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# APPENDIX H

## ENERGY CALCULATIONS

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Construction Off-Road Equipment - B				
Phase	Off-Road Equipment Type	Amount	Usage Hour/Day	Total Usage Days
Demolition	Concrete/Industrial Saws	1	8	120
	Excavators	3	8	120
	Rubber Tired Dozers	2	8	120
Site Preparation	Rubber Tired Dozers	3	8	60
	Tractors/Loaders/Backhoes	4	8	60
Grading	Excavators	2	8	160
	Graders	1	8	160
	Rubber Tired Dozers	1	8	160
	Scrapers	2	8	160
	Tractors/Loaders/Backhoes	2	8	160
Building Construction	Cranes	1	7	1500
	Forklifts	3	8	1500
	Generator Sets	1	8	1500
	Tractors/Loaders/Backhoes	3	7	1500
	Welders	1	8	1500
	Bore/Drill Rigs	1	8	1500
Paving	Pavers	2	8	125
	Paving Equipment	2	8	125
	Rollers	2	8	125
Architectural Coating	Air Compressors	1	6	125

**Buildout under the Gilman Gateway Rezone**

<b>Total Usage Hours/Equipment</b>	<b>Horsepower</b>	<b>Load Factor</b>	<b>Total Usage Hours/ Equipment</b>	<b>Horsepower-Hour</b>	<b>Fuel Usage (gallons)</b>
960	33	0.73	960	23126.4	1184.07168
2880	36	0.38	2880	39398.4	2017.19808
1920	367	0.4	1920	281856	14431.0272
1440	367	0.4	1440	211392	10823.2704
1920	84	0.37	1920	59673.6	3055.28832
2560	36	0.38	2560	35020.8	1793.06496
1280	148	0.41	1280	77670.4	3976.72448
1280	367	0.4	1280	187904	9620.6848
2560	423	0.48	2560	519782.4	26612.85888
2560	84	0.37	2560	79564.8	4073.71776
10500	367	0.29	10500	1117515	57216.768
36000	82	0.2	36000	590400	30228.48
12000	14	0.74	12000	124320	6365.184
31500	84	0.37	31500	979020	50125.824
12000	46	0.45	12000	248400	12718.08
12000	83	0.5	12000	498000	25497.6
2000	81	0.42	2000	68040	3483.648
2000	89	0.36	2000	64080	3280.896
2000	36	0.38	2000	27360	1400.832
750	37	0.48	750	13320	681.984
				<b>Total</b>	<b>268587.2026</b>

Diesel

<b>Construction Truck and Worker Vehicle Fuel Efficiency - Buildout under the Gilman Gateway Rezone</b>				
<b>Vehicle Type</b>	<b>Vehicle Class</b>	<b>EMFAC 2021 Outputs</b>		
		<b>Fuel Consumption (1,000 gallons/day)</b>	<b>VMT (miles/day)</b>	<b>Fuel Efficiency (miles/gallon)</b>
Construction Truck	MHDT	70.9	598,407.5	8.4
	HHDT	296.6	1,777,266.4	6.0
	HHDT/MHDT	-	-	7.2
Construction Worker Vehicle	LDA	665.3	19,996,646.2	30.1
	LDT1	68.6	1,731,568.5	25.3
	LDT2	396.0	9,685,168.7	24.5
	Worker Mix	-	-	27.5

Notes:

<sup>1</sup> For construction trucks assumes 50 percent HHDT and 50 percent MHDT vehicles, consistent with assumptions in CalEEMod for hauling trucks. For construction worker vehicles assume

<sup>2</sup> EMFAC2021 was run for Alameda County for the construction year 2024. Data was aggregated over all vehicle model years and speed bins.

<sup>3</sup> The fuel efficiency was calculated by dividing the VMT (miles/day) by the fuel consumption (gallons/day).

<b>Construction Vehicle Fuel Use - Diesel Vehicles - Buildout under the Gilman Gateway Rezone</b>				
<b>Phase</b>	<b>Trip Type</b>	<b>Total Trips</b>	<b>Trip Length (miles)</b>	<b>Total VMT</b>
Demolition	Hauling	8,160.0	20.0	163,200.0
Grading	Hauling	37,440.0	20.0	748,800.0
Building Construction	Vendor	1,086,000.0	8.4	9,122,400.0

<sup>1</sup> Assumes 100 percent HHDT vehicles for haul trucks and 50 percent HHDT/50 percent MHDT vehicles for MHDT, consistent with assumptions in CalEEMod.

<sup>2</sup> EMFAC2021 was run for Alameda County for the construction year 2024. Data was aggregated over all vehicle model years and speed bins.

<sup>3</sup> The fuel efficiency was calculated by dividing the VMT (miles/day) by the fuel consumption (gallons/day).

<b>Construction Worker Vehicle Fuel Use - Gasoline Vehicles - Buildout under the Gilman Gateway Rezone</b>					
<b>Phase</b>	<b>Total One-Way Trips/Day</b>	<b>Total Days</b>	<b>Total Trips</b>	<b>Trip Length (miles)</b>	<b>Total VMT</b>
Demolition	15	120	3,600	11.7	42,120
Site Preparation	18	60	2,160	11.7	25,272

Grading	20	160	6,400	11.7	74,880
Building Construction	828	1,500	2,484,000	11.7	29,062,800
Paving	15	125	3,750	11.7	43,875
Architectural Coating	166	125	41,500	11.7	485,550

<b>Total Construction Gasoline Usage</b>	1,082,963.2
<b>Total Construction Diesel Usage</b>	1,684,799.0

es 50 percent LDA, 25 percent LDT1, and 25 percent LDT2 vehicles, consistent with assumptions in CalEEMod for worker vehicles.

<b>way Rezone</b>	
<b>Diesel Fuel Efficiency (miles/gallon)</b>	<b>Fuel Usage (gallons/year)</b>
6.0	27,240.1
6.0	124,984.2
7.2	1,263,987.5
<b>Total</b>	<b>1,416,211.8</b>

Diesel

<b>Gateway Rezone</b>	
<b>Gasoline Fuel Efficiency (miles/gallon)</b>	<b>Fuel Usage (gallons/year)</b>
27.5	1,534.1
27.5	920.4

27.5	2,727.2	
27.5	1,058,499.2	
27.5	1,598.0	
27.5	17,684.3	
<b>Total</b>	<b>1,082,963.2</b>	Gas



Operational Trips - Buildout under the Gilman Gateway Rezone			
Vehicle Class	CalEEMod	Total Project Trips	Total Trips per Vehicle Class
LDA	51.16%	10,002	5,117.0
LDT1	3.61%	10,002	361.1
LDT2	23.41%	10,002	2,341.5
MDV	13.12%	10,002	1,312.3
LHD1	2.50%	10,002	250.1
LHD2	0.63%	10,002	63.0
MHD	1.48%	10,002	148.0
HHH	1.45%	10,002	145.0
OBUS	0.07%	10,002	7.0
UBUS	0.09%	10,002	9.0
MCY	2.22%	10,002	222.0
SBUS	0.05%	10,002	5.0
MH	0.20%	10,002	20.0

Operational Trips – Fuel Efficiency - Buildout under the Gilman Gateway Rezo				
Fuel	Vehicle Class	EMFAC2021 Outputs <sup>1</sup>		
		Fleet Mix (%) <sup>2</sup>	Fuel Consumption (1,000 gallons/day)	VMT (miles/day)
Gas	LDA	54%	665.3	19,996,646.21
	LDT1	5%	68.6	1,731,568.48
	LDT2	26%	396.0	9,685,168.66
	MDV	13%	246.5	4,980,332.96
	LHD1	2%	396.0	716,627.08
	MCY	0%	3.7	152,639.62
	MH	0%	3.9	17,316.01
	Fleet Mix	–	–	–
Diesel	LHD2	6%	12.0	159,736.20
	MHDT	24%	70.9	598,407.5
	HHDT	70%	296.6	1,777,266.4
	Fleet Mix	–	–	–

Notes:

<sup>1</sup> EMFAC2021 was run for Alameda County for the year 2024. Data was aggregated over all vehicle model years and speed bins.

<sup>2</sup> Fleet mix is based on assumptions made in CalEEMod for the proposed project.

<sup>3</sup> The fuel efficiency was calculated by dividing the VMT (miles/day) by the fuel consumption (gallons/day).

Operational Trips – Fuel Usage - Buildout under the Gilman Gatew				
Land Use	Total Annual VMT <sup>2</sup> (miles/year)	Fuel Type	Portion of Fleet <sup>3</sup> (%)	VMT by Fuel Type (miles/year)
Research &	35,508,126.00	Gas	96%	34,215,630.2

Development	33,300,120.00	Diesel	4%	1,264,089.3

Notes:

<sup>1</sup> Calculated for year 2024 only. Future years will likely use less fuel due to more efficient cars.

<sup>2</sup> Total VMT is based on project's trip generation and trip lengths.

<sup>3</sup> Fleet distribution is based on EMFAC2021 output and CalEEMod assumptions.

<sup>4</sup> Fuel efficiency is based on fuel consumption and VMT data from EMFAC2021 for Alameda County and total VMT.

ne	
Fuel Efficiency3 (miles/gallon)	
30.1	
25.3	
24.5	
20.2	
1.8	
41.4	
4.4	
26.6	
13.4	
8.4	
6.0	
7.0	

16.1  
1.2  
6.4  
2.7  
0.0  
0.2  
0.0  
26.6  
0.8  
2.0  
4.2  
7.0

way Rezone	
Fleet Mix Efficiency4 (miles/gallon)	Fuel Usage (gallons/ year)
26.6	1,288,549.2

7.0	179,721.2
<b>Total Gasoline/year</b>	<b>1,288,549.2</b>
<b>Total Diesel/year</b>	<b>179,721.2</b>

<b>Proposed Project Electricity Usage</b>	
<b>Electricity by Land Use</b>	<b>kWh/year</b>
Research & Development	21,280,107
Unenclosed Parking with Elevator	3,399,635
<b>Total</b>	<b>24,679,742</b>

<b>Proposed Project Natural Gas Usage</b>			
<b>Natural Gas by Land Use</b>	<b>kBTU/year</b>	<b>BTU/year</b>	<b>therms/year</b>
Research & Development	23,875,359	23,875,359,060	238,801
<b>Total</b>	<b>23,875,359</b>	<b>23,875,359,060</b>	<b>238,801</b>

Construction Off-Road Equipment				
Phase	Off-Road Equipment Type	Amount	Usage Hour/Day	Total Usage Days
Demolition	Concrete/Industrial Saws	1	8	90
	Excavators	3	8	90
	Rubber Tired Dozers	2	8	90
Site Preparation	Rubber Tired Dozers	3	8	45
	Tractors/Loaders/Backhoes	4	8	45
Grading	Excavators	2	8	135
	Graders	1	8	135
	Rubber Tired Dozers	1	8	135
	Scrapers	2	8	135
	Tractors/Loaders/Backhoes	2	8	135
Building Construction	Cranes	1	7	1380
	Forklifts	3	8	1380
	Generator Sets	1	8	1380
	Tractors/Loaders/Backhoes	3	7	1380
	Welders	1	8	1380
	Bore/Drill Rigs	1	8	1380
Paving	Pavers	2	8	90
	Paving Equipment	2	8	90
	Rollers	2	8	90
Architectural Coating	Air Compressors	1	6	90

**- Potential Berkeley Forge Development**

<b>Total Usage Hours/Equipment</b>	<b>Horsepower</b>	<b>Load Factor</b>	<b>Total Usage Hours/ Equipment</b>	<b>Horsepower-Hour</b>	<b>Fuel Usage (gallons)</b>
720	33	0.73	720	17344.8	888.05376
2160	36	0.38	2160	29548.8	1512.89856
1440	367	0.4	1440	211392	10823.2704
1080	367	0.4	1080	158544	8117.4528
1440	84	0.37	1440	44755.2	2291.46624
2160	36	0.38	2160	29548.8	1512.89856
1080	148	0.41	1080	65534.4	3355.36128
1080	367	0.4	1080	158544	8117.4528
2160	423	0.48	2160	438566.4	22454.59968
2160	84	0.37	2160	67132.8	3437.19936
9660	367	0.29	9660	1028113.8	52639.42656
33120	82	0.2	33120	543168	27810.2016
11040	14	0.74	11040	114374.4	5855.96928
28980	84	0.37	28980	900698.4	46115.75808
11040	46	0.45	11040	228528	11700.6336
11040	83	0.5	11040	458160	23457.792
1440	81	0.42	1440	48988.8	2508.22656
1440	89	0.36	1440	46137.6	2362.24512
1440	36	0.38	1440	19699.2	1008.59904
540	37	0.48	540	9590.4	491.02848
				<b>Total</b>	<b>236460.5338</b>

Diesel

<b>Construction Truck and Worker Vehicle Fuel Efficiency - Potential Berkeley Forge Development</b>				
<b>Vehicle Type</b>	<b>Vehicle Class</b>	<b>EMFAC 2021 Outputs</b>		
		<b>Fuel Consumption (1,000 gallons/day)</b>	<b>VMT (miles/day)</b>	<b>Fuel Efficiency (miles/gallon)</b>
Construction Truck	MHDT	70.9	598,407.5	8.4
	HHDT	296.6	1,777,266.4	6.0
	HHDT/MHDT	-	-	7.2
Construction Worker Vehicle	LDA	665.3	19,996,646.2	30.1
	LDT1	68.6	1,731,568.5	25.3
	LDT2	396.0	9,685,168.7	24.5
	Worker Mix	-	-	27.5

Notes:

<sup>1</sup> For construction trucks assumes 50 percent HHDT and 50 percent MHDT vehicles, consistent with assumptions in CalEEMod for hauling trucks. For construction worker vehicles

<sup>2</sup> EMFAC2021 was run for Alameda County for the construction year 2024. Data was aggregated over all vehicle model years and speed bins.

<sup>3</sup> The fuel efficiency was calculated by dividing the VMT (miles/day) by the fuel consumption (gallons/day).

<b>Construction Vehicle Fuel Use - Diesel Vehicles - Potential Berkeley Forge Development</b>				
<b>Phase</b>	<b>Trip Type</b>	<b>Total Trips</b>	<b>Trip Length (miles)</b>	<b>Total VMT</b>
Demolition	Hauling	7,380.0	20.0	147,600.0
Grading	Hauling	31,320.0	20.0	626,400.0
Building Construction	Vendor	750,720.0	8.4	6,306,048.0

<sup>1</sup> Assumes 100 percent HHDT vehicles for haul trucks and 50 percent HHDT/50 percent MHDT vehicles for MHDT, consistent with assumptions in CalEEMod.

<sup>2</sup> EMFAC2021 was run for Alameda County for the construction year 2024. Data was aggregated over all vehicle model years and speed bins.

<sup>3</sup> The fuel efficiency was calculated by dividing the VMT (miles/day) by the fuel consumption (gallons/day).

<b>Construction Worker Vehicle Fuel Use - Gasoline Vehicles - Potential Berkeley Forge Development</b>					
<b>Phase</b>	<b>Total One-Way Trips/Day</b>	<b>Total Days</b>	<b>Total Trips</b>	<b>Trip Length (miles)</b>	<b>Total VMT</b>
Demolition	15	90	2,700	11.7	31,590
Site Preparation	18	45	1,620	11.7	18,954



Grading	20	135	5,400	11.7	63,180
Building Construction	607	1,380	1,675,320	11.7	19,601,244
Paving	15	90	2,700	11.7	31,590
Architectural Coating	121	90	21,780	11.7	254,826

<b>Total Construction Gasoline Usage</b>	728,472.5
<b>Total Construction Diesel Usage</b>	1,271,535.1

assumes 50 percent LDA, 25 percent LDT1, and 25 percent LDT2 vehicles, consistent with assumptions in CalEEMod for worker vehicles.

Development	
Diesel Fuel Efficiency (miles/gallon)	Fuel Usage (gallons/year)
6.0	24,636.3
6.0	104,554.1
7.2	873,757.5
<b>Total</b>	<b>1,002,947.9</b>

Diesel

Large Development	
Gasoline Fuel Efficiency (miles/gallon)	Fuel Usage (gallons/year)
27.5	1,150.5
27.5	690.3

27.5	2,301.1
27.5	713,898.9
27.5	1,150.5
27.5	9,281.0
<b>Total</b>	<b>728,472.5</b>

Gas

Proposed Project Operational Trips			
Vehicle Class	CalEEMod	Total Project Trips	Total Trips per Vehicle Class
LDA	50.94%	8,955	4,561.7
LDT1	3.53%	8,955	316.1
LDT2	23.54%	8,955	2,108.0
MDV	13.27%	8,955	1,188.3
LHD1	2.52%	8,955	225.7
LHD2	0.63%	8,955	56.4
MHD	1.49%	8,955	133.4
HHH	1.47%	8,955	131.6
OBUS	0.08%	8,955	7.2
UBUS	0.09%	8,955	8.1
MCY	2.21%	8,955	197.9
SBUS	0.05%	8,955	4.5
MH	0.19%	8,955	17.0

Proposed Project Operational Trips – Fuel Efficiency				
Fuel	Vehicle Class	EMFAC2021 Outputs <sup>1</sup>		
		Fleet Mix (%) <sup>2</sup>	Fuel Consumption (1,000 gallons/day)	VMT (miles/day)
Gas	LDA	54%	665.3	19,996,646.21
	LDT1	5%	68.6	1,731,568.48
	LDT2	26%	396.0	9,685,168.66
	MDV	13%	246.5	4,980,332.96
	LHD1	2%	396.0	716,627.08
	MCY	0%	3.7	152,639.62
	MH	0%	3.9	17,316.01
	Fleet Mix	–	–	–
Diesel	LHD2	6%	12.0	159,736.20
	MHDT	24%	70.9	598,407.5
	HHDT	70%	296.6	1,777,266.4
	Fleet Mix	–	–	–

Notes:

<sup>1</sup> EMFAC2021 was run for Alameda County for the year 2024. Data was aggregated over all vehicle model years and speed bins.

<sup>2</sup> Fleet mix is based on assumptions made in CalEEMod for the proposed project.

<sup>3</sup> The fuel efficiency was calculated by dividing the VMT (miles/day) by the fuel consumption (gallons/day).

Proposed Project Operational Trips – Fuel Usage				
Land Use	Total Annual VMT <sup>2</sup> (miles/year)	Fuel Type	Portion of Fleet <sup>3</sup> (%)	VMT by Fuel Type (miles/year)
Research &	21,789,028.00	Gas	96%	30,626,397.4

Development	31,703,500.00	Diesel	4%	1,141,257.7

Notes:

<sup>1</sup> Calculated for year 2024 only. Future years will likely use less fuel due to more efficient cars.

<sup>2</sup> Total VMT is based on project's trip generation and trip lengths.

<sup>3</sup> Fleet distribution is based on EMFAC2021 output and CalEEMod assumptions.

<sup>4</sup> Fuel efficiency is based on fuel consumption and VMT data from EMFAC2021 for Alameda County and total VMT.

<b>Fuel Efficiency<sup>3</sup> (miles/gallon)</b>
30.1
25.3
24.5
20.2
1.8
41.4
4.4
26.6
13.4
8.4
6.0
7.0

16.1  
1.2  
6.4  
2.7  
0.0  
0.2  
0.0  
26.6  
0.8  
2.0  
4.2  
7.0

<b>Fleet Mix Efficiency<sup>4</sup> (miles/gallon)</b>	<b>Fuel Usage (gallons/ year)</b>
26.6	1,153,379.9

7.0	162,257.7
<b>Total Gasoline/year</b>	<b>1,153,379.9</b>
<b>Total Diesel/year</b>	<b>162,257.7</b>

<b>Proposed Project Electricity Usage</b>	
<b>Electricity by Land Use</b>	<b>kWh/year</b>
Research & Development	19,051,770
Unenclosed Parking with Elevator	2,141,680
<b>Total</b>	<b>21,193,450</b>

<b>Proposed Project Natural Gas Usage</b>			
<b>Natural Gas by Land Use</b>	<b>kBTU/year</b>	<b>BTU/year</b>	<b>therms/year</b>
Research & Development	-	-	-
<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>