions (lb/hr, daily basis)	346.1	34.6	104.0	10.4	276.9	27.7	92.7	9.3	285.5	28.6	117.4	11.7
Emission Factor (lb/hr/mi)	13.8	1.4	5.2	0.5	11.1	1.1	4.6	0.5	11.4	1.1	5.9	0.6

Notes:

[a] Emission Factor (E) calculated from AP-42 Section 13.2.2 (Unpaved Roads) Equation 1a (Industrial Sites) -

E = k * (s/12)^a * (W/3)^b * (365-P)/365

[b] See Table 1 for number of vehicles and travel data.

[c] Particle size multiplier and constants from AP-42 Table 13.2.2-2 for industrial roads

[d] Silt content based on the Table 13.2.2-1 of AP-42 for Construction Sites

[e] Precipitation data based on annual summary data for 2020 Meteorological Data - Richland Airport (Benton County)

[f] Dust control efficiency based on 75% for basic watering on unpaved roads according to the Document Emission Factors for Paved and Unpaved Roads by the Department of Environmental Quality, State of Utah, January 2015

Fugitive PM Emissions from Bulldozers
Construction Phase 1
Horse Heaven Wind Farm

Parameters	Bulldozing/Scraping Activities		
	Wind	**Solar**	**Battery**
ID	**B1**	**B2**	**B3**
Operational Data [b]			
Daily Operation Hours (hrs/day)	12	12	12
Total No. of Operating Months for activity	8	10.1	4
No. of active bulldozers/loaders/excavators/scrapers (per month)	19	19	2
Site Characteristics [c]			
M = Moisture content (%)	3.4	3.4	3.4
s = Silt content of site specific unpaved roads (%)	7.5	7.5	7.5
Control Efficiency			
Dust Control Method [d]	Watering	Watering	Watering
Dust Control Efficiency (%)	70	70	70
Calculated PM Emission Factors (EF) [a]			
Uncontrolled TSP EF (lb/hr)	13.03	13.03	13.03
Controlled TSP EF (lb/hr)	3.91	3.91	3.91
Uncontrolled PM_{15} EF (lb/hr)	3.70	3.70	3.70
Controlled PM_{15} EF (lb/hr)	1.11	1.11	1.11
Uncontrolled PM_{10} EF (lb/hr)	2.78	2.78	2.78
Controlled PM_{10} EF (lb/hr)	0.83	0.83	0.83
Uncontrolled $PM_{2.5}$ EF (lb/hr)	1.37	1.37	1.37
Controlled $PM_{2.5}$ EF (lb/hr)	0.41	0.41	0.41
Estimated Emissions Rates (ER) [e]			
PM_{10} ER lb/hr (daily basis)	7.86	7.86	0.98
PM_{10} ER tons (year)	0.79	0.95	0.047
$PM_{2.5}$ ER lb/hr (daily basis)	3.88	3.88	0.48
$PM_{2.5}$ ER tons (year)	0.391	0.470	0.023

Notes:

[a] Emission Factor equations from Table 11.9-1 of US EPA AP-42 Section 11.9 for Western Surface Coal Mines, based on bulldozing for overburden:

Uncontrolled TSP EF (UEF) Equation : UEF (lb/hr) = $5.7 \times (s)^{1.2} / (M)^{1.3}$
Controlled TSP EF (CEF) Equation : CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]
Uncontrolled PM_{15} EF (UEF) Equation : UEF (lb/hr) = $1.0 \times (s)^{1.5} / (M)^{1.4}$
Controlled PM_{15} EF (CEF) Equation : CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]
Uncontrolled PM_{10} EF (UEF) Equation : UEF (kg/hr) = 0.75 x UEF of PM_{15}
Controlled PM_{10} EF (CEF) Equation : CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]
Uncontrolled $PM_{2.5}$ EF (UEF) Equation : UEF (kg/hr) = 0.105 x UEF of TSP
Controlled $PM_{2.5}$ EF (CEF) Equation : CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]

[b] The quantity of the bulldozers, operational hours and months were based on the Construction Emissions for Phase 1.

[c] Moisture content and silt sample data based on the Table 13.2.4-1 of the AP-42.

[d] Dust control efficiency based on 70% for basic watering with natural soil in place and applying water, when warranted to obtain and never exceed a 20% opacity limit, according to the Document Emission Factors by the Department of Environmental Quality, State of

[e] ER = EF x No. of active bulldozers.

Fugitive PM Emissions from Bulldozers
Construction Phase 2a
Horse Heaven Wind Farm

Parameters	Bulldozing/Scraping Activities		
	Wind	Solar	Battery
ID	**B4**	**B5**	**B6**
Operational Data [b]			
Daily Operation Hours (hrs/day)	12	12	12
Total No. of Operating Months for activity	6	10	4
No. of active bulldozers/loaders/excavators/scrapers (per month)	34	17	7
Site Characteristics [c]			
M = Moisture content (%)	3.4	3.4	3.4
s = Silt content of site specific unpaved roads (%)	7.5	7.5	7.5
Control Efficiency			
Dust Control Method [d]	Watering	Watering	Watering
Dust Control Efficiency (%)	70	70	70
Calculated PM Emission Factors (EF) [a]			
Uncontrolled TSP EF (lb/hr)	13.03	13.03	13.03
Controlled TSP EF (lb/hr)	3.91	3.91	3.91
Uncontrolled PM_{15} EF (lb/hr)	3.70	3.70	3.70
Controlled PM_{15} EF (lb/hr)	1.11	1.11	1.11
Uncontrolled PM_{10} EF (lb/hr)	2.78	2.78	2.78
Controlled PM_{10} EF (lb/hr)	0.83	0.83	0.83
Uncontrolled $PM_{2.5}$ EF (lb/hr)	1.37	1.37	1.37
Controlled $PM_{2.5}$ EF (lb/hr)	0.41	0.41	0.41
Estimated Emissions Rates (ER) [e]			
PM_{10} ER lb/hr (daily basis)	14.01	6.88	2.95
PM_{10} ER tons (year)	1.08	0.84	0.142
$PM_{2.5}$ ER lb/hr (daily basis)	6.90	3.39	1.45
$PM_{2.5}$ ER tons (year)	0.533	0.412	0.070

Notrs:

[a] Emission Factor equations from Table 11.9-1 of US EPA AP-42 Section 11.9 for Western Surface Coal Mines, based on bulldozing for overburden:

Uncontrolled TSP EF (UEF) Equation : UEF (lb/hr) = 5.7 x $(s)^{1.2}$/ $(M)^{1.3}$
Controlled TSP EF (CEF) Equation : CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]
Uncontrolled PM_{15} EF (UEF) Equation : UEF (lb/hr) = 1.0 x $(s)^{1.5}$/ $(M)^{1.4}$
Controlled PM_{15} EF (CEF) Equation : CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]
Uncontrolled PM_{10} EF (UEF) Equation : UEF (kg/hr) = 0.75 x UEF of PM_{15}
Controlled PM_{10} EF (CEF) Equation : CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]
Uncontrolled $PM_{2.5}$ EF (UEF) Equation : UEF (kg/hr) = 0.105 x UEF of TSP
Controlled $PM_{2.5}$ EF (CEF) Equation : CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]

[b] The quantity of the bulldozers, operational hours and months were based on the Construction Emissions for Phase 2a.

[c] Moisture content and silt sample data based on the Table 13.2.4-1 of the AP-42.

[d] Dust control efficiency based on 70% for basic watering with natural soil in place and applying water, when warranted to obtain and never exceed a 20% opacity limit, according to the Document Emission Factors by the Department of Environmental Quality, State of Utah, January 2015

[e] ER = EF x No. of active bulldozers.

December 2022

Fugitive PM Emissions from Bulldozers
Construction Phase 2b
Horse Heaven Wind Farm

Parameters	Bulldozing/Scraping Activities
	Wind
ID	**B7**
Operational Data [b]	
Daily Operation Hours (hrs/day)	12
Total No. of Operating Months for activity	10
No. of active bulldozers/ loaders/ excavators/ scrapers (per month)	34
Site Characteristics [c]	
M = Moisture content (%)	3.4
s = Silt content of site specific unpaved roads (%)	7.5
Control Efficiency	
Dust Control Method [d]	Watering
Dust Control Efficiency (%)	70
Calculated PM Emission Factors (EF) [a]	
Uncontrolled TSP EF (lb/hr)	13.03
Controlled TSP EF (lb/hr)	3.91
Uncontrolled PM_{15} EF (lb/hr)	3.70
Controlled PM_{15} EF (lb/hr)	1.11
Uncontrolled PM_{10} EF (lb/hr)	2.78
Controlled PM_{10} EF (lb/hr)	0.83
Uncontrolled $PM_{2.5}$ EF (lb/hr)	1.37
Controlled $PM_{2.5}$ EF (lb/hr)	0.41
Estimated Emissions Rates (ER) [e]	
PM_{10} ER lb/hr (daily basis)	14.01
PM_{10} ER tons (year)	1.70
$PM_{2.5}$ ER lb/hr (daily basis)	6.90
$PM_{2.5}$ ER tons (year)	0.837

Notes:

[a] Emission Factor equations from Table 11.9-1 of US EPA AP-42 Section 11.9 for Western Surface Coal Mines, based on bulldozing for overburden:

Uncontrolled TSP EF (UEF) Equation : UEF (lb/hr) = $5.7 \times (s)^{1.2} / (M)^{1.3}$
Controlled TSP EF (CEF) Equation : CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]
Uncontrolled PM_{15} EF (UEF) Equation : UEF (lb/hr) = $1.0 \times (s)^{1.5} / (M)^{1.4}$
Controlled PM_{15} EF (CEF) Equation : CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]
Uncontrolled PM_{10} EF (UEF) Equation : UEF (kg/hr) = 0.75 x UEF of PM_{15}
Controlled PM_{10} EF (CEF) Equation : CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]
Uncontrolled $PM_{2.5}$ EF (UEF) Equation : UEF (kg/hr) = 0.105 x UEF of TSP
Controlled $PM_{2.5}$ EF (CEF) Equation : CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]

[b] The quantity of the bulldozers, operational hours and months were based on the Construction Emissions for Phase

[c] Moisture content and silt sample data based on the Table 13.2.4-1 of the AP-42.

[d] Dust control efficiency based on 70% for basic watering with natural soil in place and applying water, when warranted to obtain and never exceed a 20% opacity limit, according to the Document Emission Factors by the Department of Environmental Quality, State of Utah, January 2015

[e] ER = EF x No. of active bulldozers.

Fugitive Particulate Matter (PM) Emissions from Grading Activities

Construction Phase 1

Horse Heaven Wind Farm

Parameters	Grading Activities during Phase 1		
	Wind	**Solar**	**Battery**
ID	**G1**	**G2**	**G3**
Operational Data [a]			
Daily Operation Hours (hrs/day)	12	12	12
Total No. of Operating Months	8	10	4
No. of active motor graders per month	19	14	2
Vehicle Data			
Mean Vehicle Speed (S) (mph) [b]	3.3	3.3	3.3
Basis for vehicle miles traveled (VMT)			
Number of vehicles			
daily	7	7	7
annually	159	71	28
Grader Utilization per day (%)	50	50	50
Distance traveled/vehicle/day (miles per grader)	19.8	19.8	19.8
VMT (no. vehicles x mi traveled)			
daily	138.6	138.6	138.6
annually	1164.2	1399.9	554.4
Control Efficiency			
Dust Control Method [c]	Watering	Watering	Watering
Dust Control Efficiency (%)	70	70	70
Scaling Factors (unitless)			
TSP	1.0	1.0	1.0
PM_{15}	1.0	1.0	1.0
PM_{10}	0.6	0.6	0.6
$PM_{2.5}$	0.031	0.031	0.031
Calculated Emission Factors (EF) [d]			
Uncontrolled TSP EF (lb/VMT)	0.79	0.79	0.79
Uncontrolled PM_{15} EF (lb/VMT)	0.56	0.56	0.56
Uncontrolled PM_{10} EF (lb/VMT)	0.33	0.33	0.33
Uncontrolled $PM_{2.5}$ EF (lb/VMT)	0.02	0.02	0.02
Estimated Uncontrolled Emission Rate (ER) [e]			
TSP ER lb/hr (daily basis)	4.57	4.57	4.57
tons/yr	0.46	0.55	0.22
PM_{10} ER lb/hr (daily basis)	1.92	1.92	1.92
tons/yr	0.19	0.23	0.09
$PM_{2.5}$ ER lb/hr (daily basis)	0.14	0.14	0.14
tons/yr	0.01	0.02	0.01
Estimated Controlled Emission Rate (ER)			
TSP ER lb/hr (daily basis)	1.37	1.37	1.37
tons/yr	0.14	0.17	0.07
PM_{10} ER lb/hr (daily basis)	0.58	0.58	0.58
tons/yr	0.06	0.07	0.03
$PM_{2.5}$ ER lb/hr (daily basis)	0.04	0.04	0.04
tons/yr	0.00	0.01	0.00

Notes:

[a] The quantity of the graders, operational hours and months were based on the Construction Emissions for Phase 1.

[b] Mean vehicle speed for graders based on the grader operations' time estimations by http://www.ocw.upj.ac.id/

[c] Dust control efficiency based on 70% for basic watering with natural soil in place and applying water, when warranted to obtain and never exceed a 20% opacity limit, according to the Document Emission Factors by the Department of Environmental Quality, State of Utah, January 2015

[d] Emission Factor equations from Table 11.9-1 of US EPA AP-42 Section 11.9 for Western Surface Coal Mines, based on grading

Uncontrolled PM_{15} EF (UEF) Equation — UEF (lb/VMT) = $0{,}051 \times S^{2.0}$ x Scaling Factor

Uncontrolled TSP EF (UEF) Equation — UEF (lb/VMT) = $0.040(S)^{2.5}$ x Scaling Factor

PM10 EF = PM15 EF x Scaling factor for PM-10

PM2.5 EF = TSP EF x Scaling factor for PM-2.5

[e] ER = EF x VMT

Fugitive Particulate Matter (PM) Emissions from Grading Activities
Construction Phase 2a
Horse Heaven Wind Farm

Parameters	Grading Activities during Phase 2a		
	Wind	**Solar**	**Battery**
ID	**G4**	**G5**	**G6**
Operational Data [a]			
Daily Operation Hours (hrs/day)	12	12	12
Total No. of Operating Months	6	10	4
No. of active motor graders per month	24	12	14
Vehicle Data			
Mean Vehicle Speed (S) (mph) [b]	3.3	3.3	3.3
Basis for vehicle miles traveled (VMT)			
Number of vehicles			
daily	7	7	7
annually	152	71	28
Grader Utilization per day (%)	50	50	50
Distance traveled/vehicle/day (miles per grader)	19.8	19.8	19.8
VMT (no. vehicles x mi traveled)			
daily	138.6	138.6	138.6
annually	891.7	1404.5	554.4
Control Efficiency			
Dust Control Method [c]	Watering	Watering	Watering
Dust Control Efficiency (%)	70	70	70
Scaling Factors (unitless)			
TSP	1.0	1.0	1.0
PM_{15}	1.0	1.0	1.0
PM_{10}	0.6	0.6	0.6
$PM_{2.5}$	0.031	0.031	0.031
Calculated Emission Factors (EF) [d]			
Uncontrolled TSP EF (lb/VMT)	0.79	0.79	0.79
Uncontrolled PM_{15} EF (lb/VMT)	0.56	0.56	0.56
Uncontrolled PM_{10} EF (lb/VMT)	0.33	0.33	0.33
Uncontrolled $PM_{2.5}$ EF (lb/VMT)	0.02	0.02	0.02
Estimated Uncontrolled Emission Rate (ER) [e]			
TSP ER lb/hr (daily basis)	4.57	4.57	4.57
tons/yr	0.35	0.56	0.22
PM_{10} ER lb/hr (daily basis)	1.92	1.92	1.92
tons/yr	0.15	0.23	0.09
$PM_{2.5}$ ER lb/hr (daily basis)	0.14	0.14	0.14
tons/yr	0.01	0.02	0.01
Estimated Controlled Emission Rate (ER)			
TSP ER lb/hr (daily basis)	1.37	1.37	1.37
tons/yr	0.11	0.17	0.07
PM_{10} ER lb/hr (daily basis)	0.58	0.58	0.58
tons/yr	0.04	0.07	0.03
$PM_{2.5}$ ER lb/hr (daily basis)	0.04	0.04	0.04
tons/yr	0.00	0.01	0.00

Notes:

[a] The quantity of the graders, operational hours and months were based on the Construction Emissions for Phase 2a

[b] Mean vehicle speed for graders based on the grader operations' time estimations by http://www.ocw.upj.ac.id/

[c] Dust control efficiency based on 70% for basic watering with natural soil in place and applying water, when warranted to obtain and never exceed a 20% opacity limit, according to the Document Emission Factors by the Department of Environmental Quality, State of Utah, January 2015

[d] Emission Factor equations from Table 11.9-1 of US EPA AP-42 Section 11.9 for Western Surface Coal Mines, ba

Uncontrolled PM_{15} EF (UEF) Equation UEF (lb/VMT) = 0,051 x $S^{2.0}$ x Scaling Factor

Uncontrolled TSP EF (UEF) Equation UEF (lb/VMT) = 0.040$(S)^{2.5}$ x Scaling Factor

PM10 EF = PM15 EF x Scaling factor for PM-10

PM2.5 EF = TSP EF x Scaling factor for PM-2.5

[e] ER = EF x VMT

Fugitive Particulate Matter (PM) Emissions from Grading Activities
Construction Phase 2b
Horse Heaven Wind Farm

Parameters	Grading Activities during Phase 2b
	Wind
ID	**G7**
Operational Data [a]	
Daily Operation Hours (hrs/day)	12
Total No. of Operating Months	10
No. of active motor graders per month	25
Vehicle Data	
Mean Vehicle Speed (S) (mph) [b]	3.3
Basis for vehicle miles traveled (VMT)	
Number of vehicles	
daily	7
annually	250
Grader Utilization per day (%)	50
Distance traveled/vehicle/day (miles per grader)	19.8
VMT (no. vehicles x mi traveled)	
daily	138.6
annually	1399.9
Control Efficiency	
Dust Control Method [c]	Watering
Dust Control Efficiency (%)	70
Scaling Factors (unitless)	
TSP	1.0
PM_{15}	1.0
PM_{10}	0.6
$PM_{2.5}$	0.031
Calculated Emission Factors (EF) [d]	
Uncontrolled TSP EF (lb/VMT)	0.79
Uncontrolled PM_{15} EF (lb/VMT)	0.56
Uncontrolled PM_{10} EF (lb/VMT)	0.33
Uncontrolled $PM_{2.5}$ EF (lb/VMT)	0.02
Estimated Uncontrolled Emission Rate (ER) [e]	
TSP ER lb/hr (daily basis)	4.57
tons/yr	0.55
PM_{10} ER lb/hr (daily basis)	1.92
tons/yr	0.23
$PM_{2.5}$ ER lb/hr (daily basis)	0.14
tons/yr	0.02
Estimated Controlled Emission Rate (ER)	
TSP ER lb/hr (daily basis)	1.37
tons/yr	0.17
PM_{10} ER lb/hr (daily basis)	0.58
tons/yr	0.07
$PM_{2.5}$ ER lb/hr (daily basis)	0.04
tons/yr	0.01

Notes:

[a] The quantity of the graders, operational hours and months were based on the Construction Emissions for Phase 2b.

[b] Mean vehicle speed for graders based on the grader operations' time estimations by http://www.ocw.upj.ac.id/

[c] Dust control efficiency based on 70% for basic watering with natural soil in place and applying water, when warranted to obtain and never exceed a 20% opacity limit, according to the Document Emission Factors by the Department of Environmental Quality, State of Utah, January 2015

[d] Emission Factor equations from Table 11.9-1 of US EPA AP-42 Section 11.9 for Western Surface Coal Mines, based on grading

Uncontrolled PM_{15} EF (UEF) Equation — UEF (lb/VMT) = $0{,}051 \times S^{2.0}$ x Scaling Factor

Uncontrolled TSP EF (UEF) Equation — UEF (lb/VMT) = $0.040(S)^{2.5}$ x Scaling Factor

PM10 EF = PM15 EF x Scaling factor for PM-10

PM2.5 EF = TSP EF x Scaling factor for PM-2.5

[e] ER = EF x VMT

Fugitive PM Emissions from Wind Erosion of Exposed Surface Areas
Construction Phase 1, 2a and 2b
Horse Heaven Wind Farm

Parameters	Exposed surface windblown dust		
	Construcion Phase 1	Construcion Phase 2a	Construcion Phase 1
ID	**WE1**	**WE1**	**WE1**
Operational Data			
Hours of Exposure (hrs/day)	24	24	24
Unvegetated Surface Area (acres) [b]	358.9	283.4	532.1
Site Characteristics [c]			
Daily hours of precipitation ≥ 0.25 mm (p)	0	0	0
Annual days of precipitation ≥ 0.25 mm (p)	72	72	72
Control Efficiency			
Dust Control Method [d]	Watering as needed	Watering as needed	Watering as needed
Dust Control Efficiency (%) [d]	70	70	70
Particle Size Multipliers (k) [e]			
For TSP	1.0	1.0	1.0
For PM_{10}	0.50	0.50	0.50
For $PM_{2.5}$	0.25	0.25	0.25
Calculated PM Emission Factors (EF) [a]			
Uncontrolled TSP EF (ton/acre/yr)	0.38	0.38	0.38
Uncontrolled PM_{10} EF (ton/acre/yr)	0.19	0.19	0.19
Uncontrolled $PM_{2.5}$ EF (ton/acre/yr)	0.095	0.095	0.095
Controlled TSP EF (ton/acre/yr)	0.11	0.11	0.11
Controlled PM_{10} EF (ton/acre/yr)	0.06	0.06	0.06
Controlled $PM_{2.5}$ EF (ton/acre/yr)	0.029	0.029	0.029
Estimated Emissions Rates [a]			
TSP ER lb/hr (daily basis)	9.34	7.38	13.85
TSP ER tons (year)	40.91	32.31	60.66
PM_{10} ER lb/hr (daily basis)	4.67	3.69	6.92
PM_{10} ER tons (year)	20.46	16.15	30.33
$PM_{2.5}$ ER lb/hr (daily basis)	2.34	1.84	3.46
$PM_{2.5}$ ER tons (year)	10.23	8.08	15.17

Notes:

[a] Emission factor equation from Table 11.9-4 (wind erosion of exposed areas) of US EPA AP-42 Section 11.9 for Western Surface Coal Mines:

Uncontrolled TSP EF (UEF) Equation : UEF (ton/acre/yr) = k x 0.38

Controlled TSP EF (CEF) Equation : CEF (ton/acre/yr) = UEF (ton/acre/yr) x [100 - Control efficiency (%)]

[b] Area of unvegetated surface (temporary and permanent disturbance) based on the Table 2.1-1 Project Related Impacts.

[c] Based on hourly surface 2020 meteorological data from the Richland Airport (Benton County)

[d] Dust control efficiency based on 70% for basic watering with natural soil in place and applying water, when warranted to obtain and never exceed a 20% opacity limit, according to the Document Emission Factors by the Department of Environmental Quality, State of Utah, January 2015

[e] Particle size based on AP-42 Section 13.2.5 recommendation.