BCAG 2012 MTP/SCS Land Use Scenario Descriptions and Analysis

BCAG has prepared three distinctive land use scenarios for the purpose of illustrating the travel effects of different development patterns on the regional transportation system and the associated greenhouse gas emissions resulting from these patterns. In addition, the scenarios allow BCAG to test the performance of the enhanced regional travel demand model to assure it is responding appropriately to changes in land use.

Land Use Scenarios

All three scenarios were prepared using the same regional employment, population and housing growth projections and regional transportation network. However, the following land use variables were adjusted to create the distinctive scenarios:

- The amount of development occurring within each of the five Growth Areas (i.e., Urban Center and Corridor, Established, New, Rural, and Agricultural).
- The levels of infill and redevelopment occurring within the Urban Center and Corridor and Established Growth Areas.
- The shares of single-family to multi-family development.
- The amount of growth being accommodated within each local jurisdiction.

The land use scenarios were designed by first assembling the balanced scenario. The balanced scenario (scenario #1) was prepared based on land use information from the recent general plan updates, the latest information regarding planned development, reasonable assumptions regarding infill and redevelopment, regional growth forecasts, and a review of development attractions (i.e., motorized and non-motorized transportation networks, existing development, utility areas, etc.) and discouragements (i.e., resource areas and farmland, public lands, areas exceeding 25% slope, etc.). Secondly, the dispersed (scenario #2) and compact (scenario #3) scenarios were prepared to represent development occurring at opposite ends of the spectrum from scenario #1. The scenarios are described by numerical order in Table 1.

Table 1

Scenario	Land Use
Scenario 1 – Balanced	• Balanced share of new housing within the center, established and new growth areas • Contains reasonable levels of infill and redevelopment • Consistent with local land use plans and draft conservation plan • Consistent with BCAG long-term regional growth forecasts by jurisdiction
Scenario 2 – Dispersed	• Largest share or single-family housing with a greater amount of growth directed to the new, rural, and agricultural growth areas • Minimize the amount of infill and redevelopment • Exceeds the unincorporated areas local land use plans reasonable capacities for growth
Scenario 3 – Compact	• Greatest share of infill and redevelopment within the established and center growth areas • Highest share of multi-family housing • Exceeds the incorporated areas local land use plans reasonable capacities for growth

Vehicle Miles of Travel

Once prepared, each scenario was incorporated, in combination with the preliminary draft forecasted transportation network, into the BCAG regional travel demand model. The travel demand model captures the amount of average weekday vehicle miles of travel (VMT) occurring as a result of each scenario, in addition to the amount of congested VMT (CVMT). In general, the more dispersed the land use pattern, the greater the average vehicle trip length should be, resulting in greater VMT. In turn, the more compact the land use pattern, the average trip length decreases, resulting in less VMT but greater congestion. The preliminary VMT and CVMT results of the scenario model runs are included in Table 2.

Table 2

Summary of Preliminary VMT and Congested VMT per Capita for the Year 2035

Year 2035 Forecast	Scenario 1 (Balanced)	Scenario 2 (Dispersed)	Scenario 3 (Compact)
Vehicle Miles of Travel[1]	5,780,000	6,327,000	5,511,000
Congested VMT[2]	355,480	408,890	360,400
Population	332,459		
VMT per Capita	17.39	19.03	16.58
Congested VMT per Capita	1.07	1.23	1.08

[1]VMT excludes through trips (X-X trips)
[2]VMT includes through trips (X-X trips)

The basic definition of VMT is one vehicle traveling on a roadway for one mile. VMT is the primary indicator of travel for policy makers and transportation professionals since it is relatively easy to measure using travel models and that it bears a direct relationship to vehicle emissions, lower VMT typically means lower emissions.

Congested VMT is used as primary indicator in determining the amount of delay a vehicle may experience when traveling. Typical signs of congestion are stop-and-go driving conditions and lines of drivers waiting to get through a signaled intersection. BCAG defines a congested VMT (CVMT) as a VMT that occurs on roadways with a volume-to-capacity ratio of 1.0 or greater, meaning that the volume on the roadway is at or exceeding its capacity.

The results of the VMT analysis for each scenario, presented in Table 2, shows VMT per capita increases of 9.5% for the dispersed scenario #2 over the balanced scenario #1. In converse, VMT per capita for the compact scenario #3 shows a 4.7% decrease from the balanced scenario #1. However, CVMT for the dispersed and compact scenarios are greater than that of the balance scenario #1. This is expected based on the assumption that a more compact land use footprint would focus more of the travel within the urbanized roadways, exceeding those roadway capacities. These results conclude that the model is responding accordingly to the changes in land use and illustrates the affects that a compact or dispersed land use allocation has on travel and the regional transportation system.

Passenger Vehicle Greenhouse Gas Emissions

In addition to measuring the amount of travel occurring as a result of each scenario, BCAG measured the levels of passenger vehicle greenhouse gas (GHG) emissions using the California Emissions Factor (EMFAC) model. The purpose of the passenger vehicle GHG measurement is to determine how well each land use scenario performs in relation to achieving the GHG targets established for the MTP/SCS as a result of SB 375. As directed by the California Air Resources Board (ARB), the 2035 GHG emission estimates are presented as pounds (lbs.) of Carbon Dioxide (CO_2) per capita. Table 3 reflects the amount of CO_2 emissions resulting from each scenario.

Table 3

Summary of Preliminary CO_2 per Capita for the Year 2035

Year 2035 Forecast	Scenario 1 (Balanced)	Scenario 2 (Dispersed)	Scenario 3 (Compact)
CO_2 lbs. per day	5,460,000	5,980,000	5,220,000
Population	332,459		
CO_2 lbs. per Capita	16.42*	17.99	15.70*

*Note: preliminary result meets or exceeds ARB GHG target for Butte County.

Similar to the results of the VMT analysis, Table 3 shows CO_2 per capita increases of 9.5% for the dispersed scenario #2 over the balanced scenario #1. In converse, CO_2 per capita for the compact scenario #3 shows a 4.4% decrease from the balanced scenario #1. These results conclude that the passenger vehicle GHG emissions, generated using VMT from the travel model, are correlating with the VMT from each scenario, illustrating the connection between VMT and GHG emissions.

The preliminary CO_2 lbs. per capita also demonstrate that the balance scenario #1 and compact scenario #3 meet or exceed the ARB GHG targets for the Butte County region for the year 2035. The current MTP/SCS GHG targets are to achieve no greater than a 1% increase in per capita CO_2 emissions, from 2005 levels. However, these are preliminary estimates based on information which has not been reviewed by ARB staff.