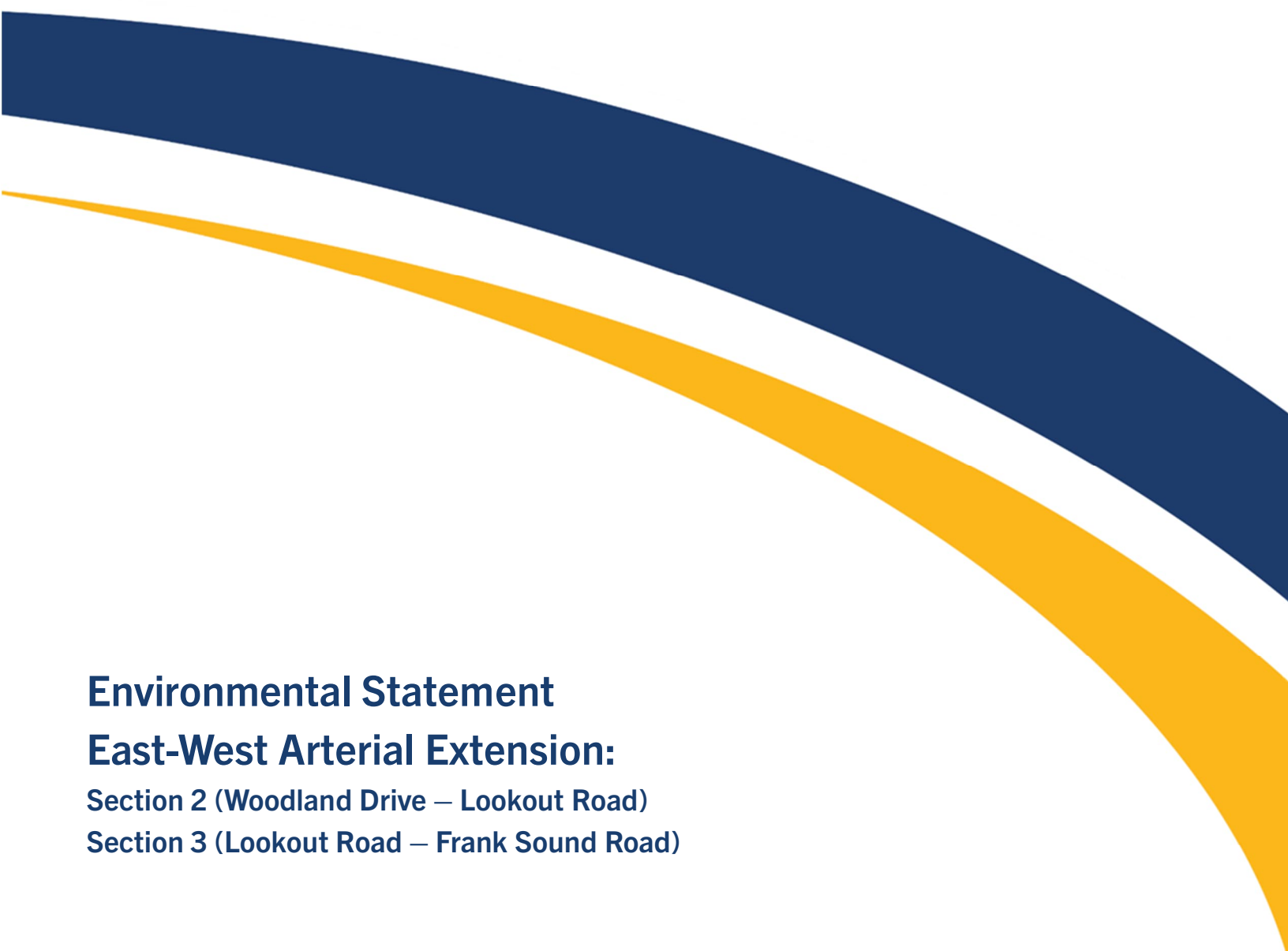


Appendix I – Greenhouse Gas Emissions



Environmental Statement

East-West Arterial Extension:

Section 2 (Woodland Drive – Lookout Road)

Section 3 (Lookout Road – Frank Sound Road)

Appendix I.1 – Traffic Data for Greenhouse Gas Analysis

Class 1 Motorcycles		Class 7 Four or more axle, single unit	
Class 2 Passenger cars		Class 8 Four or less axle, single trailer	
			
			
			
Class 3 Four tire, single unit		Class 9 5-Axle tractor semitrailer	
			
		Class 10 Six or more axle, single trailer	
Class 4 Buses			
		Class 11 Five or less axle, multi trailer	
			
Class 5 Two axle, six tire, single unit		Class 12 Six axle, multi-trailer	
			
		Class 13 Seven or more axle, multi-trailer	
Class 6 Three axle, single unit			
			
			
			

Figure A-1 Federal Highway Administration Vehicle Classification

All EPA MOVES runs applied the identical Federal Highway Administration vehicle classification distribution. Table A-1 provides the classifications by vehicle type discussed throughout the Greenhouse Gas Report

Table A-1 Segment Data – Morning AM Baseline 2021

MOVES Category	FHWA Classification
Motorcycles	1
Passenger cars	2-3
Buses	4
Single Unit Short-Haul Trucks	6-10
Combination Unit Short-Haul Trucks	11-13

Table A-2 Segment Data – Morning AM Baseline 2021

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	1595	0.68	29.5	Shamrock Rd: Hirst Rd to Woodland Dr
2	Urban	1388	2.09	34.7	Coastal Rd: Woodland to Condor Rd
3	Urban	656	1.17	27.8	Coastal Rd: Condor Rd to Bodden Town Bypass
4	Urban	624	4.54	35.9	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
5	Urban	360	0.71	29.6	Hirst Rd
6	Urban	262	3.60	40.7	Frank Sound Rd

Table A-3 Segment Data – Evening PM Baseline 2021

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	1601	0.68	29.7	Shamrock Rd: Hirst Rd to Woodland Dr
2	Urban	1580	2.09	32.8	Coastal Rd: Woodland to Condor Rd
3	Urban	929	1.17	26.7	Coastal Rd: Condor Rd to Bodden Town Bypass
4	Urban	917	4.54	34.7	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
5	Urban	795	0.71	28.3	Hirst Rd
6	Urban	417	3.60	45.7	Frank Sound Rd

Table A-4 Segment Data – Morning AM No Build 2026

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	1115	0.68	33.2	Shamrock Rd: Hirst Rd to Woodland Dr
2	Urban	1726	2.09	32.9	Coastal Rd: Woodland to Condor Rd
3	Urban	653	1.17	27.8	Coastal Rd: Condor Rd to Bodden Town Bypass
4	Urban	863	4.54	34.9	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
5	Urban	189	0.71	29.9	Hirst Rd
6	Urban	491	3.60	40.4	Frank Sound Rd

Table A-5 Segment Data – Evening PM No Build 2026

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	1157	0.68	33.2	Shamrock Rd: Hirst Rd to Woodland Dr
2	Urban	1905	2.09	31.7	Coastal Rd: Woodland to Condor Rd
3	Urban	955	1.17	26.5	Coastal Rd: Condor Rd to Bodden Town Bypass
4	Urban	1124	4.54	33.6	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
5	Urban	656	0.71	28.6	Hirst Rd
6	Urban	608	3.60	45.3	Frank Sound Rd

Table A-6 Segment Data – Morning AM Proposed Project 2026

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	221	2.90	24.5	Will T
2	Urban	1230	2.52	43.5	Agricola Dr. Connector to Lookout Rd
3	Urban	886	1.38	46.5	Lookout Rd to Meagre Bay Pond
4	Rural	818	4.00	45.0	Meagre Bay Pond to Frank Sound Rd
5	Urban	843	0.68	34.5	Shamrock Rd: Hirst Rd to Woodland Dr
6	Urban	732	2.09	37.5	Coastal Rd: Woodland to Condor Rd
7	Urban	194	1.17	29.0	Coastal Rd: Condor Rd to Bodden Town Bypass
8	Urban	169	4.54	37.0	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
9	Urban	200	0.71	30.0	Hirst Rd from Shamrock Rd to EWA
10	Urban	597	3.60	40.0	Frank Sound Rd: Bodden Town Rd to Old Robin Rd

Table A-7 Segment Data – Evening PM Proposed Project 2026

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	101	2.90	24.5	Will T
2	Urban	1327	2.52	43.0	Agricola Dr. Connector to Lookout Rd
3	Urban	1094	1.38	46.0	Lookout Rd to Meagre Bay Pond
4	Rural	953	4.00	43.5	Meagre Bay Pond to Frank Sound Rd
5	Urban	636	0.68	36.0	Shamrock Rd: Hirst Rd to Woodland Dr
6	Urban	829	2.09	38.5	Coastal Rd: Woodland to Condor Rd
7	Urban	326	1.17	29.0	Coastal Rd: Condor Rd to Bodden Town Bypass
8	Urban	292	4.54	37.0	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
9	Urban	405	0.71	30.0	Hirst Rd from Shamrock Rd to EWA
10	Urban	780	3.60	46.0	Frank Sound Rd: Bodden Town Rd to Old Robin Rd

Table A-8 Segment Data – Morning AM No Build 2036

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	1464	0.68	30.8	Shamrock Rd: Hirst Rd to Woodland Dr
2	Urban	2541	2.09	26.3	Coastal Rd: Woodland to Condor Rd
3	Urban	1243	1.17	24.7	Coastal Rd: Condor Rd to Bodden Town Bypass
4	Urban	1665	4.54	29.7	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
5	Urban	401	0.71	29.7	Hirst Rd
6	Urban	1036	3.60	39.9	Frank Sound Rd

Table A-9 Segment Data – Evening PM No Build 2036

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	1708	0.68	28.8	Shamrock Rd: Hirst Rd to Woodland Dr
2	Urban	2614	2.09	24.7	Coastal Rd: Woodland to Condor Rd
3	Urban	1687	1.17	22.3	Coastal Rd: Condor Rd to Bodden Town Bypass
4	Urban	1862	4.54	28.2	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
5	Urban	935	0.71	27.6	Hirst Rd
6	Urban	1079	3.60	44.8	Frank Sound Rd

Table A-10 Segment Data – Morning AM Proposed Project 2036

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	200	2.90	24.5	Will T
2	Urban	1622	2.52	38.5	Agricola Dr. Connector to Lookout Rd
3	Urban	1308	1.38	43.5	Lookout Rd to Meagre Bay Pond
4	Rural	1242	4.00	42.5	Meagre Bay Pond to Frank Sound Rd
5	Urban	1087	0.68	33.5	Shamrock Rd: Hirst Rd to Woodland Dr
6	Urban	1241	2.09	34.5	Coastal Rd: Woodland to Condor Rd
7	Urban	441	1.17	28.5	Coastal Rd: Condor Rd to Bodden Town Bypass
8	Urban	540	4.54	35.5	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
9	Urban	218	0.71	30.0	Hirst Rd from Shamrock Rd to EWA
10	Urban	1089	3.60	39.0	Frank Sound Rd: Bodden Town Rd to Old Robin Rd

Table A-11 Segment Data – Evening PM Proposed Project 2036

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	96	2.90	24.5	Will T
2	Urban	1694	2.52	39.0	Agricola Dr. Connector to Lookout Rd
3	Urban	1489	1.38	43.0	Lookout Rd to Meagre Bay Pond
4	Rural	1375	4.00	41.5	Meagre Bay Pond to Frank Sound Rd
5	Urban	840	0.68	35.0	Shamrock Rd: Hirst Rd to Woodland Dr
6	Urban	1238	2.09	36.0	Coastal Rd: Woodland to Condor Rd
7	Urban	524	1.17	28.0	Coastal Rd: Condor Rd to Bodden Town Bypass
8	Urban	596	4.54	35.5	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
9	Urban	430	0.71	30.0	Hirst Rd from Shamrock Rd to EWA
10	Urban	1249	3.60	44.5	Frank Sound Rd: Bodden Town Rd to Old Robin Rd

Table A-12 Segment Data – Morning AM No Build 2046

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	1619	0.68	29.5	Shamrock Rd: Hirst Rd to Woodland Dr
2	Urban	3078	2.09	22.2	Coastal Rd: Woodland to Condor Rd
3	Urban	1838	1.17	20.4	Coastal Rd: Condor Rd to Bodden Town Bypass
4	Urban	2384	4.54	24	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
5	Urban	451	0.71	29.6	Hirst Rd
6	Urban	879	3.60	39.7	Frank Sound Rd

Table A-13 Segment Data – Evening PM No Build 2046

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	2358	0.68	23.4	Shamrock Rd: Hirst Rd to Woodland Dr
2	Urban	3238	2.09	20.3	Coastal Rd: Woodland to Condor Rd
3	Urban	2374	1.17	18.1	Coastal Rd: Condor Rd to Bodden Town Bypass
4	Urban	2503	4.54	23.1	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
5	Urban	1044	0.71	26.9	Hirst Rd
6	Urban	861	3.60	44.6	Frank Sound Rd

Table A-14 Segment Data – Morning AM Proposed Project 2046

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	165	2.90	24.0	Will T
2	Urban	2354	2.52	45.0	Agricola Dr. Connector to Lookout Rd
3	Urban	1827	1.38	38.5	Lookout Rd to Meagre Bay Pond
4	Rural	1751	4.00	38.5	Meagre Bay Pond to Frank Sound Rd
5	Urban	1189	0.68	33.0	Shamrock Rd: Hirst Rd to Woodland Dr
6	Urban	1289	2.09	34.5	Coastal Rd: Woodland to Condor Rd
7	Urban	526	1.17	28.5	Coastal Rd: Condor Rd to Bodden Town Bypass
8	Urban	754	4.54	35.0	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
9	Urban	229	0.71	30.0	Hirst Rd from Shamrock Rd to EWA
10	Urban	1619	3.60	37.0	Frank Sound Rd: Bodden Town Rd to Old Robin Rd

Table A-15 Segment Data – Evening PM Proposed Project 2046

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	99	2.90	25.0	Will T
2	Urban	2343	2.52	44.0	Agricola Dr. Connector to Lookout Rd
3	Urban	1878	1.38	38.5	Lookout Rd to Meagre Bay Pond
4	Rural	1686	4.00	38.5	Meagre Bay Pond to Frank Sound Rd
5	Urban	1111	0.68	34.0	Shamrock Rd: Hirst Rd to Woodland Dr
6	Urban	1308	2.09	35.0	Coastal Rd: Woodland to Condor Rd
7	Urban	660	1.17	28.0	Coastal Rd: Condor Rd to Bodden Town Bypass
8	Urban	947	4.54	35.0	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
9	Urban	456	0.71	30.0	Hirst Rd from Shamrock Rd to EWA
10	Urban	1590	3.60	42.5	Frank Sound Rd: Bodden Town Rd to Old Robin Rd

Table A-16 Segment Data – Morning AM No Build Low Volume 2074

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	1472	0.68	30.6	Shamrock Rd: Hirst Rd to Woodland Dr
2	Urban	3489	2.09	22.5	Coastal Rd: Woodland to Condor Rd
3	Urban	1989	1.17	16.9	Coastal Rd: Condor Rd to Bodden Town Bypass
4	Urban	3394	4.54	18.1	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
5	Urban	1273	0.71	25.6	Hirst Rd
6	Urban	1480	3.60	36.5	Frank Sound Rd

Table A-17 Segment Data – Evening PM No Build Low Volume 2074

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	1326	0.68	31.0	Shamrock Rd: Hirst Rd to Woodland Dr
2	Urban	3507	2.09	22.4	Coastal Rd: Woodland to Condor Rd
3	Urban	2069	1.17	17.0	Coastal Rd: Condor Rd to Bodden Town Bypass
4	Urban	3356	4.54	18.2	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
5	Urban	1361	0.71	24.9	Hirst Rd
6	Urban	1065	3.60	41.8	Frank Sound Rd

Table A-18 Segment Data – Morning AM Proposed Project Low Volume 2074

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	235	2.90	24.5	Will T
2	Urban	3612	2.52	42.0	Agricola Dr. Connector to Lookout Rd
3	Urban	3105	1.38	44.5	Lookout Rd to Meagre Bay Pond
4	Rural	2926	4.00	43.5	Meagre Bay Pond to Frank Sound Rd
5	Urban	1837	0.68	28.0	Shamrock Rd: Hirst Rd to Woodland Dr
6	Urban	1994	2.09	33.5	Coastal Rd: Woodland to Condor Rd
7	Urban	538	1.17	28.0	Coastal Rd: Condor Rd to Bodden Town Bypass
8	Urban	732	4.54	35.5	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
9	Urban	451	0.71	30.0	Hirst Rd from Shamrock Rd to EWA
10	Urban	2520	3.60	33.0	Frank Sound Rd: Bodden Town Rd to Old Robin Rd

Table A-19 Segment Data – Evening PM Proposed Project Low Volume 2074

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	233	2.90	24.0	Will T
2	Urban	3573	2.52	43.5	Agricola Dr. Connector to Lookout Rd
3	Urban	2985	1.38	45.0	Lookout Rd to Meagre Bay Pond
4	Rural	2795	4.00	43.0	Meagre Bay Pond to Frank Sound Rd
5	Urban	1839	0.68	28.5	Shamrock Rd: Hirst Rd to Woodland Dr
6	Urban	2138	2.09	32.5	Coastal Rd: Woodland to Condor Rd
7	Urban	764	1.17	27.5	Coastal Rd: Condor Rd to Bodden Town Bypass
8	Urban	913	4.54	34.5	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
9	Urban	601	0.71	29.0	Hirst Rd from Shamrock Rd to EWA
10	Urban	2520	3.60	37.5	Frank Sound Rd: Bodden Town Rd to Old Robin Rd

Table A-20 Segment Data – Morning AM No Build Medium Volume 2074

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	2830	0.68	21.8	Shamrock Rd: Hirst Rd to Woodland Dr
2	Urban	4627	2.09	14.8	Coastal Rd: Woodland to Condor Rd
3	Urban	2998	1.17	15.1	Coastal Rd: Condor Rd to Bodden Town Bypass
4	Urban	3582	4.54	15.9	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
5	Urban	782	0.71	28.1	Hirst Rd
6	Urban	1379	3.60	37.4	Frank Sound Rd

Table A-21 Segment Data – Evening PM No Build Medium Volume 2074

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	4048	0.68	13.6	Shamrock Rd: Hirst Rd to Woodland Dr
2	Urban	4699	2.09	14.0	Coastal Rd: Woodland to Condor Rd
3	Urban	3157	1.17	14.2	Coastal Rd: Condor Rd to Bodden Town Bypass
4	Urban	3592	4.54	15.8	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
5	Urban	1199	0.71	25.7	Hirst Rd
6	Urban	1366	3.60	36.2	Frank Sound Rd

Table A-22 Segment Data – Morning AM Proposed Project Medium Volume 2074

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	210	2.90	24.0	Will T
2	Urban	3757	2.52	43.0	Agricola Dr. Connector to Lookout Rd
3	Urban	2987	1.38	45.5	Lookout Rd to Meagre Bay Pond
4	Rural	2848	4.00	43.5	Meagre Bay Pond to Frank Sound Rd
5	Urban	1841	0.68	28.0	Shamrock Rd: Hirst Rd to Woodland Dr
6	Urban	1947	2.09	31.5	Coastal Rd: Woodland to Condor Rd
7	Urban	657	1.17	28.0	Coastal Rd: Condor Rd to Bodden Town Bypass
8	Urban	1174	4.54	34.5	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
9	Urban	1071	0.71	32.5	Hirst Rd from Shamrock Rd to EWA
10	Urban	2459	3.60	34.5	Frank Sound Rd: Bodden Town Rd to Old Robin Rd

Table A-23 Segment Data – Evening PM Proposed Project Medium Volume 2074

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	134	2.90	24.5	Will T
2	Urban	3510	2.52	45.0	Agricola Dr. Connector to Lookout Rd
3	Urban	3197	1.38	46.0	Lookout Rd to Meagre Bay Pond
4	Rural	2990	4.00	44.0	Meagre Bay Pond to Frank Sound Rd
5	Urban	1776	0.68	29.0	Shamrock Rd: Hirst Rd to Woodland Dr
6	Urban	2080	2.09	31.5	Coastal Rd: Woodland to Condor Rd
7	Urban	751	1.17	27.5	Coastal Rd: Condor Rd to Bodden Town Bypass
8	Urban	971	4.54	34.0	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
9	Urban	1218	0.71	27.0	Hirst Rd from Shamrock Rd to EWA
10	Urban	2676	3.60	38.5	Frank Sound Rd: Bodden Town Rd to Old Robin Rd

Table A-24 Segment Data – Morning AM No Build High Volume 2074

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	4183	0.68	13.5	Shamrock Rd: Hirst Rd to Woodland Dr
2	Urban	8519	2.09	6.0	Coastal Rd: Woodland to Condor Rd
3	Urban	6686	1.17	5.0	Coastal Rd: Condor Rd to Bodden Town Bypass
4	Urban	7830	4.54	6.0	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
5	Urban	2680	0.71	18.0	Hirst Rd
6	Urban	4425	3.60	15.5	Frank Sound Rd

Table A-25 Segment Data – Evening PM No Build High Volume 2074

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	4650	0.68	10.7	Shamrock Rd: Hirst Rd to Woodland Dr
2	Urban	8670	2.09	5.2	Coastal Rd: Woodland to Condor Rd
3	Urban	7543	1.17	5	Coastal Rd: Condor Rd to Bodden Town Bypass
4	Urban	8597	4.54	5	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
5	Urban	2685	0.71	18.3	Hirst Rd
6	Urban	3368	3.60	26.1	Frank Sound Rd

Table A-26 Segment Data – Morning AM Proposed Project High Volume 2074

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	231	2.90	22.5	Will T
2	Urban	11260	2.52	27.0	Agricola Dr. Connector to Lookout Rd
3	Urban	10610	1.38	36.5	Lookout Rd to Meagre Bay Pond
4	Rural	10442	4.00	34.5	Meagre Bay Pond to Frank Sound Rd
5	Urban	12118	0.68	21.0	Shamrock Rd: Hirst Rd to Woodland Dr
6	Urban	10156	2.09	18.5	Coastal Rd: Woodland to Condor Rd
7	Urban	6442	1.17	16.0	Coastal Rd: Condor Rd to Bodden Town Bypass
8	Urban	7121	4.54	26.5	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
9	Urban	2359	0.71	17.5	Hirst Rd from Shamrock Rd to EWA
10	Urban	6348	3.60	16.5	Frank Sound Rd: Bodden Town Rd to Old Robin Rd

Table A-27 Segment Data – Evening PM Proposed Project High Volume 2074

Segment ID	Road Type	Segment Volume (veh/hr)	Segment Length (miles)	Segment Average Speed (mph)	Segment Description
1	Urban	779	2.90	23.5	Will T
2	Urban	9776	2.52	33.0	Agricola Dr. Connector to Lookout Rd
3	Urban	8582	1.38	46.0	Lookout Rd to Meagre Bay Pond
4	Rural	7664	4.00	43.0	Meagre Bay Pond to Frank Sound Rd
5	Urban	9434	0.68	14.0	Shamrock Rd: Hirst Rd to Woodland Dr
6	Urban	8968	2.09	13.5	Coastal Rd: Woodland to Condor Rd
7	Urban	6568	1.17	18.5	Coastal Rd: Condor Rd to Bodden Town Bypass
8	Urban	7199	4.54	27.0	Coastal Rd: Bodden Town Bypass to Frank Sound Rd
9	Urban	1908	0.71	19.0	Hirst Rd from Shamrock Rd to EWA
10	Urban	4640	3.60	18.0	Frank Sound Rd: Bodden Town Rd to Old Robin Rd

Appendix I.2 – Bulk Materials Greenhouse Gas Analysis

Preferred Alternative Quantity Summary

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NOTE:
 Items listed here are known and quantifiable items.
 Other known items not able to be quantified at this time are to be covered by separate contingencies:
 - Stormwater Conveyance
 - Signing and Pavement Markings
 - Maintenance and Protection of Traffic
 - Construction Management and Inspection
 - Erosion and Sedimentation Pollution Control
 - Design Engineering Services

Other unknown items to be covered by a general overall contingency

Individual Traffic Signal Items to include any and all equipment necessary for the functioning of the signal including mast arms and foundations, power supply conduit and trenching, signal heads, detection systems, and controller cabinets.

Highlighted excavation columns correspond to an adjusted value of material based on shrink/swell factors associated with the material properties to account for cost associated with trucking volumes.

No-Build Alternative Quantity Summary

Build Year		COMPACTED ASPHALT, 2" DEPTH COMPACTED ASPHALT, 3.5" DEPTH CRUSHER RUN, 6" DEPTH CAYMAN ROCK, 6" DEPTH MILLING, 2" DEPTH ASPHALT TACK COAT PAVEMENT MARKINGS, WHITE GENERAL EXCAVATION							
		SQ YD	SQ YD	SQ YD	SQ YD	SQ YD	SQ YD	LF	CU YD
2026	New Construction								
	Rehabilitation/Resurfacing	180,017	18,002	18,002	18,002	180,017	378,036	48,500	8,001
2036	New Construction								
	Rehabilitation/Resurfacing	180,017	18,002	18,002	18,002	180,017	378,036	48,500	8,001
2046	New Construction								
	Rehabilitation/Resurfacing		180,017	180,017	180,017		180,017	48,500	80,008
2060	New Construction								
	Rehabilitation/Resurfacing	180,017	18,002	18,002	18,002	180,017	378,036	48,500	8,001
Total/Life	New Construction								
	Rehabilitation/Resurfacing	540,051	234,022	234,022	234,022	540,051	1,314,124	194,000	104,010
	Item Grand Total	540,051	234,022	234,022	234,022	540,051	1,314,124	194,000	104,010

Proposed Project Bulk Materials Emission Calculations

[illegible]

	TOTAL MT CO2e
2026	24,747.83
2036	21,573.81
2046	16,916.15
2060	23,349.85
2074	12,325.02
Total	97,952.66

Build Year		COMPACTED ASPHALT, 2" DEPTH	COMPACTED ASPHALT, 3.5" DEPTH	CRUSHER RUN, 6" DEPTH	CAYMAN ROCK, 6" DEPTH	MILLING, 2" DEPTH	ASPHALT TACK COAT	PAVEMENT MARKINGS, WHITE	GENERAL EXCAVATION
	Type	Asphalt	Asphalt	Rock	Rock	Asphalt	Asphalt	Marking	Soil
	EF (tCO2e/t)	0.055	0.055	0.007	0.007	0.055	0.055	5.7	0.007
	Density (t/m3)	2.3	2.3	2	2	2.3	2.3	1.4	1.7
	Depth/Height (in)	2	3.5	6	6	2	0.00984252		
	Diameter (in)								
	Material Units	SQ YD	SQ YD	SQ YD	SQ YD	SQ YD	SQ YD	LF	CU YD
2026	New Construction	0	0	0	0	0	0	0	0
	Rehabilitation/Resurfacing	180,017	18,002	18,002	18,002	180,017	378,036	48,500	8,001
2036	New Construction	0	0	0	0	0	0	0	0
	Rehabilitation/Resurfacing	180,017	18,002	18,002	18,002	180,017	378,036	48,500	8,001
2046	New Construction	0	0	0	0	0	0	0	0
	Rehabilitation/Resurfacing	0	180,017	180,017	180,017	0	180,017	48,500	80,008
2060	New Construction	0	0	0	0	0	0	0	0
	Rehabilitation/Resurfacing	180,017	18,002	18,002	18,002	180,017	378,036	48,500	8,001
Total/Life	New Construction	0	0	0	0	0	0	0	0
	Rehabilitation/Resurfacing	0	0	0	0	0	0	0	0
	Item Grand Total	540,051	234,022	234,022	234,022	540,051	1,314,124	194,000	104,010
2026	MT/year CO2e	967.25	169.27	32.11	32.11	967.25	10.00	53.93	72.79
2036	MT/year CO2e	967.25	169.27	32.11	32.11	967.25	10.00	53.93	72.79
2046	MT/year CO2e	0.00	1,692.69	321.14	321.14	0.00	4.76	53.93	727.93
2060	MT/year CO2e	967.25	169.27	32.11	32.11	967.25	10.00	53.93	72.79
Total/Life	MT/year CO2e	2,901.76	2,200.50	417.49	417.49	2,901.76	34.75	215.74	946.30

The diagram shows a crane boom with a height of 100 ft and a length of 100 ft. A table below the diagram lists dimensions for Series 161 and Series 182 Truss Arm.

Series 161 / Series 182 Truss Arm	Height (ft)	Length (ft)
161	100	100
182	100	100
182	100	100
182	100	100
182	100	100

Below the table, there are two small diagrams labeled 161 and 182, showing the truss arm structure.

Column	Stress Member Area (in ²)	Stress Member Area (in ²)	Stress Member Area (in ²)	Stress Member Area (in ²)	Stress Member Area (in ²)	Stress Member Area (in ²)	Stress Member Area (in ²)
SPR121-001	8	6	4.5	0.125	8	8	8
SPR121-002	13	6	4.5	0.125	8	8	8
SPR121-003	12	6	4.5	0.125	8	8	8
SPR121-004	14	6	4.5	0.125	8	8	8

Column	Stress Member Area (in ²)	Stress Member Area (in ²)	Stress Member Area (in ²)	Stress Member Area (in ²)	Stress Member Area (in ²)	Stress Member Area (in ²)	Stress Member Area (in ²)
SPR122-001	8	6	4.5	0.125	10	10	10
SPR122-002	10	6	4.5	0.125	10	10	10
SPR122-003	12	6	4.5	0.125	10	10	10
SPR122-004	16	6	4.5	0.125	10	10	10

Average length, Waga, CED
 Average length, Waga, Gail
<http://www.gailweichta.com>
<http://www.gailweichta.com>

THSS kg CO₂ LCA kg CO₂/t raw

Table 7: Pearson and Spearman correlation coefficients, Spearman's rho (Spearman), Pearson's r (Pearson), Kendall's tau (Kendall), and the rank correlation coefficient (R) for the 2007-2012 period										
Table 7.14: UK stock indices of the 2007-2012 period										
	FTSE 100	UK All-Share	FTSE 250	FTSE SmallCap	FTSE 100	UK All-Share	FTSE 250	FTSE SmallCap	FTSE 100	UK All-Share
FTSE 100	1.0000				1.0000				1.0000	
UK All-Share	0.981	1.0000			0.972	1.0000		0.973	1.0000	
FTSE 250	0.959	0.929	1.0000		0.950	0.929	1.0000		0.950	1.0000
FTSE SmallCap	0.933	0.910	0.904	1.0000	0.924	0.909	0.904	1.0000	0.924	0.909
Spearman's rho	1.0000				1.0000				1.0000	
Pearson's r	1.0000				1.0000				1.0000	
Kendall's tau	1.0000				1.0000				1.0000	
Rank correlation coefficient	1.0000				1.0000				1.0000	
FTSE 100	1.0000				1.0000				1.0000	
UK All-Share	0.981	1.0000			0.972	1.0000			0.973	1.0000
FTSE 250	0.959	0.929	1.0000		0.950	0.929	1.0000		0.950	1.0000
FTSE SmallCap	0.933	0.910	0.904	1.0000	0.924	0.909	0.904	1.0000	0.924	0.909
Spearman's rho	1.0000				1.0000				1.0000	
Pearson's r	1.0000				1.0000				1.0000	
Kendall's tau	1.0000				1.0000				1.0000	
Rank correlation coefficient	1.0000				1.0000				1.0000	

[illegible]

Raw Material	Use	Source/Reviewed
Structural Steel	Structural Beams	https://beta.metrotransittest.org/shelter-design?text=Most%20shelters%20include%3A_made%20of%20metal%20f https://www.skaghttransit.org/about-us/bus-stop-standards/#text=Compliance%20with%20ADA%20standards%20is_accessible%20for%20individuals%20with%20disabilities
Aluminum Sheet	Roof Panel	https://www.furniturestore.com/what-are-park-benches-made-of?text=From%20steel%20modern%20types%20to%20plastic%20to%20metal%20to%20welding
Tempered glass	Walls	https://www.theparkcatalog.com/park-benches-101#:text=Aluminum%20is%20appropriate%20for%20
Aluminum Cast	Benches	https://www.reliance-foundry.com/blog/park-benches-guide#:text=Aspheric%20Metal%20may%20provide%20structure_long%20lasting%20and%20low%20maintenance
Structural Steel	Roof Beam	

Assumptions

3-sided walls, open in front

Lighting is accounted for in the "lightpoles" material category

Depth (mm) 4 ft.

Depth (regular) 5 ft.

Width 14 ft.

Height 8.92 ft.

Side panels 3 inch off ground

Bench - Backless

Length 7.5 ft.

Width 1.71 ft.

Height 1.5 ft.

Thickness 0.17 ft.

Seat Volume 2.14 R3

Leg Volume 0.04 R3

Bench Volume 2.30 R3

Walls - Safety Glass

Length Back 14 ft.

Height Back 8.67 ft.

Area Back 121.3 R2

Length Side 5 ft.

Height Side 8.67 ft.

Area Sides 43.33 R2

Thickness 0.5 ft.

Weight 6.5 lb/ft2

Volume Side (1) 21.67 R3

Volume Back 60.7 R3

Structural Poles 5 Count/Shelter

Length 0.26 ft.

Width 0.26 ft.

Height 8.92 ft.

Volume per pole 0.61 R3

Volume per Shelter 3.07 R3

Roof

Structural Beam Leng 14 ft.

Structural Beam Wid 0.26 ft.

Structural Beam Heig 0.26 ft.

Roof Beam Volume 0.96 R3

Panel Length 14 ft.

Panel Width 3 ft.

Panel Thickness 0.003 ft.

Panel Volume (ea.) 0.14 R3

Bus Stop Shelter							
Unit	Count	Structural Beams	Roof Beam	Roof Panel	Wall - Sides	Wall - Back	Bench
Material		Structural Steel	Structural Steel	Aluminum Sheet	Safety Glass	Safety Glass	Aluminum Cast
Quantity per count		5.00	1.00	2.00	2.00	1	1
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2036	20.00	100.00	20.00	40.00	40.00	20.00	20.00
2044	4.00	20.00	4.00	8.00	8.00	4.00	4.00
2060	24.00	120.00	24.00	48.00	48.00	24.00	24.00
2074	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	48.00	240.00	48.00	96.00	96.00	48.00	48.00
MT CO2e/MT material	—	2.10	2.10	13.00	2.08	2.08	13.20
MT CO2e/item	—						
Density MT/m3	—	7.8	7.8	2.7	2.5	2.5	2.7
Area Material (ft2/item)					43.33	121.3	
Volume Material (ft3/item)	—	0.63	0.96	0.14	21.67	60.7	2.30
Weight Item (lb/item)	—				6.5	6.5	
2026 (MT CO2e)	—	0	0	0	0	0	0
2036 (MT CO2e)	—	28.51832855	8.955288218	5.565950208	127.6143787	178.6601301	46.46574504
2044 (MT CO2e)	—	5.70366571	1.791057644	1.1113190042	25.52287573	35.73202603	9.293149008
2060 (MT CO2e)	—	34.22199426	10.74634586	6.67914025	153.1372544	214.3921562	55.75889405
2074 (MT CO2e)	—	0	0	0	0	0	0
Total (MT CO2e)	—	68.44398852	21.49269172	13.3582805	306.2745088	428.7843123	111.5177881

Conversion Factors		
Conv (yd3-m3)	0.764555	m3/yard3
Conv (ft-m)	0.3048	m/ft
Conv (ft3-m3)	0.028317	m3/ft3
Conv (in-yd)	36	in/yd
Conv (MT-ton)	1.10231	tons/MT
Kerb	0.0431	
Conv (in-ft)	12	in/ft
Lightpoles	0.132	ton material/pole
Conv (yd2-m2)	0.836127	m2/yard2
Conv (g-MT)	0.000001	MT/g
Conv (lb-MT)	0.000454	MT/lb
Conv (ft-yd)	27	ft3/yard3
Conv (kg-MT)	0.001	MT/kg

Assessment of Embodied Carbon National Highways Carbon Tool shows 2.54 tCO₂e/t, but is not specific to "non-woven" geotextile.

<https://greenbuildingencycloj> Also in the National Highways Carbon Tool as the same value

Markings

https://safety.fhwa.dot.gov/roadway_dept/night_vision/pavement_marking/ch3.cfm
 https://www.transport.gov.scot/media/7639/durability-of-thermoelastic-road-markings-final.pdf
 Conversion
https://muted.fhwa.dot.gov/hm/2009/part3/fig3b_24_longdesc.htm
 Conservative assumption
 Conservative assumption
<https://stop-painting.com/standard-arrow-lane-marking-pack-of-2/8---text=This%20is%20a%20road%20lane%20marking%20symbol%20assumes,safety%20by%20clearly%20communicating%20traffic%20flow%20patterns>
<https://stop-painting.com/standard-arrow-lane-marking-pack-of-2/8---text=This%20is%20a%20road%20lane%20marking%20symbol%20assumes,safety%20by%20clearly%20communicating%20traffic%20flow%20patterns>
 Calculated
 Calculated
 Conservatively calculated assuming flat bottom arrow
 Calculated
 Calculated
 Calculated

thickness

<https://blacklidge.com/tack-coat-the-glue-that-holds-a-road-together-heres-how-to-get-it-right>

triangle base

Height

Estimate: <https://www.stlouispaving.com/services/concrete/curbing/#:~:text=it%20is%20commonly%20installed%20in,vehicle%20tires%20pushing%20against%20it>

Height

Data provided by client
Calculated
[Concrete Median Barriers | Precast Systems \(precastsystemsllc.com\)](#)
Calculated, LxW

Density

<https://www.earthshields.com/how-to-choose-geotextiles-by-density/>

Guard Ra

<https://www.idealshield.ca/wp-content/uploads/2022/12/HIGHWAY-GUARDRAIL-DRAWING-2022.pdf>
<https://www.roadsidepooloffund.org/hongtitudinal-barrier-w-beam-median-barrier/>
https://www.engineeringtoolbox.com/american-wide-flange-steel-beams-d_1319.html

Ideal Shield
 Ideal Shield
 Ideal Shield

Assuming

<https://www.belson.com/Concrete-Security-Barriers-Highway/?text=Concrete%20Highway%20Barriers%20-%20VB%2D8%20%2D%2096%22LVB%2D12%20%2D%20144%22L%20x%2024%22W%20x%2034%22H>

Weight 4:

<https://www.theturnerco.com/products/reinforced-concrete-pipe/>

Diameter

<https://oldcastleinfrastructure.com/product/48-dia-pipe-rcp-flared-end/>

Conservat

<https://www.commercial-industrial-supply.com/documents/schedule80-pipe.pdf>

may be more likely for this use.

length

Data provided by client

<https://wsdot.wa.gov/construction-planning/protecting-environment/noise-walls-barriers#:~:text=Most%20often%20we%20build%20noise,%2C%20but%20are%20often%20impractical>

<https://www.iberfence.com/atfec/atfec-highway-noise-barriers#:~:text=Our%20ATFEC%20highway%20sound%20barrier,fibers%2C%20or%20patented%20nylon%20fibers>

Run Type	Quantity	Size	Use

Run Type	Quantity	Size	Use
Street Crossings	2	3" ²	High voltage load wiring
		1" ²	Low voltage detection
		2" ²	Laminated load
Signal Pole	2	3" ²	High voltage
		1" ²	Low voltage
Pedestal Pole	1	3" ²	High voltage
		1" ²	Low voltage
Pushbutton Pole	1	3" ²	Low Voltage
Controller Cabinet	2	3" ²	High voltage load wiring
		2" ²	Low voltage detection - size per Code
		1" ²	Service power
		1" ²	Interconnect
Interconnect	1	2" ²	Interconnect run only
Service Points			
Signal	1	2" ²	Utility company service run for traffic signal

Appendix I.3 – Critical Pollutants Analysis Results

Table C-1 Criteria Pollutant Emissions by Analysis Year (Metric Tonnes)

Year	Scenario	AM MT/yr	PM MT/yr	Total MT/yr	AM MT/yr	PM MT/yr	Total MT/yr	AM MT/yr	PM MT/yr	Total MT/yr	AM MT/yr	PM MT/yr	Total MT/yr
		NOx Emissions			SO2 Emissions			VOC Emissions			PM2.5 Emissions		
2021	Baseline	85.96	146.08	232.03	3.44	5.65	9.10	32.27	53.79	86.07	2.32	3.87	6.19
2026	NoBuild	70.73	99.67	170.40	1.45	2.06	3.51	23.20	33.49	56.69	2.44	3.27	5.70
	Proposed	86.89	115.71	202.59	1.75	2.42	4.16	25.22	35.35	60.57	2.90	3.57	6.47
2036	NoBuild	21.99	28.76	50.74	0.14	0.20	0.35	4.86	6.95	11.81	0.90	1.09	1.99
	Proposed	21.07	25.01	46.08	0.15	0.19	0.34	4.63	5.94	10.58	0.83	0.92	1.75
2046	NoBuild	4.99	7.23	12.22	0.15	0.20	0.35	2.07	3.72	5.79	0.15	0.23	0.39
	Proposed	4.49	5.26	9.74	0.15	0.19	0.34	2.06	2.88	4.94	0.16	0.20	0.36
2074	NoBuild_L	6.01	6.76	12.76	6.62	8.02	14.64	4.78	5.71	10.49	0.37	0.42	0.80
	NoBuild_M	8.15	11.65	19.80	8.71	11.63	20.33	6.25	10.93	17.18	0.49	0.67	1.16
	NoBuild_H	35.96	38.54	74.49	33.49	37.77	71.26	25.88	35.40	61.28	1.69	1.79	3.48
	Proposed_L	7.53	8.35	15.88	7.60	9.22	16.81	6.44	7.33	13.76	0.46	0.49	0.95
	Proposed_M	7.33	8.72	16.06	7.88	9.63	17.51	6.09	7.82	13.90	0.46	0.52	0.98
	Proposed_H	37.40	38.49	75.89	38.28	41.10	79.38	35.41	34.87	70.28	2.20	2.20	4.39

Table C-2 Criteria Pollutant Emissions by Analysis Year (Short Tons)

Year	Scenario	AM T/yr	PM T/yr	Total T/yr	AM T/yr	PM T/yr	Total T/yr	AM T/yr	PM T/yr	Total T/yr	AM T/yr	PM T/yr	Total T/yr
		NOx Emissions			SO2 Emissions			VOC Emissions			PM2.5 Emissions		
2021	Baseline	94.75	161.02	255.77	3.80	6.23	10.03	35.58	59.30	94.88	2.56	4.27	6.83
2026	NoBuild	77.97	109.87	187.84	1.60	2.27	3.87	25.57	36.92	62.49	2.68	3.60	6.29
	Proposed	95.78	127.55	223.32	1.92	2.66	4.59	27.81	38.96	66.77	3.20	3.93	7.13
2036	NoBuild	24.24	31.70	55.93	0.16	0.22	0.38	5.36	7.66	13.02	0.99	1.20	2.19
	Proposed	23.22	27.57	50.79	0.16	0.21	0.38	5.11	6.55	11.66	0.92	1.01	1.93
2046	NoBuild	5.50	7.97	13.47	0.16	0.22	0.39	2.28	4.10	6.38	0.17	0.25	0.43
	Proposed	4.94	5.79	10.74	0.17	0.20	0.37	2.28	3.18	5.45	0.18	0.22	0.40
2074	NoBuild_L	6.62	7.45	14.07	7.30	8.84	16.14	5.26	6.29	11.56	0.41	0.47	0.88
	NoBuild_M	8.99	12.84	21.83	9.60	12.81	22.41	6.89	12.05	18.94	0.54	0.73	1.27
	NoBuild_H	39.64	42.48	82.11	36.91	41.64	78.55	28.53	39.02	67.55	1.86	1.97	3.83
	Proposed_L	8.30	9.20	17.50	8.37	10.16	18.53	7.09	8.08	15.17	0.50	0.55	1.05
	Proposed_M	8.08	9.62	17.70	8.69	10.61	19.30	6.71	8.62	15.33	0.51	0.57	1.08
	Proposed_H	41.22	42.43	83.65	42.19	45.30	87.50	39.04	38.44	77.47	2.42	2.42	4.84

Appendix I.4 – Construction Emissions Analysis

		2006			2026			2046			2060		
		CO2	CH4	N2O*	CO2	CH4	N2O*	CO2	CH4	N2O*	CO2	CH4	N2O*
		Grams per Hour			Grams per Hour			Grams per Hour			Grams per Hour		
		90	5	6	90	5	6	90	5	6	90	5	6
Road Construction	MOVES Output Name												
	Pavers	40,352	1.15	1.07	40,391	0.19	0.18	40,392	0.13	0.12	40,393	0.13	0.12
	Rollers	30,458	0.82	0.76	30,461	0.21	0.20	30,463	0.15	0.14	30,463	0.15	0.14
	Excavators	54,647	1.70	1.58	54,730	0.13	0.12	54,731	0.09	0.09	54,731	0.09	0.09
	Graders	64,767	1.97	1.83	64,848	0.11	0.10	64,849	0.05	0.05	64,849	0.05	0.05
	Tractors/Loaders/Backhoes	12,989	0.53	0.49	13,060	0.17	0.16	13,071	0.03	0.03	13,071	0.03	0.03
	Crawler Tractor/Dozers	82,948	1.99	1.85	82,752	0.29	0.27	82,757	0.12	0.11	82,757	0.12	0.11
	Dumpers/Tenders	4,719	0.17	0.10	4,745	0.15	0.14	4,753	0.11	0.10	4,753	0.10	0.10
Electric Work	Surfacing Equipment	36,806	0.69	0.64	36,158	0.38	0.36	36,167	0.24	0.22	36,167	0.24	0.22
	Tractors/Loaders/Backhoes	12,989	0.53	0.49	13,060	0.17	0.16	13,071	0.03	0.03	13,071	0.03	0.03
	Cranes	53,123	1.26	1.17	52,949	0.21	0.20	52,954	0.05	0.05	52,954	0.05	0.05
	Bore/Drill Rigs	40,875	0.74	0.69	40,761	0.48	0.44	40,788	0.14	0.13	40,789	0.11	0.11
	Rough Terrain Forklifts	32,493	0.82	0.76	32,534	0.19	0.18	32,538	0.08	0.08	32,537	0.08	0.08
	Dumpers/Tenders	4,719	0.17	0.10	4,745	0.15	0.14	4,753	0.11	0.10	4,753	0.10	0.10
	Excavators	54,647	1.70	1.58	54,730	0.13	0.12	54,731	0.09	0.09	54,731	0.09	0.09

* Nonroad MOVES does not calculate N2O directly. Therefore, EPA non-road vehicle N2O emissions were determined based on a ratio. Table 5 - Construction/Mining Equipment

<https://www.epa.gov/system/files/documents/2024-02/rhg-emission-factors-hub-2024.pdf>

All other emission factors are derived from Non-road portion of EPA MOVES 4.0.1

		2026												
		Equipment					Emissions (Metric Tonnes)				Emissions (Short Tons)			
Project	Type	Number	Daily Schedule (hr/day)	Total Work Days	% of Equipment Utilization	Work Days of Equipment Utilization	CO2	CH4	N2O	CO2e	CO2	CH4	N2O	CO2e
Proposed Project	Pavers	4	8	697	33%	230	297.0	8.5E-03	7.9E-03	299.6	327.4	9.4E-03	8.7E-03	330.2
	Rollers	4	8	697	50%	349	340.2	9.1E-03	8.5E-03	342.9	375.0	1.0E-02	9.4E-03	378.0
	Excavators	4	8	697	75%	523	914.6	2.8E-02	2.6E-02	923.2	1008.1	3.1E-02	2.9E-02	1017.6
	Graders	4	8	697	50%	349	723.3	2.2E-02	2.0E-02	730.0	797.3	2.4E-02	2.3E-02	804.7
	Tractors/Loaders/Backhoes	3	8	697	75%	523	163.0	6.6E-03	6.2E-03	165.0	179.7	7.3E-03	6.8E-03	181.9
	Crawler Tractor/Dozers	4	8	697	75%	523	1388.2	3.3E-02	3.1E-02	1398.3	1530.2	3.7E-02	3.4E-02	1541.4
	Dumpers/Tenders	20	4	697	100%	697	263.1	9.3E-03	5.7E-03	265.1	290.0	1.0E-02	6.3E-03	292.2
	Surfacing Equipment	2	8	697	33%	230	135.4	2.5E-03	2.3E-03	136.2	149.3	2.8E-03	2.6E-03	150.1
	Tractors/Loaders/Backhoes	2	8	465	75%	349	72.5	2.9E-03	2.7E-03	73.4	80.0	3.2E-03	3.0E-03	80.9
	Cranes	1	8	465	25%	116	49.3	1.2E-03	1.1E-03	49.7	54.3	1.3E-03	1.2E-03	54.7
	Bore/Drill Rigs	1	8	465	33%	153	50.0	9.1E-04	8.5E-04	50.3	55.1	1.0E-03	9.3E-04	55.5
	Rough Terrain Forklifts	1	8	465	75%	349	90.7	2.3E-03	2.1E-03	91.4	100.0	2.5E-03	2.4E-03	100.8
	Dumpers/Tenders	1	4	465	100%	465	8.8	3.1E-04	1.9E-04	8.8	9.7	3.4E-04	2.1E-04	9.7
	Excavators	1	8	465	75%	349	152.6	4.7E-03	4.4E-03	154.0	168.2	5.2E-03	4.9E-03	169.8
							4687.88				5167.50			

1.10231

		2036												
		Equipment					Emissions (Metric Tonnes)				Emissions (Short Tons)			
Project	Type	Number	Daily Schedule (hr/day)	Total Work Days	% of Equipment Utilization	Work Days of Equipment Utilization	CO2	CH4	N2O	CO2e	CO2	CH4	N2O	CO2e
Proposed Project	Pavers	4	8	697	33%	230	297.3	1.4E-03	1.4E-03	297.7	327.7	1.6E-03	1.6E-03	328.2
	Rollers	4	8	697	50%	349	340.2	2.4E-03	2.4E-03	341.0	375.0	2.6E-03	2.6E-03	375.8
	Excavators	4	8	697	75%	523	916.0	2.2E-03	2.2E-03	916.7	1009.7	2.4E-03	2.4E-03	1010.5
	Graders	4	8	697	50%	349	724.2	1.3E-03	1.3E-03	724.6	798.3	1.4E-03	1.4E-03	798.8
	Tractors/Loaders/Backhoes	3	8	697	75%	523	163.9	2.1E-03	2.1E-03	164.6	180.7	2.3E-03	2.3E-03	181.4
	Crawler Tractor/Dozers	4	8	697	75%	523	1384.9	4.8E-03	4.8E-03	1386.5	1526.6	5.3E-03	5.3E-03	1528.3
	Dumpers/Tenders	20	4	697	100%	697	264.6	8.6E-03	8.6E-03	267.3	291.6	9.4E-03	9.4E-03	294.7
	Surfacing Equipment	2	8	697	33%	230	133.1	1.4E-03	1.4E-03	133.5	146.7	1.5E-03	1.5E-03	147.2
	Tractors/Loaders/Backhoes	2	8	465	75%	349	72.9	9.3E-04	9.3E-04	73.2	80.4	1.0E-03	1.0E-03	80.7
	Cranes	1	8	465	25%	116	49.1	2.0E-04	2.0E-04	49.2	54.2	2.2E-04	2.2E-04	54.2
	Bore/Drill Rigs	1	8	465	33%	153	49.9	5.8E-04	5.8E-04	50.1	55.0	6.4E-04	6.4E-04	55.2
	Rough Terrain Forklifts	1	8	465	75%	349	90.8	5.3E-04	5.3E-04	91.0	100.1	5.9E-04	5.9E-04	100.3
	Dumpers/Tenders	1	4	465	100%	465	8.8	2.9E-04	2.9E-04	8.9	9.7	3.2E-04	3.2E-04	9.8
	Excavators	1	8	465	75%	349	152.8	3.7E-04	3.7E-04	152.9	168.4	4.0E-04	4.0E-04	168.6
							4657.30				5133.78			

2046														
Project	Type	Equipment					Emissions (Metric Tonnes)				Emissions (Short Tons)			
		Number	Daily Schedule (hr/day)	Total Work Days	% of Equipment Utilization	Work Days of Equipment Utilization	CO2	CH4	N2O	CO2e	CO2	CH4	N2O	CO2e
Proposed Project	Pavers	4	8	557	33%	184	237.8	7.8E-04	7.2E-04	238.1	262.2	8.6E-04	8.0E-04	262.4
	Rollers	4	8	557	50%	279	272.0	1.4E-03	1.3E-03	272.4	299.8	1.5E-03	1.4E-03	300.3
	Excavators	4	8	557	75%	418	732.1	1.3E-03	1.2E-03	732.5	807.0	1.4E-03	1.3E-03	807.4
	Graders	4	8	557	50%	279	579.0	4.6E-04	4.2E-04	579.1	638.2	5.0E-04	4.7E-04	638.4
	Tractors/Loaders/Backhoes	3	8	557	75%	418	131.1	3.3E-04	3.0E-04	131.2	144.5	3.6E-04	3.3E-04	144.7
	Crawler Tractor/Dozers	4	8	557	75%	418	1107.0	1.6E-03	1.5E-03	1107.4	1220.2	1.7E-03	1.6E-03	1220.7
	Dumpers/Tenders	20	4	557	100%	557	211.8	4.7E-03	4.4E-03	213.2	233.5	5.2E-03	4.9E-03	235.0
	Surfacing Equipment	2	8	557	33%	184	106.5	7.1E-04	6.6E-04	106.7	117.4	7.8E-04	7.3E-04	117.6
	Tractors/Loaders/Backhoes	2	8	371	75%	279	58.3	1.5E-04	1.4E-04	58.4	64.3	1.6E-04	1.5E-04	64.4
	Cranes	1	8	371	25%	93	39.4	3.7E-05	3.4E-05	39.4	43.4	4.1E-05	3.8E-05	43.4
	Bore/Drill Rigs	1	8	371	33%	123	40.1	1.3E-04	1.3E-04	40.2	44.2	1.5E-04	1.4E-04	44.3
	Rough Terrain Forklifts	1	8	371	75%	279	72.6	1.9E-04	1.7E-04	72.7	80.1	2.0E-04	1.9E-04	80.1
	Dumpers/Tenders	1	4	371	100%	371	7.1	1.6E-04	1.5E-04	7.1	7.8	1.7E-04	1.6E-04	7.8
	Excavators	1	8	371	75%	279	122.2	2.1E-04	2.0E-04	122.2	134.7	2.3E-04	2.2E-04	134.7
3720.59											4101.25			

2060														
Project	Type	Equipment					Emissions (Metric Tonnes)				Emissions (Short Tons)			
		Number	Daily Schedule (hr/day)	Total Work Days	% of Equipment Utilization	Work Days of Equipment Utilization	CO2	CH4	N2O	CO2e	CO2	CH4	N2O	CO2e
Proposed Project	Pavers	4	8	557	33%	184	237.8	7.8E-04	7.2E-04	238.1	262.2	8.6E-04	8.0E-04	262.4
	Rollers	4	8	557	50%	279	272.0	1.4E-03	1.3E-03	272.4	299.8	1.5E-03	1.4E-03	300.3
	Excavators	4	8	557	75%	418	732.1	1.3E-03	1.2E-03	732.5	807.0	1.4E-03	1.3E-03	807.4
	Graders	4	8	557	50%	279	579.0	4.6E-04	4.2E-04	579.1	638.2	5.0E-04	4.7E-04	638.4
	Tractors/Loaders/Backhoes	3	8	557	75%	418	131.1	2.9E-04	2.7E-04	131.2	144.5	3.2E-04	3.0E-04	144.6
	Crawler Tractor/Dozers	4	8	557	75%	418	1107.0	1.6E-03	1.5E-03	1107.4	1220.2	1.7E-03	1.6E-03	1220.7
	Dumpers/Tenders	20	4	557	100%	557	211.8	4.6E-03	4.3E-03	213.2	233.5	5.0E-03	4.7E-03	235.0
	Surfacing Equipment	2	8	557	33%	184	106.5	7.0E-04	6.5E-04	106.7	117.4	7.7E-04	7.2E-04	117.6
	Tractors/Loaders/Backhoes	2	8	371	75%	279	58.3	1.3E-04	1.2E-04	58.4	64.3	1.4E-04	1.3E-04	64.4
	Cranes	1	8	371	25%	93	39.4	3.7E-05	3.4E-05	39.4	43.4	4.0E-05	3.7E-05	43.4
	Bore/Drill Rigs	1	8	371	33%	123	40.1	1.1E-04	1.0E-04	40.2	44.2	1.2E-04	1.2E-04	44.3
	Rough Terrain Forklifts	1	8	371	75%	279	72.6	1.8E-04	1.7E-04	72.7	80.1	2.0E-04	1.9E-04	80.1
	Dumpers/Tenders	1	4	371	100%	371	7.1	1.5E-04	1.4E-04	7.1	7.8	1.7E-04	1.6E-04	7.8
	Excavators	1	8	371	75%	279	122.2	2.1E-04	2.0E-04	122.2	134.7	2.3E-04	2.2E-04	134.7
3720.53											4101.18			

2074														
Project	Type	Equipment					Emissions (Metric Tonnes)				Emissions (Short Tons)			
		Number	Daily Schedule (hr/day)	Total Work Days	% of Equipment Utilization	Work Days of Equipment Utilization	CO2	CH4	N2O	CO2e	CO2	CH4	N2O	CO2e
Proposed Project	Pavers	4	8	279	33%	92	118.9	3.9E-04	3.6E-04	119.0	131.1	4.3E-04	4.0E-04	131.2
	Rollers	4	8	279	50%	140	136.5	6.8E-04	6.4E-04	136.7	150.4	7.5E-04	7.0E-04	150.7
	Excavators	4	8	279	75%	209	366.0	6.3E-04	5.9E-04	366.2	403.5	6.9E-04	6.5E-04	403.7
	Graders	4	8	279	50%	140	290.5	2.3E-04	2.1E-04	290.6	320.2	2.5E-04	2.3E-04	320.3
	Tractors/Loaders/Backhoes	3	8	279	75%	209	65.6	1.5E-04	1.4E-04	65.6	72.3	1.6E-04	1.5E-04	72.3
	Crawler Tractor/Dozers	4	8	279	75%	209	553.5	7.8E-04	7.3E-04	553.7	610.1	8.6E-04	8.0E-04	610.4
	Dumpers/Tenders	20	4	279	100%	279	106.1	2.3E-03	2.1E-03	106.8	116.9	2.5E-03	2.4E-03	117.7
	Surfacing Equipment	2	8	279	33%	92	53.2	3.5E-04	3.3E-04	53.3	58.7	3.9E-04	3.6E-04	58.8
	Tractors/Loaders/Backhoes	2	8	186	75%	140	29.3	6.6E-05	6.1E-05	29.3	32.3	7.2E-05	6.7E-05	32.3
	Cranes	1	8	186	25%	47	19.9	1.8E-05	1.7E-05	19.9	21.9	2.0E-05	1.9E-05	22.0
	Bore/Drill Rigs	1	8	186	33%	61	19.9	5.6E-05	5.2E-05	19.9	21.9	6.2E-05	5.7E-05	22.0
	Rough Terrain Forklifts	1	8	186	75%	140	36.4	9.3E-05	8.6E-05	36.5	40.2	1.0E-04	9.5E-05	40.2
	Dumpers/Tenders	1	4	186	100%	186	3.5	7.6E-05	7.1E-05	3.6	3.9	8.4E-05	7.8E-05	3.9
	Excavators	1	8	186	75%	140	61.3	1.1E-04	9.8E-05	61.3	67.6	1.2E-04	1.1E-04	67.6
1862.49											2053.05			

Worker Commuting

Activity	Year	% of Total Project Manhours	Man hours/phase	Months/P hase	Crew Size	Hrs/crew member/month	Days/crew member/Month	Vehicles miles traveled	CO2e (gr/veh-mi)	Emissions (Metric Tons)	Emissions (Short tons)
Road Construction	2026	25%	1,393,299	24	200	290	29	1,671,959	471.82	788.86	869.57
	2036	25%	1,393,299	24		290	29	1,671,959	362.82	606.62	668.68
	2046	20%	1,114,639	24		232	23	1,337,567	311.74	416.97	459.63
	2060	20%	1,114,639	24		232	23	1,337,567	264.58	353.89	390.10
	2074	10%	557,320	12		232	23	668,783	224.55	150.18	165.54
	Total Hours	5,573,195							6,687,834		2,316.52

Assumptions:

One daily trip is 12 miles round trip - assumes average of 6 miles one way
All onroad emission factors based on MOVES CY 2006, 2026,2046,2060 and a scaled 2074.
One person per personal vehicles with 80% gasoline passenger cars, 15% gasoline passenger trucks and 5% diesel trucks

Material Delivery Trucks

Activity		Work Days	Trips per Phase	Trips/day	Truck Miles	CO2e (gr/veh-mi)	Emissions (Metric Tons)	Emissions (Short Tons)
Road Construction	2026	697	232,196	333	2,786,352	1967.53	5,482.24	6,043.13
	2036	697	152,148	218	1,825,776	1735.60	3,168.82	3,493.03
	2046	557	71,931	129	863,172	1510.07	1,303.45	1,436.81
	2060	557	69,092	124	829,104	1495.63	1,240.03	1,366.90
	2074	279	12,844	46	154,128	1481.33	228.31	251.67
							11,422.86	12,591.54

Assumptions:

One daily trip is 12 miles round trip - assumes average of 6 miles one way and 10 cubic yards per truck trip
All onroad emission factors based on MOVES CY 2006, 2026,2046,2060 and a scaled 2074.

Proposed	Construction tailpipe	On-Road	Total
	Metric Tonnes		
2026	4,687.88	6,271.10	10,958.98
2036	4,657.30	3,775.44	8,432.74
2046	3,720.59	1,720.42	5,441.02
2060	3,720.53	1,593.92	5,314.45
2074	1,862.49	378.49	2,240.98
Total	18,648.79	13,739.38	32,388.17
	Short Tons		
2026	5,167.50	6,912.69	12,080.19
2036	5,133.78	4,161.71	9,295.49
2046	4,101.25	1,896.44	5,997.69
2060	4,101.18	1,757.00	5,858.17
2074	2,053.05	417.21	2,470.26
Total	20,556.75	15,145.06	35,701.80