

APPENDIX C
AIR QUALITY AND GREENHOUSE GAS EMISSIONS

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Summary Tables

Table 1. Gross Construction Emissions for the No Action Alternative

GHG	Fuel (gal)	Total Emissions (g)	Total Emissions (MT)	CO ₂ e (MT)
CO ₂	6,156,000	62,852,760,000	62,852.76	62,852.76
CH ₄	6,156,000	6,217,560	6.22	155.44
N ₂ O	6,156,000	5,786,640	5.79	1,724.42
Total			64,732.62	

Table 2. Gross Construction Emissions for Alternative 1a

GHG	Fuel (gal)	Total Emissions (g)	Total Emissions (MT)	CO ₂ e (MT)
CO ₂	136,000	1,388,560,000	1,388.56	1,388.56
CH ₄	136,000	137,360	0.14	3.43
N ₂ O	136,000	127,840	0.13	38.10
Total			1,430.09	

Table 3. Net Emissions summary for Alternative 1a

GHG	Construction GHG Emissions (MT)	No Action Construction Emissions (MT)	Net Project Emissions (MT)
CO ₂	1,388.56	62,852.76	64,241.32
CH ₄	0.14	6.22	6.35
N ₂ O	0.13	5.79	5.91
CO ₂ e	1,430.09	64,732.62	66,162.71

Table 4. Gross Construction Emissions for Alternative 6d

GHG	Fuel (gal)	Total Emissions (g)	Total Emissions (MT)	CO ₂ e (MT)
CO ₂	211,000	2,154,310,000	2,154.31	2,154.31
CH ₄	211,000	213,110	0.21	5.33
N ₂ O	211,000	198,340	0.20	59.11
Total			2,218.74	

Table 5. Net Emissions summary for Alternative 6d

GHG	Construction GHG Emissions (MT)	No Action Construction Emissions (MT)	Net Project Emissions (MT)
CO₂	2,154.31	62,852.76	65,007.07
CH₄	0.21	6.22	6.43
N₂O	0.20	5.79	5.98
CO₂e	2,218.74	64,732.62	66,951.36

Table 6. Gross Construction Emissions for Alternative 6dR

GHG	Fuel (gal)	Total Emissions (g)	Total Emissions (MT)	CO₂e (MT)
CO₂	232,000	2,368,720,000	2,368.72	2,368.72
CH₄	232,000	234,320	0.23	5.86
N₂O	232,000	218,080	0.22	64.99

Total 2,439.57

Table 7. Net Emissions summary for Alternative 6d

GHG	Construction GHG Emissions (MT)	No Action Construction Emissions (MT)	Net Project Emissions (MT)
CO₂	2,368.72	62,852.76	65,221.48
CH₄	0.23	6.22	6.45
N₂O	0.22	5.79	6.00
CO₂e	2,439.57	64,732.62	67,172.18

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Calculation of Emissions Using Fuel Volumes					
	GHG	Fuel Volume ¹ (Gallons)	Emissions Factor ² (Grams of Emissions/ Gallons of Fuel)	Emissions ³ (grams)	Fuel Volumes Debugging - Error Message
No Action	CO ₂	6,156,000	10,210.00	62,852,760,000.00	Sufficient Data Has Been Input
	CH ₄	6,156,000	1.01	6,217,560.00	Sufficient Data Has Been Input
	N ₂ O	6,156,000	0.94	5,786,640.00	Sufficient Data Has Been Input

Calculation of Emissions Using Fuel Volumes					
	GHG	Fuel Volume ¹ (Gallons)	Emissions Factor ² (Grams of Emissions/ Gallons of Fuel)	Emissions ³ (grams)	Fuel Volumes Debugging - Error Message
Alternative 1a	CO ₂	136,000	10,210.00	1,388,560,000.00	Sufficient Data Has Been Input
	CH ₄	136,000	1.01	137,360.00	Sufficient Data Has Been Input
	N ₂ O	136,000	0.94	127,840.00	Sufficient Data Has Been Input

Calculation of Emissions Using Fuel Volumes					
	GHG	Fuel Volume ¹ (Gallons)	Emissions Factor ² (Grams of Emissions/ Gallons of Fuel)	Emissions ³ (grams)	Fuel Volumes Debugging - Error Message
Alternative 6d	CO ₂	211,000	10,210.00	2154310000	Sufficient Data Has Been Input
	CH ₄	211,000	1.01	213110	Sufficient Data Has Been Input
	N ₂ O	211,000	0.94	198340	Sufficient Data Has Been Input

Calculation of Emissions Using Fuel Volumes					
	GHG	Fuel Volume ¹ (Gallons)	Emissions Factor ² (Grams of Emissions/ Gallons of Fuel)	Emissions ³ (grams)	Fuel Volumes Debugging - Error Message
Alternative 6dR	CO ₂	232,000	10,210.00	2368720000	Sufficient Data Has Been Input
	CH ₄	232,000	1.01	234320	Sufficient Data Has Been Input
	N ₂ O	232,000	0.94	218080	Sufficient Data Has Been Input

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Total Emissions from Fuel and Miles					
		Emissions Total (grams)	Emissions Total (pounds)	Emissions Total (Metric Tons)	CO ₂ e MT
No Action	CO ₂	62,852,760,000	138566729.6	62,852.76	62,852.76
	CH ₄	6,217,560	13707.38461	6.22	155.44
	N ₂ O	5,786,640	12757.36785	5.79	1,724.42
Σ					64,732.62

NEAT Input ↓	
	Annual Emissions (grams)
CO ₂	6,285,276,000
CH ₄	621,756
N ₂ O	578,664

Total Emissions from Fuel and Miles					
		Emissions Total (grams)	Emissions Total (pounds)	Emissions Total (Metric Tons)	CO ₂ e MT
Alternative 1a	CO ₂	1,388,560,000	3061253.285	1,388.56	1,388.56
	CH ₄	137,360	302.8272104	0.14	3.43
	N ₂ O	127,840	281.8391859	0.13	38.10
Σ					1,430.09

NEAT Input ↓	
	Annual Emissions (grams)
CO ₂	1,388,560,000
CH ₄	137,360
N ₂ O	127,840

	Net Emissions (MT)
CO ₂	64,241.32
CH ₄	6.35
N ₂ O	5.91
CO ₂ e MT	66,162.71

Total Emissions from Fuel and Miles					
		Emissions Total (grams)	Emissions Total (pounds)	Emissions Total (Metric Tons)	CO ₂ e MT
Alternative 6d	CO ₂	2,154,310,000	4749444.435	2,154.31	2,154.31
	CH ₄	213,110	469.8275102	0.21	5.33
	N ₂ O	198,340	437.2652075	0.20	59.11
Σ					2,218.74

NEAT Input ↓	
	Annual Emissions (grams)
CO ₂	2,154,310,000
CH ₄	213,110
N ₂ O	198,340

	Net Emissions (MT)
CO ₂	65,007.07
CH ₄	6.43
N ₂ O	5.98
CO ₂ e MT	66,951.36

Total Emissions from Fuel and Miles					
		Emissions Total (grams)	Emissions Total (pounds)	Emissions Total (Metric Tons)	CO ₂ e MT
Alternative 6dR	CO ₂	2,368,720,000	5222137.957	2,368.72	2,368.72
	CH ₄	234,320	516.5875941	0.23	5.86
	N ₂ O	218,080	480.7844936	0.22	64.99
Σ					2,439.57

NEAT Input ↓	
	Annual Emissions (grams)
CO ₂	2,368,720,000
CH ₄	234,320
N ₂ O	218,080

	Net Emissions (MT)
CO ₂	65,221.48
CH ₄	6.45
N ₂ O	6.00
CO ₂ e MT	67,172.18

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PEAT Model Step	Data Source	Assumptions
Step 1: Project Data	M. Nasuti, PD-G	
Step 2: Construction Emissions	S. Bryant, EN-C	
Step 3: O&M Emissions	N/A	
Step 4: Wetland and Aquatic Habitat Emissions	N/A	The addition or reduction of cattail vegetation does not affect the habitat type (Palustrine-Emergent)
Step 5: Embodied Carbon in Materials	N/A	
Step 6: Net Emissions	Construction Emissions Only	No Action + Each Action Alternative

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Alternative Sequential Identifier	Input Names for Project Alternatives/Construction Phases:	Construction Timing			Operations & Maintenance, Monitoring and Management Timing		
		Starting Year	Ending Year	Construction Years Total	Starting Year	Ending Year	O&M Project Lifetime (default is 50 years)
1	No Action	2027	2037	10	2038	2088	50
2	Alternative 1a	2027	2027	1	2028	2078	50
3	Alternative 6d	2027	2027	1	2028	2078	50
4	Alternative 6dR	2027	2027	1	2028	2078	50
5	Alternative 5	Choose Construction Starting Year	Choose Construction End Year	Ending year input must be equal or more than starting year value	Choose a Construction End Year First	Choose a Construction End Year First	50
6	Alternative 6	Choose Construction Starting Year	Choose Construction End Year	Ending year input must be equal or more than starting year value	Choose a Construction End Year First	Choose a Construction End Year First	50
7	Alternative 7	Choose Construction Starting Year	Choose Construction End Year	Ending year input must be equal or more than starting year value	Choose a Construction End Year First	Choose a Construction End Year First	50
8	Alternative 8	Choose Construction Starting Year	Choose Construction End Year	Ending year input must be equal or more than starting year value	Choose a Construction End Year First	Choose a Construction End Year First	50

Note - the O&M project lifetime gets used to calculate Net emissions and also carries through to the social costs which are calculated for each specific year. The dates of construction start and end carry through most all subsequent steps for calculations.

Choose the no-action alternative from the drop down menu below:

No Action

Note: drop down menu will not automatically refresh when a new name is written for the no-action alternative above, and must be re-selected from the drop down menu after changing the name.

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No Action			Year:	2027			2028			2029			2030			2031			2032
Air Quality Pollutant Emissions (Clean Air Act)				Grams	Pounds	Metric Tons	Grams	Pounds	Metric Tons	Grams	Pounds	Metric Tons	Grams	Pounds	Metric Tons	Grams	Pounds	Metric Tons	Grams
Reactive Organic Gases aka Volatile Organic Compounds (ROG/VOC)					0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Carbon Monoxide (CO)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Sulfur Oxides (SOx)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Nitrous Oxides (NOx)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Particulate Matter - 2.5 micron (PM _{2.5})				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Particulate Matter - 10 micron (PM ₁₀)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Lead (Pb)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Greenhouse Gas Emissions (NEPA)			Year:	2027			2028			2029			2030			2031			2032
Carbon Dioxide (CO ₂)				6,285,276,000.00	13,856,672.96	6,285.29	6,285,276,000.00	13,856,672.96	6,285.29	6,285,276,000.00	13,856,672.96	6,285.29	6,285,276,000.00	13,856,672.96	6,285.29	6,285,276,000.00	13,856,672.96	6,285.29	6,285,276,000.00
Methane (CH ₄)				621,756.00	1,370.74	0.62	621,756.00	1,370.74	0.62	621,756.00	1,370.74	0.62	621,756.00	1,370.74	0.62	621,756.00	1,370.74	0.62	621,756.00
Nitrous Oxide (N ₂ O)				578,664.00	1,275.74	0.58	578,664.00	1,275.74	0.58	578,664.00	1,275.74	0.58	578,664.00	1,275.74	0.58	578,664.00	1,275.74	0.58	578,664.00
Alternative 1a			Year:	2027			2027			2027			2027			2027			2032
Air Quality Pollutant Emissions (Clean Air Act)				Grams	Pounds	Metric Tons	Grams	Pounds	Metric Tons	Grams	Pounds	Metric Tons	Grams	Pounds	Metric Tons	Grams	Pounds	Metric Tons	Grams
Reactive Organic Gases aka Volatile Organic Compounds (ROG/VOC)					0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Carbon Monoxide (CO)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Sulfur Oxides (SOx)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Nitrous Oxides (NOx)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Particulate Matter - 2.5 micron (PM _{2.5})				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Particulate Matter - 10 micron (PM ₁₀)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Lead (Pb)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Greenhouse Gas Emissions (NEPA)			Year:	2027			2027			2027			2027			2027			2032
Carbon Dioxide (CO ₂)				1,388,560,000.00	3,061,253.28	1,388.56		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Methane (CH ₄)				137,360.00	302.83	0.14		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Nitrous Oxide (N ₂ O)				127,840.00	281.84	0.13		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Alternative 6d			Year:	2027			2027			2027			2027			2027			2032
Air Quality Pollutant Emissions (Clean Air Act)				Grams	Pounds	Metric Tons	Grams	Pounds	Metric Tons	Grams	Pounds	Metric Tons	Grams	Pounds	Metric Tons	Grams	Pounds	Metric Tons	Grams
Reactive Organic Gases aka Volatile Organic Compounds (ROG/VOC)					0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Carbon Monoxide (CO)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Sulfur Oxides (SOx)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Nitrous Oxides (NOx)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Particulate Matter - 2.5 micron (PM _{2.5})				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Particulate Matter - 10 micron (PM ₁₀)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Lead (Pb)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Greenhouse Gas Emissions (NEPA)			Year:	2027			2027			2027			2027			2027			2032
Carbon Dioxide (CO ₂)				2,154,310,000.00	4,749,444.43	2,154.31		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Methane (CH ₄)				213,110.00	469.83	0.21		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Nitrous Oxide (N ₂ O)				198,340.00	437.27	0.20		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Alternative 6dR			Year:	2027			2027			2027			2027			2027			2032
Air Quality Pollutant Emissions (Clean Air Act)				Grams	Pounds	Metric Tons	Grams	Pounds	Metric Tons	Grams	Pounds	Metric Tons	Grams	Pounds	Metric Tons	Grams	Pounds	Metric Tons	Grams
Reactive Organic Gases aka Volatile Organic Compounds (ROG/VOC)					0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Carbon Monoxide (CO)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Sulfur Oxides (SOx)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Nitrous Oxides (NOx)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Particulate Matter - 2.5 micron (PM _{2.5})				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Particulate Matter - 10 micron (PM ₁₀)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Lead (Pb)				0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Greenhouse Gas Emissions (NEPA)			Year:	2027			2027			2027			2027			2027			2032
Carbon Dioxide (CO ₂)				2,368,720,000.00	5,222,137.96	2,368.72		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Methane (CH ₄)				234,320.00	516.59	0.23		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Nitrous Oxide (N ₂ O)				218,080.00	480.78	0.22		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	

