Southern California Association of Governments

Scenario Planning Model

Technical Summary

Addendum to UrbanFootprint Technical Summary
Model Version 1.0

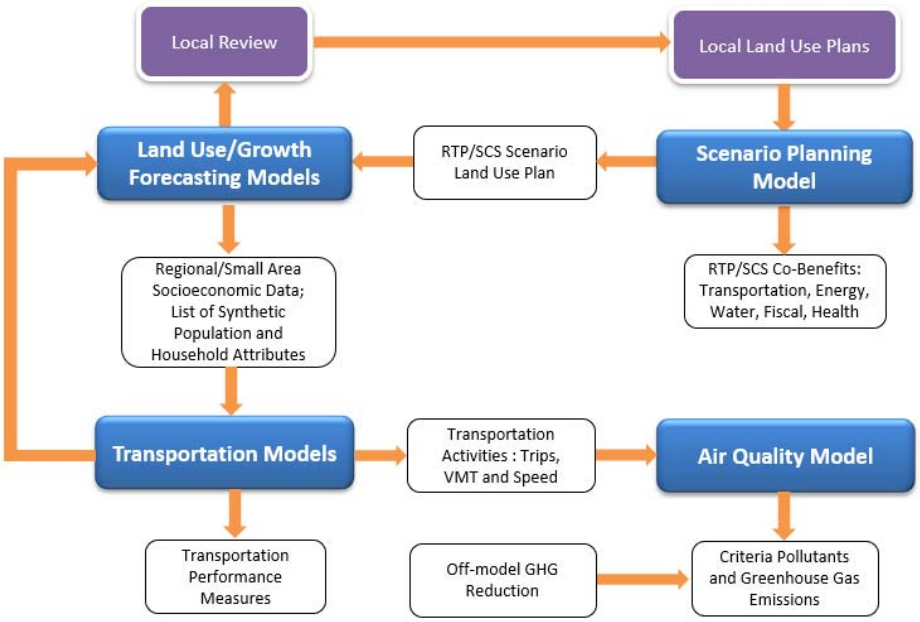
rev. Dec. 2020

I. Introduction

Scenario Planning Model (SPM) is SCAG's branding of a web-based data management, land use development and modeling platform, developed by customizing the open source version of UrbanFootprint (UF ver 1.5). UrbanFootprint was originally developed by Calthorpe Analytics for Vision California project with funding and support from California High Speed Rail Authority and California Strategic Growth Council, and later customized in partnership with SCAG and other major Metropolitan Planning Agencies (MPOs) in California. SCAG's customization efforts have largely been focused on building a seamless local and regional database connection while improving analytic capacities for regional-scale planning and scenario development.

Within SCAG's integrated modeling and forecasting system (see Figure 1), SPM serves as a conduit for the delivery of up-to-date and locally vetted data and plans to key SCAG models and of estimated impacts of local land use and policy decisions that would inform the development of regional plans and associated scenario analysis.

Figure 1: SCAG Integrated Modeling and Forecasting Framework



SPM is currently deployed as two separate web services for data management and for scenario analysis. SPM-Data Management (DM) tool at https://spmdm.scag.ca.gov provides a common data framework within which local planning efforts can be easily integrated and synced with regional plans. Using a variety of data management and data review options,

the user (local jurisdictions) can explore data, export attributes, and edit configured layers. SPM Working Group comprised of representatives from local jurisdictions and subregions played an important role, representing the functional and operational needs of end users. SPM-DM was released in November 2017 to all 197 local jurisdictions in the SCAG region in support of SCAG's local input and envisioning process for the 2020 Regional Transportation Plan and Sustainable Communities Strategy (or Connect SoCal). The SPM DM has been instrumental in the timely and efficient review of and decision on important plan datasets.

SPM-Scenario Development and Analysis (SD) tool at https://spmsd.scag.ca.gov[1] includes a suite of tools and analytic engines that facilitate scenario creation and editing with capabilities that allow for meaningful comparisons across different land use and transportation options. SCAG's been at the forefront in the changing landscape of land use and transportation planning in California, brought on by the passage of Senate Bill (SB) 375. Followed by Local Sustainability Planning Tool (LSPT) which was SCAG's 1st generation scenario planning tool, the SPM-SD has been instrumental in building a shared vision and in accessing alternative future conditions for the Southern California region.

The purpose of this document is to provide information specific to SCAG's application and implementation of SPM that is not covered in or has been updated from the UrbanFootprint Technical Summary report published in 2012.[2] Please note that the following summarizes information that is only applicable to SCAG's implementation of UrbanFootprint and may not be suited for all users of UF 1.5 in general.

SPM Components and Workflow

Scenario-based planning with SPM involves three stages: base data loading, scenario development, and scenario analysis. The following sections describe how SPM-SD works through each of these stages to arrive at clearly defined scenarios and results.

[1] Access to SPM-SD is currently not open to local jurisdictions.
[2] The report is available at https://sgc.ca.gov/resources/urban-footprint/docs/20120709-UrbanFootprintTechnicalSummary.pdf

II. Base Data Loading

SPM scenarios are built upon base-year (existing) conditions that describe the existing environment. This highly detailed "canvas" of data constitutes a baseline assessment of land use, demographic characteristics, and other conditions, providing the context for scenario painting and the foundation for analysis by the various model engines. Base loading processes involve cleaning, compiling, and processing of geographic and tabular data from a wide variety of sources. This section details the data and methodology used to construct the 2016 base year Scenario Planning Zone (SPZ)[3] layer for Connect SoCal, the 2020 Regional Transportation Plan/Sustainable Communities Strategy.

Input Datasets

SPM streamlines the development of the base canvas through a series of scripts that normalizes data of varying quality, type, and scale from a wide range of sources and import them into the model analysis zone. The regional base load process makes use of several datasets to populate the full SPM base data schema. The primary fields from the base data include SCAG existing land use, dwelling units by type, and employment by type at the SPZ scale. The secondary fields are derivatives from the primary fields and include building square feet, acreage by type, demographic characteristics, and outdoor irrigated area. The following datasets are used to populate these fields:

SCAG 2016 Parcels

The 2016 existing land use information is developed with property information from Digital Map Products (DMP) added to the 2012 land use data, and then finalized through local review and input. Existing land use attributes are "crosswalked" into UrbanFootprint's building type framework, which is then used as the basis for allocating dwelling units and employees to each parcel, as well as assessing lot coverage for the purposes of energy use, water consumption, and other analyses.

SCAG 2016 Base Year Estimates

SCAG develops socioeconomic attributes at the parcel level using diverse public and private sources of data and advanced estimation methods. The major data sources include the 2010 Census, 2012-2016 American Community Survey (ACS), Firm-based Info Group 2015,

[3] SPZ is the minimum unit of scenario planning and analysis for the SPM. It was developed by grouping parcels of uniform or compatible land uses while maintaining manageable size for capturing local land use benefits on transportation, varied by development density and intensity. There are about 125,800 SPZs for the SCAG region.

2016 California Employment Development Department (EDD), Existing Land Use, and new construction data from Digital Map Product (DMP).[4]

Base Loading Process

Step 1: Process SCAG growth estimates and load to parcels

The SCAG parcels dataset is the geographical resolution to which data is first assigned and then aggregated to the SPZ geography in the base data loading process. The first step in producing a loaded parcel file is to seed parcels with people, dwelling units by type and employment by type. This is done in a multi-step process utilizing parcel land use codes, a crosswalk of land use codes to UrbanFootprint building types and regional control totals for dwelling units by type and employment by type.

For housing variables, based on the 2012 parcel level households, housing units are estimated using diverse private and public data and then adjusted with the 2012-2016 American Community Survey (ACS) at the block group level. The ACS vacancy rate is used to estimate the numbers of households at the parcel level which are later factored in estimating jurisdiction level households. For employment variables, two firm level data – InfoGroup and California Employment Development Department (EDD) Quarterly Census of Employment Wages (QCEW) – are first assigned to parcels and then aggregated to the city/Transportation Analysis Zone (TAZ) level for comparison and selection. The selected dataset is then adjusted by jurisdiction and county level employment estimate, mainly from CA EDD.

Secondary variables including population variables and household characteristics are calculated from Population Synthesizer (or PopSyn), which adjusts household weights in ACS 5% PUMS (Public Use of Microdata Sample) data so that the weighted sums of selected control variables for household and person are identical with very small statistical tolerance to the given controls.

Step 2: Assign Building Types

Assigning building types to each parcel requires cross-walking existing land use codes to UrbanFootprint building types based on both qualitative and quantitative definitions. When a building type can't be directly assigned, existing land use codes are classified to building types using dwelling units and employment density ranges.

Step 3: Classify dwelling units by types, and employment by sectors

[4] For more information on SCAG's growth estimation and forecasting process, check out Connect SoCal Demographics & Growth Forecast technical report at https://scag.ca.gov/sites/main/files/file-attachments/0903fconnectsocal_demographics-and-growth-forecast.pdf?1606001579

UrbanFootprint requires that every dwelling unit be classified into one of the three dwelling unit types: single-family detached, single-family attached, and multifamily. This step allocates dwelling unit totals on each parcel to one of the three classifications and then classifies all single-family detached units into small or large lots. A simple break point of 5,500 square feet per dwelling unit is used for this.

Using the North American Industry Classification System (NAICS) code, employees at the parcel scale are allocated to the corresponding UrbanFootprint employment fields.

Step 4: Calculate acres and building square feet by type

Assign the parcel acreage defined by the type of dwelling units or employment on a given parcel. Based on assumptions concerning building type, employment type and regional location to estimate building size, calculate building square footage by dwelling units or employment types. This process incorporates the relative intensity of urban form by calculating separate densities for residential and commercial building square footage based on whether a parcel is located in a suburban or urban environment.

Step 5: Calculate outdoor irrigated area

This process calculates irrigated area using building type attributes which contain square feet per acre densities for residential and commercial irrigated areas. These irrigated area densities are calculated by multiplying the residential and commercial irrigated square feet factors for each of the building types by the parcel acreage

Step 6: Aggregate the parcels into the SPZs and assign Place Types

The final step in the base loading process is to aggregate the base parcels into the SPZ geographies and assign Place Types (for more information, see III Scenario Building Block). Finding the best fit Place Types utilizes pre-defined density ranges for each Place Type, which are intended to cover every potential combination of the required input attributes.

III. Scenario Building Blocks

SPM uses the building library of UrbanFootprint v 1.5 which is a customized version of the statewide Place Type and Building Types set developed for the Vision California process. This range of types was developed to represent development conditions across the state and includes enough variation to reflect conditions across Southern California.

Place Types

The building library includes 35 Place Types and over 50 Building Types that make up the palette of development options. Place Types represent the complete range of potential development types and patterns that make up a scenario. Each Place Type is composed of a mix of different building types and represents a unique set of assumptions that facilitate scenario modeling and testing at a variety of scales. The following provides brief descriptions of the 35 Place Types. For summary characteristics, see Appendix A.

Urban Mixed Use

Urban Mixed Use districts are exemplified by a variety of intense uses and building types. Typical buildings are between 10 and 40+ stories tall, with offices and/or residential uses and ground-floor retail space. Parking is usually structured below or above ground. Workers, residents, and visitors are well served by transit, and can walk or bicycle for many of their transportation needs.

Urban Residential

The most intense residential-focused type, Urban Residential areas are typically found within or adjacent to major downtowns. They include high- and mid-rise residential towers, with some ground-floor retail space. Parking usually structured below or above ground. Residents are well served by transit and can walk or bicycle for many of their daily needs.

Urban Commercial

Urban Commercial areas are typically found within major Central Business Districts. They are exemplified by mid- and high-rise office towers. Typical buildings are between 15 and 40+ stories tall, with ground-floor retail space, and offices on the floors above. Parking is usually structured below or above ground; workers tend to arrive by transit, foot or bicycle in large numbers.

City Mixed Use

City Mixed Use areas are transit-oriented and walkable, and contain a variety of uses and building types. Typical buildings are between 5 and 30 stories tall, with ground-floor retail

space, and offices and/or residences on the floors above Parking is usually structured below or above ground.

City Residential

A dense residential-focused type, City Residential is dominated by mid- and high-rise residential towers, with some ground-floor retail space. Parking is usually structured, below or above ground. Residents are well served by transit, and an walk or bicycle for many of their daily needs.

City Commercial

The Central Business Districts of most cities contain areas exemplary of City Commercial, with many mid- and high-rise office towers and government buildings. Typical structures are between 4 and 40 stories tall, with ground-floor retail space, and offices on the floors above. Parking is usually structured, though many workers arrive by transit, foot, or bicycle.

Town Mixed Use

Town Mixed Use areas are walkable mixed-use neighborhoods, such as the mixed-use core of a small city or transit-oriented development, with a variety of uses and building types. Typical buildings are between 3 and 8 stories tall, with ground-floor retail space, and offices and/or residences on the floors above. Parking is usually structured, above or below ground.

Town Residential

Containing a mix of townhomes, condominiums and apartments (and occasionally small-lot single family homes), Town Residential is characterized by dense residential neighborhoods interspersed with occasional retail areas. Typical buildings are 2-5 stories tall, with limited off-street parking; residents tend to use transit, walking and bicycling for many of their transportation needs.

Town Commercial

Equivalent to the center of a traditional town, or a more employment-focused transit-oriented development, Town Commercial contains a mix of commercial buildings set in a walkable context. Typical structures are between 2 and 8 stories tall, with ground-floor retail, and offices, services, and some residential uses on upper floors.

Village Mixed Use

Village Mixed Use areas are the walkable and transit accessible mixed-use cores of traditional neighborhoods. Typical buildings are between 2 and 6 stories tall, with ground-floor retail space, and offices and/or residences on the floors above. Parking is typically structured, tucked under, or placed behind buildings so that it does not detract from the pedestrian environment.

Village Residential

Containing a mix of single-family homes on small lots and townhomes, Village Residential is characterized by traditional neighborhoods, designed to be supportive of transit service, walking and bicycling. Typical buildings are 2-3 stories tall, with small yards and an active focus on the public realm.

Village Commercial

Equivalent to the center of a small town or district, or a lower-intensity employment-focused transit-oriented development, Village Commercial contains a mix of buildings set in a walkable context. Typical structures are between 2 and 5 stories tall, with some ground-floor retail, and offices, services, and some residential on upper floors.

Neighborhood Residential

Neighborhood Residential areas are traditional neighborhoods containing mostly single-family homes on small lots, interspersed with occasional retail spaces. Typical buildings are between 2 and 3 stories tall, with small yards and an active focus on the public realm, set in a context designed to be supportive of transit service, walking and bicycling.

Neighborhood Low

Containing a mix of single-family homes on small lots interspersed with some medium and larger lot homes, Neighborhood Low is a traditional neighborhood area designed to be supportive of walking and bicycling. Typical buildings are 2-3 stories tall, usually located within walking distance of a mixed-use neighborhood center.

Office Focus

Representing the most intense auto-oriented single-use office areas, Office Focus is characterized by mid and high-rise office towers. Typical buildings are between 2 and 9 stories tall. Parking can be either structured or provided on surface lots. Workers tend to arrive by auto, though densities are high enough to support suburban transit service.

Mixed Office and R&D

Representing intense suburban office/industrial/research areas, Mixed Office and R&D is characterized by a mix of employment buildings. Typical structures are 1-6 stories tall, surrounded by surface parking and some structured parking where appropriate.

Office/ Industrial

Office/Industrial areas are moderate-density suburban office and industrial areas. Typical structures are 1-5 stories tall, surrounded by surface parking lots and truck loading bays.

Industrial Focus

Industrial Focus areas are warehouses and industrial employment areas. Typical structures are 1-2 stories tall, surrounded by surface parking lots and truck loading bays.

Low-Density Employment Park

Low-Density Employment Parks include suburban low-intensity non-retail business areas. Typical uses include warehousing, offices, industrial, construction yards, transportation fleet services, and freight depots. Typical structures are 1-2 stories tall, surrounded by surface parking lots and truck loading bays.

High Intensity Activity Center

High Intensity Activity Centers include a mix of moderate to intense densities of retail, office, and residential uses. They are often anchored by major regional retail centers or office parks, and while they can contain a robust mix of uses, they are most often oriented within an auto-oriented and non-walkable street and land use pattern. Parking can be structured and/or provided on surface lots.

Mid Intensity Activity Center

Mid Intensity Activity Centers include a mix of moderate to intense densities of retail, office, and residential uses. They are often anchored by major regional retail centers or office parks, and while they can contain a robust mix of uses, they are most often oriented within an auto-oriented and non-walkable street and land use pattern. Parking can be structured and/or provided on surface lots.

Low Intensity Activity Center

Typically set in an auto-oriented development pattern, the Low Intensity Retail-Centered Neighborhood includes a commercial strip that fronts on to an arterial, with single-family or other housing types located in adjacent and surrounding areas Typical buildings are between 1 and 2 stories, generally served by surface parking.

Retail: Strip Mall/ Big Box

Strip Mall/Big Box areas are typically characterized by single-story retail buildings and surface parking lots. The location and design of these areas generally favors automobile access over other transport modes.

Industrial/Office/Res Mixed High

Industrial/Office/Residential Mixed High is characterized by a wide-ranging, intensely developed mix of uses located in close proximity and set in an automobile-oriented context. Building heights can range from 1 to 15+ stories, and uses can include but are not limited to industrial, warehouses, offices, residential, and retail.

Industrial/Office/Res Mixed Low

Industrial/Office/Residential Mixed Low is characterized by a wide-ranging, less-intensely developed mix of uses located in close proximity and set in an automobile-oriented context. Building heights can range from 1 to 3 stories, and uses can include but are not limited to industrial, warehouses, offices, residential, and retail.

Suburban Multifamily

Predominantly containing apartments, condos, and town homes, Suburban Multifamily represents developments that may have internal walking paths but are set in an automobile-oriented context. While densities can be high enough to support bus transit, residents are likely to drive for most trips. Typical buildings are 2-5 stories tall, surrounded by surface parking lots.

Suburban Mixed Residential

Suburban Mixed Residential areas contain a mix of apartments, condos, town homes, and single-family homes, generally set within an auto-oriented street pattern ; residents are likely to drive for most trips. Typical buildings are 1-3 stories.

Residential Subdivision

Residential Subdivisions areas contain a mix of single-family homes on medium and large lots, typically set within an auto-oriented street pattern; residents are most likely to drive for most trips. Typical houses are 1-2 stories tall.

Large Lot Residential Area

Large Lot Residential Areas contain detached single-family homes set on generously sized lots, typically oriented within an auto-oriented street pattern; residents are most likely to drive for most trips. Typical houses are 1-2 stories tall.

Rural Residential

Homes in a Rural Residential area tend to be set on lots with average sizes of 1-2 acres. Within this rural context, residents are likely to drive for most trips. Typical houses are 1-2 stories tall.

Rural Ranchettes

Rural Ranchettes are homes on very large lots. They could include active agricultural uses, and are typically located at the edges of urban areas. Within this rural context, residents are likely to drive for most trips. Typical houses are 1-2 stories tall.

Rural Employment

Rural Employment areas contain a variety of land uses, including working farms, ranches, agriculturally-supportive land uses, solar installations, oil fields, and gravel pits. While the

rural context is automobile-oriented, and thus residents and employees are likely to drive for most trips, the low-intensity of land uses tends to keep traffic volumes low. Typical buildings are 1-2 stories tall.

Campus/ University

College/University areas tend to be internally walkable, though they can be located in either a walkable or auto-oriented context. Buildings can range from 1 to 20+ stories, depending on the design of the campus. Parking may be plentiful or restricted; housing may be provided on-site in large amounts, or students may commute from homes in other locations.

Institutional

Institutional areas include a variety of land uses, including hospitals, government facilities, prisons and other institutional uses. The design and orientation of these areas varies based on the type of use and its location.

Parks & Open Space

Parks & Open Space areas include larger trunk open spaces, community and regional parks, and other large undeveloped areas.

Land Development Categories (LDCs)

Place Types can be grouped into three Land Development Categories (LDC):

Urban LDC	Compact LDC	Standard LDC
Urban Mixed Use	Town Mixed Use	Office Focus
Urban Residential	Town Residential	Low-Density Employment Park
Urban Commercial	Town Commercial	Office/Industrial
City Mixed Use	Village Mixed Use	Industrial Focus
City Residential	Village Residential	High Intensity Activity Center
City Commercial	Village Commercial	Low-Density Employment Park
	Neighborhood Residential	High Intensity Activity Center
	Neighborhood Low	Mid Intensity Activity Center
		Low Intensity Retail-Centered N'Hood
		Retail: Strip Mall/Big Box
		Industrial/Office/Res Mixed High
		Industrial/Office/Res Mixed Low
		Suburban Multifamily
		Suburban Mixed Residential
		Residential Subdivision
		Large Lot Residential Area
		Rural Residential
		Rural Ranchettes
		Rural Employment

Urban LDC	Compact LDC	Standard LDC
		Campus/University
		Institutional
		Parks & Open Space

The LDCs represent distinct forms of land use, ranging from dense and walkable mixed-use urban areas well served by transit, to lower-intensity, less walkable places where land uses are segregated, and most trips are made via automobile. The below provides a general overview of the conceptual framework underlying LDC classification:

Urban

This represents the most intense and most mixed of the LDCs, which in most cases would be found within and directly adjacent to moderate and high-density urban centers. Virtually all of the development that falls into the Urban LDC would be considered infill or redevelopment. The majority of housing in Urban areas tends to be multifamily and attached single family (townhome), with some small-lot single family homes.

It is assumed that Urban Growth is supported by high levels of regional and local transit services (likely on dedicated rights of way and including multiple modes such as rail, bus and ferry), and that well-connected street networks and the mix of intensity of uses result in a highly walkable environment that leads to a relatively low dependence on the automobile for many trips. The per capita VMT of those living in Urban environments tends to be far lower than average and generally range, in California, from 1,500 to 4,500 per year. The housing types in Urban areas tend to consume less water and energy than the larger types found in greater proportion in less urban locations.

Compact

This LDC is less intense than the Urban category, but is nonetheless highly walkable and contains a rich mix of retail, commercial, residential, and vici uses. The Compact form is most likely to occur as new growth on the Urban edge or as larger-scale (ground-up) redevelopment within urban areas. Compact areas contain a rich mix of housing, from multifamily and attached single family (townhome) to small- and medium-lot single family homes.

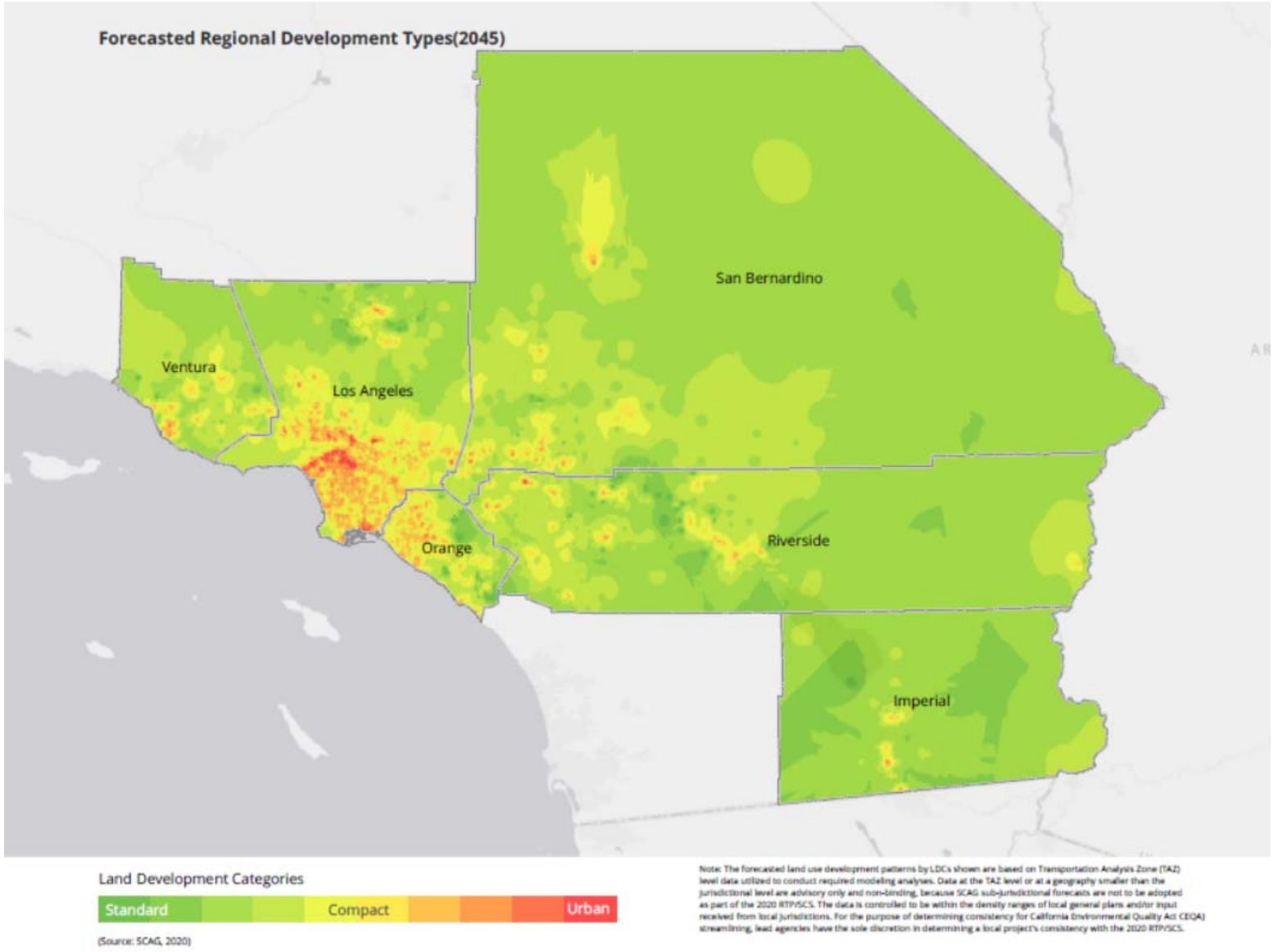
It is assumed that Compact growth is well served by regional and local transit service, but may not benefit from as much service as Urban growth, and is less likely to occur around major multimodal hubs. Streets are well connected and walkable, and destinations as such schools, shopping, and entertainment areas can typically be reached via a walk, bike, transit, or short auto trip. The per-capita VMT of those living in Compact environments tends to be lower than average and generally ranges from 4,500 to 7,500 per year in California. While the mix of housing types in Compact areas is generally not as resource-efficient as that in Urban areas, they tend to consume less energy and water than the larger types found in the Standard LDC.

Standard

This LDC represents the majority of separate-use auto-oriented development that has dominated the American suburban landscape over the past five to six decades. Densities tend to be lower than that of the Compact LDC, and are generally not highly mixed or organized in ways that facilitate walking, biking, or transit service. While Standard can contain a wide variety of housing types, including attached and multifamily units, medium- and larger-lot single family homes tend to comprise the majority of this development form.

The lower densities and decreased mix of uses in the Standard LDC are not typically well served by regional transit service, and most trips are made by car. The built environment tends to be oriented around automobile usage as the primary mode for mobility, with a low index of street intersections per square mile, many discontinuous streets that serve to channel traffic only onto arterials, long block faces, single-use zoning and a location around the periphery of the urban region. The per-capita VMT of those living in Standard environments tend to be higher than average due to auto dependence for most trips, and generally ranges from 7,500 to 18,000 per year in California. The larger single-family housing types that dominate this development form tend to consume more energy and water than those in the Urban and Compact LDCs.

Figure 2: Connect SoCal Land Development Categories (LDCs)



IV. Scenario Creation

SCAG's scenario creation for its regional plan starts from the development of regional and county level growth forecasts in collaboration with expert demographers and economists on Southern California. A base forecast of growth or locally envisioned growth at and below jurisdiction levels are then developed through one-on-one meetings with all 197 jurisdictions where locally anticipated growth patterns and transportation conditions are collected.

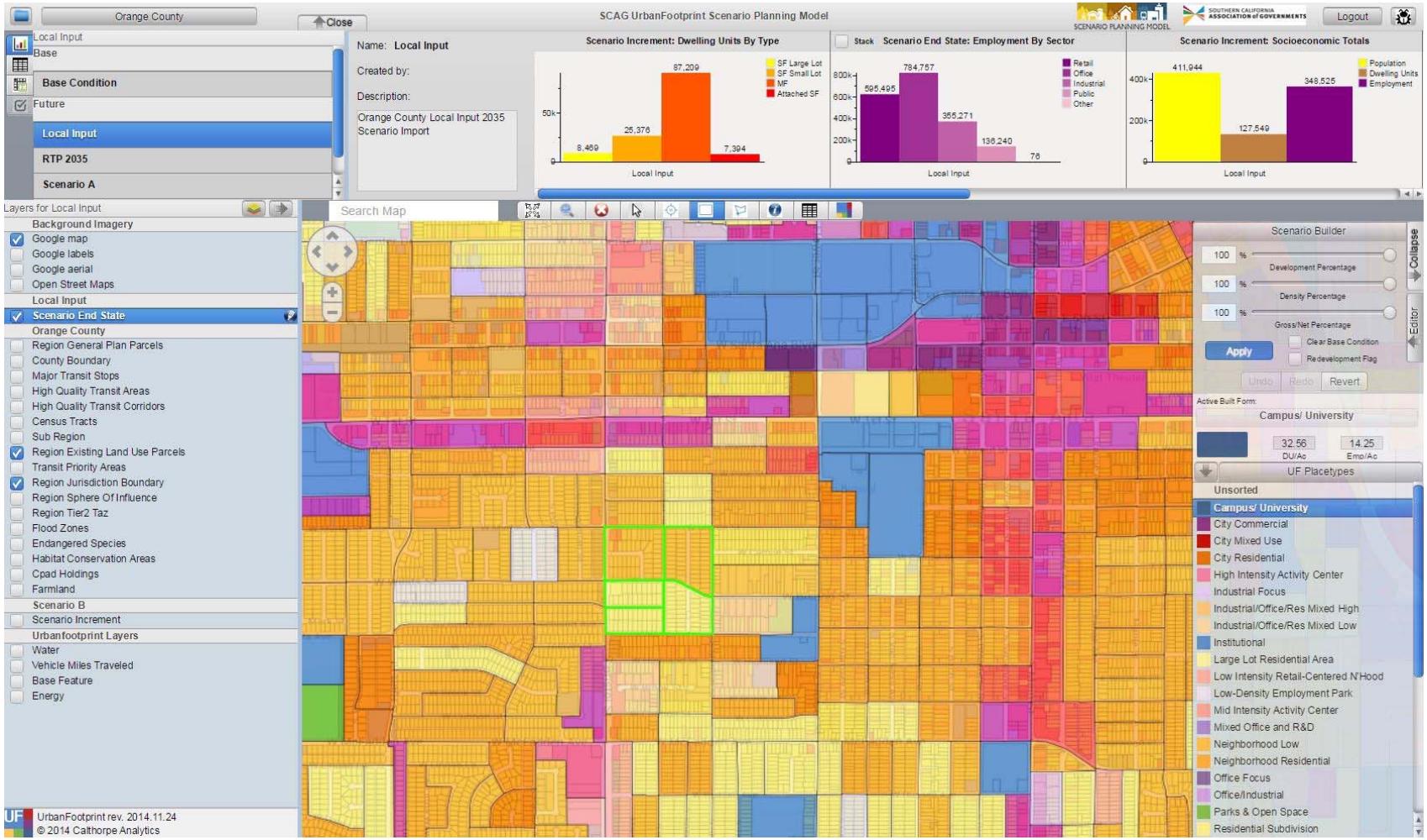
SCAG regional scenarios are first prepared at the Tier 2 Transportation Analysis Zone (TAZ) scale. For the Connect SoCal, SCAG developed five scenarios to illustrate alternative representations of the region in 2045, each of which was made up of a unique combination of land use and transportation strategies.[5] The scenarios created at the Tier 2 TAZ level are then normalized to a standardized SPM data framework at the SPZ scale. A normalization process for future scenarios utilizes the same methods as the base year with built form adjustments according to implemented growth policies.

Scenario Painting and Editing

Alternatively, scenarios can be built by directly applying Place Types to the landscape via SPM's web-based scenario painting tool (see Figure X below). It allows the user to edit or build upon a translated plan or scenarios, or create new scenarios from the scratch. SPM builds a scenario by adding the "change" or "increment" that you've painted on top of a base conditions dataset. The combination of the two produces what is known as the "End state" which represents what will be on the ground in the future.

[5] For details on Connect SoCal scenarios, check out Sustainable Communities Strategy technical chapter at https://scag.ca.gov/sites/main/files/file-attachments/0903fconnectsocal_sustainable-communities-strategy.pdf?1606002097

Figure 3: SPM SD Web-based User Interface



V. Scenario Analysis

SPM's standardized data framework constitutes baseline assessment of and forecasted land use, demographic characteristics, and other conditions, providing the context for scenario painting and the foundation for analysis by the modules. SPM analysis modules produce a wide range of inter-related metrics that allow for robust, meaningful comparisons of alternative land use and transportation scenarios. The table below summarizes Connect SoCal performance outputs from SPM.

Table1: Connect SoCal Select SPM Outputs

	Trend/Baseline	Connect SoCal
Fiscal Impacts (cumulative)	Infrastructure Capital	
	$29.0 billion	$26.2 billion
	Operations and Maintenance	
	$11.3 billion	$10.2 billion
Land Consumption	Greenfield Land	
	100 sq mi	71 sq mi
Building Energy Use (cumulative)	Residential Use	
	9,506 trillion Btu	9,358 trillion Btu
	Commercial Use	
	6,040 trillion Btu	6,038 trillion Btu
Building Water Use (cumulative)	Residential Use	
	56.6 million AF	55.3 million AF
	Commercial Use	
	33.1 million AF	32.8 million AF
Household Costs	Transportation Costs (Fuel + Auto)	
	$11,461	$10,852
	Utility Costs (Energy + Water)	
	$2,492	$2,420
Public Health	Respiratory Related Health Costs	
	$3.34 trillion	$3.16 trillion
Land Conservation	Active Farmland and Natural Land Change	
	- 120,700 acres	-116,000
	Total Carbon Stock Change*	
	- 589,000 metric tons	- 734,000 metric tons
	Agriculture Production Value Change	
	$ -94.4 million	$ -72 million
	High Species Movement Potential Change**	
	- 32,200 acres	- 47,400 acres
	Habitat Degraded***	
	151,800 acres	144,120 acres

Land Consumption Module

Land consumption module calculates greenfield land consumed to accommodate new growth for future scenarios. Greenfield is identified based on the assessment of the base year or existing condition. Total land consumed in the existing greenfield is then estimated by applying per unit or per employee assumptions to counts of new housing unit by type and new employment by sector.

Active Output

- **Greenfield land consumed (acre):** measurement of the greenfield land consumed to accommodate new residential and employment growth

Fiscal Impact Module

Fiscal impact analysis allows users to compare the implications of varying forms of development on local expenditures. The current fiscal impact module limits its focus to the impacts associated with new residential growth, accounting for the capital costs of new and upgraded local infrastructures, and local operations and maintenance (O&M) costs to serve new and upgraded infrastructures. Cost factors vary by Land Development Category (LDC), development condition (refill or greenfield), and housing type (single family detached large lot, single family detached small lot, single family attached or multifamily).

Active Outputs

- **Capital infrastructure costs ($):** one-time capital costs for local streets and transportation, water supply, sewage and wastewater, and local parks.
- **Operations and Maintenance (O&M) costs ($):** annual O&M costs in public works functions, general government services, public safety (police and fire), and community services

Energy Use Module

Energy use module computes residential and commercial building energy use, and their related costs and greenhouse gas (GHG) emissions. Within the module, energy use is determined by three types of variables: building characteristics, climate zone, and efficiency factors. Building characteristics and climate zone determine what baseline per-residential unit or per-commercial square foot factors (derived from survey data)[6] are used to calculate energy use. Reductions are then applied to the resulting baseline estimates to reflect the implementation of building efficiency and conservation policies into the future.

Active Outputs

- **Residential Energy Use (kWh, thm):** annual residential electricity and natural gas use
- **Commercial Energy Use (kWh, thm):** annual commercial electricity and natural gas use

[6] The current baseline energy use factors are based on the 2009 California Energy Commission (CEC) Residential Appliance Saturation Survey for residential and on the 2006 CEC Commercial End-Use Survey (CEUS) for commercial buildings.

- **Building-related Total Energy Cost ($):** cost associated with residential and commercial building energy use
- **Building-related GHG Emissions (lbs):** GHG emissions associated with residential and commercial energy use

Water Use Module

Water use module calculates indoor and outdoor residential and commercial water use, and their related costs and greenhouse gas (GHG) emissions. Indoor and outdoor water use is first calculated according to baseline rates[7], determined by building or employment characteristics and climate zone, and then adjusted to account for the application of efficiency and conservation policies into the future.

Active Outputs

- **Indoor and Outdoor Water Use (gal):** annual residential and commercial indoor and outdoor water use
- **Water Cost ($):** annual residential and commercial indoor and outdoor water use
- **Water-Related Energy Use (kWh):** annual residential and commercial indoor and outdoor water use
- **Water-Related GHG Emissions (lbs):** annual residential and commercial indoor and outdoor water use

Public Health Module

Public health module measures the impact of land use patterns and urban form on physical activity-related weight and disease incidences, and respiratory impacts, as well as their related costs. Respiratory health analysis is based on overall VMT from SCAG's regional travel demand model and associated criteria air pollutant emissions from EMFAC 2014. Health incidence and valuation assumptions for select air pollutants (PM2.5, SOx, VOC and NOx) are then applied to estimate pollution-related health incidences and costs.

Physical-activity related health incidences are calculated from California Public Health Assessment Model (C-PHAM) that uses a behavioral and exposure-based pathway approach that links the built environment with health outcomes. The current version of C-PHAM (ver. 2.0)[8] consists of a series of regression models built from the latest health and travel survey data along with demographic, built and natural environment information at the SPZ level. C-PHAM provided health outcomes include the Body Mass Index (BMI), the likelihood of being obese or having high blood pressure/heart disease/type 2 diabetes.

[7] Baseline rates for indoor water use are on a per capita basis by building type for residential and by employment category for commercial buildings. Outdoor use factors are based on per-acre watering needs based on climate.
[8] For more information on C-PHAM version 2, check out C-PHAM fast sheet at xxx.

Active Outputs

- **Respiratory Health Incidences and Cost ($):** pollution-related health incidences total[9] and cost
- **Obese Population (%):** likelihood of being obese for adult/senior/teens/children
- **High Blood Pressure (%):** likelihood of having high blood pressure for adult/senior
- **Heart Disease (%):** likelihood of having heart disease for adult/senior
- **Type 2 Diabetes (%):** likelihood of having type 2 diabetes for adult/senior
- **Body Mass Index (BMI) percentile:** age and gender adjusted body mass index for teens/children

Land Conservation Module

Land Conservation Module measures the impacts of change upon a detailed depiction of existing conditions on the four major themes: carbon, water, agriculture and habitat.[10] The terrestrial carbon storage model analyzes the impact of land use changes on carbon storage associated with natural vegetation in the landscape as well as with soil organic carbon. The water theme measures the impacts of changes to natural lands or land cover on watershed, the ground recharge potential of converted lands, water resource priority areas, and agricultural land with associated water demand. The terrestrial habitat model measures the capacity of the landscape to facilitate or inhibit species movement and the suitability of land use in an area to support terrestrial vertebrates. The agricultural model estimates the impact of land conversion on agricultural production and capacity.

Active Outputs

<u>Carbon</u>
- **Above ground live carbon stocks (metric tons of C)**: carbon stocks in live vegetation
- **Below ground carbon stocks (metric tons of C)**: carbon stocks in the soil up to a depth of 30 cm

<u>Water</u>
- **Watershed Integrity (acres)**: total acreage reported by 3 catchment categories - degraded, important riparian buffer, natural catchment
- **Urban and Agricultural Water Demand (ac-ft)**: estimated water demand
- **Groundwater recharge potential (ac-ft/yr):** net volume of potential groundwater recharge area
- **Water Resource Priority Areas (acres):** acreage change by type in water resource priority areas such as wetlands, flood plains, active river area and drinking water source watersheds

<u>Terrestrial Habitat Conservation</u>
- **Habitat for Terrestrial Vertebrates (acres):** average acres of habitat degraded or improved by individual species and by species guilds, measure as changes from the base
- **Species Movement Potential (acres):** acres of high/medium/low species movement potential

[9] Respiratory health incidences include cases of premature mortality, chronic bronchitis, acute myocardial infarction, respiratory and cardiovascular hospitalization, respiratory related ER visits, acute bronchitis, work loss days, asthma exacerbation, and acute, lower, and upper respiratory symptoms.

[10] Modeling methods for each of the themes were developed in partnership with policy and subject matter experts, including The Nature Conservancy (TNC), American Farmland Trust, UC Davis, and the Sonoma County Agricultural Preservation and Open Space District.

- **Habitat Priority Areas (acres):** acres of habitat priority area classified into natural, urban or agricultural

Agriculture

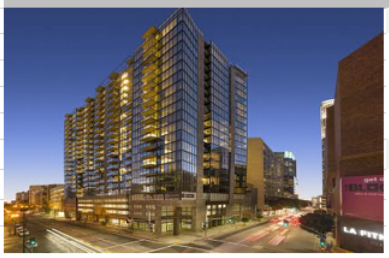
- **Agricultural Capacity (acres):** acres of prime, statewide importance, unique and local importance farmland (FMMP) converted from Agricultural type to an urban landscape
- **Agricultural Production Value ($):** agricultural production in dollars by agricultural landscape type

Appendix A: Place Types Characteristics

Urban Mixed Use

Land Use Mix		Residential Mix		Employment Mix	
Residential	18%	*SF Large Lot*	0%	*Office*	80%
Employment	16%	*SF Small Lot*	0%	*Retail*	20%
Mixed Use	45%	*Townhome*	0%	*Industrial*	0%
Open Space/Civic	21%	*MultiFamily*	100%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	200	*Household*	40-500+	*Household*	85
Average Floors	23	*Employee*	50-500+	*Employee*	266
Total Net FAR	9.0				

Urban Residential



Land Use Mix		Residential Mix		Employment Mix	
Residential	64%	*SF Large Lot*	0%	*Office*	22%
Employment	4%	*SF Small Lot*	0%	*Retail*	78%
Mixed Use	12%	*Townhome*	0%	*Industrial*	0%
Open Space/Civic	21%	*MultiFamily*	100%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	200	*Household*	75-500+	*Household*	131
Average Floors	18	*Employee*	0-50+	*Employee*	44
Total Net FAR	9.0				

Urban Commercial

Land Use Mix		Residential Mix		Employment Mix	
Residential	1%	*SF Large Lot*	0%	*Office*	93%
Employment	4%	*SF Small Lot*	0%	*Retail*	7%
Mixed Use	12%	*Townhome*	0%	*Industrial*	0%
Open Space/Civic	21%	*MultiFamily*	100%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	200	*Household*	0-40	*Household*	8
Average Floors	15	*Employee*	250-500+	*Employee*	402
Total Net FAR	6.0				

City Mixed Use

Land Use Mix		Residential Mix		Employment Mix	
Residential	28%	*SF Large Lot*	0%	*Office*	60%
Employment	17%	*SF Small Lot*	0%	*Retail*	40%
Mixed Use	35%	*Townhome*	3%	*Industrial*	0%
Open Space/Civic	20%	*MultiFamily*	97%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	200	*Household*	10-75	*Household*	44
Average Floors	7	*Employee*	25-165	*Employee*	85
Total Net FAR	3.4				

City Residential

Land Use Mix		Residential Mix		Employment Mix	
Residential	65%	*SF Large Lot*	0%	*Office*	40%
Employment	4%	*SF Small Lot*	0%	*Retail*	60%
Mixed Use	11%	*Townhome*	3%	*Industrial*	0%
Open Space/Civic	20%	*MultiFamily*	97%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	200	*Household*	35-75	*Household*	58
Average Floors	7	*Employee*	0-17	*Employee*	14
Total Net FAR	2.9				

City Commercial

Land Use Mix		Residential Mix		Employment Mix	
Residential	1%	*SF Large Lot*	0%	*Office*	77%
Employment	82%	*SF Small Lot*	0%	*Retail*	23%
Mixed Use	4%	*Townhome*	0%	*Industrial*	0%
Open Space/Civic	14%	*MultiFamily*	100%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	200	*Household*	0-10	*Household*	4
Average Floors	7	*Employee*	90-250	*Employee*	200
Total Net FAR	3.1				

Town Mixed Use

Land Use Mix		Residential Mix		Employment Mix	
Residential	26%	*SF Large Lot*	0%	*Office*	75%
Employment	20%	*SF Small Lot*	0%	*Retail*	25%
Mixed Use	29%	*Townhome*	0%	*Industrial*	0%
Open Space/Civic	25%	*MultiFamily*	100%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	200	*Household*	7-35	*Household*	21
Average Floors	4	*Employee*	25-70	*Employee*	50
Total Net FAR	1.9				

Town Residential

Land Use Mix		Residential Mix		Employment Mix	
Residential	68%	*SF Large Lot*	0%	*Office*	47%
Employment	0%	*SF Small Lot*	0%	*Retail*	53%
Mixed Use	10%	*Townhome*	47%	*Industrial*	0%
Open Space/Civic	22%	*MultiFamily*	53%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	220	*Household*	12-35	*Household*	18
Average Floors	3	*Employee*	0-25	*Employee*	12
Total Net FAR	1.2				

Town Commercial

Land Use Mix		Residential Mix		Employment Mix	
Residential	1%	*SF Large Lot*	0%	*Office*	68%
Employment	69%	*SF Small Lot*	0%	*Retail*	32%
Mixed Use	17%	*Townhome*	0%	*Industrial*	0%
Open Space/Civic	14%	*MultiFamily*	100%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	200	*Household*	0-7	*Household*	5
Average Floors	3	*Employee*	60-90	*Employee*	75
Total Net FAR	1.8				

Village Mixed Use

Land Use Mix		Residential Mix		Employment Mix	
Residential	43%	*SF Large Lot*	15%	*Office*	42%
Employment	14%	*SF Small Lot*	15%	*Retail*	58%
Mixed Use	14%	*Townhome*	29%	*Industrial*	0%
Open Space/Civic	28%	*MultiFamily*	41%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	220	*Household*	5-12	*Household*	10
Average Floors	3	*Employee*	5-40	*Employee*	14
Total Net FAR	1.0				

Village Residential

Land Use Mix		Residential Mix		Employment Mix	
Residential	74%	*SF Large Lot*	26%	*Office*	100%
Employment	0%	*SF Small Lot*	26%	*Retail*	0%
Mixed Use	1%	*Townhome*	49%	*Industrial*	0%
Open Space/Civic	26%	*MultiFamily*	0%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	180	*Household*	8-12	*Household*	10
Average Floors	3	*Employee*	0-5	*Employee*	2
Total Net FAR	0.9				

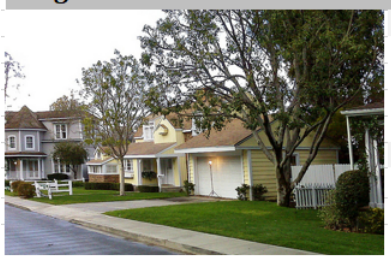
Village Commercial

Land Use Mix		Residential Mix		Employment Mix	
Residential	0%	*SF Large Lot*	0%	*Office*	49%
Employment	61%	*SF Small Lot*	0%	*Retail*	51%
Mixed Use	7%	*Townhome*	0%	*Industrial*	0%
Open Space/Civic	32%	*MultiFamily*	100%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	230	*Household*	0-5	*Household*	2
Average Floors	2	*Employee*	1-60	*Employee*	40
Total Net FAR	1.2				

Neighborhood Residential

Land Use Mix		Residential Mix		Employment Mix	
Residential	76%	*SF Large Lot*	0%	*Office*	86%
Employment	0%	*SF Small Lot*	95%	*Retail*	14%
Mixed Use	2%	*Townhome*	0%	*Industrial*	0%
Open Space/Civic	23%	*MultiFamily*	5%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	180	*Household*	5-8	*Household*	7
Average Floors	2	*Employee*	0-3.5	*Employee*	3
Total Net FAR	0.7				

Neighborhood Low



Land Use Mix		Residential Mix		Employment Mix	
Residential	77%	*SF Large Lot*	13%	*Office*	100%
Employment	1%	*SF Small Lot*	87%	*Retail*	0%
Mixed Use	0%	*Townhome*	0%	*Industrial*	0%
Open Space/Civic	23%	*MultiFamily*	0%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	230	*Household*	0.2-5	*Household*	4
Average Floors	2	*Employee*	0-5	*Employee*	2
Total Net FAR	0.5				

Office Focus

Land Use Mix		Residential Mix		Employment Mix	
Residential	0%	*SF Large Lot*	0%	*Office*	93%
Employment	82%	*SF Small Lot*	0%	*Retail*	2%
Mixed Use	0%	*Townhome*	0%	*Industrial*	5%
Open Space/Civic	18%	*MultiFamily*	0%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	45	*Household*	0	*Household*	0
Average Floors	4	*Employee*	35-150+	*Employee*	65
Total Net FAR	1.1				

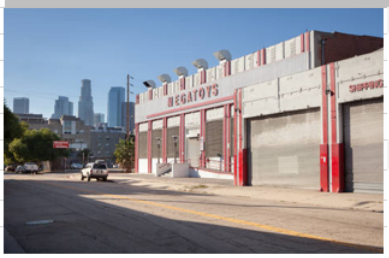
Mixed Office and R&D

Land Use Mix		Residential Mix		Employment Mix	
Residential	0%	*SF Large Lot*	0%	*Office*	82%
Employment	89%	*SF Small Lot*	0%	*Retail*	5%
Mixed Use	0%	*Townhome*	0%	*Industrial*	13%
Open Space/Civic	11%	*MultiFamily*	0%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	45	*Household*	0	*Household*	0
Average Floors	2	*Employee*	25-150+	*Employee*	33
Total Net FAR	0.8				

Office/Industrial

Land Use Mix		Residential Mix		Employment Mix	
Residential	0%	*SF Large Lot*	0%	*Office*	23%
Employment	92%	*SF Small Lot*	0%	*Retail*	5%
Mixed Use	0%	*Townhome*	0%	*Industrial*	72%
Open Space/Civic	8%	*MultiFamily*	0%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	40	*Household*	0	*Household*	0
Average Floors	1	*Employee*	16-25	*Employee*	21
Total Net FAR	0.5				

Industrial Focuse



Land Use Mix		Residential Mix		Employment Mix	
Residential	0%	*SF Large Lot*	0%	*Office*	20%
Employment	89%	*SF Small Lot*	0%	*Retail*	14%
Mixed Use	0%	*Townhome*	0%	*Industrial*	66%
Open Space/Civic	11%	*MultiFamily*	0%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	35	*Household*	0	*Household*	0
Average Floors	1	*Employee*	8-16	*Employee*	14
Total Net FAR	0.5				

Low Desity Employment Park

Land Use Mix		Residential Mix		Employment Mix	
Residential	0%	*SF Large Lot*	0%	*Office*	28%
Employment	86%	*SF Small Lot*	0%	*Retail*	5%
Mixed Use	0%	*Townhome*	0%	*Industrial*	67%
Open Space/Civic	14%	*MultiFamily*	0%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	35	*Household*	0	*Household*	0
Average Floors	1	*Employee*	1-8	*Employee*	6
Total Net FAR	0.4				

High Intensity Activity Center

Land Use Mix		Residential Mix		Employment Mix	
Residential	14%	*SF Large Lot*	0%	*Office*	20%
Employment	37%	*SF Small Lot*	0%	*Retail*	80%
Mixed Use	41%	*Townhome*	6%	*Industrial*	0%
Open Space/Civic	8%	*MultiFamily*	94%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	130	*Household*	0.5-200+	*Household*	24
Average Floors	5	*Employee*	3-250+	*Employee*	69
Total Net FAR	2.5				

Mid Intensity Activity Center

Land Use Mix		Residential Mix		Employment Mix	
Residential	23%	*SF Large Lot*	0%	*Office*	8%
Employment	64%	*SF Small Lot*	0%	*Retail*	92%
Mixed Use	5%	*Townhome*	51%	*Industrial*	0%
Open Space/Civic	8%	*MultiFamily*	49%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	70	*Household*	0.5-9	*Household*	7
Average Floors	3	*Employee*	3-22	*Employee*	11
Total Net FAR	1.3				

Low Intensity Retail-Centered Neighborhood

Land Use Mix		Residential Mix		Employment Mix	
Residential	45%	*SF Large Lot*	9%	*Office*	4%
Employment	33%	*SF Small Lot*	60%	*Retail*	96%
Mixed Use	0%	*Townhome*	12%	*Industrial*	0%
Open Space/Civic	22%	*MultiFamily*	18%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	65	*Household*	0.5-7	*Household*	4
Average Floors	2	*Employee*	1-6	*Employee*	4
Total Net FAR	0.4				

Strip Mall/Big Box Retail

Land Use Mix		Residential Mix		Employment Mix	
Residential	0%	*SF Large Lot*	0%	*Office*	11%
Employment	93%	*SF Small Lot*	0%	*Retail*	89%
Mixed Use	0%	*Townhome*	0%	*Industrial*	0%
Open Space/Civic	7%	*MultiFamily*	0%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	60	*Household*	0	*Household*	0
Average Floors	1	*Employee*	1-100+	*Employee*	15
Total Net FAR	0				

Industrial/Office/Residential Mixed High

Land Use Mix		Residential Mix		Employment Mix	
Residential	58%	*SF Large Lot*	0%	*Office*	73%
Employment	36%	*SF Small Lot*	0%	*Retail*	16%
Mixed Use	0%	*Townhome*	4%	*Industrial*	11%
Open Space/Civic	6%	*MultiFamily*	96%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	60	*Household*	18-200+	*Household*	45
Average Floors	4	*Employee*	3-250+	*Employee*	42
Total Net FAR	2				

Industrial/Office/Residential Mixed Low

Land Use Mix		Residential Mix		Employment Mix	
Residential	42%	*SF Large Lot*	8%	*Office*	32%
Employment	51%	*SF Small Lot*	8%	*Retail*	0%
Mixed Use	0%	*Townhome*	43%	*Industrial*	68%
Open Space/Civic	7%	*MultiFamily*	40%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	60	*Household*	5-18	*Household*	10
Average Floors	2	*Employee*	1-35	*Employee*	18
Total Net FAR	0.9				

Suburban Multifamily

Land Use Mix		Residential Mix		Employment Mix	
Residential	87%	*SF Large Lot*	0%	*Office*	85%
Employment	0%	*SF Small Lot*	0%	*Retail*	15%
Mixed Use	0%	*Townhome*	11%	*Industrial*	0%
Open Space/Civic	13%	*MultiFamily*	89%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	90	*Household*	18-150+	*Household*	32
Average Floors	3	*Employee*	0-6	*Employee*	2
Total Net FAR	1.2				

Suburban Mixed Residential

Land Use Mix		Residential Mix		Employment Mix	
Residential	76%	*SF Large Lot*	3%	*Office*	95%
Employment	4%	*SF Small Lot*	18%	*Retail*	5%
Mixed Use	0%	*Townhome*	27%	*Industrial*	0%
Open Space/Civic	19%	*MultiFamily*	52%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	90	*Household*	7-18	*Household*	13
Average Floors	3	*Employee*	0-6	*Employee*	2
Total Net FAR	0.6				

Residential Subdivision

Land Use Mix		Residential Mix		Employment Mix	
Residential	73%	*SF Large Lot*	12%	*Office*	96%
Employment	4%	*SF Small Lot*	88%	*Retail*	4%
Mixed Use	0%	*Townhome*	0%	*Industrial*	0%
Open Space/Civic	23%	*MultiFamily*	0%		
Built Environment		**Gross Density Range (per acre)**		**Average Density (per acre)**	
Intersections per mi²	90	*Household*	2.5-7	*Household*	5
Average Floors	2	*Employee*	0-6	*Employee*	1
Total Net FAR	0.4				

Large Lot Residential

Land Use Mix		Residential Mix		Employment Mix	
Residential	81%	*SF Large Lot*	100%	*Office*	97%
Employment	2%	*SF Small Lot*	0%	*Retail*	3%
Mixed Use	0%	*Townhome*	0%	*Industrial*	0%
Open Space/Civic	17%	*MultiFamily*	0%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	20	*Household*	0.5-2	*Household*	2
Average Floors	2	*Employee*	0-2	*Employee*	1
Total Net FAR	0.3				

Rural Residential

Land Use Mix		Residential Mix		Employment Mix	
Residential	94%	*SF Large Lot*	100%	*Office*	0%
Employment	0%	*SF Small Lot*	0%	*Retail*	0%
Mixed Use	0%	*Townhome*	0%	*Industrial*	100%
Open Space/Civic	6%	*MultiFamily*	0%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	15	*Household*	0.1-0.3	*Household*	0.2
Average Floors	2	*Employee*	0-0.02	*Employee*	0.01
Total Net FAR	0.04				

Rural Ranchettes

Land Use Mix		Residential Mix		Employment Mix	
Residential	96%	*SF Large Lot*	100%	*Office*	0%
Employment	1%	*SF Small Lot*	0%	*Retail*	0%
Mixed Use	0%	*Townhome*	0%	*Industrial*	100%
Open Space/Civic	3%	*MultiFamily*	0%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	10	*Household*	0-0.12	*Household*	0.1
Average Floors	2	*Employee*	0-0.02	*Employee*	0.01
Total Net FAR	0.01				

Rural Employment

Land Use Mix		Residential Mix		Employment Mix	
Residential	5%	*SF Large Lot*	100%	*Office*	0%
Employment	92%	*SF Small Lot*	0%	*Retail*	0%
Mixed Use	0%	*Townhome*	0%	*Industrial*	100%
Open Space/Civic	3%	*MultiFamily*	0%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	10	*Household*	0-0.02	*Household*	0.01
Average Floors	1	*Employee*	0-0.05	*Employee*	0.01
Total Net FAR	0.001				

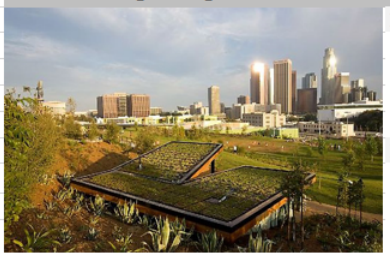
Campus/University

Land Use Mix		Residential Mix		Employment Mix	
Residential	32%	*SF Large Lot*	0%	*Office*	64%
Employment	2%	*SF Small Lot*	0%	*Retail*	36%
Mixed Use	0%	*Townhome*	0%	*Industrial*	0%
Open Space/Civic	67%	*MultiFamily*	100%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	150	*Household*	1-50	*Household*	31
Average Floors	8	*Employee*	10-100	*Employee*	22
Total Net FAR	1.7				

Institutional

Land Use Mix		Residential Mix		Employment Mix	
Residential	5%	*SF Large Lot*	0%	*Office*	99%
Employment	26%	*SF Small Lot*	16%	*Retail*	1%
Mixed Use	0%	*Townhome*	0%	*Industrial*	1%
Open Space/Civic	70%	*MultiFamily*	84%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	130	*Household*	0-2	*Household*	1
Average Floors	7	*Employee*	5-250+	*Employee*	96
Total Net FAR	2.5				

Parks & Open Space



Land Use Mix		Residential Mix		Employment Mix	
Residential	0%	*SF Large Lot*	0%	*Office*	0%
Employment	0%	*SF Small Lot*	0%	*Retail*	0%
Mixed Use	0%	*Townhome*	0%	*Industrial*	0%
Open Space/Civic	100%	*MultiFamily*	0%		
Built Environment		**Gross Density Range** *(per acre)*		**Average Density** *(per acre)*	
Intersections per mi²	10	*Household*	0	*Household*	0
Average Floors	0	*Employee*	0	*Employee*	0
Total Net FAR	0				