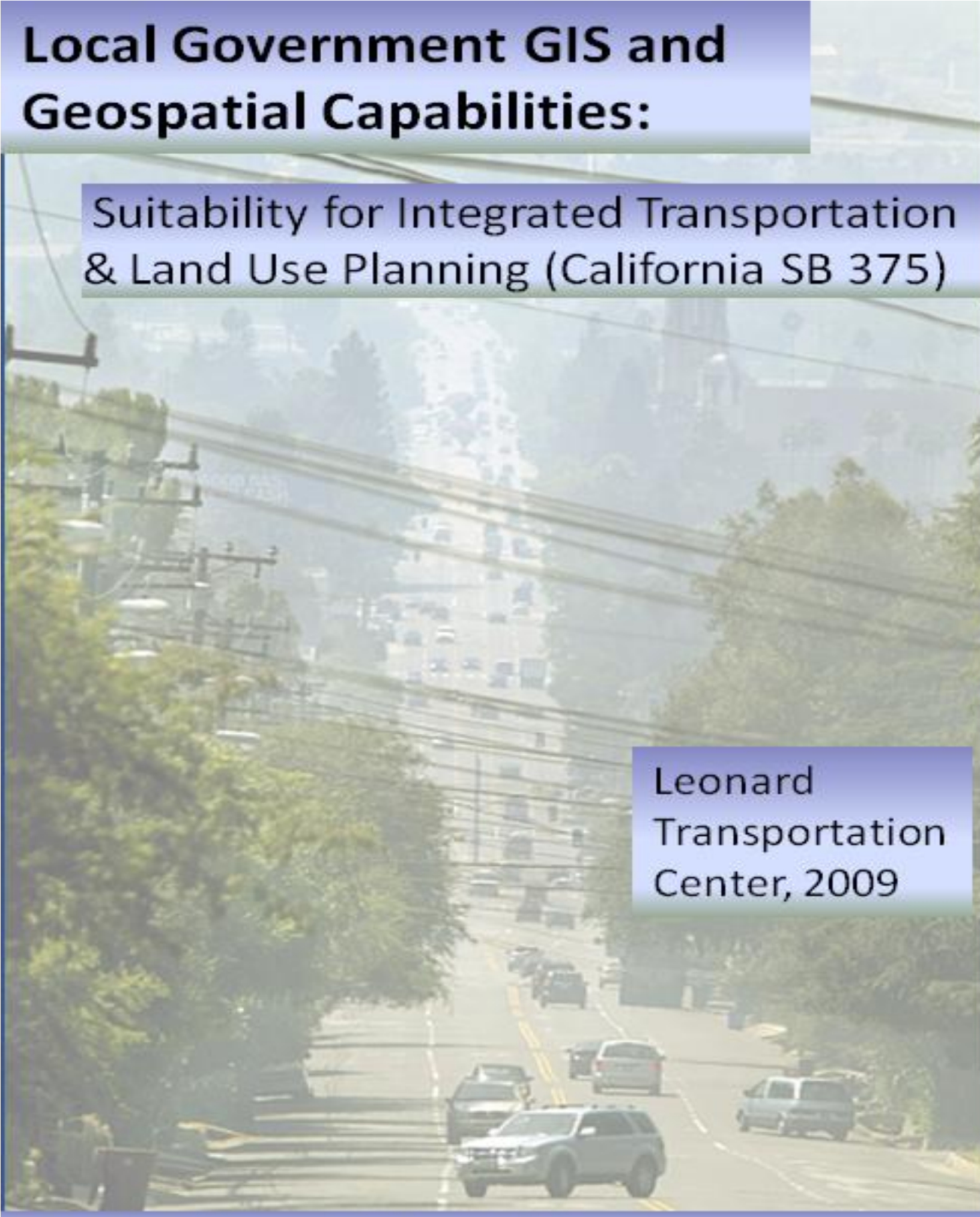
Local Government GIS and Geospatial Capabilities:

Suitability for Integrated Transportation & Land Use Planning (California SB 375)



Leonard Transportation Center, 2009

M Reibel – K Chan – R Willson – CP Trinh

Local Government GIS and Geospatial Capabilities:

Suitability for Integrated Transportation and Land Use Planning (California SB375)

Center for Geographic Information Science Research

California State Polytechnic University, Pomona

Michael Reibel, PhD*

Kelly Chan, PhD

Richard Willson, PhD

Cuong Phu Trinh

November 2009

This Research was made possible by a grant from the Leonard Center for Transportation Research, California State University, San Bernardino

Cover photo courtesy of the Pasadena Star-News

* Corresponding author: mreibel@csupomona.edu

Table of Contents

List of Tables

Executive Summary

This report examines two linked phenomena in transportation planning: the geospatial analysis capabilities of local planning agencies and the increasing demands on such capabilities imposed by comprehensive planning mandates. The particular examples documented in this report are local planning agencies in San Bernardino and Riverside Counties, California and their geospatial analysis capabilities relative to the implementation of SB 375. SB 375 is a groundbreaking law mandating planning for compact growth as part of California's comprehensive legislative initiative to reduce greenhouse gas (Ghg) emissions. As such, SB 375 explicitly links transportation and land use planning to reduce vehicle miles traveled, thus reducing Ghg. SB 375 provides incentives for compact development in the form of additional transportation subsidies and streamlining of, or exemptions from, the California environmental regulatory process (California Environmental Quality Act or CEQA).

After a brief introduction the report goes on to explain the provisions of AB32, the umbrella climate change legislation within which SB 375 is nested, and those of SB 375 itself (Section 2). The study's chief findings and observations relating to governance and the SB 375 process are:

1. Although primary responsibility for SB 375 planning and implementation rests with the state's metropolitan planning organizations (MPOs), the greatest possible direct participation by local agencies in the planning effort will be necessary to ensure buy-in while protecting local planning mandates and priorities

2. In the territory of the Southern California Association of Governments MPO (SCAG), the planning mandate is complicated by the presence of sub-regional MPOs, which have the ability to impose SB 375 plans that must be accommodated by SCAG

3. For the same reasons that maximum local government participation is desirable, we believe that the goals of SB 375 will be best served if sub-regional MPOs , have a meaningful role in the SB 375 planning process (whether or not as primary planners) in consultation and cooperation with SCAG.

The study continues in Section 3 with a review of the specific planning tasks and the technical means required to execute them. Section 4 begins with a summary assessment of local agency GIS and geospatial capabilities derived from original survey research undertaken for this study. Findings from this phase of the work indicate the following:

4. The level of local agency GIS use in transportation planning was low primarily because the level of local agency responsibility for transportation planning is low. With the exception of asset management and capital planning of those minor roads controlled locally, most of these tasks are performed by county-level agencies and MPOs.

5. Many smaller local agencies, including smaller MPOs such as WRCOG, lack many types of GIS functionality in practice and also typically lack a centralized geospatial data management repository (enterprise GIS).

6. Even in jurisdictions with better developed GIS capabilities, control of geospatial data and GIS analysis was often fragmented across several departments, sometimes in incompatible formats and not always shared

7. The fragmentation of geospatial data and GIS analysis across agencies' departments is an obstacle particularly to the implementation of SB 375, which requires analytic coordination between housing/development and transportation related departments

8. The existence of an enterprise GIS staff and data infrastructure did not necessarily prevent the development of separate, sometimes incompatible GIS capabilities and tasking separately controlled by other departments

Section 4 continues with a brief assessment of the gap between common configurations of local agency GIS and geospatial data capabilities and those required for successful implementation of SB 375. Findings include:

9. Meaningful comprehensive planning processes like SB 375 require greater geographic information systems use and integration than many local governments and some MPOs can currently bring to bear

10. Meaningful comprehensive planning processes like SB 375 require greater standardization and sharing of relevant geospatial data than is now common. This applies to data sharing and streamlining not only among departments within local agencies, but also between local, county and regional planning agencies

11. Meaningful comprehensive planning processes like SB 375 require greater quantitative and spatial modeling expertise than many local governments and some MPOs can currently bring to bear

The logical implication of these findings is that the success of SB 375 will depend on technical assistance to local governments in their efforts to participate in the SB 375 planning process. The report goes on to discuss the optimal parameters for such technical assistance in Section 5. Key recommendations for SB 375 technical assistance are:

12. The development and distribution of a standardized analytic protocol spelling out thresholds and algorithms for identifying suitable/optimal locations for transit-oriented development [TODs], local housing allocation and infill planning, and transit augmentation

13. The development of, and access to, specialized and automated software tools to apply the analytic protocol to local areas, given local conditions and priorities. Notably, SB 375 planning for TODs, housing and transit must be compatible with city general and specific plans, or must be achieved in concert with corresponding modifications of existing plans.

14. A comprehensive and accessible database of regional geospatial data designed to work compatibly with these special software tools

15. A set of standards for proprietary local data that will allow compatibility with the special software tools

Section 1: Introduction

This research was conducted between October 2008 and September 2009 at California State Polytechnic University, Pomona. The project was led by Michael Reibel, Professor of Geography, with the assistance of Richard Willson, Professor of Urban Planning. It was funded by the Leonard Transportation Center at California State University, San Bernardino. The project team consists of the professors, project coordinator Kelly Chan, and graduate students from the Urban and Regional Planning department. The project was housed in and received technical support from the Center for Geographic Information Science Research at Cal Poly Pomona.

The goal of the project was to study and inventory GIS best practices for use in local government transportation planning within the Inland Empire. A team of students and researchers canvassed planning and GIS departments concerning the use of GIS tools in transportation planning. Although a very diverse range of activities were found, the level of specific uses of GIS in transportation planning was low; most GIS uses in transportation planning are done at the regional scale. Some cities were more active in the COMPASS project, which was a major component of the 2008 Regional Transportation Plan developed by the region's highest level metropolitan planning organization (MPO), the Southern California Association of Governments (SCAG). These cities tended to have more advanced levels of GIS use than others. Overall there were no established protocols for technical interactions amongst local planners and analysts and their counterparts at the MPO level.

The enactment in California of SB 375 in 2008 significantly altered the relationships between local and MPO level planners. SB 375, sometimes called the anti-sprawl bill, explicitly links housing and development planning with regional transportation planning. The regional transportation plan now becomes integrated with the regional housing needs plan and coordinated under a Sustainable Community Strategy. Details of this realignment of land use planning process in California are discussed in Section 3.

The changes in the regional and local planning processes resulting from the implementation of SB 375 makes it necessary for cities to revisit their analytical use of GIS and geospatial data for planning in general and, especially, for general plans, specific plans, project review, redevelopment activity, and capital improvement planning. Because of the unique challenge and opportunity presented by the enactment of SB 375, this research project evolved into a focused gap analysis of geospatial data and analytical capabilities relative to the integration of transportation and land use planning among cities in the Inland Empire. The project team also developed a set of recommendations for local governments addressing the technological gaps in the implementation of SB 375 and the first Regional Transportation Plan and Sustainability Communities Strategy in the 2012 cycle.

The following summarizes the contents of the study:

Section 2 provides an overview of SB 375 as well as AB 32, the broader climate change legislation within which SB 375 is nested. SB 375 is one of the three main immediate actions under the AB 32 initiative. In particular, the section gives background about the Ghg (Greenhouse gas) emission reduction objective and VMT (vehicle miles traveled) reduction targets.

Section 3 discusses in detail the planning tasks and geospatial data requirements needed for a reasonably complete implementation of SB 375. This task and resource inventory is intended as a yardstick against which local agencies' GIS capabilities can be measured. The gaps in practice thus identified are obstacles to full local participation in, and advice and consent to, the regional planning process for SB 375 to be carried out by the localities' respective MPOs.

Section 4 summarizes the existing use of GIS by Inland Empire local agencies that were surveyed regarding their land use planning and transportation planning processes, and discusses these capabilities relative to the requirements of SB 375 planning as outlined in section 3.

Section 5 discusses GIS tools and geospatial data structures recommended by the research team that might usefully assist local agencies in their efforts to participate in SB 375 planning in a meaningful way. The research team discusses existing GIS tools and makes recommendations regarding such new, specialized SB 375 implementation tools as may be developed.

Appendix A reproduces the survey guide used in data collection, while appendix B provides detailed abridged interview data from cooperating Inland Empire agencies. As far as was possible, these interviews establish not only details of specific relevant tasks and their degree of GIS application, but also GIS expertise and staffing levels, software installed base, details of geospatial data sharing and the organization and control of GIS within the departments of local agencies and governments.

Section 2: SB 375 and Related Global Warming Solutions Legislation

Assembly Bill 32 - The California Global Warming Solutions Act of 2006

Assembly Bill 32 established a program to achieve the reduction of greenhouse gases (GHG) to 1990 levels by 2020, through regulatory and market-based methods. The act defined several specific requirements that the California Air Resources Board (ARB) must act upon. AB 32 intends to curtail GHG emissions in the atmosphere, which if left unchecked, lead to disastrous consequences, such as rising sea levels that damage coastal areas and communities, decreased air quality, increased mortality due to heat and disease, loss of snowpack that impacts water supplies and an increase in energy needs due to increased heat.

The lead agency, the California Air Resources Board (ARB) was given the responsibility to monitor, report, and reduce GHG emissions. As for the specific target for GHG reduction, the emissions cap for 2020 is based on 1990 levels, which is a reduction of about 15 percent based from current GHG emissions. The specific limit of 427 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) of greenhouse gases for 2020 was approved in December 2007. In the long term, the goal is to reduce GHG emissions to 80% of 1990 levels by 2050, per Executive Order S-3-05. According to the Climate Action Team (CAT) biennial report, in 2004 about 40 percent of total GHG emissions statewide were generated by the transportation sector. About 80 percent of those emissions came from transportation on roadways. Transportation accounts for 70 percent of fuel consumption in California (CLCV, NRDC and Caltrans, 2008, 2009).

The ARB encourages stakeholders to voluntarily reduce GHG emissions by establishing a framework to grant appropriate credits. In addition the ARB was directed to form two committees: an Economic and Technology Advancement Advisory Committee (ETAAC), as well as an Environmental Justice Advisory Committee (EJAC). ETAAC's duties entail the research of technologies and other reduction measures necessary to curb GHG emissions. EJAC's duties entail the development of the Scoping Plan and other matters related to the implementation of AB 32. Both committees have submitted their recommendations to the ARB in 2008. The Scoping Plan was approved by the ARB in December 2008, with the most recent version being made available as of May 2009.

Key elements of the Scoping Plan include:

- SB375
- Expanding existing energy efficiency, building and appliance programs;
- Achieving a statewide renewable energy mix of 33%;
- Developing a Cap and Trade system that links with the Western Climate Initiative, along with targeted fees to bring down the overall GHG emissions as well as AB32 program administrative costs;

- Adopting and implementing measures in accordance to existing state laws, including clean car standards, low carbon fuel standards and cleaner goods movement

Executive order S-3-05 also established a Climate Action Team (CAT) in 2005, headed by the California Environmental Protection Agency (CalEPA). The CAT has directed State agencies to identify areas to reduce carbon emissions and provide recommendations to the Governor and Legislature. Various agencies engage in joint research help further common interests to protect public health, infrastructure and conserve natural resources.

According to the CAT biennial report, in 2004 about 40 percent of total GHG emissions statewide were generated by the transportation sector. About 80 percent of those emissions came from transportation on roadways. The growth of emissions from the transportation sector increased from 150 $MMTCO_2e$ in 1990 to 182 $MMTCO_2e$ by 2004.

SB 375

Senate Bill 375 (D-Steinberg) targets the greenhouse gas (GHG) reduction goals set by Assembly Bill 32 (CLCV and NRDC, 2008). SB 375 focuses on reducing sprawl as well as vehicle miles traveled (VMT). Thus the legislation builds upon the goals set by AB 32 (limiting GHG emissions) by focusing on "land use and transportation components of GHG emissions" through sustainable community strategies (SCS) or alternative planning strategies (APS) to SCS plans (SCAG, 2008). Thus the objective of SB 375 is to integrate the planning processes of transportation, land use and housing, through a synchronization of deadlines as well as policies across a regional scale. SB 375 builds on existing laws including the Federal Clean Air Act, as well as requirements for Regional Transportation Plans (RTPs) for MPOs. SB 375 brings together various interests and harnesses funding and regulatory incentives, without mandates, to get the population to drive less, reduce fuel consumption, which in turn, creates less GHG emissions (CLCV and NRDC, 2008).

Senate Bill 375 provides distinctive additional ways to implement AB 32. As AB 32 was signed into law in 2006 to create GHG emission targets, those reduction goals existed, but there was no definite direction as to how the targets could be reached. SB 375 is one element of a wide range of strategies to achieve the GHG reduction targets. The bill was authored by Darrel Steinberg (D-Sacramento) and sponsored by the California League of Conservation Voters (CLCV) and the National Resources Defense Council (NRDC). It specifically makes climate change an explicit factor in land use planning, through the following:

- Planning for climate change in terms of land use;
- Linking land use planning and transportation funding at a regional scale to support smart growth principles;
- Bringing various stakeholders (local governments, builders, affordable housing interests, environmental community) together to plan for change;
- Ensuring that the CARB has a role in all of the above

Multiple stakeholders are involved in the successful execution of the SB 375 planning process. From local officials to the public, to developers and regional/ metropolitan planning organizations, there is a process in which all parties involved will have a forum to participate. Regional transportation plans (RTPs) are required by law to have a land use allocation and the metropolitan planning organizations (MPOs) that prepare such must ensure the plan meets the federal Clean Air Act.

SB 375 is a component of a three-legged stool in AB 32 compliance. AB 1493 and Low Carbon Fuel Standard (LCFS) help clean up the vehicle emissions. Without controlling the pattern of development, by tying development with transportation planning, the goal of AB 32 cannot be realized. Driving less will contribute substantially to GHG reduction targets, since technological advances alone, such as increased fuel efficiency in vehicles as well as produced cleaner-burning fuel, cannot fully meet the reduction. According to the Climate Action Team (CAT) biennial report, in 2004 about 40 percent of total GHG emissions statewide were generated by the transportation sector. About 80 percent of those emissions came from transportation on roadways. Transportation accounts for 70 percent of fuel consumption in California (CLCV, NRDC and Caltrans, 2008, 2009).

The California Air Resources Board (CARB) is given the authority to set the regional GHG emissions reduction targets for each of the MPOs. Large MPOs in the State of California include the Southern California Association of Governments (SCAG), San Diego County Association of Governments (SANDAG) Sacramento Area Council of Governments (SACOG) and the Metropolitan Transportation Commission (MTC). The RTPs must be linked to the Regional Housing Needs Assessment (RHNA). Thus each MPO will create a SCS (or APS) in order to reduce GHG emissions to CARB issued GHG reduction targets.

Table 1: Key Dates in the Implementation of SB 375
(League of California Cities, 2008)

December 31, 2008	Projects specifically listed on a local ballot measure prior to the date are exempt from the Sustainable Communities Strategy (SCS) consistency requirement
January 1, 2009	California ARB adopted Scoping Plan; defined total carbon reduction from transportation planning
June 1, 2009	MPOs in Clean Air Act attainment areas and RTP Agencies not belonging to an MPO can choose to opt into 8-year planning cycle (rather than 4-5 years)
September 30, 2009	Regional Targets Advisory Committee (RTAC) must submit recommendations to ARB.
June 30, 2010	California ARB must provide each region with GHG emissions reduction target
October 1, 2010	MPOs updating their RTP begin 8-year planning cycle that incorporates Sustainable Communities Strategy/ Alternative Planning Strategy as well as the Regional Housing Needs Assessment (RHNA) process
December 31, 2010	Allocations for transportation sales tax measures do not need to be changed if voter-approved prior to date
December 31, 2011	Funding for Federal Statewide Transportation Improvement Projects (TIPs) programmed prior to date exempt from SCS consistency requirement.

SB 375 requires the ARB to set regional GHG targets by September 30, 2010, with draft targets to be released by June 30 of the same year. A Regional Targets Advisory Committee (RTAC), composed of representatives from the League of California Cities, California State Association of Counties, MPOs, affected air districts, planners, homebuilders, affordable housing organizations, environmental entities and other affective parties, must provide the California ARB with a report by September 30, 2009. This report will contain factors and methodologies to assist ARB in setting regional targets.

SB 375 changes the housing element law, requiring that the Regional Transportation Plan (RTP) to plan for the Regional Housing Needs Assessment (RHNA). Previously a disconnect existed between the regional housing policy and transportation planning through conflicting deadline policies, even though the same regional organization would produce both, in most areas of the state. For cities and counties within the state that do not fulfill the Clean Air Act, the housing element must be updated every eight years, rather than five. Depending on how often local governments adopt and revise the RTP, they must have their SB 375-compliant housing element (RHNA) adopted within 18 months of September 30, 2010 or 18 months after the first RTP following an election. For those entities that fail to submit a timely RHNA will be subject to a filing every four years, and sanctions if necessary.

The SB 375 implementation process begins from the moment when the California Air Resources Board (CARB) informs each Metropolitan Planning Organization (MPO) of their expected emissions reduction target. The following is a brief list of steps needed to implement SB 375:

1. September 2010: CARB issues final GHG emissions reduction targets per region
2. MPO establishes Sustainable Communities Strategy (SCS) framework
3. MPO develops guidelines to create a SCS plan (in order to achieve emissions reduction targets by 2020 and 2035).
4. MPO reviews and approves the SCS
5. The MPO updates the 2012 Regional Transportation Plan (RTP) and Regional Housing Needs Assessment (RHNA) as their revision cycles will be aligned.
6. The MPO proposes GHG emissions reduction targets to each sub-region.
7. Each sub-region draft SCS strategy.
8. Each city in each sub-region an input to the SCS, via general plan and housing elements of the general plan, which factors into the RHNP.
9. Each sub-regional SCS is integrated into the regional SCS for review and approval.
10. The regional SCS is submitted for review and approval.

The MPO is responsible in adopting a framework that allows the sub-regional SCS to be congruent with the regional SCS.

According to the 2008 Legislative Report on SB 375, sustainable community strategies must perform the following (League of California Cities):

- Identify the general location of uses, residential densities and building intensities within the region;
- Identify areas sufficient to house all economic segments of the population of the region over the long term planning horizon of the RTP;
- Identify areas sufficient to house all economic segments the population of the region over the long term planning horizon of the RTP;
- Identify areas within the region sufficient to house an eight-year projection of the regional housing need for the region;
- Identify a transportation network to service the transportation needs of the region;

- Gather and consider the best practically available scientific information regarding resource areas and farmland in the region (note, there is no requirement to act on this information);

- Set a forecasted development pattern for the region, which, when integrated with the transportation network and other transportation measures and policies, will reduce the GHG emissions from automobiles and light trucks to achieve, if there is a feasible way to do so, the GHG emission reduction targets approved by the state board;

- Quantify the reduction in GHG emissions projected to be achieved by the SCS and, if the SCS does not achieve the targeted reductions in greenhouse gas emissions, set forth the difference between the amount that the SCS would reduce GHG emissions and the target for the region;

- Take into account the spheres of influence adopted by the local agency formation commissions within the region

Federal law requires RTPs to include a land use allocation and requires the MPOs to find that the RTP is consistent with federal Clean Air Act requirements. State law requires RTPs include "clear, concise policy guidance to local and state officials," regarding transportation planning (League of California Cities, 2008.) The RTP, for federal purposes, must contain a likely estimate of or a realistic development pattern for the next 20-30 years. Taken into account, the RTP makes the case for and allocates transportation funding in a financially constrained scenario. The growth development pattern illustrated in the RTP must be based on "current planning assumptions" for compliance with the Clean Air Act. Without the RTP being consistent with "current planning assumptions," it can be ineligible for federal transportation funding. Thus the growth pattern illustrated in a SCS must based upon the "most recent planning assumptions considering local general plans and other factors" as well as consistency with federal regulations that require a realistic growth pattern to achieve the goals of the Clean Air Act (League of California Cities, 2008).

However if the SCS prepared in compliance with the above is unable to achieve the GHG reduction targets set by CARB, the MPO must prepare an alternative planning strategy (APS) to the SCS. The APS must show how GHG emission targets would be achieved through "alternative development patterns, infrastructure, or additional transportation measures or policies," (Section 65080).

Each of the affected stakeholders must be consulted with in the preparation of the SCS. The MPO must conduct at least two meetings with the county board of supervisors and city councils for the purpose of presenting a draft SCS (or APS) and soliciting feedback. If the majority of the board of supervisors and city councils attend, then only one meeting is required. Meeting notices must be sent to the clerks of each city and board of supervisors. In addition each MPO must both notify and involve community stakeholders, such as advocates of affordable housing, environment, transportation, as well as homebuilder representatives, landowners, homeowners associations, business groups and commercial property interests in the planning process, in accordance to the agency's Federal Public Participation Plan (Section 65080).

Each MPO must conduct workshops throughout its region to engage public participation. At least one workshop is required per county; however if the county has more than 500,000 residents, at least three workshops must be held. Each of these workshops must contain "urban simulation computer modeling to create visual representations of the SCS and the APS," (Section 65080).

The preparation and circulation of a draft SCS or APS (if prepared) must be done more than 55 days before the adoption of a final RTP. There must be at least three public hearings on the draft. However if the MPO's region consists of a single county, at least two hearings must be held. Regardless of the boundaries of the MPO, the meetings must be held in different regions within the MPO to maximize public participation. The MPO must create a process for the public to provide a singular way to be notified of notices, information and updates.

SB 375 allows for Transit Priority Projects (TPPs) to be given partial or total exemptions on California Environmental Quality Act (CEQA) compliance. Transit priority projects consist of the following:

- Located within ½ mile of a major transit stop or high-quality transit corridor;
- Contain a minimum net housing density of 20 dwelling units per acre. (There are about 6-7 dwelling units per acre in a single family home development;)
- Must be 75% residential; or if any commercial use exists be 50% residential and have a floor area ratio of at least 0.75;
- Must be consistent with the SCS or APS in achieving the California ARB-set GHG reduction target.

Under SB375 there are three types of CEQA process streamlining for Transit Priority Projects. In order to achieve a total CEQA exemption, the TPP must meet the following criteria:

- Must not be more than 8 acres and not consist of more than 200 residential units;
- Can be served by existing utility infrastructure;
- Buildings are 15% more energy efficient than required standards, with buildings and landscaping designed to use 25% less water;
- Provide a minimum of 5 acres of open space per 1,000 residents OR 20% housing for moderate income, or 10% housing for low income or 5% housing for very low income (or fees in lieu to developing an equivalent amount of units.)

For TPPs that do not qualify for a total CEQA exemption, a short form EIR may be used. Also known as a Sustainable Communities Environmental Assessment (SCEA), it is similar to a Negative Declaration (ND), in which all significant effects must be analyzed and mitigated to an insignificant level. There are several significant differences between the short form EIR or SCEA and ND (League of California Cities, 2008).

- Cumulative regional effects of the project previously addressed and mitigated in prior EIRs do not need to be treated as cumulatively considerable;

- Impacts that are growth-inducing need not to be mentioned;

- Cumulative or project specific impacts related to global warming or the rational transportation network from cars and small truck trips need not to be mentioned.

SB 375 additionally allows for the application of traffic mitigation measures to transit priority projects. Such measures may include (but are not limited to) improvements to roadways and traffic control, transit subsidies for future residents, as well as other actions to avoid or minimize traffic impacts caused by the TPP. If traffic mitigation measures are adopted, the TPP need not comply with any additional mitigation measures on streets, highways, intersections or mass transit (League of California Cities, 2008). Transportation projects funded by local sales tax funds are exempt from SB 375 compliance if the measure was placed on the ballot prior to December 31, 2008, or if voters approved the measure prior to December 31, 2010.

It was mentioned earlier that the RTP and SCS must be based on "current planning assumptions," as dictated in the SB 375 bill text. In his blog, Bill Fulton (2008) quoted League of California Cities lobbyist Bill Higgins, as stating "If a certain type of development pattern is unlikely to emerge from local decision-making, it will be difficult for the regional agency to say that it reflects current planning assumptions." Therefore a certain type of development pattern that is conducive to reducing VMT may reflect future, idealistic planning, and not "current planning assumptions," which furthers the status quo of land use sprawl. Thus "current planning assumptions" as presented in the bill text may be a misnomer, as single-use, non-dense planning is the status quo in many municipalities. The integration of general use plans into a sustainable communities strategy, while idealistic, does not reflect "current planning assumptions."

Special Issues in SB375 Implementation in the SCAG Region

There are two special issues that confront SB375 Implementation in the SCAG region: the unique MPO structure of the SCAG region with its subregional MPOs and the region's sheer size. SCAG's territory encompasses all of Los Angeles, Orange, Riverside, San Bernardino and Ventura counties, which is "roughly half the state, both in terms of population and emissions," (2008). There are 14 sub regions within SCAG's territory. By county, they are as follows: Los Angeles: Arroyo Verdugo Cities, Gateway Cities Council of Governments, South Bay Cities Council of Governments, San Gabriel Valley Council of Governments, City of Los Angeles, Las Virgenes Malibu Council of Governments, North Los Angeles County and Westside Cities Council of Governments; Riverside: Coachella Valley Council of Governments, Western Riverside County Council of Governments; San Bernardino County Council of Governments; Ventura County Council of Governments and Imperial Valley Association of Governments. SCAG's estimate of CARB's 2010 GHG emissions reduction target is a reduction of 2.5 million metric tons of carbon emissions ($MMTCO_2e$) from present.

A substantial issue that can be foreseen with SCAG's implementation of SB 375 is related to the size of the MPO itself. Since SCAG encompasses five counties, divided into 14 sub regions and

189 member cities, all of the minute details in the coordination of transportation and land use planning through the SCS (or ACS) can be very complex to organize. Each of the five counties contains a population greater than 500,000. In addition many of the sub regions contain more than 500,000 residents. SCAG's region encompasses more than 38,000 square miles and 18 million residents (SCAG 2009). Thus the integration of various stakeholders into the planning process can prove to be a monumental task. In addition the coordination of sub regional land use and transportation planning across all of SCAG's coverage area may prove to be a substantial task. The creation of an "urban simulation computer modeling to create visual representations of the SCS and the APS," that is compatible with the overall area requires substantial labor that MPOs such as SCAG currently lack (Section 65080). With further budget cuts looming and the state's financial situation in jeopardy, most MPOs, which are state-funded regional government agencies have already suffered budget cuts themselves, resulting in additional staff cutbacks.

The additional subregional institutional layer within the SCAG region also creates challenges for SB375 implementation, as it did for the architects of the bill. Specifically, in cases of disagreement between subregional MPOs and SCAG, which vision should prevail? SB375 contains special provisions that protect the prerogatives of the subregional MPOs under SCAG. These organizations are given the right to optionally design SCS or APS alternative strategies, which SCAG is bound to accept. In point of fact, however, all the limitations and problems confronting stand-alone MPOs in implementing SB375 are present for the subregional MPOs in the SCAG region, with the additional constraint that these organizations have long been in the habit of deferring to SCAG in highly technical planning matters. The sub-regional MPOs in the SCAG region therefore tend to have even fewer geo-spatial analysis and technical planning capabilities than similar sized (small) stand-alone MPOs.

The lack of technical capacity among constituent cities statewide is even greater. If cities opt out of collaboration with MPOs in the process of devising the SCS or APS, the priorities of these cities will not be reflected in the resulting plans. Thus the goals of SB 375 will not be realized, with all interested parties arriving back at square one, with many problems and few resolutions.

Section 3: Planning Tasks and Geospatial Data Requirements for SB 375 Planning

Travel Demand Models

SB 375 requires a transportation demand model (TDM) that explicitly models relationships amongst land use activities, household vehicle ownership, and vehicle miles traveled. Traditionally TDMs are estimated in four steps: trip generation (how often do people travel); trip distribution (where do they travel); mode choice (how many drive alone, share a ride or take transit); and trip assignment (what routes travelers use and how much congestion results).

Recent advances in transportation demand modeling include the development of activity-based TDMs[1]. These more closely approximate real transportation behavior by modeling individuals' entire set of transportation decision making and tactics throughout the day. This addresses issues such as trip chaining (where each chain of trips is a separate "tour") and decision making in situations where travel may be optional. Even prior to the legislative adoption of SB 375, the 2008 revision of regional transportation planning guidelines[2] indicates the need for Activity-Based Travel Demand Model for MPOs of the size and complexity of SCAG. Accordingly, SCAG is developing an activity-based TDM, tentatively called SimAGENT (Simulator of activities, greenhouse emissions, networks, and travel). A preliminary version of SimAGENT is expected by January 2010, and a final version by January 2011[3].

An activity-based travel demand model requires significantly more elaborate and sophisticated geospatial data and tools compared to conventional trip-based models. Maintaining a model is labor intensive and costly. Local governments, save for a few of the larger municipalities in the Inland Empire, are unlikely to build or operate local travel demand models independently of SCAG. A regional data protocol and data sharing schema where local governments contribute increasing detailed, comprehensive, and timely data to the model will benefit both SCAG and Inland Empire communities.

The data elements that are required for the TDM and which potentially can be re-purposed are:

(1) Transportation network.
(2) Transit service levels.
(3) Land use activities.
(4) Household vehicle ownership.
(5) Vehicle miles traveled – speed, frequency and length of trips.
(6) Changes in travel and land development from highway and passenger rail expansion.
(7) Mode splitting between automobile, transit, carpool, bike, and pedestrian trips.

---

[1] Bowman J.L. and Ben-Akiva M.E. 2001. Activity-based disaggregate travel demand model system with activity schedules. *Transportation Research Part A, Policy and Practice*. Vol. 35:1-28.

[2] [http://www.dot.ca.gov/hq/tpp/offices/orip/rtp/index_files/2007_California_Regional_Transportation_Plan_Guidelines.pdf, Accessed March 13, 2009]

[3] http://www.scag.ca.gov/modeling/mtf/powerpoint/mtf072209ActivityBasedTDM.ppt

Quantifying Greenhouse Gas Reduction

SB 375 mandates sustainable communities strategy (SCS) within regional transportation plans. Sustainable communities strategies are development patterns and other transportation measures that together reduce greenhouse gas emissions from passenger vehicles and light trucks by reducing their total vehicle miles traveled (VMT.) Prior to adopting a sustainable communities strategy, MPOs must quantify the reduction in greenhouse gas emissions projected to be achieved by the SCS.

Importantly, the ways different land development patterns decrease or increase regional aggregate VMT may vary depending on the details of local urban morphology and transportation preferences. Studies and conclusions from other localities might not be directly applicable to the Inland Empire without thorough examination of the similarities and differences in economic structure, demographic composition, and urban structure. Few existing studies and/or benchmarks have the range and disparity in urbanization, industrial activities, and topography observed in the Inland Empire. Rule-based or heuristic land use policies/VMT reductions are unlikely to be sufficient to satisfy the requirement of SB 375.

The trend towards activity-based TDM and integrated land use models in the regional transportation planning process obviously overlaps and would satisfy this requirement. However, this requirement to quantify greenhouse gas emission reduction introduces a different class of "low-threshold" integrated land use models to the repertoire of the GIS planning tools for SB 375 implementation. UPlan, for example, is a very compact and effective GIS-based land use modeling tool that can be used to quantify greenhouse gas emission reduction. Whilst SCAG has the capacity and resources to implement and maintain a more powerful TDM and comprehensive integrated land use model for its planning regions, local cities and sub-regions can use a simpler model, such as UPlan, for alternatives generation and evaluation. Uplan and other potential technical solutions are discussed in Section 5.

In addition to vehicle counts and detection-based collection, commuter surveys are tremendously useful in providing insights to regional VMT aggregates and geographic distribution. Many of the existing surveys are one-off, project-oriented surveys; others, such as SCAQMD's annual major employers' survey do not collect enough geographic information for land use planning. Surveys are expensive and labor intensive. SCAG's most recent transportation survey was released in 2003, with data through 2000; the next survey by SCAG is not expected until 2011 or later[4]. An equally essential consideration is to provide coordination and a clearinghouse for the various commuter and transit surveys throughout the Inland Empire and SCAG planning region. This would provide the maximum reuse and repurposing of survey data, as well as creating opportunities for imaginative spatial data mining to investigate VMT in different geographic areas and among various socio-economic and demographic populations.

Lastly, the proposed AB 1135[5] requires vehicle odometer readings to be included in annual registration renewal. The proposal keeps vehicle owner and address information private and has

[4] http://www.scag.ca.gov/travelsurvey/index.htm
[5] AB 1135 (Skinner) Vehicles: registration renewal.

no mechanism to validate the odometer reading submitted. Nevertheless, this potentially could provide a very valuable source of VMT statistics, although not directly addressing the requirements. Future development of data protocol and tools should incorporate the indispensable data source.

GIS tools and a comprehensive geospatial data repository are required to predict and monitor the reduction in greenhouse gas emissions from strategies developed for the Inland Empire. These tools and geospatial databases include: UPlan-type integrated land use models, VMT/ADT databases, in addition to land use, demographic, and business activities data required in the TDM. The findings of this study point to a conclusion that broad-based local planning participation in SB375 is necessary for optimal implementation, and that most local governments and planning entities require help with geospatial analysis to meaningfully participate in that process. A key part of any such technical assistance effort should be the design, construction and maintenance of a comprehensive geospatial database for SB375 planning use.

Geospatial Data Requirements for Drafting a Sustainable Communities Strategy

SB 375 prescribes a set of tasks in developing a SCS; many of these tasks are relatively straightforward and do not require special tools, per se. Traditional land suitability and capability analysis methodology should suffice for the analytical elements in preparing the SCS. The Inland Empire as a planning entity still needs to develop suitable and consensus criteria for these models, however.

Foremost in the SCS is the requirement to rely on "most recent planning assumptions considering local general plans and other factors" –which are entirely local in nature. At the most pragmatic level, this suggests that in order for a MPO to have a successful SCS, local governments within the planning region need to have changed their general plans beforehand, in anticipation of the SCS.

The following table summarizes geospatial data requirements and, in certain instances, planning data protocol. The two county assessor offices maintain parcel databases for Inland Empire. However these parcel databases, or cadastres, do not provide details about location and intensity of uses. Cities generally can infer location and intensity of uses from business and building permits, or from land use surveys.

Table 2: SB 375 Planning Tasks	
Identify the general location of uses, residential densities, and building densities	• Requires definition of "general location" • Requires definition of unit scale • Regional classification of "uses[6]" • Calculate residential and building densities from general plans, zoning and predicted demand • Calculate actual residential and building densities
Identify areas sufficient to house all the population of the region, including all economic segments of the population	• Requires existing and planned housing stock statistics • Requires housing affordability indices
Identify areas sufficient to house an eight-year projection of the regional housing needs	• Requires existing and planned housing stock statistics • Requires housing affordability indices • Requires RHNA projections and allocations for local areas
Gather and consider the best practically available scientific information regarding resource areas and farmland	• Requires locations and attributes of resources areas and farmland • Requires valuation of resources areas and farmland (for example, Multiple Species Habitat Conservation Plan for Western Riverside[7] and Coachella Valley[8], MSHCP[9])
Set forth a forecasted development pattern, when integrated with the transportation network, and other transportation measures, reduce the greenhouse gas emissions from automobiles and light trucks	• Requires development pattern scenarios
Regional transportation plan to comply with the federal Clean Air Act	

[6] SCAG published a Conceptual Land Use Development Type Definition along with its conceptual SCS [http://www.scag.ca.gov/sb375/data/clus/CLUS_DevelopmentType.xls, Accessed July 2, 2009]
[7] [http://www.rctlma.org/mshcp, Accessed March 13, 2009]
[8] [http://www.cvmshcp.org, Accessed March 13, 2009]
[9] [http://ccb.cmsdev.ucr.edu, Accessed March 13, 2009]

Among these requirements, the most obvious one seems, in fact, most difficult to achieve. The general locations of uses, residential densities, and housing densities depend on a definition of land unit for measurement. Mixed-uses, a particularly important concept to reduce VMT, are especially difficult to measure and report.

Sustainable Communities Projects

SB 375 affords further incentives to development projects; these are Sustainable Communities Projects. Sustainable Communities Projects enjoy full or partial CEQA streamlining; hence removing redundant traffic, transportation, and greenhouse gas emission related studies presently required for CEQA approval. Transit priority projects are principally candidates for sustainable communities projects. There are strict requirements for qualifications. For example, these projects must contain at least 50 percent residential use, and must be located within ½ mile of a major transit stop or high-quality transit corridor included in the regional transportation plan. The projects enjoy full or partial CEQA streamlining, depending on additional environmental criteria.

Cities can employ GIS tools to identify candidate sustainable communities projects after development of the regional transportation plan. The threshold criteria for proximity to transit stops and transit corridors can easily implemented in a GIS. In fact it is probably more efficient to "publish" sustainable communities projects boundary maps along with transit stops or corridors alignments. In any case it is quite unusual for developers to miss any incentive so publicizing CEQA streamlining would not be particularly urgent. However, cities need to be more proactive and can employ GIS tools to inform the regional transportation plan, given the existence of potentially qualifying projects and/or developer and market interests in potentially qualifying projects.

The Housing Element

SB 375 seeks to integrate transportation and land use planning in its prescription for a new planning process for California. It also aligns schedules for the Regional Transportation Plan, the Regional Housing Needs Plan, and General Plan Housing Element revision. This has tremendous implications to the land development process; and impacts all players in the process, including local politicians, planners, and developers.

Although it has been argued that SB 375 does not usurp local land use decision making and control, SCSs in regional transportation plans indirectly drive state-mandated General Plan Housing Element revisions carried out by local governments. Sustainable communities projects, which afford significant benefits in the form of CEQA streamlining, could alter the feasibility of development. Whether sustainable communities projects trump local general plans and zoning ordinances remains to be tested. The relationship between SCS and General Plans and Zoning are circular, as explained earlier.

Many local governments already utilize GIS in their General Plan drafting and revision process. However, analyses performed in the General Plan process are ad hoc and, oftentimes, outsourced to consulting firms. Valuable geospatial data are lost as the plans are completed[10]. Additionally, few local governments have a systemic document management database and/or process to simultaneously maintain the two documents. The introduction of SB 375 data requirements could lead to more widespread use of GIS data and tools in General Plan Housing Element revisions by local governments. A standardized regional repository of housing characteristics, together with the land use and socio-economic protocol, becomes a valuable information asset that not only satisfies SB 375's requirements but also has utility far beyond SB 375.

SB 375 explicitly enumerates items to be included in the housing element revisions. These requirements establish a baseline planning database for local governments in California. The principal focus of the housing element is existing and projected housing needs, population and employment trends. These data elements are required at both regional and local level. Specific to geospatial data are the requirements for:

1) An inventory of land suitable for housing development

2) Vacant sites and sites having potential for redevelopment

3) Zoning of potential development sites

4) Facilities and services accessible to these sites

5) Zone or zones where emergency shelter is allowed as a permitted use

6) Household characteristics, housing characteristics and housing stock conditions.

This land inventory is not unique to planning under SB 375. Other data requirements concern the identification of potential and actual governmental constraints upon the maintenance, improvement, or development of housing for all income levels, including availability of financing, the price of land, and the cost of construction. Given the geographic extents and variations in the Inland Empire, these constraints have significant locational differences.

Finally, at the most fundamental level, general plans and zoning ordinances must be consistent. All general plans and zoning ordinances have a concordance matrix, yet a hierarchical one potentially extending to the SCS-level might also be needed. For example, the Riverside County Planning Department publishes a Riverside County Integrated Project (RCIP) General Plan Land Use Designations – Zoning Consistency Guidelines[11]. Local governments need a GIS-based concordance analysis tool to explore and visualize impacts of the SCS on their individual general plans and zoning ordinances.

---

[10] Jia, X. 2008. Use of GIS Technologies to Facilitate the Transportation Project Programming Process. Leonard Transportation Center, California State University San Bernardino.

[11] http://www.rctlma.org/genplan/content/documents/gp_landUseDesignations_Zoning_Consistency_Guidelines.pdf, Accessed March 11, 2009

Rezoning for the Regional Housing Needs Allocation: SB 375 aligns the revision cycles of the Regional Transportation Plan (4-year cycle) and the Regional Housing Needs Plan (8-year.) It also implicitly requires that the two planning exercises share the same data and assumptions. The development pattern developed in a SCS also informs the Regional Housing Needs Plan and, consequently, governs the regional housing needs allocation. Cities receive state funding when they provides adequate housing to meet the allocated needs.

Housing needs allocations in future revisions are driven by the SCS in the regional transportation plan, rather than the traditional "fair-share" proportioning across all cities. This implies GIS analysis at the MPO level (since allocations are determined at the MPO level). However, local governments need to respond to the allocations within a limited time period, generally 3 years, and rezone sites to make up for any deficiency in the city's housing inventory vis-à-vis the allocation. GIS tools are very useful to screen sites for such rezoning and to evaluate the various environmental as well as socio-economic impacts of the rezoning actions.

Finally, the planning units applicable for rezoning would undoubtedly differ from the planning units used in preparing the sustainable communities strategy. An explicitly developed data protocol is necessary as the rezoning for a regional transportation plan will, almost immediately, become the most recent planning assumptions for the subsequent regional transportation plan. Not having a consistent and systematic document management scheme for general plans and zoning ordinances introduces errors in planning models.

Regional Transportation Improvement Projects Management System

SB 375 alters funding criteria for transportation. SCAG and both CTCs in the Inland Empire have substantial investments in their respective RTIP management information systems. These systems have varying degree of GIS capability. It is unclear if any of these RTIP management information systems is able to evaluate and rank projects based on SB 375 related criteria and performance metrics.

There are three major functional requirements for RTIP management systems in the SB 375 environment that demand a GIS solution. While RTIP funding decisions traditionally do not require elaborate geographic analysis, non GIS-based capital improvement projects (CIP) management systems are inadequate for these requirements. First, the RTIP management system needs to maintain proposed and funded projects for the entire SCAG planning region. The in-fill and/or high density bias demanded by VMT reduction means the distribution of transportation funding could similarly bias coastal regions at the expenses of inland areas. Transparency and accessibility to regional distribution of perspective projects are necessary in equitable funding decisions.

Second, under the SB 375 environment, project evaluation and funding decisions need to consider the land use and housing components as described in the SCS. A GIS-based capital improvement projects management system is needed to support and manage regional transportation improvement projects. Third, the RTIP management system needs to support non-

traditional transportation projects. SB 375 mandates so-called "rural sustainability". These are financial incentives for cities and counties that have resource land or farmland. Local, place-based characteristics are becoming more important in transportation projects funding decisions. A traditional non-geospatial capital projects management system will not have the necessary capabilities to handle place-based characteristics.

Both CTCs and cities require more comprehensive and readily-available geospatial data to evaluate costs, benefits, and merits of projects for funding decisions. SCAG's RTIP is not geo-referenced, although it does have plans for a new system to be in-place for the 2010 RTP revision.

Section 4: Local Government Use of GIS for Transportation Planning and Related Tasks

This section combines and summarizes original research based on interviews conducted by project staff. It also includes some information from a report by Dr. Xudong Jia[12]. Our objectives in conducting the interviews were to ascertain for the local agencies surveyed:

- Which tasks relevant to transportation planning were performed using GIS
- The extent to which the range of applicable GIS capabilities (especially spatial analysis and modeling) were applied to those tasks, where applicable
- The degree of geospatial data integration, data sharing and procedural cooperation across offices or departments within the agency
- The degree to which geospatial data stewardship and GIS analysis was centralized in an enterprise GIS service of the agency (if any)

The survey was done by researching which relevant departments in San Bernardino and Riverside County local agencies were responsible for the identified geospatial planning functions and cold-calling the staff. Additional contacts were made in the manner of a snowball sample, through staff recommendations of colleagues in other departments and agencies. The interview guide used is reproduced in Appendix A of this report, while abridged interview notes with details of reported GIS usage, bureaucratic integration and data sharing by local agencies can be found in Appendix B.

Survey results indicate there is considerable variation in the application and integration of GIS technology in transportation planning and related tasks in inland southern California. The levels of implementation varied from strong to weak to include cities which do not have GIS technology but have utilized private consultants to implement GIS projects. In particular:

- The level of local agency GIS use in transportation planning was low primarily because the level of local agency responsibility for transportation planning is low. With the exception of asset management and capital planning of those minor roads controlled locally, most of these tasks are performed by county-level agencies and MPOs.
- Many smaller local agencies, including smaller MPOs such as WRCOG, lack many types of GIS functionality in practice and also typically lack a centralized geospatial data management repository (enterprise GIS).
- Even in jurisdictions with better developed GIS capabilities, control of geospatial data and GIS analysis was often fragmented across several departments, sometimes in incompatible formats and not always shared

[12] Jia, X. 2008. Use of GIS Technologies to Facilitate the Transportation Project Programming Process. Leonard Transportation Center, California State University San Bernardino.

- The fragmentation of geospatial data and GIS analysis across agencies' departments is an obstacle particularly to the implementation of SB 375, which requires analytic coordination between housing/development and transportation related departments

- The existence of an enterprise GIS staff and data infrastructure did not necessarily prevent the development of separate, sometimes incompatible GIS capabilities and tasking separately controlled by other departments

Riverside County

The cities of Corona and Indio have GIS structures within their Information Technology Department. Other cities including Beaumont, Moreno Valley, Temecula and Murrieta apply GIS technologies through other departments such as Planning and Administrative Services. The city of Riverside has a GIS Team but the department to which it belongs is in flux.

In Riverside County, Corona, Palm Springs, Palm Desert, Perris, Rancho Mirage, Riverside, and San Jacinto use advanced GIS technologies for transportation planning, road construction, maintenance and emergency services. These cities also use GIS in other applications such as: land development, land use planning, environmental programs, law enforcement, and demographics. Over one-half of the cities in Riverside County do not use GIS technology to develop their general plans, but GIS is used in tasks that feed into the general plans. Three Riverside County cities or census designated places (CDPs) - Indian Wells, Norco and Wildomar CDP - have no capabilities in any related areas.

San Bernardino County

Eight San Bernardino cities (Apple Valley, Colton, Fontana, Ontario, Redlands, San Bernardino, Victorville and Yucaipa) have both GIS transportation technologies and the capability for utilizing GIS in other project areas such as: land development, land use planning, environmental programs, law enforcement, and demographics. An additional eight cities in San Bernardino County (Barstow, Big Bear Lake, Chino Hills, Loma Linda, Montclair, Rancho Cucamonga, Rialto, Upland) have no GIS transportation technologies; however, they do have other GIS application projects such as mapping through consultation and minor GIS departments.

There are only two cities, Highland, and Twentynine Palms, that do have transportation GIS technologies, but they do not have other GIS related projects such as land development, land use planning, environmental programs, law enforcement, and demographics. Adelanto, Grand Terrace, Hesperia, Needles, Yucca Valley Crestline CDP, Joshua Tree CDP, Lake Arrowhead CDP, Lucerne CDP, Running Springs CDP, and Wrightwood CDP have no GIS technology that are related to transportation nor other property information management system that could possibly utilize GIS.

According to Gary Carpenter, a transportation planner, in general, the county has been utilizing GIS for 18 years. However, most of the data the county collected had been in CAD with no spatial reference to the past and current projects.

Table 3: GIS Use for Specific Transportation and Land Use Planning Tasks, Paticipating Inland Empire Local Agencies

	Transportation Planning							*Land use planning*				*Other*	
	Capital planning	Traffic reduction/mgmt[a]	Asset Mgmt.	Transit Tracking	Traffic Counts/ Modeling	Public Safety	Parking	Growth mgmt.	Demog / Econ. Devel.	Parcel / Use Mix	Hist. Pres., Recreation + Envir.	Enter-prise GIS?	ADA com-pliance
Cities													
Colton	*	~	*					*			~	*	
Corona		*								*	*	*	~
Fontana	*	*	*	n/a	*	~			*	*		*	
Indio	*	~	*	n/a					*				*
San Bernardino	*	*	*						?	*	~	*	*
Victorville													
MPOs													
SANBAG	~	*		~	*			*		*	~	~	
SANDAG	~	*		*	*			*	*	*		*	
WRCOG					~			~					

* = well developed; ~ = partially developed or in development.

a: Includes rideshare, pedestrian and bike planning, large employer locations, special events routing, etc.

Conclusion: Gap analysis of local GIS capabilities relative to SB 375 planning tasks

Eighteen out of fifty-five cities in Inland Empire utilize advanced GIS technologies on transportation projects such as road construction, maintenance and emergency services. These cities also utilize GIS in other applications such as land development, land use planning, environmental programs, law enforcement, and demographics. A sizeable number of the Inland Empire's cities, about one-half, do not utilize GIS technology within their general plan, but the GIS technology applications are available in other sectors of their general plan implementation such as land development, land use planning, environmental programs, law enforcement, and demographics.

In addition, some of the regional agencies that serve the Inland Empire use advanced GIS technologies while others do not possess any GIS applications at all. For instance, Southern California Association of Governments (SCAG), the top level metropolitan planning organization for the two counties, has three departments that utilize GIS. SANBAG, the subregional MPO for San Bernardino County has advanced GIS technologies ranging from interactive Maps to Ariel Photos. WRCOG agency has a transportation department, but no GIS staff, just the IT Administrator. Meanwhile, RTA has no GIS capabilities for servicing its bus operations, instead it utilizes Google Earth.

We conclude that none of the local agencies in the study area has the capability to independently run transportation demand models. They could conceivably plug formulas or thresholds gleaned from existing TDMs into various stages of SB 375 planning analysis, but even this would probably require technical assistance because of the lack of familiarity with existing models. Moreover, no local agency could generate estimates of VMT reductions associated with various development scenarios from scratch, although many could presumably do so with UPlan if they could prioritize the learning curve. Few if any local agencies could perform automated database prospecting for potential TOD or infill sites, let alone score their suitability relative to each other (the latter would require parameters derived from TDM modeling). Finally, few if any local agencies could perform network analysis or otherwise align improvements or modifications in transportation service with desired land use development.

We conclude from this assessment that local planning participation in the SB 375 process, which has been identified as essential to the success of the law, will require considerable technical assistance. In the first instance relevant data that is uniform across (at least) MPO regions and automated GIS based prospecting and analysis tools customized for SB 375 implementation should be developed and made available to the relevant local agencies. If possible, training of local agency professionals in the use of the data and the analysis tools would be desirable.

Section 5: Data and Tools for SB375 Implementation

Statistical Tools

SB 375 implicitly requires a comprehensive list of geospatial information and analytic tasks for the development both of the Sustainable Communities Strategy and of the General Plan Housing Element revision. These elements describe land use characteristics, for example the density and intensity of use for areas within the planning region. The language in the bill fully described this list, as explained in the previous section. Given our belief that the SB375 process is best served by broad-based local government participation, and our conclusion that considerable help would be required for most local governments to achieve such participation, we believe a standard collection of statistical protocols and a toolkit for their implementation should be developed to assist local governments in that effort.

These tools would analyze parcel-level and other local inputs and generate the complete list of land use and socio-economic characteristics for all levels of analysis; from larger city level aggregates, to planning areas, and traffic analysis zones. This type of tool is common in planning, but seldom is there a mandate to include a specific set to use in both land use and transportation planning process, and to be included in planning documents. To our knowledge none of these tools are adapted to assist in SB375 planning with its specific requirements and targets.

The proposed tools would operate on a set of geospatial data layers including a snapshot of initial conditions in the focus area for growth simulation and predictions. Other geospatial data layers required for the analysis include general plans and zoning ordinances throughout the entire planning area (to satisfy the SB 375 requirement that Sustainable Communities Strategy must respect most current planning and land use assumptions).

The development pattern from the Sustainable Communities Strategy is another data overlay. The Sustainable Communities Strategy is both an input and an output for many of the tools. During the conceptualization and development phases of the Regional Transportation Plan, draft development patterns are developed and analyzed. During the implementation of the Regional Transportation Plan, the development pattern becomes one of the documents guiding project choices and performance monitoring.

Ghg Emission Reduction Heuristic

One of the key performance indices under SB 375 is the reduction of Ghg emission. The bill mandates MPOs to reduce Ghg emission by reducing VMT, through land use decisions, and by other transportation measures. Estimates of VMT reduction resulting from land use policies traditionally rely on TDMs. The demand model relies on the geographic distribution of economic activities and behavioral assumptions to estimate transportation demand and miles traveled. TDM simulations are resource intensive; they are time consuming and require significant expertise. Some sort of heuristic model is needed to assist planners in land use design and planning. These heuristics lower the level of resources and efforts to obtain a quick indication of the effectiveness of any land use policy, especially local-scale land use policy. That said, even simplified models can be adjusted to reflect new information regarding the particularities of local transportation behavior in particular regions such as the Inland Empire.

In addition to planning heuristics, there are existing planning and modeling tools operating within a GIS framework that perform some of the basic tasks associated with SB375 planning[13]. As general planning tools, however, such software is not designed to address all the specific planning tasks, nor any of the legislated technical criteria necessary for SB375 implementation; moreover none of them explicitly link development models to transportation improvement and capital planning. Nevertheless, customized SB375 tools can, and for efficiency's sake should, adapt some elements of existing tools in addition to developing new capabilities for the specific needs of SB375 implementation.

Among existing GIS planning tools of this type, UPlan is the most suitable for specialized SB375 modification. UPlan is a simple ArcView GIS extension that includes several models for transportation planning and analysis of the growth inducing effects of new developments. UPlan has three operational characteristics: it is simple, rule-based, and intended for regional or county level scenario modeling of urban growth. The model is simple because it uses straightforward demographic data (residential and employment). Second, it is governed by set of rules regarding the, attraction and inhibition of both residential and employment growth.

Third, UPlan is inexpensive to run. The model has been tested on the 1969 NEPA assessments for joint land use and transportation planning. Therefore, to implement the UPlan models on SB375 mandates (for regional transportation and housing) may be useful in facilitating the assessment of the regional transportation and housing projects for VMT role in GHG reduction analysis as mandated by the bill. However, integration of RTIP models with UPlan which requires secondary transportation models render the models more complex.

UPlan is excellent for allocating the various categories of land uses to predefined complex growth areas. In general, UPlan models are applicable in a wide variety of rural, suburban, and urban settings, a good fit for SB 375 mandates for the "rural sustainability." Furthermore, UPlan is capable of addressing concerns of residents and other interest groups, for the models iterate the land use model with the travel model. The models make improvement over the past travel demand models, both theoretically and operationally.

UPlan could potentially accommodate SB 375 transportation projects mandates; however, the transportation projects models within UPlan are complex and may require execution of secondary models. Finally, since about two-thirds of cities, within the Inland Empire directly or indirectly utilize GIS technologies, it will make the adaptation of UPlan models much easier for the region's transportation and housing modeling.

Tools for Zoning and Rezoning

Cities desiring to accommodate Regional Housing Needs Allocations need geospatial tools to estimate the existing and planned housing stocks for all the income groups. Local governments also need to rezone areas if they cannot fully accommodate the allocation. Cities have only a relatively short period of time to make adjustments to accommodate the allocated housing units. Rezoning decisions rely on site factors as well as regional relationships of the areas intended for zoning changes. Significant aspects of these decisions are thus driven by traditional land capability and suitability analysis.

[13] For links to a variety of such available tools, as well as monographs and related resources, see http://www.smartcommunities.ncat.org/landuse/tools.shtml

In-fill Parcels Inventory

There are obvious parallels between rezoning land to accommodate housing allocations and in-fill developments. Existing In-fill parcels locator tools are available from Berkeley and UCLA. These tools allow users, mostly assumed to be developers, to "prospect" underutilized land parcels. Additional geospatial tools are required to provide further insights to in-fill parcels. These are the same suitability and capability analyses that highlight why certain parcels are underutilized.

The Pilot California Infill Parcel Locator[14] is maintained at the Institute of Urban and Regional Development (IURD) at the University of California, Berkeley. It was one outcomes of the California Statewide Infill Study, conducted during 2004 and 2005. Data on the site has not been updated. The site relies on an improvement-value-to-land-value (IL) ratio to select potential parcels for infill development, in addition to vacuum parcels.

The following highlight the features of the study and web site[15].

- Introduces a new tool, the California Infill Parcel Locator, a web-based, searchable geo-coded parcel inventory to facilitate and promote additional infill housing development.
- Provide a statewide perspective on the potential to address a portion of California's housing need through infill development.
- Provide an analysis of some of the opportunities and limitations of expanding infill housing development potential.
- Provide a theoretical estimate of potential infill development parcels, acreage, and housing development capacity for different regions of the state and statewide.
- Describe a methodology for identifying potential parcels for infill housing development.

The Land Opportunities Tracking System (CA LOTS) is another infill tool. Its stated objective is to [serve] as an interactive web portal that addresses the issue of information barriers in promoting infill development by providing a rich database within a mapping platform. The system allows users to query as well as spatially map various characteristics that collectively provide information on potential for infill development." [16] The site has grown from a project at the UCLA Center for Neighborhood Knowledge focusing only within Los Angeles[17] to being currently operated in partnership with SCAG, covering the entire SCAG region.

Data available on CA LOTS include the SCAG TAZ (Traffic Analysis Zones) population, employment, and household data; the 2000 Census data; and property data. The site is jointly maintained by UCLA Center for Neighborhood Knowledge and SCAG; it does not seem to be actively updated at this time.

Many factors can cause significant land-rent gaps (areas of suboptimal density and development). Rather sophisticated analyses are required to tease out these factors. Many of these factors are geographic in nature; they require an understanding of spatial situation of underutilized parcels. Lack of transportation, retail, services and amenities can severely limit the utility of a piece of land.

---

[14] [http://infill.gisc.berkeley.edu/about.html, Accessed July 1, 2009.]
[15] Ibid.
[16] [http://164.67.52.33/scalotsdev/Master.cfm?Content=AboutUs/AboutCALOTS&SubContent=LALOTS.cfm&CFID=39893&CFTOKEN=79182294, Accessed July 1, 2009.]
[17] [http://lots.ucla.edu/Master.cfm?Content=AboutUs&SubContent=AboutUs.cfm, Accessed July 1, 2009.]

The corollary to identifying existing in-fill opportunity is that eventually growth requires local governments to create additional in-fill opportunities by up-zoning low density areas. Land suitability, its capability, limitations, and compatibility with neighboring uses determine whether a particular parcel is a candidate for up-zoning or re-zoning.

Transit Oriented Development Projects

Along with in-fill developments, transit-oriented developments are of particular interest under SB 375. SB 375 specifically exempts certain development projects from EIR requirements. These Sustainable Communities Projects enjoy CEQA streamlining including, in some cases, exemption from the CEQA process.

SB 375 establishes criteria to qualifying transit-oriented projects. These criteria include density of development, its composition, and its proximity to transit hubs and corridors. These projects must be deemed consistent with the Sustainable Communities Strategy in the approved Regional Transportation Plan. Geospatial analytic tools can easily determine the minimal qualifications of proposed projects. And they can delineate areas for potential projects—buffer zones around transit hubs and corridors. Ideally, the tools to be developed will not only determine if potential TOD sites meet minimum qualification thresholds, they will score the suitability and desirability of a set of sites for TOD development. This will allow planners to rank potential sites based on their relative desirability for TOD development under the terms of SB375.

RTIP Funding and Projects Management

A regional capital improvement projects/programs management system needs to supplement the current RTIP funding reports. SB 375 allows funding for rural-sustainability that differs from conventional RTIP transportation funding on road and highway projects. Additional emphases on transit and rail projects demand better regional visibility to funding decisions. The regional perspective of Sustainability Communities Strategy means RTIP funding decisions need to be displayed geographically. Improved visibility of projects is required to help these projects "make the business cases".
Beyond the traditional roles in visualization, GIS has been gaining in the full life-cycle of capital improvement programs. Except for the few region-wide projects, the majority of capital improvement projects are geographically dispersed and keeping track of them geographically (i.e. using GIS) is preferable in order to clearly identify the location and scope of potential projects.

GIS has been utilized extensively by many agencies for capital project selections. A regional-level project management system is needed to bridge SCAG with its subregions and county transportation commissions. Project selection criteria inevitably contain environmental considerations. Geospatial tools are needed to fully understand the combined effects of geographic and non-geographic distributed impacts and benefits for potential projects. Distributions of funding for transportation improvement projects are geographically sensitive. Equitable distributions of funding and benefits must be balanced with urgency of the improvements.

Once projects are vetted and funded, significant gains are enjoyed simply by scheduling nearby projects wisely. Breaking up the same pavement twice is always expensive and an annoyance to citizens. Finally, with today's trip planning tools, traffic web sites, and on-line GPS navigation devices, a spatially managed capital project monitoring and outreach process adds tremendous value to a GIS-based capital improvement program management system.

Conclusion

The last two sections cover data requirements, analytical protocols, and a toolkit for the SB 375 implementation, especially from the perspective of cities and local governments in the Inland Empire. Many geospatial analytical and descriptive tools are necessary for an integrated land use and transportation planning regime. Tools have been built for planning, EIR, and EIS for individual client agencies but seldom has there been an opportunity such as that presented by SB 375 to develop a toolkit to unify and coordinate so many related planning tasks.

Site suitability and capability analysis tools are the mainstay of GIS tools in land use planning. For SB 375, these tools take on very specific applications in (a) Infill development and parcel inventory, and (b) TOD targeting. SB 375 gives impetus to refine and expand the pilot California Infill Parcel Locator and CA LOTS. What these tools currently lack are the ability to study and "create" infill opportunities. Simply having a mechanism to prospect under-utilized parcels is not adequate for long-term regional land-use and transportation planning. The SB 375 toolkit needs to incorporate tools to create infill opportunities and to make sure support for social, environmental, and utility infrastructure is available for infill developments.

Ghg emission reduction is an added criterion in evaluation the regional transportation plan; it is as important as other evaluation metrics. Tools for VMT and Ghg emission reduction estimates are integral parts of the SB 375. In fact the bill specifically required the CARB to certify such tools even before the MPOs proceed with the regional transportation planning process in the 2012 cycle. All TDMs, with obvious caveats, can output VMT, and consequently derive Ghg emission estimates. However, such modeling exercises are expensive and time consuming for scenario testing and for local governments. The proposed SB 375 toolkit should incorporate heuristic tools that do not require a full-scale TDM in order to generate meaningful Ghg emission reduction estimates.

Finally, the discussions cover Capital Improvement Project management systems, specifically GIS-based systems for regional transportation improvement program.
Discussions in the last two sections left out a number of critical geographic aspects of SB 375 implementation because these do not directly represent feasible analytical modules in the toolkit. These are nonetheless important analyses needing attentions. The three most crucial geographic aspects are: (a) regional and local financial analyses, (b) geographic and environmental equality, and (c) program implementation monitoring.

Specific technical criteria for an SB 375 analytic protocol and toolkit:

- The SB 375 toolkit and data should run under ArcGIS 9.x.
- The toolkit should incorporate and extend existing GIS-based planning tools
- Both the toolkit and associated data holdings will be made available to local governmental agencies with SB 375 planning responsibilities.

Appendix A: Interview Guide for Municipal GIS Use in Transport Planning

Part 1: Institutional Considerations and Data Sharing

Note: for county or MPO (e.g. SCAG) professionals switch county/MPO with city

1. Do you run an enterprise GIS - defined as a system that can share geospatial data and services among all departments of the city?
2. Please explain the other agencies in your city that regularly use GIS and which applications they use it for.
3. Describe the GIS data sharing practices and requests for geospatial information services between agencies in your municipality
4. Please describe in detail your geospatial data sharing relationship with metropolitan planning organizations (MPOs) such as Southern California Association of Governments and (name relevant sub-regional MPO): Which geospatial data do they request from you? Which geospatial data do you acquire from MPOs for local use?
5. Are you familiar with the provisions of Senate Bill SB375, which requires MPO allocation of transportation to reduce emissions? Have you considered how to document compliance?

Part 2: Describe if/how your city uses GIS for the following tasks:

Capital Planning	Project Development & Management
Land Use Planning	Walkable environments Growth Management/Sprawl reduction Use mix/parcel information/Zonng Economic Development Historic Preservation Recreational Space/Parks Environmental/Wildlife Protection
Transportation Planning	Traffic Reduction (Rideshare, Van Pool) Transit stops/stations Transit Ridership Street capacity analysis and improvements Air quality Parking
Mapping and Data Management	Basemap Road Edges Routable Network (centerline) Routable Network (pedestrian) ADA Assess Point-of-Interests (landmarks) Demographic and Economic Data Map production

Appendix B: Interviews Regarding Local Agency GIS Use for Transportation and Land Use Planning

City: Colton

Part 1: Institutional Considerations and Data Sharing

The City of Colton maintains an enterprise GIS system using ArcGIS. The interviewee is the only GIS professional at the city, though there are power users within other departments who can create/modify base maps for their own needs (ArcSD). Others within the city can access ArcIMS, a web application, for light duty GIS needs.

Two departments have GIS power users who utilize GIS on a regular basis (10-20 hours/week): public works and electric (the city has its own utilities – power and water).

Interviewee noted that he shares his GIS information with most anyone who needs it, including contractors (e.g., working on water infrastructure) and the public, though there are limits to what information the public can have.

The city does not have a strong relationship or data sharing arrangement with any of the MPOs. Their base parcel and street information comes from San Bernardino County (all cities rely on the county for this), so it is surmised that any data requests from SANBAG or SCAG would go through San Bernardino County.

The interviewee was not familiar with SB 375, which interviewer briefed him on. Because the main compliance with this legislation is with the MPOs, which have three years to devise and implement Sustainable Community Strategies, it is not expected to filter down to the city level quite yet.

Part 2: GIS for specific tasks

Public transit: It was stated that they get what they need from Caltrans.

Routing: They don't have a system based on streets, but they have used GIS for truck routing.

Ridership/yield: Might be under Public Works.

Asset Management: The layers exist, and there is a payment management system in place based on GIS.

Traffic and Navigation - Major Events/Street Closures: GIS not currently used for this, but it could be utilized for supporting street closures related to major events.

Traffic Reduction - Bike paths: GIS is used for their bike paths; a new one was recently created.

Public Safety - interviewee stated that the Emergency Services group might use GIS for Highway Safety and HazMat routes.

Capital Improvement Projects (CIPs) - Project Development: Yes, GIS is used for CIPs.

Environmental Compliance: Endangered species habitats within the city have been mapped.

Mapping and Data Management

Basemap: The city gets info from San Bernardino County (parcels and streets) and builds off of that; also mentioned high quality aerial photography.

Road Edges: They are currently mapping curbsides and gutters.

Routable Network (centerline): They store addresses; spatially rectified; linear (real world); rights of way.

Routable Network (pedestrian): They are working on sidewalks right now, including the north side of Main St., which needs to be resurfaced. I mentioned crosswalks, which he said they haven't mapped, but he thought it was a good idea.

ADA Access: Access wasn't really addressed, but it was mentioned that they have mapped locations where people need to have continuous power for health reasons (e.g., respirators).

Points-of-Interest (landmarks): Yes – City Hall, parks, schools, museums, etc. have been mapped.

Demographic Data: This is well used. They get this information from their vendor (Claritas), who provides them with raw data the city can then manipulate.

Economic Data: same as Demographic Data (Claritas).

City: Corona

Part 1: Institutional Considerations and Data Sharing

The City of Corona maintains what can be characterized as an enterprise GIS system. The interviewee is one of two GIS professionals at the city, though there are users within other departments.

Other departments (e.g., public works, police, planning, engineering) have a total of 18 GIS users who utilize GIS on a regular basis (ArcView), with 6-8 of those being experienced users.

The City of Corona maintains its own parcel map, district, planning, street, water/sewer, storm drain, and lighting info. The GIS department there started in earnest in 1994.

While various groups do use GIS, several, such as planning and fire, rely heavily on GIS staff for their geospatial data needs.

We were informed that the city does freely share information with other entities, city contractors and the public (to a limited degree). They also get data requests from the MPOs – WRCOG and SCAG. Requests have included information about the city's general plan, zoning, land use and transportation system.

The interviewee was not familiar with SB 375. Because the main compliance with this legislation is with the MPOs, which have three years to devise and implement Sustainable Community Strategies, it is not expected to filter down to the city level quite yet.

Part 2: GIS for specific tasks

Capital Planning - The GIS department hasn't done much, although they noted that the public works department uses GIS for capital projects.

Land Use Planning - They haven't necessarily mapped walkable environments, but they have used GIS for mapping safe routes to schools.

It was also mentioned that the city has a bicycle master plan, which they are revising, but it wasn't mapped in GIS.

The GIS group has recently assisted the planning department with updating the housing element portion of its general plan, including creating a data store of the city's historic homes, as well as homes that have been defaulted on.

They have mapped recreation areas and park space, including detailed maps of city parks. However, nothing has been done regarding environmental/wildlife mapping.

Transportation Planning - Traffic reduction efforts by the city are the result of AQMD rules to reduce traffic (employers with 250 or more employees). Corona has a van pool system for city employees and is working on a system to map large employer locations with residential areas to assist in helping them better coordinate ride shares/van pools.

Corona has a two-line bus system (red and blue lines) with roughly 5 buses that have AVL systems for tracking. They also operate a nine-vehicle dial-a-ride service. While their bus service is city-owned, it is operated by a vendor (Route Match).

Eventually, the city wants to map transit location data, including: distance between and location of transit stops; planning for future amenities; tracking and displaying ETAs; and tracking on-time performance. They also have the ability (via Safety Vision) and eventually want to conduct ridership counts, as well as determine how many riders board/exit buses at each stop.

The city has a traffic automation/monitoring group that has shape file information on centerline data (note: for mapping and data management section). They can also conduct traffic counts and store those within shape files.

Items such as air quality and parking within the city are not currently captured.

As far as ADA Access goes, the city has the required ¾ mile from public transit area mapped, which even goes slightly into the City of Norco to the north.

The GIS department definitely works on producing maps needed on an ad-hoc basis throughout the city.

City: Fontana

Part 1: Institutional Considerations and Data Sharing

The GIS group within Information Technology Department (ITD) under the Administrative Services Organization maintains an enterprise GIS for all city departments. The group maintains an enterprise ArcSDE database and a number of intranet web mapping applications. The Sewerage Browser, originally built for Public Works, has since been deployed to all departments, including the City Hall front-counter. Most departments use

the Browser to lookup parcels, ignoring the sewerage data layers. Presently the group is retooling the Browser, and building a custom web-base GIS application for the front-counter.

The enterprise GIS deployed at the City of Fontana has a number of significant features. It is tightly integrated with two existing enterprise applications. The City relies on GBA Master Series (www.gbaMS.com) –a specialized, third-party ArcGIS application—for asset management. Since gbaMS is built on the ArcGIS platform, the enterprise GIS inevitably becomes a critical component of the application. The Laserfiche (www.Laserfiche.com) Document Management System is deployed throughout the city. Many of the documents, especially plans and maps, are geo-referenced and integrated with the enterprise GIS.
In the summer of 2008, the City has hired Information Strategies (http://www.infostrat.com) to implement a building permitting and code enforcement application. ITD has a 2-year implementation plan for the application. The proof-of-concept is expected to be completed in the coming weeks. The enterprise GIS is prominent in this application.

Of all the departments, only ITD and the Department of Engineering have GIS professionals on staff. The GIS group in ITD has 3 full-time GIS professionals; the group within the Department of Engineering has 2. Both groups have contractors on-site, as well as have outsourced some their GIS operations to vendors.
The Department of Engineering is the responsible local agency for the review and tracking of residential, commercial, and industrial subdivisions for conformance with the State of California Subdivision Map Act (often referred to as the "Map Act"). A subdivision, whether tract map or parcel map, is the means by which land is officially and legally subdivided, thus creating defined parcels of land for sale, financing, leasing or building purposes. In addition to being the responsible "local agency", the Department of Engineering also functions as the City's primary contact with other regional agencies such as the California Department of Transportation (CALTRANS), the San Bernardino Association of Governments (SANBAG, SANBAG-Measure I),the San Bernardino County Flood Control District (SBCFCD), and the Inland Empire Utility Agency (IEUA). All regional public infrastructure projects such as the I-10 Sierra Freeway Interchange, the Freeway 210 construction project, flood control channel improvements for the San Sevaine Channel and West Fontana Channel, and the master sanitary sewer trunk line improvements known as the Etiwanda Trunk Sewer, are coordinated through the Department of Engineering.

ITD does not share geospatial data with MPOs

Part 2: GIS for specific tasks

Highway, Planning and Modeling - Fontana's GIS office does not utilize any highway planning and modeling GIS application. Highway, Asset Management.

Highway asset management is handled in gbaMS. ITD maintains the enterprise database and GIS for gbaMS. GbaMS modules deployed at the City include: (1) sewer, (2) street, (3) pavement, (4) sign, (5) signals, (6) lights, (7) right-of-way, (8) parks, (9) trees, and (10) work order. Bridges and overpasses within the city limits are maintained by Caltrans.

An article from the City's GIS/gbaMS recently appeared in ArcNews (article).

Highway, Monitoring and Performance Evaluation - The City's Traffic Control Center performs highway and traffic monitoring and performance evaluation. This is supported by the Department of Engineering's GIS group. A specialized application –CrossRoad—manages traffic counts and accidents.

Transit - The City of Fontana does not provide transit services. Omnitrans provides bus and public transits for the area. The Metrolink commuter rail system has a station in Fontana.

Traffic and Navigation - Regional Major Trip Producers, Major Local Destinations, and Major Events/Street Closure: The California Speedway is the most significant destination that impacts traffic. The Police Department is responsible for traffic and street closures during Speedway events.

Trip Planning - The City of Fontana ITD does not provide trip planning services.

Traffic Reduction - The GIS group provides no data or application services for rideshare, van pool or bike path. The City's HR Department has an employee rideshare program but it is not GIS-based.

Public Safety, Air Quality - The City's enterprise GIS has no air quality data.

Public Safety, Highway Safety - The City's enterprise GIS has no highway safety data.

Public Safety, Accident Hotspots - The CrossRoad traffic application reports highway accident hotspots. This information is not integrated with the City's enterprise GIS.

Public Safety, HazMat Routes - The Police Department has HazMat routes in its Emergency Operations Center. The routes are maintained as shapefiles that can be overlaid on base maps from the enterprise GIS. HazMat routes are no uploaded to the enterprise GIS.

Capital Improvement Projects - The Department of Engineering's GIS group maintains footprints and designs for all capital improvement projects. These project shapefiles are kept at the Department of Engineering, and are not uploaded to the enterprise GIS.

Mapping and Data Management, base map - The GIS group is responsible for the City's base map and aerial photography. The GIS group obtains parcel data from the County. The group recently was awarded a contract by the Census Bureau to update the Master Address Table.

Mapping and Data Management, road edges - The City currently does not have road edges. However, the Department of Engineering is in the process of building a storm drain database which can approximate road edges.

Mapping and Data Management, routable network (centerlines) - The City currently does not maintain a routable street network. Since there are no one-way streets in the City of Fontana, the existing street segments can easily be built into a routable network. Police and emergency dispatch have an independent dispatch center which does not rely on the enterprise GIS for data.

Mapping and Data Management, routable network (pedestrian) - The City does not maintain a routable pedestrian network.

Mapping and Data Management, ADA Access - The City currently does not have a comprehensive ADA Access dataset.

Mapping and Data Management, Point-of-interest, landmarks - The City's enterprise GIS maintains a conventional landmarks dataset including, schools, hospitals, parks, civic and cultural centers, and so on.

Mapping and Data Management, Demographic and Economic Data - The City is in the process of licensing ESRI's Business Analyst Online. This online service will provide more up-to-date demographic and economic data than presently available from the Census Bureau and MPOs.

City: Indio

Part 1: Institutional Considerations and Data Sharing

The City of Indio maintains an enterprise GIS system. The interviewee is one of two GIS professionals at the city, though there are users within other departments.

Three departments have a total of 8-10 GIS users who utilize GIS on a regular basis (10-20 hours/week): Indio Water Authority (IWA), Police and Development Services.

Emina noted that the City of Indio usually purchases GIS data from TLMA (Riverside County Transportation and Land Management Authority). That data is neither shared nor sold to any agencies or private parties. In-house created data is available for share only after the other party (agency, consulting firm that works on City's projects) signs an End User License Agreement

I was informed that the city does not have a relationship or data sharing arrangement with any of the MPOs. It is surmised that any data requests from WRCOG or SCAG would go through Riverside County TLMA.

The interviewee was not familiar with SB 375. Because the main compliance with this legislation is with the MPOs, which have three years to devise and implement Sustainable Community Strategies, it is not expected to filter down to the city level quite yet.

Part 2: GIS for transport-related tasks

Asset Management -

- Pavement: The city has a pavement management system that can be mapped in GIS.
- Structure: Currently creating a Building Block Data / exist / database in a different system.
- Signage: Inventory with another system compatible with GIS, but not yet integrated.
- Lights: same as above
- Transit – N/A

Traffic and Navigation -

- Major Events/Street Closures: Simple mapping.
- Traffic Reduction
- Bike paths: Currently in progress with a consultant and a Coachella Valley consortium.
- Public Safety – none

Capital Improvement Projects (CIPs) -

- Project Development: Mapped.

- Mapping and Data Management

Basemap, Road Edges, Routable Network (centerline), and Routable Network (pedestrian): Consultant currently finalizing.

ADA Access: Mapped.

Demographic Data: Submitted to LUCA program for finalizing Census 2010.

City: San Bernardino

Part 1: Institutional Considerations and Data Sharing

The City of San Bernardino maintains an enterprise GIS system. The interviewee is one of two GIS professionals at the city, though there are users within other departments. Only one person is totally dedicated to GIS, as they run the email and other IT systems as well.

The water department (called San Bernardino Metropolitan Water District – but not a city entity) and economic development (EDA) group have GIS users.

The City of San Bernardino gets parcel map and street data from the county. The GIS department started in 1987.

While various groups do use GIS, most, such as planning, rely heavily on GIS staff for their geospatial data needs.

We were informed that the city does freely share information with other entities, city contractors and the public (to a limited degree). They do not often interact with MPOs, but their last contact with SCAG was to provide zoning layers. However, the city will work with either SANBAG or SCAG over the next few years pursuant to the decennial census (2010).

The interviewee was not familiar with SB 375.

Part 2: GIS for specific tasks

Capital Planning - They produce CIP maps every year, which are heavily used by the planning department.

Land Use Planning - They have mapped bike trails within the city. A project is in the works to restore part of the Santa Ana River to a more natural state, and this will include walking and biking trails, which will be mapped.

Every parcel has zoning information, and when there are multiple zones (overlays), additional layers are created to reflect that and store data.

The GIS group has provided information layers of data to EDA for a while.

Historic preservation was mapped when the GIS group was formed, but nothing has been updated since. It was noted that most historic buildings were torn down before their value was recognized.

They have mapped recreation areas and park space, including detailed maps of city parks, as well as police and fire facilities.

They have received information on the endangered San Bernardino kangaroo rat (SBKR) from SB MWD, as well as a liquefaction map.

Transportation Planning – Traffic reduction efforts by the city are the result of AQMD rules to reduce traffic (employers with 250 or more employees). San Bernardino has a van pool system for city employees and is working on a system to map large employer locations with residential areas to assist in helping them better coordinate ride shares/van pools.

San Bernardino has a two-line bus system (red and blue lines) with roughly 5 buses that have AVL systems for tracking. They also operate a nine-vehicle dial-a-ride service. While their bus service is city-owned, it is operated by a vendor (Route Match).

Eventually, the city wants to map transit location data, including: distance between and location of transit stops; planning for future amenities; tracking and displaying ETAs; and tracking on-time performance. They also have the ability (via Safety Vision) and eventually want to conduct ridership counts, as well as determine how many riders board/exit buses at each stop.

The city has a traffic automation/monitoring group that has shape file information on centerline data (note: for mapping and data management section). They can also conduct traffic counts and store those within shape files.

Items such as air quality and parking within the city are not currently captured.

Mapping and Data Management – They have their major facilities mapped in GIS.

The city created a map of ADA compliant features such as crosswalk ramps about five years ago.

The city currently gets demographic and economic data from ESRI's Business Analyst software (originally received data from SCAG and then Claritas).

The GIS department definitely works on producing maps needed on an ad-hoc basis throughout the city.

City: Victorville

The City of Victorville is just getting started with GIS. They don't have any kind of plan or process right now; they get their centerline data from the county – arterials, super arterials, circulation element only.

Right now the city is doing a lot of data conversion after going through a needs analysis: mapping all of striping, lines, signage – down the line after water and sewer get mapped. Biggest obstacle – getting people reassigned for data conversion project. They are also establishing RoWs.

Due to the recent slowdown in the economy/development, they have been able to take over maintaining their own parcel base changes: tracts, deeds, and easements. The Development division (includes planning, building, development engineering and code enforcement) maintains zoning and circulation.

They are not yet in a position to do any spatial analysis, but will establish an enterprise GIS; they currently have a web-based system. They are using ArcGIS – 9.3 conversion upgrade this week.

Within engineering they have 3 seats of ARCinfo and 4 seats ARCView.

Their Assistant Engineer is also the city's Traffic Engineer.

Metropolitan Planning Organizations (MPOs)

San Bernardino Association of Governments (SANBAG)

Part 1: Institutional Considerations and Data Sharing

SANBAG maintains what can be characterized as a quasi-enterprise GIS system, which includes ArcSD and IMS. The interviewee is one of two GIS professionals at the city. The other is the former Data Program Administrator who works part-time

SANBAG works with the state's Traffic Collision Monitoring System, which uses Office of Traffic Safety (OTS) data. SANBAG stores this in GIS format at the county level. The interviewee indicated that though they haven't done so yet, SANBAG may possibly use the data to do studies incorporating traffic counts and accident info and make their analyses available via active server pages (ASP) on their website and incorporate with Google Maps for easy viewing.

Other departments mainly use the IMS interface to access GIS data and go to the GIS group for their needs.

SANBAG has an agreement to share geospatial (centerline, parcel) data with San Bernardino County. Staff can access the County's server using a VPN to get what they need.

The interviewee had heard of, but was not familiar with SB 375. He believed it was under SCAG's purview as regional MPO, with SANBAG only being a COG

Part 2: GIS for specific tasks

Capital Planning - The GIS department creates mostly simple maps for projects/development. It was stated that SANBAG currently has 25-30 major projects (e.g., I-215 widening, interchanges), with several hundred other small ones in various stages of progress within the planning department.

Land Use Planning -SANBAG maintains a parcel-level land use file (partially funded with OWP funds delivered via SCAG) and does not rely on the cities for input, though it does work with them on interpreting local zoning and land use designations in order to find common ground (e.g., differences in cities' residential designations) for building a county-wide LU map, which is based on SCAG's LU classifications.

SANBAG is working with its member cities on mapping critical and other wildlife habitat, but it is not a priority at this time.

Transportation Planning - SANBAG uses ModelBuilder within ArcGIS for modeling and forecasting, and this information is sent to SCAG to do high-level regional transportation planning, which is then sent to SANBAG's transportation planning group.

It was also noted that SANBAG participates with other SCAG agencies (minus Imperial County) on the CommuteSmart.info website.

Other Information - Synchro software is used for 3D modeling and forecasting of things such as highway interchanges to determine potential impacts of projects.

The Programming department is responsible for overseeing financial aspects of projects (e.g., CMAQ (Congestion Mitigation and Air Quality) and Measure I fund distribution and use), while Planning handles the actual planning and logistics.

There is no IT department within SANBAG – it is outsourced to a company in Texas, though Cameron maintains a server for some of his needs.

San Diego Association of Governments (SANDAG)

Part 1: Institutional Considerations and Data Sharing

SANDAG operates an enterprise GIS using ArcGIS 9.3. Many groups throughout the organization use the system, including planning. There are roughly 20 users overall. GIS is used to store finished data, while intermediate data are stored on network file servers and local drives.

There is a joint San Diego Regional GIS Council within the region, and SANGIS is used for storing and extracting current GIS data that is shared across agencies/cities. There are approximately 300 layers of data, including roads and parcels. Along with various governmental agencies, the public has access to this information as well.

SANDAG itself deals with long-range modeling and planning, including producing traffic counts, vehicle miles traveled (VMTs), ADTs and other data. Caltrans has remote access to the data and models produced by SANDAG. The City of San Diego also utilizes this resource, though not to the same degree as Caltrans. This information is also shared with smaller local cities in the form of raw GIS data, spreadsheets, and printouts, depending on the municipalities' needs. The 19 jurisdictions within the SANDAG umbrella work with SANDAG to validate land use and other data use in regional forecasting.

SB 375 - SANDAG is currently working on forecasting for its 2011 RTP (last one was 2007) and determining how to make it conform to the mandates of SB 375 via its Sustainable Communities Strategy component, so that an Alternative Planning Strategy (APS) is not needed for compliance.

Currently, SANDAG is transitioning its transportation and land use models. In the case of the former, it is moving from a 4-step to an activity-based model for the 2015 RTP. For land use, they, along with the Association of Bay Area Governments (ABAG) and the Sacramento Council of Governments (SACOG) are going from a large, aggregate model to a parcel-level one, which will require much more need for/use of GIS and sociodemographic (and other) data. These switches in modeling philosophy were recommendation by the FHWA and Caltrans.

SANDAG has used PLACE3S in the past, but is in the process of looking at three different off-the-shelf tools to use for public workshops instead, including Community Viz and SSim. This was due economic considerations.

Gary Gallegos, the Executive Director of SANDAG, will represent the region on the SB 375 Regional Targets Advisory Council (RTAC).

Part 2: GIS-Specific Uses

Capital Planning: use GIS to a certain degree for TransNet and 'New Stats' (vendor?) and, as part of financial feasibility requirements. TransNet is the half-cent sales tax for local transportation projects.

Land Use Planning - SANDAG has a Regional Comprehensive Plan (2003) that looks at smart growth boundaries that target areas for higher density development and land use mixes. However, it is not a land use authority, and this information is primarily for the use of local governments to help with their decision-making.

Environmental - As part of their environmental mitigation program, SANDAG has a database of information for developers to use when implementing plans.

Transportation Planning

- GIS layers w/routes & stops
- Transit ridership figures in their transportation model
- Air quality – conformity with ARB's model
- Parking – know where lots are, but not integrated into GIS

Mapping and Data Management

- Base maps: airports, coastline, 10-30 meter digital elevation models maintained in-house
- Points of interest
- Demographic & economic data - in both Data Warehouse and Profile Warehouse, which are accessible via web for the public to use
- Map production – transportation base maps, sensitive lands, etc.

Western Riverside Council of Governments (WRCOG)

Part 1: Institutional Considerations and Data Sharing

WRCOG does not have an enterprise GIS system, as it is a small agency that only has a limited number of users. They do tap into Riverside County's GIS, but apparently theirs isn't a true enterprise system either.

Interdepartmental requests are handled on an ad-hoc basis, and have in the past included such data elements as maps of home foreclosures and county bus routes. WRCOG stores shape files, which are ready to use for most requests, although others may be created as needed.

SCAG used to ask for data from WRCOG, but there haven't been any requests in several years, due to a dearth of projects.

However, there is still some cross interaction with SCAG on the land use file it maintains and updates biennially. The data gathering starts at the COG (lower MPO) level and is then passed on to SCAG, which incorporates all of the info for the region. This is in turn used by the COGs when need be.

With regard to regional transportation planning, WRCOG (like SANBAG) provides SCAG with whatever it needs (including demographic information from their demographics group), and the latter handles the modeling and analyses. A new development is that Riverside County's travel demand management (TDM) will be based on SCAGs, then enhanced for local use.

SB 375 – Staff are very aware of this legislation, although right now they have more questions than answers, including delegation of authority, timelines and who (individuals, not agencies) will serve on the regional target advisory committee – and how many. There is also the question of funding to implement SB 375. Interviewee noted that some funds may be available via Prop 84, but that nothing is specifically earmarked in that legislation for the Sustainable Community Strategies (SCS)…many agencies are competing for Prop 84 money ($90MM) for other air quality-related projects.

The main question is whether or not the sub-regions (such as WRCOG's) will develop their own SCS and get approval directly from California Air Resources Board (CARB) or will be a part of a larger SCAG-level SCS. Part of the issue is that the sub-regions would have even less time to turn their plans over to SCAG than doing a single plan. However, there is a measure of control given up by ceding SB375 planning duties to SCAG.

Also part of this concern is what exactly the allocations of CO2 equivalent (CO2E) reductions will be overall, and then by sub-region. The reductions are now expected to be somewhere between 5-11MMTCO2E, but how much each sub-region may have to contribute will need to be worked out.

Transit Agencies

Metrolink

Part 1: Institutional Considerations and Data Sharing

Metrolink does not have a GIS enterprise system, as they only have five users, and ten are need to make one cost effective, due to storage and operation expenses. They currently maintain their storage on-site, but to go to an enterprise operation would bog down the whole IT system. Metrolink may well skip going to an enterprise system and go with a web-based one instead. Amazon's S3 product was mentioned – 15cents/TB of storage.

The five users are scattered across marketing, customer service and engineering. They are mostly self-sufficient, but there are requests for the GIS administrator that are submitted via project request forms, which allows for tracking of projects. System-wide, line and station level layers are the main ones that are maintained by Metrolink.

It was remarked that Metrolink is spread across/accountable to five counties and only runs about a ½ mi ROW corridor, so its footprint it pretty small compared to Metro or other governmental entities. Thus, they don't get a lot of requests from other agencies, though they do use Metro information (e.g., bus routes), use SCAG's TDM, and work with cities (which actually own the Metrolink stations) when need be.

The interviewee was not familiar with SB 375, but remarked that whatever came down would have to filter through Metrolink's five county members first. Due to the relatively small scope of Metrolink's purview, it is hard to say how much (or if) they will be involved with the legislation's implementation.

Part 2: GIS for specific tasks

Capital Planning - Contractors are now required to make their renderings (e.g., CAD) spatially-enabled for incorporation into Metrolink's GIS.

Transportation Planning - Ridership figures are tracked, and every two years there is a customer survey of where people live, work, commuting patterns and issues such as safety, parking and train schedules.

They do have air quality coverage zone information from AQMD, but don't really use it.
All stations, including parking are mapped (point lines, polygons, etc.), but the cities make the determination, since as previously mentioned, they own the land. However, Metrolink works with them in designing and planning stations and parking.