

APPENDIX F CLIMATE AND AIR QUALITY

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APPENDIX F – CLIMATE AND AIR QUALITY

TRANSMISSION LINE CONSTRUCTION EMISSIONS

Table F-1 summarizes the total transmission-line construction related criteria emissions by source category and year for each of the options under consideration. GHG emissions are summarized in Table F-2. Note that the CO₂e emissions shown are a summation of the emissions of individual GHGs, including carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), expressed as an equivalent mass of CO₂.

Table F-1. Transmission Line Construction Criteria Pollutant Emissions					
Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)	Entire Project (tons/mile of transmission line)
One 500 kV Single-Circuit, AC Facility (First Line)					
Fugitive Dust from Earthmoving and Grading Activities					
PM _{2.5}	11.9	12.7	6.7	0.0	0.06
PM ₁₀	119.0	126.9	66.6	0.0	0.6
Paved and Unpaved Road Dust					
PM _{2.5}	91.3	90.8	58.4	0.0	0.49
PM ₁₀	911.6	905.8	582.9	0.0	4.89
Nonroad Engine Emissions					
PM _{2.5}	1.3	1.7	1.3	0.0	0.008
PM ₁₀	1.3	1.7	1.3	0.0	0.008
NO _x	48.7	82.8	77.7	0.0	0.41
SO ₂	0.10	0.13	0.13	0.0	0.001
CO	56.7	92.9	88.1	0.0	0.46
VOC	1.4	2.0	1.6	0.0	0.01
Helicopter Emissions					
PM _{2.5}	0.01	0.01	0.01	0.0	0.0001
PM ₁₀	0.01	0.01	0.01	0.0	0.0001
NO _x	0.30	0.30	0.19	0.0	0.002
SO ₂	0.06	0.06	0.04	0.0	0.0003
CO	0.90	0.89	0.57	0.0	0.005
VOC	0.71	0.71	0.45	0.0	0.004
Traffic Emissions					
PM _{2.5}	0.69	0.69	0.44	0.0	0.004
PM ₁₀	0.98	0.98	0.63	0.0	0.01
NO _x	30.9	30.7	19.8	0.0	0.17
SO ₂	0.13	0.13	0.08	0.0	0.001
CO	51.4	51.1	32.9	0.0	0.28
VOC	5.5	5.5	3.5	0.0	0.03
Option A: Two 500 kV Single-Circuit, AC Facilities					
Fugitive Dust from Earthmoving and Grading Activities					
PM _{2.5}	11.9	20.6	15.1	4.6	0.05

Table F-1. Transmission Line Construction Criteria Pollutant Emissions					
Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)	Entire Project (tons/mile of transmission line)
PM ₁₀	119.0	205.7	150.7	45.5	0.53
Paved and Unpaved Road Dust					
PM _{2.5}	91.3	180.3	150.7	58.6	0.49
PM ₁₀	911.6	1,800	1,504	584.9	4.89
Nonroad Engine Emissions					
PM _{2.5}	1.3	2.9	3.0	1.3	0.009
PM ₁₀	1.3	2.9	3.0	1.3	0.009
NO _x	48.7	130.4	161.1	78.3	0.43
SO ₂	0.10	0.22	0.26	0.13	0.001
CO	56.7	148.2	181.7	88.8	0.48
VOC	1.4	3.3	3.6	1.6	0.01
Helicopter Emissions					
PM _{2.5}	0.01	0.02	0.02	0.01	0.0001
PM ₁₀	0.01	0.02	0.02	0.01	0.0001
NO _x	0.30	0.60	0.50	0.19	0.002
SO ₂	0.06	0.13	0.10	0.04	0.0003
CO	0.90	1.77	1.48	0.58	0.005
VOC	0.71	1.40	1.17	0.46	0.004
Traffic Emissions					
PM _{2.5}	0.69	1.4	1.1	0.44	0.004
PM ₁₀	0.98	1.9	1.6	0.63	0.01
NO _x	30.9	61.1	51.0	19.8	0.17
SO ₂	0.13	0.25	0.21	0.08	0.001
CO	51.4	101.5	84.8	33.0	0.28
VOC	5.5	10.9	9.1	3.5	0.03
Option B: One 500 kV Single-Circuit, AC Facility and One 500 kV Single-Circuit, DC Facility					
Fugitive Dust from Earthmoving and Grading Activities					
PM _{2.5}	11.9	21.1	15.7	3.4	0.05
PM ₁₀	119.0	211.4	156.8	33.8	0.53
Paved and Unpaved Road Dust					
PM _{2.5}	91.3	187.3	157.4	44.9	0.49
PM ₁₀	911.6	1,870	1,571	448.3	4.89
Nonroad Engine Emissions					
PM _{2.5}	1.3	3.0	3.2	1.0	0.009
PM ₁₀	1.3	3.0	3.2	1.0	0.009
NO _x	48.7	136.3	173.9	59.6	0.43
SO ₂	0.10	0.23	0.28	0.10	0.001
CO	56.7	155.2	196.1	67.4	0.48
VOC	1.4	3.4	3.8	1.2	0.01

Table F-1. Transmission Line Construction Criteria Pollutant Emissions					
Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)	Entire Project (tons/mile of transmission line)
Helicopter Emissions					
PM _{2.5}	0.01	0.02	0.02	0.0	0.0001
PM ₁₀	0.01	0.02	0.02	0.0	0.0001
NO _x	0.30	0.62	0.52	0.15	0.002
SO ₂	0.06	0.13	0.11	0.03	0.0003
CO	0.90	1.84	1.55	0.44	0.005
VOC	0.71	1.46	1.23	0.35	0.004
Traffic Emissions					
PM _{2.5}	0.69	1.4	1.2	0.34	0.004
PM ₁₀	0.98	2.0	1.7	0.48	0.01
NO _x	30.9	63.4	53.3	15.2	0.17
SO ₂	0.13	0.26	0.22	0.06	0.001
CO	51.4	105.4	88.6	25.3	0.28
VOC	5.5	11.3	9.5	2.7	0.03

Table F-2. Transmission Line Construction Greenhouse Gas Emissions					
Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)	Entire Project (tons/mile of transmission line)
One 500 kV Single-Circuit, AC Facility (First Line)					
Nonroad Engine Emissions					
CO _{2e}	10,029	16,680	15,912	0.0	86.8
Helicopter Emissions					
CO _{2e}	199.6	198.4	127.6	0.0	1.1
Traffic Emissions					
CO _{2e}	12,063	11,986	7,713	0.0	64.7
Option A: Two 500 kV Single-Circuit, AC Facilities					
Nonroad Engine Emissions					
CO _{2e}	10,029	26,472	32,718	16,025	86.8
Helicopter Emissions					
CO _{2e}	199.6	394.1	329.4	128.1	1.1
Traffic Emissions					
CO _{2e}	12,063	23,816	19,907	7,739	64.7
Option B: One 500 kV Single-Circuit, AC Facility and One 500 kV Single-Circuit, DC Facility					
Nonroad Engine Emissions					
CO _{2e}	10,029	27,726	35,317	12,171	86.8
Helicopter Emissions					
CO _{2e}	199.6	409.4	344.0	98.2	1.1
Traffic Emissions					
CO _{2e}	12,063	24,741	20,789	5,933	64.7

CONCRETE BATCH PLANT EMISSIONS

Table F-3 summarizes the emissions for construction and operation of the concrete batch plants. GHGs expressed as CO₂e include CO₂, CH₄, and N₂O.

Table F-3. Concrete Batch Plant Emissions		
Pollutant	All Batch Plants (tons)	Entire Project (tons/mile of transmission line)
One 500 kV Single-Circuit, AC Facility (First Line)		
Batch Plant Construction Emissions		
PM _{2.5}	60.3	0.12
PM ₁₀	570.0	1.16
NO _x	68.0	0.14
SO ₂	0.36	0.001
CO	78.7	0.16
VOC	6.6	0.01
CO ₂ e	17,218	35.1
Batch Plant Operation Emissions		
PM _{2.5}	3.8	0.008
PM ₁₀	33.5	0.07
NO _x	1.2	0.002
SO ₂	0.004	0.00001
CO	0.27	0.001
VOC	0.09	0.0002
CO ₂ e	404.0	0.82
Option A: Two 500 kV Single-Circuit, AC Facilities		
Batch Plant Construction Emissions		
PM _{2.5}	120.57	0.12
PM ₁₀	1,139.94	1.16
NO _x	136.0	0.14
SO ₂	0.72	0.001
CO	157.3	0.16
VOC	13.3	0.01
CO ₂ e	34,435	35.1
Batch Plant Operation Emissions		
PM _{2.5}	7.5	0.008
PM ₁₀	67.0	0.07
NO _x	2.3	0.002
SO ₂	0.01	0.00001
CO	0.55	0.001
VOC	0.18	0.0002
CO ₂ e	808	0.82
Option B: One 500 kV Single-Circuit, AC Facility and One 500 kV Single-Circuit DC, Facility		
Batch Plant Construction Emissions		
PM _{2.5}	120.6	0.12

Table F-3. Concrete Batch Plant Emissions		
Pollutant	All Batch Plants (tons)	Entire Project (tons/mile of transmission line)
PM ₁₀	1,140	1.16
NO _x	136.0	0.14
SO ₂	0.72	0.001
CO	157.3	0.16
VOC	13.3	0.01
CO ₂ e	34,435	35.1
Batch Plant Operation Emissions		
PM _{2.5}	6.7	0.007
PM ₁₀	60.7	0.06
NO _x	2.1	0.002
SO ₂	0.01	0.00001
CO	0.49	0.001
VOC	0.16	0.0002
CO ₂ e	726.9	0.74

ROUTE GROUP 1: SUNZIA EAST SUBSTATION TO MIDPOINT SUBSTATION – WEST OF WHITE SANDS EMISSIONS

Criteria pollutant emissions associated with construction and expansion of the SunZia East Substation are summarized in Table F-4. GHG emissions associated with construction of the substation are shown in Table F-5, while operation phase GHG emissions are shown in Table F-6. GHGs expressed as CO₂e from substation construction include CO₂, CH₄, and N₂O, while GHGs emitted during substation operation include only sulfur hexafluoride (SF₆).

Table F-4. SunZia East Substation Construction Criteria Pollutant Emissions				
Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)
One 500 kV Single-Circuit, AC Facility (First Line)				
Fugitive Dust from Earthmoving and Grading Activities				
PM _{2.5}	0.07	0.08	0.03	0.0
PM ₁₀	0.65	0.82	0.26	0.0
Paved and Unpaved Road Dust				
PM _{2.5}	15.2	16.8	11.2	0.0
PM ₁₀	152.0	167.4	111.3	0.0
Nonroad Engine Emissions				
PM _{2.5}	0.29	1.21	0.83	0.0
PM ₁₀	0.29	1.21	0.83	0.0
NO _x	4.2	19.2	13.4	0.0
SO ₂	0.01	0.13	0.08	0.0
CO	4.7	21.6	14.8	0.0
VOC	0.30	1.5	1.0	0.0

Table F-4. SunZia East Substation Construction Criteria Pollutant Emissions				
Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)
Traffic Emissions				
PM _{2.5}	0.12	0.13	0.09	0.0
PM ₁₀	0.17	0.19	0.12	0.0
NO _x	5.3	5.9	3.9	0.0
SO ₂	0.02	0.02	0.02	0.0
CO	6.7	7.4	4.9	0.0
VOC	0.81	0.89	0.59	0.0
Option A: Two 500 kV Single-Circuit, AC Facilities				
Fugitive Dust from Earthmoving and Grading Activities				
PM _{2.5}	0.07	0.08	0.03	0.0
PM ₁₀	0.65	0.82	0.26	0.0
Paved and Unpaved Road Dust				
PM _{2.5}	15.2	31.6	27.9	11.6
PM ₁₀	152.0	314.7	278.7	116.1
Nonroad Engine Emissions				
PM _{2.5}	0.29	1.5	2.0	0.85
PM ₁₀	0.29	1.5	2.0	0.85
NO _x	4.2	23.4	32.3	13.7
SO ₂	0.01	0.13	0.20	0.08
CO	4.7	26.3	36.2	15.2
VOC	0.30	1.8	2.5	1.0
Traffic Emissions				
PM _{2.5}	0.12	0.25	0.22	0.09
PM ₁₀	0.17	0.35	0.31	0.13
NO _x	5.4	11.1	9.8	4.1
SO ₂	0.02	0.04	0.04	0.02
CO	6.7	13.8	12.3	5.1
VOC	0.81	1.7	1.5	0.62
Option B: One 500 kV Single-Circuit, AC Facility and One 500 kV Single-Circuit, DC Facility				
Fugitive Dust from Earthmoving and Grading Activities				
PM _{2.5}	0.07	0.15	0.10	0.0
PM ₁₀	0.65	1.5	1.0	0.0
Paved and Unpaved Road Dust				
PM _{2.5}	15.2	33.4	29.6	8.2
PM ₁₀	152.0	333.3	294.9	81.3
Nonroad Engine Emissions				
PM _{2.5}	0.29	1.5	2.3	0.57
PM ₁₀	0.29	1.5	2.3	0.57
NO _x	4.2	24.0	36.1	9.3
SO ₂	0.01	0.14	0.23	0.06
CO	4.7	26.9	40.4	10.3

Table F-4. SunZia East Substation Construction Criteria Pollutant Emissions				
Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)
VOC	0.30	1.8	2.7	0.70
Traffic Emissions				
PM _{2.5}	0.12	0.26	0.23	0.06
PM ₁₀	0.17	0.37	0.33	0.09
NO _x	5.4	11.7	10.4	2.9
SO ₂	0.02	0.05	0.04	0.01
CO	6.7	14.6	13.0	3.6
VOC	0.81	1.8	1.6	0.43

Table F-5. SunZia East Substation Construction Greenhouse Gas Emissions				
Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)
One 500 kV Single-Circuit, AC Facility (First Line)				
Nonroad Engine Emissions				
CO _{2e}	794.7	3,894	2,686	0.0
Traffic Emissions				
CO _{2e}	2,038	2,245	1,492	0.0
Option A: Two 500 kV Single-Circuit, AC Facilities				
Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)
Nonroad Engine Emissions				
CO _{2e}	794.7	4,676	6,529	2,748
Traffic Emissions				
CO _{2e}	2,038	4,220	3,736	1,557
Option B: One 500 kV Single-Circuit, AC Facility and One 500 kV Single-Circuit, DC Facility				
Nonroad Engine Emissions				
CO _{2e}	794.7	4,795	7,294	1,864
Traffic Emissions				
CO _{2e}	2,038	4,470	3,954	1,090

Table F-6. SunZia East Substation Operation Greenhouse Gas Emissions	
Pollutant	Emissions (tons per year)
One 500 kV Single-Circuit, AC Facility (First Line)	
CO _{2e}	12.9
Option A: Two 500 kV Single-Circuit, AC Facilities	
CO _{2e}	34.4
Option B: One 500 kV Single-Circuit, AC Facility and One 500 kV Single-Circuit, DC Facility	
CO _{2e}	64.5

ROUTE GROUP 2: SUNZIA EAST SUBSTATION TO MIDPOINT SUBSTATION – EAST OF WHITE SANDS EMISSIONS

There are no emissions or impacts specific to this route group.

ROUTE GROUP 3: MIDPOINT SUBSTATION TO WILLOW-500 KV SUBSTATION EMISSIONS

Criteria pollutant emissions associated with construction and expansion of the Midpoint Substation are summarized in Table F-7. GHG emissions associated with construction of the substation are shown in Table F-8, while operation phase GHG emissions are shown in Table F-9. For the Midpoint Substation, Option B total construction and operation emissions would be the same as those for the initial transmission line, because no additional equipment would be installed at this location for the proposed Option B DC line.

Criteria pollutant emissions associated with construction and expansion of the Lordsburg Substation are summarized in Table F-10. GHG emissions associated with construction of the substation are shown in Table F-11, while operation phase GHG emissions are shown in Table F-12. For the Lordsburg Substation, Option B total construction and operation emissions would be the same as those for the initial transmission line, because no additional equipment would be installed at this location for the proposed Option B DC line.

Table F-7. Midpoint Substation Construction Criteria Pollutant Emissions				
Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)
One 500 kV Single-Circuit, AC Facility (First Line)				
Fugitive Dust from Earthmoving and Grading Activities				
PM _{2.5}	0.07	0.11	0.03	0.0
PM ₁₀	0.66	1.0	0.33	0.0
Paved and Unpaved Road Dust				
PM _{2.5}	10.4	14.2	9.9	0.0
PM ₁₀	104.0	141.6	99.0	0.0
Nonroad Engine Emissions				
PM _{2.5}	0.19	0.94	0.73	0.0
PM ₁₀	0.19	0.94	0.73	0.0
NO _x	2.7	14.9	11.8	0.0
SO ₂	0.01	0.10	0.07	0.0
CO	3.0	16.9	13.0	0.0
VOC	0.19	1.1	0.89	0.0
Traffic Emissions				
PM _{2.5}	0.08	0.11	0.08	0.0
PM ₁₀	0.12	0.16	0.11	0.0
NO _x	3.7	5.0	3.5	0.0
SO ₂	0.01	0.02	0.01	0.0
CO	4.6	6.2	4.4	0.0
VOC	0.55	0.76	0.53	0.0

Table F-7. Midpoint Substation Construction Criteria Pollutant Emissions				
Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)
Option A: Two 500 kV Single-Circuit, AC Facilities				
Fugitive Dust from Earthmoving and Grading Activities				
PM _{2.5}	0.07	0.11	0.03	0.0
PM ₁₀	0.66	1.0	0.33	0.0
Paved and Unpaved Road Dust				
PM _{2.5}	10.4	27.6	23.5	7.7
PM ₁₀	104.0	274.8	234.1	76.4
Nonroad Engine Emissions				
PM _{2.5}	0.19	1.2	1.8	0.54
PM ₁₀	0.19	1.2	1.8	0.54
NO _x	2.7	18.7	28.7	8.8
SO ₂	0.01	0.11	0.18	0.05
CO	3.0	21.1	32.0	9.7
VOC	0.19	1.4	2.2	0.66
Traffic Emissions				
PM _{2.5}	0.08	0.22	0.18	0.06
PM ₁₀	0.12	0.31	0.26	0.09
NO _x	3.7	9.7	8.2	2.7
SO ₂	0.01	0.04	0.03	0.01
CO	4.6	12.1	10.3	3.4
VOC	0.55	1.5	1.3	0.41

Table F-8. Midpoint Substation Construction Greenhouse Gas Emissions				
Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)
One 500 kV Single-Circuit, AC Facility (First Line)				
Nonroad Engine Emissions				
CO ₂ e	505.8	3,028	2,365	0.0
Traffic Emissions				
CO ₂ e	1,395	1,899	1,327	0.0
Option A: Two 500 kV Single-Circuit, AC Facilities				
Nonroad Engine Emissions				
CO ₂ e	505.8	3,745	5,795	1,752
Traffic Emissions				
CO ₂ e	1,395	3,684	3,139	1,024

Table F-9. Midpoint Substation Operation Greenhouse Gas Emissions	
Pollutant	Emissions (tons per year)
One 500 kV Single-Circuit, AC Facility (First Line)	
CO ₂ e	25.8
Option A: Two 500 kV Single-Circuit, AC Facilities	
CO ₂ e	51.6

Table F-10. Lordsburg Substation Construction Criteria Pollutant Emissions				
Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)
One 500 kV Single-Circuit, AC Facility (First Line)				
Fugitive Dust from Earthmoving and Grading Activities				
PM _{2.5}	0.04	0.07	0.02	0.0
PM ₁₀	0.38	0.65	0.22	0.0
Paved and Unpaved Road Dust				
PM _{2.5}	9.9	14.2	10.4	0.0
PM ₁₀	98.5	141.9	104.2	0.0
Nonroad Engine Emissions				
PM _{2.5}	0.17	0.92	0.77	0.0
PM ₁₀	0.17	0.92	0.77	0.0
NO _x	2.4	14.6	12.5	0.0
SO ₂	0.004	0.10	0.07	0.0
CO	2.7	16.4	13.8	0.0
VOC	0.17	1.1	0.94	0.0
Traffic Emissions				
PM _{2.5}	0.08	0.11	0.08	0.0
PM ₁₀	0.11	0.16	0.12	0.0
NO _x	3.5	5.0	3.7	0.0
SO ₂	0.01	0.02	0.01	0.0
CO	4.3	6.2	4.6	0.0
VOC	0.53	0.76	0.56	0.0
Option A: Two 500 kV Single-Circuit, AC Facilities				
Fugitive Dust from Earthmoving and Grading Activities				
PM _{2.5}	0.04	0.07	0.02	0.0
PM ₁₀	0.38	0.65	0.22	0.0
Paved and Unpaved Road Dust				
PM _{2.5}	9.9	23.8	24.7	10.8
PM ₁₀	98.5	237.2	246.1	107.4
Nonroad Engine Emissions				
PM _{2.5}	0.17	1.1	1.7	0.80
PM ₁₀	0.17	1.1	1.7	0.80
NO _x	2.4	16.9	26.8	12.8
SO ₂	0.004	0.10	0.16	0.07
CO	2.7	19.0	29.9	14.2

Table F-10. Lordsburg Substation Construction Criteria Pollutant Emissions				
Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)
VOC	0.17	1.3	2.0	0.97
Traffic Emissions				
PM _{2.5}	0.08	0.19	0.19	0.08
PM ₁₀	0.11	0.26	0.27	0.12
NO _x	3.5	8.3	8.7	3.8
SO ₂	0.01	0.03	0.03	0.01
CO	4.3	10.4	10.8	4.7
VOC	0.53	1.3	1.3	0.57

Table F-11. Lordsburg Substation Construction Greenhouse Gas Emissions				
Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)
One 500 kV Single-Circuit, AC Facility (First Line)				
Nonroad Engine Emissions				
CO _{2e}	452.7	2,947	2,499	0.0
Traffic Emissions				
CO _{2e}	1,321	1,903	1,397	0.0
Option A: Two 500 kV Single-Circuit, AC Facilities				
Nonroad Engine Emissions				
CO _{2e}	452.7	3,382	5,389	2,574
Traffic Emissions				
CO _{2e}	1,321	3,180	3,300	1,441

Table F-12. Lordsburg Substation Operation Greenhouse Gas Emissions	
Pollutant	Emissions (tons per year)
One 500 kV Single-Circuit, AC Facility (First Line)	
CO _{2e}	12.9
Option A: Two 500 kV Single-Circuit, AC Facilities	
CO _{2e}	34.4

ROUTE GROUP 4: WILLOW-500 KV SUBSTATION TO PINAL CENTRAL SUBSTATION EMISSIONS

Criteria pollutant emissions associate with construction and expansion of the Willow-500 kV Substation are summarized in Table F-13. GHG emissions associated with construction of the substation are shown in Table F-14, while operation phase GHG emissions are shown in Table F-15. For the Willow-500 kV Substation, Option B total construction and operation emissions would be the same as those associated with the initial transmission line, because no additional equipment would be installed at this location for the proposed Option B DC line.

Criteria pollutant emissions associate with construction and expansion of the Pinal Central Substation are summarized in Table F-16. GHG emissions associated with construction of the substation are shown in Table F-17, while operation phase GHG emissions are shown in Table F-18.

Table F-13. Willow-500 kV Substation Construction Criteria Pollutant Emissions				
Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)
One 500 kV Single-Circuit, AC Facility (First Line)				
Fugitive Dust from Earthmoving and Grading Activities				
PM _{2.5}	0.05	0.06	0.02	0.0
PM ₁₀	0.47	0.60	0.19	0.0
Paved and Unpaved Road Dust				
PM _{2.5}	15.0	16.7	11.5	0.0
PM ₁₀	149.2	166.8	114.8	0.0
Nonroad Engine Emissions				
PM _{2.5}	0.29	1.2	0.84	0.0
PM ₁₀	0.29	1.2	0.84	0.0
NO _x	4.2	19.0	13.5	0.0
SO ₂	0.01	0.13	0.08	0.0
CO	4.7	21.4	15.0	0.0
VOC	0.30	1.4	1.0	0.0
Traffic Emissions				
PM _{2.5}	0.12	0.13	0.09	0.0
PM ₁₀	0.17	0.19	0.13	0.0
NO _x	5.3	5.9	4.0	0.0
SO ₂	0.02	0.02	0.02	0.0
CO	6.6	7.3	5.0	0.0
VOC	0.80	0.89	0.61	0.0
Option A: Two 500 kV Single-Circuit, AC Facilities				
Fugitive Dust from Earthmoving and Grading Activities				
PM _{2.5}	0.05	0.06	0.02	0.0
PM ₁₀	0.47	0.60	0.19	0.0
Paved and Unpaved Road Dust				
PM _{2.5}	15.0	31.5	28.2	11.7
PM ₁₀	149.2	314.4	280.9	117.1
Nonroad Engine Emissions				
PM _{2.5}	0.29	1.5	2.0	0.87
PM ₁₀	0.29	1.5	2.0	0.87
NO _x	4.2	23.1	32.3	13.9
SO ₂	0.01	0.13	0.20	0.09
CO	4.7	26.0	36.1	15.4
VOC	0.30	1.7	2.4	1.0
Traffic Emissions				

Table F-13. Willow-500 kV Substation Construction Criteria Pollutant Emissions

Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)
PM _{2.5}	0.12	0.25	0.22	0.09
PM ₁₀	0.17	0.35	0.31	0.13
NO _x	5.3	11.1	9.9	4.1
SO ₂	0.02	0.04	0.04	0.02
CO	6.6	13.8	12.4	5.1
VOC	0.80	1.7	1.5	0.62

Table F-14. Willow-500 kV Substation Construction Greenhouse Gas Emissions

Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)
One 500 kV Single-Circuit, AC Facility (First Line)				
Nonroad Engine Emissions				
CO ₂ e	799.7	3,857	2,717	0.0
Traffic Emissions				
CO ₂ e	2,000	2,236	1,539	0.0
Option A: Two 500 kV Single-Circuit, AC Facilities				
Nonroad Engine Emissions				
CO ₂ e	799.7	4,632	6,515	2,801
Traffic Emissions				
CO ₂ e	2,000	4,215	3,767	1,570

Table F-15. Willow-500 kV Substation Operation Greenhouse Gas Emissions

Pollutant	Emissions (tons per year)
One 500 kV Single-Circuit, AC Facility (First Line)	
CO ₂ e	34.4
Option A: Two 500 kV Single-Circuit, AC Facilities	
CO ₂ e	55.9

Table F-16. Pinal Central Substation Construction Criteria Pollutant Emissions

Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)
One 500 kV Single-Circuit, AC Facility (First Line)				
Fugitive Dust from Earthmoving and Grading Activities				
PM _{2.5}	0.0	0.001	0.02	0.0
PM ₁₀	0.0	0.005	0.15	0.0
Paved Road Dust				
PM _{2.5}	0.0	0.1	0.7	0.0
PM ₁₀	0.0	0.6	5.8	0.0

Table F-16. Pinal Central Substation Construction Criteria Pollutant Emissions

Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)
Nonroad Engine Emissions				
PM _{2.5}	0.0	0.01	0.92	0.0
PM ₁₀	0.0	0.01	0.92	0.0
NO _x	0.0	0.15	14.6	0.0
SO ₂	0.0	0.0003	0.09	0.0
CO	0.0	0.18	16.3	0.0
VOC	0.0	0.01	1.1	0.0
Traffic Emissions				
PM _{2.5}	0.0	0.01	0.11	0.0
PM ₁₀	0.0	0.02	0.15	0.0
NO _x	0.0	0.52	4.8	0.0
SO ₂	0.0	0.002	0.02	0.0
CO	0.0	0.64	6.0	0.0
VOC	0.0	0.08	0.73	0.0
Option A: Two 500 kV Single-Circuit, AC Facilities				
Fugitive Dust from Earthmoving and Grading Activities				
PM _{2.5}	0.0	0.001	0.02	0.0
PM ₁₀	0.0	0.005	0.15	0.0
Paved Road Dust				
PM _{2.5}	0.0	0.1	0.7	0.3
PM ₁₀	0.0	0.6	6.0	2.3
Nonroad Engine Emissions				
PM _{2.5}	0.0	0.01	0.93	0.92
PM ₁₀	0.0	0.01	0.93	0.92
NO _x	0.0	0.15	14.7	14.6
SO ₂	0.0	0.0003	0.09	0.09
CO	0.0	0.18	16.4	16.4
VOC	0.0	0.01	1.1	1.1
Traffic Emissions				
PM _{2.5}	0.0	0.01	0.12	0.11
PM ₁₀	0.0	0.02	0.17	0.15
NO _x	0.0	0.52	5.2	4.9
SO ₂	0.0	0.002	0.02	0.02
CO	0.0	0.64	6.5	6.1
VOC	0.0	0.08	0.79	0.74
Option B: One 500 kV Single-Circuit, AC Facility and One 500 kV Single-Circuit, DC Facility				
Fugitive Dust from Earthmoving and Grading Activities				
PM _{2.5}	0.0	0.07	0.09	0.0
PM ₁₀	0.0	0.66	0.92	0.0

Table F-16. Pinal Central Substation Construction Criteria Pollutant Emissions				
Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)
Paved Road Dust				
PM _{2.5}	0.0	0.2	0.8	0.1
PM ₁₀	0.0	1.6	6.9	0.5
Nonroad Engine Emissions				
PM _{2.5}	0.0	0.34	2.4	0.56
PM ₁₀	0.0	0.34	2.4	0.56
NO _x	0.0	4.9	37.5	9.1
SO ₂	0.0	0.01	0.24	0.05
CO	0.0	5.4	42.1	10.1
VOC	0.0	0.34	2.8	0.69
Traffic Emissions				
PM _{2.5}	0.0	0.06	0.16	0.02
PM ₁₀	0.0	0.08	0.22	0.03
NO _x	0.0	2.6	7.0	1.0
SO ₂	0.0	0.01	0.03	0.004
CO	0.0	3.2	8.8	1.3
VOC	0.0	0.39	1.1	0.15

Table F-17. Pinal Central Substation Construction Greenhouse Gas Emissions				
Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Year 4 (tons)
One 500 kV Single-Circuit, AC Facility (First Line)				
Nonroad Engine Emissions				
CO ₂ e	0.0	28.1	2,921	0.0
Traffic Emissions				
CO ₂ e	0.0	196.7	1,825	0.0
Option A: Two 500 kV Single-Circuit, AC Facilities				
Nonroad Engine Emissions				
CO ₂ e	0.0	28.1	2,937	2,934
Traffic Emissions				
CO ₂ e	0.0	196.7	1,989	1,858
Option B: One 500 kV Single-Circuit, AC Facility and One 500 kV Single-Circuit, DC Facility				
Nonroad Engine Emissions				
CO ₂ e	0.0	916.2	7,569	1,838
Traffic Emissions				
CO ₂ e	0.0	988.9	2,673	381.2

Table F-18. Pinal Central Substation Operation Greenhouse Gas Emissions	
Pollutant	Emissions (tons per year)
One 500 kV Single-Circuit, AC Facility (First Line)	
CO ₂ e	8.6
Option A: Two 500 kV Single-Circuit, AC Facilities	
CO ₂ e	17.2
Option B: One 500 kV Single-Circuit, AC Facility and One 500 kV Single-Circuit, DC Facility	
CO ₂ e	60.2

RESULTS OF AIR POLLUTANT DISPERSION MODELING

The results of the air pollutant dispersion modeling are shown in Tables F-19 and F-20 for transmission line construction and substation construction, respectively.

Table F-19. Modeling Results: Transmission Line Construction

Route Group	Pollutant	Averaging Period	Maximum 1-hour AERSCREEN Concentration (µg/m ³)	Significant Impact Levels (SILs) (µg/m ³)	Background Concentration (µg/m ³)	Project Impact + Background (µg/m ³)	NAAQS (µg/m ³)	AAAQS (µg/m ³)	NMAAQS (µg/m ³)	Surface Characteristics and Temperatures	Comments	
1	NO ₂	1-hour	23.36	7.5	47.2	70.5	188.7	—	—	Grassland	Below all AAQS	
		24-hour	23.36	—	47.2	70.5	—	—	188.7	Grassland	Use 1-hour background concentration Below all AAQS	
	PM ₁₀	24-hour	80.32	5	33	113.3	150	150	—	—	Grassland	Below all AAQS
		24-hour	10.98	1.2	11.2	22.2	35	65	—	—	Grassland	Below all AAQS
	CO	1-hour	35.04	2,000	2,299	2,334	40,000	40,000	15,057	15,057	Grassland	Below SIL/NMAAQS
		8-hour	35.04	500	1,034	1,070	10,000	10,000	10,000	10,000	Grassland	Below SIL/NMAAQS
	SO ₂	1-hour	0.073	7.9	5.26	NA	NA	196.4	—	—	Grassland	Below SIL
		3-hour	0.073	25	2.63	2.7	2.7	1,300	1,300	—	Grassland	Below SIL/AAAQS
		24-hour	0.073	5	2.63	2.7	2.7	365	365	263.2	Grassland	Below SIL/AAAQS/NMAAQS
		1-hour	22.50	7.5	47.2	69.7	188.7	188.7	—	—	Desert	Below all AAQS
3	NO ₂	24-hour	22.50	—	47.2	69.7	—	—	188.7	Desert	Use 1-hour background concentration Below all AAQS	
		24-hour	77.36	5	33	110.4	150	150	—	—	Desert	Below all AAQS
	PM _{2.5}	24-hour	10.57	1.2	11.2	21.8	35	65	—	—	Desert	Below all AAQS
		1-hour	33.75	2,000	2,299	2,333	40,000	40,000	15,057	15,057	Desert	Below SIL/NMAAQS
	CO	8-hour	33.75	500	1,034	1,068	10,000	10,000	10,000	10,000	Desert	Below SIL/NMAAQS
		1-hour	0.070	7.9	5.26	NA	NA	196.4	—	—	Desert	Below SIL
	SO ₂	3-hour	0.070	25	2.63	2.7	2.7	1,300	1,300	—	Desert	Below SIL/AAAQS

Table F-19. Modeling Results: Transmission Line Construction

Route Group	Pollutant	Averaging Period	Maximum 1-hour AERSCREEN Concentration (µg/m ³)	Significant Impact Levels (SILs) (µg/m ³)	Background Concentration (µg/m ³)	Project Impact + Background (µg/m ³)	NAAQS (µg/m ³)	AAAQS (µg/m ³)	NMAAQS (µg/m ³)	Surface Characteristics and Temperatures	Comments
4 (except Subroute 4C3 and portion within West Pinal County PM ₁₀ Nonattainment Area)		24-hour	0.070	5	2.63	2.7	365	365	263.2	Desert	Below SIL/AAAQS/NMAAQS
		1-hour	22.50	7.5	47.2	69.7	188.7	—	—	Desert	Below all AAQS
	NO ₂	24-hour	22.50	—	47.2	69.7	—	—	188.7	Desert	Use 1-hour background concentration Below all AAQS
		24-hour	77.36 ^a	5	33.5	110.9	150	150	—	Desert	Below all AAQS
	PM _{2.5}	24-hour	10.57	1.2	9.6	20.2	35	65	—	Desert	Below all AAQS
		1-hour	33.75	2,000	2,299	2,333	40,000	40,000	15,057	Desert	Below SIL/NMAAQS
	CO	8-hour	33.75	500	1,034	1,068	10,000	10,000	10,000	Desert	Below SIL/NMAAQS
		1-hour	0.070	7.9	28.95	NA	196.4	—	—	Desert	Below SIL
		3-hour	0.070	25	12.11	12.2	1,300	1,300	—	Desert	Below SIL/AAAQS
	SO ₂	24-hour	0.070	5	3.68	3.8	365	365	263.2	Desert	Below SIL/AAAQS/NMAAQS
1-hour		22.50	7.5	110	132.5	188.7	—	—	Desert	Below all AAQS	
4C3	NO ₂	1-hour	22.50	7.5	110	132.5	188.7	—	Desert	Below all AAQS	
4 (within West Pinal County PM ₁₀ Nonattainment Area)	PM ₁₀	24-hour	77.36 ^a	5	131.7 ^a	209.1	150	150	—	Desert	May exceed NAAQS numerical value ^b

Notes:

^a Average of second maximums at three co-located monitors.

^b Form of standard is “not to be exceeded more than once per year, on average over three years.” Project impact listed is maximum modeled impact.

Table F-20. Modeling Results: Substation Construction

Substation	Pollutant	Averaging Period	Maximum 1-hour AERSCREEN Concentration (µg/m3)	Significant Impact Levels (SILs) (µg/m3)	Background Concentration (µg/m3)	Project Impact + Background (µg/m3)	NAAQS (µg/m3)	AAAQS (µg/m3)	NMAAQS (µg/m3)	Surface Characteristics and Temperatures	Comments	
SunZia East	NO ₂	1-hour	59.91	7.5	47.2	107.1	188.7	—	—	Grassland	Below all AAQS	
		24-hour	59.91	—	47.2	107.1	—	—	188.7	Grassland	Use 1-hour background concentration Below all AAQS	
	PM ₁₀	24-hour	21.9	5	33	54.9	150	150	—	Grassland	Below all AAQS	
	PM _{2.5}	24-hour	3.26	1.2	11.2	14.5	35	65	—	Grassland	Below all AAQS	
	CO	1-hour	90.21	2,000	2,299	2,389	40,000	40,000	15,057	15,057	Grassland	Below SIL/NMAAQS
		8-hour	90.21	500	1,034	1,125	10,000	10,000	10,000	10,000	Grassland	Below SIL/NMAAQS
	SO ₂	1-hour	0.96	7.9	5.26	NA	196.4	196.4	—	—	Grassland	Below SIL
		3-hour	0.96	25	2.63	3.6	1,300	1,300	1,300	—	Grassland	Below SIL/AAAQS
			24-hour	0.96	5	2.63	3.6	365	365	263.2	Grassland	Below SIL/AAAQS/NMAAQS
			1-hour	59.91	7.5	47.2	107.1	188.7	—	—	—	Grassland
SunZia South (Midpoint)	NO ₂	24-hour	59.91	—	47.2	107.1	—	—	188.7	Grassland	Use 1-hour background concentration Below all AAQS	
		24-hour	21.9	5	33	54.9	150	150	—	—	Grassland	Below all AAQS
	PM ₁₀	24-hour	3.26	1.2	11.2	14.5	35	65	—	Grassland	Below all AAQS	
	CO	1-hour	90.21	2,000	2,299	2,389	40,000	40,000	15,057	15,057	Grassland	Below SIL/NMAAQS
		8-hour	90.21	500	1,034	1,125	10,000	10,000	10,000	10,000	Grassland	Below SIL/NMAAQS
	SO ₂	1-hour	0.96	7.9	5.26	NA	196.4	196.4	—	—	Grassland	Below SIL
		3-hour	0.96	25	2.63	3.6	1,300	1,300	1,300	—	Grassland	Below SIL/AAAQS
			24-hour	0.96	5	2.63	3.6	365	365	263.2	Grassland	Below SIL/AAAQS/NMAAQS
			1-hour	59.91	7.5	47.2	107.1	188.7	—	—	—	Grassland
	Lordsburg (Hidalgo)	NO ₂	1-hour	49.07	7.5	47.2	96.2	188.7	—	—	Desert	Below all AAQS
24-hour			49.07	—	47.2	96.2	—	—	188.7	Desert	Use 1-hour background concentration	

Table F-20. Modeling Results: Substation Construction

Substation	Pollutant	Averaging Period	Maximum 1-hour AERSCREEN Concentration (µg/m3)	Significant Impact Levels (SILs) (µg/m3)	Background Concentration (µg/m3)	Project Impact + Background (µg/m3)	NAAQS (µg/m3)	AAAQS (µg/m3)	NMAAQS (µg/m3)	Surface Characteristics and Temperatures	Comments		
Willow-500 kV	PM ₁₀	24-hour	21.1	5	33	54.1	150	150	—	Desert	Below all AAQS		
		24-hour	3.14	1.2	11.2	14.3	35	65	—	Desert	Below all AAQS		
	CO	1-hour	73.89	2,000	2,299	2,373	40,000	40,000	15,057	15,057	Desert	Below SIL/NMAAQS	
		8-hour	73.89	500	1,034	1,108	10,000	10,000	10,000	10,000	Desert	Below SIL/NMAAQS	
	SO ₂	1-hour	0.79	7.9	5.26	NA	196.4	196.4	—	—	Desert	Below SIL	
		3-hour	0.79	25	2.63	3.4	1,300	1,300	1,300	—	Desert	Below SIL/AAAQS	
	NO ₂	24-hour	49.07	—	47.2	96.2	188.7	188.7	—	188.7	Desert	Use 1-hour background concentration Below all AAQS	
		1-hour	49.07	7.5	47.2	96.2	188.7	188.7	—	—	Desert	Below all AAQS	
	Pinal Central	PM ₁₀	24-hour	21.1	5	29	50.1	150	150	—	Desert	Below all AAQS	
			24-hour	3.14	1.2	9.6	12.7	35	65	—	—	Desert	Below all AAQS
		CO	1-hour	73.89	2,000	2,299	2,373	40,000	40,000	15,057	15,057	Desert	Below SIL/NMAAQS
			8-hour	73.89	500	1,034	1,108	10,000	10,000	10,000	10,000	Desert	Below SIL/NMAAQS
SO ₂		1-hour	0.79	7.9	28.95	NA	196.4	196.4	—	—	Desert	Below SIL	
		3-hour	0.79	25	12.11	12.9	1,300	1,300	1,300	—	Desert	Below SIL/AAAQS	
NO ₂	24-hour	49.07	—	3.68	4.5	365	365	365	263.2	Desert	Below SIL/AAAQS/NMAAQS		
	1-hour	49.07	7.5	110.0	159.1	188.7	188.7	—	—	Desert	Below all AAQS		
PM ₁₀	24-hour	49.07	—	110.0	159.1	188.7	188.7	—	188.7	Desert	Use 1-hour background concentration Below all AAQS		
	24-hour	21.1	5	131.7 ^a	152.8	150	150	150	—	Desert	May exceed NAAQS numerical value ^b		

Table F-20. Modeling Results: Substation Construction

Substation	Pollutant	Averaging Period	Maximum 1-hour AERSCREEN Concentration (µg/m3)	Significant Impact Levels (SILs) (µg/m3)	Background Concentration (µg/m3)	Project Impact + Background (µg/m3)	NAAQS (µg/m3)	AAAQS (µg/m3)	NMAAQS (µg/m3)	Surface Characteristics and Temperatures	Comments
	PM _{2.5}	24-hour	3.14	1.2	9.6	12.7	35	65	—	Desert	Below AAQS
		1-hour	73.89	2,000	2,299	2,373	40,000	40,000	15,057	Desert	Below SIL/NMAAQS
	CO	8-hour	73.89	500	1,034	1,108	10,000	10,000	10,000	Desert	Below SIL/NMAAQS
		1-hour	0.79	7.9	28.95	NA	196.4	—	—	Desert	Below SIL
	SO ₂	3-hour	0.79	25	12.11	12.9	1,300	1,300	1,300	Desert	Below SIL/AAAQS
		24-hour	0.79	5	3.68	4.5	365	365	263.2	Desert	Below SIL/AAAQS/ NMAAQS

^a Average of second maximums at three co-located monitors.

^b Form of standard is “not to be exceeded more than once per year, on average over three years.” Project impact listed is maximum modeled impact.

