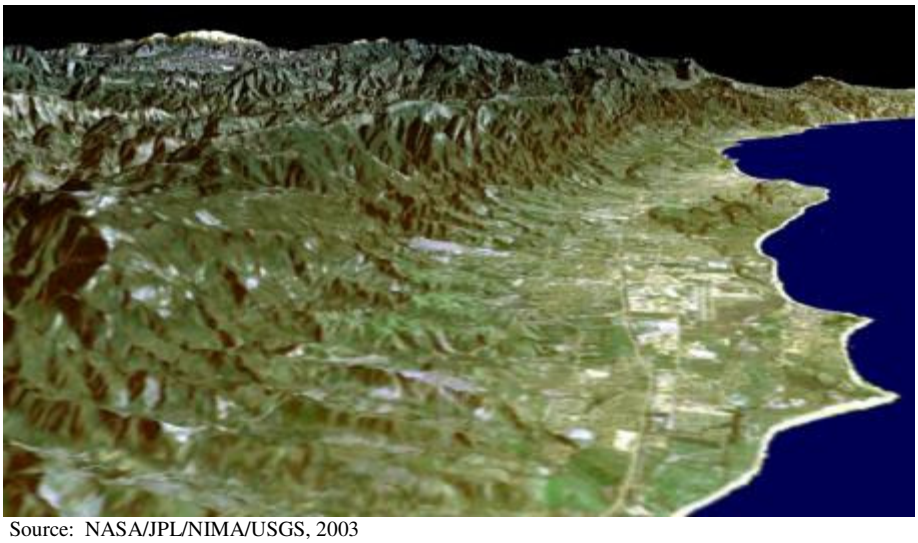
SOUTH COAST

REGIONAL IMPACTS OF GROWTH STUDY



Source: NASA/JPL/NIMA/USGS, 2003

Santa Barbara Region Economic Community Project

October 2003

SANTA BARBARA REGION ECONOMIC COMMUNITY PROJECT

Consultants

Ryan Aubry, UC Santa Barbara, Department of Geography
Michael S. Brown, Michael S. Brown and Associates
Keith Clarke, UC Santa Barbara, Department of Geography
Dan Hamilton, UC Santa Barbara Economic Forecast Project
Jeff Onsted, UC Santa Barbara, Department of Geography
Pat Saley, Pat Saley and Associates
Bill Watkins, UC Santa Barbara Economic Forecast Project

A LETTER FROM THE BOARD OF DIRECTORS
SANTA BARBARA REGION ECONOMIC COMMUNITY PROJECT

We are pleased to present the Regional Impacts of Growth Study (RIGS) to the South Coast community. For too long, issues of growth have been discussed without a good understanding of the long-term effects different policies would have on the people who live here, the businesses and their employees in this region, and the natural environment that surrounds us. While the South Coast is recognized as zealous about managing growth, we seem to find ourselves in a situation where the policy tools we have relied upon are no longer getting us the results that we want. We hope that this report provides a basis for productive decisions about our future.

ECP began as an economic development organization concerned about the impact of the early 1990s recession on the South Coast. The founding members believed that we could build a healthy economy based on high wage, low impact jobs while maintaining the quality of our environment and a high quality of life. As the recession faded into the economic juggernaut of the late 1990s, the organization shifted focus to the future growth of the region.

We do not have all the answers nor are we presenting this study as a solution to our problems. We do believe that better transportation, new development patterns, and an urban growth boundary are necessary to preserve what is unique about the South Coast. We feel strongly that our area is a single region and that cooperation among all jurisdictions is required to create the future we want. Still, the RIGS study exists to provide the basis for an informed discussion of our future—regardless of one's perspective on what policies might be appropriate here.

Many organizations and individuals have contributed to making RIGS possible. Primary funders for the study include the James Irvine Foundation and the Santa Barbara Foundation. Additional funding and in-kind support were provided by the Cities of Carpinteria and Santa Barbara, the County of Santa Barbara, and the Santa Barbara County Association of Governments. The analytical tools upon which the RIGS analysis is based were created by the faculty and students at the Department of Geography, University of California at Santa Barbara, led by Professor Keith Clarke. Jeff Onsted created the SCOPE model of urban growth and web interface based on early work by Prescott College researchers, Don Seville and Andrew Jones. Ryan Aubry oversaw the development of the geographic information system database for the study and the output of maps and geographic-based information. Dan Hamilton and Bill Watkins of the UCSB Economic Forecast Project conducted the fiscal analysis for the study. We also want to thank staff at the cities, the county, and SBCAG who spent numerous hours providing primary data and critiquing the model and study approach. Eric Sonquist provided administrative support to ECP while the study was in a critical phase. Current Board member, Jim Neuman, who served as ECP's Executive Director for several years, provided vital leadership in the initial phases of the study. The primary author of the study is Michael S. Brown with considerable assistance from Pat Saley and ECP's "RIGS Product Committee."

RIGS is available to all and we hope everyone on the South Coast with an interest in our future will use it. ***Please visit our website at www.sbecp.org to obtain a copy.***

Jon Clark
President of the Board

PREFACE

The Regional Impacts of Growth Study (RIGS) is the realization of the project that was initiated nearly 30 years ago with the *Impacts of Growth Study*. That study, conducted for the City of Santa Barbara, was based on the premise that growth was not something that could be predicted in a simple, straight-line projection from past trends, but rather resulted from a complex set of factors – including, and especially, the willingness of citizens and their elected officials to intervene in market forces and make policies that would produce a future they deemed desirable. In the *Impacts of Growth Study*, therefore, we shunned the then-conventional approach of predicting future levels of growth based on a simple extrapolation of past trends. Instead, we generated what we termed "population impact points" that reflected alternative possible scenarios of growth, estimating the impact of each scenario on such things as housing, transportation, air quality, and open space. Our technology was crude: in a long-forgotten era before personal computers, we did our own programming (in Fortran) and were forced to make extremely simplifying assumptions.

For us, RIGS represents a dream come true. Instead of rudimentary scenarios based on a handful of assumptions, it has constructed a sophisticated model that incorporates multiple factors, all interacting with one another in ways that simulate complex urban systems. Yet RIGS remains true to the underlying philosophy of the original *Impacts of Growth Study* – the belief that the future is made, not predicted. Its alternative scenarios are constructed and presented in such a way that both policy-makers and citizens can see the tradeoffs that come with one growth scenario versus another. Thanks to modern computer simulation technology, it is possible to ask "what if?" questions by changing underlying assumptions and parameters. Thirty years ago we imagined such a possibility, but could not realize it technically.

RIGS achieves the regional vision we called for. Because we conducted our study for the City of Santa Barbara, we lacked the mandate (and the budget) to do a more comprehensive regional analysis. We understood this limitation, and cautioned that a piecemeal approach to controlling growth would only transfer problems from one jurisdiction to another. The problems of traffic congestion, affordable housing, and preservation of open space embrace the entire South Coast. Solving these problems requires a coordinated region-wide effort. Although we urged such an effort, we did not have great hopes it would be achieved. Local governance was too fragmented and opinions too divergent.

Today that picture has changed, and our community – which we personally cherish no less today that we did thirty years ago – has matured. We believe that the time is ripe for the long-awaited regional approach to growth, and that RIGS has provided the planning tool for achieving it.

Richard Appelbaum
Professor of Sociology, UCSB
Director, Institute for Social, Behavioral, and Economic Research, UCSB

Harvey Molotch
Professor of Sociology Emeritus, UCSB
Professor of Metropolitan Studies, New York University

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

PART I
ALTERNATIVE SCENARIOS FOR THE FUTURE

INTRODUCTION

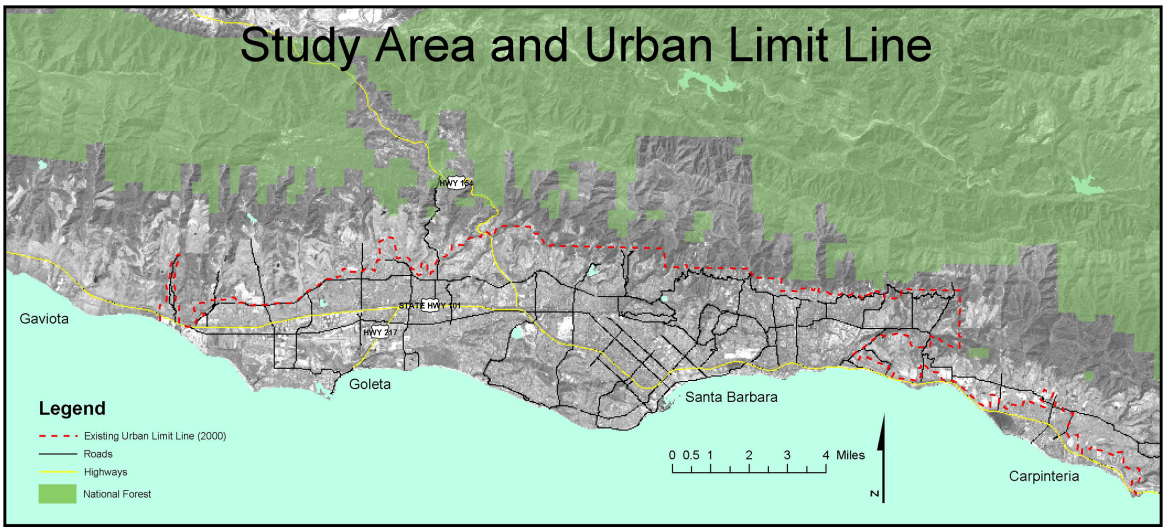
Santa Barbara's South Coast is one of the world's most beautiful places. It is a wonderful place to live, work and enjoy the company of family and friends in the midst of natural beauty, temperate weather, and a diverse economy. Yet, the South Coast—from the Ventura County line to Gaviota and from the ocean to the National Forest boundary—is in crisis. Housing affordability is at an all-time low, while the number of people commuting to jobs on the South Coast from the north and south is at an all-time high. We debate the merits of widening our freeways, while hoping to preserve our natural environment. Though the economy remains relatively resilient, manufacturing jobs are slowly moving away. Pressure is building to convert more and more agricultural land to homes. Our present course does not appear to be on a path towards a healthy, sustainable community. We must do something or we risk losing that which makes the South Coast the treasure we value.

In response, the Santa Barbara Region Economic Community Project (ECP) has undertaken an assessment of current growth-related policies and alternative growth scenarios that affect issues of importance to the South Coast region. ECP is a non-profit organization of businesses, government, community institutions, and local activists whose mission is to promote a healthy environment, a sustainable economy, and the preservation of our citizens' quality of life for future generations. A decade ago, the recession had policy makers and business leaders focusing on how to stimulate the economy in the region. Individuals who saw a strength of the South Coast as being its commitment to preserving the region's natural heritage formed ECP to advocate for economic development without sacrificing environmental protection. As the recession turned into the boom of the late 1990s, the issues facing the South Coast became the ones we struggle with today—rapid increases in housing prices, new job creation far outpacing housing growth, preservation of open space and agriculture, increasing traffic, and maintaining economic diversity.

While maintaining its business base, ECP broadened its membership in the late 1990s to include representatives of local and regional government as well as community and environmental activists. The organization's principles are grounded in the need for regional coordination, improved transportation, and "smart growth" that conserves land while maintaining the high quality of life that has characterized the South Coast. ECP, working in conjunction with its University of California at Santa Barbara partners, the Department of Geography and the UCSB Economic Forecast Project, has set itself the task of looking back 40 years at how the South Coast evolved and then looking ahead to what it might become.

BACKGROUND

Figure 1
Urban Limit Line Boundaries



Since 1960, the South Coast has been remarkably successful at maintaining large tracts of agricultural land and open space, primarily through the enforcement of an Urban Limit Line.[1] Within the Urban Limit Line, extensive socio-economic and demographic changes have occurred, marked by substantial growth in population and developed land.

Figure 2
1960 Land Use Profile

Source: UCSB Geography Department

In 1960, the South Coast consisted of an urbanized area in the City of Santa Barbara with limited development in Summerland, the Goleta Valley and Carpinteria, and large agricultural tracts and open space areas. The region was dominated by middle-income residents, who accounted for about half the population of roughly 93,000, with the rest estimated to be split evenly between

[1] For the South Coast, the western boundary is Winchester Canyon; the northern boundary varies between Rt 192 and the National Forest; on the east the Urban Limit Line separates the agricultural areas of the Carpinteria Valley from the City of Carpinteria, the urbanized coastal areas, and Summerland.

lower and higher-income residents.[2] About 34,000 housing units existed on the South Coast, with a median price of about $18,000 (in 1960) or just under $134,000 (in constant 2000 dollars).[3]

Affordable housing units, defined as rental or ownership housing occupied by lower-income households that costs no more than 30 percent of a household's monthly gross income, represented 21 percent of the housing stock. Of the roughly 43,000 jobs in the South Coast in 1960, just over half were in the public/institutional (e.g., government, schools, and colleges) and retail/service sectors. Average household income was nearly $44,000 (in constant 2000 dollars).

In 1960, the region had just over 12,000 developed acres, of which roughly 11,000 were residential (over 90 percent). Protected open space accounted for an estimated 12,000 additional acres. The jobs-housing ratio was calculated at 1.27, which reflected a low number of daily commuters, estimated to be about 2,700, and small traffic volumes estimated at 24,000 vehicles daily passing the Sheffield exits on Highway 101, 39,000 going by the Las Positas exits, and 19,000 vehicles daily passing the Fairview exits.

[2] A detailed explanation of how income levels are defined is in Appendix 2. Briefly, lower-income households are less than 50 percent of the median income; middle-income are 50 to 120 percent; and upper-income are greater than 120 percent.

[3] All dollar figures in this report are given in constant 2000. For conversion to nominal dollars, an inflation calculator is available at the Bureau of Labor Statistics Consumer Price Index website (http://www.bls.gov/cpi/).

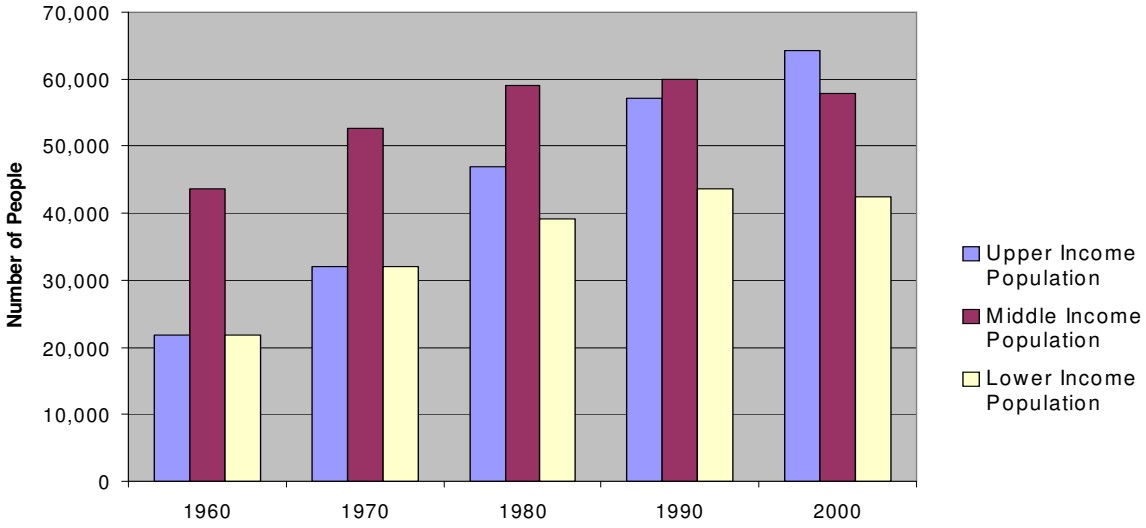
CURRENT PROFILE (2000)

Figure 3
2000 Land Use Profile

Source: UCSB Geography Department

By the year 2000, development had filled in most of the area between Winchester Canyon and Summerland and a growing portion of the Carpinteria Valley. Large tracts of agricultural land and open space remained along the Gaviota Coast and parts of the Carpinteria Valley outside the Urban Limit Line. Population had more than doubled in 40 years to around 199,000 with middle-income residents declining to just above one-third of the total from one-half in 1960, upper-income increasing to 39 percent of residents from 25 percent in 1960, and lower-income staying roughly the same (26 percent). The number of upper-income residents rose steadily throughout the 40-year period, while middle and lower-income residents rose until around 1990, then began a slow decline.

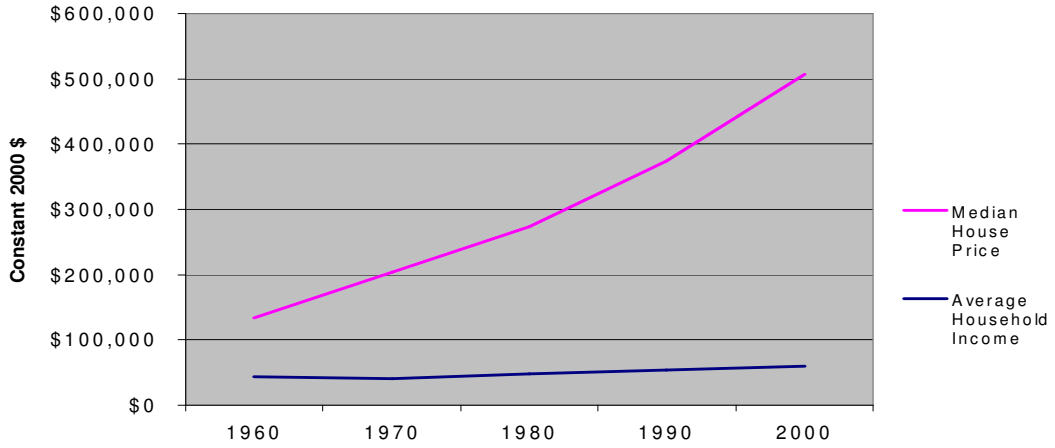
Figure 4
1960-2000 Income Distribution



While the amount of housing more than doubled from 34,000 in 1960 to roughly 81,000 housing units, the number of jobs tripled, with office jobs accounting for about 38 percent of the estimated 127,000 jobs in the region, retail/service jobs representing another 22 percent and pub-

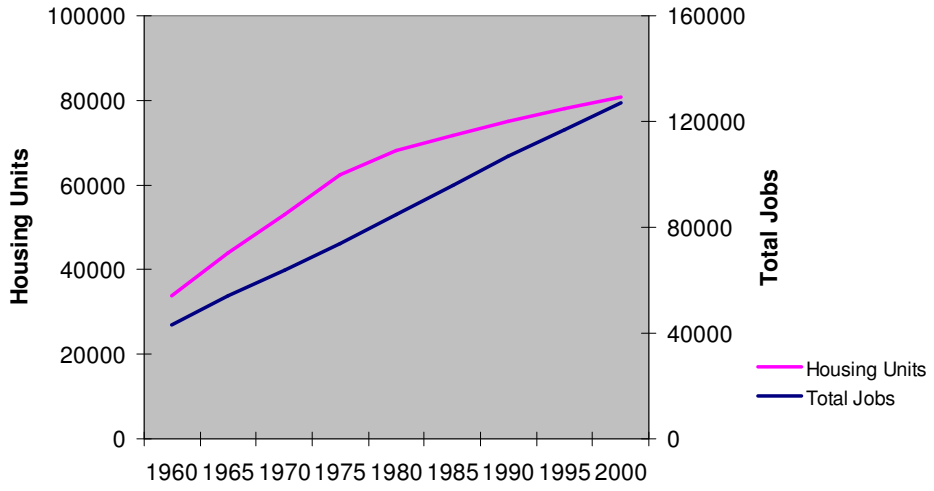
lic/institutional jobs accounting for 18 percent. The median house price more than tripled to just over $507,000. Yet, average household income rose by only one-third to about $59,000. Affordable housing units went down by almost one-third, to 15 percent of the total.

Figure 5
1960-2000 House Prices and Household Income



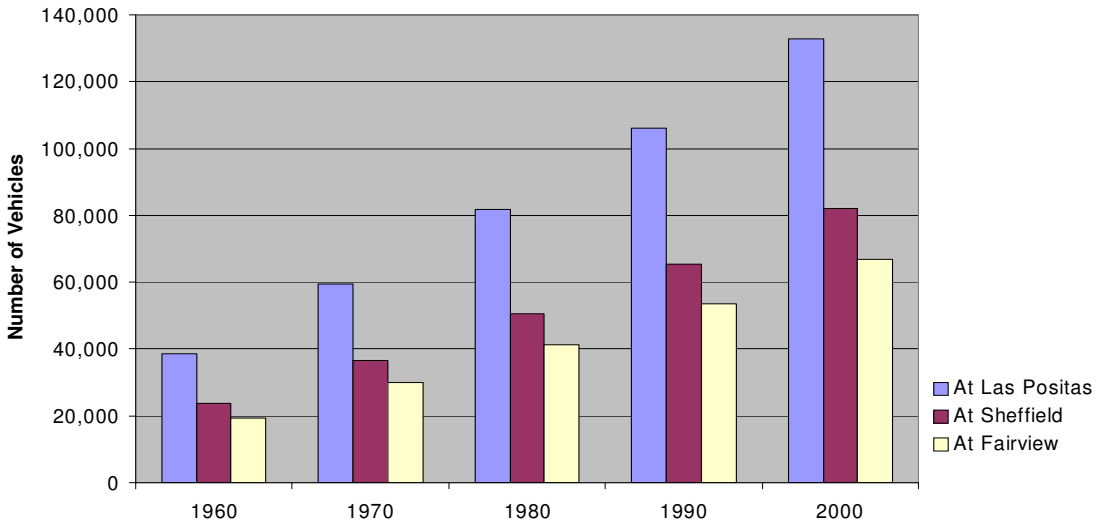
Of the 31,000 acres that were developed by 2000, 79 percent were residential (compared with 90 percent in 1960), indicating a pattern of increasing levels of commercial development and associated jobs. Protected open space doubled to roughly 25,000 acres.

Figure 6
1960-2000 Jobs and Housing Units



The increase in jobs was reflected in the jobs-housing ratio which increased from 1.27 in 1960, to 1.57. Commuting increased by a factor of nine to 25,000 daily commuters, while traffic volumes jumped nearly 250 percent to an estimated 82,000 vehicles passing the Sheffield exits daily (as compared to 24,000 vehicles in 1960), 133,000 vehicles passing the Las Positas exits (39,000 in 1960), and 67,000 vehicles going by the Fairview exits (19,000 in 1960).

Figure 7
1960-2000 Annual Traffic Volume



THE SOUTH COAST AT THE CROSSROADS

Since the publication of the City of Santa Barbara's 1974 *Impacts of Growth Study* (Santa Barbara Planning Task Force, 1974, see Appendix 1 for a summary), the South Coast has had a mixed experience controlling housing while we have been quite successful in creating a jobs-rich environment. However, the combination of rapidly rising housing prices coupled with modest growth in average incomes has resulted in increasing commuting on Highway 101 and parallel roads such as Foothill, Cathedral Oaks and Coast Village Roads. Traffic has increased from the Ventura County line through Santa Barbara and into Goleta as middle-income residents began to search for more affordable housing in outlying areas.

According to the News-Press, the median house price on the South Coast reached $900,000 during May 2003 (Zate 2003), declining the next month and rising again the month after.[4]

It appears that we are beginning to see a "de-coupling" of the housing market from the job market, where a small, but increasing, number of home buyers on the South Coast are not dependent on local jobs. Also, as jobs are created, they are increasingly filled by people who live outside the area. Those who move to the South Coast may have independent sources of wealth or income, reinforcing the escalation of housing prices. A growing portion of lower-income housing has become housing for middle-income and above, as a portion of formerly middle-income housing is affordable only at the upper-income levels.

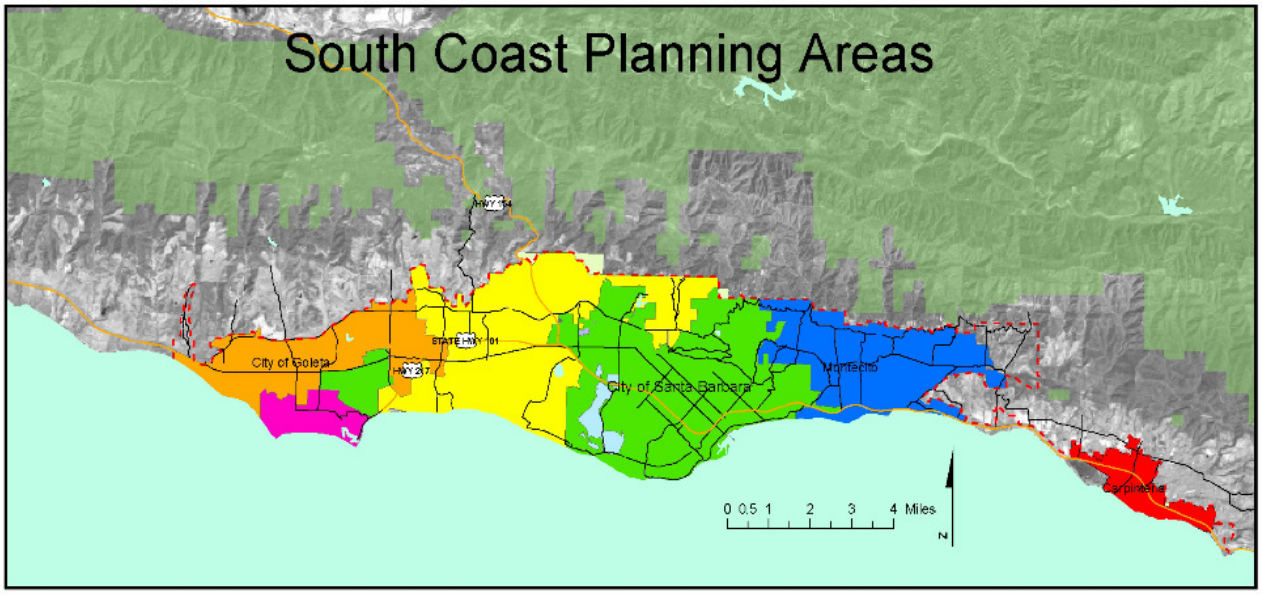
The gentrification pattern that is taking hold of the South Coast has potential for significant changes in the demographics of who will live here in the future. While the share of lower-income residents remained steady over the 40-year period, anecdotal evidence suggests that it has come at the cost of crowding on the part of some of this population. As rents and mortgages increase, household size and the number of households per dwelling unit increase, at least in some of the more urbanized areas. Spillover effects of crowding range from increased parking congestion, lack of recreational opportunities, and high levels of stress among families and single individuals sharing cramped living spaces. For those in the middle-income population, commuting often is the price paid for obtaining housing at a cost deemed affordable. And as housing in adjacent communities also increases in price, commute times and distances continue to lengthen as traffic congestion worsens. This is affecting critical public service jobs such as firefighters and police officers as recruitment becomes more and more difficult. Increasingly, this is affecting higher paying jobs that require residential proximity to South Coast institutions, such as physicians who must be able to be within a short drive of local hospitals to respond to emergency calls. Local health care institutions are forced into nearly perpetual recruitment for a wide range of highly paid positions due to the high living costs in the region. Thus, the beginning of the 21st century is marked by diminishing diversity and increasing pressure on the South Coast environment from traffic congestion and demands for increased housing opportunities.

[4] The California Association of Realtors calculates affordability statistics for various regions and counties in the state. They do not calculate a specific affordability rate for the South Coast region, although they do track housing for this region. For the County of Santa Barbara, the median price home is affordable to approximately 22 percent of county residents. (CAR 2003)

A Regional Perspective

In the 1974 *Impacts of Growth Study*, the authors pleaded with the region's policy makers to view the "South Coast [a]s a geographic and economic region." Though the communities of the South Coast may be integrated economically, culturally, and ecologically, we continue to struggle to create cohesive policies that preserve what we say we want. Because planning for the future of the South Coast is the responsibility of individual jurisdictions with multiple planning responsibilities (see Figure 8), a multitude of local, county, state and federal agencies weigh in on various issues. All too often, the very autonomy of each jurisdiction prevents looking at the larger picture of what is happening on the South Coast.

Figure 8
The South Coast and its Planning Jurisdictions[5]



ECP's origin as an economic development organization prompted its recognition that the South Coast economy rested on a foundation of sound planning and a regional perspective. Though representing a diversity of interests, the organization found common ground on four land use principles:

[5] The Coastal Zone, Summerland Community Plan and Toro Canyon Plan areas are not shown due to the scale of this map.

Figure 9
Economic Community Project Land Use Principles

1. *Recognize the South Coast as a distinctive planning region and integrate the communities' General Plans to facilitate the remaining principles.*
2. *Create and enforce a permanent Urban Growth Boundary that focuses planned development into existing urban areas while respecting existing General Plan growth limits. Establish creative and appropriate land use mechanisms to protect and preserve private property rights outside the boundary and valuable resources within the boundary.*
3. *Create and fund an integrated regional multi-modal transportation system within and between communities on the South Coast. Ensure that any future development is effectively served by transit, bikeway and pedestrian pathways.*
4. *Promote responsible, efficient and compact development while preserving green space, utilizing existing General Plan growth limits, and respecting the character of existing neighborhoods.*

Working within the four land use principles outlined above, ECP recognizes that there are additional issues that must be addressed. Agricultural parcels inside and outside of the Urban Limit Line of the South Coast are under pressure to convert to other uses. These parcels, some of which are farmed using sustainable organic practices, provide a connection for urban dwellers to the agricultural roots of the county and offer a respite from the impacts of development. In addition, infrastructure and services, be it parks and libraries, police and fire services, or water and sewers, are being stretched to accommodate current growth in a statewide budget climate that is characterized by constrained fiscal resources.

Different voices in the community focus on different aspects of our situation. Some argue for reducing the restrictions on housing construction and allowing more development of agricultural land and open space. Proponents of this approach argue that more housing will generate lower housing prices that are affordable to a wider range of people. Others argue for adoption of strategies that will allow denser housing within the urbanized portions of the South Coast, capitalizing on vacant and underused parcels. Still others, focusing on the risks of losing open space and preservation of existing neighborhoods, call for minimal growth in housing and jobs.

Addressing issues regionally will require confronting widely disparate assumptions about the causes and solutions the South Coast's problems: What policies will allow people of diverse incomes to continue to live in our region? How do we preserve our agricultural heritage, while reducing commuting and impacts on infrastructure? Can we balance jobs and housing with the need for open space, community facilities, and recreational opportunities? There is no simple answer to these questions, no single path to achieving a vibrant South Coast that can sustain itself far into the future. ECP's task is to understand the costs and benefits of alternative patterns of development, recognizing that population alone does not cause growth.

REGIONAL IMPACTS OF GROWTH STUDY (RIGS)

To answer our questions, ECP has sponsored the Regional Impacts of Growth Study (RIGS), conducted in cooperation with Professor Keith Clarke and graduate students Jeff Onsted and Ryan Aubry of UC Santa Barbara's Geography Department, and Bill Watkins and Dan Hamilton of the Santa Barbara Economic Forecast Project (SBEFP). RIGS looks at the potential impacts of alternative growth scenarios in the South Coast region. It updates and expands the 1974 *Impacts of Growth Study*, going beyond their analysis of the economic, environmental, and social consequences of different population levels on the City of Santa Barbara and its neighborhoods. RIGS incorporates a regional perspective in the belief that our transportation problems, housing needs, and the protection of open space can only be addressed if we recognize that we are a region.

Beyond taking a regional approach to evaluating the impacts of growth, we have expanded the previous study to look at alternative patterns of growth through the use of both systems and spatial analysis. In the original study, the researchers analyzed the impacts of different population levels on various indicators within the City of Santa Barbara. In the current study, we have asked what will happen if we adopt different land use policies across all South Coast jurisdictions that allow different levels and types of growth. We have developed quantitative expressions of these policies and evaluated their impacts using SCOPE (South Coast Outlook and Participation Experience), an urban growth model developed by faculty and graduate students at UCSB's Geography Department. We have also conducted a spatial analysis using Geographic Information System (GIS) tools.

*S*OUTH *C*OAST *O*UTLOOK AND *P*ARTICIPATION *E*XPERIENCE (SCOPE)

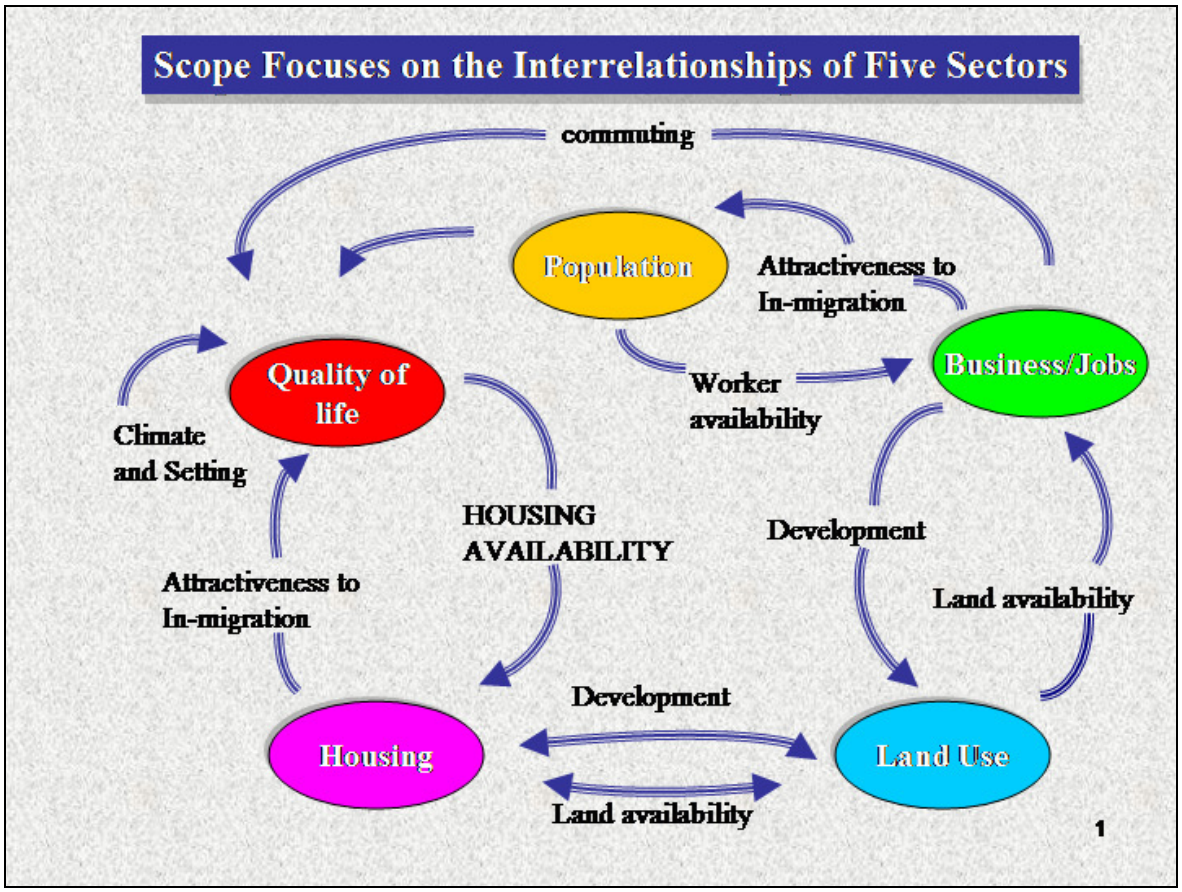
Jeff Onsted of the UCSB Geography Department developed the current SCOPE model using an early version constructed by researchers at Prescott College. SCOPE is built on an urban dynamics model (see Forrester 1969) that represents multiple relationships among five different aspects of the South Coast—*population, business and jobs, quality of life, housing, and transportation*. Each of these relationships represents how one or more factors affects other factors (e.g., births and deaths affect changes in the population). The model is designed so that factors in one sector may be affected by the relationships among factors in other sectors (e.g., the connection between jobs and housing). Because the model creates relationships among the various sectors as well as within each sector, it is considered to be "dynamic" in that it can create "feedback" among the different sectors that mimics our understanding of what happens in the region. The model is not "linear" in that it does not simply continue past trends out into the future (see Appendices 2 and 3 for a more detailed explanation of the model and the important parameters).

For example, we know that increased commercial development will generate the potential for more jobs. More jobs create more demand for housing at prices affordable to the incomes of people for those jobs. If housing prices rise beyond that level of affordability, the model will also increase both the amount of commuting to reflect people who will work in the South Coast but live in a community outside the region and the number of people who will move out of the area, leaving their jobs because of the lack of housing. Increased commuting and traffic will

lower the attractiveness of jobs in the region, depressing the number of new jobs that might otherwise be created and affecting the amount of commercial development that would occur.

SCOPE is "calibrated" by testing it against historical data (1960 to 2000 where available) for a variety of output measures. Factors in SCOPE are adjusted such that SCOPE outputs are within 10 percent of the historical data, a reasonable expectation of accuracy in forecasting. In addition, outputs were reviewed over a two-year period by local experts and citizens familiar with the region's development patterns (see Appendix 6), who critiqued the results and provided suggestions for improving the model and scenarios. The primary relationships among the sectors are:

Figure 10
SCOPE Model



Source: Myers 1989 with modifications by Don Seville and Andrew Jones.

To run the model, the user specifies the inputs in quantitative terms for various factors. For example, a user can tell the model to construct a specific number of affordable housing units each year at a specific density (in units per acre). The model will then try to meet the input set by the user, provided land remains available for the specified use. Outputs are the results of SCOPE interactions for specific variables on an annual basis. A web-based version offers users a limited set of input variables (or assumptions) to control and a group of outputs (or results) in numerical form or in a graphical representation.

It is important to understand that SCOPE works on a region-wide basis. It can describe changes in scale and intensity across the whole South Coast, but cannot describe where change may occur within the region. Several variables within the model are specified in geographic terms, but that is limited to distinguishing between in and out of the region, such as commuters who live outside the region and commute to work within the region. SCOPE can describe how many would commute to work within the South Coast under various assumptions, but it cannot describe where they commute from or the specific location they would commute to within the South Coast.

GEOGRAPHIC DISTRIBUTION OF GROWTH

Separate from SCOPE, RIGS is also based on specific geographic information. Data from the County Assessor's office and local jurisdictions combined with aerial photo analysis provide the basis for the geographic information system (GIS) database. Because we are evaluating the impacts of different land use policies that will result in varied patterns of growth, we need to be assured of the physical basis for our assumptions, such as where we locate development under each scenario. Based on input from planning agency staff within the South Coast as well as the expertise of ECP board members, we have a reasonable degree of confidence that it is physically possible to accommodate a wide variety in the number and type of residential units and commercial development assumed in each scenario. The work of UCSB graduate student Ryan Aubry has been critical to showing the physical demarcation of different development patterns in the South Coast. In addition, Aubry has been responsible for calculating various critical parameters such as the amount of vacant land in terms of area and parcels, land uses, and zoning designations.

THE SCENARIOS

The main purpose of SCOPE is to look at what will happen on the South Coast under different land use policy assumptions. To do that, we have built six "scenarios." Each scenario represents a set of policy choices put into terms that can be incorporated into the model. They include:

- The maximum amount of housing that can be built over the 40 year period, averaged per year
- The maximum amount of restricted affordable housing that would be built and the time period for controls
- The amount and density of commercial development of various types that would occur
- The amount of land to be set aside as open space protected from development
- Whether development is market-driven or constrained by government policies
- Whether the existing Urban Limit Line is maintained, altered or removed
- Whether development will follow a sprawl pattern or a more compact pattern.

We chose scenarios that reflect widely divergent views within the community regarding future patterns of growth in the region. Our first effort was to construct a scenario that reflected a continuation of current land use policies. We chose additional scenarios with the help of a broad range of interested organizations, individuals, agencies, and businesses (see Appendix 6) to represent distinct choices for our future.

One scenario allows market development over nearly all the region from Rincon to Gaviota. Other scenarios reflect policies that create compact development that differs substantially from historical patterns of growth. We also created a scenario that keeps new housing and commercial development to the legal minimum. For each of these scenarios we used SCOPE to project the impacts on the South Coast over a horizon that extends out to 2040.

The scenarios are not meant to reflect specific recommendations for policy changes. We recognize that most would not be easily implemented. Some require changes in policies that must be approved by a variety of state and local agencies ranging from the Coastal Commission to the County's Local Agency Formation Commission (LAFCo) to individual City Councils and the Board of Supervisors. Others would require residents to agree to significant changes to the character of neighborhoods. Still others require an economic commitment to affordable housing that goes far beyond existing precedents. Our purpose in creating each of the scenarios is to highlight a range of policies for discussion and to present data on their future impacts.

The six scenarios are described below and summarized in Table 1. Input settings for each of the scenarios and the full set of outputs are described in Appendix 4.

The **Existing Policies Scenario** assumes full build out under existing zoning and all General, Community, Coastal and Specific Plans. The current Urban Limit Line would be maintained, limiting nearly all development to the existing urbanized areas. The type and location of new development would be driven primarily by market forces with some government mandated affordability requirements in new construction.

In the **Widespread Scenario**, the pattern of development and rate of growth experienced over the last 40 years continues, but with double the number of units assumed in the Existing Policies scenario. The Urban Limit Line would be eliminated and most agricultural, coastal and open space protection policies would be significantly weakened to allow development throughout the region. The type and location of new development would be driven almost entirely by market forces, with minimal government mandated affordability requirements in new construction.

The **No Growth Scenario** assumes no additional development except one new home on every vacant residential lot and a small commercial building on every vacant commercial lot (at a Floor Area Ratio of 0.1). The current Urban Limit Line would be maintained and the preservation of open space would be maximized. Commercial and selected residential areas throughout the South Coast would be downzoned significantly, reducing allowable future development from current zoning. The scenario does not include any governmental requirements for affordable housing.

The **New Neighborhoods Scenario** doubles the number of housing units as compared to the Existing Policies Scenario. It locates new neighborhoods on the periphery of the South Coast without creating major changes to existing urbanized areas and reduces commercial development significantly from that allowed under the Existing Policies Scenario. The Urban Limit Line would be expanded to include Naples, lower portions of the Bishop Ranch, and the Carpinteria Valley, thereby opening those areas up to urban development. Residential development would be mostly

market driven with moderate government mandated affordability requirements in new construction.

The **Infill Scenario** retains the Urban Limit Line to help preserve rural open space and agriculture, while allowing denser development in existing urban areas (including urban agricultural parcels) focused along transit corridors and near jobs. New residential development would allow 50 percent more housing than the Existing Policies Scenario, while allowing a small amount of new commercial development. Residential development would involve a significant level of government mandated affordable housing within a market driven approach.

The **All Affordable** scenario assumes a high level of residential development limited to restricted affordable housing only. All other attributes are the same as the Infill Scenario.

Table 1
Key Land Use Assumptions for Each Scenario[6]

Scenario	*Affordable Housing*	*New Residential Construction*	*Commercial Construction*	*Preservation of Open Space*
Existing Policies	25 units/year	10,700 max @ 4-5 units/acre	10.2 million sq. ft. (over 40 years)	250 acres/year
Widespread	50 units/year	19,400 max @ 4-5 units/acre	12.3 million sq. ft. (over 40 years)	0 acres/year
No Growth	0 units/year	1,300 on vacant parcels	1 million sq. ft. (over 40 years)	500 acres/year
New Neighborhoods	100 units/year	20,000 max @ 15-20 units/acre	2 million sq. ft. (over 40 years)	100 acres/year
Infill	250 units/year	15,000 max @ 10-20 units/acre	1.5 million sq. ft. (over 40 years)	250 acres/year
All Affordable	375 units/year	15,000 max @ 10-20 units/acre	1.5 million sq. ft. (over 40 years)	250 acres/year

The model uses the assumptions as both "initiators" and "limiters" for running the model. For example, SCOPE will attempt to create the specified residential units per year at the average densities specified. If the maximum residential or commercial development is reached, the model will prevent further development from occurring unless "new" land becomes available through the process of an existing structure obsolescing or being demolished. If at some year prior to 2040 sufficient land is not available to build the specified annual amount of residential units, the model will not allow any further development until "new" land is available. Thus, one scenario may reach maximum development potential, while another scenario may fall short.

[6] The scenarios are designed to generate a net amount of new residential units to the extent that land would be available. To account for processes of obsolescence and demolition, we increased the annual number of units that would be built. As an example, the Existing Policies Scenario assumes approximately 10,700 additional residential units of which 25 per year are restricted affordable. To achieve this overall number of units and the affordable fraction, the model has to use as inputs 48 affordable units per year (to account for time controls expiring on affordable units, gentrification, etc.), 238 middle-income units per year, and 235 upper-income units per year. Similar adjustments are made for all the scenarios.

IMPACTS OF ALTERNATIVE GROWTH SCENARIOS

In this section, we discuss the results of using SCOPE to analyze the impacts associated with the six policy scenarios. In each subsection, we analyze major aspects of the model results—housing, population, jobs, land use, and quality of life—for each scenario. We look first at the Existing Policies scenario to understand what would be likely to occur over the 40 year period based on a continuation of current land use policies. We then discuss the outcomes over the 40 year period for the other five scenarios and compare the SCOPE results for each with the Existing Policies scenario. In the last part of this section, we examine in detail each of the major issues of concern and highlight the differences among all the scenarios.

EXISTING POLICIES SCENARIO

Scenario	*Affordable Housing*	*New residential construction*	*Commercial construction*	*Preservation of open space*
Existing Policies	25 units/year	10,700 max @ 4-5 units/acre	10.2 million sq. ft. (over 40 years)	250 acres/year

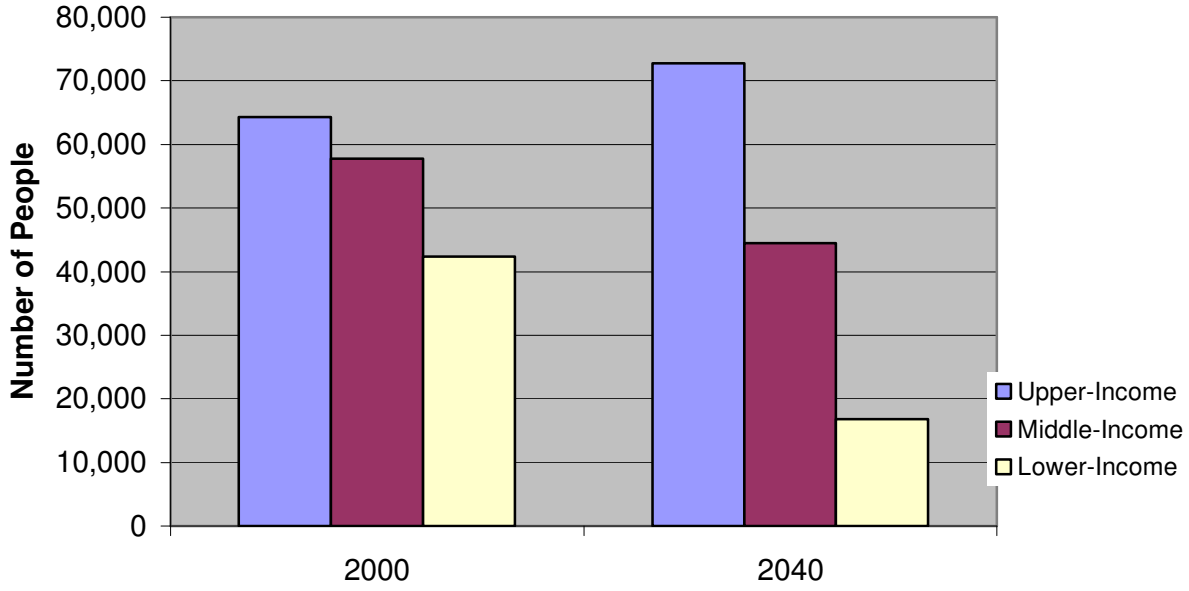
We first examine the impacts associated with continuing existing land use policies as adopted in the General and Specific Plans of the County and the Cities of Carpinteria and Santa Barbara. Over the next 40 years, we expect further demographic changes along with changes in the affordability of housing, increases in commuting and a shift in the region's job base and economic profile of its residents. Because the City of Goleta incorporated just over one year ago (in February 2002) and has not yet adopted a General Plan, we have assumed that the existing County policies would apply to that area.

Population

Under the **Existing Policies** scenario, population on the South Coast would begin a slow decline around 2005 that accelerates in the last decade of the 40 year period. By 2040, the population is expected to decline to about 174,000 from about 199,000 in 2000. The upper-income population rises to over 50 percent of the population, while middle-income residents stay steady at one-third and the lower-income population declining to less than 15 percent. Upper-income households tend to have fewer people per household so as the community becomes more affluent, the overall population begins a gradual decline.[7] The overall decline in population is accompanied, however, with growth in housing, jobs, and commuting.

[7] The issue of crowding, particularly in lower income households, is discussed in more detail in "Comparing Scenarios."

Figure 11
Existing Policies Scenario
2040 Income Distribution



Housing

Housing is projected to get more expensive even with the net addition[8] of about 7,000 units over the 40 year period as the South Coast region continues a general trend towards gentrification. Fewer and fewer households would be able to afford to buy in the South Coast region as housing prices would increase 167 percent, while incomes rise by only 43 percent. The median housing price is expected to rise to just under $1.4 million (2000 dollars).[9]

The number of housing units is expected to rise until 2030, at which time it levels off to about 88,000 units due to reaching build out (i.e., the maximum number of units allowed under existing zoning). The fraction of units that are affordable is expected to decline precipitously from 15 percent in 2000 to just 5 percent by 2040 as shown in Figure 13. Despite construction of new affordable units, the total number of affordable units in 2040 would decline significantly from about 12,000 in 2000 to just over 4,000. Market and demographic forces driving gentrification and minimal controls on the length of time existing affordable units remain affordable contribute to the conversion of lower priced housing to higher priced categories. Upper-income houses will represent approximately 78 percent of total units, up from 65 percent of the total in 2000.

[8] Net addition is the number of dwelling units on the ground that results from new construction minus units lost to demolition and decay. For example, if someone buys two houses next to each other, demolishes both and then re-builds a large house, SCOPE counts the action as two demolished units and one new unit resulting in a net loss of one unit.

[9] In 2040 nominal dollars, the median house price would be in excess of $4 million based on a three percent annual inflation rate.

Figure 12
Existing Policies Scenario
Housing Prices and Household Income

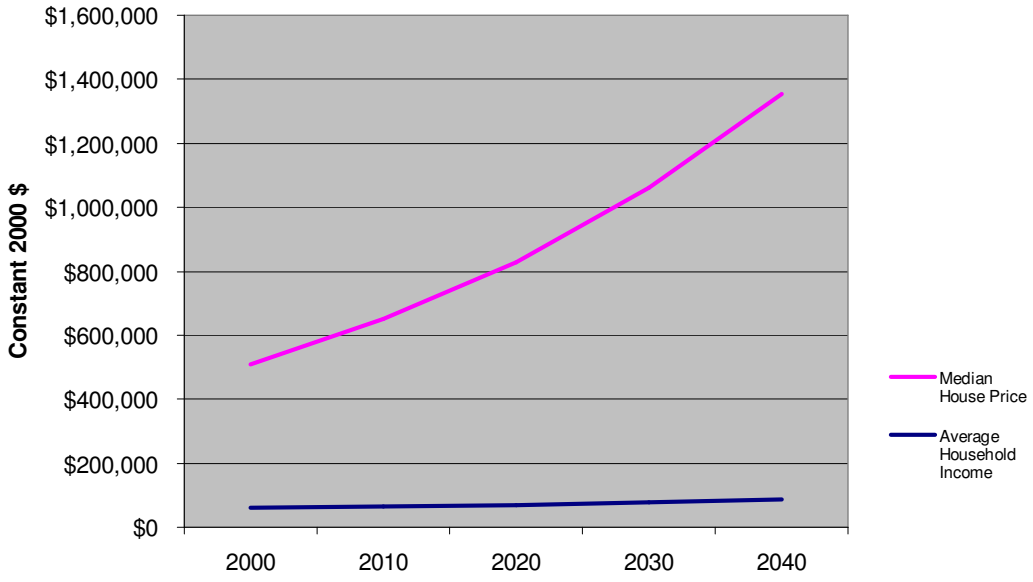
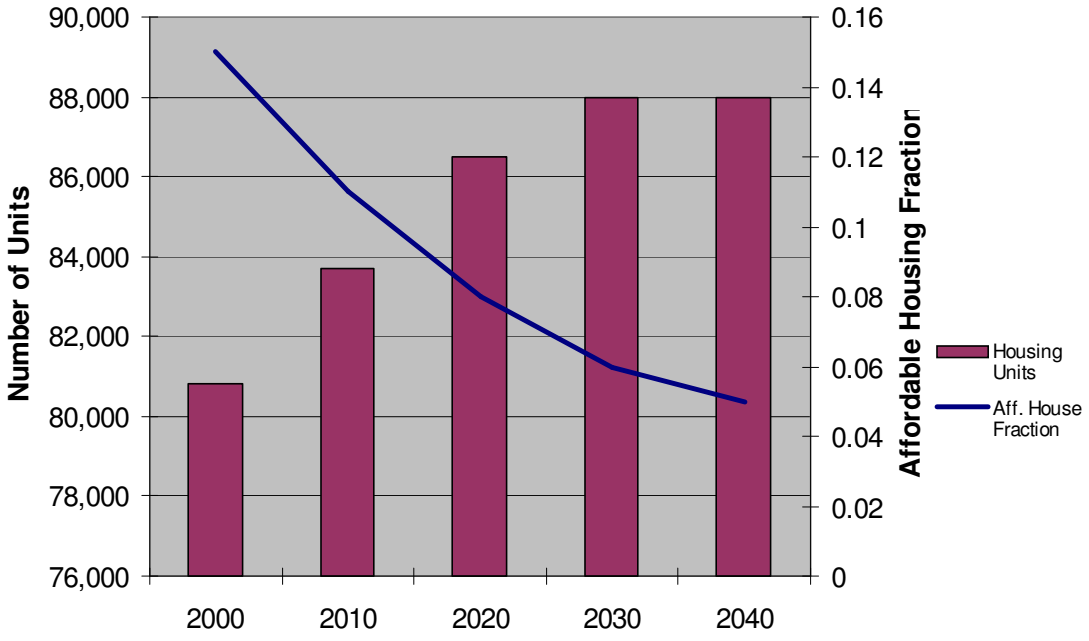


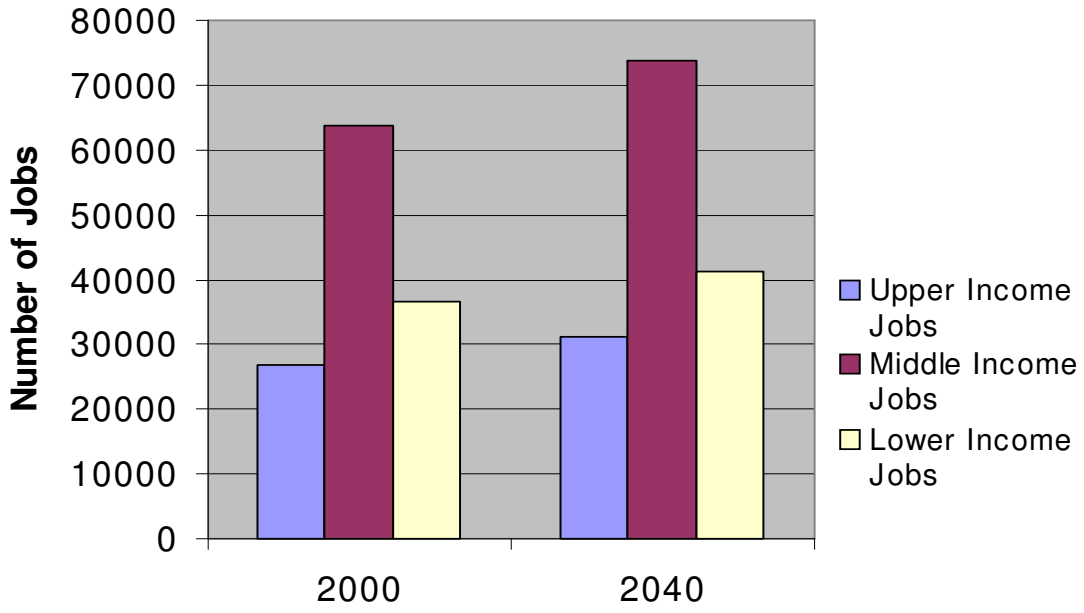
Figure 13
Existing Policies Scenario
Housing Units and Affordable Ratio



Jobs

Total jobs under the **Existing Policies** scenario are projected to continue to increase, rising 11 percent from 2000 to 146,000 in 2040, despite the population decline noted above. The jobs-housing ratio increases somewhat to 1.66. While office and public/institutional jobs are expected to remain stable, retail/service jobs are projected to increase to 24 percent of the total by 2040 from 23 percent of the total jobs in 2000. The mix of upper, middle, and lower-income jobs stays relatively stable as well, with a slight increase in lower-income jobs over the 40 year period, reflecting the growth in the retail/service sector, as shown in Figure 14.

Figure 14
Existing Policies Scenario
2040 Jobs by Income



Land Use and Commuting

Since most of the suitable land within the Urban Limit Line of the South Coast has been developed, little vacant land is expected to be converted over the 40 year period. Developed land is projected to increase just three percent to over 31,000 acres. About half of the increase is in residential acreage, with retail consuming most of the rest of the increase. Protected open space is projected to increase by nearly 10,000 acres, or 41 percent over 2000. The number of commuters will continue to grow at a strong pace, rising a projected 41 percent over 2000 levels to nearly 36,000 per day. Traffic volume at Sheffield, Las Positas, and Fairview are all projected to rise 35 percent over 2000 figures (Figure 15).

Figure 16 shows the likely location of new construction in 2040 under the Existing Policies scenario.

Figure 15
Existing Policies Scenario
Traffic

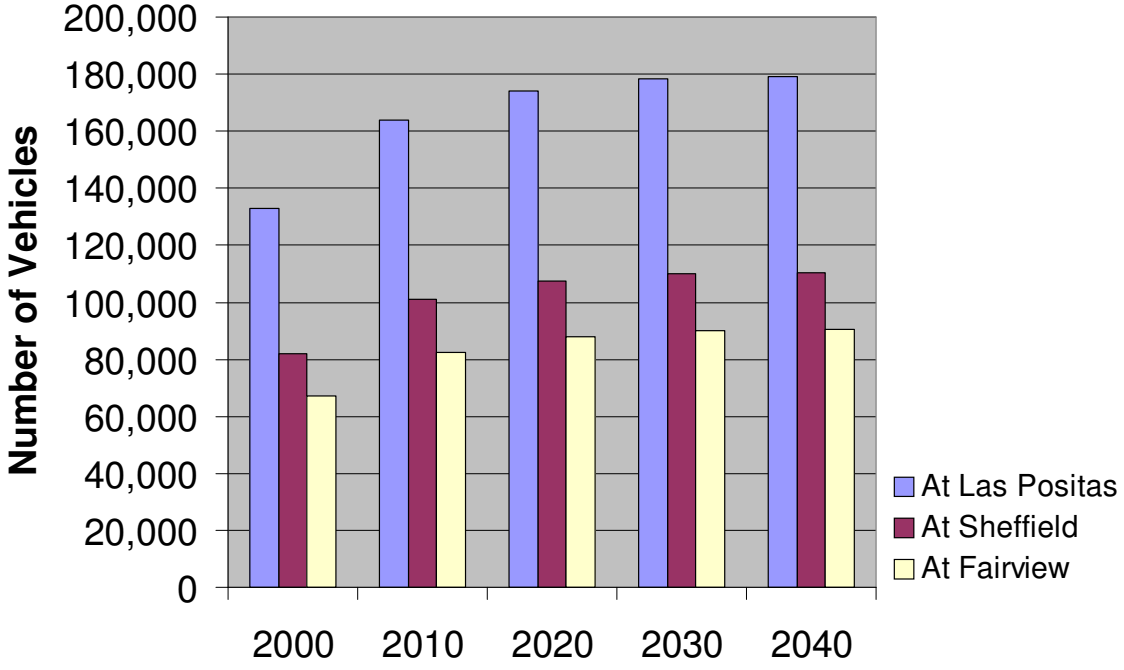


Figure 16
2040 Existing Policies Scenario Development
[11x17 map]

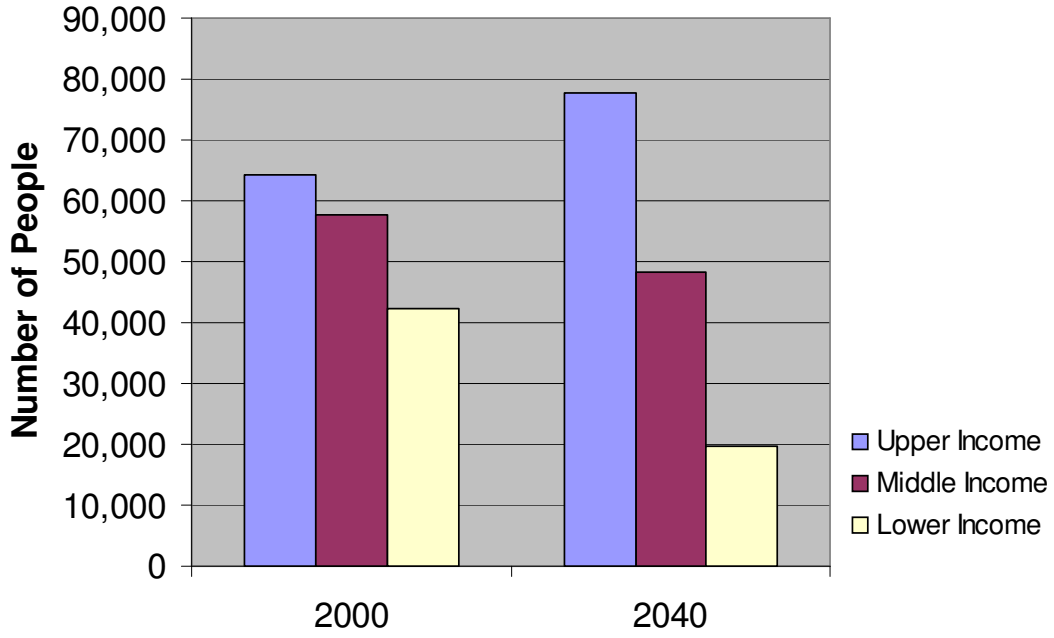
WIDESPREAD SCENARIO

Scenario	Affordable Housing	New residential construction	Commercial construction	Preservation of open space
Widespread	50 units/year	19,400 max @ 4-5 units/acre	12.3 million sq. ft. (over 40 years)	0 acres/year

The **Widespread** scenario is designed to analyze the effects of allowing the market to dictate building patterns across the South Coast. The Urban Limit Line is eliminated allowing unrestricted development from the Ventura County line through Gaviota and all the way up to the National Forest. Future development is limited only by building and safety constraints such as slopes. Housing is primarily market-driven with minimal requirements for affordable housing. The scenario is designed to evaluate if unrestricted growth could moderate the impacts of rising housing prices, commuting, and traffic congestion.

Population

Figure 17
Widespread Scenario
2040 Income Distribution

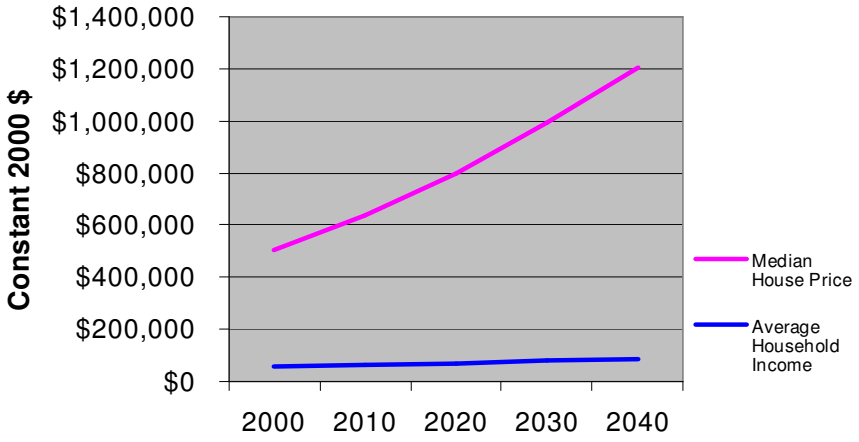


Similar to the Existing Policies scenario, under the **Widespread** scenario, population begins a very slow decline that accelerates somewhat in the last decade of the 40 year period, although not to the same degree. By 2040, the population is expected to decline to about 186,000, about seven percent higher than the Existing Policies scenario. The upper-income population rises to 53 percent of the population while the middle-income stays steady at one-third and the lower-income population declines to less than 14 percent.

Housing

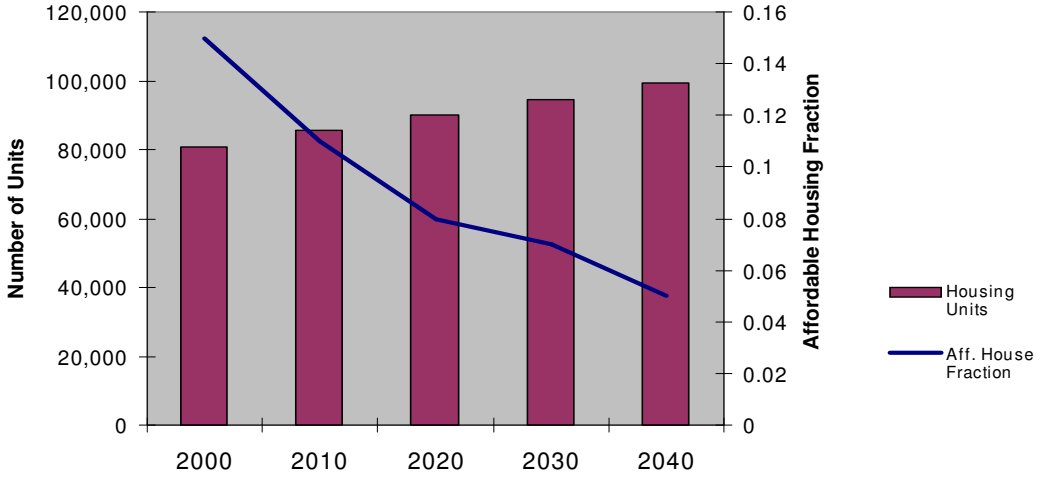
Housing in the **Widespread** scenario is projected to get almost as expensive as in the Existing Policies scenario, suggesting that even under market conditions, the South Coast region will continue a general trend towards gentrification. Housing prices are expected to increase roughly 140 percent to $1.2 million, while incomes rise by only 43 percent to just over $84,000, a level slightly below the Existing Policies scenario.

Figure 18
Widespread Scenario
Housing Prices and Household Income



The number of housing units is expected to rise throughout the period to about 99,000 units. Despite the addition of nearly 18,000 units, the fraction of units that are affordable will match the steep decline in the Existing Policies scenario from 15 percent in 2000 to just five percent by 2040. Market and demographic forces driving gentrification and minimal controls on existing affordable units contribute to the conversion of lower priced housing to higher priced categories. Upper-income houses will represent approximately 75 percent of total units, three percent less than under the Existing Policies Scenario.

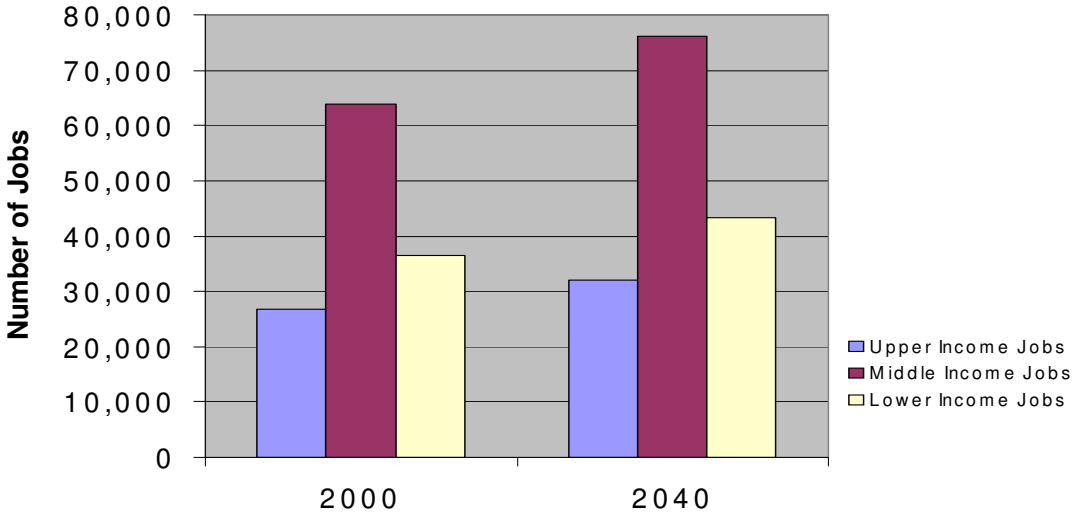
Figure 19
Widespread Scenario
Housing Units and Affordable Fraction



Jobs

The general job climate is projected to very strong under this scenario. Total jobs are projected to continue to increase, rising 19 percent from 2000 to 152,000 in 2040, due primarily to the large amount of nonresidential square footage assumed in the scenario and despite the population decline noted above. Office jobs would increase by 25 percent, while public/institutional jobs are expected to remain stable. Retail/service jobs are projected to increase by 28 percent to 24 percent of the total jobs by 2040 up from 22 percent of the total jobs in 2000. The mix of upper, middle, and lower-income jobs stays stable. The jobs-housing balance would decrease to 1.53 from 1.57 in 2000.

Figure 20
Widespread Scenario
2040 Jobs by Income



Land Use and Commuting

Because there is no Urban Limit Line under this scenario, developed land is projected to increase 24 percent to over 37,000 acres, substantially more than under the Existing Policies scenario. Over 80 percent of the increase is in residential acreage, with retail consuming almost all of the rest of the acreage. No additional acreage would be set aside as protected open space over the 40 year period. The number of commuters would increase at a substantial rate, rising a projected 46 percent over 2000 to just under 37,000 per day, an increase over the Existing Policies scenario. Traffic volume is projected to rise 41 percent over 2000 figures at the Sheffield (115,000), Las Positas (187,000) and Fairview (94,000).

Figure 22 shows the likely location of new construction in 2040 under the Existing Policies scenario.

Figure 21
Widespread Scenario
Daily Traffic Volume

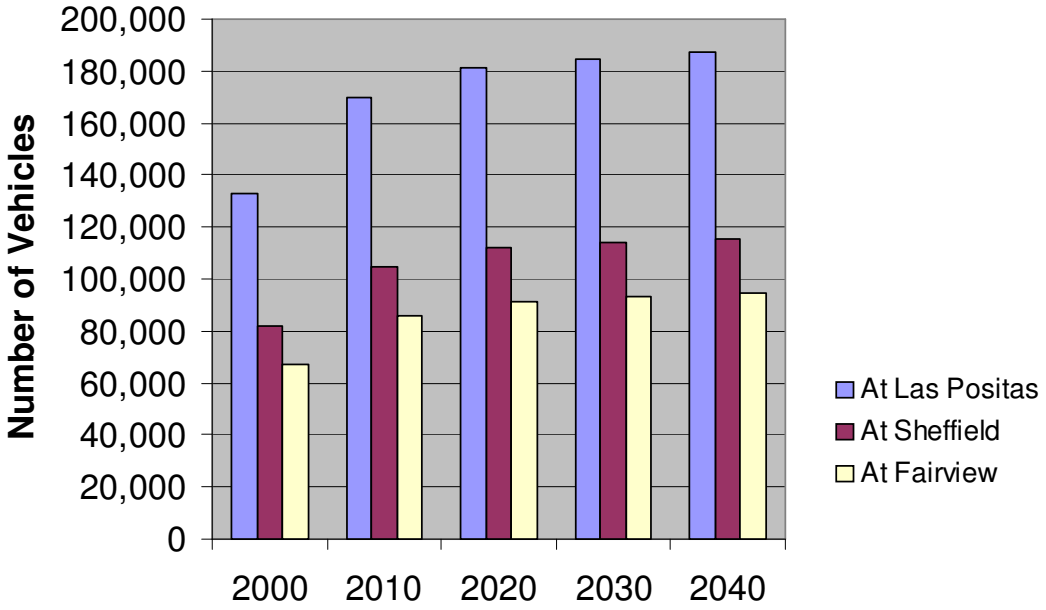


Figure 22
2040 Widespread Scenario Development
[11x17 map]

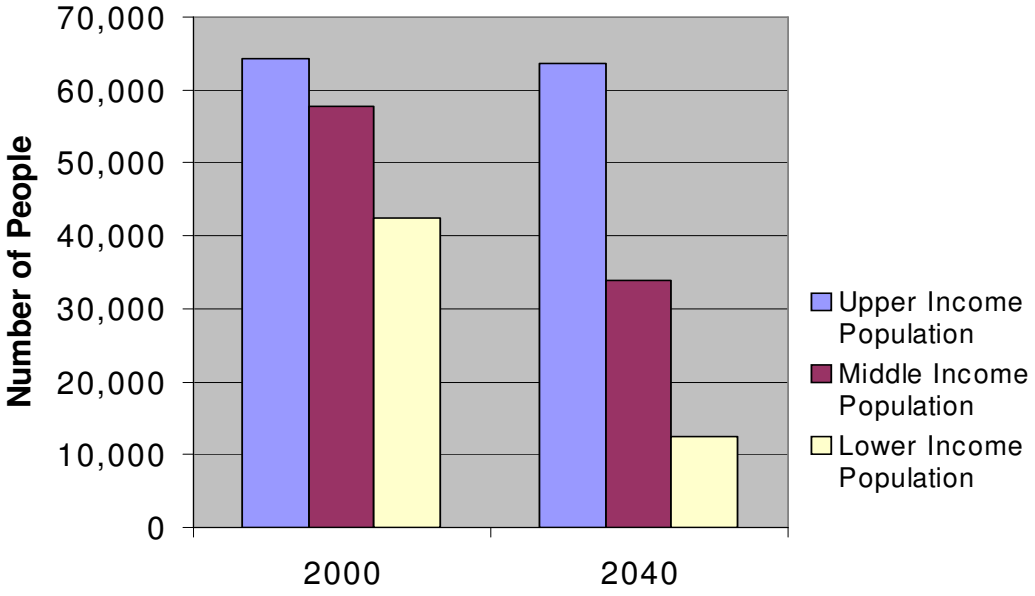
NO GROWTH SCENARIO

Scenario	*Affordable Housing*	*New residential construction*	*Commercial construction*	*Preservation of open space*
No Growth	0 units/year	1,300 on vacant parcels	1 million sq. ft. (over 40 years)	500 acres/year

The **No Growth** scenario looks at the impacts of barring future development except for the legal minimum along the entire South Coast. For the estimated 1,300 vacant parcels on the South Coast, each residential parcel would be allowed one dwelling unit regardless of the size of the parcel. Residential or commercial subdivisions would not be allowed. A minimal amount of commercial development would be allowed on nonresidential parcels within the Urban Limit Line. This scenario focuses on maximizing conservation of land and analyzing the effect of such limited growth on housing prices along with jobs, commuting, and traffic congestion.

Population

Figure 23
No Growth Scenario
2040 Income Distribution

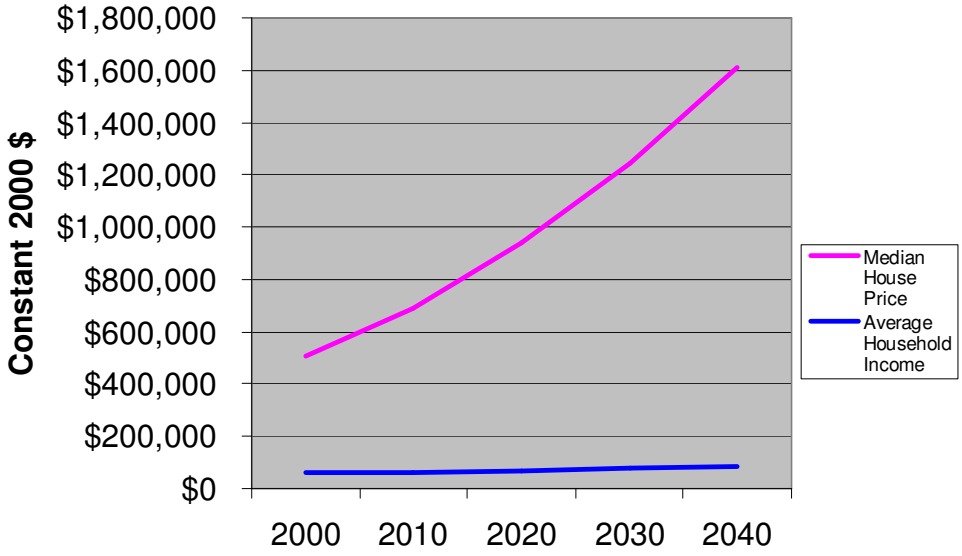


Similar to the Existing Policies scenario, under the **No Growth** scenario, population begins a severe drop in the second decade accelerating in the last decade of the 40 year period. By 2040, the population is expected to decline to about 150,000, about 14 percent lower than the Existing Policies scenario. The upper-income population rises to 58 percent of the population, versus just over 50 percent in the Existing Policies scenario, while the middle-income drops below one-third and the lower-income population declines to just 11 percent.

Housing

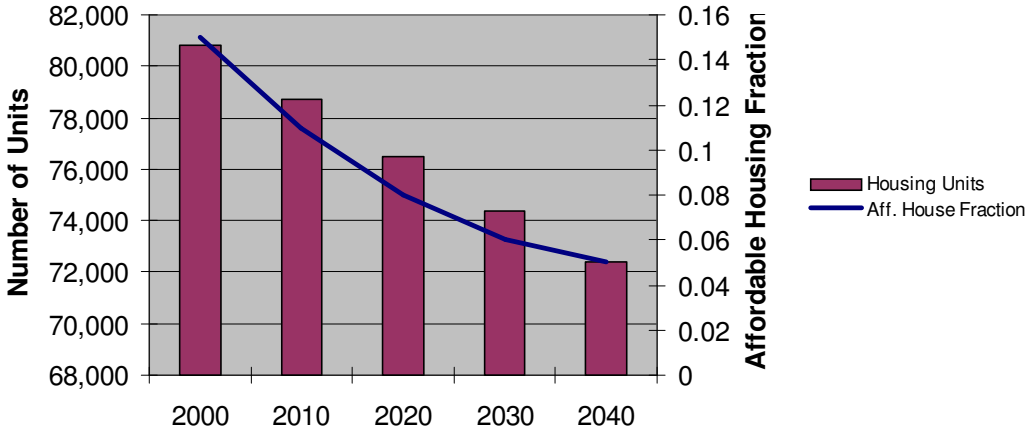
Housing in the **No Growth** scenario is projected to become substantially more expensive than the Existing Policies scenario, suggesting a rapid trend towards gentrification. Housing prices are expected to increase 217 percent to $1.6 million, while incomes rise by only 46 percent to $87,000, two percent higher than the Existing Policies scenario.

Figure 24
No Growth Scenario
Housing Prices and Household Income



The number of housing units is expected to decline steadily during the 40 year study period to 72,000 units, an 11 percent drop. Upper-income houses will represent approximately 81 percent of total units, three percent higher than in the Existing Policies scenario, with middle-income units accounting for 14 percent. Although a few newly built units may be affordable by design, the fraction of units that are affordable will match the steep decline in the Existing Policies scenario from 15 percent in 2000 to just five percent by 2040. Market and demographic forces driving gentrification and minimal controls on existing affordable units would contribute to the conversion of lower priced housing to higher priced categories. With the inability to subdivide parcels in the No Growth scenario, the expected demand for upper income housing would be met in part by combining lots, removing existing residential units, and building a smaller number of more expensive housing units, thus contributing to the decline in the number of housing units.

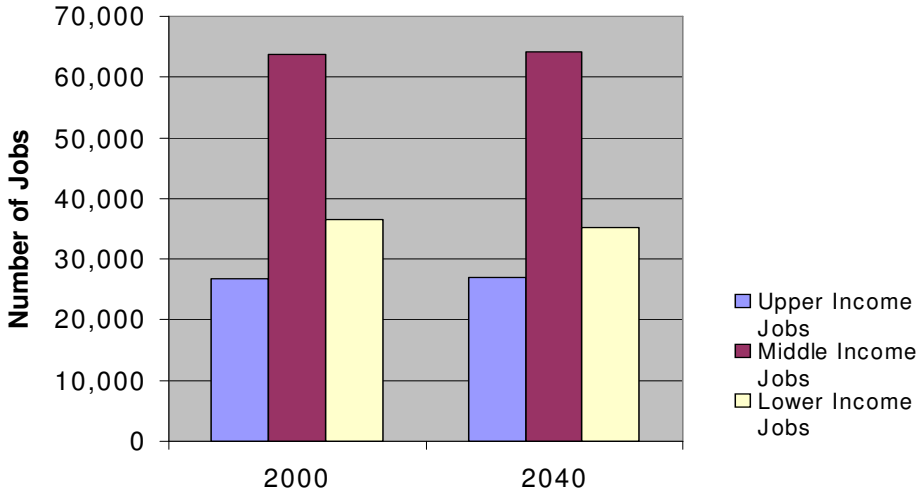
Figure 25
No Growth Scenario
Housing Units and Affordable Fraction



Jobs

The job climate under the **No Growth** scenario is projected to be moderate with a decline of less than one percent from 2000 to just under 127,000. This can be attributed to the very small increase in commercial space assumed in the scenario. The number of jobs by type is expected to remain very stable except for a small increase in retail/service jobs of just over two percent. Retail/service jobs are projected to represent 23 percent of total jobs by 2040, a slight increase from 2000, while self-employed jobs would decline slightly with all other job categories remaining stable. The mix of upper, middle, and lower-income jobs remains virtually identical over the 40 year period. The jobs-housing ratio would rise to 1.75, a substantial increase over the Existing Policies scenario.

Figure 26
No Growth Scenario
2040 Jobs by Income Distribution



Land Use and Commuting

Because of the Urban Limit Line and severe development constraints under the **No Growth** scenario, developed land is projected to decrease 10 percent to nearly 28,000 acres. All of the decrease is in residential acreage, with acreage for other types of land uses remaining stable. A projected 29 percent increase in protected open space over the 40 year period would bring the total to 32,000 acres. The number of commuters will rise a projected 22 percent over 2000 to nearly 31,000 per day, substantially less than the Existing Policies scenario. Traffic volume is projected to rise 17 percent over 2000 figures with an expected 96,000 per day passing the Sheffield exit, 156,000 vehicles per day passing Las Positas, and 79,000 passing Fairview.

Figure 28 shows the likely location of new construction in 2040 under the Existing Policies scenario.

Figure 27
No Growth Scenario
Traffic

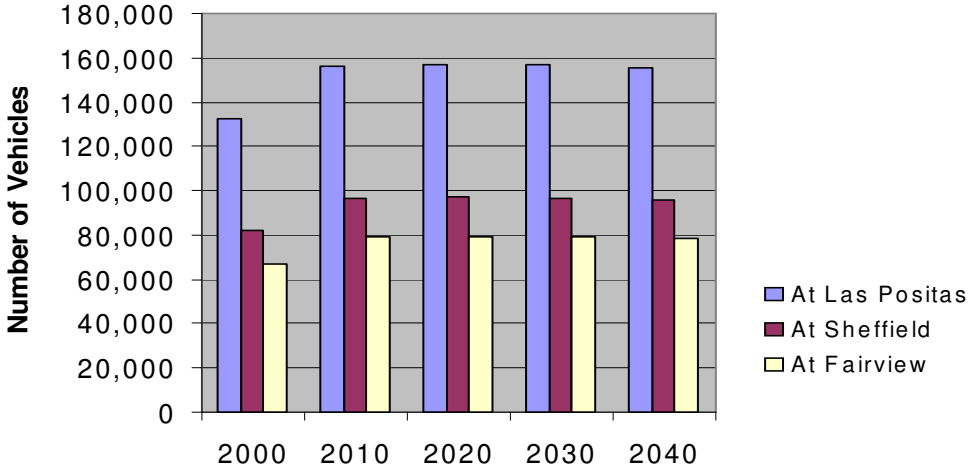


Figure 28
2040 No Growth Scenario Development
[11x17 map]

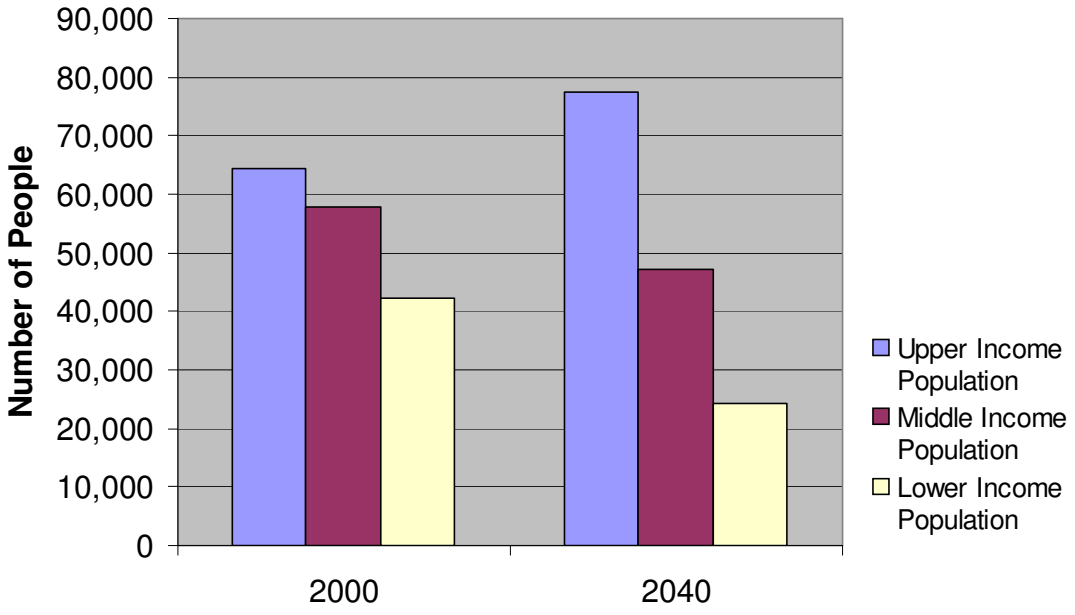
NEW NEIGHBORHOODS SCENARIO

Scenario	*Affordable Housing*	*New residential construction*	*Commercial construction*	*Preservation of open space*
New Neighbor-hoods	100 units/year	500 units/year 20,000 max @ 15-20 units/acre	2 million sq. ft. (over 40 years)	100 acres/year

The **New Neighborhoods** scenario is designed to create a large amount of housing in a more compact development form without altering existing neighborhoods. It assumes that development will take place on large tracts of land on the urban periphery (specifically in the western end of Goleta and in the Carpinteria Valley) following a relatively dense development pattern. It differs from the Widespread scenario in its compact form—an Urban Limit Line with an expanded geographic area—inclusion of affordable housing, and de-emphasis on commercial development. This scenario is also primarily market-driven, although it does include some government controls promoting affordable housing.

Population

Figure 29
New Neighborhoods Scenario
2040 Income Distribution



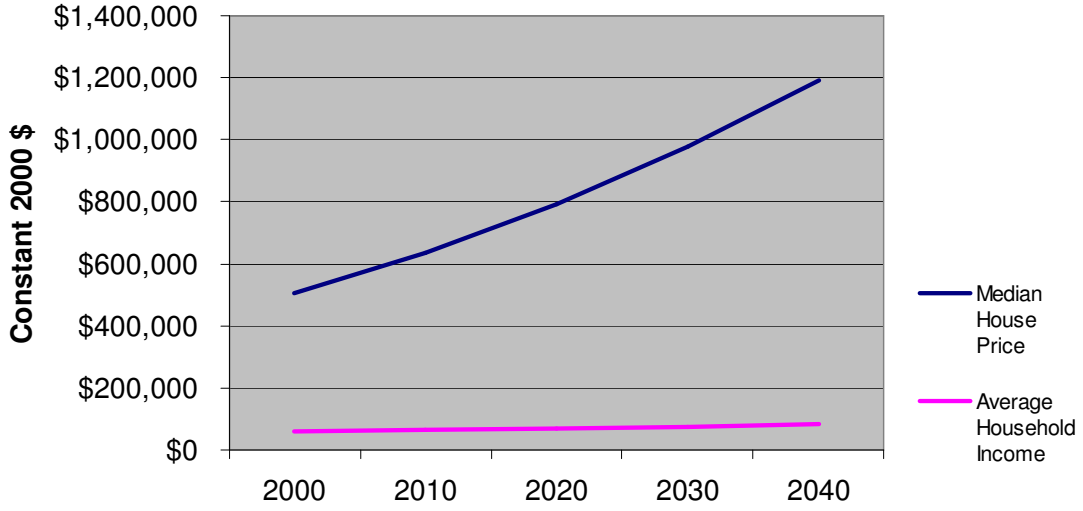
Under the **New Neighborhoods** scenario, population grows somewhat before beginning to decline in the second decade of the 40 year period. By 2040, the population is expected to decline to about 189,000, about nine percent higher than the Existing Policies scenario. The upper-

income population rises to 52 percent of the population, while the middle-income drops to just below one-third and the lower-income population declines to 16 percent.

Housing

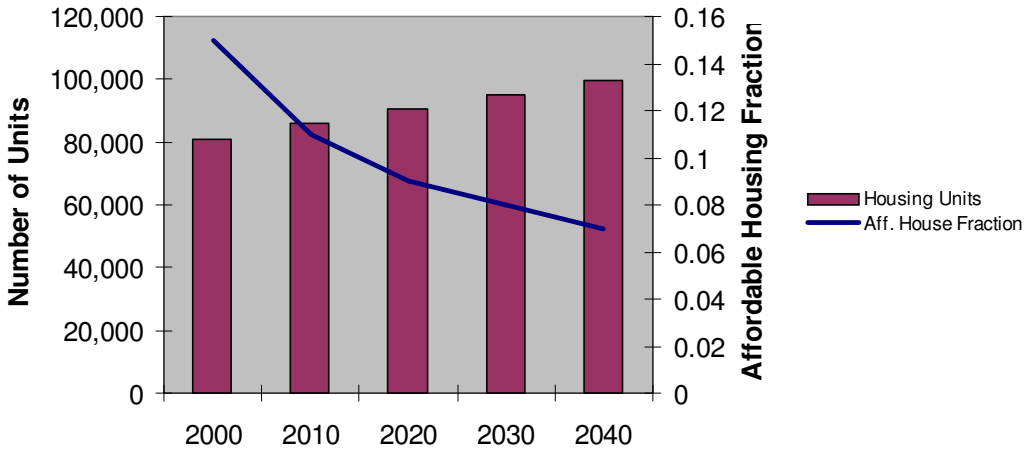
Housing in the **New Neighborhoods** scenario is projected to become more expensive, though less expensive than under the Existing Policies scenario, suggesting a trend towards gentrification. Similar to the Existing Policies scenario, market and demographic forces driving gentrification and minimal controls on existing affordable units contribute to the conversion of lower priced housing to higher priced categories. Housing prices are expected to increase roughly 135 percent to nearly $1.2 million from 2000 prices, while incomes rise by only 38 percent to almost $82,000, about three percent lower than the Existing Policies scenario.

Figure 30
New Neighborhoods Scenario
Housing Prices and Household Income



The number of housing units is expected to rise 23 percent to nearly 100,000, with the increase over 2000 equivalent to the maximum new units specified for the scenario. The fraction of units that are affordable would decline from 15 percent in 2000 to about seven percent by 2040. Upper-income houses will represent approximately 74 percent of total units with middle-income units accounting for just 19 percent.

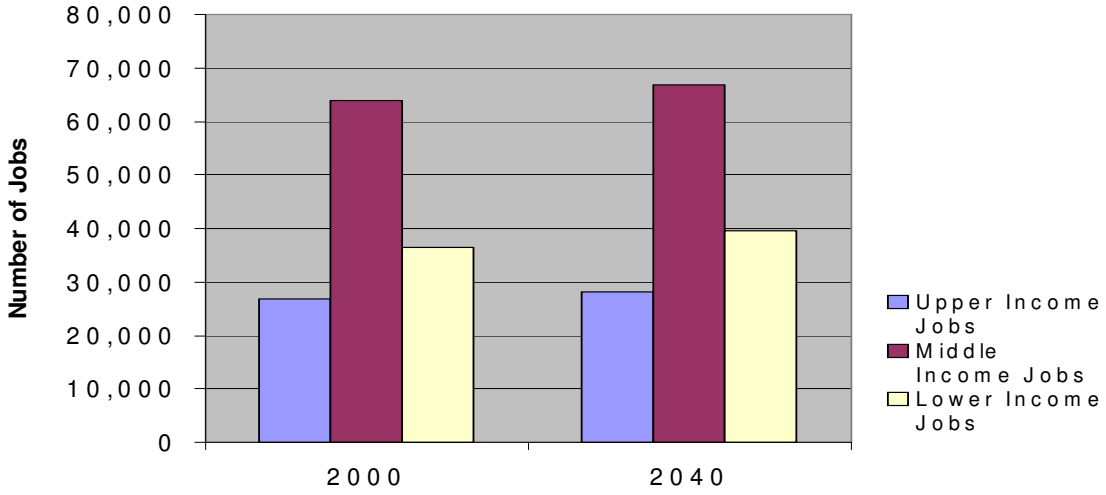
Figure 31
New Neighborhoods Scenario
Housing Units and Affordability Ratio



Jobs

Total jobs are projected to increase under the **New Neighborhoods**, rising six percent over 2000 levels to 134,000 in 2040. Retail/service jobs are expected to increase 20 percent over 2000, to 25 percent of the total by 2040 from 22 percent in 2000. The mix of upper, middle, and lower-income jobs would remain nearly identical over the 40 year period. The jobs-housing ratio would decline to 1.35 from 1.57 in 2000 due to the relatively larger growth in the number of housing units against the growth in jobs.

Figure 32
New Neighborhoods Scenario
2040 Jobs by Income



Land Use and Commuting

Because of Urban Limit Line and development criteria assumed in the **New Neighborhoods** scenario, developed land is projected to increase just eight percent to just over 32,000 acres, somewhat more than what is developed under the Existing Policies scenario. Residential and commercial acreage increase 60 percent and 39 percent respectively. Overall percentages of residential, commercial, and public/institutional acreages would remain fairly stable. A 16 percent increase in additional acreage would be added to protected open space over the 40 year period, bringing the total to approximately 29,000 acres. The number of commuters will grow substantially, rising a projected 30 percent over 2000 to nearly 33,000 per day, about eight percent less than the Existing Policies scenario. Traffic volume is projected to rise 30 percent over 2000 figures with 107,000 vehicles per day at Sheffield, 173,000 at Las Positas, and 87,000 at Fairview.

Figure 34 shows the likely location of new construction in 2040 under the Existing Policies scenario.

Figure 33
New Neighborhoods Scenario
Traffic Volume

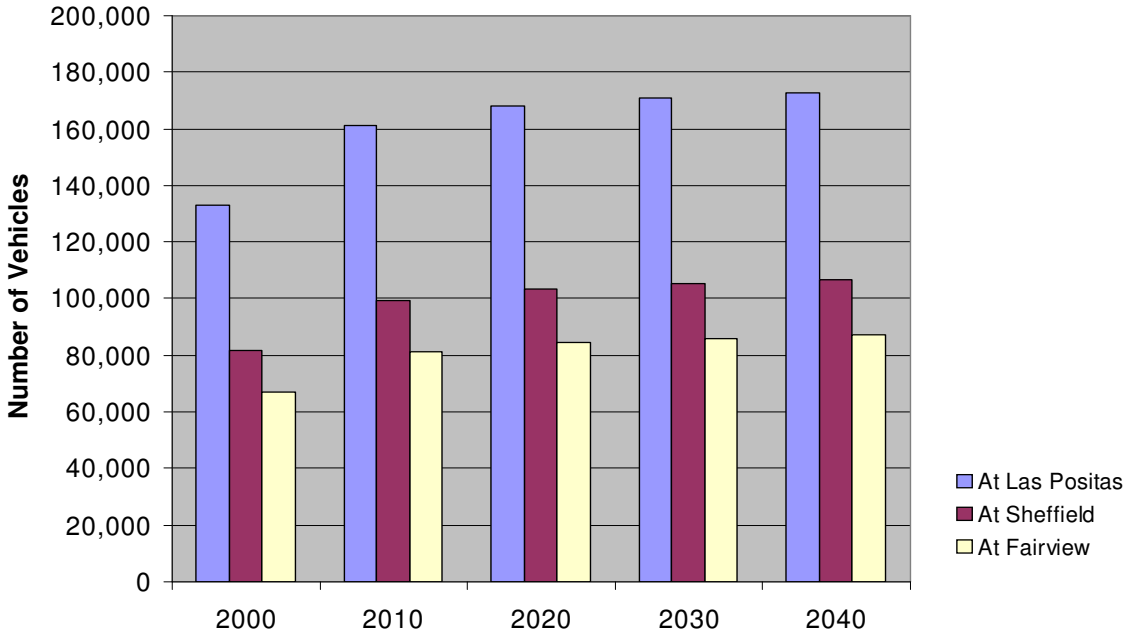


Figure 34
2040 New Neighborhoods Scenario Development
[11x17 Map]

INFILL SCENARIO

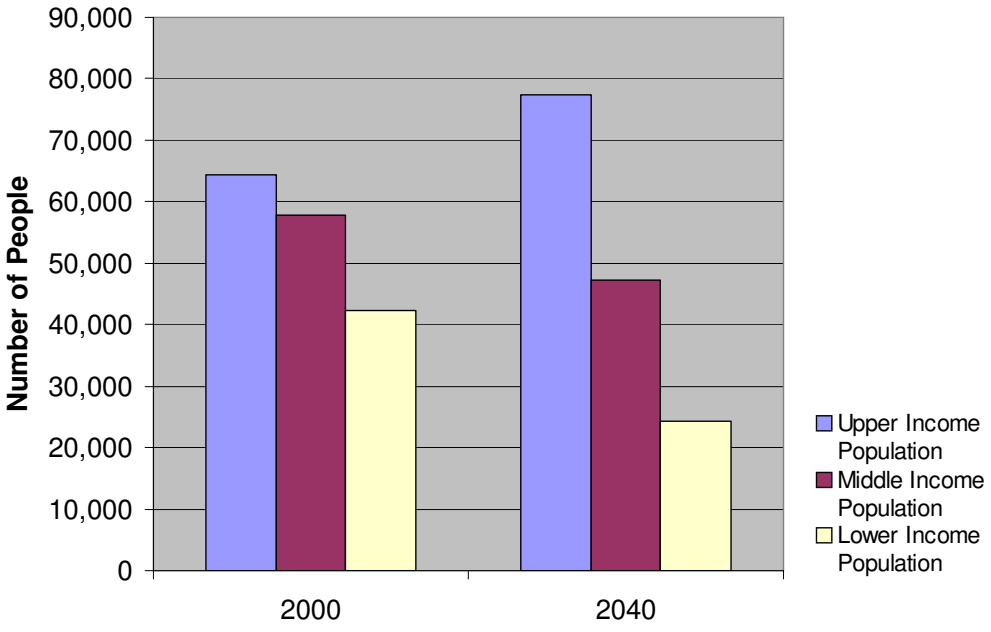
Scenario	Affordable Housing	New residential construction	Commercial construction	Preservation of open space
Infill	250 units/year	15,000 max @ 10-20 units/acre	1.5 million sq. ft. (over 40 years)	250 acres/year

The **Infill** scenario was created to seek a balance of environmental protection and varied housing opportunities. It follows a compact development approach within the existing urban boundaries, incorporates a significant level of affordable housing in conjunction with market-rate housing, and provides a moderate amount of commercial development. This scenario also assumes that a considerable amount of housing is added to commercial areas, including adding housing over existing commercial businesses in shopping centers along transit corridors and near jobs.

Population

Under the **Infill** scenario, population begins a slow decline that accelerates in the second decade of the 40 year period. By 2040, the population is expected to decline to about 183,000, five percent higher than the Existing Policies scenario. Because of the relatively high affordable housing component, which tends to have higher population per household, population does not decline as much as with the Widespread scenario. The upper-income population rises to 48 percent of the population, while the middle-income drops to 29 percent and the lower-income population is 23 percent.

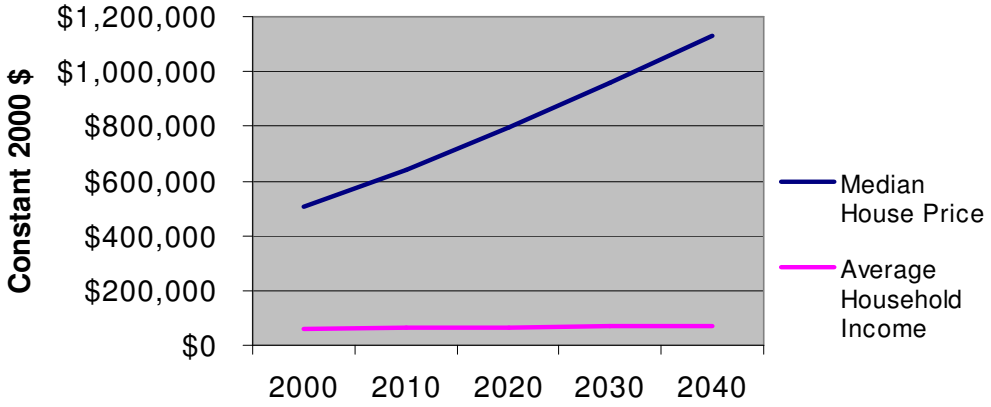
Figure 35
Infill Scenario
2040 Income Distribution



Housing

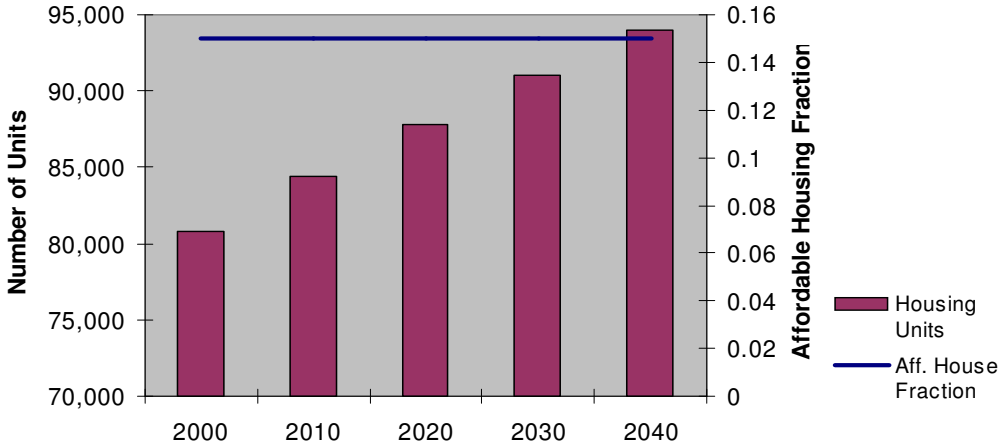
Although housing in the **Infill** scenario is projected to become more expensive, increasing roughly 135 percent to just over $1.1 million, it is the smallest increase compared with the previous scenarios. Average household income would rise by only 22 percent to $72,000 (in constant 2000 dollars), 15 percent less than the Existing Policies scenario.

Figure 36
Infill Scenario
Household Prices and Household Income



The number of housing units is expected to rise to 94,000, the maximum specified for the scenario, a 16 percent increase. The fraction of units that are affordable remains at 15 percent, unchanged from 2000, the highest as compared to the previous scenarios. Gentrification and minimal controls on existing affordable units contribute to the conversion of lower priced housing to higher priced categories, preventing an increase in the percentage of affordable despite the substantial level of construction of new affordable units. Upper-income houses would represent approximately 69 percent of total units with middle-income units accounting for 16 percent.

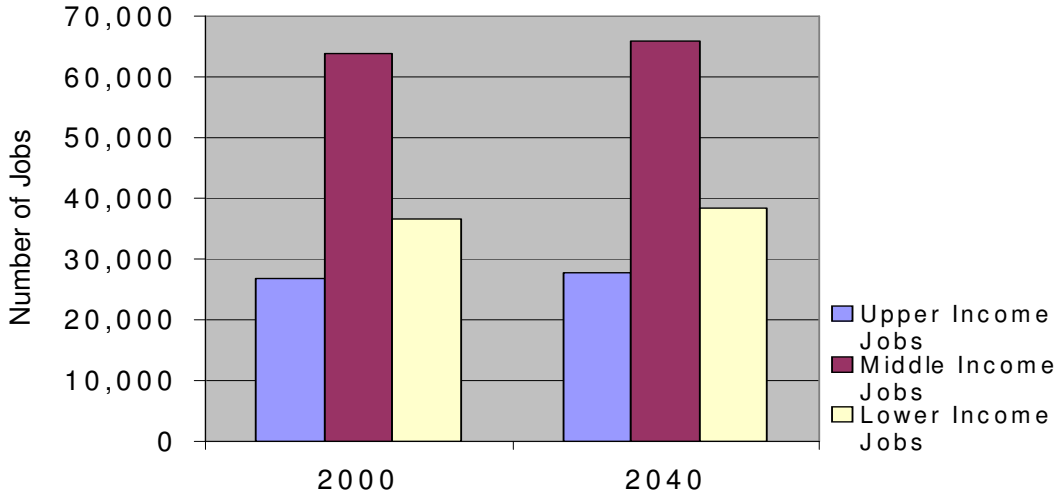
Figure 37
Infill Scenario
Housing Units and Affordability Fraction



Jobs

Total jobs are projected to continue to increase, rising four percent over 2000 to 132,000 in 2040, due primarily to growth in nonresidential square footage assumed in the scenario. Retail/service jobs are projected to increase the most, 15 percent over 2000, to 24 percent of the total by 2040 from 22 percent of the total jobs in 2000. While the mix of upper, middle, and lower-income jobs would remain similar over the 40 year period, lower-income jobs would increase slightly more than middle and upper-income jobs reflecting the availability of more affordable housing in this scenario as compared to the previous ones.

Figure 38
Infill Scenario
2040 Jobs by Income



Land Use and Commuting

Because of Urban Limit Line and development criteria under the **Infill** scenario, developed land is projected to increase just five percent to just under 32,000 acres, almost the same as what would be expected under the Existing Policies scenario. Nearly all the increase is in commercial acreage as most new residential units are in existing developed areas and are not consuming vacant land. A 40 percent increase in additional acreage would be added to protected open space over the 40 year period, bringing the total to approximately 35,000 acres. The number of commuters will grow substantially, rising a projected 41 percent over 2000 to about 32,000 per day, nine percent less than the Existing Policies scenario. Traffic volume at Sheffield is expected to be 103,000 per day, 166,000 at Las Positas, and 84,000 at Fairview, a rise of 25 percent over 2000 figures.

Figure 40 shows the likely location of new construction in 2040 under the Existing Policies scenario.

Figure 39
Infill Scenario
Annual Traffic Volume

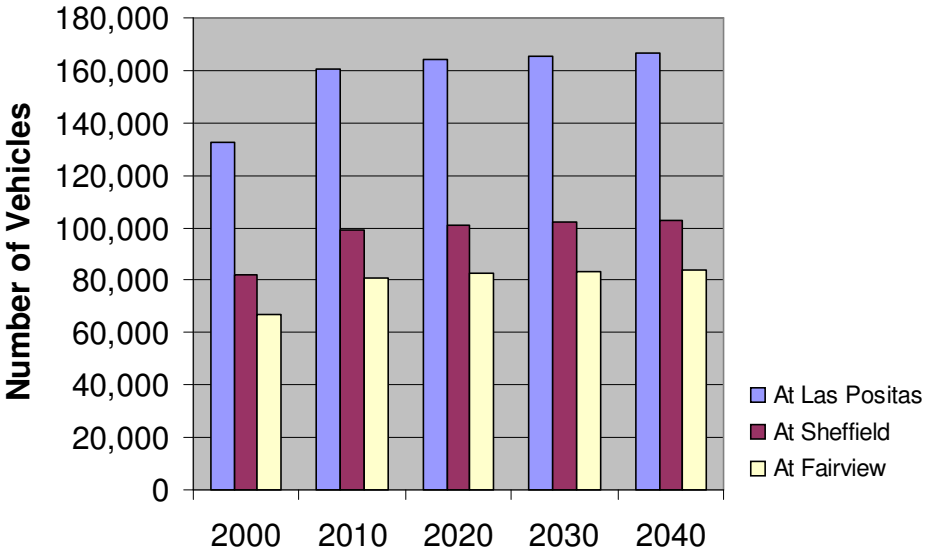


Figure 40
2040 Infill Scenario Development
[11x17 map]

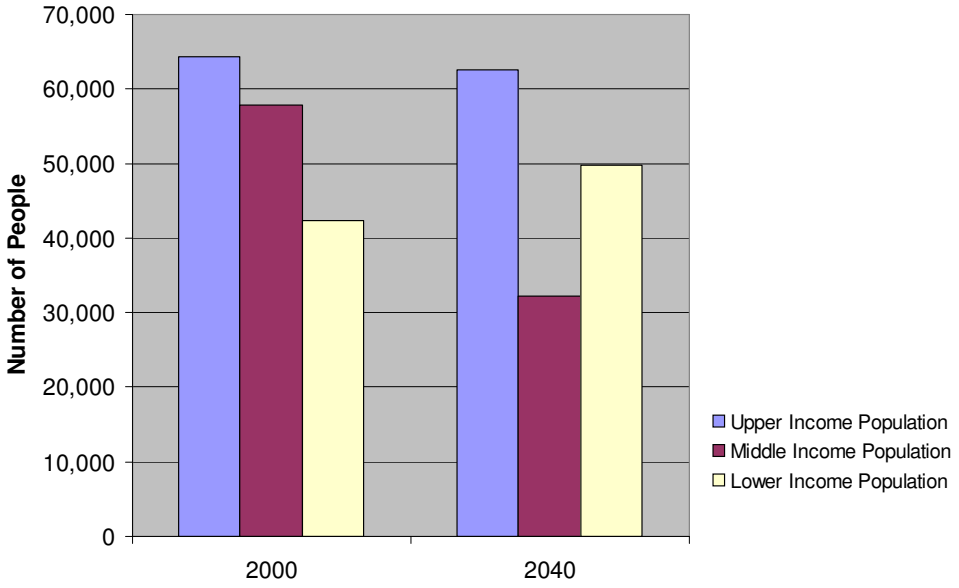
ALL AFFORDABLE SCENARIO

Scenario	Affordable Housing	New residential construction	Commercial construction	Preservation of open space
All Affordable	375	15,000 max @ 10-20 units/acre	1.5 million sq. ft. (over 40 years)	250 acres/year

The **All Affordable** scenario is designed to evaluate the effect of regulating all residential development to maximize the availability of new housing for lower-income residents. It limits all new residential development to permanently[10] restricted affordable housing. In all other respects, the scenario is equivalent to the Infill scenario, where nonresidential development is kept to a minimum, the existing Urban Limit Line is maintained, and major open space areas are protected.

Population

Figure 41
All Affordable Scenario
2040 Income Distribution

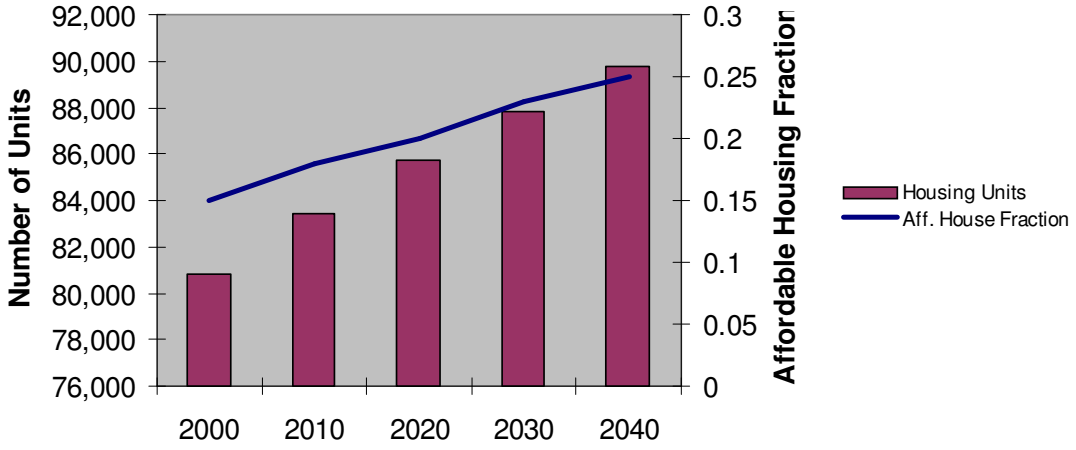


Under the **All Affordable** scenario, population is expected to decline eight percent from 2000 levels to slightly under 184,000, somewhat above the Infill scenario. Upper-income residents are projected to become a plurality, but less so than in any other scenario. Lower-income residents are also expected to increase to slightly over one-third of the population. Middle-income residents are projected to decline to about 22 percent, the lowest of all the scenarios.

[10] Due to the model's structure, affordable housing cannot be designated as controlled in perpetuity. Controls are designated as lasting 150 years, which has a similar effect in the operation of the model.

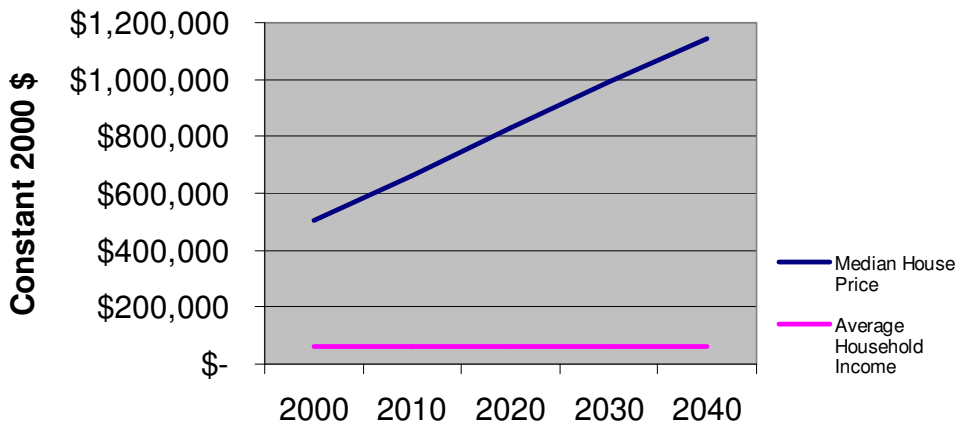
Housing

Figure 42
All Affordable Scenario
Housing Units and Affordable Fraction



Housing in the **All Affordable** scenario is projected to increase in a manner similar to the Infill scenario, with a median house price just above $1.1 million. The ratio of affordable units is expected to increase to 25 percent, due to the assumption that limits residential construction to restricted affordable units. However, because no other types of housing will be built, gentrification of the remaining housing is expected to result in about 90,000 total units at the end of the 40 year period, less than the Infill scenario. Unlike the other scenarios, All Affordable results in a loss of middle-income housing, which declines 37 percent from 2000 levels. Overall affordability remains low, however, as median house price is projected to rise 125 percent, while incomes would rise just four percent.

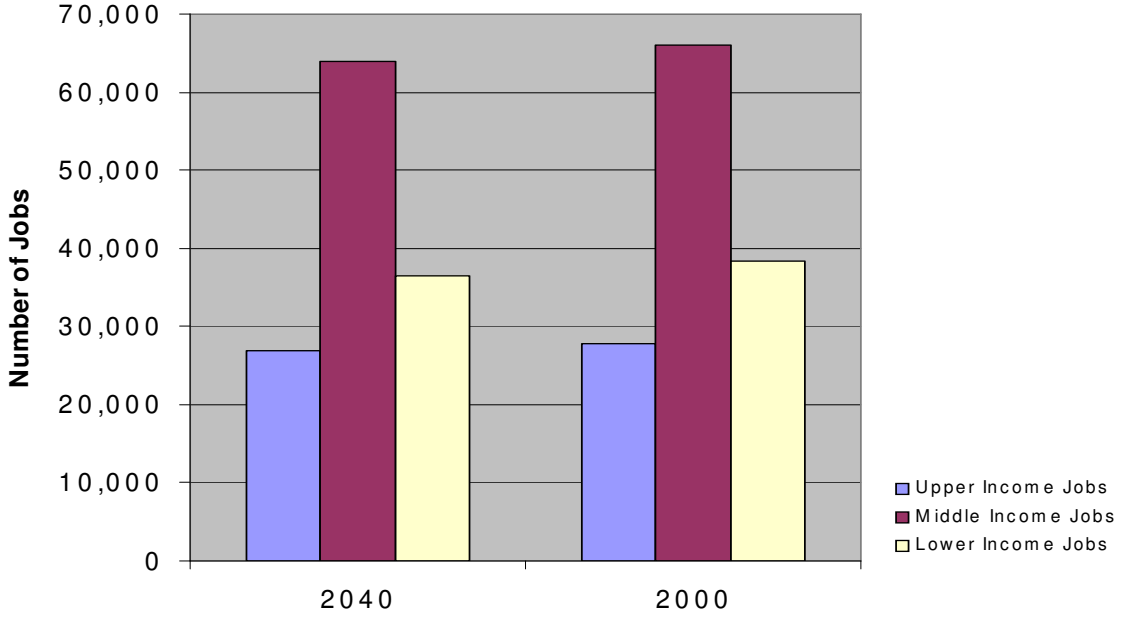
Figure 43
All Affordable Scenario
Housing Units and Household Income



Jobs

Total jobs are projected to rise about four percent, from 127,000 to 132,000, with most of the increase coming from the Retail/Service sector. This sector is expected to increase 15 percent over 2000 and represent 24 percent of the total jobs in 2040. Upper, middle, and lower-income jobs would remain similar over the 40 year period with lower-income jobs increasing slightly more than middle and upper-income jobs.

Figure 44
All Affordable Scenario
2040 Jobs by Income



Land Use and Commuting

The Urban Limit Line and development constraints under the **All Affordable** scenario are projected to result in developed land remaining nearly static at nearly 31,000 acres. There would be a small increase in commercial acreage, which would be offset by a loss of residential land. A 40 percent increase in additional protected open space acreage would occur over the 40 year period, bringing the total to approximately 35,000 acres. The number of commuters would grow substantially, rising a projected 28 percent over 2000 to 32,300 per day. Traffic volume is projected to rise 23 percent over 2000 figures. Approximately 101,000 vehicles would pass the Sheffield exit per day, 163,000 vehicles per day would pass the Las Positas exit, and 82,000 vehicles would pass the Fairview exit daily.

Figure 46 shows the likely location of new construction in 2040 under the Existing Policies scenario.

Figure 45
All Affordable Scenario
Annual Traffic Volume

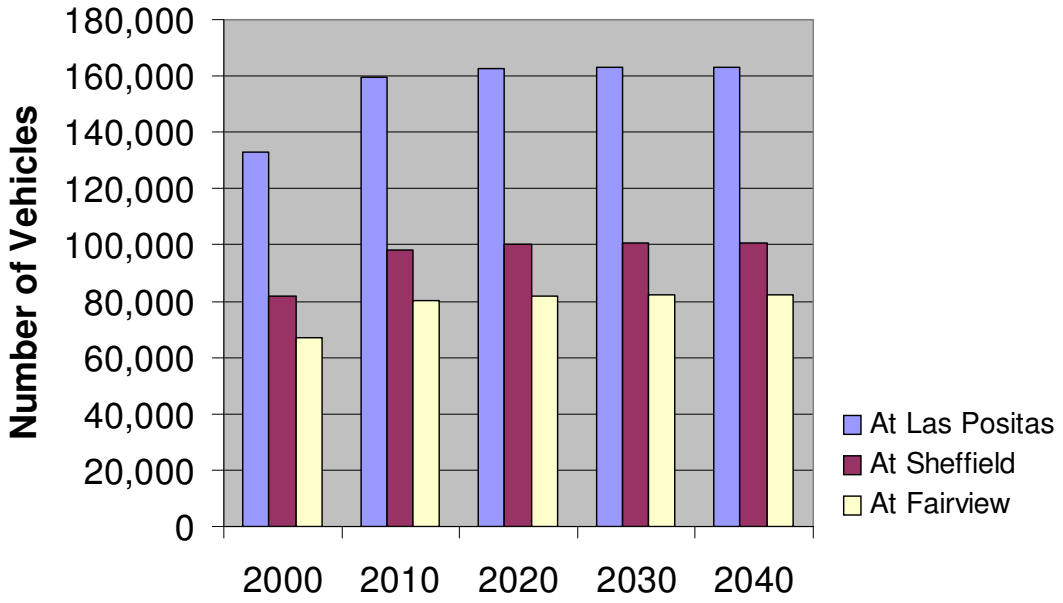


Figure 46
2040 All Affordable Scenario Development
[11x17 map]

COMPARING SCENARIOS

The discussion below compares the scenarios across the major dimensions of the SCOPE model. First, however, we discuss the impact of the scenarios on the general character of South Coast communities.

COMMUNITY CHARACTER

The scenarios will have different impacts on the character of individual South Coast communities. Table 3 gives the assumptions on the amount and geographic distribution of housing units that would be associated with each scenario. The table does not identify, however, specific housing types or density in these areas as the specification of each scenario was limited to a general average density (see the discussion of each scenario above and Table 1). Average densities for new construction vary from 4-5 housing units per acre for the Existing Policies and Widespread scenarios to a maximum of 20 housing units per acre for the New Neighborhoods, Infill, and All Affordable scenarios. The No Growth scenario specifies one unit per vacant residential parcel.

Densities of 4-5 units per acre generally translate into detached single family homes between 2,000 and 4,000 sq. ft. in size, although larger and smaller houses can be built to that density. Attached housing typically is not built at those densities. Small detached single family houses, as well as some styles of attached housing, may be built at densities of 8-12 units per acre. Above those densities, almost all housing is attached or in the form of multi-family units. The use of granny flats may increase density without substantially altering the perceived character of a development. The massing of structures in developments, hence the perceived character, depends not only on building height and form, but on placement on lots. Cluster development minimizes private yards and setbacks to maximize aggregated open space; single family developments with large yards and setbacks minimize aggregated open space in a community.

Except for the All Affordable scenario, where there will be limited opportunities for market development of new housing, market forces will dictate much of the types and forms of housing within the general specifications of the scenarios. This makes it difficult to predict changes in community character limiting the analysis to general observations.

Existing Policies — Continuation of the recent trend of mixed low and medium density single family housing built in existing and new communities of detached and attached housing styles.

Widespread — Primarily single family housing built in new low density communities with larger house sizes.

No Growth — Primarily single family housing with very large house sizes in existing communities.

New Neighborhoods — A mix of single family and multiple family housing built in new medium density communities of primarily attached styles.

Infill — A mix of single family and multi-family housing built in existing communities with medium to small dwelling unit sizes of mixed detached and attached styles.

All Affordable — A mix of single family and multi-family housing built in existing communities with small dwelling unit sizes of primarily attached styles.

COMPARISONS ACROSS SCOPE DIMENSIONS

SCOPE outputs for the scenarios suggest that there are dimensions in which the scenarios are very similar and other dimensions in which impacts are substantially different. Table 2 summarizes the primary outputs by scenario and is followed by detailed comparisons.

Table 2
Comparison of Scenario Results

			2040					
		2000	Existing Poli-cies	Widespread	No Growth	New Neigh-borhoods	Infill	All Afford-able
Housing Units		80,800	88,000	99,200	Least 72,000	Most 99,700	94,000	89,800
Affordable Houses		11,800	4,400	5,400	Least 3340	6,800	14,500	Most 22,000
Aff. House Fraction		0.15	Least 0.05	Least 0.05	Least 0.05	0.07	0.15	Most 0.25
Median House Price		$507,100	$1,354,700	$1,205,600	Most $1,609,800	$1,191,100	Least $1,132,400	$1,142,800
Total Jobs		127,200	146,200	Most 151,500	Least 126,500	134,300	132,100	132,100
Average Household Income		$59,200	$84,600	$84,400	Most $86,500	$81,800	$72,000	Least $61,500
Percentage Share	Upper-income	39	54	53	Most Upper 58	52	48	Least Upper 43
	Middle-income	35	Most Middle 33	Most Middle 33	31	32	29	Least Middle 22
	Lower-income	26	13	14	Least Lower 11	16	23	Most Lower 34
Jobs-Housing Balance		1.57	1.66	1.53	Most 1.75	Least 1.35	1.41	1.47
Total Developed Acreage		30,500	31, 400	Most 37,400	Least 27,500	32,300	31,600	30,500
Protected Open Space Acreage		24,900	Most 34,800	Least 24,900	32,000	28,800	Most 34,800	Most 34,800
Total Population		198,900	173,900	185,700	Least 150,000	Most 188,900	183,000	183,600
Commuters		25,300	35,600	Most 36,900	Least 30,800	32,800	32,300	32,300
Traffic Volume at Las Positas		132,800	179,000	Most 187,100	Least 155,800	172,900	166,500	163,100

Table 3
Location of New Housing Units by Scenario

Name	Total new non-resid. area	Gaviota Coast	Naples	Bishop Ranch & Ellwood	Isla Vista/ UCSB	Goleta (Patter-son to Los Carn-eros)	Hollister Corridor (154 to Patterson)	South Pat-terson Ave.	City of SB	Montecito/ Summer-Land[D]	Toro Cyn	City of Carp & Carp Val-ley	Total Esti-mated New Residential Units
Existing Policies[a]	*10.2 M sq. ft.*	200	275	Minimal new housing					4,000	375	300	850	**10,700**
Wide-spread	*12.0 M sq. ft.*	4,750	900	4,700	1,000	375	300	700	4,000	375	300	2,000	**19,400**
No Growth	*1.0 M sq. ft.*	1,000								375			**1,375**
New Neighbor-hoods	*2.0 M sq. ft.*	0	2,500	4,000[B]	4,700				4,000	375	300	4,125	**20,000**
Infill	*1.5 M sq. ft.*	0	0	4,000	00	1,000	975	0	6,850 [C]	725	0	950	**15,000**
All Af-fordable	*1.5 M sq. ft.*	0	0	4,000	00	1,000	975	0	6,850 [C]	725	0	950	**15,000**

Notes: [A] Sources: City and County General Plans, Community and Specific Plans
[B] On Bishop Ranch
[c] 5,000 in city center (from Milpas to Westside & Mission to ocean); 1,000 single family homes on existing lots; 100 in coastal industrial area; 500 in Outer State Street area; and 250 along Modoc Rd. from Mission St. to State/Hollister = 6,800 new units
[D] 375 existing vacant lots= 250+ on Coast Village & in Montecito Village; 100+ in Summerland.

Population Impacts

The six scenarios have varying impacts on population across a variety of socioeconomic indicators. Overall population in each scenario is projected to decline over the 2000 to 2040 period of the analysis (see Figure 47). [11] The greatest loss of population is expected under the No Growth scenario, with the least loss in the New Neighborhoods scenario. The Widespread, Infill, and All Affordable scenarios all have roughly the same population loss. They differ, however, in the expected mix of upper, middle, and lower-income residents and, to some extent, in age distribution as well, as shown in Figure 47 through Figure 50**.**

The Upper-income population would rise in all the scenarios except for All Affordable (see Figure 48). The reverse is the case for the Lower-income population, which would decline in all the scenarios except for All Affordable (see Figure 50). In all the scenarios, the Middle-income population is projected to decline, with the greatest decrease in the All Affordable and Infill scenarios (see Figure 49).

---

[11] SBCAG is responsible for preparing periodic growth projections for its *Regional Growth Forecast* (RGF). The current forecast includes an analysis of changes in population, housing, and employment in the County over a 30 year period through 2030. The Forecast indicates that, similar to projections for California as a whole, the County's population is expected to grow by 30 percent in the next three decades. On the South Coast, the population growth is projected to be on the order of 20 percent over that period. That study notes that the South Coast will also continue to be a major employer in the service and tourism business sectors with the manufacturing sector continuing its decline.

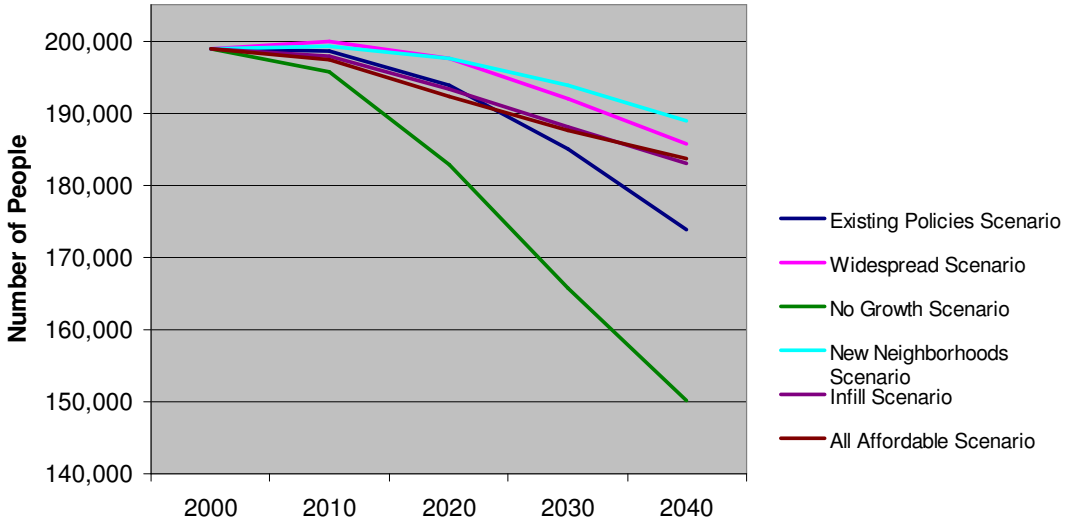
The *Regional Impacts of Growth Study* (RIGS) makes projections about the future based on a different model and assumptions than those used in the RGF. RIGS looks only at the South Coast and the SCOPE model correlates well with recently emerging trends. For example, several coastal California cities, including Santa Monica and Monterey, lost population between 1990 and 2000 while both cities continued to add housing units. This shift is attributable to gentrification where the number of upper-income households, which tend to have smaller families, increases in proportion to other income levels, thus reducing the average number of people per household. ECP believes that same phenomenon is happening along the South Coast as the percentage of lower and middle-income households drops relative to the number of upper-income households. As the population becomes more affluent, the connection between jobs and housing is less direct as more people move to the area who are not dependent on local jobs.

In the RGF, SBCAG uses ethnicity to complement income as a significant variable in determining household size and population changes. An increase in the Hispanic population, which tends to have larger households and higher fertility rates than nonHispanic populations, will result in higher numbers of people per household in the South Coast and higher population levels. RIGS differs from the RGF in focusing primarily on the relationship between income and household size. While not using ethnicity as a variable, RIGS recognizes the potential for overcrowding, primarily in lower-income households, as a response to higher housing prices and accounts for that through variable levels of people per household depending on income level (see Appendix 8).

SBCAG also suggests that over time changes in the local labor force, due to retirements and loss of workers who cannot afford to live in the region, may not be sufficient to meet the needs of the current mix of businesses, forcing some employers to leave the area in search of a more appropriate pool of workers on which to draw. In response, housing prices would eventually decline. While RIGS does not incorporate a mechanism to match labor force characteristics with specific jobs (e.g., engineers, mechanics, chambermaids, etc.), the SCOPE model projects that availability of a local workforce for different income-level jobs may evolve, but to a certain extent commuters may take their place. Moreover, it also projects an independent trend of people wanting to live on the South Coast regardless of the local job market, which will result in the continuing increase in the cost of housing.

The RGF and RIGS offer two views of the future based on different assumptions. We urge readers to consider and evaluate both.

Figure 47
All Scenarios
2000 – 2040 Population



The age distribution does not differ to any great extent across the scenarios (see Figure 51). Seniors are roughly 20 percent of the population regardless of population changes. The absolute number of students is constant across all scenarios, becoming a relatively larger share of the No Growth scenario due to its having the largest decrease in population. The young population is a slightly larger share of the Infill and All Affordable scenarios, most likely due to the availability of affordable housing. Adults are roughly 40 percent of the population across the scenarios, although in the No Growth scenario, their share drops and students stay a constant number.

Figure 48
All Scenarios
Upper-income Population

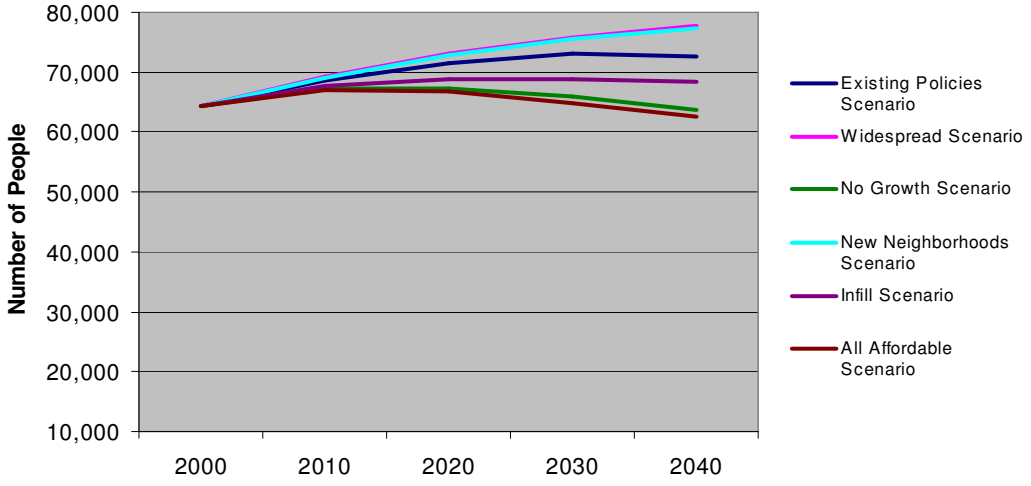


Figure 49
All Scenarios
Middle-income Population

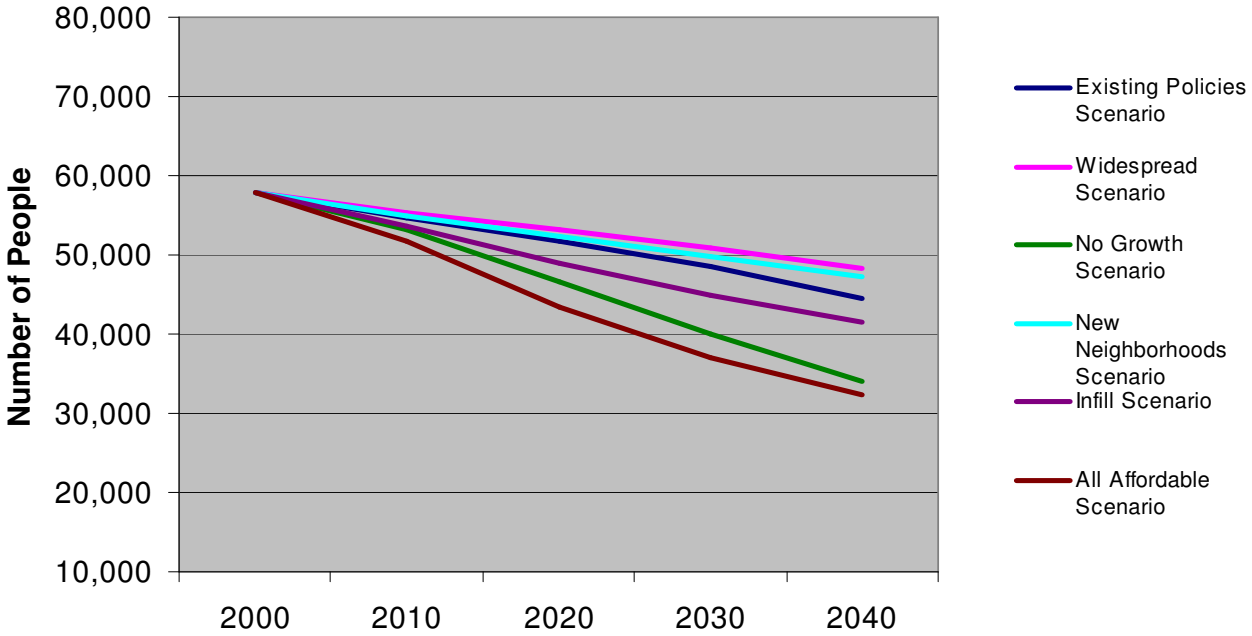


Figure 50
All Scenarios
Lower-income Population

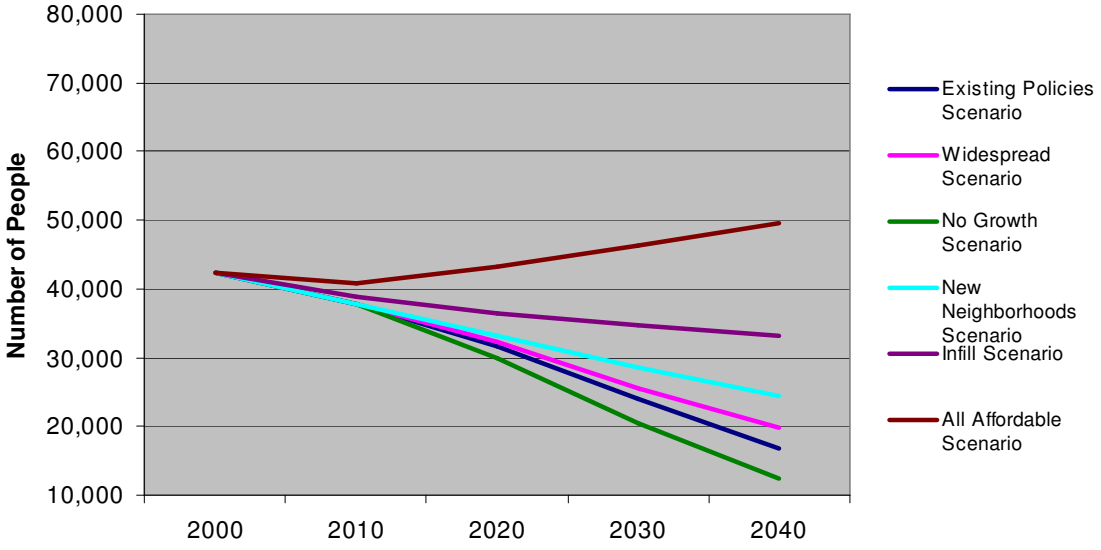
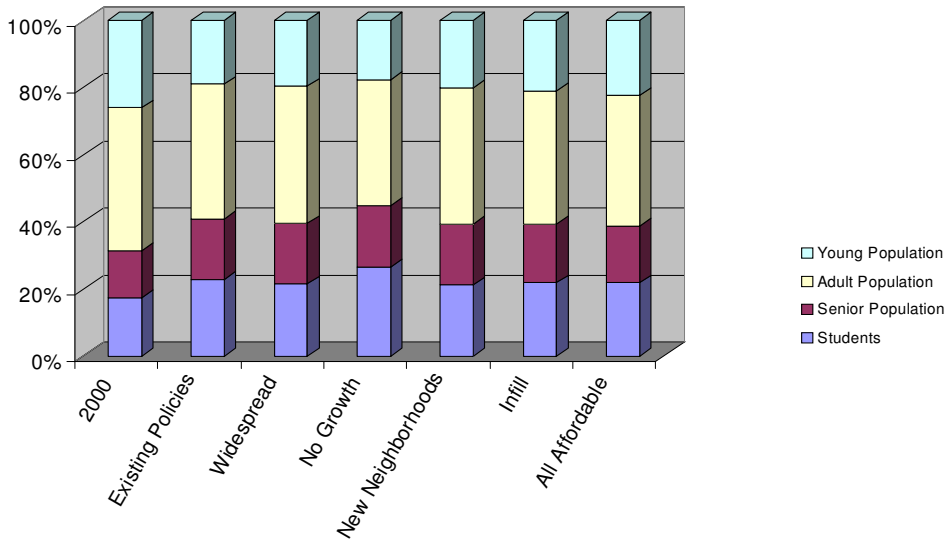


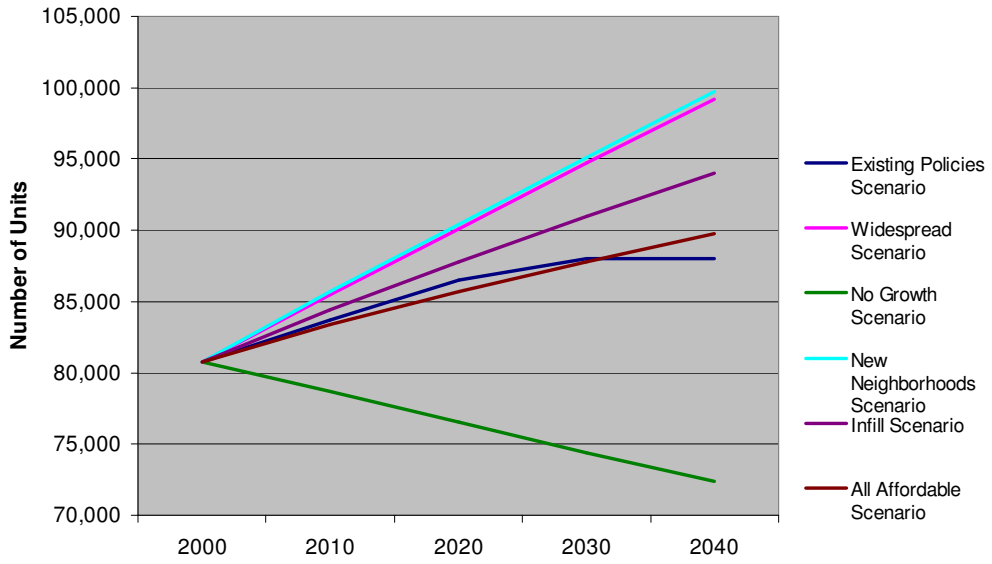
Figure 51
All Scenarios
2040 Population by Age



Impacts on Housing

The scenarios result in varying amounts of housing units ranging from nearly 100,000 in the New Neighborhoods and Widespread scenarios to about 72,000 units in the No Growth scenario (see Figure 52). The number of units projected in the Existing Policies scenario rises until between 2025 and 2030 then levels off as it reaches build out under the maximums allowed.

Figure 52
All Scenarios
2040 Housing Units



In all scenarios, upper-income housing would dominate the available dwelling units by 2040 (see Figure 53). The number of middle-income units would be greater in the Widespread and New Neighborhoods scenarios than in the other scenarios, while the number of lower-income housing units would be minimal in the Existing Policies, Widespread and No Growth scenarios. The Infill and All Affordable scenarios offer the potential for the greatest number of affordable units.

Households also rise in most of the scenarios in conjunction with the number of units built (see Figure 54). Persons per household differs among the scenarios, with higher levels for Existing Policies, No Growth, and All Affordable and lower levels for Widespread and New Neighborhoods.

All the scenarios except No Growth accommodate “granny flats” and the Regional Housing Needs Assessment allocation of new affordable units for the South Coast.

Figure 53
All Scenarios
2040 Distribution of Housing Units by Income Group

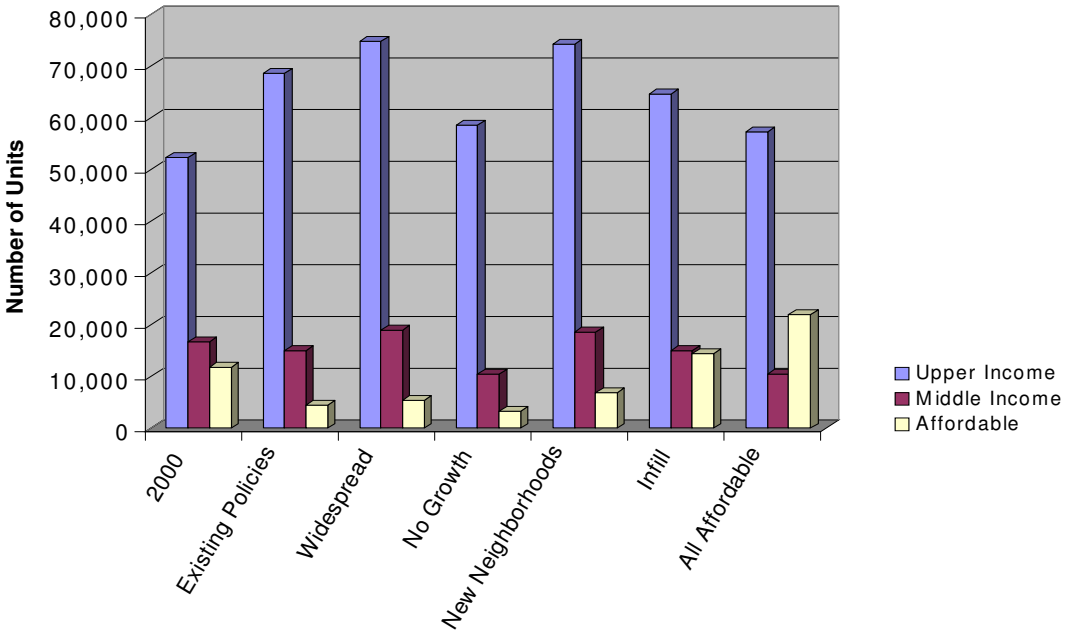
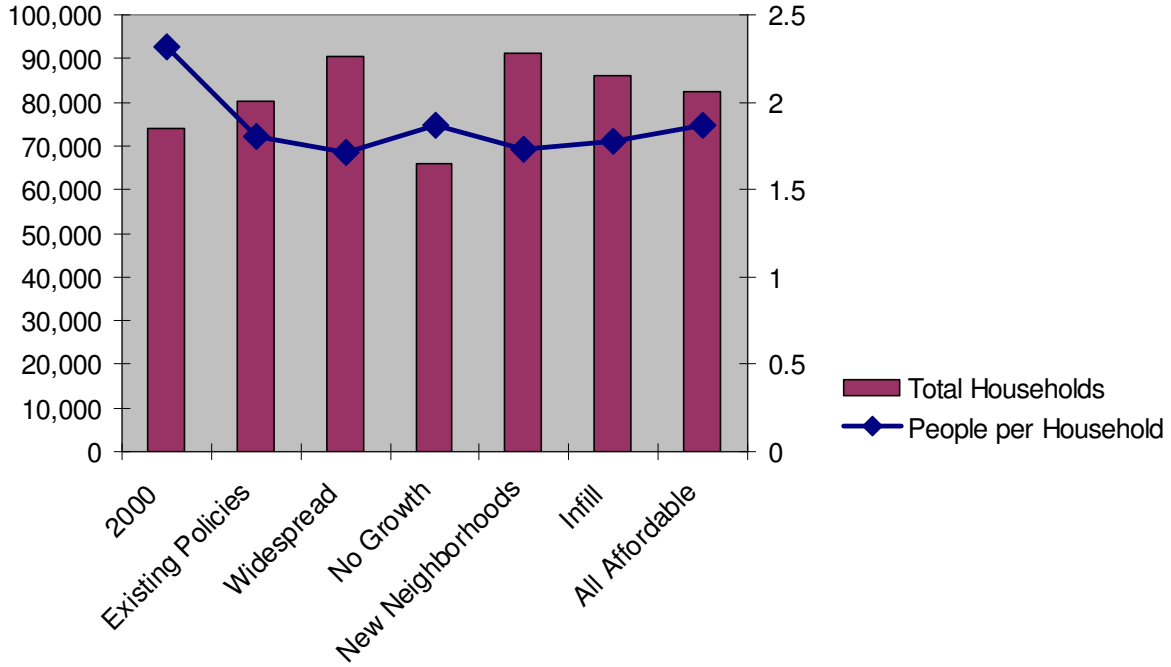
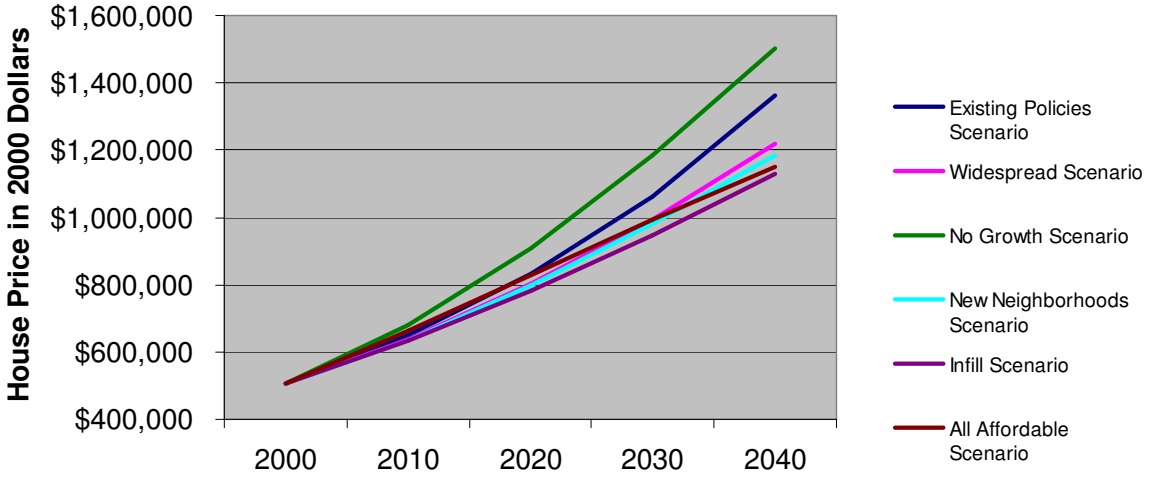


Figure 54
All Scenarios
2040 Total Households and People per Household



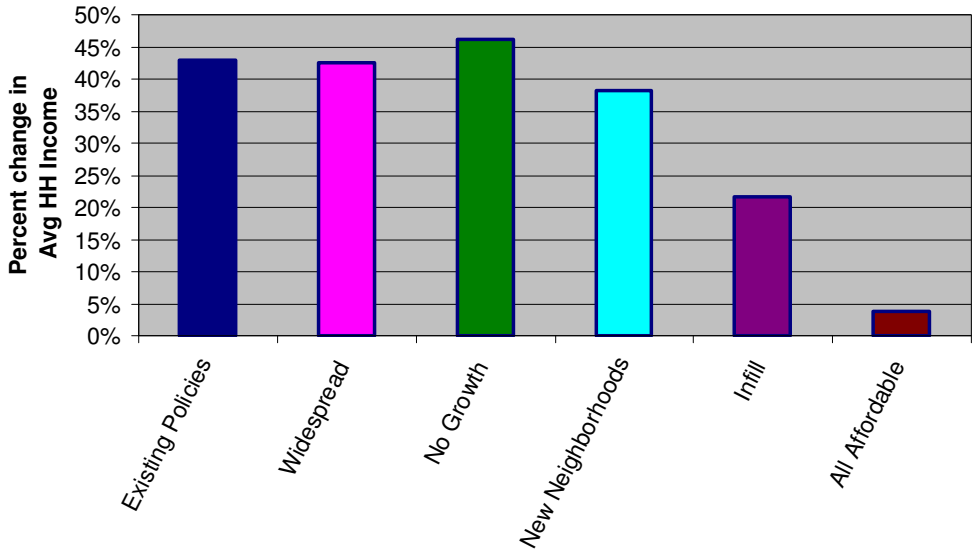
Median housing prices are expected to rise in all scenarios with the greatest increases in the No Growth and Existing Policies scenarios (up to 217 percent) (see Figure 55). The Infill and the All Affordable scenarios would result in the lowest increases (about 125 percent), with the New Neighborhoods and Widespread scenarios expected to generate increases between the extremes.

Figure 55
All Scenarios
Housing Prices



Since average household incomes do not rise at the same rate (increases range from 4 to over 40 percent), overall affordability declines. Housing purchases are likely to be driven by wealth, rather than income derived from jobs.

Figure 56
All Scenarios
Percentage Change in Average Household Income between 2000-2040



Jobs

Growth in jobs is driven in the model primarily by the availability of structures on commercially zoned land and secondarily by the availability of a workforce to fill the jobs. The latter is driven by a complex set of relationships derived from available housing, household size, commuting, and quality of life along with factors such as births, deaths and students. Existing Policies and Widespread result in the most jobs due to the large amount of commercial development allowed. Upper-income jobs are stable in number across all the scenarios. Middle and lower-income jobs vary across the scenarios, with the most middle and lower-income jobs in the Widespread scenario. The least middle and lower-income jobs are projected in the No Growth scenario (see Figure 57). The mix of jobs, while similar in most scenarios, differs primarily in the relative importance of office and retail/service sector jobs (see Figure 58).

Figure 57
All Scenarios
2040 Jobs

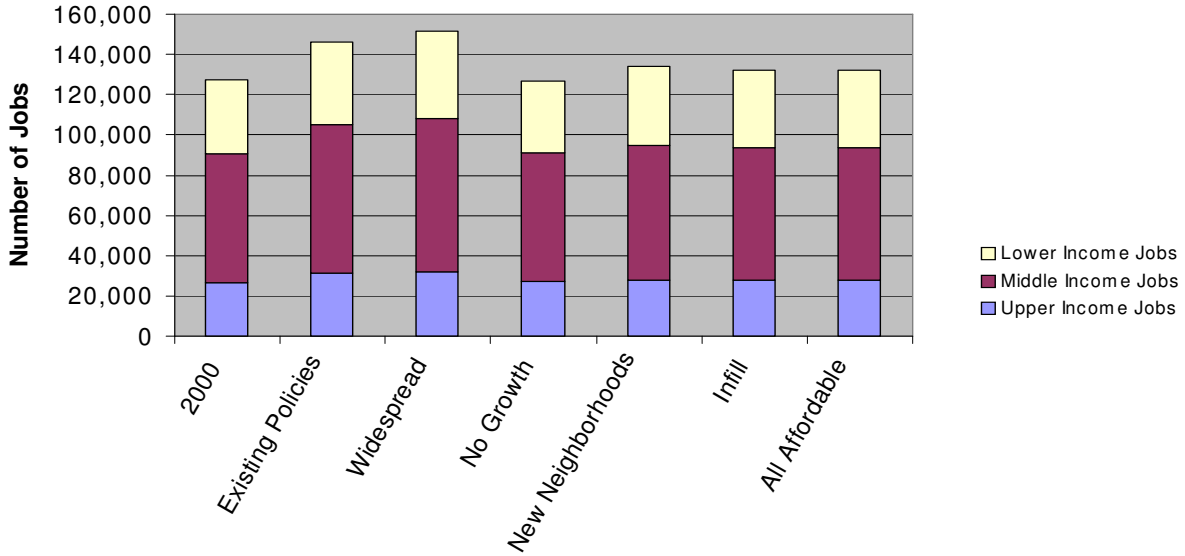
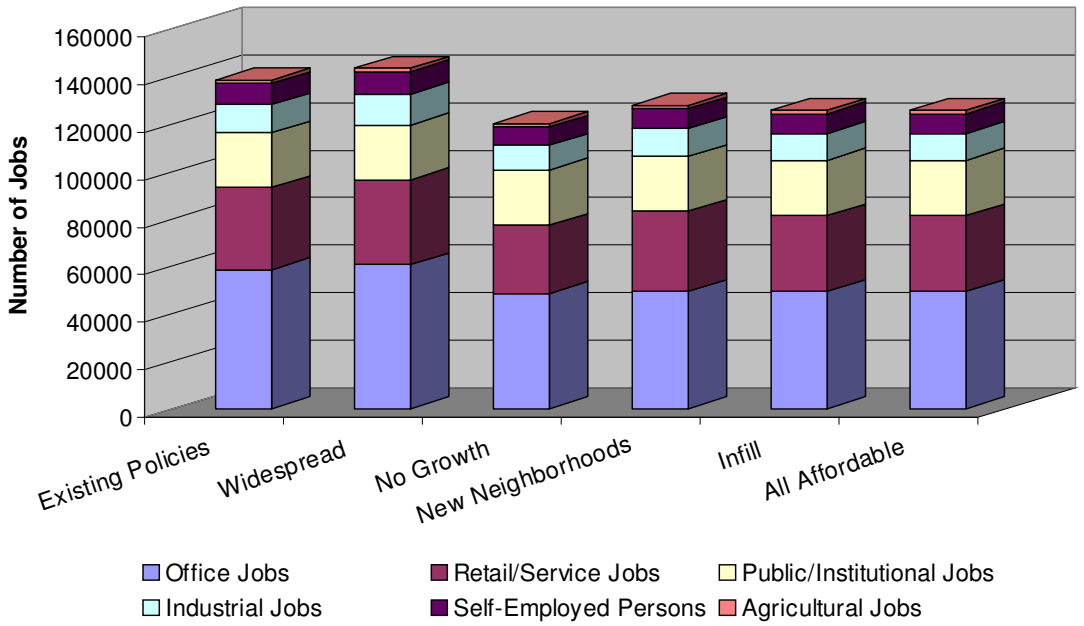


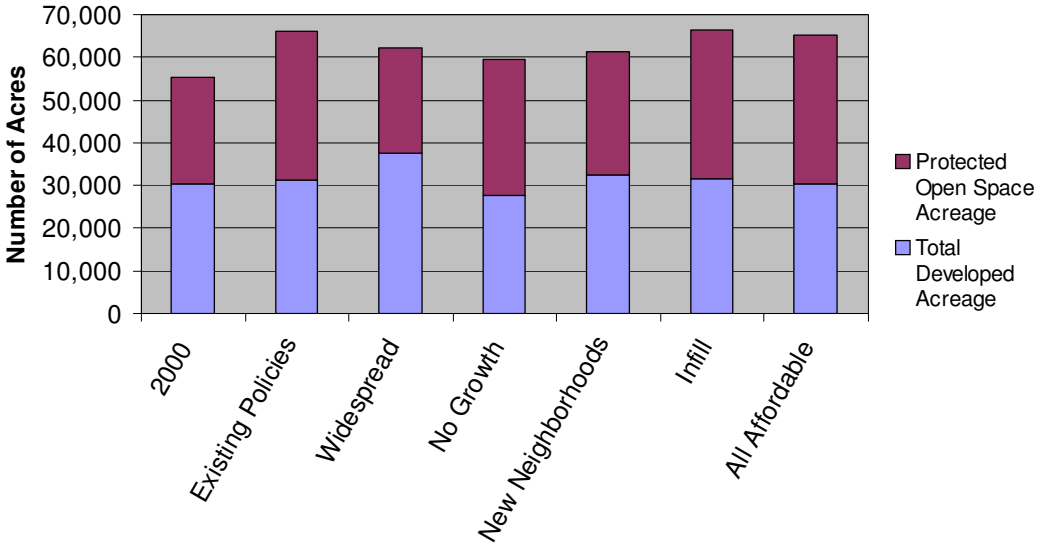
Figure 58
All Scenarios
2040 Job Distribution by Type



Land Use and Commuting Comparisons

Developed land would be greatest under the Widespread scenario, which allows for development outside the existing Urban Limit Line (see Figure 59). All other scenarios would have roughly the same amount of developed land, although No Growth would have slightly less than the others. Driven primarily by the assumptions made for each scenario, the greatest amount of protected open space would be in the No Growth scenario, while the least is the Widespread scenario.

Figure 59
All Scenarios
2040 Developed and Undeveloped Land



Residential uses predominate in all of the scenarios, accounting for approximately 75 to 80 percent of developed land usage (see Figure 60). Public and institutional acreage, which remains stable across all the scenarios, is the next most common land use. The other uses (retail and services, industrial, and office) vary slightly in the absolute number of acres and in the share of total developed land.

The number of commuters would increase substantially in all scenarios during the first decade in the 2000 to 2040 period, leveling off somewhat thereafter as capacity is approached for commuting corridors (see Figure 61). The No Growth scenario would have the fewest commuters in 2040, with the Widespread scenario having the most. In all of the other scenarios, the number of commuters is clustered between the extremes of the No Growth and Widespread scenarios, with Infill and All Affordable having an equal number of commuters. Traffic follows a similar pattern for each of the scenarios (see Figure 62), with the Existing Policies and Widespread scenarios resulting in the highest traffic levels, the No Growth in the lowest levels, and the others in between.

Figure 60
All Scenarios
2040 Land Uses

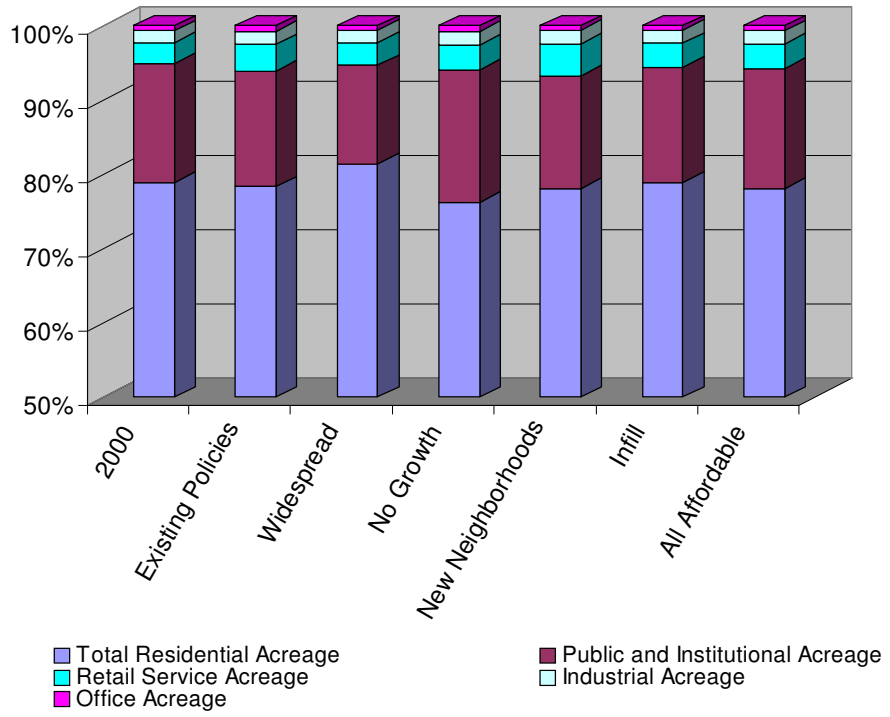


Figure 61
All Scenarios
Commuters

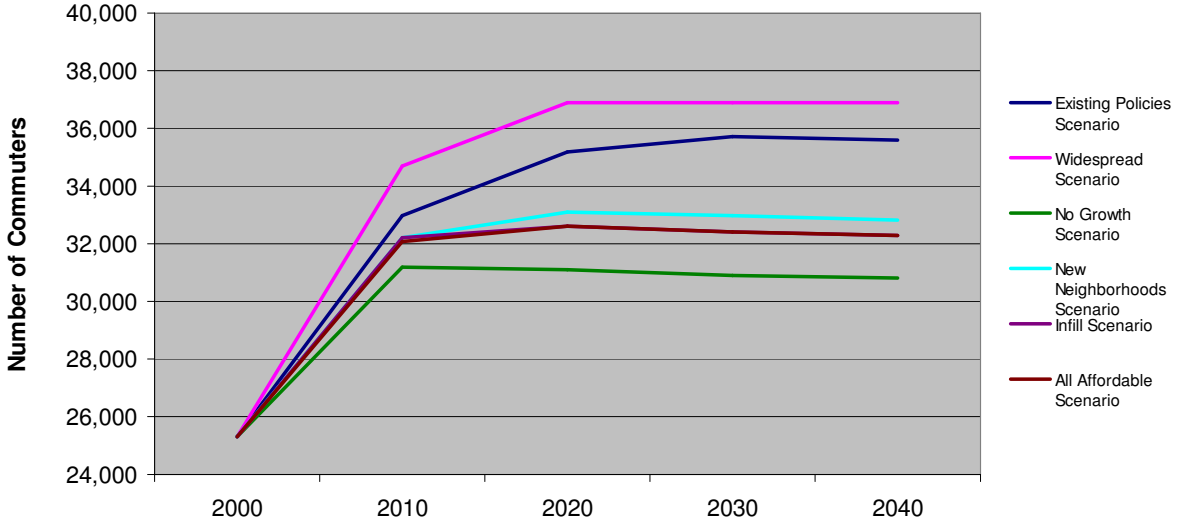
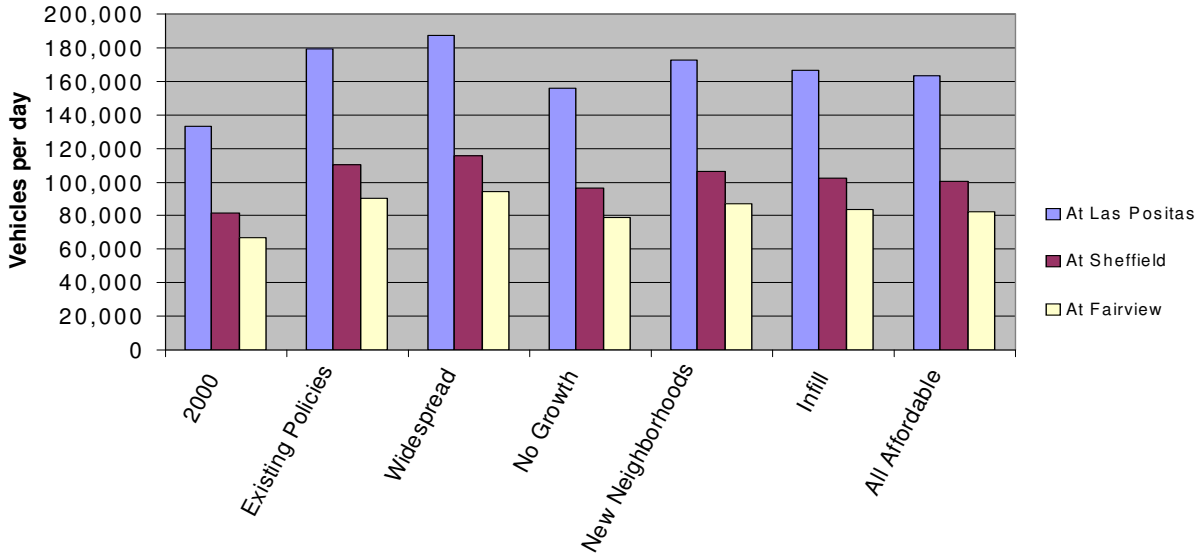
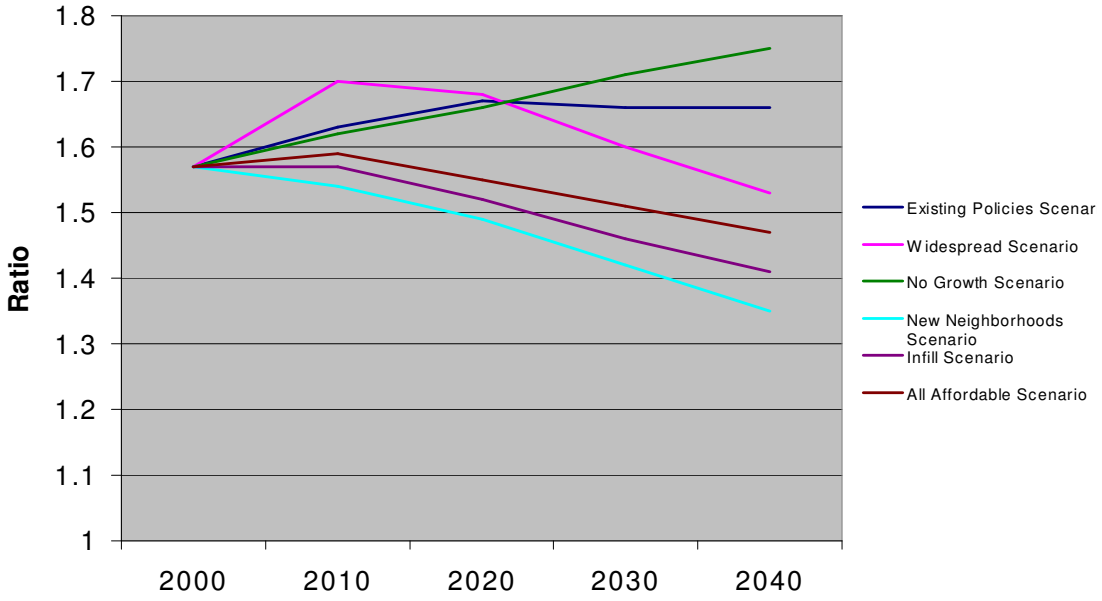


Figure 62
All Scenarios
2040 Traffic on 101



Changes in the jobs-housing ratios for each of the scenarios reflect the relative increases within each for housing and jobs see Figure 63). Two scenarios would become worse—Existing Policies and No Growth. The New Neighborhoods, Infill, and All Affordable scenarios, which result in a large amount of housing with relatively small increases in jobs, would improve. The Widespread scenario would worsen substantially, then begin a slow improvement trend.

Figure 63
All Scenarios
Jobs-Housing Ratio



SUMMARY OF SCOPE RESULTS

As the various scenarios evaluated with SCOPE were constructed to represent very different policy choices, it is not surprising that they generate varying results. What is surprising is the similarity in results among the different scenarios on some issues. All scenarios would result in a loss of population, although to a greatly varying degree. All would lead to higher median housing prices. All would have a majority share of the South Coast population shift to the upper-income population. And all would generate larger numbers of commuters. These similarities point to the desirability of the South Coast and the power of market forces that promote gentrification in this area.

While there are strong similarities on some critical issues, differences among the scenarios are noteworthy. Scenarios with weak or nonexistent affordable housing policies do not lead to much housing that is affordable to lower-income residents. The production of new affordable housing with significant restrictions, as in the All Affordable scenario, leads directly to low income residents maintaining their share of the total population. But that would come at the cost of the middle-income population, which would decline in response to the rising cost of housing in their affordability bracket. The middle-income cohort does better if substantial numbers of new houses are built, but that means that lower-income residents lose their share as gentrification accelerates. Moreover, if those housing units are built outside the Urban Limit Line, while increasing the number of jobs (as in the Widespread Scenario) there would be a significant increase in commuters as compared to the situation where housing units would be built within the urbanized area along with minimal job growth.

The results also indicate that if current land use policies were to continue, as represented by the Existing Policies scenario, we would see high housing prices, reductions in available affordable housing, substantial increases in commuting and traffic, moderate increases in protected open space, and a worsening of the jobs-housing ratio on the South Coast.

ANALYSIS OF ADDITIONAL IMPACTS

FISCAL IMPACTS ACROSS SCENARIOS

Local jurisdictions are required by law to balance their budgets, annually keeping revenues in equilibrium with expenditures. In an analysis of the fiscal impacts of the scenarios, Dan Hamilton and Bill Watkins at the Economic Forecast Project forecasted expenditures based on revenues. In other words, in scenarios where low revenues were projected, expenditures were low to meet budget requirements. Scenarios with high revenue projections had corresponding higher expenditures.

Because home prices drive property taxes, higher home prices and more housing units increase property taxes and service revenues. The number of housing units and population increases tend to drive expenditures for services and general government. Higher household income tends to increase sales tax revenue via retail sales. Retail/Services acreage and population are the drivers for bed taxes. Jobs drive both other taxes and license and permit revenues. Overall population numbers tend to drive general government and public protection expenditures. Although budgets may be balanced, a mismatch between revenues and service demands can occur when higher numbers of housing units and total population (generating higher expenditures) coincide with lower household incomes, commercial acreage, and jobs (generating lower revenues). Table 3 shows that highest revenues and expenditures are associated with the Widespread scenario which has a relatively high number of housing units and population as well as jobs and household incomes. The No Growth Scenario is projected to have the lowest revenues and expenditures reflecting a low number of housing units, population, and jobs, although household income is relatively high.

There is growing literature on the costs of development, comparing expenditures and revenues associated with sprawl compared with more compact development (see Burchell and Listoken 1995; Pelly 1997; Planners Web 2003; Real Estate Research Corporation 1975). Substantial evidence exists that infrastructure costs associated with sprawl are significantly greater than those of compact development. Extending roads, sewers, water supplies, electric and gas utilities, etc. to areas without existing services is costly, especially in comparison to infill development. Moreover, studies show that the provision of police and fire services are routinely more expensive for comparable levels of service when travel time and/or new facilities are required. In jurisdictions where such costs are borne primarily by public entities, studies suggest that revenues typically do not cover the full costs of sprawl development and come closer in more compact development.

California, however, has taken a different approach. In recent decades, infrastructure costs of new residential development, whether sprawl or compact, have shifted from public entities to developers who, in turn, pass the costs along to their customers. For the most part, the direct costs of building or extending roads and utilities, such as water, sewer, and power, are the developer's responsibility. They also typically pay school impact fees and park fees, as well as transportation impact fees, and may even pay for new police and fire facilities in some circumstances. While the services provided by local jurisdictions are not paid for by the developer, property tax revenues for market rate housing generally are sufficient to pay for the incremental cost of most services.[12] For most local jurisdictions, the budget consequences for sprawl versus compact residential development are similar.

[12] Budget crises in California have resulted in a smaller share of property taxes going to local jurisdictions, thus reducing the value of the tax increment in offsetting increased service costs.

Table 4
Fiscal Analysis of Scenarios

	Existing Policies	Widespread	No Growth	New Neigh	Infill	All Af-fordable
REVENUES						
Taxes						
Other	Medium	High	Low	Low	Low	Low
Bed	Low	High	Very low	Very high	Low	Low
Property	Medium	Low	High	Low	Low	Low
Sales	High	Medium	High	Medium	Low	Very low
Total Taxes	High	Very High	Low	Medium	Medium	Medium
Charges						
Service Charges	Medium	High	Low	Medium	Medium	Medium
Licenses/Permits	Medium	High	Low	Medium	Medium	Medium
Total Revenues	Moderate	Highest	Lowest	2nd High-est	3rd Low-est	2nd Lowest
EXPENDITURES						
Public Protection	Medium	High	Very Low	High	Medium	Medium
General Government	Medium	High	Very Low	High	Medium	Medium
Other Expenditures	High	High	Medium	High	Medium	Low
Total Expendi-tures	Moderate	Highest	Lowest	2nd High-est	3rd Low-est	2nd Lowest

Source: Santa Barbara Economic Forecast Project, August 2003.

This does not hold true for commercial development, however, such as retail development that generates sales taxes and tourist-oriented development that contributes to bed taxes. Because "big box" retailers as well as auto malls generate significantly higher levels of sales taxes than typical "Main Street" retailing, sprawl development is pursued as large open tracts of land are required for warehouse style stores, outlet malls, and large concentrations of auto dealers. Similarly, resort style hotels require a larger land area than business hotels, especially when focused on amenities such as access to recreational activities. Thus, the constraints on property tax revenues imposed by Proposition 13 have intensified the "fiscalization" of land use, where local jurisdictions seek higher revenues primarily through development that generates high levels of sales and bed taxes.

While the scenarios do not assume any particular type of retail/services development, the Widespread scenario accommodates development that maximizes revenue via sales and bed taxes. In particular, the scenario allows for a high level of residential and nonresidential construction in undeveloped areas—a recipe for "fiscalized" planning. In contrast, the No Growth scenario, by severely constraining growth in commercial space and promoting infill development through maintenance of the Urban Limit Line, discourages large retailers, auto mall development and large resort style hotels, thereby hampering growth of sales and bed tax revenues.

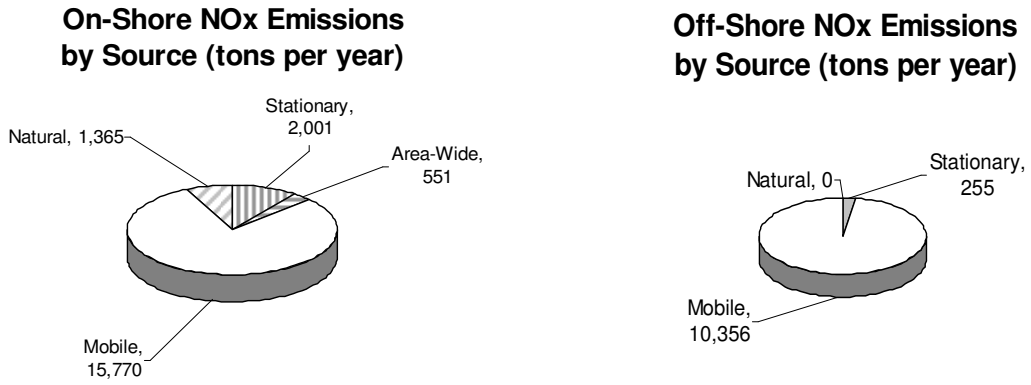
ENVIRONMENTAL CONSTRAINTS ANALYSIS

During the 1960 to 2000 period, the South Coast had to address several environmental resource issues, the most significant of which was the adequacy of water supplies. This was a critical constraint on growth in the Goleta Valley during this period. Of less intense focus were issues of air quality and waste management capacity. The following sections analyze potential environmental constraints on future land use choices across the South Coast. The analysis focuses on four issues: air quality, water supply, waste management, and wastewater.

Air Quality

Air quality on the South Coast is a function of the mix of potential pollution sources—mobile sources (e.g., vehicles, equipment, ships), stationary sources (e.g., energy production, industry, waste disposal, service businesses), area-wide sources (e.g., consumer products, waste disposal) and natural sources (e.g., vegetation, oil and gas seeps, wildfires). Two major pollutants, reactive organic compounds (ROC) and nitrogen oxides (NO_x), are the major contributors to our region's exceeding state and federal air quality standards. While natural sources contribute the bulk of ROCs to air pollution, mobile sources are the most important secondary source. The vast majority of NOx in our environment, however, comes from human-origin sources. Of these, mobile sources, particularly vehicles and shipping, generate nearly all of the pollution.

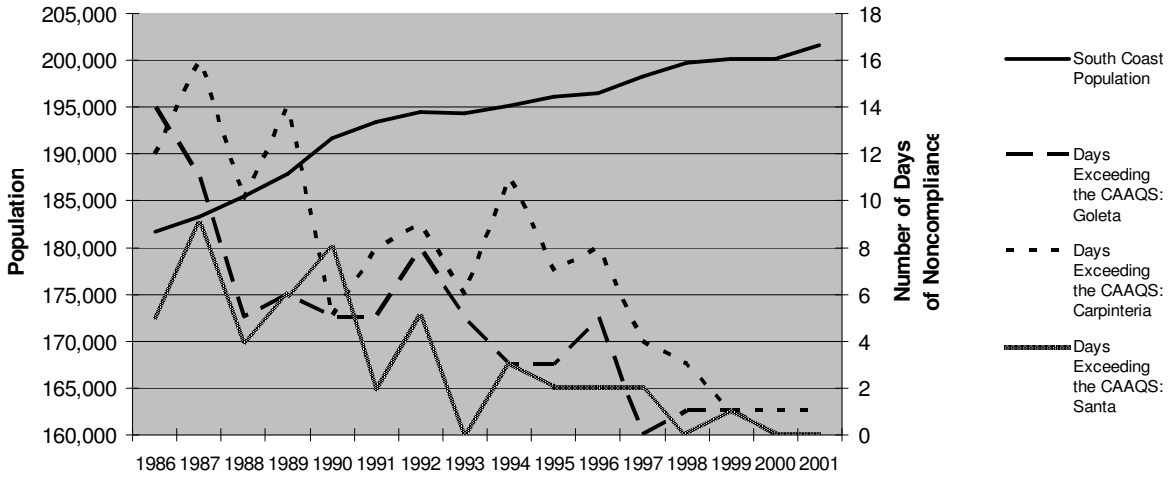
Figure 64
Onshore and Offshore NO_x Emissions



While vehicle traffic has increased over the years—for example, daily car counts at Sheffield Drive on the 101 in Montecito have increased 44 percent between 1986 and 2001 and car counts at Fairview on the 101 in Goleta have increased 51 percent in the same time period—cars have become substantially cleaner and pollute less. According to the Santa Barbara Air Pollution Control District, the contribution of vehicles to County-wide NOx levels is now only slightly larger that the contribution from marine sources. As cars and trucks continue to get cleaner, future emissions of NOx will be primarily from off-shore sources—cargo ships and tankers along with commercial and recreational boats.

On the South Coast, compliance with the California Ambient Air Quality Standards (CAAQS) has been trending towards significant improvement. This comes despite continued population growth and increased commuting, as well as the changing mix of vehicles on the road over the past decade where light trucks, which include SUVs, have come to predominate among passenger vehicles. The light truck category gets lower gas mileage, resulting in more fuel being burned per mile traveled, while emission controls are less stringent than for passenger cars. As the category's share of vehicles increases, gains in air quality may erode.

Figure 65
Air Quality Compliance



Increased commuting and, therefore, increased traffic counts would indicate the potential for a rise in noncompliance with air quality standards. However, this may not occur for several reasons. First, vehicles, including light and heavy trucks, are expected to continue to become cleaner over time. Second, despite the current popularity of SUVs, vehicle preferences may evolve away from larger truck-based platforms to smaller, more fuel efficient passenger cars. Finally, alternative fuel vehicles, such as hydrogen powered fuel cells, as well as hybrid gas-electric motors, may become mainstream offerings that have inherently less pollution potential than existing internal combustion-based engines.

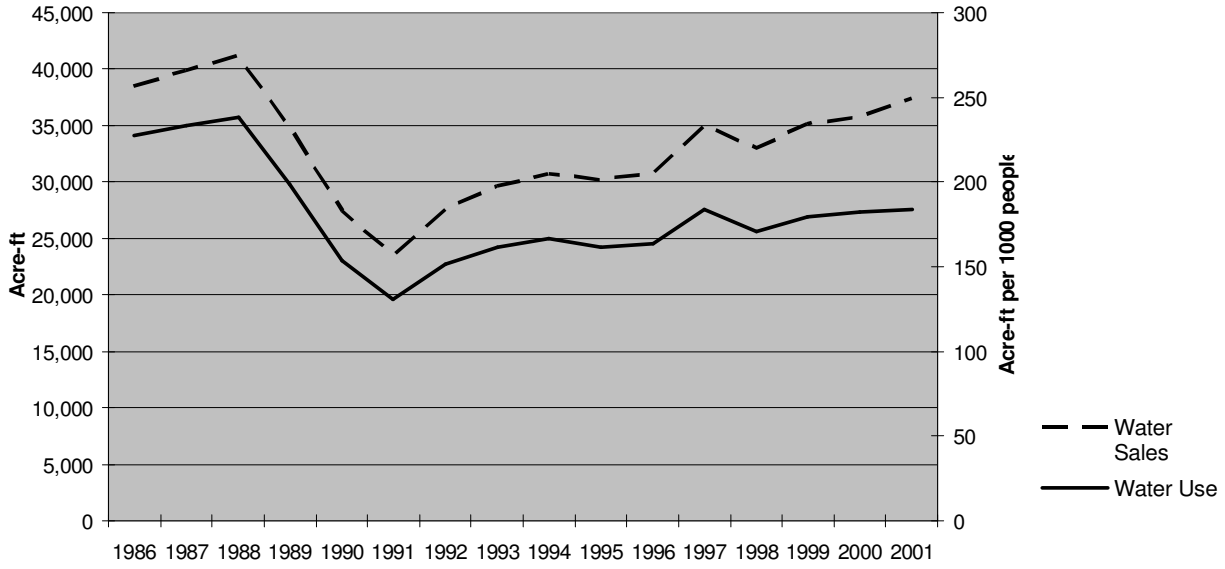
Air quality impacts may occur even as overall emissions decline. Increased commuting has the potential to contribute to localized "hot spots," where a combination of vehicles, weather, and local geography combine to create higher pollution levels. Although population declines, the number of housing units increases for all scenarios. This results in potentially greater emissions associated with consumer products and waste disposal that are a function of households as well as individuals. This would have the most impact with the Widespread and New Neighborhoods scenarios, which have the most new housing units and households.

Water

Water has been a critical issue for a number of decades on the South Coast. Limited water availability drove the slow down in Goleta development beginning in the 1970s. During the drought

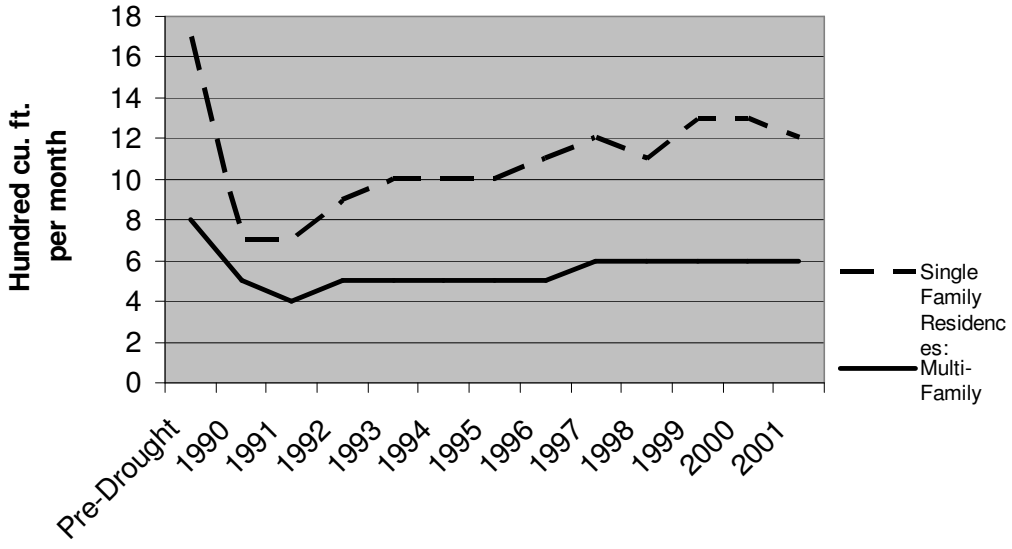
of the late 1980s and early 1990s, tight water supplies resulted in major changes in water use among residents. While new regulations on plumbing fixtures increase efficiency and a new ethic promotes water saving landscaping, water use in the residential sector, particularly single family homes, has begun to creep up on the South Coast since the end of the drought (Figure 66).

Figure 66
Historic Water Sales and Use on the South Coast



Differential rates of residential water use distinguished by single family and multifamily housing types are shown in the following figure:

Figure 67
Residential Water Use by Type



Source: City of Santa Barbara, Water Resources Division, http://ci.santa-barbara.ca.us/departments/public_works/water_resources/index.html

Average use by households continues to rise, especially in single family dwelling units, suggesting that scenarios with increases in dwelling units and households (all but the No Growth scenarios) will result in growing demand for water, despite declines in population. Scenarios where larger single family homes predominate and the 2040 fraction of affordable housing is low (the Existing Policies and Widespread scenarios) would be expected to have even higher usage rates. While we were not able to use the model to determine estimated water use for each of the scenarios, the following table suggests different ways of looking at overall water use for each of the scenarios:

Table 5
Relative Potential Water Use by Scenario

	Existing Policies	Wide-spread	No Growth	New Neighbor-hoods	Infill	All Afford-able
Total Water Use based on population	Moderate	High	Low	High	High	High
Total Water Use based on dwelling units	Moderate	High	Low	High	Moderate	Moderate
Total Water use based on land uses	High	High	Low	Moderate	Moderate	Moderate

Assessing the adequacy of water supplies for the expected demand under each of the scenarios is a complex task undertaken by the South Coast water purveying agencies and by the County's Water Resources Department.[13] Across the County, we rely on groundwater for 77 percent of our supplies. Although several North County basins are in a condition of overdraft (a long-term trend of pumping more water than the "safe yield" amount), none of the South Coast basins are considered to be in that condition. State Water Project deliveries to the County that began in 1997 provide an important buffer to the reliance on groundwater supplies on the South Coast, offsetting the need to draw on groundwater and, in some cases, allowing replenishment. However, total statewide entitlements of the project exceed its yield in dry years. Even with a drought buffer in the Project, deliveries during dry years may be inadequate to counter the effects of a drought. Allocations to South Coast recipients of Project water were less than their requested allocations in 2001 and 2002, as shown in Table 6.

The following summarizes the water supply and demand for the water districts on the South Coast:

- Carpinteria Valley Water District (CVWD), which relies on groundwater for agriculture and Cachuma and State Project water for residential and commercial use, is considered to have an annual surplus without an overdraft condition in the foreseeable future.

[13] *2002 Santa Barbara County Groundwater Report*, Santa Barbara County Public Works, Water Resources Department, Water Agency Division, February 17, 2003, http://www.countyofsb.org/pwd/water/pdf/2002text2.pdf.

Table 6
2001 and 2002 State Water Project
Allocations & Deliveries

Jurisdiction	Acre-Feet				Notes
	2001 REQUEST	2001 ACTUAL	2002 REQUEST	2002 ACTUAL	
Santa Barbara Research Center	55	0	55	55	
Morehart Land Company	100	21	100	0	
La Cumbre Mutual Water Co.	1100	637	1,100	797	
Goleta Water District	4,950	2,019	4,538	3,724	An additional 929 A.F. was received as exchange water from the Cachuma Project
City of Santa Barbara	0	4	418	888	An additional 464 A.F. was received as exchange water from the Cachuma Project
Montecito Water District (includes Summerland)	1,200	365	844	1244	An additional 270 A.F. was received as exchange water from the Cachuma Project
Carpinteria Valley Water District	600	364	244	270	All 270 A.F. was received as exchange water from the Cachuma Project
Totals	8005	3410	7299	6978	

Source: *2002 Santa Barbara County Groundwater Report*, Santa Barbara County Public Works, Water Resources Department, Water Agency Division, February 17, 2003, http://www.countyofsb.org/pwd/water/pdf/2002text2.pdf.

- Montecito Water District (MWD), which relies almost exclusively on surface water, has a large surplus.
- City of Santa Barbara relies on groundwater for about 10 percent of its supply, with the rest a mix of surface water, allocations from MWD and CVWD, desalinization, and reclaimed water. A substantial surplus is available to the City and an overdraft condition is not expected in the near future.
- La Cumbre Mutual Water Co. has an agreement to limit withdrawals from its source in the Foothill basin (the City of Santa Barbara also uses this basin) and, given the active management of the basin as a storage source (by the City), overdraft conditions are not expected.
- Goleta Water District had historically severely overdrafted one of the basins in its supply area, but following a court order has since brought the basin into balance through increased supplies from the State Water Project and other sources. The other basin is pumped mainly by private landowners. Residential and commercial water users are served by the District through Cachuma and the State Project.
- From Ellwood up through Gaviota, substantial groundwater storage exists with uses that are primarily agricultural, with some secondary industrial use. Domestic use would most likely require treatment to make the water potable. Groundwater pumping is augmented by supplies from Cachuma in this part of the South Coast.

For every 1,000 single family homes, following City of Santa Barbara usage rates, an average of 33 acre-feet are required per year. The Widespread scenario, which projects low density devel-

opment up through the Gaviota, projects a maximum of 18,000 new units. This would require, if all new units were single family homes, about 600 acre-feet per year. The New Neighborhoods scenario, which has an estimated 20,000 additional units by 2040 at a higher average density (15-20 units per acre) than the Widespread scenario, would result in about 450 acre-feet per year additional demand (if half of the new homes are single family units and half are multi-family). Although this growth in dwelling units could be accommodated within the current basin plans, an extended period of dry years combined with the failure of the State Water Project to deliver expected allocations could place severe stress on water supplies and lead to potential overdrafting of some basins if other supplies are not identified and delivered.

Wastewater

Beginning in the mid-1990s, wastewater came to the center of public attention on the South Coast due to continuing pollution of creeks and the marine environment, especially during the rainy season. Identifying specific sources of pollution has been difficult. Concerns about septic systems in beach communities, the adequacy of treatment for sewage discharged to the ocean, storm runoff from streets and agricultural properties, and leaking sewers have prompted extensive research and cleanup efforts to rid our creeks and the ocean of pollution.

The infrastructure for managing wastewater in the South Coast is a complex combination of systems. Sewer systems are designed to treat raw sewage to permitted levels, limiting exposure to bacteria, viruses, and some chemicals; pretreatment by industries before discharge to sewers minimizes levels of hazardous chemicals. Large treatment facilities are linked to individual sources such as residences and businesses via a network of sanitary sewer pipes and discharge into the ocean environment about a mile offshore. Septic systems—discharging through piping and filters on-site—serve residences that are not connected to treatment facilities. A few commercial dischargers release effluent directly to surface waters. Rain and the resulting stormwater flows are managed through a system that directs runoff from watersheds and urbanized areas into piping and channels and then on into the ocean to minimize flooding. Several plants also provide treated recycled water for irrigation use, conserving surface and groundwater resources.

Table 7
South Coast Treatment Facilities

Treatment Plant	Million Gallons per Day (mgd)		Level of Treatment	Recycled Water Uses
	Daily Flow	Capacity		
Carpinteria Sanitary District	1.7	2.5	Secondary	Treatment plant landscape irrigation
Goleta Sanitary District and Goleta West Sanitary District	4.7	9.0	Blended primary/secondary	Landscape irrigation, toilet flushing
Montecito Sanitary District	1.0	1.5	Secondary	None

Treatment Plant	Million Gallons per Day (mgd)		Level of Treatment	Recycled Water Uses
	Daily Flow	Capacity		
El Estero Wastewater Treatment Plant (City of Santa Barbara)	6.0	11.0	Secondary/ tertiary	Landscape irrigation; toilet flushing
Summerland Sanitary District	0.15	0.5	Tertiary	None
TOTAL	13.55	24.5		

Sources: Michael Higgins, CCRWQCB, August 5, 2003 personal communication and Santa Barbara Water Education website available at http://www.sbwater.org/WWScience.htm#WWTPlants, accessed October 8, 2003.

Even well designed systems may have a variety of environmental impacts associated with this infrastructure. Sewer systems and the five South Coast sewage treatment plants may affect the environment through intended and unintended releases. Leaks in sewer pipes may result in dispersal of raw sewage to the environment prior to treatment. Water may infiltrate into systems when the water table rises, adding to the flow of influent into and effluent out of treatment facilities. During storm events, inflow via manholes and illegal connections that direct storm water to sewer systems may also increase flows to and from treatment facilities. South Coast treatment plants discharge treated effluent that may have residual contaminants of varying levels, albeit within permitted levels (see Appendix 7), to the marine environment.

Critics of inshore ocean outfalls, such as those used by all South Coast facilities, have argued that primary and secondary treatment is inadequate to protect human health and marine life from adverse effects associated with allowed levels of pollutants in effluent (Kator, 2003). They argue that such treatment is insufficient to render bacterial and viral pathogens harmless, that it does not control chemicals such as plasticizers that affect marine mammal endocrine systems, pharmaceuticals, pesticides, and antibiotics. Furthermore, critics suggest that inshore outfalls do not provide sufficient dilution and decay of pathogens in comparison to longer outfalls.

Septic systems, if improperly maintained or poorly located, may result in pathogens and other contaminants reaching soil and waterways. Direct dischargers, primarily agriculture and industry, may release a wide variety of contaminants, ranging from bacteria to fertilizer to chemicals. Releases in excess of permit limits or done without permits may contribute to excessive levels of contaminants reaching sensitive areas. Finally, pollutants may concentrate in stormwater due to runoff from impervious surfaces and end up contaminating the ocean far from the original source of the pollution.

Potential constraints within this infrastructure include:

- Capacity of the existing network of sanitary sewers and treatment facilities to manage existing and additional flows
- Adequacy of particular locations for septic systems
- Overall capacity of receiving waters for existing and future dischargers
- Ability to manage stormwater flows to minimize flooding and conveyance of pollutants

The relationship of growth on the South Coast with water (both sewer and stormwater) impacts is complex. Residential uses, whether single family dwelling units or multiple family dwelling units, are essentially equivalent in contribution to sewage depending on household size. Non-residential uses such as retail, office, and light manufacturing are equivalent if water is limited to sanitary uses. In this case, the number of bathrooms rather than square footage is the controlling factor in wastewater generation. Restaurants, laundries, hospitals, and manufacturing operations that involve the use of process water may result in significant contributions to the influent of treatment facilities in terms of both volume and contaminants. In the case of restaurants, oil and grease are major concerns; for manufacturing operations, chemical contaminants may require pretreatment of wastewater prior to discharge to the sewer system.

Development may also result in additional contaminated stormwater flows due to uncontrolled runoff from construction sites, parking lots, and rooftops. Available technologies such as oil and grease traps, physical barriers, and bioswales can reduce contaminants and flows to creeks and the ocean. Good design, enforcement, and maintenance are required to make the technologies effective.

Development can result in additional costs of several types. Tying new development into existing sewer facilities involves extending sewer lines to areas where they do not exist. If gravity flow cannot be utilized, pumping stations are required. Infill development may require improvements in existing lines if capacity is not available to handle additional flows. If treatment facility capacity is limited, expansion of treatment facilities may be required and could result in a significant capital cost borne by ratepayers. It may be more cost effective for remote developments (e.g., in the west end of the Gaviota Coast) to use septic systems if soil conditions and lot sizes are adequate or establish a private treatment facility. In general, current practice is to make new development pay for any required infrastructure improvements.

The five treatment facilities in the South Coast all have residual capacity. Carpinteria Sanitary District's facility is the most constrained, currently operating at roughly two-thirds of its design capacity. On average, residential wastewater generation is approximately 75 to 100 gallons per day (gpd) (UNEP, n.d.), every 1,000 additional residents adds 75,000 to 100,000 gpd. Alternative calculations by several types of land use show the following (IEUA, 2002):

Table 8
Wastewater Flow Factors (gpd/acre)

General Commercial	2500
Industrial	3000
Low Density Residential (3 du/acre)	810
Medium Density Residential (7 du/acre)	1890
High Density Residential (15 du/acre)	4050

Source: IEUA 2002

When applied to the expected land uses for each of the scenarios, the estimated wastewater flows (in million gallons per day) are:

Table 9
Estimated Additional Wastewater Flows (mgd) by Scenario

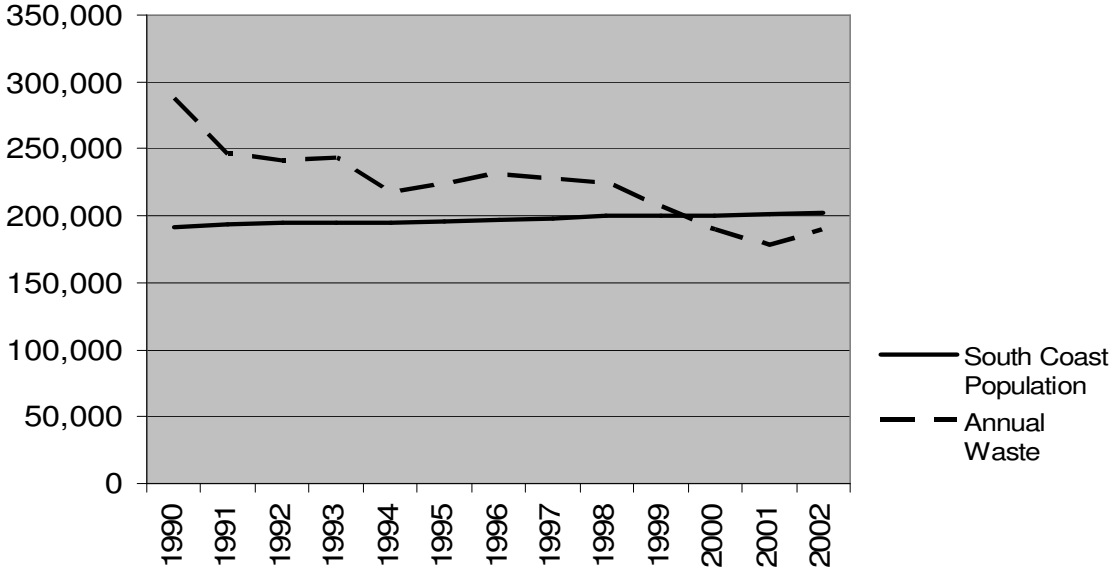
Existing Policies	3.0
Widespread	15.4
No Growth	5.4
New Neighborhoods	5.5
Infill	7.1
All Affordable	6.6

Currently, the aggregate available unused capacity for all five South Coast treatment facilities is 10.9 mgd, which could accommodate the estimated increased wastewater flow for all of the scenarios except for the Widespread scenario. Development in the Carpinteria Valley under the New Neighborhoods scenario may require expansion to overcome capacity constraints for the Carpinteria Sanitary District facility.

Waste Disposal and Recycling

Individual jurisdictions on the South Coast are responsible for managing waste disposal and diversion of materials. In the unincorporated areas as well as the City of Goleta, the Santa Barbara County Solid Waste and Utilities Division oversees collection services, recycling, and disposal of solid waste. Collection and recycling services are provided by contractors. The Division also manages the transfer station in the eastern end of the Goleta Valley and the landfill at Tajiguas, which serve the unincorporated portions of the South Coast. Both the Cities of Santa Barbara and the Carpinteria also manage waste collection and recycling through contracted service providers. While most of the City of Santa Barbara's waste goes to landfills in Santa Barbara County (primarily Tajiguas), the City of Carpinteria sends much of its waste to landfills in Ventura County.

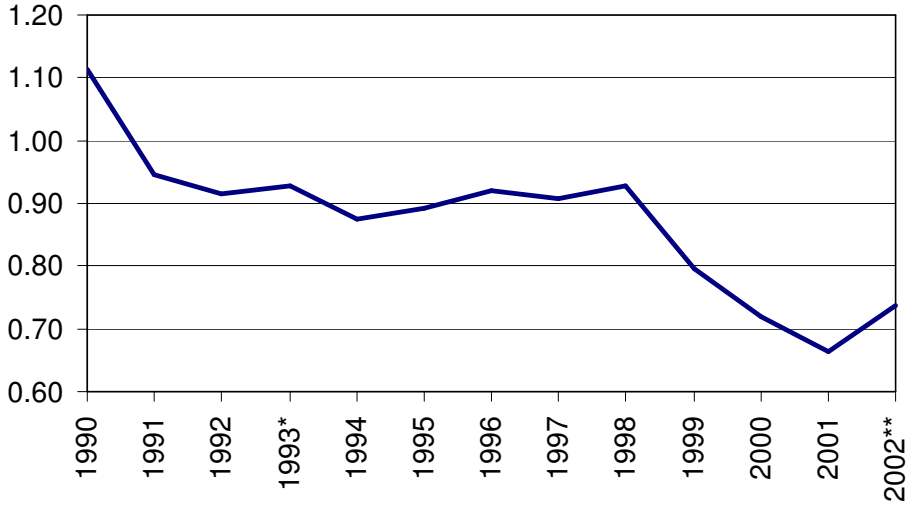
Figure 68
South Coast Solid Waste
Population and Disposal 1990-2000



2003

Source: Santa Barbara Economic Forecast Project, Community Indicators, 2002. Solid waste data for 2002 data provided Jody Rundell, Santa Barbara County, Department of Public Works, Solid Waste and Utilities Division, personal communication, July 23,

Figure 69
South Coast Solid Waste
Per Capita Disposal Rate



Source: Jody Rundell, Santa Barbara County, Department of Public Works, Solid Waste and Utilities Division, personal communication, July 23, 2003

County and municipal waste diversion programs have been effective in reducing amounts disposed at landfills and increasing the availability of collected materials for reuse. Greenwaste, construction and demolition debris, white goods (appliances), paper and packaging materials,

beverage and food containers, food, and electronics are some of the materials that are segregated, collected, processed, or otherwise reused by public and private initiatives. Individual households and businesses further contribute to reduction by reducing waste generation at the source. County staff estimated the diversion rate in the unincorporated areas of Santa Barbara County (countywide) in 2000 to be approximately 59 percent of total wastes otherwise generated (see Table 10).

Continued success in diversion of wastes that would otherwise go to landfills helps maximize the availability of landfill capacity, but does not change the fundamental need for additional waste management capacity in the future. A portion of the need may be addressed by alternative technologies, such as gasification and energy recovery of organic wastes. Regardless of future growth, landfill capacity at Tajiguas will be fully used over the next two decades.

Overall differences among the scenarios are not expected to significantly alter the demand for waste management services. Individual scenarios will differ in the marginal effects on the need for specific programs.

Those scenarios that result in development of larger single family residential units (e.g., the Existing Policies and Widespread scenarios), rather than denser development, would have large landscaped areas that necessitate expansion of green waste collection and processing programs and an extension of the household recyclables collection system. Conversely, compact development with a large share of attached housing requires expansion of recycling opportunities that serve multi-family dwelling units.

Table 10
Diversion Quantities
Unincorporated Santa Barbara County

	Quantities (tons)	
Disposal		**168,716.51**
Diversion		
County Facilities	21,754.28	
County-Wide Diversion	85,855.82	
CRV Numbers	1,476.96	
Source Reduction	4,954.41	
Restricted Wastes	129,494.32	
Total Diversion		**243,535.79**
Generation		**412,252.30**
Diversion Rate		**59.1 percent**

Source: Jody Rundell, Santa Barbara County, Department of Public Works, Solid Waste and Utilities Division, personal communication, July 23, 2003

QUALITY OF LIFE MEASURES

As detailed in Appendix 4, SCOPE has a wide range of output variables. The majority are absolute values (e.g., median house prices, number of office jobs, persons per household). Some, however, are relative values that are based on constructed indices since an absolute value is not readily available. These are quality of life indicators that are more difficult to validate than the quantitative measures that are relatively easy to model. Summarized below is the output of the summary Quality of Life index and a brief discussion of its significance. Data on the outputs from all the Quality of Life measures are presented in Appendix 11. We caution the reader that interpretation of the Quality of Life is difficult as the measures have not been validated to the same degree as the quantitative measures reported above.

The output for Quality of Life is an index that is best evaluated as one scenario relative to the others. An increase in the index is a measure of improvement. It is an aggregated index using specific quality of life variables (some of which are moderated by a mitigating exponent) including: Traffic, Crime Risk, Adequacy of Services, Environment, Recreational Amenities, Education, and Arts. The Traffic variable is described and reported in the main section of the report. Crime Risk, Adequacy of Services, Environment, and Recreational Amenities are each described and reported in the following sections. The last two variables, Education and Arts, cannot be modeled in SCOPE as it is currently configured, therefore nominal values are used as placeholders.

While the index dropped between 1960 and 2000, indicating a decline in overall quality of life, the 2040 forecast suggests there are marginal differences among the scenarios.

Table 11
Quality of Life Index

		2040					
1960	2000	Existing Policies	Widespread	No Growth	New Neighborhoods	Infill	All Affordable
1.2	0.96	0.95	0.94	0.97	0.96	0.95	0.95

IMPLICATIONS

In some significant ways, the scenarios produce very similar outcomes. Across all scenarios, the model projects increases in median housing prices that will far outstrip average household income. Traffic will increase and commuting will approach maximum capacity. The South Coast will gentrify with upper-income residents dominating, middle-income residents leaving, and mixed effects on lower-income residents. Retail and service jobs will predominate with further erosion of manufacturing jobs. Air quality is likely to be similar across all scenarios as will overall quality of life, at least as indicated by the indices measured in the SCOPE model. Moreover, by virtue of legislative requirements, fiscal accounts will be balanced. In addition, water supplies, though technically available through the State Water Project, may be limited in all scenarios under long-term drought conditions.

But the differences among the scenarios are significant as well. The outcome of the Widespread scenario, which allows development of large numbers of market rate housing across all non-protected land, results in the construction of very little new affordable housing and an overall loss of affordable units as existing restrictions expire and units convert to market rate housing. In contrast, the Infill and All Affordable scenarios, which mandate the development of restricted affordable units, result in much higher levels of affordable units and, consequently, a more economically diverse population. The No Growth scenario results in the lowest percentage of lower-income residents and next lowest percentage of middle-income residents, reflecting the lack of new housing alternatives amidst steeply rising prices.

Moreover, the scenarios have very different effects on open space and agricultural land. Scenarios that maintain the Urban Limit Line preserve rural agricultural land, much of which is lost in the Widespread scenario across the South Coast and adjacent to the current urbanized zones in the New Neighborhoods scenario. Conversely, focusing development within the Urban Limit Line could result in a loss of urban agricultural land and the jobs associated with that use.

There are also trade-offs for the other scenarios as well. Both the Infill and All Affordable scenarios emphasize compact development of multi-family housing concentrated in the existing urbanized areas. For Carpinteria, currently characterized by single family residential neighborhoods, the trade-off to maintain open space and agricultural land will be a community of multi-family units and mixed-use zones. Similarly, the character of the Hollister corridor will evolve to a similar mixed-use area as will portions of downtown Santa Barbara. And in much of the urbanized residential areas, second units will flourish.

Transportation issues arise in different ways for the scenarios as well. Development spread out across the entire South Coast will increase traffic from passenger vehicles that is not likely to be addressed by mass transit alternatives due to the low density of the development. Conversely, compact development will place demands for parking and traffic capacity on existing neighborhoods. Compact development, however, offers greater potential for effective transportation alternatives, from walking and biking to mass transit.

Differences among scenarios also exist for several environmental factors. The Widespread scenario would create a demand for a significant amount of potable water on the western Goleta aq-

uifer that is not currently in production. It would also be more likely than other scenarios to generate an increase in wastewater in excess of current capacity, therefore requiring capital improvements in existing infrastructure or the development of new facilities. The New Neighborhoods scenario may also result in a need for expansion of capacity in the eastern end of the South Coast. The Existing Policies and Widespread scenarios would be more likely than other scenarios to require a significant increase in resources for addressing green waste and recycling needs in outlying areas as well as potential increases in solid waste generation that would shorten the effective lifetime of available landfill capacity. The scenarios with large increases in housing units—Widespread and New Neighborhoods—may have larger impacts on air quality due to household associated pollution sources such as lawn mowers, recreational vehicles, and consumer goods.

Assessing the relative fiscal impacts of the alternative scenarios is complicated by the evolving relationship between the state and local jurisdictions. Certain types of development may "pay their own way" in the sense that developers pay for infrastructure improvements and property taxes may generate sufficient funds to cover service delivery. However, over the last decade. the state budget process has resulted in a shift of expected tax flows from local jurisdictions to the state making it more difficult for municipalities and counties to predict the magnitude of any future revenue source. The level of revenues and the types of revenue sources, assuming they stay the same, would differ among the scenarios. More revenue, particularly sales and bed taxes, would be available under the Widespread scenario, although it is difficult to determine if it would be sufficient to address increased service demands and long-term infrastructure needs. Although less revenue would be available under the No Growth scenario, the minimal amount of development and the expected reduction population level, may mean resources are adequate to meet needs. Of the three scenarios that result in more compact development, New Neighborhoods would generates the most revenues, although there are greater infrastructure requirements and long-term associated costs. The Infill and All Affordable scenarios may require the least infrastructure improvements and associated long-term maintenance requirements and minimal extensions of services, but they are likely to be lower in revenues than all the scenarios except No Growth.

The outcomes of the scenarios demonstrate that we cannot simply build our way out of the housing crisis. Market forces would not produce much housing that is affordable for middle and lower-income households. The market would primarily address the demand for housing by upper-income households. Because of gentrification, more and more of the existing housing stock would convert to upper-income housing, exacerbating the crisis. Affordability, particularly at the lower-income levels, is enhanced only with policy initiatives addressing both existing affordable housing and new construction. The scenarios suggest, however, that we cannot rely on simply creating more new housing affordable for lower and middle-income households to replace housing that is gentrified. We have to tackle the future of existing housing as well.

To address the housing crisis without diminishing our quality of life we will have to make policy changes simultaneously on housing, transportation, jobs, and open space, agricultural and natural resources protection. We will have to adopt policies that simultaneously conserve existing affordable housing and open space, promote the development of new housing affordable to a diverse population and maintain its affordability, while preserving neighborhood quality of life.

We will also have to establish new transportation modes to enhance mobility within the South Coast and between the South Coast and other residential centers. And we will have to improve our jobs-housing ratio to bring it into a better balance that will reduce the need for commuting.

The scenarios chosen for evaluation in RIGS are not the only possible scenarios. The tools used in this analysis—SCOPE and GIS-based analysis—can be applied to additional scenarios. An example of a new scenario would be one that broadens the definition of affordable housing to include a portion or all of the moderate-income housing. The scenarios analyzed in RIGS are only a means to test the effects on the region of different policy choices.

We have a wide range of policy tools available to us. To use them effectively will require both political will and coordination among all the South Coast jurisdictions. We cannot address our collective problems with piecemeal individual jurisdictional approaches. We will have to see ourselves much as SCOPE sees the South Coast—as a whole region rather than entities that function in isolation to each other.

In Part II, we examine the policy alternatives, first giving a brief overview of the policies currently in place among the South Coast jurisdictions and then providing information and analysis for policies that address housing, transportation, and environmental protection.

PART II
POLICY ALTERNATIVES—
GETTING FROM HERE TO THERE

INTRODUCTION

RIGS began as an effort to understand what the South Coast would look like 40 years from now under the current policies that guide growth. This future is not pre-ordained. Policies can be changed. In creating alternatives to the existing development policies for the region's future development, RIGS offers insights into how we might enhance different aspects of our region's housing market, economy, population, and land use patterns. The scenarios show that if want, we can choose a different future.

The goal of ECP is to show that choices are available. The organization is not an advocate for any one of the RIGS scenarios. As the Board of the organization sponsoring RIGS, we believe that people must take an active role in planning the future of the South Coast. And in doing so, RIGS will give them a better understanding of choices available to our community. We also urge residents, business owners, and political leaders to recognize that success in planning for the future will only come with regional cooperation.

Making choices will change the landscape of the South Coast. Development in the Goleta Valley slowed considerably in response to a voter approved initiative in 1972. That initiative validated a Goleta Water Board decision to impose a moratorium on new water hook-ups based on a shortage of available water resources. In 1974, the Santa Barbara City Council dramatically reduced the allowable level of potential residential development in the City of Santa Barbara. Though controversial, the decision resulted in considerably fewer people living in the City, reducing the population from an expected 135,000 to about 90,000 through the zoning changes. Jurisdictions across the South Coast are updating their Housing Elements, which will likely result in important changes in land uses as the cities and the County respond to the decline in affordable housing coupled with the increase in demand for affordable housing.

In the following section, we analyze how the existing land use and growth-related policies across the South Coast jurisdictions may be modified to implement the six scenarios developed for this study. The discussion is a general description of the policy changes that would be needed for each scenario and addresses modifications of each jurisdiction's policies towards regional consistency. Because the updates of the region's Housing Elements are not complete and the new City of Goleta is in the midst of developing its first General Plan, that will include a Housing Element, this analysis is tentative and an update will be required as policies change.

We also include a section on regional coordination, reinforcing the conclusion of the 1974 *Impacts of Growth Study* that regional problems need regional solutions. This section provides information on commissions and other regional collaboratives across the country assessing what works in promoting cooperative efforts. Regardless of the choices the South Coast communities might pursue, we believe that the need to cooperate and collaborate remains critical to the likely success of any policies that are chosen.

GROWTH-RELATED POLICIES

In the following discussion, we focus on seven issues that affect growth and future development. These are:

1. Housing affordability
2. Jobs-Housing Balance
3. Efficient use of land
4. Respect Urban Limit Line
5. Annexations
6. Promotion of alternate transit modes
7. Protection of open space, natural resources & agriculture

Table 12 summarizes the approach to these issues by each jurisdiction. The discussion below presents alternate strategies by issue area, where appropriate. This section concludes with a discussion of the policy changes that might be necessary to implement each scenario.

HOUSING AFFORDABILITY

Housing affordability is a major policy concern throughout California, especially in the coastal portion of the state. While population is rapidly increasing throughout most of the state with a parallel increase in residential development, housing and population growth are not always synchronized. Not surprisingly, in areas where housing development is constrained, affordability is reduced. But there is also another relatively recent trend, particularly in coastal California, of construction of new expensive housing with a simultaneous slow decline in population. This phenomenon has been experienced in the six Bay Area counties (partly fueled by the cyclical decline of the technology industry), but it is also occurring in cities as varied as Del Mar, Monterey, Palos Verdes Estates, and Santa Monica. The lack of affordable housing appears to be driving middle and lower-income residents out of these "high-priced" bedroom communities that serve nearby job centers.

As long as the South Coast maintains a healthy jobs-rich economy while constraining housing supply, the demand for housing will contribute to escalating prices and declining affordability, threatening to markedly change the economic make-up of the region. Since 2000, the median house price has gone from just over $500,000 on the South Coast to $900,000 (in nominal dollars) in mid-2003 (although fluctuating from month to month). Buying a median-priced home, whether in Goleta, on the Mesa in Santa Barbara, or in Summerland, requires a household income of at least $230,000 given a typical down payment of 20 percent and historically low interest rates. This pattern provides further drive to the demographic shift towards a South Coast population dominated by upper-income residents. That SCOPE forecasts a continuing increase in median house prices given current housing and land use policies underscores that housing affordability will remain a critical issue for the region.

Currently, South Coast jurisdictions seek to increase the supply of affordable housing in three basic ways:

Table 12
Overview of Existing Regional Growth-Related Policies – South Coast

Unincorporated So. Coast	City of Santa Barbara	City of Carpinteria
Housing Affordability		
• 25 percent affordable required for larger projects • Varying number of year controls on affordable housing • Affordable housing overlay zones	• 30 year controls on affordable housing; greater period recommended • Bonus density allowed for affordable units only • Financing assistance for affordable projects	• Draft Housing Element recommends 25 percent affordable required for projects of 10 units or more • Controls on affordable housing negotiated on project-by-project basis • Bonus density currently not codified but City follows State standards.
Jobs-Housing Balance		
	• Measure E controls amount of non-resid. space thru 2008; no restriction on residential • Mixed use gets 50 percent parking break for resid. • Rezonings from commercial to residential during 80s & 90s	• In lieu fee program not effective as of 9-03. Presently under consideration as part of the Housing Element Update • Mixed use projects promoted by City.
Efficient Use of Land		
• Most residentially zoned land is single family and rural ranchettes	• Most residentially zoned land is single family	• Most residentially zoned land is single family
Urban Limit Line		
• Yes, although other uses allowed through CUP (e.g., golf courses)	• Yes, especially in foothills	• Strong Coastal policies prevent urban development outside ULL
Annexations		
• N/A	• Only within Sphere of Influence, especially where "islands" of County land surrounded by City	• Sphere and City boundary lines are the same so limited potential for annexations
Promote alternate transit modes – *Most projects accommodate automobiles with some recent projects requiring less parking if near transit and jobs.*		
	• Recent projects allow less parking in Downtown	• As of 9-03, all projects must satisfy the minimum parking requirements for specific use.
Protection of Open Space, Natural Resources & Agriculture		
• Generally strong policies, esp. in Coastal Zone • Other uses (e.g., golf courses) allowed with CUP	• No agriculture zoning	• Strong Coastal Plan policies

- First, public sector housing construction (e.g., Housing Authorities);
- Second, requirements for "inclusionary" affordable housing in certain private developments; and
- Third, "bonus density" programs that offer developers an opportunity to increase the number of units in a project in exchange for making a portion of the units affordable.

Units that are sold as affordable are maintained as such through restrictions on future sales prices for a period that typically has been 30 years. Each South Coast jurisdiction, however, has developed different housing affordability policies, although the current process of updating and developing new Housing Elements may lead to greater uniformity across the region. For example, the County and South Coast cities are discussing the use of a "rolling" price control program that would result in the control period starting over with each new owner thereby ensuring the long term affordability of the unit.

Alternate Policy Strategies - Housing Affordability

This section discusses strategies that have the potential to contribute to an increase in the number and percentage of affordable housing units on the South Coast over the next forty years. Commonly used strategies are presented first (additional detail is provided in Appendix 12). The discussion that follows examines additional policies that may augment or replace current approaches, in recognition that existing policies are not sufficient to deal with this critical issue.

A number of commonly used strategies exist to promote affordable housing. Many of these have been used individually or in combination on the South Coast or elsewhere in California to both preserve existing affordable housing and generate new affordable units. The strategies fall into these general categories:[14]

a. **Affordability in exchange for density, low interest rates, upzoning, etc. -** Require affordable units in exchange for upzoning (i.e., increase in intensity of use and/or number of units allowed on the parcel), bonus density to meet in lieu requirements, low interest rate loans, or other items that reduce the cost per unit and thus increase affordability. While 30-year time controls on affordable units has been the norm, it is increasingly common to extend that time frame to 45 or 60 years and/or to require a "rolling" time period that starts over with each subsequent owner.

b. **Grant relief from various zoning or building requirements** – Examples include allowing less parking than is typically required if near transit and jobs, construction methods that have the same safety and visual aspects but are not usually allowed, such as manufactured housing, etc.

c. **Modify zoning districts to increase amount of housing provided and to replace existing affordable units -** This could include rezoning from commercial to multi-family residential, upzoning residential areas to a higher density, allowing "pyramid zoning" so

[14] These strategies were developed based on a variety of sources including the draft Housing Element Updates of the South Coast jurisdictions, the South Coast Livable Community's Housing Platform plus meetings with the League of Women Voters' discussion groups throughout the South Coast.

that housing is allowed in most zones, allowing multi-family densities in commercial zones, requiring "minimum" (as well as "maximum") densities on a parcel of a given size, etc. Consider using existing height and setbacks as maximums, i.e., be more creative in how the "building envelope" can be used to get more units, open space, etc. Consider maximum housing unit sizes in multi-family zones so that more units are created rather than fewer, larger units for upper-income residents. The process and requirements for adding Additional Dwelling Units ("ADU" or "Granny Flats") could also be streamlined and simplified to encourage more of these units in existing developed areas. Another approach could be to simplify findings to approve affordable projects, including those that request relief from numerous ordinance standards. Regardless of whether the existing units are protected or not, require the replacement of existing affordable units on site.

d. **Allow transfers of density, especially to commercial sites** - Allow development rights to be transferred to appropriate parcels on the South Coast such as existing large commercial parcels, e.g., La Cumbre Plaza. Create "village centers" that allow residents to shop and/or work in proximity to their homes.

e. **Alternative funding sources for purchase of land or low interest mortgages** – Traditionally a major source of funds for the purchase of affordable housing sites or low-interest mortgages has been redevelopment agencies, Community Development Block Grant and other government sources of funding. Housing Trust Funds and employer sponsored programs are increasingly popular. Encourage land donations to cities, the county or a non-profit whereby the owner retains ownership and gets an income stream until death and affordable housing can be built without needing to cover land costs. Also explore public service districts that have excess land.

f. **Develop design guidelines for affordable projects –** Quality design and construction of affordable units help promote acceptance in traditional residential neighborhoods. Guidelines, however, should promote good design while keeping construction costs down. As part of the guidelines, perhaps establish acceptable Floor-to-Area Ratios (FARs) for residential neighborhoods to ensure that additional density is appropriate in scale and character.

It would be helpful if a region-wide clearinghouse were provided to assist with regulatory and statutory relief, to bring various parties together from the public and private sector to realize more affordable projects, etc. More flexibility is needed to facilitate multi-jurisdictional projects and programs.

JOBS-HOUSING BALANCE

When jobs and housing are in balance, there is a rough equality between the jobs in a community or region and housing availability, minimizing crowding and the need for commuting from other regions. The jobs-housing ratio is a gross measure that is calculated by dividing the number of jobs available by the number of housing units. For example, it is very sensitive to how the region is defined and it does not take into account whether the jobs provide an income sufficient to afford

local housing. On the assumption that a region's housing units are occupied by a mix of households with a range of job holders, from single occupant units holding one job to multi-income families to retired seniors, analysts suggest that an appropriate a jobs-housing ratio is between 1.0 and 1.5.[15] Based on the 2000 Census, the jobs-housing ratio on the South Coast is about 1.5.

A regional jobs-housing ratio that is substantially under 1.0 indicates a shortage of jobs in the region (unless it is a retirement community) and, in all likelihood, that the region is a bedroom community where residents commute out to a jobs rich area. Conversely, a jobs-housing ratio that is much higher than 1.0 is an area where workers commute into the region. For example, the San Francisco peninsula has been a jobs rich region with a number of East Bay communities tending towards being housing rich. Loss of jobs over the past few years, primarily due to the collapse of the high tech sector, is bringing the jobs-housing ratio on the peninsula closer to being in balance while the East Bay communities are growing in population.

Factors that work against jobs-housing balance in a region include:

- Zoning and other land use policies that make it difficult to construct mixed use and higher density residential projects;
- State insurance laws that make it difficult to construct condominiums because of long-term responsibility for construction defects;
- Lack of housing affordable to the workforce;
- "Fiscalization" of land use ("zoning for dollars") that makes it more profitable for a city or county to allow commercial projects that generate sales tax rather than residential projects that provide only property tax revenues; and
- Neighborhood concerns about the effects of increased density.

EFFICIENT USE OF LAND

The predominant land use on the South Coast is low density single family residential. This inefficient use of land results in an automobile-oriented community with little consideration for pedestrian or bicycle modes of daily travel. Mass transit is limited to selected corridors where population densities are higher. With homes and jobs spread all over the South Coast, the cost of inefficient use of land can be measured in lost time due to commuting and congestion and diminishing agricultural land and open space.
Policies and zoning designations that promote higher density, infill development along transportation corridors and near jobs, and mixed use developments make more efficient use of land than the traditional single family subdivisions that characterize development on the South Coast over the last 40 years. Increased density, while offering benefits in the ability to preserve large tracts of land for agriculture and open space, may result in impacts if services such as schools, libraries, and parks as well as the transportation network (roads, transit, and parking) are inadequate.

[15] For many years, a key planning assumption has been that a jobs-housing ratio of 1.0 was in "balance." More recently, planners have argued that the appropriate jobs-housing ratio may be as high as 1.5 reflecting an increasing number of households with two or more workers (ABAG 2001). Analysis of an optimal regional jobs-housing ratio is complicated in communities such as ours with high numbers of households with non-job holders (typically retirees), housing units that are second or third homes, or where individuals hold multiple jobs (usually low paying).

Comprehensive planning along with community-oriented design guidelines are required to maximize the benefits of efficient use of land.

URBAN GROWTH BOUNDARIES

Urban growth boundaries (also known as urban limit lines) exist in nearly 100 California cities (OPR 1999) and are mandated in three states (Oregon, Washington and Tennessee) (Staley, et al 1999). These boundaries are intended to curb sprawl development, encourage infill projects, and protect open space and agricultural land. An Urban Limit Line (the formal designation for Santa Barbara County) may be contiguous with a city boundary, as in the case of Carpinteria, or mark the urban/rural divide in an unincorporated area. Boundaries can be established by local jurisdictions, as is the case for the South Coast where the Urban Limit Line was adopted by the Board of Supervisors, or enacted by referendum or initiative and approved by voters. The latter increases the certainty with which the line remains intact. In Ventura County, county-wide and city SOAR (Save Our Open Space and Agricultural Resources) initiatives received voter approval between 1995 and 2000.

ANNEXATIONS

Annexation is a process by which a city claims jurisdiction over unincorporated land. It typically involves geographic areas that are surrounded by another jurisdiction (called "islands") or peninsulas of land that extend into a city. Annexations are intended to simplify boundaries and to avoid creating new islands or peninsulas that would encourage further annexations. Many cities annex land in exchange for providing essential services. In California, each county has a Local Agency Formation Commission (LAFCO) that must approve all annexations. Each city is assigned a sphere of influence by LAFCO as required by state law. Cities cannot annex land outside their sphere of influence without first amending their sphere of influence. Because of the general characteristics of cities as more urban in character and unincorporated areas as more rural, urban development that is proposed adjacent to a city's boundary would trigger an annexation process. On the South Coast, conversion of agricultural land adjacent to the Urban Limit Line to residential or commercial uses is likely to result in annexation by the adjacent city.

ALTERNATE TRANSIT MODES

The most urbanized portions of the South Coast, particularly Downtown Santa Barbara and Isla Vista, are very pedestrian and bicycle oriented. Bus service is available on major east-west corridors through the South Coast, although ridership is limited. Bike lanes exist in much of the area, with Class 1 bike lanes in the Waterfront area and along Atascadero Creek from Modoc Road to UCSB. Two low-cost shuttles run along State Street and Cabrillo Boulevard and between the Eastside and Westside in the City of Santa Barbara. Mandatory fees allow UCSB students to use the bus system for free.

Despite the successes, the alternate transit infrastructure on the South Coast could be improved substantially. Jobs are often located at a substantial distance from residential areas, reinforcing the use of cars. Bus routes and schedules do not always lend themselves to getting riders to destinations in a timely manner. Amtrak is the sole north-south train service and, because its charter

prohibits providing commuter service, it is not easy for people to commute to jobs on the South Coast or vice versa. North-south bike access across the freeway is difficult, with limited crossings and conflicts with turn pockets for freeway access. Bus and shuttle service could be expanded to reach additional residential areas. As previously noted, comprehensive planning for regional transportation is critical to any choice about future.

OPEN SPACE AND RESOURCE PROTECTION

A portion of the RIGS study area is within the Coastal Zone, including the entire City of Carpinteria, Summerland, the waterfront in Santa Barbara, Isla Vista and UCSB. Within these areas, policies for protecting sensitive open space and natural resources are strong. In recent years, there have been several successful campaigns to purchase large open tracts of land within the Coastal Zone, including Carpinteria Bluffs, the Wilcox Property (now called the Douglas Family Preserve), the Jesuit property (now part of Elings or Las Positas Park), and Arroyo Hondo.

Outside the Coastal Zone, the open space and resource protection policies are not nearly as strong. Efforts to protect areas with important resources tend to be addressed when a development is proposed as in the San Marcos Foothills Coalition's efforts to protect the parcel near Route 154 and Foothill Road. When subdivisions are proposed in the steep foothills, often a portion of the site is required to have a conservation easement, dedication of development rights or similar legal instrument to ensure that the area is protected in perpetuity. Efforts to adopt Transfer of Development Rights, or similar ordinances that would transfer density offsite in exchange for permanent protection of sensitive land, have not been successful to date.

AGRICULTURAL PROTECTION

Similar to the open space and resource protection policies discussed above, agricultural protection policies along the South Coast are much stronger in the Coastal Zone. This is most evident in the Carpinteria Valley and portions of the Patterson agricultural block located at the south end of Patterson Avenue in Goleta and other constraints. Outside the Coastal Zone, there are small tracts of land in agricultural use including San Marcos Growers and the Christmas Tree Farm in Goleta. These tracts are being discussed as possible sites for housing as part of the County Housing Element Update.

Revisions to Local Coastal Programs would be necessary to rezone existing agricultural land for residential use in coastal zones, which is a difficult process. Outside the coastal zone, consideration should be given to the priority for conversion of agricultural land both within and outside the Urban Limit Line. As explained in the County's Agricultural Newsletter (Santa Barbara County 2002), urban agricultural parcels on the South Coast offer significant benefits to the community in regards to the availability of local agricultural products, the opportunity to understand the nature of farming and the origins of food, and the high concentration of organic production.

POLICY STRATEGIES AND RIGS SCENARIOS

The following is an overview of the policy changes and additions that would be necessary to implement each of the six scenarios (see Table 13).

WIDESPREAD

The Widespread scenario would require elimination of the Urban Limit Line to allow development throughout the study area and modification to the area's zoning pattern to allow residential uses on agriculturally zoned land in the Gaviota and Carpinteria Valley areas. Commercially zoned areas would need to be intensified to achieve the additional 2 million sq. ft. Coastal, agricultural, open space and resource protection policies would need to be weakened.

NO GROWTH

Implementation of the No Growth scenario would require major changes to existing plans, policies and ordinances. All affordability requirements would be repealed and major changes to subdivision and other ordinances would be necessary to allow only one new residence on a vacant residential property. The same would apply to limit commercial development to 0.10 floor-to area ratio on vacant commercial parcels.

NEW NEIGHBORHOODS

The New Neighborhoods scenario would require an expansion of the urban area to the west and east without markedly changing the development pattern in the main part of the South Coast. This scenario would require modification to the Naples, Bishop Ranch and Carpinteria Valley's zoning pattern to allow residential uses on agriculturally zoned land. The commercially zoned areas would need to be reduced in build out potential to achieve only 2 million sq. ft. Coastal agricultural, open space and resource protection policies would need to be weakened. Quality design of these communities is an important aspect of this scenario's implementation.

INFILL

To implement this scenario in residential areas, the primary policy change would be zoning district changes to allow increases in density, especially along transit corridors and near jobs. There would be major reductions in commercial build out potential in those zones. Quality design of new infill housing is an important aspect of this scenario's implementation.

ALL AFFORDABLE

This scenario would require research to determine how a jurisdiction could require that virtually all new units be affordable. Assuming that is legally possible, changes to the residential zone districts would be necessary to allow the increases in density as well as to require affordability. As with the Infill scenario, quality design is important to the success of this scenario.

Table 13
Overview of Scenarios and Related Changes to Growth-Related Policies

SCENARIOS[16]				
WIDESPREAD	**NO GROWTH**	**NEW NEIGHBOR-HOODS**	**INFILL**	**ALL AFFORDABLE**
Housing Affordability				
• Slight strengthening of housing affordability policies to double # of units constructed per year (as compared to Existing Policies)	• Repeal all affordability requirements	• Strengthen affordability requirements • Master planned Communities which allow more units on smaller lots and flexible requirements (setbacks, etc.); adopt design guidelines for new neighborhoods	• Strengthen affordability requirements significantly • Allow more units on smaller lots and flexible requirements (setbacks, parking relief near transit and jobs, etc.); • Modify commercial zones to require significant # of residential units • Adopt design guidelines for infill projects	• See Infill Scenario • Aggressive housing affordability program including rezonings for more density, strong requirements for residential on commercial lots, tax and financing incentives, etc.
Jobs-Housing Balance				
• Double # of new housing units allowed through removal of Urban Limit Line, major annexations, etc., and rezoning of agricultural land to residential • 20 % increase in commercial square footage through changes to commercial zone districts to increase build out on each parcel	• Revise all residential zoning districts to allow only one new dwelling per vacant lot, regardless of size. • Revise all commercial zoning districts to limit construction on vacant lots to a floor-to-area ratio (FAR) of 0.1.	• Give preference to local residents in purchase or rental of new housing • Discourage second home buyers from purchasing new units	• Give preference to local residents in purchase or rental of new housing • Discourage second home buyers from purchasing new units	• Same as Infill Scenario
Urban Limit Line				
• Eliminate Urban Limit Line	• No change	• Relocate line on west to include Naples and on east to include parts of Carpinteria Valley	• No Change	• No Change

[16] The Existing Policies scenario is omitted as no policy changes are required for implementation.

SCENARIOS[16]				
WIDESPREAD	**NO GROWTH**	**NEW NEIGHBOR-HOODS**	**INFILL**	**ALL AFFORDABLE**
Annexations				
• Amend LAFCo policies and General Plans to readily allow annexations	• Strengthen existing policies to prevent annexations	• Annexations on west to City of Goleta and on east to City of Carpinteria (difficult as in Coastal Zone)	• For infill properties only, e.g., Las Positas Valley, Upper State, assuming considerable # of affordable units	• Same as Infill Scenario
Alternate Transit Modes				
• More difficult to achieve with widespread development as larger area to serve with dispersed population	• Likely to be major no change in existing service	• Incorporate free or reduced fare transit to employment areas into new neighborhoods	• Improve bus service throughout So. Coast • Provide free or reduced fare bus passes to residents, especially near transit corridors	• Same as Infill Scenario
Open Space and Resource Protection				
• Loosen existing open space, resource & agricultural protection policies (problematic in Coastal Zone)	• No change necessary	• Provide for protection of these resources within Master Planned Communities	• Strengthen these policies • Transfer of Development Rights ordinances needed that allow transfers of density within South Coast jurisdictions	• Same as Infill Scenario

REGIONAL PLANNING

> "The South Coast is a geographic and economic region…. Its residents drink from the same water supply, breathe the same air, ride on the same highways, and do much of their shopping in the same stores…. In the absence of regional planning, there tends to be inter-city competition. If there is going to be a shopping center anyway, each jurisdiction wants to have the taxes it will bring. It will have many of the liabilities in any event.
>
> *It makes no sense for a region such as ours to adopt a piecemeal approach to the future.* [emphasis in original] …The absence of area-wide policy is thus itself a form of policy: if the jurisdictions of the regions do not form a common compact charting a common future, they will be left to mean-spirited squabbles in which each tries to gain at the expense of the others – and to the detriment of all."
>
> *Santa Barbara - The Impacts of Growth, 1974*

At the heart of the Santa Barbara Region Economic Community Project is a belief in the value of regional coordination to plan for our future. We understand the desire for local decision making where public policy is decided at a level closest to the neighborhoods that are affected. But many of these local decisions have regional implications. What we have tried to show in using SCOPE to evaluate alternative development scenarios is that we function as a region. Housing and job decisions, regardless of where they occur in the South Coast, will affect all of us in the region, whether through traffic, the cost of housing, availability of open space, or other quality of life factors. Regional coordination does not mean giving up local control. What it does require is a commitment to evaluating the regional impacts of local decisions, taking these impacts into account, and working towards solutions that offer benefits locally and regionally.

Our primary experience with regional coordination is through the Santa Barbara County Association of Governments (SBCAG). SBCAG has been successful in its efforts to coordinate the distribution of funds for transportation infrastructure investments among the various jurisdictions within the county. SBCAG also functions well as the Airport Land Use Commission in reviewing plans and projects that directly and indirectly affect several jurisdictions. SBCAG, however, lacks the authority and support needed to succeed in its regional planning functions for housing and land uses. Its Board members and the jurisdictions they represent tend to focus on impacts of policies and decisions to their individual jurisdictions.

Another longstanding example of regional coordination is the County's Air Pollution Control District, which is charged with improving the region's air quality. Its success is due to agreement on its goals and obligations, recognition that air quality is a regional concern, and a belief that partnership will achieve its goals. Indeed, it goes out of its way to create partnerships with other agencies (including SBCAG), local communities, and the region's businesses. Where success in meeting air quality goals is difficult is with sources that are beyond the reach of its regional grasp (e.g., ship transport in the Santa Barbara Channel, a major contributor to onshore air pollution).

In the last few years, additional multi-jurisdictional programs have been established to coordinate actions on a wide range of issues. Project Clean Water involves several cities and the County along with local nonprofits in a coordinated effort to protect creek and marine water quality. The recent creation of the Countywide Housing Advisory Committee will bring together a number of agencies and jurisdictions to address housing affordability. Other examples include coordinated efforts relating to cleaning up creeks and improving ocean water quality and the Homeless Advocates Task Force.

Local governments are also a critical part of the South Coast Community Indicators Project which, with help from nonprofits, UCSB, and foundations, created a process for tracking critical changes in South Coast. The annual Indicators report tracks social, economic, and environmental issues and provides perspective on evolving trends across the South Coast region. Land use decisions, however, remain within the purview of individual jurisdictions.

In ECP's view, our local experience underscores both the value of regional coordination and the problems in establishing coordination mechanisms and making those efforts effective. In this section, we offer suggestions for alternatives in creating a regional approach that is a core part of our policy making toolkit and which complements our local decision making bodies. We will review regional planning mechanisms used elsewhere and suggest what differentiates success from failure. Finally, we will offer our thoughts on how we might improve regional coordination on the South Coast.

REGIONAL PLANNING EXAMPLES

The fragmented nature of governance in metropolitan regions stems, in part, from a preference for "home rule" rooted in cities, rural counties, and school and special districts that are viewed as responsive to local concerns. Historically, this made sense when cities were isolated and metropolitan regions did not exist. Fifty years ago, the notion of an integrated housing and job market that encompasses southern San Luis Obispo County, all of Santa Barbara County, and the western half of Ventura County would have seemed ludicrous. Today it is our reality. Yet we retain our perception that regional decision making bodies are unresponsive to the needs of local neighborhoods, local schools, and local transportation networks.[17]

[17] Much has been written on regionalism, its history, success, and failures. A good starting place is Kathryn A. Foster, "Regionalism on Purpose," written for the Lincoln Institute of Land Policy (Foster 2001).

Establishing successful regional planning and coordination mechanisms requires overcoming that healthy skepticism that local concerns will be ignored to gain benefits for a greater community. The skepticism is driven by a belief that regional planning is a zero-sum game—solutions will necessarily involve winners and losers and that will mean that some localities will gain benefits while others will endure impacts. Regional coordination takes root when there is a belief that a crisis is at hand—that going it alone will result in greater impacts than can be overcome through local decision making. Under these conditions, the case for regionalism is made on the belief that coordination will "limit my neighbors' bad decisions that adversely affect my community" and that "my community will gain from better decisions that offer greater benefits for me and my neighbors."

Multiple approaches to regionalism, loosely framed around different purposes, have been tried over the years (see Table 14). One basic approach to regional coordination is the governmental solution where a state or group of jurisdictions create a geographically based governing body. In California the Councils of Government (or COGs), such as SBCAG, have a mixed record of success. Examples of a proven track record of success with this approach include the Metropolitan Council of the Twin Cities (http://www.metrocouncil.org) and the Metropolitan Service District of Portland (http://www.metro-region.org), the regional government for the Portland, OR, metropolitan area.

A different approach that has had a measure of success is partnerships, often led by nonprofit independent organizations that serve a regional coordination function. The Metropolitan Planning Council (http://www.metroplanning.org/), which serves a six county region centered on Chicago and Cook County in Illinois, educates members and localities on regional issues, advocates for regional solutions to transportation, housing, and economic development problems, and provides a neutral forum for seeking common ground among its constituents. The Regional Planning Partnership (http://www.planningpartners.org/) is an independent, non-partisan organization in Central New Jersey that serves as a research and policy development organization on smart growth issues in its region and statewide in New Jersey. Similarly, the Santa Ana River Watershed Group operating as a regional focus group in Southern California. Both the Metropolitan Planning Council and the Regional Planning Partnership are organizations with broad membership among elected officials, business and institutional leaders, community activists, and citizens. Examples of how these approaches work are discussed below.

Metropolitan Council of the Twin Cities

Originally established by the Minnesota legislature in 1967, the Council is the regional planning agency serving the Twin Cities' (Minneapolis and St. Paul) seven-county metropolitan area. The Council operates a regional bus system, wastewater collection and treatment system, affordable housing program, and parks and trails network. It conducts regional planning for future growth, develops regional growth forecasts, and plans for the regional needs in aviation, transportation, parks and open space, water quality and water management. The Council is governed by a 17 member board appointed and serving at the pleasure of the Governor with 16 members from individual geographic districts within the region and an at-large Chair and works through a profes-

sional staff. Funding is a combination of user fees from operations and state and federal funds with a small amount from property taxes and supports a budget of nearly $400 million.

An example of the Council's regional efforts are its housing programs (http://www.metrocouncil.org/housing/ housing.htm). Committed to increasing the availability of affordable housing throughout the region, the Council implements the regional Section 8 federal housing assistance program, an inclusionary affordable housing programs that promotes water use and wastewater generation reductions, grants for affordable housing projects that follow smart growth principles, grants that promote workforce housing, a "smart commute mortgage" program that provides incentives to live and work in close proximity, and a family affordable housing program to encourage rental housing in suburban communities. The Council also served as the convener of several Mayors' Task Forces on affordable housing and is using the recommendations to guide its legislative initiatives and development of new programs.

Table 14
Regional Purposes and Regional Means

	Structural Means			Nonstructural Means			
	Metro Govt. Models (city-county consolidations, two-tier federations)	**Multipurpose Regional Entity**	**Single-Purpose Regional Entity**	**Inter-local Agreements/ Service Compacts**	**Private/ Civic-led Collaborations**	**County Program/ Policy**	**State-motivated Program/ Policy**
Environmental		Portland, Minneapolis-St. Paul	Cape Cod, Tahoe RPA		San Francisco, Portland, SARWG		
Fiscal	Nashville, Jacksonville, Miami-Dade Co.	Portland, Minneapolis-St. Paul	Many metros, e.g., for transit	Many metros, e.g., for service sharing			
Economic	Indianapolis				Silicon Valley, Austin, Charlotte, Cleveland-Akron		
Political	Louisville, Indianapolis						
Equity						Montgomery Co., MD, Dayton-Montgomery Co., OH	New Jersey metros
Growth-based	Nashville	Portland, Minneapolis-St. Paul	Atlanta	Denver	Chicago, San Francisco		Denver, Portland
Cultural	Miami-Dade Co.	Portland, Minneapolis-St. Paul	Pittsburgh, St. Louis, Denver		Chattanooga		
Ad Hoc					Baltimore-Washington, DC		

Source: adapted from Foster 2001.

Metropolitan Service District of Portland

The Metropolitan Service District of Portland, known as Metro, was created by the Oregon State Legislature in 1977, merged with the Columbia Region Association of Governments the next year, and began operations in 1979 with a charter that included responsibility for an urban growth boundary, solid waste planning, and operating the Washington Park Zoo. Metro now serves 1.3 million citizens in three counties and 24 cities in the Portland region. It's responsible for land use, natural resources, and transportation planning, maintenance of the urban growth boundary, parks and trails planning and management, recycling and waste reduction and management, the zoo, regional mapping and data management, and the regional convention, performing arts, and exposition centers. Its Board is composed of seven members, six of whom are elected by district and one elected at-large who serves as the Chair. The professional staff is overseen by an Executive Officer and an Auditor who are elected at-large by the District.

Metro is probably best known for its work on establishing an urban growth boundary for the region. Within the UGB are the urban services such as roads, sewer, water, parks, schools and fire and police protection. The UGB is designed to help protect farm and forests from urban sprawl. By law, Metro must plan for a 20-year supply of land for future residential development inside the boundary and must review the land supply every five years and, if necessary, expand the boundary to meet the requirement. The Metro Council has several specific land use planning powers including coordinating regional and local comprehensive plans in adopting the UGB, requiring consistency of local comprehensive plans with statewide and regional planning goals, and planning for activities of metropolitan significance including transportation, water quality, air quality and solid waste. Last year, following extensive testimony from residents and businesses, the Metro Council approved a major expansion of the UGB, which now encompasses nearly 19,000 acres with about 3,000 acres dedicated to employment, and which includes new policies to protect existing neighborhoods, provide additional land for jobs and to improve local commercial centers and main streets.

Metropolitan Planning Council

The Chicago area Metropolitan Planning Council (MPC) was established in 1934 as a coalition of business and civic leaders who advocated for regional solutions as the metropolitan area grew. Today, MPC focuses on identifying needed policy changes in the areas of education funding, freight transportation, and affordable housing. Its efforts on educational funding seek to shift revenue sources from a property tax base to state sources so as to minimize the "fiscalization" of land use decisions. Its freight initiative centers on developing regional rail yards outside the urban core as part of an area-wide economic development vision—the Chicago metropolitan area is the 3rd largest inter-modal center in world. It is promoting "housing for the workforce," focusing its efforts on the business benefits of regional planning and smart growth.

They use their business base—their members include executives with most of the metropolitan areas' biggest corporations—to push for greater regional cooperation among agencies and local jurisdictions. They tend to work on the same issues for a long time (10 to 20 years) and, as a consequence, tend to take the long view of keeping pressure on decision makers. More recently, they have become a key part of a coalition campaign to promote sensible growth

(http://www.growingsensibly.org) as suburban towns are seeing their downtowns die when "big box" stores come to the periphery. MPC makes the case to local jurisdictions and the business community for acting differently. They are leading an innovative effort to tap "unused" public housing monies each year where a percentage goes to a development pool for affordable projects initiated by developers. They attribute their success to going beyond simple preaching for solutions to getting into the politics of the issues.

Regional Planning Partnership

The Regional Planning Partnership (RPP) is smart growth research and advocacy organization based in central New Jersey that is dedicated to enhancing the quality of community life through better land use planning and regional cooperation. It began in 1968 as a forum for stakeholders from the three counties around Princeton, New Jersey to plan together for a better future. Members include representatives of major corporations, universities, public agencies, and civic groups. The organization sees itself as a developer of new land use tools, strategies, plans and programs to achieve smart growth goals, educator of local, state and regional decision-makers on how best to protect the natural environment and improve the built environment, a coalition builder among a broad range of public and private interests, and an advocate for policies, programs, plans and regulations that support smart growth.

Since 1968, RPP has achieved strategic victories that have shaped its original study area in central New Jersey including: the location and extent of sewer lines and the funding of transportation improvements; the preservation of farmland and open space; the construction of affordable housing; and investment in urban areas. It helped establish the state planning process that has created various planning innovations, including the Goal Oriented Zoning program that can estimate the build-out of a zoning ordinance and calculate the likely impacts that development will have on air and water resources, traffic and public costs. RPP is working on regional planning legislation to support the development of Regional Action Plans (RAPs) that bridge the gap between state planning goals and local land use decision-making. RAPs are part of a process that combines factual analysis and political choice to obtain binding agreements for setting targets for growth, transportation choice and environmental protection.

The Santa Ana River Watershed Group

The Santa Ana River Watershed Group (SARWG) is a collaborative effort of more than 30 private and public organizations and agencies addressing issues in Southern California's Santa Ana River Watershed, focusing on the Chino Basin Dairy Area. It combines some aspects of research, dialogue, and advocacy with regulatory clout in a process they call "shared governance." Flowing nearly 100 miles from the San Bernardino Mountains to the Pacific Ocean, the Santa Ana River has not only the largest Southern California watershed, but it is also in the midst of one of the most rapidly urbanizing regions in the nation. The organization is characterized by a broad "visioning" process involving affected agencies and interests that it matches with a focus on specific initiatives. A key element of this effort is a unique collaborative effort where the Group meetings are facilitated by the Growth Management Institute, a non-profit organization, to scope issues, opportunities and potential alternative solutions to problems in the watershed region without votes or recommendations. Funding for the group's efforts has been provided by

key participants such as the region's dairies, local agencies, and the US EPA, as well as grants from utility agencies and foundations.

The group serves as a regional planning mechanism to assist in formulating consistent approaches and initiatives that are then available to be implemented by individual member agencies and interests. SARWG has had a great deal of success addressing waste problems in the dairy industry which is a significant contributor to pollution in the watershed. Its facilitated process allowed multiple competing interests—watershed protection, water quality, waste management, economic development, agricultural protection—to craft approaches that could be implemented in a coordinated fashion rather than piecemeal assuring that the vision of protecting the watershed and maintaining the viability of agriculture can be maintained.

GOING FORWARD

Regardless of the implementing mechanism, successful regional efforts share some common traits. First is coming to agreement on a sense of crisis that, without regional planning, all local jurisdictions would be worse off. If across the region we want to save open space, increase affordable housing, diversify our economy and community, reduce congestion and improve transportation, we have to decide if those things are so bad that we have more to gain than lose by coordinating efforts across jurisdictions. Second, solving a regional problem will require addressing multiple issues. Regional efforts are rarely successful if they compartmentalize problems or take a narrow view of solutions. An urban growth boundary works when planning for housing and transportation are part of the process for establishing and maintaining the boundary. Third, is a belief that all stakeholders have a role in a regional approach—elected officials, residents, businesses, environmentalists, housing advocates, and agriculturalists from the private and public sectors. Dialogue that respects the right to hold different views while sharing a belief in the value of achieving a shared vision for the region is the basis for moving away from a zero-sum game approach.

We do not take a position on the best mechanism for a South Coast's regional coordination effort. We believe that the crisis is upon us and that RIGS tells us that we need to face this now rather than putting it off for another decade. We are advocates for a region-wide discussion on the problems that must be addressed in concert and the mechanisms for putting regional coordination policies in place. That dialogue should start today.

APPENDICES

APPENDIX 1
1974 IMPACTS OF GROWTH STUDY

In 1974, the Santa Barbara City Council asked a group of local citizens, organized as the Santa Barbara Planning Task Force, to provide information and analysis in support of an effort to determine an optimum population level for the City. The resulting work, published as *Santa Barbara: The Impacts of Growth* (Santa Barbara Planning Task Force 1974), became a guide for the citizens and policy makers in the City of Santa Barbara. The study had a direct influence on the passage of Measure E in 1989 that controlled the development of commercial properties within the City.

The study was driven by a general concern that population and quality of life, particularly environmental quality, are linked. How they are linked, how an optimum population level might be determined, and the policy mechanisms available to achieve a particular population level was the focus of the Task Force's efforts. The Task Force did not attempt to determine what would be the best size for Santa Barbara. It sought to lay out what citizens and policy makers would need to do and to accept if they wanted the City to be a particular size.

The Task Force broke new ground in asserting that growth was driven in large part by job opportunities rather than housing availability. While Santa Barbara attracted some people who sought out the community as a retirement home or a residence to enjoy independent wealth, this was, in their research, far from the majority. Growth was driven, instead, by the University, tourism-related businesses, and research and development industries. Policies to control growth should, therefore, focus on controlling new jobs. The Task Force argued against the myth that a focus on controlling housing availability would control population growth, demonstrating that such a policy approach (without control of jobs) would result only in higher cost housing, enabling the affluent to live in Santa Barbara and forcing less well off residents out of the housing market.

In a parallel argument, the Task Force urged policy makers to consider the South Coast as a region and that regional decisionmaking was critical to effective planning. They acknowledged the potential for inter-city competition over revenue generating activities such as shopping centers, for the impact of transportation or housing decisions on neighboring jurisdictions. Whether traffic or pollution or water or libraries, regional planning was critical to enhancing future quality of life. Noting the lack of coordination among the existing South Coast jurisdictions, the Task Force concluded that:

> "The absence of area-wide policy is thus itself a form of policy: if the jurisdictions of the regions do not form a common compact charting a common future, they will be left to mean-spirited squabbles in which each tries to gain at the expense of the others - and to the detriment of all." (p. 1.18)

The analysis evaluated a variety of social, environmental and economic impacts of different population levels for the City of Santa Barbara and specific neighborhoods. Major findings included:

- An increase in population will increase the relative proportion of renters in the City, increase density, and decrease open space other than parks.
- Traffic will increase to the point of exceeding capacity, even with road improvements.
- Crime will increase at higher population levels.
- Segregation by race and income generally increases with population increases.
- Air quality will improve, although relatively less at higher population levels.
- Noise generally increases in conjunction with traffic.
- Habitat is at greater risk with higher populations.
- Cost of living increases with city size, although personal economic well-being may not be affected one way or another.
- As population increases, the mix of retail stores would shift from local merchants towards national chains.
- Per capita expenditures for government will rise as population grows due to the need for new capital investment and additional services to maintain a similar quality of life. Additional taxes will be required up to a certain point, then efficiencies of scale will allow taxes rates to stabilize.

The Task Force evaluated a variety of policies that could restrain growth levels. Their conclusions about the various policies included:

- Restricting the growth of housing in the City of Santa Barbara but not elsewhere will result in the City becoming an increasingly wealthy residential area as the less affluent locate elsewhere on the South Coast. Restricting the growth of housing throughout the South Coast will drive the less affluent out of the region.
- Controls on the cost of housing, such as rent control and price controls on sales, are likely to result in less housing being offered, benefiting existing residents with lower prices, but risking deterioration, administrative complexity, and unethical and illegal behaviors to get around the constraints of the system.
- Tax strategies that capture a portion of the increase in value caused by governmental restrictions on housing could be used to improve other services even as a lack of adequate housing reduced standards of living for some in the region.
- Various planning strategies can be effective in controlling the rate of labor force growth, in effect controlling the demand for local housing and population growth. These include zoning restrictions and rezones that reduce the amount of land zoned for job-inducing activities, such as manufacturing, hotels, restaurants, large retail, etc. Some types of residential construction, such as upscale retirement and second home production, could be restricted without having significant impacts on the general housing market and would also serve to restrict population growth.
- The Task Force counseled against significant improvements in inter-regional transportation, contending that it would induce population growth by allowing residents to commute to jobs elsewhere and encourage manufacturing businesses to locate in the City and region, increasing jobs and the demand for housing.
- Promotion of the City as a place to visit, retire, or relocate a business, generates additional jobs and increases pressures to grow. Promotional efforts could be redirected to maintain population and job levels.

- Controls on the growth and expansion of public institutions, including the university, local, state, and federal government agencies would limit the increase in jobs and the need for additional housing.
- A failure to coordinate regionally among the South Coast jurisdictions would most likely result in an expansion of jobs, restrictions on housing, and the consequent impacts of traffic congestion, a shift to a wealthier community with the less affluent forced to commute, and a general decline in the overall quality of life.
- The Task Force strongly advocated regional cooperation to limit the demand for housing through control of the labor force market.

The final section of the Study included a discussion of a large range of planning tools, legal strategies, and program alternatives that would promote regional planning, growth management, and affordable housing.

APPENDIX 2
EXPLANATION OF SCOPE

Introduction

SCOPE is built on the foundation laid by Jay Forrester in his influential book, *Urban Dynamics* (Forrester 1969). Don Seville and Andrew Jones constructed the original version of the model as consultants to Prescott College, which had been hired by SBRECP to develop a method of forecasting impacts of land use planning decisions. Development of the current model was overseen by Professor Keith Clarke with the assistance of Jeff Onsted at UCSB's Geography Department. Model assumptions were reviewed and critically analyzed by Pat Saley, SBRECP Board of Directors and consultants, staff and officials from the County of Santa Barbara County, the Cities of Carpinteria and Santa Barbara, SBCAG (Santa Barbara County Association of Governments), along with other agencies, organizations, and individuals.

Data for the process of setting the parameters of the model and for validating the model's outputs against available historical data were obtained primarily from SBCAG and include:

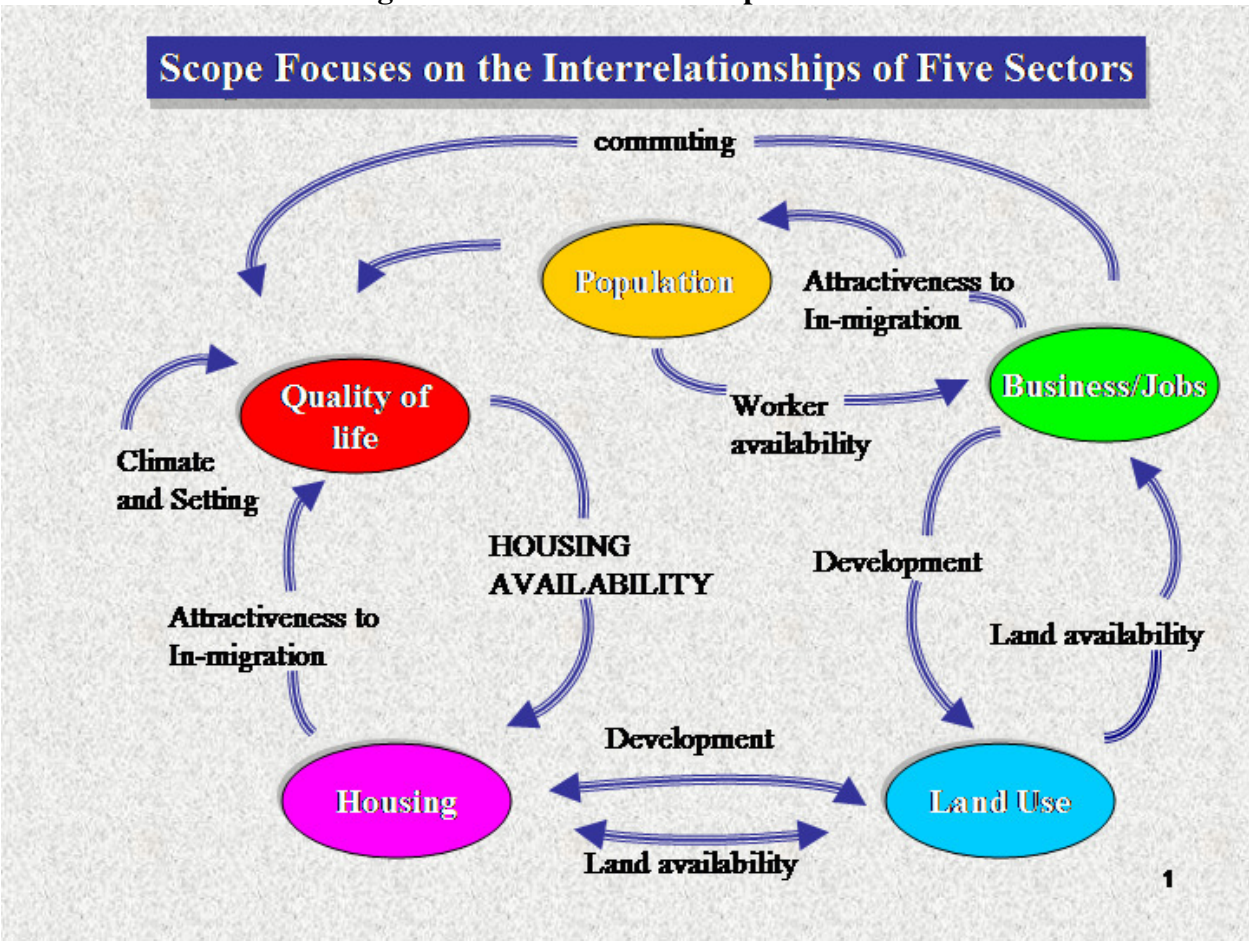
- Regional Growth Forecast 2000-2030
- The Regional Housing Needs Plan
- An Analysis of the Jobs/Housing Relationship (April 1989)
- Analysis of Journey to Work Information
- Profile of Older Adults in Santa Barbara County
- Regional Transportation Plan
- Census Sources

This appendix describes the critical components of the model that affect its functionality plus some additional outputs that are critical to RIGS .Terms in boldface (e.g., **Median House Price**) denote an equation that can be found in the Equations section in Appendix 3. Note that the terms "converter," "variable," and "element" are interchangeable as are "stocks" with "levels," and "rates" with "flows." Capitalized terms that are not in bold are used for commonly referred data outputs that are not in the exact nomenclature used in the Equations section. Finally, some variables are listed in a sector that may not be obvious, as in the case of Business Land, which is found in the Business Sector, rather than the Land Use Sector. The Equations Appendix lists all equations by sector.

The convention used in this appendix is to display the operational diagram of each sector and a close up of every Stock and Flow process with a hierarchical dissection of a process: e.g., A=B*C. B=12*X and C =89+Y. X=56 and Y=34. The model was run and revised in an iterative process in an effort to adjust relationships so that 1960-2000 outputs matched historical data (within 10 percent). If historical data on particular variables were unavailable, regression analysis of recent data was used to generate approximations.

The general relationships between the different sectors in SCOPE are outline in the flowchart seen in Figure A-1 below.

Figure A-70
Diagram of Sector Relationships in SCOPE



Housing Sector

Housing (

Figure A-71) is affected by and affects a number of other factors. These include **Households**, Median Housing Price, Construction, Demolition, Obsolescence, and Gentrification. Both the terms **Families** and **Households** are used in SCOPE. **Families** are a group of people who live together by choice, rather than circumstance, whether or not they are related. More than one family can live in a housing unit and this larger group of people is referred to, in conformity with the Census definition, as a **Household**. To avoid confusion, the term **Families** will be used to denote those agents that act as a group when it comes to making housing choices which reflect their income. The difference between our use of **Families** and the Census Bureau definition of a household is only relevant when depicting average household size. Also, it should be noted that

our **Household** (as defined by the Census) numbers in the past have been validated by the Census household numbers. Hence, when we speak of Low_income families it is in the same context that the Census would remark upon Low-Income Households. Low-Income **Families** will increasingly crowd together as Affordable Housing disappears. The initial assumption of **Average Family Size** is as follows:

- Upper Income is 2.12
- Middle Income is 2.96
- Lower Income is 3.78

The average number of people per affordable housing unit may be substantially higher (e.g., 8 or 9) due to more than one family sharing quarters.

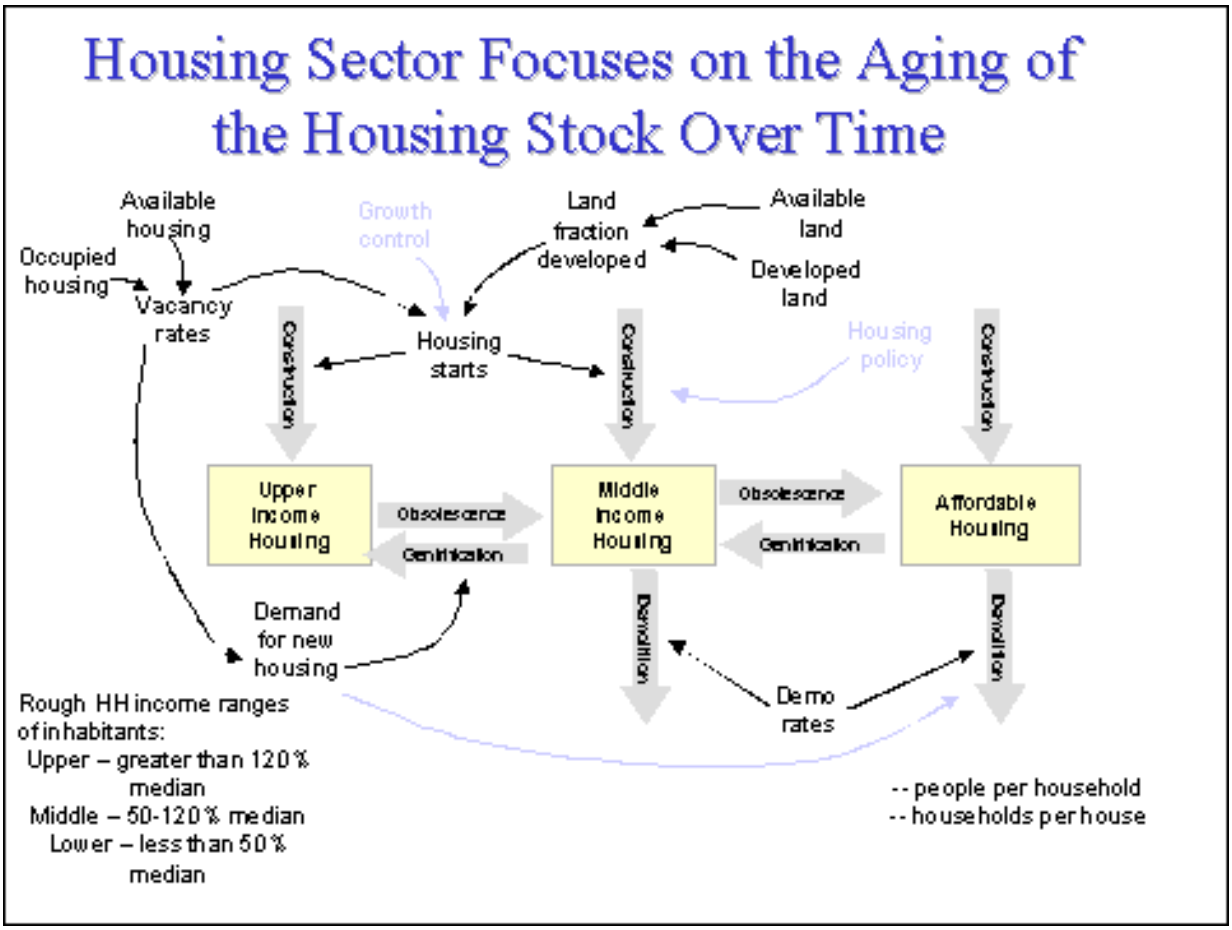
The Population sector tracks in-migration via individuals that are agglomerated into **Families** at the three different income levels. Low Income households consist of all Lower Income **Families** plus 90 percent of **Non-Housed Students** (since most live in student communities or other low income housing). The Middle Income pool consists of all Middle Income persons plus 9 percent of **Non-Housed Students** (reflecting a small number in the market for Middle Income Housing) **Upper Income Families** are made up of the Upper Income population plus 1 percent of **Non-Housed Students** (which assumes a very small fraction seek upper income housing). Each age demographic has a certain percentage of people who are living in group quarters. It was assumed that 17% of Seniors are in retirement homes, 1.7% of adults are in some sort of group quarters and, 0.17% of children are in some sort of group quarters. Each of the household types are divided by their respective **Average Family Size** and then summed to yield the final tally of **Families**. Over time, to allow for a decreasing birth rate, the **Average Family Size** decreases somewhat. Also, based on SBCAG analysis, there are about 5,000 beds in group quarters available for Students, which results in **Non-Housed Students** consisting of all **University Students** minus 5,000.

The Initial **Housing Prices** for the three housing income levels, derived from historical data, are as follows:

- **Initial 1960 Housing Price** (Upper) in 2000 dollars = $281,839.93
- **Initial 1960 Housing Price** (Middle) in 2000 dollars = $80,526.49
- **Initial 1960 Housing Price** (Lower) in 2000 dollars = $24,161.25

The above proportional differences in **Housing Price** are kept throughout the 80-year modeling cycle to facilitate model operability, although over time, the actual proportional differences may change. To address differences in demand between Affordable Housing and Middle Income Housing, the **Average Household to Housing Ratio** is used to calculate the **Effect of Demand on Price** for Middle Income Housing, which is then further multiplied by the respective coefficient for each level of housing: 3.5 for Upper Income, 1 for Middle Income, and 0.3 for Affordable. This allows the relationship between the three income levels to remain constant. These relationships were chosen to match SBCAG's demarcation of three different housing levels.

Figure A-71
Housing Sector



The Census Bureau defines income groups as follows: Very Low Household Income is <50 percent of Median Household Income; Low Household Income is 50-80 percent of Median; Moderate is 80-120 percent of Median; and Above Moderate is 120+ percent of the Median. Since the model tracks in-migration attractiveness by matching up income groups with housing affordable to each group, it is essential that **Families** and **Houses** are broken up in an identical fashion to reduce problematic overlap. In SCOPE, The Census Bureau definition of **Households** was condensed from four brackets to three by treating the Very Low Income Census Bureau category as Low Income in SCOPE, combining the Census Bureau's Low and Moderate Income categories to form the **Middle Income Households** in SCOPE, and making SCOPE's **Upper Income Households** equivalent to the Bureau's Above Moderate **Households**.

One definitional issue arises when the model projects the number of **Upper Income Families** to exceed 50 percent of total **Families**, which would put the median household income somewhere

in the Upper Income range and make it impossible for those at the lower end of the Upper Income Range to be greater than 120 percent median household income. In essence, upper income households would dominate a wealthy community, then a portion of that segment would become, for that community, the equivalent of middle income people in a larger geographic area. In SCOPE, the definitions given above are loosely held so that it can still present an accurate portrayal of the affluence of those who live in a community that is becoming wealthy. Consequently, Upper, Middle, and Lower Income **Households**, though initially defined and validated using historical data for the South Coast (and therefore conforming more closely to national norms), will change in meaning as SCOPE projects them into the future to a national context of income. If SCOPE did not allow that, then it would not be possible for more than 50 percent of the South Coast to be considered **Upper Income Households**.

Housing Prices must have the same relationships to each other as **Families**. Consequently, Lower Income **Families** are assumed to be the only families in the market for **Affordable Houses**, meaning only those **Families** that are <50 percent of the Median Household Income are in the market for Affordable Housing, despite the possibility that **Families** much wealthier would qualify as well. Middle Income **Families** are paired with Middle Income (Workforce) housing and Upper Income with Upper Income.

Calculating **Median House Price** (the point at which 50 percent of the house prices are higher and 50 percent are lower) is much more complicated than calculating a mean (sum of housing prices divided by the total number of houses). Medians must be assumed about each income level's housing prices. The median Affordable Housing Unit is the price affordable to families that are 25 percent of the median household income since 25 percent is halfway between 0 percent and 50 percent, which is the Affordable Housing range. Eighty-five percent (halfway between 50 and 120 percent) of the Median Household Income is assumed to be the mid-point affordability level for Middle Income Housing, and 289 percent is used to determine the median for Upper Income Housing. The **Median House Price** for each level of housing is driven by the demand for each level of housing by the concomitant household level, modeled as the **Families to House Ratio** for each level with higher ratios creating higher demand. Because the modeling program uses equations and cannot create rank orders (necessary to derive a median), a methodological hybrid is used. First, each Housing type has an initial **Median House Price** that fluctuates (based on an equation) with demand. As mentioned earlier, these fluctuations are driven by a function rather than a true rank-order process (See **Median House Price** equation). A complex second process is used to approach the true median that locates mean number of total houses in one of the three housing groups (affordable, middle income, and upper income), takes a certain calculated ratio of the number of houses in the identified group and uses it to calculate the total **Median House Price** based on a specified range for that housing group (see the equation list for **Median House Price)**.

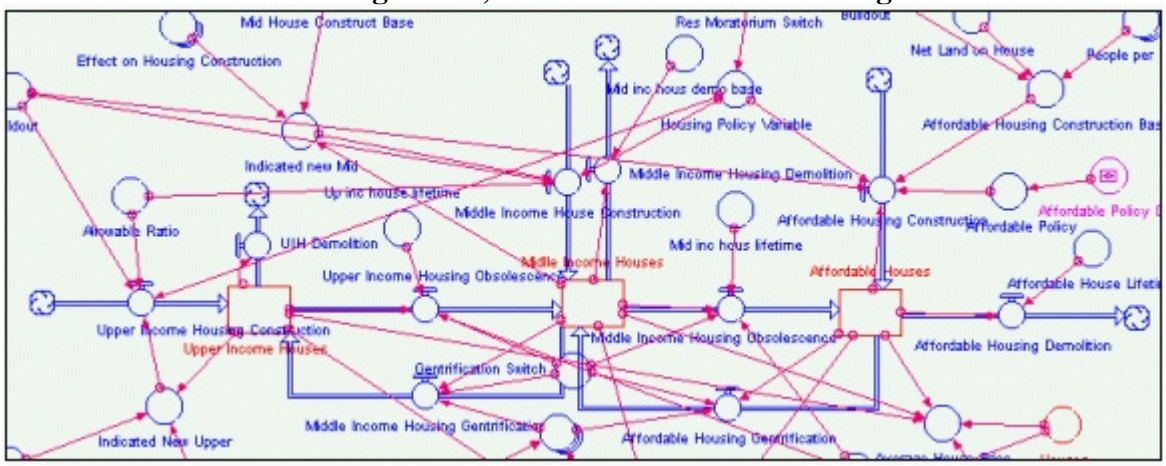
Housing Demand, which drives many of the processes that affect housing stock, is calculated by taking into account the **Families to House Ratio** for each income class and setting each to a particular power. These exponents represent the different sensitivities (willingness) towards crowding for each income class, with a higher exponent indicating greater sensitivity. Exponents for Upper, Middle, and Lower Incomes are 2.0, 1.0, and 0.75, respectively. Each income category

has its own **Housing Demand** which drives housing stock fluctuations generated by the corresponding income level, excepting **House Price**, as explained above.

Processes that affect housing stock include ***Construction, Demolition, Gentrification, and Obsolescence***. Any housing unit can be created by one or more of these processes (shown in

Figure A-**72**). An Upper Income unit can be created through construction or from gentrification of a Middle Income unit. A Middle Income unit can be created by construction, obsolescence from an Upper Income unit, or gentrification from an Affordable unit. Affordable units can be constructed or result from obsolescence of a Middle Income unit. A regression-derived calculation was used for the number of **Houses** that existed in 1960 and then applied to initialize the model: 11,101 Upper Income units, 15,728 Middle Income units, and 6929 Affordable units.

Figure A-**72**
Housing Sector, Stocks and Flows of Housing



Construction

Very little Affordable Housing is built solely as a result of market forces; policy initiatives drive most new Affordable Housing. Because policies change over time, it is difficult to model past **Affordable Housing Construction** in the same way that other housing types (by income) are modeled. The base amount of **Affordable Housing Construction** uses socio-demographic characteristics as a proxy for policies that would result in new affordable housing units being built. This algorithm can be turned off after 2000 to evaluate alternative scenarios and replaced with a user-defined number of affordable units constructed per year. Lower Income population pressure (derived from **People per House** (Lower)) and the amount of available land (**Land Fraction Developed**) define the algorithm. Available land has a relationship with the attitudes the region has in general towards new construction. Both of these factors above are taken into account when evaluating affordable housing (**Net Land on House**). Also, whether or not the user of the model wishes to obey the current General Plan will affect the plateau of housing construction since the plan specifies that only a certain additional number of units may be built. **Ignore GenPl** when switched on, tells the model that only the amount of available land, along with other possible model variables, will create the ceiling for additional housing units. When turned off,

the user tells the model to obey the current general plan ceiling, which happens to be around 88,000 total units.

Middle Income Housing Construction is determined by **Effect on Housing Construction**, **Allowable Ratio**, and **Middle Income Housing Construction Base**. The **Middle Income Housing Construction** Base is a 2 percent increase in units per year (modified from Forrester 1969). **Allowable Ratio** affects the number of new housing starts over time and results in a steadily decreasing housing construction rate. **Effect on Housing Construction** accounts for **Housing Demand,** the **Upper Class Market Share**, and changing attitudes towards growth as well as momentum of growth as the amount of available land fluctuates (**Net Land on House**). Feedback from local experts and the original modeling team established an inverse relationship between **Upper Class Market Share** increases and decreases in **Middle Income Housing Construction**. **Upper Class Market Share** simulates the snowball effect of a wealthy enclave, which tends to encourage speculation and greater development due to higher profits per unit sold. **Upper Income Housing Construction** is determined using the same variables as **Middle Income Housing Construction**, except that as the **Upper Class Market Share** increases, so does upper income housing construction.

All construction, **Residential Structures**, **Public and Institutional Structures,** and **Business Structures,** are a function of available land. The **Buildout** converter, therefore, is in place to halt all construction when the **Land Fraction Developed** exceeds 99 percent, although the process remains dynamic even after this point is initially reached. When a sufficient number of buildings are demolished (or transformed into another type of building) per their lifetime the **Land Fraction Developed** will drop below the 99 percent threshold resulting in land once again being available for development.

Demolition

Affordable Housing Demolition represents a unit lifetime of 50 years (derived from Forester 1969). Therefore, one out of every 50 units is assumed to be at the end of its lifetime per year resulting in two percent of all affordable units per year being demolished. However, this lifetime can be increased in the case of gentrification pressure. **Middle Income Demolition** (as well as Upper) is assumed to be much more rare. Census data for housing starts in Santa Barbara reveals a demolition rate for middle income and upper income units of 0.235 percent a year, which is kept constant throughout the modeling time span. An inverse relationship between gentrification and obsolescence exists since high **Housing Demand** mitigates obsolescence and accelerates gentrification.

Gentrification

Affordable units gentrify to Middle Income units at a rate that ranges from 0 percent a year to 3.3 percent a year (**Affordable House Gentrification**). However, this rate only applies to mandated affordable housing. This upper limit was chosen to account for the 30-year price controls that are placed on affordable housing units in the South Coast.[*] There is also de facto affordable housing which is available for gentrification at a rate as great as the market can demand. The variation is controlled by **Housing Demand** (Middle) for housing, i.e., the **Families to House**

[*] This version of SCOPE simplifies the affordable control period to one single period even though control periods differ among government-subsidized housing programs.

(Middle) ratio. Middle Income units gentrify to Upper Income units in a parallel manner. However, there are no thirty-year controls on Middle Income units so the upper limit is 6 percent a year.

Obsolescence

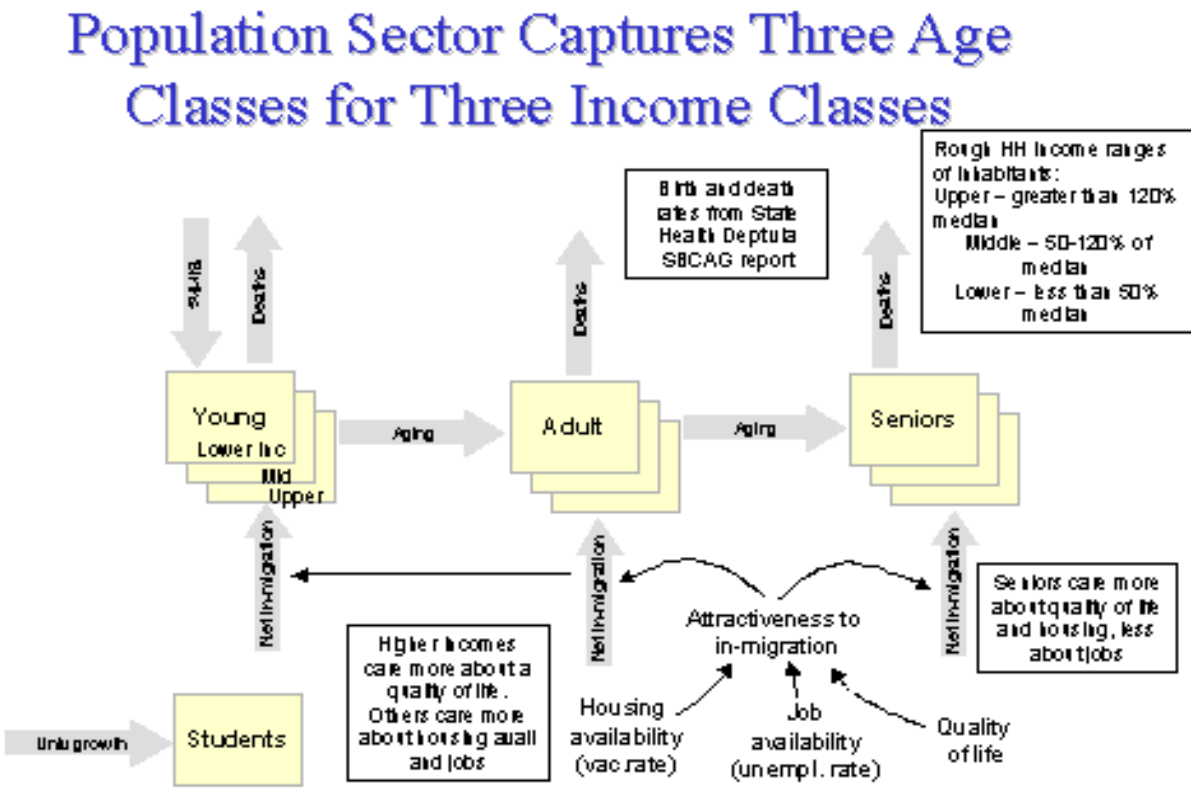
Obsolescence, or dilapidation, of structures is also an urban process. The rate of **Upper Income Housing Obsolescence** (into Middle Income) is 0.74 percent to 6.7 percent a year, depending on demand. **Middle Income Housing Obsolescence** (into affordable housing) proceeds at a rate of 0.44 percent to 4 percent a year, depending on demand. The pattern of obsolescence is based on housing units having a natural lifetime but that the lifetime is altered based on demand. Low demand encourages increased dilapidation, while high demand reduces downgrading. The Upper Income housing lifetime is assumed to be 30 years while **Middle Income Houses** and affordable units are both considered to have 50 year lifespans (though the conclusion of an affordable lifetime leads to demolition, not further obsolescence and, as mentioned above, Affordable Housing Lifetime can be prolonged from gentrification). All lifetimes are derived from Forrester, 1969.

Population Sector

South Coast residents are broken into ten groups: three income classes each of **Youth** (under 18), **Adults** (non-students 18-65), **Seniors** (65+), and **Students** (College and University only) (see Figure A-73).

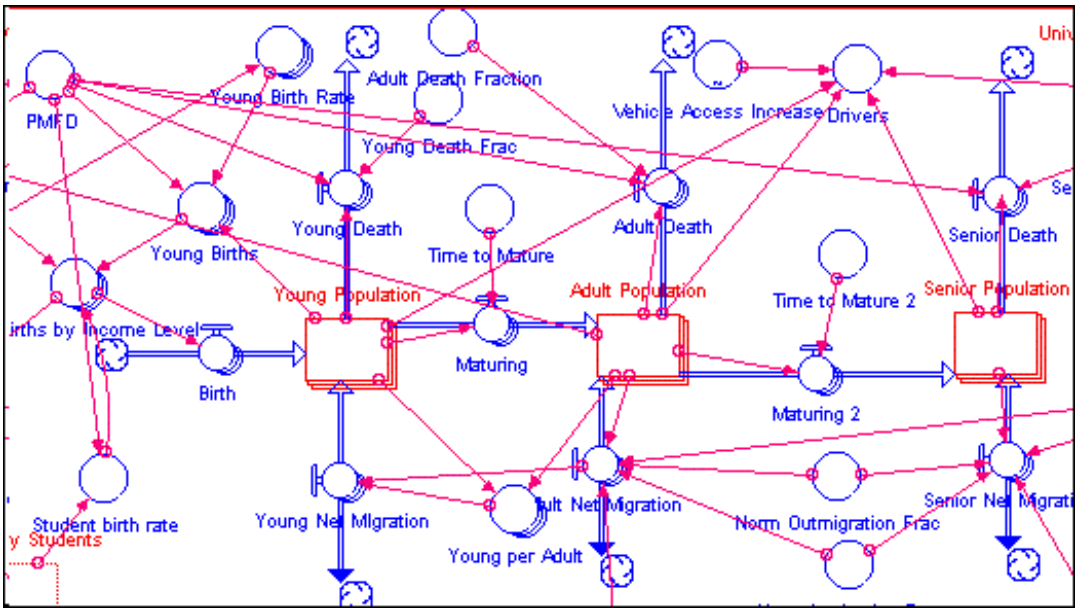
Figure A-73

Population Sector



Sources and sinks include ***Births, Deaths, Net Migration,*** and ***Aging*** (see Figure A-74).

Figure A-74
Population Sector, Stocks and Flows of Population



The initial stock values for nine of the demographic categories shown above are detailed in below. The derivation of these values is explained in the Initial Parameters Sector.

Table A-15
Initial Stock values of Population by Cross Section of Age and Income Levels

	Young Population	Adult Population	Senior Population
Upper Income	5235	12,652	3927
Middle Income	15,706	22,032	5890
Lower Income	10,471	9380	1963

Birth

Based on average fertility rates provided by SBCAG, income level multipliers were applied (0.5 for Upper Income, 1.0 for Middle Income, and 2.0 for Lower Income) following demographic research showing that wealthier populations have fewer children (Isserman, 1986). While race and ethnicity affect fertility, these factors are not included in the model because SCOPE does not predict racial or ethnic demographic changes. Teenage births are tracked following SBCAG rates and multiplied by the same income multipliers. Student births, however, required a number of assumptions and extrapolations for births among the varying cohorts of Students using census data for the Student population and births among age cohorts. Based on these, there is a total estimate of 102.5 births for 17,928 female students in the year 2000,yielding a birth rate of 0.572 percent.

Death

SBCAG data provided death rates by age cohort, which were then differentiated via income level multipliers (0.75 for Upper, 1 for Middle, 1.25 for Lower).

Post-Modern Fertility Decline (**PMFD**)

As socio-economic and technological changes occur, impacts on demographics will yield smaller families and longer life-spans. The model uses a variable called **PMFD** (Post-Modern Fertility Decline) to gradually reduce birth rates by 18% over the 1960 to 2040 period. Youth birth rates are reduced by only 10 percent, since more births among this age group are unplanned. Death rates for each age group are also slowly reduced. The death rate of children (**Youth Death**) is reduced the least since the incidence of death is relatively low and more likely to be a result of accidents or trauma, while the rate of **Senior Death**s drop the most. Young Death drops by 5 percent, **Adult Death** by 10 percent, and **Senior Death** drops by 18 percent over the 80 year period. While more sophisticated techniques are available, they require much smaller age-cohorts or extrapolations from national models to regional settings.

Maturing

The proportion of the population considered to be in the last year of that age class moves into the next age class every year. For example, one eighteenth of the children are considered to become adults each year.

Net Migration

Models of regional in and out-migration may look at a variety of factors. Some look only at wage differentials (Ghali et al. 1978), while others have concentrated on socioeconomic factors such as age, sex, and race (Lowry, 1966). The "alternative opportunities" approach involves comparing one community with another in order to gauge flows of people (something not possible in SCOPE since it deals with only one functional region). Liu (1975) uses **Quality of Life** variables (as does SCOPE, see below) to model in-migration flows. Although the availability of housing has not been used as often as availability of jobs (Dahlberg and Holmlund, 1978) for the explanation of people flows, we feel that this should not be overlooked in the case of the South Coast where housing (or lack of it) has become an extremely limiting issue.

In SCOPE, in-migration is driven by an Attractiveness factor (**Attractiveness to General Population** and **Attractiveness to Seniors**) by income levels multiplied by **Norm Inmigration Frac** of 0.11 (altered from Forrester 1969) with a **Norm Outmigration Frac** of 0.07 (also from Forrester 1969) subtracted from the product. **Young Net Migration** takes the output of **Adult Net Migration** and multiplies this with the **Young per Adult**, which is calculated by taking the **Young Population** and dividing this by the **Adult Population**. Though this assumes that those moving to the area have the same average number of children as those already here, this reduces complexity to a manageable level.

Adult Net Migration multiplies an Attractiveness factor with the **Norm Inmigration Frac** (shown above) to produce a percentage increase of new arrivals. This percentage is multiplied with the number of Adults already living in the South Coast to get an absolute number of newly arrived adult immigrants. This number is reduced by those leaving the South Coast. The percentage of the population emigrating is calculated by finding the product of the normal outmigration factor (given above) and the **Crowding Feedback** variable. This percentage is then multiplied by the **Adult Population** to yield the absolute numbers of those emigrating. **Crowding Feedback** is a control mechanism to limit people in all income classes from crowding too densely into housing units. Therefore, a certain **People per House** carrying capacity exists for each income level of housing. When **People per House** surpasses the carrying capacity created for each income level, this number is divided by the carrying capacity, yielding the **Crowding Feedback** output. The carrying capacity for **Affordable Houses** is 8, Middle Income **Houses** is 4, and Upper Income **Houses** is 2.16.

Attractiveness consists of three different drivers: Housing, Jobs, and **Quality of Life**. The **Effect of Job on Attractiveness** is an index of the **Labor to Jobs Ratio** for each income category. **Families to House Ratio** drives **Effect on Housing Attractiveness** while Crime, Traffic, Service Availability, as well as Climate are indexed to create **Quality of Life** (See Traffic and **Quality of Life** section).

Effect of Housing on Attractiveness takes as its input the **Families to House Ratio**. A graphical function outputs into the **Attractiveness to General Population** variable and is then placed to the power of the **Sensitivity to Housing** exponent. This affects a household's willingness to move to the South Coast based on the availability of housing in their income bracket. Upper-Income families are given a sensitivity exponent of 2, Middle Income families are given an exponent of 1, and Lower Income families are given a 0.75. Upper Income families are extremely sensitive to shortages and will be highly unlikely to move in with other families in the same housing unit. At the same time, they are extremely attracted to emerging wealthy enclaves where suitable housing is available and public institutions are considered to be excellent. Middle and Lower Income Families are increasingly less sensitive to this pressure.

Seniors are affected by the **Effect of Housing on Senior Attractiveness** factor via the **Families to House Ratio, which is** used as an input to a specific graphical function and differentiated by income level. Upper Income **Seniors** have a sensitivity (**Sr Sens Housing**) of 0.81, Middle Income have 0.675, and Lower Income have 0.54, derived empirically to yield the most accurate results.

Effect of Jobs on Attractiveness is driven by the **Labor to Jobs Ratio**. This ratio is tracked for each income level since jobs are tracked in parallel with these three income brackets. Therefore, the amount of upper income labor divided by the amount of upper income jobs yields the upper income **Labor to Jobs Ratio**, etc (See Business Sector for the discussion on Labor), which is used as an input into a graphical function called **Effect of Jobs on Attractiveness**. The **Sensitivity to Jobs for** Upper Income people is 0.45, Middle Income 0.54, and Lower Income 0.225. These sensitivity rationales may seem surprising, given their non-descending order, but Middle Income labor is less likely to be independently wealthy and more likely to be beholden to a location sensitive job than upper income labor. Also, Lower Income labor sources, on the other

hand, are assumed to be more amenable to welfare/extended family resources in the case of unemployment, rendering them less influenced by labor/job ratio fluctuations. **Seniors** are considered to make up a very small percentage of labor, and those who are in the labor pool are not likely to move to the South Coast for good job opportunities. Thus, **Seniors** are assumed to not be influenced by the **Labor to Jobs Ratio** and there is no **Effect of Jobs on Attractiveness** for **Seniors**.

Quality of Life (explained below) is modulated by an Upper Income **Adults** sensitivity of 0.72, Middle Income of 0.6, and Lower Income of 0.48. **Seniors** are modulated by an Upper Income factor of 1.08, Middle Income of 0.9, and Lower Income of 0.72. **Seniors** of each income level are given a higher sensitivity to **Quality of Life** than their Adult counterparts based on an assumption that **Seniors** place a higher priority on these environmental factor than **Adults**.

Students

The student population in the South Coast is significant with UCSB dominant, Santa Barbara City College (SBCC) at 67 percent of UCSB's student population, and Westmont at 1,200 students. UCSB's student population, growing at about 8 percent a year, is multiplied by 1.67 to account for SBCC's contribution to the total region's student population while Westmont is given a constant of 1,200 students due to its enrollment cap. UCSB's growth rate is slowed asymptotically as enrollment levels reach the maximum 20,000, while SBCC continues to its 18,000 maximum based on an initial **University Students** value for 1960 of 5,999. Death rates are not tracked for students since they are very low and any that do occur would be compensated for with an appropriate amount of increased acceptance/enrollment. Attrition and matriculation rates are also not tracked for the same reason.

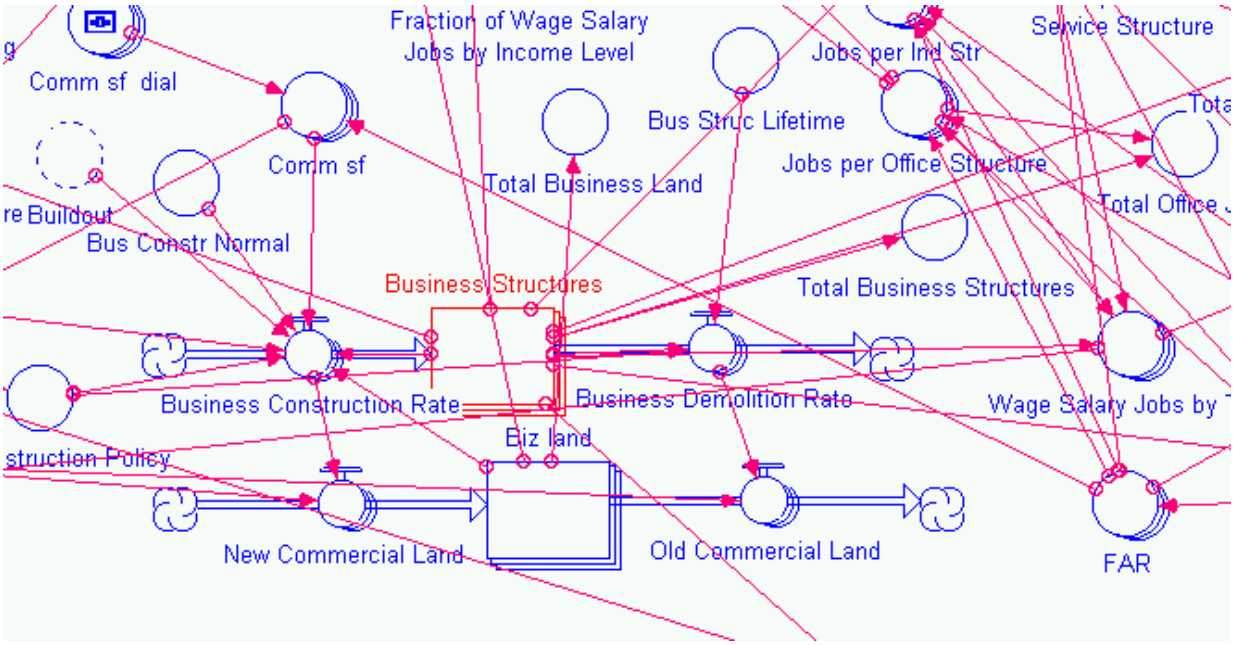
Drivers

The final aspect tracked in the Population Sector is the number of **Drivers**. This number becomes important in the estimation of Highway 101 Traffic. (See Traffic and Quality of Life). This variable, however, is not specifically named. In fact, the number generated by this variable is really more of an index that will be used to project traffic generation. Although the number of people with drivers licenses is an important aspect of this, so is access to automobiles and tendency to drive. Therefore, it is the combination of all of these factors. Thus, the coefficients multiplied by the various population groups are chosen to accurately weight the impact that these different population groups will have on Highway **101 Traffic Volume** in the South Coast. These coefficients can be seen below in the **Drivers** equation, taken directly from the model. Upper Income people tend to have more access to vehicles and **Adults** are more likely to drive than **Seniors**. Young People only have 2 years of possible driving time and Students are assumed to have a coefficient of 0.5 since it is estimated that half of students have cars. The **Vehicle Access Increase** factor incorporates the assumption that from 1960 to 2040 the number of automobiles per person will increase as will the mobility of our society (just like it has from 1960 to 2000). This factor begins with a 0.8 in 1960 and increases to 1.2 in 2040. This will have the overall effect of increasing the per person impact on Highway **101 Traffic Volume** (by the preceding coefficients) with the passage of time.

Business Sector

Jobs are tracked by the construction of **Business Structures** and **Public and Institutional Structures**. The model accounts for three types of **Business Structures**: Office, Retail/Service, and IndustrialFor the initial parameters, Retail Service units are considered to be 57% of the total, with Office structures at 18%, and Industrial structures at 25%.. Structures are both built and demolished just like homes while Jobs are tracked by assuming an average amount of employees (by income) per type of unit built. **Public and Institutional Structures** are built as the population grows and are assumed to have an average of 4 Upper Income jobs, 9 Middle Income, and one Lower Income job per unit.**Business Structures** (Office) have 4.8 Upper Income jobs, 10.8 Middle Income, and 1.2 Lower Income. Retail/Service units are assumed to have an average of 1.5 Upper Income, 4.5 Middle Income, and 7.5 Lower Income jobs per unit. Industrial Structures are assumed to have an average of an average of 2 Upper Income, 5 Middle Income and 15 Lower Income jobs per unit. These averages were derived iteratively using advice from local experts, and **Total Jobs** validation runs. No actual data exists to confirm how close these averages are to experience. Their totals, however, have been checked against real data.

Figure A-75
Business Sector



Labor

The model also takes into account those working in agriculture, those who are self-employed, those who do not wish to be employed, and those who live in the South Coast, but commute elsewhere. The converter, **Frac Jobs SelfEmpl and Other**, calculates the amount of self-employed labor as well as agricultural labor on the South Coast. These percentages change over time, with agriculture decreasing by 33 percent over the 80-year modeling period and self-

employment increasing by 49 percent based on the evolution of the economy from an industrial to one that emphasizes high-end services along with telecommunications and home-based employment.

SBCAG data shows that in 2000, agricultural employment in the South Coast was about 1.5 percent of the **Total Jobs**. Extrapolations to 1960 result in Agricultural workers comprising 10 percent of the labor force in that year composed of 27 percent of Lower Income labor, 2.7 of percent of Middle Income and 0.27 percent of Upper Income.

Based on a reported 11 percent of labor working from home in 2000 (SBCAG), 4.3 percent were in this category in 1990, 3 percent in 1980, and an expected 1 percent worked at home in 1960. The wealthy are more likely to run a home-based business than other groups. Therefore, the Income breakdown for this assumption: 1.3 percent for Upper, 0.7 percent for Middle, and 0.3 percent for Lower. In sum, the initial Upper Income percentage of labor that is not tracked through the construction of structures is 1.6 percent, Middle Income is 3.4 percent, and Lower Income is 27.4percent. Again, these percentages change with time.

Not every adult who can legally be employed wishes to be. The reasons for this could be traditional gender divisions of labor, injury, independent wealth, or even lack of interest. However, it is the first reason, gender divisions, that accounts for most of this phenomenon. It is not assumed, though, that this aspect is constant across income levels. It assumes a base labor participation fraction of 47 percent for Upper Income **Adults**, 59 percent for Middle Income **Adults**, and 47 percent for Lower Income **Adults**. This variable, like many others, changes over time. As women became a stronger element of the workforce these percentages increase by 50 percent to reflect this change in society (i.e., 47 percent becomes 70 percent, etc.). Upper Income women are considered to have less financial reason to work and, consequently, work less than Middle Income women. One might also initially presume that Lower Income women are thought to work less than Middle Income women because they usually have more children, come from more traditional families, and can not afford to hire nannies and other caregivers. This is mitigated, however, by a greater need for money. Therefore, it is presumed that the upper income female participation in the workforce is roughly equal to the lower income participation.

Those who hold jobs on the South Coast, while living elsewhere are referred to as "**Commuters**" in SCOPE. A smaller number live on the South Coast, but work outside (5.7 percent in 2000 according to SBCAG). This percentage is assumed to have been in 1960, so the initial value is 3 percent. This percentage is kept constant since, although other areas nearby the South Coast may be growing in opportunity, traffic concerns may mitigate a rising percentage of those who commute out. This **Frac Labor Commute Out** is subtracted from the **Local Labor Force**.

In addition to the **Adult Population** accounting of **Local Labor Force,** there are other populations that participate in the labor market. Ten percent of Upper Income **Seniors** will work in upper income positions (whether 20 percent working half-time or 10 percent working full time, or any combination in between). This full-time equivalency assumption is kept for Upper Income **University Students** and teenagers (**Young Population** that is 15, 16, and 17) as well.

For Lower Income positions (**Local Labor Force** (Lower)) it is assumed that at least a certain percentage of all demographic groups tracked in the model will participate. Lower Income **Seniors** equal a lower income labor force that is equal to 10 percent of their number, Middle Income **Seniors** are 1 percent their number, and Upper Income **Seniors** are 0.1 percent of their number. **University Students** are a **Local Labor Force** (Lower) equal to 25 percent of their number. Finally, teenagers (15-17, inclusive) are considered to also play a part in Lower Income jobs. A trip to the ice cream shop or to McDonald's, or a look at the youth mowing a lawn confirms this. Therefore, it has been assumed that teenagers from **Households** (Lower) equal a lower income workforce that is equal to 40 percent of their number. Teenagers from **Households** (Middle) equal a lower income workforce that is 20 percent of their number and Upper income teenagers equal a workforce equal to 10 percent of their number. The preceding percentage breakdowns are based on the assumption that **Seniors**, teenagers, and Students work less than **Adults** and Lower Income jobs are more likely to be filled by Lower Income **Seniors** and teenagers.

For Middle Income Jobs, **Seniors** will work to a certain degree but also some **University Students**. Therefore, for **Local Labor Force** (Middle), 1 percent of Upper Income **Seniors** fill these positions, 10 percent of Middle Income **Seniors** and 12.5 percent of **University Students**. It is acknowledged that most working **University Students** are part-time and most of these work at Lower Income positions. However, older Students often work at Middle-Income positions or even full-time at middle-income positions. Given this, we presume that all the **University Students** in the area provide a middle-income labor force equal to one-eighth their number.
The **Local Labor Force** (Upper) includes, in addition to **Adults**, 10 percent of the Senior Population (Upper). Students and teenagers are not considered to comprise any portion of this Labor Force.

Construction

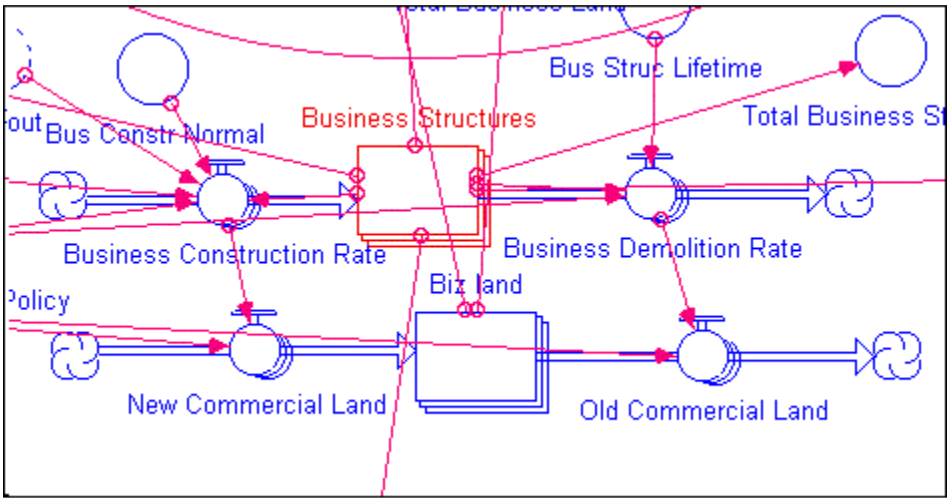
The initial (1960) **Business Structures** number is divided into 295 for Offices 920 for Retail/Service, and 401 Industrial. While the number of **Business Structures** and the total amount of developed land (**Total Land Occupied**) determine the number of jobs on the South Coast, the model does not evaluate the number of businesses and the jobs per business per se, which would provide a further validation point. Instead, **Total Jobs**, as well as the different sectors ,(which also is influenced by **P and I Jobs**) and **Biz Land** have been validated against available data. The 1960 initial **Biz Land** for Offices is 52 acres, for Retail/Service it is 226 acres, and it is 435 acres for Industrial.

The **Business Construction Rate** (See Figure A-76) is driven by a constant rate of construction (7 percent) as well as **Effect on Business Construction**. The latter is driven by **Land Price Effect on Business**, **Labor Effect on Retail Service**, **Effect of Service Adequacy on Construction**, **Labor Effect on Office, and Labor Effect on Industrial**.

Land Price Effect on Business is distributed between an Office dimension, a Retail/Service Dimension, and an Industrial dimension. The **Land Fraction Developed** is input into a graphical function based on an assumption that at low levels of density, increasing density drives greater construction as more development brings greater infrastructure. At higher levels, however, the **Business Construction Rate** falls as land prices rise and location choices diminish.

While prices go up as available land goes down thereby reducing construction, retail/service is moderated by an exponent of 0.75.

Figure A-76
Business Sector, Stocks and Flows of Businesses and Commercial Land

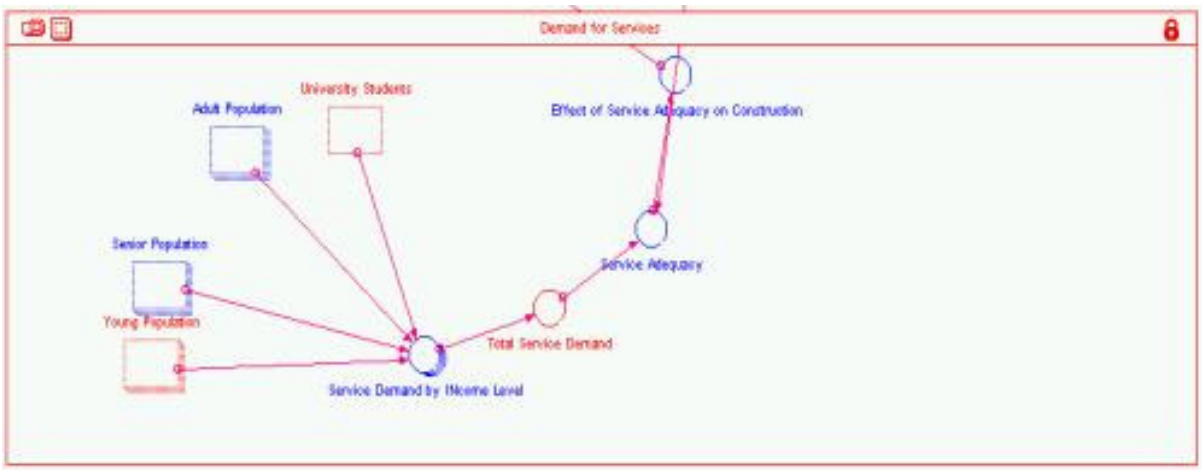


Labor effect on Retail Service tracks the **Labor to Jobs Ratio** for each income class multiplied by the proportion of jobs for each income category to the total number of jobs for retail/service units and added together. The result is input into the **Labor Effect on Retail Service** graphical function to account for the influence of labor availability across all income categories on the construction of new retail service units. An analogous process is executed for the **Labor Effect on Office** and **Labor Effect on Industrial** variable.

Effect of Service Adequacy on Construction (Figure A-77 below) gives the influence of service demand on the construction of Retail/Service units. Income multipliers for each income level represent a demand for services for each category: **Adults** by Upper, Middle, and Lower are 1.0, 0.75, 0.25 and **Seniors** are 2.0, 1.2, 0.25 respectively. These are multiplied with the populations in each of these categories to add appropriate weights to their respective demands for services and summed together to form **Total Service Demand**. Each Retail/Service Structure is considered to have a service value of 50. Thus, the number of Retail/Service Structures multiplied by 50 and then divided by the Total Service Demand yields the Service Adequacy. The inverse is **Effect of Service Adequacy on Construction**.

A graphical function, **Office Crowding**, reflects a tendency to increase the number of employees per square foot in office buildings, rather than creating new office space when the price of construction rises. Therefore, **Office Crowding** outputs a coefficient that increases with increasing **Land Fraction Developed** and this is multiplied with the **Jobs per Office Structure** converter. This has the maximum effect of 1.5 times the normal **Jobs per Office Structure** at 100 percent **Land Fraction Developed** and half the normal Jobs per Office Structure at 0 percent **Land Fraction Developed** (1960 begins with 20 percent **Land Fraction Developed**).

Figure A-77
Demand for Services Sector



Biz Land is a stock that tracks the amount of land occupied by Businesses. First, the acreage per Business Structures (**Land per Bus Struc**) is 0.541for Retail/Service, 0.058for Offices, and 0.85 acres per unit for Industrial. These are based on extrapolated estimates of initial (1960) acreages for Offices of 52, Retail/Service facilities is 226, and 435 acres for Industrial.* These numbers change through the effects of **New Commercial Land** (inflow), which has two inputs: **Land per Bus Struc** and **Business Construction Rate**. This tracks the development of new Office acreage. This methodology is also used to track residential land uses, although with an added layer of complexity (See Residential Land Use Sector).

Land Use Sector

The South Coast study area (ocean on the south to mountain ridge on the north; Ventura County line on the east and Gaviota Pass on the west) is approximately 137,000 acres. Primary sources of land use data are Santa Barbara County Assessor data and remote sensing analysis by UCSB of aerial photographs. Greater precision is complicated by the lack of consistent definitions among political and governmental jurisdictions (e.g., County assessor data against political boundaries). A community map of the South Coast Study Area is displayed in Figure A-78 below.

The most important output of this sector is **Land Fraction Developed**, which is critical for setting the pace in construction, among other things (See Figure A-79 below). This equation consists of **Total Land Occupied** divided by **Total Developable Land Area**.

* Discrepancies amongst the data sources exist, however, complicating data validation.

Figure A-78
South Coast Study Area

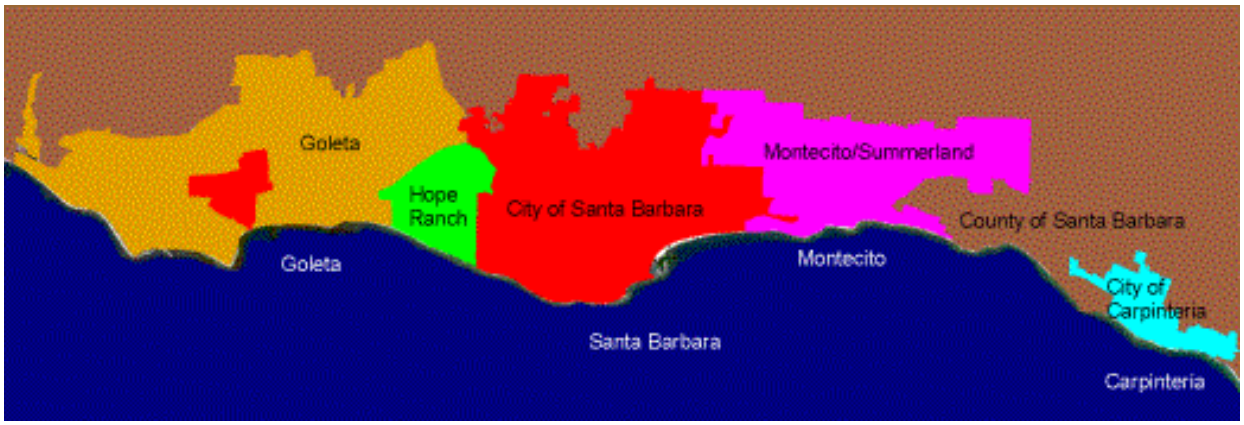
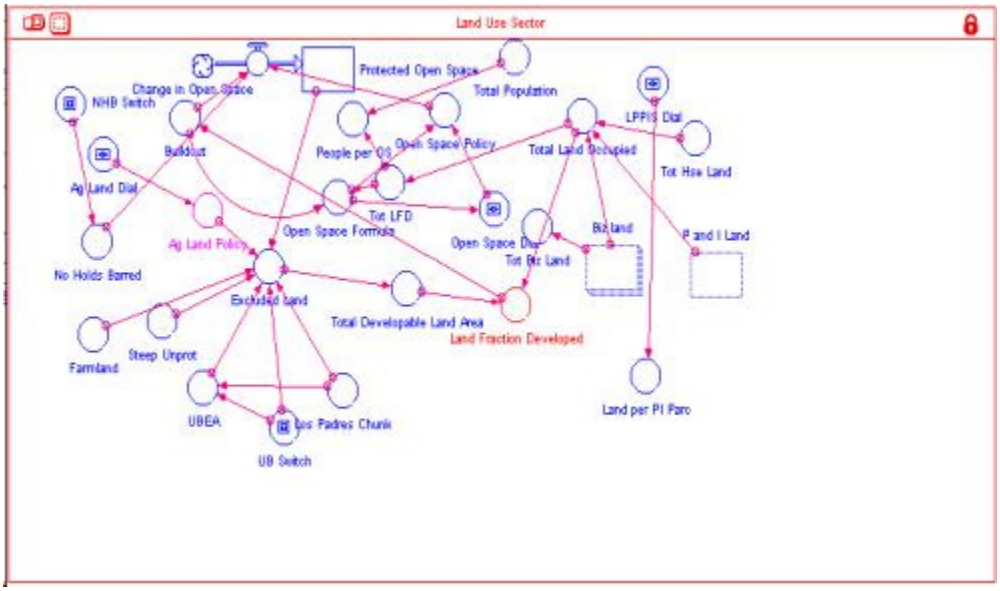


Figure A-79
Land Use Sector



Total Land Occupied

This converter tracks all of the developed acres accrued throughout the model including **Biz Land** (Commercial acreage), **P and I Land** (Public and Institutional Structures acreage), and **Tot Hse Land** (Residential acreage). **Biz Land** and **Tot Hse Land** are explained in the Business Sector and Residential Land Use Sector, respectively. **P and I Land** is assumed to be 5.12 acres per structure, unless changed by the **LPPIS Dial**. The structures themselves, and assumptions regarding them, will be explained in the Public and Institutional Sector.

Total Developable Land Area

This variable yields the difference between the entire South Coast Study Area (137,000 acres) and **Excluded Land**, which is composed of **Protected Open Space**, 652 acres of fresh water, land too steep (greater than 21 percent slope) for development (**Steep Unprot**), protected farmland, and the **Los Padres Chunk** (the acreage of Los Padres National Forest that is found in the Northeast of the Study Area). **Steep Unprot** is a constant 22,686 acres of land that, in 1997, was too steep for development but not officially protected. Protected farmland equals the product of **Farmland** and **Ag Land Policy**. Farmland is assumed to be 51,537 acres in the initial year (1960) and includes rangelands, croplands, vineyards, and greenhouse lands. Up until 2000, the **Ag Land Policy** factor is 0.3 (30 percent of agricultural land off-limits to development and, therefore, part of **Excluded Land**), but post-2000 **Ag Land Policy** is controlled through **Ag Land** Dial, which is set to a default of 0.3.

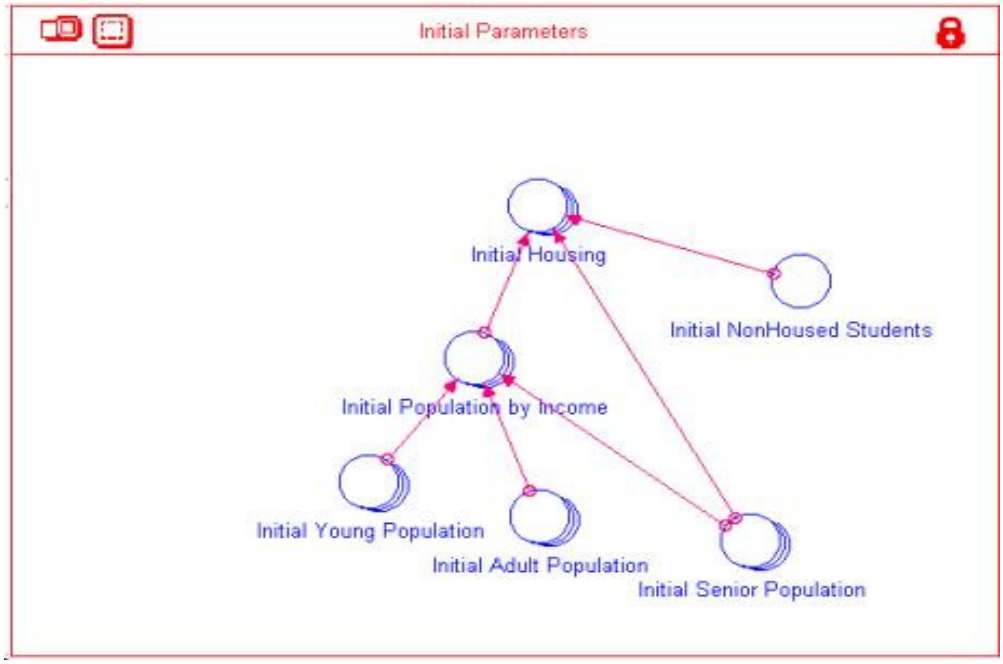
Protected Open Space

The model assumes that as more land in the South Coast is developed, there is a corresponding increase in land off-limits to development as public demand for protected lands increases. The model assumes an initial protected status of 12,379 acres in 1960, with annual increases based on the ratio of **Total Land Occupied** over 137,000 acres multiplied by 1,800.

Initial Parameters

The model operates with an initial number of people and housing units (
Figure A-80 below).

Figure A-80
Initial Parameters



Initial Housing is calculated from **Initial Population by Income**, which is comprised of the three age cohorts. Each of the nine non-student categories are calculated by multiplying the initial **Non-Student Population** with the proportion that the age class in question represents in the **Non-Student Population** and the proportion that the respective income comprises of the **Non-Student Population**. Table A-16 below lists the proportions:

Table A-16
Initial Demographic Proportions

	Percentage			
	Initial Young Population	**Initial Adult Population**	**Initial Senior Population**	**Income of Non-Student Population**
Lower Income	48	43	9	25
Middle Income	36	50.5	13.5	50
Upper Income	24	58	18	25

The 1960 distribution of income groups is assumed to be 25 percent Lower Income, 50 percent Middle Income, and 25 percent Upper Income. This assumption was made since specific income data for 1960 in the exact non-formal location we are examining was too difficult to find. Given this difficulty, the assumption seems reasonable.

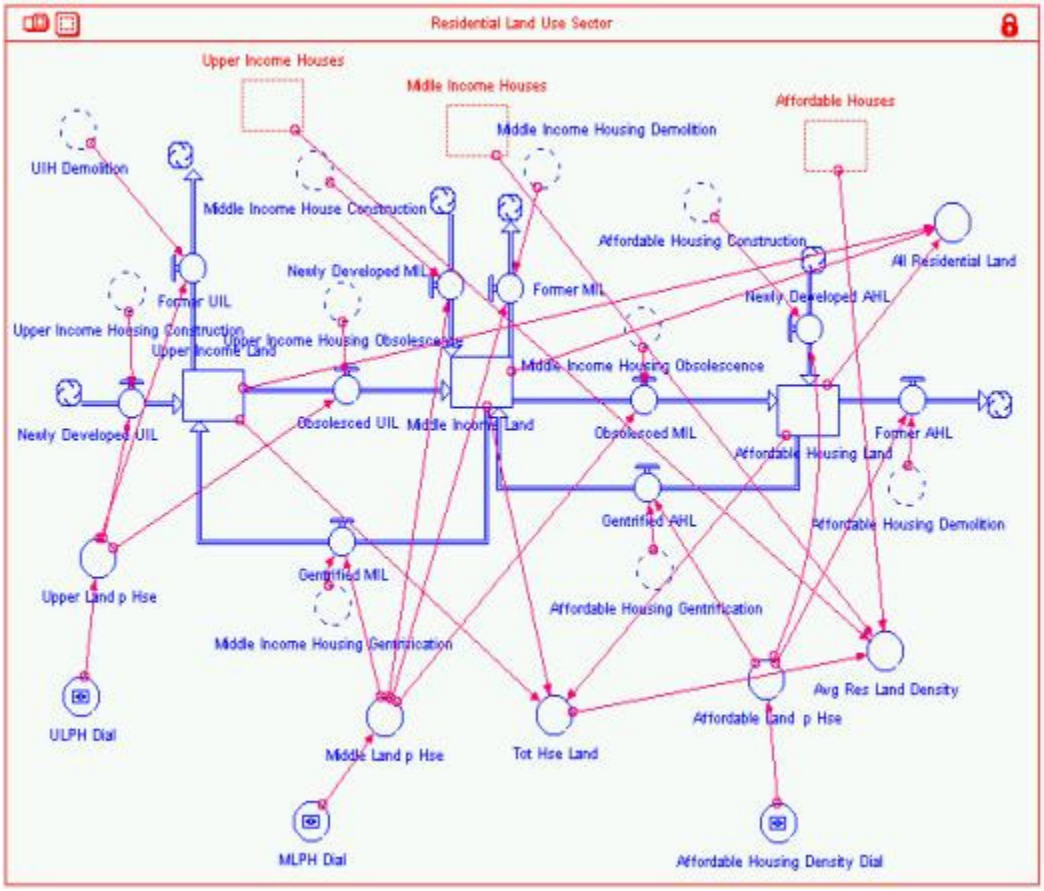
Initial Housing uses the **Initial Population by Income** to assume a number of housing units for each income level. The population of each respective income class that is not assumed to be living in quarters (including non-housed students) is divided by the **Average Family Size** and an initialization mulitplier to start off the model with the initial number of housing units.As in **Average Family Size**, special consideration is given to both Students and **Seniors** in their respective effects on housing. **Initial NonHoused Students** (which is 3,272) is added to **Initial Population by Income** (within the converter **Initial Housing**) in the same manner as in **Average Family Size**. **Seniors** are also treated identically in both converters.

Residential Land Use

Residential Land Use is given special attention because of the complexities of gentrification and obsolescence. This subsector runs parallel to the Housing Sector as shown below in Figure A-81.

Each type of housing unit built adds to the amount of developed land for that type of housing unit (**Upper Income Land**, for instance). Also tracked are those housing units that migrate from one income level to another (for example, gentrify into Upper Income Housing and concomitantly, **Upper Income Land** from **Middle Income Housing**). These built units are added to the **Upper Income Land** at the **Middle Land p Hse** (0.254 acres per unit) rate, rather that at the assumed **Upper Land p Hse** (0.508 acres per unit) rate. By doing this the model avoids spuriously forcing a gentrified unit to consume more land than it actually sits on.

Figure A-81
Residential Land Use



Each stock and flow in the Residential Land Use Sector corresponds to a parallel stock or flow in the Housing Sector. For instance, **Obsolesced MIL** (Obsolesced Middle Income Land) reflects how each Middle Income Housing Unit that obsolesces into an Affordable Unit adds to **Affordable Housing Land** the same amount that a newly built Middle Income Unit would add to **Middle Income Housing Land**, more accurately reflecting true changes in residential land uses. The model does not differentiate, however, the origin of construction for a demolished unit. If an Affordable Housing unit is demolished, the unit could have originated as a unit from a higher income level that subsequently obsolesced into Affordable Housing or it could have been built as an Affordable Housing unit. This is significant when acreage is retabulated. The model tracks the addition of gentrified and obsolesced units into the acreages of the appropriate residential land classes, but cannot subtract precise acreages out of these stocks. Therefore, for demolition purposes (which is barely noticeable in Middle and Upper Income Housing units), the assumed Land per Housing unit for the unit being demolished is subtracted from the respective built acreage. Table A-17 below matches each stock and flow in the Residential Land Use Sector with its sister stock and flow in the Housing Sector while Table A-18 reveals assumed constants used in this sector.

Table A-17
Parallel processes in Residential Land Use Sector and Housing Sector

Residential Land Use Sector	**Housing Sector**
Stocks	
Upper Income Land	Upper Income Houses
Middle Income Land	Middle Income Houses
Affordable Housing Land	Affordable Houses
Flows	
Newly Developed UIL	Upper Income Construction
Gentrified MIL	Middle Income Housing Gentrification
Former UIL	UIH Demolition
Obsolesced UIL	Upper Income Housing Obsolescence
Newly Developed MIL	Middle Income House Construction
Gentrified AHL	Affordable Housing Gentrification
Former MIL	Middle Income Housing Demolition
Obsolesced MIL	Middle Income Housing Obsolescence
Newly Developed AHL	Affordable Housing Construction
Former AHL	Affordable Housing Demolition

Table A-18
Assumed Constants in Residential Land Use Sector

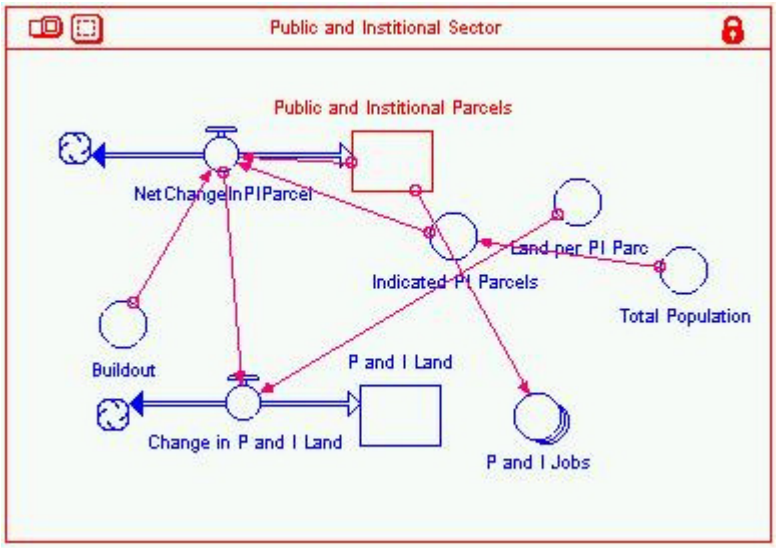
Element	**Value (in acres)**
Upper Income Land (Initial)	5,181
Middle Income Land (Initial)	4,679
Affordable Housing Land (Initial)	1,208
Upper Land p Hse (Acreage per Upper Income Housing Unit)	0.395 units per acre
Middle Land p Hse	5.07 units per acre
Affordable Land p Hse	10.2 units per acre

The initial acreage values for each land type are derived from the product of the units per acre assumption and the initial number of **Houses** of that type.

Public and Institutional Land Use

This includes the construction of all non-residential and non-commercial developments such as the airport, libraries, hospitals, schools, and roads. With the exception of roads, all of these developments give rise to employment (see Figure A-82).

Figure A-82
Public and Institutional Sector



Public and Institutional Parcels construction is driven by population growth. The initial **Public and Instititutional Parcels** are assumed to be 774 for 1960, although data are not available to validate the assumption and inferences require distinguishing discrete chunks of what are essentially continuous vectors (i.e., roads). P and I Land has been reconciled with available data through extrapolation (initialized at 406 acres). Even if the initial **Public and Institutional Parcels** is off, the combination of parcels and **Land per PI Parc** as well as parcels and jobs per parcel (**P and I Jobs**) result in a fit with past data.

Population drives the construction of new parcels in the equation, Total_Population*(1647/198,564) where the denominator is the 1997 South Coast Population and the numerator is the assumed number of parcels in that year. The Land per PI Parc is 5.12 acres and, similar to Residential Land Use, **P and I Land** is tracked in parallel with **Public and Institutional Parcels**.

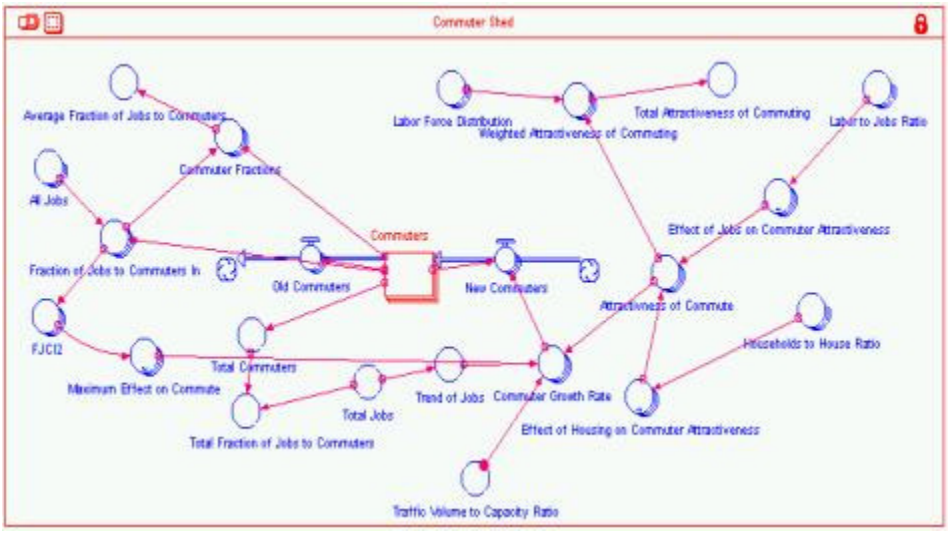
The public sector is a large employer in the South Coast so there are employment figures that are tracked with the construction of **Public and Institutional Parcels**. **P and I Job**s assumes the following number of jobs, by income level per parcel: Upper is 4.0, Middle is 9.0, and Lower is 1.0.

Commuter Shed

Those who live in the South Coast, but work outside the region are tracked through **Frac Labor Comm Out** in the Business Sector. The initial rate is 3 percent and remains static over time, unlike those who commute in (hereafter referred to as **Commuters**). The initial number of **Commuters** is 2719 employees derived from multiplying the **Total Jobs** for a year (initially 1960) by an assumption of the percentage of employees, by income level, who commute and the percentage each income level that comprise the total (Labor Force Distribution). **Init Frac Commute** assumes the following concerning each income level's commuting fraction: Upper is 4.13 percent, Middle is 8.25 percent, and Lower is 4.13 percent. Middle Income workers are assumed to commute the most since Upper Income workers can afford to live where they choose (and, therefore, would choose to live in higher income areas close to work) and Lower Income workers don't have easy access to transportation that can take them from one city to another on a daily basis. Of course, all of this determines only the initial number of **Commuters**.

The number of **Commuters** changes through an inflow and an outflow: New **Commuters** and Old **Commuters**, respectively (see below).

Figure A-83
Commuter Shed



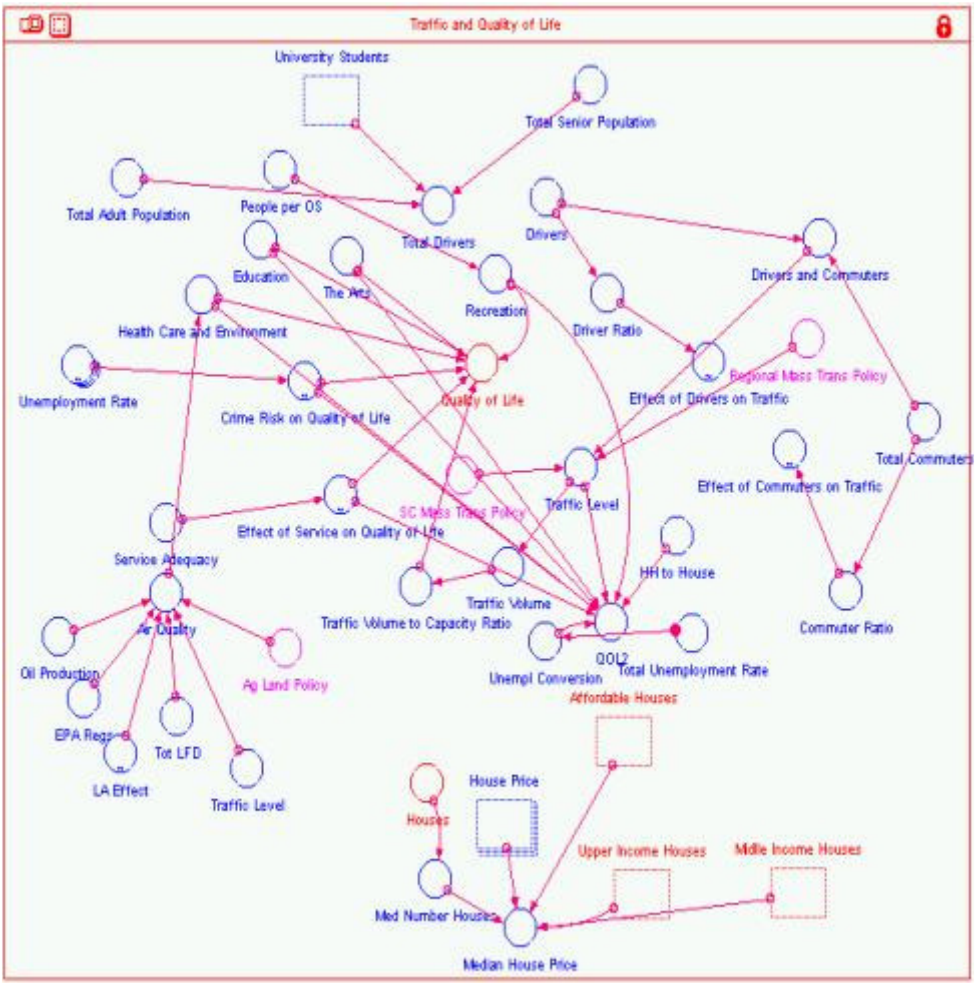
Old commuters (those who no longer commute) are created at a constant rate of 2 percent a year while **New Commuters** are created by multiplying the current number of **Commuters** by the **Commuter Growth Rate (with an absolute cap of 48,000 commuters due to maximum conceivable highway capacity)**. The **Commuter Growth Rate** is a function based on the **Trend of jobs**, which is the fractional change in jobs over time; **Attractiveness of Commute, which factors in both housing and job opportunities; Maximum Effect on Commute**, which softens the commuter trend; and **Traffic Volume to Capacity Ratio,** which acts as feedback for commuters when traffic becomes increasingly unbearable. **Attractiveness of Commute** is computed with the **Effect of Jobs on Commuter Attractiveness**, which is index with the **Labor to Jobs Ratio** as its input. As the **Labor to Jobs Ratio** goes up, this index goes down, simulating a tight

job market's negative effect on commuter growth. It also includes the **Effect of Housing on Commuter Attractiveness**, which is based on an index of **Families to Housing Ratio**. As this goes up, so does the index, simulating the effect that a high priced housing market (communicated through the high **Families Housing Ratio**) would have on a local employee's willingness to commute rather than live close to work.

Traffic and Quality of Life

Traffic is an input into **Quality of Life** and, indirectly, **Quality of Life** affects **Traffic**. Relationships are shown in Figure A-84 below. Factors affecting **Quality of Life** are listed in the Equations list (Appendix 3) and explained in Appendix 11.

Figure A-84
Traffic and Quality of Life



Traffic

Traffic is a function of the number of **Drivers** and **Commuters** mitigated by negative feedbacks on the growth of **Drivers** and **Commuters** that are measured by the **Traffic Volume to Capac-**

ity Ratio. The **Traffic Volume to Capacity Ratio** measures the **Traffic Volume** over the **Maximum Capacity** of Traffic through a series of South Coast checkpoints defined by the California Dept. of Transportation (CalTrans) on U.S. Highway 101. All traffic-related outputs are associated with this highway. Maximum daily capacity through all CalTrans checkpoints (i.e., a car going through 2 checkpoints is counted twice) is 568,550 cars.

Traffic Volume uses **Traffic Level** and multiplies it with a coefficient of 0.00214 that yields the total number of cars that pass through all Highway 101 checkpoints on an average weekday. **Traffic Level** sums the number of Drivers with the sum of all **Commuters** of all income levels **(Total Commuters)** multiplied by a coefficient. The equation weights a **Commuter** much more heavily than a **Driver** based on the expectation that a **Commuter** will use Highway 101* and travel farther on it than **Drivers** who may or may not need to use 101 to get to their place of employment, and may not even drive at all that day. A new output that has not yet been given a proper name (called **No Name 20** in the Equations Appendix) gives actual outputs for three well-known Highway 101 exits. They are Sheffield, Las Positas, and the Fairview exits. Much data of the past has been collected for these three exits and their relationships, in terms of average number of cars per weekday has been examined and a fair constant of this relationship has been projected into the past. This is a traffic ratio of 291: 472: 238, respectively. **Traffic Volume**, as explained above, is the input for this variable.

Calculations and Extra Housing Math

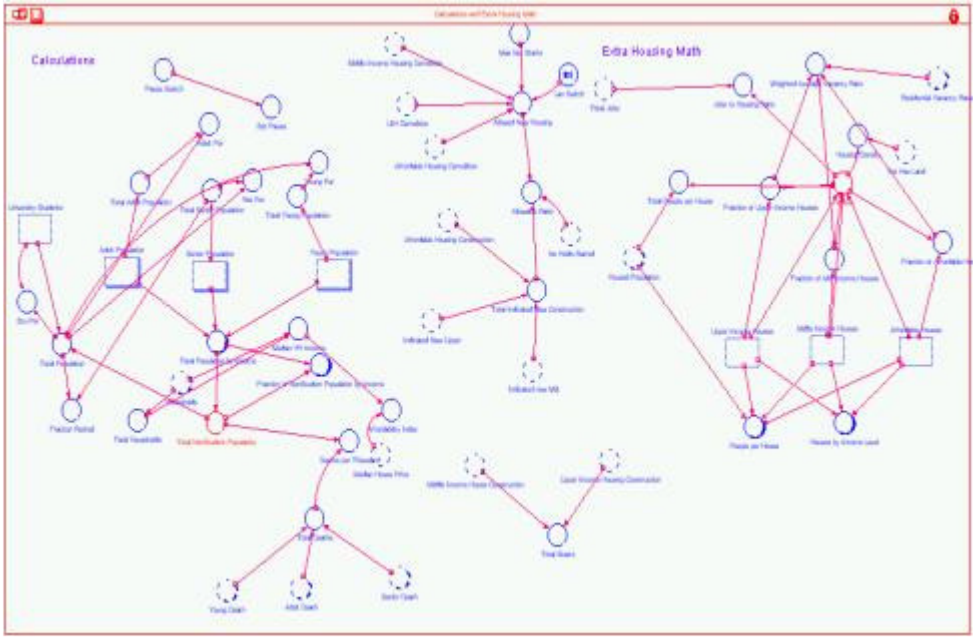
Various outputs, which are not easily assigned to a sector are graphical shown in Figure A-85. Important among these: **Allowable Ratio** (comprised of **Allowed New Housing** (comprised of **Max Net Starts**), and **Total Indicated New Construction**), and the **Affordability Index** (comprised of **Median Household Income** and **Median House Price**).

The **Allowable Ratio** takes the minimum between 1 and **Allowed New Housing** over **Total Indicated New Construction**. The minimum function prevents the output from becoming greater than 1 since this variable serves to inhibit growth, but not to encourage it. It can be neutral or 1. The **Allowable Ratio** determines construction rates for Upper and Middle Income housing units by multiplying the output of **Allowable Ratio** with the other construction variables. When it is 1, then it is neutral, but when it is less than 1 it decreases the construction rate.

Total Indicated New Construction is the sum of Indicated New Upper Income Housing Units (**Indicated New Upper**) and Indicated New Middle Income Housing Units (**Indicated New Middle**). These variables pass through this converter first before entering the **Upper Income Constructio**n Flow. Once there, the output of **Indicated New Upper** is multiplied with the **Allowable Ratio**. An analogous process takes place in Middle Income construction.

* With the exception of those who commute via Highway 154 and exit before it reaches Highway 101. This is most likely a small number of commuters

Figure A-85
Calculations and Extra Housing Math



Allowed New Housing takes into account all of the demolition of Middle and Upper Income housing stock that year and adds this to the **Max Net Starts**, which limits the number of new units that can be built per year above replacement level. This variable is time sensitive and ranges from 5,000 in 1960 to 300 in 2010. It was created by the original modelers.

The **Affordability Index** is the **Median Household Income** divided by the **Median House Price**. The difficulties of developing a true Median apply to **Median Household Income** as to **Median House Price** (discussed above in the Housing Sector). Weightings are as for the housing stock for the purposes of calculating **Median House Price**, with **Upper Income Households** having, on average, 3.5 times the income of **Middle Income Households** and Lower Income **Households** having, on average, 0.3 times as much income as **Middle Income Households**. After being weighted and added together they are then divided by the Total **Households,** allowing for less than even distributions. The result is then taken to the power of 2.25, to capture fluctuations. A constant is used to convert the index into the appropriate number of baseline dollars. As with **Median House Price**, this variable is output in 2000 dollars.

APPENDIX 3
SCOPE EQUATIONS

Business Sector

Biz_land[RetServ](t) = Biz_land[RetServ](t - dt) + (New_Commercial_Land[RetServ] - Old_Commercial_Land[RetServ]) * dt
INIT Biz_land[RetServ] = 226

Biz_land[Office](t) = Biz_land[Office](t - dt) + (New_Commercial_Land[Office] - Old_Commercial_Land[Office]) * dt
INIT Biz_land[Office] = 52

Biz_land[Industrial](t) = Biz_land[Industrial](t - dt) + (New_Commercial_Land[Industrial] - Old_Commercial_Land[Industrial]) * dt
INIT Biz_land[Industrial] = 435

INFLOWS:
New_Commercial_Land[BType] = Business_Construction_Rate[BType] * Land_per_bus_struct[BType]

OUTFLOWS:
Old_Commercial_Land[BType] = Business_Demolition_Rate[BType] * INIT(Land_per_bus_struct[BType])

Business_Structures[RetServ](t) = Business_Structures[RetServ](t - dt) + (Business_Construction_Rate[RetServ] - Business_Demolition_Rate[RetServ]) * dt
INIT Business_Structures[RetServ] = 920

Business_Structures[Office](t) = Business_Structures[Office](t - dt) + (Business_Construction_Rate[Office] - Business_Demolition_Rate[Office]) * dt
INIT Business_Structures[Office] = 295

Business_Structures[Industrial](t) = Business_Structures[Industrial](t - dt) + (Business_Construction_Rate[Industrial] - Business_Demolition_Rate[Industrial]) * dt
INIT Business_Structures[Industrial] = 401

INFLOWS:
Business_Construction_Rate[RetServ] = IF Comm_sf[RetServ] > 0 AND Biz_land[RetServ]- 848> Comm_sf[RetServ] THEN 0 ELSE (Business_Structures[RetServ] * (Effect_on_Business_Construction[RetServ]) * Bus_Constr_Normal * Bus_Construction_Policy) * Buildout
Business_Construction_Rate[Office] = IF Comm_sf[Office] > 0 AND Biz_land[Office]-202> Comm_sf[Office] THEN 0 ELSE (Business_Structures[Office] * (Effect_on_Business_Construction[Office]) * Bus_Constr_Normal * Bus_Construction_Policy) * Buildout
Business_Construction_Rate[Industrial] = IF Comm_sf[Industrial] > 0 AND Biz_land[Industrial]-502> Comm_sf[Industrial] THEN 0 ELSE (Business_Structures[Industrial] * (Effect_on_Business_Construction[Industrial]) * Bus_Constr_Normal * Bus_Construction_Policy) * Buildout

OUTFLOWS:
Business_Demolition_Rate[BType] = Business_Structures[BType]/Bus_Struc_Lifetime * Bus_Construction_Policy * 0
Ag_Only[Upper] = All_Jobs[Upper]-(Wage_Salary_Jobs_by_Income_Level[Upper]/(1-(.002706 * ((1960/TIME)^10))))
Ag_Only[Middle] = All_Jobs[Middle]-(Wage_Salary_Jobs_by_Income_Level[Middle]/(1-(.02706 * ((1960/TIME)^10))))
Ag_Only[Lower] = All_Jobs[Lower]-(Wage_Salary_Jobs_by_Income_Level[Lower]/(1-(.2706 * ((1960/TIME)^10))))

All_Jobs[Income] = Wage_Salary_Jobs_by_Income_Level[Income]/(1-Frac_Jobs_SelfEmpl_and_Other[Income])
Bus_Construction_Policy = IF Com_Moratorium_Switch =1 AND (TIME>2000 AND TIME<2041) THEN 0 ELSE 1
Bus_Constr_Normal = .07
Bus_Struc_Lifetime = 72
Commuter_Percentage = ARRAYSUM(Commuters[*])/Total_Jobs
Comm_sf[RetServ] = IF(TIME>2000) AND Comm_sf__dial[RetServ] > 0 THEN Comm_sf__dial[RetServ]/(43560 * FAR[RetServ] * .541) ELSE 0
Comm_sf[Office] = IF(TIME>2000) AND Comm_sf__dial[Office] > 0 THEN Comm_sf__dial[Office]/(43560 * FAR[Office]) ELSE 0
Comm_sf[Industrial] = IF(TIME>2000) AND Comm_sf__dial[Industrial] > 0 THEN Comm_sf__dial[Industrial]/(43560 * FAR[Industrial]) ELSE 0
Comm_sf__dial[RetServ] = (IF(TIME>2000 AND TIME<2041) THEN 0 ELSE 0)
Comm_sf__dial[Office] = (IF(TIME>2000 AND TIME<2041) THEN 0 ELSE 0)
Comm_sf__dial[Industrial] = (IF(TIME>2000 AND TIME<2041) THEN 0 ELSE 0)
Com_Moratorium_Switch = 1
Effect_on_Business_Construction[RetServ] = ((Land_Price_Effect_on_Business^.75) * (Labor_Effect_on_Retail_Service_2) * (Effect_of_Service_Adequacy_on_Construction) + (Labor_Effect_on_Office * 0))+Land_Price_Effect_on_Industry_ * 0 * Labor_Effect_on_Industrial
Effect_on_Business_Construction[Office] = ((Land_Price_Effect_on_Business^1) * (Labor_Effect_on_Office^8) + (Labor_Effect_on_Retail_Service_2 * Effect_of_Service_Adequacy_on_Construction * 0))+Land_Price_Effect_on_Industry_ * 0 * Labor_Effect_on_Industrial
Effect_on_Business_Construction[Industrial] = (Land_Price_Effect_on_Industry_ * Labor_Effect_on_Industrial^8)+(0 * Effect_of_Service_Adequacy_on_Construction * Labor_Effect_on_Retail_Service_2 * Labor_Effect_on_Office * Land_Price_Effect_on_Business)
FAR[RetServ] = (IF(TIME>2000 AND TIME<2041) THEN FAR_Dial[RetServ] ELSE .23)
FAR[Office] = (IF(TIME>2000 AND TIME<2041) THEN FAR_Dial[Office] ELSE 1.39)
FAR[Industrial] = (IF(TIME>2000 AND TIME<2041) THEN FAR_Dial[Industrial] ELSE .346)
FAR_Dial[RetServ] = (IF(TIME>2000 AND TIME<2041) THEN 0.23 ELSE 0.23)
FAR_Dial[Office] = (IF(TIME>2000 AND TIME<2041) THEN 1.39 ELSE 1.39)
FAR_Dial[Industrial] = (IF(TIME>2000 AND TIME<2041) THEN 0.346 ELSE 0.346)
Fraction_of_Local_Labor_Force[Income] = Local_Labor_Force[Income]/ARRAYSUM(Local_Labor_Force[*])
Fraction_of_Wage_Salary_Jobs_by_Income_Level[Income] = Wage_Salary_Jobs_by_Income_Level[Income]/Total_Wage_Salary_Jobs
Fraction_of_Wage_Salary_Jobs_by_Type[BType] = Wage_Salary_Jobs_by_Type[BType]/ARRAYSUM(Wage_Salary_Jobs_by_Type[*])
Frac_Jobs_SelfEmpl_and_Other[Upper] = (((TIME/1960)^10) * .013)+(.002706 * ((1960/TIME)^10))
Frac_Jobs_SelfEmpl_and_Other[Middle] = (((TIME/1960)^10) * .00656)+(.02706 * ((1960/TIME)^10))
Frac_Jobs_SelfEmpl_and_Other[Lower] = (((TIME/1960)^10) * .00328)+(.2706 * ((1960/TIME)^10))
Frac_Labor_Comm_Out = .03
Init_Frac_Commute[Upper] = .0825/2
Init_Frac_Commute[Middle] = .165/2
Init_Frac_Commute[Lower] = .0825/2
Jobs_for_Commuter_Shed_Population[Income] = All_Jobs[Income]-Jobs_for_Local_pp[Income]
Jobs_for_Local_pp[Income] = All_Jobs[Income]-Commuters[Income]
Jobs_per_Acre = Total_Jobs/ARRAYSUM(Biz_land[*])
Jobs_per_Ind_Str[Upper] = IF FAR_Dial[Industrial]> 0 AND TIME > 2000 AND FAR_Dial[Industrial] < .346 THEN 2-((2-(2 * (FAR[Industrial]/0.346))) * Noname_10[Industrial]) ELSE IF FAR_Dial[Industrial] >.346 THEN (2 * (FAR[Industrial]/.346) * Noname_10[Industrial])+(2 * (1-Noname_10[Industrial])) ELSE 2
Jobs_per_Ind_Str[Middle] = IF FAR_Dial[Industrial]> 0 AND TIME > 2000 AND FAR_Dial[Industrial] < .346 THEN 5-((5-(5 * (FAR[Industrial]/0.346))) * Noname_10[Industrial]) ELSE IF FAR_Dial[Industrial] >.346 THEN (5 * (FAR[Industrial]/.346) * Noname_10[Industrial])+(5 * (1-Noname_10[Industrial])) ELSE 5
Jobs_per_Ind_Str[Lower] = IF FAR_Dial[Industrial]> 0 AND TIME > 2000 AND FAR_Dial[Industrial] < .346 THEN 15-((15-(15 * (FAR[Industrial]/0.346))) * Noname_10[Industrial]) ELSE IF FAR_Dial[Industrial] >.346 THEN (15 * (FAR[Industrial]/.346) * Noname_10[Industrial])+(15 * (1-Noname_10[Industrial])) ELSE 15

Jobs_per_Office_Structure[Upper] = IF FAR_Dial[Office] > 0 AND TIME > 2000 AND FAR_Dial[Office] <1.39 THEN 4.8-((4.8-(4.8 * (FAR[Office]/1.39))) * Noname_10[Office]) ELSE IF FAR_Dial[Office] > 1.39 AND TIME > 2000 THEN (4.8 * (FAR[Office]/1.39) * Noname_10[Office])+(4.8 * (1-Noname_10[Office])) ELSE 4.8
Jobs_per_Office_Structure[Middle] = IF FAR_Dial[Office] > 0 AND TIME > 2000 AND FAR_Dial[Office] <1.39 THEN 10.8-((10.8-(10.8 * (FAR[Office]/1.39))) * Noname_10[Office]) ELSE IF FAR_Dial[Office] > 1.39 AND TIME > 2000 THEN (10.8 * (FAR[Office]/1.39) * Noname_10[Office])+(10.8 * (1-Noname_10[Office])) ELSE 10.8
Jobs_per_Office_Structure[Lower] = IF FAR_Dial[Office] > 0 AND TIME > 2000 AND FAR_Dial[Office] <1.39 THEN 1.2-((1.2-(1.2 * (FAR[Office]/1.39))) * Noname_10[Office]) ELSE IF FAR_Dial[Office] > 1.39 AND TIME > 2000 THEN (1.2 * (FAR[Office]/1.39) * Noname_10[Office])+(1.2 * (1-Noname_10[Office])) ELSE 1.2
Jobs_per_Retail_Service_Structure[Upper] = IF FAR_Dial[RetServ] > 0 AND TIME > 2000 AND FAR_Dial[RetServ] < .23 THEN 1.5 - ((1.5-(1.5 * (FAR[RetServ]/0.23))) * Noname_10[RetServ]) ELSE IF FAR_Dial[RetServ] > 0 AND TIME > 2000 AND FAR_Dial[RetServ] > .23 THEN (1.5 * (FAR[RetServ]/0.23) * Noname_10[RetServ])+(1.5 * (1-Noname_10[RetServ])) ELSE 1.5
Jobs_per_Retail_Service_Structure[Middle] = IF FAR_Dial[RetServ] > 0 AND TIME > 2000 AND FAR_Dial[RetServ] < .23 THEN 4.5 - ((4.5-(4.5 * (FAR[RetServ]/0.23))) * Noname_10[RetServ]) ELSE IF FAR_Dial[RetServ] > 0 AND TIME > 2000 AND FAR_Dial[RetServ] > .23 THEN (4.5 * (FAR[RetServ]/0.23) * Noname_10[RetServ])+(4.5 * (1-Noname_10[RetServ])) ELSE 4.5
Jobs_per_Retail_Service_Structure[Lower] = IF FAR_Dial[RetServ] > 0 AND TIME > 2000 AND FAR_Dial[RetServ] < .23 THEN 7.5 - ((7.5-(7.5 * (FAR[RetServ]/0.23))) * Noname_10[RetServ]) ELSE IF FAR_Dial[RetServ] > 0 AND TIME > 2000 AND FAR_Dial[RetServ] > .23 THEN (7.5 * (FAR[RetServ]/0.23) * Noname_10[RetServ])+(7.5 * (1-Noname_10[RetServ])) ELSE 7.5
Jobs_per_Structure = Total_Jobs/ARRAYSUM(Business_Structures[*])
Labor_Effect_on_Retail_Service_2 = Labor_Effect_on_Retail_Service^6
Labor_Force_Distribution[Income] = Local_Labor_Force[Income]/ARRAYSUM(Local_Labor_Force[*])
Labor_Force_to_Jobs_Ratio[Income] = Local_Labor_Force[Income]/Jobs_for_Local_pp[Income]
Labor_Participation_Fraction[Upper] = ((TIME/1960)^10) * .47
Labor_Participation_Fraction[Middle] = ((TIME/1960)^10) * .59
Labor_Participation_Fraction[Lower] = ((TIME/1960)^10) * .47
Labor_to_Jobs_Ratio[Income] = (Local_Labor_Force[Income]+Commuters[Income])/All_Jobs[Income]
Land_per_bus_struct[RetServ] = .541
Land_per_bus_struct[Office] = .058
Land_per_bus_struct[Industrial] = 0.85
LJ = ARRAYMEAN(Labor_to_Jobs_Ratio[*])
Local_Labor_Force[Upper] = ((Adult_Population[Upper] * Labor_Participation_Fraction[Upper]+Senior_Population[Upper] * .1+University_Students * 0+Young_Population[Upper] * 0)) * 1.4 * (1-Frac_Labor_Comm_Out) * (1-Frac_Jobs_SelfEmpl_and_Other[Upper])
Local_Labor_Force[Middle] = ((Adult_Population[Middle] * Labor_Participation_Fraction[Middle]+Senior_Population[Upper] * .01+Senior_Population[Middle] * .1+University_Students * .025+Young_Population[Middle] * 0)) * 1.4 * (1-Frac_Labor_Comm_Out) * (1-Frac_Jobs_SelfEmpl_and_Other[Middle])
Local_Labor_Force[Lower] = ((Adult_Population[Lower] * Labor_Participation_Fraction[Lower]+(Senior_Population[Lower] * .1)+(Senior_Population[Middle] * .01)+(Senior_Population[Upper] * .001)+(Young_Population[Lower] * (3/18) * .4)+(Young_Population[Middle] * (3/18) * .2)+(Young_Population[Upper] * (3/18) * .1)+ (University_Students * .25))) * 1.4 * (1-Frac_Labor_Comm_Out) * (1-Frac_Jobs_SelfEmpl_and_Other[Lower])
Noname_10[RetServ] = (Business_Structures[RetServ]-2070)/Business_Structures[RetServ]
Noname_10[Office] = (Business_Structures[Office]-2877)/Business_Structures[Office]
Noname_10[Industrial] = (Business_Structures[Industrial]-480)/Business_Structures[Industrial]
Noname_11[Income] = (Commuters[Income]+Local_Labor_Force[Income])-All_Jobs[Income]
Noname_12 = ARRAYSUM(Local_Labor_Force[*])+Tot_Ag_Jo_+Tot_Self_Emp
Noname_13 = ARRAYSUM(Commuters[*])
Noname_14 = Noname_12+Noname_13
Noname_7 = IF TIME > 2000 AND Ag_Land_Dial < 0.3 AND UB_Switch = 1 THEN MIN (Office_Crowding, 1.138) ELSE IF TIME > 2000 AND Ag_Land_Dial < 0.3 AND UB_Switch = 0 THEN MAX (Office_Crowding,

1.138) ELSE IF TIME > 2000 AND Ag_Land_Dial > 0.3 AND UB_Switch = 1 THEN MIN (Office_Crowding,
1.138) ELSE IF TIME > 2000 AND Ag_Land_Dial > 0.3 AND UB_Switch = 0 THEN MIN (Office_Crowding,
1.138) ELSE IF TIME > 2000 AND Ag_Land_Dial = 0.3 AND UB_Switch = 1 THEN MIN (Office_Crowding,
1.138) ELSE Office_Crowding
Noname_8[RetServ] = FAR[RetServ]/.23
Noname_8[Office] = FAR[Office]/1.39
Noname_8[Industrial] = FAR[Industrial]/.346
Noname_9[BType] = Comm_sf[BType]/Wage_Salary_Jobs_by_Type[BType]
Raw_Weighted_Office_Labor_to_Jobs_Ratio[Upper] =
(Jobs_per_Office_Structure[Upper]/(ARRAYSUM(Jobs_per_Office_Structure[*]))) * La-
bor_to_Jobs_Ratio[Upper]
Raw_Weighted_Office_Labor_to_Jobs_Ratio[Middle] =
(Jobs_per_Office_Structure[Middle]/(ARRAYSUM(Jobs_per_Office_Structure[*]))) * La-
bor_to_Jobs_Ratio[Middle]
Raw_Weighted_Office_Labor_to_Jobs_Ratio[Lower] =
(Jobs_per_Office_Structure[Lower]/(ARRAYSUM(Jobs_per_Office_Structure[*]))) * La-
bor_to_Jobs_Ratio[Lower]
Raw_Weighted_RetailService_Labor_to_Jobs_Ratio[Upper] =
(Jobs_per_Retail_Service_Structure[Upper]/(ARRAYSUM(Jobs_per_Retail_Service_Structure[*]))) * La-
bor_to_Jobs_Ratio[Upper]
Raw_Weighted_RetailService_Labor_to_Jobs_Ratio[Middle] =
(Jobs_per_Retail_Service_Structure[Middle]/(ARRAYSUM(Jobs_per_Retail_Service_Structure[*]))) * La-
bor_to_Jobs_Ratio[Middle]
Raw_Weighted_RetailService_Labor_to_Jobs_Ratio[Lower] =
(Jobs_per_Retail_Service_Structure[Lower]/(ARRAYSUM(Jobs_per_Retail_Service_Structure[*]))) * La-
bor_to_Jobs_Ratio[Lower]
Self_Emp_Only[Upper] = All_Jobs[Upper]-(Wage_Salary_Jobs_by_Income_Level[Upper]/(1-(((TIME/1960)^10)
* .013)))
Self_Emp_Only[Middle] = All_Jobs[Middle]-(Wage_Salary_Jobs_by_Income_Level[Middle]/(1-
(((TIME/1960)^10) * .00656)))
Self_Emp_Only[Lower] = All_Jobs[Lower]-(Wage_Salary_Jobs_by_Income_Level[Lower]/(1-(((TIME/1960)^10)
* .00328)))
Sq_ft_per_employee = 43560/Jobs_per_Acre
Total_Business_Land = ARRAYSUM(Biz_land[*])
Total_Business_Structures = ARRAYSUM(Business_Structures[*])
Total_Ind_Jobs_ = Business_Structures[Industrial] *
(Jobs_per_Ind_Str[Upper]+Jobs_per_Ind_Str[Middle]+Jobs_per_Ind_Str[Lower])
Total_Jobs = ARRAYSUM(All_Jobs[*])
Total_Jobs_for_Local_Population = ARRAYSUM(Jobs_for_Local_pp[*])
Total_Labor_Force = ARRAYSUM(Local_Labor_Force[*])
Total_Office_Jobs = Business_Structures[Office] *
(Jobs_per_Office_Structure[Upper]+Jobs_per_Office_Structure[Middle]+Jobs_per_Office_Structure[Lower])
Total_Retail_Service_Jobs = Business_Structures[RetServ] *
(Jobs_per_Retail_Service_Structure[Upper]+Jobs_per_Retail_Service_Structure[Middle]+Jobs_per_Retail_Service
_Structure[Lower])
Total_Unemployment_Rate = 1-(Total_Jobs_for_Local_Population/Total_Labor_Force)
Total_Wage_Salary_Jobs = ARRAYSUM(Wage_Salary_Jobs_by_Income_Level[*])
Tot_Ag_Jo_ = ARRAYSUM(Ag_Only[*])
Tot_Self_Emp = ARRAYSUM(Self_Emp_Only[*])
Wage_Salary_Jobs_by_Income_Level[Upper] = Business_Structures[RetServ] *
Jobs_per_Retail_Service_Structure[Upper]+(Business_Structures[Office] * Jobs_per_Office_Structure[Upper] *
Noname_7)+P_and_I_Jobs[Upper]+(Business_Structures[Industrial] * Jobs_per_Ind_Str[Upper])
Wage_Salary_Jobs_by_Income_Level[Middle] = Business_Structures[RetServ] *
Jobs_per_Retail_Service_Structure[Middle]+(Business_Structures[Office] * Jobs_per_Office_Structure[Middle] *
Noname_7)+P_and_I_Jobs[Middle]+(Business_Structures[Industrial] * Jobs_per_Ind_Str[Middle])

Wage_Salary_Jobs_by_Income_Level[Lower] = Business_Structures[RetServ] * Jobs_per_Retail_Service_Structure[Lower]+(Business_Structures[Office] * Jobs_per_Office_Structure[Lower] * Noname_7)+P_and_I_Jobs[Lower]+(Business_Structures[Industrial] * Jobs_per_Ind_Str[Lower])
Wage_Salary_Jobs_by_Type[RetServ] = ARRAYSUM(Jobs_per_Retail_Service_Structure[*]) * Business_Structures[RetServ] + (0 * Jobs_per_Office_Structure[Upper] * Jobs_per_Ind_Str[Upper])
Wage_Salary_Jobs_by_Type[Office] = ARRAYSUM(Jobs_per_Office_Structure[*]) * Business_Structures[Office]+ (0 * Jobs_per_Retail_Service_Structure[Upper])+Jobs_per_Ind_Str[Middle] * 0
Wage_Salary_Jobs_by_Type[Industrial] = ARRAYSUM(Jobs_per_Ind_Str[*]) * Business_Structures[Industrial]+ (0 * Jobs_per_Retail_Service_Structure[Upper] * Jobs_per_Office_Structure[Upper])
Weighted_Ind_Labor_to_Jobs_Ratio[Upper] = Jobs_per_Ind_Str[Upper]/ARRAYSUM(Jobs_per_Ind_Str[*]) * Labor_to_Jobs_Ratio[Upper]
Weighted_Ind_Labor_to_Jobs_Ratio[Middle] = Jobs_per_Ind_Str[Middle]/ARRAYSUM(Jobs_per_Ind_Str[*]) * Labor_to_Jobs_Ratio[Middle]
Weighted_Ind_Labor_to_Jobs_Ratio[Lower] = Jobs_per_Ind_Str[Lower]/ARRAYSUM(Jobs_per_Ind_Str[*]) * Labor_to_Jobs_Ratio[Lower]
Weighted_Ind_Unemployment = ARRAYSUM(Weighted_Ind_Labor_to_Jobs_Ratio[*])
Weighted_Office_Unemployment = ARRAYSUM(Raw_Weighted_Office_Labor_to_Jobs_Ratio[*])
Weighted_RetailService_Unemployment = ARRAYSUM(Raw_Weighted_RetailService_Labor_to_Jobs_Ratio[*])
Wtd_Average_Unemployment = ARRAYSUM(Wtd_Unemployment[*])
Wtd_Unemployment[Income] = Unemployment_Rate[Income] * Fraction_of_Local_Labor_Force[Income]
Labor_Effect_on_Industrial = GRAPH(Weighted_Ind_Unemployment)
(0.00, 0.00), (0.2, 0.13), (0.4, 0.27), (0.6, 0.44), (0.8, 0.71), (1.00, 1.01), (1.20, 1.27), (1.40, 1.52), (1.60, 1.73), (1.80, 1.91), (2.00, 2.00)
Labor_Effect_on_Office = GRAPH(Weighted_Office_Unemployment^1)
(0.00, 0.00), (0.2, 0.13), (0.4, 0.27), (0.6, 0.44), (0.8, 0.71), (1.00, 1.01), (1.20, 1.27), (1.40, 1.52), (1.60, 1.73), (1.80, 1.91), (2.00, 2.00)
Labor_Effect_on_Retail_Service = GRAPH(Weighted_RetailService_Unemployment)
(0.00, 0.00), (0.2, 0.13), (0.4, 0.27), (0.6, 0.44), (0.8, 0.71), (1.00, 1.01), (1.20, 1.27), (1.40, 1.52), (1.60, 1.73), (1.80, 1.91), (2.00, 2.00)
Land_Price_Effect_on_Business = GRAPH(Land_Fraction_Developed)
(0.00, 1.00), (0.1, 1.15), (0.2, 1.30), (0.3, 1.40), (0.4, 1.45), (0.5, 1.40), (0.6, 1.30), (0.7, 0.9), (0.8, 0.5), (0.9, 0.25), (1, 0.00)
Land_Price_Effect_on_Industry_ = GRAPH(Land_Fraction_Developed)
(0.00, 1.49), (0.1, 1.37), (0.2, 1.20), (0.3, 1.06), (0.4, 0.915), (0.5, 0.757), (0.6, 0.593), (0.7, 0.435), (0.8, 0.285), (0.9, 0.15), (1, 0.00)
Office_Crowding = GRAPH(Land_Fraction_Developed)
(0.00, 1.00), (0.1, 1.00), (0.2, 1.00), (0.3, 1.00), (0.4, 1.00), (0.5, 1.00), (0.6, 1.10), (0.7, 1.20), (0.8, 1.30), (0.9, 1.40), (1, 1.50)
Unemployment_Rate[Income] = GRAPH(Labor_to_Jobs_Ratio[Income])
(0.6, 0.014), (0.7, 0.021), (0.8, 0.033), (0.9, 0.047), (1, 0.063), (1.10, 0.077), (1.20, 0.095), (1.30, 0.116), (1.40, 0.149), (1.50, 0.216), (1.60, 0.3), (1.70, 0.409), (1.80, 0.472)

Calculations and Extra Housing Math

Adult_Per = Total_Adult_Population/Total_Population
Affordability_Index = (Median_HH_Income/(Median_House_Price))
Allowable_Ratio = MIN(1,(Allowed_New_Housing/Total_Indicated_New_Construction)^No_Holds_Barred)
Allowed_New_Housing = max_net_starts+Middle_Income_Housing_Demolition+UIH_Demolition+Affordable_Housing_Demolition
Deaths_per_Thousand = (Total_deaths/Total_NonStudent_Population) * 1000
Fraction_of_Affordable_Houses = Total_Affordable_Houses/Houses
Fraction_of_Mid_Income_Houses = Middle_Income_Houses/Houses
Fraction_of_NonStudent_Population_by_Income[Income] = Total_Population_by_Income[Income]/Total_NonStudent_Population
Fraction_of_Upper_Income_Houses = Upper_Income_Houses/Houses
Fraction_Retired = Total_Senior_Population/Total_Population

Houses = Upper_Income_Houses+Middle_Income_Houses+Total_Affordable_Houses
Houses_by_Income_Level[Upper] = Upper_Income_Houses +(0 * Total_Affordable_Houses * Middle_Income_Houses)
Houses_by_Income_Level[Middle] = Middle_Income_Houses + (0 * Total_Affordable_Houses * Upper_Income_Houses)
Houses_by_Income_Level[Lower] = Total_Affordable_Houses + (0 * Middle_Income_Houses * Upper_Income_Houses)
Housing_Density = Houses/Tot_Hse_Land
Jobs_to_Housing_Ratio = Total_Jobs/Houses
Median_HH_Income = (((families_[Upper] * 3.5+families_[Middle]+families_[Lower] * .3)/Total_families_)^2.25) * 13959
People_per_House[Upper] = Housed_Population[Upper]/Occupied_Units_[Upper]
People_per_House[Middle] = Housed_Population[Middle]/Occupied_Units_[Middle]
People_per_House[Lower] = Housed_Population[Lower]/Occupied_Units_[Lower]
Ret_Per = Total_Senior_Population/Total_Population
Stu_Per = University_Students/Total_Population
Total_Adult_Population = ARRAYSUM(Adult_Population[*])
Total_Deaths = ARRAYSUM(Young_Death[*])+ARRAYSUM(Adult_Death[*])+ARRAYSUM(Senior_Death[*])
Total_families_ = ARRAYSUM(families_[*])
Total_Indicated_New_Construction = indicated_new_Mid+Indicated_New_Upper
Total_NonStudent_Population = ARRAYSUM(Total_Population_by_Income[*])
Total_People_per_House = ARRAYSUM(Housed_Population[*])/Houses
Total_Population = (Total_NonStudent_Population+University_Students)
Total_Population_by_Income[Income] =
Young_Population[Income]+Adult_Population[Income]+Senior_Population[Income]
Total_Senior_Population = ARRAYSUM(Senior_Population[*])
Total_Starts = Middle_Income_House_Construction+Upper_Income_Housing_Construction
Total_Young_Population = ARRAYSUM(Young_Population[*])
Weighted_Average_Vacancy_Rate = Fraction_of_Affordable_Houses * Residential_Vacancy_Rates[Lower]+Fraction_of_Mid_Income_Houses * Residential_Vacancy_Rates[Middle]+Fraction_of_Upper_Income_Houses * Residential_Vacancy_Rates[Upper]
Young_Per = Total_Young_Population/Total_Population

Commuter Shed
Commuters[Income](t) = Commuters[Income](t - dt) + (New_Commuters[Income] - Old_Commuters[Income]) * dt
INIT Commuters[Income] = Total_Jobs * Init_Frac_Commute[Income] * Labor_Force_Distribution[Income]

INFLOWS:
New_Commuters[Income] = IF ARRAYSUM(Commuters[*]) > 48000 THEN 0 Else Commuters[Income] * Commuter_Growth_Rate[Income]

OUTFLOWS:
Old_Commuters[Income] = Commuters[Income] * .02
Attractivness_of_Commute[Income] = Effect_of_Jobs_on_Commuter_Attractiveness[Income] * Effect_of_Housing_on_Commuter_Attractiveness[Income]
Average_Fraction_of_Jobs_to_Commuters = ARRAYSUM(Commuter_Fractions[*])
Commuter_Fractions[Income] = (Commuters[Income]/ARRAYSUM(Commuters[*])) * Fraction_of_Jobs_to_Commuters_In[Income]
Commuter_Growth_Rate[Income] = (.016+Trend_of_jobs) * Attractivness_of_Commute[Income] * (Maximum_Effect_on_Commute[Income]^800) * ((1/Traffic_Volume_to_Capacity_Ratio)^.65)
FJCI2[Income] = Fraction_of_Jobs_to_Commuters_In[Income]/.5
Fraction_of_Jobs_to_Commuters_In[Income] = Commuters[Income]/All_Jobs[Income]
Total_Attractiveness_of_Commuting = ARRAYSUM(Weighted_Attractiveness_of_Commuting[*])
Total_Commuters = ARRAYSUM(Commuters[*])
Total_Fraction_of_Jobs_to_Commuters = Total_Commuters/Total_Jobs

Trend_of_Jobs = (Total_Jobs/INIT(Total_Jobs)) * .01
Weighted_Attractiveness_of_Commuting[Income] = Attractivness_of_Commute[Income] * Labor_Force_Distribution[Income]
Effect_of_Housing_on_Commuter_Attractiveness[Income] = GRAPH(families_to_House_Ratio[Income])
(0.00, 0.33), (0.2, 0.39), (0.4, 0.51), (0.6, 0.67), (0.8, 0.84), (1.00, 0.99), (1.20, 1.13), (1.40, 1.24), (1.60, 1.33), (1.80, 1.42), (2.00, 1.44)
Effect_of_Jobs_on_Commuter_Attractiveness[Income] = GRAPH(Labor_to_Jobs_Ratio[Income])
(0.00, 1.93), (0.2, 1.88), (0.4, 1.78), (0.6, 1.58), (0.8, 1.27), (1.00, 1.00), (1.20, 0.7), (1.40, 0.5), (1.60, 0.3), (1.80, 0.16), (2.00, 0.07)
Maximum_Effect_on_Commute[Income] = GRAPH(FJCI2[Income])
(0.00, 1.00), (0.2, 1.00), (0.4, 1.00), (0.6, 1.00), (0.8, 0.94), (1.00, 0.75), (1.20, 0.26), (1.40, 0.06), (1.60, 0.01), (1.80, 0.00), (2.00, 0.00)

Demand for Services
Effect_of_Service_Adequacy_on_Construction = 1/Service_Adequacy
Service_Adequacy = (Business_Structures[RetServ] * 50)/Total_Service_Demand
Service_Demand_by_INcome_Level[Upper] = Adult_Population[Upper] * 1+Senior_Population[Upper] * 2+(Young_Population[Upper] * 1/18)+University_Students * 0
Service_Demand_by_INcome_Level[Middle] = Adult_Population[Middle] * .75+Senior_Population[Middle] * 1.2+(Young_Population[Middle] * .75/18)+University_Students * 0
Service_Demand_by_INcome_Level[Lower] = Adult_Population[Lower] * .25+Senior_Population[Lower] * .25+(Young_Population[Lower] * 1/72)+University_Students * .25
Total_Service_Demand = ARRAYSUM(Service_Demand_by_INcome_Level[*])

Housing Sector
Constructed_Affordable(t) = Constructed_Affordable(t - dt) + (Affordable_Housing_Construction - Con_Af_Gent - Con_Af_Dem) * dt
INIT Constructed_Affordable = 0

INFLOWS:
Affordable_Housing_Construction = IF Houses > 88000 AND Ignore_GenPl_ = 0 THEN 0 ELSE IF (Affordable_Policy >0) THEN (Affordable_Policy * Buildout * Housing_Policy_Variable)
ELSE(Total_Affordable_Houses * Affordable_Housing_Construction_Base * Housing_Policy_Variable)

OUTFLOWS:
Con_Af_Gent = MIN (Constructed_Affordable/Control_Time, Constructed_Affordable * (Gentrification_Rate_2[Middle]))
Con_Af_Dem = IF Res_Moratorium_Switch=1 AND (TIME>2000 AND TIME<2041) THEN 0 ELSE MIN (Constructed_Affordable/Control_Time, Constructed_Affordable/Affordable_House_Lifetime)
House_Price[Upper](t) = House_Price[Upper](t - dt) + (Change_in_Price[Upper]) * dt
INIT House_Price[Upper] = 281839.93

House_Price[Middle](t) = House_Price[Middle](t - dt) + (Change_in_Price[Middle]) * dt
INIT House_Price[Middle] = 80526.49

House_Price[Lower](t) = House_Price[Lower](t - dt) + (Change_in_Price[Lower]) * dt
INIT House_Price[Lower] = 24161.25

INFLOWS:
Change_in_Price[Upper] = ((House_Price[Middle] * Effect_of_Demand_on_Price[Middle] * Sens_to_Housing[Middle])^.91) * 3.5
Change_in_Price[Middle] = ((House_Price[Middle] * Effect_of_Demand_on_Price[Middle] * (Sens_to_Housing[Middle]))^.91) * 1
Change_in_Price[Lower] = ((House_Price[Middle] * Effect_of_Demand_on_Price[Middle] * Sens_to_Housing[Middle])^.91) * .3

Middle_Income_Houses(t) = Middle_Income_Houses(t - dt) + (Affordable_Housing_Gentrification + Middle_Income_House_Construction + Upper_Income_Housing_Obsolescence + Con_Af_Gent - Middle_Income_Housing_Obsolescence - Middle_Income_Housing_Demolition - Middle_Income_Housing_Gentrification) * dt
INIT Middle_Income_Houses = Initial_Housing[Middle]

INFLOWS:
Affordable_Housing_Gentrification = Obsolesced_Affordable * (Gentrification_Rate_2[Middle])
Middle_Income_House_Construction = IF Houses > 88000 AND Ignore_GenPl_ =0 THEN 0 ELSE IF Full_Housing_Switch = 1 AND TIME > 1999.75 THEN 333.375 ELSE If MIH_Con > 0 Then MIH_Con * Buildout ELSE ((indicated_new_Mid * Allowable_Ratio) * Housing_Policy_Variable) * Buildout

Upper_Income_Housing_Obsolescence = Upper_income_houses/(Up_inc_house_lifetime * Housing_Demand_on_Life[Upper])
Con_Af_Gent = MIN (Constructed_Affordable/Control_Time, Constructed_Affordable * (Gentrification_Rate_2[Middle]))

OUTFLOWS:
Middle_Income_Housing_Obsolescence = Middle_Income_Houses/(Mid_inc_hous_Lifetime * Housing_Demand_on_Life[Middle])
Middle_Income_Housing_Demolition = IF Res_Moratorium_Switch=1 AND (TIME>2000 AND TIME<2041) THEN 0 ELSE Middle_Income_Houses * Mid_inc_hous_demo_base
Middle_Income_Housing_Gentrification = Middle_Income_Houses * (Gentrification_Rate_2[Upper])
Obsolesced_Affordable(t) = Obsolesced_Affordable(t - dt) + (Middle_Income_Housing_Obsolescence + Grannification - Affordable_Housing_Gentrification - Affordable_Housing_Demolition) * dt
INIT Obsolesced_Affordable = Initial_Housing[Lower]

INFLOWS:
Middle_Income_Housing_Obsolescence = Middle_Income_Houses/(Mid_inc_hous_Lifetime * Housing_Demand_on_Life[Middle])
Grannification = IF Granny_ = 1 THEN ((1/240) * (Middle_Income_Houses+Upper_Income_Houses)) ELSE 0

OUTFLOWS:
Affordable_Housing_Gentrification = Obsolesced_Affordable * (Gentrification_Rate_2[Middle])
Affordable_Housing_Demolition = IF Res_Moratorium_Switch=1 AND (TIME>2000 AND TIME<2041) THEN 0 ELSE Obsolesced_Affordable/Affordable_House_Lifetime
Upper_Income_Houses(t) = Upper_Income_Houses(t - dt) + (Upper_Income_Housing_Construction + Middle_Income_Housing_Gentrification - Upper_Income_Housing_Obsolescence - UIH_Demolition) * dt
INIT Upper_Income_Houses = Initial_Housing[Upper]

INFLOWS:
Upper_Income_Housing_Construction = IF Houses > 88000 AND Ignore_GenPl_ =0 THEN 0 ELSE If UIH_Con > 0 Then UIH_Con * Buildout ELSE (Allowable_Ratio * Indicated_New_Upper * Housing_Policy_Variable) * 1 * Buildout
Middle_Income_Housing_Gentrification = Middle_Income_Houses * (Gentrification_Rate_2[Upper])

OUTFLOWS:
Upper_Income_Housing_Obsolescence = Upper_income_houses/(Up_inc_house_lifetime * Housing_Demand_on_Life[Upper])
UIH_Demolition = IF Res_Moratorium_Switch=1 AND (TIME>2000 AND TIME<2041) THEN 0 ELSE Upper_Income_Houses * .00235
Affordable_House_Lifetime = 50+Affordable_Housing_Gentrification
Affordable_Housing_Construction_Base = IF TIME < 2000 THEN People_per_House[Lower] * .04 * Net_Land_on_House * Buildout ELSE 0

Affordable_Policy = IF Full_Housing_Switch =0 AND (TIME > Time_begin_dial AND TIME < Time_end_dial) THEN Affordable_Policy_Dial ELSE IF Full_Housing_Switch =1 AND TIME > 1999.75 THEN 166.625 ELSE 0
Affordable_Policy_Dial = IF(TIME>Time_begin_dial AND TIME<Time_end_dial) THEN 0 ELSE 0
All_OU = ARRAYSUM(Occupied_Units_[*])
Average_family_Size[Upper] = 2.12
Average_family_Size[Middle] = 2.96
Average_family_Size[Lower] = 3.78
Average_House_Price = ((Upper_Income_Houses/Houses) * House_Price[Upper])+((Middle_Income_Houses/Houses) * House_Price[Middle])+((Total_Affordable_Houses/Houses) * House_Price[Lower])
Avg_HH_to_H_Ratio = (families_[Upper]+families_[Middle]+families_[Lower])/Houses
Control_Time = IF(TIME>2000) THEN Control_Time_Dial ELSE 30
Control_Time_Dial = (IF(TIME>2000 AND TIME<2041) THEN 30 ELSE 30)
Effect_on_Housing_Construction[Upper] = Net_Land_on_House * Upper_Class_Market_Share_2 * Housing_Demand[Upper]
Effect_on_Housing_Construction[Middle] = (Net_Land_on_House * Housing_Demand[Middle])+Upper_Class_Market_Share_2 * 0
Effect_on_Housing_Construction[Lower] = 1+ (0 * Housing_Demand[Lower] * Net_Land_on_House * Upper_Class_Market_Share_2)
families_[Income] = Housed_Population[Income]/(Average_family_Size[Income] * (((1960/TIME)^10) * 1)^1)
families_to_House_Ratio[Upper] = families_[Upper]/Occupied_Units_[Upper]
families_to_House_Ratio[Middle] = families_[Middle]/Occupied_Units_[Middle]
families_to_House_Ratio[Lower] = families_[Lower]/Occupied_Units_[Lower]
fam_to_House = ARRAYMEAN(families_to_House_Ratio[*])
Full_Housing_Switch = 0
Gentrification_Rate_2[Upper] = Gentrification_Rate[Upper] * Gentrification_Strength[Upper]
Gentrification_Rate_2[Middle] = MIN(.033333333, (Gentrification_Rate[Middle] * Gentrification_Strength[Middle]))
Gentrification_Rate_2[Lower] = Gentrification_Rate[Lower] * Gentrification_Strength[Lower]
Gentrification_Strength[Upper] = 1
Gentrification_Strength[Middle] = 6
Gentrification_Strength[Lower] = 0
GQ_Population_[Income] = Total_Population_by_Income[Income]-Housed_Population[Income]
Granny_ = IF(TIME>2000) THEN Granny_Dial ELSE 0
Granny_Dial = 1
Housed_Population[Upper] = Total_Population_by_Income[Upper]+(.01 * NonHoused_Students)-(Senior_Population[Upper] * .17)-(Adult_Population[Upper] * .017)-(Young_Population[Lower] * .0017)
Housed_Population[Middle] = Total_Population_by_Income[Middle]+(.09 * NonHoused_Students)-(Senior_Population[Middle] * .17)-(Adult_Population[Middle] * .017)-(Young_Population[Middle] * .0017)
Housed_Population[Lower] = Total_Population_by_Income[Lower]+(NonHoused_Students * .9)-(Senior_Population[Lower] * .17)-(Adult_Population[Lower] * .017)-(Young_Population[Lower] * .0017)
Households = ARRAYSUM(Occupied_Units_[*])
House_Growth_Control = 1.1
Housing_Demand[Income] = ((Effect_of_Households_on_Housing_Construction[Income])^Sens_to_Housing[Income])
Housing_Policy_Variable = IF Res_Moratorium_Switch=1 AND (TIME>2001 AND TIME<2041) THEN 0 ELSE 1
Ignore_GenPl_ = 0
Indicated_new_Mid = Middle_Income_Houses * Effect_on_Housing_Construction[Middle] * Mid_House_Construct_Base
Indicated_New_Upper = Upper_income_houses * Effect_on_Housing_Construction[Upper] * Up_inc_hous_constr_base
Mid_House_Construct_Base = .02
Mid_inc_hous_demo_base = .00235
Mid_inc_hous_lifetime = 50
MIH_Con = IF(TIME>2000) THEN MIH_Con_Dial_ ELSE 0

MIH_Con_Dial_ = (IF(TIME>2000 AND TIME<2041) THEN 0 ELSE 0)
Net_Land_on_House = Normal_Land_on_House_Construction * ((Pro_Growth_Attitude^House_Growth_Control))
NonHoused_Students = University_Students-(5000 * ((TIME/2000)^30))
Occupied_Units_[Upper] = Upper_Income_Houses/(.9906 + 0.111 * 1) +0 * Total_Affordable_Houses * Middle_Income_Houses
Occupied_Units_[Middle] = Middle_Income_Houses/(.9906 + 0.0856 * 1) + 0 * Total_Affordable_Houses * Upper_Income_Houses
Occupied_Units_[Lower] = Total_Affordable_Houses/(.9906 + 0.0741 * 1) + 0 * (Middle_Income_Houses * Upper_Income_Houses)
Res_Moratorium_Switch = 1
Sens_to_Housing[Upper] = 2
Sens_to_Housing[Middle] = 1
Sens_to_Housing[Lower] = .75
Time_begin_dial = 2000
Time_end_dial = 2040
Total_Affordable_Houses = Constructed_Affordable+Obsolesced_Affordable
Total_Average_family_Size = (Average_family_Size[Upper] * families_[Upper]+Average_family_Size[Middle] * families_[Middle]+Average_family_Size[Lower] * families_[Lower])/Total_families_
Tot_GQ_Pop = ARRAYSUM(GQ_Population_[*])+University_Students
UIH_Con = IF(TIME>2000) THEN UIH_Con_Dial ELSE 0
UIH_Con_Dial = (IF(TIME>2000 AND TIME<2041) THEN 0 ELSE 0)
Upper_Class_Market_Share_2 = 1+(Upper_Class_Market_Share_1 * Netland_Graph) * 1
Up_inc_house_lifetime = 30
Up_inc_hous_constr_base = .05
Effect_of_Demand_on_Price[Income] = GRAPH(Avg_HH_to_H_Ratio)
(0.00, -0.01), (0.2, 0.00), (0.4, 0.015), (0.6, 0.021), (0.8, 0.028), (1.00, 0.034), (1.20, 0.04), (1.40, 0.046), (1.60, 0.052), (1.80, 0.058), (2.00, 0.064)
Effect_of_Households_on_Housing_Construction[Income] = GRAPH(families_to_House_Ratio[Income])
(0.00, 0.48), (0.2, 0.6), (0.4, 0.84), (0.6, 1.20), (0.8, 1.92), (1.00, 2.64), (1.20, 3.24), (1.40, 3.84), (1.60, 4.32), (1.80, 4.68), (2.00, 4.80)
Gentrification_Rate[Income] = GRAPH(Housing_Demand[Income])
(0.8, 0.0003), (0.9, 0.00), (1.00, 0.00), (1.10, 0.008), (1.20, 0.016), (1.30, 0.023), (1.40, 0.028), (1.50, 0.032), (1.60, 0.035), (1.70, 0.037), (1.80, 0.04), (1.90, 0.0438), (2.00, 0.0459), (2.10, 0.0473), (2.20, 0.0494), (2.30, 0.0511), (2.40, 0.0528), (2.50, 0.0536), (2.60, 0.0544), (2.70, 0.0552), (2.80, 0.0564), (2.90, 0.0576), (3.00, 0.0576), (3.10, 0.0584), (3.20, 0.0596), (3.30, 0.0596), (3.40, 0.06), (3.50, 0.06), (3.60, 0.061)
Housing_Demand_on_Life[Income] = GRAPH(Housing_Demand[Income])
(0.00, 0.5), (0.2, 0.55), (0.4, 0.66), (0.6, 0.76), (0.8, 0.87), (1.00, 1.00), (1.20, 1.13), (1.40, 1.26), (1.60, 1.38), (1.80, 1.48), (2.00, 1.68), (2.20, 1.93), (2.40, 2.13), (2.60, 2.43), (2.80, 2.73), (3.00, 3.00), (3.20, 3.25), (3.40, 3.60), (3.60, 3.93), (3.80, 4.15), (4.00, 4.50)
Netland_Graph = GRAPH(Net_Land_on_House)
(0.00, 1.00), (0.1, 1.00), (0.2, 0.95), (0.3, 0.54), (0.4, 0.29), (0.5, 0.17), (0.6, 0.05), (0.7, 0.00), (0.8, 0.00), (0.9, 0.00), (1, 0.00)
Normal_Land_on_House_Construction = GRAPH(Land_Fraction_Developed)
(0.00, 0.638), (0.1, 0.54), (0.2, 0.488), (0.3, 0.42), (0.4, 0.363), (0.5, 0.36), (0.6, 0.33), (0.7, 0.255), (0.8, 0.173), (0.9, 0.098), (1, 0.00)
OU_Rate_Change = GRAPH(TIME)
(1960, 1.00), (1970, 0.7), (1980, 0.49), (1990, 0.343), (2000, 0.24), (2010, 0.168), (2020, 0.118), (2030, 0.0824), (2040, 0.0576)
Pro_Growth_Attitude = GRAPH(Land_Fraction_Developed)
(0.00, 1.50), (0.1, 1.18), (0.2, 0.983), (0.3, 0.78), (0.4, 0.62), (0.5, 0.48), (0.6, 0.37), (0.7, 0.25), (0.8, 0.17), (0.9, 0.12), (1, 0.11)
Residential_Vacancy_Rates[Income] = GRAPH(families_to_House_Ratio[Income])
(0.4, 0.6), (0.5, 0.5), (0.6, 0.4), (0.7, 0.3), (0.8, 0.2), (0.9, 0.12), (1, 0.06), (1.10, 0.033), (1.20, 0.02), (1.30, 0.011), (1.40, 0.008)
Upper_Class_Market_Share_1 = GRAPH(Housing_Demand[Upper])

(1.00, 0.00), (1.10, 0.06), (1.20, 0.14), (1.30, 0.31), (1.40, 0.61), (1.50, 0.82), (1.60, 0.94), (1.70, 1.00), (1.80, 1.00), (1.90, 1.00), (2.00, 1.00)

Initial Parameters
Initial_Adult_Population[Upper] = 87256 * 0.58 * 0.25
Initial_Adult_Population[Middle] = 87256 * 0.505 * 0.5
Initial_Adult_Population[Lower] = 87256 * 0.43 * 0.25
Initial_Group_Quart_Pop[Income] = (Initial_Senior_Population[Income] * .13)+(Initial_Adult_Population[Income] * .013)+(Initial_Young_Population[Income] * .0013)
Initial_Housing[Upper] = ((Initial_Senior_Population[Upper] * .87+Initial_Adult_Population[Upper] * .987+Initial_Young_Population[Upper] * .9987+(Initial_NonHoused_Students * .01))/Average_family_Size[Upper]) * 1.06203989177625369659598565406 15 * 1.047
Initial_Housing[Middle] = ((Initial_Senior_Population[Middle] * .87+Initial_Adult_Population[Middle] * .987+Initial_Young_Population[Middle] * .9987+(Initial_NonHoused_Students * .09))/Average_family_Size[Middle]) * 1.06203989177625369659598565406 15 * 1.023
Initial_Housing[Lower] = ((Initial_Senior_Population[Lower] * .87+Initial_Adult_Population[Lower] * .987+Initial_Young_Population[Lower] * .9987+(Initial_NonHoused_Students * .9))/Average_family_Size[Lower]) * 1.06203989177625369659598565406 15 * 1.012
Initial_NonHoused_Students = 3272
Initial_Population_by_Income[Income] = Initial_Adult_Population[Income]+Initial_Senior_Population[Income]+Initial_Young_Population[Income]
Initial_Senior_Population[Upper] = 87256 * 0.18 * 0.25
Initial_Senior_Population[Middle] = 87256 * 0.135 * 0.5
Initial_Senior_Population[Lower] = 87256 * 0.09 * 0.25
Initial_Young_Population[Upper] = 87256 * 0.24 * 0.25
Initial_Young_Population[Middle] = 87256 * 0.36 * 0.5
Initial_Young_Population[Lower] = 87256 * 0.48 * 0.25
Total_Initial_Group_Quart = ARRAYSUM(Initial_Group_Quart_Pop[*])+Initial_NonHoused_Students

Land Use Sector

Farmland2_(t) = Farmland2_(t - dt) + (- Farmland_Loss) * dt
INIT Farmland2_ = 51537

OUTFLOWS:
Farmland_Loss = (Farmland2_/Total_Developable_Land_Area) * (Change_in_Open_Space+Change_in_P_and_I_Land+Newly_Developed_AHL+Newly_Developed_MIL+Newly_Developed_UIL+ARRAYSUM(New_Commercial_Land[*]))
Protected_Open_Space(t) = Protected_Open_Space(t - dt) + (Change_in_Open_Space) * dt
INIT Protected_Open_Space = 12379

INFLOWS:
Change_in_Open_Space = IF (Open_Space_Policy >0) THEN (Open_Space_Policy * Buildout) ELSE Open_Space_Formula * Buildout
Ag_Land_Dial = (IF(TIME>2000 AND TIME<2041) THEN .3 ELSE .3)
Ag_Land_Policy = IF(TIME>2000) THEN Ag_Land_Dial ELSE 0.3
Buildout = IF(Land_Fraction_Developed >.999999) THEN 0 ELSE 1
Excluded_Land = IF UB_Switch =1 AND TIME>2000 THEN 652 + UBEA ELSE IF UB_Switch =0 and TIME>2000 THEN (652+Protected_Farmland+((Protected_Open_Space+Steep_Unprot)) +Los_Padres_Chunk) ELSE 652 + 51537 * .3 + Protected_Open_Space +Steep_Unprot +Los_Padres_Chunk
Farmland = 51537
Land_Fraction_Developed = Total_Land_Occupied/Total_Developable_Land_Area
Land_per_PI_Parc = IF(TIME>2000) THEN LPPIS_Dial ELSE 5.12
Los_Padres_Chunk = 25570
LPPIS_Dial = (IF(TIME>2000 AND TIME<2041) THEN 5.12 ELSE 5.12)
NHB_Switch = 1

Noname_18 = Ag_Land_Policy * Farmland2_
Noname_19 = Noname_18
Noname_4 = ((Total_Land_Occupied-INIT(Total_Land_Occupied))/Total_Developable_Land_Area)/(TIME-1959)
No_Holds_Barred = IF NHB_Switch =1 AND (TIME>2000 AND TIME<2041) THEN 0 ELSE 1
Open_Space_Dial = IF TIME>2000 THEN 0 ELSE 0
Open_Space_Formula = IF TIME < 2000 THEN 1800 * Tot_LFD ELSE 0
Open_Space_Policy = IF(TIME>2000) THEN Open_Space_Dial ELSE 0
People_per_OS = Total_Population/(137000 * (1-Tot_LFD))
Protected_Farmland = IF TIME < 2000 THEN INIT(Farmland2_) * Ag_Land_Policy ELSE IF TIME > 2000 AND Ag_Land_Policy < 0.3 THEN INIT(Farmland2_) * Ag_Land_Policy ELSE IF TIME > 2000 AND Ag_Land_Policy > 0.3 THEN MIN (28576, INIT(Farmland2_) * Ag_Land_Policy) ELSE INIT(Farmland2_) * Ag_Land_Policy
Remaining_Farmland_ = Farmland-(Land_Fraction_Developed * (Farmland * (1-Ag_Land_Policy)))
Steep_Unprot = 22686
Total_Developable_Land_Area = 137000-Excluded_Land
Total_Land_Occupied = ARRAYSUM(Biz_land[*])+P_and_I_Land+Tot_Hse_Land
Tot_Biz_Land = ARRAYSUM(Biz_land[*])
Tot_LFD = Total_Land_Occupied/137000
UBEA = IF UB_Switch=1 AND (TIME>2000 AND TIME<2041) THEN 72623+Los_Padres_Chunk ELSE 72623+Los_Padres_Chunk
UB_Switch = 1

Population Sector

Adult_Population[Upper](t) = Adult_Population[Upper](t - dt) + (Adult_Net_Migration[Upper] + Maturing[Upper] - Adult_Death[Upper] - Maturing_2[Upper]) * dt
INIT Adult_Population[Upper] = Initial_Adult_Population[Upper]

Adult_Population[Middle](t) = Adult_Population[Middle](t - dt) + (Adult_Net_Migration[Middle] + Maturing[Middle] - Adult_Death[Middle] - Maturing_2[Middle]) * dt
INIT Adult_Population[Middle] = Initial_Adult_Population[Middle]

Adult_Population[Lower](t) = Adult_Population[Lower](t - dt) + (Adult_Net_Migration[Lower] + Maturing[Lower] - Adult_Death[Lower] - Maturing_2[Lower]) * dt
INIT Adult_Population[Lower] = Initial_Adult_Population[Lower]

INFLOWS:
Maturing[Income] = Young_Population[Income]/Time_to_Mature
Adult_Net_Migration[Income] = ((Attractiveness_to_General_Population[Income]) * Norm_Inmigation_Frac * Adult_Population[Income])-(Norm_Outmigration_Frac * Adult_Population[Income] * Crowding_Feedback[Income])

OUTFLOWS:
Adult_Death[Upper] = (Adult_Population[Upper] * (Adult_Death_Fraction) * (PMFD^.5)) * .75
Adult_Death[Middle] = Adult_Population[Middle] * (Adult_Death_Fraction) * (PMFD^.5)
Adult_Death[Lower] = (Adult_Population[Lower] * (Adult_Death_Fraction) * (PMFD^.5)) * 1.25
Maturing_2[Income] = Adult_Population[Income]/Time_to_Mature_2
Senior_Population[Upper](t) = Senior_Population[Upper](t - dt) + (Maturing_2[Upper] + Senior_Net_Migration[Upper] - Senior_Death[Upper]) * dt
INIT Senior_Population[Upper] = Initial_Senior_Population[Upper]

Senior_Population[Middle](t) = Senior_Population[Middle](t - dt) + (Maturing_2[Middle] + Senior_Net_Migration[Middle] - Senior_Death[Middle]) * dt
INIT Senior_Population[Middle] = Initial_Senior_Population[Middle]

Senior_Population[Lower](t) = Senior_Population[Lower](t - dt) + (Maturing_2[Lower] + Senior_Net_Migration[Lower] - Senior_Death[Lower]) * dt
INIT Senior_Population[Lower] = Initial_Senior_Population[Lower]

INFLOWS:
Maturing_2[Income] = Adult_Population[Income]/Time_to_Mature_2
Senior_Net_Migration[Income] = ((Attractiveness_to_Seniors[Income]) * Norm_Inmigation_Frac * Senior_Population[Income])-(Norm_Outmigration_Frac * Senior_Population[Income] * Crowding_Feedback[Income])

OUTFLOWS:
Senior_Death[Upper] = (Senior_Population[Upper] * Senior_Death_Fraction * PMFD) * .75
Senior_Death[Middle] = Senior_Population[Middle] * Senior_Death_Fraction * PMFD
Senior_Death[Lower] = (Senior_Population[Lower] * Senior_Death_Fraction * PMFD) * 1.25
University_Students(t) = University_Students(t - dt) + (Change_in_Students) * dt
INIT University_Students = IF(TIME<1945) THEN 500 ELSE Initial_STudents

INFLOWS:
Change_in_Students = University_Students * Student_Growth_Rate * Effect_of_enrollment_limit
Young_Population[Upper](t) = Young_Population[Upper](t - dt) + (Birth[Upper] + Young_Net_MIgration[Upper] - Maturing[Upper] - Young_Death[Upper]) * dt
INIT Young_Population[Upper] = Initial_Young_Population[Upper]

Young_Population[Middle](t) = Young_Population[Middle](t - dt) + (Birth[Middle] + Young_Net_MIgration[Middle] - Maturing[Middle] - Young_Death[Middle]) * dt
INIT Young_Population[Middle] = Initial_Young_Population[Middle]

Young_Population[Lower](t) = Young_Population[Lower](t - dt) + (Birth[Lower] + Young_Net_MIgration[Lower] - Maturing[Lower] - Young_Death[Lower]) * dt
INIT Young_Population[Lower] = Initial_Young_Population[Lower]

INFLOWS:
Birth[Income] = Total_Births_by_Income_Level[Income]
Young_Net_MIgration[Income] = Adult_Net_Migration[Income] * Young_per_Adult[Income]

OUTFLOWS:
Maturing[Income] = Young_Population[Income]/Time_to_Mature
Young_Death[Upper] = (Young_Population[Upper] * Young_death_frac * (PMFD^.25)) * .75
Young_Death[Middle] = Young_Population[Middle] * Young_death_frac * (PMFD^.25)
Young_Death[Lower] = (Young_Population[Lower] * Young_death_frac * (PMFD^.25)) * 1.25
Adult_Births[Income] = Adult_Population[Income] * Adult_Birth_Rate[Income] * PMFD * .5
Adult_Birth_Rate[Upper] = .0568 * 1 * Income_Birth_Multiplier[Upper]
Adult_Birth_Rate[Middle] = .0568 * 1 * Income_Birth_Multiplier[Middle]
Adult_Birth_Rate[Lower] = .0568 * 1 * Income_Birth_Multiplier[Lower]
Attractiveness_to_General_Population[Upper] = ((Effect_of_Housing_on_Attractiveness[Upper])^Sensitivity_to_Housing[Upper]) * (Effect_of_Jobs_on_Attractiveness[Upper]^Sensitivity_to_Jobs[Upper]) * (Quality_Of_Life^Sensitivity_to_QOL[Upper])
Attractiveness_to_General_Population[Middle] = ((Effect_of_Housing_on_Attractiveness[Middle])^Sensitivity_to_Housing[Middle]) * (Effect_of_Jobs_on_Attractiveness[Middle]^Sensitivity_to_Jobs[Middle]) * (Quality_of_Life^Sensitivity_to_QOL[Middle])
Attractiveness_to_General_Population[Lower] = ((Effect_of_Housing_on_Attractiveness[Lower])^Sensitivity_to_Housing[Lower]) * (Effect_of_Jobs_on_Attractiveness[Lower]^Sensitivity_to_Jobs[Lower]) * (Quality_of_Life^Sensitivity_to_QOL[Lower])

Attractiveness_to_Seniors[Upper] = ((Ef-
fect_of_Housing_on_Senior_Attractiveness[Upper]^Sr_Sens_Housing[Upper]) * (Qual-
ity_of_Life^Sr_Sens_QOL[Upper]))
Attractiveness_to_Seniors[Middle] = ((Ef-
fect_of_Housing_on_Senior_Attractiveness[Middle]^Sr_Sens_Housing[Middle]) * (Qual-
ity_of_Life^Sr_Sens_QOL[Middle]))
Attractiveness_to_Seniors[Lower] = ((Ef-
fect_of_Housing_on_Senior_Attractiveness[Lower]^Sr_Sens_Housing[Lower]) * (Qual-
ity_of_Life^Sr_Sens_QOL[Lower]))
Births_Per_Thousand[Income] = Total_Births/Total_NonStudent_Population * 1000
City_College_Bonus = .667
Crowding_Feedback[Upper] = IF People_per_House[Upper] > 2.16 THEN People_per_House[Upper]/2.16 ELSE 1
Crowding_Feedback[Middle] = IF People_per_House[Middle] >4 THEN People_per_House[Middle]/4 ELSE 1
Crowding_Feedback[Lower] = IF People_per_House[Lower] > 8 THEN People_per_House[Lower]/8 ELSE 1
Drivers = (((Adult_Population[Upper] * 1)+(Adult_Population[Middle] * .5)+(Adult_Population[Lower] *
.25))+((Senior_Population[Upper] * .8)+(Senior_Population[Middle] * .4)+(Senior_Population[Lower] *
.2))+((Young_Population[Upper] * (2/18 * .9))+(Young_Population[Middle] * (2/18 *
.45))+(Young_Population[Lower] * (2/18 * .225))+(University_Students * .5))) * Vehicle_Access_Increase
Fraction_of_Maximum_STudents = University_Students/Max_Students
Income_Birth_Multiplier[Upper] = .5
Income_Birth_Multiplier[Middle] = 1
Income_Birth_Multiplier[Lower] = 2
Initial_STudents = (Actual_UCSB_STudents * (1+City_College_Bonus))+Westmont_College_Bonus
Max_Students = 20000 + 18000 + 1200 + 600 +250
Norm_Inmigation_Frac = .11
Norm_Outmigration_Frac = .07
PMFD = (((1960/TIME)^10) * 1.22)^1
Senior_Death_Fraction = ((14.9+22.4+60)/3)/1000
Sensitivity_to_Housing[Upper] = 2.25
Sensitivity_to_Housing[Middle] = .45
Sensitivity_to_Housing[Lower] = .675
Sensitivity_to_Jobs[Upper] = .45
Sensitivity_to_Jobs[Middle] = .54
Sensitivity_to_Jobs[Lower] = .225
Sensitivity_to_QOL[Upper] = .72
Sensitivity_to_QOL[Middle] = .6
Sensitivity_to_QOL[Lower] = .48
Sr_Sens_Housing[Upper] = .81
Sr_Sens_Housing[Middle] = .675
Sr_Sens_Housing[Lower] = .54
Sr_Sens_QOL[Upper] = 1.08
Sr_Sens_QOL[Middle] = .9
Sr_Sens_QOL[Lower] = .72
Student_birth_rate = University_Students * .5 * .00572 * PMFD
Student_Growth_Rate = .08
Time_to_Mature = 18
Time_to_Mature_2 = 65-18
Total_Births = ARRAYSUM(Total_Births_by_Income_Level[*])
Total_Births_by_Income_Level[Income] = Young_Births[Income]+Adult_Births[Income]+Student_birth_rate
Westmont_College_Bonus = 1200
Young_Births[Income] = Young_Population[Income] * Young_Birth_Rate[Income] * (PMFD^.5)
Young_Birth_Rate[Upper] = .0276 * .5 * Income_Birth_Multiplier[Upper]
Young_Birth_Rate[Middle] = .0276 * .5 * Income_Birth_Multiplier[Middle]
Young_Birth_Rate[Lower] = .0276 * .5 * Income_Birth_Multiplier[Lower]
Young_Death_Frac = ((3.347+.084+.062+.319)/4)/1000
Young_per_Adult[Income] = Young_Population[Income]/Adult_Population[Income]

Actual_UCSB_STudents = GRAPH(TIME)
(1944, 0.00), (1945, 1660), (1946, 1571), (1947, 2791), (1948, 3009), (1949, 2811), (1950, 2548), (1951, 2125), (1952, 1646), (1953, 1547), (1954, 1587), (1955, 1725), (1956, 2021), (1957, 2220), (1958, 2480), (1959, 2722), (1960, 2879), (1961, 3511), (1962, 4130), (1963, 4785), (1964, 5938), (1965, 7879), (1966, 9570), (1967, 11245), (1968, 12201), (1969, 12619), (1970, 13733), (1971, 13644), (1972, 12916), (1973, 12300), (1974, 12526), (1975, 13277), (1976, 14584), (1977, 14691), (1978, 14588), (1979, 14473), (1980, 14785), (1981, 15450), (1982, 15706), (1983, 16158), (1984, 16753), (1985, 16936), (1986, 17414), (1987, 18005), (1988, 17879), (1989, 18571), (1990, 19082), (1991, 18391), (1992, 18519), (1993, 18655), (1994, 18581), (1995, 17834), (1996, 18224), (1997, 18531), (1998, 18940), (1999, 19363)
Effect_of_Enrollment_Limit = GRAPH(Fraction_of_Maximum_STudents)
(0.00, 17.5), (0.1, 8.00), (0.2, 2.25), (0.3, 2.00), (0.4, 1.75), (0.5, 0.8), (0.6, 0.225), (0.7, 0.175), (0.8, 0.13), (0.9, 0.12), (1, 0.00)
Effect_of_Housing_on_Attractiveness[Income] = GRAPH(families_to_House_Ratio[Income])
(0.00, 2.78), (0.2, 2.23), (0.4, 1.73), (0.6, 1.16), (0.8, 0.88), (1.00, 0.715), (1.20, 0.55), (1.40, 0.385), (1.60, 0.33), (1.80, 0.22), (2.00, 0.138)
Effect_of_Housing_on_Senior_Attractiveness[Income] = GRAPH(families_to_House_Ratio[Income])
(0.00, 1.03), (0.2, 0.9), (0.4, 0.77), (0.6, 0.6), (0.8, 0.43), (1.00, 0.3), (1.20, 0.26), (1.40, 0.178), (1.60, 0.138), (1.80, 0.124), (2.00, 0.11)
Effect_of_Jobs_on_Attractiveness[Income] = GRAPH(Labor_to_Jobs_Ratio[Income])
(0.00, 1.00), (0.2, 0.975), (0.4, 0.9), (0.6, 0.8), (0.8, 0.675), (1.00, 0.675), (1.20, 0.675), (1.40, 0.675), (1.60, 0.675), (1.80, 0.6), (2.00, 0.4)
Vehicle_Access_Increase = GRAPH(TIME)
(1960, 0.8), (1970, 0.85), (1980, 0.9), (1990, 0.95), (2000, 1.00), (2010, 1.05), (2020, 1.10), (2030, 1.15), (2040, 1.20)

Public and Institional Sector

Public_and_Institional_Parcels(t) = Public_and_Institional_Parcels(t - dt) + (NetChangeInPIParcel) * dt
INIT Public_and_Institional_Parcels = Indicated_PI_Parcels

INFLOWS:
NetChangeInPIParcel = (Indicated_PI_Parcels-Public_and_Institional_Parcels) * Buildout
P_and_I_Land(t) = P_and_I_Land(t - dt) + (Change_in_P_and_I_Land) * dt
INIT P_and_I_Land = 406

INFLOWS:
Change_in_P_and_I_Land = NetChangeInPIParcel * Land_per_PI_Parc
Indicated_PI_Parcels = Total_Population * (1647/198564)
P_and_I_Jobs[Upper] = Public_and_Institional_Parcels * 4
P_and_I_Jobs[Middle] = Public_and_Institional_Parcels * 9
P_and_I_Jobs[Lower] = Public_and_Institional_Parcels * 1
Total_P_and_I_Jobs = ARRAYSUM(P_and_I_Jobs[*])

Real World Data
Act_pp_per_hh = IF(TIME<1970 OR TIME>1990) THEN 2.73 ELSE Actual_SB_County_Population__DOF_Forecast/Actual_SB_County_Households
SC_Actual_and_Forecast = Actual_SC_Population+SBCAG_and_JO_SC_Forecast
Actual_County_Housing_Units = GRAPH(TIME)
(1960, 58667), (1970, 88336), (1980, 114910), (1990, 138149), (2000, 169232), (2010, 207309), (2020, 253954), (2030, 311093), (2040, 381089)
Actual_Developed_Land = GRAPH(TIME)
(1960, 12479), (1961, 13212), (1962, 14215), (1963, 15218), (1964, 16221), (1965, 17224), (1966, 18227), (1967, 19230), (1968, 19286), (1969, 19342), (1970, 19398), (1971, 19454), (1972, 19510), (1973, 19566), (1974, 19622), (1975, 19678), (1976, 19736), (1977, 20815), (1978, 21894), (1979, 22973), (1980, 24052), (1981, 25131), (1982, 26210), (1983, 27289), (1984, 28368), (1985, 29447), (1986, 30522), (1987, 30781), (1988, 31040), (1989, 31299),

(1990, 31558), (1991, 31817), (1992, 32076), (1993, 32335), (1994, 32594), (1995, 32853), (1996, 33112), (1997, 33371), (1998, 33632)
Actual_SB_County_Households = GRAPH(TIME)
(1970, 82540), (1980, 109559), (1990, 129816)
Actual_SB_County_Population__DOF_Forecast = GRAPH(TIME)
(1960, 168962), (1970, 264324), (1980, 298694), (1990, 369608), (2000, 436649), (2010, 482061), (2020, 536500), (2030, 593500), (2040, 650900)
Actual_SC_Employment = GRAPH(TIME)
(1930, 0.00), (1940, 0.00), (1950, 0.00), (1960, 42843), (1970, 64300), (1980, 86600), (1990, 109581), (2000, 121627)
ACtual_SC_Households = GRAPH(TIME)
(1930, 0.00), (1940, 0.00), (1950, 0.00), (1960, 31200), (1970, 51600), (1980, 66018), (1990, 70455), (2000, 73542)
Actual_SC_Housing_Units = GRAPH(TIME)
(1960, 33758), (1970, 54583), (1980, 68984), (1990, 75042), (2000, 78000), (2010, 0.00), (2020, 0.00), (2030, 0.00), (2040, 0.00)
Actual_SC_Population = GRAPH(TIME)
(1960, 93252), (1970, 150425), (1980, 170867), (1990, 191367), (2000, 201047), (2010, 0.00), (2020, 0.00), (2030, 0.00), (2040, 0.00)
Actual_UCSB_beds = GRAPH(TIME)
(1972, 1490), (1973, 3220), (1974, 3220), (1975, 3220), (1976, 3220), (1977, 3220), (1978, 3220), (1979, 3220), (1980, 3220), (1981, 3820), (1982, 3862), (1983, 3862), (1984, 4066), (1985, 4066), (1986, 4066), (1987, 4066), (1988, 4166), (1989, 4166), (1990, 4166), (1991, 4166), (1992, 4166), (1993, 4166), (1994, 4166), (1995, 4166), (1996, 4166), (1997, 4166), (1998, 4166), (1999, 4166), (2000, 4166), (2001, 4166), (2002, 4166), (2003, 4166), (2004, 4166), (2005, 4166), (2006, 4166), (2007, 4166), (2008, 4166), (2009, 4166), (2010, 4166), (2011, 4166), (2012, 4166), (2013, 4166), (2014, 4166), (2015, 4166), (2016, 4166), (2017, 4166), (2018, 4166), (2019, 4166), (2020, 6166)
Act_Com_Land = GRAPH(TIME)
(1986, 1795), (1989, 1890), (1992, 1965), (1995, 2070), (1998, 3000)
ACt_PIP_Land = GRAPH(TIME)
(1986, 4846), (1998, 5031)
ACt_Res_Land = GRAPH(TIME)
(1986, 18742), (1998, 19671)
DOF_County_Forecast = GRAPH(TIME)
(1980, 0.00), (1990, 371400), (2000, 435900), (2010, 484800), (2020, 536500), (2030, 593500), (2040, 650900)
Household_by_Income = GRAPH(TIME)
(1960, 0.00), (1968, 0.00), (1976, 0.00), (1984, 0.00), (1992, 0.00), (2000, 0.00), (2008, 0.00), (2016, 0.00), (2024, 0.00), (2032, 0.00), (2040, 0.00)
Median_House_Ac = GRAPH(TIME)
(1960, 125742), (1970, 178079), (1980, 253330), (1990, 403950), (2000, 508510), (2010, 0.00), (2020, 0.00), (2030, 0.00), (2040, 0.00)
Noname_3 = GRAPH(TIME)
(1979, 47440), (1980, 47888), (1981, 48336), (1982, 48784), (1983, 49232), (1984, 49680), (1985, 50128), (1986, 50576), (1987, 51024), (1988, 51472), (1989, 51918), (1990, 50037), (1991, 48156), (1992, 46275), (1993, 44393)
Real_Traffic_Volume = GRAPH(TIME)
(1960, 119), (1970, 200), (1980, 279), (1990, 440), (2000, 590), (2010, 680), (2020, 798), (2030, 916), (2040, 1034)
SBCAG_and_JO_SC_Forecast = GRAPH(TIME)
(1960, 0.00), (1970, 0.00), (1980, 0.00), (1990, 0.00), (2000, 0.00), (2010, 0.00), (2020, 0.00), (2030, 0.00), (2040, 0.00)
SBCAG_County_Forecast = GRAPH(TIME)
(1980, 0.00), (1985, 0.00), (1990, 369608), (1995, 394165), (2000, 416214), (2005, 437398), (2010, 457441), (2015, 479321)

Residential Land Use Sector

Affordable_Housing_Land(t) = Affordable_Housing_Land(t - dt) + (Newly_Developed_AHL + Obsolesced_MIL - Gentrified_AHL - Former_AHL) * dt
INIT Affordable_Housing_Land = 1208

INFLOWS:
Newly_Developed_AHL = Affordable_Housing_Construction * Affordable_Land__p_Hse
Obsolesced_MIL = Middle_Income_Housing_Obsolescence * Middle_Land_p_Hse

OUTFLOWS:
Gentrified_AHL = Affordable_Housing_Gentrification * Affordable_Land__p_Hse
Former_AHL = Affordable_Housing_Demolition * Affordable_Land__p_Hse
Middle_Income_Land(t) = Middle_Income_Land(t - dt) + (Obsolesced_UIL + Newly_Developed_MIL + Gentrified_AHL - Gentrified_MIL - Former_MIL - Obsolesced_MIL) * dt
INIT Middle_Income_Land = 4679

INFLOWS:
Obsolesced_UIL = Upper_Income_Housing_Obsolescence * Upper_Land_p_Hse
Newly_Developed_MIL = Middle_Income_House_Construction * Middle_Land_p_Hse
Gentrified_AHL = Affordable_Housing_Gentrification * Affordable_Land__p_Hse

OUTFLOWS:
Gentrified_MIL = Middle_Income_Housing_Gentrification * Middle_Land_p_Hse
Former_MIL = Middle_Income_Housing_Demolition * Middle_Land_p_Hse
Obsolesced_MIL = Middle_Income_Housing_Obsolescence * Middle_Land_p_Hse
Upper_Income_Land(t) = Upper_Income_Land(t - dt) + (Newly_Developed_UIL + Gentrified_MIL - Obsolesced_UIL - Former_UIL) * dt
INIT Upper_Income_Land = 5181

INFLOWS:
Newly_Developed_UIL = Upper_Income_Housing_Construction * Upper_Land_p_Hse
Gentrified_MIL = Middle_Income_Housing_Gentrification * Middle_Land_p_Hse

OUTFLOWS:
Obsolesced_UIL = Upper_Income_Housing_Obsolescence * Upper_Land_p_Hse
Former_UIL = UIH_Demolition * Upper_Land_p_Hse
Affordable_Housing_Density_Dial = (IF(TIME>2000 AND TIME<2041) THEN 10.2 ELSE 10.2)
Affordable_Land__p_Hse = IF(TIME>2000) THEN 1/Affordable_Housing_Density_Dial ELSE 1/10.2
All_Residential_Land = Affordable_Housing_Land+Middle_Income_Land+Upper_Income_Land
Avg_Res_Land_Density = (Total_Affordable_Houses+Middle_Income_Houses+Upper_Income_Houses)/Tot_Hse_Land
Middle_Land_p_Hse = IF(TIME>2000) THEN 1/MLPH_Dial ELSE 1/5.07
MLPH_Dial = (IF(TIME>2000 AND TIME<2041) THEN 5.07 ELSE 5.07)
Tot_Hse_Land = (Affordable_Housing_Land+Middle_Income_Land+Upper_Income_Land)
ULPH_Dial = (IF(TIME>2000 AND TIME<2041) THEN 2.53 ELSE 2.53)
Upper_Land_p_Hse = IF(TIME>2000) THEN 1/ULPH_Dial ELSE 1/2.53

Traffic and Quality of Life

Air_Quality = (1/(Ag_Land_Policy^.25+Tot_LFD+Oil_Production^.25+(Traffic_Level/INIT(Traffic_Level))^.25) * EPA_Regs^.25 * LA_Effect^.25) * 2.399741206 * 1.176470588235294117647058823529 4
Commuter_Ratio = Total_Commuters/(INIT(Total_Commuters))
Drivers_and_Commuters = Drivers+(Total_Commuters * 7)
Driver_Ratio = Drivers/INIT(Drivers) Education = 1
EPA_Regs = (TIME/1960)^10
Health_Care_and_Environment = (1 +(1+Air_Quality)/2)/2
Median_House_Price = IF Med_Number_Houses < Total_Affordable_Houses THEN (Med_Number_Houses/Total_Affordable_Houses) * ((House_Price[Lower]+House_Price[Middle])/2) ELSE IF Total_Affordable_Houses < Med_Number_Houses < (Middle_Income_Houses +Total_Affordable_Houses) THEN ((Med_Number_Houses-Total_Affordable_Houses)/Middle_Income_Houses) *

(((House_Price[Middle]+House_Price[Upper])/2)- ((House_Price[Lower]+House_Price[Middle])/2)) + ((House_Price[Lower]+House_Price[Middle])/2) ELSE IF (Total_Affordable_Houses+Middle_Income_Houses) < Med_Number_Houses THEN (((Med_Number_Houses-(Total_Affordable_Houses+Middle_Income_Houses))/(Upper_Income_Houses)) * 2) * (House_Price[Upper]-((House_Price[Upper]+House_Price[Middle])/2)) + ((House_Price[Upper]+House_Price[Middle])/2) ELSE 0
Med_Number_Houses = Houses/2
Noname_20[Sheffield] = Traffic_Volume * MAX((.68^((TIME/1960)^40)), .42) * .291 * 1000
Noname_20[Las_Positas] = Traffic_Volume * MAX((.68^((TIME/1960)^40)), .42) * .472 * 1000
Noname_20[Fairview] = Traffic_Volume * MAX((.68^((TIME/1960)^40)), .42) * .238 * 1000
Noname_21 = .68^((TIME/1960)^40)
Oil_Production = 1960/TIME
QOL2 = 1.2 * Education * Health_Care_and_Environment * Recreation * The_Arts * Effect_of_Service_on_Quality_of_Life/((Traffic_Level^.5) * Crime_Risk_on_Quality_of_Life^2 * fam_to_House * (Unempl_Conversion^.5))
Quality_of_Life = (((1/(Traffic_Volume_to_Capacity_Ratio)^.1) * (Crime_Risk_on_Quality_of_Life^.5) * (Effect_of_Service_on_Quality_of_Life^.1) * Education * (Health_Care_and_Environment^.1) * (Recreation^.1) * The_Arts)) * 1.0169491525423728813559322033898
Recreation = (1+(1/People_per_OS))/2
Regional_Mass_Trans_Policy = IF (TIME> 2010) THEN 1 ELSE 1
SC_Mass_Trans_Policy = IF (TIME>2005) THEN 1 ELSE 1
The_Arts = 1
Total_Drivers = University_Students+Total_Adult_Population+(Total_Senior_Population * .75)
Traffic_Level = Regional_Mass_Trans_Policy * Drivers_and_Commuters * SC_Mass_Trans_Policy
Traffic_Volume = Traffic_Level * .00216 * 1.1527656688947011527656688947012
Traffic_Volume_to_Capacity_Ratio = Traffic_Volume/568.55
Unempl_Conversion = IF Total_Unemployment_Rate < 0 THEN .001 ELSE Total_Unemployment_Rate
Crime_Risk_on_Quality_of_Life = GRAPH(Unemployment_Rate[Lower])
(0.00, 1.00), (0.03, 1.00), (0.06, 1.00), (0.09, 0.96), (0.12, 0.89), (0.15, 0.79), (0.18, 0.69), (0.21, 0.59), (0.24, 0.52), (0.27, 0.5), (0.3, 0.49)
Effect_of_Commuters_on_Traffic = GRAPH(Commuter_Ratio)
(0.00, 0.00), (1.20, 1.20), (2.40, 1.40), (3.60, 1.60), (4.80, 1.80), (6.00, 2.00), (7.20, 2.20), (8.40, 2.40), (9.60, 2.60), (10.8, 2.80), (12.0, 3.00)
Effect_of_Drivers_on_Traffic = GRAPH(Driver_Ratio)
(0.00, 0.00), (0.3, 0.3), (0.6, 0.6), (0.9, 0.9), (1.20, 1.20), (1.50, 1.50), (1.80, 1.80), (2.10, 2.10), (2.40, 2.40), (2.70, 2.70), (3.00, 3.00)
Effect_of_Service_on_Quality_of_Life = GRAPH(Service_Adequacy)
(0.00, 0.23), (0.2, 0.23), (0.4, 0.33), (0.6, 0.52), (0.8, 0.74), (1.00, 1.00), (1.20, 1.17), (1.40, 1.26), (1.60, 1.31), (1.80, 1.33), (2.00, 1.35)
LA_Effect = GRAPH(TIME)
(1960, 1.00), (1961, 0.945), (1962, 0.905), (1963, 0.885), (1964, 0.865), (1965, 0.845), (1966, 0.83), (1967, 0.805), (1968, 0.79), (1969, 0.775), (1970, 0.75), (1971, 0.74), (1972, 0.72), (1973, 0.685), (1974, 0.645), (1975, 0.64), (1976, 0.6), (1977, 0.59), (1978, 0.565), (1979, 0.545), (1980, 0.5), (1981, 0.51), (1982, 0.52), (1983, 0.53), (1984, 0.54), (1985, 0.55), (1986, 0.56), (1987, 0.57), (1988, 0.58), (1989, 0.59), (1990, 0.6), (1991, 0.61), (1992, 0.62), (1993, 0.63), (1994, 0.64), (1995, 0.65), (1996, 0.66), (1997, 0.67), (1998, 0.68), (1999, 0.69), (2000, 0.7), (2001, 0.71), (2002, 0.72), (2003, 0.73), (2004, 0.74), (2005, 0.75), (2006, 0.76), (2007, 0.77), (2008, 0.78), (2009, 0.79), (2010, 0.8), (2011, 0.81), (2012, 0.82), (2013, 0.83), (2014, 0.84), (2015, 0.85), (2016, 0.86), (2017, 0.87), (2018, 0.88), (2019, 0.89), (2020, 0.9), (2021, 0.9), (2022, 0.91), (2023, 0.92), (2024, 0.93), (2025, 0.94), (2026, 0.95), (2027, 0.96), (2028, 0.97), (2029, 0.98), (2030, 0.99), (2031, 1.00), (2032, 1.00), (2033, 1.00), (2034, 1.00), (2035, 1.00), (2036, 1.00), (2037, 1.00), (2038, 1.00), (2039, 1.00), (2040, 1.00)

Not in a sector

Adult_Death_Fraction = ((1.212+.4+.416+.878+1.71+1.45+2.89+5.56+10.54)/9)/1000
Max_Net_Starts = GRAPH(TIME)
(1960, 5000), (1965, 4860), (1970, 3470), (1975, 1120), (1980, 300), (1985, 300), (1990, 300), (1995, 300), (2000, 300), (2005, 300), (2010, 300)

APPENDIX 4
INPUTS AND OUTPUTS DEFINITIONS FOR SCOPE

Scenario Model Inputs*

Year	Existing Policies	Widespread	No Growth	New Neighbor-hoods	Infill	All Af-fordable
Affordable Construc-tion units	48	73	0	146	405	500
Affordable Control Time	30	30	30	30	50	150
Percent of Agricultural Land that is Off Limits	0.3	0	1	0.3	0.3	0.3
Open Space Acres Protected	250	0	500	100	250	250
Affordable Density	50	7.69	7.69	50	16.67	16.67
Middle-income Resi-dential Density	20	4	4	20	7.69	7.69
Upper-income Resi-dential Density	10	1.96	1.96	10	4	4
Commercial Cap (0 = off, 1 = on)	0	0	0	0	0	0
Residential Cap (0 = off, 1 = on)	0	0	0	0	0	0
Unrestrained Devel-opment (0 = off, 1 = on)	0	1	0	1	1	1
Urb. Growth Boundary (0 = off, 1 = on)	1	0	0	0	1	1
Ignore General Plan (0 = off, 1 = on)	0	1	0	1	1	1
Middle-income Resi-dential Construction	238	319	0	291	102	1
Upper-income Resi-dential Construction	235	317	0	291	100	1
Retail/Services Sq. Ft. Limit	1,400,000	1,700,000	150,000	1,200,000	900,000	900,000
Office Sq. Ft. Limit	2,100,000	2,500,000	200,000	200,000	150,000	150,000
Industrial Sq. Ft. Limit	6,700,000	8,100,000	650,000	600,000	450,000	450,000
Retail/Services Floor Area Ratio	0.23	0.23	0.1	0.1	0.23	0.23
Office Floor Area Ratio	1.39	1.39	0.14	0.7	1.39	1.39
Industrial Floor Area Ratio	0.35	0.346	0.1	0.15	0.35	0.35

* The scenarios are designed to generate a net amount of new residential units to the extent that land would be available. To account for processes of obsolescence and demolition, we increased the annual number of units that would be built. As an example, for the model to generate in the Existing Policies Scenario approximately 10,700 additional residential units of which 25 per year are restricted affordable, the model has to use as inputs 48 affordable units per year (to account for time controls expiring on affordable units, gentrification, etc.), 238 middle-income units per year, and 235 upper-income units per year. Similar adjustments are made for all the scenarios.

Input Definitions

Affordable Control Time
How many years that subsidized affordable housing will be kept off the market. The default is 30 years.

Protected Agricultural Land
The percentage of agriculturally-zoned land should be off-limits to development from 2000 until 2040. The default is 30 percent.

Protected Open Space
The number of new acres per year, from 2000 to 2040, that should become Protected Open Space in the South Coast. Protected refers to land that is held in fee by a non-profit for conservation purposes or is subject to a conservation or other easement that preserves the land.

Affordable Housing Density
The average number of newly constructed affordable housing units per acre built between 2000 and 2040 The default density is 10.2 units per acre.

Middle-income Housing Density
The average number of newly constructed units per acre built between 2000 and 2040 of middle-income housing units. The default density is 5.07 units per acre.

Upper-income Housing Density
The average number of newly constructed units per acre (i.e., built between 2000 and 2040 of upper-income housing units. The default density is 2.53 units per acre.

Affordable Housing Construction
The number of affordable housing units built every year from 2000 until 2040. The default is zero additional affordable housing units.

Middle-income Construction
The number of middle-income housing units built every year from 2000 until 2040. The default is the formula for middle-income housing construction that corresponds to past construction rates.

Upper-income Construction
The number of upper-income housing units built every year from 2000 until 2040. The default is the formula for middle-income housing construction that corresponds to past construction rates.

Commercial Cap
A switch that will prohibit commercial construction from 2000 until 2040. The default is off where commercial construction will proceed following model parameters. 0 is off and 1 is on.

Residential Cap
A switch that will prohibit residential construction from 2000 until 2040. The default is off where residential construction will proceed following model parameters. 0 is off and 1 is on.

Unrestrained Development
A switch that will allow development to proceed without any regulatory restraints until all available land is developed. The default is off which allows development under historic constraints. 0 is off and 1 is on.

Urban Growth Boundary
A switch that will maintain the urban growth boundary (also known as the Urban Limit Line) and make all unprotected land within the urban growth boundary available for development from 2000 until 2040. All land outside the UGB will be prohibited from development. The default is off, which assumes that the urban growth boundary does not exist. 0 is off and 1 is on.

Ignore General Plan
A switch that will remove the cap on the number of new houses that can be built per year imposed by the existing general plans and zoning. The default is off, where a cap on the maximum number of houses built per year exists. 0 is off and 1 is on.

Retailt/Services Square Foot Limit
The maximum amount of new Retail/Service square footage built during the 2000 to 2040 period. The default is the maximum square footage following historic rates as a proportion of commercial development bound by the amount of land available in the South Coast.

Office Square Foot Limit
The maximum amount of new office square footage. The default is the maximum square footage following historic rates as a proportion of commercial development bound by the amount of land available in the South Coast.

Industrial Square Foot Limit
The maximum amount of new industrial square footage. The default is the maximum square footage following historic rates as a proportion of commercial development bound by the amount of land available in the South Coast.

Retail/Service FAR
The floor area ratio (or FAR) or usable space in a retail or services (e.g., medical office) building divided by the lot size on which it sits. For example, a 5,000 square foot one-story building that occupies 50 percent of a 10,000 square foot lot has an FAR of 0.5. A 10,000 square foot two-story building that occupies the same 50 percent of a 10,000 square foot lot has an FAR of 1.0. The default FAR is 0.23.

Office FAR
The floor area ratio (or FAR) or usable space in an office building divided by the lot size on which it sits. The default FAR is 1.39.

Industrial FAR
The floor area ratio (or FAR) or usable space in an industrial building divided by the lot size on which it sits. The default FAR is 0.346.

Output Definitions

Total Housing Units
The total number of housing units, including owned housing and rented, apartments, condos, trailers, and single-family homes. It does not include group housing such as dormitories and nursing homes.

Upper-income Houses: This is the total number of Upper-income housing units on the South Coast, including apartments, condos, and single family homes.

Middle-income Houses: This is the total number of Middle-income dwelling units on the South Coast, including apartments, condos, and single family homes.

Affordable Houses: This is the total number of Affordable Dwelling units on the South Coast, including subsidized affordable housing with price controls, for a certain number of years and de facto affordable housing that exists because of quality, location, or other factors.

Affordable Housing Fraction of Total: This number is fraction of Affordable Houses over the total housing units.

Median House Price: This is the price in 2000 dollars of SCOPE's modeled Median House Price.

People per Housing Unit: This is the average number of people per dwelling unit on the South Coast, not including group quarters such as dormitories and nursing homes.

People per House (Upper-income): This is the average number of people per Upper-income dwelling unit on the South Coast, not including group quarters such as dormitories and nursing homes

People per House (Middle-income): This is the average number of people per Middle-income dwelling unit on the South Coast, not including group quarters such as dormitories and nursing homes

People per House (Lower-income): This is the average number of people per Affordable dwelling unit on the South Coast, not including group quarters such as dormitories and nursing homes

Total Households: This is the total number of households in the South Coast excluding people living in group quarters such as dormitories and nursing homes. Households are defined as a group of people who live together by choice. More than one household can live in a housing unit and this can result in more households than total housing units on the South Coast, especially because of limited housing resources.

Average Number of Housing Units per Acre: This is the average number of dwelling units per acre including apartments, condos, and single family homes across all income levels, but not including dormitories, nursing homes, and other group quarter facilities.

Total Jobs: This is the total number of jobs existing on the South Coast. It includes jobs of all types at all pay levels and salaries.

Average Household Income: This income (given in 2000 dollars) is derived mainly through an algorithm that takes into account general trends nationally and the different proportions of households in the South Coast (high income, middle-income, and lower-income).

Jobs-Housing Balance: This number reflects the ratio of the number of jobs to the number of housing units in the South Coast.

Agricultural Jobs: This is the total number of jobs on the South Coast in Agriculture.

Self-employed Persons: This is the total number of people living on the South Coast who are self-employed.

Upper-income Jobs: This is the total number of jobs available on the South Coast for those in the Upper-income bracket.

Middle-income Jobs: This is the total number of jobs available on the South Coast for those in the Middle-income bracket.

Lower-income Jobs: This is the total number of jobs available on the South Coast for those in the Lower-income bracket.

Office Jobs: This is the total number of Office Jobs on the South Coast that are not in the Public Sector.

Public and Institutional Jobs: This is the total number of Public Sector jobs as well as Institutional Jobs, such as hospital workers, bus drivers, etc.

Retail/Service Jobs: This is the total number of Retail/Service jobs on the South Coast.

Industrial Jobs: This is the total number of Industrial Jobs on the South Coast.

Total Developed Acreage: This is the total number of acres of all developed land in the South Coast. This includes parking lots, streets, and landscaped portions of parcels. It does not include farmland.

Protected Open Space: This is the total number of acres of open space that are protected, and therefore off limits to development. This does not include Agricultural land and land that is open space but unprotected.

Public and Institutional Acreage: This is the total number of acres that public and institutional facilities occupy on the South Coast, including government buildings, libraries, hospitals, bus stations, etc.

Upper-income Residential Acreage: This is the total number of acres that Upper-income Residences occupy on the South Coast, including the landscaped portions of the property, but not including agricultural or open space areas of a property.

Middle-income Residential Acreage: This is the total number of acres that Middle-income Residences occupy on the South Coast , including the landscaped portions of the property, but not including agricultural or open space areas of a property.

Affordable Housing Residential Acreage: This is the total number of acres that Affordable Residences occupy on the South Coast, including the landscaped portions of the property, but not including agricultural or open space areas of a property.

Total Residential Acreage: This is the total number of acres of all Residential land in the South Coast. This includes portions of a residential parcel that are heavily altered (i.e., landscaped) but still not concrete. However, a large parcel that has both Open Space and a barn upon it would be split accordingly.

Retail/Service Acreage: This is the total number of acres occupied on the South Coast by non-Public and Institutional Retail/Service structures and their accompanying parking lots and landscaped areas.

Office Acreage: This is the total number of acres occupied on the South Coast by non-Public and Institutional Office structures and their accompanying parking lots and landscaped areas.

Industrial Acreage: This is the total number of acres occupied on the South Coast by non-Public and Institutional Industrial structures and their accompanying parking lots and landscaped areas.

Total Commercial Acreage: This is the total number of acres that have been consumed on the South Coast by the Retail/Services, Office, and Industrial Acreage above.

Total Population: This is the total population of ALL people living in the South Coast. All ages, all income levels, students and non-students, and those both in group quarters and in households are included.

Students: This is the total population of all college or University Students in the South Coast including UCSB, Santa Barbara City College, and Westmont College, regardless of age.

Senior Population: This is the population of all non-students ages 65 and over living in the South Coast including those living in households and Group Quarters.

Adult Population: This is the population of all non-students in the South Coast between the ages of 18 and 65, including those living in households and Group Quarters.

Young Population: This is the total population of all non-students below the age of 18.

Upper-income Seniors: This is the total of all Seniors (non-students 65 and older) who are in the Upper-income bracket.

Middle-income Seniors: This is the total of all Seniors (non-students 65 and older) who are in the Middle-income bracket.

Lower-income Seniors: This is the total of all Seniors (non-students 65 and older) who are in the Middle-income bracket.

Upper-income Adults: This is the total of all Adults (non-students between the ages of 18 and 65) who are in the Upper-income bracket.

Middle-income Adults: This is the total of all Adults (non-students between the ages of 18 and 65) who are in the Middle-income bracket.

Lower-income Adults: This is the total of all Adults (non-students between the ages of 18 and 65) who are in the Lower-income bracket.

Upper-income Youth: This is the total of all Young People(non-students younger than 18) who are in the Upper-income bracket.

Middle-income Youth: This is the total of all Young People (non-students younger than 18) who are in the Middle-income bracket.

Lower-income Youth: This is the total of all Young People (non-students younger than 18) who are in the Lower-income bracket.

Traffic Volume: This number represents the number of vehicles daily that pass through a particular checkpoint on US Hwy 101.

Commuters: This is the number of people working in the South Coast, but living elsewhere*, e.g., Santa Maria, Santa Ynez Valley, Lompoc or Ventura*.

Quality of Life: See Appendix 11

APPENDIX 5
SCOPE OUTPUTS

1960-2000	1960	1970	1980	1990	2000
Household					
Housing Units	33758	53067	68251	75093	80846
Upper Income Houses	11101	25855	37290	45074	52428
Middle Income Houses	15728	16752	18724	17443	16639
Affordable Houses	6929	10460	12238	12575	11779
Aff. House Fraction	0.21	0.2	0.18	0.17	0.15
Median House Price	$133,854	$204,540	$274,021	$373,683	$507,091
Total People per Housing Unit	2.6	2.49	2.4	2.42	2.32
People per House (Upper Income)	2.08	1.31	1.34	1.34	1.29
People per House (Middle Income)	2.91	3.38	3.4	3.72	3.77
People per House (Lower Income)	3.73	4.98	5.18	5.64	6.12
Total Households	31199	48861	62743	68936	74117
Acres per Housing unit	3.05	3.22	3.28	3.34	3.36
Jobs Sector					
Total Jobs	42997	63769	84929	106684	127222
Average Household Income	$43,613	$40,361	$48,690	$53,693	$59,201
Jobs-Housing Balance	1.27	1.2	1.24	1.42	1.57
Agricultural Jobs	289	479	683	908	1141
Self-Employed Persons	5728	6490	7553	8659	9592
Upper Income Jobs	6799	12251	17262	22222	26861
Middle Income Jobs	16859	29448	41195	52890	63834
Lower Income Jobs	19339	22069	26473	31571	36527
Office Jobs	4956	18158	29755	40294	48338
Public/Institutional Jobs	10829	15725	19687	22110	23064
Retail/Service Jobs	12420	13994	17865	22820	27947
Industrial Jobs	8822	8980	9457	10027	10561
Land Use					
Total Developed Acreage	12187	19500	25523	28319	30484
Public and Institutional Acreage	406	2196	3645	4532	4881
Upper Income Residential Acreage	5181	9513	12355	13450	14421
Middle Income Residential Acreage	4679	5219	6222	6350	6612
Affordable Housing Residential Acreage	1208	1744	2259	2688	3018
Total Residential Acreage	11068	16475	20836	22489	24052
Retail Service Acreage	226	289	444	643	848
Office Acreage	52	98	138	174	202
Industrial Acreage	435	441	460	482	502
Total Commercial Acreage	713	828	1041	1298	1552
Protected Open Space Acreage	12379	14460	17455	20995	24861

1960-2000	1960	1970	1980	1990	2000
Population					
Total Population	93255	139347	172442	191756	198933
Students	5999	22644	27268	31048	34438
Senior Population	11780	16098	21009	25098	28059
Adult Population	44064	59119	74329	82463	84613
Young Population	31412	41487	49835	53147	51823
Upper Income Seniors	3927	5876	8716	11618	14242
Middle Income Seniors	5890	7310	8530	9009	8957
Lower Income Seniors	1963	2913	3763	4471	4860
Upper Income Adults	12652	18416	27113	32540	36157
Middle Income Adults	22032	26917	30333	31006	30058
Lower Income Adults	9380	13786	16883	18917	18398
Upper Income Youth	5235	7672	11161	12977	13918
Middle Income Youth	15706	18375	20089	19920	18764
Lower Income Youth	10471	15440	18586	20251	19141
Upper-Income All	21,814	31,964	46,990	57,135	64,317
Middle-Income All	43,628	52,602	58,952	59,935	57,779
Lower-Income All	21,814	32,139	39,232	43,639	42,399
Traffic and Quality of Life					
At Las Positas	38529	59500	81820	106003	132832
At Sheffield	23754	36683	50444	65353	81894
At Fairview	19428	30002	41257	53451	66979
Commuters	2719	4692	8247	14637	25250
Quality of Life	1.2	1.07	1.01	0.98	0.96
Crime Risk on Quality of Life	1	1	1	1	1
Adequacy of Services	0.93	0.74	0.73	0.8	0.91
Environment	1	0.97	0.94	0.94	0.94
Recreational Amenities	1.17	0.92	0.82	0.78	0.77

Existing Policies	2000	2010	2020	2030	2040
Household					
Housing Units	80846	83679	86507	88023	88014
Upper Income Houses	52428	57601	62507	66274	68648
Middle Income Houses	16639	17179	17056	16252	14998
Affordable Houses	11779	8899	6945	5497	4368
Aff. House Fraction	0.15	0.11	0.08	0.06	0.05
Median House Price	$507,091	$649,204	$829,283	$1,059,757	$1,354,699
Total People per Housing Unit	2.32	2.22	2.08	1.94	1.8
People per House (Upper Income)	1.29	1.25	1.2	1.15	1.1
People per House (Middle Income)	3.77	3.48	3.32	3.28	3.26
People per House (Lower Income)	6.12	7.8	9.15	10.03	10.72
Total Households	74117	76609	79113	80426	80355
Acres per Housing unit	3.36	3.45	3.53	3.58	3.58
Jobs					
Total Jobs	127222	136435	144352	146525	146228
Average Household Income	$59,201	$64,490	$70,393	$77,495	$84,644
Jobs-Housing Balance	1.57	1.63	1.67	1.66	1.66
Agricultural Jobs	1141	1281	1421	1517	1588
Self-Employed Persons	9592	9819	9891	9430	8919
Upper Income Jobs	26861	28751	30416	31136	31176
Middle Income Jobs	63834	68358	72313	73857	73856
Lower Income Jobs	36527	39326	41622	41532	41196
Office Jobs	48338	52609	56446	58478	58478
Public/Institutional Jobs	23064	23135	23135	23135	23135
Retail/Service Jobs	27947	31481	34439	34439	34439
Industrial Jobs	10561	10955	11342	11569	11709
Land Use					
Total Developed Acreage	30484	30916	31261	31374	31363
Public and Institutional Acreage	4881	4904	4904	4904	4904
Upper Income Residential Acreage	14421	14457	14439	14315	14086
Middle Income Residential Acreage	6612	6789	6980	7177	7368
Affordable Housing Residential Acreage	3018	3041	3068	3092	3113
Total Residential Acreage	24052	24288	24486	24584	24567
Retail Service Acreage	848	990	1108	1108	1108
Office Acreage	202	217	230	237	237
Industrial Acreage	502	517	532	541	547
Total Commercial Acreage	1552	1724	1871	1886	1892
Protected Open Space Acreage	24861	27298	29798	32298	34798

Existing Policies	2000	2010	2020	2030	2040
Population					
Total Population	198933	198579	193767	185066	173904
Students	34438	37560	39069	39673	39906
Senior Population	28059	30013	31166	31534	31261
Adult Population	84613	82941	79891	75388	69586
Young Population	51823	48065	43641	38471	33151
Upper Income Seniors	14242	16413	18233	19734	20825
Middle Income Seniors	8957	8794	8603	8332	7893
Lower Income Seniors	4860	4806	4330	3468	2543
Upper Income Adults	36157	38076	39137	39532	38901
Middle Income Adults	30058	28529	27088	25529	23456
Lower Income Adults	18398	16336	13666	10326	7229
Upper Income Youth	13918	14151	14050	13697	13008
Middle Income Youth	18764	17337	16027	14693	13132
Lower Income Youth	19141	16577	13564	10081	7011
Upper-Income All	64,317	68,640	71,420	72,963	72,734
Middle-Income All	57,779	54,660	51,718	48,554	44,481
Lower-Income All	42,399	37,719	31,560	23,875	16,783
Traffic and Quality of Life					
At Las Positas	132832	163675	174306	178272	179125
At Sheffield	81894	100910	107464	109909	110435
At Fairview	66979	82531	87892	89891	90322
Commuters	25250	33043	35192	35677	35581
Quality of Life	0.96	0.95	0.95	0.95	0.95
Crime Risk on Quality of Life	1	1	1	1	1
Adequacy of Services	0.91	0.98	1.04	1.04	1.05
Environment	0.94	0.95	0.96	0.96	0.97
Recreational Amenities	0.77	0.77	0.77	0.79	0.8

Widespread	2000	2010	2020	2030	2040
Household					
Total Housing Units	80,846	85,488	90,123	94,694	99,194
Upper Income Houses	52,428	58,426	64,318	69,821	74,891
Middle Income Houses	16,639	17,944	18,445	18,681	18,881
Total Affordable Houses	11,779	9,118	7,359	6,192	5,422
Aff. House Fraction	0.15	0.11	0.08	0.07	0.05
Median House Price	$507,091	$636,833	$799,937	$990,358	$1,205,642
Total People per Housing Unit	2.32	2.19	2.04	1.87	1.71
People per House (Upper Income)	1.29	1.25	1.19	1.13	1.08
People per House (Middle Income)	3.77	3.37	3.16	2.98	2.8
People per House (Lower Income)	6.12	7.62	8.75	9.22	9.24
Total Households	74,117	78,274	82,436	86,554	90,618
Acres per Housing unit	3.36	3.32	3.29	3.27	3.25
Jobs					
Total Jobs	127,222	145,369	151,401	151,524	151,520
Average Household Income	$59,201	$64,748	$70,583	$77,511	$84,367
Jobs-Housing Balance	1.57	1.7	1.68	1.6	1.53
Agricultural Jobs	1,141	1,366	1,491	1,565	1,641
Self-Employed Persons	9,592	10,436	10,345	9,843	9,351
Upper Income Jobs	26,861	30,669	31,956	32,033	32,099
Middle Income Jobs	63,834	72,930	75,941	76,030	76,092
Lower Income Jobs	36,527	41,771	43,503	43,460	43,330
Office Jobs	48,338	57,443	60,391	60,391	60,391
Public/Institutional Jobs	23,064	23,211	23,211	23,211	23,211
Retail/Service Jobs	27,947	33,803	35,781	35,781	35,781
Industrial Jobs	10,561	11,295	11,964	12,514	12,926
Land Use					
Total Developed Acreage	30,484	32,538	34,295	35,889	37,413
Public and Institutional Acreage	4,881	4,934	4,934	4,934	4,934
Upper Income Residential Acreage	14,421	14,856	15,093	15,049	14,734
Middle Income Residential Acreage	6,612	7,755	9,003	10,444	12,080
Affordable Housing Residential Acreage	3,018	3,146	3,304	3,479	3,665
Total Residential Acreage	24,052	25,757	27,399	28,972	30,480
Retail Service Acreage	848.24	1,083	1,162	1,162	1,162
Office Acreage	201.77	233.2	243.38	243.38	243.38
Industrial Acreage	502.21	530.56	556.38	577.66	593.57
Total Commercial Acreage	1,552	1,847	1,962	1,983	1,999
Protected Open Space Acreage	24,861	24,861	24,861	24,861	24,861

Widespread	2000	2010	2020	2030	2040
Population					
Total Population	198,933	199,877	197,584	191,944	185,731
Students	34,438	37,560	39,069	39,673	39,906
Senior Population	28,059	30,220	31,800	32,769	33,465
Adult Population	84,613	83,677	81,972	79,082	75,965
Young Population	51,823	48,420	44,743	40,421	36,395
Upper Income Seniors	14,242	16,530	18,520	20,268	21,791
Middle Income Seniors	8,957	8,877	8,845	8,774	8,658
Lower Income Seniors	4,860	4,813	4,434	3,726	3,015
Upper Income Adults	36,157	38,466	40,081	41,224	41,908
Middle Income Adults	30,058	28,860	27,905	26,771	25,507
Lower Income Adults	18,398	16,351	13,986	11,086	8,550
Upper Income Youth	13,918	14,293	14,374	14,251	13,954
Middle Income Youth	18,764	17,535	16,494	15,375	14,223
Lower Income Youth	19,141	16,592	13,875	10,794	8,217
Upper-Income All	64,317	69,289	72,976	75,744	77,653
Middle-Income All	57,779	55,272	53,244	50,921	48,389
Lower-Income All	42,399	37,756	32,295	25,607	19,783
Traffic and Quality of Life					
At Las Positas	132,832	169,879	181,283	184,504	187,102
At Sheffield	81,894	104,735	111,766	113,751	115,353
At Fairview	66,979	85,659	91,410	93,034	94,344
Commuters	25,250	34,732	36,922	36,944	36,910
Quality of Life	0.96	0.95	0.95	0.95	0.94
Crime Risk on Quality of Life	1.00	1.00	1.00	1.00	1.00
Adequacy of Services	0.91	1.04	1.06	1.04	1.02
Environment	0.94	1.00	1.01	1.01	1.02
Recreational Amenities	0.77	0.76	0.76	0.76	0.77

No Growth	2000	2010	2020	2030	2040
Household					
Housing Units	80,846	78,682	76,497	74,421	72,442
Upper Income Houses	52,428	55,245	57,195	58,239	58,618
Middle Income Houses	16,639	14,971	13,167	11,686	10,483
Affordable Houses	11,779	8,466	6,136	4,495	3,340
Aff. House Fraction	0.15	0.11	0.08	0.06	0.05
Median House Price	$507,091	$691,791	$940,052	$1,245,146	$1,609,762
Total People per Housing Unit	2.32	2.33	2.22	2.04	1.87
People per House (Upper Income)	1.29	1.28	1.23	1.18	1.13
People per House (Middle Income)	3.77	3.89	3.91	3.79	3.63
People per House (Lower Income)	6.12	8.19	10.07	11.47	12.71
Total Households	74,117	72,012	69,917	67,949	66,090
Acres per Housing unit	3.36	3.37	3.39	3.42	3.45
Jobs					
Total Jobs	127,222	127,806	127,329	126,894	126,498
Average Household Income	$59,201	$63,907	$70,040	$78,172	$86,459
Jobs-Housing Balance	1.57	1.62	1.66	1.71	1.75
Agricultural Jobs	1,141	1,202	1,257	1,315	1,376
Self-Employed Persons	9,592	9,147	8,614	8,119	7,661
Upper Income Jobs	26,861	27,030	27,051	27,073	27,096
Middle Income Jobs	63,834	64,192	64,153	64,119	64,090
Lower Income Jobs	36,527	36,584	36,126	35,703	35,313
Office Jobs	48,338	48,505	48,505	48,505	48,505
Public/Institutional Jobs	23,064	23,114	23,114	23,114	23,114
Retail/Service Jobs	27,947	28,636	28,636	28,636	28,636
Industrial Jobs	10,561	10,607	10,608	10,608	10,608
Land Use					
Total Developed Acreage	30,484	29,869	29,088	28,300	27,514
Public and Institutional Acreage	4,881	4,897	4,897	4,897	4,897
Upper Income Residential Acreage	14,421	13,403	12,203	10,789	9,229
Middle Income Residential Acreage	6,612	6,903	7,302	7,907	8,661
Affordable Housing Residential Acreage	3,018	3,038	3,058	3,078	3,099
Total Residential Acreage	24,052	23,344	22,563	21,775	20,989
Retail Service Acreage	848	912	912	912	912
Office Acreage	202	208	208	208	208
Industrial Acreage	502	508	509	509	509
Total Commercial Acreage	1,552	1,628	1,628	1,628	1,628
Protected Open Space Acreage	24,861	29,736	30,486	31,236	31,986

No Growth	2000	2010	2020	2030	2040
Population					
Total Population	198,933	195,698	182,778	165,831	150,053
Students	34,438	37,560	39,069	39,673	39,906
Senior Population	28,059	29,647	29,660	28,603	27,210
Adult Population	84,613	81,237	73,670	64,625	56,321
Young Population	51,823	47,254	40,380	32,930	26,616
Upper Income Seniors	14,242	16,233	17,559	18,420	18,918
Middle Income Seniors	8,957	8,613	8,006	7,228	6,415
Lower Income Seniors	4,860	4,801	4,094	2,955	1,877
Upper Income Adults	36,157	37,165	36,484	35,136	33,399
Middle Income Adults	30,058	27,749	24,261	20,685	17,568
Lower Income Adults	18,398	16,324	12,925	8,805	5,354
Upper Income Youth	13,918	13,820	13,136	12,258	11,299
Middle Income Youth	18,764	16,869	14,401	12,018	10,014
Lower Income Youth	19,141	16,565	12,844	8,654	5,303
Upper-Income All	64317	67218	67179	65814	63616
Middle-Income All	57779	53231	46668	39931	33997
Lower-Income All	42399	37690	29863	20414	12534
Traffic and Quality of Life					
At Las Positas	132,832	156,526	157,210	156,741	155,846
At Sheffield	81,894	96,502	96,924	96,635	96,083
At Fairview	66,979	78,926	79,271	79,035	78,583
Commuters	25,250	31,211	31,072	30,942	30,821
Quality of Life	0.96	0.94	0.95	0.96	0.97
Crime Risk on Quality of Life	1	1	1	1	1
Adequacy of Services	0.91	0.93	0.95	0.99	1.04
Environment	0.94	0.94	0.94	0.95	0.96
Recreational Amenities	0.77	0.77	0.8	0.83	0.86

New Neighborhoods	2000	2010	2020	2030	2040
Household					
Housing Units	80,846	85,658	90,437	95,129	99,732
Upper Income Houses	52,428	58,184	63,916	69,297	74,253
Middle Income Houses	16,639	17,769	18,186	18,411	18,655
Affordable Houses	11,779	9,705	8,335	7,421	6,824
Aff. House Fraction	0.15	0.11	0.09	0.08	0.07
Median House Price	$507,091	$633,509	$793,046	$980,235	$1,191,087
Total People per Housing Unit	2.32	2.18	2.03	1.88	1.73
People per House (Upper Income)	1.29	1.25	1.19	1.14	1.09
People per House (Middle Income)	3.77	3.38	3.16	2.97	2.77
People per House (Lower Income)	6.12	7.15	7.82	8.09	8.01
Total Households	74,117	78,443	82,748	86,983	91,148
Acres per Housing unit	3.36	3.51	3.66	3.81	3.95
Jobs					
Total Jobs	127,222	132,104	135,018	134,777	134,333
Average Household Income	$59,201	$64,759	$70,362	$76,099	$81,832
Jobs-Housing Balance	1.57	1.54	1.49	1.42	1.35
Agricultural Jobs	1,141	1,237	1,320	1,383	1,447
Self-Employed Persons	9,592	9,619	9,506	8,994	8,485
Upper Income Jobs	26,861	27,647	27,993	28,034	28,059
Middle Income Jobs	63,834	65,808	66,729	66,742	66,712
Lower Income Jobs	36,527	38,649	40,296	40,000	39,563
Office Jobs	48,338	49,418	49,418	49,418	49,418
Public/Institutional Jobs	23,064	23,164	23,164	23,164	23,164
Retail/Service Jobs	27,947	31,028	33,513	33,513	33,513
Industrial Jobs	10,561	10,922	11,385	11,592	11,592
Land Use					
Total Developed Acreage	30,484	31,176	31,744	32,046	32,318
Public and Institutional Acreage	4,881	4,914	4,914	4,914	4,914
Upper Income Residential Acreage	14,421	14,509	14,551	14,545	14,488
Middle Income Residential Acreage	6,612	6,816	7,024	7,263	7,538
Affordable Housing Residential Acreage	3,018	3,061	3,109	3,160	3,213
Total Residential Acreage	24,052	24,386	24,684	24,968	25,239
Retail Service Acreage	848	1,132	1,361	1,361	1,361
Office Acreage	202	209	209	209	209
Industrial Acreage	502	534	576	594	594
Total Commercial Acreage	1,552	1,876	2,146	2,165	2,165
Protected Open Space Acreage	24,861	25,836	26,836	27,836	28,836
Population					
Total Population	198,933	199,336	197,490	193,759	188,917
Students	34,438	37,560	39,069	39,673	39,906
Senior Population	28,059	30,167	31,903	33,240	34,234
Adult Population	84,613	83,357	81,732	79,582	77,001
Young Population	51,823	48,251	44,785	41,265	37,775
Upper Income Seniors	14,242	16,503	18,552	20,357	21,917

Middle Income Seniors	8,957	8,853	8,797	8,696	8,555
Lower Income Seniors	4,860	4,811	4,555	4,187	3,762
Upper Income Adults	36,157	38,366	39,959	41,033	41,641
Middle Income Adults	30,058	28,644	27,420	26,122	24,764
Lower Income Adults	18,398	16,348	14,353	12,427	10,596
Upper Income Youth	13,918	14,257	14,333	14,189	13,872
Middle Income Youth	18,764	17,406	16,218	15,020	13,834
Lower Income Youth	19,141	16,589	14,235	12,055	10,069
Upper-Income	64,317	69,126	72,844	75,579	77,430
Middle-Income	57,779	54,903	52,435	49,838	47,153
Lower-Income	42,399	37,748	33,143	28,669	24,427
Traffic and Quality of Life					
At Las Positas	132,832	160,961	167,871	170,730	172,863
At Sheffield	81,894	99,236	103,497	105,259	106,574
At Fairview	66,979	81,162	84,647	86,088	87,164
Commuters	25,250	32,188	33,080	32,965	32,772
Quality of Life	0.96	0.96	0.96	0.96	0.96
Crime Risk on Quality of Life	1	1	1	1	1
Adequacy of Services	0.91	1.08	1.21	1.18	1.17
Environment	0.94	0.95	0.96	0.96	0.97
Recreational Amenities	0.77	0.77	0.77	0.77	0.78

Infill	2000	2010	2020	2030	2040
Household					
Housing Units	80,846	84,421	87,812	91,005	94,025
Upper Income Houses	52,428	56,127	59,325	62,095	64,591
Middle Income Houses	16,639	15,538	14,949	14,829	14,980
Affordable Houses	11,779	12,755	13,538	14,081	14,454
Aff. House Fraction	0.15	0.15	0.15	0.15	0.15
Median House Price	$507,091	$642,568	$794,565	$957,113	$1,132,352
Total People per Housing Unit	2.32	2.2	2.05	1.91	1.78
People per House (Upper Income)	1.29	1.27	1.22	1.16	1.1
People per House (Middle Income)	3.77	3.78	3.6	3.33	3.06
People per House (Lower Income)	6.12	5.53	5.07	4.71	4.41
Total Households	74,117	77,369	80,459	83,372	86,129
Acres per Housing unit	3.36	3.47	3.58	3.68	3.77
Business					
Total Jobs	127,222	132,625	133,046	132,574	132,143
Average Household Income	$59,201	$63,666	$66,963	$69,703	$72,029
Jobs-Housing Balance	1.57	1.57	1.52	1.46	1.41
Agricultural Jobs	1,141	1,240	1,304	1,364	1,427
Self-Employed Persons	9,592	9,727	9,287	8,753	8,258
Upper Income Jobs	26,861	27,632	27,737	27,759	27,783
Middle Income Jobs	63,834	65,835	66,031	65,996	65,966
Lower Income Jobs	36,527	39,158	39,278	38,818	38,393
Office Jobs	48,338	49,155	49,155	49,155	49,155
Public/Institutional Jobs	23,064	23,127	23,127	23,127	23,127
Retail/Service Jobs	27,947	31,706	32,163	32,163	32,163
Industrial Jobs	10,561	10,991	11,331	11,331	11,331
Land Use					
Total Developed Acreage	30,484	30,946	31,206	31,418	31,616
Public and Institutional Acreage	4,881	4,901	4,901	4,901	4,901
Upper Income Residential Acreage	14,421	14,212	13,922	13,547	13,102
Middle Income Residential Acreage	6,612	6,834	7,085	7,400	7,766
Affordable Housing Residential Acreage	3,018	3,276	3,543	3,816	4,094
Total Residential Acreage	24,052	24,322	24,550	24,763	24,961
Retail Service Acreage	848	999	1,017	1,017	1,017
Office Acreage	202	205	205	205	205
Industrial Acreage	502	519	532	532	532
Total Commercial Acreage	1,552	1,722	1,754	1,754	1,754
Protected Open Space Acreage	24,861	27,298	29,798	32,298	34,798

Infill	2000	2010	2020	2030	2040
Population					
Total Population	198,933	197,880	193,363	188,106	182,992
Students	34,438	37,560	39,069	39,673	39,906
Senior Population	28,059	29,830	30,854	31,464	31,891
Adult Population	84,613	82,406	79,034	75,812	72,902
Young Population	51,823	48,084	44,406	41,158	38,294
Upper Income Seniors	14,242	16,322	17,863	19,004	19,859
Middle Income Seniors	8,957	8,642	8,199	7,739	7,366
Lower Income Seniors	4,860	4,866	4,792	4,720	4,666
Upper Income Adults	36,157	37,538	37,539	37,054	36,347
Middle Income Adults	30,058	28,001	25,565	23,499	21,838
Lower Income Adults	18,398	16,867	15,931	15,259	14,717
Upper Income Youth	13,918	13,956	13,499	12,889	12,226
Middle Income Youth	18,764	17,021	15,154	13,582	12,297
Lower Income Youth	19,141	17,108	15,753	14,687	13,770
Upper-Income All	64,317	67,816	68,901	68,947	68,432
Middle-Income All	57,779	53,664	48,918	44,820	41,501
Lower-Income All	42,399	38,841	36,476	34,666	33,153
Traffic and Quality of Life					
At Las Positas	132,832	160,387	164,120	165,421	166,478
At Sheffield	81,894	98,882	101,184	101,986	102,638
At Fairview	66,979	80,873	82,756	83,411	83,945
Commuters	25,250	32,213	32,590	32,426	32,264
Quality of Life	0.96	0.95	0.95	0.95	0.95
Crime Risk on Quality of Life	1	1	1	1	1
Adequacy of Services	0.91	0.99	1	1.01	1.01
Environment	0.94	0.95	0.96	0.96	0.97
Recreational Amenities	0.77	0.77	0.77	0.78	0.79

All Affordable	2000	2010	2020	2030	2040
Household Sector					
Housing Units	80,846	83,375	85,695	87,836	89,820
Upper Income Houses	52,428	54,898	56,321	57,039	57,322
Middle Income Houses	16,639	13,755	11,920	10,920	10,459
Affordable Houses	11,779	14,723	17,454	19,876	22,038
Aff. House Fraction	0.15	0.18	0.2	0.23	0.25
Median House Price	$507,091	$661,015	$827,950	$990,858	$1,142,767
Total People per Housing Unit	2.32	2.22	2.09	1.97	1.87
People per House (Upper Income)	1.29	1.28	1.24	1.18	1.13
People per House (Middle Income)	3.77	4.12	4.03	3.78	3.46
People per House (Lower Income)	6.12	4.94	4.33	3.94	3.66
Total Households	74,117	76,443	78,596	80,594	82,454
Acres per Housing unit	3.36	3.47	3.58	3.68	3.78
Business Sector					
Total Jobs	127,222	132,730	133,012	132,540	132,109
Average Household Income	$59,201	$62,807	$63,835	$63,176	$61,533
Jobs-Housing Balance	1.57	1.59	1.55	1.51	1.47
Agricultural Jobs	1,141	1,241	1,304	1,364	1,427
Self-Employed Persons	9,592	9,741	9,282	8,749	8,254
Upper Income Jobs	26,861	27,643	27,734	27,757	27,781
Middle Income Jobs	63,834	65,865	66,022	65,987	65,957
Lower Income Jobs	36,527	39,221	39,256	38,796	38,372
Office Jobs	48,338	49,157	49,157	49,157	49,157
Public/Institutional Jobs	23064	23131	23131	23131	23131
Retail/Service Jobs	27947	31769	32117	32117	32117
Industrial Jobs	10,561	11,013	11,342	11,342	11,342
Land Use Sector					
Total Developed Acreage	30,484	30,642	30,595	30,521	30,446
Public and Institutional Acreage	4,881	4,903	4,903	4,903	4,903
Upper Income Residential Acreage	14,421	13,965	13,400	12,750	12,042
Middle Income Residential Acreage	6,612	6,723	6,902	7,164	7,481
Affordable Housing Residential Acreage	3,018	3,326	3,638	3,951	4,268
Total Residential Acreage	24,052	24,014	23,940	23,866	23,791
Retail Service Acreage	848	1,001	1,015	1,015	1,015
Office Acreage	202	205	205	205	205
Industrial Acreage	502	520	532	532	532
Total Commercial Acreage	1,552	1,726	1,752	1,752	1,752
Protected Open Space Acreage	24,861	27,298	29,798	32,298	34,798

All Affordable	2000	2010	2020	2030	2040
Population Sector					
Total Population	198,933	197,387	192,316	187,622	183,574
Students	34,438	37,560	39,069	39,673	39,906
Senior Population	28,059	29,692	30,385	30,802	30,999
Adult Population	84,613	81,871	77,682	74,237	71,513
Young Population	51,823	48,264	45,180	42,911	41,156
Upper Income Seniors	14,242	16,243	17,525	18,238	18,519
Middle Income Seniors	8,957	8,476	7,588	6,750	5,997
Lower Income Seniors	4,860	4,973	5,272	5,813	6,482
Upper Income Adults	36,157	37,096	36,104	34,423	32,505
Middle Income Adults	30,058	26,915	22,488	19,107	16,647
Lower Income Adults	18,398	17,859	19,090	20,707	22,361
Upper Income Youth	13,918	13,795	13,003	12,023	11,020
Middle Income Youth	18,764	16,370	13,388	11,163	9,552
Lower Income Youth	19,141	18,099	18,789	19,724	20,584
Upper Income All	64,317	67,144	66,729	64,945	62,457
Middle Income All	57,779	51,745	43,485	37,101	32,305
Lower Income All	42,399	40,934	43,189	46,388	49,740
Traffic and Quality of Life Sector					
At Las Positas	132,832	159,529	162,693	163,037	163,159
At Sheffield	81,894	98,354	100,305	100,516	100,592
At Fairview	66,979	80,440	82,036	82,209	82,271
Commuters	25,250	32,095	32,596	32,449	32,310
Quality of Life	0.96	0.95	0.95	0.95	0.95
Crime Risk on Quality of Life	1	1	1	0.99	0.97
Adequacy of Services	0.91	1.01	1.04	1.07	1.1
Environment	0.94	0.95	0.96	0.97	0.97
Recreational Amenities	0.77	0.77	0.78	0.78	0.79

APPENDIX 6
SCENARIO DEVELOPMENT CONSULTATION

The following organizations, agencies, businesses, and individuals helped evaluate and critique the scenarios:

Organization	Individuals and Activities
Chambers of Commerce	• Government Review Comm.
City of Carpinteria	• Dave Durflinger, City Manager
	• Paul Kermoyan, Community Development Director
City of Santa Barbara	• Paul Casey, Community Development Director
	• Dave Davis, Community Development Director (former)
	• John Ledbetter, Principal Planner
County of Santa Barbara	• Housing and Community Development Dept. "Stakeholders Retreat" – May 22, 2003 (approx. 75 participants)
	• John Patton, Director of Planning & Development (former)
	• Lisa Plowman, Deputy Director, Comprehensive Planning
League of Women Voters	• Community Forum – March 20, 2002 (approx. 100 participants)
	• Community Forum – April 16, 2003 (approx. 100 participants)
Planning groups	• Carpinteria Valley Association
	• Citizen's Planning Association – Comprehensive Planning Comm.
	• Citizen's Planning Association – Land Use Comm.
Rotaries	• Goleta Rotary – noon and pm groups
	• Montecito Rotary
	• Santa Barbara Rotary
Santa Barbara County Association of Governments	• Bill Derrick, Executive Director (former)
	• Tom Frutchey
	• Jim Kemp, Executive Director
	• Michael Powers, Deputy Director
	• Brian Bresolin
Other Community Organizations	• Goleta Beautiful
	• Fund for Santa Barbara

APPENDIX 7
ANNUAL AVERAGE FLOW-WEIGHTED CONSTITUENT CONCENTRATIONS IN EFFLUENT FROM SOUTH COAST WASTEWATER TREATMENT FACILITIES IN 2000

Constituent	Carpinteria	El Estero	Goleta	Montecito	Summerland
Flow (mgd)	1.5	6.0	4.7	1.1	0.14
Flow (L x 106/day)	5.8	23	18	4.1	0.51
Suspended Solids (mg/L)	15	11	40	9.2	1.9
Settleable Solids (mg/L)	0.18	0.23	0.24	0.1	0
BOD (mg/L)	9.0	na	62	3.6	0.51
CBOD (mg/L)	na	7.2	na	na	na
Oil/grease (mg/L)	3	2.8	14	0.17	0.07
Ammonia N (mg/L)	0.26	12	36	0.54	0.42
Nitrate-N (mg/L)	na	na	na	na	na
Nitrite-N (mg/L)	na	na	na	na	na
Organic-N (mg/L)	na	na	na	na	na
Ortho Phosphate (mg/L)	na	na	na	na	na
Cyanide (ug/L)	< 10[c]	na	0	< 10	< 100
Turbidity (NTU)	2.3	4.2	47	1.2	1.1
Acute Toxicity (TU[a])	-	-	-	na	na
Pimephales promelas (survival)	0.10	0.33	1.19	-	-
Gasterosteus aculeatus (survival)	na	na	na	-	-
Menidia beryllina (survival)	na	2.38	na	-	-
Chronic Toxicity (TU[c])	-	-	-	-	-
Atherinops affinis (growth)	na	na	na	na	na
Atherinops affinis (survival)	na	na	na	na	na
Dendraster excentricus (fertilization)	na	na	na	na	na
Haliotis rufescens (development)	na	na	21	na	na
Macrocystis pyrifera (germination)	na	na	na	31.25	na
Macrocystis pyrifera (germination/growth)	na	na	na	na	na
Macrocystis pyrifera (growth)	na	na	na	31.25	na
Menidia beryllina (growth)	na	na	na	< 31.25	17.86
Menidia beryllina (survival)	na	na	na	< 31.25	17.86
Mytilus edulis (development)	na	na	na	na	na
Pimephales promelas (survival)	na	na	na	na	na
Strongylocentrotus purpuratus (fertilization)	< 17.86[c]	17.86	na	31.25	17.86
Strongylocentrotus purpuratus (growth)	na	na	na	na	na
Arsenic (ug/L)	< 10[c]	na	1.1	< 2	< 2
Cadmium (ug/L)	nd	na	0.19	< 1	< 1
Chromium (ug/L)	< 5[c]	na	2.6	< 1	< 5
Copper (ug/L)	< 10[c]	na	33	8	< 50
Lead (ug/L)	< 10[c]	na	1.2	0.8	< 5
Mercury (ug/L)	< 0.1[c]	na	0.03	0d	< 1
Nickel (ug/L)	< 20[c]	na	8.7	2	< 10
Selenium (ug/L)	< 10[c]	na	< 2	na	na
Silver (ug/L)	< 20[c]	na	1.1	< 1	< 10
Zinc (ug/L)	154	na	56	58	< 0.2
Phenols[a] (ug/L)	-	-	< 100	-	< 10

Constituent	Carpinteria	El Estero	Goleta	Montecito	Summerland
Nonchlorinated Phenols	27	< 20	< 50	< 50	< 25
Chlorinated Phenols	10	< 30	< 20	< 10	< 20
Total DDT (ug/L)	< 0.05	na	< 0.05	< 0.05	< 0.1
Total PAH (ug/L)	< 10	na	< 10	na	< 0.2
Total PCB (ug/L)	< 0.5	na	< 0.5	< 0.5	< 0.5

[a] Phenols represents the measurement for total phenols, for facilities which did not measure individual phenols.
c Value provided is the MDL for the measurement, RL not provided in reports.
na = Not analyzed.
nd = Measurement was below detection level, however RL/MDL not provided or not found.
Dash = Not applicable.
< = Less than the reporting level; where more than one RL was used during the year, the higher of the two was reported here.

Source: Southern California Coastal Water Research Project, 2001-2002 Biennial Report, *Characteristics of Effluents from Small Municipal Wastewater Treatment Facilities in 2000*, Andrea Steinberger and Kenneth C. Schiff, "Table 4. Annual average flow-weighted constituent concentrations in effluent from small POTWs in 2000." ftp://ftp.sccwrp.org/pub/download/PDFs/2001_02ANNUALREPORT/02_ar20-andrea.pdf, accessed August 6, 2003.

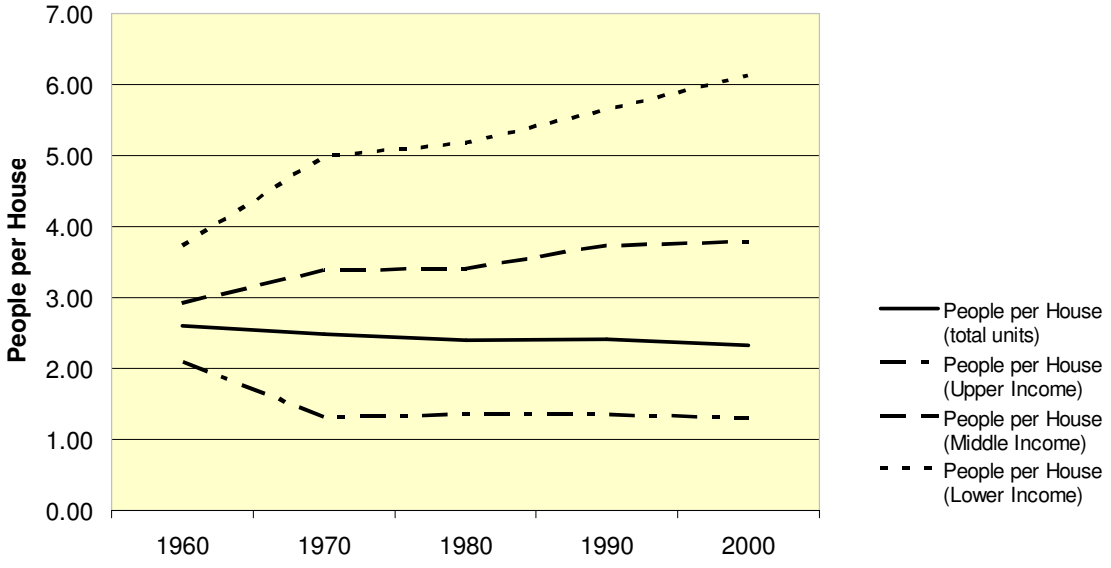
APPENDIX 8
PEOPLE PER HOME

The number of people that occupy the average housing unit has a significant impact on the outcomes of SCOPE. For any given number of housing units, the higher the people per home, the greater the population. As noted in Appendix 2, in SCOPE, **Families** are a group of people who live together by choice, rather than circumstance, whether or not they are related. More than one family can live in a housing unit and this larger group of people is referred to, in conformity with Census definitions, as a **Household**. Crowding can result from either families growing larger in a housing unit or multiple families choosing to live in a single home.

Assumptions about family size and changes over time are explained in Appendix 2; the model considers family income as the primary variable in determining household size in conjunction with a general long-term trend towards smaller family size across all income levels. In this Appendix, the changes in household by scenario are shown and analyzed.

Estimated Household size in 1960 across all units (all income levels together) was 2.6 people per house. By 2000, this had declined to 2.3. Household size by income level in 1960 varied between 2.1 and 3.7 people per house. By 2000, the variance had increased to between 1.3 and 6.1 people per house. Upper-income household size declined and Lower-income household size increased. The latter reflects the effect of increased housing prices on crowding, primarily through multiple families living in one home.

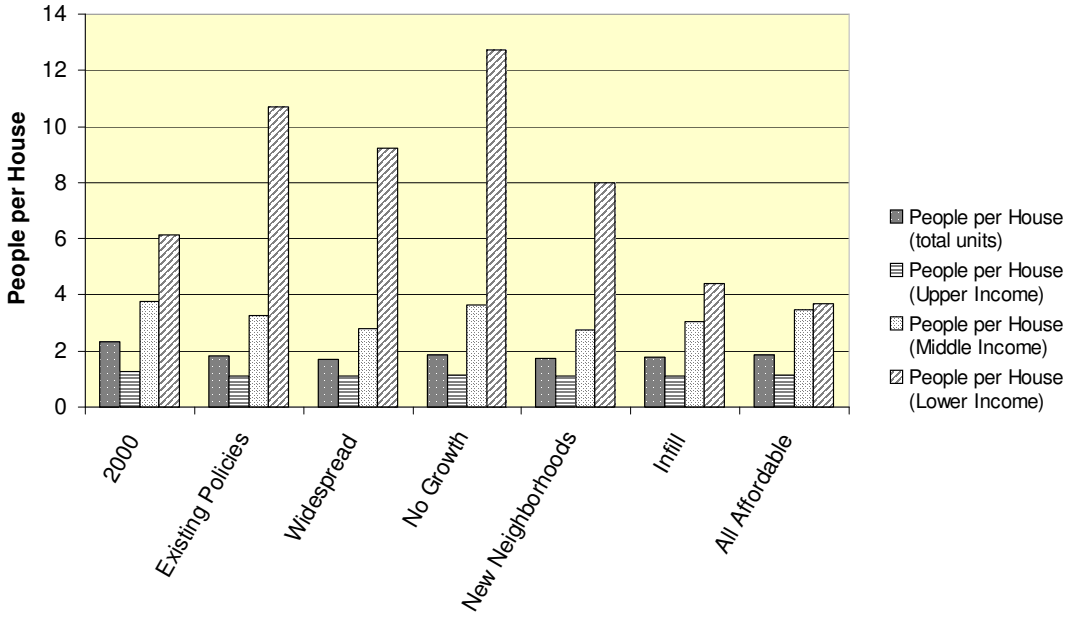
Figure A-86
1960-2000 People per Household



For the 2040 period, household size in Upper-income houses varies little across the six scenarios, indicating that upper-income families do not resort to crowding in response to house prices

within the range of the scenarios. For Middle-income houses, household size varies slightly more than for Upper-income size. Household size is lower in the Widespread and New Neighborhood scenarios, both of which have the highest number of Middle-income housing units; conversely, household size is higher for the No Growth and All Affordable scenarios in which the number of Middle-income housing units is lowest. The variability of household size for Lower-income housing units is substantial (3.7 to 12.7 people per house), tracking the number of Affordable housing units in each scenario (22,000 in the All Affordable scenario, 3,300 in the No Growth scenario). Crowding in Lower-income households is reduced in both the Infill and All Affordable scenarios compared to 2000, while all other scenarios result in increased crowding indicating that an increase in restricted affordable housing units reduces crowding in Lower-income Households.

Figure A-87
All Scenarios
2040 People per Household



APPENDIX 9
FISCAL MODEL STRUCTURE AND CRITICAL ASSUMPTIONS PREPARED BY THE SANTA BARBARA ECONOMIC FORECAST PROJECT

The fiscal analysis uses a model developed after extensive discussions with Robert Geis, Santa Barbara County's Auditor-Controller. Using scenario data from SCOPE as the primary input along with additional local and national information, the model is used to produce fiscal accounts data for each scenario. More detailed information about the model is available from the UCSB Economic Forecast Project.*

Basic Assumptions

The model projects future South Coast revenues and expenditures by category for each scenario. For most of the categories, projections are a function of a consolidated account of past financials for the region. This consolidated account was constructed by summing the individual fiscal accounts for each of the cities and the South Coast portion of the County's jurisdiction across each fiscal year between 1982 and 2002 (on a July 1 to June 30 fiscal year basis).

Some categories are independent of local economic and fiscal activities and therefore cannot be modeled with past fiscal data. Instead, we assumed an average annual growth rate similar to the prior 20 years. These categories are:

- Fines, Forfeitures, and Penalties
- Intergovernmental Revenue
- Other Revenue

Past Fiscal Accounts Assumptions

Santa Barbara County

Some fiscal data were readily available for the southern portion of the County. County Administrator Michael F. Brown provided County data for fiscal year 1999-2000 that showed:

- South Coast property taxes at 64% of total County property taxes
- South Coast property transfer taxes at 55% of total County property transfer taxes
- South Coast sales taxes at 79% of total County sales taxes
- South Coast bed taxes at 95% of total County bed taxes

Other revenues had to be segregated to determine the South Coast share. To do that, we used financial information from the County's North/South analysis of Fiscal Year 2000 financials for a possible County split. These financials, while not specifically labeled as "All Governmental Funds," were similar enough to the category to use in the analysis. Assumptions for the FY2000 data derived from the North/South analysis and communicated to us by the County Administrator are listed below.

* Contact Dan Hamilton: 805-893-5272, dan.hamilton@ucsb-efp.com, www.ucsb-efp.com.

Fiscal Account		South Coast Percentage
Revenues	1. Other Taxes*	65%
	2. Licenses/Permits*	65.5%
	3. Fines and Penalties	63%
	4. Use of Money & Property	65%
	5. Inter Governmental	56%
	6. Charges for Current Services	50%
	7. Other Revenues	64%
Expenditures	1. General	51%
	2. Public Protection	54%
	3. Public Ways	56%
	4. Health Services	50%
	5. Public Assistance	50%
	6. Education	50%
	7. Other Expenditures	51%

*Information provided by Robert Geis, Santa Barbara County Auditor

We then had to allocate South Coast percentages for prior fiscal years and the 2001-2002 fiscal year. Following the County Split analysis, which used population to allocate various activities and financial accounts, we analyzed changes in North/South population shares (using California Department of Finance data) to "evolve" the revenue or expense component shares. Between 1992 and 2002, the modal increase in the North County's share of population was about 0.20 percent, which was applied to determine the fiscal shares across the entire 1980 to 2002 period.

Goleta

City of Goleta data for fiscal year 2002 came from the City's Annual Financial Report for the period ending June 30, 2002. This report reflected partial year data since the City opened its doors February 1, 2002. Prior year data was captured by the County fiscal accounts.

Santa Barbara City

All required data for the City of Santa Barbara was provided by the City's Finance Department.

Carpinteria

City of Carpinteria fiscal data was obtained from the City's Finance Department. Due to the data file structure, additional analysis was needed before the data could be added to the consolidated account.

Source data included detail sufficient for analysis only for the 1982 fiscal year and for the 1989-2002 fiscal years. For the 1983 and 1984 fiscal years, we used the shares from 1982. For the

1985 through 1988 fiscal years, we adjusted the 1984 shares forward to the 1989 numbers in a gradual linear fashion. The shares of total taxes are:

Table A-19
City of Carpinteria Tax Allocation Across 1982-1988

	1982-1983-1984	1985	1986	1987	1988
Property Taxes	37.7	35.9	34.0	32.7	31.5
Sales Taxes	44.3	42.4	40.5	38.6	37.1
Bed Taxes	7.5	10.2	13.0	16.0	18.7
Other Taxes	11.4	11.5	12.5	12.7	12.7

For the 1992 to 1997 period, the numbers were initially prepared by the City of Carpinteria. We adjusted some of the data to match our categories based on the following relationships:

- For revenues, the City's Fiduciary Funds category was assigned to "Other Revenues"
- For expenditures, the City's Fiduciary Funds category was initially assigned to "Other Expenditures," but because this did not consistently yield total expenditures equal to the City's report, the "Other Expenditures" category was adjusted to give the proper expenditure level.

For the 1984 through 1988 fiscal years, the City's revenue categories differed than those needed for the fiscal analysis. The following relationships were used to assign data to the fiscal analysis categories:

Table A-20
Fiscal Categories

City of Carpinteria Category		Fiscal Analysis Category
Revenues	"Intergovernmental" + Federal Revenue sharing	Intergovernmental Revenue
	Special and Restricted + Miscellaneous	Other Revenues
	"Use of Money and Property" + Interest and Other	Use of Money and Property
	CCS + Assessments and Interest	Charges for Current Services
Expenditures	Culture/Leisure + Other Special Programs + Interest + Miscellaneous + Community Development	Other Expenditures
	Transportation	Public Ways & Facilities

City data for the 1983 fiscal year were unavailable. An estimate was derived by averaging 1982 and 1984 fiscal year data by expenditure and revenue category.

Common Components

The "Use of Money and Property" category of the fiscal accounts was modeled using national interest rates as the primary driver for the category as it is not affected by local economic activity. As national interest rates were not a derived output of the SCOPE model, interest rates are the same for all six scenario. Thus, the fiscal forecasts for "Use of Money and Property" are the same for each scenario.

Key Drivers and Relationships

Based on our conversations with Robert Geis, we identified a set of key drivers for each revenue and expenditure category that was driven at least in part by local economic activity and modeled through SCOPE. The key drivers may be outputs of the SCOPE model and variables derived from other sources (e.g., interest rates). We then established mathematical relationships using the key drivers within the model to forecast the effects of each scenario. These are:

Table A-21
Key Fiscal Drivers

Key Drivers		Fiscal Analysis Category
Revenues	• Median home prices • Inflation rates	Property Taxes
	• Retail sales derived from average income	Sales Taxes
	• Retail/service acreage • Real California gross state product	Bed Taxes
	• Employment level • Rate of job creation	Other Taxes
	• Employment level • Real California gross state product	Licenses and Permits
	• Rate of change of new housing units permitted • Level of new housing units permitted	Charges for Current Services
Expenditures	• Population growth	General Government
	• Population growth	Public Protection
	• Total fiscal revenues	Total Fiscal Expenditures

Accounting Identities

The following accounting relationships are used to ensure that categories interactions are internally consistent:

Other Expenditures = Total Expenditures - General Government Expenditures - Public Protection Expenditures

Total Taxes	=	Property Taxes + Sales Taxes + Bed Taxes + Other Taxes
Total Revenues	=	Total Taxes + Licenses and Permits + Fines, Forfeitures and Penalties + Intergovernmental Transfers + Use of Money and Property + Charges for Current Services + Other Revenues
Surplus/Deficit	=	Total Revenues – Total Expenditures

APPENDIX 10
RESEARCH ON IMPACTS BY DEVELOPMENT TYPE

Little consideration had been given to the impacts of different approaches to development prior to a study in the mid1970s conducted on behalf of the U.S. Department of Housing and Urban Development, the U.S. Environmental Protection Agency, and the Council on Environmental Quality. (Real Estate Research Corporation, 1974) The study noted that not only was land use much more efficient in high density development than in sprawl type development, but that infrastructure costs such as roads and utilities were as little as half, with significantly lower public investment required in higher density communities. Moreover, because less energy is used in high density development, energy costs and associated air pollution are lower and because less land is developed, storm water runoff is reduced. Overall, the landmark study concluded that "higher densities to a much greater extent, result in lower economic costs, environmental costs, natural resource consumption, and some personal costs for a given number of dwelling units."

Subsequent research has confirmed these findings (Frank, J. 1989, Burchell and Listoken 1995, Pelley, *et al*, 1997; extensive bibliographies are available in each of these sources). Specific analyses of the cost of services born by the public compared with the return in revenues via taxes have shown that residentially developed areas consistently cost more in services than they generate in revenues. Analysts conclude that efficient use of land for residential development results in relatively lower public costs due to maintaining land in agriculture, open space, and commercial use.

Figure A-88
Revenues Compared to Service Costs
on a Dollar to Dollar Basis for Different Land Uses

Location	Residential building cost	Commercial building cost	Farmland, forest and open space cost
Carroll County, MD	1 : 1.22	1 : 0.55	1 : 0.47
Cecil County, MD	1 : 1.12	1 : 0.28	1 : 0.37
Culpeper County, VA	1 : 1.25	1 : 0.19	1 : 0.19
Connecticut avg	1 : 1.06	1 : 0.47	1 : 0.43
Massachusetts avg	1 : 1.12	1 : 0.42	1 : 0.33
New York average	1 : 1.24	1 : 0.24	1 : 0.35
Town of Dunn, WI	1 : 1.06	1 : 0.29	1 : 0.18
Minnesota avg	1 : 1.04	1 : 0.39	1 : 0.50
Ohio avg	1 : 1.41	1 : 0.23	1 : 0.34
Average	1 : 1.17	1 : 0.33	1 : 0.34

Source: Pelley, *et al* 1997.

A critical aspect of the "costs" of sprawl is the economic value of ecosystem services provided by natural habitats. Services such as the creation of wetlands that detoxify runoff and forests that provide a sink for carbon dioxide releases could otherwise be provided through direct expendi-

tures. In the absence of such expenditures (e.g., capture and treatment of storm water), the resulting pollution creates a variety of impacts with direct and indirect costs. Such services are essentially free if we choose to follow development patterns that maintain the integrity of ecosystems. One estimate of the planet-wide value of these ecosystem services is $36 trillion annually (Hawken, et al, 2000).

Apart from direct public and ecosystem costs, differences in development type generate varying personal costs. Increasing commuting distances between home and work involves a number of different costs. First, direct commuting costs go up, whether travel is by mass transit or personal vehicle. Vehicle costs increase in terms of the cost of gas and oil, increased maintenance, increased wear and tear, and increased insurance costs. Second, indirect costs such as time away from work to deal with child care, health care, emergencies, and routine issues increase. Third, non-financial costs accumulate, such as the increased time required for commuting and increased stress from long and congested commutes.

APPENDIX 11
SCOPE QUALITY OF LIFE INDICATORS

SCOPE also includes a small number of additional quality of life indicators. These are:

- Quality of Life
- Crime Risk on Quality of Life
- Adequacy of Services
- Environment
- Recreational Amenities

However, due to limited data availability, the indicators are not validated to the same extent as the variables described in the main body of the report. The following discusses these additional indicators, the limitations on interpreation and the SCOPE forecasts for each.

Quality of Life

The output for Quality of Life is an index that is best evaluated as one scenario relative to the others. The greater the index, the higher the quality of life. It is an aggregated index using specific quality of life variables (some of which are moderated by a mitigating exponent) including: Traffic, Crime Risk, Adequacy of Services, Environment, Recreational Amenities, Education, and Arts. The Traffic variable is described and reported in the main section of the report. Crime Risk, Adequacy of Services, Environment, and Recreational Amenities are each described and reported in the following sections. The last two variables, Education and Arts, cannot be modeled in SCOPE as it is currently configured, therefore nominal values are used as placeholders.

While the index dropped between 1960 and 2000, indicating a decline in overall quality of life, the 2040 forecast suggests there are marginal differences among the scenarios.

Table A-22
Quality of Life Index

		2040					
1960	2000	Existing Policies	Widespread	No Growth	New Neighbor-hoods	Infill	All Af-fordable
1.2	0.96	0.95	0.94	0.97	0.96	0.95	0.95

Crime Risk

Crime Risk is an index defined by the model's Unemployment Rate, particularly for the lower-income population, which in turn is tracked by income level via a calculated Labor to Jobs Ratio. Crime Risk is considered to be such an important factor in calculating the Quality of Life index, that it is not reduced by a mitigating exponent. The Crime Risk index remains the same from 1960 to 2000 and across all 2040 forecasts for all scenarios except for the All Affordable

scenario. The decline in the index for that scenario indicates a higher crime risk, most likely as a result of the increased lower-income population relative to the other scenarios.

Table A-23
Crime Risk Index9

		2040					
1960	2000	Existing Policies	Widespread	No Growth	New Neighbor-hoods	Infill	All Af-fordable
1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97

Adequacy of Services

The Adequacy of Services index is a function of the demand for retail services against the availability of retail service units. The demand is derived from multipliers used with income levels for retirees and adults multiplied by the populations in each of the income categories and then summed together to create a services demand proxy. The Adequacy of Services index is created by dividing the service demand proxy by a multiplier of the number of retail service structures. To reduce the impact on the overall Quality of Life index, this variable is reduced by an exponent of 0.1. While there was a slight decline in the index between 1960 and 2000, all of the scenarios indicate an improvement in the Adequacy of Services index with the greatest improvement in the New Neighboods and All Affordable scenarios.

Table A-24
Adequacy of Services Index10

		2040					
1960	2000	Existing Policies	Widespread	No Growth	New Neighbor-hoods	Infill	All Af-fordable
0.93	0.91	1.05	1.02	1.04	1.17	1.01	1.10

Environment

The Environment index has only one input variable, Air Quality, although the index is designed to allow additional variables to be added in the future. Air Quality is a complicated function of agricultural activity, developed land, oil production, traffic level, regulatory requirements, and air quality influences that originate outside the South Coast region. SCOPE uses 1960 as a baseline year to set the Air Quality index to 1.00 and then measures all other years as a percentage of that level. Thus, an Air Quality index of 0.70 indicates that air quality is 30 percent worse than the air quality in 1960. Because Air Quality is the sole variable for the Environment index the two indices are equivalent. The Environment index declined slightly from 1960 to 2000. All of the scenarios result in an improvement in the Environment index over 2000, although the Widespread scenario is the only one that improves on the index for 1960.

This outcome differs from the qualitative discussion of air quality impacts in the Analysis of Additional Impacts section of the main report. The variables in the SCOPE model do not include the contribution of offshore transport to onshore air quality, may overweight the contribution of certain external air quality influences, and may not adequately account for the influence of regulatory requirements.

Table A-25
Environment Index11

		2040					
1960	**2000**	**Existing Policies**	**Widespread**	**No Growth**	**New Neighborhoods**	**Infill**	**All Affordable**
1.00	0.94	0.97	1.02	0.96	0.97	0.97	0.97

Recreational Amenities

The input for the Recreation Amenities index is people per acre of undeveloped land. As with several others variables, the effect of the Recreation Amenities index on Quality of Life is reduced by a factor of 0.1. The Recreation Amenities index declined significantly between 1960 and 2000 indicating that the amount of people per acre of undeveloped land increased substantially. While the index for the 2040 forecast in the Widespread scenario remains the same as the 2000 index, in each of the other scenarios' 2040 forecasts, the index rises. The improvement is greatest in the No Growth scenario reflecting the largest population loss and the minimal consumption of undeveloped land. There is no change from 2000 in the index for the Widespread scenario indicating that population growth and consumption of undeveloped land are equivalent. The New Neighborhoods, Infill, and All Affordable scenarios all show minimal improvement in the index.

Table A-26
Recreational Amenities Index

		2040					
1960	**2000**	**Existing Policies**	**Widespread**	**No Growth**	**New Neighborhoods**	**Infill**	**All Affordable**
1.17	0.77	0.8	0.77	0.86	0.78	0.79	0.79

APPENDIX 12
HOUSING AFFORDABILITY STRATEGIES

a. **Require minimum densities based on lot size and unit mix -** Require minimum (as well as maximum) densities on residential parcels. Where the zoning of a parcel would allow more units, an inclusionary requirement can be a disincentive to providing all the units allowed under zoning. Requiring that a minimum number of units be created based on zoning would be likely to result in more affordable units based on the economics of amortizing high land costs across a larger number of units.

b. **Maximum standards, especially in multi-family zones -** Use existing height and setbacks as maximums, i.e., be more creative in how the "building envelope" can be used to get more units, open space, etc. Consider maximum housing unit sizes in multi-family zones so that more units are created rather than fewer, larger units for upper-income residents. Consider a maximum square footage for single family dwellings, irrespective of total lot area, to avoid the "mansionization" of neighborhoods. Consider a maximum square footage for all multi-family units (i.e., duplexes and above).

c. **Convert commercial sites to mixed use and/or transfer development rights or credits (TDR or TDC) to commercial sites** – Rezone to allow mixed use and protect sensitive resources and potentially increase affordability by allowing development rights to be transferred to appropriate land on the South Coast such as existing large commercial parcels, e.g., La Cumbre Plaza. Create "village centers" that allow residents to shop and/or work in proximity to their homes.

d. **Develop design guidelines for affordable projects –** Quality design and construction of affordable units help promote acceptance in traditional residential neighborhoods. Guidelines, however, should promote good design while keeping construction costs down.

e. **Tie approval of commercial projects to improvement of the jobs-housing balance –** This concept would require findings of approval that require that more housing units are created by a project than would be generated by new workers. This could be hard to implement for small infill projects but easier on larger vacant or underdeveloped lots.

f. **Strengthen in lieu mitigation requirements** – The in lieu mitigation approach, which allows a commercial project to go forward with the payment of an "in lieu" housing mitigation fee, can be an effective means of provide additional affordable units in the region. If this approach is used consider requirements to:

    - **Set** and adjust the fee to increase with the cost to construct housing units.
    - **Trade off** one low-income unit for several moderate-income units, i.e., encourage as many units as possible.
    - **Promote partnering** with non-profits and housing developers to use in lieu fees to construct projects.
    - **Require identifying** in lieu project locations prior to approving a commercial

project.

g. **Encourage land donations for affordable housing** – Land donations to cities, county or a non-profit whereby the owner retains ownership and gets income stream until death (or could continue for heirs) and affordable housing can be built without needing to cover land costs. Also explore public service districts that have excess land that would be appropriate for housing.

h. **Control upzoning** – Tie upzoning to affordability so that the developer doesn't make additional profit because of the upzoning but instead provides more affordability.

i. **Modify development requirements** – Increase density by reducing the land required for each unit thereby reducing land costs per unit, e.g.,

- **Simplify findings**– Modifications with simpler findings than variances to design standards provide more flexibility in making affordable housing projects feasible.
- **Building standards** – Consider relief from certain building standards.
- **Open space standards –** More flexibility in combining community and private open space can in a more land efficient manner (e.g., Casa de las Fuentes project at Carrillo & Castillo Streets).
- **Tie affordability to relief from zoning standards -** Allow relief from zoning provisions for discretionary actions (e.g., zone change, GPA, development standards) in exchange for affordability of unit(s).
- **Modify height and setback limits** - Consider allowing higher residential or mixed use buildings than currently allowed, especially when additional units are affordable. Consider zero lot line and other zoning and design techniques to maximize the number of units, while still providing amenities.
- **Flexibility in parking standards -** Provide flexibility in parking requirements, especially in urban areas with transit and jobs nearby and in low income projects.

j. **Alternative construction** – "Manufactured housing" is inherently more affordable than on-site construction. Mobile home communities are successful in providing an affordable alternative when land costs are controlled. This can be implemented through residents' ownership of the land as well as the coach (e.g., Silver Sands in Carpinteria).

k. **Establish Floor to Area Ratios (FARs) for neighborhoods** – Establish acceptable FARs for residential neighborhoods to ensure that additional density is appropriate in scale and character.

l. **Replacement of affordable units** – Require the replacement of existing affordable units.

m. **Location-efficient mortgages (LEMs) –** Mortgages that consider household savings in transportation costs due to the availability of nearby public transit allow potential homebuyers to qualify for higher mortgages, thereby making housing more affordable for individual households.

n. **Bank Community Reinvestment Act (CRA) requirements** – Require banks to expand loans for affordable housing in neighborhoods where the banks draw deposits and avoid the shifting of investment and mortgage dollars out of "declining" neighborhoods.

o. **Extend price controls on existing affordable housing** – The City of Los Angeles, among other jurisdictions, are exploring programs to continue the price controls on privately-owned rental and ownership units when the price controls are set to expire. This program could include requirements for notification and even offers for the property by qualified buyers who would retain the price controls and affordability of the units.

p. **Affordability easements** – Obtaining a property interest that limits the use of the property to affordable housing or requires development or use of the property to include a certain number or percentage of affordable housing units.

q. **Promote information exchange to increase regulatory flexibility**– Establish a "clearinghouse" improve coordinate between public agencies and private investors and to increase flexibility in multi-jurisdictional projects & programs.

REFERENCES

Association of Bay Area Governments (ABAG). 2003. "Smart Growth Strategy/Regional Livability Footprint Project," PowerPoint presentation, website http://www.abag.ca.gov/planning/smartgrowth/index.html, accessed on September 30, 2003.

Burchell, R.W. and D. Listokin. 1995. *Land, infrastructure, housing costs and fiscal impacts associated with growth: The literature on the impacts of sprawl v. managed growth.* Cambridge, Massachusetts: Lincoln Institute of Land Policy.

California Association of Realtors (CAR). 2003. "California's Housing Affordability Index falls one point in June," Available at http://www.car.org/index.php?id=MzIyNzk, accessed on August 15, 2003.

California Governor's Office of Research and Planning (OPR). 1999. "The California Planners' Book of Lists, 1999," Governor's Office of Planning and Research, 1998 Survey Results of City and County Planning Activities. Available at http://ceres.ca.gov/planning/bol/1999/survey_3.html, accessed on August 24, 2003.

City of Santa Barbara. 2003. 7-31-03, *2003 Draft Housing Element*. Available at http://www.ci.santa-barbara.ca.us/departments/community_development/efforts/HEU/heu.html, accessed September 30, 2003.

Dahlberg, A., and B. Holmlund. 1978. "The Interaction of Migration, Income, and Employment in Sweden." *Demography 15*(3):259-266.

Forester, Jay, 1969. *Urban Dynamics*, Cambridge, Massachusetts and London, England, The M.I.T. Press.

Frank, J. 1989. *The costs of alternative development patterns: A review of the literature.* Washington, D.C.: The Urban Land Institute.

Ghali, M.; AKiyama, M.; and Fujiwara, J. 1978. "Factor Mobility and Regional Growth." *Review of Economics and Statistics 60* (1):78-84.

Great Lakes Commission website www.glc.org/about/ and www.glc.org/about/glbc

Groves, M. 2003. "State Panel Begins Task of Overseeing Bay Cleanup." Los Angeles Times, August 1, 2003.

Hawken, P., H. Lovins, and A. Lovins. 2000. *Natural Capitalism: Creating the Next Industrial Revolution*, Back Bay Books. Available at http://www.natcap.org/sitepages/pid5.php, accessed August 26, 2003.

Inland Empire Utilities Agency. 2002. Wastewater Facilities Master Plan, " Wastewater Flow Projections and Management, 4/25/02." Available at http://www.ieua.org/a/WFMP/section3.pdf, accessed August 8, 2003.

Isserman, A.M. 1986. "Forecasting Birth and Migration Rates: The Theoretical Foundation". *Population change and the economy: social science theories and models.* A.M. Isserman. Boston, Kluwer-Nijhoff Publishing.

Kator, H. 2003. Letter Report to Heal The Ocean. May 16, 2003. Available at http://www.healtheocean.org/Kator_Report.pdf, accessed August 7, 2003.

LeGates, R. T. 2001. "Housing Incentives to Promote Inter-Regional Jobs/Housing Balance." A Report to the Inter-Regional Partnership, Jobs/Housing Balance Program. January. Available at http://www.abag.ca.gov/planning/interregional/pdf/housing_incentives.pdf, accessed September 30, 2003.

Liu, B-C. 1975. "Differential Net Migration Rates and The Quality of Life." *Review of Economics and Statistics 5*7(3): 329-337.

Lowry, I.S. (1966). *Migration and Metropolitan Growth: Two Analytical Models*. San Francisco: Chandler Publishing Company.

Myers, D. 1989. "The Ecology of Quality of Life," chapter in David J. Brower, David R. Godschalk, and Douglas R. Porter, eds., *Understanding Growth Management: Critical Issues and a Research Agenda*, Washington, D.C.: Urban Land Institute.

NASA/JPL/NIMA/USGS, 2003. Available at http://photojournal.jpl.nasa.gov/catalog/PIA03306, accessed August 26, 2003.

Panhandle Regional Planning Commission (Texas). 2003. Available at http://www.prpc.cog.tx.us/, accessed September 30, 2003.

Pelley, J. *et al*. 1997. *Sprawl Costs Us All: A Guide to the Costs of Sprawl and How to Create Livable Communities in Maryland*, Annapolis, MD: Sierra Club Foundation, January.

Planners Web. 2003. "Sprawl Guide." Available at http://www.plannersweb.com/sprawl/home.html, accessed September 30, 2003.

Real Estate Research Corporation, 1974. *The Costs of Sprawl: Detailed Cost Analysis, Executive Summary,* Washington, D.C: Superintendent of Documents, U.S. Government Printing Office. Available at http://www.smartgrowth.org/pdf/costs_of_sprawl.pdf, accessed August 26, 2003.

Regional Planning Partnership. 2003. http://www.planningpartners.org/

Santa Barbara County Association of Governments. 2002. *Regional Growth Forecast 2000-2030.* http://www.sbcag.org

Santa Barbara County Planning and Development, 2002. *Goleta Valley Urban Agriculture Newsletter*, August. Available at http://www.countyofsb.org/plandev/comp/programs/Newsletters/guan/default.html, accessed September 29, 2003.

Santa Barbara Planning Task Force, 1974. "Santa Barbara: The Impacts of Growth," prepared for the City of Santa Barbara. Volume 1: Citywide Effects; Volume 2: Neighborhood Fact Book; Volume 3: Technical Appendices.

South Alabama Regional Planning Commission. 2003. http://www.sarpc.org/.

Staley, S., *et al*. 1999. "A Line in the Land: Urban-growth Boundaries, Smart Growth, and Housing Affordability." Policy Study No. 263. Reason Public Policy Institute: Los Angeles.

Tahoe Regional Planning Agency. 2003. http://www.trpa.org/

United Nations Environment Program. 2003. "International Source Book On Environmentally Sound Technologies for Wastewater and Stormwater Management," Division of Technology, Industry, and Economics, International Environmental Technology Centre, Chapter 4 Wastewater Characteristics. No date. Available at http://www.unep.or.jp/ietc/Publications/TechPublications/TechPub-15/3-4AmericaNorth/4-1_1.asp, accessed August 8, 2003.

Wedner, D. 2003. "Tax Credits are the Spark for Affordable Housing. *Los Angeles Times*. June 15, 2003.

Zate, M. 2003. *Santa Barbara News Press.* June 26, 2003. p. A-1.