gilroy2040 GENERAL PLAN

City of Gilroy

General Plan Alternatives Report

Technical Appendix

Public Review Draft

July 2019

Contents

APPENDIX A: HOLDING CAPACITY ANALYSIS

This document provides a description of the assumptions and methods used to determine housing, population, and employment capacity for the land use alternatives illustrated in the 2018 Land Use Alternatives Report. The holding capacity analysis represents an estimate of the total dwelling units, population, and non-residential building square footage associated with the future buildout of the land use alternatives. A key assumption in understanding this holding capacity analysis is that it reflects a theoretical buildout of the entire city, rather than what is likely to appear on the ground within the General Plan horizon year of 2040.

The holding capacity analysis for the land use alternatives was conducted at both a focus area level and citywide level using an inventory of vacant and underutilized land as the basis for analysis. City staff and the consultants identified all vacant and underutilized parcels in the city. Using GIS, the sites were compiled into a map, and the inventory was checked against aerial images to confirm vacancy status. Once verified, the proposed General Plan Land Use designation for each alternative was identified, and the attributes of the vacant land GIS data were exported into an excel spreadsheet. The data was then sorted by General Plan Land Use designation. The holding capacity analysis was conducted for each of the three alternatives (Alternatives A, B, and C). Tables A-3, A-4, and A-5 show a summary of the holding capacity. Each table is divided into two categories: areas within the five focus areas and areas outside the focus areas. Development capacity only fluctuates on land within the designated focus areas because these are the areas that are being considered for land use changes. The assumed growth outside the focus areas is held constant for each alternative holding capacity because no land use changes are proposed in these areas.

Development Assumptions

The holding capacity analysis uses development assumptions such as target density for residential uses, target floor area ratio (FAR) for non-residential uses, and percentage distribution of uses within each land use designation. Table A-1 below shows the assumptions used to calculate the residential holding capacity (i.e., housing units and population). Table A-2 below shows the assumptions used to calculate the employment holding capacity. The assumptions shown in Tables A-1 and A-2 were applied to all vacant and underutilized parcels within the city.

The following terms are used in Tables A-1 and A-2:

- Residential Acreage and Employment Acreage. This is the percentage of the vacant acreage within each land use designation that is expected to develop with residential uses or employment uses.
- Net Acreage. Net acreage refers to the size of the parcel, excluding the area dedicated for public roads, drainage easements, and other dedicated rights of way.
- Percent Redevelopment. The holding capacity analysis applies a percentage redevelopment factor to underutilized sites in areas of the city that are already built out with established uses, recognizing that not all uses will redevelop by 2040.
    - Percent of Acreage by Residential Zoning District. These assumptions are applied to calculate the expected housing types for each designation. The following are the residential Zoning Districts, which are used as a proxy for housing types:

  - Single-Family Residential (R1)
  - Two-Family Residential (R2)
  - Medium Density Residential (R3)
  - High Density Residential (R4)

  City staff and the consultants converted the R1, R2, R3, and R4 housing types to a more simplified model of single-family and multi-family housing. Single-family housing was assumed to equal the total of R1 and R2 and 25 percent of R3, while multi-family was assumed to equal the total of R4 and 75 percent of R3.

- Typical Dwelling Units per Acre (du/ac). Each designation allows a range of residential densities (measured in dwelling units per acre), and development will occur somewhere within the allowable range. The holding capacity analysis applies a typical density for each designation.
- Persons per Household. The persons per household assumption is used to convert the calculated number of households to population.
- FAR (Floor Area Ratio). FAR is the intensity measurement for non-residential uses and refers to the ratio of building floor area to the square footage of the site.
- Percent of Acreage by Employment Type. These assumptions are applied to calculate the expected type of jobs for each non-residential designation. The following abbreviations are used:
  - RET - Retail
  - SER - Service
  - OFF - Office
  - MAN - Manufacturing
  - WHO - Wholesale

Specific Plan Areas

The City has two adopted specific plans covering areas outside of the five focus areas: Hecker Pass Specific Plan and Glen Loma Ranch Specific Plan. As part of the vacant and underutilized land inventory, City staff and the consultants confirmed the remaining vacant and underutilized sites within each of these areas. In lieu of creating a set of new assumptions, City staff and the consultants used the adopted development assumptions for these areas and updated the remaining capacity based on current vacant and underutilized land.

TABLE A-1: RESIDENTIAL DEVELOPMENT ASSUMPTIONS FOR HOLDING CAPACITY

				Percent of Acreage by Residential Zoning District				Typical Dwelling Units per Acre (du/ac)				
Land Use Designation	Residential Acreage	Net Acreage	Percent Redevelop.	R1	R2	R3	R4	R1	R2	R3	R4	Person per Household
Residential												
Neighborhood District High	95%	80%	N/A	82%	5%	10%	3%	7	9	16	30	3.10
Neighborhood District Low	95%	80%	N/A	60%	5%	25%	10%	7	9	16	30	3.10
Low Density Residential	100%	80%	N/A	100%	0%	0%	0%	5	N/A	N/A	N/A	3.27
Medium Density Residential	100%	80%	N/A	0%	10%	90%	0%	N/A	12	12	N/A	2.77
High Density Residential	100%	80%	N/A	0%	0%	0%	100%	N/A	N/A	N/A	24	2.77
Hillside Residential	100%	50%	N/A	100%	0%	0%	0%	2	N/A	N/A	N/A	3.27
Miller Pond (Hillside Residential)	100%	50%	N/A	100%	0%	0%	0%	2	N/A	N/A	N/A	3.27
Mixed-Use												
Mixed-Use	50%	85%	25%	0%	0%	0%	100%	N/A	N/A	N/A	20	2.77
Mixed-Use High	50%	85%	25%	0%	0%	0%	100%	N/A	N/A	N/A	30	2.77
Downtown Specific Plan												
Historic District	44%	85%	N/A	0%	0%	50%	50%	N/A	N/A	N/A	30	2.77
Expansion District	44%	85%	N/A	0%	0%	50%	50%	N/A	N/A	N/A	30	2.77
Cannery District	29%	85%	N/A	0%	0%	50%	50%	N/A	N/A	N/A	30	2.77
Transitional District	69%	85%	N/A	0%	0%	50%	50%	N/A	N/A	N/A	30	2.77
Gateway District	73%	85%	N/A	0%	0%	50%	50%	N/A	N/A	N/A	30	2.77
Civic/Cultural Arts District	40%	85%	N/A	0%	0%	50%	50%	N/A	N/A	N/A	30	2.77
Station Area Plan												
Mixed-Use Housing	80%	85%	60%	0%	0%	0%	100%	N/A	N/A	N/A	30	2.77
Mixed-Use Office/Housing	67%	85%	60%	0%	0%	0%	100%	N/A	N/A	N/A	30	2.77

Source: Mintier Harnish, 2017

TABLE A-2: EMPLOYMENT DEVELOPMENT ASSUMPTIONS FOR HOLDING CAPACITY

					Percent of Acreage by Employment Type					Square Foot per Employee				
Land Use Designation	Employment Acreage	Net Acreage	Percent Redevelopment	FAR	RET	SER	OFF	MAN	WHO	RET	SER	OFF	MAN	WHO
Residential														
Neighborhood District Low	5%	80%	N/A	0.275	50%	30%	20%	0%	0%	550	550	550	N/A	N/A
Neighborhood District High	5%	80%	N/A	0.275	50%	30%	20%	0%	0%	550	550	550	N/A	N/A
Mixed-Use														
Mixed-Use	50%	0.5	25%	0.52	75%	15%	10%	0%	0%	300	300	300	N/A	N/A
Mixed-Use High	50%	85%	25%	1.0	75%	15%	10%	0%	0%	500	500	500	N/A	N/A
Commercial														
General Services Commercial	100%	85%	N/A	0.275	80%	20%	0%	0%	0%	550	550	N/A	N/A	N/A
Visitor Serving Commercial	100%	85%	N/A	0.3	80%	20%	0%	0%	0%	500	500	500	N/A	N/A
City Gateway	100%	85%	25%	1.0	40%	20%	40%	0%	0%	300	300	300	N/A	N/A
Industrial														
Employment Center	100%	85%	N/A	0.4	5%	5%	60%	30%	0%	700	700	700	700	N/A
Industrial Park	100%	85%	N/A	0.25	0%	0%	20%	80%	0%	N/A	N/A	1500	1500	N/A
General Industrial	100%	85%	N/A	0.25	0%	0%	10%	70%	20%	N/A	N/A	1500	1500	1500
Public														
Public/Quasi-Public	100%	85%	N/A	0.275	0%	0%	100%	0%	0%	N/A	N/A	400	N/A	N/A
Downtown Specific Plan														
Historic District	56%	85%	N/A	1.0	40%	20%	30%	0%	0%	300	300	300	N/A	N/A
Expansion District	56%	85%	N/A	1.0	40%	20%	30%	0%	0%	300	300	300	N/A	N/A
Cannery District	71%	85%	N/A	0.5	40%	20%	30%	0%	0%	300	300	300	N/A	N/A
Transitional District	31%	85%	N/A	0.3	40%	20%	30%	0%	0%	300	300	300	N/A	N/A
Gateway District	27%	85%	N/A	0.3	40%	20%	30%	0%	0%	300	300	300	N/A	N/A
Civic/Cultural Arts District	60%	85%	N/A	0.3	40%	20%	30%	0%	0%	300	300	300	N/A	N/A
Station Area Plan														
Mixed-Use Housing	20%	85%	60%	2.0	40%	20%	30%	0%	0%	500	300	300	N/A	N/A
Mixed-Use Office/Housing	33%	85%	60%	2.0	15%	15%	70%	0%	0%	500	300	300	N/A	N/A
Office	100%	85%	70%	1.0	0%	0%	100%	0%	0%	500	300	300	N/A	N/A

Holding Capacity – Alternative A

The holding capacity analysis for Alternative A is based on the 2015 Draft Preferred Land Use Alternative. The land use designations in this Alternative did not change from 2015, but the assumptions were updated to reflect both current trends in development for 2017 and the new urban growth boundary approved by voters in November 2016. Table A-3 shows a summary of the holding capacity for Alternative A.

TABLE A-3: HOLDING CAPACITY-ALTERNATIVE A

		Dwelling Units		Jobs						
Designation	Acres	Single-family	Multi-family	RET	SER	OFF	MAN	WHO	Total	Total Non-Residential Square Footage
Focus Area Designations										
Neighborhood District Low	193.20	968	308	84	50	34	0	0	168	92,574
Neighborhood District High	276.59	1,187	1,262	120	72	48	0	0	241	132,531
High Density Residential	15.15	0	291	0	0	0	0	0	0	0
Mixed-Use	18.94	0	161	438	88	58	0	0	584	175,341
Mixed-Use High	0	0	0	0	0	0	0	0	0	0
General Services Commercial	36.50	0	0	541	135	0	0	0	676	371,648
Visitor Serving Commercial	5.91	0	0	105	26	0	0	0	131	65,647
City Gateway	2.12	0	0	105	52	105	0	0	262	78,680
Employment Center	0	0	0	0	0	0	0	0	0	0
Industrial Park	335.60	0	0	0	0	414	1,657	0	2,071	3,106,481
Public/Quasi-Public	8.52	0	0	0	0	217	0	0	217	86,752
Downtown Specific Plan	22.13	168	1,174	2,843	0	0	0	0	2,843	232,187
Mixed-Use Housing	0	0	0	0	0	0	0	0	0	0
Mixed-Use Office/Housing	0	0	0	0	0	0	0	0	0	0
Office	0	0	0	0	0	0	0	0	0	0
Subtotal	908.8	2,323	3,196	4,131	398	876	1,657	0	7,063	4,276,195
Designations outside Focus Areas										
Low Density Residential	36.89	146	0	0	0	0	0	0	0	0
Medium Density Residential	14.94	0	143	0	0	0	0	0	0	0
Hillside Residential	166.72	165	0	0	0	0	0	0	0	0
Miller Pond (Hillside Residential)	30.6	50	0	0	0	0	0	0	0	0
General Industrial	619.23	0	0			382	2,675	764	3,821	5,731,865
Glen Loma Ranch Specific Plan	292	1,120	0	127	76	51	0	0	254	139,915
Hecker Pass Specific Plan	321.21	143	0	0	0	0	0	0	0	0
General Services Commercial	53.89	0	0	728	140	0	0	0	918	548,411
Employment Center	155.76	0	0	165	165	1,977	989	0	3,295	2,306,832
City Gateway	7.67	0	0	353	119	379	0	0	801	283,989
Visitor Serving Commercial	5.91	0	0	105	26	0	0	0	131	65,647
Subtotal	1,704.8	1,624	143	1,478	527	2,789	3,664	764	9,226	9,076,660
TOTAL	2,613.3	3,948	3,339	5,658	925	3,665	5,321	719	16,289	13,352,855

Source: Mintier Harnish, 2017 Note: Amounts vary due to rounding.

Holding Capacity – Alternative B

Table A-4 shows a summary of the holding capacity for Alternative B.

TABLE A-4: HOLDING CAPACITY-ALTERNATIVE B

		Dwelling Units		Jobs						
Designation	Acres	Single-family	Multi-family	RET	SER	OFF	MAN	WHO	Total	Total Non-Residential Square Footage
Focus Area Designations										
Neighborhood District Low	0	0	0	0	0	0	0	0	0	0
Neighborhood District High	693	2,976	3,160	302	181	121	0	0	604	332,058
High Density Residential	15.15	0	291	0	0	0	0	0	0	0
Mixed-Use	0	0	0	0	0	0	0	0	0	0
Mixed-Use High	18.94	0	242	526	105	117	0	0	748	350,683
General Services Commercial	36.50	0	0	541	135	0	0	0	676	371,648
Visitor Serving Commercial	7.5	0	0	133	33	0	0	0	167	83,309
City Gateway	2.12	0	0	105	52	105	0	0	262	78,680
Employment Center	0	0	0	0	0	0	0	0	0	0
Industrial Park	112	0	0	0	0	138	553	0	691	3,106,481
Public/Quasi-Public	8.52	0	0	0	0	217	0	0	217	86,752
Downtown Specific Plan	22.13	123	864	2,843	0	0	0	0	2,843	232,187
Mixed-Use Housing	47.22	0	963	559	280	699	(50)	0	1,489	629,412
Mixed-Use Office/Housing	29.58	0	505	217	217	1,687	(50)	0	2,070	722,851
Office	28.14	0	0	0	0	3,473	(100)	0	3,373	1,041,912
Subtotal	1,020.9	3,099	6,025	5,230	1,006	6,560	353	0	13,149	4,276,195
Designations outside Focus Areas										
Low Density Residential	36.89	146	0	0	0	0	0	0	0	0
Medium Density Residential	14.94	0	143	0	0	0	0	0	0	0
Hillside Residential	166.72	165	0	0	0	0	0	0	0	0
Miller Pond (Hillside Residential)	30.6	50	0	0	0	0	0	0	0	0
General Industrial	619.23	0	0			382	2,675	764	3,821	5,731,865
Glen Loma Ranch Specific Plan	292	1,120	0	127	76	51	0	0	254	139,915
Hecker Pass Special Use District	321.21	143	0	0	0	0	0	0	0	0
General Services Commercial	53.89	0	0	728	140	0	0	0	918	548,411
Employment Center	155.76	0	0	165	165	1,977	989	0	3,295	2,306,832
City Gateway	7.67	0	0	353	119	379	0	0	801	283,989
Visitor Serving Commercial	5.91	0	0	105	26	0	0	0	131	65,647
Subtotal	1,704.8	1,624	143	1,478	527	2,789	3,664	764	9,226	9,076,660
TOTAL	2,725.7	4,723	6,167	6,708	1,533	9,349	4,017	764	22,375	14,045,657

Source: Mintier Harnish, 2017
Note: Amounts vary due to rounding.

Holding Capacity – Alternative C

Table A-5 shows a summary of the holding capacity for Alternative C.

TABLE A-5: HOLDING CAPACITY-ALTERNATIVE C

		Dwelling Units		Jobs						
Designation	Acres	Single-family	Multi-family	RET	SER	OFF	MAN	WHO	Total	Total Non-Residential Square Footage
Focus Area Designations										
Neighborhood District Low	419.8	2,103	670	183	110	73	0	0	366	201,151
Neighborhood District High	0	0	0	0	0	0	0	0	0	0
High Density Residential	15.15	0	291	0	0	0	0	0	0	0
Mixed-Use	18.94	0	161	438	88	58	0	0	0	175,341
Mixed-Use High	0	0	0	0	0	0	0	0	0	0
General Services Commercial	36.50	0	0	541	135	0	0	0	676	371,648
Visitor Serving Commercial	0	0	0	0	0	0	0	0	0	0
City Gateway	2.12	0	0	105	52	105	0	0	262	78,680
Employment Center	325.8	0	0	345	345	4,136	2,068	0	6,893	4,825,228
Industrial Park	60.5	0	0	0	0	75	299	0	373	560,018
Public/Quasi-Public	8.52	0	0	0	0	217	0	0	217	86,752
Downtown Specific Plan	22.13	168	1,174	2,843	0	0	0	0	2,843	232,187
Mixed-Use Housing	0	0	0	0	0	0	0	0	0	0
Mixed-Use Office/Housing	0	0	0	0	0	0	0	0	0	0
Office	0	0	0	0	0	0	0	0	0	0
Subtotal	908.8	2,271	2,296	4,455	730	4,664	2,367	0	12,215	6,531,007
Designations outside Focus Areas										
Low Density Residential	36.89	146	0	0	0	0	0	0	0	0
Medium Density Residential	14.94	0	143	0	0	0	0	0	0	0
Hillside Residential	166.72	165	0	0	0	0	0	0	0	0
Miller Pond (Hillside Residential)	30.6	50	0	0	0	0	0	0	0	0
General Industrial	619.23	0	0			382	2,675	764	3,821	5,731,865
Glen Loma Ranch Specific Plan	292	1,120	0	127	76	51	0	0	254	139,915
Hecker Pass Special Use District	321.21	143	0	0	0	0	0	0	0	0
General Services Commercial	53.89	0	0	728	140	0	0	0	918	548,411
Employment Center	155.76	0	0	165	165	1,977	989	0	3,295	2,306,832
City Gateway	7.67	0	0	353	119	379	0	0	801	283,989
Visitor Serving Commercial	5.91	0	0	105	26	0	0	0	131	65,647
Subtotal	1,704.8	1,624	143	1,478	527	2,789	3,664	764	9,226	9,076,660
TOTAL	2,613.3	3,895	2,439	5,933	1,257	7,453	6,031	764	21,441	15,607,667

Source: Mintier Harnish, 2017
Note: Amounts vary due to rounding.

APPENDIX B: TRANSPORTATION AND CIRCULATION

Commute Patterns

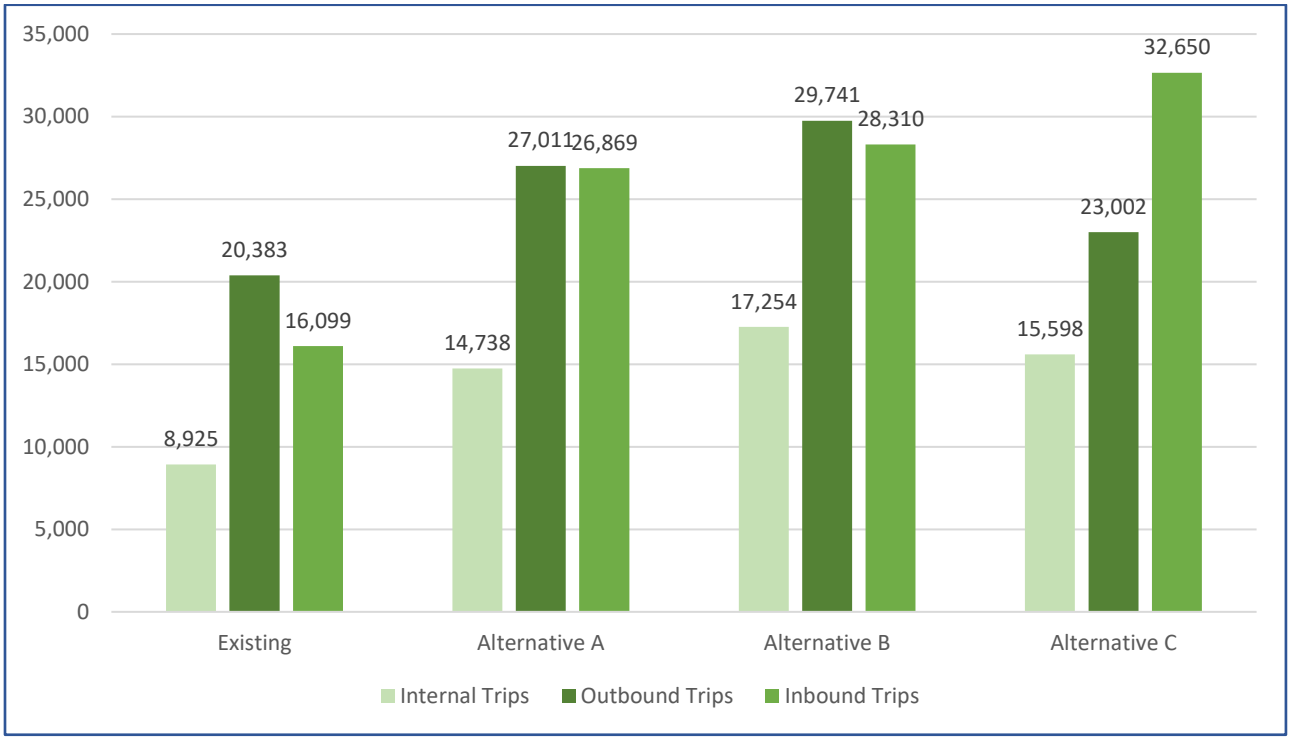
The land use growth associated with the each of the alternatives would change the existing commute travel patterns for Gilroy. Table B-1 (Work Related Trips) and Figure B-1 (Commute Patterns (Work-Related Trips) present the work trips to and from Gilroy. Currently, more people commute to areas outside Gilroy (45 percent) compared to people commuting into Gilroy (35 percent). In the future, this pattern would change with more of a balance between inbound and outbound trips with Alternatives A and B and it would reverse, with Alternative C, where more people commute into than out of Gilroy. This change in travel pattern is due to the relative difference in the number of workers and the number of jobs assumed in each of the alternatives. The increase in Gilroy jobs exceeds the increase in workers which is most notable in Alternative C. Alternatives A and B provide a better balance between jobs and workers, resulting in more internal trips, and nearly balanced inbound and outbound commuter trips. A balance between inbound and outbound trips results in more evenly distributed demand on the transportation system with no significant peak travel directions. A higher percentage of internal trips tends to reduce average vehicle miles of travel per trip because a higher percentage of trips have shorter lengths.

TABLE B-1: WORK RELATED TRIPS

Direction	Existing (2017)		Direction General Plan Alternatives					
			Alternative A		Alternative B		Alternative C	
	Trips	% of Total	Trips	% of Total	Trips	% of Total	Trips	% of Total
Internal[1]	8,925	20%	14,738	21%	17,254	23%	15,598	22%
Outbound	20,383	45%	27,011	39%	29,741	39%	23,002	32%
Inbound	16,099	35%	26,869	39%	28,310	38%	32,650	46%
Total	45,407	100%	68,618	100$	75,305	100%	71,250	100%

Source: Hexagon Transportation Consultants, 2018.
Footnotes:
1 Internal work trips are calculated by dividing the trip ends for internal-internal work trips from the model by two.

FIGURE B-1: COMMUTE PATTERNS (WORK RELATED TRIPS)



Source: Hexagon Transportation Consultants, 2018.

The City of Gilroy Transportation Demand Model was used to track work-related trips for land uses within the City of Gilroy. The information shown in this analysis represents those work-related trips that have a beginning or an end in the City of Gilroy. Work-related trips that start in Gilroy and end somewhere outside of Gilroy (i.e., Gilroy residents that work outside of Gilroy and commute out of town every day for work) would be counted in the "outbound" work trips. Work-related trips that end in Gilroy but start somewhere outside of Gilroy (i.e., workers that live outside of Gilroy but commute to a job within Gilroy) are counted in the "inbound" work trips. Trips that have both a beginning and an end in Gilroy (i.e., Gilroy residents that also work in Gilroy) are counted in the "internal" work trips. Since the travel demand model counts internal trips as two trips ends, the values produced by the model were divided by two to represent the number of internal work trips.

The change in travel patterns shown in Table B-1, is due to the relative difference in the number of workers and the number of jobs assumed in each of the alternatives. The increase in Gilroy jobs exceeds the increase in workers which is most notable in Alternative C. Alternatives A and B provide a better balance between jobs and workers, resulting in more internal trips, and nearly balanced inbound and outbound commuter trips. A balance between inbound and outbound trips results in more evenly distributed demand on the transportation system with no significant peak travel directions. A higher percentage of internal trips tends to reduce average vehicle miles of travel per trip because a higher percentage of trips have shorter lengths.

Trip Generation Analysis

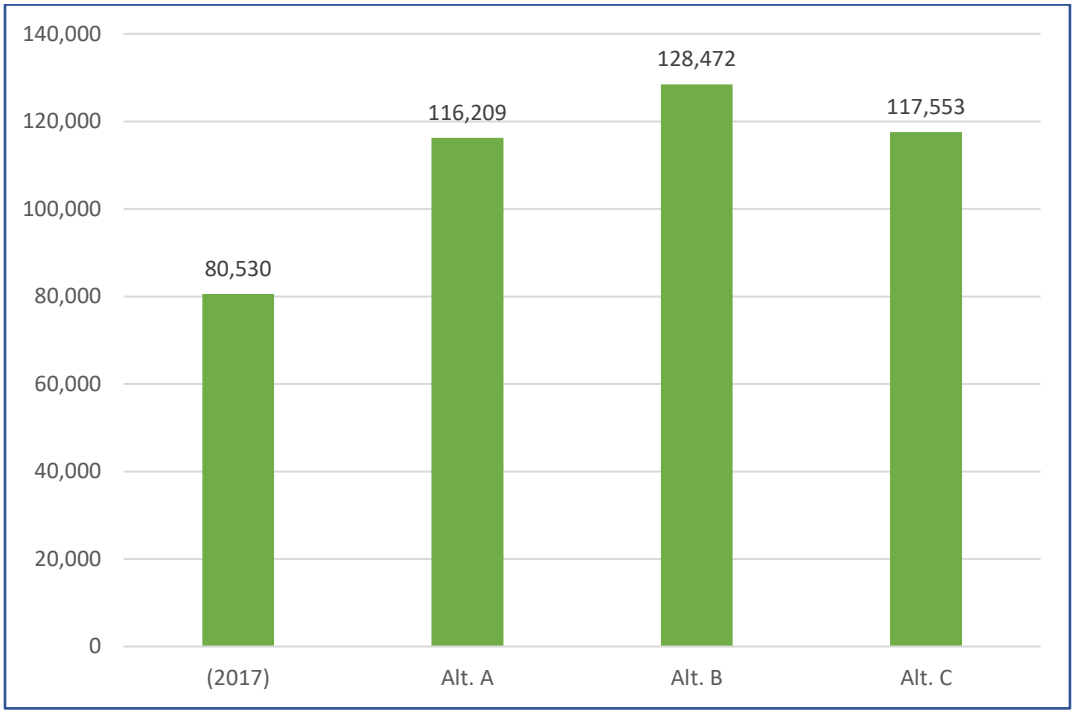
The section provides a summary of the trip generation estimates for the three General Plan alternatives. Table B-2 (AM and PM Peak-Hour Trip Generation Comparison) provides a summary of the model estimated AM and PM peak-hour trips generated by the Gilroy land uses. Figure B-2 (Total Peak-Hour Trip Generation) summarizes the combined AM and PM peak-hour trip generation totals for each study alternative. The results show that Alternatives A and C would have roughly the same total trip generation and Alternative B would have about 11,000 to 12,000 more peak-hour trips than the other two alternatives.

TABLE B-2: AM AND PM PEAK-HOUR TRIP GENERATION COMPARISON

Peak Hour	Existing (2017)	General Plan Alternatives		
		Alternative A	Alternative B	Alternative C
AM	40,303	57,600	63,776	57,624
PM	40,227	58,609	64,696	59,929
Total	80,530	116,209	128,472	117,553

Source: Hexagon Transportation Consultants, 2018.

FIGURE B-2: TOTAL PEAK-HOUR TRIP GENERATION



Source: Hexagon Transportation Consultants, 2018.

The City of Gilroy Transportation Demand Model was used to develop trip generation estimates for the three General Plan alternatives. The transportation model uses land use and demographic data to generate trips on the transportation network. The model primarily bases trip generation on the following land use variables: housing units, workers (employed residents), household population, various job types, and students enrolled in Gilroy schools. The AM and PM peak-hour trip generation values reported in this analysis represent the

combination of inbound, outbound, and internal trips generated by each traffic analysis zone within the City of Gilroy in the travel demand model.

Vehicle Miles Traveled Analysis

A comparison of Vehicle Miles Traveled (VMT) for each of the land use alternatives was completed using the City of Gilroy travel demand model.

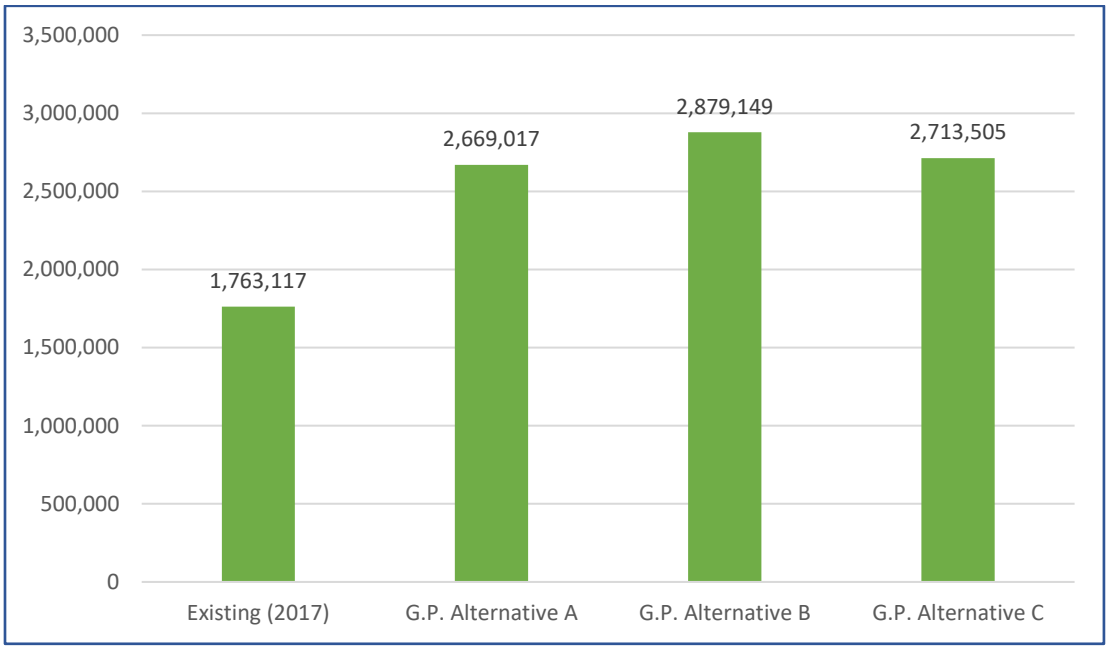
Table B-3 (Vehicle Miles Traveled per Capita) summarizes the daily VMT per capita for the existing and the three future land use alternatives. Since the travel demand model generates traffic based on population (defined by the number of housing units) and jobs, for the purpose of comparison, the definition of "per capita" is the sum of Gilroy population and Gilroy jobs. Figure B-3 (Total Vehicle Miles Traveled) summarizes total VMT for each study alternative and Figure B-4 (VMT per Capita) summarizes the VMT per capita. The results show that the VMT per capita would increase by approximately 0.6 for Alternative B and by 0.8 for Alternative A and C compared to 2017. Although Alternative B would have slightly higher overall VMT than the other two alternatives, it also would have a slightly higher percentage of internal trips (trips that start and end in Gilroy) compared to the other alternatives, which results in lower VMT per capita. This is likely the result of the larger increase in the number of multi-family units assumed in Alternative B and a better balance between jobs and employed residents in Gilroy.

TABLE B-3: VEHICLES MILES TRAVELED PER CAPITA

Scenario	Vehicle Miles Traveled			Int./Ext. Proportion		City of Gilroy		
	Internal-Internal[1]	External-External[2]	Total	Int.-Int.	Ext.-Int.	Population	Jobs	VMT/Capita[3]
Existing (2017)	354,469	1,408,648	1,763,117	20%	80%	62,035	24,564	20.4
Alternative A	539,170	2,129,847	2,669,017	20%	80%	85,139	40,706	21.2
Alternative B	603,623	2,275,526	2,879,149	21%	79%	92,119	45,243	21.0
Alternative C	546,149	2,167,356	2,713,505	20%	80%	82,170	45,862	21.2

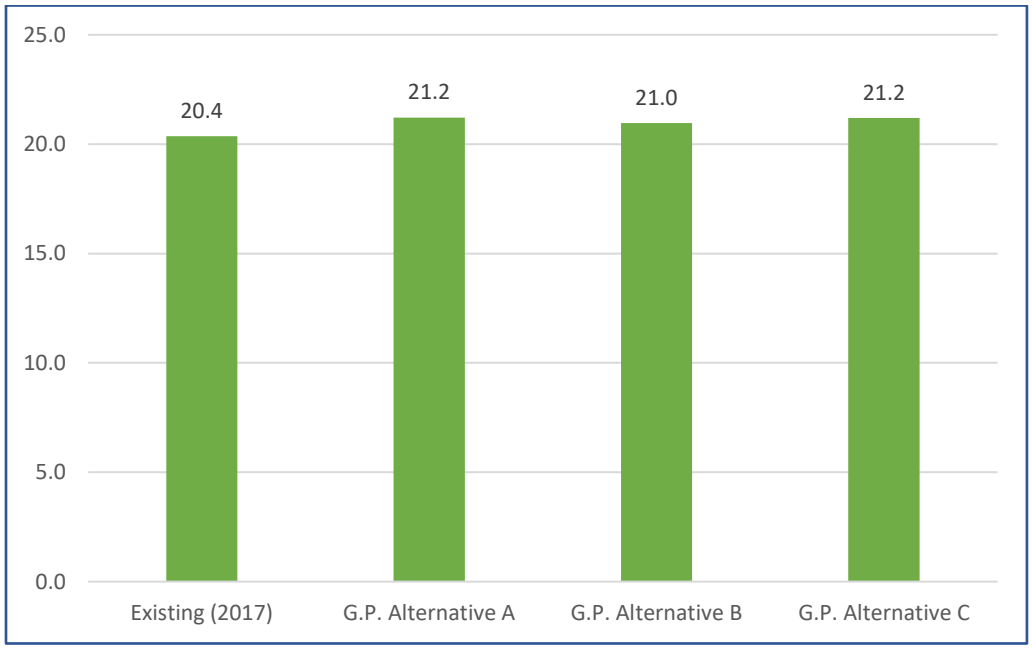
Source: Hexagon Transportation Consultants, 2018.
Footnotes:
1 Internal-internal VMT are related to trips that start and end within Gilroy.
2 External-internal VMT are related to trips that only have one trip end starting or ending within Gilroy. Only 50 percent of the External-internal VMT is calculated in this analysis since half of the VMT is attributable to Gilroy and the other half is generated by land uses outside of Gilroy.
3 Capita= Population + Jobs.

FIGURE B-3: TOTAL VEHICLE MILES TRAVELED



Source: Hexagon Transportation Consultants, 2018.

FIGURE B-4: VMT PER CAPITA



Source: Hexagon Transportation Consultants, 2018.

Table B-4 (Peak-Hour Vehicle Miles Traveled Analysis Comparison) provides a summary of the peak-hour VMT on three facility types (freeways, arterials, and collectors) within the City for each of the land use alternatives. The values in the table represent the sum of the AM and PM peak-hour VMT results produced by the model. The VMT analysis indicates that Alternatives A and C would result in similar increases in peak-hour VMT (approximately 43 percent) compared to existing (2017). Alternative B would result in an increase in peak-hour VMT of approximately 50 percent compared to existing (2017).

TABLE B-4: PEAK-HOUR VEHICLE MILES TRAVELED ANALYSIS COMPARISON

Scenario	Facility Type			Total
	Freeways	Arterials	Collectors	
Existing (2017)	99,935	78,182	30,673	208,790
Alternative A	137,154	118,527	41,879	297,560
Alternative B	140,473	127,497	45,592	313,562
Alternative C	137,816	118,523	42,486	298,825

Source: Hexagon Transportation Consultants, 2018.

Figure B-5 (Peak-Hour VMY by Facility Type) summarizes the combined AM and PM peak hour VMT for local roadways (collectors and arterials) and freeways within the City of Gilroy for each study scenario.

FIGURE B-5: PEAK-HOUR VVMT BY FACILITY TYPE

Source: Hexagon Transportation Consultants, 2018.

VMT can be used as an indicator to evaluate the extent to which land use alternatives could be expected to increase or decrease the average travel distance on the roadway system within a defined geographic area such as the City of Gilroy. In general, when the number of jobs and the number of housing units are in balance, the average trip length or VMT is likely to be shorter compared to land use alternatives where the number jobs far exceed the number of housing units, or vice versa.

Since the travel demand model generates traffic based on population (defined by the number of housing units) and jobs, for the purpose of comparison, the definition of "per Capita" is the sum of Gilroy population and Gilroy jobs.

Roadway Network Congestions Analysis

The alternatives analysis includes the evaluation of overall traffic conditions on the City of Gilroy roadway network. Traffic conditions were evaluated using level of service (LOS). Level of service is a qualitative description of operating conditions ranging from LOS A, or free-flow conditions with little or no delay, to LOS F, or jammed conditions with excessive delays. The analysis evaluates the number of lane-miles within the roadway network system projected to operate at various LOS grades. For this analysis LOS C and better is considered acceptable operating conditions and LOS D or worse is considered congested operating conditions. Table B-5 (Peak Hour Roadway Lane-Mile Analysis by Facility Type and LOS) presents the networkwide AM and PM peak-hour level of service results by facility type. This table summarizes the number of lane-miles of each facility type, within the City, that are projected to operate at the various levels of service.

TABLE B-5: PEAK-HOUR ROADWAY LANE-MILE ANALYSIS BY FACILITY TYPE AND LOS

EXISTING (2017)												
LOS	AM Peak Hour						PM Peak Hour					
	Freeways	%	Local Streets	%	Total	%	Freeways	%	Local Streets	%	Total	%
A-C	38.5	92.3%	368.4	99.3%	406.9	98.1%	35.3	84.6%	368.9	99.4%	404.2	97.4%
D	0.4	0.9%	2.1	0.6%	2.4	0.6%	3.2	7.7%	1.0	0.3%	1.0%	4.2
E	2.9	6.8%	0.3	0.1%	3.1	0.8%	2.2	5.2%	1.1	0.3%	3.2	0.8%
F	0.0	0.0%	0.41	0.1%	0.4	0.1%	1.0	2.5%	0.3	0.1%	1.3	0.3%
Total	41.7	100%	371.1	100%	414.8	100%	41.7	100%	371.1	100%	414.8	100%

Source: Hexagon Transportation Consultants, 2018.

ALTERNATIVE A												
LOS	AM Peak Hour						PM Peak Hour					
	Freeways	%	Local Streets	%	Total	%	Freeways	%	Local Streets	%	Total	%
A-C	56.3	95.9%	421.1	98.7%	477.5	98.0%	51.0	86.8%	424.1	99.4%	475.2	97.5%
D	2.4	4.1%	4.0	0.9%	6.5	1.3%	7.4	12.5%	1.5	0.4%	8.9	1.8%
E	0.0	0.0%	0.5	0.1%	0.5	0.1%	0.4	0.6%	0.8	0.2%	1.2	0.2%
F	0.0	0.0%	1.0	0.2%	1.0	0.2%	0.0	0.0%	0.3	0.1%	0.3	0.1%
Total	58.8	100%	426.7	100%	487.4	100%	58.8	100%	426.7	100%	487.5	100%

Source: Hexagon Transportation Consultants, 2018.

ALTERNATIVE B												
LOS	AM Peak Hour						PM Peak Hour					
	Freeways	%	Local Streets	%	Total	%	Freeways	%	Local Streets	%	Total	%
A-C	56.3	95.9%	419.6	98.3%	476.0	97.6%	48.5	82.4%	423.2	99.2%	471.6	96.8%
D	2.1	3.5%	5.1	1.2%	7.1	1.5%	9.9	16.9%	2.4	0.6%	12.3	2.5%
E	0.4	0.6%	1.1	0.2%	1.4	0.3%	0.0	0.0%	0.9	0.2%	0.9	0.2%
F	0.0	0.0%	0.9	0.2%	0.9	0.2%	0.4	0.6%	0.3	0.1%	0.7	0.1%
Total	58.8	100%	426.7	100%	487.5	100%	58.5	100%	426.7	100%	487.4	100%

Source: Hexagon Transportation Consultants, 2018.

ALTERNATIVE C												
LOS	AM Peak Hour						PM Peak Hour					
	Freeways	%	Local Streets	%	Total	%	Freeways	%	Local Streets	%	Total	%
A-C	56.3	95.9%	421.4	98.8%	477.8	98.0%	51.7	88.0%	423.8	99.3%	475.5	97.6%
D	2.4	4.1%	3.8	0.9%	6.2	1.3%	6.7	11.3%	1.7	0.4%	8.3	1.7%
E	0.0	0.0%	0.4	0.1%	0.4	0.1%	0.4	0.6%	0.9	0.2%	1.3	0.3%
F	0.0	0.0%	1.0	0.2%	1.0	0.2%	0.0	0.0%	0.3	0.1%	0.3	0.1%
Total	58.5	100%	426.7	100%	487.4	100%	58.5	100%	426.7	100%	487.5	100%

Source: Hexagon Transportation Consultants, 2018.

Figures B-6 (Percentage of Lane Miles Operating at Congested LOS (AM Peak-Hour) and B-7 (Percentage of Lane Miles Operating at Congested LOS (PM Peak-Hour) depict the percentage of lane miles within the City of Gilroy projected to operate at congested levels of service during the AM and PM peak hours, respectively. These figures show that demand on the transportation system would be slightly higher with Alternative B. However, the results indicate that the anticipated overall level of congestion on local roadways would be relatively low with all the General Plan alternatives. The results also indicate that the local transportation system would have roughly the same projected traffic demands with each of the land use alternatives. Therefore, traffic conditions and the level of transportation infrastructure improvements needed would be about the same with each of the land use alternatives.

FIGURE B-6: PERCENTAGE OF LANE MILES OPERATING AT CONGESTED LOS (AM PEAK-HOUR)

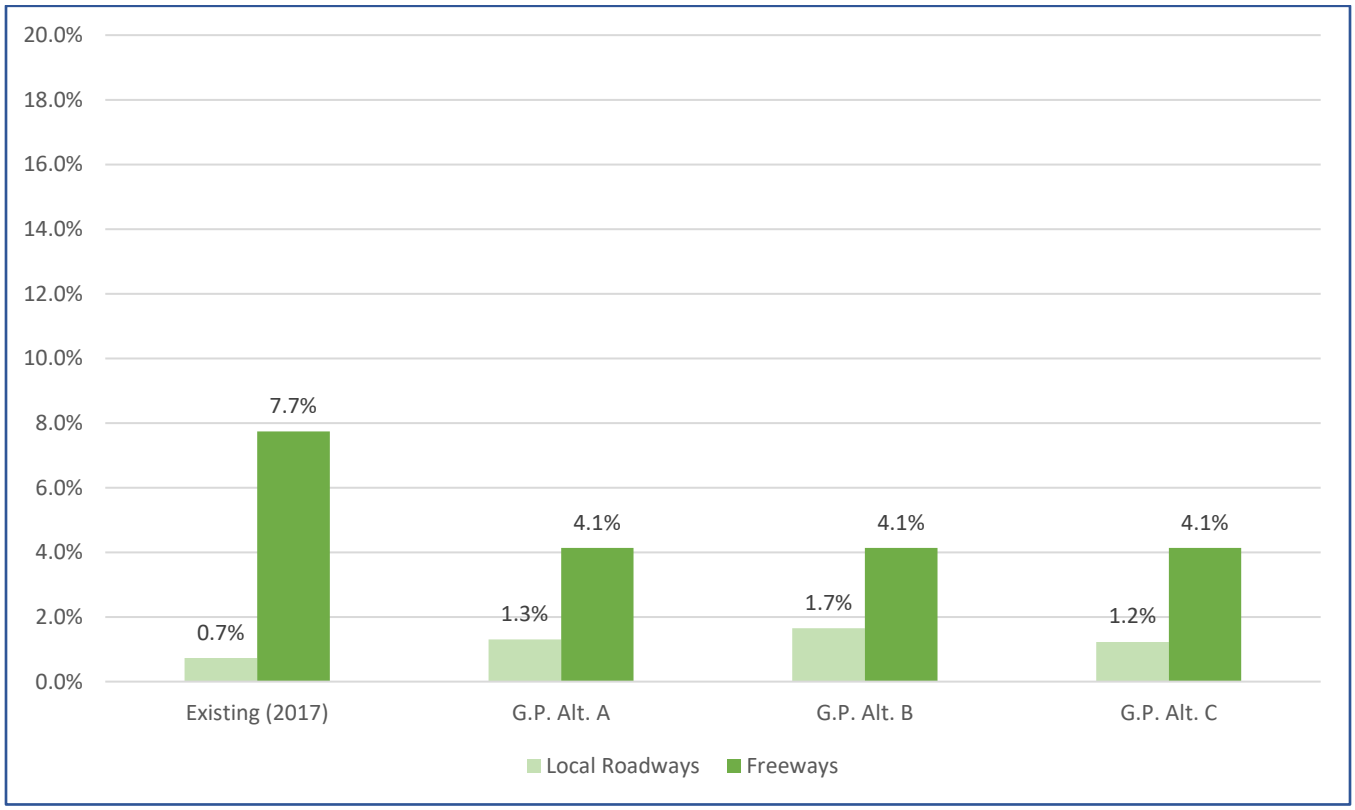
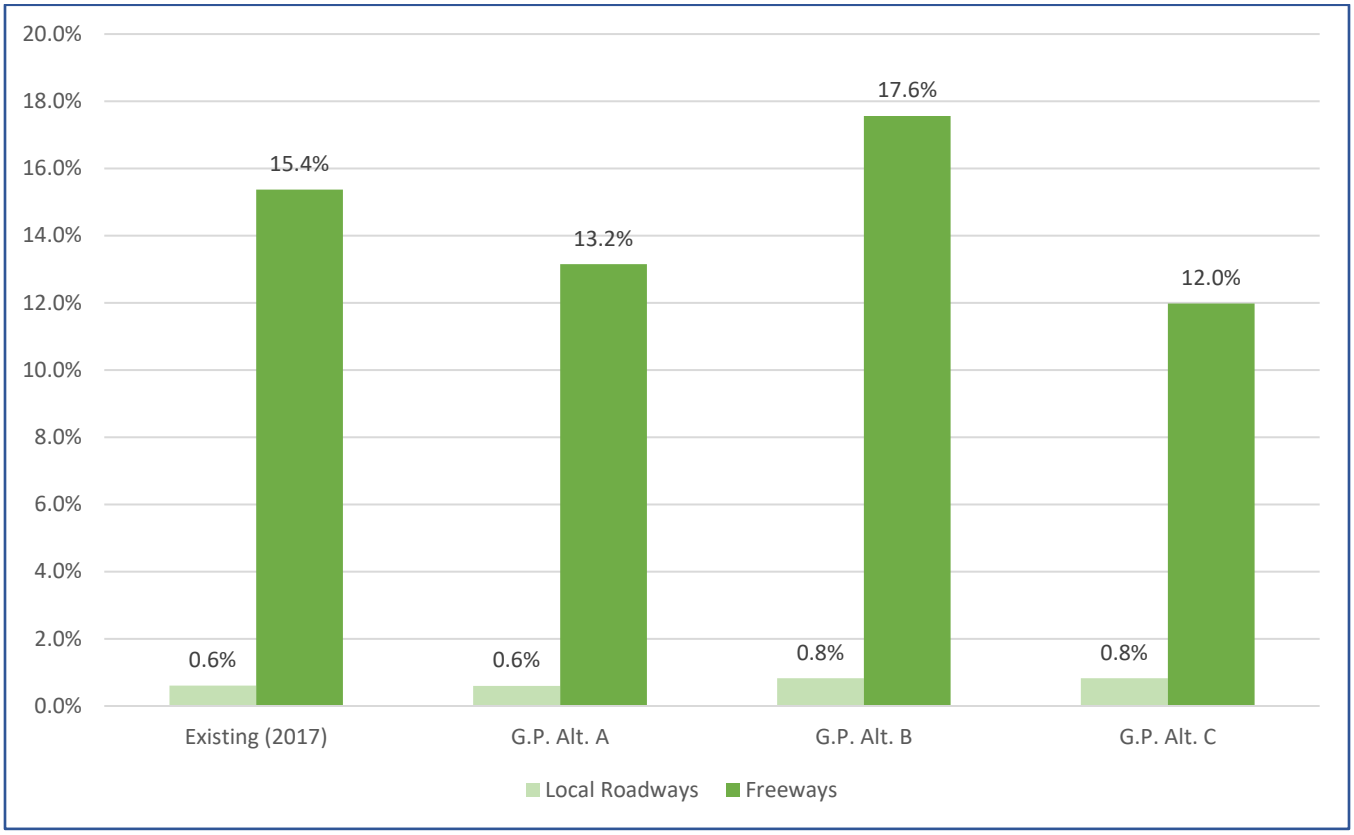


FIGURE B-7: PERCENTAGE OF LANE MILES OPERATING AT CONGESTED LOS (PM PEAK-HOUR)



For the alternatives analysis, peak-hour volume-to-capacity (V/C) ratios were used to determine operating levels of service on roadway segment links in the city, based on planning-level capacity thresholds. A V/C ratio less than 0.80 (the threshold between LOS C and D conditions) generally indicates that adequate capacity is available, and vehicles are not expected to experience significant queues and delays. As the V/C ratio approaches 1.0, traffic flow becomes unstable, and delay and queuing problems begin to occur. Once the demand exceeds the capacity (a V/C ratio greater than 1.0), traffic flow is unstable and excessive delay and queuing is expected.

APPENDIX C: GREENHOUSE GAS EMISSIONS

The GHG emissions analysis identifies operational on-road transportation and non-transportation sources of GHG emissions and projected volumes of GHG emissions for new development that would be enabled in 2040 at build out of each GPU alternative. Construction phase emissions are not modeled as they are a minor component of each alternative's GHG emissions profile and the Bay Area Air Quality Management District does not include such emissions as part of its methodology for assessing GHG impacts of land use development projects. Total new GHG emissions for each alternative were estimated by combining the results of two models that are widely used to assess GHG generation from transportation and land use development activities, respectively. The first model is the Emission Factors (EMFAC) model developed by the California Air Resources Board. The EMFAC model enables projection of GHG and other air pollutants primarily from combustion of fuels in on-road vehicles. The transportation sector is generally the largest contributor to GHG emissions from the operations of land development associated with urban growth due to increases in vehicle trips and in total vehicle miles traveled that result therefrom.

The second model, the California Emissions Estimator Model (CalEEMod), was used to estimate GHG emissions from non-transportation sources. The primary non-transportation GHG source is combustion of fossil fuels to produce electricity used in residential and non-residential buildings, pumping water for domestic use, and pumping and treating wastewater.

Total projected GHG volume, GHG volume per capita per day, and GHG volume per capita per year have been projected for each alternative. The term "capita" refers to the sum of the new projected population and jobs created at build out of each alternative.

Refer to Attachments 1, 2, and 3, Gilroy 2040 General Plan Alternatives: Greenhouse Gas Emissions for a summary of the methodology, assumptions, and results of EMFAC and CalEEMod modeling for this General Plan alternatives analysis.

Greenhouse Gas Emissions Evaluation

GHG modeling was undertaken using the CalEEMod emissions estimator software for operational non-mobile sources of emissions, and EMFAC 2014 mobile sources of emissions from the mix of land uses proposed for each alternative. The purpose was to quantify GHG emissions for each alternative as a means to compare their relative merits from a GHG perspective.

Methodology

Three scenarios were studied using land use information for development potential for each alternative based on current available vacant land and using total daily vehicle miles traveled (VMT) for each alternative. Alternative A is the current draft 2040 general plan "Preferred Land Use Alternative". Alternative B, "Housing Focus", maximizes residential development. Alternative C, "Low Residential Growth", reduced new residential development and increases opportunities for employment.

Annual GHG emissions from operational, non-mobile sources were estimated using the California Emissions Estimator Model (CalEEMod) Version 2016.3.2 software, which is an accepted methodology recommended by the Bay Area Air Quality Management District. The CalEEMod platform calculates the annual average of GHG emissions in metric tons (MT) that are generated by area sources, mobile sources, energy consumption, waste, and water consumption. The CalEEMod software utilizes emissions models USEPA AP-42 emission factors, California Air Resources Board (CARB) vehicle emission model's studies and studies commissioned by

other California agencies such as the California Energy Commission and CalRecycle. For the purposes of this assessment only non-mobile source emissions were modeled using CalEEMod. All land use assumptions provided by Mintier Harnish (2018) were utilized in the preparation of data for inputs into CalEEMod.

For the purposes of this assessment only non-mobile source emissions were modeled using CalEEMod. All land use assumptions provided by Mintier Harnish (2018) were utilized in the preparation of data for inputs into CalEEMod. The US-EPA approved EMFAC2014 model was used to model annual operational, mobile-source GHG emissions and transportation fuel demand for each alternative using VMT data provided by Hexagon Transportation Consultants (2018). The EMFAC emissions model was developed to assess emissions from on-road vehicles including cars, trucks, and buses in California. A more recent model, EMFAC2017, was released by CARB in late 2017, but is not used here as it has not yet been approved by the US-EPA.

Land Use Assumptions

Certain assumptions for mixes of land uses were provided by Mintier Harnish during development of the Gilroy 2040 General Plan preferred land use alternative. Unless otherwise noted, all land use assumptions shown in Attachment 1 were utilized in the preparation of data for inputs into the model.

- Emissions estimates are based on the land use development potential of each alternative. Existing development located outside of the general plan update focus areas is assumed to remain unchanged in the future and is not included in the model;
- Open space uses, infrastructure (roadways, drainage improvements, etc.) are not substantial sources of operational emissions and; therefore, are not included in the model;
- Condominium/townhome uses allowed by the general plan land use designations are included in the model's single-family housing land use category;
- The mix of modeled multi-family residential land uses for each alternative is assumed to be all R-4 units plus 75 percent of R-3 units; and
- The number of single-family residential land uses for each alternative is assumed to be R-1 units + R-2 units + 25 percent of R-3 units.

Model Data Input Assumptions

Unless otherwise noted, data inputs for the project model are based on the following assumptions:

A. The modeled operational date is 2040;

Operational GHG emissions volumes from non-mobile sources were estimated for each alternative using the following CalEEMod default land use subtypes:

B. Emissions generated by single-family residential units are assumed to be generally similar to emissions that would be generated by the CalEEMod default land use subtype "Single Family Housing";

C. Emissions generated by multi-family residential dwelling units for each alternative area assumed to be general similar to emissions that would be generated by the CalEEMod default land use subtypes:

D. Emissions from 75 percent of total R-3 dwelling units are assumed to be generally similar to emissions that would be generated by the CalEEMod default land use subtype "Apartments Low-rise", defined as apartments in rental buildings having 1-2 levels;

E. Emissions generated by R-4 multifamily units are assumed to be similar to emissions that would be generated by the CalEEMod default land use subtype "Apartments Mid-rise", which are defined as apartments in rental buildings that have between 3 and 10 levels;

F. Emissions generated by manufacturing uses under the Employment Center land use designation are assumed to be generally similar to emissions that would be generated by the CalEEMod default land use "General Light Industry", which is defined as containing free-standing facilities devoted to a single use. The facilities have an emphasis on activities other than manufacturing and typically have minimal office space. Typical light industrial activities include printing, material testing and assembly of data processing equipment;

G. Emissions generated by retail, service, and office uses under the Employment Center land use designation are assumed to be generally similar to emissions that would be generated by the CalEEMod default land use "Office Park", which is defined as suburban subdivisions or planned unit developments containing general office buildings and support services, such as banks, restaurants and service stations, arranged in a park-or campus-like atmosphere;

H. Emissions generated by manufacturing uses under the Industrial Park land use designation are assumed to be generally similar to emissions that would be generated by the CalEEMod default land use "Manufacturing", which is defined as areas where the primary activity is the conversion of raw materials or parts into finished products and generally also has office, warehouse, and research and development functions at the site;

I. Emissions generated by office uses under the Industrial Park land use designation are assumed to be generally similar to emissions that would be generated by the CalEEMod default land use "Industrial Park", which is defined as containing a number of industrial or related facilities and a mix of manufacturing, service and warehouse facilities with a wide variation in the proportion of each type of use from one location to another. Many industrial parks contain highly diversified facilities;

J. Emissions generated by uses under the Public Quasi-Public land use designation are assumed to be generally similar to emissions that would be generated by the CalEEMod default land use "Government Office Building", which are defined as containing either the entire function or simply one agency of a governmental unit;

K. Emissions generated by office uses under the land use designations of Neighborhood District(s), Mixed Use, and Downtown District(s) are assumed to be generally similar to emissions that would be generated by the CalEEMod default land use "General Office Building", which is defined as a building that houses multiple tenants where affairs of businesses commercial or industrial organizations or professional persons or firms are conducted;

L. Emissions generated by retail and service uses under the land use designations of General Services Commercial, City Gateway, and Visitor Serving Commercial are assumed to be generally similar to emissions that would be generated by the CalEEMod default land use "Regional Shopping Center", which is defined as an integrated location– or market-based group of commercial establishments that are planned, developed cohesively and often owned and managed as a unit; and

M. Emissions from retail, service, and office uses within the land use designations of Neighborhood District(s), Mixed-Use, and Downtown District(s) are assumed to be generally similar to emissions generated by the CalEEMod default land use "Strip Mall", which is defined as a small shopping center containing a variety

of retail shops specializing in quality apparel, hard goods and services such as real estate office, dance studios, florists, and small restaurants.

The model's default CO2 intensity factor of 641 pounds/megawatt hour is adjusted to 290 pounds/megawatt hour to reflect Pacific Gas & Electric carbon intensity projections for its 2020 energy production profile, which is the horizon year for Pacific Gas & Electric's current carbon intensity projections. The intensity factor has been falling, in significant part due to the increasing percentage of Pacific Gas & Electric's energy portfolio obtained from renewable energy. Emissions intensity data is from Pacific Gas & Electric's Greenhouse Gas Factors: Guidance for PG&E Customers, dated November 2015.

Land Use Characteristics of the General Plan Update Alternatives

The land use types and development capacities associated with each of the three alternatives are presented in Table C-1 (Land Use Characteristics). This table also presents the CalEEMod land use default categories that are used for each land use type.

TABLE C-1: LAND USE CHARACTERISTICS

Emissions Source	CalEMod Land Use Category[1]	Size/Metric[2]		
		Alt A	Alt B	Alt C
Single-Family Residential[3]	Single-Family housing[4]	2,324 du	3,097du	2,270 du
Multi-Family Residential[5]	Apartments Low-rise	1,747 du	1,950 du	886 du
Multi-Family Residential[5]	Apartments Mid-rise	1,886 du	4,075 du	1,410 du
Employment Center (manufacturing)	General Light Industry	0	0	1,447,570
Employment Center (retail, service, office)	Office Park	0	0	2,895,140
Industrial Park (manufacturing)	Manufacturing	2,485,190	829,380	448,000
Industrial Park (office)	Industrial Park	621,300	207,350	112,000
Public Quasi-Public	Government Office Building	86,750	86,750	86,750
Neighborhood Districts (office)	General Office Building	139,950	1,946,590	135,160
Downtown Districts (office)				
Mixed-Use (office)				
General Services Commercial	Regional Shopping Center	450,330	536,410	450,330
City Gateway District				
Visitor Serving Commercial				
Neighborhood Districts (retail and service)	Strip Mall	492,680	1,372,520	1,438,560
Downtown Districts (retail and service)				
Mixed-Use (retail and service)				

Source: Mintier Harnish 2018, Trinity Consultants 2018.
Footnotes:
1 Descriptions of the model's default land use categories are found in the CalEEMod User Guide (Trinity Consultants 2018) available online at http://aqmd.gov/caleemod/guide.htm
2 Expressed in square feet unless otherwise noted. Amounts may vary due to rounding.
3 Single-family uses = R-1 + R-2 + (0.25*R-3)
4 Condominium uses allowed in Neighborhood Districts are included as single-family.
5 Total Multi-family uses = R-4 +(0.75*R-3). Low-rise apartments = 75 percent of R-3 dwelling units; Mid-rise apartments = all R-4 dwelling units.

Operational, Non-Mobile Sources GHG Results

The CalEEMod results for annual, non-mobile source GHG emissions volumes generated by Alternatives A, B, and C are summarized in Tables C-2, C-3, and C-4, respectively. Results for Alternative A are shown in Table 15, CalEEMod Results Alternative A, Annual, Non-Mobile GHG Emissions Volumes by Source (MT CO2e/Year).

TABLE C-2: CALEEMOD RESULTS ALTERNATIVE A, NON-MOBILE GHG, VOLUMES PER SOURCE (MT CO2E/YEAR)

Emissions Sources	Bio CO_2	NBio CO_2	CH_4	N_2O	CO_{2e}
Area	461.03	212.89	0.89	0.03	704.53
Energy	0.00	20,295.49	1.24	0.40	20,444.72
Waste	1,931.65	0.00	114.16	0.00	4,785.59
Water	386.56	1,011.51	39.81	0.96	2,678.79
Total	2,779.25	21,519.89	156.09	1.38	28,613.63

GHG emissions projections for Alternative B are presented in Table C-3, CalEEMod Results Alternative B, Annual, Non-Mobile GHG Emissions Volumes by Source (MT CO2e/Year).

TABLE C-3: CALEEMOD RESULTS ALTERNATIVE B, NON-MOBILE GHG, VOLUMES PER SOURCE (MT CO_2E/YEAR)

Emissions Sources	Bio CO_2	NBio CO_2	CH_4	N_2O	CO_{2e}
Area	668.34	320.21	1.29	0.04	1,032.89
Energy	0.00	26,542.84	1.76	0.52	26,742.62
Waste	2,367.50	0.00	139.92	0.00	5,865.38
Water	424.14	1,265.97	43.69	1.05	3,096.69
Total	3,459.98	28,129.02	186.65	1.62	36,737.58

GHG emissions projections for Alternative B are presented in Table C-4, CalEEMod Results Alternative B, Annual, Non-Mobile GHG Emissions Volumes by Source (MT CO2e/Year).

TABLE C-4: CALEEMOD RESULTS ALTERNATIVE C, NON-MOBILE GHG, VOLUMES PER SOURCE (MT CO_2E/YEAR)

Emissions Sources	Bio CO_2	NBio CO_2	CH_4	N_2O	CO_{2e}
Area	393.22	169.35	0.77	0.02	588.68
Energy	0.00	28,792.71	1.94	0.57	29,010.63
Waste	2,252.48	0.00	133.12	0.00	5,580.42
Water	478.26	1,369.78	49.26	1.19	3,433.59
Total	3,123.95	30,331.83	185.08	1.78	38,613.33

Mobile Source and Total GHG Emissions Volumes

The EMFAC2014 estimates for operational, mobile-source GHG emissions for each alternative are included in Table C-8, Modeling Results - Unmitigated GHG Emissions (MT CO2e/Year). The EMFAC2014 results for each alternative are included as appendices to this memorandum. Table C-5 also includes the operational, non-mobile GHG emissions projections as summarized from Tables C-2, C-3, and C-4, as well as total operational emissions volumes for each alternative.

TABLE C-5: MODELING RESULTS UNMITIGATED GHG EMISSIONS (MT CO2E/YEAR)

Emissions Sources	Alternatives		
	Alt A	Alt B	Alt C
Area	704.53	1,032.89	588.68
Energy Consumption	20,444.72	26,742.362	29,010.63
Solid Waste Generation	4,785.59	5,865.38	5,580.42
Water Usage	2,678.79	3,096.69	3,433.59
Total Non-Mobile Sources	28,613.63	36,737.58	38,613.33
Mobile Source Total[2]	83,455.24	102,724.49	87,468.98
Total GHG Emissions	112,068.87	139,462.07	126,082.31

EMFAC 2014 Transportation Source GHG Emissions

The EMFAC 2014 model can be used to project GHG emissions from transportation sources based on estimated average daily miles traveled (VMT) by new vehicle trips from new development. These trips include those that originate and travel within the city, originate inside but travel outside the city, and originate outside the city but travel into the city. EMFAC includes assumptions about the types of vehicles (e.g., passenger vehicles, light duty trucks, heavy duty trucks, etc.) and types of fuels used by each that would comprise the vehicle fleet. EMFAC also includes air pollutants emissions factors for each type of vehicle by fuel type and by emission source (e.g., vehicle starts, vehicle idling, etc.). Further, the model includes assumptions about expected reductions in emissions factors and rates that are now being realized and that would accrue over time from implementation of state and federal regulations that directly or indirectly affect vehicle emissions, especially GHG emissions. These regulations include the Pavley-1, Low Carbon Fuel Standard, Advanced Clean Car Standards, Samrtway/Phase I Heavy Duty Vehicle Greenhouse Gas Regulation, and on-road diesel fleet rules promulgated by the state. The main GHG emission from transportation sources is carbon dioxide (CO2). Other GHGs include methane (CH4) and nitrous oxide (N2O), but these sources constitute a very small percentage of total GHGs relative to CO2.

EMFAC Transportation Source GHG Results

Table C-1 (On-Road Transportation Sources of CO2e), shows the total number of metric tons (MT) of GHG emissions from each alternative per day, per year, per capita per day and per capita per year. Carbon dioxide equivalent (CO2e) is a measure used to compare the emissions from various greenhouse gases based upon their global warming potential relative to that of CO2. For example, the global warming potential for CH4 over 100 years is 21. This means that one metric ton of CH4 emissions are equivalent to 21 metric tons of CO2 emissions. GHG emissions are typically reported in metric tons. A U.S. ton is equal to .907 MT. Data, EMFAC results, and calculations used to prepare Table C-6 are included in Attachment 3.

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TABLE C-6: ON-ROAD TRANSPORTATION SOURCES OF CO_2E (MT CO_2E)[1]

Alternative	CO_2	CH_4	N_2O	Total Per Day[2]	Total Per Day[3]	Capita[4]	Capita Per Day	Capita Per Year
Alternative A	235.427	0.118	4.96	240.505	83,455.235	39,246	0.006	2.127
Alternative B	290.000	0.146	5.89	296.036	102,724.49	50,763	0.006	2.024
Alternative C	246.988	0.124	4.96	252.072	87,468.984	41,433	0.006	2.111

Footnotes:
1 Amounts vary due to rounding.
2 Emissions per day are based on average weekday VMT as modeled in EMFAC 2014.
3 Annual MT CO 2e is calculated by multiplying daily volumes by 347 days rather than 365 (per EMFAC 2014 methodology) to scale annual emissions to reflect that weekday VMT are higher than average weekend VMT.
4 Capita = Population + Jobs.

EMFAC Non-Transportation Source GHG Results

Non-transportation source GHG emissions were estimated using CalEEMod, a modeling platform recommended by the California Air Resources Board and accepted by the Bay Area Air Quality Management District. The CalEEMod platform calculates the annual average of GHG emissions in metric tons. The CalEEMod software utilizes USEPA AP-42 emission factors, CARB vehicle emission model's studies and studies commissioned by other California agencies such as the California Energy Commission and CalRecycle. All land use assumptions provided by Mintier Harnish were utilized in the preparation of data for inputs into the model.

A multitude of assumptions were made to derive inputs to CalEEMod. These are summarized in Attachment 1.

Table C-7 (Annual Non-Transportation Source GHG Emissions) summarizes projected 2040 GHG emissions by source for each alternative and includes a total emissions volume for each. CalEEMod results for the operational GHG emissions for each alternative are summarized in Attachment 1. Note that the construction emissions estimates from CalEEMod are not included in the model result printouts as the Bay Area Air Quality Management District does not require that construction emissions be included in the assessment of GHG impacts of development projects.

TABLE C-7: ANNUAL NON-TRANSPORTATION SOURCE GHG EMISSIONS (MT CO_2E/YEAR)[1]

Emissions Source	Alternative		
	A	B	C
Area (ac.)	704.53	1,032.89	588.68
Energy Consumption (kwH)	20,444.72	26,742.62	29,010.63
Solid Waste Generation (gallons)	4,785.59	5,865.38	5,580.42
Water Usage (gallons)	2,678.79	3,096.69	3,433.59
Total Non-Mobile Sources	28,613.63	36,737.58	38,613.33

Footnotes:
1 Amounts vary due to rounding.

Overall 2040 GHG Emissions Results

Table C-8 (Total 2040 GHG Emissions) shows the sum of the daily and annual transportation source GHG emissions and non-transportation source GHG emissions for each alternative as reported above in Tables C-1 and C-2. Table C-3 summarizes total daily per capita and annual per capita GHG emissions for each alternative. The volumes shown are unmitigated. That is, the emissions volumes do not reflect emissions reduction that are likely to accrue from implementing a range of land use, transportation, energy, and other policies that will be included in the General Plan Update that directly or indirectly may reduce GHG emissions.

Alternatives Comparison

Based on current Bay Area Air Quality Management District guidance, this approach is reinforced by the California Air Resources Board in its 2017 Scoping Plan Update. The per capita metric used in this alternatives analysis is equivalent to the service population concept identified by the air district and California Air Resources Board. Therefore, a comparison of the per capita per year results for the three alternatives provides the most relevant context for ranking their GHG characteristics. In this regard, Alternative B is most favorable with a per capita GHG emissions rate of 2.75 MT CO2e, followed by Alternative A with a rate of 2.86 MT CO2e, and Alternative C with a rate of 3.04 MT CO2e.

TABLE C-8: TOTAL 2040 GHG EMISSIONS

Alternative A		
GHG Source	CO_{2e} Per Day	CO_{2e} Per Year
Transportation	240.51	83,455.24
Non-Transportation	82.46	28,613.63
Total	322.97	112,068.87
Capita (population +jobs)		39,246
GHG Emissions per Capita per Day		0.01
GHG Emissions per Capita per Year		2.86
Alternative B		
GHG Source	CO_{2e} Per Day	CO_{2e} Per Year
Transportation	96.036	102,724.49
Non-Transportation	105.872	36,737,.58
Total	201.980	139,462.07
Capita (population +jobs)		50,763
GHG Emissions per Capita per Day		0.004
GHG Emissions per Capita per Year		2.75
Alternative C		
GHG Source	CO_{2e} Per Day	CO_{2e} Per Year
Transportation	252.072	87,468.98
Non-Transportation	111.278	38,613.33
Total	363.35	126,082.31
Capita (population +jobs)		41,433
GHG Emissions per Capita per Day		0.01
GHG Emissions per Capita per Year		3.04