

UPLAN
BASE CASE MODEL RUN

Calaveras County General Plan

May 2008

Calaveras Council of Governments

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I. Executive Summary

The UPLAN model can be an effective tool in Calaveras County's General Plan update process. The model can simulate projected growth patterns under the County's current adopted General Plan and proposed alternative scenarios and assess related impacts. UPLAN can assist the general public and decision-makers in understanding growth alternatives by providing visual map displays and analytical impact reports.

This base case model run utilizes the land use designations contained in the County's 1996 General Plan, current City of Angels General Plan, Community Plans and specific plans. The planning horizon is the year 2050. Geographic Information System (GIS) layers used in the analysis include:

GIS LAYERS		
<i>Attractions</i>	<i>Discouragements</i>	<i>Masks</i>
Major Roads (State/County)	Agricultural Preserves	Public Lands
Community Centers	Timber Preserves	Existing Development
Water & Wastewater	Flood Plains	Water Features
Proposed Developments		Excessive Slopes

Future land use allocations are shown in the following table based upon the Department of Finance (DOF) population projection for Calaveras County in the year 2050 of 80,424 persons (chart represents the number of acres necessary to accommodate growth based on current planning trends and practices).

FUTURE LAND USE ALLOCATION 2050	
<i>Land Use Category</i>	<i>Acres</i>
Industrial	239
Commercial High	46
Commercial Low	431
Residential Very High	208
Residential High	384
Residential Medium	4,608
Residential Medium Low	10,848
Residential Low	14,855
Residential Very Low	39,478
Residential Extremely Low	18,483
TOTAL	89,580

Continuation of past land use trends, referred to by some as rural sprawl, will consume large amounts of land and place pressure on the roadway network. Nearly 15,000 acres of agricultural preserves could be impacted by future growth. Several segments of the County's roadway network identified below would be operating near capacity with stop-and-go conditions.

- ❑ Highway 49 from Highway 26 at Mokelumne Hill northward to the Mokelumne River
- ❑ Highway 49, Poole Station Road, Mountain Ranch Road and Pope Street in San Andreas
- ❑ Highways 4, Highway 49 and Murphys Grade Road in Angels Camp
- ❑ Highway 4 between Copperopolis and Angels Camp near the intersection of Poole Station Road
- ❑ Highway 12 and 26 in Valley Springs
- ❑ Highway 4, Main Street, Sheep Ranch Road and Rock Hill Road in Murphys
- ❑ Highway 4 in Vallecito

Future UPLAN efforts will also test and evaluate alternative land use/transportation scenarios developed by the County and its consultants.

II. Introduction

This report is provided as a progress summary of the modeling of the 1996 Calaveras County General Plan and its potential impacts. The results of this analysis can be used as a Base Case scenario for use in the County's general plan update process and related environmental document pertaining to the No Action Alternative.

This report is a product of the Tri-County Partnership in Integrated Planning (UPLAN) project. A number of partners have participated in collaboration with the Calaveras Council of Governments (CCOG) to bring this planning software to our County including:

- University of California, Davis
- California Department of Transportation
- Amador County Transportation Commission
- Alpine County Local Transportation Commission
- Fehr and Peers Transportation Consultants (transportation modeling)

The UPLAN modeling tool has been developed with funding from the UC Transportation Center, California Energy Commission, U.S. Department of Energy, U.S. Department of Agriculture, the Mineta Institute of California State University San Jose, and the California Department of Transportation.

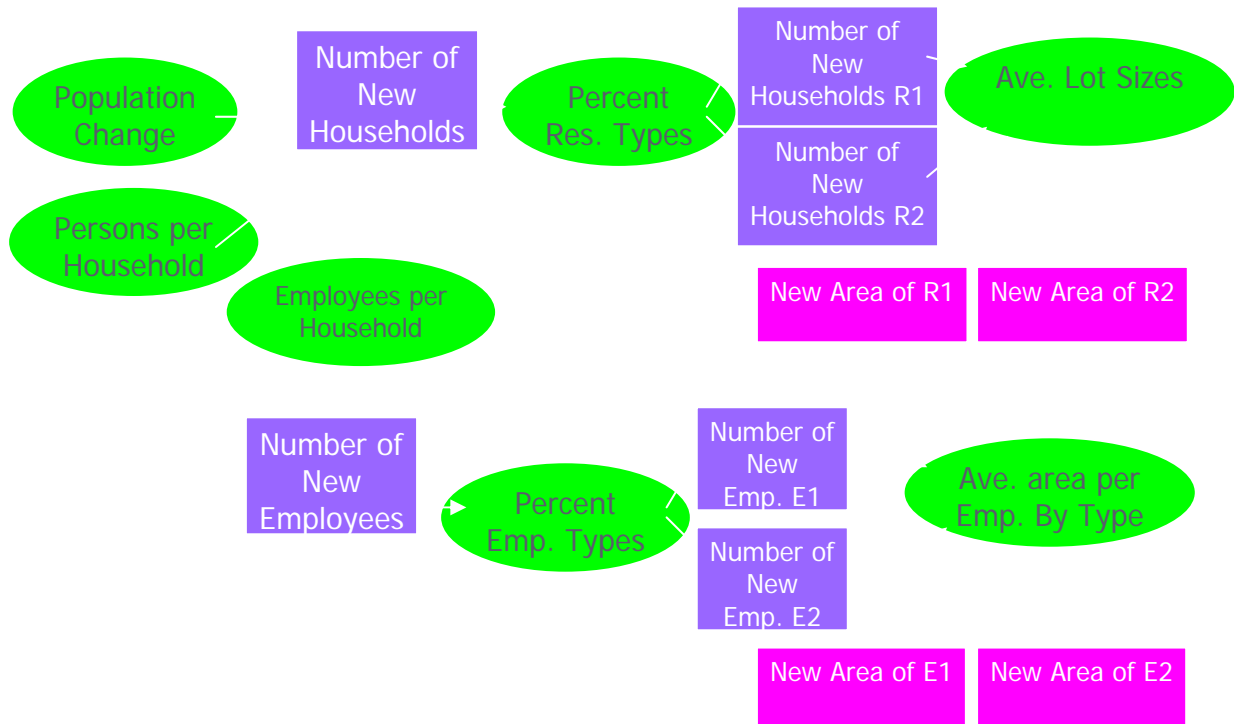
UPLAN is a rule-based urban growth model intended for regional and county level modeling. The model was developed by and is maintained by UC Davis.

III. Step One: Building the “Base Case” Scenario

The UPLAN modeling tool can assist in the evaluation of the current County general plan and the development and evaluation of alternative land use and transportation plans.

The UPLAN model uses **Inputs** provided by the user and **Rules** built into the model to produce **Outputs** consisting of maps and tabular data. Refer to the following **Flowchart**. Changing the Inputs, in particular the land use plan itself, will produce tabular Output analyses. For example, input of a higher proportion of high-density residential uses results in a more compact future urban footprint. Another example, placing a high priority on the protection of prime agricultural lands and thereby redirecting growth to other areas in the County.

Input Data:



Inputs are determined by policy makers and department heads working in coordination with planning staff (the model user). Inputs are entered into the model in tables and/or GIS layers using a cell size of 50 meters square or approximately ½ acre. Inputs include demographic information such as current

population and future population projections, proportion of future resident development by density, and employment projections. GIS layers can be used as attraction layers, discouragement layers or masks for future development. Attraction layers may include such things as roads, water and sewer systems and existing community boundaries. Discouragement layers may include flood plains, agricultural lands and wildlife habitats. Mask layers may include such things as public lands, steep slopes and existing developed areas.

Rules (internal algorithms) are built into the UPLAN model that allocates future development beginning with land of the highest value (singularly or aggregated). As the higher value areas are consumed, the model looks for incrementally lower valued areas of land to distribute growth. Future development may only be allocated in areas designated for such uses by the General Plan.

Outputs include analyses presented in spreadsheet format and visualized through maps depicting future development and tables listing under-allocated future land uses and impacts upon discouragement layers (such as agricultural lands). UPLAN outputs can provide inputs into other models such as traffic models allowing for traffic impact assessment of each land use. UPLAN outputs can also be used as inputs to the Watershed Analysis Risk Management Framework (WARMF) model to determine the impacts upon water quality and quantity likely to result from the projected growth.

IV. The Base Case Scenario

The 1996 Calaveras County General Plan future land use designations create the platform for the Base Case model scenario. Refer to **Map 1: Current General Plan Future Land Use** at the end of this report that depicts the County's current land use policy. The land uses contained within the County's General Plan and various Community Plans were correlated with the ten UPLAN land use categories. Additional GIS layers are available and can be used in the Base Case model run or in alternative scenario testing upon direction. Refer to the Appendix for a listing of those GIS layers.

The following summarizes the inputs used for the Base Case model run:

IV:a. Demographics

Demographic inputs were obtained from California Department of Finance (DOF). DOF estimates Calaveras County's population was 45,928 persons in 2006 with an average household size of 2.361 persons. Civilian employment in the County was 19,700 for the same period or 1.01 employees per household.

The Tri-Counties have agreed upon a planning horizon of 2050 for UPLAN planning purposes. The DOF population projection for the County in 2050 is 80,424 persons. For modeling purposes the County's average household size was not changed. Calaveras County has a large number of second and vacation homes. According to the County's Housing Element, the housing vacancy rate was 28.23 percent. The Housing Element calculated that 5.4 percent was attributed to normal vacancies while the remaining 22.93 percentage could be attributed to second homes. In order to take this factor into consideration and provide for sufficient land area to accommodate both residents and visitors, the County's 2050 population was increased by 22.93 percent in the model.

Employment projections for 2050 were based upon the current ration of 1.01 employees per household for resident population (Note: in the model this factor was reduced to .82 so not to over account employment due to second home population).

The land use designations in the County's General Plan, City's General Plan and various Community and Special Plans were correlated with UPLAN's ten land use categories. The Tri-Counties have mutually agreed upon the land use types and their respective densities. Residential densities were distributed among the seven UPLAN residential types based upon Building Department permit data from 2000 to 2006.

FUTURE RESIDENTIAL LAND USE ALLOCATION		
Category	Percentage	Average Lot Size (acres)
Residential Very High - RVH	9.26	.10
Residential High - RH	13.16	.13
Residential Medium - RM	41.09	.50
Residential Medium Low - RML	18.56	2.50
Residential Low - RL	8.83	7.50
Residential Very Low - RVL	7.04	25.00
Residential Extremely Low - REL	2.06	40.00

Future employment allocations and related data were based upon data derived from infoUSA, which provides current County employment by type. The Commercial High category is considered to be largely retail businesses and the Commercial Low category non-retail (offices etc.). Industrial are “other” business establishments including industry.

FUTURE EMPLOYMENT ALLOCATION			
Category	Percentage	Sq. Ft. per Employee	Floor Area Ratio
Industrial - I	26	500	.23
Commercial High - CH	19	200	.35
Commercial Low - CL	51	300	.15

IV:b. Attraction GIS Layers

The UPLAN model is based upon the premise that development occurs in areas that are attractive due to their proximity to various factors. The following table describes the attractions used in the Base Case model run for various land uses. The UPLAN model also provides for each of these attraction layers to be given relative weighting and buffer zones for each particular land use type.

ATTRACTION LAYERS	
<i>GIS Layer</i>	<i>Land Use Type</i>
Major Roads	I, CH, CL, RVH, RH, RM, RML, RL
Community Centers	I, CH, CL
Water & Wastewater Districts	I, CH, CL, RVH, RH, RM, RML
Proposed Developments (See Note 1)	RVH, RH, RM
Agricultural Preserves	RVL, REL

Note 1: Refer to **Map 2: Current Development Projects** (This map is currently a work in progress and needs to be updated through and synchronized with Planning Department records).

IV:c. Discouragement GIS Layers

The UPLAN model also functions upon the premise that development is less likely to occur or occurs more infrequently in areas that are less attractive due to their proximity to or distance from various factors. The following table describes the discouragements used in the Base Case model run for various land uses. The UPLAN model also provides for each of these discouragement layers to be given relative weighting and buffer zones for each particular land use type.

DISCOURAGEMENT LAYERS	
<i>GIS Layer</i>	<i>Land Use Type</i>
FEMA Floodplains	I, CH, CL, RVH, RH, RM
Agricultural Preserves (see Note 2)	RVH, RH, RM, RML, RL, RVL, REL
Timber Preserves	RVH, RH, RM, RML, RL, RVL, REL

Note 2: Agricultural Preserves were given a very low weighting because it was assumed that due to growth pressures some lands currently under Williamson Act preserves may no longer be protected by 2050.

IV:d. Mask GIS Layers

The UPLAN model includes Mask layers, which exclude certain lands from future development of any kind. The following table describes the masks used in the Base Case model run for all future land uses. Buffers were included around certain features such as lakes, rivers and wetlands, to prevent growth from creeping to close.

MASKS	
GIS Layer	Land Use Type
Developed Lands	All land uses
Public Lands	All land uses
Wetlands plus 50 meter buffer	All land uses
Maximum Slopes	I, CH, RVH, RH – 10 percent CL, RM, RML – 30 percent RL, RVL, REL – 50 percent

Existing developed lands were used as a Mask for future development as depicted on **Map 3: Current Land Use**. This information was derived from County Assessor land use codes. Additional factors in the development of this layer include improvement values exceeding \$100,000 per parcel being counted as developed (and thus masked) and correlation of parcel size with residential development potential as allowed by the General Plan.

Also, refer to **Map 4: Selected Natural Resources** that displays public lands plus agricultural and timber preserves.

IV:e. Base Case Outputs

The UPLAN model run generated **Map 5: UPLAN Future Allocation**, which depicts the County’s allocation of projected growth to 2050.

The following table displays the amount of land allocated for future development based upon the demographic inputs.

FUTURE LAND USE ALLOCATION 2050	
Land Use Category	Acres
Industrial	239
Commercial High	46
Commercial Low	431
Residential Very High	208
Residential High	384
Residential Medium	4,608
Residential Medium Low	10,848
Residential Low	14,855
Residential Very Low	39,478
Residential Extremely Low	18,483
TOTAL	89,580

V. Step Two: Preliminary Impact Analysis

The following provides a preliminary analysis of the impacts of the 2050 UPLAN model run.

V.a. Land Use Impacts

One of the UPLAN models strengths is it's assessment of impacts upon discouragement layers. The following table summarizes the growth impacts upon floodplains and agricultural preserves by land use category and the amount of acres impacted. Refer to **Map 4: Selected Natural Resources**.

DISCOURAGEMENT LAYER IMPACTS 2050 (IN ACRES)			
<i>Land Use Category</i>	<i>Floodplains</i>	<i>Ag Preserves</i>	<i>Total</i>
Industrial			
Commercial High		1	1
Commercial Low	2		2
Residential Very High			
Residential High	1		1
Residential Medium	17		17
Residential Medium Low	96	7	103
Residential Low	59	912	971
Residential Very Low	216	2,234	2,450
Residential Extremely Low	84	11,442	11,526
TOTAL	475	14,596	15,071

The residential categories of Low, Very Low and Extremely Low caused the greatest amount of impact upon floodplains and Agricultural Preserves due to two factors. The first factor is large parcel sizes and the second factor is the amount of future growth allocated to these land use types based upon recent building permit trends.

Other GIS layers such as groundwater potential, wildlife habitats, and mineral resource areas can be used in the UPLAN model as discouragement layers and the impact of future growth upon these layers can also be assessed. Refer to the Appendix for a list of GIS layers that have been developed.

V.b. Transportation Impacts

Fehr & Peers, Transportation Consultants, using another model called TransCAD conducted an impact analysis upon the County's road network. Output from the

UPLAN model run was input into the TransCAD model. The County is divided into numerous traffic analysis zones (TAZs). The model distributes trips to and from the TAZs.

Volume to capacity (V/C) ratios were calculated for the year 2050 and are displayed on **Map 6: Transportation Analysis**. V/C ratios are often used to measure the level of service (LOS) of a roadway for planning purposes. A V/C ratio greater than 0.8 typically represents LOS D conditions, which indicate that the roadway is near capacity and stop-and-go conditions can be expected at intersections and in areas with numerous driveways.

The primary roadway segments that had a V/C ratio greater than 0.8 were:

- ❑ Highway 49 from Highway 26 at Mokelumne Hill northward to the Mokelumne River
- ❑ Highway 49, Poole Station Road, Mountain Ranch Road and Pope Street in San Andreas
- ❑ Highways 4, Highway 49 and Murphys Grade Road in Angels Camp
- ❑ Highway 4 between Copperopolis and Angels Camp near the intersection of Poole Station Road
- ❑ Highway 12 and 26 in Valley Springs
- ❑ Highway 4, Main Street, Sheep Ranch Road and Rocky Hill Road in Murphys
- ❑ Highway 4 in Vallecito

Major improvements to these roadway segments would need to be made to assure an adequate level of service in the future.

VI. Conclusions

The model run this report addresses uses certain inputs and assumptions that can be easily changed based upon the desire of the model user. The model run attempted to demonstrate the land use pattern under the County's current land use policies based upon recent building permit trends. It was however assumed that numerous parcels currently under Agricultural Preserves (AP) zoning would be cancelled by 2050 due to growth pressures in the western third of the County where flatter land is available and communities are closer to the employment centers of the Central Valley. However, it is recognized that termination of Agricultural Preserves within the County is not a current land use policy of the County.

Continuation of past land use trends, referred to by some as rural sprawl, will presumably continue to consume large amounts of land and place pressure on the County's natural resource lands (such as Agricultural Preserves) to be rezoned for residential development. Likewise, this trend will likely continue to make it difficult to provide the delivery of adequate public facilities and services to a dispersed development pattern.

The UPLAN modeling tool in conjunction with TransCAD and WARMF can be an effective tool in Calaveras County's current General Plan update process. The model can simulate projected growth patterns under the County's current adopted General Plan and assess related impacts. Likewise, these tools can be used in the reiterative process of alternative development and assessment.

UPLAN can assist the general public and decision-makers in understanding growth alternatives and their respective impacts by providing visual map displays and statistical information.

VII. Appendix

The following provides a list of the GIS layers that are currently available in the General Plan update process.

- ❑ Base Layer (parcel database)
- ❑ Current Land Use
- ❑ Land Values
- ❑ Vacant Land
- ❑ Future Land Use (County General Plan, Community Plans, City of Angels Existing General Plan and Proposed General Plan)
- ❑ Current County & City Zoning
- ❑ Jurisdictional Boundaries (City limits and Sphere of Influence (SOI), Special District SOIs, water and sewer improvement districts)
- ❑ Land Ownership (public, quasi public and private)
- ❑ Waterways (rivers, creeks, wetlands and floodplains)
- ❑ Airport Zones
- ❑ Williamson Act Lands
- ❑ Timberland Preserves
- ❑ Slope and Aspect
- ❑ High Capability Agricultural Lands
- ❑ High Capability Timberlands
- ❑ Mineral Resource Areas
- ❑ Wildlife and Botanical Areas
- ❑ Archaeology Sensitivity
- ❑ Traffic Analysis Zones
- ❑ Major Roadways
- ❑ Groundwater Potential