

Appendix 6
Air Quality Alternatives Calculations

**Table 1
Land Use Summary
Willow Village - Base Project Alternative Analysis
Menlo Park, California**

Land Use ¹	CalEEMod® Land Use	Size	Units ²	Square Footage
Existing Conditions (2019)				
Office	General Office Building	252	ksf	251,530
R&D	Research and Development	124	ksf	123,870
Warehouse	Unrefrigerated Warehouse-No Rail	501	ksf	500,780
Lab & Manufacture	Manufacturing	24	ksf	23,570
Health Center	Health Club	24	ksf	24,060
Former Fire Department Building	General Light Industry	80	ksf	80,100
Parking	Enclosed Parking with Elevator	2,300	Spaces	920,000
Partial Buildout by Year³				
Land Use Type ⁴	Percent Operational by Year			
	Year 4	Year 5	Year 6	
Office	3.1%	58%	95%	
Retail	10%	59%	98%	
Residential	0%	16%	64%	
Hotel	0%	41%	100%	
Parking	53%	75%	96%	
Park	86%	94%	100%	
Full Buildout				
Land Use Type ⁴	Size	Units ²	Square Footage	
Office	714	ksf	713,841	
Retail	279	ksf	279,386	
Residential	523	DU	678,390	
Hotel	193	Rooms	172,000	
Parking	733	ksf	733,041	
Park	404	ksf	403,837	

Notes:

- Land uses analyzed based on information provided by the Project Applicant, as found in the Project Description. "Office" land use mapped to General Office Building and Research and Development; "Office/Lab" mapped to General Office Building, Research and Development, Health Club, and Manufacturing; "Warehouse" mapped to Unrefrigerated Warehouse-No Rail and General Light Industry, and "Warehouse/Office" mapped to Unrefrigerated Warehouse-No Rail and Research and Development CalEEMod land use types on a building-by-building basis.
- The Project Applicant provided Project land uses in units of square footage, hotel rooms, and dwelling units. For the existing parking land use, each parking space is assumed to be 400 sqft. This assumption is based on CalEEMod defaults.
- Partial buildout for Year 4, Year 5, and Year 6 were calculated based on the portion of building area for each land use type that becomes operational each year, based on the construction schedule, as shown in Table 2.
- For Hamilton Avenue Parcels North and South, only net new square footage was included in the analysis. This is under the conservative assumption that the existing retail area and the retail land use that will replace it have similar operational emissions.

Abbreviations:

DU - dwelling unit sqft - square foot
ksf - 1,000 square feet CalEEMod® - California Emissions Estimator Model

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2020.4.0. Available online at <http://www.caleemod.com/>

**Table 17
Traffic Data Provided by the Transportation Engineer
Willow Village - Base Project Alternative Analysis
Menlo Park, California**

Daily Trips Rates and VMT

Land Use	Fleet Type / Land Use	Trip Rate Units ¹	Weekday Trips per Day per Unit ¹	Weekday daily VMT ²
			TOTAL	TOTAL
Main Project Site - Existing Conditions	Cars	per 1,000 s.f.	9.19	110,860
	Trucks	per 1,000 s.f.	0.22	2,640
	Shuttles	per 1,000 s.f.	0.66	21,088
	On-Demand	per 1,000 s.f.	0.66	7,919
Campus District - Full Buildout	Cars	per 1,000 s.f.	10.05	79,756
	Trucks	per 1,000 s.f.	0.23	1,810
	Shuttles	per 1,000 s.f.	0.44	9,408
	On-Demand	per 1,000 s.f.	0.68	5,429
Town Square and the Residential/Shopping District - Full Buildout	Residential	per d.u.	4.35	21,622
	Retail ³	per 1,000 s.f.	25.07	47,098
	Hamilton Avenue Parcels North and South ³	per 1,000 s.f.	28.31	1,461
	Park	per acre	42.80	1,147
	Hotel	per room	6.69	14,814

Notes:

- ¹ Daily project trip rates were provided by the Transportation Engineer in terms of trip rates per land use amount.
- ² Daily Project VMT provided by the Transportation Engineer include reductions for pass-by and diverted trips. Daily VMT is given in VMT per day. The Project trips and VMT have been scaled based on the Base Alternative's land uses in Table 1.
- ³ The trip rates and VMT for Hamilton Avenue Parcels North and South were provided separately and added to retail totals in calculations.

Abbreviations:

VMT - Vehicle miles traveled
s.f. - Square feet
d.u. - Dwelling unit

Table 18
Trip Rates and VMT for Existing Conditions and Project Operations
Willow Village - Base Project Alternative Analysis
Menlo Park, California

Project Area ¹	Land Use	Fleet Type ²	Total Weekday Daily VMT ³	Total Weekday Daily Trips ³	Total Average Daily VMT ⁴	Total Average Daily Trips ⁴	Total Annual VMT ⁵	Total Annual Trips ⁵
			VMT/day	trips/day	VMT/day	trips/day	VMT/year	trips/year
Existing Conditions	Campus District	Cars	110,860	9,221	84,225	7,006	30,742,244	2,557,040
		Trucks	2,640	220	2,005	167	731,958	60,882
		Shuttles	21,088	659	15,063	470	3,916,358	122,319
		On-Demand	7,919	659	5,656	470	1,470,590	122,319
Year 4	Campus District	Cars	2,445	220	1,820	164	664,174	59,728
		Trucks	55	5.0	41	3.7	15,069	1,355
		Shuttles	288	10	206	6.9	53,559	1,783
		On-Demand	166	15	119	11	30,903	2,779
	Residential	San Mateo	0	0	0	0	0	0
	Retail	San Mateo	4,787	692	4,624	669	1,687,805	244,097
	Park	San Mateo	987	147	3,652	545	1,332,917	198,943
	Hotel	San Mateo	0	0	0	0	0	0
Year 5	Campus District	Cars	46,633	4,194	34,709	3,121	12,668,859	1,139,286
		Trucks	1,058	95	787	71	287,436	25,849
		Shuttles	5,501	183	3,929	131	1,021,622	34,009
		On-Demand	3,174	285	2,267	204	589,471	53,010
	Residential	San Mateo	3,389	357	3,312	349	1,208,975	127,261
	Retail	San Mateo	27,938	4,040	26,986	3,903	9,849,726	1,424,505
	Park	San Mateo	1,080	161	3,993	596	1,457,557	217,546
	Hotel	San Mateo	6,049	527	5,816	507	2,122,939	184,925
Year 6	Campus District	Cars	75,728	6,810	56,365	5,069	20,573,247	1,850,112
		Trucks	1,718	155	1,279	115	466,775	41,976
		Shuttles	8,933	297	6,381	212	1,659,035	55,228
		On-Demand	5,154	464	3,682	331	957,256	86,084
	Residential	San Mateo	13,765	1,449	13,455	1,416	4,911,036	516,951
	Retail	San Mateo	46,093	6,666	44,521	6,439	16,250,317	2,350,182
	Park	San Mateo	1,147	171	4,243	633	1,548,641	231,140
	Hotel	San Mateo	14,814	1,290	14,244	1,241	5,199,035	452,878
Full Buildout	Campus District	Cars	79,756	7,172	59,363	5,338	21,667,612	1,948,526
		Trucks	1,810	163	1,347	121	491,604	44,209
		Shuttles	9,408	313	6,720	224	1,747,285	58,165
		On-Demand	5,429	488	3,878	349	1,008,176	90,663
	Residential	San Mateo	21,622	2,276	21,135	2,225	7,714,176	812,018
	Retail	San Mateo	47,098	6,811	45,492	6,579	16,604,534	2,401,410
	Park	San Mateo	1,147	171	4,243	633	1,548,641	231,140
	Hotel	San Mateo	14,814	1,290	14,244	1,241	5,199,035	452,878

Notes:

¹. Partial years are scaled from the full buildout based on the portion of each land use that becomes operational for each year of construction. See Table 16 for more details.

Table 18
Trip Rates and VMT for Existing Conditions and Project Operations
Willow Village - Base Project Alternative Analysis
Menlo Park, California

2. The fleet type for each land use was provided by the Transportation Engineer. The Campus District will have various fleets for specific uses. Town Square and the Residential/Shopping District land uses (Residential, Retail, Park, and Hotel) are analyzed assuming a default San Mateo fleet. Hamilton Avenue Parcels North and South are combined with retail land uses. See AQTR Table 19 for more information.
3. Daily VMT and trip rates were provided by the Transportation Engineer on October 5, 2021. Total trip rates are calculated using land uses in AQTR Table 1.
4. Weekday VMT and trip rates provided by the Transportation Engineer were scaled to average trip rates using the ratio between CalEEMod® weekday and weekend one-way trip rates.
5. Annual trips and VMT are calculated by multiplying daily values by 365 for all fleets with the exception of shuttles and on-demand, which are multiplied by 260 days/year.

Abbreviations:

VMT - vehicle miles traveled

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2020.4.0. Available online at <http://www.caleemod.com/>

Table 21a
Mobile CAP Emissions Before EV Reductions
Willow Village - Base Project Alternative Analysis
Menlo Park, California

Year	Land Use ¹	Fleet Type	Annual Trips ²	Annual VMT ²	CAP Emissions ^{3,4}							
					ROG	NOX	PM ₁₀	PM _{2.5}	ROG	NOX	PM ₁₀	PM _{2.5}
					tons/year				lb/day			
			trips/year	VMT/year								
Existing Conditions	Campus District	Cars	2,557,040	30,742,244	4.9	4.1	3.1	0.59	27	22	17	3.3
		Trucks	60,882	731,958	0.18	2.0	0.17	0.068	1.0	11	0.92	0.37
		Shuttles	122,319	3,916,358	0.027	1.8	0.59	0.15	0.15	10	3.3	0.80
		On-Demand	122,319	1,470,590	0.19	0.15	0.15	0.028	1.1	0.85	0.81	0.15
				2,862,559	36,861,150	5.3	8.0	4.0	0.84	29	44	22
Full Buildout	Campus District	Cars	1,948,526	21,667,612	2.6	1.5	2.2	0.41	14	8.1	12	2.2
		Trucks	44,209	491,604	0.053	0.42	0.094	0.028	0.29	2.3	0.52	0.15
		Shuttles	58,165	1,747,285	0.016	1.0	0.27	0.068	0.088	5.7	1.5	0.38
		On-Demand	90,663	1,008,176	0.10	0.058	0.10	0.019	0.57	0.32	0.55	0.10
	Residential	San Mateo	812,018	7,714,176	0.9	1.0	0.8	0.16	4.9	5.6	4.5	0.9
	Retail	San Mateo	2,401,410	16,604,534	2.3	2.4	1.8	0.35	13	13	10	1.9
	Park	San Mateo	231,140	1,548,641	0.22	0.23	0.17	0.033	1.2	1.3	0.91	0.18
	Hotel	San Mateo	452,878	5,199,035	0.55	0.65	0.55	0.11	3.0	3.6	3.0	0.60
				6,039,011	55,981,062	6.8	7.3	6.0	1.2	37	40	33

Notes:

- Hamilton Avenue Parcels North and South were provided separately and added to the retail land use totals.
- Trip counts and VMTs by land use type were broken out by year using a scaling factor representing the percent of each fleet that is operational in a given year leading up to full buildout. This percent was determined based on the square footage of the land use associated with each fleet that is operational in a given year relative to that land use's full buildout square footage. See Table 16 for more details on scaling. See Table 18 for Project Trip Rates and VMT.
- Criteria air pollutants are calculated by year using emission factors for the associated year and fleet from EMFAC2021. Electric vehicles are not included in the emission factors for Campus District fleets (all fleet types except San Mateo Fleet), as reductions associated with EVs are considered separately. Project emission factors are shown in AQTR Table 20a.
- Full buildout emissions are conservatively calculated using 2026 emission factors.

Abbreviations:

EV - electric vehicle PM₁₀ - particulate matter less than 10 microns in diameter
 lb - pound PM_{2.5} - particulate matter less than 2.5 microns in diameter
 NO_x - nitrogen oxides ROG - reactive organic gases
 VMT- vehicle miles traveled

References:

California Air Resources Board. EMFAC2021. Available at: <https://arb.ca.gov/emfac/>

**Table 21b
Summary of Mobile GHG Emissions Before EV Reductions
Willow Village - Base Project Alternative Analysis
Menlo Park, California**

Year	Land Use ¹	Fleet Type	Annual GHG Emissions ^{3,4}		GHGs Emissions ^{3,4}			
			Annual Trips ²	Annual VMT ²	CO ₂	CH ₄	N ₂ O	CO ₂ e
			trips/year	VMT/year	MT/year			
Existing Conditions	Campus District	Cars	2,557,040	30,742,244	9,997	0.41	0.32	10,104
		Trucks	60,882	731,958	834	0.043	0.082	859
		Shuttles	122,319	3,916,358	4,965	0.019	0.78	5,199
		On-Demand	122,319	1,470,590	444	0.017	0.014	448
			2,862,559	36,861,150	16,240	0.48	1.2	16,610
Full Buildout	Campus District	Cars	1,948,526	21,667,612	6,403	0.18	0.15	6,454
		Trucks	44,209	491,604	485	0.018	0.047	499
		Shuttles	58,165	1,747,285	2,129	0.0016	0.34	2,229
		On-Demand	90,663	1,008,176	273	0.0071	0.0065	275
	Residential	San Mateo	812,018	7,714,176	2,694	0.09	0.11	2,728
	Retail	San Mateo	2,401,410	16,604,534	5,847	0.23	0.25	5,928
	Park	San Mateo	231,140	1,548,641	546	0.022	0.024	554
	Hotel	San Mateo	452,878	5,199,035	1,809	0.055	0.070	1,831
			6,039,011	55,981,062	20,186	0.60	1.0	20,498

Notes:

- ¹ Hamilton Avenue Parcels North and South were provided separately and added to the retail land use totals.
- ² VMT and trip rates are summarized in Table 18.
- ³ Greenhouse Gases are calculated by year using emission factors for the associated year and fleet from EMFAC2021. Electric vehicles are not included in the emission factors for Campus District fleets (all fleet types except San Mateo Fleet), as reductions associated with EVs are considered separately. Project emission factors are shown in AQTR Table 20b.
- ⁴ Full buildout emissions are conservatively calculated using 2026 emission factors.

Abbreviations:

GHG - Greenhouse Gas EV - electric vehicle
 CO₂ - carbon dioxide MT - Metric Ton
 CH₄ - methane VMT- vehicle miles traveled
 N₂O - Nitrous Oxide
 CO₂e - Carbon dioxide equivalent

References:

California Air Resources Board. EMFAC2021. Available at: <https://arb.ca.gov/emfac/>

**Table 22
EV Assumptions for Campus District
Willow Village - Base Project Alternative Analysis
Menlo Park, California**

Campus District EV Parameters

Description	Units	Value
Electricity required per mile charged ¹	kWh/mi	0.30
Total Charging Energy of Meta Campuses ²	kWh/year	3,791,856
Total Area of Meta Campuses ²	sqf	4,753,594
Total Meta Campus Energy per Area ²	kWh/sqf	0.80
Existing Conditions Fleet eVMT per Total VMT ³	Percent	5.5%
Full Buildout Fleet MSS eVMT per Total VMT ⁴	Percent	14%
Electricity Loss Factor ⁵	Percent	10%
Existing Conditions Charging Energy Usage ⁶	kWh/year	534,955
Full Buildout Charging Energy Usage ⁷	kWh/year	1,305,262

eVMTs from Project Chargers at the proposed Campus District

Year	Land Use Category⁸	Project Increase in Annual eVMTs⁹
		eVMT/year
Existing Conditions	Campus District	1,783,182
Partial Buildout - Year 4		133,367
Partial Buildout - Year 5		2,543,916
Partial Buildout - Year 6		4,131,123
Full Buildout		4,350,873

Notes:

1. An average EV fuel economy of 0.30 kWh per mile was used. The fuel economy is based on electric fleet data from fueleconomy.gov. Available at: <https://www.fueleconomy.gov/>.
2. Meta provided energy usage and areas for EV charging at their existing campuses: Classic, Bayfront, Chilco, Willow, Gateway. The provided data was used to evaluate an average ratio of EV charging energy usage per campus area.
3. The percent eVMT for existing conditions is calculated by dividing the eVMT in existing conditions by the annual VMT from the 'Car' and 'On-Demand' vehicle types in existing conditions. For existing conditions VMT, see Table 18.
4. ARB is currently preparing its 2020 Mobile Source Strategy (MSS) update to the ARB VISION Model (version 2.1) estimating future fleet characteristics. The Mobile Source Strategy projects eVMTs reflecting the aspirational target identified in EO N-79-20, assuming 100% of passenger vehicle sales in California are ZEV or PHEV, and GHG emissions assumed to have reduced by 2.0% per year from 2026 to 2035. The increase in annual eVMTs charged by the Campus District is scaled from the increase in fleet eVMT from existing conditions to full buildout.
5. A 10% Loss Factor was applied to the annual project energy uses to account for expected losses. Source available at: <https://www.fueleconomy.gov/>
6. The EV charging energy consumption for existing conditions was based on existing charger energy usage data for Willow Village for 2019 provided by the Project applicant. The total energy usage was reduced assuming a 10% loss factor.

Table 22
EV Assumptions for Campus District
Willow Village - Base Project Alternative Analysis
Menlo Park, California

7. The EV charging energy consumption for the Project at full buildout was determined using an average ratio of existing charging sites kWh/sqf and multiplying it by the Campus District land use area at full buildout (714 thousand sqf). This number was scaled by the increase in fleet eVMT from existing conditions to full buildout based on the MSS scenario of the VISION model. A 10% loss factor was applied to the total energy usage per year. All relevant data sources were provided by the Project applicant.
8. Meta offers an EV charging program to its workers. Charging on campus is free and valets move cars into chargers to maximize charging time. Therefore, the EV charging annual electricity for the Campus District was provided based on studies from Meta's existing campuses in the area. The electricity for EV charging at the Project would be supplied with 100% renewable energy.
9. For years where the Campus District is only operational a proportion of the year, the annual kWh is multiplied by a scaling fraction for the Campus District land use, found in Table 16.

Abbreviations:

EV - Electric vehicle (includes battery electric or plug-in hybrid technology)
eVMT- Electric vehicle miles traveled
kWh - Kilowatt hour
sqf- Square foot
MSS - Mobile Source Strategy

References:

City of Menlo Park Nonresidential EV Charging Requirements. Published July 17, 2019. Available at: <https://www.menlopark.org/DocumentCenter/View/22382/Nonresidential-EV-Charging-Requirements>
California Air Resources Board. Vision Scenario Planning. Available at: <https://ww2.arb.ca.gov/resources/documents/vision-scenario-planning>
CalEEMod Appendix D. Available at: <http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-d2020-4-0-full-merge.pdf?sfvrsn=12>

Table 23
EV Assumptions for Town Square and the Residential/Shopping District
Willow Village - Base Project Alternative Analysis
Menlo Park, CA

EV Assumptions

Description	Units	Input
Miles Charged per Hour Charged ¹	(miles/hr)	21
Scenario 1 ²	-	Reference
Scenario 2 ²	-	MSS
Number of Chargers ³	Total #	249
Average Daily Hours for Charging per Charger ⁴	hr	10
Annual Days of Charger Activity ⁴	days/yr	365

eVMTs from Project Chargers - Reference Scenario

Year	Total Annual Project Trips ^{5,6}	Total Annual Project VMT ^{5,6}	% of total Fleet using Electric Fuel ²	Annual Project EV Trips ⁶	Annual Project Electric VMT ⁶	Number of Project EV Chargers Available ⁷	Total Annual EV Charge Hours Available from Project Chargers ⁸	Number of EV Annual VMT Available from Project Chargers ⁸	Project Chargers at Capacity Relative to Project Electric VMT ⁹	Total Annual eVMTs Charged by Project ⁹
	trips/year	VMT/year		trips/year	eVMT/year		hours/year	eVMT/year		
Partial Buildout - Year 4	443,039	3,020,721	4.7%	20,728	141,328	131	477,218	10,021,583	Under Capacity	141,328
Partial Buildout - Year 5	1,954,236	14,639,198	5.2%	101,736	762,106	187	683,944	14,362,828	Under Capacity	762,106
Partial Buildout - Year 6	3,551,151	27,909,029	5.6%	197,959	1,555,790	239	871,770	18,307,160	Under Capacity	1,555,790
Full Buildout	3,897,447	31,066,385	5.9%	230,919	1,840,648	249	908,850	19,085,850	Under Capacity	1,840,648

eVMTs from Project Chargers - Mobile Source Strategy (MSS) Scenario

Year	Total Annual Project Trips ^{5,6}	Total Annual Project VMT ^{5,6}	% of total Fleet using Electric Fuel ²	Annual Project EV Trips ⁶	Annual Project Electric VMT ⁶	Number of Project EV Chargers Available ⁷	Total Annual EV Charge Hours Available from Project Chargers ⁸	Number of EV Annual VMT Available from Project Chargers ⁸	Project Chargers at Capacity Relative to Project Electric VMT ⁹	Total Annual eVMTs Charged by Project ⁹
	trips/year	VMT/year		trips/year	eVMT/year		hours/year	eVMT/year		
Partial Buildout - Year 4	443,039	3,020,721	8.3%	36,837	251,163	131	477,218	10,021,583	Under Capacity	251,163
Partial Buildout - Year 5	1,954,236	14,639,198	10.6%	206,826	1,549,333	187	683,944	14,362,828	Under Capacity	1,549,333
Partial Buildout - Year 6	3,551,151	27,909,029	13.1%	463,984	3,646,522	239	871,770	18,307,160	Under Capacity	3,646,522
Full Buildout	3,897,447	31,066,385	15.8%	615,615	4,907,045	249	908,850	19,085,850	Under Capacity	4,907,045

Notes:

- The miles charged per hour charged is representative of a typical charge rate for an EV of 6.25 kWh per hour and a fuel economy of 0.30 kWh per mile. The charge rate is based on capability of existing battery-electric vehicles and Level 2 charging stations. Reference: Chargepoint. 2017. Level Up Your EV Charging Knowledge. Available at: <https://www.chargepoint.com/blog/level-your-ev-charging-knowledge/>. The fuel economy is based on electric fleet data from fueleconomy.gov. Available at: <https://www.fueleconomy.gov/>.
- The two scenarios analyzed are the Reference and the Mobile Source Strategy scenarios. ARB is currently preparing its 2020 Mobile Source Strategy (MSS) update to the ARB VISION Model (version 2.1). The 2020 MSS uses "scenario planning to take an integrated approach to identifying the technology trajectories and programmatic concepts" to model projected years of electric vehicle miles for assessed scenarios. The Mobile Source Strategy projects eVMTs reflecting the aspirational target identified in EO N-79-20, assuming 100% of passenger vehicle sales in California are ZEV or PHEV, and GHG emissions assumed to have reduced by 2.0% per year from 2026 to 2035. The 2020 update only considers passenger vehicles (LDA, LDT1, LDT2, and MDV). To determine the eVMT percent of the passenger vehicle fleets, the 2020 MSS update was downloaded in July 13, 2021. The increase in annual eVMTs charged by the Project from the Reference Scenario to the MSS Scenario is used to determine the eVMTs the Project can take credit for based on providing additional charging infrastructure for the state to reach aspirational EV fleet penetration.
- The number of chargers in the Town Square and the Residential/Shopping District was provided by the Project Applicant in the Willow Village Mixed Use Development Concept Level Energy Use Summary, dated June 14, 2021, detailing chargers available for all mixed-use traffic. 249 EV Charging Stations are available to serve the 1,694 residential spaces and 500 commercial spaces.
- Meta offers a valet service to charge EVs from 7am to 7pm, average daily hours of availability for charging per charger is conservatively assumed to be 10 hours per day. When demand is met, the full 10 hours will be used for charging, with each vehicle cycling out of the charging spot before or as the car reaches full charge. The number of chargers are available for all Town Square and the Residential/Shopping District land uses, and it is expected that there will be 10 hours a day of active charging taking place due to the frequency of turnover associated with retail, restaurant, hotel, and park land uses. Town Square and the Residential/Shopping District land uses are assumed to operate 365 days per year. Any charging inefficiencies associated with cars remaining plugged in after reaching full charge is assumed to balance out due the likelihood of more than 10 hours of activity a day associated with Town Square and the Residential/Shopping District activity.
- Town Square and the Residential/Shopping District Total VMT and trips includes all proposed Project residential, retail, park, and hotel land uses, consistent with Table 18. Retail land uses include Hamilton Parcels North and South and are added to total VMT and trips.
- EV Annual Trips and EV Annual VMT are determined based on Project trips and VMTs and the VISION Reference Scenario percent of Electric Fleet. These eVMTs (electric vehicle miles traveled) represents the number of project VMTs that are driven by electric vehicles.
- 249 EV Charging Stations are proposed for the full buildout. To reflect the EV charging stations that will come online during construction in the partial years leading up to full buildout, a scaling factor was applied based on the ratio of square feet of the parking land use that is built out in a given year to the total square feet that will be built. The scaling factor for a given year was applied to the 249 chargers at full buildout. To see scaling factors used, refer to the parking land use from Table 16.
- Total annual charge hours available from the project are determined by multiplying the average daily hours of charging per charger (10 hours) by the annual days of charger activity (365 days). The annual charge hours available from the project are then multiplied by 25 miles charged per charge hour to determine the number of eVMT available from the project.
- The Project EV chargers for Town Square and the Residential/Shopping District land uses are determined to be at capacity, meaning used fully for all available charge hours per day, when the electric vehicle miles associated with the Project are in excess of the maximum electric vehicle miles the Project chargers can charge. If there is a surplus of chargers relative to EVs coming to the site, then the Project chargers are under-capacity, and only a fraction of chargers will be used as the number of EVs coming to the site are fewer than the total number of charger capacity. If there is a surplus of EVs coming to the site relative to the chargers at the site, all chargers will be used and the site will be at capacity. In the scenario when the chargers are at capacity, the full capacity of VMTs the site can charge are assumed to be charged.

Abbreviations:

- EV - electric vehicle (includes battery electric or plug-in hybrid technology)
- Hr - hour
- TDM - Transportation Demand Management
- VMT - vehicle miles travelled
- eVMT - electric vehicle mile traveled

References:

- U.S. Census. 2019. Factfinder. Available at: <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>
- California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod), Version 2016.3.2. Available online at <http://www.caleemod.com/>
- California Air Resources Board. EMFAC2021. Available at: <https://arb.ca.gov/emfac/>
- California Air Resources Board. Vision Scenario Planning. Available at: <https://ww2.arb.ca.gov/resources/documents/vision-scenario-planning>

**Table 24a
EV CAP Emissions Reductions Summary
Willow Village - Base Project Alternative Analysis
Menlo Park, California**

Town Square and the Residential/Shopping District

Year	Scenario	Miles Charged by Project Chargers ¹	EV Trips Charged by Project Chargers ¹	eVMT from Additional Project Chargers ²	Trip Counts from additional Project Chargers ²	Electric VMT CAP Emissions Reduction (lb/year) ^{3,4}			
				eVMT/year	trips/year	ROG	NOx	PM ₁₀	PM _{2.5}
Existing Conditions	Reference	0	0	0	0	0	0	0	0
	MSS	0	0						
Year 4	Reference	141,328	20,728	109,835	16,109	-39	-21	-0.39	-0.36
	MSS	251,163	36,837						
Year 5	Reference	762,106	101,736	787,226	105,090	-251	-134	-2.7	-2.5
	MSS	1,549,333	206,826						
Year 6	Reference	1,555,790	197,959	2,090,732	266,025	-623	-326	-6.7	-6.2
	MSS	3,646,522	463,984						
Full Buildout	Reference	1,840,648	230,919	3,066,397	384,696	-906	-475	-10	-9
	MSS	4,907,045	615,615						

Campus District

Year	eVMT from Additional Project Chargers ⁵	Trip Counts from additional Project Chargers ^{5,6}	Electric VMT CAP Emissions Reduction (lb/year) ^{3,4}			
	eVMT/year	trips/year	ROG	NOx	PM ₁₀	PM _{2.5}
Existing Conditions	1,783,182	148,319	-564	-472	-7.6	-7.0
Year 4	133,367	11,993	-35	-21	-0.44	-0.41
Year 5	2,543,916	228,769	-639	-372	-8.1	-7.5
Year 6	4,131,123	371,504	-1,004	-563	-13	-12
Full Buildout	4,350,873	391,266	-1,057	-593	-13	-12

Year	Electric VMT CAP Emissions Reduction (lb/year)			
	ROG	NOx	PM ₁₀	PM _{2.5}
Existing Conditions	-564	-472	-7.6	-7.0
Partial Buildout- Year 4	-73	-42	-0.84	-0.77
Partial Buildout- Year 5	-890	-505	-11	-10
Partial Buildout- Year 6	-1,627	-889	-19	-18
Full Buildout	-1,963	-1,068	-23	-21

Notes:

- Expected eVMT and trips charged by the Project chargers in Town Square and the Residential/Shopping District land uses are calculated based on the San Mateo Fleet, charger usage assumptions, ARB's Vision Model, and traffic data provided by the Transportation Engineer. For calculation details, see Table 23.
- Emissions reductions from EV charging represent the decrease in emissions from increases in electric vehicle use due to the installation of EV chargers throughout the site. For Town Square and the Residential/Shopping District land uses, the eVMT and trips from additional Project chargers is calculated based on the difference between the MSS scenario and the baseline scenario, representing the additional eVMT due to the installation of additional chargers.
- Emissions reductions use emission factors developed in EMFAC2021 that represent passenger vehicles (LDA, LDT1, LDT2, MCY). The eVMTs determined for Town Square and the Residential/Shopping District are based on ARB's VISION Model, which includes expected electric vehicle fleet % for passenger vehicles only (LDA, LDT1, LDT2, MCY).
- EVs emit particulate matter brake wear and tire wear, therefore those emissions are not considered in the reductions.
- Expected eVMT charged by additional Project chargers is measured based on anticipated charging energy usage provided by the Project Applicant. For calculation details see Table 22.
- Trip counts from Project chargers were calculated by dividing the increased eVMTs from project chargers by the average VMTs per trip for the passenger vehicles (Cars) in a given year, based on traffic data provided by the Transportation Engineer.

Abbreviations:

eVMT - electric vehicle miles traveled	ROG - reactive organic gases
lb - pound	NOx - nitrogen oxides
EV - electric vehicle	PM ₁₀ - particulate matter less than 10 microns in diameter
	PM _{2.5} - particulate matter less than 2.5 microns in diameter

References:

California Air Resources Board. Vision Scenario Planning. Available at: <https://ww2.arb.ca.gov/resources/documents/vision-scenario-planning>

**Table 24b
EV GHG Emissions Reductions Summary
Willow Village - Base Project Alternative Analysis
Menlo Park, California**

Town Square and the Residential/Shopping District

Year	Scenario	Miles Charged by Project Chargers ¹	EV Trips Charged by Project Chargers ¹	eVMT from Additional Project Chargers ²	Trip Counts from additional Project Chargers ²	Electric VMT GHG Emissions Reduction (MT/year) ^{3,4}			
				eVMT/year	trips/year	CO ₂	CH ₄	N ₂ O	CO ₂ e
Full Buildout	Reference	1,840,648	230,919	3,066,397	384,696	-914	-0.033	-0.025	-922
	MSS	4,907,045	615,615						

Campus District

Year	eVMT from Additional Project Chargers ⁴	Trip Counts from additional Project Chargers ^{4,5}	Electric VMT GHG Emissions Reduction (MT/year) ³			
	eVMT/year	trips/year	CO ₂	CH ₄	N ₂ O	CO ₂ e
Existing Conditions	1,783,182	148,319	-580	-0.024	-0.019	-586
Full Buildout	4,350,873	391,266	-1,286	-0.037	-0.031	-1,296

Year	Electric VMT GHG Emissions Reduction (MT/year)			
	CO ₂	CH ₄	N ₂ O	CO ₂ e
Existing Conditions	-580	-0.024	-0.019	-586
Full Buildout	-2,200	-0.070	-0.056	-2,218

Notes:

- Expected eVMT and trips charged by the Project chargers in Town Square and the Residential/Shopping District land uses are calculated based on the San Mateo Fleet, charger usage assumptions, ARB's Vision Model, and traffic data provided by the Transportation Engineer. For calculation details, see Table 23.
- Emissions reductions from EV charging represent the decrease in emissions from increases in electric vehicle use due to the installation of EV chargers throughout the site. For Town Square and the Residential/Shopping District land uses, the eVMT and trips from additional Project chargers is calculated based on the difference between the MSS scenario and the baseline scenario, representing the additional eVMT due to the installation of additional chargers.
- Emissions reductions use emission factors developed in EMFAC2021 that represent passenger vehicles (LDA, LDT1, LDT2, MCY). The eVMTs determined for Town Square and the Residential/Shopping District are based on ARB's VISION Model, which includes expected electric vehicle fleet % for passenger vehicles only (LDA, LDT1, LDT2, MCY).
- Expected eVMT charged by additional Project chargers is measured based on anticipated charging energy usage provided by the Project Applicant. For calculation details see Table 22.
- Trip counts from Project chargers were calculated by dividing the increased eVMTs from project chargers by the average VMTs per trip for the passenger vehicles (Cars) in a given year, based on traffic data provided by the Transportation Engineer.

Abbreviations:

GHG - Greenhouse Gas	eVMT - electric vehicle miles traveled
CO ₂ - carbon dioxide	MT - metric ton
CH ₄ - methane	EV - electric vehicle
N ₂ O - Nitrous Oxide	
CO ₂ e - Carbon dioxide equivalent	

References:

California Air Resources Board. Vision Scenario Planning. Available at: <https://ww2.arb.ca.gov/resources/documents/vision-scenario-planning>

**Table 25a
Summary of Mobile CAP Emissions
Willow Village - Base Project Alternative Analysis
Menlo Park, California**

Total Emissions Before Reductions:¹

Year	CAP Emissions without Reductions (ton/year)			
	ROG	NO _x	PM ₁₀ ²	PM _{2.5} ²
Total Emissions by Year				
Existing Conditions ³	5.0	8.0	4.0	0.84
Year 4	0.57	0.62	0.40	0.081
Year 5	3.8	4.1	3.1	0.62
Year 6	6.3	6.7	5.5	1.1
Full Buildout	6.8	7.3	6.0	1.2
Net Emissions by Year				
Full Buildout	1.8	-0.70	1.9	0.35

Total Emissions with Reductions:⁴

Year	CAP Emissions with Reductions (ton/year)			
	ROG	NO _x	PM ₁₀ ²	PM _{2.5} ²
Total Emissions by Year				
Existing Conditions ³	5.0	8.0	4.0	0.84
Year 4	0.53	0.59	0.40	0.081
Year 5	3.3	3.8	3.1	0.61
Year 6	5.5	6.3	5.5	1.1
Full Buildout	5.8	6.8	6.0	1.2
Net Emissions by Year				
Full Buildout	0.9	-1.2	1.9	0.34

Notes:

- Calculations of CAP emissions before reductions are shown in detail in Table 21a. Net emissions subtract the emissions from the existing conditions in 2019.
- PM10 and PM2.5 emissions include exhaust, tire wear, brake wear, and fugitive dust. Fugitive dust emissions factors are calculated in AQTR Table 8.
- The Existing Conditions includes EV reductions associated with existing Project Site chargers.
- CAP Emissions after reductions account for the reductions associated with EVs as shown in Table 24a. The emissions reductions are subtracted from the total Project emissions.

Abbreviations:

lb - pound NO_x - nitrogen oxides
 MT - metric ton PM₁₀ - particulate matter less than 10 microns in diameter
 EV - electric vehicle PM_{2.5} - particulate matter less than 2.5 microns in diameter
 ROG - reactive organic gases

References:

California ARB. 2021. Miscellaneous Processes Methodologies - Paved Entrained Road Dust. Available online at: https://ww3.arb.ca.gov/ei/areasrc/fullpdf/2021_paved_roads_7_9.pdf

California Air Resources Board. EMFAC2021. Available at: <https://arb.ca.gov/emfac/>

Table 25b
Summary of Mobile GHG Emissions
Willow Village - Base Project Alternative Analysis
Menlo Park, California

Total Emissions Before Reductions:¹

Year	GHG Emissions without Reductions (MT/year)			
	CO ₂	CH ₄	N ₂ O	CO ₂ e
Total Emissions by Year				
Existing Conditions ²	15,660	0.46	1.2	16,024
Full Buildout	20,186	0.60	1.0	20,498
Net Emissions				
Full Buildout	4,525	0.14	-0.19	4,473

Total Emissions with Reductions:³

Year	GHG Emissions with Reductions (MT/year)			
	CO ₂	CH ₄	N ₂ O	CO ₂ e
Total Emissions by Year				
Existing Conditions ²	15,660	0.46	1.2	16,024
Full Buildout	17,986	0.53	0.9	18,279
Net Emissions				
Full Buildout	2,326	0.074	-0.24	2,255

Notes:

- Calculations of GHG emissions before reductions are shown in detail in AQTR Table 21b. Net emissions subtract the emissions from the existing conditions in 2019.
- The Existing Conditions includes EV reductions associated with existing Project Site chargers.
- GHG Emissions after reductions account for the reductions associated with EVs as shown in Table 24b. The emissions reductions are subtracted from the total Project emissions.

Abbreviations:

GHG - Greenhouse Gas	MT - metric ton
CO ₂ - carbon dioxide	EV - electric vehicle
CH ₄ - methane	
N ₂ O - Nitrous Oxide	
CO ₂ e - Carbon dioxide equivalent	

References:

California ARB. 2021. Miscellaneous Processes Methodologies - Paved Entrained Road Dust. Available online at: https://ww3.arb.ca.gov/ei/areasrc/fullpdf/2021_paved_roads_7_9.pdf
 California Air Resources Board. EMFAC2021. Available at: <https://arb.ca.gov/emfac/>

**Table 28
Energy Usage for Existing Conditions and Project Operations
Willow Village - Base Project Alternative Analysis
Menlo Park, California**

Land Use	Floor Area	Annual Electricity Use	Annual Natural Gas Use
	(sqft) (DU - Residential)	(MWh/yr)	(MMBtu/yr)
Existing Conditions (2019)¹			
All	1,923,910	12,050	30,039
Total Existing Energy Usage		12,050	30,039
Full Buildout^{2,3}			
Office	713,841	10,631	0
Retail	279,386	6,106	2,966
Residential	0,523	5,095	0
Hotel	172,000	2,528	0
Parking	733,041	12,621	0
Park	403,837	38	0
Total Full Buildout Energy Usage		37,019	2,966

Notes:

- ¹ Energy use rates for existing conditions were provided for 2019 by the Project Applicant via email on August 10, 2021.
- ² Electricity and natural gas usage rates for the retail, residential, and parking land uses were provided by PAE in the June 14, 2021 memorandum. Electricity usage rates for Office, Hotel, and Park were provided by Hines on June 21, 2021. The hotel and office do not use natural gas. The electricity usage includes 27,986 MWh/year of electricity use associated with the Campus District EV charging stations, which is summarized in the parking land use category. Electricity and energy use rates for the Willow Road Retail were calculated based on the CalEEMod defaults the retail land use type in Climate Zone 5.
- ³ Natural gas for the project is only used for Hamilton Avenue Parcels North and South and the supermarket and restaurant land uses, which are summarized in the retail category.

Abbreviations:

CalEEMod - California Emissions Estimator Model	MMBTU - million British Thermal Units
DU - dwelling unit	MWh - Megawatt-hour
kBTU - thousand British Thermal Units	sqft - square feet
kWh - kilowatt-hour	yr - year

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod), Version 2020.4.0. Available online at <http://www.caleemod.com>

**Table 30
Energy Usage Emissions from Existing Conditions and Project Operations
Willow Village - Base Project Alternative Analysis
Menlo Park, California**

Location	Natural Gas Emissions ^{1,2}					Electricity Emissions ^{1,2}
	ROG	NOx	PM ₁₀	PM _{2.5}	CO ₂ e	
	(tons/yr)					(MT/yr)
Existing Conditions (2019)						
All	0.16	1.5	0.11	0.11	1,613	0
Total Existing Emissions	0.16	1.5	0.11	0.11	1,613	0
Full Buildout						
Retail	1.6E-02	0.15	1.1E-02	1.1E-02	159	0
Total Full Buildout Emissions	1.6E-02	0.15	1.1E-02	1.1E-02	159	0
Partial Buildout³						
Total Year 4 Emissions	1.6E-03	1.5E-02	1.1E-03	1.1E-03	16	0
Total Year 5 Emissions	9.5E-03	0.086	6.6E-03	6.6E-03	94	0
Total Year 6 Emissions	0.016	0.142	0.011	0.011	156	0

Notes:

- CAP emissions result from the combustion of natural gas. As a result, CAP emissions were only calculated for natural gas usage. In compliance with the City of Menlo Park Municipal Code, natural gas usage for the Project will be offset; however, since the carbon intensity of the offset production is not known at this time, GHG emissions from natural gas were conservatively included alongside electricity GHG emissions.
- Emissions were calculated based on energy use, shown in Table 28, and energy emission factors, shown in AQTR Table 29. Existing electricity is sourced from PCE. Project electricity will be sourced from 100% renewable sources; as such, emissions from Project electricity use are expected to be zero. Project natural gas will only be used in retail land uses for commercial cooking equipment.
- Partial buildout emissions were calculated from full buildout using scaling factors by land use type and year, as shown in Table 16.

Abbreviations:

- | | |
|--|--|
| CAP - Criteria Air Pollutants | PM - particulate matter |
| CO ₂ e - carbon dioxide equivalents | PM _{2.5} - PM less than 2.5 microns in diameter |
| GHG - Greenhouse Gas | PM ₁₀ - PM less than 10 microns in diameter |
| MT - metric ton(s) | ROG - reactive organic gases |
| NOx - nitrogen oxides | yr - year |

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod), Version 2020.4.0. Available online at <http://www.caleemod.com>

Table 31
Water Usage for Existing Conditions and Project Operations
Willow Village - Base Project Alternative Analysis
Menlo Park, California

Water Usage

Land Use	CalEEMod® Land Use Subtype	Size	Size Metric	Indoor Water	Outdoor Water	
				(million gal/year)	(million gal/year)	
Existing Conditions (2019)¹						
Office	General Office Building	251,530	sqft	45	27	
Commercial	Research and Development	123,870	sqft	61	0	
Industrial - Warehouse	Unrefrigerated Warehouse-No Rail	500,780	sqft	116	0	
Industrial - Manufacturing	Manufacturing	23,570	sqft	5.5	0	
Recreational	Health Club	24,060	sqft	1.4	0.87	
Light Industrial	General Light Industry	80,100	sqft	19	0	
Parking	Enclosed Parking with Elevator	920,000	sqft	0	0	
Full Buildout²						
Office		713,841	sqft	16	4.5	
Retail		279,386	sqft	6.2	0.84	
Residential		678,390	sqft	20	1.9	
Hotel		172,000	sqft	7.6	2.5	
Parking		733,041	sqft	0	0.56	
Park		403,837	sqft	0	14	
Partial Buildout³						
				Total Year 4 Usage ³	1.1	13
				Total Year 5 Usage ³	19	18
				Total Year 6 Usage ³	41	24

Notes:

- ¹ Existing water use was calculated using the CalEEMod default water consumption profile for each land use.
- ² Project indoor water use rates and outdoor water use for all parcels except Willow Road Retail were provided by the Project Applicant on June 14, 2021. Indoor and outdoor water use rates for Willow Road Retail were calculated using the CalEEMod default water consumption profile for the retail land use type.
- ³ Partial buildout usage rates were calculated from full buildout using scaling factors by land use type and year, as shown in Table 16.

Abbreviations:

- CalEEMod - California Emissions Estimator Model
- gal - gallon
- kWh - kilowatt-hours
- ksf - thousand square feet
- sqft - square feet

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2020.4.0. Available online at <http://www.caleemod.com>

**Table 32
Water Usage and Wastewater Emissions from Existing Conditions and Project Operations
Willow Village - Base Project Alternative Analysis
Menlo Park, California**

Land Use	Electricity Indirect Emissions ^{1,2}	Septic Tank Direct Emissions ^{1,2}	Aerobic Direct Emissions ^{1,2}	Facultative Lagoon Direct Emissions ^{1,2}	Total Emissions
	(MT CO ₂ e/yr)	(MT CO ₂ e/yr)	(MT CO ₂ e/yr)	(MT CO ₂ e/yr)	(MT CO ₂ e/yr)
Existing Conditions (2019)					
Office	37	27	24	10	98
Commercial	36	37	33	13.1	119
Industrial - Warehouse	68	71	62	25	226
Industrial - Manufacturing	3.2	3.3	2.9	1.2	10.6
Recreational	1.2	0.87	0.76	0.30	3.1
Light Industrial	11	11.3	9.9	4.0	36
Parking	0	0	0	0	0
Total Existing Emissions	156	151	132	53	492
Full Buildout					
Office	8	10	8	3.4	30
Retail	3.0	3.8	3.3	1.33	11.5
Residential	10	12	11	4	37
Hotel	4.1	4.6	4.1	1.6	14
Parking	0.16	0	0	0	0.16
Park	4.2	0	0	0	4.2
Total Full Buildout Emissions	30	30	27	11	97
Partial Buildout³					
Total Year 4 Emissions ³	4.7	0.68	0.60	0.24	6.2
Total Year 5 Emissions ³	15	12	10	4.1	41
Total Year 6 Emissions ³	26	25	22	9	82

Notes:

- Emissions shown in this table were calculated using default values and methods from CalEEMod Version 2020.4.0. The Water Electricity Intensity, Water Treatment Types, and Wastewater Treatment Direct Emission Factors used in the calculation can be found in Tables 9.2, 9.3 and 9.4 of Appendix D of the CalEEMod user guide, respectively. These calculations were performed using water use rates, shown in Table 31, and energy emission factors, shown in AQTR Table 29.
- Consistent with CalEEMod, indoor water use was assumed to be processed as wastewater and outdoor water use was assumed to not be processed as wastewater.
- Partial buildout direct emissions from Septic Tank, Aerobic, and Facultative Lagoon wastewater treatment were calculated from full buildout using scaling factors by land use type and year, as shown in Table 1. For partial buildout indirect electricity emissions from water usage and wastewater treatment, usage rates rather than emission were scaled to account for year specific energy emission factors from PG&E, as shown in AQTR Table 29.

Abbreviations:

CalEEMod - California Emissions Estimator Model
 CO₂e - carbon dioxide equivalents
 MT - metric ton
 yr - year

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2020.4.0. Available online at <http://www.caleemod.com>

**Table 33
Solid Waste Generation for Existing Conditions and Project Operations
Willow Village - Base Project Alternative Analysis
Menlo Park, California**

Solid Waste Generation¹

Land Use	Size	Units	Solid Waste Disposal Rate
			(ton/year)
Existing Conditions (2019)			
Office	251,530	sqft	42
Commercial	123,870	sqft	10
Industrial - Warehouse	500,780	sqft	471
Industrial - Manufacturing	23,570	sqft	29
Recreational	24,060	sqft	137
Light Industrial	80,100	sqft	99
Parking	920,000	sqft	0
Full Buildout Conditions			
Office	713,841	sqft	119
Retail	279,386	sqft	293
Residential	0,523	DU	241
Hotel	193	Rooms	106
Parking	733,041	sqft	0
Park	403,837	sqft	0.83

Notes:

¹. Solid Waste Generation Rates are from Table 10.1 of Appendix D of the CalEEMod User's Guide. An 82% diversion rate, provided by the Project Applicant via email communication dated August 2, 2021, is applied to default solid waste generation rates for the existing and project office land use to account for recycling and composting. The diversion rate is generated using data from Recology with the assumption that all bins are at 100% capacity and 0% contamination.

Abbreviations:

CalEEMod - California Emissions Estimator Model
 DU - dwelling unit
 sqft - square feet

References

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2020.4.0. Available online at <http://www.caleemod.com>

**Table 34
Solid Waste Emissions from Existing Conditions and Project Operations
Willow Village - Base Project Alternative Analysis
Menlo Park, California**

Solid Waste Emissions¹

Location	CalEEMod® Land Use Subtype	CO ₂	CH ₄	CO ₂ e
		(MT/year)	(MT/year)	(MT/year)
Existing Conditions (2019)				
Office	General Office Building	8.5	0.51	21
Commercial	Research and Development	2.0	0.12	5.0
Industrial - Warehouse	Unrefrigerated Warehouse-No Rail	96	5.6	237
Industrial - Manufacturing	Manufacturing	5.9	0.35	15
Recreational	Health Club	28	1.6	69
Light Industrial	General Light Industry	20	1.2	50
Parking	Enclosed Parking with Elevator	0	0	0
Total Existing Emissions		160	9.5	397
Full Buildout Conditions				
Office		24	1.4	60
Retail		60	3.5	148
Residential		49	2.9	121
Hotel		22	1.3	53
Parking		0	0	0
Park		0.17	0.010	0.42
Total Full Buildout Emissions		154	9.1	382
Partial Buildout²				
	Total Year 4 Emissions ²	6.9	0.41	17
	Total Year 5 Emissions ²	66	3.9	164
	Total Year 6 Emissions ²	134	7.9	332

Notes:

1. Emissions shown in this table were calculated using default values and methods from CalEEMod Version 2020.4.0. These calculations were performed using default waste use rates by land use type and an 82% diversion rate for office land use types provided by the Project Applicant, shown in Table 33, and default solid waste landfill gas emission factors from Table 10.2 of CalEEMod User's Guide Appendix D.
2. Partial buildout emissions were calculated from full buildout using scaling factors by land use type and year, as shown in Table 16.

Abbreviations:

CalEEMod - California Emissions Estimator Model	LFG - Landfill Gas
CH ₄ - methane	MT - metric ton
CO ₂ - carbon dioxide	
CO ₂ e - carbon dioxide equivalents	

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2020.4.0. Available online at <http://www.caleemod.com>

**Table 35
Unmitigated Architectural Coating Emissions from Existing Conditions and Project Operations
Willow Village - Base Project Alternative Analysis
Menlo Park, California**

Land Use	Floor Area	Building Surface Area ¹	Application Rate ²	Indoor Paint VOC EF ³	Outdoor Paint VOC EF ³	Architectural Coating VOC Emissions ⁴
	(sqft)	(sqft)		(g/L)	(g/L)	
Existing Conditions (2019)						
Office	251,530	503,060	10%	100	150	262
Commercial	123,870	247,740	10%	100	150	129
Industrial - Warehouse	500,780	1,001,560	10%	100	150	522
Industrial - Manufacturing	23,570	47,140	10%	100	150	25
Recreational	24,060	48,120	10%	100	150	25
Light Industrial	80,100	160,200	10%	100	150	84
Parking	920,000	55,200	10%	0	150	9.6
Total Existing Conditions Emissions						1,057
Full Buildout						
Office	713,841	1,427,682	10%	100	150	745
Retail	279,386	558,772	10%	100	150	291
Residential	678,390	1,831,653	10%	100	150	955
Hotel	172,000	344,000	10%	100	150	179
Parking	733,041	43,982	10%	0	150	8
Park	403,837	0	10%	0	0	0
Total Full Buildout Emissions						2,178
Partial Buildout⁵						
Total Year 4 Emissions ⁵						56
Total Year 5 Emissions ⁵						837
Total Year 6 Emissions ⁵						1,787

Notes:

- Consistent with CalEEMod Appendix A, residential building surface area was assumed to be 2.7 times the floor area, and non-residential 2 times the floor area. Also consistent with CalEEMod Appendix E, the parking painted area was assumed to be 6% of the total surface area for surface lots.
- Consistent with CalEEMod Appendix A, 10% of all surfaces were assumed to be coated each year.
- Consistent with CalEEMod Appendix D Table 6.1, which is based on BAAQMD Regulation 8 Rule 3 paint VOC regulations, use VOC EF of 100 g/L for flat paints, generally used indoors, and 150 g/L for all other architectural coatings.
- Uses CalEEMod Appendix A assumption that 1 gallon of paint covers 180 square feet. Building surface area is assumed to be 75% indoors and 25% outdoors, consistent with CalEEMod Appendix A. Parking garages are assumed to have no indoor surfaces.
- Partial buildout emissions were calculated from full buildout using scaling factors by land use type and year, as shown in Table 16.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District	lb - pound
CalEEMod - California Emissions Estimator Model	sqft - square feet
EF - emission factor	VOC - volatile organic compound
g - grams	yr - year
L - liters	

References:

BAAQMD. 2009. Regulation 8 Rule 3 Architectural Coatings. Accessed November 2020. Available at: https://www.baaqmd.gov/~/media/dotgov/files/rules/reg-8-rule-3-architectural-coatings/documents/rg0803_0709.pdf?la=en.

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2020.4.0. Available online at <http://www.caleemod.com/>

**Table 36
Mitigated Architectural Coating Emissions from Existing Conditions and Project Operations
Willow Village - Base Project Alternative Analysis
Menlo Park, California**

Land Use	Floor Area	Building Surface Area ¹	Application Rate ²	Indoor Paint VOC EF ³	Outdoor Paint VOC EF ³	Architectural Coating VOC Emissions ⁴
	(sqft)	(sqft)		(g/L)	(g/L)	
Full Buildout						
Office	713,841	1,427,682	10%	10	150	298
Retail	279,386	558,772	10%	10	150	117
Residential	678,390	1,831,653	10%	10	150	382
Hotel	172,000	344,000	10%	10	150	72
Parking	733,041	43,982	10%	0	150	8
Park	403,837	0	10%	0	0	0
Total Full Buildout Emissions						876
Partial Buildout⁵						
Total Year 4 Emissions ⁵						25
Total Year 5 Emissions ⁵						338
Total Year 6 Emissions ⁵						719

Notes:

- Consistent with CalEEMod Appendix A, residential building surface area was assumed to be 2.7 times the floor area, and non-residential 2 times the floor area. Also consistent with CalEEMod Appendix E, the parking painted area was assumed to be 6% of the total surface area for surface lots.
- Consistent with CalEEMod Appendix A, 10% of all surfaces were assumed to be coated each year.
- Paint VOC content is consistent with or more stringent than BAAQMD Regulation 8 Rule 3 (Architectural Coatings). Emissions were estimated assuming that indoor painting will utilize "super-compliant" VOC architectural coatings that meet the more stringent limits in South Coast Air Quality Management District Rule 1113. For outdoor paint, assumed use of coatings with VOC content of 150 g/L, consistent with BAAQMD requirements. VOC was assumed to be equivalent to ROG for these purposes.
- Uses CalEEMod Appendix A assumption that 1 gallon of paint covers 180 square feet. Building surface area is assumed to be 75% indoors and 25% outdoors, consistent with CalEEMod Appendix A. Parking garages are assumed to have no indoor surfaces.
- Partial buildout emissions were calculated from full buildout using scaling factors by land use type and year, as shown in Table 16.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District	lb - pound
CalEEMod - California Emissions Estimator Model	sqft - square feet
EF - emission factor	VOC - volatile organic compound
g - grams	yr - year
L - liters	

References:

BAAQMD. 2009. Regulation 8 Rule 3 Architectural Coatings. Accessed November 2020. Available at: https://www.baaqmd.gov/~media/dotgov/files/rules/reg-8-rule-3-architectural-coatings/documents/rg0803_0709.pdf?la=en.

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod@), Version 2020.4.0. Available online at <http://www.caleemod.com/>

South Coast Air Quality Management District. Super Compliant Architectural Coatings per Rule 1113. Accessed July 2021. Available at: <http://www.aqmd.gov/home/programs/business/business-detail?title=super-compliant-coatings&parent=other-low-voc-products>.

**Table 38
Consumer Product Emissions from Existing Conditions and Project Operations
Willow Village - Base Project Alternative Analysis
Menlo Park, California**

Land Use	Building Area	Consumer Products VOC EF ^{1,2}	Days per Year	Consumer Products VOC emissions
	(sqft)	(lb/sqft/day)		(lb/yr)
Existing Conditions (2019)				
Office	251,530	1.8E-05	365	1,670
Commercial	123,870	1.8E-05	365	822
Industrial - Warehouse	500,780	1.8E-05	365	3,324
Industrial - Manufacturing	23,570	1.8E-05	365	156
Recreational	24,060	1.8E-05	365	160
Light Industrial	80,100	1.8E-05	365	532
Parking	920,000	3.5E-07	365	119
Existing Conditions Emissions				6,783
Full Buildout				
Office	713,841	1.8E-05	365	4,739
Retail	279,386	1.8E-05	365	1855
Residential	678,390	1.8E-05	365	4,503
Hotel	172,000	1.8E-05	365	1,142
Parking	733,041	3.5E-07	365	95
Park	403,837	5.2E-08	365	7.6
Total Full Buildout Emissions				12,340
Partial Buildout³				
Total Year 4 Emissions ³				390
Total Year 5 Emissions ³				5,121
Total Year 6 Emissions ³				10,421

Notes:

- ¹ The consumer products VOC EF for office, retail, and residential land uses was derived using methodology consistent with CalEEMod with adjusted parameters for San Mateo County, as described in AQTR Table 37. The default emissions factor assumes 2020 consumer products VOC inventory for San Mateo County. The default building square footage used is from 2010, which was updated to 2020 using population growth of San Mateo County, as shown in AQTR Table 37.
- ² Consumer product VOC EFs for parking and open space were taken from CalEEMod 2020.4.0. These defaults take into account pesticide and fertilizer use in city parks and degreaser use in parking areas.
- ³ Partial buildout emissions were calculated from full buildout using scaling factors by land use type and year, as shown in Table 16.

Abbreviations:

ARB - Air Resources Board	sqft - square feet
CalEEMod - California Emissions Estimator Model	VOC - volatile organic compound
EF - emission factor	yr - year
lb - pound	

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2020.4.0. Available online at <http://www.caleemod.com/>

Table 40
Summary of Unmitigated Operational CAP Emissions
Willow Village - Base Project Alternative Analysis
Menlo Park, California

Emissions Source	CAP Emissions ¹							
	(ton/year)				(lb/day) ²			
	ROG	NO _x	PM ₁₀	PM _{2.5}	ROG	NO _x	PM ₁₀	PM _{2.5}
Existing Conditions (2019)³								
Architectural Coating	0.53	--	--	--	2.9	--	--	--
Consumer Products	3.4	--	--	--	19	--	--	--
Landscaping	2.9E-03	2.8E-04	1.1E-04	1.1E-04	0.016	1.5E-03	6.0E-04	6.0E-04
Natural Gas Use	0.16	1.5	0.11	0.11	0.89	8.1	0.61	0.61
Mobile	5.0	8.0	4.0	0.84	27	44	22	4.6
Emergency Generators	2.9E-03	0.051	2.7E-03	2.7E-03	0.016	0.28	0.015	0.015
Total Emissions	9.1	10	4.1	0.95	50	52	23	5.2
Full Buildout Conditions⁴								
Architectural Coating	1.1	--	--	--	6.0	--	--	--
Consumer Products	6.2	--	--	--	34	--	--	--
Landscaping	0.39	0.15	0.071	0.071	2.1	0.81	0.39	0.39
Natural Gas Use ⁵	0.016	0.15	1.1E-02	1.1E-02	0.088	0.80	0.061	0.061
Mobile	5.8	6.8	6.0	1.2	32	37	33	6.4
Emergency Generators	0.15	1.3	0.047	0.047	0.79	7.0	0.26	0.26
Total Emissions	14	8.3	6.1	1.3	75	46	33	7.1
Partial Buildout Emissions⁶								
Total Year 4 Emissions	1.1	1.0	0.48	0.15	6.2	5.7	2.6	0.84
Total Year 5 Emissions	7	4.7	3.2	0.71	37	26	18	3.9
Total Year 6 Emissions	12	7.5	5.6	1.2	66	41	31	6.6
Net Emissions⁷								
Net Year 4 Emissions	-7.9	-8.5	-3.7	-0.80	-44	-47	-20	-4.4
Net Year 5 Emissions	-2.3	-4.9	-0.9	-0.24	-13	-27	-5.1	-1.31
Net Year 6 Emissions	3.1	-2.0	1.5	0.2	17	-11	8.0	1.4
Net Full Buildout Emissions	4.6	-1.2	1.9	0.4	25	-6.5	11	1.9

Notes:

- Emissions estimated using methods consistent with CalEEMod® version 2020.4.0.
- Operational emissions shown represent activity and emissions across 365 days per year.
- Operational emissions from existing conditions were calculated using CalEEMod® default data and emission factors based on the existing land use type and energy use rates provided by the Project Applicant.
- Full buildout operational emissions are based on electricity, natural gas, and water usage rates provided by the Project Applicant alongside CalEEMod® defaults for architectural coating, consumer product, landscaping, and waste emissions. Net emissions were calculated as the difference between full buildout emissions and existing condition emissions.
- Natural gas usage for the project would be used exclusively for supermarket and commercial cooking.
- Partial buildout emissions were calculated from full buildout using scaling factors by land use type and year, as shown in Table 16.
- Net emissions were calculated as the difference between partial buildout emissions for each year and existing condition emissions.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District	NO _x - nitrogen oxides
CalEEMod® - California Emissions Estimator Model	PM - particulate matter
CAP - Criteria Air Pollutant	PM _{2.5} - PM less than 2.5 microns in diameter
CO _{2e} - carbon dioxide equivalent	PM ₁₀ - PM less than 10 microns in diameter
GHG - greenhouse gas	PM - particulate matter
lb - pounds	ROG - reactive organic gases
MT - metric ton	yr - year

References:

CalEEMod® Version 2020.4.0 Available Online at: <http://www.caleemod.com>

Table 41
Summary of Mitigated Operational CAP Emissions
Willow Village - Base Project Alternative Analysis
Menlo Park, California

Emissions Source	CAP Emissions ¹							
	(ton/year)				(lb/day) ²			
	ROG	NO _x	PM ₁₀	PM _{2.5}	ROG	NO _x	PM ₁₀	PM _{2.5}
Existing Conditions (2019)³								
Architectural Coating	0.53	--	--	--	2.9	--	--	--
Consumer Products	3.4	--	--	--	19	--	--	--
Landscaping	2.9E-03	2.8E-04	1.1E-04	1.1E-04	0.016	1.5E-03	6.0E-04	6.0E-04
Natural Gas Use	0.16	1.5	0.11	0.11	0.89	8.1	0.61	0.61
Mobile	5.0	8.0	4.0	0.84	27	44	22	4.6
Emergency Generators	2.9E-03	0.051	2.7E-03	2.7E-03	0.016	0.28	0.015	0.015
Total Emissions	9.1	9.5	4.1	0.95	50	52	23	5.2
Full Buildout Conditions⁴								
Architectural Coating	0.44	--	--	--	2.4	--	--	--
Consumer Products	6.2	--	--	--	34	--	--	--
Landscaping	0.39	0.15	0.071	0.071	2.1	0.81	0.39	0.39
Natural Gas Use ⁵	0.016	0.15	1.1E-02	1.1E-02	0.088	0.80	0.061	0.061
Mobile	5.8	6.8	6.0	1.2	32	37	33	6.4
Emergency Generators	0.15	1.3	0.047	0.047	0.79	7.0	0.26	0.26
Total Emissions	13	8.3	6.1	1.3	71	46	33	7.1
Partial Buildout Emissions⁶								
Total Year 4 Emissions	1.1	1.0	0.48	0.15	6.1	5.7	2.6	0.84
Total Year 5 Emissions	6.5	4.7	3.2	0.71	36	26	18	3.9
Total Year 6 Emissions	12	7.5	5.6	1.2	64	41	31	6.6
Net Emissions⁷								
Net Year 4 Emissions	-8.0	-8.5	-3.7	-0.80	-44	-47	-20	-4.4
Net Year 5 Emissions	-2.6	-4.9	-0.93	-0.24	-14	-27	-5.1	-1.3
Net Year 6 Emissions	2.5	-2.0	1.5	0.25	14	-11	8.0	1.4
Net Full Buildout Emissions	3.9	-1.2	1.9	0.35	22	-6.5	11	1.9

Notes:

- Emissions estimated using methods consistent with CalEEMod® version 2020.4.0. The mitigated scenario for the Project is equivalent to the unmitigated scenario for all sources except Architectural Coating, as shown in Table 36.
- Operational emissions shown represent activity and emissions across 365 days per year.
- Operational emissions from existing conditions were calculated using CalEEMod® default data and emission factors based on the existing land use type and energy use rates provided by the Project Applicant.
- Full buildout operational emissions are based on electricity, natural gas, and water usage rates provided by the Project Applicant alongside CalEEMod® defaults for architectural coating, consumer product, landscaping, and waste emissions.
- Natural gas usage for the project would be used exclusively for supermarket and commercial cooking.
- Partial buildout emissions were calculated from full buildout using scaling factors by land use type and year, as shown in Table 16.
- Net emissions were calculated as the difference between partial buildout emissions for each year and existing condition emissions.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District	NO _x - nitrogen oxides
CalEEMod® - California Emissions Estimator Model	PM - particulate matter
CAP - Criteria Air Pollutant	PM _{2.5} - PM less than 2.5 microns in diameter
CO ₂ e - carbon dioxide equivalent	PM ₁₀ - PM less than 10 microns in diameter
GHG - greenhouse gas	PM - particulate matter
lb - pounds	ROG - reactive organic gases
MT - metric ton	yr - year

References:

CalEEMod Version 2020.4.0 Available Online at: <http://www.caleemod.com>

**Table 42
Summary of Operational GHG Emissions
Willow Village - Base Project Alternative Analysis
Menlo Park, California**

Emissions Source	GHG Emissions ¹	
	(MT/yr)	
	CO ₂ e	
	Existing Conditions (2019) ²	Full Buildout Conditions ³
Landscaping	0.063	22
Electricity Use	0	0
Natural Gas Use ⁴	1,613	159
Water Use	492	97
Waste Disposed	397	382
Emergency Generators	8.5	399
Total Emissions	2,509	1,059
	Net Emissions⁵	-1,450

Notes:

- ¹ Emissions estimated using methods consistent with CalEEMod® version 2020.4.0.
- ² Operational emissions from existing conditions were calculated using CalEEMod® default data and emission factors based on the existing land use type and energy use rates provided by the Project Applicant.
- ³ Full buildout operational emissions are based on electricity, natural gas, and water usage rates provided by the Project Applicant alongside CalEEMod® defaults for architectural coating, consumer product, landscaping, and waste emissions.
- ⁴ Natural gas usage for the project would be used exclusively for supermarket and commercial cooking.
- ⁵ Net emissions were calculated as the difference between partial buildout emissions for each year and existing condition emissions.

Abbreviations:

- CalEEMod® - California Emissions Estimator Model
- CO₂e - carbon dioxide equivalent
- GHG - greenhouse gas
- MT - metric ton
- yr - year

References:

CalEEMod® Version 2020.4.0 Available Online at: <http://www.caleemod.com>

**Table 43
Unmitigated Construction and Net New Operational CAP Emissions by Year
Willow Village - Base Project Alternative Analysis
Menlo Park, California**

Year	Average Daily CAP Emissions ^{1,2}											
	(lb/day)											
	Construction Emissions Only				Net Operational Emissions ³				Construction and Net Operational Emissions ³			
	ROG	NO _x	PM ₁₀	PM _{2.5}	ROG	NO _x	PM ₁₀	PM _{2.5}	ROG	NO _x	PM ₁₀	PM _{2.5}
Year 1	0.12	2.4	0.053	0.050	-50	-52	-23	-5.2	-50	-50	-23	-5.2
Year 2	4.5	64	1.4	1.3	-50	-52	-23	-5.2	-45	11	-21	-3.9
Year 3	19	124	5.8	5.4	-50	-52	-23	-5.2	-31	72	-17	0.15
Year 4	52	53	2.3	2.1	-44	-47	-20	-4.4	8.5	7.0	-18	-2.3
Year 5	63	45	2.1	2.0	-13	-27	-5.1	-1.3	50	18	-3.0	0.67
Year 6	31	11	0.60	0.55	17	-11	8.0	1.4	48	-0.32	9	1.9
Full Buildout	--	--	--	--	25	-6.5	11	1.9	25	-6.5	11	1.9
BAAQMD Significance Threshold									54	54	82	54

Notes:

- Emissions estimated using methods consistent with CalEEMod® version 2020.4.0.
- Net new operational emissions are scaled for partial years of phased operations by the percent that each parcel is operational for each year relative to full buildout, as shown in Table 16.
- Unmitigated construction emissions can be found in Table 13. Net unmitigated operational emissions were calculated by subtracting the emissions from the existing conditions from the project emissions, as reported in Table 42.

Abbreviations:

CalEEMod - California Emissions Estimator Model	PM _{2.5} - PM less than 2.5 microns in diameter
CAP - Criteria Air Pollutant	PM ₁₀ - PM less than 10 microns in diameter
lb - pounds	ROG - reactive organic gases
NO _x - nitrogen oxides	yr - year
PM - particulate matter	

References:

CalEEMod Version 2020.4.0 Available Online at: <http://www.caleemod.com>

Table 44
Mitigated Construction and Net New Operational CAP Emissions by Year
Willow Village - Base Project Alternative Analysis
Menlo Park, California

Year	Average Daily CAP Emissions ^{1,2}											
	(lb/day)											
	Construction Emissions Only ³				Net Operational Emissions Only ³				Construction and Net Operational Emissions ³			
	ROG	NO _x	PM ₁₀	PM _{2.5}	ROG	NO _x	PM ₁₀	PM _{2.5}	ROG	NO _x	PM ₁₀	PM _{2.5}
Year 1	0.064	1.9	0.019	0.019	-50	-52	-23	-5.2	-50	-50	-23	-5.2
Year 2	2.7	45	0.49	0.48	-50	-52	-23	-5.2	-47	-7.6	-22	-4.7
Year 3	10	47	0.78	0.77	-50	-52	-23	-5.2	-40	-5.1	-22	-4.4
Year 4	24	29	0.38	0.37	-44	-47	-20	-4.4	-20	-18	-20	-4.0
Year 5	28	22	0.26	0.25	-14	-27	-5.1	-1.3	14	-4.7	-4.9	-1.1
Year 6	13	4.8	0.060	0.058	14	-11	8.0	1.4	27	-6.2	8.1	1.4
Full Buildout	--	--	--	--	22	-6.5	11	1.9	22	-6.5	11	1.9
BAAQMD Significance Threshold									54	54	82	54

Notes:

- Emissions estimated using methods consistent with CalEEMod® version 2020.4.0.
- Net new operational emissions are scaled for partial years of phased operations by the percent that each parcel is operational for each year relative to full buildout, as shown in Table 16.
- Mitigated construction emissions can be found in Table 14. Net mitigated operational emissions were calculated by subtracting the emissions from the existing conditions from the project emissions, as reported in Table 43.

Abbreviations:

CalEEMod - California Emissions Estimator Model	PM _{2.5} - PM less than 2.5 microns in diameter
CAP - Criteria Air Pollutant	PM ₁₀ - PM less than 10 microns in diameter
lb - pounds	ROG - reactive organic gases
NO _x - nitrogen oxides	yr - year
PM - particulate matter	

References:

CalEEMod Version 2020.4.0 Available Online at: <http://www.caleemod.com>