Jan. 2002

San Joaquin Valley

GROWTH RESPONSE STUDY

WHITE PAPER - PHASE 1

State of California
Department of Transportation
Office of Transportation Planning
District 6 - Fresno

San Joaquin Valley Growth Response Study
Phase I

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INTRODUCTION

The San Joaquin Valley Growth Response Study is being conducted to promote smart growth within the San Joaquin Valley. The primary intent of the study is to identify innovative strategies to respond to new urban growth within eight San Joaquin Valley counties by integrating transportation and land use decisions to allow making effective use of transportation infrastructure and resources as the region experiences high population growth in the San Joaquin Valley. The study is comprised of three phases.

The Mineta Transportation Institute at California State University, San Jose, conducted the first phase of the San Joaquin Valley Growth Response Study for the California Department of Transportation (Caltrans). This phase was conducted simultaneously with the Sustainable Communities Study that was completed in 2001. The Sustainable Communities Study addresses smart growth issues from a statewide perspective. Phase I of the San Joaquin Valley Growth Response Study produced a White Paper and seven Appendices.

Phase II of the San Joaquin Valley Growth Response Study is being conducted by the Rand Corporation and the University of Southern California. It will contain an educational component and the development of a planning toolbox for the San Joaquin Valley. The educational component of the study will address technical, procedural, and political barriers to integrated planning, and towards overcoming these barriers. The development of a planning toolbox will serve planners, citizens and decision-makers in analyzing future growth and land use based transportation scenarios in the San Joaquin Valley. It will guide development of models to help communities plan for sustainable growth and will consider the key issues of land use, transportation, and economic development. The toolbox will incorporate political, procedural, and technical strategies and will include:

- Smart growth best practices
- Criteria for selecting and using land use and transportation models to analyze growth
- A technical framework for modeling smart growth

Phase III of the study will involve two demonstration projects for the implementation of the toolbox developed in Phase II.

The San Joaquin Valley Growth Response Study seeks to facilitate efforts towards smart growth by offering an assessment of activities in the San Joaquin Valley in the first phase and education for overcoming barriers and the development of a planning toolbox to serve planners, citizens, and decision-makers in making land use decisions in the second phase. The final phase of the study will implement the toolbox in two jurisdictions as a way to positively demonstrate the ability of these communities to produce quality growth within the San Joaquin Valley.

CALIFORNIA STATE DEPARTMENT OF TRANSPORTATION
DISTRICT 6

SAN JOAQUIN VALLEY GROWTH RESPONSE STUDY
WHITE PAPER

Transportation, Land Use and Growth

The purpose of the first phase of the San Joaquin Valley Growth Response Study is to research information related to growth, land use, and transportation planning in the San Joaquin Valley and to develop recommendations which could improve land use and transportation coordination. Currently, land use and transportation planning within the state and the San Joaquin Valley can benefit from a larger, regional, macro-level coordination and collaboration. A partnership among the California Department of Transportation, cities, counties, the eight regional transportation planning agencies, and the private sector is a key element to establishing a comprehensive and iterative planning approach for the San Joaquin Valley.

The California Department of Transportation contracted with the Norman Y. Mineta International Institute for Surface Transportation Policy Studies (IISTPS) to undertake this study. The Mineta Institute is part of the College of Business at San Jose State University. The IISTPS was established by Congress as part of the Intermodal Surface Transportation Efficiency Act of 1991. IISTPS focuses on international surface transportation policy issues as related to three primary responsibilities: research, education and technology transfer. IISTPS receives policy oversight from an internationally respected Board of Trustees who represents all of the major transportation modes.

Objectives of the Study

This study's first phase was combined with the first phase of a California Department of Transportation Sustainable Communities Study, managed by the California Department of Transportation headquarters in Sacramento. The purpose of the Sustainable Communities/San Joaquin Valley Growth Response Study include the following goals:

1. Define the concepts of sustainable communities, livable communities, and smart growth.

2. Provide a baseline of information for the California Department of Transportation, regional, and local agencies to use in developing appropriate transportation policies and programs.

3. Identify barriers for local, regional, and state agencies in responding to growth.

4. Complete the first phase of the San Joaquin Valley Growth Response Study.

5. Identify opportunities for how the California Department of Transportation could promote sustainable transportation.

The California Department of Transportation District 6 has initiated the Study in cooperation with the California Department of Transportation District 10. District 6 is based in Fresno and District 10 is based in Stockton. The two District offices have responsibility for the California Department of Transportation activities in the eight counties that make up the San Joaquin Valley.

The projected rate of growth within the San Joaquin Valley will result in increasingly severe traffic congestion if the San Joaquin Valley jurisdictions, and the California Department of Transportation continue traditional land use and transportation responses. Given the responsibility for operation and maintenance of the state highway system, the California Department of Transportation has an understandable concern with actual and potential deteriorating traffic conditions. It is in the best interest of local jurisdictions and the California Department of Transportation that the land use and transportation planning process be as thorough as possible. Local jurisdictions have limited financial and technical resources available for land use and transportation planning. Thus, the objective is to identify ways that the California Department of Transportation can provide financial and technical assistance to local jurisdictions, while respecting and maintaining local land use planning and decision-making roles and responsibilities.

The Study's first phase has been part of a broader effort of the California Department of Transportation to investigate and promote sustainable, smart, and livable growth concepts. These concepts are described in Appendix IV and the definitions are included in this document.

The Study report is organized into this white paper and seven appendices.

- Appendix I, *Summary of San Joaquin Valley Conditions and Perceptions*
- Appendix II, *The Framework for Land Use and Transportation Planning in the San Joaquin Valley*
- Appendix III, *The Emergence of Planning Partnerships and Collaborative Planning*
- Appendix IV, *The San Joaquin Valley's Emerging Interest in Sustainable, Smart and Livable Growth*
- Appendix V, *The State of Planning in the San Joaquin Valley*
- Appendix VI , *Linking Land Use and Transportation---Strategies and Actions*
- Appendix VII , *Technical Tools for Evaluation of Land Use Alternative Models*

A description of physical, demographic, and economic information along with the results of several public opinion surveys can be found in a separate document, Appendix I. The information in the Appendix provides major portions of the context within which land use and transportation planning occur. The key conclusions of Appendix I are as follows:

1. *Agricultural Economy*
   The San Joaquin Valley is fundamentally different from the Los Angeles metropolitan area and the San Francisco Bay Area in terms of high

unemployment and poverty levels, strong emphasis on the farm economy, and growing support for preservation of agricultural land.

2. *Population and Employment Growth*
   The San Joaquin Valley, especially south of Merced County, is fundamentally different from the Los Angeles or the Bay Area in having significantly less traffic congestion and a greater acceptance of and desire for population and employment growth. Due to the higher levels of unemployment and the concern for loss of agricultural land in the valley, the public's concern of traffic issues in the valley does not appear to be of the same magnitude as the larger urban areas of the state. However, the potential growth in congestion and the presence of air pollution are major concerns of the valley, which will worsen given (a) the existing patterns of development, and (2) the lack of coordination in land use / transportation planning.

3. *Preservation of Agricultural Land*
   Preservation of agricultural land is a central issue for the San Joaquin Valley rather than a peripheral issue that it is in the Bay Area and Los Angeles. Agriculture is the key economic component for much of the San Joaquin Valley. Concerns about hurting the agricultural economy are real and widespread.

4. *Poverty and Employment*
   Poverty and unemployment are part of the everyday reality for the San Joaquin Valley, and they impact the types of growth desired and regarded as feasible.

5. *San Joaquin Valley Identity*
   The San Joaquin Valley lacks a strong sense of identity, in part, because the San Joaquin Valley has three different areas that have different issues as well as shared ones including concern about high unemployment, the loss of prime agricultural land, the presence of air pollution, and the need for economic development. San Joaquin and Stanislaus Counties and at least part of the Merced County are oriented to the San Francisco Bay Area with higher housing prices, greater traffic congestion, and growing concerns regarding the negative impacts of new growth. Taking the regional perspective, Madera, Fresno, Kings, and Tulare Counties and a portion of Merced County are oriented to the Fresno/Clovis metropolitan area. Kern County is considerably impacted by the Los Angeles metropolitan area but is oriented toward the City of Bakersfield. Kern County also has a substantial oil extraction element in its economy.

6. *New Development with the Existing Landscape*
   The City of Fresno is the only city in the San Joaquin Valley with a population of over 400,000. Because the scale of the urban areas for the San Joaquin Valley is predominantly characterized by medium to smaller sized cities and contains large, unincorporated areas, the general population more

easily notices the visual, traffic, and other impacts of new developments compared to residents of larger urban areas.

7. *Stakeholders with Knowledge of Local Needs*
   Cities and towns in the San Joaquin Valley tend to have distinct areas with agricultural lands separating the communities. Having a more manageable number of decision makers and significant public support for preservation of agricultural land provides opportunities to address growth that are different from Los Angeles and the San Francisco Bay Area. The Stakeholders would be instrumental in promoting the concepts of "smart growth" to local planning and in thoroughly assessing the information that would be integrated into a local decision-making toolbox.

8. *Public Sector Trust*
   The San Joaquin Valley has notably lower levels of trust of governments than other urban areas of the State.

Appendix II elaborates on conclusion #5 that the San Joaquin Valley is not a unified region but has common concerns such as air pollution, the protection of prime agricultural land, the need for economic development and the function of major transportation routes that transverse the San Joaquin Valley. A common theme that occurs throughout the San Joaquin Valley is strong concern that future growth will result in development patterns similar to the experiences of the Los Angeles and San Francisco regions.

Eight county-based Regional Transportation Planning Agencies (RTPA) serve the San Joaquin Valley. The primary function of each RTPA is to prepare a cooperative, continuous, and a comprehensive transportation plan and program as well as facilitate the receipt and disbursement of transportation funds. Most, if not all of the cities that make up the membership of the RTPAs, are opposed to having the agencies exercise any notable land use review and planning. There is little support for any type of multi-county planning organization and no politically effective support for a San Joaquin Valley-wide planning organization similar to the multi-county, region-wide organizations of the Bay Area and Los Angeles.

Appendix IV defines sustainable communities, smart growth, livable communities, barriers to these planning concepts, and information on overcoming the identified barriers. In the San Joaquin Valley during the past five to ten years, there has been a pronounced increased interest in these concepts. Appendix V identifies a variety of San Joaquin Valley planning efforts, and most of those have elements of sustainable, smart, and livable growth concepts.

Sustainable communities, smart growth and livable communities are often not precisely defined and tend to be used somewhat interchangeably. What they signify in the San Joaquin Valley is a growing interest for having land use development occur in a more attractive and compact way and fear that growth in the next decades will mirror the major growth trends that are happening in the Los Angeles and San Francisco areas.
Sustainable communities, livable communities, and smart growth all involve new ways of conceptualizing and managing growth and development of regional communities. While

these terms are distinct, they nevertheless share many broad concepts, policies, and practices intended to achieve economic, environmental, and social benefits simultaneously.

These terms all involve an effort to reconcile three historically opposing forces:

- Growth and development as advocated by business leaders;
- environmental quality as advocated by environmental and neighborhood activists; and
- social and economic justice as advocated by champions for the lower-income and disadvantaged.

While there is a widespread agreement that business, environmental, and social objectives can all be served by many of the same public and private policies, there remain differences of perspectives and priorities on the detailed level. These differences can make it difficult to get an agreement on definitions of specific terms. Thus, this study has combined these terms in an effort to reflect the frequent use of these terms in the San Joaquin Valley. However, general definitions are helpful in differentiating the concepts among livable communities, smart growth and sustainable communities.

Some claim that smart growth and sustainable communities assume denser development and the presence of a metropolitan core. Smart growth and sustainable communities can encourage denser development if they encourage shorter commutes, less dependence on single occupancy vehicle travel, better air quality, and safer communities. These three terms—livable communities, smart growth, and sustainable communities—are distinguished as follows:

1. Livable Communities

   This term often refers to qualities of life encountered on a daily basis. A livable community has qualities such as clean air and water, is walkable, facilitates other non-auto modes of transportation, has quality parks, libraries, schools and other community facilities, promotes affordable housing and lower taxes, and is clean and safe.

   In orientation and priorities, livable communities tend to be more local and more "here-and-now" compared to smart growth and sustainable communities. It gives more emphasis to neighborhood and quality of life issues such as schools, parks, urban beautification, and litter and graffiti removal. In the San Joaquin Valley, there is a growing downtown revitalization effort as well as advocacy for compact growth that combines livable and smart growth perspectives.

2. Smart Growth

   This term involves being thoughtful and deliberate (i.e., smart) about where growth is being channeled and how it is being shaped to accomplish community goals. Smart growth steers development to areas with existing or planned infrastructure. It balances jobs, housing, and other development types, and it promotes affordable housing. Within developing areas, compact, mixed-

use, and pedestrian- and bicycle-friendly and transit-oriented development is encouraged. Incentives are established to enhance investment, regulatory barriers are lowered, and state and local funding is used to improve infrastructure. Outward development is controlled, "leapfrog development" is prevented, and open space is protected both at the edges and inside the area permitted for development.

Citizen or "stakeholder" participation usually has an important role in program development. Specific local programs may be summed up as intended to make the community livable, sustainable, healthy, clean, or some other term.

Smart growth has little to do with the rate of growth. Often, smart growth is more beneficial if it comes quickly. And slow growth does not guarantee avoidance of growth-related problems.

3. Sustainable Communities:
   The term sustainable community is usually intended to include most things meant by the terms livable communities and smart growth. It is distinct in that it often includes an explicitly global ("think globally, act locally") and long-term dimension ("...without compromising the ability of future generations to meet their own needs"). It tends to involve a more explicit view of the community as an important part of the larger world within which it functions—seeing the community as both having responsibility as a "global citizen" and as being significantly impacted by what happens on a global, long-term basis.

Recommended Actions for Growth Planning

There are 11 recommended actions that the California Department of Transportation, at the District level, could promote in responding to growth related issues. A few of the recommended actions are internal to the California Department of Transportation (i.e., recommended actions #4, #7, and #9). Most of the recommended actions depend on the California Department of Transportation, in cooperation with the eight Regional Transportation Planning Agencies serving the San Joaquin Valley, local cities and towns, and the private sector. The plan calls for developing partnerships to address growth and planning issues. The process of creating and maintaining partnerships will most likely modify some of the recommended actions and identify additional action opportunities.

The recommended actions were guided by several conclusions reached by the Study Team during the interview and document review process. Key conclusions include:

1. Establishing and maintaining partnerships is crucial to any effort by the California Department of Transportation to encourage integration of local and regional land use and transportation planning processes. These partnerships should be based on clear ongoing communication between the California Department of Transportation, local jurisdictions and the private sector. Clarification of roles and responsibilities must be a key topic of both the initial discussions and ongoing communications. Prior to undertaking any specific action, the issues should be fully discussed with all affected parties.

2. Greater planning needs are present in the "smaller jurisdictions." In this context, the "smaller jurisdictions" refer to cities with a population of less than 100,000. Each jurisdiction has a distinct set of needs and issues; identifying what needs are applicable is a cooperative task best done by an outside consultant. It is in the interest of improved valley-wide land use and transportation coordination to focus the study attention on both smaller and larger jurisdictions.

3. Communities could benefit from many types of land use and transportation planning assistance. For many smaller jurisdictions, small investments in land use planning; traffic engineering and other technical tasks could yield major returns for both local jurisdictions and the California Department of Transportation. The transportation issues of small communities—whether they are internal traffic problems, the travel patterns caused by existing and future commuters to larger cities, farm-to-market road problems, or direct impacts on a state route—are legitimate issues for all city and county agencies.

4. Providing training for local, regional and state agencies managers and staff is very important. The San Joaquin Valley is a complex physical, social and economic environment. Having a clear and consistent understanding of local and regional complexity will help make coordination efforts among these agencies positive and productive. Training should include the approaches and techniques required to building partnerships. Partnerships require trust, and establishing that trust is a critically important and delicate process that should be addressed in the training program.

5. The Fresno/Clovis area is a special situation in that it is the largest urban area in the Valley and includes the significantly sized cities of Clovis and Fresno, and Fresno County.

6. Within the context of forming a partnership, special attention is appropriately placed on addressing growth and development issues in the Fresno/Clovis area.

Recommended Actions

The eleven recommended actions are divided into three areas:

- Making Transportation Facility Investment and Location Decisions;
- Providing Technical and Financial Assistance; and
- Promoting Regional Cooperation in Planning.

As a prelude to moving ahead with any of the actions in future phases of this study, the California Department of Transportation senior staff at Districts 6 and 10 need to develop a clear approach to addressing the topics identified in this study. This approach should attempt to both minimize contradictions in how the California Department of Transportation interacts with local agencies and maximize opportunities for successful efforts in working with local and regional agencies on growth-related issues. Then, as

noted earlier, the California Department of Transportation staff members need to carefully discuss issues with the affected parties including the Regional Transportation Planning Agencies, local jurisdictions, and members of the private sector.

1. Making Transportation Facility Investment Decisions

   Action #1: *Devise Criteria to Rank Transportation Programming Priorities*
   Develop programming prioritization criteria for new intersection and route decisions that evaluate potential growth inducing and growth shaping impacts, and give priority to facilities serving communities planning for smart growth. Alongside such programming policies, the California Department of Transportation could develop programs to work with communities ensuring that any growth "induced" by interregional facilities would be smart, sustainable, and livable.

   Action #2: *Integrate Land Use into Transportation Planning*
   In conducting corridor and route studies, the California Department of Transportation could give higher priority to land use planning issues related to smart, sustainable, livable urban development patterns and related to land conservation for agricultural or environmental protection purposes.

   Action #3: *Use Smart Growth Concepts for Facility Location Decisions*
   Location decisions for yards, offices, or other California Department of Transportation facilities could be made using new criteria developed to factor in smart growth considerations.

2. Providing Technical and Financial Planning Assistance

   In the San Joaquin Valley most of the local general planning work still focuses on identifying a desired allocation of land uses. Exploration of alternative land use scenarios (e.g., higher density, small lot, single family, residential, and mixed land uses) is seldom done. Economic analysis often consists of the market implementing or not implementing the adopted land use plan.

   Especially for the larger cities in the San Joaquin Valley, and for areas expected to receive the bulk of the population growth, the rigorous evaluation of alternative land use policies and patterns can facilitate more informed General Plan decision-making. That decision-making is much more likely to effectively guide a city to the desired land use and transportation future. State governments can provide the tools, or the technical and financial resources needed to use the tools, to support smarter planning decisions.

   Local agency planning staff members often lack the capacity or resources needed to undertake comprehensive integrated land use and transportation planning. At the same time, policy makers may lack the decision support tools that allow them to better understand the implications of alternative land use patterns and the relationships between individual development decisions and broader community

goals. The problem is especially acute in the San Joaquin Valley because of the combination of many smaller communities, and very limited local funding for land use and transportation planning.

Research and interviews conducted by the Study Team confirm that it would be beneficial for the State of California and the California Department of Transportation to offer many types of assistance. The Valley's different communities need various kinds of assistance delivered in different ways—therefore, no single assistance program will meet all needs.

If the California Department of Transportation decides to undertake a program of providing technical and financial resources to local communities in the Valley, it would be important for the California Department of Transportation to initially identify the level of resources from state and federal funding that could be made available. These should not be the only source of potential financing but decisions to pursue funds from local governments and private foundations will be strongly influenced by what resources California can provide.

The California Department of Transportation's up-front collaboration and corroboration with local planning agencies may save resources and time in the future. Such partnership efforts by the state Department of Transportation can help reduce redundant or unforeseen efforts through prudent local and regional planning.

Actions #5 through #10 are intended to be cooperative efforts between the California Department of Transportation and the regional transportation planning agencies (RTPA), counties, cities and members of the private sector. Prior to undertaking actions, the California Department of Transportation and local representatives need to carefully discuss their roles and responsibilities. In some cases, contracting with a consultant and supervision of the work may best be undertaken by an RTPA, city or county.

Action #4: *Identify Resources for a Partnership Program*
Identify the financial resources that could be devoted to an ongoing San Joaquin Valley Transportation and Land Use Planning Partnership Program.

Action #5: *Develop an Action Plan for a Partnership Program*
Through interagency consultation among the eight regional transportation planning agencies, local jurisdictions, the San Joaquin Valley Unified Air Pollution Control District and other relevant agencies, develop the details of a Partnership Program through the use of a consultant that is knowledgeable about local conditions in the San Joaquin Valley.

The Partnership Program should focus on the provision to local jurisdictions financial and technical resources that address the needs identified in the recommended technical needs assessment. The

Partnership Program should include financial grants and could include the use of the California Department of Transportation staff expertise. To facilitate local jurisdiction participation, the Partnership Program should be designed to be administratively simple.

Action #6: *Develop a Plan to Address Local Needs*
Contract with a consultant who has familiarity with the Valley and a track record of working with local jurisdictions on land use planning issues to undertake an assessment of general plan and development review technical needs, and develop a plan to address local needs. Integrate local input and public involvement in decision-making involving land use issues.

Action #7: *Compile 3-4 Best Case Scenarios*
Undertake three or four case studies regarding what planning in smaller San Joaquin Valley jurisdictions has been able to accomplish. Short (e.g., four page) handouts should be prepared that can be used with other San Joaquin Valley jurisdictions to illustrate planning opportunities.

Action #8: *Offer Training/Workshops on Transportation, Land Use, and Growth*
Contract with a consultant with experience in the San Joaquin Valley to provide a series of training programs on transportation, land use and growth issues for planning and other staff, Planning Commissioners and City Council members of smaller jurisdictions. These programs need to be held in smaller jurisdictions and at times when there is the potential for significant attendance.

Action #9: *Have Training/Workshops on Partnership Building*
Contract with a consultant that is familiar with the San Joaquin Valley to conduct a workshop/training for the California Department of Transportation staff members working in the San Joaquin Valley that focus on:

- Clarification of San Joaquin Valley transportation, land use and growth issues; and
- Procedures for building partnerships with local, regional and private sector stakeholders.

Action #10: *Establish the Optimal Tool for Land-Use Based Transportation Planning*
Explore the types of land use and transportation planning assistance and the mechanisms for providing that assistance that local jurisdictions believe would be most beneficial. Based on these discussions, the California Department of Transportation could establish a technical assistance program for smaller jurisdictions in the San Joaquin Valley.

Large communities need tools that will allow analysis of more factors than transportation. Recently developed models can be appropriate for larger

area, community wide and multi-jurisdictional studies. The United States Environmental Protection Agency (EPA) published in 2000 an evaluation of 22 land use models (see separate document, Appendix VI). Of special note are the guidelines for selecting a model.

As a generalization, models that need less information and can be operated through typical office computers will provide more generalized and less sophisticated results. The use of considerable information and more complicated computer techniques does not necessarily result in a corresponding increase in the quality of results. Picking the model most appropriate for a given situation should involve careful review and planning.

The Association of Bay Area Governments' (ABAG) "Making Better Communities By Linking Land Use and Transportation" document contains strategies and available actions that can serve as a checklist for communities in developing and evaluating planning efforts and providing ideas for local land use and transportation plans and development proposals (see separate document, Appendix VII).

3. Promoting Regional Cooperation in Planning

Within the Valley, the Fresno/Clovis urban area is the largest metropolitan area and faces continuing substantial growth. There are four jurisdictions that have a direct role in planning for and handling most future growth: the Cities of Fresno and Clovis and the Counties of Fresno and Madera. A number of difficult transportation-related issues need to be dealt with including a potential Foothills Expressway and the east/west connector. All four of these jurisdictions have an important role in addressing issues related to growth and the future transportation network in the region.

It is assumed for Actions # 11 that developing and approving a work program, and hiring and supervising consultants would be done by the Cities of Clovis and Fresno, and Fresno and Madera Counties. The mechanism for carrying out these tasks will need to be identified and agreed to by the cities and counties.

Action #11: *Provide Policy and Technical Support*
The California Department of Transportation could offer to provide financial and technical resources to facilitate a policy and technical effort by the Cities of Fresno and Clovis, Fresno County and Madera County to identify and address common issues regarding future growth scenarios and growth areas including the Foothill Expressway (Route 65), the east/west connector and other major transportation/land use issues identified by the four jurisdictions.

Recommended Funding Actions

Funding the proposed actions should draw on a variety of resources including local, state, federal, and private sector sources. The first decision point is for the California Department of Transportation, through its budget process, to identify resources that can be devoted to particular tasks. Some actions may be feasible within existing staffing and budget resources.

The funding process should focus first on developing a common understanding and agreement on the nature of the work to be done and who will do the work. With organizational commitments in place, funding from a variety of sources can be pursued. For foundations, having a clear demonstration of organizational commitment can strongly influence their receptivity to providing support. Also, many state and federal financial sources require matching funds and initial organizational commitments and foundation funding can be used to provide the required local match.

As Phase II of the Study proceeds, the Stakeholders for the San Joaquin Valley Growth Study can help suggest solutions to derive an equitable fiscal policy for the local, state, and federal transportation agencies, and in particular, help generate ideas to instigate economic development opportunities for the Central Valley region.

Alternative Design Standards

A specific issue not addressed in the recommended actions is the development of alternative design standards for state routes that serve as local residential and/or commercial streets. In interviews with local and regional staff and elected decision makers in the San Joaquin Valley, the most common response to the question regarding what the California Department of Transportation could do to help was to modify the transportation project review process to facilitate "friendlier" street designs for state routes that serve as surface streets within communities. The specific concern is that the State Highway Design Manual is a barrier to street designs that facilitate local economic development, pedestrian use and quality of life objectives.

Local and regional staff and elected decision makers often believe that the established exception procedure is a long and difficult process that is not sensitive to local goals for having a more human scale environment associated with state surface routes in communities. The California Department of Transportation recently initiated a Flexible Design Working Group to investigate this issue. In the related Sustainable Communities Study, it is recommended that the California Department of Transportation, over the next 12 to 18 months, continue investigation of the issues and identify a way to provide alternative design standards for state routes that serve as local surface streets.

Conclusion

This white paper addresses some of the key issues that have been identified in Phase I of the San Joaquin Valley Growth Response Study. Phase II of the Study will further investigate these issues, develop critical stakeholder partnerships, and compile information relevant to modeling alternative land use/transportation scenarios. In Phase III, the transportation model results will be compiled and used to guide development of an implementation plan for transportation facilities that also addresses relevant land use,

and anticipates the changing demographic, employment, housing, and economic development needs of the San Joaquin Valley region.

Appendix I

Summary of San Joaquin Valley Conditions and Perceptions

Introduction and Conclusions

Land use planning, including evaluation of transportation policies and potential projects, takes place within a framework of physical, demographic, local and economic factors and is shaped by the local political environment. This Appendix highlights physical, demographic and economic information along with the results of several public surveys. Professor Marc Baldassare has developed the key public survey information. Professor Baldassare's work includes statewide California public opinion surveys and similar surveys that focus on California's Great Valley. The Great Valley surveys are on the Great Valley Center's web site (www.greatvalley.org). The Great Valley surveys have information for the San Joaquin Valley that is separated out for the North San Joaquin Valley (San Joaquin, Stanislaus and Merced counties) and the South San Joaquin Valley (Madera, Fresno, Kings, Tulare and Kern counties). Readers are encouraged to monitor the Great Valley Center's web site for updated survey results.

The primary conclusions that emerge from the following information include:

9. Agricultural Economy: The San Joaquin Valley is fundamentally different from the Los Angeles metropolitan area and the San Francisco Bay Area in terms of high unemployment and poverty levels, strong emphasis on a farm economy and widespread support for preservation of agricultural land.

10. Population and Employment Growth: The San Joaquin Valley especially south of Merced County is fundamentally different from Los Angeles or the Bay Area in having significantly less traffic congestion, lower public concern regarding traffic issues and greater acceptance of and desire for population and employment growth.

11. Preservation of Agricultural Land: Preservation of agricultural land is a central issue for the San Joaquin Valley rather than the peripheral issue that it is in much of the Bay Area and Los Angeles. Agriculture is the key economic component for much of the San Joaquin Valley, and concerns about hurting the agricultural economy are real and widespread.

12. Poverty and Employment: Poverty and unemployment are part of the everyday reality for the San Joaquin Valley and impact the types of growth desired and regarded as feasible.

13. San Joaquin Valley Identity: The San Joaquin Valley lacks a strong sense of identity in part because the SJV has three different areas that have different issues as well as shared issues. Shared issues include concern about high unemployment, the loss of prime agricultural land and air pollution along with the need for economic development. San Joaquin and Stanislaus Counties and at least part of Merced County are oriented to the San Francisco Bay Area with higher housing prices, greater traffic congestion and growing concerns regarding

the negative impacts of new growth. Madera, Fresno, Kings and Tulare Counties and a portion of Merced County are oriented to the Fresno/Clovis metropolitan area. Kern County is receiving increased impacts from the Los Angeles urban area but is oriented to the City of Bakersfield. Kern County also has a substantial oil extraction element of its economy.

14. Integration of New Development with the Existing Landscape: The scale of urban areas, with only one city over 400,000 population, many medium and smaller sized cities and significant unincorporated area, means that the visual, traffic and other impacts of new development are more easily perceived by the general population than is the case for many residents of larger urban areas.

15. Stakeholders with Knowledge of Local Needs: Cities and towns in the San Joaquin Valley tend to have distinct areas with agricultural lands separating the communities. Having a more manageable number of decision makers and significant public support for preservation of agricultural land provides opportunities to address growth that are different from Los Angeles and the San Francisco Bay Area.

16. Public Sector Trust: The San Joaquin Valley has notably lower levels of trust of governments than other urban areas of the State.

Key Physical, Demographic and Economic Factors

The San Joaquin Valley (SJV) is an eight county area from San Joaquin County in the north to Kern County in the south (see figure 1). The eight counties contain approximately 27,280 square miles and represent about 17 per cent of California's land area. State route 99 runs the length of the eastern side of the SJV and Interstate 5 runs along the west of the SJV.

Most of the San Joaquin Valley is flat land located between the coast range to the west and the Sierra Nevada Mountains to the east. Much of the Valley's flat land has good to excellent soil that yields substantial agricultural production. The SJV accounts for about 50 percent of California's agricultural output and approximately 7 percent of the nation's agricultural output. Six of the seven top agricultural output counties in California are located in the Valley (in order of production value, Fresno, Tulare, Kern, Merced, San Joaquin and Stanislaus; Monterey County ranks third in the state). In 1996, the value of the San Joaquin Valley's agricultural production was almost $14 billion. Fresno County was the number one agricultural producing county in the nation with production of $3.3 billion (see table 1). In addition, agriculture results in many jobs such as equipment and product sales, hauling produce, processing plants, and related service jobs in finance, construction and packaging. In the southern part of the SJV, Kern County has major oil and borax resources and related production facilities.

Table 1
Agricultural Production of San Joaquin Valley Counties

County	1996 Market Value of

	Agricultural Production ($1,000)
Fresno	3,313,426
Tulare	2,901,921
Kern	2,067,028
Merced	1,429,918
San Joaquin	1,351,530
Stanislaus	1,233,196
Kings	883,887
Madera	712,113

Source: Report of the Agricultural Task Force for Resource Conservation and Economic Growth in the Central Valley, Great Valley Center Web site

The San Joaquin Valley is about 250 miles long and forms a natural narrow bowl that traps air contaminants. The SJV's weather conditions include hot summers, cool foggy winters with stagnant air patterns, and temperature inversions. According to the San Joaquin Valley Unified Air Pollution Control District, the SJV's air quality is among the poorest in the state. On average the SJV experiences 35 to 40 days when federal air quality standards for ground level ozone are exceeded and more than 100 days when state ozone standards are exceeded. Airborne particles exceed federal standards less than five days per year but exceed the lower state standards about 90 to 100 days per year. The SJV is classified as a severe non-attainment area for California ozone a non-attainment area for the state's air particle standard. The SJV is an attainment area for carbon monoxide and other air pollutants.

Air pollution transported from the San Francisco Bay Area and Sacramento area account for approximately 27% of the total emissions in the Northern portion of the SJV, 11% in the Central SJV and 9% in the Southern SJV.

While the San Joaquin Valley has geographic unity, it is divided into three areas based on economic and location factors. The northern section of the SJV, consisting of San Joaquin County, Stanislaus County and Merced County, has a primary orientation to the San Francisco Bay Area. Increasingly over the past 10 to 20 years, Bay Area employees have found affordable housing in this section of the SJV. The central section of the SJV consists of Madera, Fresno, Kings and Tulare counties. This area identifies itself primarily with the Fresno metropolitan area. Kern County, the southern most area of the SJV, tends to focus on the City of Bakersfield and regard itself as separate from both the rest of the SJV and the Los Angeles area to the south. Bakersfield, with a population of 237,000, is the third largest city in the SJV-- only slightly smaller than Stockton (247,000) and substantially smaller than Fresno (421,000).

The State Department of Finance estimates that in January 2000, the eight San Joaquin Valley counties had a population of about 3.3 million. Table 2 identifies the January 2000 population of incorporated and unincorporated areas. Of note is the number of cities with less than 25,000 and the substantial unincorporated area population in every County.

Insert Figure 1 (map of the Valley)

Table 2
Incorporated and Unincorporated Population of Cities and Counties—January 2000

Jurisdiction	January 2000 Population
FRESNO COUNTY	
Clovis	70,700
Coalinga	15,200
Firebaugh	6,125
Fowler	3,870
Fresno	420,600
Huron	5,875
Kerman	7,800
Kingsburg	9,425
Mendota	7,850
Orange Cove	7,900
Parlier	11,400
Reedley	20,950
Sanger	19,050
San Joaquin	3,260
Selma	18,700
Unincorporated Area	176,400
TOTAL	805,000
KERN COUNTY	
Arvin	11,850
Bakersfield	237,200
California City	8,775
Delano	35,550
Maricopa	1,250
McFarland	9,450
Ridgecrest	27,300
Shafter	11,900
Taft	9,150
Tehachapi	12,600
Wasco	20,100
Unincorporated Area	237,800
TOTAL	658,900
KINGS COUNTY	
Avenal	13,100
Corcoran	21,550
Hanford	41,000

Jurisdiction	January 2000 Population
MERCED COUNTY	
Atwater	22,500
Dos Palos	4,460
Gustine	4,440
Livingston	10,550
Los Banos	23,250
Merced	63,300
Unincorporated Area	
TOTAL	210,100
SAN JOAQUIN COUNTY	
Escalon	5,825
Lathrop	9,975
Lodi	57,900
Manteca	49,500
Ripon	10,400
Stockton	247,300
Tracy	54,200
Unincorporated Area	131,400
TOTAL	566,600
STANISLAUS COUNTY	
Ceres	32,950
Hughson	3,620
Modesto	188,300
Newman	6,375
Oakdale	14,950
Patterson	10,950
Riverbank	14,600
Turlock	53,500
Waterford	6,775
Unincorporated Area	
TOTAL	
TULARE COUNTY	
Dinuba	15,700
Exeter	8,625
Farmersville	

Lemoore	18,800	Lindsey	9,050
Unincorporated Area	36,750	Porterville	37,600
TOTAL	131,200	Tulare	41,800
		Visalia	96,800
MADERA COUNTY		Woodlake	6,450
Chowchilla	13,650	Unincorporated Area	144,300
Madera	37,600	TOTAL	368,800
Unincorporated Area	65,800		
TOTAL	117,100		

Source: California Department of Finance web site

Table 3

San Joaquin Valley County Population--1990 to 2040

County/ Year	Total	White	Hispanic	Asian/ Pacific	Black	American Indian
FRESNO						
1990	673608	342145	239541	55213	31609	5100
2000	811179	361168	318661	84846	39258	7246
2010	953457	378693	403301	114847	47362	9254
2020	1114403	391507	506235	147956	57339	11366
2030	1308767	403774	635694	188045	67817	13437
2040	1521360	410775	784293	231708	79112	15472
KERN						
1990	549531	345148	154397	15133	29177	5676
2000	677372	383074	223713	23210	40278	7097
2010	859818	421889	339644	37402	52128	8755
2020	1073748	453877	492867	50808	65754	10442
2030	1327013	478655	691188	65809	79469	11892
2040	1623671	497891	936569	81669	94381	13161
KINGS						
1990	102238	55172	34940	3419	7800	907
2000	126672	61574	48550	4979	10498	1071
2010	154617	68199	65221	6789	13068	1340
2020	186611	74392	86076	8520	16073	1550
2030	223914	79973	112748	10497	18956	1740
2040	265944	84919	144621	12560	21940	1904
MADERA						
1990	89549	53808	30968	1087	2321	1165
2000	126394	69751	47828	1770	5749	1296
2010	175132	89128	71915	2795	9752	1542
2020	224567	103089	102356	3668	13663	1791
2030	281300	115676	141289	4679	17638	2018

2040	346451	128061	188420	5777	21946	2247
MERCED						
1990	180182	97786	58939	14393	7922	1142
2000	215256	103737	79435	23216	8624	1244
2010	264420	109394	106761	37287	9572	1406
2020	319785	113992	141291	52366	10591	1545
2030	385120	117068	184972	70085	11364	1631
2040	460020	118592	237033	90634	12069	1692
SAN JOAQUIN						
1990	483817	284700	113743	56578	24984	3812
2000	579712	310062	149468	85283	30829	4100
2010	725868	355705	205138	121164	38864	4997
2020	884375	398738	276499	154328	48891	5919
2030	1060442	436907	366318	191199	59210	6808
2040	1250610	470691	471990	229914	70333	7682
STANISLAUS						
1990	375089	264519	82327	18554	6208	3481
2000	459025	298868	116480	30380	8943	4354
2010	585519	350088	167790	49368	12880	5393
2020	708950	388597	229933	66663	17285	6472
2030	846998	422190	309536	85777	21931	7564
2040	998906	451624	405351	106240	27062	8629
TULARE						
1990	313999	171547	122218	12653	4345	3236
2000	379944	181623	169828	19726	5289	3478
2010	469509	193339	235298	30469	6522	3881
2020	569896	202350	315808	39663	7882	4193
2030	692981	209575	419908	49840	9227	4431
2040	836973	215075	546018	60633	10657	4590

Source: California Department of Finance web site

Table 4

San Joaquin Valley's Employment, Income and Housing Data

County	Employed Population 1999	Unemployment Population 1999	Unemployment Rate 1999 %	Per Capita Income 1997	Per Cap Income County Rank	Medium Housing Price-99	Vacancy Rate 1999
Fresno	328500	51,000	13.4	$19,180	40 of 58	$90,000	6.1%
Kern	248600	31,800	11.3	$18,320	46 of 58	$77,018	8.6%
Kings	37830	5640	13.0	$14,559	57 of 58	NA	6.2%
Madera	46590	6130	11.6	$17,483	49 of 58	NA	8.0%
Merced	73500	11,200	13.2	$17,485	48 of 58	NA	6.7%
San Joaquin	230,800	22,100	8.7	$20,092	34 of 58	$129,500	5.0%
Stanislaus	181,600	21,400	10.5	$19,650	37 of 58	$114,500	5.0%
Tulare	139,200	27,300	16.4	$17,116	50 of 58	$85,000	6.6%
California	15,721,000	864,200	5.2	$26,314		NA	NA

Source: California Department of Finance web site

Table 3 identifies the historic, January 2000 and projected population for the counties as forecast by the California Department of Finance. In 2020, the San Joaquin Valley is projected to have a population of about 5.1 million, a 53 percent increase from 2000. The prospect of adding 1,175,000 people over the next twenty years, with continued growth after 2020, is the primary factor raising concerns about the land use and transportation future of the SJV. While the SJV is divided in how it identifies itself, there are indications of widespread sentiments that accommodation of future growth should not result in the creation of another Bay Area or Los Angeles environment.

Economic considerations result in the San Joaquin Valley being a very different place than California's larger coastal urban areas. Agriculture, both as a direct crop raising activity, and through the related economic impacts (e.g., sale of equipment and supplies, processing of crops) is the primary economic focus of the SJV. An agriculturally based economy employs significant numbers of lower paid workers, and often this work is seasonal. The SJV has significantly higher unemployment than California's coastal urban areas (see Table 4). Lower paid work results in lower per capita income than non-agricultural areas. For the central and southern parts of the SJV, income and housing cost levels are substantially different than the Bay Area and Los Angeles. San Joaquin and Stanislaus counties in the north have somewhat higher income levels and lower unemployment levels than the rest of the SJV. However, these counties still have notably lower per capita income than the California average as well as higher unemployment. In these counties, agriculture is still very important, and the socio-economic differences from the Bay Area are greater than the differences from the rest of the SJV.

Public Survey Results

Mark Baldassare is a Professor of Civic Governance at University of California, Irvine and a Senior Fellow with the Public Policy Institute of California. Mr. Baldassare has undertaken numerous in depth polls evaluating the views of Californians on a wide variety of public policy issues. The following indicators of San Joaquin Valley views are taken from work done in October 1999 for the Great Valley Center (available on the Great Valley Center web site at www.greatvalley.org) and polls done in 1998 for a recently published book, California in the New Millennium. The Great Valley Center polling included all of the Central Valley, an 18 county area extending from Shasta County to Kern County. Poll results were identified for North San Joaquin (i.e., San Joaquin, Stanislaus and Merced counties) and South San Joaquin (i.e., Madera, Fresno, Kings, Tulare and Kern counties). The 1998 polling focused on four geographic areas including Los Angeles County, Orange County and the Inland Empire area of Riverside and San Bernardino counties, the nine county San Francisco Bay Area, and the 18 county Central Valley.

Perceptions of Problems

Table 5 identifies reactions to air pollution, traffic congestion, loss of farms and agriculture, and population growth and urban development as perceived problems. Another way of addressing public problems is to ask what is regarded as the most

important problem. Table 6 identifies the percentage of survey respondents that ranked an issue as the number one problem. It is clear that residents in the northern San Joaquin Valley have a higher level of concern regarding the impact of population growth and the related impacts of traffic congestion and loss of farmland. With growth increasing as Bay Area employees seek affordable housing on the east side of the Altamount Pass and the Pachaco (SP) Pass, the near term and immediate impacts of urban growth are likely to continue. Of the nine identified concerns in Table 6, traffic and transportation ranked in the lower middle of the list.

Table 5

"In your region, how much of a problem is _____ ? Is it a big problem, somewhat of a problem, or not a problem?"

	North San Joaquin	South San Joaquin
*Air pollution**		
Big problem	23%	28%
Some problem	46	37
Not a problem	30	35
Don't know	1	0
Traffic congestion		
Big problem	21%	11%
Some problem	39	31
Not a problem	40	57
Don't know	0	1
Loss of farms and agriculture		
Big problem	28%	24%
Some problem	32	27
Not a problem	32	43
Don't know	8	6
Population growth, urban development		
Big problem	20%	16%
Some problem	37	32
Not a problem	41	51
Don't know	2	1

Source: Public Policy Institute of California, Special Survey of the Great Valley, Great Valley Center web site

Table 6

"What do you think is the most important public policy issue facing the Central Valley today?"

	North San Joaquin	South San Joaquin
Water	7%	15%
Environment, pollution	8	9
Population growth and development	10	4
Loss of farmlands, agriculture	9	8
Crime and gangs	7	11
Traffic and transportation	6	5
Schools	7	4
Jobs and economy	6	7
Immigration, illegal immigration	1	4
Other*	12	8
Don't know	27	25

*Includes several issues, each mentioned by one percent or fewer respondents

Source: Public Policy Institute of California, Special Survey of the Great Valley, Great Valley Center web site

Table 7 addresses job, housing, traffic and population growth issues for the Central Valley and the three other regional areas analyzed in California in the New Millennium. Central Valley residents have significantly less concern about traffic conditions than the other three areas surveyed with 51% identifying this as not a problem and 15% ranking it as a big problem. Central Valley residents also have notably less concern about population growth and have greater concerns for the availability of job opportunities.

Table 7

Regional Perceptions

	Los Angeles	San Francisco Bay Area	Central Valley	Orange/ Inland
Job Opportunities				
Very satisfied	22%	46%	18%	23%
Somewhat satisfied	54%	42%	45%	51%
Not satisfied	24%	12%	37%	26%
Housing Availability				
Very satisfied	23%	11%	31%	29%
Somewhat satisfied	44%	31%	49%	49%
Not satisfied	33%	58%	20%	22%
Traffic Conditions				
Big problem	36%	54%	15%	31%

Somewhat a problem	38%	29%	34%	41%
Not a problem	26%	17%	51%	28%
Population Growth				
Big problem	27%	38%	15%	28%
Somewhat a problem	38%	40%	42%	37%
Not a problem	35%	22%	43%	35%

Source: Mark Baldassare, California in the New Millennium, page 157

Table 8 contains the San Joaquin Valley's responses to the question of how people rate freeways, streets and roads in their local area. Another way of addressing the traffic congestion issue is the perceptions of employees regarding their commute. Table 9 indicates that for a majority of SJV commuters, the drive to and from work is not regarded as a notable problem. This holds true for the North San Joaquin Valley even with the number of employees that experience the very difficult commute into the Bay Area. With over one-half on the people rating freeways, streets and roads as either excellent or good, and one-half of the people in the northern SJV and over 60 percent in the southern SJV finding no problems with their commute, the time may not yet have arrived when immediate traffic concerns can be a key factor in motivating jurisdictions to change the way they plan for and implement growth.

Table 8

How would you rate local freeways, streets and roads in your local area?"

	North San Joaquin	South San Joaquin
Local freeways, streets, and roads		
Excellent	11%	13%
Good	46	42
Fair	33	34
Poor	10	11
Don't know	0	0

Source: Public Policy Institute of California, Special Survey of the Great Valley, Great Valley Center web site

Table 9

"On a typical day, how much of a problem is traffic congestion when you travel to and from work?" (asked of those who are employed)

	North San Joaquin	South San Joaquin
Great problem	17%	8%
Some problem	33	30
No problem	50	62

Source: Public Policy Institute of California, Special Survey of the

Great Valley, Great Valley Center web site

Table 10 indicates that a majority of San Joaquin Valley residents are evenly divided between those who regard the local economy as functioning in either a fair or poor condition and those who regard it as functioning in an excellent or good condition.

Table 10
"In general, how would you rate the economy in the Central Valley?"

	North San Joaquin	South San Joaquin
Excellent	8%	7%
Good	42	42
Fair	39	39
Poor	11	10
Dont know	0	2

Source: Public Policy Institute of California, Special Survey of the Great Valley, Great Valley Center web site

What is very evident is how perceptions are different in the San Joaquin Valley from other major growth areas in California. The fact that concerns about traffic conditions and population growth are much lower in the SJV will significantly affect how the issues of growth will need to be addressed. Solutions based on assumptions valid in California's large coastal urban areas may not have popular and thus political support in the San Joaquin Valley.

Ways to Improve the Quality of Life

For the Great Valley Center, the survey asked respondents to rank a variety of measures and actions on the basis of whether they would improve the quality of life in the Central Valley over the next ten years. Table 11 contains the percentage of respondents that gave an "extremely effective" ranking (i.e., a 5 on a scale of 1 to 5) to various actions that are often proposed as ways to improve an area's quality of life. Protecting agricultural lands enjoys strong support throughout the SJV. There is also strong support for protecting environmentally sensitive lands. Support for expanding transit service is greater in the North SJV and probably reflects a desire for improved transit service to the Bay Area's employment locations. Support for building a high speed passenger rail system was especially strong among Latino residents, with 54% giving it a number 5 ranking versus 43% for all adult respondents. Latinos also were significantly more disposed to encouraging job centers near existing housing (53% versus 41% of all adults). The lower level of support for restricting development to existing developed areas and establishing growth boundaries may reflect both the anticipation of a high growth rate and the need for economic development to address the SJV's persistent unemployment problem. When combined with the support for protecting agricultural and wetlands, rivers and other environmentally sensitive lands, the challenge for government is to find

areas within existing communities for additional development and areas for some urban expansion while minimizing negative impacts on sensitive lands.

Table 11

"We'd like to ask you about ways to improve the quality of life in the Central Valley over the next 10 years. How effective do you think the following activities would be on a scale of 1 to 5, where 1 represents something that would be not at all effective and 5 represents something that would be extremely effective?"

% who rated an activity "extremely effective"–i.e., who gave an activity a 5 score

	North San Joaquin	South San Joaquin
Protecting farms and agricultural lands from urban development	54%	53%
Preserving wetlands, rivers, environmentally sensitive areas	50	46
Expanding bus, light rail, public transit systems	51	40
Building a high-speed passenger rail system from San Diego to San Francisco through the Central Valley	49	46
Encouraging job centers to develop near existing housing	44	39
Increasing freeway capacity	39	35
Restricting development to existing suburban and urban areas	34	33
Establishing growth boundaries for future development	35	32

Source: Public Policy Institute of California, Special Survey of the Great Valley, Great Valley Center web site

Support of Government

Trust in government to appropriately address problems is a critical factor in gaining public support for difficult and often controversial land use and transportation actions. Table 12 indicates that the Central Valley has a notably higher distrust of government than residents of Los Angeles, the Bay Area or Orange County/Inland Empire. The three questions in Table 12 were asked in sequence, and respondents may have had a federal government bias after the first question. For the San Joaquin Valley, the questions in Table 13 specifically address performance of city and county government. The small percentage of people that rate their city and county government as having excellent problem solving abilities and the majority that rank problem solving as either fair or poor raise significant concerns.

Table 12

Government Distrust By Region

	Los Angeles	San Francisco Bay Area	Central Valley	Orange/ Inland
Trust Federal Government				
Always or most of time	41%	34%	24%	34%
Only sometimes	56%	61%	71%	62%
Never	3%	4%	4%	4%
Don’t know	0	1%	1%	0
Government Wastes Money				
Wastes a lot	59%	61%	72%	66%
Wastes some	34%	32%	25%	30%
Doesn’t waste much	6%	5%	3%	4%
Don’t know	1%	2%	0	0
How government is run				
Few big interests	62%	74%	78%	69%
Benefit of all people	32%	20%	15%	28%
Don’t know	6%	6%	7%	3%

Source: Mark Baldassare, California in the New Millennium, page 165

Table 13

"How would you rate the performance of your city government in solving problems in your city or community?"

	North San Joaquin	South San Joaquin
Excellent	6%	6%
Good	33	32
Fair	35	39
Poor	17	16
Don't know, don't live in a city	9	7

"How would you rate the performance of county government in solving problems in your county?"

	North San Joaquin	South San Joaquin
Excellent	4%	4%
Good	37	38
Fair	41	41
Poor	11	13
Don’t know	7	4

Source: Public Policy Institute of California, Special Survey of the Great Valley, Great Valley Center web site

Public Perceptions—Fresno County

Fresno County is one of three San Joaquin Valley counties that have enacted a local one-half cent sales tax to fund transportation improvements. The tax was approved by the voters in 1986. Revenue from the tax has been instrumental in completing a variety of freeway projects and related major capacity improvements. Completion of these projects has resulted in the Fresno/Clovis area having substantial freeway capacity. Freeways tend to function with available capacity during peak periods. Congestion in the Fresno area focuses on surface streets leading to and from the freeways and streets in areas that are not well served by the freeway system.

In 1999, the Council of Fresno County Governments hired Fairbank, Maslin, Maullin & Associates to conduct a survey of 800 likely voters and 77 community leaders. The survey was desiged to identify attitudes toward transportation needs and priorities in the County and the level of public and community leader support for extension of the sales tax. The surveys were undertaken in December 1999 and January 2000.

The following findings and conclusions are taken from a February 2000 report prepared for the Fresno COG by Fairbank, Maslin, Maullin & Associates.

- Fifty-four percent of voters and 68 percent of community leaders believe that transportation problems have stayed the same or improved during the past five years. When looking to the next five years, 45 percent of voters and 64 percent of community leaders say that transportation conditions will get worse.
- For voters, the three most important transportation problems facing Fresno County were:1) lack of public transportation (29 percent overall and 31 percent in Fresno; 2) road repairs and expansion (22 percent overall and 26 percent in Fresno); 3) traffic congestion (14 percent overall and 16 percent in Fresno). For community leaders, the three most important transportation problems were: 1) lack of public transportation (29 percent overall and 28 percent in Fresno; 2) lack of an east-west freeway system (13 percent overall and 21 percent from leaders living outside of Fresno and Clovis; and 3) traffic congestion (13 percent overall and 20 percent in Clovis).
- When asked a series of either/or questions, 78 percent of voters want to see money spent on repairing and improving existing streets versus 18 percent on expanding and building new streets. 58 percent of voters would favor spending money on city and county streets rather than on busses, bike lanes and pedestrian walkways. When asked if more money should be spent on city streets or on rural roads, 51 percent of voters and 32 percent of community leaders favored city streets.
- 48 percent of voters and 58 percent of community leaders say that things in Fresno County are going in the right direction. 27 percent of voters say that things are seriously off track in Fresno County. Specific concerns of voters are identified in Table 14. Note that loss of farmland and rush hour traffic congestion receive similar rankings and unplanned growth and development receives a slightly lower ranking but 57 percent of voters rank it as an extremely or very serious problem.

- When asked about the believability of various organizations or people, Caltrans (29 percent very believable/44 percent somewhat believable) ranked slightly higher than city transportation staff (27%/42%) and higher than County transportation staff (19%/49%).

Table 14
How Serious Are Each of the Following issues (Voter Survey)

Issue	Extremely Serious	Very Serious	Somewhat Serious	Not Serious
Drugs, gangs and juvenile violence	39%	36%	22%	2%
High cost/lack of air service	37%	25%	16%	7%
Air pollution, smog	34%	35%	20%	8%
Loss of farmland	32%	31%	17%	10%
Traffic congestion during rush hour	32%	29%	21%	14%
Unplanned growth and development	28%	29%	21%	16%
Crime	27%	29%	32%	11%
Quality of local public schools	26%	27%	17%	21%
Lack of synchronized traffic signals	23%	26%	24%	23%
Lack of economic development	20%	25%	31%	16%

Source: Fairbank, Maslin, Maullin & Associates, A Survey of Fresno County Voters and Community Leader Attitudes and Opinions Concerning Transportation Needs and Funding Options, Conducted for The Council of Fresno County Governments, page 7.

Appendix II

The Framework for Land Use and Transportation Planning in the San Joaquin Valley

Land use and transportation planning occur in the context of various local conditions. Understanding those conditions is critical for any individual or agency that wants to influence how planning occurs. This chapter, which is based on both interviews and review of written reports, identifies key factors and forces influencing planning in the San Joaquin Valley (SJV). The last section identifies five issues that any agency attempting to influence the land use and transportation planning process should be especially sensitive to when addressing local land use issues in the SJV.

Four Key Factors Establishing the Framework For Planning

The nature of land use planning, including planning for transportation facilities, is intricately related to and impacted by a variety of physical, social, economic and political factors. The combination of factors can vary significantly from area to area and within larger areas.

While the San Joaquin Valley has some common features, including one air basin and Air District, there are notable differences from San Joaquin County in the north to Kern County in the south. Most people living in the SJV do not identify themselves as San Joaquin Valley residents but relate more to their city and/or their county. Appendix I identifies differences between the North San Joaquin Valley (San Joaquin, Stanislaus and Merced counties), the Central San Joaquin Valley (Madera, Fresno, Tulare and Kings counties) and the Southern San
Joaquin Valley (Kern County) were identified. The following brief review identifies primarily SJV wide factors that significantly influence the planning process.

<u>Geographic and Environmental Factors</u>

The major geographic feature of the San Joaquin Valley is a broad expanse of flat land, much of which is classified as prime agricultural land. Settlers to the SJV, arriving for the most part after statehood was achieved in 1848, were impressed and at times overwhelmed by the fertility of the soil. One hundred and fifty years later, that fertility is still in great evidence as attested to by the amount and value of agricultural production generated within the SJV (see Appendix I). Flat land is also the easiest to build on and convert to towns and cities. The tension between retention of prime agricultural land and the tendency of development to spill out onto that land is ongoing within the SJV, and it is an increasingly major factor in shaping the planning process.

Broad expanses of flat land result in the accumulations of water, and wetlands are another significant feature of the SJV. In the 1850s Lake Tulare, a large fresh water lake located south of the headwaters of the San Joaquin River on land that is now primarily in Kings County, was a major feature. Colton's 1855 state map identifies a wide area on either side of the San Joaquin River (from Merced south to the headwaters and continuing south around Lake Tulare and on to what is now Buena Vista Lake in Kern County) as land

having "Tules covered with a growth of rushes and subject to overflow." Most of this land, with the exception of wildlife refuges, has been drained, but it remains flat and environmentally sensitive. In the northern SJV, the San Joaquin River enters the Sacramento River Delta in an area having extensive low lying land either inundated, subject to periodic flooding, or protected by dikes.

A significant public concern in the SJV is the general loss of the SJV's historic physical appearance. For example, the restoration of the San Joaquin River has strong public support and, where the River's route is part of a city, the River offers opportunities to create upgraded and more livable environments.

The SJV is bounded by the Sierra Nevada Mountains to the east and coast range hills to the west, and this forms a 250 mile long pocket of land that traps airborne impurities. Air quality in the SJV is impacted by air pollution generated in the SJV as well as air contaminants from the San Francisco Bay Area and Sacramento area that are carried by winds. As described in more detail in Appendix A, the SJV has a serious air pollution problem that threatens to trigger penalties under federal and state air quality regulations.

The first towns created in the Valley followed the route of the railroad. Bakersfield, Visalia, Fresno, Merced, Modesto and any number of smaller communities are located along the railroad line. Currently, the railroad serves a vital freight carrying function, but it also divides communities and is a frustrating barrier to street traffic. The original major roadway through the SJV followed the railroad and today is California State Route 99. The other major north/south roadway is Interstate 5 running along the west side of the Valley. Routes 99 and 5 present very different land use planning issues. State Route 99 carries substantial traffic within the SJV and is a significant physical factor in planning for numerous communities both in terms of its physical presence within urban areas and its potential for opening agricultural land to urban development. Interstate 5 goes through open land and directly serves few towns. If development were to occur along Interstate 5, it would often impact prime agricultural land.

Economic Factors

As noted in Appendix A, the San Joaquin Valley's economy is significantly tied to agriculture. A large scale agricultural economy has significant numbers of field and other workers that earn low to very low wages and face periods of unemployment. Household income levels are significantly lower in the Valley than in California's large coastal urban areas. The economy is one reason housing prices are much lower in the SJV than typically found in the coastal areas.

The combination of poverty and low housing prices has numerous impacts on land use planning. Most Californians would prefer to live in a single family detached house, and the barriers to that type of housing for middle and upper income households, are lower in the SJV than in the Bay Area or Los Angeles. The Valley's low housing prices also have the effect, in some areas, of encouraging developers to pursue higher density single family housing (i.e. 5 to 7 units per acre). The infrastructure costs associated with new housing (e.g. roads, sewer lines, water mains) can be shared by more units. Lowering the infrastructure costs per unit of new housing can be an important factor in keeping the price of new housing within the range of what can be afforded by typical buyers.

The northern San Joaquin Valley (San Joaquin, Stanislaus and portions of Merced County) is experiencing substantial residential development pressure from the spill over of Bay Area employees looking for single family housing they can afford. While northern SJV housing prices are lower than typical Bay Area prices, they are considerably higher than house prices in the central and southern SJV. In Kern County, there are initial indications of residential purchases by employees from the Los Angeles area, but the impact on the housing market is, at this time, small. Over time, there will undoubtedly be greater impacts for the expanding Los Angeles area. For much of the SJV, the impact of the San Francisco and Los Angeles areas is primarily as an object lesson on the mistakes SJV residents want to avoid as their communities continue to experience population growth.

A shared desire for most SJV residents is to have more economic development. Jobs are desired because of the high unemployment levels and, in some areas, to provide alternatives to commuting to the Bay Area. The attractiveness of economic growth substantially influences the planning process by often making it difficult for communities to withstand the pressure to change plans to accommodate economic development. Another impact of the desire for economic development is an emphasis on downtown redevelopment and rejuvenation in many communities.

A final economic factor is the perception of quality of life, especially by those living outside the San Joaquin Valley. Most SJV residents highly regard their communities, but there is concern that in state and national rankings of desirable places to live, the SJV ranks quite low. Poverty, the hot dry summers, foggy winters and dust are among the negative factors that are cited. Quality of life has a substantial impact on planning by making improving the physical environment through better land use planning a high priority for many business groups. Chambers of Commerce and Business Councils are often among the leaders advocating more and better land use and transportation planning. They are at the forefront because they see the need to facilitate the creation of high quality attractive environments in which people will want to live and work. Such environments will benefit their economic interests as well as influence those outside the SJV who make decisions on the location and relocation of businesses.

Traffic

In most of California's large urban areas, a major force for land use planning is the impact of traffic congestion. Morning commute periods that extend from before 6:00 to after 9:00 a.m., and afternoon commute periods that start by 3:30 and don't end until 7:00 p.m. or later, are a fact of life in the Bay Area and Los Angeles. Freeways, expressways and local streets can all be substantially congested. Weekend traffic in some places is as bad as weekday traffic, and the use of metering lights for expressway access on Saturdays and Sundays is becoming more common.

The San Joaquin Valley has a different traffic situation than the Bay Area or Los Angeles. Most of the SJV has relatively light commute period traffic with localized pockets of congestion. San Joaquin and Stanislaus counties have the impact of commuters entering and leaving the Bay Area as well as more localized congestion than the central and southern SJV. However, as noted in Appendix I, most people do not find

the commute difficult, even in the north SJV. This is not to say that some SJV residents do not have congestion complaints, but those complaints come from an environment that has fewer actual congestion problems than in California's large urban areas. Further, appropriate planning can focus on retaining existing good levels of traffic service rather than trying to solve problems than often have, at best, limited solutions.

The Fresno/Clovis area has both a high quality freeway system financed in part through a local sales tax enacted in 1986 and concerns with how the area will handle projected growth. Discussions of land use and transportation planning issues such as a Foothill Expressway or an east-west connector, need to involve representatives from Fresno and Clovis as well as Fresno and Madera counties. The Fresno area is also impacted by two rail lines that are both an obstacle to surface travel and a physical blight that impedes redevelopment of nearby areas. Rail line consolidation is an issue in the area. In recent years there appears to have been little concentrated effort to resolve this issue. However, there is an existing rail consolidation process. The Fresno County Council of Governments is updating a 1993 rail consolidation report and there is a citizens rail consolidation advocacy group. The citizens group and Madera County are part of the project team working on the update.

Concerns regarding State Route 99 (SR 99) tend to focus on the impact of interregional truck traffic as well as on pockets of local commute congestion. SR 99 carries considerable truck traffic. A growing concern being studied by Caltrans is the ability to keep pace with the need for truck parking, stops and rest areas.

The amount of traffic on Interstate 5 is generally not a local concern, but the usability of connecting routes from the Interstate to local communities is an issue because road conditions can impact economic activity. Also, there are some concerns that urban growth could occur along the connecting routes and consume prime agricultural land.

City and Town Development Pattern

The San Joaquin Valley's cities and towns are marked by a feature that is very different from the San Francisco and Los Angeles areas. Many communities are completely or nearly isolated from other developed areas, and they are often surrounded by large areas of open and usually agricultural land. This is not the case with Fresno and Clovis, but even there, two major urban entities (cities of Fresno and Clovis) and two county governments (Fresno and Madera with significant future growth likely to be in Madera County) effectively control much of the existing and future urban environment. This is in stark contrast to the over one hundred municipalities in the Bay Area or the even larger number in the Los Angeles area. The physical separation between SJV communities gives residents and governments a greater sense that they can control their environment. Also, because of the relatively smaller size of the urban areas, the impacts of new development are much more apparent to the community than is often the case in larger urban clusters. Thus the opportunities for addressing growth issues are probably better than in areas with numerous jurisdictions and much larger populations.

Eight Key Forces Shaping Local Planning

Discussions with San Joaquin Valley residents and others knowledgeable about the SJV, as well as review of SJV planning documents, identify eight important forces that, in varying ways, significantly shape, or in the future will shape, land use planning in the SJV. These forces are:

- The Business Community;
- The Farm Community;
- Political Conservatism;
- Dislike and fear of San Francisco and Los Angeles Growth Patterns;
- Increasing Environmental Concerns;
- The Great Valley Center and the Local Government Commission;
- The lack of a multi-county land use planning body; and
- Emerging Ballot Box Planning.

As noted before, significant elements of the business community have a strong interest in promoting creation of quality living, working, shopping and recreation environments. The Fresno Business Council and the Building Industry Association of the San Joaquin Valley (i.e. the home builders) along with the Fresno Chamber of Commerce are key participants in the Growth Alternatives Alliance. The Alliance is significantly influencing planning in the Fresno metropolitan area. The Bakersfield Chamber of Commerce is the primary instigator of the Bakersfield Vision 2020 process. Downtown revitalization efforts are underway in numerous communities and are usually led by business groups. There is a growing sense in the SJV that effective land use planning is good for business, and that effective planning includes a combination of sustainable, smart and livable development concepts.

The farm community is very concerned about the loss of prime farm land to development. The American Farmland Trust is a major factor in promoting compact growth and infill development. The Fresno County Farm Bureau is a key supporter of the Growth Alternatives Alliance. Strongly worded policies to preserve prime agricultural land are features of every county general plan and are part of most city general plans. In 1996, a group of farmers, ranchers and representatives of agricultural organizations formed the Agricultural Task Force for Resource Conservation and Economic Growth in the Central Valley. Their report, available on the Great Valley web site or directly at www.cfbf.com/agexec.htm, contains a strong call for urban development policies that "encourage city-centered growth at more efficient densities" as a key part of a strategy to protect the agricultural economy.

The San Joaquin Valley is politically conservative. In the 2000 presidential election, the Valley voted 42% for Gore and over 54% for Bush, almost the opposite of the overall state vote. Four Valley counties had less than a 40% vote for Gore (Madera, Kings, Tulare and Kern). Marc Baldassare's California poll (Appendix I) found that significantly more voters in the SJV call themselves conservative than in San Francisco or Los Angeles. As was noted in Appendix I, SJV residents tend to have a higher level of distrust of government than other Californians. The political conservatism has a strong property rights component that may influence the specific types of land use controls acceptable in the SJV.

Interviews in the SJV often included the statement that "we don't want to become another Los Angeles" (or Bay Area). The negative visual and emotional impact of the State's two largest urban areas is substantial for the SJV. Many SJV residents want to avoid development that is patterned after the large coastal urban areas and are increasingly receptive to land use and transportation planning policies that try to achieve that result.

There are indications in the San Joaquin Valley of increasing concerns for impacts of current and future activities on environmental quality. In the Northern SJV, house buyers with previous living experience in the Bay Area often have a significant sensitivity for environmental concerns. Protection of prime agricultural land has both a physical and quality of life perspective that encourages urban limit lines and other techniques to preserve land from urban development. Air quality is a major problem in the SJV and raises public sensitivity to environmental issues. Widespread fear of future growth that emulates what has happened in the Los Angeles and San Francisco areas carries with it an environmental protection component. At the same time, there is notable concern about the high unemployment rate and support for economic development. Economic issues will influence environmental protection attitudes and there will be opportunities for environmental protection/business community partnerships.

Two nonprofit organizations are having a noticeable impact on the perception of planning issues in the San Joaquin Valley. The Great Valley Center, located in Modesto, provides a wide range of programs and grants directed toward land use issues. The Local Government Commission (LGC), located in Sacramento, has supported numerous planning efforts. The LGC's visioning program has stimulated some jurisdictions to undertake major overhauls of General Plans and others to start a downtown revitalization process. Both of these organizations have generated notable change in the last 5 to 10 years and are laying the groundwork for stronger community planning programs.

All eight San Joaquin Valley counties have their own councils or associations of governments that serve as the regional transportation planning agencies (RTPAs) for the SJV. These agencies focus on obtaining transportation funding and responding to Air District issues. The only region-wide agency with any involvement with transportation issues is the San Joaquin Valley Unified Air Pollution Control District. Each of the RTPAs serves the local governments in their county, and the local governments do not want them to become land use planning agencies. The lack of a governmental agency with a regional land use perspective impedes coordinated attention to land use issues. While a few of the people interviewed in the SJV expressed a desire for a regional land use planning agency, the great majority noted that such an agency is not wanted by local governments, and the potential to create an agency was effectively nonexistent.

A factor that has become prevalent in the Bay Area and Los Angeles is citizens taking planning issues to the ballot box. Urban limit lines, planning and growth policies and specific development proposals are being placed on the ballot. This trend is emerging in the northern San Joaquin Valley in areas like the City of Tracy. The trend will probably spread, perhaps slowly because of political conservatism and the need for economic development, to other parts of the Valley.

Land Use and Transportation Planning in the San Joaquin Valley

Efforts to promote multi-jurisdictional consideration of land use and transportation planning must be very sensitive to local issues and concerns. Following are five issues that are especially important factors for to consider. The issues are derived from this Chapter, interviews conducted with San Joaquin Valley representatives and Appendix I.

The San Joaquin Valley is Not a Unified Region

While the San Joaquin Valley has some common concerns, including air pollution, protection of prime agricultural land and the function of major transportation facilities that transverse the SJValley, there is little sense of the SJV as a region. The northern three counties have different issues than the central four counties, and both areas are different than Kern County.

The San Joaquin Valley's Eight Regional Transportation Planning Agencies

The Valley has eight county-based regional transportation planning agencies (RTPAs). There is no region wide public sector organization interested in land use and transportation planning other than the Air District. With the exception of the quarterly meetings of the Directors of the eight RTPAs with Air District and Caltrans, there is no framework for a coordinated San Joaquin Valley response to land use and transportation issues. To move the quarterly meetings beyond a primary focus on air quality, transportation funding and multi-county transportation project issues to broader land use and transportation concerns will require careful discussion. Most, if not all, of the cities that make up the membership of the Agencies are opposed to having the Agencies exercise any notable land use review and planning role. The primary function of each RTPA is to prepare a cooperative, continuous and comprehensive transportation plan and program as well as coordinate and facilitate the receipt and disbursement of transportation funds. There is little support for any type of multi-county planning organization and essentially no politically effective support for a San Joaquin Valley-wide planning organization similar to the region wide organizations in the Bay Area, Los Angeles and San Diego.

An important role that each RTPA can play is to serve as a forum for city and county representatives to develop the partnership. Frequent and full communication is very important to help build trust and allow cities and counties to voice concerns. Local agencies must be given a strong sense that any intention to encourage broader review of land use and transportation issues includes not usurping the authority of local governments.

The Role of Medium and Smaller Sized Jurisdictions

Fresno is the only city in the San Joaquin Valley with a population over 400,000, and there are only three other cities (Bakersfield, Modesto and Stockton) with a population over 100,000. Fifty eight jurisdictions have less than 100,000 people, and of these, forty four have less than 25,000 people. Most jurisdictions are also stand alone communities rather than members of a larger urban area. Local planning programs have limited resources that are primarily oriented to the development review process rather than longer range General Plans and studies. At the same time, cities have the primary responsibility

for conducting their land use and transportation planning and coordinating with other cities on issues of mutual interest and concern.

The combination of smaller cities, limited resources and relative isolation strengthens the need to treat each jurisdiction as a distinct entity with its own values, needs and approaches to planning issues. Many smaller jurisdictions need basic traffic engineering and trip generation and evaluation tools rather than more sophisticated help. Further, it should not be assumed that local staff have a good working knowledge of land use and transportation planning tools that might be of the most value to them. Finally, transportation planning should be placed in the larger context of needed land use planning resources. It is recommended that in Phase II a consultant be retained to undertake a technical needs assessment in consultation with each jurisdiction's staff. This process would serve to both educate local staff and identify the specific needs and planning tools that are most appropriate.

Protection of Prime Agricultural Land

A primary planning feature of the San Joaquin Valley is the need for and value of protecting prime farm land from urban use. Any involvement with land use planning in the SJV needs to focus on this factor. The roles of the Farm Bureau and the American Farmland Trust are central to local longer term land use planning, and representatives of these organizations are valuable supporters of compact growth. An important transportation issue that impacts prime agricultural land is the routing of the proposed high speed rail line. While the Draft Environmental Review (DEIR) for this project is not yet available, potential routes are likely to impact a significant amount of prime agricultural land. Caltrans should consult with the Directors of the San Joaquin Valley Regional Transportation Planning Agencies to discuss how the review of the DEIR can be coordinated.

Local Transit and Other Non-Highway Planning

In nearly all of the San Joaquin Valley, for the foreseeable future the primary role of local transit providers will be to provide service to the transit dependent population rather than to serve as an alternative to the automobile commute. In unusual areas, shuttle buses may serve a commute function, but for the vast majority of commuters, transit will be unable to come close to matching the speed and convenience of commuting by automobile. Significantly increased parking costs could encourage drivers to take transit, but the likelihood of imposing high parking charges is very low. In the immediate future, planning goals should include retaining route options that might be of value for future transit service.

Pedestrian and bicycling alternatives to commuting usually receive less attention from transportation planners than warranted. Compact mixed use developments can provide opportunities for people to live both close to their employment and close to commercial and other services and activities. Offering pleasant pedestrian environments, bicycle lanes, bicycle access to transit vehicles and bicycle paths connecting neighborhoods with employment, other commercial areas and public facilities such as schools and parks should become part of the basic transportation planning of each jurisdiction.

Opportunities may exist for beneficial use of Intelligent Transportation System (ITS) technologies to provide highway driving condition information to drivers as well as city, county and Caltrans traffic managers. It is unlikely, given limited local resources and the relatively short high volume commute period, for any agency other than Caltrans, through a program initiated by Headquarters staff, to initiate evaluation and use of ITS.

Appendix III

The Emergence of Planning Partnerships and Collaborative Planning

Emerging interest in sustainable, smart and livable growth concepts is reviewed in Appendix IV. Effective implementation of sustainable, smart and livable growth concepts involves a strong citizen participation element and the creation of partnerships among various participants in the planning process.

Partnerships in the planning and decision making process function at two interrelated levels: involvement of the public and citizen groups (i.e. citizens) and involvement of governmental agencies. What has emerged over the past four decades is a strong expectation on the part of citizens, both individuals and groups, that they have a right and will be involved in governmental decision making that effects them. For local government, greater emphasis on the development of general plans through processes that involve affected partners is critical to identify and implement the communities planning goals and policies.

What has emerged in the 1990s for transportation decision making is that federal and state legislation has resulted in far more decisions on what projects to fund and construct being made at the local level (i.e. cities and counties). This shift of funding decision making results in Caltrans having significantly less authority over the future of the state's transportation network. Thus Caltrans has to work with local agencies in new ways that recognize the shift in decision making authority.

Stakeholder Participation and Demand Management

There are many ways citizens and other stakeholders (or "interest groups") do and must participate in making the decisions and implementing the land use and transportation policies and programs. In the San Joaquin Valley, the interest and involvement of local citizens, by the very nature of their emphasis on changing local environments, has resulted in the emergence of livable communities, sustainable communities, and smart growth concepts. The more that people realize that a land use decision will impact a part of the community close to them, the greater the level of citizen interest and involvement. Sprawl may be viewed as something happening "on the edge" and not directly relevant but compact growth, downtown revitalization, infill and mixed use developments and new transit corridors, to give a few examples of sustainable, smart and livable growth concepts, tend to generate substantial community interest and involvement.

Many major land use and transportation planning projects are designed with intensive involvement by community members and other stakeholders. Sometimes called community-based planning, such processes allow all concerned citizens and businesses to get directly involved in considering the often complex trade-offs at every stage of the facility planning and design process.

Once the community's attention has been raised, the engagement into the planning process must be user friendly. The conditions for successful implementation of

controversial, large scale collaborative planning efforts generally involve several key factors:

- Demystification – Project involvement in planning and implementation should be user friendly. People want to talk about issues that affect their life in a language that makes sense to them.
- Democratization – Those people who have the greatest stake in the future of their community should be directly involved in the decision making process.
- Deprofessionalization – Professionals are partners in the planning process, but the community members both directly and through organizations and agencies that represent them, are major contributors in decision making.
- Decentralization – Decision making is shared between government agencies with implementation authority, community building organizations and residents.

Community-based planning may be used for general plan updates, urban service area expansions, annexations, major or specific area plans, redevelopment plans, neighborhood or neighborhood business district plans, transportation corridor and facility plans, or even subdivision or shopping center designs.

Such community-based planning efforts have major advantages beyond merely getting projects past the stumbling blocks of ballot initiatives or litigation. Many highly desirable developments from the point of view of smart, sustainable, livable communities are politically difficult (dense development in transit station areas in developed neighborhoods, for example, whether as infill or redevelopment projects). Developers and financing sources frequently decline to initiate such projects because they expect long and difficult timelines, large planning and other up front expenses, and a high probability of project failure.

Proactive community-based planning, particularly when matched by proactive government initiated and funded traffic and infrastructure capacity studies and master EIRs, can change this equation dramatically. Land owners and developers, if approached by planners who can provide reliable assurances of neighborhood and government approval of projects with shortened planning timelines and reduced up front planning and procedural expenses, may see such projects as attractive marketplace opportunities rather than as likely money losers. In this way, community-based planning can work hand-in-hand with the marketplace and with real-world consumer preferences to help make smart growth possible, affordable, and attractive. Unless it is affordable and attractive, it will not gain consumer acceptance.

Considering majority views, strongly held minority opinions, and the multiple avenues of recourse available to citizens, it is fair to say that many of the largest projects (both buildings and infrastructure) on the ground today could not have been built in today's legal, institutional, and political environment.

Because citizens and governmental agencies have so many powers and so many ways to make their influence felt, most governmental managers today regard processes to consult with and involve "stakeholders" in planning and project design decision making as quite literally the only way to bring a major project to fruition.

The roles of citizens are more important than ever before for several reasons that extend well beyond the potential for advocates to block specific projects.

A combination of constraints (physical, environmental, financial, legal, political) make it expensive, difficult, and sometimes impossible to meet growing public appetites for governmental facilities and services exclusively by increasing the supply. This is true across the board -- for energy, water, solid waste disposal, wastewater treatment, safety and health services, transportation facilities and services, and more.

These constraints have given birth to the "demand management" approach, in which a multitude of policies and programs are crafted to constrain growth in demand and/or to find multiple (and less expensive) ways to meet that demand. Thus we see energy and water conservation and recycling, solid waste recycling, pollution prevention, spare-the-air days, crime and fire prevention and wellness, transportation demand management and multi-modal approaches to transportation, and so on.

The demand management approach has many implications for citizen participation. While expanding the supply of facilities and services requires little of citizens beyond opening their checkbooks, demand management frequently involves active attention, conscious efforts, and changes in behavior. Conservation and recycling don't happen by themselves. Crime and fire prevention and wellness programs require individual and neighborhood participation, and transportation alternatives such as ridesharing, biking, or walking require citizen efforts.

In short, the new world of governance is really a partnership between government agencies and between government agencies and individual, organizational, and corporate citizens in which all affected parties must be actively engaged and do their respective parts for the whole to work properly. Government cannot take public cooperation and participation for granted, or command it by dictate. Persuasion, involvement, and winning support are now much more important than ever before.

Collaboration with the citizens who are the most vocal or politically active is inadequate. Effective outreach to minority groups is a serious consideration because it is the means to gain knowledge about the broadest spectrum of potential stakeholders. Outreach must be geared toward eliciting responses and active participation from target populations that are in need of services. These processes extend to racial, political, social-economic and social minorities. In the San Joaquin Valley, as described in Appendix I, there are substantial numbers of low income people and minority households. Gaining their involvement in the land use and transportation planning and decision making process is critical to eventual success.

The shift in thinking and approach described above is having powerful impacts on how our communities address transportation, mobility, and accessibility needs. It has become common to hear experts say "we can't build our way out of the problem."

Many factors have come together to make the construction of new roadways simply not feasible as our primary transportation strategy. Limited rights of way, adjacent developments, relocation expenses, environmental laws, limitations on taxing and bonding authority, threats of lawsuits, and simple political opposition have made it

impossible to build sufficient lane miles of new roads to meet the growth in demand flowing from both population growth and the lengthening of trips. Pubic support for construction of major new roadways has declined. With increasing support for transit and other changes from a highway-oriented perspective, it is not surprising that less than one-third of the respondents to the Great Valley Center's survey gave an extremely effective ranking to the idea of improving the Valley's quality of life by building more freeways.

In response, transportation planners have created alternative (or supplemental) strategies. These strategies include transportation demand management, transportation systems management, intelligent transportation systems, multi-modal approaches, land use changes to shorten trips and make biking and walking possible for more trips, land use changes to increase transit ridership and lower the level of subsidies needed, telecommuting, and more.

Transportation planners are realizing that people want convenient access (accessibility) to where they need to be more than they want additional lane miles of roadway to allow them to drive longer distances to get there. As a result, transportation planners now plan to increase both mobility and accessibility. Sustainable, smart and livable growth concepts are all oriented to finding ways to increase accessibility with less emphasis on building highway capacity.

All of this means that citizens have many active roles and responsibilities in meeting their transportation needs, and citizen participation in the many decisions and program planning and implementation efforts is indispensable.

To sum it up, the paradigm of governance has shifted from a perspective of top down decision making and following directions to a model of community and agency involvement and joint problem solving. In no area of public facilities and services is this shift more dramatic than in transportation.

Appendix IV

The San Joaquin Valley's Emerging Interest in Sustainable, Smart and Livable Growth

In the San Joaquin Valley (SJV) during the past five to ten years, there has been a pronounced increase of interest in the concepts of sustainable communities, smart growth and livable communities. However, the terms are often not precisely defined and tend to be used somewhat interchangeably. What they signify is a desire for having land use development occur in a more attractive and compact way and fear that the SJV's growth in the next decades will mirror what has already happened in the Los Angeles and San Francisco areas.

The interest in sustainable, smart and livable growth has been sparked by a variety of factors. Representatives of the agricultural community have increasingly expressed concern about the loss of prime agricultural land if historic and current sprawl patterns of growth continue. Business community representatives have identified quality of life concerns with traditional growth patterns and have increasingly supported community efforts to change land development policies and regulations. The San Joaquin Valley Business Industry Association, representing home builders, has actively supported efforts in Fresno County to adopt sustainable, smart and livable growth concepts. Citizen and community groups have increasingly voiced concern about continuation of traditional suburban growth patterns and supported finding alternative growth policies that increase the livability of their communities. The combined support of agriculture, business, home builders and community organizations is creating a mix of political support for change in planning policies and regulations that is quite different from what is found in either the Los Angeles or San Francisco Bay areas. These local efforts are being facilitated by programs funded by the Great Valley Center and the Local Government Commission.

What is Sustainable, Smart and Livable Growth?

Sustainable communities, livable communities, and smart growth all involve new ways of thinking about and managing the growth and development of communities and regions. While these terms are distinct, they nevertheless share in common many broad concepts, policies, and practices intended to achieve economic, environmental and social benefits simultaneously.

These terms all involve an effort to reconcile three historically opposing forces:

- growth and development as advocated by business leaders,
- environmental quality as advocated by environmental and neighborhood activists, and
- social and economic justice as advocated by champions for the poor and disadvantaged.

While there is widespread agreement in principle that business, environmental, and social objectives can all be served by many of the same public and private policies and practices, there remain differences of perspective and priority on the detail level. These

differences can make trying to get agreement on specific definitions of these terms difficult or even counterproductive. Thus this study has combined the terms in an effort to reflect the use of the terms in the San Joaquin Valley. However, general definitions are helpful in differentiating the concepts.

Livable Communities: This term often refers to qualities encountered on a daily basis. A livable community has clean air and water, is walkable and facilitates other non-auto modes of transportation, has quality parks, libraries, schools, and other community facilities, promotes affordable housing and lower taxes, is clean and safe, and so on.

While including in the minds of most people many of the features of smart growth and sustainable communities as described below, the term tends to be more local and more here-and-now in orientation and priorities. It gives more emphasis to neighborhood and quality of life issues such as schools, parks, urban beautification, litter and graffiti removal. In the San Joaquin Valley, there is a growing downtown revitalization effort as well as advocacy for compact growth that combines livable and smart growth perspectives.

Smart Growth: This term involves being thoughtful and deliberate (smart) about where growth is channeled and how it is shaped to accomplish community goals. Smart growth steers development to areas with existing or planned infrastructure. It balances jobs, housing, and other development types, and it promotes affordable housing. Within developing areas, compact, mixed-use, and pedestrian- and bicycle-friendly and transit-oriented development is encouraged. Incentives are established to enhance investment, regulatory barriers are lowered, and state and local funding is used to improve infrastructure. Outward development is controlled, leapfrog development is prevented, and open space is protected both at the edges and inside the area permitted for development.

It is most often emphasized in communities either currently experiencing or expecting to experience significant amounts of growth or redevelopment. Smart growth programs are developed to serve the needs and desires of particular communities, and incorporate locally selected objectives and priorities. Citizen or "stakeholder" participation usually has an important role in program development. Specific local programs may be summed up as intended to make the community livable, sustainable, healthy, clean, or some other term.

Smart growth has little to do with the rate of growth. Often, smart growth is more beneficial if it comes quickly. And slow growth does not guarantee avoidance of growth-related problems.

Sustainable Communities: The term sustainable communities usually is intended to include most things meant by the terms livable communities or smart growth. It is distinct in that it often includes an explicitly global ("think globally, act locally") and long-term dimension ("...without compromising the ability of future generations to meet their own needs"). It tends to involve a more explicit view of the community as an important part of the larger world within which it functions -- seeing the community as both having responsibility as a "global citizen" and as being significantly impacted by what happens on a global long-term basis.

Opinion and Attitude Barriers To New Growth and Development Concepts

Some of the barriers to new growth management approaches -- to smart, sustainable, livable development -- are primarily based upon misconceptions about what practices and policies these ideas represent, or about the outcomes being pursued, or both. These types of barriers may be addressed by a combination of education, careful use of terms, and extensive stakeholder involvement. These methods will be discussed more fully in the next section on Overcoming the Barriers to Change.

Barriers which may be overcome by public education and involvement include:

- Lack of understanding of the meaning of the new growth management concepts

  Such issues may sometimes be resolved by developing clearer and more specific descriptions of the new approaches. Sometimes they may be resolved by distinguishing the new approaches more clearly from various political or ideological agendas. Both proponents and opponents of these new growth management concepts sometimes blend them with other ideas or agendas of their own, and then wind up differing about issues that are not inherent to the core concepts of the new growth management approaches. Thus achieving a general understanding of the meaning of terms and concepts is an important early step in the planning process.

- Lack of agreement about who gets to decide what

  Various stakeholders in any community are sometimes fearful that practices or costs will be forced upon them and/or their decision making authority will be compromised. This fear may be compounded by the perception that some advocates are pursuing hidden agendas. One area where this issue is important is the interaction of different levels of government, especially in the decision making on land use issues. Local governments strongly guard their decision making authority, and attempts by special districts or regional, state or national bodies to become involved are very often perceived as unwarranted intrusions. Such fears may sometimes be resolved by full and ongoing participation in shaping new plans, policies, and programs by all parties with a stake in the outcome. If these new planning concepts are in reality beneficial to economic, environmental, and social interests, it should be possible through participatory processes to develop widely shared and genuine agreement about what course to follow.

- Lack of factual knowledge

  Misconceptions may sometimes be corrected by the development and communication of objective factual information. What follows is an illustrative list of some of the more common and important misconceptions about the smart, sustainable, livable approaches to planning. The section on Overcoming Barriers will lay out the benefits of new approaches to planning in a way that addresses many of the issues outlined below.

    - The problems or threats described by the advocates of a new approach to planning are greatly exaggerated, and sometimes the cures being advocated would be more costly than the problems.

- The advocates for change have not given enough consideration to maintaining our economic and property rights and personal freedoms.

- The new planning approach would force people to live in higher density communities and to use transit, when in fact people want and have a right to the American dream of suburban detached homes and cars.

- There isn't a market for the kind of housing the new planning approaches call for building.

- These new planning approaches will bring more crime, congestion, and social problems into our neighborhoods and into our kids' schools.

- These new planning approaches will reduce our economic prosperity. They will harm the economic competitiveness of our community in attracting new businesses.

- These new approaches will restrict the upward mobility of the poor and minorities by restricting economic growth.

- Government today can't afford to do all these new things. In order to do an adequate job in providing basic public services, we need to avoid expanding the role of government.

- All of these new government planning programs will just increase the cost of housing.

Objective Barriers To Change

All of the barriers to smart, sustainable, livable development aren't just opinions and attitudes. The list below illustrates some of the more significant barriers to planning smart, sustainable, livable communities. Policies and actions to overcome the barriers described below will be discussed in the section on Overcoming Barriers to Change.

- The existing structure of taxes and fees creates many incentives that work against smart, sustainable, livable development. Counties and larger metropolitan regions are governed and taxed by a variety of local agencies. In this highly fragmented setting, the existing tax and fee structure sets up competition for revenue generating new development in which what is good for each local agency can be bad for the region as a whole. This revenue competition is called "the fiscalization of land use" and numerous San Joaquin Valley representatives cited this as a fundamental problem for planning in the SJV.

- In many areas, local, state and federal funding is still used to subsidize the costs of sprawl.

- Governmental fragmentation, both horizontally (many small local governments and special agencies) and vertically (many layers of government), makes it very difficult to communicate and coordinate related development decisions (e.g. land use, transportation facilities and services, other infrastructure facilities and services, schools, etc.).

- Small governments may not have the funding or professional capacities to exercise their decision making with the benefit of sophisticated information and analysis tools. In the San Joaquin Valley, which is governed by many small or medium size governments, this problem is compounded by the difficulty of sharing and aggregating information to permit meaningful analysis of processes that operate on a larger geographic scale.

- Even within individual governments, the fragmentation of development-related functions between different departments with different goals, responsibilities, and constituencies often makes creating a coherent policy direction difficult. In terms of smart, sustainable, livable development, departments such as transportation, energy, water resources, economic development, housing, utility regulation, health, and more should, to be most effective, all adopt policies and programs which together send clear signals and create consistent incentives.

- In many communities, existing plans, policies, codes, and development review and approval practices make it more difficult, expensive, and risky for builders to undertake smart, sustainable, livable developments than to build according to past practices.

- Existing development dilutes the benefits of smart, sustainable, livable growth policies. In many areas, existing development may present enormous barriers to reshaping a community to support transit, for example. It is generally much more difficult, expensive, and lengthy to reshape and retrofit a community to support transportation alternatives or to reflect other characteristics of smart, sustainable, livable development than it would have been to build the community that way in the first place. The Fresno survey that identified substantial support for expansion of transit. However, development of significantly increased transit ridership in Fresno will have to contend with the existing development pattern that generally does not concentrate potential transit users in locations that can be efficiently served.

- Many businesses have invested their money in ways that assumed the continuation of auto oriented transportation, or the continuation of other elements of a traditional community development pattern. The owners of these “sunk” or potentially “stranded” investments will resist their being made prematurely obsolete by smart, sustainable livable land use or transportation policies.

Overcoming the Barriers to Change

This section on overcoming the barriers to change is presented in three parts:

- Communicating the Benefits of Change -- addressing what were defined in the last section as opinion and attitude barriers to change.

- New Approaches in Governance and Service Delivery -- describing process methods of dealing with both attitudinal and objective issues.

- Changing the Fiscal Impacts of Land Use on Local Government and Planning -- addressing financial incentives and disincentives

Communicating the Benefits of Change

Nothing prompts resistance to an idea like the expectation that it is to be forced upon one. The transition to a smart, sustainable, livable future cannot be forced on an unwilling public and, without great opposition, on an unwilling governmental agency.

Much more important than any given line of argumentation (the content of an educational program) is reliance on the strategy of voluntary participation. A core concept of sustainability is that economic, environmental, and social equity benefits can be achieved simultaneously with a common set of policies. If this is the starting point for developing policies and programs, then it follows that there should be a basis in enlightened self interest for selling those policies to a broad cross section of the public.

An essential prerequisite for crafting new policies and programs and for communicating their benefits is acceptance that change will only occur if it reflects the wishes of a large majority of society -- or of any given community. If those doing the communicating truly accept this premise, they will be far less threatening and the resistance to considering the merits of their ideas will be reduced.

Most advocates for a new approach to planning believe that aligning market forces to support that new approach is critical. Economic analysis has demonstrated that sprawling patterns of sub-urbanization are in part a product of enormous subsidies that have distorted the market. Individual and business choices have been made in the context of these subsidies.

A voluntary transition to a smart, sustainable, livable future -- a transition that is based upon the free choices of individuals and businesses -- will depend upon individuals and businesses receiving accurate and complete price information upon which to base future choices. Or, said another way, you cannot usually sell a product when your competition can sell their product below its true cost.

It follows from this that an education strategy will not likely be very successful unless reforms removing or reducing subsidies for sprawl (as well as removing or reducing the other objective barriers to change) are also successful.

Many of the objections posed by opponents of change are based on the fear that change will be unpleasant and costly, and thus that it will of necessity have to be forced upon communities. An exhaustive treatment of the benefits of change is beyond the scope of

this study, but the points summarized below should serve to illustrate the concepts involved.

1. Many people want to live in the physical environments that smart, sustainable, livable development advocates want to build.

Advocates point out that attractive and desirable single family housing can be built with somewhat smaller lots thus saving land and increasing the viability of transit.

Not everyone wants to live in a detached single family house. Facilitating attractively designed and located housing alternatives to typical sprawl development, whether for the young, the empty nest adults or the elderly, responds to the market.

Mixed use neighborhoods can reduce vehicle use without reliance on transit by providing people with services that are within walking distance. Studies have shown that mixed use neighborhoods often generate notably fewer vehicle trips than low density single family neighborhoods.

Peter Calthorpe, one of the leading advocates of a new way of planning growth, noted in the Background Report for *Designs for Air Quality*, a compilation of recommended development standards and techniques prepared for the San Joaquin Valley Unified Air Pollution Control District, that:

> "Existing low density development and dispersed employment sites (within the San Joaquin Valley) make effective transit systems very difficult to develop. For this reason, the *Designs for Air Quality* emphasizes walkable neighborhoods that capture internal trips for the short term and promote incremental improvements in transit for the long term.
>
> "...changing demographics in the Valley support changes in development patterns and designs. Low cost housing and efficient public transportation will be needed by many people. As the baby boom generation grows older, it may seek less maintenance intensive housing located in neighborhoods where it is not necessary to drive to obtain all of life's necessities. The design concepts shown in the guidelines seem ideal to fill these market niches while still meeting the expectations of other people wanting suburban housing.
>
> "*Designs for Air Quality* illustrates a new vision of the suburban dream. The designs reduce many of the problems created by conventional development, but still provide the single-family homes and quiet neighborhoods people want along with new housing options that meet changing needs. The designs provide a more efficient use of land and avoid many of the negatives that have been associated with multi-family homes."

2. There is a robust market for the types of housing called for by advocates of smart, sustainable, livable development.

Various market studies as well as the actual marketing experience of developers demonstrate that in many areas "smart" developments are also smart investments.

While many home buyers still want single family detached large lot homes, many others want homes that are nearer where they work, nearer recreation opportunities, nearer transit services, easier to maintain, or are sized to account for children having grown up and departed. Smart, sustainable, livable developments provide a broader range of housing choices, and in so doing may actually increase the percentage of the total population who can find what they most desire in the marketplace.

3. Higher density infill and/or redevelopment projects can often improve neighborhoods, stabilize social conditions, allow for the improvement of public facilities, and improve property values.

In many neighborhoods, developable infill and/or redevelopment sites involve vacant lots or developed parcels with structures that are old, in poor condition, abandoned or underutilized, or otherwise blighted. Some infill or redevelopment candidate sites are old shopping centers. Some are "brownfield" sites that contain contamination from previous urban uses. Many represent problems that drag down neighborhoods that are as a whole in pretty good condition. Studies have shown that the presence of such properties in a neighborhood can begin or reinforce a cycle of disinvestment and flight from which the entire neighborhood suffers.

Modern well designed higher density projects are often architecturally attractive and contain significant landscaping and open space. Housing projects may include neighborhood-serving commercial facilities that address needs not currently being met. Within limits established by project economics, infill development may permit the improvement of adjacent streets, parks, or other public facilities. Infill developments that are designed to provide increased connections between residents, visitors and the public right-of-way can reduce crime and increase public perceptions of community safety. Neighbors of such projects are often pleasantly surprised -- not only by their attractiveness, but also by the subsequent stabilization or improvement of property values.

4. Constraining outward sprawling growth will be good for the business climate, protect agricultural land, and foster the development of the more affordable housing needed for economic and social health.

Many business leaders in the San Joaquin Valley, including various chambers of commerce, the Fresno Business Council and the San Joaquin Valley Building Industry Association, have concluded that affordable housing, less traffic congestion, and preserving the quality of life in communities are all critical for the San Joaquin Valley. This is an important consideration for both retaining businesses and attracting new employers.

Housing will be more affordable if it makes efficient use of land and infrastructure. Congestion will be reduced by locating housing closer to jobs and other trip destinations, and by taking full advantage of all modes of transportation. Quality of life will be preserved by reducing congestion, reducing related air and water pollution, and preserving greenspace.

All of these benefits to the business climate will be fostered by a pattern of development that promotes infilling and reduces sprawling development.

5. "Smart" growth will be good for lower income groups and minorities.

Focusing on growth being compact including some higher densities means building economically integrated neighborhoods, it means improving urban schools, it means ensuring safe neighborhoods and streets in older areas, and it means not concentrating all of the undesirable land uses in older areas. All of this, plus a much larger supply of affordable housing, should substantially improve the quality of life for lower income groups and minorities.

6. "Smart" growth and other measures to promote sustainable and livable communities will generally be good for the fiscal health of local governments.

Outward sprawling development often requires large new expenditures, both for capital facilities and for ongoing public services. These costs are not usually covered completely by the taxes and fees generated by such new development. Instead, some costs must be paid by existing residents. In an era when local government revenues are often insufficient to maintain the desired quality of facilities and services for residents, such subsides add further strain to local government budgets.

In contrast, infill development often makes use of the underutilized capacity of existing streets, storm drains, sewers, water systems, schools, and so on. Per unit capital costs are thus lowered. Service costs for infill developments may also be lower as a result of the reduced size of the urbanized area that must be served.

Changing the Fiscal Impacts of Land Use on Local Governments

The fiscalization of land use results from laws and governmental decisions that establish the fiscal structure for local governments and create incentives to plan land uses to increase governmental revenues and reduce governmental costs. Land uses which have an excess of governmental revenues over costs tend to be considered more favorably, while those with costs in excess of revenues are looked upon with less favor.

Where taxing authority is fragmented within a single "transportation shed," these incentives often result in imbalanced land uses. Local governments in a position to do so may grab the lion's share of fiscal winners, while other governments in the same area are left with the balancing uses (like the majority of housing developments) that yield costs in excess of revenues. The consequences of such imbalances often include increased housing costs, increased infrastructure costs, increased congestion, and lengthened trips (and thus greater air and water pollution).

Appeals to "do the right thing" in spite of incentives to the contrary are usually ineffective. Even if some local governments respond to such appeals, some do not and continue to degrade transportation conditions for everyone.

Many of the changes in tax policies and regulations have to be addressed at the state and federal level. However, there are important actions that can be taken within the San Joaquin Valley by local jurisdictions.

The more important changes that would have a significant impact on transportation and land use decisions by consumers, businesses, and governments include:

1. Regional tax sharing requirements, new and stable revenue sources, or changes in tax rates that would as a whole remove the fiscal incentive for imbalanced land uses. There are mechanisms and approaches to accomplish this that do not need changes in state or federal laws. Counties in the San Joaquin Valley currently make far greater use of tax sharing agreements than in the state's larger urban areas. These agreements, which link approval of annexations to sharing of tax revenues, while often disliked by local jurisdictions, are better than County policies that facilitate growth in unincorporated areas.

2. Creation of facilitating mechanisms through which adjoining local agencies, special districts, and regional, state and federal agencies could coordinate their related land use, infrastructure, and service provision decisions to make a coherent whole. An example is policy B-1-a in the Draft City of Fresno 2020 General Plan. The Policy is to "Pursue a coordinated Regional Land Use and Transportation Program with the City of Clovis, Fresno and Madera Counties, and other cities" with specific areas of interest identified.

3. Where local governments cannot afford the technical means required to plan and coordinate integrated land use and transportation decisions, technical and financial assistance could be provided by state and federal agencies. Recommended Actions #4 through #11 in the White Paper for the San Joaquin Valley Growth Response Study identify some types of technical and financial assistance that government agencies involved with the San Joaquin Valley's land use and transportation planning could pursue.

4. Changes in planning codes and practices (and related state requirements or the enforcement thereof) to reduce single use zoning and provide for multi-use land use planning controls and reduce or limit large lot only zoning. A major effort currently underway in Fresno County focuses on combining local, state and private foundation funding to translate the planning and development concepts in The Growth Alternatives Alliance's A Landscape of Choice into model general plan language and development regulations. The outcome of this effort may well provide both the process and product models for use in other parts of the San Joaquin Valley.

5. New planning processes to reduce the risks and disincentives for developers to attempt "smart" growth projects. These include master EIRs, master infrastructure and area development plans, proactive neighborhood planning, and related methods that would together provide developers with much faster and much less uncertain development approval decisions.

Appendix V

The State of Planning in the San Joaquin Valley

Land use and transportation planning in the San Joaquin Valley (SJV) has and continues to focus on the actions of cities and counties. Marked by strong support for private property rights, cities and counties have followed the traditional California practice of focusing growth on outward expanding predominantly single family development.
Freeway planning, especially in the Fresno/Clovis metropolitan area, has kept pace with growth to the point where there is relatively little commute period congestion and traffic problems tend to focus on specific local streets and intersections.

In the past ten years, change has begun to emerge in how local jurisdictions think about land use planning. There is growing interest in and support for greater regulation of land. The use of sustainable, smart and livable growth terminology has become widespread. This chapter describes the linkage between land use and transportation planning and then describes San Joaquin Valley planning activities that reflect the changing thinking occurring in the SJV. However, the activities fit within a planning and regulatory environment in which there is a need for both basic planning programs and more complex integrated land use and transportation planning.

The Transportation and Land Use Linkage

A widespread planning problem in the San Joaquin Valley and elsewhere is that transportation planning is done as a reaction to a proposed land use pattern. The primary purpose is to identify what transportation actions are needed to facilitate implementation of the proposed land uses. Thus there is little, if any, investigation of transportation alternatives and the impacts of alternative land use policies and actions. For areas with reasonably complex land use patterns and/or expected to have substantial growth (e.g., Fresno/Clovis, Bakersfield, Stockton, Modesto, and other rapidly growing areas in Stanislaus and San Joaquin counties as well as the Los Banos area of Merced County), the planning process should approach land use/transportation issues in one of two ways. One alternative is to assess multiple land use and transportation plans to evaluate the benefits and problems associated with each. A second alternative is an iterative process in which land use and transportation alternatives are evaluated, adjusted and then reevaluated. These processes are more time consuming and expensive but provide better results than the common practice of transportation planning following the land use decision making process.

Three major interrelated problems confront the San Joaquin Valley and the rest of California. First, a typical suburban growth pattern results in relatively low density single family areas. These areas are separated from commercial, recreation and public facilities by distances that result in higher vehicle use and higher vehicle miles traveled per household than is the case in traditionally developed areas that have a closer mixing of land uses, denser single family areas, and some multi-family uses. Second, in general, California's funding for transportation capacity improvements has not kept pace with

demand, and there is little if any likelihood that it will keep up with future growth in demand for highway facilities. Fresno/Clovis and much of the SJV are different than the large coastal urban areas in that there is greater freeway and other roadway capacity available for future growth. However, in the longer term, that capacity will be used up, and increasing congestion will become an ongoing factor for the SJV. Third, environmental and political constraints, along with funding limitations, make building more roadways or widening existing roadways difficult in many cases and all but impossible in some situations.

In the past decade, a major trend in land use and transportation planning has been to look for ways to reduce urban sprawl, more efficiently use transportation facilities and systems and enhance livability of communities. Five basic strategies to address these issues are:

1. Compact and balanced communities;
2. Greater mix and intensity of land uses;
3. An integrated transportation system;
4. Pedestrian development standards; and
5. Incentives to reduce driving (including bicycle use).

"Making Better Communities by Linking Land Use and Transportation," published by the Association of Bay Area Governments, identifies numerous actions (see Appendix II) that can be employed to carry out the basic strategies. Some of these actions are beginning to appear in San Joaquin Valley cities. Examples are cited later in this chapter.

While not all of the actions cited in Appendix II will be applicable to all SJV cities and towns, the table can serve as a check list in undertaking land use and transportation planning. While traffic and transit modeling is a critical plan preparation activity, the details of integrating land use and transportation planning to reduce vehicle trips and facilitate alternatives to the automobile are also important.

San Joaquin Valley Planning Activities

The historic approach to land use regulation in the San Joaquin Valley (SJV) has been consistent with much of the rest of California and the United States. Strong support for private property rights and limited governmental resources have led to relatively minimal efforts to shape growth patterns outside of where the private property market directed growth. Since the end of World War II, most outward expansion has been single family residential with related commercial services and employment areas. Nearly all development has been oriented to automobile access and the availability of transit service has declined. Both urban expansion and the creation of large "rural residential" lots (e.g. one to five acre parcels) served by septic tanks rather than sanitary sewer service have resulted in the loss of substantial amounts of agricultural. For the larger Central Valley, the American Farmland Trust estimates that 15,000 acres of farmland is converted each year to residential and commercial uses. The University of California estimates that cropland shrank by 500,000 acres from 1978 to 1992. A significant amount of the lost cropland has occurred and continues to occur in the San Joaquin Valley portion of the Central Valley.

In the 1990s, significant change in the San Joaquin Valley's land use planning environment began to occur. There is growing interest in and support for stronger

planning and regulation of land use growth and development. This change has been triggered by the farming community's concern for the amount of lost cropland, the business community's concerns for the economic and quality of life impacts of sprawl development, and overall community concerns regarding the overall quality of life and fear that the Valley will follow the examples of the Los Angeles and San Francisco Bay Areas.

The change from traditional planning approaches is a process that has just begun. Downtown areas are being revitalized, creation of rural large lot subdivisions is being discouraged and compact growth is being encouraged. The primary focus, as described below, has been on specific planning issues. Revisions of general plans is beginning to occur (e.g. Fresno County, cities of Fresno, Escalon, Modesto, Merced) but most jurisdictions still have to confront the broader community wide implications of the growing support for alternatives to traditional sprawl development. A good test of translating these general sentiments into general plans will occur when the City of Bakersfield and Kern County undertake their general plan updates. Both jurisdictions have delayed their planning processes and will not start until the Chamber of Commerce initiated Bakersfield Vision 2020 process is completed in 2001.

The next decade will be critical in determining whether the support exists for a significant change in how communities grow or more traditional sprawl will accommodate the projected increases in population. Policies are easier to enact than specific regulations. Development, especially when jobs are at stake, is easier to approve than deny. Higher density infill development is easier to deny, especially when neighbors are opposed, than to approve.

Sustainable, smart and livable growth terminology is present in land use discussions in many jurisdictions, but it is not clear if the primary motivation is managing sprawl or the preservation of prime agricultural land. If urban growth can occur in areas that are not prime agricultural land, will that growth be the traditional sprawl pattern or will it use sustainable, smart and livable growth concepts? A key part of the decision making process is the need in nearly all communities for economic development. Sustainable, smart and livable growth offers the opportunity to address the need for economic development with planning that minimizes the amount of rural land converted to urban use. While in the past decade the public consciousness of land use and sprawl issues has grown, the next decade will require confronting critical land use planning decisions that are more difficult than supporting downtown revitalization.

The areas with the least planning activity are Kings and Madera Counties. Both counties are predominantly rural with low populations. Madera County has two incorporated cities (Madera and Chowchilla) that contain less than 50 percent of the County population. Involvement of Madera County with the cities of Fresno and Clovis and Fresno County is important because of Madera County's location adjacent to the Fresno/Clovis urban area and the need to address existing and future growth and transportation issues in Madera County that impact the greater Fresno/Clovis area.

The fact that so many enlightened policies are being adopted is very encouraging. However, it is important to note that most jurisdictions do not have the resources to undertake the type and level of land use and transportation planning that would be

desirable given the growth forecasts. Many smaller jurisdictions are trying to function with the use of a planning consultant that can provide, because of budget constraints, very limited time during the month. Many cities and towns are also limited because the planning budget is tied to development fees. Longer range planning gets the left over funds and the occasional grant. Also, many small jurisdictions have very limited resources for grant writing and administration. Examples were cited during interviews of jurisdictions using a successful application previously submitted by a nearby city to try for funds in a later year and finding out that funding programs and priorities had changed. There were also situations where a city, trying to achieve what a neighbor had done, adopted a neighbor's ordinance without understanding some of its' implications.

The Local Government Commission stated in their Fall 1999 San Joaquin Valley Livable Places NEWS that "while sprawl is still the dominant pattern of growth in the Valley, the leadership, vision, and models for better development are all there." Following are examples of some of the positive land use planning activities occurring in the SJV. This selection of local actions is meant to show what has begun to happen. However, as noted earlier, the need for both basic planning and more complex integrated land use and transportation planning is evident and needs to be addressed.

Visioning the Future

Spurred by the Local Government Commission, numerous communities in the San Joaquin Valley have gone through a visioning process. Based on research work done by Anton Nelessen, one form of this process uses public meetings in which people react to pictures of a variety of community environments and identify what types of environment they prefer. What usually comes out of this process is a general agreement that many of the features of typical sprawl development are undesirable, and more traditional city environments are ranked as the "good places" to live in. Some visioning processes have focused on a particular area, often a community's downtown. Other visioning exercises have focused on general community growth and planning issues. Many of the downtown revitalization efforts described later in this chapter were triggered by visioning exercises and processes.

Two broader community visioning processes have occurred in the City of Bakersfield and Stanislaus County. These processes have used surveys and community meetings to develop a vision for the future of an area. The product of the visioning exercise can then be used in amending existing land use plans or developing new general plans.

In Stanislaus County, the eight cities and the County established a process under which community leaders from each community developed a Cities/County Vision document. The document was then sent to each household to obtain reactions to the preliminary vision statements. Final visions were agreed on in the Fall of 2000, and each city and the County will pursue review and acceptance of the vision document. The vision places a strong emphasis on communities that "will plan, grow and evolve in a compact, efficient fashion. Large expanses of agricultural land and other open space will secure buffers between urban areas …" Compact urban development is seen as encouraging "redevelopment of blighted areas, 'in fill' development of vacant and underutilized land, and a variety of affordable housing." The County should not only have a good system of

roads but a countywide public transit system and bicycle and pedestrian paths that both link neighborhoods and form a regional network. The potential for fiscally-based land use decisions to disrupt land use planning is recognized, and the vision includes developing "a method for distributing tax revenues that will encourage good land use decisions."

The City of Bakersfield and Kern County are correctly regarded as having a very strong growth orientation. In the late 1990s, the Bakersfield Chamber of Commerce identified the need for a vision for future growth of the Bakersfield area. The Chamber, after an initial effort, concluded that to be effective, the development of a shared community vision needed to involve all parts of the community and be an extensive undertaking. A separate non-profit organization, Greater Bakersfield Vision 2020, was established and $25,000 was obtained from the Great Valley Center. From September 1999 through January 2000, more than 12,500 residents participated in identification of the community's strengths and weaknesses. Community meetings, high school based area meetings, small area meetings and surveys were used to involve people in the assessment process. Among Bakersfield's eighteen major strengths, relatively light traffic, short commutes and wide roads were identified. Downtown revitalization was also on the list. The list of sixteen major weaknesses included urban sprawl and leapfrog development, specific congested areas, inadequate road maintenance and lack of adequate cooperation between the City of Bakersfield and Kern County regarding the location of new development and urban services.

In 2000, the strengths and weaknesses evolved into specific vision statements including "a community with a clear set of development and land use policies that encourage infill development while discouraging urban sprawl and leapfrog development into prime agricultural lands." Leapfrog development was a major force in triggering the visioning process, and in late 2000, Kern County approved an ordinance requiring a sanitary sewer connection for any new development in the unincorporated area. This action was a major change in County policy and resulted from the visioning process. Also, both the City of Bakersfield and Kern County have delayed starting major updates of their General Plans. There is a sense that the delay is to allow the visioning process to be completed with the release in early 2001 of action plans for each vision.

Compact Growth Policies

Numerous areas have either adopted or are in the process of considering adoption of policies to achieve compact growth. The City of Oakdale adopted the "Oakdale Principles," a set of development policies that emphasizes a compact, walkable city with a revitalized downtown. The Oakdale General Plan designates nine areas for new development, and any proposed development must submit a specific plan that addresses the Principles.

The City of Escalon adopted a General Plan that calls for compact growth and places strict limits on outward growth. The City also adopted a 20,000 square foot cap on retail development to both encourage development in their downtown and discourage big box retailers.

In 1990, the City of Modesto adopted the Village One Specific Plan covering an area of almost 1800 acres in the northeast portion of Modesto's Urban Area. The Plan focuses on development of a pedestrian oriented village having 7000 to 8000 dwelling units, a 220 acre business park and related facilities. The Plan has been amended numerous times, and some of the original pedestrian intent has been weakened. However, the plan is still a major effort to direct growth in ways that reduce traffic and achieve greater use of land than traditional sprawl.

The City of Fresno has recently completed a Draft 2000 Fresno General Plan. The Plan calls for accommodating an increase during the next twenty years in Fresno's population from 420,000 to 785,000 people without expanding the urban service area. In part, this policy approach is related to conflicts with Fresno County over the sharing of tax revenues in areas to be added to Fresno's urban service area and annexed. The Plan's policies attempt to "minimize outward geographic expansion by increasing the intensity and efficiency of urban areas." The Growth Alternatives Alliance's guiding principles, policies and strategies are incorporated into the Plan. Multiple activity centers, mixed use development, and a mid- and high-rise corridor are identified in the Plan. If adopted (the Plan is currently under City Council review) and implemented, the Plan will result in substantial changes to Fresno's development patterns.

Fresno County's new General Plan will situate over 90 percent of new growth in existing cities as part of a policy to preserve farmland. As discussed below, the willingness of counties to approve unincorporated residential uses, often in the form of large lot rural residential subdivisions, has been a major land use problem in various parts of the Valley.

The City of Reedley has adopted a Specific Plan to guide growth on portions of the City's fringe areas. The Plan responds to five challenges identified by the Planning Commission and City Council after substantial public involvement. The challenges include:

- Preserving and protecting farmland;
- Preserving and protecting air quality;
- Building a strong sense of community and livability in new neighborhoods;
- Conserving energy; and
- Fostering development that accommodates and encourages alternative forms of transportation like walking and bicycling.

The City of Merced Vision 2015 General Plan incorporates a strong emphasis on developing in an Urban Village pattern that involves mixed use as well as pedestrian and transit friendly features. "The goal is to build an environmentally and economically 'sustainable' city. A sustainable city is a city designed, constructed, and operated to efficiently use land and other natural resources, minimize waste, and manage and conserve resources for the use of present and future generations." Most new growth will be in the form of single family development, but it will integrate "housing, shops, work places, schools, parks and civic facilities." The Plan's ten Guiding Principles include a strong emphasis on facilitating pedestrian and bicycle use and public transit.

Downtown Revitalization

The Local Government Commission estimates that over one-half of the cities in the San Joaquin Valley are pursuing downtown revitalization efforts. These efforts have a variety of goals, including economic development, agricultural protection and finding housing sites within established communities.

The City of Turlock responded to the need to expand City Hall by moving it back into the downtown in a renovated historic building. The City and the Turlock Downtown Association jointly have pursued a program for downtown streetscape, parking and utility improvements.

Stockton's Downtown Alliance and the City have pursued a program to encourage housing in the downtown as well as evening and weekend activities. Nearby, the City of Lodi has undertaken a major downtown renovation effort based on a Downtown Master Plan and Central City Revitalization Project that was approved by the voters in 1996. $3,000,000 has been invested in a multi-modal transit center. Over 35 new, relocated or expanded businesses as well as senior housing have sparked a major rejuvenation of their downtown. Along with Stockton and Lodi, downtown housing efforts are being pursued in Modesto, Lindsey, Newman, Fresno, Visalia, Woodlake, Clovis, Kerman and Dinuba.

In the City of Bakersfield, the Kern County School District moved their offices downtown and then built a new downtown elementary school. The school location decision was based on both the availability of underutilized land and the goal of providing an opportunity for people working in the downtown to have a school close to their work location. Downtown businesses have become involved in supporting classrooms. The school has been very successful and has a long waiting list.

It is important to note that compact growth and downtown revitalization are complimentary polices. If communities are going to have less outward growth, then making better use of existing areas is critical. Downtown areas offer opportunities to provide not only the commercial services that the expanding residential population needs but housing locations to accommodate some of the increased population.

Restrictions on Rural Residential Large Lot Development

A major land use planning problem in various parts of the San Joaquin Valley has been the willingness of county governments to approve large lot rural residential subdivisions. These areas usually have lots in the two and one-half to five acre range. Often these subdivisions have been located in areas that cities would, in the future, logically expand into. The subdivisions are difficult to provide with urban services, difficult to incorporate into a city fabric, use up substantial land for small amounts of housing and facilitate leapfrog development because cities find it necessary to bypass these areas when expanding to accommodate new growth. Approval of these subdivisions is often based on the view that property owners have a right to develop their land. Without access to sanitary sewer and water systems, the need for septic tanks and water wells necessitates the large lot size. Purchasers of these lots often want to maintain a rural environment with horses and open area, but the lots are too small to effectively use for agriculture.

In the past year, Fresno and Kern counties have adopted land use policies to not approve more of these types of subdivisions. Fresno County included this issue as a policy in

their new General Plan. Kern County adopted a policy of not approving developments that are not served by sanitary sewer. The test of these policies will come when property owners, many of whom are long time residents, bring proposals to the County Board that, under the policies, should be denied.

The Growth Alternatives Alliance/ "A Landscape of Choice"

As described earlier in this Study, a very important feature of the San Joaquin Valley is the extent that agricultural and business groups are taking the lead in defining and advocating land use and transportation planning approaches. The American Farmland Trust, the Farm Bureau and other farming advocates have a critical role in the advocacy of planning. In the Fresno area, the Farmland Trust, Fresno County Farm Bureau, Fresno Chamber of Commerce and the Building Industry Association of the San Joaquin Valley issued a letter in July 1996 calling for adoption of policies that would facilitate compact growth and infill development. In January 1997, the Fresno Business Council joined these groups in forming the Growth Alternatives Alliance. The Alliance's primary objective was to create a vision for growth in Fresno County. Subsequent discussions resulted in identification of three guiding principles:

1. Utilize urban land as efficiently as possible;
2. Develop livable communities that emphasize pedestrian or transit-oriented design; and
3. Recognize the importance of agriculture and the need to protect productive farmland.

In April, 1998, the Alliance published "A Landscape of Choice: Strategies for Improving Patterns of Community Growth." The report identifies various actions needed to meet the three guiding principles. Compact urban growth and infill of existing urban areas are the keys in the vision for Fresno County growth. Fresno County and each municipal jurisdiction in the County subsequently adopted the principles contained in "A landscape of Choice." The next step is to have local planning documents reflect this vision. The recently adopted Fresno County General Plan shifts County policy to have nearly all new growth occur within municipal boundaries. The City of Fresno Draft General Plan reflects key elements of compact urban growth and pedestrian and transit oriented development as spelled out in "A Landscape of Choice." The City of Reedley's planning, including preparation of a major specific plan, also reflects the Alliance's compact growth policies.

San Joaquin Valley Unified Air Pollution Control District

In October, 1994, the San Joaquin Valley Unified Air Pollution Control District adopted "Air Quality Guidelines for General Plans." The Guidelines encourage adoption of local policies for compact pedestrian and transit oriented growth as a major air pollution control strategy. In May 1997, the District adopted guidelines for new development authored by Calthorpe & Associates, a major new urbanist planning consultancy. The Guidelines contain detailed suggestions for compact growth that fit within the sustainable, smart and livable development format. The ability of the District to do more than advocate is quite limited. The District suffers from the problem of being distrusted by local agency representatives who have concerns regarding any land use planning or enforcement roles for a non-local agency. The major impact of the District's Guidelines

has been in raising ideas and encouraging some local agencies and private sector organizations to pursue further evaluations of the concepts.

Creating Transportation Options in the San Joaquin Valley Through Improved Land Use Patterns

An important contribution being made by the Air District is facilitating the funding of a Transportation and Community Systems Preservation (TCSP) grant through which the Growth Alternatives Alliance and the Local Government Commission, in cooperation with the cities of Fresno and Reedley, are developing model zoning ordinances and design standards to implement "A Landscape of Choice." The effort involves not only $230,000 of TCSP funding but $175,000 from the David and Lucile Packard Foundation, $30,000 from the American Farmland Trust, $150,000 from the City of Reedley and $8,600 from the District.

The model ordinances to be developed in Phase I will address:

- Amending zoning ordinances to allow moderate increases in density to facilitate pedestrian and transit use;
- Developing pedestrian and transit oriented design guidelines;
- Revising local street standards to make streets narrower and more pedestrian friendly;
- Developing mixed use zoning standards;
- Promoting downtown or village centers; and
- Identifying developer incentives to encourage infill development.

Draft ordinances and guidelines will be available in 2001 for review by local agencies.

The intent of Phase II is to provide targeted assistance to implement the Phase I strategies in one large city (City of Fresno) and one small city (City of Reedley). For the City of Fresno, the emphasis will be on development of a mixed use zone district including identification of a suitable area and preparation of Zoning Ordinance text amendments. Phase II will carry the local review process through the preparation of ordinances and environmental review documents and City Council consideration of the Zoning Ordinance amendments. The Phase II emphasis in the City of Reedley will be on the preparation of a Specific Plan for a 1,100 acre area. The Specific Plan will include land use and transportation elemente and incorporate the planning principles from Phase I.

Phase III involves, through the Local Government Commission's Center for Livable Communities, disseminating the ordinances and project experiences and encouraging similar efforts at the regional, state and national levels.

Partnership for Integrated Planning: Merced County--A Model Approach

Merced County will be the focus of a joint effort by Caltrans, the United States Environmental Protection Agency (EPA), the Federal Highway Administration and the Merced County Association of Governments to address transportation planning and project development review through early coordination, cooperation and an effective environmental process. The project is one of twenty Smart Growth Index Pilot Projects being undertaken nationally. The Smart Growth Pilot Project is an effort by US EPA to

use the Smart Growth INDEX, a sketch model for simulating alternative land use and transportation scenarios and evaluating their outcomes using indicators of environmental performance. The Reference Guide for the INDEX notes that this "sketch tool… simulates land use/transportation dynamics in a simplified manner, and should not be solely relied upon for evaluating major investments…" If successful, the process could facilitate planning and major project review primarily by identifying environmental problems at an early stage of the planning process and thus allowing for better focus of resources during the project development and environmental review processes.

Summary

Effective land use planning programs are emerging in the San Joaquin Valley. However, much work needs to be done. Many communities lack the resources to undertake extensive land use and transportation planning programs. The San Joaquin Valley's larger urban areas would greatly benefit from integrated land use and transportation panning conducted as a process that considers alternative development scenarios.

The San Joaquin Valley is at a point in time where future growth can be planned to avoid the worst of the urban growth experiences of Los Angeles and the San Francisco Bay Area. However, avoiding the sprawl alternative will take aggressive local, regional and state planning and regulatory actions.

Appendix VI

Linking Land Use and Transportation---Strategies and Actions

The following table is taken from "Making Better Communities by Linking Land Use and Transportation" published by the Association of Bay Area Governments. The strategies and available actions can serve as a checklist for communities in developing and evaluating planning efforts as well as providing ideas for local land use and transportation plans and development proposals.

Strategy	Available Actions
Compact and Balanced Communities	-Establish urban growth boundaries around existing communities -Encourage the development of housing targeted to the incomes and needs of workers within the community -Identify transit corridors and activity centers and separate auto-dependent uses from them -Require specific plans to ensure coordinated planning for the development of activity centers
Greater Mix and Intensity of Land Uses	-Increase the density of housing and employment especially in activity centers -Increase the mix of uses within communities -Allow a broader range of uses within zoning districts -Encourage more on site services (e.g., day care, dry cleaning, cafes, health clubs) within employment centers and office parks -Add housing within walking distances of employment areas -Encourage infill and intensification: -second units -sale of air rights over public lands -redevelopment of vacant or underutilized lands -Direct civic uses and create public spaces in community activity centers -Discourage auto-oriented uses in pedestrian and transit oriented areas
Integrated Transportation Network	-Plan and implement a dense, interconnected network of streets and pathways: -connect key core sites -have short, regularly shaped blocks and frequent intersections -limit the use of cul-de-sacs -provide direct bus access to potential riders and

	key sites -Keep vehicle speeds low and improve safety: -traffic calming techniques -narrow vehicle ways -reduced turning radii -reduced "optical widths" of streets -reduced intersection widths -more frequent, well-marked mid-block crossings -wider, frequent sidewalks -wider inside lanes for bicyclists -eliminate "free right turn" lanes where pedestrian use if high -Provide a dense pedestrian network: -include mid-block passageways where blocks are long -provide shortcuts and alternative routes to walking along high-volume roadways -require clearly marked pedestrian paths through parking areas directly to building entrances -Establish transit routes that serve and link activity centers, with priority for transit vehicles, direct routing, and few turns -Limit freeway expansion, particularly where expansion would compete with regional transit corridors
Pedestrian-friendly Development Standards	-Orient buildings and entrances to the pedestrian network: -Encourage visually interesting building facades instead of blank walls -Encourage frequent building entrances -Encourage front porches -Reduce setbacks for both commercial and residential buildings -Locate parking areas to the rear of or, if screened, to the side of buildings -Coordinate and connect adjoining parking areas -Limit driveways crossing pedestrian areas -Locate residential garages to rear or side of lot -Provide pedestrian amenities -Provide street trees along roadways and to help mark pedestrian paths through parking lots -Use on-street parking to help separate pedestrians from moving vehicles -Provide adequate lighting and visual surveillance
Incentives to Reduce Driving	-Limit the amount of parking allowed; encourage shared parking -Reduce parking subsidies through parking cash –out programs and increase parking fees -Allow bicycles on buses and rail transit

-Require bicycle friendly facilities with new commercial and office development (bike parking, on-site showers)
-Include bicycle and pedestrian facilities in street design and reconstruction
-Establish shuttles to connect employment and shopping areas to fixed rail transit stations
-Assign local staff to manage programs that promote walking, bicycling and transit use city-wide
-Conduct public outreach or awareness programs to encourage greater use of alternative travel modes, and involve citizens in applying new development principles

Source: Association of Bay Area Governments, Making Better Communities by Linking Land Use and Transportation, 1997, pages 7 and 8.

Appendix VII

Technical Tools for Evaluation of Land-use Alternatives

Introduction

There is widespread use of computer models to evaluate transportation impacts of land-use decisions. In the past decade, considerable research has been undertaken on computer models that can evaluate a wider variety of impacts. This research continues and will undoubtedly result in more complex technical tools. Transportation continues to be the focus of most modeling efforts. The first section of this Appendix provides background on the types of transportation modeling that remain appropriate for individual development analysis and smaller area and smaller community studies.

Larger communities need tools that will allow analysis of more factors than transportation. Recently developed models can be appropriate for larger area, community wide and multi jurisdictional studies. The United States Environmental Protection Agency (EPA) published in 2000 an evaluation of 22 land-use models. Information from the EPA study makes up the bulk of the material in this Appendix. Of special note are the guidelines for selecting a model. The five step process including the evaluation criteria for choosing a model will be useful long after the specific models described in the study have been superceded by new tools.

Traditional Transportation Modeling

Transportation modeling initially developed in the mid-1900s and has undergone considerable refinement. For small cities, analysis of land-use and transportation options can focus on relatively simple technical tools referred to as "manual assignment techniques". This approach uses software that is relatively easy to use and can be used effectively by most transportation planning professionals. TRAFFIX is one of the most popular software applications for manual assignment forecasting. Manual assignment techniques are most effective in smaller jurisdictions where the street system is complete. The techniques are also used in the evaluation of individual development applications. Manual assignment techniques require the planner to input trip generation, distribution and assignment data, based on existing travel data and experience. Manual assignment techniques are less effective for larger communities where land-use patterns and the street system are complex since the software data sets can become difficult to create. Manual assignment techniques are not always effective in evaluating changes in the street or highways system since their use requires making important assumptions regarding dispersal of traffic through the street network. One advantage of the manual assignment techniques is that they do not require validation to existing counts since they add future traffic directly to the existing link and turning movement volumes. Disadvantages of manual assignment models are that they predict only automobile trips and do not account for shared or pass-by trips. Total person trips and transit trips cannot be predicted using manual assignment techniques. Manual assignment software programs are relatively inexpensive ($1,500 to $3,000) and can be run on desktop or laptop computers with enough memory capacity.

The second approach to forecast future traffic demand is the use of "gravity models." Gravity models use street characteristics, land-uses and demographic variables to predict future traffic demand. Gravity model equations must be validated against actual traffic count data and their trip distribution module must be calibrated against survey or other travel behavior data. The gravity model, if properly validated, provides results that are

most accurate on street and roadway links. Gravity models may not always produce reasonable turning movement estimates. Substantial adjustments of gravity model generated turning movements are often required. These adjustments are usually made through comparison of existing turning movement data, model-predicted link volumes under existing conditions and future forecast link volumes. Gravity models are better than manual assignment techniques when major changes to the street system need to be tested for their impact on travel patterns or when complex land-use changes make it difficult to manually predict trip distribution and assignment patterns. Gravity models can be used to predict total person trips and transit usage. They are complex and must be created and used by transportation professionals experienced with gravity models. Common gravity model software includes MINUTP, EMME 2, TP+ and Tranplan. Software license costs can vary depending on the software specifics but can exceed $7,000 to $10,000. Hardware needs and costs may also be higher with gravity model software than with manual assignment techniques. Often significant expenses are incurred in collecting the traffic data that the model needs. Gravity models are difficult to use in the evaluation of relatively small, individual development projects.

Land-use Models

By the early 1990s, more affordable and advanced computer systems, the ability to collect and use more community-related data, the growing use of geographic information systems and spreading interest on sustainable, smart and livable growth combined to encourage creation of land-use models that evaluate land-use impacts beyond traditional transportation concerns.

The United States Environmental Protection Agency (EPA) completed a study in 2000 that evaluates 22 currently available land-use models (Projecting Land-Use Change: A Summary of Models for Assessing the Effects of Community Growth and Change on Land-use Patterns; EPA/600/R-00/098). The study contains information on selecting a model appropriate for a specific situation and technical and comparison information on the 22 models (see attached exhibits). The study notes that there are other models in use but the 22 identified models are the most commonly used and cited resources. The study did not review models that focus on evaluating the environmental impact of land-use change but EPA is conducting a related study of these models (e.g., the PLACES3S model developed by the California Energy Commission that uses energy consumption as the primary impact criteria).

Attached is a list of the 22 land-use models with their developer, basic purpose and 11 comparative matrixes that address a variety of technical issues. The study also contains an extensive discussion of each model.

Information on selecting a model contains advice that will be useful even after the models available to a community have evolved well beyond the 22 models evaluated in the study. The study notes (page 6) that “Land-use change models can assist in evaluating alternative futures and potential consequences of those alternatives. With these models, the user can begin to understand the complex array of actions and interactions associated with development by projecting the conversion and loss of land that occurs as a result of development and community policies” (emphasis added). Models can be a valuable part of the land-use planning process, however, by themselves, they will not result in better decision making. Further, every model has strengths and weaknesses that constrain its use. One of the major weaknesses of many models is the lack of economic criteria to evaluate the feasibility of different land-use alternatives, especially for community and regional planning efforts.

The cost of modeling efforts varies considerably given the information needs of the model, the amount and usability of available information and the questions that are to be answered. The equipment and staffing resources also varies with many models requiring technically trained staff. The increasing affordability of computers assists in the use of models that require substantial computing power.

As a generalization, models that need less information and can be operated through typical office computers will provide more generalized and less sophisticated results. However, the use of considerable information and more complicated computer techniques does not necessarily result in a corresponding increase in the quality of results. Picking the model most appropriate for a given situation should involve careful review and planning. The objective is to minimize the potential for either starting to use a model which does not fit within budget constraints or using a model that does not answer the key questions and yields inadequate information.

The EPA study outlines a five step process that should be followed in selecting a land-use model. The steps include:

1. Understanding the Proposal

A planning process is advocated that considers alternative future land-uses for an area to evaluate the possible different impacts of pursuing a set of land-use planning policies. Clarifying the geographical boundaries of the planning study is critical. Assumptions about how to treat areas outside of the study area need to be made. Evaluation of alternatives can involve evaluating a set of scenarios or assessing one scenario and then analyzing changes to that scenario. All of the involved decision makers need to have an agreed upon understanding of the purpose of the study.

2. Asking the Right Questions

If the questions to be answered are not identified and agreed to prior to the land-use modeling work, there is considerable potential for the study to not satisfy the needs of the decision makers or take longer and cost more money to address the issues that are of greatest concern.

3. Identifying Information Needs

Based on the proposal and the questions of greatest concern, the specific information needed to effectively run a model can begin to be assessed. Jurisdictions will vary considerably in the amount and format of land-use, environmental, economic, transportation and other data used in the modeling process. If multiple jurisdictions are involved in the study, the data from communities may not be in compatible formats. Collection of new data will take time and can become a major budget item.

4. Assessing Internal Capabilities

Three key factors need to be evaluated:

- Financial resources---what size budget is acceptable and how much of the budget is a reasonable contingency. How much of the budget is committed and how much needs to be acquired from grants or other sources.
- Staff resources---how much of the work can be done by available staff versus hiring temporary staff and consultants. Tasks range from the relatively simple (e.g., collection of land-use data) to the technically complex (e.g., programming and running the computer modeling). Few jurisdictions can afford to maintain the technical staff needed to run complicated models but many other tasks can be undertaken by local staff if the staff time is available. Who will manage the

study and does management staff have the time and knowledge to carry out the assignment are also important considerations.

- Computer resources---can the study use available hardware, software and computers or will some or all of these resources have to supplied by consultants.

5. Choosing the Right Model

The EPA study identifies thirteen primary model selection criteria noting that steps 1 through 4 may result in additional criteria. The thirteen criteria should be weighted, based their the nature of the study and their level of importance to decision makers. The criteria include:

- Relevancy---Does the model provide pertinent information that meets the analytical needs of the community?
- Resources---Are the model and the computer requirements and staffing needed to support the system within the budget and the available organizational capabilities?
- Model Support---Do the model developers, or the model itself, provide sufficient support needed to understand and implement the model (e.g., model documentation, user discussion groups, training)?
- Technical Expertise---Is the technical expertise available to use, calibrate and interpret the results of the model?
- Data Requirements---Is the data necessary to run the model available or can the necessary data be obtained?
- Accuracy---Are the projections generated by the model reliable to a degree that is useful to the public and decision-makers?
- Resolution---What amount of land and what level of detail can be modeled in a single scenario?
- Temporal Capabilities---Can the model project outcomes for multiple time periods?
- Versatility---Can the model project outcomes for multiple variables (i.e., land-use, transportation, employment, housing and environmental)?
- Linkage Potential---The EPA study concludes that, "to date, no single model exists that can perform all community planning functions; it is very likely that it will be necessary to link economic, transportation and land-use models together, then visualize the results by incorporating the output into a geographic information system."
- Public Accessibility---Can the model be run in an interactive public environment and display the results in a manner that is comprehensible to the general public?
- Transferability---Can the model be applied to locations other than the one(s) for which it was developed?
- Third-Party Use---How extensively has this model been used in "real world" situations?

The five-step process may seem like a long and difficult task with the temptation to accelerate the process by selecting a model and beginning the "real work" of undertaking the study. However, the careful consideration of the issues raised in steps one through four and in depth evaluation of the capabilities of alternative models will result in a study process and result that is very likely to be more useful and acceptable to the key decision makers.

Economic /market assessment: Economic consultants use a combination of computer models and personal professional knowledge to analyze land-uses. Critical land-use questions related to the economic analysis include the economic viability and likelihood of development or redevelopment of a particular land-use; employment forecasting; economic benefits and impacts of various land-uses; the amount of financial impact from different land-uses; and setting the appropriate amount of development impact and/or special assessment fees. One of the major limitations of many land-use models is the lack of economic analysis. This is a critical problem that can lead to land-use policies unconnected to economic reality and thus unlikely to be implemented.

Just as transportation and air quality model results need to be validated by a trained professional, the outputs of economic models need to be professionally validated.

Attachment A

Land-use Change Models Included in the Environmental Protection Agency's Guide

Table 1: Land-use Change Models Included in This Guide

Model name	Developer	Purpose
California Urban Futures (CUF) Model: CUF-1	John Landis, Institute of Urban and Regional Planning, University of California at Berkeley	Provides a framework for simulating how growth and development policies might alter the location, pattern, and intensity of urban development
California Urban Futures (CUF) Model: CUF-2	John Landis, Institute of Urban and Regional Planning, University of California at Berkeley	Same as CUF-1 (CUF-2 addressed some of the theoretical holes of CUF-1)
California Urban and Biodiversity Analysis Model (CURBA)	John Landis, Institute of Urban and Regional Planning, University of California at Berkeley	Evaluates the possible effects of alternative urban growth patterns and policies on biodiversity and natural habitat quality
DELTA (formally DSCMODE)	David Simmonds Consultancy	Projects changes in urban areas, including the location of households, population, employment, and the amount of real estate development
Disaggregated Residential Allocation Model of Household Location and the Employment Allocation Model (DRAM/EMPAL)	S.H. Putman and Associates, Inc.	Projects the interactions and distribution of employment and housing in a specified geographic area
Growth Simulation Model (GSM)	Maryland Department of Planning, Baltimore, Maryland. Contact: Joe Tassone	Projects population growth and new development effects on land use/land cover under alternative land management
Index®	Criterion Planners/Engineers, Inc.	Measures the characteristics and performance of land-use plans and urban designs with "indicators" derived from community goals and policies
IRPUD Model (formally Dortmund)	Michael Wegener, Institute of Spatial Planning, University of Dortmund, Germany	Projects the impacts of long-range economic and technological change on housing, transportation, public policies, land uses, and infrastructure
Land Transformation Model (LTM)	Dr. Bryan C. Pijanowski, Michigan State University	Integrates a variety of land use change driving variables to project impact on land use on a watershed level
Land-Use Change Analysis System (LUCAS)	Michael W. Berry, et al., Department of Computer Sciences, University of Tennessee	Examines the impact of human activities on land use and the subsequent impacts on environmental and natural resource sustainability

Model name	Developer	Purpose
Markov Model of Residential Vacancy Transfer	Philip Emmi and Lena Magnusson	Explores changes in demand for various types of residential housing within a community
MEPLAN	Marcial Echenique & Partners Limited. Contact: Ian Williams	Helps communities analyze the inter- related effects of land use and transportation and is designed to compare proposed plans/policies
METROSIM	Alex Anas & Associates	Uses an economic approach forecasting interdependent effects of transportation and land use systems and of land use and transport policies
Sub-Area Allocation Model-Improved Method (SAM-IM) (formally LAM)	Planning Technologies, LLC	Creates new land use scenarios that reflect alternative development concepts for the future
The SLEUTH Model (formally Clarke Cellular Automata)	Keith C. Clarke, Department of Geography, University of California at Santa Barbara	Projects urban growth and examines how new urban areas consume surrounding land and impact the natural environment
Smart Growth INDEX®	Criterion Planners/Engineers, Inc. (with Fehr & Peers Associates, Inc.)	Evaluates transportation and land-use alternatives and assesses their impact on travel demand, land consumption, housing and employment density, and pollution emissions
Smart Places	Electric Power Research Institute (EPRI). Contact: Paul Radcliffe	Assists communities in the simulation and evaluation of land-use development and transportation alternatives using indicators of environmental performance
TRANUS	Modelistica	Analyzes the effects of land-use and transportation policies or combinations of policies on the location of various activities and the land market
Ugrow	Wilson W. Orr, Prescott College	Projects long-term changes to communities in response to changes in transportation and fiscal policies
UPLAN	Robert Johnston, Dept. of Environmental Science and Policy, University of California at Davis	Creates alternative development patterns in response to changes in development and fiscal scenarios
UrbanSim	Paul Waddell, Daniel J. Evans School of Public Affairs, University of Washington	Explores how the interactions between land use, transportation, and public policy shape a community's development trends and affect the natural environment
What if?	Dr. Richard E. Klosterman (as Community Analysis and Planning Systems, Inc)	Supports comprehensive community land-use planning in regard to determining land suitability for development, projecting future land- use demand, and providing the capability to allocate the demand to the most suitable location

Attachment B

Comparative Matrixes from the Environmental Protection Agency's Guide

Table 17: Skills / Technical expertise Comparative Matrix

Table 18: Hardware Comparative Matrix

Table 19: Software Comparative Matrix

Table 20: Cost Comparative Matrix

Table 21: Urban Land Use Categories Addressed Comparative Matrix

Table 22: Nonurban Land Use Categories Addressed Comparative Matrix

Table 23: Impacts of Community Decisions on Land Use Patterns Comparative Matrix

Table 24: Impacts of Land Use Patterns on Community Characteristics Comparative Matrix

Table 25: Model Utility and Integration Comparative Matrix

Table 26: Basic Operational Characteristics Comparative Matrix

Table 27: Spatial and Temporal Capabilities Comparative Matrix

Table 2: Skills / Technical expertise Comparative Matrix

Model name	Target User Group	Technical Expertise for Usage (1 [none] - 3 [extensive])[1]	Consultant Expertise Required?	Computer Skills for Usage (1 [general] - 3[extensive])[2]
CUF-1	Nontechnical community planning Participants	2	No	3
CUF-2	Nontechnical community planning Participants	2	No	3
CURBA	Land use planners, policy makers, and environmentalists	1	No	2
DELTA	Politicians, policy makers, planners	3	Yes	1
DRAM/EMPAL	Regional transportation and land-use planners	3	Yes	2
GSM	Land Resource Managers	2	No	2
INDEX	Community planning participants	3	Yes	2
IRPUD	Regional transportation and land-use planners, researchers	3	Yes	1
LTM	Watershed stakeholders (resource managers, landowners, planners)	3	Yes	3
LUCAS	Land resource managers	3	Yes	3
Markov	Demographers, residential planners, developers, policy makers	1	No	2
MEPLAN	Planners, transportation engineers, Economists	2	No	1
METROSIM	Planners, transportation engineers, Economists	1	Yes	1
SAM-IM	Land-use planners and forecasters	1 (but there is a learning curve/training required)	Yes	2
SLEUTH	Academic and government researchers, planners	2	No	2
Smart Growth Index	Community planning participants	2	No	2
Smart Places	Planners (land use, transportation, environmental), community groups	1	No	1

[1] No experience required; (2) land use experience; (3) land use modeling experience
[2] (1) General computer experience; (2) familiarity with specific software applications; (3) programming skills

Model name	Target User Group	Technical Expertise for Usage (1 [none] - 3 [extensive])[1]	Consultant Expertise Required?	Computer Skills for Usage (1 [general] - 3[extensive])[2]
TRANUS	Transportation and land use planners and academics	2	No	2
Ugrow	Academic and government researchers, planners, policy Makers	1	No	1
UPLAN	Nontechnical community planning Participants	2	No	2
UrbanSim	Planners (land use, transportation, environmental), community groups	2	No	1
What if?	Nontechnical community planning participants	2	No	1

Table 3: Hardware Comparative Matrix

Model name	Type of Computer Required	CPU Required (MHz)	Minimum Disk Space Required / RAM (MB)	Peripherals Needed?
CUF-1	Workstation	Not specified	Not specified	Not specified
CUF-2	Sun Sparc or PC	300	2 GB/32	Color monitor
CURBA	PC	300+	1GB/32	Color monitor
DELTA	PC	Pentium 200	Depends of model dimensions	Color monitor recommended
DRAM/EMPAL	PC	Pentium	Not specified	Color monitor and color printer
GSM	PC	500	Not specified/128+	Color plotter
INDEX	PC	200	150/64	Color monitor and color printer
IRPUD	IBM Pentium III PC	300+	4+ GB/128	Color monitor with minimum resolution of 1024X768 and color printer
LTM	Sun Sparc or PC	300	Not specified/256	Color monitor with minimum resolution of 1024X768 and color printer
LUCAS	UNIX-based workstation (e.g., Sun Sparc Station 10)	Not specified	Not specified	Color monitor and color printer
Markov	Any	Not specified	Not specified	Not specified
MEPLAN	PC	200+	500/64	Color monitor
METROSIM	Any	300+	Not specified/128	Color monitor
SAM-IM	PC	400	2 GB/128+	Color monitor and printer
SLEUTH	PC, Workstation, or mainframe	Not Applicable	Not Applicable	None
Smart Growth Index	PC	300	500/64	Color monitor with minimum resolution of 1024X768 and color printer
Smart Places	Pentium PC	120	1 GB/32	CD-ROM drive required; color monitor recommended
TRANUS	PC	Not specified – The faster, the better	30/64	Color monitor required; color printer and a digitizer are useful

Model name	Type of Computer Required	CPU Required (MHz)	Minimum Disk Space Required / RAM (MB)	Peripherals Needed?
Ugrow	PC	Not specified – A minimum amount is necessary	Not specified – A minimum amount is necessary	None
UPLAN	PC	300	Several hundred/32	Color monitor required; 21" monitor, color printer, and plotter are recommended
UrbanSim	Any	333	2 GB/128	None
What if?	PC	300	1 GB/64	None

Table 4: Software Comparative Matrix

Model name	Operating System	Program Compiler Needed? (Y/N)	Data Management Tools	Statistical Software Needed? (Y/N)	GIS Software Needed? (Y/N)	Other
CUF-1	UNIX	N	Not Specified	Y;SPSS	Not Specified	Not Specified
CUF-2	MS Windows 95, Sun Solaris	N	Not Specified	Y;SAS	Y; ArcView or ArcInfo	Not Specified
CURBA	MS Windows	N	Not Specified	Y;SAS or SPSS	Y; ArcView	None
DELTA	MS DOS (either under DOS mode or Windows 95/ 98)	N	Spreadsheets and data bases highly recommended	Not Specified	Highly recommended	DBOS memory manager (distributed with DELTA model)
DRAM/EMPAL	MS Windows 95/98 or NT	N	Spreadsheets and data bases	N	Y; ArcView	Developer Participation
GSM	MS Windows NT or UNIX	N	Paradox or Oracle	N	Y; ArcInfo or other GIS	None
INDEX	MS Windows 95 or NT	N	None	N	Y; ArcView	None
IRPUD	MS Windows NT	Y; Fortran, C, C++	None	Y	Y; ArcInfo	None
LTM	MS Windows NT or Sun Soloris	Y	Spreadsheets and data bases	Y Y; S-Plus and SAS	Y; ArcView or ArcInfo	Stuttgart Neural Network Simulator
LUCAS	MS Windows with OSF/Motif toolkit	Y	Spreadsheets	Y; SAS	Y; GRASS	Not Specified
Markov	Any	Not Specified	Recommended for Users	Recommended for developers	Not Specified	Not Specified

Model name	Operating System	Program Compiler Needed? (Y/N)	Data Management Tools	Statistical Software Needed? (Y/N)	GIS Software Needed? (Y/N)	Other
MEPLAN	MS Windows NT	N	Any for data preparation; MapInfo 4.5 and ACCESS 95 for MEPLUS	Y; any will do	Y	Any word processor; MapInfo is needed if MEPLUS is being used to process MEPLAN Results
METROSIM	Any; UNIX preferred but not required	Y; Fortran, C	Excel or Access	Y; SPSS or SAS	Y; ArcInfo or MapInfo	None
SAM-IM	MS Windows 95 or NT	N; although visual BASIC is helpful	None	Y; for calibration only, if want to do it	Y; ArcView 3.2 with the Spatial Analyst Extension	None
SLEUTH	UNIX	Y; gnu C compiler (gcc)	Not Specified	Not Specified	Not Specified	X-Windows required for graphical version
Smart Growth Index	MS Windows 95 or NT	N	None	N	Y; any local system	None
Smart Places	MS Windows 95; 98 or higher	N	None	N	Y; ArcView	None
TRANUS	MS Windows 95, 98 or NT; or Mac with Windows emulation	N	Windows-based spreadsheets, word processors, and presentation programs very useful, but not essential	SAS or SPSS can be useful, but not essential	ArcView or Arclnfo can be very useful, but not essential	Logit calibration program can be useful (e.g., Alogit, Hielow)
Ugrow	MS Windows 95	N	None	N	Y; ArcInfo, ArcView	Powersim modeling software

Model name	Operating System	Program Compiler Needed? (Y/N)	Data Management Tools	Statistical Software Needed? (Y/N)	GIS Software Needed? (Y/N)	Other
UPLAN	MS Windows 95, 98 or NT	N	Excel for data exchange with other models	Y; SAS fr data exchange with other models	Y; ArcView (Need ArcInfo to prepare data lays for local application)	None
UrbanSim	MS Windows 95, 98 or Windows NT 4.0/2000, Linux, or Unix	Y; JAVA JKD 1.3	Not specified	Not specified	Not specified	Not specified
What if?	MS Windows 95, 98 or NT 4.0	N	None	N	N	None

Table 5: Cost Comparative Matrix

Model name	Purchase Cost	Operating Cost	Maintenance Cost	Training Costs
CUF-1	Not available for "off- the-shelf" purchase. Contact developer.	Not specified	Not specified	Not specified
CUF-2	Not available for "off- the-shelf" purchase. Contact developer.	Not specified	Not specified	Not specified
CURBA	Not specified	Not specified	Not specified	Not specified
DELTA	Contact developer	Contact developer	Contact developer	Contact developer
DRAM/EMPAL	$30,000-$60,000 which includes training and consulting services	Not specified, but requires about 1 senior modeler with junior support	Not specified	Included with purchased cost
GSM	Not applicable - not yet adapted as an application for distribution	Not applicable - not yet adapted as an application for distribution	Not applicable - not yet adapted as an application for distribution	Not applicable - not yet adapted as an application for distribution
INDEX	$15,000- $75,000	Typically 1-8 person Hours	Typically 4-6 person weeks	Typically 2-3 person Days
IRPUD	Contact developer	Contact developer	Contact developer	Contact developer
LTM	Contact developer (likely no cost)	Contact developer	Contact developer	Contact developer
LUCAS	No cost	Not specified	Not specified	Not specified
Markov	No cost	No cost	No cost	No cost
MEPLAN	$25,000	Not available	10% of purchase price annually	About $640 per day
METROSIM	$20,000-$30,000	$2,500 for three initial runs (negotiable). Full reports are included.	$5,000 - $10,OOOlyr	$10,000 one-time
SAM-IM	Contact developer (average $30,000 - $100,000 total cost)	Contact developer	Contact developer	Contact developer
SLEUTH	No cost	Not specified	Not specified	Not specified
Smart Growth Index	Initial version available at no cost through U.S. EPA Urban and Economic Development Division; enhanced versions currently under Development	Typically 4-6 person-weeks/yr.; cost dependent upon salary rate for staff or consultant labor.	Typically 4-6 person-weeks/yr.; cost dependent upon salary rate for staff or consultant labor.	Typically 2-3 person-days; cost dependent upon salary rate for staff or consultant labor.

Model name	Purchase Cost	Operating Cost	Maintenance Cost	Training Costs
Smart Places	Contact developer	Contact developer	Contact developer	Contact developer
TRANUS	$7,500	Included in purchase cost	1-year guarantee included in purchase cost	$8,000 plus expenses for 2-week, full-time course
Ugrow	Software is free. However, to be useful, the developer must adapt the model which can cost $30,000 - $200,000.	Not specified	Not specified	Not specified
UPLAN	No cost	Not specified	Not specified	Not specified
UrbanSim	No cost	Not specified	Not specified	Not specified
What if?	For a single user, the professional price is $2,495 and the academic price is $250. Professional and academic site licenses are available.	No cost	No cost	No cost

Table 6: Urban Land Use Categories Addressed Comparative Matrix

Model name	User Defined? Limits?	Urban Land Use Categories				
		Residential	Commercial	Mixed Use	Industrial	Other
CUF-1	No; limited to Residential	Yes	No	No	No	Open Space
CUF-2	No; four "new" land uses and three redevelopment land uses	Single-family; multi-family	Yes	Not considered separately from residential or commercial land uses	Yes	Residential, commercial, and industrial redevelopment
CURBA	No; all urban development considered together					
DELTA	Yes; no Limitations	User defined, so all potential urban categories				
DRAM/EMPAL	No	By household Income	By employment type	No	By employment type	Vacant, developable, vacant undevelopable
GSM	Yes; no Limitations	User defined, so all potential urban categories				
INDEX	Yes; typically 6-30 categories	User defined, so all potential urban categories				
IRPUD	No	Yes	Yes	Yes	Yes	Yes
LTM	Yes; can accommodate up to 8 land uses	By Density	No	No	No	No
LUCAS	Yes	By Density	Yes	No	No	No
Markov	Yes; residential sector only	Owner/renter, Single l multifamily, Size of home	No	No	No	No
MEPLAN	Yes; no Limitations	User defined, so all potential urban categories				
METROSIM	Yes; no limitations	User defined, so all potential urban categories				
SAM-IM	Yes; limit of 40 categories	User defined, so all potential urban categories				
SLEUTH	Yes; no limitations	User defined, so all potential urban categories				

Model name	User Defined? Limits?	Urban Land Use Categories				
		Residential	Commercial	Mixed Use	Industrial	Other
Smart Growth Index	Yes; typically 6-30 categories	By Density	Office, retail, service	Can be customized to accommodate user's data	Light/heavy brownfields, enterprise zones	Can be customized to accommodate user's data
Smart Places	Yes; no limitations	User defined, so all potential urban categories				
TRANUS	Yes; no limitations	User defined, so all potential urban categories				
Ugrow	Yes; no limitations	User defined, so all potential urban categories				
UPLAN	Yes; no limitations	User defined, so all potential urban categories				
UrbanSim	Yes; no limitations	User defined, so all potential urban categories				
What if?	Yes; can accommodate up to 15 different land uses	User defined, so all potential urban categories				

Table 7: Nonurban Land Use Categories Addressed Comparative Matrix

Model Name	User Defined? Limits?	Nonurban Land Use Categories					
		Agriculture	Forest	Wetlands	Water	Preservation	Parkland
CUF-1	Yes; determined by availability of input map layers	Yes	Yes	Yes	Yes	As identified by user	Yes
CUF-2	Yes; determined by availability of input map layers	Yes	Yes	Yes	Yes	As identified by user	Yes
CURBA	Yes; determined by availability of input map layers	Yes	Yes	Yes	Yes	As identified by user	Yes
DELTA	No	No					
DRAM/EMPAL	Yes	User defined, so all potential urban categories					
GSM	Yes; no limitations	User defined, so all potential urban categories					
INDEX	Yes typically 6-30 categories	User defined, so all potential urban categories					
IRPUD	No	Yes					
LTM	Yes, can accommodate up to 8 land uses	Yes					
LUCAS	Yes	Yes					
Markov	No	No					
MEPLAN	Yes; no limitations	User defined, so all potential urban categories					
METROSIM	Yes; no limitations	User defined, so all potential urban categories					
SAM-IM	Yes; limitation of 40 categories	User defined, so all potential urban categories					
SLEUTH	Yes; no limitations	User defined, so all potential urban categories					
Smart Growth Index	Yes typically 6-30 categories	User defined, so all potential urban categories					
Smart Places	Yes; no limitations	User defined, so all potential urban categories					
TRANUS	Yes; no limitations	User defined, so all potential urban categories					
Ugrow	Yes; no limitations	User defined, so all potential urban categories					
UPLAN		User defined, so all potential urban categories					
UrbanSim		User defined, so all potential urban categories					

Model Name	User Defined? Limits?	Nonurban Land Use Categories					
		Agriculture	Forest	Wetlands	Water	Preservation	Parkland
What if?	Yes; can accommodate up to 15 land use types	User defined, so all potential urban categories					

Table 8: Impacts of Community Decisions on Land Use Patterns Comparative Matrix

Model name	Transportation Infrastructure	Local Zoning	City & County Master Plans	Other Local Fiscal Policy	Developer Impact fees	Property Taxes	Municipal Sewer & Water Fees	Subsidies	Road Tolls	Parking Fees	Fuel & sales Taxes	VMT	Registration Fees
CUF-1		✓	✓		✓		✓						
CUF-2	✓	✓	✓		✓		✓						
CURBA	✓	✓	✓										
DELTA	✓	✓	✓						✓[3]	✓[3]	✓[3]	✓[3]	✓[3]
DRAM / EMPAL[4]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GSM	✓[5]	✓	✓	✓[6]									
INDEX		✓	✓										
IRPUD										✓	✓	✓	✓
LTM	✓		✓										
LUCAS	✓	✓	✓										
Markov		✓	✓										
MEPLAN	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
METROSIM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SAM-IM	✓	✓	✓										

[3] Yes, but only if these can be modeled in an associated transport model integrated with DELTA.
[4] Any may be addressed by DRAM/EMPAL when linked to the right model. Without linking, most cannot be.
[5] Under development
[6] No fiscal policies are pre-set in the model. However, if the user can provide specification son the impact of the revenue source, then the policy can be incorporated.

Model name	Transportation Infrastructure	Local Zoning	City & County Master Plans	Other Local Fiscal Policy	Developer Impact fees	Property Taxes	Municipal Sewer & Water Fees	Subsidies	Road Tolls	Parking Fees	Fuel & sales Taxes	VMT	Registration Fees
SLEUTH	✓	✓	✓	✓									
Smart Growth Index	✓	✓	✓										
Smart Places[7]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TRANUS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ugrow													
UPLAN	✓	✓	✓		✓	✓	✓	✓		✓			
UrbanSim	✓	✓	✓	✓					✓[8]	✓[8]	✓[8]	✓[8]	✓[8]
What if?	✓	✓	✓										

[7] Smart Places can be customized to evaluate the impact of changes in land-use patterns based on the user-supplied criteria.
[8] Included only through interaction with travel models.

Table 9: Impacts of Land Use Patterns on Community Characteristics Comparative Matrix

Model Name	Travel Demand	Changes In Infrastructure Costs	Changes In Local Tax Revenue	Other Fiscal Impacts	Open Space	Nutrient Loading	Increases In Storm Water Runoff	Other Nonpoint Source Water Pollution	Other Water Quality Impacts	Changes In Criteria Pollutants	Changes In Greenhouse Gasses	Other Air Quality Impacts
CUF-1	✓				✓	✓[9]	✓[9]	✓[9]	✓[9]	✓[9]	✓[9]	✓[9]
CUF-2					✓	✓[9]	✓[9]	✓[9]	✓[9]	✓[9]	✓[9]	✓[9]
CURBA						✓[9]	✓[9]	✓[9]	✓[9]	✓[9]	✓[9]	✓[9]
DELTA	✓[10]									✓[10]	✓[10]	✓[10]
DRAM / EMPAL	✓	✓	✓	✓	✓	✓	✓			✓	✓	
GSM	✓[11]				✓	✓	✓		✓			
INDEX						✓	✓			✓	✓	
IRPUD	✓				✓							✓[12]
LTM									✓			
LUCAS					✓							
Markov		✓	✓	✓								
MEPLAN	✓	✓	✓	✓	✓[13]					✓	✓	
METROSIM[14]	✓	✓	✓	✓	✓					✓	✓	

[9] Model does not directly address these issues. However, model results may be applicable as inputs into appropriate impact models to determine effects of urbanization and land use change on other systems.
[10] Model does not directly address these issues. However, model results may be applicable as inputs into appropriate impact models to determine effects of urbanization and land use change on other systems.
[11] Currently under development.
[12] The IRPUD can forecast CO, emissions as a function of forecasting transportation-related indicators. Environmental submodels that calculate traffic noise pollution indicators are under development
[13] Open space is addressed in MEPLAN only when linked to the right model.

Model Name	Travel Demand	Changes In Infrastructure Costs	Changes In Local Tax Revenue	Other Fiscal Impacts	Open Space	Nutrient Loading	Increases In Storm Water Runoff	Other Nonpoint Source Water Pollution	Other Water Quality Impacts	Changes In Criteria Pollutants	Changes In Greenhouse Gasses	Other Air Quality Impacts
SAM-IM	✓				✓							
SLEUTH			✓[15]	✓[15]	✓[15]	✓[15]	✓[15]	✓[15]	✓[15]	✓[15]	✓[15]	✓[15]
Smart Growth Index	✓			✓	✓	✓		✓	✓			
Smart Places[16]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TRANUS	✓	✓	✓	✓	✓					✓	✓	✓
Ugrow	✓				✓						✓	
UPLAN	✓[17]	✓	✓	✓	✓	✓[18]		✓[18]		✓	✓	
UrbanSim	✓	✓	✓	✓	✓	✓						
What if?					✓	✓[9]	✓[9]	✓[9]	✓[9]	✓[9]	✓[9]	✓[9]

[14] Effects on air and water pollution can be treated if METROSIM is interfaced with any add-oft environmental package.
[15] Any fiscal or environmental impact which can be estimated as a function of urbanized area could be developed for the output of SLEUTH, but the model does not do so directly.
[16] Smart Places can be customized to evaluate these impacts based on user-specified criteria.

[17] UPLAN does not address travel demand directly but can when linked to any travel model.
[18] UPLAN is under development to address nutrient loading or sedimentation in surface waters and other nonpoint pollution.

Table 10: Model Utility and Integration Comparative Matrix

Model name	Relative Ease of Linking to Other Models (1[easy] – 3[hard])[19]	Relative Ease of Transferring to Other Locations(1[easy] – 3[hard])[19]	Number of Locations to Which Model has been Applied[20]
CUF-1	2	2	1
CUF-2	2	2	1
CURBA	2	2	>10
DELTA	2	2	6
DRAM/EMPAL	2	2	40+
GSM	2	2	350
INDEX	2	2	> 10
IRPUD	2	2	1
LTM	1 (environmental process models)	2	1-5
LUCAS	3	2	1-5
Markov	2	2	>10
MEPLAN	2	2	25+
METROSIM	1-2 (depends on package linked to)	1	6 (includes earlier versions)
SAM-IM	2	2	2
SLEUTH	2	2	13
Smart Growth Index	2	1	18
Smart Places			1 (35+ other sites have license agreements to use)
TRANUS	2	2	35+
Ugrow	2	1	6
UPLAN	3	2	2
UrbanSim	2	2	4
What if?	2	2	3

[19] (1) Effortless: (2) feasible with a manageable amount of modifications required; (3) impossible or impractical, would require a great deal of effort.

[20] The spatial scales of the locations vary and include regions / watersheds, large and small cities/ towns, and neighborhoods.

Table 11: Basic Operational Characteristics Comparative Matrix

Model name	Model Type	Thematic Scope	Underlying Math Structure	Operational Method	Technical Expertise for Calibration (1[easy] – 3[hard])[21]	Relative Ease of Calibration (1[easy] – 3[hard])[21]	Measure of Confidence or Goodness of Fit (Y/N)
CUF-1	✓Urban growth	✓Urban development ✓Evaluation and simulation	✓Deterministic	✓Regression	2	3	N
CUF-2	✓Land use change	✓Urban development ✓Evaluation and simulation	✓Deterministic ✓Stochastic	✓Multinominal Logit ✓Regression	3	3	Y
CURBA	✓Urban growth	✓Urban development ✓Environmental and Ecological Quality	✓Stochastic	✓Binomial Logit ✓Regression	2	2	Y

[21] (1) Parameters can be recalibrated using options embedded in the software for the model.; (2) Parameters can be recalculated using methods/instruction cited in model documentation or by altering input files; (3) Parameters can only be recalibrated using original programming with no guidance from the model developers (e.g., no documentation), or parameters are hardwired and cannot be recalibrated.

Model name	Model Type	Thematic Scope	Underlying Math Structure	Operational Method	Technical Expertise for Calibration (1[easy] – 3[hard])[21]	Relative Ease of Calibration (1[easy] – 3[hard])[21]	Measure of Confidence or Goodness of Fit (Y/N)
DELTA	✓Urban Economic / land use market	✓Urban and regional economics	✓Deterministic	✓Markov Chains ✓Multinominal Logit methods ✓Cobb-Douglas utility functions ✓Elasticity-based responses ✓Matrix adjustment methods	3	3	N
DRAM/EMPAL	✓Urban statistical ✓Spatial interaction ✓Aggregate Logit	✓Housing ✓Employment	✓Stochastic	✓Multinominal logit ✓Regression	3	1	Y
GSM	✓GIS	✓Development ✓Resource Land ✓Conservation ✓Watershed Management	Not Specified	Not specified	3	2	Not applicable

Model name	Model Type	Thematic Scope	Underlying Math Structure	Operational Method	Technical Expertise for Calibration (1[easy] – 3[hard])[21]	Relative Ease of Calibration (1[easy] – 3[hard])[21]	Measure of Confidence or Goodness of Fit (Y/N)
INDEX	✓GIS ✓Urban Impact	✓Land use ✓Transportation ✓Housing ✓Employment ✓Natural Environment	✓Deterministic	✓Causal inference ✓Correlation ✓Linear programming ✓Network analysis ✓Time series	2	2	Not applicable
IRPUD	✓Travel Demand model ✓Urban / Land use market models	Transportation Economics Technological impacts	✓Probabilistic ✓Stochastic	✓Markov chains	3	3	Not specified
LTM	✓GIS ✓Urban Impacts ✓Neural network	✓Land Use ✓Ecological integrity ✓Economic sustainability	✓Empirical	✓Markov Chains ✓Regression ✓Artificial neural networks	3	3	Y
LUCAS	✓GIS	✓Land Use ✓Environmental Impacts ✓Socioeconomic	✓Stochastic	✓Time series	3	3	Y

Model name	Model Type	Thematic Scope	Underlying Math Structure	Operational Method	Technical Expertise for Calibration (1[easy] – 3[hard])[21]	Relative Ease of Calibration (1[easy] – 3[hard])[21]	Measure of Confidence or Goodness of Fit (Y/N)
Markov	✓Markov chain	✓Residential housing ✓Mobility	✓Stochastic	✓Linear programming ✓Markov chains / transition matrices ✓Multinomial logit ✓Regression	3	2	Y
MEPLAN	✓Travel demand ✓Urban economic / land use market ✓Hedonic	✓Spatial economic-based input/output	✓Stochastic	✓Multinominal logit ✓Network analysis	3	2	Y
METROSIM	✓Travel demand ✓Markov chain ✓Urban economic / land use market ✓Hedonic ✓Discrete choice method	✓Land use ✓Metropolitan economy	✓Deterministic ✓Stochastic ✓Empirical/semi-empirical	✓Markov chains ✓Multinominal logit methods ✓Network analysis ✓Regression ✓Time-series ✓Dynamic economic general equilibrium analysis	1	1-2	Y; if desired

Model name	Model Type	Thematic Scope	Underlying Math Structure	Operational Method	Technical Expertise for Calibration (1[easy] – 3[hard])[21]	Relative Ease of Calibration (1[easy] – 3[hard])[21]	Measure of Confidence or Goodness of Fit (Y/N)
SAM-IM	✓GIS	✓Urban growth ✓Transportation ✓Economics ✓Environmental impacts ✓	✓Deterministic ✓Stochastic ✓Empirical/semi-empirical	✓Cellular ✓Automata ✓Multinominal logit methods ✓Regression	1 (but there is a learning curve/training required)	3	N/model doesn't provide but statistical packages used in the calibration
SLEUTH	✓Cellular automata	✓Urban growth ✓Environmental impacts	✓Stochastic	✓Cellular automata ✓Time-series ✓Monte Carlo imaging	3	2	Y
Smart Growth Index	✓GIS ✓Urban impacts ✓Travel demand	✓Land use ✓Transportation ✓Housing ✓Employment ✓Infrastructure ✓Environment	✓Deterministic	✓Causal inference ✓Correlation ✓Linear programming ✓Multinominal logit ✓Network analysis ✓Time series	3	1	N
Smart Places	✓GIS	✓Land Use ✓Economics ✓Environmental impacts	✓Deterministic	✓Causal inference	2	2 (calibration is not required)	N

Model name	Model Type	Thematic Scope	Underlying Math Structure	Operational Method	Technical Expertise for Calibration (1[easy] – 3[hard])[21]	Relative Ease of Calibration (1[easy] – 3[hard])[21]	Measure of Confidence or Goodness of Fit (Y/N)
TRANUS	✓GIS ✓Urban impact ✓Travel demand ✓Urban ✓Economic/land ✓use market	✓Transportation ✓Economics ✓Environmental impacts	✓Stochastic	✓Causal inference ✓Multinominal logit ✓Network analysis ✓Time-series ✓Discrete choice analysis ✓Decision theory ✓Random utility theory ✓Input-output analysis ✓Algorithms	3	3	N
Ugrow	✓Systems dynamics	✓Private and public infrastructure ✓Land use ✓Transportation	✓Deterministic	✓Causal inference ✓Systems dynamics	3	3	N
UPLAN	✓GIS ✓Urban impact	✓Land use evaluation and change analysis	✓Deterministic	✓Not specified	Not applicable	Calibration not required	N

Model name	Model Type	Thematic Scope	Underlying Math Structure	Operational Method	Technical Expertise for Calibration (1[easy] – 3[hard])[21]	Relative Ease of Calibration (1[easy] – 3[hard])[21]	Measure of Confidence or Goodness of Fit (Y/N)
UrbanSim	✓Random utility logit ✓Urban economic / land use market ✓GIS	✓Land use ✓Transportation ✓Economics ✓Environmental impacts	✓Empirical / semi-empirical	✓Expert systems ✓Multinominal logit ✓Regression ✓Monte Carlo simulation	3	2	Y
What if?	✓GIS	✓Land-use evaluation and change analysis	✓Deterministic	✓Mapping (GIS)	Not applicable	Calibration not required	N

Table 12: Spatial and Temporal Capabilities Comparative Matrix

Model name	Spatial Resolution	Spatial Extent	Temporal Resolution	Temporal Extent (future and past)
CUF-1	User defined, but generally 1 acre or larger	Customized for user needs	5 year	5+ years into the future
CUF-2	One hectare (100m x 100m) grid cells	Customized for user needs	5 year	5+ years into the future
CURBA	One hectare (100m x 100m) grid cells	Scalable and can be customized for user needs	User defined	User defined into the future
DELTA	User defined, but intended to work with strategic rather than very detailed zones	Customized for user needs, typically applicable to cities with populations of 250,000+	1 year increments recommended, but can be longer	User defined into the future
DRAM/EMPAL	Census tracts for some data; regional level for economic data	Customized for user needs, typically applicable to cities with populations of 200,000+	5 year	40 years into the future
GSM	User defined	User defined	User defined	User defined
INDEX	User defined	User defined (depends on the extent of local GIS)	Yearly	User defined (depends on available data)
IRPUD	Revised version of model will allow about 300 zones	Local or regional level	User defined	User defined into the future
LTM	Parcel (30m x 30m), plat (100m x 100m), block (300m x 300m), and local (1 km x 1km)	User defined (precedence given to watersheds)	5 or ten year	20-50 years into the future; can hindcast into the past
LUCAS	User defined; a single grid cell or pixel may be defined to 90m x 90m.	User defined	5 year	100 years into the future
Markov	One or more households	Not applicable	Usually 3-5 years	Limited by census data

Model name	Spatial Resolution	Spatial Extent	Temporal Resolution	Temporal Extent (future and past)
MEPLAN	User defined; can vary from a few hundred meters to whole countries, depending on study	User defined; has been used to represent cities in regional context to entire countries	User defined; but five years is common	User defined
METROSIM	User defined	User defined	Yearly or some aggregation of years such as 2 years, 5 years or decades	Any number of time periods can be accommodated, but more than 30 not recommended
SAM-IM	User defined	User defined	User defined	User defined into the future
SLEUTH	User defined	User defined	Yearly	As far into the past or future as available data will allow
Smart Growth Index	User defined between 5-100 acres	Community or region, depends on the extent of local GIS	Yearly	20 years into the future
Smart Places	User defined	User defined	Not applicable	Not applicable
TRANUS	User defined, but too many zones can become a nuisance	User defined	User defined, but 5 years is common	User defined
Ugrow	Depends on available GIS data	User defined	Yearly	1950-2100
UPLAN	Low density residential represented in 10 acre parcel size (200m cells), while all other land uses are represented by ½ acre parcel size (50 m cells)	User defined	User defined	User defined
UrbanSim	User defined, current application have used 150m resolution	User defined	Yearly, but option arbitrary time intervals	User defined into the future
What if?	User defined, but best suited for sizes larger than single parcel	User defined	User defined	Up to 4 projection periods

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