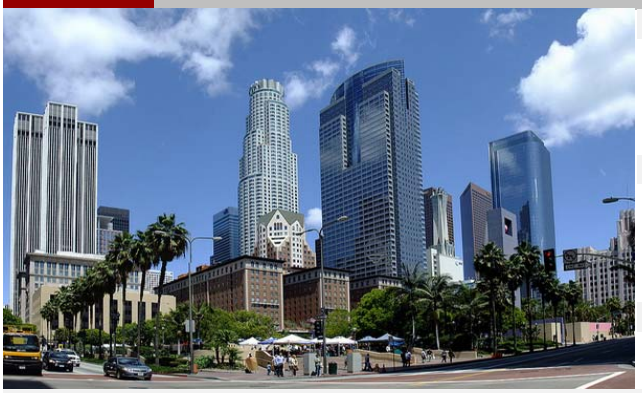
APPENDIX M

SCAG 2016-2040 RTP/SCS, Sustainable Communities Strategy Background Documentation

UrbanFootprint Place Types

Urban Mixed Use

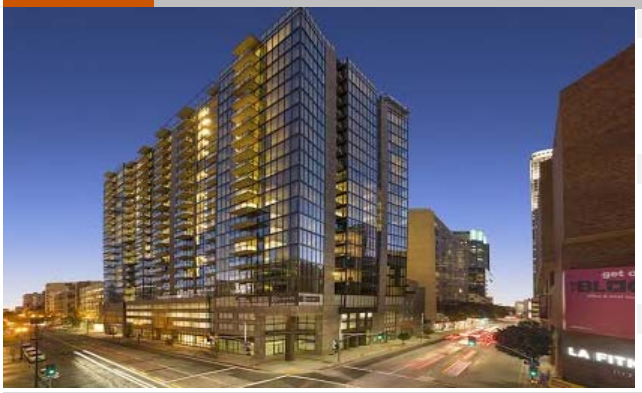


Land Use Mix		Residential Mix	
Residential	18%	*SF Large Lot*	0%
Employment	16%	*SF Small Lot*	0%
Mixed Use	45%	*Townhome*	0%
Open Space/Civic	21%	*MultiFamily*	100%
Built Environment		**Employment Mix**	
Intersections per mi²	200	*Office*	80%
Average Floors	23	*Retail*	20%
Floors Range	15 – 100	*Industrial*	0%
Total Net FAR	9.0		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	40-500+	*Household*	85
Employee	50-500+	*Employee*	266

Description

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

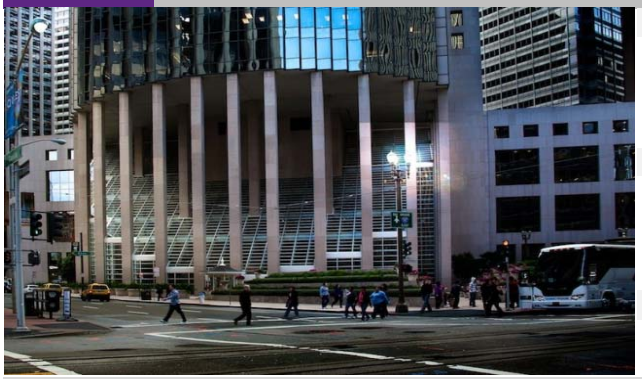


Land Use Mix		Residential Mix	
Residential	64%	*SF Large Lot*	0%
Employment	4%	*SF Small Lot*	0%
Mixed Use	12%	*Townhome*	0%
Open Space/Civic	21%	*MultiFamily*	100%
Built Environment		**Employment Mix**	
Intersections per mi²	200	*Office*	22%
Average Floors	18	*Retail*	78%
Floors Range	5 – 60	*Industrial*	0%
Total Net FAR	9.0		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	75-500+	*Household*	131
Employee	0-50+	*Employee*	44

Description

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



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

Description

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.

UrbanFootprint Place Types

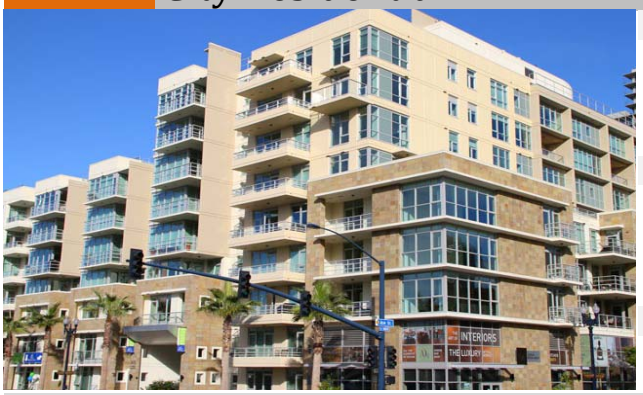
City Mixed Use

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

Description

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

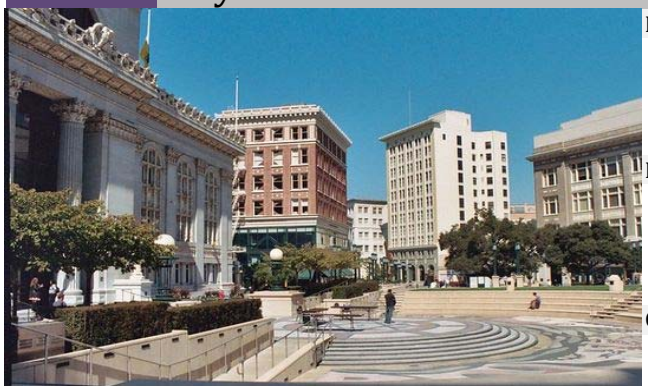


Land Use Mix		Residential Mix	
Residential	65%	*SF Large Lot*	0%
Employment	4%	*SF Small Lot*	0%
Mixed Use	11%	*Townhome*	3%
Open Space/Civic	20%	*MultiFamily*	97%
Built Environment		**Employment Mix**	
Intersections per mi²	200	*Office*	40%
Average Floors	7	*Retail*	60%
Floors Range	5 – 40	*Industrial*	0%
Total Net FAR	2.9		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	35-75	*Household*	58
Employee	0-17	*Employee*	14

Description

An 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 can walk or bicycle for many of their daily needs.

City Commerical



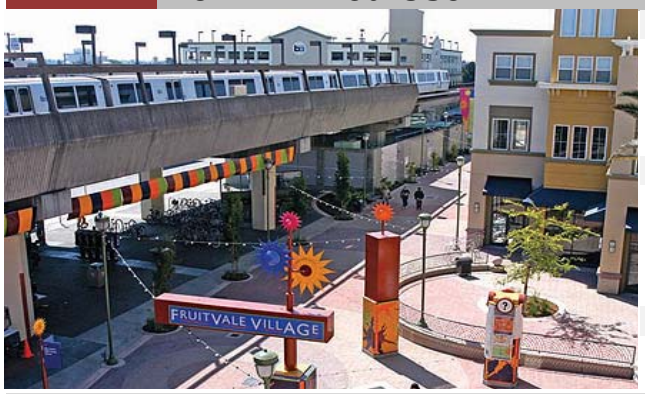
Land Use Mix		Residential Mix	
Residential	1%	*SF Large Lot*	0%
Employment	82%	*SF Small Lot*	0%
Mixed Use	4%	*Townhome*	0%
Open Space/Civic	14%	*MultiFamily*	100%
Built Environment		**Employment Mix**	
Intersections per mi²	200	*Office*	77%
Average Floors	7	*Retail*	23%
Floors Range	5 – 40	*Industrial*	0%
Total Net FAR	3.1		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	0-10	*Household*	4
Employee	90-250	*Employee*	200

Description

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.

UrbanFootprint Place Types

Town Mixed Use

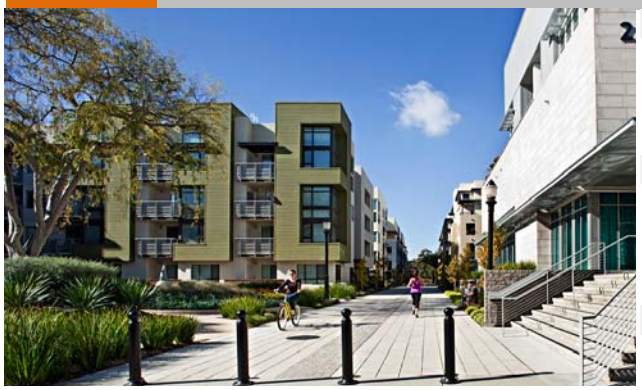


Land Use Mix		Residential Mix	
Residential	26%	*SF Large Lot*	0%
Employment	20%	*SF Small Lot*	0%
Mixed Use	29%	*Townhome*	0%
Open Space/Civic	25%	*MultiFamily*	100%
Built Environment		**Employment Mix**	
Intersections per mi²	200	*Office*	75%
Average Floors	4	*Retail*	25%
Floors Range	2 – 8	*Industrial*	0%
Total Net FAR	1.9		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	7-35	*Household*	21
Employee	25-70	*Employee*	50

Description

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



Land Use Mix		Residential Mix	
Residential	68%	*SF Large Lot*	0%
Employment	0%	*SF Small Lot*	0%
Mixed Use	10%	*Townhome*	47%
Open Space/Civic	22%	*MultiFamily*	53%
Built Environment		**Employment Mix**	
Intersections per mi²	220	*Office*	47%
Average Floors	3	*Retail*	53%
Floors Range	2 – 8	*Industrial*	0%
Total Net FAR	1.2		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	12-35	*Household*	18
Employee	0-25	*Employee*	12

Description

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

Land Use Mix		Residential Mix	
Residential	1%	*SF Large Lot*	0%
Employment	69%	*SF Small Lot*	0%
Mixed Use	17%	*Townhome*	0%
Open Space/Civic	14%	*MultiFamily*	100%
Built Environment		**Employment Mix**	
Intersections per mi²	200	*Office*	68%
Average Floors	3	*Retail*	32%
Floors Range	2 – 8	*Industrial*	0%
Total Net FAR	1.8		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	0-7	*Household*	5
Employee	60-90	*Employee*	75

Description

Equivalent to the center of a traditional town, or a more employment-focused transit-oriented development, Town Commercial contains a mix of commerical 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.

UrbanFootprint Place Types

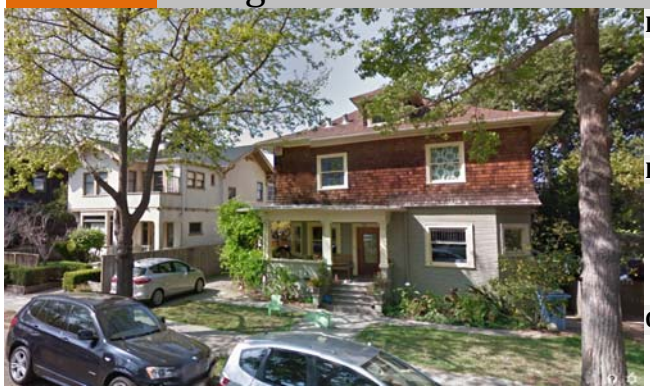
Village Mixed Use

Land Use Mix		Residential Mix	
Residential	43%	*SF Large Lot*	15%
Employment	14%	*SF Small Lot*	15%
Mixed Use	14%	*Townhome*	29%
Open Space/Civic	28%	*MultiFamily*	41%
Built Environment		**Employment Mix**	
Intersections per mi²	220	*Office*	42%
Average Floors	3	*Retail*	58%
Floors Range	2 – 6	*Industrial*	0%
Total Net FAR	1.0		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	5-12	*Household*	10
Employee	5-40	*Employee*	14

Description

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



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

Description

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 Commerical

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

Description

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.

UrbanFootprint Place Types

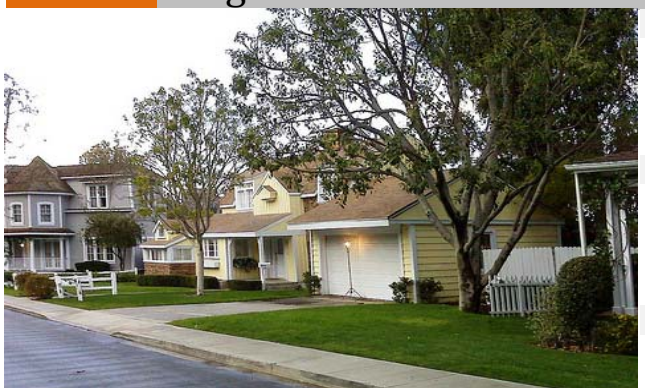
Neighborhood Residential

Land Use Mix		Residential Mix	
Residential	76%	*SF Large Lot*	0%
Employment	0%	*SF Small Lot*	95%
Mixed Use	2%	*Townhome*	0%
Open Space/Civic	23%	*MultiFamily*	5%
Built Environment		**Employment Mix**	
Intersections per mi²	180	*Office*	86%
Average Floors	2	*Retail*	14%
Floors Range	2 – 4	*Industrial*	0%
Total Net FAR	0.7		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	5-8	*Household*	7
Employee	0-3.5	*Employee*	3

Description

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



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

Description

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

Land Use Mix		Residential Mix	
Residential	0%	*SF Large Lot*	0%
Employment	82%	*SF Small Lot*	0%
Mixed Use	0%	*Townhome*	0%
Open Space/Civic	18%	*MultiFamily*	0%
Built Environment		**Employment Mix**	
Intersections per mi²	45	*Office*	93%
Average Floors	4	*Retail*	2%
Floors Range	2 – 9	*Industrial*	5%
Total Net FAR	1.1		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	0	*Household*	0
Employee	35-150+	*Employee*	65

Description

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

Land Use Mix		Residential Mix	
Residential	0%	*SF Large Lot*	0%
Employment	89%	*SF Small Lot*	0%
Mixed Use	0%	*Townhome*	0%
Open Space/Civic	11%	*MultiFamily*	0%
Built Environment		**Employment Mix**	
Intersections per mi²	45	*Office*	82%
Average Floors	2	*Retail*	5%
Floors Range	1 – 6	*Industrial*	13%
Total Net FAR	0.8		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	0	*Household*	0
Employee	25-150+	*Employee*	33

Description

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.

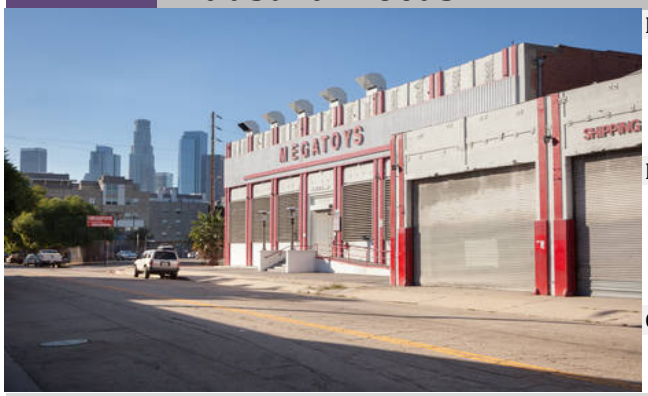
Office/Industrial

Land Use Mix		Residential Mix	
Residential	0%	*SF Large Lot*	0%
Employment	92%	*SF Small Lot*	0%
Mixed Use	0%	*Townhome*	0%
Open Space/Civic	8%	*MultiFamily*	0%
Built Environment		**Employment Mix**	
Intersections per mi²	40	*Office*	23%
Average Floors	1	*Retail*	5%
Floors Range	1 – 4	*Industrial*	72%
Total Net FAR	0.5		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	0	*Household*	0
Employee	16-25	*Employee*	21

Description

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



Land Use Mix		Residential Mix	
Residential	0%	*SF Large Lot*	0%
Employment	89%	*SF Small Lot*	0%
Mixed Use	0%	*Townhome*	0%
Open Space/Civic	11%	*MultiFamily*	0%
Built Environment		**Employment Mix**	
Intersections per mi²	35	*Office*	20%
Average Floors	1	*Retail*	14%
Floors Range	1 – 2	*Industrial*	66%
Total Net FAR	0.5		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	0	*Household*	0
Employee	8-16	*Employee*	14

Description

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.

UrbanFootprint Place Types

Low Density Employment Park

Land Use Mix		Residential Mix	
Residential	0%	*SF Large Lot*	0%
Employment	86%	*SF Small Lot*	0%
Mixed Use	0%	*Townhome*	0%
Open Space/Civic	14%	*MultiFamily*	0%
Built Environment		**Employment Mix**	
Intersections per mi²	35	*Office*	28%
Average Floors	1	*Retail*	5%
Floors Range	1 – 2	*Industrial*	67%
Total Net FAR	0.4		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	0	*Household*	0
Employee	1-8	*Employee*	6

Description

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

Land Use Mix		Residential Mix	
Residential	14%	*SF Large Lot*	0%
Employment	37%	*SF Small Lot*	0%
Mixed Use	41%	*Townhome*	6%
Open Space/Civic	8%	*MultiFamily*	94%
Built Environment		**Employment Mix**	
Intersections per mi²	130	*Office*	20%
Average Floors	5	*Retail*	80%
Floors Range	5 – 40	*Industrial*	0%
Total Net FAR	2.5		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	0.5-200+	*Household*	24
Employee	3-250+	*Employee*	69

Description

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

Land Use Mix		Residential Mix	
Residential	23%	*SF Large Lot*	0%
Employment	64%	*SF Small Lot*	0%
Mixed Use	5%	*Townhome*	51%
Open Space/Civic	8%	*MultiFamily*	49%
Built Environment		**Employment Mix**	
Intersections per mi²	70	*Office*	8%
Average Floors	3	*Retail*	92%
Floors Range	2 – 7	*Industrial*	0%
Total Net FAR	1.3		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	0.5-9	*Household*	7
Employee	3-22	*Employee*	11

Description

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.

UrbanFootprint Place Types

Low Intensity Retail-Centered Neighborhood

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

Description

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.

Strip Mall/ Big Box Retail

Land Use Mix		Residential Mix	
Residential	0%	*SF Large Lot*	0%
Employment	93%	*SF Small Lot*	0%
Mixed Use	0%	*Townhome*	0%
Open Space/Civic	7%	*MultiFamily*	0%
Built Environment		**Employment Mix**	
Intersections per mi²	60	*Office*	11%
Average Floors	1	*Retail*	89%
Floors Range	1 – 2	*Industrial*	0%
Total Net FAR	0		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	0	*Household*	0
Employee	1-100+	*Employee*	15

Description

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/Residential Mixed High

Land Use Mix		Residential Mix	
Residential	58%	*SF Large Lot*	0%
Employment	36%	*SF Small Lot*	0%
Mixed Use	0%	*Townhome*	4%
Open Space/Civic	6%	*MultiFamily*	96%
Built Environment		**Employment Mix**	
Intersections per mi²	60	*Office*	73%
Average Floors	4	*Retail*	16%
Floors Range	1 – 17	*Industrial*	11%
Total Net FAR	2		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	18-200+	*Household*	45
Employee	3-250+	*Employee*	42

Description

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.

UrbanFootprint Place Types

Industrial/Office/Residential Mixed Low

Land Use Mix		Residential Mix	
Residential	42%	*SF Large Lot*	8%
Employment	51%	*SF Small Lot*	8%
Mixed Use	0%	*Townhome*	43%
Open Space/Civic	7%	*MultiFamily*	40%
Built Environment		**Employment Mix**	
Intersections per mi²	60	*Office*	32%
Average Floors	2	*Retail*	0%
Floors Range	1 – 3	*Industrial*	68%
Total Net FAR	0.9		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	5-18	*Household*	10
Employee	1-35	*Employee*	18

Description

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

Land Use Mix		Residential Mix	
Residential	87%	*SF Large Lot*	0%
Employment	0%	*SF Small Lot*	0%
Mixed Use	0%	*Townhome*	11%
Open Space/Civic	13%	*MultiFamily*	89%
Built Environment		**Employment Mix**	
Intersections per mi²	90	*Office*	85%
Average Floors	3	*Retail*	15%
Floors Range	2-5	*Industrial*	0%
Total Net FAR	1.2		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	18-150+	*Household*	32
Employee	0-6	*Employee*	2

Description

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

Land Use Mix		Residential Mix	
Residential	76%	*SF Large Lot*	3%
Employment	4%	*SF Small Lot*	18%
Mixed Use	0%	*Townhome*	27%
Open Space/Civic	19%	*MultiFamily*	52%
Built Environment		**Employment Mix**	
Intersections per mi²	90	*Office*	95%
Average Floors	3	*Retail*	5%
Floors Range	1 – 3	*Industrial*	0%
Total Net FAR	0.6		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	7-18	*Household*	13
Employee	0-6	*Employee*	2

Description

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.

UrbanFootprint Place Types

Residential Subdivision

Land Use Mix		Residential Mix	
Residential	73%	*SF Large Lot*	12%
Employment	4%	*SF Small Lot*	88%
Mixed Use	0%	*Townhome*	0%
Open Space/Civic	23%	*MultiFamily*	0%
Built Environment		**Employment Mix**	
Intersections per mi²	90	*Office*	96%
Average Floors	2	*Retail*	4%
Floors Range	1 – 3	*Industrial*	0%
Total Net FAR	0.4		
Gross Density Range (per acre)		**Average Density (per acre)**	
Household	2.5-7	*Household*	5
Employee	0-6	*Employee*	1

Description

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

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

Description

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

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

Description

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.

UrbanFootprint Place Types

Rural Ranchettes

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

Description

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

Land Use Mix		Residential Mix	
Residential	5%	*SF Large Lot*	100%
Employment	92%	*SF Small Lot*	0%
Mixed Use	0%	*Townhome*	0%
Open Space/Civic	3%	*MultiFamily*	0%
Built Environment		**Employment Mix**	
Intersections per mi²	10	*Office*	0%
Average Floors	1	*Retail*	0%
Floors Range	1 – 2	*Industrial*	100%
Total Net FAR	0.001		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	0-0.02	*Household*	0.01
Employee	0-0.05	*Employee*	0.01

Description

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

Land Use Mix		Residential Mix	
Residential	32%	*SF Large Lot*	0%
Employment	2%	*SF Small Lot*	0%
Mixed Use	0%	*Townhome*	0%
Open Space/Civic	67%	*MultiFamily*	100%
Built Environment		**Employment Mix**	
Intersections per mi²	150	*Office*	64%
Average Floors	8	*Retail*	36%
Floors Range	3 – 17	*Industrial*	0%
Total Net FAR	1.7		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	1-50	*Household*	31
Employee	10-100	*Employee*	22

Description

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.

UrbanFootprint Place Types

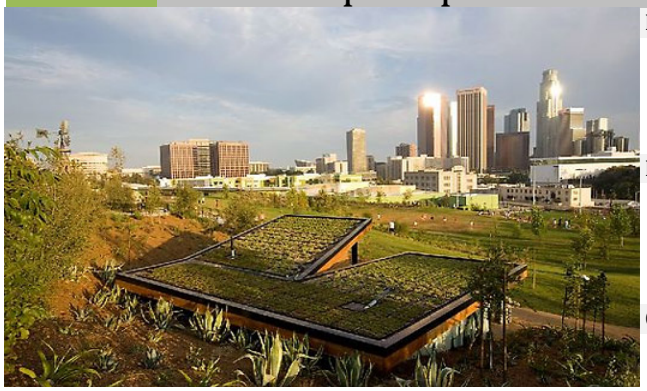
Institutional

Land Use Mix		Residential Mix	
Residential	5%	*SF Large Lot*	0%
Employment	26%	*SF Small Lot*	16%
Mixed Use	0%	*Townhome*	0%
Open Space/Civic	70%	*MultiFamily*	84%
Built Environment		**Employment Mix**	
Intersections per mi²	130	*Office*	99%
Average Floors	7	*Retail*	1%
Floors Range	1 – 9	*Industrial*	1%
Total Net FAR	2.5		
Gross Density Range *(per acre)*		**Average Density** *(per acre)*	
Household	0-2	*Household*	1
Employee	5-250+	*Employee*	96

Description

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



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

Description

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

Terminology

Land Use Mix	
Residential	Percent of land dedicated to residential uses
Employment	Percent of land dedicated to commercial uses
Mixed Use	Percent of land dedicated to a mix of residential and commercial uses
Open Space/Civic	Percent of land dedicated to civic, park, and utility uses
Residential Mix	
SF Large Lot	Percent of households that are Single family, large lots (> 5500 square feet per lot)
SF Small Lot	Percent of households that are Single family, small lots (< 5500 square feet per lot)
Townhome	Percent of households that are Townhome/Single Family Attached
MultiFamily	Percent of households that are Multifamily types
Employment Mix	
Office	Percent of Employment that is Office
Retail	Percent of Employment that is Retail
Industrial	Percent of Employment that is Industrial
Built Environment	
Intersections per mi ^{2}	Intersections per square mile is an indicator of the connectivity of an area. Walkable areas are considered to have greater than 150 intersections per square mile.
Average Floors	The average building height measued in number of floors
Floors Range	The range of building heights measured in number of floors
Total Net FAR	The average net floor-to-area ratio
Gross Density Range	
Household	The range of household density per acre present in a given place type
Employee	The range pf employee densities per acre present in a given place type
Average Density	
Household	The average gross household density per acre
Employee	The average gross employee density per acre

SUSTAINABILITY

SUSTAINABLE COMMUNITIES STRATEGY (SCS) BACKGROUND DOCUMENTATION

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

2016 2040 RTPSCS

APPENDIX

ADOPTED | ARRIL 2016

2016 2040 RTPSCS

APPENDIX

SUSTAINABILITY | SUSTAINABLE COMMUNITES STRATEGY (SCS) BACKGROUND DOCUMENTATION

ADOPTED | MARCH 2016

SCS BACKGROUND DOCUMENTATION

SCS REQUIREMENTS MATRIX

The passage of California Senate Bill 375 (SB 375) in 2008 requires that a Metropolitan Planning Organization such as SCAG prepare and adopt a Sustainable Communities Strategy (SCS) that sets forth a forecasted regional development pattern which, when integrated with the transportation network, measures, and policies, will reduce greenhouse gas emissions from automobiles and light duty trucks (Govt. Code §65080(b)(2)(B)). The SCS outlines certain land use growth strategies that provide for more integrated land use and transportation planning, and maximize transportation investments. The SCS is intended to provide a regional land use policy framework that local governments may consider and build upon. The following matrix outlines the statutory requirements of a SCS and where the requirements are addressed in both the 2012 RTP/SCS and the 2016 RTP/SCS.

TABLE 1 SCS Requirements Matrix

Required Element	Reference (2012)	Reference (2016)
California Government Code (CGC) Section 65080(b) (2)(B): Each metropolitan organization shall prepare a sustainable communities strategy, subject to the requirements of Part 450 of Title 23 of, and Part 93 of Title 40 of, the Code of Federal Regulations, including the requirement to utilize the most recent planning assumptions considering local General Plans and other factors.	2012–2035 RTP/SCS Chapter 4: Sustainable Communities Strategy	2016-2040 RTP/SCS Chapter 5: The Road to Greater Mobility and Sustainable Growth 2016-2040 RTP/SCS Appendix: SCS Background Documentation
CGC Section 65080(b) (2)(B)(i): Identify the general location of uses, residential densities, and building intensities within the region	2012–2035 RTP/SCS Chapter 4: Sustainable Communities Strategy 2012–2035 RTP/SCS Appendices: SCS Background Documentation; Growth Forecast	2016-2040 RTP/SCS Appendices: SCS Background Documentation; Demographics and Growth Forecast
CGC Section 65080(b) (2)(B)(ii): Identify areas within the region sufficient to house all the population of the region, including all economic segments of the population, over the course of the planning period of the regional transportation plan taking into account net migration into the region, population growth, household formation and employment growth	2012–2035 RTP/SCS Chapter 4: Sustainable Communities Strategy 2012–2035 RTP/SCS Appendices: SCS Background Documentation; Growth Forecast	2016-2040 RTP/SCS Appendices: SCS Background Documentation; Demographics and Growth Forecast
CGC Section 65080(b) (2)(B)(iii): Identify areas within the region sufficient to house an eight-year projection of the regional housing need for the region pursuant to Section 65584	2012–2035 RTP/SCS Chapter 4: Sustainable Communities Strategy 2012–2035 RTP/SCS Appendix: SCS Background Documentation	2016-2040 RTP/SCS Appendices: SCS Background Documentation; Demographics and Growth Forecast
CGC Section 65080(b) (2)(B)(iv): Identify a transportation network to service the transportation needs of the region	2012–2035 RTP/SCS Chapter 4: Sustainable Communities Strategy; Chapter 2: Transportation Investments	2016-2040 RTP/SCS Chapter 5: The Road to Greater Mobility and Sustainable Growth

TABLE 1 SCS Requirements Matrix: continued

Required Element	Reference (2012)	Reference (2016)
CGC Section 65080(b) (2)(B)(v): Gather and consider the best practically available scientific information regarding resource areas and farmland in the region as defined in subdivisions (a) and (b) of Section 65080.01	2012–2035 RTP/SCS Chapter 4: Sustainable Communities Strategy; Chapter 2: Transportation Investments	2016-2040 RTP/SCS Appendix: Natural Lands
CGC Section 65080(b) (2)(B)(vi): Consider the state housing goals specified in Sections 65580 and 65581	2012–2035 RTP/SCS Chapter 4: Sustainable Communities Strategy 2012–2035 RTP/SCS Appendix: SCS Background Documentation	2016-2040 RTP/SCS Appendix: SCS Background Documentation
CGC Section 65080(b) (2)(B)(vii): Set forth a forecasted development pattern for the region, which, when integrated with the transportation network, and other transportation measures and policies, will reduce the greenhouse gas emissions from automobiles and light trucks to achieve, if there is a feasible way to do so, the greenhouse gas emission reduction targets approved by the state board	2012–2035 RTP/SCS Chapter 4: Sustainable Communities Strategy; Chapter 5: Measuring Up 2012–2035 RTP/SCS Appendices: Transportation Conformity Analysis; Performance Measures	2016-2040 RTP/SCS Chapter 5: A Plan for Mobility, Sustainability and a High Quality of Life, Chapter 8: Measuring Our Progress for the Future 2016-2040 RTP/SCS Appendices: SCS Background Documentation; Transportation Conformity Analysis
CGC Section 65080(b) (2)(B)(viii): Allow the regional transportation plan to comply with Section 176 of the federal Clean Air Act (42 U.S.C. Sec. 7506)	2012–2035 RTP/SCS Chapter 4: Sustainable Communities Strategy 2012–2035 RTP/SCS Appendix: Transportation Conformity Analysis	2016-2040 RTP/SCS Appendix: Transportation Conformity Analysis
CGC Section 65080(b) (2)(D) The metropolitan planning organization shall conduct at least two informational meetings in each county within the region for members of the board of supervisors and city councils on the sustainable communities strategy and alternative planning strategy.	2012–2035 RTP/SCS Chapter 6: Public Participation Plan 2012–2035 RTP/SCS Appendix: Public Participation and Consultation	2016-2040 RTP/SCS Appendix: Public Participation and Community Consultation
CGC Section 65080(b) (2)(E) Each metropolitan planning organization shall adopt a public participation plan, for development of the sustainable communities strategy and an alternative planning strategy, if any, that includes the following:	2012–2035 RTP/SCS Chapter 6: Public Participation Plan 2012–2035 RTP/SCS Appendix: Public Participation and Consultation	2016-2040 RTP/SCS Appendix: Public Participation and Community Consultation

TABLE 1 SCS Requirements Matrix: continued

Required Element	Reference (2012)	Reference (2016)
CGC Section 65080(b) (2)(E)(i): Outreach efforts to encourage active participation of a broad range of stakeholder groups in the planning process, consistent with the agency's adopted Federal Public Participation Plan, including, but not limited to, affordable housing advocates, transportation advocates, neighborhood and community groups, environmental advocates, home builder representatives, broad-based business organizations, landowners, commercial property interest, and homeowner associations.	2012–2035 RTP/SCS Chapter 6: Public Participation Plan 2012–2035 RTP/SCS Appendix: Public Participation and Consultation	2016-2040 RTP/SCS Appendix: Public Participation and Community Consultation
CGC Section 65080(b) (2)(E)(ii): Consultation with congestion management agencies, transportation agencies, and transportation commissions.	2012–2035 RTP/SCS Chapter 6: Public Participation Plan 2012–2035 RTP/SCS Appendix: Public Participation and Consultation	2016-2040 RTP/SCS Appendix: Public Participation and Community Consultation
CGC Section 65080(b) (2)(E)(iii): Workshops throughout the region to provide the public with the information and tools necessary to provide clear understanding of the issues and policy choices. At least one workshop shall be held in each county in the region. For counties with a population greater than 500,000, at least three workshops shall be held. Each workshop, to the extent practicable shall include urban simulation computer modeling to create visual representation of the sustainable communities strategy and the alternative planning strategy.	2012–2035 RTP/SCS Chapter 6: Public Participation Plan 2012–2035 RTP/SCS Appendix: Public Participation and Consultation	2016-2040 RTP/SCS Appendix: Public Participation and Community Consultation
CGC Section 65080(b) (2)(E)(v): At least three public hearings on the draft sustainable communities strategy in the regional transportation plan and alternative planning strategy, if one is prepared. If the metropolitan transportation organization consists of a single county, at least two public hearings shall be held. To the maximum extent feasible, the hearings shall be in different parts of the region to maximize the opportunity for participation by members of the public throughout the region.	2012–2035 RTP/SCS Chapter 6: Public Participation Plan 2012–2035 RTP/SCS Appendix: Public Participation and Consultationn	2016-2040 RTP/SCS Appendix: Public Participation and Community Consultation
CGC Section 65080(b) (2)(E)(vi): A process for enabling members of the public to provide a single request to receive notices, information and updates.	2012–2035 RTP/SCS Chapter 6: Public Participation Plan 2012–2035 RTP/SCS Appendix: Public Participation and Consultation	2016-2040 RTP/SCS Appendix: Public Participation and Community Consultation
CGC Section 65080(b) (2)(F) In preparing a sustainable communities strategy, the metropolitan planning organization shall consider spheres of influence that have been adopted by the local agency formation commissions within its region.	2012–2035 RTP/SCS Appendix: Growth Forecast	2016-2040 RTP/SCS Appendix: Demographics and Growth Forecast

TABLE 1 SCS Requirements Matrix: continued

Required Element	Reference (2012)	Reference (2016)
GC Section 65080(b) (2)(G) Prior to adopting a sustainable communities strategy, the metropolitan planning organization shall quantify the reduction in greenhouse gas emissions projected to be achieved by the sustainable communities strategy and set forth the difference, if any, between the amount of that reduction and the target for the region established by the state board.	2012–2035 RTP/SCS Chapter 4: Sustainable Communities Strategy	2016-2040 RTP/SCS Chapter 8: Measuring Our Progress for the Future 2016-2040 RTP/SCS Appendices: SCS Background Documentation; Transportation Conformity Analysis
CGC Section 65080(b) (2)(J) Neither a sustainable communities strategy nor an alternative planning strategy regulates the use of land, nor, except as provided by subparagraph (I), shall either one be subject to any state approval. Nothing in a sustainable communities strategy shall be interpreted as superseding the exercise of the land use authority of cities and counties within the region. Nothing in this section shall be interpreted to limit the state board's authority under any other provision of law. Nothing in this section shall be interpreted to authorize the abrogation of any vested right whether created by statute or by common law. Nothing in this section shall require a city's or county's land use policies and regulations, including its general plan, to be consistent with the regional transportation plan or an alternative planning strategy. Nothing in this section requires a metropolitan planning organization to approve a sustainable communities strategy that would be consistent with Part 450 of Title 23 of, or Part 93 of Title 40 of, the Code of Federal Regulations and any administrative guidance under those regulations. Nothing in this section relieves a public or private entity or any person from compliance with any other local, state, or federal law.	2012–2035 RTP/SCS Chapter 4: Sustainable Communities Strategy	2016-2040 RTP/SCS Chapter 5: A Plan for Mobility, Sustainability and a High Quality of Life 2016-2040 RTP/SCS Appendix: SCS Background Documentation

Source: SCAG

FORECASTED REGIONAL DEVELOPMENT TYPES BY LAND DEVELOPMENT CATEGORIES (LDCS)

Given the number of square miles the SCAG region encompasses, SCAG developed a simplified series of Land Development Categories (LDCs) to represent the dominant themes taken from the region's many General Plans. This was developed in order to facilitate regional modeling of land use information from nearly 200 distinct jurisdictions.

The LDCs employed in the RTP/SCS are not intended to represent detailed land use policies, but are used to describe the general conditions likely to occur within a specific area if recently emerging trends, such as transit-oriented development, were to continue in concert with the implementation of the 2016 RTP/SCS. These forecasted regional development types are shown in Exhibits 1 through 34 by county and subregion.

SCAG 2016 RTP/SCS SCENARIOS

OVERVIEW OF THE SCENARIOS

To develop a preferred scenario for the region in 2040, SCAG first generated four preliminary "sketch scenarios" for our region's future - each one representing a different vision for land use and transportation in 2040. More specifically, each scenario was designed to explore and convey the impact of where the region would grow, to what extent the growth would be focused within existing cities and towns, and how it would grow - the shape and style of the neighborhoods and transportation systems that would shape growth over the period. The following are descriptions of the four scenarios that were presented to the regional council, stakeholders, and at workshops throughout the region.

SCENARIO 1: TREND

Scenario 1 was a base case scenario that represented "business-as-usual" growth to 2040, based on the region's population, household and employment trends. By "base case" SCAG meant all existing regionally significant highway and transit projects, all ongoing Transportation Demand Management (TDM) and Transportation System Management (TSM) activities, and all projects which are undergoing right-of-way acquisitions, are currently under construction, have completed the federal environmental process (NEPA), or will be in the first two years of the previously conforming Federal Transportation Improvement Plan (FTIP). This scenario served as a yardstick to compare with the three other scenarios in this Plan. Growth and land use under the baseline scenario followed previous trends. Significant transportation investments or new policies regarding land use, housing or transportation were not introduced.

SCENARIO 2: 2012 RTP/SCS UPDATED WITH LOCAL INPUTS

Scenario 2 updated SCAG's established 2012 RTP/SCS with inputs from local jurisdictions, and included the adopted plan's suite of land use and transportation strategies, investments and policies. Scenario 2 envisioned future regional growth coordinated with the transportation system improvements of the approved 2012 RTP/SCS, as well as anticipated new transportation projects planned by the region's County Transportation Commissions (CTCs) and transit providers. This scenario reflected land use patterns as depicted by local general plan land use policies and refined by jurisdictions through SCAG's extensive bottom-up local review input process and outreach effort.

SCENARIO 3 (POLICY A): MAKING FURTHER PROGRESS

Scenario 3 (also known as Policy A) built upon Scenario 2 and incorporated additional best practices to increase transportation mode choice and reduce personal automobile dependency. This scenario included expanded regional investment in Transit Integration strategies to increase transit ridership. This scenario assumed that first/last mile improvements will be made at all fixed-guideway transit stations (i.e. commuter rail, subway, light rail and bus rapid transit (BRT) stations) across the region. Scenario 3 tested a new concept called Livable Corridors, comprised of arterial roadways where jurisdictions are planning for some combination of high-quality bus service, increased opportunities for active transportation, and higher density residential and employment at key intersections. Scenario 3 also tested the concept of "Neighborhood Mobility Areas." This concept is built on a set of policies and complete street investments to encourage replacing automobile trips less than three miles in length with walking, bicycling and slow-speed electric vehicles. Scenario 3 incorporated new technology and innovations such as bike share and car sharing, and assumed growth of these shared mobility services in urban areas predominantly through private sector actions. This scenario built upon SCAG policies from the 2012 Plan, and allowed for more future growth in walkable, mixed-use communities and in High Quality Transit Areas (HQTAs).

SCENARIO 4 (POLICY B): EXCEEDING EXPECTATIONS

Scenario 4 (or Policy B) built upon Scenario 3, and represented an ambitious and holistic slate of public policies and investments. This scenario was intended to determine what policies would be required to achieve maximum per-capita greenhouse gas reductions, in order to inform a comprehensive discussion during outreach and deliberation. Scenario 4 assumed improved bus transit services throughout identified HQTAs, as well as land use policies that encourage density along those routes. There was added emphasis on higher density residential and mixed-use infill along arterials with high-quality bus service, and more robust active transportation infrastructure or Livable Corridors, as described in Scenario 3. This scenario directed new growth away from undeveloped high-quality habitat areas to promote resource conservation, and it assumed no new residential growth in areas vulnerable to future sea level rise. Scenario 4 included a mix of housing options, with even more focus on infill development in towns and urban centers. Multifamily development in HQTAs was emphasized throughout the region.

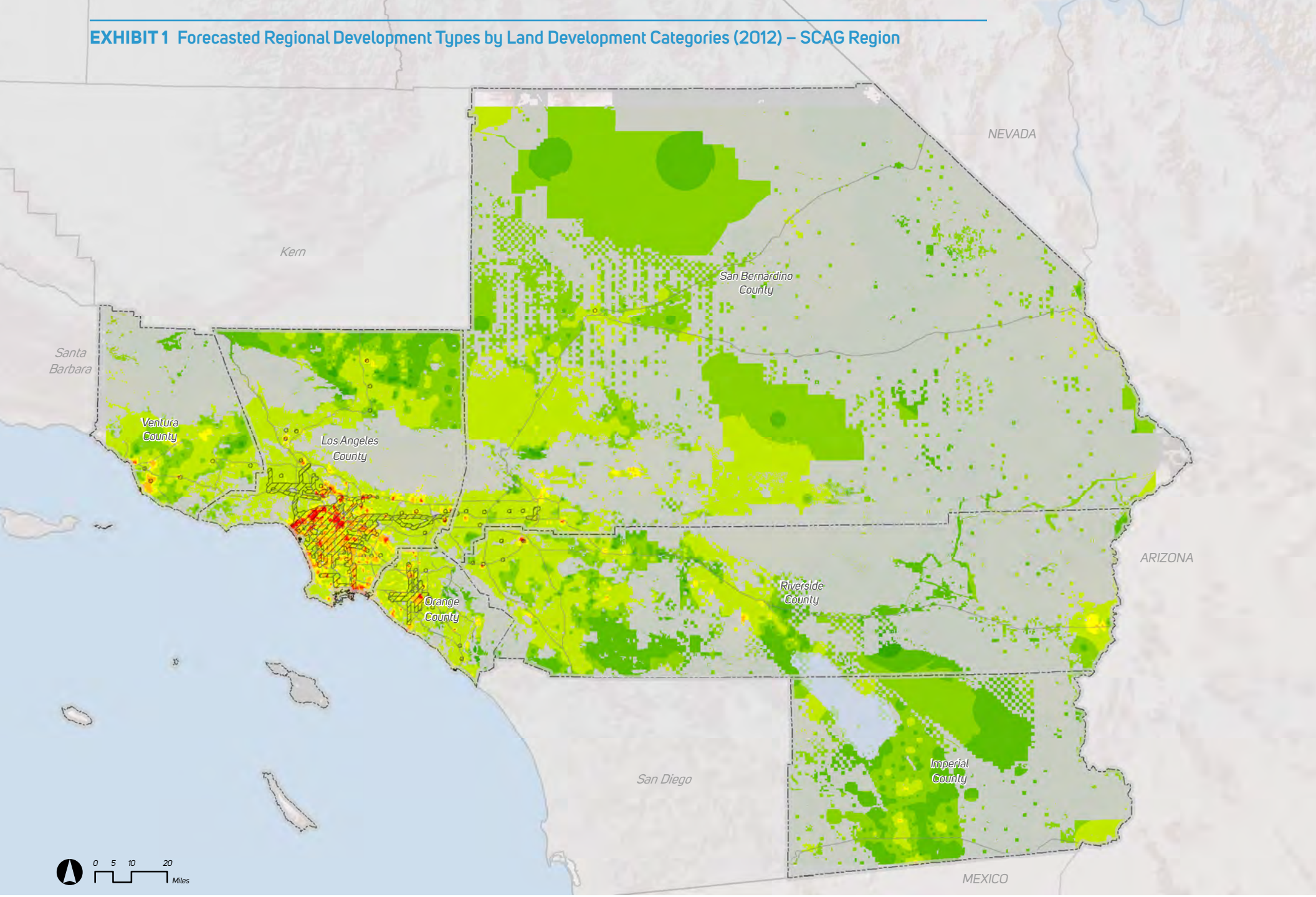
URBANFOOTPRINT/SPM

UrbanFootprint is the software modeling platform behind the SCAG Scenario Planning Model (SPM). It has been used by SCAG and its RTP/SCS consultants (Calthorpe Analytics is the developer of UrbanFootprint) to build and analyze the 2016 RTP/SCS scenarios and the Draft Preferred RTP/SCS plan.

UTILIZING URBANFOOTPRINT

UrbanFootprint starts with a detailed base data 'canvas' of existing buildings, land uses, and other details of the built environment. A suite of Place Types and Building Types are used to create scenarios of future development at a city, county or regional scale. Scenarios are then analyzed using UrbanFootprint's suite of analysis modules, which estimate building energy and water use, vehicle travel, public health consequences, and fiscal impacts.

EXHIBIT 1 Forecasted Regional Development Types by Land Development Categories (2012) – SCAG Region



HQTA (2012)

California Protected Areas Database (CPAD)

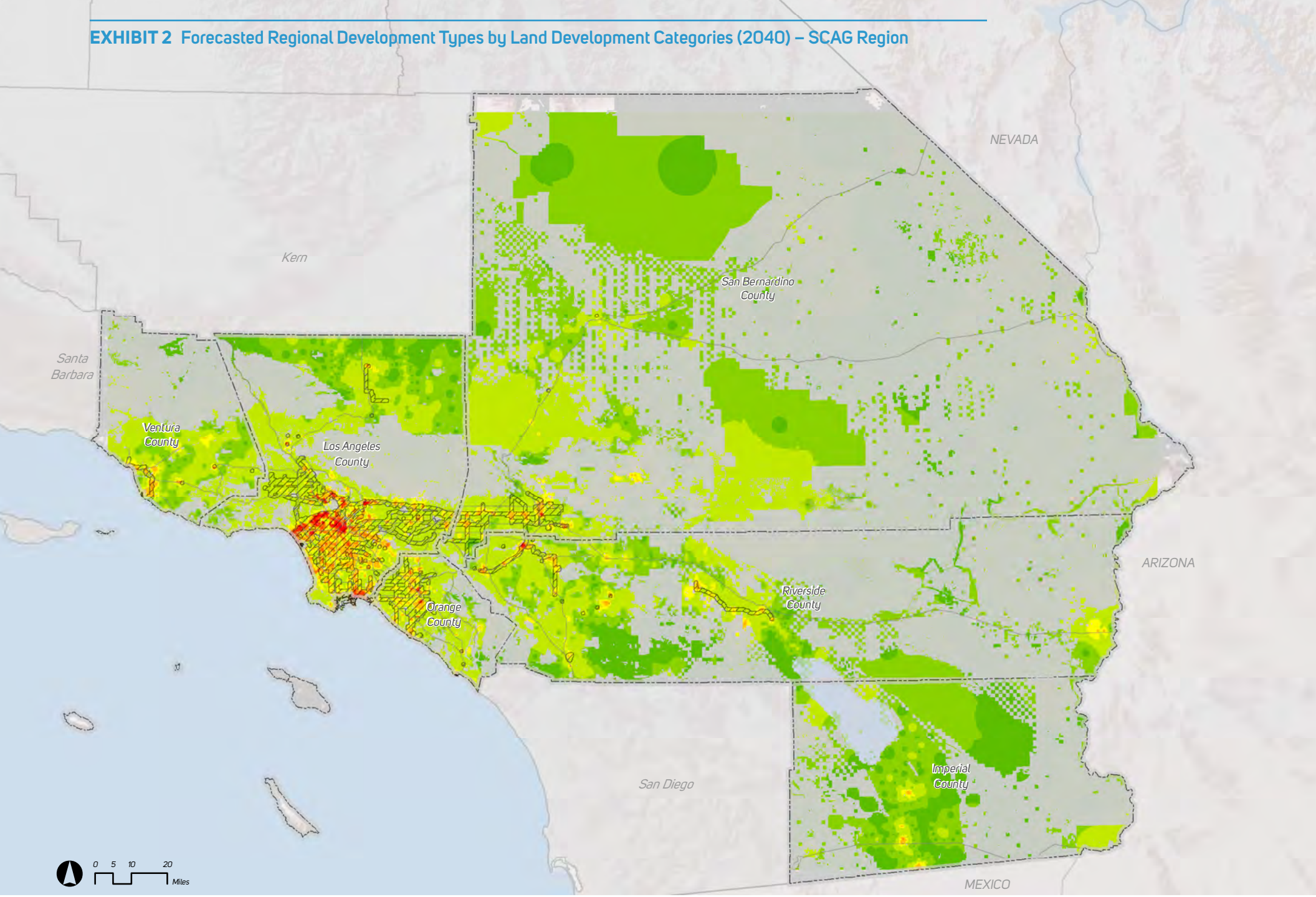
Urban
Compact
Standard

Description of LDCs can be found on page 43.

Note: The forecasted land use development patterns by LDCs shown are based on Transportation Analysis Zone (TAZ) level data utilized to conduct required modeling analyses. Data at the TAZ level or at a geography smaller than the jurisdictional level are advisory only and non-binding, because SCAG sub-jurisdictional forecasts are not to be adopted as part of the 2016 RTP/SCS. For purposes of qualifying for future funding opportunities and/ or other incentive programs, sub-jurisdictional data and/or maps used to determine consistency with the Sustainable Communities Strategy shall only be used at the discretion and with the approval of the local jurisdiction. However, this does not otherwise limit the use of the sub-jurisdictional data and/or maps by SCAG, CTCs, Councils of Governments, SCAG Subregions, Caltrans and other public agencies for transportation modeling and planning purposes. Any other use of the sub-jurisdictional data and/or maps not specified herein, shall require agreement from the Regional Council, respective policy committees and local jurisdictions.

Source: SCAG, 2015

EXHIBIT 2 Forecasted Regional Development Types by Land Development Categories (2040) – SCAG Region



HQTA (2040)

California Protected Areas Database (CPAD)

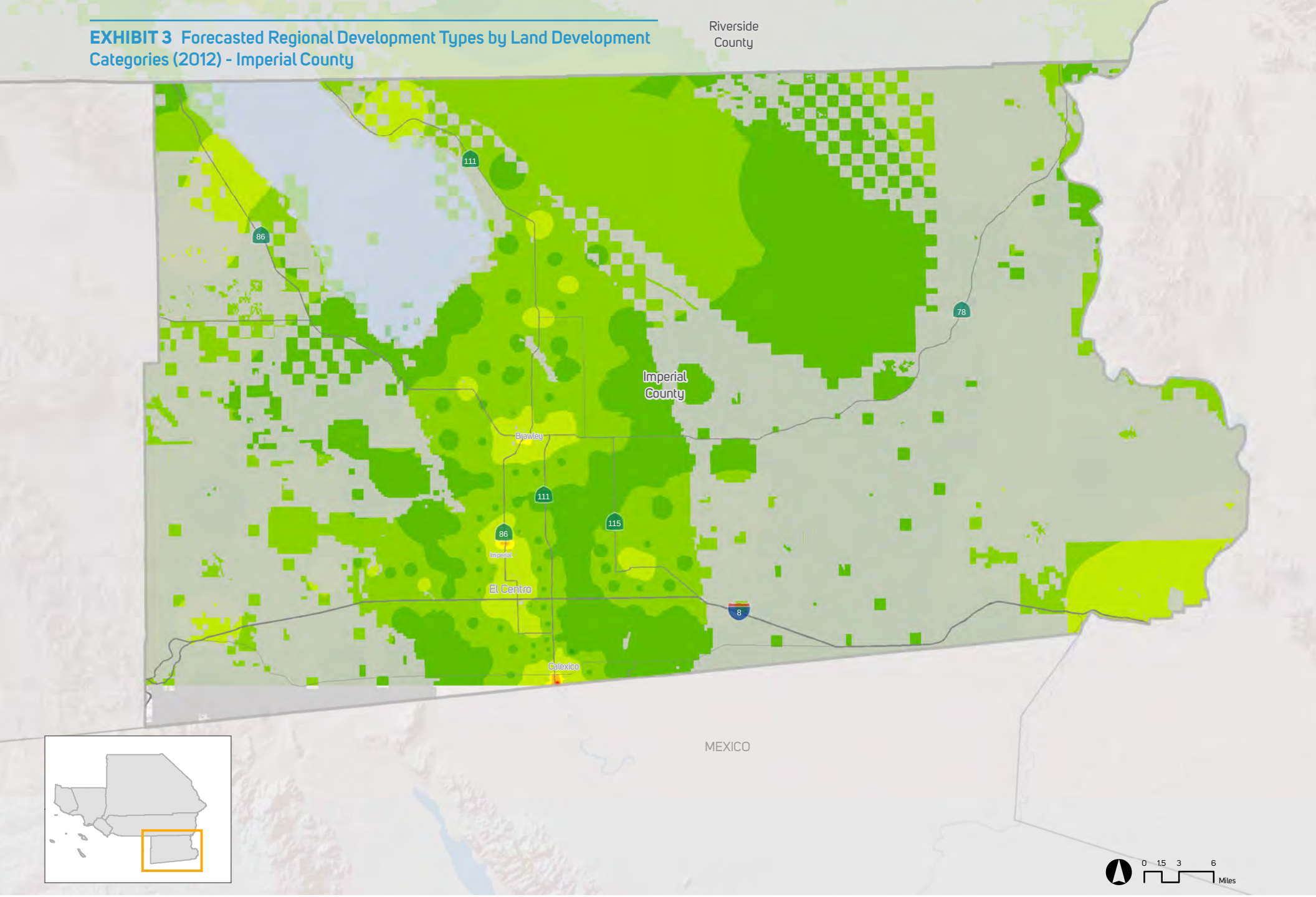
Urban
Compact
Standard

Description of LDCs can be found on page 43.

Source: SCAG, 2015

Note: The forecasted land use development patterns by LDCs shown are based on Transportation Analysis Zone (TAZ) level data utilized to conduct required modeling analyses. Data at the TAZ level or at a geography smaller than the jurisdictional level are advisory only and non-binding, because SCAG sub-jurisdictional forecasts are not to be adopted as part of the 2016 RTP/SCS. For purposes of qualifying for future funding opportunities and/ or other incentive programs, sub-jurisdictional data and/or maps used to determine consistency with the Sustainable Communities Strategy shall only be used at the discretion and with the approval of the local jurisdiction. However, this does not otherwise limit the use of the sub-jurisdictional data and/or maps by SCAG, CTCs, Councils of Governments, SCAG Subregions, Caltrans and other public agencies for transportation modeling and planning purposes. Any other use of the sub-jurisdictional data and/or maps not specified herein, shall require agreement from the Regional Council, respective policy committees and local jurisdictions.

EXHIBIT 3 Forecasted Regional Development Types by Land Development Categories (2012) - Imperial County



HQTA (2012)

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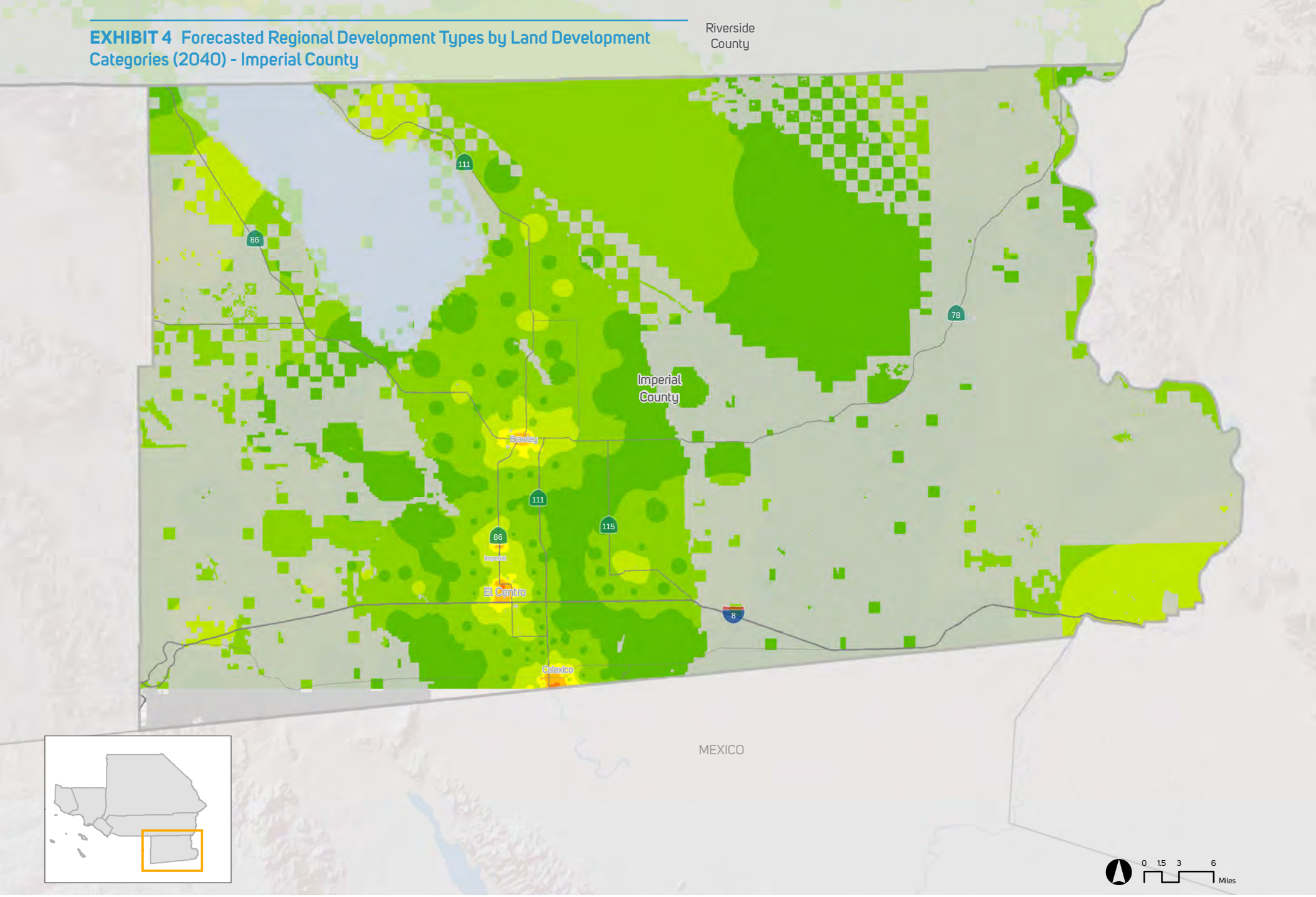
(Source: SCAG, 2015)

EXHIBIT 4 Forecasted Regional Development Types by Land Development Categories (2040) - Imperial County



HQTA (2040)

California Protected Areas Database (CPAD)

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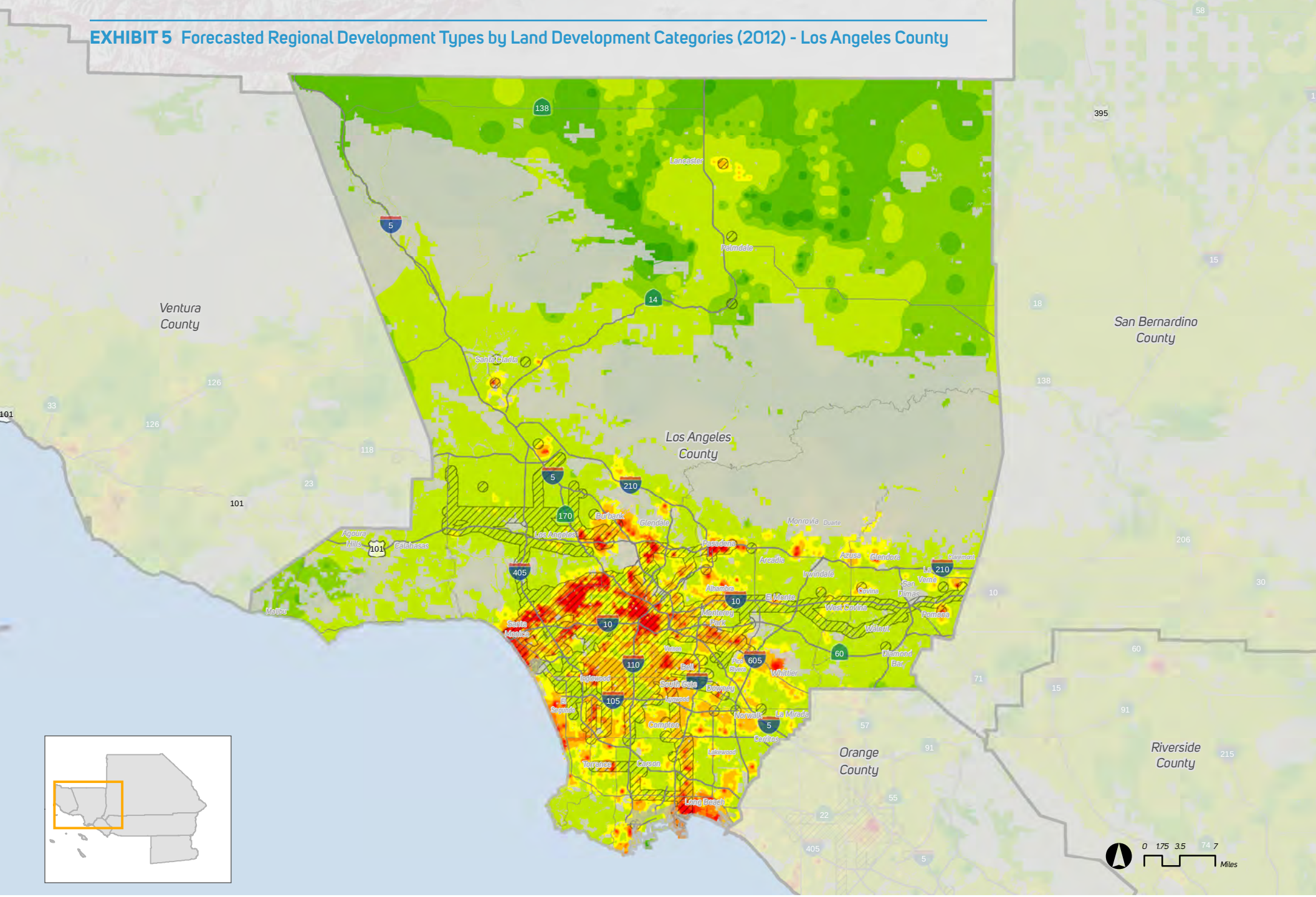
(Source: SCAG, 2015)

EXHIBIT 5 Forecasted Regional Development Types by Land Development Categories (2012) - Los Angeles County



HQTA (2012)

California Protected Areas Database (CPAD)

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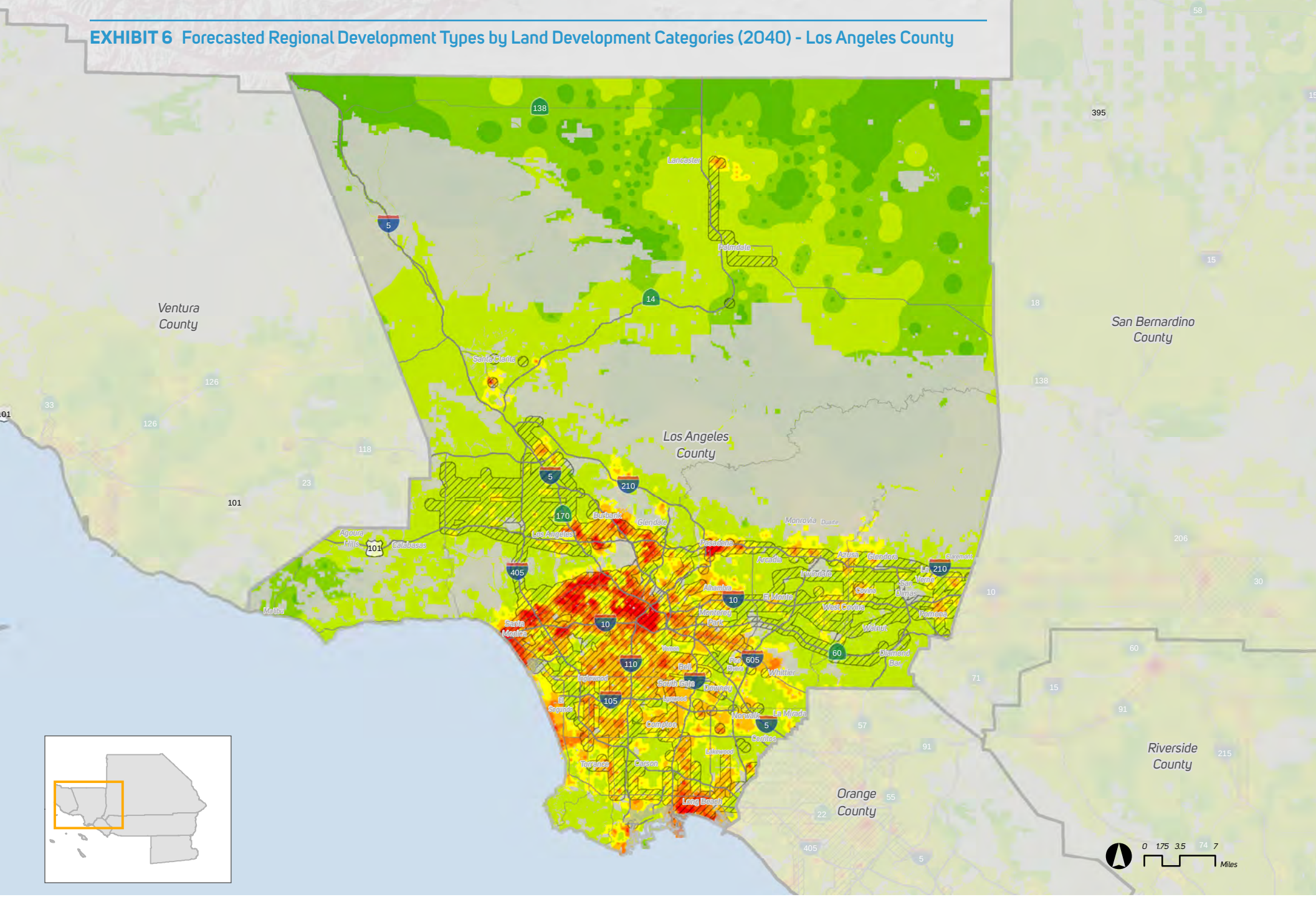
(Source: SCAG, 2015)

EXHIBIT 6 Forecasted Regional Development Types by Land Development Categories (2040) - Los Angeles County



HQTA (2040)

California Protected Areas Database (CPAD)

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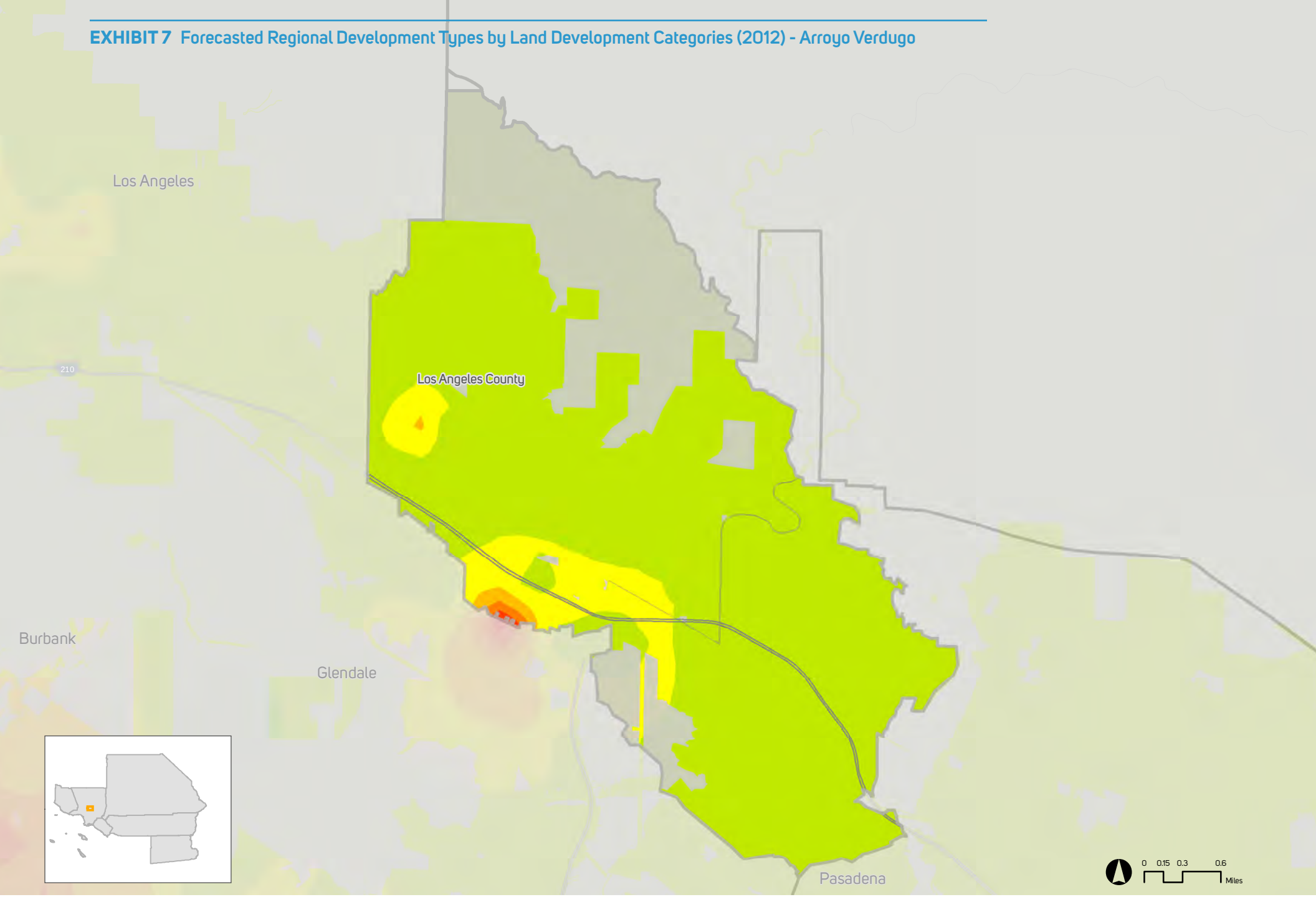
(Source: SCAG, 2015)

EXHIBIT 7 Forecasted Regional Development Types by Land Development Categories (2012) - Arroyo Verdugo



HQTA (2012)

California Protected Areas Database (CPAD)

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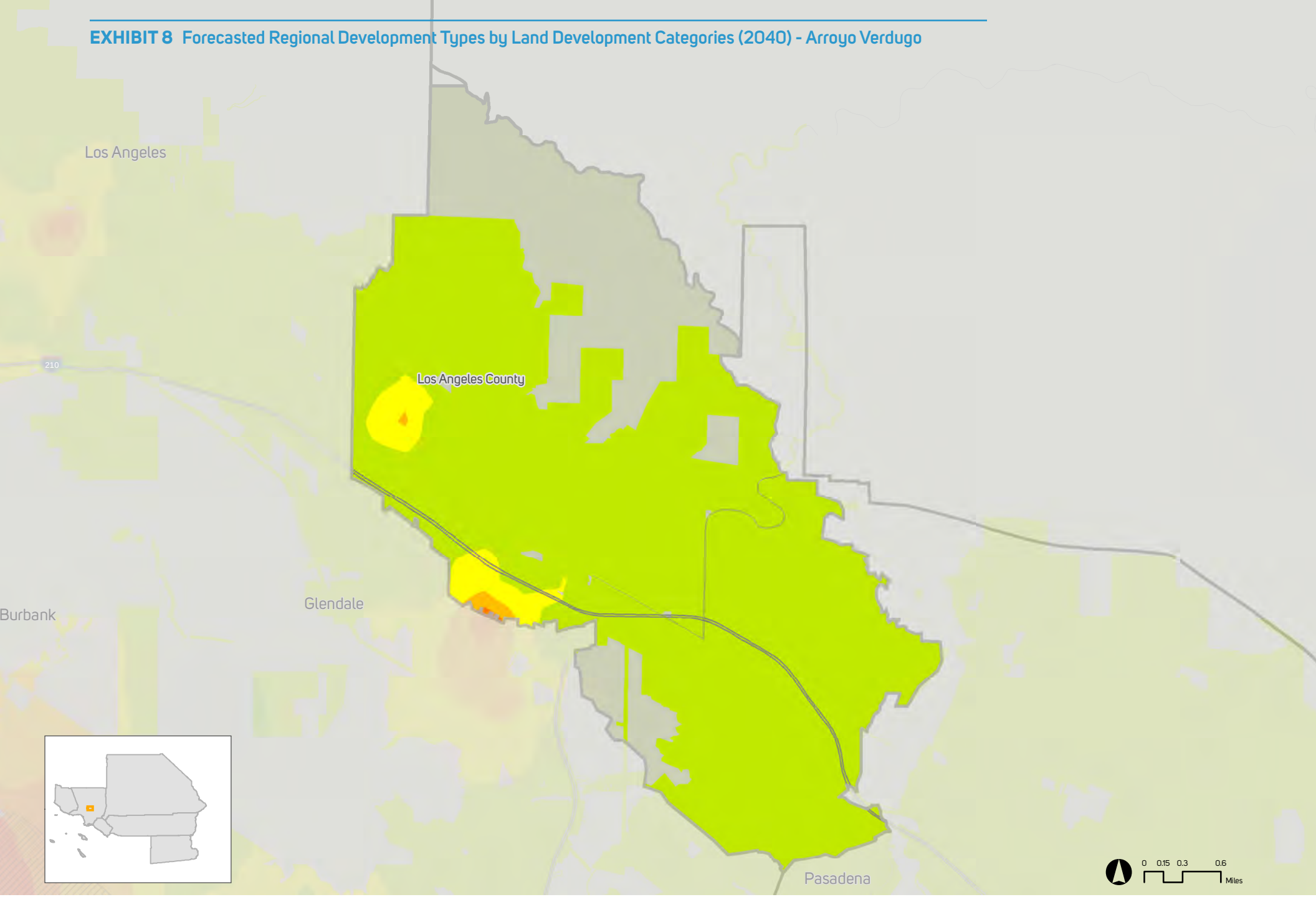
(Source: SCAG, 2015)

EXHIBIT 8 Forecasted Regional Development Types by Land Development Categories (2040) - Arroyo Verdugo



HQTA (2040)

California Protected Areas Database (CPAD)

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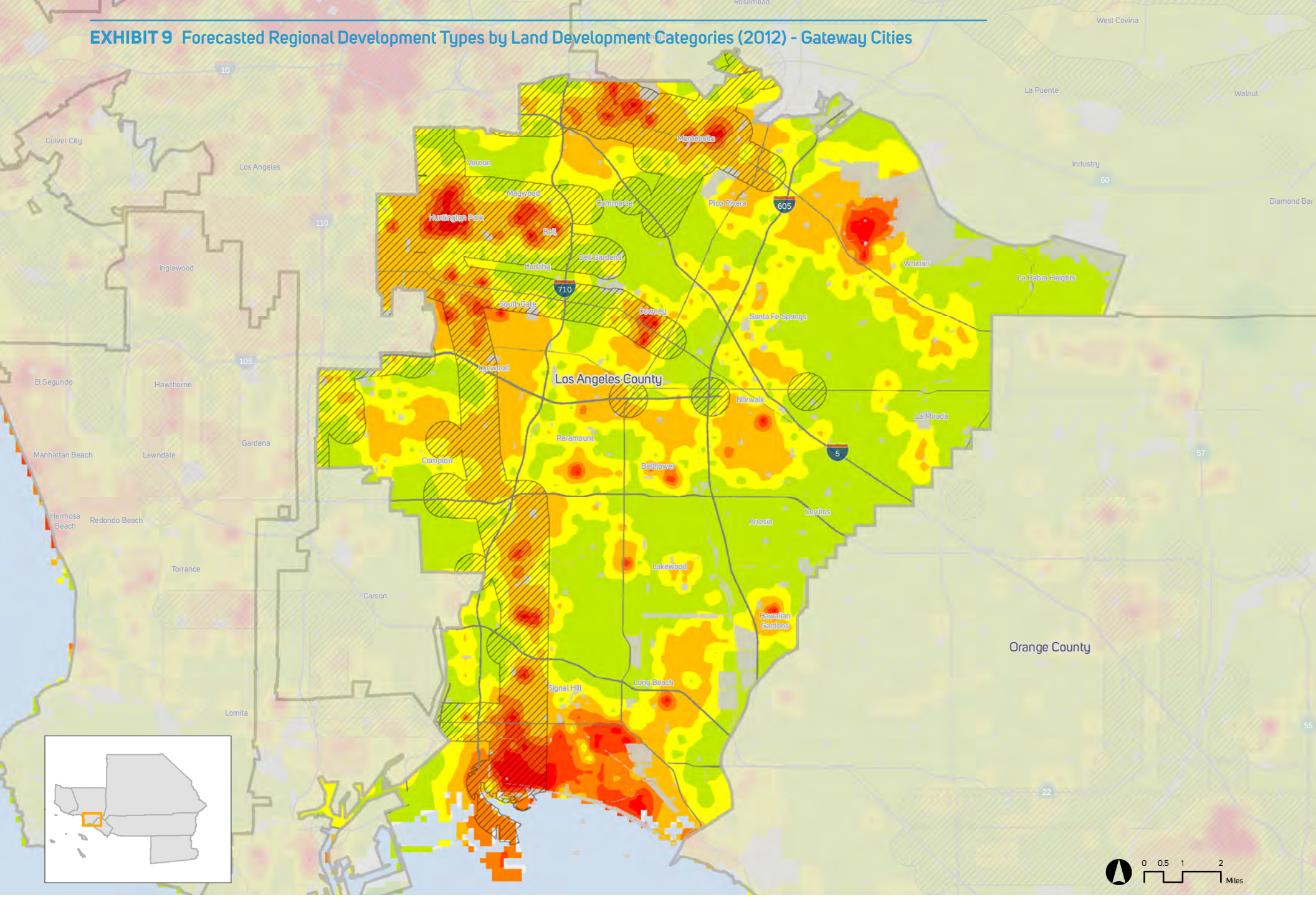
(Source: SCAG, 2015)

EXHIBIT 9 Forecasted Regional Development Types by Land Development Categories (2012) - Gateway Cities



HQTA (2012)

California Protected Areas Database (CPAD)

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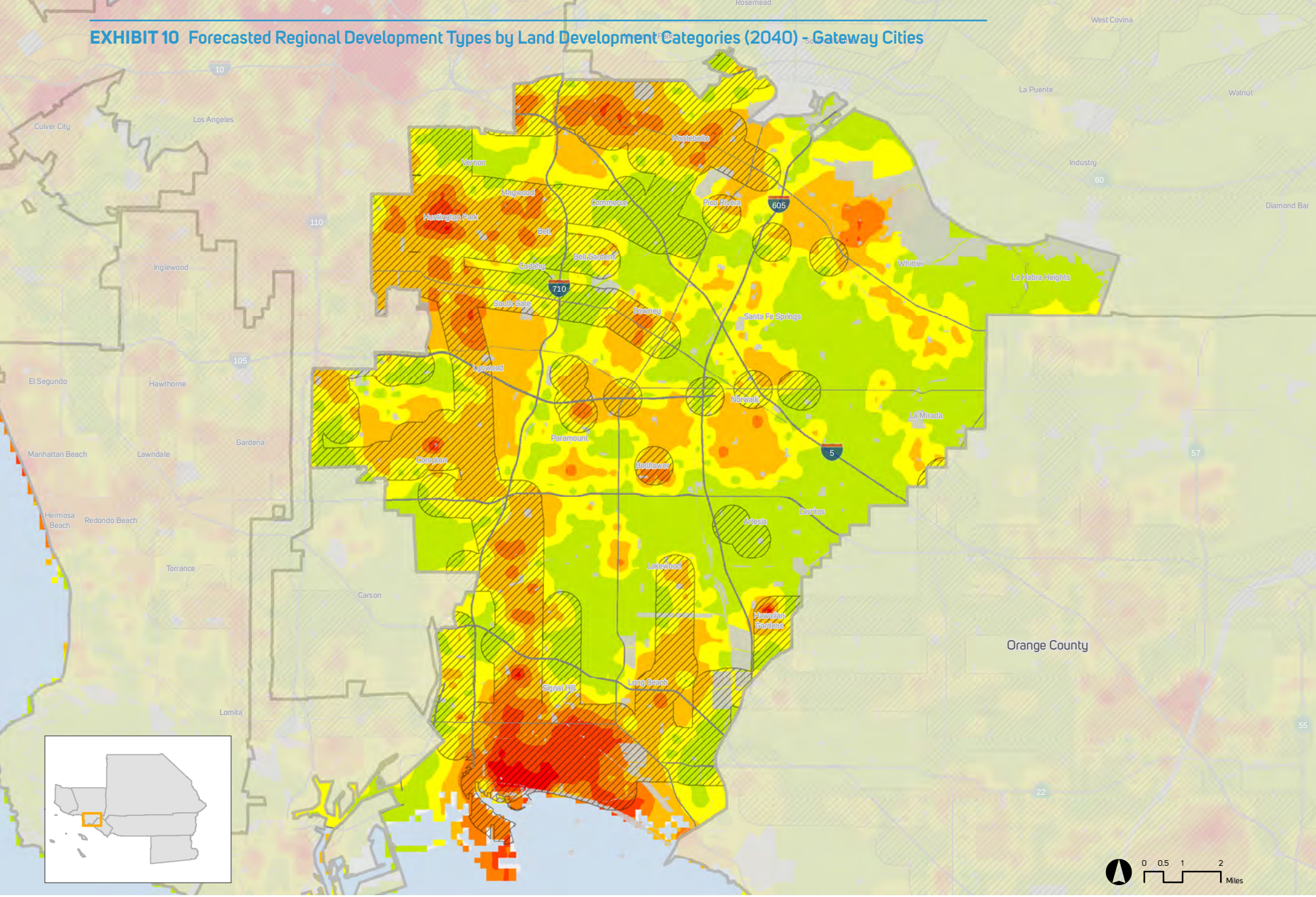
(Source: SCAG, 2015)

EXHIBIT 10 Forecasted Regional Development Types by Land Development Categories (2040) – Gateway Cities



HQTA (2040)

California Protected Areas Database (CPAD)

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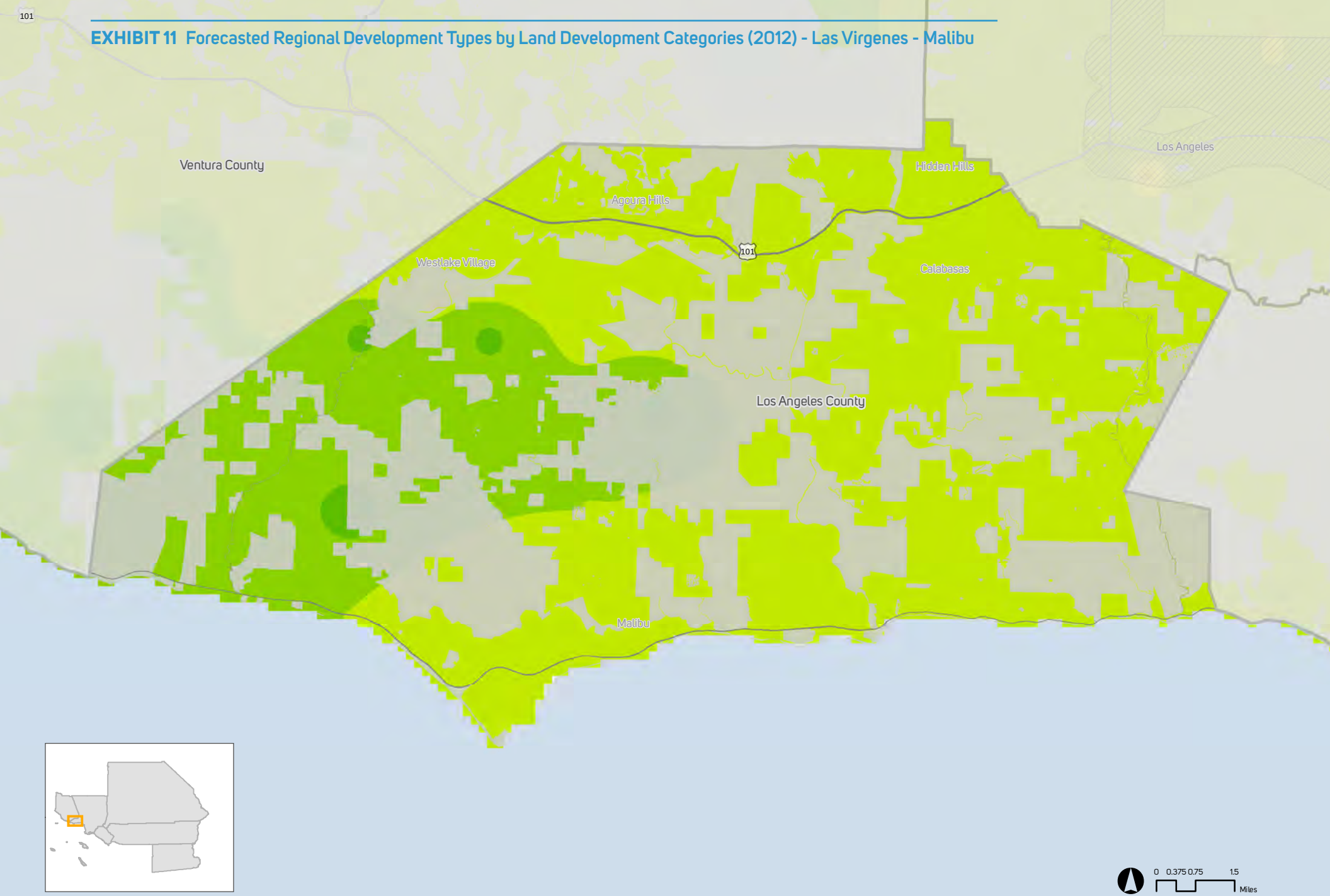
(Source: SCAG, 2015)

EXHIBIT 11 Forecasted Regional Development Types by Land Development Categories (2012) - Las Virgenes - Malibu



HQTA (2012)

California Protected Areas Database (CPAD)

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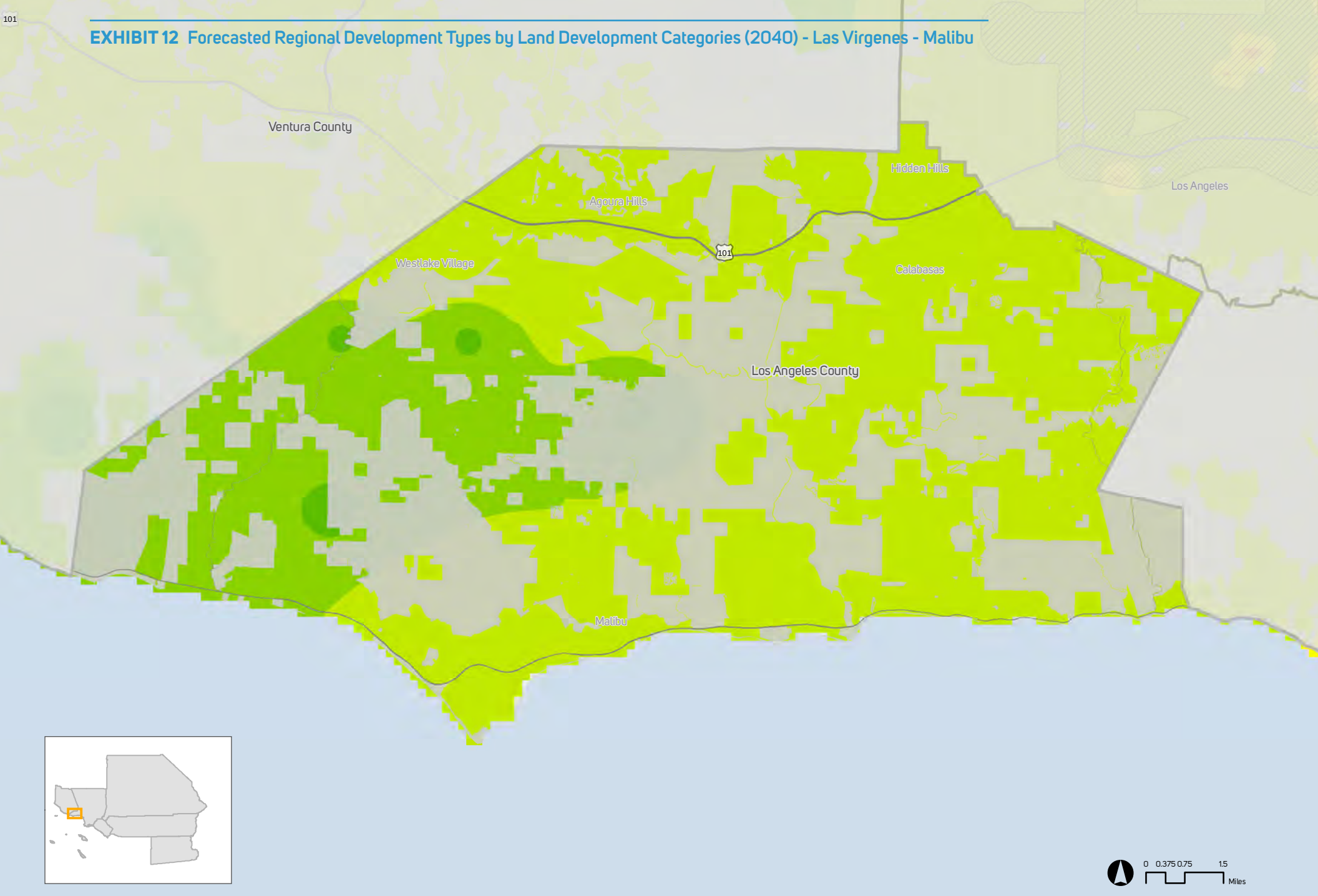
(Source: SCAG, 2015)

EXHIBIT 12 Forecasted Regional Development Types by Land Development Categories (2040) - Las Virgenes - Malibu



HQTA (2040)

California Protected Areas Database (CPAD)

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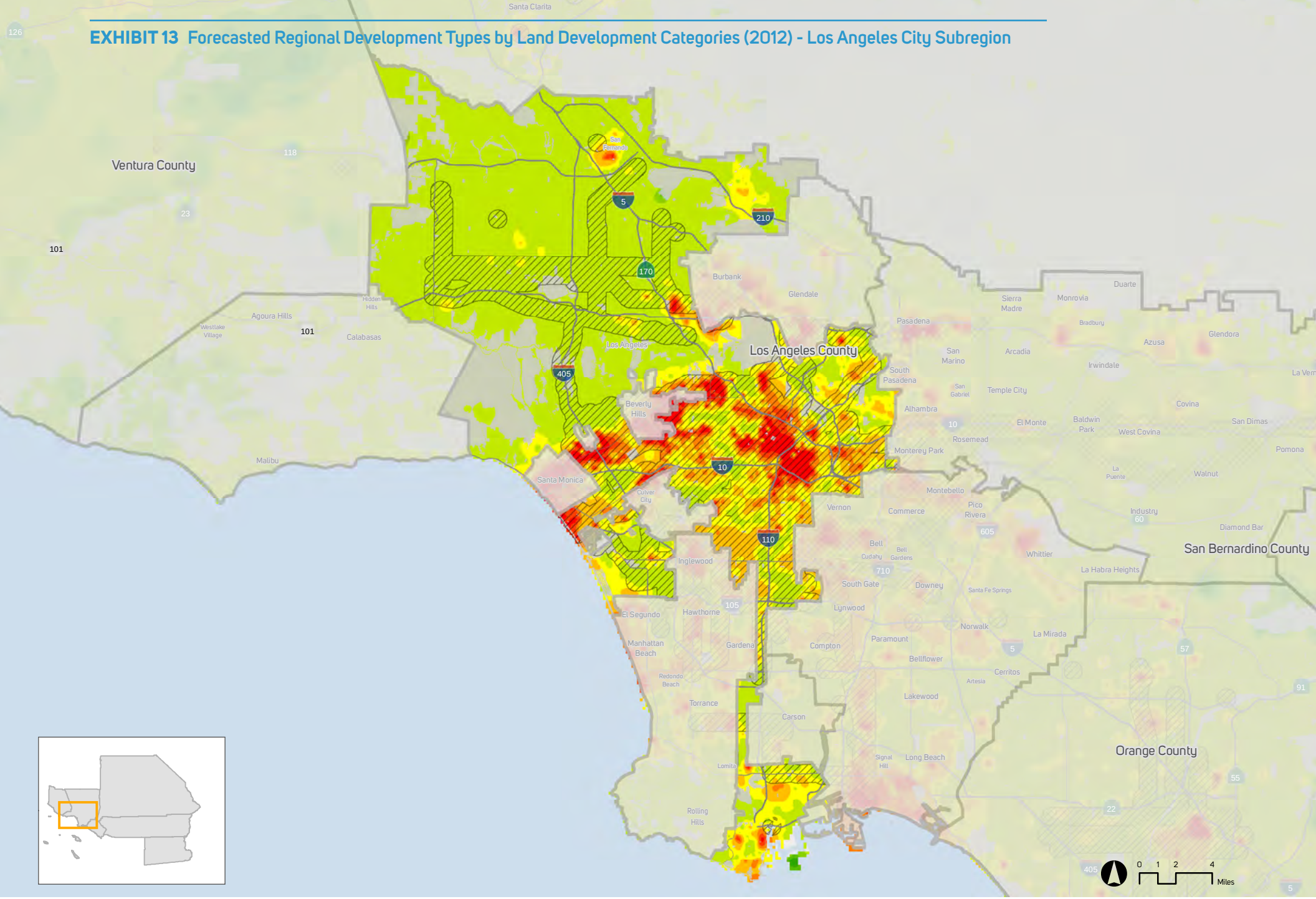
(Source: SCAG, 2015)

EXHIBIT 13 Forecasted Regional Development Types by Land Development Categories (2012) - Los Angeles City Subregion



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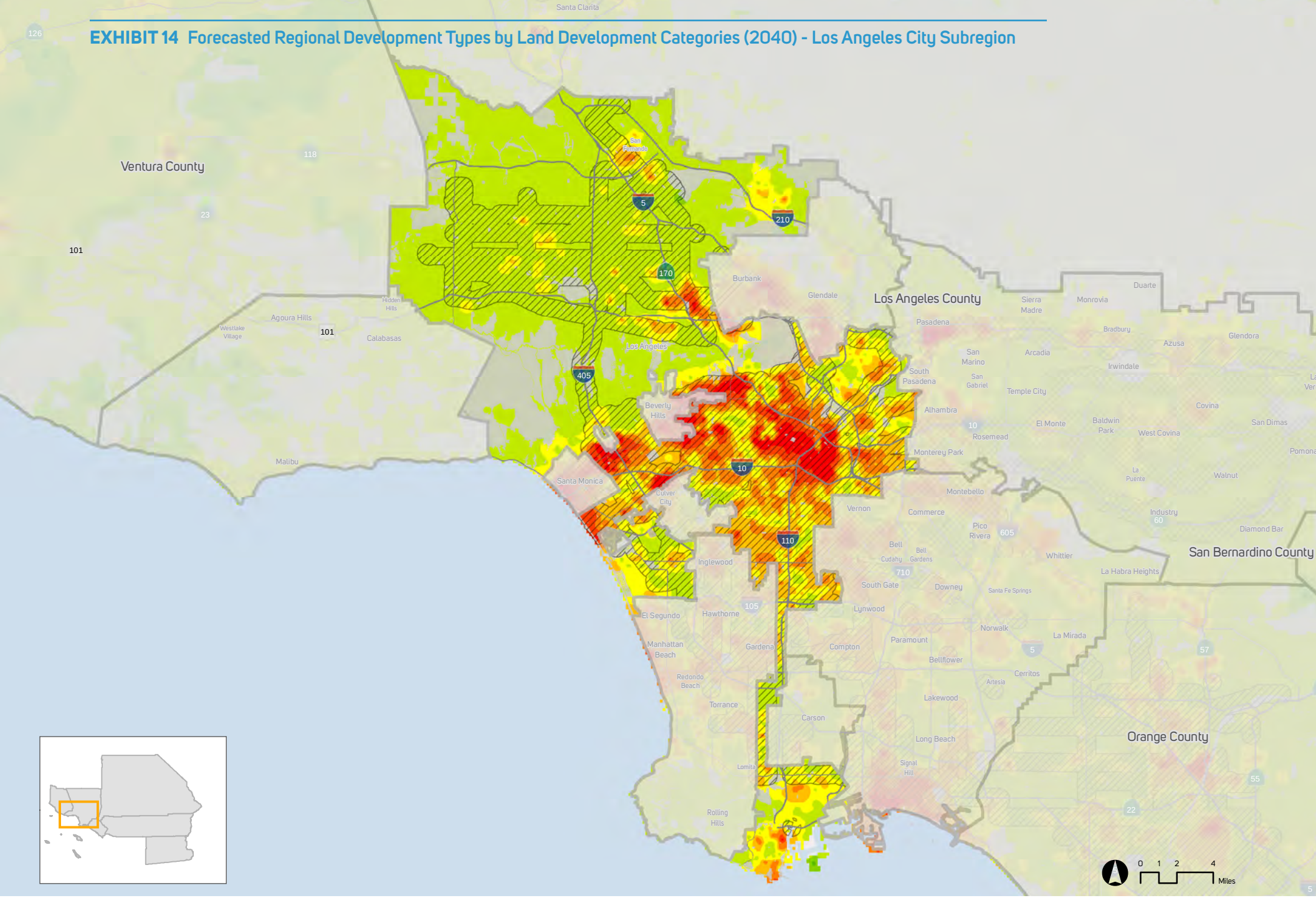
(Source: SCAG, 2015)

EXHIBIT 14 Forecasted Regional Development Types by Land Development Categories (2040) - Los Angeles City Subregion



HQTA (2040)

California Protected Areas Database (CPAD)

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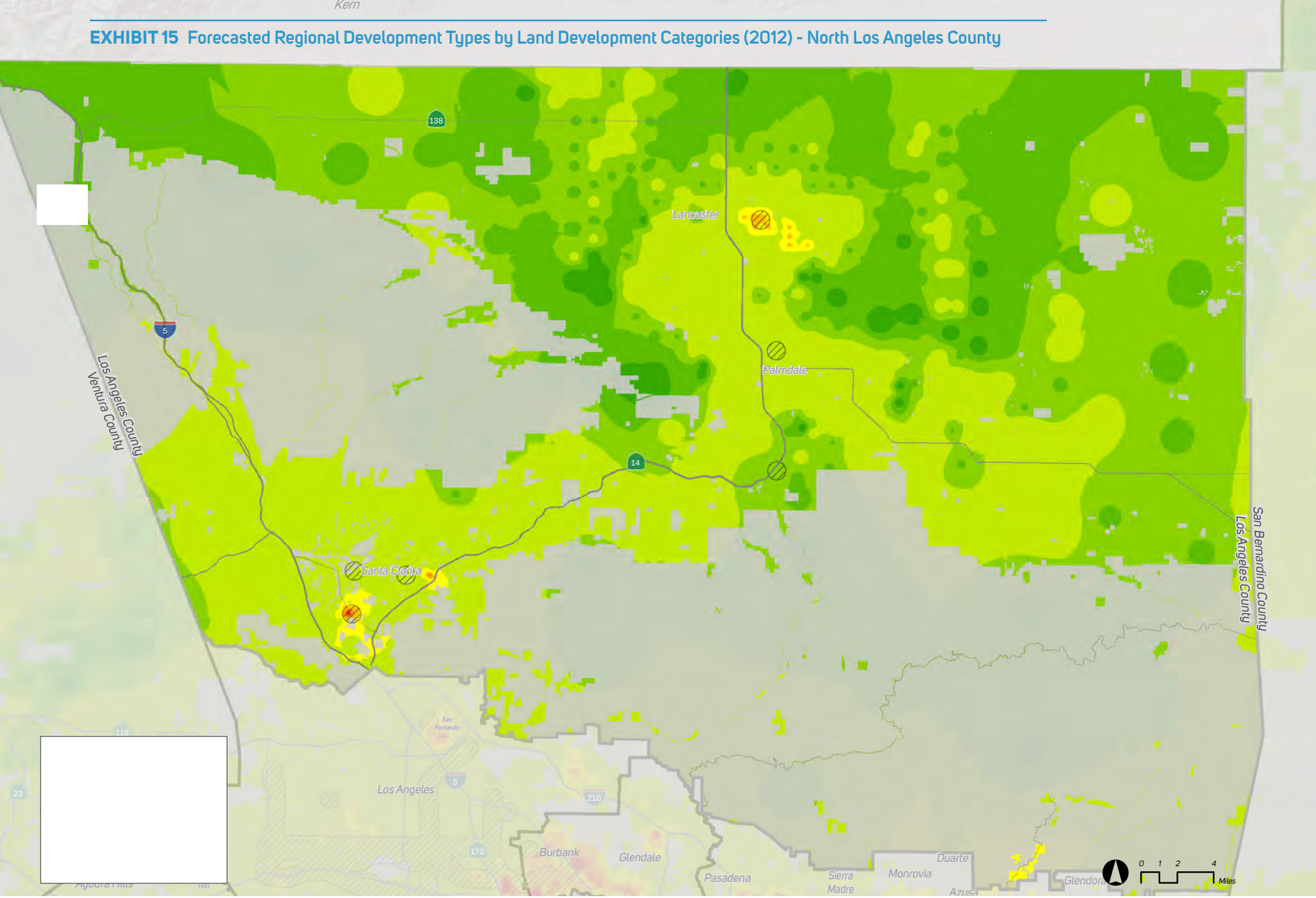
(Source: SCAG, 2015)

EXHIBIT 15 Forecasted Regional Development Types by Land Development Categories (2012) - North Los Angeles County



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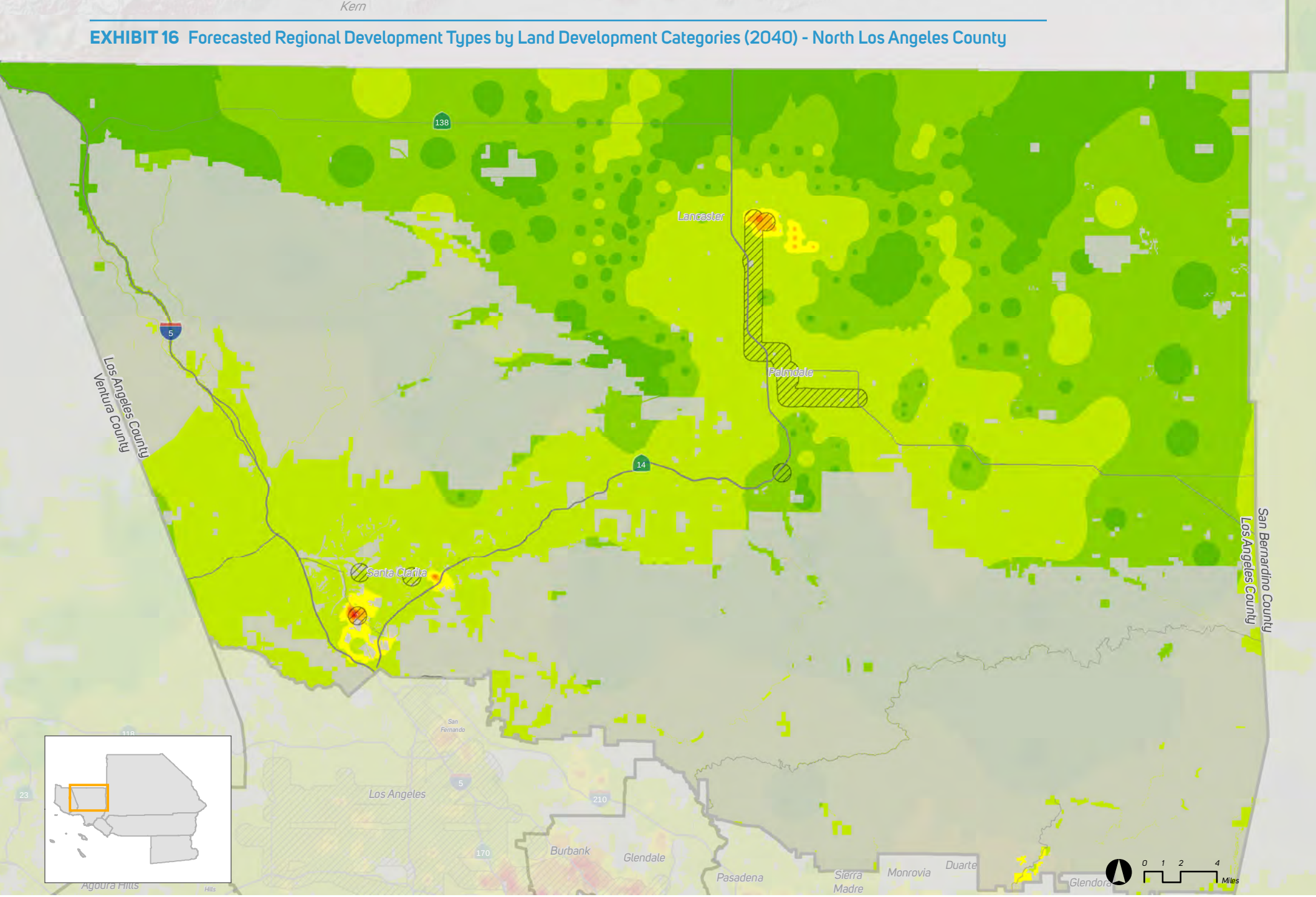
(Source: SCAG, 2015)

EXHIBIT 16 Forecasted Regional Development Types by Land Development Categories (2040) - North Los Angeles County



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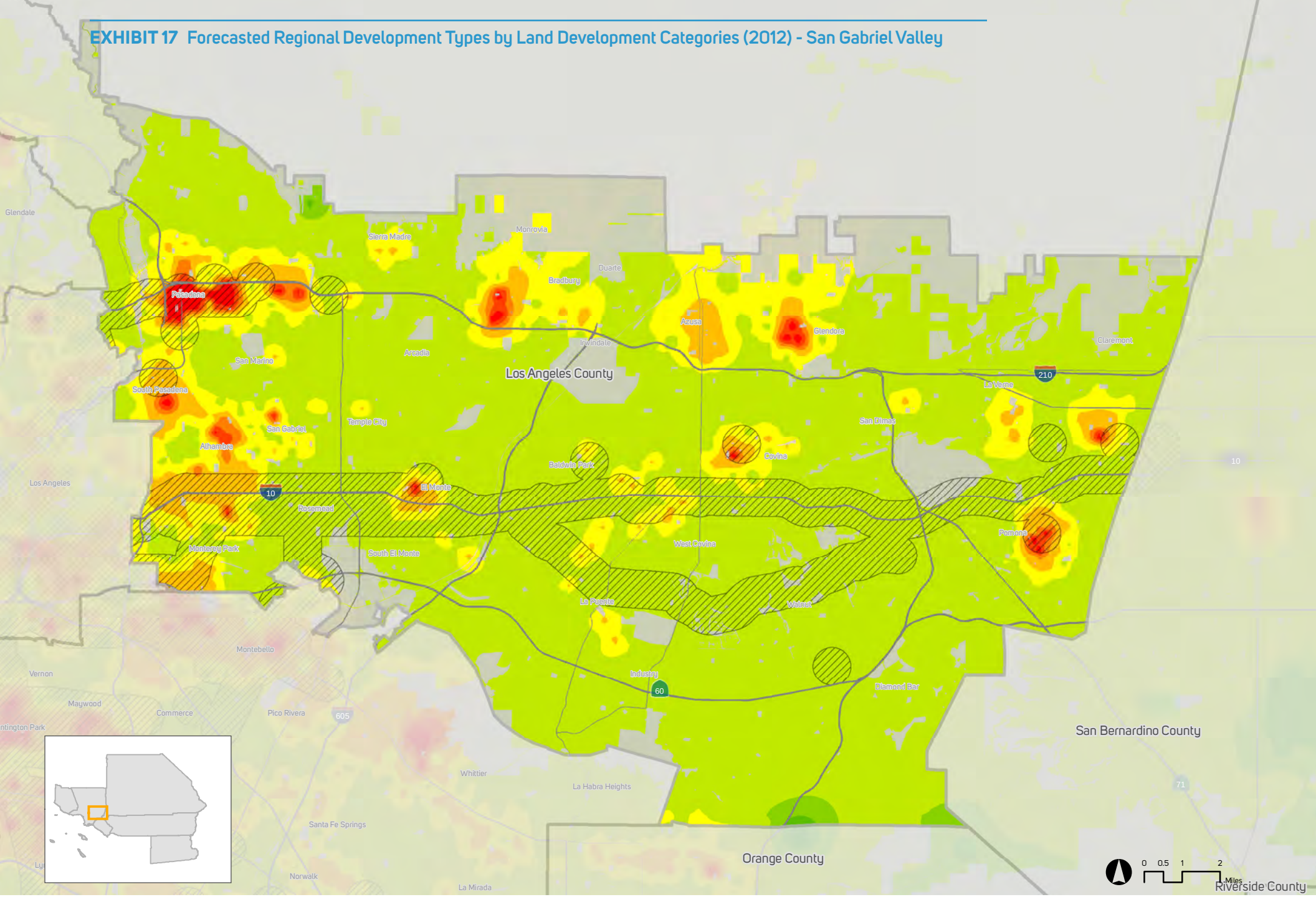
(Source: SCAG, 2015)

EXHIBIT 17 Forecasted Regional Development Types by Land Development Categories (2012) - San Gabriel Valley



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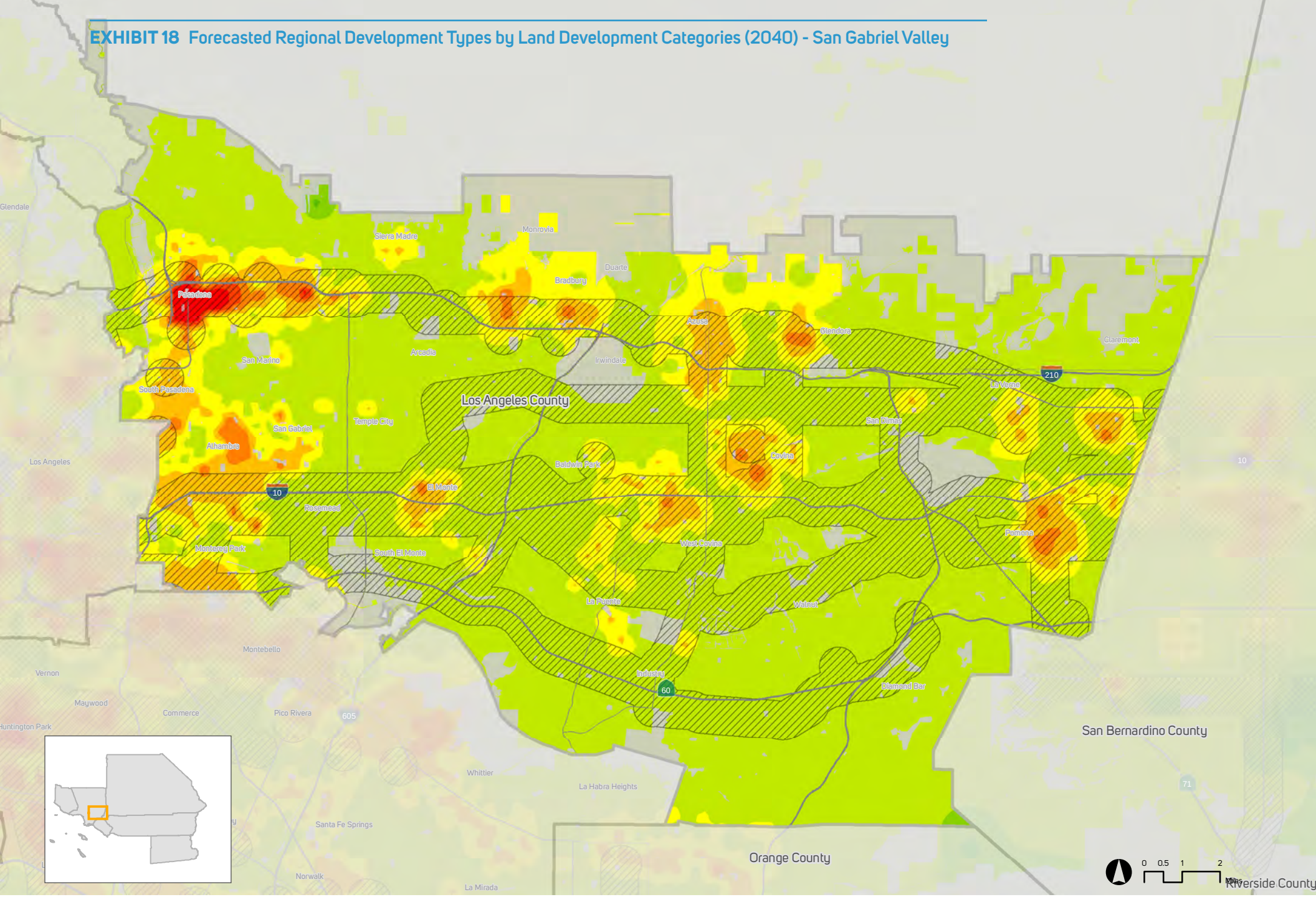
(Source: SCAG, 2015)

EXHIBIT 18 Forecasted Regional Development Types by Land Development Categories (2040) - San Gabriel Valley



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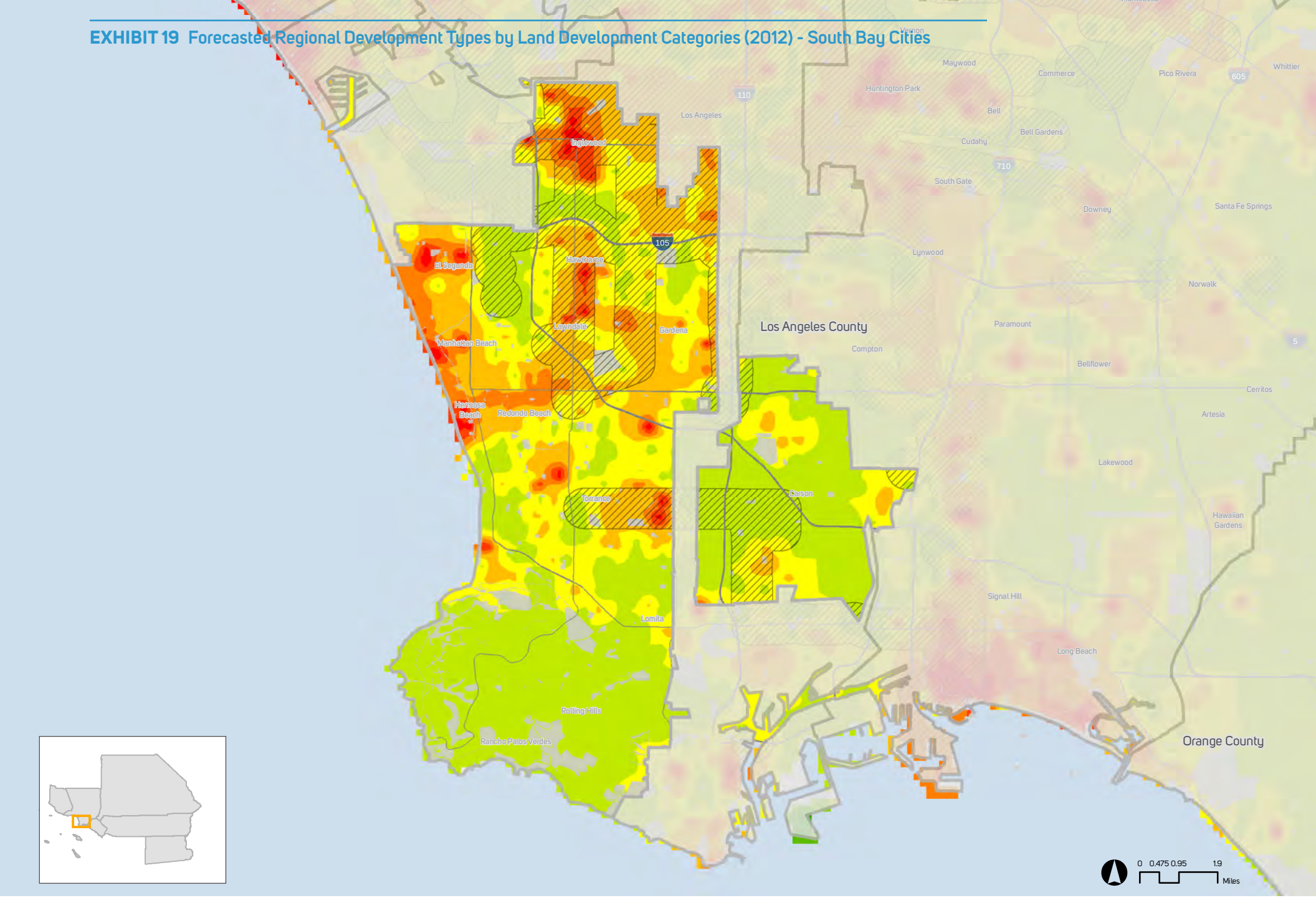
(Source: SCAG, 2015)

EXHIBIT 19 Forecasted Regional Development Types by Land Development Categories (2012) - South Bay Cities



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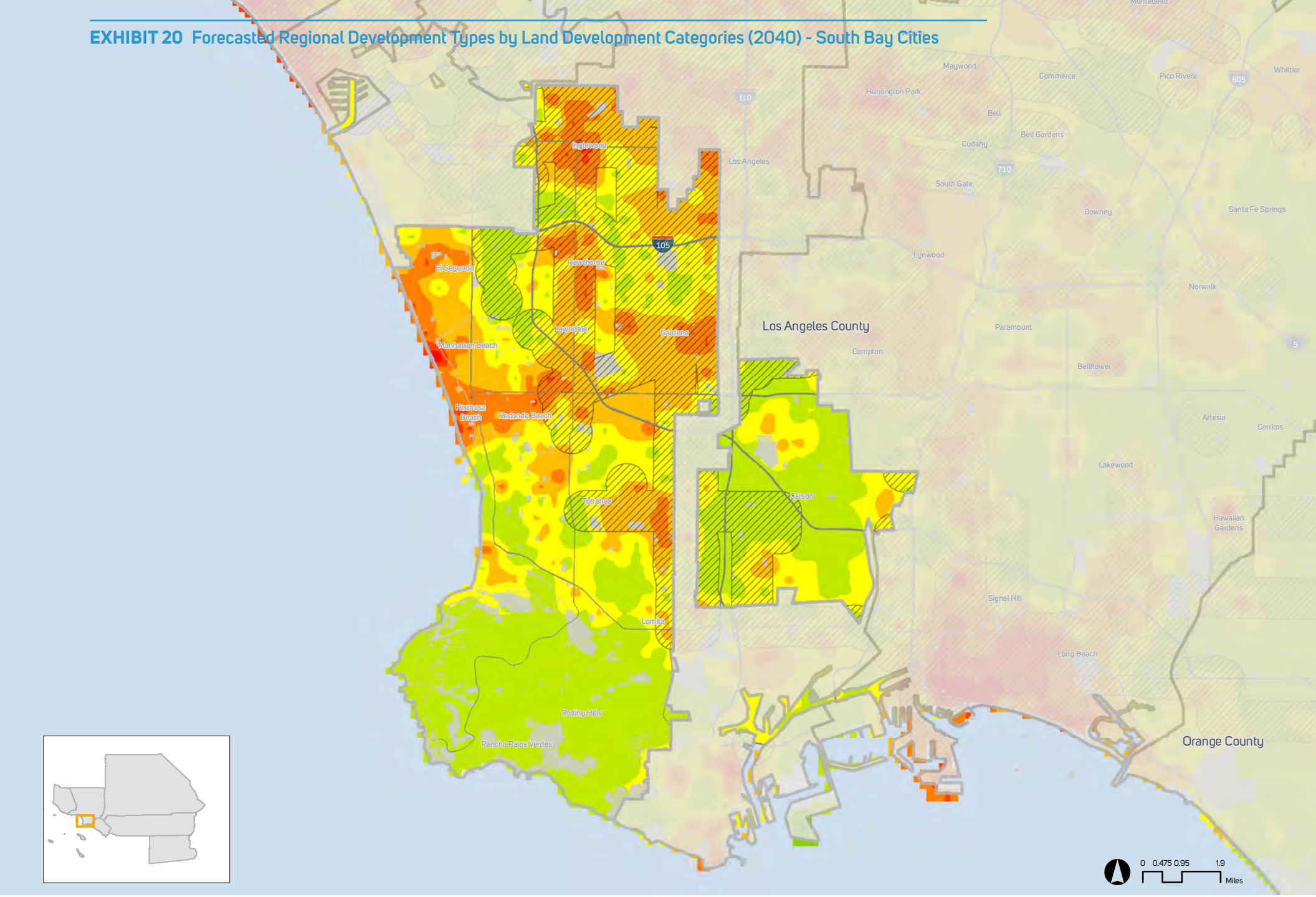
(Source: SCAG, 2015)

EXHIBIT 20 Forecasted Regional Development Types by Land Development Categories (2040) - South Bay Cities



HQTA (2040)

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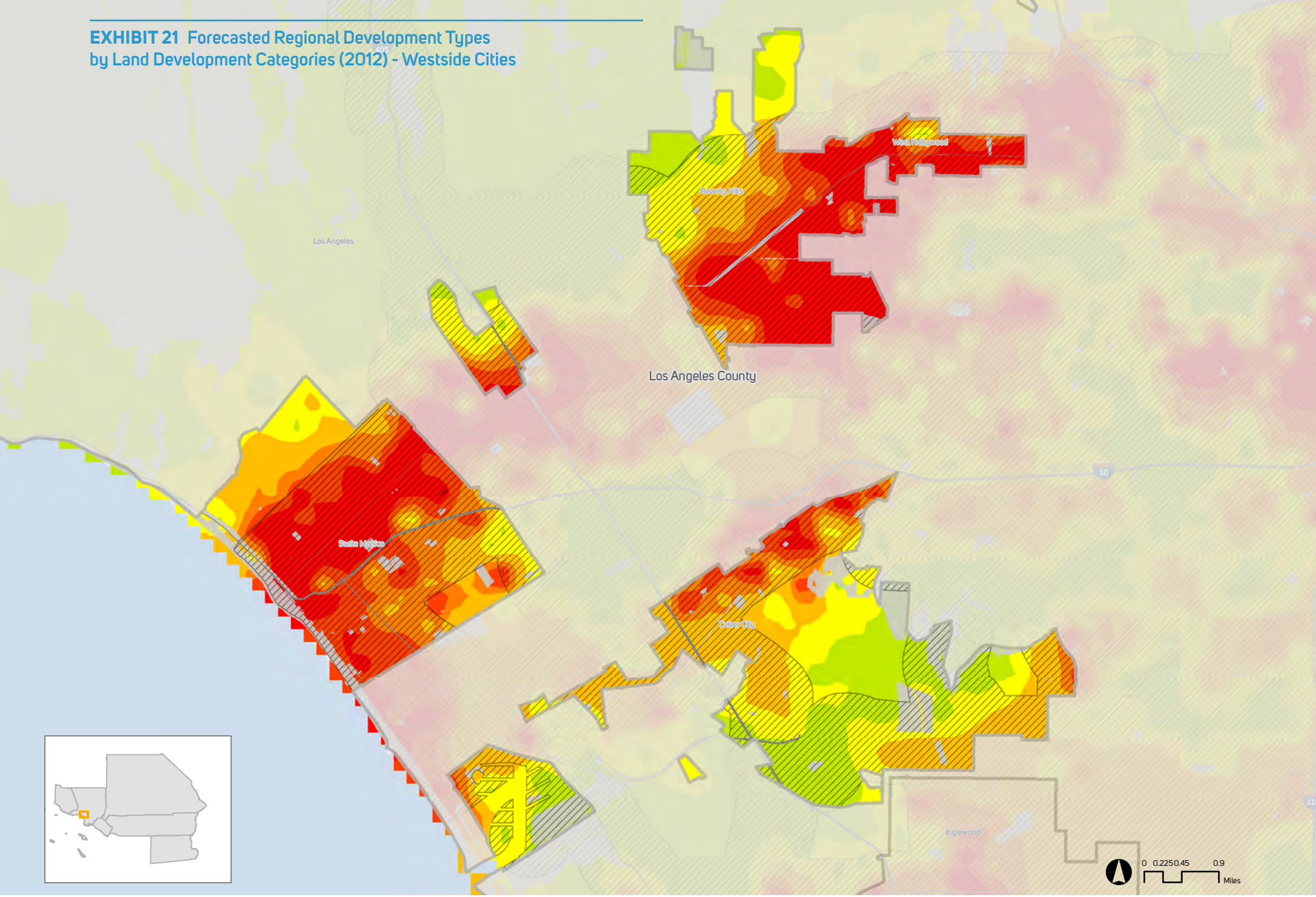
(Source: SCAG, 2015)

EXHIBIT 21 Forecasted Regional Development Types by Land Development Categories (2012) - Westside Cities



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Standard

Description of LDCs can be found on page 43.

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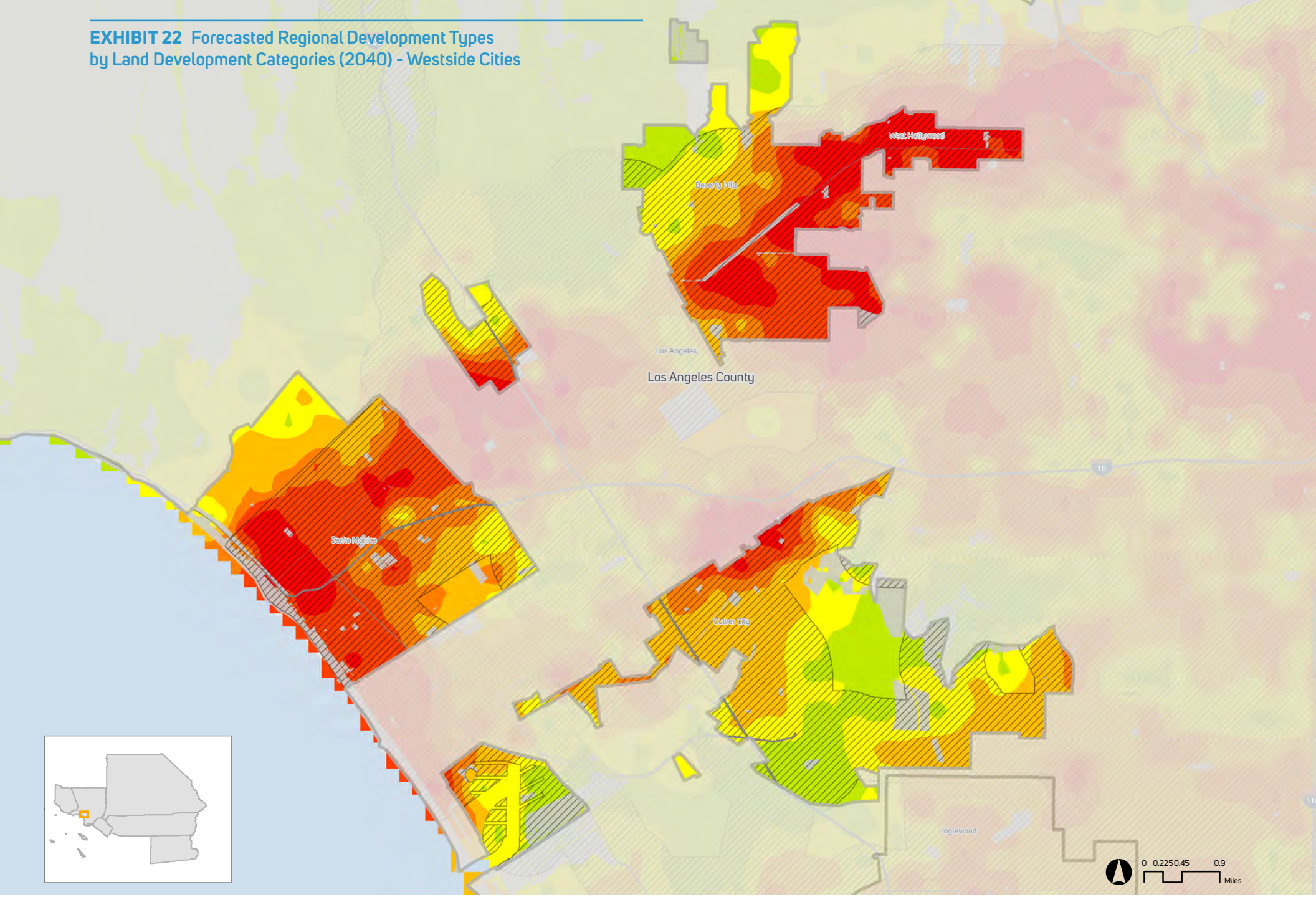
(Source: SCAG, 2015)

EXHIBIT 22 Forecasted Regional Development Types by Land Development Categories (2040) - Westside Cities



HQTA (2040)

California Protected Areas Database (CPAD)

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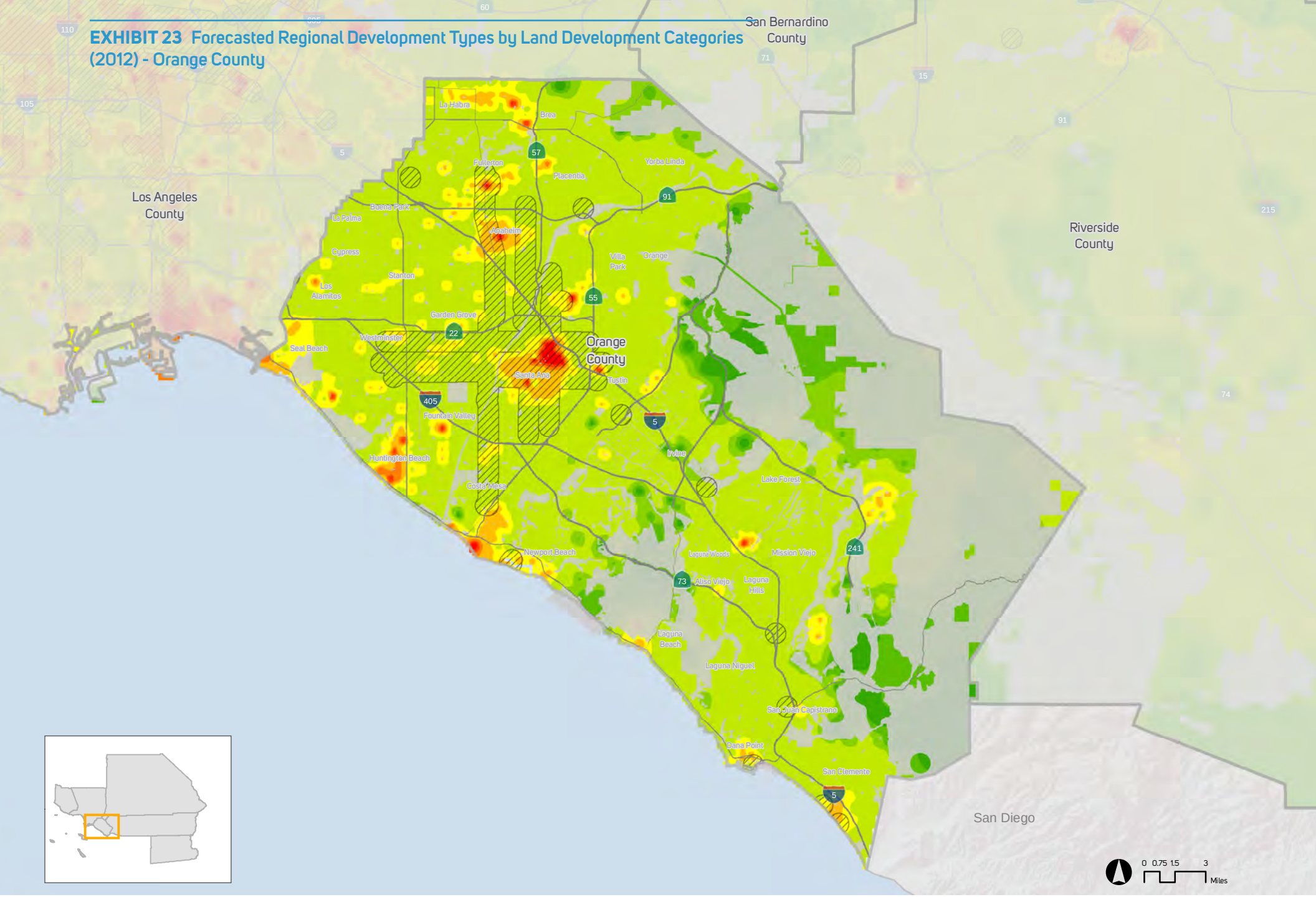
(Source: SCAG, 2015)

EXHIBIT 23 Forecasted Regional Development Types by Land Development Categories (2012) - Orange County



HQTA (2012)

California Protected Areas Database (CPAD)

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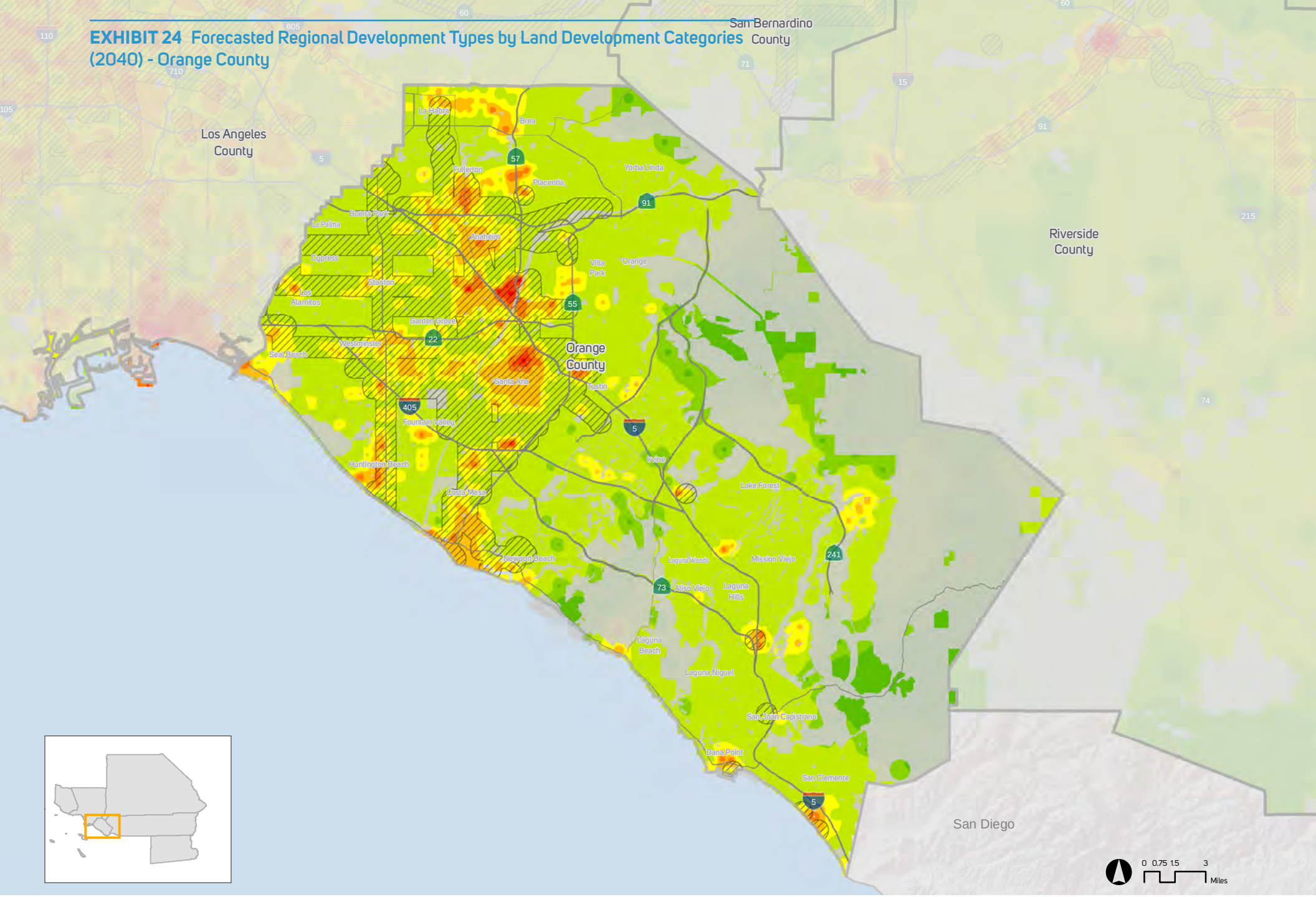
(Source: SCAG, 2015)

EXHIBIT 24 Forecasted Regional Development Types by Land Development Categories (2040) - Orange County



HQTA (2040)

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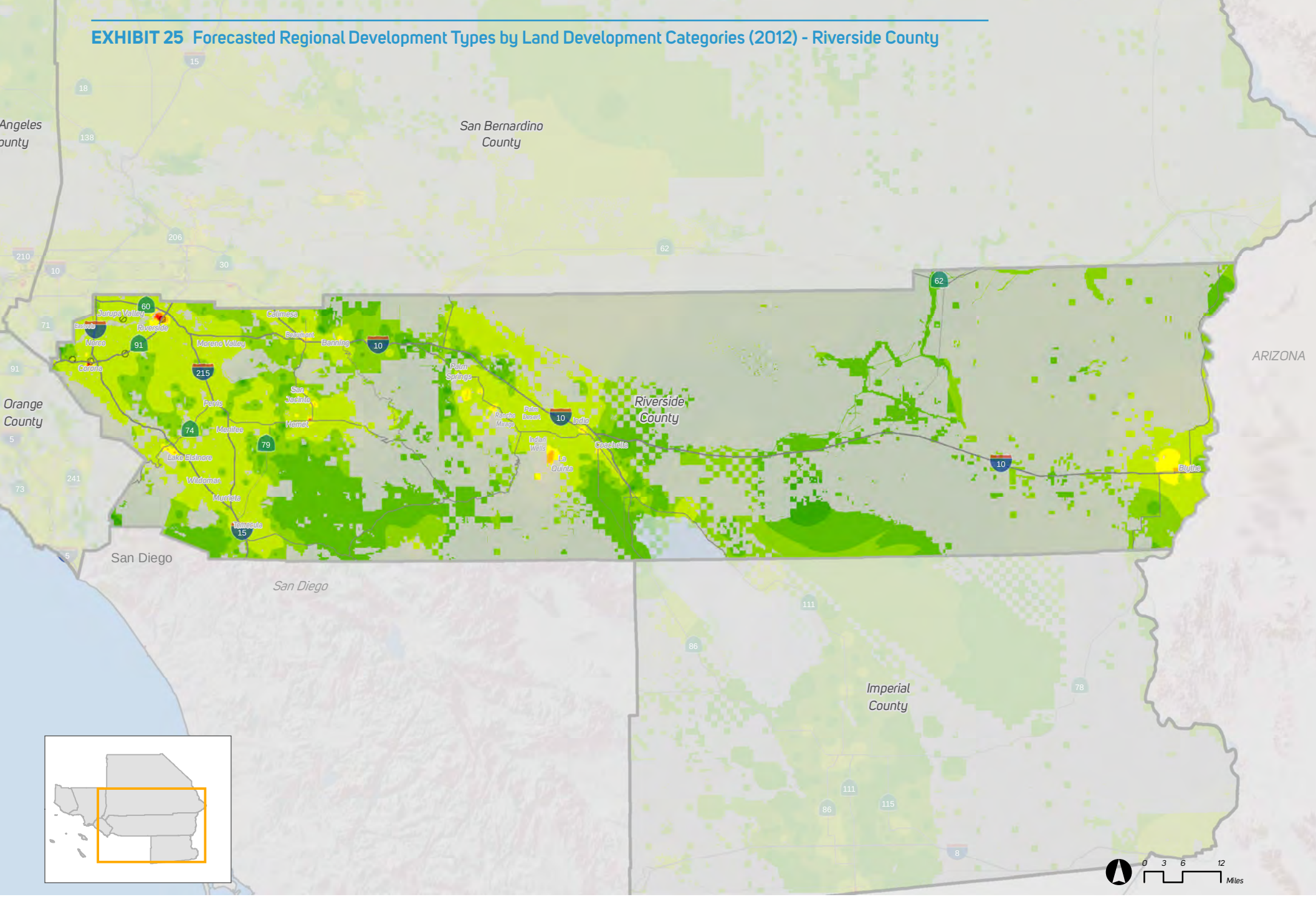
(Source: SCAG, 2015)

EXHIBIT 25 Forecasted Regional Development Types by Land Development Categories (2012) - Riverside County



HQTA (2012)

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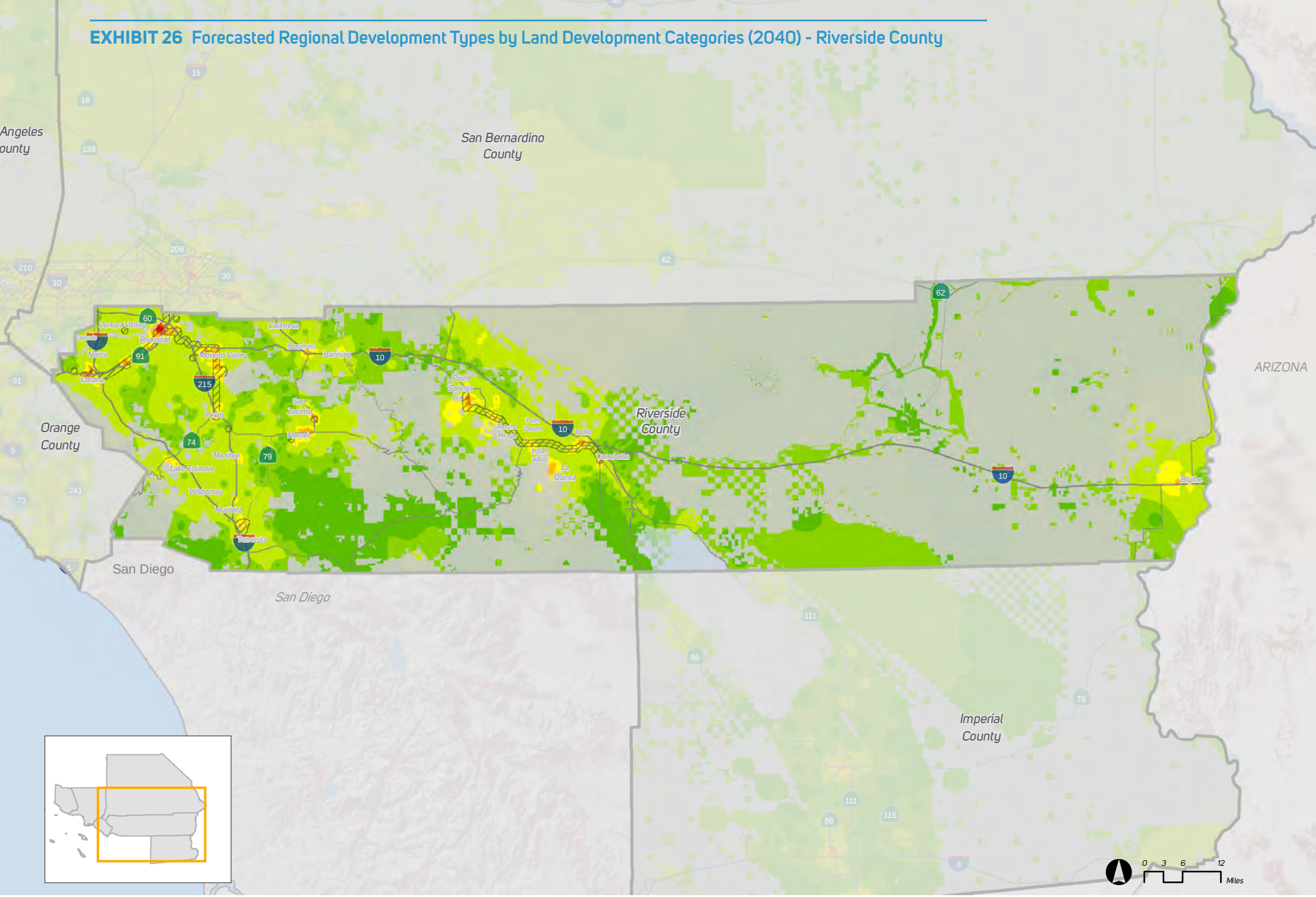
(Source: SCAG, 2015)

EXHIBIT 26 Forecasted Regional Development Types by Land Development Categories (2040) - Riverside County



HQTA (2040)

California Protected Areas Database (CPAD)

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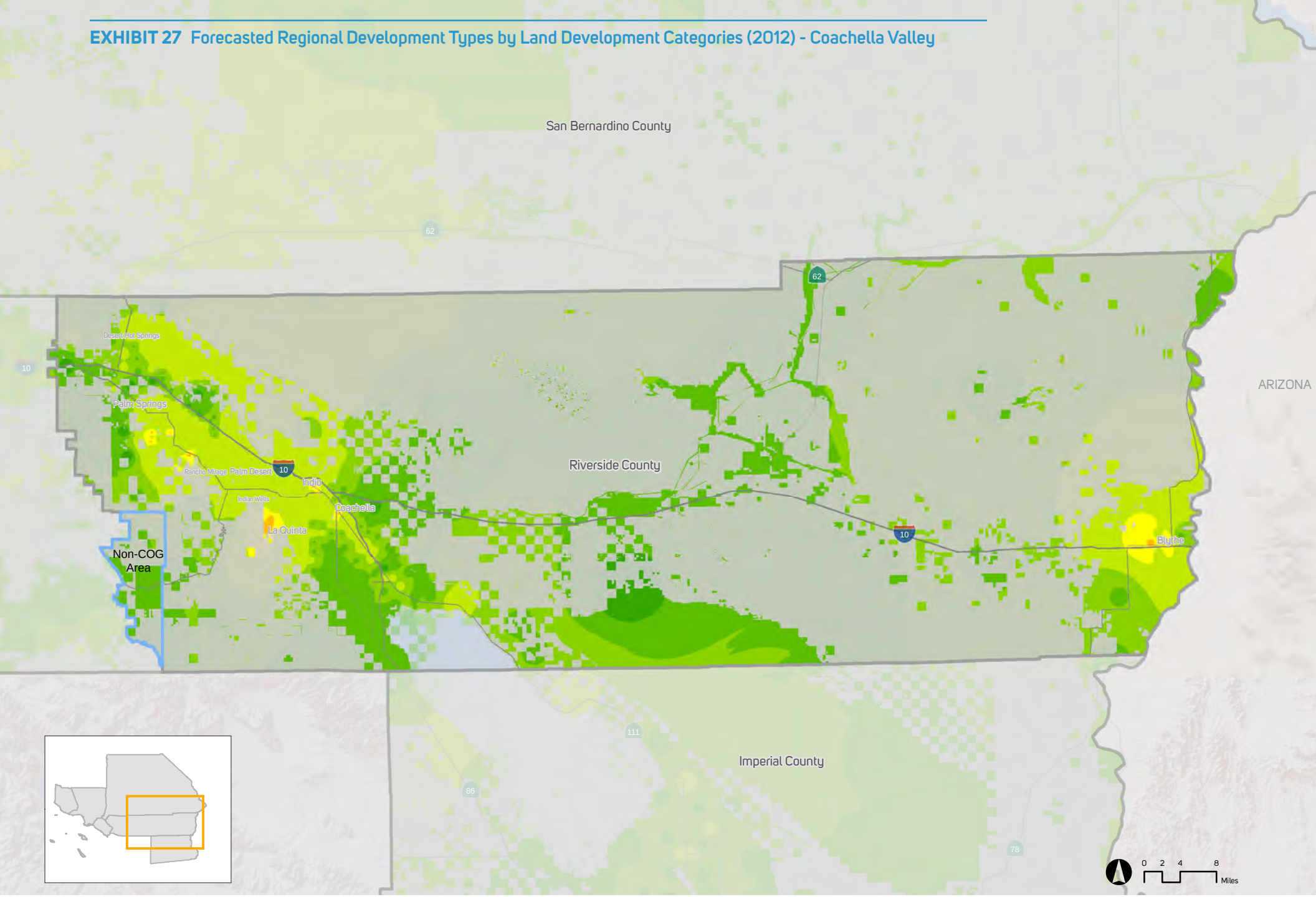
(Source: SCAG, 2015)

EXHIBIT 27 Forecasted Regional Development Types by Land Development Categories (2012) - Coachella Valley



HQTA (2012)

California Protected Areas Database (CPAD)

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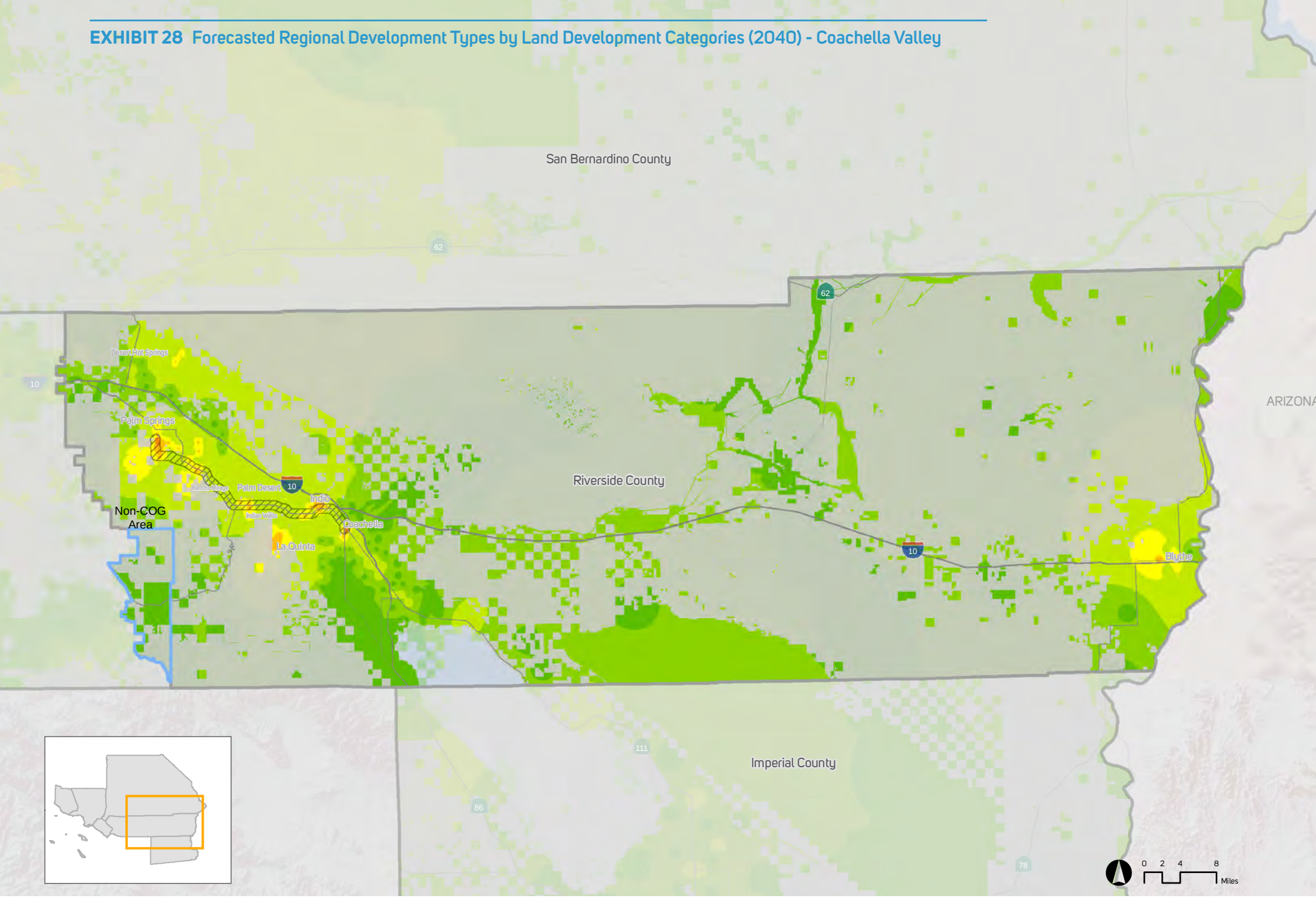
(Source: SCAG, 2015)

EXHIBIT 28 Forecasted Regional Development Types by Land Development Categories (2040) - Coachella Valley



HQTA (2040)

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Standard

Description of LDCs can be found on page 43.

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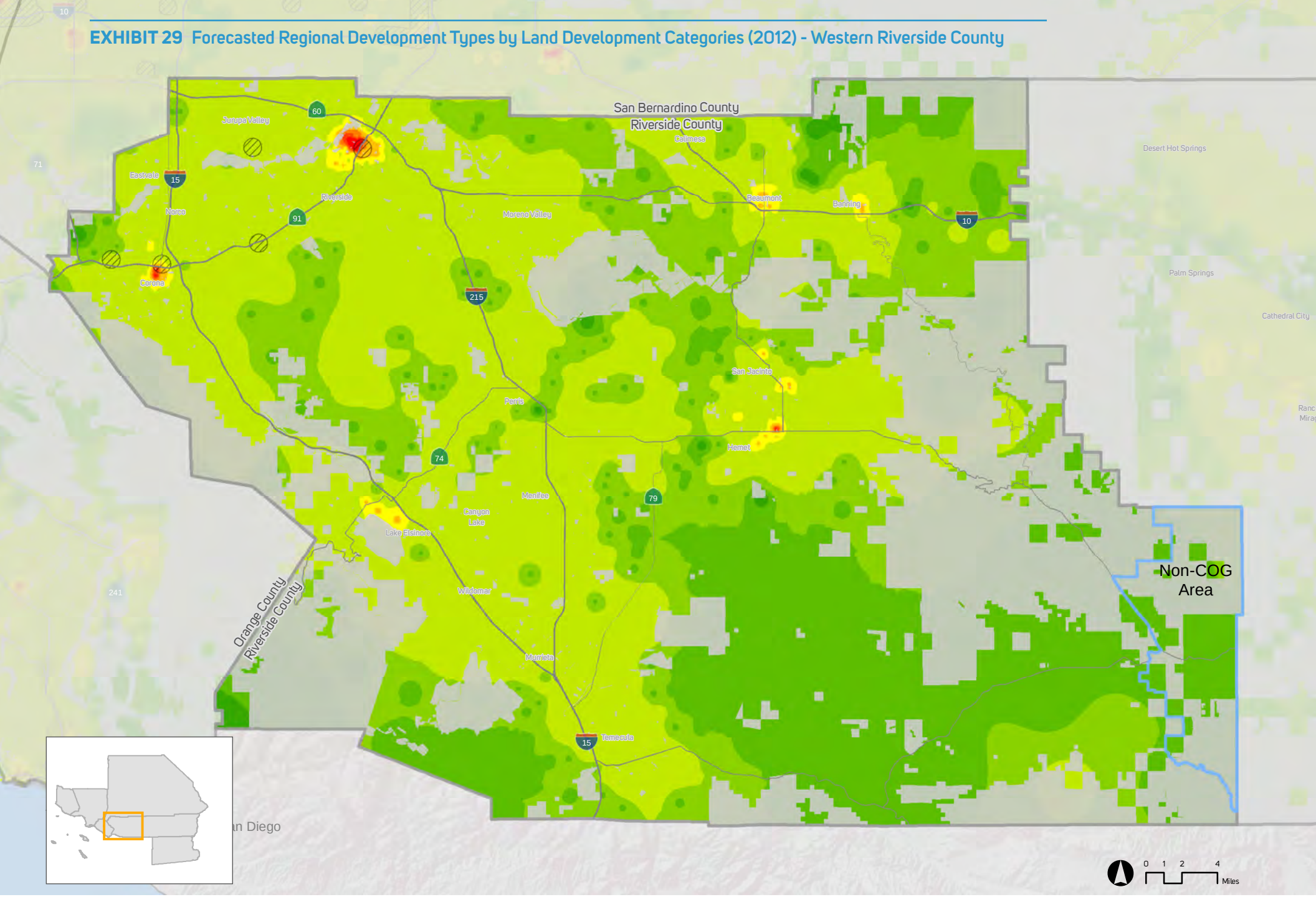
(Source: SCAG, 2015)

EXHIBIT 29 Forecasted Regional Development Types by Land Development Categories (2012) - Western Riverside County



HQTA (2012)

California Protected Areas Database (CPAD)

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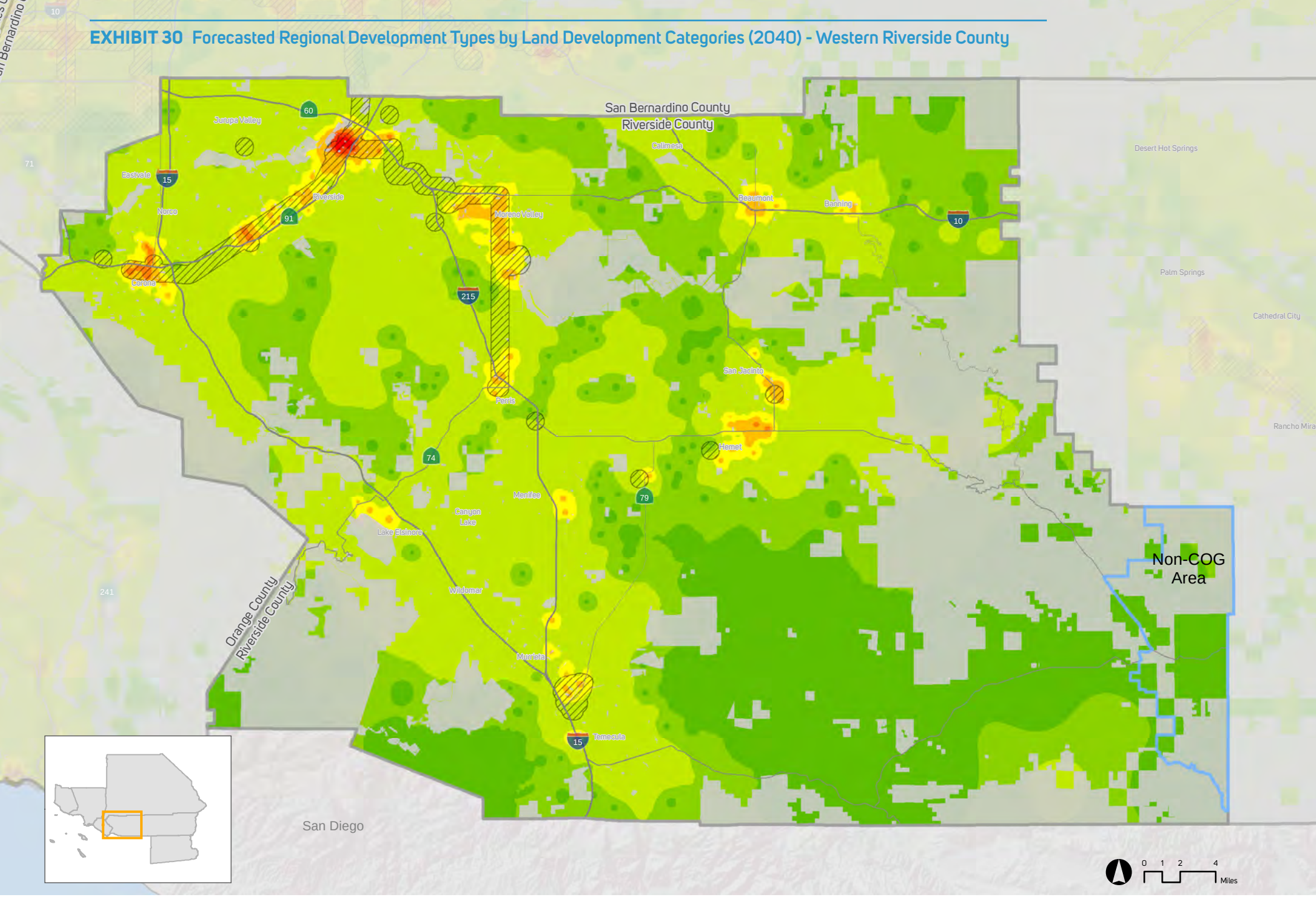
(Source: SCAG, 2015)

EXHIBIT 30 Forecasted Regional Development Types by Land Development Categories (2040) - Western Riverside County



HQTA (2040)

California Protected Areas Database (CPAD)

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Description of LDCs can be found on page 43.

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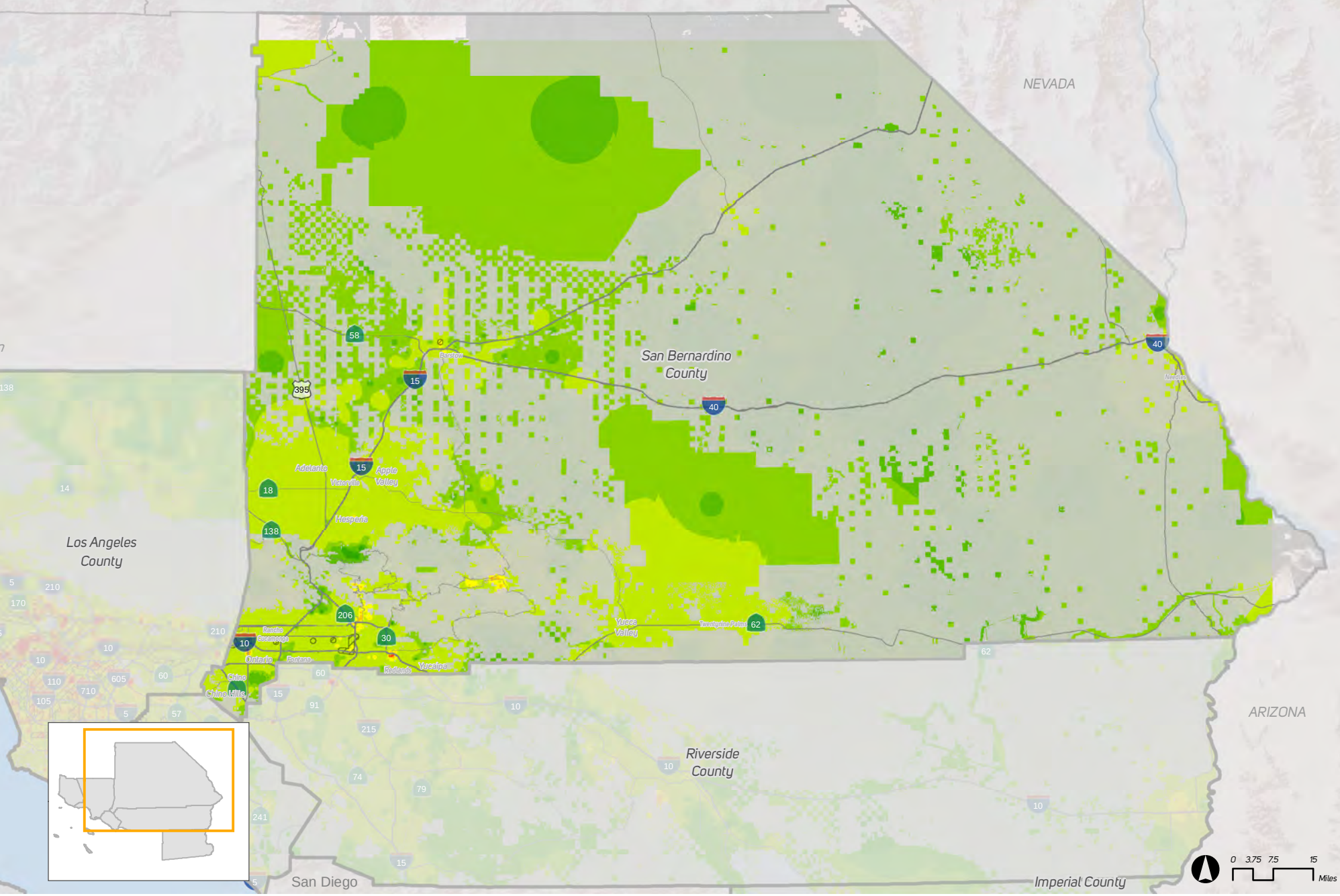
(Source: SCAG, 2015)

EXHIBIT 31 Forecasted Regional Development Types by Land Development Categories (2012) - San Bernardino County



HQTA (2012)

California Protected Areas Database (CPAD)

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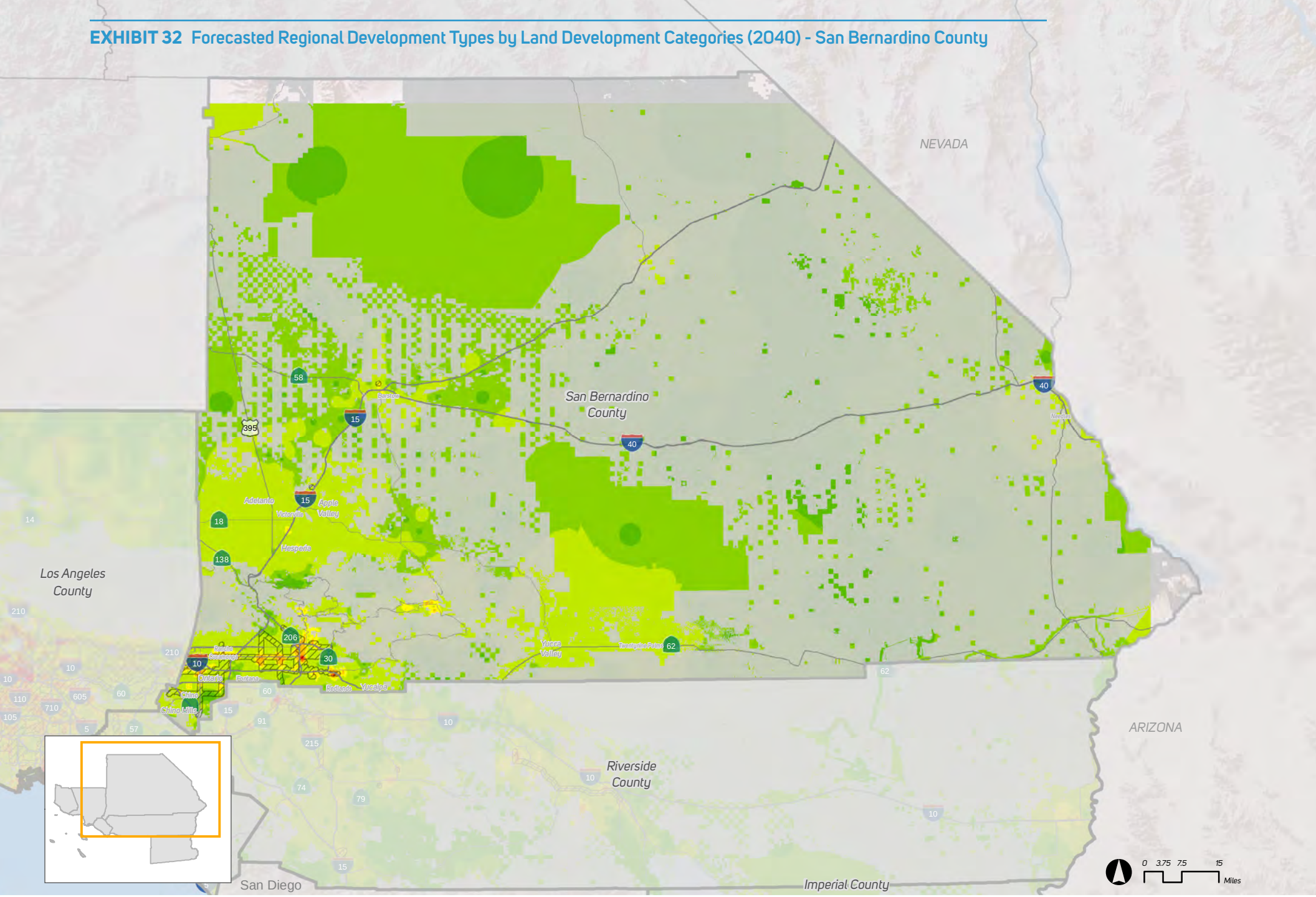
(Source: SCAG, 2015)

EXHIBIT 32 Forecasted Regional Development Types by Land Development Categories (2040) - San Bernardino County



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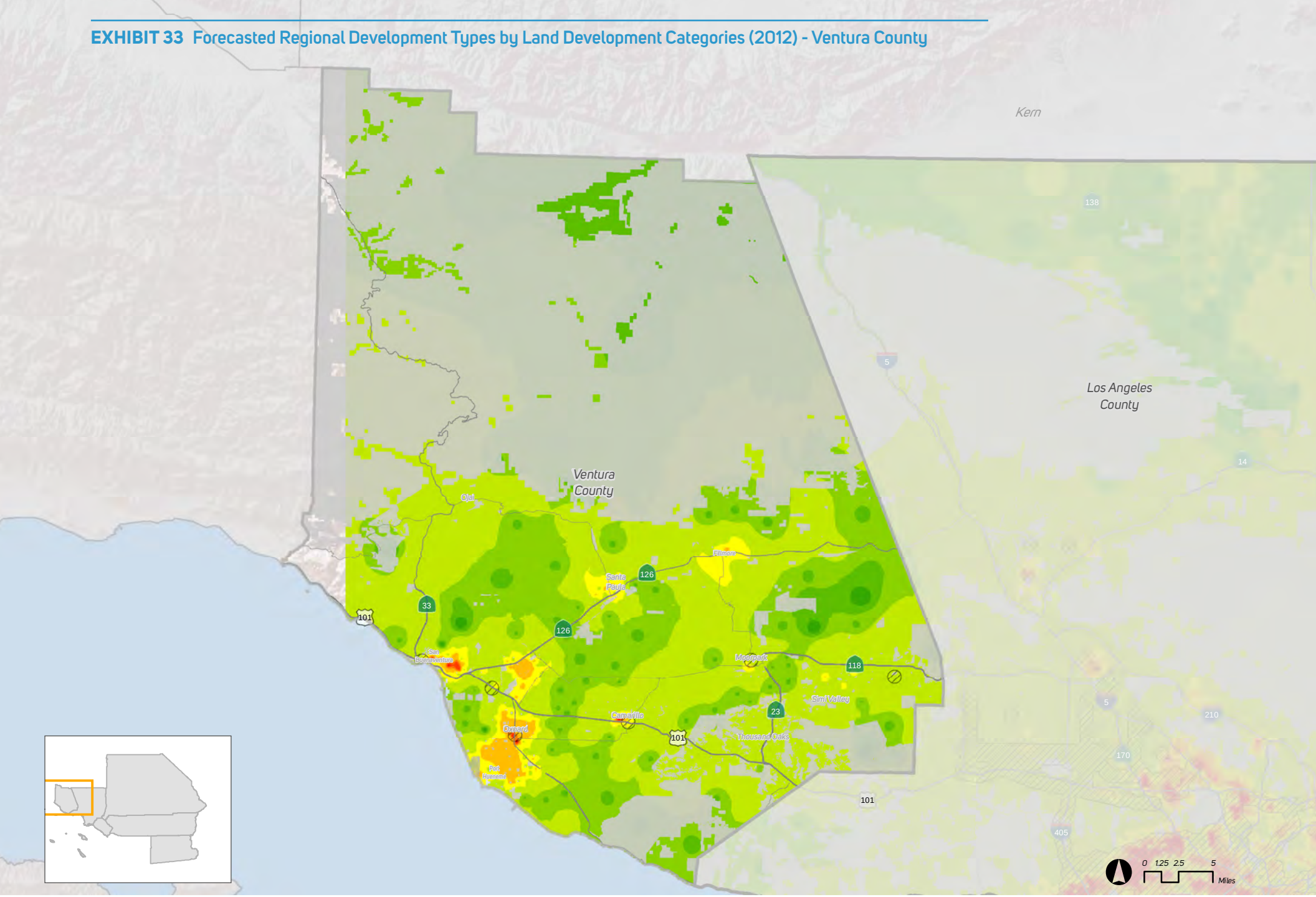
(Source: SCAG, 2015)

EXHIBIT 33 Forecasted Regional Development Types by Land Development Categories (2012) - Ventura County



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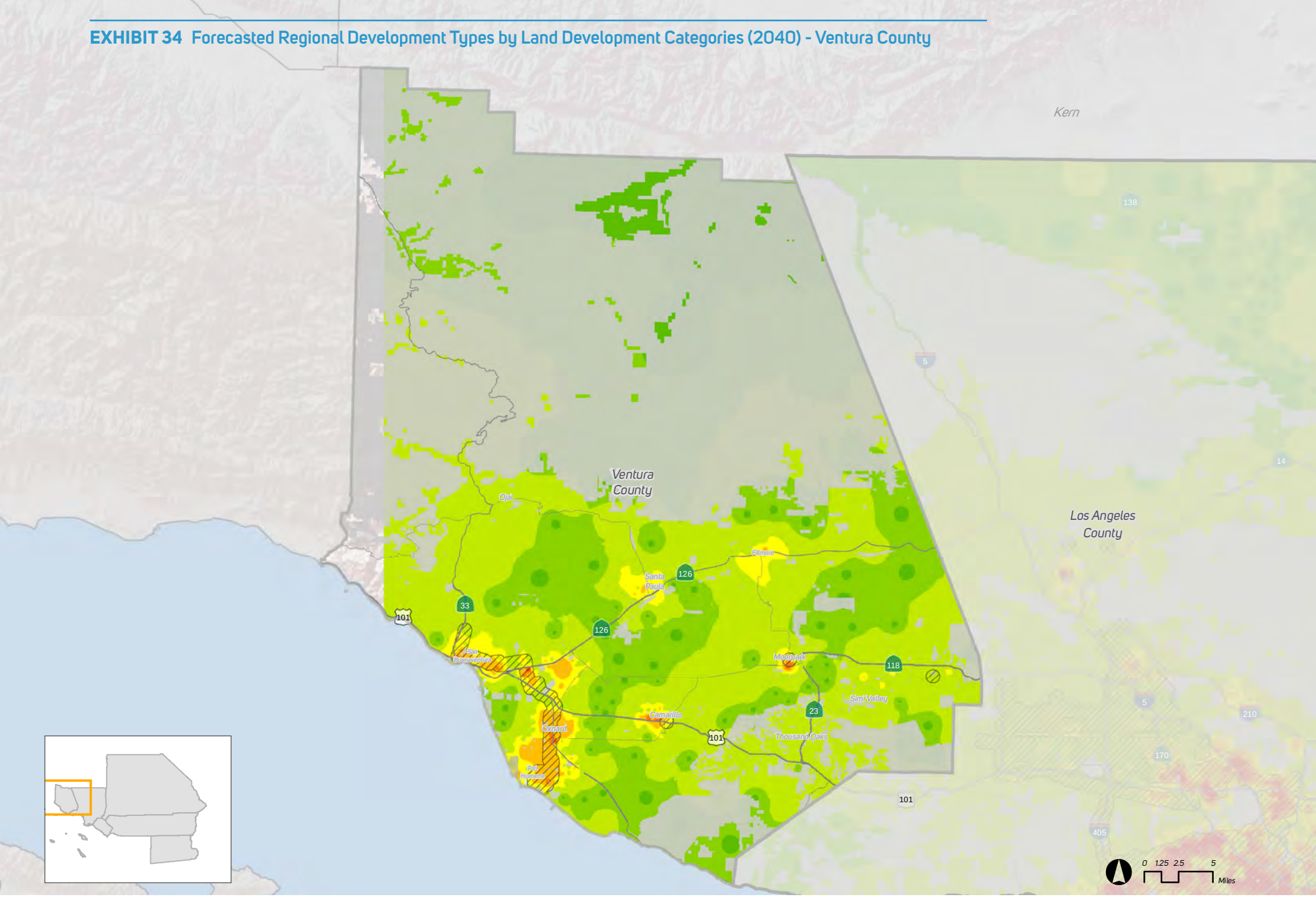
(Source: SCAG, 2015)

EXHIBIT 34 Forecasted Regional Development Types by Land Development Categories (2040) - Ventura County



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(Source: SCAG, 2015)

ROLE OF URBANFOOTPRINT SCENARIOS FOR THE 2016 RTP/SCS

Scenarios enable broad analysis of the implications of potential future conditions. Forecasts and many other models attempt to predict or identify the most likely future conditions. By contrast, normative or sketch-level scenarios let users assert future conditions to test "what if" scenarios. Instead of saying, "this is the future that will most likely happen," UrbanFootprint is designed to help users say "if we develop in this way, here are the impacts to travel behavior, energy use, public health outcomes, and other important metrics."

To this end, the scenarios developed for the 2016 RTP/SCS process are designed to inform conversations about the impacts of varying land use, policy, and investment decisions. They should be used to compare the implications of scenarios for important impacts on water and energy use, public health, fiscal impacts, regional vehicle miles traveled (VMT), travel and building-related greenhouse gas emissions, and household costs for transportation and utilities. This comparative information complements the outputs from the SCAG regional travel, air quality, and economic models (i.e. ABM, REMI) and can help the public and decision makers understand the relative impacts of varying land use and transportation investment strategies. UrbanFootprint models are calibrated and verified using these critical conformity models, but are not meant to replace them – rather, UrbanFootprint allows for rapid comparisons of scenario impacts for a range of critical indicators. How much more or less energy, water, or VMT will result if the region moves in one direction or another? Scenario modeling with UrbanFootprint brings meaningful, comprehensible, and timely results to those wanting to understand how growth and development choices will impact the region in the coming years and decades.

PEER REVIEW OF URBANFOOTPRINT

The UrbanFootprint model has gone through an extended peer review process at the state and regional levels. In October 2012, the "UrbanFootprint State and Regional Agency Review" group agreed that UrbanFootprint was a step forward from the existing scenario planning toolkits. The group agreed it was also a step forward for use by state, regional, and local governments. The model met and surpassed the requirement of being at least consistent with the current state of practice in scenario planning and could reasonably be expected to advance the state of the practice.

Since 2012, the various components of the UrbanFootprint model have been presented and discussed at length with agencies and stakeholders across the state. Among those agencies at the state level are the Air Resources Board (ARB), Office of Planning and Research (OPR), Strategic Growth Council (SGC), California Technology Agency (CTA), California Energy Commission, Department of Water Resources, Lawrence Berkeley National Labs and Caltrans. Developers of UrbanFootprint have also met with regional agencies, such as SCAG, Sacramento Area Council of Governments (SACOG), and San Diego Association of Governments (SANDAG). Among the stakeholders that have actively participated in the review process are the: American Lung Association, ClimatePlan, Transform, faculty from UC Berkeley and UC Davis, Resources Legacy Fund, Policy in Motion and the Nature Conservancy and the SCAG Scenario Planning Model (SPM) Working Group.

SCENARIO DEVELOPMENT RULES

This section summarizes the processes utilized in the development and analysis of SCAG's 2016 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) "scenarios". It provides an overview of the primary components of each of the four scenarios as well as the primary "rules" and methods used to develop them.

The SCAG regional scenario development process is designed to explore alternative land use distributions and transportation networks as a critical step in the process of drafting the 2016 RTP/SCS. Four scenarios were developed and analyzed. For the 'Trend' and '2012 RTP Updated' scenarios, SCAG provided its consultant, Calthorpe Analytics, with key scenario data and controlling mechanisms. Two additional scenarios, the Policy A and B scenarios were built and analyzed by Calthorpe Analytics to explore land use and transportation system variations. Using the UrbanFootprint Scenario Planning Model (SPM), all scenarios were normalized to a standardized data framework and analyzed using the model's peer reviewed analytical modules. More information on the Urban Footprint model can be found in the Reference Documents section at the end of this Appendix.

Each land use-transportation scenario explores a different policy framework for the 2040 horizon year. All four scenarios assumed the same growth in population, housing and employment at the county and regional scales. All four scenarios utilized the latest growth projections for population, household and employment. All four scenarios were built with 2012 as the base year, and all were developed at the same geographic scale, the Scenario Planning Zone (SPZ). A high level summary of the characteristics of each of the scenarios is provided in **TABLE 2**.

Each scenario was assessed for land consumption, passenger vehicle travel, greenhouse gas emissions, energy and water use, household costs, public health impacts and local infrastructure costs using SPM analytical models. More information on the Building Energy, Transportation Impacts, Transportation Model and Water Analysis can be found in the Reference Documents section at the end of this Appendix. These metrics highlight the impacts of varying residential and commercial growth patterns around High-Quality Transit Areas (HQTAs)[1] and Transit Priority Area (TPAs)[2] . These metrics are also sensitive to the nature of the development patterns in terms of walkability and mix of use. The scenarios were built to reflect the impact of UrbanFootprint's Land Development Categories (LDCs)[4] that relate the impact of investment in active transportation measures and land pattern relationships to changes in the regional transportation network.

TABLE 2 2016 RTP/SCS Scenarios Summary

	Scenario 1 - Trend	Scenario 2 - 2012 RTP Updated	Scenario 3 - Policy A	Scenario 4 - Policy B
Growth Projections	**Projections 2012–2040**: 21% Population Growth 2012 Base Year: 18.3 million population, 5.9 million households, 7.4 million jobs 26% Housing Growth 2012 – 2040 Change: 3.8 million population, 1.5 million households, 2.4 million jobs 33% Job Growth 2040 End State: 22.1 million population, 7.4 million households, 9.8 million jobs			
Scenario Theme	Past trends extrapolated forward	How does the 2012 RTP plan work with local land use planning 4 years later?	More focused land use based on shifting demographics and preference.	Pushing the envelope with more aggressive transit investments, land use coordination, and technology change.
Transportation Network	2012 RTP Network	Updated 2012 RTP Network	Updated 2012 RTP Network	Updated 2012 RTP Network Strategic plan Projects
Housing Mix	Growth Increment:	Growth Increment:	Growth Increment:	Growth Increment:
	64% single family	48% single family	34% single family	28% single family
	36% multifamily	52% multifamily	66% multifamily	72% multifamily
Land Use & Transit Policy Themes	Past trend	HQTA/TPA focus per existing plans	Additional HQTA focus	Additional HQTA and TPA focus
			Active transportation investments	Active transportation investments
			Improved walkability	Improved walkability
			'First/Last' Mile focus	First/Last' Mile focus
Land Use & Transit Coordination	High Quality Transit Areas	High Quality Transit Areas	High Quality Transit Areas	High Quality Transit Areas
	36% Homes	39% Homes	46% Homes	53% Homes
	44% Employees	48% Employees	55% Employees	66% Employees
	Transit Priority Areas	Transit Priority Areas	Transit Priority Areas	Transit Priority Areas
	16% Homes	19% Homes	23% Homes	27% Homes
	23% Employees	27% Employees	31% Employees	36% Employees
Land Use Pattern Focus	2012-2040 New growth:	2012-2040 New growth:	2012-2040 New growth:	2012-2040 New growth:
	3% Urban Infill	13% Urban Infill	13% Urban Infill	13% Urban Infill
	11% Compact Walkable	32% Compact Walkable	49% Compact Walkable	59% Compact Walkable
	86% Standard Suburban	55% Standard Suburban	38% Standard Suburban	28% Standard Suburban
Climate Resilience	No Policy	No Policy	No Policy	Avoided growth in:
				Critical habitat areas
				2100 5 foot sea level rise zones

Source: SCAG

Each of the scenarios analyzed by Calthorpe Analytics incorporates a specific set of parameters and scenario "rules." One of the key differences between each scenario is the relative proportion of housing and employment in TPAs and HQTAs. TABLE 3 and TABLE 4 detail the proportion of households and employment within TPAs and HQTAs for each scenario and for each county at the 2040 out year.

The following section describes the Land Development Categories (LDCs) and Place Types used to build the scenarios. The sections after detail the process used to translate the 'Trend' and '2012 RTP Plan Updated' scenarios provided by SCAG into the SPM data framework, and the steps used by Calthorpe Analytics to build the Policy A and Policy B scenarios.

LAND DEVELOPMENT CATEGORIES (LDCS) AND PLACE TYPES

The SPM employs a series of LDCs and Place Types to describe the different types of land uses in the region. These LDCs and Place Types are comprised of a mix of different types of buildings along with assumptions about characteristics such as the amount of land devoted to streets, parks and civic areas. There are two levels of detail. The first level, LDCs, is a simplified classification intended for conveying land use alternative and maps to the broader public. At a more detailed level, the Place Types are intended for modeling purposes at the SPZ level.

LAND DEVELOPMENT CATEGORIES (LDCS)

As previously mentioned, the future forecasted development types of the region also employs a series of Land Development Categories (LDCs), which serve as a simplified classification used to describe the general conditions likely to occur within a specific area. These LDCs are aggregations of the 35 Place Types used for modeling purposes. A table of how the 35 Place Types were categorized into the three LDCs can be found in the Reference Documents section of the SCS Background Documentation Appendix. Following is a list of the three LDCs employed in the 2016-2040 RTP/SCS Plan Scenarios.

- **Urban**

Often found within and directly adjacent to moderate and high density urban centers. Virtually all 'Urban' growth would be considered infill or redevelopment. The majority of housing units are multifamily and attached single family (townhome), which tend to consume less water and energy than the larger types found in greater proportion in less urban locations. These areas are supported by high levels of regional and local transit service. Well-connected street networks and the mix and intensity of uses result in a highly walkable environment. Enhanced access and connectivity for people who choose not to drive or do not have access to a vehicle.

- **Compact Walkable**

Less intense than Urban LDC, but highly walkable with rich mix of retail, commercial, residential and civic uses. Most likely to occur as new growth on the urban edge, or large-

TABLE 3 Percentage of Households in High Quality Transit Areas (HQTAs) Including Transit Priority Areas (TPAs), 2040

County	Trend	2012 RTP Updated	Policy A	Policy B
Imperial	0%	0%	0%	0%
Los Angeles	56%	58%	65%	73%
Orange	27%	30%	38%	44%
Riverside	2%	7%	16%	22%
San Bernardino	13%	20%	29%	41%
Ventura	3%	3%	21%	25%
SCAG Region	36%	39%	46%	53%

Source: SCAG

TABLE 4 Percentage of Employment in High Quality Transit Areas (HQTAs) Including Transit Priority Areas (TPAs), 2040

County	Trend	2012 RTP Updated	Policy A	Policy B
Imperial	0%	0%	0%	0%
Los Angeles	64%	66%	73%	81%
Orange	38%	39%	46%	60%
Riverside	7%	15%	29%	41%
San Bernardino	18%	35%	42%	59%
Ventura	7%	6%	19%	27%
SCAG Region	44%	48%	55%	66%

Source: SCAG

scale redevelopment. Rich mix of housing, from multifamily and attached single family (townhome) to small- and medium-lot single family homes. 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 such as schools, shopping and entertainment areas can typically be reached via a walk, bike, transit or short auto trip.

- **Standard Suburban**

Reflects the separate-use auto-oriented development of the American suburban landscape over the past five decades. Densities tend to be lower than in Compact Walkable LDC, and land uses are generally not highly mixed - medium- and larger-lot single family homes comprise the majority of this development form. Standard areas are not typically well served by regional transit service and most trips are made via automobile.

Place Types

The Place Types were virtually "painted" onto the map of the region using the SPM. Each Place Type carries with it values that describe the characteristics of the place it represents. It was important to establish a set of Place Types that represent the full range of development patterns and forms that make up the region today and into the future. In addition, these Place Types must be easy to communicate to the public and key policy decision makers. The Place Types contain a large amount of information relating to the characteristics of the landscape, including jobs and housing density, urban design and mix of land uses, and lend themselves to clear communication through photo-simulations and other types of renderings.

Through use of the SPM, Place Types are the foundation of the forecasted regional development types scenarios. The SPM uses the typologies to calculate results for a range of evaluation criteria, in advance of the four-step travel demand model including housing and job mix, densities and VMT. The scenarios are built upon, and provide data at the SPZ level including households and employment. This represents the data that is fed into the regional transportation model to determine how the potential land use pattern impacts travel behavior.

Within the SPM, Place Types were assigned a mix of building types, each having an associated job and housing density. Examples of building types include mixed-use residential four stories, garden apartment, compact single-family home, office, main street retail, business flex and many others. Because Place Types make it possible to measure evaluation criteria that rely on information tied directly to individual buildings and uses, many of the assumptions are built into the individual building spreadsheets (called prototype buildings) that were then grouped together to form Place Types. More information on the Place Types, such as summaries and descriptions, can be found in the Reference Documents section at the end of this Appendix.

SCENARIO 1 (TREND) AND SCENARIO 2 (2012 RTP-UPDATED) SCENARIO TRANSLATION

SCENARIO 1 (TREND SCENARIO) AND SCENARIO 2 (2012 RTP UPDATED SCENARIO) TRANSLATION METHODOLOGY

SCAG provided Calthorpe Analytics with land use and forecast allocation data for the Scenario 1 (Trend) and Scenario 2 (2012 RTP Updated) scenarios as csv formatted tables at the SPZ and Tier 2 TAZ scales.
This data was processed to conform to the UrbanFootprint/SPM data schema and normalized to the SPZ scale using the following steps:

- **Step 1: Place type translation**

  Every SPZ that contained households or employment was assigned a qualitative land use designation known as a place type. There are 35 Place Types in the UrbanFootprint/SPM library (see Reference Documents section). Place types are assigned by one of two methods, utilizing either a density-based or a rule-based approach. Density classification utilizes dwelling unit density, employment density, street intersection density, and the proportion of retail employment to classify a given SPZ to a place type designation. Rule-based place type assignment is used for locations which cannot be classified by density, such as parks, civic institutions, and military bases. Rule-based assignment uses parcel data and other spatial datasets to assign place types based on spatial location.

- **Step 2: Deriving dwelling units from households**

  The standardized UrbanFootprint/SPM schema requires that both unoccupied and

TABLE 5 SCAG to UrbanFootprint Residential Types

UrbanFootprint Type	SCAG Type
Single Family Large Lot	Single Family
Single Family Small Lot	Single Family
Attached Single Family	Multifamily
Multifamily	Multifamily

Source: SCAG

occupied dwelling units are tracked through the system. For SPZs experiencing no change, the base year (2012) occupancy rate was applied to estimate the number of dwelling units. For SPZs with growth in households or employment into the future, a combination of the base year occupancy rate and the occupancy rate derived from the UrbanFootprint translated place type were used to estimate dwelling units from SCAG-provided occupied-household data. Dwelling units were calculated for each county independently so that county controls of dwelling units were equivalent across scenarios.

- **Step 3: Establishing residential units by type**

  SCAG provided the number of single family and multifamily households at the SPZ scale. These were disaggregated into the four UrbanFootprint/SPM residential classifications according to the crosswalk in **TABLE 6.** For SPZs that had no residential growth from the base to the future, the base year distribution was used to disaggregate the four types. For SPZs with future growth, a combination of the base year distribution and place type distribution was used to disaggregate the residential types. This process utilized the following rules:

  If growth in total households was less than five households between 2012 and 2040 in a given SPZ, the base year UrbanFootprint/SPM residential distribution was utilized.

  If growth in total units was greater than five households between 2012 and 2040 in a given SPZ, the classified place type household distribution was utilized.

  For all households in SPZs classified as Institutional, Parks or Military place types, the base year 2012 distribution of households was utilized.

  For all remaining undistributed units (<5 percent of new units), these were allocated to UrbanFootprint residential types using ACS 2013 five year block group housing distributions at the Census Block Group scale.

  Once all units were allocated to the four types, these were controlled to county level control totals by household type while maintaining total household totals at the Tier 2 TAZ scale.

- **Step 4: Disaggregating SCAG employment to the UrbanFootprint/SPM NAICS schema**

  SCAG provided a detailed employment breakdown at the SPZ scale for both the 2012 RTP Updated and Trend scenarios. This data was cross-walked into the UrbanFootprint/SPM schema using the relationship contained in **TABLE 6** and the following process steps:

  Employment categories that cross-walked directly to UrbanFootprint categories were assigned directly.

TABLE 6 Crosswalk from SCAG Employment Category to UrbanFootprint NAICs Categories

UrbanFootprint Category	SCAG Provided Category
Emp_retail_services	Retail
Emp_restaurant	Art_entertainment
Emp_accommodation	Art_entertainment
Emp_arts_entertainment	Art_entertainment
Emp_other_services	Other_service
Emp_office_services	Information + FIRE + Professional
Emp_medical_services	Education
Emp_public_admin	Public_admin
Emp_education	Education
Emp_manufacturing	Manufacturing
Emp_wholesale	Wholesale
Emp_transport_warehousing	Transportation_utilities
Emp_construction	Construction
Emp_utilities	Transportation_utilities
Emp_agriculture	Agriculture
Emp_extraction	Agriculture

Source: SCAG

TABLE 7 UrbanFootprint Building Square Footage Factors for Residential Units and Employees by Type

UrbanFootprint Field		Description	Suburban Sqft/Employee	Urban Sqft/Employee
RESIDENTIAL BUILDING SQUARE FEET	Bldg_sqft_detsf_sl	Small Lot Single Family building square feet	2400	1650
	Bldg_sqft_detsf_ll	Large Lot Single Family building square feet	3000	2100
	Bldg_sqft_attsf	Attached Single Family building square feet	1800	1800
	Bldg_sqft_mf2to4	Multifamily 2 to 4 building square feet	2000	1850
	Bldg_sqft_mf5p	Multifamily 5 plus building square feet	1200	1200
COMMERCIAL BUILDING SQUARE FEET	Retail building square feet			
	Bldg_sqft_retail_services	Retail services building square feet	750	475
	Bldg_sqft_accommodation	Accommodation building square feet	2000	1875
	Bldg_sqft_restaurant	Restaurant building square feet	750	475
	Bldg_sqft_arts_entertainment	Entertainment and recreation building square feet	1250	900
	Bldg_sqft_other_services	Other services building square feet	850	650
	Office building square feet			
	Bldg_sqft_office_services	Office services building square feet	350	280
	Bldg_sqft_education	Education services building square feet	1050	900
	Bldg_sqft_medical_services	Medical and health services building square feet	800	725
	Bldg_sqft_public_admin	Public administration building square feet	700	620
	Industrial building square feet			
	Bldg_sqft_transport_warehousing	Transportation and warehousing building square feet	1700	1200
	Bldg_sqft_wholesale	Wholesale building square feet	660	600

Source: Calthorpe Analytics, 2015

For categories that needed to be disaggregated (such as the SCAG 'art_ entertainment' category), if growth in new employment was less than 20 employees between 2012 and 2040, base year employment distributions were applied to disaggregate these employment categories.

For categories that needed to be disaggregated, if growth in new employment was greater than 20 employees between 2012 and 2040, the classified place type-based employment distribution was utilized.

For categories that needed to be disaggregated, all remaining unclassified SPZs had Longitudinal Employer-Household Dynamics (LEHD) 2010 rates applied from the Census Block Group scale.

- **Step 5: Estimating building square feet**

  Having populated the UrbanFootprint schema for residential units by type and employment by type, building square footage at the SPZ scale was estimated. For each SPZ, building square footage was estimated using assumptions for square footage by residential type, square footage per employee by employment type, and street intersection density (to distinguish urban versus suburban street connectivity and associated building categories). The building square footage factors are contained in **TABLE 7**.

- **Step 6: Estimating parcel acreage**

  The UrbanFootprint/SPM schema tracks residential, commercial, mixed use, and no-use parcel acreage fields through the system. Parcel acreage was estimated for each SPZ using a combination of base 2012 parcel-derived acreages as well as acreage distributions sourced from translated place type attributes. The following rules were utilized to assign parcel acreage at the SPZ scale.

  For SPZs which had less than five new households or 20 new employees between 2012 and 2040, parcel acreage by type was taken from the 2012 base dataset as long as those SPZs continued to have households or employment that corresponded with the acreage type from the base year. In other words, if the 2040 dataset continued to have households, residential parcel acreage was taken from the 2012 dataset.

  For SPZs which had greater than five new households and 20 new employees between 2012 and 2040, the acreage by type distribution was taken from the place type acreage distribution.

- **Step 7: Estimating outdoor irrigated area**

  Irrigated area was estimated using place type derived per household and per employee by type densities at the SPZ-scale. Sourced from the place type attribute table, residential irrigated area densities were multiplied by the number of households at the SPZ scale to estimate the residential portion of SPZ area that was irrigated. Commercial irrigated area was calculated with a similar method, utilizing the place type look-up of irrigated area per employee multiplied by the number of employees at the SPZ-scale.

SCENARIO 1 (TREND) RESULTS

The Trend scenario is a representation of the land use patterns and transportation policies of the past decades projected out to 2040. A significant proportion of housing growth in this scenario is made up of single family large lot units (> 5,500 sqft / parcel). A high percentage of growth takes place in suburban areas in and around the urban edges of the region. A visual representation of new growth in the Trend Scenario is provided in **EXHIBIT 35**: Trend Scenario Growth with TPA/HQTA transit network. **FIGURE 1** and **FIGURE 2** provide the residential unit type distribution of growth to 2040, and the breakdown of growth by land development category (LDC).

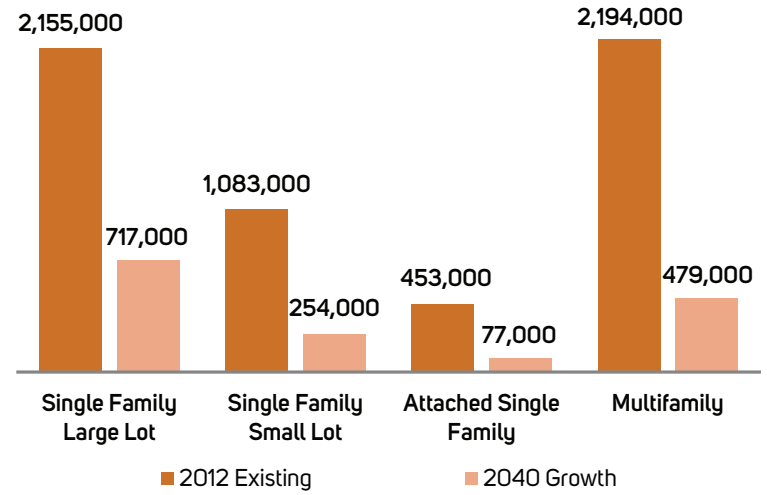
Scenario 2 (2012 RTP Updated) Results
The 2012 RTP Updated scenario represents SCAG's regional 'stitch' of the jurisdictional general plans, paired with the transportation network from the 2012 RTP. The growth in residential units in this scenario is more evenly split between single family and multifamily types, and nearly 40 percent of residential units in 2040 are within a TPA or HQTA. A visual representation of new growth in the 2012 RTP/SCS Updated scenario is provided in **EXHIBIT 36**: RTP 2012 Updated Scenario Growth with TPA/HQTA transit network. **FIGURE 3** and **FIGURE 4** provide the residential unit type distribution of growth to 2040 and the breakdown of growth by land development category (LDC).

SCENARIO 3 (POLICY A) AND SCENARIO 4 (POLICY B) SCENARIO CREATION

The Scenario 3 (Policy A) and Scenario 4 (Policy B) scenarios were created by Calthorpe Analytics based on the five guiding principles identified in Chapter 4 of the Plan. Following these guiding principles, 'rules' were developed in collaboration with SCAG staff. Both scenarios were constructed as 'pivots' from the '2012 RTP Updated' dataset to match their established rules frameworks. The resulting land use scenarios distribute housing and employment in response to changes in transportation networks, varying demand for residential types by county, and the incorporation of policy assumptions related to active transportation investments, walkability and climate adaptation and resilience.

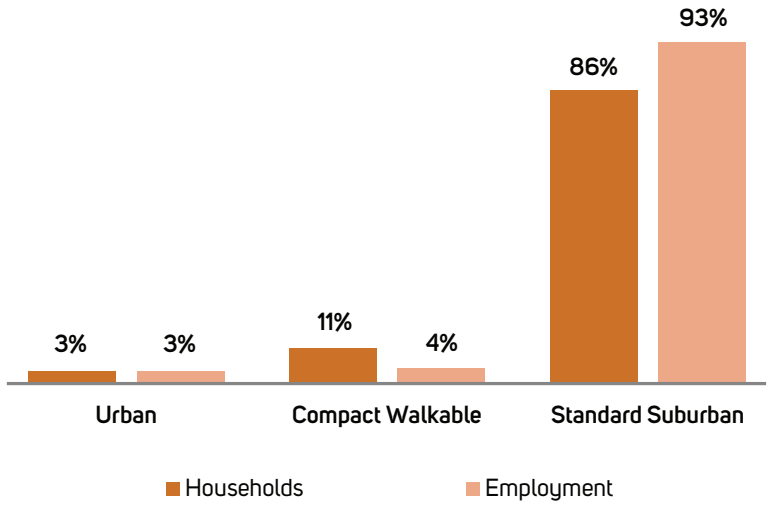
The process by which scenarios are created in the UrbanFootprint/SPM follows the general flow illustrated in **FIGURE 5**. Utilizing a detailed and standardized canvas of built form, residential and commercial use and street connectivity, change is applied via the allocation of place types which are distributed using rule-based spatial queries. Once applied, place types are used to calculate new residential and commercial growth and changes in street connectivity using their density, use and other characteristics.

FIGURE 1 Trend, Residential Growth by Unit Type, 2012-2040



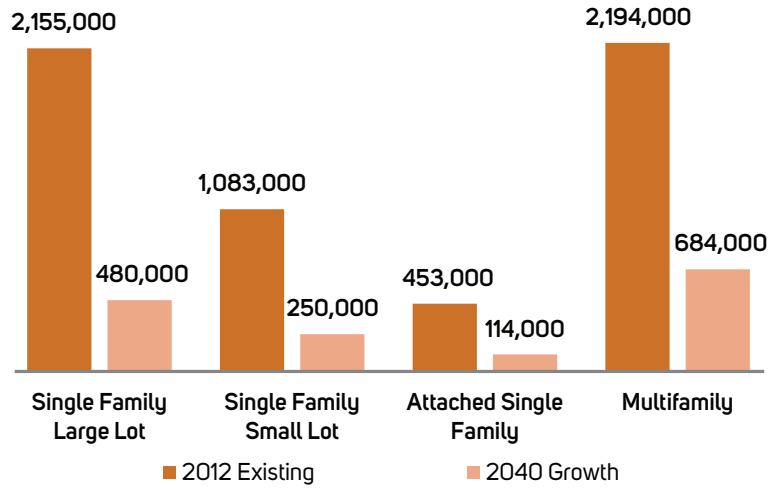
Source: SCAG

FIGURE 2 Trend, Proportion of New Growth by Land Development Category (LDC), 2012 - 2040



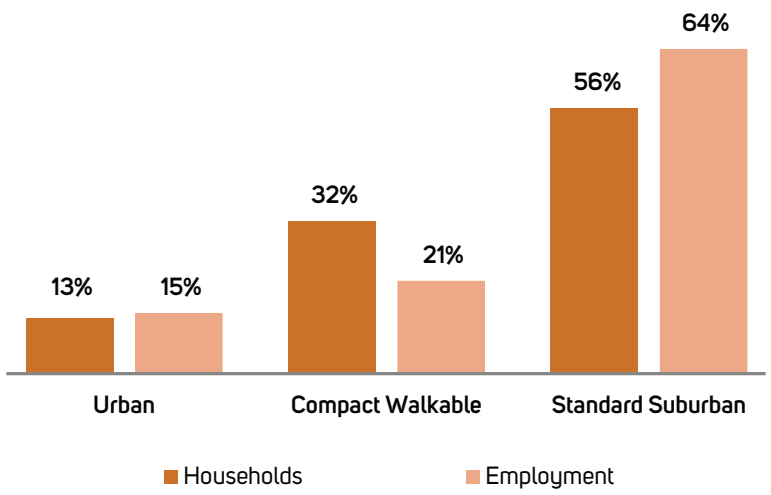
Source: SCAG

FIGURE 3 2012 RTP Updated, Residential Growth by Unit Type, 2012-2040



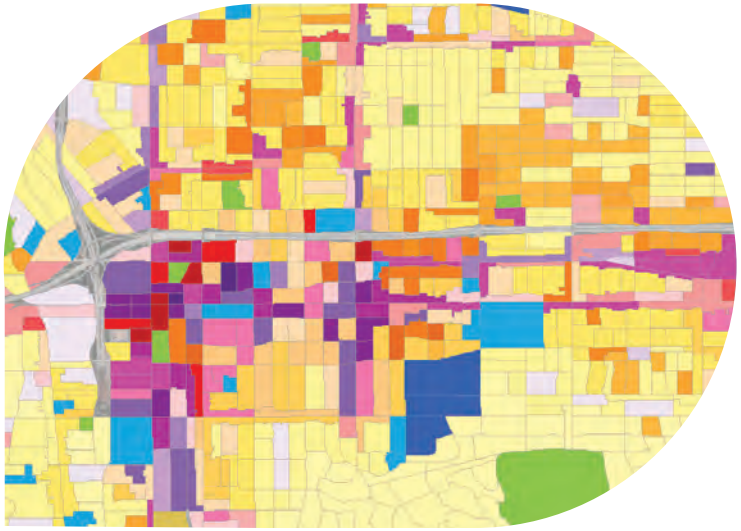
Source: SCAG

FIGURE 4 2012 RTP Updated, Proportion of New Growth by Land Development Category (LDC), 2012 - 2040

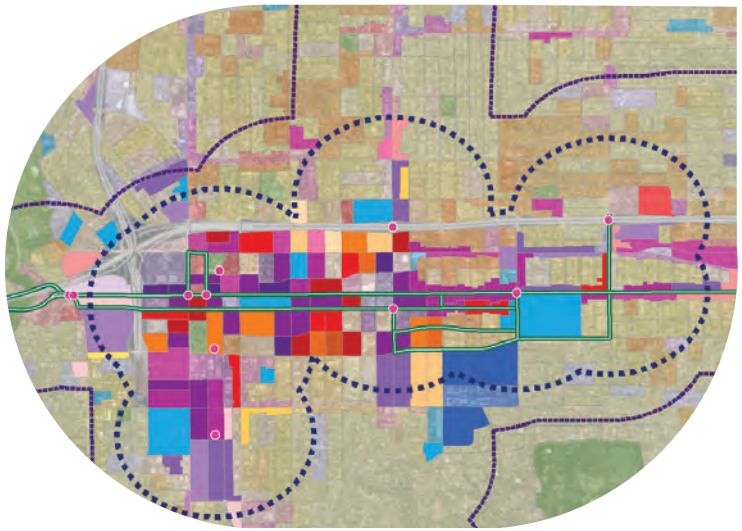


Source: SCAG

FIGURE 5 Example: Applying Change via Place Types to Increase Density and Walkability in Transit Priority Areas (TPAs)



Starting Condition



Place types applied in TPAs

Applied place type change blended with the starting condition to create a new end state.

Source: Calthorpe Analytics, 2015

SCENARIO 3 (POLICY A) SCENARIO RULES AND ALLOCATION METHODOLOGY

Scenario 3 (Policy A) closely resembles the development types distribution of the 2012 SCS, but has an increased focus on active transportation investments within one mile of major transit stops, and improved walkability proximate to transit corridors (as designated by TPAs and HQTAs). It has a notable increase in the growth of multifamily and attached single family (townhome) units across the region as compared to the 2012 RTP Updated scenario and a larger focus on compact walkable and urban land use types.

Scenario 3 (Policy A) Scenario Rules

The rules that governed the allocation and type of growth in Scenario 3 (Policy A) are described below.

- **Focus on HQTAs and TPAs:** The Scenario 3 (Policy A) scenario sees a modest increase in the proportion of growth allocated to HQTAs and TPAs, with 46 percent of households and 55 percent of jobs within an HQTA or TPA by 2040. This represents a 7 percent increase in the number of households and a 7 percent increase in jobs in an HQTA when compared to the 2012 Updated scenario.
- **Residential Distribution:** The distribution of households by type closely resembles the SCAG 2012 SCS distribution, with 66 percent of new growth in multifamily households and 34 percent as single family households. This is a significant increase in the relative proportion of multifamily households to single family households as compared with 2012 RTP Updated scenario which was more evenly split in household growth between single family and multifamily types.
- **Transit Network:** The Scenario 3 (Policy A) scenario uses the same updated 2012 RTP transit network and operational characteristics as used in the 2012 RTP Updated scenario.
- **Walkability, First and Last Mile-Focus, and Active Transportation Investment:** The Scenario 3 (Policy A) scenario sees significant active transportation investments above and beyond the 2012 RTP/SCS, and improvement in walkability within and around one mile of major transit stations. To represent this increase in investments and walkability, "walkable" Urban and Compact place types are focused in and around HQTAs and TPAs throughout the region; walkable place types are those that have a street intersection density greater than 150 intersections per square mile, which is generally correlated with an increase in walk, bike, transit and non-auto mode share.
- **County/Jurisdiction Control Totals.** For each county, the high level totals for population, households and employment were controlled at the jurisdictional level to ensure comparability across the scenarios. For residential units by type, each county was controlled to specific totals in order to ensure that changes in unit type were comparable both regionally and sub-regionally across the scenarios.

Scenario 3 (Policy A) Allocation Methodology

Scenario 3 (Policy A) was developed using the translated 2012 RTP Updated scenario as a starting point. Modifications were made using Python and PostgreSQL programming languages to implement the UrbanFootprint/SPM modeling framework. The following steps highlight the process that was executed by the scripted templates to quantitatively build out the Policy A rules framework.

- **Step 1: Allocate new residential growth in HQTA/TPAs.**

  The first pass was to roughly allocate new residential growth in the HQTA/TPA areas to match the portion of households within HQTAs by county. Using the county-level percent of households within HQTAs, factors were derived to increase household HQTA totals to match the county distribution. Of the new units added to HQTA areas through this process, only multifamily and attached single family types experienced growth (66 percent were multifamily and 34 percent attached single family); detached single family unit totals stayed constant within these areas.

- **Step 2: Control residential units to county controls.**

  Following the initial allocation of new residential units to HQTAs, households by type (single family, attached single family, and multifamily) were adjusted by factors so that sum of each household type matched the county control total. Any SPZ that showed losses in households when comparing 2040 to the 2012 base year were set to the 2012 base year household distribution.

- **Step 3: Allocate new employee growth in HQTA/TPAs.**

  This pass allocated the correct proportion of employees to HQTA/TPA areas to match county-level distribution of employees within HQTA/TPA zones. New employee growth in HQTAs took the form of Retail and Office employees; industrial employment did not occur within the HQTA/TPA zones.

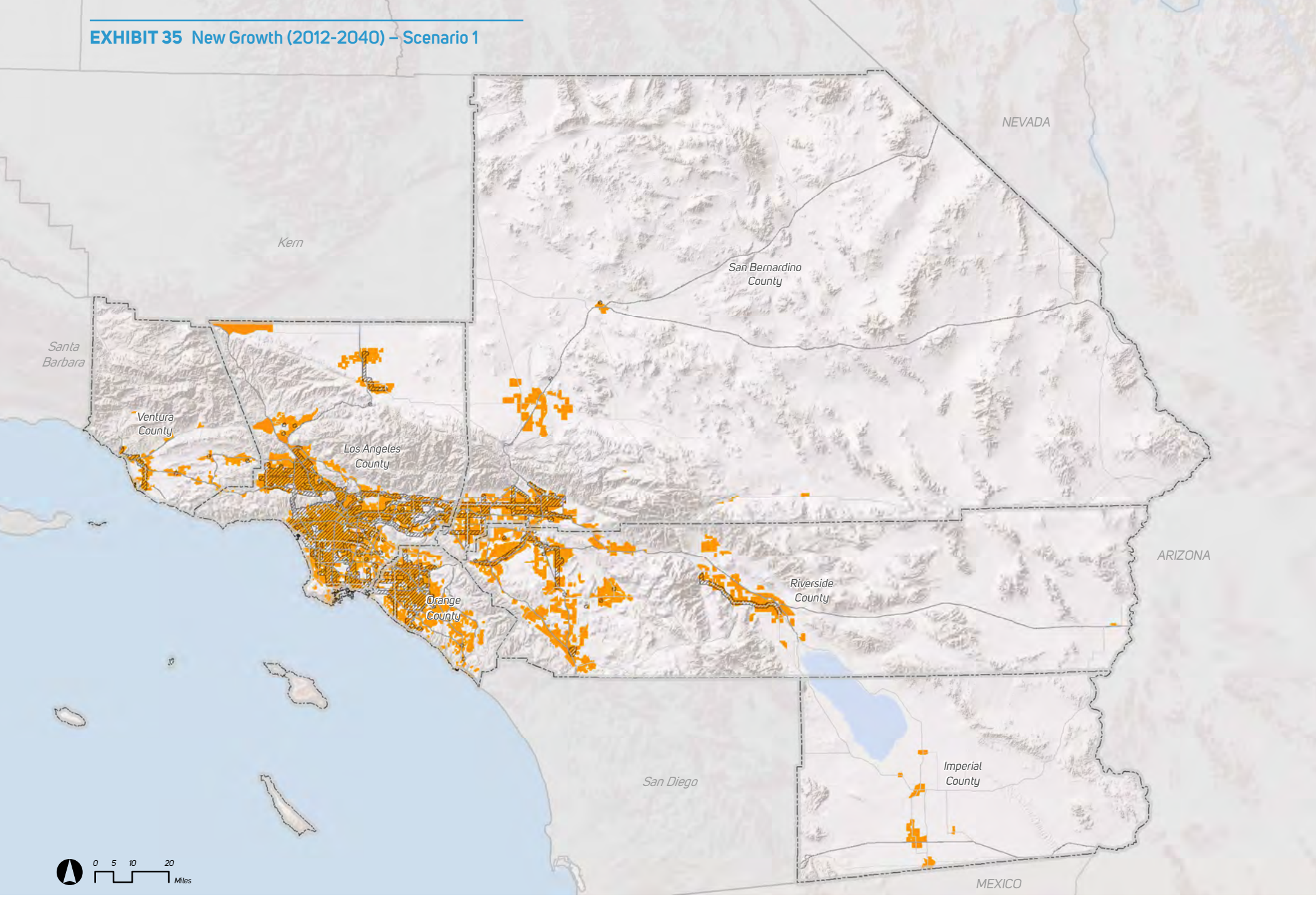
- **Step 4: Control employees to county controls.**

  Following the initial allocation of new employees to HQTA/TPAs, factors were derived to adjust the total number of employees to match county totals. Any SPZ that showed losses in the 2012 base year were set to the 2012 base year employment distribution.

- **Step 5: Assign 'Compact Walkable' and 'Urban' place types.**

  Having allocated the high-level distributions of households and employment, 'compact walkable' and 'urban' place types were assigned to increase density and walkability, as well as proxy first/last mile investment assumptions in and around HQTAs, TPAs and within one mile of major transit stops (as defined by SCAG).

EXHIBIT 35 New Growth (2012-2040) – Scenario 1



HQTA (2040)

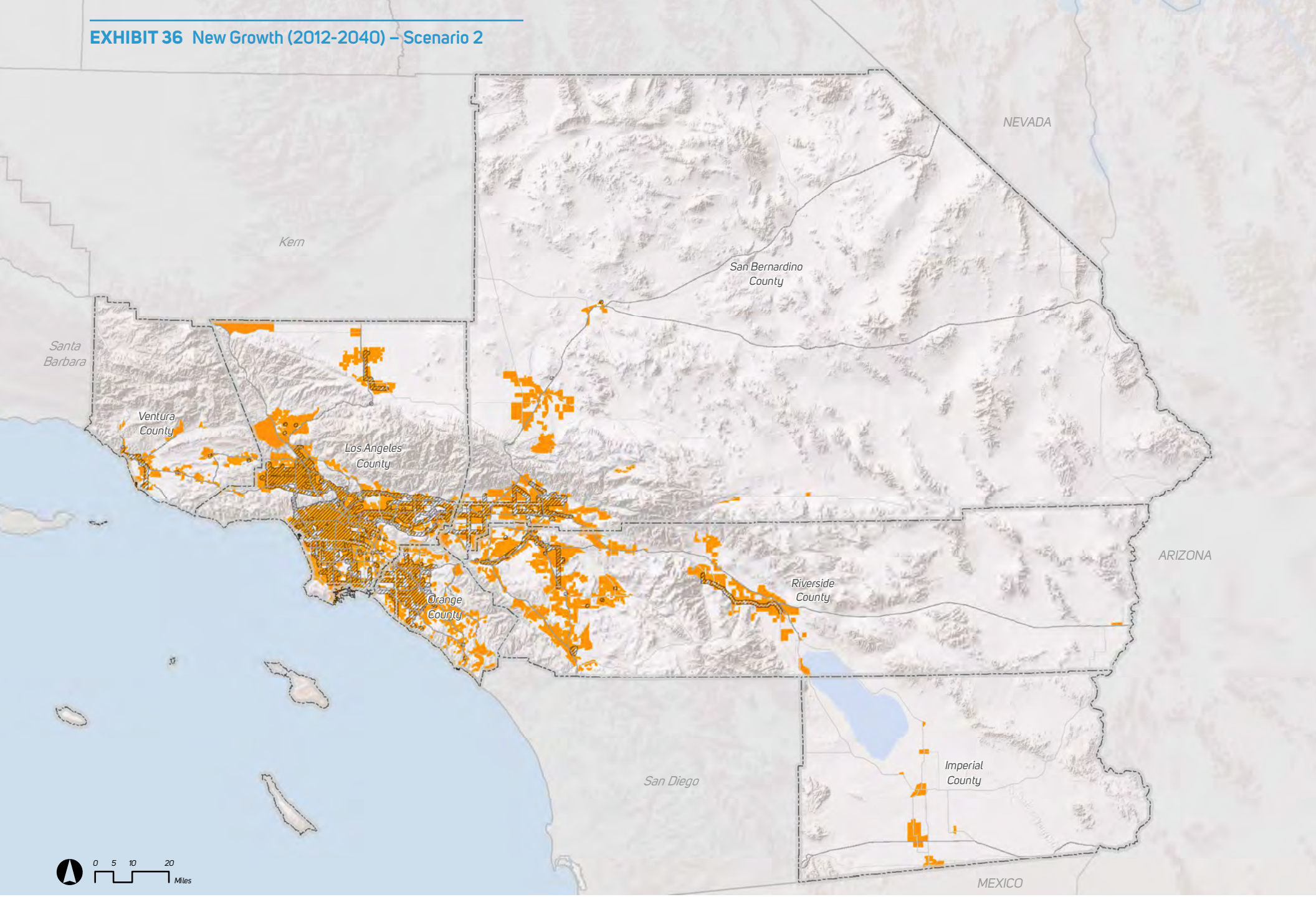
New Growth (2012-2040) – Scenario 1

New growth represents household and commercial growth

Note: The forecasted land use development patterns by LDCs shown are based on Transportation Analysis Zone (TAZ) level data utilized to conduct required modeling analyses. Data at the TAZ level or at a geography smaller than the jurisdictional level are advisory only and non-binding, because SCAG sub-jurisdictional forecasts are not to be adopted as part of the 2016 RTP/SCS. For purposes of qualifying for future funding opportunities and/ or other incentive programs, sub-jurisdictional data and/or maps used to determine consistency with the Sustainable Communities Strategy shall only be used at the discretion and with the approval of the local jurisdiction. However, this does not otherwise limit the use of the sub-jurisdictional data and/or maps by SCAG, CTCs, Councils of Governments, SCAG Subregions, Caltrans and other public agencies for transportation modeling and planning purposes. Any other use of the sub-jurisdictional data and/or maps not specified herein, shall require agreement from the Regional Council, respective policy committees and local jurisdictions.

Source: SCAG, 2015

EXHIBIT 36 New Growth (2012-2040) – Scenario 2



HQTA (2040)

New Growth (2012-2040) – Scenario 2

New growth represents household and commercial growth.

Note: The forecasted land use development patterns by LDCs shown are based on Transportation Analysis Zone (TAZ) level data utilized to conduct required modeling analyses. Data at the TAZ level or at a geography smaller than the jurisdictional level are advisory only and non-binding, because SCAG sub-jurisdictional forecasts are not to be adopted as part of the 2016 RTP/SCS. For purposes of qualifying for future funding opportunities and/ or other incentive programs, sub-jurisdictional data and/or maps used to determine consistency with the Sustainable Communities Strategy shall only be used at the discretion and with the approval of the local jurisdiction. However, this does not otherwise limit the use of the sub-jurisdictional data and/or maps by SCAG, CTCs, Councils of Governments, SCAG Subregions, Caltrans and other public agencies for transportation modeling and planning purposes. Any other use of the sub-jurisdictional data and/or maps not specified herein, shall require agreement from the Regional Council, respective policy committees and local jurisdictions.

Source: SCAG, 2015

- **Step 6: Control population, households, and employment to jurisdictional controls.**

  Using jurisdictional control totals of population, households and employment sourced from the 2012 RTP Updated scenario, factors were derived so that Scenario 3 (Policy A) population, households and employment matched jurisdictional control totals.

- **Step 7: Iterate jurisdictional controls and county households by type until balanced.**

  The application of factors to match jurisdictional totals in the previous step altered the county distribution of households by type. In this step, the model iterated over the scenario to balance the growth in households by type with the requirement that jurisdictions maintain household totals. Using iteration, factors were derived for each pass to match county level control totals for households by type, weighted so that when households by type were summed they matched jurisdictional and county totals for households. Once balanced, the county totals for households by type match those of the scenario and the household control total at the jurisdictional level also match those of the scenario.

- **Step 8: Re-translate place types to adjust classification for controlling process.**

  The controlling process slightly adjusted the SPZ-level totals of households and employment, which in turn can have an impact on the corresponding place type assignment. This next process re-translated the assigned place type at the SPZ scale so that there was no quantitative deviation from the qualitative classification of place.

- **Step 9: Calculate derivative fields.**

  Having produced a "clean" household and employment distribution, this final process followed the steps detailed in the scenario translation section for populating building square feet, acres by type, and irrigated area.

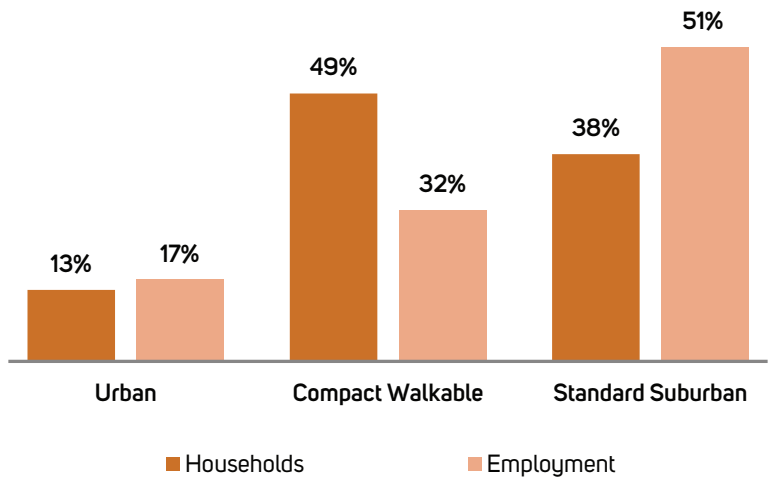
Scenario 3 (Policy A) Scenario Results

Scenario 3 (Policy A) sees a significant portion of residential and commercial growth in High Quality Transit Areas (HQTAs) and Transit Priority Areas (TPAs). A visual representation of new household and commercial growth can be seen in **EXHIBIT 37**: Policy A Scenario Growth with TPA/HQTA transit network below, while **FIGURE 6** and **FIGURE 7** provide the the residential unit type distribution of growth to 2040 and breakdown of growth by land development category (LDC).

SCENARIO 4 (POLICY B) RULES AND ALLOCATION METHODOLOGY

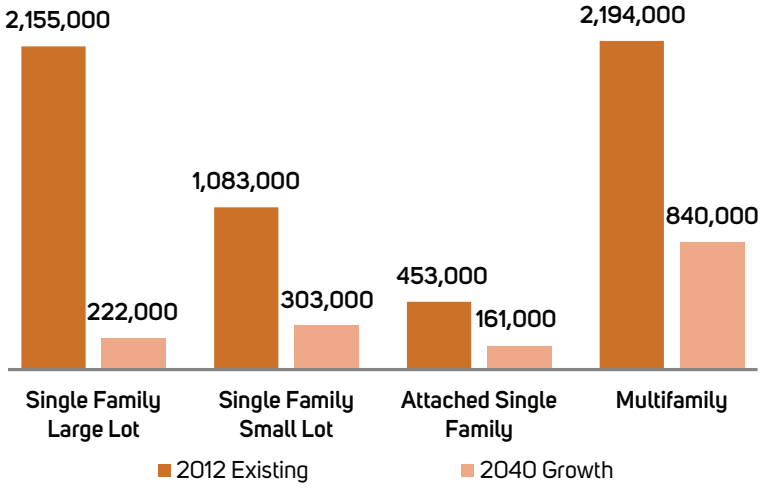
Scenario 4 (Policy B) used the Policy A scenario as a foundation, but expanded the transportation network with a greater focus on transit oriented development, incorporated climate resilience strategies, enhanced focus on active transportation investments within

FIGURE 6 Policy A, Proportion of New Growth by Land Development Category (LDC), 2012 - 2040



Source: SCAG

FIGURE 7 Policy A, Residential Growth by Unit Type, 2012 - 2040



Source: SCAG

one mile of major transit stops and improved walkability proximate to transit corridors (as designated by TPAs and HQTAs). The majority of new growth takes the form of 'Compact Walkable' and 'Urban' types, with only 28 percent of new residential growth taking the 'Standard Suburban' form.

SCENARIO 4 (POLICY B) RULES

The rules that governed the allocation and type of growth in Scenario 4 (Policy B) are described below.

- **Increased focus on TPAs.** Scenario 4 (Policy B) increases the number of households and jobs within TPAs beyond the levels in Policy A. This was accomplished by both increasing the number of major transit station areas and their associated TPAs and allocating additional growth in households and employment within the majority of TPAs across the region. By 2040, the Policy B scenario has 27 percent of households and 36 percent of jobs within TPAs.
- **Focus on HQTAs:** As with TPAs, scenario 4 (Policy B) sees a significant increase in the proportion of growth allocated to HQTAs, with 53 percent of households and 66 percent of jobs within an HQTA by 2040. With additional transit alignments, there are more HQTAs in the Policy B scenario and a larger portion of growth is allocated to HQTAs across the region.
- **Residential Distribution:** The distribution of household growth sees only a modest increase in the relative proportion of multifamily households to single family households as compared with Policy A. The Policy B scenario has 72 percent of new growth in multifamily households and 28 percent as single family households.
- **2012 RTP Transit Network and Strategic Plan Projects:** The Policy B scenario utilizes the updated 2012 RTP Transit network and operational characteristics but includes additional strategic plan projects.
- **Climate Resilience – Sea Level Rise and Critical Habitat:** No growth is allowed in SPZs that intersect with the year 2100 five-foot sea level rise zones (as defined by NOAA and CalAdapt) and that intersect with 'High Quality Habitat Areas' (level 5) as defined by the Combined Habitat Assessment Protocol (CHAP) dataset.
- **Walkability, First and Last Mile-Focus, and Active Transportation Investment:** As in the Policy A scenario, the Policy B scenario sees significant active transportation investments above and beyond the 2012 RTP/SCS, and improvement in walkability within and around one mile of major transit stations. To represent this increase in investments and walkability, "walkable" Urban and Compact place types are focused in and around HQTAs and TPAs throughout the region; walkable place types are those that have a street intersection density greater than 150 intersections per square mile, which is generally correlated with increase walk, bike, transit, and non-auto mode share.
- **County/Jurisdiction Control Totals.** For each county, the high level totals for population, households, and employment were controlled at the jurisdictional scale to ensure comparability across the scenarios. For residential units by type, each county was controlled to specific control totals in order to ensure that changes in unit type were comparable both regionally and subregionally across the scenarios.

Scenario 4 (Policy B) Allocation Methodology

Scenario 4 (Policy B) used the Policy A scenario as a starting point which was then modified using Python and PostgreSQL programming languages to implement the UrbanFootprint/SPM modeling framework. The following steps highlight the process that was executed to quantitatively build out the Policy B rules framework.

- **Step 1: Allocate new residential and employment growth in TPAs.**

  The first pass in the script was to roughly allocate new residential and employment growth in the TPAs. New multifamily households were increased 20 percent within TPAs and new retail and office employees increased by 25 percent, as compared to the Policy A scenario. New units were allocated at 80 percent multifamily and 20 percent attached single family and new employment growth was allocated as retail and office employees.

- **Step 2: Allocate new residential growth in HQTAs.**

  The second pass was to roughly allocate new residential growth in the HQTA/TPA areas to match the Policy B portion of households within HQTAs by county. Using the county-level percent of households within HQTAs, factors were derived to increase household HQTA totals to match the county distribution. Of the new units added to HQTA areas through this process, only multifamily and attached single family types experienced growth (72 percent were multifamily and 28 percent attached single family), single family unit totals stayed constant within these areas.

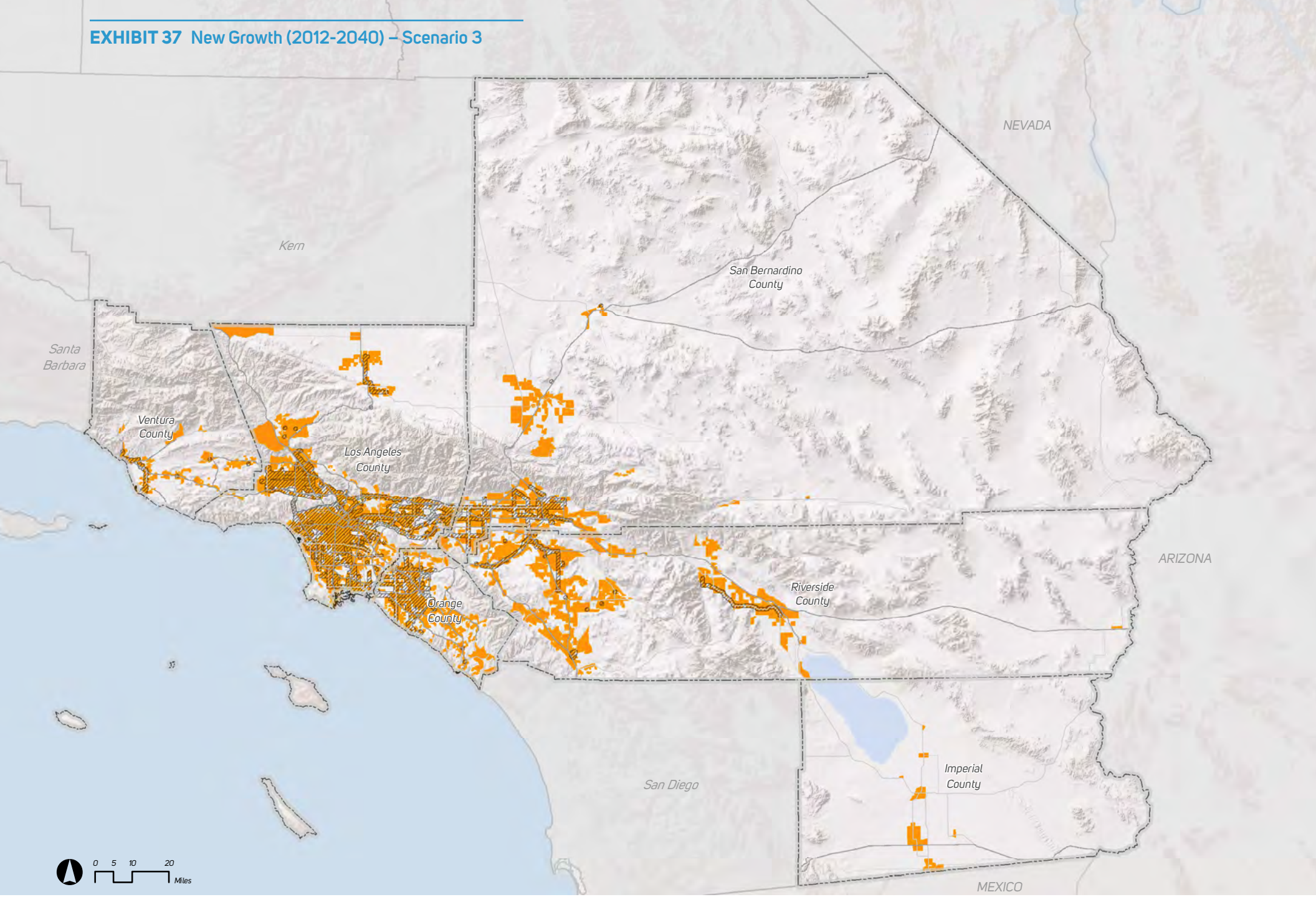
- **Step 3: Control residential units to county controls.**

  Following the initial allocation of new residential units to HQTAs and TPAs, households by type (single family, attached single family, and multifamily) were controlled to county control totals. With the controlling, any SPZ that showed losses to the 2012 base year were set to the 2012 base year household distribution.

- **Step 4: Allocate new employee growth in HQTAs.**

  This pass allocated the correct proportion of employees to HQTA/TPA areas to match county level distributions. New employee growth in HQTAs took the form of retail and office employees; industrial employment was not allocated within the HQTA/TPA zones.

EXHIBIT 37 New Growth (2012-2040) – Scenario 3



HQTA (2040)

New Growth (2012-2040) – Scenario 3

New growth represents household and commercial growth.

Note: The forecasted land use development patterns by LDCs shown are based on Transportation Analysis Zone (TAZ) level data utilized to conduct required modeling analyses. Data at the TAZ level or at a geography smaller than the jurisdictional level are advisory only and non-binding, because SCAG sub-jurisdictional forecasts are not to be adopted as part of the 2016 RTP/SCS. For purposes of qualifying for future funding opportunities and/ or other incentive programs, sub-jurisdictional data and/or maps used to determine consistency with the Sustainable Communities Strategy shall only be used at the discretion and with the approval of the local jurisdiction. However, this does not otherwise limit the use of the sub-jurisdictional data and/or maps by SCAG, CTCs, Councils of Governments, SCAG Subregions, Caltrans and other public agencies for transportation modeling and planning purposes. Any other use of the sub-jurisdictional data and/or maps not specified herein, shall require agreement from the Regional Council, respective policy committees and local jurisdictions.

Source: SCAG, 2015

- **Step 5: Control employees to county controls.**

  Following the initial allocation of new employees to HQTAs, the total number of employees was controlled to county control totals. With the controlling, any SPZ that showed losses to the 2012 base year were set to the 2012 base year employment distribution.

- **Step 6: Assign 'Compact Walkable' and 'Urban' place types.**

  Having allocated the high-level distributions of households and employment, 'compact walkable' and 'urban' place types were assigned to increase density and walkability, as well as proxy first/last mile investment assumptions in and around HQTAs, TPAs and within one mile of major transit stops (as defined by SCAG).

- **Step 7: Remove growth from sea rise and high quality habitat areas.**

  This step removed any of the growth that had been allocated to SPZs designated as sea rise zones or high quality habitat areas in Policy A. Households and employment were held constant to the 2012 base year in those SPZs.

- **Step 8: Control population, households, and employment to jurisdictional controls.**

  Using jurisdictional control totals of population, households, and employment sourced from the 2012 RTP Updated scenario, factors were derived so that Policy B population, households and employment matched jurisdictional control totals.

- **Step 9: Iterate jurisdictional controls and county households by type until balanced.**

  The application of factors to match jurisdictional totals in the previous step altered the county distribution of households by type. In this step, the model iterated over the scenario to balance the growth in households by type with the requirement that jurisdictions maintain household totals. Using iteration, factors were derived for each pass to match county level control totals for households by type, weighted so that when households by type were summed they matched jurisdictional and county totals for households. Once balanced, the county totals for households by type match those of the scenario and the household control total at the jurisdictional level also match those of the scenario.

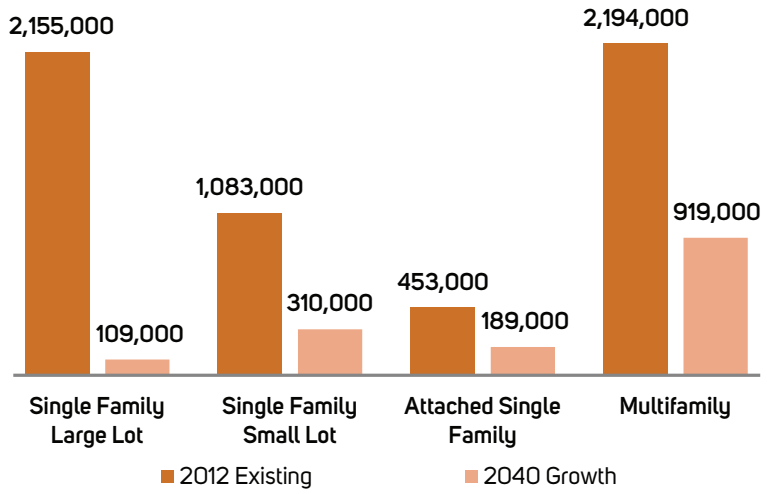
- **Step 10: Re-translate place types to adjust classification for controlling process.**

  The controlling process slightly adjusted the SPZ level totals of households and employment which has an impact on the corresponding place type assignment. This next process re-translated the assigned place type at the SPZ scale so that there was no quantitative deviation from the qualitative classification of place.

- **Step 11: Calculate derivative fields.**

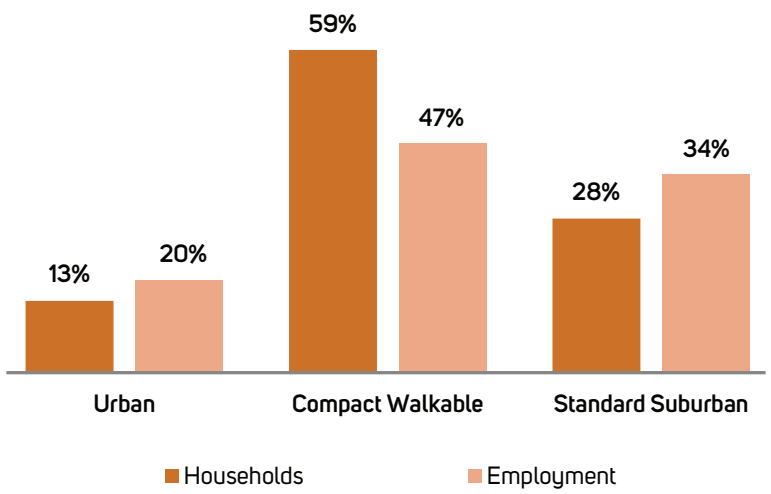
  Having produced a "clean" household and employment distribution, this step follows the steps detailed in the scenario translation section for populating building square feet, acres by type, and irrigated area.

FIGURE 8 Policy B, Residential Growth by Unit Type, 2012-2040



Source: SCAG

FIGURE 9 Policy B, Proportion of New Growth by Land Development Category (LDC), 2012 - 2040



Source: SCAG

Scenario 4 (Policy B) Results

Scenario 4 (Policy B) includes an expanded transit network and increased growth in and around HQTAs and TPAs. A visual representation of new household and commercial growth can be seen in **EXHIBIT 38**: Policy B Scenario Growth with TPA/HQTA transit network while **FIGURE 8** and **FIGURE 9** provide the residential unit type distribution of growth to 2040 and breakdown of growth by land development category (LDC).

These four scenarios were developed in early 2015 by SCAG and their consultant and shared with the CEHD Committee and SCAG's Technical Working Group (TWG). Using local population, household, and employment growth projections, these scenarios explored a range of potential regional development patterns using myriad land use and transportation inputs. In an effort to facilitate understanding of the impacts for policymakers and for the general public, a variety of scenario impacts were considered including land, energy, and water consumption; air quality; and household costs. Based on policy direction, as well as an extensive analysis of these scenarios using SCAG's Regional Travel Demand Model (RTDM) and Scenario Planning Model (SPM), and considering the substantial feedback received during the public input process, the Plan (Preferred Scenario) was developed utilizing elements of all scenarios that demonstrates progress over the 2012 RTP/SCS.

PREFERRED DRAFT ALTERNATIVE OUTCOMES

As mentioned in Chapter 8 of the Plan, the RTP/SCS's more focused land pattern, increased investments in transit, and support for communities that foster walk and bike modes as serious transportation options leads to additional benefits in fiscal, economic, environmental, and other quality-of-life performance measures. These results compare the RTP/SCS with a future trend-based scenario that more closely follows the development trends of the past decades. Unlike the RTP/SCS, this trend-based future scenario relies more heavily on growth in undeveloped lands at the edges of cities and beyond and focuses more new housing toward single-family products in suburban patterns. Different from the modeling process used for the mobility-based performance measures, these performance results were derived using the single framework model described above.

BETTER PLACEMAKING

The challenges of traffic congestion and long commutes make the value of including options for better places to live and work even more important. In 2040, the RTP/SCS envisions 46 percent of housing and 55 percent of jobs in areas served by high quality transit. This does not account for housing and jobs in other opportunity areas in existing main streets, downtowns and along corridors where infrastructure already exists. This more compact development type pattern, combined with the identified transportation network improvements and strategies, results in improved pedestrian and bicycle access to community amenities, lowers average trip length and reduces vehicle miles traveled. These outcomes not only reduce greenhouse gas emissions, but also support the development of more livable communities that provide more housing choices, conserve natural resources, offer transportation options, and promote a better quality of life.

LOWER COST TO TAXPAYERS AND FAMILIES

LOCAL INFRASTRUCTURE CAPITAL AND OPERATIONS AND MAINTENANCE COSTS

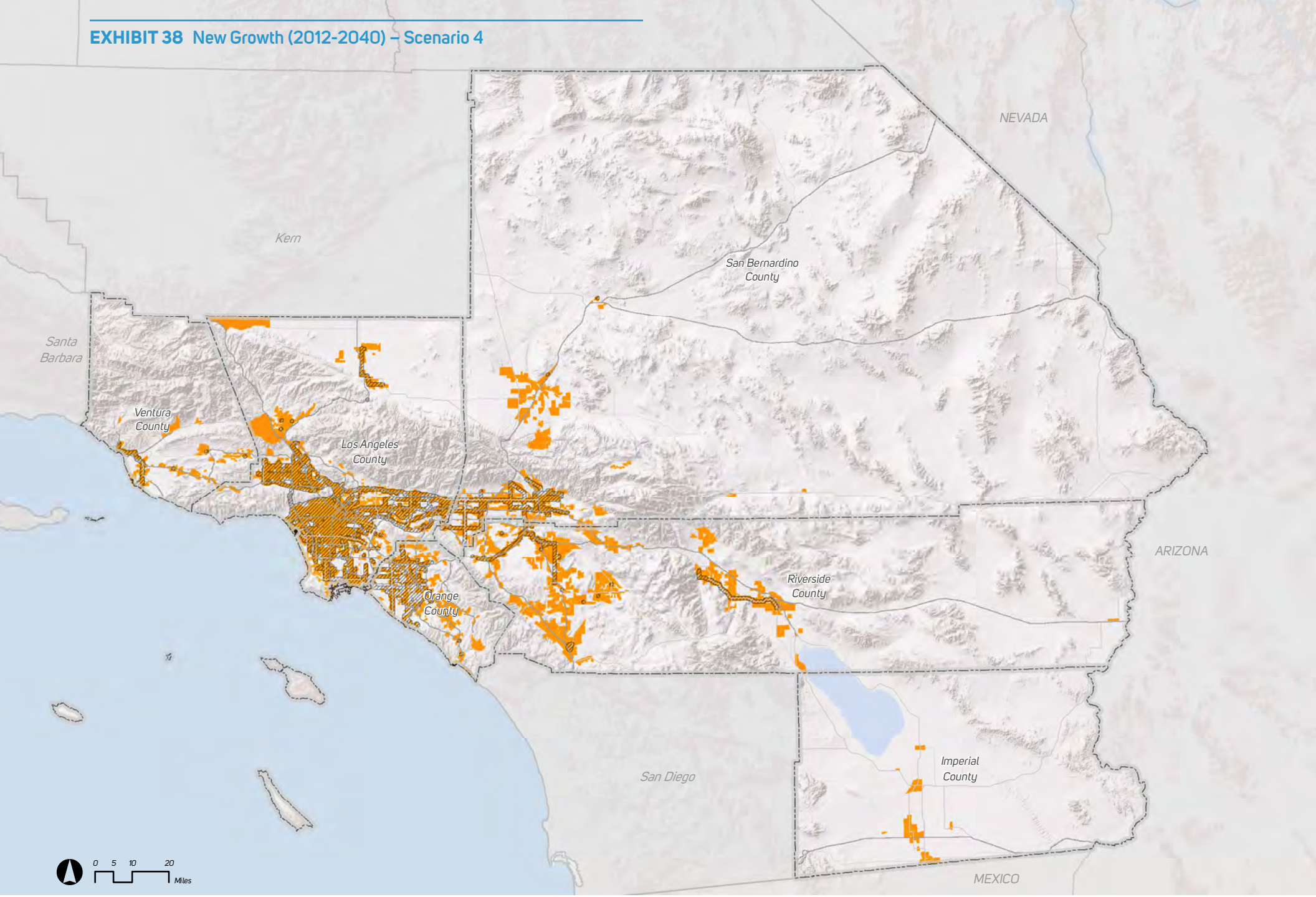
Increased land consumption can lead to higher costs for local and subregional infrastructure, as new development in greenfield lands (areas, including agricultural lands, not previously developed) requires significant capital investments to extend or build new local roads, water and sewer systems, and parks. Conversely, growth focused in urban areas often takes advantage of existing infrastructure and more efficient service to higher concentrations of jobs and housing. This cost difference increases when operations and maintenance (O&M) costs are taken into account. O&M costs include the ongoing jurisdiction expenditures required to operate and maintain the infrastructure serving new residential growth. More dispersed development, which requires greater lengths of roads and sewer pipes, incurs higher O&M costs to local jurisdictions than more compact development, which capitalizes on shared infrastructure capacity.

The 2016 RTP/SCS shows that growth in urban and mixed-use developments in already developed areas can reduce costs significantly, as demonstrated by adding up capital infrastructure and ongoing O&M costs to 2040. If the development trend of the past decades continues, new growth would require $40.6 billion in capital infrastructure and O&M costs. By contrast, local jurisdictions following the development type pattern included in the RTP/SCS leads to $37.3 billion in costs, representing a savings of $3.3 billion.

HOUSEHOLD COSTS

If the development type patterns of the past decades persist, average household costs associated with driving and residential energy and water use will be up to $16,000 annually in 2040. By comparison, the RTP/SCS would cost each household $14,000 annually. Over time, the differences in annual expenditures would amount to a significant sum for each household, which increases further if the effect of local infrastructure cost burdens, which are typically passed on to homeowners and renters in the form of taxes, fees, home prices and assessments is considered.

EXHIBIT 38 New Growth (2012-2040) – Scenario 4



HQTA (2040)

New Growth (2012-2040) – Scenario 4

New growth represents household and commercial growth.

Note: The forecasted land use development patterns by LDCs shown are based on Transportation Analysis Zone (TAZ) level data utilized to conduct required modeling analyses. Data at the TAZ level or at a geography smaller than the jurisdictional level are advisory only and non-binding, because SCAG sub-jurisdictional forecasts are not to be adopted as part of the 2016 RTP/SCS. For purposes of qualifying for future funding opportunities and/ or other incentive programs, sub-jurisdictional data and/or maps used to determine consistency with the Sustainable Communities Strategy shall only be used at the discretion and with the approval of the local jurisdiction. However, this does not otherwise limit the use of the sub-jurisdictional data and/or maps by SCAG, CTCs, Councils of Governments, SCAG Subregions, Caltrans and other public agencies for transportation modeling and planning purposes. Any other use of the sub-jurisdictional data and/or maps not specified herein, shall require agreement from the Regional Council, respective policy committees and local jurisdictions.

Source: SCAG, 2015

BENEFITS TO PUBLIC HEALTH AND THE ENVIRONMENT

LAND CONSUMPTION

Land consumption measures the amount of land that has changed from rural to more intensive development patterns to accommodate new growth. This land, also known as greenfield, refers to development that occurs on land that has not previously been developed for, or otherwise impacted by, urban uses, including agricultural lands, forests, deserts and other undeveloped sites. A development type pattern with a greater share of urban infill and compact development consumes less greenfield (undeveloped) land overall. By contrast, a pattern that places a greater share of new growth in dispersed standard development patterns consumes more greenfield land. The development trend of the past decades would consume about 154 square miles of land, about 23 percent more square miles more than the RTP/SCS, which consumes approximately 118 square miles, to accommodate growth through 2040.

BUILDING ENERGY USE AND COSTS

Building energy use is determined by the mix of housing and commercial types and the proportion of development in temperate climate zones within the SCAG region. A development type pattern that contains more mixed-use/walkable and urban infill development accommodates a higher proportion of growth in more energy-efficient housing types like townhomes, apartments, and smaller single-family homes, as well as more compact commercial building types. By contrast, standard suburban development leads to a higher proportion of larger single-family homes, which are typically less energy efficient. Location also comes into play—buildings in the warmer areas of the region use more energy each year, in part because they require more energy to cool during the summer months.

Differences in development type patterns lead to substantial differences in the amount of electricity and natural gas used. These differences will vary depending on policies regulating how efficient buildings become. Assuming the same efficiency standards, the RTP/SCS saves the average household in the SCAG region ten percent (10 percent) on electric and gas bills compared with a development type pattern that more closely aligns with the past development trend. This reduction in building energy use as a result from developing more compact walkable areas translates to meaningful savings in building energy costs. On average, the RTP/SCS saves households $2 billion in annual electricity and gas costs.

BUILDING WATER USE AND COSTS

Variations in development type patterns and their related building profiles also lead to substantial differences in building water use and cost. Building water use is a function of both indoor and outdoor water needs, with outdoor use (landscape irrigation) accounting for the majority of the difference among housing types. As it pertains to residential, homes with larger yards require more water for landscape irrigation, lot size is generally interrelated with a household's overall water consumption. Therefore, a development type pattern with a greater proportion of standard suburban development, which includes more large-lot single-family homes, requires more water than a development type pattern with a greater proportion of compact and urban infill development, which includes more attached and multifamily homes. And, as is the case for energy use, the location of new development has a significant bearing on water use—homes in warmer areas use more water to maintain lawns and other landscaping.

Water use will vary based on efficiency and conservation policies, which will be increasingly important as California faces future constraints to water supply. Assuming the same modest improvements, the RTP/SCS uses approximately 862,000 acre feet less water (133.2 million acre feet) when compared with past development trends (134 million acre feet). This would also result in a reduction of water-related electricity use and carbon emissions of one percent (one percent). Saving water also saves on costs, and the RTP/SCS saves about $1.2 billion over the span of the plan, and saves households in the SCAG region $93 million on annual water bills.

PUBLIC HEALTH ASSESSMENT

New to the 2016 RTP/SCS is the development of the California Public Health Assessment Model (C-PHAM) and its integration into the UrbanFootprint (UF)/Scenario Planning Model (SPM). As noted in the Public Health section and Appendix, Public Health has increasingly become an area of emphasis for Metropolitan Planning Organizations (MPOs) and Departments of Transportation (DOTs) across the country. During the 2012 RTP/SCS development process, SCAG received numerous comments from public health stakeholders and direction from the Regional Council to address public health more broadly in its planning process. Since the adoption of the 2012 RTP/SCS, SCAG has taken steps to integrate public health into its planning processes. One of the steps, in conjunction with the California Strategic Growth Council, Resources Legacy Fund and Sacramento Area Council of Governments, is the development of the C-PHAM.

The C-PHAM advances the ability to directly assess and predict how built environment (transportation and land use) strategies will impact public health in California. It draws upon built environment, travel and health outcome data, and integrates it into an innovative new scenario-planning platform with access to powerful cloud computing capabilities. The result is an enhanced ability to both understand and apply evidence on the connection between built environment factors, physical activity, and related public health outcomes. More information on the C-PHAM and its methods, data and application can be found in the Reference Documents section.

For more information on this analysis, please refer to the Public Health Appendix.

GREATER RESPONSIVENESS TO DEMOGRAPHICS AND THE CHANGING HOUSING MARKET

There is little question that the demographic profile of Southern California is changing, resulting in different housing and transportation needs. The traditional suburban development pattern that characterizes most of the region is still appropriate for many residents and homeowners, but the increasing demand for small-lot and multifamily housing, walkable and bikeable environments and shorter commutes calls for more varied housing options located in more compact developments.

The RTP/SCS responds to this emerging need through an overall development type pattern that focuses new housing growth in urban centers served by various transportation options, including high-quality transit and active transportation. About 70 percent of this new housing will be multifamily units.

While a majority of the new housing will be multi-family units as part of the RTP/SCS, the percentage of multifamily and single-family will not change drastically when compared with the existing housing stock. The housing stock split between single-family and multifamily is currently 55 percent single-family and 45 percent multi-family in the SCAG region. At the end state of the RTP/SCS (Year 2040), the housing stock split is projected to be 50 percent single-family and 50 percent multi-family. This small change in housing stock split is due to the majority of the existing homes in the SCAG region being single-family.

SB 375 AND GREENHOUSE GAS EMISSION TARGETS SET BY THE STATE

As previously noted, SB 375 requires SCAG to develop a Sustainable Communities Strategy to reduce per capita greenhouse gas emissions through integrated transportation, land use, housing, and environmental planning. Pursuant to SB 375, ARB set per capita greenhouse gas emission reduction targets from passenger vehicles for each of the state's 18 MPOs. For the SCAG region, the targets are set at eight percent below 2005 per capita emissions levels by 2020 and 13 percent below 2005 per capita emissions levels by 2035. Though ARB has not adjusted SCAG's regional targets since the 2012 RTP/SCS, SCAG anticipates the region's targets may change, considering Governor Brown's recent Executive Order (B-30-15) that establishes a California greenhouse gas reduction target of 40 percent below 1990 levels by 2030. Because the transportation sector is the largest contributor to California's greenhouse gas emissions (more than 36 percent), SCAG anticipates updated and more stringent regional greenhouse gas emissions goals are forthcoming. The 2016 RTP/SCS achieves per capita greenhouse gas emissions reductions relative to 2005 of eight percent (8 percent) in 2020, and 18 percent in 2035.

CEQA EXEMPTION CRITERIA

SB 375 amends CEQA to add Chapter 4.2 Implementation of the Sustainable Communities Strategy, which allows for CEQA exemption for certain projects, as well as reduced CEQA analysis. Lead agencies (including local jurisdictions) maintain the discretion and will be solely responsible for determining consistency of any future project with the 2016 RTP/SCS. Cities and counties maintain their existing authority over local planning and land use decisions, including discretion in certifying the environmental review for a project, regardless of eligibility for streamlining. SCAG staff may provide a lead agency at the time of its request readily available data and documentation to help support its finding upon request. In addition to a project's consistency with the 2016 RTP/SCS, below are additional criteria for CEQA streamlining eligibility.

TYPES OF CEQA STREAMLINING

CEQA EXEMPTION

A full CEQA exemption is proposed to provide for a special class of Transit Priority Project (TPP) determined to be a Sustainable Communities Project (SCP) (California Public Resources Code 21155.1 (a)). As a threshold matter, to qualify as a TPP, a project must be consistent with the general use designation, density, building intensity and applicable policies in an approved SCS or APS. The TPP must also:

- Be at least 50 percent residential use based on area;
- Be at least 20 units/acre; and
- Be within ½ mile of a major transit stop or high-quality transit corridor included in the RTP/SCS (a high-quality transit corridor is defined as one with 15-minute frequencies during peak commute hours)

Consequently, a Sustainable Communities Project (SCP) is a TPP that is consistent with the SCS or APS and meets additional criteria including numerous land use and environmental standards, such as being 15 percent more efficient than Title 24 standards and using 25 percent less water than the regional average household. In addition, the site cannot be more than eight acres or contain more than 200 units. The proposed project must be located within one half mile of rail transit station or ferry terminal included in RTP/SCS or a quarter mile from a high quality transit corridor. Lastly, the project must meet additional requirements for the provision of affordable housing and open space. After a public hearing where a legislative body finds that a TPP meets all the requirements, a project can be declared to be an SCP and be exempted from CEQA.

Sustainable Communities Environmental Assessment (SCEA)/Limited EIR CEQA relief is provided for TPPs that incorporate all feasible mitigation measures, performance standards,

or criteria set forth in the prior applicable environmental impact reports and adopted in findings as described in (California Public Resources Code 21155.2 (a), (b) and (c)). This type of streamlining applies to initial studies that meet the following criteria:

- Avoids or mitigates impacts to a level of less than significant;
- Incorporates all feasible mitigation measures, performance standards, or criteria set forth in applicable EIRs; and
- Identifies all significant/potentially significant impacts and identifies adequately addressed cumulative effects in prior applicable certified EIRs

An SCEA is not required to reference, describe or discuss growth-inducing impacts; project-specific impacts; and cumulative impacts from cars and light duty truck trips generated by the project. If a lead agency determines that a cumulative effect has been adequately addressed and mitigated, that cumulative effect shall not be treated as cumulatively considerable, and the SCEA will be reviewed under the substantial evidence standard. The lead agency is required to circulate the document for a 30-day comment period, consider all comments received, conduct a public hearing, and make findings that the project has fully mitigated impacts.

If a TPP requires an EIR, certain CEQA relief also applies for projects that incorporate all feasible mitigation measures, identify all significant and potentially significant impacts, and identify adequately addressed cumulative effects in prior applicable certified EIRs. The streamlined EIR is not required to analyze off-site alternatives to the TPP or discuss a reduced residential density alternative to address the effects of car and light duty truck trips generated by the project. Furthermore, the EIR is not required to include an analysis of growth inducing impacts or any project specific or cumulative impacts from cars and light duty truck trips generated by the project on global warming or the regional transportation network. The initial study must identify any cumulative effects that have been adequately addressed and mitigated in prior applicable certified EIRs and these cumulative effects are not to be treated as cumulatively considerable in the EIR. As with the SCEA, the Streamlined EIR will be reviewed under the substantial evidence standard. The certification process is consistent with CEQA Guidelines Section 15090.

LIMITED ANALYSIS FOR RESIDENTIAL/MIXED-USE PROJECTS

SB 375 also provides for general CEQA streamlining for residential and mixed-use residential projects as well as TPPs pursuant to Section 21159.28 of the Public Resources Code. It should also be noted that CEQA streamlining opportunities will be available once SB 743 guidelines are adopted. Projects that meet the following requirements can be eligible for streamlined CEQA review:

- A residential or mixed-use residential project (or a TPP) consistent with the designation, density, building intensity, and applicable policies specified for the project area in an accepted SCS or APS (a residential or mixed-use residential project is defined as one where at least 75 percent of the total building square footage consists of residential use or a project that is a transit priority project)
- A residential or mixed-use project that incorporates the mitigation measures required by an applicable prior environmental document.

If a project meets these requirements, any exemptions, negative declarations, mitigated negative declarations, SCEA, EIR or addenda prepared for the projects shall not be required to reference, describe or discuss:

- Any project specific or cumulative impacts from cars and light duty truck trips generated by the project on global warming or the regional transportation network;
- Growth inducing impact; nor
- A reduced density alternative (EIRs only)

TRAFFIC MITIGATION MEASURES

Pursuant to California Public Resources Code 21155.3, a legislative body or a local jurisdiction may adopt traffic mitigation measures that would only apply to TPPs which may include requirements for the installation of traffic control improvements, street or road improvements, and contributions to road improvement or transit funds, transit passes for future residents or other measures that will avoid or mitigate traffic impacts of TPPs. A TPP does not need to comply with any additional mitigation measures for the traffic impacts of that project on streets, highways, intersections or mass transit if the local jurisdiction has adopted these traffic mitigation measures. The traffic mitigation measures must be updated at least every five years.

SUSTAINABILITY PROGRAM

SUSTAINABILITY PLANNING GRANTS PROGRAM

SCAG offers direct funding of innovative planning initiatives for member agencies through the Sustainability Planning Grants Program. SCAG manages all of the funding and administrative duties, enabling the municipalities and retained consultants to focus on crafting forward-thinking planning efforts.

Since 2005, the program has grown rapidly, from nine projects in the first year to 70 projects funded from the 2013 call for applications. In addition to local municipalities, SCAG has worked in collaboration with county planning departments, County Transportation Commissions, as well as sub-regional Councils of Governments. SCAG has funded more than 200 Projects with $22 million dollars. **EXHIBIT 39** is a map of all the Sustainability

Planning Grant projects begun as of the adoption of the 2016 RTP/SCS. Table 8 shows all Sustainability Planning Grant Demonstration Projectssince 2005 to date.

SUSTAINABILITY AWARDS

Since 2007, SCAG has honored projects that best exemplify the core planning principles of mobility, livability, prosperity and sustainability with awards at the Annual Regional Conference & General Assembly. The SCAG Sustainability Awards recognize exemplary planning projects that support SCAG's core principles of mobility, livability, prosperity and sustainability. Each year, cities and public agencies are honored in one of four categories for their projects: Active Transportation, Green Region, Integrated Planning and the President's award for overall excellence.

TOOLBOX TUESDAYS

Toolbox Tuesdays training sessions are free educational opportunities for planning professionals from our member cities and agencies. The program was started in mid-2007 as a response to a pressing need for free accessible training in innovative, regionally responsive planning techniques. Popular presentation sessions cover a wide range of topics including corridor planning, parking policy reform, cutting-edge visualization tools and active transportation planning. Starting in Fall of 2010, SCAG began using video-conferencing technology to simulcast the sessions at SCAG regional offices in all six SCAG counties.

METHODOLOGY FOR CALCULATING SB 375 CO2 EMISSIONS PER CAPITA FOR 2016 RTP/SCS

SCAG'S TECHNICAL METHODOLOGY FOR ESTIMATING GREENHOUSE GAS EMISSIONS FOR THE 2016-2040 RTP/SCS

INTRODUCTION

Prior to a Metropolitan Planning Organization (MPO) formally taking credit for implementing the public participation plan required by SB 375, the MPO must submit to the California Air Resources Board (ARB) a description of the technical methodology it intends to use to estimate the greenhouse gas emissions from its Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS) and, if necessary, its Alternative Planning Strategy (APS). SB 375 encourages the MPO to work with the ARB until the ARB Board concludes that the technical methodology operates accurately. [Government Code Section 65080(b)(2)(I)(i)]

For the purposes of SB 375 GHG analyses, the SCAG region greenhouse gas emissions reduction targets for the 2016 RTP/SCS remain the same as those adopted by ARB for the last round of RTP/SCS—the 8 percent in 2020 and 13 percent in 2035 per capita greenhouse gas emissions reduction compared with the level in 2005.

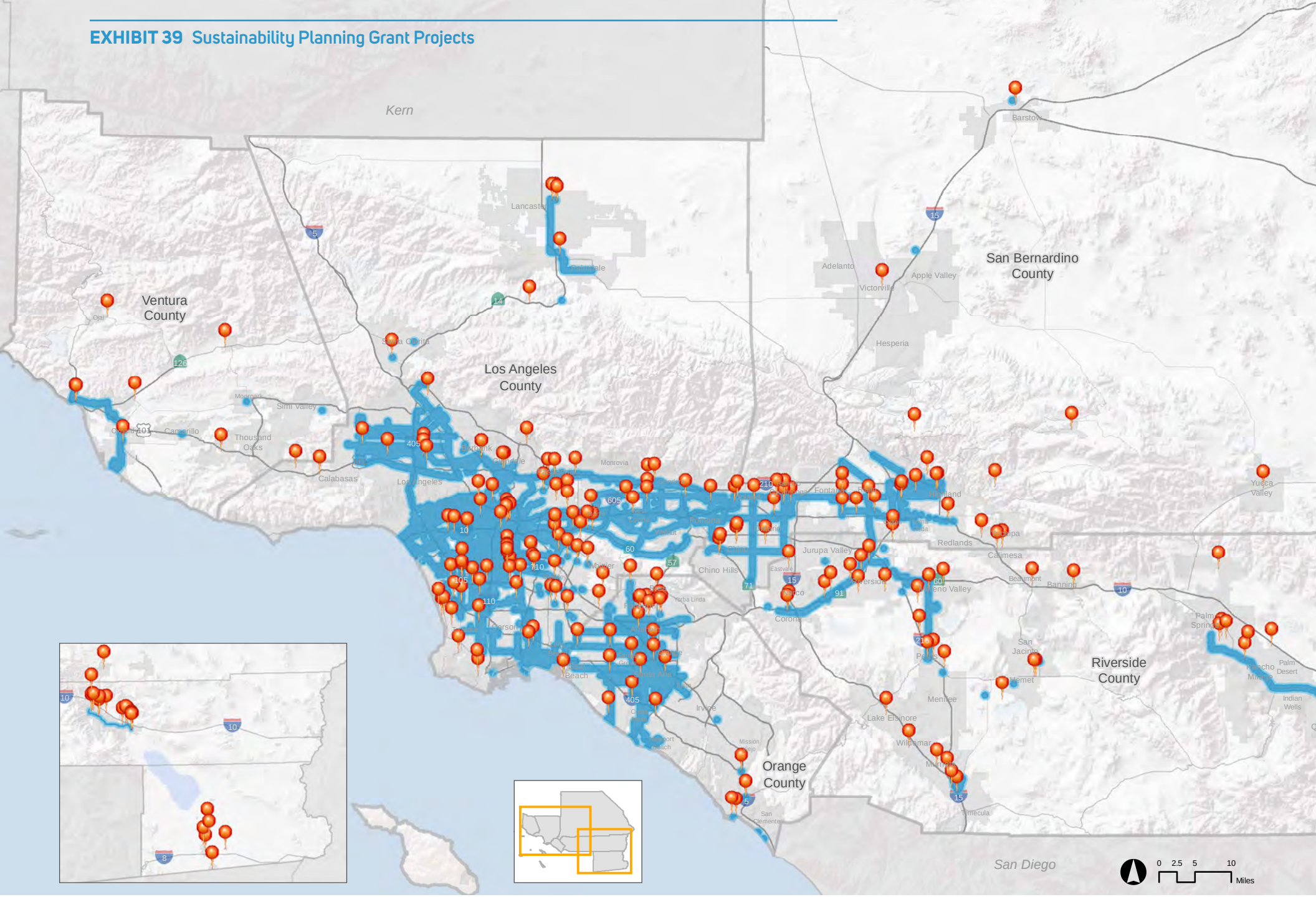
The following describes the technical methodology for SCAG's upcoming 2016 RTP/SCS, relating to the requirements of SB 375. SCAG's comprehensive technical methodology exists in tandem with the outreach, planning, forecasting, and the iterative scenario development process described below.

SCAG's comprehensive technical methodology for SB 375 implementation consists of the following elements:

- Developing the 2016 RTP/SCS
- Technical Methodology
- Data Development for the SCS
- Sustainable Community Strategies
- Models and Tools

A description of these elements is provided in the following sections.

EXHIBIT 39 Sustainability Planning Grant Projects



Sustainability Projects

High Quality Transit Areas (2040 Plan)

Source: SCAG

TABLE 8 Sustainability Planning Grants Demonstration Projects

FY	County	Subregion	Agency	Project Title
2005-2006	Los Angeles	LA CITY	Los Angeles County METRO	Early METRO Visualization 2
2005-2006	San Bernardino	SANBAG	City of Ontario	New Model Colony Phase 1
2005-2006	San Bernardino	SANBAG	City of Upland	Downtown Infill Study
2005-2006	Los Angeles	SBCCOG	Los Angeles County METRO	Early METRO Visualization 3
2005-2006	Los Angeles	SGVCOG	City of South Pasadena	Mission Street Gold Line Station
2005-2006	Los Angeles	SGVCOG	Los Angeles County METRO	Early METRO Visualization 1
2005-2006	Riverside	WRCOG	City of Lake Elsinore	Visioning Workshop
2005-2006	Riverside	WRCOG	City of Temecula	Front Street Photomorph
2005-2006	Riverside	WRCOG	WRCOG	ULI Inland Empire Visioning Workshop
2006-2007	Los Angeles	LA CITY	City of Compton	General Plan Update Small Area Visioning
2006-2007	Los Angeles	LA CITY	City of Los Angeles	Expo Light Rail Stations
2006-2007	Los Angeles	NLAC	City of Lancaster	Short-Term Economic Forecast
2006-2007	San Bernardino	SANBAG	City of Montclair	North Montclair Parking Analysis
2006-2007	San Bernardino	SANBAG	City of San Bernardino	E Street Station Area Concept

TABLE 8 Sustainability Planning Grants Demonstration Projects: continued

FY	County	Subregion	Agency	Project Title
2006-2007	Los Angeles	SBCCOG	City of Rolling Hills Estates	Penninsula Village Specific Plan
2006-2007	Riverside	WRCOG	City of Corona	Metrolink Station Area Concept
2006-2007	Riverside	WRCOG	City of Hemet	Metrolink Station Area Concept
2006-2007	Riverside	WRCOG	City of Moreno Valley	March AFB Metrolink Station Area Concept
2006-2007	Riverside	WRCOG	City of Perris	Metrolink Station Area Concept
2006-2007	Riverside	WRCOG	City of Riverside	Metrolink Station Area Concept
2007-2008	Riverside	CVAG	City of Coachella	Sphere of Influence Sustainability Project
2007-2008	Imperial	ICTC	City of El Centro	Project SHAPE Downtown Plan
2007-2008	Los Angeles	LA CITY	Los Angeles Hollywood Chamber of Commerce	Hollywood Freeway Central Park
2007-2008	Los Angeles	LA CITY	Los Angeles Planning Department	La Cienega / Jefferson Station Area TOD
2007-2008	Orange	OCCOG	City of Brea	Bus Rapid Transit Station Concepts
2007-2008	Orange	OCCOG	City of Fullerton	Southeast Industrial Area
2007-2008	Orange	OCCOG	City of La Habra	Boulevard Corridor
2007-2008	Orange	OCCOG	City of Placentia	Metrolink Station Concepts

TABLE 8 Sustainability Planning Grants Demonstration Projects: continued

FY	County	Subregion	Agency	Project Title
2007-2008	San Bernardino	SANBAG	City of Ontario	New Model Colony Phase 2
2007-2008	San Bernardino	SANBAG	SANBAG	Transportation Land Use Integration
2007-2008	Los Angeles	SBCCOG	City of Lawndale	Economic Development Strategy
2007-2008	Los Angeles	SGVCOG	City of Azusa	Citrus Station TOD Concepts
2007-2008	Los Angeles	SGVCOG	City of Baldwin Park	3D and photo visualizations for downtown redevelopment
2007-2008	Los Angeles	SGVCOG	City of El Monte	Economic Development Plan
2007-2008	Los Angeles	SGVCOG	City of San Gabriel	Visualizations and Tipping Point Analysis
2007-2008	Los Angeles	SGVCOG	San Gabriel Valley	Arrow Highway Corridor
2007-2008	Ventura	VCOG	City of Fillmore	Business Park Tipping Point Analysis
2007-2008	Ventura	VCOG	Ventura Council of Governments	Compact for a Sustainable Ventura County
2007-2008	Riverside	WRCOG	Temecula	Transit Station Area Concept
2008-2009	Los Angeles	AVCCOG	City of Burbank	Downtown Development Standards
2008-2009	Riverside	CVAG	City of Coachella	Pueblo Viejo Revitalization Master Plan
2008-2009	Riverside	CVAG	City of Desert Hot Springs	CityWest Visioning Plan

TABLE 8 Sustainability Planning Grants Demonstration Projects: continued

FY	County	Subregion	Agency	Project Title
2008-2009	Riverside	CVAG	City of Indio	Highway 99 / Indio Boulevard Study
2008-2009	Riverside	CVAG	City of Palm Springs	Airport to Downtown Shuttle
2008-2009	Los Angeles	GCCOG	City of Long Beach	Long Beach Boulevard Corridor Study Phase 1
2008-2009	Imperial	ICTC	City of Calexico	Gateway to Mexico
2008-2009	Imperial	ICTC	City of El Centro	Parking and Circulation Plan
2008-2009	Imperial	ICTC	City of Holtville	Economic Development and Master Plan
2008-2009	Los Angeles	LA CITY	Los Angeles County METRO	Sunset Junction Streetscape Vision
2008-2009	Los Angeles	LA County	Los Angeles County	Florence Firestone Visioning Project Phase 1
2008-2009	Orange	OCCOG	City of Laguna Niguel	Gateway Specific Plan
2008-2009	San Bernardino	SANBAG	City of Chino	Focus Area Revitalization Strategy
2008-2009	Ventura	VCOG	City of Ventura	101 Freeway Cap Project
2008-2009	Ventura	VCOG	Ventura County Civic Alliance	Compact for a Sustainable Ventura County Phase 2
2008-2009	Los Angeles	WCCOG	Culver City	Washington / National Catalytic Projects
2008-2009	Riverside	WRCOG	City of Calimesa	Downtown Boulevard Revitalization Project

TABLE 8 Sustainability Planning Grants Demonstration Projects: continued

FY	County	Subregion	Agency	Project Title
2009-2010	Riverside	CVAG	Cathedral City	Date Palm Drive Connector Plan
2009-2010	Los Angeles	GCCOG	City of La Mirada	Imperial Highway Corridor Specific Plan
2009-2010	Imperial	ICTC	City of Brawley	Downtown Overlay District
2009-2010	Los Angeles	LA CITY	Los Angeles HACLA	Jordan Downs Specific Plan
2009-2010	Los Angeles	LA CITY	Los Angeles Mayor's Office	Sustainable Transit Communities
2009-2010	Los Angeles	LA CITY	Los Angeles Urban Design Studio	Tarzana Crossing
2009-2010	Los Angeles	LA County	Los Angeles County	Florence Firestone Community Plan Phase 2
2009-2010	Los Angeles	NLAC	Los Angeles County	Antelope Valley Area Plan Update
2009-2010	Los Angeles	NLAC	City of Santa Clarita	North Newhall Specific Plan
2009-2010	Orange	OCCOG	City of Fullerton	Downtown 3D Model & Database
2009-2010	Orange	OCCOG	City of Los Alamitos	Commercial Corridors Plan
2009-2010	San Bernardino	SANBAG	City of Fontana	Downtown Overlay District
2009-2010	San Bernardino	SANBAG	City of Grand Terrace	Barton Road Specific Plan
2009-2010	San Bernardino	SANBAG	City of Redlands	Transferring Development from Greenfields to Infill

TABLE 8 Sustainability Planning Grants Demonstration Projects: continued

FY	County	Subregion	Agency	Project Title
2009-2010	San Bernardino	SANBAG	City of San Bernardino	Regional Energy Efficiency Program
2009-2010	Los Angeles	SBCCOG	Los Angeles County	Vision Lennox
2009-2010	Los Angeles	SBCCOG	SBCCOG	Shared Vision for a Sustainable South Bay
2009-2010	Riverside	WRCOG	City of Banning	Paseo San Gorgonio Downtown Specific Plan
2009-2010	Riverside	WRCOG	City of Corona	Downtown Redevelopment Plan
2009-2010	Riverside	WRCOG	City of Lake Elsinore	Key to Downtown Implementation Plan
2009-2010	Riverside	WRCOG	City of Moreno Valley	Alessandro Boulevard Corridor Vision Phase 1
2009-2010	Riverside	WRCOG	City of Victorville	Non-Motorized Transportation Plan
2009-2010	Riverside	WRCOG	WRCOG	I-15 Smart Growth Concept Map
2009-2010	Riverside	WRCOG	WRCOG	Non-Motorized Transportation Plan Update
2009-2010	Riverside	WRCOG	WRCOG	Neighborhood Electric Vehicle Plan
2009-2010	Riverside	WRCOG	WRCOG	Bus Rapid Transit Route Vision
2010-2011	Los Angeles	LA CITY	Los Angeles Urban Design Studio	PARK 101 District Phase 1
2010-2011	Orange	OCCOG	City of San Juan Capistrano	Historic Los Rios Streetscape

TABLE 8 Sustainability Planning Grants Demonstration Projects: continued

FY	County	Subregion	Agency	Project Title
2010-2011	Los Angeles	SGVCOG	SR60 Coalition of Cities	SR60 Transit Corridor Study
2011-2012	Riverside	CVAG	Cathedral City	Date Palm Drive Corridor Plan Phase 2
2011-2012	Riverside	CVAG	City of Rancho Mirage	Interim Energy Park Study
2011-2012	Los Angeles	GCCOG	City of Bellflower	Alondra Mixed-Use Overlay Zone
2011-2012	Los Angeles	GCCOG	City of La Mirada	I-5 Corridor Specific Plan
2011-2012	Los Angeles	GCCOG	City of Long Beach	Long Beach Boulevard Development Code Plan
2011-2012	Los Angeles	GCCOG	Washington Blvd Coalition of Cities	Gold Line Corridor Study
2011-2012	Los Angeles	LA CITY	Los Angeles County METRO	METRO Orange Line Sustainable Corridor Plan
2011-2012	Los Angeles	LA CITY	Los Angeles Planning Department	TOD Parking Study
2011-2012	Los Angeles	LA CITY	Los Angeles Urban Design Studio	PARK 101 Phase 2
2011-2012	Orange	OCCOG	City of Anaheim	Platinum Triangle Outdoors
2011-2012	Orange	OCCOG	City of Fullerton	Fullerton Smart Growth 2030
2011-2012	Orange	OCCOG	City of Santa Ana	Harbor Boulevard Transit Corridor Vision
2011-2012	San Bernardino	SANBAG	City of Highland	Base Line Corridor Vision

TABLE 8 Sustainability Planning Grants Demonstration Projects: continued

FY	County	Subregion	Agency	Project Title
2011-2012	San Bernardino	SANBAG	City of Upland	College Heights Economic Strategy
2011-2012	Los Angeles	SFVCOG	Los Angeles Planning Department	Canoga Connect
2011-2012	Los Angeles	SGVCOG	City of Alhambra	Envision 2035
2011-2012	Ventura	VCCOG	City of Oxnard	Downtown East TOD Feasibility Study
2011-2012	Ventura	VCCOG	City of Ventura	101 Freeway Cap Project Phase 2
2011-2012	Riverside	WRCOG	City of Calimesa	Calimesa Creek Riverwalk Master Plan
2011-2012	Riverside	WRCOG	City of Moreno Valley	Alessandro Boulevard Corridor Plan Phase 2
2011-2012	Riverside	WRCOG	WRCOG	Subregional Sustainability Plan Framework
2011-2013	Riverside	WRCOG	Temecula	Jefferson Corridor and Highway 395 Vision
2012-2013	Los Angeles	GCCOG	City of Cerritos	Station TOD District
2012-2013	Los Angeles	GCCOG	City of Downey	Civic Center Plan
2012-2013	Los Angeles	GCCOG	City of South Gate	Rail Station Concept Vision
2012-2013	Imperial	ICTC	City of Brawley	Non-Motorized Transportation Plan
2012-2013	Imperial	ICTC	City of Imperial	Building Blocks Vision

TABLE 8 Sustainability Planning Grants Demonstration Projects: continued

FY	County	Subregion	Agency	Project Title
2012-2013	Los Angeles	LA City	Downtown Los Angeles Neighborhood Council	Vision Downtown
2012-2013	Los Angeles	LA City	Los Angeles Department of Transportation	New Mobility Metrics
2012-2013	Los Angeles	LA County	Los Angeles County	TOD Station Access Studies
2012-2013	Los Angeles	LVMCOG	City of Agoura Hills	Kanan Rd. & Thousand Oaks Blvd. Pedestrian Evaluation
2012-2013	Los Angeles	NLAC	City of Lancaster	Southeast Transit Village
2012-2013	Orange	OCCOG	City of Dana Point	Connectivity Study
2012-2013	San Bernardino	SANBAG	City of Chino Hills	The Shoppes Specific Plan Update
2012-2013	San Bernardino	SANBAG	City of Fontana	Sierra Avenue / Valley Boulevard Land Use Study
2012-2013	San Bernardino	SANBAG	City of Rancho Cucamonga	Specific Plan Corridor
2012-2013	San Bernardino	SANBAG	City of San Bernardino	Redlands Passenger Rail Project TOD PEIR
2012-2013	San Bernardino	SANBAG	City of Yucca Valey	Town Center Mixed Use Plan
2012-2013	Los Angeles	SBCCOG	City of Inglewood	Downtown Inglewood Community Visioning Project
2012-2013	Los Angeles	SBCCOG	City of Rancho Palos Verdes	Western Avenue Corridor Strategy
2012-2013	Los Angeles	SBCCOG	SBCCOG	Sustainable Arterials Feasibility Study

TABLE 8 Sustainability Planning Grants Demonstration Projects: continued

FY	County	Subregion	Agency	Project Title
2012-2013	Los Angeles	SFVCOG	City of Glendale	Space 134
2012-2013	Los Angeles	SGVCOG	City of Pomona	North Pomona TOD Plan
2012-2013	Los Angeles	SGVCOG	City of San Gabriel	Greening the Zoning Code
2012-2013	Los Angeles	SGVCOG	San Gabriel Valley	Mid-Valley Transportation Corridor
2012-2013	Ventura	VCOG	Ventura County	Old Town Saticoy Area Plan
2012-2013	Riverside	WRCOG	City of Wildomar	Old Town Vision
2013-2014	Los Angeles	GCCOG	City of Paramount/City of Bellflower	Regional Bicycle Connectivity
2013-2014	Imperial	ICTC	Imperial County Transportation Commission	Safe Routes to School Plan
2013-2014	Los Angeles	LA CITY	Los Angeles Department of City Planning	Van Nuys & Boyle Heights Modified Parking
2013-2014	Los Angeles	LA CITY	Los Angeles Department of City Planning	Bicycle Plan Performance Evaluation
2013-2014	Los Angeles	LVMCOG	Las Virgenes Malibu Council of Governments	Multi-Jurisdictional Regional Bicycle Master Plan
2013-2014	Orange	OCCOG	City of Costa Mesa	Implementation Study for Multi-Purpose Trails
2013-2014	Orange	OCCOG	City of Placentia	Sustainable Development Code
2013-2014	Orange	OCCOG	City of Santa Ana	Complete Streets Plan

TABLE 8 Sustainability Planning Grants Demonstration Projects: continued

FY	County	Subregion	Agency	Project Title
2013-2014	San Bernardino	SANBAG	San Bernardino Associated Governments	Climate Action Plan Implementation Tools
2013-2014	San Bernardino	SANBAG	San Bernardino County	Bloomington / Valley Blvd. Specific Plan
2013-2014	San Bernardino	SANBAG	City of Yucaipa	Sustainable College Village/Greater Dunlap
2013-2014	Ventura	VCOG	Ventura County	Connecting Newbury Park - Multi-Use Pathway Plan
2013-2014	Riverside	WRCOG	City of Eastvale	Bicycle & Pedestrian Master Plan
2013-2014	Riverside	WRCOG	Western Riverside Council of Governments	Sustainability Framework Public Health
2014-2015	Riverside	CVAG	City of Coachella	La Plaza East Urban Development Plan
2014-2015	Riverside	CVAG	Coachella Valley Association of Governments	CV Link Health Impact Assessment
2014-2015	Riverside	CVAG	City of Indio	General Plan Sustainability and Mobility Elements
2014-2015	Riverside	CVAG	City of Palm Springs	Sustainability Master Plan Update
2014-2015	Riverside	CVAG	City of Palm Springs	Urban Forestry Initiative
2014-2015	Los Angeles	GCCOG	City of Long Beach	Wetland Habitat Creation Plan
2014-2015	Los Angeles	GCCOG	City of Lynwood	Safe and Healthy Community Element
2014-2015	Los Angeles	NLA	City of Palmdale	Avenue Q Feasibility Study

TABLE 8 Sustainability Planning Grants Demonstration Projects: continued

FY	County	Subregion	Agency	Project Title
2014-2015	Orange	OCCOG	City of Anaheim	Bicycle Master Plan Update
2014-2015	Orange	OCCOG	City of Fullerton	East Wilshire Avenue Bicycle Boulevard
2014-2015	Orange	OCCOG	Orange County	"Orange to Green" County Zoning Code Update
2014-2015	Orange	OCCOG	Orange County Parks	Orange County Bicycle Loop
2014-2015	Orange	OCCOG	City of Stanton	Green Planning Academy
2014-2015	San Bernardino	SANBAG	City of Big Bear Lake	Rathbun Corridor Sustainability Plan
2014-2015	San Bernardino	SANBAG	City of Chino	Bicycle & Pedestrian Master Plan
2014-2015	San Bernardino	SANBAG	City of Chino Hills	Climate Action Plan and Implementation Strategy
2014-2015	San Bernardino	SANBAG	San Bernardino Associated Governments	Countywide Complete Streets/Safe Routes to School Plan
2014-2015	Los Angeles	SBCCOG	City of Hawthorne	Crenshaw Station Active Transporation Plan
2014-2015	Los Angeles	SBCCOG	City of Hermosa Beach	Carbon Neutral Plan
2014-2015	Los Angeles	SBCCOG	South Bay Bicycle Coalition/Hermosa, Manhattan, Redondo	Bicycle Mini-Corral Plan
2014-2015	Los Angeles	SBCCOG/LA CITY	City of Rancho Palos Verdes/City of Los Angeles	Western Avenue Design Guidelines
2014-2015	Los Angeles	SFVCOG	City of Glendale	Space 134

TABLE 8 Sustainability Planning Grants Demonstration Projects: continued

FY	County	Subregion	Agency	Project Title
2014-2015	Los Angeles	SGVCOG	City of West Covina	Downtown Central Business District
2014-2015	Riverside	WRCOG	City of Beaumont	Climate Action Plan
2014-2015	Riverside	WRCOG	City of Calimesa	Trail Master Plan Study
2014-2015	Riverside	WRCOG	City of Moreno Valley	Nason Street Corridor Plan
2014-2015	Riverside	WRCOG	City of Riverside	Restorative Growthprint Riverside
2014-2015	Riverside	WRCOG	Western Riverside Council of Governments	Sustainability Planning Framework
2014-2015	Riverside	WRCOG	Western Riverside Council of Governments	Climate Action Plan Implementation
2015-2016	Riverside	CVAG	Cathedral City	General Plan Update - Sustainability Plan
2015-2016	Los Angeles	GCCOG	City of Bell	General Plan Update and Bicycle Master Plan
2015-2016	Los Angeles	GCCOG	City of Pico Rivera	Kruse Road Open Space Study
2015-2016	Los Angeles	GCCOG	City of South Gate	Rapid Transit Station Specific Plan
2015-2016	Los Angeles	LA CITY	Friends of Hollywood Central Park	Hollywood Central Park EIR
2015-2016	Los Angeles	LA CITY	Los Angeles Department of City Planning	CEQA Streamlining for SCS Implementation
2015-2016	Los Angeles	LA CITY	Los Angeles Urban Design Studio	Park 101 District

TABLE 8 Sustainability Planning Grants Demonstration Projects: continued

FY	County	Subregion	Agency	Project Title
2015-2016	Los Angeles	NLA	City of Lancaster	Complete Streets Master Plan
2015-2016	Orange	OCCOG	City of Dana Point	General Plan Update
2015-2016	Orange	OCCOG	City of Fountain Valley	I-405/Euclid Specific Plan
2015-2016	Orange	OCCOG	City of Garden Grove	RE:IMAGINE Downtown - Pedals & Feet
2015-2016	Orange	OCCOG	City of Huntington Beach	Neighborhood Electric Vehicle Plan
2015-2016	Orange	OCCOG	City of Seal Beach	Climate Action Plan
2015-2016	Orange	OCCOG	City of Westminster	General Plan Update - Circulation Element
2015-2016	San Bernardino	SANBAG	City of Barstow	Housing Element and Specific Plan Update
2015-2016	San Bernardino	SANBAG	City of Rancho Cucamonga	Healthy RC Sustainability Action Plan
2015-2016	San Bernardino	SANBAG	City of Rancho Cucamonga	Feasibility Study for Relocatoin of Metrolink Station
2015-2016	San Bernardino	SANBAG	San Bernardino Associated Governments	Countywide Bicycle Route Mobile Application
2015-2016	Los Angeles	SBCCOG	South Bay Cities Council of Governments	Neighborhood-Oriented Development Graphics
2015-2016	Los Angeles	SFVCOG	City of Burbank	Mixed-Use Development Standards
2015-2016	Los Angeles	SFVCOG	San Fernando Valley Green Team	Northeast San Fernando Valley Sustainable Growth Strategy

TABLE 8 Sustainability Planning Grants Demonstration Projects: continued

FY	County	Subregion	Agency	Project Title
2015-2016	Los Angeles	SGVCOG	City of La Canada Flintridge	Climate Action Plan
2015-2016	Los Angeles	SGVCOG	City of Pasadena	Form-Based Street Design Guidelines
2015-2016	Los Angeles	SGVCOG	City of Pasadena	Emission Reduction Evaluation Protocol
2015-2016	Los Angeles	SGVCOG	City of San Dimas	Downtown Specific Plan
2015-2016	Riverside	WRCOG	City of Hemet	Downtown Hemet Specific Plan

DEVELOPING THE 2016 RTP/SCS

The 2016 RTP/SCS will have a horizon year of 2040 and will be adopted by SCAG's Regional Council in April 2016. To initiate the process, SCAG's Regional Council developed and approved updated goals to help carry out the vision for improved mobility, economy and sustainability. Performance Measures were then developed to implement and monitor the vision and provide guidance throughout the technical process. The Performance Measures consider the following critical items:

SCAG's Performance Measures:

1. Location Efficiency
2. Mobility & Accessibility
3. Reliability
4. Productivity
5. Safety and Health
6. Environmental Quality
7. System Sustainability
8. Resource Efficiency

TECHNICAL METHODOLOGY

The methodology for estimating transportation-related greenhouse gas emissions associated with the 2016 RTP/SCS is primarily based on SCAG's Trip-Based Regional Transportation Demand Model and the ARB's EMFAC Model. The affects and impacts of various land use scenarios on greenhouse gas emissions will be evaluated and accounted for by SCAG's SPM Model, the Trip-Based Model, and various off-model methodologies. An overview of the methodology is presented below:

TABLE 9 Analysis Years for SB 375

YEAR	PURPOSE
2005	Base year for SB 375 target setting
2012	Base year for 2016 RTP/SCS
2020	SB 375 GHG target year
2035	SB 375 GHG target year
2040	2016 RTP/SCS horizon year

1. **Develop land use portion of SCS**
   Growth forecasts, particularly the local input based growth forecasts, will be developed based on SCAG's bottom-up integrated growth forecasting process and will be used as the basis and starting point to develop the SCS. SCAG's SPM Model will be used to facilitate local input, develop and test land use scenarios, and evaluate potential impacts. The resulting datasets may or may not achieve the greenhouse gas emissions reduction target set by ARB. If additional strategies are necessary to achieve the target, SCAG will work with its jurisdictions and other stakeholders to develop a range of potential land use strategies for consideration in SCS development. Each of these strategies will be included in one or more draft scenarios and greenhouse gas emissions will be quantified to test their effectiveness. For the 2016 RTP/SCS, in addition to the local input based growth forecasts, SCAG, in collaboration with subregions and local jurisdictions, developed two sets of growth forecasts/land use scenarios based on different emphasis of land use and investment strategies.
2. **Identify related transportation investments/improvements and other RTP/SCS policies**
   The 2016 RTP/SCS will identify and examine new investments in transportation facilities, including toll facilities, HOV/mixed-flow, transit, rail, active transportation, etc., and improvements in TDM and TSM strategies as well as other relevant policies and strategies. These investments/improvements will be incorporated into the regional transportation demand model where feasible.
3. **Analyze RTP/SCS through modeling**
   SCAG will use the Trip-Based and the EMFAC models to test greenhouse gas emissions reduction scenarios as appropriate. The SCS and alternatives scenarios will be used as input to the regional transportation demand model for RTP/SCS conformity/CEQA analyses.
4. **Use off-model analyses to estimate VMT changes or greenhouse gas emissions reductions, if necessary**
   Per the RTAC and ARB recommendations, SCAG will use off-model analyses as necessary and appropriate to account for any voluntary efforts or other strategies that are not captured by the regional transportation demand model. The off-model analysis methodology will be informed by the on-going collaboration among MPOs and between MPOs and the ARB on this subject, as well as discussions with applicable technical working groups. SCAG anticipates that the off-model analysis technique will be primarily used for quantifying voluntary efforts from cities/counties and the business sector, and those policies and practices that are not readily applicable for modeling analyses. Descriptions of off-model measures are provided on Page 80.

5. **Run ARB's EMFAC Model**
   Pending U.S. EPA's approval of the updated emission model, SCAG will run EMFAC 2014 for baseline and SCS scenarios for the appropriate milestone years and greenhouse gas emissions will be calculated. Adjustments to EMFAC that account for recent state laws will be made per ARB direction.

6. **Next Generation Tools**
   SCAG has committed considerable effort to develop working versions of both the Activity-Based Model and PECAS Land Use Model. These tools should be available for use in the 2020 RTP/SCS development and greenhouse gas emissions evaluation. Both models require additional refinement, sensitivity testing, and review/outreach with modeling stakeholders before they will be available for use in RTP/SCS production.

DATA DEVELOPMENT FOR THE SCS

1. **Socio-Economic Growth Forecast**
   The process for developing growth and economic forecasts includes:
   - Initiate the SB 375 and 2016 RTP/SCS growth forecasting process (commenced June 2013)
   - Convene a panel of experts for technical assistance and advisory role in June 2013
   - Produce a range of growth forecasts
   - Release the draft growth forecast to all local jurisdictions
   - Build teams to conduct one-to-one meetings with local jurisdictions, subregions and all major stakeholders (February 2014 – January 2015)
   - Develop draft policy growth forecast, continue local and subregional review, comment, and input to refine and revise the policy growth forecast (June 2015 – September 2015)
   - Release the Draft policy growth forecast along with the draft RTP/SCS and PEIR for public review and comments (December 2015)
   - Adopt final forecasts as part of the SCS process

2. **SCS/RTP Datasets and Trend Baseline**
   To meet the requirements of SB 375 in developing a SCS by 2016, the following datasets will be developed in collaboration with subregions, local jurisdictions and CTCs:
   - 2012 base year for 2016 RTP/SCS
   - Trend baseline growth distribution and underlying land uses
   - General plan based growth forecast and distribution
   - Policy growth forecast/SCS

The "trend baseline" illustrates the most likely outcomes of growth distribution and land use in the absence of recent policy intervention, allowing the region and its jurisdictions to take credit for actions and policies adopted recently or in the near future. The "trend baseline" is a technical projection that provides a best estimate of future growth based on past trends and assumes no recent general plan land use policies. The Policy Forecast/SCS builds from local jurisdictional general plan land use stratregies, updated policies from local jurisdictions that may not be reflected in their general plan and additional regional policy assumptions.

3. **Data and GIS Maps**
   Data/GIS maps have been provided to subregions and local jurisdictions for their review. These data include the 2012 base year population, employment, and households estimates and their projections for 2020 and 2035 and 2040. GIS maps include existing land use for 2012, general plan land use and zoning, resource areas, and other important areas identified in SB 375.

The list of data/GIS maps provided to stakeholders includes:

- Existing land use (2012)
- General plan land use and zoning

Resource areas include:

- All publicly owned parks and open space;
- Open space or habitat areas protected by natural community conservation plans, habitat conservation plans, and other adopted natural resource protection plans;
- Habitat for species identified as candidate, fully protected, sensitive or species of special status by local, state or federal agencies or protected by the federal Endangered Species Act of 1973, the California Endangered Species Act or the Native Plant Protection Act;
- Lands subject to conservation or agricultural easements for conservation or agricultural purposes by local governments, special districts or nonprofit 501(c)(3) organizations, areas of the state designated by the State Mining and Geology Board as areas of statewide or regional significance pursuant to Section 2790 of the Public Resources Code and lands under Williamson Act contracts;
- Areas designated for open space or agricultural uses in adopted open-space elements or agricultural elements of the local general plan or by local ordinance;

- Areas containing biological resources as described in Appendix G of the CEQA Guidelines that may be significantly affected by the sustainable communities strategy or the alternative planning strategy; and
- Areas subject to flooding where a development project would not, at the time of development in the judgment of the agency, meet the requirements of the National Flood Insurance Program or where the area is subject to more protective provisions of state law or local ordinance.

4. Farmland
5. Spheres of influence
6. High Quality Transit Areas (HQTA) and transit priority areas (TPA)
7. City/Census tract boundary with ID
8. City/Tier2 Transportation Analysis Zone (TAZ) boundary with ID

SUSTAINABLE COMMUNITIES STRATEGIES

1. **Land Use Component**
The growth distribution, for SCS purposes, is the adopted growth forecast used for the RTP. SB 375 requires that this forecast be developed in such a way that it demonstrates reduced per capita greenhouse gas emissions due to land use strategies as compared to the per greenhouse gas level in 2005.

   SCAG will work with all jurisdictions and other stakeholders to develop a range of potential land use strategies for consideration in SCS development. Each of these strategies will be included in one or more draft scenarios and greenhouse gas emissions will be quantified. Prior to incorporating any strategies into a final SCS SCAG, in consultation with the applicable local government, will determine the political and market feasibility of said strategy.

   It should be noted, however, that as the same practice in the 2012 RTP/SCS, the final adoption of growth forecast is at the jurisdictional level, subjurisdictional level socioeconomic data set or growth forecast is advisory and non-binding, and for modeling and analysis purposes only to demonstrate for the attainment of greenhouse gas emissions reduction targets (See CEHD action in October 2015 regarding guiding principles for the development of policy growth forecast for the 2016 RTP/SCS).

2. **Transportation Investment**
The transportation network consists of existing and planned transportation projects. SB 375 requires the development of the future transportation network should proceed in such a way that it complements the anticipated growth strategy and distribution reflected in the SCS.

   Development of a SCS presents an opportunity for developing approaches to system management and operational improvements, implementing pricing policies, developing comprehensive bikeway networks, using complete streets as an active transportation funding strategy and improving the coordination between transit services and active transportation (first/last mile strategies), all with the goal of creating more livable communities. These efforts assume collaboration and voluntary participation among subregional stakeholders and CTCs in order to derive higher performance from the transportation system.

3. **Transportation Demand Management / Transportation Systems Management**
In addition to transportation projects, the RTP contains policies such as Transportation Demand Management (TDM) or Transportation System Management (TSM) policies. These include pricing, ridesharing, smart shuttles, preferential parking, freeway metering, etc. These policies can be layered with the other major elements of the SCS. It is anticipated that TDM/TSM policies will be used and applied in particular, in locales that do not have substantial existing or planned transit infrastructure.

4. **Other Economic Factors & Principles**
The following factors and principles are reflected in the growth forecasts and land use data set:

   - Align economic development with the land use and transportation investment strategies
   - Promote job-housing supply balance
   - Develop a "Land-use Strategy" that the market wants and can deliver

5. **Technology and Local Voluntary Efforts (Off-Model Analysis)**
In estimating emissions benefits from an SCS, the region may account for local voluntary efforts that result in reduced vehicle greenhouse gas emissions not limited to strategies aimed at reducing VMT.

   Examples of such efforts may include local neighborhood electric vehicle programs, local incentives for the purchase or use of electric or other alternative fuel vehicles (e.g., preferential parking), or increase in active transportation investments and capital projects. Any local voluntary effort to reduce emissions that are accounted for in the SCS should demonstrate additional benefits beyond what is already required in state law.

In accounting for the benefits of such efforts, SCAG may rely on any local analysis to determine emissions savings. In lieu of locally derived data, SCAG may use off-model analyses as necessary and appropriate to account for any voluntary efforts or other strategies that are not captured by the regional transportation demand model. SCAG has developed off-model tools and methodologies to estimate trip reductions related to active transportation improvements, zero emissions vehicle strategies, neighborhood electric vehicles policies, and shared mobility programs. Descriptions of measures that are considered are the following:

Active Transportation / Proximity

SCAG's Active Transportation Programs

The 2016 RTP/SCS contains 11 strategies designed to increase active transportation, as a share of all transportation modes. These strategies are established in four categories:

- Regional Trip Strategies
  - Regional Bikeway Network
  - Regional Greenway Network: designed to increase walking and biking for recreation, making use of available open space, such as rivers, drainage canals, cycle tracks and utility corridors.
- Transit Integration Strategies
  - First/Last Mile
  - Livable Corridors
  - Bike Share
- Short Trip Strategies
  - Sidewalk repair and upgrading
  - Local Bikeway Networks
  - Neighborhood Mobility Areas (integrated with NEV short-trip concept)
- Education and Encouragement
  - Safe Routes to School
  - SCAG Encouragement and Safety Campaigns

SCAG staff conducted GIS analysis to create a bike lane network, first/last mile areas, livable corridors, and neighborhood mobility areas. The GIS data and shapefiles are used to create active transportation infrastructure input for off-model analysis.

Methodology – Active Transportation Tool

SCAG developed a methodology to analyze the impact of active transportation infrastructure enhancement (AT enhancement) on mode share and VMT. A mode share model was developed based on 2012 California Household Travel Survey (CHTS) and zonal data from SCAG's Scenario Planning Zones (SPZs). A multinomial logit model was estimated with following modes: auto, transit, walk-to-transit, walk-to-activity and bike.
Independent variables of the mode share model include 1) individual and household socioeconomic characteristics from CHTS, 2) neighborhood land use characteristics by SPZs, and 3) neighborhood built environment and active transportation infrastructures by SPZs (including bike lane density, street density and percent of roadways with sidewalks). The model calculates the changes in mode share as well as the number of trips by modes by different AT infrastructure inputs. The number of walk and bike trips is expected to increase with enhanced AT infrastructure, such as bike lanes and sidewalks. Furthermore, AT enhancement programs near transit stops or stations, such as first mile/last mile, that enhance accessibility to transit service will increase the use of transit services. Since the methodology focuses on mode choice, it is assumed that increased AT trips and transit trips substitute for automobile trips (total trips remain the same). The reduction of vehicle trips and VMT is equal to the increased trips and travel distance by non-vehicle modes.

Zero-Emissions Vehicles

Zero Emissions Vehicle Strategies

SCAG has also provided specific planning and support for Plug-in Electric Vehicles (PEV) and electric vehicle charging stations (EVCS). Since SCAG adopted the 2012 RTP/SCS, the Governor's Office released the Zero Emissions Vehicle (ZEV) Action Plan for 2013 and 2015. These plans identified state level funding to support the implementation of Plug-in Electric Vehicle (PEV) and Hydrogen Fuel Cell refueling networks. ARB has provided aggressive growth projections for all ZEVs throughout the state. As part of the 2016 RTP/SCS, SCAG modeled PEV growth specific to Plug-in Hybrid Electric Vehicles (PHEV) in the SCAG region. These are electric vehicles that are powered by a gasoline engine when their battery is depleted. The SCAG program proposes a regional charging network that will increase the number of PHEV miles driven on electric power. This will allow SCAG to derive regionally specific greenhouse gas emissions reductions that will be achieved through increased usage of electric power relative to the gasoline power.

Methodology

SCAG applied a methodology developed by the Metropolitan Transportation Commission (MTC) to measure the greenhouse gas emissions reductions achievable through providing support for a regional network of charging stations. The investment plan will support enough charging stations to increase the PHEV usage of electric power by 10 percent.

Neighborhood Electric Vehicle (NEV) Policies

The 2016 RTP/SCS Neighborhood Mobility Areas (NMAs) strategy presents a set of state, regional, and local policies to encourage the use of alternatives to full size internal combustion engine vehicles for short trips. In the U.S., nearly 40 percent of urban and suburban auto trips are less than two miles. In SCAG region, 38 percent of trips are less

than three miles. Specifically, the 2016 RTP/SCS includes policies to encourage planning and promotion of Neighborhood Electric Vehicles (NEVs) in NMAs. A short trip using a Neighborhood Electric Vehicle (NEV) would have positive net impacts due to negligible greenhouse gas emissions (based on energy production) and zero local pollution, though this travel mode would not bring a reduction of VMT.

Methodology

SCAG prepared a New Mobility Areas Map that represents areas where local agencies should be encouraged to support short trip replacement. SCAG used a methodology based on various studies of observed NEV usage, such as methodology documented in CAPCOA and ARB documents. Within the Short Trip Concept areas, it is assumed that NEVs can be used to replace 1.5 percent of all automobile trips less than three miles of trip length. The number of automobile trips less than three miles in Short Trip Concept TAZs can be directly calculated from SCAG regional model output. VMT reduction is calculated as the number of substituted vehicle trips multiplying 1.5 miles (average of three miles).

Shared Mobility Programs

Shared Mobility modes include both new mobility paradigms as well as old models that are finding new markets and delivery methods thanks to new technology platforms. Shared Mobility encompasses a wide range of services including the following:

- Return Trip Car Sharing (Zipcar, Enterprise)
- Point-to-Point Car Sharing (Car-to-Go)
- Peer-to-Peer Car Sharing (Relayrides)
- Ridesourcing (Lyft, Uber, also known as Transportation Network Companies)
- Dynamic On-Demand Private Transit (Bridj, Leap)
- Vanpool and Private Employer Charters

The 2016 RTP/SCS includes policies to encourage Shared Mobility and to guide the region in maximizing the benefits and minimizing the potential for negative effects. The off-model methodology described below is the beginning of an ongoing process to develop modeling and off-model processes to achieve a better understanding of the costs and benefits that shared mobility services in particular will have in the SCAG region. For the 2016 RTP/SCS scenario development process, SCAG focused on geographic locations where shared mobility services are expected to accelerate, and on the attendant VMT reductions that will be realized through potential reduction in personal vehicle ownership.

Roundtrip car share is most known in the U.S. as membership-based programs where individuals can sign up to have hourly access to a pool of vehicles and then return them to the same place where they were picked up. Unlike traditional car rentals, vehicles can be picked up at designated spots around the city, usually in public parking lots. One-way car share allows members to take a vehicle and leave it at a different station, or anywhere within the allowed boundaries (roughly city boundaries).

Ridesourcing is a term coined by researchers at U.C. Berkeley to refer to the provision of rides sourced from application enabled networks of ride providers. This term is useful in distinguishing this innovation from car sharing, and from carpooling. For legal purposes, the California Public Utilities Commission defines the entities, referred to as Transportation Network Companies (TNC), as "companies or organizations, operating in California that provides transportation services using an online-enabled platform to connect passengers with drivers using their personal, non-commercial, vehicles". Essentially, TNCs add two new aspects to the vehicle for hire service model – peer drivers and smartphone dispatch.

Methodology for Carsharing Analysis

SCAG classified the 35 detailed place types in SPZs into six main groups of TAZs, based on land use characteristics such as density and diversity. SCAG applied higher car sharing programs household participation rate for place type with higher density/diversity. This assumption is consistent with methodology applied by MTC and applied in Caltrans' 2040 statewide plan. SCAG assumed a 30 percent reduction in VMT for households participating in car sharing based on empirical data noted in CAPCOA and ARB documents.

Methodology for Ridesourcing (TNCs) Analysis

For the analysis of ridesourcing, SCAG used the same six place type categories as the car sharing analysis. SCAG assumed higher percent of households using TNCs for place type with higher density/diversity. This assumption is consistent with summary data provided by Lyft, one of the major ridesourcing companies. SCAG programed a 30 percent reduction in VMT for households participating in ridesourcing based on similar assumption from car sharing analysis.

6. **Outreach/Stakeholder Input**
   A collaborative and inclusive bottom-up process is the key to ensure a successful development of SCAG's 2016 RTP/SCS. The following are the major tasks and associated objectives that SCAG has undertaken since 2012 to move the process forward to address the requirements of SB 375.

Program Setup

- Conduct SB 375 workshops throughout the region and provide information on requirements and concepts of SB 375, introduce different elements of the RTP/SCS, plus introduce the four preliminary scenarios, as part of the scenario planning exercise.
- Conduct initial outreach strategy kick-off.
- Develop and adopt Guidelines and Public Participation Plan.
- Finalize roles and responsibilities among regional partners, particularly subregions and County Transportation Commissions (CTCs).

RTP/SCS Scenario Development

- Review and gather local input on general plans, including growth forecast/ distribution and land use for 2020, 2035 and 2040.
- Set-up four preliminary scenarios for SB 375 workshops and SCAG Regional Council, Policy Committees, Technical Working Groups, Tasks Forces and other working groups to analyze and compare various policies and to provide their feedback:
  - Trend
  - 2012 Plan Update
  - "Policy A"
  - "Policy B"

- Determine and review RTP base year (2012) conditions.
- Develop growth projections for the four scenarios above for years 2020, 2035 and 2040.
- Develop outreach materials based on different elements of the RTP/SCS that were included in the scenarios.
- Develop survey questions for public feedback.
- Conduct outreach open house sessions based on SB 375 requirements.
- Publish materials online for broader outreach.
- Provide a summary of public input to SCAG's Regional Council.

Draft RTP/SCS Development

- Continue to collect input on additional local planning efforts.
- Outreach to develop policy assumptions for the Draft RTP/SCS.
- Perform technical analyses, including quantification of greenhouse gas emissions reductions achieved by the SCS.
- Develop and release the Draft RTP/SCS.

Final RTP/SCS Development and Approvals

- Develop the final RTP/SCS.
- SCAG Regional Council and regulatory agency approvals.

MODELS AND TOOLS

The diagram below provides an overview of SCAG's modeling system and how the various tools will be applied in the modeling of the 2016 RTP/SCS.

SCENARIO PLANNING MODEL

The SCAG Scenario Planning Model (SPM) is a web-based scenario development, modeling and data organization tool developed to facilitate informed and collaborative planning among counties/subregions, local jurisdictions, other stakeholders and the public. The SPM includes a suite of tools and analytical engines that help to quickly illustrate alternative plans and policies and to estimate their transportation, environmental, fiscal and public health regional impacts. Moreover, SPM provides a common data framework within which local planning efforts can be easily integrated and synced with regional plans.

SCAG SPM is built using UrbanFootprint, a scenario development and modeling platform based on open source software and tools, developed by Calthorpe Analytics. Several of the major MPOs in California are developing different facets of UrbanFootprint for their planning needs. Enhancement and customization of the UrbanFootprint system for SCAG's application involves local level data review, edit and management functionality via a web-based user interface, and regional-scale scenario development and modeling capacity. In order to make the tool more useful to subregions and local jurisdictions, SCAG formed a Working Group that includes representatives from all counties and subregions in the SCAG region to direct the tool's development. The SPM Working Group serves as an advisory group to SCAG staff and provides technical input on the aspects of the tool's functions and operations.

Within SCAG's integrated modeling and forecasting system, SPM serves as a conduit between local jurisdictions and key SCAG models. SPM analytical engines produce a range of critical metrics that allow for meaningful comparisons across different land use and transportation scenarios. Scenarios are run through model engines to measure their performance for the following co-benefits:

- mobility
- public health
- fiscal impacts
- energy usage
- water usage
- land consumption

The SPM will be the tool used to develop and analyze future land use scenarios for the 2016 RTP/SCS.

LAND USE/GROWTH FORECASTING

SCAG's growth forecast is developed using a series of computer programs and outreach to forecast growth first at the regional/county level and then disaggregate the county growth to the jurisdiction/TAZ level. The following description provides an overview of SCAG's growth forecasting process.

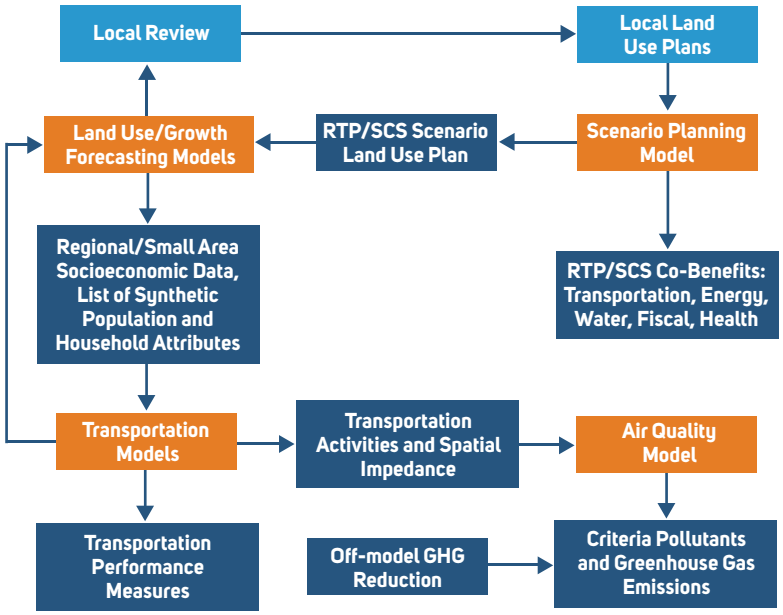
REGIONAL GROWTH ESTIMATION

The Regional Growth Forecast is the basis for developing the Regional Transportation Plan (RTP), Sustainable Communities Strategy (SCS), Program Environmental Impact Report (PEIR), and the Regional Housing Needs Assessment (RHNA). SCAG's 2016 RTP/SCS growth forecast includes our six county jurisdictional level population, household and employment for years 2012, 2020, 2035 and 2040.

The following major data sources are considered and used in the development of the growth forecast:

- California Department of Finance (DOF) population and household estimates;
- California Employment Development Department (EDD) jobs report by industry;
- Regional Housing Needs Assessment (RHNA) growth projections for years 2014-2021;
- 2012 existing land use and General Plans from local jurisdictions;
- 2010 Census and the latest American Community Survey (ACS) data; and
- 2011 Business Installment data from InfoGroup.

FIGURE 10 SCAG's Integrated Modeling & Forecasting Framework



Source: SCAG

SCAG's Regional Growth Forecast includes three major indicators: population, households and employment. SCAG's forecast maintains a balance between employment, population and households at the regional level, given their interrelationship. SCAG computes regional employment based on the SCAG region's share of the nation's employment. Future population is calculated by adding or subtracting to the existing population the number of group quarters population, births, migration and deaths during a projection period. Households are projected by applying headship rates, based on age-gender-racial/ethnic breakdowns, to the projected population. A panel of experts reviewed and provided input to the Regional Growth Projections for the 2016 RTP/SCS (June 2013). The regional forecast was then presented to the Community, Economic and Human Development (CEHD) Committee in August 2013 for their consideration and endorsement.

Based on the regional growth forecast, SCAG then projects jurisdictional level population, households and employment. The jurisdictions' latest existing and general plan land use serve as the basis for future year population and household allocations. Household growth rates and household size are estimated based on historical trends and the developable capacity from the local jurisdiction's general plan. Population projections are calculated based on household growth and household size. Future employment is estimated based on the jurisdiction's employment share of the county's employment by sector, using 2012 jobs data. Employment is further adjusted to account for population serving jobs, such as retail and service, which are highly correlated with population growth.

After the initial growth forecast was developed, SCAG's staff conducted one-on-one meetings with 197 jurisdictions to review the forecast and receive local input. This local input process provided an opportunity for jurisdictions to offer their local knowledge and input to inform SCAG's regional datasets. SCAG evaluated the comments and incorporated the adjustments into the population, household and employment growth distributions. The resulting 2016 RTP/SCS growth forecast will serve as the basis for the initial 2016 RTP/SCS evaluation. Additional refinements to the growth forecast may be made through the scenario planning process in the development of the final 2016 RTP/SCS growth alternative.

SMALL AREA GROWTH FORECASTING

The goal of the small area growth forecasting methodology is to allocate jurisdictional level population, household and employment into the smaller Transportation Analysis Zones (TAZs) utilized by SCAG's Transportation Model. The jurisdictional level household and

employment are developed using an independent projection methodology and review process with SCAG's cities and counties. Population projections are tied to household growth. The jurisdiction's forecast and the projection year are often referred to as the "control total" and the "target year", respectively.

The geographic levels utilized in the growth forecasting process range from the SCAG region as a whole to Tier 2 Transportation Analysis Zones. Each lower level is consistent with higher aggregation levels, i.e., a jurisdiction's values when summed to their respective county will equal the county projection. In addition, the combination of jurisdiction boundaries and Tier 2 (T2) zones when summed to their respective jurisdiction total must be consistent with their jurisdiction's projections.

SCAG's small area growth forecasting process is applied to develop base year and future year socio-economic data at the Tier 2 zone level. Below is a list of the data sources incorporated in the process.

Data Sources:

- SCAG's existing land use data
- SCAG's General Plan Database, processed based on jurisdictional General Plans
- SCAG's 2012 RTP/SCS growth forecast
- SCAG's 2016 RTP/SCS jurisdictional level population, household and employment
- 2013 Longitudinal Employer-Household Dynamics, Origin-Destination, Employment Statistics from the Census Bureau
- Employment Development Department (EDD) 2012, 3rd quarter jurisdictional jobs by sector
- 2011 InfoGroup firm-based employment data
- SCAG Intergovernmental Review (IGR) data
- Digital Mapping Product (DMP) parcel data (2010-2012) and new construction data (2010-2012)
- 2010 Decennial Census Summary File 1 (SF1)

The above approach distributes jurisdictional level population, household and employment into city/T2 level zones (15,000+ city/T2 zones), which work with SCAG's current databases and zonal systems. It creates the first cut of the small area forecast. The draft Tier2 level forecast is then shared with SCAG jurisdictions for further review and comment. Secondary variables, such as population/household characteristics, needed for various models, were developed using SCAG's population synthesis tool (POPsyn). Below is a graphic providing an overview of SCAG's growth forecasting process.

TRIP-BASED REGIONAL TRANSPORTATION DEMAND MODEL

SCAG's trip-based regional transportation demand model will be the primary transportation modeling tool utilized to evaluate the 2016 RTP/SCS's performance. The model was peer reviewed and updated based on the 2012 California Household Travel Survey. A comprehensive model validation was also performed to ensure the model properly replicates base-year (2012) travel conditions.

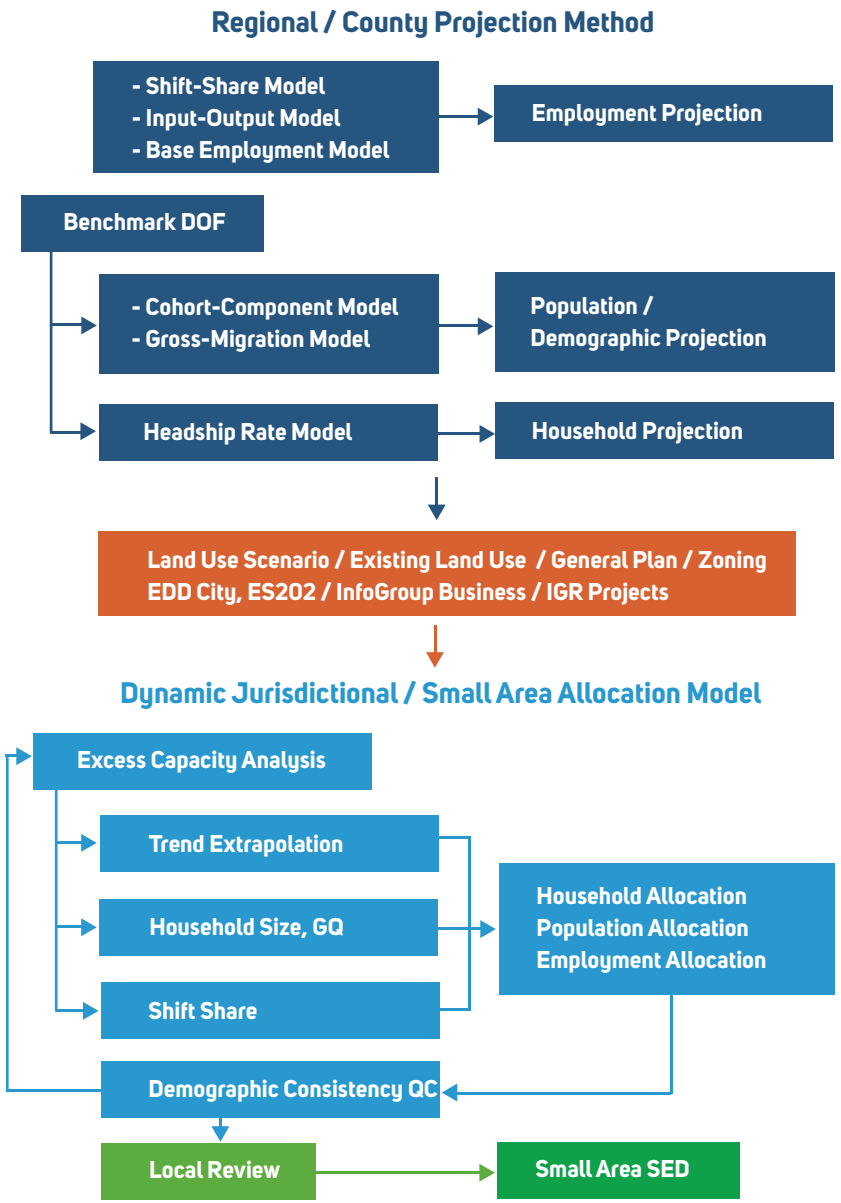
The model calculates vehicle miles and vehicle hour traveled (VMT and VHT), speeds and delay, and other performance measures for both passenger car and heavy-duty vehicles. The enhanced model utilizes Transportation Analysis Zones (TAZs) that are comparable to Census Block Groups as the analysis unit for most model components. There are 10,569 Census Block Groups and 11,267 Tier 2 TAZs in SCAG modeling area. Inter-regional and ports related travel are also included in the Model.

MODEL AND DATA ENHANCEMENTS

The trip-based model which is being utilized to analyze the 2016 RTP/SCS is basically the same model used in the 2012 RTP/SCS. The model framework is identical to the previous model with enhancements to selected modules, recalibrated using the 2012 Travel Survey, and validated to Year 2012 to replicate 2012 travel conditions. Below is a listing of the Trip-Based Model and data enhancements:

- **Model enhancements include:**
  - Comprehensive calibration and validation to 2012 travel conditions;
  - Trip market strata defined by car sufficiency and household income groups used throughout the entire demand models;
  - Re-estimated auto ownership model, sensitive to transit and non-motorized accessibility, multi-dwelling family housing, and residential and employment mixed use densities;
  - Updated trip production cross-classification models;
  - Re-estimated destination choice model, replacing the previous gravity models for all purposes except home-based college and school trips;
  - Re-calibrated nested mode choice model;
  - All cost variables updated to 2011 dollars; and
  - Updated the Heavy-Duty Truck Model.
- **Major Data Development and Acquisitions Include:**
  - 2012 CHTS and SCAG Travel Surveys;
  - Highway Network updated to 2012 base year conditions;

FIGURE 11 Overview of SCAG's Growth Forecasting Methodology



Source: SCAG

- Transit Network developed using the 2012 LA Metro's TripMaster database;
- Transit Level of Service Data obtained from the region's transit agencies;
- Working with other MPOs, updated auto operating costs;
- Year 2012 Screenline Count Database created, contains 640 traffic counts on the arterials and 33 video traffic counts on freeways;
- HPMS data from Caltrans for estimating regional and sub-air basin VMT;
- HERE / Google data for real-time network speed verification; and
- Airsage Data for alternative source of regional travel patterns.

HOUSEHOLD CLASSIFICATION AND POPULATION SYNTHESIZER

This module classifies zonal households into several household segments. Prior to the application of Auto Ownership module, households are classified across the following four attributes:

1. Household Size (4 categories): the number of one-person households, two-person households, three-person households, and four or more person households.
2. Number of Workers (4 categories): the number of households with no worker, with one worker, with two workers, and with three workers or more.
3. Household Income (4 categories): the number of households with annual household income (in 2011 dollars) less than $35K (Low), $35K-$75K (Medium), $75K-$150K (High), and $150K or more (Very High).
4. Type of Dwelling Unit (2 categories): single-family detached, and multifamily/ attached and group quarters.

For Home-Based-Work (HBW) trip generation, households are aggregated across the dwelling unit type and size attributes, and then further disaggregated into four Age of Head of Household groups (18 to 24 years old, 25 to 44 years old, 45 to 64 years old, and 65 years old or older).

The Population Synthesizer (PopSyn) is a module that generates a synthetic population by expanding the existing disaggregate sample data (from Census PUMS data) to mirror known aggregate distributions of household and person attributes (from SCAG zonal data). The control variables used in the population synthesizer are the above-mentioned four household variables. A synthetic population is generated for the entire SCAG region using this procedure.

AUTO OWNERSHIP MODEL

The auto ownership model predicts the number of households by auto ownership level (0, 1, 2, 3, 4 or more available vehicles) for each zone. This information is used in trip generation models to estimate zonal person trips. The auto availability model uses indicators for household size, household income, number of workers, residential and employment density, and transit and non-motorized accessibilities. The models were estimated in multinomial logit form. This is the very first model applied in the model chain.

TRIP GENERATION MODEL

Trip generation is the process of estimating daily person trips generated (i.e., trip production) and attracted to (i.e., trip attraction) by each TAZ on an average weekday. The trip generation model contains nine trip purposes: home-based work (HBW), home-based school (HBSC), home-based college/university (HBCU), home-based shopping (HBS), home-based social-recreational (HBSR), home-based serving-passenger (HBSP), home-based other (HBO), work-based other (WBO) and other-based other (OBO) trips. HBW trips are further split into eight types based on two trip categories ("Direct" versus "Strategic") and four income categories (less than $20,000, $20,000 to $49,999, $50,000 to $99,999, and $100,000 or more). "Direct" home-work trips go directly between home and work. "Strategic" home-work trips include one or more intermediate stops between home and work. In total, there are 16 trip types: eight types for home-based work, and one type for each of the other eight trip purposes.

TRIP DISTRIBUTION MODEL

The SCAG model includes two types of trip distribution models that estimate the number of trips from each TAZ to other TAZs. Destination choice models are developed for HBW, HBS, HBSR, HBSP, HBO, WBO and OBO trip purposes while a gravity model approach is used to distribute trips for school related purposes (HBSC and HBCU trip purposes). For each of the nine trip purposes, the productions and attractions are split into both peak and off-peak periods. The destination choice models are stratified by the car sufficiency/ income market segments and estimated in multinomial logit form. The following variables were examined and proved to be significant in the utility functions: mode choice logsum, distance between production and attraction zones, intra-zonal indicator and the mix of employment and households.

MODE CHOICE MODEL

Mode choice is the process of taking the zone-to-zone person trips by trip purpose from the trip distribution model, and determining how many of these trips are made by various travel modes. The SCAG mode choice model is a nested logit model. The top branch of the nesting structure includes Auto, Transit and Non-Motorized. The branch under Auto includes Drive Alone and Shared Ride which is further split into two-person carpool, three-person carpool, and four-or-more person carpool. The branch under Transit includes Local Bus, Rapid Bus, Express Bus, Bus Rapid Transit (BRT), Transit Way, Urban Rail, Commuter Rail and High-Speed Rail (HSR). The branch under Non-Motorized includes Walk and Bicycle. Separate mode choice models are estimated for each trip purpose and time period. Mode choice is a function of level of service attributes (in-vehicle travel time, out-of-vehicle travel time, fares, parking fees, roadway tolls and auto operating costs); household attributes such as income; and zonal attributes such as residential and employment densities.

NETWORK ASSIGNMENT MODEL

Prior to assignment, the mode choice output is converted from peak/off-peak production-attraction (PA) format to time-of-day OD format. The time-of-day procedure, employed for the 2016 RTP/SCS development, is based on trips-in-motion diurnal factors. Network assignment is the process of loading vehicle trips onto the appropriate networks. For highway assignment, the Regional Model consists of series of multi-class simultaneous equilibrium assignments for seven classes of vehicles (drive alone, two-person carpool, three-person carpool, four or more-person carpool, light HDT, medium HDT and heavy HDT) and for each of the five time periods. During this assignment process, trucks are converted to Passenger Car Equivalent (PCE) for each link and each truck type based on: 1) percentage of trucks, 2) percentage of grade, 3) length of the link, and 4) level of congestion (v/c ratios). Transit vehicles are also included in the highway assignment. For transit trip assignment, the final transit trips from the last loop mode choice models are aggregated by access mode and time period, and then assigned to transit networks for each time period. The vehicle trip tables obtained from mode choice, Airport and Heavy-Duty Truck models are aggregated to the 4,109 zone system (Tier-1 zones) prior to network assignment.

MODEL CONVERGENCE

In order to maintain consistency between the speeds predicted by the highway assignment and the travel times input to the entire travel demand model chain, the predicted speeds are used to re-compute highway and transit travel times, and the entire model sequence is repeated until input and output speeds are consistent with each other.

HEAVY-DUTY TRUCK MODEL

The Heavy-Duty Truck (HDT) Model produces forecasted trips for each of three HDT weight classes with gross vehicle weight (GVW) ranging from 8,500 to 14,000 lbs. for light-heavy

HDT, 14,001 to 33,000 lbs. for medium-heavy HDT, and more than 33,000 lbs. for heavy-heavy HDT. Below is an overview of the various HDT Model components:

- Internal HDT Model: This includes the development of all HDT trips that have both an origin and destination within the six-county modeling area. This component of the HDT Model estimates trip tables for intra-regional truck trips. Trip generation is based on trip rates (number of trips per employee or household) for 10 different land uses/industry sectors at the trip ends. The trip distribution process is based on a matrix of factors that indicate the trip interchange relationships among different land use types (i.e., what fraction of trips originating at a land use such as manufacturing sites go to warehouses vs. other manufacturing sites, etc.).
- External HDT Model: This includes how the external HDT trips are captured in the HDT model that come into, go out of, and pass through the region. This component estimates the trip table for all interregional truck trips based on commodity flow patterns that link Southern California with the rest of the nation. The model uses a commodity flow database obtained from outside sources and procedures for converting annual tonnage flows at the county level to daily truck trips at the TAZ level. Seaport and airport related truck trips were included as special generator truck trips.
- Port Related Truck Trips: The Port of Long Beach (POLB) and Port of Los Angeles (POLA) have developed detailed models to forecast port related truck trips. SCAG obtains outputs (trip tables) from the Port Model which predict the HDT trips coming out of and going into the San Pedro ports, which includes the POLB and POLA.
- Intermodal Trip Tables: This includes the intermodal trip tables which are integrated into the HDT Model.
- Time-of-Day Choice: This includes the derivation of time-of-day factors from various sources. The daily truck trips by truck types are allocated to five time periods and merged with the auto trips in trip assignment step.

EMFAC MODEL

The ARB's EMFAC2014 (short for "EMission FACtor", approved by the U.S. EPA in Fall 2015) Model is a computer model capable of estimating both current year, as well as back-cast and forecasted emission inventories for calendar years of 2000 to 2050. EMFAC estimates the emission rates of 1965 and newer vehicles, powered by gasoline, diesel or electricity. Emissions inventory estimates are made for over two hundred and 77 different technology groups and are reported for 51 broad vehicle classes segregated by usage and weight.

EMFAC calculates the emission rates of HC, CO, NOx, PM, lead, SO2 and CO2 for 45 model years for each vehicle class within each calendar year, for twenty-four hourly periods, for each month of the year, for each district, air basin, county and subcounty in California. EMFAC2014 can report the grams per mile emission rates of a single technology group or the ton per day inventory for the entire 37,000,000 vehicle California fleet.

To determine regional and air basin emissions, SCAG runs the ARB's EMFAC Model using the outputs from the trip-based regional transportation demand model including the HDT Model.

NOTES

[1] High Quality Transit Area: Generally a walkable transit village or corridor, consistent with the adopted RTP/SCS and is within one half-mile of a well-serviced transit stop or a transit corridor with 15-minute or less service frequency during peak commute hours. The definition that SCAG has been using for the HQTA is based on the language in SB375 which defines:

[2] Major Transit Stop: A site containing an existing rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods (CA Public Resource Code Section 21064.3). Major Transit Stop A site containing an existing rail transit station, a ferry terminal served

[3] Transit Priority Area: An area within a ½-mile of high quality transit; a rail stop or a bus corridor that provides or will provide at least 15-minute frequency service during peak hours.

[4] Land Development Categories:
Urban Infill: Well-connected street networks and the mix and intensity of uses, often found within and directly adjacent to moderate and high density urban centers.
Compact Walkable: Less density than Urban Infill, but highly walkable with rich mix of uses.
Standard Suburban: Represents the majority of separate-use auto-oriented development and low walkability.

REFERENCE DOCUMENTS

As mentioned in this Appendix, below are reference documents on the analytical modules utilized as a part of the Urban Footprint Scenario Planning Model. These serve as documentation on the model, details on the assumptions and calculations the analytical modules utilize, and a summary of the "Place Types" Urban Footprint utilizes for analysis purposes.

1
URBAN FOOTPRINT - TECHNICAL SUMMARY

http://scagrtpscs.net/documents/2016/supplemental/UrbanFootprint_TechnicalSummary.pdf

2
URBAN FOOTPRINT - BUILDING ENERGY

http://scagrtpscs.net/documents/2016/supplemental/UrbanFootprint_BuildingEnergy.pdf

3
URBAN FOOTPRINT - TRANSPORTATION IMPACTS

http://scagrtpscs.net/documents/2016/supplemental/UrbanFootprint_TransportationImpacts.pdf

4
URBAN FOOTPRINT - TRANSPORTATION MODEL

http://scagrtpscs.net/documents/2016/supplemental/UrbanFootprint_TransportationModel.pdf

5
URBAN FOOTPRINT - WATER ANALYSIS

http://scagrtpscs.net/documents/2016/supplemental/UrbanFootprint_WaterAnalysis.pdf

6
URBAN FOOTPRINT - PLACE TYPES SUMMARY

http://scagrtpscs.net/documents/2016/supplemental/UrbanFootprint_PlaceTypesSummary.pdf

7
SCAG URBAN FOOTPRINT SCENARIO PLANNING MODEL (SPM) DATA REVIEW AND EDITING MANUAL

http://scagrtpscs.net/documents/2016/supplemental/SCAGUrbanFootprint_SPMmanual.pdf

8
CALIFORNIA HEALTH IMPACT ASSESSMENT SOFTWARE TOOL: METHODS, DATA & URBAN FOOTPRINT APPLICATION

http://scagrtpscs.net/documents/2016/supplemental/CaliforniaHealthImpactAssessmentTool.pdf

9
PLACE TYPES CATEGORIZED INTO LAND DEVELOPMENT CATEGORIES (LDCS)

http://www.scagrtpscs.net/Documents/2016/supplemental/LDC_PlaceType.pdf

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Orange County
OCTA Building
600 South Main Street, Suite 1233
Orange, CA 92868
Phone: (714) 542-3687
Fax: (714) 560-5089

Riverside County
3403 10th Street, Suite 805
Riverside, CA 92501
Phone: (951) 784-1513
Fax: (951) 784-3925

San Bernardino County
Santa Fe Depot
1170 West 3rd Street, Suite 140
San Bernardino, CA 92410
Phone: (909) 806-3556
Fax: (909) 806-3572

Ventura County
950 County Square Drive, Suite 101
Ventura, CA 93003
Phone: (805) 642-2800
Fax: (805) 642-2260

2016 2040 RTPSCS

APPENDIX

SUSTAINABILITY | SCS BACKGROUND DOCUMENTATION

ADOPTED | APRIL 2016

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