Appendix K

Emissions Calculations

Northern States Power Company and Dairyland Power Cooperative
Gopher to Badger Link Transmission Line Project
Construction Emission Calculations

Summary of Potential Construction Emissions (tons)						
	Emissions					
	Criteria Pollutants					
Description	NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
SEGMENT 1						
Off-Road Engine Emissions	1,573.38	350.93	82.51	0.74	53.21	53.21
Unpaved Roads	--	--	--	--	68.29	6.83
Earthmoving	--	--	--	--	188.46	19.87
Segment 1 Subtotal	1,573.38	350.93	82.51	0.74	309.96	79.91
SEGMENT 2						
Off-Road Engine Emissions	4,382.76	1,000.01	224.83	2.04	149.49	149.49
Unpaved Roads	--	--	--	--	181.84	18.18
Earthmoving	--	--	--	--	694.45	73.17
Segment 2 Subtotal	4,382.76	1,000.01	224.83	2.04	1,025.78	240.84
Q-9 Segment						
Off-Road Engine Emissions	17.22	4.18	0.84	0.01	0.60	0.60
Unpaved Roads	--	--	--	--	0.79	0.08
Earthmoving	--	--	--	--	1.97	0.21
Q-9 Segment Subtotal	17.22	4.18	0.84	0.01	3.35	0.89
TOTAL PROJECT						
Off-Road Engine Emissions	5,973.36	1,355.12	308.17	2.78	203.29	203.29
Unpaved Roads	--	--	--	--	250.93	25.09
Earthmoving	--	--	--	--	884.87	93.25
PROJECT TOTAL	**5,973.36**	**1,355.12**	**308.17**	**2.78**	**1,339.09**	**321.64**

Northern States Power Company and Dairyland Power Cooperative
Gopher to Badger Link Transmission Line Project
Construction Emission Calculations

Summary of Emission Factors for Construction Engines																			
	Construction Equipment Associated with Segment 1		Construction Equipment Associated with Segment 2		Construction Equipment Associated with Q-9 segment		Emission Factors for Construction Engines												
										Emission Factors [c,d] (g/hp hr)									
Equipment	Quantity [a]	Total Hours Used [b]	Quantity [a]	Total Hours Used [b]	Quantity [a]	Total Hours Used [b]	Max Power (HP)	Load Factor [b]	Loaded Power (HP)	VOC	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O
10K Puller	2	7,820	2	15,946	1	120	150	0.59	89	0.367	2.366	4.700	0.240	0.240	0.002	188.262	0.008	0.002
3 Drum Pullers	2	7,820	4	31,892	1	120	250	0.59	148	0.338	0.867	4.100	0.180	0.180	0.002	188.262	0.008	0.002
300 Ton Crane	8	31,280	10	79,730	0	0	600	0.21	126	0.338	0.867	4.100	0.180	0.180	0.002	188.262	0.008	0.002
40 Ton Crane (Picking)	2	7,820	10	79,730	1	600	380	0.21	80	0.367	2.366	4.700	0.240	0.240	0.002	188.262	0.008	0.002
40 Ton Crane w/ Basket	13	50,830	15	119,595	1	600	380	0.21	80	0.367	2.366	4.700	0.240	0.240	0.002	188.262	0.008	0.002
4-inch Water Pump.	3	10,080	3	20,619	0	0	25	0.43	11	0.551	4.113	4.300	0.500	0.500	0.002	188.262	0.008	0.002
60K Puller	2	7,820	4	31,892	0	0	400	0.59	236	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
6-inch Water Pump	3	10,080	4	27,492	0	0	50	0.43	22	0.438	2.161	4.440	0.267	0.267	0.002	188.262	0.008	0.002
90 Ton RT Crane	5	19,550	15	112,176	1	600	350	0.21	74	0.367	2.366	4.700	0.240	0.240	0.002	188.262	0.008	0.002
Air Compressor(s)	11	41,360	23	183,379	4	1200	50	0.43	22	0.438	2.161	4.440	0.267	0.267	0.002	188.262	0.008	0.002
ATV	7	20,760	16	147,420	1	600	90	0.42	38	0.279	1.532	4.728	0.339	0.339	0.002	188.262	0.008	0.002
Bulldozer	4	10,320	15	143,600	0	0	363	0.59	214	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
Cattle Truck (Dunnage)	8	31,280	6	47,838	0	0	350	0.59	207	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
Challenger	1	3,910	0	0	0	0	360	0.21	76	0.367	2.366	4.700	0.240	0.240	0.002	188.262	0.008	0.002
Compactor	5	16,800	7	48,111	0	0	130	0.43	56	0.367	2.366	4.700	0.240	0.240	0.002	188.262	0.008	0.002
Compactor, Vibratory	2	6,720	0	0	1	300	130	0.59	77	0.367	2.366	4.700	0.240	0.240	0.002	188.262	0.008	0.002
Concrete Mixer Truck	10	33,600	10	79,730	0	0	350	0.43	151	0.338	0.867	4.100	0.180	0.180	0.002	188.262	0.008	0.002
Concrete Pump	3	10,080	2	15,946	0	0	350	0.43	151	0.338	0.867	4.100	0.180	0.180	0.002	188.262	0.008	0.002
Distro Bucket	1	3,910	4	27,492	0	0	350	0.21	74	0.367	2.366	4.700	0.240	0.240	0.002	188.262	0.008	0.002
Distro Digger Derrick	1	3,910	8	54,984	1	120	350	0.59	207	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
Dump Truck	11	35,940	9	90,000	0	0	350	0.59	207	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
Excavator	20	72,650	32	255,136	3	1200	101	0.59	60	0.367	2.366	4.700	0.240	0.240	0.002	188.262	0.008	0.002
Fellerbuncher	1	600	3	2,400	1	100	250	0.59	148	0.338	0.867	4.100	0.180	0.180	0.002	188.262	0.008	0.002
Flatbed Truck w/ Reel Stand	4	15,640	8	63,784	1	300	330	0.59	195	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
Foreman Truck	3	11,730	40	318,920	2	600	475	1	475	0.167	0.843	4.335	0.132	0.132	0.002	188.262	0.008	0.002
Forklift	21	81,010	24	126,960	3	1200	120	0.59	71	0.367	2.366	4.700	0.240	0.240	0.002	188.262	0.008	0.002
Forwarder	1	4,680	3	20,619	1	300	220	0.59	130	0.338	0.867	4.100	0.180	0.180	0.002	188.262	0.008	0.002
Front End Loader	8	29,300	35	205,866	3	1200	420	0.21	88	0.367	2.366	4.700	0.240	0.240	0.002	188.262	0.008	0.002
Fuel Truck	3	11,400	4	32,760	1	50	350	0.21	74	0.367	2.366	4.700	0.240	0.240	0.002	188.262	0.008	0.002
Generator	5	16,800	26	196,714	2	600	22	0.43	9	0.551	4.113	4.300	0.500	0.500	0.002	188.262	0.008	0.002
Generators/Light Trees	30	117,300	0	0	0	0	32	0.43	14	0.438	2.161	4.440	0.267	0.267	0.002	188.262	0.008	0.002
Grader	1	4,680	3	30,000	1	100	250	0.59	148	0.338	0.867	4.100	0.180	0.180	0.002	188.262	0.008	0.002
Horizontal Grinder	1	600	3	2,400	0	0	600	0.59	354	0.167	0.843	4.335	0.132	0.132	0.002	188.262	0.008	0.002
Hydrovac Truck	2	6,720	2	13,746	0	0	350	0.59	207	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
JLG	4	15,640	0	0	0	0	75	0.21	16	0.438	2.161	4.440	0.267	0.267	0.002	188.262	0.008	0.002
Light Tower	10	33,600	11	98,280	0	0	25	0.43	11	0.551	4.113	4.300	0.500	0.500	0.002	188.262	0.008	0.002
Man Hauls	19	74,290	0	0	0	0	330	0.59	195	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
Man Hauls w/ Canopy	2	7,820	0	0	0	0	330	0.59	195	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
Man Hauls w/ Winch	13	50,830	30	239,190	0	0	330	0.59	195	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
Mechanic Trucks	5	19,550	10	79,730	1	120	350	1	350	0.167	0.843	4.335	0.132	0.132	0.002	188.262	0.008	0.002
Medium Crane	5	16,800	0	0	0	0	350	0.21	74	0.367	2.366	4.700	0.240	0.240	0.002	188.262	0.008	0.002
Pickup Truck	88	323,310	82	563,586	6	3600	475	1	475	0.167	0.843	4.335	0.132	0.132	0.002	188.262	0.008	0.002
Semi / Semitruck & Trailer	22	85,690	40	318,920	3	1200	565	1	565	0.167	0.843	4.335	0.132	0.132	0.002	188.262	0.008	0.002
Site Prep Machine/Barko 930	1	600	0	0	0	0	305	1	305	0.167	0.843	4.335	0.132	0.132	0.002	188.262	0.008	0.002
Skid Steer / Skidder	8	30,840	38	238,140	3	1500	100	0.21	21	0.438	2.161	4.440	0.267	0.267	0.002	188.262	0.008	0.002
Sleeving Rig	1	3,910	0	0	0	0	350	0.59	207	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
Snub Cats	3	11,730	5	39,865	1	120	363	0.59	214	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
Tractor	13	46,040	3	30,000	3	1200	175	0.59	103	0.338	0.867	4.100	0.180	0.180	0.002	188.262	0.008	0.002
Trash Truck	1	3,910	0	0	0	0	350	1	350	0.167	0.843	4.335	0.132	0.132	0.002	188.262	0.008	0.002
Triple Bundle Tensioners	2	7,820	2	15,946	0	0	200	0.59	118	0.338	0.867	4.100	0.180	0.180	0.002	188.262	0.008	0.002
Water Truck	22	85,140	7	62,920	1	120	350	0.59	207	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
Welding machine	5	16,800	10	79,730	0	0	25	0.21	5	0.551	4.113	4.300	0.500	0.500	0.002	188.262	0.008	0.002

[a] Equipment counts estimated based on current construction plan.

[b] Source: U.S. Environmental Protection Agency (EPA). 2010. EPA-420-R-10-016 NR005d. Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling. Available online at: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10081RV.pdf. Accessed July 2026.

[c] Conservatively assumes Tier 2 engines. Source: EPA. 2004. EPA-420-R-21-021, Exhaust and Crankcase Emission Factors for Nonroad Emission modeling -Compression-Ignition. Available online at: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10001WF.pdf. Accessed July 2026.

[d] GHG emission factors from EPA's 2025 GHG Emission Factors Hub. Available online at https://www.epa.gov/climateleadership/ghg-emission-factors-hub. Accessed July 2026.

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Gopher to Badger Link Transmission Line Project
Construction Emission Calculations

Criteria Pollutant Emission Estimates from Construction Engines																							
	Construction Associated with Segment 1						Construction Associated with Segment 2						Construction Associated with Q-9 Segment						Total Project					
	Potential Emissions (tons)						Potential Emissions (tons)						Potential Emissions (tons)						Potential Emissions (ton)					
Equipment	VOC	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2
10K Puller	0.28	1.80	3.59	0.18	0.18	0.00	0.57	3.68	7.31	0.37	0.37	0.00	0.00	0.03	0.06	0.00	0.00	0.00	0.86	5.51	10.95	0.56	0.56	0.00
3 Drum Pullers	0.43	1.10	5.21	0.23	0.23	0.00	1.75	4.49	21.26	0.93	0.93	0.01	0.01	0.02	0.08	0.00	0.00	0.00	2.19	5.61	26.55	1.17	1.17	0.01
300 Ton Crane	1.47	3.77	17.81	0.78	0.78	0.01	3.75	9.60	45.40	1.99	1.99	0.02	0.00	0.00	0.00	0.00	0.00	0.00	5.22	13.36	63.22	2.78	2.78	0.03
40 Ton Crane (Picking)	0.25	1.63	3.23	0.17	0.17	0.00	2.58	16.59	32.96	1.68	1.68	0.01	0.02	0.12	0.25	0.01	0.01	0.00	2.85	18.34	36.44	1.86	1.86	0.02
40 Ton Crane w/ Basket	1.64	10.58	21.01	1.07	1.07	0.01	3.86	24.89	49.44	2.52	2.52	0.02	0.02	0.12	0.25	0.01	0.01	0.00	5.52	35.59	70.71	3.61	3.61	0.03
4-inch Water Pump.	0.07	0.49	0.51	0.06	0.06	0.00	0.13	1.00	1.05	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	1.50	1.56	0.18	0.18	0.00
60K Puller	0.63	1.52	8.14	0.27	0.27	0.00	2.56	6.20	33.19	1.09	1.09	0.02	0.00	0.00	0.00	0.00	0.00	0.00	3.19	7.72	41.32	1.36	1.36	0.02
6-inch Water Pump	0.10	0.52	1.06	0.06	0.06	0.00	0.29	1.41	2.89	0.17	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39	1.92	3.95	0.24	0.24	0.00
90 Ton RT Crane	0.58	3.75	7.44	0.38	0.38	0.00	3.34	21.50	42.72	2.18	2.18	0.02	0.02	0.11	0.23	0.01	0.01	0.00	3.94	25.36	50.39	2.57	2.57	0.02
Air Compressor(s)	0.43	2.12	4.35	0.26	0.26	0.00	1.90	9.39	19.30	1.16	1.16	0.01	0.01	0.06	0.13	0.01	0.01	0.00	2.35	11.57	23.77	1.43	1.43	0.01
ATV	0.24	1.33	4.09	0.29	0.29	0.00	1.71	9.41	29.04	2.08	2.08	0.01	0.01	0.04	0.12	0.01	0.01	0.00	1.96	10.78	33.25	2.38	2.38	0.01
Bulldozer	0.75	1.82	9.75	0.32	0.32	0.00	10.46	25.34	135.61	4.46	4.46	0.07	0.00	0.00	0.00	0.00	0.00	0.00	11.21	27.16	145.35	4.78	4.78	0.07
Cattle Truck (Dunnage)	2.20	5.32	28.48	0.94	0.94	0.01	3.36	8.14	43.56	1.43	1.43	0.02	0.00	0.00	0.00	0.00	0.00	0.00	5.56	13.46	72.04	2.37	2.37	0.04
Challenger	0.12	0.77	1.53	0.08	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.77	1.53	0.08	0.08	0.00
Compactor	0.38	2.45	4.87	0.25	0.25	0.00	1.09	7.01	13.93	0.71	0.71	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.47	9.46	18.80	0.96	0.96	0.01
Compactor, Vibratory	0.21	1.34	2.67	0.14	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.12	0.01	0.01	0.00	0.22	1.40	2.79	0.14	0.14	0.00
Concrete Mixer Truck	1.89	4.83	22.85	1.00	1.00	0.01	4.48	11.46	54.23	2.38	2.38	0.03	0.00	0.00	0.00	0.00	0.00	0.00	6.36	16.30	77.08	3.38	3.38	0.04
Concrete Pump	0.57	1.45	6.86	0.30	0.30	0.00	0.90	2.29	10.85	0.48	0.48	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.46	3.74	17.70	0.78	0.78	0.01
Distro Bucket	0.12	0.75	1.49	0.08	0.08	0.00	0.82	5.27	10.47	0.53	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.93	6.02	11.96	0.61	0.61	0.01
Distro Digger Derrick	0.27	0.67	3.56	0.12	0.12	0.00	3.86	9.36	50.06	1.65	1.65	0.03	0.01	0.02	0.11	0.00	0.00	0.00	4.14	10.04	53.73	1.77	1.77	0.03
Dump Truck	2.52	6.12	32.72	1.08	1.08	0.02	6.32	15.31	81.95	2.70	2.70	0.04	0.00	0.00	0.00	0.00	0.00	0.00	8.84	21.43	114.67	3.77	3.77	0.06
Excavator	1.75	11.29	22.43	1.15	1.15	0.01	6.15	39.64	78.77	4.02	4.02	0.03	0.03	0.19	0.37	0.02	0.02	0.00	7.94	51.12	101.57	5.19	5.19	0.04
Fellerbuncher	0.03	0.08	0.40	0.02	0.02	0.00	0.13	0.34	1.60	0.07	0.07	0.00	0.01	0.01	0.07	0.00	0.00	0.00	0.17	0.44	2.07	0.09	0.09	0.00
Flatbed Truck w/ Reel Stand	1.04	2.51	13.43	0.44	0.44	0.01	4.22	10.23	54.76	1.80	1.80	0.03	0.02	0.05	0.26	0.01	0.01	0.00	5.28	12.79	68.44	2.25	2.25	0.03
Foreman Truck	1.03	5.17	26.63	0.81	0.81	0.01	27.87	140.69	723.90	21.98	21.98	0.33	0.05	0.26	1.36	0.04	0.04	0.00	28.95	146.12	751.89	22.82	22.82	0.35
Forklift	2.32	14.96	29.71	1.52	1.52	0.01	3.64	23.44	46.57	2.38	2.38	0.02	0.03	0.22	0.44	0.02	0.02	0.00	5.99	38.62	76.72	3.92	3.92	0.03
Forwarder	0.23	0.58	2.75	0.12	0.12	0.00	1.00	2.56	12.10	0.53	0.53	0.01	0.01	0.04	0.18	0.01	0.01	0.00	1.24	3.17	15.02	0.66	0.66	0.01
Front End Loader	1.05	6.74	13.39	0.68	0.68	0.01	7.35	47.35	94.07	4.80	4.80	0.04	0.04	0.28	0.55	0.03	0.03	0.00	8.44	54.36	108.01	5.52	5.52	0.05
Fuel Truck	0.34	2.18	4.34	0.22	0.22	0.00	0.97	6.28	12.47	0.64	0.64	0.01	0.00	0.01	0.02	0.00	0.00	0.00	1.32	8.47	16.83	0.86	0.86	0.01
Generator	0.10	0.72	0.75	0.09	0.09	0.00	1.13	8.44	8.82	1.03	1.03	0.00	0.00	0.03	0.03	0.00	0.00	0.00	1.23	9.18	9.60	1.12	1.12	0.00
Generators/Light Trees	0.78	3.84	7.90	0.47	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	3.84	7.90	0.47	0.47	0.00
Grader	0.26	0.66	3.12	0.14	0.14	0.00	1.65	4.23	20.00	0.88	0.88	0.01	0.01	0.01	0.07	0.00	0.00	0.00	1.91	4.90	23.19	1.02	1.02	0.01
Horizontal Grinder	0.04	0.20	1.01	0.03	0.03	0.00	0.16	0.79	4.06	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.99	5.07	0.15	0.15	0.00
Hydrovac Truck	0.47	1.14	6.12	0.20	0.20	0.00	0.97	2.34	12.52	0.41	0.41	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.44	3.48	18.63	0.61	0.61	0.01
JLG	0.12	0.59	1.21	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.59	1.21	0.07	0.07	0.00
Light Tower	0.22	1.64	1.71	0.20	0.20	0.00	0.64	4.79	5.01	0.58	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.86	6.43	6.72	0.78	0.78	0.00
Man Hauls	4.92	11.92	63.78	2.10	2.10	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.92	11.92	63.78	2.10	2.10	0.03
Man Hauls w/ Canopy	0.52	1.25	6.71	0.22	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	1.25	6.71	0.22	0.22	0.00
Man Hauls w/ Winch	3.37	8.15	43.64	1.44	1.44	0.02	15.84	38.37	205.34	6.76	6.76	0.10	0.00	0.00	0.00	0.00	0.00	0.00	19.20	46.53	248.98	8.19	8.19	0.12
Mechanic Trucks	1.26	6.35	32.70	0.99	0.99	0.02	5.13	25.92	133.35	4.05	4.05	0.06	0.01	0.04	0.20	0.01	0.01	0.00	6.40	32.31	166.25	5.05	5.05	0.08
Medium Crane	0.50	3.22	6.40	0.33	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	3.22	6.40	0.33	0.33	0.00
Pickup Truck	28.25	142.62	733.86	22.28	22.28	0.34	49.25	248.62	1279.26	38.83	38.83	0.59	0.31	1.59	8.17	0.25	0.25	0.00	77.82	392.83	2021.29	61.36	61.36	0.93
Semi / Semitruck & Trailer	8.91	44.96	231.36	7.02	7.02	0.11	33.15	167.34	861.06	26.14	26.14	0.40	0.12	0.63	3.24	0.10	0.10	0.00	42.18	212.93	1095.66	33.26	33.26	0.51
Site Prep Machine/Barko 930	0.03	0.17	0.87	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.17	0.87	0.03	0.03	0.00
Skid Steer / Skidder	0.31	1.54	3.17	0.19	0.19	0.00	2.41	11.91	24.48	1.47	1.47	0.01	0.02	0.08	0.15	0.01	0.01	0.00	2.74	13.53	27.80	1.67	1.67	0.01
Sleeving Rig	0.27	0.67	3.56	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.67	3.56	0.12	0.12	0.00
Snub Cats	0.85	2.07	11.08	0.36	0.36	0.01	2.90	7.04	37.65	1.24	1.24	0.02	0.01	0.02	0.11	0.00	0.00	0.00	3.77	9.13	48.84	1.61	1.61	0.02
Tractor	1.77	4.54	21.48	0.94	0.94	0.01	1.16	2.96	14.00	0.61	0.61	0.01	0.05	0.12	0.56	0.02	0.02	0.00	2.97	7.62	36.04	1.58	1.58	0.02
Trash Truck	0.25	1.27	6.54	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	1.27	6.54	0.20	0.20	0.00
Triple Bundle Tensioners	0.34	0.88	4.17	0.18	0.18	0.00	0.70	1.80	8.50	0.37	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.05	2.68	12.67	0.56	0.56	0.01

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Construction Emission Calculations

Criteria Pollutant Emission Estimates from Construction Engines																							
	Construction Associated with Segment 1						Construction Associated with Segment 2						Construction Associated with Q-9 Segment						Total Project					
	Potential Emissions (tons)						Potential Emissions (tons)						Potential Emissions (tons)						Potential Emissions (ton)					
Equipment	VOC	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2
Water Truck	5.98	14.49	77.52	2.55	2.55	0.04	4.42	10.71	57.29	1.88	1.88	0.03	0.01	0.02	0.11	0.00	0.00	0.00	10.41	25.21	134.92	4.44	4.44	0.07
Welding machine	0.05	0.40	0.42	0.05	0.05	0.00	0.25	1.90	1.98	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	2.30	2.40	0.28	0.28	0.00
TOTAL	**82.51**	**350.93**	**1,573.38**	**53.21**	**53.21**	**0.74**	**224.83**	**1,000.01**	**4,382.76**	**149.49**	**149.49**	**2.04**	**0.84**	**4.18**	**17.22**	**0.60**	**0.60**	**0.01**	**308.17**	**1,355.12**	**5,973.36**	**203.29**	**203.29**	**2.78**

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Fugitive Dust Emissions from Unpaved Roads																					
	Segment 1			Segment 2			Q-9 Segment				Emission Factor (lb/VMT) [c]		Segment 1 Emissions (ton)		Segment 2 Emissions (ton)		Q-9 Emissions (ton)		Project Total Emissions (ton)	
Equipment	Quantity [a]	Total Days Used	VMT [b]	Quantity [a]	Total Days Used	VMT [b]	Quantity [a]	Total Days Used	VMT [b]	W	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
10K Puller	2	391	2	2	797	797	1	12	6	20	1.88	0.19	0.00	0.00	0.75	0.07	0.01	0.00	0.75	0.08
3 Drum Pullers	2	391	391	4	797	1,595	1	12	6	25	2.07	0.21	0.41	0.04	1.65	0.17	0.01	0.00	2.06	0.21
300 Ton Crane	8	391	1,564	10	797	3,987	0	0	0	25	2.07	0.21	1.62	0.16	4.13	0.41	0.00	0.00	5.75	0.58
40 Ton Crane (Picking)	2	391	391	10	797	3,987	1	60	30	25	2.07	0.21	0.41	0.04	4.13	0.41	0.03	0.00	4.57	0.46
40 Ton Crane w/ Basket	13	391	2,542	15	797	5,980	1	60	30	25	2.07	0.21	2.63	0.26	6.20	0.62	0.03	0.00	8.86	0.89
60K Puller	2	391	391	4	797	1,595	0	0	0	25	2.07	0.21	0.41	0.04	1.65	0.17	0.00	0.00	2.06	0.21
90 Ton RT Crane	5	391	978	15	748	5,609	1	60	30	25	2.07	0.21	1.01	0.10	5.81	0.58	0.03	0.00	6.86	0.69
ATV	7	297	1,038	16	921	7,371	1	60	30	5	1.00	0.10	0.52	0.05	3.70	0.37	0.02	0.00	4.24	0.42
Bulldozer	4	258	516	15	957	7,180	0	0	0	25	2.07	0.21	0.53	0.05	7.44	0.74	0.00	0.00	7.98	0.80
Cattle Truck (Dunnage)	8	391	1,564	6	797	2,392	0	0	0	25	2.07	0.21	1.62	0.16	2.48	0.25	0.00	0.00	4.10	0.41
Challenger	1	391	196	0	0	0	0	0	0	25	2.07	0.21	0.20	0.02	0.00	0.00	0.00	0.00	0.20	0.02
Compactor	5	336	840	7	687	2,406	0	0	0	25	2.07	0.21	0.87	0.09	2.49	0.25	0.00	0.00	3.36	0.34
Compactor, Vibratory	2	336	336	0	0	0	1	30	15	25	2.07	0.21	0.35	0.03	0.00	0.00	0.02	0.00	0.36	0.04
Concrete Mixer Truck	10	336	1,680	10	797	3,987	0	0	0	25	2.07	0.21	1.74	0.17	4.13	0.41	0.00	0.00	5.87	0.59
Distro Bucket	1	391	196	4	687	1,375	0	0	0	25	2.07	0.21	0.20	0.02	1.42	0.14	0.00	0.00	1.63	0.16
Distro Digger Derrick	1	391	196	8	687	2,749	1	12	6	25	2.07	0.21	0.20	0.02	2.85	0.28	0.01	0.00	3.06	0.31
Dump Truck	11	327	1,797	9	1,000	4,500	0	0	0	25	2.07	0.21	1.86	0.19	4.66	0.47	0.00	0.00	6.53	0.65
Excavator	20	363	3,633	32	797	12,757	3	40	60	25	2.07	0.21	3.77	0.38	13.22	1.32	0.06	0.01	17.05	1.71
Fellerbuncher	1	60	30	3	80	120	1	10	5	25	2.07	0.21	0.03	0.00	0.12	0.01	0.01	0.00	0.16	0.02
Flatbed Truck w/ Reel Stand	4	391	782	8	797	3,189	1	30	15	25	2.07	0.21	0.81	0.08	3.31	0.33	0.02	0.00	4.13	0.41
Foreman Truck	3	391	587	40	797	15,946	2	30	30	2	0.67	0.07	0.20	0.02	5.30	0.53	0.01	0.00	5.51	0.55
Forklift	21	386	4,051	24	529	6,348	3	40	60	25	2.07	0.21	4.20	0.42	6.58	0.66	0.06	0.01	10.84	1.08
Forwarder	1	468	234	3	687	1,031	1	30	15	25	2.07	0.21	0.24	0.02	1.07	0.11	0.02	0.00	1.33	0.13
Front End Loader	8	366	1,465	35	588	10,293	3	40	60	25	2.07	0.21	1.52	0.15	10.67	1.07	0.06	0.01	12.25	1.23
Fuel Truck	3	380	570	4	819	1,638	1	5	3	25	2.07	0.21	0.59	0.06	1.70	0.17	0.00	0.00	2.29	0.23
Grader	1	468	234	3	1,000	1,500	1	10	5	25	2.07	0.21	0.24	0.02	1.55	0.16	0.01	0.00	1.80	0.18
Horizontal Grinder	1	60	30	3	80	120	0	0	0	25	2.07	0.21	0.03	0.00	0.12	0.01	0.00	0.00	0.16	0.02
Hydrovac Truck	2	336	336	2	687	687	0	0	0	25	2.07	0.21	0.35	0.03	0.71	0.07	0.00	0.00	1.06	0.11
JLG	4	391	782	0	0	0	0	0	0	25	2.07	0.21	0.81	0.08	0.00	0.00	0.00	0.00	0.81	0.08
Man Hauls	19	391	3,715	0	0	0	0	0	0	25	2.07	0.21	3.85	0.39	0.00	0.00	0.00	0.00	3.85	0.39
Man Hauls w/ Canopy	2	391	391	0	0	0	0	0	0	25	2.07	0.21	0.41	0.04	0.00	0.00	0.00	0.00	0.41	0.04
Man Hauls w/ Winch	13	391	2,542	30	797	11,960	0	0	0	25	2.07	0.21	2.63	0.26	12.40	1.24	0.00	0.00	15.03	1.50
Mechanic Trucks	5	391	978	10	797	3,987	1	12	6	25	2.07	0.21	1.01	0.10	4.13	0.41	0.01	0.00	5.15	0.52
Medium Crane	5	336	840	0	0	0	0	0	0	25	2.07	0.21	0.87	0.09	0.00	0.00	0.00	0.00	0.87	0.09
Pickup Truck	88	367	16,166	82	687	28,179	6	60	180	25	2.07	0.21	16.76	1.68	29.21	2.92	0.19	0.02	46.15	4.62
Semi / Semitruck & Trailer	22	390	4,285	40	797	15,946	3	40	60	40	2.56	0.26	5.49	0.55	20.42	2.04	0.08	0.01	25.99	2.60
Site Prep Machine/Barko 930	1	60	30	0	0	0	0	0	0	25	2.07	0.21	0.03	0.00	0.00	0.00	0.00	0.00	0.03	0.00
Skid Steer / Skidder	8	386	1,542	38	627	11,907	3	50	75	15	1.65	0.16	1.27	0.13	9.81	0.98	0.06	0.01	11.14	1.11
Sleeving Rig	1	391	196	0	0	0	0	0	0	25	2.07	0.21	0.20	0.02	0.00	0.00	0.00	0.00	0.20	0.02
Snub Cats	3	391	587	5	797	1,993	1	12	6	25	2.07	0.21	0.61	0.06	2.07	0.21	0.01	0.00	2.68	0.27
Tractor	13	354	2,302	3	1,000	1,500	3	40	60	25	2.07	0.21	2.39	0.24	1.55	0.16	0.06	0.01	4.00	0.40
Trash Truck	1	391	196	0	0	0	0	0	0	25	2.07	0.21	0.20	0.02	0.00	0.00	0.00	0.00	0.20	0.02
Triple Bundle Tensioners	2	391	391	2	797	797	0	0	0	25	2.07	0.21	0.41	0.04	0.83	0.08	0.00	0.00	1.23	0.12
Water Truck	22	387	4,257	7	899	3,146	1	12	6	30	2.25	0.23	4.79	0.48	3.54	0.35	0.01	0.00	8.34	0.83
TOTAL	--	--	--	--	--	--	--	--	--	--	--	--	**68.29**	**6.83**	**181.84**	**18.18**	**0.79**	**0.08**	**250.93**	**25.09**

[a] Equipment counts are estimated based current construction plan.

[b] Each vehicle is assumed to travel 0.5 mile per day on site.

[c] U.S. Environmental Protection Agency (EPA). November 2006. AP-42: Compilation of Air Emissions Factors from Stationary Sources, Section 13.2.2 Unpaved Roads, Equations 1a and 2 TOTALS 11.19 1.12 Surface Silt content based on Table 13.2.2 1 construction sites.

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Fugitive Dust Emissions from Unpaved Roads																					
	Segment 1			Segment 2			Q-9 Segment				Emission Factor (lb/VMT) [c]		Segment 1 Emissions (ton)		Segment 2 Emissions (ton)		Q-9 Emissions (ton)		Project Total Emissions (ton)	
Equipment	Quantity [a]	Total Days Used	VMT [b]	Quantity [a]	Total Days Used	VMT [b]	Quantity [a]	Total Days Used	VMT [b]	W	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$

Eq 1a: $E = k * (s/12)^a * (W/3)^b$

Eq 2: $E_{ext} = E * [(365-P)/365]$

where:

VMT = Vehicle Miles Traveled

W = Mean Vehicle Weight, tons

S = Mean Vehicle Speed, mph

P = 100 days with at least 0.01 inches rain, EPA's AP-42 Figure 13.2.2-1

s = 8.5 surface material silt content (%) for construction sites, EPA's AP-42 Table 13.2.2-1

E = size-specific emission factor, lb/ VMT

E_{ext} = annual size-specific emission factor extrapolated for natural migration, lb/VMT

Constants	PM	PM_{10}	$PM_{2.5}$
k (lb/VMT)	4.9	1.5	0.15
a	0.7	0.9	0.9
b	0.45	0.45	0.45

Miles traveled per day **0.5**

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Fugitive Dust Emissions from Earthmoving Activities							
	Daily Material Handling			Emission Factors [b - f] (lb/ton)		Emissions (ton)	
Construction Activity	Construction Rate [a] (ton/day)	Handling Time[b] (days)	Average Exposed Area (acres)	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Segment 1							
Topsoil removed by scraper [g]	5,091.3	468	---	0.058	0.0061	69.10	7.27
Project excavation and loading to storage piles	0.0	468	---	0.037	0.0039	0.00	0.00
Backfilling excavations	0.0	468	---	0.012	0.0013	0.00	0.00
Topsoil replacement	5,091.3	468	---	0.012	0.0013	14.30	1.55
Wind erosion of exposed areas	--	468	1,181.52	0.38	0.03999	105.06	11.06
Segment 1 Subtotal						**188.46**	**19.87**
Segment 2							
Topsoil removed by scraper [g]	5,355.9	1,002	---	0.058	0.0061	155.63	16.37
Project excavation and loading to storage piles	0.0	1,002	---	0.037	0.0039	0.00	0.00
Backfilling excavations	0.0	1,002	---	0.012	0.0013	0.00	0.00
Topsoil replacement	5,355.9	1,002	---	0.012	0.0013	32.20	3.49
Wind erosion of exposed areas	--	1,002	2,661.11	0.38	0.03999	506.62	53.32
Segment 2 Subtotal						**694.45**	**73.17**
Q-9 Segment							
Topsoil removed by scraper [g]	584.8	96	---	0.058	0.0061	1.63	0.17
Project excavation and loading to storage piles	0.0	96	---	0.037	0.0039	0.00	0.00
Backfilling excavations	0.0	96	---	0.012	0.0013	0.00	0.00
Topsoil replacement	584.8	96	---	0.012	0.0013	0.34	0.04
Wind erosion of exposed areas	--	96	0.00	0.38	0.03999	0.00	0.00
Q-9 Segment Subtotal						**1.97**	**0.21**
PROJECT TOTAL							
Topsoil removed by scraper [g]	11,032.0	708	---	0.058	0.0061	226.36	23.81
Topsoil replacement	11,032.0	708	---	0.012	0.0013	46.83	5.07
Wind erosion of exposed areas	--	838	3,842.63	0.38	0.03999	611.68	64.37
PROJECT TOTAL						**884.87**	**93.25**

Notes and Assumptions:

[a] Soil density: 1.25 tons per yard

[b] Conservatively assumes handling time is the maximum amount of days a construction equipment is used on the portion of the project.

[c] Backfilling and topsoil replacement emission factor: U.S. Environmental Protection Agency (EPA). AP-42: Compilation of Air Emissions Factors from Stationary Sources, Section 11.9 Western Surface Coal Mining, Table 11.9 4, July 1998, overburden replacement

[d] As worst case, PM_{10} is set equal to Total Particulate Matter. $PM_{2.5}$ is set to 0.105 times PM_{10} per Table 11.9 1

[e] Emission factor: EPA. AP-42: Compilation of Air Emissions Factors from Stationary Sources, Section 11.9 Western Surface Coal Mining, Table 11.9 4, July 1998, topsoil removal by scraper

[f] Wind Erosion Exposed Areas emission factor: EPA. AP 42: Compilation of Air Emissions Factors from Stationary Sources, Section 11.9 Western Surface Coal Mining, Table 11.9 4, July 1998, wind erosion of exposed areas (ton/yr/acre)

[g] Conservatively assumes the entire right of way is cleared to 1 foot deep, 1.25 tons per cubic yard.

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Construction Schedule			
	Segment 1	Segment 2	Q-9 Segment
Work Hours/day	10	10	10
Work Days/week	6	6	6
Crews:	1	1	1
Weeks:	78	167	16
Total Days:	468	1,002	96
Hours per week	60	60	60
Total Hours	4,680	10,020	960

Topsoil Removed by Scraper [a]				
Facility	Total (Acres)	Soil Volume (yd^3)	Soil Weight (ton)	Daily Material Handling Rate (ton/day)
Segment 1	1,182	1,906,178	2,382,722	5,091
Segment 2	2,661	4,293,261	5,366,576	5,356
Q-9 Segment	17	28,072	35,090	585

[a] Acreages from GIS data as of 7/10/2026

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Greenhouse Gas Emissions Summary (tons)				
	CO_2	CH_4	N_2O	CO_2e [a]
SEGMENT 1				
Off-Road Engine Emissions	69,217.68	2.81	0.56	69,445.07
On-Road Engine Emissions	6,050.40	0.00	0.00	6,050.40
SEGMENT 1 TOTAL	75,268.07	2.81	0.56	75,495.46
SEGMENT 2				
Off-Road Engine Emissions	191,932.36	7.78	1.56	192,562.88
On-Road Engine Emissions	14,461.78	0.00	0.00	14,461.78
SEGMENT 2 TOTAL	206,394.14	7.78	1.56	207,024.66
Q-9 SEGMENT				
Off-Road Engine Emissions	743.73	0.03	0.01	746.17
On-Road Engine Emissions	3,515.08	0.00	0.00	3,515.08
Q-9 SEGMENT TOTAL	4,258.81	0.03	0.01	4,261.25
PROJECT				
Off-Road Engine Emissions	261,893.77	10.62	2.12	262,754.12
On-Road Engine Emissions	24,027.25	0.00	0.00	24,027.25
PROJECT TOTAL	**285,921.03**	**10.62**	**2.12**	**286,781.38**

Northern States Power Company and Dairyland Power Cooperative
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Construction Emission Calculations

Greenhouse Gas Emissions from On-Road Construction Traffic					
	Vehicles per day	**Miles per vehicle**	**Number of Days**	**Fuel Used (gallons)**	**CO_2 Emissions [a] (tons)**
Segment 1					
Commuter Vehicles - Gasoline [b,c]	216	60	468	252,720	2,475.71
Delivery Trucks - Diesel [d]	60	60	468	259,200	2909.19
Concrete Mixer Trucks - Diesel [e]	10	60	336	59,294	665.50
Segment 1 Subtotal					**6,050.40**
Segment 2					
Commuter Vehicles - Gasoline [b,c]	250	60	1,002	626,250	6,134.89
Delivery Trucks - Diesel [d]	65	60	1,002	601,200	6,747.71
Concrete Mixer Trucks - Diesel [e]	10	60	797	140,700	1,579.18
Segment 2 Subtotal					**14,461.78**
Q-9 Segment					
Commuter Vehicles - Gasoline [b,c]	28	60	96	6,720	3,515.08
Delivery Trucks - Diesel [d]	12	60	96	10,634	0.00
Concrete Mixer Trucks - Diesel [e]	0	60	0	0	0.00
Q-9 Segment Subtotal					**3,515.08**
Project					
Commuter Vehicles - Gasoline [b,c]	494	60	1,566	885,690	12,125.68
Delivery Trucks - Diesel [d]	137	60	1,566	871,034	9,656.90
Concrete Mixer Trucks - Diesel [e]	20	60	1,133	199,994	2,244.68
PROJECT TOTAL					**20,512.18**

[a] Assumes 1 gallon of gasoline = 8,887 grams CO_2 and 1 gallon of diesel = 10,180 g CO_2, per U.S. Environmental Protection Agency (EPA). 2018. *Greenhouse Gas Emissions from a Typical Passenger Vehicle*. Available online at: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100U8YT.pdf.

[b] Assumes commuters travel 30 miles each way (60 miles round trip) per day, with a fuel economy of 24 miles per gallon, per EPA and U.S. Department of Energy Fuel Economy data for combined city and highway driving in 2023, available online at: https://www.fueleconomy.gov/feg/download.shtml.

[c] Commuter counts include the solar farm and BESS. Number of days is a weighted average of the three project components.

[d] Assumes delivery trucks travel 30 miles each way (60 miles round trip) per day, with a fuel economy of 6.5 miles per gallon, industry average.

[e] Assumes concrete mixer trucks travel 30 miles each way (60 miles round trip) per day, with a fuel economy of 3.4 miles per gallon, industry average. Source: J. D. Thompson and H. H. Bashford. 2012. *Compressed Natural Gas as a Fuel for Concrete Mixer Trucks: The Business Case*. Associated Schools of Construction, 48th ASC Annual International Conference Proceedings. Available online at: http://ascpro0.ascweb.org/archives/cd/2012/paper/CPRT221002012.pdf#:~:text=The%20National%20Ready%20Mix%20Concrete%20Association%20%28NRMCA%29%20in,average%203.4%20miles%20per%20gallon%20of%20diesel%20fuel.

Northern States Power Company and Dairyland Power Cooperative
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Construction Emission Calculations

Greenhouse Gas Emission Factors for Construction Engines												
	Construction Equipment Associated with Segment 1		Construction Equipment Associated with Segment 2		Construction Equipment Associated with Q-9 segment							
Equipment	Quantity [a]	Total Hours Used [b]	Quantity [a]	Total Hours Used [b]	Quantity [a]	Total Hours Used [b]	Max Power (HP)	Load Factor [b]	Loaded Power (HP)	Emission Factors [c,d] (g/hp hr)		
										CO_2	CH_4	N_2O
10K Puller	2	7,820	2	15,946	1	120	150	1	89	188.262	0.008	0.002
3 Drum Pullers	2	7,820	4	31,892	1	120	250	1	148	188.262	0.008	0.002
300 Ton Crane	8	31,280	10	79,730	0	0	600	0	126	188.262	0.008	0.002
40 Ton Crane (Picking)	2	7,820	10	79,730	1	600	380	0	80	188.262	0.008	0.002
40 Ton Crane w/ Basket	13	50,830	15	119,595	1	600	380	0	80	188.262	0.008	0.002
4-inch Water Pump.	3	10,080	3	20,619	0	0	25	0	11	188.262	0.008	0.002
60K Puller	2	7,820	4	31,892	0	0	400	1	236	188.262	0.008	0.002
6-inch Water Pump	3	10,080	4	27,492	0	0	50	0	22	188.262	0.008	0.002
90 Ton RT Crane	5	19,550	15	112,176	1	600	350	0	74	188.262	0.008	0.002
Air Compressor(s)	11	41,360	23	183,379	4	1,200	50	0	22	188.262	0.008	0.002
ATV	7	20,760	16	147,420	1	600	90	0	38	188.262	0.008	0.002
Bulldozer	4	10,320	15	143,600	0	0	363	1	214	188.262	0.008	0.002
Cattle Truck (Dunnage)	8	31,280	6	47,838	0	0	350	1	207	188.262	0.008	0.002
Challenger	1	3,910	0	0	0	0	360	0	76	188.262	0.008	0.002
Compactor	5	16,800	7	48,111	0	0	130	0	56	188.262	0.008	0.002
Compactor, Vibratory	2	6,720	0	0	1	300	130	1	77	188.262	0.008	0.002
Concrete Mixer Truck	10	33,600	10	79,730	0	0	350	0	151	188.262	0.008	0.002
Concrete Pump	0	10,080	2	15,946	0	0	350	0	151	188.262	0.008	0.002
Distro Bucket	1	3,910	4	27,492	0	0	350	0	74	188.262	0.008	0.002
Distro Digger Derrick	1	3,910	8	54,984	1	120	350	1	207	188.262	0.008	0.002
Dump Truck	11	35,940	9	90,000	0	0	350	1	207	188.262	0.008	0.002
Excavator	20	72,650	32	255,136	3	1,200	101	1	60	188.262	0.008	0.002
Fellerbuncher	1	600	3	2,400	1	100	250	1	148	188.262	0.008	0.002
Flatbed Truck w/ Reel Stand	4	15,640	8	63,784	1	300	330	1	195	188.262	0.008	0.002
Foreman Truck	3	11,730	40	318,920	2	600	475	1	475	188.262	0.008	0.002
Forklift	21	81,010	24	126,960	3	1,200	120	1	71	188.262	0.008	0.002
Forwarder	1	4,680	3	20,619	1	300	220	1	130	188.262	0.008	0.002
Front End Loader	8	29,300	35	205,866	3	1,200	420	0	88	188.262	0.008	0.002
Fuel Truck	3	11,400	4	32,760	1	50	350	0	74	188.262	0.008	0.002
Generator	0	16,800	26	196,714	2	600	22	0	9	188.262	0.008	0.002
Generators/Light Trees	0	117,300	0	0	0	0	32	0	14	188.262	0.008	0.002
Grader	1	4,680	3	30,000	1	100	250	1	148	188.262	0.008	0.002
Horizontal Grinder	1	600	3	2,400	0	0	600	1	354	188.262	0.008	0.002
Hydrovac Truck	2	6,720	2	13,746	0	0	350	1	207	188.262	0.008	0.002
JLG	4	15,640	0	0	0	0	75	0	16	188.262	0.008	0.002
Light Tower	0	33,600	11	98,280	0	0	25	0	11	188.262	0.008	0.002

Northern States Power Company and Dairyland Power Cooperative
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Construction Emission Calculations

Greenhouse Gas Emission Factors for Construction Engines												
	Construction Equipment Associated with Segment 1		Construction Equipment Associated with Segment 2		Construction Equipment Associated with Q-9 segment							
Equipment	Quantity [a]	Total Hours Used [b]	Quantity [a]	Total Hours Used [b]	Quantity [a]	Total Hours Used [b]	Max Power (HP)	Load Factor [b]	Loaded Power (HP)	Emission Factors [c,d] (g/hp hr)		
										CO_2	CH_4	N_2O
Man Hauls	19	74,290	0	0	0	0	330	1	195	188.262	0.008	0.002
Man Hauls w/ Canopy	2	7,820	0	0	0	0	330	1	195	188.262	0.008	0.002
Man Hauls w/ Winch	13	50,830	30	239,190	0	0	330	1	195	188.262	0.008	0.002
Mechanic Trucks	5	19,550	10	79,730	1	120	350	1	350	188.262	0.008	0.002
Medium Crane	5	16,800	0	0	0	0	350	0	74	188.262	0.008	0.002
Pickup Truck	88	323,310	82	563,586	6	3,600	475	1	475	188.262	0.008	0.002
Semi / Semitruck & Trailer	22	85,690	40	318,920	3	1,200	565	1	565	188.262	0.008	0.002
Site Prep Machine/Barko 930	1	600	0	0	0	0	305	1	305	188.262	0.008	0.002
Skid Steer / Skidder	8	30,840	38	238,140	3	1,500	100	0	21	188.262	0.008	0.002
Sleeving Rig	1	3,910	0	0	0	0	350	1	207	188.262	0.008	0.002
Snub Cats	3	11,730	5	39,865	1	120	363	1	214	188.262	0.008	0.002
Tractor	13	46,040	3	30,000	3	1,200	175	1	103	188.262	0.008	0.002
Trash Truck	1	3,910	0	0	0	0	350	1	350	188.262	0.008	0.002
Triple Bundle Tensioners	2	7,820	2	15,946	0	0	200	1	118	188.262	0.008	0.002
Water Truck	22	85,140	7	62,920	1	120	350	1	207	188.262	0.008	0.002
Welding machine	5	16,800	10	79,730	0	0	25	0	5	188.262	0.008	0.002

[a] Equipment counts estimated based on current construction plan.

[b] Load Factors from Appendix A of U.S. Environmental Protection Agency (EPA). April 2004. EPA 420_P 04 005, Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling.

[c] EPA 420 P 04 009, Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling Compression Ignition, USEPA, April 2004 Tier 2 Engines.

[d] GHG emission factors from EPA's 2025 GHG Emission Factors Hub. Available online at https://www.epa.gov/climateleadership/ghg-emission-factors-hub.

Northern States Power Company and Dairyland Power Cooperative
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Construction Emission Calculations

Greenhouse Gas Emission Estimates from Construction Engines																
	Construction Equipment Associated with Segment 1				Construction Equipment Associated with Segment 2				Construction Equipment Associated with Q-9				Project Total			
	Potential Emissions (ton)				Potential Emissions (ton)				Potential Emissions (ton)				Potential Emissions (ton)			
Equipment	CO_2	CH_4	N_2O	CO_2e	CO_2	CH_4	N_2O	CO_2e	CO_2	CH_4	N_2O	CO_2e	CO_2	CH_4	N_2O	CO_2e [a]
10K Puller	143.62	5.8E-03	1.2E-03	144.09	292.86	1.2E-02	2.4E-03	293.82	2.20	0.00	0.00	2.21	438.69	0.02	0.00	440.13
3 Drum Pullers	239.37	9.7E-03	1.9E-03	240.15	976.20	4.0E-02	7.9E-03	979.41	3.67	0.00	0.00	3.69	1,219.25	0.05	0.01	1,223.25
300 Ton Crane	817.91	3.3E-02	6.6E-03	820.59	2,084.78	8.5E-02	1.7E-02	2091.62	0.00	0.00	0.00	0.00	2,902.68	0.12	0.02	2,912.22
40 Ton Crane (Picking)	129.50	5.3E-03	1.1E-03	129.93	1,320.36	5.4E-02	1.1E-02	1324.70	9.94	0.00	0.00	9.97	1,459.80	0.06	0.01	1,464.59
40 Ton Crane w/ Basket	841.76	3.4E-02	6.8E-03	844.53	1,980.54	8.0E-02	1.6E-02	1987.04	9.94	0.00	0.00	9.97	2,832.24	0.11	0.02	2,841.54
4-inch Water Pump.	22.49	9.1E-04	1.8E-04	22.56	46.00	1.9E-03	3.7E-04	46.15	0.00	0.00	0.00	0.00	68.49	0.00	0.00	68.71
60K Puller	382.99	1.6E-02	3.1E-03	384.25	1,561.93	6.3E-02	1.3E-02	1567.06	0.00	0.00	0.00	0.00	1,944.92	0.08	0.02	1,951.30
6-inch Water Pump	44.97	1.8E-03	3.6E-04	45.12	122.66	5.0E-03	9.9E-04	123.07	0.00	0.00	0.00	0.00	167.64	0.01	0.00	168.19
90 Ton RT Crane	298.20	1.2E-02	2.4E-03	299.18	1,711.02	6.9E-02	1.4E-02	1716.64	9.15	0.00	0.00	9.18	2,018.36	0.08	0.02	2,024.99
Air Compressor(s)	184.54	7.5E-03	1.5E-03	185.14	818.19	3.3E-02	6.6E-03	820.88	5.35	0.00	0.00	5.37	1,008.08	0.04	0.01	1,011.40
ATV	162.85	6.6E-03	1.3E-03	163.38	1,156.42	4.7E-02	9.4E-03	1160.22	4.71	0.00	0.00	4.72	1,323.97	0.05	0.01	1,328.32
Bulldozer	458.68	1.9E-02	3.7E-03	460.18	6,382.35	2.6E-01	5.2E-02	6403.32	0.00	0.00	0.00	0.00	6,841.03	0.28	0.06	6,863.50
Cattle Truck (Dunnage)	1,340.46	5.4E-02	1.1E-02	1344.86	2,050.03	8.3E-02	1.7E-02	2056.76	0.00	0.00	0.00	0.00	3,390.49	0.14	0.03	3,401.63
Challenger	61.34	2.5E-03	5.0E-04	61.54	0.00	0.0E+00	0.0E+00	0.00	0.00	0.00	0.00	0.00	61.34	0.00	0.00	61.54
Compactor	194.89	7.9E-03	1.6E-03	195.53	558.11	2.3E-02	4.5E-03	559.95	0.00	0.00	0.00	0.00	753.00	0.03	0.01	755.48
Compactor, Vibratory	106.96	4.3E-03	8.7E-04	107.31	0.00	0.0E+00	0.0E+00	0.00	4.78	0.00	0.00	4.79	111.74	0.00	0.00	112.10
Concrete Mixer Truck	1,049.40	4.3E-02	8.5E-03	1052.85	2,490.15	1.0E-01	2.0E-02	2498.33	0.00	0.00	0.00	0.00	3,539.55	0.14	0.03	3,551.18
Concrete Pump	314.82	1.3E-02	2.6E-03	315.86	498.03	2.0E-02	4.0E-03	499.67	0.00	0.00	0.00	0.00	812.85	0.03	0.01	815.52
Distro Bucket	59.64	2.4E-03	4.8E-04	59.84	419.33	1.7E-02	3.4E-03	420.71	0.00	0.00	0.00	0.00	478.97	0.02	0.00	480.55
Distro Digger Derrick	167.56	6.8E-03	1.4E-03	168.11	2,356.26	9.6E-02	1.9E-02	2364.00	5.14	0.00	0.00	5.16	2,528.96	0.10	0.02	2,537.27
Dump Truck	1,540.16	6.2E-02	1.2E-02	1545.22	3,856.82	1.6E-01	3.1E-02	3869.49	0.00	0.00	0.00	0.00	5,396.98	0.22	0.04	5,414.71
Excavator	898.41	3.6E-02	7.3E-03	901.36	3,155.09	1.3E-01	2.6E-02	3165.46	14.84	0.00	0.00	14.89	4,068.34	0.17	0.03	4,081.71
Fellerbuncher	18.37	7.4E-04	1.5E-04	18.43	73.46	3.0E-03	6.0E-04	73.70	3.06	0.00	0.00	3.07	94.89	0.00	0.00	95.20
Flatbed Truck w/ Reel Stand	631.93	2.6E-02	5.1E-03	634.01	2,577.18	1.0E-01	2.1E-02	2585.65	12.12	0.00	0.00	12.16	3,221.23	0.13	0.03	3,231.81
Foreman Truck	1,156.27	4.7E-02	9.4E-03	1160.07	31,437.08	1.3E+00	2.5E-01	31540.36	59.14	0.00	0.00	59.34	32,652.50	1.32	0.26	32,759.76
Forklift	1,190.25	4.8E-02	9.7E-03	1194.16	1,865.38	7.6E-02	1.5E-02	1871.51	17.63	0.00	0.00	17.69	3,073.26	0.12	0.02	3,083.36
Forwarder	126.06	5.1E-03	1.0E-03	126.48	555.40	2.3E-02	4.5E-03	557.23	8.08	0.00	0.00	8.11	689.55	0.03	0.01	691.81
Front End Loader	536.29	2.2E-02	4.3E-03	538.06	3,768.08	1.5E-01	3.1E-02	3780.46	21.96	0.00	0.00	22.04	4,326.34	0.18	0.04	4,340.55
Fuel Truck	173.88	7.1E-03	1.4E-03	174.46	499.69	2.0E-02	4.1E-03	501.33	0.76	0.00	0.00	0.77	674.33	0.03	0.01	676.55
Generator	32.98	1.3E-03	2.7E-04	33.09	386.18	1.6E-02	3.1E-03	387.45	1.18	0.00	0.00	1.18	420.34	0.02	0.00	421.72
Generators/Light Trees	334.95	1.4E-02	2.7E-03	336.05	0.00	0.0E+00	0.0E+00	0.00	0.00	0.00	0.00	0.00	334.95	0.01	0.00	336.05
Grader	143.25	5.8E-03	1.2E-03	143.72	918.29	3.7E-02	7.4E-03	921.31	3.06	0.00	0.00	3.07	1,064.60	0.04	0.01	1,068.10
Horizontal Grinder	44.08	1.8E-03	3.6E-04	44.22	176.31	7.2E-03	1.4E-03	176.89	0.00	0.00	0.00	0.00	220.39	0.01	0.00	221.11
Hydrovac Truck	287.98	1.2E-02	2.3E-03	288.92	589.07	2.4E-02	4.8E-03	591.00	0.00	0.00	0.00	0.00	877.04	0.04	0.01	879.92
JLG	51.12	2.1E-03	4.1E-04	51.29	0.00	0.0E+00	0.0E+00	0.00	0.00	0.00	0.00	0.00	51.12	0.00	0.00	51.29
Light Tower	74.96	3.0E-03	6.1E-04	75.20	219.25	8.9E-03	1.8E-03	219.97	0.00	0.00	0.00	0.00	294.21	0.01	0.00	295.17
Man Hauls	3,001.67	1.2E-01	2.4E-02	3011.53	0.00	0.0E+00	0.0E+00	0.00	0.00	0.00	0.00	0.00	3,001.67	0.12	0.02	3,011.53
Man Hauls w/ Canopy	315.97	1.3E-02	2.6E-03	317.00	0.00	0.0E+00	0.0E+00	0.00	0.00	0.00	0.00	0.00	315.97	0.01	0.00	317.00
Man Hauls w/ Winch	2,053.78	8.3E-02	1.7E-02	2060.52	9,664.42	3.9E-01	7.8E-02	9696.17	0.00	0.00	0.00	0.00	11,718.20	0.48	0.10	11,756.69
Mechanic Trucks	1,419.98	5.8E-02	1.2E-02	1424.64	5,791.04	2.3E-01	4.7E-02	5810.07	8.72	0.00	0.00	8.74	7,219.74	0.29	0.06	7,243.45
Medium Crane	256.25	1.0E-02	2.1E-03	257.09	0.00	0.0E+00	0.0E+00	0.00	0.00	0.00	0.00	0.00	256.25	0.01	0.00	257.09
Pickup Truck	31,869.82	1.3E+00	2.6E-01	31974.52	55,554.69	2.3E+00	4.5E-01	55737.19	354.86	0.01	0.00	356.03	87,779.38	3.56	0.71	88,067.74
Semi / Semitruck & Trailer	10,047.21	4.1E-01	8.1E-02	10080.22	37,393.59	1.5E+00	3.0E-01	37516.43	140.70	0.01	0.00	141.16	47,581.50	1.93	0.39	47,737.81
Site Prep Machine/Barko 930	37.98	1.5E-03	3.1E-04	38.10	0.00	0.0E+00	0.0E+00	0.00	0.00	0.00	0.00	0.00	37.98	0.00	0.00	38.10
Skid Steer / Skidder	134.40	5.5E-03	1.1E-03	134.84	1,037.81	4.2E-02	8.4E-03	1041.22	6.54	0.00	0.00	6.56	1,178.75	0.05	0.01	1,182.62
Sleeving Rig	167.56	6.8E-03	1.4E-03	168.11	0.00	0.0E+00	0.0E+00	0.00	0.00	0.00	0.00	0.00	167.56	0.01	0.00	168.11
Snub Cats	521.34	2.1E-02	4.2E-03	523.06	1,771.81	7.2E-02	1.4E-02	1777.63	5.33	0.00	0.00	5.35	2,298.49	0.09	0.02	2,306.04
Tractor	986.49	4.0E-02	8.0E-03	989.73	642.80	2.6E-02	5.2E-03	644.92	25.71	0.00	0.00	25.80	1,655.00	0.07	0.01	1,660.44
Trash Truck	284.00	1.2E-02	2.3E-03	284.93	0.00	0.0E+00	0.0E+00	0.00	0.00	0.00	0.00	0.00	284.00	0.01	0.00	284.93
Triple Bundle Tensioners	191.49	7.8E-03	1.6E-03	192.12	390.48	1.6E-02	3.2E-03	391.76	0.00	0.00	0.00	0.00	581.98	0.02	0.00	583.89

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Greenhouse Gas Emission Estimates from Construction Engines																
	Construction Equipment Associated with Segment 1				Construction Equipment Associated with Segment 2				Construction Equipment Associated with Q-9				Project Total			
	Potential Emissions (ton)				Potential Emissions (ton)				Potential Emissions (ton)				Potential Emissions (ton)			
Equipment	CO_2	CH_4	N_2O	CO_2e	CO_2	CH_4	N_2O	CO_2e	CO_2	CH_4	N_2O	CO_2e	CO_2	CH_4	N_2O	CO_2e [a]
Water Truck	3,648.55	1.5E-01	3.0E-02	3660.54	2,696.35	1.1E-01	2.2E-02	2705.20	5.14	0.00	0.00	5.16	6,350.04	0.26	0.05	6,370.90
Welding machine	18.30	7.4E-04	1.5E-04	18.36	86.87	3.5E-03	7.0E-04	87.15	0.00	0.00	0.00	0.00	105.17	0.00	0.00	105.51
TOTAL	**69,217.68**	**2.8E+00**	**5.6E-01**	**69,445.07**	**191,932.36**	**7.8E+00**	**1.6E+00**	**192,562.88**	**743.73**	**3.0E-02**	**6.0E-03**	**746.17**	**261,893.77**	**10.62**	**2.12**	**262,754.12**

[a] Calculated using global warming potentials from U.S. Environmental Protection Agency's 2025 GHG Emission Factors Hub. Available online at: https://www.epa.gov/climateleadership/ghg-emission-factors-hub. Accessed July 2026.

Global Warming Potentials		
CO_2	CH_4	N_2O
1	28	265

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Land Use Change From Transmission Line Structures											
Project Component		**Action**	**Structure Type**	**Maximum foundation diameter (feet)**	**Number of feet per structure**	**Footprint per structure (sq. feet)**	**Footprint per structure (acres)**	**Length of Segment (miles)**	**Minimum Span (feet)**	**Number of Structures**	**Total structure area (acres)**
Segment 1											
	765 kV	New build	Lattice	8	4	201.1	4.62E-03	39	1200	172	0.8
	Segment 1 net change	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**0.792**
Segment 2											
	765 kV / 161 kV	New build	Lattice	8	4	201.1	4.62E-03	--	--	419	1.9
	161 kV	New build	Monopole	6	1	28.3	6.49E-04	--	--	39	0.0
	161 kV	Removal	H-Frame	6	2	56.5	1.30E-03	--	--	673	0.9
	Segment 2 net change	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1.086**
Q-9											
	161 kV	New build	Monopole	6	1	28.3	6.49E-04	2	450	18	0.0
	161 kV	Removal	H-Frame	6	2	56.5	1.30E-03	1.5	300	26	0.0
	Segment Q-9 net change	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-0.0228**
Total Change											**1.8549**

Conversions

43,560 sq. feet per acre
5,280 feet per mile