APPENDIX I:
AIR QUALITY ACAM MODEL

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to assess the potential air quality impact/s associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; the *Environmental Impact Analysis Process* (EIAP, 32 CFR 989); the *General Conformity Rule* (GCR, 40 CFR 93 Subpart B); and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the ACAM analysis.

a. Action Location:

State: Maryland
County(s): Prince George's
Regulatory Area(s): Washington, DC-MD-VA

b. Action Title: BEP CPF - Roadway Mitigation and Trenching to Odell Road - Alternative 1

c. Project Number/s (if applicable):

d. Projected Action Start Date: 12 / 2027

e. Action Description:

Construct roadway improvements and trenching for sanitary sewerage line to Odell Road - Alternative 1

f. Point of Contact:

Name: Andrew Glucksman
Title: Environmental Scientist
Organization: Mabbett
Email: glucksman@mabbett.com
Phone Number: 781-275-6050

2. Analysis: Total reasonably foreseeable net change in direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" (highest annual emissions) and "steady state" (no net gain/loss in emission stabilized and the action is fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

All emissions estimates were derived from various sources using the methods, algorithms, and emission factors from the most current *Air Emissions Guide for Air Force Stationary Sources*, *Air Emissions Guide for Air Force Mobile Sources*, and/or *Air Emissions Guide for Air Force Transitory Sources*. For greater details of this analysis, refer to the Detail ACAM Report.

____ applicable
_X_ not applicable

Conformity Analysis Summary:

2027

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Washington, DC-MD-VA			
VOC	0.028	50	No
NOx	0.193	100	No
CO	0.302		
SOx	0.001		
PM 10	2.700		
PM 2.5	0.007		
Pb	0.000		
NH3	0.001		

2028

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Washington, DC-MD-VA			
VOC	0.659	50	No
NOx	5.044	100	No
CO	7.142		
SOx	0.012		
PM 10	67.185		
PM 2.5	0.181		
Pb	0.000		
NH3	0.013		

The Criteria Pollutants (or their precursors) with a General Conformity threshold listed in the table above are pollutants within one or more designated nonattainment or maintenance area/s for the associated National Ambient Air Quality Standard (NAAQS). These pollutants are driving this GCR Applicability Analysis. Pollutants exceeding the GCR thresholds must be further evaluated potentially through a GCR Determination.

The pollutants without a General Conformity threshold are pollutants only within areas designated attainment for the associated NAAQS. These pollutants have an insignificance indicator for VOC, NOx, CO, SOx, PM 10, PM 2.5, and NH3 of 250 ton/yr (Prevention of Significant Deterioration major source threshold) and 25 ton/yr for Pb (GCR de minimis value). Pollutants below their insignificance indicators are at rates so insignificant that they will not cause or contribute to an exceedance of one or more NAAQSs. These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Refer to the *Level II, Air Quality Quantitative Assessment Insignificance Indicators* for further details.

None of the annual net change in estimated emissions associated with this action are above the GCR threshold values established at 40 CFR 93.153 (b); therefore, the proposed Action has an insignificant impact on Air Quality and a General Conformity Determination is not applicable.

Name, Title **Date**

1. General Information

- Action Location
State: Maryland
County(s): Prince George's
Regulatory Area(s): Washington, DC-MD-VA

- Action Title: BEP CPF - Roadway Mitigation - Alternative 1

- Project Number/s (if applicable):

- Projected Action Start Date: 12 / 2027

- Action Purpose and Need:
Mitigate level of service impacts identified during EIS - Alternative 1

- Action Description:
Construct roadway improvements and trenching for sanitary sewerage line to Odell Road - Alternative 1

- Point of Contact
Name: Andrew Glucksman
Title: Environmental Scientist
Organization: Mabbett
Email: glucksman@mabbett.com
Phone Number: 781-275-6050

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	Roadway intersection and trenching
3.	Personnel	Construction workers – intersection and trenching

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location
County: Prince George's
Regulatory Area(s): Washington, DC-MD-VA

- Activity Title: Roadway intersection and trenching

- Activity Description:
Activity to construct Intersections and trenching

- Activity Start Date
Start Month: 12
Start Month: 2027

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.597220
SO_x	0.011794
NO_x	5.011241
CO	6.311120

Pollutant	Total Emissions (TONs)
PM 10	67.183414
PM 2.5	0.179458
Pb	0.000000
NH_3	0.006396

- Activity Emissions of GHG:

Pollutant	Total Emissions (TONs)
CH_4	0.052519
N_2O	0.010828

Pollutant	Total Emissions (TONs)
CO_2	1336.232585
CO_2e	1340.771268

- Global Scale Activity Emissions for SCGHG:

Pollutant	Total Emissions (TONs)
CH_4	0.052519
N_2O	0.010828

Pollutant	Total Emissions (TONs)
CO_2	1336.232585
CO_2e	1340.771268

2.1 Site Grading Phase

2.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 12
Start Quarter: 3
Start Year: 2027

- Phase Duration
Number of Month: 12
Number of Days: 0

2.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 541256
Amount of Material to be Hauled On-Site (yd^3): 30000
Amount of Material to be Hauled Off-Site (yd^3): 30000

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Scrapers Composite	2	8
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.37809	0.00542	3.36699	4.21640	0.08879	0.08169
Graders Composite [HP: 148] [LF: 0.41]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.29535	0.00490	2.28401	3.40565	0.12705	0.11688
Other Construction Equipment Composite [HP: 82] [LF: 0.42]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.25231	0.00487	2.49971	3.48392	0.13245	0.12186
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.34288	0.00492	3.09108	2.65644	0.13550	0.12466
Scrapers Composite [HP: 423] [LF: 0.48]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.19058	0.00488	1.60937	1.52212	0.06336	0.05829
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.17717	0.00489	1.80740	3.48712	0.05440	0.05005

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02383	0.00477	587.39431	589.41010
Graders Composite [HP: 148] [LF: 0.41]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02155	0.00431	531.25291	533.07604
Other Construction Equipment Composite [HP: 82] [LF: 0.42]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02140	0.00428	527.44206	529.25211
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02160	0.00432	532.55942	534.38703
Scrapers Composite [HP: 423] [LF: 0.48]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02145	0.00429	528.70476	530.51914
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02148	0.00430	529.61807	531.43559

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**NH_3**
LDGV	0.16534	0.00193	0.07529	2.55532	0.00386	0.00341	0.02321
LDGT	0.17696	0.00253	0.12157	2.83524	0.00546	0.00483	0.02488
HDGV	0.74131	0.00610	0.67352	11.59213	0.02168	0.01918	0.05076
LDDV	0.06234	0.00095	0.05770	2.45415	0.00241	0.00221	0.00821
LDDT	0.06379	0.00117	0.08997	1.95115	0.00324	0.00298	0.00856
HDDV	0.09586	0.00395	2.15720	1.45529	0.02963	0.02726	0.03198
MC	2.43964	0.00259	0.65615	11.82749	0.02222	0.01965	0.05429

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH_4	**N_2O**	**CO_2**	**CO_2e**
LDGV	0.01101	0.00440	289.85857	291.44403
LDGT	0.01245	0.00658	381.35125	383.62022
HDGV	0.06054	0.02743	918.14108	927.81731
LDDV	0.03696	0.00069	284.29375	285.42131
LDDT	0.03367	0.00102	349.06311	350.20819
HDDV	0.02967	0.00336	1176.93439	1178.67655
MC	0.11591	0.00306	390.09412	393.90298

2.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
HP: Equipment Horsepower
LF: Equipment Load Factor
EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.2 Trenching/Excavating Phase

2.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 12
Number of Days: 0

2.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 19900
Amount of Material to be Hauled On-Site (yd^3): 2000
Amount of Material to be Hauled Off-Site (yd^3): 2000

- Trenching Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.36597	0.00542	3.33858	4.22211	0.08125	0.07475
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.40903	0.00542	3.44749	4.54768	0.08420	0.07746
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02383	0.00477	587.54144	589.55773
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02384	0.00477	587.79831	589.81549
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**NH_3**
LDGV	0.16534	0.00193	0.07529	2.55532	0.00386	0.00341	0.02321
LDGT	0.17696	0.00253	0.12157	2.83524	0.00546	0.00483	0.02488
HDGV	0.74131	0.00610	0.67352	11.59213	0.02168	0.01918	0.05076
LDDV	0.06234	0.00095	0.05770	2.45415	0.00241	0.00221	0.00821
LDDT	0.06379	0.00117	0.08997	1.95115	0.00324	0.00298	0.00856
HDDV	0.09586	0.00395	2.15720	1.45529	0.02963	0.02726	0.03198
MC	2.43964	0.00259	0.65615	11.82749	0.02222	0.01965	0.05429

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH_4	**N_2O**	**CO_2**	**CO_2e**
LDGV	0.01101	0.00440	289.85857	291.44403
LDGT	0.01245	0.00658	381.35125	383.62022
HDGV	0.06054	0.02743	918.14108	927.81731
LDDV	0.03696	0.00069	284.29375	285.42131
LDDT	0.03367	0.00102	349.06311	350.20819
HDDV	0.02967	0.00336	1176.93439	1178.67655
MC	0.11591	0.00306	390.09412	393.90298

2.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
HP: Equipment Horsepower
LF: Equipment Load Factor
EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.3 Paving Phase

2.3.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 12
Start Quarter: 3
Start Year: 2027

- Phase Duration
Number of Month: 12
Number of Days: 0

2.3.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 541256

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	8
Paving Equipment Composite	2	6
Rollers Composite	2	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.3.3 Paving Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.55279	0.00855	4.19775	3.25549	0.16311	0.15007
Pavers Composite [HP: 81] [LF: 0.42]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.22921	0.00486	2.45013	3.43821	0.11941	0.10986
Paving Equipment Composite [HP: 89] [LF: 0.36]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.18341	0.00488	2.01586	3.40316	0.07465	0.06867
Rollers Composite [HP: 36] [LF: 0.38]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.52865	0.00542	3.57666	4.10537	0.14602	0.13434
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.17717	0.00489	1.80740	3.48712	0.05440	0.05005

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02313	0.00463	570.32048	572.27767
Pavers Composite [HP: 81] [LF: 0.42]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02133	0.00427	525.80912	527.61356
Paving Equipment Composite [HP: 89] [LF: 0.36]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02142	0.00428	528.06776	529.87995
Rollers Composite [HP: 36] [LF: 0.38]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02382	0.00476	587.12246	589.13732
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02148	0.00430	529.61807	531.43559

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**NH_3**
LDGV	0.16534	0.00193	0.07529	2.55532	0.00386	0.00341	0.02321
LDGT	0.17696	0.00253	0.12157	2.83524	0.00546	0.00483	0.02488
HDGV	0.74131	0.00610	0.67352	11.59213	0.02168	0.01918	0.05076
LDDV	0.06234	0.00095	0.05770	2.45415	0.00241	0.00221	0.00821
LDDT	0.06379	0.00117	0.08997	1.95115	0.00324	0.00298	0.00856
HDDV	0.09586	0.00395	2.15720	1.45529	0.02963	0.02726	0.03198
MC	2.43964	0.00259	0.65615	11.82749	0.02222	0.01965	0.05429

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH_4	N_2O	CO_2	CO_2e
LDGV	0.01101	0.00440	289.85857	291.44403
LDGT	0.01245	0.00658	381.35125	383.62022
HDGV	0.06054	0.02743	918.14108	927.81731
LDDV	0.03696	0.00069	284.29375	285.42131
LDDT	0.03367	0.00102	349.06311	350.20819
HDDV	0.02967	0.00336	1176.93439	1178.67655
MC	0.11591	0.00306	390.09412	393.90298

2.3.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
HP: Equipment Horsepower
LF: Equipment Load Factor
EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

3. Personnel

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Prince George's
Regulatory Area(s): Washington, DC-MD-VA

- Activity Title: Construction workers - intersection 1

- Activity Description:
Construction workers traveling to and from intersection 1

- Activity Start Date
Start Month: 12
Start Year: 2027

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2028

- Activity Emissions of Criteria Pollutants:

Pollutant	Total Emissions (TONs)
VOC	0.066867
SO_x	0.000715
NO_x	0.035484
CO	0.900279

Pollutant	Total Emissions (TONs)
PM 10	0.001606
PM 2.5	0.001420
Pb	0.000000
NH_3	0.007693

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH_4	0.004324
N_2O	0.001764

Pollutant	Total Emissions (TONs)
CO_2	107.777682
CO_2e	108.410861

3.2 Personnel Assumptions

- Number of Personnel
Active Duty Personnel: 0
Civilian Personnel: 0
Support Contractor Personnel: 25
Air National Guard (ANG) Personnel: 0
Reserve Personnel: 0

- Default Settings Used: No

- Average Personnel Round Trip Commute (mile): 40

- Personnel Work Schedule
Support Contractor Personnel: 5 Days Per Week

3.3 Personnel On Road Vehicle Mixture

- On Road Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	37.55	60.32	0	0.03	0.2	0	1.9
GOVs	54.49	37.73	4.67	0	0	3.11	0

3.4 Personnel Emission Factor(s)

- On Road Vehicle Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH_3
LDGV	0.16534	0.00193	0.07529	2.55532	0.00386	0.00341	0.02321
LDGT	0.17696	0.00253	0.12157	2.83524	0.00546	0.00483	0.02488
HDGV	0.74131	0.00610	0.67352	11.59213	0.02168	0.01918	0.05076
LDDV	0.06234	0.00095	0.05770	2.45415	0.00241	0.00221	0.00821
LDDT	0.06379	0.00117	0.08997	1.95115	0.00324	0.00298	0.00856
HDDV	0.09586	0.00395	2.15720	1.45529	0.02963	0.02726	0.03198
MC	2.43964	0.00259	0.65615	11.82749	0.02222	0.01965	0.05429

- On Road Vehicle Greenhouse Gasses Emission Factors (grams/mile)

	CH_4	N_2O	CO_2	CO_2e
LDGV	0.01101	0.00440	289.85857	291.44403
LDGT	0.01245	0.00658	381.35125	383.62022
HDGV	0.06054	0.02743	918.14108	927.81731
LDDV	0.03696	0.00069	284.29375	285.42131
LDDT	0.03367	0.00102	349.06311	350.20819
HDDV	0.02967	0.00336	1176.93439	1178.67655
MC	0.11591	0.00306	390.09412	393.90298

3.5 Personnel Formula(s)

- Personnel Vehicle Miles Travel for Work Days per Year

$VMT_P = NP * WD * AC$

VMT_P: Personnel Vehicle Miles Travel (miles/year)
NP: Number of Personnel
WD: Work Days per Year
AC: Average Commute (miles)

- Total Vehicle Miles Travel per Year

$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$

VMT_{Total}: Total Vehicle Miles Travel (miles)
VMT_{AD}: Active Duty Personnel Vehicle Miles Travel (miles)
VMT_C: Civilian Personnel Vehicle Miles Travel (miles)
VMT_{SC}: Support Contractor Personnel Vehicle Miles Travel (miles)
VMT_{ANG}: Air National Guard Personnel Vehicle Miles Travel (miles)
VMT_{AFRC}: Reserve Personnel Vehicle Miles Travel (miles)

- Vehicle Emissions per Year

$V_{POL} = (VMT_{Total} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{Total}: Total Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Personnel On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to estimate GHG emissions and assess the theoretical Social Cost of Greenhouse Gases (SC GHG) associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide. This report provides a summary of GHG emissions and SC GHG analysis.

a. Action Location:
State: Maryland
County(s): Prince George's
Regulatory Area(s): Washington, DC-MD-VA

b. Action Title: BEP CPF - Roadway Mitigation - Alternative 1

c. Project Number/s (if applicable):

d. Projected Action Start Date: 12 / 2027

e. Action Description:

Construct roadway improvements and trenching for sanitary sewerage line to Odell Road - Alternative 1

f. Point of Contact:

Name:	Andrew Glucksman
Title:	Environmental Scientist
Organization:	Mabbett
Email:	glucksman@mabbett.com
Phone Number:	781-275-6050

2. Analysis: Total combined direct and indirect GHG emissions associated with the action were estimated through ACAM on a calendar-year basis from the action start through the expected life cycle of the action. The life cycle for "steady state" emissions (SS, net gain/loss in emission stabilized and the action is fully implemented) is assumed to be 10 years beyond the SS emissions year or 20 years beyond SS emissions.

GHG Emissions Analysis Summary:

GHGs produced by fossil-fuel combustion are primarily carbon dioxide (CO2), methane (CH4), and nitrous oxide (NO2). These three GHGs represent more than 97 percent of all U.S. GHG emissions. Emissions of GHGs are typically quantified and regulated in units of CO2 equivalents (CO2e). The CO2e takes into account the global warming potential (GWP) of each GHG. The GWP is the measure of a particular GHG's ability to absorb solar radiation as well as its residence time within the atmosphere. The GWP allows comparison of global warming impacts between different gases; the higher the GWP, the more that gas contributes to climate change in comparison to CO2. All GHG emissions estimates were derived from various emission sources using the methods, algorithms, emission factors, and GWPs from the most current Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and/or Air Emissions Guide for Air Force Transitory Sources.

Title 40, Chapter 1, Subchapter C, part 52, Subpart A, Section 52.21, provides the Prevention of Significant Deterioration (PSD) threshold for GHG of 75,000 ton per year (ton/yr) of CO2e (or 68,039 metric ton per year, mton/yr) as an indicator or "threshold of insignificance" for NEPA air quality impacts in all areas. This indicator does not define a significant impact; however, it provides a threshold to identify actions that are insignificant (de minimis, too trivial or minor to merit consideration). Actions with a net change in GHG (CO2e) emissions below

the insignificance indicator (threshold) are considered too insignificant on a global scale to warrant any further analysis. Note that actions with a net change in GHG (CO2e) emissions above the insignificance indicator (threshold) are only considered potentially significant and require further assessment to determine if the action poses a significant impact. For further detail on insignificance indicators see Level II, Air Quality Quantitative Assessment, Insignificance Indicators (April 2023).

The following table summarizes the action-related GHG emissions on a calendar-year basis through the projected life cycle of the action.

Action-Related Annual GHG Emissions (mton/yr)						
YEAR	**CO2**	**CH4**	**N2O**	**CO2e**	**Threshold**	**Exceedance**
2027	54	0.00213032	0.00049808	54	68,039	No
2028	1,302	0.05126572	0.01130036	1,307	68,039	No

The following U.S. and State's GHG emissions estimates (next two tables) are based on a five-year average (2016 through 2020) of individual state-reported GHG emissions (Reference: State Climate Summaries 2022, NOAA National Centers for Environmental Information, National Oceanic and Atmospheric Administration. https://statesummaries.ncics.org/downloads/).

State's Annual GHG Emissions (mton/yr)				
YEAR	**CO2**	**CH4**	**N2O**	**CO2e**
2027	58,221,463	107,271	6,992	58,335,727
2028	58,221,463	107,271	6,992	58,335,727

U.S. Annual GHG Emissions (mton/yr)				
YEAR	**CO2**	**CH4**	**N2O**	**CO2e**
2027	5,136,454,179	25,626,912	1,500,708	5,163,581,798
2028	5,136,454,179	25,626,912	1,500,708	5,163,581,798

GHG Relative Significance Assessment:

A Relative Significance Assessment uses the rule of reason and the concept of proportionality along with the consideration of the affected area (yGba.e., global, national, and regional) and the degree (intensity) of the proposed action's effects. The Relative Significance Assessment provides real-world context and allows for a reasoned choice against alternatives through a relative comparison analysis. The analysis weighs each alternative's annual net change in GHG emissions proportionally against (or relative to) global, national, and regional emissions.

The action's surroundings, circumstances, environment, and background (context associated with an action) provide the setting for evaluating the GHG intensity (impact significance). From an air quality perspective, context of an action is the local area's ambient air quality relative to meeting the NAAQSs, expressed as attainment, nonattainment, or maintenance areas (this designation is considered the attainment status). GHGs are non-hazardous to health at normal ambient concentrations and, at a cumulative global scale, action-related GHG emissions can only potentially cause warming of the climatic system. Therefore, the action-related GHGs generally have an insignificant impact to local air quality.

However, the affected area (context) of GHG/climate change is global. Therefore, the intensity or degree of the proposed action's GHG/climate change effects are gauged through the quantity of GHG associated with the action as compared to a baseline of the state, U.S., and global GHG inventories. Each action (or alternative) has significance, based on their annual net change in GHG emissions, in relation to or proportionally to the global, national, and regional annual GHG emissions.

To provide real-world context to the GHG and climate change effects on a global scale, an action's net change in GHG emissions is compared relative to the state (where action will occur) and U.S. annual emissions. The following table provides a relative comparison of an action's net change in GHG emissions vs. state and U.S. projected GHG emissions for the same time period.

Total GHG Relative Significance (mton)					
		CO2	CH4	N2O	CO2e
2027-2040	State Total	174,664,390	321,814	20,976	175,007,180
2027-2040	U.S. Total	15,409,362,537	76,880,735	4,502,123	15,490,745,395
2027-2040	Action	1,310	0.051567	0.011423	1,315
Percent of State Totals		0.00075000%	0.00001602%	0.00005446%	0.00075121%
Percent of U.S. Totals		0.00000850%	0.00000007%	0.00000025%	0.00000849%

Climate Change Assessment (as SC GHG):

On a global scale, the potential climate change effects of an action are indirectly addressed and put into context through providing the theoretical SC GHG associated with an action. The SC GHG is an administrative and theoretical tool intended to provide additional context to a GHG's potential impacts through approximating the long-term monetary damage that may result from GHG emissions affect on climate change. It is important to note that the SC GHG is a monetary quantification, in 2020 U.S. dollars, of the theoretical economic damages that could result from emitting GHGs into the atmosphere.

The SC GHG estimates are derived using the methodology and discount factors in the "Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990," released by the Interagency Working Group on Social Cost of Greenhouse Gases (IWG SC GHGs) in February 2021.

The speciated IWG Annual SC GHG Emission associated with an action (or alternative) are first estimated as annual unit cost (cost per metric ton, $/mton). Results of the annual IWG Annual SC GHG Emission Assessments are tabulated in the IWG Annual SC GHG Cost per Metric Ton Table below:

IWG SC GHG Discount Factor: 2.5%

IWG Annual SC GHG Cost per Metric Ton ($/mton [In 2020 $])			
YEAR	CO2	CH4	N2O
2027	$86.00	$2,300.00	$31,000.00
2028	$87.00	$2,400.00	$32,000.00

Action-related SC GHG were estimated by calendar-year for the projected action's lifecycle. Annual estimates were found by multiplying the annual emission for a given year by the corresponding IWG Annual SC GHG Emission value (see table above).

Action-Related Annual SC GHG ($K/yr [In 2020 $])				
YEAR	CO2	CH4	N2O	GHG
2027	$4.65	$0.00	$0.02	$4.67
2028	$113.31	$0.12	$0.36	$113.80

The following two tables summarize the U.S. and State's Annual SC GHG by calendar-year. The U.S. and State's Annual SC GHG are in 2020 dollars and were estimated by each year for the projected action lifecycle. Annual SC GHG estimates were found by multiplying the U.S. and State's annual five-year average GHG emissions for a given year by the corresponding IWG Annual SC GHG Cost per Metric Ton value.

State's Annual SC GHG ($K/yr [In 2020 $])				
YEAR	**CO2**	**CH4**	**N2O**	**GHG**
2027	$5,007,045.84	$246,723.85	$216,754.31	$5,470,524.00
2028	$5,065,267.31	$257,450.98	$223,746.38	$5,546,464.67

U.S. Annual SC GHG ($K/yr [In 2020 $])				
YEAR	**CO2**	**CH4**	**N2O**	**GHG**
2027	$441,735,059.39	$58,941,896.86	$46,521,936.72	$547,198,892.97
2028	$446,871,513.57	$61,504,588.03	$48,022,644.35	$556,398,745.96

Relative Comparison of SC GHG:

To provide additional real-world context to the potential climate change impact associate with an action, a Relative Comparison of SC GHG Assessment is also performed. While the SC GHG estimates capture an indirect approximation of global climate damages, the Relative Comparison of SC GHG Assessment provides a better perspective from a regional and global scale.

The Relative Comparison of SC GHG Assessment uses the rule of reason and the concept of proportionality along with the consideration of the affected area (yGba.e., global, national, and regional) and the SC GHG as the degree (intensity) of the proposed action's effects. The Relative Comparison Assessment provides real-world context and allows for a reasoned choice among alternatives through a relative contrast analysis which weighs each alternative's SC GHG proportionally against (or relative to) existing global, national, and regional SC GHG. The below table provides a relative comparison between an action's SC GHG vs. state and U.S. projected SC GHG for the same time period:

Total SC-GHG ($K [In 2020 $])					
		CO2	**CH4**	**N2O**	**GHG**
2027-2040	State Total	$15,195,801.92	$772,352.93	$664,247.07	$16,632,401.92
2027-2040	U.S. Total	$1,340,614,540.72	$184,513,764.10	$142,567,225.42	$1,667,695,530.24
2027-2040	Action	$113.87	$0.12	$0.37	$114.36
Percent of State Totals		0.00074934%	0.00001597%	0.00005496%	0.00068755%
Percent of U.S. Totals		0.00000849%	0.00000007%	0.00000026%	0.00000686%

From a global context, the action alternative's total SC GHG percentage of total global SC GHG for the same time period is: 0.00000092%.*

* Global value based on the U.S. emits 13.4% of all global GHG annual emissions (2018 Emissions Data, Center for Climate and Energy Solutions, accessed 7-6-2023, https://www.c2es.org/content/international-emissions).

Andrew Glucksman, Environmental Scientist — Dec 05 2023

Name, Title — **Date**

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to assess the potential air quality impact/s associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; the *Environmental Impact Analysis Process* (EIAP, 32 CFR 989); the *General Conformity Rule* (GCR, 40 CFR 93 Subpart B); and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the ACAM analysis.

a. Action Location:

State: Maryland
County(s): Prince George's
Regulatory Area(s): Washington, DC-MD-VA

b. Action Title: BEP CPF - Roadway Mitigation - Alternative 2

c. Project Number/s (if applicable):

d. Projected Action Start Date: 12 / 2027

e. Action Description:

Construct roadway improvements and sanitary sewerage trenching to Powder Mill Road - Alternative 2

f. Point of Contact:

Name: Andrew Glucksman
Title: Environmental Scientist
Organization: Mabbett
Email: glucksman@mabbett.com
Phone Number: 781-275-6050

2. Analysis: Total reasonably foreseeable net change in direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" (highest annual emissions) and "steady state" (no net gain/loss in emission stabilized and the action is fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

All emissions estimates were derived from various sources using the methods, algorithms, and emission factors from the most current *Air Emissions Guide for Air Force Stationary Sources*, *Air Emissions Guide for Air Force Mobile Sources*, and/or *Air Emissions Guide for Air Force Transitory Sources*. For greater details of this analysis, refer to the Detail ACAM Report.

____ applicable
_X_ not applicable

Conformity Analysis Summary:

2027

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Washington, DC-MD-VA			
VOC	0.028	50	No
NOx	0.193	100	No
CO	0.302		
SOx	0.001		
PM 10	2.700		
PM 2.5	0.007		
Pb	0.000		
NH3	0.001		

2028

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Washington, DC-MD-VA			
VOC	0.660	50	No
NOx	5.063	100	No
CO	7.155		
SOx	0.012		
PM 10	69.143		
PM 2.5	0.181		
Pb	0.000		
NH3	0.014		

The Criteria Pollutants (or their precursors) with a General Conformity threshold listed in the table above are pollutants within one or more designated nonattainment or maintenance area/s for the associated National Ambient Air Quality Standard (NAAQS). These pollutants are driving this GCR Applicability Analysis. Pollutants exceeding the GCR thresholds must be further evaluated potentially through a GCR Determination.

The pollutants without a General Conformity threshold are pollutants only within areas designated attainment for the associated NAAQS. These pollutants have an insignificance indicator for VOC, NOx, CO, SOx, PM 10, PM 2.5, and NH3 of 250 ton/yr (Prevention of Significant Deterioration major source threshold) and 25 ton/yr for Pb (GCR de minimis value). Pollutants below their insignificance indicators are at rates so insignificant that they will not cause or contribute to an exceedance of one or more NAAQSs. These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Refer to the *Level II, Air Quality Quantitative Assessment Insignificance Indicators* for further details.

None of the annual net change in estimated emissions associated with this action are above the GCR threshold values established at 40 CFR 93.153 (b); therefore, the proposed Action has an insignificant impact on Air Quality and a General Conformity Determination is not applicable.

Name, Title **Date**

1. General Information

- Action Location
State: Maryland
County(s): Prince George's
Regulatory Area(s): Washington, DC-MD-VA

- Action Title: BEP CPF - Roadway Mitigation - Alternative 2

- Project Number/s (if applicable):

- Projected Action Start Date: 12 / 2027

- Action Purpose and Need:
Mitigate level of service impacts identified during EIS

- Action Description:
Construct roadway improvements and santiary sewerage trenching - Alternative 2

- Point of Contact
Name: Andrew Glucksman
Title: Environmental Scientist
Organization: Mabbett
Email: glucksman@mabbett.com
Phone Number: 781-275-6050

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	Roadway intersection 2
3.	Personnel	Construction workers - intersection 1

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location
County: Prince George's
Regulatory Area(s): Washington, DC-MD-VA

- Activity Title: Roadway intersection and trenching to Powder Mill Road – Alternative 2

- Activity Description:
Activity to construct Intersection improvements and sanitary sewerage extension to Powder Mill Road - Alt 2

- Activity Start Date
Start Month: 12
Start Month: 2027
- Activity End Date
Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.598065
SO_x	0.011829
NO_x	5.030267
CO	6.323956

Pollutant	Total Emissions (TONs)
PM 10	69.141435
PM 2.5	0.179699
Pb	0.000000
NH_3	0.006678

- Activity Emissions of GHG:

Pollutant	Total Emissions (TONs)
CH_4	0.052781
N_2O	0.010857

Pollutant	Total Emissions (TONs)
CO_2	1346.613147
CO_2e	1351.167195

- Global Scale Activity Emissions for SCGHG:

Pollutant	Total Emissions (TONs)
CH_4	0.052781
N_2O	0.010857

Pollutant	Total Emissions (TONs)
CO_2	1346.613147
CO_2e	1351.167195

2.1 Site Grading Phase

2.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 12
Start Quarter: 3
Start Year: 2027

- Phase Duration
Number of Month: 12
Number of Days: 0

2.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 541256
Amount of Material to be Hauled On-Site (yd^3): 30000
Amount of Material to be Hauled Off-Site (yd^3): 30000

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Scrapers Composite	2	8
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.37809	0.00542	3.36699	4.21640	0.08879	0.08169
Graders Composite [HP: 148] [LF: 0.41]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.29535	0.00490	2.28401	3.40565	0.12705	0.11688
Other Construction Equipment Composite [HP: 82] [LF: 0.42]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.25231	0.00487	2.49971	3.48392	0.13245	0.12186
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.34288	0.00492	3.09108	2.65644	0.13550	0.12466
Scrapers Composite [HP: 423] [LF: 0.48]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.19058	0.00488	1.60937	1.52212	0.06336	0.05829
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.17717	0.00489	1.80740	3.48712	0.05440	0.05005

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02383	0.00477	587.39431	589.41010
Graders Composite [HP: 148] [LF: 0.41]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02155	0.00431	531.25291	533.07604
Other Construction Equipment Composite [HP: 82] [LF: 0.42]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02140	0.00428	527.44206	529.25211
Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02160	0.00432	532.55942	534.38703
Scrapers Composite [HP: 423] [LF: 0.48]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02145	0.00429	528.70476	530.51914
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02148	0.00430	529.61807	531.43559

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**NH_3**
LDGV	0.16534	0.00193	0.07529	2.55532	0.00386	0.00341	0.02321
LDGT	0.17696	0.00253	0.12157	2.83524	0.00546	0.00483	0.02488
HDGV	0.74131	0.00610	0.67352	11.59213	0.02168	0.01918	0.05076
LDDV	0.06234	0.00095	0.05770	2.45415	0.00241	0.00221	0.00821
LDDT	0.06379	0.00117	0.08997	1.95115	0.00324	0.00298	0.00856
HDDV	0.09586	0.00395	2.15720	1.45529	0.02963	0.02726	0.03198
MC	2.43964	0.00259	0.65615	11.82749	0.02222	0.01965	0.05429

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH_4	**N_2O**	**CO_2**	**CO_2e**
LDGV	0.01101	0.00440	289.85857	291.44403
LDGT	0.01245	0.00658	381.35125	383.62022
HDGV	0.06054	0.02743	918.14108	927.81731
LDDV	0.03696	0.00069	284.29375	285.42131
LDDT	0.03367	0.00102	349.06311	350.20819
HDDV	0.02967	0.00336	1176.93439	1178.67655
MC	0.11591	0.00306	390.09412	393.90298

2.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
HP: Equipment Horsepower
LF: Equipment Load Factor
EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.2 Trenching/Excavating Phase

2.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 12
Number of Days: 0

2.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 36300
Amount of Material to be Hauled On-Site (yd^3): 6000
Amount of Material to be Hauled Off-Site (yd^3): 6000

- Trenching Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.36597	0.00542	3.33858	4.22211	0.08125	0.07475
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.40903	0.00542	3.44749	4.54768	0.08420	0.07746
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.17299	0.00489	1.74942	3.49553	0.04787	0.04404

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02383	0.00477	587.54144	589.55773
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02384	0.00477	587.79831	589.81549
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02148	0.00430	529.56544	531.38277

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**NH_3**
LDGV	0.16534	0.00193	0.07529	2.55532	0.00386	0.00341	0.02321
LDGT	0.17696	0.00253	0.12157	2.83524	0.00546	0.00483	0.02488
HDGV	0.74131	0.00610	0.67352	11.59213	0.02168	0.01918	0.05076
LDDV	0.06234	0.00095	0.05770	2.45415	0.00241	0.00221	0.00821
LDDT	0.06379	0.00117	0.08997	1.95115	0.00324	0.00298	0.00856
HDDV	0.09586	0.00395	2.15720	1.45529	0.02963	0.02726	0.03198
MC	2.43964	0.00259	0.65615	11.82749	0.02222	0.01965	0.05429

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH_4	**N_2O**	**CO_2**	**CO_2e**
LDGV	0.01101	0.00440	289.85857	291.44403
LDGT	0.01245	0.00658	381.35125	383.62022
HDGV	0.06054	0.02743	918.14108	927.81731
LDDV	0.03696	0.00069	284.29375	285.42131
LDDT	0.03367	0.00102	349.06311	350.20819
HDDV	0.02967	0.00336	1176.93439	1178.67655
MC	0.11591	0.00306	390.09412	393.90298

2.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
HP: Equipment Horsepower
LF: Equipment Load Factor
EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.3 Paving Phase

2.3.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 12
Start Quarter: 3
Start Year: 2027

- Phase Duration
Number of Month: 12
Number of Days: 0

2.3.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 541256

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	8
Paving Equipment Composite	2	6
Rollers Composite	2	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.3.3 Paving Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour) (default)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.55279	0.00855	4.19775	3.25549	0.16311	0.15007
Pavers Composite [HP: 81] [LF: 0.42]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.22921	0.00486	2.45013	3.43821	0.11941	0.10986
Paving Equipment Composite [HP: 89] [LF: 0.36]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.18341	0.00488	2.01586	3.40316	0.07465	0.06867
Rollers Composite [HP: 36] [LF: 0.38]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.52865	0.00542	3.57666	4.10537	0.14602	0.13434
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.17717	0.00489	1.80740	3.48712	0.05440	0.05005

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour) (default)

Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02313	0.00463	570.32048	572.27767
Pavers Composite [HP: 81] [LF: 0.42]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02133	0.00427	525.80912	527.61356
Paving Equipment Composite [HP: 89] [LF: 0.36]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02142	0.00428	528.06776	529.87995
Rollers Composite [HP: 36] [LF: 0.38]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02382	0.00476	587.12246	589.13732
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02148	0.00430	529.61807	531.43559

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**NH_3**
LDGV	0.16534	0.00193	0.07529	2.55532	0.00386	0.00341	0.02321
LDGT	0.17696	0.00253	0.12157	2.83524	0.00546	0.00483	0.02488
HDGV	0.74131	0.00610	0.67352	11.59213	0.02168	0.01918	0.05076
LDDV	0.06234	0.00095	0.05770	2.45415	0.00241	0.00221	0.00821
LDDT	0.06379	0.00117	0.08997	1.95115	0.00324	0.00298	0.00856
HDDV	0.09586	0.00395	2.15720	1.45529	0.02963	0.02726	0.03198
MC	2.43964	0.00259	0.65615	11.82749	0.02222	0.01965	0.05429

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH_4	N_2O	CO_2	CO_2e
LDGV	0.01101	0.00440	289.85857	291.44403
LDGT	0.01245	0.00658	381.35125	383.62022
HDGV	0.06054	0.02743	918.14108	927.81731
LDDV	0.03696	0.00069	284.29375	285.42131
LDDT	0.03367	0.00102	349.06311	350.20819
HDDV	0.02967	0.00336	1176.93439	1178.67655
MC	0.11591	0.00306	390.09412	393.90298

2.3.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
HP: Equipment Horsepower
LF: Equipment Load Factor
EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

3. Personnel

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Prince George's
Regulatory Area(s): Washington, DC-MD-VA

- Activity Title: Construction workers - intersection 1

- Activity Description:
Construction workers traveling to and from intersection 1

- Activity Start Date
Start Month: 12
Start Year: 2027

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2028

- Activity Emissions of Criteria Pollutants:

Pollutant	Total Emissions (TONs)
VOC	0.066867
SO_x	0.000715
NO_x	0.035484
CO	0.900279

Pollutant	Total Emissions (TONs)
PM 10	0.001606
PM 2.5	0.001420
Pb	0.000000
NH_3	0.007693

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Total Emissions (TONs)
CH_4	0.004324
N_2O	0.001764

Pollutant	Total Emissions (TONs)
CO_2	107.777682
CO_2e	108.410861

3.2 Personnel Assumptions

- Number of Personnel
Support Contractor Personnel: 25

- Default Settings Used: No

- Average Personnel Round Trip Commute (mile): 40

- Personnel Work Schedule
Support Contractor Personnel: 5 Days Per Week

3.3 Personnel On Road Vehicle Mixture

- On Road Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	37.55	60.32	0	0.03	0.2	0	1.9
GOVs	54.49	37.73	4.67	0	0	3.11	0

3.4 Personnel Emission Factor(s)

- On Road Vehicle Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH_3
LDGV	0.16534	0.00193	0.07529	2.55532	0.00386	0.00341	0.02321
LDGT	0.17696	0.00253	0.12157	2.83524	0.00546	0.00483	0.02488
HDGV	0.74131	0.00610	0.67352	11.59213	0.02168	0.01918	0.05076
LDDV	0.06234	0.00095	0.05770	2.45415	0.00241	0.00221	0.00821
LDDT	0.06379	0.00117	0.08997	1.95115	0.00324	0.00298	0.00856
HDDV	0.09586	0.00395	2.15720	1.45529	0.02963	0.02726	0.03198
MC	2.43964	0.00259	0.65615	11.82749	0.02222	0.01965	0.05429

- On Road Vehicle Greenhouse Gasses Emission Factors (grams/mile)

	CH_4	N_2O	CO_2	CO_2e
LDGV	0.01101	0.00440	289.85857	291.44403
LDGT	0.01245	0.00658	381.35125	383.62022
HDGV	0.06054	0.02743	918.14108	927.81731
LDDV	0.03696	0.00069	284.29375	285.42131
LDDT	0.03367	0.00102	349.06311	350.20819
HDDV	0.02967	0.00336	1176.93439	1178.67655
MC	0.11591	0.00306	390.09412	393.90298

3.5 Personnel Formula(s)

- Personnel Vehicle Miles Travel for Work Days per Year

$VMT_P = NP * WD * AC$

VMT_P: Personnel Vehicle Miles Travel (miles/year)
NP: Number of Personnel
WD: Work Days per Year
AC: Average Commute (miles)

- Total Vehicle Miles Travel per Year

$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$

VMT_{Total}: Total Vehicle Miles Travel (miles)
VMT_{AD}: Active Duty Personnel Vehicle Miles Travel (miles)
VMT_C: Civilian Personnel Vehicle Miles Travel (miles)
VMT_{SC}: Support Contractor Personnel Vehicle Miles Travel (miles)
VMT_{ANG}: Air National Guard Personnel Vehicle Miles Travel (miles)
VMT_{AFRC}: Reserve Personnel Vehicle Miles Travel (miles)

- Vehicle Emissions per Year

$V_{POL} = (VMT_{Total} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{Total}: Total Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Personnel On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to estimate GHG emissions and assess the theoretical Social Cost of Greenhouse Gases (SC GHG) associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide. This report provides a summary of GHG emissions and SC GHG analysis.

a. Action Location:

State: Maryland
County(s): Prince George's
Regulatory Area(s): Washington, DC-MD-VA

b. Action Title: BEP CPF - Roadway Mitigation and Trenching for Sanitary to Powder Mill Road - Alternative 2

c. Project Number/s (if applicable):

d. Projected Action Start Date: 12 / 2027

e. Action Description:

Construct roadway improvements and sanitary sewerage trenching to Powder Mill Road/Edmonston Road - Alternative 2

f. Point of Contact:

Name: Andrew Glucksman
Title: Environmental Scientist
Organization: Mabbett
Email: glucksman@mabbett.com
Phone Number: 781-275-6050

2. Analysis: Total combined direct and indirect GHG emissions associated with the action were estimated through ACAM on a calendar-year basis from the action start through the expected life cycle of the action. The life cycle for actions with "steady state" emissions (SS, net gain/loss in emission stabilized and the action is fully implemented) is assumed to be 10 years beyond the SS emissions year or 20 years beyond SS emissions year.

GHG Emissions Analysis Summary:

GHGs produced by fossil-fuel combustion are primarily carbon dioxide (CO2), methane (CH4), and nitrous oxide (NO2). These three GHGs represent more than 97 percent of all U.S. GHG emissions. Emissions of GHGs are typically quantified and regulated in units of CO2 equivalents (CO2e). The CO2e takes into account the global warming potential (GWP) of each GHG. The GWP is the measure of a particular GHG's ability to absorb solar radiation as well as its residence time within the atmosphere. The GWP allows comparison of global warming impacts between different gases; the higher the GWP, the more that gas contributes to climate change in comparison to CO2. All GHG emissions estimates were derived from various emission sources using the methods, algorithms, emission factors, and GWPs from the most current Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and/or Air Emissions Guide for Air Force Transitory Sources.

Title 40, Chapter 1, Subchapter C, part 52, Subpart A, Section 52.21, provides the Prevention of Significant Deterioration (PSD) threshold for GHG of 75,000 ton per year (ton/yr) of CO2e (or 68,039 metric ton per year, mton/yr) as an indicator or "threshold of insignificance" for NEPA air quality impacts in all areas. This indicator does not define a significant impact; however, it provides a threshold to identify actions that are insignificant (de

minimis, too trivial or minor to merit consideration). Actions with a net change in GHG (CO2e) emissions below the insignificance indicator (threshold) are considered too insignificant on a global scale to warrant any further analysis. Note that actions with a net change in GHG (CO2e) emissions above the insignificance indicator (threshold) are only considered potentially significant and require further assessment to determine if the action poses a significant impact. For further detail on insignificance indicators see Level II, Air Quality Quantitative Assessment, Insignificance Indicators (April 2023).

The following table summarizes the action-related GHG emissions on a calendar-year basis through the projected life cycle of the action.

Action-Related Annual GHG Emissions (mton/yr)						
YEAR	**CO2**	**CH4**	**N2O**	**CO2e**	**Threshold**	**Exceedance**
2027	54	0.00213032	0.00049808	54	68,039	No
2028	1,312	0.05150312	0.01132724	1,317	68,039	No

The following U.S. and State's GHG emissions estimates (next two tables) are based on a five-year average (2016 through 2020) of individual state-reported GHG emissions (Reference: State Climate Summaries 2022, NOAA National Centers for Environmental Information, National Oceanic and Atmospheric Administration. https://statesummaries.ncics.org/downloads/).

State's Annual GHG Emissions (mton/yr)				
YEAR	**CO2**	**CH4**	**N2O**	**CO2e**
2027	58,221,463	107,271	6,992	58,335,727
2028	58,221,463	107,271	6,992	58,335,727

U.S. Annual GHG Emissions (mton/yr)				
YEAR	**CO2**	**CH4**	**N2O**	**CO2e**
2027	5,136,454,179	25,626,912	1,500,708	5,163,581,798
2028	5,136,454,179	25,626,912	1,500,708	5,163,581,798

GHG Relative Significance Assessment:

A Relative Significance Assessment uses the rule of reason and the concept of proportionality along with the consideration of the affected area (yGba.e., global, national, and regional) and the degree (intensity) of the proposed action's effects. The Relative Significance Assessment provides real-world context and allows for a reasoned choice against alternatives through a relative comparison analysis. The analysis weighs each alternative's annual net change in GHG emissions proportionally against (or relative to) global, national, and regional emissions.

The action's surroundings, circumstances, environment, and background (context associated with an action) provide the setting for evaluating the GHG intensity (impact significance). From an air quality perspective, context of an action is the local area's ambient air quality relative to meeting the NAAQSs, expressed as attainment, nonattainment, or maintenance areas (this designation is considered the attainment status). GHGs are non-hazardous to health at normal ambient concentrations and, at a cumulative global scale, action-related GHG emissions can only potentially cause warming of the climatic system. Therefore, the action-related GHGs generally have an insignificant impact to local air quality.

However, the affected area (context) of GHG/climate change is global. Therefore, the intensity or degree of the proposed action's GHG/climate change effects are gauged through the quantity of GHG associated with the action as compared to a baseline of the state, U.S., and global GHG inventories. Each action (or alternative) has significance, based on their annual net change in GHG emissions, in relation to or proportionally to the global, national, and regional annual GHG emissions.

To provide real-world context to the GHG and climate change effects on a global scale, an action's net change in GHG emissions is compared relative to the state (where action will occur) and U.S. annual emissions. The following table provides a relative comparison of an action's net change in GHG emissions vs. state and U.S. projected GHG emissions for the same time period.

Total GHG Relative Significance (mton)					
		CO2	CH4	N2O	CO2e
2027-2040	State Total	174,664,390	321,814	20,976	175,007,180
2027-2040	U.S. Total	15,409,362,537	76,880,735	4,502,123	15,490,745,395
2027-2040	Action	1,319	0.051805	0.01145	1,324
Percent of State Totals		0.00075539%	0.00001610%	0.00005459%	0.00075660%
Percent of U.S. Totals		0.00000856%	0.00000007%	0.00000025%	0.00000855%

Climate Change Assessment (as SC GHG):

On a global scale, the potential climate change effects of an action are indirectly addressed and put into context through providing the theoretical SC GHG associated with an action. The SC GHG is an administrative and theoretical tool intended to provide additional context to a GHG's potential impacts through approximating the long-term monetary damage that may result from GHG emissions affect on climate change. It is important to note that the SC GHG is a monetary quantification, in 2020 U.S. dollars, of the theoretical economic damages that could result from emitting GHGs into the atmosphere.

The SC GHG estimates are derived using the methodology and discount factors in the "Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990," released by the Interagency Working Group on Social Cost of Greenhouse Gases (IWG SC GHGs) in February 2021.

The speciated IWG Annual SC GHG Emission associated with an action (or alternative) are first estimated as annual unit cost (cost per metric ton, $/mton). Results of the annual IWG Annual SC GHG Emission Assessments are tabulated in the IWG Annual SC GHG Cost per Metric Ton Table below:

IWG SC GHG Discount Factor: 2.5%

IWG Annual SC GHG Cost per Metric Ton ($/mton [In 2020 $])			
YEAR	CO2	CH4	N2O
2027	$86.00	$2,300.00	$31,000.00
2028	$87.00	$2,400.00	$32,000.00

Action-related SC GHG were estimated by calendar-year for the projected action's lifecycle. Annual estimates were found by multiplying the annual emission for a given year by the corresponding IWG Annual SC GHG Emission value (see table above).

Action-Related Annual SC GHG ($K/yr [In 2020 $])				
YEAR	CO2	CH4	N2O	GHG
2027	$4.65	$0.00	$0.02	$4.67
2028	$114.13	$0.12	$0.36	$114.62

The following two tables summarize the U.S. and State's Annual SC GHG by calendar-year. The U.S. and State's Annual SC GHG are in 2020 dollars and were estimated by each year for the projected action lifecycle. Annual SC GHG estimates were found by multiplying the U.S. and State's annual five-year average GHG emissions for a given year by the corresponding IWG Annual SC GHG Cost per Metric Ton value.

State's Annual SC GHG ($K/yr [In 2020 $])				
YEAR	**CO2**	**CH4**	**N2O**	**GHG**
2027	$5,007,045.84	$246,723.85	$216,754.31	$5,470,524.00
2028	$5,065,267.31	$257,450.98	$223,746.38	$5,546,464.67

U.S. Annual SC GHG ($K/yr [In 2020 $])				
YEAR	**CO2**	**CH4**	**N2O**	**GHG**
2027	$441,735,059.39	$58,941,896.86	$46,521,936.72	$547,198,892.97
2028	$446,871,513.57	$61,504,588.03	$48,022,644.35	$556,398,745.96

Relative Comparison of SC GHG:

To provide additional real-world context to the potential climate change impact associate with an action, a Relative Comparison of SC GHG Assessment is also performed. While the SC GHG estimates capture an indirect approximation of global climate damages, the Relative Comparison of SC GHG Assessment provides a better perspective from a regional and global scale.

The Relative Comparison of SC GHG Assessment uses the rule of reason and the concept of proportionality along with the consideration of the affected area (yGba.e., global, national, and regional) and the SC GHG as the degree (intensity) of the proposed action's effects. The Relative Comparison Assessment provides real-world context and allows for a reasoned choice among alternatives through a relative contrast analysis which weighs each alternative's SC GHG proportionally against (or relative to) existing global, national, and regional SC GHG. The below table provides a relative comparison between an action's SC GHG vs. state and U.S. projected SC GHG for the same time period:

Total SC-GHG ($K [In 2020 $])					
		CO2	**CH4**	**N2O**	**GHG**
2027-2040	State Total	$15,195,801.92	$772,352.93	$664,247.07	$16,632,401.92
2027-2040	U.S. Total	$1,340,614,540.72	$184,513,764.10	$142,567,225.42	$1,667,695,530.24
2027-2040	Action	$114.69	$0.12	$0.37	$115.18
Percent of State Totals		0.00075473%	0.00001605%	0.00005509%	0.00069249%
Percent of U.S. Totals		0.00000855%	0.00000007%	0.00000026%	0.00000691%

From a global context, the action alternative's total SC GHG percentage of total global SC GHG for the same time period is: 0.00000093%.*

* Global value based on the U.S. emits 13.4% of all global GHG annual emissions (2018 Emissions Data, Center for Climate and Energy Solutions, accessed 7-6-2023, https://www.c2es.org/content/international-emissions).

Name, Title **Date**